

intersystems

Model LF Sampler Manual

Safety

Installation

Operation

Maintenance

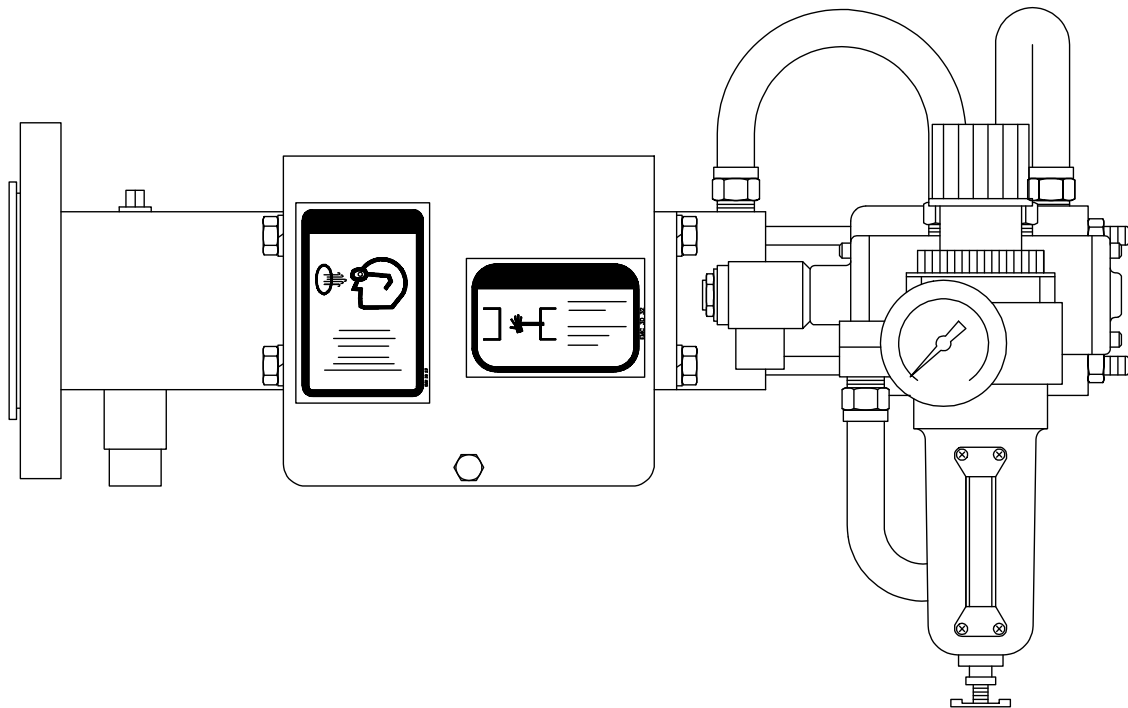


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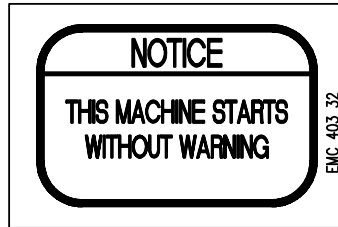
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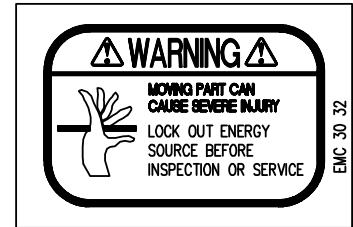
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I. GENERAL SAFETY INFORMATION

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



STARTS W/OUT WARNING
EMC40332

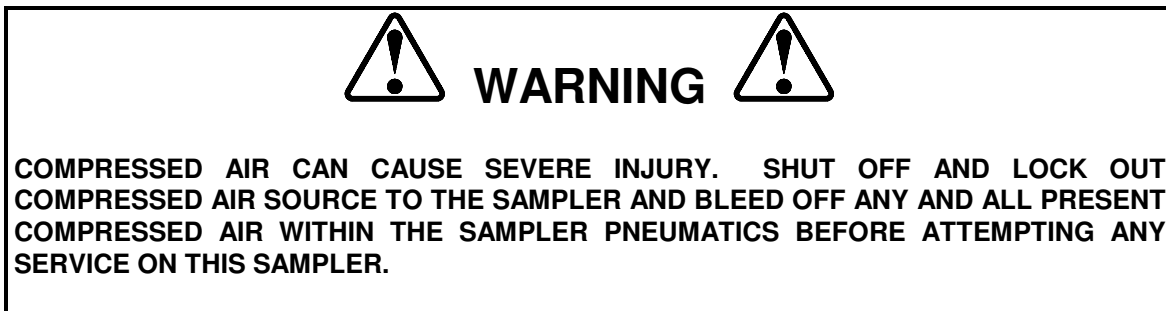
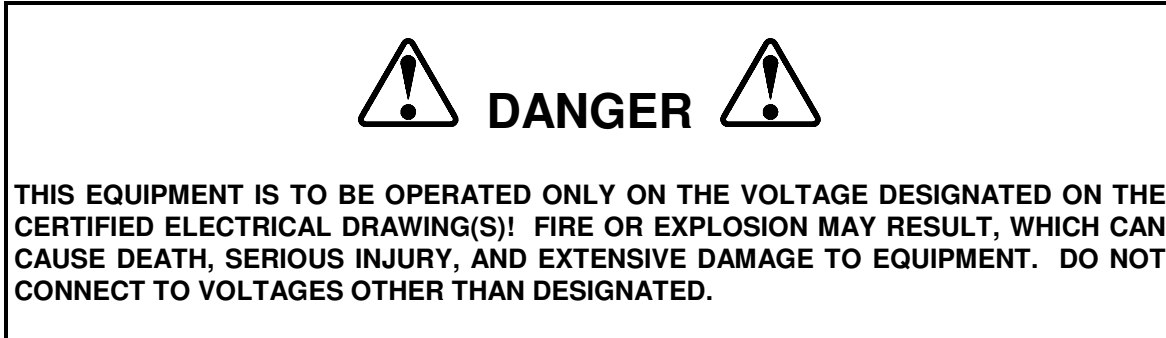


