

# Model 121 Regulators

Brochure

## Introduction

### For Commercial, Industrial Combustion and Distribution Applications

The **Model 121** is a new dimension in spring regulator capability, offering spring regulator **dependability, simplicity and economy.**

**New technology plus contemporary design provides greater capacity, higher inlet pressure, more accurate performance and faster response, with resulting economy** — in most cases a smaller regulator will do the job.

Use the 121 for commercial and industrial applications: burners, boilers, furnaces, air heaters, kilns, gas engines and benefit from its fast response.

Use it also as a large capacity supply regulator on commercial or industrial service lines, or as a small district regulator.

It's excellent for primary control or monitoring — use it for either or both.

The 121 is actually a whole new family of regulators — standard regulator, zero governor or atmospheric regulator, differential regulator, back pressure regulator, or relief valve, vacuum regulator and vacuum breaker.

Compatible with natural gas, propane, LPG, air nitrogen, etc. Special material available for certain corrosive gases. For installation, servicing and parts, see Bulletin IN-G-REG-1328.

And, for a complete 121 regulator, ready to go back to work for you — contact your Sensus Representative or Authorized Industrial Distributor.

## Outlet Pressure Ranges and Springs

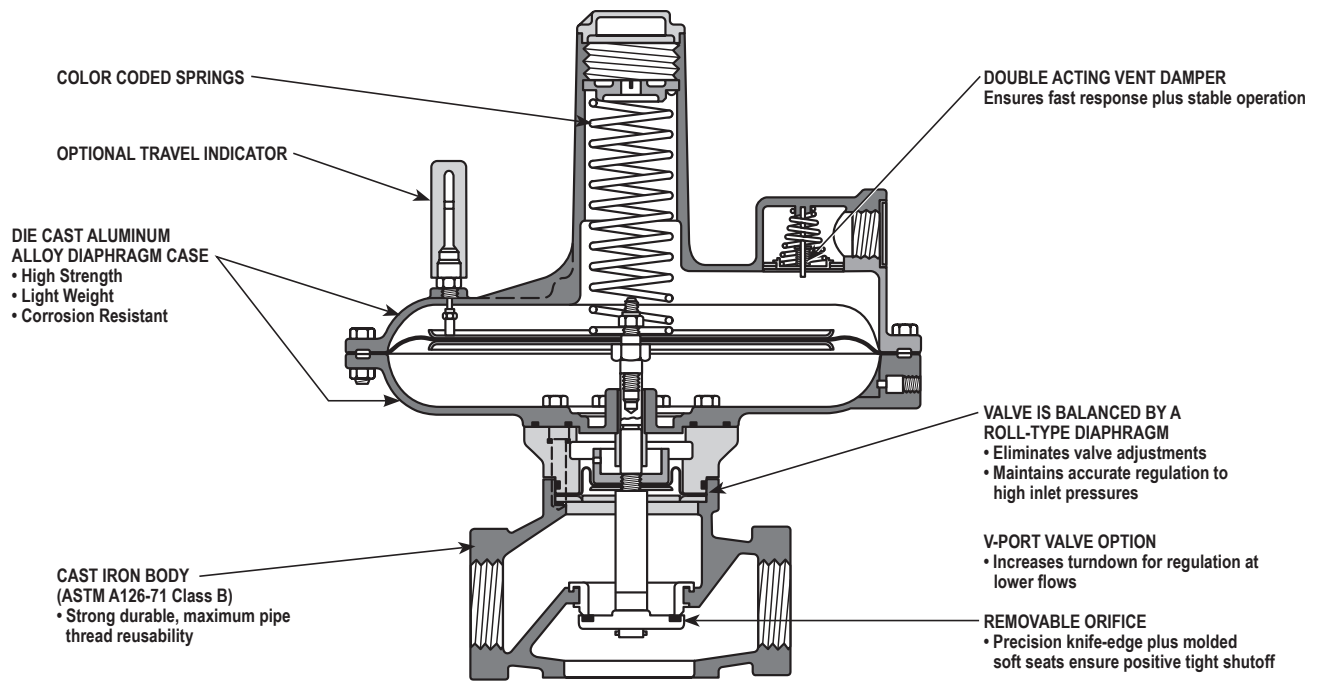
Size	Outlet Pressure Range	Spring Color	Spring Part Number	Maximum Inlet Pressure	Nominal Diaphragm Size
¾", 1", and 1¼" ** Model 121-8	1½" to 3½" w.c.	blue-black black-red	143-82-021-01 (main spring) 121-10-021-50 (counterspring)	60 psi	8"
	1½" to 12" w.c.	green-black black-red	143-82-021-02 (main spring) 121-10-021-50 (counterspring)		
	3½" to 6½" w.c.	red-black	143-82-021-00		
	5" to 8½" w.c.	blue-black	143-82-021-01		
	6" to 14" w.c.	green-black	143-82-021-02		
	12" to 28" w.c. 1 psi to 2 psi 2 psi to 4¼ psi	green (2" O.D.) orange (2" O.D.) black	143-16-021-05 143-16-021-06 143-16-021-07		
¾", 1" and 1¼" ** Model 121-8HP	3 psi to 6 ½ psi	cadmium*	143-16-021-08	60 psi	8"
	6 psi to 10 psi	cadmium* white	143-16-021-08 (outer) 143-16-021-13 (inner)		
1½", 2" and 2½" Model 121-12	1½" to 3½" w.c.	red —	143-16-021-03(main spring) 120-10-021-10 (counterspring)	60 psi	12"
	1½" to 12" w.c.	maroon —	121-42-021-00 (main spring) 120-10-021-10 counter spring)		
	3½" to 6½" w.c.	red (2" O.D.)	143-16-021-03		
	5" to 8½" w.c.	blue (2" O.D.)	143-16-021-04		
	6" to 14" w.c.	green (2" O.D.)	143-16-021-05		
	12" to 28" w.c. 1 psi to 2 psi 1½ psi to 3 psi	orange (2" O.D.) black cadmium	143-16-021-06 143-16-021-07 143-16-021-08		
1½", 2" and 2½" Model 121-8	1 psi to 2 psi 2 psi to 4¼ psi	orange (2" O.D.) black	143-16-021-06 143-16-021-07	60 psi	8"
	3 psi to 6½ psi	cadmium*	143-16-021-08		
1½", 2" and 2½" Model 121-8HP	6 psi to 10 psi	cadmium* white	143-16-021-08 (outer) 143-16-021-13 (inner)	60 psi	8"
	3" and 4" Model 121-16	3½" to 6½" w.c. 5" to 8½" w.c. 6" to 14" w.c. 14" to 28" w.c. ½ psi to 1¼ psi	red (3" O.D.) blue (3" O.D.) green (3" O.D.) orange (3" O.D.) yellow		
3" and 4" Model 121-12	1 psi to 2 psi 1½ psi to 3 psi	black cadmium	143-16-021-07 143-16-021-08	40 and 15†	12"

\* Require High Pressure Spring Adjustment.

