

The HydroMet logo features a stylized white slash mark followed by the word "HydroMet" in a bold, white, sans-serif font. The background of the top half of the cover is a photograph of a bright sun partially obscured by large, white, puffy clouds against a deep blue sky. A large, diagonal, semi-transparent blue band cuts across the image from the top left towards the bottom right.

/HydroMet

User Manual

HS23 Bubble Unit

The KISTERS logo consists of a stylized white 'K' symbol followed by the word "KISTERS" in a bold, white, sans-serif font. Below the company name is the tagline "Empowering decisions of tomorrow" in a smaller, white, sans-serif font.

KISTERS
Empowering decisions of tomorrow

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I Disclaimer

The information provided in this manual was deemed accurate as of the publication date. However, updates to this information may have occurred.

This manual does not include all of the details of design, production, or variation of the equipment nor does it cover every possible situation which may arise during installation, operation or maintenance. KISTERS shall not be liable for any incidental, indirect, special or consequential damages whatsoever arising out of or related to this documentation and the information contained in it, even if KISTERS has been advised of the possibility of such damages.

Any errors found in any KISTERS product should be reported to KISTERS where every effort will be made to quickly resolve the problem.

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This document is public.

II Scope of Delivery

- Model HS23 Bubble Unit

III Safety Instructions

- Read the user manual including all operating instructions prior to installing, connecting and powering up the KISTERS HS23. The manual provides information on how to operate the product. The manual is intended to be used by qualified personnel, i.e. personnel that have been adequately trained, are sufficiently familiar with installation, mounting, wiring, powering up and operation of the product.
- Keep the user manual on hand for later reference!
- If you encounter problems understanding the information in the manual (or part thereof), please consult the manufacturer or its appointed reseller for further support.
- KISTERS HS23 is intended to be used in hydrometeorological or environmental monitoring applications.
- Before starting to work, you have to check the functioning and integrity of the system.
 - Check for visible defects on the HS23, this may or may not include any or all of the following: mounting facilities, connectors and connections, mechanical parts, internal or external communication devices, power supplies or power supply lines, etc.
 - If defects are identified that could compromise operational safety, work must be stopped immediately. This applies to defects detected both before work begins and during operation.
- Do not use the KISTERS HS23 in areas where there is a danger of explosion.
- The present user manual specifies environmental/climatic operating conditions as well as mechanical and electrical conditions. Installation, wiring, powering up and operating the KISTERS HS23 must strictly comply with these specifications.
- Perform maintenance only when tools or machinery are not in operation.
- If guards are removed to perform maintenance, replace them immediately after servicing.
- Never make any electrical or mechanical diagnostics, inspections or repairs under any circumstances. Return the product to the manufacturer's named repair centre. You can find information on how to return items for repair in the relevant section of the KISTERS website.



Disposal instructions: After taking the KISTERS HS23 out of service, it must be disposed of in compliance with local waste and environmental regulations. The KISTERS HS23 is never to be disposed of in household waste!



Inputs and outputs of the device are protected against electric discharges and surges (so-called ESD). Do not touch any part of the electronic components! If you need to touch any part, please discharge yourself, i.e. by touching grounded metal parts.

1 Introduction

Thank you for choosing our product. We hope you will enjoy using the device.

KISTERS manufactures, sells, installs and operates quality instrumentation, data loggers and communication technology. Products are designed with passion for environmental monitoring and with a deep understanding of the quality, accuracy and robustness needed to fulfil the requirements of measurement practitioners in the field.

The present User Manual will help you understand, install and deploy the device. If, however, you feel that a particular information is missing, incomplete or confusing, please do not hesitate to contact us for further support!

- The HS23 bubble unit utilises the proven gas purge method to sense water level by bubbling gas from a gas cylinder (e.g. Dry Nitrogen) through a small diameter tube and out from an open orifice end into the water body.
- Changes in water level in the water body result in a change in the pressure of gas inside the tube.
- A pressure transducer, connected to the HS23 then converts pressure changes in the tube to a reading of water level (in metres or feet).
- The HS23 provides a constant differential pressure above the pressure head at the orifice to ensure a constant flow of gas to the orifice regardless of the prevailing water level or rate of rise in the stream.
- The HS23 is a design which incorporates a Nupro needle valve for setting the bubble rate. The unit is pre-calibrated at the factory at approximately 26 bubbles per minute at the orifice.
- The HS23 is a reliable low maintenance unit, manufactured from quality materials ensuring long life in the harshest of environments.

1.1 Unpacking Your HS23 Bubble Unit

This package should contain:

- Model HS23 Bubble Unit

Please verify you have received these items and that the type of dry bubble unit is as ordered.

To prepare the HS23 bubble unit for installation:

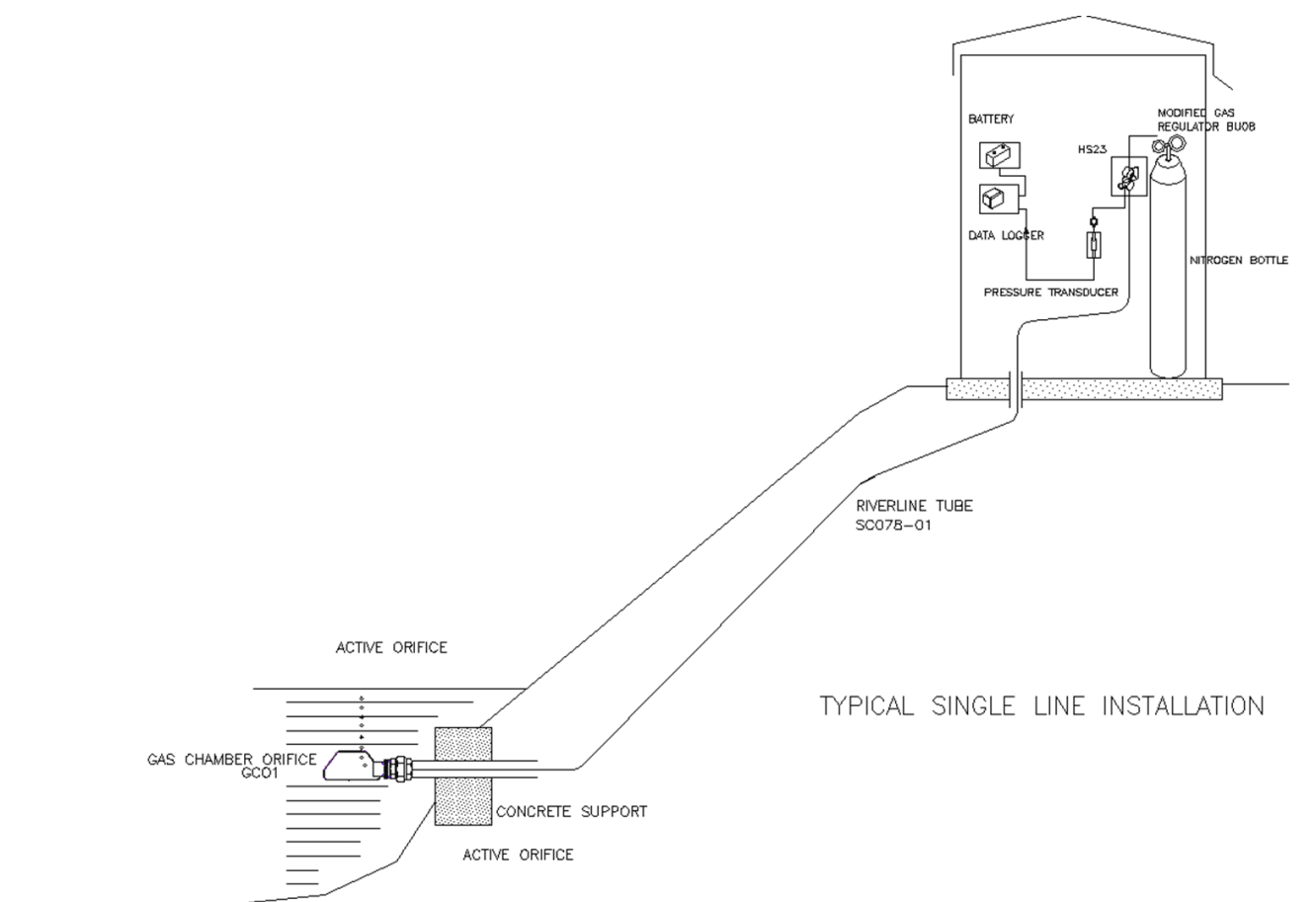
- Read the manual carefully, it can be downloaded from our website www.kisters.eu.
- Lift the unit from the carton and place on secure surface.
- Remove the polythene bag from the unit.
- Undo the two mounting bolts and remove from the transport board.

