

JISKOOT™ SERIES 210 SD SAMPLE PROBE

User Manual



Manual No.H61, Rev. 4

Important Safety Information

Symbols used in this manual:



This symbol identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.



This symbol indicates actions or procedures which if not performed correctly may lead to personal injury or incorrect function of the instrument or connected equipment.

Terms used in this manual:

Note **Indicates actions or procedures which may affect instrument operation or may lead to an instrument response which is not planned.**

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1 Introduction

The 210 SD Sample Probe provides a means of extracting a sample from liquids flowing in a pipeline. Primarily designed for applications where air pressure is available to provide the motive power, the 210 is installed directly into the main pipeline.



The Jiskoot Series 210 'SD' Sample Probe is designed to extract nominal 1cc samples from products ranging from crude oil, refined hydrocarbons (including non-lubricating products) and non-corrosive chemicals, operating in a pressure range from 3 to 50 Barg, within a product temperature range of -20 to 100oC, on viscosities 0.5 to 5000cSt in an ambient temperature range of -20oC to 40oC.

The 210 'SD' Sampler incorporates features to minimise and simplify maintenance in conjunction with an external check valve to provide integrity against leakage under all circumstances.

The standard 210 Sampler is designed for installation through a 3" 150#, 3" 300# or 3" 600# raised face flanged tapping in the pipeline fitted with a full-bore ball isolating valve, without the need for depressurisation and can withstand static pressure testing to full flange rating of 76 Barg. Other flange sizes and finishes are available to special order.

The 210 Sampler is supplied in three lengths options to suit the pipeline diameter and method of installation, and with three actuator options. These are:

'A' Length for pipeline diameters 8"-14"

'B' Length for pipeline diameters 16" - 28"

'C' Length for pipeline diameters 30" - 52"

Standard air actuated Sample Probe

210 HP air actuated Sample Probe for high-pressure (ANSI 900#) applications or where there is low air pressure (<5 Barg).

210 EH Sample Probe fitted with Electro-Hydraulic actuator for use with a Hydraulic Power Pack on installations without a suitable air supply.

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In addition, 210 'SD' Short Style Sampler Probes may be supplied without Seal Housings for mounting direct to small diameter pipelines without isolation valving.

Note: When requesting assistance or spare parts, please provide the Sampler Model and Serial Numbers to ensure that the correct options are noted.

2 Operating Instructions

The Sampler must be installed in accordance with the Installation Details (Section 7) be connected to a suitable sample receptacle, via an external line balanced or check valve and operated and maintained as detailed below.

To operate, the Sampler requires a regulated air supply at 5 - 8 Barg (70 - 120 psig) and a signal to energise the Sampler Solenoid to actuate the sampler at the required intervals. Any pipeline conditioning facility must be active to ensure a representative product is available to the Sampler. Electro-Hydraulic versions (210 EH) require a Hydraulic Power Pack to provide the actuation source.

Control of the Sampler, including changeover of Sample Receivers will be determined by the type of Sampler Control System being used.

3 Glossary of Special Terms

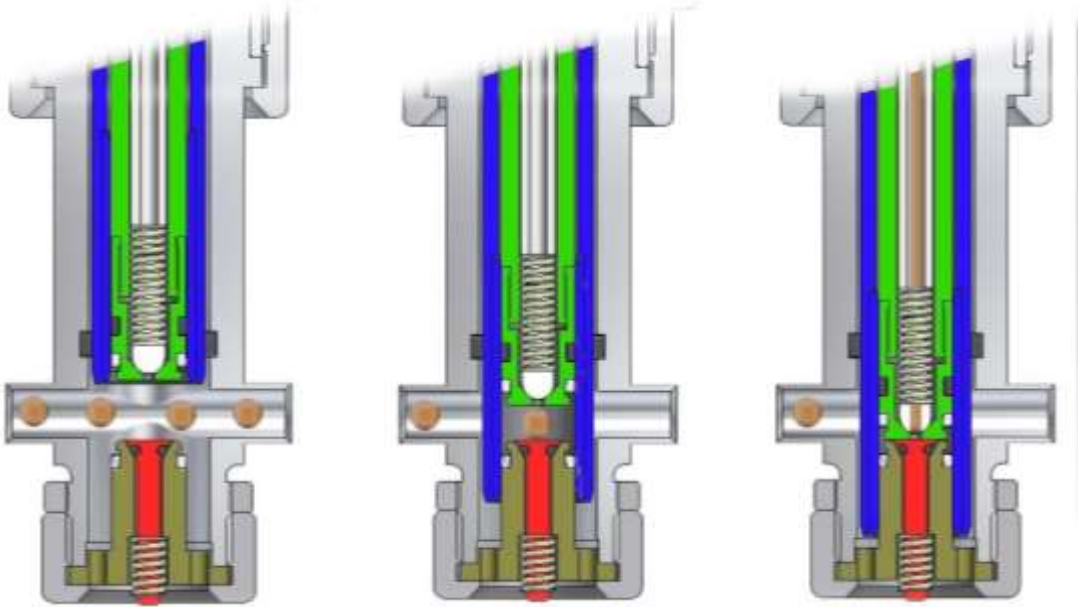
Grab The action of taking an individual sample (normally 1 or 2 cc) from the pipeline.

4 Utilities Reference

Air Supply (Filtered)		4 - 10 Barg (40 - 145 psig)
Air Consumption*	210 standard Probe	0.8 m3/hr or 0.47 scfm (5 Barg at 30 grabs/min)
	210 HP Probe	1.67 m3/hr or 1.0 scfm (5 Barg at 30 grabs/min)
Solenoid Voltages Available:	AC	100-254 Volts 50/60 Hz
	DC	24 Volts DC
	Power Consumption	10 Watts
Solenoid energisation time		500 ms
Maximum Sampling Rates*	210 standard Probe	120 Samples/min
	210 HP Probe	60 Samples/min
	210 EH Probe	50 Samples/min
	210 EH-HP	30 Samples/min

Note: * Maximum grab rate, air consumption and supply requirements are dependent on process conditions, i.e. line pressure and viscosity, together with motive power, hose diameter, length and condition.

5 Full Functional Description



The 210 SD Sample Probe operates on the Jiskoot standard 3-step principle, using an air or hydraulically actuated piston to provide the motive power.

In the idle, or de-energised state, air or hydraulic pressure is applied to the bottom of the Actuator Housing (13) through Port 'B', holding the Capture Tube and the Sample Tube at the top of their stroke, and allowing the product to flow through the Probe Head (37).

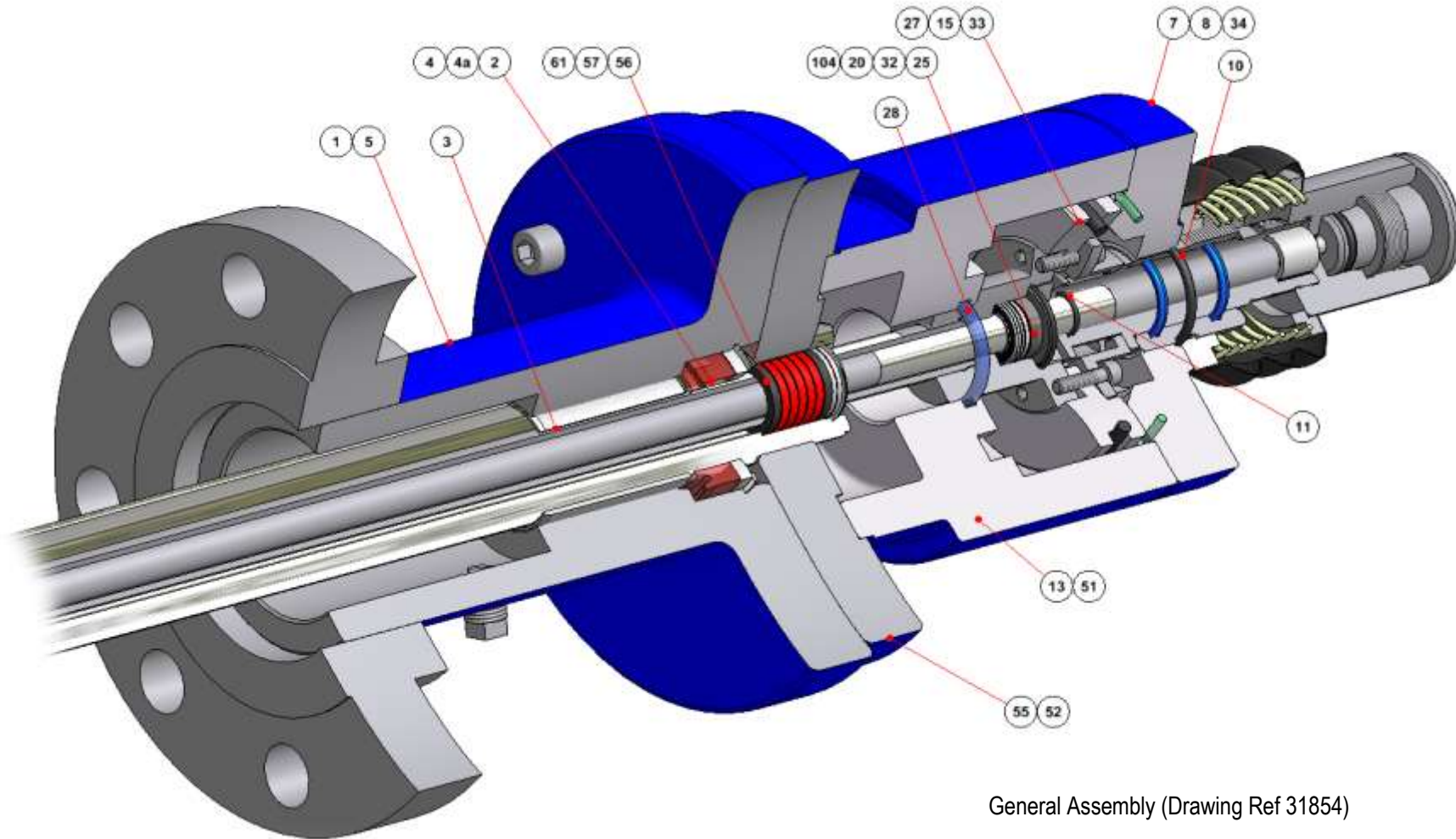
When the external Sampler Solenoid is energised, it applies air or hydraulic pressure to Port 'A', onto the top of the Piston (15), while venting the pressure from the underside to atmosphere. The pressure on the Piston moves the Capture Tube (92) downwards, trapping a sample of product inside the Capture Tube in the void between the Sample Tube (94) and the End Plug (43).

Continuing downward motion pushes the Catchplate (17) against the Sample Tube Actuator (16), moving the Sample Tube down with the Capture Tube and forcing the trapped sample through the centre of the Sample Tube past the Check Valve Tip (66) and up the Check Valve Stem (91). The sample is then expelled from the Sample Outlet Port in the Sample Tube Head (19) through the external Check Valve to the sample receptacle.

When the Sampler Solenoid is de-energised, air is vented from the top side of the Actuator Piston and applied to the underside of the Piston, moving the Capture Tube and Sample Tube away from the End Plug, whereupon an anti- vacuum Breaker (44), incorporated in the End Plug momentarily opens to relieve the vacuum created in the void between Sample Tube and End Plug.

