CASH ACME

TECHSPEC

Type G4

PILOT OPERATED PRESSURE REDUCING REGULATOR

This Bulletin No.	
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SPECIFICATION DATA

Service: Steam, air, gas (including oxygen)

Sizes: 1/2", 3/4", 1", 1-1/4", 1-1/2", 2", 2-1/2", 3", 4", 5" and 6"

Connections:
Threaded - 1/2" through 2"
CL 125 - 2-112" **through** 6"
CL 150 & 300 - 1/2" through 6"

Body: Bronze, cast iron, cast steel and stainless steel.

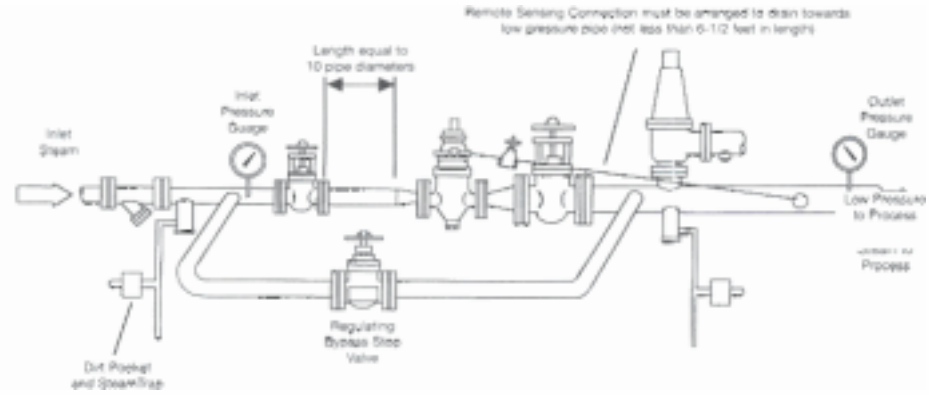
Maximum Temperature: To 750°F
(See page 5)

Maximum Initial Pressure: To 740 psig
(See page 5)

Outlet **Pressure** Range: 1-300 **psig**
(See page 5)

Capacity: Refer to bulletin PRV-G4 for capacity information.

INSTALLATION - GENERAL



Sizing The correct sizing and **layout** of regulators, pipework, stop valves, strainers, and other fittings is **extremely** Important for good performance. See PRV-G4 and sizing program.

Inlet Strainer Dirt, grit, and pipe scale are **common** causes of regulator failure. A strainer af upstream pipe size should be installed at least 10 pipe diameters before the regulator.

Relief Valve Every **installation** should be protected against regulator failure by a Relief or Excess Pressure Protection Valve. Care should be taken that the discharge from such a **valve** cannot cause damage to **property** or create a **hazard** to **persons.**

Pipe Strain **All** pipe work and **fittings** should be **properly** supported and free from any strain which **could affect** their **correct** operation. All flanges **should** be **correctly aligned** and gaskets carefully **fitted** to *avoid* **blockage** of valve ports. **If** a **jointing** compound is used it should not be allowed to foul internal ports or working parts of the valve.

Remote Sensing Connection The G4 pressure **regulator** is a **pilot-operated, self-actuating,** pressure reducing valve and **relies** upon a stable pressure signal from the outlet **piping in** order to maintain stable control of the outlet pressure.

However, under certain **operating conditions the signal** pressure may be. **unstable** in **the** irnmediie vicinity of **the** valve outlet and as a **result** may cause **erratic** control.

This can be easily overcome by installing a remote sensing **connection.** All G4 **regulators** can **be** remotely controlled, *where* necessary, by **connecting** a remote sensing connection from the remote control port **and** into the outlet **piping** at a **point** where **stable** pressure **conditions** are likely to **occur.** Ideally it should be installed **into** a straight **length, correctly** sized section of the outlet piping. The remote sensing **connection** should, normally be not less than 6 feet **long.** and must be screwed into the remote **control** port to a depth not **less** than **one** Inch. It should also include a pipe union and stop valve to enable **disman-tling** and **isolation.** Wherever **possible, the** remote sensing connection should be installed with a **steady fall** away from the regulator into the outlet piping to facilitate self draining of condensate.

