



 **Norval**  
Pressure regulator

## Classification and Area of Application

The **NORVAL** is a downstream pressure regulator, self actuated, spring loaded for medium and low pressure applications.

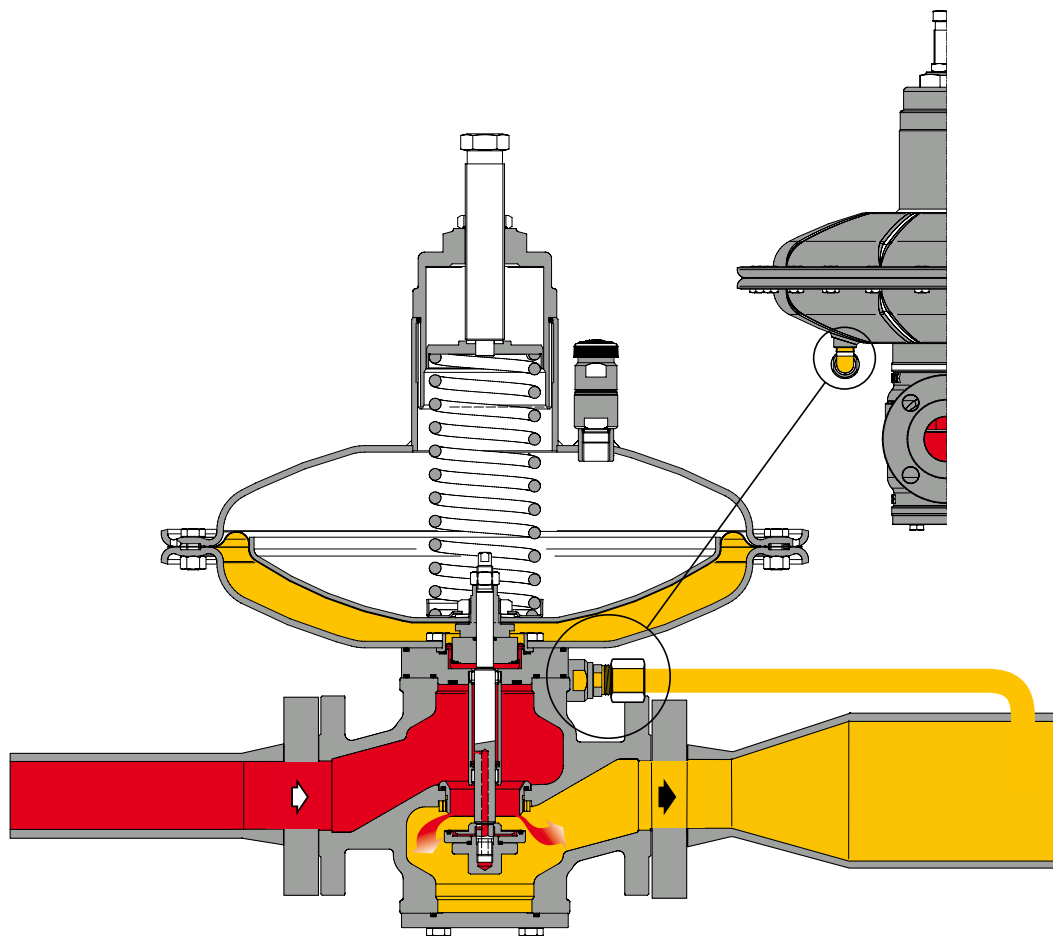
It is suitable for gaseous, non-corrosive, previously filtered fluids.

It is characterized by a quick response to varying operating conditions, which make it particularly suitable for use when serving **ON-OFF** burners and in any industrial process characterized by a quick change of the flow rate.

Its features of good accuracy of regulation, even in presence of significant variations of the upstream pressure and/or flow rate, make the Norval regulator also particularly suitable in distribution networks for civil use.

The **NORVAL** regulator, in its basic version, is classified according to the European standard **EN 334**, as a regulator which reacts in opening (**Fail to Open**).

It is Truly a **TOP ENTRY** design, which confers to the regulator management advantages, for example the ability to perform full maintenance without uninstalling it from the connection pipe.



**NORVAL** - standard version

## FEATURES

### Functional features:\*

■ <b>Maximum inlet pressure up to:</b>	19,6 bar for regulators from DN 25 (1") to DN 80 (3") 8 bar for regulators from DN 100 (4") to DN 200 (8")
■ <b>Range of downstream pressure:</b>	from 8 to 4.400 mbar for regulators from DN 25 (1") to DN 100 (4") from 12 to 1.800 mbar for regulators DN 150 (6") and DN 200 (8")
■ <b>Minimum ambient temperature:</b>	Execution up to -40°C (to specify in the request ).
■ <b>Maximum ambient temperature:</b>	+60°C
■ <b>Inlet gas temperature:</b>	up to -20°C + 60°C
■ <b>Accuracy class AC:</b>	up to 5
■ <b>Look-up pressure class SG:</b>	up to 10

