

Valtek StarPac II Intelligent Control System

Valtek Logix Series 2000 Digital Positioner

GENERAL INFORMATION

The following instructions are designed to assist in unpacking, installing and performing maintenance as required on Valtek® StarPac® II Intelligent Control Systems and Logix™ 2000 Digital Positioners. Product users and maintenance personnel should thoroughly review this bulletin prior to installing, operating, or performing any maintenance on the valve.

More detailed operation instructions are included in the StarPac II / Logix 2000 Manual; refer to them when more information is needed.

Separate Valtek Installation, Operation, Maintenance instructions cover the valve (IOM 1 or IOM 27) and actuator (IOM 2 or IOM 31) portions of the system and other accessories. Refer to the appropriate instructions when this information is needed.

To avoid possible injury to personnel or damage to valve parts, users must strictly adhere to WARNING and CAUTION notes. Modifying this product, substituting non-factory parts, or inferior parts, or using maintenance procedures other than outlined could drastically affect performance and be hazardous to personnel and equipment, and may void existing warranties.

WARNING: Standard industry safety practices must be adhered to when working on this, or any, process control product. Specifically, personal protective and lifting devices must be used as warranted.

Unpacking

1. While unpacking the StarPac II / Logix 2000 unit, check the packing list against the materials received. Lists describing the system and accessories are included in each shipping container.
2. When lifting the system from the shipping container, position lifting straps to avoid damage to tubing and mounted accessories. Systems with valves up to eight inches may be lifted by actuator lifting ring. On larger systems, lift unit using lifting straps and hooks through the yoke legs and outer end of body.
WARNING: When lifting a valve/actuator assembly with lifting straps, be aware the center of gravity may be above the lifting point. Therefore, support must be given to prevent the valve/actuator from rotating. Failure to do so can cause serious injury to personnel or damage to nearby equipment.
3. In the event of shipping damage, contact your shipper immediately.
4. Should any problem arise, contact your Valtek Control Valve representative.

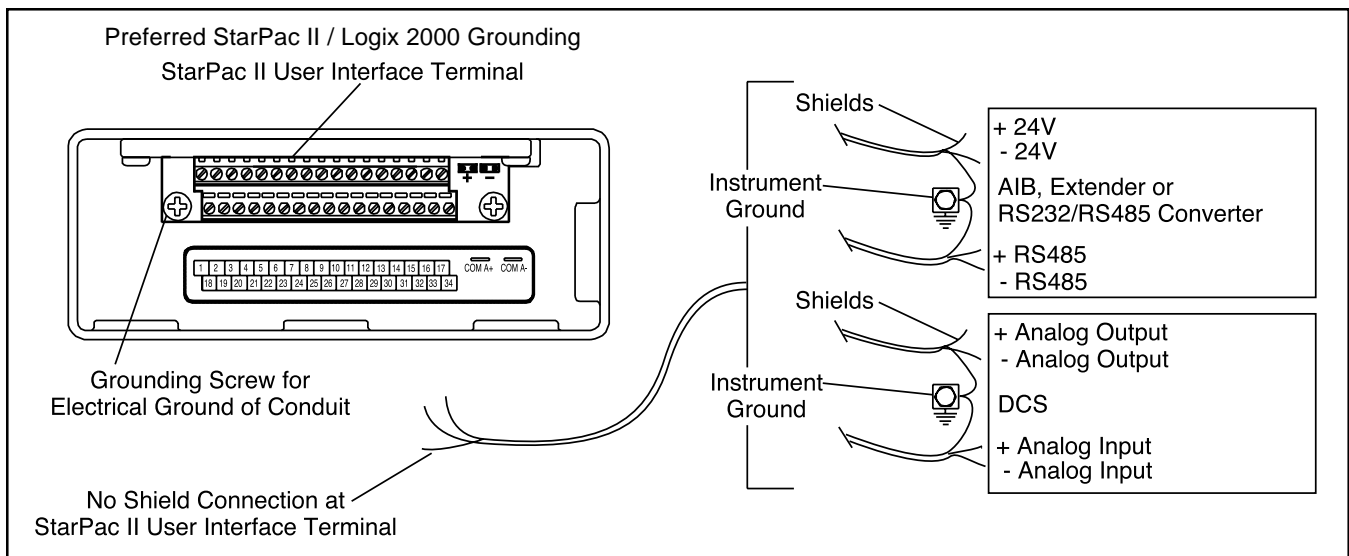


Figure 1: Shielded Wire Diagram

Tools required for StarPac II / Logix 2000 Maintenance and Start-up

1. Multi-meter w/alligator clips, probes & jumpers
2. 4-20 mA analog calibrator with power supply
3. RS-232-485 communication and cabling
4. Windows™ compatible PC
5. Standard 6-inch flat screwdriver
6. Standard phillips screwdriver
7. 1/4-inch flat screwdriver
8. Small wire cutter (flush cut) & wire strippers
9. Needle-nose pliers
10. 1/16-inch allen wrench
11. Vise grips
12. Small vise grips
13. 1/2-inch nut driver
14. 5/32-inch allen wrench
15. Large crescent wrench (minimum 15-inch)
16. 8-inch channel lock pliers
17. 3/32-inch screwdriver
18. Wrist grounding strap
19. Antistatic bag or packaging
20. EPROM remover (PLCC type)
21. Electrical tape
22. Feedback shaft tool and drive module pressure calibration connectors (supplied with feedback module kit)

INSTALLATION

Valve Installation

The StarPac II / Logix 2000 Intelligent Control System valve is installed in the same manner as a conventional control valve and according to industry standards. Refer to the appropriate valve installation, operation, maintenance instructions for proper installation procedures.

If the StarPac II is being installed in an insulated process line, do not place more than four inches of insulation around the pressure or temperature sensors; otherwise the sensors may not operate properly. In addition, *NEVER* insulate the unit electronics assembly or remote-mounted temperature/pressure sensors (when used).

CAUTION: Do not insulate the StarPac II / Logix 2000 electronics housing or remote-mounted pressure or temperature sensors; otherwise excessive heat may build up and affect operation.

Wiring and Grounding Guidelines

This section will help you achieve a maximum “noise-free” environment and performance with a StarPac II / Logix 2000 unit.

Shielding Versus Grounding

All signals to the StarPac II / Logix 2000 unit should be in shielded cables. Shields must be tied to a ground at only one end of the cable to provide a place for environmental electrical noise to be removed from the cable. A ground wire (unlike a shield) is attached at both ends to provide a continuous path for electrical conductivity.

Grounding Screw

The green grounding screw by the user interface terminal block should be used to provide the unit with an adequate and reliable earth ground reference. This ground should be tied to the same ground as the electrical conduit. Additionally, the electrical conduit connecting to the unit should be earth grounded at both ends of its run. *The green grounding screw must not be used to terminate signal shield wires.*

24VDC Power

The 24 VDC connection points will work best with shielded twisted pair wire with the shield wire connected

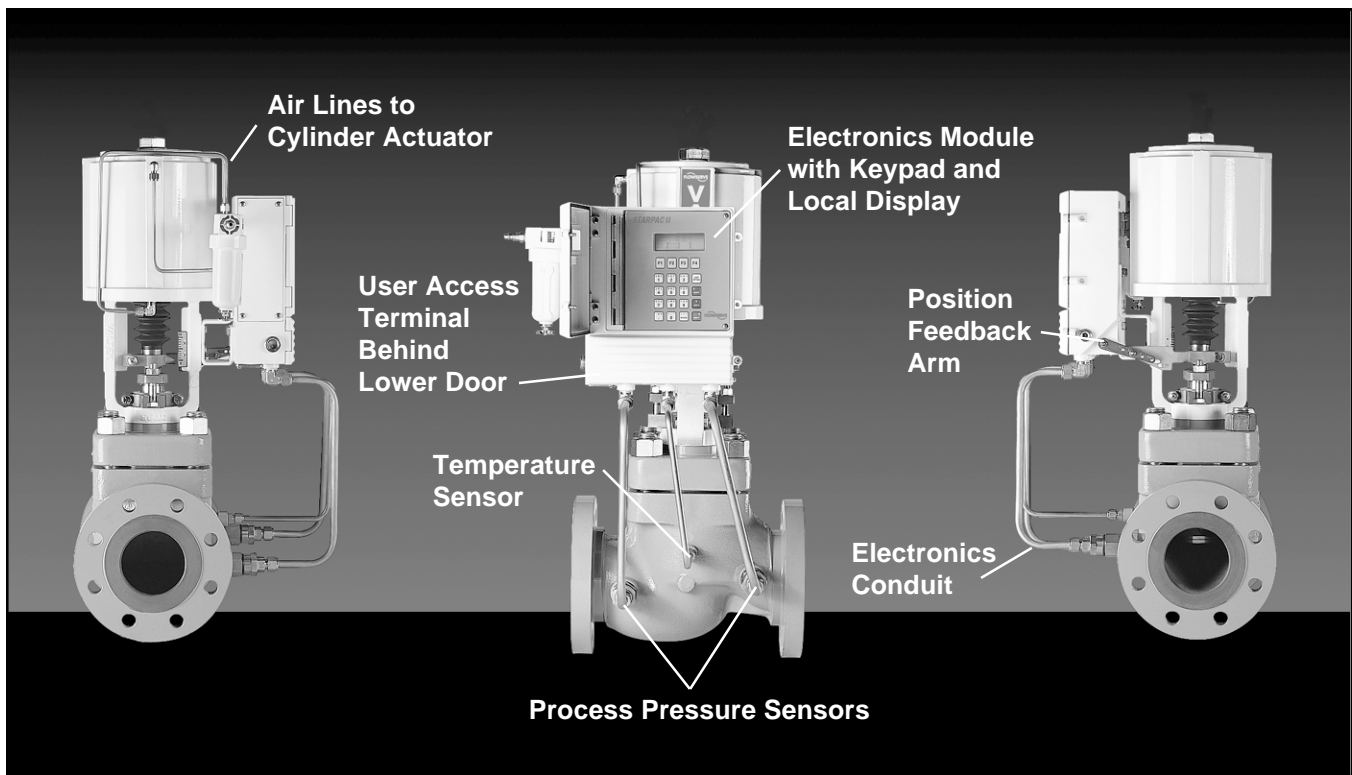


Figure 2: StarPac II / Logix 2000 Intelligent Control System Components

only at the source. The input power is isolated within the unit and may be referenced to whatever level is necessary. **The 24 VDC power supply should not be connected to earth ground.**

RS-485 Communication

RS-485 wiring requires the use of a shielded twisted pair cable, which is grounded only at the source and not in the unit. (For maximum performance, wire should have a characteristic impedance of 120 ohms.) The RS-485 input is fully isolated, using opto-isolators.

The RS-485 allows only a 7 to 12 V common mode voltage differential between stations. Valtek's RS-232 to RS-485 converter is not a grounded connection. PC's with internal RS-485 cards, on the other hand, are often grounded. If another ground communication device is on the network, a fault condition will almost certainly exist due to transient and steady state differences in ground potential.

4 - 20 mA Command Input, Auxiliary Input, and Feedback Output

These signals are isolated but shielded twisted pair wire should be used to reduce crosstalk from other signals. The shield should be connected only at the source.

Discrete Inputs and Outputs

These signals are isolated, but because they are frequently used to switch high voltage (120 VAC), they should be run in separate shielded wire paths away from the other StarPac II / Logix 2000 signals.

AIB and RS-232 to RS-485 Converter Connection

When connecting a StarPac II / Logix 2000 unit to a communication device, no shield or ground connections exist. Hence, the 24 VDC power and RS-485 communication shield drain wires must be connected to a convenient ground near the AIB or converter.