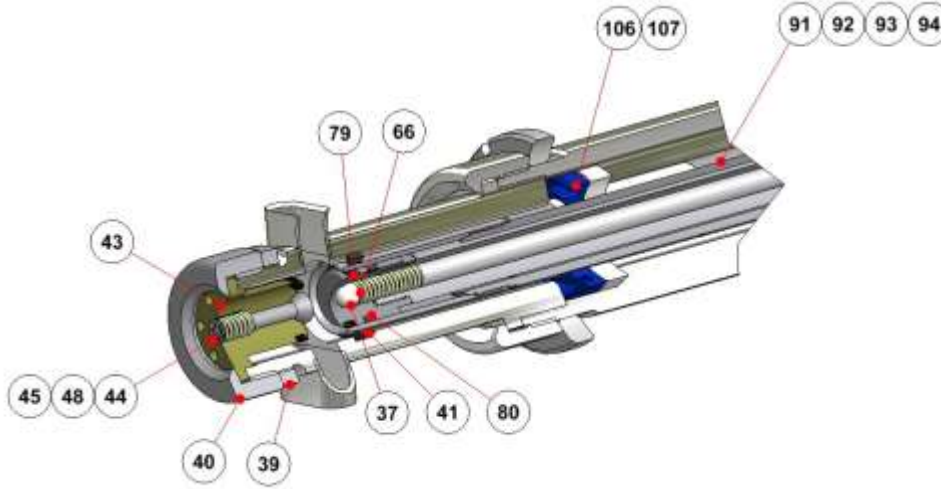
Fresh product can now pass through the Probe Head and the Sampler is ready for the next grab to be initiated. (See following diagrams for component locations)

6 General Assembly & Bill Of Material



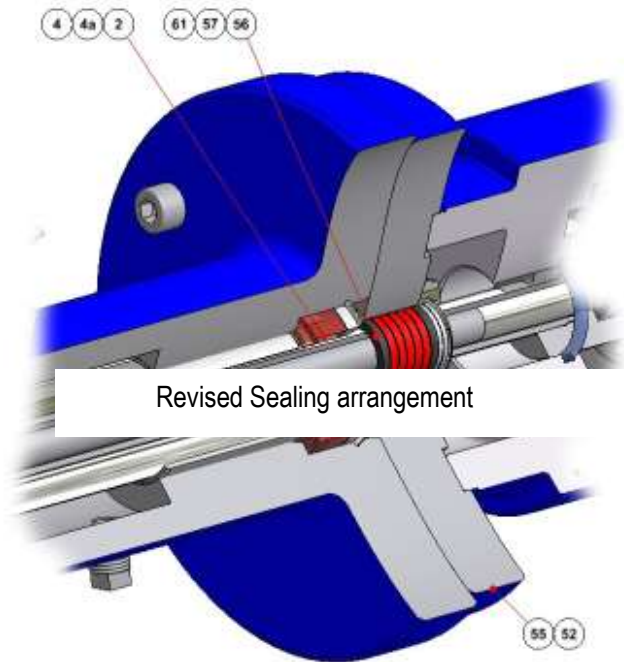
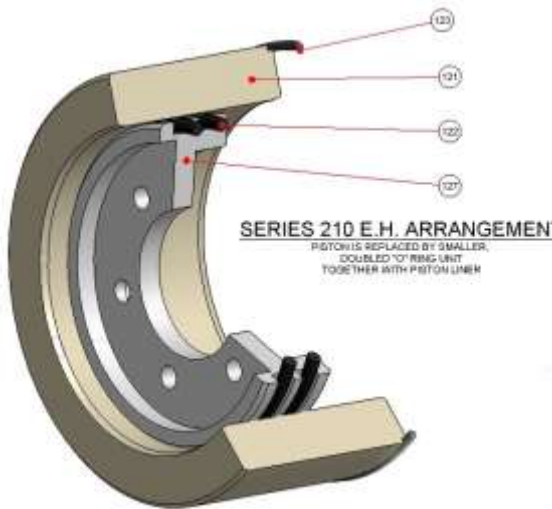
General Assembly (Drawing Ref 31854)

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Probe Head General Assembly

In the first quarter of 2011, the 210 'SD' Sampler was introduced utilising a revised sealing arrangement between the Support Tube and Capture Tube.



The Support Tube arrangement is not interchangeable with the earlier version.

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Item No	Description	Part Number	Item No	Description	Part Number
1	Seal Housing	3J-36-3324-06	2	Smalley Ring	3J-37-0797-00
3	Support Tube Bush	3J-39-0408-00	4	"U" Seal	3J-37-0795-00
			4a	Seal Backing Ring	3J-37-4503-00
5	Hexagon Plug	3J-48-0330-00	6		
7			8	Label	3J-33-0238-00
9			10	'O' Ring	3J-37-0701-00
11	'O' Ring	3J-37-0705-00	12	Top Housing	3J-36-1183-00
13	Bottom Housing	3J-36-1184-00	14	Bush	3J-36-1185-00
15	Piston	3J-36-1186-00	16	Sample Tube Actuator	3J-36-1187-00
	Piston Pneumatic and EH	3J-36-1215-00			
17	Catchplate	3J-36-1188-00	18	Lower Piston Rod	3J-36-1189-00
19	Sample Tube Head	3J-36-1101-00	20	Seal Nut	3J-36-1102-00
21	Split Collet	3J-36-1103-00	22	Seal Ring	3J-36-1190-00
23	Lock Ring	3J-36-1191-00	24	Flat Washer – M6	
25	Quadring	3J-37-0551-00	26	'O' Ring	3J-37-0015-00
27	'O' Ring	3J-37-003J-33-00	28	Quadring Seal	3J-37-0544-00
29			30	Spring	3J-40-0082-00
31	Split Collar	3J-36-1209-00	32	Balseal	3J-37-0530-00
33	Cap head Screw M5 x 20	3J-99-0027-01	34	Cap head Screw (10.9) M8 x 35	3J-99-0094-00
35			36	Gaiter	3J-48-0465-00
37	Probe Head – Welded Assembly	3J-36-1198-00	38	Lock Ring	3J-36-1134-00
39	Lock Ring	3J-36-1203-00	40	Lock Nut	3J-36-1202-00
41	Slydring	3J-37-0518-00	42	Balseal 1cc	3J-37-0519-00
			42	Balseal (2cc)	3J-37-0540-00
43	End Plug	3J-36-1212-00	44	Vacuum Breaker Valve	3J-36-1213-SL
43	End Plug (2cc)	3J-36-1381-00			
45	Spring	3J-40-0083-00	46	'O' Ring	3J-37-0702-00
47	Roller – 2.4 x 10mm		48	Fastener – 5/32	3J-99-0003-00
49			50		
51	Cap head Screw M8 x 30	3J-99-0034-00	52	Cap head Screw (10.9) M10 x 40	3J-99-0025-00
53			54		
55	Support Tube Flange	3J-36-3344-06	56	Smalley Ring	3J-37-0796-00
57	Anti-extrusion Ring	3J-36-4504-00	58	Shim – 0.010" Thick	3J-48-043J-37-00
59	Shim – 0.020" Thick	3J-48-0438-00	60		
61	Seal	3J-37-0818-00	62		
63			64		
65	Nut	3J-36-1061-00	66	Check Valve Tip	3J-36-1229-00
67			68	'O' Ring	3J-37-0517-00
69	Spring	3J-40-0089-00	70		
71			72		
73	Shim – 0.010" Thick	3J-48-043J-39-00	74	Shim – 0.020" Thick	3J-48-043J-40-00
75			76	Shim – 0.010" Thick	3J-48-0441-00
77	Shim – 0.020" Thick	3J-48-0442-00	78		
79	Balseal 1cc	3J-37-0519-00	80	Slydring	3J-37-0532-00
79	Balseal (2cc)	3J-37-0540-00	80	Slydring (2cc)	3J-37-0541-00
91	Valve Stem – A (Std)	3J-36-1238-00	92	Capture Tube - A	3J-36-1390-SD
91	Valve Stem – B Std)	3J-36-123J-39-00	92	Capture Tube - B	3J-36-1391-SD
91	Valve Stem – C Std)	3J-36-123J-40-00	92	Capture Tube – C	3J-36-1392-SD
93	Support Tube - A	3J-36-1178-SD	94	Sample Tube – A (Std)	3J-36-1218-00
93	Support Tube - B	3J-36-1179-SD	94	Sample Tube – B (Std)	3J-36-1219-00
93	Support Tube - C	3J-36-1180-SD	94	Sample Tube – C (Std)	3J-36-1220-00
95	EH Piston Liner	3J-36-1216-00	96	'O' Ring	3J-37-0704-00
97	'O' Ring	3J-37-0713-00	98		
99			100	EH Label	3J-33-0246-00
101	EH Piston	3J-36-1215-00	102		
103			104	'O' Ring	3J-37-0550-00
106	Seal	3J-37-0731-00	107	Anti-Extrusion	3J-36-1195-00

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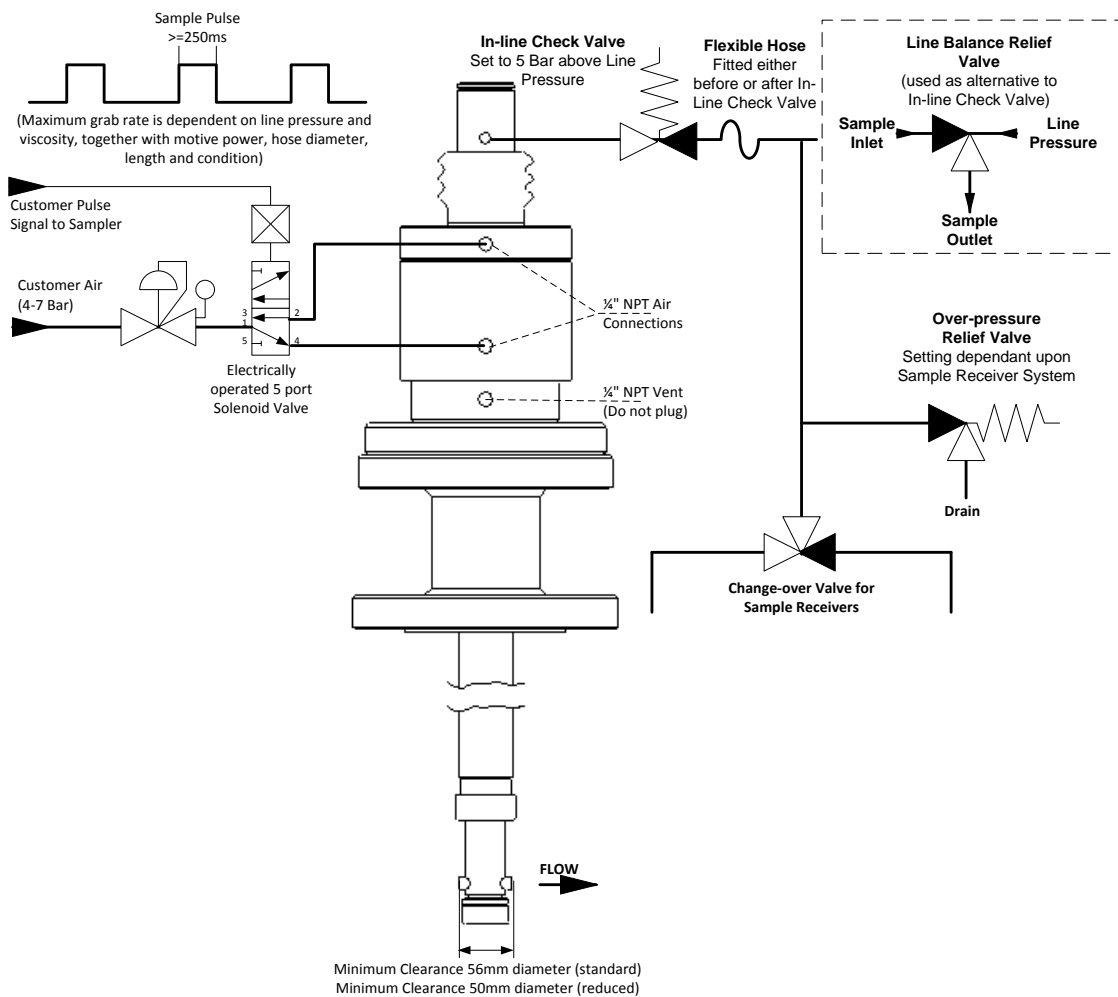
7 Installation Details

The standard 210 Probe Sampler is designed to be bolted to a 3" ANSI 150#, ANSI 300#RF or 600#RF flanged tapping on the side of the pipeline and can withstand static pressure testing to full flange rating. To permit the standard probe head to pass through the tapping, it must be a minimum of 56mm diameter and in line with the isolation valve and mounting flange. A modified probe head can be supplied which will fit through a 50mm diameter tapping.

