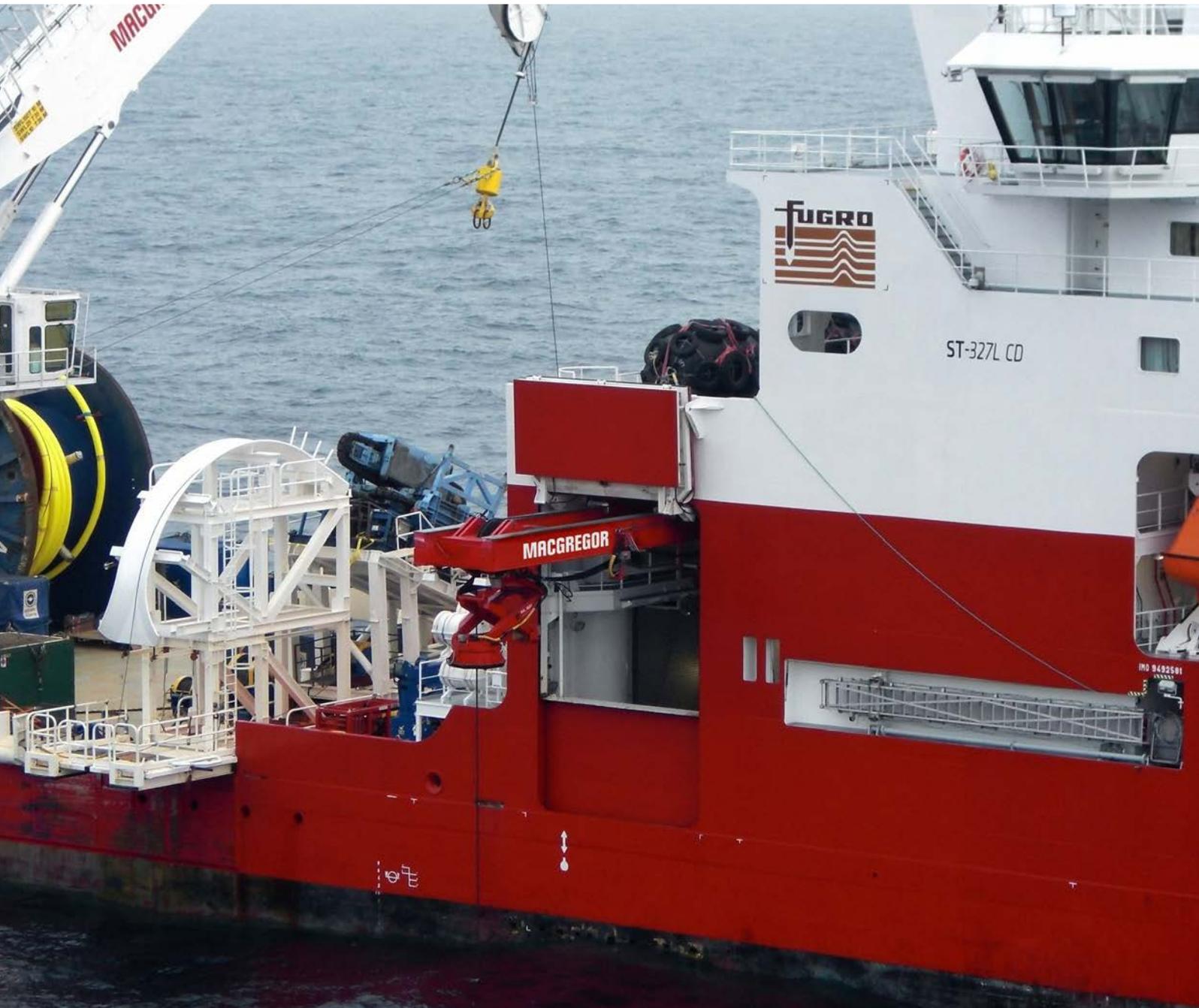


Launch and recovery systems

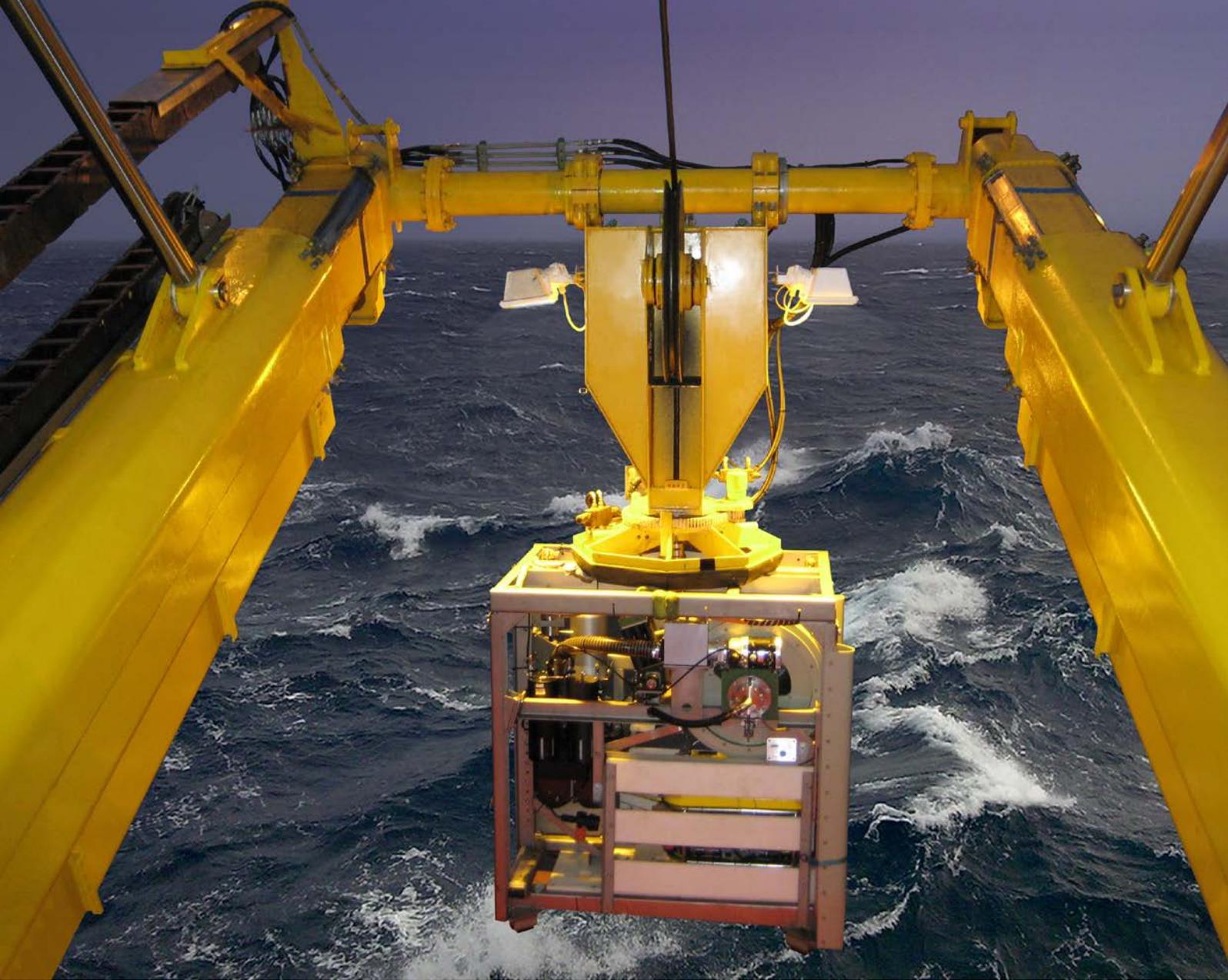


MACGREGOR

Integrated or mobile designs for ROVs, AUVs and other tools

MacGregor offers a full range of Launch and Recovery Systems (LARS) for all types of ROVs in service today. Our LARS portfolio includes overhead and deck-mounted A-frames, moonpool-based and portable containerised designs.

All MacGregor LARS systems are tested and certified in accordance with Standard for Certification of Lifting Appliances No. 2.22 of 2013.



Going to extremes

MacGregor launch and recovery systems are designed to make critical subsea operations safe and effective in the harshest of environments worldwide, expanding the operational weather window for ROVs.

MacGregor LARS systems are exceptionally reliable and precise, and are designed to withstand extreme dynamic forces and are supplied with dynamic factor of 3.

These robust and accurate systems enable safe operation of heavy systems in adverse weather conditions of -20°C to +40°C and sea states up to Hs6 at unlimited depths (exceeding 6,000m).

