

rotork[®]
Fluid Systems

Advanced VRCS Range

Valve Remote Control Systems for Marine Applications



masso

Keeping the World Flowing

rotork®

Keeping the World Flowing



**RELIABILITY
IN FLOW CONTROL
CRITICAL
APPLICATIONS**



RELIABLE OPERATION WHEN IT MATTERS

Assured reliability for critical applications and environments. Whether used 24/7 or very infrequently, Rotork products will operate reliably and efficiently when called upon.

QUALITY-DRIVEN GLOBAL MANUFACTURING

Rotork products are designed with 60 years of industry and application knowledge.

Research and development across all our facilities ensures cutting edge products are available for every application.

CUSTOMER-FOCUSED SERVICE WORLDWIDE SUPPORT

Rotork focus on solving customer challenges and developing new solutions, from initial enquiry through to product installation, long-term after-sales care and client support programmes.

LOW COST OF OWNERSHIP

Long-term reliability prolongs service life, reducing long term cost of ownership and providing greater efficiency to process and plant.

Advanced VRCS Range

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COMPREHENSIVE PRODUCT RANGE SERVING MULTIPLE INDUSTRIES

Rotork products and services are used in the Power, Oil & Gas, Water & Waste Water, HVAC, Marine, Mining, Food & Beverage, Pharmaceutical and Chemical industries around the world to improve efficiency, assure safety and protect the environment.

MARKET LEADER TECHNICAL INNOVATOR

The recognised market leader for sixty years. Our customers have relied upon Rotork for innovative solutions to safely manage the flow of liquids, gases and powders.

GLOBAL PRESENCE LOCAL SERVICE

Global company with local support. Manufacturing sites, offices and *Centres of Excellence* throughout the world provide unrivalled customer services and fast delivery.

CORPORATE SOCIAL RESPONSIBILITY

Rotork believes that being a responsible business leads to being the best business. We are socially, ethically, environmentally responsible and committed to embedding CSR across all our processes and ways of working.

Introduction

More than 80 years of experience in specialist design, fabrication and installation of actuators and Valve Remote Control Systems

The Valve Remote Control System (VRCS) is considered by the "International Convention for the Safety of the Life at Sea" (SOLAS) to be critical for the safety of passengers, crew and transported cargo on any type of ship, whether on commercial ships, cruise vessels, chemical carriers, LNG, LPG, and even FPSOs.

Since the company was founded, Rotork has become the standard for excellence in the field of valve and damper automation for all industries around the world.

Rotork's leading solution for the marine and offshore industries is the Masso range of Valve Remote Control Systems. With more than 80 years of experience in specialist design, fabrication and installation of actuators and VRCS, the Masso range provides safety critical solutions.

Our involvement goes further than just providing the actuators; we provide solutions. Well equipped Rotork trained engineers, technicians and representatives provide worldwide on-site and factory based service. In addition, specialist Rotork Site Services teams offer preventive maintenance, retrofit and client support services.

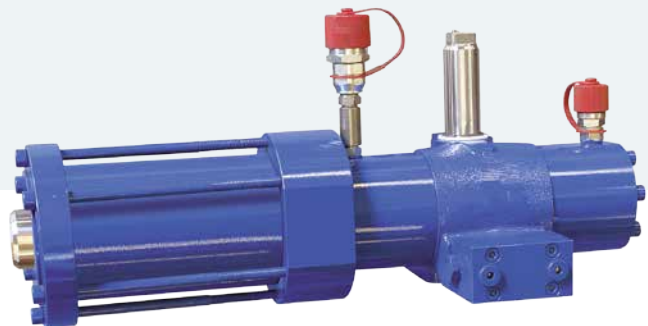
Industry Compliance

- IACS UR E10
- IEC 60092-504
- IEC 60945 Ed.4

Frigates
Corvettes
Aircraft Carriers
Submarines
FPSOs
FLNG

Semi-Submersible Platforms
Offshore Support Vessels

Cargo Ships
Oil and Chemical Tankers
LNG Carriers
Cruise Vessels
Ferries
Mega Yachts

