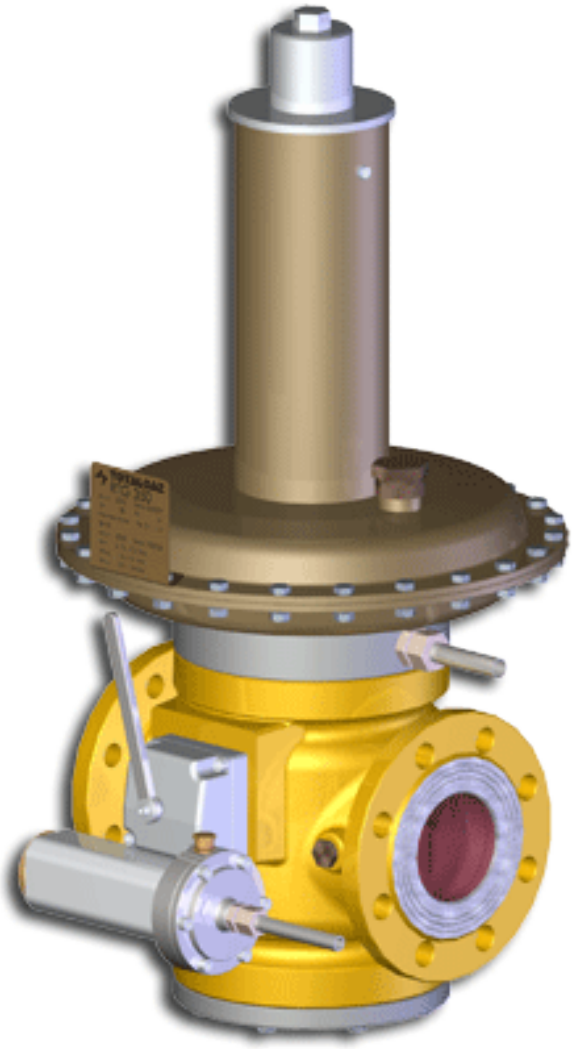
TOTALGAZ INDUSTRIE

PRESSURE REGULATOR RTG 320



Introduction

RTG 320 pressure regulators are direct acting regulators with balanced valve. Their operation is based on the balance between the force generated by the regulated pressure and the force of the adjustment spring. They are used for reducing and regulating the pressure of LPG and natural gas, ensuring a constant value of the outlet pressure, within the limits of the regulation class at inlet pressure and flow variation.

Advantages of RTG 320 direct acting pressure regulators

- precise and constant operation even if the inlet pressure fluctuates significantly, provided with external impulse line and silencer valve;
- easy regulation of outlet pressure;
- easy change of the regulator setting range;
- high flow rate due to the body special design;
- easy maintenance without dismantling the regulator from the installation;
- low noise level during operation even at high flow rates;
- designed and manufactured according to the specifications of *EN 334* standard.

RTG 320 regulator operation

RTG 320 regulators are normally open regulators (fail-open), so that they are open when:

- the inlet pressure is lower than the outlet set pressure;
- failure occurs (breakage of the control diaphragm).

The upstream (inlet) pressure enters the regulator body (1) via the inlet connection. Variations in inlet pressure do not create additional forces in the system, as the regulator is provided with a separation diaphragm (6) - (meaning it is balanced).

The pressure is set by modifying the distance between the seat (2) and the valve plate (3), which results in different passage sections.

The downstream (set) pressure is applied by means of the impulse connection under the control diaphragm (7) generating a force that opposes the force produced by the spring (8).

A change in the downstream pressure creates an imbalance in the system, determining the valve plate (3) to open proportionally with the flow required by the consumer.

In the rated operation conditions (constant inlet pressure, constant flow rate), the assembly comprising the spring, diaphragm, rod, valve plate is in balance.

Modifications in one or more parameters produce an imbalance in the system, which moves until reaching another point of balance.

Modifications in the outlet set pressure are made by acting the adjustment screw (10). The screw acts on the spring (8) and modifies the pre-stressing force.

RTG 320 regulators are also produced in the double compensation variant (Figure 2), which ensures enhancement of flow capacity. The constructive variant implies fixing a device comprising a separation diaphragm at the lower part of the regulator.

