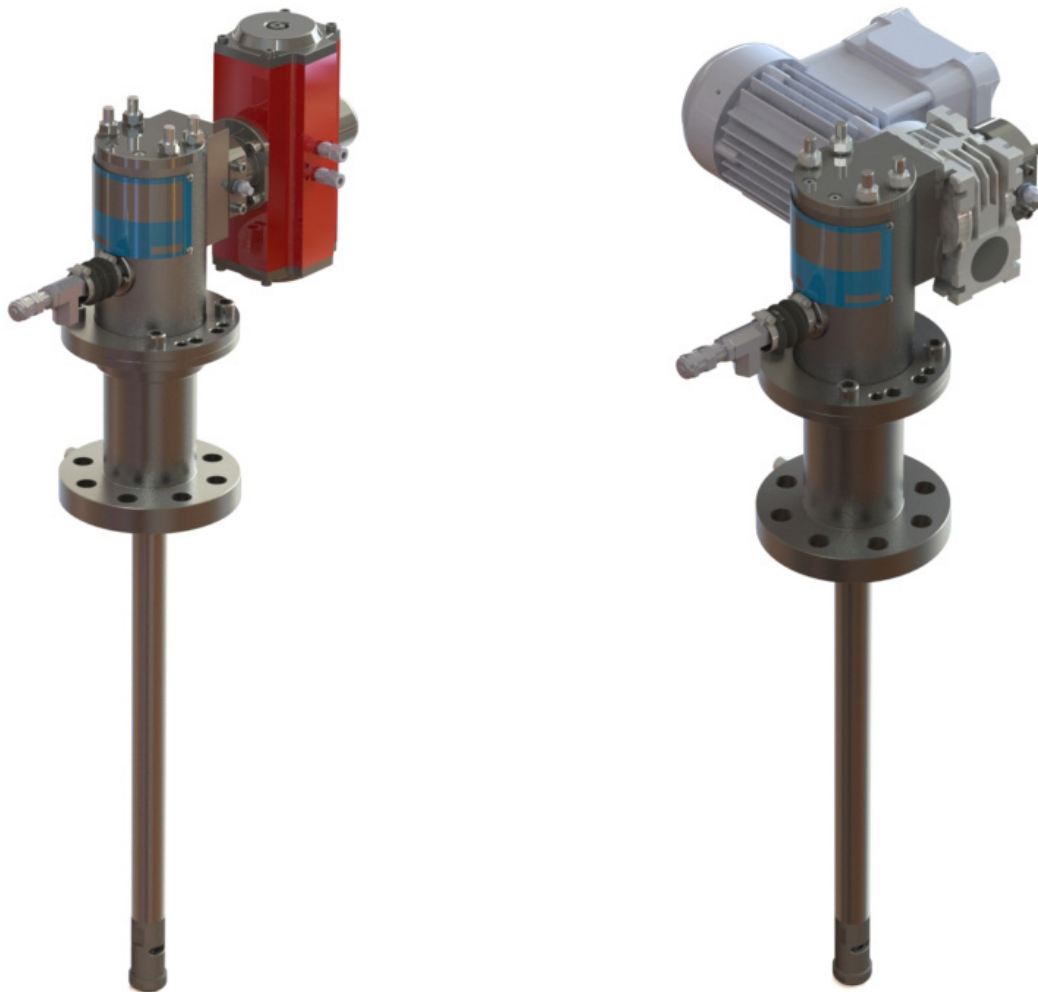


Installation, Operation & Maintenance Manual

ISOLOK API-PA Sampler ISOLOK API-PE Sampler Point Samplers

S-AS-IOM-00437-7 09-20





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.

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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.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could 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.

