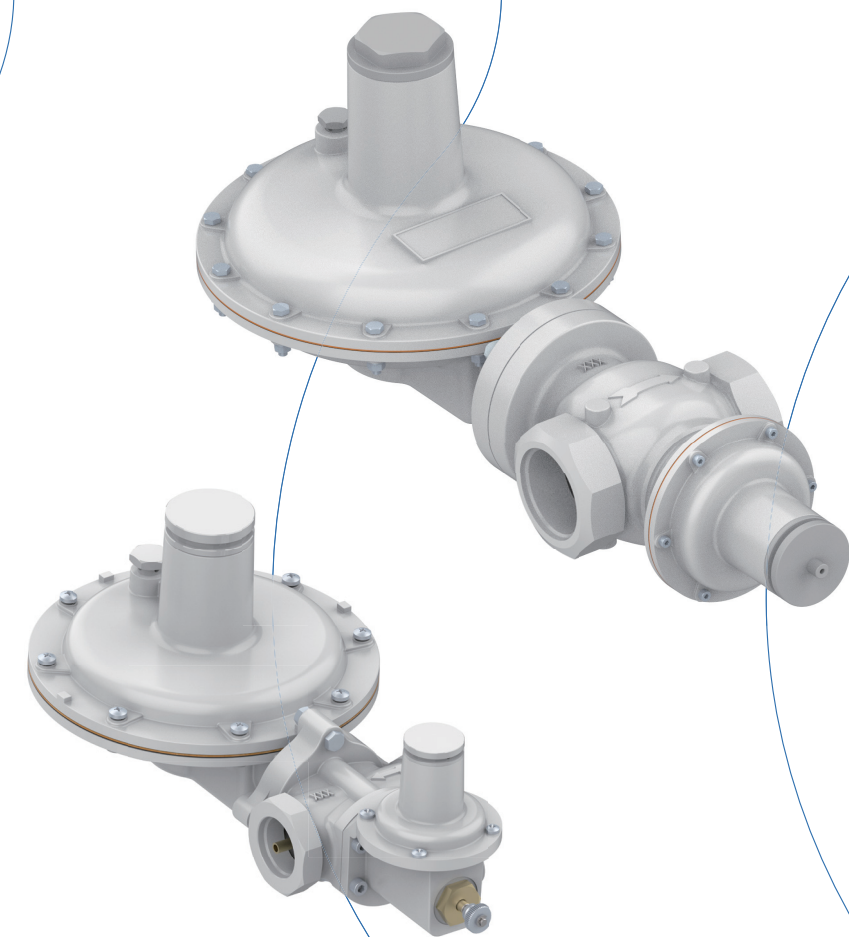




Regulator **HN Series**



Address: Unit 133, 7121-104 Avenue SE, Calgary, Alberta, Canada

Website: www.dgreg.com

Tel: +1 5878920168

Email: sales@dgreg.com / info@dgreg.com

HN Series

DESCRIPTION

The HN series pressure regulator, equipped with loaded spring and controlling diaphragm, is suitable for low and medium pressure.

The regulators are widely used in both commercial and industrial installations using Natural Gas, LPG and other non-corrosive gases.

FEATURES

- High accuracy, fast response
- Horizontal lever structure, Low lock-up pressure, zero leakage
- Configure multiple specifications of valve orifices to adapt to various working conditions
- Fail to open
- Modular structure enables partial repairs without removing the entire unit from the pipeline
- Optional built-in relief valve
- Optional SD300/200 series shut-off sensor



PARAMETERS

Operating Parameters

- Maximum inlet pressure: 8 bar
- Outlet pressure regulation range: from 15 to 500 mbar
- Accuracy class AC: up to 5
- Lock-up pressure class SG: up to 10
- Working temperature: -20°C ~+60°C

Valve Orifice Size

Model	Valve orifice Size (Inch)	Maximum inlet pressure (bar)
HN50 HNS50	1/8	8
	3/16	7
	1/4	4
	5/16	4
	3/8	2

Model	Valve orifice Size (Inch)	Maximum inlet pressure (bar)
HN100 HNS100	1/8	8
	3/16	7
	1/4	7
	5/16	4
	3/8	4
	1/2	3
	9/16	1.5

Model	Valve orifice Size (Inch)	Maximum inlet pressure (bar)
HN210 HN220	1/4	8
	5/16	7
	3/8	4
	1/2	2.5
	9/16	1.5
	5/8"	1

Model	Valve orifice Size (Inch)	Maximum inlet pressure (bar)
HN410 HN420	1/4	8
	3/8	6
	1/2	5
	5/8	5
	3/4	4
	7/8	4
	1	2

Flow Coefficient (Cg)

HN50	HN100	HN200	HN400
95*	110	260	530

*Cg varies according to the size of the orifice. The value of Cg shown corresponds to the maximum orifice size.