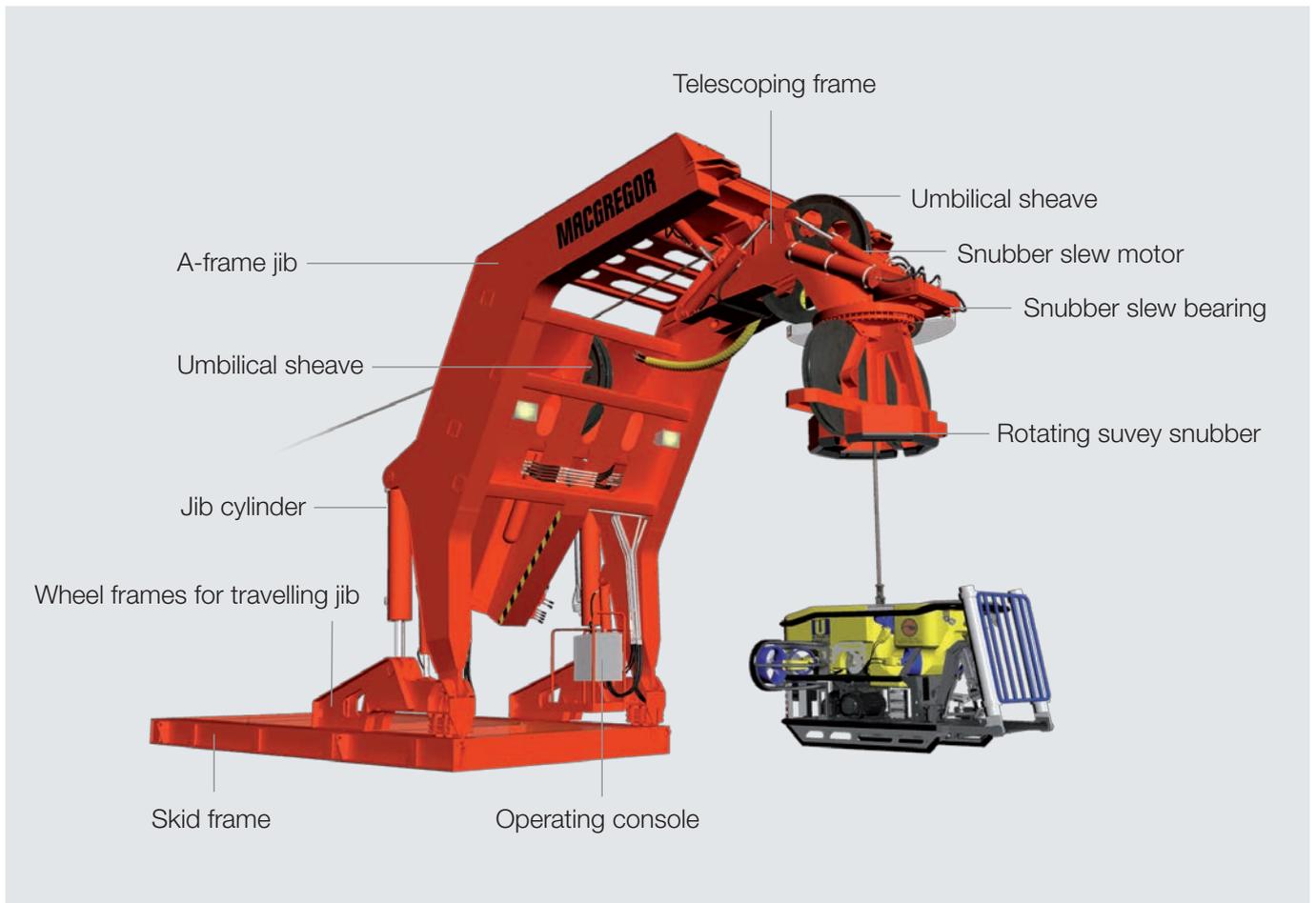
Enhancing operability with integrated sub-systems

MacGregor LARS is delivered as a complete self-contained unit, consisting of an A-frame or cursor, umbilical winch, control system, electric or hydraulic power pack and operating console.

Umbilical winches are equipped with CTS (constant tension system) that ensures tension in the umbilical when operating LARS in/out of the hangar.

The standard MacGregor electrically-driven umbilical winches have active heave compensation system, which ensures substantially better performance than conventional hydraulic winch applications.