The mounting flange fixing holes must straddle the centre-line of the pipeline to ensure that the direction of probe head (item 37) is correctly positioned in the line of flow. This is identified by a direction arrow on the seal housing.

Note: Sample probes may be installed vertically but, in accordance with the sampling standards this is a non-preferred method

The 210 'SD' Sampler is designed to be used in conjunction with a Jiskoot '154' Series Hydraulic Extractor, assisting will safe installation or removed from a flooded or pressurised pipeline via a full-bore ball valve fitted to the flanged tapping.



A Sampler Solenoid Valve must be selected to suit the specific application and will require connecting to suitable supplies via glands and cables appropriate to the hazardous area classification.

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A regulated filtered air supply must be connected to the Solenoid and the normally energised outlet connected to Port 'B' of the Sampler. The normally de-energised port of the Solenoid must be connected to Port 'A'. The exhaust port(s) of the Solenoid may be piped away or fitted with silencers as required. (On Electro-Hydraulic applications, the Solenoid is incorporated within the Hydraulic Power Pack.)

The 1/8"NPTF Sample Outlet Port located in the Sample Tube Head (19) must be connected to the Sample Receiver System using 1/4" or 6mm stainless steel tubing via either a Jiskoot in-line Check Valve or a Jiskoot Line Balanced Relief Valve together with a relief valve as shown in the above diagram.

NOTE: To allow for the 19mm movement of the top of the probe during operation, the in-line Check/Relief Valve must either be directly mounted to the Sample Tube Head with a flexible hose immediately after it, or connected to the Sampler via a flexible hose.

The Check Valve will normally be set to 5 Bar above the maximum line pressure, ensuring that this is sufficient to allow for any additional pressure increase created by thermal expansion or line fluctuations. If the cracking pressure is set too low, the valve may open under adverse conditions, causing the Sample Receiver System to overfill with potential of leakage.

Where high-pressure Constant Pressure Sample Receivers (CPC's) are being used and the installation uses the Swagelok branded Jiskoot R3A line balanced valve or any similar valve(s) unaffected by back pressure, the Check Valve should be set to operate at 1 Bar. If the valve is found to lift and fill the Sample Receiver due to pressure surges, this setting may be increased slightly.

A relief valve must be fitted to the Sampler Outlet to provide protection to the Sampler in the event of the sampler being operated against a blocked sample line. This relief valve should be within the maximum pressure rating of the receiver system, but may need to be increased slightly to allow for momentary pressure surges as the sample is being taken.



Ensure the Sample tube head is tight, after fitting any outlet connections

Ensure that lengths of tubing connecting the sampler to the receiver system are kept to a minimum to minimise "dead" i.e. trapped volume (long lengths of tubing also create extra back pressure and may contribute to premature seal wear). Ensure tubing travels downhill at a minimum angle of 15 degrees from the Sampler Outlet to the Receiver to avoid water traps. The sample outlet piping may require heat tracing to prevent blockage.

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7.1 Sample Probe Installation

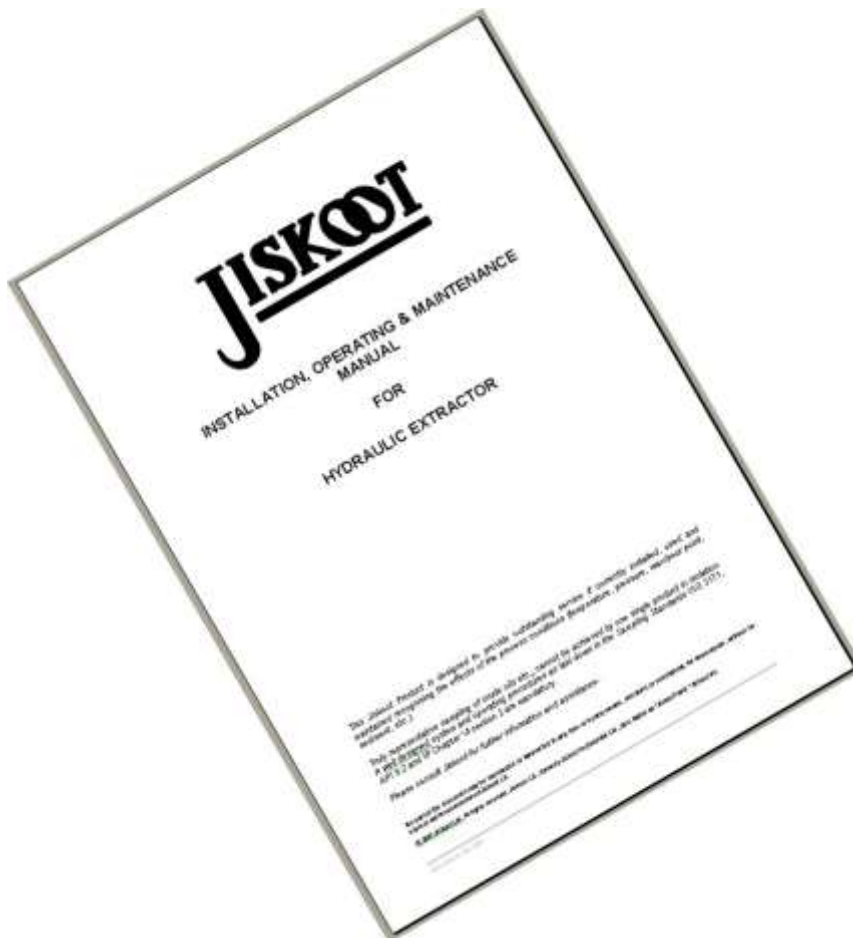


Notes: Do not attempt insertion or withdrawal of the Standard 210 'SD' Sample Probe without the optional 154 Series Hydraulic Extractor if the line pressure exceeds 2.5 Barg (40 psig). At this pressure, approximately 60KgF – 132 lbf will be produced at the probe head, as such it will not be possible to undertake the operation without risk of damage or injury to equipment or personnel.

The combined weight of the Sample Probe and the Hydraulic Extractor is approximately 65kg (145lb). Operators must ensure that adequate lifting equipment and safety precautions are used to avoid the risk of injury to personnel and damage to equipment whilst the Sample Probe is being installed or extracted.

Site location and access for Hydraulic Extractors in extended position should be considered together with additional scaffolding for slinging and supporting in both vertical and horizontal applications. See 7.2

7.2 Installation of Sample Probe with HE1B and 154 Series Hydraulic Extractor



Sample Probe should be Installed
():

Extractor Manual:

Remove the Weatherproof Housing (if supplied) and any ancillary equipment fitted to the Sample Probe detach the connections from the Actuator (pneumatic connectors are a push-to-release type) and disconnect the flexible hose from the Sampler Outlet.

The entire Weatherproof Housing may now be released loosening the clamp securing the mounting plate to the Support Tube Flange.

Refer to H27 Hydraulic Extractor Manual for detailed instruction and usage.

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Fit the Hydraulic Extractor as detailed in H27 Hydraulic Extractor Manual Connect the high-pressure hose from the pump head end of the Hydraulic Pump to the quick release coupling piped from the bottom of the hydraulic rams, and the hose on the reservoir end of the Pump to the coupling for the top end of the rams.

Due to the combined weight of the Sample Probe and Hydraulic Extractor, it is recommended that the Extractor be unbolted from the Probe when fitting the Sample Probe to the Isolating Valve.

Locate the Sampler on the Isolating Valve ensuring the flow direction arrow/mark on the Seal Housing is in the direction of flow.

Bolt the Sample Probe to the isolating valve using appropriate gaskets. Ensure that the bleed tappings on the Seal Housing are closed and that suitable ½" NPT plugs are fitted in place of any plastic shipping plugs. Once secured, fit the Hydraulic Extractor as detailed in H27 Hydraulic Extractor Manual to the Support Tube Flange and Seal

Open the pipeline Isolation Valve

Select the '154' series diverter valve to apply pressure to the top of the hydraulic rams and apply one or two strokes of the Pump to push the Sample Probe towards the isolating valve and pipeline.

Pump the Sample Probe into the pipeline.

Once the Sample Probe has been fully inserted, replace and tighten the cap head screws which attach the support tube flange to the seal housing. The Hydraulic Extractor should now be removed.

Notes: It is not recommended that the Hydraulic Extractor remain attached to the Sample Probe when installed in the line.

7.3 Manual Installation of Sample Probe (Unpressurised Pipeline)

Installation of the 210 SD Sample Probe (all versions) is carried out as follows:

Remove the Weatherproof Housing as detailed above

Remove the Cap head screws item 52 securing the Support Tube Flange to the Seal Housing.

Move the Seal Housing down the Support Tube until the Probe Head is inside the Seal Housing.

Bolt the Sample Probe to the isolating valve using appropriate gaskets. Ensure that the bleed tappings on the Seal Housing are closed and that suitable ½" NPT plugs are fitted in place of any plastic shipping plugs.

Open the pipeline isolation valve. Push the Sample Probe through the valve and into the pipeline.

Refit and tighten the cap head screws to locate the Support Tube Flange to the Seal Housing, ensuring that the arrow in the top of the Support Tube Flange is aligned in the direction of the flow.

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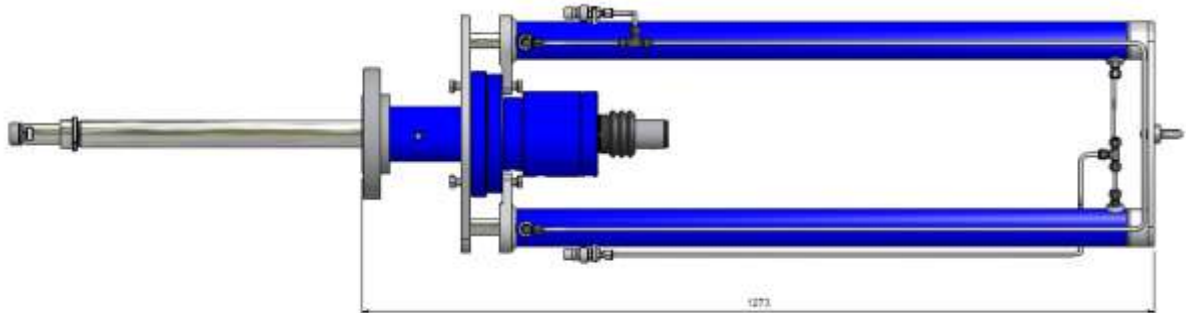
7.4 Removing the Sample Probe

Notes: Do not attempt insertion or withdrawal of the Standard 210 'SD' Sample Probe without the optional 154 Series Hydraulic Extractor if the line pressure exceeds 2.5 Barg (40 psig). At this pressure, approximately 60KgF – 132 lbf will be produced at the probe head, as such it will not be possible to undertake the operation without risk of damage or injury to equipment or personnel.