### Design features:

■ <b>Nominal dimensions DN:</b>	25 (1"); 40 (1"1/2); 50 (2"); 65 (2"1/2); 80 (3"); 100 (4"); 150 (6"); 200 (8").
■ <b>Flanged connections:</b>	UNI PN 16; class 150 RF

### Materials: \*\*

■ <b>Body:</b>	Cast steel ASTM A 216 WCB (all DN). Spheroidal ductile iron GS 400 – 18 ISO 1083 DN 150 (6") included.
■ <b>Covers:</b>	Diameter from 375 to 630 Drop-forged carbon steel / from 658 to 817 Alluminium
■ <b>Diaphragm:</b>	Rubberized canvas (performed by hot-pressing process).
■ <b>Seat:</b>	Stainless steel
■ <b>Sealing ring:</b>	Nitril rubber
■ <b>Connection fittings:</b>	In zinc-plated carbon steel according to DIN 2353; Stainless steel on request

REMARK: \* Different functional features available on request.

\*\* The materials indicated above refer to the standard models.  
Different materials can be provided according to specific needs.

## MODULARITY AND ACCESSORIES

The project of **NORVAL** regulator has been designed with a high degree of modularity that allows to incorporate, within the basic regulator, alternative devices and additional accessories.

These can also be added to a basic regulator at a later time, with no need to change the existing assembly piping connections.

### SLAM SHUT DEVICE model SN/...

It is a **Safety Accessory** whose task is that of blocking the gas flow if abnormal pressure conditions appear, compared to the one set during calibration of the dedicated pressure switch.

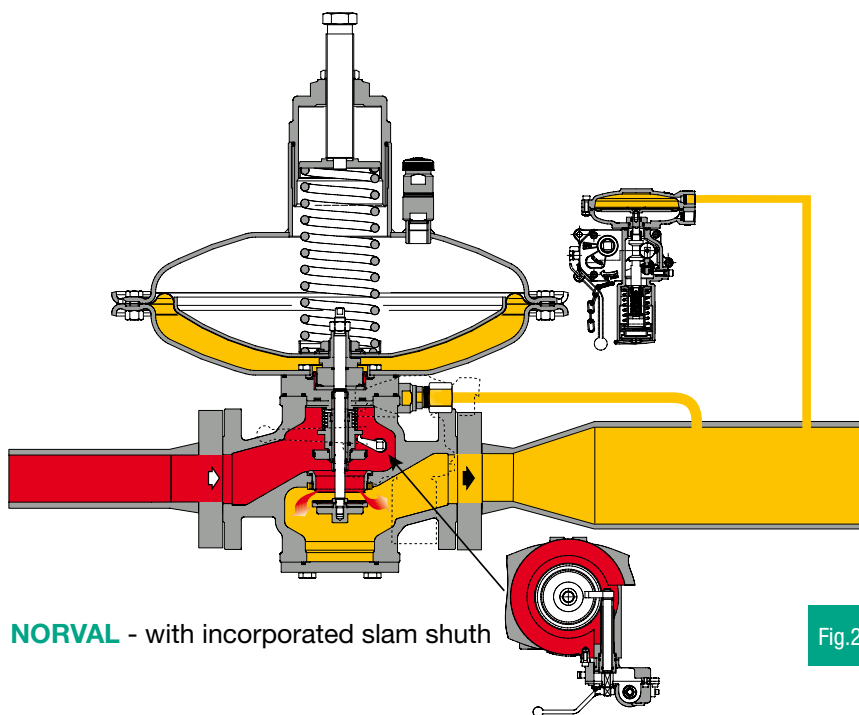
The calibration can be varied in, according to the operating needs, in the fields referred to in the table N.2 below, according to the model of pressure switch forecast.

There are two available models: SN91 and SN92, the accuracy class of the block device is up to **AG up to 2,5**.

The slam shut device is equipped with a button for local manual control of the block operation.

The reset of the slam shut device, for safety reasons, is exclusively manual and, inside the slam shut valve, a bypass device is provided, in order to make the reset operation easier.

The slam-shut device can be equipped with pneumatic or electromagnetic accessories type allowing control, as well as with sensors (micro-switches) for the remote signaling of its tripping.



The slam shut valve can be calibrated for pressure increase, **over pressure shut off (OPSO)** and/or for pressure drop, **under pressure shut off (UPS0)**.

The two intervention modes can be tuned independently, using the dedicated calibration springs: a spring for the intervention of maximum pressure and a second spring for the intervention of minimum pressure.

### Device for in line monitor regulator operation (ER)

The **MONITOR REGULATOR** is a safety accessory whose task is that of performing the functions of the regulator in case of failure of the main regulator.

It is a regulator that is normally in the fully open position during normal operation of the service regulator.