We recommend that a remote **sensing connection be** installed when the following **conditions apply:**

1. When **the** reduced pressure is below 55% of **the inlet** pressure.
2. **When a** tow pressure top assembly is **installed.**
3. **Whenever** difficult outlet piping **conditions occur.**

(**Refer** to **Figure** 2 on page 2.)

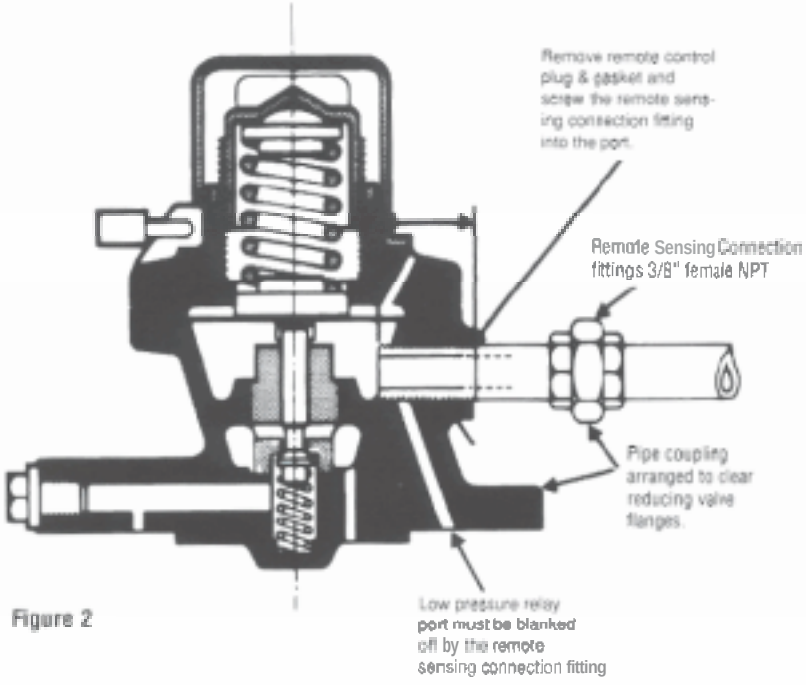


Figure 2

FIRST AID

Regulators occasionally give trouble (particularly on new installations) due to dirt and other foreign matter fouling the internals. In this event the trouble can often be quickly eliminated by applying the following first aid treatment:

1. With pressure 'off', remove complete valve top assembly (which is secured by four nuts) and check by 'pushing down' that the piston and main valve are moving freely and that the main valve returns quickly to its seat. Unscrew bottom plug and withdraw main valve. Clean all parts and re-seat main valve if necessary. Re-assemble and test.

IF IT IS STILL NOT WORKING PROPERLY - TRY 2

2. Remove top cap, adjusting screw, spring top cover and diaphragm. Check spring, diaphragm and gasket. Turn on service supply and close outlet stop valve.

IF IT IS STILL NOT WORKING PROPERLY - TRY 3

3. With pressure off, unscrew pilot valve plug, check pilot valve, spring, and seat. Clean and re-seat if necessary. Check the pilot valve plug bottom gasket(copper). Reassemble and test.

INSTALLATION-SETTING

Before putting a regulator in to service

All pipes should be thoroughly blown-down to remove any dirt. grit or pipe scale. This can be done by removing the regulator bottom plug, main valve and spring, and carefully opening the inlet stop valve by a small amount. Remove any dirt lodged in the valve body and replace the parts.

Setting Under No-Flow Conditions

This is the more accurate method and may be carried out as follows:

1. Condensate should be removed from the pipeline by first applying a little tension to the regulator adjusting spring (by rotating the adjusting screw clockwise for a few turns) and then slowly opening the outlet and inlet stop valves. When the downstream pressure starts to rise, close the inlet stop valve and remove all tension from the regulator adjusting spring.
2. Close the outlet stop valve and slowly open the inlet stop valve. Wait for about one minute to confirm that the reduced pressure is maintained at zero. This is a check that the regulator gives 'absolute-tight' shut-off under no-flow conditions.
3. Slowly raise the reduced pressure (by rotating the regulator adjusting screw clockwise) until the desired pressure is obtained. (Do not forget to set the relief valve, if necessary.) The valve is now correctly set and the adjusting screw should be locked with the lock-nut provided.
4. Slowly bring the outlet stop valve to fully 'open'. The regulator should continue to maintain the reduced pressure just below the 'set' value.

