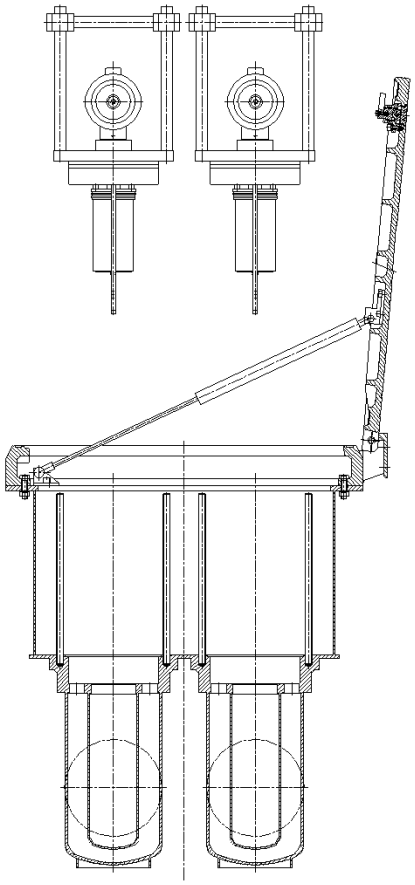
UNDERGROUND GAS REGULATION STATION

TYPE: COCON 13

Twin stream
Active/Slam – Active/Monitor

OPERATORS-MANUAL



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1. Introduction

This manual has been compiled to help you install, adjust and maintain the gas pressure reducing station.
It answers the most recurring questions about the gas pressure reducing station and it explains how to replace several parts easily. The manual is for operators who are qualified in assembling and operating gas installations.

This manual has been divided into six chapters, in order to give the operators easy access to the required information.

- Chapter 1 Introduction
- Chapter 2 General information concerning the gas pressure reducing station.
- Chapter 3 Describes how to operate the Cocon 13 safely.
- Chapter 4 Describes installation, commissioning and maintenance
- Chapter 5 Describes the extra options that are possible
- Chapter 6 Additional data contains various lists to help you find the required information in this manual.

This gas pressure reducing station is the result of years of development. Development is still in process. We will inform you by mailing about developments concerning this type of gas pressure reducing station.

Definitions

p_1 = Inlet pressure
p_2 = Reduced pressure
Δp = Differential pressure (p_1-p_2)
CR = Closing rate
MR = Monitoring rate
Q = Capacity

The standard Cocon 13 is a twin stream gas reducing system which can be configured in several ways.

Example 1
Both lines Active regulator with SSV

Example 2
One line Active / Monitor regulator and one line Active / SSV

Picture of a twin stream Cocon 13 inclusive manifolds and final coating.

The in-and outlet valves are connected by manifolds creating a twin steam configuration.

One of the lines normally is the “stand-by” line and one is operational.

2. General

2.1 Technical data

Technical data HON COCON 13 twin stream	:	
Medium	:	all types of gases except for Sulphur-containing gases (H_2S). *Stations for gas pressure reduction of gases containing Sulphur are available on request.*
Inlet pressure (p_1)	:	maximum 20 bar (ANSI150)
Outlet pressure (p_2)	:	minimum 20 mbar (2 kPa)
Minimal Δp (p_1-p_2)	:	0.5 bar
Temperature range (ambient)	:	-20 °C to +60 °C
Flow coefficient	:	Cg value (EN 334) 435
Regulating capacities	:	see sizing tables
Total weight	:	about 300 kg
Cartridge weight	:	about 40 kg
Packed volume	:	about 1.5 m^3
Length	:	maximum 1435 mm (incl. header)
Width	:	maximum 860 mm
Height	:	maximum 980 mm
Inlet connection	:	2”
Outlet connection	:	4”
Pressure rating	:	according to ANSI 150
Impulse line connection	:	metric fittings according to DIN 2353
Pressure gauges	:	2 or 3, for measuring inlet, (intermediate) and outlet pressure.
Pressure gauge	:	¼" BSP thread
Regulator type	:	two-path pilot operated spring loaded closed gas pressure regulator
Shut off valve type	:	direct acting safety shut off device (SSD) with integral pressure equalizing. (Push button type)
Filter	:	cartridge filter with support cage
Filter material	:	felt
Filter fineness	:	3 micron (0,003 mm)
Safety devices		
Safety device	:	SSD valve with SSD controller
Location of type plates		
Casing	:	beneath pit cover
Unit	:	on membrane cover
Pilots	:	on the side of the pilot
Information on type plates		
Casing	:	name manufacturer, type specification, serial number, maximum operation pressure, year of construction
Unit	:	name manufacturer, type specification, serial number, maximum operation pressure, minimal reduced pressure, year of construction
Pilots	:	name manufacturer, type specification, spring type, serial number, adjustment data, year of construction, maximum allowed inlet pressure

2.2 What is the HON COCON 13

The HON Cocon 13 is a complete self-contained underground gas regulating station for the reduction of gas pressure.
The station can be completely buried or installed above ground in an area much smaller than a conventional regulating station.
The station ensures reliable gas supply at a constant pressure independent of the gas consumption.

The station having all essential elements of a conventional pressure reduction station is designed for use on gas distribution and industrial applications.
Only a very restricted area is required for installing the station.
The working elements are contained in a removable cartridge retained by a simple closing construction.
All being housed in a steel body that is installed underground into the gas main.
Above ground is a vent stack, which contains vent pipes for atmospheric reference and the relief valve.

The HON Cocon is supplied pre-assembled into a skid package, which considerably reduces the on-site installation time.

The station is made of steel, aluminum, bronze and synthetics. The station can be produced in other materials upon request.

2.3 Construction

Remark:	For the location of the parts of the gas pressure reducing station, mentioned in the text, we refer to illustration 2.4.1. The short numbers between the brackets, which are mentioned in the text, are position numbers of the parts in illustration 2.1.

The top of the station is located a few centimeters above or at ground level. Depending on the composition of the soil, a concrete foundation (plate) under the station may be needed.

The gas regulating station HON COCON 13 consists of two parts:

- The body.
- The gas regulating and safety unit. (Cartridge)

Remark:	The "gas regulating and safety unit" will be referred to as the cartridge in the rest of the manual.