Connecting Parameters

Model	HN50	HN100	HN200	HN400
Connecting size	1"	1"	1-1/2"	2"
Thread standard*	Internal thread in line with ISO 7-1			

* Other connection standards can be provided upon request

Materials

Valve Body	Covers	Diaphragm	Seat	O-ring
Ductile cast iron(GJS 400-18-LT EN1563) Optional: Cast steel(ASTM A216 WCB)	Aluminum alloy ASTM A380	Reinforced fiber rubber	Stainless Steel	Nitrile rubber

MODEL INTRODUCTION

Model	Description
HNS	HN Series Pressure Regulator “S” indicates the equipment with the SD300 series shut-off sensor, while no 'S' indicates the SD300 series shut-off valve is not equipped.
50	Indicates flow rate
100	
LP	$P1 \leq 8\text{bar}$, $15\text{mbar} \leq P2 \leq 100\text{mbar}^*$
MP	$P1 \leq 8\text{bar}$, $0.1\text{bar} \leq P2 \leq 0.5\text{bar}$
-R	Equipped with built-in relief, omitted if not equipped

Model	Description
HN	HN Series Pressure Regulator
2	Indicates flow rate
4	
1	With SD300 series Shut-off Valve
2	Without Shut-off Valve
1	$P1 \leq 8\text{bar}$, $15\text{mbar} \leq P2 \leq 150\text{mbar}^*$
2	$P1 \leq 8\text{bar}$, $0.15\text{bar} \leq P2 \leq 0.5\text{bar}$
-R	Equipped with built-in relief, omitted if not equipped

*P1: Inlet pressure, P2: Outlet pressure

Model	Description
SD	SD Series Shut-off sensor
3	Type 300 Shut-off sensor
1	With over pressure and under pressure shut-off
2	With over pressure shut-off
1	$27\text{mbar} \leq \text{OPSO} \leq 210\text{mbar}$, $20\text{mbar} \leq \text{UPSO} \leq 140\text{mbar}^*$
2	$180\text{mbar} \leq \text{OPSO} \leq 800\text{mbar}$, $125\text{mbar} \leq \text{UPSO} \leq 350\text{mbar}$

Model	Description
SD	SD Series Shut-off sensor
2	Type 200 Shut-off sensor
1	With over pressure and under pressure shut-off
2	With over pressure shut-off
1	$27\text{mbar} \leq \text{OPSO} \leq 240\text{mbar}$, $5\text{mbar} \leq \text{UPSO} \leq 110\text{mbar}^*$
2	$185\text{mbar} \leq \text{OPSO} \leq 900\text{mbar}$, $100\text{mbar} \leq \text{UPSO} \leq 300\text{mbar}$

