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5. SF MULTIPLEX ACTUATOR MODULE

5.1 DESCRIPTION

The SF Multiplex Actuator Module, hereafter referred to as the Actuator Module, contains the mechanisms for controlling the rotary and linear motion of the Pump Module. The Actuator Module is available with either 8, 10 or 12 channels. The dimensions are different for each of the three configurations. Following is a chart of the dimensions for each configuration:

Size	Width	Depth	Height
8 Channel	418.34mm (16.5")	216mm (8.5")	335mm (13.2")
10 Channel	488.00mm (19.2")	216mm (8.5")	335mm (13.2")
12 Channel	583.50mm (23.0")	216mm (8.5")	335mm (13.2")

WARNING

Never remove or open a safety cover while the Actuator Module is running. Moving parts are located under these covers. Physical harm to individuals is possible.

5.1.1 Front (Figure 5.1)

The front of the Actuator Module contains the upper and lower guards, and piston and valve holders.

5.1.1.1 Reservoir Bracket

The reservoir bracket holds the reservoirs and provides easy installation and removal. The reservoirs must be mounted in reservoir clips for the system to operate properly.

5.1.1.2 Piston Holder

The piston holder secures the pistons on the slide assembly.

5.1.1.3 Valve Holder

The valve holder secures the valves on the mounting bar.

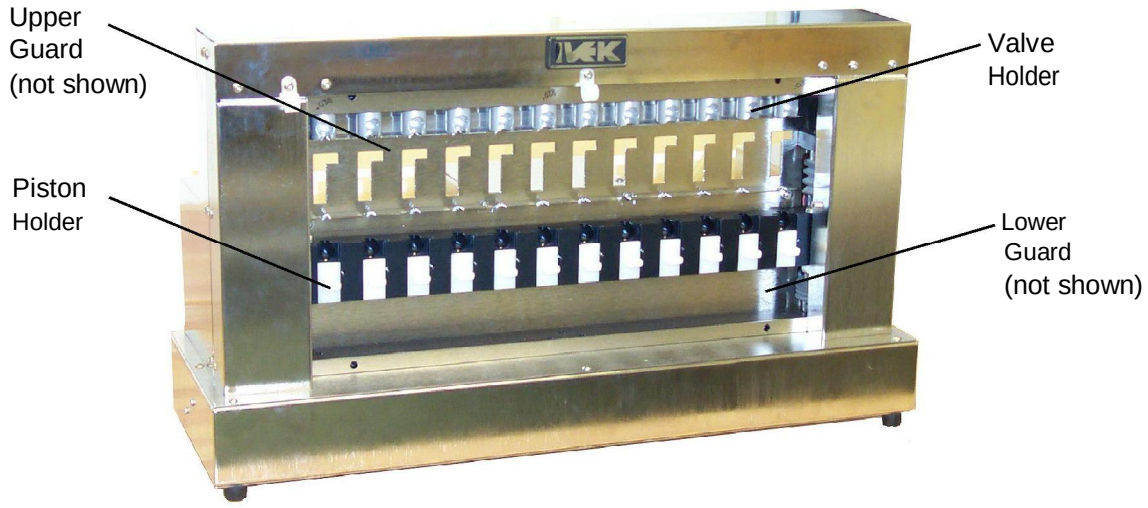


Figure 5.1 Actuator Module Front Guards

5.1.1.4 Guards

The guards cover the moving parts of the Actuator Module.

WARNING

Do not remove the guards during operation of the Actuator Module.

5.1.2 Rear (Figure 5.2)

The rear of the Actuator Module contains motor, control and air connectors. Each connector must have the corresponding cable attached to ensure proper operation of the Actuator Module.

5.1.2.1 Motor Connector (Item 1)

This is a 16-pin connector used to connect to the Controller Module. The motor provides linear motion for the Pump Module. This connector provides both power and feedback to and from the motor.

5.1.2.2 Control Connectors (Item 2)

The Actuator Module has one or two 28-pin connectors to connect the Controller Module for controlling and sensing the movement of the piston holder. Control A connector is used for Pump Modules 1 through 8 and the linear position sensors. Control B Connector is used for the remaining Pump Modules.

NOTE

Control B connector is not required for the 8 channel Actuator Module.

5.1.2.3 Air Connector (Item 3)

The air connector provides a connection point from the main air line. The air input provides air to the rotary actuators. Refer to section 5.7 for air specifications.

