

Schilling Robotics TITAN™ 4 Manipulator

Thousands of Schilling Robotics' manipulator systems are in use worldwide, every day. TITAN™ manipulators are the highest quality systems on the market for the dexterity and strength to withstand the industry's harsh and repetitive needs day after day.

- ▶ Acute precision control
- ▶ Durable and reliable through the harshest conditions
- ▶ Large operating envelope
- ▶ High lift-to-weight ratio
- ▶ Depth rating up to 7,000msw
- ▶ Titanium construction

The TITAN™ 4 is widely regarded as the world's premier servo-hydraulic remote manipulator system. Since 1987, these systems have been the industry standard for dexterous manipulator systems used in subsea applications and are extensively used on ultra-heavy work-class ROVs.

This arm has the dexterity and accuracy necessary to perform the fine movements needed for complex tasks. When this ability is combined with the manipulator's reach (1,922mm), payload capacity (122kg at full extension), and large operating envelope, the TITAN™ 4 offers unequalled performance in a wide range of subsea applications.

Acute Precision Control

The manipulator's accuracy is limited only by the pilot's eye. The master controller includes a six-degree-of-freedom replica master arm that ensures comfortable, intuitive manipulator operation. Its movements are just as sharp, whether it is moving a 5lb. object or moving a 250lb object.

The controller also contains function keys for selecting menu options and a display for viewing diagnostic and status information. The controller's advanced operational features include individual joint freeze, position scaling (altering the ratio of master arm movement to manipulator arm movement), password security, programmable stow/deploy routines, individual joint movement limits, incremental gripper movement, individual joint diagnostics, and automatic error checking.





In-arm electronics are located in the forearm, increasing system reliability and minimizing electrical connections



Diagnostics

Colored diagnostic lights in the connector head indicate the status of electrical power delivery to the arm, master controller transmission to the arm, and arm responsiveness.

Construction

The arm is constructed primarily of titanium for structural strength, light weight, corrosion resistance, and extraordinary resistance to

damage from collisions. TITAN™ manipulators have a proven track record of reliability in the world's most demanding subsea environments.

Operating Envelope

It is engineered to give operators the largest range of motion in its class. This significant flexibility only enhances the arm's precision dexterity for exploration and recovery missions.

Specifications

Reach:	1.922 m
Type:	13,025 kg
Functions:	7
Materials:	Primary Titanium
Dimensions:	3.5m X 1.9m X 2.1
Payload:	Up to 600 kg

Arm Specifications

Standard Depth:	4,000 msw
Extended Depth:	7,000 msw
Weight in air:	100kg
Weight in water:	78kg
Lift at full extension:	122kg
Maximum lift, nominal:	454kg
Standard Gripper Opening:	99mm
Grip Force, nominal:	4,092N
Wrist torque, nominal:	170Nm
Wrist rotate, cont.:	6-35rpm

Master Controller Specifications

Length:	470mm
Width:	177mm
Height:	67mm
Weight:	3.7kg

Electrical and Telemetry

Input Power, Controller:	90-260VAC
Input Power, Arm:	24 VDC
Power, Controller:	6W start, 3W run
Power, Arm:	6W start, 45W run
Telemetry:	RS-232 or RS-422/485

Hydraulic Requirements

Fluid:	Mineral, Glycol, or Synthetic
Viscosity:	10-200 cSt
Available Flow:	5.7 - 19 lpm
Max. Pressure:	3,000 psi
Max. Fluid Temperature:	54°C
Fluid Cleanliness:	ISO 4406 14/11
Thrusters:	(7) Sub Atlantic 420

Robust Power/ Signal Connection

A SeaNet cable connects the arm to electrical power and telemetry, providing a robust, reliable attachment. The small diameter cable (8.9mm) is actively pressure balanced and oil filled. The connector head has spring-loaded contacts, and a positive locking feature eliminates accidental cable disconnection.

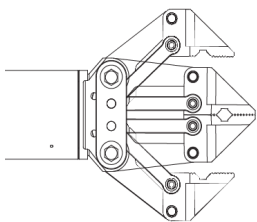
Reliable In-Arm Electronics

All downside arm electronics are located inside the manipulator forearm. This configuration greatly reduces the number of electrical connections, simplifying service operations and increasing the system's ability to withstand shock.

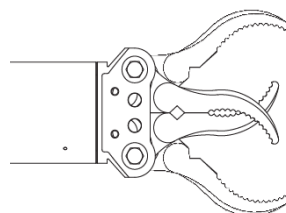
Quick, Easy Diagnostics

The SeaNet cable connector head contains bright LED status indicator lights that allow first-level diagnostics to be performed solely by visual inspection. The lights show electrical power is being delivered to the arm, the controller is transmitting to the arm, and the arm is responding. This information lets the operator quickly determine where to begin troubleshooting, without removing connectors, applying a voltmeter, or opening sealed enclosures. The system also detects missing or reduced arm position sensor signals, and diagnostic lights on the in-arm electronics module indicate system health.

