

SAFETY
INSTALLATION
OPERATION
MAINTENANCE



M A N U A L

SAMPLER Model PRT

No. PC 522848D
Revised 2013-08-15

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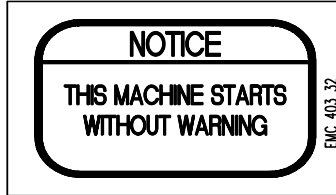
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I. GENERAL SAFETY INFORMATION

SAFETY FIRST! The symbols shown identify examples of the safety labels and signs to be found on InterSystems equipment. They are affixed to the equipment to warn of danger to persons and of possible equipment damage. These signs must never be removed, tampered with, painted over or obscured in any way. (See Page 4 for label locations.) If labels are damaged or become unreadable, replacement labels are available from InterSystems. The user must institute a continuing program to instruct all personnel in safe operating and maintenance procedures, and to insure that all safety devices, guards, and covers are intact and operable, and that all safety signs are legible.



STARTS W/OUT WARNING
EMC40332

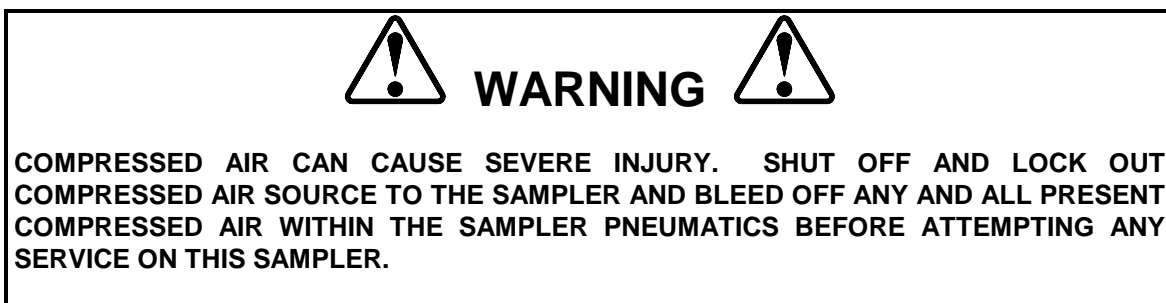
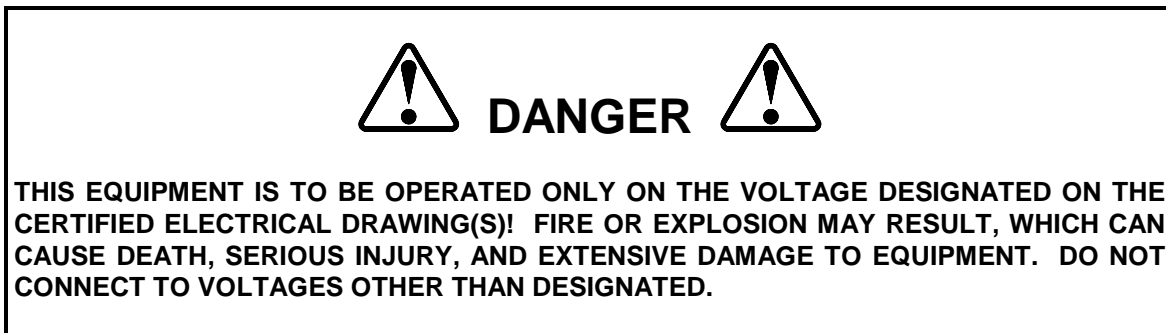


MOVING PART
EMC3032

Consult InterSystems, Inc. before making any changes to the sampler or its operating environment. Careless changes could result in death or serious injury to people, and reduce the performance and service life of the equipment.

Never perform any service on this equipment or any other powered equipment until all power has been shut off and locked out so that it cannot be restored without the consent and knowledge of the person who interrupted power. Power includes electrical, fluid, mechanical, or pneumatic energy.

Never perform any service on this equipment without utilizing the required PPE (personal protective equipment). Refer to the MSDS(s), material safety data sheet(s), on all the products to which this equipment is in contact with to determine what PPE is required.



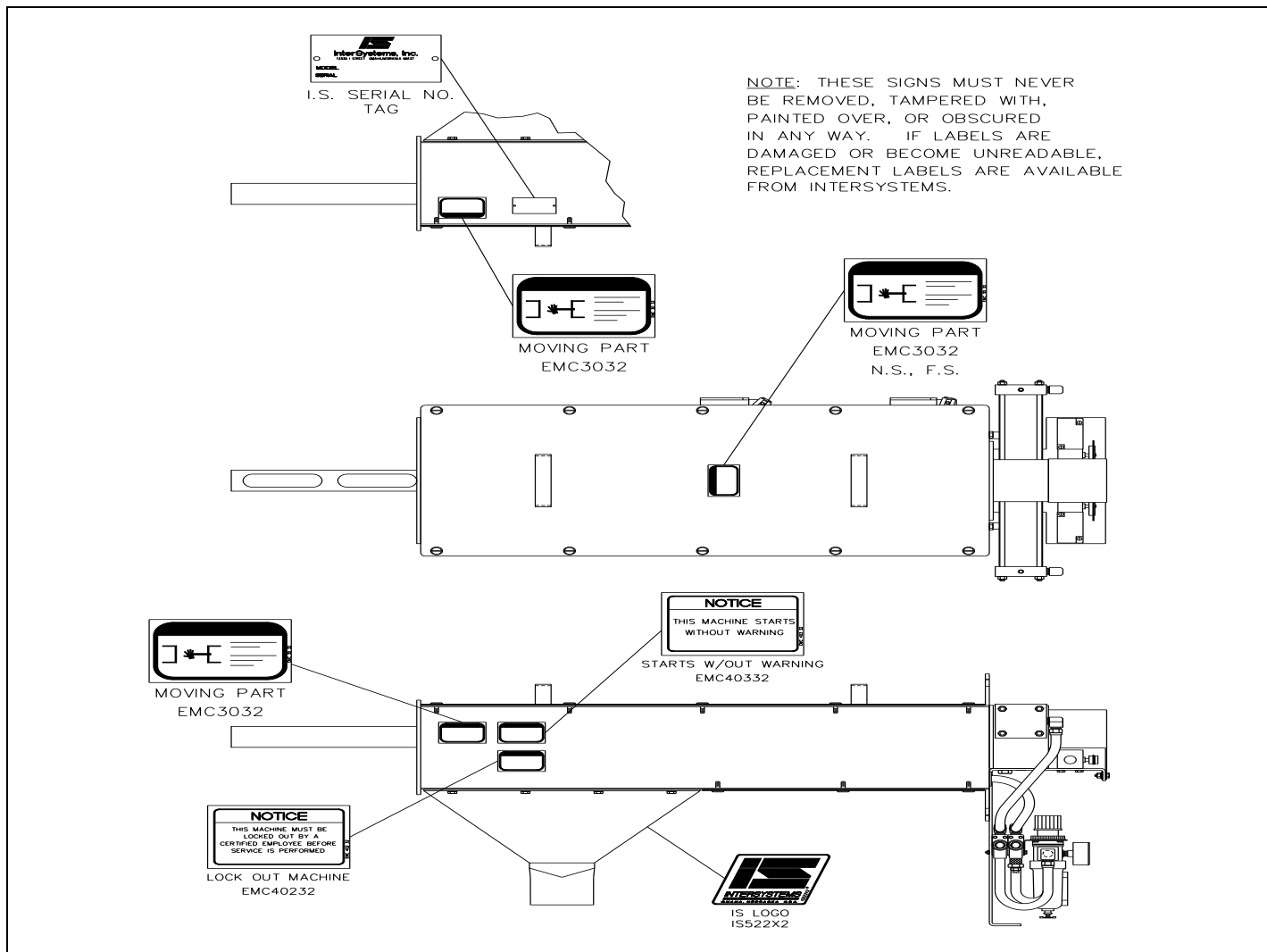


FIGURE 1-1, PRT SAMPLER SAFETY LABEL LOCATIONS

II. GENERAL INFORMATION

2.1 System Description

The PRT Sampler is designed to collect a representative sample of granular, pellet, chip, flake or other materials in a gravity chute. Figure 2-1 illustrates a typical PRT Sampler application.

Sample collection is initiated in response to either an operator's manual command or a signal automatically generated by controller logic. A sample cycle begins when a pair of double-acting pneumatic cylinders extend the slotted sampling probe into the product stream. Then the rotary actuator rotates the sample probe clockwise (when viewed from the rotary actuator end of the sampler) through a 270 degree arc, exposing the sample probe cavity to the product stream to collect a sample of the material. Next, the cylinders retract the sample probe from the product stream, isolating the sample and sample probe cavity from the product stream. Subsequently, the rotary actuator rotates the sample probe counter-clockwise through 270 degrees, dumping the collected sample into the sampler's discharge chute. The sample then falls down and out of the discharge chute to the desired sample collection point, at which point an InterSystems SCS Sample Collection System (optional) may be installed.

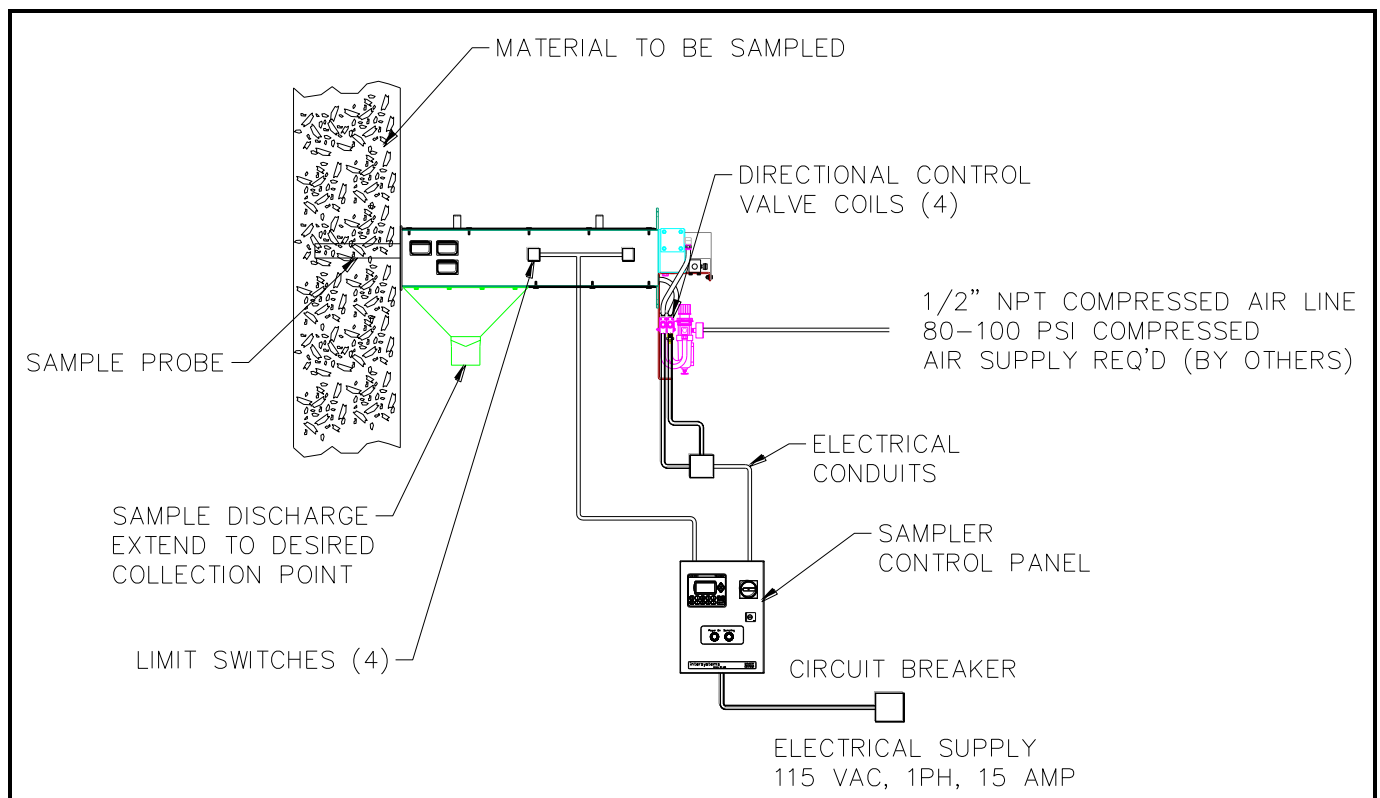


FIGURE 2-1, TYPICAL INSTALLATION, MODEL PRT SAMPLING SYSTEM

2.2 Optional Features

The certified drawings indicate which, if any, optional features are included with a sampling system. Some of the more frequently specified optional features are briefly described in the following list.

