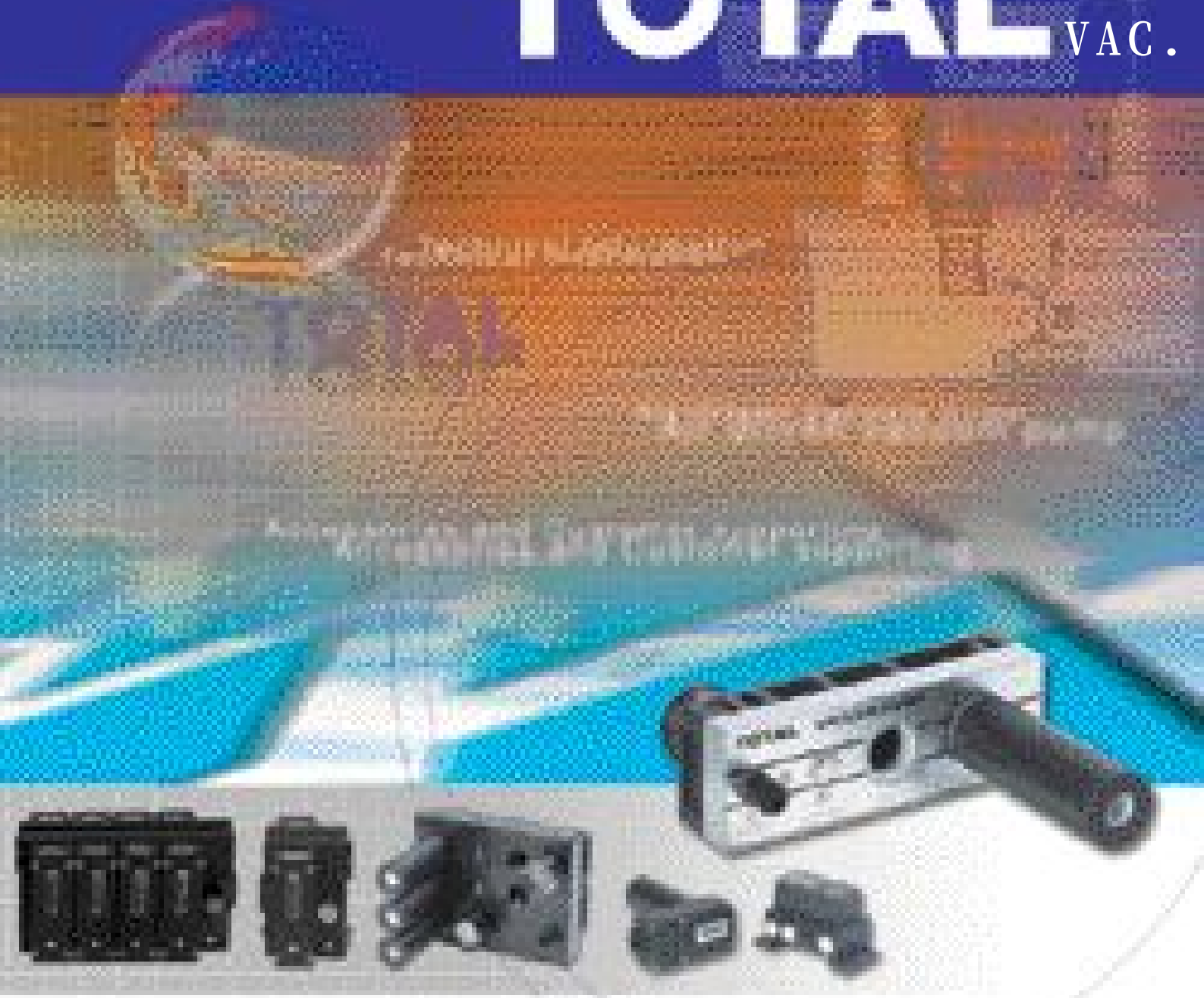
Vacuum Technology

TOTAL VAC.



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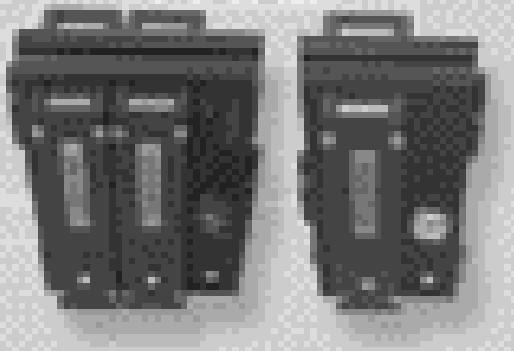

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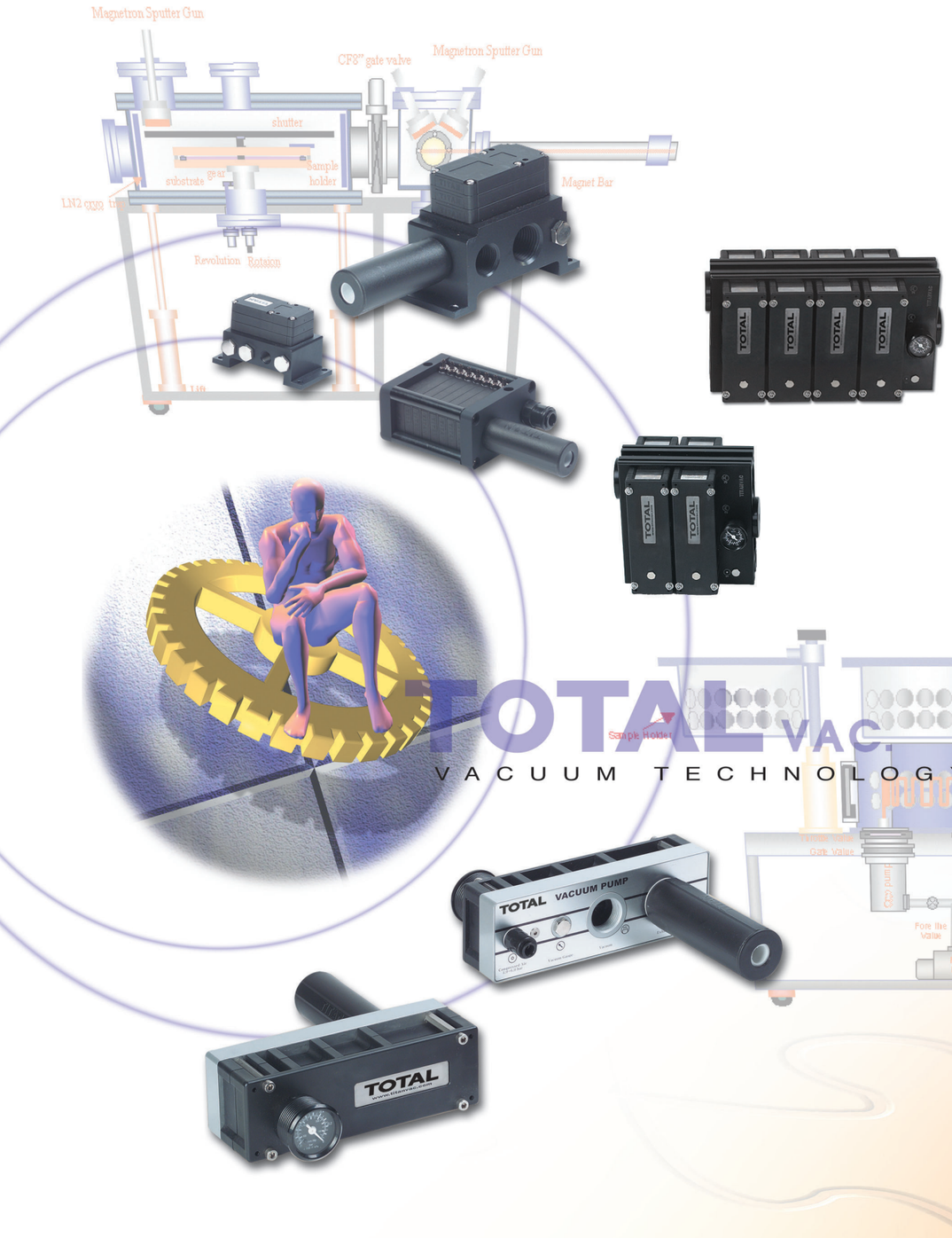
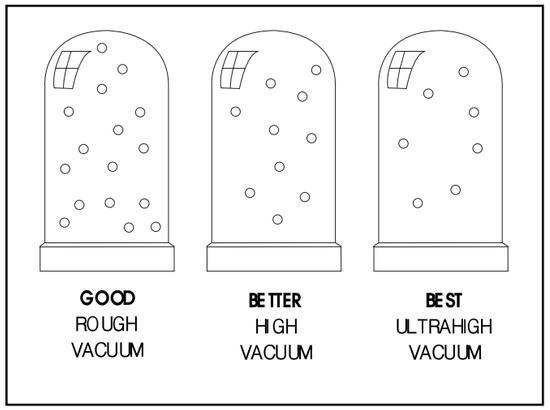


Chap. 1

Vacuum Technical Information

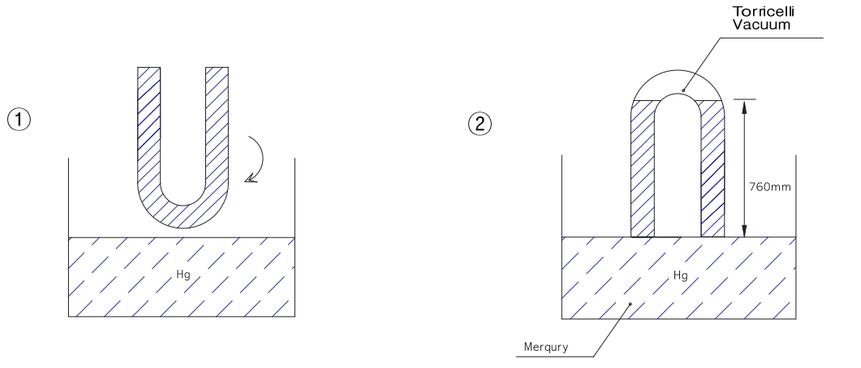
1) What's Vacuum?



In general, the answer to this question is "The space in which none of molecules are existed"
This is so theoretical review. In the certain space, as the number of molecules is decreased, it's pressure becomes lower than the atmospheric pressure. This is caused by the movement of outer molecules to fill in the space.

Therefore, the principle of vacuum in industry is "artificial space to maintain lower pressure than the atmospheric pressure." To make this space, we use vacuum pump, vacuum generator and so on. We hope the principle of vacuum generator and examples in this catalog can be a great help to you.

2) Torricelli's Experimental



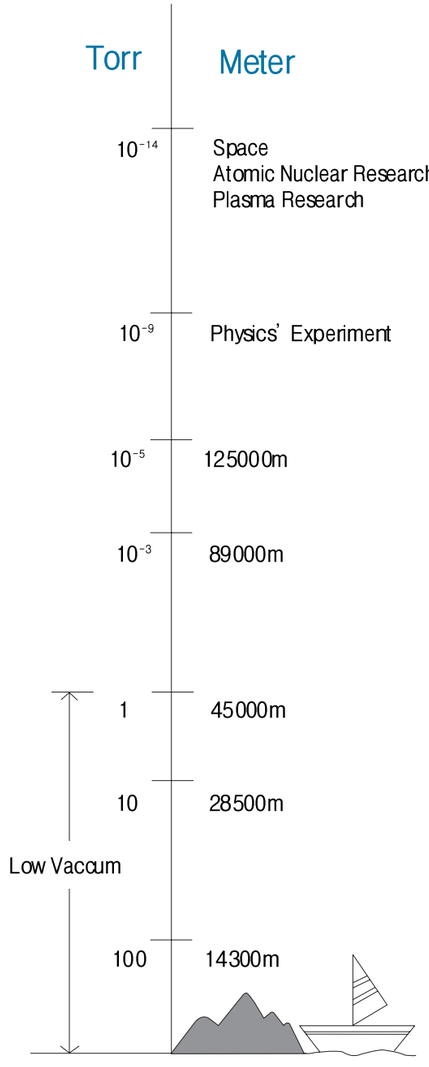
Put the test tube which is fully filled with mercury upside down in mercury tub.

The certain space is appeared as mercury stopped at 760 mm from the surface of mercury tub. Vacuum is made in the top of the test tube.

The cautions of experiment

① Be sure to thoroughly close the test tube which is fully filled with mercury before putting mercury tub.

② Measure exactly the distance between the surface of the mercury tub and the marked line of test tube.



Conclusion...

This space is called "Torricelli Vacuum", and it is expressed by 760 mmHg.abs (29.9″Hg).

▶ Korea Standard (KS)'s unit, Torr is the same with mmHg, cmHg, and inHg.

▶ German Standard (DIN)
Using mbar.abs, mbar.G.
1 mbar is a pressure unit as 1,000 dyne force to a 1cm² face.
1 Torr = 76 cmHg
76 cm, mercury's volume = 76 cc
76 cc x 13.6 (gravity of mercury) = 1,033.6 g
1 g = 980 dyne ,
1033.6 g x 980 dyne = 1,012,928 dyne ≒ 1,013.3 mbar,
Therefore 1,013.3 mbar , that is, 1 Torr = 1,013.3 mbar

3) Negative Pressure Conversions

	mbar (hpa)	bar	Pa (Nm^{-2})	kpa	kgf cm^{-2}(at)
1 mbar (hpa)	1	1×10^{-3}	10^{2}	0.1	1.02×10^{-3}
1 bar	10^{3}	1	1×10^{5}	100	1.02
1 Pa (Nm^{-2})	0.01	1×10^{-5}	1	0.001	1.02×10^{-5}
1 kPa	10	0.01	103	1	1.02×10^{-2}
1 atm	1.013×10^{3}	1.013	1.013×10^{5}	1.013×10^{2}	1.033
1 kg cm^{-2} (at)	9.807×10^{2}	0.981	9.807×10^{4}	98.07	1
1 mmH_2O	9.807×10^{-2}	9.807×10^{-5}	9.807	9.807×10^{-3}	10^{-4}
1 Torr (mmHg)	1.333	1.333×10^{-3}	1.333×10^{2}	1.333×10^{-1}	1.36×10^{-3}
1 micron	1.333×10^{-3}	1.333×10^{-6}	1.333×10^{-1}	1.333×10^{-4}	1.36×10^{-6}
1 in Hg	33.86	3.386×10^{-2}	3.386×10^{3}	3.386	3.453×10^{-2}
1 in H_2O	2.491	2.491×10^{-3}	2.491×10^{2}	0.249	2.54×10^{-3}
1 lbf in^{-2} (psi)	68.95	6.895×10^{-2}	6.895×10^{3}	6.895	7.03×10^{-2}

	mmH_2O	Torr (mmHg)	in Hg	in H_2O	lbf in^{-2} (psi)
1 mbar (hpa)	10.197	0.75	2.953×10^{-2}	0.402	1.45×10^{-2}
1 bar	1.02×10^{4}	7.5×10^{2}	29.53	1.015×10^{3}	14.5
1 Pa (Nm^{-2})	0.102	7.5×10^{-3}	2.953×10^{-4}	4.015×10^{-3}	1.45×10^{-4}
1 kPa	1.02×10^{2}	7.5	0.295	4.015	0.145
1 atm	1.033×10^{4}	7.6×10^{2}	29.92	4.068×10^{3}	14.7
1 kg cm^{-2} (at)	10^{4}	7.356×10^{2}	28.96	3.973×10^{3}	14.22
1 mmH_2O	1	7.354×10^{-2}	2.896×10^{-3}	3.394×10^{-2}	1.42×10^{-3}
1 Torr (mmHg)	13.29	1	3.937×10^{-2}	0.535	1.934×10^{-2}
1 micron	1.359×10^{-2}	10^{-3}	3.937×10^{-5}	5.35×10^{-4}	1.934×10^{-5}
1 in Hg	3.45×10^{2}	25.4	1	13.6	0.491
1 in H_2O	25.4	1.868	7.356×10^{-2}	1	3.613×10^{-2}
1 lbf in^{-2} (psi)	7.03×10^{2}	51.71	2.036	27.68	1

▶Unit conversion (760 Torr = 1,013 mbar = 29.92 inch Hg)

$29.92-2.953\times10^{-2}\times P$ (mbar abs) = △P (inch Hg)

$1{,}013-33.76\times$ △P(inch Hg) = P (mbar abs)

4) Flow Conversions

	m^3/h	m^3/min	m^3/s
1m^3/h	1	1.667×10^{-2}	2.778×10^{-4}
1m^3/min	60	1	1.667×10^{-2}
1m^3/s	3600	60	1
1ℓ/min	6×10^{-2}	10^{-3}	1.667×10^{-5}
1 cfm (ft^3min^{-1})	1.699	2.832×10^{-2}	4.72×10^{-4}
1 gal/min	0.227	0.378	6.306×10^{-5}

	ℓ/min	cfm (ft^3min^{-1})	gal/min
1m^3/h	16.67	0.588	4.403
1m^3/min	10^{3}	35.28	2.642×10^{2}
1m^3/s	6×10^{4}	2.117×10^{3}	1.585×10^{4}
1ℓ/min	1	3.528×10^{-2}	0.264
1 cfm (ft^3min^{-1})	28.32	1	7.481
1 gal/min	3.784	0.133	1

5) Choosing the Correct Vacuum Pump

① The size of vacuum pump is represented by suction flow when pump's vacuum level is the same with the atmospheric pressure.

② Suction flow is also called by open flow.
The units are LPM (ℓ/min), CFM (cubic foot per minute), M^3/hr (cubic meter per hour), etc.
And by this basis, motor's power is decided in the electric motor type.

③ The 3 (three) important things when selecting vacuum pump.
The first, suction flow (open flow: ℓ/min) or horse power (Hp: Kw).
The second, working vacuum range as mmHg.G, Torr.
The third, application.

$$S = 2.303 \frac{V}{T} \log \frac{P_1}{P_2}$$

S : Suction flow (ℓ/min)
V : Sum of tank and pipe volume from vacuum pump's suction vacuum port (liter)
T : Time to evacuate to a vacuum
P_2 : Required vacuum level (Torr. Abs)
P_1 : The status of current atmospheric pressure (that is, 760 Torr. Abs)

④ These factors are applied in the same way to our air-driven vacuum pump: Multi-stage vacuum ejector. So to speak, you can select the right model by the volume of open flow based on the below formula.

⑤ Example: Suppose you want to lift and move 100 kg of furniture in the plant.
When we have total 64 ℓ of the vacuum container with vacuum pipe, 90 Torr (670 mmHg.G) of the working vacuum level, and we can spend 12 seconds to evacuate, please calculate the required vacuum pump's size.

$$S = 2.303 \frac{64}{0.2} \log \frac{760}{90} = 683 \ \ell/\text{min}$$

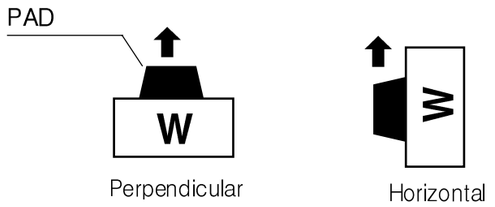
At this time, we didn't consider the pipe flow resistance, leakage, valve resistance, working temperature, vacuum pad's size, and so on, and will mention about the vacuum pad's size in the next page.

6) Suction Cup Lifting Force Calculation & How to Select the Right Vacuum Pad Size

① Lifting force formula

$$W = \frac{P}{760} \times S \times t \times (1.033)$$

W : Lifting force(kgf)
P : Vacuum level(mmHg)
S : The size of vacuum pad / vacuum pad area(cm^2)
t : Perpendicular safety factor (1/2)
Parallel / Horizontal safety factor (1/4)



Perpendicular Horizontal

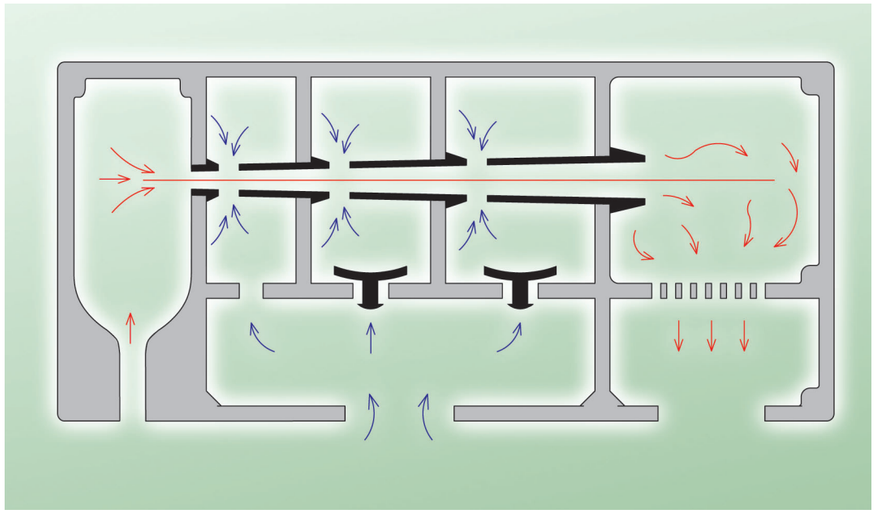
② The equation for vacuum pad size (∅)

$$D = 113 \times \sqrt{\frac{m \times n}{u \times s}}$$

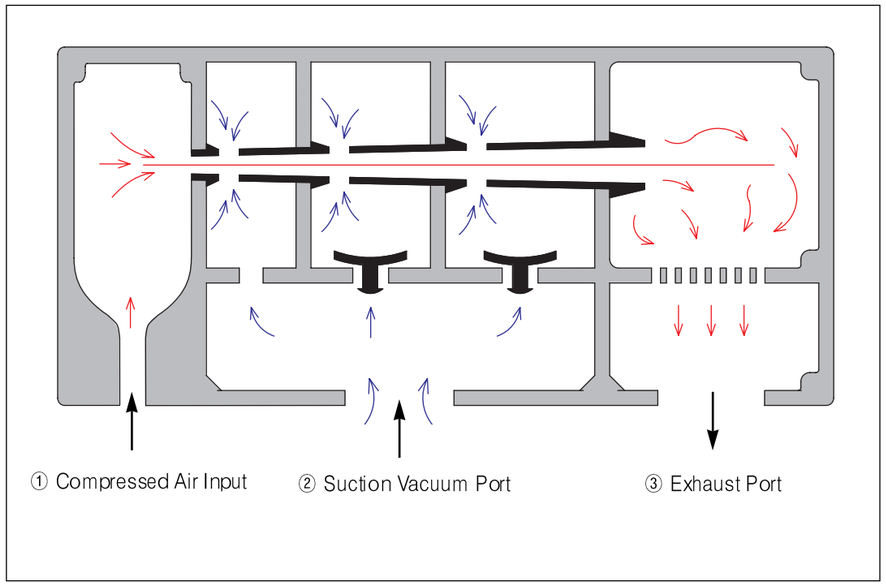
D : Diameter of vacuum pad
m : Mass (kg)
u : Vacuum level (-kPa)
n : Safety factor (Generally 2)
s : Number of suction cups

Chap. 2

Air-Driven Vacuum Pump



1) The Principle Total Multi-Stage Vacuum Pump



Using only compressed air produced by compressor, this TOTAL "multi-stage ejector" that can get up to −100.8 kPa, plays a revolutionary role in the various vacuum automotive industry.

The operating principle described above, putting compressed air into compressed air input (①), it is finally put out to exhaust port (③). At this time, each nozzle makes "Venturi-Effect" , and each chambers of nozzles produce vacuum. Also each chamber has a flap valve to check one another's different vacuum levels and integrate vacuum for sucking in through suction vacuum port (②)

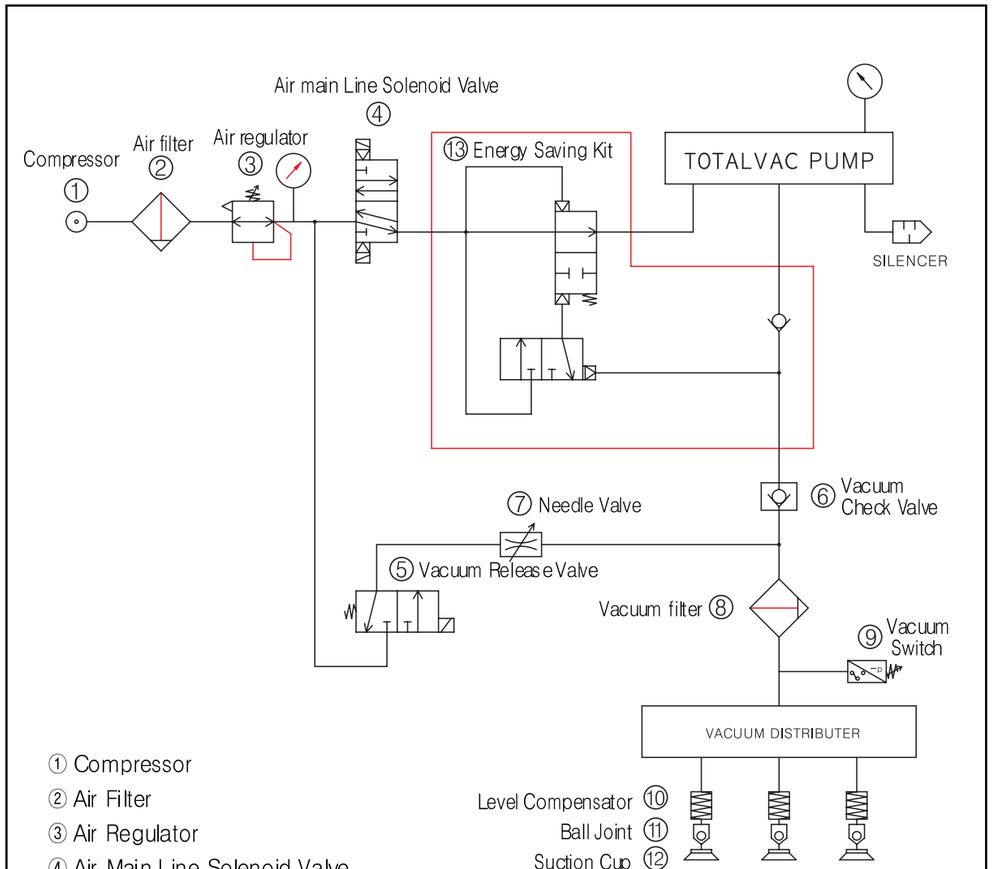
The TOTAL vacuum pump uses minimum amount of compressed air to achieve high suction flows for maximum (about 1:3) vacuum levels, and makes an epoch by playing a role of electric motor driven vacuum pumps and also in industrial vacuum systems.

2) The Advantages of TOTAL Vacuum Pumps

(Multi-Stage Vacuum Ejector Type)

	Characteristics	Remarks
1	Max. − 100.8 kPa vacuum level	Replace motor driven vacuum pump
2	Only using the compressed air	No need to use electricity. Can be used in radioactive place
3	High efficiency, fast response	Possible to save air consumption. Short evacuation time to save the working period
4	Small size & low weight	Very easy to equip inside the system machine
5	Easy to install & require minimal service	A/S not necessary. Warranty for customer
6	Low noise level	53 dBA~65 dBA Compared with the other same flow pump, almost no noise
7	No heat emission	−20℃~+80℃ (−4°F~+176°F) Possible to use in any temperature within this range. Always maintain normal temperature in working
8	No vibrations	Increase the precision of working due to no vibration
9	No oil mist	Only use filter & regulator (No lubricator use)
10	Suction flow per air consumption rate is high. Very economical	Multi-stage nozzle About 3 times more than single type (Air: 1, Suction : 3)
11	Energy saving kit	Automatically control air according to working vacuum levels

3) Flow Diagram



① Compressor
② Air Filter
③ Air Regulator
④ Air Main Line Solenoid Valve
⑤ Vacuum Release Valve
⑥ Vacuum Check Valve
⑦ Needle Valve
⑧ Vacuum Filter
⑨ Vacuum Switch
⑩ Level Compensator
⑪ Ball Joint
⑫ Suction Cup
⑬ Energy Saving Kit

TOTAL VACUUM PUMP : Multi-stage ejector vacuum pump using compressed air (3.5~6.2 bar), there are various models of L, M, X, H and so on by vacuum level.

① **Compressor:**
A device that compresses a gas, especially air, by raising its pressure and decreasing its volume. In general, it is a compressed air line in the field.

② **Air Filter:**
A device that removes dust and other small particles from compressed air.

③ **Air Regulator:**
A device that controls the pressure of compressed air.

④ **Air Main Line Solenoid Valve**
A device that controls the supply, close, and direction changing of compressed air, generated by vacuum generator (vacuum pump).

⑤ **Vacuum Release Valve**
A device that quickly and completely removes vacuum, left in the line right after stopping vacuum pump. (For speedy working process)

⑥ **Vacuum Check Valve**
A device that protects breaking vacuum while working.

⑦ **Needle Valve**
A device that controls air pressure and flow of vacuum breaking line.

⑧ **Vacuum Filter**
A material that filters small particles in internal vacuum pump and stops various and strange materials through vacuum port

⑨ **Vacuum Switch**
There are pneumatic (mechanical) or electronic controlled models. A device that maintains the proper and consistent vacuum level and sends necessary signal to control

⑩ **Level Compensator**
A device that adjusts differences in heights of the objects to be handled to provide a certain degree of shock absorption.

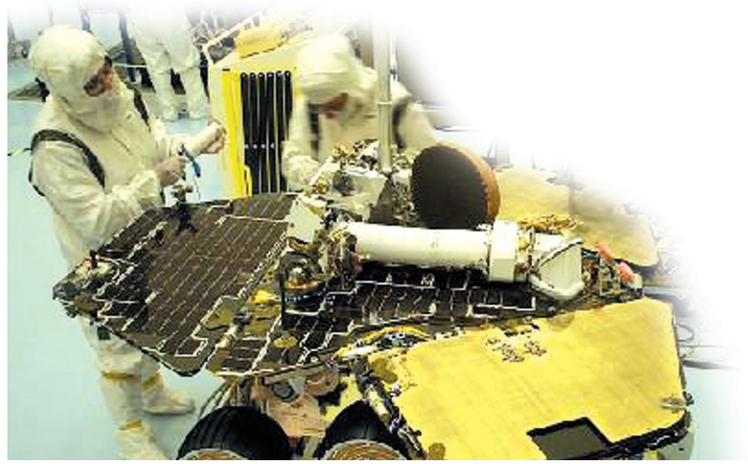
⑪ **Ball Joint**
A device that enables pad to be adjusted when a degree of angular compliance is required.

⑫ **Suction Cup**
A final part which transfers vacuum force to the objects to be handled. There are various models depending on figures, surface, material, wear resistance, and temperature of objects to be handled.

⑬ **Energy Saving Kit**
A device that saves compressed air by cutting unnecessary air consumption. Cut compressed air when vacuum level is higher than a certain degree of it which intentionally is made by vacuum switch, and supply compressed air again if vacuum level is below of it.