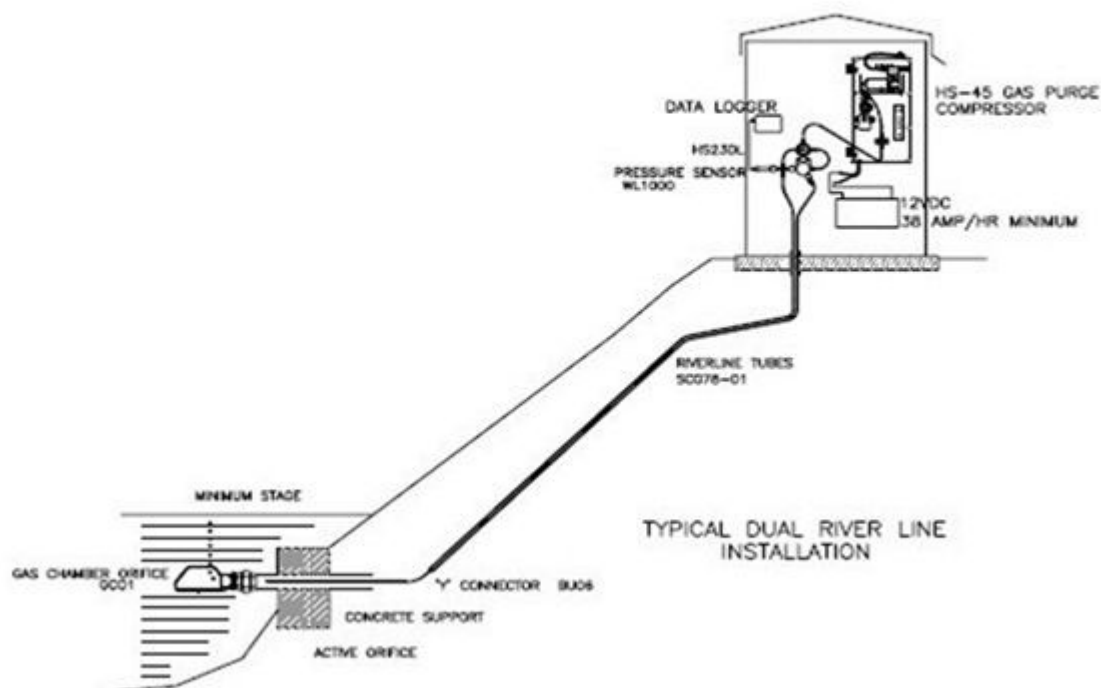
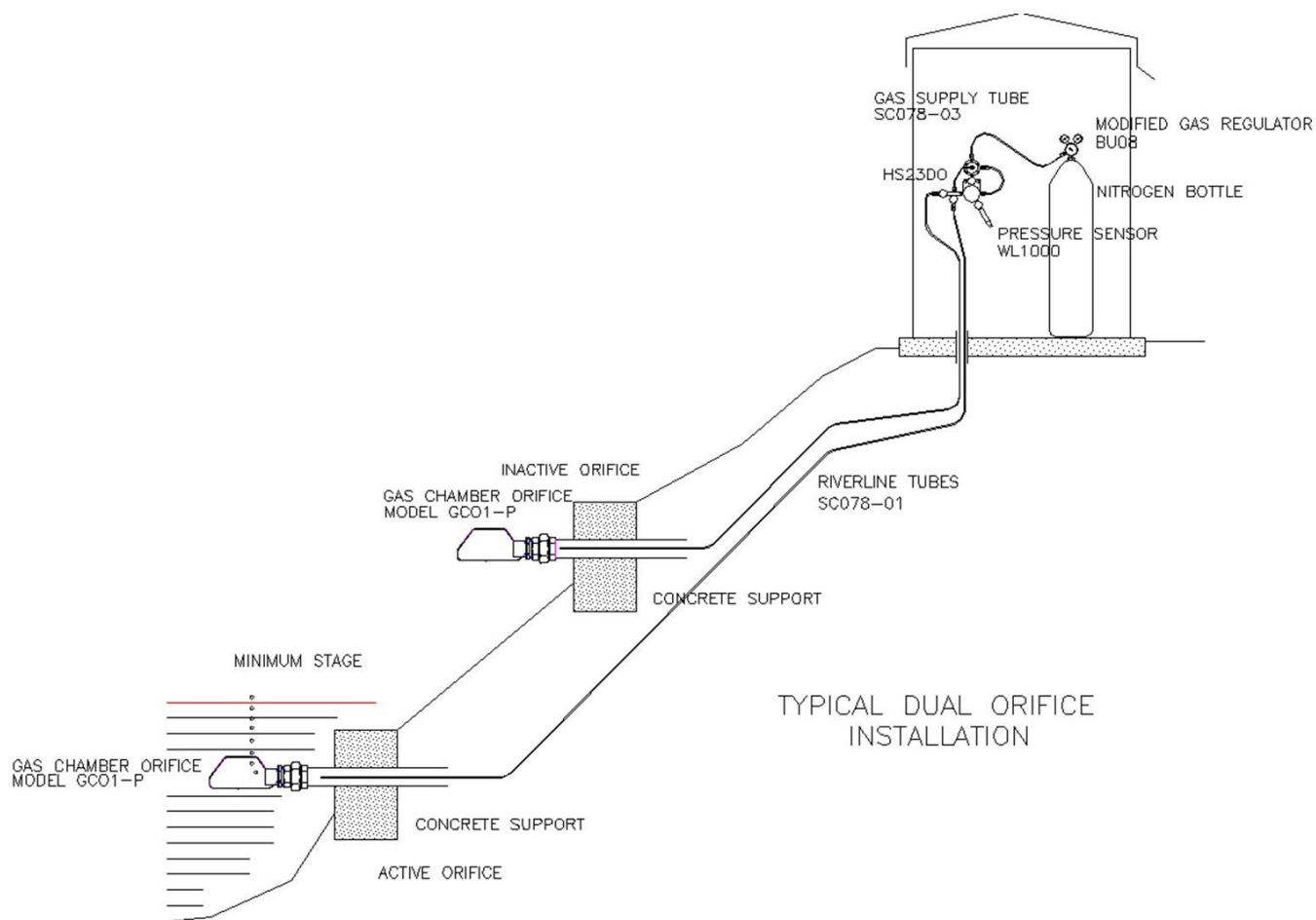
Your HS23 bubble unit is now ready for [installation and connection](#) .

2 Installation

- Secure the gas cylinder in a convenient position and fix to a wall or shelf with a bracket or chain to prevent the cylinder from falling over.
- Before fitting the gas regulator, open the cylinder valve to clear dust away from the outlet (also check that the cylinder contains gas).
- Fit the gas cylinder regulator in accordance with manufacturer's instructions.
- Fix the HS23 dry bubble unit in a secure **vertical** position to wall or edge of shelf using the two holes provided on the mounting plate.
- Install the River Line tubing as required by site conditions ensuring the tubing is encased in a protective conduit.
- The River Line should be either buried underground or secured to stable surfaces above ground using suitable masonry anchors.
- The River Line installation must ensure there is a continuous fall with no LOW spots where moisture can be trapped (see diagram below)
- For pressure fittings ensure ferrules are inserted correctly prior to tensioning of nut (**finger tight then a maximum 1¼ turns**)
- Ensure that the gas supply regulator is set at 550 kPa (80 psi). This supply pressure is adequate for a change of river height of 45 metres (147 feet).
- The supply pressure to the bubble unit regulator should NOT exceed 1,050 kPa (152 psi) under any circumstances.
- The Model HS23 can be supplied to suit SINGLE (HS23SL) or DUAL (HS23DL) orifice lines. A DUAL ORIFICE (HS23DO) model is also available. Details follow below.

Typical Installation





3 Configuration

This chapter contains the following subsections:

- [Available Configurations](#)⁹
- [Adjustment of Bubble Rate Using HS23QC Bubble Rate Tester](#)⁹
- [Adjustment of Bubble Rate Using River Line](#)¹⁰

3.1 Available Configurations

Model	Description	Gas Supply Line Fitting (standard)	Instrument Fitting (standard)	River Line Fitting (standard)	Gas Supply
HS23SL	Single River Line	¼"	¼"	3/8"	Dry Nitrogen or Dried Air
HS23DL	Dual River Line	¼"	¼"	3/8"	Dry Nitrogen or Dried Air
HS23DO	Dual Orifice	¼"	¼"	3/8"	Dry Nitrogen or Dried Air

Additional fittings on request

- Gas Supply Fittings also available in 3/16" or 3/8"
- Instrument Fittings also available in 3/16" or 3/8"
- River Line Fittings also available in 3/16" or ¼"

Compatible Pressure Transducers

Models WL3100 and WL3100A (and compatible third-party transducers)

3.2 Adjustment of Bubble Rate Using HS23QC Bubble Rate Tester

Note: This option is only available if the Bubble Unit is equipped with the Bubble Test Upgrade.

The HS23 Bubble Unit has been factory set to the equivalent rate of approximately 26 bubbles per minute at the orifice. To check and adjust the bubble rate using the HS23QC bubble rate tester the following method should be employed:

1. Close valve A (instrument line), then close valve B (river line).
 2. Connect the HS23QC test orifice tube to the quick connect fitting.
 3. Submerge the end of the test orifice in a container of clean water to a depth of at least 100 mm.
 4. The water container should be placed on a flat and stable surface to prevent movement of the water. Ensure that the level of the water is below the level of the HS23 Bubble Unit, to avoid the ingress of water.
- Note:** Bubbles may take a couple of minutes to appear.
5. Allow the rate to settle for five minutes before timing the bubble rate.
 6. With the aid of a stop watch, count the number of bubbles emerging from the orifice in a one-minute period. The factory set rate is approximately 26 bubbles per minute.
 7. For recommended bubble rates (refer to figure below).
 8. If adjustment is required, loosen the Nupro valve thumbscrew to increase/decrease bubble rate.
 9. Wait 10 minutes for bubble rate to settle before checking.
 10. Tighten the Nupro valve thumbscrew **FINGER TIGHT ONLY** when the correct bubble rate is observed, and recheck the bubble rate.
 11. When the bubble rate is correct, disconnect the HS23QC from the quick-connect fitting and open valve B.
 12. Open valve C and purge the river line.
 13. Close valve C and wait approximately 60 seconds to allow excess line pressure to escape from the orifice assembly.
 14. Open valve A (instrument line).

