

Original Instructions

Installation, Operation & Maintenance Manual

ISOLOK M4KSA Sampler Point Samplers

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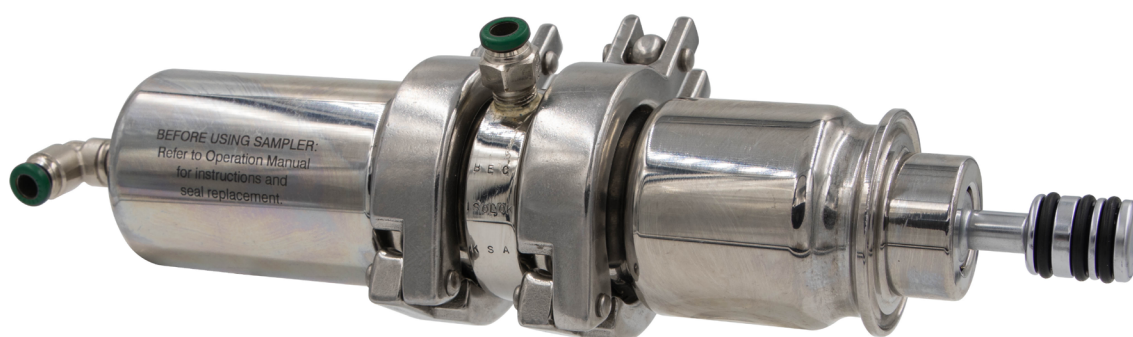



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 Do not install, maintain, or operate this equipment without reading, understanding, and following the appropriate Sentry Equipment Corp instructions. Otherwise, injury, damage, or both may result.

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Note

The information contained in this document is subject to change without notice.

Safety Information

Please read the entire manual before attempting to unpack, set up, or operate this product. Pay careful attention to all Warnings, Cautions, and Notes. Failure to do so could result in serious personal injury and/or equipment damage.

Use of Hazard Information

If multiple hazards exist, the signal word corresponding to the greatest hazard shall be used.

Definitions

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

CAUTION

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

NOTE

Information that requires special emphasis.

TIP

Alternate techniques or clarifying information.

SHALL: This word is understood to be mandatory.

SHOULD: This word is understood to be advisory.

General Safety Precautions

Product Selection, Installation, and Use

WARNING

Improper selection, installation, or use can cause personal injury or property damage. It is solely the responsibility of users, through their own analysis and testing, to select products suitable for their specific application requirements, ensure they are properly maintained, and limit their use to their intended purpose.

Follow proper local, state, and federal regulations for proper installation and operational requirements.

Always use caution and common sense when working with any chemical. Read the product label and Safety Data Sheets (SDS) carefully and follow the instructions exactly.

Potential Equipment Hazards

WARNING

Hot surfaces! This equipment may have very hot surfaces. If an operator contacts a hot surface, injury may occur. Use protective clothing to prevent injury. If other equipment comes in contact with a hot surface, damage to the equipment may occur. Ensure the area around this equipment is kept clear to prevent damage from occurring.

High pressures! This equipment may contain fluids at very high pressures. Prior to installing, removing or maintaining this equipment, ensure that the equipment is isolated from all connecting piping, the equipment is depressurized, the contents have been drained, and the equipment is cool.

Moving parts! This equipment may contain moving parts. All drive guards and doors must be secured in place when this machine is being operated.

WARNING

Equipment rated TX. Equipment maximum surface temperature depends on operating conditions. Ensure maximum surface temperature shall stay below ignition temperature of dust or gas atmosphere where it is installed based on process conditions. Failure to comply could result in an explosion, causing serious injury or death to personnel and damage to equipment.

If the sampler is mounted directly to a non-electrically conductive surface, sampler shall be bonded to a grounding electrode. Failure to comply could result in sparking, which could lead to an explosion, causing harm to personnel and equipment.

If the sample container is removed from the sampler, do not insert any body part or other item into the sample discharge port. Crushing will occur.

NOTICE

To ensure proper sampler operation, be sure the sampler is installed in a pipe large enough for the sampler plunger to extend without impacting the pipe. Failure to comply will result in equipment damage and poor sample quality.

CAUTION

Sampler may require a two-person lift. Please refer to the General Arrangement drawing for weight and dimensional information.

General Description

WARNING

Read these instructions completely before proceeding to assemble, install or operate this machine. This machine should be installed, operated and serviced by qualified individuals. All drive guards and doors must be secured in place when this machine is being operated. Follow proper local, state and federal regulations for proper installation and operational requirements.

