

Seaeye Falcon & Falcon DR

Powerful, Portable, Versatile



SAAB

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The powerful, portable and versatile Seaeye Falcon and Falcon DR ROVs are designed for coastal and inshore operations to 300 and 1000 metres water depth or for fly away operations offshore.

Standard Falcon features include:

- 300 m (1,000 ft) depth rating, 8.5 kg (19 lbs) payload
- Max 450 m umbilical length upgradeable to 1100 m length with F2 Fibre Optic Pack upgrade
- Magnetically coupled brushless DC thrusters with velocity feedback - 4 vectored and 1 vertical
- 50 kgf (110 lbs) of thrust with 1:1 power to weight ratio, without additional payload
- Distributed intelligence control system
- High resolution colour camera on 180° tilt platform
- Variable intensity 150 Watts of lighting

- Auto heading and depth
- Single phase 100-270 VAC universal auto sensing power input at 2.8 kW.

The Falcon DR offers the additional capability of:

- 1000 m depth rating
- Max 1100 m umbilical length with 14 mm diameter umbilical - longer options available
- Tilting variable intensity lights linked to camera tilt mechanism
- F2 fibre optic data and video transmission system.

THE VEHICLE

Chassis Layout

Seaeye Marine pioneered the use of polypropylene in the construction of ROV frames and continues this development with the Falcon. This material is robust, buoyant, easily drilled and machined and is corrosion free. Falcon's modern 'open frame' design allows the easy addition of standard bolt on accessories including cameras, sonars, tracking systems and a single function manipulator. Custom designed under-slung modules can also be added for task specific tooling. 316 stainless steel fittings are used throughout.

Propulsion

Brushless DC thrusters have been used on all Seaeye ROVs since 1987 when the company first introduced this technology to the offshore oil and gas industry. These thrusters have drive electronics with velocity feedback for precise and rapid thrust control. A fast PID control system and a solid-state rate gyro for enhanced azimuth stability also prevent overshoot on a change of heading making this vehicle so easy to fly.

The Falcon MCT01 thrusters are magnetically coupled and run cool without oil. Having no moving shaft seals they are extremely low maintenance, reliable and ideal for use in sensitive areas such as fisheries and on reefs.

Thruster Configuration:
4 Vectored Horizontal Thrusters and
1 Vertical Thruster

The open frame and clutter free layout between decks in the Falcon provides the clearest water flow to 4 horizontal vectored thrusters positioned for optimum thrust and control in all directions and superior station keeping in strong cross currents.

Buoyancy & Payload

Buoyancy and payload is provided by securing buoyancy blocks of the appropriate depth rating to the chassis below an easily removable hydrodynamic cover. The cover also provides protection to electronics housings and cabling routed along the top of the buoyancy to the junction box.



Mounting points on the vehicle skids are provided for lead ballast to trim the vehicle's centre of gravity and buoyancy.

Distributed Intelligence Control System & ROV Junction Box

The Falcon is the first ROV in its class to have a distributed intelligence control system. This is a multi-drop network that allows up to 128 devices to be connected together on a single RS 485 serial network and to be individually controlled by a master processor.

Every controllable device on a Falcon, such as thrusters, lights, camera tilt motor, navigation pod and manipulator pod, contains its own microprocessor and



interface and is called a 'node'. Each of these 'nodes' is separately addressed on the network and controlled by the master processor in the Surface Unit. Every node is fully isolated to maximise system reliability and each is connected into the vehicle junction box PCB using a common through bulkhead connector. The JB printed circuit board provides each node with its own fused power supply and telemetry.

The junction box also houses the video line driver for Falcon and the F2 fibre optic multiplexer for the Falcon DR that is an optional upgrade for the standard system.

This use of distributed intelligence does away with the traditional ROV electronics pod packed with interface circuit boards and frees up space while significantly reducing the weight of the vehicle.

Control System Diagnostics

Full system diagnostics are provided: A software routine automatically checks each node when the system is powered up and alerts are provided on the video overlay to warn the operator. The full characteristics of each node can also be interrogated individually from the surface unit. Local diagnostics are also provided for each node in the junction box with colour coded LEDs confirming fuse and telemetry status.

Camera System

A high resolution fixed focus colour camera is fitted to a camera platform that can be tilted ± 90 degrees. An additional switched camera can be added. The F2 Fibre Optic Pack in Falcon DR which is optional in standard Falcons, provides 3 simultaneous video channels. Panning the camera is achieved by turning the vehicle which it can do within its own length.