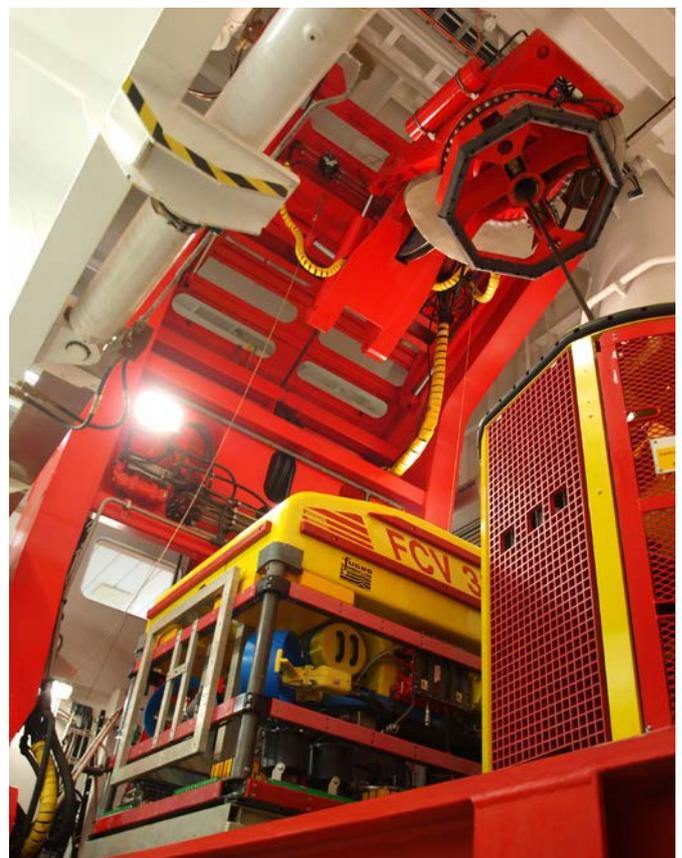
Deck/skid-mounted overside



MacGregor deck/skid-mounted overside LARS is a flexible and compact modular A-frame based system for precise ROV control during launch and recovery.

As an option, the overside LARS may be delivered with an articulated and fully damped snubber, which allows increased security and full rotation of the load while additional snubber sheaves allow for offlead umbilical angles during surveys.

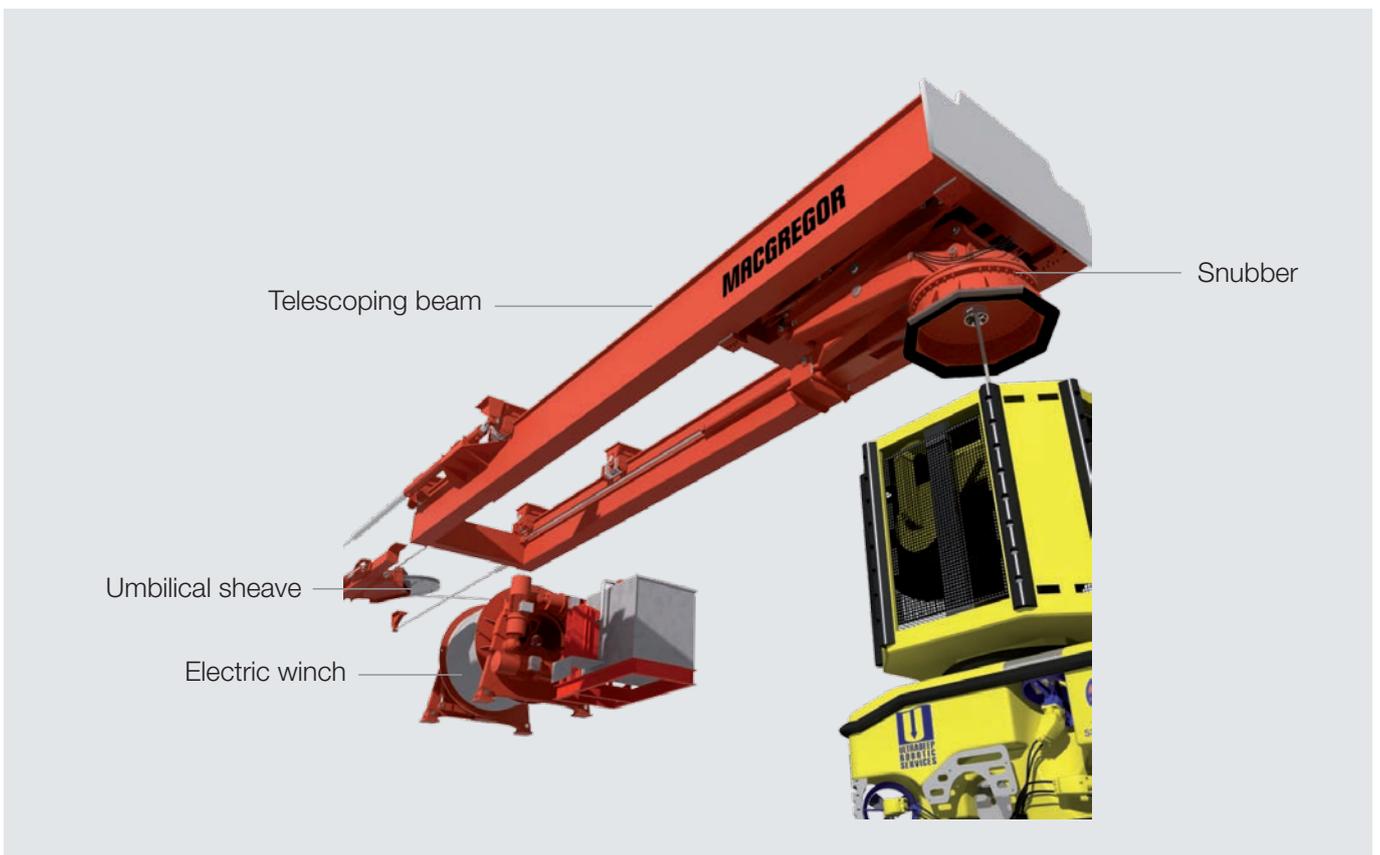
The A-frame can be retracted to free the maintenance area around the ROV when parked.