RTG 320 DC variant is also used when the regulator acts as monitor.

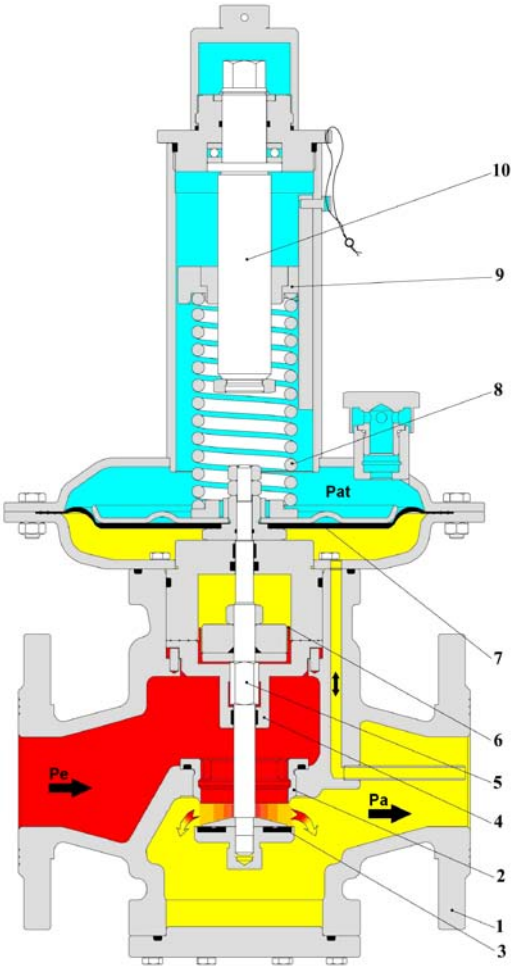


Figure 1 – RTG 320 DN 25 ÷ 50

Internal impulse variant

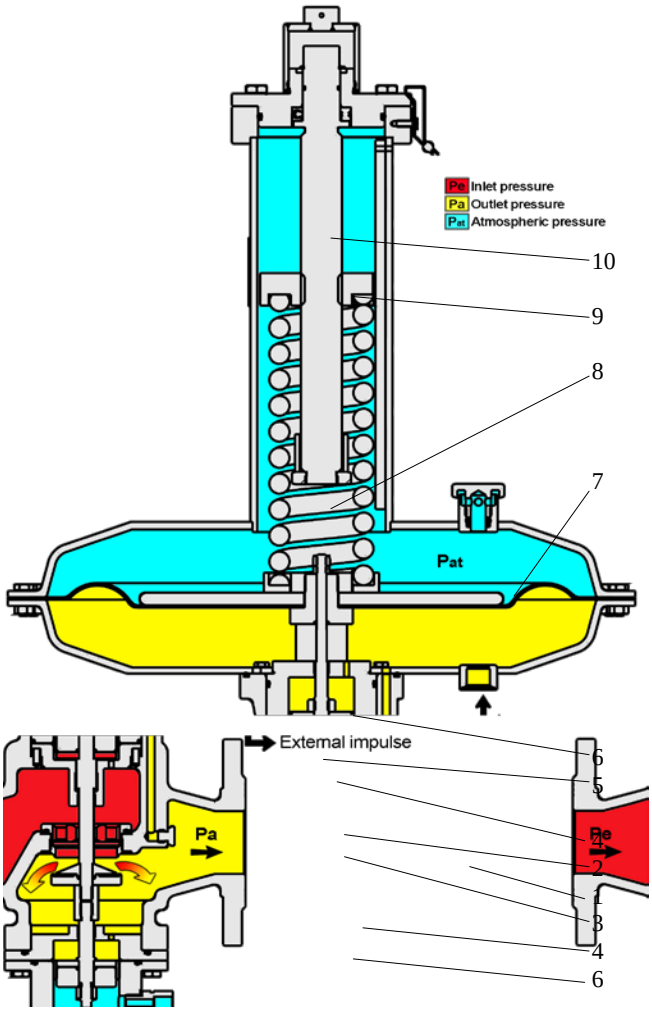
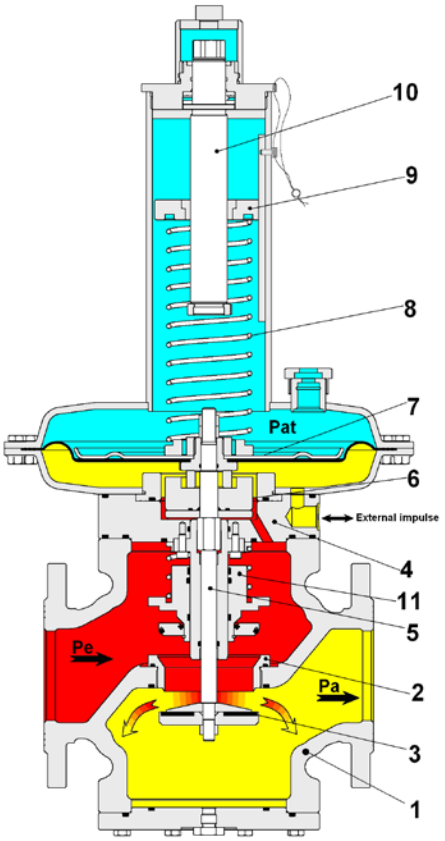
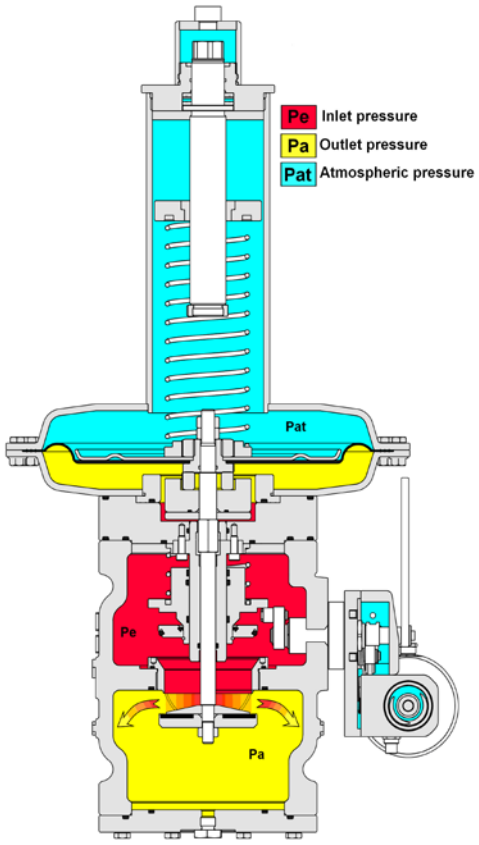


Figure 2 – RTG 320 DN 25 ÷ 80

DC variant – double compensated, external impulse





1. body
2. seat
3. valve plate
4. separation disk
5. rod
6. separation diaphragm
7. control diaphragm
8. adjustment spring
9. adjustment nut
10. adjustment screw
11. shut-off device

Figure 3 – RTG 320 external impulse *Incorporated SB 750 shut-off device*

Technical characteristics

Table 1 – Technical characteristics

Regulator model	RTG 320
Inlet/outlet diameter	DN 25 ÷ DN 300
Flange type	PN 16, PN 20 / ANSI 150
Inlet pressure Pu [bar]	0,05 ÷ 6
Outlet pressure Pd [bar]	0,015 ÷ 2
Working environment	Natural gas / non-corrosive gases
Ambient temperature [°C]	-30 ÷ 80
Working medium temperature [°C]	-20 ÷ 60
Accuracy class (AC)	± 2,5 ÷ 5%
Lock-up pressure class (SG)	5 ÷ 30%
Intervention accuracy class of incorporated shut-off device (AG)	- minimum up to 2.5% - maximum up to 1% (depending on the control pressure)

Body material	**WCB 216**
Diaphragm material	**Rubber (NBR) with textile insert**
Internal part material	**Aluminium; brass; stainless steel; zinc plated steel**

Selection of pressure regulator

EN 334 – Gas pressure regulators for inlet pressures up to 100 bar

When the control valve is used for natural gases, in normal conditions, simple calculation relations are used based on the flow coefficient KG (according to *EN 334*).

The flow coefficient KG is calculated based on Cg coefficient and comprises the density correction for natural gases.