MOVING PART
EMC3032

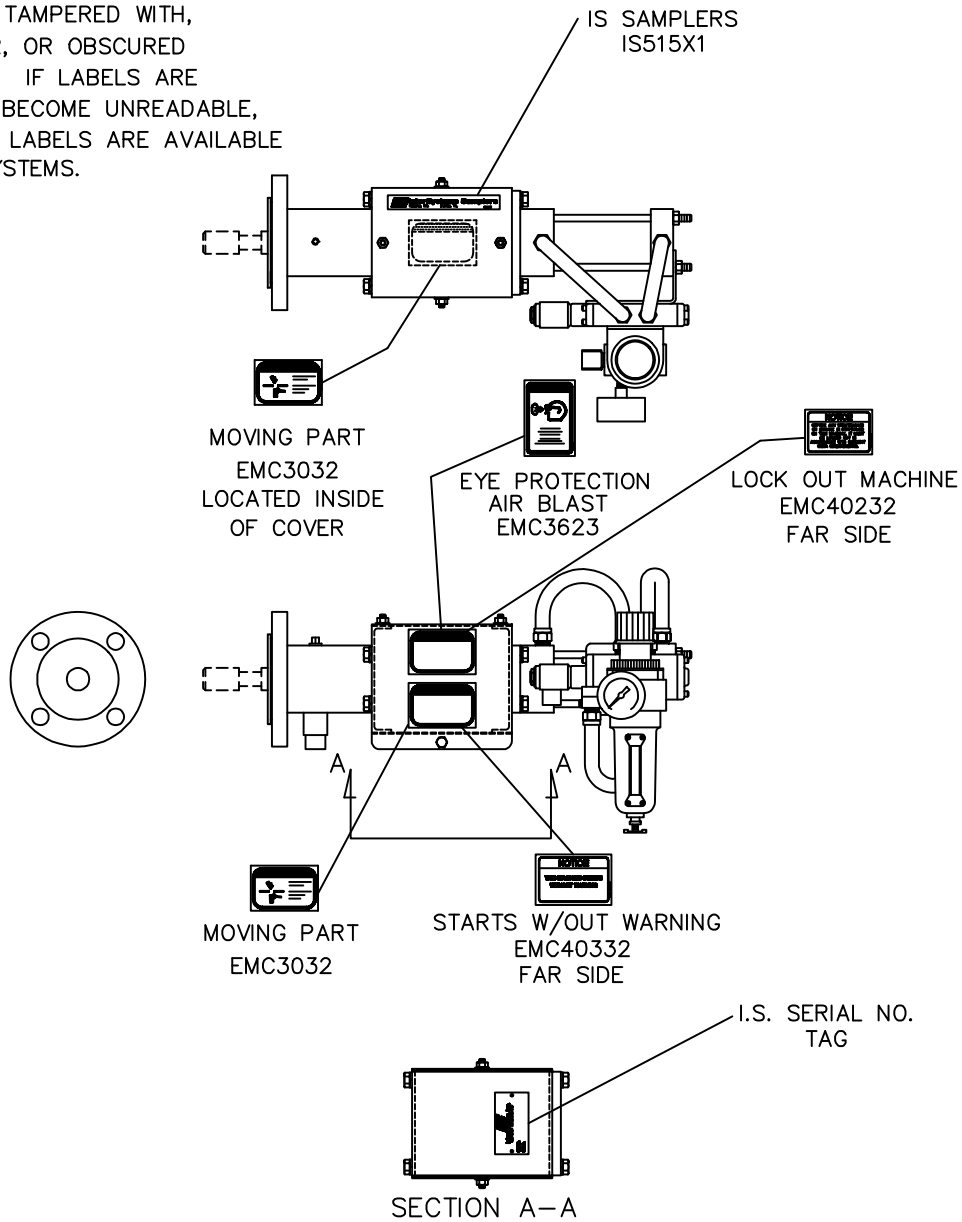
Consult Intersystems before making any changes to the sampler or its operating environment. Careless changes could result in death or serious injury to people, and reduce the performance and service life of the equipment.

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.



NOTE: THESE SIGNS MUST NEVER BE REMOVED, TAMPERED WITH, PAINTED OVER, OR OBSCURED IN ANY WAY. IF LABELS ARE DAMAGED OR BECOME UNREADABLE, REPLACEMENT LABELS ARE AVAILABLE FROM INTERSYSTEMS.



DATE: 5/13/94

FIGURE 1-1, LF SAMPLER SAFETY LABEL LOCATIONS

II. GENERAL INFORMATION

2.1 System Description

The LF Sampler is designed to collect a representative sample of liquid from pipe, hopper tank or pressure vessel. Figure 2-1 illustrates a typical LF 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 sample probe into the product line to collect a sample of the material. The sample flows into the sample cavity in the sample probe. Next, the sample probe is withdrawn into the seal housing isolating the sample and sample cavity from the conveying line. The sample in the sample cavity then falls down and out the 1.00" (38mm) OD discharge tube to the desired sample collection point, at which point an Intersystems SCS Sample Collection System (optional) may be installed.