The Sentry® ISOLOK® M4KSA automatic fixed volume sampler is designed to obtain samples of liquid and slurry flowing in a process stream, into which extends a plunger with an annulus for sampling. The M4KSA sampler has been configured specifically for use in sampling the process media at the process conditions provided by the user at time of manufacture.

Each sampler cycle consists of a plunger extension and a plunger retraction. During plunger extension, the volume of the annulus is filled with a sample of the process stream. The plunger is then retracted into the body of the sampler, thereby capturing a volume of sample. This sample is then deposited into a sample collection container.

The ISOLOK M4KSA automatic fixed volume sampler is pneumatically operated. Pressurized air (or other gas) is used to provide the force to extend and retract the plunger. When in the retracted position, air or other inert gas may be used to assist the displacement of the sample material from the plunger annulus.

The ATEX Temperature Class rating is dependent upon process fluid temperature. Reference the following chart for the appropriate rating:

TX	maximum temperature
T2	572°F (300°C)
T3	392°F (200°C)
T4	275°F (135°C)
T5	212°F (100°C)
T6	185°F (85°C)

ATEX Ratings:

Ex h IIB T6...T2 Gb
Ex h IIIC T83°C...T300°C Db
 $-20^{\circ}\text{C} \leq T_a \leq +65^{\circ}\text{C}$

NOTE

The working pressure of the air cylinder is 120 psig with a max cycle rate of 12 cycles/min on a continuous duty cycle. Additionally, actuating gas needs to be a non-combustible neutral gas and the working temperature must be between -4°F to 149°F (-20°C to 65°C).

The standard ISOLOK M4KSA sampler takes 3cc of sample per cycle, with optional annulus volumes of 1 cc and 2 cc. The ISOLOK M4KSA sampler is available in models that meet sanitary construction standards and conforms to 3-A Sanitary Standards through Third Party Verification (TPV).

The sampler is powered by compressed air and is typically operated by an electrical cycle control that provides an adjustable time or flow-based sampling rate. Other operating mediums are available.

The sampler normally connects to the sampler controller by two 16-foot lengths of flexible tubing. It mounts onto a 1-1/2 inch Tri-Clamp ferrule that is specially close-coupled to the line, usually by adding a specialized line-mounting adapter tee into the piping.

NOTE

Figures in this manual may differ from actual purchased equipment. Please refer to the drawings in the appendices of this document.

Installation

Selection of Installation Location

Select a location to install the sampler where the material in the process stream is well mixed. Location of the sampler and controller is very important for accurate sampling results. They should be as close together as practical, within sight of each other, and protected from weather, traffic damage and normal work activities in the area.

When selecting a sampler location, ensure the sample collection container will clear vertical lines (or other obstructions) when mounted onto the sampler. The sampler can be used on a pipe or tank running horizontally, vertically or at an angle, but the axis of the sampler body must be horizontal.

For dairy applications, the sampler can be located on either a pressure or a vacuum line (suction inlet or discharge lines of a receiving pump). If possible, choose a sampler location where the receiving line runs dry between pump-out of incoming tankers. This can be on either the suction or discharge side of the pump. On the suction side, an adapter tee with clamp type fittings can often be installed between the flexible hose connection and the pump inlet, if this section runs dry between the loads. On the discharge side, many plants pump through a vertical line and past a check valve into a receiving tank or silo. A location several feet up the vertical line and just before the check valve can be suitable. Here, the volume of the line beyond the pump discharge acts as a reservoir and entrained air rises in the line against the check valve when a tanker is drained.

Check carefully to see that no product stands static in front of the sampler. In other instances a slight modification of existing piping systems can create a location for the sampler free of product standing between alternate loads. Regardless of the sampler location, most accurate samples will be taken where the sampler is started when flow begins (pump on) and stopped when flow stops.

Line Adapter Mounting (if provided)

1. Reference the accompanying drawing to determine which line adapter had been provided.
 - a. SADDLE SHAPE line adapters are machine cut to fit the OD of sampler diameter process pipes.
 - b. PLUG SHAPE line adapters are installed through the wall of larger diameter pipes or sides of tanks.
2. After selecting a location and verifying the sampler orientation, cut a hole in the process line (or tank) according to the shape of the line adapter. Exact size to cut is shown on the accompanying drawings
3. Protect bore and face of adapter from weld spatter.
4. Tack weld adapter in position. Again, check orientation and position before continuing to weld.

NOTICE

Use industry code procedures to protect adapter from distortion. Major distortion cannot be corrected and will prevent installation of sampler.

Sampler Mounting

⚠ CAUTION

Sampler may require a two-person lift. Please refer to the General Arrangement drawing for weight and dimensional information.