The Monitor regulator is an emergency pressure regulator that is generally located in the flow direction of the gas, upstream another pressure regulator that performs the function of SERVICE regulator.

In order to allow a **NORVAL** regulator to perform the MONITOR regulator function it is necessary to include, in addition to the Basic regulator, a **ER** device ensuring greater accuracy of the regulated pressure and allows rapid intervention of the device.

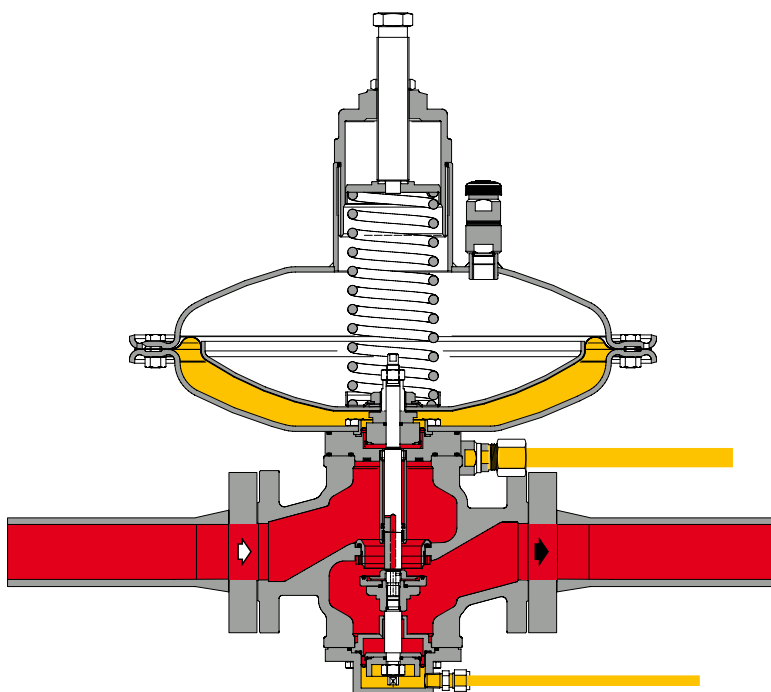


Fig.3

**NORVAL** - With in-line monitor

## Possible set pressure range

The regulated outlet pressure range is determined by the control head installed. The table below sums up the heads available for every size and the ranges of outlet pressure expressed in mbar.

## Pressure regulator

Nominal dimension DN								
Millimeter	25	40	50	65	80	100	150	200
Inches	1"	1"1/2	2"	2"1/2	3"	4"	6"	8"
ø 817							12 ÷ 79	12 ÷ 79
ø 658							75 ÷ 405	75 ÷ 405
ø 630				10 ÷ 80	10 ÷ 80	12 ÷ 80	220 ÷ 650	220 ÷ 650
ø 495	16 ÷ 83	16 ÷ 83	16 ÷ 83	80 ÷ 530	80 ÷ 530	80 ÷ 530	390 ÷ 1800	390 ÷ 1800
ø 375	80 ÷ 1100	80 ÷ 1100	80 ÷ 1100	470 ÷ 2800	470 ÷ 2800	470 ÷ 2800		
ø 375TR	900 ÷ 4400	900 ÷ 4400	900 ÷ 4400	900 ÷ 4400	900 ÷ 4400	900 ÷ 4400		
								Tab.1

## Slam shut

Pressure switch	SN 91	SN 92
Set point range for Overpressure (OPSO)	25 ÷ 1100	650 ÷ 5500
Set point range for Underpressure (UPSO)	10 ÷ 900	200 ÷ 3100
		Tab.2

## Sizing of the Pressure Regulator

In general, the choice of a regulator is made on the basis of the calculation of the flow rate determined by the use of flow rate coefficients (Cg or KG) as indicated by the EN 334 standard.

However, the analytical method of calculation is not suitable for a correct sizing of the regulator, because it is necessary not to consider the whole theoretical flow rate obtainable from the analytical method, but only a percentage of it, which varies from case to case, depending on the desired class of accuracy and on the available pressure drop.

Therefore it is more appropriate to refer to the following tables that provide directly the value of the flow rates that can be provided by the specific regulator considered, depending on the specific operating conditions.

The tables provide the value of the flow rate, expressed in Stmc/h, of a natural gas having a relative density to air of 0.61 and at a temperature of 15 °C, to the barometric pressure of 1,013 bar.