Special Note

The regulator should be kept under supervision for the first few days after its installation and any defects which may occur as the new system settles down should be noted.

It is strongly recommended that the inlet strainer and reducing valve should be cleaned out one week after installation, and the strainer cleaned out at regular intervals thereafter.

Outlet Pressure Regulation

Up to 3" size ± 1/2% (± 1/2 psig below 100 psig)
Above 3" size ±1% (± 1 psig below 100 psig)
Pressure rise to dead end = 1%

SERVICING

G4 Regulators should be given a complete service every 12 months. They should, if possible be removed from the line, stripped down and each part examined and put aside in order of removal lo simplify re-assembly.

For a complete service carry out instructions contained in sections (1) to (5) Inclusive.

1. **Changing Adjusting** Springs
   Unlock the valve, remove the top cap, and completely unscrew the adjusting screw. Replace spring using existing top and bottom spring plates and re-assemble.
2. **Changing Diaphragms**
   Remove adjusting spring. Standard Top: Remove the pilot valve body top cover by undoing four cap-headed screws. Remove the diaphragm and gasket. (Two diaphragms should be fitted if the reduced pressure is 150 psig *or* above.) Low pressure top: This has a larger diaphragm than standard which is removed by undoing twelve bolts and nuts. and detaching the top cover. The top cover has a beaded gasket instead of the separate diaphragm gasket and care should be taken not to damage it. The low pressure top is necessary lor reduced pressures of 5 psig or less.

DIAPHRAGM **CONDITION**

All flat diaphragms become "molded" by the reduced pressure without detriment to their performance. They should only be replaced if sharp concentric or radial ridges or fractures develop. It should be possible to flex the central area of the diaphragm using both hands, and produce an 'oil-can' effect, even if it is molded. Diaphragms which are too rigid should be rejected.

PILOT VALVE STANDOUT

Check that the pilot valve cap is in line with the top surface of the diaphragm gasket (or the push-rod and the top face of the adapter flange in the case of the low pressure top). This can be done by resting a saw-blade across the gasket and through the slot provided in the flange. This height should be adjusted by filing down the pilot valve cap (or push-rod). Re-assembly is otherwise relatively simple.

3. Pilot Value

   Remove adjusting spring and diaphragm (see sections 1 and 2) and the adapter flange and push-rod if a low pressure top. Remove pilot valve cap and unscrew pilot valve plug (with removing key or box wrench) and withdraw pilot valve and spring. Check copper plug gasket.

   The pilot valve has a soft seat valve and stainless steel or bronze spindle. The valve should be replaced if worn. When re-assembling pilot valves, check the standout as described in section (2). The toque required to obtain a good seal between the pilot valve and copper washer is approximately 120 lbs.ft.

4. **Piston and Rings**

   Remove the top assembly completely from the main valve. Withdraw the piston and rings and m i n e them, the liner and guide. for wear and deposits. Refer to factory for piston ring gap specifications.

   Clean and re-assemble. The piston should move quite freely with only a light pressure required to overcome frictional resistance. Take care, that when the main flange body top gasket is replaced, it does not cover the relay ports.

5. Maln Valve

   Remove the bottom plug or cover and withdraw the main valve spring. Examine both the vahe and seat for deposits or erosion (evidence of the latter would indicate that the regulator is oversized or subjected to long periods of operation at very low loads). Replace if visible damage is present. Re-assemble the main valve, spring and bottom plug or cover.

RECOMMENDED **SPARE** PARTS

A. Routine Service Packages

Each contains:
- 1 Diaphragm
- 1 Set of Piston Rings
- 1 Pilot Valve Cap
- 1 Set of Gaskets

These parts enable a valve to be stripped down and re-assembled as part of a routine maintenance check It is assumed that the valve is in good working order and that other parts would not be required.