2.4.1 Active/Slam operation

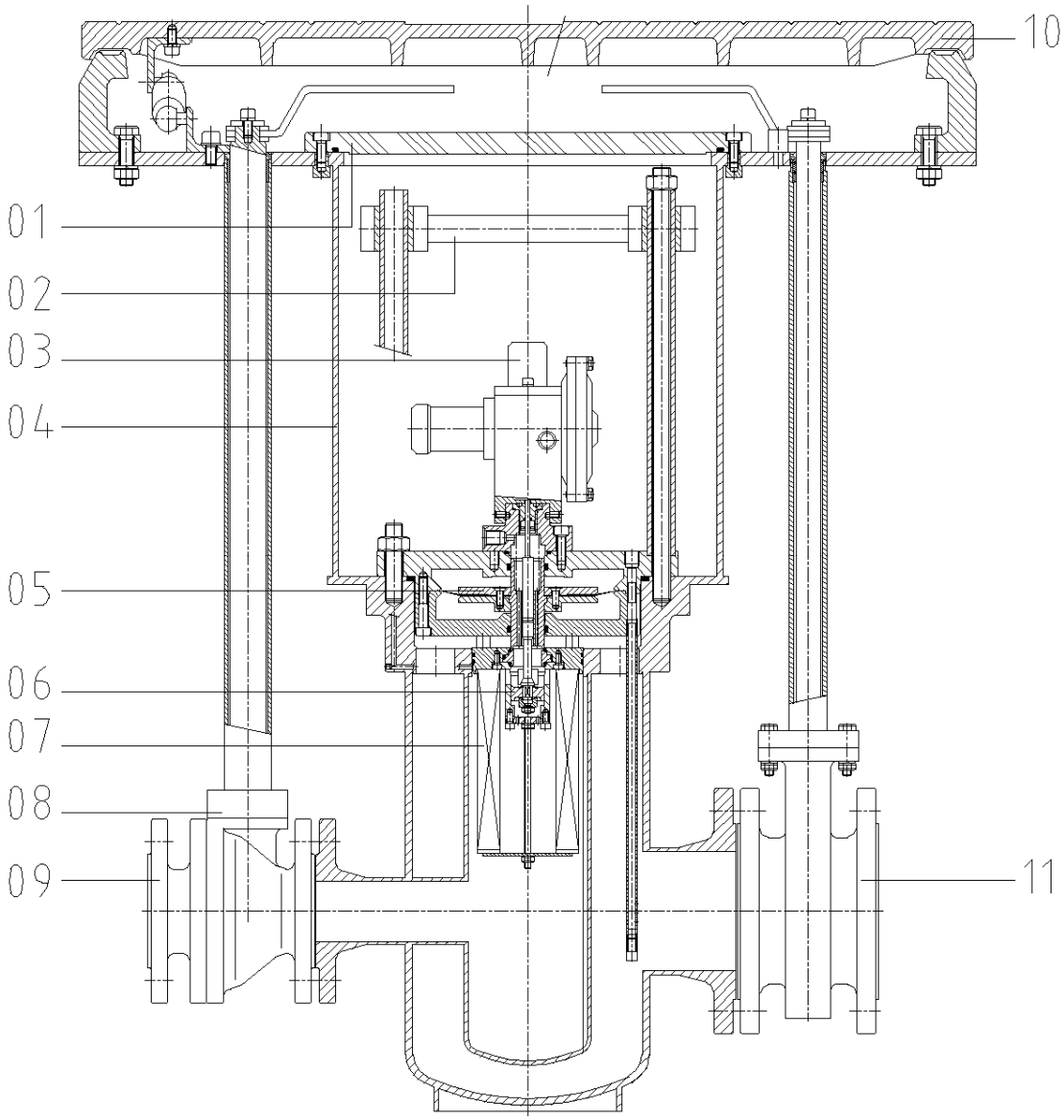


figure 2.4.1 'Cross section HON Cocon 13 Active/Slam Shut Valve

01	Cover
02	Lifting handle
03	SSD-controller
04	Body
05	Regulator
06	SSD-valve
07	Filter element
08	Stem extension
09	Inlet ball valve*
10	Pit cover
11	Outlet valve*
	* (Isolating valves)

The hinged pit lid cover (10) is fitted with a stainless latch that is securely plugged for the prevention of unauthorized entry.

An isolating ball valve (09) is mounted to the inlet of the casing. When this ball valve is open, its handle prevents removal of the Plexiglas cover.

A dust filter (07) is connected under the cartridge.

The gas then passes through a safety shut-off device upstream of the regulator within the modular cartridge:

- The device consists of a ssd valve (06) and a ssd controller (03). The controller sits on top of the cartridge. If the regulator fails in the open position, the relay will detect an increase in line pressure and release the spring-loaded valve, cutting off the gas supply. It is also fitted with a manual emergency release button.

Gas pressure reduction is achieved by a pilot operated, diaphragm regulator (05).
The required outlet pressure is set and controlled with the pilot.

A valve (11) is attached to the outlet flange. The valve can be operated without removing the cover of the casing. However, as a safety feature, if this valve is open, then it is not possible to remove this Plexiglas cover.

The installation of a relief valve is an option.

Transducers can be installed in the protection of the enclosed space, for the remote measurement of pressures. Close indication of the slam shut valve by means of a proximity switch is also available.

The station is fitted with two pressure gauges which read the inlet and outlet pressures. These gauges are situated under the protection of the Plexiglas cover but are visible when the pit lid cover is opened.

Purge valves for depressurization of the unit are mounted on the cartridge.

A handle is attached to the cartridge, so the cartridge can be easily removed from the casing.

2.4.2 – Active/Monitor operation

Gas flows from inlet to outlet passing inlet valve, filter, monitor, worker, and outlet valve.

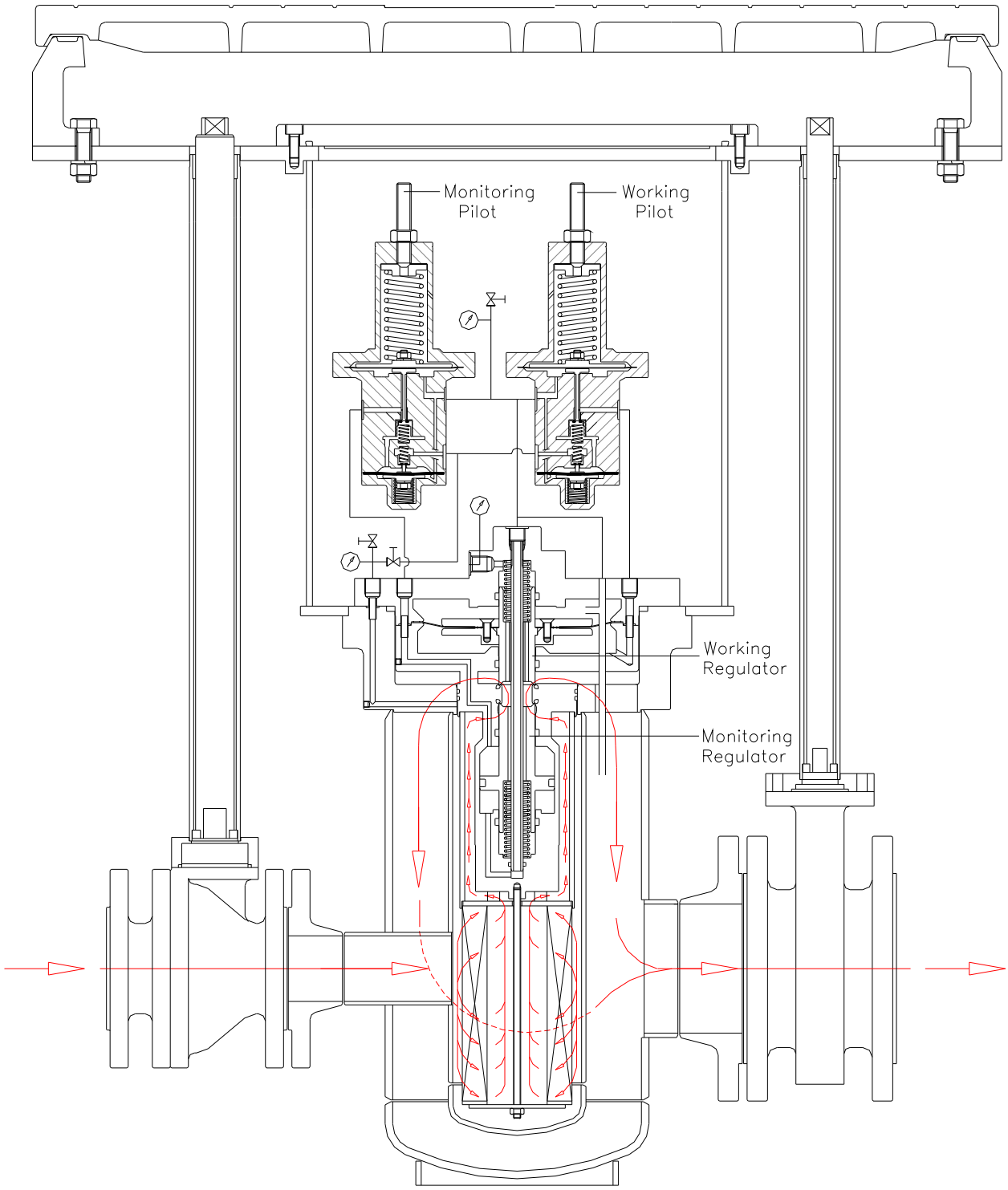


Fig. 2.4.2

2.4.3 Pressure Pattern

The following functional pressures stages can be distinguished:

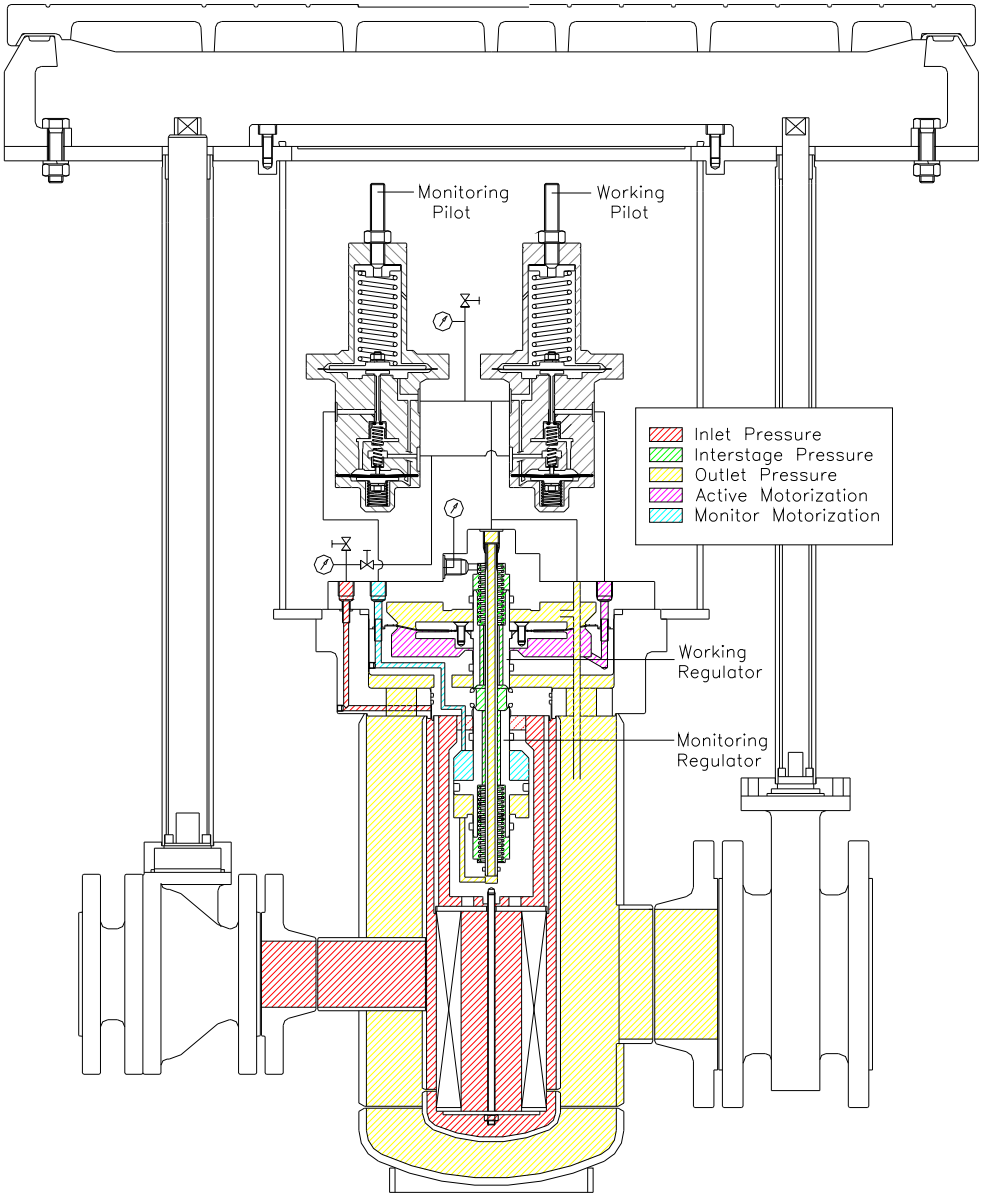


Fig. 2.4.3

Take note that in the piloting additional auxiliary pressure stages can be found.

2.4.4 Pressure Control

Two operation modes are possible: active and monitor control. Both modes operate identical and can be reversed during testing and operation. During normal operation the upstream control valve monitors the outlet pressure in wide-open position, while the downstream valve reduces inlet to outlet pressure in throttling position.

Control has been based upon cascaded loops (with master and slave) which have been proven reliable and accurate under most operation conditions. The outlet pressure depends upon the dome-load (motorization) as set and corrected by the pilot.

2.4.5 Active Control

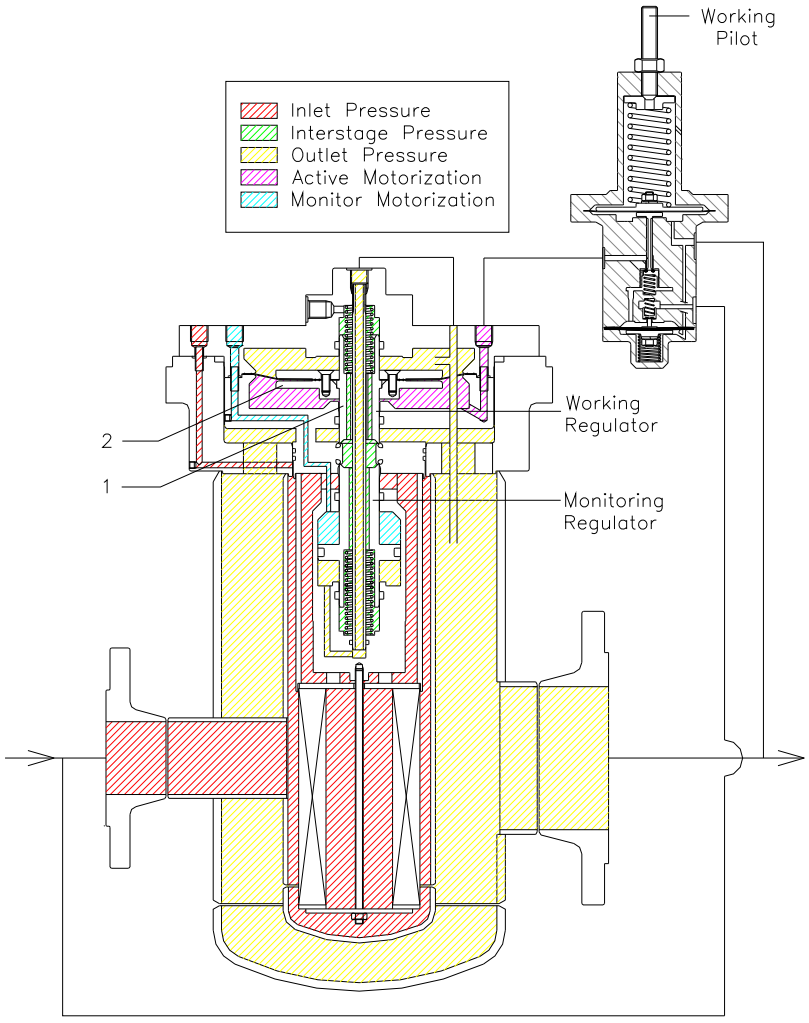


Fig. 3.3.1

Low Pressure

If the dome load (active motorization) on the active valve (1) exceeds the outlet pressure, the diaphragm (2) will move upward. This increases the stem travel and allows the active to compensate (directly) for low pressure.

High Pressure

If the outlet pressure exceeds the dome load, the diaphragm (2) will move downward. This results in decrease of stem travel and allows the active to compensate (directly) for high pressure.