The graph below shows the relationship between flow rate and bubble rate for a selected length of tube. Please note the bubble rate changes depending on the orifice type used.

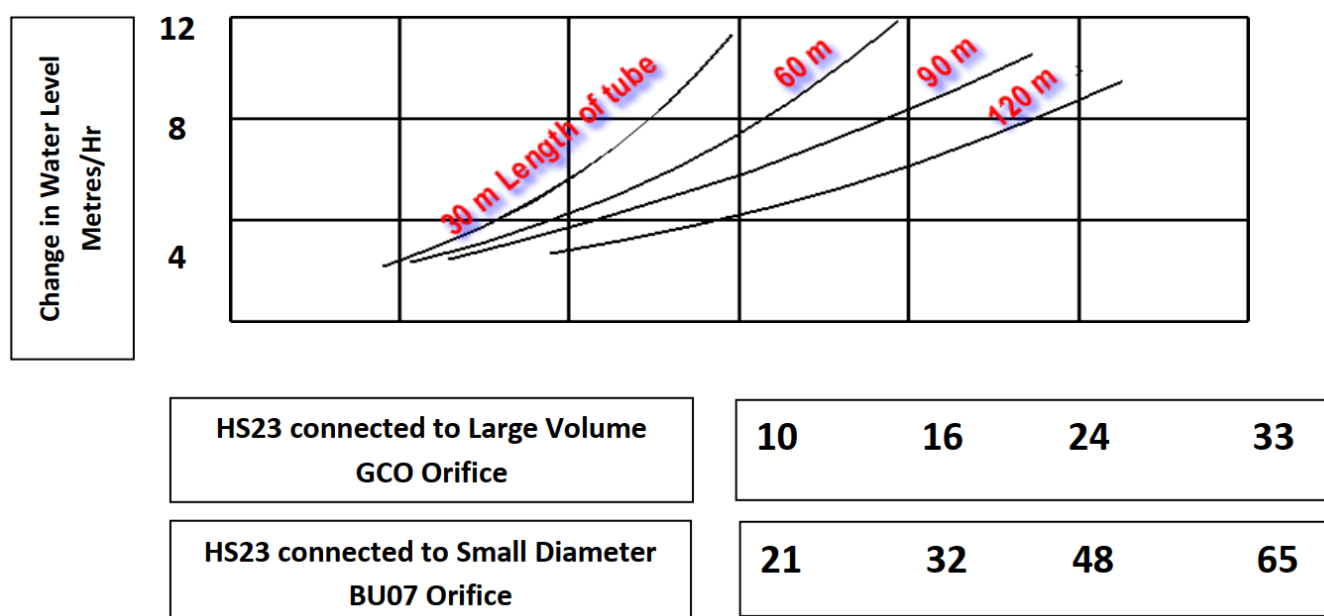


Figure 1

Note: Bubble rates detailed above are only an **approximate** guide for the purpose of conserving gas and have no influence on the performance of the transducer.

3.3 Adjustment of Bubble Rate Using River Line

The HS23 Bubble Unit has been factory set to the equivalent rate of approximately 26 bubbles per minute at the orifice. To check and adjust the bubble rate the following method should be employed:

1. Close the instrument line valve (A), river line valves (B) and (E), and make sure the purge valve is completely closed.
2. Disconnect the river line tubing from the bubble unit.
3. Connect a one metre length of tube to the river line fitting of the bubble unit.
4. Submerge the other end of the tube in a container of clean water to a depth of at least 100 mm. (This end of the tube should be secured at this depth, preferably in a horizontal position). The end of the tube should not be in contact with the sides or bottom of the water container.
5. The water container should be placed on a steady surface to prevent movement of the water. Ensure that the level of the water is below the level of the HS23 Bubble Unit, to avoid the ingress of water.
6. Ensure that the gas supply valve is open and the gas supply regulator is set at 500 kPa.
7. Open the river line valve (B) or (E) (gas should bubble out of the orifice, this may take several minutes).
8. Allow the rate to settle for five minutes before timing the bubble rate.
9. With the aid of a stop watch, count the number of bubbles emerging from the orifice in a one minute period. The factory set rate is $26 \pm 10\%$ bubbles per minute.
10. For recommended bubble rates (refer to figure 3).
11. To adjust the rate, release the Nupro valve thumbscrew. The valve is now free to rotate.
12. Rotate the valve knob to adjust the rate of bubbles emerging from the tube orifice. Clockwise to reduce and anticlockwise to increase to the desired rate. Repeat step 8 and 9 until desired bubble rate is obtained.
13. Tighten the Nupro valve thumbscrew **FINGER TIGHT ONLY**.
14. Close the river line valves (B) and (E) and make sure the purge valve is completely closed.
15. Disconnect the one metre length tube from the river line fitting of the bubble unit.
16. Reconnect the river line tubing to the bubble unit, replacing ferrules if necessary.
17. Open valve (B) river line and purge river line by opening valve (C).
18. Close valve (C) and wait approximately 60 seconds for excess pressure to escape from the orifice.
19. Open instrument line valve (A).

The graph below has been prepared to show the relationship between flow rate and bubble rate for a selected tube length and orifice type.

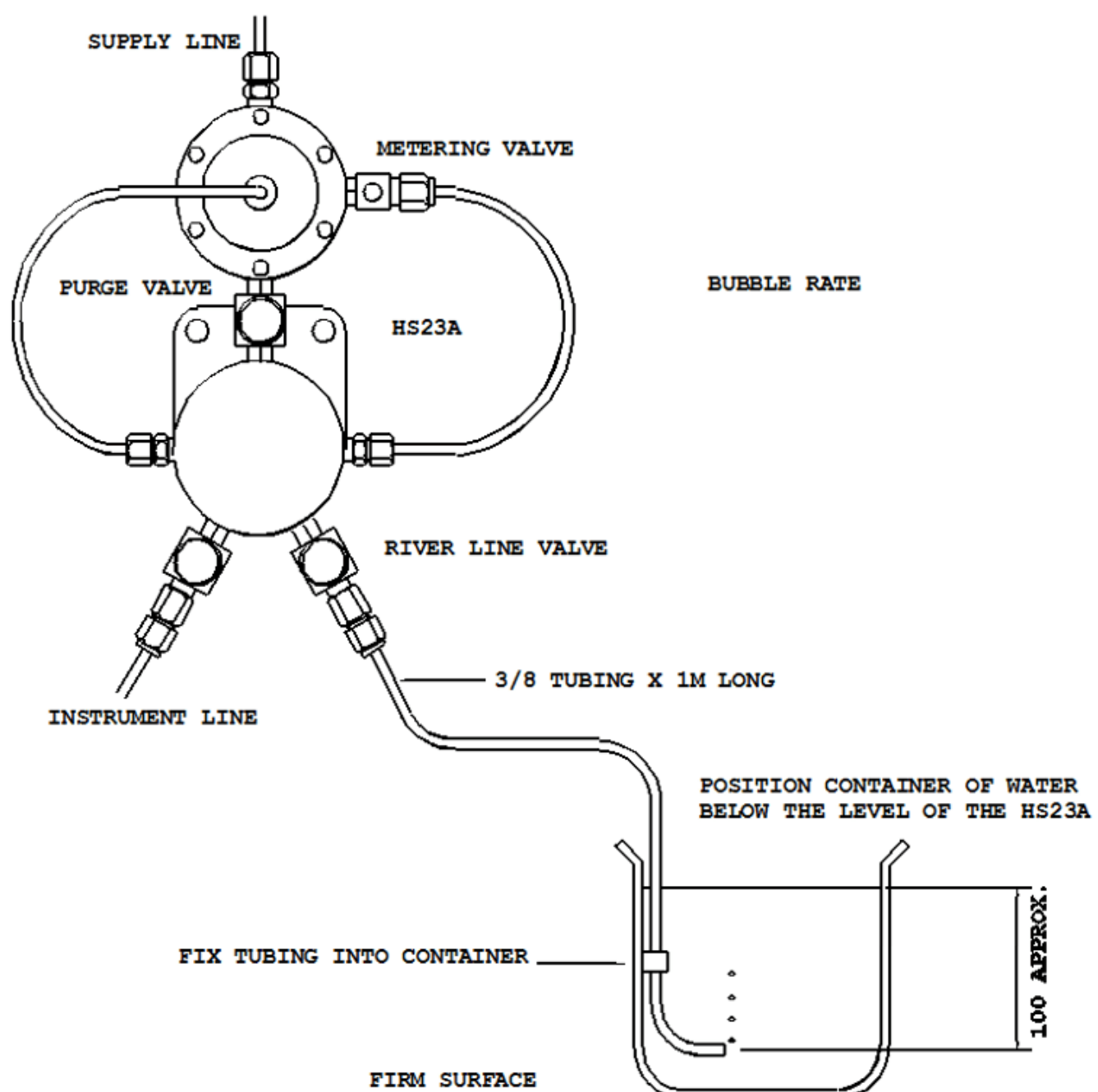


Figure 2

The graph below shows the relationship between follow rate and bubble rate for a selected length of tube. Please note the bubble rate changes depending on the orifice type used.

