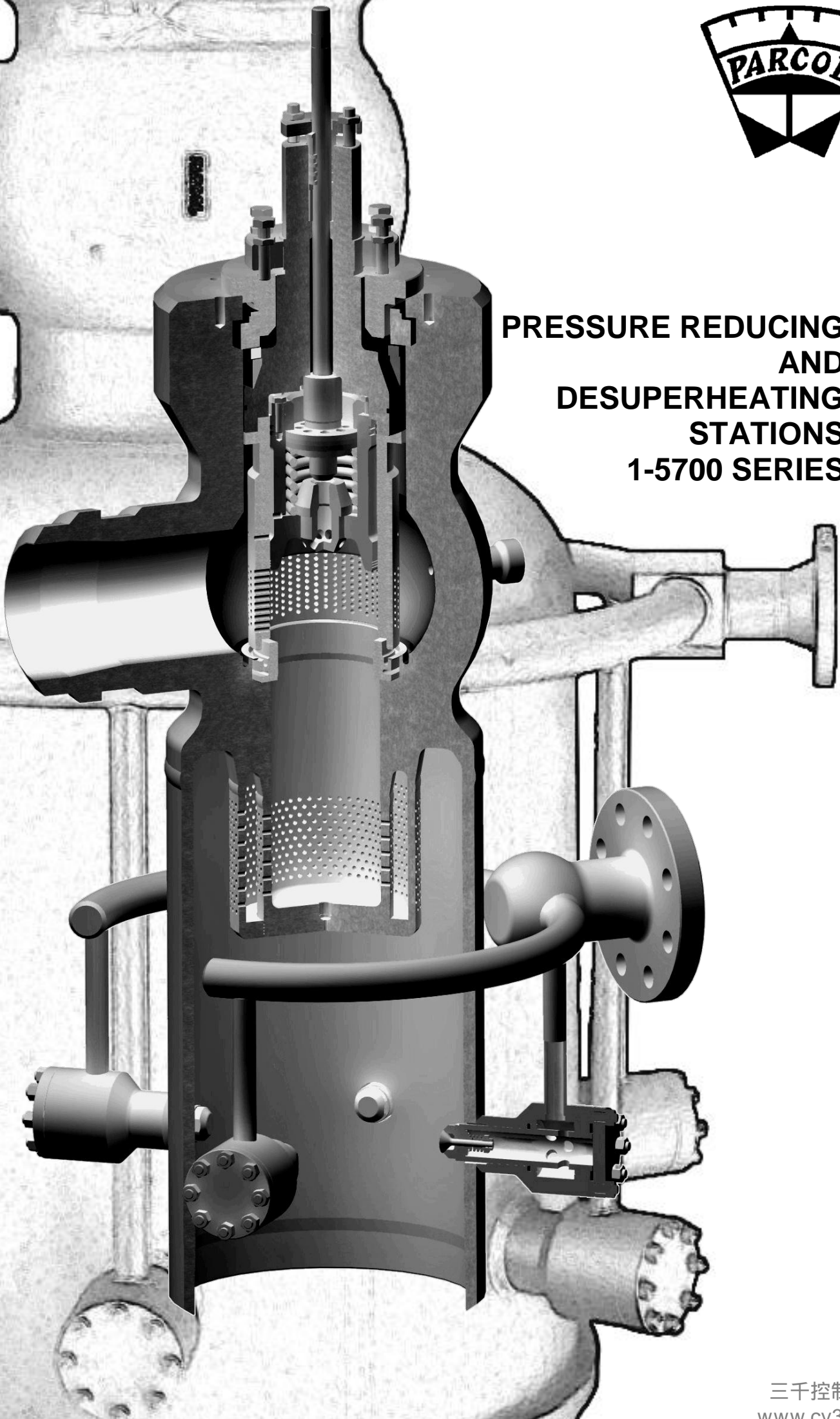




**PRESSURE REDUCING  
AND  
DESUPERHEATING  
STATIONS  
1-5700 SERIES**





**I.P. to condenser bypass valve 1-5765**

- Inlet: DN 30" ANSI 900 BW
- Outlet: DN 60" ANSI 300 BW
- Port : 443 mm

Body material: SA182 F91 / SA182 F22

Desuperheater: Parcol LVM 3-4122

## PRESSURE REDUCING AND DESUPERHEATING STATIONS 1-5700 SERIES

### DESCRIPTION

Parcol 1-5700 Pressure Reducing and Desuperheating stations (PRDS) represent the most universal and compact solution for pressure reduction and desuperheating service of turbine bypass lines, discharging both to intermediate or low pressure sections of power stations.

The spherical body shape design, together with the high quality of construction materials, allow a more uniform wall thickness than the conventional ones, fabricated by welding bodies, reducing P/T fatigue effects and improving welded joints quality.

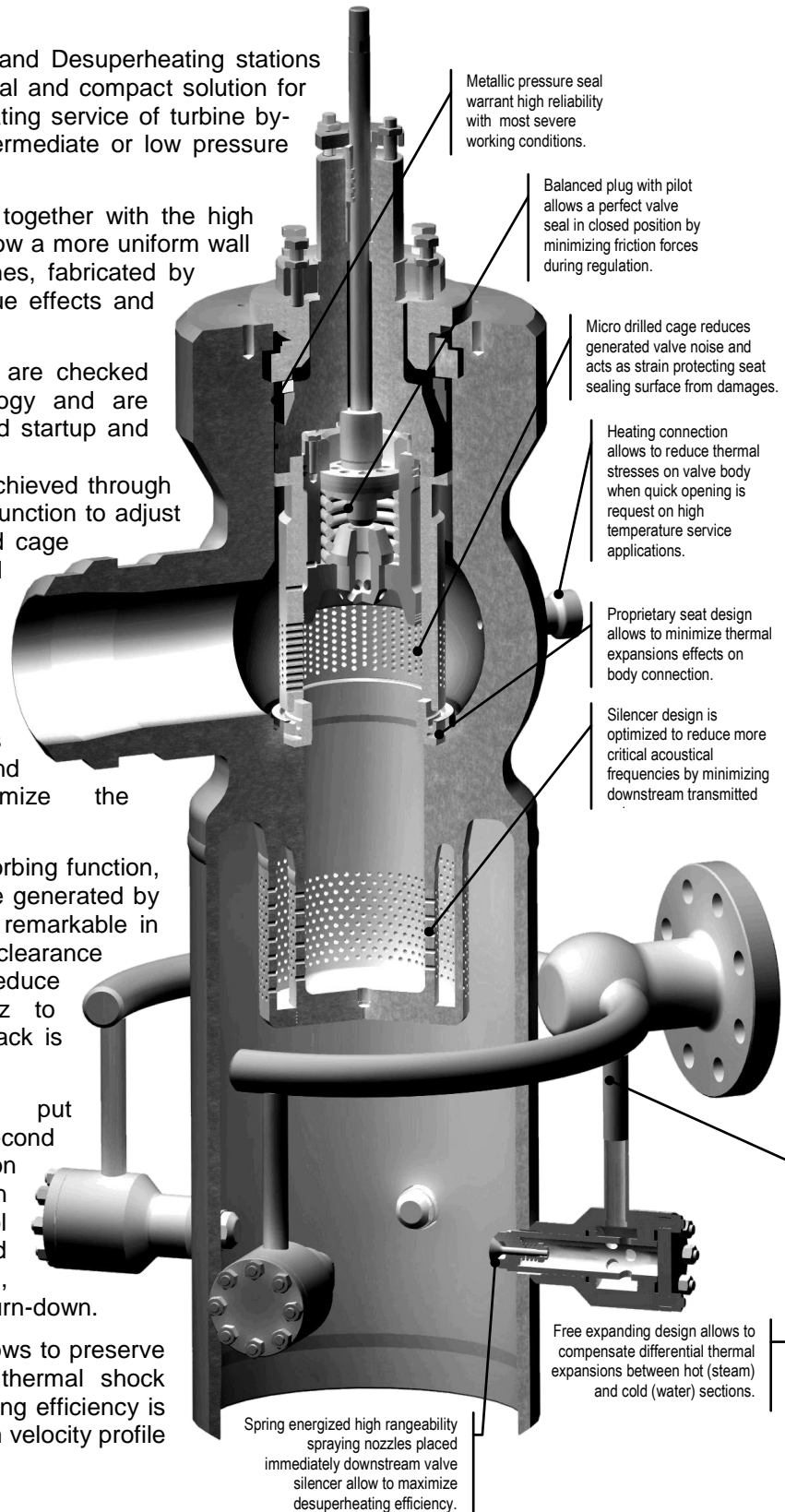
All Parcol desuperheating stations are checked according to TRD 301 methodology and are suitable for not less than 2000 cold startup and 10000 hot startup cycles.

The pressure reduction is mainly achieved through two stages: the first stage has the function to adjust the flow rate by means of a drilled cage trim, the second stage, designed with fixed throttling section, has the double function to generate a backpressure on the first stage by reducing fluid velocity and generated sound pressure level, and to convey the steam towards the injection chamber, at speed and distribution suitable to optimize the desuperheating process.

The second stage has also an absorbing function, acting as silencer towards the noise generated by the first stage. Such a function is remarkable in multi-cage figures, where the clearance between silencer is optimized to reduce noise frequencies between 1kHz to 4kHz, or when a Limiphon disk stack is installed as a silencer.

The desuperheating section, put immediately downstream the second stage, consists of the injection chamber complete with injection nozzles or a different Parcol desuperheater, to be selected according to operation conditions, plant lay-out and required process turn-down.

The downstream water injection allows to preserve valve trim and main body from thermal shock phenomena, while the desuperheating efficiency is warranted by the downstream steam velocity profile produced by the silencer design.