1. ISOLOK samplers are designed to mount to a line adapter that is welded or otherwise attached to a process line.

2. **PLUNGER CLEARANCE.** Ensure that adequate clear space exists ahead of nose of sampler to allow for full plunger movement.
3. Check orientation of sampler and line mounting adapter, and ensure that axis of sampler is mounted as shown on the accompanying general arrangement drawing.

Inspection

1. After installation, check the sampler periodically for proper operation and to insure that any wear is detected so proper preventive maintenance can be performed.
2. On continuous duty installations, check the sampler once per day for proper operation and any needed maintenance indicated. On intermittent duty installations, less frequent inspections are needed.
3. On all installations, establish a definite schedule of inspection. The Maintenance section of this manual describes recommended procedures for routine cleaning and maintenance.

Controller (if provided)

1. Make connections as shown on the accompanying drawings.
2. The typical sampler controller uses PLC-based timing to actuate a four-way solenoid valve that provides a compressed air pulse to operate the sampler. The controller requires a source of compressed air at 80 psig (5.5 bar) minimum to 120 psig (8.3 bar) maximum, and an operating power supply.

Service Connections

1. Make air line connections as shown on the accompanying drawings.
2. For most installations, the sampler requires compressed air at normal flow capacity of 2 standard cubic feet per minute (SCFM) at normal regulated pressures between 30 psig (2.1 barg) and 80 psig (5.5 barg).
3. At 80 psig (5.5 barg), air consumption is approximately 0.023 SCF per sampler cycle for 1-1/2 in cylinders.
4. **AIR LINES.** Connect two air outlet ports on control to sampler air fittings P5 on head and P6 on rear of cylinder using 1/4 in OD air lines. Use no more line than is necessary.
5. An adjustable restrictor (flow-control valve) should be used to control exhaust air flow from the air cylinder. Consult Sentry Equipment if this is not furnished as part of the operating control system.
6. Connect lines so that the sampler is in the retracted position between samples or when off.
7. Check for proper connection of air lines by extending the sampler plunger using the "HAND" or "GRAB" option of control.

Operation

DANGER

Dangerous gas! The gases being emitted from the bottle vent may be hazardous and toxic upon exposure. The vent line should be directed to a charcoal canister, flare or other sub atmospheric region for collection and treatment of sample vapors.

Sample Containers

1. Sample collection containers always should be clean and completely dry before being used. Containers (bottles) of polypropylene most often are utilized. Sample collection bottles in 4, 8 and 16 ounce (125, 250 and 500 cc) capacities with 24 mm threads are available and screw directly into the sampler body.
2. Adapters to fit 38 mm (or larger) thread sample collection bottles are available from Sentry Equipment. These adapters have a suitable threaded port and screw mount into the discharge port of the sampler. Up to 1 U.S. gallon (3.8 liters) can be supported by the sampler, assuming there is sufficient clearance to mount the container.
3. In most cases, bottles of polypropylene plastic are selected. Polypropylene has a temperature rating limit of 275°F (135°C) and can be autoclaved.
4. TUBE. When larger sample quantities are required, a separate free-standing container beneath the sampler can be used. Flexible tubing is used to connect to the adapter in the threaded port of the sampler body where sample is discharged. This method of sample collection sometimes is used where milk is fed directly to analysis equipment.
5. SEPARATE CONTAINERS. Suitable piping connections for metal or plastic components can be arranged to conduct sample portions to a separate container. Whenever such piping is installed, avoid long runs with multiple fittings, joints or other areas where solids or crystals could build up and block flow.

NOTE

IMPORTANT. Select sample container size that will not be filled completely even during longest sampling times. Use care when setting a cycle rate that may nearly fill a container.

WARNING

Always ensure control is OFF before mounting or exchanging sample containers.

6. BAG OR VIAL. A sampler may optionally include a sample bag mounting adapter or a vial adapter. Either adapter mounts into the discharge port of the sampler body. The bag adapter holds wire-tie plastic sample bags, while the vial adapter mounts single service plastic sample vials.
 - a. Bag Adapter – This adapter is intended to be used with single service sanitary plastic bags that close with a built-in wire tie. Sizes up to about 8 ounce (250cc) capacity can be supported by carefully folding the open bag mouth and wire around the small diameter below the drip shield. Larger capacity bags are available, but should be used with caution. The weight of larger samples could cause a bag to pull off of the adapter. Alternately, excessive twisting of the wire tie of a “big bag” could leak during later handling.
 - b. Vial Adapter – This adapter is intended to be used with single service sanitary plastic vials. Vials with a top diameter between 15/16 in. (33mm) and 19/16 in. (40mm) can be accommodated. The vial selected should have a small bead or ring around the opening, intended for use with a push-on (“snap-cap”) closure. If other vial diameters or closure designs are desired, consult Sentry Equipment Corp. For greatest simplicity in setting the sampling rate, use the largest capacity vial practical.

