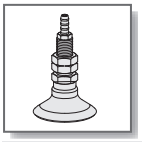
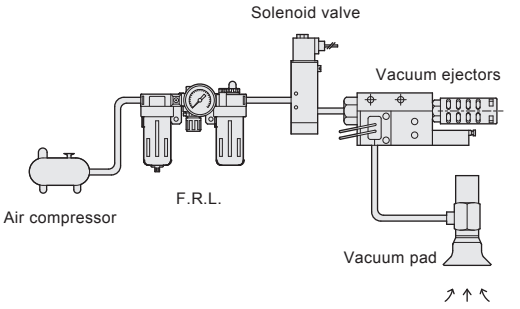


Vacuum pad

Theoretical suction , Material and Characteristics

How to use vacuum pad



Theoretical suction

Circle pad

The dia. Vacuum pad (Ømm)	2	3.5	5	6	8	10	15	20	25	30	35	40	50	60	80	95	100	120	150	200
Vacuum value (cm^2)	0.031	0.096	0.196	0.282	0.502	0.785	1.767	3.141	4.908	7.068	9.621	12.56	19.63	28.27	50.26	70.88	78.53	113.0	176.7	314.1
-93.3 kPa -700 (mmHg)	0.293 [0.029]	0.900 [0.091]	1.837 [0.186]	2.645 [0.269]	4.703 [0.478]	7.349 [0.747]	16.53 [1.681]	29.39 [2.989]	45.93 [4.670]	66.14 [6.725]	90.03 [9.153]	117.5 [11.95]	183.7 [18.68]	264.5 [26.90]	470.3 [47.82]	663.2 [67.44]	734.9 [74.79]	1058 [107.6]	1653 [168.1]	2939 [298.9]
-80.8 kPa -600 (mmHg)	0.254 [0.025]	0.779 [0.078]	1.591 [0.160]	2.291 [0.230]	4.073 [0.409]	6.364 [0.640]	14.32 [1.441]	25.45 [2.562]	39.78 [4.003]	57.28 [5.764]	77.96 [7.846]	101.8 [10.24]	159.1 [16.01]	229.1 [23.05]	407.3 [40.99]	574.4 [57.8]	636.4 [63.05]	916.5 [92.23]	1432 [144.1]	2545 [256.2]
-66.7 kPa -500 (mmHg)	0.210 [0.021]	0.648 [0.065]	1.313 [0.133]	1.891 [0.192]	3.362 [0.341]	5.254 [0.533]	11.82 [1.200]	21.01 [2.135]	32.83 [3.336]	47.28 [4.083]	64.36 [6.538]	84.06 [8.540]	131.3 [13.34]	189.1 [19.21]	336.2 [34.16]	474.1 [48.17]	525.4 [53.37]	756.5 [76.86]	1182 [120.0]	2101 [213.5]
-53.4 kPa -400 (mmHg)	0.168 [0.017]	0.515 [0.052]	1.051 [0.106]	1.514 [0.153]	2.692 [0.273]	4.206 [0.427]	9.464 [0.960]	16.82 [1.708]	26.29 [2.668]	37.85 [3.843]	51.52 [5.230]	67.30 [6.832]	105.1 [10.67]	151.4 [15.37]	269.2 [27.32]	379.6 [38.53]	420.6 [42.70]	605.7 [61.48]	947.4 [96.07]	1682 [170.8]
-40.0 kPa -300 (mmHg)	0.126 [0.012]	0.385 [0.039]	0.787 [0.080]	1.134 [0.115]	2.016 [0.204]	3.150 [0.320]	7.089 [0.720]	12.60 [1.281]	19.69 [2.001]	28.35 [2.882]	38.59 [3.923]	50.41 [5.124]	78.77 [8.006]	113.4 [11.52]	201.6 [20.49]	284.3 [28.90]	315.0 [32.02]	453.7 [46.11]	708.9 [72.05]	1260 [128.1]

