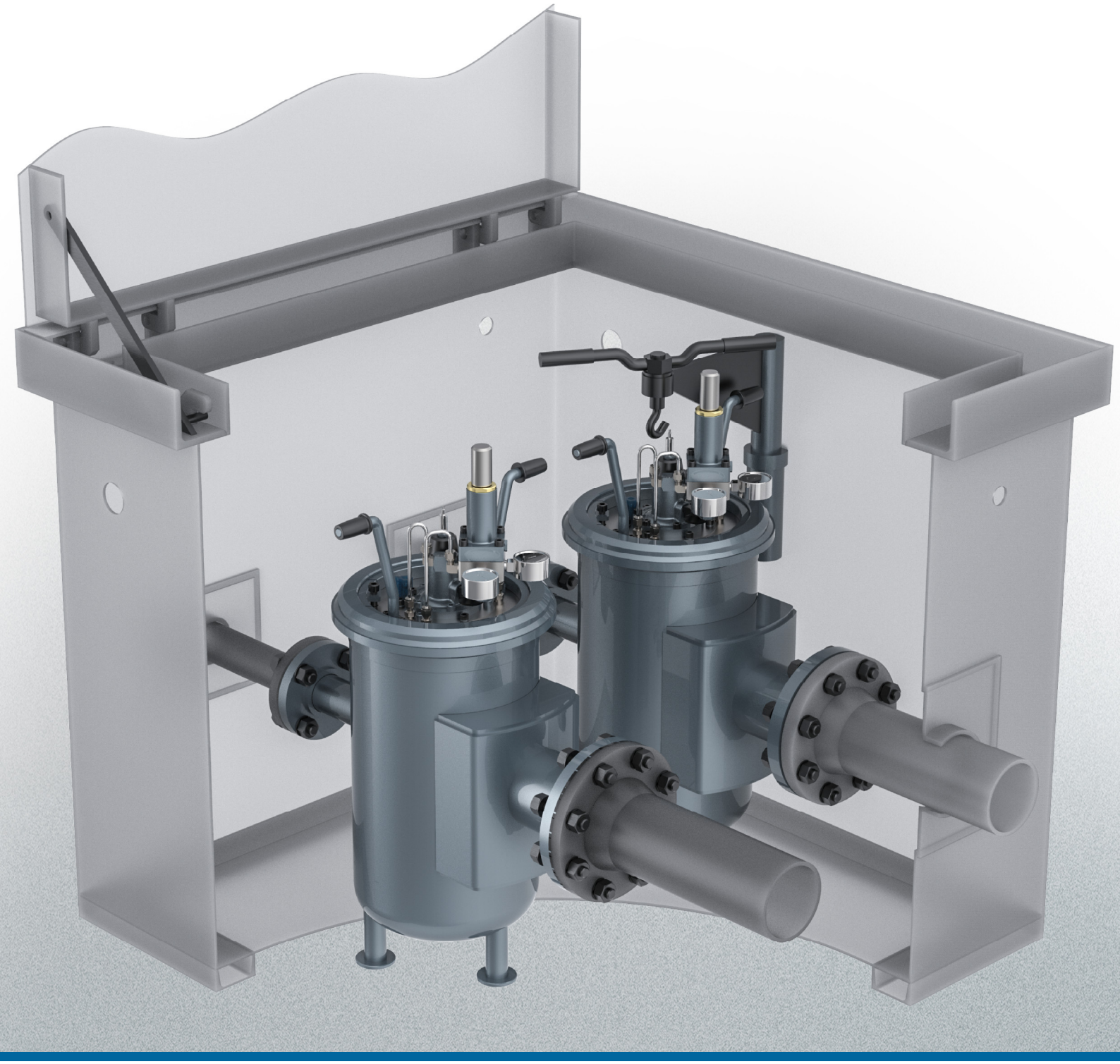
HATHOR

Underground Compact Installation for Pressure Regulation



GASCAT

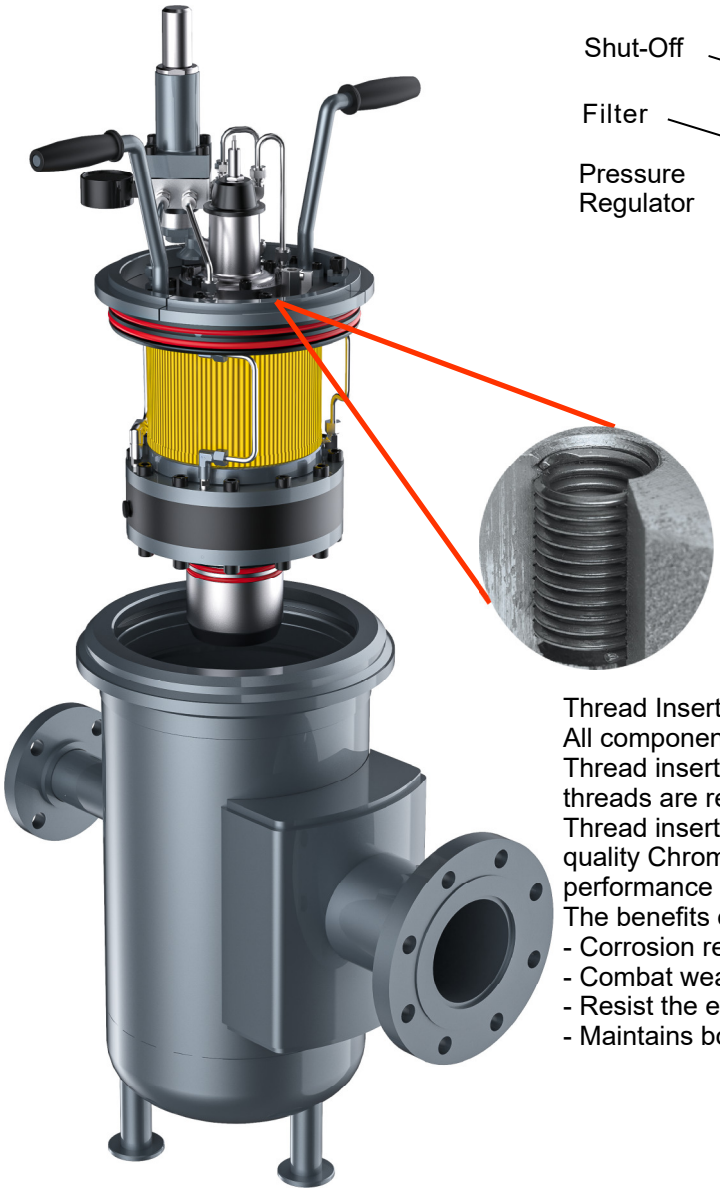
INTRODUCTION

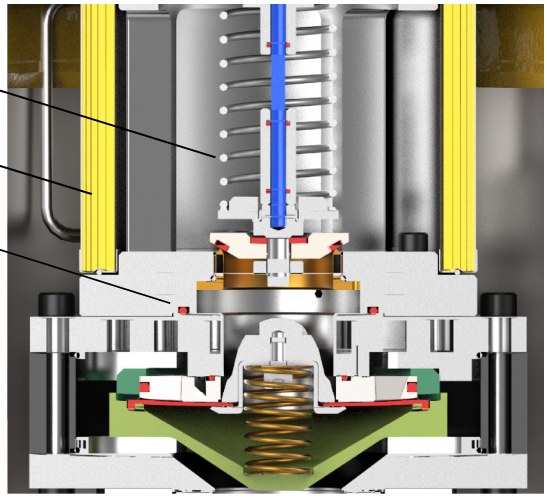
It is a solution for urban areas since the instalation is uderground and landscape remains totally unaffected.
It is a underground compact but complete installation with filter/ active regulator/ monitor(optional)/ security all together in a small cartridge.

Hathor is a completely self-contained pressure reduction module for both above and underground installations.
Designed on the principle of easy maintenance and long life product with low cost maintenance Hathors have a proven track record mainly at Brazil South Gas Companies.
The working parts are contained in a removable cartridge housed in Stainless Steel Body AISI 304 or AISI 316 (Vessel) which is installed underground (or above) into the gas mains.
Above Ground is a “Vent Stack” which contains vent pipes for atmospheric reference pressure and the relief valve together with the necessary instrumental and reference points and provision for others electronic devices like EVCs.
The Hathors have single access point for maintenance with no special tools at all.
The Cartridges have a light weight allowing one man lifting them. Example Hathor cartridge 2” x 4” or 2” x 6” weight is 21 Kg.
All cartridges are totally interchangeable and nno sensors tubing outside the vessel.

FEATURES

1. Underground and non confined area
2. Totally vandal proof wtih many kinds of tamper-proof security screws
3. Low noise level, much loss noise than above ground station
4. Very easy maintenance “one man” and “one key” due to the interchangebity cartridge units
The cartridge can be changed with 12 minutes
5. Water proof stations due to higher performance seals





Thread Inserts
All components made of aluminum receive thread inserts.
Thread inserts create high-strength fastenings in softer core materials, threads are reinforced whenever low-strength materials are used.
Thread inserts, also known as screw thread inserts, are manufactured from high quality Chromium Nickel Austenitic Stainless Steel, and provide high performance internal threads that resist the effects of temperature and corrosion.
The benefits of thread inserts:
- Corrosion resistant
- Combat wear in threaded components
- Resist the effects of temperature
- Maintains bolt tension under severe vibration conditions