- A. Controller arranged to initiate a sampling cycle based on quantity or volume of material passing through conveying line rather than upon elapsed time periods.
- B. Explosion-Proof Sampling System. There are several major differences in an explosion-proof sampler as compared to a standard sampling system. An explosion proof sampler will typically have the following features.
 - 1. An explosion-proof solenoid on the directional control valve with the rating of:
 - Class 1, Groups C & D, Division 1 & 2
 - Class 2, Groups E, F & G, Division 1 & 2
 - 2. An explosion-proof limit switch with the rating of:
 - Class 1, Groups C & D, Division 1 & 2
 - Class 2, Groups E, F & G, Division 1 & 2

The explosion proof sampler control is available in two enclosure classifications.

- 1. The NEMA 9 control with the rating of:
 - Class 2, Groups E, F & G, Division 1 & 2
 - 2. The NEMA 7 control with the rating of:
 - Class 1, Groups C & D, Division 1 & 2
 - Class 2, Groups E, F & G, Division 1 & 2
- C. Components of special materials, such as 316 stainless steel, monel, inconel or nedox coatings.
- D. Programmable Controls to sequence the sampler and the sample collection equipment.

2.3 Material Sampled

Most materials from light to heavy density powders, granules, flakes and pellets.

2.4 Sampler Construction

Standard sampler housing construction is of painted carbon steel. This includes the frame, mount plate, sample hopper and guards. The sample probe is of Type 304 Stainless Steel. Other materials and/or finishes appropriate to the operating environment and the material or product being sampled may be used. Refer to the certified drawing(s) for any optional or special components installed on the sampler.

III. GENERAL INSTALLATION REQUIREMENTS

3.1 Receiving Inspection

Carefully inspect the sampling system for damage as soon as it is received. Also, verify that the quantity of parts or packages actually received corresponds to the quantity shown on the packing slip. Report any damage or shortage to the delivering carrier as soon as possible. InterSystems' responsibility for the equipment ended with acceptance by the delivering carrier. Refer to the bill of lading.

3.2 Pre-Installation Preparation

Note, before starting sampling system installation, study this manual, the certified drawing(s) furnished with the system, and other applicable documents (including, but not limited to OSHA Regulations; the National Electrical Code; and all other applicable federal, state, and local codes and regulations).



3.3 Location

The PRT sampler is typically mounted horizontally onto a vertical gravity flow conveying line carrying the product to be sampled as in Figure 2-1. The sampler axis must be installed perpendicular (at a 90 degree angle) to the axis of the product line for optimum performance. Additionally, the sampler should be located where the product has a non-turbulent flow pattern. The sampler and associated equipment should be located for ease of access and maintenance.

The sampler is to be installed only as shown on the certified drawing(s). If an alternate mounting arrangement is desired, contact InterSystems prior to installation for proper guidance. The sampler is of a general design with modifications specifically for your application. It may be necessary to rework the sampler in order for it to function properly if you alter the application.

3.4 General Mounting Guidelines

The sampler assembly is designed to support ONLY its own weight.

**DANGER**
**SAMPLER CANNOT SUPPORT ANY OTHER EQUIPMENT OR CONVEYING LINE!
COLLAPSE OF THE WHOLE SYSTEM CAN CAUSE DEATH, SERIOUS INJURY, AND
EXTENSIVE DAMAGE TO EQUIPMENT. PROPERLY SUPPORT ALL SPOUTS,
CONTAINERS, AND CONVEYING LINES.**

NOTE: IF THE SURFACE AREA TO WHICH THE MOUNTING PLATE IS TO BE ATTACHED IS WARPED OR BENT, STRAIGHTEN AND SMOOTH THE METAL SO THE SAMPLER WILL BE PROPERLY ALIGNED WHEN THE INSTALLATION IS COMPLETE. THE SURFACE TO WHICH THE SAMPLER IS MOUNTED MUST NOT FLEX.

3.4.1 Sampler Without Optional Mounting Accessories

Weld-on plates are typically used when mounting the sampler to a large existing surface, such as on a storage hopper or a long section of chutework.

- A. Locate and mark the desired mounting location on the discharge chute, spout, or conveying line.
- B. Cut and de-burr a clearance hole in the chute where the sample probe is to enter the chute. This hole will need to be 1/2" larger in diameter than the diameter of the PRT probe. Refer to the certified drawing(s).
- C. The mounting flange on the end of the sampler drive housing has four 0.44 (7/16") clearance holes for 3/8" mounting screws or studs. Using the sampler mounting face as a pattern, layout or transfer punch the hole locations onto the conveying line.
- D. Drill and tap the holes for the mounting screws, or weld studs to the conveying line for fastening the sampler.
- E. Position the sampler on the conveying line and loosely install the mounting fasteners. Verify that the sample probe will extend and retract without interference. The probe should be centered in the clearance hole. Tighten the mounting fasteners.
- F. Finally, attach the sample discharge hopper to the sampler.
- G. The user or installer may need to provide additional support towards the rear of the sampler. Refer to the certified drawing(s) of the sampler to verify if this is required.

3.4.2 Field-Mounted Sampler Using Weld-On Plate

Weld-on plates are typically used when mounting the sampler to a large existing surface, such as on a storage hopper or a long section of chutework.

- A. Locate and mark the desired mounting location on the discharge chute, spout, or conveying line.
- B. Cut and de-burr a clearance hole in the chute where the sample probe is to enter the chute. This hole will need to be 1/2" larger in diameter than the diameter of the PRT probe. Refer to the certified drawing(s).
- C. Carefully center the sampler mounting plate over the hole. Check for concentricity, then tack weld.
- D. Recheck the alignment of the mounting plate relative to the hole in the product line. When concentricity has been verified, weld a continuous bead around all sides of the mounting plate.

NOTE: WHEN WELDING THE MOUNTING PLATE TO THIN GAUGE SHEET OR THIN PLATE, SKIP WELD ALTERNATING SIDES OF THE MOUNTING PLATE TO LIMIT HEAT INPUT TO MINIMIZE WARPING.

- E. Position the sampler on the conveying line and loosely install the mounting fasteners. Verify that the sample probe will extend and retract without interference. The probe should be centered in the clearance hole. Tighten the mounting fasteners.
- F. Finally, attach the sample discharge hopper to the sampler.
- G. The user or installer may need to provide additional support towards the rear of the sampler. Refer to the certified drawing(s) of the sampler to verify if this is required.

3.5 Material Sample Transport Lines

The tubing used to transport material samples must be adequately sized and compatible with the operating environment and the material sampled. Tubing size is determined by the size of the discharge outlet as shown on the certified drawing(s) furnished with the sampler. Typically a flexible hose is slipped over the discharge tube and held in place by a worm clamp. The hose is then routed to allow material to flow via gravity to a convenient collection point. At that point the hose may be connected to a collection jar bracket or a Sample Collection System cabinet.

Rigid tubing may also be used if desired for the sample transport line.

Make all connections airtight and make sure all interior surfaces of joints are smooth and flush. Any ragged or raised tube ends will collect dust and debris as well as retard material flow. Escaping sample material can contaminate surrounding atmosphere and equipment.

3.6 Controller Location

- A. Use vibration isolation pads when mounting the control enclosure or mount the controller in a vibration-free location.
- B. Unless ordered for severe duty, locate controller so it is protected from water and dust.
- C. Unless an explosion-proof rated controller was specifically ordered, DO NOT locate the controller in a hazardous area.
- D. Most applications require that the sampler be in easy view of the controller.

3.7 System Wiring

Refer to the certified electrical drawing(s) for specific wiring requirements. As explained in Paragraph 4.1.10, the terminal strip mounted INSIDE the controller enclosure is the connection point for ALL external circuitry.

The controller was completely assembled and tested with the sampler before it left the factory. The electrical installation must comply with OSHA Regulations; the National Electrical Code; and all other applicable federal, state, and local codes and regulations.

If wiring between the controller and the sampler unit is run through rigid conduit, use a short length of flexible conduit to connect wiring to the sampler. This will isolate the rigid conduit from any vibration originating in the product conveying line and sampler.

3.7.1 Electrical Power Requirements, System

110/120 VAC 50/60 Hz, Single Phase, 10 Amp Service.
Optional - 220/240 VAC 50/60 Hz, Single Phase, 5 Amp Service.

Refer to the certified electrical drawing(s) for specific wiring requirements. InterSystems strongly recommends that electrical service to the sampling system be an isolated line. Voltage fluctuations and line noise can affect the controller's circuit board, thus causing the sampler to malfunction.

3.7.1.1 Controller

110/120 VAC, 50/60 Hz, Single Phase, 4 Amp Max. (includes motor power requirements).
Optional - 220/240 VAC, 50/60 Hz, Single Phase, 2 Amp Max. (includes motor power requirements).

3.7.1.2 Solenoid Valve Coil

110/120 VAC, 50/60 Hz, Single Phase, 7 Watts.
Optional - 220/240 VAC, 50/60 Hz, Single Phase, 7 Watts.