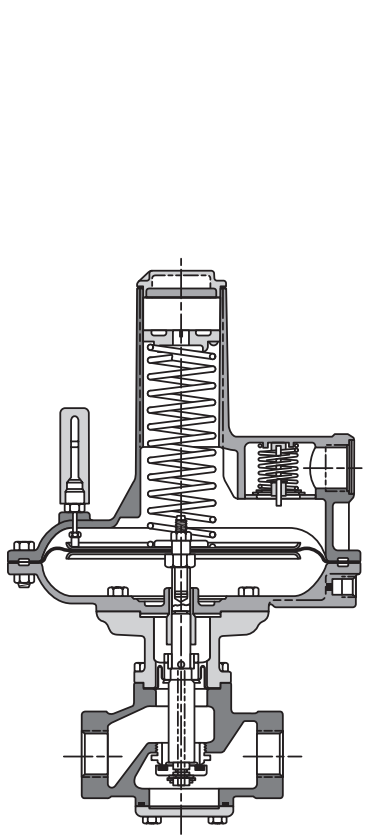
† 3" 121 is 40 psi., 4" 121 is 15 psi.

\*\* ¾" x ¾" not available.

### 1½", 2" and 2½" Model 121-12 Regulator

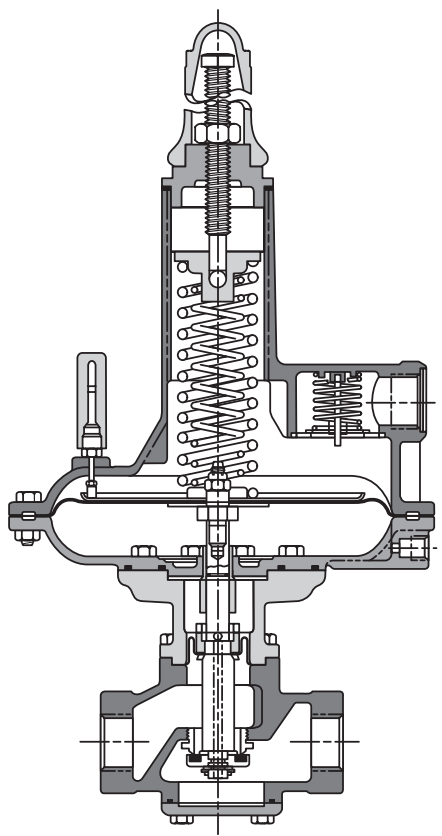


GCD1328-005



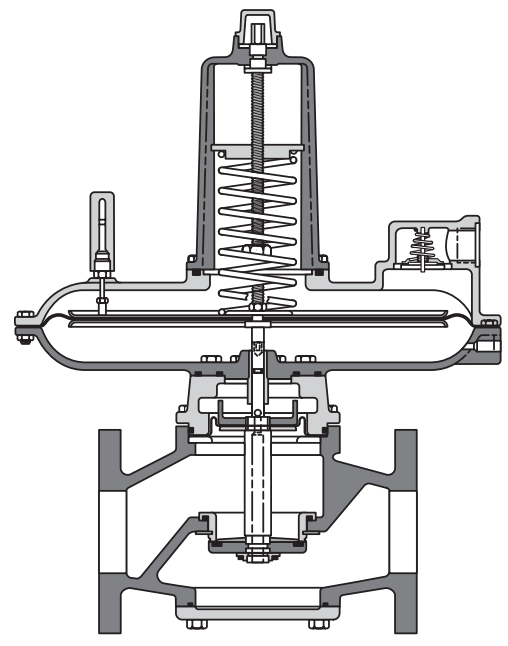
GCD1328-010

¾", 1" AND 1¼"  
MODEL 121-8



GCD1328-015

HIGH PRESSURE SPRING ADJUSTMENT  
FOR 3 PSI TO 10 PSI OUTLET PRESSURE  
MODEL 121-8HP

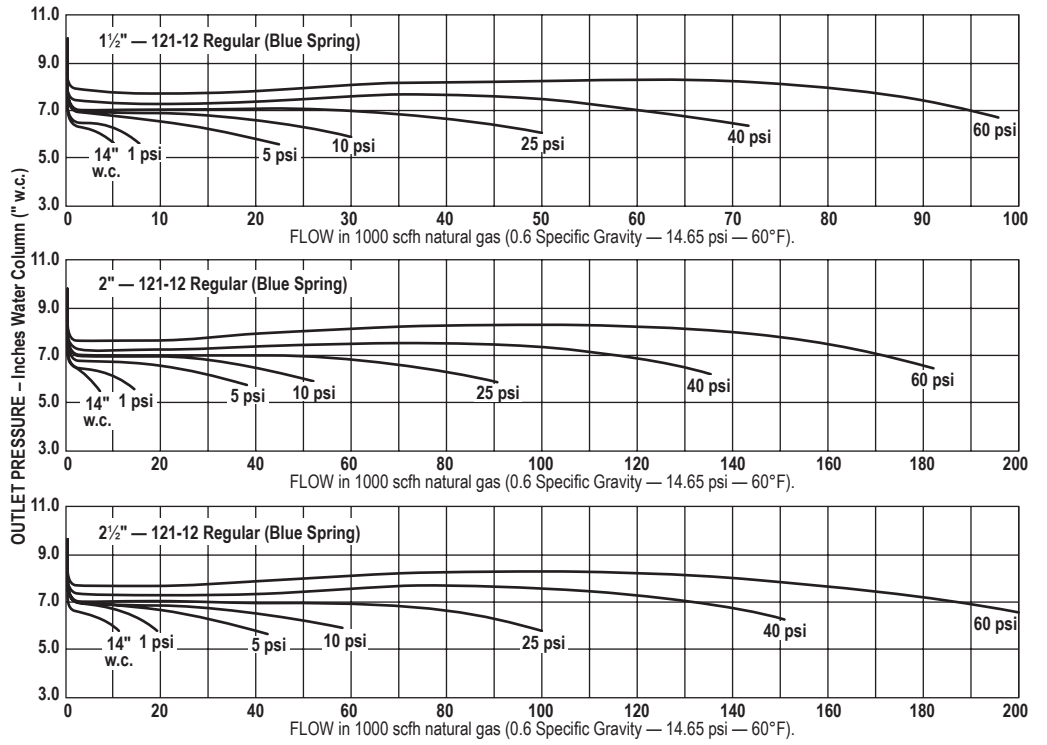


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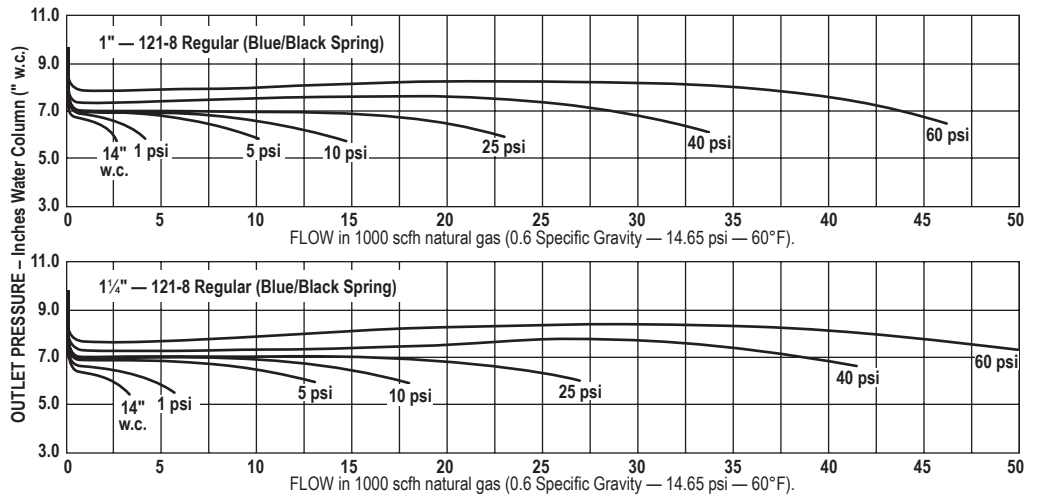
3" AND 4"  
MODEL 121-16