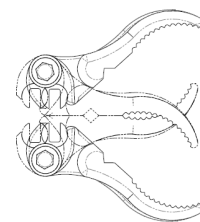
Gripper Options



6-in Parallel



7.5-in Four
Finger
Intermeshing



7.8-in Four
Finger
Intermeshing



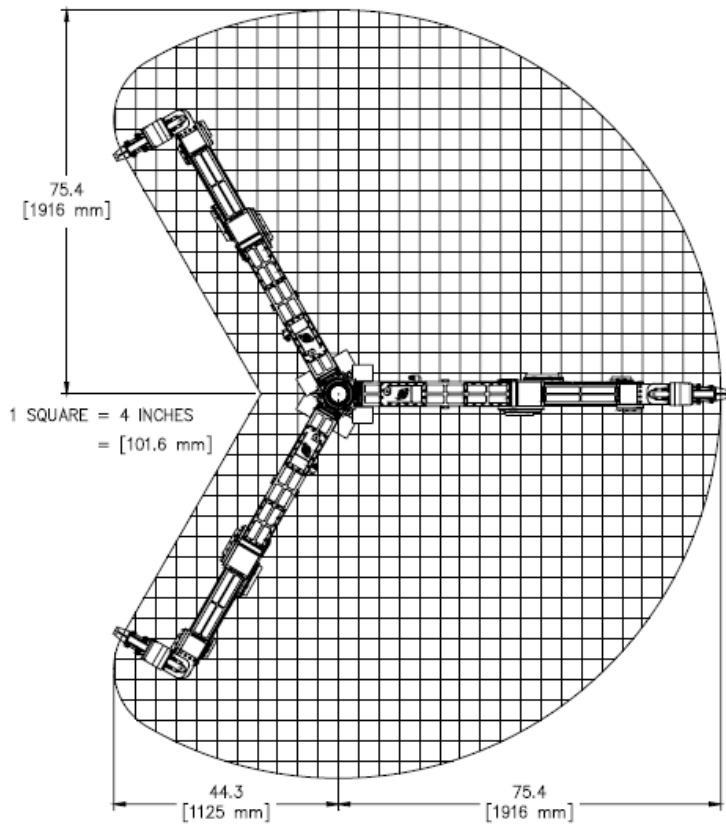
The titanium wrist camera can be ordered already installed on a new TITAN™ 4 manipulator system..

Manipulator Compatibility

We took the most field proven manipulator technologies and used them repetitively throughout the system. The result is a simple, reliable system with high component commonality that minimizes spare part requirements. Many parts are interchangeable throughout the entire manipulator line: TITAN™ 4, Atlas™, RigMaster, and ORION™.

