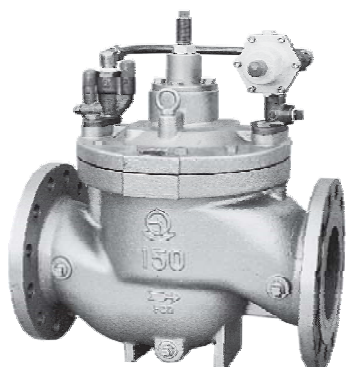


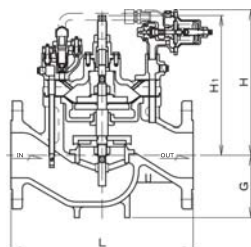
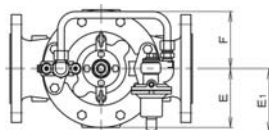
WVR-02 Type Series Pressure Reducing Valve (for Water)

for **Building facilities** **Industrial facilities** etc., Multipurpose Pilot type (High capacity)

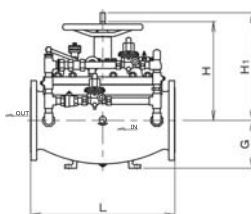
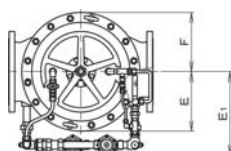
Large capacity pressure reducing valve for water supply line of air conditioning, sanitary accommodations, fire extinguishing, and farm irrigating equipments. Pilot operated valve has pressure balancing structure, thus can regulate secondary pressure without being influenced by the change of primary pressure.



CONSTRUCTION



Size 40~200mm



Size 250~400mm

FEATURES

- Sensitive needle valve opening adjustment according to state of use, allow easy and reliable operation.
 - The base and pilot-operated part can be disassembled easily, thus make it easy to adjust, repair, or replace parts.
 - Lift limiting device limits overflow.
 - The base and pilot-operated part can be installed on vertical or horizontal pipes, thus allow piping according to space.
- *: The pilot piping should be at the upper side in the case of horizontal piping.

SPECIFICATIONS

Usage	Standard		Nylon coating		
Model name	WVR-02		WVR-02CN		
Code name	WVR02-B □	WVR02-L □	WVR02CN-B □	WVR02CN-L □	
	※ L (low press.) or H (high press.) for adjustable secondary pressure is required in □.				
Size	50~400(2"~16")	40~200(1½"~8")	80~200(3"~8")		
Applicable fluid	Water & hot water				
Applicable temperature	5~60°C				
Applicable primary pressure	Max. 1.0MPa*1				
Adjustable secondary pressure	Size 40~200mm L:0.05~0.35, H:0.3~0.95MPa Size 250~400mm L:0.05~0.35, H:0.3~0.7MPa				
Maximum reducing rate	10:1				
Minimum pressure differential across the disc	0.05MPa				
Offset pressure	Adjustable secondary pressure 0.05~0.35MPa:Within 0.08MPa*1 Adjustable secondary pressure 0.3~0.95(0.7)MPa:Within 0.1MPa*1				
End connection	Flanged JIS 10KRF*1				
Valve body pressure test	Hydraulic 1.75MPa				
Materials	Body	Cast iron	Ductile cast iron	Cast iron	Ductile cast iron
	Trim	Diaphragm & disc(Synthetic rubber), Seat ring(Cast bronze)			
Painting or coating for Body	Interior:Epoxy resin Exterior:Metallic blue		Nylon coating		
Installation	In vertical and horizontal pipe line However, 250mm and bigger are allowed to install in horizontal pipe line erect position				

*1. Size 200mm and smaller with Flanged JIS 16K are available upon your request.
 (Offset pressure with Flanged JIS 16KRF, Adjustable secondary pressure for 0.05~0.35MPa is below 0.09MPa, for 0.3~1.0MPa is below 0.14MPa)
 *2. The valve with 2 pressure gauges is also available upon your request.
 *3. Refer to page 55 of valve size selection chart for WV Types.