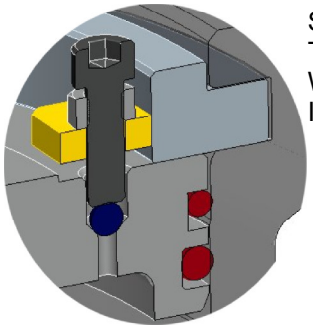
MAIN CHARACTERISTICS

Filter Element

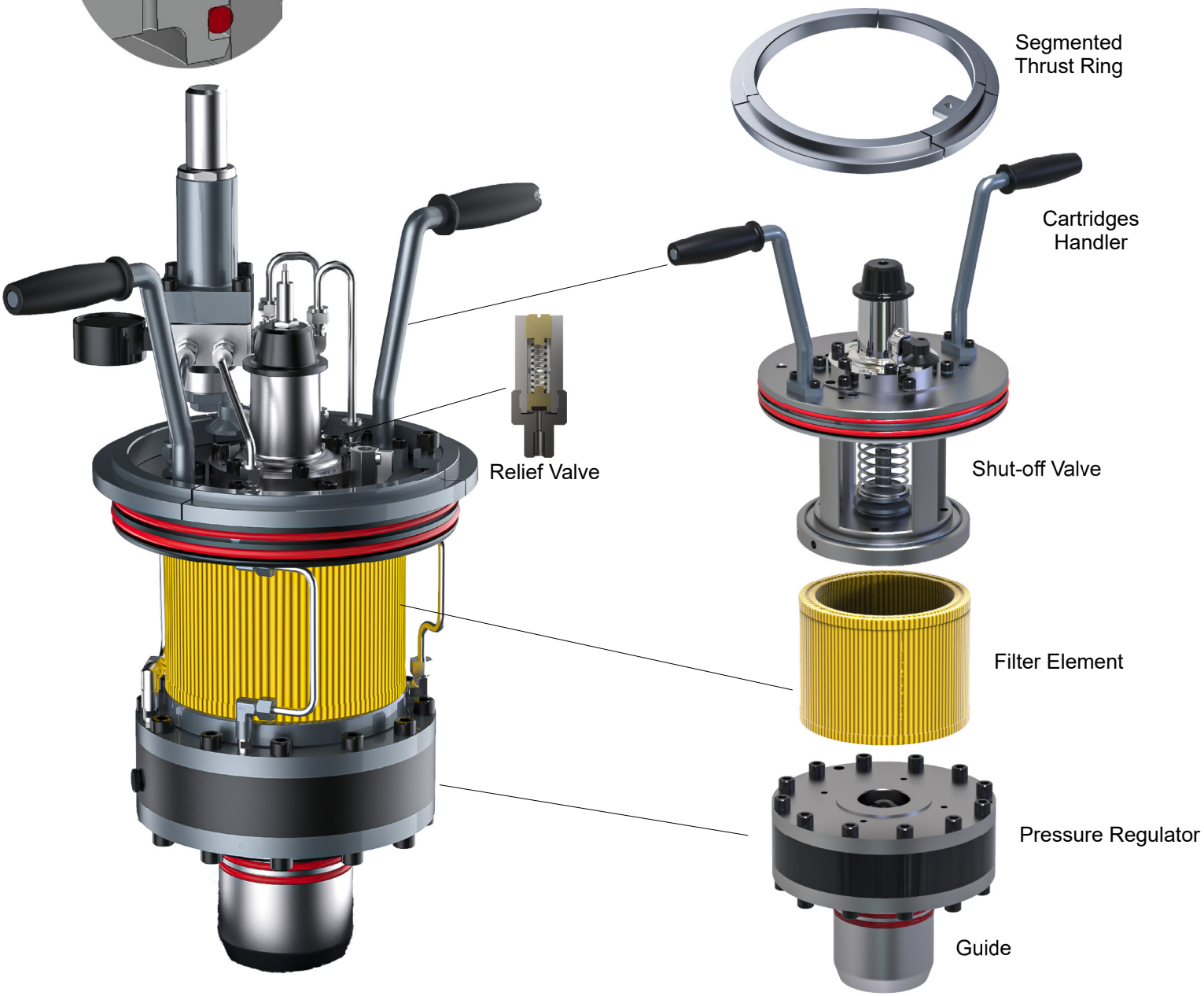
Available in 20 to 5 microns, the filter element is designed for filtering solids in the gas stream using pleated cartridges whose design and construction offers maximum filtering area and a large capacity to hold and accumulate filtered solids.
Operating at high efficiency and low pressure drop, it provides excellent protection for the system, minimizing maintenance and extending equipment life.

Slam shut off valve incorpoated

It has the function to shut gas flow in order to protect the gas supply line from unwanted increase in working pressure. It also has the function of spring to close (fail close), that is, it shut flow in case of rupture of the valve sensing element (diaphragm), or also in case of interruption of the gas supply or with the sharp decrease or interruption of the gas line sensing. With this function (factory set only) the shut-off valve meets the requirements of EN 14382. Hathor's built-in quick-release valves (<1s), completely free for leakege, have manual reset, wide adjustment range and easy installation and operation.



Safety Device.
This pin must be unlighted in order to remove the segmented metal O´ring.
Without remove this pin it is not possible take the segmented metal out.
In case reminiscent Gas inside the vessel the ball will lift and Gas start to scape to atmosphere.



Pressure Regulator

The pressure regulator model ARGOS WA was developed by GASCAT to applications in natural gas or other non corrosive gases, approved by DVGW EN 334.

This new axial flow regulator was designed of avoid high pulsation problems met in the most of high flow regulators when they work with very low flow.

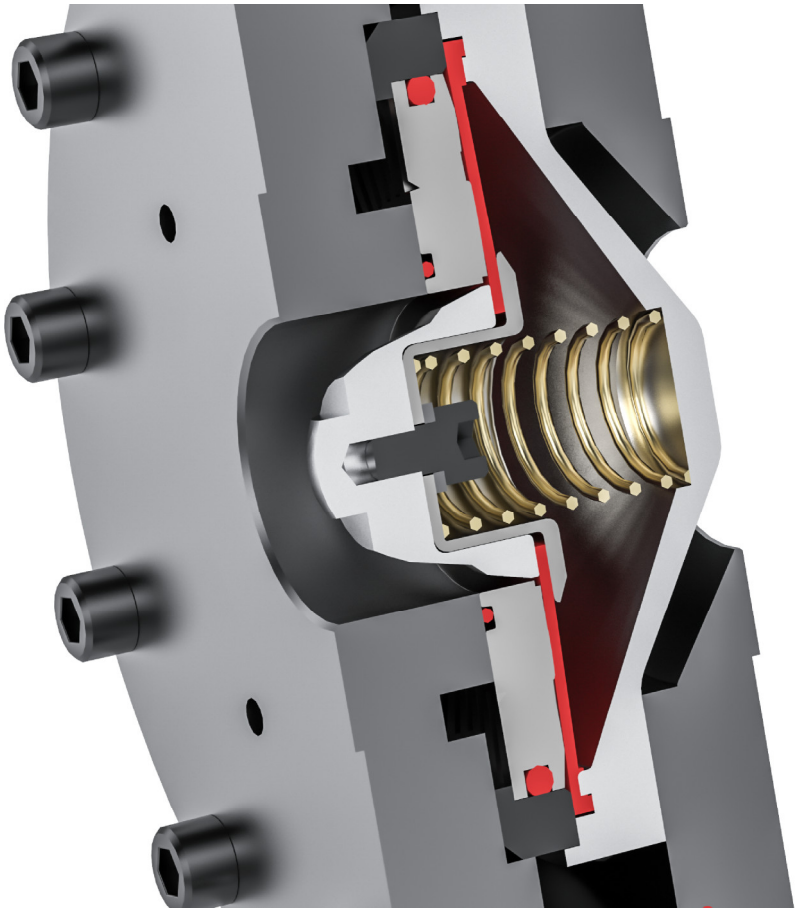
Grid And Flow Directioned

These components were developed by GASCAT to obtain high abrasion resistence. It works reducing the knetic energy of the particles in suspencion in the gas, directioning them for the valve seat, inimizing the contact of these particles with the valve diaphragm and seat seal, guaranteeing larger useful life of those components.

