CRP SERIES

ChemValve-Schmid Americas

ENVIRONMENTALLY SAFE, CLOSED LOOP SAMPLING SYSTEMS

We are a world leader in the design and manufacture of environmentally safe, closed loop, sampling systems for the Chlor-Alkali, Bromine, Pharmaceutical, Chemical, Petro-Chemical, Food and Beverage, Biotechnology, Pulp and Paper, & Semiconductor industries.

We offer a comprehensive range of sample dispensing options and secondary containment solutions to satisfy all process requirements. Various levels of technology are available from basic manual sample systems to remote automated sampling systems and analysis systems. All our sampling systems are engineered with operator and environmental safety as the primary consideration.

Toxic, flammable and corrosive medias are safely sampled using systems with all wetted parts in PTFE, PFA, Hastelloy® or other exotic materials. For less corrosive services, sampling systems are also available in 316L stainless steel.

Our engineering principles are environmentally secure and the first sample collected is the right sample.

Introduction to Sampling

Across the complete spectrum of the process industry, from pharmaceutical to petro-chemical, the collection of samples has become more important. The reasons for taking samples include: confirming that a chemical reaction has been completed, checking that a product has the correct physical or chemical composition, requiring a sample to archive or confirming that a delivered chemical conforms to the agreed specifications.

The key to achieving the above is to ensure that the sample taken is representative of the material sampled. Very often, poor sampling systems have contaminating residual material from the last or previous batches. In most cases this results in an inaccurate sample, requires disposing the product to a waste system and repeating the sampling process until an accurate sample is collected.

Next from a sampling perspective, it is critical to consider the specific properties of the sampled chemicals, are they viscous, abrasive, corrosive, gaseous, explosive, radioactive, flammable etc. Again the design of the valve, how the sample is taken, dispensed and contained is critical to engineering a piece of equipment that functions well and satisfies plant safety and operations.

Equally as important to the designing of a sampling device that properly functions is the need to consider operator and environmental security. This is where a properly engineered system is designed to minimize the need for personal protective equipment thus making this the second line of defense rather than the primary. From an environmental perspective, one should consider the need for secondary containment in the event of leakage, overflow, or evacuation of vapors to a dedicated scrubber system.

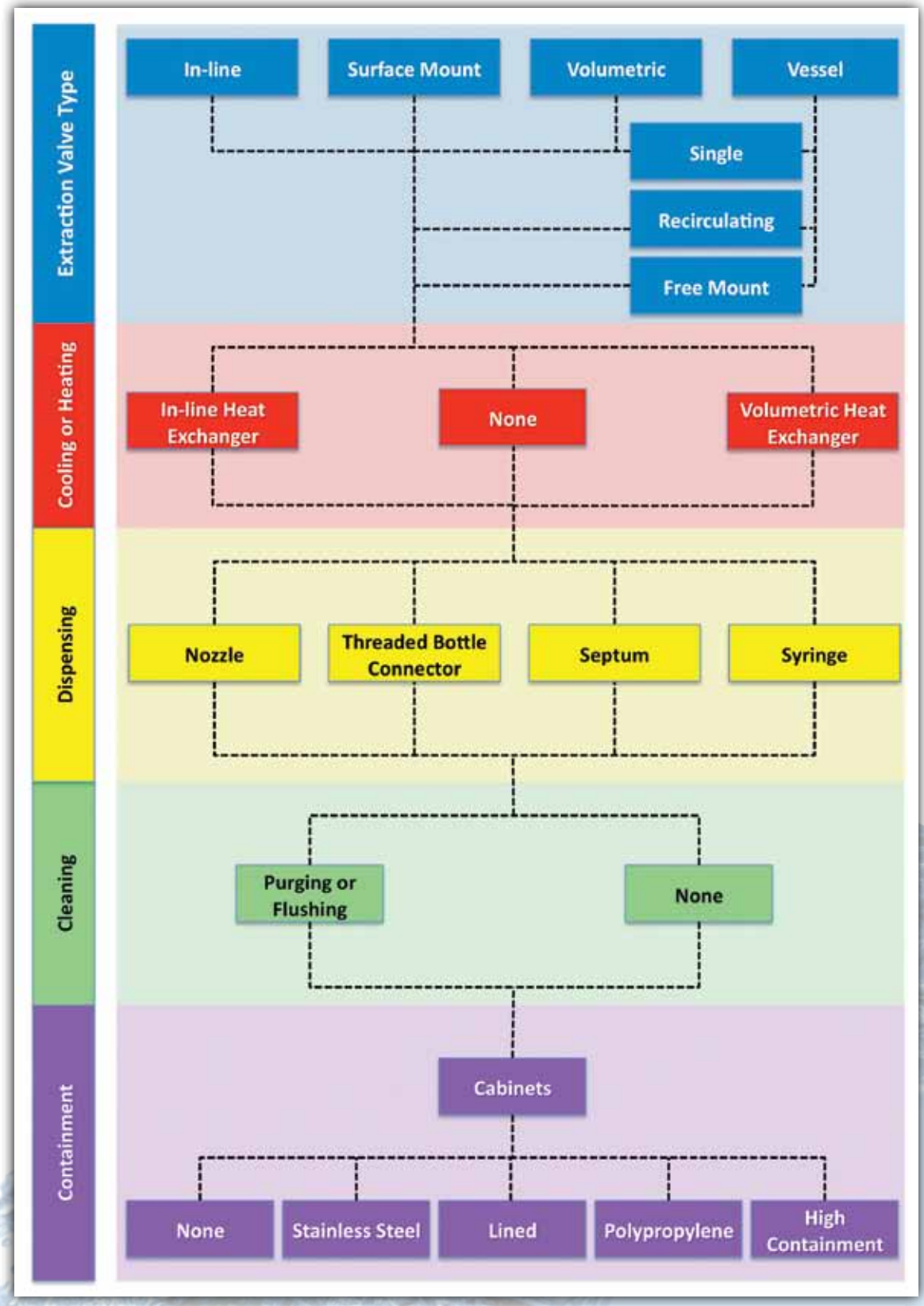
To address these needs of function and safety, we have developed a comprehensive range of equipment for representative sampling of liquids, gases and powders from a wide range of process equipment. The standard range of equipment will allow samples to be taken in the majority of circumstances, but when the demands of the application are special, we have a wealth of experience and a skilled engineering team to develop a customized solution.

We manufacture all our products internally including our PFA molding . This flexibility enables us to develop designs that quickly can be turned into finished products offering the highest levels of corrosion resistance.

Please use this guide as a starting point and call us or your local distributor to discuss your requirements.

Liquid and Gas Sampling Flowchart

Below is a step by step guide to the key selection choices when choosing a “standard” sampling system. This logic is followed in the succeeding pages.



In-Line Sample System

The closed loop, dead-space free, in-line sampling valve provides a safe and effective method for taking representative samples from horizontal and vertical process piping. With the addition of other equipment for treating, dispensing and containing the sample, it forms the core of a robust and versatile system. It is available both as a PFA lined stainless steel product for corrosive applications and in un-lined stainless steel for less corrosive applications.