## Typical Performance Curves

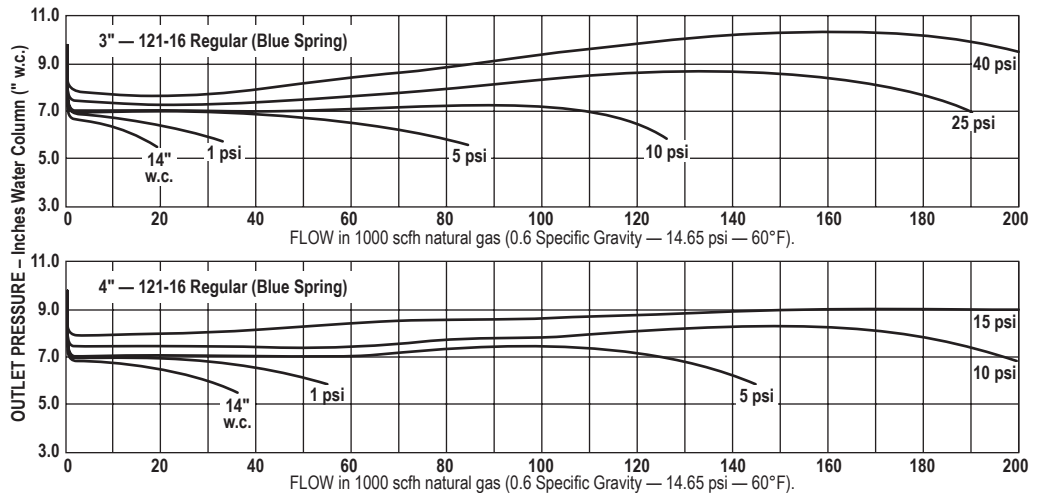
### Model 121-12



### Model 121-8



### Model 121-16



### 1½", 2" and 2½" Model 121-12 Capacity in scfh of natural gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

An outstanding feature of the 121 is large capacity. It has so much that at higher inlet pressure it is necessary to increase the size of the outlet piping.

This pipe size increase is indicated by the asterisks in the capacity tables below and on pages 4, 5, 6 and 7. The following note explains how to read this data from the tables:

**NOTE:** Each capacity figure immediately above the heavy horizontal lines is a maximum capacity for the outlet pipe size shown. Increasing the inlet pressure will not increase the capacity without also increasing the outlet pipe size as indicated.

For example: a 1½" Model 121-12 at 5" w.c. set-point has the following maximum capacities:

1. With 1½" size outlet piping ..... 14,600 SCFH at 3 psi to 60 psi inlet pressure.
2. With 2" size outlet piping ..... 37,000 SCFH at 15 psi to 60 psi inlet pressure.
3. With 3" size outlet piping ..... 95,000 SCFH at 60 psi inlet pressure.

The designated increase in outlet pipe size must be made immediately downstream of the regulator outlet.

This **NOTE** applies to the asterisks in all capacity tables, pages 4, 5, 6 and 7.

Pipe Size	Inlet Pressure	Outlet Pressure							Regulator Size and Model	
		Set-Point 5" W.C.	Set-Point 7" W.C.	Set-Point 11" W.C.	Set-Point 18" W.C.	Set-Point 28" W.C.	Set-Point 2 psi.	Set-Point 3 psi.		
		Red Spring 1" w.c. Droop	Blue Spring 1" w.c. Droop	Green Spring 2" w.c. Droop	Orange Spring 2" w.c. Droop	Orange Spring 3" w.c. Droop	Black Spring ¼ psi. Droop	Cadmium ½ psi. Droop		
1½" *	8" w.c.	4000	3000	—	—	—	—	—	1½" Model 121-12	
	14" w.c.	4900	4500	3700	—	—	—	—		
	1 psi	7400	7000	6500	6000	—	—	—		
	2 psi	11500	11000	10300	9500	10000	—	—		
	3 psi	14600	14500	13750	12500	13000	10000	—		
2" *	5 psi	19500	19400	18500	17300	18000	16400	14000		
	10 psi	30000	30000	28000	27000	27500	25100	25500		
	15 psi	37000	37000	36200	35000	35700	34000	31500		
3" *	25 psi	50000	50000	49000	47400	48000	46000	45500		
	40 psi	68000	68000	67100	66000	66600	64200	63500		
	50 psi	80000	80000	79000	77700	78000	74900	76000		
	60 psi	95000	95000	93500	90000	92000	87000	86500		
2" *	8" w.c.	5000	4000	—	—	—	—	—		2" Model 121-12
	14" w.c.	8900	8000	6600	—	—	—	—		
	1 psi	13000	12500	12000	11000	—	—	—		
	2 psi	20500	20000	19400	17500	18000	—	—		
	3 psi	26300	26000	25000	23400	23800	19000	—		
	5 psi	35000	35000	34500	33500	34000	30000	27500		
3" *	10 psi	52000	52000	51000	49600	50000	49000	46500		
	15 psi	68000	68000	67500	65500	66000	64700	61500		
	25 psi	90000	90000	89000	88000	88500	84500	87000		
4" *	40 psi	125000	125000	124000	120000	121500	118000	116500		
	50 psi	150000	150000	148000	145000	146500	143300	139500		
	60 psi	175000	175000	174000	171200	172000	170000	165500		
2½" *	8" w.c.	5500	4500	—	—	—	—	—	2½" Model 121-12	
	14" w.c.	9700	9000	7300	—	—	—	—		
	1 psi	14400	14000	13000	12000	—	—	—		
	2 psi	22200	22000	21000	19100	20000	—	—		
	3 psi	29100	29000	27900	26000	27100	21500	—		
5 psi	39500	39500	38700	37000	37600	33500	27500			
3" *	10 psi	5800	58000	57000	54800	55500	53000	52000		
	15 psi	75500	75500	74000	71900	72300	70100	66500		
	25 psi	100000	100000	99000	97100	98000	94000	94000		
4" *	40 psi	140000	140000	138000	133500	135000	130000	129500		
	50 psi	166000	166000	164000	156000	158000	155000	153500		
	60 psi	195000	195000	193000	189700	191000	188000	179000		

\*See NOTE in upper part of page 4.