The ARGOS Axial regulator uses grids in anodized aluminium that presents several advantages, such as

- Possibility to use grid flow channels passages extremely narrow in order to avoid the excessive entrance of the diaphragm rubber in those channels, consequently increasing diaphragm life and enable the equipment operation with larger differential pressure. Uniform seal profile, enabling larger accuarcy in the closing pressure values.

The hard anodization alow superficial hardness reach of 40 to 50 HCR against 20 to 30 HCR common in other materials as stainless steel, which increase considerably the useful life of this component.



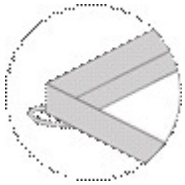
Cross section WA Regulator

Hard anodized aluminum Grid

Hinged & Locked Access Cover

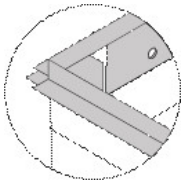
Acess Cover must always be carried out in accordance with DIN EN 124, Group 4, coverage class D 400.

It must be secured and locked against unauthorized opening.



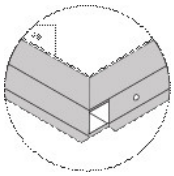
Standard Frame

- Frame is bedded directly to the top of the chamber.
- Supplied with corner lugs to enhance adhesion to bedding mortar.



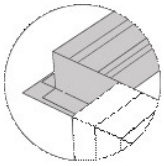
Rising

- Galvanised steel frame with internal or external locating skirt.
- Can be supplied with holes for securing to the chamber with self-tapping screws.
- Raising skirt assists with reinstatement and prevents ingress of debris if the frame is raised in the future.



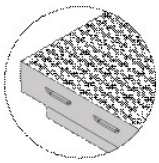
Homezone

- Recessed cover with extra-deep frame.
- Standard cover tray means it can still be manually removed by a single person when filled.
- Allows paving materials to be placed right up to the edge of the frame.
- Designed for use in Shared Spaces/Homezone areas.



Hightop

- Steel frame with smooth outer vertical face to allow for block paving etc. To be placed right up to the frame.



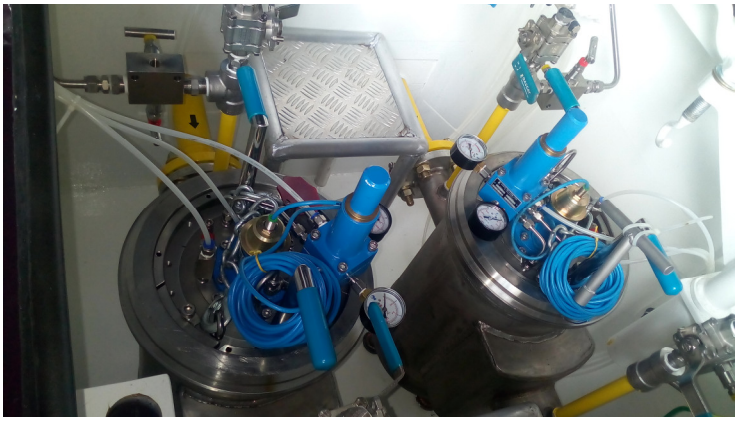
Louvre

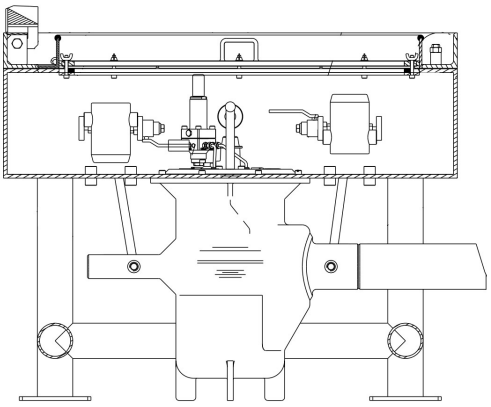
- Extra deep frame which allows finished paving to be installed without the need for a concrete fillet.
- Available for selected sizes only.

DVGW

Technische Prüfgrundlage
DVGW G 5702 (P) | Mai 2014

Unterirdische Kompaktanlagen zur Gas-Druckregelung; UKA





Intermediate coverage of the control equipment room:
- When it is necessary to protect the different functional units against water and contamination and / or
- When the comparator rooms of several functional units must be ventilated together by means of a collecting pipe.