**Flow rate ( Stm<sup>3</sup>/h NG ) \***
**NORVAL DN 50**

Inlet pressure Pu (bar)	Outlet pressure Pd (bar)											
	0,02	0,05	0,08	0,1	0,3	0,5	0,75	1	1,5	2	3	4,4
<b>0,2</b>	540	500	450	430								
<b>0,3</b>	670	650	600	600								
<b>0,5</b>	900	880	850	850	600							
<b>0,75</b>	950	1100	1100	1050	900	700						
<b>1</b>	1000	1300	1300	1300	1200	1050	750					
<b>1,5</b>	1150	1700	1700	1700	1650	1550	1450	1150				
<b>2</b>	1200	1880	2000	1850	2000	2000	1900	1700	1400			
<b>4</b>	1200	1970	2500	1850	3200	3300	3400	3400	3400	3200	2400	
<b>6</b>	1320	2000	2500	1750	3400	4300	4800	4700	4700	4800	4500	3700
<b>8</b>	1480	2050	2500	1780	3600	4300	5000	6000	6100	6200	6100	5800
<b>10</b>	1600	2200	2800	1780	3700	4300	5000	6000	7000	7500	7500	7500
<b>13</b>	1830	2400	3000	1800	3700	4300	5000	6000	7000	8500	8800	8800
<b>16</b>	2270	2750	3000	2350	3700	4300	5000	6000	7000	8500	10500	11500
												Tab.3

**NORVAL DN 65**

Inlet pressure Pu (bar)	Outlet pressure Pd (bar)											
	0,02	0,05	0,08	0,1	0,3	0,5	0,75	1	1,5	2	3	4,4
<b>0,2</b>	900	800	750	700								
<b>0,3</b>	1100	1050	1000	1000								
<b>0,5</b>	1400	1450	1400	1400	1050							
<b>0,75</b>	1600	1800	1800	1800	1600	1150						
<b>1</b>	1800	2100	2100	2100	2050	1800	1250					
<b>1,5</b>	2000	2800	2800	2600	2600	2600	2400	1900				
<b>2</b>	2100	3200	3300	3000	3000	3000	3200	2900	2350			
<b>4</b>	2200	3500	3800	3200	4000	5700	5500	5500	5500	5200	4000	
<b>6</b>	2300	3600	4000	3400	4500	7000	7000	7000	7500	7800	7000	6000
<b>8</b>	2400	3700	4100	3400	4800	7300	7500	9000	9500	10000	9000	9000
<b>10</b>	2500	3800	4200	3600	5000	7300	8000	10000	10000	12000	11000	11000
<b>13</b>	2600	3900	4400	3800	6000	7300	8400	10000	10500	12000	13000	13000
<b>16</b>	2700	4000	4500	4000	6200	7300	8400	10000	11000	12000	17000	18000
												Tab.4

NORVAL DN 80												
Inlet pressure Pu (bar)	Outlet pressure Pd (bar)											
	0,02	0,05	0,08	0,1	0,3	0,5	0,75	1	1,5	2	3	4,4
<b>0,2</b>	1350	1200	1150	1100								
<b>0,3</b>	1700	1600	1500	1500								
<b>0,5</b>	2200	2200	2150	2150	1600							
<b>0,75</b>	2500	2800	2700	2700	2400	1750						
<b>1</b>	2900	3300	3000	3000	3100	2700	1900					
<b>1,5</b>	3700	4300	4000	4000	4100	3950	3500	2900				
<b>2</b>	5000	5100	5100	4600	5200	5000	4500	4300	3600			
<b>4</b>	5000	6000	5500	5400	7400	8700	7500	8000	8200	8000	6100	
<b>6</b>	5000	6500	5700	5600	8200	11000	10000	10500	12000	12000	10000	9500
<b>8</b>	3000	6500	6000	5100	9400	11000	11000	13000	14000	15000	15000	14500
<b>10</b>	3000	6500	6100	5300	9400	11000	12000	15200	16000	19000	18000	19000
<b>13</b>	3000	6500	6200	5500	9400	11000	12700	15200	16000	20000	22000	22000
<b>16</b>	3000	6500	6300	5700	9400	11000	12700	15200	16000	20000	25000	25000

Tab.5

NORVAL DN 100												
Inlet pressure Pu (bar)	Outlet pressure Pd (bar)											
	0,02	0,05	0,08	0,1	0,3	0,5	0,75	1	1,5	2	3	4
<b>0,2</b>	2050	1800	1600	1600								
<b>0,3</b>	2500	2400	2200	2200								
<b>0,5</b>	3400	3300	3000	3200	2450							
<b>0,75</b>	3800	4000	3800	4100	3700	4000						
<b>1</b>	4400	5000	4500	4900	4600	5000	4500					
<b>1,5</b>	5800	6500	6500	6500	6200	6500	6500	6500				
<b>2</b>	7000	7500	7000	7000	7800	7800	7800	7500	7800			
<b>4</b>	7000	9000	8000	9000	11000	12500	11000	12000	12000	12000	13000	
<b>6</b>	7000	9000	8200	9000	12000	16000	15000	15000	18000	18000	18000	18000
<b>8</b>	7000	9000	9000	9000	13000	17000	16000	18000	21000	21000	22000	23000
<b>10</b>												
<b>13</b>												
<b>16</b>												

