SAFETY
INSTALLATION
OPERATION
MAINTENANCE

M A N U A L

SAMPLER
Model PDP

No. PC545735A
Revised 2016-06-09

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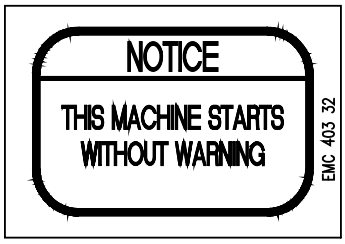
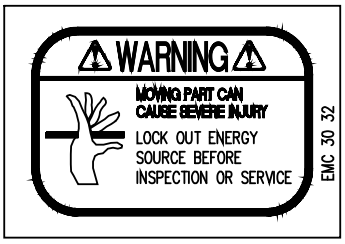
I. GENERAL SAFETY INFORMATION

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 5 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.

DANGER

THIS EQUIPMENT IS TO BE OPERATED ONLY ON THE VOLTAGE DESIGNATED ON THE CERTIFIED ELECTRICAL DRAWING(S)! FIRE OR EXPLOSION MAY RESULT, WHICH CAN CAUSE DEATH, SERIOUS INJURY, AND EXTENSIVE DAMAGE TO EQUIPMENT. DO NOT CONNECT TO VOLTAGES OTHER THAN DESIGNATED.

WARNING

COMPRESSED AIR CAN CAUSE SEVERE INJURY. SHUT OFF AND LOCK OUT COMPRESSED AIR SOURCE TO THE SAMPLER AND BLEED OFF ANY AND ALL PRESENT COMPRESSED AIR WITHIN THE SAMPLER PNEUMATICS BEFORE ATTEMPTING ANY SERVICE ON THIS SAMPLER.

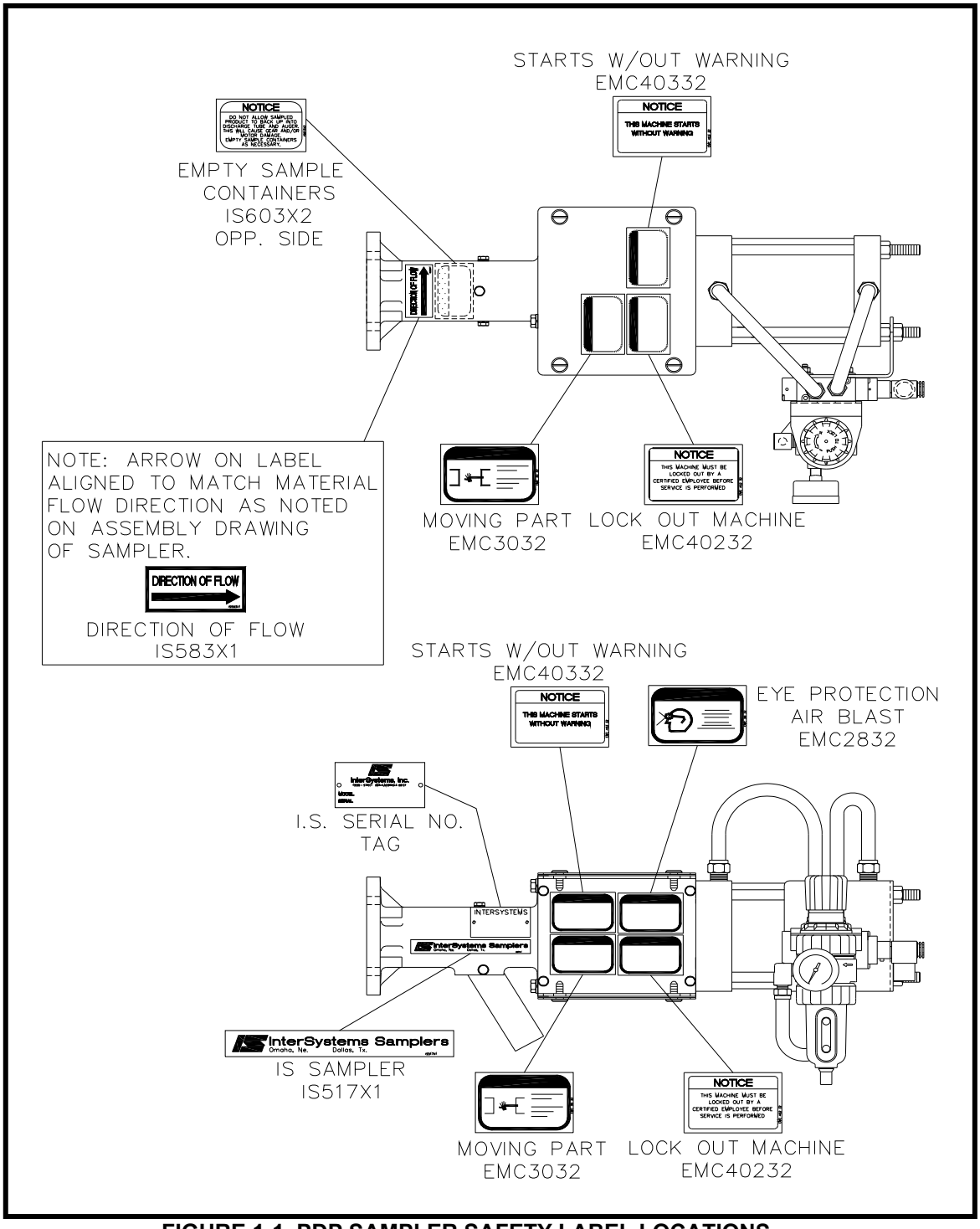


FIGURE 1-1, PDP SAMPLER SAFETY LABEL LOCATIONS

II. GENERAL INFORMATION

2.1 System Description

The PDP Sampler is designed to collect a representative sample of granular, flake, powder, or other materials in a pressurized conveying line or pressure vessel. Figure 2-1 illustrates a typical PDP Sampler application.

Sample collection is initiated in response to either an operator's manual command or a signal automatically generated by controller logic, usually time-based but which could also be volume or quantity based. A sample cycle begins when a double-acting pneumatic cylinder forces the slotted sampling tube (probe) into the product line to collect a sample of the material. Next, the sample tube (probe) is withdrawn into the seal housing isolating the sample and sample tube cavity from the conveying line. The sample then falls down and out the discharge tube to the desired sample collection point, at which point an InterSystems SCS Sample Collection System (optional) may be installed.