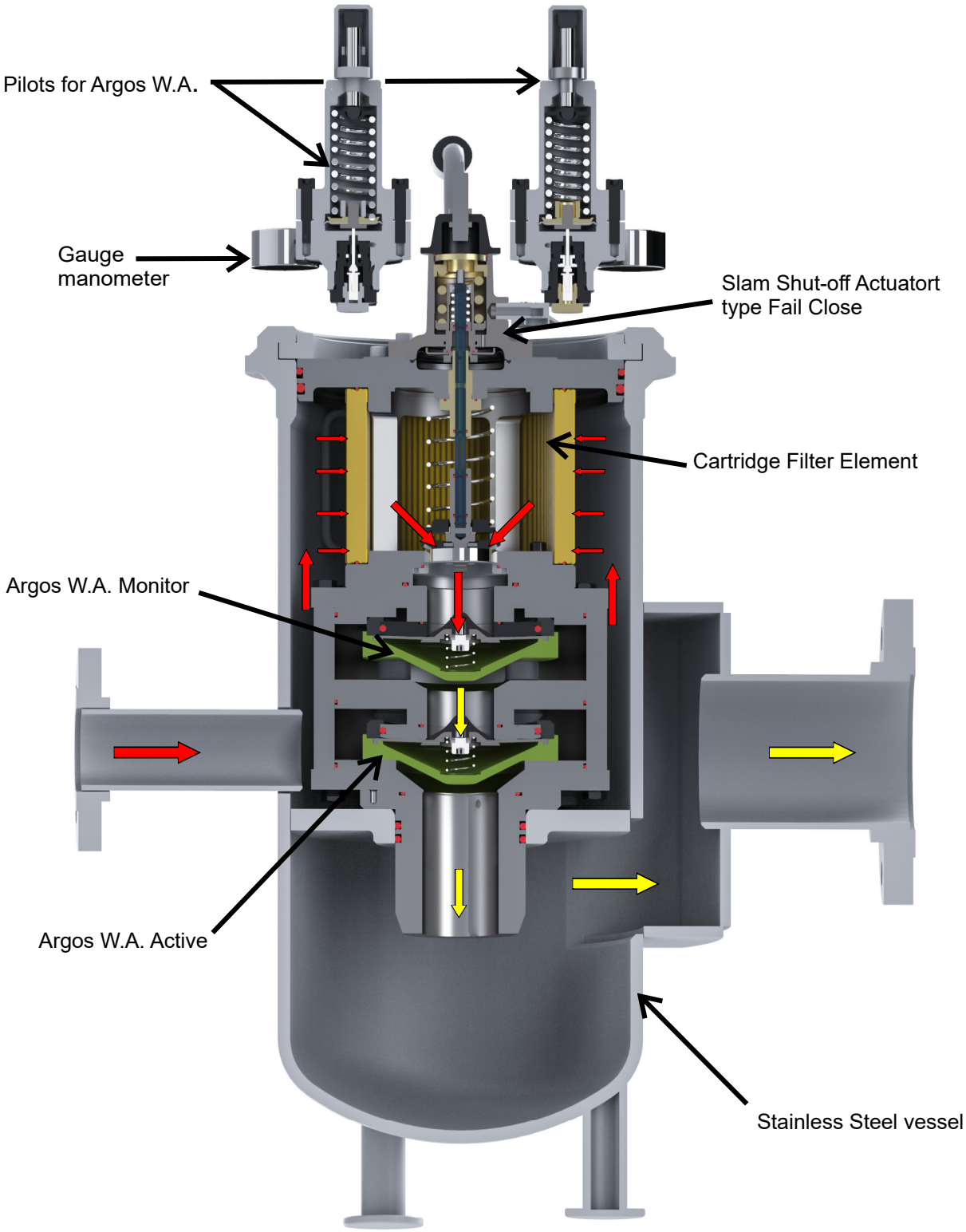
Intermediate coverage must meet at least the following conditions:
- tightness against a 0.5 m water column,
- Sufficient ventilation of the room under the intermediate cover

ACTIVE / MONITOR SYSTEM

In the active / monitor system, the working principle of the regulators are the same as explained on the previous page.

The upstream regulator (the monitor) stays in the open position because the pressure set point on its pilot is higher than the pilot on the active regulator. Both regulators sense the downstream pressure, and if the active regulator is operating properly, the monitors' pilot will never be satisfied, causing the monitor valve to open fully.

If a failure in the active regulator occurs causing an increase in the downstream pressure, the pilot on the monitor will sense this and start to close the monitor valve as the downstream pressure reaches its set point. The monitor will then become the active regulator until repairs are made.



HATHOR ABOVE GROUND - AG

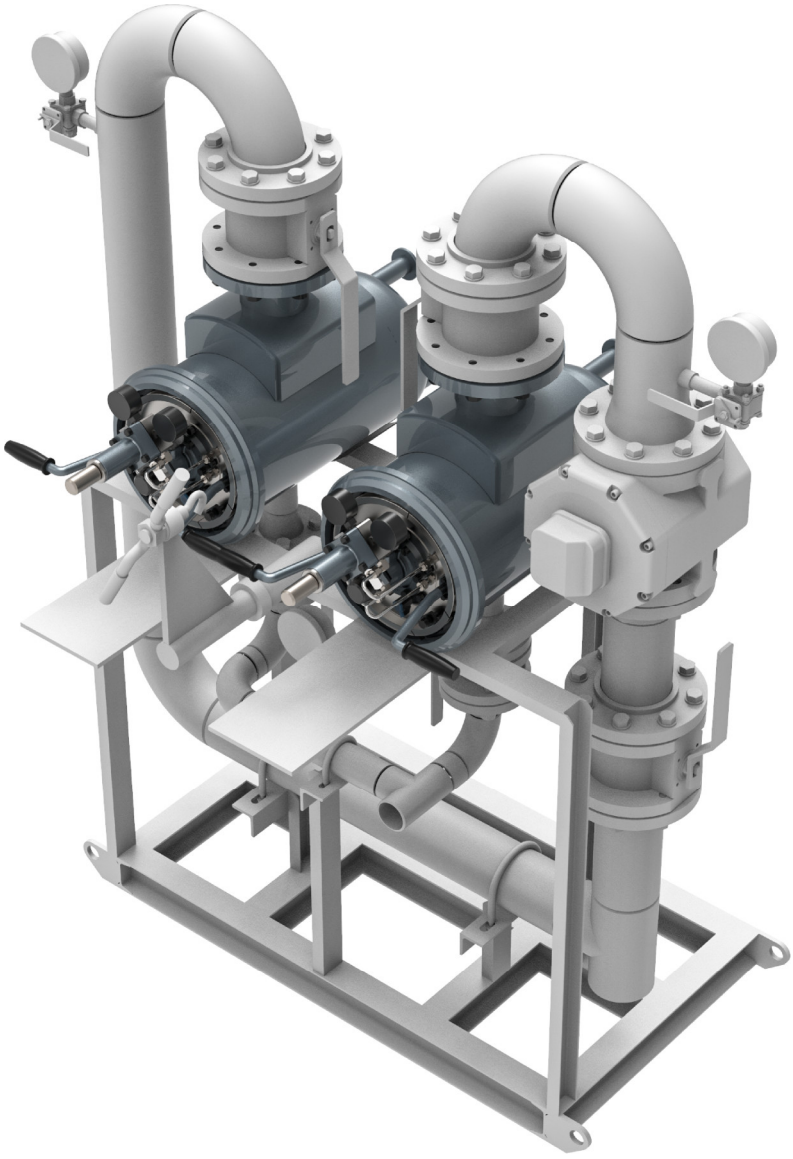
Derived from Buried Module the Pressure Regulating Module HATHOR - AG assembled in Skid utilizes the same technology and know-how, keeping the national and international success in applications with Natural Gas Distributors.