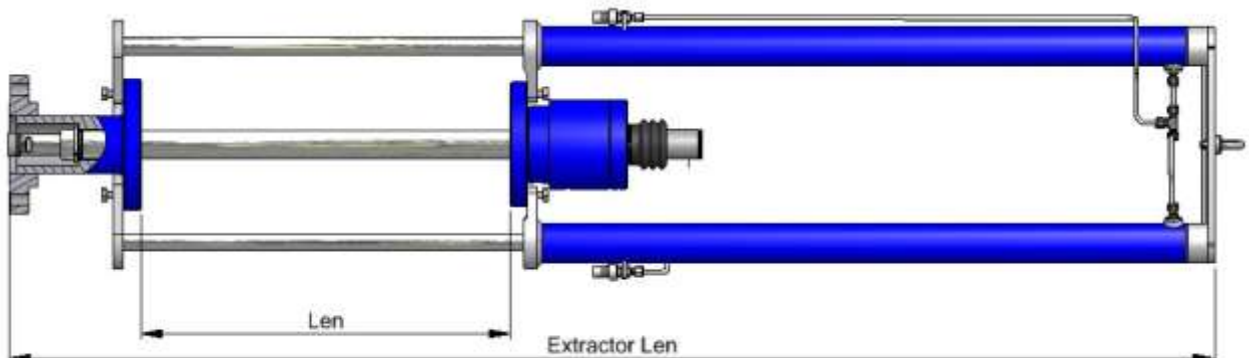
The combined weight of the Sample Probe and the Hydraulic Extractor is approximately 65kg (145lb). Operators must ensure that adequate lifting equipment and safety precautions are used to avoid the risk of injury to personnel and damage to equipment whilst the Sample Probe is being installed or extracted.

The procedure for withdrawing the Sample Probe from a pressurised pipeline is as follows:

1. Turn off any compressed air and electrical supply to the equipment.
2. Close all isolating valves on connections at line pressure. Any isolation valves fitted to the Sample Probe Head and Seal Housing must be closed.
3. Disconnect all lines to the Sample Probe - compressed air, hydraulic hoses and sample discharge line.
4. Remove the Sampler Weatherproof Housing (where fitted) complete with any insulation and ancillary equipment.
5. Fit the Hydraulic Extractor to the Sample Probe, as detailed in H27 Hydraulic Extractor Manual.
6. Connect the pump hoses to the Hydraulic Extractor via the quick connect couplings.
7. Select the '154' series diverter valve on the pump to apply pressure to the top of the hydraulic cylinders and pump until pressure is felt. This will ensure that the probe remains in contact with the seal housing as the seal housing fixing bolts are loosened and removed.



8. Remove the cap head screws (52) completely.
9. The Probe has an engineered stop to limit its travel when fully withdrawn from the pipeline. However, the user must check the length during extraction and not rely on the stop ring. Refer to table below.
10. Select the '154' series diverter valve on the hydraulic pump to apply pressure to the bottom of the hydraulic cylinders. Operate the pump to extract the probe out of the pipeline.



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- As the Sample Probe nears full extraction, check the length in anticipation of Extractor resistance due to reaching mechanical stop or failure of the 'Stop' ring, due to damage or loss.

Sampler Length	Stop Ring 'Len'	Extractor 'Len'
A	563	1836
B	693	1966
C	868	2141

- Close the pipeline isolating valve, depressurise and bleed the Seal Housing and disconnect the Hydraulic Extractor.
- The probe may now be removed from the pipeline isolating valve.

7.5 Ancillary Equipment Installation (Weatherproof Housing)

The Ancillary Equipment, typically comprising Heater and Thermostat, Air Regulator, Solenoid Valve and External Check Valve, are mounted within an optional Weatherproof Housing.

Depending on the type of Sampler Weatherproof Housing; Insulated, pneumatic or hydraulic actuation, fit the clamp brackets or support plate to the Support Tube Flange.

Connect the two ports of the Actuator to the Solenoid Valve or Hydraulic Power Pack, ensuring that when de-energised, the Sample Probe is in "Open condition" (pressure is applied below the Actuator Piston, Port B).

Connect the outlet of the Sample Probe to the sample receiver.

Note: In order to prevent water drop out, the top of the Sample Receiver must be below the lowest level of the Sample Discharge from the Sampler and any ancillary equipment. The tubing must slope downwards at approximately 15° towards the Sample Receiver and be as straight and short as possible.

Heat-trace the tubing to 60°C in any installation where waxy or viscous crude oils are sampled. Use the following table as a guide to tubing size:

Sampler Tubing Length	Up to 200 cSt	Over 200 cSt
Up to 1.5m	1/4" O.D.	1/4" O.D.
1.5m to 3m	1/4" O.D.	3/8" O.D.
Over 3m	3/8" O.D.	1/2" O.D.

On air actuated versions, connect the air supply to the inlet port (1/4" NPT) of the pressure regulator.

On EH versions, connect the flexible hydraulic hoses to the Actuator (normally depressurised line to the upper port, Port A).

Connect cable(s) to the junction box through cable glands certified for use in the hazardous area classification. The wiring diagram for the ancillary equipment will be found in Section 10.

Note: The correct rating fuse must be included in the Solenoid Valve supply circuit.

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The bottom port (drain cavity) of the actuator may be connected to a closed drain or a pressure switch if required.

Fit the Weatherproof Housing (if supplied) in position. Slots or holes will have to be made to allow access into the housing for the Actuator supply piping, the Sample Outlet piping and electrical cables. The slots or holes should be made in the housing across the joint between its two halves. This will allow the housing to be completely removed without disconnecting piping or cables. The housing is attached by two M8 x 40 long bolts screwed into nuts attached to the upper bracket. To prevent ingress of water, seal all entries into the Housing using a suitable mastic.

7.6 Removal of Ancillary Equipment

Removal of the ancillary equipment is generally the reverse of the above.

8 Maintenance and Troubleshooting

8.1 Health and Safety Precautions

The Series 210 SD Sample Probe should only be overhauled by trained and competent personnel. Incorrect assembly of the sampler may result in premature component failure and loss of containment. Cameron can provide in-house or on-site courses to ensure that personnel have the necessary training to be able to safely and competently overhaul the equipment.

The Series 210 SD Sample Probe may be used in applications involving carcinogenic or other hazardous products. Care must be taken to avoid contamination by any product trapped within the internal components that may be released as the Sampler is stripped down.

8.2 Weekly Maintenance

External visual inspection of the Sampler, including connections, hoses and general condition. Regular maintenance is limited to draining excess moisture from the air filter/regulator or on EH applications, checking the level in the hydraulic oil reservoir on the Hydraulic Power Pack.

8.3 Annual Maintenance (or less as determined by site conditions)

The Series 210 Probe Sampler is designed to operate continuously for a period of about 1,000,000 grabs before a major overhaul. However, this service interval will be affected by the type of product being sampled, particularly the amount of particulate matter such as sand, and therefore cannot be guaranteed. When used in crude oils with high levels of sediment or from mixed carrier shipments, the maintenance interval may be shortened. The service intervals will therefore need to be determined from the experience gained on the particular application. In any event, the Sampler should be overhauled at least every 12 months

The Sampler must be removed from the pipeline and taken to a clean area for servicing.

It is essential that soft vice jaws are used whenever components are required to be held, and that all components, particularly those with sealing faces are thoroughly cleaned of dirt and other contamination by degreasing and drying prior to re-assembly.

A Special Tool Kit, Part Number 45-0126-00, is available to assist in fitting some components and seals. Failure to use the correct tools may damage seals and other components, and will have a direct effect on the future performance of the Sampler.

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8.4 General Notes

These instructions apply to overhaul of the Hydraulic and High-Pressure versions as well as the standard 210 air actuated Sampler. Variations are noted in the text of the relevant sections.

Any corroded and worn parts and expendable items such as bolts and seals should be replaced with OEM (Original equipment manufacturer) spares of the correct specification.

Hydraulically actuated (EH) Sampler Probes may be tested using compressed air or gas instead of hydraulic oil where this is more convenient.

The item numbers in brackets throughout the text relate to item numbers of components shown on the drawing referenced at the beginning of that section. To simplify the overhaul instructions, standard drawings and component numbers have been used throughout. Please note: Part Numbers for Hydraulic and High-Pressure Sampler components may differ from standard. Refer to Section 11 for details of the spares kits and special tools required to overhaul all versions of the Sample Probe.



When requesting assistance or spare parts, please advise the Sampler Model and Serial Numbers to ensure that the correct options are supplied.

The complete overhaul should be carried out in the following order:

Step	Description
1	Removal and overhaul of End Plug & Vacuum Breaker
2	Removal of Probe Head
3	Slydring (41) Replacement
4	Removal and overhaul of Seal Housing
5	Removal and overhaul of Check Valve Sub-Assembly
6	Removal of Sample Tube Head
7	Removal and overhaul of Actuator Assembly
8	Reassembly of Actuator Bottom Housing & Support Tube Assembly
9	Overhaul of Piston/Sample Tube Actuator/Lower Piston Rod Assembly
10	Reassembly of Piston/Sample Tube Actuator/Lower Piston Rod Assembly
11	Replacement of Piston/Catch Plate/Actuator Assembly
12	Replacement Seal Housing
13	Replacement Probe Head Assembly

NOTE: It is essential that soft vice jaws are used whenever components are required to be held, and that all components, particularly those with sealing faces are thoroughly cleaned of dirt and other contamination by degreasing and drying prior to re-assembly. If any of the sliding surfaces or the Support Tube are damaged, leakage will occur from the seals.

Any corroded and worn parts and expendable items such as bolts and seals should be replaced with OEM (Original equipment manufacturer) spares of the correct specification.

All joints, 'O' Rings and moving parts must be lubricated on assembly using a general-purpose grease such as Castrol "LMX" grease or an equivalent high temperature lithium based water-resistant grease.

Cameron recommend that to prevent seizure, all screwed components are lubricated with Molykote 1000 or equivalent on assembly.

8.5 Torque Setting:

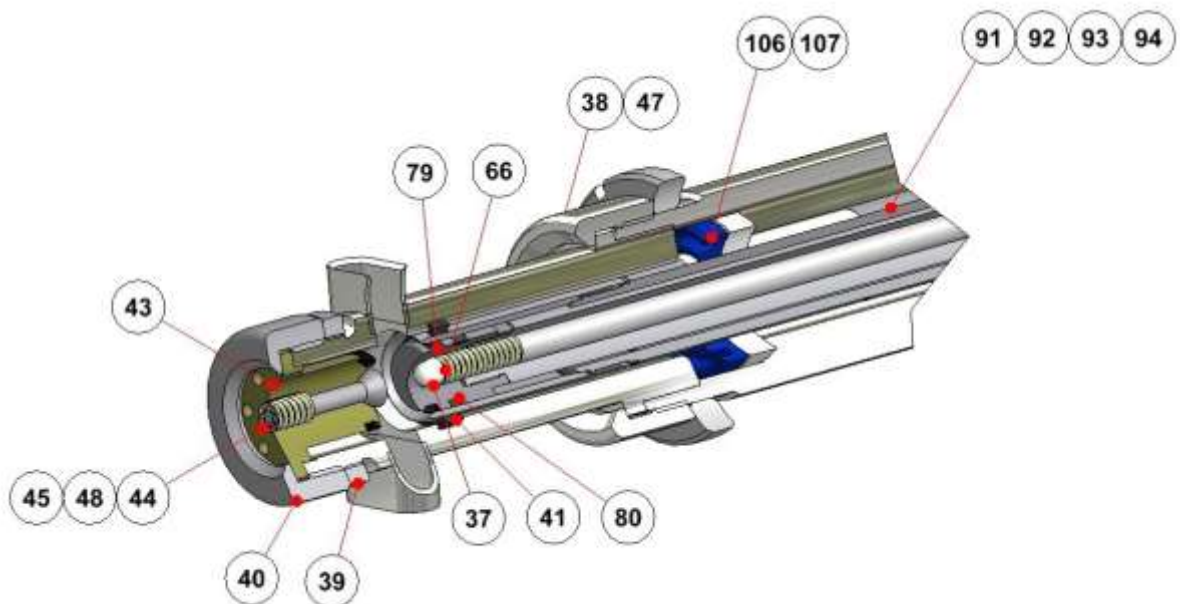
Care should be taken not to over tighten screw fittings