Chap. 3

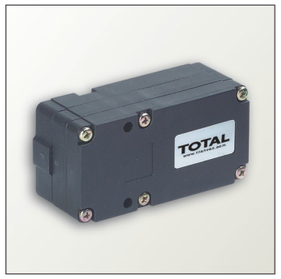
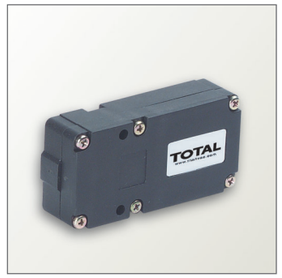
Air-Driven Vacuum Pump



1) TCVM/X: Mini Chip Type

Equipped with multi-stage nozzle, realize the max. vacuum flow by the min. air supply.
Can save energy 2(two) times more than the current single nozzle pumps.

▶**Use of Application –** vacuum lifting Device, vacuum packaging/cartonning, valve leakage inspection, semiconductor, pharmaceutical reactor, other manufacturing automation


Performance and Specifications Outline

Max. Vacuum Level	Max. 645 (mmHg.G) Max. −25.40 (inHg) Max. −86 (kPa)
Max. Vacuum Flow	Max. 36~215 (N. ℓ/min) Max. 1.271~7.592 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	4~6.2 bar (Max. 6.2 bar) 58.01~89.92 psi
Working Temperature	−20℃~+80℃ −4°F~+176°F
Noise Level	51~68 dBA

Ordering Information

TCVM	5, 10, 20, 30		-A, B, C	N	Option
	Pump's Size (Open Flow)		Base Type	Seal Material	Vacuum S/W & Others
Total Chip Type Vacuum Pump (Medium Vacuum)	5	36 (ℓ/min) 1.271 (scfm)	A: Air in (M5) B: Air in (1/8″) Exhaust: internal silencer C: Air in (1/8″) Exhaust: 3/8″ external silencer	(Check V/V – basic installed) N: Nitrile V: Viton E: EPDM	-None : Standard
	10	72 (ℓ/min) 2.542 (scfm)			
	20	144 (ℓ/min) 5.085 (scfm)			
	30	215 (ℓ/min) 7.592 (scfm)			

TCVM Series: Mini Chip Type

Characteristics / Medium Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (mm) (inches)
TCVM5-A	645 25.39 86	36 1.271	15~22 0.530~0.777	57~68	26 0.917	>2 0.08″	>5.2 0.20″	>8 0.32″
TCVM5-B		36 1.271	15~22 0.530~0.777	57~64	33 1.164	>2 0.08″	>5.2 0.20″	>8 0.32″
TCVM5-C		36 1.271	15~22 0.530~0.777	52~62	44 1.552	>2 0.08″	>5.2 0.20″	>8 0.32″
TCVM10-A		72 2.542	30~42 1.059~1.483	57~68	26 0.917	>2 0.08″	>8 0.32″	>10 0.39″
TCVM10-B		72 2.542	30~42 1.059~1.483	57~64	33 1.164	>2 0.08″	>8 0.32″	>10 0.39″
TCVM10-C		72 2.542	30~42 1.059~1.483	52~65	44 1.552	>2 0.08″	>8 0.32″	>10 0.39″
TCVM20-B		144 5.085	60~84 2.119~2.966	61~69	44 1.552	>4 0.16″	>10 0.39″	3/8″
TCVM20-C		144 5.085	60~84 2.119~2.966	61~69	55 1.940	>4 0.16″	>10 0.39″	3/8″
TCVM30-C		215 7.592	90~107 3.178~3.778	61~69	66 2.330	>6 0.24″	>12 0.47″	3/8″

Vacuum flow in (N ℓ/min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ/min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM5	36 1.271	25 0.883	15 0.530	13 0.459	10 0.353	8 0.282	5.7 0.201	2.4 0.085	0.70 0.025	
TCVM10	72 2.542	47 1.660	30 1.059	27 0.953	20 0.706	16 0.565	11.8 0.417	4.8 0.169	1.32 0.047	
TCVM20	144 5.085	97 3.425	60 2.119	49 1.730	39 1.377	31 1.095	22.4 0.791	9.7 0.343	2.60 0.092	
TCVM30	215 7.592	146 5.155	93 3.284	74 2.613	60 2.119	46 1.624	31.2 1.102	16 0.565	4.00 0.141	

TCVM5: A, B, C type available TCVM20: B, C type available
TCVM10: A, B, C type available TCVM30: only C type (external silencer) available

TCVX Series: Mini Chip Type

Characteristics / Extra Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (mm) (inches)
TCVX5-A	712.5 28.05 95	31.2 1.102	21.6~24.3 0.763~0.858	61~66	26 0.917	>2 0.08″	>5.2 0.20″	>8 0.32″
TCVX5-B		31.2 1.102	21.6~24.3 0.763~0.858	58~65	33 1.164	>2 0.08″	>5.2 0.20″	>8 0.32″
TCVX5-C		31.2 1.102	21.6~24.3 0.763~0.858	52~62	44 1.552	>2 0.08″	>5.2 0.20″	>8 0.32″
TCVX10-A		62 2.189	43.2~48.6 1.525~1.716	62~66	26 0.917	>2 0.08″	>8 0.32″	>10 0.39″
TCVX10-B		62 2.189	43.2~48.6 1.525~1.716	60~66	33 1.164	>2 0.08″	>8 0.32″	>10 0.39″
TCVX10-C		62 2.189	43.2~48.6 1.525~1.716	52~62	44 1.552	>2 0.08″	>8 0.20″	>10 0.39″
TCVX20-B		123 4.343	86.4~97 3.051~3.425	60~66	44 1.552	>4 0.16″	>10 0.39″	3/8″
TCVX20-C		123 4.343	86.4~97 3.051~3.425	52~64	55 1.940	>4 0.16″	>10 0.39″	3/8″
TCVX30-C		184 6.497	130~145 4.590~5.120	52~64	66 2.33	>6 0.24″	>12 0.47″	3/8″

Vacuum flow in (N ℓ/min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

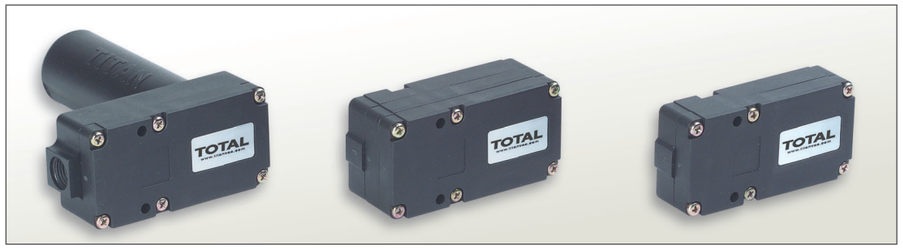
Pump Model \ Vacuum Level	Vacuum Flow (N ℓ/min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVX5	31.2 1.102	18.2 0.643	9 0.318	7.9 0.279	6.6 0.233	5.4 0.191	4.2 0.148	3 0.106	1.2 0.042	0.5 0.018
TCVX10	62 2.189	36 1.271	18 0.636	15.8 0.558	13.5 0.477	11 0.388	8.3 0.293	5.2 0.184	2.4 0.085	0.9 0.032
TCVX20	123 4.343	73 2.578	35 1.236	32.3 1.141	27 0.953	22 0.777	17.6 0.621	11.7 0.413	4.9 0.173	1.8 0.064
TCVX30	184 6.497	111 3.919	52.8 1.864	47.2 1.667	40.8 1.441	32.5 1.148	26 0.918	17.7 0.625	7.5 0.265	2.8 0.099

TCVX5: A, B, C type available　　TCVX20: B, C type available

TCVX10: A, B, C type available　　TCVX30: only C type (external silencer) available

Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

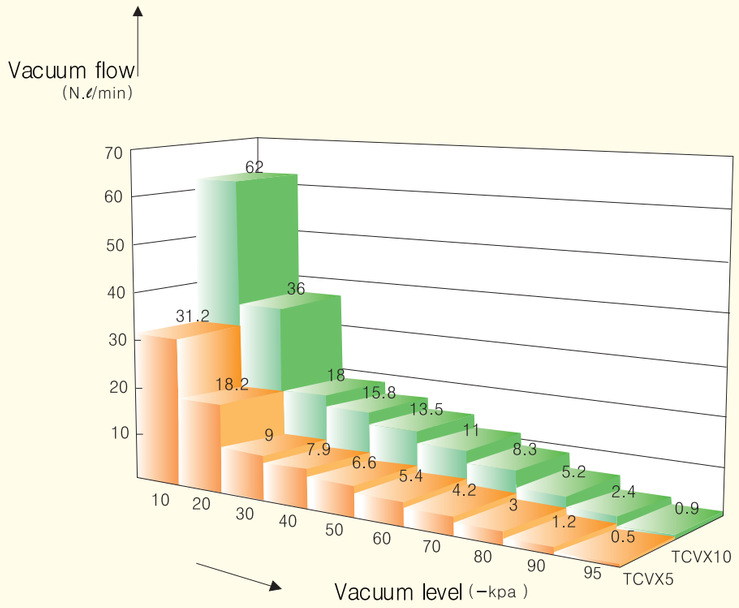
Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM5	0	0.200 5.660	0.660 18.777	1.300 36.400	1.690 47.658	2.720 76.704	4.400 122.320	6.500 179.400	12.900 363.780	–
TCVM10	0	0.120 3.396	0.280 7.966	0.580 16.240	0.810 22.842	1.220 34.404	1.840 51.152	2.880 79.488	5.320 150.024	–
TCVM20	0	0.062 1.755	0.150 4.268	0.270 7.560	0.420 11.844	0.630 17.766	0.910 25.298	1.400 38.640	2.620 73.884	–
TCVM30	0	0.041 1.160	0.112 3.186	0.188 5.264	0.316 8.911	0.455 12.831	0.654 18.181	1.020 28.152	1.980 55.836	–
TCVX5	0	0.270 7.641	0.820 23.329	1.540 43.120	2.600 73.320	3.650 10.293	4.930 137.054	7.000 193.200	10.800 304.560	–
TCVX10	0	0.130 3.679	0.410 11.665	0.770 21.560	1.240 34.968	1.840 51.888	2.510 69.778	3.520 97.152	5.900 166.380	–
TCVX20	0	0.068 1.924	0.220 6.259	0.390 10.920	0.620 17.484	0.940 26.508	1.250 34.750	1.750 48.300	2.600 73.320	–
TCVX30	0	0.048 1.358	0.161 4.580	0.288 8.064	0.464 13.085	0.680 19.176	0.942 26.188	1.300 35.880	1.910 53.862	3.800 107.730



How to Read Graph

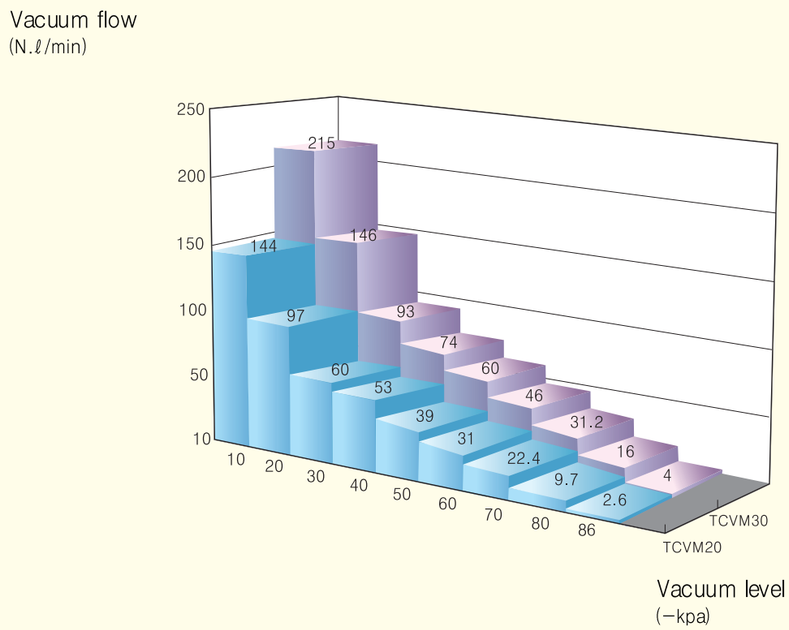
Compressed Air Pressure
at 4.0~6.2 bar

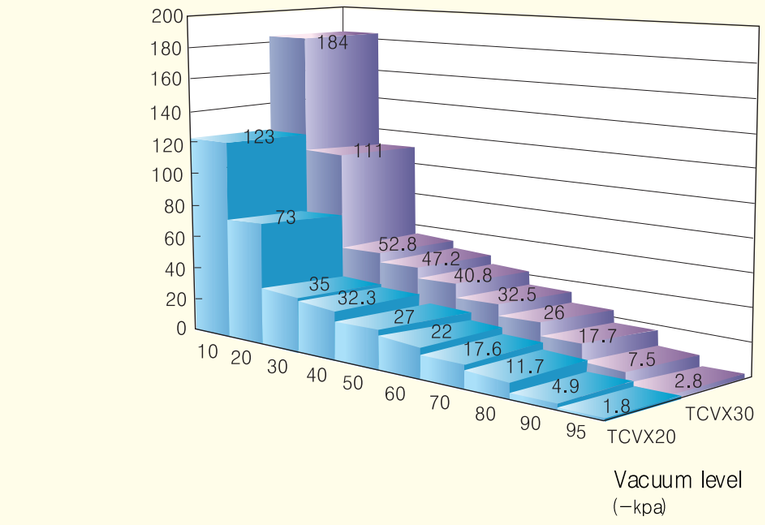
y : It shows the vacuum pump's vacuum flows.
Vacuum pump size is described by the volume (N ℓ /min, scfm, M³/hr)
of sucking flow in an atmospheric pressure when vacuum level is 0.



x: Vacuum level.
It shows vacuum level up to almost perfect vacuum,
−100 kPa in an atmospheric pressure.

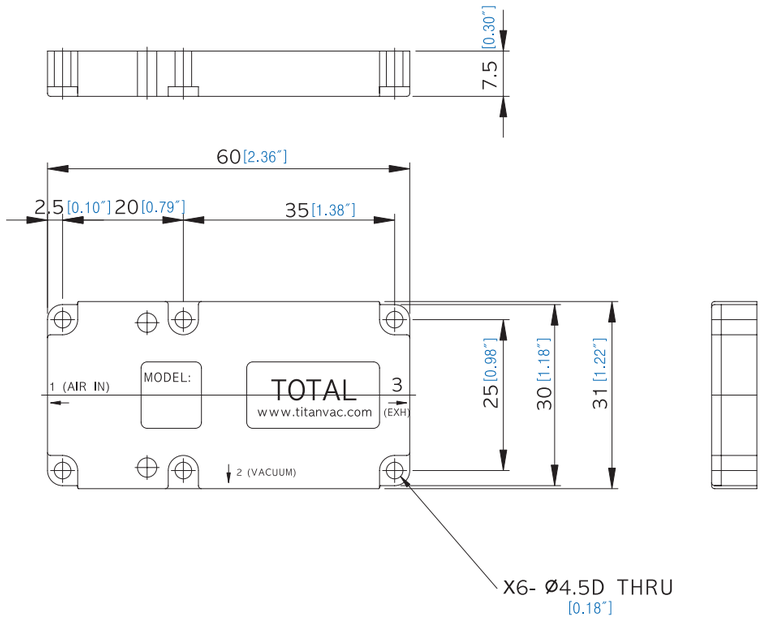
Conclusion: This graph is an inverse proportion that shows that the volume of vacuum pump's sucking flow is becoming near to 0(zero) when vacuum level is getting increased.





Mini Chip Type

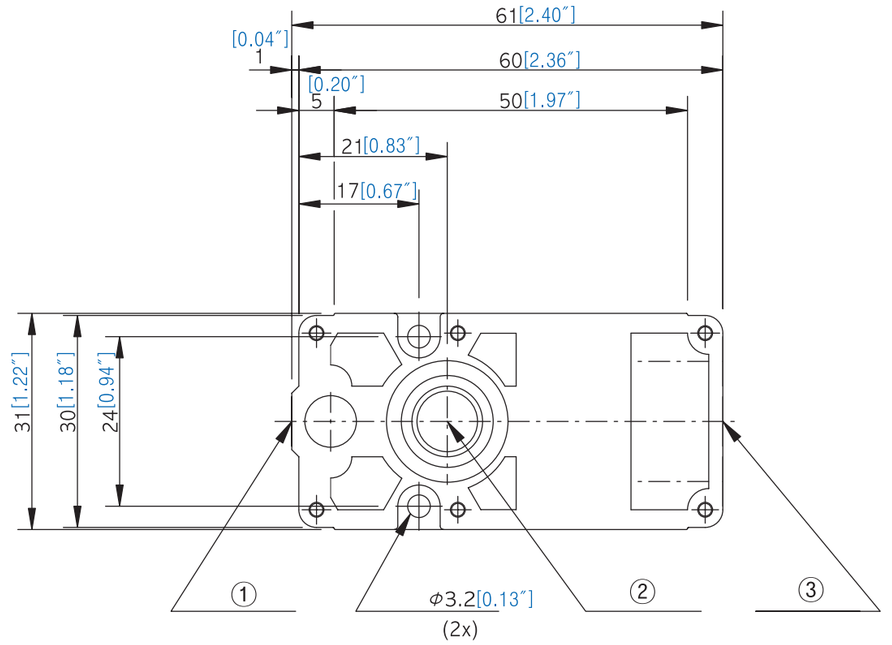
Metric(mm) U.S. Imperial(inches)

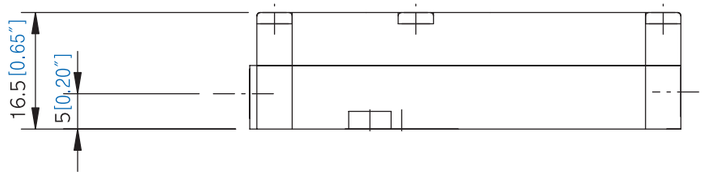


Specifications subject to change without notice.

TCVM / TCVX-A Type

Metric(mm) U.S. Imperial(inches)



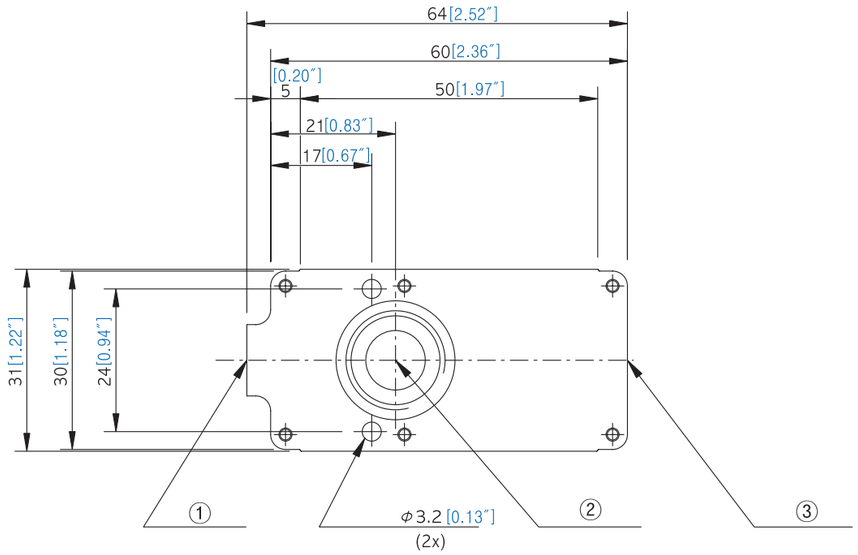


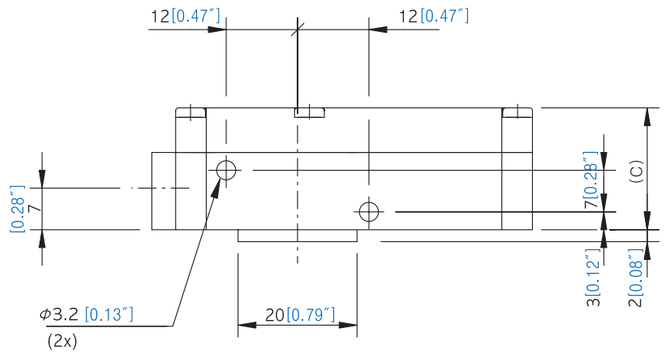
① Compressed air – M5
② Vacuum – NPSF 1/8″
③ Exhaust – ϕ 5 x 3

Specifications subject to change without notice.

TCVM / TCVX-B Type

Metric(mm) U.S. Imperial(inches)





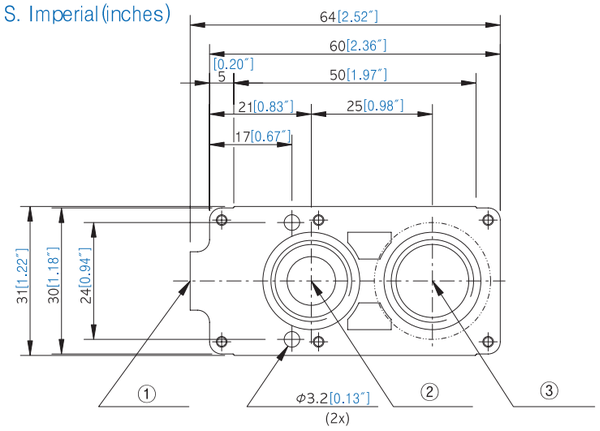
① Compressed air – NPSF 1/8″
② Vacuum – NPSF 3/8″
③ Exhaust internal silencer

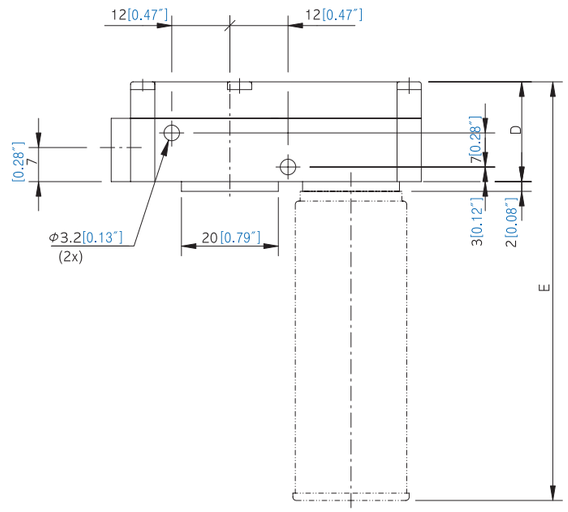
Pump Model	C
TCVM / X 5–10	20.5 [0.81″]
TCVM / X 20	28.2 [1.11″]

Specifications subject to change without notice.

TCVM / TCVX-C Type

Metric(mm) U.S. Imperial(inches)



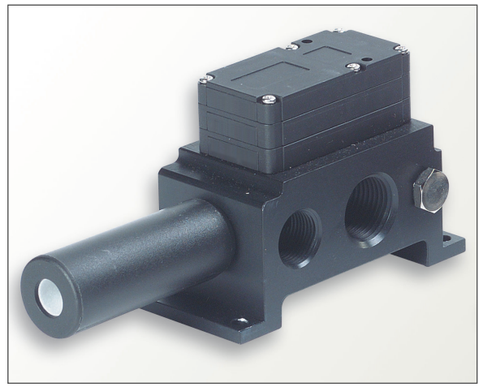


① Compressed air – NPSF 1/8″
② Vacuum – NPSF 3/8″
③ Exhaust – NPSF 3/8″

Pump Model	D	E
TCVM / X 5–10	20.5 [0.81″]	86 [3.39″]
TCVM / X 20	28.2 [1.11″]	94.2 [3.71″]
TCVM / X 30	35.7 [1.41″]	101.7 [4.00″]

Specifications subject to change without notice.

2) TCVM/X-D1: Mini Duplex Type



Mini chip type of pumps in the aluminum connection plate for multiple connections to maximize workability and reliability.

Performance and Specifications Outline

Max. Vacuum Level	Max. 645.16 ~ 712.68 (mmHg.G) Max. −86 ~ −95 (kPa) Max. −25.40 ~ −28.06 (inHg)
Max. Vacuum Flow	Max. 216 (N ℓ /min) Max. 7.627 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	4~6.2 bar 58.01~89.92 psi
Working Temperature	−20℃~+80℃ −4°F~+176°F
Noise Level	57~65 dBA

Ordering Information

TCVM TCVX	-D1	-5, 10, 20, 30	N	Options
M: Medum Vacuum (-86 kPa) X: Extra Vacuum (-95 kPa) TOTAL Chip Type Vacuum Pump Chip Base Type	Chip base Blocktype	Pump's Size 5 10 20 30	Seal Material (Check V/V – basic installed) N: Nitrile V: Viton E: EPDM	Vacuum S/W -None: Standard -S/W: With Switch -CXC: With External Check V/V

TCVM-D1 / TCVX-D1 Series

Characteristics / Medium Vacuum & Extra Vacuum

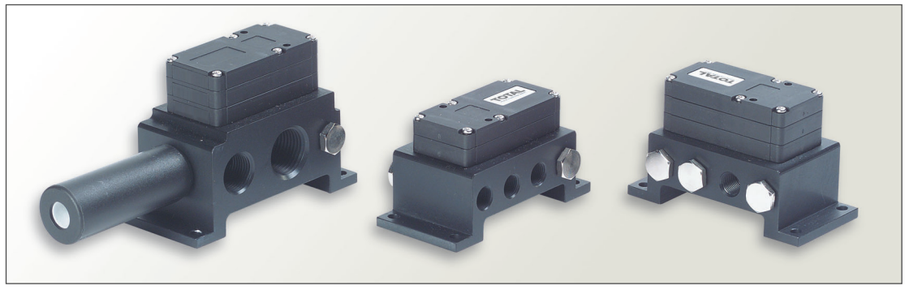
Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ /min) (scfm)	Air Consumption (N ℓ /min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (∅) Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (mm) (inches)
TCVM-D1-5	645 25.39 86	36 1.271	15~21 0.530~0.742	57~63	178 6.278	>2 0.08″	>5 0.20″	1/8″
TCVM-D1-10		72 2.542	30~42 1.059~1.483	58~65	178 6.278	>2 0.08″	>8 0.32″	1/8″
TCVM-D1-20		144 5.085	60~84 2.119~2.966	58~65	278 9.805	>4 0.16″	>10 0.39″	3/8″
TCVM-D1-30		216 7.627	90~125 3.178~4.414	58~65	289 10.193	>4 0.16″	>12 0.47″	3/8″
TCVX-D1-5	712.5 28.05 95	31.4 1.109	21.6 0.763	57~63	178 6.278	>2 0.08″	>5 0.20″	1/8″
TCVX-D1-10		62 2.189	43.2 1.525	60~68	178 6.278	>2 0.08″	>8 0.32″	1/8″
TCVX-D1-20		123 4.343	86.5 3.054	60~68	278 9.805	>4 0.16″	>10 0.39″	3/8″
TCVX-D1-30		188 6.638	129 4.555	60~68	289 10.193	>4 0.16″	>12 0.47″	3/8″

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

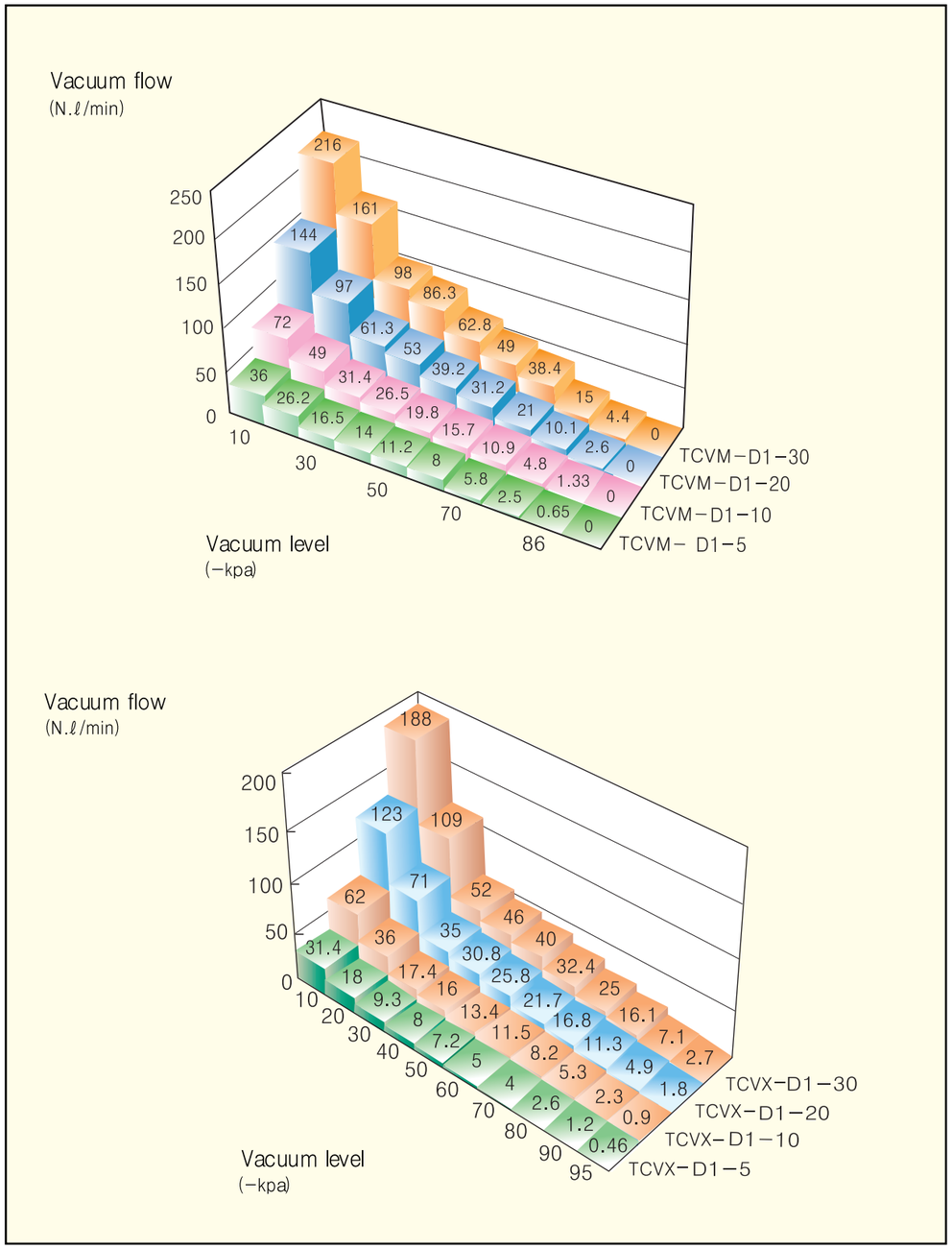
Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM-D1-5	36 1.271	26.2 0.925	16.5 0.583	14 0.494	11.2 0.395	8 0.282	5.8 0.205	2.5 0.088	0.65 0.023	–
TCVM-D1-10	72 2.542	49 1.730	31.4 1.109	26.5 0.936	19.8 0.699	15.7 0.554	10.9 0.385	4.8 0.169	1.33 0.047	–
TCVM-D1-20	144 5.085	97 3.425	61.3 2.165	53 1.871	39.2 1.384	31.2 1.102	21 0.742	10.1 0.357	2.6 0.092	–
TCVM-D1-30	216 7.627	161 5.685	98 3.460	86.3 3.047	62.8 2.218	49 1.730	38.4 1.356	15 0.530	4.4 0.155	–
TCVX-D1-5	31.4 1.109	18 0.636	9.3 0.328	8 0.282	7.2 0.254	5 0.177	4 0.141	2.6 0.092	1.2 0.042	0.46 0.016
TCVX-D1-10	62 2.189	36 1.271	17.4 0.614	16 0.565	13.4 0.473	11.5 0.406	8.2 0.290	5.3 0.187	2.3 0.081	0.9 0.032
TCVX-D1-20	123 4.343	71 2.507	35 1.236	30.8 1.088	25.8 0.911	21.7 0.766	16.8 0.593	11.3 0.399	4.9 0.173	1.8 0.064
TCVX-D1-30	188 6.638	109 3.849	52 1.836	46 1.624	40 1.412	32.4 1.144	25 0.883	16.1 0.569	7.1 0.251	2.7 0.095

Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Vacuum Level / Pump Model	Evacuation Time (sec/ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM-D1-5	0	0.200 5.660	0.560 15.932	1.050 29.400	1.610 45.402	2.400 67.680	3.480 96.744	5.440 150.144	11.200 315.840	–
TCVM-D1-10	0	0.100 2.830	0.280 7.966	0.540 15.120	0.800 22.560	1.190 33.558	1.800 50.040	2.750 75.900	5.950 167.790	–
TCVM-D1-20	0	0.050 1.415	0.140 3.983	0.260 7.280	0.420 11.844	0.620 17.484	0.920 25.576	1.420 39.192	2.830 79.806	–
TCVM-D1-30	0	0.040 1.132	0.110 3.130	0.170 4.760	0.310 8.742	0.430 12.126	0.650 18.070	1.030 28.428	2.040 57.528	–
TCVX-D1-5	0	0.270 7.641	0.810 23.045	1.540 43.120	2.400 67.680	3.660 103.212	4.950 137.610	7.030 194.028	10.400 293.280	19.400 549.990
TCVX-D1-10	0	0.130 3.679	0.420 11.949	0.790 22.120	1.190 33.558	1.870 52.734	2.500 69.500	3.480 96.048	5.800 163.560	9.900 280.665
TCVX-D1-20	0	0.070 1.981	0.220 6.259	0.390 10.920	0.640 18.048	0.920 25.944	1.290 35.862	1.750 48.300	2.580 72.756	4.900 138.915
TCVX-D1-30	0	0.050 1.415	0.080 2.276	0.110 3.080	0.250 7.050	0.370 10.434	0.590 16.402	0.980 27.048	1.640 46.248	3.380 95.823

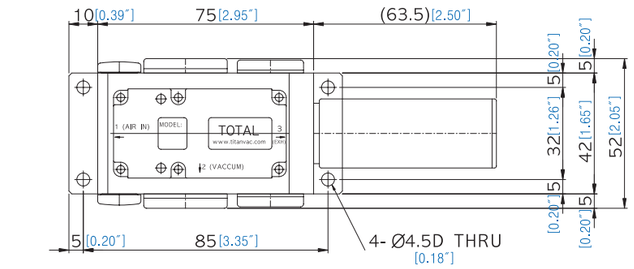


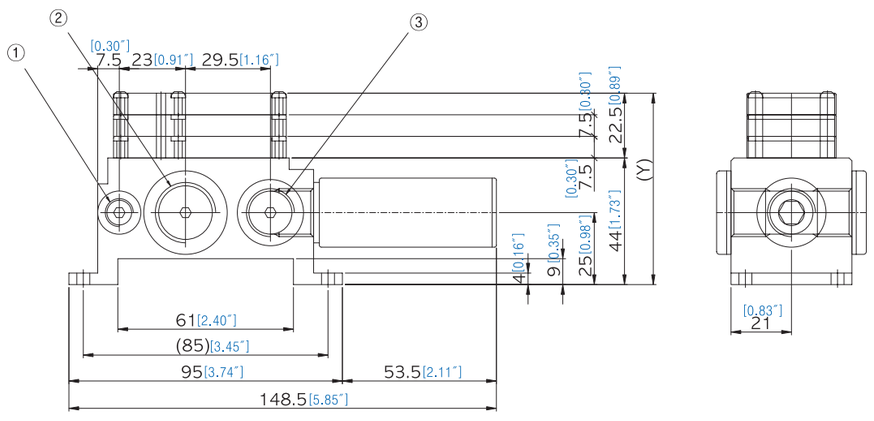
Experimental Performance Curve



TCVM/X-D1
Dimension

Metric(mm) U.S. Imperial(inches)



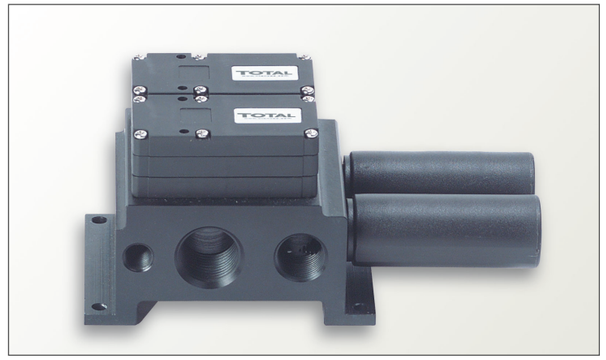


Pump Model	(Y)
TCVM/X-CB5~10	51.5 [2.03"]
TCVM/X-CB20	59 [2.32"]
TCVM/X-CB30	66.5 [2.62"]

① Compressed air - NPSF 1/8"
② Vacuum - NPSF 1/2"
③ Exhaust - NPSF 3/8"

Specifications subject to change without notice.

3) TCVM/X-2: Mini Duplex Type



Mini chip type of pumps with multi-stage nozzle in the aluminum connection plate that has vacuum port and exhaust port together to make it easy to be laid out and maximize the vacuum flow.

Performance and Specifications Outline

Max. Vacuum Level	Max. 645.16 ~ 712.68 (mmHg.G) Max. -86 ~ -95 (kPa) Max. -25.40 ~ -28.06 (nHg)
Max. Vacuum Flow	Max. 403 (N ℓ/min) Max. 14.230 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	4~6.2 bar 58.01~89.92 psi
Working Temperature	-20℃~+80℃ -4°F~+176°F
Noise Level	57~65 dBA

Ordering Information

TCVM TCVX	-D2	-20, 30, 40, 60	N	Options
M: Medum Vacuum (-86 kPa) X: Extra Vacuum (-95 kPa) TOTAL Chip Type Vacuum Pump	Duplex Type	Pump's Size 20 30 40 60	Seal Material (Check V/V – basic installed) N: Nitrile V: Viton E: EPDM	Vacuum S/W -None: Standard -S/W: With Switch -CXC: With External Check V/V

TCVM-D2 / TCVX-D2 Series Standard Type

Characteristics / Medium Vacuum & Extra Vacuum

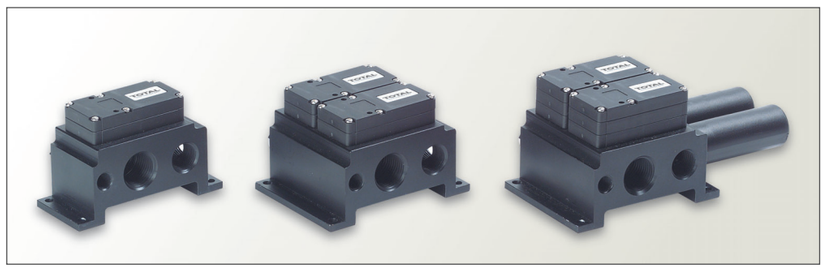
Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dB A)	Net Weight (g) (oz)	Pipe Arrangement (∅)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (mm) (inches)
TCVM-D2-20	645 25.39 86	151 5.332	60~84 2.119~2.966	57~60	279 9.840	>4 0.16″	>10 0.39″	3/8″
TCVM-D2-30		226 7.980	90~128 3.178~4.520	58~60	301 10.616	>6 0.24″	>10 0.39″	3/8″
TCVM-D2-40		301 10.629	122~170 4.308~6.003	58~63	323 11.392	>6 0.24″	>12 0.47″	3/8″
TCVM-D2-60		403 14.230	184~258 6.497~9.110	60~65	345 12.168	>6 0.24″	>12 0.47″	3/8″
TCVX-D2-20	712.5 28.05 95	123 4.343	91~96 3.213~3.390	57~60	279 9.840	>4 0.16″	>10 0.39″	3/8″
TCVX-D2-30		184 4.343	132~144 4.661~5.085	58~60	301 10.616	>6 0.24″	>10 0.39″	3/8″
TCVX-D2-40		246 8.686	177~192 6.250~6.780	58~63	323 11.392	>6 0.24″	>12 0.47″	3/8″
TCVX-D2-60		334 11.794	268~288 9.463~10.169	60~65	345 12.168	>6 0.24″	>12 0.47″	3/8″

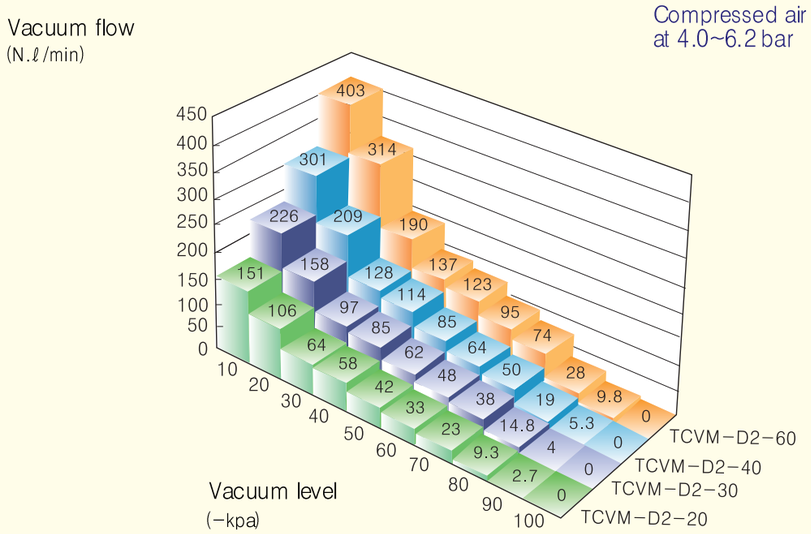
Vacuum flow in (N ℓ/min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

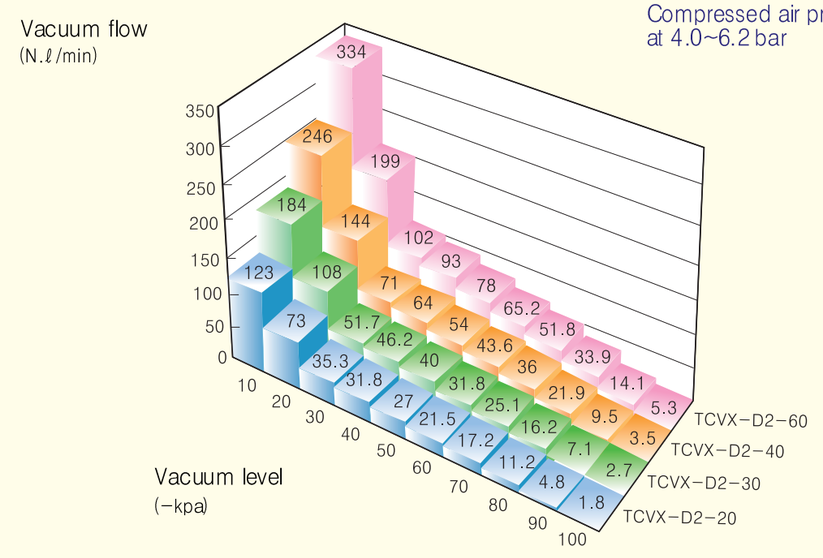
Pump Model \ Vacuum Level	Vacuum Flow (N ℓ/min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM-D2-20	151 5.332	106 3.743	64 2.260	58 2.048	42 1.483	33 1.165	23 0.812	9.3 0.328	2.7 0.095	–
TCVM-D2-30	226 7.980	158 5.579	97 3.425	85 3.001	62 2.189	48 1.695	38 1.342	14.8 0.523	4 0.141	–
TCVM-D2-40	301 10.629	209 7.380	128 4.520	114 4.025	85 3.001	64 2.260	50 1.766	19.0 0.671	5.3 0.187	–
TCVM-D2-60	403 14.230	314 11.088	190 6.709	137 4.838	123 4.343	95 3.355	74 2.613	28 0.989	9.8 0.346	–
TCVX-D2-20	123 4.343	73 2.578	35.3 1.246	31.8 1.123	27 0.953	21.5 0.759	17.2 0.607	11.2 0.395	4.8 0.169	1.8 0.064
TCVX-D2-30	184 6.497	108 3.814	51.7 1.826	46.2 1.631	40 1.412	31.8 1.123	25.1 0.886	16.2 0.572	7.1 0.251	2.7 0.095
TCVX-D2-40	246 8.686	144 5.085	71 2.507	64 2.260	54 1.907	43.6 1.540	36 1.271	21.9 0.773	9.5 0.335	3.5 0.124
TCVX-D2-60	334 11.794	199 7.027	102 3.602	93 3.284	78 2.754	65.2 2.302	51.8 1.829	33.9 1.197	14.1 0.498	5.3 0.187

Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum Levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM-D2-20	0	0.061 1.726	0.160 4.552	0.280 7.840	0.400 11.280	0.600 16.920	0.880 24.464	1.340 36.984	2.590 73.038	–
TCVM-D2-30	0	0.044 1.245	0.110 3.130	0.190 5.320	0.300 8.460	0.480 13.536	0.650 18.070	1.000 27.600	1.960 55.272	–
TCVM-D2-40	0	0.028 0.792	0.028 0.800	0.126 3.528	0.200 5.640	0.300 8.460	0.450 12.510	0.700 19.320	1.300 36.660	–
TCVM-D2-60	0	0.020 0.566	0.020 0.569	0.086 2.408	0.130 3.666	0.200 5.640	0.290 8.062	0.450 12.420	0.880 24.816	–
TCVX-D2-20	0	0.066 1.868	0.066 1.878	0.390 10.920	0.620 17.484	0.940 26.508	1.300 36.140	1.780 49.128	2.600 73.320	4.960 140.616
TCVX-D2-30	0	0.050 1.415	0.050 1.423	0.290 8.120	0.460 12.972	0.700 19.740	0.950 26.220	1.300 35.880	1.940 54.708	3.630 102.911
TCVX-D2-40	0	0.034 0.962	0.034 0.967	0.200 5.600	0.300 8.460	0.450 12.690	0.620 17.112	0.880 24.288	1.300 36.660	2.500 70.875
TCVX-D2-60	0	0.022 0.623	0.022 0.626	0.130 3.640	0.240 6.768	0.350 9.870	0.420 11.592	0.590 16.284	0.880 24.816	1.700 48.195



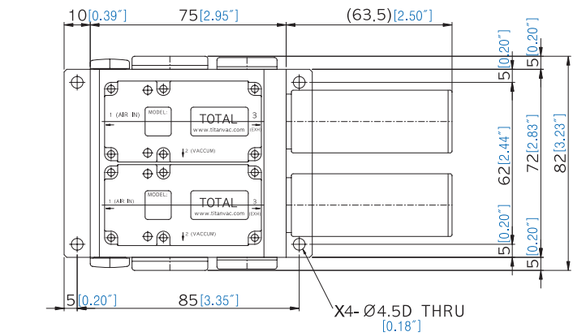


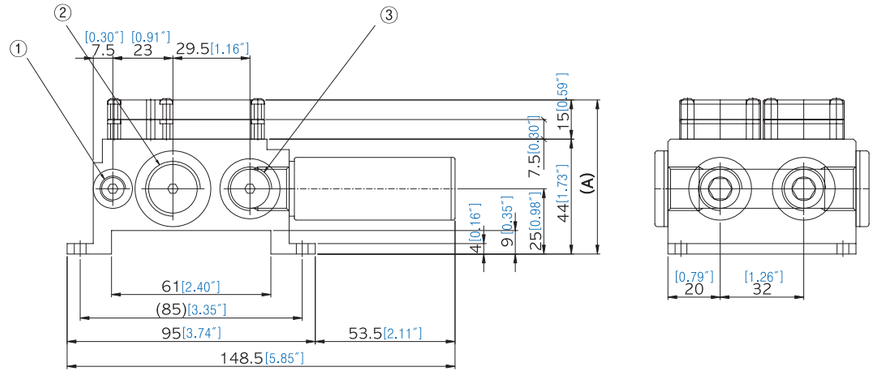


TCVM-D2 / TCVX-D2

Dimension

Metric(mm) U.S. Imperial(inches)





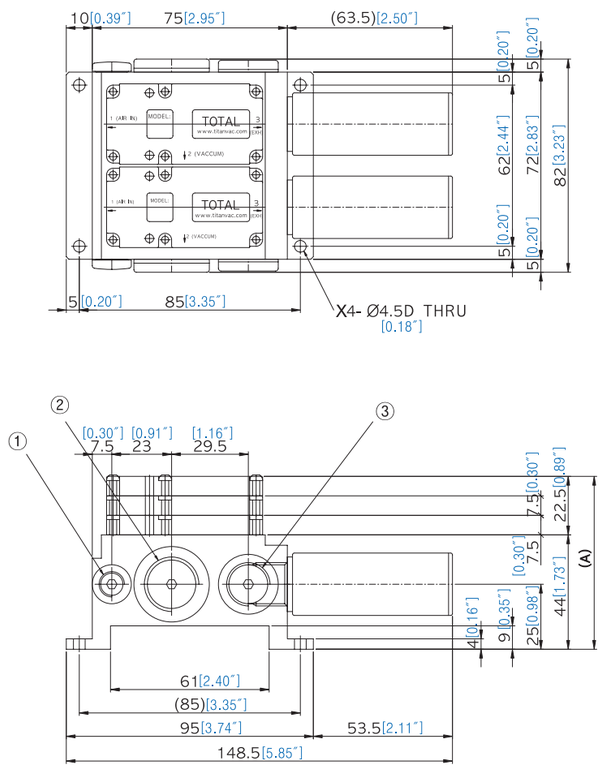
① Compressed air - NPSF 1/8″
② Vacuum - NPSF 1/2″
③ Exhaust - NPSF 3/8″

Pump Model	A
TCVM / X 20	51.5 [2.03"]
TCVM / X 30	59 [2.32"]

Specifications subject to change without notice.

TCVM-D2 / TCVX-D2
Dimension

Metric(mm) U.S. Imperial(inches)

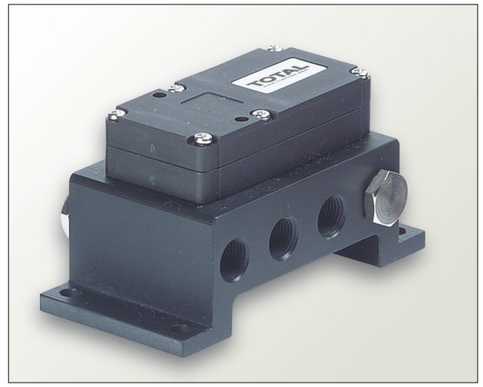


① Compressed air - NPSF 1/8"
② Vacuum - NPSF 1/2"
③ Exhaust - NPSF 3/8"

Pump Model	A
TCVM/X40	59.0 [2.32"]
TCVM/X60	66.5 [2.62"]

Specifications subject to change without notice.

4) TCVM/X-CB: Mini Base Block Type



Mini chip type of pumps in the aluminum connection plate for multiple connections to maximize workability and reliability.

Performance and Specifications Outline

Max. Vacuum Level	Max. 645.16 ~ 712.68 (mmHg.G) Max. −86 ~ −95 (kPa) Max. −25.40 ~ −28.06 (inHg)
Max. Vacuum Flow	Max. 216 (N ℓ/min) Max. 7.627 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	4~6.2 bar 58.01~89.92 psi
Working Temperature	−20℃~+80℃ −4°F~+176°F
Noise Level	57~65 dBA

Ordering Information

TCVM TCVX	-CB	5, 10, 20, 30	N	Option
M: Medum Vacuum (-86 kPa) X: Extra Vacuum (-95 kPa) TOTAL Chip Type Vacuum Pump Chip Base Block Type	Chip Base Block Type	Pump's Size 5 10 20 30	Seal Material (Check V/V – basic installed) N: Nitrile V: Viton E: EPDM	Vacuum S/W -None: Standard -S/W: With Switch -CXC: With External Check V/V

TCVM/X-CB Series Chip Base Block Type

Characteristics / Medium Vacuum & Extra Vacuum

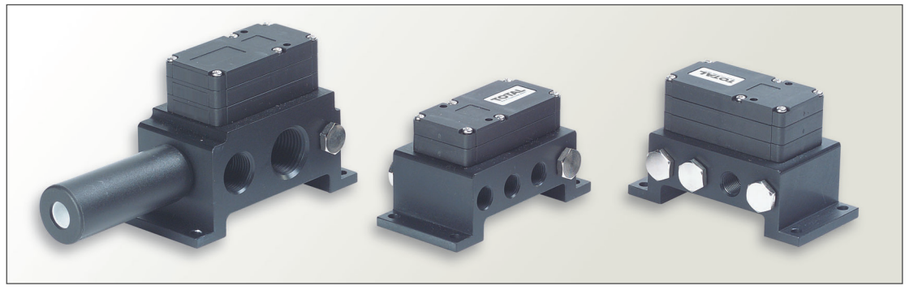
Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dB A)	Net Weight (g) (oz)	Pipe Arrangement (∅)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (mm) (inches)
TCVM-CB5	645 25.39 86	36 1.271	15~21 0.530~0.742	57~63	178 6.278	>2 0.08″	>5 0.20″	1/8″
TCVM-CB10		72 2.542	30~42 1.059~1.483	58~65	178 6.278	>2 0.08″	>8 0.32″	1/8″
TCVM-CB20		144 5.085	60~84 2.119~2.966	58~65	278 9.805	>4 0.16″	>10 0.39″	3/8″
TCVM-CB30		216 7.627	90~125 3.178~4.414	58~65	289 10.193	>4 0.16″	>12 0.47″	3/8″
TCVX-CB5	712.5 28.05 95	31.4 1.109	21.6 0.763	57~63	178 6.278	>2 0.08″	>5 0.20″	1/8″
TCVX-CB10		62 2.189	43.2 1.525	60~68	178 6.278	>2 0.08″	>8 0.32″	1/8″
TCVX-CB20		123 4.343	86.5 3.054	60~68	278 9.805	>4 0.16″	>10 0.39″	3/8″
TCVX-CB30		188 6.638	129 4.555	60~68	289 10.193	>4 0.16″	>12 0.47″	3/8″

Vacuum flow in (N ℓ/min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

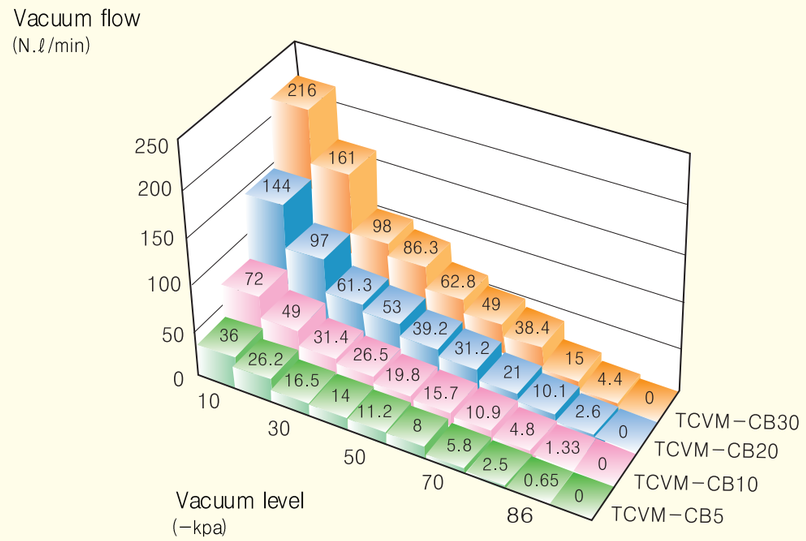
Pump Model \ Vacuum Level	Vacuum Flow (N ℓ/min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM-CB5	36 1.271	26.2 0.925	16.5 0.583	14 0.494	11.2 0.395	8 0.282	5.8 0.205	2.5 0.088	0.65 0.023	–
TCVM-CB10	72 2.542	49 1.730	31.4 1.109	26.5 0.936	19.8 0.699	15.7 0.554	10.9 0.385	4.8 0.169	1.33 0.047	–
TCVM-CB20	144 5.085	97 3.425	61.3 2.165	53 1.871	39.2 1.384	31.2 1.102	21 0.742	10.1 0.357	2.6 0.092	–
TCVM-CB30	216 7.627	161 5.685	98 3.460	86.3 3.047	62.8 2.218	49 1.730	38.4 1.356	15 0.530	4.4 0.155	–
TCVX-CB5	31.4 1.109	18 0.636	9.3 0.328	8 0.282	7.2 0.254	5 0.177	4 0.141	2.6 0.092	1.2 0.042	0.46 0.016
TCVX-CB10	62 2.189	36 1.271	17.4 0.614	16 0.565	13.4 0.473	11.5 0.406	8.2 0.290	5.3 0.187	2.3 0.081	0.9 0.032
TCVX-CB20	123 4.343	71 2.507	35 1.236	30.8 1.088	25.8 0.911	21.7 0.766	16.8 0.593	11.3 0.399	4.9 0.173	1.8 0.064
TCVX-CB30	188 6.638	109 3.849	52 1.836	46 1.624	40 1.412	32.4 1.144	25 0.883	16.1 0.569	7.1 0.251	2.7 0.095

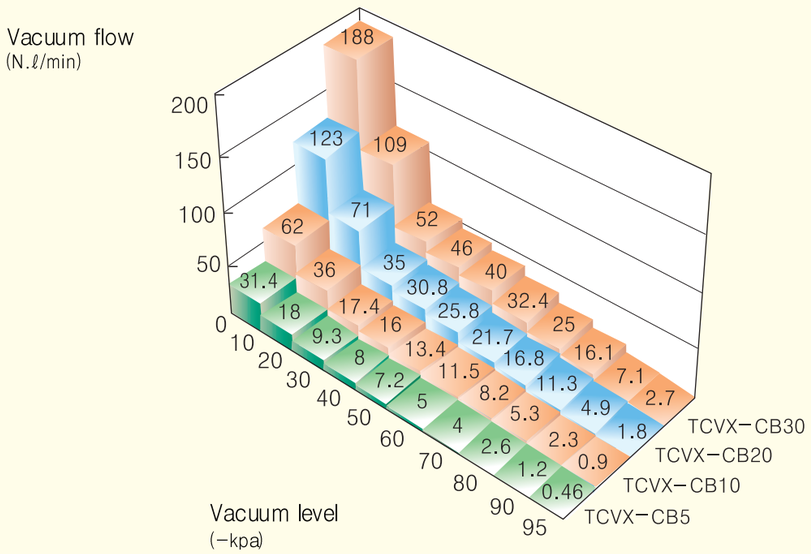
Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM-CB5	0	0.020 5.660	0.560 15.932	1.050 29.400	1.610 45.402	2.400 67.680	3.480 96.744	5.440 150.144	11.200 315.840	–
TCVM-CB10	0	0.010 2.830	0.280 7.966	0.540 15.120	0.800 22.560	1.190 33.558	1.800 50.040	2.750 75.900	5.950 167.790	–
TCVM-CB20	0	0.050 1.415	0.140 3.983	0.260 7.280	0.420 11.844	0.620 17.484	0.920 25.576	1.420 39.192	2.830 79.806	–
TCVM-CB30	0	0.040 1.132	0.110 3.130	0.170 4.760	0.310 8.742	0.430 12.126	0.650 18.076	1.030 28.428	2.040 57.578	–
TCVX-CB5	0	0.270 7.641	0.810 23.045	1.540 43.120	2.400 67.680	3.660 103.212	4.950 137.610	7.030 194.028	10.400 293.280	19.400 549.99
TCVX-CB10	0	0.130 3.679	0.420 11.949	0.790 22.120	1.190 33.558	1.870 52.734	2.500 69.500	3.480 96.048	5.800 163.560	9.900 280.665
TCVX-CB20	0	0.070 1.981	0.220 6.259	0.390 10.920	0.640 18.048	0.920 25.944	1.290 35.862	1.750 48.300	2.580 72.756	4.900 138.915
TCVX-CB30	0	0.050 1.415	0.080 2.276	0.110 3.080	0.250 7.050	0.370 10.434	0.590 16.402	0.980 27.048	1.640 46.248	3.380 95.823



Experimental Performance Curve

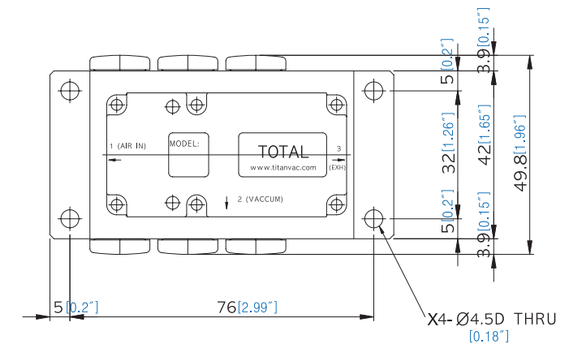


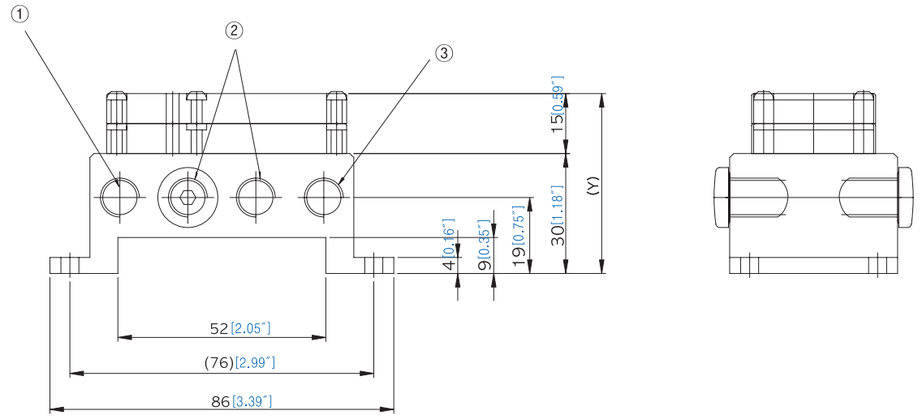


TCVM-CB / TCVX-CB

Dimension

Metric(mm) U.S. Imperial(inches)





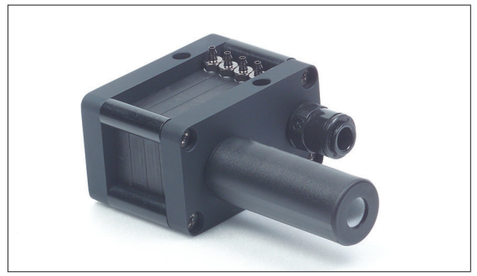
① Compressed air - NPSF 1/8″
② Vacuum - NPSF 1/8″
③ Exhaust - NPSF 1/8″

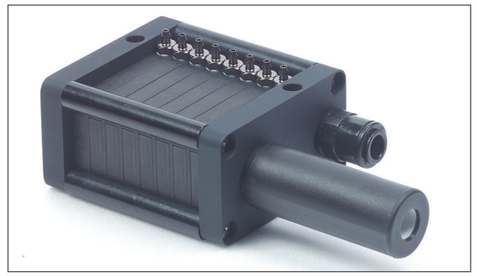
Pump Model	(Y)
TCVM/X-CB 5~10	37.5 [1.48″]
TCVM/X-CB 20	45 [1.77″]
TCVM/X-CB 30	52.5 [2.07″]

Specifications subject to change without notice.

