sensia
Rockwell Automation + Schlumberger

MEASUREMENT SOLUTIONS

OPERATING, INSTALLATION & MAINTENANCE MANUAL

FOR

G6 MC (ELECTRIC) GAS SAMPLER

This Jiskoot Product is designed to provide outstanding service if correctly installed, used and maintained recognising the effects of the process conditions (temperature, pressure, wax/pour point, sediment, etc.).

Truly representative sampling of crude oils etc., cannot be achieved by one single product in isolation. A well designed system and operating procedures as laid down in the Sampling Standards ISO 3171*, API 8.2 and* IP Chapter VI section 2 *are mandatory.*

Please consult Jiskoot for further information and assistance.

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1 Warranty

This product should be supplied with a warranty card. Please complete and return it to register for warranty support.

In the event it is missing, to register for support, please contact us on +44 (0)1892 518000 or support@jiskoot.com, quoting the Jiskoot Order Number or Serial No with the following information:

- Date installed
- Full installation site details, including contact details
- Maintenance and operator contact details (where different from above)
- Product comments/feedback

If the product has been supplied as part of a Jiskoot system or assembly, please complete the warranty card for the system.

2 Introduction

The Jiskoot G6 MC Gas Sampler provides accurate and reliable means of extracting gas samples from pipelines.

The sample size is fully adjustable. The G6 uses pressure balanced self-lubricating seals to maximise service intervals and all construction materials are selected to eliminate corrosion by contaminants.

The complete design concept of the G6 MC is to combine reliability and accuracy with minimum maintenance. The base unit of the G6 MC Electric Gas Sampler can be completely overhauled in less than 15 minutes (Qualified and trained personnel).

The G6 MC operates at pipeline pressures between 5 and 200 barg and will provide repeatable sample sizes regardless of pressure fluctuations. It operates as a pressure balanced sampler ensuring samples are discharged as pipeline pressure and process. This minimises evaporation or condensation and ensures that each grab remains representative.

The G6 MC Gas Sampler is equipment with a 3 phase motor, whose operating voltage and frequency were specified at order placement.

Motors may be supplied for use in a hazardous area, certified to either ATEX/CENELEC Zone 1, Gas Group IIB, T3, or UL/FM Class 1, Division 1, Gas Groups 2, 3 & 4.

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

3 Operating Instructions

The G6 MC Electric Gas Sampler is intended for incorporation into a Sampling System typically comprising Sample Take Off Probe, a controller to generate the control signal to operate the solenoid valve switching the regulated air or gas supply to the actuator and a sample receiver.

To operate the G6 MC Electric Gas Sampler, ensure any isolating valves in the pipe work between the Sample Take-off Probe, the Sample Gas Inlet/Outlet Ports and the sample return line or vent, are open. Open any isolating valves between the Sample Outlet and the sample collection system.

The time interval between each sample grab and the duration of the actuating pulse will have been adjusted during installation and commissioning. Depending on the type and method of determining grab intervals, the sample will operate automatically when the flow is detected in the main pipeline or the Controller is initiated.

4 Glossary of Special Terms

Grab	-	The action of taking an individual sample (normally 1 or 2 ml) from the pipeline.
Fast Loop	-	A by-pass pipeline along side the main pipeline through which a proportion of the product is flowing. This may either be pumped by a dedicated pump, or utilise the pressure drop across the discharge to suction of Jet-Mix Pump or across an orifice.
	-	Triangle with an exclamation mark Caution, risk of danger

5 Full Functional Description

The G6 MC Electric Gas Sampler is intended to be installed close to a sample take-off probe mounted in the system pipeline as described in section 7 of this manual.

The G6 MC Electric Gas Sampler operates the compression cycle using an electric motor to provide the motive power.

The speed of the Sampler Motor is reduced through a gearbox to a free-wheel gear and cam arrangement. The magnet (81) within the Sensor Cam (79) pulses a signal to the control unit indicating one revolution, which in turn signals disconnection of the power supply to the motor.

The power to the G6 MC Electric Gas Sampler is controlled by the MCU and sensor mounted on the side of the gearbox. On receipt of a “grab” signal from a controller the MCU applies power to the motor revolving the sensor cam. The Cam Follower (50) moves the plunger (60) downwards depressing the Sample Ram.

A flow of gas is maintained from the pipeline via the sample take-off configuration used across the Gas Sampler through the two bi-directional Sample Gas Inlet /Outlet ports.

Item numbers and components are used to aid and illustrate the functional description identified in fig 1. (For clarity, not all components have been defined)

Line pressure is applied to the Balance Port. This pressure is retained between the pair of main cartridge seal assemblies (Items 21/21a), the lower cartridge seal 21a pressing down on the annulus of the Spring Retainer (9), which is located within the body by the spring (22) pushing against the applied pressure. This ensures that the pressure required to lift the Seal (21b) between the Sample Chamber (25), and the Sample Outlet Port is, at all times, maintained above line pressure by the force exerted by the Spring.