DIMENSIONS (Body materials: Cast iron)

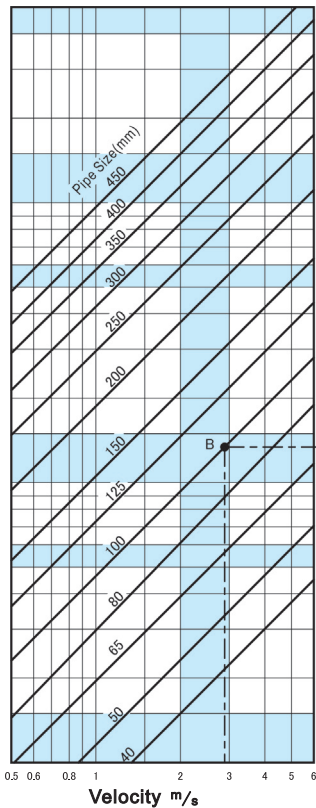
(mm)

Size	L		G	H	H ₁	E	E ₁	F	Cv value	Mass(kg)
	JIS 10K	JIS 16K								
40(1½")	260	260	80	285	230	93	136	136	18	21.5
50(2")	270	270	85	285	230	93	136	136	32	24.5
65(2½")	340	340	100	295	261	117	136	136	38	43
80(3")	350	354	110	298	261	117	136	145	54	43
100(4")	400	404	130	324	300	130	136	145	96	60
125(5")	440	444	140	354	371	145	136	145	150	70
150(6")	500	504	165	387	416	173	136	160	216	125
200(8")	600	608	200	438	522	218	136	195	384	200
250(10")	720	—	240	490	560	295	420	295	600	470
300(12")	820	—	280	540	620	328	430	328	864	524
400(16")	1040	—	370	690	800	440	520	440	1536	1400

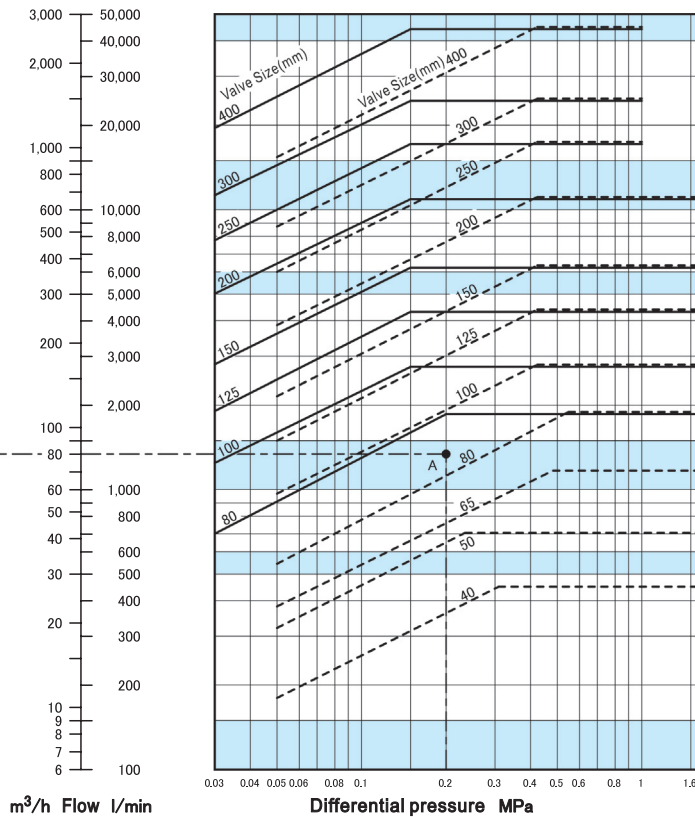
*1. JIS10K:Flanged code JIS 10KRF
 JIS16K:Flanged code JIS 16KRF
 *2. Please contact our local agent about figures for valve body with Ductile cast iron.
 *3. Size 40mm of material is Ductile cast iron.

SIZE SELECTION CHART (for Water)

■ VELOCITY RATE LINE CHART



■ SIZE SELECTION CHART



● PRODUCTS WHICH SIZES CAN BE DETERMINED
 - - - - - (dashed line) in the size selection chart

Pressure reducing valve WVR-02, Primary pressure regulating valve WVM-02.

● VALVES APPLICABLE TO
 ——— (solid line) in size selection chart

Solenoid valve WVE-02, Level control valve WVL-02

Note 1: In the size selection chart, the horizontal position of the valve size line represents the maximum flow.

Note 2: Use velocity line of less than 3m/s in velocity line chart with obtained pipe size, if not any special case.

Note 3: Size 40~65mm is for WVR and WVM types only.