*OPSO: Over pressure shut-off value / UPSO: Under pressure shut-off value

SPRING

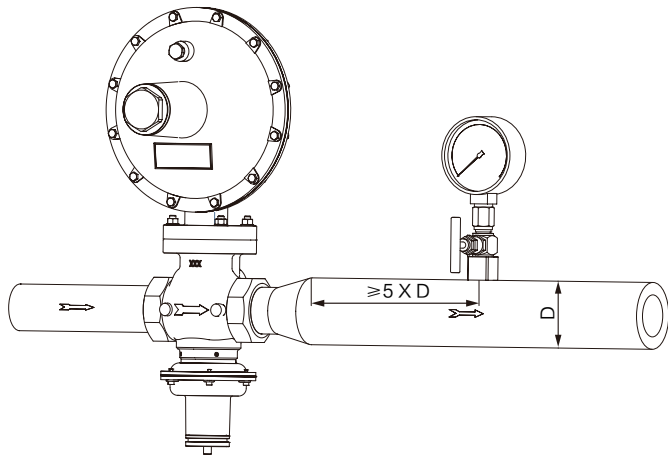
Pressure range of the regulator spring

Model	Version	Outlet pressure range (mbar)	Part number	Color
HN50	HN50-LP HNS50-LP	15-28	19010807041	White
		28-59	19010807042	Yellow
		50-90	19010807043	Green
		84-152	19010807044	Blue
	HN50-MP HNS50-MP	84-152	19010807044	Blue
		135-246	19010807045	Red
		245-456	19010807046	Black
		455-550	19010807047	White
HN100	HN100-LP HNS100-LP	15-20	19010803151	White
		20-27	19010803152	Yellow
		25-36	19010803153	Green
		34-52	19010803154	Blue
		52-74	19010803155	Red
		72-109	19010803156	Black
	HN100-MP HNS100-MP	105-158	19010803157	White
		158-233	19010803158	Yellow
		226-325	19010803159	Green
		319-430	190108031510	Blue
		410-550	190108031511	Red
		15-28	19010802081	White
HN200	HN211 HN221	25-33	19010803213	Yellow
		30-47	19010802082	Green
		42-68	19010802083	Blue
		65-103	19010802084	Red
		95-133	190108020813	Black
		125-220	19010803159	White
	HN212 HN222	125-220	19010803159	White
		200-300	190108031511	Yellow
		280-530	19010204122	Green
		15-24	19010805231	Black
		20-29	19010805232	White
		24-37	19010805233	Yellow
HN400	HN411 HN421	37-59	19010805235	Green
		44-72	19010805236	Red
		62-106	19010805238	Black
		84-165	190108052310	White
	HN412 HN422	118-280	190108052311	Yellow
		220-360	190108052312	Green
		320-570	190108052313	Blue

