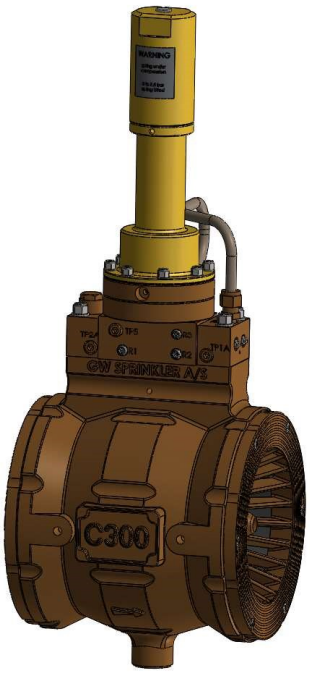
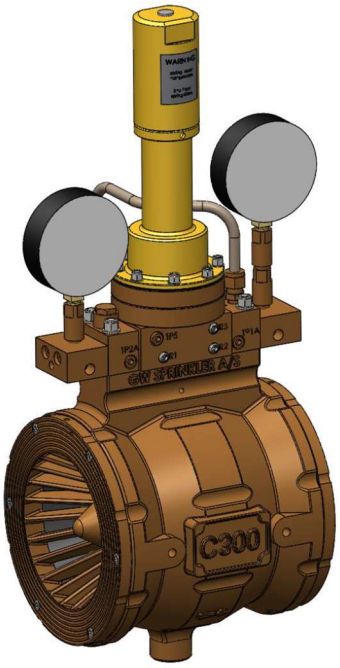
GW C-300 – PRESSURE REDUCING VALVE
MANUAL
INSTALLATION, OPERATION & MAINTENANCE (IO&M)

GW SPRINKLER A/S





C-300 PRESSURE REDUCING VALVE						
Material	**80 (3")**	**100 (4")**	**150 (6")**	**200 (8")**	**250 (10")**	**300 (12")**
Ni. Al. Bronze	64.515.14	64.516.14	64.517.14	64.51.814	64.519.14	64.520.14
Super Duplex	64.515.16	64.516.16	64.517.16	64.518.16	64.519.16	64.520.16
Titanium	64.515.17	64.516.17	64.517.17	64.518.17	64.519.17	64.520.17

GW SPRINKLER A/S
Kastanievej 15, DK-5620 Glamsbjerg, Denmark
Tel: +45 64 72 20 55 • Fax: +45 64 72 22 55
E-mail: sales.dep@gwsprinkler.com

Content

HEALTH AND SAFETY AT WORK

Section 6 of the Health and Safety at Work act 1974 imposes specific duties on manufacturers, importers, designers and suppliers to ensure that articles supplied for use at work are safe and without risk to health.
The section states:

1. It shall be the duty of any person who designs, manufactures, imports or supplies any article for use at work -
   a. to ensure, so far as is reasonably practicable, that the article is so designed and constructed as to be safe and without risks to health when properly used;
   b. to carry out or arrange for the carrying out of such testing and examinations as may be necessary for the performance of the duty imposed on him by the preceding paragraph;
   c. to take such steps as are necessary to secure that there will be available in connection with the use of the article at work adequate information about the use for which it is designed and has been tested, and about any conditions necessary to ensure that, when put to use, it will be safe and without risks to health.

2. It shall be the duty of any person who undertakes the design or manufacture of any article for use at work to carry out or arrange for the carrying out of any necessary research with a view to the discovery and, so far as is reasonably practicable, the elimination or minimisation of any risks to health or safety to which the design or article may give rise.

3. It shall be the duty of any person who erects or installs any article for use at work in any premises where the article is to be used by persons at work to ensure, so far as it is reasonably practicable, that nothing about the way in which it is erected or installed makes it unsafe or a risk to health when properly used.

The above is an extract from "Croners H&S Manual" - September 1987.

Service

The Health and Safety at Work Act 1974 imposes specific duties on the user of an installed system to ensure that the system is properly maintained in good repair so as to prevent danger. Advice is given in BS 7273: Part 1: 1990 - The Operation of Fire Protection Measures.

Support

After completing these procedures support is available by:

	International
Telephone	+45 64 72 20 55
Fax	+45 64 72 22 55
E-mail	Sales.dep@gwsprinkler.com

INTRODUCTION

Function

The GW C-300 deluge valve is fitted in fire water mains, or section supply branch pipes, in accordance with the requirements of NFPA 13/15 to:

a) Provide a controlled opening and closing upon instruction, thus preventing surges and water hammer (requires an actuator fitted)

b) In stand-by position stay fully closed solely by utilizing the inlet (upstream) pressure as acting (closing) force.

c) Provide a constant downstream pressure regulated flow of water, and a very low pressure drop across the valve – irrespective of the fire main operating at a higher pressure (inlet/upstream).

d) Upon instruction to provide a controlled closing, thus eliminating the damaging effect of water hammer and reaction forces in the connected pipe work.

Note: a) + b) + d) requires an actuator to be fitted (see Manual 6470645)

Principle of operation

In the closed position (Fig.1)), water from the upstream side (1) of the GW C-300 deluge valve is allowed, via a restrictor controlled port, to enter and pressurise the *sleeve cavity*, defined by the area (2) within the valve between the elastomeric sleeve (3) and the body casing (4) via the pilot system (5). This pressure prevents a flow through the valve by compressing the sleeve tightly around the inner core seat (6), thus maintaining the valve closed. It is this feature which keeps the valve closed also under surge conditions, as the high transient pressure is seen simultaneously at both the inlet of the valve and in the sleeve cavity, thereby allowing the sleeve compression in the seat area to keep a biasing action to the closed position.

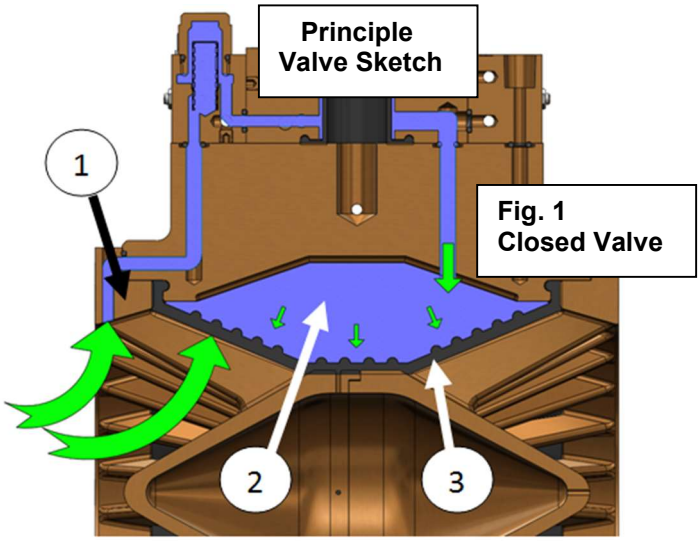


Fig. 1
Closed Valve

The opening of the valve (Fig. 2) is achieved by releasing the pressure from the sleeve cavity via a restrictor controlled vent opening (7). The elastomeric sleeve expands thus allowing water to flow through the valve.

Pressure control downstream is obtained by preventing the elastomeric sleeve from achieving its fully open position by modulating the pressure maintained between the sleeve and the outer body casing. This is achieved by the use of a pilot valve regulator and variable restriction orifices which are set for the desired pressure and flow conditions.

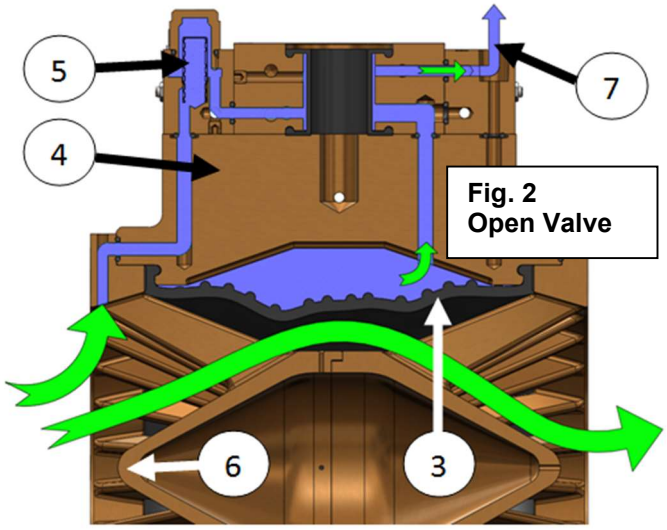


Fig. 2
Open Valve

Description of operation

(only applicable for valves fitted with an actuator)

The GW C-300 deluge valve is closed, or maintained in the closed position, by diverting upstream water to the sleeve cavity. This is accomplished in the 'with Pneumatic Actuator' variant by the pneumatic actuator. Applying air pressure to the actuator switches its position to "supply ON/ drain OFF", which allows upstream water to flow to the sleeve cavity, thus closing the deluge valve.

Releasing the air, switches the actuator to position: "supply OFF/ drain ON", which allows the water to drain from the sleeve cavity, thus opening the deluge valve. This function may also be accomplished by a three way solenoid valve – i.e. electrical actuation.

GW C-300 deluge valve body

The valve comprises of a tubular casing fitted, at the respective ends, with an inlet and outlet body (cone). Each inlet and outlet body incorporates a central tapered core (valve seat) surrounded by longitudinal slots which provide the water passage through the valve. These inlet and outlet bodies clamp an elastomeric (flow control) sleeve into the casing.

Pilot valve

The Pilot valve comprises an inlet, central, and outlet manifold block, bolted on top of the casing and providing the water passageways for flow control. The inlet manifold block contains the removable in-line strainer and the centre block contains the adjustable pilot valve flow restrictors.

Each of the ports in the inlet, central and outlet manifold blocks are provided with ¼" NPT screwed external outlets, designated Terminal Points (TP).

The Pilot Regulator assembly is bolted on top of the central manifold block. This assembly comprises a spring loaded piston operated cam (spindle). The spindle controls the movement of stainless steel balls in the ball guide. These balls then act on the elastomeric pilot sleeve to control the water into and out from the sleeve cavity. The pressure to control the valve is derived from the valves upstream water supply via an integral port in the inlet body.

The regulated pressure is adjusted (SET) by rotating the adjusting sleeve mounted on top of the pilot control valve. Rotation clockwise will compress the spring and increase the SET-pressure. Rotation counter clockwise will relax the spring and reduce the SET-pressure.