Wiring The StarPac II / Logix 2000 System

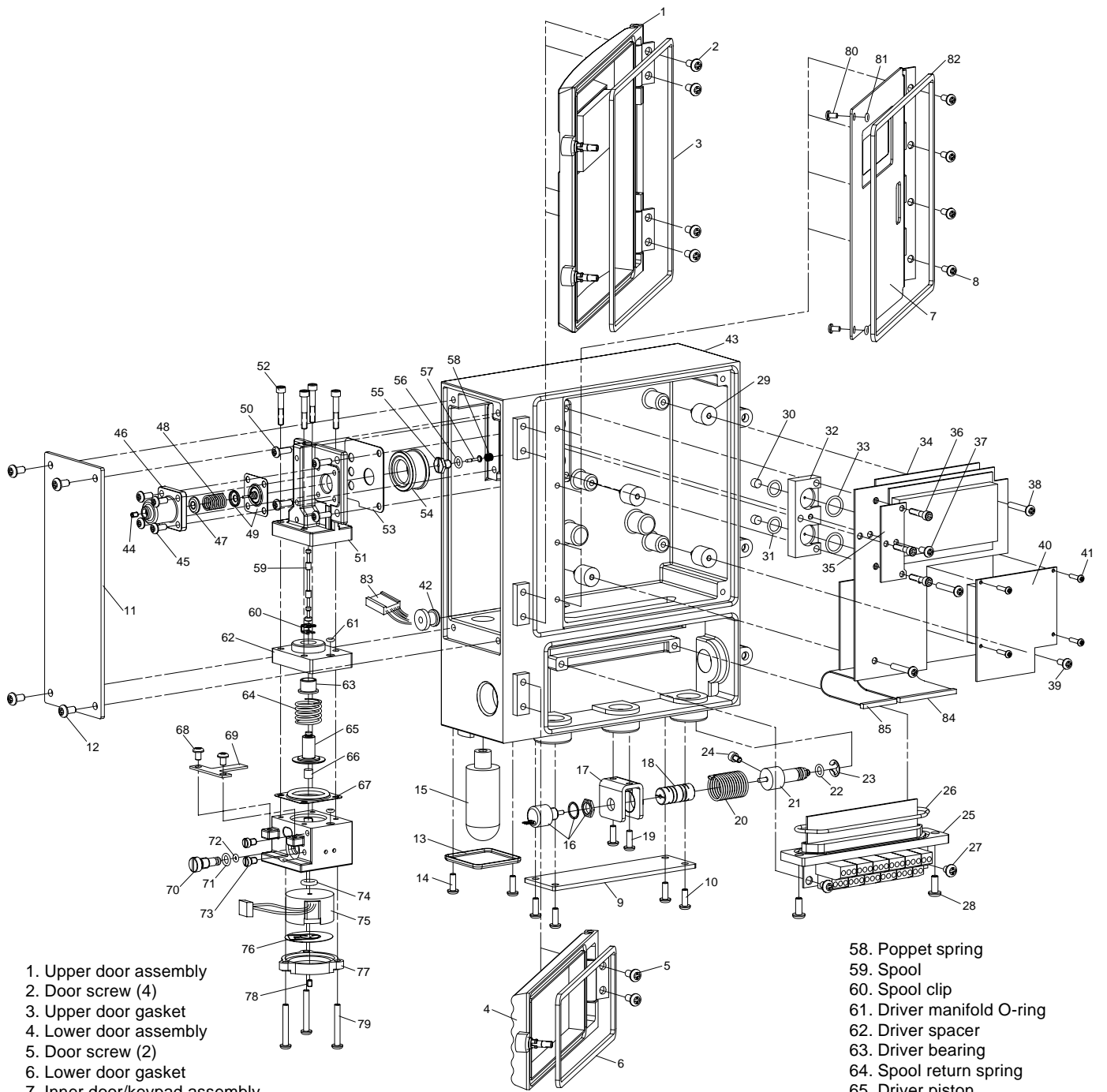
All electrical connections must be done according to local and industry electrical codes. Valtek recommends a shielded cable be used for the RS-485 command signal wire (e.g., Belden 9841 or equivalent).

When connecting multiple StarPac II / Logix 2000 units, a parallel daisy-chain wiring pattern is used. Connect unit's branch lines to main line, keeping branch lines as short as possible. The total length of wiring should not exceed 4,000 feet (1,200 meters) without use of repeaters.

Avoid devices producing electrical 'noise' while installing the cable.

CAUTION: The following procedure should be performed on the bench or with the unit isolated so that unexpected valve stroking will not adversely affect the process.

WARNING: The following procedures may cause the valve to stroke, causing pressures and temperatures to vary from their norms. Notify appropriate personnel that the valve may stroke unexpectedly. Valtek suggests that the system be isolated from the process, if installed in line.



- 1. Upper door assembly
- 2. Door screw (4)
- 3. Upper door gasket
- 4. Lower door assembly
- 5. Door screw (2)
- 6. Lower door gasket
- 7. Inner door/keypad assembly
- 8. Inner door screw (4)
- 9. Feedback cover assembly
- 10. Cover screw (4)
- 11. Driver cover assembly
- 12. Cover screw (4)
- 13. Hydrophobic filter cover
- 14. Cover screw (2)
- 15. Hydrophobic filter
- 16. Hall potentiometer assembly
- 17. Potentiometer bracket
- 18. Flex couple
- 19. Bracket screws (2)
- 20. Torsional spring
- 21. Feedback shaft
- 22. Shaft O-ring
- 23. Retaining ring
- 24. Screw, hard stop
- 25. Feedthrough assembly
- 26. Feedthrough O-ring
- 27. Board screw (2)
- 28. Block screw (2)

- 29. Isolator (4)
- 30. Filter (2)
- 31. Adapter O-ring, lower (2)
- 32. Pressure sensor adapter
- 33. Adapter O-ring, upper (2)
- 34. StarPac II / Logix 2000 board assembly
- 35. Board stiffener
- 36. Board assembly screw (3)
- 37. Board stiffener screw
- 38. Board assembly screw (3)
- 39. Board assembly screw
- 40. Personality card
- 41. Personality card screw (4)
- 42. Rubber grommet (2)
- 43. Housing assembly

- 44. Regulator set screw
- 45. Regulator housing screw (4)
- 46. Regulator housing
- 47. Spring button
- 48. Regulator spring
- 49. Regulator diaphragm assembly
- 50. Driver module mounting screw (4)
- 51. Pilot valve
- 52. Pilot valve screw (4)
- 53. Pilot valve gasket
- 54. Regulator filter
- 55. Poppet guide
- 56. Poppet O-ring
- 57. Poppet

- 58. Poppet spring
- 59. Spool
- 60. Spool clip
- 61. Driver manifold O-ring
- 62. Driver spacer
- 63. Driver bearing
- 64. Spool return spring
- 65. Driver piston
- 66. Magnet
- 67. Driver manifold diaphragm
- 68. T-board screw (2)
- 69. T-board
- 70. Orifice screw
- 71. Orifice screw O-ring
- 72. Orifice O-ring
- 73. Testing plug (2)
- 74. Coil O-ring
- 75. Pressure modulator assembly
- 76. Spring diaphragm
- 77. Modulator cover
- 78. Modulator set screw
- 79. Modulator screw (3)
- 80. Inner door screw (2)
- 81. Inner door screw O-ring (2)
- 82. Keypad gasket
- 83. Wire harness
- 84. 24-pin ribbon cable
- 85. 14-pin ribbon cable

Figure 3: Exploded View

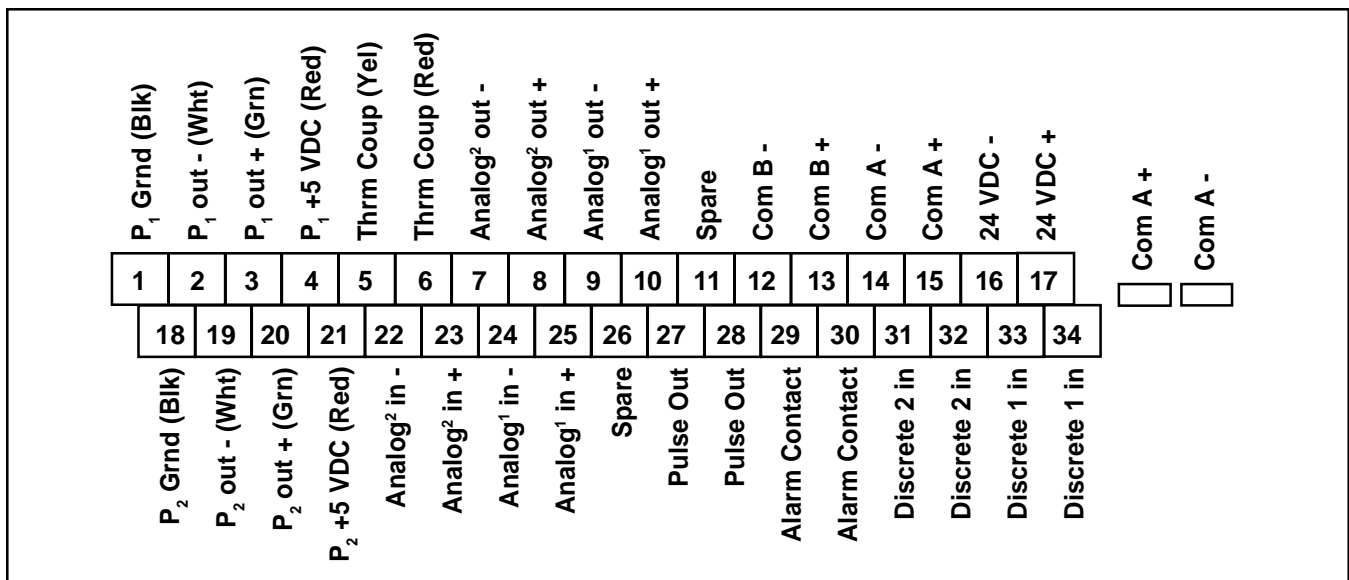


Figure 4: User Interface Terminal Pinouts

To connect the wiring to the StarPac II / Logix 2000 unit, refer to Figures 1 and 4, and Table I, then proceed as follows.

1. Open the lower door on the front of the housing.

WARNING: Do not open the electronic housing covers in flammable atmospheres; otherwise, possible injury to personnel or equipment may occur.

2. Connect the required wires to the terminal interface block and computer as described in Figure 4 and Table I. (The system must have 24 VDC power for operation.)

NOTE: The StarPac II / Logix 2000 unit remembers the operating mode setting (automatic or manual) from the last time the unit had power. When power to the system is turned on again, the unit will resume operation in the previous mode.

Normally the unit arrives from the factory set in the manual analog operating mode. This means a command signal will position the valve the same as a traditional control valve, providing a plug position proportional to the 4 - 20 mA signal.

To avoid upsetting the process because of improper operating mode selection:

- Ensure that the system arrived from factory with the proper operating mode setting in the shop prior to installation by connecting air supply and command signal, then turning on the power and looking at the mode value on the local display, or;
- Set the proper operating mode for the particular application in the shop prior to installation by selecting the desired operating mode from the local interface or in the Tuning/Tune screen of the StarTalk software, or;

- Ensure that the block valves in the process line around the unit are closed and the process is diverted around the unit.

**Table I:
User Interface Terminal Connections**

Signal	Negative Term. No.	Positive Term. No.
24 VDC power	16	17
Valve command signal	24	25
Primary RS-485 communication link	14	15
Secondary RS-485 communication link	12	13
Auxiliary input (4-20 mA)	22	23
Analog output (4-20 mA) 1	9	10
Analog output (4-20 mA) 2	7	8
Discrete input 1 – switch/solenoid monitoring (discrete mode source input)	33	34
Discrete input 2 – switch/solenoid monitoring	31	32
Discrete output 1 (malfunction alarm contact)	29	30
Discrete output 2 (pulse)	27	28

3. Turn on the 24 VDC power to the unit, and verify that it has been correctly wired by checking the following:
 - 24 VDC power is at least 300 mA and between 18.0 and 64.0 VDC
 - Polarity is correct
 - Local display is on; if not, check the power supply.
4. Close the front cover on the housing of the unit.