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 Material Safety Data Sheets (MSDS) 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

The Sentry® ISOLOK® API-PA and ISOLOK API-PE samplers are suitable for sampling a variety of liquids, especially hydrocarbon liquids such as crude oil and oil/water mixtures, and condensate or finished product. The wetted materials are 316 stainless steel (standard) or Super Duplex (or equivalent) which have higher tensile strengths, toughness, and greater corrosion resistance, particularly relating to enhanced pitting and crevice corrosion resistance. The ISOLOK API-PA and ISOLOK API-PE samplers use a next generation seal design to improve performance and reduce maintenance. The seal design and modular construction significantly reduce the time required to service the unit.

The pneumatically (ISOLOK API-PA) or electrically (ISOLOK API-PE) actuated sampler optimizes the accuracy and repeatability of hydrocarbon fluid samples. Based on scotch yoke and lost motion principles, the sampler eliminates the problems of and accessories required in conventional air-actuated samplers.

The ISOLOK API-PA and ISOLOK API-PE samplers use an isokinetic probe that is inserted directly into the pipeline. Using the optional insertion and retraction tool, the samplers may be inserted and retracted without depressurizing the pipeline. The electric motor or pneumatic actuator operates a scotch yoke mechanism which actuates the capture tube. During its movement the capture tube creates the fixed volume. The sampler's design includes a unique non-return valve and defined actuation speed to provide a repeatable, representative sample. Sampling frequency is changed based on flow.

Product Specifications

Wetted materials:	316 stainless steel, standard (2507 Super Duplex or equivalent, optional)
Flanges:	2" Class 300/600 RF
Process pressure:	1440 psi at 100°F (99 bar at 38°C) standard 1500 psi at 100°F (103 bar at 38°C) optional
Viscosity range:	0.5–8000 cSt
Seal temperature:	-4°F to 500°F (-20°C to 260°C)
Sample size (nominal):	1 cc per grab
Grab size repeatability:	± 2%
Maximum sampling rate:	20 grabs/min
Utilities required:	API-PA: 58–145 psi (4–10 bar) lubricated air; 0.04 ft ³ per grab at 60 psi (1133 cc at 4.1 bar) API-PE: 3 Phase, 230 V; 50 Hz; 0.12 kW; 1.07 A
Hazardous classification:	API-PA: CE Ex h IIB T5...T2 Gb -20°C≤Ta≤70°C API-PE: CE Ex h IIB T4...T2 Gb -20°C≤Ta≤55°C

- Relief valve at sampler discharge set 44–73 psi (3–5 bar) over line pressure.
- Sampler discharges to sample receiver (sold separately).
- Meets API 8.2, ISO 3171, ANSI 4177 sampling standards.

The maximum rated temperature of the ISOLOK API-Px sampler is defined by the process fluid temperature. Reference the following chart:

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

Installation

Receiving

- Examine the crate and all contents for any shipping damage immediately after receipt.
- Take pictures of any suspected damage.
- Report damages to the delivery company at once. This is the responsibility of the consignee.

NOTE:

To ensure full accuracy and repeatability, the standards listed in this section should be used to create the entire sampling system.

Selecting Sampler Location

The mounting location of the sampler is extremely important for the most accurate sampling results.

The ISOLOK API-PA or ISOLOK API-PE sampler is inserted directly into the process pipeline. Normally the sampler is installed in a vertical piping loop configuration to ensure proper mixing. Otherwise, the sampler must be located downstream from a static or power mixing component.

For further information on selecting the location for the probe, use the following sampling specifications:

- API 8.2/ASTM D4177, sections 6 and 10
- ISO3171 section 8.2

Mounting the Sampler

The ISOLOK API-PA and ISOLOK API-PE samplers use 2" ANSI 300# or 600# flanges. See the General Arrangement drawing for flange locations and face distances.

CAUTION

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

Ball Valve

To aid in the installation and removal from a live pipeline, install the sampler through a full bore ball valve, and then into the process stream. Use a Sentry hydraulic extractor (part number 7-04493B) to install and remove the sampler from the line.

Pneumatic Actuator Setup (API-PA only)

For most installations, the sampler requires compressed air at normal flow capacity of 0.8 standard cubic feet per minute (SCFM) at normal regulated pressure between 58 psig (4 barg) and 145 psig (10 barg).