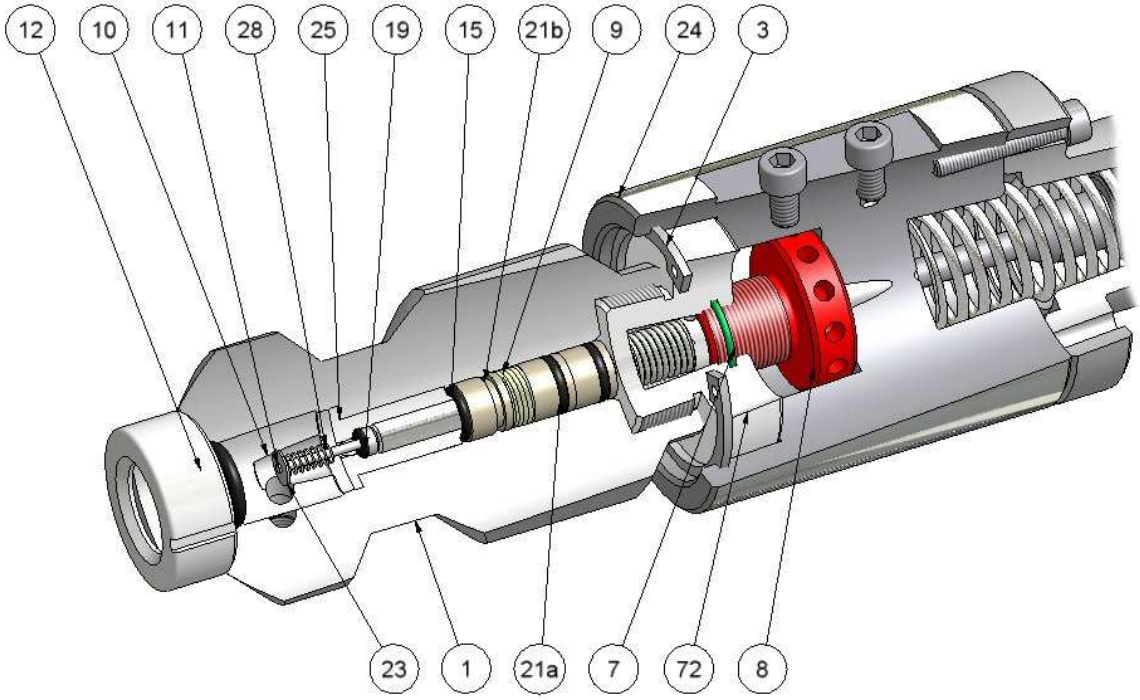


Fig. 1 Sectional View Indicating G6 MC Gas Sampler

Item No	Description	Item No	Description
1	Main Body		
3	Circlip	4	Spring
7	“O” ring	8	Displacement Adjuster
9	Spring Guide	10	Valve Body
11	Spring Retainer	12	Lock Nut
13	Check Valve Insert		
15	'O' Ring		
19	'O' Ring		
21	Cartridge		
21a	Cartridge		
21b	Cartridge	22	Spring
23	Flat Washer	25	Sample Chamber
24	Adaptor Housing	28	Spring

6 Utilities Reference

AC Power	Available Motor Voltages*	400 VAC +10%/-6% 50/60 Hz
	Power Consumption	90 Watts (60 Watts Typical)
Maximum Grab Rate **		50 grabs/minute with a 50Hz 3-phase supply

* Other voltages are available upon request.