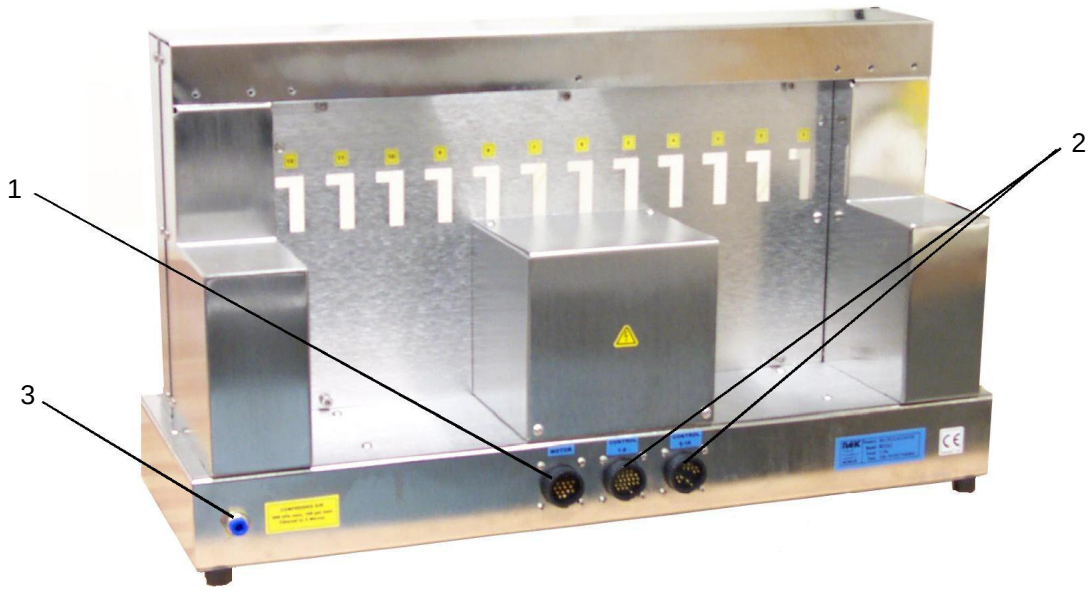


Figure 5.2 Actuator Module Rear

5.2 OPERATION

The Actuator Module utilizes a pneumatic rotary actuator and motor driven lead screw to produce a controllable linear and rotary motion. A pneumatic rotary actuator controlled by a solenoid valve creates the rotary motion of the ceramic valve. A lead screw, driven by a motor, controls the linear motion of the ceramic piston.

Electronic control over these linear and rotary functions allows a mounted Pump Module to be driven so the linear motion is used to fill or empty the Pump Module and rotary motion is used to valve to the intake and discharge ports.

5.2.1 Rotary Control

A pneumatic rotary actuator and sensor/flag control the rotary motion of the Pump Module's valve. The rotary actuator positions the valve to the intake port during the intake cycle and the discharge port during the discharge cycle. A sensor detects a flag on the rotary actuator indicating the position of the valve.

The Controller Module sends an electronic signal to a solenoid valve sending air into one of two ports on the rotary actuator. While air is entering one port, the other port is venting back through the solenoid valve to allow the rotary actuator to rotate.

The rotary sensor sends a signal to the Controller Module when the rotary actuator is in the rotary home or dispense position. The rotary sensor is used to detect problems during rotation of the Pump Module's valve.

Rotational movement is transferred from the rotary actuator's shaft to a valve coupling. The coupling allows free movement of the valve in the cylinder and provides ease of installation and removal.

When power is first applied to the Controller Module or when a fault occurs, the valve needs to be referenced to the home position prior to operation (Refer to Chapter 3).

5.2.2 Linear Control

A lead screw, slide assembly and sensor/flag control the linear motion of the Pump Module's piston. A motor drives a series of pulleys and belts turning a lead screw connected to a slide assembly. The connection of the lead screw to the slide assembly converts the rotary motion to linear motion. The slide assembly controls the linear motion of all the Pump Module's pistons. Two sensors detect flags on the slide assembly indicating the status of the slide assembly.

The Controller Module sends a signal to the motor for controlling the linear motion of the slide assembly. This linear motion pulls liquid into the cylinder during the intake cycle and forces liquid out of the cylinder during the discharge cycle.

The linear sensors send a signal to the Controller Module when the slide assembly is in the linear home and dispense positions. The linear home sensor detects a piston withdrawn to full chamber capacity. The dispense sensor stops the piston when the chamber has been emptied.

The Pump Module's piston is secured in the slide assembly providing uniform dispense amounts between all the Pump Modules.

When power is first applied to the Controller Module or when a fault occurs, the piston needs to be referenced to the home position prior to operation (Refer to Chapter 3).