At 60 psig (4.1 barg) air consumption is approximately 0.04 SCF per sampler cycle.

Air lines:

- Use 1/4" OD air lines, and make sure that each line is as short as possible in order to minimize any delay between the solenoid and the sampler.
- Connect port 2 on the air actuator to the normally open port on the air solenoid.
- Connect port 4 on the air actuator to the normally closed port on the air solenoid.

Once the pneumatic actuator is connected, make sure the crankshaft eccentric is at the top of its stroke while the solenoid is in the non-powered state. If the eccentric is at the bottom of the stroke, switch the air lines on the actuator. That is, connect port 4 on the air actuator to the normally open port on the air solenoid, and connect port 2 on the air actuator to the normally closed port on the air solenoid.

Motor Setup (API-PE only)

➔ NOTE

Wiring connections/conduit runs must be installed using Zone 1 hazardous area wiring methods per local code.

The motor selected for your specific application is ATEX certified.

1. Connect the motor to an appropriate controller (such as the Sentry COS Controller). The motor cable entry is an M20 cable gland.
2. A shielded cable (Belden 29550C or equivalent) must be used for the connection to the motor, and it must be tied to ground on the VFD and motor. Wiring requirements must be suitable to meet motor specifications
3. An appropriate disconnect shall be addressed by the controller in the end product installation.
4. Connect the sampler to an approved/certified motor drive with the appropriate electrical ratings. The motor drive shall have both overcurrent and overtemperature protection equivalent to or better than the one in the Sentry COS Controller.
5. The power supply cord shall be housed within an approved/certified conduit. There shall be approved/certified bushing or a strain relief on the controller side to prevent wear on the power supply cord.
6. To satisfy applicable wiring codes, connect the equipment using the earth grounds provided on the motor to a properly installed grounding rod.

Ventilation

Make sure the area round the motor fan and motor body is clear for cooling.

Proximity Switch

- Both the ISOLOK API-PA and ISOLOK API-PE samplers utilize a proximity switch for sample confirmation and, in the case of the ISOLOK API-PE, sampler control.
- The proximity switch is an intrinsically safe device and needs to be run through an intrinsically safe (IS) barrier per applicable codes.

Relief Valve

- Set the supplied relief valve to open at 44–73 psi (3–5 bar) above operating line pressure.
- Attach a flexible hose to the relief valve discharge with a male ¼" NPT fitting.

Sample Receiver

The sample receiver must be the lowest point in the system to facilitate proper sampling and sample flow of viscous fluids.

- Attach flexible hose from the sampler to the sample receiver(s).
- To minimize trapped volume (i.e., "dead" sample), keep hose runs short.
- Lines should slope downward at least 15 degrees to avoid water entrapment.
- Use heat tracing in cold environments or at high viscosities to prevent line blockage.

Operation

⚠ CAUTION

Keep fingers and hands away from sampler discharge port while sampler is in use. Discharge moves during operation and may pose a pinch hazard resulting in minor or moderate personal injury.

- Before operating the sampler, make sure that it is installed in accordance with the installation instructions provided in this manual, and that it is connected to an appropriate sample receiver.
- The sampler is controlled via the Sentry COS Controller, or similar control system.
- The sampler operates using compressed gas (API-PA) or 3 phase power from the controller (API-PE) with an incoming flow signal to initiate sampling at the required intervals.

Maintenance

⚠ WARNING

Wear appropriate personal protective equipment and exercise care to minimize contamination by any residual sample or liquid. Liquids sampled by this equipment may be carcinogenic or highly hazardous.

Relieve all pressure to components before removing the sampler from the process pipeline.

NOTICE

Use soft vise jaws to hold components to avoid damaging seals or sealing surfaces. Damage may cause seal failure, resulting in inadequate sample volume, process leakage into the sampler body, or failure to take sample.

