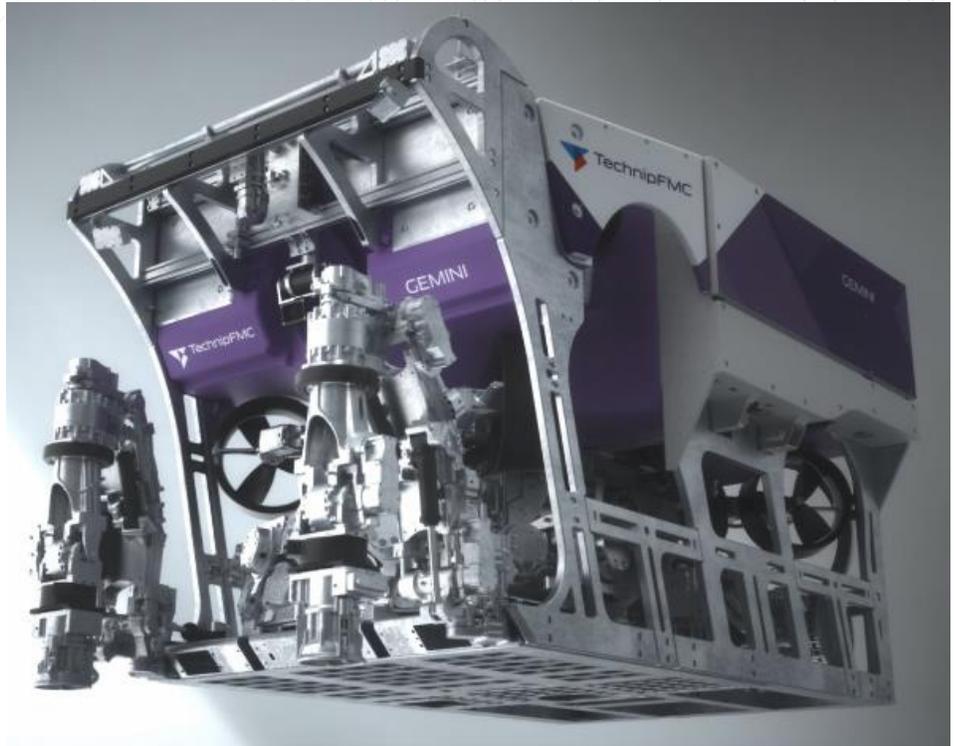


Schilling Robotics GEMINI[®] ROV

The GEMINI[®] ROV is designed to remain at the subsea worksite for extended periods, performing numerous subsea tasks utilizing the tooling and services stored on the ROV and TMS. The GEMINI[®] ROV is equipped with dual, next-generation manipulators, enabling the ROV to exchange subsea end manipulator tool and functionality without the requirement to recover to surface. A number of automated functions have been incorporated to ensure consistent results for intervention activities, including but not limited to hot stabs (60 seconds) wellhead cleaning and tool exchanges. These automated features can be performed easily by ROV pilots regardless of skill level.

Features:

- ▶ Integrated, next-generation dual manipulator systems with force compliance
- ▶ Manipulator wrists with integrated power, communications, and hydraulics, allowing automated tool exchange
- ▶ Integrated tooling suite
- ▶ One-touch automated tool exchange on either manipulator
- ▶ Pilot-assisted hot stab insertion capability (60 seconds)
- ▶ Two (2) 55 gal fluid reservoirs and 25 gal waste fluid reservoir
- ▶ Meets API 53 standards for BOP intervention (less than 45-second ram closure)
- ▶ 60-minute repair/ replacement time on all subsystems
- ▶ Integrated 250 hp HPU (motor, pumps, reservoirs, and filters)
- ▶ Advanced 150 hp auxiliary system (ISOL-8 pump) capable of pumping multiple fluids simultaneously (including BOP secondary intervention)
- ▶ Integrated Schilling Robotics advanced tooling valve packs
- ▶ Seven (7) thruster propulsion system, featuring Schilling Robotics' proprietary thruster design that provides increased reliability
- ▶ Removable full-buoyancy protection
- ▶ Vehicle automatic control modes: StationKeep, AutoTrack, AutoDisplacement, etc.
- ▶ Integrated HD ethernet video system (HDEVS)
- ▶ Updated tooling user interface (UI) that focuses on intuitive, efficient, safe, and consistent operations