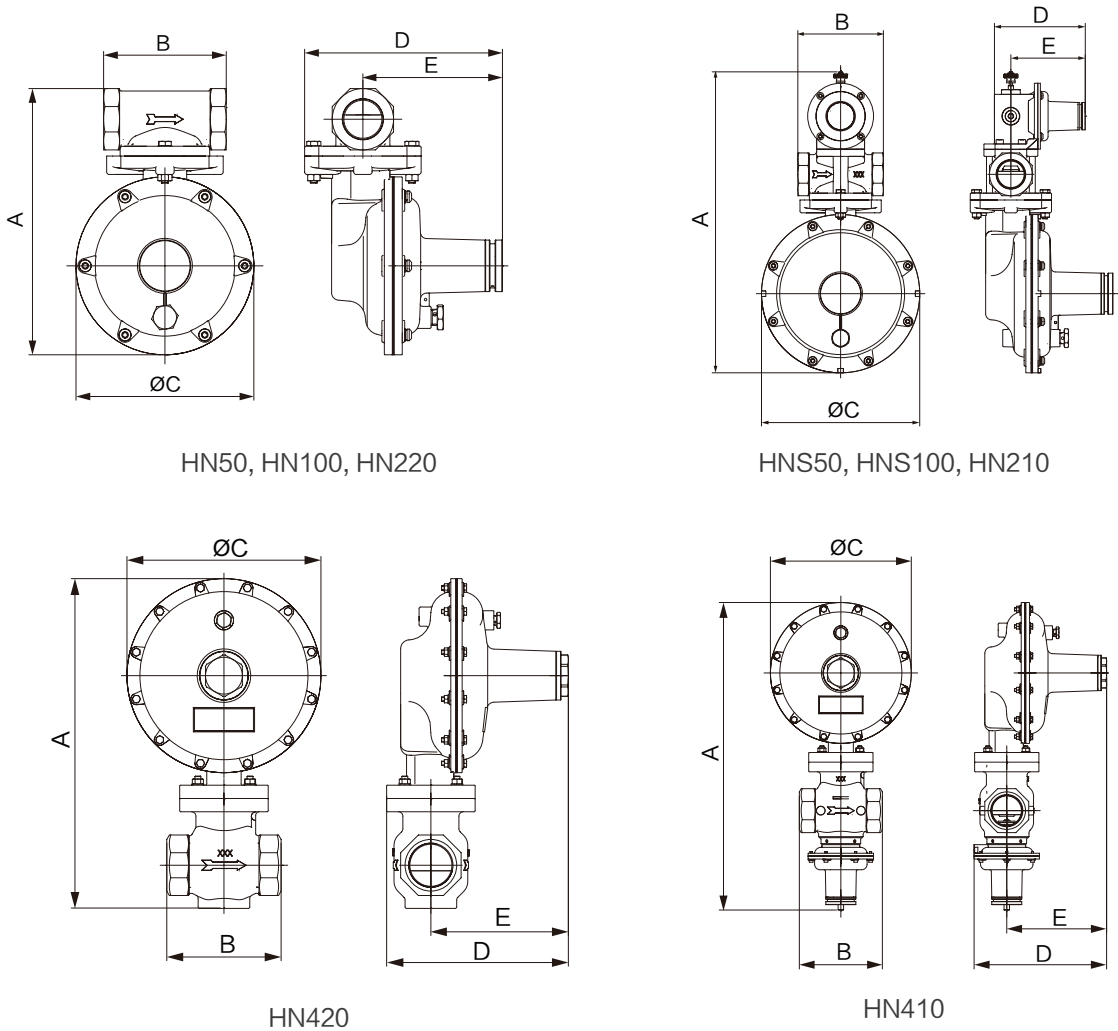
Pressure range of the shut-off spring

	Model	Shut-off pressure range(mbar)	Part number	Color
Over pressure shut-off	SD301	27-50	19010803917	Brown
		40-70	19010803911	White
		65-100	19010803919	Orange
		90-135	19010803912	Yellow
		130-210	19010803913	Green
	SD302	180-270	19010803914	Blue
		230-400	19010803918	Purple
		340-600	19010803915	Red
		570-800	19010803916	Black
Under pressure shut-off	SD301	20-51	19010803921	White
		35-78	19010803922	Yellow
		60-140	19010803923	Green
	SD302	125-245	19010803924	Blue
		200-350	19010803925	Red
Over pressure shut-off	SD201	27-65	19010801658	Silver
		45-110	19010801651	White
		90-240	19010801652	Yellow
	SD202	185-460	19010801653	Green
		330-650	19010801654	Blue
Under pressure shut-off	SD201	450-900	19010801655	Red
		5-18	19010700311	White
		16-54	19010700312	Yellow
	SD202	50-110	19010700313	Green
		100-190	19010700314	Blue
		170-300	19010700315	Red

INSTALLATION



DIMENSIONS



Unit: mm

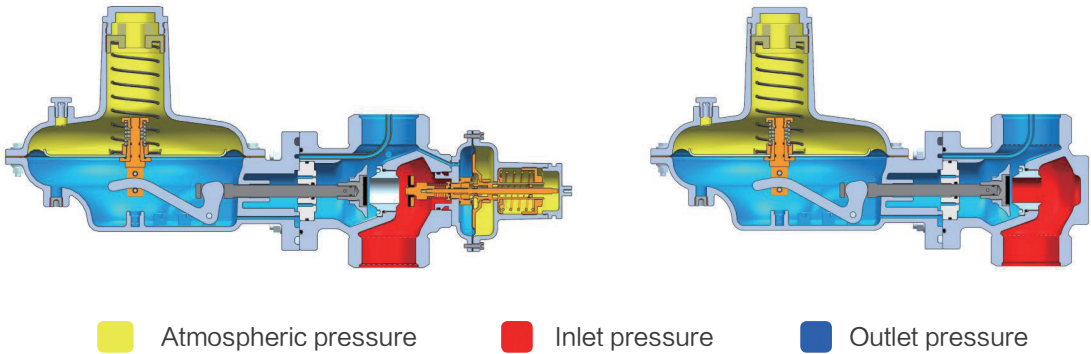
Model	A	B	C	D	E	Weight (Kg)
HN50	217					1.9
HNS50	312	100	145	161	114	2.5
HN100	257					2.2
HNS100	352	100	185	167	120	2.8
HN220	302.5					3.5
HN210	436	130	203	192	145	5
H420	447					9.3
H410	574	155	263	246.5	186.5	11.2

OPERATING PRINCIPLE

The HN series regulator is a direct-acting regulator that provides pressure feedback through internal sensing.

When the downstream flow demand decreases, the pressure under the diaphragm increases, which overcomes the load of the loaded spring and causes the diaphragm to move upward. The movement of the diaphragm is transmitted to the stem through the lever system, driving the valve seat closer to the valve orifice. The valve seat is vulcanized on the seat.

When the downstream flow demand increases, the pressure under the diaphragm decreases, which is less than the load of the loaded spring, causing the diaphragm to move downward and the valve seat to move away from the valve orifice until the flow demand decreases.



FLOW CAPACITY

The size of the regulator is usually selected based on the flow coefficient C_g. Under the reference condition (15°C), the maximum flow rate of a natural gas regulator when fully open is calculated using the following formula:

1) Sub-critical state [When (P₁ - P₂) ≤ 0.5 (P₁ + P_a)]

$$Q=0.526 \cdot C_g \cdot (P_1+P_a) \cdot \sin \left[K_1 \cdot \sqrt{\frac{P_1-P_2}{P_1+P_a}} \right] \text{ deg}$$

2) Critical state [When (P₁ - P₂) > 0.5 (P₁ + P_a)]

$$Q=0.526 \cdot C_g \cdot (P_1+P_a)$$

Q — Flow rate (m³/h) ;
P₁ — Inlet pressure (bar) ;
P_a — Atmospheric pressure (bar) ;
C_g — Flow coefficient;
P₂ — Outlet pressure (bar) ;
K₁ — valve shape coefficient, 103.3 in this formula;