**Maximum grab rate is dependent on supply frequency and process conditions (i.e. line pressure and fluid viscosity)

Air pressure	80psig/5.5barg

7 Installation Details

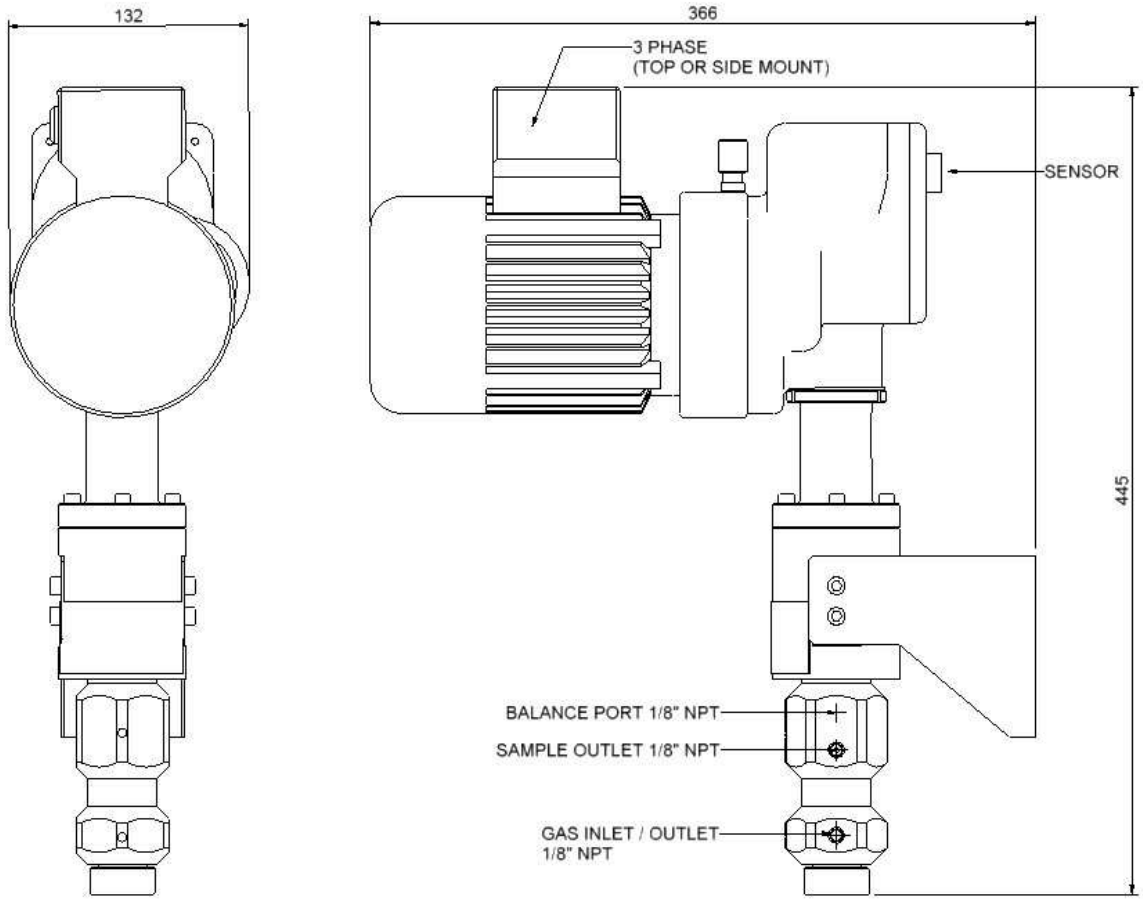


Fig 2 G6 Gas Sampler

NOTE: ***Thread tape must NOT be used on any joints associated with this equipment due the risk of pieces of tape becoming entrapped in the internal components. Use liquid thread sealants such as Loctite 572 or similar.***

7.1 Minimum Requirements

The G6 MC Gas Sampler is intended for incorporation into a Sampling System typically comprising Sample Take-Off Probe and a controller to generate the control signal

7.2 Typical Sampling System Installation

All equipment required for the correct operation of the gas sampling system should be located and installed inside a suitable enclosure. The enclosure may require heating to keep all piping and cylinders at line pressure and temperature if the gas is wet. This will prevent condensation of the heavy products and liquids that may affect the sample validity.

The Sample Cylinder, either a fixed volume (variable pressure) type or the variable volume (constant pressure) version, should be mounted vertically inside the enclosure close to the Gas Sampler.

The sampling system enclosure, being a fully functioning self-contained system, should be located as close to the Sample Take-off Probe as possible.

To prevent any trapped volume, the sample line from the probe to the sampling system enclosure should ideally be sloping upwards.

If the gas pressure applied to the Balance Port is to be supplied from an external source such as a Nitrogen supply and not directly from the Sample Inlet pipework, it is essential that the pressure is controlled to within 2 bar of the sample inlet pressure.

7.3 Sample Take-off Probe Selection, Location and Installation

Selection of Sample Take-off Probe

Single Flow (conventional) Probe.

A single flow probe may be used singularly if only a product supply is desired for sampling procedure. If a product loop is desired, a single flow probe installed in a high pressure area and return through a tapping in a low pressure area may be used. (Fig. 4).

Fig 3 for Illustration only showing “Air operated Gas Sampler”

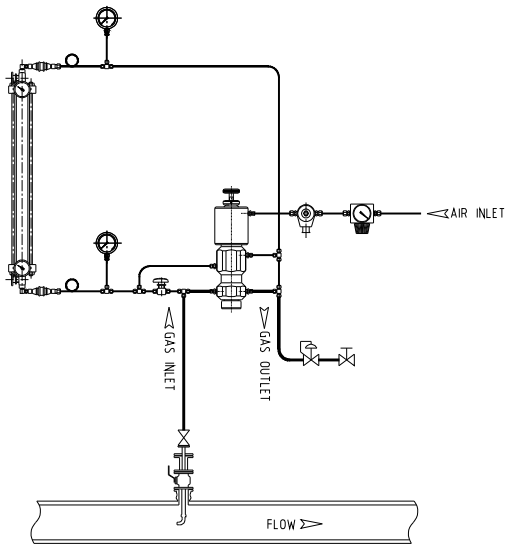


Fig. 3. Single Flow Probe

Dual Flow Probe.