The main advantage of HATHOR - AG Module is the interchangeability that allows quick change of internals, and compact design that results in less space necessary for installation.

Assembled with pilot operated pressure regulator the HATHOR - AG Module has excellent accuracy and high flow capacity.

HATHOR - AG COMPONENTS	
ITEM	MODEL
PRESSURE REGULATOR	ARGOS W.A.
SLAM SHUT ACTUATOR	FC - FAIL CLOSE
FILTER ELEMENT	CARTRIDGE TYPE

TECHNICAL DATA	
DIAMETERS	2'' - 4''
OUTLET PRESURE RANGE	0.1 - 36.6 bar
MAX. INLET PRESSURE	51 bar



CONFIGURATION & LAYOUT

The configuration and layout of HATHOR - AG Module Skid allows several layouts adjusting it to available space in each installation.

Through internal components adapting the module can be supplied with active / monitor system, double stream and others.

Other stations accessories as flow meters, transmitters (pressure, temperature) can be included if necessary.

REGULATING MODULE INTERCHANGEABILITY

The interchangeability of HATHOR - AG Pressure Regulating Module is the main feature and advantage comparing with any other similar equipment. The quick change of regulating cartridge results in less maintenance time beyond less gas supply interruption.

Cartridge and Material features

COMPONENT	MATERIAL
Body	Aluminium 6351-T6 Hard Anodized 12 µm (STD) Carbon Steel - ASTM A516 GR.70 (Optional)
Cover	Aluminium 6351-T6 Hard Anodized 12 µm (STD) Carbon Steel - ASTM A516 GR.70 (Optional)
Internals	Aluminium 6351-T6 Hard Anodized 12 µm (STD) Stainless Steel AISI 304(Optional)
Grid	Aluminium 6351-T6 Hard Anodized 12 µm (STD)
Elastomers	BUNA - N (STD) FKM (Optional)

OPERATION LIMITS	
Maximum inlet pressure	51 bar
Outlet pressure range	90 mbar ~ 36.6 bar
Temperature Range	-20°C ~ +60°C (*)
Accuracy Class (AC) Lock Up (SG) Slam Shut Accuracy Group (AG)	Up to ± 2.5% Up to ± 5% Up to ± 1%

Note: Gascat should be consulted for temperatures different than mentioned above.

CONNECTION	ND
Flange ANSI B16.5 150# / 300# PN 16 - 40	2” x 4”
	2” x 6”
	3” x 6”
	3” x 8”
	4” x 8”
	4” x 12”

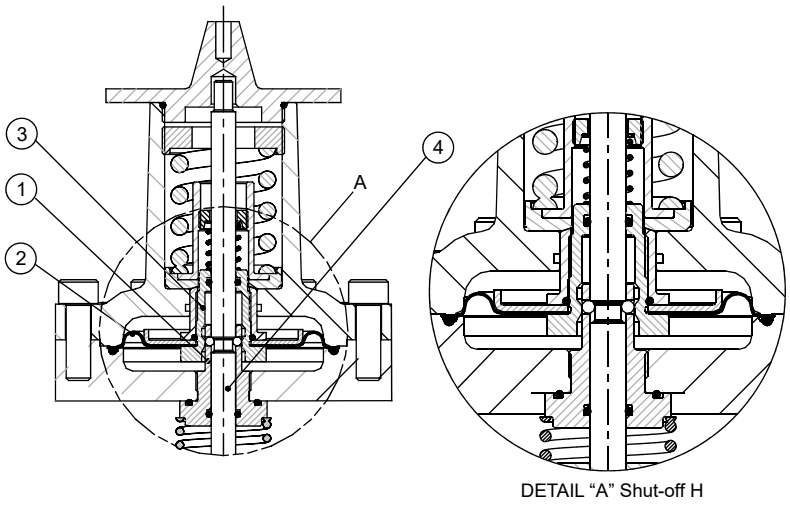
SPRING RANGE (bar)		
SPRING RANGES	*SPRING COLOR*	PILOT
90 ~ 250 mbar	*WHITE & GRAY*	G80
230 ~ 400 mbar	*SILVER*	
350 ~ 1100 mbar	*GRAY*	
1050 ~ 2500 mbar	*BROWN*	
0.7 ~ 2.8 bar	*SILVER*	G30F
2 ~ 5.5 bar	*GREEN*	
4,5 ~ 14 bar	*RED*	
7 ~ 18.3 bar	*BROWN*	
14 ~ 32 bar	*BLACK*	
14 ~ 36.6 bar	*BLACK*	G32F