When the relative density d of the gas used differs from 0.61 (natural gas) or the gas temperature is not 15 °C , the flow rate should be multiplied by the correction factor F obtained using the following formula:

$$F= \sqrt{\frac{0.61 \cdot 288}{d \cdot (t+273)}}$$

F — Correction factor;
d — Relative density d of the gas;
t — Gas temperature (°C) ;
The following is the gas relative density d and correction factor F of commonly used gases at the gas temperature of 15 °C :

Gas type	Relative density d	Factor F
Air	1	0.78
Coal gas	0.44	1.18
Methane	0.55	1.05
Ethane	1.05	0.76
Propane	1.53	0.63
Butane	2.01	0.55
Nitrogen	0.97	0.79
Carbon dioxide	1.52	0.63

AC10, Capacity in Nm ³ /h, Natural gas									
Inlet pressure (bar)		Outlet pressure (bar)							
		0.025	0.03	0.05	0.1	0.15	0.2	0.3	0.5
HN50/HNS50 Connecting size:1" Orifice size:1/4"	0.5	17	15	15	18	16	18	14	–
	0.7	28	20	18	22	22	21.5	19	15
	1	37	31	30	31	28	31	25	22
	1.5	54	58	40	40	37	40	36	33
	2	54	63	60	54	50	48	44	40
	3	70	72	80	80	72	70	64	56
HN50/HNS50 Connecting size:1" Orifice size:3/8"	4	80	80	90	90	80	80	75	65
	0.5	44	47	41	35	25	31	22	–
	0.7	65	64	61	41	33	39	32	24
	1	66	72	80	60	48	54	44	38
	1.5	68	68	90	86	62	82	56	52
	2	66	68	90	90	80	80	70	70

AC10, Capacity in Nm ³ /h, Natural gas									
Inlet pressure (bar)		Outlet pressure (bar)							
		0.025	0.03	0.05	0.1	0.15	0.2	0.3	0.5
HN100/HNS100 Connecting size:1" Orifice size:3/8"	0.5	45	44	38	36	32	30	28	–
	0.7	50	50	48	45	42	42	38	30
	1	60	62	66	60	58	60	52	45
	1.5	70	70	70	70	68	68	61	58
	2	75	75	75	75	75	75	70	70
	3	80	80	80	80	80	80	80	80
	4	90	90	90	90	90	90	90	90
HN100/HNS100 Connecting size:1" Orifice size:9/16"	0.5	55	58	54	52	52	50	50	–
	0.7	72	75	72	68	70	67	66	65
	1	90	90	90	90	80	80	80	80
	1.5	100	100	100	100	90	90	90	90

AC10, Capacity in Nm ³ /h, Natural gas									
Inlet pressure (bar)		Outlet pressure (bar)							
		0.025	0.03	0.05	0.1	0.15	0.2	0.3	0.5
HN210/HN220 Connecting size:1–1/2" Orifice size:3/8"	0.5	50	46	45	42	40	34	32	–
	0.7	62	58	54	60	55	48	42	40
	1	80	78	72	65	57	55	52	50
	1.5	102	110	110	115	85	80	80	70
	2	120	120	120	130	100	95	95	90
	3	130	130	130	150	120	120	120	115
	4	130	140	150	170	125	120	120	130
HN210/HN220 Connecting size:1–1/2" Orifice size:5/8"	0.5	62	68	68	70	70	65	60	–
	0.7	80	80	80	90	75	75	75	75
	1	90	90	90	90	90	90	95	95

AC10, Capacity in Nm ³ /h, Natural gas									
Inlet pressure (bar)		Outlet pressure (bar)							
		0.025	0.03	0.05	0.1	0.15	0.2	0.3	0.5
HN400/HNS400 Connecting size:2" Orifice size:3/4"	0.5	130	130	130	130	120	105	100	–
	0.7	160	160	170	170	170	140	140	110
	1	230	210	240	240	240	190	190	170
	1.5	320	310	340	320	320	240	240	240
	2	440	440	410	400	400	320	290	290
	3	530	530	560	600	580	440	400	400
	4	580	580	610	800	800	540	540	540
HN400/HNS400 Connecting size:2" Orifice size:1"	0.5	170	170	170	190	170	140	120	–
	0.7	220	220	230	250	230	180	160	130
	1	290	300	310	300	300	240	230	210
	1.5	380	400	420	430	430	300	300	290
	2	620	600	560	560	560	400	390	380

The above lists the commonly used valve orifice flow rates. Custom flow tables for specific valve orifice requirements can be provided upon request.