A dual flow probe is recommended to achieve a product loop where only one pipeline port is available. (Fig. 6 and 7).

Fig 4 or Illustration only showing “Air operated Gas Sampler”

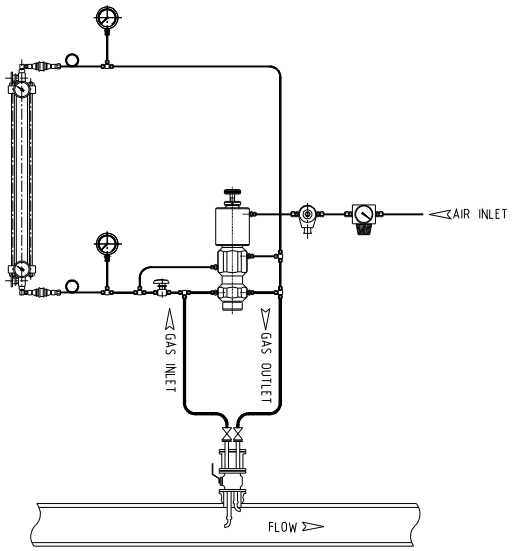


Fig. 4. Dual Flow Probe

Acceptable Sample Loops

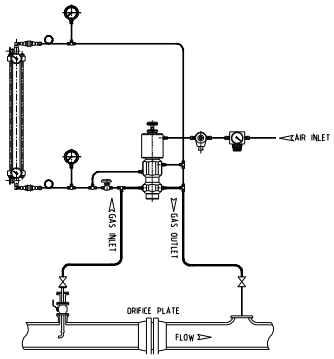


Fig. 5

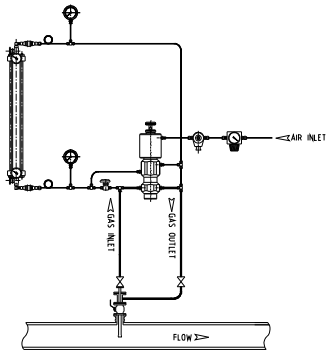


Fig. 6

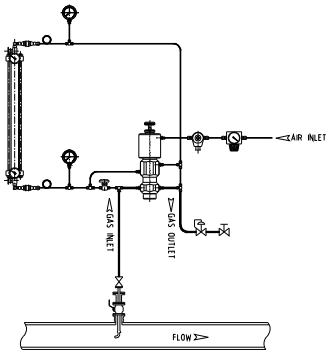


Fig. 7

Fig 5, 6 and 7 for Illustration only showing “Air operated Gas Sampler”.

7.4 Sample Take-off Probe Location and Installation

The Sample Take-off Probe should be a minimum of five pipe diameters from any device which could cause aerosols or significant pressure drops.

The Sample Take-off Probe should not be located within the meter tube region as defined in *AGA 3-1985 edition, Figure 4-8.*

The Sample Take-off Probe should be mounted vertically in a horizontal run.

The Sample Take-off Probe should penetrate into the centre one-third of the pipeline.

The end of the Sample Take-off Probe should be cut parallel to the pipeline.

The Sample Take-off Probe should be stainless steel.

