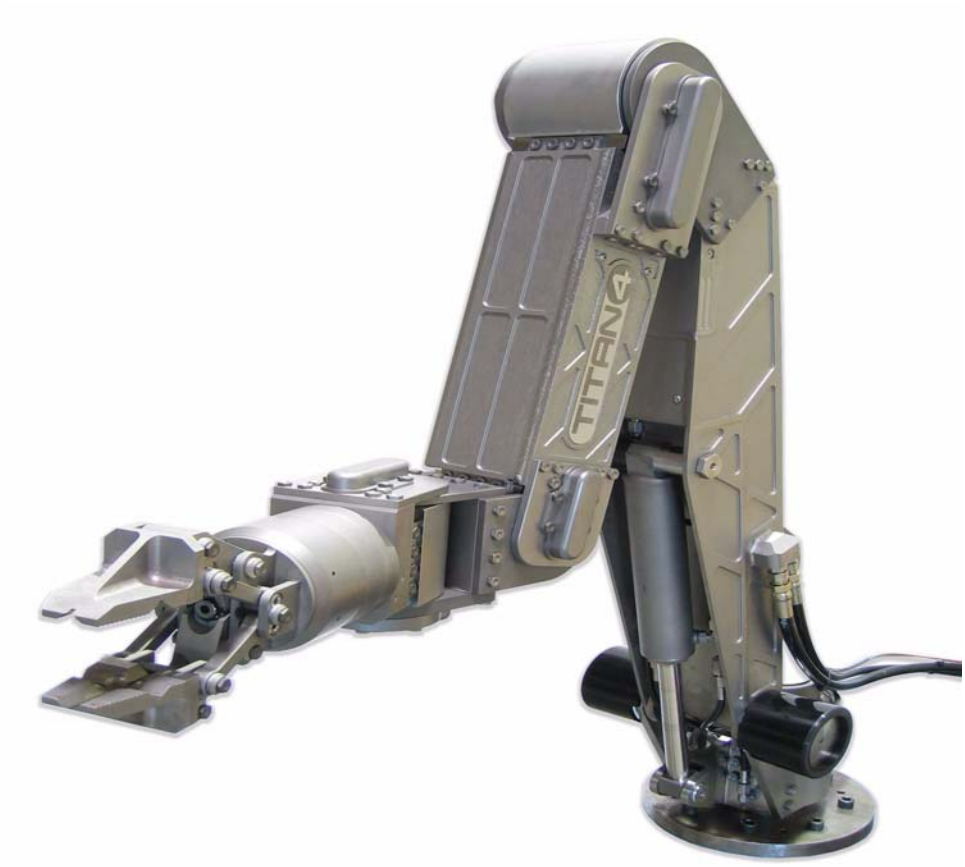
Schilling Robotics
Titan 4 Manipulator System
Position-Controlled, 4 Km Submersible



Models:

199-0295
199-0295PAL
199-0296
199-0299
199-0299-1
199-0300
199-0301
199-0307
199-0308-1
199-0308-2
199-0308-3
199-0308-4
199-0308-7
199-0308-81
199-0324

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TECHNICAL MANUAL REVISION LOG		
Titan 4 Manipulator System, Model Nos. 199-0295, 0295PAL, 0296, 0299, 0299-1, 0300, 0301, 0302, 0307, 0308-1, 2, 3, 4, 7, 8		
TECHNICAL MANUAL: 011–8239		
Description	**Date**	**Rev.**
Manual release	March, 2012	**A**
T4 O7P compatible, 8 pin 20 shell burton connector	June, 2012	**B**

Table of Contents

Specifications

Installation

Operation

Troubleshooting

Maintenance & Service

Drawings & Part Lists

Safety & Service Summary

Precautionary Notices

This manual provides precautionary notices which carry important information about safety risks to personnel and damage to equipment while installing, operating, servicing, or maintaining this equipment.

The form and significance of the notices are shown below.

WARNING

A WARNING alerts you to a risk of injury or loss of life. It may also include instructions to help minimize or eliminate the risk.

!Caution

A CAUTION alerts you to a risk of equipment damage or loss. It may also include instructions to help minimize or eliminate the risk.

NOTE: *The absence of WARNING and CAUTION notices does not mean that risk is absent. Always use appropriate safety procedures, equipment, and personal protective equipment (PPE) when operating and servicing this equipment.*

Service Assumption

This manual assumes that service personnel are familiar with the general operating principles, safety guidelines, and service practices associated with the types of equipment represented in this manual.

Security Password

Model No._____

Serial No._____

Level 5 Password

This is your level 5 password: 1357

WARNING

Misuse of the menus accessible with this password can cause malfunctions of the manipulator system, injury to personnel, and/or damage to equipment.

The password for security level 5 is set at the factory and cannot be changed. It provides access to all configurable system menus, including those for setting other security levels and passwords for other operators. See the OPERATION module in your technical manual for complete information on how to use the level 5 password.

Temporary Password, Levels 1-4

The temporary password **0000** is provided for access to security levels 1 through 4 during installation and first startup. This password can be changed to meet your security level requirements.

Security Level 0

Security level 0 is the default level, always available at system startup and requiring no password. While permitting operation, it restricts access to almost all system configuration menus and security features. An operator using a correctly configured manipulator should need no higher privilege level. Levels above 0 require passwords and allow access to specific manipulator system configuration menus.