Standard Camera Specification

Camera Resolution 480 TVL
Min. Scene Illumination 0.2 LUX (F1.4)
Pick Up Device 1/2" CCD Image Sensor
Lens 1/2" Aspherical 3.8mm lens, wide angle fixed focus
Horizontal Field of View 91°
Tilt $\pm 90^\circ$

Lighting

Two forward facing variable intensity 75 Watt Tungsten Halogen flood lights are fitted. An optional additional light can be added. The lights are powered at low voltage, to improve



reliability and longevity. In the Falcon DR the forward facing lights tilt with the camera for improved scene illumination. HID lights are offered as an option.

Navigation System & Auto Functions

All navigation sensors and aids are housed in a single hardened aluminium pod. Auto depth and heading are standard fit. A pitch and roll sensor is included and may be selected for display on the video overlay.

Nav Specifications

Compass Accuracy $\pm 0.5^\circ$
Depth Sensor Accuracy $\pm 0.5\%$ of FSD
Gyro 0.1 %/s
Surface Update Rate <40 mS

SURFACE EQUIPMENT

Input Power Requirements:

Single phase universal auto sensing input, 100-270 VAC at 2.8 kW.

Falcon Surface Units

The Falcon's switch mode power supplies, control system, fold out 15 inch LCD monitor and keyboard are installed in a 19 inch rack transport case.

All connections to the surface unit are on the front panel for easy access including the hand controller with its 5 metre flying lead.

The power output from the surface unit to the umbilical is a galvanically isolated 500 VDC protected by a L.I.M.

An optional IP68 waterproof surface unit is available and is particularly popular with military users.

Vehicle Controls on the Hand Control Unit

The following vehicle controls are provided on the hand controller:

- Single 3 axis joystick for horizontal vehicle control
- Rotary trim controller for vertical thrust up or down
- Push button dive and surface control
- Thruster enable / disable and power setting
- Camera selection
- Rotary control for lights intensity
- Auto pilot function for both heading and depth
- Auxiliary vehicle controls (including manipulator open / close).



A video overlay system is incorporated as standard providing the following information to the pilot:

- Compass heading
- Depth
- Camera tilt position
- Auto pilot function status
- Umbilical turns counter
- Vehicle pitch and roll
- CP reading
- Date and time
- Free text using a QWERTY keyboard.

Umbilical Cable & Winch Options

A choice of neutrally buoyant or thinner, slightly heavy umbilical cable is offered. These light weight proprietary jacketed cables offer high abrasion resistance and incorporate a Vectran strength member. A choice of hand operated winches are available including a compact wheeled Pelican case housed winch that can accommodate a useful 295 metres of 11 mm diameter umbilical. Electric winches are available for the longest umbilical lengths. All have appropriate slip rings to suit the umbilical type.

F2 Fibre Optics

The F2 Fibre Optic Pack is standard fit to the Falcon DR and an optional upgrade for standard Falcons.

It provides the addition of a subsea and surface fibre optic multiplexer and a suitable umbilical for transmission of video and data over fibre optics between the surface and the vehicle.

The benefits of the F2 Fibre Optic Pack include:

- 14 mm low drag twin pass fibre optic umbilical
- Spare fibre optic pass
- 2 x RS 485 (1 spare) and 4 spare RS 232 bi-directional channels
- 3 Simultaneous video channels
- Ability to use broadcast quality video cameras.



VERSATILE FALCONS

Standard bolt on accessories that can be fitted on Falcon include additional cameras and lights, sonars, acoustic tracking systems, CP probes and a single function manipulator. Larger tools and sensor packages can also be accommodated in specially designed tool skids fitted under the vehicle with compensating buoyancy included where necessary. A single cable is normally all that is needed to interface a skid to the ROV.



SPECIFICATIONS	FALCON	FALCON DR
System power requirements	Single phase 100-270 VAC at 2.8kW	Single phase 100-270 VAC at 2.8kW
Maximum umbilical length	450 m	1100 m
Depth rating	300 msw	1000 msw
Length	1000 mm	1055 mm
Height	500 mm	635 mm
Width	600 mm	600 mm
Launch weight	55 kg	100 kg
Forward speed	> 3 knots	> 3 knots
Thrust forward	50 kgf	50 kgf
Thrust lateral	28 kgf	28 kgf
Thrust vertical	13 kgf	13 kgf
Payload	8.5 kg	15 kg



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