SAFETY

INSTALLATION

OPERATION

MAINTENANCE

M A N U A L

SAMPLER

Model GP, GPE and GPH

No. PC 519794C

Revised 2012-12-31

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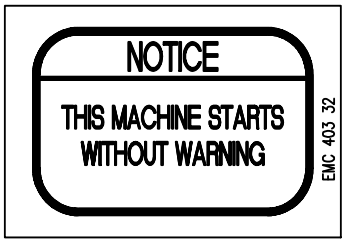
List Of Illustrations & Drawings

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.

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.

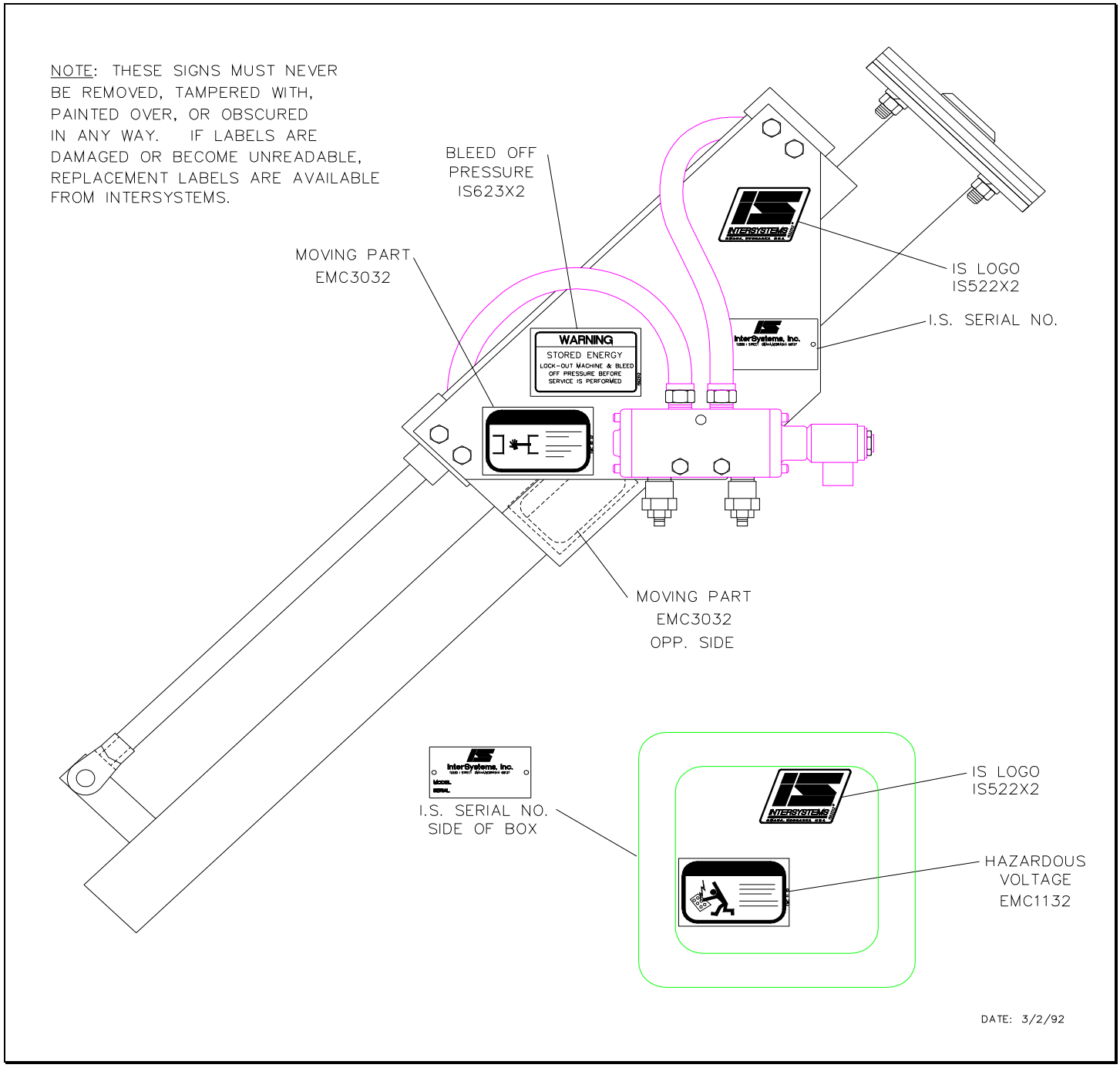


FIGURE 1-1, GP SAMPLER SAFETY LABEL LOCATIONS

II. GENERAL INFORMATION

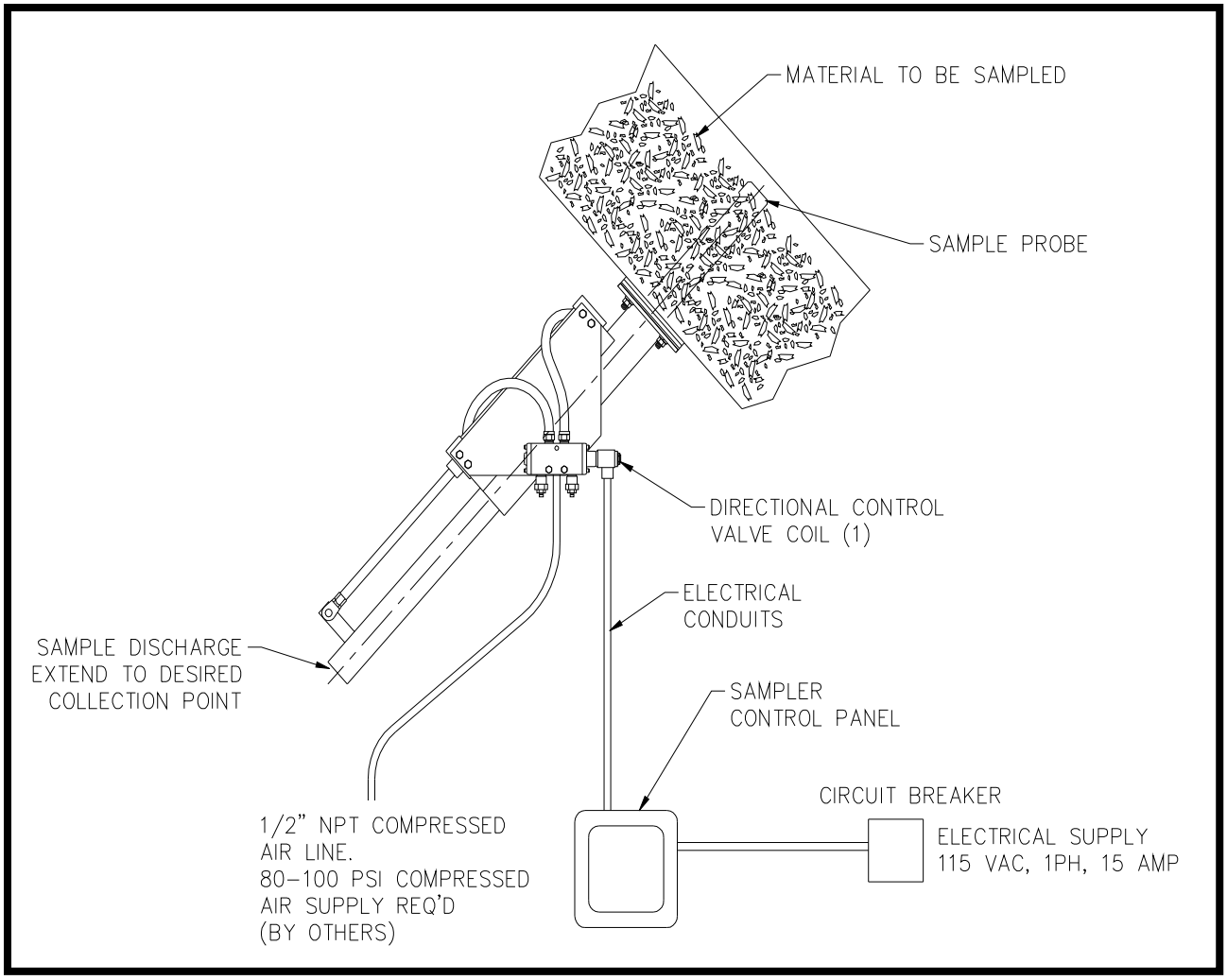
2.1 System Description

There are three variations of the GP Sampler. The GP Sampler is operated pneumatically, the GPH Sampler is operated hydraulically and the GPE Sampler is operated electorally.

Each Model GP Sampler is designed to collect a representative sample of granular, flake, pellet, or other materials in a gravity conveying line or from a hopper tank. Figure 2-1 illustrates a typical GP 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 cylinder forces the slotted sampling tube (probe) into the product line to collect a sample of the material. The sample flows through the sample tube and out the discharge for as long as the sample slot is in the material conveying line. Next, the sample tube probe is withdrawn into the housing isolating the sample and sample tube cavity from the conveying line. The remaining sample in the sample tube then falls down and out the 2.00" (51mm) OD 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 GP 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 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. Hydraulic drive components.

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

E. Programmable Controls to sequence the sampler and the sample collection equipment.

2.3 Material Sampled

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

2.4 Sampler Construction

Standard construction is of painted carbon 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 GP sampler is typically mounted onto a vertical or sloping, gravity flow conveying line carrying the product to be sampled as in Figure 2-1. The sampler axis is typically installed at a 45 degree slope to allow the sampled material to flow via gravity out of the sampler. 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

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.

3.4.1 Sampler Without Optional Mounting Accessories

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

B. Cut and deburr a 2.5" diameter hole in the product line through which the sample tube will pass to collect material samples.

C. The mounting flange on the end of the sampler housing has four .406 (13/32") 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. Ensure that the mounting gasket is in place 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.

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. Locate the sampler premount in the desired position.

C. 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.

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.

B. Cut and deburr a 2.5" diameter hole in the conveying line through which the sample tube will pass to collect material samples.

C. Position the sampler mounting plate by aligning the 2.5" diameter sample probe clearance holes.

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