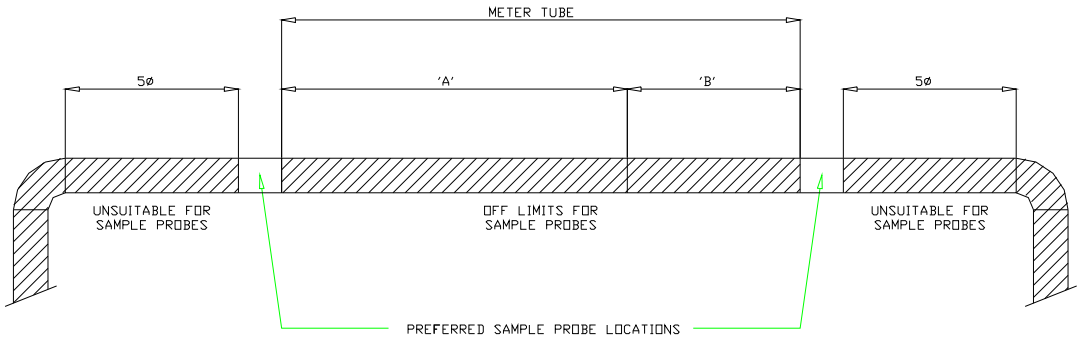


Fig. 8. PREFERRED PROBE LOCATION

7.5 Typical Gas Sampling Configurations

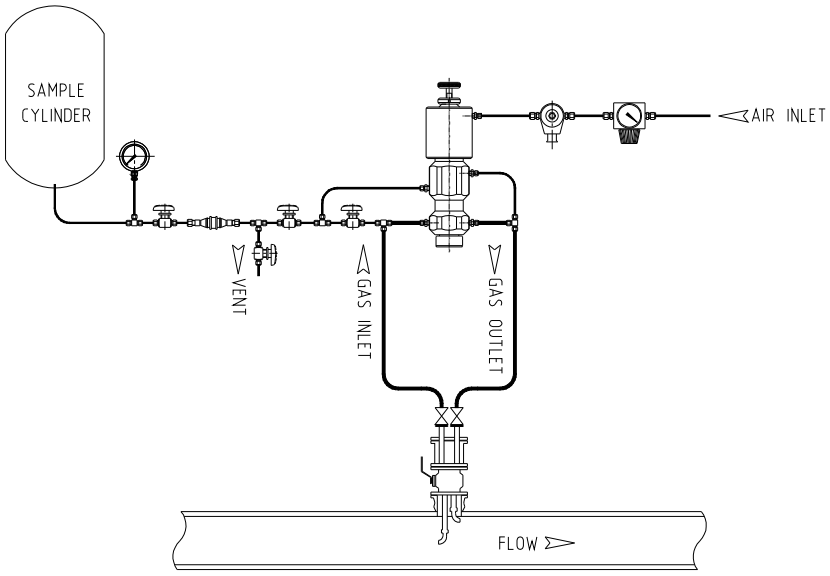


Fig.9. Fixed Volume Sampling System

(For Illustration only showing “Air operated Gas Sampler”)

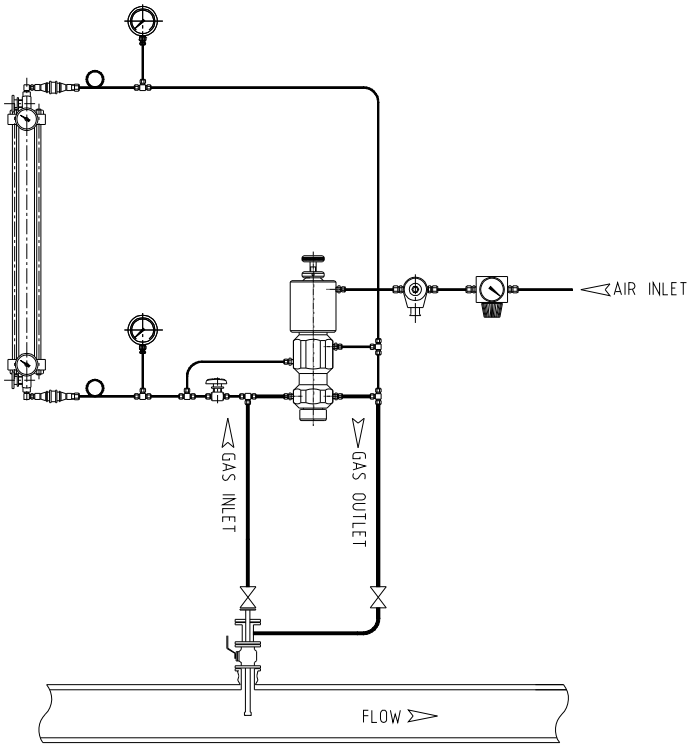


Fig.10. Constant Pressure Sampling System

(For Illustration only showing “Air operated Gas Sampler”)

The product loop should be as short as possible using 1/4"-3/8" (6-8mm) inch stainless steel tubing and should be insulated if extreme conditions are expected (e.g. extremely cold weather, product supply lines longer than 10 feet/3 metres).

The supply line should slope from the probe up to the sampler. All traps must be avoided.

The supply line should slope down from the sample to a connection of lower pressure on the pipeline.

To minimise pressure loss in the sample loop, all valves should be full bore stainless steel ball valves.

The product loop should not have filters fitted.

8 Equipment Start-up

8.1 Initial Start-up and Leak Testing

When all tubing connections have been completed, open the sample probe supply and return valves to establish product supply pressure to the sampler. Check all connections in the product loop using leak detector (e.g. *SNOOP*).

Adjust the actuator supply filter/regulator to 80psig/5.5 Barg and check all connections and valving using leak detector.

The Displacement Adjuster (8) within the “Adaptor Body” of Sampler (if not factory set) should be open (anti-clockwise) for maximum volume. Select the quickest sampling rate which can be achieved by applicable control for the initial start-up and leak test procedure.

Sampler actuation will cycle upon sampler controller or timer. Allow the Sampler to actuate at the fast rate and maximum volume until desired stabilised pressure is achieved at sample discharge. Check all connections from sample discharge of Sampler to connection on sample cylinder using liquid leak detector.