B. Complete Repair **Kits**

Each contains -
- 1 Diaphragm
- 1 Set of Piston Rings
- 1 Pilot Valve Assembly
- 1 Main Valve
- 1 Maln Valve Seat
- 1 Maln Valve Spring
- 1 Set of Gaskets

These are for use when a valve is known to be giving trouble and a complete set of parts may be needed to put it into good working condiian.

Each carton of parts contains a leaflet which identifies the particular parts and illustrates the most common causes of reducing valve problems. These are in the form of a series of 'Check Points,' which should be referred to in the course of *an* overhaul.

DIAPHRAGMS (Sis of valve up to 4')

REDUCED PRESSURE RANGE	DIAPHRAGM DIA.	CODE NO.	NO. REQUIRED	NOTES
5 psig and below	5"	011855	One	Low Pressure Top
5 - 150 psig	3-1/4"	011844	One	Standard Top
150 psig and above	3-1/4"	011844	Two	Standard Top

SPRING IDENTIFICATION (Sizes of valve up to 4")

SPRING RANGE	CODE NO.	COLOR CODE*	WIRE DIA.	NOTES
1 - 5 psig	C0330	Yellow	5/32"	Use Low Pressure Top
5 - 50 psig	C0330	Yellow	5/32"	
10 - 100 psig	C0331	Black	3/16"	Standard Top
40 - 150 psig	C0332	White	7/32"	(2 Diaphragms required for reduced pressures of 150 psig and above.)
50 - 200 psig	C0333	Green	1/4"	
100 - 300 psig	C0334	Red	9132	

TROUBLE SHOOTING

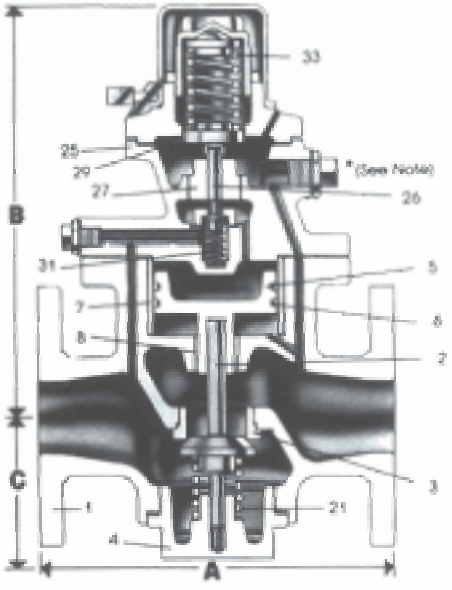
SYMPTOM	POSSIBLE CAUSE	REMEDY
A. Leakage from spring chamber Mead hole.	Broken diaphragm	Replace diaphragm and gasket
B. Reduced pressure not maintained as flow varies. Relief valve blows when flow ceases.	Piston stuck due to:	
	(a) Dirt in chamber	Clean out and re-assemble, Check inlet strainer and clean if necessary.
	(b) Excessive deposit of solids from fluid.	Clean out and re-assemble. Check condensate and modify water treatment as necessary.
	(c) Broken or scored piston rings.	Replace and check piston ring gap.
	(d) Scored piston liner	Replace and check piston ring gap.
	Main valve stuck in guides.	Free and if necessary replace worn parts.
	Relay port between diaphragm chamber and valve outlet blocked.	Clear blockage
C. Reduced pressure not maintained when f k w approaches maximum, but is correct at "low-flow" and "no-flow" conditions,	Regulator undersized	Replace with larger valve or consider installing another regulator in parallel. (assuming piping is suitable for larger capacities)
	Pressure differential across the regulator too small.	None - unless inlet or reduced pressure can be adjusted to give increased differential.
	Downstream piping and fittings undersized.	Try installing a remote sensing connection, or increasing size of piping.
	Upstream pressure not being maintained.	None - this Is a basic system fault that needs to be corrected.
D. Reduced pressure builds up on "no-flow" conditions but otherwise operates correctly.	Main valve damaged or stuck In guides.	Replace main valve. Check that regulator Is not oversized.
	Pilot valve damaged	Replace pilot valve.
	Inlet fluid leaking past pilot valve plug gasket.	Tighten down pilot valve plug. Renew copper gasket if necessary.
E. Violent reduced pressure fluctuations under all flow conditions.	Inlet pipe gasket and/or strainer and fittings undersized.	If badly undersized, replace pipework and fittings.
	Relay port from valve inlet to pilot valve partially Mocked	Clear blockage
	Regulator oversized	Fit small regulator or replace maln valve with restricted main valve.
	Inlet flange gasket restricting flow to regulator	Rectify gasket