E. 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.

F. Ensure that the mounting gasket is in place on the sampler housing mounting flange and verify that the sample tube extends and retracts without interference.

G. 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.

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. Cut and deburr a 2.5" diameter hole in the product line through which the sample tube will pass to collect material samples.

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

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 mounting gasket is in place 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.

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 2.00" 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.

If rigid tubing is desired for the sample transport line a short length (5 foot minimum) of flexible hose will still be needed to connect the sample line to the discharge of the sampler that will permit movement of the sample discharge (sample probe). The discharge outlet on the sampler is actually the exposed end of the moving sample probe.

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 4.1.6, the barrier terminal strip on the circuit board 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, 2 Amp Max. (5 Amp Max for GPE Sampler)
Optional - 220/240 VAC, 50/60 Hz, Single Phase, 1 Amp Max.

3.7.1.2 Solenoid Valve Coil

120 VAC, 60 Hz, Single Phase, 0.06 Amps.
Optional - 240 VAC, 60 Hz, Single Phase, 0.03 Amps.

3.8 System Piping - GP

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.

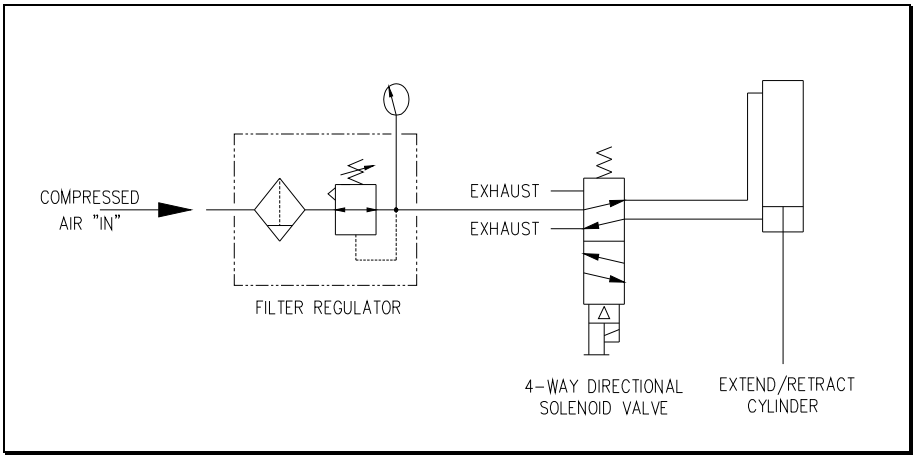


FIGURE 3-1, PNEUMATIC SCHEMATIC

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 optional 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 optional 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 shutoff valve upstream of the filter/regulator. A 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 - GP

A complete sampling cycle requires that the cylinder extend and retract. To determine the compressed air requirements to operate the sampler, multiply the consumption per cycle (a std. GP sampler requires 0.23 SCF @ 80 PSI) 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 1-15 seconds, depending on the control settings.

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

The optional 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.

3.9 Hydraulic Requirements – GPH

The GPH Sampler is driven with hydraulic pressure, typically supplied by the End User's own hydraulic power unit. The GPH Sampler requires supplied hydraulic pressure to be set at 300 PSI full load with a minimum flow rate of 3 gallons per minute. The Sampler's hydraulic valve (directional control) defaults to the retracted position. In this condition, set supply pressure to 300 PSI. The Sampler is provided with a dual flow control which is mounted between the hydraulic valve and manifold. Use the flow control knobs to speed up or slow down the speed of the Sample Tube's extend and retract strokes.

3.10 Electrical Requirements – GPE

The GPE Sampler is driven with an electric linear actuator. The electrical requirements are determined by the input voltage of the actuator provided with the Sampler. Consult the Certified Drawings and the Manufacturer's label located on the actuator.