Controller (if provided)

See separate controller manual for more details.

ISOLOK samplers require an operating control which determines the time interval between cycles, speed of the plunger and dwell in product stream. Filtered, compressed air or gas is provided from control to sampler air cylinder for operation.

NOTE

The plunger should remain extended into the process flow for the shortest amount of time possible.

General Specifications:

In most cases, an automatic electric sampler cycle control requires an 115 VAC power supply. IN ALL CASES controls require a suitable ground and means to disconnect the electrical supply.

- Where connecting a contact closure or pulse input from the flow meter to the control, using shielded cable is recommended if the run is more than 10 feet or if the conduit contains leads of higher voltage.
- The control location should be within sight of the sampler and require connecting air lines to the sampler of no more than 30 feet.
- Connect a compressed air supply line to the sampler operating control of nominal flow capacity in the range of 2 SCFM at 80 psig (5.5 barg) to 120 psig (8.3 barg). Dry, oil-free air gives best operation with minimum maintenance. Adequate use of air filters is recommended. Minimum pressure setting of 30 psig (2.1 barg) is required. The maximum pressure setting should be less than the incoming air supply to ensure steady, regulated pressure on the sampler.

Automatic Cycle Rate

Select a cycle rate on an adjustable delay timer that will provide an adequate sample composite for the container in use. DO NOT overfill the container. Sample delivery is charted for samplers with 1 cc to 3 cc liquid volumetric displacement per cycle. A partial chart is shown on the following page. Cycle rate is a combination of the time needed to fully extend the plunger into the product line, then completely retract and discharge the sample collected.

To convert cubic centimeters to fluid ounces, multiply by .0338. There are approximately 30cc (29.5735) to one fluid ounce, 128 fluid ounces to one U.S. gallon.

$$*\text{CYCLE TIME} = \frac{\text{CC PER CYCLE} \times \text{TOTAL SAMPLING TIME (SEC)}}{\text{TOTAL SAMPLE (CC)}}$$

$$*\text{CYCLE TIME (SEC)} = \text{EXTEND TIME} + \text{RETRACT TIME}$$

Type

Operation can be manual-pneumatic, electric-pneumatic, all-pneumatic, etc. A few are described:

- Manual-Pneumatic Control includes a filter, regulator, gage, and lever operated four-way air valve with speed controls and mounting bracket. The lever is depressed to extend the plunger and held approximately two seconds. The lever release retracts the plunger. A stainless steel enclosure with locking provision is optional.
- Electric-Pneumatic Control includes an electric power supply for the timer and solenoid operation with separate pneumatics. Time-based units include EXTEND-RETRACT adjustable plug-in timers to control time intervals and optional special time delay functions. Flow proportional or remote contact controls operate from the user's flow meter or pulse generating device and usually include an adjustable counter. NEMA 4 or NEMA 7 enclosure models are available.
- All-Pneumatic Control is suitable for explosion hazard-rated areas where compressed air is available for sampler operation or for areas where electric power supply is not available.

Specialized controls are available on request to suit various requirements.

total sample (cc) at 1 cc per cycle						
	total sampling time					
cycle time*	5 min	10 min	30 min	1 hr	8 hr	24 hr
5 sec	60	120	360	720	5760	17280
10 sec	30	60	180	360	2880	8640
15 sec	20	40	120	240	1920	5760
20 sec	15	30	90	180	1440	4320
30 sec	10	20	60	120	960	2880
60 sec	5	10	30	60	480	1440
120 sec	2	5	15	30	240	720
300 sec	1	2	6	12	96	288
480 sec	--	1	3	7	60	180
600 sec.	--	1	3	6	48	144

total sample (cc) at 2 cc per cycle						
	total sampling time					
cycle time*	5 min	10 min	30 min	1 hr	8 hr	24 hr
5 sec	120	240	720	1440	11520	34560
10 sec	60	120	360	720	5760	17280
15 sec	40	80	240	480	3840	11520
20 sec	30	60	180	360	2880	8640
30 sec	20	40	120	240	1920	5760
60 sec	10	20	60	120	960	2880
120 sec	4	10	30	60	480	1440
300 sec	2	4	12	24	192	576
480 sec	--	2	6	14	120	360
600 sec	--	2	6	12	96	288

total sample (cc) at 3 cc per cycle						
	total sampling time					
cycle time*	5 min	10 min	30 min	1 hr	8 hr	24 hr
5 sec	180	360	1080	2160	17280	51840
10 sec	90	180	540	1080	8640	25920
15 sec	60	120	360	720	5760	17280
20 sec	45	90	270	540	4320	12960
30 sec	30	60	180	360	2880	8640
60 sec	15	30	90	180	1440	4320
120 sec	6	15	45	90	720	2160
300 sec	3	6	18	36	288	864
480 sec	--	3	9	21	180	540
600 sec	--	3	9	18	144	432

Sampling

The sampler design precludes marking each component of the sampler with a part or serial number. We recommend the user uniquely identify each sampler and controller. Equipment identification becomes invaluable when operating more than one sampling instrument serviced through a central maintenance facility. Identification tags can be provided from Sentry Equipment in laminated plastic or metal to be attached to the sampler or controller. Price of the tags is available upon request.