5) TCVM/X SM: Mini Multiple Stack Type

Integrated of mini chip type of pumps with multi-stage nozzle as a manifold.
Possible to be put together from 2(two) to max. 12(twelve), and can be operated by 1(one) air supply line.
When a line has vacuum breaking, there is no effect on the other line of pumps.
Therefore, this can improve reliability on the process having much vacuum leakage or on the process using many suction cups.





Performance and Specifications Outline

Max. Vacuum Level	Max. 712.68 (mmHg.G) Max. -95 (kPa) Max. -28.06 (inHg)
Max. Vacuum Flow	Different by the number of stacks. Max. 31.2 ~ 980 (N ℓ/min) Max. 1.102 ~ 7.627 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	4~6.2 bar 58.01~89.92 psi
Working Temperature	-20℃~+80℃ -4°F~+176°F
Noise Level	51~68 dBA

Ordering Information

TCVM TCVX	5, 10	X( )	SM	N	Option
M: Medium Vacuum (-86 kPa) X: Extra Vacuum (-95 kPa) TOTAL Chip Type Vacuum pump	Basic Stack Pump's Size 5: 31.2 (N ℓ/min) 1.102 (scfm) 10: 61.8 (N ℓ/min) 2.182 (scfm)	The Number of Pumps Can be stacked from 2(two) to 12 (twelve),	Stack Manifold Type	Seal Material (Check V/V - basic installed) N: Nitrile V: Viton E: EPDM	Vacuum S/W -None: Standard -S/W: With switch -CXC: External Check V/V

TCVM5, 10x() SM Type: Mini Stack Manifold

Characteristics / Medium Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dB A)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (mm) (inches)
TCVM5x2 SM	645 25.39 86	36 x 2 1.278 x 2	31~42 1.095~1.483	54~68 dBA	137 4.832	>2 0.08″	>4 0.16″	3/8″ x 1
TCVM5x3 SM		x 3	46~64 1.624~2.260		155 5.467	>2 0.08″	>4 0.16″	3/8″ x 1
TCVM5x4 SM		x 4	40~84 1.412~2.966		173 6.102	>4 0.16″	>4 0.16″	3/8″ x 1
TCVM5x5 SM		x 5	74~104 2.613~3.672		191 6.737	>4 0.16″	>4 0.16″	3/8″ x 1
TCVM5x6 SM		x 6	90~126 3.178~4.449		209 7.371	>6 0.24″	>4 0.16″	3/8″ x 1
TCVM5x7 SM		x 7	105~148 3.708~5.226		227 8.006	>6 0.24″	>4 0.16″	3/8″ x 1
TCVM5x8 SM		x 8	120~168 4.237~5.932		245 8.641	>6 0.24″	>4 0.16″	3/8″ x 2
TCVM5x9 SM		x 9	138~190 4.873~6.709		263 9.276	>6 0.24″	>4 0.16″	3/8″ x 2
TCVM5x10 SM		x 10	152~211 5.367~7.451		281 9.910	>6 0.24″	>4 0.16″	3/8″ x 2
TCVM5x11 SM		x 11	166~234 5.862~8.263		299 10.546	>6 0.24″	>4 0.16″	3/8″ x 2
TCVM5x12 SM		x 12	184~259 6.497~9.145		317 11.181	>6 0.24″	>4 0.16″	3/8″ x 2
TCVM10x2 SM	645 25.39 86	72 x 2 2.542 x 2	60~85 2.119~3.001	57~68 dBA	137 4.832	>6 0.24″	>4 0.16″	3/8″ x 1
TCVM10x3 SM		x 3	91~128 3.213~4.520		155 5.467	>6 0.24″	>4 0.16″	3/8″ x 1
TCVM10x4 SM		x 4	122~172 4.308~6.073		173 6.102	>6 0.24″	>4 0.16″	3/8″ x 1
TCVM10x5 SM		x 5	153~215 5.403~7.592		191 6.737	>6 0.24″	>4 0.16″	3/8″ x 1
TCVM10x6 SM		x 6	182~261 6.427~9.216		209 7.371	>6 0.24″	>4 0.16″	3/8″ x 1
TCVM10x7 SM		x 7	214~303 7.556~10.699		227 8.006	>8 0.32″	>4 0.16″	3/8″ x 1
TCVM10x8 SM		x 8	246~341 8.686~12.041		245 8.641	>8 0.32″	>4 0.16″	3/8″ x 2
TCVM10x9 SM		x 9	275~384 9.710~13.559		263 9.276	>8 0.32″	>4 0.16″	3/8″ x 2
TCVM10x10 SM		x 10	304~430 10.734~15.184		281 9.910	>8 0.32″	>4 0.16″	3/8″ x 2
TCVM10x11 SM		x 11	338~472 11.935~16.667		299 10.546	>8 0.32″	>4 0.16″	3/8″ x 2
TCVM10x12 SM		x 12	372~512 13.136~18.079		317 11.181	>8 0.32″	>4 0.16″	3/8″ x 2

TCVX5, 10x( ) SM Type: Mini Stack Manifold

Characteristics / Extra Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ /min) (scfm)	Air Consumption (N ℓ /min) (scfm)	Noise Level (dB A)	Net Weight (g) (oz)	Pipe Arrangement (∅)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (mm) (inches)
TCVX5x2 SM	712.5 28.05 95	31.2 x 2 1.102 x 2	40~55 1.412~1.942	57~68 dBA	137 4.832	>2 0.08″	>4 0.16″	3/8″ x 1
TCVX5x3 SM		x 3	59~84 2.083~2.966		155 5.467	>2 0.08″	>4 0.16″	3/8″ x 1
TCVX5x4 SM		x 4	77~109 2.719~3.849		173 6.102	>4 0.16″	>4 0.16″	3/8″ x 1
TCVX5x5 SM		x 5	96~135 3.390~4.767		191 6.737	>4 0.16″	>4 0.16″	3/8″ x 1
TCVX5x6 SM		x 6	117~164 4.131~5.791		209 7.371	>6 0.24″	>4 0.16″	3/8″ x 1
TCVX5x7 SM		x 7	136~192 4.802~6.780		227 8.006	>6 0.24″	>4 0.16″	3/8″ x 1
TCVX5x8 SM		x 8	156~218 5.508~7.698		245 8.641	>6 0.24″	>4 0.16″	3/8″ x 2
TCVX5x9 SM		x 9	180~247 6.356~8.722		263 9.276	>6 0.24″	>4 0.16″	3/8″ x 2
TCVX5x10 SM		x 10	198~275 6.992~9.710		281 9.910	>6 0.24″	>4 0.16″	3/8″ x 2
TCVX5x11 SM		x 11	216~305 7.627~10.770		299 10.546	>6 0.24″	>4 0.16″	3/8″ x 2
TCVX5x12 SM		x 12	239~337 8.439~11.900		317 11.181	>6 0.24″	>4 0.16″	3/8″ x 2
TCVX10x2 SM	645 25.39 86	61.8 x 2 2.182 x 2	79~112 2.790~3.955	57~68 dBA	137 4.832	>2 0.24″	>4 0.16″	3/8″ x 1
TCVX10x3 SM		x 3	117~166 4.131~5.862		155 5.467	>2 0.24″	>4 0.16″	3/8″ x 1
TCVX10x4 SM		x 4	158~222 5.579~7.839		173 6.102	>4 0.24″	>4 0.16″	3/8″ x 1
TCVX10x5 SM		x 5	199~280 7.027~9.887		191 6.737	>4 0.24″	>4 0.16″	3/8″ x 1
TCVX10x6 SM		x 6	236~340 8.333~12.006		209 7.371	>6 0.24″	>4 0.16″	3/8″ x 1
TCVX10x7 SM		x 7	277~394 9.781~13.912		227 8.006	>6 0.32″	>4 0.16″	3/8″ x 1
TCVX10x8 SM		x 8	320~445 11.299~15.713		245 8.641	>6 0.32″	>4 0.16″	3/8″ x 2
TCVX10x9 SM		x 9	356~499 12.571~17.620		263 9.276	>6 0.32″	>4 0.16″	3/8″ x 2
TCVX10x10 SM		x 10	396~560 13.983~19.774		281 9.910	>6 0.32″	>4 0.16″	3/8″ x 2
TCVX10x11 SM		x 11	440~613 15.537~21.645		299 10.546	>6 0.32″	>4 0.16″	3/8″ x 2
TCVX10x12 SM		x 12	483~665 17.055~23.482		317 11.181	>6 0.32″	>4 0.16″	3/8″ x 2

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

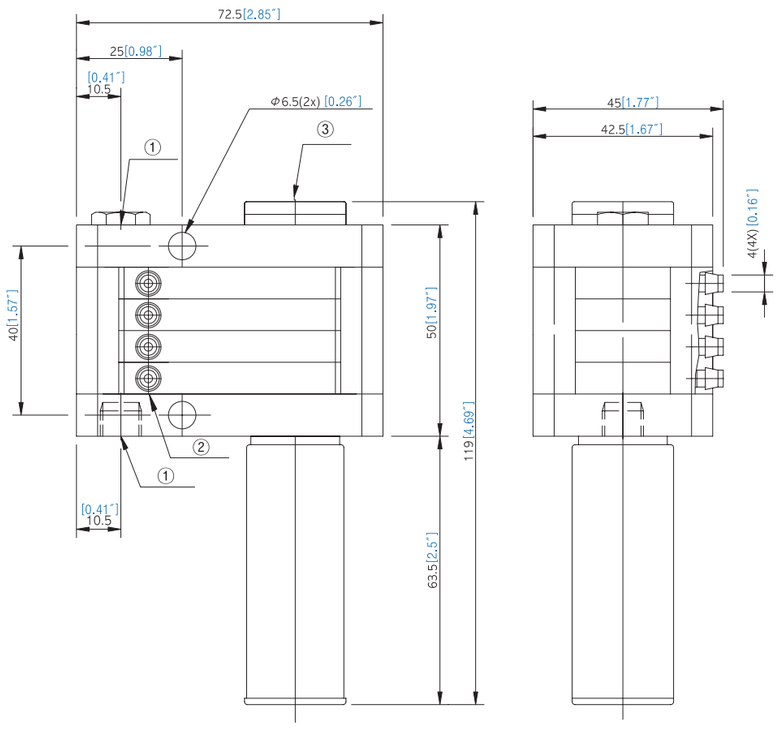
Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM5x1 SM	36.2 1.278	22 0.777	12 0.424	9.7 0.343	8 0.282	5.6 0.198	4.7 0.166	2.1 0.074	0.78 0.028	–
TCVM10x1 SM	72.0 2.542	45.4 1.603	23 0.812	19.8 0.699	16.3 0.576	12.6 0.445	9.3 0.328	4.3 0.152	1.48 0.052	–
TCVX5x1 SM	31.2 1.102	19 0.671	9.8 0.346	8.3 0.293	7.1 0.251	4.9 0.173	4 0.141	2.8 0.099	1.3 0.046	0.47 0.017
TCVX10x1 SM	61.8 2.182	38 1.342	19.6 0.692	17 0.600	14 0.494	11 0.388	8 0.282	5.6 0.198	2.6 0.092	0.94 0.033

Time to evacuate a volume (sec/ ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TCVM5x1 SM	0	0.200 5.660	0.660 18.777	1.300 36.400	1.690 47.658	2.720 76.704	4.400 122.320	6.500 179.400	12.900 363.780	–
TCVM10x1 SM	0	0.120 3.396	0.280 7.966	0.580 16.240	0.810 22.842	1.220 34.404	1.840 51.152	2.880 79.488	5.320 150.024	–
TCVX5x1 SM	0	0.270 7.641	0.820 23.329	1.540 43.120	2.600 73.320	3.650 102.930	4.930 137.054	7.000 193.200	10.800 304.560	–
TCVX10x1 SM	0	0.130 3.679	0.410 11.665	0.770 21.560	1.240 34.968	1.840 51.888	2.510 69.778	3.520 97.152	5.900 166.380	–

TCVM(X)5, 10 x 4 SM
Dimension

Metric(mm) U.S. Imperial(inches)



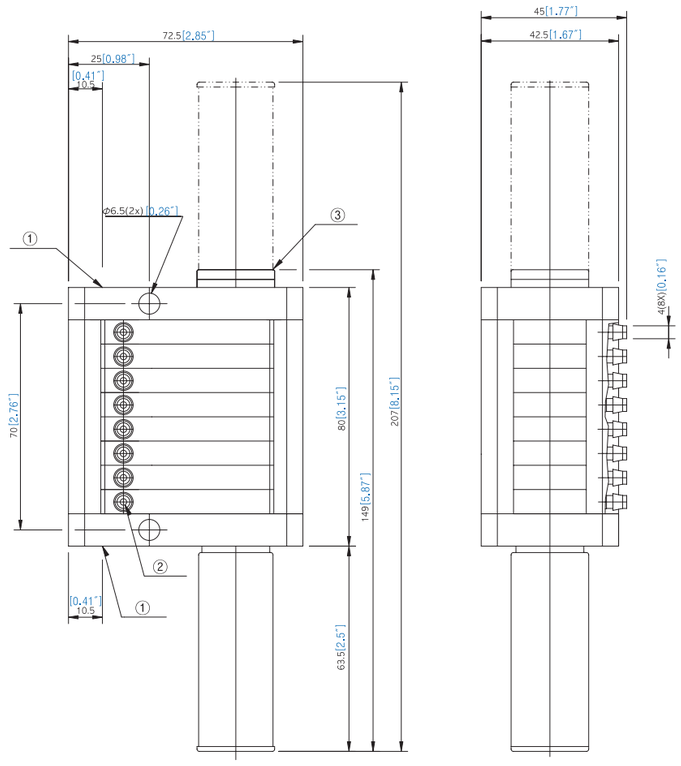
① Compressed air - 1/8″
② Vacuum - ϕ4, ϕ6
③ Exhaust - 3/8″

Pump Model	(Y)
TCVM/X5,10x1	20+7.5 [1.08″]
TCVM/X5,10x2	20+15.0 [1.38″]
TCVM/X5,10x10	20+75.0 [3.74″]

Specifications subject to change without notice.

TCVM(X)5, 10 x 8 SM
Dimension

Metric(mm) U.S. Imperial(inches)



① Compressed air - 1/8″
② Vacuum - ϕ4, ϕ6 [0.24″]
③ Exhaust - 3/8″

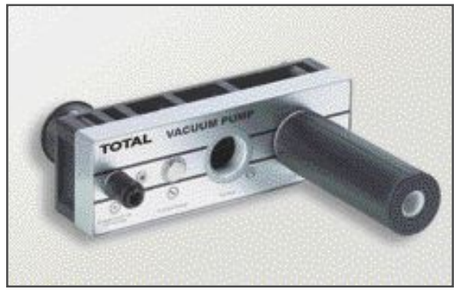
Pump Model	(Y)
TCVM/X5,10x1	20+7.5 [1.08″]
TCVM/X5,10x2	20+15.0 [1.38″]
TCVM/X5,10x10	20+75.0 [3.74″]

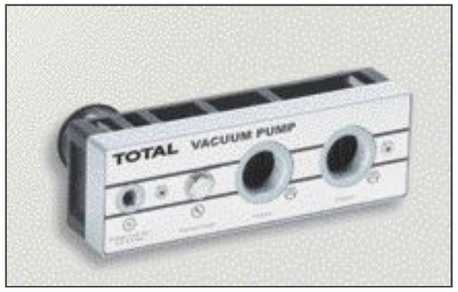
Specifications subject to change without notice.

6) TVL: Normal Low Vacuum Standard Type

Air-driven vacuum pump with multi-stage ventury nozzle of low vacuum & high flow.
By using only 4 ~ 5.8 bar, can get up to -74.2 kpa of vacuum level and much vacuum flow than other identical products.

▶Use of Application - process required low vacuum & high flow such as film process device, shoemaking, gas recovery, printing machine, etc.





Performance and Specifications Outline

Max. Vacuum Level	Max. 556.64 (mmHg,G) Max. -74.2 (kPa) Max. -21.91 (inHg)
Max. Vacuum Flow	Max. 388~3,046 (ℓ/min) Max. 13.701~107.556 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	4~5.8 bar 58.01~84.12 psi
Working Temperature	-20℃~80℃ -4℉~176℉
Noise Level	60~65 dBA

Ordering information

TV	L	25 50 75	-C5	AP	N	-E.S
Manufacturer TOTAL Vacuum Pump	Vacuum Level L: Low Vacuum (Max. -72.4kPa)	Size of Vacuum Pump 25: Max. 388 (ℓ/min) Max. 13.701 (scfm) 50: Max. 767 (ℓ/min) Max. 27.083 (scfm) 75: Max. 1,108 (ℓ/min) Max. 39.124 (scfm) 100: Max. 1,492 (ℓ/min) Max. 52.684 (scfm) 125: Max. 1,864 (ℓ/min) Max. 65.819 (scfm) 150: Max. 2,320 (ℓ/min) Max. 81.921 (scfm)	Input Compressed Air of Pressure Circulating Pressure -C5: 4~5 bar	Material of Pump Body A: Aluminum P: PPS AP: Al+PPS PP: PPS+PPS AA: Al + Al	Material of Seal Kits N: Nitrile V: Viton E: EPDM	Energy Saving Kit & The Other Option -E.S: Energy Saving Kit (S/W: swich Cut-Off V/V, Check V/V, Vacuum Release V/V)

TVL: Medium Flow Low Vacuum Type

Characteristics / Low Vacuum

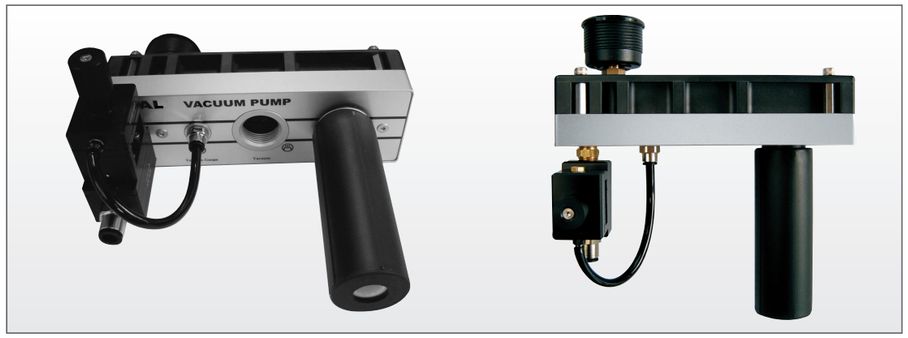
Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dB A)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (mm) (inches)
TVL25	557 21.93 74.27	388 13.701	78~106 2.754~3.743	60~65	645 22.749	>4 0.16″	>12 0.47″	G 3/4″
TVL50		767 27.083	154~212 5.438~7.486	60~65	651 22.961	>6 0.24″	>14 0.55″	G 3/4″
TVL75		1,108 39.124	232~329 8.192~11.617	60~65	847 29.874	>8 0.32″	>19 0.75″	G 3/4″
TVL100		1,492 52.684	300~415 10.593~14.654	60~65	853 30.085	>8 0.32″	>19 0.75″	G 3/4″
TVL125		1,864 65.819	376~544 13.277~19.209	60~65	1,049 36.998	>8 0.32″	>25 0.98″	G 3/4″
TVL150		2,320 81.921	448~637 15.819~22.493	60~65	1,055 37.210	>10 0.39″	>25 0.98″	G 3/4″

Vacuum flow in (N ℓ/min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ/min) (scfm)								
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80
TVL25	388 13.701	228 8.051	166 5.862	108 3.814	55 1.942	43 1.518	27 0.953	16 0.565	–
TVL50	767 27.083	468 16.525	312 11.017	199 7.027	107 3.778	89 3.143	61 2.154	37 1.306	–
TVL75	1,108 39.124	743 26.236	542 19.138	372 13.136	220 7.768	166 5.862	121 4.273	77 2.719	–
TVL100	1,492 52.684	912 32.203	661 23.340	374 13.206	278 9.816	182 6.427	149 5.261	92 3.249	–
TVL125	1,864 65.819	1,097 38.736	803 28.355	414 14.619	322 11.370	214 7.556	180 6.356	103 3.637	–
TVL150	2,320 81.921	1,322 46.681	971 34.287	532 18.785	378 13.347	271 9.569	201 7.097	152 5.367	–

Time to evacuate a volume (sec/ ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

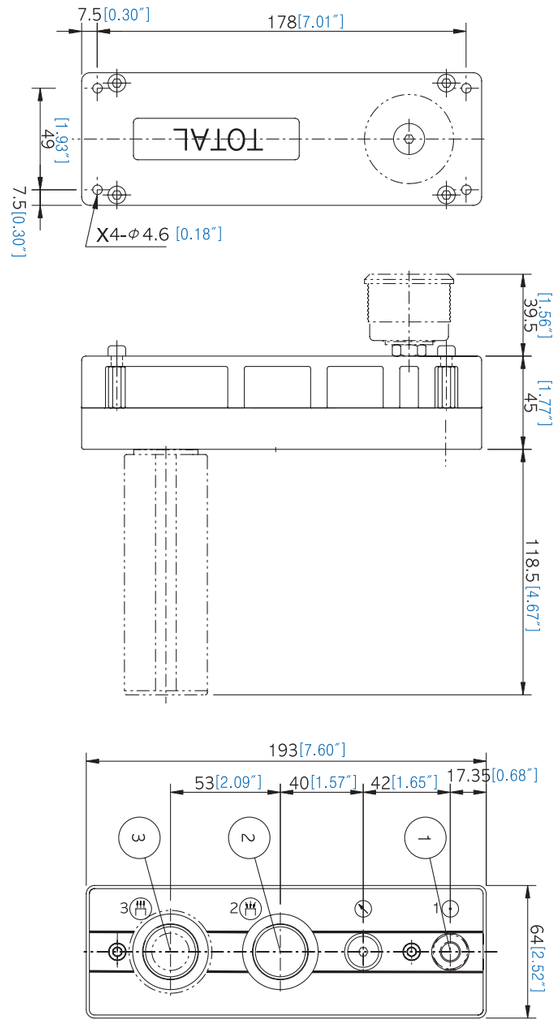
Pump Model \ Vacuum Level	Evacuation Time (sec/ ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TVL25	0	0.015 0.425	0.040 1.138	0.100 2.800	0.210 5.922	0.390 10.998	0.700 19.460	1.200 33.120	–	–
TVL50	0	0.008 0.113	0.020 0.569	0.050 1.400	0.120 3.384	0.210 5.922	0.400 11.120	0.600 16.56	–	–
TVL75	0	0.005 0.142	0.013 0.370	0.030 0.840	0.080 2.256	0.140 3.948	0.300 8.340	0.400 11.040	–	–
TVL100	0	0.004 0.113	0.010 0.285	0.025 0.700	0.060 1.692	0.100 2.820	0.160 4.448	0.300 8.280	–	–
TVL125	0	0.004 0.113	0.008 0.228	0.017 0.476	0.050 1.410	0.100 2.820	0.140 3.892	0.300 8.280	–	–
TVL150	0	–	0.007 0.199	0.015 0.420	0.040 1.128	0.080 2.256	0.120 3.336	0.180 4.968	–	–



TVL25/50 SIZE

Dimension

Metric(mm) U.S. Imperial(inches)



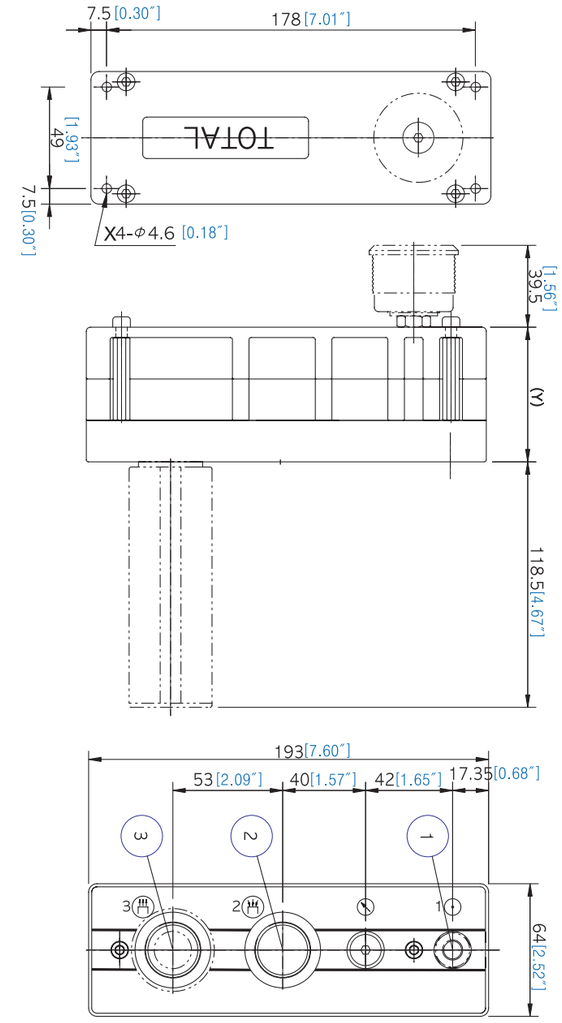
① Compressed air - NPT 1/4″
② Vacuum - NPT 3/4″
③ Exhaust - NPT 3/4″

Specifications subject to change without notice.

TVL75, 100, 125, 150 SIZE

Dimension

Metric(mm) U.S. Imperial(inches)



① Compressed air - NPT 1/4″
② Vacuum - NPT 3/4″
③ Exhaust - NPT 3/4″

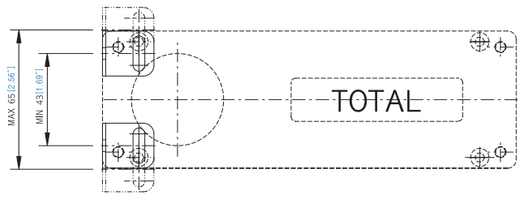
Pump Model	(Y)
75, 100	65 [2.56"]
125, 150	85 [3.35"]

Specifications subject to change without notice.

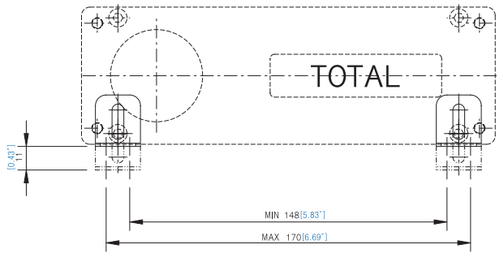
Mounting style
Dimension

Metric (mm) U.S. Imperial (inches)

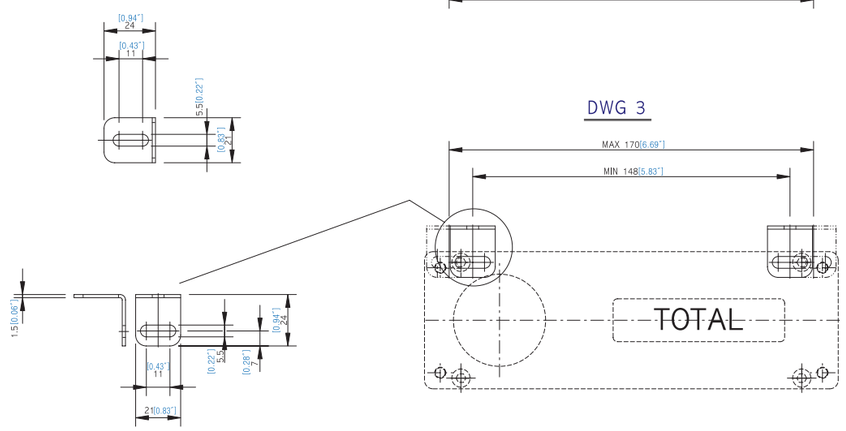
DWG 1



DWG 2



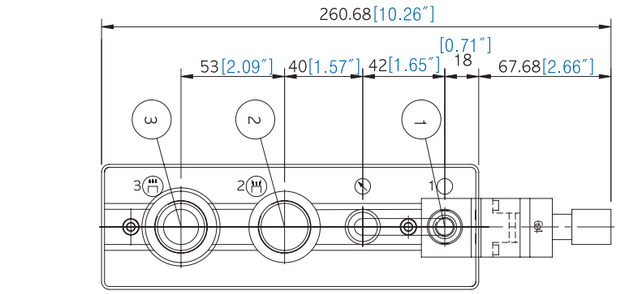
DWG 3

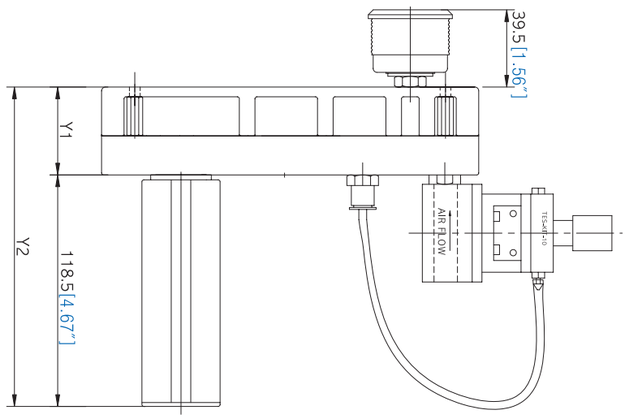


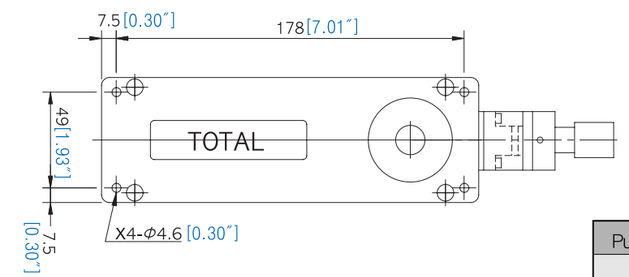
Specifications subject to change without notice.