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 Standard Internal Timer Control Components And Their Functions

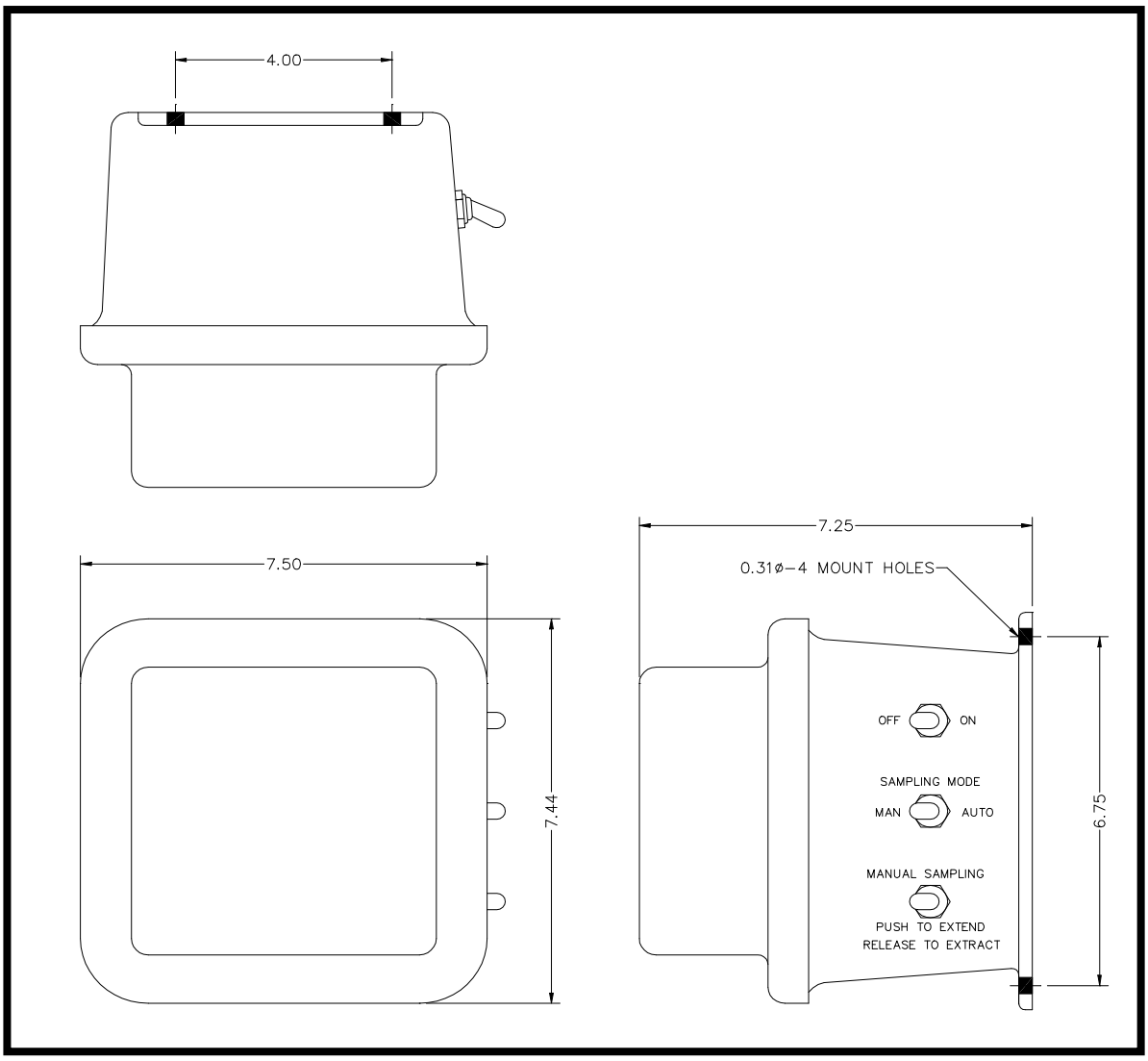


FIGURE 4-1, STANDARD NEMA 4 CONTROL PANEL DETAIL

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

4.1.1 POWER OFF/ON Switch S-1

This toggle switch controls all electrical power to the controller and the sampler unit.

WARNING

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

4.1.2 SAMPLING MODE Switch S-2 (Automatic/Manual)

This switch permits the operator to select whether samples will be collected automatically at timed intervals as determined by the internal Re-cycle Relay (R-1), OR manually whenever the operator momentarily actuates the MANUAL SAMPLING toggle switch S-3.

4.1.3 MANUAL SAMPLING Switch S-3

This switch functions ONLY when the AUTO/MANUAL switch has been set to the Manual Mode position. Activating the Manual Sampling switch S-3 to the ON position causes the sample probe to extend and remain in the sampling position as long as the switch is held in the activated position. When the switch is released the sample probe will retract and end the sampling cycle.

4.1.4 Internal Re-cycle Timing Relay R-1

This relay cycles the sampler repeatedly when in the AUTO mode is selected. The OFF time is the time span from the end of a sampling cycle to the start of the next. The ON time is the duration of time that the sample probe is extended to collect a sample.

Both ON and OFF times will need to be set. Determine the desired time interval between samples. This will be the OFF time setting. Locate the appropriate dip switch setting from the chart below. Select the switch setting which has a maximum range closest yet exceeding the desired setting.

A. Move the dip switches, on the OFF side of the relay, to the required positions for the selected time range.
B. Using the selected time range as a scale, interpolate the desired setting relative to the minimum & maximum values.
C. Repeat steps A to D for the ON time setting.

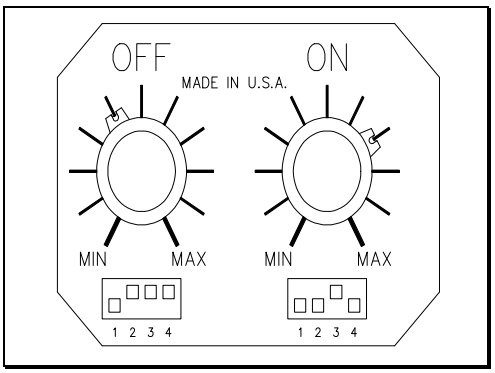


FIGURE 4-2, INTERNAL TIMER

Figure 4-2 shows.
OFF time range is 1.5 to 5.5 minutes. Knob position indicates ~ 3.1 minutes.
ON time range is 2.5 to 10.5 seconds. Knob position indicates ~ 8.1 seconds.

The dip switch chart shown below is also located on the side of the timer.