System Communication Default Configuration

StarPac II / Logix 2000 units are shipped from the factory ready for installation and operation. Rarely do the units need to be re-configured prior to operation. Table II lists the factory default communication settings. If these settings are not correct for the equipment being used, proceed to the following sections.

Table II: Factory Default Mode Settings

Description	Setting
Address	1
Parity	odd
Baud Rate	19,200
Modbus Communication Mode	RTU
RS-485 Termination Resistors	Installed

Selecting Correct Address Setting

If the StarPac II / Logix 2000 unit is the only one on the communication network, the default address (1) is fine.

If multiple units will be operating on the same communication network, each unit must have a unique address. Before changing the address, the StarTalk software can be used to determine what devices are on the line. (Remember to include devices that may be temporarily off line.)

If the default address setting needs to be changed, use the 'Comm' option in the configuration menu of the local interface to change the settings.

Selecting Correct Baud Rate Setting

StarPac II / Logix 2000 units support baud rates of up to 57,600 baud. However, both the StarPac II / Logix 2000 system and StarTalk software are shipped from the factory set to 19,200 baud.

If the default baud rate setting needs to be changed, use the 'Comm' option in the configuration menu of the local interface to change the settings.

Selecting Correct Modbus Transmission Mode

Two transmission modes exist in a Modbus system, ASCII and RTU (default). Use the ASCII mode when transmitting information through a device that uses ASCII control codes; for example, a modem. Use the RTU mode when connecting directly to both devices; for example, an RS-485 interface card wired directly to a StarPac II / Logix 2000 system.

If the default Modbus transmission mode setting needs to be changed, use the 'Comm' option in the configuration menu of the local interface to change the settings.

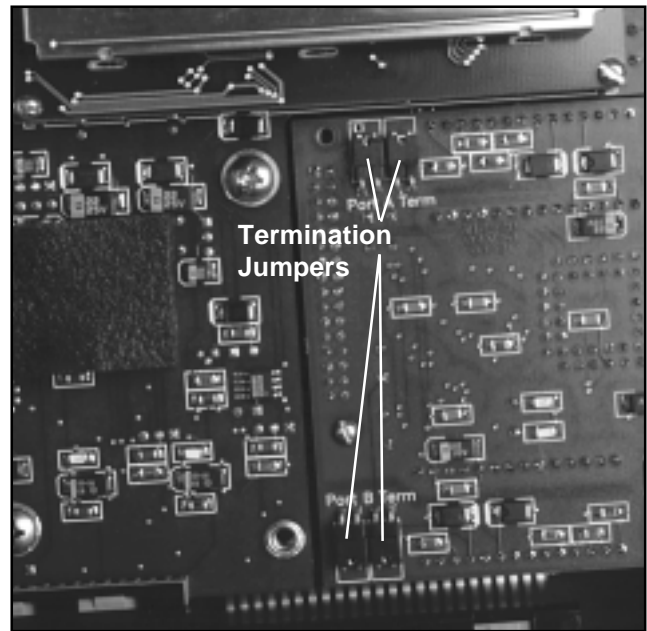


Figure 5: Termination Jumpers and Personality Module

Selecting Proper RS-485 Termination Resistor Setting

A termination resistor must be installed on the two most remote devices on the network, counting the host computer as any other device.

(For example, a single StarPac II / Logix 2000 unit and the RS-485 driver in the host computer would each require the termination resistor to be installed. If four units were on the network with a host computer, decide which of the two devices have the most combined cable length between them. These two devices should have the termination resistors installed. The termination resistors should be disabled in the devices not considered to be the most remote using the instructions in the next section. Using more than two termination resistors in a network can cause the RS-485 communications to operate erratically or fail.)

To enable 120 ohms termination, insert both jumpers for A and B channels. To disable termination, remove both jumpers from each channel as shown in Figure 5.

SYSTEM MAINTENANCE

Valtek recommends that the StarPac II / Logix 2000 system calibration be checked every six months. If, after checking the unit, a component is determined to be defective, the following section will help with the component replacement.

The following items may be needed to install, start up and calibrate the unit's electronics.

- Power supply: 24 VDC, 300 mA
- Digital volt meter with 4 - 20 mA range
- Air supply: 50 psig minimum, 80-100 psig preferred
- Gauges or the ability to accurately determine process pressures and valve air supply pressures
- 4 - 20 mA command source
- Thermocouple calibrator or simulator with 0 to 500° Celsius range

Mechanical Subsystem Maintenance

Refer to the appropriate Valtek Installation, Operation & Maintenance (IOM) instructions for details on repair and maintenance of the control valve actuator components. Please refer to the manufacturers' manuals for maintenance and operation instructions for non-pneumatic actuators, e.g., electric or electro-hydraulic actuators.

WARNING: The process line must be depressurized and drained of process fluid and decontaminated prior to working on internal valve components. Failure to do so may cause serious injury to personnel.

1. Depressurize the line, decontaminate the valve (if needed) and shut off the air supply to the valve positioner.
2. Disconnect the actuator air tubes from the unit.
3. Disconnect the two mounting bolts that attach the StarPac II / Logix 2000 system bracket.
4. Disconnect the follower arm from the unit base. This is done by removing the follower arm nut and washer and pulling the arm off the shaft. Notice that this shaft connection is keyed and that the shafts are slightly spring loaded.
5. The actuator subassembly is now isolated and is removed by loosening the bonnet bolts and lifting the actuator away from the body.

The tubing holds the StarPac II / Logix 2000 base in place, eliminating the need to disconnect wiring or air connections.

6. Standard valve maintenance may now be done on the actuator or valve body components. Refer to the Valtek IOM instructions for details on such things as trim or packing replacement. If you have to replace the trim, use the same trim number and characteristic as the original trim so the flow calculations are not affected. If a trim size change is needed, contact your Valtek representative to find out about flow characterization options.
7. Reassemble the system by reversing the above steps. Be sure to follow the procedures outlined in the Valtek IOM instructions for valve reassembly. When reconnecting the follower arm, make sure that the arm fits correctly on the keyed shaft and has a positive spring action.

8. Turn on the air supply to the valve and check for leaks in the reattached actuator tubing lines.
9. Turn on power to the unit. Check the system calibration and perform a Valve Stroke Calibration to reset the position feedback. Refer to the Calibration section of the StarPac II / Logix 2000 manual.

StarPac II / Logix 2000 Positioner Overview

The StarPac II / Logix 2000 is double-acting, capable of supplying air to either side of the actuator piston while exhausting the other side to the atmosphere. Also, the positioner can be mounted on either Valtek linear or rotary actuators without modification to the actuator.

The positioner is pending non-incendive for class I, division II, groups A, B, C, and D; class II, groups E, F, and G. Since the positioner is insensitive to supply pressure changes and can handle supply pressures from 30 to 150 psig, a supply regulator is usually not required; however, an air filter is required due to the close tolerances of the spool assembly.

NOTE: The air supply should conform to ISA Standard S7.3 (a dew point at least 18° F below ambient temperature, particle size below 5 microns, oil content not to exceed 1 part per million).

Positioner Operation

The StarPac II / Logix 2000 Positioner is an electric feedback instrument. Figure 6 shows a StarPac II installed on a double-acting actuator for air-to-open action. Positioning is based on a balance of two signals: one proportional to the modulator input signal and the other proportional to the stem position.

The supply pressure for the positioner modulator is tapped off the main supply and is filtered as it passes through a field-replaceable, coalescing filter element in the module. Next it passes through an internal pressure regulator that regulates it to approximately 22 psig. The air then goes through an orifice that restricts the flow and air consumption (refer to Figure 6).

The air is further controlled to 6-12 psig using a spring-diaphragm flapper that is attracted by an electromagnet to a nozzle. A temperature compensated hall effect sensor mounted on a circuit board senses the spool valve position. The hall effect sensor and circuitry create a feedback loop, which determines how much current to send to the electromagnet for a desired spool valve position. The electromagnet in the feedback loop varies the nozzle-flapper spacing, which regulates the output pressure to 6-12 psig proportional to the command input signal.

When these opposing signals are equal, the system will be in equilibrium and the stem will be in the position called for by the command signal. If these opposing

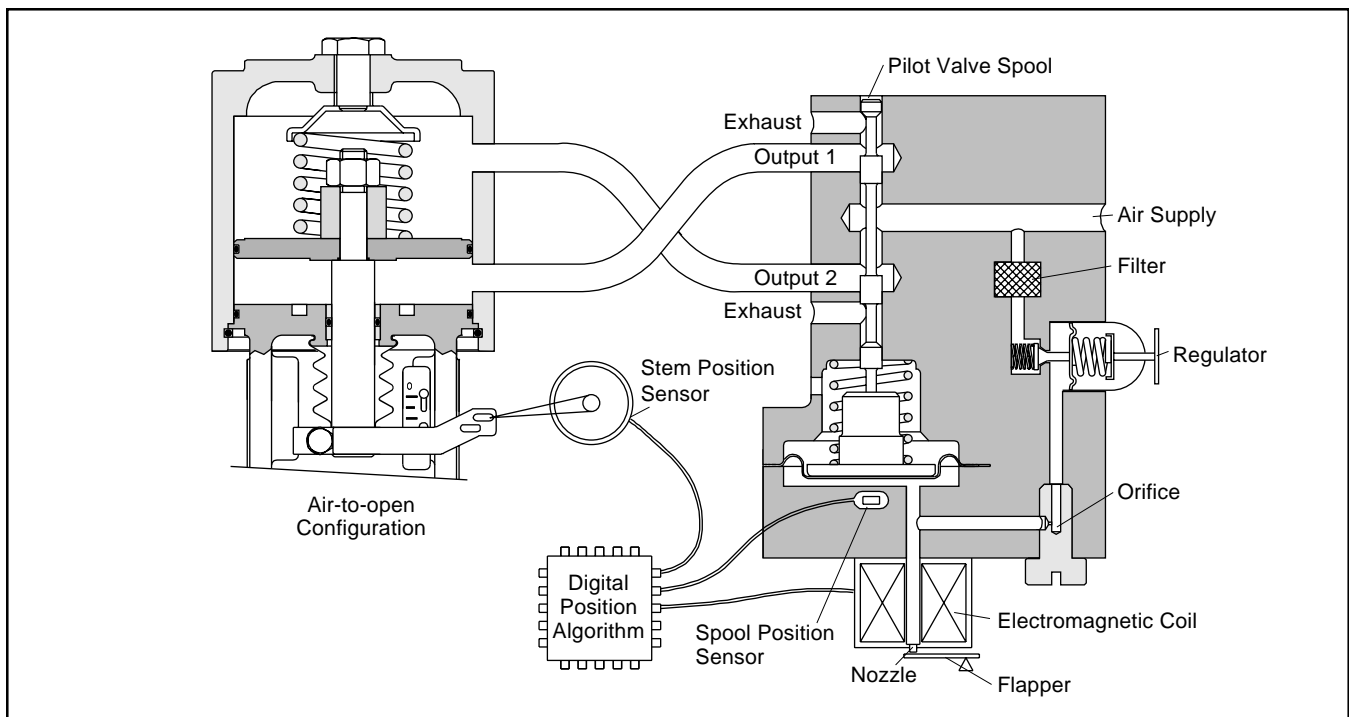


Figure 6: Positioner Diagram

signals are not equal, the spool valve will move up (or down) and, by means of the modulator, will change the output pressures and flow rate. This will cause the piston to move until the signal of the feedback sensor equalizes with the command signal.

The detailed sequence of positioner operations are as follows: An increase in the command signal forces the modulator signal capsule and spool valve upward. This motion of the modulator also pushes the pilot valve spool upward from its equilibrium position. This opens the pilot valve ports, supplying air to port one and exhausting air from port two. This causes the actuator piston to move upward.