Overhead-mounted outside

MacGregor overhead-mounted outside LARS utilizes extremely precise, electrically-driven heave compensated umbilical winch for safe launch and recovery of various types of TMS/ROVs. An extendible, telescoping snubber reduces pendulum motions and allows locking and rotating of the load.

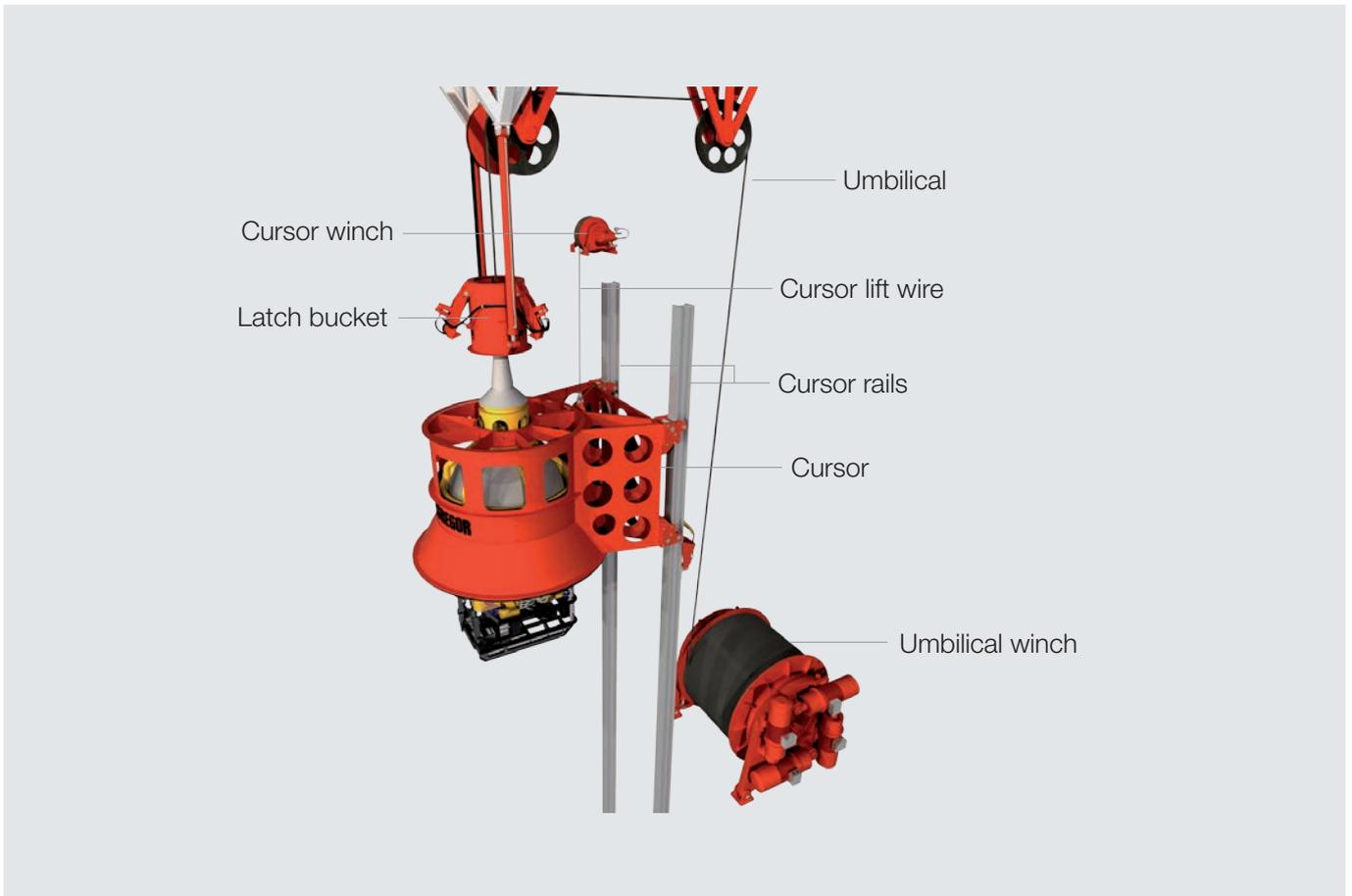
The compact telescoping design and overhead placement of the LARS ensure safety and allow for considerable free work space in the ROV hangar. Crew safety and comfort may be further enhanced by placing the side hangar door tops below the LARS. This allows the hangar doors to be closed even when the ROV is deployed.



