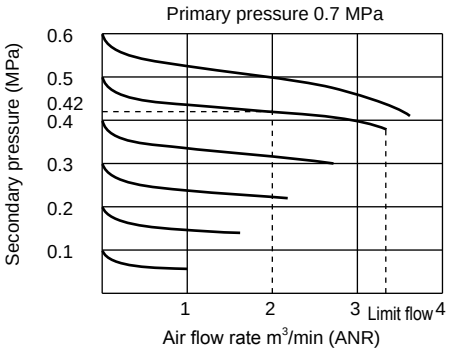
Reading the Properties Table

1. Combination, filter regulator, and regulator flow characteristics

The flow characteristics table indicates changes (pressure drop) in the set secondary pressure in regard to the changes (air flow) in the amount of air consumed on the secondary side.

When the primary side is 0.7 MPa and the secondary pressure is set with an air flow of "0", the secondary pressure fluctuation and limit flow for a specified air flow can be confirmed.



1) Finding the pressure fluctuation

If secondary pressure is 0.5 MPa and air flow is 2 m^3/min, secondary pressure is 0.42 MPa.

Using the flow characteristics table, draw a perpendicular line at an air flow of 2 m^3/min. Then draw a horizontal line along the 0.5 MPa flow curve and read off the secondary pressure where the lines intersect.

2) Finding the limit flow rate

Straight down from the right end of the flow curve at an air flow of 3.6 m^3/min. is the limit flow rate.

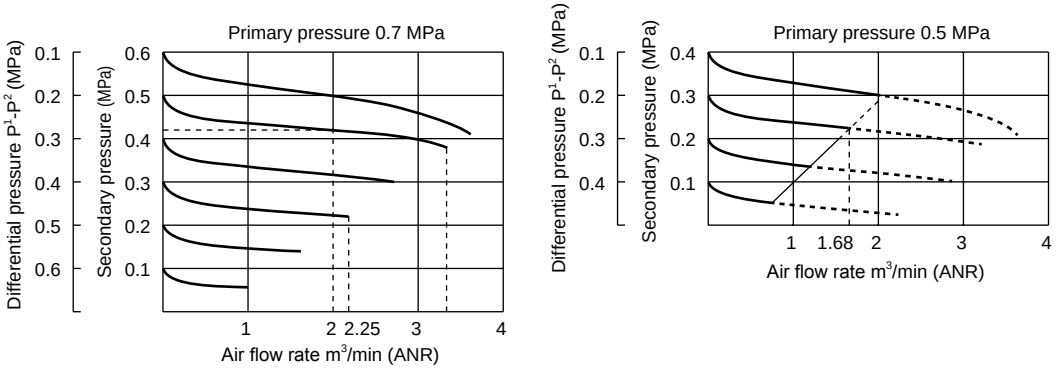
Notes

1) The actuator's working flow rate should be within 0.1 MPa of the regulator pressure drop.
2) The limit flow greatly changes depending on the pipe's effective section area (piping inner diameter, pipe length, etc.). Graphs in the catalog are all measured using steel pipe according to JIS B8372-1.
3) Keep differential pressure between primary and secondary sides to 0.1 MPa or more during use.

2. Approximate characteristics when primary side pressures of combination, filter regulator, and regulator flow characteristics differ from the catalog value (primary side pressure 0.7 MPa)

Using the catalog flow characteristics table (primary pressure 0.7 MPa) and a flow curve in which the pressure difference of primary and secondary set pressure is the same, variations in the secondary pressure for the required primary pressure are estimated.

Example) Flow rate properties for which the primary pressure is 0.5 MPa, use 0.4, 0.3, 0.2, and 0.1 MPa flow curves for the secondary pressure catalog values (primary pressure of 0.7 MPa) of 0.6, 0.5, 0.4, and 0.3 MPa, respectively.



The limit flow rate varies with the absolute pressure ratio of the primary pressure. An approximate value is calculated using the following formula:

$$Q = Qo \times \frac{P1+0.1}{0.8}$$

Qo = Each secondary pressure limit flow rate for the catalog primary pressure of 0.7 MPa

Q = Approximate limit flow rate m^3/min

$P1$ = Required primary side pressure MPa

Example) The approximate limit flow rate at the primary side pressure 0.5 MPa and secondary side pressure 0.3 MPa is:

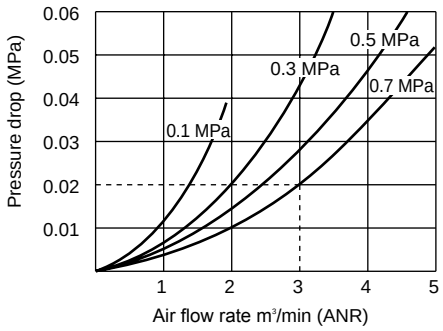
$$Q = 2.25 \times \frac{0.5+0.1}{0.8} = 1.68(m^3/min)$$

Qo can be obtained by reading the limit flow rate at the secondary side pressure 0.3 MPa in the catalog.

3. Air filter flow characteristics

The flow characteristics table indicates the pressure drop (pressure loss on primary and secondary sides of the air filter) at the air filter for air consumed (air flow) on the secondary side.

The pressure drop is shown for air flow for 0.1, 0.3, 0.5, or 0.7 MPa primary pressure.

