



# WINCHES

High performance cable handling systems



InterOcean Systems, LLC

An affiliate of  
Delmar Systems, Inc.



# A HISTORY OF PERFORMANCE



Modern oceanographic research is complex and the costs of operating marine survey and research vessels are escalating rapidly. Therefore, research instrumentation and ancillary equipment must be carefully selected to be applicable to as wide a variety of tasks as possible and to accomplish these tasks quickly with high reliability.

In keeping with this philosophy, InterOcean Systems designs and manufactures a variety of standard and custom-designed wire rope and instrument cable winches for multiple applications. These include hydrographic requirements for water sampling, CTD, sound velocity profiling, biological trawl nets; geophysical requirements including towed side-scan sonar, sub-bottom profilers, magnetometers, sediment coring; and instrument deployments. InterOcean winch models fill many needs from portable light-duty small boat operations to heavy-duty deepwater marine applications. Choosing one of our standard models as a baseline design has many advantages.

Our application engineers may be consulted and modifications made to standard designs, or a special winch may be proposed. InterOcean Systems is a unique resource for both standard and custom winch engineering design and manufacturing.

To provide the most efficient solution, engineering and design costs are kept to a minimum by using standard components and sub-assemblies as much as possible, and extensive use of 2D and 3D CAD systems. You don't have to pay a premium price for a winch uniquely configured and engineered for your specific needs.

Having engineered and manufactured state-of-the-art winches for over forty years, InterOcean standard models and custom winch designs have earned a reputation for long and useful lives. Using a conservative design process, comprehensive quality guidelines, and proven manufacturing techniques allow us to provide the most reliable, robust, and easy to maintain systems that give long-term value to our customers.

In today's environment of quality, safety and multi-purpose utility, our customers are assured that an InterOcean solution will repay them many times over in convenience, safety, and efficiency. An applications engineer can provide technical details and assistance in selecting the proper winch for the job and offer consultation for a standard or custom winch proposal.



*InterOcean Systems designed and supplied the complete set of oceanographic winches for the US Coast Guard icebreaker fleet—Polar Sea, Polar Star, and Healy (pictured above). Top photo courtesy NOAA Stellwagen Bank NMS*



# STANDARD FEATURES

## DRIVE SYSTEMS

InterOcean Systems winches are designed to operate from available shipboard power (electric or hydraulic) and can also be supplied with integrated or stand-alone auxiliary power packs, electro-hydraulic power units, or diesel-powered electrical generators. Some winch models incorporate additional power output to drive external customer devices. Battery, air motor, and manual operation are available for smaller winches.

**Electric Drive:** Electric powered winches offer exceptional reliability and efficiency for marine applications and can be conveniently powered from available electric source. InterOcean electric winches use the latest technology in high-efficiency variable frequency drives (VFD), also known as flux vector drive technology. The VFD electric motor controller converts standard input power into a variable frequency AC output with full field and armature control to drive a zero-maintenance AC motor. This electric drive technology permits infinitely variable speed control while providing full cable tension at any operating speed.

The VFD electric motor controller is a programmable micro-processor-based unit with integrated keypad and display. These features are used to establish adjustable torque limits, soft start/stop acceleration and deceleration, allowing greater control of cable dynamics and load that can help prevent damage to cable or instrument. The digital control, programmability, and I/O interface capability of the variable frequency electric drive system also enables direct input and feedback from external sensors such as an accelerometer or depth sensor to permit adaptive winch response such as active heave compensation, bottom following, or specific user requirements.

Whether using advanced features inherent within the electric motor controller or simple speed and directional control, the reliability, efficiency, convenience and versatility make the electric powered winch an excellent, clean, long-term solution.

**Hydraulic Drive:** The InterOcean series of hydraulic-powered winches offer a useful alternative when it may be desirable to select a hydraulic or electro-hydraulic drive system for the winch and advanced control is not required. Hydraulic drive systems also provide ruggedness, simplicity of design, and proven performance. InterOcean hydraulic winches may be connected directly to a shipboard source of hydraulic power or supplied with its own hydraulic power unit, depending on the facilities available on board the ship of installation.

