

Self-operated Pressure Regulators

Steam Pressure Reducing Valve Type 39-2 • Valve closes when downstream pressure rises



Application

Type 39-2 Steam Pressure Reducing Valves regulate the steam pressure downstream of the valve to a pre-adjusted set point value.

Set points from 0.3 psi to 230 psi (0.02 bar to 16 bar)

Nominal valve sizes ½" to 4"

Pressure ratings ANSI Class 125 to 300

For steam up to 660 °F (350 °C)

The regulators consist of a Type 2392 valve, complete with actuator, set point adjustment, and condensate chamber.

Features

- Low-maintenance, medium-controlled, self-operated proportional regulators requiring no auxiliary energy
- Easy setpoint adjustment at the valve
- Field retrofit of actuator for simple change of set point range
- No packing - stainless steel bellows provides zero-leak and frictionless plug stem seal
- Low-noise standard plug – special version with an St I flow divider for further noise level reduction (see Data Sheet T 8081)
- All wetted parts free of non-ferrous metal

Standard version

Type 2392 Valve with Control Actuator

- Sizes ½" to 4"
- ANSI Class 125 to 300
- Body made of ASTM materials cast iron A 126 Cl. B or cast carbon steel A 216 WCB
- Seat and plug of AISI 410 stainless steel
- Metal bellows seal of AISI 316 Ti stainless steel
- Type 2413 Actuator with EPDM rolling diaphragm
- Plug with metal sealing
- Includes condensate chamber and threaded fitting with dampening orifice

Options

- **Valve with St I flow divider** for particularly low-noise operation
- **With special actuator with metal bellows** for setpoint ranges 150...300 and 300...400 psi (10...20 and 20...25 bar). Information available upon request.



Fig. 1
Type 39-2 Steam Pressure Reducing Valve

For **DIN version** see Technical Data Sheet T 2506 EN

Associated Information Sheet

T 2500

Edition October 1996

ANSI Version

Associated Data Sheet for Accessories

T 2595

Technical Data Sheet

T 2508

Principle of operation (Fig. 2)

The process medium flows through the valve as indicated by the arrow. The position of the valve plug and hence the free area between the plug (3) and seat (2) determine the flow rate. The downstream pressure (p_2) to be controlled is transmitted via a control line to the rolling diaphragm where it is converted into a positioning force. The spring force can be adjusted using the set point adjustment (6). When the force resulting from the downstream pressure p_2 rises above the adjusted set point, the valve closes proportionally to the change in pressure.

The regulators are equipped with a stainless steel bellows (4.1) that eliminates stem packing. The **upstream** pressure (p_1) is applied to the exterior side of the bellows surface, thus balancing the forces acting on the valve plug. The **downstream** pressure is balanced via the diaphragm area in the actuator.

Table 1 · Technical data · All pressures in psig and bar (gauge)

Pressure rating	Class 125	Class 250	Class 150 and 300
Nominal size	1" to 4"	1/2" to 2"	1/2" to 4"
End connection	Flat face flanges	Female NPT threaded	Raised face flanges
Temperature range	According to ANSI (B16 Series)		
Valve plug	Metal-sealed up to 660 °F (350 °C)		
Actuator with condensate chamber	Steam up to 660 °F (350 °C)		
Perm. ambient temperature	175 °F (80 °C)		
Max. differential pressure Δp	1/2" to 2"	360 psi (25 bar)	
	2 1/2" to 3"	290 psi (20 bar)	
	4"	230 psi (16 bar)	
C_v (K_{vs}) value and seat dia.	See Table 3		
Terms for sizing according to ISA S75.01 and S75.02	$F_L = 0.95 \quad X_T = 0.75$		
Leakage rate	$\leq 0.05\%$ of C_v (K_{vs}) value		
Set point ranges	psi	0.3 to 3.5 psi	
		1.5 to 8.5 psi	
		3 to 18 psi	
		10 to 35 psi	
		30 to 75 psi	
Set point ranges	bar	65 to 145 psi	
		115 to 230 psi	
		0.02 to 0.25 bar	
		0.1 to 0.6 bar	
		0.2 to 1.2 bar	
Set point ranges	bar	0.8 to 2.5 bar	
		2 to 5 bar	
		4.5 to 10 bar	
		8 to 16 bar	
		1.5 · max. set point value	

Pressure-Temperature Diagram

The range of application of the valves is limited by the pressure-temperature rating of the body material and ANSI class. The diagram in Fig. 3 is for reference only. For exact values, consult ANSI standards B16.1, B16.4 and B16.34.