**APPLICATIONS**

Parcol 1-5700 are the best solution for steam conditioning, combining high performance flow control with high efficient integrated steam desuperheating.

The most significant applications are turbine by-pass without practical pressure, temperature and flow rate limitations.

The high experienced trim materials allows to minimize wear effects also for continuous services requiring minimum maintenance.

A wide range of Parcol desuperheaters can be installed allowing a proper steam conditioning also with high water to steam flow rates and high turndown ratio.

Thanks to the wide range of silencer solutions (including Limiphon disk stack silencer), any reasonably noise level requirement can be satisfied.

For continuous service with high water to steam temperature differential the injection chamber can be provided with built in protective lining to avoid piping damages. See Parcol Bulletin 1-XI for further details.

Parcol 1-5700 are particularly appreciated when straight line pipe layout is not allowed.

Standard actuator is single effect spring return pneumatic diaphragm type equipped with positioner and other accessories for quick or emergency actuation.

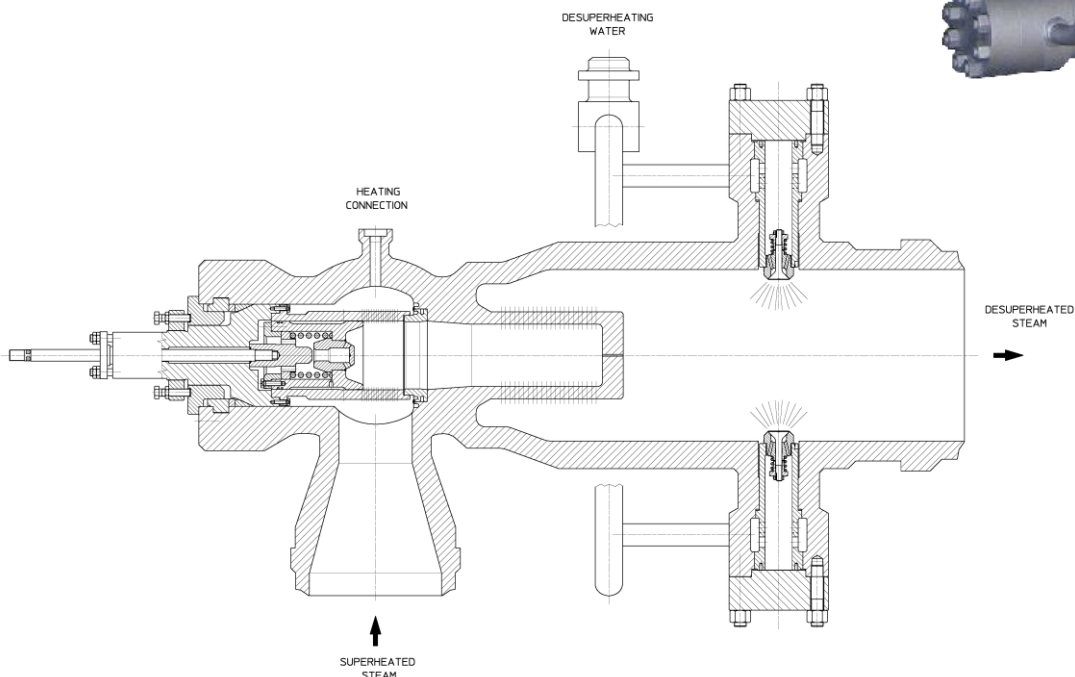
Piston hydraulic or electric actuators can be supplied on request.

**H.P. to I.P. bypass valve 1-5745**

- Inlet: DN 14" ANSI 2500 BW
- Outlet: DN 18" ANSI 2500 BW
- Port : 7"

Body material: SA182 F91

Desuperheater: Parcol LVM 3-4122



**DESIGN FEATURES**

**Body**

- manufactured from fully machined forgings with welded inlet connection and integral downstream injection chamber;
- available: sizes according to service conditions;
- ratings: up to ANSI 2500 (up to ANSI 4500 on request).

**Bonnet**

- up to ANSI 600: flanged bonnet;
- over ANSI 600: pressure seal.

**Trim**

- cage-guided balanced plug with pilot;
- first pressure reduction stage is performed by a specially drilled cage;
- seat ring is welded to the body through an easily removable tension free lip-seal;
- quick change seat ring is available on request as special construction.

**Silencer**

- two different designs are available:
  - 1 to 3 stages diffuser;
  - LIMIPHON silencer.
- the silencer is usually welded to valve body, however, when quick change seat ring is provided, the silencer is clamped between body and seat and can be removed through the bonnet cavity.

**Materials of construction**

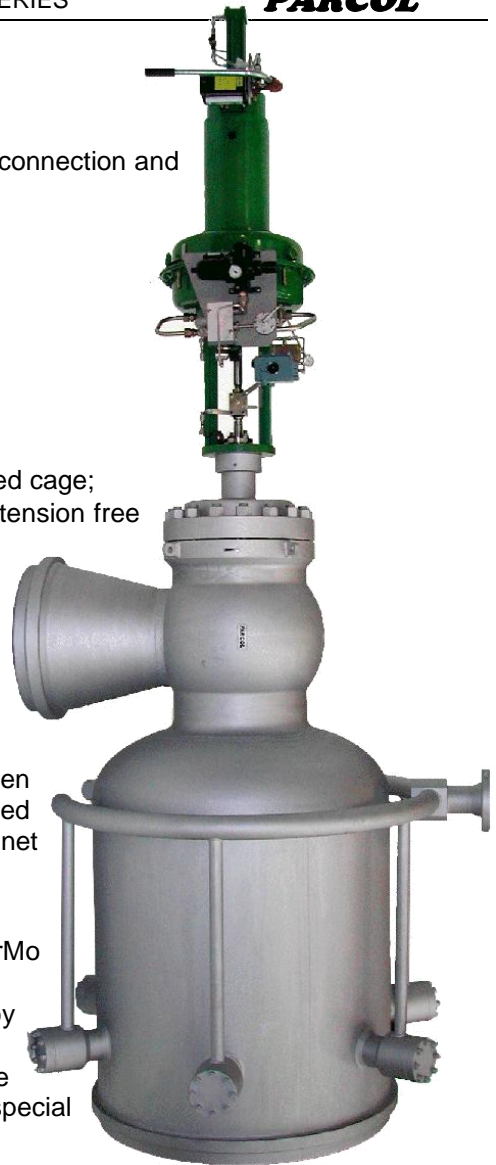
- body and bonnet are usually made of carbon steel and CrMo alloy steels according to line class;
- trim parts are usually made of nitrided or stellite F6NM alloy steel;
- silencer is normally made of CrMo alloy steel, while LIMIPHON stack is normally made of AISI 430 or 12Cr special stainless steel for temperature above 400°C.

**Leakage class (according to IEC 60534-4)**

- up to class V both for balanced and unbalanced plug.

**Packing**

- Parcol GRF pure graphite packing specially designed for control application is supplied. Parcol GRF packing provides bi-directional tightness and it is therefore suitable also when vacuum seal is required.

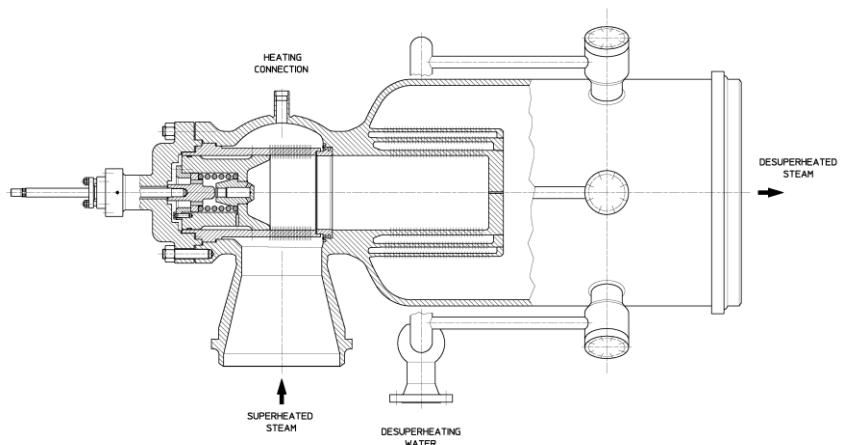
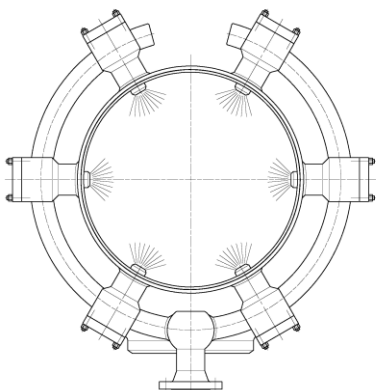


**I.P. to condenser bypass valve 1-5745**

- Inlet: DN 24" ANSI 600 BW
- Outlet: DN 48" ANSI 300 BW
- Port : 14"

Body material: SA182 F91 / SA182 F22

Desuperheater: Parcol LVM 3-4122



**NUMBERING SYSTEM**

1 - 5 7 X X

DESUPERHEATER TYPE	
0	undefined
3	LFP 3-4511 fixed area nozzle
4	LVP 3-4111 variable area nozzle
5	LVM 3-4121 multiple nozzle
6	Spraysat 1-4442 desuperheater

