VOL: MA-GP2000-2

You can believe in.

Troubleshooting “ GP-2000 ”

Technical Knowledge

K C MAHANAKORN CO.,LTD.

GP-2000 : Trouble Shooting

Cause of problems

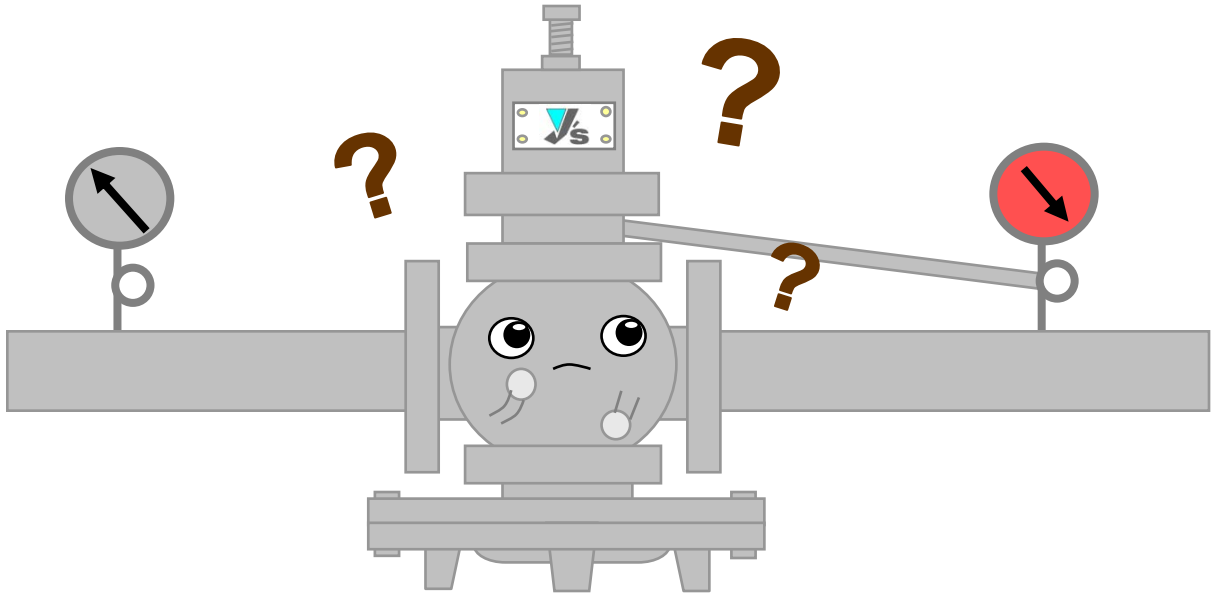
1: Problems related to other factors

2: Problems on the pressure reducing valve

A : Reduced pressure exceed specified set pressure.
B : Reduced pressure does not reach the set pressure.
C : Unstable operation

Problems caused by other factors “Outlet pressure increase / decrease”

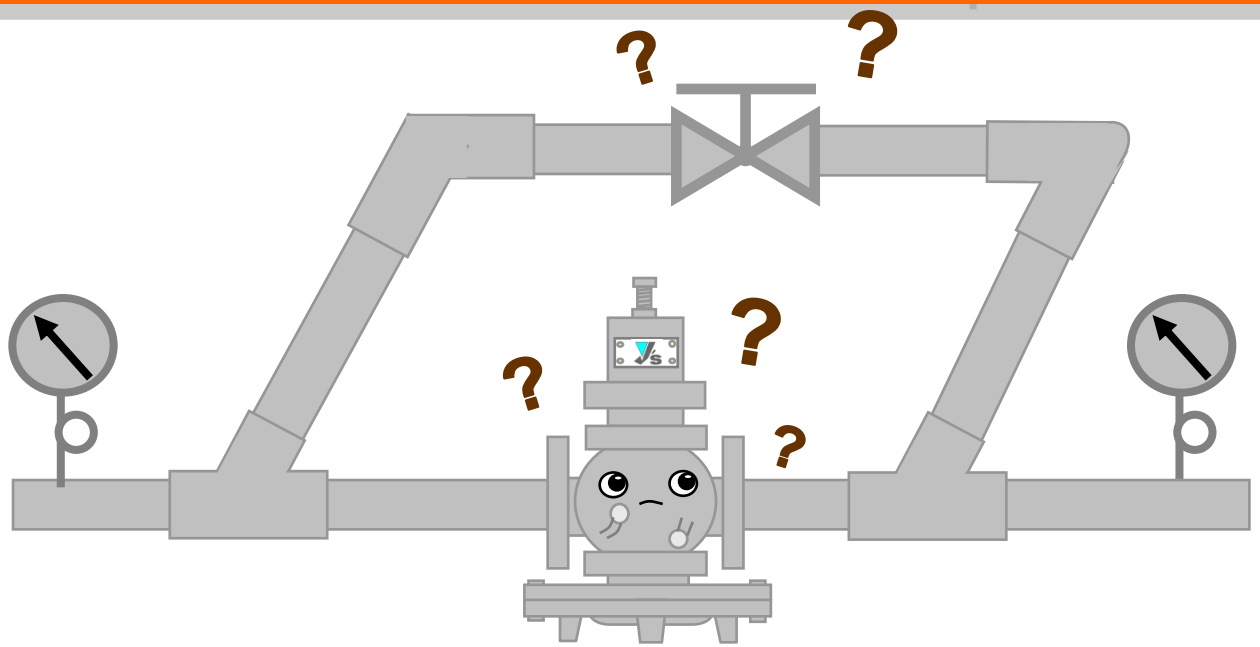
Fact example



Problem	Solutions
Pressure gauge is broken	Replace the pressure gauge

Problems caused by other factors “Outlet pressure increase”

Fact example

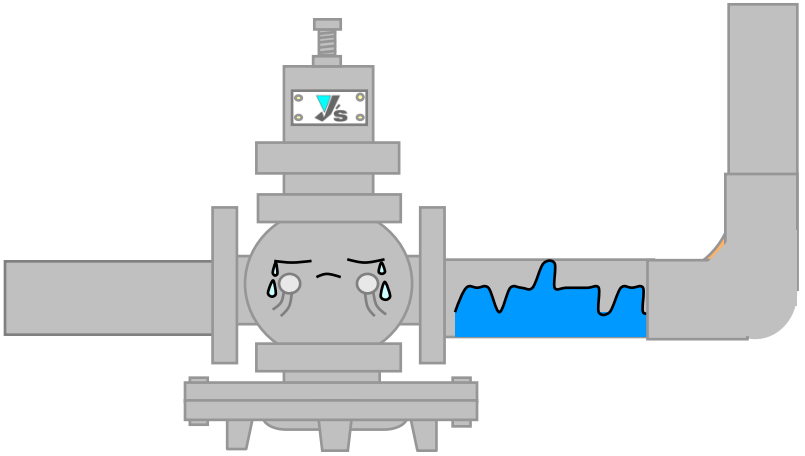


Outlet pressure increase

Problem	Solutions
By-pass valve has leakage	Replace isolation valve

Problems caused by other factors “does not reach the set pressure”

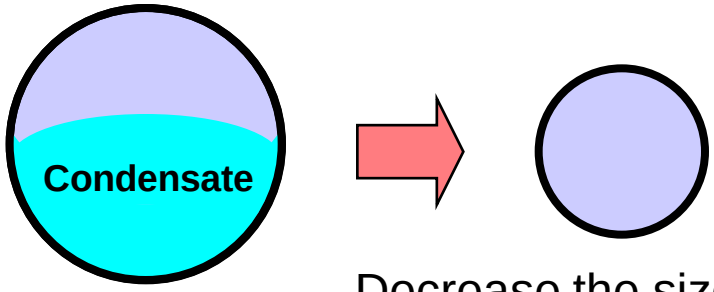
Fact example



Rising pipe at outlet side without trap

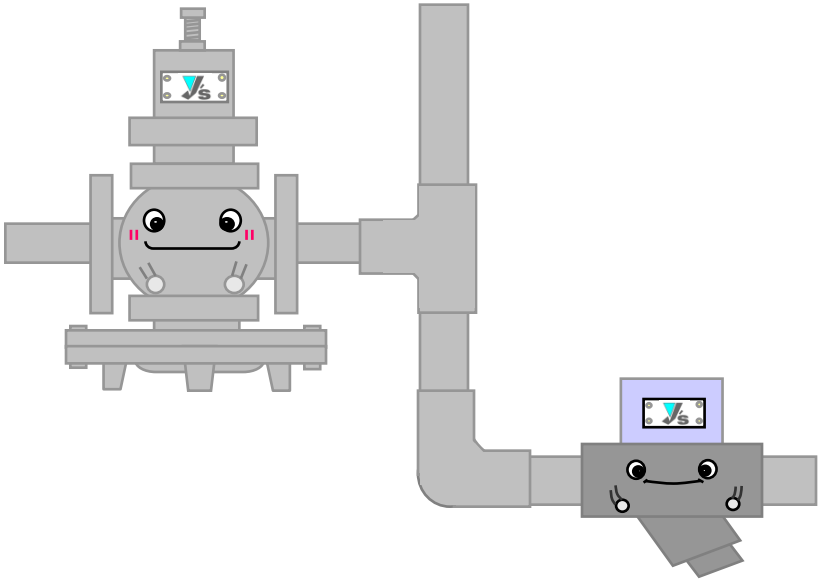
Problem

Condensate at outlet side



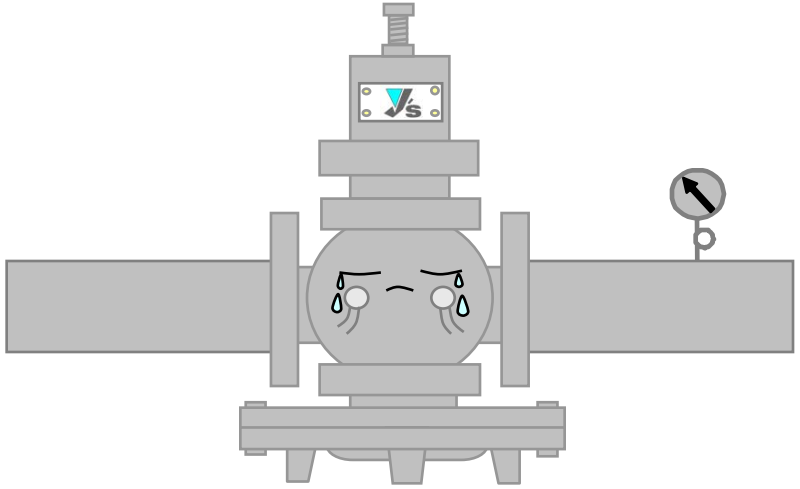
Decrease the size of piping

Solutions



Problems caused by other factors “does not reach the set pressure”

Fact example



Conditions:

*Inlet : 0.5MPa, pipe size 50A
Outlet : 0.2MPa, pipe size 50A
Steam capacity : 600 kg/h

Problem

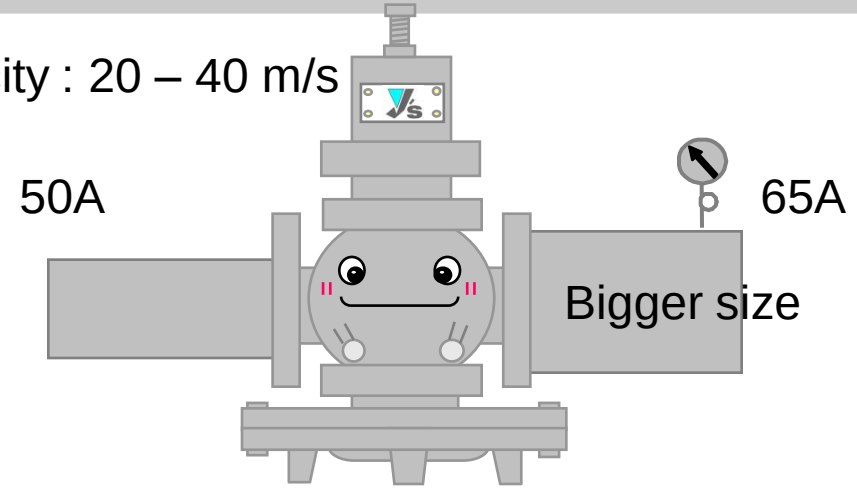
Pipe size at outlet side is too small !!