**Hydraulic Motor:** In the typical arrangement, a frame-mounted hydraulic motor with attached gear reducer and brake unit, is used to rotate the winch drum using sprocket and chain. This arrangement of individual drive components provides safe and effective control at low cost.

**Planetary Drive:** The optional direct-drive high-torque hydraulic motor drive with integrated gearbox and brake incorporates the drum bearing and is directly coupled to the winch drum without external gears. This arrangement avoids the use of chain drives and sprockets, reducing complexity and maintenance by eliminating components that frequently require lubrication and replacement due to wear.

**Hydraulic Power Unit (HPU):** The hydraulic power unit provides hydraulic fluid pressure and flow to the winch if not available directly from the vessel, and is used to convert shipboard electrical power into hydraulic power for use by the winch (electrohydraulic power system). The HPU comprises an electric motor and pressure-compensated hydraulic pump with load-sensing controller and electric proportional control valve, providing a high-efficiency drive system. Pressure from the hydraulic power unit is supplied to the winch hydraulic motor to drive the winch. Other HPU components include reservoir, filters, indicators, hoses, controls, and oil coolers or heat exchangers appropriate for the environmental conditions. The HPU may be supplied as a stand-alone skid-mounted unit or integrated within the winch frame as a single package. The customer may consult with InterOcean application engineers to determine the most suitable arrangement to facilitate transportation and installation convenience.

## CONTROL

Standard winch control is a single-lever control handle (joystick) allowing safe and easy operation of all winch functions—start, stop, speed, and directional control—and may be handheld for portability or mounted on a permanent control station. For increased safety, the control handle is spring-centered and will return to the center position (stop) if released by the operator. Additionally, the user must unlock the handle from the stop position to avoid accidental winch operation. The winch control provides infinitely variable speed control for the safety and secure handling of the customer's equipment.

## WINCH DESIGN COMPUTER PROGRAM

InterOcean Systems experienced engineering department has written unique computer programs to facilitate the design of custom-made special application winches and to evaluate their performance under a variety of conditions. The inputs to the program are performance requirements, cable characteristics, cable capacity, load, speed, drive type, brake, and material, in addition to selected optional features such as level wind, grooved drum, slip-ring, and cable tension, speed and length monitors. The design engineer can select and evaluate several design configurations based on standard winch model types until the final proposed design is optimized with respect to convenience, performance efficiency and economy. From unique fully-customized designs to standard or modified models, InterOcean winches ensure conformance to any set of requirements and provide confidence for long-term operation in any environment. Please feel free to consult with InterOcean Systems to take advantage of this service.

# WHICH FEATURES ARE RIGHT FOR YOU?

## LEVEL WIND

Many winch installations require some means of assistance to spool the cable evenly over the drum. This is especially true where the distance between the winch and the overboard sheave is relatively short or the winch drum is quite wide. Applications requiring high-speed retrieval of long cables also benefit from a level wind system.

InterOcean Systems manufactures an automatic, diamond screw level wind system fabricated from solid highly durable stainless steel. The diamond screw shaft rotates in sequence with the spooling drum at the appropriate speed to ensure smooth and even spooling regardless of retrieval speed, line tension, or distance from the overboard sheave. The diamond screw level wind is the most reliable and effective automatic spooling technique available and most appropriate for remote environments. For special applications with multi-part variable-diameter cables, a more complex adaptive level wind system with electronic position sensing may be used.

## BRAKE

A reliable braking system is indispensable to convenient and safe operation of a winch. Our winches can be equipped with as many as four braking mechanisms, which are operated under different conditions and act as backup in case of an emergency.