Sampling should be performed only when the product is moving. Sampling from stagnant (stationary) product can bias the sample. Starting and stopping the sampling system can be done manually or by interlocking to a pump or valve. Special controls are available for use with flow meters or for remote computer operation.

CAUTION

Product collected with each sampler plunger cycle drains from the discharge port (P1) of the sampler into the container. However, there is always some clingage to wetted parts. Those collecting samples should be instructed in proper techniques and care when handling containers. If required, users should wear protective equipment such as gloves, masks or other clothing at all times when operating sampling equipment where exposure to the sampled product could be hazardous.

Venting

Samplers used on pressurized lines – where expansion of entrained gas, air, steam or fumes could cause a pressure rise in the sample bottle – require adequate venting.

1. Venting may be provided by a port in the bottle adapter or body top port of the sampling instrument. Ensure any potentially hazardous fumes or product are conducted to a safe area. Periodically check to ensure the vents are open and unclogged.
2. Vent or drain ports always should be located to avoid accidental exposure of an operator to hazardous or hot material. Where evaporation or vapor loss through a vent is undesirable, the vent should be equipped with a proper control.
3. Contact Sentry Equipment Corp for clarification of any questions on venting of the sampler system.

Sample Collection Containers

The sampler has been provided with one of a variety of sample collection container connections. See the accompanying drawing to identify which has been provided.

1. Sample collection containers always should be clean and completely dry before being used. Containers (bottles) of polypropylene most often are utilized.
2. SCREW MOUNT CONTAINERS. These adapters have a suitable threaded port and mount onto a discharge port.
3. SEPARATE CONTAINERS. Suitable piping connections for metal or plastic components can be arranged to conduct sample portions to a separate container. Whenever such piping is installed, avoid long runs with multiple fittings, joints or other areas where solids or crystals could build up and block flow.

Maintenance

WARNING

Sampler must not be disassembled or removed from line until line is free of product, is at atmospheric pressure, all components are at safe temperature, and all services have been shut off.

1. Operating an accurate and valid sampling installation is critically dependent on effective cleaning procedures. ISOLOK samplers incorporate materials, finishes and design to allow effective cleaning of seals, ports, vents and interior body cavities.
2. Whenever a sampler is cleaned, it should be lubricated and inspected for wear and damage that can affect its continued successful operation. The sampler periodically should be checked for proper operation and to ensure that any wear is detected for preventive maintenance.
3. On continuous duty installations, the sampler should be checked once a day for proper operation. On all installations, a definite schedule of inspection should be established to ensure safe and accurate sampling operation. ISOLOK samplers initially must be installed and periodically inspected to ensure all connections, clamps and fasteners are firmly tightened. Failure to keep screws or connections properly secured could result in leakage or damage.
4. Do not weld, machine or otherwise modify the sampler or control in any manner. Consult Sentry Equipment Corp before undertaking any changes. Follow your plant safety procedures whenever maintenance or inspection is required on this equipment.
5. We recommend that service records be maintained on sampling equipment. Data should include:
 - a. Sampler: Record date of installation, date of seal replacement, which seals were replaced and the condition of used seals, and the reason they were replaced. Accurate records will assist in determining seal life or if abnormal operating conditions exist. Contact Sentry Equipment Corp if unusual wear or chemical attack to the seals or the metal parts of the sampler occurs.
 - b. Controller: Record the date of installation, the date of timer or air valve replacement, items replaced and the condition of used parts. Indicate the reason they were replaced. Frequent replacement of timers may indicate an issue with the controller operating environment. Impurities in the air supply source may cause premature failure of pneumatic components.

Sampler Removal and Cleaning

WARNING

Sampler must not be disassembled or removed from line until line is free of product, is at atmospheric pressure, all components are at safe temperature, and all services have been shut off.

Removal

Refer to the included general arrangement and assembly drawings for removal information. All service to the sampler should be performed with it removed from the process line.

Your sampling system should be cleaned and checked at daily and weekly intervals for proper operation and to insure any wear is detected so that preventive maintenance can be performed.