The following torque settings should be used in the reassembly of the sampler:

Screw Location	Size	Torque
Bottom Actuator Housing (51) to Support Tube Flange (55)	M8 x 30mm cap head (Item 52)	25Nm/18.4lbfft
Lower Piston Rod to Capture Tube	Factory Assembled	75Nm/55.3lbfft
Sample Tube Actuator to Catchplate	M5 x 20mm cap head (Item 33)	10Nm/7.4lbfft
Actuator Top to Bottom Housing	Pre- August 1992 M6 x 25mm cap head (Item 34)	15Nm/11.1lbfft
	Post August 1992 M8 x 35mm cap head (Item 34)	25Nm/18.4lbfft
Support Tube Flange to Seal Housing	Pre- April 2006 M10 x 40mm cap head (Item 51)	40Nm/29.5lbfft
	Post April 2006 M12 x 35mm cap head (Item 51)	50Nm/37lbfft
Sample Tube Head to Sample Tube Actuator		60Nm/44.5lbfft

9 Overhaul of Series 210 Sampler

9.1 Removal & Overhaul of End Plug & Vacuum Breaker



Loosen the Lock Ring (39) using 3J-36-2000 Series 'C' Spanner

Loosen and remove the Lock Nut (40) using 3J-36-2000 Series 'C' Spanner

Withdraw the End Plug (43) from the Probe Head.

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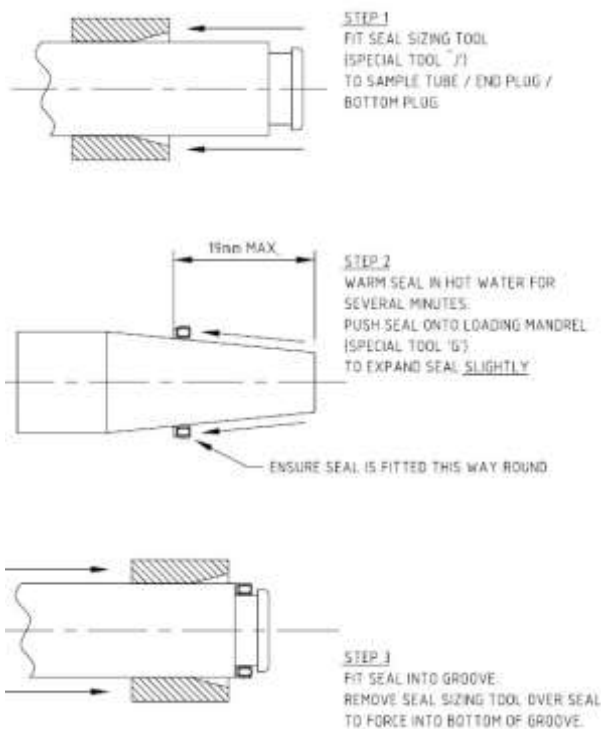
Remove the Balseal (42) taking care not to damage the machined surfaces. Examine seal area of End Plug for wear (scoring), discard and replace if necessary.

Remove the Fastener (48) from the stem of the Vacuum Breaker Valve (44) and discard.

Remove the Spring (45) from the End Plug.

Examine seal area of Vacuum Breaker for wear (scoring), discard and replace if necessary.

Re-assemble using new Spring (45). Ensure the New Fastener (48) is assembled to the stem of the Valve (44) as per illustration and engages in the retaining groove.



Warm the Balseal (42) in hot water. Place the Balseal over the Balseal Loading Mandrel, Special Tool 'G' and push down approximately half the mandrel's length to expand the lip seal so it will fit over the End Plug (43).

Remove Balseal from Mandrel and fit to End Plug ensuring the Balseal is fitted with the Spring toward the head of the End Plug.

Using fingers, reform the Balseal into the groove and then place Balseal Assembly Tool, Special Tool 'J' over the End Plug (tapered end first) to set the Balseal to the required size. Leave for 3-5 minutes.

Remove Balseal Sizing Tool and check Balseal for damage.

If not proceeding further with the overhaul, replace the Vacuum Breaker and End Plug Assembly in the reverse order of the above, else set aside until required.

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9.2 Removal of Probe Head

Loosen the Lock Ring (38) using 'C' Spanner, Special Tool 'A'.

Loosen the Probe Head Lock Nut using 3J-36-2000 Series 'C' Spanner and unscrew the Lock Nut from the Support Tube.

Withdraw the Probe Head (37) from the Support Tube and remove Lock Nut (38).

9.3 Slydring (41) Replacement

Remove the Slydring (41) from inside the Probe Head (37).

Fit the new Slydring inside the Probe Head by slightly overlapping the ends of the Slydring, placing the Slydring in the core of the Probe Head and then pushing it into position in the groove. Once in position, the Slydring is expanded so that the ends no longer overlap.

Re-fit the End Plug (43) into the Probe Head. Tighten Lock Nut (40) and back down Lock Ring (39) to secure.

If not proceeding further with the overhaul, re-fit the Probe Head to the Support Tube ensuring the Roll Pin (47) fitted to the Probe Head engages with the corresponding notch in the Support Tube. Ensure the Probe Head Lock Nut and Lock Ring (38) are securely tightened.

If proceeding with overhaul, place sub-assembly to one side.

9.4 Removal & Overhaul of Seal Housing

Remove the Probe Head Assembly as described previously and remove the Lock Ring (38). Grease the threaded end of the Support Tube.

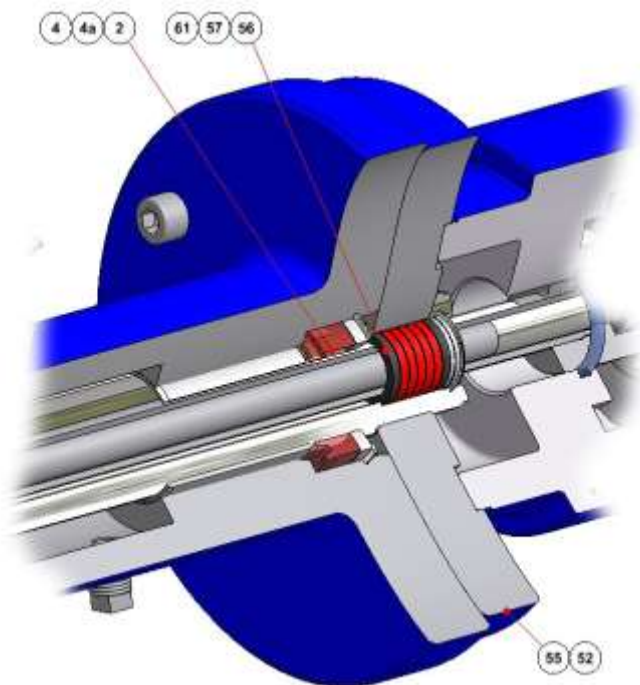
Note: 'SD' Short Style Samplers do not have a Seal Housing, but have an adapter fitted to the Support Tube Flange (55), which should be removed at this stage together with 'O' Ring (3J-36-0009-00) to provide access to the Actuator Retaining Bolts, (51).

Remove the 4 off M12 x 40mm cap head screws (52) that attach the Support Tube Flange (55) to the Seal Housing.

Withdraw the Seal Housing from the Support Tube (93) Using a pick form the toolkit or small screwdriver, release and remove the Smalley Ring (2).

Remove the Seal (4) and the Seal Backing Ring (4a).

Fit the new Seal orientation as shown.



Re-fit the Seal Backing Ring and the Smalley Ring, tapping to ensure that it is firmly engaged.

Note: The Smalley Ring will not rotate when correctly fitted in the groove

If proceeding with overhaul, place sub-assembly to one side.

9.5 Removal & Overhaul of Check Valve Sub-Assembly

Screw 1/8" NPT Tommy Bar, Special Tool 'D', into the Sample Tube Head (19), ensuring the tool is fully tightened.

Hold the Tommy Bar and unscrew the Check Valve Nut (65) using Check Valve Peg Spanner, Special Tool 'E', and Tommy Bar, Special Tool 'F'.

Withdraw the Check Valve Assembly from the Sample Probe.



Remove the Valve Stem (91) along with the Check Valve Tip (66) and Spring (69). See also 8.5.1

Check straightness and fit the new Spring and Check Valve Tip to valve stem.

Replace the 'O' Ring (68) fitted to the Check Valve Nut (65).

If proceeding with overhaul, place sub-assembly to one side.

9.6 Removal of Sample Tube Head

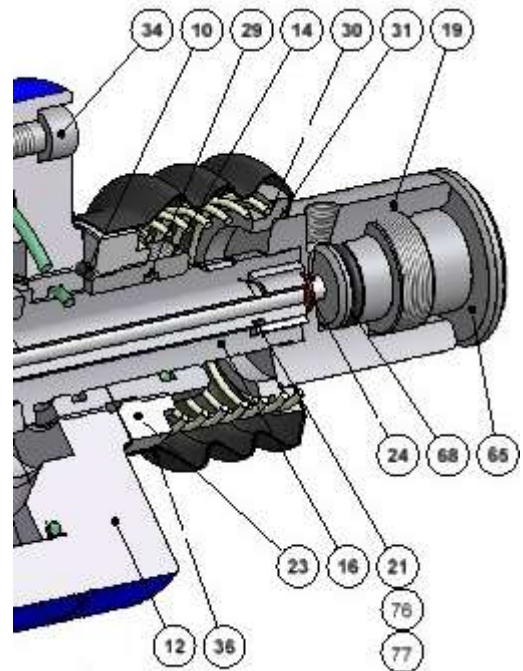
Remove the Gaiter (36) to expose the machined flats on the Sample Tube Actuator (16) through the Spring (30).

If not previously fitted, screw 1/8" NPT Tommy Bar, Special Tool 'D', into the Sample Tube Head (19), ensuring it is fully

tightened.

Hold the Sample Tube Actuator (16) with a 19mm A/F open-ended spanner on the flats, and loosen the Sample Tube Head by gently tapping the Tommy Bar with a soft-faced hammer. The Sample Tube Head unscrews in an anti-clockwise direction when viewed from above.

Remove the Sample Tube Head (19), Sealing Washer (24), Spring (36) and the two halves of the Split Collar (31).



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Place components to one side.

9.7 Removal & Overhaul of Actuator

Remove the 6 off M8 screws (34) retaining the Top Housing (12) to the Bottom Housing (13).

NOTE: Prior to August 1992, Item 34 was M6.



Fit a suitable 1/8"NPT Fitting into the port 'A' in the Top Housing. Using a twisting and pulling motion, remove the Top Housing (12), complete with Adjustment Bush (14).