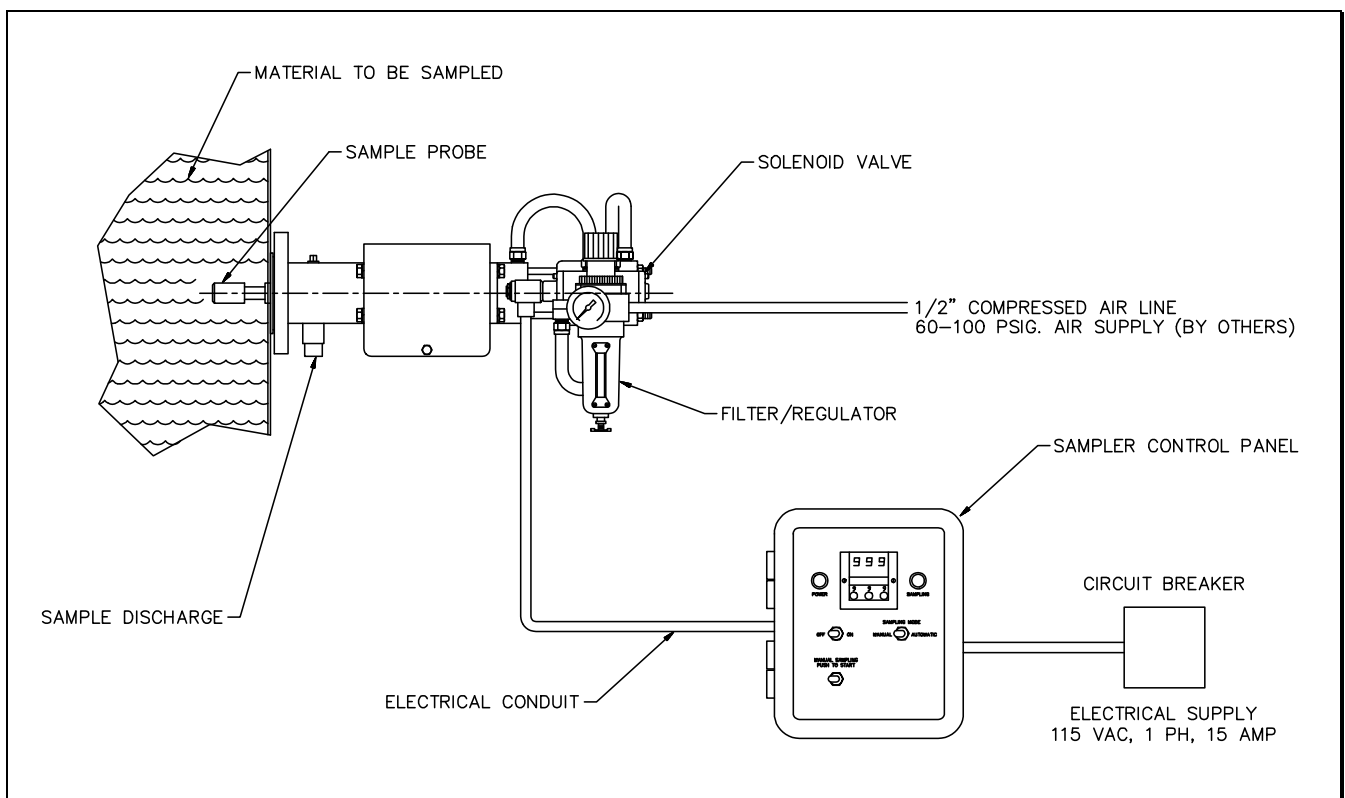


FIGURE 2-1, TYPICAL INSTALLATION, MODEL LF SAMPLING SYSTEM

2.2 Optional Features

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

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

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 system to aid in material discharging from the sampler.
- D. Water purge to aid in cleaning the sample cavity and discharge line.
- E. Steam jacket to keep liquid to be sampled from solidifying.
- F. Components of special materials, such as monel, inconel or nedox coatings.
- G. Programmable Controls to sequence the sampler and the sample collection equipment.

2.3 Material Sampled

Most light to heavy density liquids.

2.4 Sampler Construction

Standard sampler seal housing, sample probe and seal spacers are of type 316 stainless steel construction. The sample covers and guards are 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 LF sampler is typically mounted onto a tank, pressure vessel, or a vertical or horizontal conveying line carrying the product to be sampled as in Figure 2-1. The sampler axis is installed at a 90 degree angle to the axis of the product line. 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.**

3.4.1 Sampler Mounting To An Existing Flange

- A. The standard sampler is furnished with a 2" 150 lb type 316 stainless steel mount flange on the seal housing and may be attached to an existing 2" 150 lb flange on a process pipe, tank or pressure vessel.
- B. The mounting flange on the end of the seal housing has four .75 (3/4") clearance holes for 5/8" mounting screws or studs.
- C. Ensure that the mounting gasket is in place on the sampler housing mounting flange and verify that the sample probe extends and retracts without interference.
- D. 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.
- E. Check to see that the seals at the connections are not leaking any liquid. Re-tighten fasteners if necessary.

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.
- D. Check to see that the seals at the connections are not leaking any liquid. Re-tighten fasteners and/or re-weld if necessary.

3.4.3 Field-Mounted Sampler Using A Weld Neck Flange

A weld neck flange is typically used when mounting the sampler to a large existing surface, such as on a storage tank, pressure vessel or a long section of piping.

- A. Locate and mark the desired mounting location on the conveying line.
- B. Cut and deburr a 2.1" diameter hole in the conveying line through which the sample tube will pass to collect material samples.
- C. Position the weld neck flange by aligning the 2.1" diameter sample probe clearance holes.
- D. Tack weld the sides of the weld neck flange to the product line surface and double check alignment.
- E. Weld a continuous bead around the weld neck flange.
- F. Ensure that the mounting gasket is in place on the sampler housing mounting flange and verify that the sample probe 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.

H. Check to see that the seals at the connections are not leaking any liquid. Re-tighten fasteners if necessary. If the weld leaks, remove the sampler and mounting gasket before making any repair welds. Weld heat will damage or destroy the gasket and the Teflon seals in the seal housing.

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 1.00" 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.

Rigid tubing or pipe may also be used if desired for sample transport lines.

Make all connections liquid tight and make sure all interior surfaces of joints are smooth and flush. Any ragged or raised tube ends will collect and retain liquid contaminants and retard liquid 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 4.1.8.9, the 20-position 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.
Optional - 220/240 VAC, 50/60 Hz, Single Phase, 1 Amp Max.

3.7.1.2 Solenoid Valve Coil

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

3.8 System Piping

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 valve(s) 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.

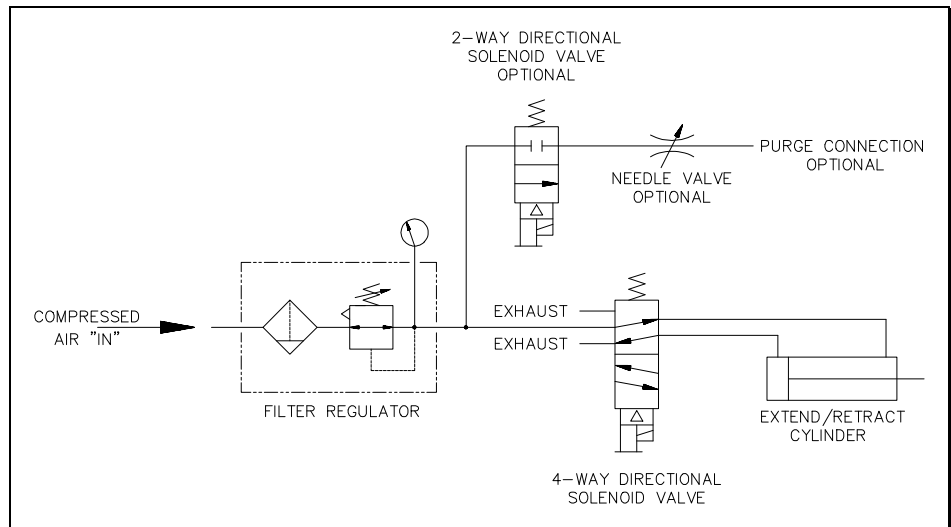


FIGURE 3-1, PNEUMATIC SCHEMATIC

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

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. LF sampler requires 0.12 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 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