ISOL-8 Auxiliary Tooling Pump/ Valve Packs

The GEMINI® ROV can meet the most demanding intervention requirements; the pressure and flow of the ISOL-8 pump can be controlled from the surface. The pump is capable of producing a maximum output of 50-gpm at 5,000-psi, sufficient to actuate BOP shear rams and achieve full closure in 45-seconds or less as specified by API 53. This level of performance is attained through an 8 double acting pump unit that can operate with hydraulic fluid, water glycol or seawater.

For tooling/ intervention applications, the ISOL-8 pump eight double can deliver dual fluids simultaneously, offering fully independent pressure and flow control of each circuit through the onboard Schilling Robotics' valve packs.

Digital Video Suite

The digital video-over-ethernet system can transport both HD and SD video, through H.264 compression, that can be annotated and recorded via the video PC on surface. The system can record up to 4x HD streams simultaneously, and redundant HD video recording, annotation, and editing suites are provided as standard.

- ▶ High-definition, low-latency streaming video at 1920 x 1080 resolution, 60 frames per second
- ▶ Video streaming using H.264 compression over RTSP
- ▶ SD low-latency streaming video at NTSC/PAL resolution
- ▶ Topside video output: HDMI, NTSC/PAL analog video

GEMINI® Manipulators

The GEMINI® ROV features a fully integrated, redundant, dual manipulator system. Each manipulator is a six-degree-of-freedom, roll-pitch-roll hydraulic manipulator with a force sensing, tool exchanging wrist that can transfer power, communications, and hydraulic fluid to attached tools.

The manipulator incorporates a modular design that simplifies maintenance, troubleshooting, and repair by concentrating functions in modules and simplifying the interconnections between modules.

The manipulator meets Schilling Robotics' 60-minute repair philosophy. Each GEMINI® manipulator provides two (2) separate hydraulic circuits through the arm to support tools connected to the tool-exchanging wrist. Circuit A provides two flow lines and a case drain line; circuit B provides two flow lines. Both tooling circuits can be operated at up to 5,000 psi and provide 8 gpm of flow.

- ▶ GEMINI® manipulators provided: 2 each
- ▶ Depth rating: 4,000 m
- ▶ Weight in air: 400 lbs
- ▶ Weight in seawater: 265 lbs
- ▶ Reach (from shoulder pivot to tip of std gripper): 92 in
- ▶ High-accuracy performance payload: 140 lbs
- ▶ Heavy-lift manipulation payload: 375 lbs
- ▶ FLOT 1-DOF orientation payload: 600 lbs
- ▶ Wrist torque and rotation, nominal: 450 ft-lbs; 360° continuous up to 100 rpm

Specifications

Working Depth:	3,000 mts & 4,000 mts
Docking Interface SWL:	13,025 kg
Through-Frame Lift:	3,500 kg
Weight in Air:	6,340 kg
Dimensions:	3.7 mt X 2.4 mt X 2.2 mt
Payload:	80 kg

Peak Thrust Performance

Forward/ Aft/ Lateral:	1,200 kgf
Vertical - Up/ Down:	1,000 kgf
StationKeep:	2.5 cm

Equipment Fit

Manipulators:	GEMINI
Cameras:	SD and HD Options
Depth Sensor:	Valeport
Heading Sensor:	IXblu Nano
DVL:	Teledyne RDI 1200kHz
Lights:	8 x 120VAC and 2 x 24VDC
Pan and Tilt:	Schilling Electric
Valves:	(14) 8 lpm, (2) 32 lpm, (1) 160 lpm