***0.5MPa Pipe size 50A, Velocity : 35.6 m/s**
***0.2MPa Pipe size 50A, Velocity : 130 m/s**

High velocity leads to have pressure loss

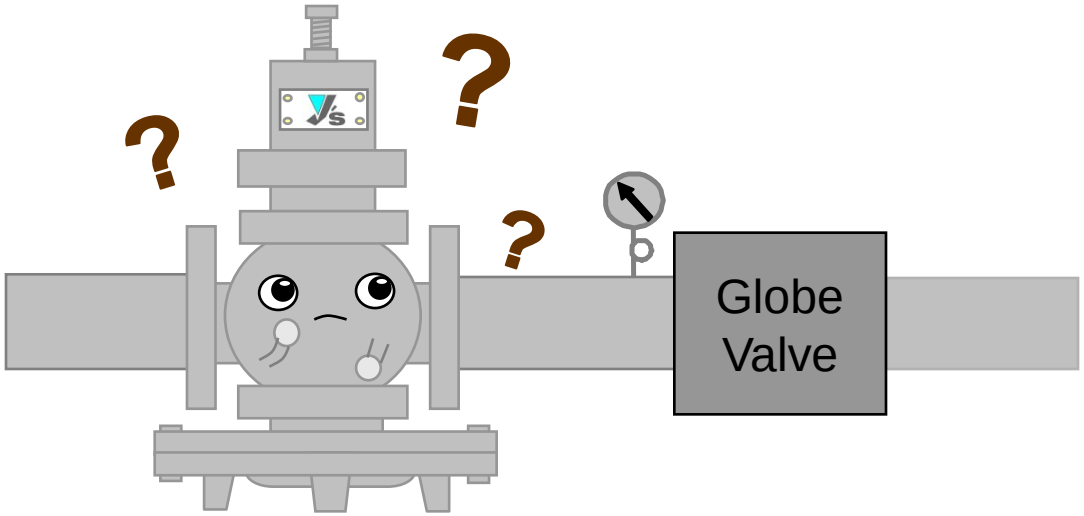
Solutions

Velocity : 20 – 40 m/s



Problems caused by other factors “does not reach the set pressure”

Fact example



Conditions:

*Decrease in outlet pressure

*Globe valve is installed after PRV

Problem

The pressure loss is caused by Globe valve.

The flow capacity of globe valve was cannot handle the steam capacity.

Solutions

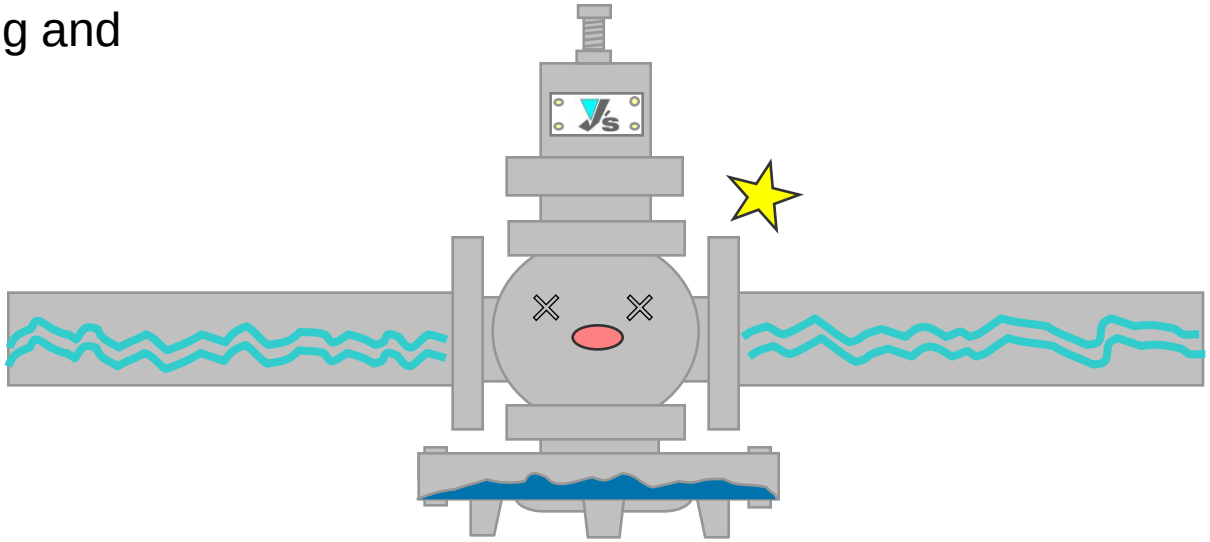
*Should install gate valve which has less pressure loss comparing to globe valve.

*Select proper size of valve after PRV.

Problems caused by other factors “does not reach the set pressure”

Fact example

Condensate in the piping and bottom diaphragm case



Problem

*The pressure at bottom diaphragm cannot increase because of condensate.

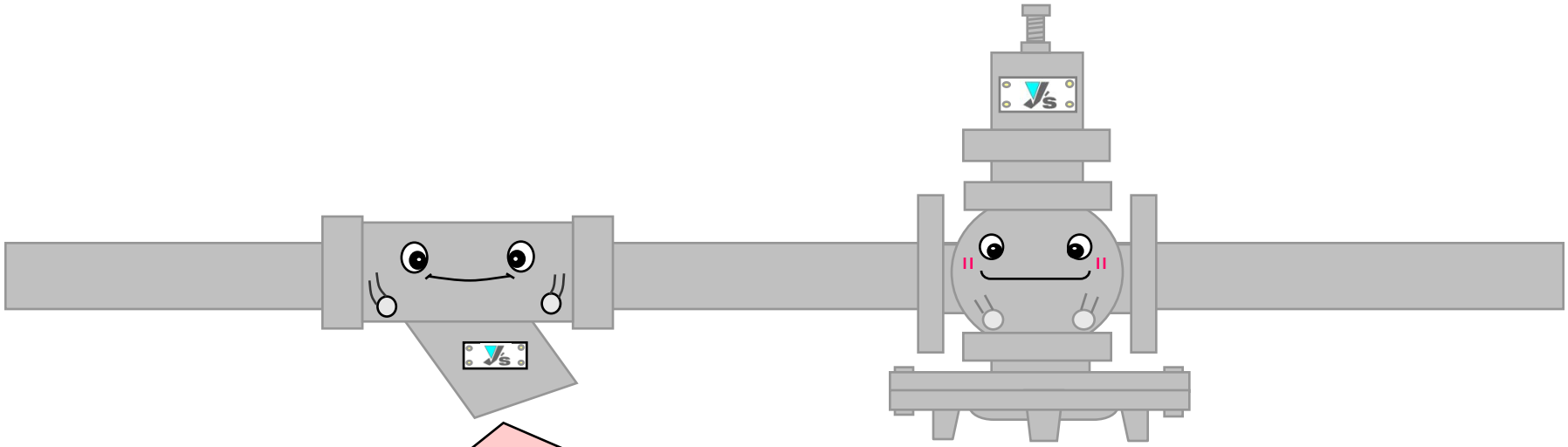
Solutions

*Discharge condensate by opening the plug at bottom diaphragm case.

To avoid “Scale problem”

Proposal : When scale problem

Make sure the strainer is installed before PRV



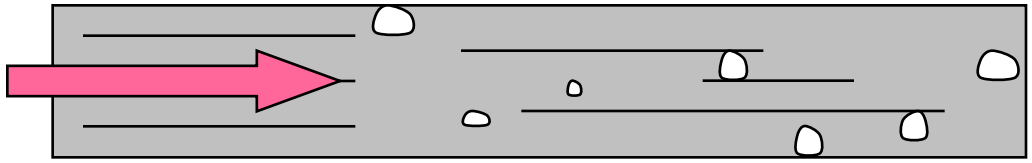
Screen 60-100 mesh are recommended when installing in front of PRV

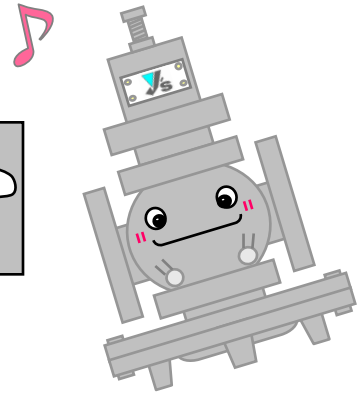
To avoid “Scale problem”

Proposal : When scale problem

Flushing is required when

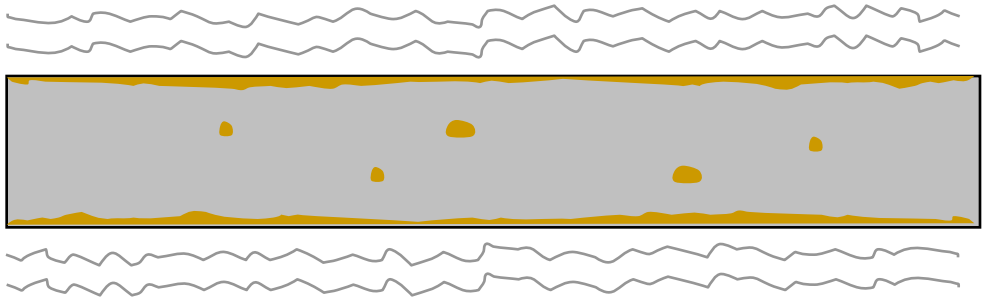
①Change of piping system
②Modifying the piping
③installing new piping