5.2.3 Pneumatic Controls

The AIR INPUT connector provides a single connection point for the air. The air feeds the rotary valves. Connect a clean, dry, oil free air line capable of supplying the air requirements described in section 5.7.

CAUTION

Do not exceed 100 PSI (6.9 Bar). Damage to the equipment may result.

5.3 INSTALLATION

General operating practices provide the best guidelines for locating the components of the system. The Actuator Module should be located for ease of use during all phases of operation and maintenance.

5.4 OPTIONS

None.

5.5 MAINTENANCE

Periodically inspect the motor belt for wear and check belt tension. Replace the belt if necessary using the procedure described in sections 5.5.3.1.

WARNING

Disconnect the power and air sources from the Multiplex System prior to performing any assembly/disassembly procedures.

5.5.1 Belt Inspection

To inspect the motor belt (Figure 5.3):

1. Remove three cables and the air line from the rear of Actuator Module (1).
2. Remove four screws and four screws with feet securing the bottom cover to Actuator Module (1).
3. Remove three screws (2) securing belt guard (3) to Actuator Module (1).
4. Tilt belt guard (3) down to gain access to belt (7) (it should pivot toward the bottom).
5. Inspect belt (7).
6. Position belt guard (3) on Actuator Module (1) and secure with three screws (2).
7. Position bottom cover on Actuator Module (1) and secure with four screws and four screws with feet.
8. Connect the three cables and air line to the rear of Actuator Module (1).

5.5.2 Belt Tension

To check and adjust the motor belt tension (Figure 5.3):

1. Remove two or three cables and the air line from the rear of Actuator Module (1).
2. Remove four screws and four screws with feet securing the bottom cover to Actuator Module (1).
3. Remove three screws (2) securing belt guard (3) to Actuator Module (1).
4. Tilt belt guard (3) down to gain access to belt (7) (it should pivot toward the bottom).
5. Check belt (7) tension by moving belt (7) up and down in the area between screws (6). Belt (7) should move approximately +/- 1/4" (6.4mm).
6. Proceed to step 10 if belt (7) tension is correct.
7. Loosen two screws (6) securing belt tensioner (5) to Actuator Module (1).
8. Place your hand as shown in Figure 5.3 and move belt tensioner (5) upward until you feel tension.
9. Tighten two screw (6). Return to step 5.
10. Position belt guard (3) on Actuator Module (1) and secure with three screws (2).
11. Position bottom cover on Actuator Module (1) and secure with four screws and four screws with feet.
12. Connect the three cables and air line to the rear of Actuator Module (1).

5.5.3 Assembly/Disassembly Procedures (Figure 5.4)

The Actuator Module contains the following replaceable parts.