Energy Saving Kit
Dimension

Metric (mm) U.S. Imperial (inches)







1 NPSF 1/8"
2 G 3/4" Alt.
3 G 3/4"

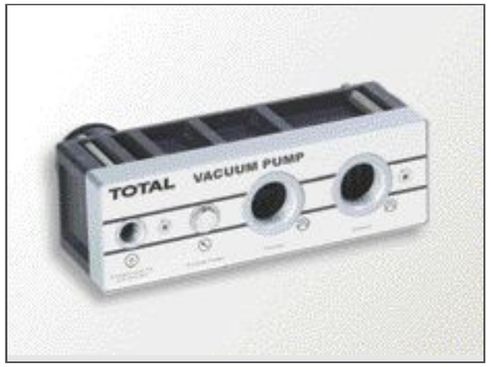
Pump Model	(Y1)	(Y2)
25, 50	45 [1.77"]	163.5 [6.44"]
75, 100	65 [2.56"]	183.5 [7.22"]
125, 150	85 [3.35"]	203.5 [8.01"]

Specifications subject to change without notice.

7) TVM: Normal Medium Vacuum Standard Type

The most general type of air-driven vacuum pump with multi-stage ventury nozzle.
By using only 4~6.2 bar of compressed air, this can get up to -92 kPa of vacuum level.
Due to the recent technical development, the new model that can be maintain up to -92 kPa by 5.5 bar of compressed air, came out to the market.
With less compressed air than single-stage nozzle pump, can get more vacuum flow and save more air consumption by using "Energy Saving Kit".

▶Use of Application - vacuum lifting device(metal sheets, glasses, furniture, and various boards),
liquid filling M/C, vacuum clamp, vacuum packaging/palletizing,
vacuum bearing, printing machine, etc.



Performance and Specifications Outline

Max. Vacuum Level	Max. 690.17 (mmHg,G) Max. -92 (kPa) Max. -27.17 (inHg)
Max. Vacuum Flow	Max. 326~1,724 (ℓ/min) Max. 11.511~60.876 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	4~6.2 bar 58.01~89.92 psi
Working Temperature	-20℃~+80℃ -4℉~+176℉
Noise Level	60~65 dBA

Ordering information

TV	M	25, 50, 75, 100, 125, 150	-C5, C6	AP	N	-E.S
Manufacturer TOTAL Vacuum Pump	Vacuum Level M: Medium Max. 690.17 (mmHgG) Max. -27.17 (inHg) Max. -92 (kPa)	Size of Vacuum Pump (M Type) 25: Max. 326 (ℓ/min) 11.511 (scfm) 50: Max. 614 (ℓ/min) 21.681 (scfm) 75: Max. 854 (ℓ/min) 30.155 (scfm) 100: Max. 1,042 (ℓ/min) 36.794 (scfm) 125: Max. 1,332 (ℓ/min) 47.034 (scfm) 150: Max. 1,724 (ℓ/min) 60.876 (scfm)	Input Compressed Air of Pressure Circulating Pressure -C5: 4~5.8 (bar) 58.01~84.12 (psi) -C6: 4~6.2 (bar) 58.01~89.92 (psi)	Material of Pump Body A: Aluminum P: PPS AP: Al+PPS PP: PPS+PPS AA: Al+Al	Material of Seal Kits N: Nitrile V: Viton E: EPDM	Energy Saving Kit & The Other Options -E.S: Energy Saving Kit

TVM: Normal Medium Vacuum Standard Type

Characteristics / Medium Vacuum

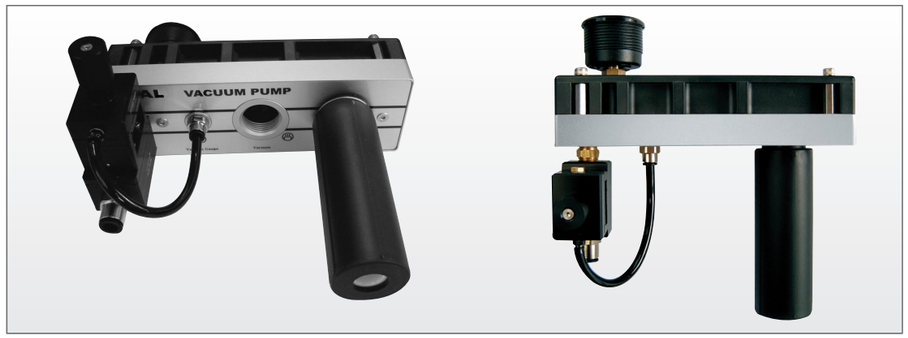
Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ /min) (scfm)	Air Consumption (N ℓ /min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (inches)
TVM25	685.5 26.99 91.4	326 11.511	75~105 2.648~3.708	60~65	645 22.749	>4 0.16″	>12 0.47″	G 3/4″
TVM50		614 21.681	150~208 5.297~7.345	60~65	651 22.961	>6 0.24″	>14 0.55″	G 3/4″
TVM75		854 30.155	232~330 8.192~11.653	60~65	847 29.874	>8 0.32″	>19 0.75″	G 3/4″
TVM100	679.5 26.75 90.6	1,042 36.794	300~415 10.593~14.654	60~65	853 30.085	>8 0.32″	>19 0.75″	G 3/4″
TVM125		1,332 47.034	376~544 13.277~19.209	60~65	1,049 36.998	>8 0.32″	>25 0.98″	G 3/4″
TVM150		1,724 60.876	448~637 15.819~22.493	60~65	1,055 37.210	>10 0.39″	>25 0.98″	G 3/4″

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

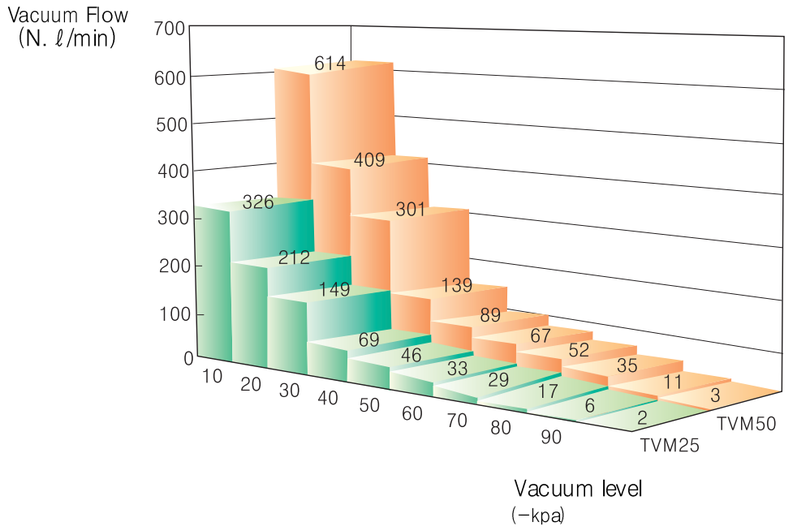
Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TVM25	326 11.511	212 7.486	149 5.261	69 2.436	46 1.624	33 1.165	29 1.024	17 0.600	6 0.212	2 0.071
TVM50	614 21.681	409 14.442	301 10.629	139 4.908	89 3.143	67 2.366	52 1.836	35 1.236	11 0.388	3 0.106
TVM75	854 30.155	516 18.220	425 15.007	192 6.780	131 4.626	98 3.460	77 2.719	52 1.836	16 0.565	5 0.177
TVM100	1,042 36.794	775 27.366	520 18.362	264 9.322	172 6.073	110 3.884	88 3.107	64 2.260	21 0.742	6 0.212
TVM125	1,332 47.034	914 32.274	822 29.025	392 13.842	217 7.662	162 5.720	143 5.049	88 3.107	27 0.953	6 0.212
TVM150	1,724 60.876	1,042 36.794	891 31.462	427 15.078	299 10.558	204 7.203	169 5.968	94 3.319	34 1.201	7 0.247

Time to evacuate a volume (sec/ ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

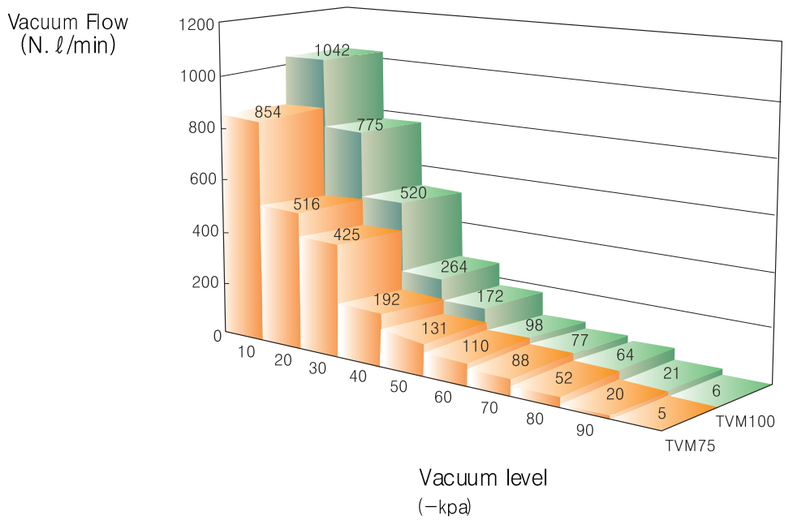
Pump Model \ Vacuum Level	Evacuation Time (sec/ ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
TVM25	0	0.015 0.425	0.050 1.415	0.132 3.696	0.240 6.768	0.480 13.536	0.760 21.128	1.190 32.844	1.940 54.708	5.270 149.405
TVM50	0	0.012 0.340	0.030 0.854	0.071 1.988	0.140 3.948	0.240 6.768	0.370 10.286	0.580 16.008	0.980 27.636	2.740 77.679
TVM75	0	0.006 0.170	0.016 0.455	0.034 0.952	0.080 2.256	0.154 4.343	0.292 8.118	0.400 11.040	0.631 17.794	1.720 48.762
TVM100	0	0.006 0.170	0.020 0.569	0.037 1.036	0.071 2.002	0.128 3.610	0.184 5.115	0.312 8.611	0.508 14.326	1.395 39.548
TVM125	0	0.005 0.142	0.011 0.313	0.023 0.644	0.057 1.607	0.096 2.707	0.145 4.031	0.219 6.044	0.410 11.562	1.144 32.432
TVM150	0	0.004 0.113	0.009 0.256	0.024 0.672	0.048 1.354	0.079 2.228	0.122 3.392	0.194 5.354	0.388 10.942	0.899 25.487



Experimental Performance Curve



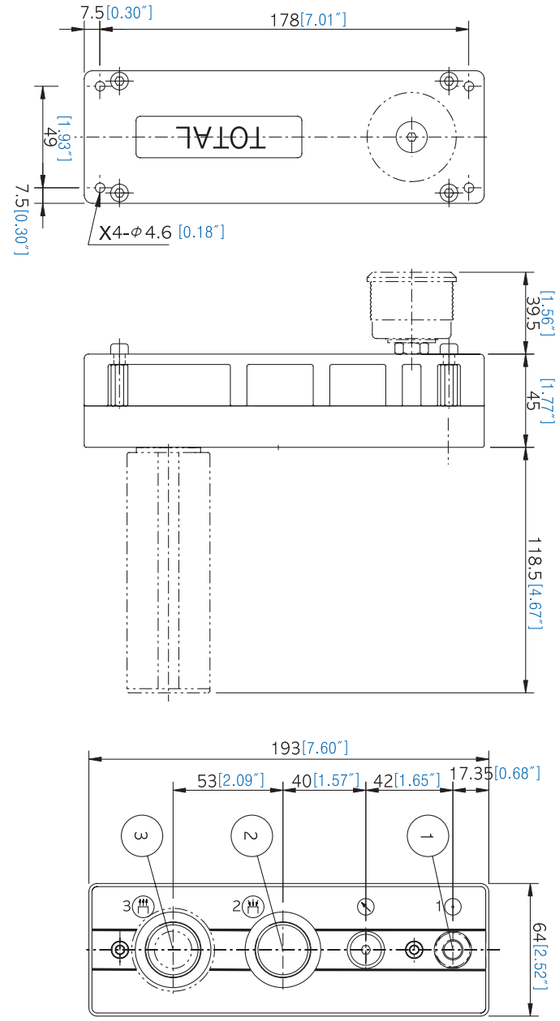
Experimental Performance Curve



TVM 25/50 SIZE

Dimension

Metric(mm) U.S. Imperial(inches)



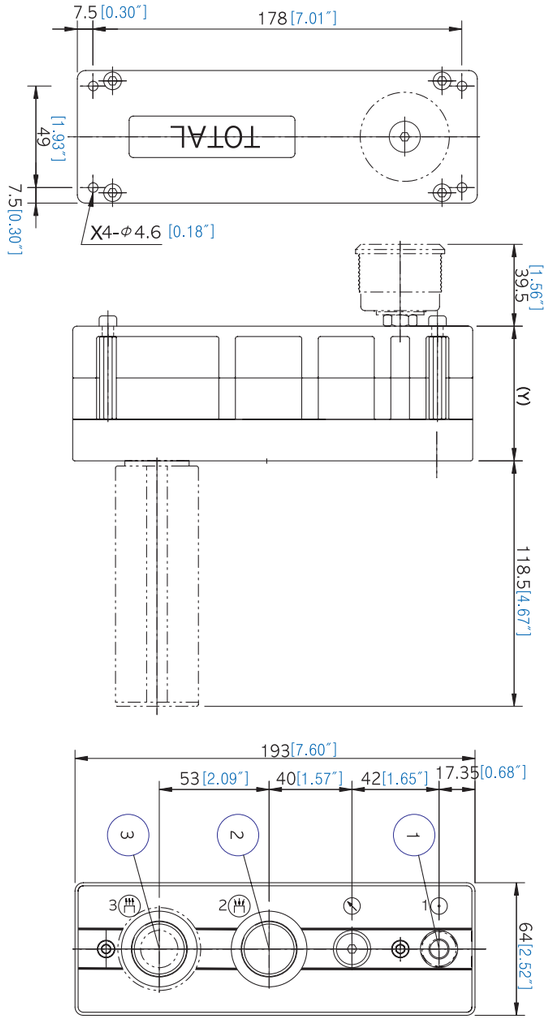
① Compressed air - NPT 1/4″
② Vacuum - NPT 3/4″
③ Exhaust - NPT 3/4″

Specifications subject to change without notice.

TVM 75, 100, 125, 150 SIZE

Dimension

Metric(mm) U.S. Imperial(inches)



① Compressed air – NPT 1/4″
② Vacuum – NPT 3/4″
③ Exhaust – NPT 3/4″

Pump Model	(Y)
75, 100	65 [2.56"]
125, 150	85 [3.35"]

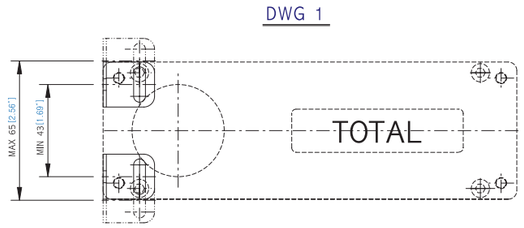
Specifications subject to change without notice.

Mounting style

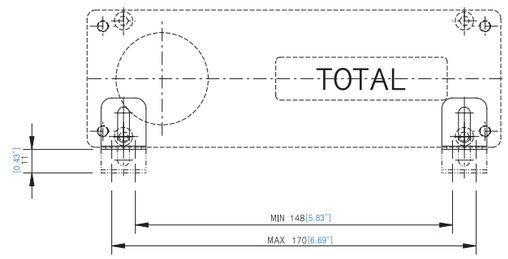
Dimension

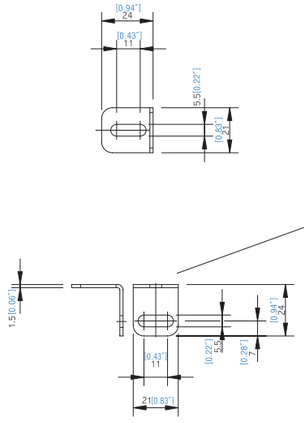
Metric(mm) U.S. Imperial(inches)

DWG 1



DWG 2





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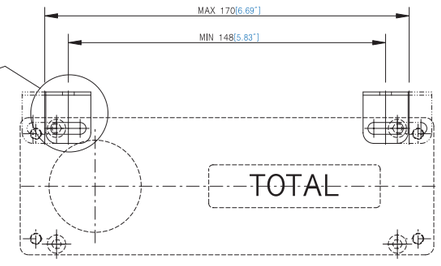
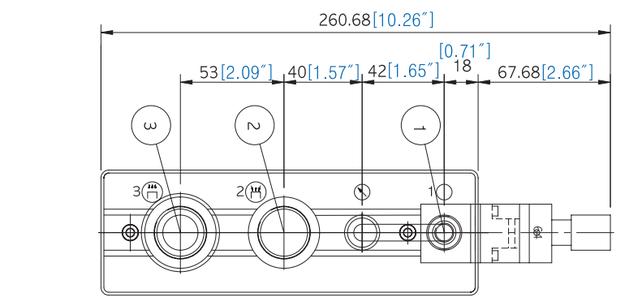
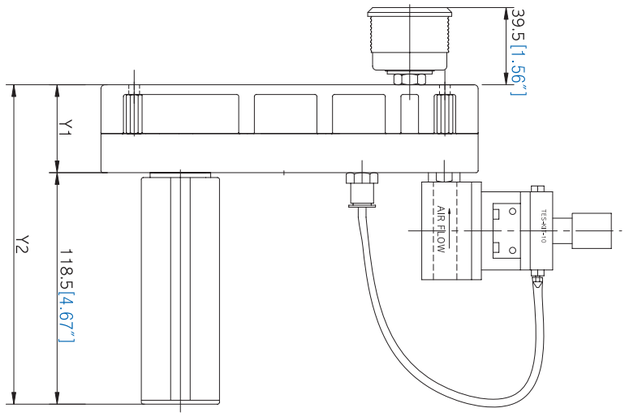


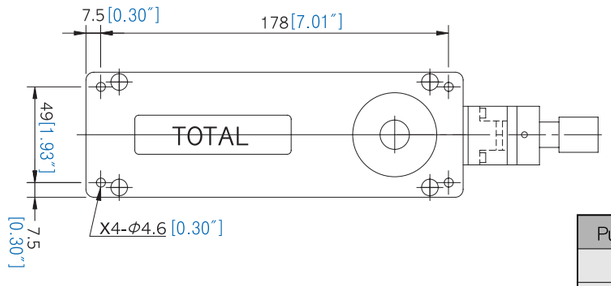
Specifications subject to change without notice.

Energy Saving Kit
Dimension

Metric(mm) U.S. Imperial(inches)







1 NPSF 1/8"
2 G 3/4" Alt.
3 G 3/4"

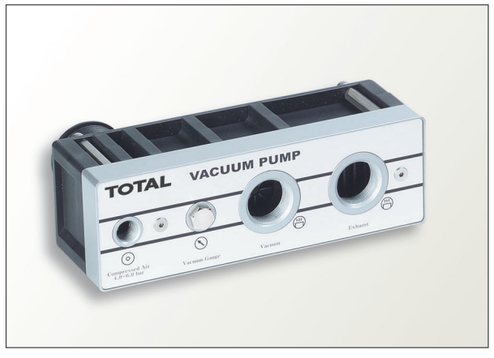
Pump Model	(Y1)	(Y2)
25, 50	45[1.77″]	163.5 [6.44″]
75, 100	65 [2.56″]	183.5 [7.22″]
125, 150	85 [3.35″]	203.5 [8.01″]

Specifications subject to change without notice.

8) TVH: Normal High Vacuum Standard Type

Air-driven vacuum pump with multi-stage ventury nozzle of low vacuum & high flow.
By using only 4~7 bar, this realizes up to -100.8 kpa of high vacuum level.
Can replace and be compatible with most of electric motor-driven pumps.

▶ **Use of Application** – laboratory vacuum reactor, degassing process, semiconductor manufacturing reactor, gel Drying, high purified plastic molding

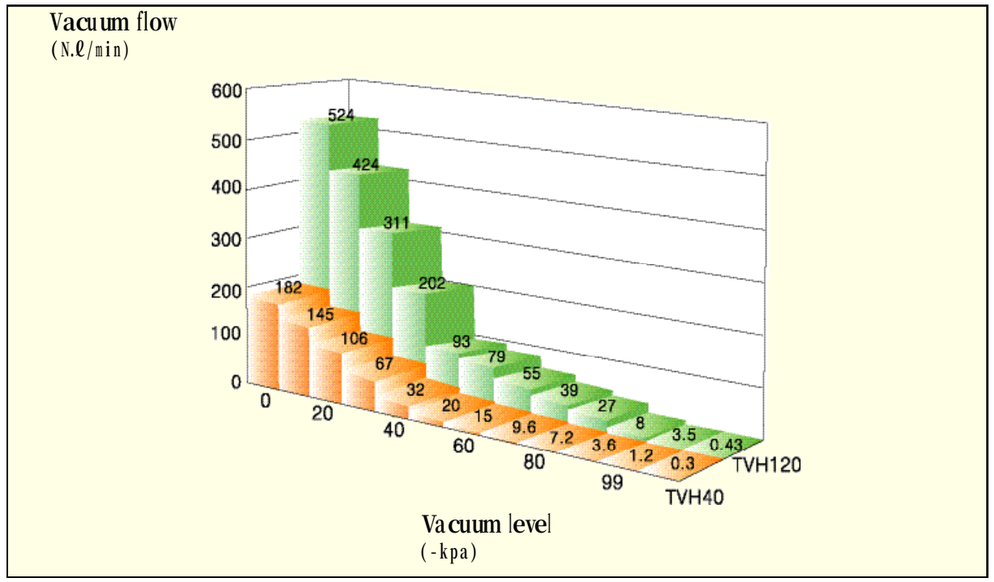


Performance and Specifications Outline

Max. Vacuum Level	Max. 756.19 (mmHg.G) Max. -100.8 (kPa) Max. -29.77(inHg)
Max. Vacuum Flow	Max. 524 (ℓ/min) Max. 18.503 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	4~7 bar 58.01~101.53 psi
Working Temperature	-20℃~+80℃ -4°F~+176°F
Noise Level	58~70 dBA

Ordering information

TV	H	40,120	-C6	AP	N	-E.S
Manufacturer TOTAL Vacuum Pump	Vacuum Level H: High Vacuum Max. 748.69~750.19 (mmHgG) Max. -29.47~-29.53 (inHg) Max. -99.8~-100 (kPa)	Size of Vacuum Pump 40: Max. 182 (ℓ/min) Max. 6.427 (scfm) 120: Max. 524 (ℓ/min) Max. 18.503 (scfm)	Input Compressed Air of Pressure Circulating Pressure -C6: 4~6.2 (bar) 58.01~89.92 (psi)	Material of Pump Body A: Aluminum P: PPS AP: Al+PPS PP: PPS+PPS AA: Al+Al	Material of seal kits N: Nitrile V: Viton E:EPDM	Energy Saving Kit & The Other Options -E.S: Energy Saving Kit (S/V: Switch Cut-Off V/V, Check V/V, Vacuum Release V/V)



TVH: Normal Medium High Vacuum Level Type

Characteristics / High Vacuum

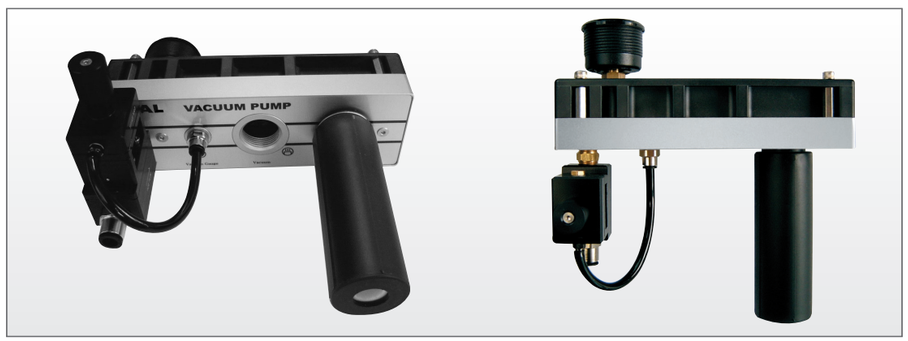
Pump Model	Max. Vacuum (mmHg·G) (-inHg) (-kPa)	Max. Vacuum Flow (Nℓ/min) (scfm)	Air Consumption (Nℓ/min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (mm) (inches)	Vacuum (mm) (inches)	Exhaust (inches)
TVH40	748.5 29.47 99.8	182 6.427	158 5.579	58~65	645 22.749	>6 0.24"	G 3/4"x1	3/4"
TVH120	756 29.76 100.80	524 18.503	459 16.208	58~65	853 30.085	>8 0.31"	G 3/4"x1	3/4"

Vacuum flow in (Nℓ/min) (scfm) at different vacuum levels (mmHg·G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (Nℓ/min) (scfm)													
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	712.5 28.05 95	742.5 29.23 99	746.2 29.38 99.5	752.2 29.61 103.3
TVH40	182 6.427	145 5.120	106 3.743	67 2.366	32 1.130	20 0.706	15 0.530	9.6 0.339	7.2 0.254	3.6 0.127	1.2 0.042	0.3 0.011	0.1 0.004	0.05 0.000
TVH120	524 18.503	424 14.972	311 10.982	202 7.133	93 3.284	79 2.790	55 1.942	39 1.377	27 0.953	8 0.282	3.5 0.124	0.43 0.015	0.2 0.007	0.1 0.004

Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

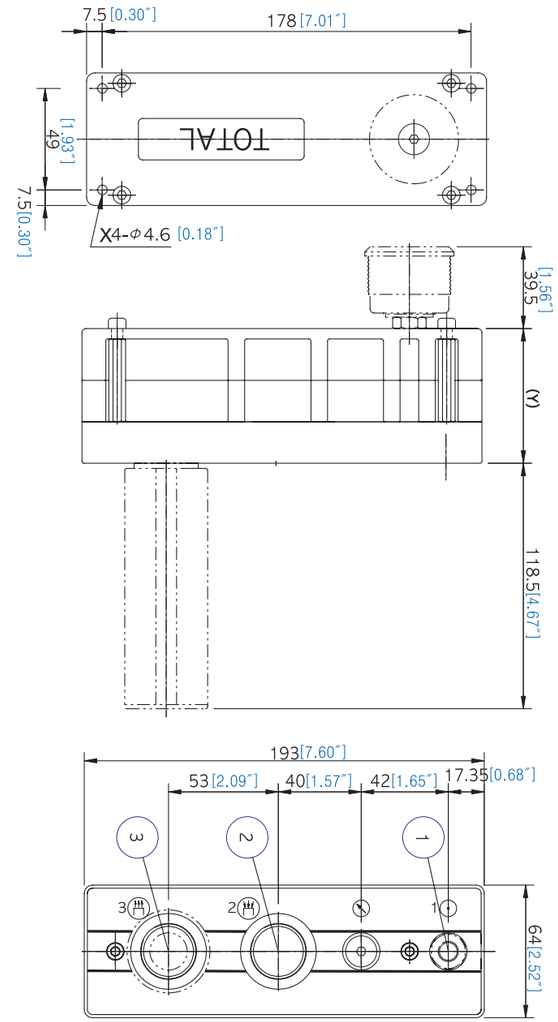
Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)													
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	712.5 28.05 95	742.5 29.23 99	746.2 29.38 99.5	752.2 29.61 103.3
TVH40	0	0.034 0.962	0.074 2.105	0.140 3.920	0.260 7.332	0.570 16.074	0.930 25.854	1.480 40.848	2.400 67.680	3.600 102.06	5.520 154.56	9.400 266.020	12.500 353.75	16.300 461.29
TVH120	0	0.012 0.340	0.026 0.740	0.058 1.624	0.100 2.820	0.180 5.076	0.300 8.340	0.450 12.420	0.660 18.612	1.240 35.154	1.870 52.36	3.500 99.050	4.220 119.426	6.500 183.95



TVH40, 120 SIZE

Dimension

Metric(mm) U.S. Imperial(inches)



① Compressed air – NPT 1/4″
② Vacuum – NPT 3/4″
③ Exhaust – NPT 3/4″

Pump Model	(Y)
TVH40	45 [1.77″]
TVH120	65 [2.56″]

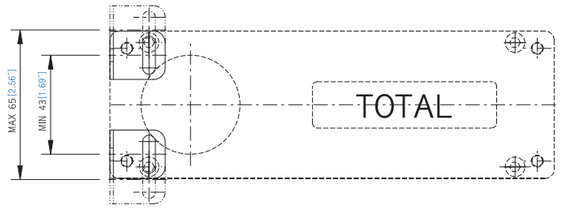
Specifications subject to change without notice.

Mounting style

Dimension

Metric(mm) U.S. Imperial(inches)

DWG 1



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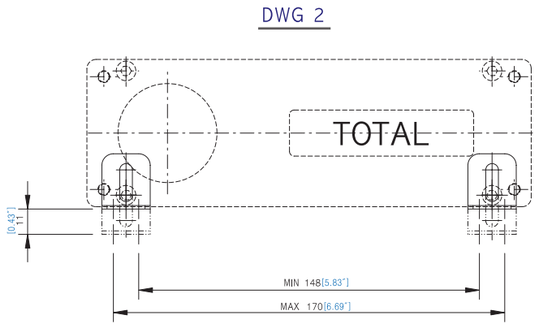
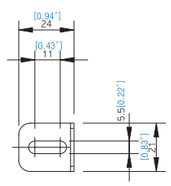
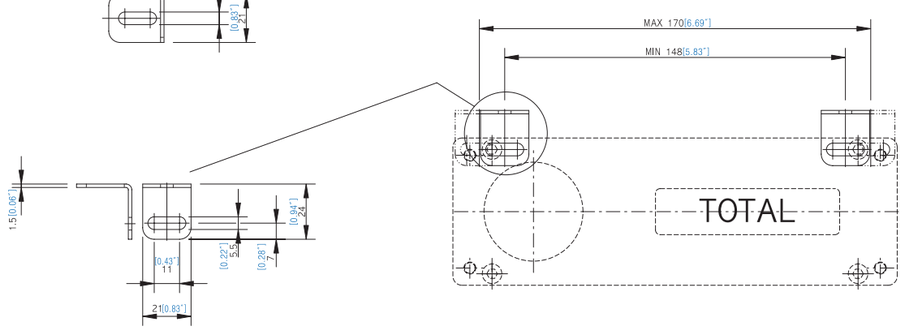




DWG 3



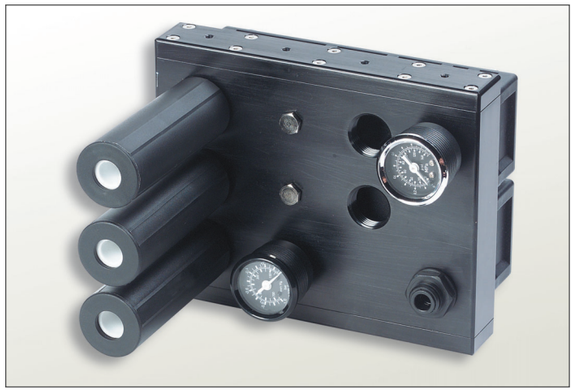
Specifications subject to change without notice.