3.8 System Piping

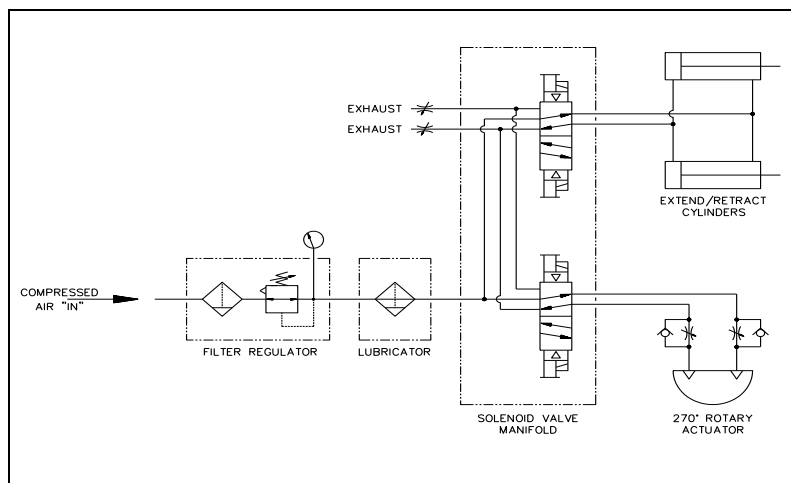


FIGURE 3-1, PNEUMATIC SCHEMATIC

The pneumatic system was pre-plumbed and tested with the sampler before it left the factory. The final installation must comply with OSHA Regulations and all other applicable federal, state, and local codes and regulations.

As shown on the certified drawing(s), the solenoid valves and filter/regulator (F/R) were mounted on the sampler at the factory. The user or installer must pipe the compressed air supply to the F/R. Minimum pipe size for the air supply to the filter/regulator is 1/2" NPT, reduced to 3/8" NPT at sampler. Larger piping to the sampler, and/or a surge tank located at the sampler, will be required on installations where the compressed air source is further

than 200 feet from the sampler to prevent excessive drop in air pressure.

InterSystems recommends installing a lockable shutoff valve upstream of the filter/regulator. The shutoff valve facilitates maintenance as it allows the sampler's pneumatic system to be maintained and repaired without shutting down other equipment supplied from the same air source.

3.8.1 Compressed Air Consumption

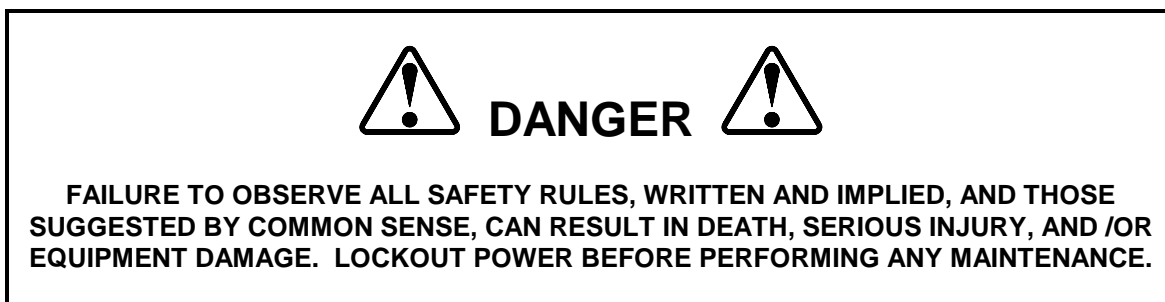
A complete sampling cycle requires that the cylinders retract and extend and that the rotary actuator rotates the sample probe twice through a 270 degree arc during each cycle. To determine the compressed air requirements to operate the sampler, multiply the consumption per cycle (refer to chart) by the number of cycles per minute. The number calculated is the SCFM (Standard Cubic Feet per Minute) of air required. A typical cycle takes between 10-20 seconds, depending on the sampler size and control settings.

The pneumatic system on the sampler, consisting of the filter/regulator, directional control valve and air cylinder was pre-plumbed and tested at the factory. The regulator is factory set at 80 PSI.

MODEL/SIZE	AIR CONSUMPTION PER SAMPLE CYCLE @ 80 PSI	
	2.0" PROBE	3.5" PROBE
PRT - 4	0.64 SCF	1.87 SCF
PRT - 6	0.80 SCF	2.27 SCF
PRT - 8	0.96 SCF	2.67 SCF
PRT - 10	1.12 SCF	3.07 SCF
PRT - 12	1.28 SCF	3.47 SCF
PRT - 14	1.44 SCF	3.87 SCF
PRT - 16	1.60 SCF	4.27 SCF
PRT - 18	1.76 SCF	4.67 SCF

The regulator cannot increase downstream outlet pressure above the upstream inlet pressure. If the pressure from the regulator is not sufficient to operate the cylinder, some means must be found to increase the inlet pressure to the regulator. Recommended air supply pressure is 80-100 PSI.

IV. OPERATIONS AND ADJUSTMENTS



4.1 Control Components And Their Functions

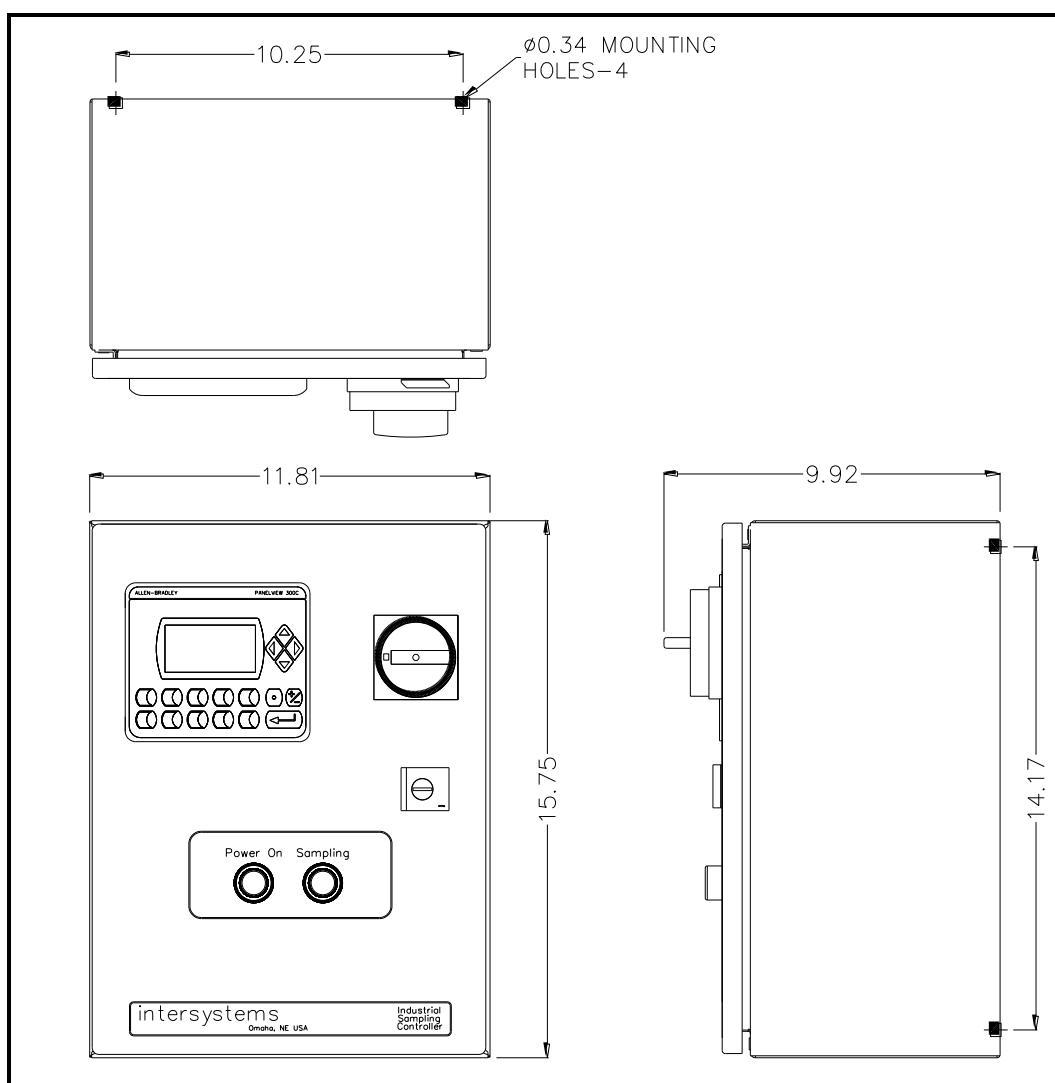
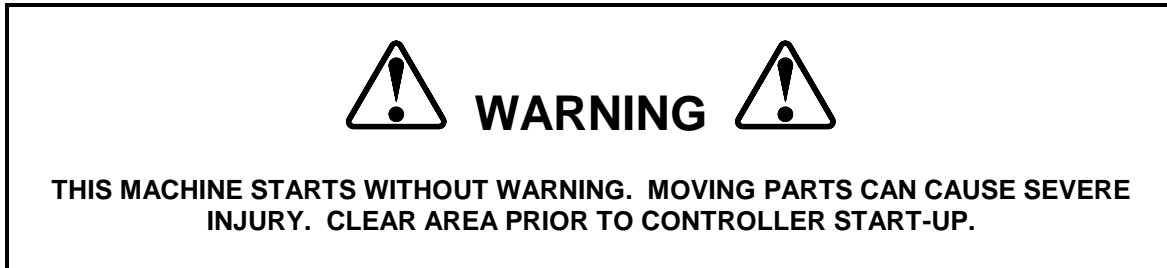


FIGURE 4-1, STANDARD NEMA 4 CONTROL PANEL DETAIL

Refer to the certified electrical drawing(s) for dimensions on control panels with optional features.

4.1.1 POWER OFF/ON SWITCH (S1)

The power OFF/ON Switch controls the electrical power to the controller and the sampler.



4.1.2 POWER Pilot Light

This light is illuminated as long as power is available to the controller and the POWER switch (S1) is set to ON.

4.1.3 SAMPLING Pilot Light

This light is illuminated when a sampling cycle has been initiated and will stay lit until the sampling cycle has completed.

4.1.4 Control Keypad

The operator Keypad is the source of all inputs necessary to operate the control. The Operator Keypad is set up using linked menus to step through the operation of the control. See the control manual 550791A for further information on the sampler control.

4.1.5 Main Fuse (FU1)

The fuse, located along the top center of the control, protects the controller and sampler components against overloads and short circuits.

For 110/120 VAC, 1PH operation, use ONLY a BUSS Type FNM 2 Amp, 250 VAC Slo-Blo fuse or equivalent.

For 220//240 VAC, 1PH operation, use ONLY a Buss Type FNM, 1 Amp, 250 VAC Slo-Blo fuse of equivalent.

4.1.6 Terminal Strip

This 19-position terminal strip is located along the bottom of the controller. It serves as the controller's interface and connection point for all external circuits and for the components mounted inside the enclosure. Refer to the certified electrical drawing(s).

4.1.7 Power Supply

The controller is equipped with a Power Supply which converts 120/240 VAC to 24 VDC for the operation of the PLC, Micro-View, display lights, input signals and the operation of the control relays. Refer to the certified drawing(s).

4.1.8 Control Relays

The controller is equipped with four control relays which are driven by the PLC 24 VDC outputs. Each relay has a mechanical flag indicator showing the relay is energized. The relay contacts are wired for 120/240 VAC. Refer to the certified drawing(s).