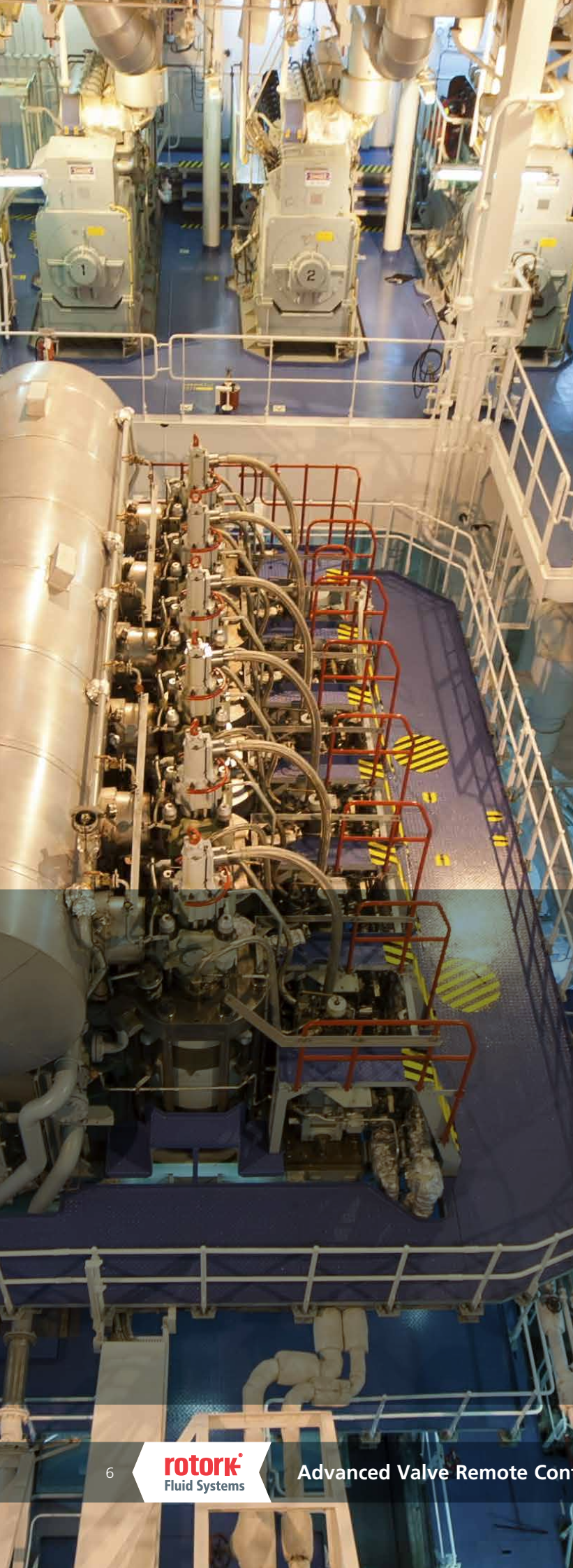




masso ind
ideas novelties design
S.p.A.

masso





"... Large passenger ships should be designed for improved survivability based on the time-honoured principle that 'a ship is its own best lifeboat'".

IMO: 60 years in the service of shipping

Advanced Valve Remote Control System

Through continuous development of rules and regulations by the IMO (International Maritime Organization), there is an increase in requirements from classification societies to add redundancy to essential systems. This is the case of the 'Safe Return to Port' rules, particularly applicable to passenger vessels, but also for ships classified for Dynamic Positioning Class 2 and 3.

In the case of Safe Return to Port for example, a passenger ship shall be designed so that the essential systems remain operational after a fire which does not exceed the casualty threshold or a flooding of any single watertight compartment allowing the ship to proceed to a safe port under its own power.

The Valve Remote control system is one of these essential systems, as it is used in the control of the Bilge and Ballast systems, Fuel Oil, Fire Main, and Fire extinguishing systems, amongst many others in the ship.