Acceptance tests on the M4 series sanitary sampler for the U.S. Public Health Service included removal of the unit from the product line and manual cleaning.

CIP Cleaning

NOTICE

Chemical solutions and higher temperatures used in the cleaning and sanitizing process may damage sampler plunger seals. Remove sampler prior to CIP cleaning.

Because of its design, the sampler cannot be made to pass sufficient cleaning solution under sufficient pressure to meet customary CIP requirements.

It is recommended that sampler be Cleaned Out of Place (COP) while CIP plant cleaning is in process. Return sampler to the process line after the CIP cycle is complete.

Manual Cleaning

CAUTION

The control and the air supply to the control should be off and product line free of fluid prior to removing the sampler.

1. Remove the sampler from its mounting tee by loosening the thumbscrew on the heavy duty stainless clamp holding the sampler to the tee. Remove the gasket and any sample bottle. Remove the body by loosening the clamp between the body and the air cylinder head.

NOTE

Do not remove the head-to-barrel clamp. It is not necessary to remove the air cylinder barrel for normal daily cleaning.

2. Remove the plunger seal o-rings from the grooves in the plunger by squeezing the o-ring diameter between thumb and finger and rolling them out of the groove. Roll o-rings into the sample collecting annulus on the plunger where they will not become misplaced during cleaning.
3. Spray or brush clean the plunger, exposed front of cylinder head, and body and gasket in approved sanitary procedure.
4. Apply a thin film of approved lubricant to all seals. Roll the plunger seal o-rings into the grooves and slip the body over the plunger.
5. Ensure that the front rod seal o-ring is cleaned/lubricated, then replaced in the recess at the rear of the body before reassembling the body over the plunger. Replace the clamp and tighten securely.
6. Replace the line tee gasket, install sampler and clamp it in place. The body should be horizontal with the sample discharge port pointing down.

Preliminary Inspection

1. With the control and the air supply to the control shut off (with the control preferably disconnected from the air and/or electrical supply) and the product line free of fluid, the cylinder and plunger can be removed from the body to inspect the plunger, plunger seals and inside of the body.
2. Remove from the line. If the sampler is equipped with tube discharge fittings or any other accessory lines that would prevent disassembling the sampler from its mounting port, remove them.
3. Close the line mounting port with an appropriate ferrule cap if the line must be put back into service before the sampler can be repaired or exchanged.

NOTE

If flexible air lines are used and sufficient slack is available, the cylinder and plunger assembly can be removed with the lines intact. Otherwise, remove the air lines from the connectors on the cylinder. Mark the lines for reassembly to the proper port.

Operational Inspection

With the sampler removed from the line, turn on the compressed air and control power. When a cycle is initiated, the sampler plunger should extend and retract quickly. If the seals are completely dry, a sluggish or incomplete stroke may occur. Between cycles the plunger dwells in the retracted position.

Lubrication

Cleaning normally removes all lubrication. Wipe a thin film of lubricant onto all seals. Continued short stroke, incomplete cycling or sluggish extension may indicate dirt or liquid in the barrel, leaks in the air line, or damage to the metal parts.

Plunger Seal Condition

Inspect the o-ring seals on the plunger. Replace any that are scuffed, scored or with flats worn on the outer diameter. Carefully insert the plunger through the bore of the body. Seals should move through smoothly, but with some resistance. Little or no resistance indicates that the o-rings are not properly sealing and should be replaced.

Body Condition

The bore of the body where the seals contact should be smooth and free of nicks and scratches. Using light and a finger or a probe, check the small diameter of the body for scoring. If preliminary inspection of the body shows scoring or if persistent leakage occurs, this indicates the possibility of wear on the sealing surface of the body. Remove the complete sampler and thoroughly inspect the body bore.

➔ NOTE

This sampler has a chrome-lined body bore and should not be honed or polished. Replace with a new body and/or return the worn unit to Sentry Equipment Corp for inspection and possible reconditioning.

Complete Disassembly and Inspection

If preliminary inspection indicates further work is needed, close the sampler line mounting port and review the following procedures for complete disassembly and inspection.

1. Remove the thumb-screw type clamp between the body and the head. Pull out the cylinder and plunger assembly, using steady pull/twist force in line with the axis of the body.
2. Loosen the thumb-screw on the heavy duty clamp holding the head to the cylinder barrel.
3. Remove clamp.
4. Hold the plunger assembly and slide the barrel off the piston.

Inspect Piston Seal

A single elastomer o-ring seal is used. If the seal is deformed, scored, or has flats worn on the outside diameter, it should be replaced.

Inspect Barrel

Inspect the inside of the barrel for scoring or wear. Wipe it out with a dry, non-abrasive cloth. A scored or worn barrel should be replaced.