4.1.9 Micrologix PLC

The PLC for the control is an Allen Bradley Micrologix controller. The PLC operates using 24 VDC and is prewired to the proper terminal strip inputs and outputs. The processor program is protected to prevent any alterations to the existing program. This control is designed to run Intersystem equipment.

4.1.10 Manual Sampling

The operator may choose to run the sampler in Manual Mode by selecting manual mode in the Panel-View menu (Refer to manual 550791A). After selecting manual mode, each time F1 is pressed on the PanelView, a manual sample is initiated.

4.1.11 Automatic Sampling

The operator may choose to run the sampler in the Automatic Mode by selecting automatic mode in the PanelView menu (Refer to manual 550791A). Note: A jumper or switch must be installed between the controller's terminals 1 and 2 to initiate automatic sampling. When automatic mode is selected, an automatic sample will not be initiated until the jumper circuit between terminals 1 and 2. By installing a remote switch across terminals 1 and 2, the user can initiate the sampling cycle remotely. See manual 550791A for sampling automatic sampling options.



THIS CONTROL IS TO BE OPERATED ONLY ON THE VOLTAGE DESIGNATED ON THE CERTIFIED ELECTRICAL DRAWING! FIRE OR EXPLOSION MAY RESULT, WHICH CAN CAUSE DEATH, SERIOUS INJURY, AND EXTENSIVE DAMAGE TO EQUIPMENT. DO NOT CHANGE THE 115/230 VAC SWITCH SETTING WITHOUT CONSULTING INTERSYSTEMS.

4.2 Sampler Mounted Electrical Components

4.2.1 Sample Probe EXTENDED Limit Switch, LS-1

This switch is actuated when the sample probe is fully extended into the product stream. Closing of the N.O. contacts energizes the "A" coil of the rotation control valve, V-2. The rotary actuator causes the sample probe to rotate clockwise (when viewed from the rotary actuator end of the sampler) from the six o'clock to the three o'clock position to collect a sample. The switch is restored when the cylinders retract the sample probe from the product stream.

4.2.2 Sample Probe RETRACTED Limit Switch, LS-2 (actuated at rest)

This switch is actuated when the sample probe is fully retracted from the product stream. Closing of the N.O. contacts energizes the "B" coil of the rotation control valve, V-2, which rotates the sample probe counter-clockwise (when viewed from the rotary actuator end of the sampler) from the three o'clock position to the six o'clock position to dump the sample into the discharge chute. The switch is actuated at rest and restores when the cylinders extend at the beginning of a cycle.

4.2.3 Sample Probe @ SIX O'CLOCK Limit Switch, LS-3 (actuated at rest)

This switch is actuated when the rotary actuator has rotated fully counter-clockwise to the six o'clock position. Closing of the N.O. contacts signals a sample cycle is complete and allows the digital display timer to run (in the automatic mode). An automatic or manual sample cycle may be initiated if, and only if, this switch is actuated. The switch is actuated at rest and restores when the rotary actuator begins to rotate to sample.

4.2.4 Sample Probe @ THREE O'CLOCK Limit Switch, LS-4

This switch is actuated when the rotary actuator has rotated fully clockwise to the three o'clock position. Closing of the N.O. contacts energizes the "B" coil of the EXTEND/RETRACT control valve, V-1. The switch restores later in the cycle when the sample probe rotates to dump the sample.

4.3 Pneumatic Components

4.3.1 Solenoid Valves V-1 And V-2

These valves are 4-way, 2-position, double-solenoid operated, maintained-position directional control valves.

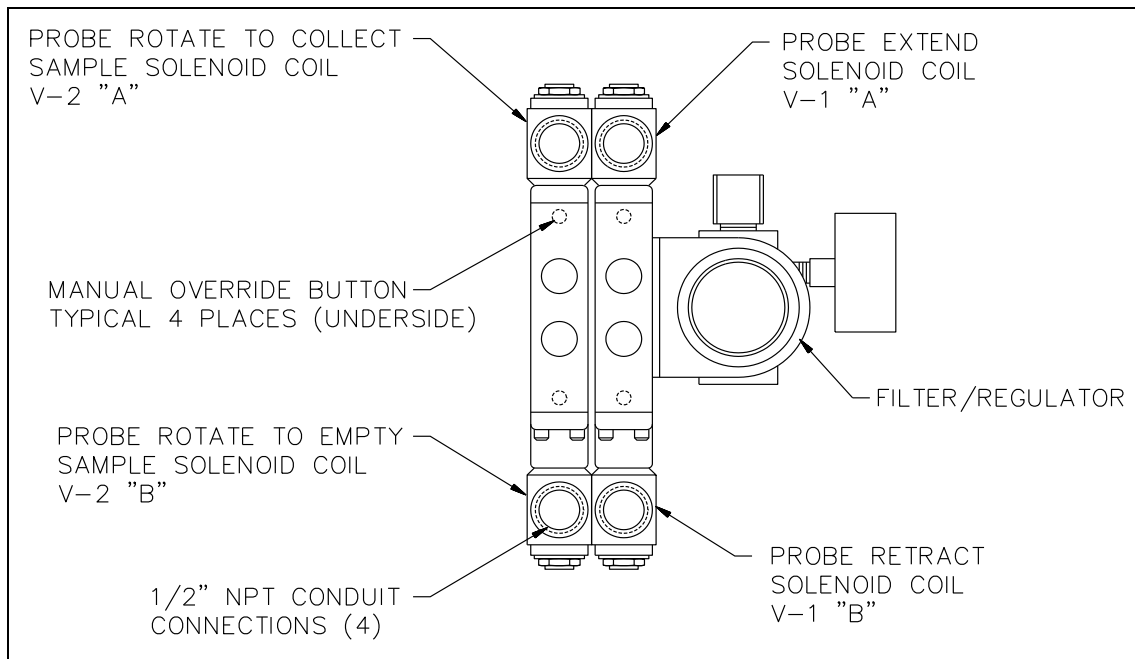


FIGURE 4-2, SOLENOID VALVE

4.3.1.1 Sample Probe EXTEND/RETRACT Valve V-1

This solenoid-operated directional control valve alternately pressurizes the piston end and rod end of two double-acting cylinders to extend and retract the sample probe. When the valve's "A" solenoid is energized, the valve spool shifts, pressurizing the rod ends of the cylinders. The cylinders extend, extending the sample probe into the product stream. When the "B" solenoid is energized, the valve spool shifts, pressurizing the piston ends of the cylinders. The cylinders retract, retracting the sample probe from the product stream.

4.3.1.2 Sample Probe ROTATE Valve V-2

This solenoid-operated directional control valve alternately pressurizes opposing ports of the rotary actuator to rotate the sample clockwise (CW) to collect samples and counter-clockwise (CCW) to dump samples (when viewed from the rotary actuator end of the sampler). When the valve's "A" solenoid is energized, the valve spool shifts, pressurizing the CW port of the actuator. The sample probe rotates, collecting a sample of the material from the product stream. When the "B" solenoid is energized, the valve spool shifts, pressurizing the CCW port of the actuator. The sample probe rotates, dumping the collected sample.

4.3.2 Rotation Speed Controls

Needle valves are built into the heads of the rotary actuator. Each needle valve can be adjusted to restrict the flow of air FROM the actuator port and control the rotational speed at which the actuator rotates the sample probe in one direction. The rotation speed controls are designated with the letter "P". This is stamped into the head of the actuator. Using a 1/8" hex key wrench, turn the screw clockwise to slow the rotation speed. This will increase the amount of sample collected. Turn the screw counter-clockwise and the amount of sample will decrease.

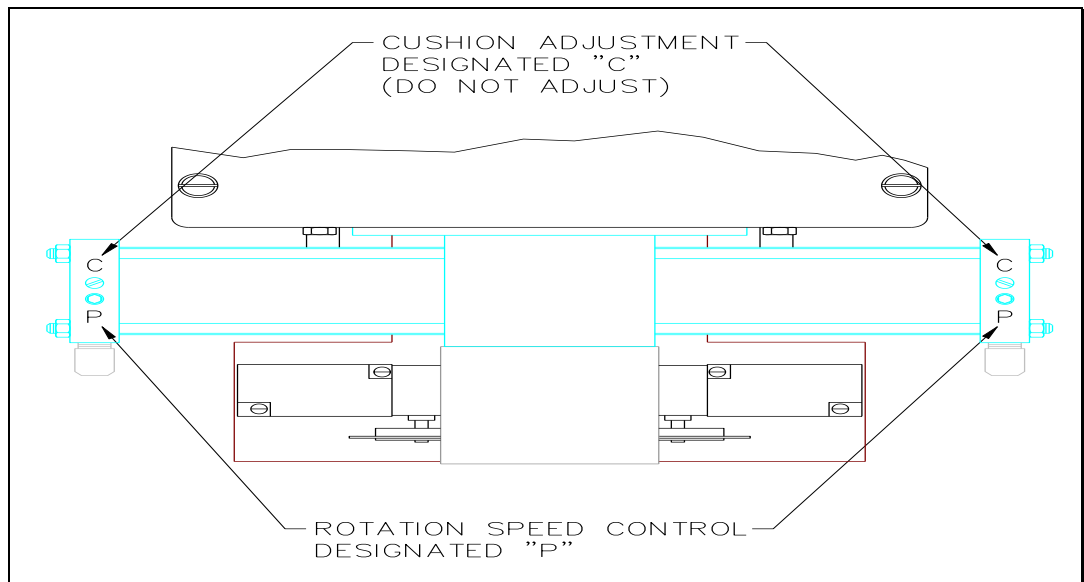




FIGURE 4-3, ROTATION SPEED CONTROLS

NOTE: DO NOT ADJUST THE CUSHION SCREW.

4.3.3 Probe Extend/Retract Speed Control Valve Adjustment

A speed control valve is threaded into each exhaust port of Valve V-1. Each speed control valve controls the rate at which air exhausts from one end of the cylinder and as a result, controls cylinder operating speed in only one direction. The speed controls were factory set but may need minor adjustment due to differences in air supplies. Use the following guidelines when adjusting the speed controls.

**CAUTION**

ESCAPE OF PRESSURIZED AIR, FLUIDS, AND CONTAMINANTS AT HIGH VELOCITY CAN CAUSE INJURY TO UNPROTECTED EYES. ALWAYS WEAR EYE PROTECTION WHEN SERVICING AIR VALVES AND COMPONENTS.

A. Turn the nut locking the one speed control valve's metering screw clockwise to loosen it. (NOTE: left hand threads). Do not allow metering screw to turn.

B. Change control switch to manual mode and initiate a manual sample. While operating the sampler, turn the metering screw to vary the speed of cylinder operation. Turn the screw clockwise to decrease speed, or turn the screw counterclockwise to increase speed.

C. When the desired cylinder operating speed in one direction has been achieved, tighten the nut to lock the adjustment and repeat procedure to adjust the other speed control valve.

4.3.4 Air Filter/Pressure Regulator

The air filter/regulator assembly provides a clean and regulated air supply to the samplers pneumatic components. A pressure gauge gives the operator an accurate reading of the downstream air pressure. The regulator is equipped with an adjustment knob for controlling the outlet pressure and a manual "pet-cock" type drain for draining the filter bowl.