Masso Ind. through its Advanced Remote Control System exceeds these requirements, providing the maximum redundancy, while offering high cost savings. In fact, our Advanced VRC can achieve a 50% reduction in cabling compared to STAR systems, while providing a higher redundancy to the system.

It was said in the document **IMO: 60 years in the service of shipping**, that "... large passenger ships should be designed for improved survivability based on the time-honored principle that 'a ship is its own best lifeboat'". Masso Ind is committed to this principle, providing reliable and safety-critical systems that through continuous monitoring, provide peace of mind to the ship operators.



Advanced Valve Remote Control System

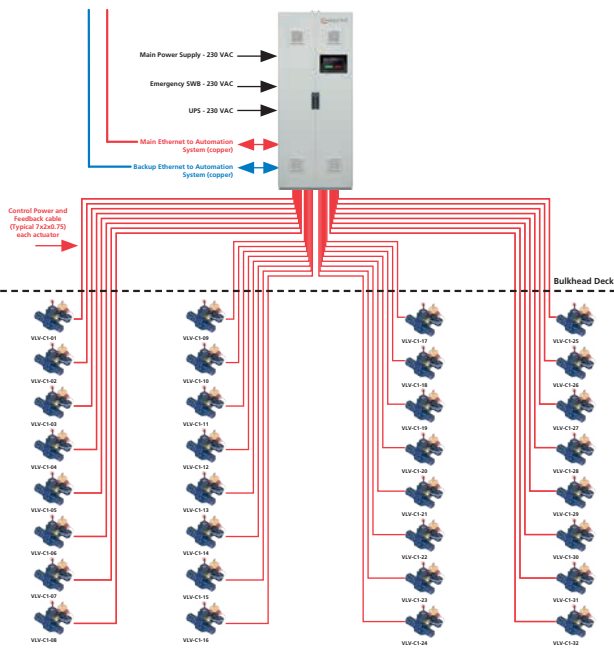
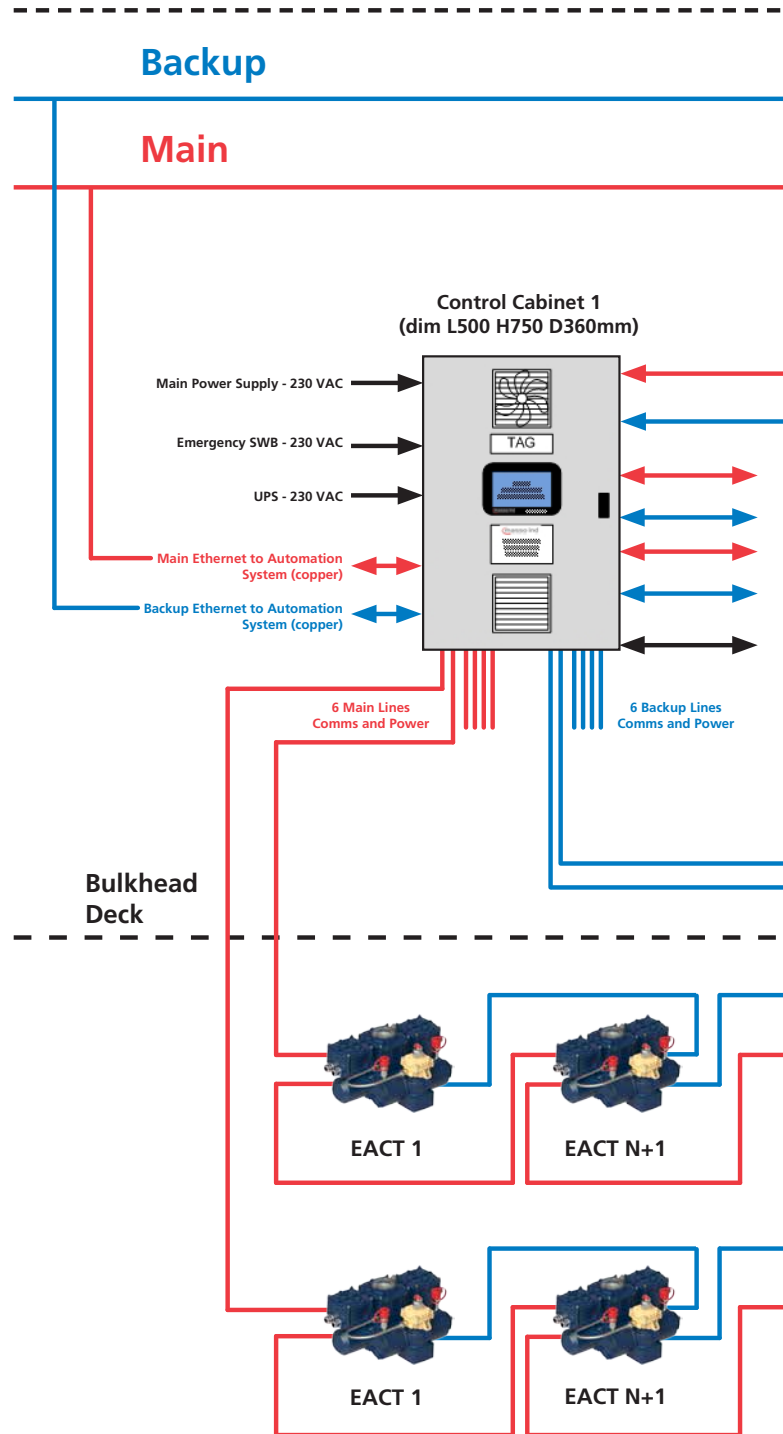
The Rotork Advanced Valve Remote Control System starts with the self-contained micro power pack E-ACT-C type (electro-hydraulic actuator with integral electronic control unit), and goes up to the "I/O Control Cabinet" which contains main and backup communication cards, power distribution, serial interface and a touch-screen panel for local control.