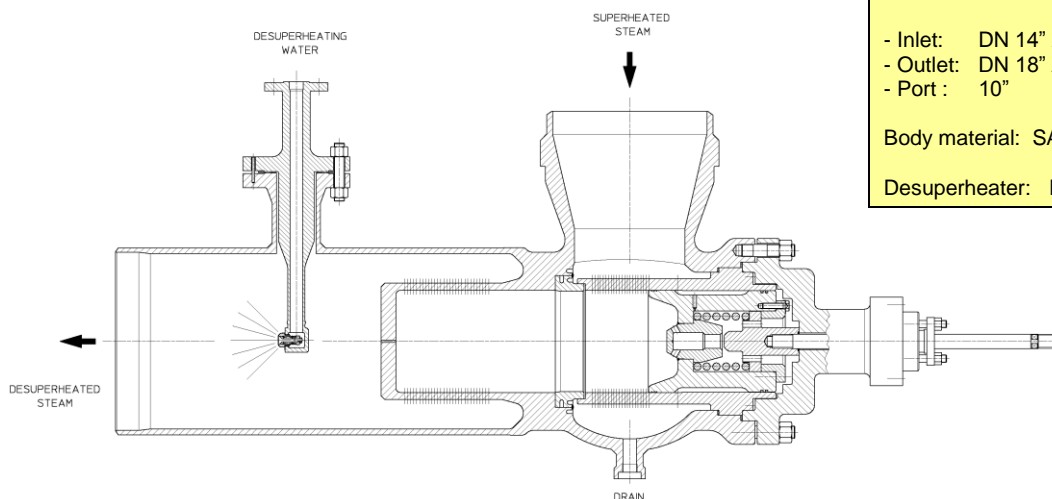
DOWNSTREAM SILENCER TYPE	
0	undefined
1	without silencer
4	disk or drilled basket type silencer
5	HAS reactive adsorption silencer
6	Limiphon disk stack silencer



**L.P. to Condenser bypass valve 1-5744**

- Inlet: DN 14" ANSI 150 BW
- Outlet: DN 18" ANSI 150 BW
- Port : 10"

Body material: SA105  
Desuperheater: Parcol LVP 3-4112

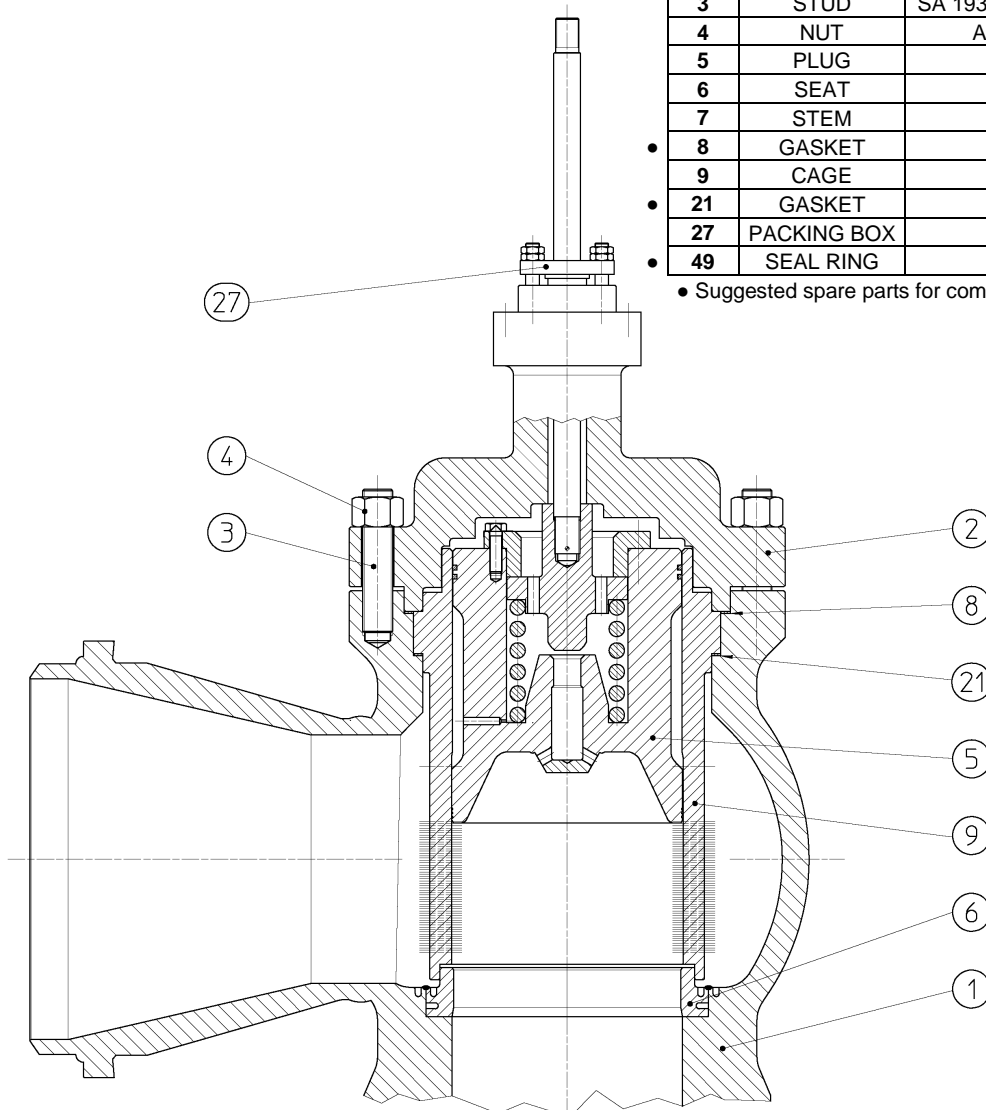


**MATERIALS OF CONSTRUCTION**

**Flanged Body – Bonnet connection  
ANSI 150 ÷ 600**

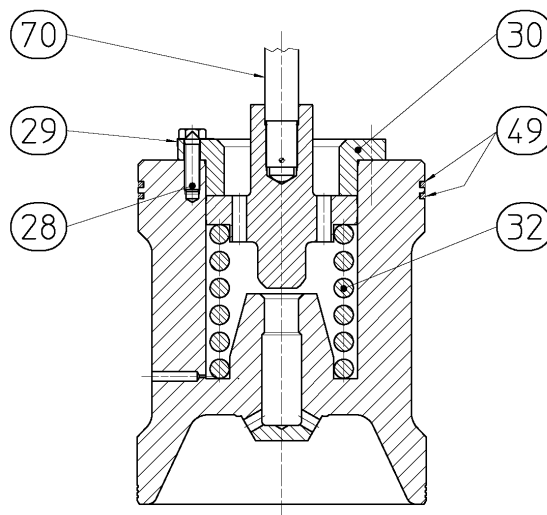
ITEM	PART NAME	MATERIAL		
1	BODY	SA 105	SA F22	SA F91
2	BONNET	SA 105	SA F22	SA F91
3	STUD	SA 193 B7	SA 193 B16	SA 276 XM 19
4	NUT	ASTM A194 4		SA 194 4
5	PLUG	SA 182 F6NM Nitrided		
6	SEAT	A 182 F6NM Stellite		
7	STEM	A 276 XM19		
8	GASKET	AISI 321 + GRAPHITE		
9	CAGE	A 182 F6NM Nitrided		
21	GASKET	AISI 321 + GRAPHITE		
27	PACKING BOX	See SUB ASSEMBLY		
49	SEAL RING	A 182 F6NM Hardened		

• Suggested spare parts for commissioning and start-up.



**Balanced Plug with Pilot  
ANSI 150 ÷ 2500**

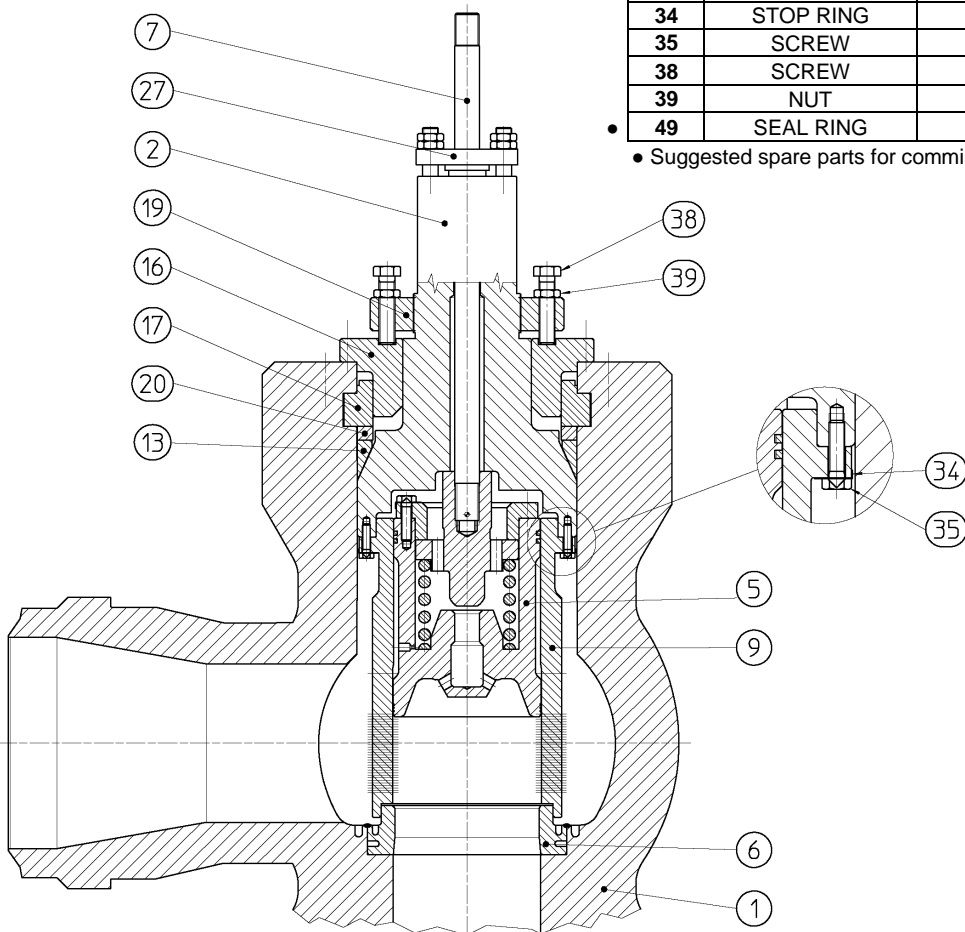
ITEM	PART NAME	MATERIAL
28	SCREW	AISI 304
29	STOP RING	AISI 304
30	FLANGE	A 182 F6NM
31	PILOT	A 182 F6NM Stellite
32	SPRING	Inconel X750