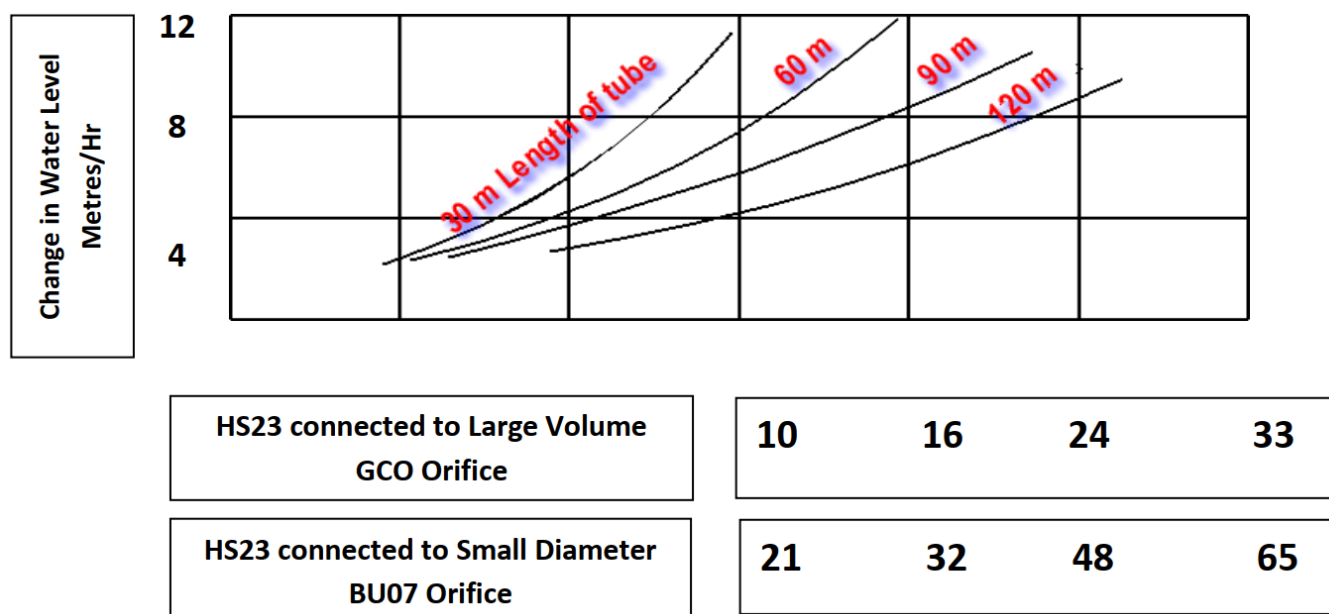


Figure 3

Note: The bubble rates listed above are only an **approximate** guide for gas conservation purposes and, if adequate for site conditions, will not affect transducer performance and the water level being recorded.

4 Operation

In addition, ensure that the gas supply regulator is set at 550 kPa (80 psi). This supply pressure is adequate for a change of river height of 45 Metres (147 Feet).

The supply pressure to the bubble unit regulator should not exceed 1,050 kPa (152 psi) under any circumstances.

Open the gas supply pressure and then open the red purge valve (C) to purge the river line for approximately 10 minutes, check orifice and ensure that gas is bubbling from the orifice

After purging the river line shut the red purge valve (C) and allows the bubble rate to settle for five minutes before proceeding.

The HS23 is factory set to approximately 26 bubbles per minutes at the orifice). (Refer to fig.4) for bubble rate selection chart. For details of bubble rate adjustments (refer to section 3.3^[9] and 3.4^[10]).

Slowly open valve (A) to instrument - instrument should now respond to pressure in system and soon record the true head over the orifice.

Leak test all connections before leaving the site.

Adjust the pressure sensing device to correspond to the head indicated by the reference gauge.

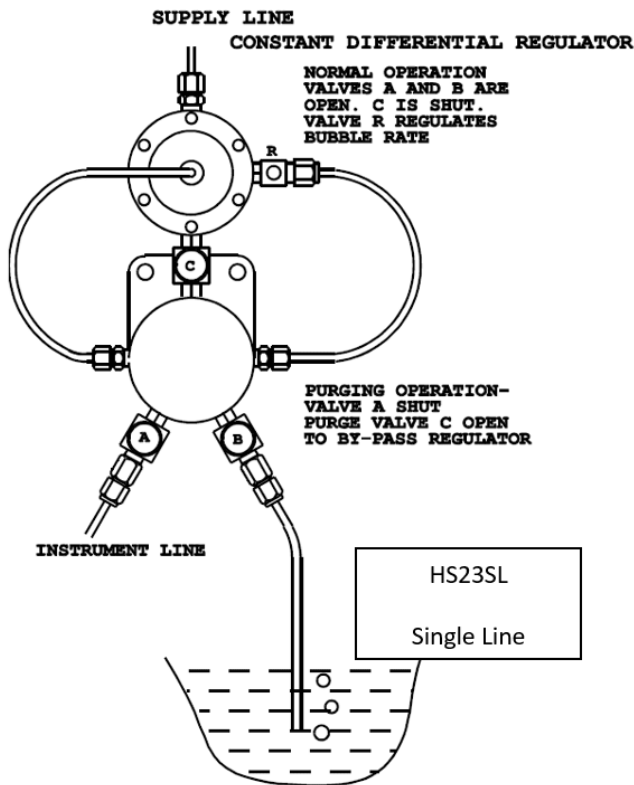


Figure 4

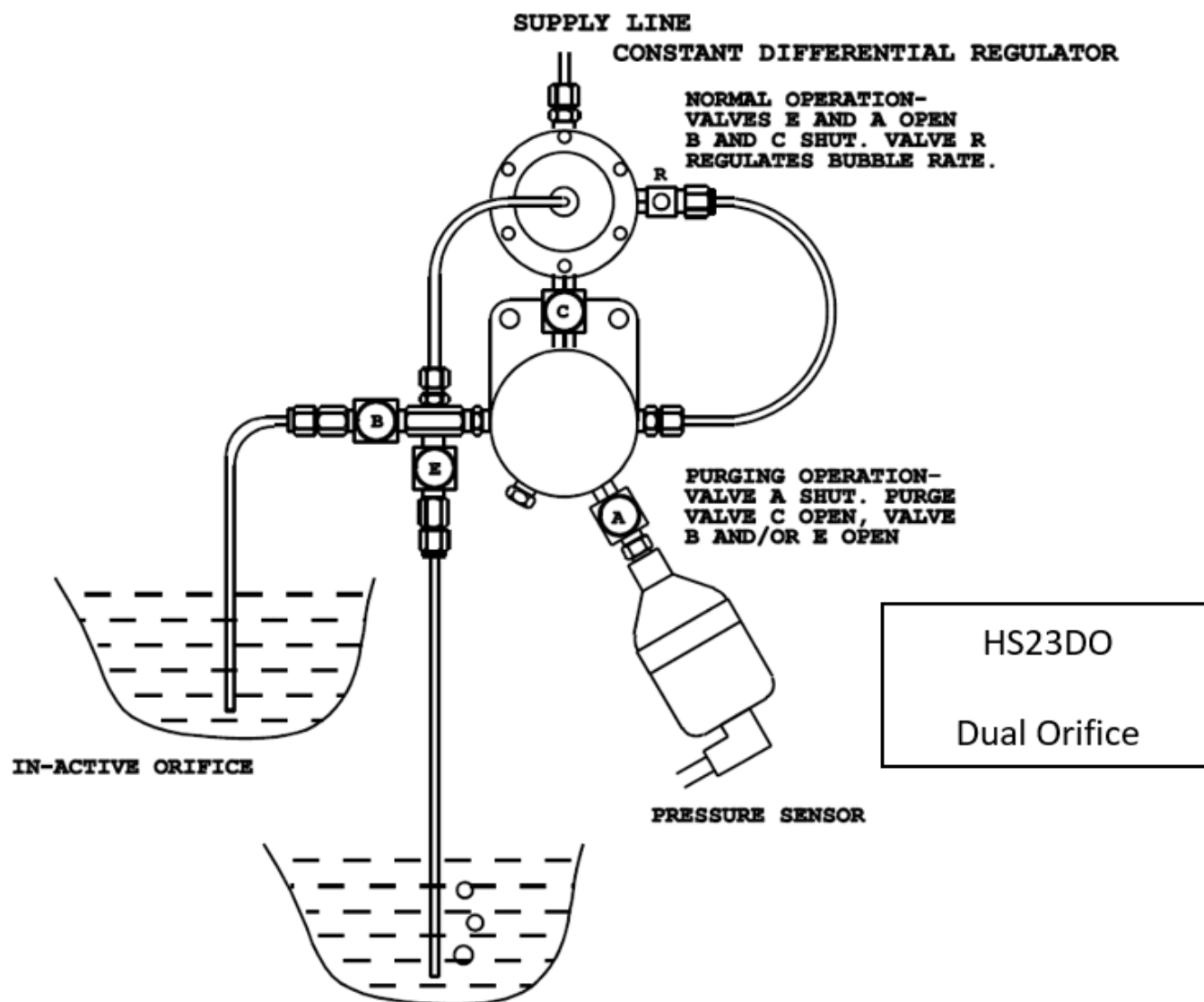


Figure 5

5 Maintenance

The Model HS23 Bubble Unit is virtually maintenance free. The only suggested checks are visual checks of product integrity and a check for leaks in connectors and fasteners using an approved leak detection fluid. Schematics showing all components for various models of the HS23 can be seen below.