This upward motion of the piston is transmitted back to the positioner through the feedback linkage and hallpot sensor signal changing proportionally to the valve position. The piston continues to stroke upward until the signal of the feedback sensor increases sufficiently to counter the signal being sent to the modulator. At this point, the spool is at its equilibrium position as the pressures in the cylinder stabilize and the air flow to the actuator decreases.

After the piston has reached the required position, the feedback signal will equal the spool position generated in the modulator capsule. The computer will then make small null adjustments to fine-tune the desired position and compensate for changes in dynamic loading.

A decrease in the command signal reverses the described actions causing a proportional downward movement of the actuator piston and stem.

Position Feedback System

The position feedback linkage of the StarPac II / Logix 2000 system is a critical part of the system. This linkage is also used in the StarPac II to calculate the valve's C_v for a given stroke for flow measurement. This linkage should be lubricated and checked periodically for tight, smooth operation. The follower arm should operate smoothly with no binding and have a positive spring loading on the arm. Inspect the follower arm pin for excess wear and replace if needed. The take-off arm attached to the stem clamp must be firmly secured to the stem clamp and perpendicular to the actuator stem. If this takeoff arm is canted or misaligned, problems may occur with positioner calibration and the position reading on the unit may go out of range.

On rotary actuators, make sure the adjustment linkage locknut is tight and has no excessive play in the ball joints. The rotary shaft clamp must be tight and should not freely rotate on the shaft.

Pressure Sensor Replacement

Standard StarPac II pressure sensors are typically installed directly into the control valve body. Before they can be removed, the process line must be depressurized and drained of all fluids and the valve decontaminated.

To replace a pressure sensor, refer to Figure 7 then proceed as follows.

WARNING: The process line must be depressurized and drained of process fluid, and decontaminated prior to working on internal valve components. Failure to do so may cause serious injury to personnel.



Figure 7: Disconnecting Lemo Connector

WARNING: If the pressure sensors are remote-mounted, the sensor will be located in a sensor housing in the tubing line and not in the sensor housing located on the valve body. This section of the tubing contains process fluid and must be drained and decontaminated before the sensor is removed. The procedure for sensor removal and replacement will be similar to that outlined below.

(Refer to alternate sensor information when this type of sensor is included with system.)

1. Depressurize and decontaminate the line and valve. Loosen the tubing nuts on the conduit leading to the pressure sensor, if applicable.
2. Loosen the sensor nut.
3. Gently pull the conduit and sensor nut approximately $\frac{1}{2}$ to 0.75-inch from the sensor. Use needle nose pliers to release the locking sleeve of the Lemo™ connector by moving the collar away from the sensor and disconnect the connector from the sensor. Swing the sensor conduit out of the way (refer to Figure 7).
4. Unscrew the sensor from the sensor boss.
5. Remove the sensor O-ring or gasket and replace with a new one. Make sure the environmental O-ring seal is in good condition and in place on the new sensor.
6. Install the new sensor into the sensor port making sure the O-ring or gasket remains properly in place while tightening the sensor. Tighten the sensor until it seats metal-to-metal at the gasket section of the sensor port, ensuring the proper compression of the process O-ring or gasket seal.

7. Align the red dots on the sensor and connector, and reconnect the Lemo connector. Fully seat the connector until the locking sleeve latches. Replace the sensor nut and tighten.
8. Pressurize the valve body to make sure the sensors are properly seated before attaching the sensor conduit and tightening.
9. Reattach the conduit lines and securely tighten the fittings.

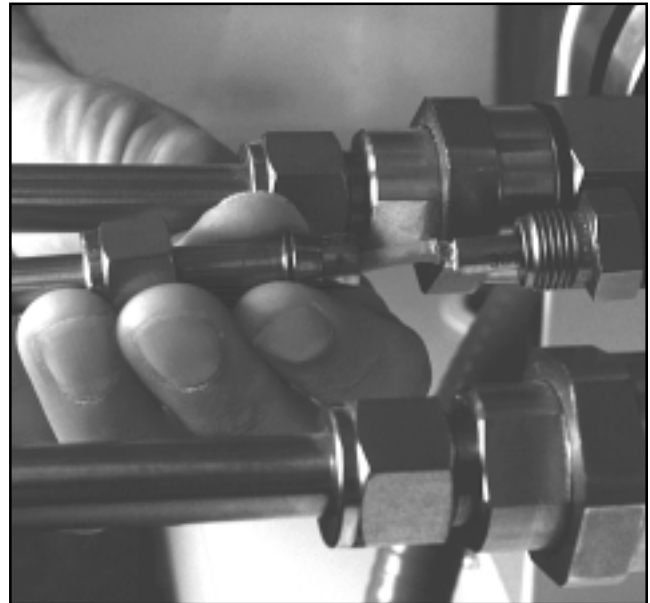


Figure 8: Thermocouple Replacement

Thermocouple Replacement

In normal configuration, the thermocouple does not penetrate the valve body wall. Depressurizing the body *is not necessary* when replacing the thermocouple.

NOTE: If the StarPac II was ordered with a special thermocouple option, verify the need to depressurize the body before proceeding.

1. Disconnect power and air supply to the unit.
2. Open the lower terminal block cover and disconnect the red and yellow thermocouple wire.
3. Loosen the tubing nuts on both ends of the thermocouple assembly (refer to Figure 8).
4. Pull the wires out of the StarPac base and slip the tubing off the wires.
5. Unscrew the old thermocouple from the body.
6. Install the new thermocouple.
7. Feed the wires back through the tubing and into the StarPac housing.
8. Tighten the tubing nuts.
9. Cut the thermocouple wires to length. Strip and reattach wires to the terminal block, noting color polarity. (The red wire is the negative signal.)
10. Check that all the fittings are tight.

Keypad Assembly Replacement

If, after consulting with the local Valtek or factory representative, the StarPac II / Logix 2000's keypad is found to be defective and needs replacement, refer to Figure 3 and proceed as follows.

1. Make sure valve is by-passed and in a safe condition.
2. Disconnect the power and air supply to the unit.
3. Undo the two captive screws securing the upper door to the housing and open the upper door.
4. Undo the two screws securing the inner door to the housing and swing the inner door completely open.
5. Carefully disconnect the keypad connector from the board stack.
6. Remove the four hinge mounting screws and remove the inner door.
7. Install the new keypad assembly in reverse order.

Note: When installing a new keypad assembly, check for proper door alignment before final lock-down of hinge-mounting screws.

Feedback Assembly Replacement

If it is determined that the Feedback Assembly needs replacement, refer to Figures 3 and 9 then proceed as follows: (New feedback assembly is preset at the factory.)

1. Make sure valve is by-passed or in a safe condition.
2. Disconnect the power and air supply to the unit.
3. Disconnect the positioner pin and follower arm from the feedback shaft.
4. Remove the four feedback cover screws and remove the cover.
5. Disconnect the three-pin connector from the hallpot while observing the connector orientation.
6. Remove the two potentiometer bracket screws.
7. Remove the retaining ring from the feedback shaft.
8. Thread the feedback shaft tool (provided in the replacement kit) onto feedback shaft and push shaft out of bushing (refer to Figure 9).
9. Remove feedback shaft tool and feedback assembly.
10. To install the new feedback assembly, lightly grease the feedback shaft and apply thread locking compound to the two potentiometer bracket mounting holes. Slide the feedback assembly into the feedback bushing.
11. Thread on the feedback shaft tool and push while turning clockwise, aligning the stroke-stop screw and stop boss. Next, pull back to the seat stop on the housing (refer to Figure 9).
12. Remove the feedback shaft tool and install the retaining ring in the feedback shaft.
13. Using two mounting screws, fasten the potentiometer bracket to the housing, making sure the feedback assembly is aligned and the flex couple is engaged.

14. Reconnect the three-pin connector to the hallpot (in orientation as noted above).
15. Replace the feedback cover and four cover screws. Then perform a stroke calibration.



Figure 9: Feedback Shaft Tool

Regulator Filter Replacement

To replace the regulator filter, refer to Figures 3 and 10 then proceed as follows:

1. Make sure valve is by-passed or in a safe condition.
2. Disconnect the power and air supply to the unit.
3. Remove the four driver module cover screws and set the cover aside.
4. Disconnect the four-pin connector from the T-board, observing the connector orientation.
5. Remove the four driver module mounting screws and remove the driver module.
6. Carefully remove the pilot valve gasket by peeling or scraping.
7. Remove the old regulator filter and insert the new filter (refer to Figure 10).
8. Remove the backing on the pilot valve gasket to expose the adhesive and apply the pilot valve gasket to the housing, making sure that the holes are aligned.
9. Apply thread locking compound to the four mounting holes and fasten the driver module to the housing with the four mounting screws.
10. Reconnect the four-pin connector to the T-board in the orientation as noted above.
11. Replace the driver module cover with the four cover screws.

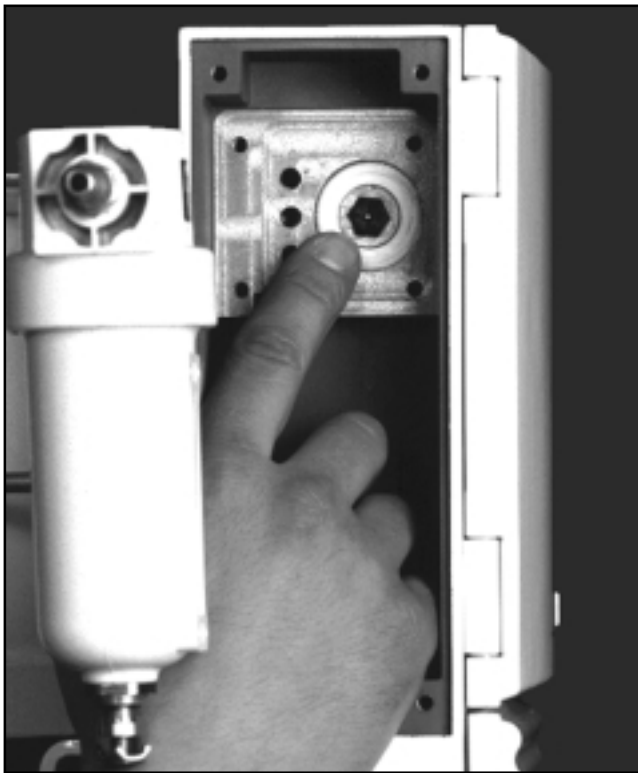


Figure 10: Regulator Filter Replacement

Driver Module Assembly Replacement

To replace the driver module assembly, refer to Figures 3, 10, 11, and 12 then proceed as follows:

1. Make sure valve is by-passed or in a safe condition.
2. Disconnect the power and air supply to the unit.
3. Remove the four driver module cover screws and set the cover aside.
4. Disconnect the four-pin connector from the T-board, observing the connector orientation.
5. Remove the four driver module mounting screws and remove the driver module. (Check the pilot valve and poppet assemblies for wear or deterioration. If needed, continue with steps 6-12. If cleaning only, refer to Spool Valve Assembly Replacement then proceed to step 13 after cleaning.)
6. Carefully remove the pilot valve gasket by peeling or scraping.
7. Remove the poppet guide, poppet O-ring, poppet, and poppet spring.
8. Remove and replace the regulator filter.
9. Insert the new poppet spring into the housing poppet hole.
10. Place the O-ring on the poppet seat.
11. Thread the poppet guide and poppet into the housing and tighten to 6-inch/lbs. maximum (refer to Figure 12).
12. Remove the backing from the pilot valve gasket to expose the adhesive and apply the gasket to the housing, making sure the holes are aligned.

13. Apply thread locking compound to the four mounting holes and fasten the driver module to the housing using the four mounting screws.
14. Reconnect the four-pin connector to the T-board in the same orientation as noted above.
15. Replace the driver module cover and cover screws.