**Pressure Seal – Bonnet connection  
ANSI 1500 ÷ 2500**

ITEM	PART NAME	MATERIAL	
1	BODY	SA 182 F22	SA 182 F91
2	BONNET	SA 182 F22	SA 182 F91
5	PLUG	A 182 F6NM Nitrided	
6	SEAT	A 182 F6NM Stellite	
7	STEM	A 276 XM19	
9	CAGE	A 182 F6NM Nitrided	
13	SEAL RING	AISI 316	
14	RETAINING RING	A 182 F91 Nitrided	
16	FLANGE	SA 182 F22	
20	SPACER	SA 182 F91	
21	RING NUT	SA 182 F22	
27	PACKING BOX	See SUB ASSEMBLY	
34	STOP RING	AISI 304	
35	SCREW	AISI 304	
38	SCREW	AISI 304	
39	NUT	AISI 304	
49	SEAL RING	A 182 F6NM Hardened	

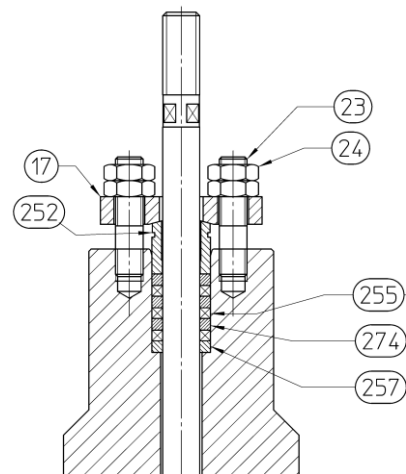
• Suggested spare parts for commissioning and start-up.



**GRF – Pure Flexible Graphite Packing  
Ratings: ANSI 150 ÷ 2500**

ITEM	PART NAME	MATERIAL
17	PACKING FLANGE	AISI 316
23	STUD	AISI 304
24	NUT	AISI 304
252	PACKING FOLLOWER	AISI 316
255	PACKING RING	Flexible Graphite
257	END RING	AISI 316
274	INTERMEDIATE RING	Pure Graphite

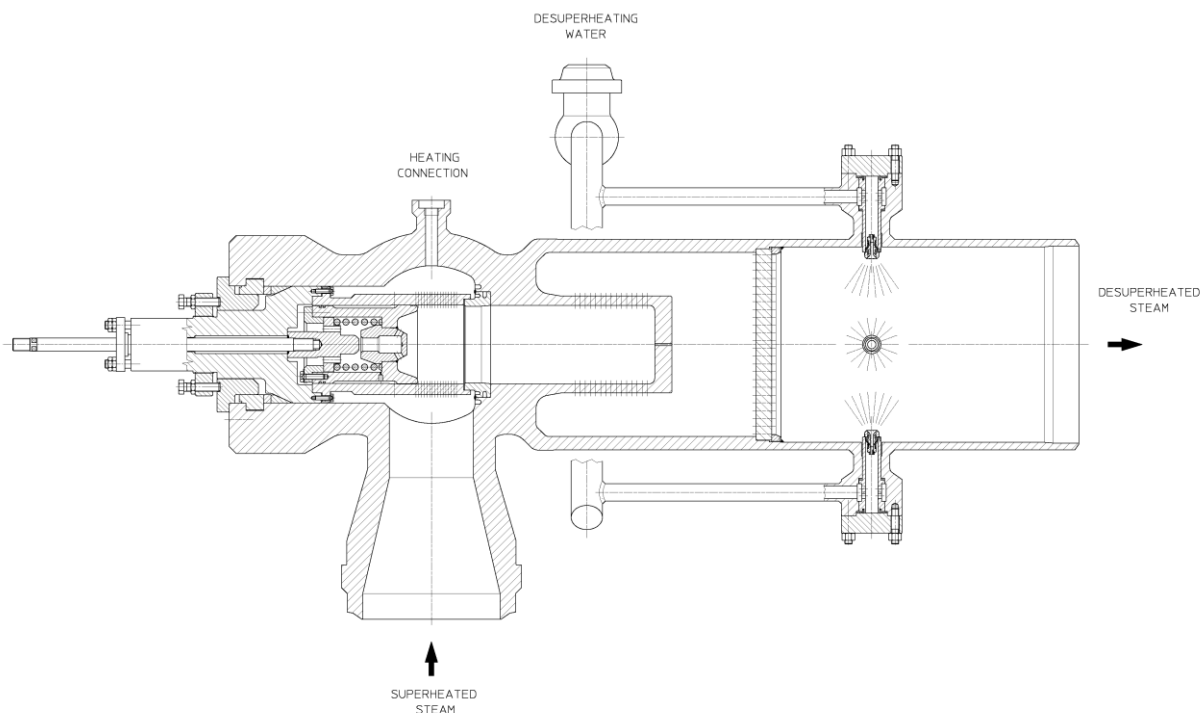
• Suggested spare parts for commissioning and start-up.



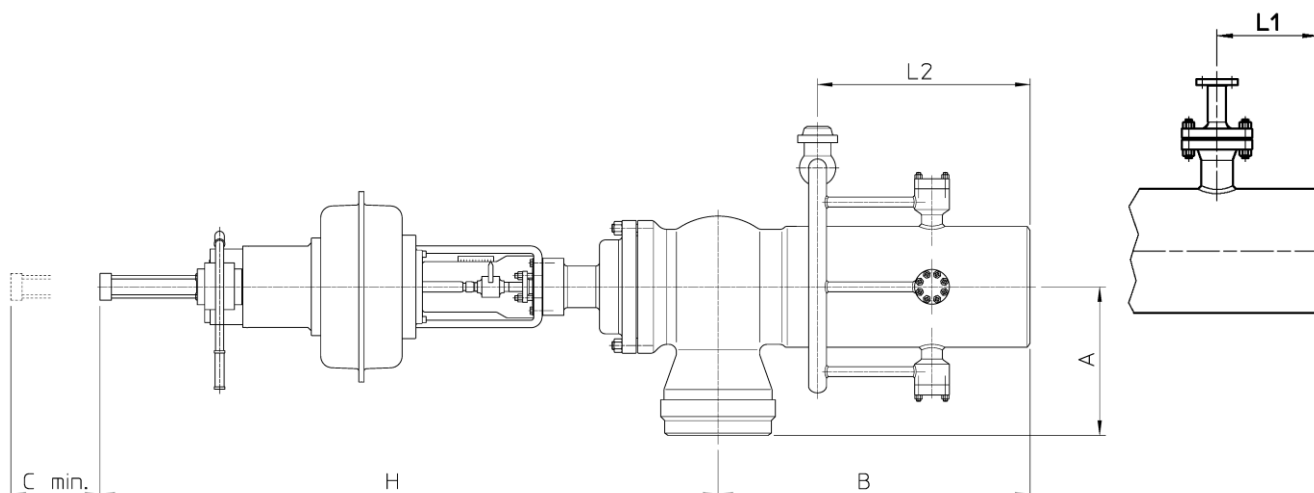


**CV TABLES**

Port		Valve stroke mm	Max valve Cv with silencer - gpm					
in.	mm		Linear Characteristic			Modified Linear Characteristic		
			1 stage	2 stages	3 stages	1 stage	2 stages	3 stages
2"	65.5	45	100	100	105	84	85	88
3"	83.5	60	180	170	185	155	145	155
4"	95.5	60	215	200	210	180	170	180
5"	112.5	76	320	280	305	275	245	265
6"	126.5	100	470	380	420	405	345	370
7"	146.5	100	555	455	485	465	400	420
8"	161.5	120	730	570	605	620	515	540
9"	186.5	120	875	695	715	730	615	630
10"	216.5	150	1 250	940	950	1 050	850	855
12"	244.5	150	1 450	1 100	1 100	1 200	995	985
13"	266.5	200	2 050	1 450	1 400	1 750	1 350	1 300
14"	294.5	200	2 350	1 700	1 600	1 950	1 550	1 450
15"	324.5	250	3 150	2 150	2 000	2 700	1 950	1 850
16"	344.5	250	3 350	2 300	2 150	2 900	2 150	2 000
17"	364.5	300	4 150	2 700	2 450	3 600	2 500	2 300



**Parcol 1-5755 Pressure Reducing and Desuperheating System.**  
**HAS style silencer:**  
 - increase downstream silencer efficiency  
 - minimize outlet generated noise levels  
 - allows to reduce valve outlet diameters.