Remove Head

The cylinder head can be removed by sliding over the plunger. Hold the piston end and withdraw the head, being careful not to catch the rod seals onto the plunger o-ring seals.

Inspect Front Rod Seal

The front rod seal is a special o-ring of approved Buna-N rubber. Inspect the seal for signs of wear such as portions worn or abraded flat, particularly on the inside diameter. A worn front rod seal that does not provide a snug fit onto the piston rod area of the plunger should be replaced.

Inspect Rear Rod Seal

The rear rod seal is a V-type wiper seal of filled Teflon (fluoropolymer) with an Alloy-C metal expansion spring. Wash out the inside V of the rod seal with antiseptic cleaning solution. If the seal has worn to a loose fit, or the coil of the spring can be seen about to push through the Teflon jacket, the seal must be replaced.

If air leakage at the P4 port becomes audibly noticeable, the seal must be replaced. Please note that a certain minimal leak rate is acceptable. Remove the worn seal from the recess in the head by grasping the seal with needlenose pliers. V-type rod seals are not reusable once they are removed.

NOTE

Do not nick or scratch the seal seat.

Inspect Plunger

Inspect the plunger rod area that normally passes through the rod seals. A lightly scratched plunger rod usually can be returned to service, while a heavily scored plunger should be replaced. Check to ensure the plunger rod has not been bent.

Seal Replacement and Reassembly

Clean and polish metal components as appropriate using a soft cloth. Avoid excessive abrasives. Refer to your sampler parts list drawing when reassembling your sampler.

Plunger Seal Replacement

Always replace the plunger seals as a complete set for even wear. Roll the o-rings into the grooves on the plunger, ensuring each seal is seated in place and not twisted.

Lubrication

Apply a thin film of appropriate lubricant to all plunger seals.

Rod Seal Replacement

Replacing the rear rod seal (toward air cylinder) is best accomplished using a loading tool. A loader can be purchased from Sentry Equipment. Lay the sampler head on a bench with the seal cavity facing upward. A small amount of lubricant in the cavity and on the rod seal will aid installation.

1. Place the seal into the tapered bore with the spring side facing upward.
2. Once seal is part way into the cavity of the sampler head, place the loading tool against the seal.
3. Keeping the seal and loader in line with the bore of the head, push straight downward with a firm continuous motion until the seal snaps into the groove.

If a loading tool is not available, the seal can be installed by hand using a piece of rod (most any material) 7/8 to 15/16 inch in diameter. Exercise care in this procedure, as the seal easily can be damaged.

1. Warm the seal by boiling in water for 5 minutes or use thermostatically controlled hot plate set at 180° to 200°F (82° to 93°C).
2. Insert your finger or a flat end rod of approximately the same diameter as the plunger through the sampler head from the front (opposite seal groove).
3. Start the seal at an angle into the recess in the sampler head with the spring side of the seal facing out (toward rear of air cylinder).
4. Tuck the seal into its recess, being careful not to kink it.

5. Work about half the seal into the groove, then press with fingers to snap the remainder into place.

Front Rod Seal Replacement

1. Ensure the front rod seal o-ring is replaced in the recess at the rear of the sampler body before reassembling the body over the plunger.
2. Apply a thin film of dairy lubricant to the inside of the o-ring.

Piston Seal Replacement

1. The o-ring piston seal can be replaced by pinching it between the thumb and forefinger and rolling off the old seal.
2. Roll the new seal into the groove, making sure it is well seated and not twisted.
3. Apply a small quantity of an appropriate dairy lubricant to the seal.

Head

Slip the sampler head (with the rear head seal o-ring in position) over the plunger rod from the front end. Make sure the end of the head with the hole for operating air is toward the sampler rear (piston end).

Barrel

Reassemble the barrel over the piston and plunger rod.

1. A light coating of grease or dairy lubricant wiped into the barrel before reassembly will aid in inserting the piston.
2. Use a slight rocking-twisting motion to start the piston into the barrel to avoid damaging the piston seal.
3. Clamp the barrel to the head and tighten the thumb-screw securely.
4. Slide the plunger in and out several times to ensure it is free. Movement should be stiff, but smooth.

Body

1. Install the front rod seal o-ring into the recess before replacing the sampler body.
2. Apply a thin film of lubricant to seal.
3. Carefully slip the sampler body over the plunger seals and clamp to the head with a heavy duty thumb-screw clamp. Tighten securely.

Reconnection

1. Reconnect the sampler to the control air lines and use the Hand setting or other means provided to manually activate the sampler controller.
2. Test the sampler for proper operation.
3. Replace any accessory lines and return the sampler to service.
4. Replace any bottle or bag adapter after inserting the o-ring seal at the base of the body threads.
5. Cycle testing at this point is recommended to ensure proper operation.