2.4.6 Monitor Control

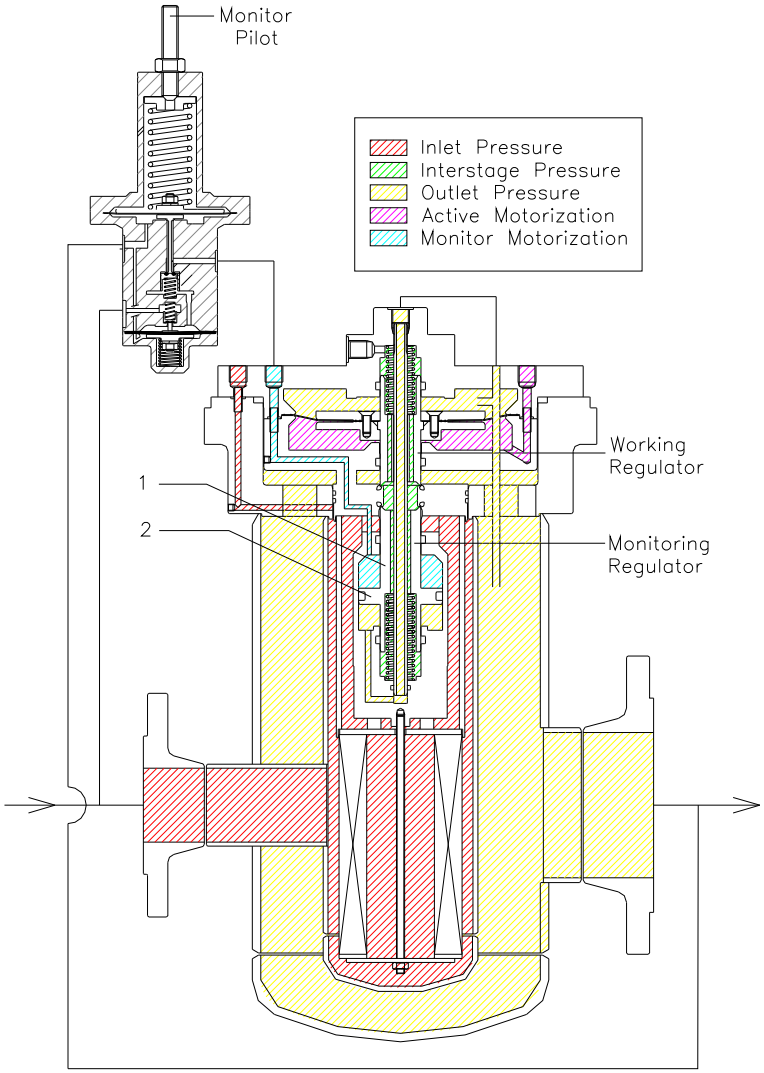


Fig. 3.3.2

Low Pressure

If the dome load (monitor motorization) on the active valve (1) exceeds the outlet pressure, the piston (2) will move downward. This increases the stem travel and allows the active to compensate (directly) for low pressure.

High Pressure

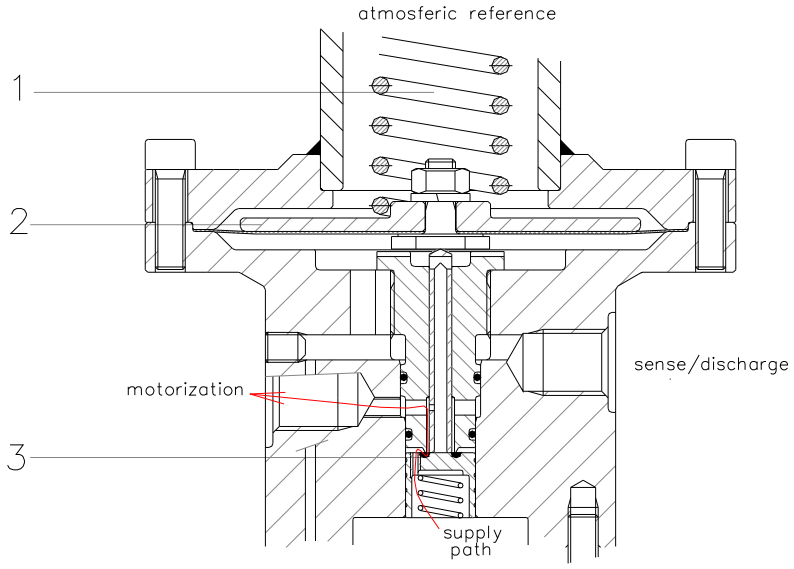
If the outlet pressure exceeds the dome load, the piston (2) will move upward. This results in decrease of stem travel and allows the active to compensate (directly) for high pressure.

2.4.7 Pilot Control

The set point can be adjusted with the set screw on top of the pilot (CW to increase, CCW to decrease)

As dome load (active motorization) and spring force vary with stem travel the outlet pressure will deviate from the set point. Upon set point deviation the pilot, (which functions similar to the main line valve) will open, or close to correct the dome load and (indirectly) correct the outlet pressure.

Low Pressure



High Pressure

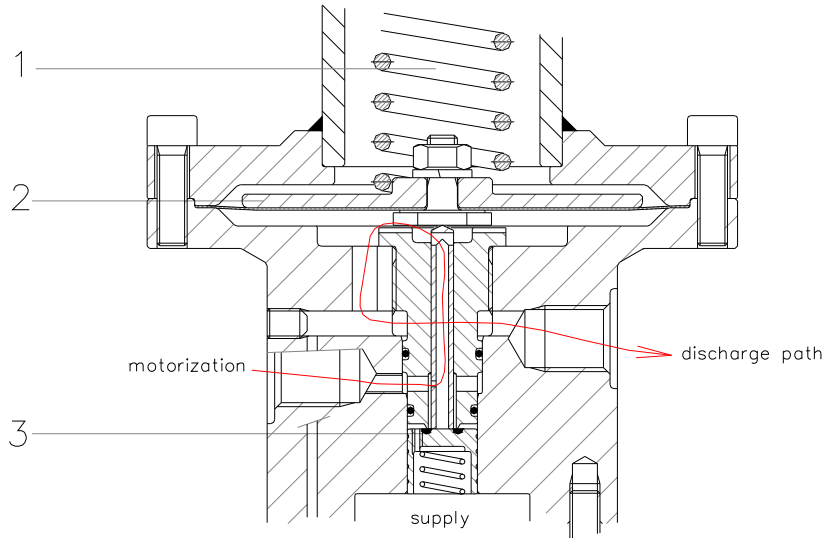


Fig. 3.3.3

Consideration should be given to the bleed or discharge of the monitor controller @ lock-up, low flow and testing of the *active*.
Upon activation of the monitor pilot the excess of motorization will be discharged to outlet which results in closing of the monitor.
Note that after monitor lock-up (which equals system lock-up) no bleeds are present. See also the relevant pilot manual

Safety device: ssd-valve

Should the regulator malfunction, then the ssd-valve will automatically cut off the gas supply. The value at which the controller activates shall be higher, than the value set on the regulator pilot.

When the cause of the rise in outlet pressure has been rectified, the slam shut valve can then be reset by pressing a button on the relay.