Technical Specifications

PFA Lined Sampling Valve [SD-IL 400]	
Design	Wafer pattern to suit ASME 150, ASME 300, PN 10/16
Size	1" - 6" DN 25 - DN 150 ***2.36" Face to Face**
Performance	-29ºC to 180ºC, Full Vacuum to 10 bar g
Wetted Materials	PFA, PTFE, Chemraz® Perfluoroelastomer
Body Material	316 Stainless Steel - C 276
Installation	Sampling from a horizontal or vertical piping system.
Options	
Materials	Lined in Static-dissipating PFA
Valve	Kalrez® Perfluoroelastomer tip seal for abrasive/crystalline media

Unlined Sampling Valve [SD-IL 300]	
Design	Wafer pattern to suit ASME 150, ASME 300, PN 10/16
Size	1/2" - 6" DN 15 - DN150 ***2.36" Face to Face**
Performance	-29ºC to 200ºC, Full Vacuum to 16 bar g. (ASME 300 Full Vacuum to 24 bar g)
Wetted Materials	316 Stainless Steel - C 276, PTFE, Chemraz® Perfluoroelastomer
Body Material	316 Stainless Steel - C 276
Installation	Sampling from a horizontal or vertical piping system.
Options	
Materials	Body in Hastelloy® C276, Monel and other alloys
Design	ASME/DIN Flanges, Tri-clamp or other connections

In-Line Sample System

Function

The valve functions with a **manual hand-wheel, twin action fail closed safety handle** or **fail closed pneumatic actuator**. The fail closed safety handle design operates by pulling out against a spring force enabling it to be pushed down over a lip on the top cap. This downward force opens the valve by working against the spring force. As soon as the handle is released, the spring force automatically returns the valve to the closed position. The handle may be fitted with a padlock as part of a safe operating process. The fail closed pneumatically operated valve enables remote sampling operation.

- Features zero dead space providing a safe representative sample each and every time.
- A stroke adjuster enabling the valve to be set for a suitable flow of liquid given its line pressure and viscosity.
- An industry validated, environmentally secure, stem sealing system, tested for over 20,000 cycles at elevated temperatures with over 20 years of performance.
- Both the PFA lined and stainless steel versions are FDA compliant.

SD-IL 400

PFA Lined
Sampling Valve

PFA Lined
Sampling Valve

Actuated valve
combined with
pneumatic bottle
sensor

SD-IL 300

Unlined
Sampling Valve

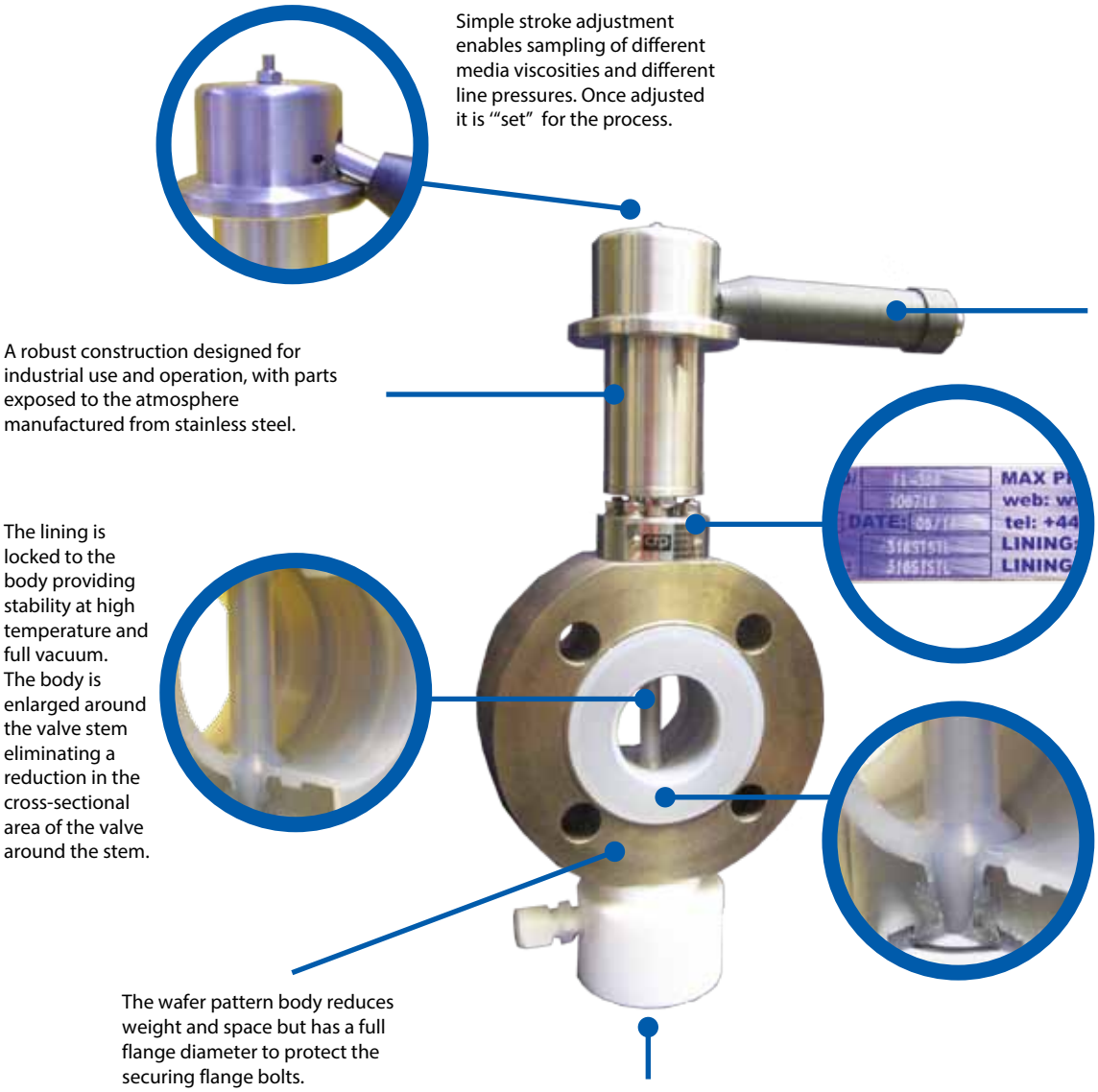
Flanged Unlined
Sampling Valve

Sampling Valve
with Cabinet

Key Performance Features

The heart of any sampling system is the valve itself. The valve has been designed to be robust and withstand rigorous plant use and exposure. Its function is simple and gives a truly representative sample.

PFA Lined Sampler [SD-IL 400]



Simple stroke adjustment enables sampling of different media viscosities and different line pressures. Once adjusted it is '"set" for the process.

The handle is manufactured from static-dissipating PTFE providing excellent corrosion resistance, self-lubricatiion, and protects the operators hands from hot process temperatures. It is elevated well above the valve body allowing the process line to be insulated if required.

A robust construction designed for industrial use and operation, with parts exposed to the atmosphere manufactured from stainless steel.

A product identification plate ,identifies type, size, date, serial number and operating parameters to assist in identifying any product spares requirements and the management of plant assets.

The lining is locked to the body providing stability at high temperature and full vacuum. The body is enlarged around the valve stem eliminating a reduction in the cross-sectional area of the valve around the stem.

There is no internal dead space, with the valve closure being on the pipe line surface.

The wafer pattern body reduces weight and space but has a full flange diameter to protect the securing flange bolts.

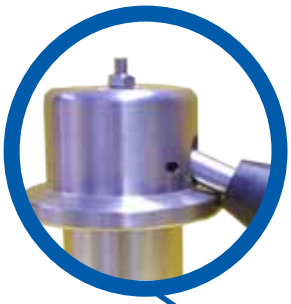
The conical seated valve design has a closure element with no potential to trap material in or around the valve.

A versatile bottom outlet design enables different dispensing options to be selected and a variety of purging and cleaning options.

Key Safety Features

The valve is designed to assure operator safety

The handle is a spring return, fail safe safe design with a powerful spring to ensure closing the valve upon release.