**Dynamic Motor:** All electric-drive winches are supplied with integrated dynamic braking systems designed to control the full rated load and absorb energy as the winch is slowed.

**Hydraulic:** All hydraulic winches have dynamic braking provided by a relief valve that absorbs the energy created by the motor when slowing the drum. The hydraulic relief valve also prevents loss of control of the load.

**Fail-safe:** In the event that power is lost, a fail-safe brake is automatically engaged. The fail-safe brake is a spring-applied power-released safety brake that is automatically engaged any time the operator moves the control to the zero-speed or stop position, or in the event of power loss. This important safety feature prevents uncontrolled conditions even during emergency situations. The fail-safe brake is capable of containing the full rated load of the winch.

**Manual:** Although typically not required when other brake systems are installed, a manually operated friction band brake or disk brake may be provided as an additional safety feature for special applications.

**Locking pawl or ratchet:** Also known as “dog stops”, these brakes offer multiple positive lock points to mechanically secure the drum and provide additional support for towing applications.

## GROOVED DRUM

Winch drums may be equipped with a specially designed grooved core to match the cable specifications. When combined with the diamond-screw level-wind, a properly grooved drum facilitates the perfect spooling, enhanced protection, and long-term care of cables.

## Line Length, Speed, and Tension Display

The winch system offers optional instrumentation for accurate monitoring of cable conditions. Cable length and speed are precisely measured using rotations of the level wind sheave. Cable tension is derived by a load cell at the axle of the level wind sheave using a fixed geometry to prevent bias due to angular variation. Cable speed, payout length, and cable tension may be displayed on the operator's local or remote control panel.

## Remote Control

A single hand-held joystick control is typically used to operate the winch from any location. Alternately, local control and secondary control stations can be added to allow operation from multiple fixed locations. All functions of speed and directional control, brake, and optional cable display can be made available at either local or remote control panel.

## Slip Rings

Low-noise instrument grade slip rings are available for transmission of real-time signal from customers deployed equipment package through the winch to surface electronics or laboratory connection. All slip rings are contained in sealed, water-proof housings and terminated in waterproof cable glands or connectors. Slip rings are available for any combination and number of power and signal conductors and fiber-optic channels. Provisions can be made to supply the appropriate slip ring with the winch, or to include mounting for a customer-supplied slip ring.

## Finish and Paint

Steel winches are finished with a multi-step marine painting system consisting of sand-blast, anti-corrosion zinc-based primer, high-strength epoxy-based paint and a highly-durable polyurethane finish in the customer's choice of color. Winches constructed from marine grade aluminum alloy do not require any additional surface finish and are suitable for long-term direct use in marine environments without paint or other coating. As an option, marine grade aluminum winches may be finished by a multi-step painting process. All winches remain highly resistant to corrosion related to long-term operation in the marine environment.



Control/Display Console



Precision Diamond Screw Cutting



Right Angle Adaptive Level Wind



Integrated Cable Monitoring

# LIGHT DUTY WINCHES

## Portable Manual, Electric, and Hydraulic Winches

Small portable and light-duty winches are particularly useful in small boats or areas with limited access. Typical applications include shallow water instrument or transducer deployments, small tow vehicles, and light-duty sampling where cable storage and retrieval is kept neat and compact.

### Model 388



#### Model 388

##### Light Duty, Portable

InterOcean Systems Model 388 is a portable electric winch that incorporates 24 VDC or 115 VAC electric motor with infinitely variable speed control, lightweight materials, and high-quality construction for portability and long-term use on small boats.

The Model 388 winch is supplied with a mounting flange for a customer supplied slip ring assembly, remote control, and a 36" boom with sheave for over the side operations.