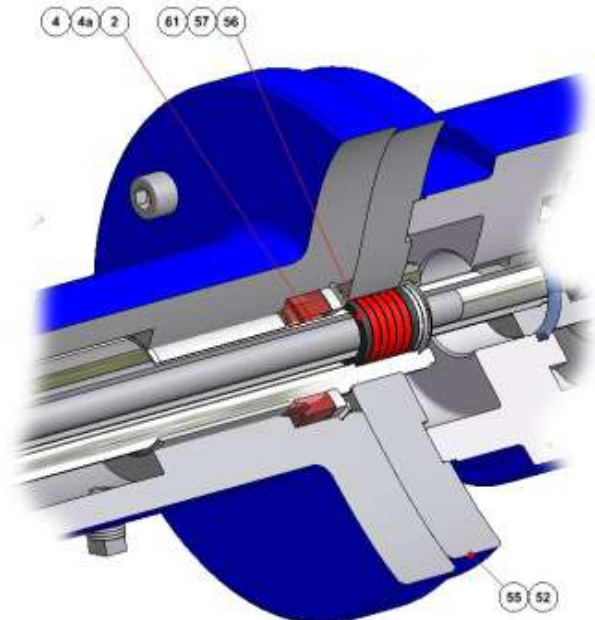


Apply slight air pressure to Port B in the Bottom Housing (13), and withdraw the complete sub-assembly comprising Piston/Catchplate/Sample Tube Actuator/Lower Piston Rod/Sample Tube/Capture Tube.

Note the location of the ports in the Bottom Housing in relation to the Support Tube

Flange. Unscrew the 6 off M8 x 30mm cap head screws (52) locating the Bottom Housing to the Support Tube Flange (55) and remove the Bottom Housing (13).

Using a pick form the toolkit or a small screwdriver, remove the Smalley Ring (56). Anti-extrusion Ring (57) and the seal (61).



Note: On samplers supplied before Serial Number 206F****, the Balseal (61) is retained by Seal Nut (56), which required a 3J-36-2000 series 'C' Spanner

9.8 Reassembly of Actuator Bottom Housing & Support Tube Assembly

Note: All components must be thoroughly cleaned and lightly greased on reassembly.

Inspect Support Tube (93) for scoring and ensure Tube is straight. If in doubt, consult Cameron for replacement Support Tube/Support Tube Flange sub-assembly.

Using the Upper Capture Tube Seal Assembly Tool, Special Tool 'M', fit the new Balseal (61) with the Seal Spring facing towards the bottom of the seal recess in the Support Tube Flange (as shown on the drawing).

Refit the Anti-extrusion Ring (57) and Smalley Ring (56). On samplers supplied before Serial Number 2006F****, the Balseal (61) is retained by Seal Nut (56), which requires 'C' Spanner, Special Tool 'A' to tighten it.

Clean and examine the bore of Bottom Housing for wear.

Fit new Quadring Seal (28).

Note: From 1999, Item 28 on all variants of the 210 Sampler was replaced by a Quadring Seal, Part No. 3J-37-0554-00. This Seal is fully interchangeable with all options previously supplied.

Replace Bottom Housing on the Support Tube Flange, ensuring orientation of ports is as found.

Tighten M8 x 30mm screws to specified torque.

9.9 Overhaul of Piston/Sample Tube Actuator/Lower Piston Rod Assembly

Hold the assembly by the Lower Piston Rod, **taking care to protect its surface.**

Pull the Sample Tube Actuator (16) up to the top of its stroke, and then push the Actuator back down to expose the Split Collet (21) at the end of the Sample Tube.

Remove the two halves of the Split Collet, and any shims that may be exposed.



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Note: All shims are unique and must be replaced on reassembly.



Unscrew the 6 off M5 x 20mm cap head screws (33), remove the Catchplate (17) and Actuator (16) from the Piston (15).

Remove Piston from Lower Piston Rod (18).



Push the top end of the Sample Tube (94) down until the Sample Tube Balseal (79) and Slydring (80) are exposed at the opposite end of the Sample Tube.

Remove the Sample Tube Balseal (79) and Slydring (80) from the Sample Tube.



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Unscrew and remove the Lower Piston Rod Seal Nut (20) using Lower Piston Rod Seal Nut Peg Spanner - Tool 'E'.

Pull the Sample Tube down past the Balseal (32) and then push back up, to remove the Balseal (32), Seal Ring (22) and Quadring (25).

Remove the Sample Tube from the Lower Piston Rod/Capture Tube Assembly.

Clean all components and inspect for wear and straightness. Any components with scoring in the seal area must be replaced.

Note: If the Capture Tube is to be replaced, a complete sub-assembly including the Lower Piston Rod must be obtained from Cameron.

9.10 Reassembly of Piston/Sample Tube Actuator/Lower Piston Rod Assembly

Note: All components must be thoroughly cleaned and lightly greased on reassembly.



To assist the fitting of the Balseal (32), fit the 'O' Ring (Cameron Ref. 3J-37-0709-00) supplied in the Spares Kit, to the split collet groove of the Sample Tube (94).

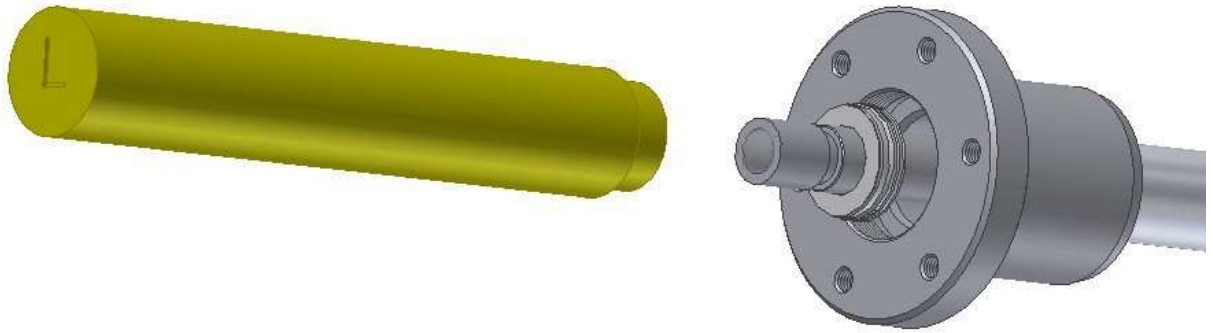
Fit the Balseal (32) over the end of the Sample Tube, with the spring facing the check valve end of the tube, and push carefully over the split collet groove down to the chromed part of the tube.

Insert Sample Tube into the Lower Piston Rod/Capture Tube Assembly.

Fit Balseal into the bore of the Lower Piston Rod (18) using Upper Sample Tube Seal Assembly Tool, Special Tool 'L'.



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Push the Sample Tube down through the Capture Tube to expose the Slydring and seal grooves.

Remove the 'O' Ring fitted to the split collet groove and discard.

Fit new 'O' Ring (104) into the seal ring recess of the Lower Piston Rod, using an inverted Seal Ring (22) to push it into the undercut at the bottom of the thread.

Fit new Seal Ring (22) and push fully home.

Note: From 1999, Item 25 on all variants of the 210 Sampler was replaced by a Quadring, Part No. 3J-37-0551-00.
This Seal is fully interchangeable with all options previously supplied.

Fit Quadring (25), and push fully home using Upper Sample Tube Seal Assembly Tool, Special Tool 'L'.

Fit Seal Nut (20) and fully tighten using Lower Piston Rod Peg Spanner, Special Tool 'E'.



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Form the new Sample Tube Slydring (80) by wrapping it round its groove in the Sample Tube until its diagonally cut ends meet.

Push Slydring into the groove in the bore of the Capture Tube.

Fit the new Balseal (79) to the Sample Tube. Ensure the Seal is fitted to the Sample Tube with the spring facing towards the end of the Sample Tube.

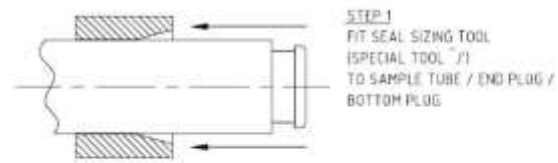
Warm the Balseal (79) in hot water. Place the Balseal over the Balseal Loading Mandrel, Special Tool 'G' and push down approximately half the mandrel's length to expand the lip seal so it will fit over the Sample Tube (94).

Remove Seal from Mandrel and fit to Sample Tube ensuring the Balseal is fitted with the spring facing to check valve end of tube.

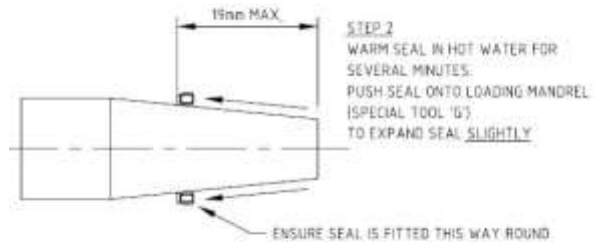
Using fingers, reform the Balseal into the groove and then place Balseal Assembly Tool, Special Tool 'J' over the End Plug (tapered end first) to set the Balseal to the required size. Leave for 3-5 minutes.

Remove Balseal Sizing Tool and check Balseal for damage.

Using a suitable rod of soft material, e.g. Delrin, push the Sample Tube into the bore of Capture Tube until end of Sample Tube is 20mm (3/4") inside the Tube.

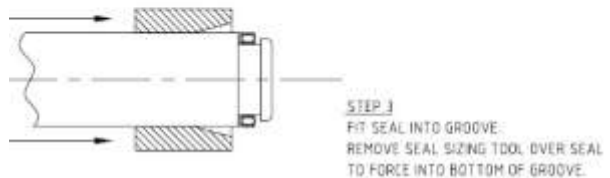


STEP 1
FIT SEAL SIZING TOOL (SPECIAL TOOL 'J') TO SAMPLE TUBE / END PLUG / BOTTOM PLUG



STEP 2
WARM SEAL IN HOT WATER FOR SEVERAL MINUTES. PUSH SEAL ONTO LOADING MANDREL (SPECIAL TOOL 'G') TO EXPAND SEAL SLIGHTLY

ENSURE SEAL IS FITTED THIS WAY ROUND



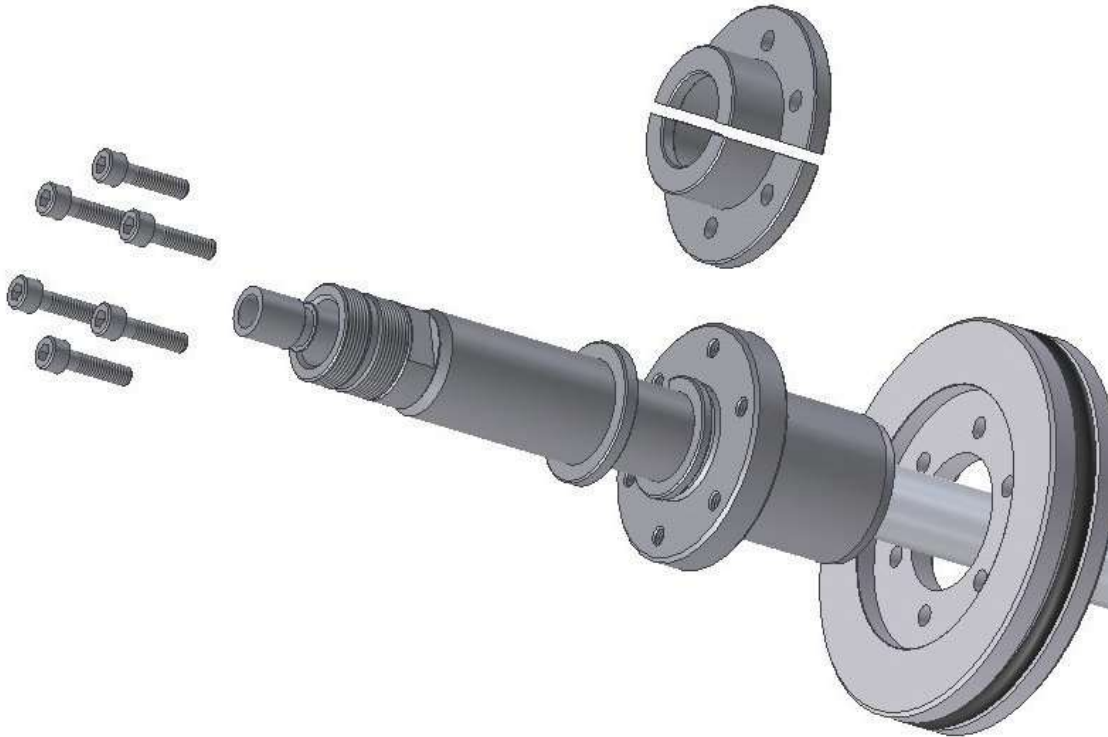
STEP 3
FIT SEAL INTO GROOVE. REMOVE SEAL SIZING TOOL OVER SEAL TO FORCE INTO BOTTOM OF GROOVE.