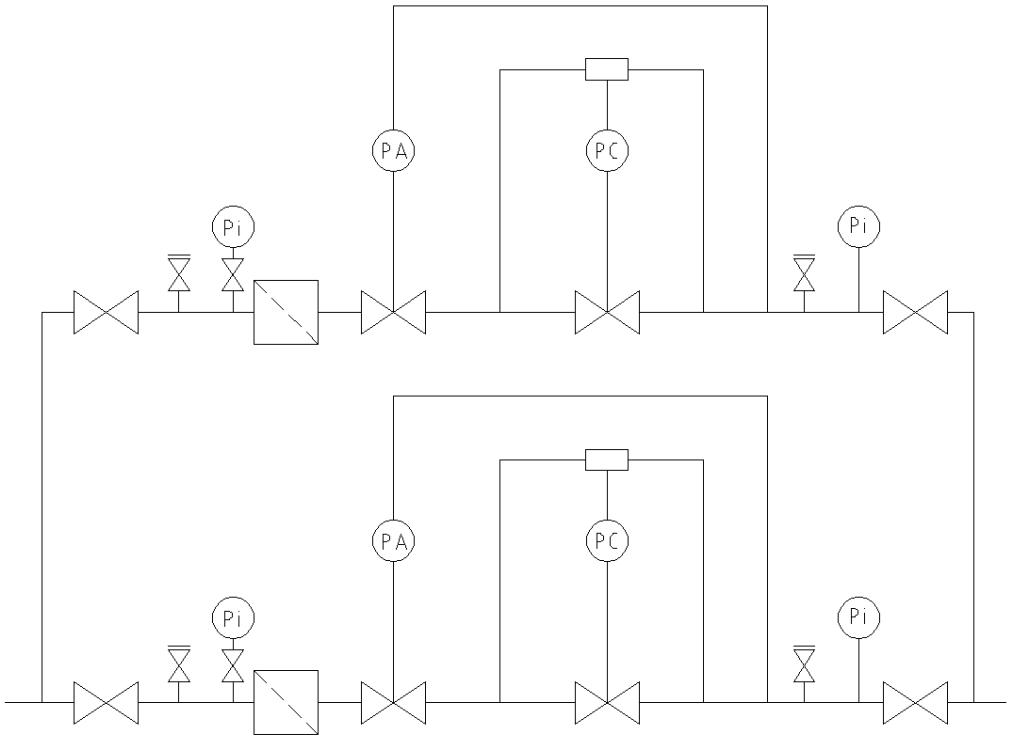


Illustration 2.2 'Flow scheme HON COCON 13 twin stream active/slam – Active/slam'

Objectives

The operational objectives of the gas regulating station are:

- No gas leakage.
- Accurate control of the outlet pressure by means of the pilot controlled regulator.
- Clean filtering of the gas medium.
- Watertight protection of the control equipment.

2.5 - Automatic operation

The HON Cocon is a completely self-contained gas regulating station, which operates automatically if correctly installed and set. Should a major malfunction occur, then the cartridge automatically shuts off the gas supply.

2.6 - Maintenance

Although the cartridge has relatively few moving parts, regular maintenance is advised. This helps to ensure the long and smooth operation of the cartridge.

Due to its ingenious design the cartridge can be replaced quickly and easily with a previously set-up spare cartridge. Cartridge maintenance can be done in the service shop.

Lubrication

During normal operations, the moving parts of the station needs no additional lubrication. All moving parts are either self-lubricating or don't need any.

3. Safety

Because a gas regulating station operates with explosive media, all safety aspects must be taken into account. Regular maintenance of the gas regulating station promotes safe operation.

Only trained and qualified persons should carry out work on these units.

The following points should also be considered and this manual

- When in doubt or if operating the gas regulating station for the first time, read all necessary instructions in this manual.
- It is assumed that the unit has been properly shipped and stored prior to installation.
- In addition it is required to make sure that the control valve is only used in areas where the operating pressure and temperatures do not exceed the operating values which are based on the valve sizing data submitted in the order.
- Any hazards which could be caused by the process medium and pressure are to be prevented by appropriate means.
- Before starting maintenance, always close the valves in the upstream supply and downstream discharge pipes first. These valves should be situated within a distance of five meters of the station's inlet and outlet flanges.
- Ensure that you are sufficiently trained to install and remove the cartridge.
- Ensure that you are sufficiently trained to service the cartridge.
- Protect - if necessary - your ears, eyes and hands, when carrying out maintenance work. Wear ear protection, safety glasses and working gloves.
- Ensure that the station and the direct surroundings are always well illuminated in dark and twilight, during on-site maintenance.
- Ensure that there is sufficient ventilation surrounding the station, when removing the cartridge. Gas condensate and other additives or contaminations may damage your health.
- Use spark free tools for all maintenance work to prevent explosions.
- Take care of your back during the installation and removal of the cartridge. Bend your knees and keep your back straight in accordance with proper lifting practices. Do not extend yourself or attempt to lift anything that is too heavy for you.

4. Installation & operation

4.1 – Installation instructions

This chapter describes the installation of the casing and the attachment of the upstream supply and downstream discharge pipes to the body. Illustration 4.1 is a drawing of a fully installed station. Use this drawing for guidance in the next four paragraphs.

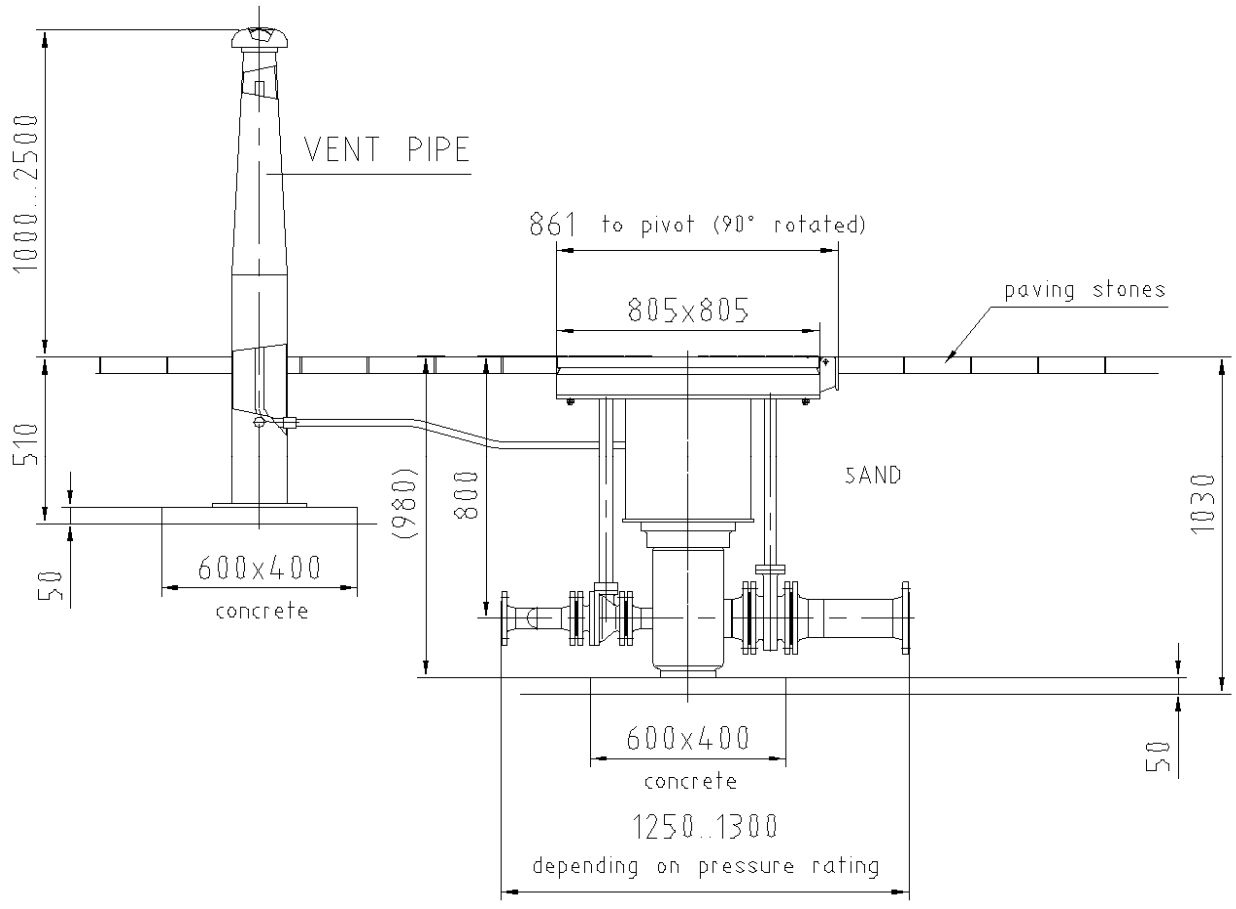


Illustration 4.1 'Fully installed station'

4.1.1 - Soil condition and foundation

Depending on the composition of the soil, a concrete foundation (plate) under the station may be needed, to prevent the station from sinking. With the following soil compositions, a foundation is necessary:

- Organic soil compositions such as peat, humus and gardening soil.
- Very fine-grained soil compositions (clay plates) such as clay, bolder clay, sandy clay and compost.