Note 4: For sizes 40,50mm, in case of the larger differential pressure, please contact our local agent in your area.

● HOW TO USE THE CHART

Example: Select the size of valve for the following conditions:

Primary pressure: 0.5MPa; Secondary pressure: 0.3MPa; Flow: 80m³/h

1. Calculate differential pressure between inlet and outlet of valve: $0.5 - 0.3 = 0.2 \text{ MPa}$
2. Follow the 80m³/h flow line horizontally until it intersects with the 0.2MPa differential pressure line. The intersection point is named A.
3. Since point A is between the lines representing size 80mm and 100mm, select the larger size, which is size 100mm, is selected.

● CONFIRMING PIPE FLOW RATE

1. Assume the pipe and valve are of the same diameter. Follow the 80m³/h flow line horizontally until it intersects with the 100mm size line to obtain cross point B.
2. Draw a vertical line from point B and find out the pipe flow rate 2.8m/s.
3. Since the flow rate is less than 3m/s, the pipe size should be size 100mm. If flow rate is larger than 3m/s, select a larger size to make the flow rate less than 3m/s.

● REFERENCE

■ To select the size for pressure reducing valve or primary pressure regulating valve with considering dynamic water pressure:

For pressure reducing valve, add the largest offset pressure to the secondary pressure. For primary pressure regulating valve, deduct the minimum accumulation from the primary pressure. The size can be determined using the differential pressure between primary and secondary of valve.

● Pressure reducing valve

Find out the maximum offset pressure 0.1MPa from the specifications. The differential pressure is $0.5 - (0.3 + 0.1) = 0.1 \text{ MPa}$. Use the method described in the example in "How to use the chart" to select the size.

● Primary pressure regulating valve

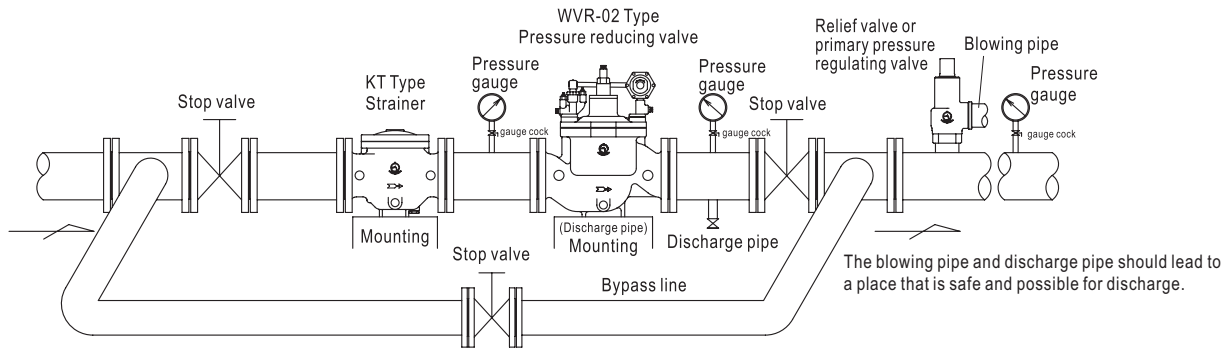
Find out the minimum accumulation 0.03MPa from specifications. The differential pressure is $(0.5 - 0.03) - 0.3 = 0.17 \text{ MPa}$. Use the method described in the example in "How to use the chart" to select the size.

DATA/WV Type Regulating Valve (for Water or Hot water)

PIPING EXAMPLE (horizontal piping with the size of WVR-02 pressure reducing valve is 200mm or small)

Water supply system using roof tank in tall/medium height buildings

Install water hammer preventing device closely at the primary side of pressure reducing valve if the pressure is reduced by one and more steps.



POINTS FOR INSTALLATION AND USE

BYPASS LINE

It is necessary to install a bypass pipe with stop valve, as shown in the figure above, for test before filling water, air purging, cleaning the inside of pipes, or maintenance.

STRAIGHT PIPE

To ensure stable operation of the valve, install straight pipe before and after the valve. The length of the straight pipe depends on the state before and after piping. However, the length should be approximately 10~20 times the nominal diameter (Minimum 500mm).

PIPING SUPPORT

Install piping support to avoid undesired mechanical impact due to the weight of the piping, weight of fluid, or continuous vibration, stress, or bending force.