Specifications

In This Chapter:

NOTE: *The specifications in this chapter apply to the systems listed on the title page, except as noted. The components specific to each system are itemized in the 199-level part lists at the end of the "Drawings & Part Lists" chapter.*

1 System

1.1 Electrical

System supply at junction box . . . . . 90 to 260 VAC, 50-60 Hz, single-phase

1.2 Telemetry

Default protocol RS-232

User-selectable option . . . . . RS-422/-485 half-duplex 2-wire

NOTE: *RS-485 full-duplex telemetry (4-wire) is not supported.*

Default baud 19200

User-selectable options . . . . . 57600 and 115200 baud

NOTE: *At 57600 and 115200 baud, additional slave arm joint position data is added to each data packet, however third-party software is needed to utilize it.*

2 Password

Access to some master controller menus is password protected. A password information sheet follows the "Table of Contents" section.

- Specifications

3 Slave Arm

3.1 Specifications

Depth rating . . . . . 4,000 msw (13,124 fsw)
Maximum reach . . . . . 1,922 mm (75.7 in.) (from azimuth to gripper T-bar slot)
Weight in air . . . . . 100 kg (221 lb)
Weight in seawater . . . . . 78 kg (174 lb)

NOTE: *Performance specifications use the standard system configuration with Shell Tellus Oil 32 hydraulic fluid, input pressure of 207 bar (3,000 psi) and available flow of 19 lpm (5 gpm).*

Lift at full extension, nominal . . . . . 122 kg (270 lb)
Maximum lift, nominal . . . . . 454 kg (1,000 lb)
Maximum gripper opening (standard gripper), nominal . . . . . 99 mm (3.9 in.)
Grip force, nominal . . . . . 4,092 N (920 lbf)
Wrist torque, nominal . . . . . 170 Nm (125 ft-lb)
Wrist rotation, continuous . . . . . 360°, 6-35 rpm

3.2 Electrical

Connector

The slave arm connector to system power and telemetry varies with the Titan 4 model. See the 199- part list for this system model.

Input power:

Slave arm . . . . . 24 VDC

Power consumption:

Slave in-arm controller plus solenoid . . . . . 6 W start, 12 W run
Slave arm current draw . . . . . 1.875 A, at 24 VDC

3.3 Slave Arm Functions

Function	Actuator	Nominal Range
Azimuth	Rotary	240°
Shoulder pitch	Linear	120°
Elbow pitch	Rotary	270°
Wrist pitch	Rotary	180°
Wrist yaw	Rotary	180°
Wrist rotate	Gerotor	360° continuous
Jaw (standard)	Linear	99mm (3.9-in.)

3.4 Slave Arm Dimensions & Range of Motion

See the slave arm drawing in the “Drawings & Part Lists” chapter for:

- Ranges of motion
- Extended dimensions
- Stow dimensions
- Mounting dimensions

3.5 Sensor

Water detection ..... forearm

4 Master Controller

4.1 Specifications

Length ..... 470 mm (18.5 in.)
Width ..... 177 mm (7.0 in.)
Height ..... 67 mm (2.6 in.)
Weight ..... 3.7 kg (8.2 lb)

4.2 Electrical

Input power:

Master controller ..... 90 to 260 VAC, 50-60 Hz, single-phase

Power consumption:

Master controller ..... 6 W start, 3 W run

5 Environmental

Operating temperature ..... -2 to +54° C (+28 to +130° F)
Storage temperature ..... -15 to +71° C (+5 to +160 ° F)
Humidity ..... 0% to 100% condensing

6 Hydraulics

6.1 Fluids

Select a hydraulic fluid based on its maximum temperature during normal operations.

- Lower than 54°C (130°F): Use 22 grade oil.
- Higher than54°C (130°F): Use 32 grade oil.
- For temperatures above 71°C (160°F), below 0°C (32°F), or when in doubt about which fluid to use, contact your regional technical support representative.
- Do not use water-based fluids.
- If a fluid has been specified for this system to meet special environmental or operational requirements, use it and disregard the parameters listed above.

6.2 System Requirements

Viscosity. . . . . 10 - 200 cSt

Available flow . . . . . 5.7 - 19.0 lpm (1.5 - 5.0 gpm)

Pressure . . . . . .103 bar (1,500 psi) minimum to 207 bar (3,000 psi) maximum

NOTE: *Slave arm performance specifications are determined at maximum pressure and flow. Performance diminishes when pressure or flow are reduced.*

Hydraulic fluid temperature, maximum . . . . . .54° C (130° F)

Return pressure, maximum . . . . . 34.5 bar (500 psi)

Filtration, hydraulic supply. . . . . 3 microns (10 microns absolute)

NOTE: *Use of the recommended filtration will reduce the need to clean or replace the slave arm's internal hydraulic filter (10 microns, 25 microns absolute).*

Return relief valve cracking pressure, nominal . . . . . 500 psi (34.5 bar)

Customer-supplied mating fittings required:

Supply hose fitting -4 JIC female, 1/4-in.

Return hose fitting -6 JIC female, 3/8-in.

7 Compensation

Fluid requirement . . . . . Non-conductive, non-water based

Compensator fluid capacity. . . . . 2.2 l (0.58 gal)

Slave arm fluid capacity. . . . . 9.6 l (2.54 gal)

System total fluid capacity. . . . . 11.8 l (3.12 gal.)

Fluid pressure (above ambient) . . . . . 0.48 to 0.69 bar (7 to 10 psi)

Relief valve cracking pressure, nominal . . . . . .1.4 bar (20 psi)

8 Custom Features or Modifications

Any custom features or modifications present on the supplied Manipulator System are described on the following page(s).