The system has been designed with full redundancy in mind – considering both power and communications. If one of the two lines of each group is cut, the other one will remain connected and operative. If an E-ACT-C micro power pack is damaged or totally lost, the others will be still connected and operational.

Main features and benefits of the Rotork Advanced VRCS include:

- Removal of hydraulic tubing
- Less bulkhead penetrations
- Replacement of HPP and HSVC for smaller control cabinets
- Lower overall system cost
- Reduction of installation and maintenance costs
- Full diagnostic capabilities
- Low maintenance costs
- Full system redundancy

On request, turnkey installation may be supplied.

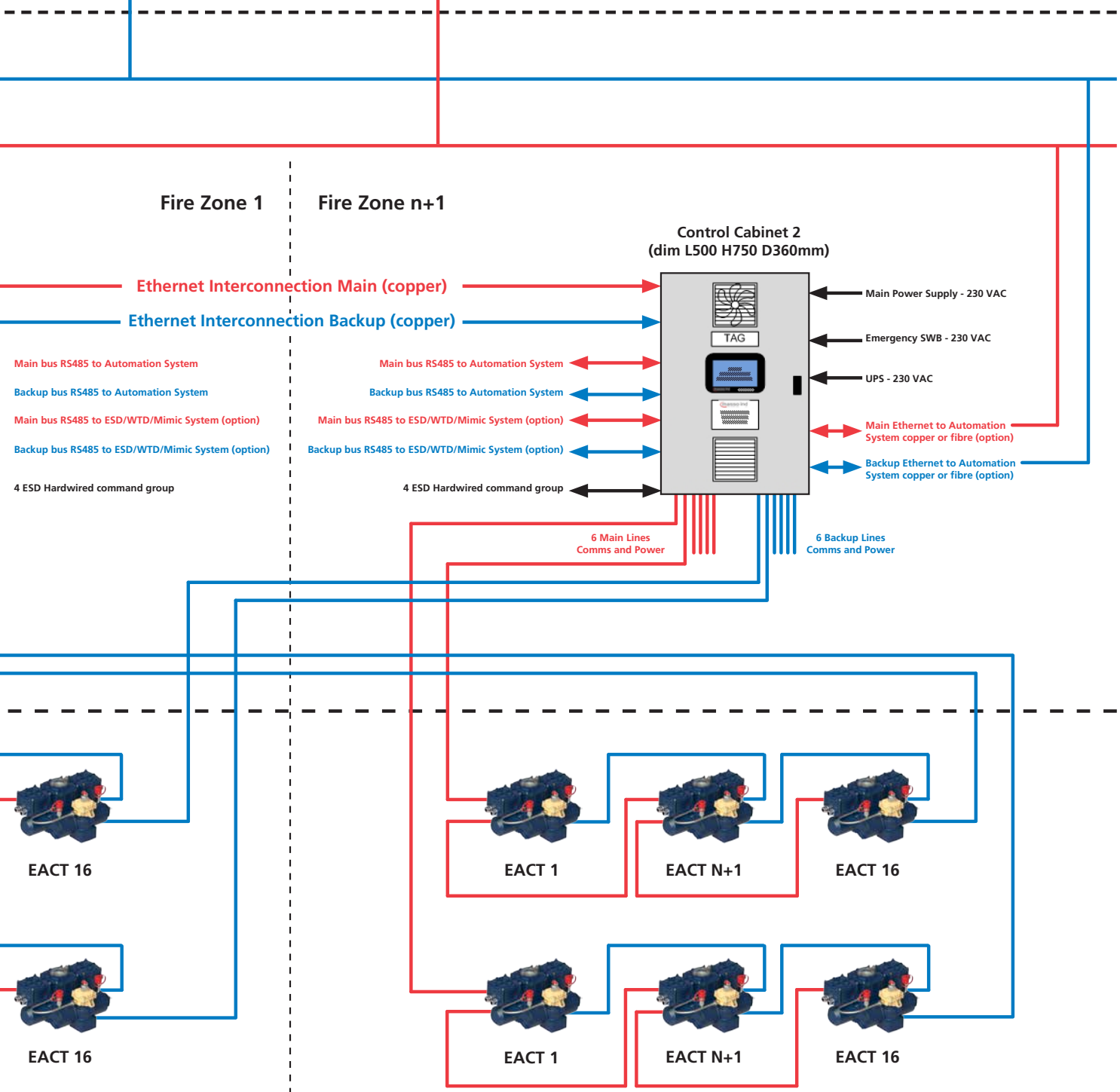


Standard STAR Valve Remote Control System configuration

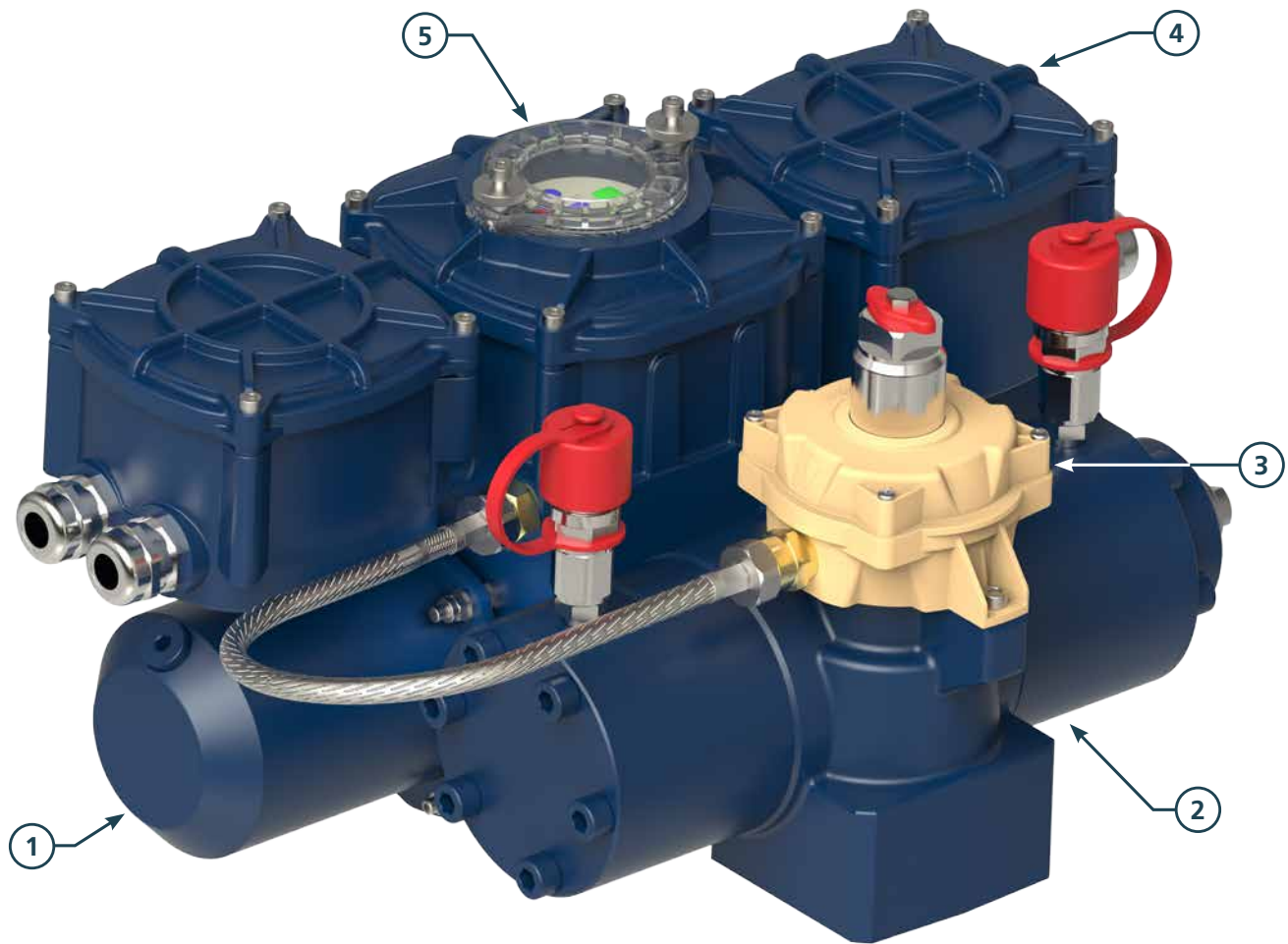


IAS*

* Customer Supply



EACT-C Electro-Hydraulic Actuator



1 Self Contained micro Power Unit

The micro power unit consists of a central hydraulic manifold, an oil tank and Electric motor casing. The tank can be rotated to allow for easy oil re-filling at any valve position.

2 Hydraulic Actuator – Quarter-Turn or Linear, Single or Double-acting

Our micro power unit can be interfaced with our hydraulic actuators, both in quarter-turn or linear applications. Double acting or spring-return versions are available. All actuators come with quick couplings for emergency hand-pump operations.

3 FBKS – IP68 Hall Effect Sensors

Our FBKS Feedback sensors are based on hall-effect sensor technology, resin-bonded and located inside a polymer box. Without the mechanical contact of typical switches, our feedback unit is protected from damage caused by dirt and corrosive elements during the installation process.