Prior to introduction of air supply, turn the adjustment knob counter-clockwise until all load is removed from the regulating spring. Turn on system air pressure. Turn adjustment knob clockwise until desired outlet pressure is reached.

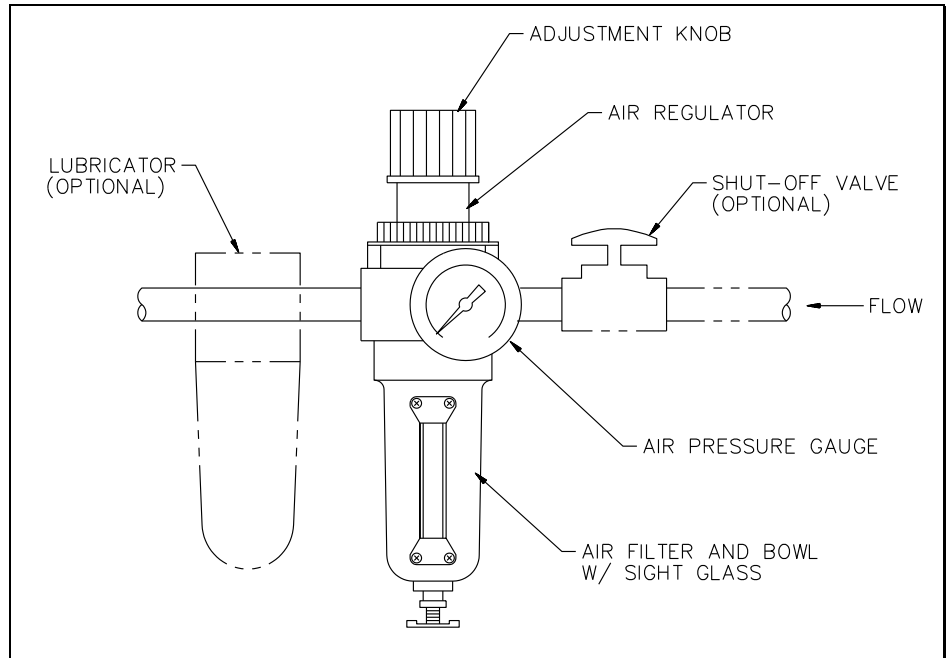


FIGURE 4-4, FILTER/REGULATOR

To avoid minor re-adjustments after making a change in the pressure setting, always approach the desired setting from a lower pressure. When reducing from a higher setting to a lower setting, first reduce to a pressure setting lower than desired and then adjust upward.

To "lock-in" the pressure setting on the regulator, push the locking on the adjustment knob down until it snaps into place. To release pull the locking upward. The pressure setting can be made tamper resistant by installing a seal wire in the groove above the locking.

4.3.5 Pneumatic Cylinders

These double-acting, non-cushioned rod cylinders extend and retract the sample probe. Stroke length varies with the sample probe stroke. Cylinder rods are attached to the sample probe assembly using an alignment coupler. Solenoid valve V-1 controls extension and retraction of the cylinders.

4.3.6 Rotary Actuator

The actuator is essentially two double acting air cylinders which drive a rack and pinion unit, thus converting linear motion into rotary motion. The actuator is coupled directly to the sample probe, alternately rotating the sample probe clockwise to collect samples and counter-clockwise to dump samples. Solenoid valve V-2 controls rotary actuator motions.

V. MAINTENANCE AND REPAIR



FAILURE TO OBSERVE ALL SAFETY RULES, WRITTEN AND IMPLIED, AND THOSE SUGGESTED BY COMMON SENSE, CAN RESULT IN DEATH, SERIOUS INJURY, AND /OR EQUIPMENT DAMAGE. LOCKOUT POWER BEFORE PERFORMING ANY MAINTENANCE.

5.1 General Maintenance

A good maintenance program involves thorough general housekeeping, adequate periodic re-lubrication, and replacement of worn or damaged components.

5.2 Periodic Inspection

At regularly scheduled intervals, while observing all safety precautions, observe the sampler as it operates. Inspect for:

- A. Loose or missing hardware
- B. Functioning and properly adjusted shock absorbers.
- C. Structural damage
- D. Rust or corrosion
- E. Damaged wiring, including exposed conductors and connections
- F. Damaged airlines or pneumatic components
- G. Keep the areas around the limit switches clear of accumulations of dirt and debris which might prevent the switches from functioning as intended.
- H. Make sure that all guards are in place and that all warning labels are in place and legible. Section I, GENERAL SAFETY INFORMATION, explains the purpose and intended location of the warning signs. Warning signs are an important part of any safety program; replace any missing signs IMMEDIATELY!

5.3 Lubrication

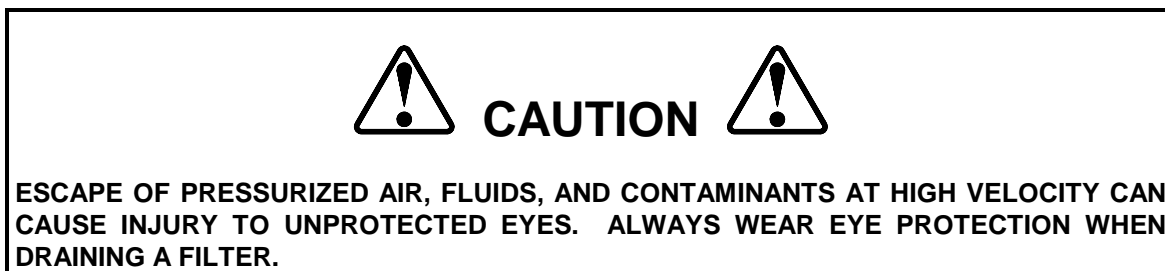
5.3.1 Guide Bushings and Drive Bearings

The bushings and drive bearings require no grease or lubrication. If lubrication is desired, use a dry lube silicone or light grease. Note that after lubricating it is essential that all covers remain fastened in place to prevent the entrance of dust and dirt, which would contaminate the grease.

5.3.2 Airline Lubricator

An airline lubricator is not required. The cylinders and the rotary actuator are of a non-lube design requiring NO lubrication. If the use of a lubricator is desired, it must be field mounted between the filter/regulator and the directional control valve. If a lubricator has been added to the system, the user must determine the appropriate lubricant and the proper intervals for refilling the reservoir. Refer to the lubricator manufacturer's technical literature. Note that by introducing oil into the airline, it will be discharged into the surrounding environment near the air exhausts of the directional control valves on the sampler.

5.4 Draining and Servicing the Filter



Drain the accumulated fluid whenever the fluid level in the reservoir (quiet-zone) rises to the lower baffle. Filters have either a screw-type drain or a push-type drain. If the filter requires frequent draining, consider installing an automatic drain or an air drying system. Periodically, the bowl may need to be removed to clean out accumulated moisture and contaminants.

- A. Shut off and lock out the air supply.
- B. Operate a valve or loosen an airline connection to relieve all pressure downstream from the filter/regulator.
- C. Remove and clean the bowl; various types of clamp rings or threaded collars are used to retain bowls.

NOTE: THE BOWLS OF FILTER/REGULATORS CAN NOT BE REMOVED WHILE PRESSURIZED! INTERNAL PRESSURE PREVENTS THE CLAMP RING OR THREADED COLLAR FROM TURNING.

- D. Clean or replace the filter element.
- E. If the bowl seal is damaged or brittle replace it. In any event lightly coat the seal with petroleum-based grease to help hold it in position.
- F. Reinstall the bowl. Turn on pressure and make sure the bowl is seated and sealed.

VI. TROUBLESHOOTING

6.1 General PRT Sampler Troubleshooting



DANGER



CARELESS OR ACCIDENTAL RESTORATION OF POWER CAN RESULT IN DEATH OR SERIOUS INJURY. MAKE CERTAIN AREA IS CLEAR BEFORE REMOVING LOCKOUTS.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Sampler does not cycle in either auto or manual modes (Power light Off).	Power switch OFF.	Turn power switch ON.
	Circuit breaker is open.	Reset breaker.
	Main fuse is blown.	Replace. Refer to Section 4.1.9.
	Faulty supply wiring.	Correct. Refer to certified electrical schematic.
	Defective power switch.	Replace switch.
Sampler does not cycle in either auto or manual modes (Power light On).	Faulty system wiring.	Correct. Refer to certified electrical schematic.
	Limit switch malfunction.	Inspect. Refer to Sections 4.2.1 to 4.2.4.
	No or low air pressure.	Turn air supply On and set regulator to 80-100 PSI.
	Defective control valve.	Refer to Section 6.2.
	Defective control relay.	Replace Relay
Sampler cycles in manual mode but not in automatic mode	Automatic initiate jumper not installed	Install jumper across terminals 1 & 2
Sample size too small or large.	Rotational speed of the sample probe too fast or too slow.	Adjust needle valve V-3. Refer to Section 4.3.2.

General PRT Sampler Troubleshooting (continued)

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Sampler sluggish (Operates too slowly).	Inadequate air supply.	Increase line size or add surge tank.
	Regulator set too low.	Reset. Refer to Section 4.3.4.
	Filter clogged.	Clean as outlined in Section 5.4.
	Airline from filter regulator blocked or damaged.	Inspect and correct.
	Cylinder seal leakage.	Refer to Section 6.3.1.
Sampler stops with probe extended.	Limit switch LS-1 and/or LS-4 not properly set.	Inspect & adjust If limit switch arm bent or loose.
	Limit switch LS-1 and/or LS-4 defective.	Replace if contacts not opening and closing by manually tripping.
	Sample probe jammed.	Inspect and correct.

6.2 Directional Solenoid Valve Troubleshooting

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Valve does not shift but full line voltage signal is present at the terminal strip inside the control.	No or low air pressure.	Turn on air supply and set regulator to 80-100 PSI.
	Faulty field wiring.	Check for full line voltage at the solenoid.
	Solenoid coil burnt out.	Replace coil if no continuity through coil.
	Valve clogged or stuck.	Remove & clean. Or replace.
Valve leaks air continuously out an exhaust port.	Defective valve seals.	Refer to Section 6.3.2.
	Defective cylinder seals.	Refer to Section 6.3.2.

There must be at least 60 PSI pressure at the valve. The valve pilot operators are air assisted. If there is insufficient pressure the valve will not shift or may not shift completely.

Observe the pressure gauge. Assume the gauge indicates sufficient pressure when the sampler is idle, 85 PSI for example. If the pressure drops significantly to perhaps 55 PSI when the valve shifts, a blocked or damaged air line should be suspected.