The flow calculation relations depending on working conditions and KG are indicated below (Pb = 1.013 bar).

- in subcritical conditions, when: $\frac{(Pu - Pd)}{(Pu + Pb)} \leq 0{,}5$

  The following relation is used: $Q = KG \times \sqrt{(Pd + Pb) \times (Pu - Pd)}$

- in critical conditions, when: $\frac{(Pu - Pd)}{(Pu + Pb)} > 0{,}5$

  The following relation is used: $Q = KG \times \frac{Pu + Pb}{2}$

Legend

Q – flow rate [Nm³/h]

Pu –inlet pressure [barg]

Pd – outlet pressure [barg]

Pb – atmospheric pressure [bar]

KG – natural gas flow coefficient [Nm³/h]

DN	25	40	50	80	100	150	200	250	300
Kg	331	847	1502	3392	5633	10593	18336	23655	43260

For regulators, the recommended gas velocity in the outlet flange is less than 150 m/s. The erosion phenomenon accelerates and the noise level increases significantly at greater velocity.

The pipes are sized for gas velocities lower than 20 m/s.

Gas velocity in the outlet flange or in pipes is calculated using the formula:

$$V = 345{,}92 \times \frac{Q \times (1 - 0{,}002 \times Pd)}{DN \times (1 + Pd)}$$

where: V – gas velocity [m/s]

Q – flow rate [Sm^3/h]

Pd – outlet pressure [burg]

DN – inner diameter [mm]

Safety devices and optional accessories

SB 750 shut-off device

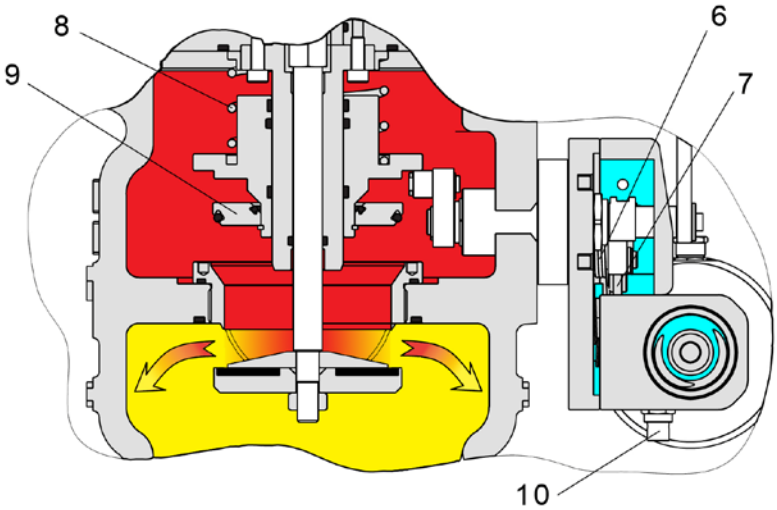


Figure 4 – SB 750 incorporated shut-off device

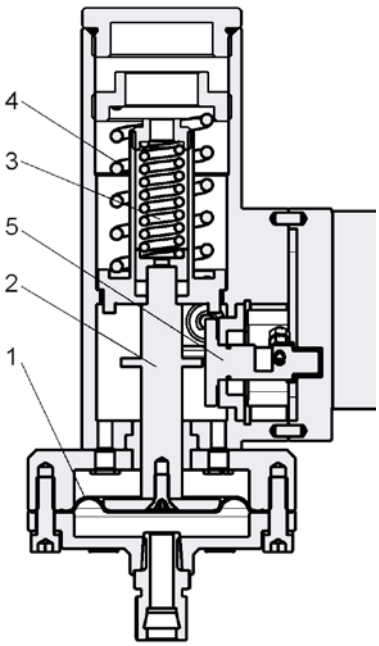


Figure 5 - SB 75 control mechanism

1. diaphragm; 2. rod; 3. minimum spring; 4. maximum spring;
5. fork; 6. spring; 7. cam; 8. spring; 9. valve plate holder; 10. reset button

The description of the SB 750 valve operation references Figures 4 and 5. When the regulated pressure is within the working range, the shut-off valve is open.