**NOTE:** The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

### 1½", 2" and 2½" Models 121-8 and 121-8HP Capacity in scfh of natural gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

Regulator Size and Model	Outlet Pressure		Pipe Size	Inlet Pressure	Outlet Pressure		Regulator Size and Model
	Set-Point 3 psi	Set-Point 2 psi			Set-Point 5 psi	Set-Point 10 psi	
	Black Spring ½ psi. Droop	Orange Spring ¼ psi. Droop			Cadmium Spring ½ psi. Droop	Cadmium & White Spring 1 psi. Droop	
1½" Model 121-8	—	8500	1½" *	3 psi	—	—	1½" Model 121-8HP†
	11000	13000		5 psi	—	—	
	20000	21000		10 psi	16500	—	
	26000	27000		15 psi	24500	22000	
	35100	36000		25 psi	33000	30000	
	47000	50000		40 psi	44500	42700	
	63500	66000		50 psi	62000	60500	
	70000	71500		60 psi	68000	66500	
2" Model 121-8	—	15000	2" *	3 psi	—	—	2" Model 121-8HP†
	20000	24000		5 psi	—	—	
	37000	39000		10 psi	30000	—	
	48000	50000		15 psi	45000	40000	
	64000	65000		25 psi	60000	55000	
	85000	90000		40 psi	80000	76000	
	116000	120000		50 psi	114000	110000	
127000	130000	60 psi	123000	121000			
2½" Model 121-8	—	16700	2½" *	3 psi	—	—	2½" Model 121-8HP†
	22000	26700		5 psi	—	—	
	41000	43500		10 psi	33500	—	
	53500	55000		15 psi	50000	44500	
	71000	72000		25 psi	66500	61000	
	94500	100000		40 psi	89000	85000	
	129000	133000		50 psi	127000	122000	
140000	144000	60 psi	135000	130000			

\* See NOTE in upper part of page 4.

† These Regulators use the High Pressure Spring Adjustment.

**NOTE:** The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

### ¾", 1" and 1¼" Models 121-8 and 121-8HP

#### Capacity in scfh of natural gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

Pipe Size	Inlet Pressure	Outlet Pressure							Regulator Size and Model	
		Set-Point 5" W.C.	Set-Point 7" W.C.	Set-Point 11" W.C.	Set-Point 18" W.C.	Set-Point 28" W.C.	Set-Point 2 psi.	Set-Point 3 psi.		
		Red/Black Spring 1" w.c. Droop	Blue/Black Spring 1" w.c. Droop	Green/Black Spring 2" w.c. Droop	Green Spring 2" w.c. Droop	Green Spring 3" w.c. Droop	Orange Spring ¼ psi. Droop	Black Spring ½ psi. Droop		
1" *	8" w.c.	1500	1000	—	—	—	—	—	¾" x 1" 1" x 1" Model 121-8	
	14" w.c.	2500	2300	2000	—	—	—	—		
	1 psi	4200	4000	3600	2500	—	—	—		
	2 psi	6100	6000	5500	5000	5200	—	—		
	3 psi	7700	7500	7400	7200	7300	6000	—		
2" *	5 psi	11200	10000	9900	9700	9800	9000	7500		
	10 psi	14500	14000	13700	13000	13500	12200	11500		
	15 psi	17300	17000	16500	15800	16000	15000	14300		
	25 psi	23200	23000	22700	22000	22500	21400	20000		
	40 psi	32000	32000	31200	30000	31000	30100	29500		
3" *	50 psi	38000	38000	37700	37000	38000	35500	34500		
	60 psi	44000	44000	43300	42500	43000	42000	40000		
1¼" *	8" w.c.	2000	1500	—	—	—	—	—		¾" x 1¼" 1" x 1¼" 1¼" x 1¼" Model 121-8
	14" w.c.	3500	3000	2200	—	—	—	—		
	1 psi	5500	5000	4500	4000	—	—	—		
	2 psi	7800	7500	7000	6000	6200	—	—		
	3 psi	9700	9500	9000	8000	8400	7200	—		
2" *	5 psi	12700	12500	11200	10400	10800	9700	8300		
	10 psi	18000	17850	17000	16000	16300	15400	15000		
	15 psi	22500	22000	21700	20500	21000	18900	18000		
3" *	25 psi	27100	27000	26200	25400	25900	24900	24000		
	40 psi	41000	41000	40000	39000	39600	38400	38000		
	50 psi	48000	48000	45000	43600	44000	42000	40800		
	60 psi	56000	56000	55000	53000	53800	52100	51600		

Regulator Size and Model	Outlet Pressure		Pipe Size	Inlet Pressure	Pipe Size	Outlet Pressure		Regulator Size and Model
	Set-Point 10 psi	Set-Point 5 psi				Set-Point 5 psi	Set-Point 10 psi	
	Cadmium & White Spring 1 psi. Droop	Cadmium Spring ½ psi. Droop				Cadmium Spring ½ psi. Droop	Cadmium & White Spring 1 psi. Droop	
¾" x 1" 1" x 1" Model 121-8HP†	—	11000	1" *	10 psi	1¼" *	14200	—	¾" x 1¼" 1" x 1¼" 1¼" x 1¼" Model 121-8HP†
	10000	14000		15 psi		17300	14000	
	17000	19200		25 psi		23100	20000	
	24000	28000		40 psi		37200	34000	
	30000	34000		50 psi		39800	37000	
	35000	38500		60 psi		50000	45000	

\* See NOTE in upper part of page 4.

† These 121-8 Regulators use the High Pressure Spring Adjustment.

**NOTE:** The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

### 3" and 4" Models 121-16 and 121-12

#### Capacity in scfh of natural gas

(0.6 Specific Gravity – 14.65 psia – 60°F)

Pipe Size	Inlet Pressure	Outlet Pressure					Regulator Size and Model
		Set-Point 5" W.C.	Set-Point 7" W.C.	Set-Point 11" W.C.	Set-Point 18" W.C.	Set-Point 28" W.C.	
		Red Spring 1" w.c. Droop	Blue Spring 1" w.c. Droop	Green Spring 2" w.c. Droop	Orange Spring 2" w.c. Droop	Orange Spring 3" w.c. Droop	
3" *	8" w.c.	10000	9700	—	—	—	3" Model 121-16
	14" w.c.	19500	19000	18000	—	—	
	1 psi	31000	30800	29000	27000	—	
	2 psi	47000	46000	46000	34000	35000	
	3 psi	60000	59000	58000	53000	55000	
5 psi	80000	80000	78000	74000	75000		
4" *	10 psi	12500	125000	120000	120000	125000	
	15 psi	14500	145000	145000	138500	140000	
6" *	25 psi	190000	190000	190000	185000	190000	
	40 psi	260000	260000	260000	260000	260000	
4" *	8" w.c.	18000	17200	—	—	—	4" Model 121-16
	14" w.c.	34500	34000	29000	—	—	
	1 psi	56400	56000	49000	47200	—	
	2 psi	90000	85000	80000	68000	70000	
	3 psi	110000	110000	105000	99000	100000	
5 psi	145000	145000	140000	131000	135000		
6" *	10 psi	202000	202000	200000	191000	200000	
	15 psi	252000	252000	245000	240000	250000	

\* See NOTE in upper part of page 4.