8.2 Sampler Stroke Adjustment

Table 1 provides an approximate theoretical displacement per sample grab for the setting of the Displacement Adjuster based on a non-compressible medium and time desired between samples.

The sample output is infinitely adjustable from 0-0.4cc/stroke. Turn the Displacement Adjuster clockwise until plunger is bottomed out. Turning anti-clockwise count the revolutions until desired setting is reached.

The desired time between samples (determined from Table 1) is set in the sampler controller and requires a pulse of 3 seconds duration time for Sampler actuation.

SAMPLING RATE IN MINUTES FOR VESSEL INDICATED													
No. of turns open on Displacement Adjuster	**Sample Displacement per Stroke**	**31 DAY SAMPLING PERIOD Sample Vessel Size In cc's**						**7 DAY SAMPLING PERIOD Sample Vessel Size In cc's**					
		1000	**800**	**600**	**500**	**400**	**300**	**1000**	**800**	**600**	**500**	**400**	**300**
1	0.042	1.9	2.3	2.9	3.7	4.7	6.2	0.4	0.5	0.7	0.8	1.1	1.4
2	0.083	3.7	4.7	5.8	7.4	9.3	12.4	0.8	1.1	1.3	1.7	2.1	2.8
3	0.125	5.6	7.0	8.7	11.2	14.0	18.6	0.3	1.6	2.0	2.5	3.2	4.2
4	0.167	7.4	9.3	11.6	14.9	18.6	24.8	1.7	2.1	2.6	3.4	4.2	5.6
5	0.208	9.3	11.6	14.5	18.6	23.3	31.0	2.1	2.6	3.3	4.2	5.3	7.0
6	0.250	11.2	14	17.4	22.3	27.9	37.2	2.5	3.2	3.9	5.0	6.3	8.4
7	0.292	13.0	16.3	20.3	26.0	32.6	43.4	2.9	3.7	4.6	5.9	7.4	9.8
8	0.333	14.9	18.6	23.3	29.8	37.2	49.6	3.4	4.2	5.3	6.7	8.4	11.2
9	0.375	16.7	20.9	26.2	33.5	41.9	55.8	3.8	4.7	5.9	7.6	9.5	12.6
10	0.417	18.6	23.3	29.1	37.2	46.5	62.0	4.2	5.3	6.6	8.4	10.5	14.0
11	0.458	20.5	25.6	32.0	40.9	51.2	68.2	4.6	5.8	7.2	9.2	11.6	15.4
12	0.500	22.3	27.9	34.9	44.6	55.8	74.4	5.0	6.3	7.9	10.1	12.6	16.8

9 Maintenance and Troubleshooting

9.1 Health and Safety Precautions

The G6 MC Gas Sampler may be used in applications involving hazardous products (Generally as a Jiskoot bespoke project) In the event of the sampler being shipped as an individual item **IT IS THE RESPONSIBILITY OF THE END USER TO CONFIRM INSTALLATION SUITABLITY AND COMPLY WITH ALL INSTALLATION REQUIREMENTS AND CONFORMANCE**.

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.

9.2 Annual Maintenance

The G6 MC Gas Sampler is designed to operate continuously for a period of about 1,000,000 grabs or 12 months 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 can not be guaranteed. The service intervals will therefore need to be determined from the experience gained on the particular application.

The G6 MC Gas Sampler should be removed from the pipeline and taken to a clean area for servicing, servicing by trained and competent personnel.

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.

9.3 Overhaul Instructions

Envisaged as being preformed via trained and competent personnel

Remove the Gas Sampler from sampling system enclosure.

All stainless steel tubing from process connecting to the Sampler must be disconnected before removing the Sampler. It is not necessary to remove the fittings from the Sampler.