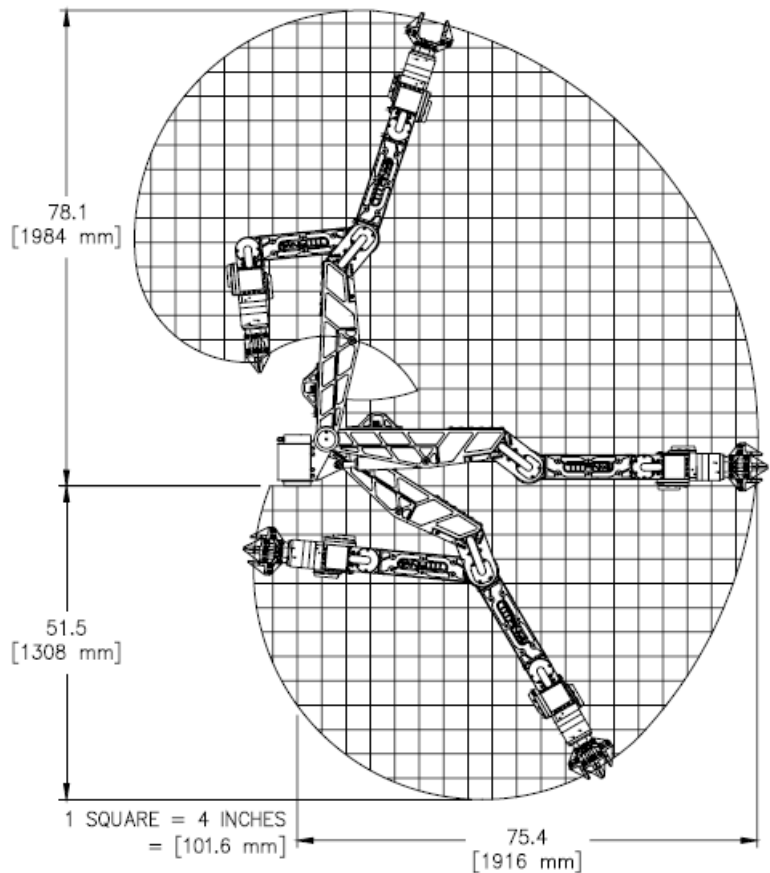
Options and Accessories

- ▶ Extended depth rating to 7,000msw
- ▶ Spares kit
- ▶ Seal installation tool kit
- ▶ Technician's tool kit
- ▶ Dual-manipulator configuration includes two manipulator arms and a single master controller with two replica master arms
- ▶ Radiation hardening (up to 1x10⁷ rad gamma)
- ▶ Titanium wrist-mounted camera

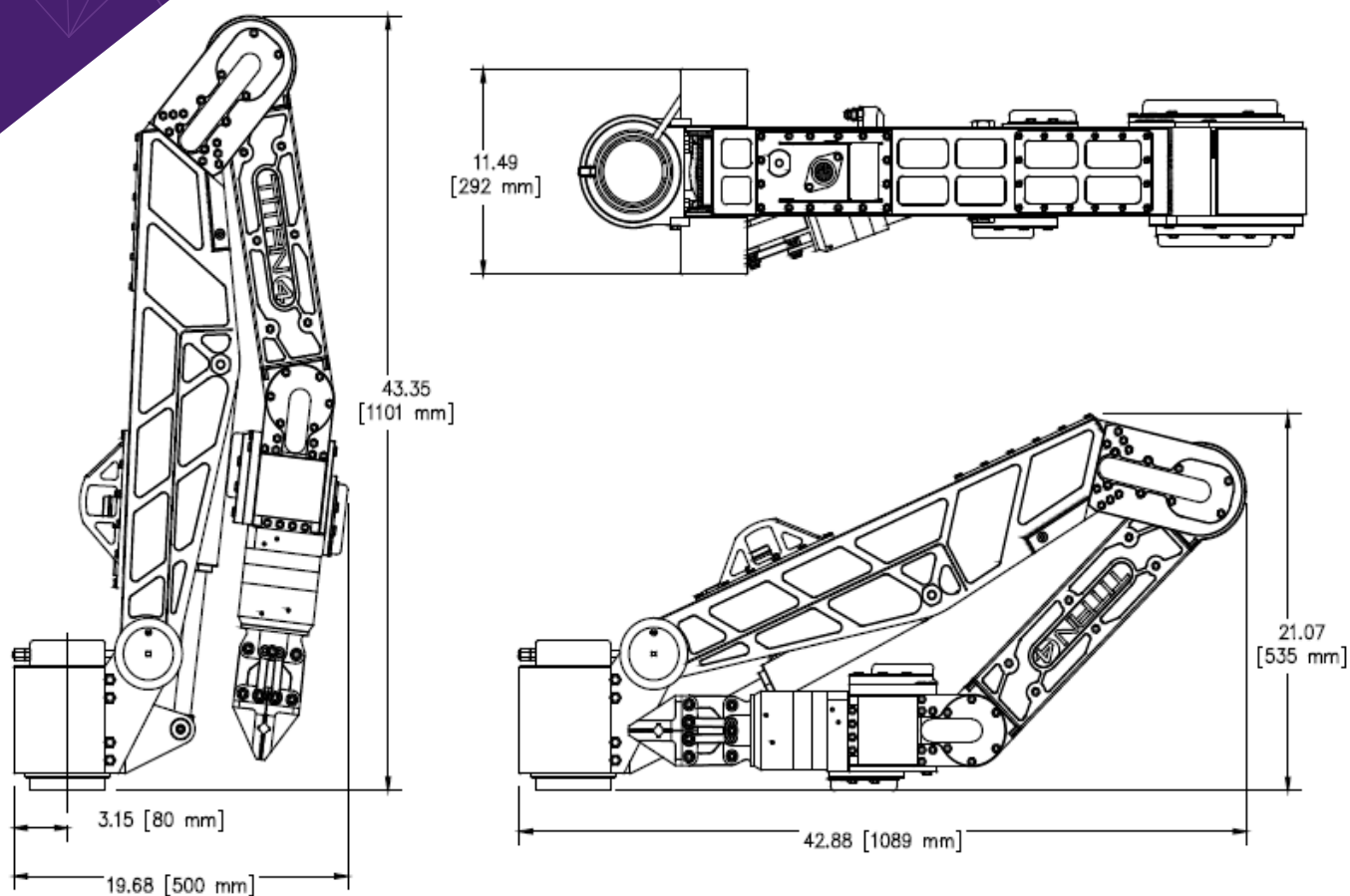


Range
of Motion,
Top View

Range
of Motion,
Side View



Dimension with Arm Stowed



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