Moonpool-based

MacGregor moonpool LARS is designed to accommodate safe handling of large TMS and work ROVs. The vertical LARS system is delivered with a vessel-integrated and rail-mounted guide cursor and highly accurate hydraulic or electric active heave compensated umbilical winch, large screen-based control panel and moonpool door system.

Cursor locks allow secure and convenient parking at heights ideally suited to maintenance or traffic around or under the ROV.



Portable containerised design

MacGregor portable LARS may be designed and delivered for handling of various types of unmanned underwater vehicles and subsea survey equipment such as WROV's, AUV's and seismic nodes. This LARS system is delivered as an integrated unit, consistent of lower base and upper skid-base containers.

MacGregor portable containerized LARS is designed and manufactured in accordance with DNV Rules for certification of lifting appliances 2.22 of 2013 and DNV Offshore Containers 2.7.1.



Main components of the lower base container are:

- Active heave compensated electrically-driven winch
- Lever wind for winch spooling
- Guide sheave for wire transfer to top mounted handling arm
- Cabinets for the frequency controlled drive system
- Control cabinet, including MRU
- Radio remote control panel
- Portable remote control panel (incl.20 m cable)
- 4 twist locks for deck interface

Main components of the upper skid-base container are:

- Skid frame for installation on top of lower base container
- Electro-hydraulic power unit
- Telescopic handling arm with attached snubber system and wire sheaves
- Hose transfer system for hydraulic power transfer to arm



Integrated door systems



MacGregor LARS systems may be delivered as part of integrated package, coupled with access doors with main and remotely-operated controls that operate both the opening/closing of the doors and the moving in/out of the LARS. MacGregor door design is reliable, safe and secure and of well-proven structural integrity, particularly in respect to high sea loads. They retain weather tightness when closed and secured; a combination of operating systems is available using hydraulic cylinders or hydraulic motors.

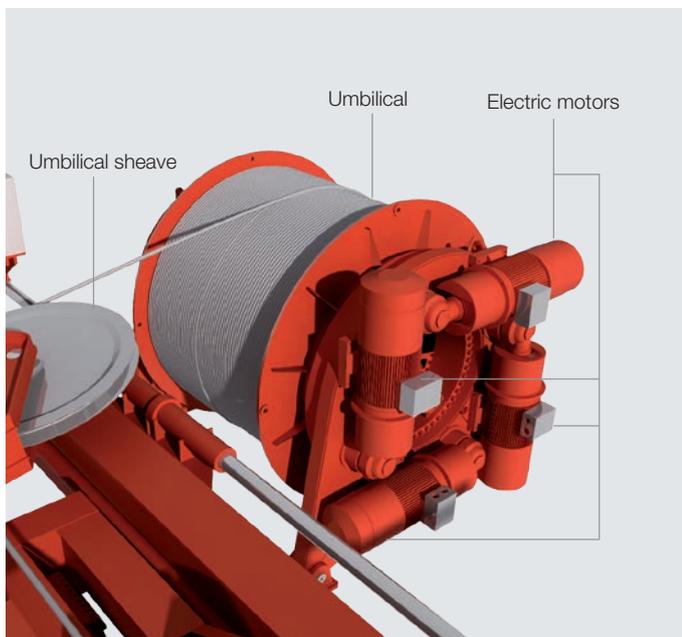
Doors can be partially opened, to provide operator protection, or fully opened depending upon the end users operational requirements. ROV side-hangar doors are specifically designed to function in heavy weather ensuring continuity of ROV operations.

Various design configurations are available, including top or side-hinged or side-sliding, according to the specific requirements of the ship's structural design and nature of the overside work.



Umbilical winches

MacGregor umbilical winches and sheave systems designed for ROVs of all types utilize direct on-winch active heave compensation technology providing extremely precise position and speed control over an increased lifetime.



Winches are supplied as compact, electrically driven units with advanced full radius spooling systems. Sheave systems allow for flexible placement of the winch onboard while maintaining umbilical integrity. Hydraulically-driven winches offer a large amount of power with relatively small components. Heave compensation is achieved by the use of nitrogen accumulators.

Electrically-driven winches offer extremely accurate position and speed control due to the use of frequency inverters.

MacGregor winches are supplied with three motors and are redundant in the event of malfunction of one or even two of the motors. Load recovery would be ensured by the remaining operational motors at a lower speed.