9.4 To replace the Inlet Valve 'O' ring

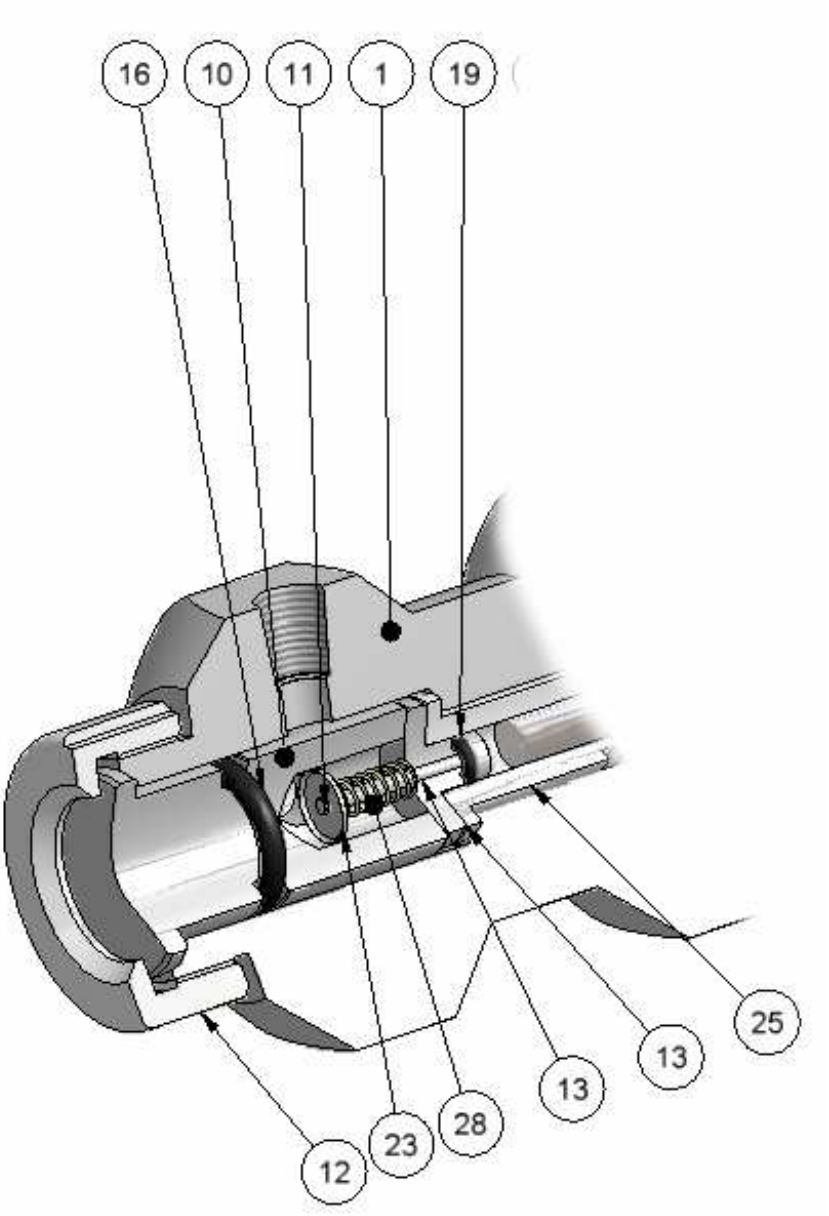


Fig.12. Sectional View - Main Seals

To replace the Inlet Valve 'O' ring (item 19), unscrew the Lock Nut (12) from the Main Body and withdraw the Valve Body (10). Cut the 'O' ring off the head of the Check Valve Stem (13) and stretch the new 'O' ring over the head of the Check Valve Stem using a light coat of *Castrol Spheerol MP2* (or equivalent) grease.

The Inlet Valve Assembly should be refitted as described in section 9.7

9.5 To remove the Actuator Cylinder and Block from the Sampler Body.

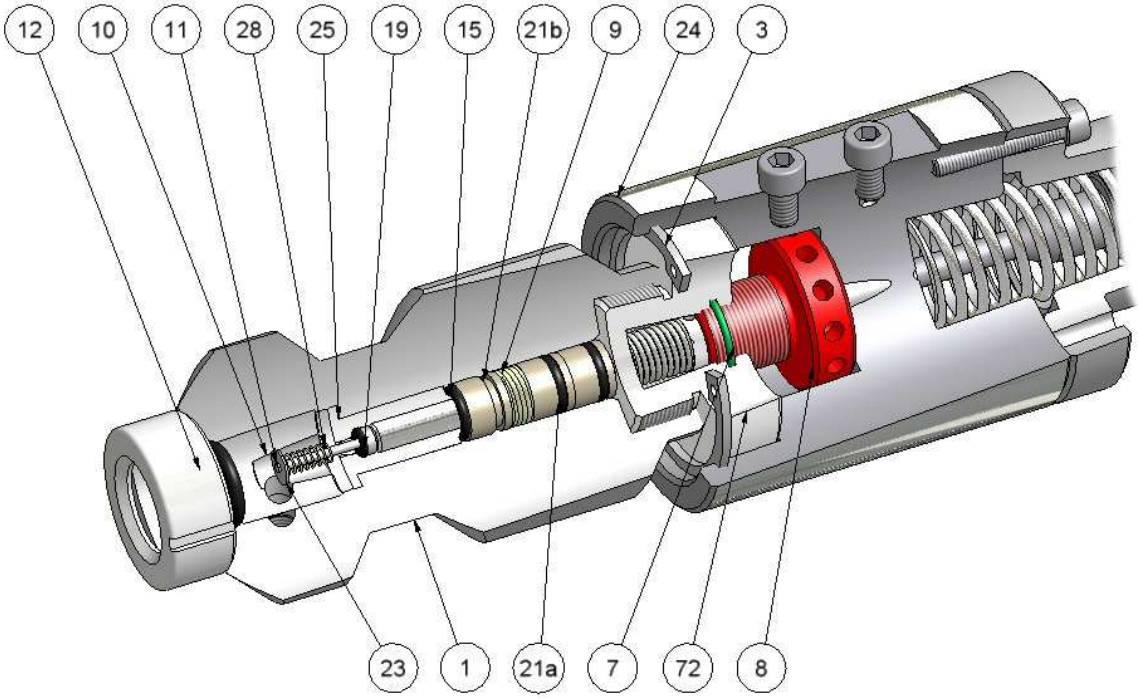
The Actuator Cylinder and Block are threaded into the top of the Main Body. The Actuator Cylinder houses the Actuator Piston, Spring and Piston and should not be dismantled unless one of these items needs replacing. To replace the Piston Seal, unscrew the Actuator Cylinder and Block from the Main Body, remove the Circlip (3) and withdraw the Actuator Block from the cylinder. This will allow the Actuator Piston to be removed and the Piston Seal to be replaced.