As the downstream pressure is sensed to be equal to the SET-pressure, the pilot control valve operates to close the internal ports and the elastomeric sleeve cavity pressure becomes hydraulically locked to provide a constant orifice for the flow conditions.

Any change in the flow conditions e.g., increased downstream water flow demand, will cause a drop in the downstream pressure. This, in turn, will cause the pilot control valve to release pressure from the elastomeric sleeve cavity, thus increasing the flow orifice and supply of water to downstream to re-establish/maintain the SET-pressure.

The pilot control valve will constantly continue to monitor the downstream pressure and adjust the orifice opening for as long as water is supplied to the system.

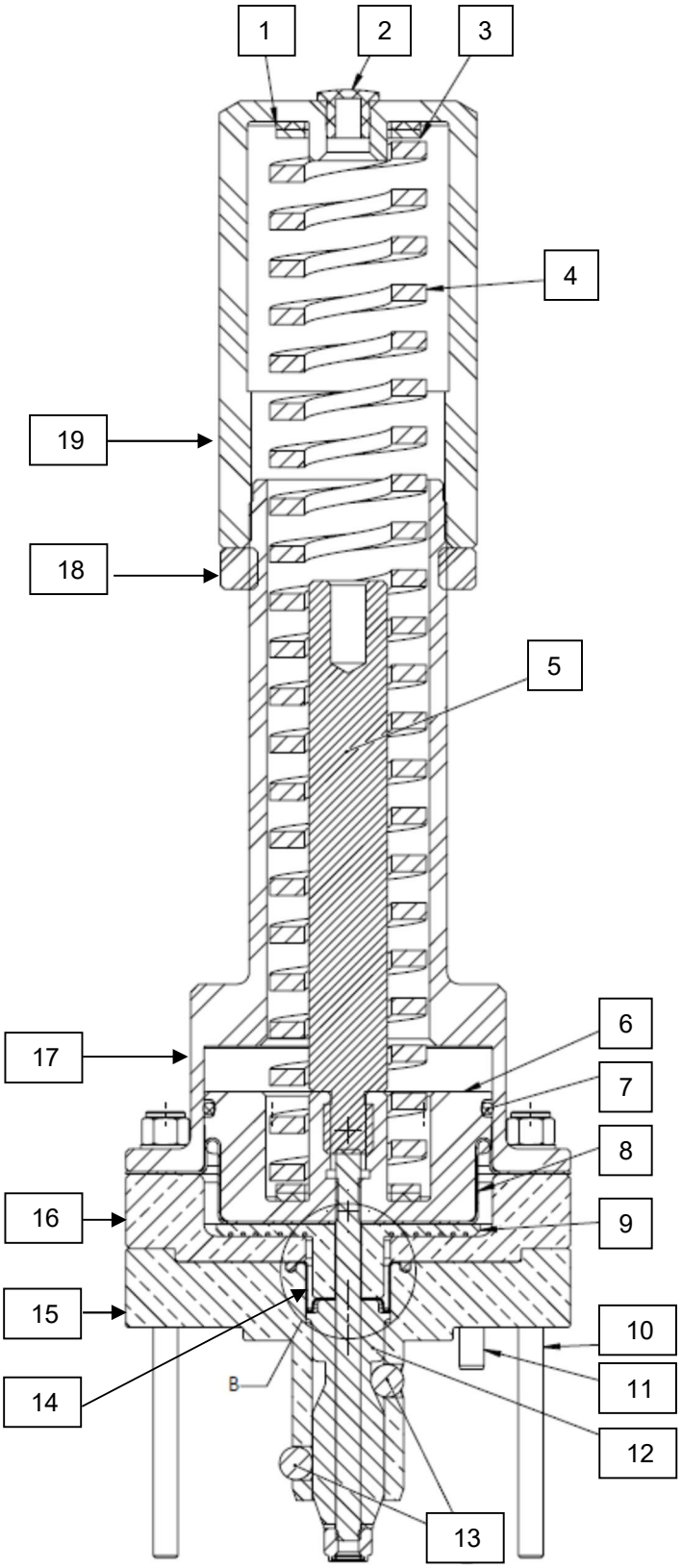
Heavy Duty Design

The GW C-300 deluge valve series is designed to meet the rigid operational demands from oil & gas and petro chemical processing industry.

The focus is on a high level of reliability in harsh environments – hence the GW C-300 deluge valve is designed with a minimum of mechanical moving parts. The few mechanical parts present (located in the Pilot) are 100% isolated from the flow media, protected by elastomeric sleeves and diaphragms, thus eliminating the risk of sticking.

All wetted parts are made from highly corrosion resistant materials – with Ni Al Bronze as standard.

Pilot valve (cut away)

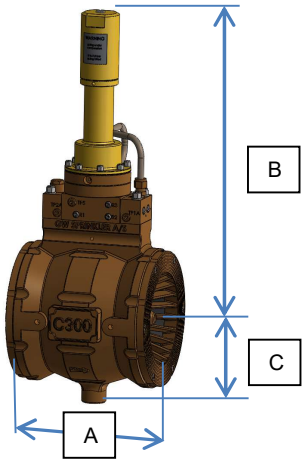


1: Washer (PTFE)
2: Plug
3: Washer (SS316)
4: Compression spring
5: Spring support
6: Piston
7: O-ring
8: Rolling diaphragm
9: Diaphragm support
10: Stud
11: Dowel pin
12: Pilot spindle (cam)
13: Ball
14: Beaded Diaphragm
15: Ball Guide
16: Diaphragm Housing
17: Spring Housing
18: Lock Nut
19: Adjusting Sleeve

TECHNICAL SPECIFICATION

Parameter	Range
Min. supply pressure	5 barg
Max. supply pressure	20 barg
Recommended operating pressure	5 to 8 bar above valve set-pressure
Pilot regulated pressure	3 to 7 bar (standard)
(downstream SET-pressure range)	7 to 12 bar (special) on request
Inlet pressure to achieve full open	Min. 4 bar
Pneumatic Actuator valve specifications	Trip @ 0,5 barg (falling), max. supply 12 barg

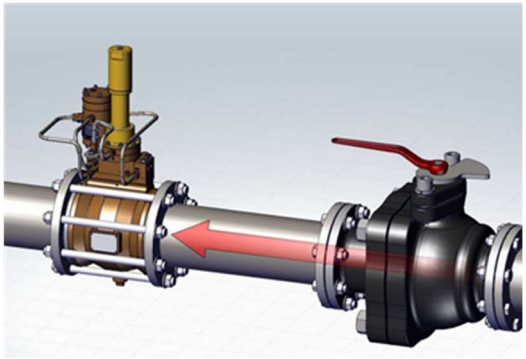
Size dia. mm (inch)		**80 (3")**	**100 (4")**	**150 (6")**	**200 (8")**	**250 (10")**	**300 (12")**
Kv (m3/h)		206	370	757	1.540	1.770	2.570
Min. flow rate (l/min.)		100	100	750	2.000	3.000	4.500
Max. flow rate (l/min.)		3.000	5.000	11.200	20.000	30.000	45.000
Weight (Kg, approx..)							
Ni. Al. Bronze		20	25	44	63	103	180
Super Duplex		23	29	50	72	118	205
Titanium		12	16	27	38	61	106
Dimensions (mm)	A	167	167	237	304	350	440
	B	417	439	471	499	534	572
	C	112	132	162	184	217	248



Materials

	Ni. Al. Bronze	Titanium	Super Duplex 25Cr
Casing and Inlet/Outlet Body	BS1400 AB2 ASTM B148 UNS C95800	Titanium ASTM B367 Grade C-2	ASTM 995 Gr. 6A UNS B93380
Pilot (wetted parts)	BS1400 AB2, ASTM B148 or SAE 660	Titanium ASTM B348 Gr.5	ASTM A276
Flow Control Sleeve	Natural Rubber	Natural Rubber	Natural Rubber
Pilot Sleeve	Natural Rubber	Natural Rubber	Natural Rubber

INSTALLATION



Preamble

The GW C-300 deluge valve assembly is designed to be clamped between pipe flanges to ANSI B16.5 Class 150 or 300 using full length studs, nuts and washers. The Valve may be positioned vertically or horizontally. Suitable sealing gaskets to ANSI B16.21 RF are to be inserted between flanged joints.
The water inlet supply to the valve should be equipped with a suitable strainer to prevent the ingress of harmful materials. Isolating butterfly type valve should be fitted upstream of the GW C-300 deluge valve assembly.
Upstream and downstream of the valve the pipe work should be straight for at least 3 pipe diameters without valves, bends or fittings. This will ensure that a stable flow regime exists at the entrance and exit from the valve. Ensure that the valve can be withdrawn from the pipework for routine maintenance/repair procedures. The larger valves may require the use of slings and strops when positioning. Lifting eye tapings are provided on the side of the larger valves. Care must be taken to ensure that the Pneumatic Actuator (if fitted) and small bore pipe work is **not** utilised for lifting.
Pressure gauges are to be provided to monitor the valve inlet and/or outlet pressure. For accurate readings the gauges should be located in straight lengths of pipework away from valves and fittings.

For test purposes a full bore test/drain outlet with separate isolation valve should be provided in the pipework on the outlet side of the GW C-300 deluge valve assembly.

The GW C-300 deluge valve jacket vent (1/2” NPT) is supplied open (plugged with a plastic cap) and shall be either firmly plugged or piped to waste via a ½" isolating valve. Opening this vent port will act as a manual release of the deluge valve.

The Pneumatic Actuator (outlet port CP2, ¼” NPT) should be piped to waste. (Min. tubing diameter: 10 mm, maximum length 2 meters using full flow fittings).

A pressure operated switch (to give remote indication of operation) may be connected to the discharge pipe work.

Procedure

1. Ensure that the inlet isolating valve is isolated.
2. Ensure that all interfacing flange surfaces are clean and the arrow on the valve points in the flow direction (i.e. to the nozzles).
3. Locate and align the sealing gaskets on the water inlet and outlet flanges (gasket to ANSI B16.21 RF). Fit the tie-rods between the two flanges. Each tie-rod is fitted initially by inserting the top end through the upper flange from its underside with the lower end of the tie-rod canted outwards to clear the lower flange, then pull it through the upper flange and finally lower it down through the lower flange, installing isolation bushes if required.
4. Fit and tighten the nuts and washers on the tie-rods, ensuring at least 1½ - 2 full threads are visible. Ensure the flanges are pulled down evenly to a maximum torque in accordance with the piping/bolting specification. The deluge valve casing and inlet and outlet bodies should be clamped to a point where there is no visible gap between casing and end cones – i.e. metal to metal.
5. If fitted, secure the pipe connection between the sleeve cavity vent outlet and the drain pipe.
6. If fitted, connect the air supply to the Pneumatic Actuator, to switch it to the “supply ON/ drain OFF” position. (if alternatively a solenoid valve is fitted: NC type = de-energized, NO type= energized), closing the deluge valve.
7. Continue onto *commissioning*.