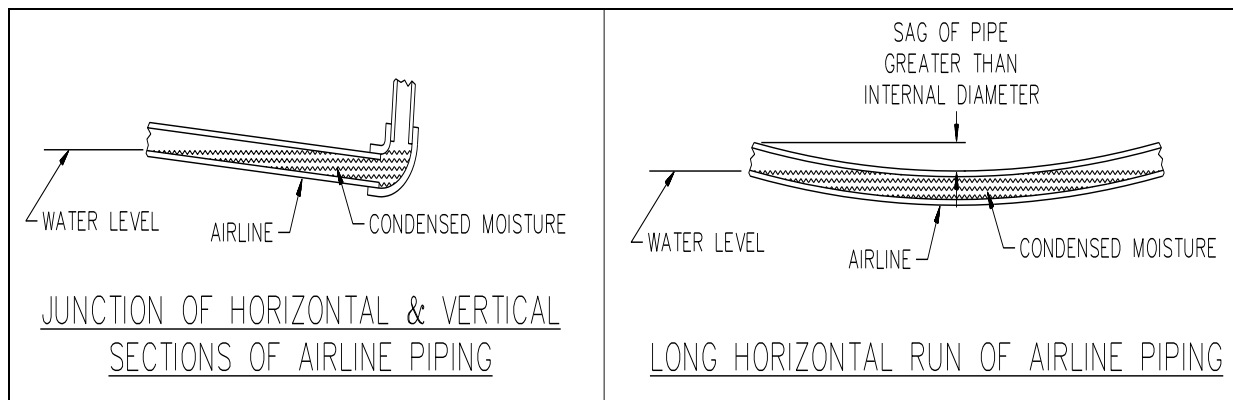


FIGURE 6-1, CONDENSED MOISTURE BLOCKING AIRLINE

One often overlooked cause of insufficient air flow is moisture condensing and collecting in a low spot in the supply line. Figure 6-1 illustrates an exaggerated example of such a problem. It can be seen that if the pipe sags only slightly over a long distance and water collects in the low spot over an extended period of time, the airline could be partially or completely blocked. A similar condition often occurs where there is a junction of horizontal and vertical sections of an air line.

This problem is particularly prevalent when there is high ambient humidity and the equipment operates infrequently and intermittently, as in the case of a sampler.

NOTE: ALL HORIZONTAL RUNS OF AN AIRLINE SHOULD HAVE A MOISTURE TRAP AND THE TRAPS SHOULD BE DRAINED FREQUENTLY; AT LEAST ONCE A DAY; ESPECIALLY, WHEN HUMIDITY LEVELS ARE HIGH.

6.3 Air Components Troubleshooting

6.3.1 Cylinder Leaking

A. External Leakage

1. Rod seal leakage can generally be traced to worn or damaged seals. Examine the piston rod for wear or damage. Replace the rod and seals if rod's surface is rough or worn out-of-round.
2. Soft or gummy seals are evidence of incompatibility with some substance in the air supply. Evaluate the area where the air intake is located. If an airline lubricator is included in the system, check to see if the lubricant being used is compatible with the seal material.

B. Internal Leakage

1. The lipseal piston seals are virtually leak free unless they are worn or damaged. Replace defective seals.
2. Contaminants in the air supply can lead to scored cylinder walls, resulting in rapid seal wear. If such is the case, check to see if the filter is being drained frequently. A different type of filter may be required; one that can remove finer particles or one that can filter out different kinds of contaminants.
3. Possible piston cylinder leakage, apparently indicated by piston drift is not always traceable to the piston. A leak through a closed valve port can also cause piston drift.

To determine if the cylinder piston is leaking (cylinder is bypassing), remove the cylinder retract hose from port 4 of the valve. This is the hose from the nose (piston rod) end of the cylinder. Use the valve's manual override to extend the cylinder. When the cylinder is fully extended, if air leaks from the retract port hose, the cylinders is bypassing. The cylinder will need to be repaired or replaced

6.3.2 Valve vs. Cylinder Leak Test

When there is continuous leakage out of a valve exhaust port, proceed as follows to determine if the leak is caused by defective valve seals or by defective cylinder seals.

A. Cylinder retracted as shown in Figure 6-2A

1. If there is continuous leakage out of Port "5", the valve seals are defective and must be replaced.
2. If there is continuous leakage out of Port "3", the problem can be with the valve seals or the cylinder seals. To determine which proceed as follows:
 - a. Disconnect the line between Valve Cylinder Port "2" and the cylinder per Figure 6-2B.
 - b. If leakage continues out of Port "3" and/or Cylinder Port "2", the valve seals are defective and must be replaced.
 - c. If there is a leakage out of the line from the cylinder, the cylinder seals are defective and must be replaced.

B. Cylinder extended as shown in Figure 6-2C.

1. If there is continuous leakage out of Port "3", the valve seals are defective and must be replaced.
2. If there is continuous leakage out of Port "5", the problem can be either the valve seals or the cylinder seals. To determine which proceed as follows:
 - a. Disconnect the line between Valve Cylinder Port "4", and the cylinder per Figure 6-2D
 - b. If leakage continues out of Port "5" and/or Cylinder Port "4", the valve seals are defective and must be replaced.
 - c. If there is a leakage out of the line from the cylinder, the cylinder seals are defective and must be replaced.

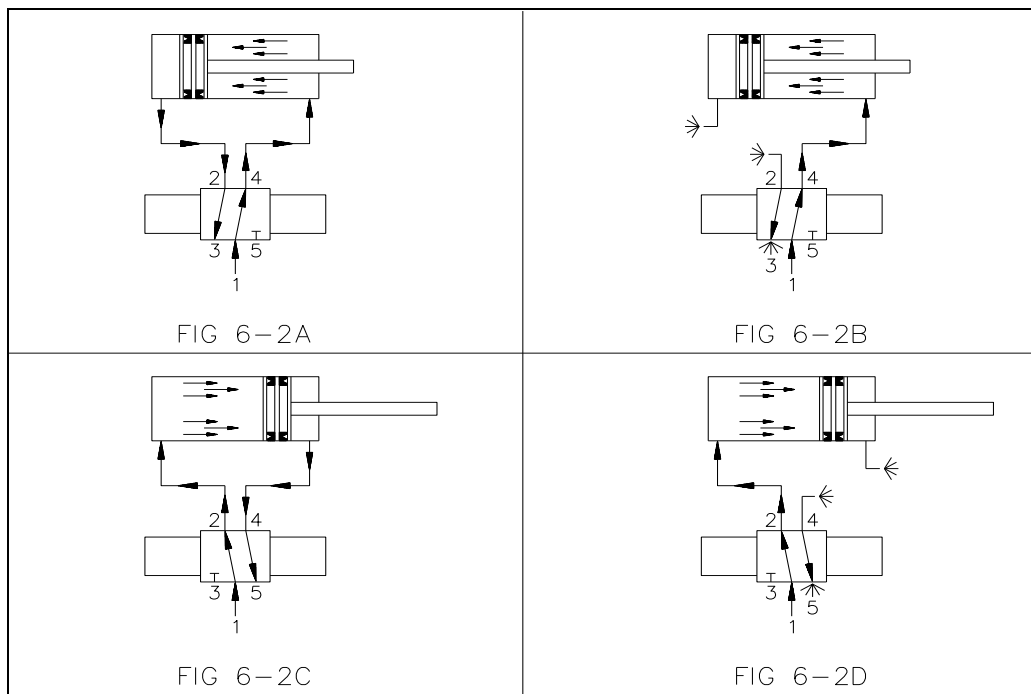


FIGURE 6-2, VALVE VS. CYLINDER LEAK TEST DIAGRAM

VII. REPLACEMENT PARTS

7.1 Scope

The certified drawings list the non-standard components that have been incorporated into the equipment. InterSystems, Inc. normally stocks non-fabricated parts and non-custom OEM parts. Replacement parts for any other components, including fabricated parts and custom OEM components can be supplied upon request.

7.2 Ordering Parts

Direct parts orders or requests for technical assistance to your sales representative or to:

InterSystems, Inc.
9575 N. 109th Ave
Omaha, NE. 68142
Phone: (402) 330-1500
FAX: (402) 330-3350

Please have available the MODEL NUMBER, SERIAL NUMBER and CUSTOMER ORDER NUMBER of the equipment in question as well as the location where the sampler is INSTALLED.

7.3 Replacement Parts

The InterSystems, Inc. sampler is a quality built piece of machinery. As with any machine, parts do wear out and fail. It is InterSystems' recommendation that a small supply of spare parts be kept on hand to cover any minor breakdowns. A separate priced Spare Parts List will be sent identifying the suggested spare parts. It is also necessary to check the certified drawings, which will list any special or custom components utilized on this equipment.

7.4 Repair Kits

The Following chart lists repair kits and parts that are available from InterSystems. These kits are offered as a more economical solution by rebuilding the defective part rather than replacing it. However in some cases the part may be beyond repair and replacement will be necessary.

Product Code	Description
512762	Standard spool kit for 4-way directional valves (ISI 375 series)
28166	Standard 120 vac valve coil & housing (ISI 375 series)
515835	Optional 240 vac valve coil & housing (ISI 375 series)
519287	Optional 120 vac explosion proof coil & housing (ISI 375 series)
527132	Rod seal kit for 5/8" rod air cylinder (Parker 2MA series)
527133	Rod seal kit for 1" rod air cylinder (Parker 2MA series)
523998	Piston seal kit for 2-1/2" bore air cylinder (Parker 2MA series)
524000	Piston seal kit for 4" bore air cylinder (Parker 2MA series)
513963	Gauge for filter regulator
524011	Filter element for filter regulator (Norgren B08 series)
35527	Limit Switch Contact Block 1 N.O. 1 N.C.

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7.4.1 Sampler Parts Listing PRT w/ 2.00" dia Probe (see Figures 7-1 & 7-2)

ITEM NO.	PART NO	DESCRIPTION	QTY
1	24550	3/8 ID AIR HOSE	A/R
2	24553	3/8 PUSH-LOC TO 3/8 MPT STR ADAPTOR	18
3	24552	3/8 PUSH-LOC TO 1/4 MPT STR ADAPTOR	2
4	510545	BRASS 90 DEG STREET ELBOW 1/4 NPT	2
5	34423	BRASS PIPE TEE 3/8 NPT	3
6	34451	BRASS 90 DEG STREET ELBOW 3/8 NPT	9
7	512823	BRASS PIPE CLOSE NIPPLE 3/8 NPT	1
8	531950	3/8 FILTER REGULATOR	1
9	28164	MOUNT BRACKET FOR FILTER REGULATOR	1
10	513735	MOUNT NUT FOR FILTER REGULATOR	1
11	28167	3/8 DUAL SOLENOID 4-WAY VALVE	2
12	34043	SPEED CONTROL 3/8 NPT	2
13	28185	GROMMET 0.69 ID X 0.12 GROOVE	2
14	26402	LIMIT SWITCH NEMA 4,12	4
15	35341	ADJ LIMIT SWITCH ROLLER ARM	2
16	35355	LIMIT SWITCH ARM 13" ROD	2
17	34355	DOORTITE SEAL 1/8 X 1/2	A/R
18	514026	ROD COUPLER 7/16-20 UNF	2
19	23852	2" SHAFT RETAINING RING	1
20	522496	PRT DRIVE THRUST RING (2.00 PROBE)	1
21	525026	PRT DRIVE PL FLG BEARING (2.00 PROBE)	2
22	525027	PRT SUPPORT BEARING (2.00 PROBE)	1
23	530293	PRT LIMIT SWITCH BRKT (2.00 PROBE)	1
24	525031	ROTARY ACTUATOR 270 DEGREE PTR-251	1
25	525058	1.0" SQ DRIVE BRG (2.00 PROBE)	1
26	530294	LIMIT SWITCH GUARD (2.00 PROBE)	1
27	530295	LIMIT SWITCH TRIPPER (2.00 PROBE)	1
28	526471	FRONT SUPPORT BEARING (2.00 PROBE)	1
29	525028	PRT DRIVE PLATE (2.00 PROBE)	1
	525782	PAINTED CARBON STEEL 304 STAINLESS STEEL	
30	525029	MOUNT PLATE ACTUATOR PTR-251	1
	525786	PAINTED CARBON STEEL 304 STAINLESS STEEL	
31	525025	PRT WELD MOUNT PLATE (2.00 PROBE)	1
	525784	PAINTED CARBON STEEL 304 STAINLESS STEEL	