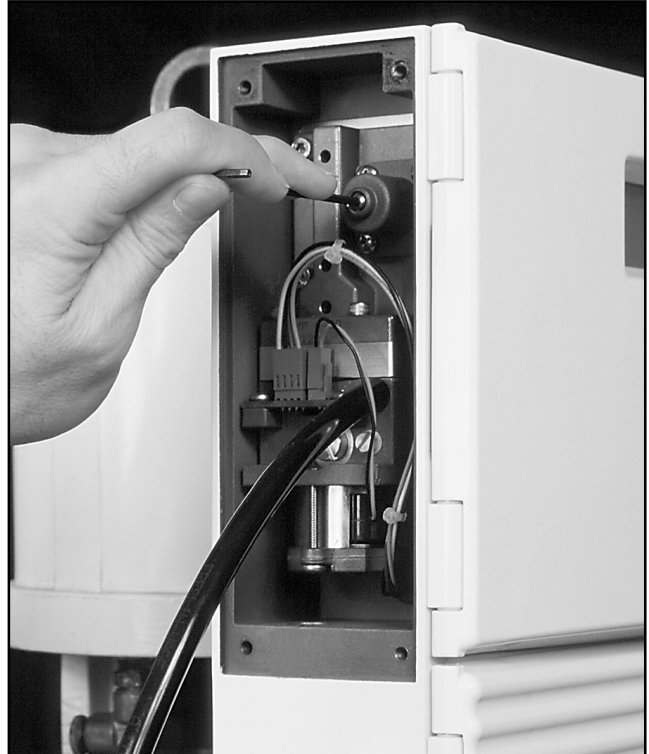


Figure 11: Setting Regulator Pressure



Figure 12: Poppet Guide Installation

Driver Module Calibration

1. Hook power supply (24 VDC) leads to StarPac II / Logix 2000 connector numbers 16 and 17.
2. Hook up supply pressure to the unit, using the port marked S.
3. Remove the upper port plug from the Driver Manifold and screw the pressure test fitting into the port.
4. Set the regulator pressure to 22 psig, plus or minus 0.5 psig by adjusting the set screw on the regulator (refer to Figure 11).
5. Remove the test fitting and replace it with the port plug ensuring that the seal washer is present.
6. Remove the lower port plug from the Driver Manifold and screw the pressure test fitting into the port.
7. Set the Modulator pressure to 2 psig, plus or minus 0.25 psig by adjusting the set screw on the bottom of the modulator cap (refer to Figure 13).
8. Remove the test fitting and replace it with the port plug, making sure the seal washer is present.
9. Proceed with the positioner calibration routine. First, edit register 40157 to put in a value of 2750 for the null adjust. The valve should be set to be 50 percent open during these calibrations and adjustments. This typically takes several minutes to complete.

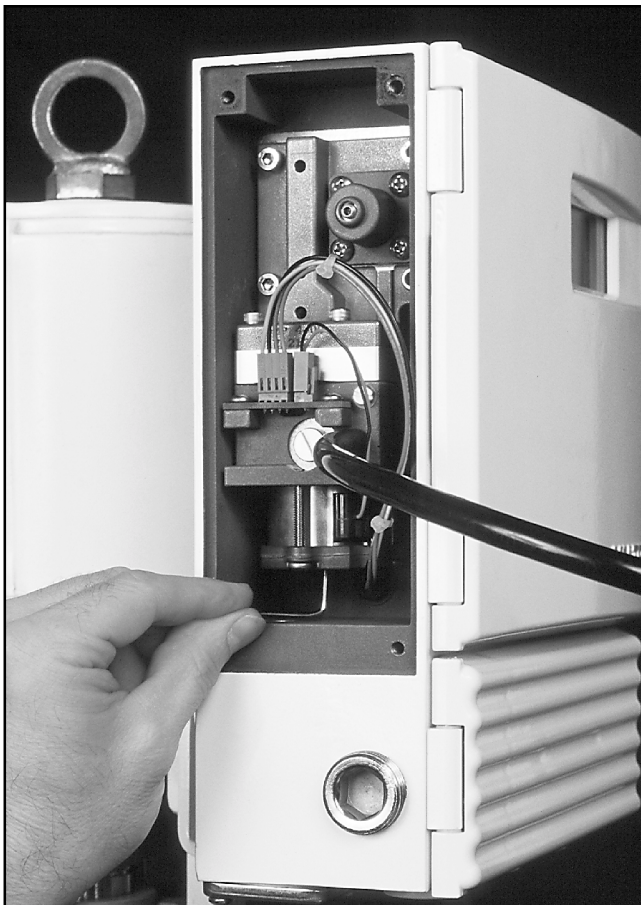


Figure 13: Setting Modulator Pressure

Replacing the Electronic Boards

The StarPac II / Logix 2000 has two main electronic boards, one personality module, and one terminal strip mounted inside the housing. The two boards are located behind the keypad door of the housing, mounted one atop the other in a stacked fashion. The personality module is plugged into the lower right hand corner of the boards.

If, after consulting with a local Valtek or factory representative, and determination is made that the electronic boards need replacement, proceed as follows.

1. Make sure the valve is by-passed or in a safe position. Follow handling procedures that protect the boards from the static electricity and ground currents.
2. To access the board stack, open the housing door. Undo the two screws that fasten the keypad door to the housing and swing out the keypad door (the stacks will be visible). Because the factory places a serial number on each stack, the board stack should be kept together as one unit. Mixing boards with other stacks is not recommended.
3. The top board consists of a main section and a smaller, removable personality card on the lower right corner. The size of this card is about two square inches. The card contains the programming logic and is sometimes removed for software customizing. Remove the card by undoing the four small screws holding it to the top board. Carefully lift it out, as it is also held in place by a board-to-board connector. Transport this card in a static resistant pouch.
4. To install the personality card, align the board-to-board connector and press straight in. Reinstall the four screws. (Any time the version of the personality module is changed, re-initialize the system by holding down the zero (0) button while turning the 24V power on – then releasing once the display is legible. The unit will be in test mode and must be reconfigured for proper operation.)

The Board Stack

1. Disconnect the power and air supply to the unit before removing the electronic board stack. The two pressurized pneumatic ports connect directly with two board mounted pressure sensors. A total of eight screws hold down the boards. The screw with an allen head should not be removed. The other seven are phillips head-type and can be removed. Note that one of the seven phillips screws is located on the lower right portion of lower board.
2. Undo the seven phillips screws and the board stack will lift away from the housing. Disconnect the connectors from the boards. Carefully undo the integral clips as you pull the connector away from the board (refer to Figure 14).



Figure 14: Replacing the Board Stack

3. Transport the board stack in a static resistant pouch.
 4. To reinstall the new stack, reverse the above procedure. (Be careful to align the pins on the interconnection connector as you install the connectors.)
- CAUTION: When sliding the new board stack in place, push gently on the connector strip to slip it behind the screw boss before installing the lower left-hand screw of the board stack. Failure to do this will cause the strip (A, Figure 15) to be pinched between the boss and board, leading to damage of the connector strip.**

Table III: MaxFlo Rotary Actuator Mounting Kits

Actuator Size	Shaft Size	Air To	Mounting Kit
25	0.4375	Open	10059457
25	0.4375	Close	10059457
25	0.625	Open	10059458
25	0.625	Close	10059458
25	0.875	Open	10059460
25	0.875	Close	10059460
50	0.875	Open	10059473
50	0.875	Close	10059472
50	1.125	Open	10059477
50	1.125	Close	10059476
100	1.5	Open	10059481
100	1.5	Close	10059480
200	1.5	Open	10094609
200	1.5	Close	10094608

Mounting kit includes bracket, linkage assembly, follower arm, and all necessary nuts, bolts and washers.

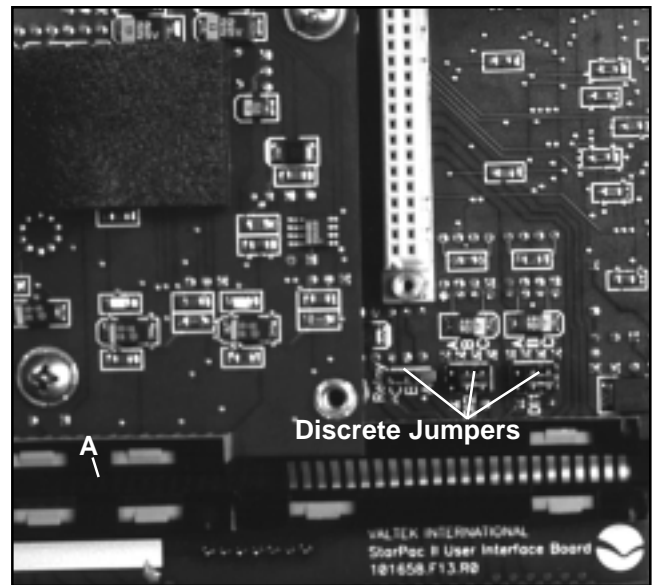


Figure 15: Discrete Jumpers Under Personality Module

Discrete Jumpers

Three sets of jumpers (Figure 15) are located on the main circuit board underneath the personality module. These jumpers are used to configure the operation of discrete inputs and outputs. These are labeled Relay, DI 1, and DI 2.

The relay jumper allows selection of normally open (N.O.) and normally closed (N.C.) forms of the alarm contacts (A-B=N.O. and B-C=N.C.). DI 1 and DI 2 allows selection of the input voltage range for the two discrete input channels. (A-B=60-120V input range, B-C=20-48V input range.)

Note: Both jumpers on each of these blocks must be moved to the desired position for proper operation.

Caution: Do not apply high voltage when low voltage sensing is selected. Damage will occur.

Table IV: Linear Actuator Mounting Kits

Actuator Size	Stroke (inches)	Spud (inches)	Mounting Kit
25	0.5 - 1.5	2.00	10007189
50	0.5 - 3	2.00	10062174
50	0.5 - 3	2.62	10007191
100	3	2.62 - 2.88	10007192
100	4	3.38 - 4.75	10007193
200	1 - 4	2.88	10054278
200	1.5 - 4	3.38 - 4.75	1005428
300	1 - 4	3.38 - 4.75	10054284

Mounting kit includes bracket, stem clamp, follower arm, follower pin, and all necessary nuts, bolts and washers.