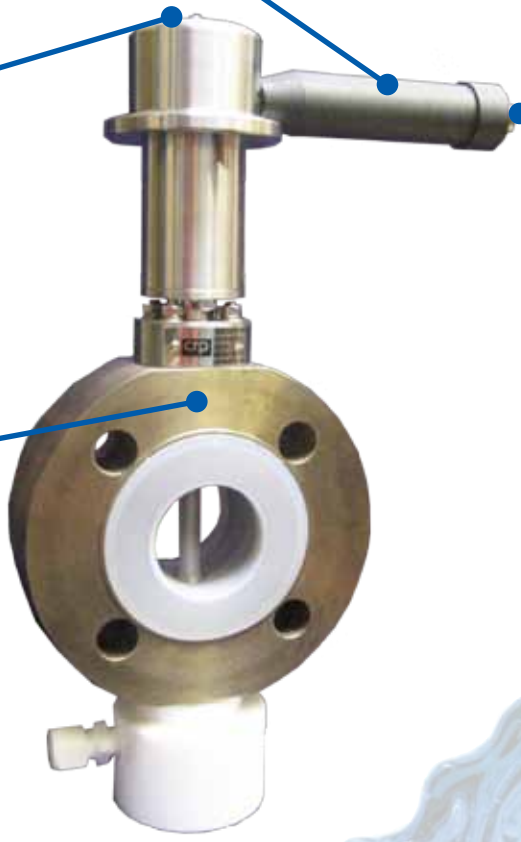
The handle requires two specific actions to operate, preventing accidental opening.

A static-dissipating PTFE handle retains its looks after many years of service, does not corrode and prevents temperature transmission from the process to the operator.

Once stem adjustment is set, it can be locked out for safe day to day operation.

A padlock can be attached the handle to enable the device to be incorporated into a permit to work routine and prevent unauthorized operation.

The valve is equipped with an environmentally safe PTFE and Chemraz ® stem seal packing system that has been tested for over 20,000 cycles.



Surface Mount Sampler

Surface mount samplers are designed for mounting onto the side or base of a vessel or large pipeline. In the case of a pipeline it has the advantage of the sampling valve not being line size specific and for vessels it eliminates the need to sample from the top of the vessel where space and nozzles are usually limited.

Technical Specifications

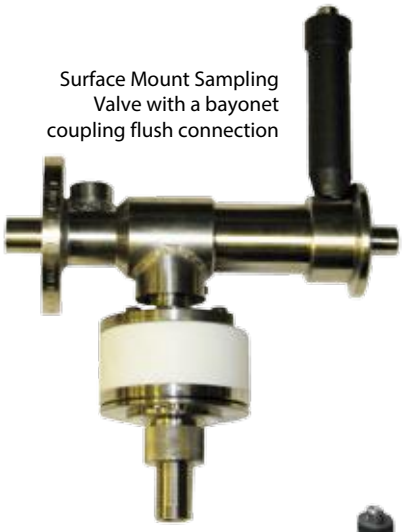
Connection	Flanged ASME 150, ASME 300, PN 10/16, Tri-Clamp and others
Size	1" - DN25 and larger
Performance	-29ºC to 200ºC, Full Vacuum to 16 bar g. (ASME 300 Full Vacuum to 24 bar g)
Wetted Materials	316 Stainless Steel - C 276, PTFE, Chemraz® Perfluoroelastomer
Body Material	316 Stainless Steel - C 276
Installation	Mounted for sampling on the side or underneath a vessel or pipeline
Options	
Materials	Body in Hastelloy® C276, Monel and other alloys
Treatment	Flush connection
	Sample cooling or heating
Function	Pneumatic Actuation

Function

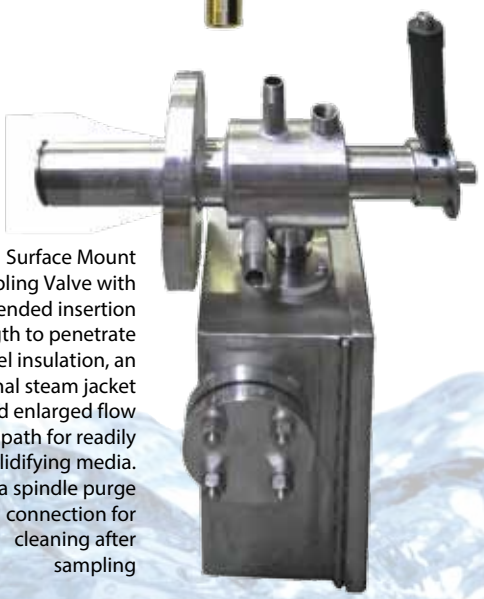
The valve functions as an In-Line sampling valve with a safety twin action handle. The handle is pulled out against a spring force enabling it to be pushed down over a lip on the top cap. This outward motion opens the valve by working against a spring force. As soon as the handle is released , the valve will automatically return to the fully closed position. The handle may be fitted with a padlock as part of a safe operating process or the valve can be fitted with an actuator to enable remote operation.

Features

- There is a carrot and cone valve where the action of the handle pushing the carrot into the vessel, so there is no dead space on the valve entry.
- There is however a need for the liquid to pass along the valve body to exit the vessel and this creates a small dead space. A flushing or purging system to clean this area between samples is available.
- A stroke adjuster enables the valve to be set for a suitable flow of liquid given the vessel or pipeline pressure and viscosity.
- Our innovative stem seal design is industry validated and has proven itself for over 20,000 cycles at elevated temperatures



Surface Mount Sampling Valve with a bayonet coupling flush connection



Surface Mount Sampling Valve with exended insertion length to penetrate vessel insulation, an external steam jacket and enlarged flow path for readily solidifying media. Also a spindle purge connection for cleaning after sampling

Volumetric Sampling

Volumetric Sampling Valve

This device is an In-Line sampling valve that serves as either an uncomplicated sampling device – requiring a simple 180º turn of the handle to dispense and reset the valve – or as a valve capable of sampling product under vacuum. The sample amount is determined by operating the valve a number of times which fills and empties a closed end cup which is within a ball.

Technical Specification

Connection	Flanged ASME 150, PN 10/16
Size	1" - 3" DN25 - DN80
Sample Size	15, 45 or 90ml.
Performance	-29ºC to 180ºC, Full Vacuum to 19 barg
Wetted Materials	PFA, PTFE
Body Material	Cast Ductile Iron According to EN-GJS-400-LT (GGG 40.3)
Installation	Mounted for sampling from a horizontal or vertical piping System
Options	
Materials	Lined in Static Dissipating PFA
	Unlined in Stainless Steel Grade GX6CrNiMo1810 (1.4408)
Function	Pneumatic Actuation

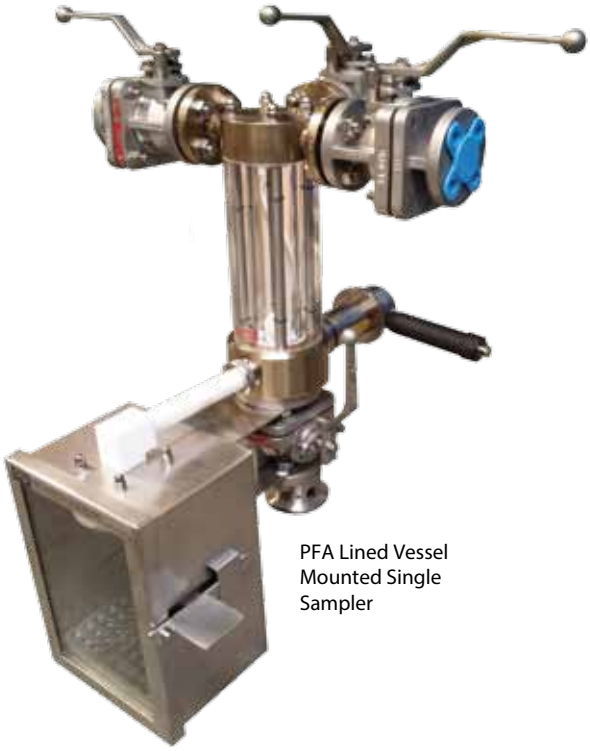
Actuated Valve

PFA Lined Valve for a horizontal pipeline

Unlined Stainless Steel Valve

Vessel Sampling - Single Sampler

This vessel mounted sampling system is designed to be connected to a dip pipe entering the top of a vessel. The sample is drawn up into the sampling valve by means of site vacuum or an eductor generating a local vacuum.