NOTE:

ON NO ACCOUNT SHOULD THE SMALL BORE PIPEWORK OR PNEUMATIC ACTUATOR (OR OTHER FITTINGS) BE USED TO LIFT, SLING OR MANOEUVRE THE VALVE ASSEMBLY.

COMMISSIONING

Preamble

Ensure an adequate water supply (20 bar max.).

It is essential that the operator, or commissioning engineer, reads these procedures prior to the operation of the valve. Failure to do so could result in the valve failing to operate properly, or damage to the valve or pipework.

Any hydrostatic tests must be less than 20 barg.

The only commissioning procedure required for the GW C-300 deluge valve is to carry out a check of the installation and regulation setting of the pilot.

It is recommended that a GW C-300 deluge valve response time and pressure setting check list (see: Appendix 1) is completed during commissioning and retained for future reference.

Checks (bracket [numbers] refer to diagram on page 29)

1. The GW C-300 deluge valve outlet is connected to the protected area's distribution pipework (downstream) via an isolating valve [5].
2. The GW C-300 deluge valve Inlet Isolating Valve [4] is closed.
3. The main water supply isolating valve is closed. (Clients Supply)
4. The GW C-300 deluge valve Outlet Isolation Valve [5] is closed.
5. The system test/drain valve [6] is piped to waste/drain and closed.
6. The GW C-300 deluge valve sleeve cavity (jacket) outlet [3] is plugged or piped to waste/drain via an isolating valve, and closed.

Procedure (bracket [numbers] refer to diagram on page 29)

Stop the commissioning if any part of the pipe work or valve shows any leakage or erratic behaviour.

1. Open the Main water supply isolating valve. (Clients Supply)
2. Open the GW C-300 deluge valve sleeve cavity outlet valve [3] to bleed any trapped air.
3. Partially open the GW C-300 deluge valve Inlet Isolation Valve [4] to fill the GW C-300 deluge valve and the upstream pipework.
4. Slowly, fully open the test and drain valve [6], to initiate flow through the deluge valve.
5. When plain water (no air) is trickling from the GW C-300 deluge valve sleeve cavity outlet pipe, **close** the 1/2" isolating valve [3], or fit the plug.
6. Fully open the GW C-300 deluge valve Inlet Valve [4] to impose full water pressure on the GW C-300 deluge valve.
7. Observe the water discharging overboard from the system Test/Drain line [6]. Allow the system to function for one minute approx. to stabilize and to prove correct operation, and note the discharge pressure [8]. Adjust the SET-pressure if necessary, by turning the Adjusting Sleeve on top of the Pilot. Also see page 12.
8. Confirm that the GW C-300 deluge valve inlet pressure gauge [7] registers line pressure, and that water is flowing through the deluge valve [1] at constant regulated set-pressure [8].
9. Slowly close the test/drain valve [6]. "Reduced" Deluge valve test via test/drain valve is now completed.

Reinstate the system to "in-service" mode – or continue with FULL FLOODING TEST

10. **IMPORTANT : FULL FLOODING TEST**

    This test must only be carried out with the full authority of the client as water will be discharged into the protected area !!.

11. **Open the main discharge valve** [5] which will allow for deluge of the risk.
12. Note the discharge pressure [8] and observe full and correct flow from all nozzles. Adjust SET-pressure if necessary.
13. Stop the pumped water supply to end/complete the deluge flooding.

NOTE 1

If a small bore test line and valve are used, only run the valve for sufficient time to confirm the function of the deluge valve. Running a valve at too low a flow will/may cause it to hammer.

NOTE 2

As needed, adjust the opening and closing time for the valve by adjusting the restrictors. See the restrictor section (page 11) and fault finding.

NOTE 3

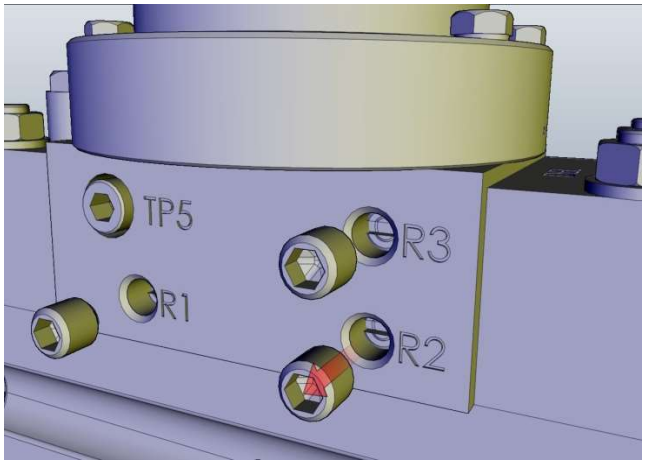
Deluge valve opening response time adjustment should only be carried out during a full discharge test through the deluge system nozzles and not through the test/drain facility as the short pipe lengths involved do not provide the required back pressure or flow to guarantee accurate settings. Following the setting of the restrictors, carry out an operational test and record the time for the valve to open and the time for the valve to achieve regulation of the set discharge pressure.

NOTE 4

Should difficulties be experienced in setting up the Pilot valve then the temporary insertion of a short length of M10 studding (remove plug on top of Pilot Adjusting Sleeve and fit stud through hole) will greatly assist in confirming correct operation. Pilot regulation will be seen as back and forth movement of the M10 stud. Full travel of the Spindle (stud) will be 14mm. Remove the M10 studding and refit the plug after use.

14. Open the system Test/Drain valve [6] in the GW C-300 deluge valve discharge pipework to drain the system pipework.
15. Close the system Test/Drain Valve on the GW C-300 deluge valve discharge pipework.
16. The FULL FLOODING TEST is now completed. Reinstate the system to “in-service” mode.

Pilot valve restrictors



The Deluge Valve has a three way pilot which operates by allowing a controlled water flow in or out of the sleeve cavity during pressure compensation.

At the desired set point, water is locked in the sleeve cavity and no water flows within the pilot system. Should the outlet pressure drop, thereby requiring the sleeve cavity to be vented, the vent port of the pilot opens and allows water to pass from the sleeve cavity through the pilot to the vent line, thereby having to pass through restrictions R2 & R3. Correspondingly, should the outlet pressure rise, the sleeve cavity requires more water to close the valve down. Here, the inlet port of the pilot opens allowing water to pass across R1 & R2 into the sleeve cavity. It can be seen from the functional description that a combination of settings of these restrictors can alter the valves characteristics (opening and closing speed).

The pilot valve incorporates three variable/adjustable restrictors, (R1, R2 and R3). The purpose of these is to enable the user to tune the valve's performance to meet the service conditions and required opening and closing characteristics.

After removing the protective plug adjust the central screwed restrictor with the tool 64/70506. Finger pressure is only required.

The Restrictor is a needle valve. Rotating clockwise (screw in) reduces the orifice (and water flow), hence slowing down the reaction of the deluge valve. Rotating the restrictor counter clockwise will do the opposite.

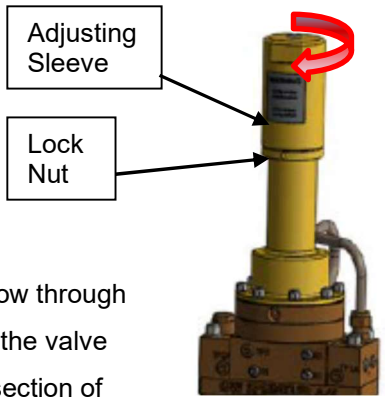
Following commissioning and the satisfactory operation of the valve, the restrictors must be locked in position with the protective plug.

Once set, the restrictors should not require further adjustment. If the valve's characteristics alter, this is not normally a function of the restrictors and reference should be made to the Fault Finding Section of this Manual.

Do not tamper with the Restrictor settings once set

R1 (Lower Left on Centre Block)	**Initial setting is 4 turns open from fully in.**	Governs the **closing speed** of the valve.
R2 (Lower Right on Centre Block)	**Initial setting is 6 turns open.** **Shall NOT be adjusted!**	Alters the speed at which water enters and leaves the sleeve cavity. Responds to the pressures within the control pilot chamber and alters the speed of response of the valve.
R3 (Upper Right on Centre Block)	**Initial setting is 4 turns open from fully in**.	Governs the **opening speed** of the valve while it is pressure regulating.

Note: later versions of the pilot do not have restrictor R2. This is unused in this valve variant.



Discharge Pressure (Set-pressure) Adjustment

The regulated pressure measured downstream of the valve may vary slightly as the flow through the valve changes. This is due to the integral position of the pressure sensing port on the valve outlet. Moving the sense connection to a stable flow region downstream in a straight section of pipework will stop these fluctuations.

The valve may be factory set to discharge at a nominal pressure (typical @ 4 barg - refer to despatch information). To increase the discharge pressure, screw the adjusting sleeve downwards (clockwise).

The Standard spring (blue color) covers the range of 3 to 7 barg. DO NOT adjust sleeve below 3 barg for the 3 to 7 barg spring - or below 7 barg for the 7 to 12 barg spring (optional).

NOTE: For each complete rotation of the adjusting sleeve, the pressure will change:

Spring type	Pressure range	Bar change per revolution	Revolutions per bar change
Blue (standard)	3 to 7 bar	0,13	7,7
Silver (optional)	7 to 12 bar	0,2	5,0

Note: The above data are close approximations for guidance only. The effectiveness of any set pressure adjustment shall always be verified by conducting a full flow test.

Following final adjustment, ensure the adjusting sleeve is locked in position by the lock nut.

For more information on pilot pressure setting see separate instruction: “GW C-300 Guideline to pressure setting”

MAINTENANCE SCHEDULE

Monthly: Visual Inspection

- Check for no damage to valve, piping and trim parts.
- No leaking from tell-tale holes (body, pilot or actuator) and seals.
- Check that all valves and handles are in “In Service” position.
- Operate upstream & downstream isolating valves to avoid sticking *).