Use the recommended tools and properly sized seals to ensure sampler performance.

When completing maintenance, remove the sampler from the process pipeline and move it to a clean area. Use a Sentry hydraulic extractor if the pipeline is still under pressure (consult factory for more information).

↻ NOTE

Parts are referenced by part number, then drawing reference letter, which can be found at the bottom of the included drawings.

Tools and Lubricants

- Soft vise jaws to hold components.
- M30 or adjustable wrench.
- Pick or small screwdriver.
- M5 allen wrench.
- Belt wrench.
- Loctite 222 for all threads (unless otherwise noted).
- PTFE based grease (such as DuPont™ Krytox® GPL 250) for all O-rings, seals, and sealing surfaces (unless otherwise noted).
- Molybdenum disulphide paste (such as Roscol 10046) for bearing surface of the lower scotch yoke support plate (C).
- Loctite 641 for piston tip (5-C).

Annual Maintenance

The ISOLOK API-PA and ISOLOK API-PE samplers are designed to function for 12 months or 1,000,000 cycles between service intervals, whichever occurs first. In addition, the two (2) bearings need to be replaced every 10 years or 10,000,000 cycles. However, experience will determine the optimal service interval, since extreme sampling conditions, such as those listed below, may shorten this time frame:

- highly abrasive or corrosive process stream
- high viscosities and temperatures
- mixing of different type of crudes

NOTE:

Before reassembly, clean and degrease all sealing surfaces using method indicated in ASTM A380-06 section 4.

Replace Anvil/Discharge Plug Seals

NOTE:

References in parentheses refer to the parts list drawing included in this manual.

1. Relieve any residual pressure by carefully lowering the relief valve setting to atmospheric pressure. Remove any tubing connected to the discharge of the relief valve (15-A), and then reset the relief valve to its original setting.
2. Use an adjustable wrench to remove the fluid pass tube (4A-B) from the outer tube weldment (4-B).
3. Use an adjustable wrench to remove the stem cap (21-B) from the fluid pass tube (4A-B).
4. Remove the anvil seal cartridge (20-B) from the stem cap (21-B) by using M4 and M5 allen wrenches to loosen the M6 x 12 mm socket head cap screw (22-B).
5. Use a pick or small screwdriver to carefully remove the lower capture tube guide ring (4B-B).
6. Loosen the plunger tube (3-C) using an M4 allen wrench on the plunger tip cartridge (5-C).
7. Once the plunger tube is loose, remove it from the outer tube weldment until wrench flats are visible.
8. Use an adjustable wrench and an M4 allen wrench to separate the plunger tip cartridge (5-C) from the plunger tube (3-C). Be careful, as the inner piston (7-C) may follow the plunger tip cartridge as it is removed.
9. Remove the NRV spring (8-C) and ball (6-C) from the plunger tip cartridge and store in a safe place until reassembly.
10. Inspect the fluid pass tube (4A-B) and stem cap (21-B) for signs of excessive wear. Thoroughly clean all debris and discard the plunger tip cartridge (5-C) and anvil seal cartridge (20-B).
11. Obtain and grease new plunger tip cartridge (5-C) and anvil seal cartridge (20-B).
12. Reinstall the NRV spring (8-C) and ball (6-C) into the plunger tip cartridge (5-C) and inner piston (7-C).
13. Apply Loctite 614 to the beveled surface above the second wear ring on the plunger tip cartridge (5-C) and then apply Loctite 222 to the threads of the plunger tip cartridge (5-C) and install back into the plunger tube (3-C). Torque per notes on drawing.
14. Reinstall the plunger tube (3-C) into the piston carrier (9-C) using an M4 allen wrench.
15. Apply anti-seize lubricant to the threads of the fluid pass tube (4A-B). Use an adjustable wrench to reinstall the fluid pass tube (4A-B) into the outer tube weldment (4-B). Torque per notes on drawing.
16. Apply Loctite 222 to the threads of the M6 x 12 mm socket head cap screw (22-B). Install the screw through the stem cap (21-B) and into anvil seal cartridge (20-B). Torque per notes on drawing.
17. Apply Loctite 222 to the threads of the stem cap (21-B); install into the fluid pass tube (4A-B) and torque per notes on drawing.

