Model Selection

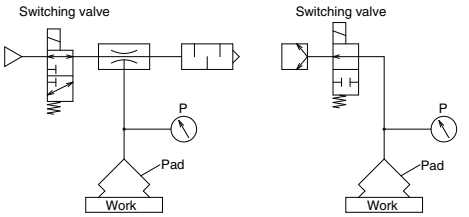
5 Adsorption Response Time

When a vacuum pad is used for the adsorption transfer of a workpiece, the approximate adsorption response time can be obtained (the length of time it takes for the pad's internal vacuum pressure to reach the pressure that is required for adsorption after the supply valve {vacuum switching valve} has been operated). An approximate adsorption response time can be obtained through formulas and selection graphs.
However, when selecting a ZL series multistage ejector, these details do not apply. Refer to the "Time to Reach Vacuum" graph in the catalog for applicable details.

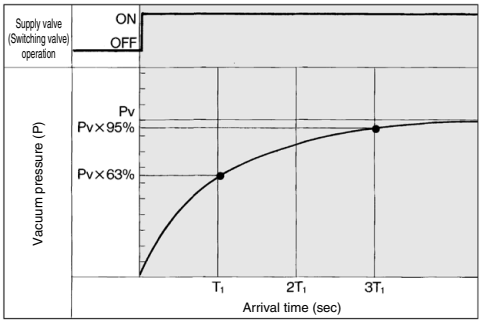
● Relationship between Vacuum Pressure and Response Time after Supply Valve (Switching Valve) is Operated

The relationship between vacuum pressure and response time after the supply valve (switching valve) is operated as shown below.

Vacuum System Circuit



Vacuum Pressure and Response Time after Supply Valve (Switching Valve) is Operated



Pv: Final vacuum pressure
T1 : Arrival time to 63% of final vacuum pressure **Pv**
T2 : Arrival time to 95% of final vacuum pressure **Pv**

● Calculating Adsorption Response Time with the Formula

Adsorption response times **T1** and **T2** can be obtained through the formulas given below.

Adsorption response time $T_1 = \frac{V \times 60}{Q}$

Adsorption response time $T_2 = 3 \times T_1$

Piping capacity

$V = \frac{3.14}{4} D^2 \times L \times \frac{1}{1000}$ (L)

T1 : Arrival time to 63% of final vacuum pressure **Pv** (sec)
T2 : Arrival time to 95% of final vacuum pressure **Pv** (sec)
Q1: Average suction flow rate L/min [ANR]
Calculation of average suction flow rate
• Ejector
Q1 = (1/2 to 1/3) x Ejector max. suction flow rate L/min [ANR]
• Vacuum pump
Q1 = (1/2 to 1/3) x 55.5 x Conductance of vacuum pump [dm³/(s·bar)]
D : Piping diameter (mm)
L : Length from ejector and switch valve to pad (m)
V : Piping capacity from ejector and switching valve to pad (L)
Q2: Max. flow from ejector and switching valve to pad by piping system
Q2 = C x 55.5 L/min [ANR]
Q : Smaller one between the **Q1** and **Q2** L/min [ANR]
C : Conductance of piping [dm³/(s·bar)]

For the conductance, the equivalent conductance can be found in "8. Data: Conductance by Tube I.D. (Selection Graph (3))."