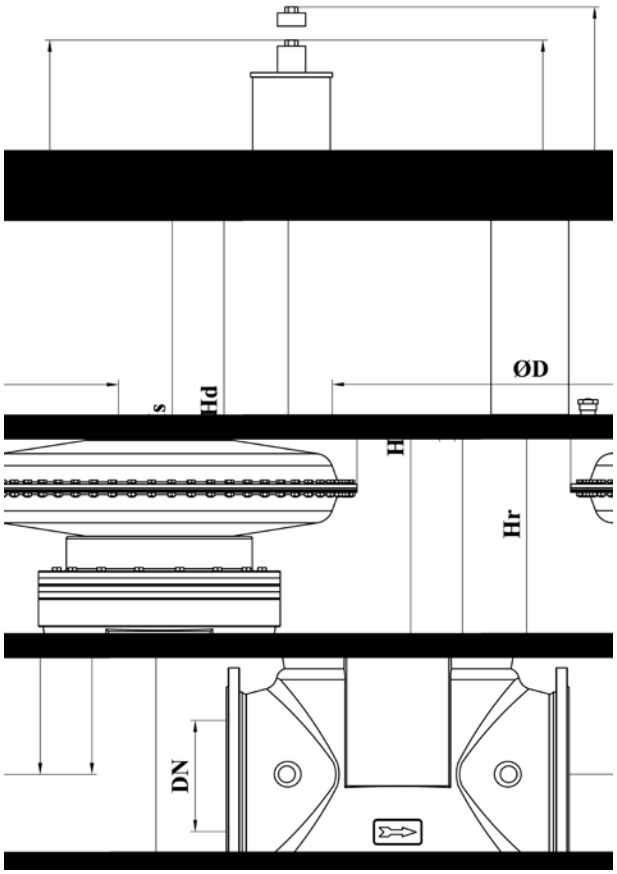
The set pressure acts on the diaphragm (1) of the servomotor, maintaining the rod (2) in balance position. Thus, the movement of the cam (7) under the action of the spring is prevented by the fork (5) whose radial movement is determined by the rod (2).

If the pressure increases over the maximum allowable value, the force of the spring (4) is overcome; this determines the rod (2) to move. The fork (5) releases the cam (7), which, under the action of the spring (6) moves, releasing the valve plate holder (9).

If the pressure decreases under the minimum allowable value, the force of the spring (3) moves the rod (2), which rotates the fork (5) releasing the cam (7). The cam moves and releases the blocking mechanism, under the action of the spring (6).

The movement of the valve plate (9) under the action of the spring (8) closes the valve. Sealing is ensured by the O-rings.