Oblong pad

The dia. Vacuum pad (Ømm)	2x4	3.5x7	4x10	4x20	4x30	5x10	5x20	5x30	6x10	6x20	6x30	8x20	8x30
Vacuum value (cm^2)	0.071	0.218	0.365	0.765	1.165	0.446	0.946	1.446	0.522	1.122	1.722	1.462	2.262
-93.3 kPa -700 (mmHg)	0.664 [0.068]	2.04 [0.207]	3.416 [0.347]	7.159 [728]	10.902 [1.108]	4.173 [0.424]	8.852 [0.900]	13.35 [1.375]	4.884 [0.496]	10.49 [1.067]	16.11 [1.638]	13.68 [1.391]	21.16 [2.152]
-80.8 kPa -600 (mmHg)	0.575 [0.058]	1.767 [0.178]	2.958 [0.298]	6.200 [0.624]	9.441 [0.950]	3.614 [0.363]	7.666 [0.771]	11.71 [1.179]	4.230 [0.425]	9.092 [0.915]	13.95 [1.404]	11.84 [1.192]	18.33 [1.844]
-66.7 kPa -500 (mmHg)	0.475 [0.048]	1.158 [0.148]	2.442 [0.248]	5.118 [0.529]	7.794 [0.792]	2.983 [0.303]	6.328 [0.642]	9.673 [0.982]	3.492 [0.354]	7.750 [0.762]	11.51 [1.170]	9.780 [0.993]	15.13 [1.537]
-53.4 kPa -400 (mmHg)	0.380 [0.039]	1.168 [0.119]	1.955 [0.198]	4.097 [0.416]	6.240 [0.633]	2.388 [0.242]	5.066 [0.514]	7.744 [0.786]	2.795 [0.283]	6.009 [0.610]	9.222 [0.936]	7.830 [0.794]	12.11 [1.229]
-40.0 kPa -300 (mmHg)	0.285 [0.029]	0.875 [0.089]	1.464 [0.149]	3.069 [0.312]	4.673 [0.475]	1.789 [0.181]	3.795 [0.385]	5.801 [0.589]	2.094 [0.212]	4.501 [0.457]	6.908 [0.702]	5.865 [0.596]	9.074 [0.922]

Material and Characteristics of vacuum pad

Item / Material	Stretch degree	Extension	Oil resistance (Gasoline)	Oil resistance (Benzene)	Weather Resistant	Ozine Resistant	Heat Resistant	Cold Resistant	Chemical Resistant	Excellent Wear Resistant	Acid Resistant	Waterproof	ElectricInsulat	Hardness HS
NBR (N)	◎	◎	◎	△	○	○	○	×	◎	○	○	◎	○	70 ± 5
Silica gel (S)	△	○	△	△	○	○	○	◎	◎	×	×	○	◎	50 ± 5
PU Rubber (PU)	◎	◎	◎	○	◎	◎	×	○	◎	◎	×	△	◎	70 ± 5
Anti-static rubber (SE)	△	○	△	△	○	○	○	◎	◎	×	×	○	10^4~$10^6\Omega$	50 ± 5
Low-impedence anti-static rubber (E)	△	○	×	×	○	×	○	◎	◎	×	△	○	200Ω	50 ± 5

Explain : : ◎ Suitable ; ○ Condition ; △ Un-Suitable ; × Confine

Vacuum pad

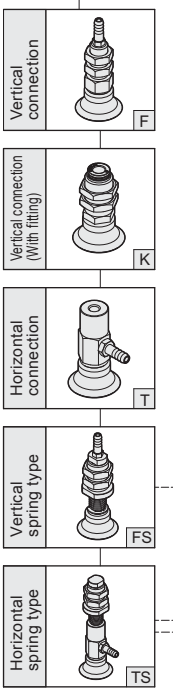
Specification and Order expression

How to order

PA — **F** — **10** x [ ] — **N** — **R**

PA series Vacuum pad

Bracket



Vacuum pad outer dia.

Code	Diameter (mm)
02	Ø 2
3.5	Ø 3.5
05	Ø 5
06	Ø 6
08	Ø 8
10	Ø 10
15	Ø 15
20	Ø 20
25	Ø 25
30	Ø 30
35	Ø 35
40	Ø 40
50	Ø 50
60	Ø 60
80	Ø 80
100	Ø 100
120	Ø 120
150	Ø 150
200	Ø 200

Stroke

Model	Code	Stroke (mm)
02	2.5	2.5 mm
	5	5 mm
3.5	2.5	2.5 mm
	5	5 mm
05	3	3 mm
	10	10 mm
06	3	3 mm
	10	10 mm
08	3	3 mm
	10	10 mm
10	4	4 mm
	10	10 mm
15	4	4 mm
	10	10 mm
20	6	6 mm
	15	15 mm
25	6	6 mm
	15	15 mm
30	6	6 mm
	15	15 mm
35	6	6 mm
	15	15 mm
40	6	6 mm
	15	15 mm
50	6	6 mm
	15	15 mm

Note :
1.Only available to PAFS、PATS series
2.Please refer to P.3-2.13~P.3-2.14

Material of vacuum pad

N : NBR material (Black) (Standard type)

S : Silica gel (Silicon) Silicon rubber

U : PU Rubber (Uret-hane)

SE : Anti-static rubber (Surface impedence 10^4 ~$10^6\Omega$)

E : low-impedence anti-static rubber (Surface impedence 200Ω)

Note : SE and E are made-to-order.