Main technical specifications

Launch and Recovery systems

ROV type	Overside systems (deck/skid-mounted or overhead telescoping)			Moonpool systems		Portable containerised
	Observation	Work	Survey	Observation	Work	ROV / Nodes
SWL	5 t	10-18,5 t	10-18,5 t	5 t	10-18 t	7 t
Snubber control	optional	120° rotation	120° rotation / 80° umbilical fleet angle	120° rotation	120° rotation	120° rotation
Power consumption	≠ 125	300-600	300-600	≠ 125	300-600	≠ 125
Voltage	440v / 690 - 60 Hz	440v / 690 - 60 Hz	440v / 690 - 60 Hz	440v / 690 - 60 Hz	440v / 690 - 60 Hz	440v / 690 - 60 Hz
Dynamic Factor	3	3	3	3	3	3
Weight	8 t	20-30 t	20-30 t	3 t	20-30 t	≈ 20 t
Latched load extension*	Standard	Standard	Standard	Optional	Optional	Standard

Umbilical winches

ROV type	Observation	Work	ROV / Nodes
Drive system	Hydraulic or electric	Hydraulic or electric	Electric
SWL	5 t	10-18,5 t	10-18,5 t
Dynamic factor	3	3	3
Hoisting speed	> 2,4 m/s	> 2,4 m/s	> 2 m/s
AHC performance	+/- 0,1m deviation at max speed	+/- 0,1m deviation at max speed	+/- 0,1m deviation at max speed
Voltage	440v / 690v = 60 Hz	440v / 690v = 60 Hz	440v / 690v = 60 Hz
Power consumption	100 kW	300-600 kW	125 kW
Number of motors	1	4	1
Cable length	> 4000 MSW	< 4000 MSW	> 3000 MSW
Cable DIA, Ø	< Ø30	< Ø47	< Ø19
Weight (not including umbilical)	≈ 10 t	20-30 t	≈ 10 t

Benefit from our expertise

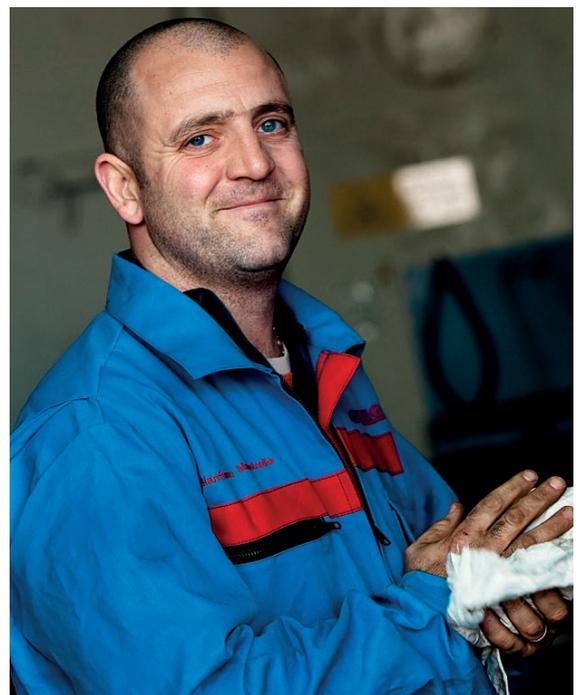
We offer a wide range of optional equipment and provide tailor-made solutions for LARS systems in accordance with client's specifications to accommodate any ROV, AUV and other tools.

Unique advantages

- Robust system design
- Hydraulic or electric drive systems to suit vessel and operational needs
- Designs specially suited to vessel or modular packages (hangar or on-deck operations)
- Active Heave Compensation direct on winch
- Constant tension direct on winch
- Designed with a minimum number of wire sheaves to increase lifetime of the umbilical
- State-of-the-art fully integrated, screen based control systems
- Satellite based online support system
- Automatic synchronization of winch systems for moonpool based LARS
- Local and remote operating locations
- Fail/safe latch locking system

Custom and optional features

- Separate or integrated umbilical winch
- Radio remote control
- Snubber damping
- Umbilical damping
- Skid-based modular design
- Travelling A-frame
- Fully latched lowering to deck for maintenance
- Complete package with hangar doors or hatches





Our references

Deck/skid-mounted overside

- Seven Petrel - 2x12t SWL (WROV)
- Acergy Viking - 1x15t SWL (WROV)
- Edda Fauna - 1x5t SWL (OBS ROV)
- Fugro Saltire - 2x15t SWL (WROW)
- CSS Derwent - 1x15t SWL (WROV)

Overhead-mounted overside

- Fugro Symphony - 2x18,5t SWL (WROV)
- TBA (Pending) - 2x18,5t SWL (WROV)