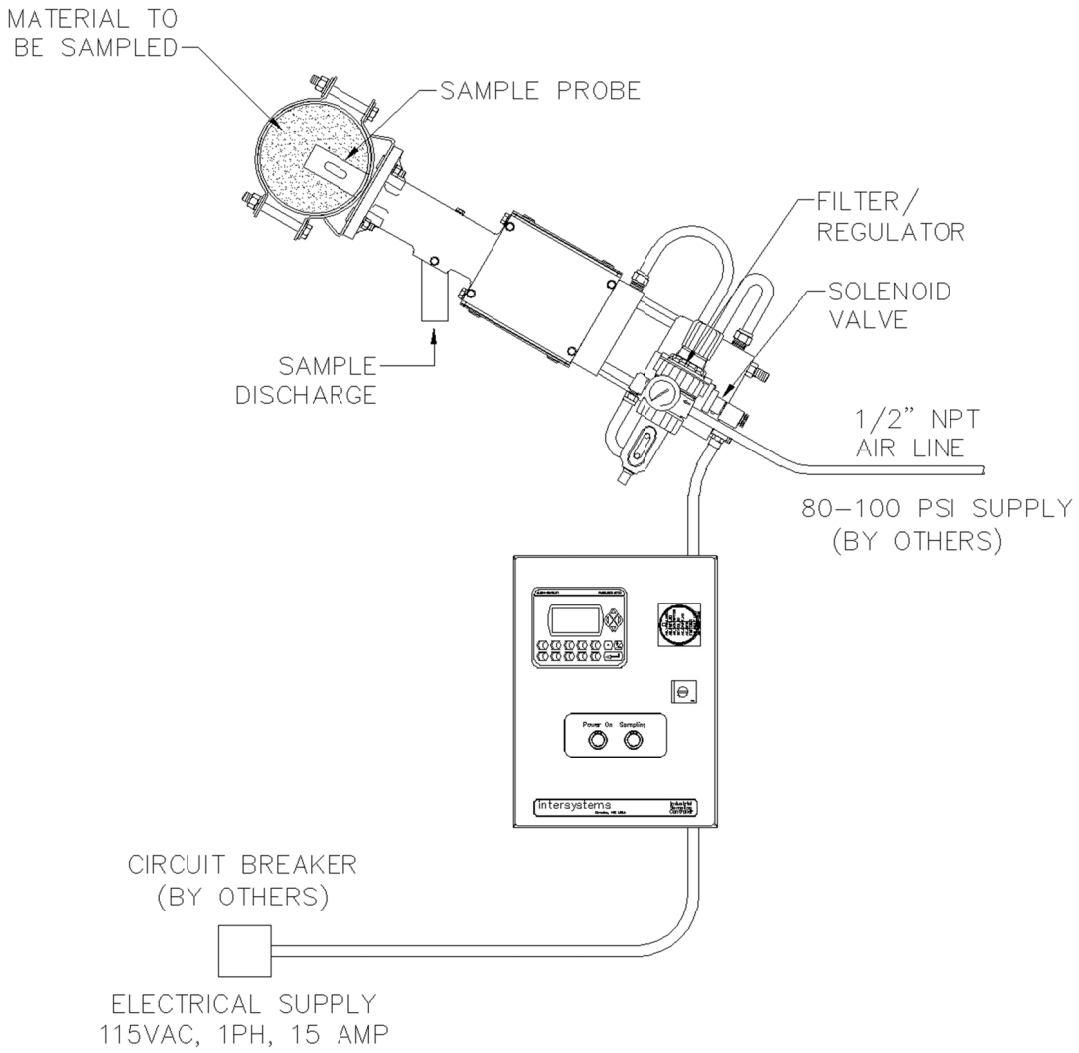


FIGURE 2-1, TYPICAL INSTALLATION, MODEL PDP SAMPLING SYSTEM

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. The difference in an explosion-proof sampler as compared to a standard sampling system is the solenoid valve. An explosion proof sampler will have:

1. An explosion-proof solenoid on the directional control valve with the rating of:
   Class 1, Groups A,B,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. Purge air systems to either aid in material discharging from the sampler or to prevent material from building up in v-ring packing seals.

D. Components of special materials, such as 316 stainless steel, monel, inconel or special probe coatings of chrome or nedox.

2.3 Material Sampled

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

2.4 Sampler Construction

Standard sampler housing construction is of painted cast aluminum. The sample probe, housing and covers are 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 PDP sampler is typically mounted 30 degrees off of horizontal on the vertical conveying line carrying the product to be sampled as in Figure 2-1. The sampler axis must be installed perpendicular to the product line and 30 degree down from horizontal 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. As shown on the certified drawing of the sampler, the sampler must be installed with an additional hanger or bracket to rigidly support the sampler. The support can be attached the cylinder tie rods at the rear of the cylinder. The hanger or bracket should be capable of supporting approximately 60 lbs.

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. THE SAMPLER CYLINDER MUST BE RIGIDLY SUPPORTED; ANY FLEXING WILL DAMAGE THE SAMPLER.

NOTE: OVER TIGHTENING THE MOUNTING FASTENERS WILL WARP OR CRACK THE SEAL HOUSING FLANGE. IMPROPER SAMPLING WILL RESULT.

3.4.1 Sampler Without Optional Mounting Accessories

A. Locate and mark the desired mounting location on the product line.

B. The mounting flange on the end of the seal housing has four .406 (13/32") clearance holes for 3/8" mounting bolts or studs. Using the sampler mounting face as a pattern, layout or transfer punch the hole locations onto the conveying line. Drill a probe clearance hole ½" greater in diameter than the probe (ie, drill a 2" diameter hole for a 1-1/2" probe).

C. Drill and tap the holes for the mounting bolts, or weld studs to the conveying line for fastening the sampler.

D. Ensure that the o-ring is seated in the groove on the sampler housing mounting flange and verify that the sample tube extends and retracts without interference.

E. Install the sampler on the mount surface and tighten the mounting fasteners to insure proper sealing between the sampler seal housing and the product line.

F. If the conveying line is a pressure or vacuum line, check to see that the seal at the connection is airtight. Re-tighten fasteners if necessary.

G. The user or installer must provide a hanger or bracket to rigidly support the sampler. The support can be attached to the cylinder tie rods at the rear of the cylinder. The hanger or bracket should be capable of supporting approximately 60 lbs.

3.4.2 Factory Pre-Mounted Sampler

As furnished, the premounted sampler is already firmly attached to a length of tube, pipe, etc.

A. Remove a section of pipe or chute work where the sampler is to be installed.

B. Remove the sampler from the sampler premount.

C. Locate the sampler premount in the desired position. Drill a probe clearance hole ½" greater in diameter than the probe (ie, drill a 2" diameter hole for a 1-1/2" probe).

D. Attach the sampler premount using one of the following methods.
   1-Weld the sampler premount ends directly to the existing pipe or chute work.
   2-Clamp the sampler premount ends to the existing pipe utilizing compression couplings
   3-Weld matching flanges to the existing pipe or chute work and sampler premount.

E. Ensure that the o-ring is seated in the groove on the sampler housing mounting flange.

F. Install the sampler on the mount surface and tighten the mounting fasteners to insure proper sealing between the sampler seal housing and the product line.

G. If the conveying line is a pressure or vacuum line, check to see that the seal at the connections are airtight. Re-tighten fasteners and/or re-weld if necessary.

H. The user or installer must provide a hanger or bracket to rigidly support the sampler. The support can be attached to the cylinder tie rods at the rear of the cylinder. The hanger or bracket should be capable of supporting approximately 60 lbs.

3.4.3 Field-Mounted Sampler Using Weld-On Plates

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 conveying line. Drill a probe clearance hole ½" greater in diameter than the probe (ie, drill a 2" diameter hole for a 1-1/2" probe).

B. Position the sampler mounting plate by aligning the sample probe clearance hole.

C. Tack weld the sides of the mounting plate to the product line surface and double check alignment.

D. 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. Ensure that the o-ring is seated in the groove on the sampler housing mounting flange and verify that the sample tube extends and retracts without interference.

F. Install the sampler on the mount surface and tighten the mounting fasteners to insure proper sealing between the sampler seal housing and the product line.

G. If the conveying line is a pressure or vacuum line, check to see that the seals at the connections are airtight. Re-tighten fasteners and/or re-weld if necessary. If the weld leaks, remove the sampler and o-ring before making any repair welds. Weld heat will damage or destroy the gasket and the Teflon seals in the seal housing.

H. The user or installer must provide a hanger or bracket to rigidly support the sampler. The support can be attached to the cylinder tie rods at the rear of the cylinder. The hanger or bracket should be capable of supporting approximately 60 lbs.

3.4.4 Field-Mounted Sampler Using Clamp-Type Mounting Brackets

Clamp-type mounting brackets are used on round tube or pipe conveying lines.