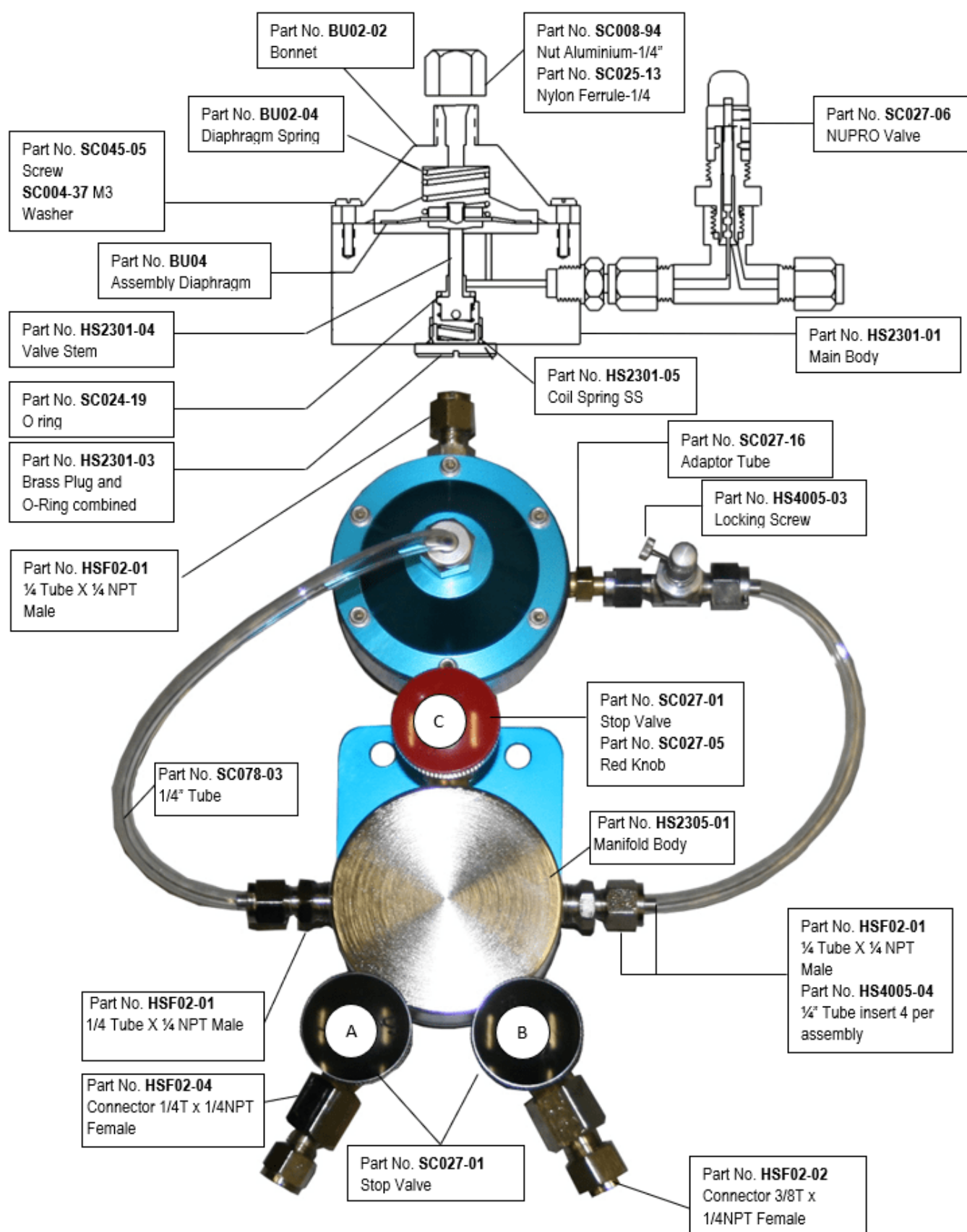


Figure 6 – Single Line Bubble Unit Model HS23SL

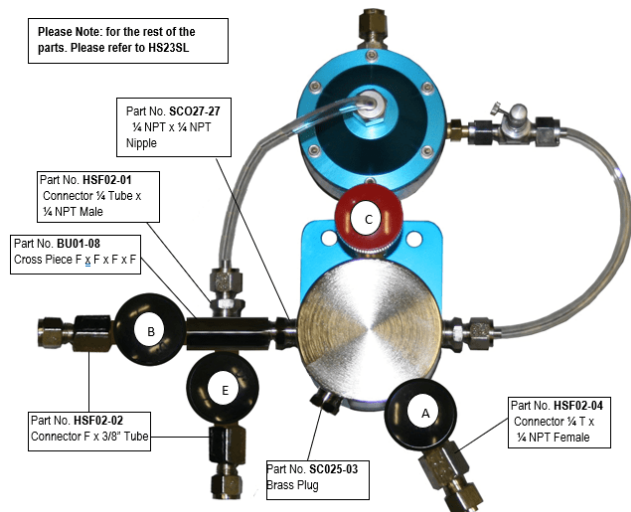
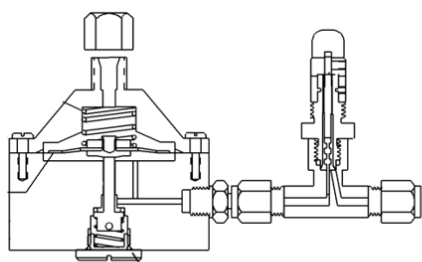


Figure 7 – Dual Orifice Bubble Unit Model HS23DO

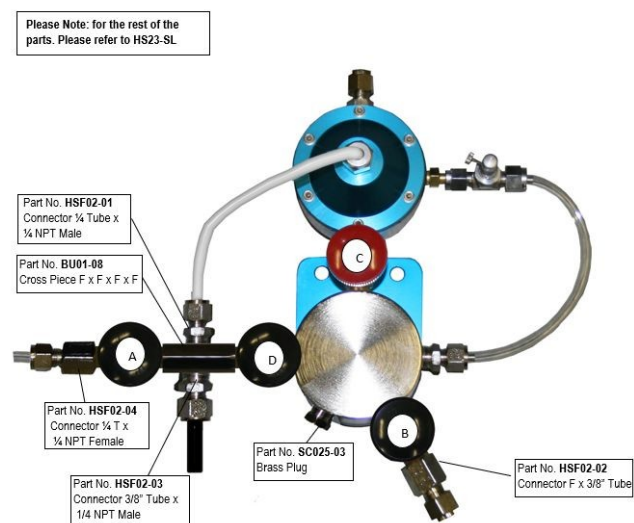
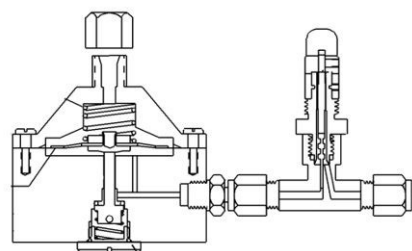


Figure 8 – Dual Line Bubble Unit Model HS23DL

6 Troubleshooting

Problem	Likely cause	Suggested corrective action
Bubbles not appearing at orifice	System pressure leak	Check all pressure fittings for leaks
	Blockage in orifice line	Purge river line
Pressure transducer reading LOWER than staff gauge reading	Leak in system	Check for leaks in system
Pressure transducer reading HIGHER than staff gauge reading	Orifice fitting affected by sediment or debris	Purge system and clear any debris

7 Repair

KISTERS precision instruments and data loggers are produced in quality-controlled processes. All KISTERS production and assembly sites in Australia, New Zealand and Europe are ISO 9001 certified. All equipment is factory tested and/or factory calibrated before it is shipped to the client. This ensures that KISTERS products perform to their fullest capacity when delivered.

Despite KISTERS most rigorous quality assurance (QA), malfunction may occur within or outside of the warranty period. In rare cases, a product may not be delivered in accordance with your order.

In such cases KISTERS' return and repair policy applies. For you as a customer, this means the following:

- Contact KISTERS using the Repair Request Form and the Declaration of Contamination made available online:

Region (Language)	Download Link
Asia-Pacific (English)	Repair Request Form (APAC) Declaration of Contamination (APAC)
Europe, the Middle East and Africa (English)	Repair Request Form (EMEA) Declaration of Contamination (EMEA)
Germany (German)	Repair Request Form (DE) Declaration of Contamination (DE)

In response you will receive a reference number that must be referenced on all further correspondence and on the freight documents accompanying your return shipment.

- Please provide as much information and/or clear instructions within the return paperwork. This will assist our test engineers with their diagnosis.
- Please do not ship the goods prior to obtaining the reference number. KISTERS will not reject any equipment that arrives without reference number; however, it may take us longer to process.

Custom requirements for items sent to KISTERS for warranty or non-warranty repairs: Check with your national customs/tax authorities for details, processes and paperwork regarding tax exempt return of products. Typically, special custom tariff codes are available (such as HS Code = 9802.00) that verify the item is being returned for repair and has no commercial value. Please note that the customs invoice / dispatch documents should also clearly state: "Goods being returned to manufacturer for repair – No Commercial value". It is mandatory to have any returned goods accompanied by a commercial invoice on headed paper. KISTERS reserves the right to charge the customer for time spent rectifying incorrect customs documents.

Note: Please ensure that your goods are packed carefully and securely. Damage that occurs during transit is not covered by our warranty and may be chargeable.