*)
The system design provides for isolating valves to remain in the OPEN position for long periods. Close and open the valve several times at monthly intervals to ensure freedom of movement. Leave and lock the valve in the OPEN position

6 months

- Conduct a ***partial flow test*** (see note below) adequate to move the sleeve from the seat.
- Check and rinse inlet-strainer.

12 months

- Conduct a ***full flow test*** at maximum pump capacity.
- Check that required downstream pressure/flow is achieved.
- Check and rinse inlet-strainer.

36 months

- Replace the elastomeric sleeve, diaphragms and seals in service – and those held unused as spare stock. Spares should be used within a two year shelf life to provide a 3 year “in service” life (5 year total life).
- Check and clean inlet strainer
- Check and clean all water channels/bores forming part of the valve internal water ways, and deluge valve pilot control system.

The “in service” life of the elastomeric sleeve can be extended annually to a **maximum “in service” period of 5 years** from the date of first installation – or 6 years from valve manufacture, whichever is the sooner, provided that a “maximum extension test” (see below) to fully stretch the flow control sleeve within the deluge valve body, is performed – AND is followed by a full flow test. Replace the elastomeric sleeve if the deluge valve does not seal 100% after “maximum extension test”.

NOTE: FLOW TESTS: Extract from NFPA 25: Records indicating the date the deluge valve was last tripped and the tripping time as well as the individual and organisation conducting the test shall be maintained at a location or in a manner readily available for review by the authority having jurisdiction. See: Appendix 1 in back of this manual.

MAXIMUM EXTENSION TEST (bracket [numbers] refer to diagram on page 29)

NOTE: Stop the test if any part of the pipe work or valve shows any leaks.

*Ensure that the deluge valve inlet [4] and outlet [5] isolating valves and system test/drain valve [6] are **closed**.*

1. Open the deluge valve sleeve cavity vent [3] outlet plug (or valve) to fully drain the valve cavity.
2. Partially open the deluge valve inlet isolation valve [4] to fill the deluge valve and upstream pipe work.
3. Fully open the deluge valve inlet isolation valve to impose full pump water pressure on the deluge valve to fully stretch the elastomeric sleeve open. Leave the valve pressurized for 1 minute. Check that downstream pressure [8] (between deluge valve outlet and outlet isolating valve) reads same pressure as inlet [7] (upstream) pressure.
4. When water has stopped trickling from the GW C-300 deluge valve sleeve cavity outlet pipe, close the isolating valve [3], or fit the plug.
5. Slowly open the downstream test and drain valve [6].
6. Confirm that the deluge valve inlet pressure gauge [7] registers line pressure and the deluge valve outlet pressure gauge reads regulated pilot set pressure [8] – and water flows at constant set-pressure through the valve.
7. If the deluge valve [1] does not regulate as intended, the elastomeric flow control sleeve should be replaced.
8. Close test/drain [6] valve. End of test. (Remember to set outlet valve [5] in service position = OPEN).

MAINTENANCE PROCEDURES

Valve Removal (bracket [numbers] refer to diagram on page 29)

Obtain a permit to disable the system.

Isolate the water supply to the GW C-300 deluge valve system.

IMPORTANT: If a by-pass system is fitted around the GW C-300 deluge valve assembly, ensure a water supply is available to this system to enable emergency operation when/while the GW C-300 deluge valve is removed.

1. Close the Inlet Isolation Valve [4] and lock in position
2. Open the Test/Drain valve [6] to drain the GW C-300 deluge valve System pipework.
3. Break the piped connection between the GW C-300 deluge valve sleeve cavity outlet [3], and the drain pipe.
4. Release and remove the tie-rods securing/clamping the GW C-300 deluge valve.
5. Slacken the pipe supports, then gently jack the pipework apart and carefully withdraw the GW C-300 deluge valve, together with the sealing gaskets.

NOTE: When manhandling the GW C-300 deluge valve, consider its size and weight.

DO NOT USE THE SMALL BORE PIPEWORK, PNEUMATIC ACTUATOR OR OTHER FITTINGS TO LIFT, SLING OR MANOEUVRE THE VALVE ASSEMBLY. For lifting - fit and use lifting eyes in tapped/threaded holes located on valve body exterior (on 6" valves and larger).

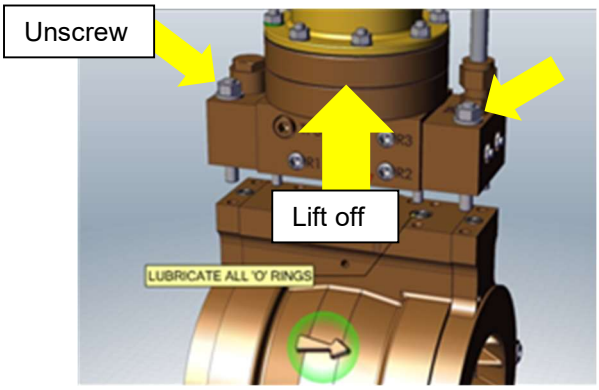
Valve Elastomer Sleeve Renewal

Equipment Required

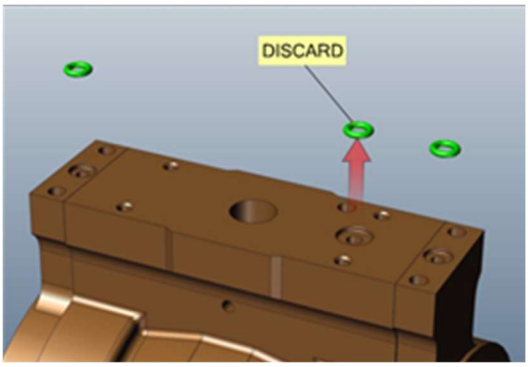
1. A set of appropriate sized A/F spanners and wrenches.
2. Valve Sleeve Spare Part Kit (see page 26, SPARE PARTS LIST)
3. Rubber Lubricant Emulsion (1 litre bottle) - Part No. CV64/62163.

Renewal of Elastomeric Sleeve

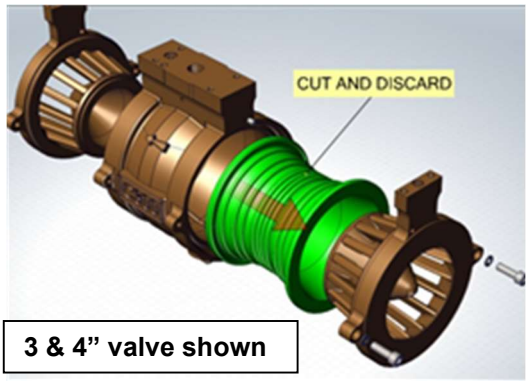
When the valve is removed for servicing, the opportunity should be taken to renew all elastomeric components associated with the GW C-300 deluge valve, the valve. Also check the condition of the Pilot spring.



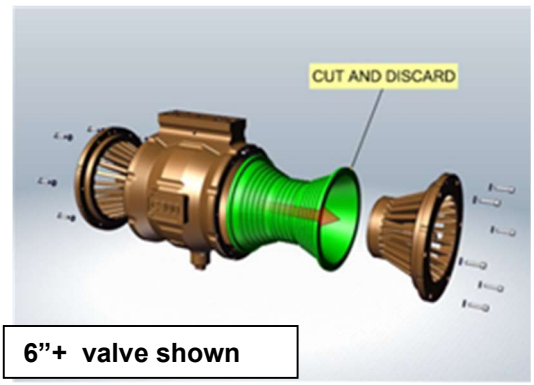
1. Support the Valve horizontally. Withdraw the Pilot and Centre Block as a complete assembly by releasing the retaining nuts fitted.



2. Remove the 'O' sealing rings located in each of the three ports associated with the inlet body, the outlet body and the valve casing, and discard.

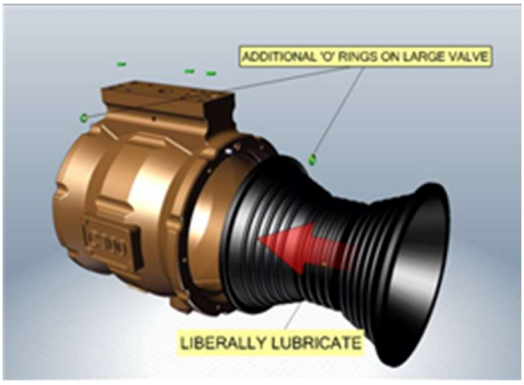


3. Stand the Valve on its outlet (see arrow on body) Release the bolts securing the inlet body to the casing and prise apart taking care not to damage the faces. Withdraw the inlet body and place on a clean surface.

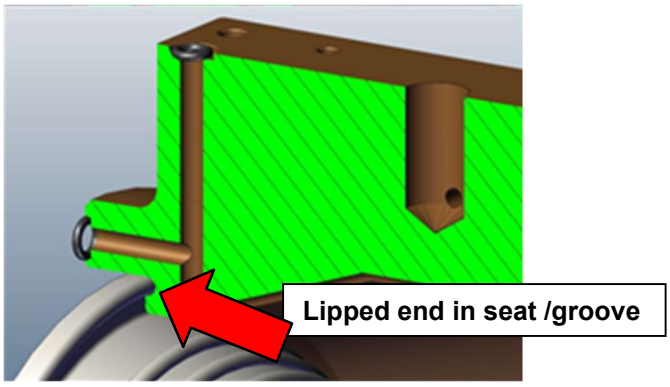


4. Invert the Valve and repeat the procedure for the outlet body, then the elastomeric sleeve may be pulled clear, cut and discarded. When disassembled, use the opportunity to check and clean the water intake bores located in the inlet & outlet cones, top inside.

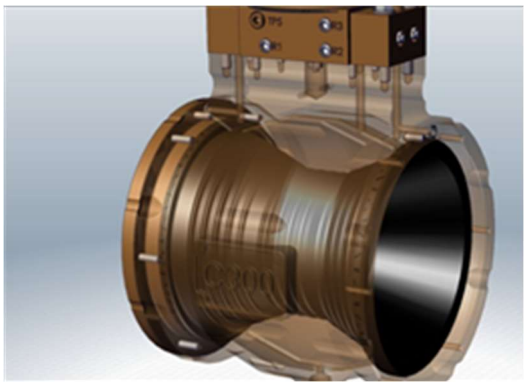
Sleeve Assembly, all except 100mm (4”) Valves



1. Support the Valve casing horizontally. For the 150mm (6”) and larger valves, fit new O-Rings into the casing to seat on the Inlet and Outlet Cones.