	SYMPTOM	POSSIBLE CAUSE	REMEDY
F.	Reduced pressure erratic under all conditions.	Main Valve spring weak or broken	Replace
G.	Reduced pressure oscillates slowly	Relay port diaphragm chamber to valve outlet partially blocked	Clear blockage
H.	Reduced pressure not obtainable (regulator will not open when adjusted)	Relay port from between valve inlet and pilot valve blocked.	Clear blockage
		Main valve or piston stuck In closed position.	Check and service as necessary.
I.	Fluid leaking through gaskets.	Gaskets not properly tightened	Adjust as necessary
J.	Gaskets de-composing	Maximum recommended working temperature of the valve exceeded	Replace with appropriate type of regulator.
K.	Appreciable reduced pressure rise on "no-flow" but correct at flow conditions.	Pilot valve standout too high	Adjust. See inspection and servicing instructions.
L.	Appreciable fall of reduced pressure to open valve from "no-now" condition.	Pilot valve standout too low	Adjust. See inspection and servicing Instructions.

SPECIFICATIONS

	Fig 2042						Fig 2043						Fig 2044					Fig 2046						
Size	½	¾	1	1¼	1½	2	½	¾	1	1¼	1½	2	2½	3	4	5	6	1	2	2½	3	4	5	6
A	4⅛	4⅛	4⅛	4⅞	5⅛	6⅛	5½	5⅛	6¼	7	7½	8¼	10	11¼	13⅛	16	16½	6¾	9	10	11¼	13½	16	16½
B	8	8¼	8⅝	9⅝	9¾	10¼	8	8¼	8⅝	9⅝	9¾	10¼	11⅝	12	13⅝	16¼	17⅝	8¾	10½	11¼	11¼	12¾	15¾	16½
C	2⅛	2½	2⅝	3	3⅛	3¼	2⅛	2½	2⅝	3	3⅛	3¼	5¼	5¾	6⅛	9	9¼	2¾	3½	5¼	5¾	7	8⅛	9¼
Wt.lb.	13.2	15.0	15.4	23.8	28.0	33.9	17.6	18.9	19.8	30.0	35.9	45.8	77.0	104.0	174.0	247.0	351.0	30.0	58.0	93.0	115.0	192.0	273.0	381.0

DIMENSIONS



PRESSURE TEMPERATURE RATINGS									
Material		End Connection	Pressure (psig)						
Description	ASTM Spec.	ANSI Class	0 to 150F	250F	300F	400F	450F	500F	750F
Cast Iron	A126 Class B	CL125 (Iron)	200	175	160	135	125	-	-
Bronze	B62 Alloy 836	CL150 (Bronze)	225	195	180	150	-	-	-
		CL300 (Bronze)	500	425	390	300	*	-	-
		CL250 (Screwed)	400	365	300	250	-	-	-
Carbon & Stainless Steel	A216 GR WCB / A361 CF8(304)	CL150 (Steel)	285	245	230	195	185	170	
		CL300 (Steel)	740	660	655	630	615	590	500
		CL250 (Steel Threaded)	600	530	525	500	490	470	460

* 570F for 150 psig

SPRINGS

VALVE SIZE		
1/2" - 4"		5" & 6" *
5 - 50	(Yellow)	5 - 20
10 - 100	(Black)	10 - 50
40 - 150	(White)	40 - 100
50 - 200	(Green)	50 - 175
100 - 300	(Red)	