STRAINER

Install strainer at the primary side of the valve.

SAFETY DEVICE

Considering the rise of secondary pressure, in some cases, it is necessary to install relief valve or primary pressure regulating valve at the secondary side. See the following table for the approximate set pressure for the relief valve or primary pressure regulating valve. The outlet of the relief valve or primary pressure regulating valve should lead to a drainage that can accept the discharge of the valve.

TABLE OF SET PRESSURE FOR SAFETY RELIEF VALVE AND PRIMARY PRESSURE REGULATING VALVE (MPa)

Set pressure of pressure reducing valve	Set pressure of safety valve
0.1 or less	+0.05
0.1 or more and below 0.4	+0.08
0.4 or more and below 0.6	+0.12
0.6 or more and below 0.8	+0.15
0.8 or more and 1.0 or less	+0.19

Add above value to set pressure of Pressure Reducing Valve.

THERMO-INSULATION

Cover the valve with insulating material if there is possibility of condensation or freezing. However, no thermo-insulation is to be applied on the coil of pilot-operated solenoid valve.

Note 1: The figure shows an example of WVR-02. The piping for other types of valve are the same. However, for WVM-02, there should be a rising part at the outlet piping. (See the piping example in page 109)

Note 2: In the case of vertical piping, the piping should be the same as shown in the piping illustration. In addition, the weight of the piping should not be applied on valves, and there should be some space for maintenance purpose.

PRESSURE GAUGE

Install pressure gauge at the primary and secondary sides of the valve, and at locations that can be easily accessed after piping.

LIMITATION ON INSTALLATION LOCATION

In the case solenoid valve, the valve should not be installed at locations where corrosive or explosive gas may accumulate.

DISCHARGE PIPE

To allow easy maintenance, install discharge pipe before the stop valve at the secondary side. In the case of installation inside buildings, discharge pipe is particularly necessary for locations where there are also wires or electric devices installed. The discharge pipe should be leading to a drainage that can accommodate the content of stop valves before and after the drainage.

MAINTENANCE SPACE

Leave some space surrounding the valve for maintenance (see the figures below).

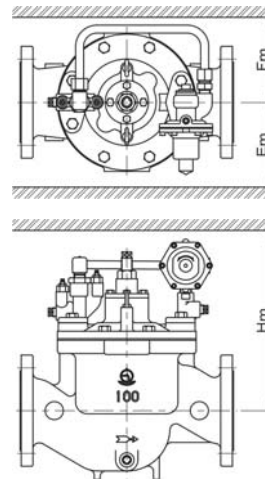


TABLE FOR MAINTENANCE SPACE (mm)

Size	Hm	Em	Fm
40(1½")	550	600	600
50(2")	550	600	600
65(2½")	600	600	600
80(3")	600	600	600
100(4")	800	680	680
125(5")	1000	780	780
150(6")	1200	910	910
200(8")	1400	1060	1060
250(10")	1500	1200	1200
300(12")	1600	1300	1300
400(16")	1800	1400	1400

The figure shows an example for WVR-02. The maintenance space for other types of valves is the same.

DATA/Pressure Reducing Valve (for Water or Liquids)

PIPING EXAMPLE

Fig 1. With bypass line

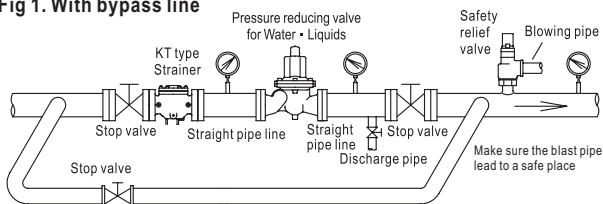


Fig 3. Screwed type connection with bypass line

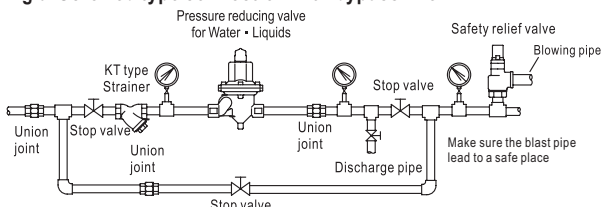
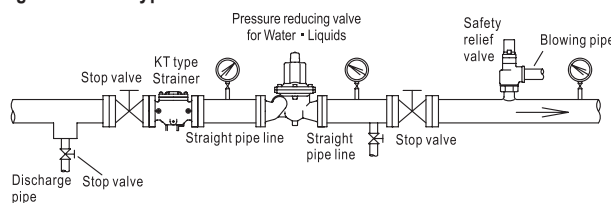


Fig 2. Without bypass line



Note: See Fig.2 for piping with screw type end connection and without bypass pipe.