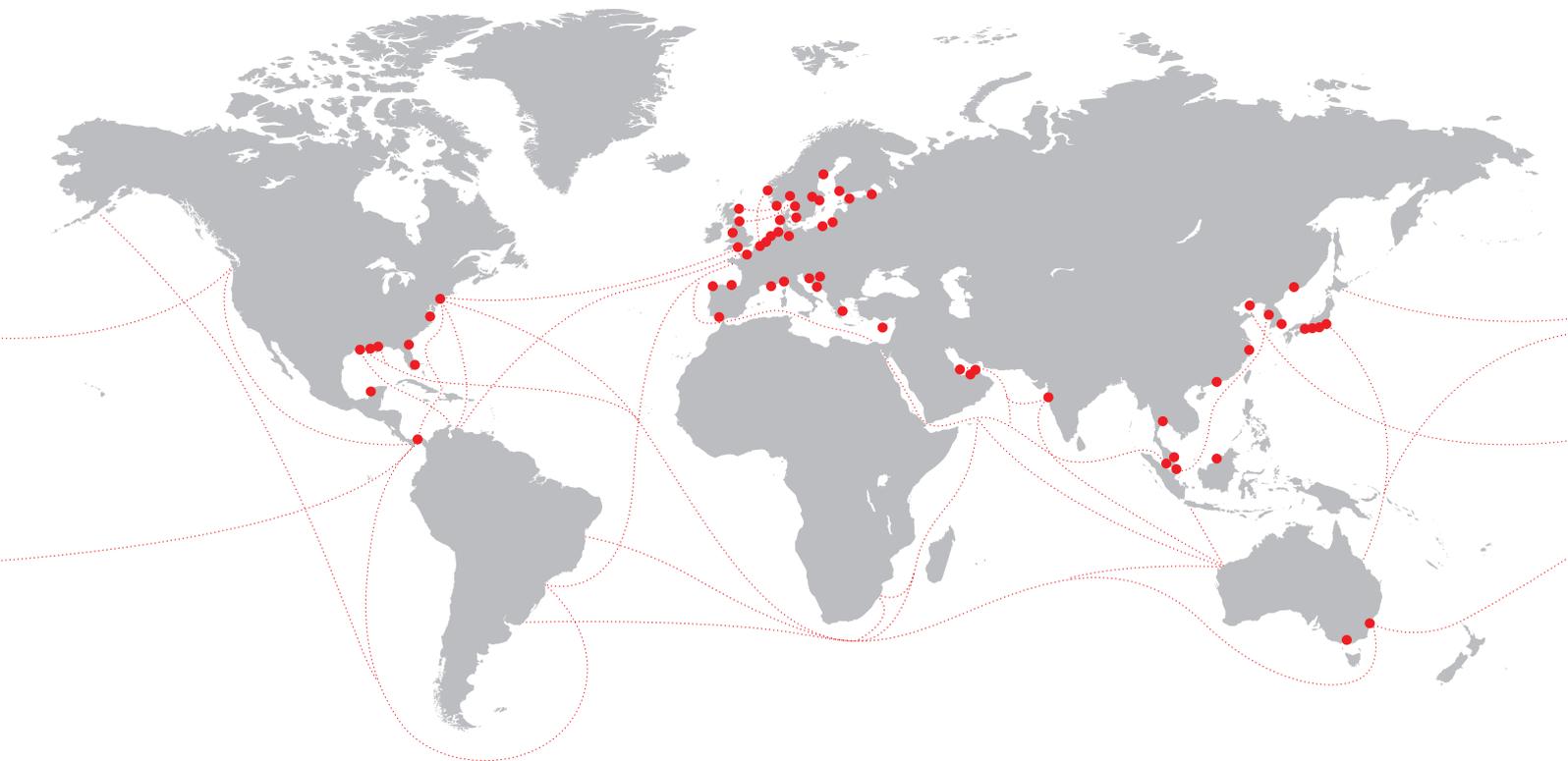
Moonpool-based

- Edda Fauna - 2x15t SWL (WROV)
- CSS Derwent - 1x15t SWL (WROW)
- Edda Freya - 2x18,5t SWL (WROV) *
- TBA - 2x18,5t SWL (WROV) **

* NB no. 373 at Kleven Shipyard for Østensjø

** NB 1063 at Tersan Shipyard for Volstad Shipping

Wherever needed, you can rely on our support.



MacGregor offers world leading engineering solutions and services for handling marine cargoes and offshore loads. The scope of our integrated packages is growing and now also includes Hatlapa, Porsgrunn, Pusnes and Triplex products.

MacGregor serves the offshore, maritime transportation and naval logistics markets in ports and terminals as well as on board ships and rigs. MacGregor solutions combine load and cargo access, stowage, care and handling functions to optimise lifetime profitability, productivity and environmental sustainability.

MacGregor is part of Cargotec. Cargotec's class B shares are quoted on NASDAQ OMX Helsinki Ltd.

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Lloyd's Register Quality Assurance certifies that the Quality Management System for MacGregor is ISO 9001:2008 compliant.