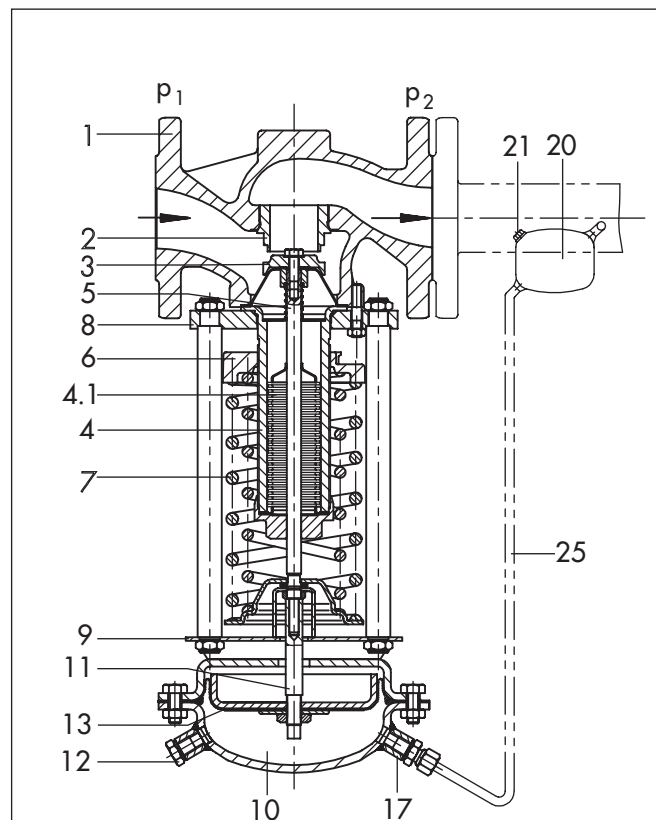


Fig. 2
Type 39-2 Steam Pressure Reducing Valve, principle of operation

- | | | |
|-----------------------------|---|---|
| 1 Valve body | 7 Operating spring | 13 Operating diaphragm |
| 2 Valve seat (exchangeable) | 8 Flange | 17 Control line connection (screw joint w. restriction) |
| 3 Plug | 9 Cross-arm | 20 Condensation chamber |
| 4 Bellows housing | 10 Actuator | 21 Filler plug |
| 4.1 Metal bellows | 11 Actuator stem | 25 Control line (to be provided by the customer) |
| 5 Plug stem | 12 Vent screw (only for A = 100 in ²) | |
| 6 Set point adjustmt. | | |

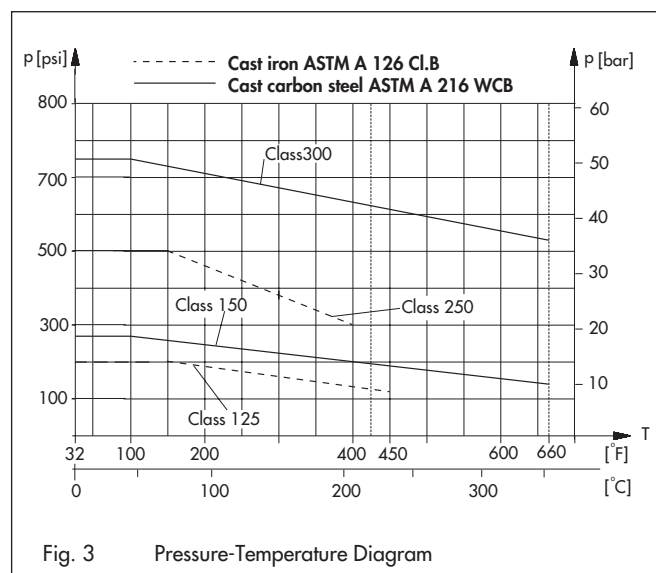


Fig. 3 Pressure-Temperature Diagram

Table 2 · Materials

Valve			
Body	Cast iron ASTM A 126 Cl.B		Cast carbon steel ASTM A 216 WCB
	Class 125	Class 250	Class 150 or 300
Maximum permissible temperature	450 °F (230 °C)	400 °F (205 °C)	660°F (350 °C)
Seat and plug	Stainless steel AISI 410 WN 1.4006		
Metal bellows	Stainless steel AISI 316 Ti WN 1.4571		
Body gasket	Graphite on metal core		
Actuator			
Diaphragm cases	Electroplated sheet steel St 37-2		
Diaphragm	EPDM with fabric reinforcing		
Condensate chamber	Sheet steel		