##### Specifications:

Capacity (typical):	1,000 m of 3 mm (1/8") 300 m of 6.4 mm (1/4")
Bare Drum Load (typical):	Up to 225 kg (500 lb)
Drum Diameter:	10 in (25.4 cm)
Drum Width:	15.5 in (39.4 cm)
Flange Diameter:	16 in (40.6 cm)
Level Wind:	No
Power:	1/3 to 1 hp 12 VDC, 24 VDC, or 115/220 VAC

### Model 1673



#### Model 1673

##### Light to Medium Duty, Hydrographic

InterOcean Systems Model 1673 is a proven multi-purpose hydrographic winch for CTD, side-scan sonar, and water sampling applications. The 1673 is fully self-contained and incorporates an electric or hydraulic motor in the range of 1hp to 5 hp with infinitely-variable joystick speed control, brake, level-wind, and optional slip-ring.

The Model 1673 is fabricated from lightweight aluminum alloy using high-quality construction for portability and long-term use in the marine environment.

##### Specifications:

Capacity (typical):	3,500 m of 3 mm (1/8") 1,500 m of 6.4 mm (1/4") 1,000 m of 8.2 mm (0.322")
Bare Drum Load (typical):	Up to 600 kg (1,320 lb)
Drum Diameter:	12 in (30.5 cm)
Drum Width:	18 in (45.7 cm)
Flange Diameter:	23 in (58.4 cm)
Level Wind:	Yes, Diamond Screw
Power:	1 to 5 hp 115/220/380/440 VAC or Hydraulic

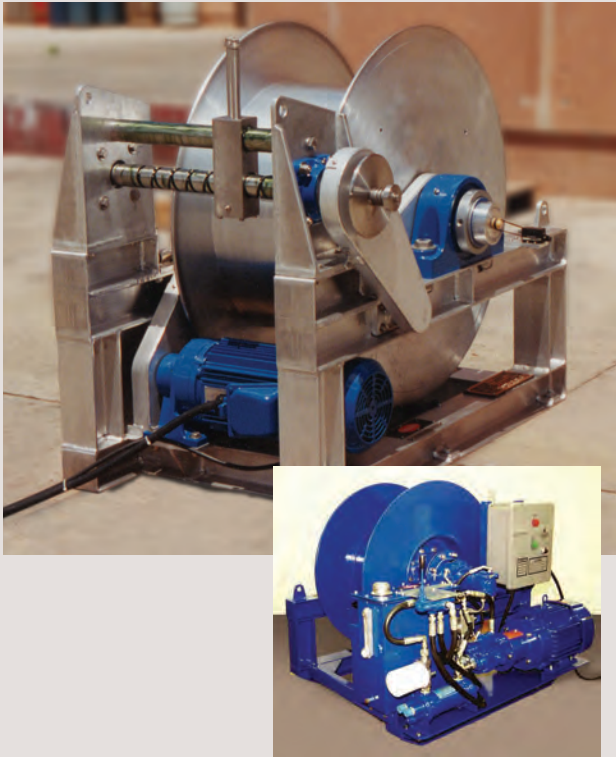


# MEDIUM DUTY WINCHES

## Medium Duty Electric and Hydraulic Winches

InterOcean medium duty winches are steadfast and robust, designed to provide long-term utility for multiple applications. Typical uses include a wide range of mid-depth instrument deployment, hydrographic sampling, water column profiling, and towing applications using a variety of cables.

### Model 10031



#### Model 10031

##### Medium Duty Sonar Tow Winch

InterOcean Systems Model 10031 sonar towing winch combines a compact footprint with a large diameter drum. This configuration is ideally suited for handling larger diameter tow cables required by side-scan sonar, sub-bottom profilers, magnetometers, or towed vehicles from small- to medium-sized vessels. The Model 10031 is available with level wind, slip ring, and either electric or hydraulic drive systems in the range of 5 hp to 25 hp to allow a broad range of loads and applications.