8 Technical Data

Operating Method	Constant bubbler
Application	Suitable for use with an external dry nitrogen gas cylinder or as a component in a compressor system using dried air (e.g. Model HS40AFC/HS40AFC/V HS40 Series II or HS55)
Pressure Transducer	Suits WL3100 or WL3100A or compatible third-party models
Differential Regulator	Standard feature on all models
Available Models	SINGLE LINE, DUAL LINE or DUAL ORIFICE
Gas Supply Line Fitting	¼" standard, 3/16" or 3/8" fittings can be provided as accessory items
Instrument Line Fitting	¼" standard, 3/16" or 3/8" fittings can be provided as accessory items
Orifice Line Fitting	3/8" standard, 3/16" or ¼" fittings can be provided as accessory items.
Bubble Rate	Factory set at approximately 26 bubbles per minute
Accessory Items	HS23QC bubble rate tested orifice when bubble unit is fitted with SC027-68 quick connector and HS2360-02 adapter
Ferrules	Available to suit fittings listed above
Dimensions	220 mm × 220 mm × 150 mm
Weight	HS23SL: 3.5 kg; HS23DL: 4.5 kg; HS23DO: 4.5 kg

9 Obligations of the Operator and Disposal

This chapter contains the following subsections:

- [Obligations of the Operator](#)^[21]
- [Dismantling / Disposal](#)^[21]

9.1 Obligations of the Operator

European Union

In the Single European Market it is the responsibility of the operator to ensure that the following legal regulations are observed and complied with: national implementation of the framework directive (89/391/EEC) and the associated individual directives, in particular 2009/104/EC, on minimum safety and health requirements for the use of work equipment by employees at work.

Worldwide

Regulations: If and where required, operating licences must be obtained by the operator. In addition, national or regional environmental protection requirements must be complied with, regardless of local legal provisions regarding the following topics:

- Occupational safety
- Product disposal

Connections: Local regulations for electrical installation and connections must be observed.

9.2 Dismantling / Disposal

When disposing of the units and their accessories, the applicable local regulations regarding environment, disposal and occupational safety must be observed.

Before dismantling

- Electrical Devices:
 - Switch off the units.
 - Disconnect electrical appliances from the power supply, regardless of whether the appliances are connected to the mains or to another power source.
- Mechanical devices:
 - Fix all loose components. Prevent the device from moving independently or unintentionally.
 - Loosen mechanical fastenings: Please note that appliances can be heavy and that loosening the fastenings may cause them to become mechanically unstable.

Disposal

Operators of old appliances must recycle them separately from unsorted municipal waste. This applies in particular to electrical waste and old electronic equipment.

Electrical waste and electronic equipment must not be disposed of as household waste!

Instead, these old appliances must be collected separately and disposed of via the local collection and return systems.

Integrated or provided batteries and accumulators must be separated from the appliances and disposed of at the designated

collection point. At the end of its service life, the lithium-ion battery must be disposed of according to legal provisions.

EU WEEE Directive

As players in the environmental market, KISTERS AG is committed to supporting efforts to avoid and recycle waste. Please consider:

- Avoidance before recycling!
- Recycling before disposal!



This symbol  indicates that the scrapping of the unit must be carried out in accordance with Directive 2012/19/EU. Please observe the local implementation of the directive and any accompanying or supplementary laws and regulations.

10 Appendices

This chapter contains the following subsections:

- [Installation of Polythene Tubing and Orifice Fittings](#) ²³
- [Small Diameter Model BU07 Orifice](#) ²⁶
- [Gas Chamber Orifice](#) ²⁶

10.1 Installation of Polythene Tubing and Orifice Fittings

A. General

- The polyethylene tubing is provided with a 3/8" OD and a 1/8" ID. It is an extremely durable material that has been used successfully in this application world-wide for many years.
- The tubing is flexible, easy to handle and can be cut with a knife.
- Prevent the ingress of dirt etc. from entering the tubing, by taping up the ends. At no time should the open end of the tubing be permitted to contact the soil.
- It is recommended that a trench be dug (minimum 600 deep) between the equipment shelter and the proposed position of the orifice
- The trench should not have any low points in their length; there should be a continuous fall to the orifice from the instrument shelter.
- The orifice line tubing should be encased in a protective conduit (e.g. galvanised steel pipe or poly pipe).
- It is also recommended that the orifice line should run through a series of Junction Pits, installed at intervals of approximately 50 metres. These pits should be clearly marked for future upgrades or maintenance at the site.
- The tubing can then be connected to the orifice fitting.

B. Preparation of Orifice Tubing

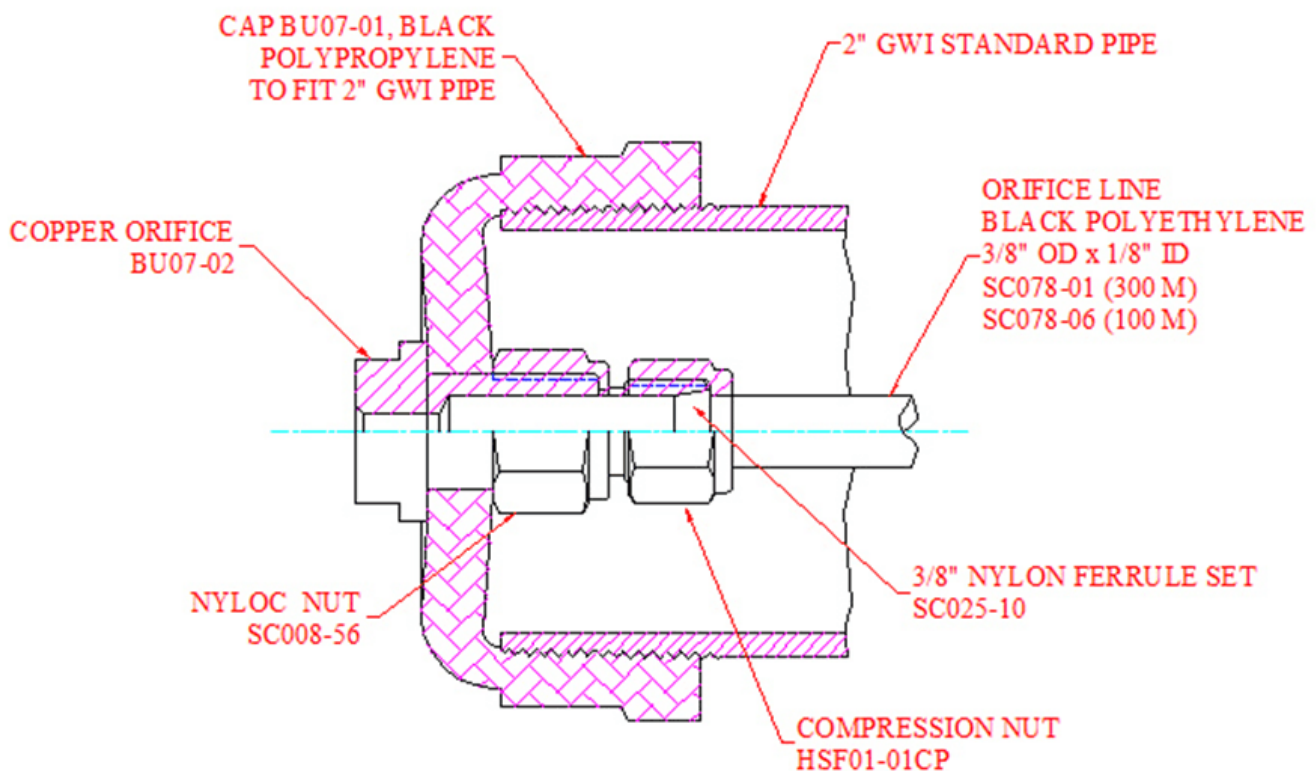
- Do not open the carton or remove the strapping.
- To prepare the roll of tubing for use, cut a 300 mm diameter hole in the centre of the cardboard carton, retrieve the end of the tubing from the middle of the coil, then cut the strapping retaining the coil.
- This method will reduce the possibility of tangling the tubing.
- Prevent the ingress of dirt etc. from entering the tubing, by taping up the ends. At no time should the open end of the tubing be permitted to contact the soil.

C. Orifice Fittings

General

- The site and reference level for the orifice fittings should be resolved before installation proceeds.
- The length of tubing from the HS23SL (Single Line Model) to the orifice should not exceed 150 metres.
- The site of the orifice should be positioned in quiet water out of the mainstream to provide protection.
- The area should be free of sediment and aquatic growth.
- The mounting for the orifice fitting should consist of a section of 50 mm NB galvanised pipe threaded at one end and secured at the appropriate reference level.
- The securing of the orifice mounting should be such that it can withstand the forces applied by the flowing stream and associated floating debris.
- The small diameter orifice fitting is comprised of a moulded polythene threaded cap, an orifice outlet and a tube fitting.
- The moulded cap will screw onto a standard 50 mm nominal bore galvanised pipe with a 2" BSP thread.
- The mounting for the orifice fitting should consist of a section of 50 mm nominal bore galvanised pipe threaded at one end (2" BSP) and secured at the appropriate reference level.
- Remove the protective tape from the end of the tubing, and push the tubing through the 50 mm nominal BU07 cap. Insert the tubing into the tube fitting on the rear of the BU07 copper orifice fitting, ensuring that both ferrules are in place.
 - Tighten the fitting nut (Maximum of 1¼ turns).
- Place the orifice fitting onto the mounting pipe using the 2" BSP pipe thread and tighten.
- Open the valve to the orifice on the HS23 Bubble Unit.