Shut-Off

The shut-off are installed in pressure regulating in order to protect the pipe line or the gas equipments and all downstream instruments from an unexpected over pressure or also in case of gas source interruption or even in case of rupture of it's own tubing's. With under pressure blocking (it is adjusted in Gascat plant) the shut-off matchs the requirements of EN 14382 standard.
The shut-off is very fast disengaging, less than 1s and totally bubble tight; they are totally manually reset and due to it's design, have a very low pressure drop with a wide range of set pressures. They are easy to install and accept any position even upside down.
Due to its design the set pressure are not affected by the inlet pressure variation (EN 14382 class A).
The shut-off have an actuator with spheres holder (1) accomplish connected to the sensor element (2) and this one is sensitive to the downstream pressure. For the following cases:

a) downstream increase pressure beyond the set limit,
b) diaphragm rupture,
c) sensing tubings ruptures,
d) downstream pressure bellow the set limit, as per the sense of any above case under the sensor element the tripping bush (3) moves to the release position with the ball mechanism disengaging the valve stem (4) to close the control element.

After normal external control pressure has been restored the valve must be manually reset to the open position to able the reset the upstream and downstream pressures must be equalized by an integral push button type which eliminate the need of a separate bypass (avoiding leaks). This push button is at the closed position valve.



DETAIL "A" Shut-off H

TECHNICAL CHARACTERISTICS		
SPRING RANGE	*SPRING COLOR*	*MODEL*
25 ~ 50 mbar	*GREEN*	Shut-off L
45 ~ 160 mbar	*BLACK*	
150 ~ 260 mbar	*BLUE*	
0.2 ~ 0.5 bar	*GREY*	Shut-off H
0.5 ~ 1.3 bar	*PURPLE*	
1 ~ 5 bar	*RED*	
4 ~ 11 bar	*YELLOW*	
10 ~ 16 bar	*BROWN*	Shut-off PH
14 ~ 38 bar	*ZINCATED*	
28 ~ 60 bar	*WHITE*	

SIZING

The sizing of ARGOS WA regulator is done based in the considerations as follow:
• definition according to inlet and outlet pressure fi it is a critic or sub-critic flow;
• convertion based on correction factor the flow value found if the process fluid is different of natural gas;
• limitation of use of pressure regulator when the flow capacity is approximately 90%.

And is calculated utilizing the equations below , where:

Q = Flow in Nm^3/h;
P1 = Inlet pressure in bar absolute;
P2 = Outlet pressure in bar absolute;
KG = Regulator flow coefficient.

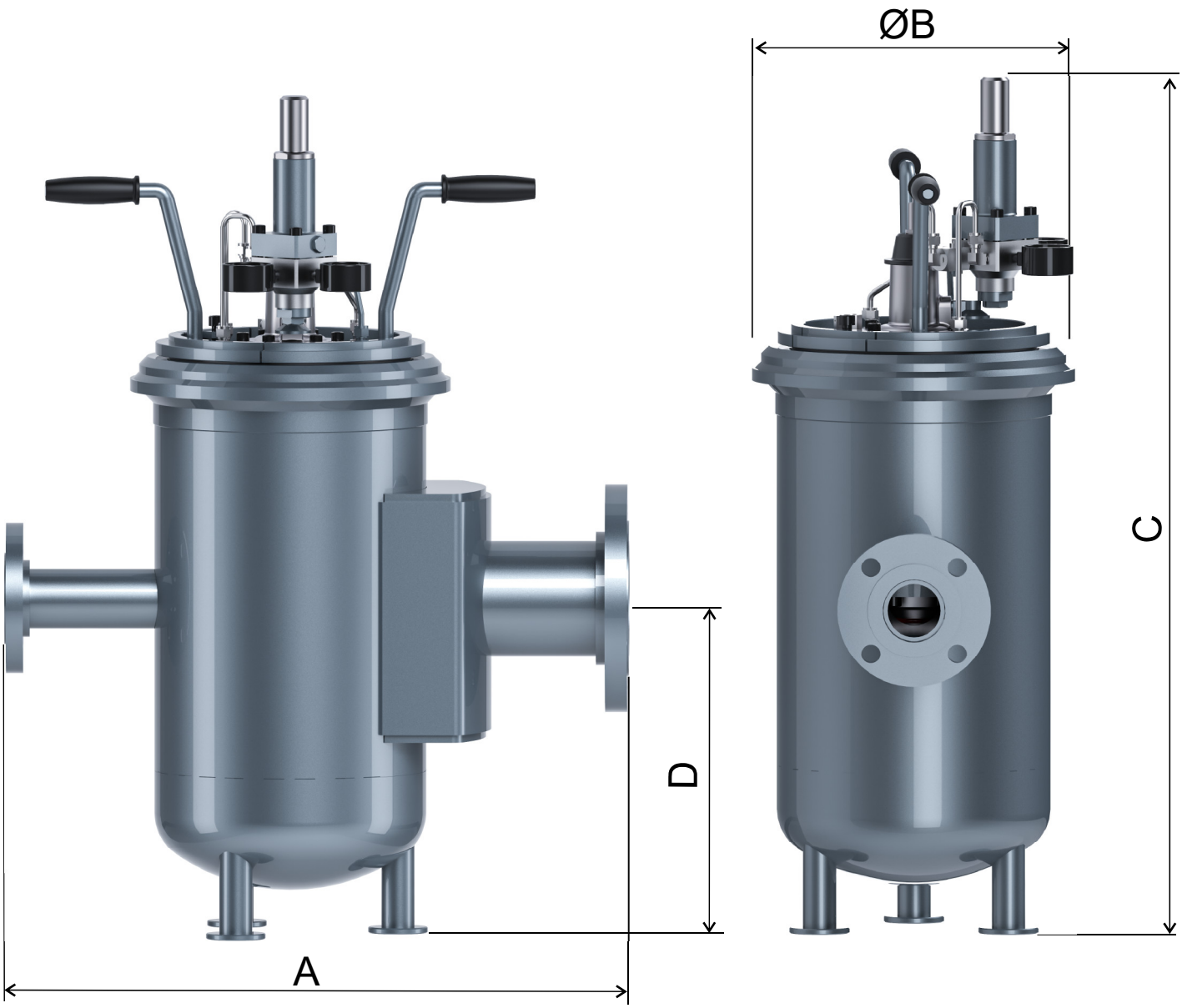
SUB-CRITICAL FLOW
$P_2 / P_1 \geq 0.53$
$Q = KG \times \sqrt{P_2 \times (P_1 - P_2)}$