PFA Lined Vessel Mounted Single Sampler

Function

The valve functions with a small bore PTFE tube running down the center of the dip pipe. Above this is an isolation valve followed by a sample outlet valve. The sample valve is connected to a cabinet with an outlet and typically a PTFE threaded bottle connector. Above the sample valve is a sight glass sized for the sample volume and fitted with a floating ball to prevent sample liquid being drawn down the vacuum line. Finally above this is a manifold typically supplying wash liquid, vacuum and nitrogen. With the isolation valve and vacuum valve open, a sample can be drawn up into the sight glass. The vacuum valve can be closed and the sample blown back into the vessel using the nitrogen supply. This can be done two or three times to ensure that the sample will be representative. Once a suitable sample is in the sight glass, the isolation valve can be closed and the sight glass slightly pressurized with nitrogen. The contents can be dispensed via the sample valve. Any remaining sample can be blown back into the vessel and the sight glass and sample valve cleaned with wash liquid. Finally nitrogen can be blown through the complete assembly to leave the system ready for the next sample.

Connection	Flanged to suit vessel dip pipe
Size	To suit vessel dip pipe
Performance	-29ºC to 180ºC, Full Vacuum to 10 bar g (dependent upon valve selection)
Wetted Materials	PFA, PTFE, Chemraz® Perfluoroelastomer, Borosilicate Glass
Body Material	316 Stainless Steel - C 276
Sample Bottle Vent	To atmosphere
Overfill Security	Floating Ball Check Valve
Options	
Sample Sight Glass	Volume adjusted for sample size
Service Valve	As standard AKH2 (PFA lined ball valve), but solid PTFE ball valves, diaphragm valves etc. are available.
Sample Valve	As standard In-Line sampling valve, but ball or diaphragm valves are available
Materials Valve	Lined in Static-dissipating PFA
Function Vacuum	Spring return handles or actuated valves
Generation	Eductor where no site vacuum is available
Instruments Sample	Temperature and/or pressure gauge, pH probes
Bottle Vent Overfill	Return to sampling sight glass or customer scrubber
Security Purging	Secondary containment for any excess sample
	Nitrogen purging between sampling sight glass and safety shield to prevent vapors

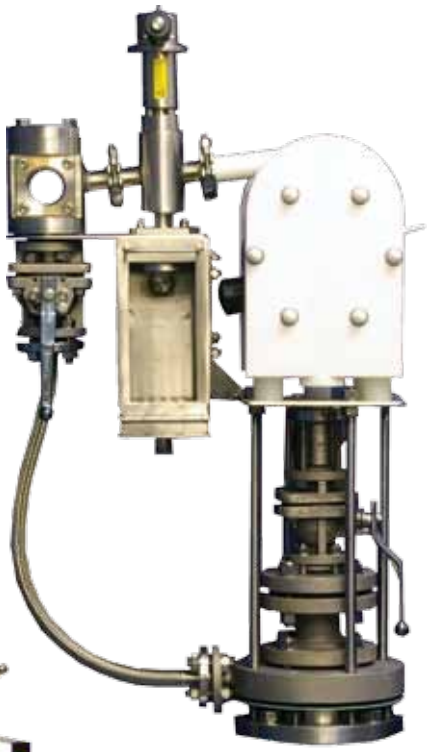
Vessel Sampling with Re-circulating Pump

A recirculating sampler creates a process liquid flow up a dip pipe through a pump, past an In-Line sampling valve and sight glass and returns the liquid to the vessel. Once the flow is established, the sample can be drawn off at any time as the sample will be representative. Our standard design is a compact sampler designed to minimize the area required above the vessel and completely drain the fluid back into the vessel. However many alternative designs are produced to suit customer specific needs.

Function

Both isolation valves are opened and the pump is set running. Depending on the configuration the pump is stopped and the inlet isolation valve closed or the system is left running. The sample is taken and the system is then purged with nitrogen, or cleaned with a wash liquid and nitrogen.

PFA lined recirculating sampler with actuated vessel isolation valves



Compact PFA lined recirculating sampler incorporating free draining design, easy valve removal and use of a small space

Connection	Flanged to suit vessel dip pipe
Size	To suit vessel dip pipe
Performance	-29ºC to 180ºC, Full Vacuum to 10 barg (dependent upon valve and pump selection)
Wetted Materials	PFA, PTFE, Chemraz® Perfluoroelastomer, Borosilicate Glass
Body Material	316 Stainless Steel - C 276
Options	
Sample Valve	Mounted on discharge side of the pump for sampling while running
Location Pump	As standard in Virgin PTFE, can be static dissipating PTFE or metallic construction. Can be ATEX compliant
Service Valve	As standard AKH2 (PFA lined ball valve), but solid PTFE ball valves, diaphragm valves etc. are available
Sample Valve	Our standard In-Line sampling valve, but ball or diaphragm valves are available
Materials	Lined in Static-dissipating PFA
Valve Function	Spring return handles or actuated valves
Instruments	Temperature and/or pressure gauge, pH probes
Sample Bottle Vent	Return to sampling sight glass or customer scrubber
Overfill Security	Secondary containment to collect any excess sample
Purging	Nitrogen purging between sampling sight glass and safety shield to prevent vapors

Free Mount Sampler

Free Mount Samplers are small lightweight mobile units ideal for laboratory use or small scale pilot plants. They can be wall or stand mounted and are suitable for vessels at ambient pressure and temperatures below 100ºC.

Function

From the valve's closed position, the vacuum and nitrogen lines are connected to their services and the vessel connection made to the dip pipe. A sample bottle is attached and the service and vessel isolation valves are opened and the sampling valve is turned to the "PURGE BOTTLE" position. This fills the bottle with nitrogen. The valve is turned to the "PURGE BACK TO VESSEL" position and this flushes the line to the vessel using nitrogen. Then turn to "SAMPLE" and a sample is drawn into the bottle. When completed, turn back to "PURGE BACK TO VESSEL" to flush the vessel line with nitrogen. The valve is returned to "PURGE BOTTLE" and then closed.

Design	Can be manufactured to connect to any equipment
Size	To suit customer process
Performance	-5ºC to 100ºC, Full Vacuum to atmospheric/slight positive pressure
Wetted Materials	PTFE, Chemraz® Perfluoroelastomer
Construction	Multiway solid PTFE valves with bottle connector(s) beneath. Valves mounted beneath a stainless steel or polypropylene mounting bracket. Nitrogen, vacuum and vessel connections via PTFE compression fittings
Options	
Seeding Dispense	Variations for vessel seeding
Instruments	Threaded bottle connector or septum sealed sampling bottle
Overfill security	Temperature and/or pressure gauge
	A secondary bottle to collect any excess sample.

Free Mount septum sample valve with wall bracket

Free Mount floor standing sampler with secondary overfill bottle

Free Mount septum sample valve with process connections running in stainless steel conduit

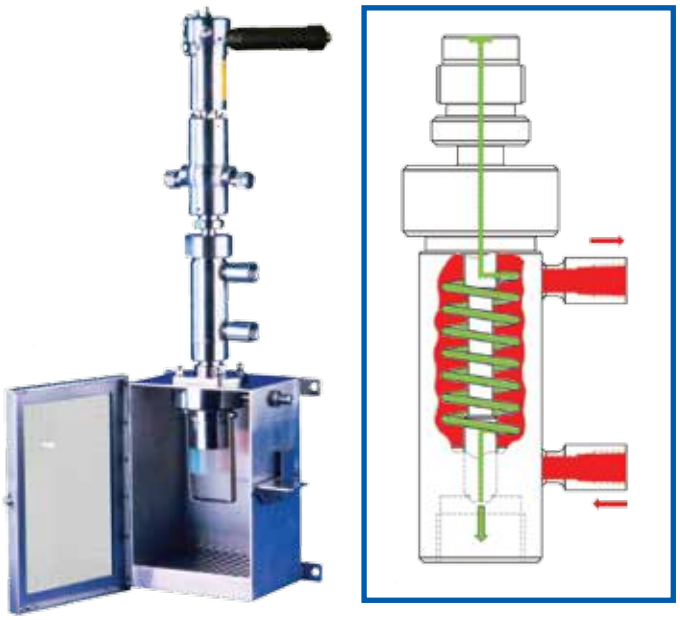
Sample Cooling or Heating

In some applications, the sampling media may be at low or high temperatures which is unsafe to dispense, or may have properties that require that the sample is maintained at a certain temperature. For such duties a heat exchanger can be supplied.