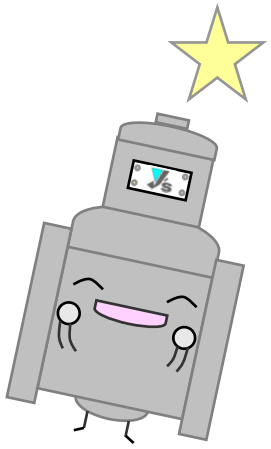




Existing piping

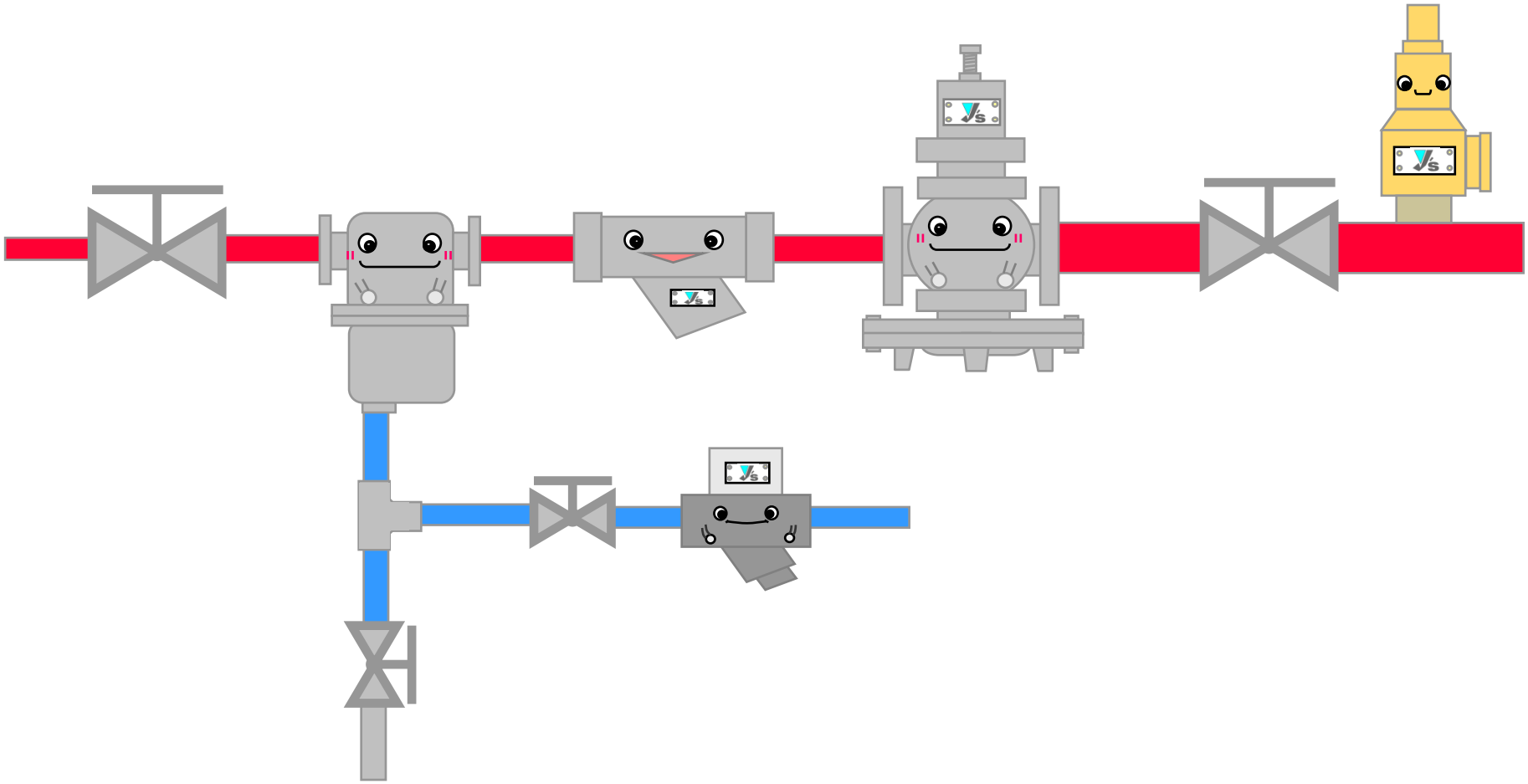
-Scales or corrosion exist





To avoid “Water hammer”

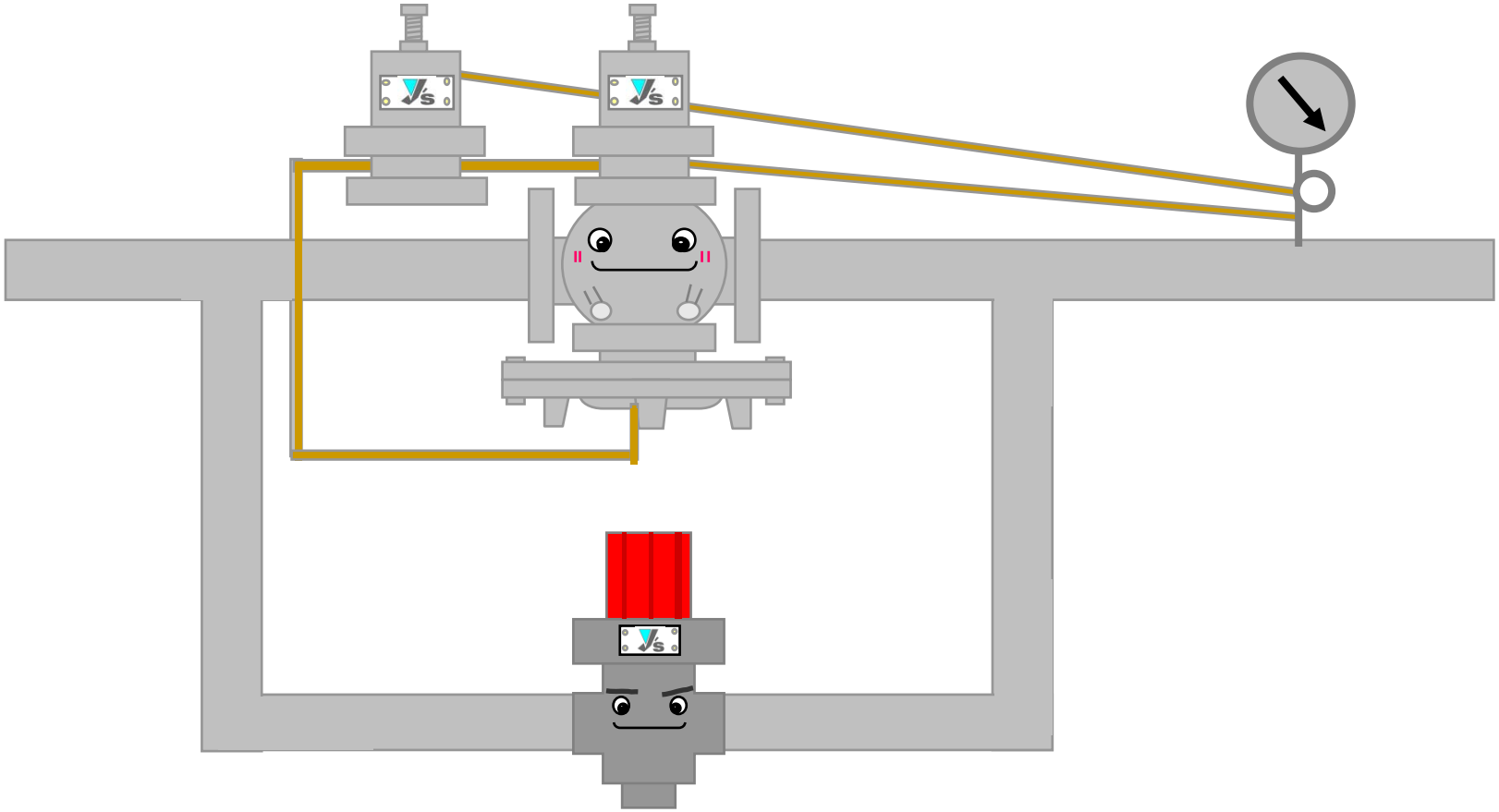
Proposal : Installing separator and steam trap



To avoid “Water hammer”

Proposal : Installing slow start-up station

Slow start-up station prevents water hammer automatically when starting the system.



GP-2000 : Trouble Shooting

Problem related to product

A. Reduced pressure exceed specified set pressure.

Maintenance procedure

Case 1-A : Check if Orifice B at Tee is clogged?

Case 2-A : Check if foreign material stuck and scratch at pilot valve or seat.

Case 3-A : Check if foreign material stuck and scratch at main valve and valve seat.

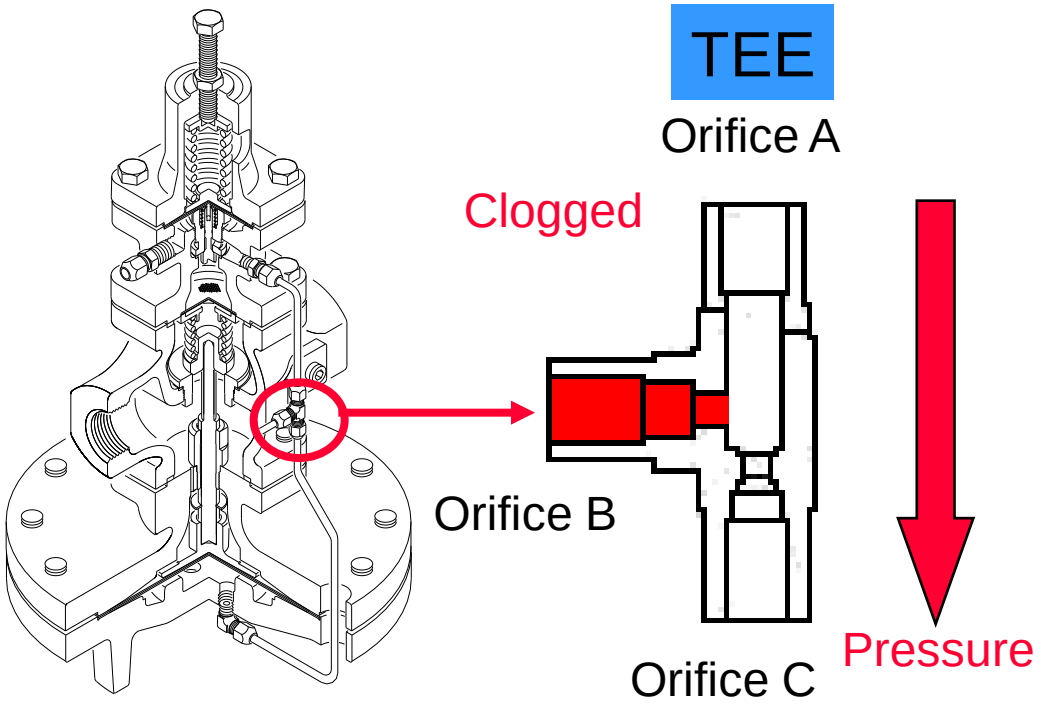
Case 4-A : Check if Pilot diaphragm is damaged?

Case 5-A : Check if External sensing pipe is not installed?

Case 1-A : Check if Orifice B at Tee is clogged?

Phenomenon

Clogging orifice B by scales causes high pressure to bottom diaphragm case, and pressure at diaphragm case stays and cannot release from Orifice B.



Problem

Clogging orifice B caused by the collection of scales at the bottom diaphragm case because of accumulation of condensate.