1	2	3	4	TIME RANGE	
				MINIMUM	MAXIMUM
DOWN	DOWN	DOWN	DOWN	0.6 SEC	2.5 SEC
DOWN	DOWN	DOWN	UP	1.5 SEC	5.0 SEC
DOWN	DOWN	UP	DOWN	2.5 SEC	10.5 SEC
DOWN	DOWN	UP	UP	5 SEC	21 SEC
DOWN	UP	DOWN	DOWN	10 SEC	42 SEC
DOWN	UP	DOWN	UP	0.4 MIN	1.4 MIN
DOWN	UP	UP	DOWN	0.7 MIN	2.8 MIN
DOWN	UP	UP	UP	1.5 MIN	5.5 MIN
UP	DOWN	DOWN	DOWN	3 MIN	11 MIN
UP	DOWN	DOWN	UP	5.5 MIN	22.5 MIN
UP	DOWN	UP	DOWN	11 MIN	45 MIN
UP	DOWN	UP	UP	0.4 HRS	1.5 HRS
UP	UP	DOWN	DOWN	0.8 HRS	3.0 HRS
UP	UP	DOWN	UP	1.5 HRS	6.0 HRS
UP	UP	UP	DOWN	3 HRS	12 HRS
UP	UP	UP	UP	6 HRS	24 HRS

4.1.5 Main Fuse

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

(GP and GPH)
For 110/120 VAC, 1PH operation use ONLY a Buss Type FNM, 2 Amp, 250 Volt Slo-Blo fuse or equal.
For 220/240 VAC, 1PH operation use ONLY a Buss Type FNM, 1 Amp, 250 Volt Slo-Blo fuse or equal.

(GPE)
For 110/120 VAC, 1PH operation use ONLY a Buss Type FNM, 5 Amp, 250 Volt Slo-Blo fuse or equal.
For 220/240 VAC, 1PH operation use ONLY a Buss Type FNM, 3 Amp, 250 Volt Slo-Blo fuse or equal.

4.1.6 Terminal Strip

This 6-position barrier terminal strip serves as the controller's interface and connection point for all external circuits and for the components mounted on the enclosure's side panel. Refer to the certified electrical drawing(s).

4.2 Optional PLC Controller And Functions

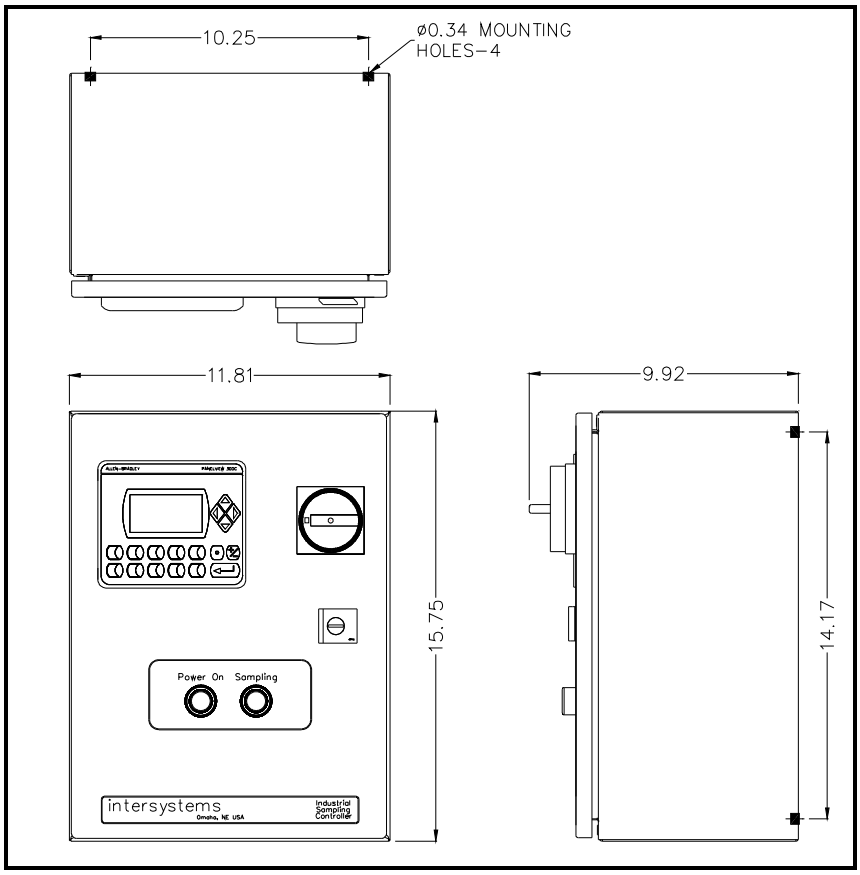


FIGURE 4-3, OPTIONAL NEMA 4 PLC CONTROL PANEL DETAIL

Refer to the certified electrical drawing(s) and manual 5550791 for operation and dimensions on optional control.

4.2.1 POWER OFF/ON Switch S-1

The Power OFF/ON switch controls all electrical power to the controller and the sampler unit.

WARNING

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

4.2.2 POWER Pilot Light

This light is illuminated as long as power is available to the controller and the POWER switch (S-1) is set to ON.

4.2.3 SAMPLING Pilot Light

This light will illuminate when a sampling cycle has been initiated and will stay lit until CR-1 has been turned off for controller series 543917. The light will stay illuminated until the solenoid has been de-energized.

4.2.4 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.

4.2.5 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.

4.2.6 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).

4.2.7 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).

4.2.8 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).

4.2.9 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.

4.2.10 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.

4.2.11 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.

4.3 Pneumatic Components – GP

4.3.1 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 rod end and cap end of the cylinder to extend and retract the sample tube.

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

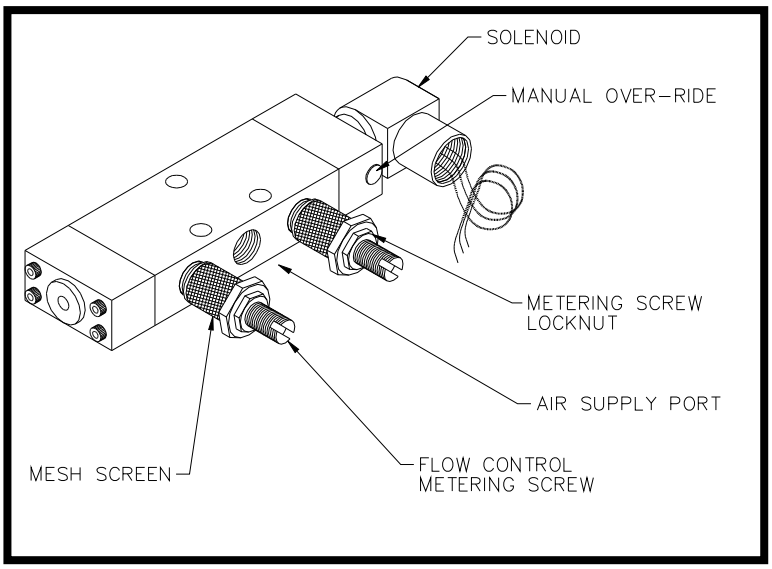


FIGURE 4-4, SOLENOID VALVE

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 retract and remain there until the button is released. When the over-ride button is released the cylinder will return to its home position.