Small Diameter BU07 Orifice



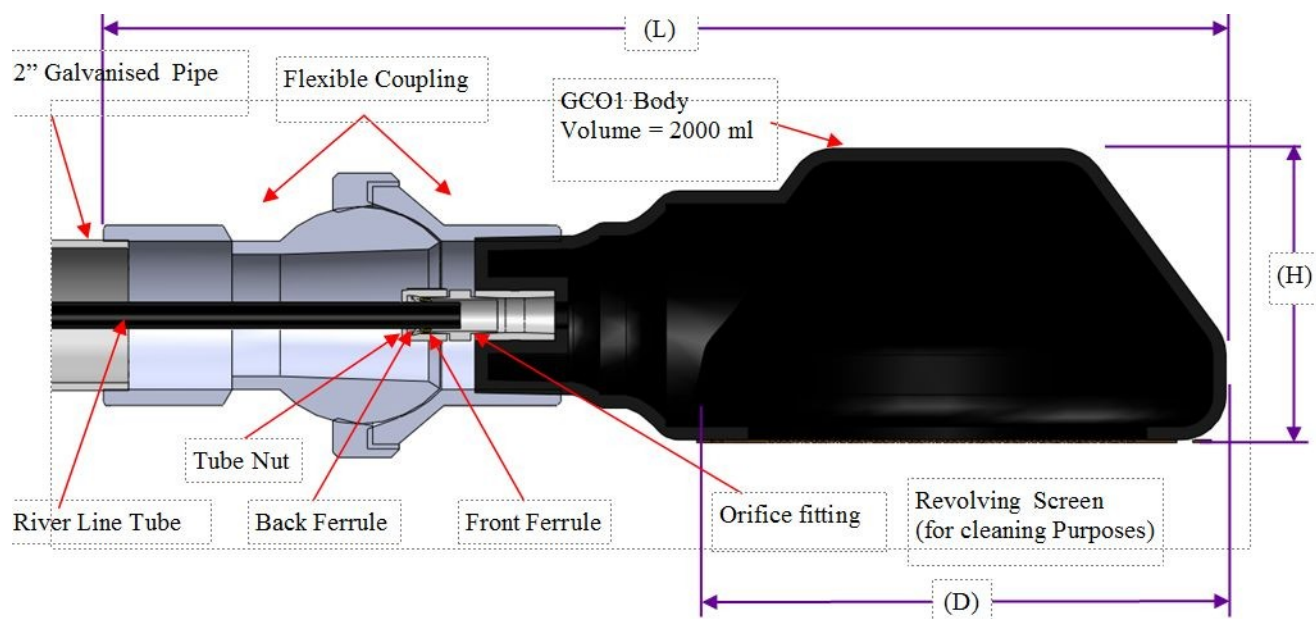
STANDARD ORIFICE FITTING MODEL BU07

NOTE:

Copper Orifice (BU07-02) must turn freely in Cap (BU07-01) after assembly.

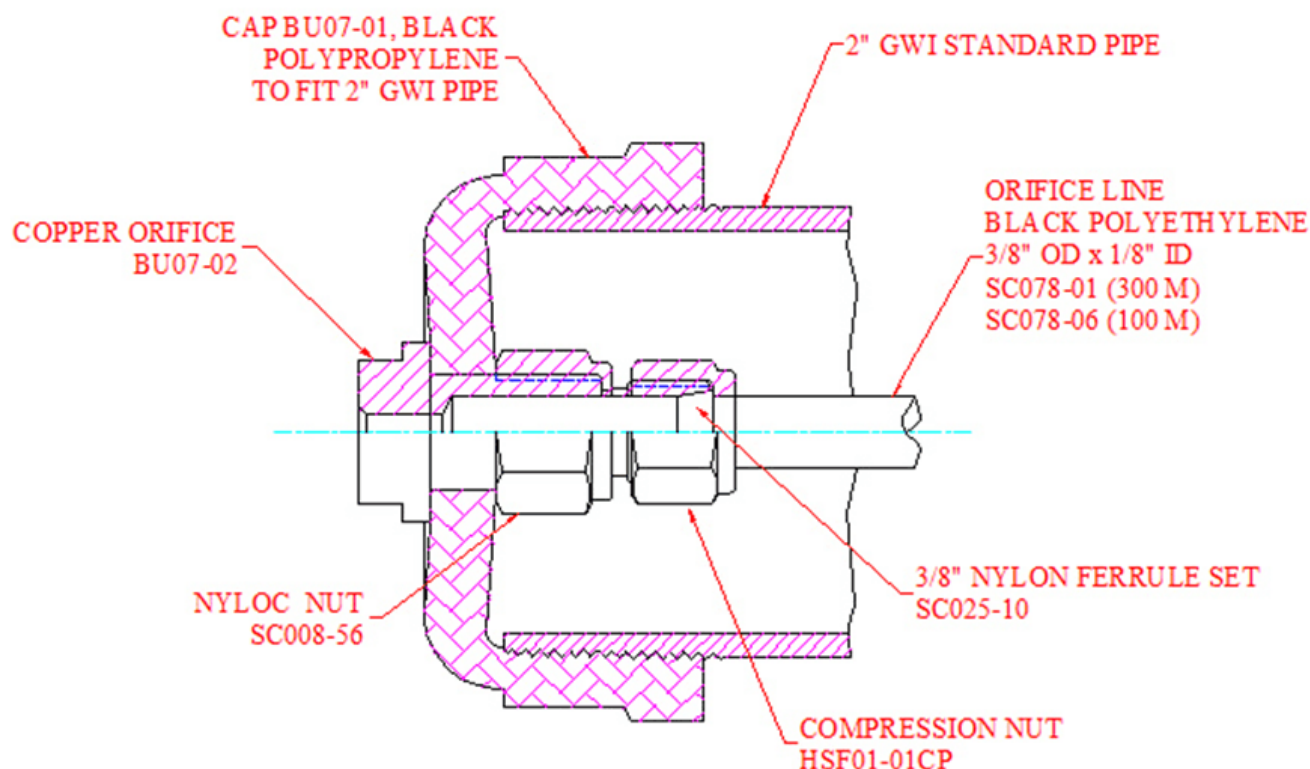
Large Volume Gas Chamber Orifice

- The Gas Chamber Orifice (GCO1P/SS) is designed to replace the standard small diameter orifice in a gas purge water level measurement system
- The GCO1P/SS permits the use of extremely low bubble rates with increased sensitivity and near total reduction of lag between actual level rise and orifice pressure. If sediment is foreseen as a problem at the site, the GCO1P/SS fitting should be considered as an option in preference to a standard BU07 orifice.
- Bubble rates as low as 10 bubbles per minute can be used, thereby reducing gas consumption and prolonging the life of the gas bottle, or reducing the duty cycle operation of the compressor pump on any bubbler water level measurement system.
- The main GCO1P/SS chamber is constructed entirely of polyethylene with a removable copper coated brass screen to deter aquatic growth, and is supplied fitted with a 2" flexible coupling to suit a standard 2" threaded pipe and to allow easy installation as the coupling allows up to 30 degrees of adjustment from horizontal. The GCO1P/SS has an in-built 1/4" NPT hex brass coupling and is supplied with a 1/4" NPT male to 3/8".
- The bottom of the chamber includes a removable copper coated brass screen for cleaning purposes.
- The unit is designed to be fitted to existing installations preferably during low water condition.



GCO1 DIMENSIONS		
Dimension	Metric (mm)	Imperial (inch)
L	410	16.2
D	210	8.3
H	110	4.3

10.2 Small Diameter Model BU07 Orifice



STANDARD ORIFICE FITTING MODEL BU07

NOTE:

Copper Orifice (BU07-02) must turn freely in Cap (BU07-01) after assembly.

10.3 Gas Chamber Orifice

The Gas Chamber Orifice (GC01P/SS) is designed to replace the standard orifice in a gas purge water level measurement system.

The GC01P/SS permits the use of extremely low bubble rates with increased sensitivity and near total reduction of lag between actual level rise and orifice pressure. It can also operate satisfactorily when buried under up to 1 m of silt.

Bubble rates as low as 10 bubbles per minute can be used, thereby reducing gas consumption and prolonging the life of the gas bottle, or reducing the duty cycle operation of the compressor pump on our HS-55/45/40 bubbler water level measurement systems.

The main GC01P/SS chamber is constructed entirely of polyethylene with a copper coated brass screen to deter aquatic growth, and is supplied fitted with a 2" flexible coupling to suit a standard 2" threaded pipe and to allow easy installation as the coupling allows up to 30 degrees of adjustment from horizontal. The GC01P/SS has an in-built 1/4 inch NPT hex brass coupling and is supplied with 1/4 inch NPT male to 3/8.

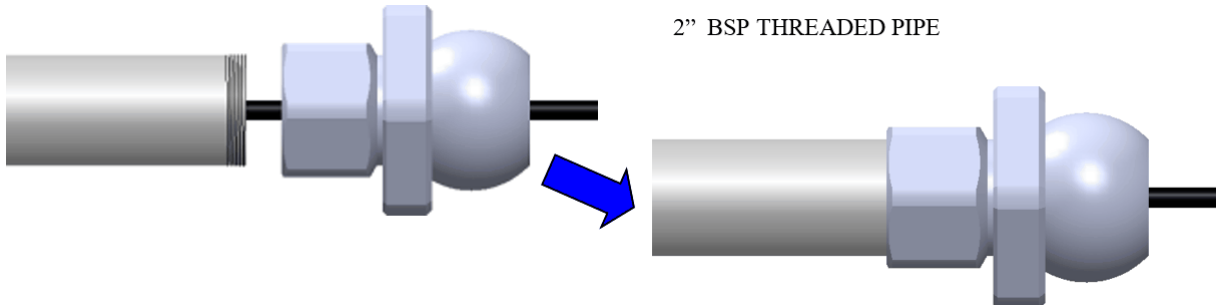
The bottom of the chamber includes a revolving copper coated brass screen for cleaning purposes.