We also advise you to use a foundation under the station with fine grained soil compositions, such as loam, sandy clay, silt and loess. Use concrete as foundation material.

A foundation is not necessary with moderate rough grained soil compositions, such as sand, gravel sand, wind born sand deposit and sandy plates.

The foundation must be at least 50 millimeters thick. Ensure that you do not only consider the weight of the station, while calculating the thickness of the foundation, but also consider extra weight. (For example, the placing of a vehicle on the pit cover).

The width and length of the foundation slab must be a minimum of 1000mm x1500 millimeters. Ensure that the top of foundation plate is levelled.

4.1.2 - Pit dimensions

The pit depth depends on the thickness of the foundation. To determine the pit depth of a partially exposed in-ground station (pit cover above ground level), always use the following formula:

$$\text{Depth of pit} = 906 + d_f$$

Fill in the thickness of the foundation d_f in millimeters. The number "906" is the distance from the bottom of the casing to halfway up the pit cover frame. The result - the depth of the, to be dug, pit - is in millimeters.

To determine the pit depth of a ground sunk station (pit cover at ground level), always use the following formula:

$$\text{Depth pit} = 980 + d_f$$

Fill in the thickness of the foundation d_f in millimeters. The number "980" is the distance from the bottom to the top of the casing. The result - the depth of the, to be dug, pit - is in millimeters.

Example:	For a foundation plate (d_f) that is 100 millimeters thick, the pit depth, for a partially exposed in-ground station is 906 + 100 = 1006 millimeters. For a foundation plate (d_f) that is 100 millimeters thick, the pit depth for a station equal to ground level is 980 + 100 = 1080 millimeters.

Dig a funnel shaped hole, so that you can easily attach the supply and discharge pipes to the casing. Fasten the piping - tension free - in the clamps, which are attached to the foundations. Delivery of a complete foundation - supplied with a positioning frame for the casing and fastening clamps for the piping - is possible.

4.1.3 - Placement of the body

Remark:	Use lifting tackle, a hoisting frame or a crane to install the body. During bad weather conditions (storm and wind), place a shelter above the station. This will prevent water and dirt from getting into the station. It is important that the area under the shelter is well ventilated. Support the opened pit cover, by wind force eight and up, with a support to prevent closing.

- Close casing cover and pit cover
- Put the hoisting hooks in the crane hooks.
- Hoist the casing carefully. Ensure that the center of the casing hangs above the center of the pit.
- Lower the casing carefully onto the foundation.

In most cases, the supply and discharge pipes are attached to the casing with a connecting flange.

- Put a seal ring ANSI 150 between the supply pipe flange and the inlet header.
- Attach the supply pipe flange to the flange of the inlet header with four bolts , four nuts and eight washers. The washers are situated between the bolt heads and the supply pipe flange and between the ball valve flange and the nuts.
- Put a seal ring ANSI 150 between the downstream discharge pipe flange and the outlet header flange.
- Attach the downstream discharge pipe flange to the casing's outlet header flange with eight bolts --, eight nuts -- and sixteen washers. The washers are situated between the bolt heads and the discharge pipe flange and between the outlet flange and the nuts.

Remark: Insulate the flange connections with a covering, to prevent the fasteners from corroding.

We advise you to place a railing around the station. This prevents the station from obstruction e.g. vehicles.

4.2 – Installation of the vent stack

Remark: During bad weather conditions (storm and wind), place a shelter above the station. This will prevent water and dirt from getting into the station. It is important that the area under the shelter is well ventilated.

Support the opened pit cover, by wind force eight and up, with a support to prevent closing.

When the casing cover and pit cover are closed and the station is in operation, the area in which the regulator pilot, relief valve and shut off relay are located is kept atmospheric. This is done by a connection between the casing and the vent pipe by means of heavy-duty flexible hoses. The relief has its own separate connection to atmosphere through the vent pipe with a flame arrestor on top of the vent pipe.

- Fill the space between the station and the wall of the hole, until just under the vent connections on the casing with soil.
- Place the vent stack at a distance of approximately 0.5 meters from the casing in a depth in accordance with illustration 4.1. The vent stack requires a concrete foundation.
- Two hoses are supplied with the unit (Three hoses if a relief valve is fitted). One of 2 meters (In case of relief valve two) and one of 3 meters to make it possible to place the vent stack on each side of the HON Cocon.
- Attach the hoses with the ¾” fitting between the ventilation connections on the casing and the vent stack. The vent stack has three connections the middle one is for the relief valve connection. The other two have to be connected to the casing to keep the area in which the regulator pilot, relief valve and shut off relay are located atmospheric. Be sure that the hoses are connected in such a way that no water can enter the hoses.
- Close the pit cover.
- Fill the space between the station and wall of the hole to ground level with soil.

4.2 - Starting up

Remark: During bad weather conditions (storm and wind), place a shelter above the station. This will prevent water and dirt from getting into the station. It is important that the area under the shelter is well ventilated.

Support the opened pit cover, by wind force eight and up, with a support.

Illustration 4.2 is a top view of the station with the pit cover open. Use the illustration for locating the various valves and pressure gauges.

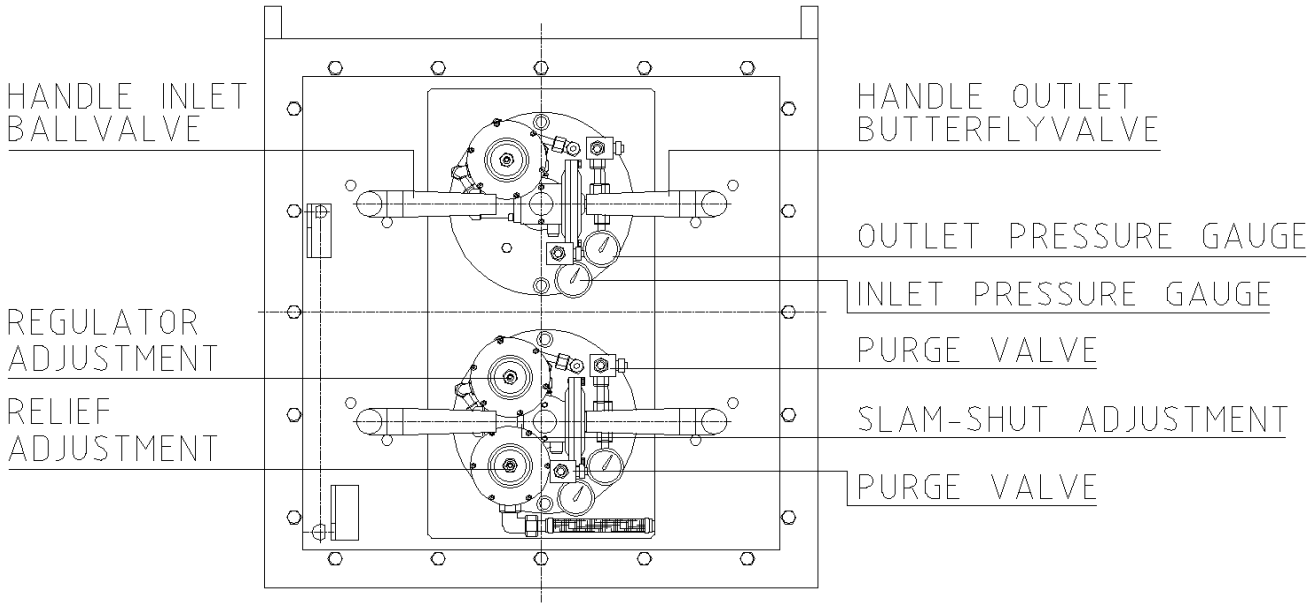


Illustration 4.2 ' Twin stream station with an open pit cover'
Active/Slam – Active/slam/Relief

4.2.1 - Installation of cartridge

This paragraph describes the installation of the cartridge in the casing. The cartridge can be replaced with a spare cartridge (adjusted) within 20 minutes.