Dimensional characteristics



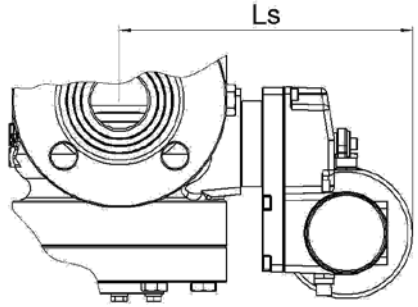


Figure 6 – RTG 320 DN 25 ÷ 300

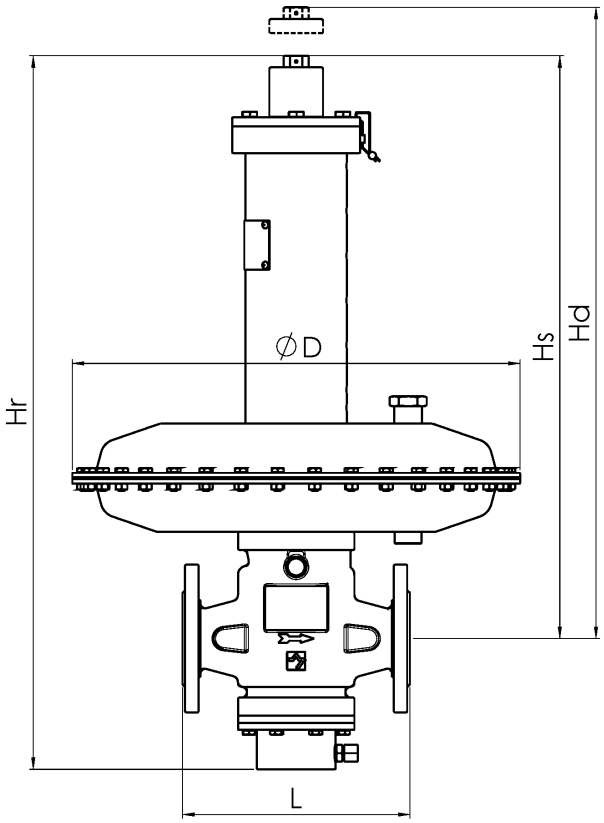


Figure 7 – RTG 320 DC, DN 25 ÷ 50

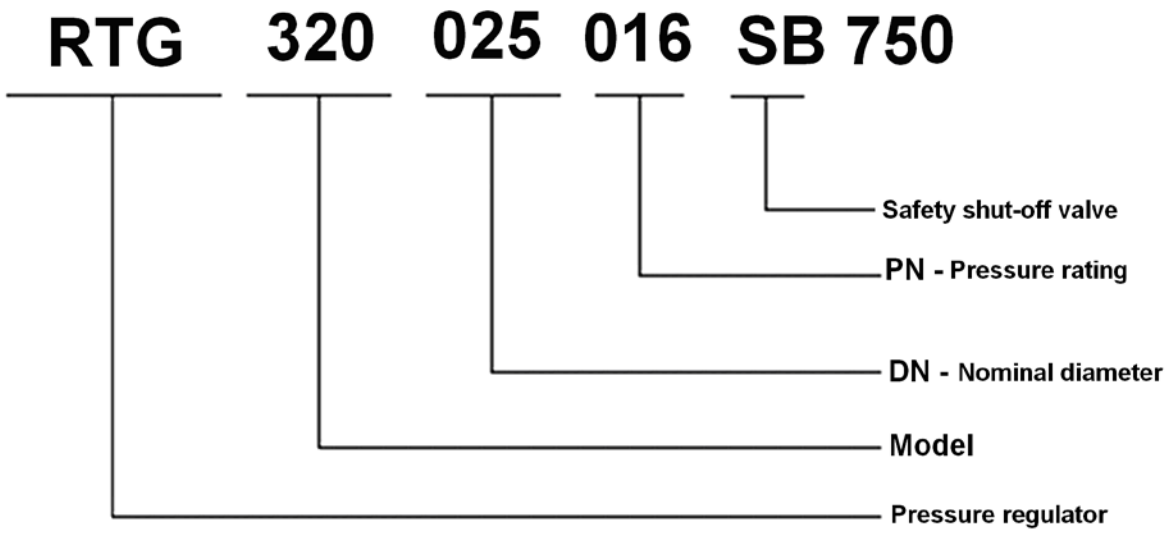
Table 2 – Overall dimensions for RTG 320 (Figure 6 and Figure 7)

Regulator model	DN	L [mm]	LS [mm]	Variant 1 (PS)				Variant 2 (PR)			
				HR [mm]	Hs [mm]	Ø D [mm]	HD [mm]	HR [mm]	Hs [mm]	Ø D [mm]	HD [mm]
RTG 320	25	184	140	600	410	370	560	555	400	270	530
	40	222	170	615	440	370	572	570	431	270	562
	50	254	195	640	465	370	577	595	448	270	571
	80	298	251	800	656	500	986	741	598	370	927
	100	352	271	835	679	500	1010	777	621	370	950
	150	451	315	1125	910	650	1340	1095	880	500	1285
	200	543	355	1200	947	650	1382	1170	917	500	1352
	250	673	400	1570	1267	850	1750	1540	1234	650	1705
	300	737	430	1680	1325	850	1800	1645	1292	650	1765
RTG 320 DC	25	184	140	640	410	370	560				
	40	222	170	772	632	500	932				
	50	254	195	797	651	500	951				
	80	298	251	857	655	650	986				

Ordering code

The pressure regulators are identified by specifying the constructive variant, the nominal dimension of inlet-outlet connections and the maximum working pressure.

Example:



For example, the code RTG 320-25-16-SB 750 designates the 320 pressure regulator, with DN 25 connections, maximum working pressure of 16 bar, equipped with SB 750 incorporated shut-off valve.

Additional requirements, if any, must be specified when placing the order.

The manufacturer reserves the right to make modifications without any prior notification.

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