A. Locate and mark the desired mounting location on the conveying line.

B. Drill a probe clearance hole ½" greater in diameter than the probe (ie, drill a 2" diameter hole for a 1-1/2" probe).

C. Make sure the 1/8" thick Neoprene gasket is in place inside the clamp bracket.

D. Position the clamp bracket by aligning the sample probe clearance holes and tighten the clamp fasteners.

NOTE: OVER TIGHTENING THE BRACKET FASTENERS WILL DISTORT THE CONVEYING LINE TUBE OR PIPE. THE TUBE CAN CRACK OR BUCKLE, THE SAMPLER WILL NOT BE PROPERLY ALIGNED WITH THE PRODUCT STREAM, AND IN CASES WHERE THE CONVEYING LINE I.D. IS NEARLY THE SAME AS THE STROKE OF THE SAMPLER, THE SAMPLE TUBE MAY ACTUALLY STRIKE THE OPPOSITE SIDE OF THE TUBE AS IT EXTENDS.

E. Ensure that the o-ring is seated in the groove on the sampler housing mounting flange and verify that the sample tube extends and retracts without interference.

F. Install the sampler on the mount surface and tighten the mounting fasteners to insure proper sealing between the sampler seal housing and the product line.

G. If the conveying line is a pressure or vacuum line, check to see that the seal at the mounting clamp is airtight. Tighten clamp fasteners if necessary.

H. The user or installer must provide a hanger or bracket to rigidly support the sampler. The support can be attached to the cylinder tie rods at the rear of the cylinder. The hanger or bracket should be capable of supporting approximately 60 lbs.

3.5 Material Sample Transport Lines

The tubing used to transport material samples must be compatible with the operating environment and the material sampled. Typically a 1.50" ID 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. Air leaks can interfere with the pressure or vacuum conveying and sampling system. Escaping sample material can contaminate surrounding atmosphere and equipment.

3.6 Electrical Power Requirements, System

110/120 VAC 50/60 Hz, Single Phase, 15 Amp Service.
Optional - 220/240 VAC 50/60 Hz, Single Phase, 10 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 may affect the controller, thus causing the sampler to malfunction. When wiring use a short length of flexible conduit to connect wiring to sampler to isolate any vibrations originating in the product conveying line and sampler.

3.6.1 Solenoid Valve Coil

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

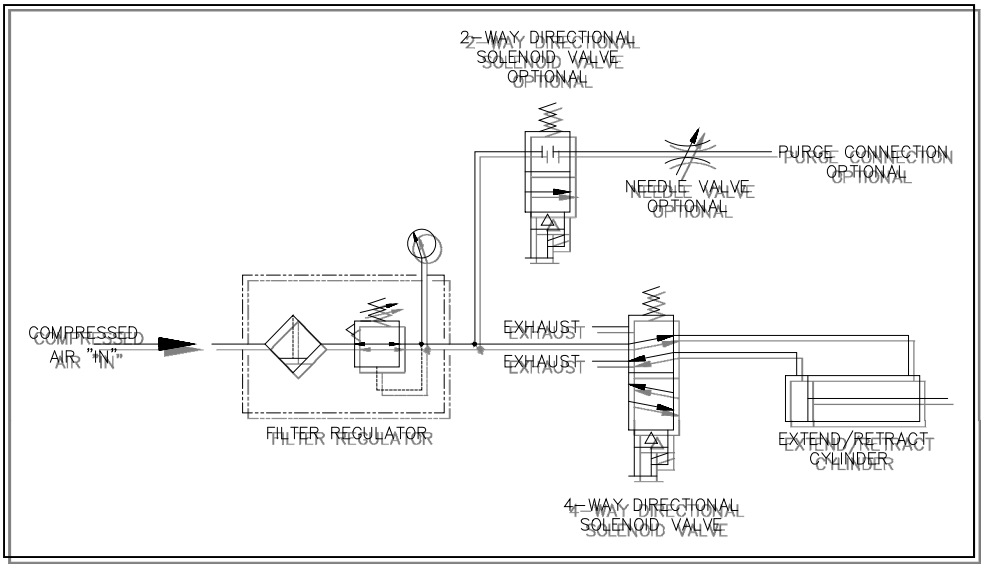


FIGURE 3-1, PNEUMATIC SCHEMATIC

3.7 System Piping

NOTE: USE ONLY CLEANED, PICKLED, DESCALED, AND OILED PIPE FOR AIR SUPPLY LINES. DIRT, SCALE, AND DEBRIS USUALLY FOUND IN STANDARD PIPE QUICKLY CLOGS FILTER/REGULATORS, VALVES, ETC. USE ONLY TEFLON TAPE TO SEAL PIPE JOINTS. CAREFULLY APPLY THE TAPE TO PIPE AND FITTINGS SO NO FRAGMENTS ENTER THE SYSTEM.

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.

3.7.1 Compressed Air Consumption

A complete sampling cycle requires that the cylinder extend and retract for a specified amount of time. 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.

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

DANGER

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.

4.1 Control Components And Their Functions

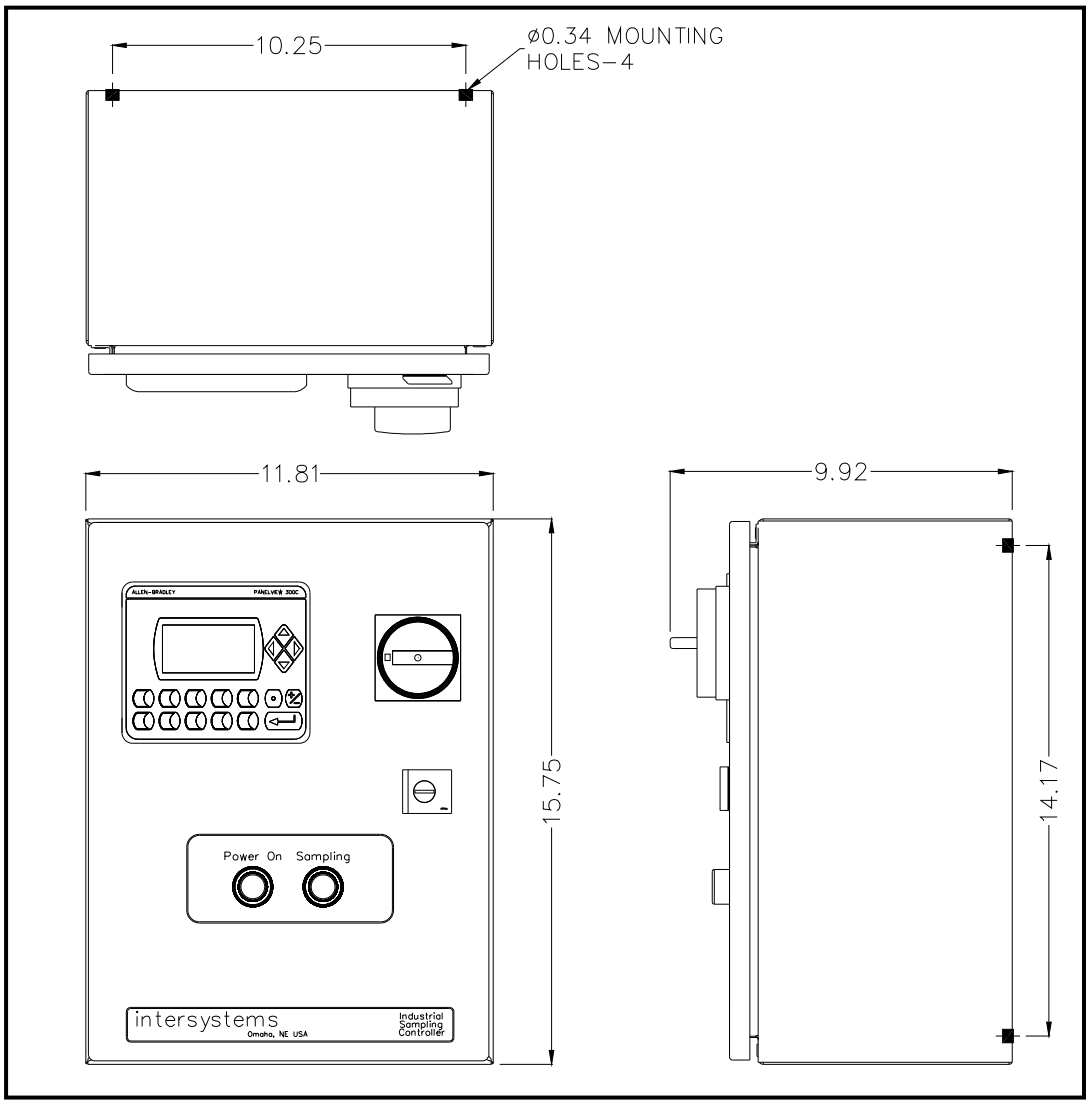


FIGURE 4-1, STANDARD NEMA 4 CONTROL PANEL DETAIL

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.