POINTS FOR INSTALLATION

○ Installation of pressure reducing valve and piping

- If not otherwise specified, the pressure reducing valve should be vertical to horizontal pipe.
Install safety valve or safety relief valve at secondary side.
 - ※ 1. In the case of failure of pressure reducing valve, expansion of fluid due to rise of ambient temperature, or water hammer, the secondary pressure may rise and equipment may be damaged.
 - ※ 2. See Tab. 1 for set pressure of safety valve or safety relief valve.
 - ※ 3. In the case safety valve or safety relief valve is used as an alarm, its nominal diameter should be big enough to allow discharge of 10% maximum flow of pressure reducing valve, which is about the leakage of pressure reducing valve. In very few cases, nominal diameter is selected by discharging amount of maximum flow for pressure reducing valve. (reference value: see Table 2 and Table 3)

TABLE 2. FLOW FOR SAFETY VALVE (Water)

(kg/h)

Set pressure (MPa)	Size					
	15(1/2")	20(3/4")	25(1")	32(1 1/4")	40(1 1/2")	50(2")
0.05	375	640	930	1720	2690	4380
0.1	531	905	1310	2430	3810	6200
0.2	742	1260	1830	3400	5320	8650
0.3	875	1490	2160	4010	6280	10200
0.4	976	1660	2410	4480	7000	11300
0.5	1070	1820	2650	4910	7690	12400
0.6	1150	1970	2860	5310	8310	13500
0.7	1230	2110	3060	5680	8890	14400
0.8	1310	2240	3250	6030	9440	15300
0.9	1380	2360	3430	6360	9950	16100
1.0	1450	2470	3600	6680	10400	16900

TABLE 1. SET PRESSURE FOR SAFETY RELIEF VALVE

(MPa)

Set pressure of pressure reducing valve	Set pressure of safety valve
0.1 or less	+0.05
0.1 or more and below 0.4	+0.08
0.4 or more and below 0.6	+0.12
0.6 or more and below 0.8	+0.15
0.8 or more and below 1.0	+0.19
1.0 or more and 1.2 or less	+0.23

Add above value to set pressure of Pressure Reducing Valve.

TABLE 3. FLOW FOR SAFETY VALVE (Air)

(kg/h)

Set pressure (MPa)	Size					
	15(1/2")	20(3/4")	25(1")	32(1 1/4")	40(1 1/2")	50(2")
0.05	21.8	37.1	53.9	100	156	254
0.1	28.2	48	69.8	129	202	329
0.2	41	69.9	101	188	294	479
0.3	55.1	93.9	136	253	396	643
0.4	69.3	118	171	318	497	808
0.5	83.4	142	206	382	598	972
0.6	97.5	166	241	447	700	1130
0.7	111	190	276	512	801	1300
0.8	125	214	311	577	902	1460
0.9	139	238	346	641	1000	1630
1.0	154	262	381	706	1100	1790

- Install strainer at the primary side of pressure reducing valve.
- For devices that cannot be stopped, install bypass piping (with stop valve) from the primary side to the secondary side of pressure reducing valve (see Fig.1).
If bypass piping is not suitable, then install blowing check valve which is derived from the main pipe before the primary side of pressure reducing valve, so as to make flushing possible(see Fig.2).
- Install straight piping, stop valve, and pressure gauge before and after pressure reducing valve.
In case of screwed type end connections, use union joint for easy maintenance and repair.(see Fig. 3).
- In the case a solenoid valve (ON/OFF operation) is installed at the secondary side of pressure reducing valve, the solenoid valve should 1~2m away from pressure reducing valve.