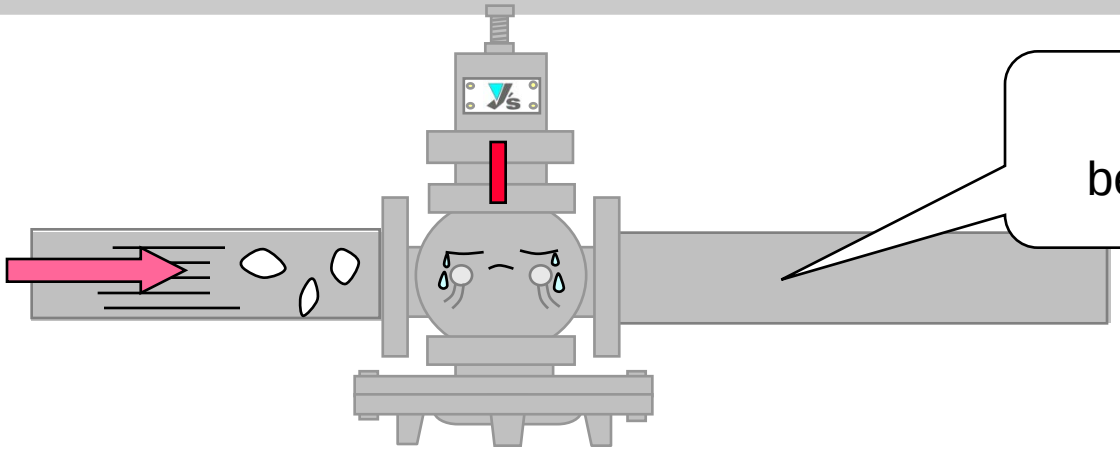
Solutions

1: Check the existence of condensate at the bottom diaphragm case by opening plug at the bottom diaphragm case.

2: Concerning the condensate, please check if steam trap and separator is installed or not.

Case 2-A : Check if foreign material stuck and scratch at pilot valve or seat.

Phenomenon



Increase in outlet pressure!!
because pilot valve force to open by scale

Problem

Leakage because valve cannot close completely

Pilot valve

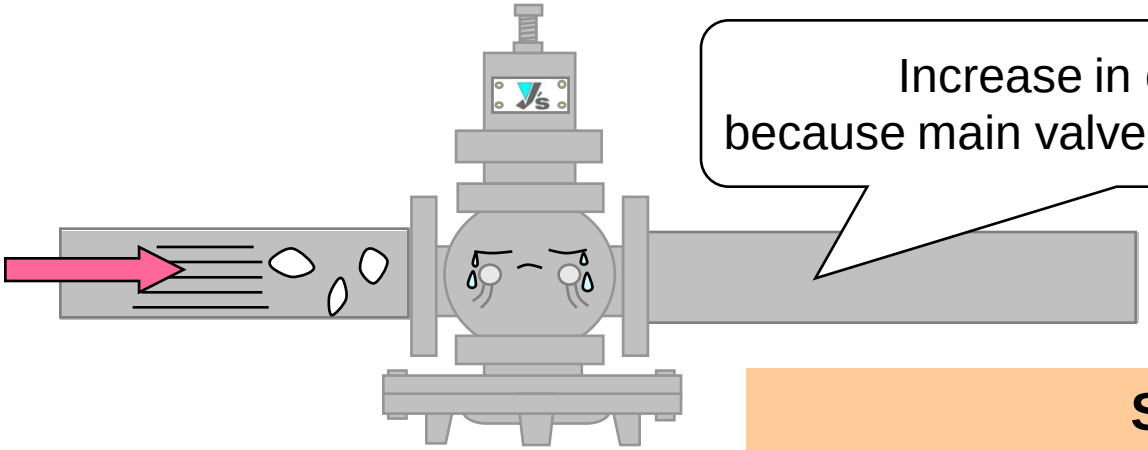
Solutions

Have to change pilot assembly

Parts kit no.	Size	Consists of	Q'ty
KS-92110	15A-200A	Pilot valve assembly	1
		Pilot valve gasket	1
		Pilot diaphragm	2

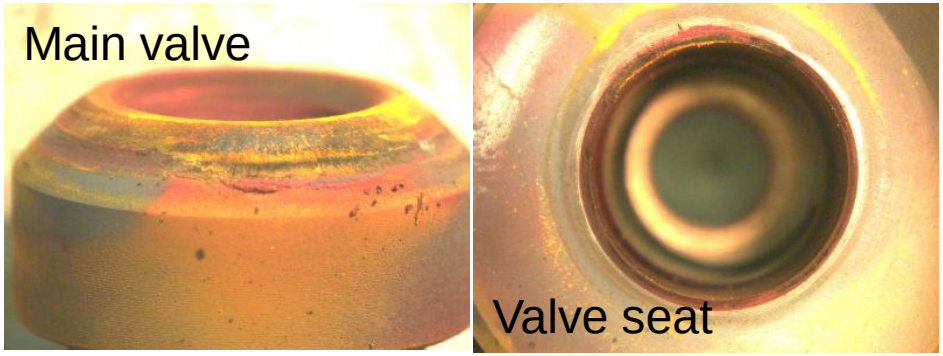
Case 3-A : Check if foreign material stuck and scratch at main valve and valve seat.

Phenomenon



Problem

Leakage because valve cannot close completely



Solutions

Lapping procedure is required

Parts kit no.	Size	Consists of	Q'ty
KS-92100	15A	Main valve	1
KS-92101	20A	Top body gasket	1
KS-92102	25A	Bottom body gasket	1
KS-92103	32A	Main valve spring	1
KS-92104	40A	Spacer gasket*	1
KS-92105	50A	*For size 50A-125A	
KS-92106	65A		
KS-92107	80A		
KS-92108	100-125A		
KS-92109	150A-200A		

Case 3-A : Check if foreign material stuck and scratch at main valve or seat.

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Solution : Lapping procedure

Step 1) Put lapping powder to the valve seating surface.
Recommended lapping powder: Fujimi incorp. Green silicon carbide #2000 or #4000. Please mix together with green silicon carbide or oil before usage.

Step 2) Set the main valve to the valve seat.

Step 3) -a: Turn the main valve clockwise and counterclockwise. Pressing the main valve down slightly.
-b: Change the main valve position and repeat above procedure.

Step 4) Continue lapping until the main valve and valve seat fit tightly.
(Time for lapping differs in main valve and valve seat condition.)

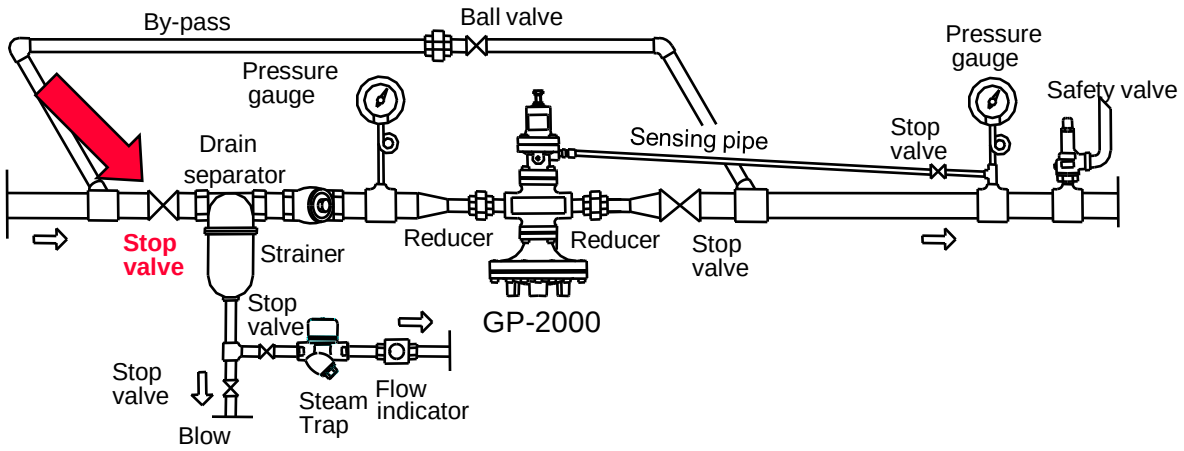
Step 5) Wipe out lapping powder completely on main valve and valve seat by soft cloth.

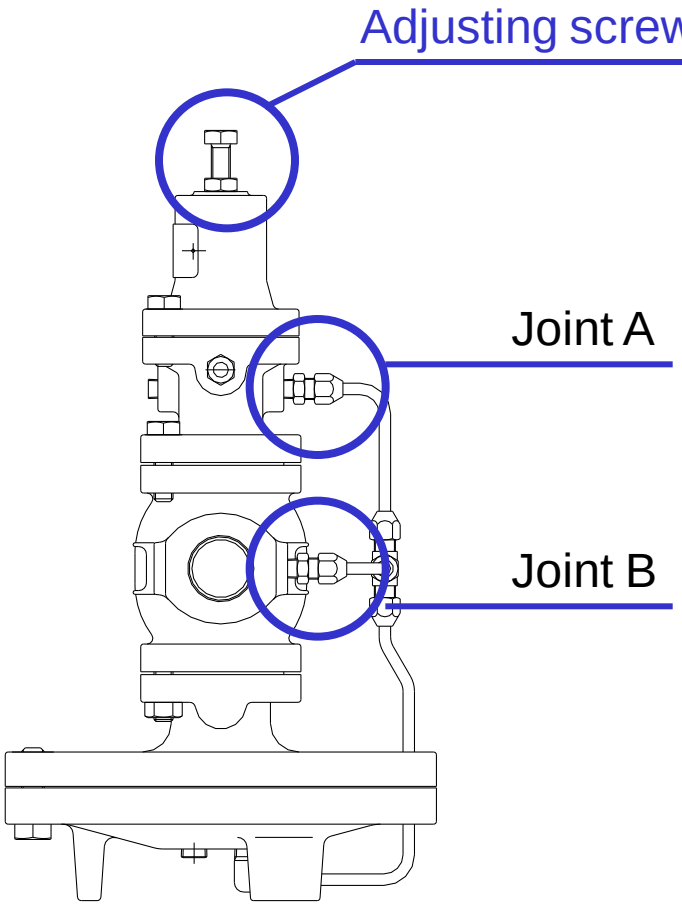
Case 2 / 3 -A : Check if foreign material stuck and scratch at GP-2000

Inspection method : Steam leakage of GP-2000

Step 1 : loosen lock nut of adjusting screw and loosen screw until feel the load has been removed.

Step 2 : Loosen joint A & B and slowly open stop valve a little. Inspect whether steam leaks out of joint A & B.