In-Line Heat Exchanger

The sampled material passes through a small bore tube which in turn is jacketed with cooling/heating fluid. The length of the tube and fluid flow rate can be adjusted to provide different amounts of cooling or heating. The heat exchanger can also be supplied with the ability to be purged and flushed for cleaning. This device is not suitable for samples with entrained solids or those that solidify easily or are very viscous.

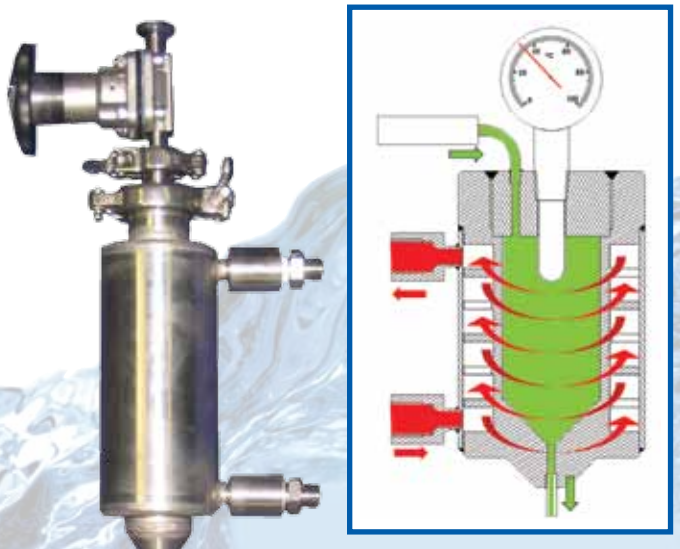
In-Line Heat Exchanger with In-Line Sampling Valve and Swagelock type process connections



Volumetric Heat Exchanger

The volumetric heat exchanger is positioned below the sample valve, with an additional valve before the dispense point. This allows the sample to be drawn into the heat exchanger and allowed to cool or be heated. The chamber volume is designed to suit the sample requirement. A temperature gauge can be used to precisely heat or cool the sample. These are usually operated with cooling/heating water, but air cooling can also be used. These can also be fitted with a purge/flush for cleaning and if necessary for pressurizing the sample in order that it may be dispensed.

Volumetric Heat Exchanger with tri-clamp connections



Sample Dispensing

After collecting the sample, it is necessary to put it into some sort of container to transfer it for analysis. This dispensing choice is a function of the type of liquid or gas and the degree of containment required from a safety and environmental perspective. The options below are presented in ascending levels of safety. Dispensing should always be considered in conjunction with a cabinet.

Nozzle

This design is infrequently used because of the ease of spilling and lack of operator protection. However if the media is non-hazardous, it can be a less expensive option or when used in conjunction with a safety cabinet, it can be useful for seeing liquid levels when sampling into a visible container such plastic or glass bottle.

Threaded Bottle Connector

This is by far the most widely used dispensing option and can be used in conjunction with a safety cabinet. The bottle connector is manufactured from PTFE with a vent to enable the bottle to depressurize when being filled. The most popular bottles have an industry standard GL45 thread, but there are many bottle thread types and special connectors can be manufactured to suit the customer's bottle.

Options Include:

- Twin threads machined on the PTFE adapter allowing two bottle sizes to be used.
- A PTFE plug and chain to act as a secondary safety seal.
- A ball check valve on the bottle vent to allow sampling both under positive pressure and vacuum.
- Pneumatic bottle sensor preventing operation if a bottle is not present.
- A mechanical bottle interlock providing an extra seal between the bottle and sample valve which only opens through the action of fitting the bottle.
- A bayonet coupling hose connector allowing the wash liquid to be piped directly to drain.
- Spring operated adjustable bottle holders to allow easy placement, often combined with a rain cover when used outside without a cabinet.

Septum

Septum dispensing requires bottle caps with a PTFE faced silicone rubber septum seal. Two needles (one for bottle venting and one for dispensing the sample) puncture the septum and the sample is dispensed into a bottle held in place with a stirrup. Our needles are designed with a point rather than the hypodermic style to prevent the needle from becoming blocked with a core of rubber and damaging the septum cap. When removing the bottle the silicone seals and enables the bottle to be transported safely.

This represents a higher level of containment than open bottle sampling and removes the need for fitting lids.

Needles as standard are manufactured in Hastelloy® C276 but also in a range of exotic alloys, with different bore diameters to suit the sample. Where space constrains the needle sizes, a single needle with a gutter is available.

Syringe Sampler

Syringe sampling provides the highest level of operator isolation from the liquid and is also suitable for sampling gases. Essentially, an In-Line sampling valve acts as a docking device into which the syringe is fitted and enables the valve to be opened. Uniquely with this design, there is no pressure increase within the syringe during its removal from the valve. Upon taking the sample the syringe is removed which simultaneously closes the valve. The syringe can then be taken to the laboratory for dispensing. A single syringe can function with a number of sampling points.

Function

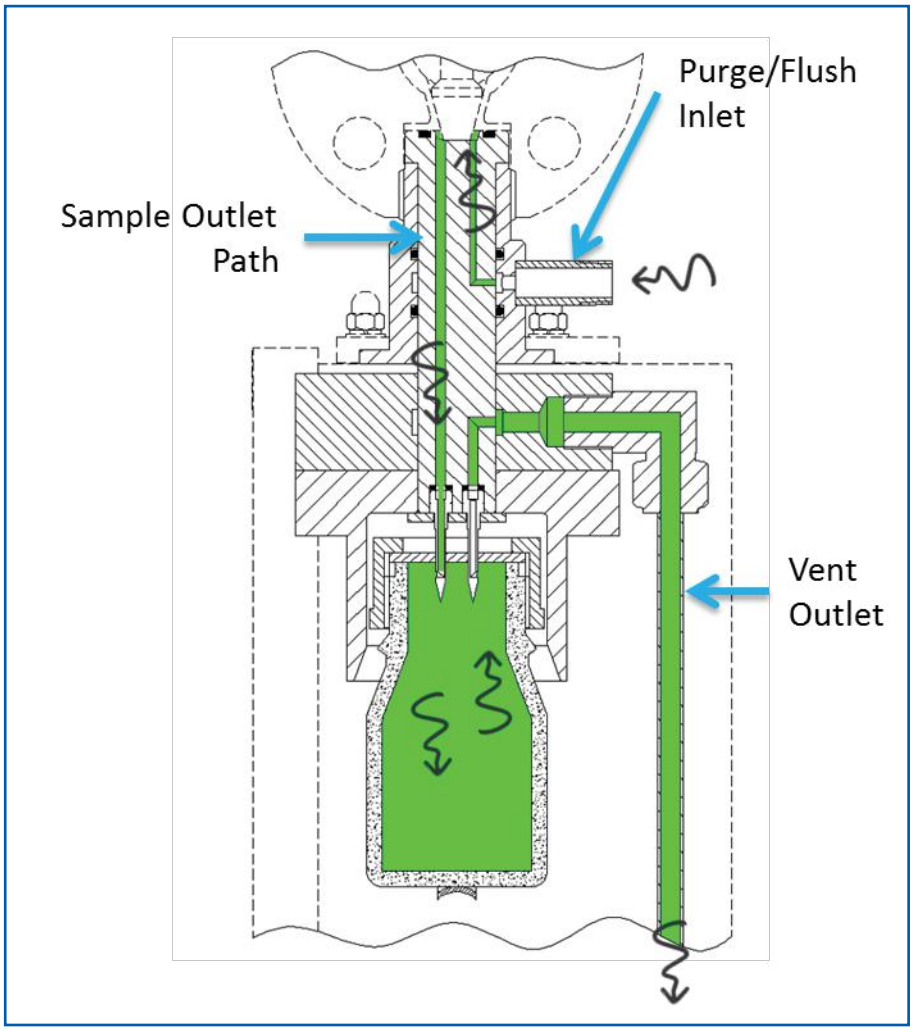
The valve section of the unit is permanently mounted in the piping to be sampled from. The operator removes the protective tip cover from the base of the valve and the cover from the syringe and inserts the syringe with a 180º turn of the handle. The bayonet fitting locks the syringe in place and simultaneously opens the syringe tip and the valve. Internal pressure pushes liquid or gas into the syringe. When the desired sample has been taken, the operator disconnects the syringe from the in-line valve by rotating the handle which simultaneously closes the syringe and valve. A safety transportation cover is attached to the syringe and the device is taken to the lab for chemical analysis.