There should also be a 1~2m distance between pressure reducing valves in the case of 2-step pressure reduction. (See Fig.4, Fig.5)

Fig.4 Solenoid valve (on/off operation) installation

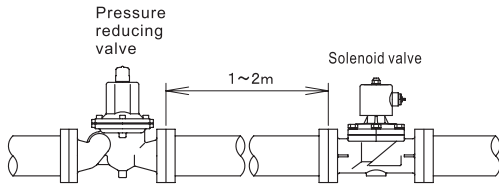
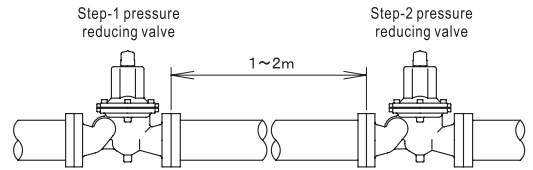


Fig.5 2-Step pressure reduction



7. In water supply system with roof tank in tall/medium height buildings, water hammer may occur if one stop or 2 more steps of pressure reducing valves are installed. In such case, install a water hammer preventing device at the primary side of pressure reducing valve. (See Fig.6)
8. Leave some space for disassembling and maintenance.
9. Apply appropriate support to pressure reducing valve to protect from the weight of piping itself, bending force, or vibration.
10. If it is possibility of freezing, perform thermal insulation or discharge the drain.
11. In the case of buried piping, install pressure reducing valve in pit (box).
The pit should have drainage system to prevent accumulation of rain etc., and thermo-insulation or drainage may be necessary if there is possibility of freezing. (See Fig. 7)

Fig.6 Roof tank in tall/medium height building

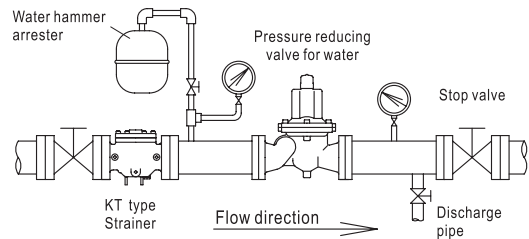
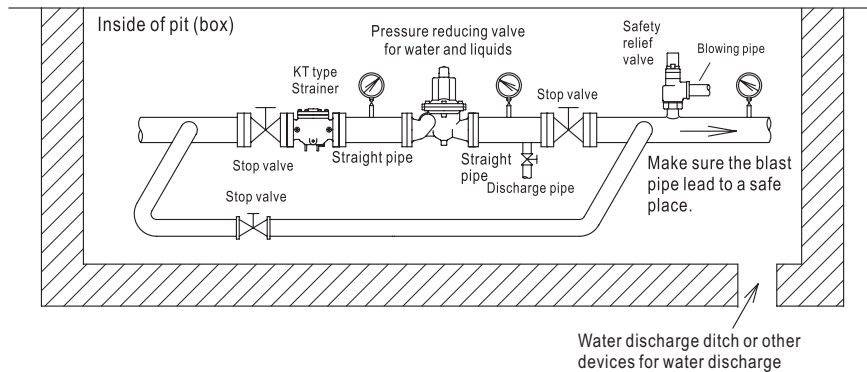


Fig.7 BURIED PIPING



12. In most cases, the secondary pressure is not adjusted when product is delivered. Therefore, adjust the secondary pressure to a desired pressure.
 ※ The secondary pressure of a non-adjusted valve is near to zero. To adjust the secondary pressure, follow the following steps.
 ※ How to adjust the secondary pressure:
 - ① Close the stop valves at primary and secondary sides.
 - ② Open the blowing stop valve or stop valve in bypass and remove any content inside. Such operation is called flushing and should be carried out sufficiently by spending sufficient time on it. take care not to make the secondary pressure rise excessively.
Take care not to make the secondary pressure rise excessively.
 - ③ Close the blowing stop valve or stop valve of bypass pipe.
 - ④ Make sure there is not any spring load caused by adjusting screw.
 - ⑤ Open the stop valve at primary side gradually.
 - ⑥ Make sure you have adjusted the secondary pressure. Open the stop valve at the secondary side slightly to allow small flow.
 - ⑦ Use the adjusting screw and apply a tiny spring load. Open the secondary stop valve gradually once fluid starts to flow.
 - ⑧ Read the pressure gauge and apply more spring load to make the pressure reaching the set pressure. The secondary pressure rises if you turn the adjusting screw clockwise, and the pressure drops if you turn the screw counterclockwise.
 - ⑨ Once the desired pressure is reached, use the lock nut to lock the adjusting screw. After the screw is locked, the spring load will not change.

Fig.8 A TYPICAL ADJUSTING METHOD