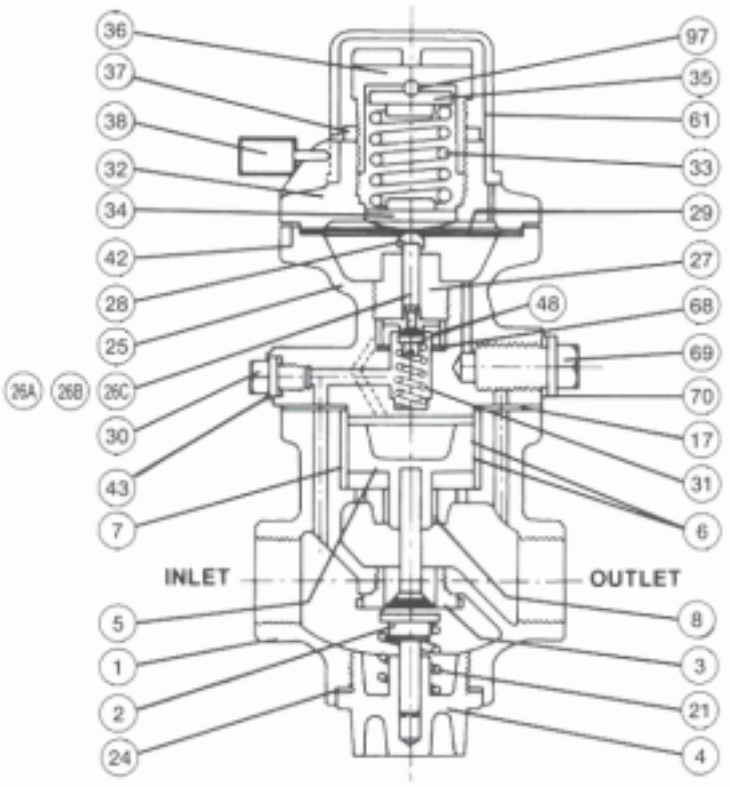
'Not Color Coded

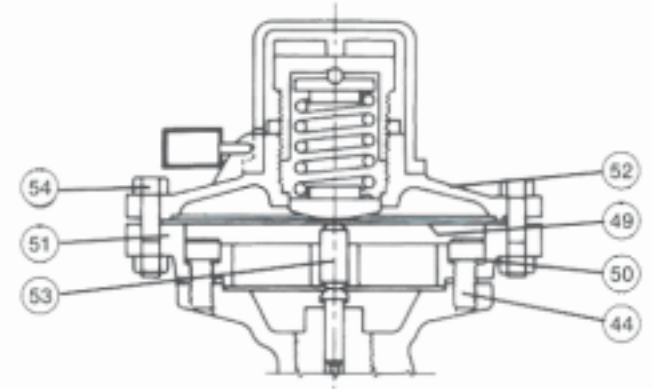
PARTS INFORMATION

1	Body
2	Main Valve
3	Main Valve Seat
4	Bottom Plug
5	Piston
6	Piston Rings
7	Piston Liner
8	Piston Guide
17	Valve Body Top Gasket
21	Main Valve Spring
24	Bottom Plug Gasket
25	Pilot Valve fop
26	Pilot Valve- A. Stem B. Valve C. Guide
27	Pitot Valve Plug
28	Pilot Valve Cap
29	Diaphragm
30	HP Port Plug
31	Pilot Valve Spring
32	Pilot Valve Top Cover
33	Adjusting Spring
34	Adjusting Spring Bottom Plate
35	Adjusting Spring Top Plate
36	Adjusting Screw
37	Locking Ring
38	Padlock
42	Diaphragm Gasket
43	HP Port Plug Gasket
44	Cap Headed Screws
61	Top Cap
68	Pilot Valve Plug Gasket (Copper)
69	Remote Control Plug
70	Remote Control Plug Gasket
97	Adjusting Screw Ball

Low Pressure Top Only

49	Diaphragm
50	Screw Gaskets
51	Adapter Flange
52	Top Cover
53	Push Rod
54	Top Cover Bolts Keep Plate) Fig. 2046 Keep Plate Screw) Valves Only





The Illustration shows Fig. 2W2 Other types have essentially the same parts.

HOW TO ORDER

To order repair parts, refer to the cutaway view of the Type G4 to identity the part required. When ordering. please use the names listed and provide the valve assembly number.
Also provide the following G4 Information:

1. Valve size
2. Service (Air, steam, etc.)
3. Inlet pressure
4. Outlet pressure range and setting
5. Part description
6. Quantity of each part
7. Valve assembly or serial number

CASH ACME®

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