#### Specifications:

Capacity:	2,500 m of 6.4 mm (1/4") 1,500 m of 8.2 mm (0.322") 700 m of 11.7 mm (0.462")
Bare Drum Load (typical):	Up to 2,500 kg (5,500 lb)
Drum Diameter:	24 in (61 cm)
Drum Width:	15 in (38 cm)
Flange Diameter:	36 in (91.4 cm)
Level Wind:	Yes, Diamond Screw
Power:	5 to 25 hp 220/380/440 VAC, Hydraulic, or Electro-Hydraulic

### Model 1871



#### Model 1871

##### Medium Duty Hydrographic, Towing Winch

InterOcean Systems Model 1871 is a highly versatile medium duty winch designed to accommodate longer cable lengths for mid-water hydrographic, CTD, and towing applications. The Model 1871 can be configured with either electric or hydraulic drive systems in range of 15 hp to 25 hp and incorporates level wind and remote joystick control as standard features. Slip ring, grooved drum, and other options are available. The 1871 incorporates solid steel construction for long-term marine operations with high reliability and exceptional utility.

#### Specifications:

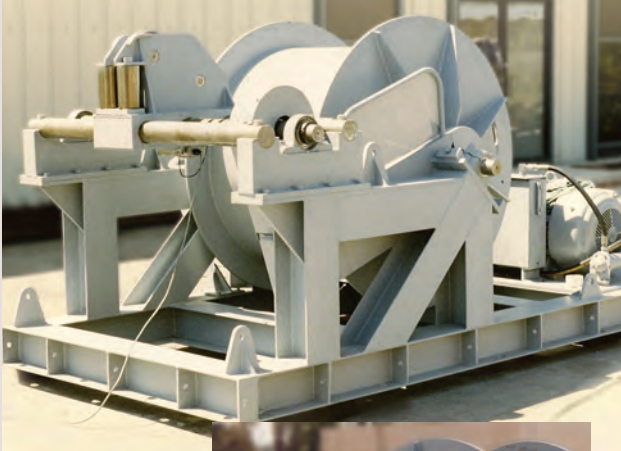
Capacity:	5,000 m of 6.4 mm (0.25") 3,500 m of 8.2 mm (0.322") 1,500 m of 11.7 mm (0.462")
Bare Drum Load (typical):	Up to 3,000 kg (6,600 lb)
Drum Diameter:	20 in (51 cm)
Drum Width:	36 in (91 cm)
Flange Diameter:	33 in (86 cm)
Level Wind:	Yes, Diamond Screw
Power:	15 to 25 hp 220/380/440 VAC, Hydraulic, or Electro-Hydraulic

# HEAVY DUTY WINCHES

## Heavy Duty High Performance Winches

InterOcean range of heavy duty oceanographic winches bring decades of design experience and proven performance to work for deep-tow, oceanographic, and geotechnical applications. These winches are engineered for handling long cables and high tension with multiple configuration options available for a customized solution.

### Model 9933



#### Model 9933

##### Heavy Duty Deepwater Winch

InterOcean Systems Model 9933 is a capable, heavy-duty oceanographic winch for deep tow and sampling applications. The 9933 is available with an all-electric drive, hydraulic, or electrohydraulic configuration in a range from 50 hp to 150 hp. Hydraulic configurations offer direct connection to ship hydraulics or may be supplied with an integrated or independent HPU.

The Model 9933 includes grooved drum and level wind systems to ensure perfect repetitive spooling and maximum protection of long cables under demanding conditions. Cable monitoring, display, and control options are provided in accordance with customer requirements. The 9933 is designed for handling long multi-conductor or coax cable, fiber-optic cable, or wire rope for open-ocean oceanographic work.

#### Specifications:

Capacity:	14,000 m of 8.2 mm (0.322") 8,500 m of 11.7 mm (0.462")
Bare Drum Load (typical):	Up to 6,000 kg (13,200 lb)
Drum Diameter:	24 in (61 cm)
Drum Width:	36 in (91 cm)
Flange Diameter:	60 in (152 cm)
Level Wind:	Yes, Diamond Screw
Power:	50 to 150 hp 380/440 VAC, Hydraulic, or Electro-Hydraulic

### Model 9602



#### Model 9602

##### Heavy Duty - Deepwater Winch

InterOcean Systems Model 9602 is another capable, heavy-duty winch for deep ocean towing and sampling applications. It is available with electric, hydraulic, or electro-hydraulic drive system from 50 hp to 200 hp.