WARNING

THIS MACHINE STARTS WITHOUT WARNING. MOVING PARTS CAN CAUSE SEVERE INJURY. CLEAR AREA PRIOR TO CONTROLLER START-UP.

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.

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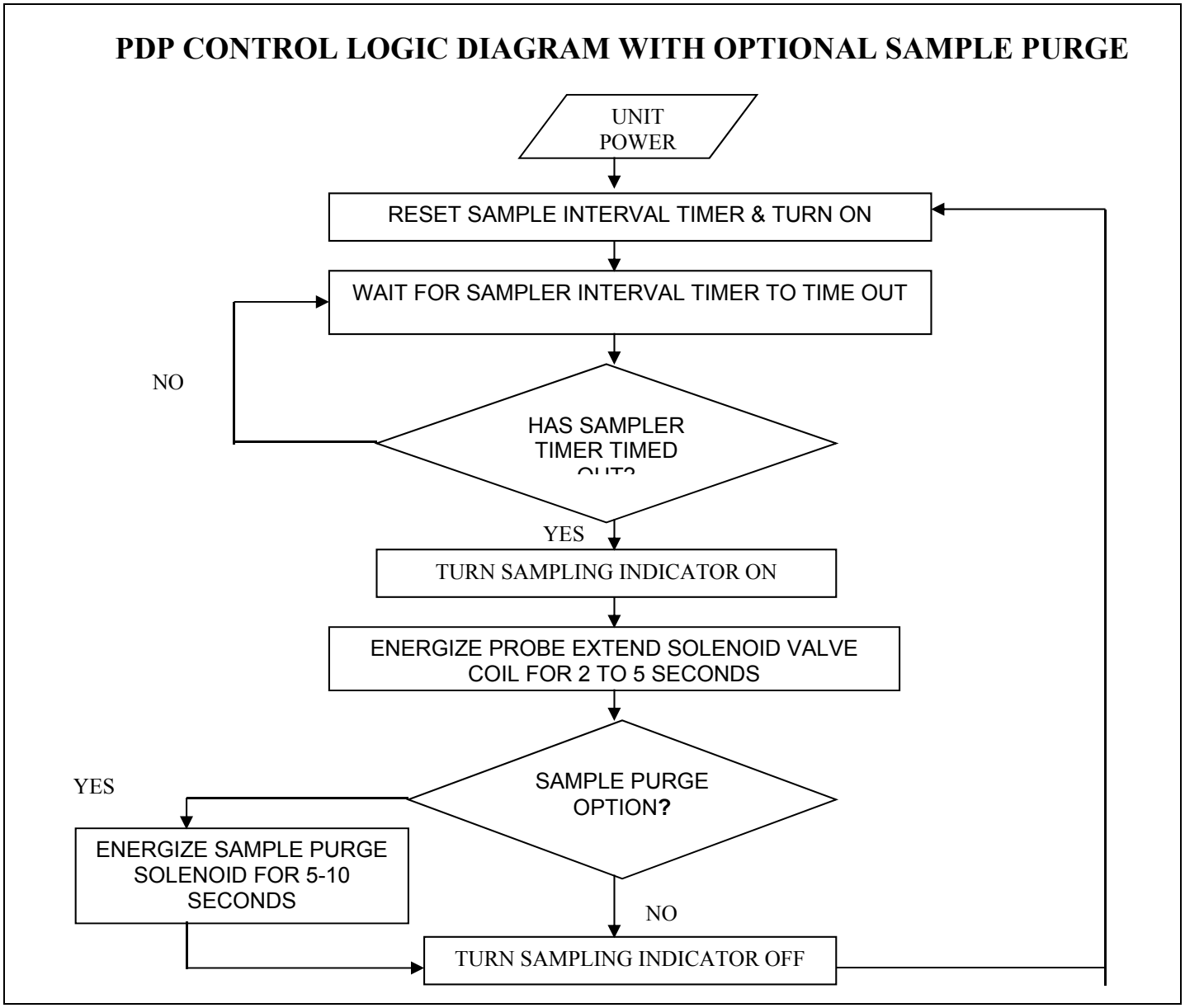
DANGER

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.

4.1.12 Sampler Control Logic



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

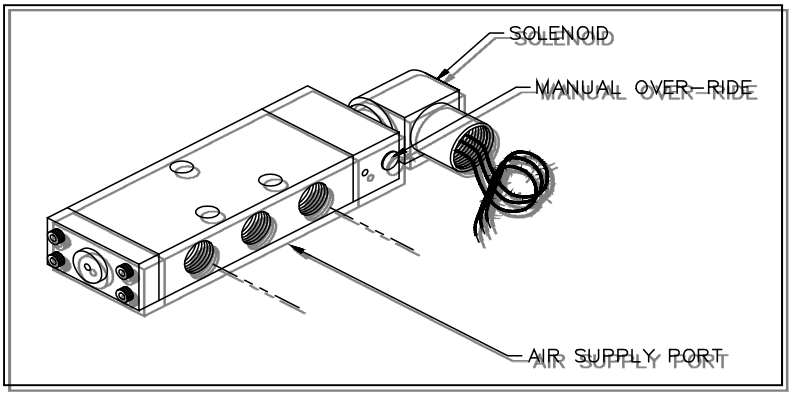


FIGURE 4-4, SOLENOID VALVE

4.2 Pneumatic Components

4.2.1 Solenoid Valve V-1

This valve is a 4-way, 2 position, spring return, single solenoid operated control valve. This valve controls the air cylinder, alternately pressurizing the cap end and rod end of the cylinder to extend and retract the sample tube (probe).

When the valve's solenoid is energized, the internal valve spool shifts, pressurizing the cap end of the cylinder. The cylinder extends, pushing the sample tube (probe) into the product stream. When the solenoid is de-energized, the valve's spring forces the valve spool to shift (return to the retracted position), pressurizing the rod end of the cylinder. The cylinder retracts, pulling the sample tube (probe) from the product stream.

The valve has a manual over-ride button that allows the operator to cycle the sampler air cylinder without the aid of the controller. By pushing the manual over-ride button, the internal valve spool is positioned manually and the sampler air cylinder will extend and remain there until the button is released. When the over-ride button is released the cylinder will return to its home position.

4.2.2 Needle Valve (Optional)

This valve regulates the air flow feeding the purge option. This valve will require some adjustment upon initial sampler start up. Figure 7-2 shows the two available purge configurations.

A. The "Sample Purge" type aids in the flow of material out of the sampler and into the sample container. This purge, which is controlled by the sample purge solenoid valve V-2, forces air into the sample tube (probe) when the sampler is at the retracted position.

B. The "Lantern Ring Purge" helps keep the material being sampled away from the sampler packing seals. This purge, which only has the needle valve for control, forces air continuously ahead of the probe seals to keep the sampled material from being forced into the seals.

4.2.3 Sample Purge Solenoid Valve V-2 (Optional)

This valve operates the sample purge option. The valve is a 2-way, normally closed, spring return, single solenoid operated control valve. As shown in Figure 7-2, it is plumbed in conjunction with the needle valve to correctly control the purge air flow. The sample purge valve is activated when the sample tube (probe) is retracted thus aiding in the flow of material out of the sampler. Refer to the certified electrical drawing(s) for proper wiring requirements.