Design	Wafer pattern to suit ASME 150, ASME 300, PN 10/16
Size	1" - 6"[PFA Lined Valve] As SD-IL 300 for Unlined DN25 - DN150 [PFA Lined Valve] As SD-IL 300 for Unlined Valve
Sample Size	50 ml & 100ml.
Performance	-5ºC to 100ºC, to 5 barg
Wetted Materials Valve	PFA, PTFE, Chemraz® Perfluoroelastomer Valve spindle Hastelloy® C276
Wetted Materials Syringe	Hastelloy® C276, PTFE, Chemraz® Perfluoroelastomer, Borosilicate Glass
Installation	Mounted for sampling from a horizontal or vertical piping
Options	
Materials	Valve in 316 Stainless Steel - C 276
	Syringe Unit in C 276
	Syringe Unit fully metallic without Borosilicate Glass
Sample	Other sample sizes possible

Cleaning

Purging or Flushing

While In-Line sampling valves are ideal from the perspective of not having dead space between the sealing element and the contained fluid, inevitably there is a small dead space between the sealing element and the sample bottle. The impact of this dead space is minimized by keeping the outlet bore small and length short and by using PTFE for the wetted components. In the majority of cases these design features mean that there is no significant sample to cause cross contamination. However in some circumstances it is necessary to clean the sample outlet area between samples. To achieve this, the device can be purged with an inert gas or flushed with liquid.



With both surface mount sampling valves and vessel sampling single samplers, their design means that the distance between samplers, the sample sealing element and the sample outlet is larger than on an In-Line sample valve. Hence on these types of samplers, purging or flushing is a more usual requirement.

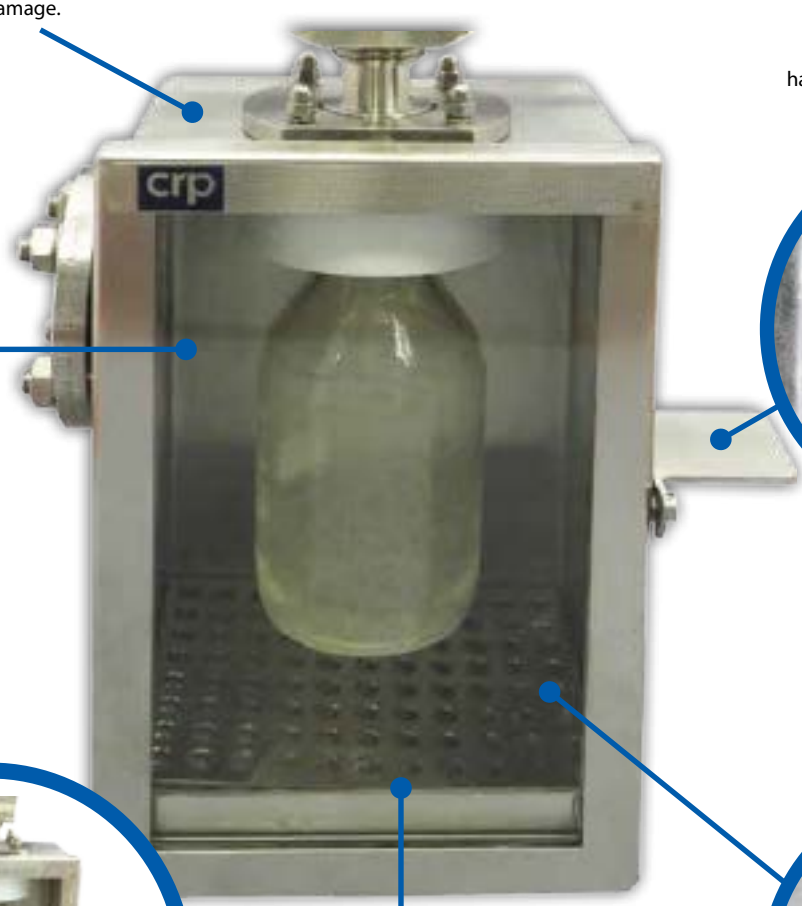
Purging and flushing are the ability to blow nitrogen or wash liquid through the outlet region of the sampler. With an In-Line sampling valve, this is typically achieved by additional drillings in the dip tube to the tip of the valve to allow the nitrogen or wash liquid to be pumped to the valve outlet and to the sample bottle. It should be noted that this also allows sample bottles to be pre-filled with nitrogen or another inert gas if it is important that the sample doesn't come in contact with air. On surface mount sampling valves an additional drilling is added into the valve body to give access for the nitrogen/wash liquid to the valve sealing element and the outlet flow path. On vessel samplers an additional flanged connection is provided for the nitrogen/wash liquid.

Sample Containment

A safety cabinet provides both primary and secondary containment around the sampling point, thus reducing levels of personal protective equipment and it enables local evacuation of any vapors and minimizes the chance of spillage.

Robust cabinet design in 3mm 316 stainless steel to protect the sampling point in the most aggressive environments, thus keeping it clean and protecting it from damage.

A large clear viewing area through laminated glass allows dispensing away from operator contact.



The door is designed for single handed glove operation with a large easy functioning handle.

The bunded area has a drain connection to run any spillage to the site waste system.

A large bunded area is provided within the cabinet (300ml) for secondary containment in case of spillage.

The door is designed for airflow into and through the cabinet. Vapors can be evacuated to the plant scrubber system.

Sample Containment

Cabinet Options

The standard stainless steel safety cabinet can be manufactured to house large or small collecting bottles or containers as well as provide room for two containers to be kept within the cabinet. Cabinets can also be manufactured in polypropylene, FRP or ETFE coated in order to protect from aggressive external environments or the spillage of corrosive materials within the cabinet.