Model	Code	Stroke (mm)
60	10	10mm
	30	30mm
80	10	10mm
	30	30mm
100	15	15mm
	30	30mm
120	30	30mm
150	30	30mm
200	30	30mm

Note :
1.Only available to PATS series
2.Please refer to P.3-2.15

With free holder

Rotary bracket	Outer diameter (mm)
PAR 05	Ø05~Ø15
PAR 20	Ø20~Ø50
PAR 60	Ø60, Ø80

Note :
According to vacuum pad specification to apply proper free holder.
Please refer to P.3-2.16

Material of vacuum pad

Code	Material	Hardness (HS)	Temperature range	Color	Surface impedence (note)
N	NBR	A60/S	-26~120°C	Black	-
U	PU (Uret-hane)	A60/S	-20~75°C	Black	-
S	Silica gel (Silicon), Silicon rubber	A60/S	-60~250°C	White	-
SE	Anti-static rubber	A50/S	-60~250°C	Black	10^4~$10^6\Omega \cdot cm$
E	Low-impedence anti-static rubber	A70/S	-60~250°C	Black	$200\Omega \cdot cm$

Note : 1. Is the conductive property of rubber. And showing the impedence per cm^3.
2. Test value from Chelic's test plate.

Vacuum control system

Theoratical suction is calculated from pad size and vacuum value, which is only a number for reference. Theoratical suction is a number under static status. Please reserve enough margin while adding workpieces and movement.
Before comfirm the Qty and location of suction pad, please reserve enough margin.

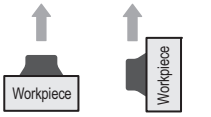
Calculation formula

$$W = \frac{P \times A}{-10}$$

W: Force N

P: Vacuum pressure kPa

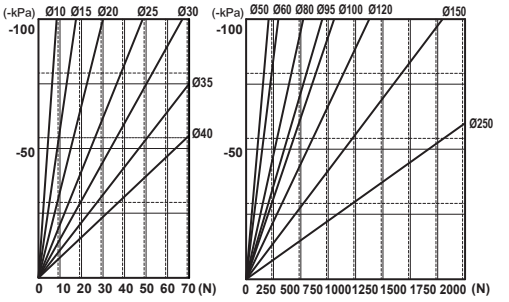
A: Pad area dimensions cm^2

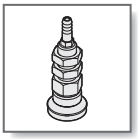


Horizontal suction　　Vertical suction

Theoratical suction

Pad diameter : Ø10~Ø40mm　Pad diameter : Ø50~Ø200mm





Vacuum pad

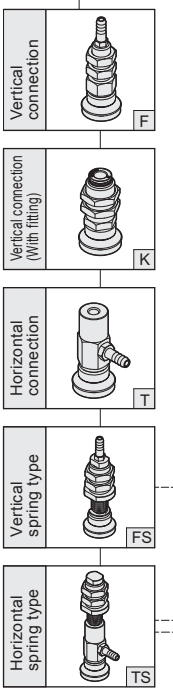
Specification and Order expression

How to order

PB — **F** — **10** x [ ] — **N** — **R**

PB series Vacuum pad

Bracket



Vacuum pad outer dia.

Code	Diameter (mm)
06	Ø6
08	Ø8
10	Ø10
15	Ø15
20	Ø20
30	Ø30
40	Ø40
50	Ø50
60	Ø60
80	Ø80

Stroke

Model	Code	Stroke (mm)
06	3	3 mm
	10	10 mm
08	3	3 mm
	10	10 mm
10	4	4 mm
	10	10 mm
15	4	4 mm
	10	10 mm
20	6	6 mm
	15	15 mm
30	6	6 mm
	15	15 mm
40	6	6 mm
	15	15 mm
50	6	6 mm
	15	15 mm

Note :
1.Only available to PBFS · PBTS series
2.Please refer to P.3-2.26~P.3-2.27

Material of vacuum pad

N : NBR material (Black) (Standard type)

S : Silica gel (Silicon) Silicon rubber

SE : Anti-static rubber (Surface impedence 10^4 ~$10^6\Omega$)

E : low-impedence anti-static rubber (Surface impedence 200Ω)

Note : SE and E are made-to-order.

Model	Code	Stroke (mm)
60	10	10 mm
	30	30 mm
80	10	10 mm
	30	30 mm

Note :
1.Only available to PBTS series
2.Please refer to P.3-2.27

With free holder

Rotary bracket	Outer diameter (mm)
PAR 05	Ø05~Ø15
PAR 20	Ø20~Ø50
PAR 60	Ø60, Ø80

Note :
According to vacuum pad specification to apply proper free holder.
Please refer to P.3-2.28

Material of vacuum pad

Code	Material	Hardness (HS)	Temperature range	Color	Surface impedence (note)
N	NBR	A60/S	-26~120°C	Black	-
S	Silica gel (Silicon), Silicon rubber	A60/S	-60~250°C	White	-
SE	Anti-static rubber	A50/S	-60~250°C	Black	10^4~$10^6\Omega$ · cm
E	Low-impedence anti-static rubber	A70/S	-60~250°C	Black	200Ω · cm

Note : 1. Is the conductive property of rubber. And showing the impedence per cm^3.
2. Test value from Chelic's test plate.