4.2.4 Air Filter/Pressure Regulator

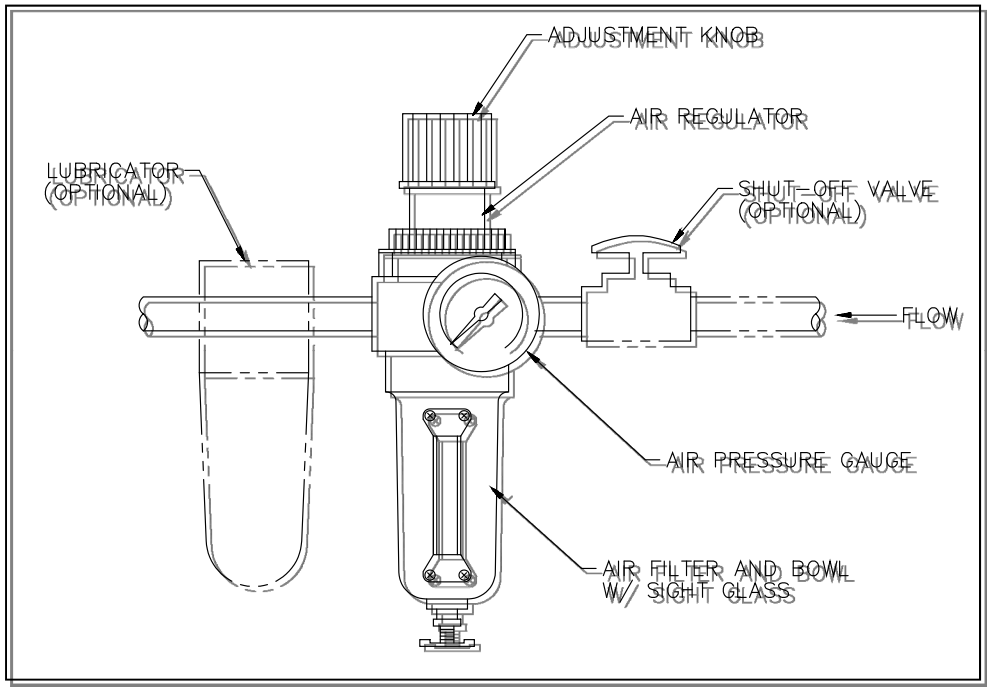


FIGURE 4-5, FILTER/REGULATOR

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.

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 lockring on the adjustment knob down until it snaps into place. To release pull the lockring upward. The pressure setting can be made tamper resistant by adding the additional tamper proof key lock to the regulator.

4.2.5 Pneumatic Cylinder

This double-acting air cylinder extends and retracts the sample tube (probe). Stroke length varies with the sample tube (probe) stroke. The cylinder rod is threaded directly into the sample tube (probe). Solenoid valve V-1 controls extension and retraction of the cylinder.

V. MAINTENANCE AND REPAIR

DANGER

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. Structural damage

C. Rust or corrosion

D. Damaged wiring, including exposed conductors and connections

E. Damaged airlines or pneumatic components

F. 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 Airline Lubricator

An airline lubricator is not required. The cylinder is 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 valve(s) on the sampler.

5.4 Draining and Servicing the Filter

CAUTION

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

5.5 Mechanical Repair Procedures

5.5.1 Adjustment of Seal Pressure

A series of v-ring packing assemblies and spacers within the seal housing support and seal the sample tube. When the sampler has operated for an extended period of time, the seals may wear or extrude. If evidence of leaking from the conveying line along the sample tube is noticed, first try to increase the compressive force on the seal and spacer stack.

Refer to the drawings in Section VII. The v-ring packing seals are held compressed by a compression nut and a seal retainer plate. To tighten the seals, back out the seal retainer plate's 4 slotted screws, ¼ turn. By hand, tighten the compression nut until the nut becomes hand tight against the seals. Finish by tightening the 4 slotted screws on the seal retainer plate.

NOTE: EXCESSIVE COMPRESSION ON THE SEAL AND SPACER STACK WILL RESULT IN PERMANENTLY DEFORMED & INEFFECTIVE SEALS THAT WILL HAVE TO BE REPLACED. IT IS POSSIBLE TO OVER TIGHTEN THE SEAL AND SPACER STACK WHICH CAN RESULT IN THE SEIZURE OF THE SAMPLE TUBE, RENDERING IT INCAPABLE OF EXTENDING OR RETRACTING.

If the leak can not be stopped by adjusting seal pressure, then the seals will have to be replaced as explained in Section 5.5.2.

5.5.2 Seal Replacement

When following the instructions below, refer to the applicable drawing of the sampler. Reference the drawings in Section VII and the certified drawing(s).

A. Shutoff and lockout all power (electrical and pneumatic).

B. Shut down conveying line and remove the sampler assembly. Install a properly designed cover plate over the hole in the conveying line. Save the gasket(s); if any have deteriorated or are damaged, order replacements.

C. In order to remove the seals, remove and retain the following components and save ALL fasteners:

1. Remove the top and bottom covers of the sampler.

2. Remove the four 1/4-20UNC hex head bolts attaching the side panels to the seal housing and the two 3/8-16UNC hex head bolts attaching the guide rods to the seal housing.

3. Loosen the compression nut with the spanner wrench (545736). Remove the two 1/4-20UNC hex head bolts holding the compression plate.

4. Pull the seal housing off of the sample probe.

5. Remove the 1/4-20UNC hex head bolt(s) over the discharge spacer and the purge spacer if applicable.

6. Remove the four #10-24UNC X 3/8" flat head screws attaching the seal retainer to the seal housing.

7. Remove the seals and spacers taking care to avoid damaging the seal housing bore. If necessary, use a round plastic rod or wooden dowel to push with.

8. Replace worn items and clean the remaining components. Remove any burrs or scratches from the bore of the seal housing.

D. Rebuild the sampler in the following order.

1. Re-install the seal retainer plate using the four #10-24UNC X 3/8" flat head screws.

2. Refer to the Teflon Seal Spacer Arrangement, Figure 7-1. It illustrates the order of insertion and orientation of seals and spacers. Carefully insert the seals and spacers from the rear of the seal housing, pushing them towards the front.

3. Re-install the 1/4-20UNC hex head bolt(s) over the discharge spacer and the purge spacer if applicable.

4. Back out the compression nut and position the compression plate onto the seal housing. Reinstall the two 1/4-20UNC hex head bolts to clamp the compression plate tight. Thread the compression nut into the compression plate loosely.

5. Carefully slide the seal housing over the sample tube (probe) and into position.

6. Re-install the four 1/4-20UNC hex head bolts fastening the side plates to the seal housing. Install the two 3/8-16UNC hex head bolts fastening the guide rod to the seal housing. Make certain that the seal housing is aligned with the sample tube so there is no side thrust. Then securely tighten all the screws.

7. Loosin the four #10-24UNC screws on the retainer plate by ¼ turn. Hand tighten the compression nut to firmly compress the seal and spacer stack. Tighten the four screws.

E. Remove the cover plate on the sample conveying line and reattach the sampler.

F. Restore power to the Sampler. Use the manual over-ride to operate it through several collection cycles. If air leaks along the sample tube (probe) are detected, tighten the compression nut a 1/4 turn. Repeat the process until no leakage is detected.

CAUTION

KEEP HANDS FREE OF MOVING PARTS!

G. Re-install the top and bottom covers of the sampler.

5.5.3 Sample Probe And Seal Replacement

When following the instructions below refer to the applicable drawing of the sampler. Reference the drawings in Section VII and the certified drawing(s).