Tab.6



### NORVAL DN 150

Inlet pressure Pu (bar)	Outlet pressure Pd (bar)											
	0,02	0,05	0,08	0,1	0,3	0,5	0,75	1	1,8			
<b>0,2</b>	4200	3700	3600	3400								
<b>0,3</b>	5300	5000	4700	4600								
<b>0,5</b>	6800	6800	6700	6700	5000							
<b>0,75</b>	7800	8700	8400	8400	7500	5400						
<b>1</b>	9000	10300	9300	9300	9700	8400	5900					
<b>1,5</b>	11500	13400	12400	12400	12800	12300	10900	9000				
<b>2</b>	15600	15900	16000	14300	16200	15600	14000	13500	11000			
<b>4</b>	15600	18700	17000	17000	23000	27000	23400	25000	25000			
<b>6</b>	15600	20300	17800	17500	25600	34000	31000	32000	37000			
<b>8</b>	9400	20300	18700	16000	29000	34000	34000	40000	43000			

Tab.7

### NORVAL DN 200

Inlet pressure Pu (bar)	Outlet pressure Pd (bar))											
	0,02	0,05	0,08	0,1	0,3	0,5	0,75	1	1,8			
<b>0,2</b>	6600	5800	5600	5300								
<b>0,3</b>	8300	7800	7300	7300								
<b>0,5</b>	10700	10700	10500	10500	7800							
<b>0,75</b>	12200	13600	13200	13200	11700	13500						
<b>1</b>	14100	16100	14600	14600	15000	16000	16000					
<b>1,5</b>	18000	21000	19500	19500	20000	21000	20000	20000				
<b>2</b>	24400	24900	25000	22000	25000	25000	23000	24000	25000			
<b>4</b>	24400	29300	27000	26700	36000	42000	36500	39000	40000			
<b>6</b>	24400	31700	28000	27500	40000	53000	49000	51000	58000			
<b>8</b>	14600	31700	29000	25000	45000	53000	53000	63000	72000			
<b>10</b>												
<b>13</b>												
<b>16</b>												

Tab.8

For operating conditions and dimensions not covered by the tables above please contact our customer care.

For different gases and for natural gas with a different density than 0,61 shall be applied the correction coefficients resulting from the following formula:

$$F_c = \sqrt{\frac{175.8}{S \times (273.16 + t)}}$$

S = relative density to air

Correction factors FC		
Type of gas	Relative density	Fc factor
Air	1.0	0.78
Propane	1.53	0.63
Butane	2.0	0.55
Nitrogen	0.97	0.79
Oxygen	1.14	0.73
Carbon dioxide	1.52	0.63
		Tab.9

The chart 9 show the correction factors FC valid for above mentioned gas at 15 °C and the relative density declared.

Flow rate conversion				
Stm <sup>3</sup> /h	x	0,94795	=	Nm <sup>3</sup> /h
				Tab.10

## TYPICAL CONNECTION DIAGRAMS

The following examples are provided as a recommendation to get the best performance from the regulator **NORVAL**.