**ANSI 150÷600**

Port	Inlet connection	A	B <sup>1</sup>	C	H	L1	L2
2"	3"	180	600	250	1070	180	540
	4"	190					
3"	3"	220	650	250	1080	200	570
	4"	220					
	6"	270					
4"	4"	280	770	250	1130	200	600
	6"	300					
	8"	400					
5"	6"	310	820	250	1140	200	630
	8"	370					
	10"	470					
6"	6"	320	865	450	2055	200	650
	8"	360					
	10"	460					
7"	8"	350	920	450	2060	200	680
	10"	430					
	12"	520					
8"	8"	350	1000	450	2085	220	710
	10"	410					
	12"	520					
9"	10"	400	1100	450	2105	250	780
	12"	470					
	14"	520					
10"	10"	430	1210	500	2505	270	840
	12"	460					
	14"	500					
12"	12"	480	1280	500	2510	270	850
	14"	500					
	16"	560					
13"	14"	500	1370	500	2605	300	900
	16"	550					
	18"	610					
14"	14"	520	1470	500	2615	320	950
	16"	550					
	18"	610					
	20"	690					
15"	16"	600	1590	350	3505	350	1100
	18"	650					
	20"	700					
16"	16"	650	1670	350	3515	370	1200
	18"	700					
	20"	750					
	22"	800					
17"	18"	700	1780	400	3535	400	1300
	20"	750					
	22"	800					
	24"	850					

**ANSI 900÷1500**

Port	Inlet connection	A	B <sup>1</sup>	C	H	L1	L2
2"	3"	190	620	250	1080	180	590
	4"	200					
3"	3"	240	670	250	1090	200	620
	4"	240					
	6"	290					
4"	6"	300	790	450	1930	200	620
	8"	380					
	10"	480					
5"	6"	320	840	450	1945	200	650
	8"	380					
	10"	480					
6"	6"	330	885	450	2055	200	670
	8"	380					
	10"	480					
7"	8"	370	935	450	2075	200	695
	10"	430					
	12"	520					
8"	8"	400	1010	450	2115	220	720
	10"	430					
	12"	500					
9"	10"	450	1105	450	2120	250	785
	12"	480					
	14"	540					
	16"	610					
10"	10"	500	1210	500	2570	270	840
	12"	500					
	14"	530					
	16"	610					
12"	12"	520	1285	500	2580	270	855
	14"	530					
	16"	580					
13"	14"	600	1390	500	2700	300	920
	16"	600					
	18"	680					
14"	14"	600	1500	500	2705	320	980
	16"	600					
	18"	640					
	20"	720					
15"	16"	730	1690	350	3610	350	1200
	18"	750					
	20"	850					
16"	16"	730	1800	350	3650	370	1330
	18"	750					
	20"	850					
	22"	950					
17"	18"	850	1920	400	3700	400	1440
	20"	900					
	22"	1000					
	24"	1100					

<sup>1</sup> Dimension B can be modified depending on downstream pipe diameter and silencer configuration.

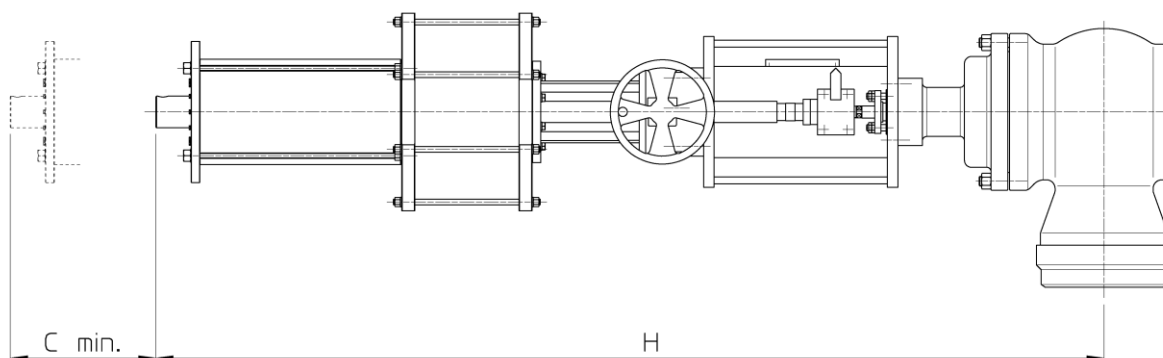
**ANSI 2500**

Port	Inlet connection	A	B <sup>1</sup>	C	H	L1	L2
2"	3"	200	640	250	1110	180	600
	4"	210					
3"	3"	300	690	250	1120	200	630
	4"	320					
4"	6"	320	810	450	1970	200	640
	8"	390					
	10"	480					
5"	6"	360	855	450	1980	200	655
	8"	390					
	10"	480					
6"	6"	380	895	450	2085	200	680
	8"	400					
	10"	470					
	12"	550					
7"	8"	420	955	450	2100	200	715
	10"	470					
	12"	550					
8"	8"	450	1030	450	2145	220	740
	10"	450					
	12"	520					
	14"	580					
9"	10"	500	1140	450	2160	250	820
	12"	520					
	14"	580					
10"	10"	550	1270	500	2615	270	900
	12"	550					
	14"	560					
	16"	650					
12"	12"	600	1330	500	2630	270	930
	14"	600					
	16"	600					
	18"	700					
13"	14"	650	1440	500	2770	300	970
	16"	650					
	18"	750					
	20"	850					
14"	14"	700	1560	500	2800	320	1040
	16"	700					
	18"	800					
	20"	900					
15"	18"	750	1710	350	3700	350	1220
	20"	850					
	22"	950					
16"	18"	780	1820	350	3570	370	1350
	20"	800					
	22"	900					
	24"	1000					
17"	20"	850	1940	400	3800	400	1460
	22"	900					
	24"	1000					
	26"	1100					



Parcol single effect diaphragm **pneumatic actuator 1-X-252 D63** equipped with hydraulic manual operator, with speed regulating additional function.

<sup>1</sup> Dimension B can be modified depending on downstream pipe diameter and silencer configuration.



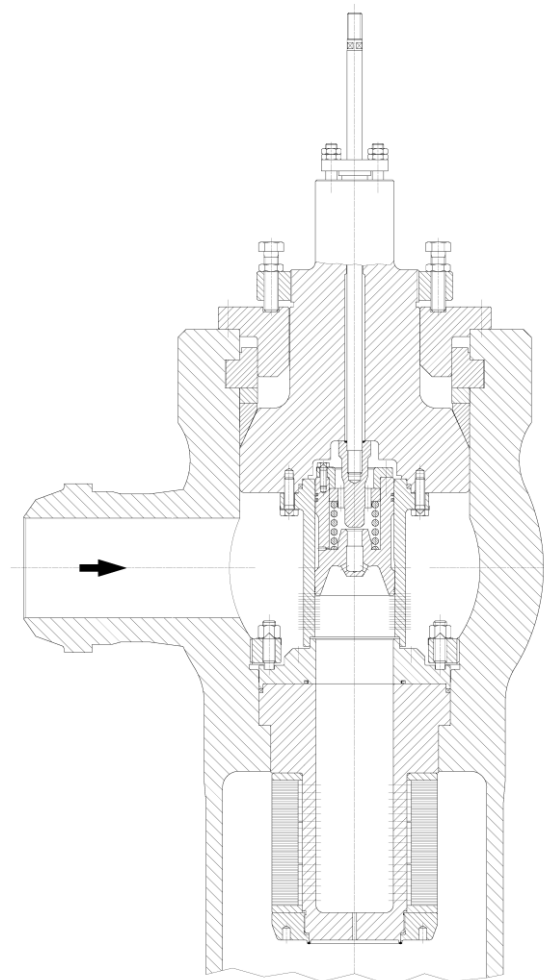
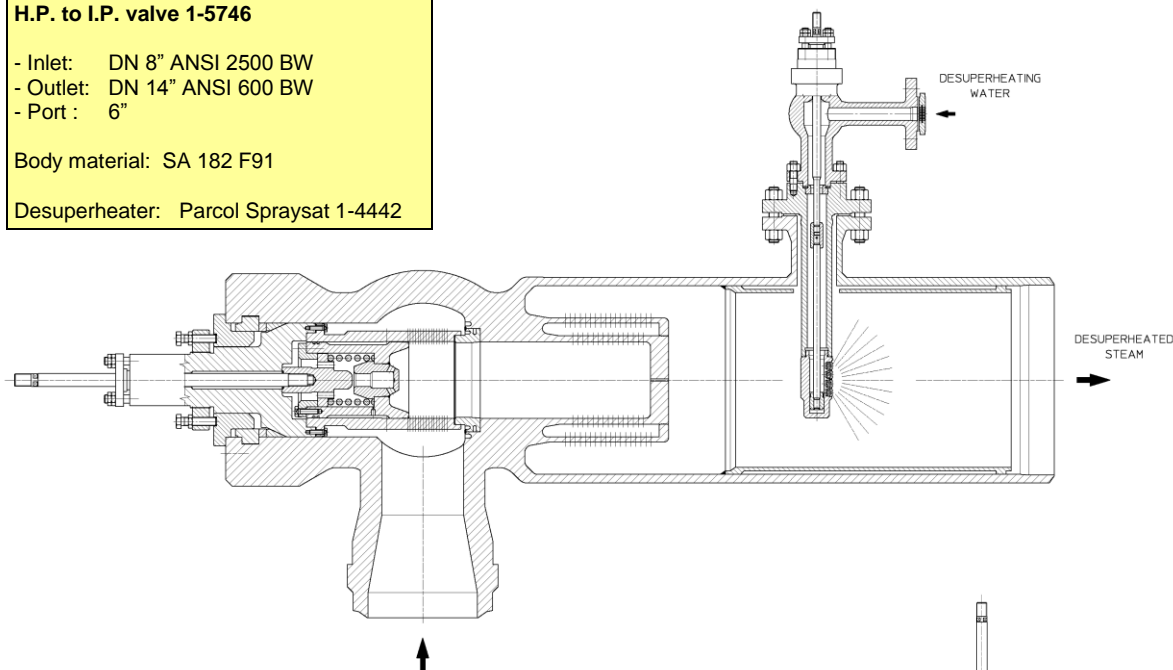
**DOUBLE EFFECT SPRING RETURN PNEUMATIC CYLINDER ACTUATOR (PORT 15" AND OVER)**