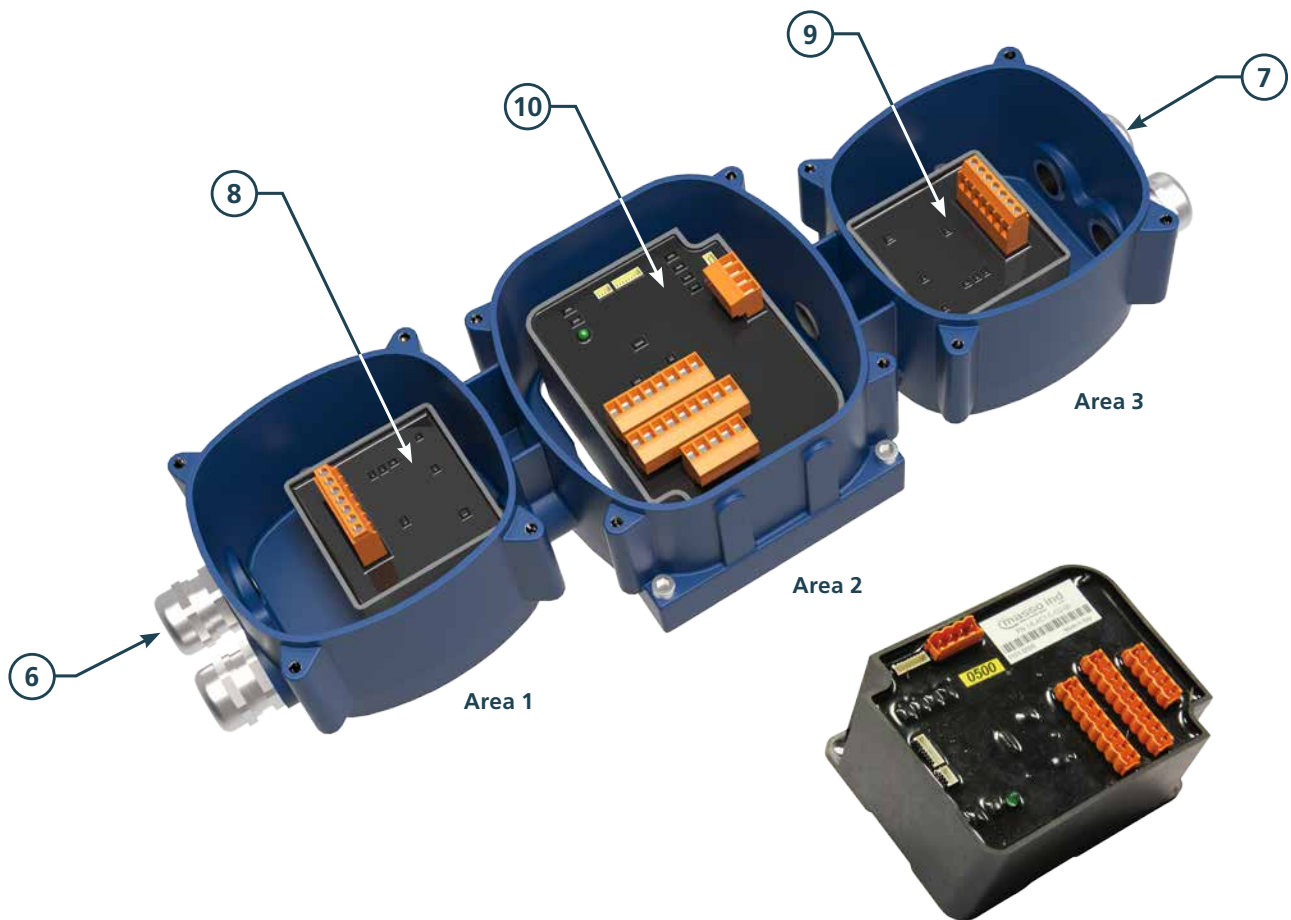
4 Junction Box IP68 and fire tested 700C 30min

The Junction Box consists of 3 segregated compartments housing the actuator control unit, and the main and back-up terminal boards. This protects the entire system, in case of flooding or fire in the area. The junction box has been tested for IP68 30m/72hr, and fire tested at 700C for 30 min.

5 Local Keyboard

The local Keyboard allows the user to take control at the valve and perform the maneuvers of opening and closing. When in local mode, the keyboard takes priority over the automation system or VRCS cabinets.





6 Main Power and Bus Entry/Outlet Cables

The E-ACT-C actuators are interfaced with the control cabinets via two cables which handle both power supply and communication bus. The Main compartment is completely independent from the Back-up side so that a failure of its bus or power supply can't have effects on the Back-up side.

7 Back-up Power and Bus Entry/Outlet Cables

The E-ACT-C actuators are interfaced with the control cabinets via two cables which handle both power supply and communication bus. The Back-up compartment is completely independent from the Main side so that a failure of its bus or power supply can't have effects on the Main side.

8 Terminal Board for Main Electrical Connection

The terminal board receives the power supply and communication bus. It protects the motor control unit from potential power supply peaks, or in case of incorrect wiring of the system. The Main compartment is completely independent from the Back-up side so that a failure of its bus or power supply can't have effects on the Back-up side.

9 Terminal Board for Back-up Electrical Connection

The terminal board receives the power supply and communication bus. It protects the motor control unit from potential power supply peaks, or in case of incorrect wiring of the system. The Back-up compartment is completely independent from the Main side so that a failure of its bus or power supply can't have effects on the Main side.

10 Control Unit Terminal Board for Back-up Electrical Connection

The Control Unit monitors and controls the actuator, and communicates its status to the control cabinets. The CU consists of an electronic card contained in a resin-bonded casing in order to protect the card during installation and from vibrations in the field.