- Motor Belt

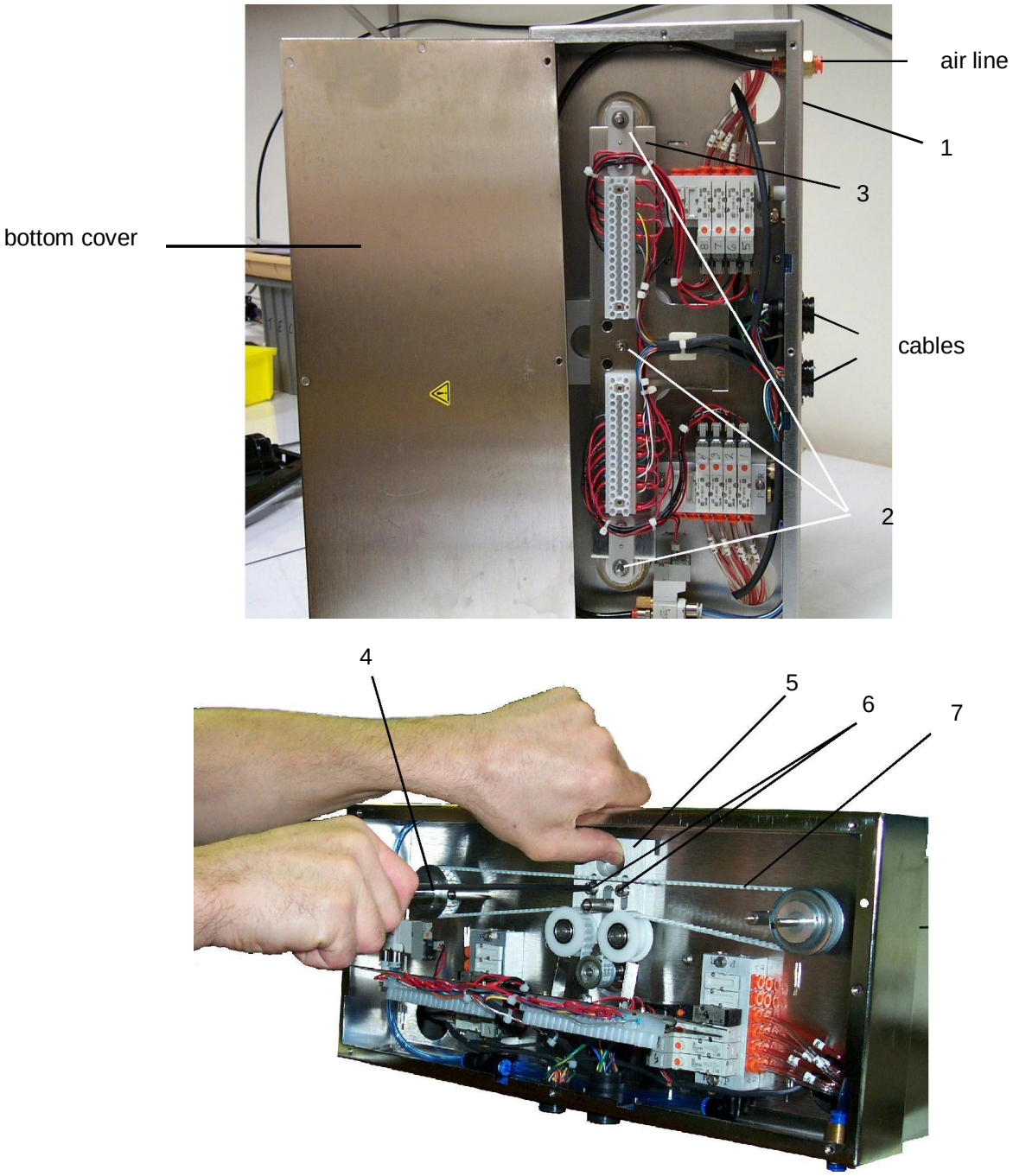


Figure 5.3 Actuator Module Maintenance

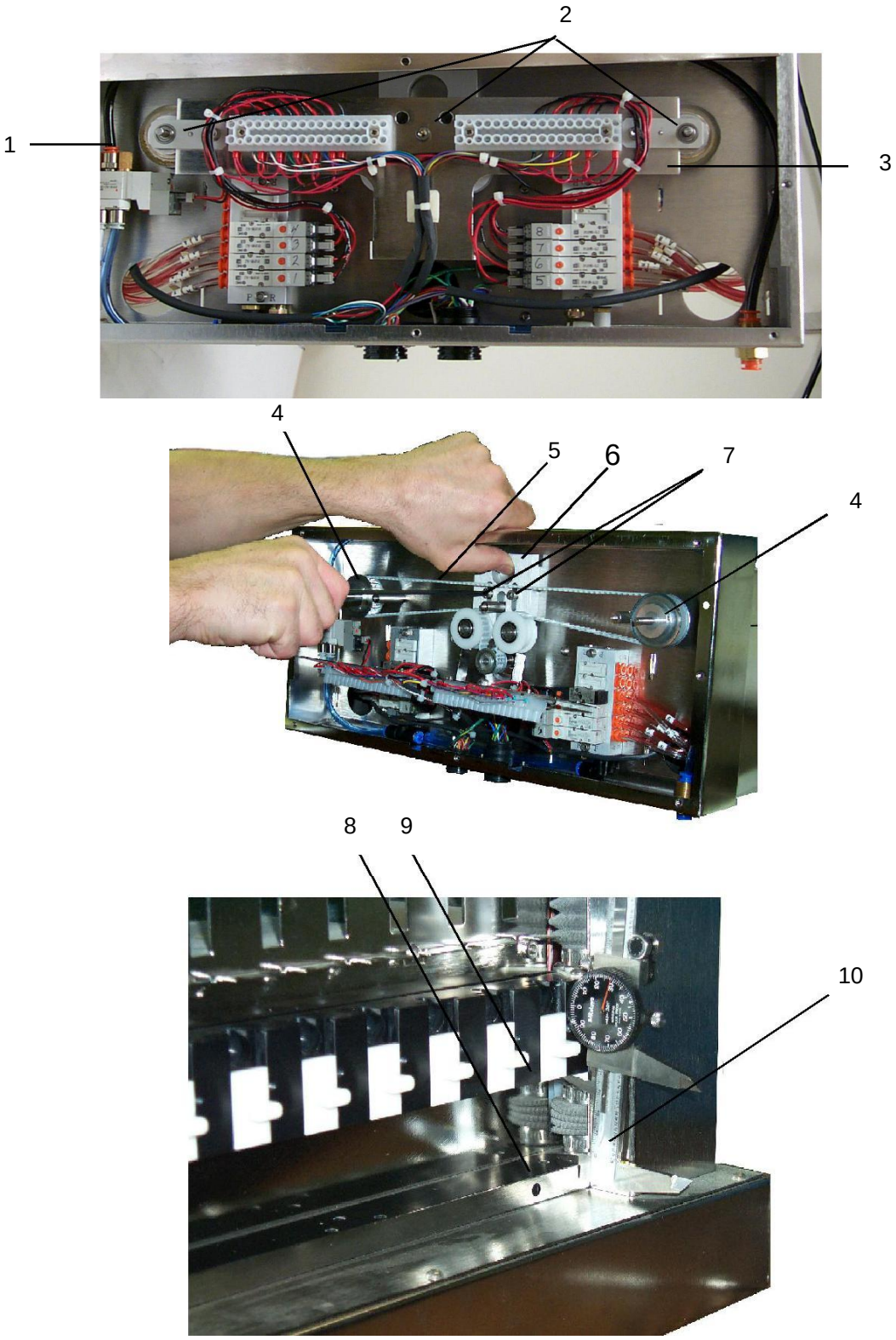


Figure 5.4 Actuator Module Assembly/Disassembly

5.5.3.1 Motor Belt

Disassembly: (Figure 5.4)

WARNING

Disconnect the power and air sources from the Multiplex System prior to performing any assembly/disassembly procedures.

1. Remove three cables and the air line from the rear of Actuator Module (1).
2. Remove four screws and four screws with feet securing the bottom cover to Actuator Module (1).
3. Remove three screws (2) securing belt guard (3) to Actuator Module (1).
4. Tilt belt guard (3) down to gain access to belt (5) (it should pivot toward the bottom).
5. Loosen two screws (7) securing belt tensioner (6) to Actuator Module (1) and slide belt tensioner (6) down.
6. Remove belt (5). (Be very careful not to rotate any of the drive or driven pulleys.)

Assembly: (Figure 5.4)

1. Using calipers (10), measure the left side of Actuator Module (1) between the bottom of slide assemble (9) and plate (8). Record the measurement.