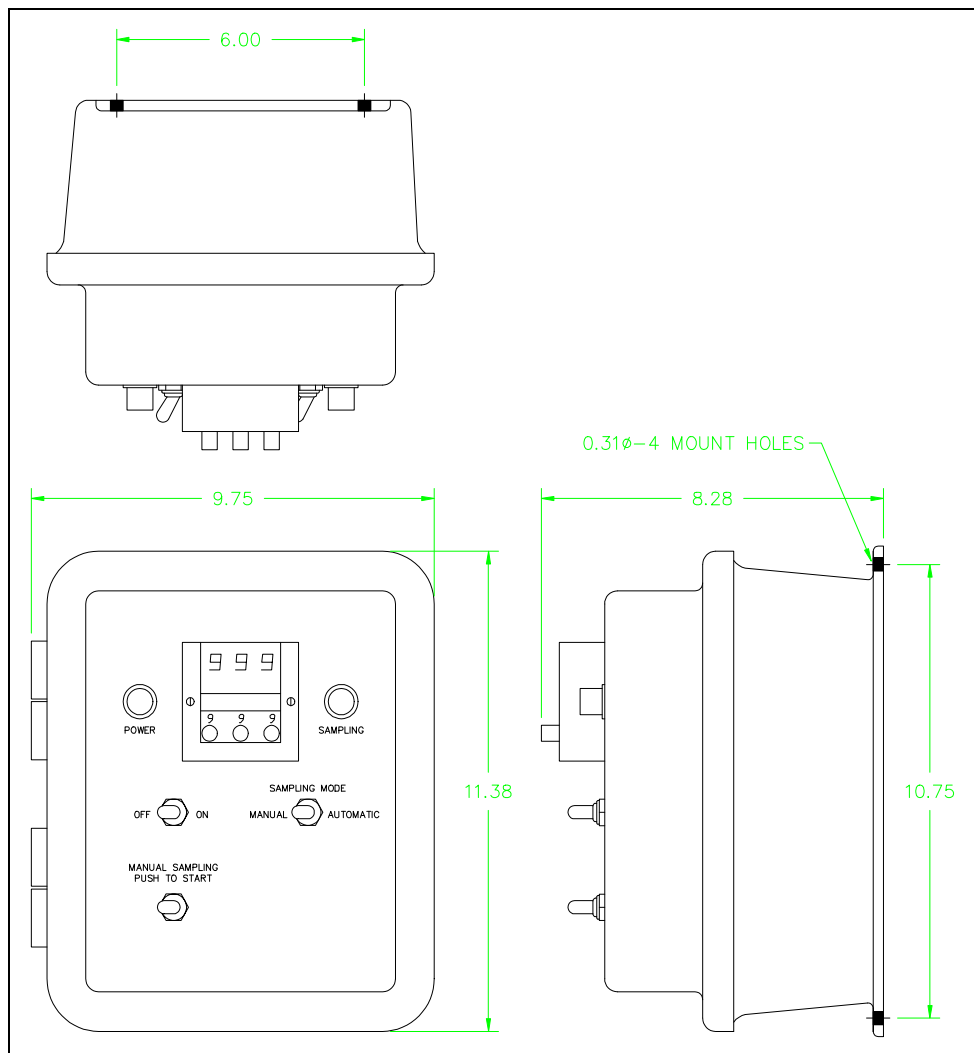
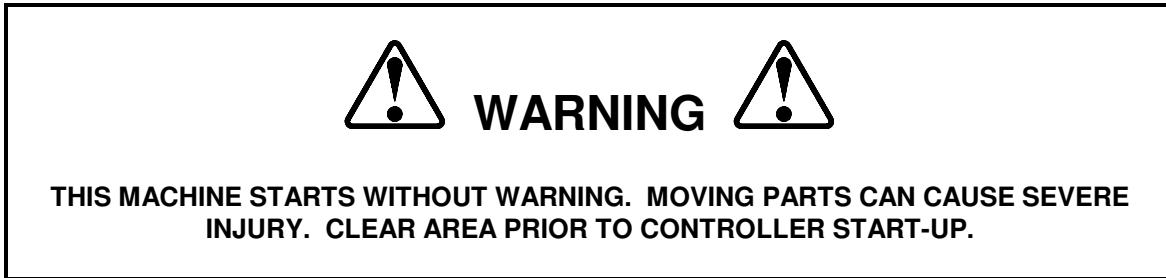


FIGURE 4-1, STANDARD NEMA 4 CONTROL PANEL DETAIL

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

4.1.1 POWER OFF/ON Switch S-2

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



4.1.2 SAMPLING MODE Switch S-3 (Automatic/Manual)

This switch permits the operator to select whether samples will be collected automatically at precisely timed or counted intervals as determined by the Digital Display Timer (T-1) or Counter C-1, OR manually whenever the operator momentarily actuates the MANUAL SAMPLING toggle switch (S-4).

4.1.3 MANUAL SAMPLING Switch S-4

This switch functions ONLY when the AUTO/MANUAL switch has been set to the Manual Mode position. Switch S-4 is a spring-return switch that is maintained in the OFF or Normally Open position. Correct operating procedure is to momentarily actuate S-4 to the Start position. When the SAMPLING light is illuminated, release the switch. The sampler will complete its cycle without further operator intervention.

4.1.4 POWER Pilot Light

This light is illuminated as long as power is available to the controller and the POWER switch (S-2) is set to ON.

4.1.5 SAMPLING Pilot Light

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

4.1.6 Digital Display Timer T-1 (Standard)

As arranged for use in this system, the timer operates in the DOWN & STOP mode. When the AUTO mode is selected, the illuminated display resets to the value dialed in to the Three Digit Preset. Immediately, the timer begins timing down. When the illuminated display reads all zeroes (000), the timer has "timed out" and initiates a sampling cycle. The sample probe extends, delays to collect a sample and then retracts. The timer display resets to the preset value and another timing interval is initiated. If the controller is shut off or the mode switched from AUTO to MANUAL, the timing cycle is terminated. When power is restored or the AUTO mode is again selected, the display is reset to the preset value and another cycle begins. NOTE: A new timing cycle can be initiated ONLY after the sampling cycle has completed.

A. External Settings

1. THE DISPLAY:

The high intensity blue fluorescent display consists of three digits and decimal point (if decimal is set in tenths or hundredths position). Also, there is a blinking Timing Bar and a special Time-Out symbol. The Timing Bar appears to the right of the digits and blinks once every second during timing. The Timing Bar shows quickly that the timer is actively timing especially when the digits do not change rapidly as in the "hours" ranges. When the delay relay is energized at time-out, a triangular Time-Out symbol appears to the left of the digits. The Timing Bar blinks noticeably faster at time-out.