ITEM NO.	DESC	QTY	(4 STROKE)	(6 STROKE)	(8 STROKE)
41	2.5 BORE AIR CYLINDER	2	525042	524145	524707

ITEM NO.	DESC	QTY	(10" STROKE)	(12" STROKE)	(14" STROKE)
41	2.5 BORE AIR CYLINDER	2	524242	525043	525044

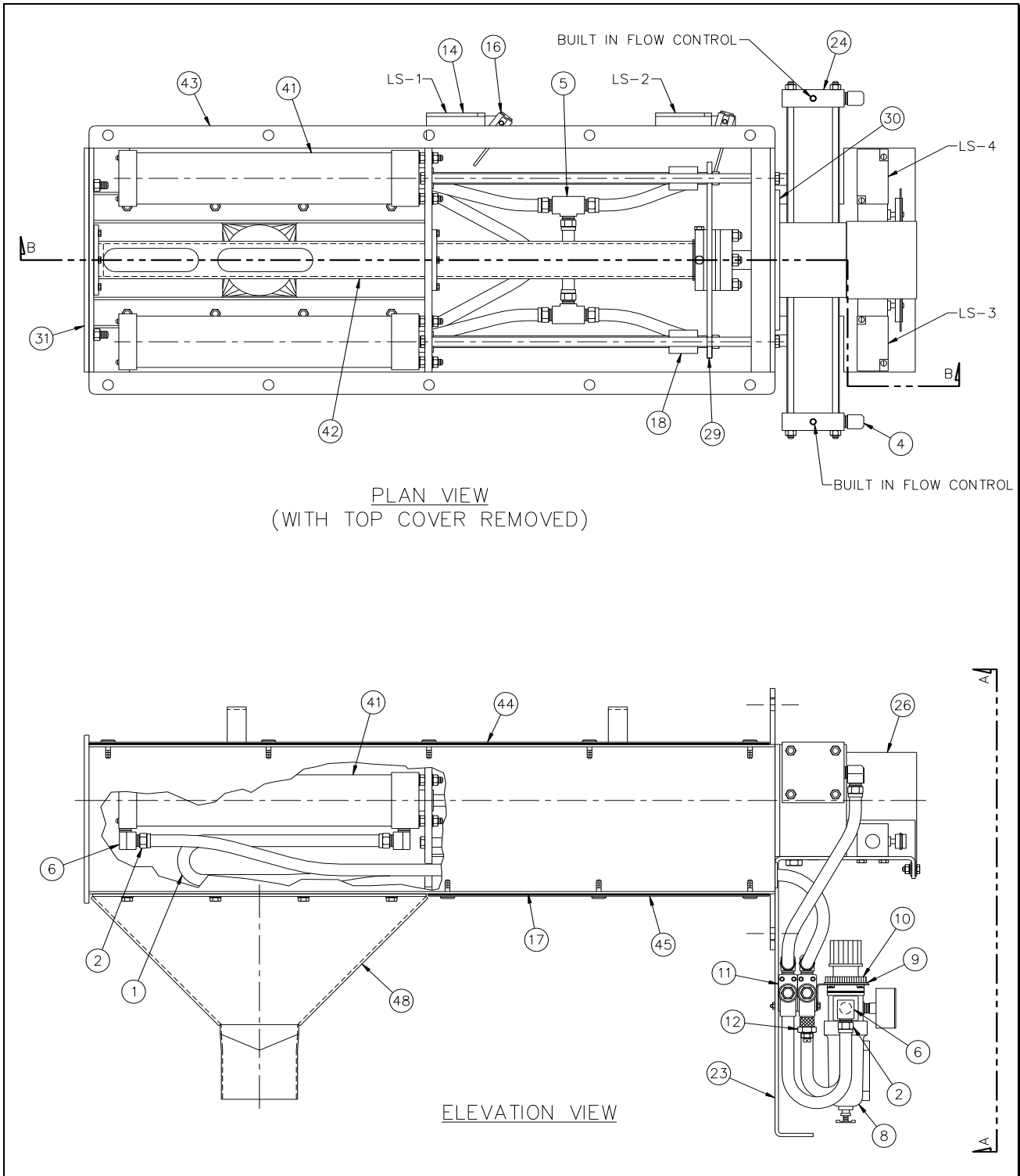
ITEM NO.	DESC	QTY	(16" STROKE)	(18" STROKE)
41	2.5 BORE AIR CYLINDER	2	525045	525046

7.4.1 Sampler Parts Listing PRT w/ 2.00" dia Probe (see Figures 7-1 & 7-2)

ITEM NO.	DESC	QTY	(4 STROKE)	(6 STROKE)	(8 STROKE)
42	PRT 304SS PROBE	1	20300-01	20301-01	20302-01
43	PRT HOUSING PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20300-02 20320-02	20301-02 20321-02	20302-02 20322-02
44	PRT COVER TOP PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20300-03 20320-03	20301-03 20321-03	20302-03 20322-03
45	PRT COVER BOTTOM PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20300-04 20320-04	20301-04 20321-04	20302-04 20322-04
46	PRT DRIVE SHAFT 1.0" SQ	1	20300-05	20301-05	20302-05
47	PRT SS GUIDE ROD	4	20300-06	20301-06	20302-06
48	PRT HOPPER PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20300-07 20320-07	20301-07 20321-07	20302-07 20322-07

ITEM NO.	DESC	QTY	(10" STROKE)	(12" STROKE)	(14" STROKE)
42	PRT 304SS PROBE	1	20303-01	20304-01	20305-01
43	PRT HOUSING PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20303-02 20323-02	20304-02 20324-02	20305-02 20325-02
44	PRT COVER TOP PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20303-03 20323-03	20304-03 20324-03	20305-03 20325-03
45	PRT COVER BOTTOM PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20303-04 20323-04	20304-04 20324-04	20305-04 20325-04
46	PRT DRIVE SHAFT 1.0" SQ	1	20303-05	20304-05	20305-05
47	PRT SS GUIDE ROD	4	20303-06	20304-06	20305-06
48	PRT HOPPER PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20303-07 20323-07	20304-07 20324-07	20305-07 20325-07

ITEM NO.	DESC	QTY	(16" STROKE)	(18" STROKE)
42	PRT 304SS PROBE	1	20306-01	20307-01
43	PRT HOUSING PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20306-02 20326-02	20307-02 20327-02
44	PRT COVER TOP PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20306-03 20326-03	20307-03 20327-03
45	PRT COVER BOTTOM PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20306-04 20326-04	20307-04 20327-04
46	PRT DRIVE SHAFT 1.0" SQ	1	20306-05	20307-05
47	PRT SS GUIDE ROD	4	20306-06	20307-06
48	PRT HOPPER PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20306-07 20326-07	20307-07 20327-07



7.4.2 Sampler Parts Listing PRT w/ 3.50" dia Probe (see Figures 7-3 & 7-4)

ITEM NO.	PART NO	DESCRIPTION	QTY
1	24550	3/8 ID AIR HOSE	A/R
2	24553	3/8 PUSH-LOC TO 3/8 MPT STR ADAPTOR	16
3	24554	3/8 PUSH-LOC TO 1/2 MPT STR ADAPTOR	4
4	513290	BRASS 90 DEG STREET ELBOW 1/2 NPT	4
5	34423	BRASS PIPE TEE 3/8 NPT	3
6	34451	BRASS 90 DEG STREET ELBOW 3/8 NPT	7
7	512823	BRASS PIPE CLOSE NIPPLE 3/8 NPT	1
8	28163	3/8 FILTER REGULATOR	1
9	28164	MOUNT BRACKET FOR FILTER REGULATOR	1
10	513735	MOUNT NUT FOR FILTER REGULATOR	1
11	28167	3/8 DUAL SOLENOID 4-WAY VALVE	2
12	34043	SPEED CONTROL 3/8 NPT	2
13	28185	GROMMET 0.69 ID X 0.12 GROOVE	2
14	26402	LIMIT SWITCH NEMA 4,12	4
15	35341	ADJ LIMIT SWITCH ROLLER ARM	2
16	35355	LIMIT SWITCH ARM 13" ROD	2
17	34355	DOORTITE SEAL 1/8 X 1/2	A/R
18	28149	ROD COUPLER 3/4-16 UNF	2
19	524424	3-1/2" SHAFT RETAINING RING	1
20	524425	PRT DRIVE THRUST RING (3.50 PROBE)	1
21	524427	PRT DRIVE PL FLG BEARING (3.50 PROBE)	2
22	525034	PRT SUPPORT BEARING (3.50 PROBE)	1
23	530290	PRT LIMIT SWITCH BRKT (3.50 PROBE)	1
24	525041	ROTARY ACTUATOR 270 DEGREE	1
25	525077	1.5 SQ DRIVE BRG (3.50 PROBE)	1
26	530291	LIMIT SWITCH GUARD (3.50 PROBE)	1
27	530292	LIMIT SWITCH TRIPPER (3.50 PROBE)	1
28	525038	PRT NOSE LOCATOR (3.50 PROBE)	1
29	525039	PRT NOSE BEARING (3.50 PROBE)	1
30	525040	PRT CHISEL NOSE (3.50 PROBE)	1
31	525035 525783	PRT DRIVE PLATE (3.50 PROBE) PAINTED CARBON STEEL 304 STAINLESS STEEL	1
32	525036 525787	MOUNT PLATE ACTUATOR PTR-321 PAINTED CARBON STEEL 304 STAINLESS STEEL	1
33	525033 525785	PRT WELD MOUNT PLATE (3.50 PROBE) PAINTED CARBON STEEL 304 STAINLESS STEEL	1