Replace Upper Wear Ring/Piston O-Ring

1. Loosen and remove the relief valve (15-A) and sample extension stem (13-A) from the piston carrier (9-C) using an adjustable wrench on the extension stem.
2. Loosen and remove the four (4) M10 hex nuts (10-A) on top of the sampler, and then remove the sampler housing cap (6-A).
3. Using an M5 allen wrench, loosen and remove the two (2) M6 socket head cap screws (5-A) connecting the upper (4-A) and lower (12-B) scotch yoke support plates.
4. Carefully remove the two (2) scotch yoke spacers (11-B) and store them, making sure the ends are protected.
5. Lift the drive assembly (2-A) up and away from the outer tube weldment (4-B) and the main stem spool (1-B).
6. Use an M5 allen wrench to remove the two (2) M6 socket head cap screws (13-B) connected to the capture tube weldment (1-C).
7. Carefully remove and store the two (2) scotch yoke lower spacers (11-B) and lower scotch yoke support plate (12-B).
8. Remove the probe assembly (10-B) and outer tube weldment (4-B).
9. Separate the piston carrier (9-C) and all attached parts from the capture tube weldment (1-C).
10. Using an adjustable wrench on the flats of the plunger tube (3-C) near the plunger tip cartridge (5-C), loosen and remove the piston carrier (9-C).
11. Using a pick or small screwdriver, remove the piston carrier O-ring (10-C) from the underside of the piston carrier (9-C).
12. Using a pick or small screwdriver, remove the capture tube carrier guide ring (2-C) from the capture tube weldment (1-C).
13. Inspect the plunger tube (3-C) / plunger tip cartridge (5-C) / piston carrier (9-C) assembly and the upper part of the capture tube weldment (1-C) for signs of excessive wear. Thoroughly clean all debris and discard any removed seals.
14. Fit a new piston carrier O-ring (10-C) into the groove on the underside of the piston carrier (9-C).
15. Fit a new capture tube carrier guide ring (2-C) into its respective groove in the capture tube weldment (1-C).
16. Insert the plunger tube assembly (3-C) back into the piston carrier (9-C). Using the flats on the plunger tube, tighten per notes on drawing.
17. Make sure that the plunger tip cartridge (5-C) and its seals are properly lubricated, and insert into the capture tube weldment (1-C).

NOTE:

To complete annual maintenance, skip the reassembly steps below and continue with Replace Capture Tube/Clamp Plate Seals.

18. Align the opening for the sample discharge port on the piston carrier (9-C) with the side opposite the motor/actuator.
19. Align the holes on the capture tube weldment (1-C) with the openings on the piston carrier (9-C).
20. Place the two (2) scotch yoke lower spacers (11-B) in the openings in the side of the piston carrier aligned with the holes in the capture tube weldment.
21. Insert the two (2) M6 socket head cap screws (13-B) through the lower scotch yoke support plate (12-B) and apply Loctite 222 to the threads of the cap screws.
22. Insert the cap screws through the scotch yoke lower spacers (11-B), and install into the probe assembly (1-C) using an M5 allen wrench. Make sure the top plate linear guide (14-B) is on the side opposite the motor/actuator. Torque per notes on drawing.
23. Install drive assembly (2-A).