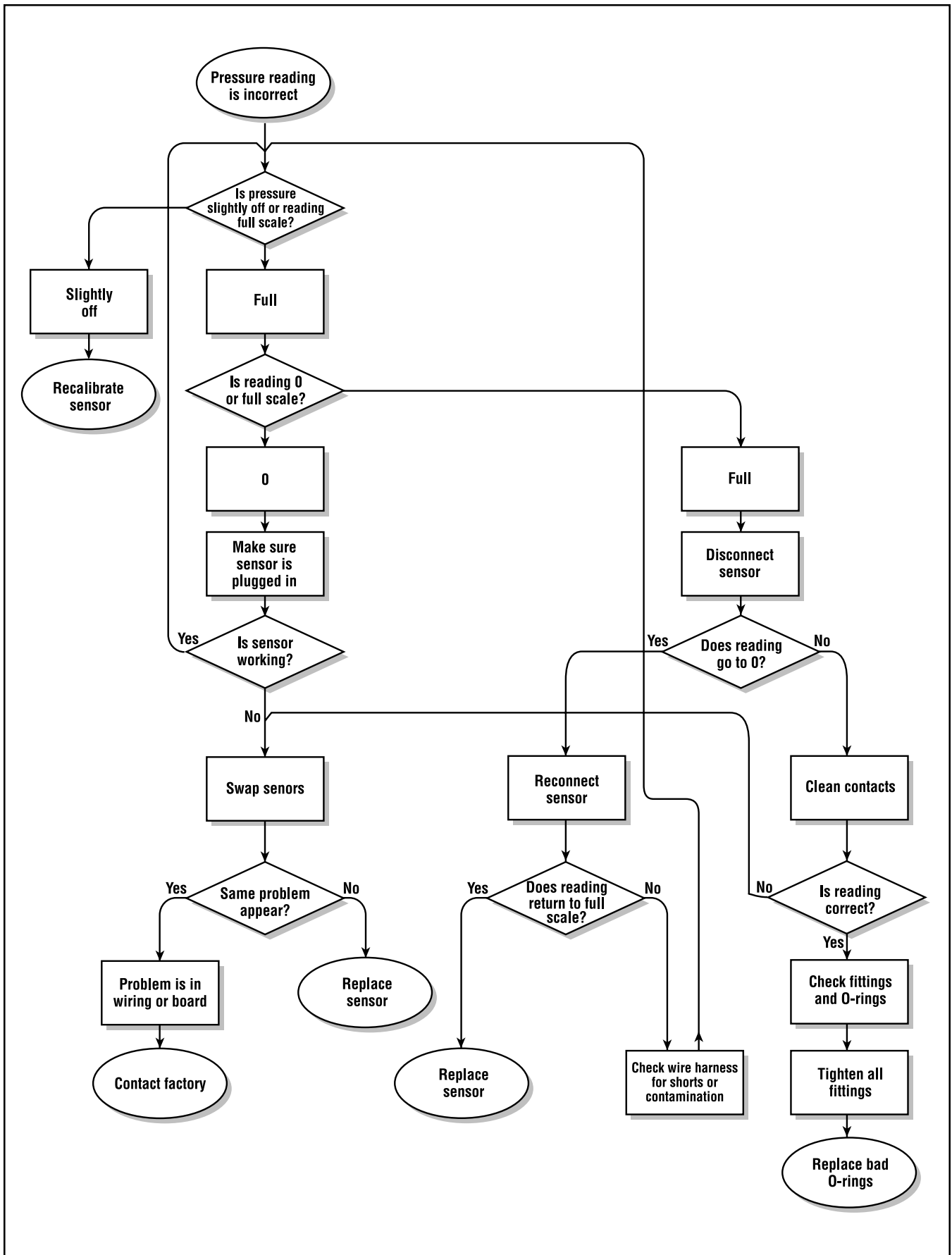


Figure 16: Sensor Troubleshooting Chart

Troubleshooting StarPac II / Logix 2000 Systems

Failure	Probable Cause	Corrective Action
Local display not on	<ol style="list-style-type: none"> 24 VDC not on or set correctly Incorrect wiring polarity Interface connections on bottom are not correct 	<ol style="list-style-type: none"> Verify power supply is outputting 24 VDC (terminals 16 and 17) Check wiring for correct polarity Make sure connections are correctly aligned and fully plugged in
Erratic communications	<ol style="list-style-type: none"> Multiple units have same address on network line Proper polarity not maintained Individual units not properly wired Termination jumpers not installed 	<ol style="list-style-type: none"> Change each unit to a unique, sequential address (refer to Address Setting in Maintenance section) Check all network connections for correct positive and negative connections Begin with shortest RS-485 run, checking polarity and communication; continue checking units throughout network Install termination jumper on two most distant devices
The unit does not respond to analog commands	<ol style="list-style-type: none"> Unit still in initialize mode 	<ol style="list-style-type: none"> Put unit in operation mode Select analog input
StarPac II / Logix 2000 data is not correct	<ol style="list-style-type: none"> Improper configuration file was loaded onto system 	<ol style="list-style-type: none"> Find the correct file for this system and load onto the unit
Valve position reading is not correct	<ol style="list-style-type: none"> Hallpot connection not tight Stroke not calibrated Hallpot shaft is not at correct part of rotation 	<ol style="list-style-type: none"> Tighten hallpot connection set screw Calibrate valve stroke Readjust hallpot shaft connection, making sure that as the shaft rotates the output signal is always increasing as valve opens
Stem position decreases when valve opens	<ol style="list-style-type: none"> Hallpot wiring harness is installed backwards Hallpot shaft is not on correct arc 	<ol style="list-style-type: none"> Reverse three-wire harness Readjust hallpot shaft connection, making sure that as the shaft rotates, the output signal is always increasing as valve opens
Sticking or hunting operation of the positioner	<ol style="list-style-type: none"> Contamination of the spool valve assembly 	<ol style="list-style-type: none"> Check air supply for proper filtering and meeting ISA Specification S7.3. Clean spool valve assembly with a non-residue cleaner.

StarPac II/Logix 2000 Electronics Initialization Procedure

To re-initialize the electronics:

- Turn OFF the 24V power.
- Press and hold down the ZERO (0) key on the keypad while turning the 24V power ON
- Release the key after the display has booted and is active (approx. 5 seconds)

The following conditions are set upon re-initialization. Those items that have been previously configured by the user may need to be reconfigured when the unit is put back into operation:

- Mode source is set to Digital
- Data Logger is disabled
- Test mode is set
- Process variable = Liquid Flow
- Command source = Analog
- Positioner Source = Normal
- Positioner Gain is reset to 25 in" actuator
- Analog Feedback = Position
- PID action = Normal
- Air Action = Air-To-Open
- Totalizer is reset
- Modbus address is set to 1
- Communications is set to 19200 baud, Odd parity, RTU mode

StarPac II and Logix Series 2000 Spare Parts Kits

See Figure 3: StarPac II / Logix 2000 Exploded View for item numbers.

Kit 1 - Upper Door Assembly

Part No. 10060956

Item No.	Description	Quantity
1	Upper door assembly	1
2	Door screw	4
3	Upper door gasket	1

Kit 2 - Lower Door Assembly

Part No. 10060958

Item No.	Description	Quantity
4	Lower door assembly	1
5	Door screw	2
6	Lower door gasket	1

Kit 3 - Key Pad Assembly

Part No. 10060978

Item No.	Description	Quantity
7	Inner door / keypad assembly	1
8	Inner door hinge screws	4
80	Inner door screw	2
81	Inner door screw O-ring	2

Kit 4 - Feedback Assembly*

Part No. 10060981

Item No.	Description	Quantity
16	Hall potentiometer assembly	1
17	Potentiometer bracket	1
18	Flex coupler	1
19	Bracket screw	2
20	Torsional spring	1
21	Feedback shaft	1
22	Shaft O-ring	1
23	Retaining ring	1
24	Hard stop screw	1

***NOTE:** Feedback shaft tool included in kit. Assembly comes pre-set from factory.

Kit 5 - Regulator Filter Replacement Kit

Part No. 10060988

Item No.	Description	Quantity
50	Driver module mounting screw	4
53	Pilot valve gasket	1
54	Regulator filter	1

Kit 6 - Driver Module Assembly*

Part No. 10060991

Item No.	Description	Quantity
44	Regulator set screw	1
45	Regulator housing screw	4
46	Regulator housing	1
47	Spring button	1
48	Regulator spring	1
49	Regulator diaphragm assembly	1
50	Driver module mounting screw	4
51	Pilot valve	1
52	Pilot valve screw	4
53	Pilot valve gasket	1
54	Regulator filter	1
55	Poppet guide	1
56	Poppet O-ring	1
57	Poppet	1
58	Poppet spring	1
59	Spool	1
60	Spool clip	1
61	Driver manifold O-ring	1
62	Driver spacer	1
63	Driver bearing	1
64	Spool return spring	1
65	Driver piston	1
66	Driver magnet	1
67	Driver manifold diaphragm	1
68	T-board screw	2
69	T-board	1
70	Orifice screw	1
71	Orifice screw O-ring	1
72	Orifice O-ring	1
73	Testing plug	2
74	Coil O-ring	1
75	Pressure modulator assembly	1
76	Spring diaphragm	1
77	Modulator cover	1
78	Modulator set screw	1
79	Modulator screw	3

***NOTE:** Regulator and modulator are shipped factory calibrated.

Kit 7 - StarPac II/Logix 2000 Electronics Board Assembly

Part No. 10055130

Item No.	Description	Quantity
31	Adapter O-ring, lower	2
32	Pressure Sensor adapter	1
33	Adapter O-ring, upper	2
34	StarPac II board assembly	1
35	Board stiffener	1
36	Board assembly screw	3
37	Board stiffener screw	1
38	Board assembly screw	3
39	Board assembly screw	1
40	Personality card with EPROM	1
41	Personality card screw	4
84	24-pin ribbon cable	1
85	14-pin ribbon cable	1

Kit 8 - Personality Card, Modbus Communications

Part No. 10061003

Item No.	Description	Quantity
40	Personality card with EPROM	1
41	Personality card screw	4

Kit 9 - 24-pin Ribbon Cable

Part No. 10202746

Item No.	Description	Quantity
84	24-pin ribbon cable	1

Kit 10 - 14-pin Ribbon Cable

Part No. 10010221

Item No.	Description	Quantity
85	14-pin ribbon cable	1

Kit 11 - Standard Wire Harness Assembly

Part No. 10061008

Item No.	Description	Quantity
42	Rubber grommet	2
83	Wire harness assembly	1

Kit 12 - Wire Harness Assembly, Sealed (Natural Gas Service) *Not shown in Figure 3*

Part No. 10061012

Item No.	Description	Quantity
83	Wire harness assembly	1

Kit 13 - Soft Goods Kit

Part No. 10061007

Item No.	Description	Quantity
3	Upper door gasket	1
6	Lower door gasket	1
22	Shaft O-ring	1
29	Isolator	4
31	Adapter O-ring, lower	2
33	Adapter O-ring, upper	2
42	Rubber grommet	2
49	Regulator diaphragm assembly	1
53	Pilot valve gasket	1
56	Poppet O-ring	1
61	Driver manifold O-ring	1
67	Driver manifold diaphragm	1
71	Orifice screw O-ring	1
72	Orifice O-ring	1
73	Test plug	2
74	Coil O-ring	1
81	Inner door screw O-ring	2

Kit 14 - Driver Cover Assembly

Part No. 10061018

Item No.	Description	Quantity
11	Driver cover assembly	1
12	Cover screw	4

Kit 15 - Feedback Cover Assembly

Part No. 10061019

Item No.	Description	Quantity
9	Feedback cover assembly	1
10	Cover screw	4

Kit 16 - Door Gasket Replacement Kit

Part No. 10061384

Item No.	Description	Quantity
3	Upper door gasket	1
6	Lower door gasket	1
82	Keypad gasket	1

Kit 17 - External Air Filter Replacement

Part No. 10053002

Description	Quantity
Coalescing air filter	1

Kit 18 - Follower Arm Pin for Linear Actuators

Part No. 10036685

Description	Quantity
Follower pin for linear actuators	1

Table V: Valdisk Rotary Actuator Mounting Kits

Actuator Size	Shaft Size	Air To	Mounting Kit
25	0.625	Open	10059458
25	0.625	Close	10059458
25	0.75	Open	10059459
25	0.75	Close	10059459
25	0.875	Open	10059460
25	0.875	Close	10059460
50	0.625	Open	10059461
50	0.625	Close	10059462
50	0.75	Open	10059463
50	0.75	Close	10059471
50	0.875	Open	10059472
50	0.875	Close	10059473
50	1.125	Open	10059476
50	1.125	Close	10059477
100	0.875	Open	10059474
100	0.875	Close	10059475
100	1.125	Open	10059478
100	1.125	Close	10059479
100	1.5	Open	10059480
100	1.5	Close	10059481
100	1 0.75	Open	10059482
100	1 0.75	Close	10059483
200	1.125	Open	10094606
200	1.125	Close	10094607
200	1.5	Open	10094608
200	1.5	Close	10094609
200	1 0.75	Open	10094610
200	1 0.75	Close	10094611

Mounting kit includes bracket, linkage assembly, follower arm, and all necessary nuts, bolts and washers.