CRITICAL FLOW
$P_2 / P_1 < 0.53$
$Q = (KG \times P_1) / 2$

FLOW COEFFICIENT	
ND	KG
2"	1140
3"	2800
4"	4900

REGULATOR DIMENSIONS AND WEIGHTS

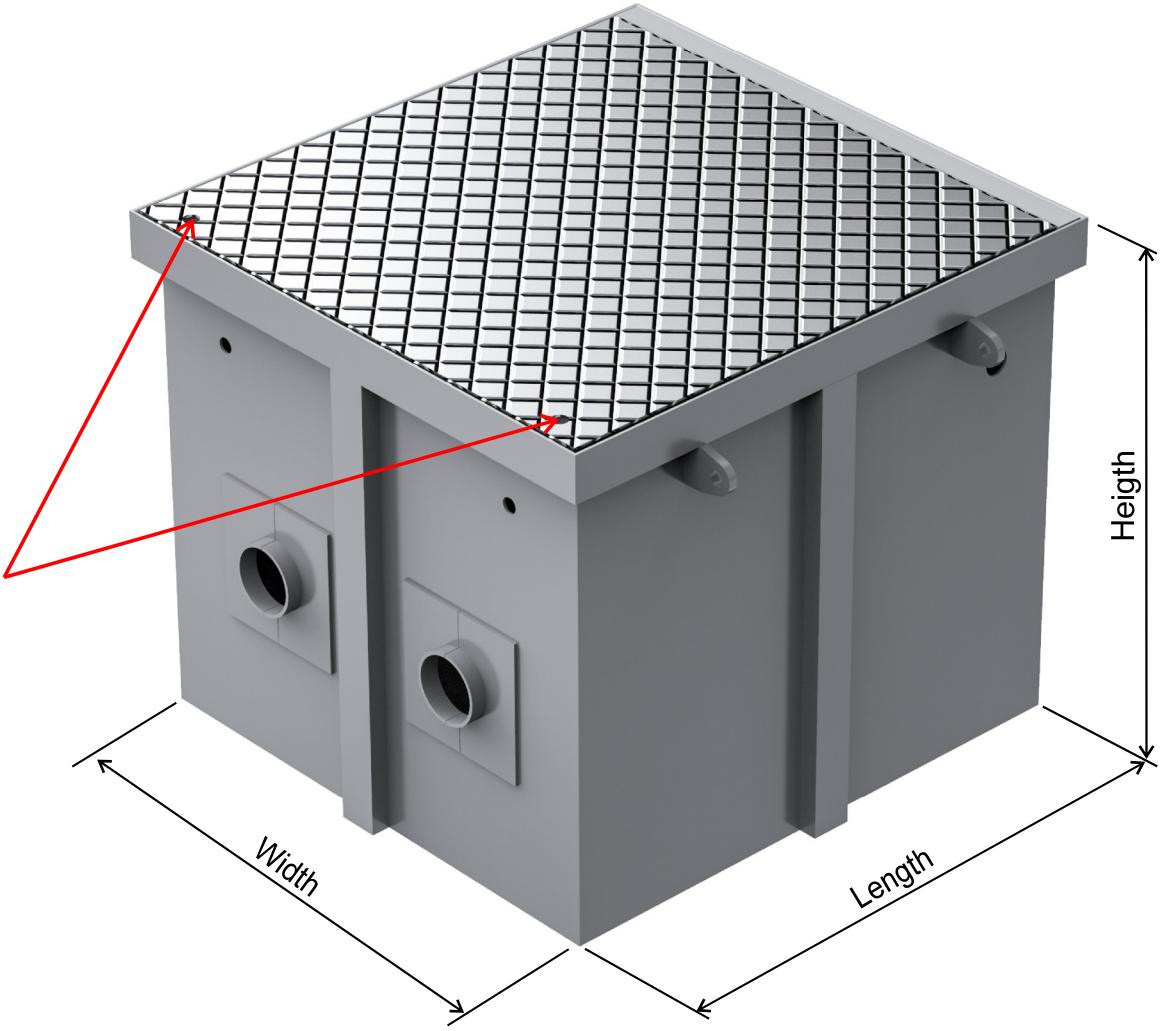
DIMENSIONS (mm)									WEIGHTS (kg)			
ND	SINGLE				ACTIVE MONITOR				SINGLE		ACTIVE MONITOR	
	A	ØB	C	D	A	ØB	C	D	150#	300#	150#	300#
2”	627	322	838	355	627	322	938	355	91	94	95	101
3”	650	380	940	435	-	-	-	-	121	130	-	-
4”	700	410	1000	550	-	-	-	-	163	168	-	-



BURIED BOX DIMENSIONS (mm)

ND	LENGTH	WIDTH	HEIGTH
2” x 4”	1140	1090	950
2” x 6”	1140	1090	950
3” x 6”	1360	1240	1050
3” x 8”	1360	1240	1050
4” x 8”	1530	1370	1130
4” x 12”	1530	1370	1130

Tamper-proof security screw



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