2. Insert the replacement sleeve into the valve casing. Carefully work into position until each lipped end of the sleeve is seated in the groove each end of the casing.



3. Liberally apply Rubber Lubricant Emulsion to the elastomeric flow control sleeve inside surface to reduce friction when fitting the cones. Locate the inlet cone ensuring the core does not damage the sleeve's surface. Fit the body retaining bolts and evenly tighten down. Repeat for the outlet body.

Sleeve Assembly, 100mm (4”) Valve

The 100 mm elastomeric sleeve may appear undersized – but is designed this way!
Liberally apply Rubber Lubricant Emulsion to the elastomeric flow control sleeve and ease the flow control sleeve onto the inlet body until it reaches the base. Carefully lower the casing over the sleeve taking note of its correct orientation. Then turn the valve over and partly secure the Inlet Body. Re-lubricate the downstream end of the sleeve. Carefully lower the outlet body into the sleeve. As the body is worked down, use a blunt instrument between the vanes (e.g., a small ring spanner) to push the sleeve outwards. When the sleeve is in position, partly tighten the securing bolts and nuts. In turn, slightly tighten the bolts on each end of the valve – so the end cones are “simultaneously” screwed in. Observe – and push/expand the elastomeric sleeve so its lip fits into the annular grooves.

All Valves

Select correct sized O-rings from the Spares Kit, lubricate and fit into the respective grooves on the valve and Centre Block interfaces.
A dowel pin fitted on the Centre Block top and bottom faces prevents wrong assembly of Pilot on Centre Block – and Centre Block on valve interface. Secure the Centre Block to the valve by tightening the retaining nuts. It is recommended to secure the nuts by applying a few droplets of removable thread locker – e.g. Loctite

Reinstatement Procedure

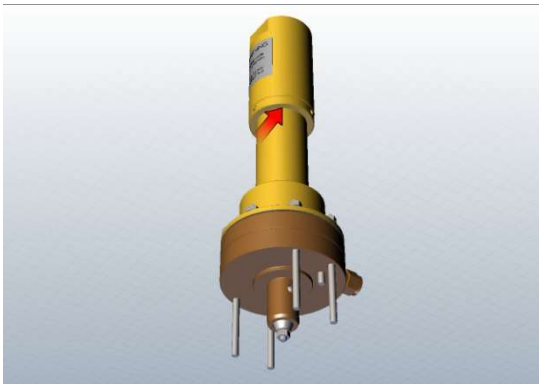
Follow the Installation Procedure.

Pilot

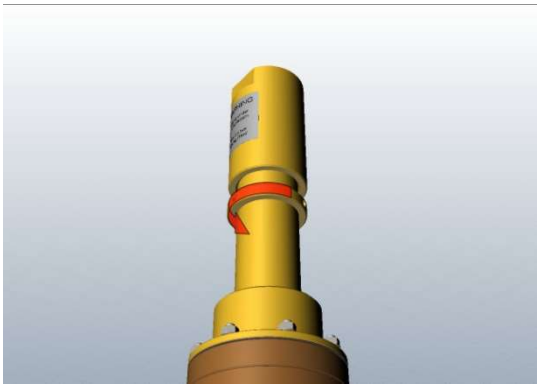
Complete the deluge valve isolation procedure.

Spring Inspection

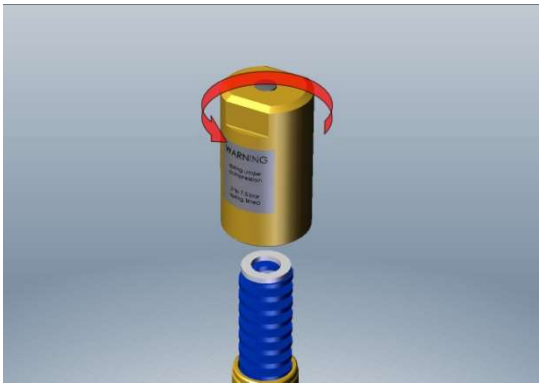
(may be conducted without removing deluge valve from pipe work provided proper isolation of deluge valve is completed.)



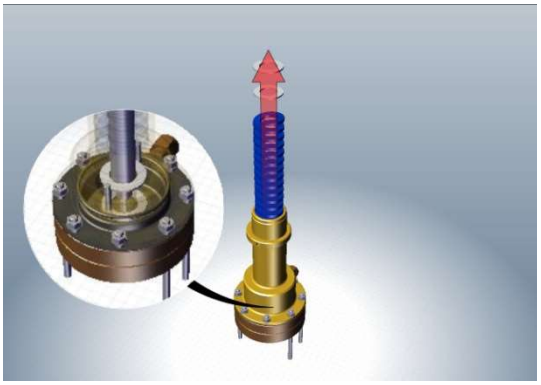
1. Mark the position of the Adjusting Sleeve Locknut (to retain actual SET-pressure).



2. Slacken the Adjusting sleeve locknut sufficiently to release the sleeve.



3. Fully unscrew the adjusting sleeve and remove (beware of potential spring force)



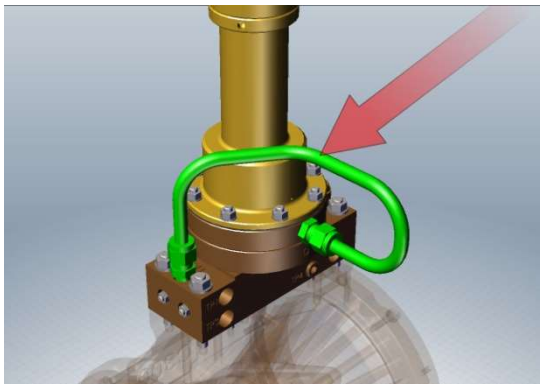
4. Withdraw the spring and the thrust washers located on top of the spring.

5. Using a length of suitable wire with a hook formed at one end; withdraw the remaining thrust washers from the spring housing. If difficulty is met in withdrawing the thrust washers, it will be necessary to remove the Pilot from the Deluge Valve.
6. Inspect all items. A component showing signs of corrosion must be replaced. Obtain a spring service kit for the appropriate spring.

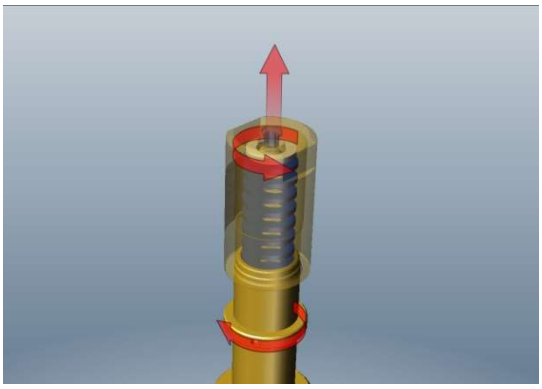
Service Kit No.	Spring Rating
CV64/90158	3 to 7 bar
CV64/90157	7 to 12 bar

7. Clean and dry the interior of the Spring Housing.
8. Fit spring with a pair of thrust washers at each end. A stainless steel washer is inserted between the spring and the PTFE washer (see: Pilot Cut Away, page 6).

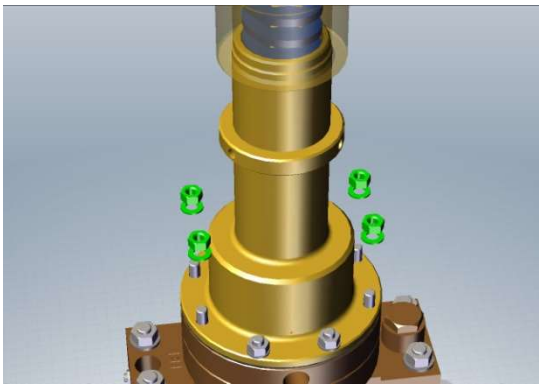
Pilot Regulator Assembly - Renewal of Diaphragms



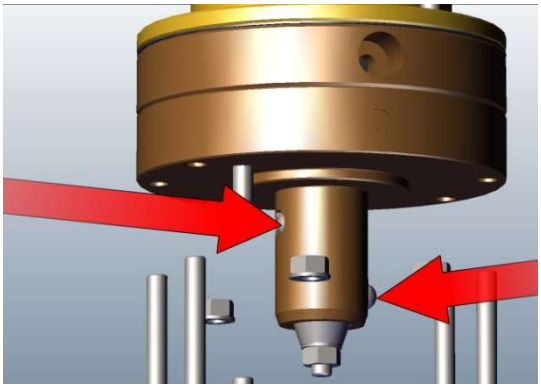
1. Remove the Pressure Sense Pipe between the Regulator Assembly and the End Block.



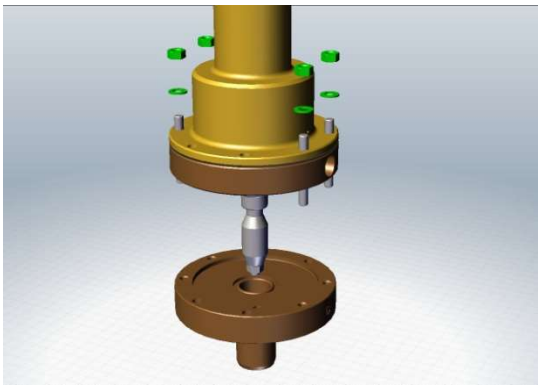
2. Slacken the Pressure Adjusting Sleeve. See the Spring Inspection procedure.