To install the cartridge in the casing, proceed as follows:

Remark: Take care of your back while lifting, when installing and removing the cartridge.

- Lift the cartridge by the handles.
- Lower the cartridge in the casing, the cartridge is guided by the threaded rods.
- The cartridge has to be fitted with its measuring tube pointed to the outlet side.
- Fix the cartridge with the four nuts M16/ M24)* to the body. The unit is now fixed into position.

4.2.2 - Emergency-stop

There is an emergency stop control button on the slam shut valve controller, which can be used when required, to put the cartridge immediately out of operation.

To use this emergency stop button, proceed as follows:

- Open the casing cover.
- The silver coloured button is located on the side of the slam shut valve controller.
- Press the emergency stop control button. This causes the valve to close down the gas supply to the regulator.

An activated valve can be recognised by the raised red button, which is located under the transparent cap, on the shut off relay.

After correcting the malfunction, you can reset the emergency stop control button by first pushing the red button halfway down (this allows the bypass to equalise the pressure). After equilibrium has been achieved then press the button all the way down, resetting the valve.

Take note: once a lower trip function is installed and set, the outlet pressure should be above the lower trip value (+ relatching difference) to enable reset

4.3 – Operation

4.3.1 – Before getting started

1 Check if the upstream & downstream block valves are closed.
2 Check if the system between the block valves is depressurized.
3 Assure that the upstream piping & equipment have been cleaned.
4 Assure that both the inside of the HON Cocon body and the HON Cocon cartridge have been checked for proper cleaning, any damage and sufficient greasing. (especially near seal area's)

5 Check inlet header, cartridge retention bolts for proper tightening.
6a Preset the relief valve by fully turning inward (CW) the pressure adjusting screw. (if applicable)
6b Check if the upper trip value of the slam-shut has been set, otherwise turn the adjustment screw fully inward (CW).
6c Check if the lower trip value of the slam-shut has been set, otherwise turn the adjustment screw fully outward (CCW)

7 Relax pressure spring of pilot regulator(s) by fully backing out the adjust screw or removal of the cap, spring cup and spring.
8 Provide the discharge line of the relief valve with an opening indicator (eg. by submerging a tube in water)
9 Check if both the purge valves are closed

4.3.2 – Leakage test & Set up

4.3.2.1 – Slam Shut Valve

Start at 4.3.1 (first time only)

1 Close the isolation valves.
2 Close the ssd valve by using the manual override (push the emergency-button).
3 Open & close both the purge valves to depressurize the module.
4 Fail the regulator open by advancing the adjust screws (CW) until a little spring tension builds up.

5 Check the upstream & downstream pressures on the gauges provided for lockup of block valves.
6 Crack the upstream block valve and the upstream isolation valve of the HON Cocon.
7 Check the downstream pressure for lockup.

8 Relatch the ssd controller, enable reset by presetting the downstream pressure above the lower trip value of the SSV by advancing the adjust screw (CW) of the regulator pilot.
9 Decrease the downstream pressure to the desired **lower trip value** of the SSV (open the purge valve) by backing out the adjust screw (CW) of the regulator pilot.
10 Slowly increase the trip pressure spring tension of the ssd valve by advancing the adjust screw of the controller (CW) until the trip mechanism is activated.
11 Relatch the ssd controller (take note of the minimal relatching differential) by first advancing the adjust screw of the regulator pilot and then increasing the downstream pressure, close the purge valve. Equalize pressure over the closing member by using the built-in bypass (push the reset-button as previously described) Finally relatch the SSV by pushing the button all the way to its stop (push twice)

12 Re-check the lower trip pressure and fine-adjust if necessary by repeating actions 9 to 11

13 Increase the downstream pressure to the desired **upper trip value** of the SSV (do not open the purge valve) by advancing the adjust screw (CW) of the regulator pilot.

14 Slowly decrease the trip pressure spring tension of the ssd valve by backing out the adjust screw of the

15 Relatch the ssd controller (take note of the minimal relatching differential) by first backing out the adjust screw of the regulator pilot and then decreasing the downstream pressure by opening & closing the purge valve. Equalize pressure over the closing member by using the built-in bypass (push the reset-button as previously described) Finally relatch the SSV by pushing the button all the way to its stop (push twice)

16 Re-check the upper trip pressure and fine-adjust if necessary by repeating actions 13 to 15

Note: re-latch the ssd controller each time at approximately the same set pressure

4.3.2.2 – Relief Valve (optional)

Start at 4.3.2.1 (first time only)

1 Check if the discharge line of the relief valve has been provided with an open indicator

2 Increase the downstream pressure to the desired set point of the relief valve
2a if necessary decrease initially the downstream pressure by opening & closing the purge valve
2b by advancing the adjust screw (CW) of the regulator pilot (do not open the hand relief)

3 Slowly decrease the opening pressure spring tension
3a by backing out the adjust screw (CCW) of the relief valve
3b until the relief valve opens (use an indicator)

4 Close the relief valve (mind the minimum closing difference)
4a by first backing out the adjust screw of the regulator pilot
4b decrease the downstream pressure by opening & closing the purge valve

5 Check the discharge line for lockup

6 Check the opening pressure and fine-adjust if necessary
6a by repeating action 2 u/i 4
If applicable remove the opening indicator & restore any changes made to the tubing

4.3.2.3 – Active and Monitor Regulator

Start at 4.3.2.1 (first time only)

1 Decrease the downstream pressure to just below the set point of the regulator. This can be done by opening & closing the hand relief valve.(purge)
1a Then advance the adjusting screw (CW) of the regulator pilot (do not open the purge valve) until the set point of the regulator is reached.
2 Check the downstream pressure for lockup.

4.3.2.4 – Gas Control Module

1 Check the atmospheric upper chamber for leakages with a leak detector before commissioning.

4.4 – Commissioning of the HON Cocon

Start at 4.3.2.1(first time only)

1 Check if regulator & line pressures are set to the approximate set points. The regulator should be preset slightly below the grid pressure.

2 Crack upstream & downstream block valves in the following order.

3 Gradually open the downstream isolation valve of the HON Cocon. A short pressure peak could occur at this point. To avoid triggering of the slam shut valve, depress and hold the reset button at this point until fully open.

4 Gradually open downstream block valve.

5 Gradually open upstream isolation valve of the HON Cocon.

6 Gradually open the upstream block valve.

7 Increase the regulator pilot spring tension by adjusting the screw inwards until the required set point is reached in the outlet piping.

8 Fine tune the regulator if necessary.

Notes:

- Change pressure spring of pilot for next higher in range to increase damping if necessary.
- Install a flow restrictor in the motorization line of the pilot to increase damping further if required. (Check with manufacturer for advise)
- To take the unit out of operation, close the upstream block valve first
- Do not forget to connect all data-transmitting devices
- Clean and grease the seal/sealings surfaces before mounting the covers.

4.5 – Trouble shooting

The cartridge must be readjusted if it is not operating as required. The cartridge's operating objectives are described in paragraph 2.4 on page 13. Adjustment data can be found in paragraph 4.4.

Failures can be caused by:

Problem 1 : The outlet pressure is too high.
Cause 1a : The regulator pilot has not been correctly adjusted.
Solution 1a : Read adjust the pilot. See paragraph 4.4.

Cause 1b : The regulator has failed open. The ssd valve is closed
Solution 1b : Replace the cartridge with a spare cartridge. Check the defective cartridge in the workshop.

Problem 2 : The outlet pressure is too low.
Cause 2a : The regulator pilot has not been correctly adjusted.
Solution 2a : Readjust the pilot. See paragraph 4.7.

Cause 2b : The differential pressure p (p1 – p2) is too small.
Solution 2b : Increase the inlet pressure.