**H.P. to I.P. valve 1-5746**

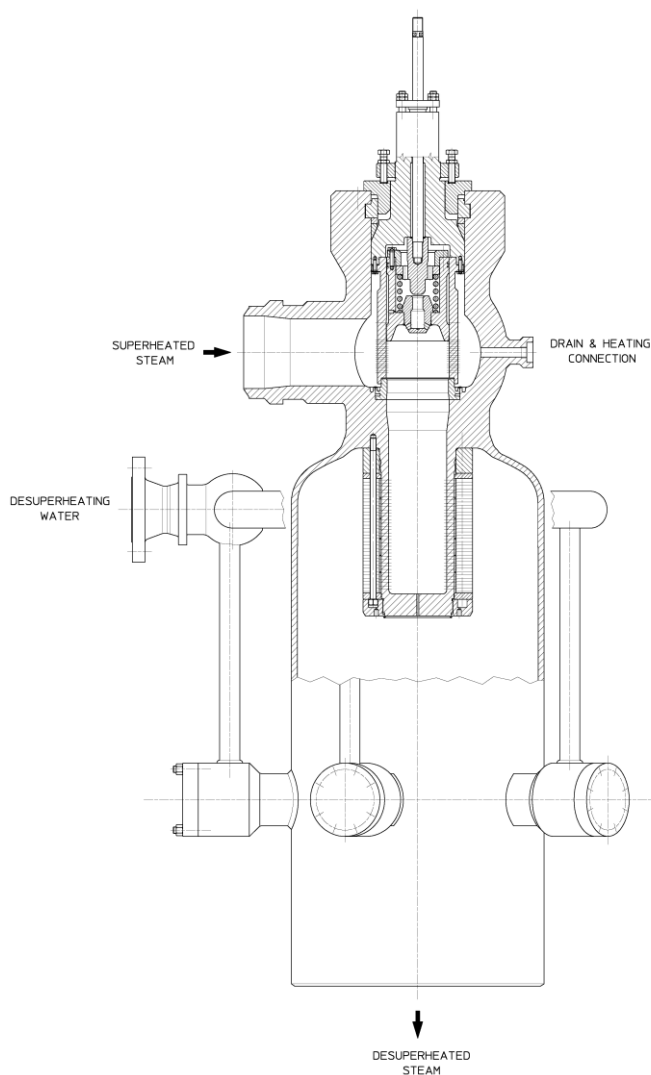
- Inlet: DN 8" ANSI 2500 BW
- Outlet: DN 14" ANSI 600 BW
- Port : 6"

Body material: SA 182 F91

Desuperheater: Parcol Spraysat 1-4442



**Parcol 1-5760** pressure reducing valve with quick change seat and Limiphon silencer, suitable for high differential pressure services when very low noise levels are required.



**H.P. to condenser bypass valve 1-5765**

- Inlet: DN 8" ANSI 2500 BW
- Outlet: DN 24" ANSI 300 BW
- Port: 7"

Body material: SA182 F91

Desuperheater: Parcol LVM 3-4121

**HYDRAULIC CONTROL SYSTEM**



Parcol 1-5700 Pressure Reducing and Desuperheating Stations can be supplied equipped with Hydraulic Actuators and complete Hydraulic Control System (HCS).

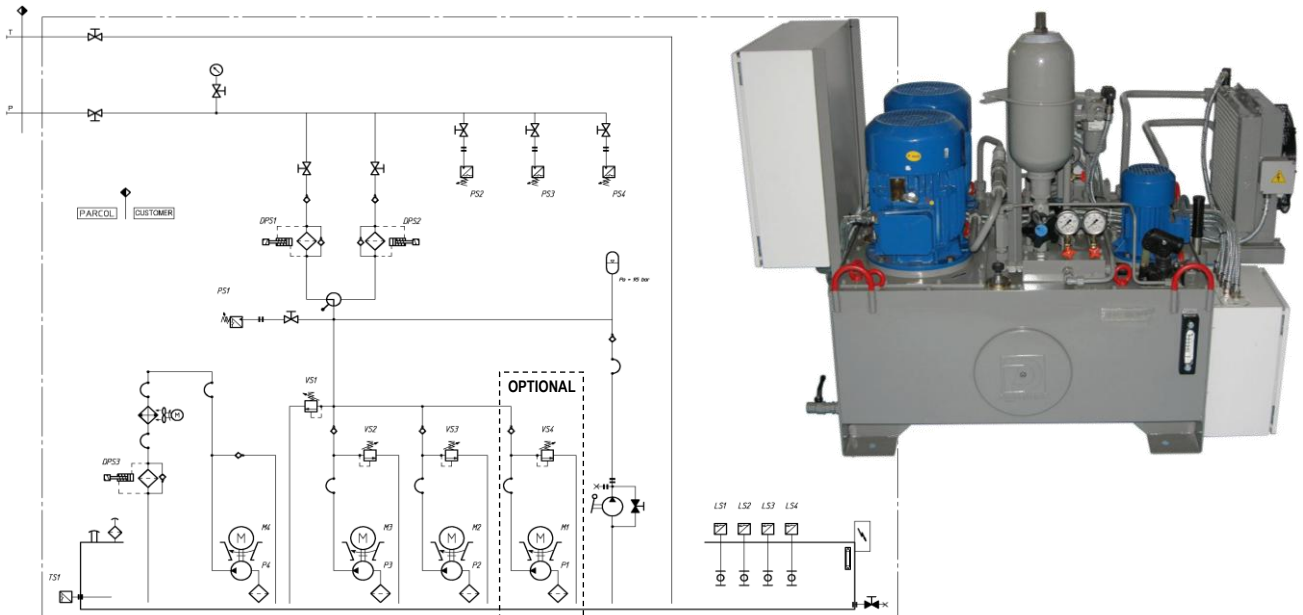
Parcol standard HCS configuration is composed by Hydraulic Power Unit (HPU) with one or more stand-by oil pump, local Hydraulic Control Panels (HCP), and Electric Control Cabinet (ECC).

ECC usually includes:

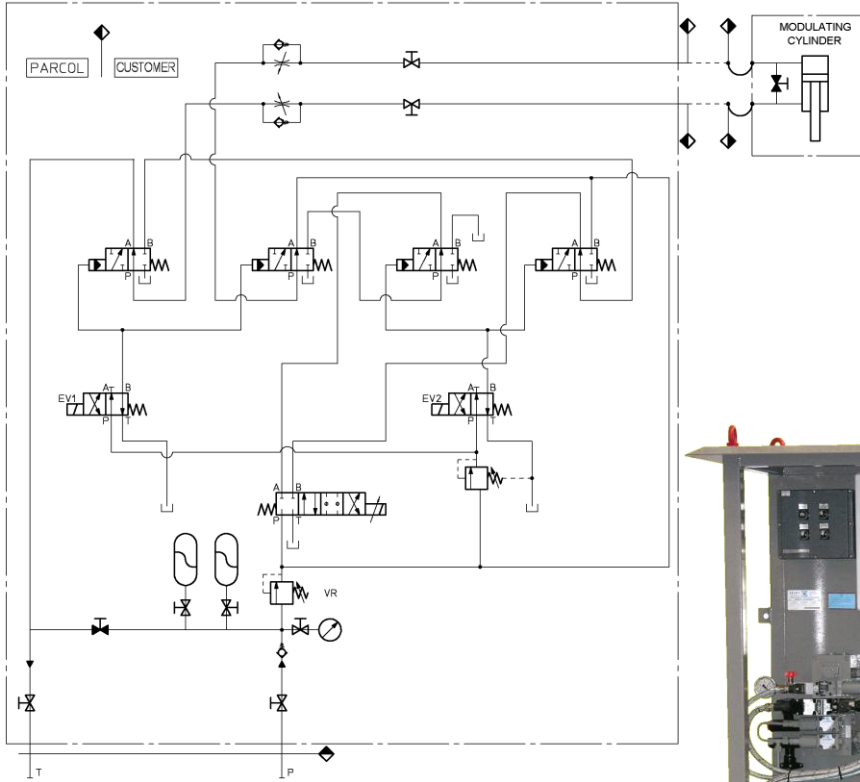
- PLC that performs valve positioning, warnings and alarms management and pumps alternation functions;
- relays circuit for emergency valve actions.

On request valve positioning can be performed by means of analogical, rack mounted, positioning system. Safety function is ensured also on power failure condition thanks to hydraulic accumulators.