Control Cabinets



1. VRCs – Cabinets list and IP addresses



2. VALVE LIST with Feedback and Warnings/Alarms status



3. SERIAL and POWER FEEDING LINES on VALVE



4. CONTROL PRIORITY ACTIVE on VALVE



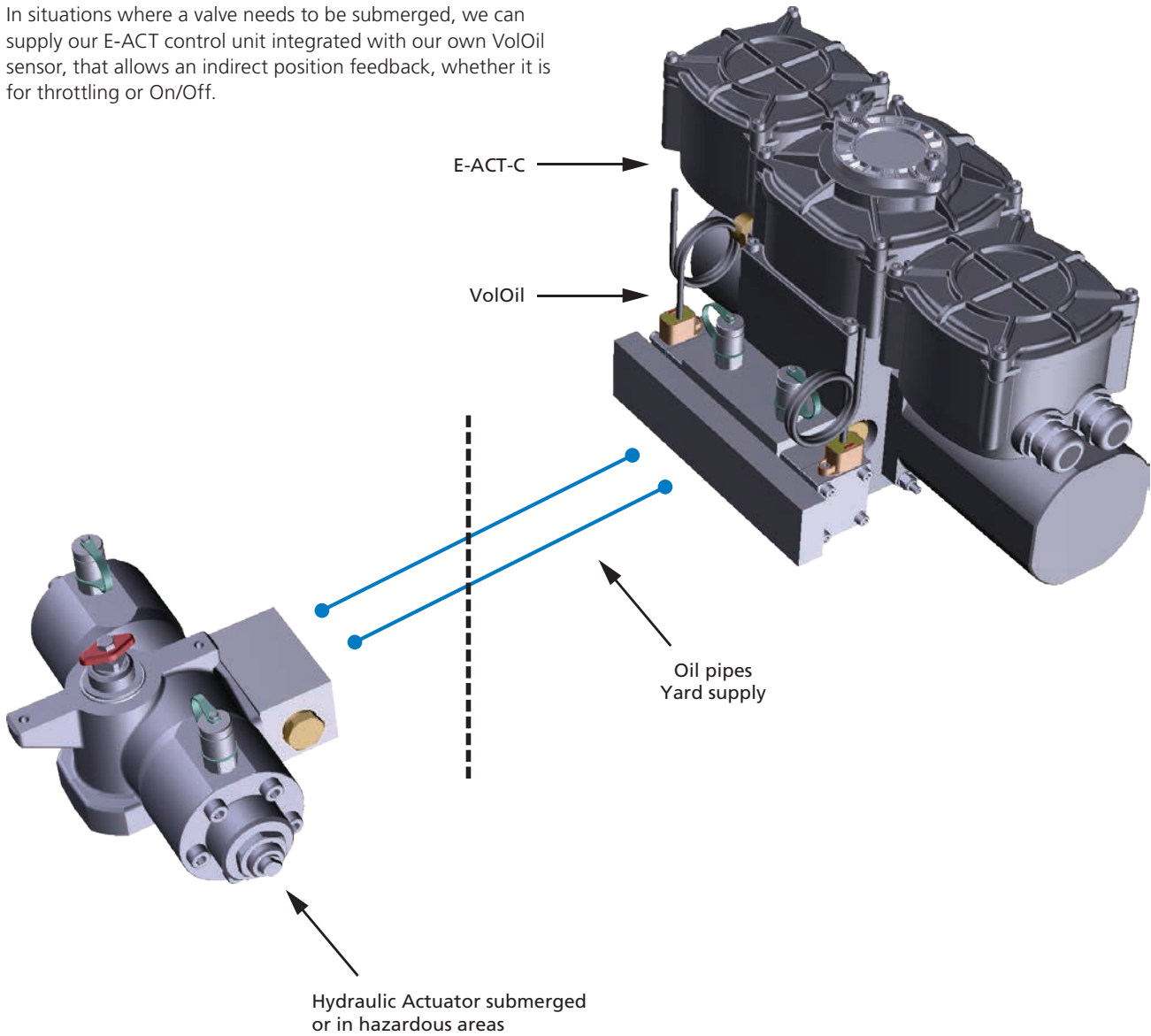
5. ALARMS & WARNINGS ACTIVE on VALVE



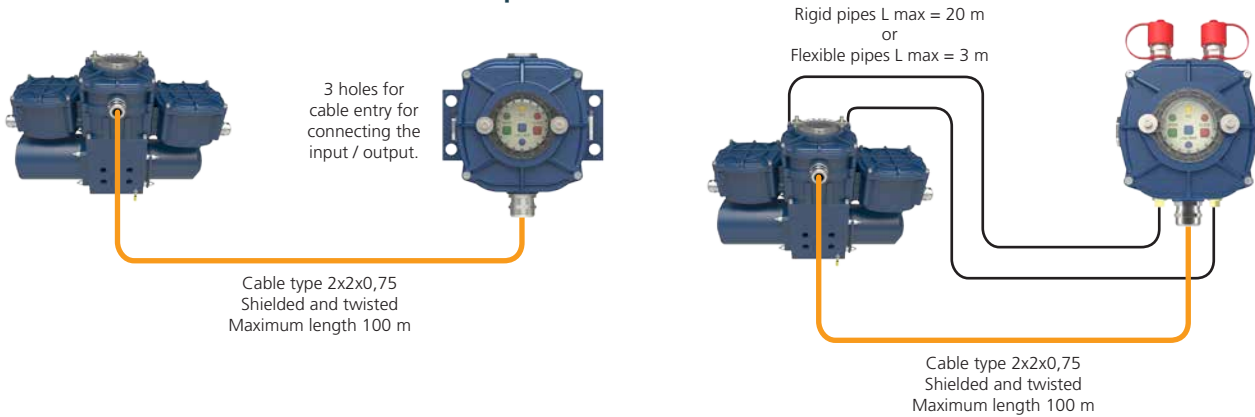
6. COMMAND ACTIVE on VALVE

Submerged Applications

In situations where a valve needs to be submerged, we can supply our E-ACT control unit integrated with our own VoOil sensor, that allows an indirect position feedback, whether it is for throttling or On/Off.