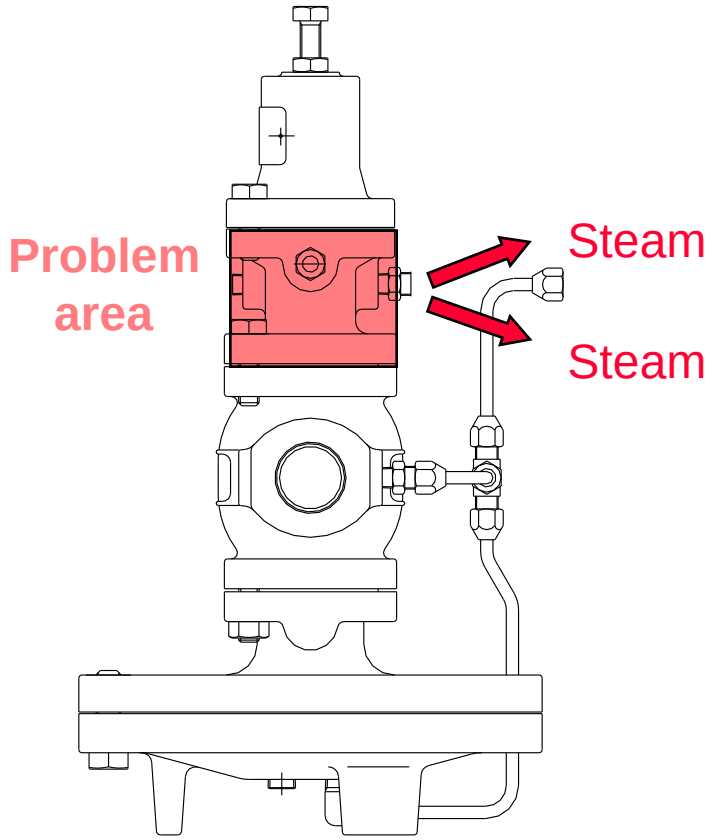




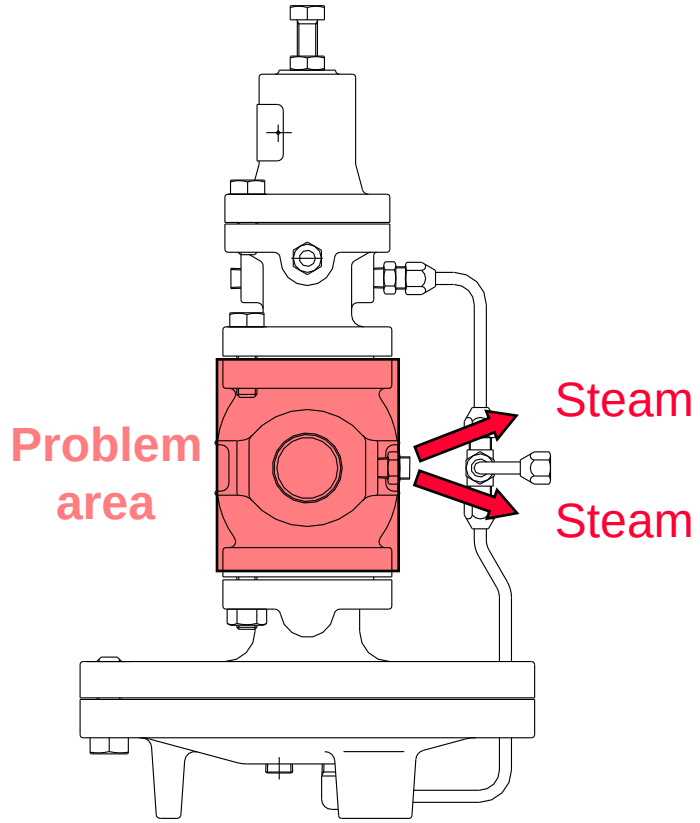
Case 2 / 3 -A : Check if foreign material stuck and scratch at GP-2000

Inspection method : Steam leakage of GP-2000

Case A : If steam leaks out of joint A, there may be foreign materials between the pilot valve & seat.

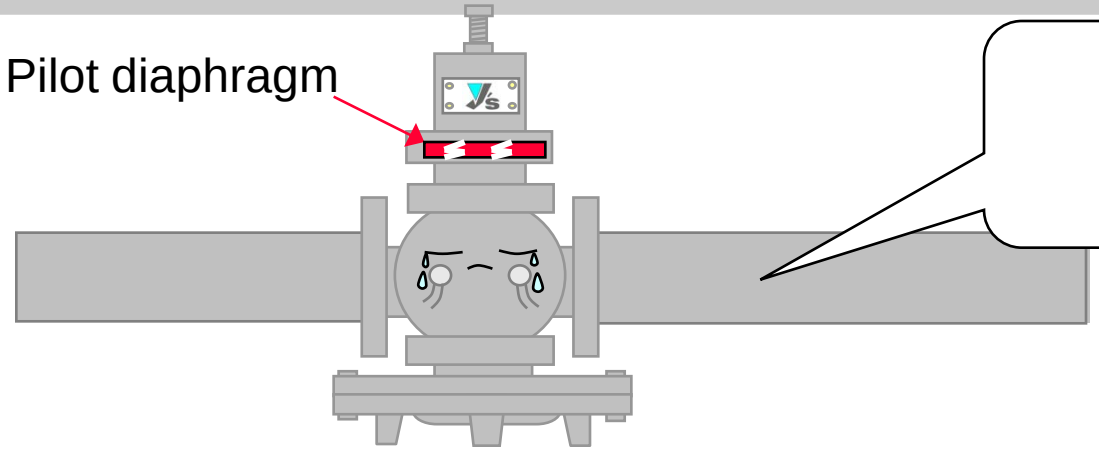


Case B : If steam leaks out of joint B, there may be foreign materials between the main valve & seat.



Case 4-A : Check if pilot diaphragm is damaged.

Phenomenon



Cannot decrease into set pressure!
because of broken pilot diaphragm

Problem

Pilot valve always opens because the pressure at bottom pilot diaphragm cannot push up diaphragm to adjust into the set pressure.

Solutions

Have to change pilot diaphragm accordance with the procedure

Case 4-A : Check if pilot diaphragm is damaged.

You can believe in.

Procedure of changing pilot diaphragm

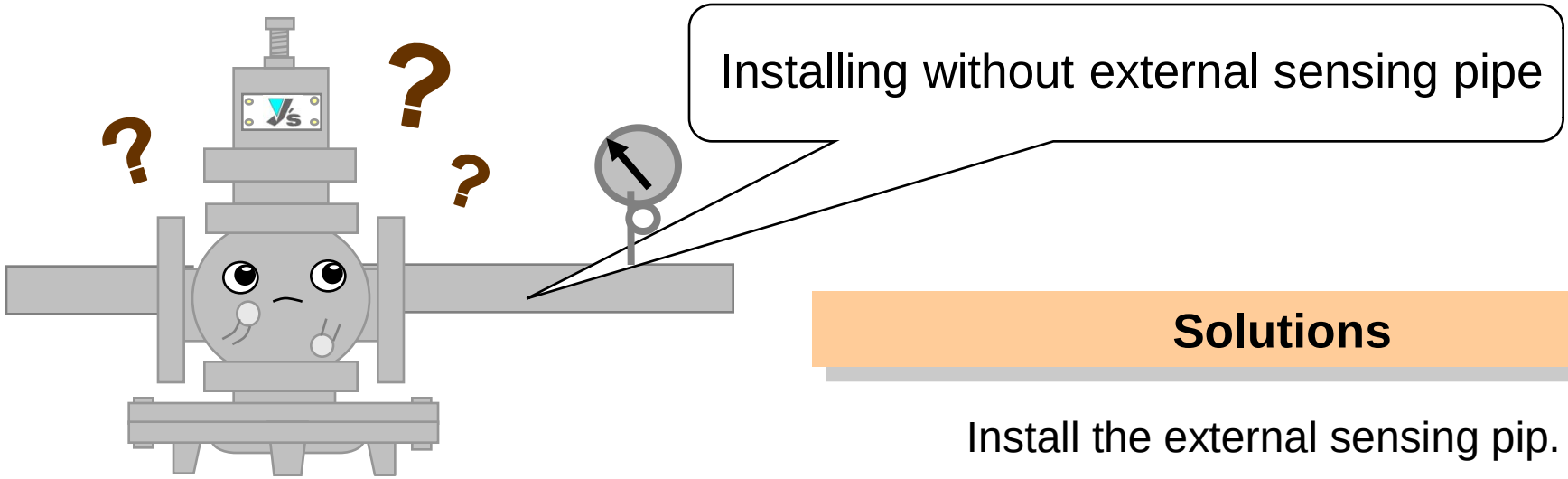
Step 1: Prepare a new pilot diaphragm.
(Using spare parts kit described on page 7).

Step 2: Apply liquid sealant to the periphery of the bottom sealing surface of pilot diaphragm.
(NEVER-SEEZ standard grade, made by BOSTIC is recommended as a liquid sealant).

Regular Grade Anti Seize
The "original" anti-seize compound and extreme pressure lubricant formulated with copper, graphite, aluminum and other ingredients to protect metal parts against rust, corrosion and seizure up to 1800ºF. Fine metallic and graphite particles in special grease protect parts even in high heat, high pressure and corrosive environments. Ford ESE-M12A4-A, Garrett Engine Div. PCS5724, Pratt & Whitney PWA 360523-2 and tested to MIL-A-907.

Case 5-A : Check if External sensing pipe is installed?

Phenomenon

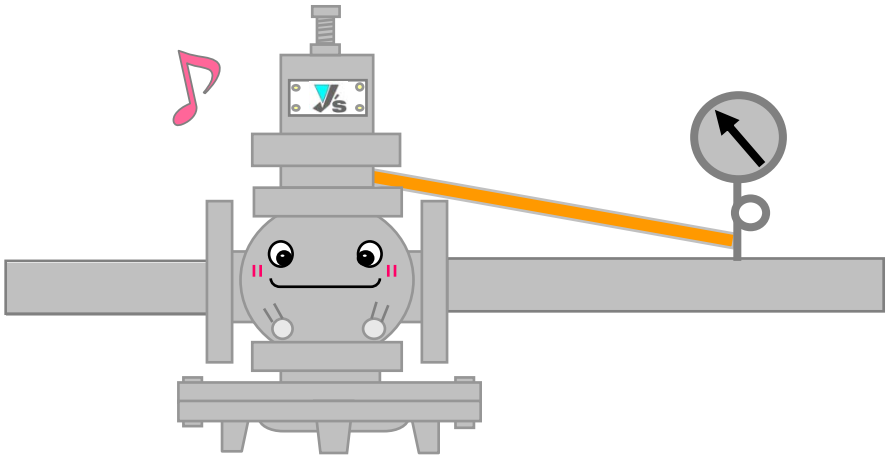


Problem

Without external sensing pipe, the pilot valve keeps opening by the adjusting spring force. Pilot valve will not sense and adjust the reducing pressure.

Solutions

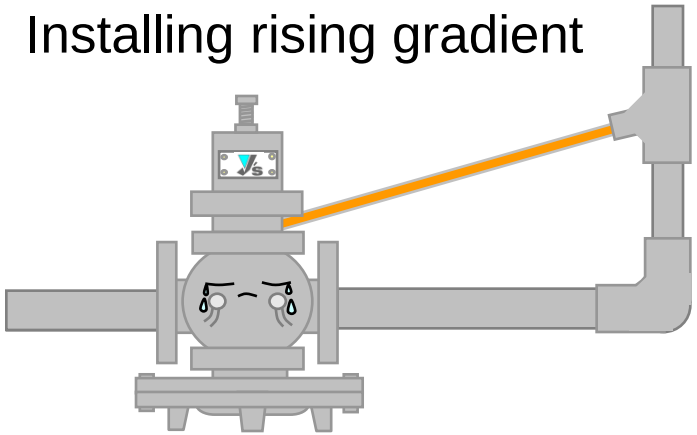
Install the external sensing pip.



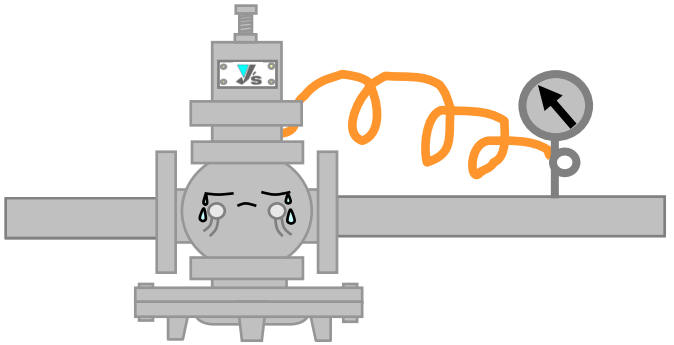
Fact Example: Reduced pressure exceed specified set pressure.