24. Put the scotch yoke spacers (3-A) back in place, apply Loctite 222 to the threads of the two M6 bolts (5-A), and install and torque per notes on drawing.
25. Reinstall sampler housing cap (6-A) and the M10 nuts (10-A) and washers (9-A); torque the nuts per notes on drawing. Make sure that the face of the scotch yoke cam bearing (2A-A) is parallel to the face of the lower scotch yoke support plate (12-B) that has the linear guide (14-B).
26. Reinstall relief valve (15-A) and sample extension stem (13-A)

Replace Capture Tube/Clamp Plate Seals

1. If the sampler is not already disassembled, follow steps 1–8 of “Replace Upper Wear Ring/Piston O-Ring” section before continuing.
2. Remove and clean the piston return spring (9-B) and carrier, the clamp plate flange (6-B) by removing the four (4) M12 socket head cap screws (7-B) from the clamp plate (6-B) using an M11 allen wrench.
3. With a pick or small screwdriver, carefully remove the upper seal cartridge (5-B) from the outer tube weldment (4-B) using the reliefs on either side of the cartridge.
4. Inspect the outer tube weldment (4-B) for signs of excessive wear, and thoroughly remove all debris. Seal cartridge can be returned to local authorized representative to be refurbished.
5. Grease all of the seals on a new upper seal cartridge (5-B), as well as the contact surfaces where the seals fit.
6. Install new upper seal cartridge (5-B) into the outer tube weldment (4-B).
7. Install clamp plate flange (6-B) with four (4) M12 socket head cap screws (7-B). Install the carrier (8-B) and the piston return spring (9-B).
8. Insert the probe assembly (10-B) back into the outer tube weldment (4-B).
9. Align the opening for the sample discharge port on the piston carrier (9-C) with the side opposite the motor/actuator.
10. Align the holes on the capture tube weldment (1-C) with the openings on the piston carrier (9-C).
11. Place the two (2) scotch yoke lower spacers (11-B) in the openings in the side of the piston carrier aligned with the holes in the capture tube weldment.
12. Insert the two (2) M6 socket head cap screws (13-B) through the lower scotch yoke support plate (12-B) and apply Loctite 222 to the threads of the cap screws.
13. Insert the cap screws through the scotch yoke lower spacers (11-B), and install into the probe assembly (1-C) using an M5 allen wrench. Make sure the top plate linear guide (14-B) is on the side opposite the motor/actuator. Torque per notes on drawing.
14. Install drive assembly (2-A).
15. Put the scotch yoke spacers (3-A) back in place, apply Loctite 222 to the threads of the two M6 bolts (5-A), and install and torque per notes on drawing.
16. Reinstall sampler housing cap (6-A) and the M10 nuts (10-A) and washers (9-A); torque the nuts per notes on drawing. Make sure that the face of the scotch yoke cam bearing (2A-A) is parallel to the face of the lower scotch yoke support plate (12-B) that has the linear guide (14-B).
17. Reinstall relief valve (15-A) and sample extension stem (13-A).

Replace Stem Housing O-Ring

1. Using an adjustable wrench, loosen and remove the fluid pass tube (4A-B) from the outer tube weldment (4-B).
2. Remove the four (4) M12 socket head cap screws (7-B) from the clamp plate (6-B) using an M11 allen wrench, then pull the main spool (1-B) down the length of the probe pipe and remove.

3. Using a pick or small screwdriver, remove the stem spool O-ring (3-B) from within the bore of the main stem spool (1-B).
4. Inspect the main stem spool (1-B) for signs of excessive wear, and thoroughly clean all debris. Discard the used O-ring.
5. Lubricate a new stem spool O-ring (3-B) and install into the groove in the main stem spool (1-B).
6. Install the plunger tube seal tool (part no. 2-07504N) onto the outer tube weldment (4-B) lower end, where the fluid pass tube (4A-B) was installed. This will aid in compressing the O-ring, allowing the pipe to get through the main stem spool.
7. Pass the tube weldment with tool back through the main stem spool (1-B) and re-install the four (4) M12 socket head cap screws (7-B) using Loctite 222; torque per notes on drawing.
8. Add Loctite 222 to the threads of the fluid pass tube (4A-B) and reinstall to outer tube weldment (4-B); torque per notes on drawing.
9. Reinstall relief valve (15-A) and sample extension stem (13-A).

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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