Extended Local Interface for Confined Spaces



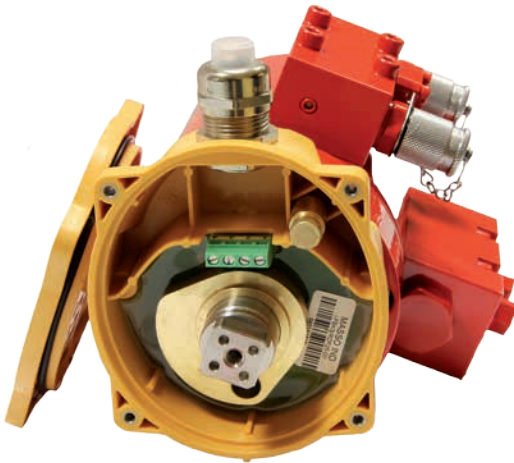
Feedback Units

FBKS

The FBKS is a feedback unit directly mounted on the actuator, and designed to meet the requirements established by the classification societies and deal with the critical situations of the marine field.

The FBKS (Both in its rotary and linear mode) was designed with the marine environment in mind: the unit consists of a printed circuit board containing hall-effect sensors, resin-bonded and located inside a polymer box. A magnetic dimmer is fixed to the valve stem, and has no contact with the feedback unit.

This design allows for a very quick setup during commissioning of the system, and prevents dirt and humidity and corrosive elements to damage the unit during the installation process. Furthermore, an increased life of the feedback unit is guaranteed, resulting in a high reduction in maintenance costs.



Advantages of the FBKS include:

- Available for quarter-turn and linear valves
- No contact or mechanical drag between the valve stem and the feedback unit
- Maintenance free
- Immune to vibrations
- Immune to dirt ingress
- Immune to humidity and salt corrosion
- Easy to use, foolproof calibration
- Polarity reversal and overload-protected
- Output protected with current limiters



Hydraulic Actuators



Our Rack & Pinion Double Acting and Single Acting rotary actuators, are specifically engineered to operate small to medium size butterfly, ball, plug or other quarter-turn valves for either on/off or throttling service.

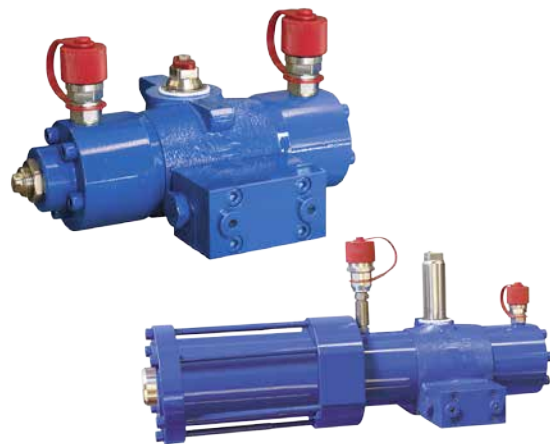
The body is in nodular cast iron, rack in steel, pinion in AISI 316, wide selection of gaskets and slide bearings in Viton, Teflon, BUNA N, NBR. These materials-in conjunction with special cycles of epoxy coating- have been carefully selected to operate in aggressive marine and off-shore environments. They are also suitable for submerged applications in crude oil (sour category / heavy API degree), oil products, salt water, installed inside floating and dry docks galleries, drilling platforms legs and placed in every dry location.

Due to their compact and modular construction based on a central body and two cylinders housing the rack and the pinion, it is possible to carry out maintenance activities (replacement of gaskets and o-rings) directly on the spot, without removing the actuator from the valve.



Quarter-Turn Rack and Pinion Hydraulic Actuators

- Rack & Pinion Hydraulic Actuators Spring-Return (5 sizes) and Double acting (10 sizes)
- Double acting torques up to 4,360 Nm (single rack) and 22,950 Nm (double rack) at 150 bar
- Single acting torques up to 655 Nm (Higher torques available upon request)
- Body in nodular cast iron
- Rack in steel, pinion and shaft in AISI 316
- Possible close regulation from -3° up to $+0^{\circ}$
- 2 quick connectors for portable or local hand pump
- Modular interconnecting brackets according to ISO 5211
- Local position indicator
- Available special execution in AISI 316

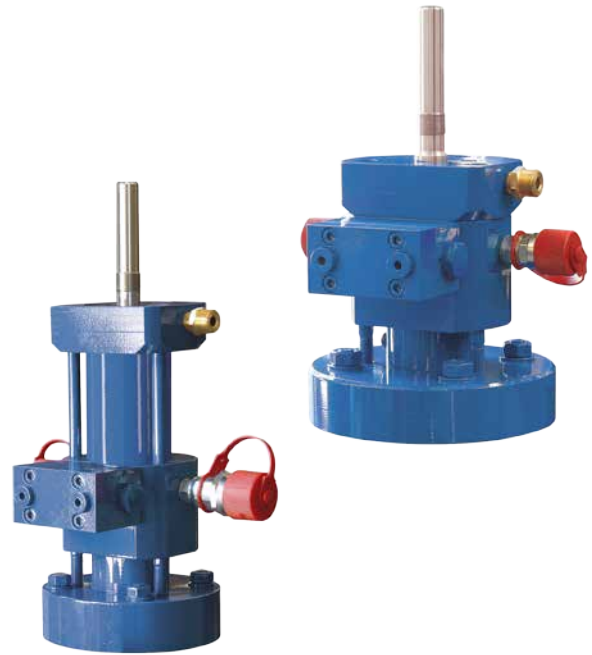


Linear Hydraulic Actuators

Our linear actuators have been specifically designed to be mounted directly on globe valves. This provides a compact and lightweight assembly on board. Typical applications include bilge, ballast and fuel services.