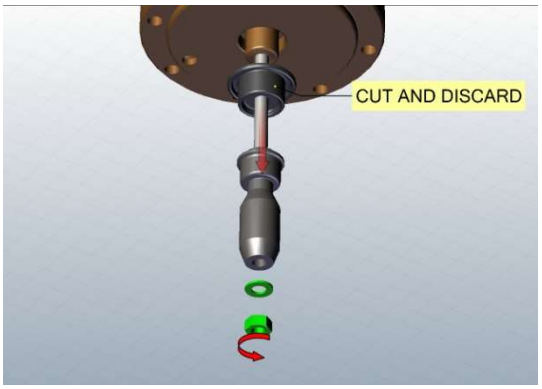
3. Remove the two pairs of M6 nuts and washers which retain the Regulator Assembly



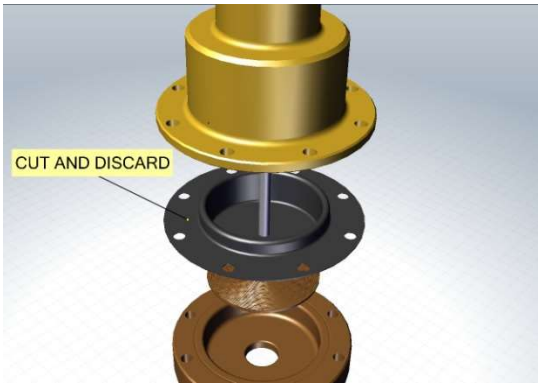
4. Carefully withdraw the Regulator Assembly. 2 x Ø 8mm steel balls are housed in drilled ports of the Ball Guide.



5. Remove the other 4 x M6 nuts and washers. Separate ball guide and spring housing.



6. Release the M6 'Nyloc' nut and withdraw the Main Pilot Spindle.

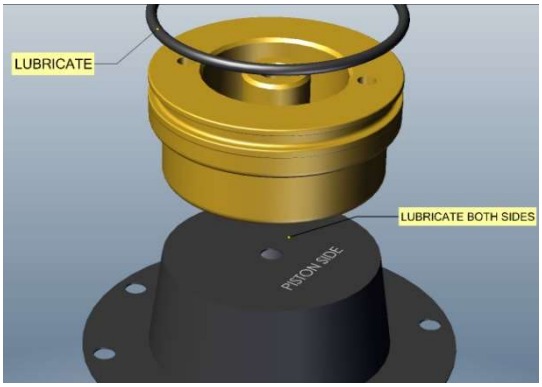


7. Withdraw the Diaphragm Support and remove the Diaphragm and discard. Cut to prevent re-use.

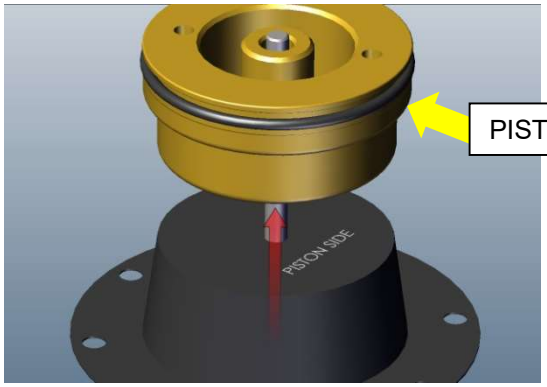
Assembly of the PILOT

Great care must be taken to ensure the diaphragms are installed correctly orientated without damage, abrasion or twisting, as this will cause the diaphragms to prematurely rupture.

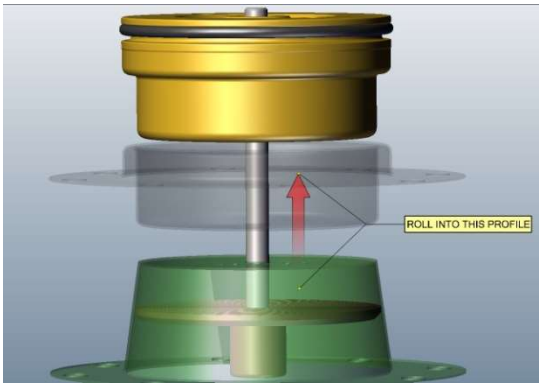
The diaphragm is single coated which means that the rubber coating is applied only to one side of the fabric. The diaphragm is strongest on the rubber side, hence the rubber side shall always be facing towards the pressurizing media (air or water). Given that it can be difficult to distinguish between rubber and fabric side, “PISTON SIDE” is printed on the fabric side of the diaphragm. The PISTON SIDE must always be facing towards the Piston!



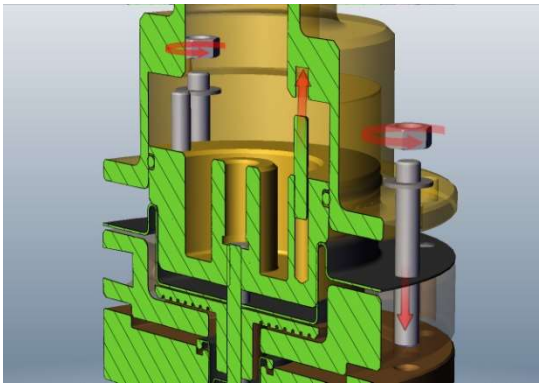
1. Lubricate the Piston ‘O’ ring with Rubberlube Grease and fit (Early versions of the pilot regulator do not include a piston ‘O’ ring). Lightly smear both sides of the Rolling Diaphragm with 'Rubberlube' grease.



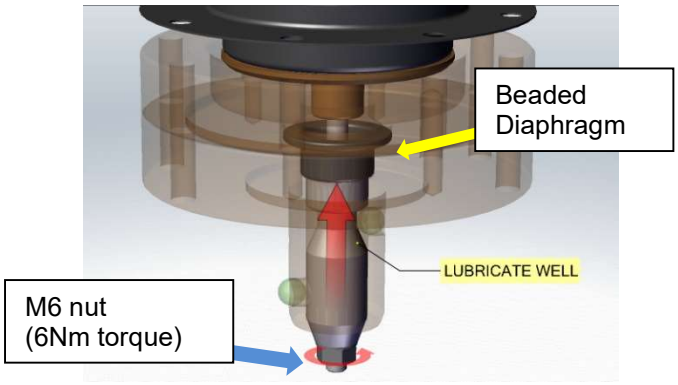
2. The texture is smooth on one side and fabric on the other (the fabric side is marked 'Piston Side'). Pressure must be applied to the smooth side to avoid rupture. Locate the Diaphragm over the central stud.



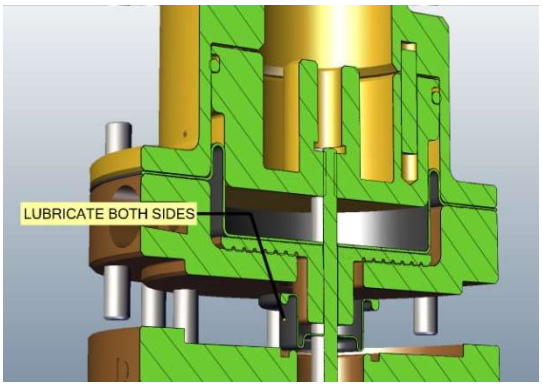
3. Fit the Diaphragm Support over the central stud and onto the Diaphragm. While holding the Diaphragm support in position, roll the Diaphragm back on itself as shown in the diagram.



4. Insert the Piston and diaphragm housing into the Spring Housing. The stud holes must be aligned. Assembly is assisted by temporarily retaining the spring housing to the Diaphragm Housing with M6 screws.



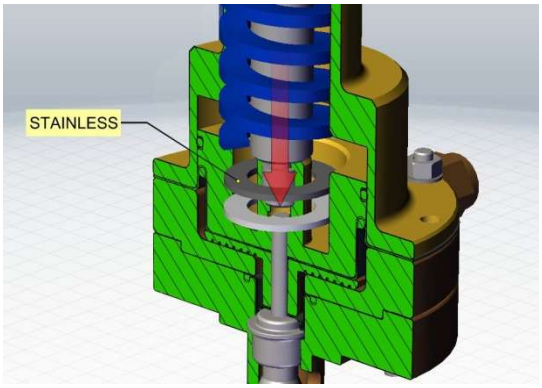
5. Smear both sides of the Beaded Rolling Diaphragm with 'Klübersynth' grease. Locate the Diaphragm over the central stud, with the bead away from the Diaphragm Housing.



6. Fit the Pilot Spindle over the central stud. Ensure that the orientation is correct. Fit and secure the M6 'Nyloc' nut to retain the Pilot Spindle
(M6 nut torque: 6 Nm +0/-0,5).

NOTE:

The Diaphragm must be central to the spindle.The M6 'Nyloc' nut must be tightened before the beaded end of the diaphragm is located into the Ball Guide clamped. This allows the diaphragm to rotate slightly while tightening the nut without twisting. Any twisting of the diaphragm will cause premature failure. Liberally coat the Spindle with 'Klübersynth' grease. Fit the Ball Guide over the Spindle. The beaded side of the diaphragm will locate in the groove within the Ball Guide. Secure the assembly with the 4 x M6 nuts and washers. Evenly x-tighten the nuts.

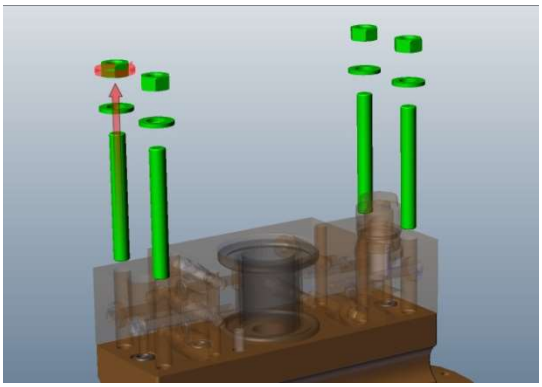


7. Fit Spring with a pair of thrust washers at each end. The stain less steel washer is inserted between the spring and the PTFE washer. The stainless steel washers are fitted in direct contact with the spring - both ends of the spring.

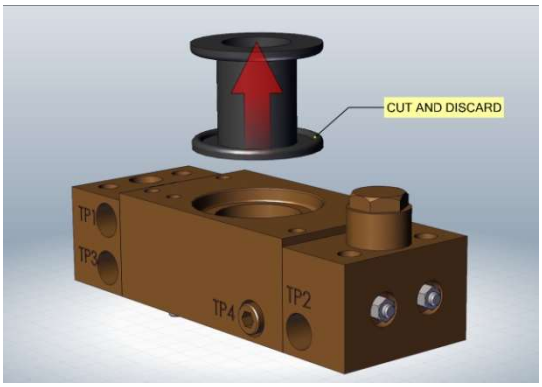
8. Screw down the Pressure Adjusting Sleeve to the previously scribed line for the pressure setting. Fit the sealing plug in the hole on top of the Adjusting Sleeve.

NOTE: Do NOT manually operate the pilot spindle as this can cause damage to the diaphragms.