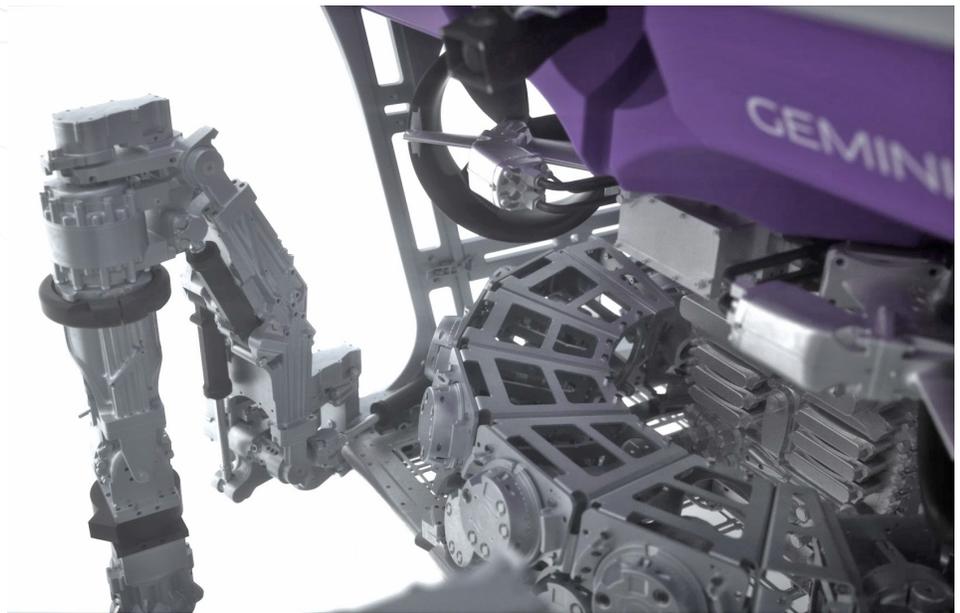
Hydraulic System

HPU:	250-hp
Auxiliary:	150-hp
Operating Pressure:	207 Bar
Thrusters:	(7) Sub Atlantic 4207

- ▶ Through-arm tool hydraulics: 5,000 psi; 8 gpm
- ▶ Through-arm tool power: 150 W
- ▶ Through-arm tool communications: 100 Mb ethernet
- ▶ Automatically exchange tools from the ROV tool carousel or TMS tool holders with the touch of a button
- ▶ Assist and automated modes aid operators to quickly and consistently perform tasks regardless of operator skill
- ▶ Tool-exchange wrist allows zero-leak subsea tool exchange with no dropped tools
- ▶ Wrist transfers power, optical communications, and fluid (oil and water glycol) from the manipulator to an attached tool
- ▶ Integrated machine vision camera (MVC) assembly with dual lights

StationKeep (SK) Version 2

The newest version of StationKeep (SK) incorporates additional ROV sensor inputs and a state estimator, dramatically improving StationKeep's overall accuracy and performance by a minimum factor of four in extreme environmental conditions and up to factor of ten



in standard operating conditions. These StationKeep performance enhancements provide an extremely stable platform from which high-precision intervention tasks can be performed by the GEMINI® ROV without the need to anchor and stabilize the ROV by “grabbing on” to the subsea asset. The accuracy of Schilling Robotics' StationKeep mode is unmatched in its ability to maintain vehicle position within a 25- mm watch circle in currents in excess of 2 knots.

- ▶ Ability to perform high-precision tasks without the need to stabilize the ROV (grabbing on)

- ▶ Improved performance using additional sensor input and a state estimator
- ▶ Accurate focus of a camera on a specific task
- ▶ Ability to assist with engagement of tooling packages with subsea structures
- ▶ Maintaining position while seabed disturbance clears during deployment of heaving loads
- ▶ Maintaining accurate position during lengthy observation tasks in the presence of currents

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