9) T2MM: High Flow Medium Vacuum Type

10) T2MX: High Flow Extra Vacuum Type

MM type: Air-driven vacuum pump with standard type of multi-stage nozzle, put together on the large size of duplex base chamber to satisfy both of -91 kPa of vacuum level and high vacuum flow. This is used easily in the process which requires high vacuum flow.

MX type: Air-driven vacuum pump with extra vacuum type of multi-stage nozzle, put together on the large size of duplex base chamber to satisfy both of -96 kPa of vacuum level and high vacuum flow. This is used easily in the process which requires extra vacuum level and a large size of pumping.
cf. possible to be joined up to 2,574 (Nℓ/min) of max. vacuum flow.



T2MM & T2MX
Identical Specification,
Different Vacuum Level

Performance and Specifications Outline

	MM Type	MX Type
Max. Vacuum Level	Max. 682.67 (mmHg.G) Max. -26.88 (inHg) Max. -91 (kPa)	Max. 720.18 (mmHg.G) Max. -28.35 (inHg) Max. -96 (kPa)
Max. Vacuum Flow	Max. 2,574 (ℓ/min) Max. 90.890 (scfm)	Max. 880 (ℓ/min) Max. 31.073 (scfm)
Supply Air Condition	Compressed Air	Compressed Air
Supply Air Pressure	4~6.2 bar 58.01~89.92 psi	4.8~7 bar 69.62~101.53 psi
Working Temperature	-20℃~+80℃ -4°F~+176°F	-20℃~+80℃ -4°F~+176°F
Noise Level	65~78 dBA	65~72 dBA

T2MM: High Flow Medium Vacuum Type

Characteristics / Medium Vacuum

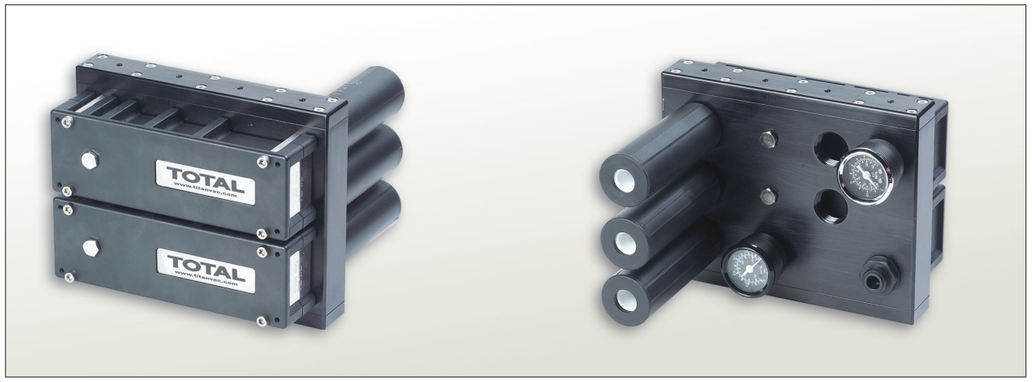
Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dB A)	Net Weight (g) (oz)	Pipe Arrangement (∅)		
						Compressed Air (mm) (inches)	Vacuum (inches)	Exhaust (inches)
T2MM100	685.5 26.99 91.4	1,230 43.432	300~416 10.593~14.689	60~65	2,894 102.071	>8 0.32"	G 3/4" x 2	G 3/4" x 3
T2MM150		1,812 63.983	450~632 15.890~22.316	60~65	3,202 112.935	>8 0.32"	G 3/4" x 2	G 3/4" x 3
T2MM200		2,574 90.890	600~784 21.186~27.684	60~65	3,202 112.935	>10 0.39"	G 3/4" x 2	G 3/4" x 3

Vacuum flow in (N ℓ/min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ/min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
T2MM100	1,230 43.432	1,070 37.782	759 26.801	358 12.641	183 6.462	137 4.838	92 3.249	50 1.766	22 0.777	3.4 0.120
T2MM150	1,812 63.983	1,522 53.743	1,084 38.277	509 17.973	263 9.287	194 6.850	132 4.661	71 2.507	31.4 1.109	4.8 0.169
T2MM200	2,574 90.890	1,798 63.489	1,188 41.949	616 21.751	309 10.911	254 8.969	161 5.685	93 3.284	43.2 1.525	7.2 0.254

Time to evacuate a volume (sec/ ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
T2MM100	0	0.004 0.113	0.018 0.512	0.026 0.728	0.059 1.664	0.110 3.102	0.170 4.726	0.280 7.728	0.480 13.536	1.400 39.690
T2MM150	0	0.004 0.113	0.011 0.313	0.021 0.588	0.042 1.184	0.076 2.143	0.123 3.420	0.210 5.796	0.369 10.406	0.872 24.721
T2MM200	0	0.002 0.057	0.006 0.171	0.013 0.364	0.032 0.902	0.058 1.636	0.095 2.641	0.158 4.361	0.280 7.896	0.684 19.391



T2MX: High Flow Extra Vacuum Type

Characteristics / Medium Vacuum

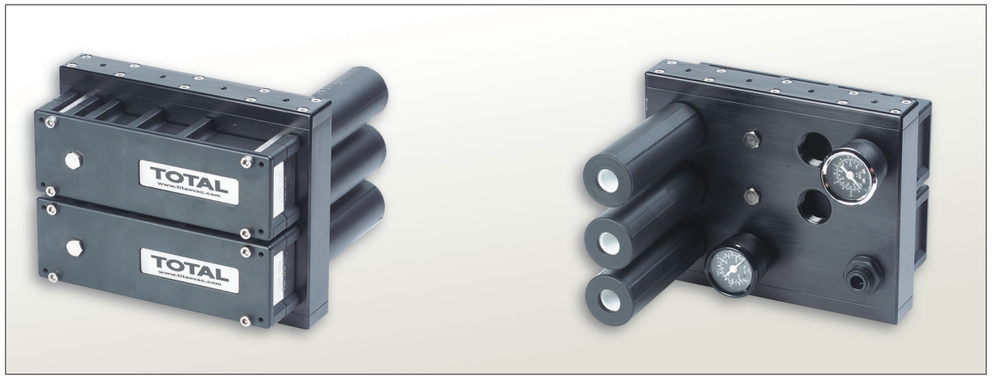
Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (∅)		
						Compressed Air (mm) (inches)	Vacuum (inches)	Exhaust (inches)
T2MX100	725 28.54 96.67	438 15.466	427~536 15.078~18.927	65~68	2,894 102.071	>8 0.32″	G 3/4″ x 2	G 3/4″ x 3
T2MX150		612 21.610	542~674 19.138~23.799	65~68	3,202 112.935	>8 0.32″	G 3/4″ x 2	G 3/4″ x 3
T2MX200		880 21.073	688~818 24.294~28.884	65~68	3,202 112.935	>10 0.39″	G 3/4″ x 2	G 3/4″ x 3

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)										
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	712 28.03 95
T2MX100	438 15.466	269 9.499	187 6.603	124 4.379	101 3.566	85 3.001	77 2.719	66.2 2.338	39.2 1.384	26 0.918	5.7 0.201
T2MX150	612 21.610	391 13.806	277 9.781	193 6.815	151 5.332	125 4.414	117 4.131	95.1 3.358	59 2.083	40.5 1.430	8.1 0.286
T2MX200	880 31.073	550 19.421	391 13.806	272 9.605	212 7.486	178 6.285	166 5.862	134 4.732	83 2.931	57 2.013	11.4 0.403

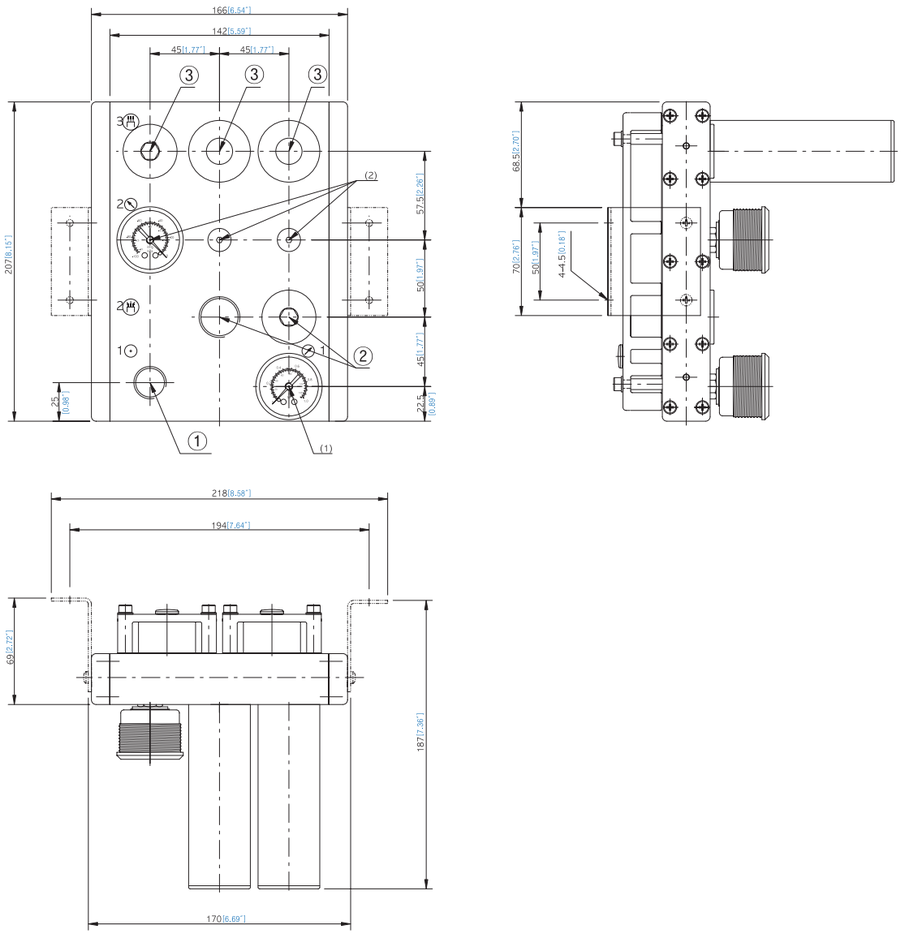
Time to evacuate a volume (sec/ ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ ℓ) (sec/cf)										
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	712 28.03 95
T2MX100	0	0.012 0.340	0.038 1.081	0.068 1.904	0.168 4.738	0.198 5.584	0.238 6.616	0.372 10.267	0.550 15.510	0.880 24.948	1.080 30.240
T2MX150	0	0.009 0.255	0.027 0.7682	0.051 1.428	0.090 2.538	0.108 3.046	0.164 4.559	0.244 6.734	0.360 10.152	0.650 18.428	0.740 20.720
T2MX200	0	0.006 0.170	0.0192 0.5462	0.038 1.064	0.040 1.128	0.088 2.482	0.120 3.336	0.192 5.299	0.290 8.178	0.480 13.698	0.580 16.240



T2MM/MX(Dimension)

Metric(mm) U.S. Imperial(inches)



① Compressed air - G 1/2″
② Vacuum - 2 x G 3/4″ (1) NPSF 1/8″
③ Exhaust - 3 x G 3/4″ (2) NPSF 1/8″

Pump Model	(Y)
T2MM/MX-100	X
T2MM/MX-150, 200	X+20

Specifications subject to change without notice.

11) T2HX: High Flow High Vacuum Type

Air-driven vacuum pump with HX type of multi-stage nozzle, put together on the large size of duplex base chamber to satisfy both of -100.8 kPa of vacuum level and max. 756 mmHg.G of high vacuum flow.

▶**Use of Application** – semiconductor manufacturing facility, rotary vacuum pump prohibition area, laboratory leakage tester, clean system facility, high vacuum 1st degassing works, etc.

T2HX Type

Performance and Specifications Outline

Max. Vacuum Level	Max. 756.19 (mmHg.G) Max. -100.8 (kPa) Max. -29.77(inHg)
Max. Vacuum Flow	Max. 2,023 (ℓ/min) Max. 71.434 (scfm)
Supply Air Condition	Compressed Air
Compressed Air Pressure	5.6~7.2 bar 81.22~104.43 psi
Working Temperature	-20℃~+80℃ -4°F~+176°F
Noise Level	65~75 dBA

T2HX: High Flow High Vacuum Type

Characteristics / High Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ /min) (scfm)	Air Consumption (N ℓ /min) (scfm)	Noise Level (dB A)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (mm) (inches)	Vacuum (inches)	Exhaust (inches)
T2HX240	756 29.76 100.8	1,028 36.299	908 32.062	58~65	2,902 102.354	>10 0.39″	G 3/4″ x 2	G 3/4″ x 2
T2HX320		1,512 53.390	1,440 50.847	58~70	3,210 113.217	>12 0.47″	G 1 1/2″ x 2	G 1 1/2″ x 2
T2HX480		2,023 71.434	1,890 66.737	60~72	3,820 134.731	>10 1/2″	G 1 1/2″ x 2	G 1 1/2″ x 2

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

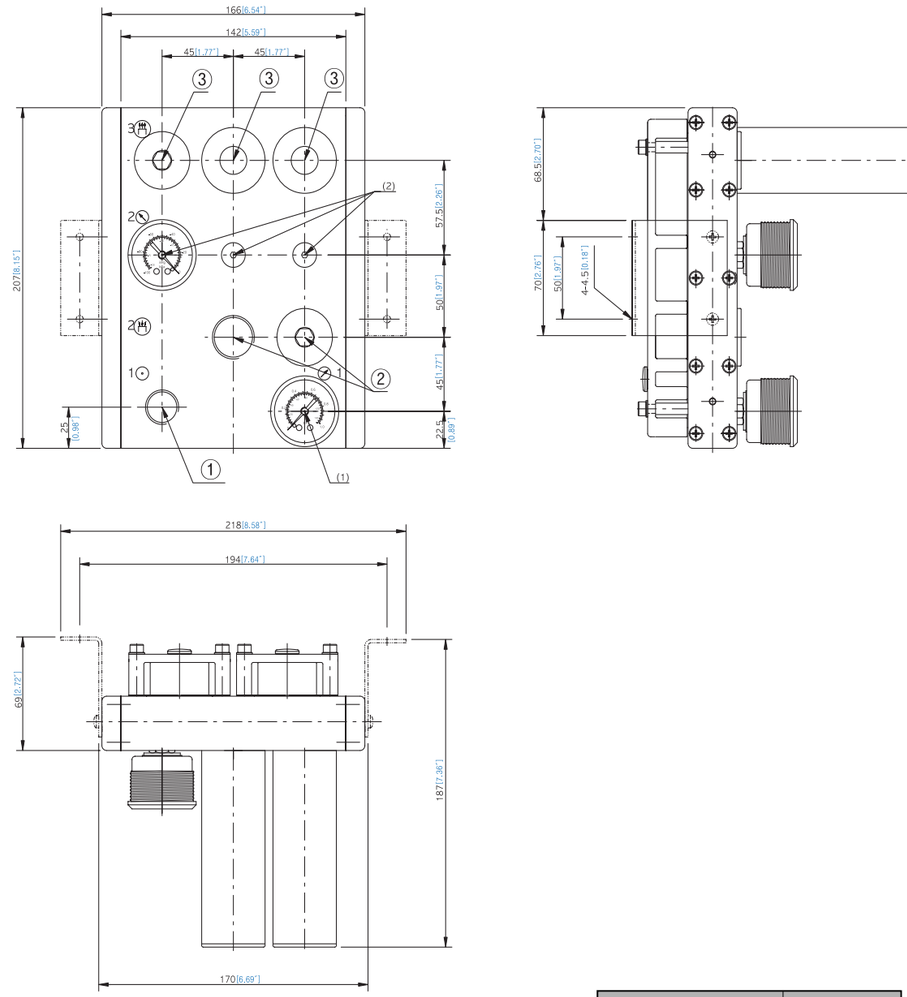
Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)											
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	712.5 28.05 95	746.2 29.38 99.5
T2HX240	1,028 36.299	775 27.366	553 19.527	319 11.264	190 6.709	153 5.403	119 4.202	82 2.895	56.3 1.988	14.8 0.523	2.7 0.095	1.2 0.042
T2HX320	1,512 53.390	1,147 40.501	818 28.884	473 16.702	282 9.958	226 7.980	174 6.144	121 4.273	83.4 2.945	21.8 0.770	3.88 0.137	2.1 0.074
T2HX480	2,023 71.434	1,537 54.273	1,099 38.806	624 22.034	299 10.558	254 8.969	211 7.451	139 4.908	101 3.566	28 0.989	5.7 0.201	3.6 0.127

Time to evacuate a volume (sec/ ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ ℓ) (sec/cf)											
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	712.5 28.05 95	746.2 29.38 99.5
T2HX240	0	0.007 0.198	0.016 0.455	0.032 0.896	0.068 1.918	0.140 3.948	0.180 5.004	0.290 8.004	0.380 10.716	0.680 19.278	1.120 31.360	2.420 68.486
T2HX320	0	0.005 0.142	0.013 0.370	0.026 0.728	0.043 1.213	0.089 2.510	0.105 2.919	0.230 6.348	0.290 8.178	0.500 14.175	0.840 23.520	1.780 50.374
T2HX480	0	0.004 0.113	0.009 0.256	0.020 0.560	0.038 1.072	0.060 1.692	0.080 2.224	0.140 3.864	0.190 5.358	0.390 11.057	0.580 16.240	1.240 35.092

T2HX

Metric (mm) U.S. Imperial (inches)



① Compressed air - G 1/2″
② Vacuum - 2 x G 3/4″
③ Exhaust - 3 x G 3/4″

(1) NPSF 1/8″
(2) NPSF 1/8″

Pump Model	(Y)
T2HX-240	X
T2HX-320	X
T2HX-480	X+20

Specifications subject to change without notice.

12) T2ML-D1/D2 (U): Low Vacuum Unification Type

Air-driven vacuum pump with ML type of multi-stage nozzle, put together on the large integrated aluminum connection plate to realize a large size of vacuum pump of low vacuum & high flow.
This product has a large size of vacuum and exhaust port (G 1 1/2″ ~ G 2″) and high momentary speed of suction, therefore, this is suitable for vacuum conveyor or vacuum holding use.
If you apply this product to the system to be designed in the field of vacuum conveying or holding, you can get maximum efficiency. Also Energy Saving Kit can be equipped.

▶ **Use of Application –** vacuum conveyor, vacuum lifting device, vacuum holding, vacuum filling, vacuum bearing, etc.

Performance and Specification Outline

T2ML Series	T2ML-D1	T2ML-D2
Max. Vacuum Level	Max. 562.64 (mmHgG) Max. −22.15 (inHg) Max. −75 (kPa)	Max. 562.64 (mmHgG) Max. −22.15 (inHg) Max. −75 (kPa)
Max. Vacuum Flow	Max. 3,910 (ℓ/min) Max. 138.065 (scfm)	Max. 11,800 (ℓ/min) Max. 416.667 (scfm)
Supply Air Condition	Compressed Air	Compressed Air
Supply Air Pressure	3.33~5.49 (bar) 3.4~5.6 (kg.f/cm²) 48.36~79.65 (psi)	3.33~5.49 (bar) 3.4~5.6 (kg.f/cm²) 48.36~79.65 (psi)
Working Temperature	−20℃~+80℃ −4°F~+176°F	−20℃~+80℃ −4°F~+176°F
Noise Level	65~70 dBA	65~70 dBA

Ordering information

①	②	③	④	⑤
T2ML	D1	100	E.S	N
		⋮		
T2ML	D2	800	E.S	N

① Basic Model

T2ML : Low vacuum (−75 kpa) – medium & large integrated

② Pumps Arrangement

-D1 : 1(one) column multi array (100, 150, 200, 300)
-D2 : 2(two) column multi array (100, 150, 200, 300, 400, 600, 800)

③ Pump's Size: classified by max. vacuum flow

100	Max. 1,288 (N ℓ/min)	Max. 45.480 (scfm)
150	Max. 1,920 (N ℓ/min)	Max. 67.797 (scfm)
200	Max. 2,650 (N ℓ/min)	Max. 93.573 (scfm)
300	Max. 3,910 (N ℓ/min)	Max. 138.065 (scfm)
400	Max. 5,360 (N ℓ/min)	Max. 189.266 (scfm)
600	Max. 7,944 (N ℓ/min)	Max. 280.508 (scfm)
800	Max. 11,800 (N ℓ/min)	Max. 416.667 (scfm)

④ Energy Saving Kit

-None : Not equipped with Energy Saving Kit

-E.S : To save air consumption, it is combined with vacuum valve, vacuum switch, and pneumatic valve (about 38% of air consumption's saving effect)

⑤ Material of Check V/V & Seal Kit's

-None : the same with "N"

N	Nitrile	Hexane, petrol, Me Hanel Resistible	For details, pls. refer to Chemical Resistance Data (on page 204)
V	Viton	C_4H_{10}, Xylene, C_6H_6 Resistible	
E	EPDM	O3. Ammonia, Ethane Resistible	

T2ML-D1: High Flow Low Vacuum Level Type

Characteristics / Low Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ /min) (scfm)	Air Consumption (N ℓ /min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (∅)		
						Air In-put (inches)	Vacuum (inches)	Exhaust (inches)
T2ML-D1-100	562.5 22.15 75	1,288 45.480	360~425 12.712~15.007	68	3,000 105.81	G 1/2″	G 1 1/2″	G 1 1/2″
T2ML-D1-150	562.5 22.15 75	1,920 67.797	536~630 18.927~22.246	68	3,600 126.972	G 1/2″	G 1 1/2″	G 1 1/2″
T2ML-D1-200	562.5 22.15 75	2,650 93.573	720~848 25.424~29.944	70	4,200 148.134	G 1/2″	G 1 1/2″	G 1 1/2″
T2ML-D1-300	562.5 22.15 75	3,910 138.065	1,100~1,298 38.842~45.833	70	5,300 186.931	G 1/2″	G 1 1/2″	G 1 1/2″

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)								
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	562.64 22.15 75
T2ML-D1-100	1,288 45.480	1,082 38.206	764 26.977	371 13.100	194 6.850	143 5.049	95 3.355	54 1.907	23 0.812
T2ML-D1-150	1,920 67.797	1,550 54.732	1,118 39.477	519 18.326	273 9.640	206 7.274	142 5.014	77 2.719	33 1.165
T2ML-D1-200	2,650 93.573	1,812 63.983	1,248 44.068	628 22.175	314 11.088	260 9.181	171 6.038	99 3.496	47 1.660
T2ML-D1-300	3,910 138.065	2,270 80.155	1,721 60.770	788 27.825	509 17.973	399 14.089	328 11.582	152 5.367	69 2.436

T2ML-D2: High Flow Low Vacuum Level Type

Characteristics / Low Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ /min) (scfm)	Air Consumption (N ℓ /min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (∅)		
						Air In-put (mm) (inches)	Vacuum (inches)	Exhaust (inches)
T2ML-D2-100	562.5 22.15 75	1,288 45.480	360~425 12.712~15.007	68	3,100 109.337	G 1/2″	G 1 1/2″	G 1 1/2″
T2ML-D2-150	562.5 22.15 75	1,920 67.797	536~630 18.927~22.246	68	3,600 126.972	G 1/2″	G 1 1/2″	G 1 1/2″
T2ML-D2-200	562.5 22.15 75	2,650 93.573	720~848 25.424~29.944	70	4,200 148.134	G 1/2″	G 1 1/2″	G 1 1/2″
T2ML-D2-300	562.5 22.15 75	3,910 138.065	1,100~1,298 38.842~45.833	70	5,300 186.931	G 1/2″	G 1 1/2″	G 1 1/2″
T2ML-D2-400	562.5 22.15 75	5,360 189.266	1,500~1,770 52.966~62.500	72	6,400 225.728	G 1/2″	G 1 1/2″	G 1 1/2″
T2ML-D2-600	562.5 22.15 75	7,944 280.508	2,200~2,620 77.684~92.514	72	8,600 303.322	G 3/4″	G 2″	G 2″
T2ML-D2-800	562.5 22.15 75	11,800 416.667	3,310~3,890 116.879~137.359	74	10,800 380.916	G 3/4″	G 2″	G 2″

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)								
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	562.64 22.15 75
T2ML-D2-100	1,288 45.480	1,082 38.206	764 26.977	371 13.100	194 6.850	143 5.049	95 3.355	54 1.907	23 0.812
T2ML-D2-150	1,920 67.797	1,550 54.732	1,118 39.477	519 18.326	273 9.640	206 7.274	142 5.014	77 2.719	33 1.165
T2ML-D2-200	2,650 93.573	1,812 63.983	1,248 44.068	628 22.175	314 11.088	260 9.181	171 6.038	99 3.496	47 1.660
T2ML-D2-300	3,910 138.065	2,270 80.155	1,721 60.770	788 27.825	509 17.973	399 14.089	328 11.582	152 5.367	69 2.436
T2ML-D2-400	5,360 189.266	3,700 130.650	2,484 87.712	1,278 45.127	628 22.175	477 16.843	318 11.229	174 6.144	85 3.001
T2ML-D2-600	7,944 280.508	5,114 180.579	3,790 133.828	1,738 61.370	987 34.852	856 30.226	419 14.795	247 8.722	104 3.672
T2ML-D2-800	11,800 416.667	7,340 259.181	4,960 175.141	2,570 90.749	1,148 40.537	929 32.804	619 21.857	334 11.794	157 5.544

Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)								
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	563 22.15 75
T2ML-D1-100	0	0.007 0.198	0.016 0.455	0.032 0.896	0.060 1.692	0.100 2.820	0.150 4.170	0.200 5.520	0.220 6.204
T2ML-D1-150	0	0.005 0.142	0.013 0.370	0.024 0.672	0.050 1.440	0.080 2.256	0.110 3.058	0.170 4.692	0.185 5.217
T2ML-D1-200	0	0.004 0.113	0.009 0.256	0.010 0.280	0.040 1.128	0.060 1.692	0.070 1.946	0.130 3.588	0.150 4.230
T2ML-D1-300	0	0.003 0.085	0.008 0.228	0.016 0.448	0.025 0.705	0.030 0.846	0.065 1.807	0.090 2.484	0.100 2.820

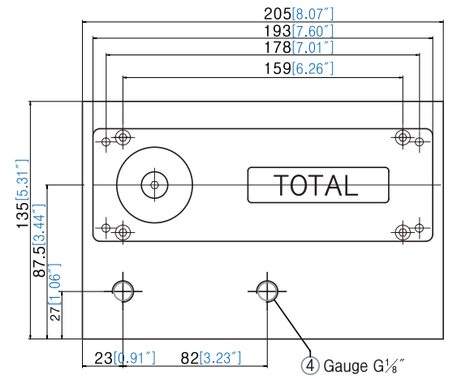
Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

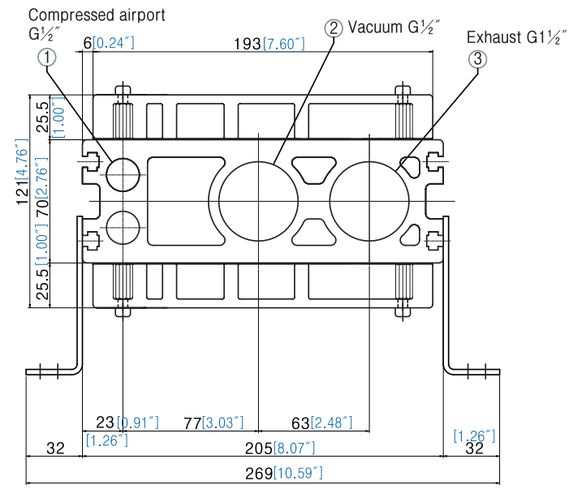
Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)								
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	563 22.15 75
T2ML-D2-100	0	0.006 0.170	0.010 0.285	0.028 0.784	0.050 1.410	0.090 2.538	0.140 3.892	0.190 5.244	0.200 5.640
T2ML-D2-150	0	0.005 0.142	0.013 0.370	0.024 0.672	0.045 1.269	0.070 1.974	0.100 2.780	0.160 4.416	0.180 5.076
T2ML-D2-200	0	0.004 0.113	0.009 0.256	0.018 0.504	0.040 1.128	0.060 1.692	0.080 2.224	0.120 3.312	0.140 3.948
T2ML-D2-300	0	0.003 0.085	0.008 0.228	0.014 0.392	0.020 0.564	0.030 0.846	0.060 1.668	0.080 2.208	0.009 2.538
T2ML-D2-400	0	0.002 0.057	0.004 0.114	0.007 0.196	0.014 0.395	0.030 0.846	0.050 1.390	0.073 2.015	0.008 2.256
T2ML-D2-600	0	0.002 0.057	0.003 0.085	0.005 0.140	0.011 0.310	0.022 0.620	0.038 1.056	0.059 1.628	0.006 1.692
T2ML-D2-800	0	0.001 0.028	0.002 0.057	0.004 0.112	0.008 0.226	0.014 0.395	0.025 0.695	0.040 1.104	0.046 1.297

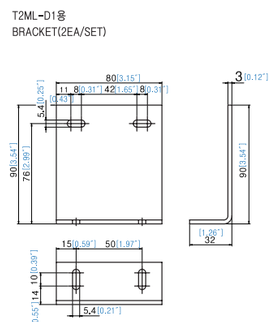
T2ML-D1-100

Dimension

Metric (mm) U.S. Imperial (inches)







① Compressed air : G ½" (15A)
② Vacuum : G 1½" (40A)
③ Exhaust : G 1½" (40A)
④ Vacuum Gauge port : G ⅛"

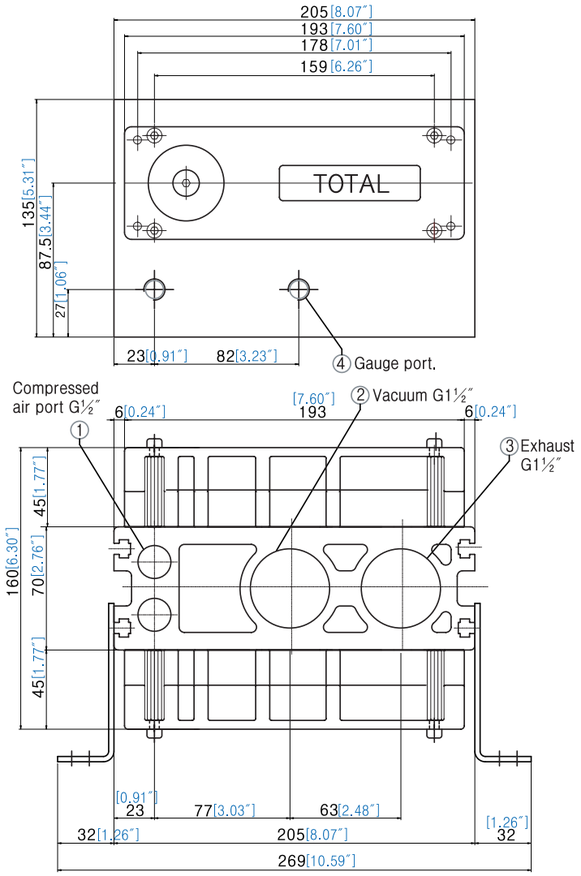
Pump Model	(Y)
T2ML-D1-100	121 [4.76"]
T2ML-D1-150	160 [6.30"]
T2ML-D1-200	160 [6.30"]
T2ML-D1-300	211 [8.31"]

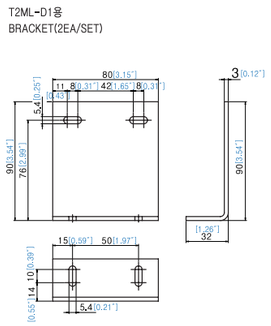
Specifications subject to change without notice.