Regulator Size and Model	Outlet Pressure			Inlet Pressure	Outlet Pressure			Regulator Size and Model
	Set-Point 3 psi	Set-Point 2 psi	Set-Point 1 psi		Set-Point 1 psi	Set-Point 2 psi	Set-Point 3 psi	
	Cadmium Spring ½ psi. Droop	Black Spring ¼ psi. Droop	Black Spring ¼ psi. Droop		Black Spring ¼ psi. Droop	Black Spring ¼ psi. Droop	Cadmium Spring ½ psi. Droop	
3" Model 121-12	—	—	35000	2 psi	60000	—	—	4" Model 121-12
	—	40000	53000	3 psi	90000	70000	—	
	55000	65000	74000	5 psi	120000	110000	80000	
	90000	100000	110000	10 psi	190000	175000	140000	
	125000	135000	139000	15 psi	240000	225000	200000	
	175000	183000	185000	25 psi	—	—	—	
200000	20000	100000†	40 psi	—	—	—		

† 100,000 is the capacity at a boost of 3" w.c. instead of the 5" w.c. droop indicated.

**NOTE:** The above performance data is based on normal testing at 70°F flowing temperature. Changes in performance can occur at extreme low flowing temperatures.

### Maximum Emergency Pressures

**NOTE:** Before using any of the following data, make sure this entire section is clearly understood.

The maximum pressure the regulator inlet may be subjected to under abnormal conditions without causing damage to the regulator is:

¾" through 2½" Pipe Sizes.....	70 psi
3" Pipe Size.....	50 psi
4" Pipe Size.....	25 psi

The maximum pressure the regulator outlet may be subjected to without causing damage to the internal parts of the regulator is:

121-8.....	set-point + 5 psi
121-8HP.....	set-point + 10 psi
121-12.....	set-point + 5 psi
121-16.....	set-point + 2 psi

Set-point is defined as the outlet pressure a regulator is adjusted to deliver. If any of the above pressure limits are exceeded, the regulator must be taken out of service and inspected. Damaged parts must be repaired or replaced.

The maximum pressure that can be safely contained by the diaphragm case is:

121-8.....	25 psi
121-8HP.....	25 psi
121-12.....	20 psi
121-16.....	10 psi

Safely contained means no leakage as well as no bursting.

### Over-pressurization Protection

Protect the downstream piping system and the regulator’s low pressure chambers against over-pressurization due to the possible regulator malfunction or failure to achieve complete lockup. The allowable outlet pressure is the lowest of the maximum pressures permitted by federal codes, state codes, Sensus bulletin RDS-1498, or other applicable standards. The method of protection can be a relief valve, monitor regulator, shutoff device, or similar mechanism.

### Full Open Capacity

Capacity of the Model 121 in the full open position can be calculated using the following formulas and K factors:

- $Q = K\sqrt{P_0(P_1 - P_0)}$ ..... (for  $P_1/P_0$  less than 1.894)
- $Q = \frac{K P_1}{2}$ ..... (for  $P_1/P_0$  greater than 1.894)

Q = Full open capacity in SCFH of 0.6 specific gravity natural gas.

$P_1$  = **absolute** inlet pressure (psia)

$P_0$  = **absolute** outlet pressure (psia)

1" Pipe Size (outlet).....	K=1400
1½" Pipe Size.....	K=2750
2" Pipe Size.....	K=4750
2½" Pipe Size.....	K=5250
1¼" Pipe Size (outlet).....	K=1750
3" Pipe Size.....	K=11000
4" Pipe Size.....	K=18000

Remember, at the above full open capacities the droop is significantly greater than specified in the capacity tables on pages 4, 5, 6 and 7.

When checking 121 regulator capacity for use in providing adequate relief capacity, use the above calculated full open capacity. Do not use 121 capacity values from the tables on pages 4, 5, 6 and 7.

### Pipe Sizes

Screwed NPT		Flanged ANSI 125 lb. FF.
¾" x 1"	1½" x 1½"	2" x 2"
¾" x 1¼"	1½" x 2"	3" x 3"
1" x 1"	2" x 2"	4" x 4"
1" x 1¼"	2½" x 2½"	
1¼" x 1¼"	3" x 3"	

### Other Gases

Model 121 Regulators are most widely used with natural gas. However, they perform equally well with LP gas, nitrogen, dry CO<sub>2</sub> and air.

For other gas capacities, multiply the table values on page 4, 5, 6 and 7 by the applicable correction factors:

Type of Gas	Correction Factor
Air (Specific Gravity 1.0)	0.77
Propane (Specific Gravity 1.53)	0.63
1350 BTU Propane-Air Mix (Specific Gravity 1.20)	0.71
Nitrogen (Specific Gravity 0.97)	0.79
Dry Carbon Dioxide (Specific Gravity 1.52)	0.63

For other non-corrosive gases use the following formula:

$$\text{CORRECTION FACTOR} = \sqrt{\frac{0.60}{\text{Specific gravity of the gas}}}$$

For use with gases not listed above, please contact your Sensus representative or Industrial Distributor for recommendations.

**CAUTION**

**Turn gas on slowly. If an outlet stop valve is used, it should be opened first. Do not overload the diaphragm with a sudden surge of inlet pressure. Monitor the outlet pressure during start-up to prevent an outlet pressure overload. REFER TO RM-1328 FOR MORE DETAILED START-UP PROCEDURES.**



### Materials of Construction

Body and Adapter .....	Cast Iron
Diaphragm Case (8" and 12" Diaphragm) .....	Die Cast Aluminum Alloy
Diaphragm Case (16" Diaphragm) .....	Permanent Mold Aluminum Alloy
Main and Seal Diaphragms .....	Buna-N on Nylon
Piston for Seal Diaphragm (¾" thru 2½" Model 121) .....	Powdered Iron-Zinc Plated
Piston for Seal Diaphragm (3" and 4" Model 121) .....	Aluminum Alloy
Stem, Stud, Pans and Plates for 8", 12" and 16" Diaphragms .....	Stainless Steel
Stem bushing .....	Stainless Steel
Orifice (¾" thru 1¼" Model 121) .....	Brass
Orifice (1½" thru 4" Model 121) .....	Cast Iron
Retaining Ring (1½" thru 4" Model 121) .....	Plated Steel
Valve .....	Plated Steel with Molded Buna-N Soft Seat
Valve Holder .....	Stainless Steel
Retaining Ring and Wave Washer .....	Stainless Steel
O-Rings and Tetraseals .....	Buna-N
Adjustment Spring Ferrule .....	Zinc Die Casting
Bottom Spring Button .....	Powdered Iron-Plated
Adjustment Screw (16" Diaphragm) and H.P. Adjustment Spring Ferrule .....	Plated Steel
Adjustment Ferrule Screw (16" Diaphragm) and H.P. Adjustment Spring Ferrule .....	Cast Iron
Seal Cap (8" and 12" Diaphragm) .....	Zinc Die Casting
Seal Cap (16" Diaphragm) .....	Die Cast Aluminum Alloy

### Body Taps

Inlet and outlet taps are available on either side of the body. Tap size is ¼" NPT. Refer to "dimensions" on page 13. Desired taps must be specified when ordering.