2. Turn the right side belt pulley (4), while measuring the right side of Actuator Module (1) between the bottom of slide assemble (9) and plate (8), until the measurement is the same as recorded in step 1.
3. Position belt (5) over gears (4) then remaining gears as shown in Figure 5.4 trying not to move gears (4).
4. Place your hand as shown in Figure 5.4 and move belt tensioner (6) upward until you feel tension.
5. Check belt (5) tension by moving the belt up and down in the area between screws (7). The belt should move approximately +/- 1/4" (6.4mm).

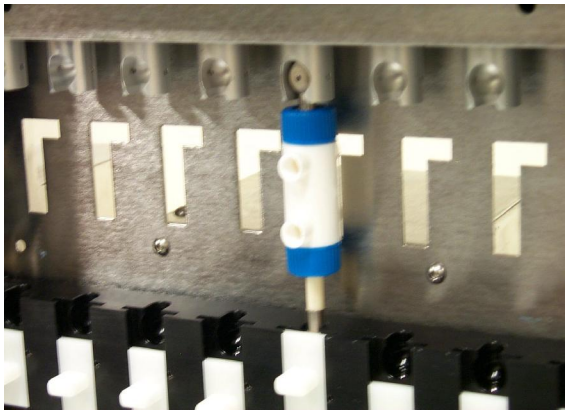
CAUTION

Do not press hard on the belt; the outside gears should not pull inward. Damage to the equipment may result.

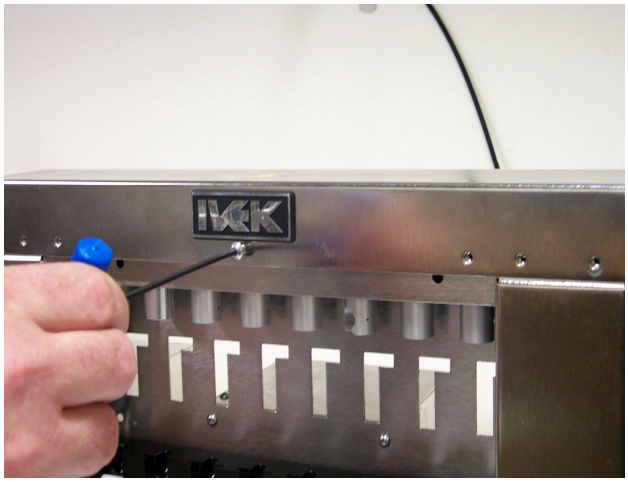
6. Tighten two screw (7).
7. Position belt guard (3) on Actuator Module (1) and secure with three screws (2).
8. Position bottom cover on Actuator Module (1) and secure with four screws and four screws with feet.
9. Connect the three cables and air line to the rear of Actuator Module (1).