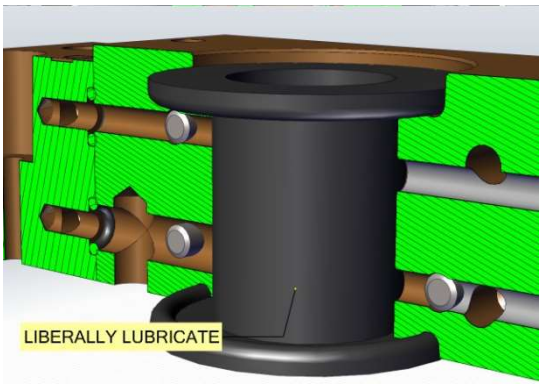
Pilot Sleeve Replacement



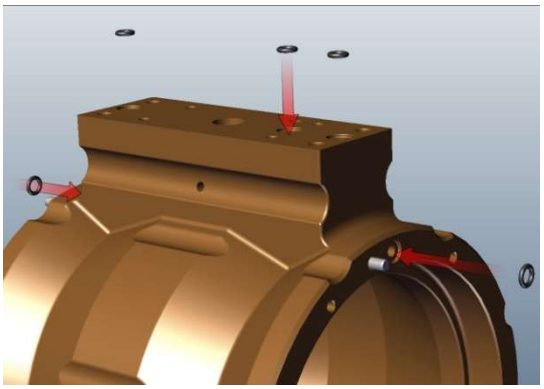
1. Remove the manifold block assembly whole from the Valve body by releasing the four retaining nuts fitted to the outer blocks.



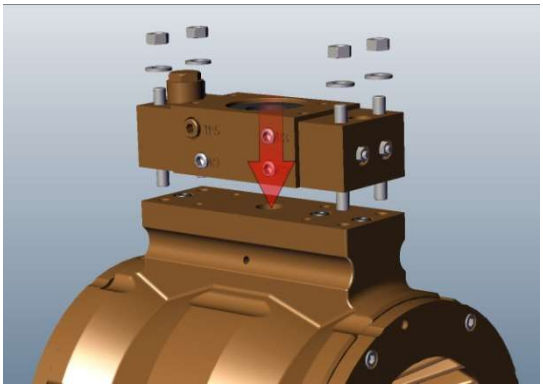
2. Withdraw the Pilot Sleeve from the Centre Block and discard. Cut to prevent re-use.



3. Liberally apply Rubber Lubricant to a new Pilot Sleeve. Fit the Sleeve into the body and confirm the moulded end flanges are correctly located in both end faces.

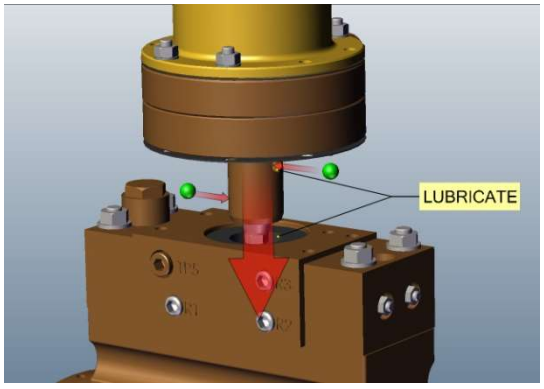


4. Fit new 'O' ring seals on top of the body, and at each end with a very light application of Rubberlube. Do not block the ports.

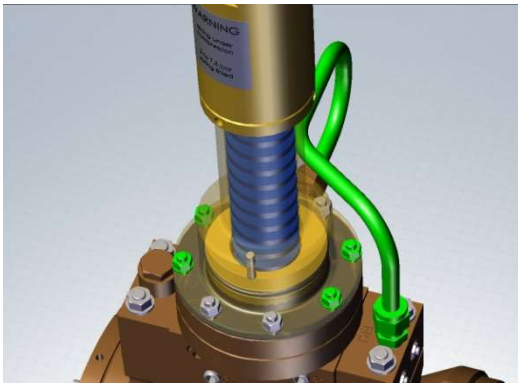


5. Fit the Manifold Block Assembly to the Valve body ensuring correct orientation and secure with the nuts and washers.

Pilot valve fitting procedure



1. Push a small amount of “Klübersynth” grease into the holes in the Ball Guide. Fit new 8mmØ steel balls. Cover the inside of the Pilot Sleeve with Rubber Lubricant Emulsion.



2. Orientate the Regulator Assembly and fit it to the Manifold Block. Fit the four M6 securing nuts and washers and evenly tighten down. Fit and secure the Pressure Sense Pipe to connect the Pilot Control Valve and the End Block DEL-port.

SPARE PARTS LIST

Elastomeric Flow Control Sleeve c/w O Ring spares kit

Size	80	100	150	200	250	300
Kit number	CV64/90119	CV64/90120	CV64/90121	CV64/90122	CV64/90123	CV64/90124

Common to all sizes of valve

Pilot Control Valve Spares Kit – CV64/90118

Comprising:-

1 × Rolling Diaphragm - Beaded

1 × Rolling Diaphragm

1 × Pilot Sleeve

2 × Ø8mm Stainless Steel Balls

1 × Lubricant (Klübersynth) (10 g packet)

1 × Sealing Plug for Adjusting Sleeve

1 × Piston O-ring

NOTE: Elastomeric Sleeves, Diaphragms and Seals should be stored in sealed light proof black bags.

Spare stocks of sleeves, diaphragms and seals should be used within a two year shelf life to provide a 3 year in-service life (5 year total life).

Pilot Strainer - CV64/70050

Spring Service Kit.

Service Kit No.	Spring Rating
CV64/90158	3 to 7 bar
CV64/90157	7 to 12 bar

Also see: Data Sheet No. DV070 1001 – GW C-300 General Spares Schedule

Commissioning /Maintenance Accessories

CV64/62163: Rubber Lubricant Emulsion

Restrictor:

CV64/70505 - Insertion / Removal Tool (fits retainer)

CV64/70506 - Adjusting Tool (fits restrictor)

FAULT FINDING

Fault	Cause	Remedial Action
Valve does not open	a) Rupture of flow control sleeve on inlet side of valve	Renew sleeve
	b) Restrictor R3 fully screwed in	Check and adjust all restrictors
	c) Ruptured pilot sleeve	Renew pilot sleeve
Valve does not close	a) Rupture of flow control sleeve on discharge side of valve	Renew sleeve
	b) Blocked filter	Clean filter
	c) Restrictor R1 screwed fully in	Adjust restrictor
	d) Ruptured pilot sleeve	Renew pilot sleeve
Valve does not regulate	a) Restrictor settings incorrect	Adjust restrictors
	b) Blocked filter	Clean filter
	c) Ruptured pilot sleeve	Renew pilot sleeve
	d) Ruptured diaphragms	Renew diaphragms
	e) Pilot valve spindle sticking	Check spindle & pilot sleeve
	f) Sensing port / pipe blocked	Check and clean port/pipe
System set pressure incorrect	a) Unauthorised adjustment of Pilot Adjusting Sleeve	Adjust Pilot
	b) R3 set too far in	Adjust R3
	c) Deterioration of spring	Renew spring
Water leaking from the side of the Pilot valve	Pilot valve large diaphragm ruptured	Renew diaphragm
Water leaking from 'tell tale' hole in valve casing	a) Pilot valve beaded diaphragm ruptured	Renew diaphragm
	b) Pilot sleeve ruptured	Renew pilot sleeve

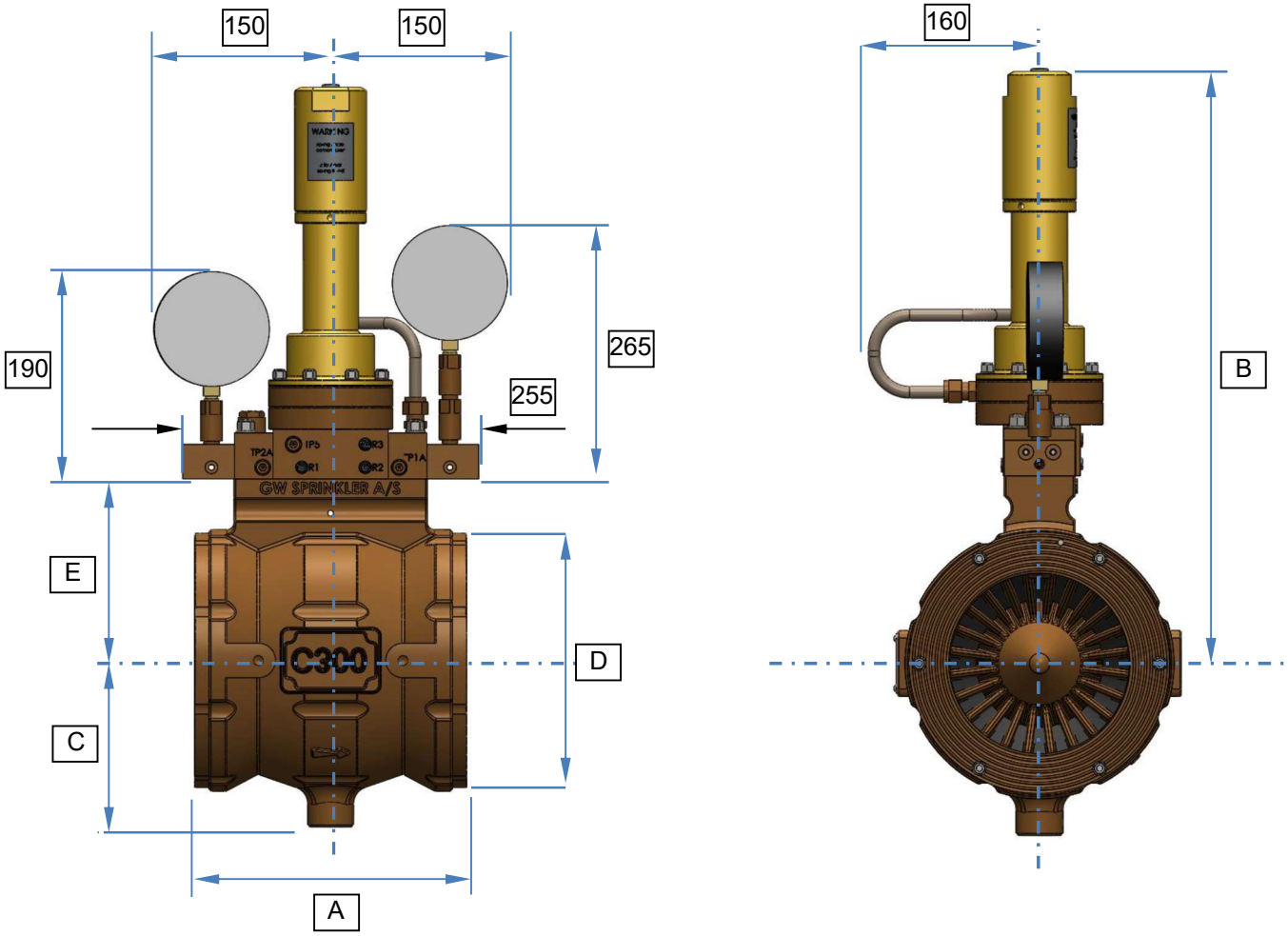
DIMENSIONS

All dimensions in mm.