### IN-LINE INSTALLATION

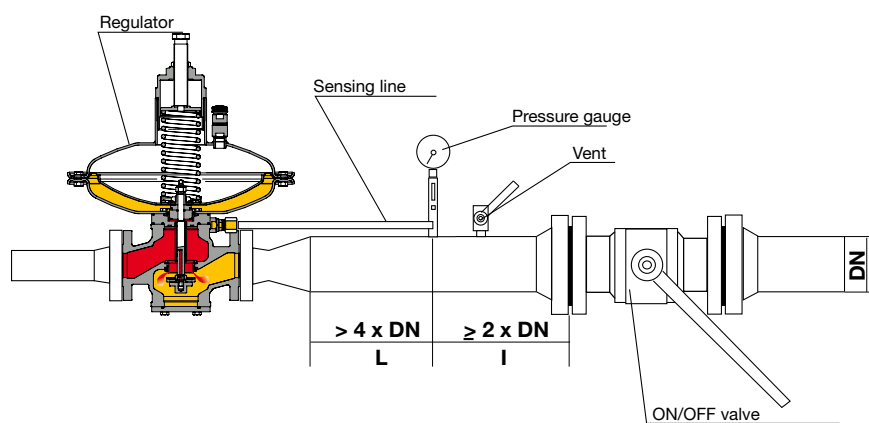


Fig.4

### INSTALLATION AT SQUARE

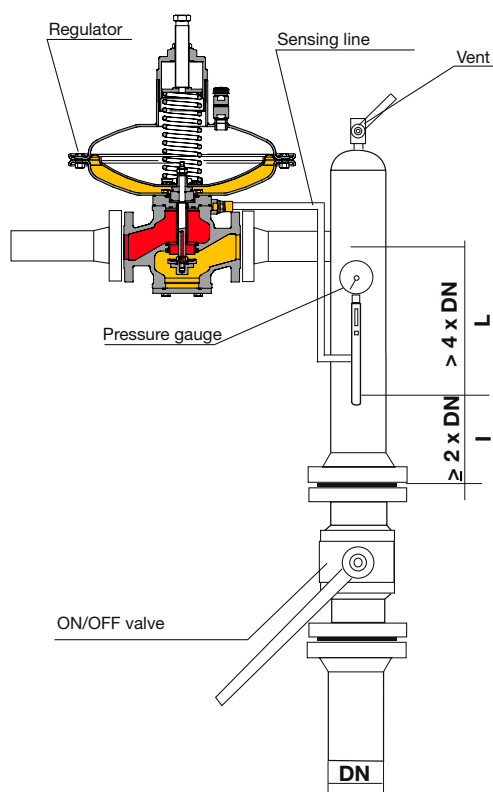
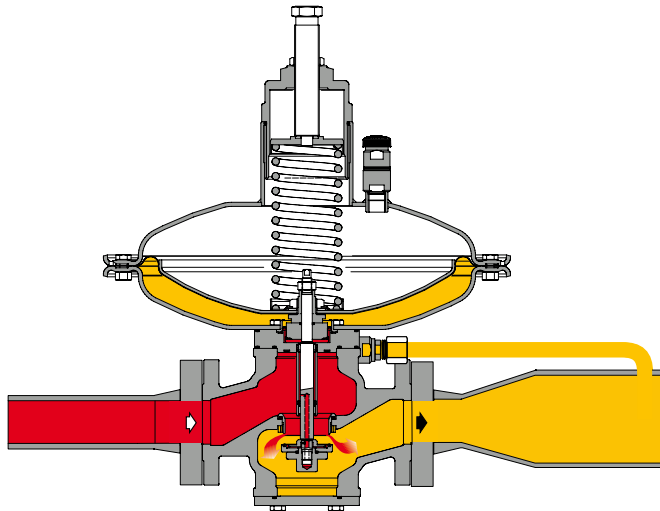