Table VI: StarPac Accessories

Description	Number
Converter, RS232/RS485, 110/220 VAC	10055963
StarPac Analog Interface (8 Channel), 24 VDC	10069207
Power supply, DIN rail mounted, 110 VAC to 24 VDC	10079519

Table VII: Valdisk 150 Rotary Actuator Mounting Kits

Actuator Size	Shaft Size	Air To	Mounting Kit
25	0.625	Open	10059458
25	0.625	Close	10059458
25	0.875	Open	10059460
25	0.875	Close	10059460
50	0.625	Open	10059461
50	0.625	Close	10059462
50	0.875	Open	10059472
50	0.875	Close	10059473
50	1.0625	Open	10059484
50	1.0625	Close	10059486
50	1.34375	Open	10059489
50	1.34375	Close	10059490
100	0.875	Open	10059474
100	0.875	Close	10059475
100	1.0625	Open	10059487
100	1.0625	Close	10059488
100	1.34375	Open	10059492
100	1.34375	Close	10059495
100	1.375	Open	10059496
100	1.375	Close	10059504
100	1.5	Open	10059480
100	1.5	Close	10059481
100	1 0.75	Open	10059482
100	1 0.75	Close	10059483
200	1.0625	Open	10094612
200	1.0625	Close	10094613
200	1.34375	Open	10094614
200	1.34375	Close	10094615
200	1.375	Open	10094616
200	1.375	Close	10094617
200	1.5	Open	10094608
200	1.5	Close	10094609
200	1 0.75	Open	10094610
200	1 0.75	Close	10094611

Mounting kit includes bracket, linkage assembly, follower arm, and all necessary nuts, bolts and washers.

Table VIII: Completed Assemblies

Description	Number
StarPac II assembly	10007028
Logix 2000 assembly	10053635

Table IX: ShearStream Rotary Actuator Mounting Kits

Shaft Size	Air To / Shaft	Mounting	25 Actuator	50 Actuator	100 Actuator	200 Actuator
0.4375	Open / Up	Right (Std)	10059457			
		Left	10059457			
	Close / Up	Right (Std)	10059457			
		Left	10059457			
	Close / Down	Right (Std)	10059457			
		Left	10059457			
Open / Down	Right (Std)	10059457				
	Left	10059457				
0.625	Open / Up	Right (Std)	10059458	10059461		
		Left	10059458	10059462		
	Close / Up	Right (Std)	10059458	10059462		
		Left	10059458	10059461		
	Close / Down	Right (Std)	10059458	10059461		
		Left	10059458	10059462		
Open / Down	Right (Std)	10059458	10059462			
	Left	10059458	10059461			
0.75	Open / Up	Right (Std)	10059459	10059463		
		Left	10059459	10059471		
	Close / Up	Right (Std)	10059459	10059471		
		Left	10059459	10059463		
	Close / Down	Right (Std)	10059459	10059463		
		Left	10059459	10059471		
Open / Down	Right (Std)	10059459	10059471			
	Left	10059459	10059463			
0.875	Open / Up	Right (Std)	10059460	10059472	10059474	
		Left	10059460	10059473	10059475	
	Close / Up	Right (Std)	10059460	10059473	10059475	
		Left	10059460	10059472	10059474	
	Close / Down	Right (Std)	10059460	10059472	10059474	
		Left	10059460	10059473	10059475	
Open / Down	Right (Std)	10059460	10059473	10059475		
	Left	10059460	10059472	10059474		
1.125	Open / Up	Right (Std)		10059476	10059478	10094606
		Left		10059477	10059479	10094607
	Close / Up	Right (Std)		10059477	10059479	10094607
		Left		10059476	10059478	10094606
	Close / Down	Right (Std)		10059476	10059478	10094606
		Left		10059477	10059479	10094607
Open / Down	Right (Std)	10059477	10059479	10094607		
	Left	10059476	10059478	10094606		
1.5	Open / Up	Right (Std)			10059480	10094608
		Left			10059481	10094609
	Close / Up	Right (Std)			10059481	10094609
		Left			10059480	10094608
	Close / Down	Right (Std)			10059480	10094608
		Left			10059481	10094609
Open / Down	Right (Std)		10059481	10094609		
	Left		10059480	10094608		
10.75	Open / Up	Right (Std)			10059482	10094610
		Left			13359483	10094611
	Close / Up	Right (Std)			13359483	10094611
		Left			10059482	10094610
	Close / Down	Right (Std)			10059482	10094610
		Left			13359483	10094611
Open / Down	Right (Std)		13359483	10094611		
	Left		10059482	10094610		

Mounting kit includes bracket, linkage assembly, follower arm, and all necessary nuts, bolts and washers.

Pressure and Temperature Sensor Spare Part Kits

See Body Mount Sensor Configurations Drawing and Remote Mount Sensor Configuration Drawing for item numbers.

Pressure Sensor Gasket Kits

NOTE: Kits 1 thru 4 will service two body or two remote-mount pressure sensors from any one of the pressure sensor configuration drawing numbers listed below each table.

Kit 1 - Viton O-ring Replacement Kit

Part No. 10061027

Item No.	Description	Quantity
6	Environmental O-ring, Viton	2
8	Environmental O-ring, Viton	4
10	O-ring seal, Viton	2
20	Environmental O-ring, Viton	2
21	O-ring seal, Viton	2

Configuration Drawing Numbers: 83883, 83891, 83904, 83884, 83892, 101565, 83887 83900, 127586, 83888, 83901

Kit 2 - Spiral Wound Gasket Replacement Kit

Part No. 10061028

Item No.	Description	Quantity
6	Environmental O-ring, Viton	2
8	Environmental O-ring, Viton	4
10	O-ring seal, Viton	2
20	Environmental O-ring, Viton	2
21	Spiral wound gasket seal	2

Configuration Drawing Numbers: 83938, 83890, 122670, 83886, 83903, 127563, 83899, 127632

Kit 3 - PTFE Gasket Replacement Kit

Part No. 10061029

Item No.	Description	Quantity
6	Environmental O-ring, Viton	2
8	Environmental O-ring, Viton	4
10	PTFE gasket seal	2
20	Environmental O-ring, Viton	2
21	PTFE gasket seal	2

Configuration Drawing Numbers: 122513, 127565

Kit 4 - Kalrez O-ring Replacement Kit

Part No. 10061113

Item No.	Description	Quantity
6	Environmental O-ring, Viton	2
8	Environmental O-ring, Viton	4
10	O-ring seal, Kalrez™	2
20	Environmental O-ring, Kalrez	2
21	O-ring seal, Kalrez	2

Configuration Drawing Numbers: 83885, 83889, 127665, 83893, 83902

Pressure Sensor Hardware Kits

Kit 5 - Pressure Sensor Connection Kit, Div II Non-incendive Configuration

Part No. 10061022

Item No.	Description	Quantity
3	Swagelok nut	2
4	Swagelok ferrules	2
5	Sensor nut	2
6	Environmental O-ring, Viton®	2
7	Division II sensor fitting	2

NOTE: Kit will service two pressure sensors. For class I, Division II, Group A, B, C, & D. See Table XIII for Tubing.

Kit 6 - Pressure Sensor Connection Kit, Div I Configuration

Part No. 10061023

Item No.	Description	Quantity
13	Division I sensor fitting	2
5	Sensor nut	2
6	Environmental O-ring, Viton	2

NOTE: Kit will service two pressure sensors. For class I, Division I, Groups B, C, & D.

Kit 7 - Remote Mount Pressure Sensor Hardware Kit

Part No. 10061025

Item No.	Description	Quantity
3	Swagelok nut	4
4	Swagelok ferrules	4
15	Temperature extended fitting	2
19	Adapter fitting	2

NOTE: Kit will service two remote-mount pressure sensors. See Table XIII for tubing. (Wet-leg tubing wall thickness must be 0.065-inch).

Kit 8 - Remote Mount Pressure Sensor Hardware Kit with Purge and Isolation Valves

Part No. 10061026

Item No.	Description	Quantity
3	Swagelok nut	4
4	Swagelok ferrules	4
15	Temperature extended fitting	2
16	Purge valve	2
17	Isolation valve	2
19	Adapter fitting	2

NOTE: Kit will service two remote-mount pressure sensors. See Table XIII for tubing. (Wet-leg tubing wall thickness must be 0.065-inch).

Kit 9 - Explosion Proof Union Fitting

Part No. 10007238

Item No.	Description	Quantity
14	Explosion proof union	1

Kit 10 - Pressure Sensor Electrical Cable Replacement Kit

Part No. 10061117

Item No.	Description	Quantity
1	Electrical connector cable	2
22	Four-pin connector	2
23	Wire crimp terminal	16

NOTE: Kit will service two pressure sensors.

Kit 11 - Pressure Sensor Electrical Extension Cable

Part No. 10054518

Description	Quantity
Electrical connector extension cable	1

Kit 12 - Pressure Sensor Calibration Kit

Part No. 10061118

Description	Quantity
Pressure sensor calibration fixture	1
Electrical connector extension cable	2
O-ring seal, Viton	2

NOTE: Two sensors can be calibrated simultaneously with this kit.

Kit 13 - DP Cell Manifold Replacement

Part No. 10203723

Description	Quantity
Valve manifold	1

Temperature Probe Kits

See temperature sensor configurations drawing for item numbers.

Kit 14 - Standard Temperature Probe Replacement, Div II Configuration

Part No. 10055955

Item No.	Description	Quantity
2	Standard temperature probe	1

Kit 15 - Standard Temperature Probe Replacement, Div I Configuration

Part No. 10070891

Item No.	Description	Quantity
2	Standard temperature probe	1
6	Adapter fitting	1
7	Adapter fitting	1

Kit 16 - Through Hole Temperature Probe Replacement

Part No. 10065272

Item No.	Description	Quantity
2	Through hole temperature probe	1

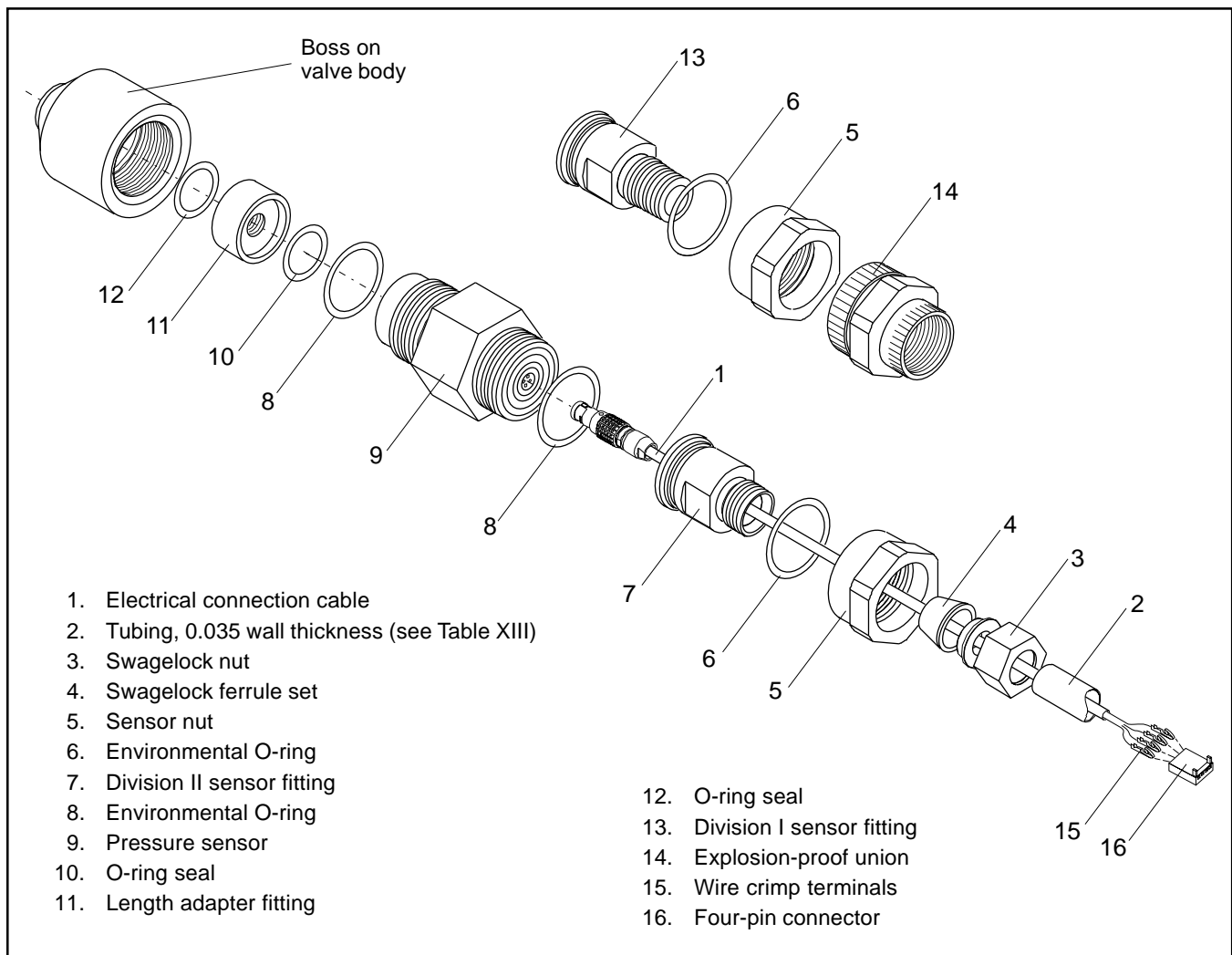


Figure 17: Body-mount Sensor Configurations

This table is a combination of Kit 17 and Table XI.