### Metrication

Use the following for Metric Conversions:

$\text{std. meters}^3/\text{hr.} \times 35.31 = \text{std. ft.}^3/\text{hr. (SCFH)}$ $\text{std. ft.}^3/\text{hr. (SCFH)} \times 0.0283 = \text{std. meters}^3/\text{hr.}$
$\text{kilograms/centimeter}^2(\text{kg/cm}^2) \times 14.22 = \text{psig}$ $\text{psig} \times 0.0703 = \text{kilograms/centimeters}^2(\text{kg/cm}^2)$
$\text{kilopascals (kPa)} \times 0.145 = \text{psig}$ $\text{psig} \times 6.90 = \text{kilopascals (kPa)}$
$\text{bars} \times 14.50 = \text{psig}$ $\text{psig} \times 0.69 = \text{bars}$
$\text{millimeters water (mm H}_2\text{O)} \times .0394 = \text{in. w.c.}$ $\text{in. w.c.} \times 25.4 = \text{millimeters water (mm H}_2\text{O)}$
$\text{millimeters mercury (mm Hg)} \times 0.535 = \text{in. w.c.}$ $\text{in. w.c.} \times 1.868 = \text{millimeters mercury (mm Hg)}$

### How to order

Specify:

1. Model Number.
2. Pipe size (on 2" and 3" specify whether screwed or flanged).
3. Inlet pressure.
4. Outlet Pressure.
5. Capacity required — SCFH.
6. Kind of gas (natural gas, propane, air, etc.)

### Buried Service

These regulators are designed for above ground or vault installations and are not recommended for direct earth burial.

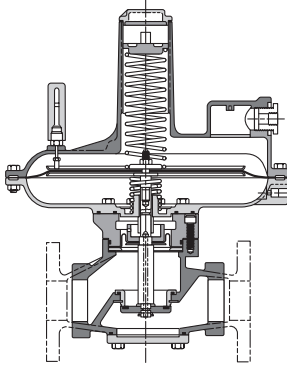
### Temperature Limits

Model 121 regulators can be used for temperatures from -20°F to 150°F.

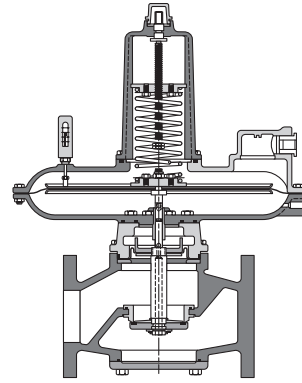
**CAUTION**

It is the user's responsibility to ensure all regulator vents and/or vent lines exhaust to a non-hazardous location away from ANY POTENTIAL sources of ignition. Refer to Sensus Bulletin RM-1328 for more detailed information.

## Variations



GCD1328-040



GCD1328-045

### Zero Governor

**Zero Governors** are also called **Atmospheric Regulators**. They are used for outlet pressures close to atmospheric, from slightly above this to slightly below. Inlet pressures are the same as on standard 121 regulators (see Page 8).

All pipe sizes listed on Page 8 are available: 3/4" through 4". Note from the illustrations that the 3" and 4" sizes use a reversed main spring design while the remaining sizes 2 1/2" and smaller, use a counterspring along with the standard main spring. With the exception of certain parts required for the foregoing, everything else is the same as on standard 121 regulators.

### Pressures and Springs

Size	Outlet Pressure Range	Springs
3/4", 1" and 1 1/4" Model 121-8	1 1/2" w.c. vacuum (-1 1/2" w.c.) to + 1 1/2" w.c.	Main Spring (red-black).....143-82-021-00 Counterspring (red-black).....121-10-021-50
2 1/2", 2" and 2 1/2" Model 121-12	1" w.c. vacuum (-1" w.c.) to + 1 1/2" w.c.	Main Spring (red-black).....143-82-021-00 Counterspring.....120-10-021-10
3" and 4" Model 121-16	1 1/4" w.c. vacuum (-1 1/4" w.c.) to + 1 1/4" w.c.	Main Spring only.....121-62-021-54

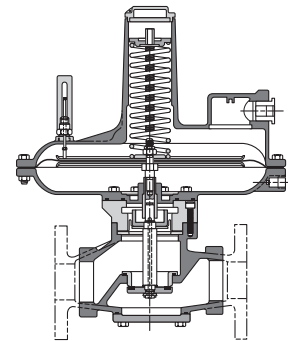
### Differential Regulators

**Differential regulators** are used to maintain a constant difference between gas pressure and air or combustion chamber pressure in certain types of premix and nozzle mix burners. This is done by adding a second control line which applies the air or combustion chamber pressure to the top of the diaphragm.

**Differential regulators** can also be used to maintain a constant pressure drop across an orifice. On the 121-8 and 121-12, both control lines are 1/4" NPT. On the 121-16 both are 1/2" NPT.

All of the pipe sizes listed on Page 8 are available; 3/4" through 4". Parts are interchangeable with standard 121 regulators.

For differentials lower than 3 1/2" w.c., please contact your Sensus Representative.



GCD1328-045A

Size	Differential Pressure Range	Spring Color	Spring Part Number	Maximum Body Pressure	Maximum Diaphragm Pressure Differential	Maximum Diaphragm Case Pressure
3/4", 1" and 1 1/4" Model 121-8 **	3 1/2" to 6 1/2"	red-black	143-82-021-00	60 psi	2 psi	35 psi
	5" to 8 1/2" w.c.	blue-black	143-82-021-01			
	6" to 14" w.c.	green-black	143-82-021-02			
	12" to 28" w.c.	green	143-16-021-05			
	1 psi to 2 psi	orange (2" O.D.)	143-16-021-06			
1 1/2", 2" and 2 1/2" Model 121-12	3 1/2" to 6 1/2" w.c.	red (2" O.D.)	143-16-021-03	60 psi	2 psi	20 psi
	5" to 8 1/2" w.c.	blue (2" O.D.)	143-16-021-04			
	6" to 14" w.c.	green (2" O.D.)	143-16-021-05			
	12" to 28" w.c.	orange (2" O.D.)	143-16-021-06			
	1 psi to 2 psi	black	143-16-021-07			
3" and 4" Model 121-16	3 1/2" to 6 1/2" w.c.	red (3" O.D.)	021-62-021-50	40 and 15 *	1 psi	10 psi
	5" to 8 1/2" w.c.	blue (3" O.D.)	121-62-021-51			
	6" to 14" w.c.	green (3" O.D.)	121-62-021-52			
	12" to 28" w.c.	orange (3" O.D.)	121-62-021-53			
3" and 4" Model 121-12	1 psi to 2 psi	black	143-16-021-07	40 and 15 *	2 psi	20 psi
	1 1/2 psi to 3 psi	cadmium	143-16-021-08			

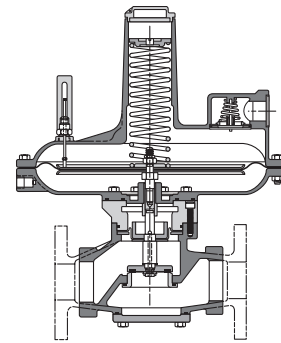
\* 3" Model 121-16 is 40 psi and 4" Model 121-16 is 15 psi. \*\* 3/4" x 3/4" not available.