T2ML-D1-200

Dimension

Metric(mm) U.S. Imperial(inches)





① Compressed air : G ½" (15A)
② Vacuum : G 1½" (40A)
③ Exhaust : G 1½" (40A)
④ Vacuum Gauge Port : G ⅛"
⑤ Pneumatic Gauge port : G ⅛"

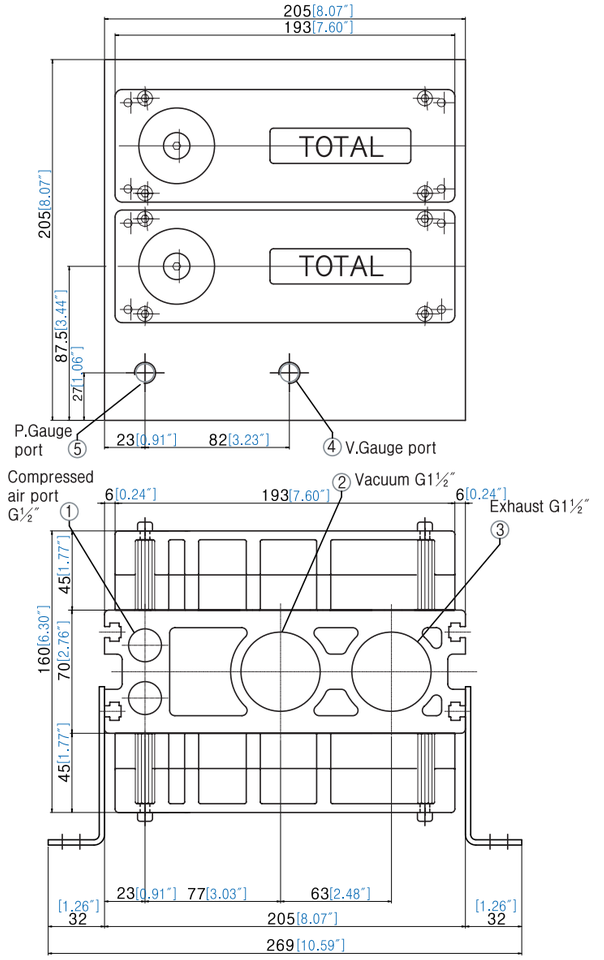
Pump Model	(Y)
T2ML-D1-100	121 [4.76"]
T2ML-D1-150	160 [6.30"]
T2ML-D1-200	160 [6.30"]
T2ML-D1-300	211 [8.31"]

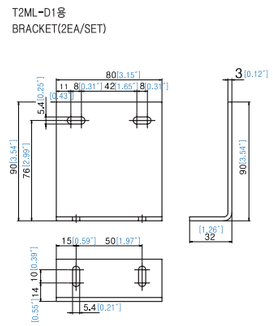
Specifications subject to change without notice.

T2ML-D2-400

Dimension

Metric(mm) U.S. Imperial(inches)





① Compressed air : G ½"
② Vacuum : G 1½"
③ Exhaust : G 1½"
④ Vacuum Gauge port : G ⅛"
⑤ Pneumatic Gauge port : G ⅛"

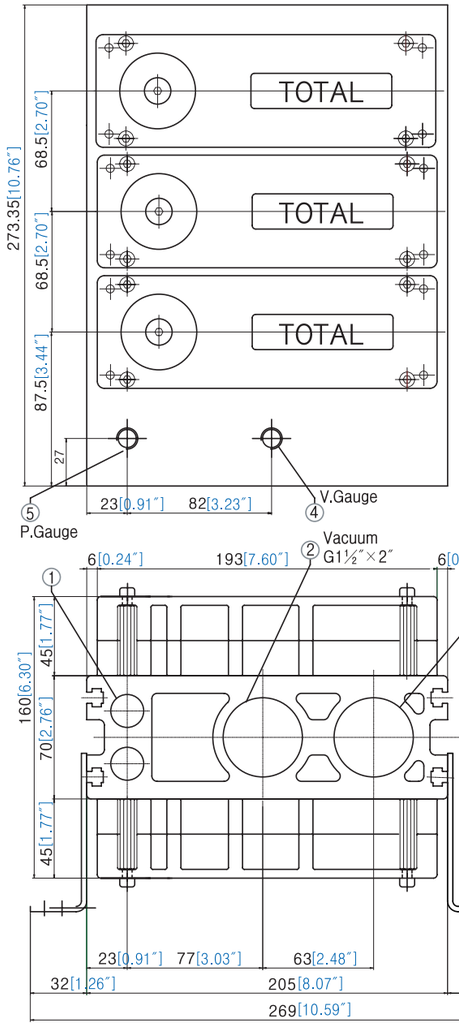
Pump Model	(Y)
T2ML-D2-200	121 [4.76"]
T2ML-D2-300	160 [6.30"]
T2ML-D2-400	160 [6.30"]

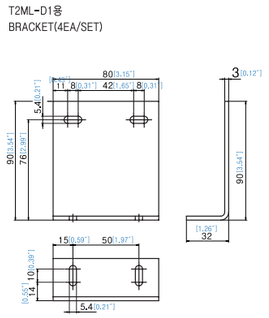
Specifications subject to change without notice.

T2ML-D2-600

Dimension

Metric(mm) U.S. Imperial(inches)





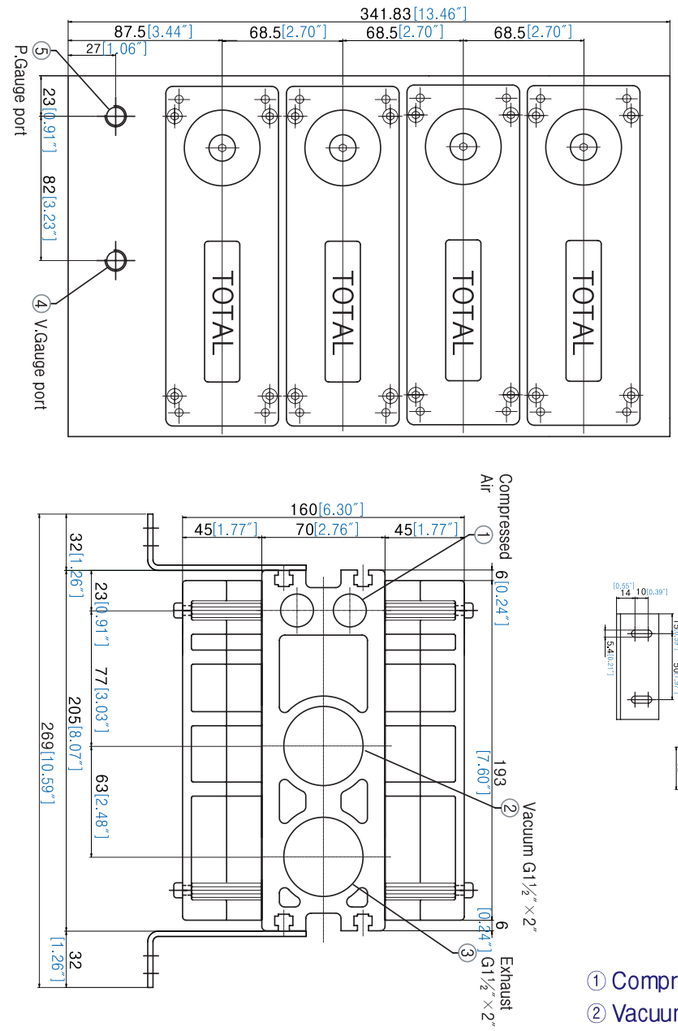
① Compressed air : G ½″ × ¾″
② Vacuum : G 1½″ × 2″
③ Exhaust : G 1½″ × 2″
④ Vacuum Gauge port : G ⅛″
⑤ Pneumatic Gauge port : G ⅛″

Specifications subject to change without notice.

T2ML-D2-800

Dimension

Metric(mm) U.S. Imperial(inches)

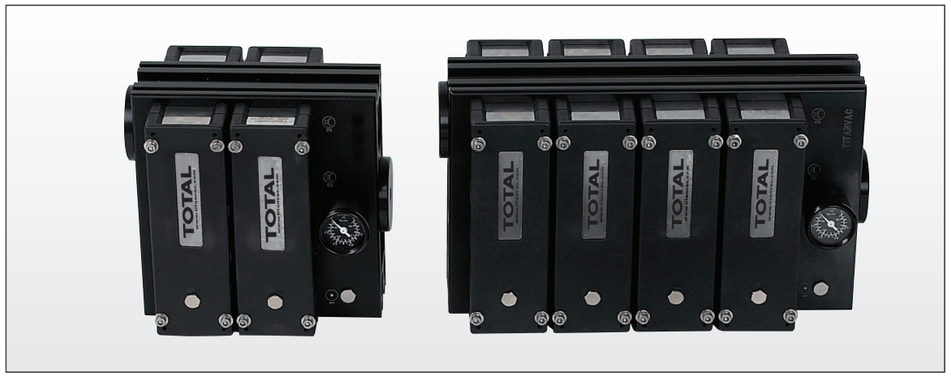


① Compressed air : G ½″ × ¾″
② Vacuum : G 1½″ × 2″
③ Exhaust : G 1½″ × 2″
④ Vacuum Gauge port : G ⅛″
⑤ Pneumatic Gauge port : G ⅛″

Specifications subject to change without notice.

13) T2MM-D1/D2 (U): Normal Medium Vacuum Unification Type

Air-driven vacuum pump with MM type of multi-stage nozzle, put together on the large of integrated aluminum connection plate to realize various vacuum flows from the medium size of vacuum pump to the large size of vacuum pump. For having the large size of vacuum and exhaust port (G 1 1/2″), this product can replace the large size of electric motor driven vacuum pumps and can also be equipped with Energy Saving Kit to save air consumption. With various vacuum & pressure switches, this enables you to design various vacuum automation system with PLC and RELAY.



Performance and Specification Outline

T2MM Series	T2MM-D1	T2MM-D2
Max. Vacuum Level	Max. 682.67 (mmHgG) Max. -26.88 (inHg) Max. -91 (kPa)	Max. 682.67 (mmHgG) Max. -26.88 (inHg) Max. -91 (kPa)
Max. Vacuum Flow	Max. 3,680 (N ℓ/min) Max. 129.944 (scfm)	Max. 10,600 (N ℓ/min) Max. 374.294 (scfm)
Supply Air Condition	Compressed Air	Compressed Air
Supply Air Pressure	3.33~5.69 (bar) 3.4~5.8 (kg.f/cm²) 48.36~82.50 (psi)	3.33~5.69 (bar) 3.4~5.8 (kg.f/cm²) 48.36~82.50 (psi)
Working Temperature	-20℃~+80℃ -4°F~+176°F	-20℃~+80℃ -4°F~+176°F
Noise Level	67~72 dBA	67~72 dBA

Ordering information

①	②	③	④	⑤
T2MM	D1	100	E.S	N
		⋮		
T2MM	D2	800	E.S	N

① Basic Model

T2MM: Medium vacuum (-91 kpa) - medium & large integrated

② Pumps Arrangement

-D1 : 1(one) column multi array (100, 150, 200, 300)
-D2 : 2(two) column multi array (100, 150, 200, 300, 400, 600, 800)

③ Pump's Size: classified by max. vacuum flow

100	Max. 1,240 (N ℓ/min)	Max. 43.785 (scfm)
150	Max. 1,800 (N ℓ/min)	Max. 63.559 (scfm)
200	Max. 2,490 (N ℓ/min)	Max. 87.924 (scfm)
300	Max. 3,680 (N ℓ/min)	Max. 129.944 (scfm)
400	Max. 5,180 (N ℓ/min)	Max. 182.910 (scfm)
600	Max. 7,800 (N ℓ/min)	Max. 275.424 (scfm)
800	Max. 10,600 (N ℓ/min)	Max. 374.294 (scfm)

cf. This is based on vacuum flow possible producing 500, 700

④ Energy Saving Kit

-None: Not equipped with Energy Saving Kit
-E.S: To save air consumption, it is combined with vacuum valve, vacuum switch, and pneumatic valve (about 38% of air consumption's saving effect)

⑤ Material of Check V/V, Seal Kit's

-None: the same with "N"

N	Nitrile	Hexane, petrol, Me Hanel Resistible	For details, pls. refer to Chemical Resistance Data (on page 204)
V	Viton	C_4H_{10}, Xylene, C_6H_6 Resistible	
E	EPDM	O3. Ammonia, Ethane Resistible	

T2MM-D1:
Normal Medium Vacuum Unification Type

Characteristics / Medium Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ /min) (scfm)	Air Consumption (N ℓ /min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (inches)	Vacuum (inches)	Exhaust (inches)
T2MM-D1-100	682.5 26.87 91.00	1,240 43.785	290~413 10.240~14.583	68	3,100 109.337	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D1-150		1,800 63.559	458~610 16.172~21.540	68	3,600 126.972	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D1-200		2,490 87.924	620~828 21.893~29.237	70	4,200 148.134	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D1-300		3,680 129.944	916~1,224 32.345~43.220	71	5,300 186.931	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D1-400		5,180 182.910	1,280~1,710 45.198~60.381	72	6,400 225.728	G 1/2″	G 1 1/2″	G 1 1/2″

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
T2MM-D1-100	1,240 43.785	1,082 38.206	764 26.977	370 13.065	193 6.815	140 4.944	95 3.355	54 1.907	23 0.812	3.3 0.117
T2MM-D1-150	1,800 63.559	1,496 52.825	1,120 39.548	515 18.185	272 9.605	206 7.274	140 4.944	75 2.648	30 1.059	4.5 0.159
T2MM-D1-200	2,490 87.924	1,810 63.912	1,238 43.715	630 22.246	322 11.370	266 9.393	165 5.826	96 3.390	44 1.554	6.3 0.222
T2MM-D1-300	3,680 129.944	2,140 75.565	1,680 59.322	780 27.542	510 18.008	387 13.665	295 10.417	142 5.014	52 1.836	9.8 0.346
T2MM-D1-400	5,180 182.910	3,555 125.530	2,390 84.393	1,188 41.949	634 22.387	466 16.455	318 11.229	179 6.321	75 2.648	14.2 0.501

T2MM-D2:
Normal Medium Vacuum Unification Type

Characteristics / Medium Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ /min) (scfm)	Air Consumption (N ℓ /min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (inches)	Vacuum (inches)	Exhaust (inches)
T2MM-D2-100	682.5 26.87 91.00	1,240 43.785	290~413 10.240~14.583	68	3,100 109.337	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D2-150		1,800 63.559	458~610 16.172~21.540	68	3,600 126.972	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D2-200		2,490 87.924	620~828 21.893~29.237	70	4,200 148.134	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D2-300		3,680 129.944	916~1,224 32.345~43.220	71	5,300 186.931	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D2-400		5,180 182.910	1,280~1,710 45.198~60.381	72	6,400 225.728	G 1/2″	G 1 1/2″	G 1 1/2″
T2MM-D2-600		7,800 275.424	1,816~2,580 64.124~91.102	74	8,600 303.322	G 1/2″ x G3/4″	G 1/2″ x G2″	G 1 1/2″ x G2″
T2MM-D2-800		10,600 374.294	2,610~3,500 92.161~123.588	74	10,800 380.916	G 1/2″ x G3/4″	G 1/2″ x G2″	G 1 1/2″ x G2″

Vacuum flow in (N ℓ /min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ /min) (scfm)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
T2MM-D2-100	1,240 43.785	1,082 38.206	764 26.977	370 13.065	193 6.815	140 4.944	95 3.355	54 1.907	23 0.812	3.3 0.117
T2MM-D2-150	1,800 63.559	1,496 52.825	1,120 39.548	515 18.185	272 9.605	206 7.274	140 4.944	75 2.648	30 1.059	4.5 0.159
T2MM-D2-200	2,490 87.924	1,810 63.912	1,238 43.715	630 22.246	322 11.370	266 9.393	165 5.826	96 3.390	44 1.554	6.3 0.222
T2MM-D2-300	3,680 129.944	2,140 75.565	1,680 59.322	780 27.542	510 18.008	387 13.665	295 10.417	142 5.014	52 1.836	9.8 0.346
T2MM-D2-400	5,180 182.910	3,555 125.530	2,390 84.393	1,188 41.949	634 22.387	466 16.455	318 11.229	179 6.321	75 2.648	14.2 0.501
T2MM-D2-600	7,800 275.424	5,400 190.678	3,592 126.836	1,844 65.113	947 33.439	683 24.117	457 16.137	254 8.969	116 4.096	20.5 0.724
T2MM-D2-800	10,600 374.294	7,410 261.653	4,780 168.785	2,515 88.806	1,282 45.268	912 32.203	608 21.469	328 11.582	159 5.614	26.4 0.932

T2MM-D1

Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
T2MM-D1-100	0	0.008 0.226	0.018 0.512	0.032 0.896	0.060 1.692	0.090 2.538	0.160 4.448	0.190 5.244	0.490 13.818	0.990 28.067
T2MM-D1-150	0	0.005 0.142	0.013 0.370	0.017 0.476	0.042 1.184	0.074 2.087	0.124 3.447	0.208 5.741	0.370 10.434	0.868 24.608
T2MM-D1-200	0	0.004 0.113	0.011 0.313	0.021 0.588	0.032 0.902	0.060 1.692	0.094 2.613	0.159 4.388	0.281 7.924	0.679 19.250
T2MM-D1-300	0	0.003 0.085	0.008 0.228	0.016 0.448	0.027 0.761	0.040 1.128	0.066 1.835	0.090 2.484	0.180 5.076	0.340 9.639
T2MM-D1-400	0	0.002 0.057	0.006 0.171	0.009 0.252	0.018 0.508	0.031 0.874	0.048 1.334	0.080 2.208	0.090 2.538	0.280 7.938

T2MM-D2

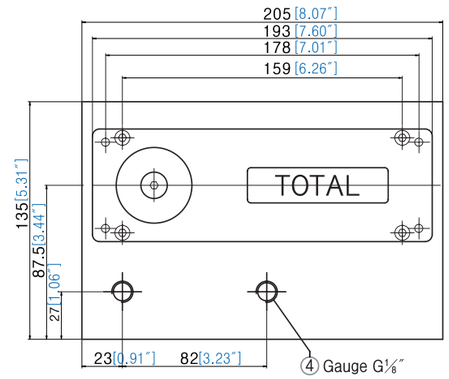
Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

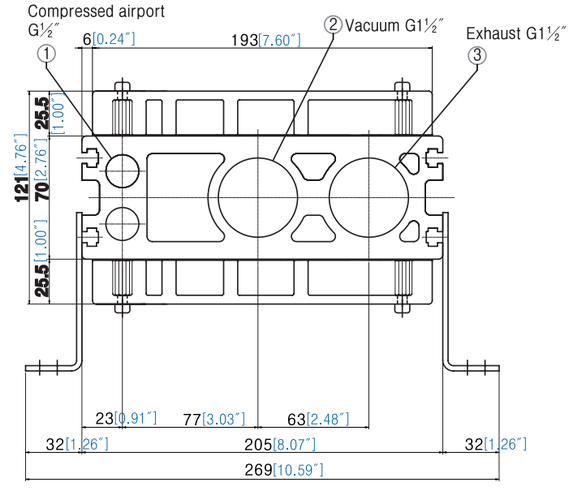
Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)									
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90
T2MM-D2-100	0	0.007 0.198	0.018 0.512	0.030 0.840	0.060 1.692	0.090 2.538	0.165 4.587	0.190 5.244	0.490 13.818	0.990 28.067
T2MM-D2-150	0	0.005 0.142	0.013 0.370	0.017 0.476	0.042 1.184	0.074 2.087	0.124 3.447	0.206 5.686	0.368 10.378	0.854 24.211
T2MM-D2-200	0	0.002 0.057	0.006 0.171	0.012 0.336	0.031 0.874	0.058 1.636	0.094 2.613	0.153 4.223	0.280 7.896	0.780 22.113
T2MM-D2-300	0	0.002 0.056	0.005 0.142	0.016 0.448	0.025 0.705	0.039 1.100	0.065 1.807	0.086 2.374	0.140 3.948	0.740 20.979
T2MM-D2-400	0	0.001 0.028	0.003 0.085	0.008 0.224	0.017 0.479	0.029 0.818	0.046 1.279	0.070 1.932	0.119 3.356	0.684 19.391
T2MM-D2-600	0	0.001 0.027	0.003 0.084	0.006 0.168	0.012 0.338	0.021 0.592	0.034 0.945	0.058 1.601	0.105 2.961	0.622 17.634
T2MM-D2-800	0	0.001 0.028	0.002 0.057	0.005 0.140	0.009 0.254	0.015 0.423	0.024 0.667	0.038 1.049	0.070 1.974	0.488 13.835

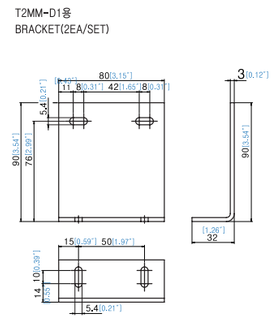
T2MM-D1-100

Dimension

Metric(mm) U.S. Imperial(inches)







① Compressed air : G ½" (15A)
② Vacuum : G 1½" (40A)
③ Exhaust : G 1½" (40A)
④ Vacuum Gauge port : G ⅛"

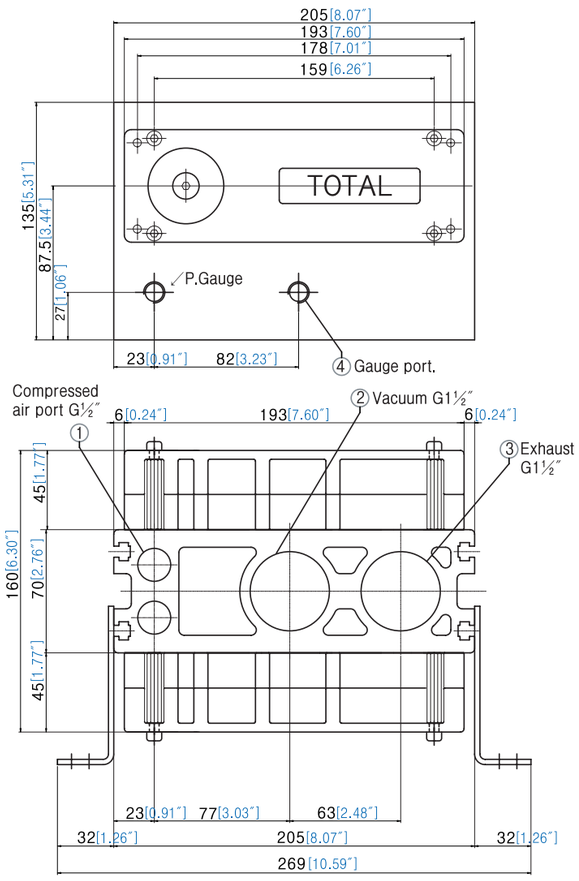
Pump Model	(Y)
T2MM-D1-100	121 [4.76"]
T2MM-D1-150	160 [6.30"]
T2MM-D1-200	160 [6.30"]
T2MM-D1-300	211 [8.31"]

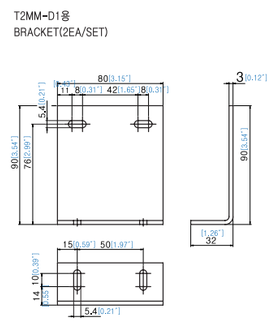
Specifications subject to change without notice.

T2MM-D1-200

Dimension

Metric(mm) U.S. Imperial(inches)





① Compressed air : G ½" (15A)
② Vacuum : G 1½" (40A)
③ Exhaust : G 1½" (40A)
④ Vacuum Gauge port : G ⅛"
⑤ Pneumatic Gauge port : G ⅛"

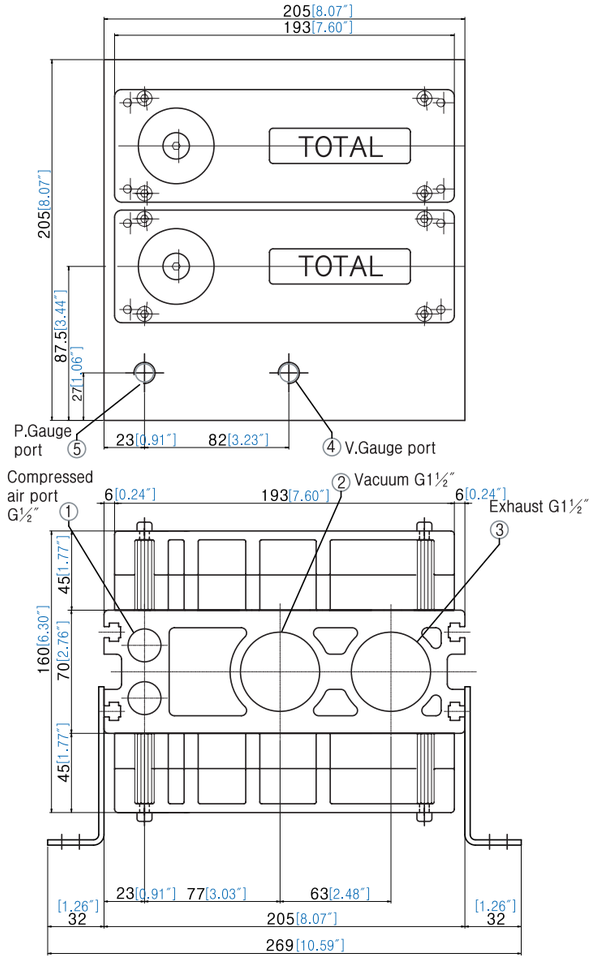
Pump Model	(Y)
T2MM-D1-100	121 [4.76"]
T2MM-D1-150	160 [6.30"]
T2MM-D1-200	160 [6.30"]
T2MM-D1-300	211 [8.31"]

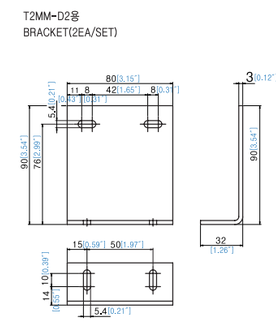
Specifications subject to change without notice.

T2MM-D2-400

Dimension

Metric(mm) U.S. Imperial(inches)





① Compressed air : G ½"
② Vacuum : G 1½"
③ Exhaust : G 1½"
④ Vacuum Gauge port : G ⅛"
⑤ Pneumatic Gauge port : G ⅛"

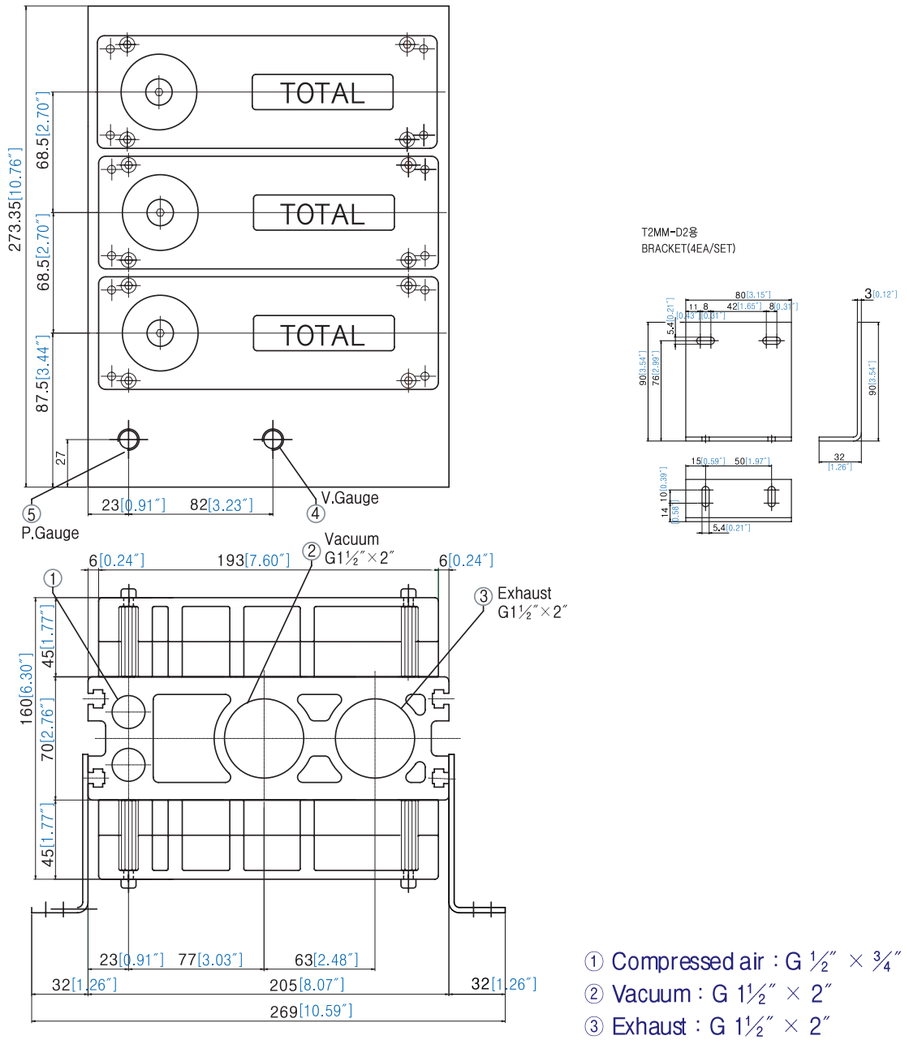
Pump Model	(Y)
T2MM-D2-200	121 [4.76"]
T2MM-D2-300	160 [6.30"]
T2MM-D2-400	160 [6.30"]

Specifications subject to change without notice.