5.5.4 Grease Check Procedure

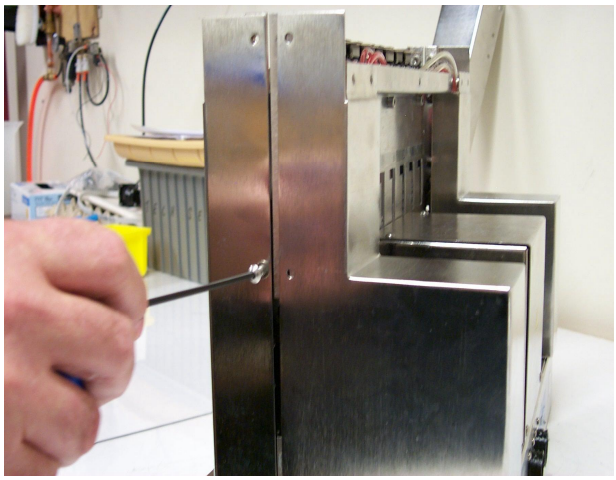
1. Remove all pump modules according to instruction 7.5.2.1 found in the maintenance section of manual chapter P07L005 (SF Multiplex Pump Module).



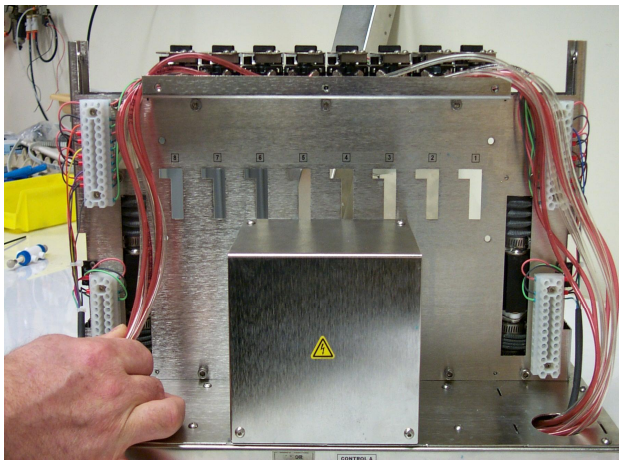
2. Remove a total of 14 screws (front and back) on the Top Cover using a 3mm HEX Wrench and remove Top Cover.



3. Remove a total of 12 screws from left and right side guards and remove guards.



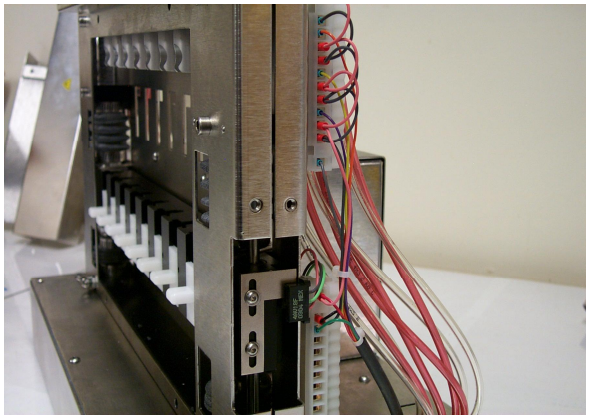
4. Inspect all wiring and tubing on the rear of the assembly to be sure there are no breaks, restrictions or wearing.



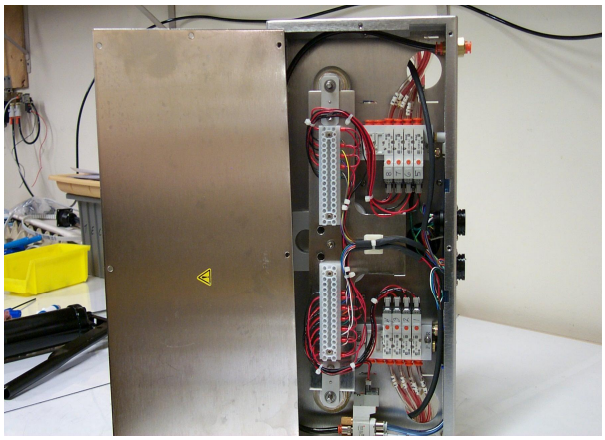
5. View each side; inspect the sensors verifying they are clean. Clean with lightly dampened IPA on a cotton swab