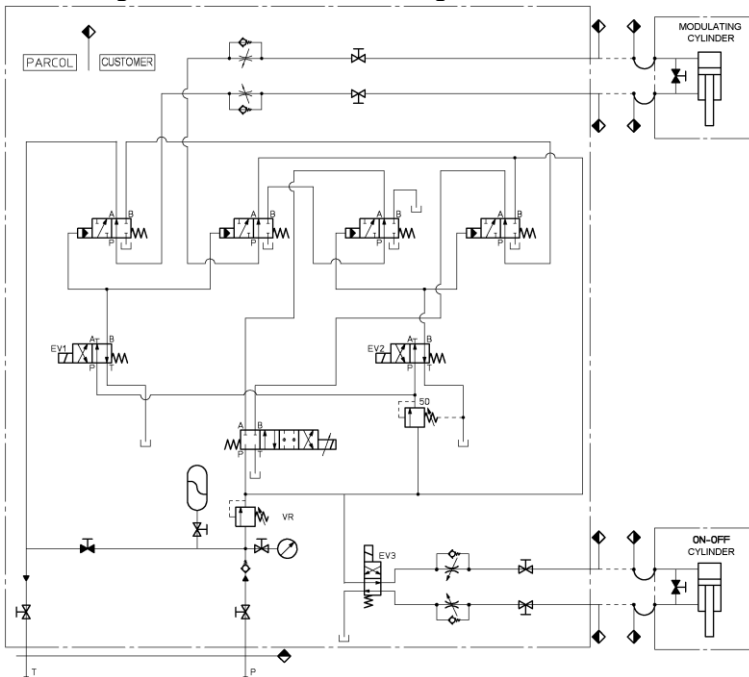
**HPU diagram.**



**Modulating HCP diagram.**



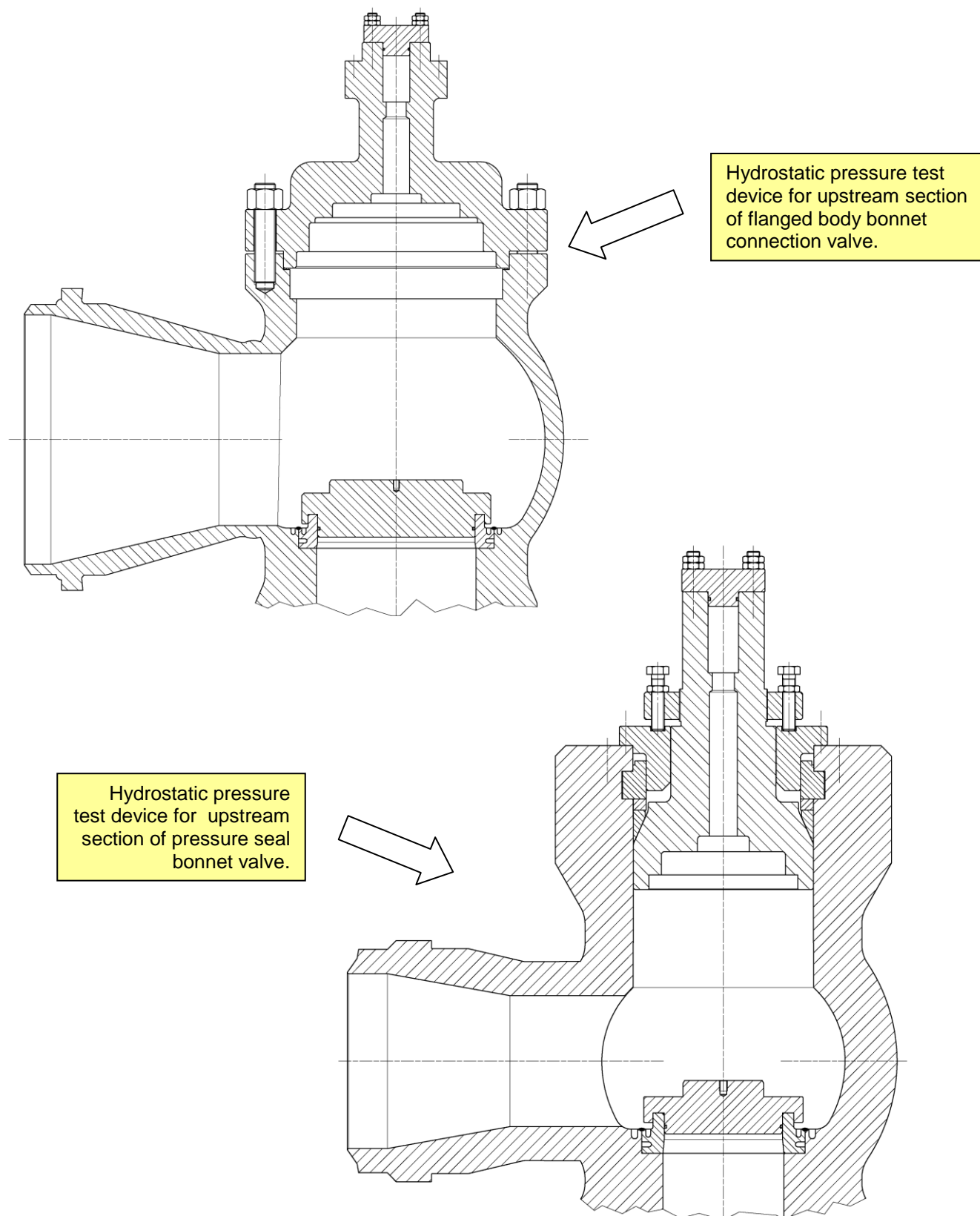
**Modulating and On-Off valve HCP diagram**



### HYDROSTATIC PRESSURE TEST DEVICES

For valves with different upstream-downstream design conditions, upstream section can be hydrostatically tested up to 250 bar without any special device by closing valve plug.

For higher test pressures or when downstream section must be tested separately from upstream section, pressure test devices can be supplied.

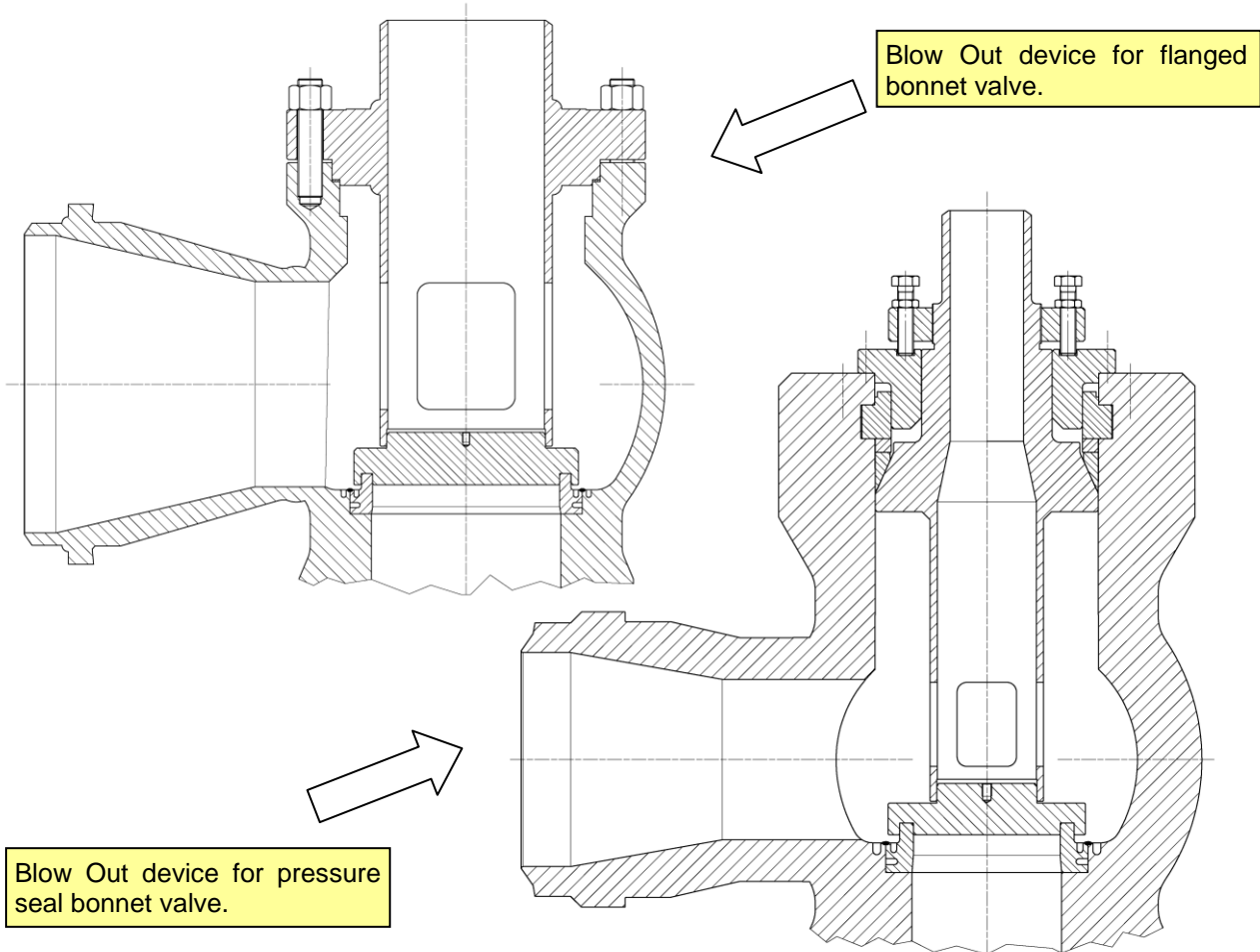


**BLOWING DEVICES**

Valve seat of 1-5700 PRDS is self-protected by the micro-drilled cage, however line cleaning before valve operation is strongly recommended to avoid trim clogging and internal parts damage.

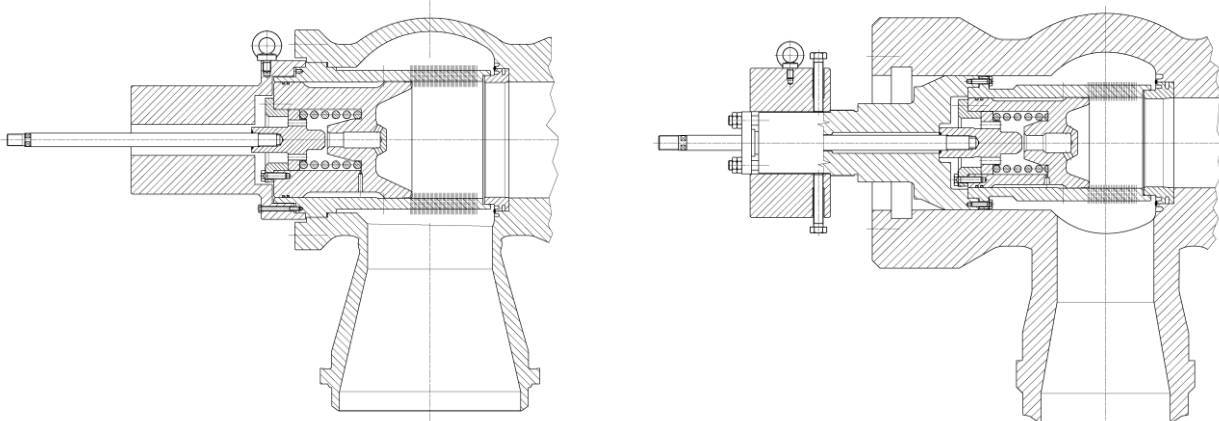
Blowing devices, typically with “blow out” function, can be supplied on request to perform line cleaning before put valves in service.