Main features include:

- Heavy duty linear hydraulic actuator
- Design pressure 150 bar
- Single acting thrusts up to 22,650 N
- Double acting thrusts up to 126,300 N
- Body and flanges in nodular cast iron
- Shaft fully in AISI 316
- Extended stem available for feedback unit coupling
- 2 quick connectors for portable or local hand pump
- Easily connected to our self-contained mini power pack



Quarter-Turn Helical Actuators

Featuring a hyper-compact screw type design, our helical actuators have been designed to reduce the actuator weight and space as much as possible. With its center of gravity as close to the mid-point of the valve, these actuators are ideal for naval applications requiring a high tolerance to shocks.

Main features include:

- Hyper compact screw type design
- Design pressure 150 bar
- Double acting execution
- 3 sizes – 240, 460, 850 Nm @150 bar
- Shaft and Pinion in one piece fully in AISI 316
- Possible close regulation from -3° up to $+0^{\circ}$
- 2 quick connectors for portable or local hand pump
- Direct assembling by means of ISO 5211 standard



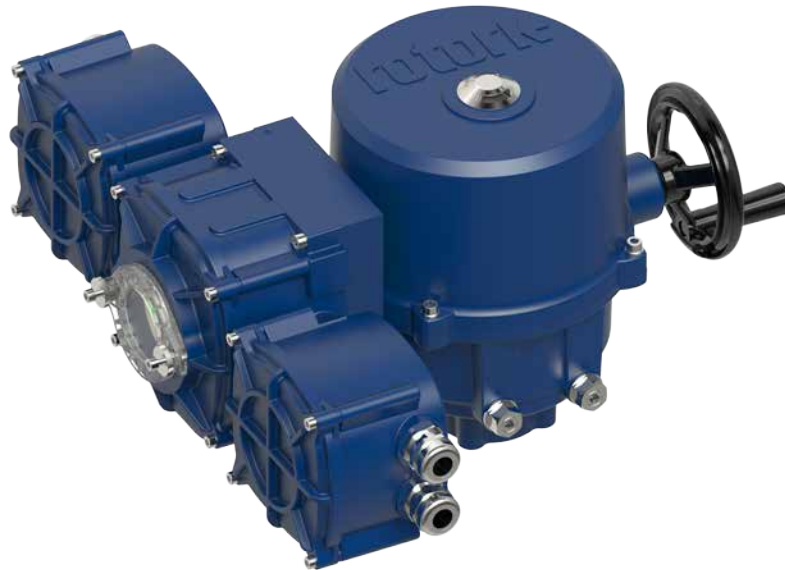
Electric Actuators



Masso Ind have now included into our Advanced VRCS the ability to operate electric actuators. We have a full range of actuators, designed to meet the stringent requirements of the marine industry. They are accurate, robust and efficient, and provide the high levels of durability and reliability that you require.

The ROM actuators provide quiet and reliable operation for all kinds of small butterfly and ball valves, making them an ideal solution on small to medium sized vessels. They provide self-locking as standard, local visual indicators and manual override options together with a wide range of voltages.

In combination with our Electro-Hydraulic actuators, the Advanced Valve Remote Control System provides a lot of flexibility to select the most cost effective solution, while allowing maximum reliability of the system.



Model No.	Torque (Nm)	Speed (sec/90°)		Motor Power (W)	Manual override	Output Drive (mm)	Mounting base designation to ISO5211 imperial
		50 Hz	60 Hz				
ROM-1	35	15	13	5	Hexagonal Drive	14/11/9	F03/F05
ROM-A	50	22	19	5	Hexagonal Drive	17/14	F05/F07
ROM-2	90	17	15	43	Handwheel	22/17	F07
ROM-3	150	28	24	43	Handwheel	22/17	F07
ROM-4	400	20	17	105	Handwheel	36/35	F10
ROM-5	500	26	22	105	Handwheel	36/35	F10
ROM-6	650	33	28	105	Handwheel	36/35	F10



PHP (Portable Hand Pump)

This easy transportable lightweight PHP unit is used for the actuators' emergency operations. It consists of:

- Lever operated hydraulic pump with a 3 litre oil reservoir complete with optical level indicator and filling cap
- Manually operated three position directional valve for the control of open/close operations
- Pressure gauges on both the pressure and return connections
- 2 metre length hoses provided with standard female quick connecting coupling (other lengths available upon request)
- Installed on an open frame structure used both for its transport and for the pumping operations, providing the PHP with necessary support base

LHP (Local Hand Pump)

The LHP (Local Hand Pump) is normally used for the manual operation of valves requested by Classification Societies to be connected with a fixed emergency pump (side valves, overboard discharge for example) and consists of:

- 5 litre oil reservoir (Double acting), or 3 litre oil reservoir (Single acting)
- Removable hand lever
- Directional three position flow control valve for valve open-close-stop (Double acting only)
- Pressure gauges on both the either pressure and return connections
- Installed on an open frame structure
- The LHP may be optionally supplied housed in carbon steel (sand blasted and primer coated) or in a stainless steel deck boxes for installation on the Main Deck or unsheltered areas



Keeping the World Flowing

A dark blue, semi-transparent world map with a white grid of latitude and longitude lines is centered in the background of the lower half of the page.

www.rotork.com

A full listing of our worldwide sales and service network is available on our website.

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