CAUTION

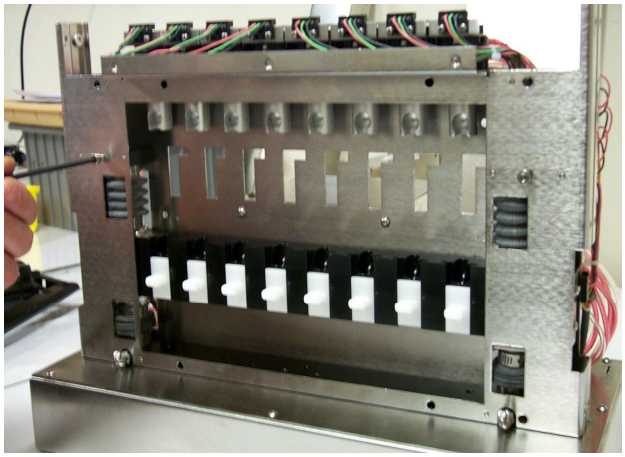
Wipe Carefully!! Do not loosen, move or remove these sensors.



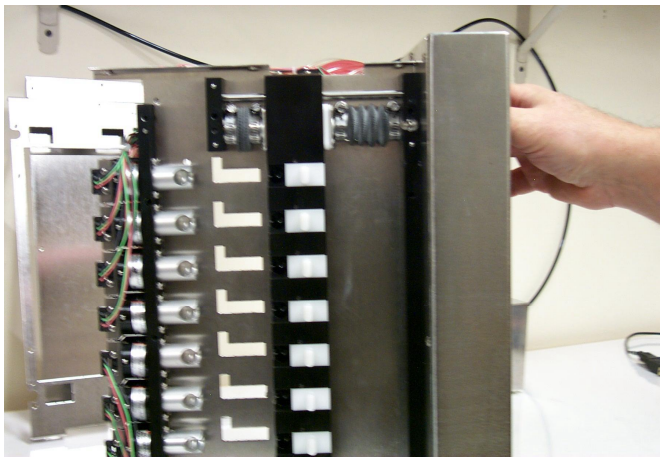
6. Carefully put Multiplex on its side, remove the 8 screws and the bottom cover.



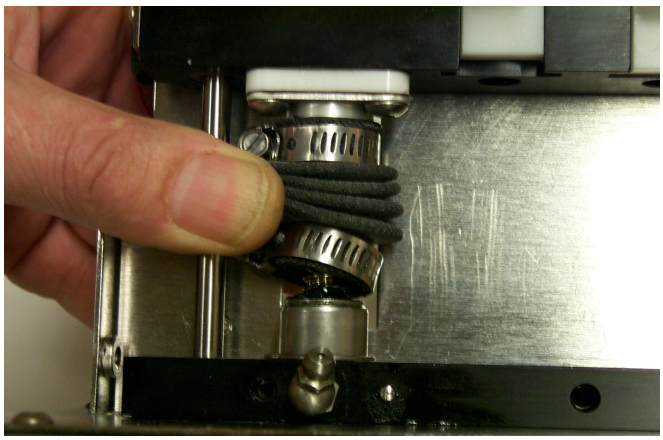
7. Put Multiplex back right side and remove 6 front guard cover screws.



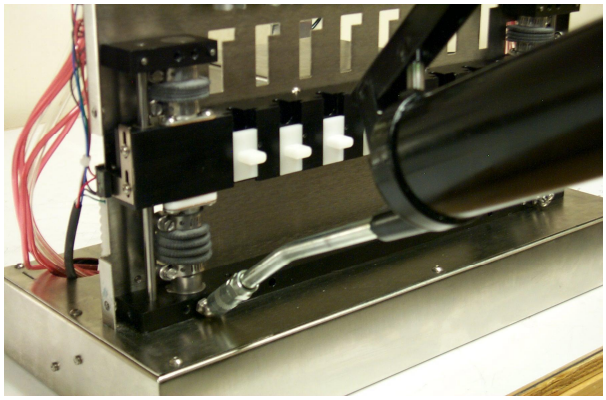
8. Move the Bar to upper most position by rotating belt pulley counter clockwise.



9. Loosen LOWER clamp only on both left and right grease boots.



10. Connect grease gun containing, Mobilith XHP222 or equivalent Multipurpose Bearing Lube, to fitting. Apply slowly until grease exits top of bearing which is exposed by lifting the grease boot slightly. Wipe off excess grease with lint free cloth. Repeat on both sides. Move bar back to lowest position and then tighten grease boot clamps.