A. Follow instructions in Section 5.5.2 "A" through "C".

B. Disconnect the sample probe from the air cylinder assembly by unthreading the probe from the cylinder.

C. Clean and inspect any items to be reused. Replace if worn or damaged.

C. Re-assemble the sample probe to the air cylinder assembly.

D. Continue by following instructions in Section 5.5.2 "D" through "G"

VI. TROUBLESHOOTING

6.1 General PDP 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 certified electrical schematic.
	Faulty supply wiring.	Correct. Refer to certified electrical schematic.
	Defective power switch.	Replace switch.
Sampler cyles in manual mode but not in automatic mode	Automatic initiate jumper not installed	Install jumper across terminals 1 & 2
Sampler does not cycle in either auto or manual modes (Power light On).	Faulty system wiring.	Correct. Refer to certified electrical schematic.
	No or low air pressure.	Turn air supply on and set regulator to 80-100 PSI.
	Fuse is blown.	Replace. Refer to certified electrical schematic.
	Defective control valve.	Refer to Section 6.3.
Sample size too small or large.	Solenoid time on setting too low or high.	Adjust solenoid time setting. Refer to control manual 550791A.
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 6.4.
	Seals adjusted too tight	Adjust seals. Refer to Section 5.5.1

General PDP Sampler Troubleshooting (continued)

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Sampler leaks air or material continuously out the sample discharge.	Packing seals not tight.	Tighten. Refer to section 5.5.1.
	Packing seals worn out.	Inspect & replace. Refer to Section 5.5.2.
	Sample probe worn out.	Inspect & replace. Refer to Section 5.5.3.
Sample probe does not extend or retract.	No or low air pressure.	Turn air supply on and set regulator to 80-100 PSI.
	Defective control valve.	Refer to Section 6.3.
	Material caked up in seals.	Inspect & replace. Refer to Section 5.5.2.
	Defective air cylinder seals.	Inspect & replace. Refer to Section 6.4.1.
	Sample probe bent or jammed.	Inspect & replace. Refer to Section 5.5.3.

NOTE: PDP SAMPLERS REQUIRE THE PROGRAM MODE TO BE SET TO "1" (ONE). REFER TO CONTROLLER MANUAL 550791A.

6.2 Directional Solenoid Valve Troubleshooting

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Valve does not shift but full line voltage signal is present at terminal TB1-8.	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 6.4.2.
	Defective cylinder seals.	Refer to Section 6.4.2.

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.

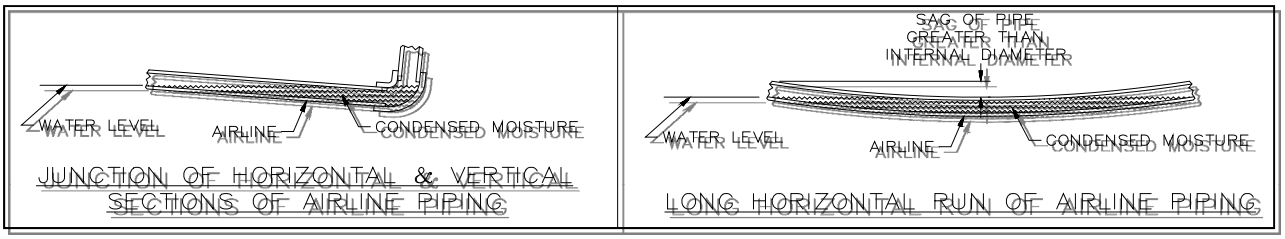


FIGURE 6-1, CONDENSED MOISTURE BLOCKING AIRLINE

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 the 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 cylinder 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.

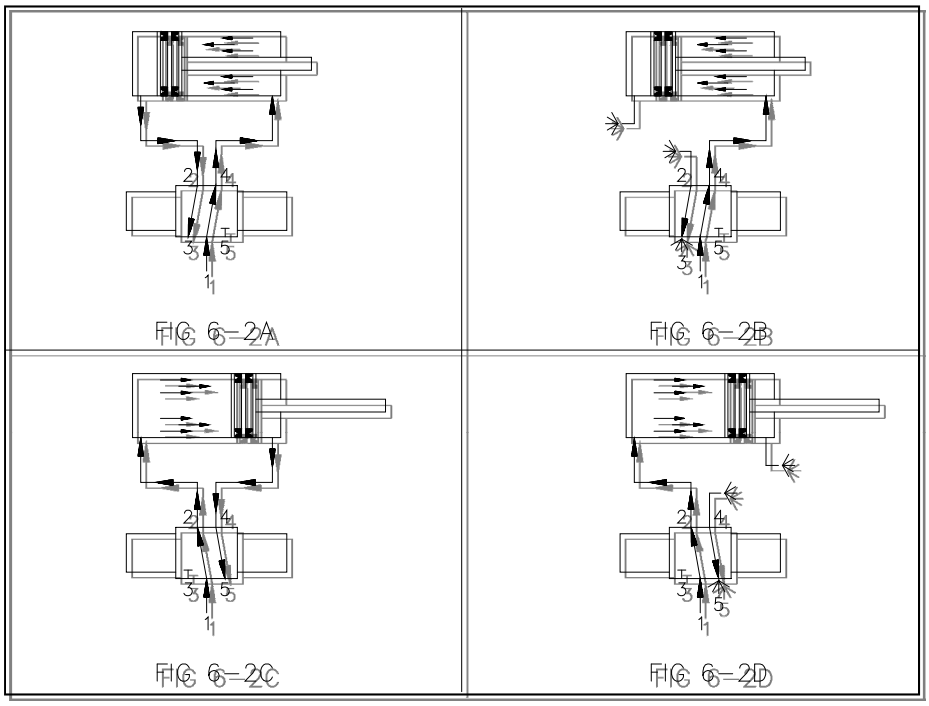


FIGURE 6-2, VALVE VS. CYLINDER LEAK TEST DIAGRAM

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: (800) 228-1483
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.

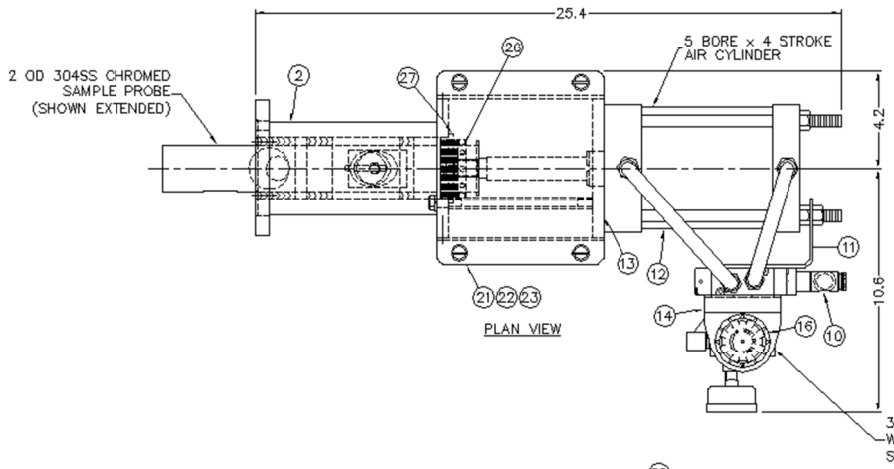
7.4 Repair Kits

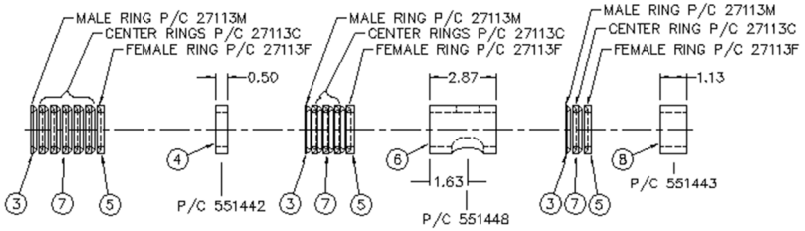
The Following chart lists repair kits and parts that are available from InterSystems. These kits are offered as a more economical solution by rebuilding the defective part rather than replacing it. However in some cases the part may be beyond repair and replacement will be necessary.