4.3.2 Speed Control Valves

A speed control valve is threaded into each exhaust port of Valve V-1. See Figure 4-5. 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.

4.3.3 Optional Air Filter/Pressure Regulator

The air filter/regulator assembly provides a clean and regulated air supply to the sampler's 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.

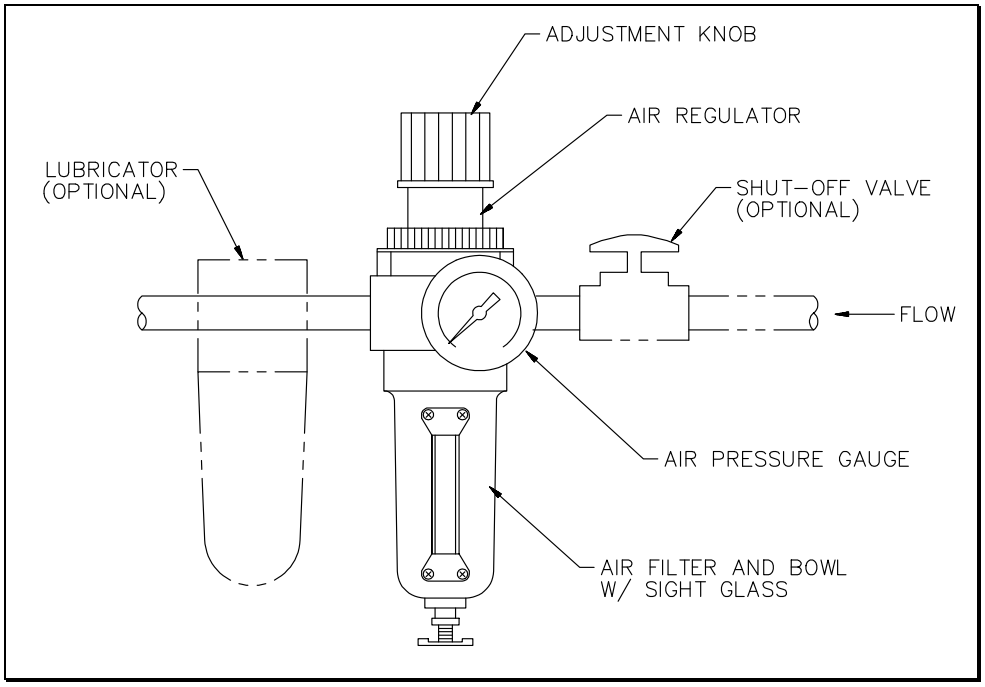


FIGURE 4-5, OPTIONAL FILTER/REGULATOR

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 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 installing a seal wire in the groove above the lockring.

4.3.4 Pneumatic Cylinder

This double-acting air cylinder extends and retracts the sample probe. Standard sampler stroke length is 10.50". The cylinder rod is connected to the sample probe by means of rod clevis and pin. Solenoid valve V-1 controls extension and retraction of the cylinder.

4.4 Hydraulic Components - GPH

4.3.1 Hydraulic Valve

This is a 4-way, 2-position, spring returned hydraulically operated directional control valve. This valve controls the hydraulic cylinder, alternately pressurizing the rod end and cap end to extend and retract the sample probe.
When power is applied to the valve's coil, the coil forces the valve's spool to shift to the extend port and extend the probe into the product. When power to the valve's coil is de-energized, the valve's internal spring forces the valve's spool to the retract port, which retracts the probe. This is the default valve position.

The valve can be manually overridden by inserting a small tool into the valve' spool hole, located at the end of the valve's electric coil. Pushing in on the spool firmly will cause the valve to shift and the cylinder to extend. When the spool is release, the valve will return to the default position and the cylinder will retract.

4.3.2 Speed Control Valves

There are two speed control valves mounted on the metering portion of the hydraulic valve assembly. By turning the speed control valves, the speed of the extend and retract movement can be adjusted.

4.3.3 Hydraulic Cylinder

This double-acting hydraulic cylinder extends and retracts the sample probe. The cylinder rod is connected to the sample probe by means of a rod clevis and pin. The hydraulic valve controls the extension and retraction of the cylinder.

4.4 Electric Linear Actuator - GPE

On the GPE Sampler, the probe extension and retraction is controlled by an electric linear actuator. By applying AC electrical power to the actuator's extend terminal, the actuator will extend until the actuator's internal limit switch opens. The actuator will stop in the extend position. When power is applied to the actuator's retract terminal, the actuator will retract until the actuator's internal limit switch opens and the actuator will stop in the retract position. **NOTE: The sampler must be run in Program Mode number 4. Refer to controller manual 550791A.**

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. Adequate lubricant in lubricator

C. Structural damage

D. Rust or corrosion

E. Damaged wiring, including exposed conductors and connections

F. Damaged airlines or pneumatic components

G. 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 - GP

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 - GP

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.

VI. TROUBLESHOOTING

6.1 General GP 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 cycles in manual but not in automatic	Jumper between controller terminals 1 and 2 not installed	Install jumper or switch controller terminals 1 and 2
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 4.1.5 or 4.2.5.
	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.
	No or low air pressure (GP).	Turn air supply on and set regulator to 80-100 PSI.
	Problem with actuator's internal limit switches (GPE)	Check actuator's limit switches and adjustments.
	Defective control valve (GP/GPH).	Refer to Section 6.3.
Sample size too small or large	ON time too low or high.	Adjust ON time. Refer to Control Manual 550791A
	Solenoid time on setting too low or high.	Adjust solenoid time setting on PLC refer to Manual 550791A.
Sampler sluggish (Operates too slowly).	Inadequate air supply (GP)	Increase line size or add surge tank.
	Regulator set too low (GP)	Reset. Refer to Section 4.3.3.
	Filter clogged (GP)	Clean as outlined in Section 5.4.
	Airline from filter regulator blocked or damaged (GP)	Inspect and correct.
	Cylinder seal leakage (GP/GPH)	Refer to Section 6.3.1

General GP Sampler Troubleshooting (continued)

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Sampler leaks air or material continuously out the sample discharge.	Sample probe worn out.	Inspect & replace.
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.
	Defective air cylinder seals.	Inspect & replace. Refer to Section 6.3.1.
	Sample probe bent or jammed.	Inspect & replace.

6.2 Directional Solenoid Valve Troubleshooting

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Valve does not shift but full line voltage signal is present across solenoid terminals. (refer to certified drawing)	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.
	Defective cylinder seals.	Refer to Section 6.3.

There must be at least 60 PSI pressure for the GP Sampler 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 (GP).