## Back Pressure Regulator

**Back Pressure Regulators** are also used as Relief Valves. When so used, the 121 is a throttling or modulating type of relief valve, not a “pop” type. During an emergency it only relieves excess pressure. In addition, it closes tight when the emergency ends.

Back Pressure Regulators maintain constant upstream pressure by allowing excess gas to exit to a lower pressure downstream.

All of the pipe sizes listed on Page 8 are available: ¾" through 4". Note on the cutaway drawing that the valve opens upwards (in standard 121 regulators it opens downwards). With the exception of certain stem and orifice parts in the valve assembly, everything else is interchangeable with standard 121 regulators.



GCD1328-050

## Pressures and Springs

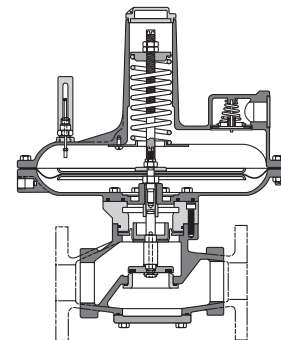
Size	Relief or Back Pressure Range	Spring Color	Part Number	Maximum Diaphragm Case Pressure
¾" thru 2½" Model 121-8	3" to 5½" w.c.	red-black	143-82-021-00	10 psi
	5" to 7½" w.c.	blue-black	143-82-021-01	
	6" to 13" w.c.	green-black	143-82-021-02	
	10" to 15" w.c.	blue (2" O.D.)	143-16-021-04	
	12" to 25" w.c.	green (2" O.D.)	143-16-021-05	
	18" w.c. to 2 psi	orange (2" O.D.)	143-16-021-06	
	1 psi to 4 psi	black	143-16-021-07	
¾" thru 2½" Model 121-8	3 psi to 6 psi	cadmium*	143-16-021-08	20 psi
	6 psi to 10 psi	{ cadmium (outer)* white (inner)	143-16-021-08 143-16-021-13	
1½", 2" and 2½" Model 121-12	3" to 5½" w.c.	red (2" O.D.)	143-16-021-03	10 psi
	5" to 7" w.c.	blue (2" O.D.)	143-16-021-04	
	6" to 12" w.c.	green (2" O.D.)	143-16-021-05	
	12" to 25" w.c.	orange (2" O.D.)	143-16-021-06	
1½" thru 4" Model 121-12	20" w.c. to 1¾ psi	black	143-16-021-07	10 psi
	1½ to 2¾ psi	cadmium	143-16-021-08	
3" and 4" Model 121-16	3" to 4½" w.c.	red (3" O.D.)	121-62-021-50	5 psi
	3" to 6" w.c.	blue (3" O.D.)	121-62-021-51	
	5" to 11" w.c.	green (3" O.D.)	121-62-021-52	
	10" to 24" w.c.	orange (3" O.D.)	121-62-021-53	
	14" w.c. to 1¼ psi	yellow	121-62-021-56	

\* Require High Pressure Spring Adjustment (121-8HP).

## Vacuum Regulator

**Vacuum Regulators** are used to maintain a certain negative pressure (vacuum) in enclosed spaces such as tanks, vessels, chambers, piping systems, etc. In general, these are piped to the regulator inlet and control line connections and the regulator outlet piped to the inlet of a vacuum pump or other vacuum source.

Available pipe sizes are ¾" thru 2½", as listed on Page 8. Note on the cutaway drawing that the spring assembly is arranged for an upward force on the valve. Also, the valve itself is normally open and moves downward to close rather than upwards as in the standard 121. With the exception of certain parts involved in the foregoing, everything else is interchangeable with standard 121 regulators.



GCD1328-055

## Vacuum and Springs

Size	Vacuum Range " w.c. vacuum (" w.c.)	Spring Color	Spring Part Number
¾", 1" and 1¼" Model 121-8	3" to 6½"	red-black	143-82-021-00
	5" to 8½"	blue-black	143-82-021-01
	8" to 14"	green-black	143-82-021-02
	12" to 20"	blue	143-16-021-04
	18" to 30"	green	143-16-021-05
1½", 2" and 2½" Model 121-12	3½" to 6½"	red	143-16-021-03
	5" to 8½"	blue	143-16-021-04
	8" to 14"	green	143-16-021-05

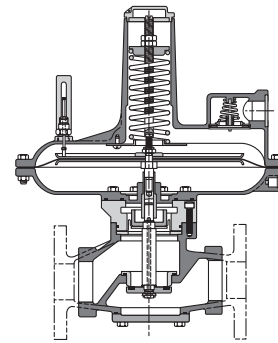
## Vacuum Breaker

**Vacuum Breakers** are vacuum limiting devices. In their general function, they can be compared to relief valves or back pressure regulators.

The breaker outlet and control line are piped to the vacuum. The breaker inlet connects to a lesser vacuum, to atmosphere, or to a positive pressure. The maximums for the positive pressure are 60 psi for ¾" through 2½" sizes, 40 psi for 3", and 15 psi for 4".

The vacuum breaker is normally closed and excess vacuum creates a valve opening movement which increases flow from the inlet and thereby relieves or "breaks" the excess.

All of the pipe sizes listed on Page 8 are available ¾" through 4". Note on the cutaway drawing that the main spring is reversed to provide the upward closing force on the valve. Except for certain parts used in the spring assembly, everything else is interchangeable with standard 121 regulators.