Cause 2c : The filter is severely polluted.
Solution 2c : Replace the filter with a new one. See paragraph 4.10.3. .

Problem 3 : Gas is required, but is not passing through.
Cause 3a : The ball valve is closed.
Solution 3a : Open the ball valve.

Cause 3b : The outlet valve is closed.
Solution 3b : Open the outlet valve.

Cause 3c : The valve in the supply pipe, located within a distance of 5 meters from the station's inlet has closed.
Solution 3c : Open the valve in the supply pipe.

Cause 3d : The valve in the discharge pipe, located within a distance of 5 meters of the station's outlet has closed.
Solution 3d : Open the valve in the discharge pipe.
Cause 3e : The regulator pilot has not been correctly adjusted.
Solution 3e : Readjust the pilot. See paragraph 4.7.

Cause 3f : The ssd valve has closed.
Solution 3f : Replace the cartridge with a spare cartridge. Check the defect cartridge in the workshop.

Problem 5 : There is water on the cartridge.
Cause 5 : The cartridge and the pit cover seals are worn.
Solution 5 : Replace the seal rings.

Problem 6 : There is dust in the discharge pipe.
Cause 6 : The filter is defect.
Solution 6 : Replace the defect filter with a new filter. See paragraph 4.8.3..

4.6 - Shutting down and removal of the cartridge

This paragraph describes the shutting down of the cartridge's operations and the removal of the cartridge, for maintenance or correcting malfunctions.

- Close the valves attached in the supply and discharge pipe, located within 5 meters of the station (block valves).
- Open the pit cover with the special key supplied.
- Close the isolating ball valve in the inlet.
- Close the isolation valve 4” in the outlet.
- Open the purge valves.
- Wait until the pressure gauge, which shows the inlet pressure, indicates "0".
- Wait until the pressure gauge, which shows the outlet pressure, indicates "0".

All handles are now turned away from the cover. To remove the cartridge, proceed as follows:

- Open the casing cover.
- Loosen the 4 x M16/M24 nuts
- Lift the cartridge from the casing by the handles.

Remark: Take care of your back by following proper lifting procedures, while installing and removing the cartridge.

See paragraph 4.6 for the installation of a spare cartridge.

4.7 - Replacing parts

The following paragraphs describe the replacement of a number of parts in the cartridge. The following parts can be replaced on site, by the operator.

- The upper seal ring between the cartridge and casing (paragraph 4.7.1);
- The two lower seal rings between the cartridge and casing (paragraph 4.7.2);
- Dust filter (paragraph 4.7.3).

The seal rings have to be replaced in case of a leakage. The dust filter has to be replaced when the pressure loss over the filter is not acceptable.
The remaining parts must be replaced by a qualified maintenance engineer in the service workshop. Paragraph 4.6 describes how to remove the cartridge from its casing.

4.7.1 - Upper seal ring

The upper seal ring is situated in the groove on the casing (Illustration 4.3).

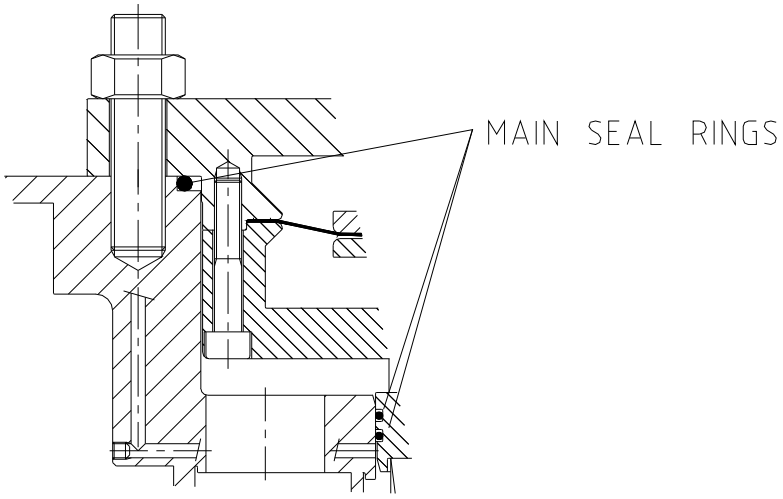


Illustration 4.7 'Upper seal rings'

To replace the upper seal ring, proceed as follows:

- Remove the seal ring from the groove.
- Clean the groove with a solvent, which does not affect the casing material.

Remark: Make sure that the seal ring is sufficiently greased with a low viscosity, gas resistant gel. (We recommend Parker Super-O-Lube)

- Press the o-ring in the groove.

4.7.2 - Lower seal rings

The two lower seal rings are situated in the grooves directly above the dust filter.

The replace the lower seal rings, proceed as follows:

- Remove both seal rings from the grooves.
- Clean both grooves with a solvent, which does not affect the cartridge's material.

Remark: Make sure that the seal rings are sufficient greased with a low viscosity, gas resistant gel (We recommend Parker Super-O-Lube).

- Slide both rings from the bottom of the cartridge upwards, until just under both grooves.
- Press the upper ring in the groove.
- Press the lower ring in the groove.

4.7.3 - Dust filter

Remark:	Use breathing protection when replacing the dust filters. Remove the cartridge carefully from the station. The dust on the filter is bad for the environment.

If the dust filter is excessively polluted, then the filter must be replaced. Replace the dust filter as follows:

- Support the cartridge.
- Loosen the nut M6, which attaches the dust filter to the cartridge.
- Remove the fastening plate from the threaded shaft.
- Remove the dust filter.

- Put a new dust filter over the threaded shaft and against the casing.
- Put the fastening plate against the dust filter.
- Attach the fastening plate to the cartridge with a nut M6.

4.7.4 - Stock

We strongly recommend you to keep parts mentioned in this chapter on stock.

Quantity	description	article number	paragraph
[1]	Upper seal ring	8401202604369	4.7.1
[2]	Lower seal rings	8401094902154	4.7.2
[1]	Dust filter	8301010000005	4.7.3

4.8 - Storage

Spare units, when being stored for long periods, should be stored in clean, dry and vibration free storerooms. Ensure that seal rings are well greased or covered with talcum powder, this prevents the rings from desiccating. The cartridges must be provided with a preservation layer, to prevent the cartridges from oxidation.
Do not expose the cartridges to extreme temperatures. Place the cartridges, in such a way, that they cannot tip. Turn the pilot spindles and the shut off relay to the left. This minimizes the pressure on the spring.

5. Options

5.1 - Introduction: Options

This chapter describes the parts for the gas regulating station which are not standard, but which can be supplied as an option. The operation of the station is made a lot easier, with the use of these optional parts.

5.2 - Relief valve

The relief valve is optional. When the pressure in a redundant station is too high due to leakage, the relief valve ensures that excess pressure is vented to atmosphere.

5.3 – Valve position indication (SSV)

A close indication by means of a proximity switch can be mounted on the Plexiglas cover of the slam shut valve.

6. Additional data

6.1 - Adjustment form

Write down on the adjustment form, all data needed for adjusting the cartridge. Keep the order form in this book, as the original; use a copy to write down the data.
Write your name, the date, the station number and the corrected data on the copy. Keep the copies in the back of this manual.

When you use several stations, with different adjustments, we advise you to keep all the forms together.

Adjustment form

Model : COCON
Type : 13
Delivery date : ....-....-....
station number : .....
unit number : .....

Name : .....

Date : .....

Location:

Place : .....
Street : .....
Exact location : .....

Write down all relevant data, for the adjustment of the cartridge, below:

Inlet pressure : ..... bar
Outlet pressure : ..... millibar

Settings for pilot and shut off relay:

Remark: The shut off relay must close the shut off valve at a higher pressure then the pressure set by the monitor.

Active Pilot regulator : ..... bar/millibar
Monitor Pilot regulator : ..... bar/millibar (if applicable)
Shut off relay : ..... bar/millibar
Relief valve : ..... bar/millibar (if applicable)

Use the space underneath for notes:
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