2. SETTING SWITCHES:

The three digits are set with the rotary switch knobs located beneath each digit. These knobs can be rotated in either direction (CW or CCW), and they are "pull" removable if digit set security is desired. Changing one or more digits, during timing, will instantly be reflected by an equivalent change in the timer's display. Setting all three digits to zero will cause instant time-out of the timer.

B. Internal Settings

THE 365 DIGITAL DISPLAY TIMER MUST BE REMOVED FROM ITS HOUSING TO ALTER ANY OF THE FOLLOWING SETTINGS.

1. TIME RANGE:

Decimal Point Location can be changed with the white plastic lever mounted behind the front face of the timer. This lever moves into three positions. With finger force you can change its position and at the same time observe the front of the timer. NOTE - this procedure sets the decimal point electronically as well as visually.

Time Units (Sec/Min/Hr) are set by moving a small width metal arm in a slotted arc on the side plate nearest to the units (Sec/Min/Hr) window. By depressing this arm slightly with a pencil or pen point, it can be moved to a new position. The time units physically change in the timer's face and the timer is electronically switched to the new units as well.

2. LINE FREQUENCY:

To set the proper line frequency, connect the jumper wire to either the 50 HZ or 60 HZ pin. These pins are clearly marked on the side of the timer.

NOTE: THE TIMER CHASSIS AND THE HOUSING ARE POLARIZED SO THAT THE CHASSIS CANNOT BE INSERTED INTO ITS HOUSING UPSIDE-DOWN. IF THE TIMER IS FORCED INTO THE HOUSING UPSIDE-DOWN DAMAGE WILL RESULT.

4.1.7 Digital Display Counter C-1 (Optional)

As arranged for use in this system, the counter operates in the DOWN & STOP mode. When the AUTO mode is selected, the illuminated display resets to the value dialed in to the Three Digit Preset. Immediately, the counter begins counting down. When the illuminated display reads all zeroes (000), the counter has "counted out" and initiates a sampling cycle. The sample probe extends, delays to collect a sample and then retracts. The counter display resets to the preset value and another counting interval is initiated. If the controller is shut off or the mode switched from AUTO to MANUAL, the counting cycle is terminated. When power is restored or the AUTO mode is again selected, the display is reset to the preset value and another cycle begins. NOTE: A new counting cycle can be initiated ONLY after the sampling cycle has completed.

A. External Settings

1. THE DISPLAY:

The high intensity blue fluorescent display consists of three digits and a Counting Bar with a special Count-Out symbol. The Counting Bar appears to the right of the digits and blinks once every count, regardless of range. When the delay relay is energized at count-out, a triangular Count-Out symbol appears to the left of the digits.

2. SETTING SWITCHES:

The three digits are set with the rotary switch knobs located beneath each digit. These knobs can be rotated in either direction (CW or CCW), and they are "pull" removable, if digit set security is desired. Changing one or more digits, during counting, will instantly be reflected by an equivalent change in the counter's display. Setting all three digits to zero will cause instant count-out of the counter.

B. Internal Settings

THE 366 DIGITAL DISPLAY COUNTER MUST BE REMOVED FROM ITS HOUSING TO ALTER THE COUNT RANGE:

The 366 has three ranges.

| | | |
|------|---|--|
| 1x | = | Counts single pulses to 999 |
| 10x | = | Counts every tenth pulse to 9,990 |
| 100x | = | Counts every hundredth pulse to 99,900 |

Each range is selectable using finger force on the white plastic lever behind the front face of the counter. In two of the three possible lever positions, an indicator will appear in a range window located on the front face of the counter. When nothing appears in this window the count is in the x 1 range.

NOTE: THE COUNTER CHASSIS AND THE HOUSING ARE POLARIZED SO THAT THE CHASSIS CANNOT BE INSERTED INTO ITS HOUSING UPSIDE-DOWN. IF THE COUNTER IS FORCED INTO THE HOUSING UPSIDE-DOWN DAMAGE WILL RESULT.

4.1.8 Printed Circuit Board

The circuit board mounted inside the controller enclosure controls the solenoid valve and serves as the connection point for all sampling system circuitry. Figure 4-2 illustrates a typical board. Depending upon the options selected there may be minor differences. The following paragraphs describe the major components of the printed circuit board, their functions, and adjustments.

4.1.8.1 Main Fuse

This fuse, located along the top center of the board, 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 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.

4.1.8.2 Motor Fuse Holder

The fuse holder, located at the top left corner of the board, does not require a fuse to be installed for the LF sampler.

4.1.8.3 PC Board Fuse F3

This fuse, located to the right on the middle of the board, protects the printed circuit board against overloads and short circuits. Use ONLY a Buss Type AGC, 1-1/2 Amp, 250 Volt fast acting fuse or equal.

4.1.8.4 Motor Timer Switches (Tens & Ones)

These rotary switches serve no function on the standard LF sampler. They will only be utilized on LF samplers with the Sample Purge option. These rotary switches can be adjusted to vary the length of time the purge solenoid is energized during each sampling cycle to discharge a collected sample.

NOTE: SAMPLE PURGE RUN TIME IS TO BE ADJUSTED TO ALLOW FOR THE CLEAN OUT OF THE SAMPLE CAVITY AT THE END OF EACH CYCLE. MINIMUM ON TIME WILL DEPEND ON THE CHARACTERISTICS OF THE MATERIAL BEING SAMPLED AND MAY WELL REQUIRE RE-ADJUSTMENT IF THE PRODUCT BEING SAMPLED CHANGES.

Utilizing a small screw driver turn the slotted rotor of the tens and/or ones switches to desired length of time the purge solenoid is energized during a cycle. The time period can be adjusted from 1 to 99 seconds. The timer is factory set at 15 seconds.