	A	B *)	C	D **)	E
80 (3”)	167	405	112	128	105
100 (4”)	167	427	132	161	127
150 (6”)	237	459	162	222	158
200 (8”)	304	487	184	295	187
250 (10”)	350	522	217	336	222
300 (12”)	440	560	248	406	260

*) SET at 4 bar (blue spring)

**) Fitment: Wafer fits between ANSI/ASME B16.5 Class 150 or 300 lbs. flanges using full length studs, nuts and washers. Gasket to ANSI B16.21 RF.

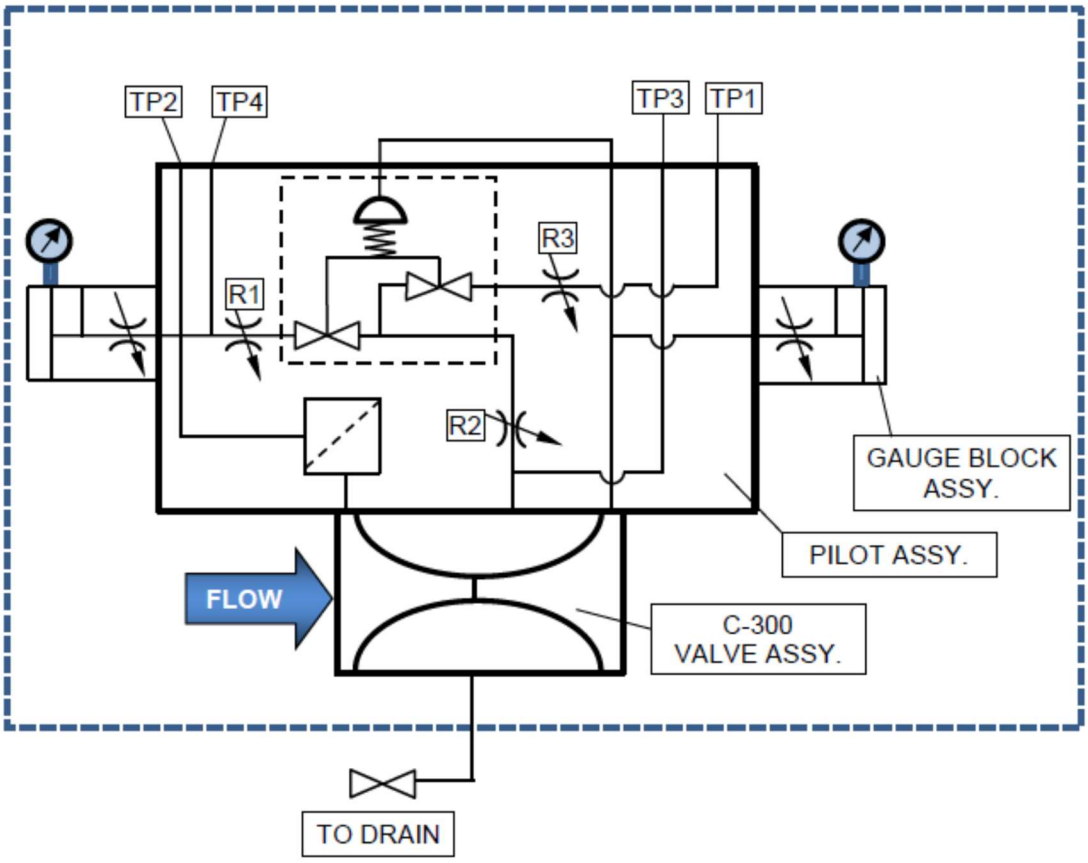


P & ID:

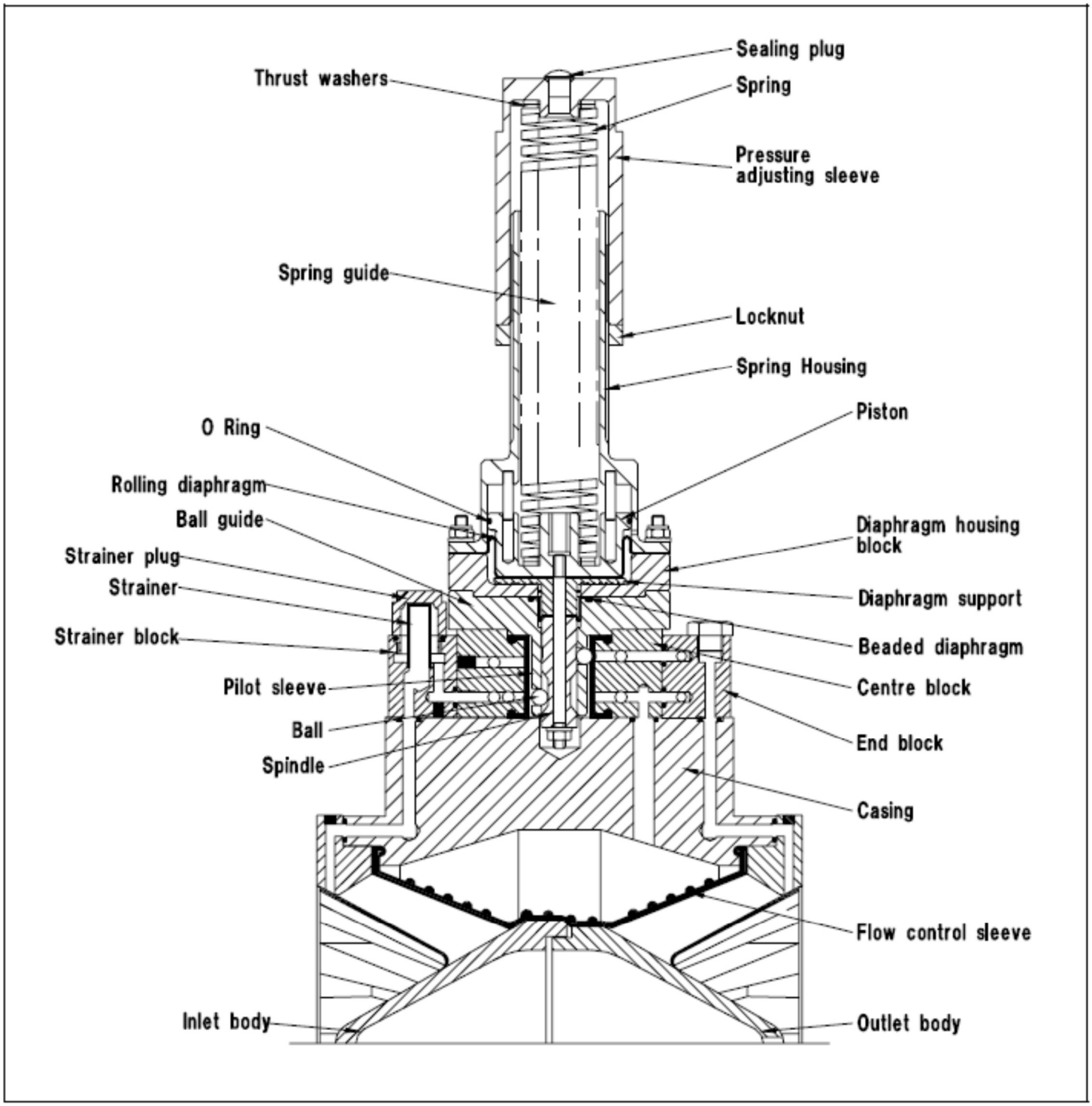
Port	Description	Size
R1	Inlet Restrictor (close)	
R2	Jacket Restrictor	
R3	Outlet Restrictor (open)	
TP1	Exhaust to open valve	¼" NPT
TP2	Plugged	¼" NPT
TP3	Plugged	¼" NPT
TP4	Plugged	¼" NPT
	DRAIN	½" NPT
	Gauge Block Ports	¼" NPT

R = Restrictor (needle valve)
TP = Terminal Port

IO&M manual: 64 70442



SECTIONAL DRAWING



APPENDIX 1

Valve Response Time & Pressure Setting Check List

Completed by:		Date	
Valve Type		Valve Serial no.	
Protected Space		Valve Size	

Notes re. testing	1	Test with pumps :
		"A" : Starting on the detection signal.
		"B" : Via the pneumatic detection sequence.
	2	Note the upstream pressure as the deluge valve opens under each condition.
	3	Start timing from when a fire signal is observed.

	Seconds			**Barg**	
TIME (seconds)	**"A"**	**"B"**	**PRESSURE** (barg)	**"A"**	**"B"**
..to fire pump reaching its set-pressure					
..to release of air from Pneu. Actuator (water starts to drain from CP2 port on Actuator)			Inlet (from Jockey)		
..to deluge valve starts to open (i.e. first water noise from valve)			Note minimum pressure that the inlet falls to.		
..to water discharging from nozzles					
..to downstream pressure reaching set-pressure			Inlet pressure		
..to stable downstream pressure			Inlet (at regulated pressure)		
			Outlet (regulated pressure)		
			Outlet fluctuation during running		
Restrictor settings (number of turns open from fully screwed in)		Turns			
	R1				
	R2				
	R3				

Valve & Instrumentation Schematic

POS.		In Service		POS.		In Service
1	GW C-300 Deluge valve			6	Test / Drain Valve	Closed
2	Pneumatic Actuator	Air ON		7	Upstream Pressure Gauge	
3	½" Manual Release Valve	Closed		8	Downstream Pressure Gauge	
4	Upstream Isolation Valve	Open		9	Pilot Air Pressure Line	Air ON
5	Downstream Isolation Valve	Open		10	Manual Reset Latch	Pulled/Air ON