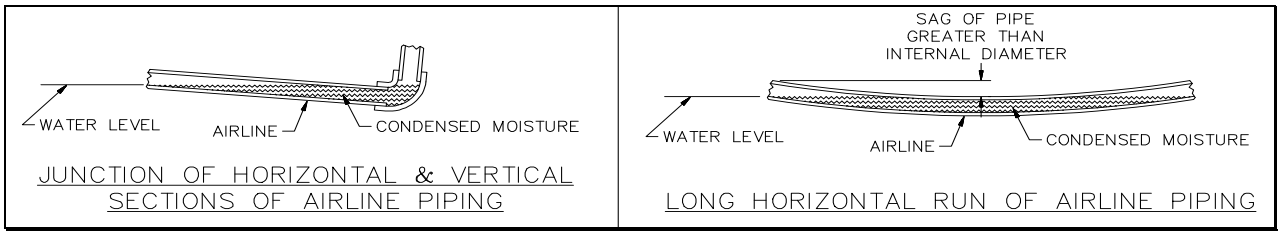


FIGURE 6-1, CONDENSED MOISTURE BLOCKING AIRLINE

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 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 a piston is leaking, use a manual override to pressurize one end of the cylinder in question. When the cylinder has completed its stroke but is still pressurized, carefully remove the airline from the other cylinder port that presumably is not pressurized. If air can be detected leaking from the airline connected to the supposedly unpressurized port, then the problem lies elsewhere in the pneumatic system.

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.

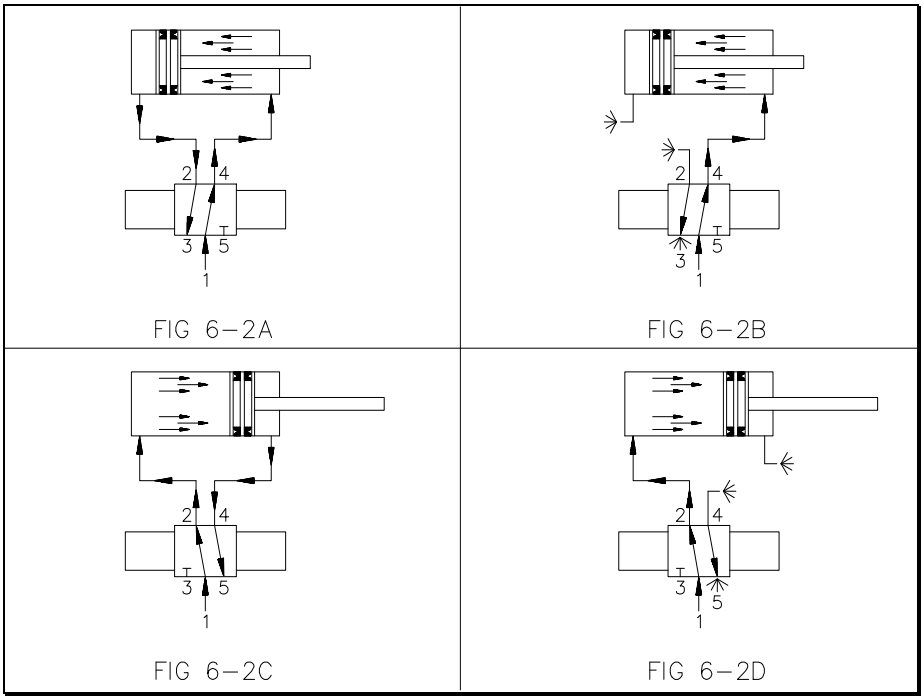


FIGURE 6-2, VALVE VS. CYLINDER LEAK TEST DIAGRAM

6.4 Hydraulic Component Troubleshooting

6.4.1 Hydraulic Valve Sticking and Will not Change States

The hydraulic valve spool to body clearance is extremely tight. If a small foreign object becomes lodged in between the spool and the body, the spool will become stuck and not move. Sometimes by simply pressing on the override port of the valve, the foreign object will work loose and the valve will start working again. If this does not clear the problem, the valve can be taken apart and cleaned by removing the cap (opposite the valve's coil). Being careful to keep the parts in the correct order, remove the spool from the valve. Clean the spool and the port and reassemble the valve. **Note: If the valve becomes stuck as described above, this is usually an indication that either the valve has become excessively worn or the hydraulic oil is contaminated. Change the hydraulic oil, clean the oil tank and clean the oil strainer.**

6.4.2 Hydraulic Cylinder Leaking Internally (Cylinder Bypassing)

If the cylinder movement becomes sluggish and the proper pressure is applied, the cylinder may be leaking internally (bypassing to the opposite port. To test for bypassing, remove the retract hose(cap end of the cylinder) from the hydraulic valve. Install a high pressure plug into the valve's port. Place the retract hose into a container to catch the oil. Extend the cylinder by using the valve's manual override.
Oil will escape the hose as the cylinder extends. Once the cylinder has fully extended, if oil continues to flow from the hose, the cylinder is bypassing. Note: Expect a little oil to escape, but a steady stream of oil from the hose is an indication of bypassing.

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
543818	Spool kit for 4-way directional valves (B5 series)
545681	120 vac explosion proof coil & housing (B5 series)
545682	220 vac explosion proof coil & housing (B5 series)
527132	Rod seal kit for 5/8” rod air cylinder (Parker 2MA series)
523997	Piston seal kit for 2" bore air cylinder (Parker 2MA series)
513963	Gauge for filter regulator
543818	Filter element for filter regulator (06E series)

7.4.1 Sampler Parts Listing GP

ITEM NO.	PART NO	DESCRIPTION	QTY
1	513177	HOUSING GP 2.75 BORE CS	1
2	513171	WELD MOUNT GP FLAT 2.25 BORE CS	1
3	546531	PROBE GP 2.00 OD x 33.13 LG 304SS	1
4	513179	SCRAPER PLATE GP UHMW 2 BORE	1
5	513180	BUSHING GP UPPER 2.75 OD x 2.03 ID	1
6	513181	BUSHING GP LOWER 2.75 OD x 2.03 ID	1
7	545677	VALVE AIR 3/8NPT 120V 2P 4W SNGL XP	1
	545678	VALVE AIR 3/8NPT 220V 2P 4W SNGL XP	
8	34032	SPEED CONTROL 1/4	2
9	24553	3/8 PUSH-LOC TO 3/8 MPT STR	4
10	24550	3/8 ID AIR HOSE PUSH-LOC	2.5 FT
11	34451	PIPE STREET ELBOW 3/8 NPT 90 DEG BRASS	2
12	524228	CYL AIR 2 BORE x 10.5 STROKE	1
13	35868	ROD CLEVIS FOR 1/2 PIN	1
14	35869	PIVOT PIN 1/2 DIA	1