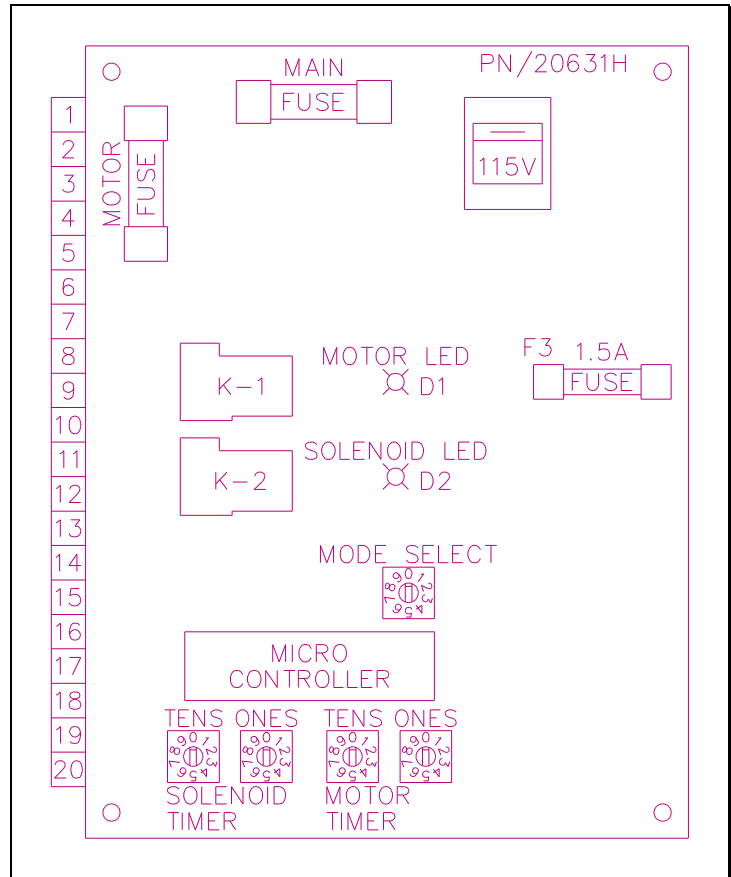


FIGURE 4-2, PRINTED CIRCUIT BOARD

The ones switch is in increments of one second and the tens switch is in increments of ten seconds. As an example, to set the motor timer to 20 seconds, turn the tens rotor to setting 2 and turn the ones setting to 0. The solenoid timer setting would be set in the same manner.

4.1.8.5 Solenoid Timer Switches (Tens & Ones)

These rotary switches can be adjusted to vary the length of time the sample tube solenoid valve is energized to extend the sample tube into the product stream during each sample collection cycle.

NOTE: SOLENOID VALVE TIME IS TO BE ADJUSTED SO THAT THE SAMPLE PROBE EXTENDS INTO THE PRODUCT STREAM ONLY LONG ENOUGH TO ALLOW A REPRESENTATIVE SAMPLE TO BE COLLECTED. EXTENDING THE SAMPLE PROBE INTO THE PRODUCT STREAM FOR EXCESSIVELY LONG PERIODS OF TIME CAN RESULT IN UNNECESSARY SAMPLE PROBE WEAR AND CAN RESULT IN CLOGGING OF PRODUCT FLOWING THROUGH THE CONVEYING LINE.

Utilizing a small screw driver turn the slotted rotor of the tens and/or ones switches to desired length of time the sample tube solenoid valve is energized during a cycle. The time period can be adjusted from 1 to 99 seconds. The timer is factory set at 2 seconds. Refer to Section 4.1.8.4 for further explanation on time settings.

4.1.8.6 Motor LED Indicator

This LED (D1) is illuminated when power is present to K-1 relay coil on the PC board. It is a visual signal showing when the optional Sample Purge should be energized.

4.1.8.7 Solenoid LED Indicator

This LED (D2) is illuminated when power is present to K-2 relay coil on the PC board. It is a visual signal showing when the solenoid valve should be energized.

4.1.8.8 Mode Select Switch

The switch, located at the lower center of the circuit board, determines the sequencing of certain internal controller events.

As this board is used in controllers for several different samplers, MODE switch settings allow the board's functions to be tailored to the requirements of the various samplers.

NOTE: LF SAMPLERS REQUIRE THE MODE SWITCH TO BE POSITIONED ON SETTING "1" (ONE). IF THE MODE SETTING IS NOT CORRECTLY SET, TURN POWER OFF TO THE CONTROL PRIOR TO RE-SELECTING. THE PC BOARD WILL ONLY CHANGE MODES WHEN POWER IS INITIALLY APPLIED.

4.1.8.9 Terminal Strip

This 20-position barrier terminal strip is located along the left edge of the circuit board. It serves as the controller's interface and connection point for all external circuits and for the components mounted on the enclosure's front panel. Refer to the certified electrical drawing(s).

4.1.8.10 115V/230V Switch

This switch is factory set to allow a common PC board to be operated on either 115 vac, 50/60 hz or 230 vac, 50/60 hz. The printed circuit board operating voltage can only be switched after all electrical components connected to it are changed. To field convert the control and sampler operating voltage, determine what components will need to be replaced. Typically this includes, but is not limited to: the digital display timer, power lamp & socket, fuse(s), solenoid coil(s), and possibly the motor. Refer to the name plate and wiring diagram on the motor to determine if the motor is rated for the desired voltage. If it is, change the wiring connections in the motor junction box for operation on the new voltage.

**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.

4.2 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.

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

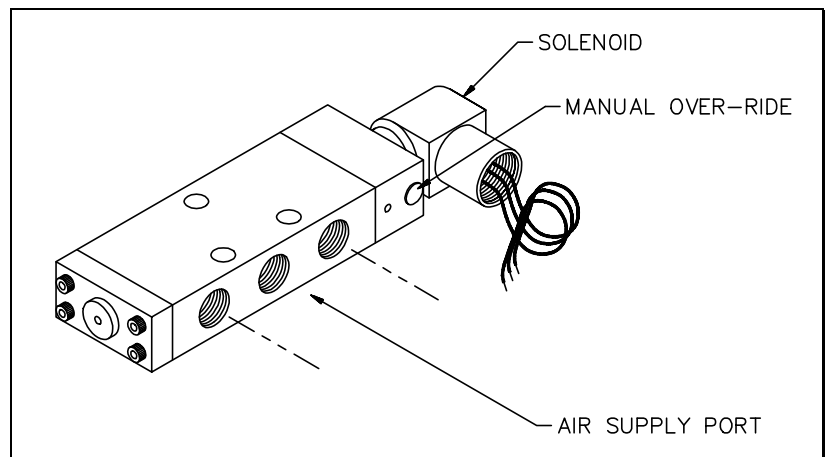


FIGURE 4-3, SOLENOID VALVE

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 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 Air Filter/Pressure Regulator