The Model 9602 is designed for high tension spooling and maximum protection of long cables under demanding conditions. Grooved drum and level wind system are standard, with optional cable monitoring, display, and control provided in accordance with customer requirements.

#### Specifications:

Capacity:	10,000 m of 11.7 mm (0.462") 5,000 m of 17.3 mm (0.680") 4,000 m of 19 mm (0.750")
Bare Drum Load (typical):	10,000 kg (22,000 lb)
Drum Diameter:	36 in (91 cm)
Drum Width:	60 in (150 cm)
Flange Diameter:	60 in (152 cm)
Level Wind:	Yes, Diamond Screw
Power:	50 to 200 hp 380/440 VAC, Hydraulic, or Electro-Hydraulic

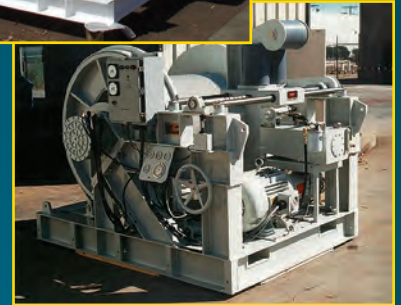
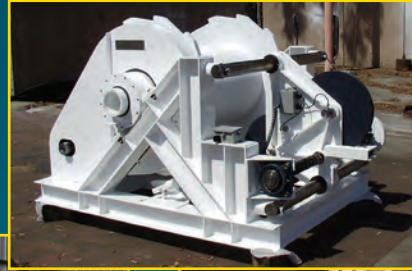


# CUSTOMIZED WINCH DESIGN

## Winches Customized for Any Application

Whether based on a standard design or a completely new application concept, InterOcean Systems can design and deliver a winch for your application...and chances are that we already have. From aerial tether management, to underwater-based profiling, to man-rated deployment systems, unique size constraints, special cable or control requirements, InterOcean has decades of custom winch engineering and design experience with many examples to inspire.

Present us with your requirements, and let InterOcean help guide you through the selection process to understand the technical, and performance that can be achieved by designs, modified or by using a completely approach.



### WINCH DESIGN GUIDE

When determining the right winch for the job, it is important to obtain as much information about the application (what it's being used for and customer's requirements) as possible to help determine the specific characteristics of the winch. The following winch worksheet/questionnaire will be useful in gathering the primary characteristics for the winch:

Application: \_\_\_\_\_

Desired Power Input:

- ☐ Hydraulic (Ship-supplied)    ☐ Electric  
☐ Hydraulic (HPU required)    ☐ Other (Specify) \_\_\_\_\_

Available Power:

- ☐ Voltage/Amperage (Electrical) \_\_\_\_\_  
☐ Pressure/Flow (Ship-supplied Hydraulic) \_\_\_\_\_  
☐ Other \_\_\_\_\_

Live Load (Lifting Load Excluding Cable Weight): \_\_\_\_\_

Speed: \_\_\_\_\_ m/s

(Applies to ☐ Full, ☐ Mid, or ☐ Bare Drum)

Cable/Wire:

- ☐ Wire Rope (non-conducting)  
☐ Electrical Conducting Instrument Cable  
\_\_\_\_\_ # of Conductors Required  
☐ Slip Ring Required?

Cable/Wire Diameter: \_\_\_\_\_

Cable/Wire Length: \_\_\_\_\_

Size or Weight Limitation: \_\_\_\_\_

Any special environmental conditions: \_\_\_\_\_

Our Application Engineers will be happy to assist you in the proper selection of your system. CALL 1.858.565.8400

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