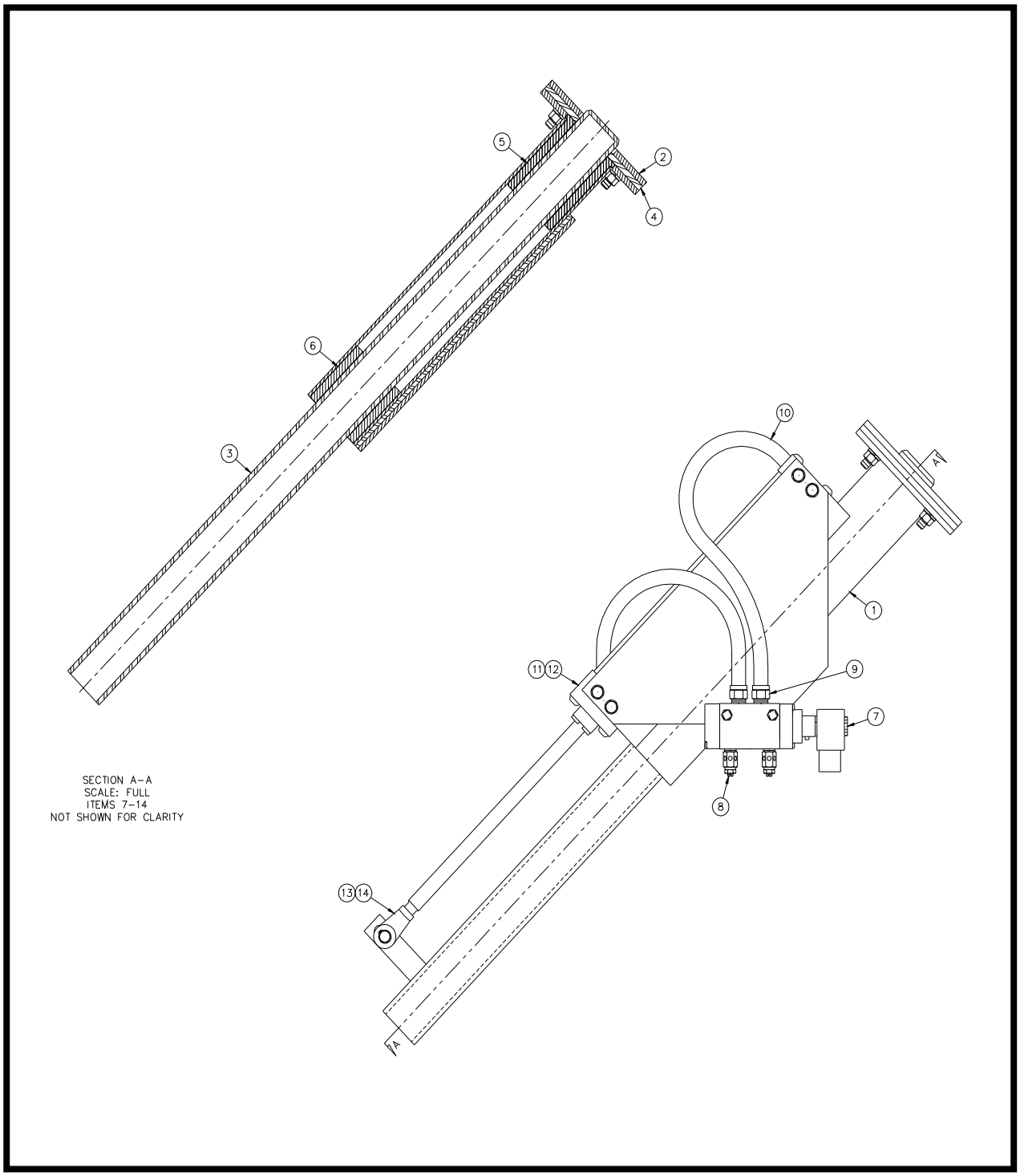


FIGURE 7-1, GP SAMPLER PARTS DRAWING

7.4.2 Sampler Parts Listing GPE

ITEM NO.	PART NO	DESCRIPTION	QTY
1	531517	HOUSING GPE 2.75 BORE CS	1
2	513171	WELD MOUNT GP FLAT 2.25 BORE CS	1
3	531518	PROBE GPE 2.00 OD	1
4	513179	SCRAPER PLATE GP UHMW 2 BORE	1
5	513180	BUSHING GP UPPER 2.75 OD x 2.03 ID	1
6	513181	BUSHING GP LOWER 2.75 OD x 2.03 ID	1
7	35869	PIVOT PIN 1/2“ DIA	1
8	531519	LINEAR ACTUATOR 12” STK 1 PH 115VAC	1