Table 4a · Effective actuator area and spring set

Depending on valve size, the desired set point range is selected by the effective actuator area **A** (in²) and spring set force **F** (lbf)

Setpoint range	Valve ½" to 2"	Valve 2½" to 4"
0.3 ... 3.5 psi	100 in ² / 393 lbf	
1.5 ... 8.5 psi	100 in ² / 990 lbf	
3 ... 18 psi	50 in ² / 990 lbf	
10 ... 35 psi	25 in ² / 990 lbf	
30 ... 75 psi	12.5 in ² / 990 lbf	25 in ² / 1800 lbf
65 ... 145 psi	6.2 in ² / 990 lbf ¹⁾	12.5 in ² / 1800 lbf
115 ... 230 psi	6.2 in ² / 1800 lbf	12.5 in ² / 1800 lbf

Table 5a · Dimensions – L – inches

Nominal valve size		½"	¾"	1"	1½"	2"	2½"	3"	4"
Length L	Class 125 FF	–	–	7.25	8.75	10	10.87	11.75	13.87
	Class 250 NPT	6.00	6.00	6.00	8.00	9.25	–	–	–
	Class 150 RF	7.25	7.25	7.25	8.75	10	10.87	11.75	13.87
	Class 300 RF	7.50	7.62	7.75	9.25	10.50	11.50	12.50	14.50

Table 5b · Dimensions – L – mm

Nominal valve size		½"	¾"	1"	1½"	2"	2½"	3"	4"
Length L	Class 125 FF	–	–	184	222	254	276	298	352
	Class 250 NPT	152	152	152	203	235	–	–	–
	Class 150 RF	184	184	184	222	254	276	298	352
	Class 300 RF	191	194	197	235	267	292	318	368

Ordering information

Pressure Reducing Valve Type 39-2
 Nominal size ... Body material ...
 ANSI Class ... End connection ...
 Set point range ... psi (bar)
 Options, ... /special version ...

Table 3 · Cv and Kvs values

Nominal size	Seat bore	Standard version	With flow divider ¹⁾	Seat bore	Standard version	With flow divider ¹⁾
	inch	C _v	C _{yl}	mm	K _{v5}	K _{v5l}
½"	0.87	3.7	2.5	22	3.2	2.2
¾"	0.87	6	4	22	5	3.5
1"	0.87	9.4	6.3	22	8	5.5
1½"	1.6	23	18	40	20	15
2"	1.6	37	27	40	32	23
2½"	2.6	60	40	65	50	35
3"	2.6	86	63	65	75	55
4"	2.6	105	73	65	90	63

1) St I Flow Divider

When a flow divider St I is installed, the rated Cv value is reduced to CvI. Flow characteristic differences between valves with and without flow dividers do not occur until the valve has passed through approx. 80 % of its travel range.

Table 4b · Effective actuator area and spring set

Depending on valve size, the desired set point range is selected by the effective actuator area **A** (cm²) and spring set force **F** (N)

Setpoint range	Valve ½" to 2"	Valve 2½" to 4"
0.02 ... 0.25 bar	640 cm ² / 1750 N	
0.1 ... 0.6 bar	640 cm ² / 4400 N	
0.2 ... 1.2 bar	320 cm ² / 4400 N	
0.8 ... 2.5 bar	160 cm ² / 4400 N	
2 ... 5 bar	80 cm ² / 4400 N	160 cm ² / 8000 N
4.5 ... 10 bar	40 cm ² / 4400 N	80 cm ² / 8000 N
8 ... 16 bar	40 cm ² / 8000 N	80 cm ² / 8000 N

Table 6a · Dimensions – H and Ø D – inches

Nominal valve size	1/2-1"	1 1/2-2"	2 1/2-3"	4"	
Set point range	Dimension in inches				
0.3 ... 3.5 psi	Height H	16.7	18.9	24.0	24.6
	Diaphragm Ø D	14.9			
1.5 ... 8.5 psi	Height H	16.7	18.9	24.0	24.6
	Diaphragm Ø D	14.9			
3 ... 17 psi	Height H	16.1	18.1	23.2	23.8
	Diaphragm Ø D	11.22			
10 ... 35 psi	Height H	16.1	18.3	23.4	24.0
	Diaphragm Ø D	8.9			
30 ... 75 psi	Height H	15.4	17.5	23.4	24.0
	Diaphragm Ø D	6.7		8.9	
65 ... 145 psi	Height H	15.4	17.5	22.6	23.2
	Diaphragm Ø D	6.7		6.7	
115 ... 230 psi	Height H	15.4	17.5	22.6	23.2
	Diaphragm Ø D	6.7		6.7	