Non-standard sizes and shapes

ETFE Coated Cabinet

Polypropylene Cabinet with GRP Reinforcement

Sample Containment

Internal Geometry Option

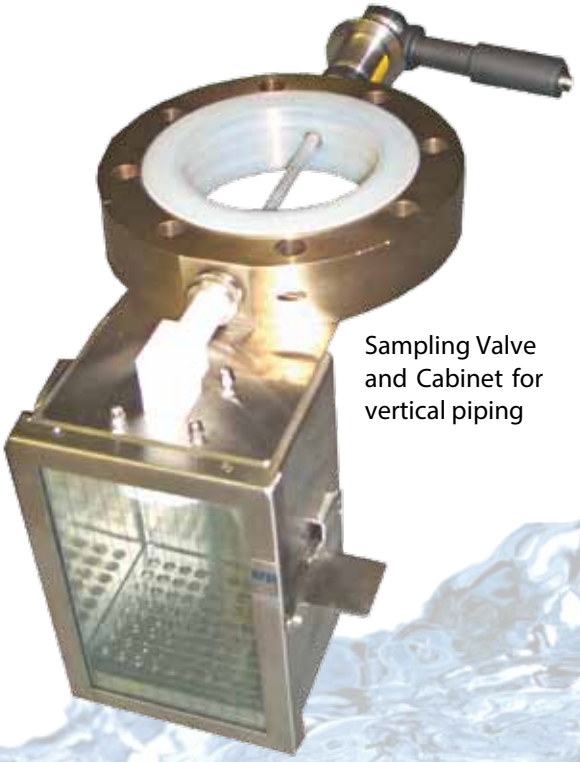
Tun dish base
Larger bunded area
Removeable spill tray
Spray bars for cabinet flush
Larger extraction or drain connection
Extraction for bottle venting

Tun Dish

External Geometry Options

Glove Ports
Alternative window materials
Rear, top or side windows
Other handed door
Lockable door
Key operated door interlock
Mounting for vertical pipeline

Cabinet with glove ports and padlockable latch



Sampling Valve and Cabinet for vertical piping

Trapped key interlock

Powder Sampling

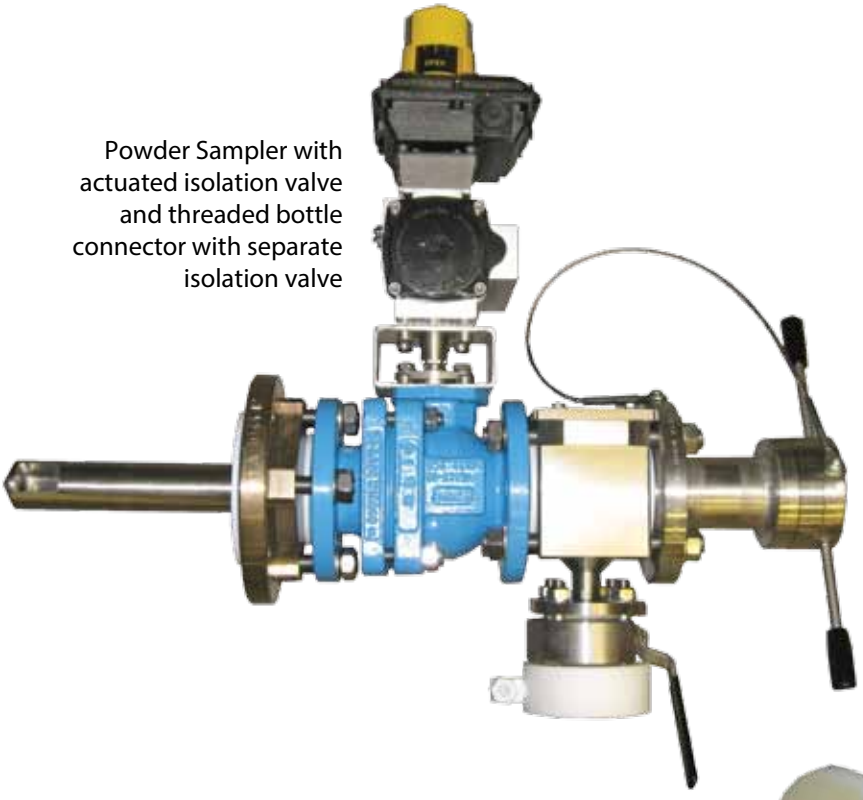
Due to the variable nature of powders, a wide variety of powder samplers can be offered to deal with wet sticky powders, light free flowing powders, powders in filter driers, and powders falling through ducting.

Different levels of containment can be offered to provide appropriate levels of operator protection, depending upon the powder being handled. Similarly many variations of interlocking can be offered to suit customer requirements.

Typical materials of construction are stainless steel, PTFE/PFA, Hastelloy® or other exotic metallics, depending upon the level of corrosion resistance required.

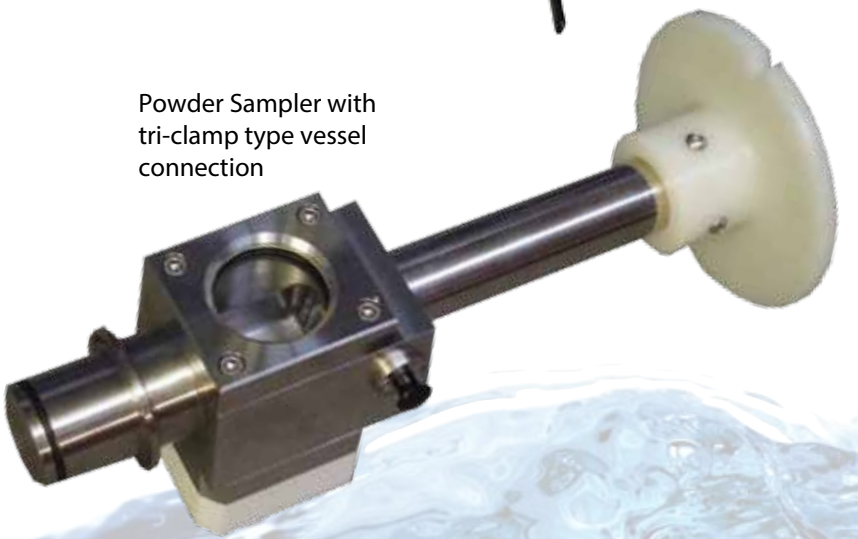
Powder Sampler to suit trapped key interlock to prevent unauthorized operation

Powder Sampler with actuated isolation valve and threaded bottle connector with separate isolation valve



Powder Sampler for sampling from falling stream of powder, with knuckle jointed thief to minimize retracted thief length

Powder Sampler with tri-clamp type vessel connection



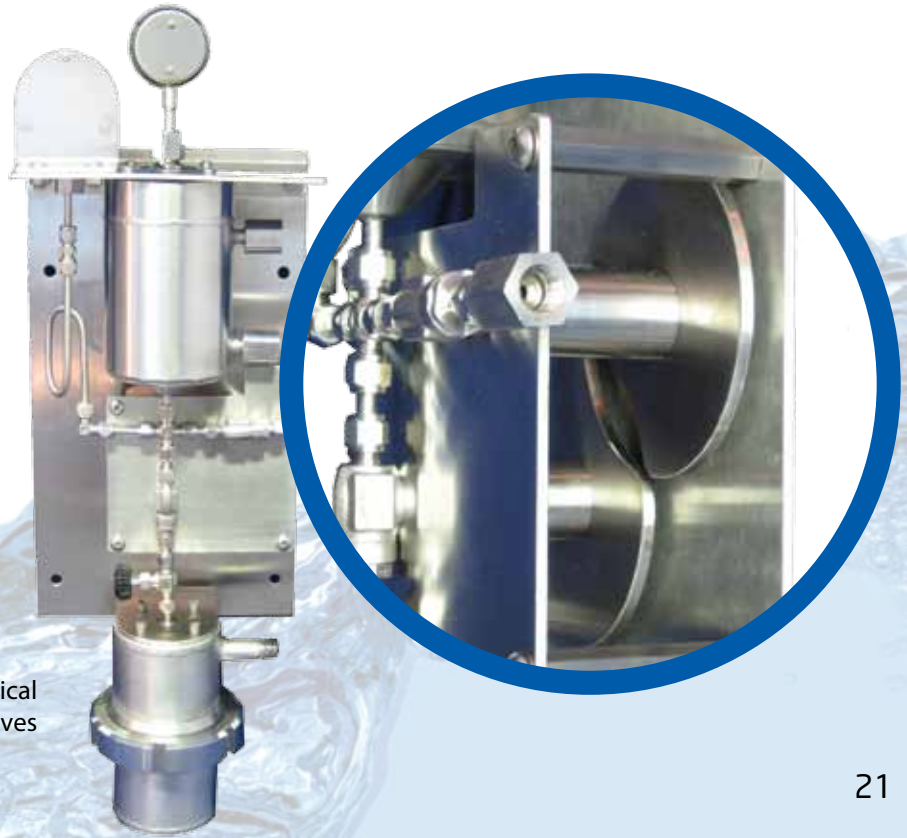
High Pressure and Temperature Sampling

CRP manufactures high pressure and temperature sampling systems to address very specific sampling requirements from customers in pharmaceutical research, fine chemical production, petrochemical, oil drilling fluids etc. Each application has specifics including process conditions, the process fluid or gas, compatible construction materials and the standards and legal framework to comply with. Some examples are detailed below.