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

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

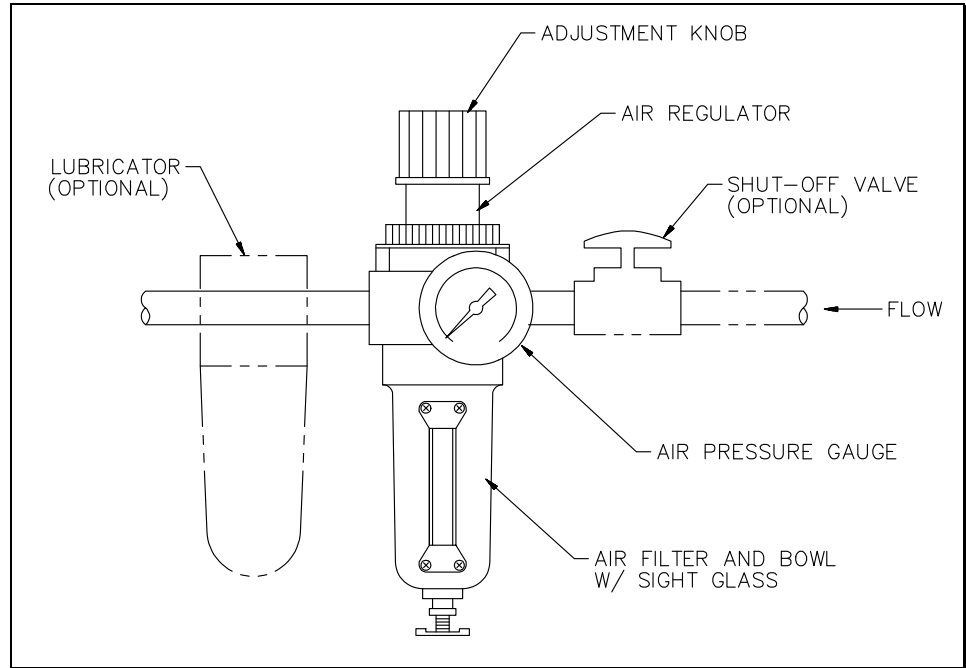


FIGURE 4-4, FILTER/REGULATOR

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

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

4.2.3 Pneumatic Cylinder

This double-acting air cylinder extends and retracts the sample probe. Standard sampler stroke length is 3.0". The cylinder rod is connected to the sample probe by means of a threaded rod end on the air cylinder and a locking jam nut. Solenoid valve V-1 controls extension and retraction of the cylinder.

V. MAINTENANCE AND REPAIR



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

5.1 General Maintenance

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

5.2 Periodic Inspection

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

- A. Loose or missing hardware
- B. 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

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 F/R 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 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



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 probe. 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.

As shown on the section drawing of the sampler on page 29, the v-ring packing seals are held compressed by the compression plate. Two 1/4-20UNC hex head screws clamp the plate to the rear flange of the seal housing. Using a 7/16" wrench evenly tighten the two cap screws a 1/2 turn at a time. This will compress the seal and spacer stack, increasing the seal effect on the sample probe.

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 PROBE, 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 section drawing of the sampler on page 29 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 two #1/4-20UNC hex nuts attaching the top cover to the sampler assembly.
 - 2. Remove the four 1/4-20UNC hex head screws and nuts attaching the bottom cover.
 - 3. Remove the four 3/8-16UNC hex head screws attaching the seal housing to the guide rods.
 - 4. Remove the two 1/4-20UNC hex head compression plate screws.
 - 5. Pull the seal housing off of the sample probe.
 - 6. Remove the 1/4-20UNC hex head screw over the discharge spacer.
 - 7. Remove the seals and spacers taking care to avoid damaging the seal housing bore. Use a 1" dia. round plastic bar or wooden dowel to push with, if necessary.
 - 8. Replace worn items and clean the remaining components. And remove any burrs or scratches from the bore of the seal housing.
- D. Rebuild the sampler in the following order.
 - 1. Refer to the section drawing of the sampler on page 29, 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.
 - 2. Re-install the 1/4-20UNC hex head screw over the discharge spacer.
 - 3. Position the compression plate so that it bears on the end of the rear spacer. Loosely re-install the two 1/4-20UNC hex head screws which clamp the plate to the seal housing flange.
 - 4. Carefully slide the seal housing over the sample probe and into position.
 - 5. Re-install the four 1/4-20UNC hex head screws and nuts fastening the bottom plate to the seal housing. And the four 3/8-16UNC hex head screws fastening the guide rods 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.

6. Evenly tighten the compression plate screws to firmly compress the seal and spacer stack.
- E. Remove the cover plate on the sample conveying line and reattach the sampler.
- F. Restore power to the sampler and operate it through several collection cycles. If leaks along the sample probe are detected, tighten both compression plate screws 1/2 turn. Make sure compression plate flange remains parallel to the seal housing flange. Repeat the process until no leakage is detected.
- G. Re-install the two #1/4-20UNC hex head nuts fastening the top cover to the sampler assembly.

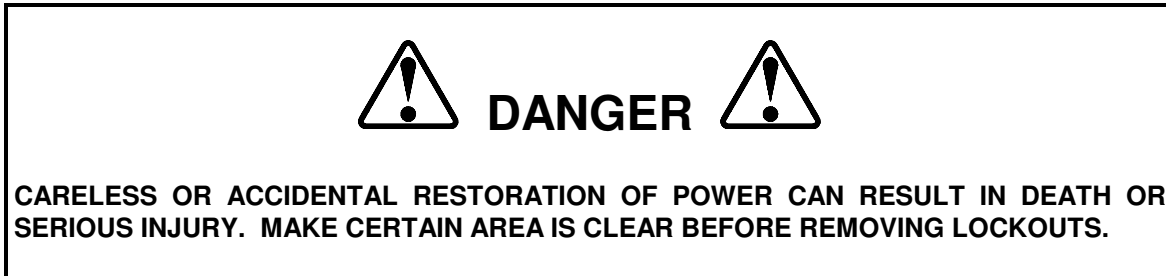
5.5.3 Sample Probe And Seal Replacement

When following the instructions below, refer to the applicable drawing of the sampler. Reference the section drawing of the sampler on page 29 and the certified drawing(s).

- A. Follow instructions in Section 5.5.2 "A" through "C".
- B. Loosen the 1/2-20UNF jam nut on the rod of the air cylinder and unthread the sample probe from the air cylinder rod.
- C. Clean and inspect any items to be reused. Replace if worn or damaged.
- D. Re-assemble the sample probe to the air cylinder assembly by threading it on to the air cylinder rod and tighten the 1/2-20UNF jam nut. The air cylinder and sample probe connection allows for adjustment. After re-installing the seal housing and fasteners check the distance the sample probe protrudes from the seal housing. With air cylinder fully retracted the sample probe should extend past the face of the seal housing 3/32" (2mm).
- E. Continue by following instructions in Section 5.5.2 "D" through "G"