ITEM NO.	DESC	QTY	(4 STROKE)	(6 STROKE)	(8 STROKE)
41	4 BORE AIR CYLINDER	2	525047	525048	525049

ITEM NO.	DESC	QTY	(10" STROKE)	(12" STROKE)	(14" STROKE)
41	4 BORE AIR CYLINDER	2	525050	525051	525052

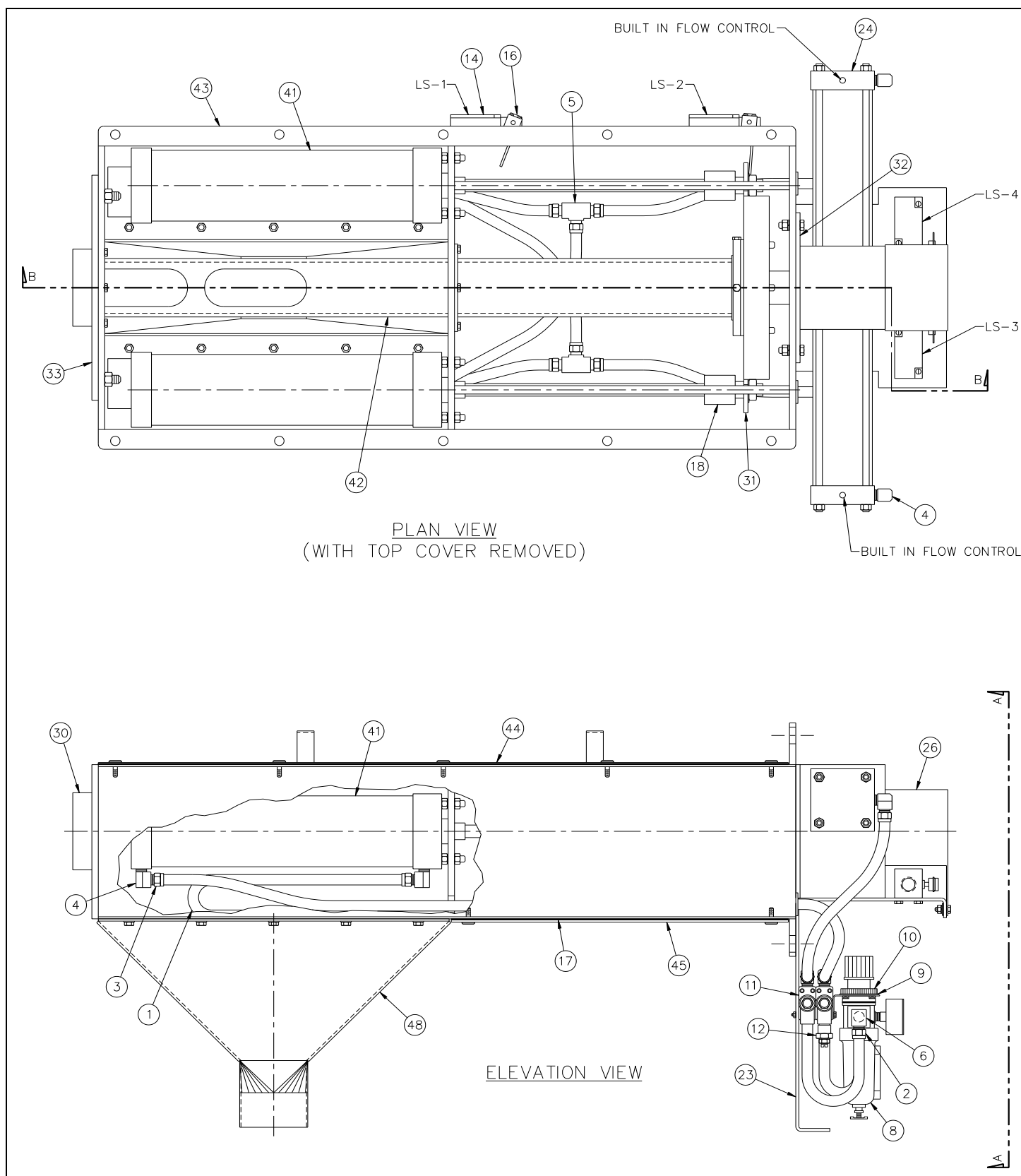
ITEM NO.	DESC	QTY	(16" STROKE)	(18" STROKE)
41	4 BORE AIR CYLINDER	2	525053	525054

7.4.2 Sampler Parts Listing PRT w/ 3.50" dia Probe (see Figures 7-3 & 7-4)

ITEM NO.	DESC	QTY	(4 STROKE)	(6 STROKE)	(8 STROKE)
42	PRT 304SS PROBE	1	20308-01	20309-01	20310-01
43	PRT HOUSING PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20308-02 20330-02	20309-02 20331-02	20310-02 20332-02
44	PRT COVER TOP PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20308-03 20330-03	20309-03 20331-03	20310-03 20332-03
45	PRT COVER BOTTOM PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20308-04 20330-04	20309-04 20331-04	20310-04 20332-04
46	PRT DRIVE SHAFT 1.5" SQ	1	20308-05	20309-05	20310-05
47	PRT SS GUIDE ROD	4	20308-06	20309-06	20310-06
48	PRT HOPPER PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20308-07 20330-07	20309-07 20331-07	20310-07 20332-07

ITEM NO.	DESC	QTY	(10" STROKE)	(12" STROKE)	(14" STROKE)
42	PRT 304SS PROBE	1	20311-01	20312-01	20313-01
43	PRT HOUSING PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20311-02 20333-02	20312-02 20334-02	20313-02 20335-02
44	PRT COVER TOP PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20311-03 20333-03	20312-03 20334-03	20313-03 20335-03
45	PRT COVER BOTTOM PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20311-04 20333-04	20312-04 20334-04	20313-04 20335-04
46	PRT DRIVE SHAFT 1.5" SQ	1	20311-05	20312-05	20313-05
47	PRT SS GUIDE ROD	4	20311-06	20312-06	20313-06
48	PRT HOPPER PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20311-07 20333-07	20312-07 20334-07	20313-07 20335-07

ITEM NO.	DESC	QTY	(16" STROKE)	(18" STROKE)
42	PRT 304SS PROBE	1	20314-01	20315-01
43	PRT HOUSING PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20314-02 20336-02	20315-02 20337-02
44	PRT COVER TOP PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20314-03 20336-03	20315-03 20337-03
45	PRT COVER BOTTOM PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20314-04 20336-04	20315-04 20337-04
46	PRT DRIVE SHAFT 1.5" SQ	1	20314-05	20315-05
47	PRT SS GUIDE ROD	4	20314-06	20315-06
48	PRT HOPPER PAINTED CARBON STEEL 304 STAINLESS STEEL	1	20314-07 20336-07	20315-07 20337-07



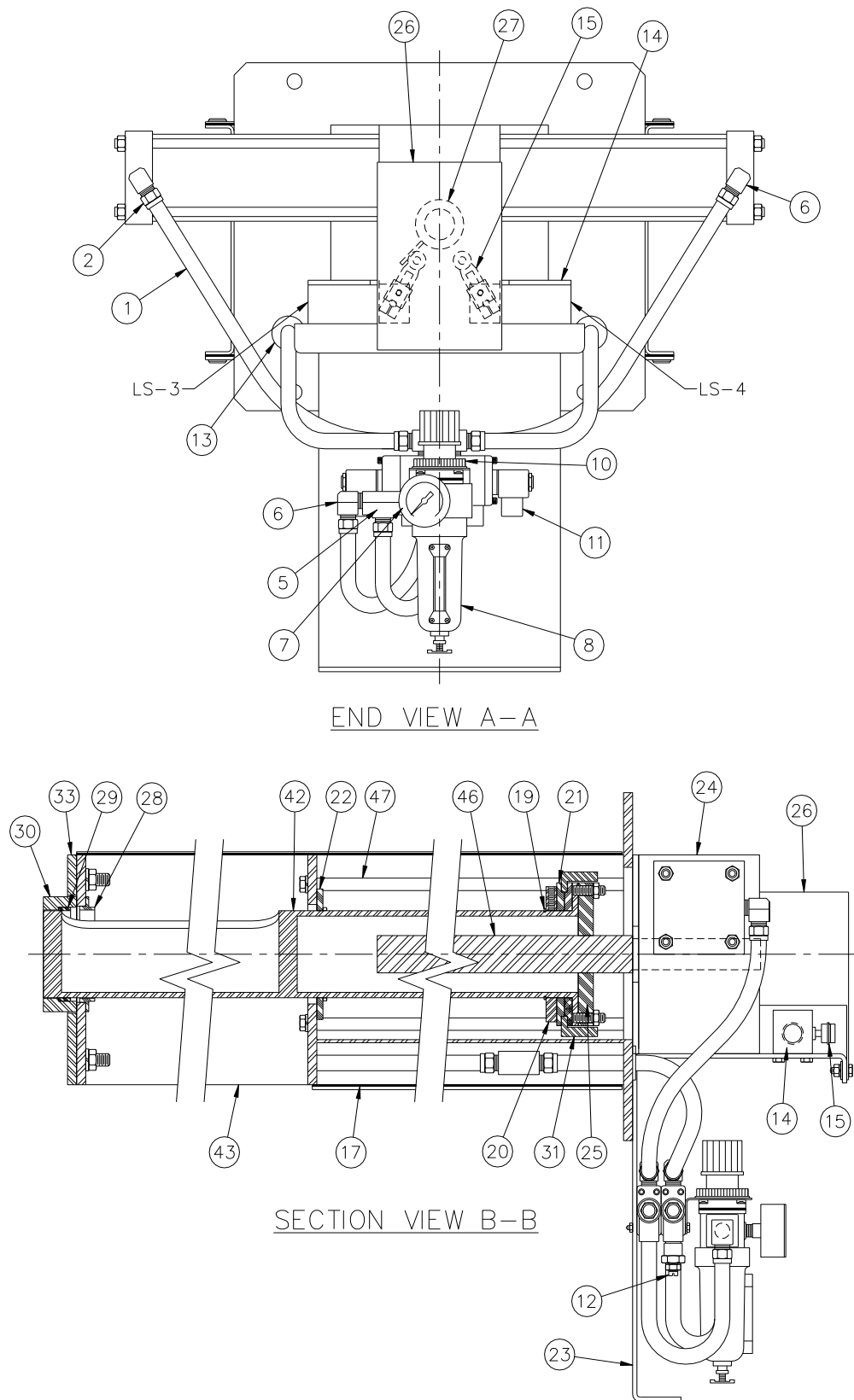


FIGURE 7-4, PRT SAMPLER w/ 3.5" od PROBE

VIII. WARRANTY

InterSystems, Inc. reserves the right to make changes in design or in construction of equipment and components without obligation to incorporate such changes in equipment and components previously ordered.

WARRANTY, LIMITATION OF LIABILITY, DISCLAIMER OF IMPLIED WARRANTIES: InterSystems, Inc. manufactured equipment and components are guaranteed against defects in workmanship or materials for one year from date of shipment. The obligation of InterSystems, Inc. with respect to any goods is limited to replacement or repair of defective parts and equipment provided those parts are returned, shipping costs prepaid, to InterSystems' factory and provided the product has not been subject to misuse, negligence, or accident, or repaired or altered outside of our factory, or other than by an Authorized Service Representative. This warranty does not cover the replacement of parts inoperative because of wear occasioned by use, the cost of replacing parts by a person other than an InterSystems employee or an Authorized Service Representative, or the adjustment of a product where the product was improperly adjusted by the purchaser. In addition, this warranty does not cover components manufactured by others such as motors, drives, clutches, cylinders, valves, blowers, and the like. On those components the standard Manufacturers' warranty applies. In any event, liability is limited to the purchase price paid, and InterSystems, Inc. will, under no circumstances, be responsible for special or consequential damages, or for incidental damages.

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