Vacuum control system

Theoratical suction is calculated from pad size and vacuum value, which is only a number for reference. Theoratical suction is a number under static status. Please reserve enough margin while adding workpieces and movement.
Before comfirm the Qty and location of suction pad, please reserve enough margin.

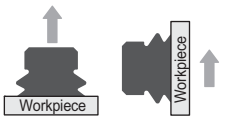
Calculation formula

$$W = \frac{P \times A}{-10}$$

W: Force N

P: Vacuum pressure kPa

A: Pad area dimensions cm^2

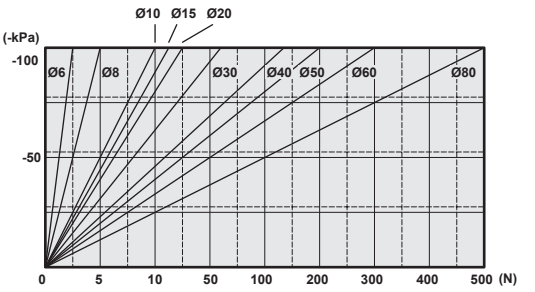


Horizontal suction

Vertical suction

Theoratical suction

Pad diameter : Ø6~Ø80mm



Vacuum pad

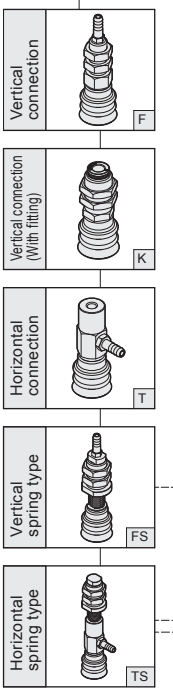
Specification and Order expression

How to order

PC — F — 10 x [Stroke] — N — R

PC — PC series Vacuum pad

F — Bracket



10 — Vacuum pad outer dia.

Code	Diameter (mm)
05	Ø 5
07	Ø 7
10	Ø 10
15	Ø 15
20	Ø 20
30	Ø 30
40	Ø 40
60	Ø 60

Stroke

Model	Code	Stroke (mm)
05	3	3 mm
	10	10 mm
07	3	3 mm
	10	10 mm
10	4	4 mm
	10	10 mm
15	4	4 mm
	10	10 mm
20	6	6 mm
	15	15 mm
30	6	6 mm
	15	15 mm
40	6	6 mm
	15	15 mm

Note :
1.Only available to PCFS、PCTS series
2.Please refer to P.3-2.38~P.3-2.39

N — Material of vacuum pad

N : NBR material (Black) (Standard type)

S : Silica gel (Silicon) Silicon rubber

SE : Anti-static rubber (Surface impedence 10^4 ~$10^6\Omega$)

E : low-impedence anti-static rubber (Surface impedence 200Ω)

Note : SE and E are made-to-order.

Model	Code	Stroke (mm)
60	10	10 mm
	30	30 mm

Note :
1.Only available to PCTS series
2.Please refer to P.3-2.39

R — With free holder

Rotary bracket	Outer diameter (mm)
PAR 05	Ø05~Ø15
PAR 20	Ø20~Ø50
PAR 60	Ø60, Ø80

Note :
According to vacuum pad specification to apply proper free holder.
Please refer to P.3-2.40

Material of vacuum pad

Code	Material	Hardness (HS)	Temperature range	Color	Surface impedence (note)
N	NBR	A60/S	-26~120°C	Black	-
S	Silica gel (Silicon), Silicon rubber	A60/S	-60~250°C	White	-
SE	Anti-static rubber	A50/S	-60~250°C	Black	10^4~$10^6\Omega \cdot cm$
E	Low-impedence anti-static rubber	A70/S	-60~250°C	Black	$200\Omega \cdot cm$

Note : 1. Is the conductive property of rubber. And showing the impedence per cm^3.
2. Test value from Chelic's test plate.

Vacuum control system

Theoratical suction is calculated from pad size and vacuum value, which is only a number for reference. Theoratical suction is a number under static status. Please reserve enough margin while adding workpieces and movement.
Before comfirm the Qty and location of suction pad, please reserve enough margin.

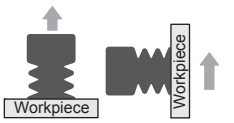
Calculation formula

$$W = \frac{P \times A}{-10}$$

W: Force N

P: Vacuum pressure kPa

A: Pad area dimensions cm^2



Horizontal suction — Vertical suction

Theoratical suction

Pad diameter : Ø5~Ø60mm