Blow through devices are usually supplied only when quick change seat and silencer are provided.



**SPECIAL MAINTENANCE TOOLS**

1-5700 PRDS are often installed with horizontal actuator axis. For such a installation special tools can be supplied, on request, to simplify disassembly and re-assembly operations.

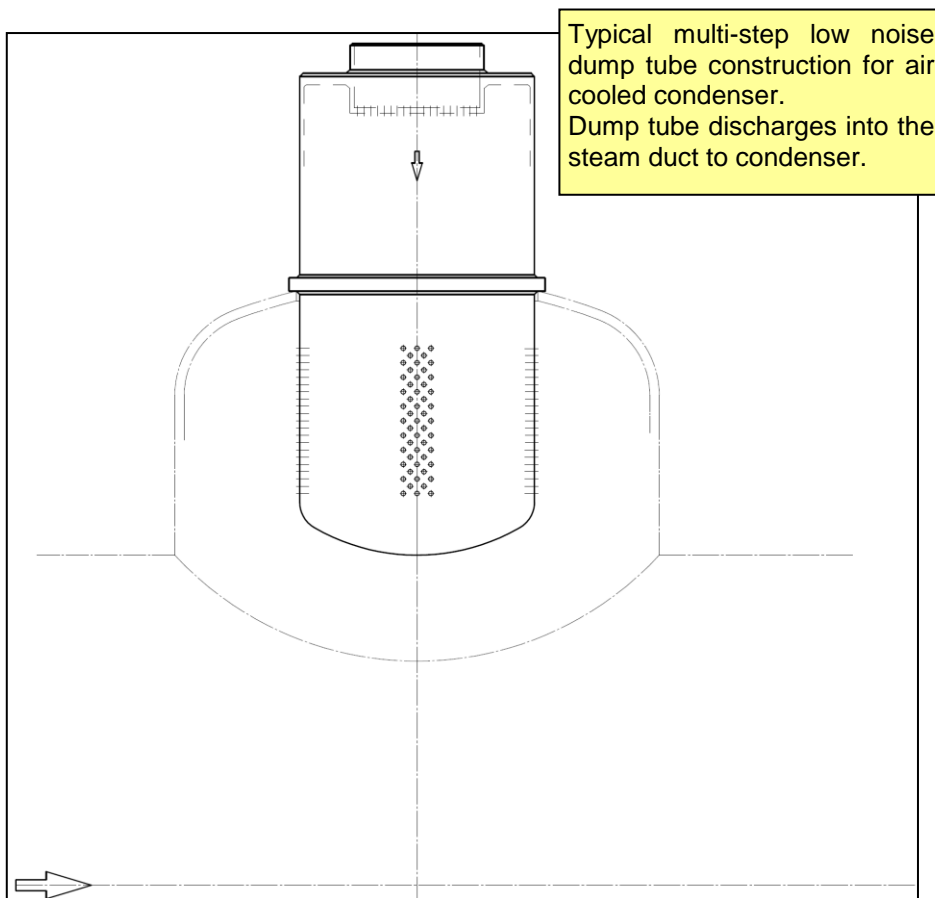
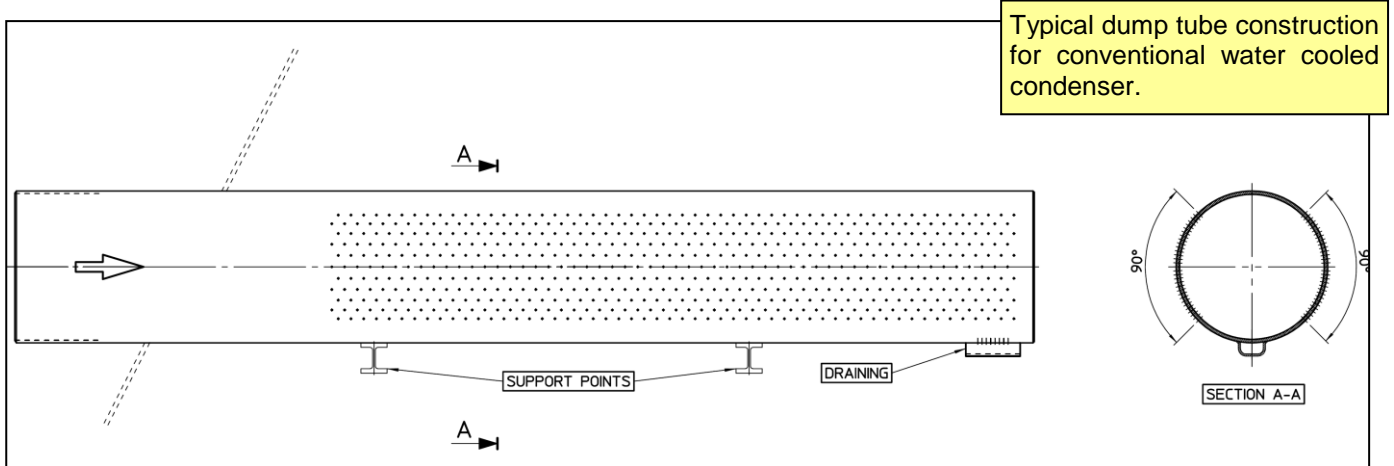




**DTC - DUMP TUBES TO CONDENSER**

Dump tube are usually installed in by-pass systems to condenser downstream PRDS to produce suitable backpressure in order to reduce outlet valve and piping diameter optimizing global cost of installation. In addition dump tubes optimize PRDS performances through last steam expansion that produce complete evaporation of residual injected desuperheating water improving homogeneous distribution of temperature inside steam condenser or into steam duct to air cooled condenser.

Dump tubes are specially designed to fully comply with specific application requirements in order to minimize dimensions and costs in the respect of noise requirements.



**MP bypass, Dump Tube to air cooled condenser**

- Inlet connection: DN 36"
- Steam duct connection: DN 68"

Body material: CrMo steel

**1-4470 SERIES – HIGH TEMPERATURE HIGH PRESSURE CONTROL VALVES**

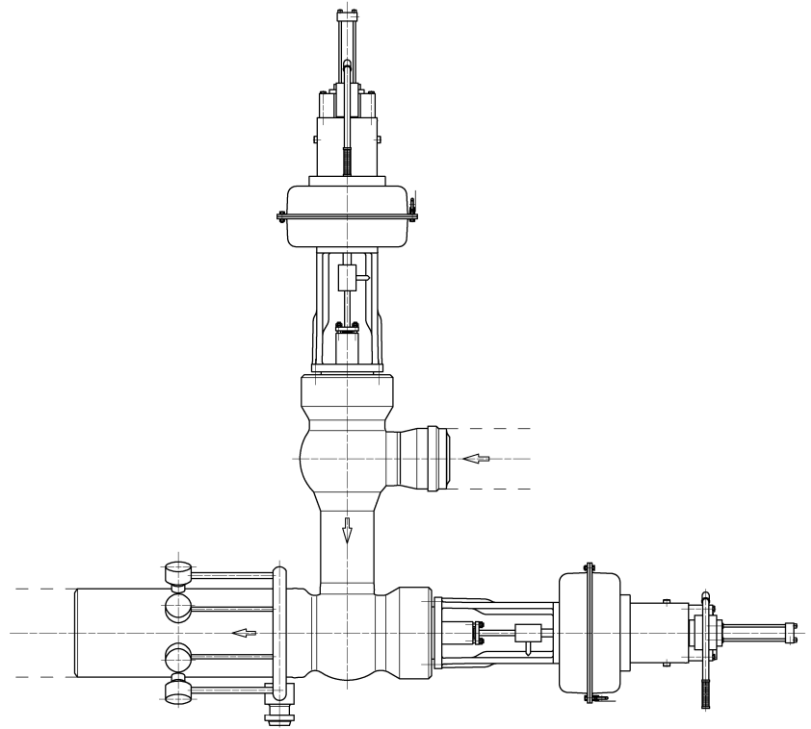
Parcol 1-4470 Series control valves are designed and manufactured simlary to PRDS 1-5700 pressure reducing valves except for desuperheating system not provided (for further infomation see 1-4470 HTHP bulletin).

**STEAM BYPASS STOP VALVE SERVICE**

When compact piping layout is required, Parcol 1-4473 (without silencer), flow to close pilot balanced plug control valves, can be supplied with Stop Valve function installed immediately upstream 1-5700 PRDS.

**Flow capacities Cv - gpm**

Port		$\Phi_{body}$	stroke	Cv
in.	mm	mm	mm	gpm
2"	65.5	73	45	120
3"	83.5	93	60	220
4"	95.5	106	60	250
5"	112.5	124	76	380
6"	126.5	140	100	575
7"	146.5	162	100	660
8"	161.5	178	120	880
9"	186.5	206	120	1 030
10"	216.5	238	150	1 460
12"	244.5	270	150	1 670
13"	266.5	294	200	2 450
14"	294.5	324	200	2 770
15"	324.5	358	250	3 800
16"	344.5	380	250	4 050
17"	364.5	400	300	5 080



Differential pressure limit  $x_T$ : 0.72

Parcol 1-4473 Stop Valve combined with 1-5700 PRDS for On-Off Service.



Parcol 1-5700 Pressure Reduction and Desuperheating Stations (PRDS) with desuperheating water control valves for HP and IP bypass service, equipped with Hydraulic Actuators and complete Hydraulic Control System (HCS).