11. Replace front guard cover and secure with 6 front guard cover screws.
12. Carefully put Multiplex on its side and replace bottom cover and secure with 8 bottom cover screws.
13. Carefully put Multiplex back right side and replace left and right side guards and secure with 12 side guard screws.
14. Replace Top cover and secure with 14 top cover screws.
15. Install all pump modules according to instruction 7.5.2.1 found in the maintenance section of manual chapter P07L005.

5.6 PROBLEM GUIDE

Table 5.1 contains a list of possible problems, causes and solutions for the Actuator Module.

5.7 SPECIFICATIONS

Motor:	Brushless DC with Resolver Feedback
Max Dispense Stroke:	0.5" (12.7mm)
Maximum Stroke Travel:	0.525" (13.3mm)
Air Input (Oil Free):	80 PSI (5.5 Bar) Nominal
	8 SCFM (3.8 liters/sec) Nominal

CAUTION

Do not exceed 100 PSI (6.9 Bar). Damage to the equipment may result.

5.8 MODEL NUMBER

The model number provides important information about the specifics of your SF multiplex Actuator Module. Refer to this number when calling IVEK Technical support. The model number for your Actuator Module is located in the Title Page section of this manual.

Actuator Module, Ver 2.0, SF 12 Multiplex	**202392**
Actuator Module, Ver 2.0, SF 10 Multiplex	**202393**
Actuator Module, Ver 2.0, SF 8 Multiplex	**202394**

5.9 ILLUSTRATED PARTS BREAKDOWN

The illustrated parts breakdown (Figures 5.5) contains replacement parts for the Actuator Module.

INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSEMBLY
		SF MULTIPLEX ACTUATOR MODULE	**1**
1	202394	Actuator Module, Ver 2.0, SF 8 Multiplex	1
2	212030-004	Belt, Timing, 10/T5 Pitch, (840mm)	1
1	202393	Actuator Module, Ver 2.0, SF 10 Multiplex	1
2	212030-006	Belt, Timing, 10/T5 Pitch, (980mm)	1
1	202392	Actuator Module, Ver 2.0, SF 12 Multiplex	1
2	212030-007	Belt, Timing, 10/T5 Pitch, (1120mm)	1

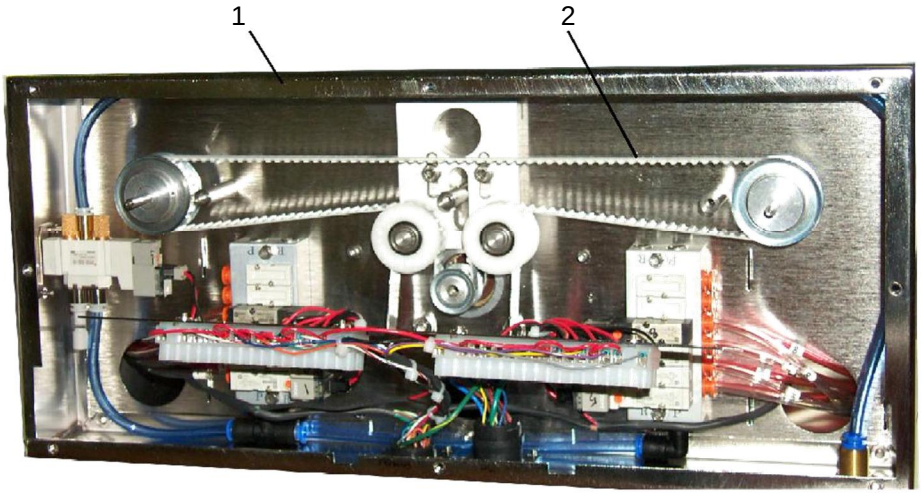


Figure 5.5 SF Multiplex Actuator Module (Sheet 1 of 1)

Table 5.1 Common Operational Problems and Solutions

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
Controller Module power on and operational, but will not activate Actuator Module.	I/O Cable	Check connection of cable between Controller Module and Actuator Module. Inspect and repair faulty cable.
	E-Stop Active or no E-Stop Connected.	Reset E-Stop switch and/or connect E-Stop Cable.
System is running but not pumping fluid.	Damaged valve holder.	If valve not referenced to output, check holder for damage.
		Refer to chapter 7 to be sure valve is installed correctly
	Porting Incorrect.	Check Inlet & Outlet porting.
	Loose fitting.	Tighten fitting.
Rotary or Linear Sensor Fault.	Piston seized in cylinder.	Remove and soak
	Broken drive Belt.	Replace Belt.