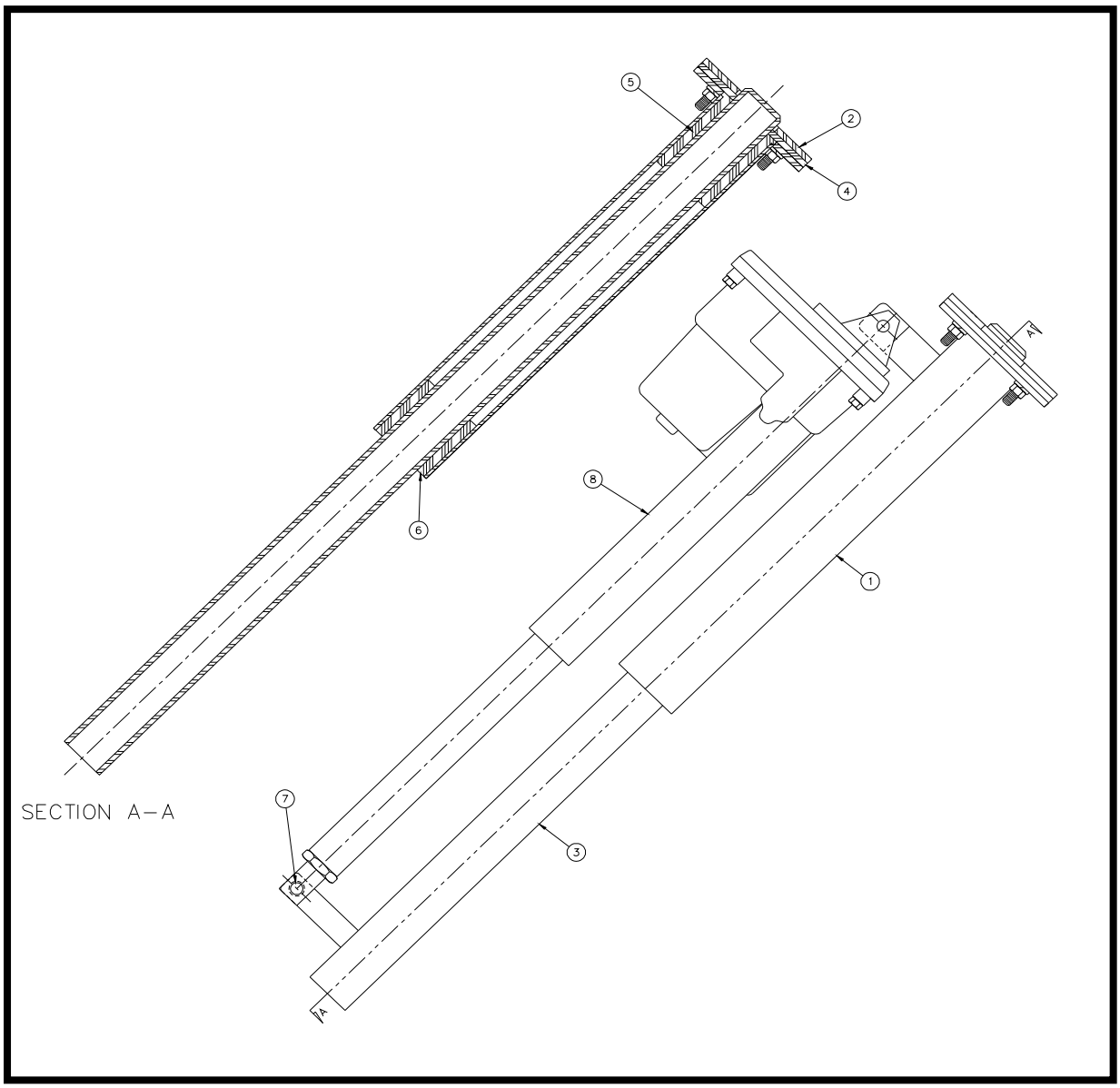


FIGURE 7-2, GPE SAMPLER PARTS DRAWING

7.4.3 Sampler Parts Listing GPH

ITEM NO.	PART NO	DESCRIPTION	QTY
1	XC8281	HOUSING GP 2.75 BORE CS	1
2	513171	WELD MOUNT GP FLAT 2.25 BORE CS	1
3	546531	PROBE GP 2.00 OD x 33.13 LG 304SS	1
4	513179	SCRAPER PLATE GP UHMW 2 BORE	1
5	513180	BUSHING GP UPPER 2.75 OD x 2.03 ID	1
6	513181	BUSHING GP LOWER 2.75 OD x 2.03 ID	1
7	519483	HYD VALVE 2 POS 120VAC 60HZ IIG DO3	1
8	531380	D03 DUAL FLOW CONTROL VALVE	1
9	513519	SUBPLATE 3/8 NPTF SIDE PORTS	1
10	39512	3/8 NPT HOSE 19LG	2
11	301926	ELBOW 90 M-F 3/8 MPT X 3/8 FPT SWVL	2
12	XC4837	CYL HYD 1-1/ 2 BORE x 10.5 STROKE	1
13	35868	ROD CLEVIS FOR 1/2 PIN	1
14	35869	PIVOT PIN 1/2 DIA	1
15	302126	ADPT M-F 1/2 MPT X 3/8 FPT SWVL	2
16	35628	ELBOW 90 M-F 1/2 MPT X 1/2 FPT STL	2

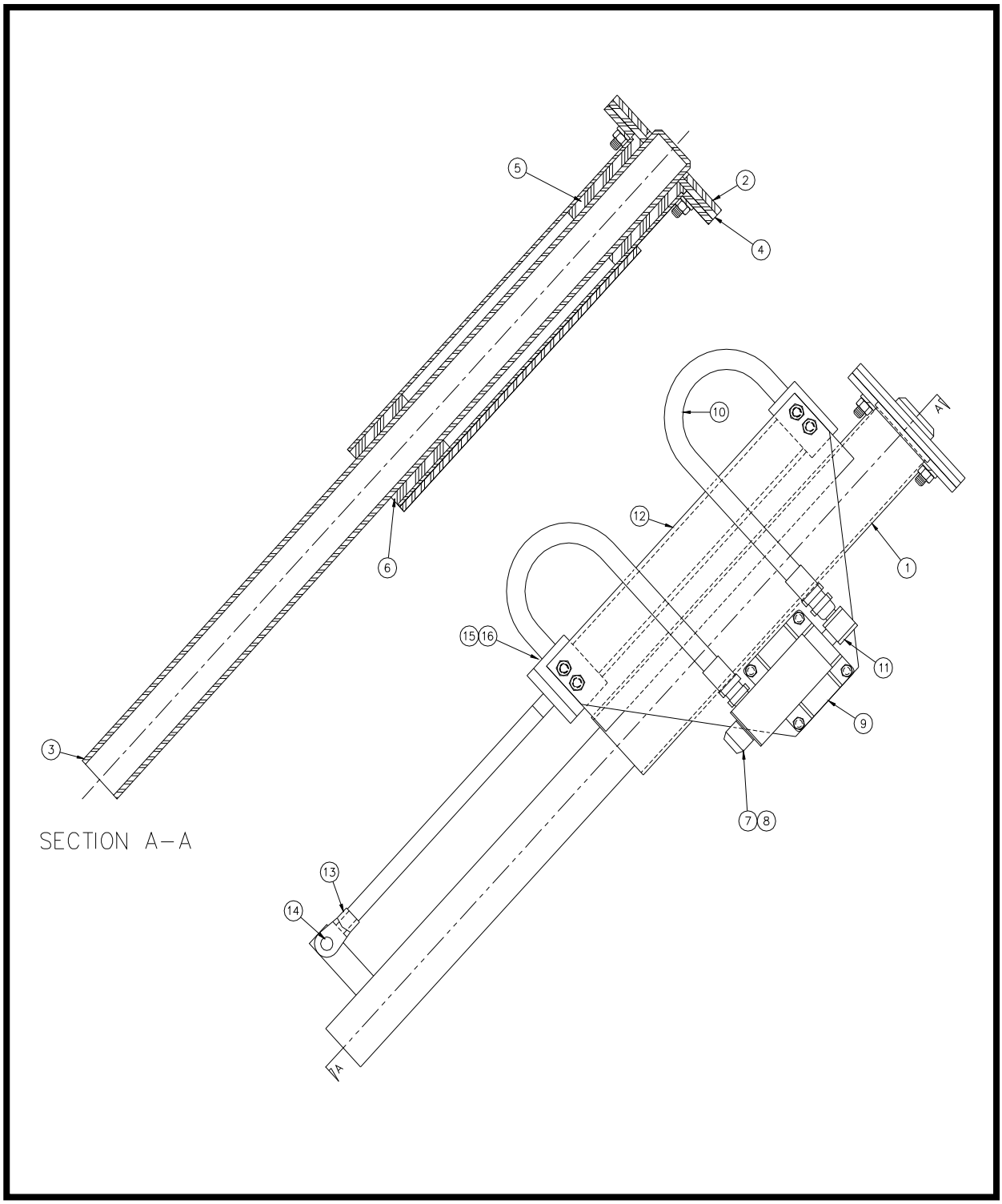


FIGURE 7-3, GPH SAMPLER PARTS DRAWING

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.

INTERSYSTEMS, INC. NEITHER MAKES NOR AUTHORIZES ANY WARRANTY OTHER THAN AS HEREIN CONTAINED. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.