Note: Do not push any further or Slydring will jam in end of Capture Tube bore.

9.11 Replacement of Piston/Catch Plate/Actuator Assembly

Fit Piston (15) to Lower Piston Rod (18), ensuring Piston is correct way round.

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Fit new 'O' Ring (11) to bore of the Sample Tube Actuator (16).

Fit Sample Tube Actuator (16) and Catchplate Assembly over the Sample Tube and attach to the Piston/Lower Piston Rod Assembly using the six new M5 x 20mm cap head screws (33) supplied in the Spares Kit, ensuring Sample Tube Actuator is correctly retained by the Catchplate.

Note: Care must be taken when pushing the Sample Tube Actuator over the Sample Tube that the Sample Tube is not pushed back down the Capture Tube.

Tighten M5 x 20mm cap head screws (33) to specified torque setting.

Note: HP Samplers use M5 x 25mm cap head screws.

Fit the two halves of the Split Collet (21) to the Sample Tube. Push the Split Collet down into the recess in the top of the Sample Tube Actuator. ENSURE ALL ORIGINAL SHIMS (76 & 78) ARE REFITTED UNDER SPLIT COLLET. If this is not done, the Sample Tube may strike the End Plug (43) in the Probe Head when the Sampler is operated and result in damage.

Fit 'O' Ring (27) to Piston.

Note: EH Samplers have two 'O' Rings (96) fitted to the Piston and a Liner (95) fitted to the Actuator Bore, sealed by an 'O' Ring (97).

Liberal grease the bore of the Bottom Housing (13) and the Capture Tube/Piston Assembly.

Slide the assembly through the Bottom Housing into the Support Tube Balseal (61). Carefully push through the Balseal and slide assembly fully home into the Bottom Housing.

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9.12 Replacement of Top Housing

Note: Avoid disturbing the Lock Ring (23) on top of the Actuator (Unless leaking). If the Sealing Bush (14) is moved, the grab size of the Sampler will be altered.

Fit the 2 off 'O' Rings (29) in the bore of the Sealing Bush (14).

Fit 'O' Ring (26) in the Top Housing (12).

Liberally grease the internal surface of the Sealing Bush (14), the outside of the Sample Tube Actuator (16) and the internal bore of the Top and Bottom Housings.

Slide the Top Housing over the Sample Tube Actuator and push the two halves of the housing together.

Rotate the Top Housing to align the Actuator Ports.

Fit 6 off M8 x 35mm cap head screws and tighten to specified torque.

Apply slight air pressure to Port B in the Bottom Housing to move the Piston assembly upwards, whilst holding the Sample Tube down in the Sample Tube Actuator to prevent it moving independently of the Sample Tube Actuator.

Fit Check Valve Stem (91), complete with Spring (69) and Check Valve Tip (66), into Sample Tube.

Place new M6 Washer (24) on top of Sample Tube Actuator.

Screw Sample Tube Head (19) onto Sample Tube Actuator and ensure Check Valve Stem moves freely before tightening Sample Tube Head.

Using a 19mm A/F open ended spanner to hold the Sample Tube Actuator (16) and tighten the Sample Tube Head by tapping the 1/8" NPT Tommy Bar, Special Tool 'D', previously fitted to the port, using a soft-faced hammer.

Note: This is a pressure retaining joint and must be tight – refer to torque settings.

Fit new 'O' Ring (68) to the Check Valve Nut (65).

Screw the Check Valve Nut into Sample Tube Head and tighten using Check Valve Nut Peg Spanner - Tool 'E' and Tommy Bar, Tool 'F'.

Note: Early Mk II Samplers may be upgraded by discarding the circlips (70) and adding a spacer (refer to Cameron for advice)

Fit replacement Spring (30), and assemble Split Collet (31) under the Sample Tube Head.

Fit new Gaiter over the assembly and secure with a cable tie.

9.13 Replacement of Seal Housing

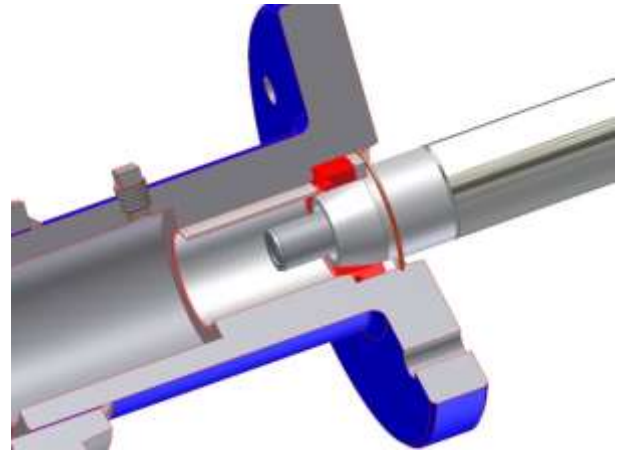
Grease the Support Tube.

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Note: 'SD' Short Style Samplers do not have a Seal Housing, but have an Adapter fitted to the Support Tube Flange, which should be refitted at this stage using a new 'O' Ring, Part Number 3J-37-0009-00.



Holding the Seal Housing in a vice, and ensuring the Sampler Assembly is adequately supported so as not to bend the Support Tube or damage any components, carefully insert the Support Tube with aid of special tool 3J-37-0795-MC through the Seal in the Seal Housing, leaving a 25mm (1") gap between the Seal Housing and the Support Tube Flange.



Attach the Support Tube Flange to the Seal Housing ensuring the flow arrow or groove on the Support Tube Flange is aligned with the 1/4" NPT tapping in the Seal Housing.

Secure the Support Tube Flange to the Seal Housing, using 4 off M12 x 40mm cap head screws, tightened to the specified torque.

9.14 Replacement of Probe Head

Fully screw Lock Ring (38) onto Support Tube (93).

Refit the Probe Head Assembly to the Support Tube (93), ensuring Pin (47) aligns with notch in Support Tube.

Fully tighten Probe Head (37) and Lock Ring (38) using C Spanner, Tool 'A'.

Screw Lock Ring (38) down onto Lock Nut (40) and tighten using 3J-36-2000 Series 'C' Spanner

Push End Plug/Vacuum Breaker Assembly into the Probe Head, and secure with Lock Nut (40). Tighten using C Spanner, Tool 'A'.

Screw Lock Ring (38) down onto Lock Nut (40) and tighten 3J-36-2000 Series 'C' Spanner

10 Testing

It is recommended that where a test facility is available, the Sampler is pressure tested and re-calibrated prior to returning to service.

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10.1 Witness testing prior to re-installing the Sampler in service.

In the absence of a test facility, the Sampler sealing and grab integrity may require witness testing after service and prior to re-installation.

Ensure the external check valve has been serviced in addition to the Sampler and the Pressure Relief Valve is rated to correct system pressure.



IMPORTANT: THE SAMPLER IS CAPABLE OF DEVELOPING VERY HIGH SAMPLE DISCHARGE PRESSURES, THIS TEST MUST BE CARRIED OUT WITH GREAT CARE.

The Sampler is capable and operates over a wide range 50 to 2250 psig. The following procedure is generic for all variations of the 210 Cell Sampler.

A) Bench testing: Support and Suspend the Sampler into a mineral oil or water reservoir. Continue to section 10.2

B) System testing: Ensure the Sampler is depressurised

10.2 Test equipment



ALL EQUIPMENT INCLUDING INTERCONNECTING PIPEWORK OR FLEXIBLE HOSE SHOULD BE INSPECTED AND VALIDATED FOR THE REQUIRED TEST PRESSURE.

Assemble a “test rig” (refer to Figure 9-1), comprising a “Tee” fitting, with the correctly rated Pressure Relief Valve (PRV) (See table below) and Needle Control Vent Valve. Connect the “test rig” to the Sample Outlet Port of the Sampler, and drain to suitable receptacle.

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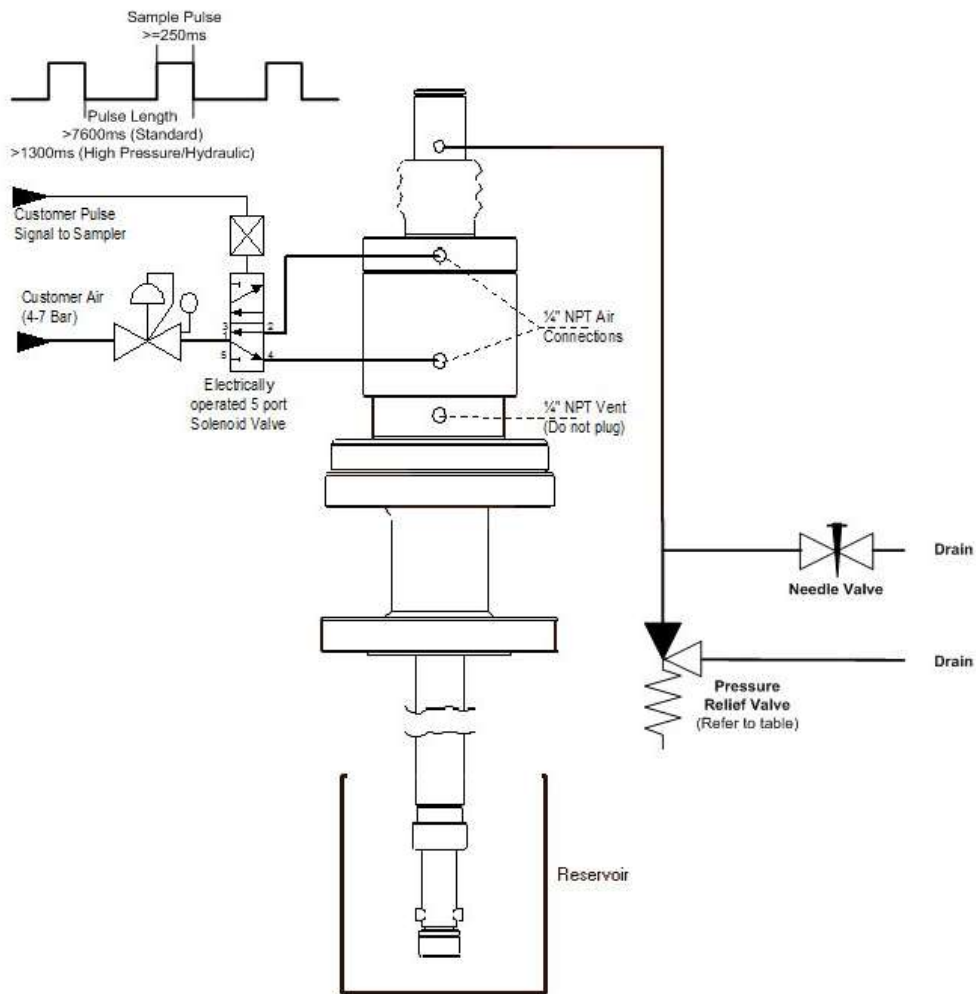


Figure 1 - Test Configuration

The following table illustrates spring pressure rating for Swagelok R3A style relief valves:

Cameron Part No.	Colour	Pressure Rating
3J-49-0085-00	Blue	50-350 psi
3J-49-0086-00	Yellow	350-750 psi
3J-49-0087-00	Purple	750-1500 psi
3J-49-0106-00	Orange	1500-2250 psig

Ensure the Pressure Relief Valve is rated to correct system pressure and the outlet is connected to a suitable receptacle.