VI. TROUBLESHOOTING

6.1 General LF Sampler Troubleshooting



| SYMPTOM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Sampler does not cycle in either auto or manual modes (Power light Off). | Power switch OFF. | Turn power switch ON. |
| | Circuit breaker is open. | Reset breaker. |
| | Main fuse is blown. | Replace. Refer to Section 4.1.8.1. |
| | 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. | Turn air supply on and set regulator to 80-100 PSI. |
| | PC board fuse is blown. | Replace. Refer to Section 4.1.8.3. |
| | Defective control valve. | Refer to Section 6.3. |
| Sampler timer T-1 digital display does not illuminate but sampler works in manual mode. | Defective auto/manual switch S-2. | Replace switch if line voltage is absent across #1 & #2 on timer T-1. |
| | Defective timer T-1. | Replace timer if line voltage is present across #1 & #2 on timer T-1. |
| Sample size too small or large. | Solenoid time on setting too low or high. | Adjust solenoid time setting on PC board refer to Section 4.1.8.5. |
| Sampler sluggish (Operates too slowly). | Inadequate air supply. | Increase line size or add surge tank. |
| | Regulator set too low. | Reset. Refer to Section 4.2.2. |
| | 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. |

General LF Sampler Troubleshooting (continued)

| SYMPTOM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|---|-------------------------------|---|
| Sampler leaks 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. |

6.2 PC Board Troubleshooting

| SYMPTOM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|---|---|---|
| Sampler digital display timer T-1 does not illuminate when in auto mode. | No wire connecting PC board terminals #1 to #3. | Correct. Refer to the certified electrical schematic. |
| | Defective PC board. | Replace. |
| Solenoid time cannot be adjusted. | Defective PC board. | Replace. |
| Solenoid LED illuminates but no full line voltage signal at terminal #13. | Defective PC board. | Replace. |
| | Improper ground wiring. | Correct. See note below. |

NOTE: LF SAMPLERS REQUIRE THE MODE SWITCH TO BE POSITIONED ON SETTING "1" (ONE). IF THE MODE SETTING IS NOT CORRECTLY SET, TURN POWER OFF TO THE CONTROL PRIOR TO RE-SELECTING. THE PC BOARD WILL ONLY CHANGE MODES WHEN POWER IS INITIALLY APPLIED.

NOTE: SAMPLER MAY FAIL TO OPERATE OR OPERATE IMPROPERLY IF THE DC GROUND TRACE ON THE PC BOARD IS NOT ISOLATED FROM THE AC GROUND OR NEUTRAL WIRING. REFER TO THE CERTIFIED ELECTRICAL DRAWING(S) FOR AC GROUND CONNECTIONS.

6.3 Directional Solenoid Valve Troubleshooting

| SYMPTOM | POSSIBLE CAUSE | CORRECTIVE ACTION |
|---|---------------------------|---|
| Valve does not shift but full line voltage signal is present across #5 & #13 on PC board. | 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.

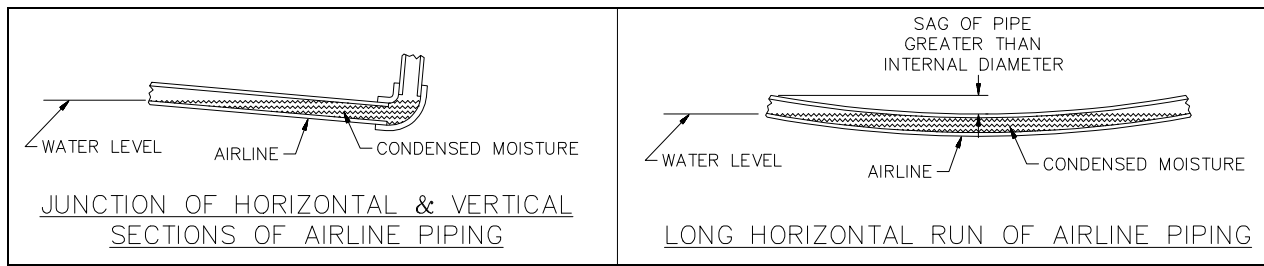


FIGURE 6-1, CONDENSED MOISTURE BLOCKING AIRLINE

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.

6.4 Air Components Troubleshooting

6.4.1 Cylinder Leaking

A. External Leakage

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

B. Internal Leakage

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

To determine if 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.

6.4.2 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.

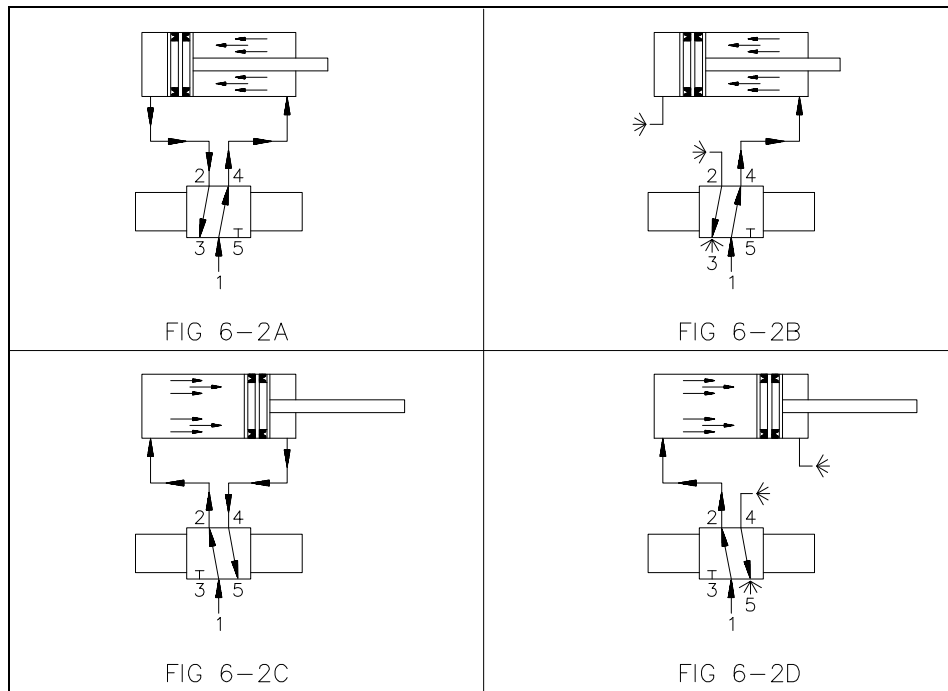


FIGURE 6-2, VALVE VS. CYLINDER LEAK TEST DIAGRAM

VII. REPLACEMENT PARTS

7.1 Scope

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

7.4 Repair Kits

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

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

replace this page with drawing 524304

VIII. WARRANTY

Intersystems 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 manufactured equipment and components are guaranteed against defects in workmanship or materials for one year from date of shipment. The obligation of Intersystems 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 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.