GCD1328-060

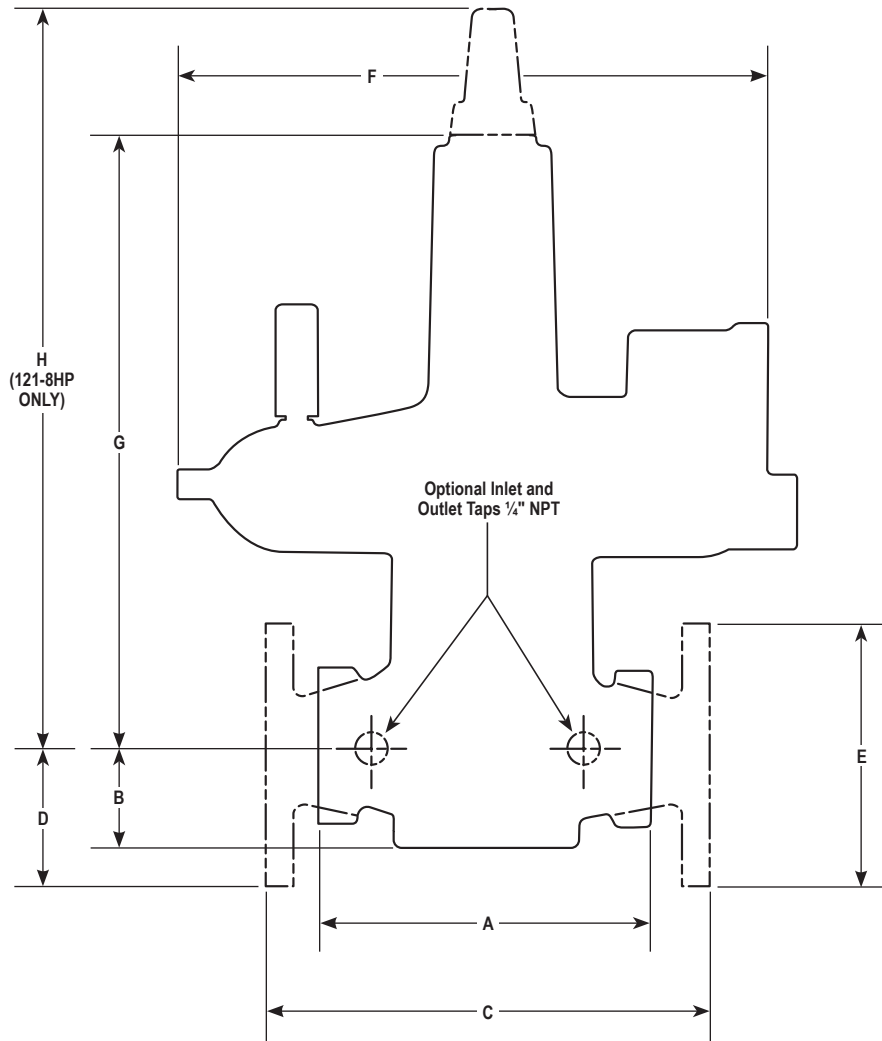
## Vacuum and Springs

Size	Vacuum Range " w.c. vacuum (-" w.c.)	Spring Color	Spring Part Number
¾", 1" and 1¼" Model 121-8	3" to 6½"	red-black	143-82-021-00
	5" to 8½"	blue-black	143-82-021-01
	8" to 14"	green-black	143-82-021-02
	12" to 20"	blue (2" O.D.)	143-16-021-04
	18" to 30"	green (2" O.D.)	143-16-021-05
	30" to 56"	orange (2" O.D.)	143-16-021-06
1½", 2" and 2½" Model 121-12	3" to 6½"	red (2" O.D.)	143-16-021-03
	5" to 8½"	blue (2" O.D.)	143-16-021-04
	8" to 14"	green (2" O.D.)	143-16-021-05
	12" to 28"	orange (2" O.D.)	143-16-021-06
	28" to 56"	black	143-16-021-07
	3" and 4" Model 121-16	3" to 5½"	red (3" O.D.)
4" to 7½"		blue (3" O.D.)	121-62-021-51
7" to 14"		green (3" O.D.)	121-62-021-52
3" and 4" Model 121-12	12" to 28"	orange (2" O.D.)	143-16-021-06
	28" to 56"	black	143-16-021-07

## Periodic Inspection:

Regulators are pressure control devices with numerous moving parts subject to wear that is dependent upon particular operation conditions. To ensure continuous satisfactory operation, adhere to periodic inspection schedule with the frequency of inspections determined by the security of service and applicable laws and regulations. **See Bulletin RM-1328 for field service instructions and warranty obligation.**

## Dimensions



GCD1328-065

Pipe Size	Model Number	Screwed NPT		Flanged ANSI 125 lb. FF			F (dia.)	G	High Pressure Spring Adjustment H
		A	B	C	D	E			
3/4"-1"-1 1/4"	121-8 & -8HP	5 3/4	1 5/8	—	—	—	10 3/16	13 3/16	19 1/4
1 1/2"	121-8 & -8HP	7 1/2	2 3/8	—	—	—	10 3/16	13 11/16	19 1/4
1 1/2"	121-12	7 1/2	2 3/8	—	—	—	14	14 1/8	—
2"	121-8 & -8HP	7 1/2	2 3/8	10	3	6	10 3/16	13 3/16	19 1/4
2"	121-12	7 1/2	2 3/8	10	3	6	14	14 1/8	—
2 1/2"	121-8 & -8HP	8 3/4	2 3/8	—	—	—	10 3/16	13 3/16	19 1/4
2 1/2"	121-12	8 3/4	2 3/8	—	—	—	14	14 1/8	—
3"	121-12	11 3/4	3 3/16	11 3/4	3 3/4	7 1/2	14	15 1/2	—
3"	121-16	11 3/4	3 3/16	11 3/4	3 3/4	7 1/2	18	19	—
4"	121-12	—	—	13 3/8	4 1/2	9	14	16 1/2	—
4"	121-16	—	—	13 3/8	4 1/2	9	18	20	—

NOTE: Dimensions are in inches.

### Other Sensus Gas Pressure Regulators

Sensus produces a broad product line of Gas Pressure Regulators which are widely used throughout the natural gas industry. These regulators are also suitable for non-corrosive industrial gas applications such as propane, butane, air, nitrogen, dry CO<sub>2</sub>, etc. For additional detailed information on a particular model, please request the indicated bulletin from the local Sensus sales office.

### Service Regulators

Model 143-80  
 Bulletin: DS-G-REG-1301  
 ¾", 1", 1¼" pipe size  
 Inlet pressures .....to 125 psi  
 Outlet pressures ..... 3½" w.c. to 6 psi  
 Capacity to 2000 CFH  
 Available with straight-through body.  
 Also available: internal relief valve and low pressure cut-off.

Model 243-8, 243-12, 243-8HP  
 Bulletin: R-1306  
 1¼", 1½" and 2" pipe size  
 Inlet pressures .....to 125 psi  
 Outlet pressures ..... 3½" w.c. to 10 psi  
 Capacity to 25,000 CFH  
 Also available: internal relief valve, low pressure cut-off, and external control line.

### Industrial Field Regulators

For intermediate to high pressure applications. Ideal on pipeline taps servicing plants and buildings. Appropriate for double stage reduction ahead of service regulators and for high pressure burners and compressed air systems.

Model 046  
 Bulletin: R-1312  
 ¾", 1" and 1¼" pipe size  
 Inlet pressures .....to 1000 psi  
 Outlet pressures .....3 to 200 psi  
 Capacity to 40,000 SCFH  
 Monitor and pressure loaded version, and internal relief valve also available.

Model 141A  
 Bulletin: R-1311  
 2" pipe size  
 Inlet pressures .....to 1500 psi  
 Outlet pressures .....5 to 400 psi  
 Capacity to 55,000 SCFH

### Pilot Loaded Regulators

For intermediate and high pressure applications requiring precise pressure reduction with minimal droop. Ideal for standard and high capacity flows on burners, driers, dehydrators and compressor factor billing.

Model 243-RPC  
 Bulletin: R-1343  
 1¼", 1½" and 2" pipe size  
 Inlet pressures .....to 150 psi  
 Outlet pressures ..... 3½" w.c. to 35 psi  
 Capacity to 76,000 SCFH

Model 1100  
 Bulletin: R-1341  
 Pipe size: 2" (screwed or flanged)  
 Inlet pressures .....to 400 psi  
 Outlet pressures ..... 3" w.c. to 100 psi  
 Capacity to 414,000 SCFH

Sensus also produces Industrial and Combustion Regulators; High Pressure, High Capacity Regulators, and Safety Relief Valves. Detailed information available on request.

**Notes:**

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# Model 121 Regulators

Brochure

## Authorized Distributor:

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