

# Product Specifications

## Nova Ray® ROV Model 2000 Package

The sleek Model 2000 (M2000) is the basic survey and inspection vehicle in the Nova Ray® ROV product line. Inspection and survey data is delivered near real-time to the integrated surface control console. The M2000 stably operates under tow in currents and cross currents up to 9 knots. It can also operate using its two 1/4hp thrusters at 4+ knots. The Nova Ray® ROV's patented arcuate (bow shaped) wing design solves challenges with cable drag in strong currents, creating unequaled ocean and river maneuverability, stability and performance. The M2000 offers portability and a multi-use platform. It is the only arcuate winged ROV in its class, offering exceptional value and many standard features.



### Standard Features

- ◆ Portable ROV with arcuate wings
- ◆ Proprietary Command and Control software with interval upgrades
- ◆ Fully digital onboard electronics
- ◆ Integrated surface control console with 3-axis joystick; laptop, LCD video display
- ◆ 3-auto pilot modes for multi tasking
- ◆ Dual operation mode (tow or use thrusters)
- ◆ Two, 1/4 hp thrusters
- ◆ 300-ft umbilical
- ◆ Internal camera system
- ◆ Transport/operation cases with wheels and telescoping handles
- ◆ Tools & Parts Standard Kit (TAPS)
- ◆ Dual quartz lighting system
- ◆ Patented channel and rail system for user specified add-on devices
- ◆ Patented arcuate wing
- ◆ Depth rated to 305 meters (1,000 ft)
- ◆ Sonar ready

### Features Description

#### Wings, Towing and Thrusters Combine for a Powerful, Adaptable ROV

Nova Ray, Inc. offers a product line of ROVs that are compact and user focused for survey, inspection and security applications. All models incorporate the patented arcuate wing design. This design allows the ROV to use its umbilical to advantage. It can be towed--operating much like a kite -- or fly under its own thruster power.

Communications between the M2000 ROV and its integrated surface control console include a laptop with proprietary Windows™ based software; LCD video display, a proprietary Command and Control system, and a high resolution color internal camera within the ROV housing.



Applications for the M2000 include marine research, maintenance and inspection and waterway emergency responses by police and fire diving units. Its portability and rapid mobilization from limited platforms makes it well suited for rivers, wilderness lakes, ports and oceans. This model is sonar ready. Where needed, it can be converted to a digitally operated conventional ROV (conversion kit optional). Other user add-on devices can be accommodated with this highly versatile ROV (ie., manipulators).



#### Lightweight and Portable with Easy Assembly, Fast Mobilization

Weighing about 25.5 kg, the M2000 can be transported and assembled in the field by one person. It get be launched from inflatable boats to larger vessels. The M2000 comes equipped with a TAPS Kit (Tools and Parts Standard Kit) for basic assembly and servicing. Additional maintenance or repair is accomplished in the field with the optional Tools and Parts Plus (TAPP+) Kit.