Technical Specification

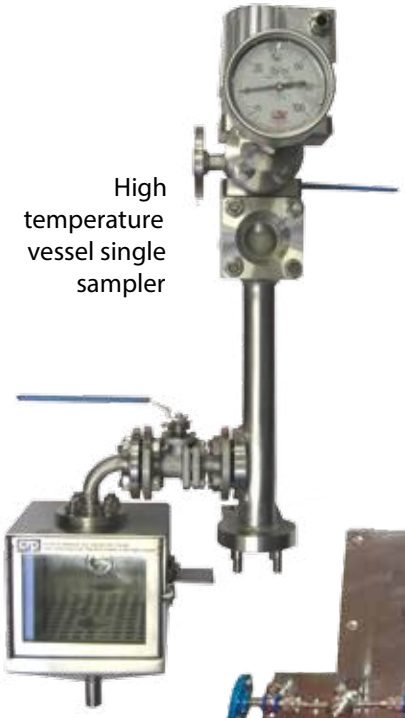
Performance	Temperature to 275ºC, Pressure to 100 bar g
Connection	To suit customer requirements, but typically small sizes including Swagelok®, threaded, welded and flanged
Wetted Materials	Stainless Steel, Hastelloy®, Monel and other exotic metallics
Other Materials	Generally 316 Stainless Steel to C 276
Safety Features	
Interlock	Mechanical, trapped key and valve actuation interlock to prevent accidental pressure release
Heat Exchanger	To cool process media to safe levels
Jacket	Heating jacket to maintain process media temperature to prevent sample solidification
Gauges	Pressure and temperature gauges to give live sample condition
Insulation	Double skinning and thermal insulation to protect operators
Cabinet	Safety cabinet in case of sample container failure and protection from the external environment
Sample Collection	To suit customer requirements, but including sample bombs and sample bottles
Typical Duties	Sampling of process media with entrained gases, supercritical fluids and media with components prone to solidification
Sample Location	Process lines, vessels and bypass/mixing loops

This sampler was designed to take samples from a process line in a fine chemicals plant, running at 25 barg and 250ºC. The sample required cooling with a volumetric heat exchanger prior to dispensing. Pressure was reduced during dispensing using a flow control valve and the sample was collected in a bottle housed inside a mechanically strong vented metal housing in case of bottle failure. The sampler incorporated a system of mechanical interlocks between the inlet and outlet valves such that only one valve could be opened at a time.



Sampler with mechanical interlocks between valves

High Pressure and Temperature Sampling



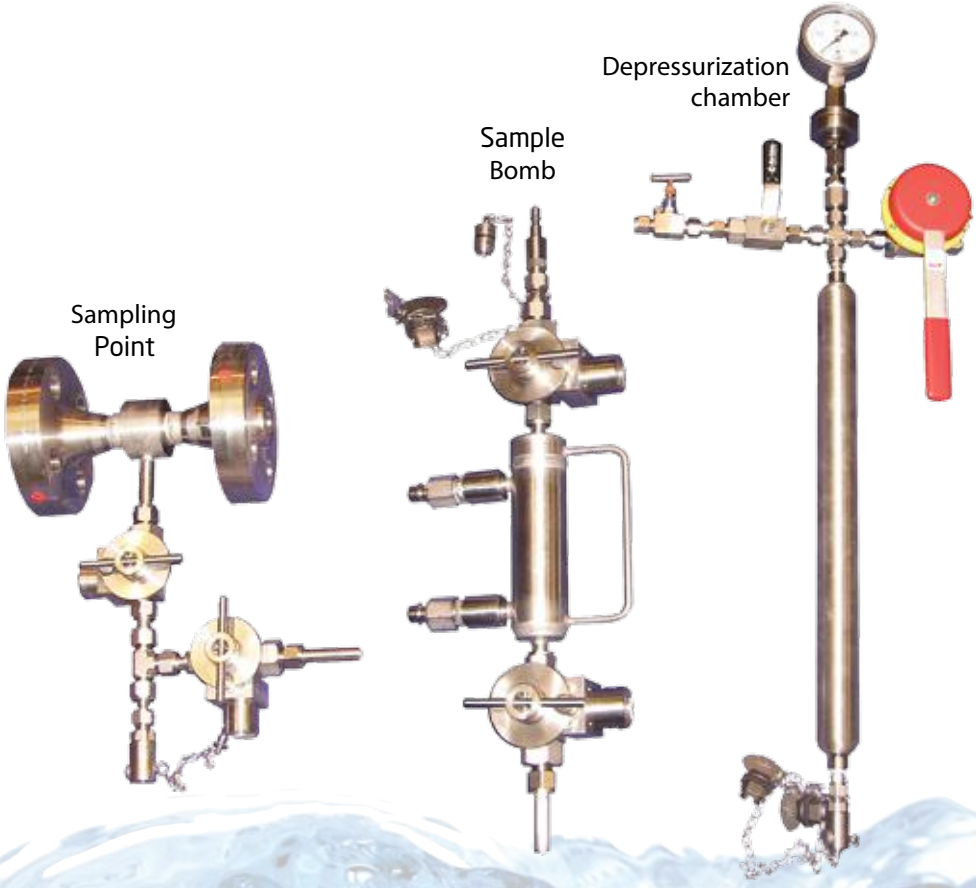
High temperature vessel single sampler

The customer required a vessel sampler to collect samples from a vessel of a chemical used as a down-hole drilling liquid in oil exploration. While the pressure requirement was modest, the temperature (275ºC) necessitated the use of high temperature valves with graphite based seals and a floating ball check valve with a PEEK float. The sample itself was to be dispensed into a metal container requiring the use of a specially designed safety cabinet with a nozzle outlet so that the liquid level in the container could be seen. Additionally the customer required that the sampler could be flushed clean through the safety cabinet and to drain, requiring the use of a tun dish base on the cabinet and a large hole in the center of the cabinet base plate to allow the flush media through with minimum splashing inside the cabinet.

High pressure gas sampling

This system was for sampling a gas at 18.3 barg and 42ºC. The inlet on the left of the panel connected to a tee and routed back to the main feed line. When a suitable flow was established the tee was used to redirect the flow to a sample collection bag. This bag had its own isolation valves as well as their being valves on the supply to and from the bag. The pressure was stepped down before the sample was allowed into the bag.

The requirement was to design a sampling system to take samples of supercritical carbon dioxide, talc and several other minor components. The process conditions were 100 barg pressure and 200ºC temperature. The sample had to be cooled and depressurized using an expansion chamber, the carbon dioxide vented safely and the remaining material dispensed for analysis. To ensure safe operation, a system of trapped key interlocks was utilized. In addition, high pressure quick release couplings were used to allow the sample bomb to be transferred from the process line to the laboratory for discharge and analysis.



Special Sampling

CRP has extensive experience in designing and manufacturing special sampling systems in collaboration with the customer. Below are a few examples.

Free standing vessel sampling system for sampling unstable process liquids with self-draining, zero crevice design, and an eductor to generate vacuum.

Lab scale unlined vessel sampling system with Swagelok type valves.

Portable tanker sampler to allow for easy collection of sample from tanker prior to accepting tanker contents onto site.

Actuated In-Line sample valve with DIN11851 end connections & triclamp sample outlet with purge connection.

Panel mounted In-Line sample valve with In-Line heat exchanger to cool process media prior to it arriving at the sample valve, and temperature gauge.

Seeding device to allow seeding material to be added to a vessel.

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