Table 6b · Dimensions – H and Ø D – mm

Nominal valve size	1/2-1"	1 1/2-2"	2 1/2-3"	4"	
Set point range	Dimension in mm				
0.02 ... 0.25 bar	Height H	425	480	610	625
	Diaphragm Ø D	380			
0.1 ... 0.6 bar	Height H	425	480	610	625
	Diaphragm Ø D	380			
0.2 ... 1.2 bar	Height H	410	460	590	605
	Diaphragm Ø D	285			
0.8 ... 2.5 bar	Height H	410	465	595	610
	Diaphragm Ø D	225			
2 ... 5 bar	Height H	390	445	595	610
	Diaphragm Ø D	170		225	
4.5 ... 10 bar	Height H	390	445	575	590
	Diaphragm Ø D	170		170	
8 ... 16 bar	Height H	390	445	575	590
	Diaphragm Ø D	170		170	

Table 7a · Weights in lbs

Nominal valve size	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	
Set point range	Approximate weight for Class 150/125/250 ¹⁾								
0.3 ... 8.5 psi	Approximate weight in lbs.	47	49	49	67	75	110	126	146
1.5 ... 17 psi		36	38	38	54	63	99	116	136
10 ... 35 psi		32	34	34	49	57	94	110	128
30 ... 230 psi		27	30	30	48	54	90	105	125

¹⁾ +10 % for Class 300

Table 7b · Weights in kg

Nominal valve size	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	
Set point range	Approximate weight for Class 150/125/250 ¹⁾								
0.02 ... 0.6 bar	Approximate weight in kg.	21	22	22	30	34	50	57	66
0.2 ... 1.2 bar		16	17	17	24	28	45	52	61
0.8 ... 2.5 bar		14	15	15	22	26	42	49	58
2 ... 16 bar		12	13	13	21	24	40	47	56

¹⁾ +10 % for Class 300

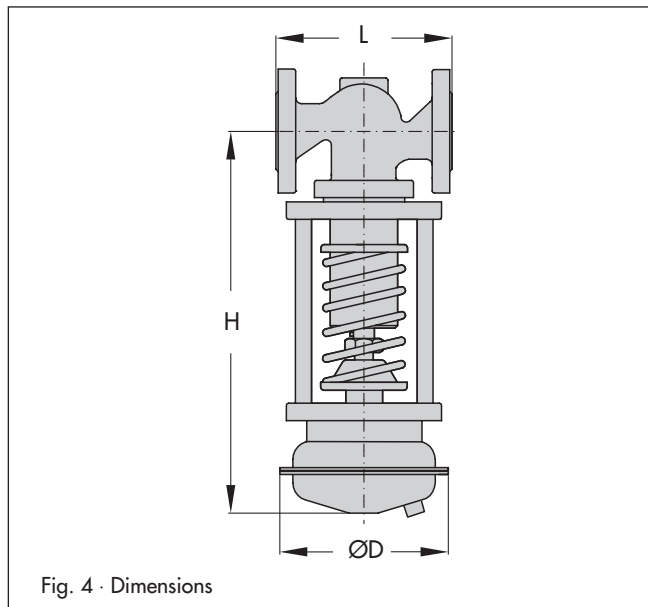


Fig. 4 · Dimensions

Installation

- Horizontal pipeline with a slight downward slope on either side (for condensate discharge)
- Direction of flow must coincide with the arrow on the valve body
- The actuator must be suspended downwards as depicted
- Pressure tap approx. 3.3 ft (1 m) downstream from the valve. The control line (pipe 3/8") is to be provided by the customer
- A larger pipe cross-section (expansion piece) downstream of the valve may be installed to compensate for cases with high steam expansion
- A strainer is recommended to be installed upstream of the valve to protect the valve internals from damage by foreign matter.
- Shutoff valves are recommended to isolate the regulator during maintenance

A pressure gauge connected to the pipe downstream of the valve is required to verify the pressure set point adjustment

Specifications subject to change without notice.



SAMSON CONTROLS INC.
1 - 105 Riviera Drive
Markham · Ontario · Canada · L3R 5J7
Tel. (905) 474-0354 · Telefax (905) 474-0998

SAMSON CONTROLS INC.
4111 Cedar Boulevard
Baytown · Texas · USA · 77520
Tel. (281) 383-3677 · Telefax (281) 383-3690

T 2508

T 2508 CA