Fact example

Installing rising gradient



Installed in round shape

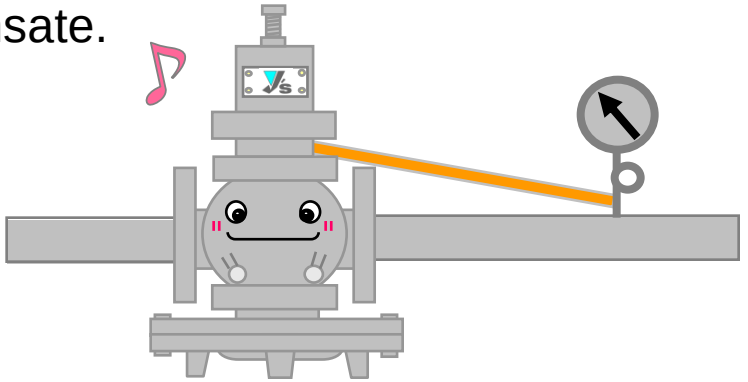


Problem

Because of accumulation of condensate at pilot, the pressure transmission to bottom pilot diaphragm is cut off.

Solutions

Install the external sensing pipe in down slope position not to have accumulation of condensate.

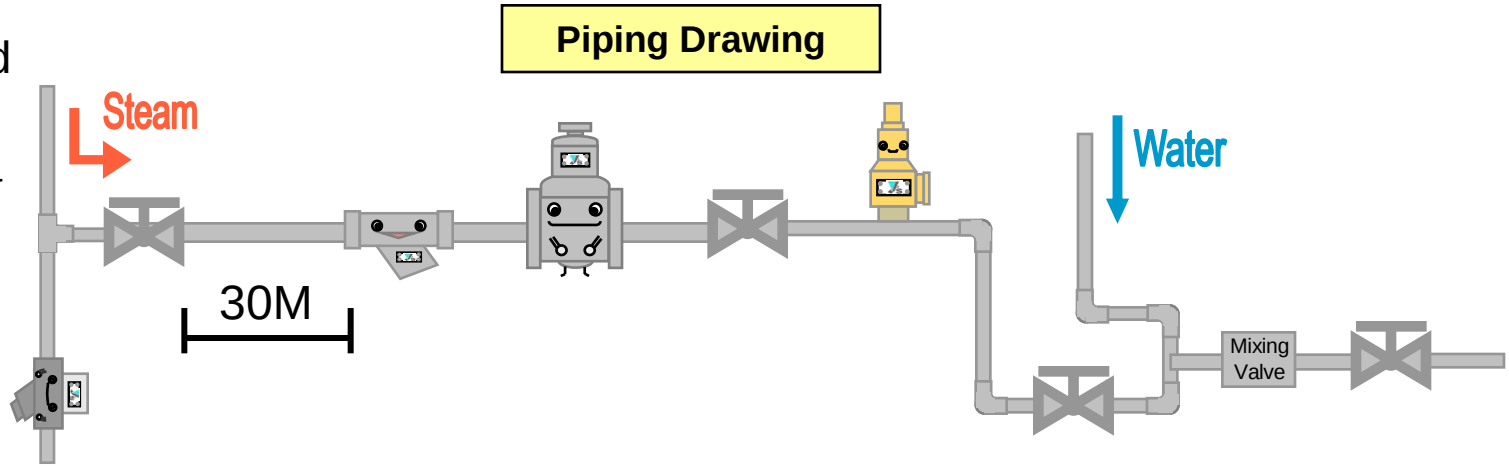


Fact Example: Reduced pressure exceed specified set pressure.

Fact example

Conditions:

*Mixing valve is only used once a day.
*Outlet pressure: 0.3MPa



Problem

*Outlet pressure increases up to 0.4MPa after 24 hours, and safety valve blows.
*Accumulation of condensate is cause because of not using for a long period of time.
*Water back flow in the piping system. *Scales stuck at the PRV.

Solutions

*Installing check valve solved the problem, and install trap close to PRV.

GP-2000 : Trouble Shooting

You can believe in.

Problem related to product

B. Pressure does not reach the set pressure.

Maintenance procedure

Case 1-B : Check if Pilot valve assembly is stuck with dirt?

Case 2-B : Check if main diaphragm is damaged?

Case 3-B : Check if Screen is clogged?

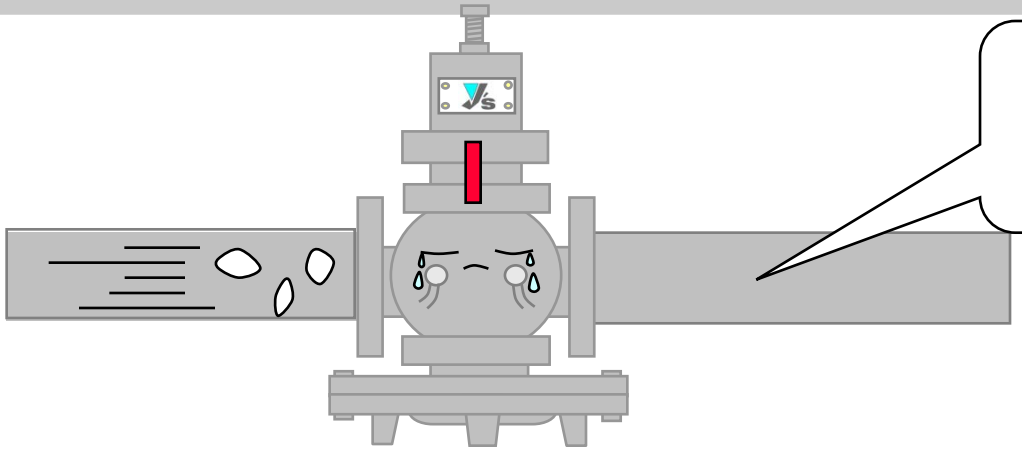
Case 4-B : Check if Orifice C at Tee is clogged?

Case 5-B : Check if External sensing pipe is clogged?

Case 6-B : Check if Nominal size is too small for the steam capacity?

Case 1-B : Check if pilot valve assembly is stuck with dirt?

Phenomenon



Outlet pressure cannot control!!
because defect on pilot valve

Problem

Leakage will be caused and valve cannot open completely because of dirt.

Case 1-B : Check if pilot valve assembly is stuck with dirt?

Inspection method

Step 1 : Turn the pilot valve assembly upside down and place it on a table.

Step 2 : Hold valve seat by fingers, depress the assembly strongly and check whether valve seat moves.

Solutions

Change the parts as pilot assembly

Pilot assembly

Parts kit no.	Size	Consists of	Q'ty
KS-92110	15A-200A	Pilot valve assembly	1
		Pilot valve gasket	1
		Pilot diaphragm	2

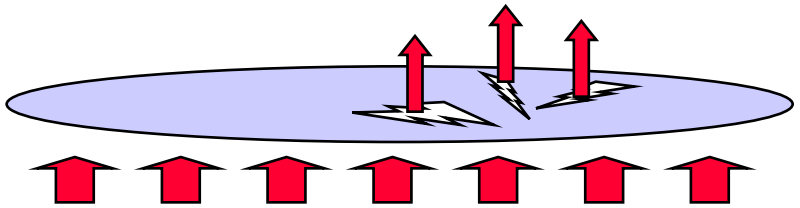
*Please also change pilot diaphragm at the same time.

Case 2-B : Check if main diaphragm is damaged?

You can believe in.

Phenomenon

1: With broken diaphragm, the pressure cannot push up the diaphragm because the pressure runs through the diaphragm.



2: Diaphragm cannot push up the main valve via retainer and spindle

3: Outlet pressure will be Zero.

Problem

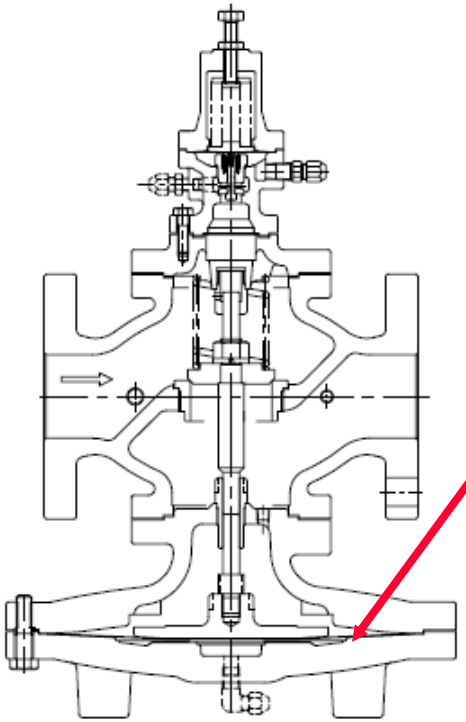
1: Scale problem
-Scales go into diaphragm case

2: Water hammer
-On-off valve or too much condensate in the piping system

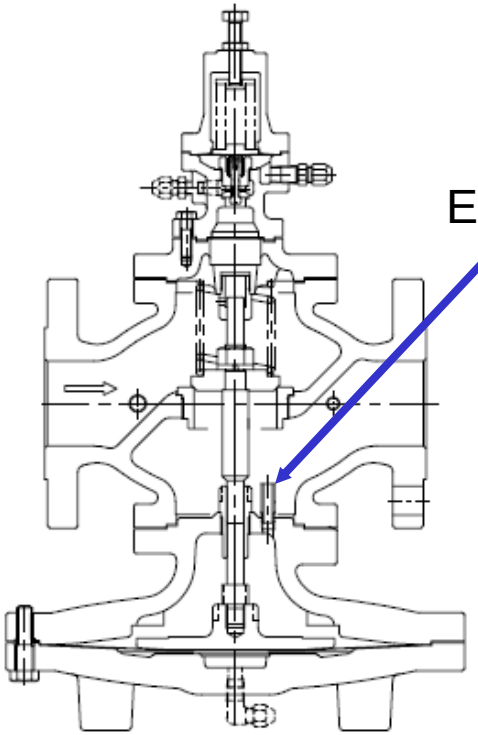
Case 2-B : Check if main diaphragm is damaged?