Troubleshooting

symptom	possible problem(s)	remedy
Sampler leaks product or air out of bottom ports	<ul style="list-style-type: none"> ▪ Worn seals ▪ Incorrect installation ▪ Other worn parts 	<ul style="list-style-type: none"> ▪ Thorough inspection is required ▪ Replace worn seals ▪ Check any recently replaced seals against drawings for correct installation ▪ Replace other worn sampler parts: Body, head, barrel or plunger
Sampler leaks product at pipe connection	<ul style="list-style-type: none"> ▪ Installation misaligned ▪ Fastener, clamp/gasket or seals issue 	<ul style="list-style-type: none"> ▪ Check installation for misalignment ▪ If the installation is threaded, replace locknut fastener and add commercial grade Teflon tape when reinstalling ▪ If the installation is tri-clamp or instrument hub, check the clamp/gasket (TC) or o-rings/fasteners (IH) attaching the sampler to the line adapter ▪ Replace seals if they are damaged or show signs of chemical attack
Sample discharge is decreasing	<ul style="list-style-type: none"> ▪ Buildup in sample spool cavity or sampler nose 	<ul style="list-style-type: none"> ▪ Check sample spool cavity for buildup; if present, add flush or air eject provision to sampler body ▪ Check sampler nose for buildup; if present on nose or pipe wall interior, remove the body from the line frequently and clean it using plant procedures
Sampler will not operate	<ul style="list-style-type: none"> ▪ Issues with power source and/or air connections 	<ul style="list-style-type: none"> ▪ Check power source and air connections; connect as required ▪ Check air lines for proper connection, as plunger must dwell retracted; air lines connected backwards will cause sampler to dwell (pause) extended into the process line ▪ Check for air bind; depending on the density of the product sampled, this sometimes can be resolved by opening a top port on the sampler ▪ Check sampler operating air pressure and process line pressures; operating air pressure must be sufficient to move the plunger against process pressure. Issue may be resolved by increasing or decreasing air to sampler or relocating sampler.
Controller does not operate	<ul style="list-style-type: none"> ▪ Issues with pneumatic and/or electric power source 	<ul style="list-style-type: none"> ▪ Verify correct 115V or other specified power to controller ▪ If using a remote contact unit, check the output signal to the controller from the flow meter; check purchase records, and if an incorrect output signal was specified, contact Sentry Equipment ▪ Secure a qualified technician to run a complete operating check of timing circuits, remote contact inputs and/or counter inputs that sequence the electric or pneumatic power valve

Standard Warranty

Sentry Equipment Corp (“Seller”) warrants products manufactured by it and supplied hereunder (“Products”) to be free from defects in workmanship and, to the extent materials are selected by Seller, to be free from defects in materials, in each case for a period as defined in the table below:

Product Line	Product Category	Warranty Period
Sentry®	1. Automatic Sampling 2. Corrosion Monitoring 3. Manual Sampling 4. Sample Conditioning 5. Sampling & Analysis Systems 6. Replacement Parts (without expiration dates)	Eighteen months from date of shipment or twelve months from startup, whichever occurs first
Waters Equipment	1. Sampling & Analysis Systems 2. Replacement Parts (without expiration dates)	Twelve months from date of shipment

To view the full warranty, go to www.sentry-equip.com/warranty.

Customer Support

With proven sampling expertise since 1924, Sentry products and services provide business operations the critical insights to optimize process control and product quality. We deliver true representative sampling and analysis techniques to customers around the globe, empowering them to accurately monitor and measure processes for improved production efficiency, output, and safety. Standing behind our commitments, we are determined to tackle any application, anywhere.

We know that running an efficient operation isn’t easy. It requires thorough, careful analysis of controlled, real-time data achieved through reliable, accurate, and repeatable process monitoring, and measuring. By effectively conditioning, sampling, and measuring gas, liquid, slurry, powder, solids, steam, or water within their production environments, our customers obtain the critical insights they need to control and optimize their processes.

Yet, controlling your processes also means reliable customer support throughout the life cycle of your equipment.

- Customer Service—General information, warranty claims, order management.
- Installation Service—For systems that require specialized expertise upon installation.
- Technical Support—Troubleshooting, training, and technical manuals.
- Field Service & Retrofits—When a problem needs immediate attention.
- Replacements Parts & Consumables—Order your replacement parts and consumables.
- Sentry ProShield Services—Select from four ProShield Guardian service plans providing different levels of support to protect your large system investments with regularly scheduled maintenance.

To learn more, go to www.sentry-equip.com/support.

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