The unit is designed to be fitted to existing installations preferably during low water condition.

Refer reverse side for results of comparative tests and installation details.

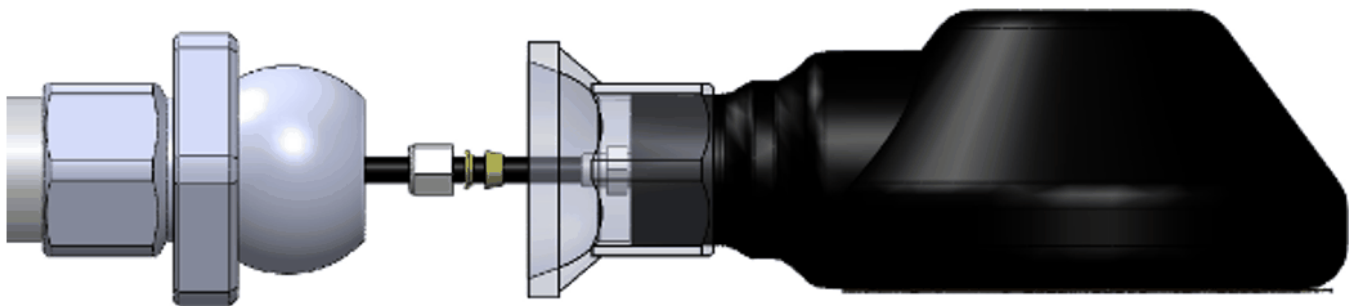
Step 1:

Secure Socket/Locknut to the 2" BSP pipe.



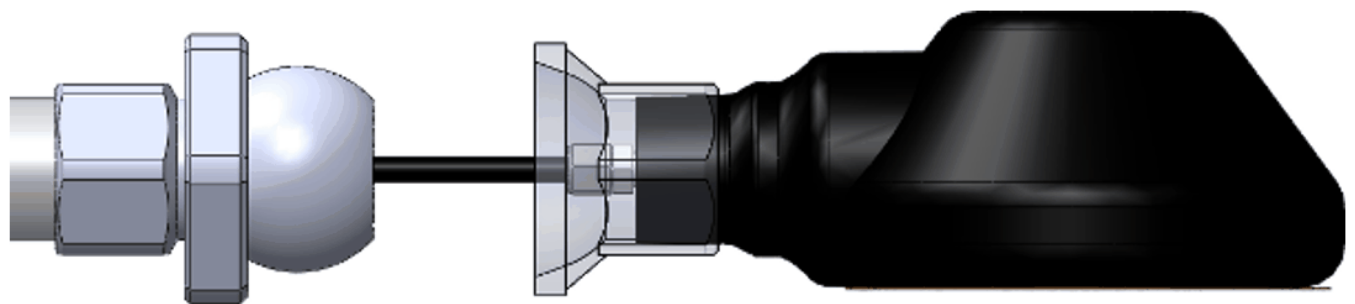
Step 2:

Undo the nut and ferrules; feed the tube nut and the two ferrules onto the river line as shown in figure below.



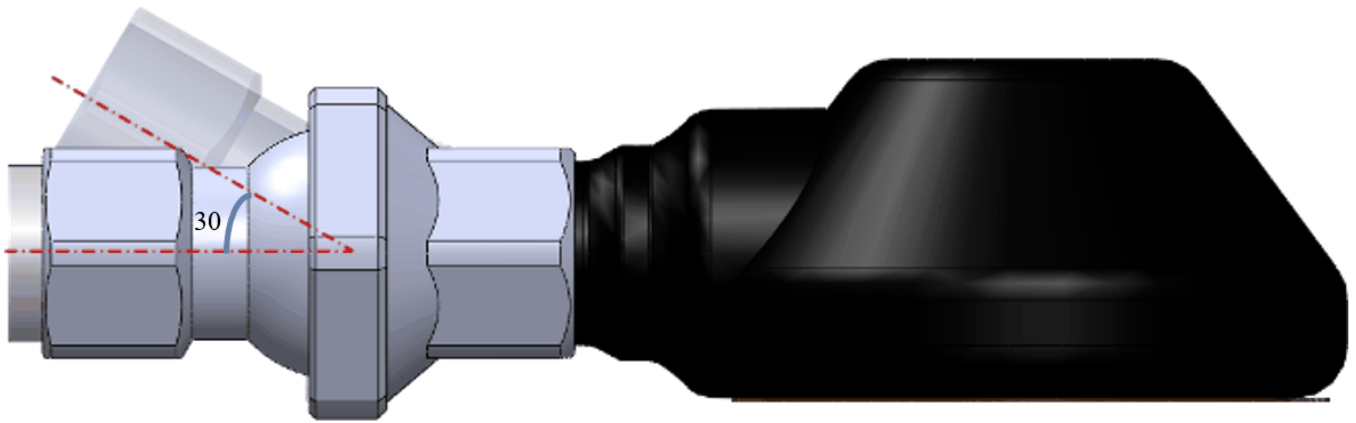
Step 3:

Tighten the tube nut to the GCO1/SS fitting as shown in figure below.

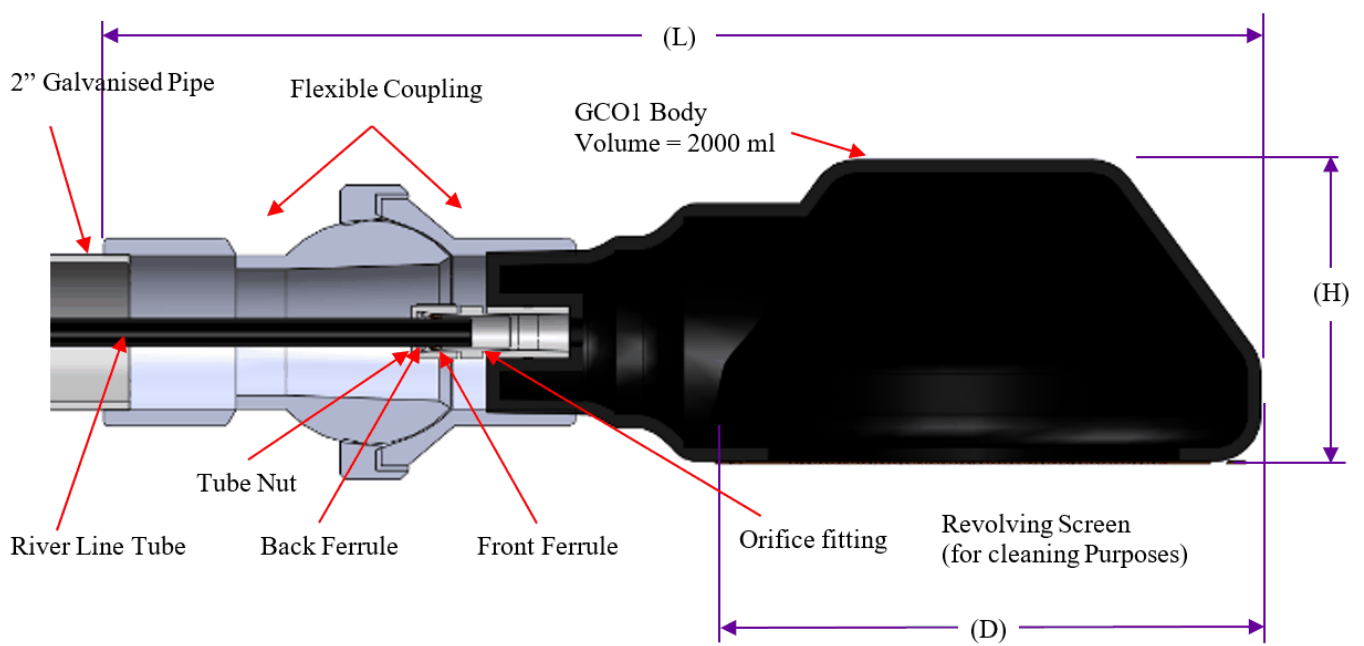


Step 4:

Place the GCO1/SS assembly onto the mounting pipe, adjust coupling so the GCO1/SS is horizontal to the water, and tighten the flexible coupling with GCO1 in position.

**Note:**

Ensure that the GCO1/SS is horizontally level as shown. Flexible coupling allows adjustment up to 30 degrees.



Contact Data

Europe	KISTERS Europe	 +49 2408 9385 0
		 hydromet.sales@kisters.eu
		 www.kisters.eu
Australia	KISTERS Australia	 +612 9601 2022
		 sales@kisters.com.au
		 www.kisters.com.au
New Zealand	KISTERS New Zealand	 +64 7 857 0810
		 sales@kisters.co.nz
		 www.kisters.co.nz
Latin America	KISTERS Latin America	 +57 350 575 4079
		 sales@kisters-latam.com
		 www.kisters-latam.com
North America	KISTERS North America	 +1 561 459 4876
		 kna@kisters.net
		 www.kisters.net
Spain	KISTERS Ibérica	 info@kisters.es
		 www.kisters.es
France	KISTERS France	 +33 1 4120 9200
		 info@kisters.fr
		 www.kisters.fr
Canada	KISTERS Canada	 kna@kisters.net
		 www.kisters.net