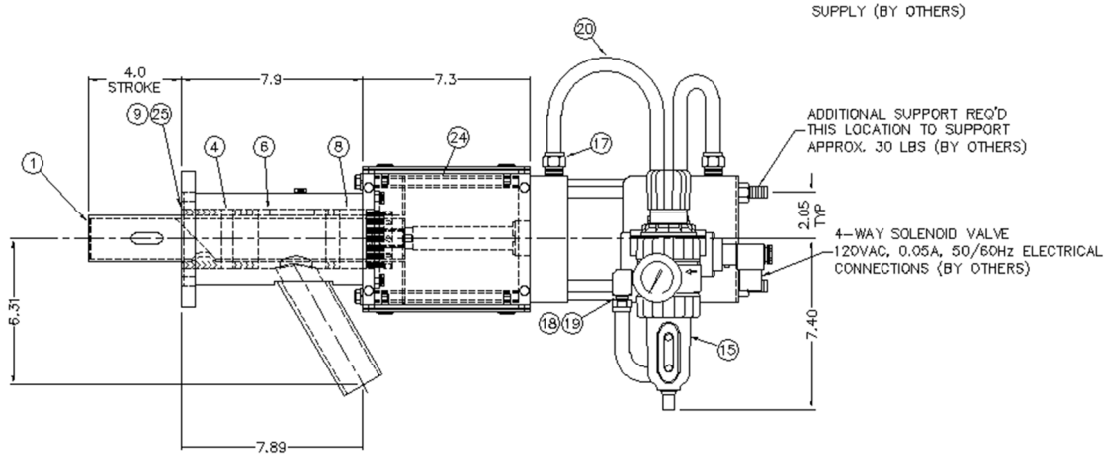
Product Code	Description
543819	Spool kit for 4-way directional valves B5 series
543185	Coil 120 vac for 4-way valve B5 series
543186	Optional coil 240 vac for 4-way valve B5 series
545681	Optional coil 120 vac 60 Hz explosion proof B5 series
527133	Rod seal kit for 1” rod air cylinder 2MA series
525512	Piston seal kit for 5" bore air cylinder 2MA series
513963	Gauge for filter regulator 1/4NPT
543818	Filter element for filter regulator 06E series

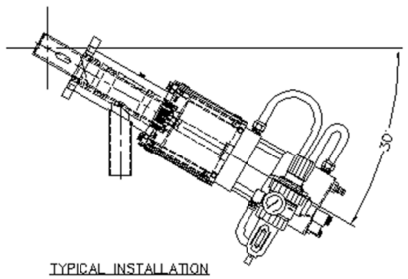
REVISIONS PDP-4.2 SAMPLER REF

REV	DATE	DESCRIPTION	BY









BUBBLE NO.	QTY	DESCRIPTION or MATERIAL AND SIZE	ITEM NUMBER	TOTAL UNITS
27	1	COMPRESSION NUT MT PL 2-1/2-12UN	551446	1
26	1	COMPRESSION NUT 2-1/2-12UN x 1.19LG	551445	1
25	1	SEAL RETAINER SS PDP 2 BORE	551444	1
24	2	GUIDE ROD 304SS PDP-4	545852	2
23	2	COVER PLATE GASKET PPD-4	545856	2
22	2	COVER PLATE 304SS PDP-4	545855	2
21	2	SIDE PLATE 304SS PDP-4	545850	2
20	3FT	3/8 ID AIR HOSE PUSH-LOC	24550	3.0
19	1	PIPE STREET EL 3/8 NPT 90 DEG BRASS	34451	1
18	4	3/8 PUSH-LOC TO 3/8 MPT STR	24553	4
17	2	3/8 PUSH-LOC TO 1/2 MPT STR	24554	2
16	1	FILTER REGULATOR MOUNT NUT	543182	1
15	1	FILTER REG ASSY 3/8 NPT 125 PSIG	543180	1
14	1	FILTER REGULATOR MOUNTING BRACKET	543183	1
13	1	CYLINDER MOUNT 5 BORE PS	20244-13	1
12	1	CYL AIR 5 BORE X 4 STROKE 2MA	525536	1
11	1	VALVE AIR MOUNTING BRACKET 5 CYL	543187	1
10	1	VALVE AIR 3/8NPT 120V 2POS 4WAY SGL	543184	1
9	1	O-RING BUNA N 3-3/4 x 4-1/8	519323	1
8	1	SEAL SPCR PDP REAR NYL 1.13LG 2B	551443	1
7	9	CVH SEAL 2 X 2-5/8 V-RING CENTER	27113C	9
6	1	SEAL SPCR PDP DISCH NYL 2.88 LG 2B	551448	1
5	3	CVH SEAL 2 X 2-5/8 V-RING FEMALE	27113F	3
4	1	SEAL SPCR PDP-4 FRNT NYL 0.50 LG 2B	551442	1
3	3	CVH SEAL 2 X 2-5/8 V-RING MALE	27113M	3
2	1	SEAL HSG PDP-4 2 PROBE	551437	1
1	1	PROBE PDP-4	(SEE CERT)	1

BILL OF MATERIALS DATE/STAMP

TYPE M SOURCE M | U/M EA | PRODUCT CODE MFG FAMILY CODE AN

CUSTOMER — CUSTOMER P.O. —

ORDER NO. —

TOLERANCES
MANUFACTURED TO TYPICAL SHOP TOLERANCES UNLESS OTHERWISE SPECIFIED

THIRD ANGLE PROJECTION

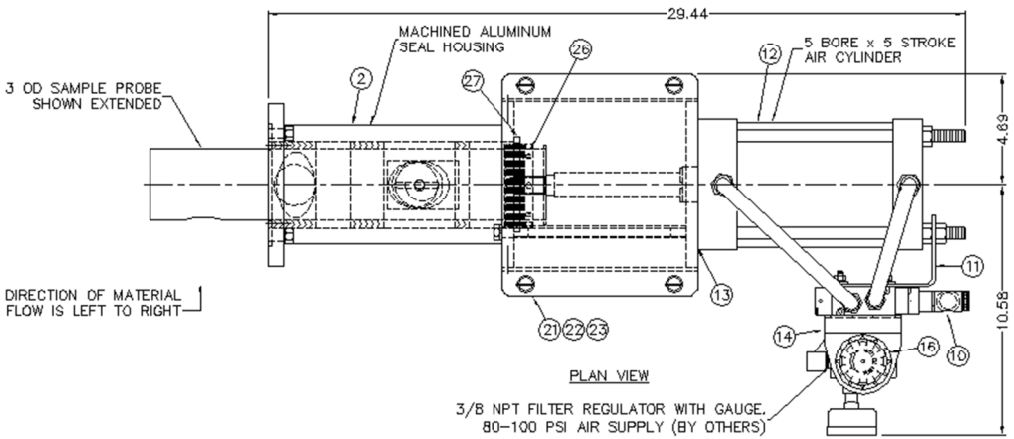
QTY REQ'D

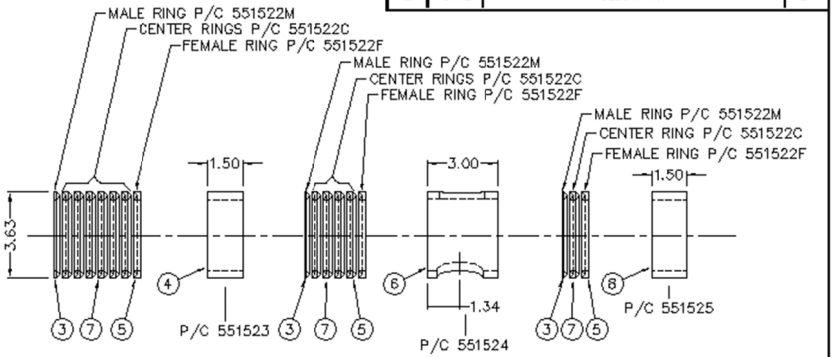
intersystems
9575 N. 109th Ave, Omaha NE 68142