Category	Standard Feature	Nova Ray® ROV Model 2000 Specifications
<b>Performance</b>	Depth Rating	305meters (1,000 feet).
<b>Currents</b>	Stability in Strong Currents	Arcuate wing design counters destabilizing effects of cable drag. Results in faster, more stable performance in currents with less cable.
<b>Maneuverability</b>	Dual Operation Mode	Can be towed or use thruster power in strong currents. See <b>Speed</b> for knots.
	Speed	Up to 9 knots in currents under tow. With thrusters: 4 to 6 knots (¼ or 1/3hp respectively)
	Cable to Depth Ratio	Under tow, Nova Ray® provides deeper operation with less cable than other Underwater Towed Vehicles (UTV). Nova Ray® can operate up to 70% deeper than conventional UTV systems using the same cable length. Under tow, operates at a ratio of 2.38:1. With thrusters, the Nova Ray® can reduce the ratio to 2:1. With less cable, the Nova Ray® system is lighter, smaller and easy to deploy anywhere in the world on a rapid response basis.
	Thrusters	DC brushless rare earth motors. Two (1 port; 1 starboard) magnetic drive. ¼ hp standard with 150 volts DC. Optional 1/3 hp. Propellers and Thruster Guards: 75mm for 1/4 hp., and 90 mm for 1/3 hp. Guard is impact resistant HMW plastic.
	Control Surfaces	Rudder provides directional control; two elevons provide vertical positioning (depth control).
<b>Umbilical</b>	Length, Diameter and Type	Length: 300 ft (91.4 m). Diameter: 15mm. Type: 12-conductor, neutrally buoyant.
	Custom Umbilical	Length to fit user specifications; optional fiber optic available.
<b>Temperature Rating</b>	Operating Range	-2 to 42 degrees C.
<b>Command &amp; Control System</b>		
<b>Hardware</b>	Integrated Control Console	3 axis joystick; mode selection buttons and slide throttle; auto pilot capability; laptop with proprietary Windows™-based software; LCD video display (see details below). I/O: video out, monitor in, RS 232 and RS 485, and hydrophone ready.
	Digital Onboard Electronics	Fully Digital: Precise control and easy integration of digital peripheral devices. Proprietary embedded software.
<b>Software</b>	Proprietary Software	Aeronautical style display showing pitch & roll and elevon, rudder and thruster direction and magnitude. Reports depth, heading, internal temperature. Heads-up video overlay enabled.
	Flight Control	Choice of manual or 3 auto pilot modes: Heading Hold, Wings Level and Depth Hold (optional altimeter provides an additional mode: Altitude Hold).
<b>Instrumentation</b>		
<b>Depth</b>	Depth Sensor	Depth gauge with range of 0 to 340 meters.
<b>Heading</b>	Compass	Solid state with pitch and roll correction and integrated thermometer.
<b>Imaging</b>	Sonar	Sonar ready
<b>Video, Camera, Lights</b>		
<b>Video Display</b>	Flat Panel Monitor	Real time image viewing; 254mm color LCD video monitor. NTSC or PAL Composite. Out Port: RCA and S Video.
<b>Lights</b>	Front Lights	Dual 150 Watt mini quartz. Beam pattern 78 degrees (included angle to half power point).
<b>Internal Camera</b>	Type and Resolution	Color. 480 TVL with CS (Hi Res maximum for color), 1/3" CCD, NTSC or PAL.
	Sensitivity and Lens	1 lux @ F1.2 for color camera. Lens: 4mm, F1.2 or wide angle: 2.6mm, F1.6.
	Focus and Tilt	Adjustable with auto white balance and auto iris. Manual tilt range: 90 degrees.
<b>ROV Characteristics</b>		
<b>Physical</b>	Length, Width, Height, Weight	L: 1,022mm. W: 997mm. H: Body: 229mm; Rudder: 356mm. Weight: 25.5 kg.
<b>Electrical</b>	Connectors	Standard watertight bulkhead connectors, and two accessory connectors.
	Line & Umbilical Voltage, Power	Line: 120 VAC 60hz. Umbilical: 109 VAC. Power Consumption: 900 -1100 Watts.
<b>Housing</b>	Construction	Single piece, anodized 6061 T6 aluminum hull with patented channel and rail system for wings, thrusters, skids & add-on devices (no welds nor hull penetration, and includes triple "O" rings to ensure watertight integrity of housing system.
<b>ROV Construction</b>	Material	Key ROV molded components: impact resistant, light weight polyurethane resin. Accessory fittings and mountings are aluminum or stainless steel for corrosion resistance and durability.
	View and Light Ports	View dome: annealed, impact-resistant 3/8" acrylic. Lights: ¼" quartz window and depth rated to 1,000 meters.
<b>Other</b>		
<b>Shipping</b>	Transport Cases	Water-tight Control Console is carry-on commercial airline luggage. 3-cases for ROV and umbilical shipped as commercial luggage. All include telescoping handles and wheels.
	Shipping Weight	Control Console: 20 kg. Transit Cases: 74.3 kg. total.
<b>Tools &amp; Spares</b>	Tool Kit	TAPS Kit (Tools and Parts Standard) provides for basic field assembly and servicing.
<b>Warranty</b>	Agreement	Details available from customer service