Solution by Modification

1: Scale problem



Scale moves into diaphragm case

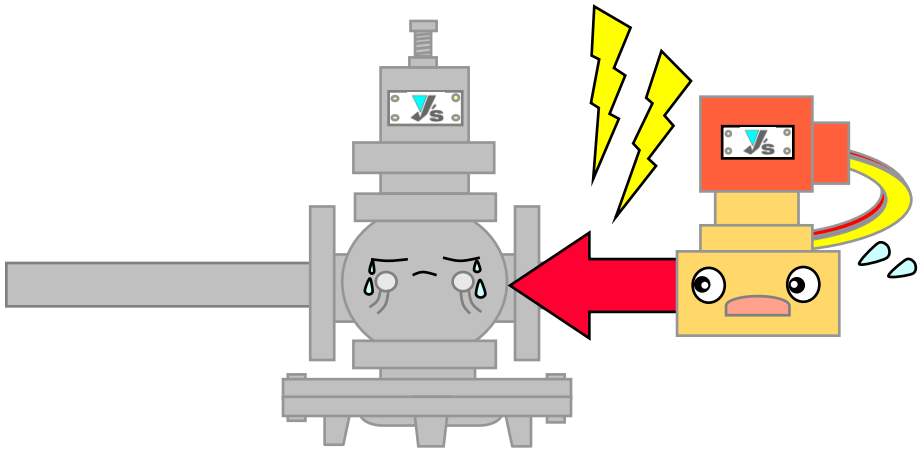


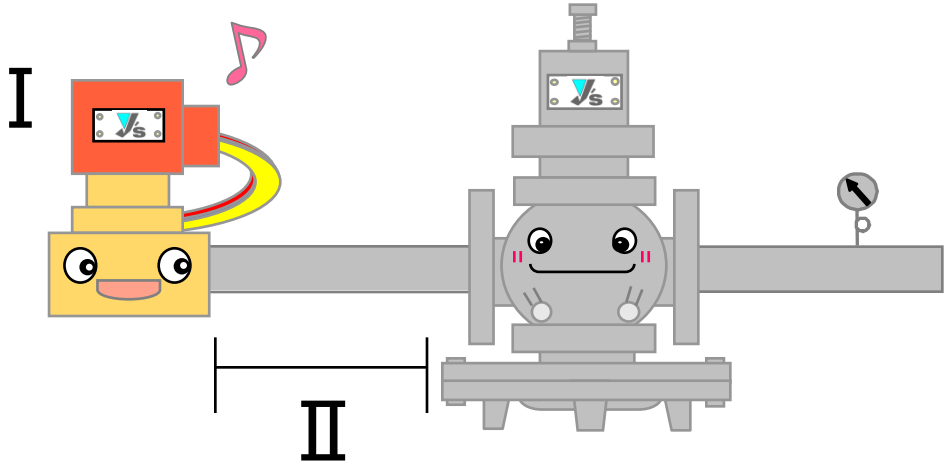
*Please make sure strainer (60 – 80 mesh) is installed before PRV.

Case 2-B : Check if main diaphragm is damaged?

Proposal : to avoid water hammer

2: Water hammer



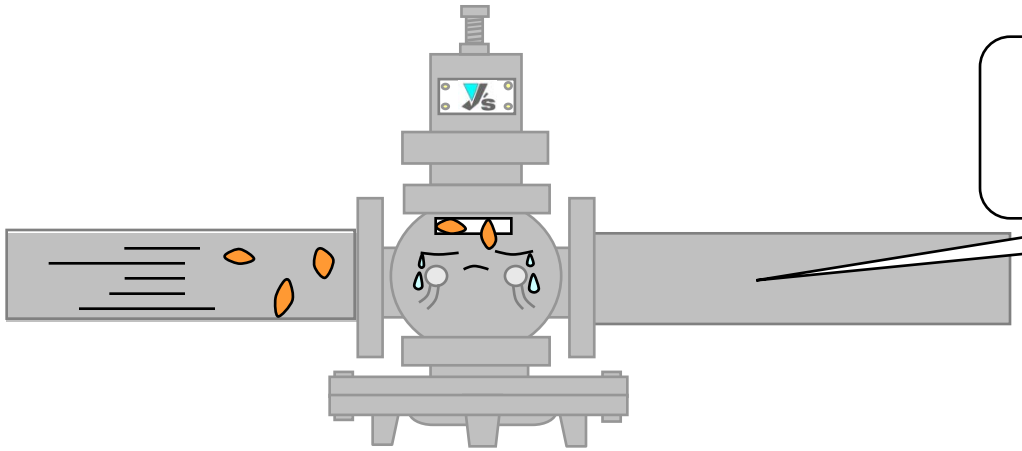


Ⅰ. On-off valve should be installed in front of PRV

Ⅱ. Proper location (more than 3M away from PRV)

Case 3-B : Check if screen is clogged?

Phenomenon



*Steam cannot flow because the integral strainer is clogged

Problem

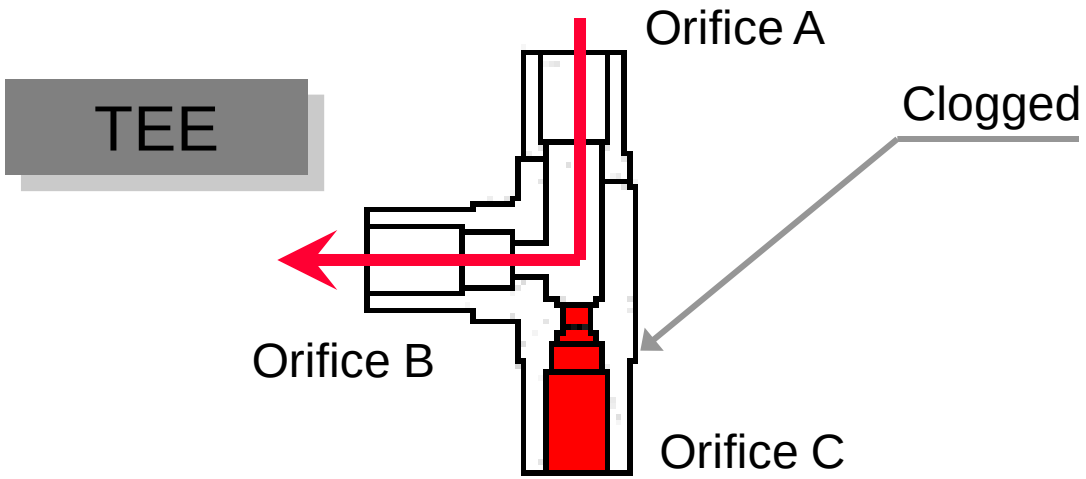
Steam cannot go through strainer because of too much scales

Solutions

Clean up or change the integral strainer

Case 4-B : Check if Orifice C at Tee is clogged?

Phenomenon



Problem

Steam cannot flow to the bottom diaphragm case and cannot push up the diaphragm to lift up the main valve

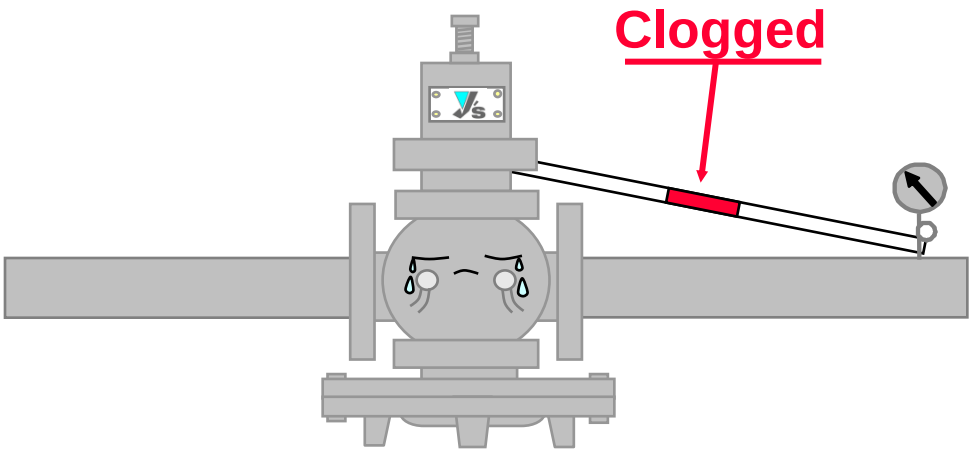
Pressure does not reach the set pressure

Solutions

Blow inside of the tee with compressed air.

Case 5-B : Check if external sensing pipe is clogged?

Phenomenon



The pressure inside of external sensing pipe cannot escape because of scales,

Problem

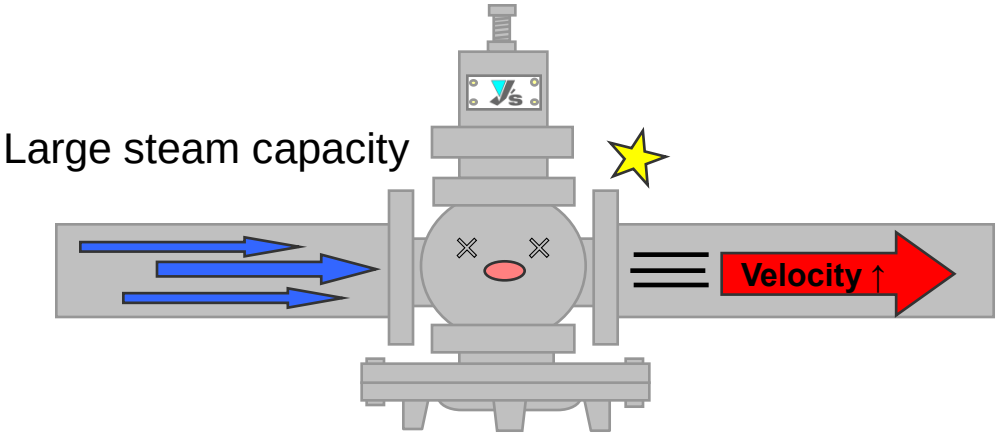
Lots of scales inside of the piping

Solutions

Blow inside of the external sensing pipe with compressed air.

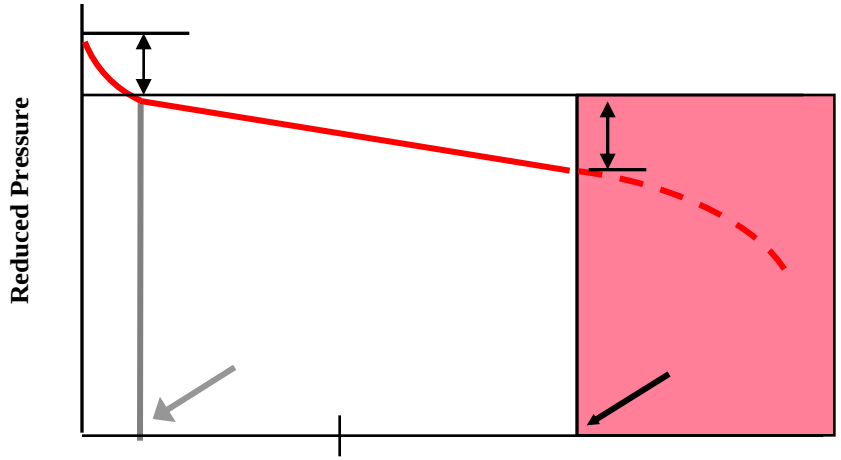
Case 6-B : Check if Nominal size is too small for the steam capacity

Fact example



Too much steam capacity to PRV

Problem



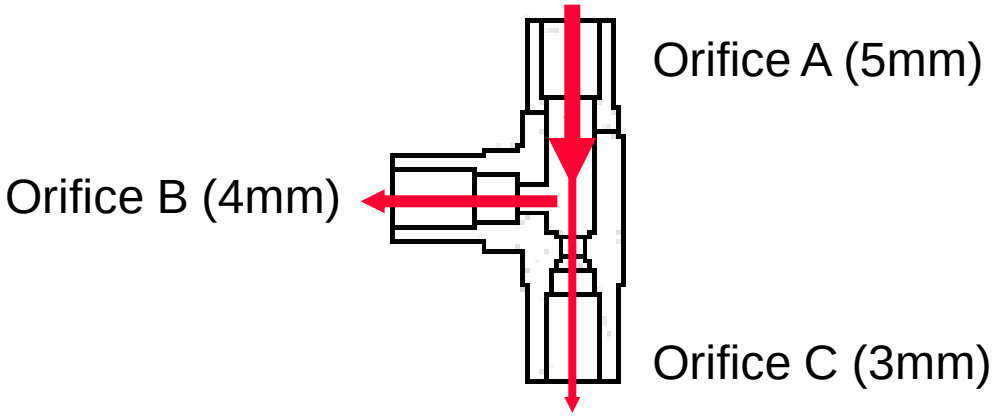
Solutions

*Select proper size of PRV
*Steam velocity should be 20 to 40 m/s

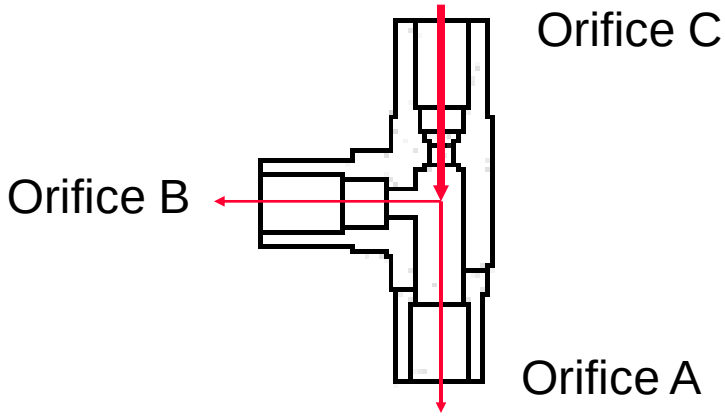
Fact Example: Pressure does not reach the set pressure.