9.6 To remove internal cartridge seals from Sampler Body.

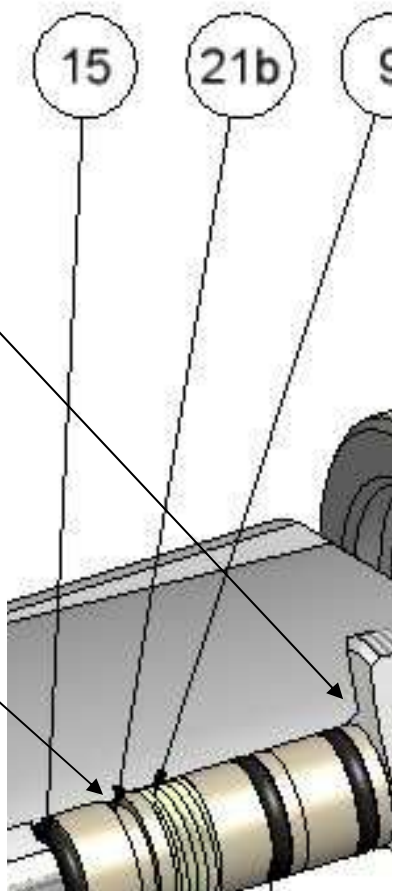
Release the Gas Sampler Body from the Electric Motor Assembly via removal of the Circlip item 3. Unscrew item 72 from the Main Body, withdrawing the Sample Ram. Unscrew the Lock Nut (12) from the Main Body and withdraw the Valve Body (10) Insert a non-metallic rod (between 5/16"-1/2" (8-12mm) diameter), pushing gently to remove the Sample Chamber (25) and Cartridge Seals, out the bottom of the Sampler Body.

Clean and inspect all components to determine if replacement is necessary.

NOTE: Normal service generally requires only the replacement of the Cartridge seals, available from Jiskoot Ltd.



9.7 Sampler Reassembly



Apply a light coat of *Castrol Spheerol MP2* (or equivalent) grease on all components to prevent damage.

It is recommended that the cartridge seals are first placed over the Sample Ram before final assembly to “Size” the internal seals.

Ensure that the Body (In the event of a G5 Upgrade) has been moderately chamfer at both ends to aid fitting of the Cartridge and “O” rings

Install the Sample Chamber with 'O' ring (15) positioned at the end of the Sample Chamber, followed the Valve Body (10) ensuring that the cross port is in line with the tappings in the body. Use a small Allen key or bar to prevent the body rotating as Lock Nut (12). is tightened.

Remove an “O” Ring from the **“FIRST”** Cartridge Seal and fit the Cartridge Seal through the top of the Sampler body, so as to press against “O” Ring (15). Fit the spring; spring spacer and two further cartridge seals complete with “O” rings on the cartridge seals.

With Sample Ram lightly coated with *Castrol Spheerol MP2* ensure that the end is free from burrs. Insert the Sample Ram into the Seal Spacer and with a twisting motion; push down through the Cartridge Seals, screwing the Actuator Block to the top of Main Body to retain all components in place.

Re-fit the Circlip to retain the Gas Sampler Body to the Motor Assembly.

Set the Displacement Adjuster back to its original setting.

Refit the G6 MC assembly to the enclosure and reconnect any power, sensor and actuator lines to the Sampler.

Pressure test Sampler as described in Section 2 to ensure correct operation.

10 Recommended Spares List

Item No	Qty.	Stock No	Description
-	1	45-0206-00	Spares Kit for G6 Gas Sampler

11 Disclaimer

Whilst Jiskoot Limited has taken every care in the preparation of this document, it cannot accept responsibility for printing errors or omissions and does not warrant that it is correct and comprehensive in every particular. Equipment supplied should always be operated by persons with an appropriate level of skill and training.

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0	First Issued (Based on G6 Issue 0)	N.McGee	P.Whittle	20.11.07
Issue	**Revision History**	**Issued**	**Approved**	**Date**

Notes

Notes