Note the pneumatic or hydraulic actuator pressure setting are correct at 5 -8 barg

Operate the Sampler as described in Section **Error! Reference source not found.** in single grab sequence until the sample grab is forced through the Pressure Relief Valve. This will validate the process grab is operating and sealing correctly.

The Sampler incorporates an internal non-return valve set nominally at 20 Barg, the external check valve prevents oil seepage under operating conditions.

Upon satisfactory testing, isolate the Sampler and open the Needle Control Valve, relieving the pressure on the “test rig”.

11 Frequently Asked Questions

11.1 *Sampler Does Not Operate*



Prior to undertaking any of the following checks, ensure the Sampler outlet is un-obstructed and connected to a suitable receptacle.

Check that all Actuator and electrical connections are secure and correct

Check that the Actuator pressure, indicated on the air regulator or Hydraulic Power Pack discharge pressure gauge is between 5-8 Barg, re-adjust as required.

Check Sampler Controller is demanding a grab and that any interposing relays are operating satisfactorily.

Is solenoid being energised? - Check Solenoid Fuse and operate manually where solenoid has manual override facility. Ensure that the electrical pulse signal supplied to the Solenoid Valve is the correct duration (500 millisecond minimum for air, 1 second minimum for hydraulic applications).

If the Sample Tube Head moves slightly, the sample outlet may possibly be obstructed. Check that external Check Valve setting and ensure the line to the Sample Receiver is not blocked.

Incorrect re-assembly?

11.2 *Sampler Operates But Does Not Produce A Sample*

Check all valves are open and that there is fluid in the pipeline.

Ensure the Actuator pressure is correct. If the pressure is too low, the Actuator will not stroke fully. Check the stroke of the Actuator is correct - the Sample Tube Head should move approximately 19mm.

Degradation of the Process Grab Seals, Anti-Vacuum Breaker 'O' Ring, or the Internal Non-return valve will cause a reduction or loss of sample grab volume. Refer to section 10.1 to ensure that they are sealing correctly.

11.3 *Sampler fails to take adequate sample*

Check that the Actuator pressure, indicated on the air regulator or Hydraulic Power Pack discharge pressure gauge is between 5-8 Barg, re-adjust as required.

Check Sample Receiver is not full or the sample outlet piping blocked through waxing.

Check the external Check Valve fitted to Sampler Outlet Adapter is set to 5 Bar above line pressure for normal low-pressure receiver systems and to 1 Bar where high-pressure sample receivers are being used.

Check the external check valve is set with the correctly sized spring for the system usage.

Check that the external relief valve fitted to the sample discharge lines is not passing.

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Ensure that the Sampler Controller is not either demanding too fast a sample grab rate (120 grabs per minute maximum), or that the signal to the solenoid is too short and not allowing the Actuator to travel to the full extent of its stroke.

If the above are satisfactory, then the Sampler will require a change of internal seals.

11.4 Sampler takes excessive sample

Check the External Check/Relief Valve fitted to Sampler Outlet Adapter is set to 5 Bar above line pressure for normal low-pressure receiver systems and to 1 Bar where high-pressure sample receivers are being used.

Check the external check valve is set with the correctly sized spring for the system usage, and is not passing fluid when the Sampler is not in operation.

If the above are satisfactory, then the Sampler will require a change of internal seals.

11.5 Leaks from Actuator

Pneumatic or Hydraulic motive power leaks from the Actuator are rare, if evident the Actuator 'O' Rings are worn or damaged.

Leaks from the Vent port indicate the Sampler requires servicing.

11.6 Vibration

Vibration is unlikely to occur in cell samplers.

12 Sub Supplier Information

The following sub supplied items are used in the 210 Sampler:

- Sampler Solenoid Valve (selected to suit application specific hazardous area requirements and power supply).
- Air regulator.

Neither of the above contains any user serviceable parts.

Hydraulic Power Pack (EH versions) - refer to H12 - Hydraulic Power Pack Handbook.

154 Series Hydraulic Extractor - refer to Hydraulic Extractor Handbook.

Line Balanced Relief Valve.

13 Recommended Spares Kits

When requesting assistance or spare parts, please advise the Sampler Model and Serial Numbers to ensure that the correct options are supplied.

13.1 Series 210, EH & EH-HP Sample Probe Service Kit

Commissioning and 1 Year Operation:

- 3J-45-0114-SD Probe Spare Kit for all 1CC and 210EH (Hydraulic)
- 3J-45-0125-SD Probe Spare Kit for all 2CC and 210EH (Hydraulic)

13.2 Series 210 HP Sample Probe Spare Parts

Commissioning and 1 Year Operation:

- 3J-45-0175-SD Probe Spare Kit for all 1CC 210HP

13.3 Series 210 Shipboard Sample Probe Spare Parts

Commissioning and 1 Year Operation:

- 3J-45-0205-SD Short Style Probe Spare Kit for all 1CC
- 3J-45-0206-SD Short Style Probe Spare Kit for all 2CC

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13.4 Alternative Seals for MTBE & Similar Applications

3J-45-0197-SD Commissioning and 1 Year Operation :
 Probe Spare Kit (Kalrez) for all 1CC and 210EH (Hydraulic)

13.5 Special Tools (Balseal Sizing tool, C Spanners, Pick, Seal tools)

3J-45-0126-00 Tool kit for all 1cc 210 Sample Probes
 3J-45-0129-00 Tool kit for all 1cc 210 Sample Probes

13.6 Ancillary Equipment

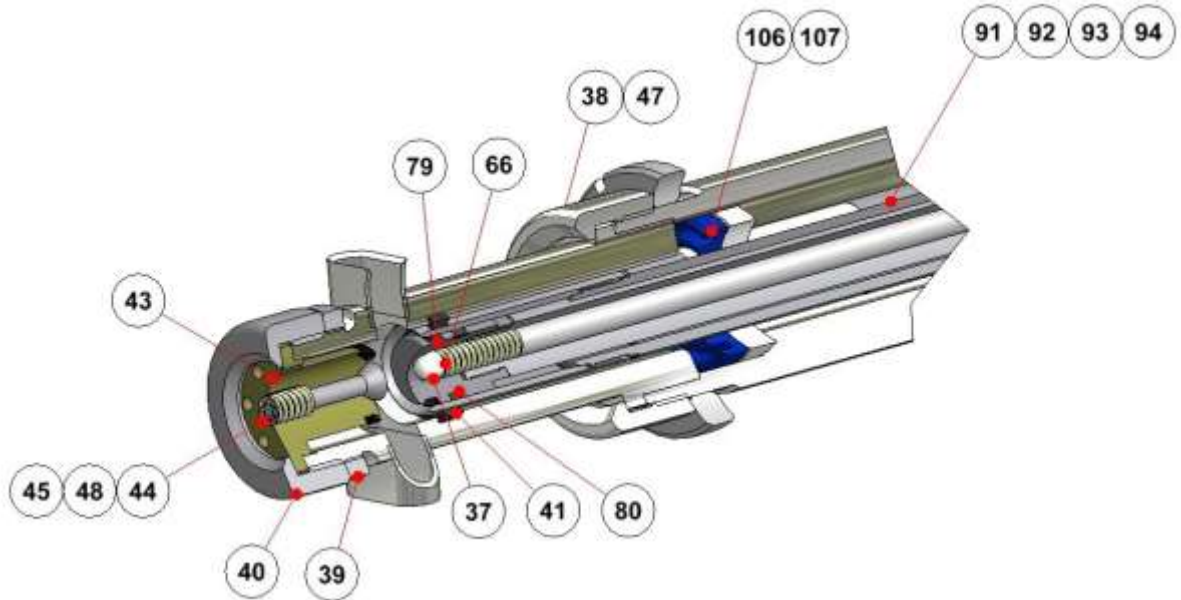
Part/Sub- Assembly	Commissioning	1 Year Operation	2 Year Operation
Solenoid Coil (to suit application)	-	1	1

14 Product Specific Drawings

210 'SD' Probe General Arrangement (Typical)	31845
Generic 210 Seal Kit Location	29174
Probe Head Assembly	15377
Seal Assembly Procedure	18098 (Illustrated within manual)
Actuator Assembly	16213

15 Addenda – 210 2cc Sample Probe

The principle of operation of the 2cc version is identical to the standard 210 SD Sampler, but achieves the increased sample size through the use of larger diameter Capture tube and Sample ends, causing a larger volume of product to be trapped.



The 2cc Sampler utilises the same Actuator and Seal housing as the standard 1cc version, but has a different End Plug (Item 43 & 66), Sample Tube (Item 93) Valve stem (Item 91) and Capture Tube (Item 92). The main sample seals, (Items 79) are also changed.

Overhaul of the Sampler is identical to the standard unit, with the exception of the larger diameter 2cc Balseals and Balseal forming tools.

See Probe Head Assembly 15377

16 Recommended Spares 2cc

When requesting assistance or spare parts, please advise the Sampler Model and Serial Numbers to ensure that the correct options are supplied.

2cc Spares Kit Pre- April 2006 - 3J-45-0125-00

2cc Spares Kit Post April 2006 – 3J-45-0125-06 (Revised seal housing)

2cc Service toolkit 3J-45-0129-00 (Balseal Sizing and loading mandrel incorporated within)

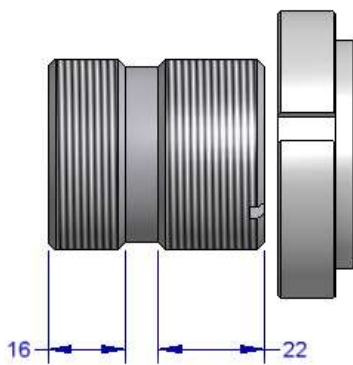
17 Addenda – High Temperature Probe Sampler

The principle of operation of the HT version is identical to the standard 210 Probe Sampler.

Site specific Risk Assessment and Safety Procedures must be in place to install and remove the Sampler Probe under elevated temperatures.

18 Addenda – Grab Volume Adjustment

Variations include Seal material, assembly and setup for grab volume remains similar for all EH, HP and standard variations.



Molykote 1000 grease all threads.

Align Actuator Bush with the longer thread facing the Adjuster Lock Nut.

Screw the Adjuster Lock Nut to the Actuator Bush.

Volume Grab pre-adjustment:



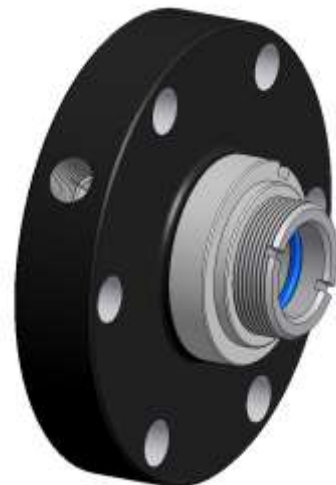
1cc: install the Actuator Bush "O" Ring and position the lock nut approximately 1.5mm back from the undercut

2cc: install the Actuator Bush "O" ring and position the lock nut in line with the start of the 16mm thread.

Screw the assembly into the Top Housing and tighten

Install the "O" ring within the Actuator Bush

Install the "O" ring within the Top Housing



19 Disclaimer

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