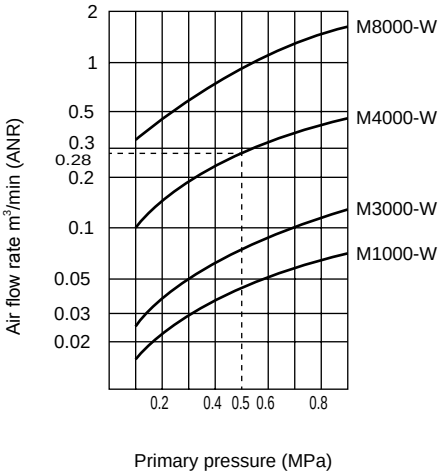


Example) If air flow is 3.0 m^3/min at primary pressure of 0.7 MPa, pressure drops 0.02 MPa (secondary pressure is 0.68 MPa).

Read the pressure drop by drawing a vertical line from air flow 3.0 m^3/min and drawing a horizontal line where it intersects the primary pressure 0.7 MPa curve.

4. Oil mist filter and Y element air filter flow characteristics

Flow characteristics indicate the max. air consumption (air flow rate) corresponding to the primary side working pressure that allows oil and tar removal. If the product is used at an air flow higher than that indicated, oil and tar within the specified value will not be removed.



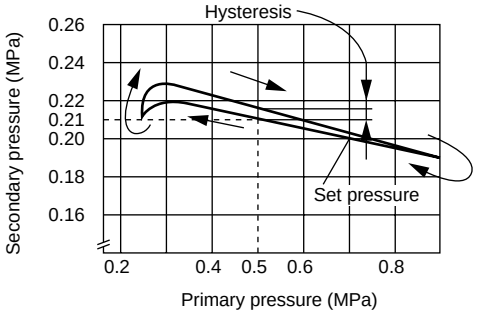
Example) When using the M4000-W with a primary pressure of 0.5 MPa, max. air flow is 0.28 m^3/min.

Read max. air flow by drawing a vertical line from primary pressure 0.5 MPa, and drawing a horizontal line where it crosses the working product curve.

5. Regulator pressure characteristics

The pressure characteristics table shows changes in secondary set pressure for changes in primary pressure.

Primary pressure is, for example, set to 0.7 MPa, secondary set pressure to 0.2 MPa, and air consumption to 25 ℓ/min (atmosphere release thanks to use of ø1 orifice). Changes in secondary set pressure when primary pressure drops to 0.25 MPa, rises to 0.9 MPa, then returns to the original 0.7 MPa are shown.



Example) Secondary set pressure rises to 0.21 MPa when primary pressure changes to 0.5 MPa.

Read secondary pressure by drawing a vertical line from primary pressure 0.5 MPa and drawing a horizontal line where it intersects the pressure characteristics curve.

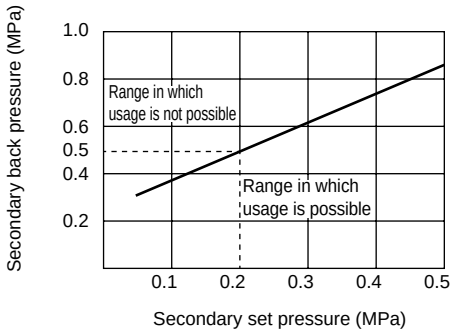
Hysteresis causes pressure difference when the primary pressure rises and falls.

Reading the Properties Table

6. Set pressure range for reverse regulator back pressure

The properties table indicates the limit of secondary back pressure (secondary rise in pressure) enabling reversal (exhaust of regulator secondary pressure to the primary side) of the secondary set pressure.

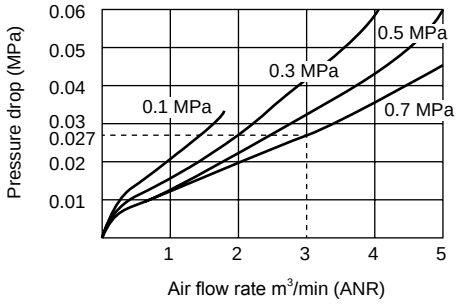
Example) This indicates that reversal is possible if secondary back pressure is 0.5 MPa or less when set pressure is 0.2 MPa.
Read secondary back pressure by drawing a vertical line from set pressure 0.2 MPa and drawing a horizontal line where it intersects the curve.
The area below the curve is reversible.



7. Lubricator flow characteristics

The flow characteristics table shows the pressure drop (primary and secondary pressure difference) at each primary pressure of the air flow.

Example) If air flow is 3 m^3/min at primary pressure of 0.7 MPa, pressure drops 0.027 MPa (secondary pressure is 0.673 MPa).
Read the pressure drop by drawing a vertical line from air flow 3.0 m^3/min and drawing a horizontal line where it intersects the primary pressure 0.7 MPa curve.



8. Exhaust cleaner flow characteristics

The flow characteristics table indicates back pressure applied to the IN side of the exhaust cleaner for the processing flow rate. If the product is used with a processing flow rate higher than that indicated, silencing and oil mist collection within the specified value will not be attained.

Example) When processing flow rate is 3 m^3/min, 0.039 MPa back pressure is generated at the exhaust cleaner IN side.
Read back pressure by drawing a vertical line from flow 2 m^3/min and drawing a horizontal line where it intersects the curve.