Table X: Pressure Sensor Accessories

Description	Number
PTFE cap for flush-mount sensors	10203061
Pressure sensor length adapters w/Viton O-rings,	10070892
Pressure sensor length adapters w/spiral-wound gaskets	10070893

NOTE: On July 1993, the sensor manufacturer shortened the process end of the pressure sensors. If the StarPac uses the longer style sensors, order one of the above adapter kits with the new sensor purchase. Each kit will service two pressure sensors.

Table XI: Flush Mount Pressure Sensor

Description	Diaphragm Material
	Hastelloy C
Pressure sensor, 0-25 PSIA, flush	10103511
Pressure sensor, 0-50 PSIA, flush	10103512
Pressure sensor, 0-100 PSIA, flush	10103514
Pressure sensor, 0-150 PSIA, flush	10103516
Pressure sensor, 0-300 PSIA, flush	10103519
Pressure sensor, 0-500 PSIA, flush	10103521
Pressure sensor, 0-1000 PSIA, flush	10103522

NOTE: Flush mount sensors are not rated for Division I applications.

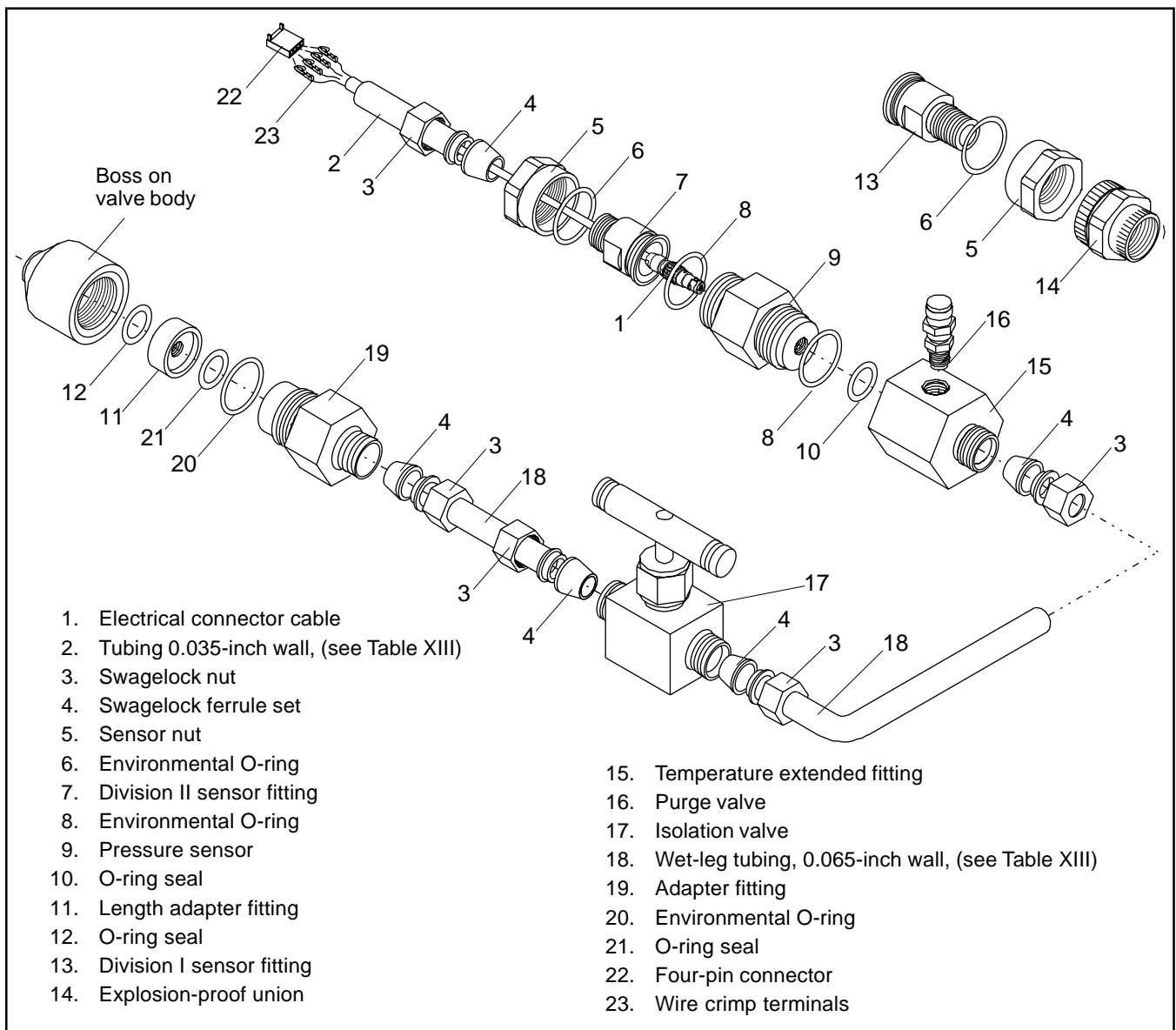


Figure 18: Remote-mount Sensor Configurations

Table XII: Standard Pressure Sensor

Description	Diaphragm Material
	316 Stainless steel
<i>Pressure sensor, 0-25 PSIA</i>	10062971
<i>Pressure sensor, 0-50 PSIA</i>	10062972
<i>Pressure sensor, 0-100 PSIA</i>	10062957
<i>Pressure sensor, 0-150 PSIA</i>	10062963
<i>Pressure sensor, 0-300 PSIA</i>	10062974
<i>Pressure sensor, 0-500 PSIA</i>	10062965
<i>Pressure sensor, 0-1000 PSIA</i>	10062960
<i>Pressure sensor, 0-1500 PSIA</i>	10062975
<i>Pressure sensor, 0-3000 PSIA</i>	10062977
<i>Pressure sensor, 0-5000 PSIA</i>	10062978
<i>Pressure sensor, 0-7500 PSIA</i>	10091198

NOTE: Hastelloy C sensors are not rated for Division I applications.

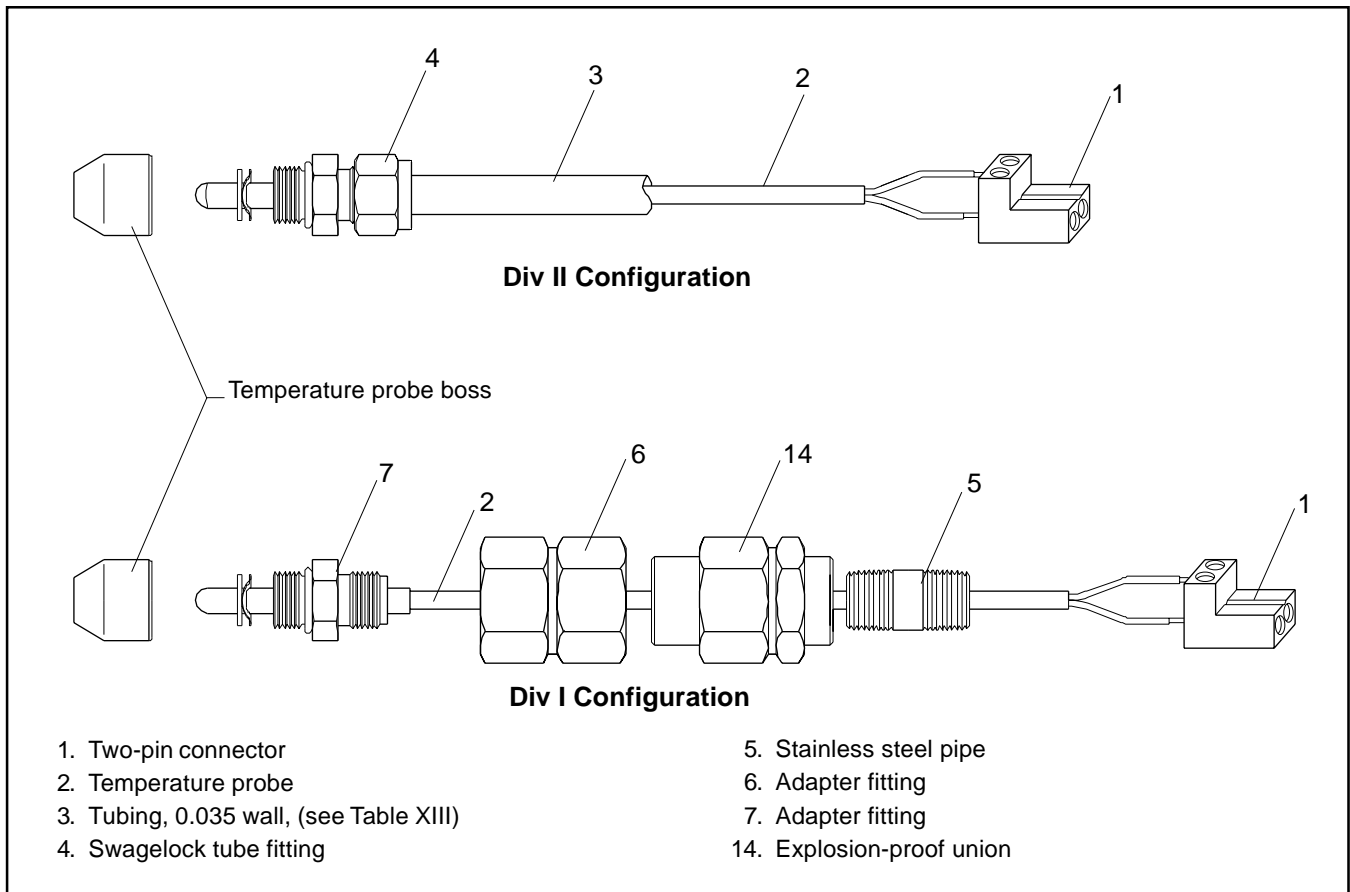


Figure 19: StarPac Temperature Sensor, Flush-mount Version

Table XIII: 316 Stainless Steel Tubing

Description	Number
Pressure sensor wire tubing (0.50-inch diameter 0.035-inch thick)	10045503
Temperature extended wet leg tubing (0.50-inch diameter 0.065-inch thick)	10055784
I/P wire and thermocouple tubing ($\frac{3}{8}$ -inch diameter, 0.035-inch thick)	10013367

On remote mount pressure sensor configurations, the wet-leg tubing must have a wall thickness of 0.065-inch.

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