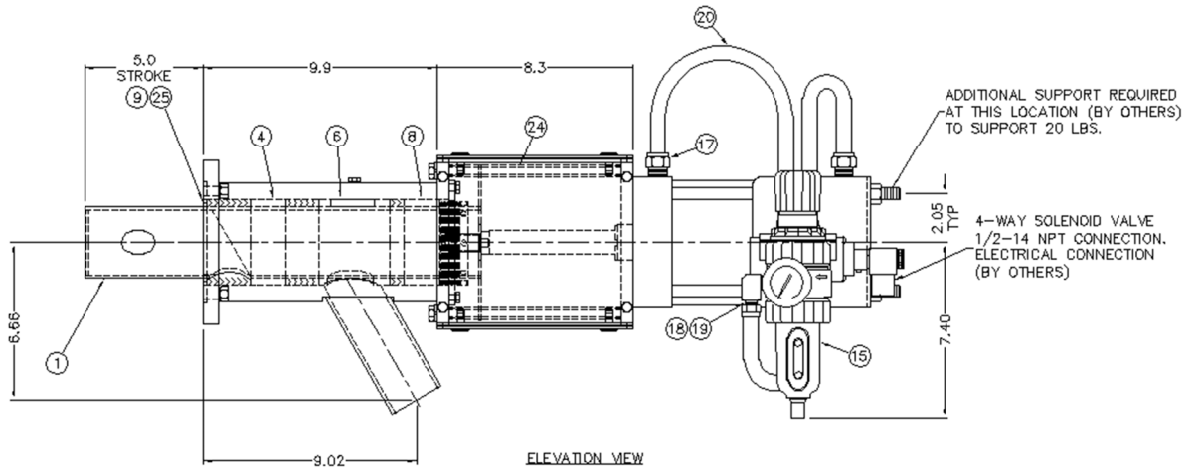
DESCRIPTION
PDP-4.2 SAMPLER REF

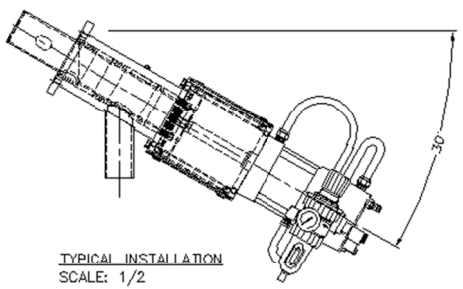
DWN BY	DATE	ITEM NUMBER/DRAWING NUMBER	REV.
CLD	7/13	—	—
CK'D BY		ACAD FILE PDP-4.2 REF	
SCALE 4	DRAWING SIZE L	SHEET 1 OF 1	

REVISIONS PDP-5.3 SAMPLER REF			
REV	DATE	DESCRIPTION	BY









BUBBLE NO.	QTY	DESCRIPTION or MATERIAL AND SIZE	ITEM NUMBER	TOTAL UNITS
27	1	COMPRESSION NUT MT PL 3-1/2-12UN	551534	1
26	1	COMPRESSION NUT 3-1/2-12UN x 1.19LG	551533	1
25	1	SEAL RETAINER SS PDP 3 BORE	551532	1
24	2	GUIDE ROD 304SS PDP-5	551531	2
23	2	COVER PLATE GASKET PDP-5	551530	2
22	2	COVER PLATE 304SS PDP-5	551529	2
21	2	SIDE PLATE 304SS PDP-5	551528	2
20	3FT	3/8 ID AIR HOSE PUSH-LOC	24550	3.0
19	1	PIPE STREET EL 3/8 NPT 90 DEG BRASS	34451	1
18	4	3/8 PUSH-LOC TO 3/8 MPT STR	24553	4
17	2	3/8 PUSH-LOC TO 1/2 MPT STR	24554	2
16	1	FILTER REGULATOR MOUNT NUT	543162	1
15	1	FILTER REG ASSY 3/8 NPT 125 PSIG	543180	1
14	1	FILTER REGULATOR MOUNTING BRACKET	543183	1
13	1	CYLINDER MOUNT 5 BORE PDP-5	551547	1
12	1	CYL AIR 5 BORE X 5 STROKE 4MA	551527	1
11	1	VALVE AIR MOUNTING BRACKET 5 CYL	543187	1
10	1	VALVE AIR 3/8NPT 120V 2POS 4WAY SGL	543184	1
9	1	O-RING BUNA N 4-3/4 x 5-1/8	551526	1
8	1	SEAL SPCR PDP-5 REAR NYL 1.50 LG 3B	551525	1
7	11	CVH SEAL 3 X 3-5/8 V-RING CENTER	551522C	11
6	1	SEAL SPCR PDP-5 DISCH NYL 3.0 LG 3B	551524	1
5	3	CVH SEAL 3 X 3-5/8 V-RING FEMALE	551522F	3
4	1	SEAL SPCR PDP-5 FRNT NYL 1.50 LG 3B	551523	1
3	3	CVH SEAL 3 X 3-5/8 V-RING MALE	551522M	3
2	1	SEAL HSG PDP-5 3 PROBE	551521	1
1	1	PROBE PDP 5 304SS 30D L R STD CHR	551510	1

BILL OF MATERIALS DATE/STAMP

TYPE M SOURCE M | U/M EA | PRODUCT CODE MFG FAMILY CODE AN

CUSTOMER — CUSTOMER P.O. —

ORDER NO. —

TOLERANCES
MANUFACTURED TO TYPICAL SHOP TOLERANCES UNLESS OTHERWISE SPECIFIED

THIRD ANGLE PROJECTION

QTY REQ'D

intersystems
9575 N. 109th Ave, Omaha NE 68142

DESCRIPTION
PDP-5.3 SAMPLER REF

D'WN BY	CLD	DATE	7/13	ITEM NUMBER/DRAWING NUMBER	REV.
CHK'D BY				—	—
SCALE	4	DRAWING SIZE	L	ACAD FILE PDP-5.3 REF	
				SHEET 1 OF 1	

Steps for installing the PDP Sampler seals.

Refer to the drawings on page 30 and 31 of this manual.

1. Install the discharge spacer. Pay attention to the orientation of the spacer.
2. Install the ¼ inch bolt into the hole on top of the discharge spacer. Be sure that the bolt sticks through the housing enough to retain the spacer.
3. Install all of the seals and spacers towards the front of the sampler per the drawing on pages 30 and 31 of the manual. The goal is to have the discharge spacer slid forward enough that ½ of the final male seal is sticking out of the end of the probe housing.
    a. The goal here is to have the seals and spacers already pressed together from the discharge spacer forward.
4. Install the retainer plate and the 4 screws but leave them slightly loose for now.
5. Install the seals and spacer behind the discharge spacer and then install the compression plate and tighten the bolts only enough to just touch the spacer. Leave it slightly loose.
6. Install the probe into the housing and seals.
7. Reassemble the sampler.
8. Connect air to the sampler and use the air valve's override button the run the sampler in and out a couple of times.
9. Tighten the 4 retainer plate screws.
10. Hold the override button to run the probe out. While still holding the button and the probe is still extended, tighten the two compression bolts evenly to take up any slack in the bolt.

    WARNING: Be very careful to keep hands clear of any possibility of moving parts.
11. Let loose of the override button and then repeat step 10 one more time.
12. Finally, tighten the bolts about a half turn more.
13. The seals are now set.

VIII. WARRANTY

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