Fig.5

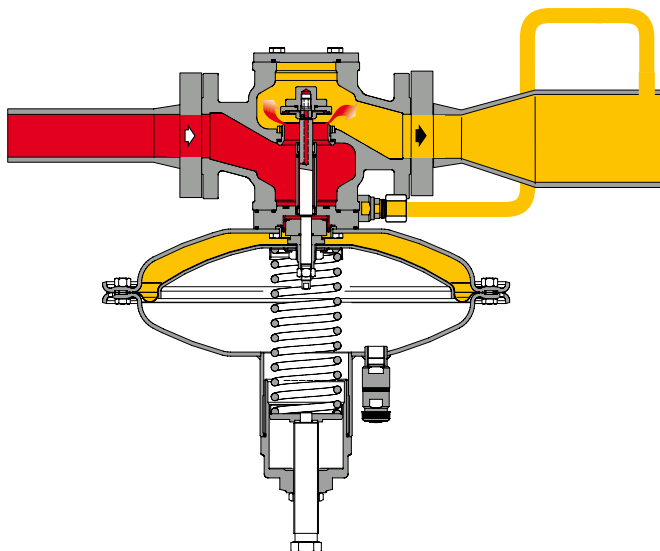
 Inlet pressure  
 Outlet pressure

## RECOMMENDED INSTALLATIONS



Standard position

Fig.6



Upside down position

Fig.7

## INSTALLATION EXAMPLES

### Regulator with block device SN/...

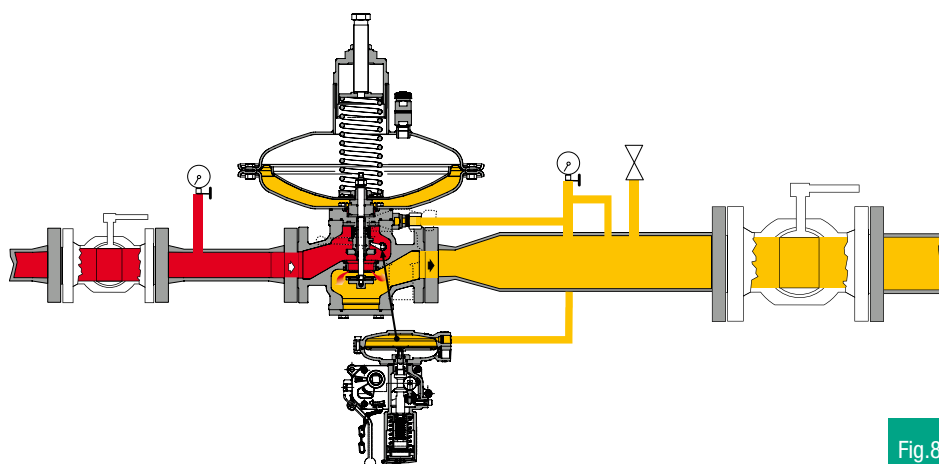


Fig.8

### Monitor regulator + adjusting regulator

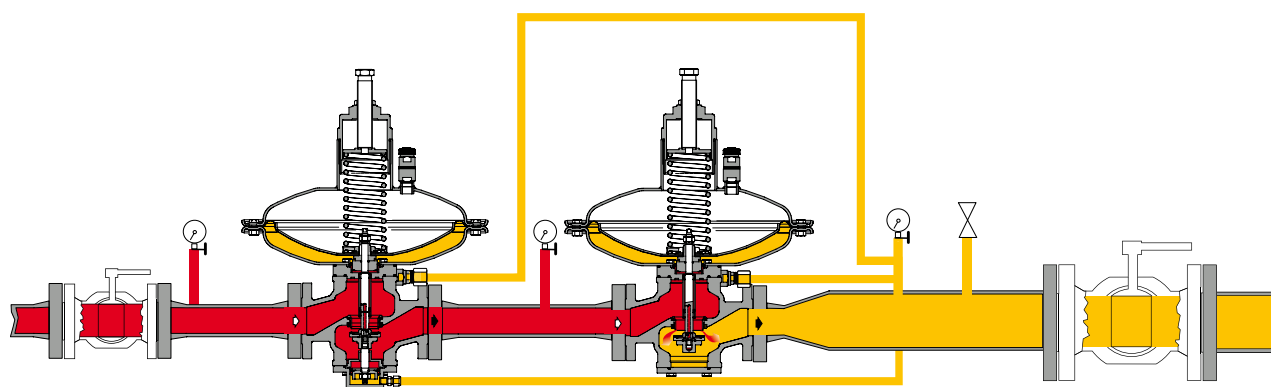


Fig.9

## Monitor regulator with block device SN/... + adjusting regulator

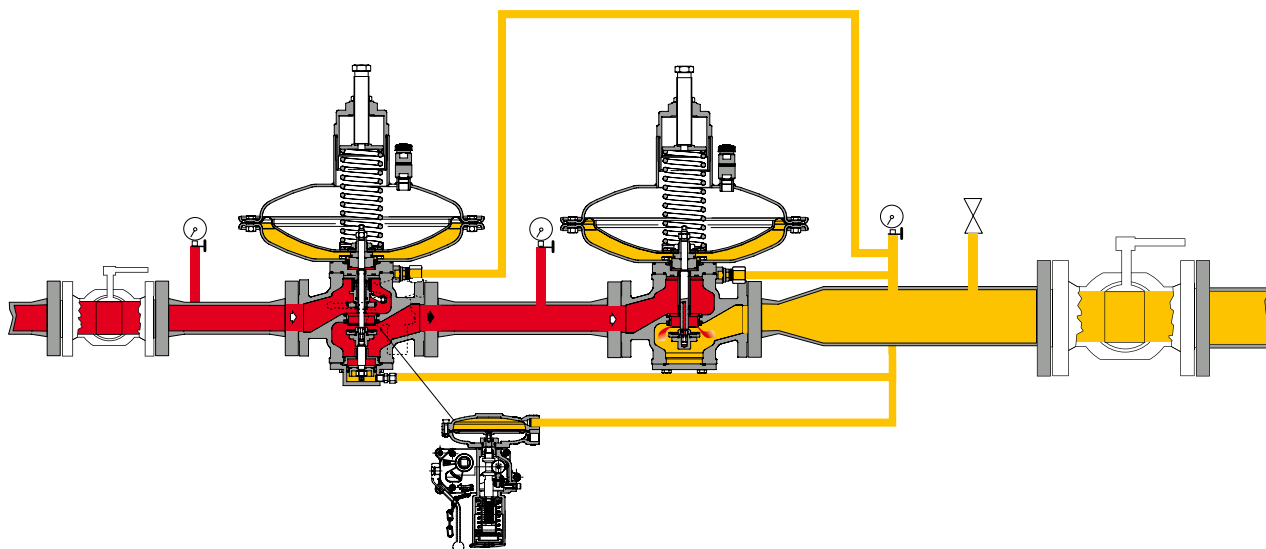


Fig.10

## Slam shut valve SCN + adjusting regulator with block device SN/...

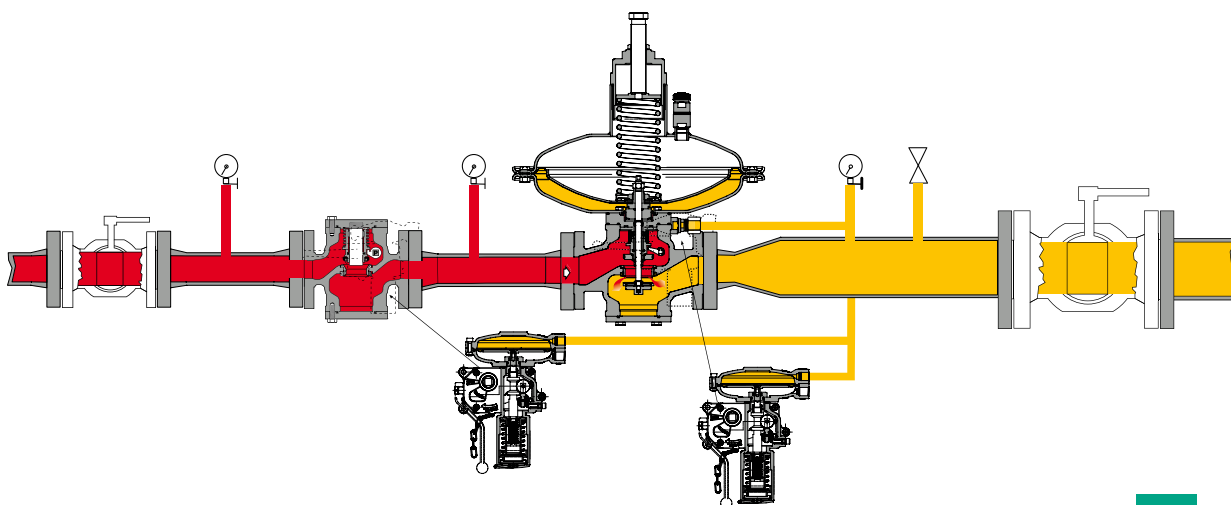
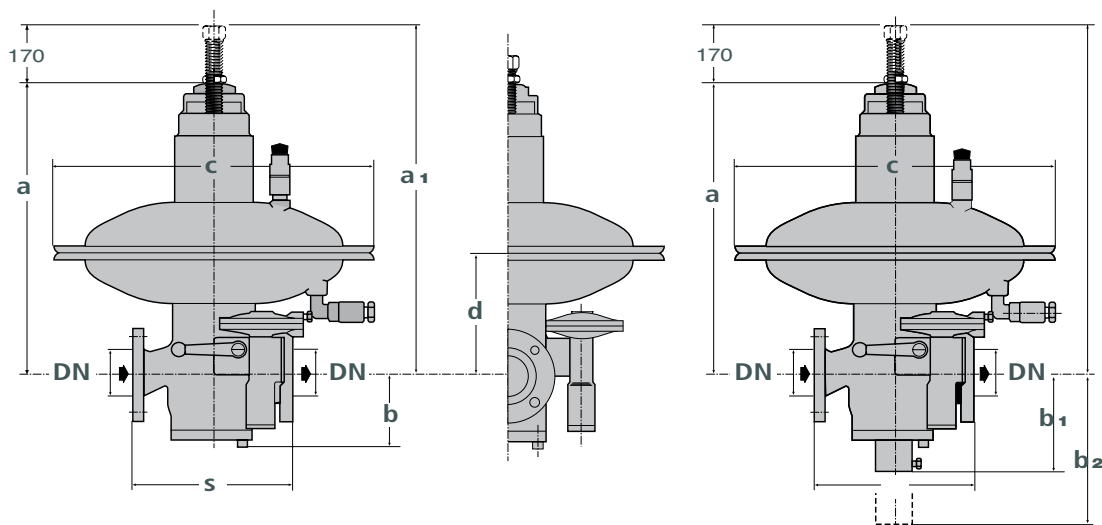


Fig.11

## DIMENSIONS



## Overall dimensions in mm

Nominal dimensions DN		c				ø 817			ø 658			ø 630			ø 495			ø 375			ø 375TR		
mm	Inches	s*	b	b1	b2	a	a1	d	a	a1	d	a	a1	d	a	a1	d	a	a1	d	a	a1	d
25	1"	183	100	200	250										460	630	175	415	585	150	425	595	155
40	1 1/2"	223	120	220	270										475	645	190	435	605	165	445	615	170
50	2"	254	120	220	270										475	645	190	435	605	165	445	615	170
65	2 1/2"	277	140	240	290							540	710	220	500	670	210	455	625	190	465	635	195
80	3"	298	140	240	290							540	710	220	500	670	210	455	625	190	465	635	195
100	4"	352	180	280	330							640	810	310	600	770	300	555	725	275	565	735	280
150	6"	451	220	320	370	760	930	400	720	890	380	675	845	380	670	840	375						
200	8"	543	260	360	410	860	1030	500	820	990	480	775	845	480	770	940	475						

Tab.11

**Pneumatic fittings**; Sensing line regulator: 14x12mm. **Other**: 10x8mm.

Dimensions S according to EN 334 and IEC 534-3.

## Weight in Kg

Size (mm)	25	40	50	65	80	100	150	200
Inches	1"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
Norval	44	48	50	75	92	121	206	291
Norval with slam-shut (SN)	48	53	55	82	97	126	211	296
Norval with monitor (ER)	48	55	58	85	100	129	216	302
Norval with slam-shut (SN) and monitor (ER)	53	60	63	90	105	134	221	307

Tab.12