Fact example

Installing normal position



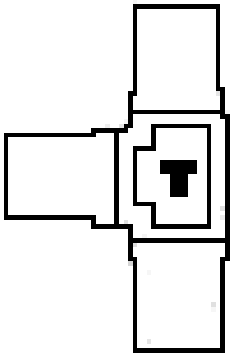
Installing wrong side up



Problem

Required pressure cannot flow to bottom diaphragm, and diaphragm does not move to open main valve

Solutions



Assemble with right position

GP-2000 : Trouble Shooting

You can believe in.

Problem related to product

C. Unstable operation

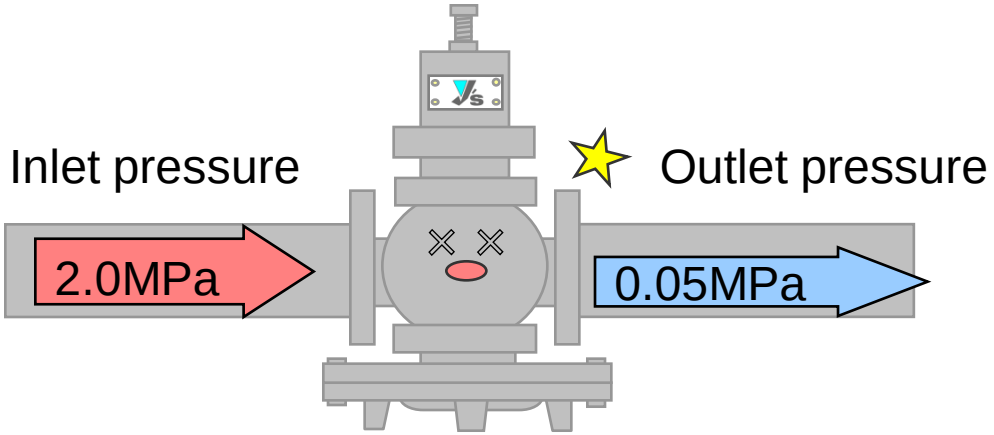
Maintenance procedure

Case 1-C : Pressure reduction ratio is too big

Case 2-C : Nominal size is too large

Problems caused by other factors “Unstable operation”

Fact example



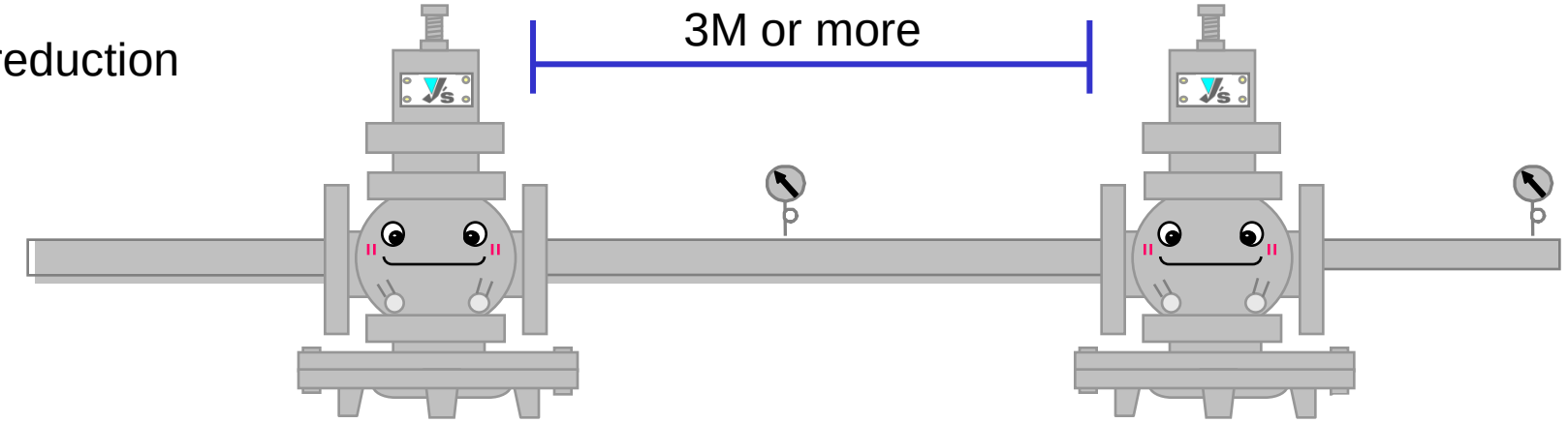
Problem

*Pressure reduction ratio is 40 : 1

*Reduction ratio must be less than 20 : 1

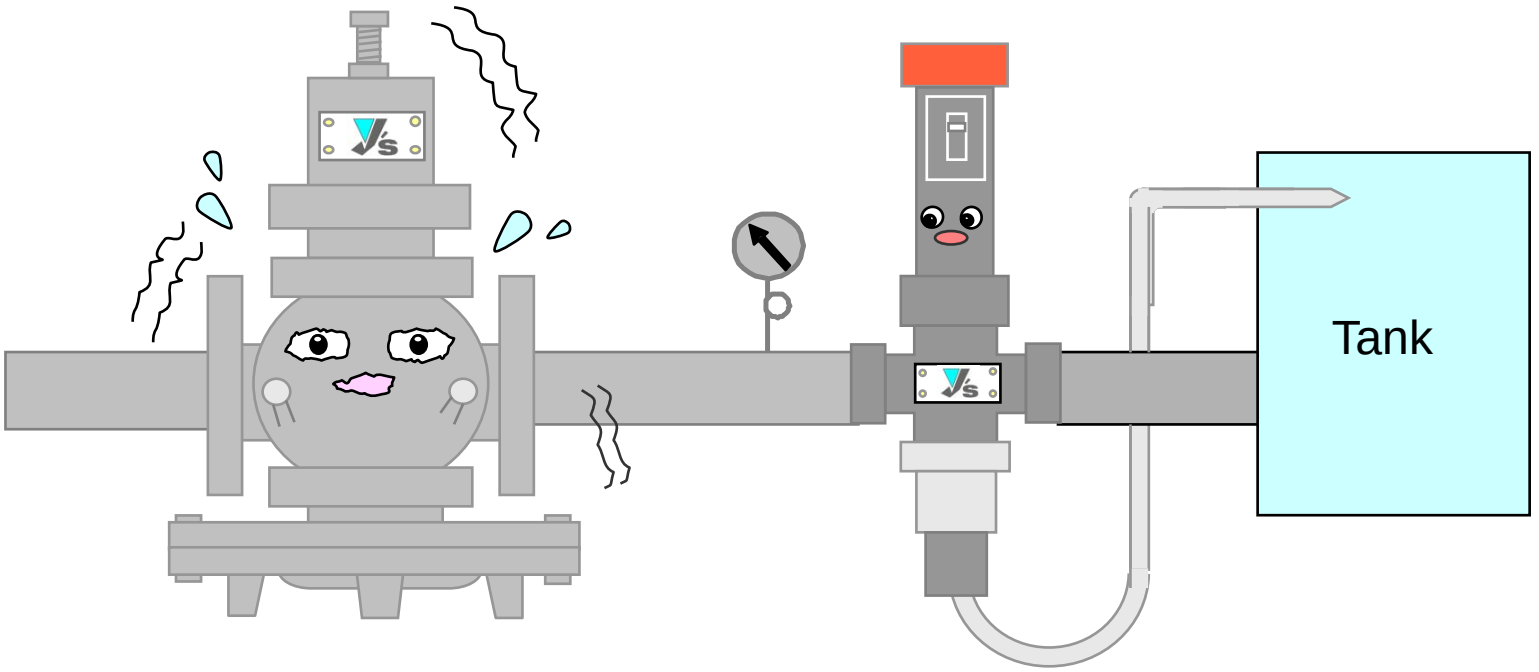
Solutions

Two-stage reduction



Problems caused by other factors “Unstable operation”

Fact example



Vibration problem

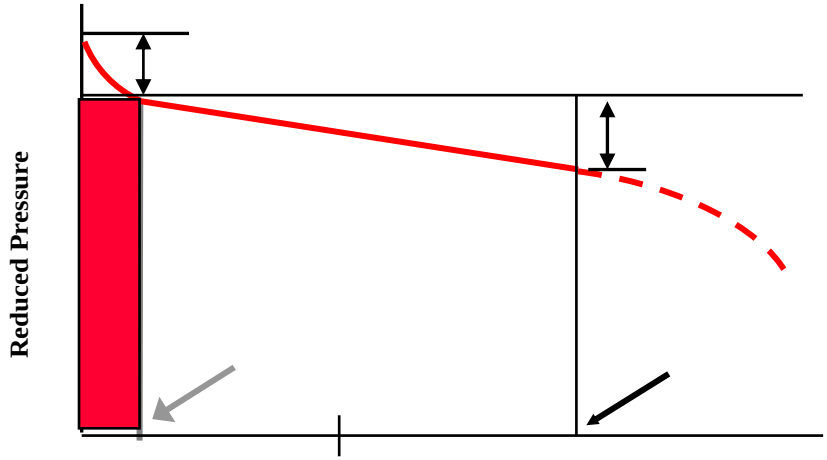
Conditions:
*Flow rate: 30 kg/h
*GP-2000 25A & OB-30 25A
*P1: 0.4MPa, P2: 0.2MPa

Problems caused by other factors “Unstable operation”

Problem

Vibration is caused because
*Rated flow of GP-2000 : 600kg/h and
Flow rate : 30kg/h is only 5% of rated flow.

*When the flow becomes lower than 30 kg/h
vibration is occurred.



Solutions

*Should install proper size of PRV.
*Installing GP-1000 15A or GD-30 15A to solve the problem.
*Select proper size of the valve between
30 to 80 % of rated flow.