T2MM-D2-600

Dimension

Metric(mm) U.S. Imperial(inches)



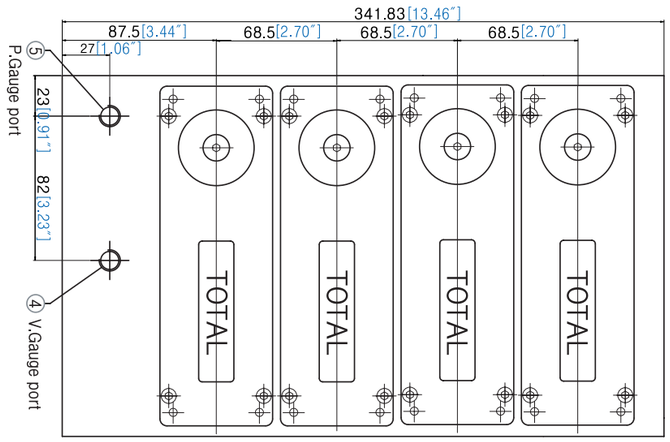
① Compressed air : G ½″ × ¾″
② Vacuum : G 1½″ × 2″
③ Exhaust : G 1½″ × 2″
④ Vacuum Gauge port : G ⅛″
⑤ Pneumatic Gauge port : G ⅛″

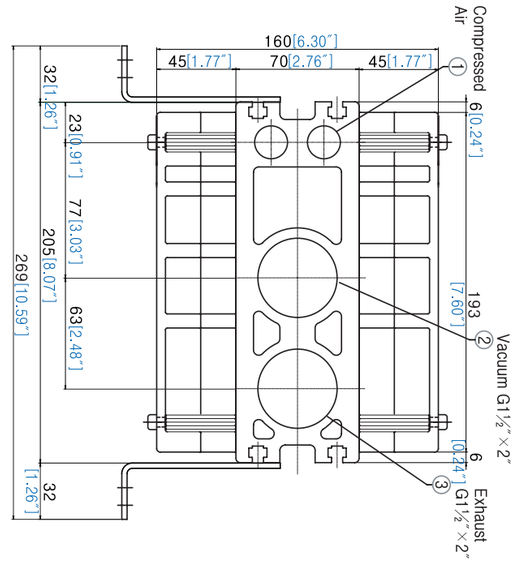
Specifications subject to change without notice.

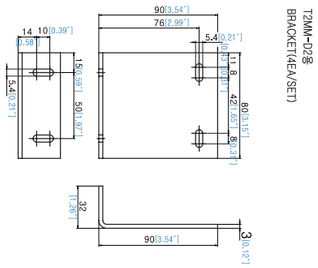
T2MM-D2-800

Dimension

Metric(mm) U.S. Imperial(inches)





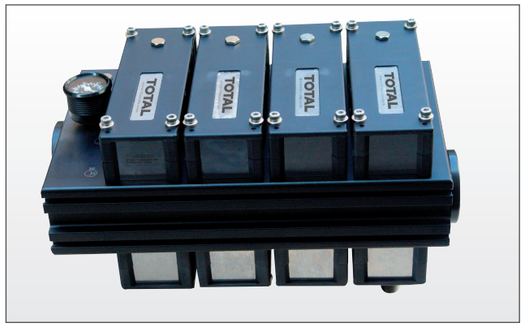


① Compressed air : G ½″ × ¾″
② Vacuum : G 1½″ × 2″
③ Exhaust : G 1½″ × 2″
④ Vacuum Gauge port : G ⅛″
⑤ Pneumatic Gauge port : G ⅛″

Specifications subject to change without notice.

14) T2MX-D1/D2 (U): Extra Vacuum Unification Type

Air-driven vacuum pump with MX type of multi-stage nozzle, put together on the large of integrated aluminum connection plate to realize various vacuum flows from the medium size of pumps to the large size of vacuum pumps.
For using MX type's nozzle, this new product can reach up to -96 kPa of vacuum level and can replace the oil lubricated rotary vane vacuum pump.
To increase vacuum flow, it has expanded vacuum port and exhaust port's size. To save air consumption, this product can be equipped with Energy Saving Kit.
With various vacuum & pressure switches, this enables you to design various vacuum automation system with PLC and RELAY.



Performance and Specification Outline

T2MX Series	T2MX-D1	T2MX-D2
Max. Vacuum Level	Max. 720.18 (mmHgG) Max. -28.35 (inHg) Max. -96 (kPa)	Max. 720.18 (mmHgG) Max. -28.35 (inHg) Max. -96 (kPa)
Max. Vacuum Flow	Max. 1,410 (N ℓ/min) Max. 49.788 (scfm)	Max. 3,530 (N ℓ/min) Max. 124.647 (scfm)
Supply Air Condition	Compressed Air	Compressed Air
Supply Air Pressure	4.12~6.08 (bar) 4.2~6.2 (kg.f/cm²) 59.74~88.18 (psi)	4.12~6.08 (bar) 4.2~6.2 (kg.f/cm²) 59.74~88.18 (psi)
Working Temperature	-20℃~+80℃ -4°F~+176°F	-20℃~+80℃ -4°F~+176°F
Noise Level	68~74 dBA	68~74 dBA

Ordering information

①		②		③		④		⑤
T2MX	-	D1	-	60	-	E.S	-	N
				⋮				
T2MX	-	D2	-	600	-	E.S	-	N

① Basic Model

T2MX: Extra vacuum (-96 kpa) - medium & large integrated

② Pump Arrangement

-D1 : 1(one) column multi array (60, 120, 240)
-D2 : 2(two) column multi array (120, 240, 360, 480, 600)

③ Pump's Size: classified by max. vacuum flow

60	Max. 360 (N ℓ/min)	Max. 12.712 (scfm)
120	Max. 714 (N ℓ/min)	Max. 25.212 (scfm)
240	Max. 1,410 (N ℓ/min)	Max. 49.788 (scfm)
360	Max. 2,120 (N ℓ/min)	Max. 74.859 (scfm)
480	Max. 2,820 (N ℓ/min)	Max. 99.576 (scfm)
600	Max. 3,530 (N ℓ/min)	Max. 124.647 (scfm)

④ Energy Saving Kit

-None: Not equipped with Energy Saving Kit
-E.S: To save air consumption, it is combined with vacuum valve, vacuum switch, and pneumatic valve (about 38 % of air consumption's saving effect)

⑤ Material of Check V/V & Seal Kit's

-None: the same with "N"

N	Nitrile	Hexane, petrol, Me Hanel Resistible	For details, pls. refer to Chemical Resistance Data (on page 204)
V	Viton	C_4H_{10}, Xylene, C_6H_6 Resistible	
E	EPDM	O3. Ammonia, Ethane Resistible	

T2MX-D1:
Extra Vacuum Unification Type

Characteristics / Medium Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (inches)	Vacuum (inches)	Exhaust (inches)
T2MX-D1-60	720 28.35 96	360 12.712	246 8.686	65	2,800 98.756	G 1/2″	G 1 1/2″	G 1 1/2″
T2MX-D1-120		714 25.212	489 17.267	65	3,300 116.391	G 1/2″	G 1 1/2″	G 1 1/2″
T2MX-D1-240		1,410 49.788	965 34.075	68	4,200 148.134	G 1/2″	G 1 1/2″	G 1 1/2″

Vacuum flow in (N ℓ/min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ/min) (scfm)											
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	713 28.06 95
T2MX-D1-60	360 12.712	252 8.898	212 7.486	192 6.780	149 5.261	114 4.025	79 2.790	22 0.777	9.3 0.328	7.7 0.272	4.8 0.169
T2MX-D1-120	714 25.212	507 17.903	410 14.477	347 12.253	224 7.910	184 6.497	124 4.379	34 1.201	14.2 0.501	11.6 0.410	7.2 0.254
T2MX-D1-240	1,410 49.788	1,029 36.335	789 27.860	684 24.153	488 17.232	252 8.898	161 5.685	49 1.730	22.9 0.809	16.8 0.593	10.8 0.381

T2MX-D2:
Extra Vacuum Unification Type

Characteristics / Extra Vacuum

Pump Model	Max. Vacuum (mmHg · G) (-inHg) (-kPa)	Max. Vacuum Flow (N ℓ/min) (scfm)	Air Consumption (N ℓ/min) (scfm)	Noise Level (dBA)	Net Weight (g) (oz)	Pipe Arrangement (Ø)		
						Compressed Air (inches)	Vacuum (inches)	Exhaust (inches)
T2MX-D2-120	720 28.35 96	714 25.212	489 17.267	65	3,100 109.337	G 1/2″	G 1 1/2″	G 1 1/2″
T2MX-D2-240		1,410 49.788	965 34.075	68	4,200 148.134	G 1/2″	G 1 1/2″	G 1 1/2″
T2MX-D2-360		2,120 74.859	1,452 51.271	72	5,300 186.931	G 1/2″	G 1 1/2″	G 1 1/2″
T2MX-D2-480		2,820 99.576	1,905 67.267	72	6,400 225.728	G 1/2″ x G3/4″	G 1/2″ x G2″	G 1 1/2″ x G2″
T2MX-D2-600		3,530 124.647	2,385 84.216	74	8,600 303.322	G 1/2″ x G3/4″	G 1/2″ x G2″	G 1 1/2″ x G2″

Vacuum flow in (N ℓ/min) (scfm) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Vacuum Flow (N ℓ/min) (scfm)											
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	713 28.06 95	750 29.53 100
T2MX-D2-120	714 25.212	507 17.903	410 14.477	347 12.253	224 7.910	184 6.497	124 4.379	34 1.201	14.2 0.501	11.6 0.410	7.2 0.254	–
T2MX-D2-240	1,410 49.788	1,029 36.335	789 27.860	684 24.153	488 17.232	252 8.898	161 5.685	49 1.730	22.9 0.809	16.8 0.593	10.8 0.381	–
T2MX-D2-360	2,120 74.859	1,778 62.782	1,210 42.726	742 26.201	614 21.681	448 15.819	276 9.746	72 2.542	36.4 1.285	27 0.953	18.4 0.650	–
T2MX-D2-480	2,820 99.576	2,224 78.531	1,720 60.734	1,045 36.900	905 31.956	829 29.273	515 18.185	134 4.732	69 2.436	49.2 1.737	34.3 1.211	–
T2MX-D2-600	3,530 124.647	2,824 99.718	2,040 72.034	1,227 43.326	1,130 39.901	1,094 38.630	732 25.847	199 7.027	99.8 3.524	72.5 2.560	48.8 1.723	–

T2MX-D1

Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)										
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	720 28.35 96
T2MX-D1-60	0	0.027 0.764	0.040 1.138	0.081 2.268	0.192 5.414	0.143 4.033	0.225 6.255	0.308 8.501	0.422 11.900	0.770 21.830	0.930 26.040
T2MX-D1-120	0	0.009 0.028	0.017 0.484	0.034 0.952	0.109 3.074	0.109 3.074	0.188 5.226	0.268 7.397	0.368 10.378	0.664 18.824	0.840 23.520
T2MX-D1-240	0	0.006 0.170	0.012 0.341	0.012 0.336	0.039 1.100	0.039 1.100	0.117 3.253	0.172 4.747	0.215 6.063	0.398 11.283	0.580 16.240

T2MX-D2

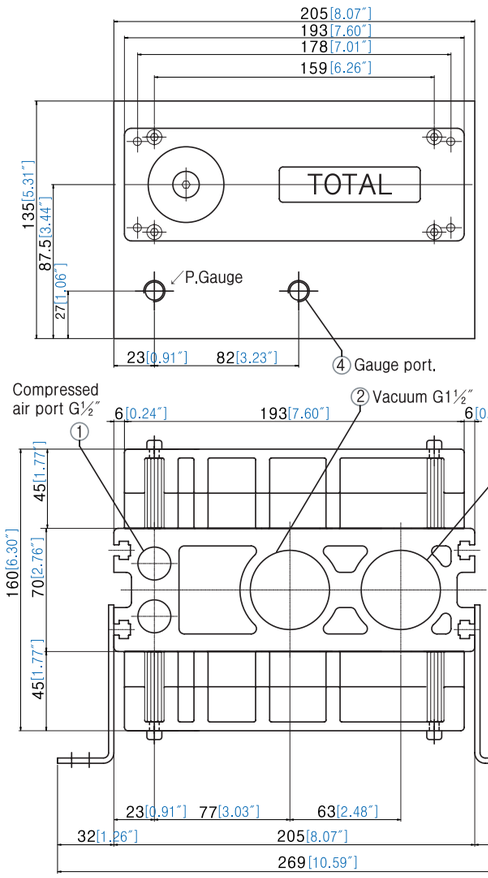
Time to evacuate a volume (sec/ℓ) (sec/cf) at different vacuum levels (mmHg · G) (-inHg) (-kPa)

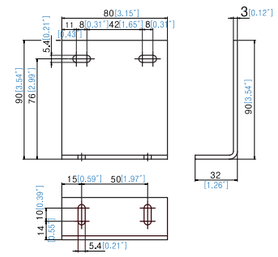
Pump Model \ Vacuum Level	Evacuation Time (sec/ℓ) (sec/cf)										
	0 0 0	75 2.95 10	150 5.91 20	225 8.86 30	300 11.81 40	375 14.76 50	450 17.72 60	525 20.67 70	600 23.62 80	675 26.57 90	720 28.35 96
T2MX-D2-120	0	0.009 0.255	0.018 0.512	0.037 1.036	0.064 1.805	0.118 3.328	0.192 5.338	0.285 7.866	0.389 10.970	0.685 19.420	0.920 25.760
T2MX-D2-240	0	0.007 0.198	0.013 0.370	0.026 0.728	0.048 1.354	0.081 2.284	0.124 3.447	0.190 5.244	0.261 7.360	0.452 12.814	0.642 17.976
T2MX-D2-360	0	0.005 0.142	0.009 0.256	0.016 0.448	0.029 0.818	0.064 1.805	0.088 2.446	0.153 4.223	0.194 5.471	0.324 9.185	0.522 14.616
T2MX-D2-480	0	0.003 0.085	0.007 0.199	0.010 0.280	0.018 0.508	0.055 1.551	0.079 2.196	0.132 3.643	0.168 4.738	0.268 7.598	0.417 11.676
T2MX-D2-600	0	0.003 0.085	0.004 0.114	0.008 0.224	0.014 0.395	0.045 1.269	0.062 1.724	0.115 3.174	0.149 4.202	0.209 5.925	0.325 9.100

T2MX-D1-120

Dimension

Metric (mm) U.S. Imperial (inches)





① Compressed air : G ½" (15A)
② Vacuum : G 1½" (40A)
③ Exhaust : G 1½" (40A)
④ Vacuum Gauge port : G ⅛"
⑤ Pneumatic Gauge port : G ⅛"

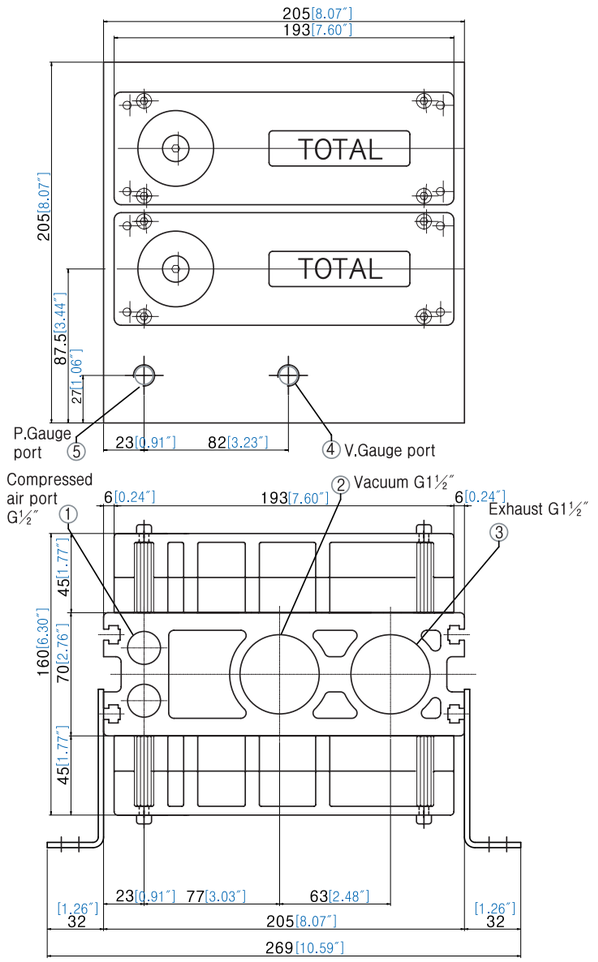
Pump Model	(Y)
T2MX-D2-60	121 [4.76"]
T2MX-D2-120	160 [6.30"]
T2MX-D2-240	250 [9.84"]

Specifications subject to change without notice.

T2MX-D2-240

Dimension

Metric(mm) U.S. Imperial(inches)



① Compressed air : G ½"
② Vacuum : G 1½"
③ Exhaust : G 1½"
④ Vacuum Gauge port : G ⅛"
⑤ Pneumatic Gauge port : G ⅛"

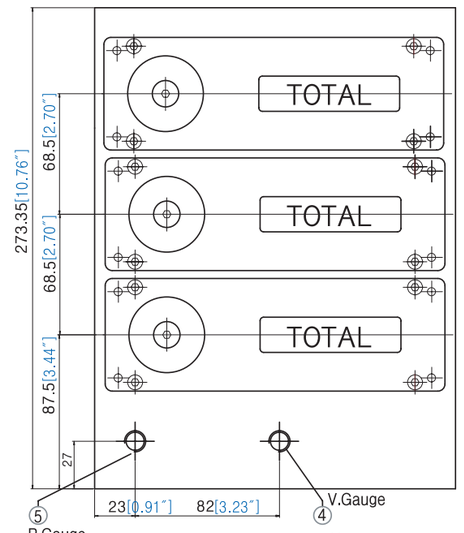
Pump Model	(Y)
T2MX-D2-120	121 [4.76"]
T2MX-D2-240	160 [6.30"]
T2MX-D2-360	223 [8.78"]
T2MX-D2-480	250 [9.84"]

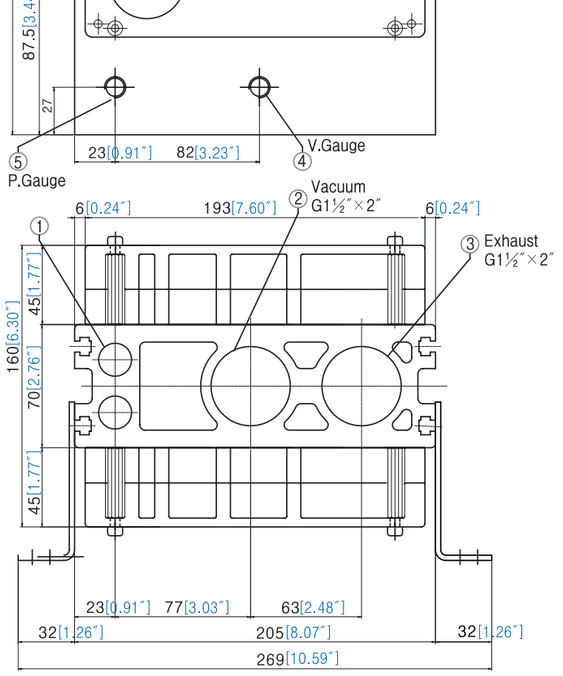
Specifications subject to change without notice.

T2MX-D2-600

Dimension

Metric(mm) U.S. Imperial(inches)





① Compressed air : G ½" x ¾"
② Vacuum : G 1½" x 2"
③ Exhaust : G 1½" x 2"
④ Vacuum Gauge port : G ⅛"
⑤ Pneumatic Gauge port : G ⅛"

Specifications subject to change without notice.

Chap. 4 Suction Cups

1) What's Suction Cup?

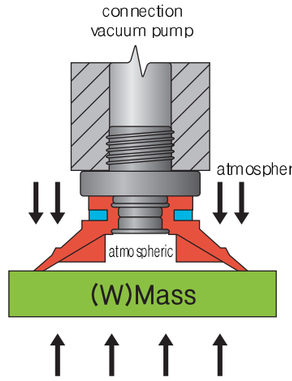
- Suction cups are used to lift or move or change the direction of the various different objects to be handled such as packaging material or parts.
- After connecting suction cup through hose with vacuum generated by TOTAL vacuum ejector, can hold and move the objects to be handled.
- Using suction cup enables you to safely move almost all objects with inexpensive price, based on reliable technology

※ Advantages
- Easy installation
- Easy to maintain
- Does not damage the products
- Low price
- Fast to be equipped
- No 2nd contamination
- Usable in the radioactive area

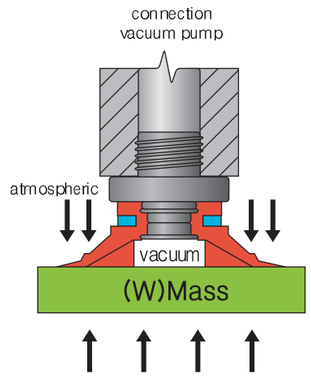
※ Disadvantages
- Having an effect on the different shapes and surfaces of the objects to be handled
- Weak against intended leakage
- Considering positioning in relation to the object's direction and the moment of a force.

2) The Principle of Suction Cup

When internal pressure between the surface of the objects to be handled and suction cup is lower than outside's pressure (atmospheric), that is, vacuum, the atmospheric pressure enables suction cup to hold.



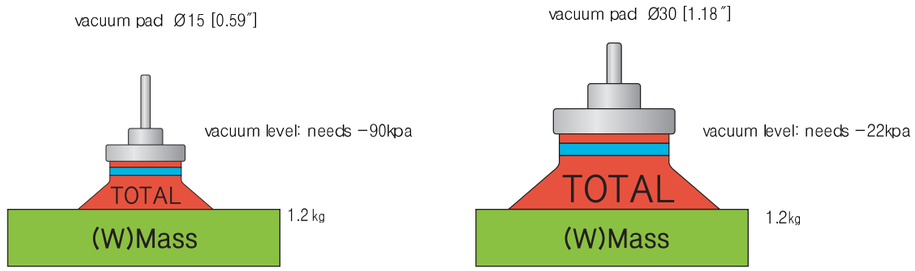
Initial stage



Vacuum pump operating stage

3) Energy Requirements

When using suction cup, it is not necessary to get high vacuum level. To get high vacuum, we will need energy as much as it and see suction cup's weariness.
The most efficient way of consumed energy is to use suction cup area's expanding with appropriate vacuum.
Broadening suction cup's areas makes the efficiency of energy to be 4 times higher than increasing vacuum.



Like this, raising the diameter of suction cup can do the same work by consuming energy a little.

4) Vacuum Pad Size Selection

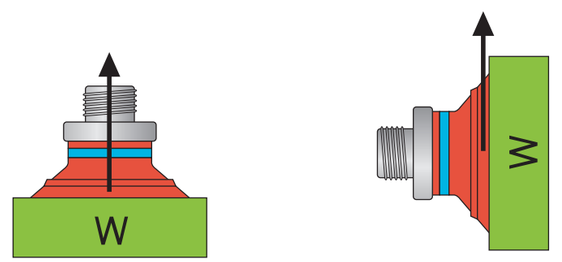
$$D=113\times\sqrt{\frac{m\times n}{u\times s}}$$

D: Diameter of Vacuum Pad
m: Mass (kg)
u: Vacuum Level (−kPa)
n: Safety Factor (≒ 2)
s: Number of Suction Cups

5) Suction Cup's Lifting Force Calculation

$$W=\frac{P}{760}\times s\times t\times(1.033)$$

W: Lifting Force (Kg.f)
P: Vacuum Level (mmHg)
s: The Size of Vacuum Pad (cm^2) / Vacuum Pad Area
t: Perpendicular Safety Factor (1/2)
Parallel / Horizontal Safety Factor (1/4)



perpendicular　　Horizontal

6) General Suction Cup (F, U Type)'s Lifting Force

Diameter of Vacuum Pad (mm)	Lifting Force(kg)-60kpa Vertical force				Lifting Force(kg)-60kpa Horizontal force			
	With Safety Factor (Kg)		Without Safety Factor (Kg)		With Safety Factor (Kg)		Without Safety Factor (Kg)	
	min.	max.	min.	max.	min.	max.	min.	max.
Ø 2-8 [0.08"] [0.31"]	0~0.002	0~0.147	0~0.03	0~0.297	0~0.004	0~0.1	0~0.010	0~0.297
Ø 10-15 [0.39"] [0.59"]	0~0.19	0~0.45	0~0.36	0~0.88	0~0.16	0~0.25	0~0.46	0~0.73
Ø 20-25 [0.79"] [0.98"]	0~0.33	0~1.27	0~0.65	0~2.7	0~0.29	0~0.85	0~0.83	0~2.7
Ø 30-35 [1.18"] [1.38"]	0~0.83	0~2.57	0~1.65	0~5.3	0~0.35	0~1.1	0~1.2	0~3.28
Ø 40 [1.57"]	0~1.14	0~3.1	0~2.26	0~5.83	0~0.76	0~1.68	0~2.26	0~5.2
Ø 50-60 [1.97"] [2.36"]	0~2.21	0~7.67	0~4.40	0~15.5	0~1.27	0~2.91	0~3.79	0~8.69
Ø 75-80 [2.95"] [3.15"]	0~8.18	0~10.4	0~16.34	0~20.6	0~3.76	0~7.0	0~11.24	0~20.6
Ø 100-115 [3.94"] [4.53"]	0~17.7	0~23.1	0~37	0~46.1	0~8.01	0~8.7	0~23.99	0~25.53
Ø 150 [5.91"]	0~35.2	0~43.5	0~72	0~86.9	—	0~20.6	—	0~61.24
Ø 200-300 [7.87"] [11.81"]	0~97.1	0~219.5	0~194.0	0~438.9	—	—	—	—

7) Basic Model's Characteristics

TOTAL suction cups have been being developed as more durable by revising existing domestic pad's defects and excellent temperature and chemical resistance. We will keep on developing various types of products from the small size(Ø) to the large size(300Ø) along with the figures and characteristics of the objects to be handled, and will bear a part of your company's vacuum automation facility.

Things to consider when you select the correct suction cup

- Figure out the shapes, size, and weight of the objects to be handled, and decide which suction cup should be selected.
- Calculate the centre of gravity and the distance of number of suction cups of the objects to be handled
- Calculate the lifting force by the number of suction cups and safety factor
- Consider the material of suction cup and the chemical characteristics of the objects to be handled.
- After checking over mechanical dimensions, select accessories such as fitting, level compensator, ball joint, etc. to be attached on vacuum pad.
- Test after installation.

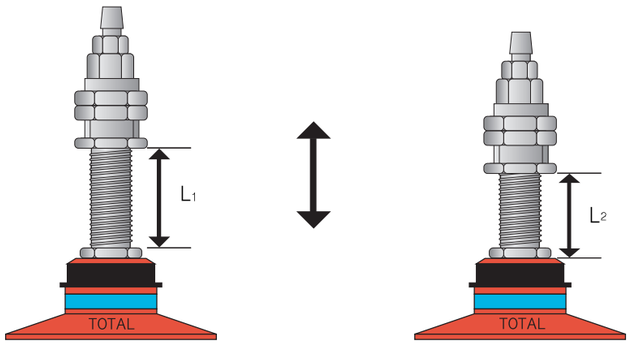
Various Suction Cups' s Features and Application

Model	Features	Application
"TU" Model	No cleats in the base side. Suitable for handling objects with flat or slightly curved surfaces. Universal type.	Micro semiconductor chip, Box packaging Metal sheets lifting Folding M/C, etc,
"TF" Model	With Cleats in the base side. Also suitable when lifting vertically as the cleats increase friction Strong horizontal and perpendicular lifting is the advantages of TF vacuum pad.	Flat metal sheets Wooden board Refrigerator Home appliances Perpendicular, horizontal moving No slippery on the flat
"TOC" Model (Oval Type)	As oval type. Designed for the objects with longish and slightly curved surfaces	Curved glass sheet Auto's plate Doors Refrigerator TV monitor Auto's bumper
"TB" Model (Bellows Type)	With 1~2ea of bellows, can handle the objects with height differences. Enables you to handle various types of objects to be handled with irregular surfaces by using this TB vacuum pad. Also suitable for handling thin products.	Glass sheet, Embossing sheet Plastics, Milk package Paper board, Pager box lifting Electronic parts's picking and moving Thin film's moving
"TD" Model (Deep Type)	Suitable for handling the objects to be handled with longish and peaky like the top of egg, having large internal volume	Metallic sphere Eggs Curved metal sheets Box packaging
"TBL" Model (Long Bellows Type)	With 4 ea of bellows, can handle the large objects with height differences like TB vacuum pad's use. Suitable for handling fragile objects to be handled by having a certain degree of shock absorption. ※ Not suitable for use with deep vacuum levels	Smooth object (Bakery) Fragile eggs Cup of glass, Plate of glass Ice cream Foodstuffs, etc.
"TFC" Model (Flat Curve Type)	With slightly curved (R) in the base side and "F" type's cleats, can handle both of flat and curved objects at the same time. Designed well for perpendicular and horizontal lifting Often use for auto manufacturing process	Auto glasses, Auto's roof Auto's door, Metal sheets lifting Feeding metal sheets into press Curved metal sheets Mechanical industry field
"TS" Model (Sponge Type)	Suitable for handling the objects with rough surfaces like blocks of stone, aggregate, concrete, and stone. Soft sponge type of vacuum pad's holding on rough surfaces, not to make a leak	Blocks of stone Concrete Large objects with rough surfaces lifting
"TPS" Model (Plastic Bag opening, Thin Film Materials)	Fit for moving thin work piece like vinyl or for plastic bag's opening. With thin vacuum pad like the objects to be handled, giving good adhesion to thin plastic and film type material..	Foodstuffs packaging PDP LCD skin film lifting Paper holding Semiconductor mark-free lifting

8) Accessories Use & Application

– Level Compensator

When the objects to be handled are stacked in parallel to the earth, this absorbs the height differences to keep in the certain position. Also provides a certain degree of shock absorption.

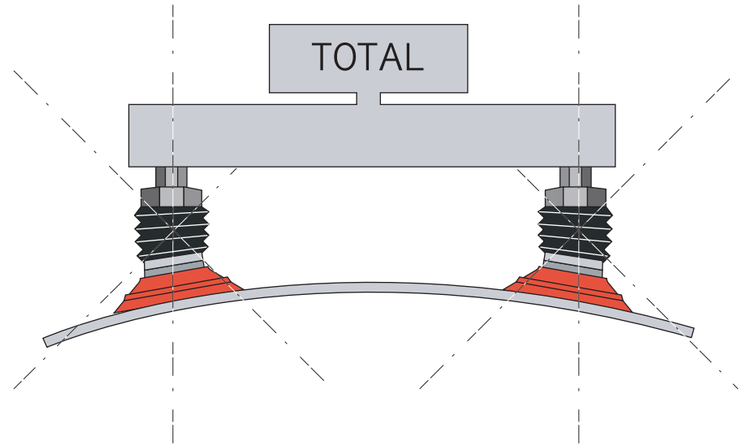


$L_1 - L_2$=Absorbing Distance

Even if the objects stack as high as this height, there is no effect on lifting work.

– Vacuum Ball-Joint

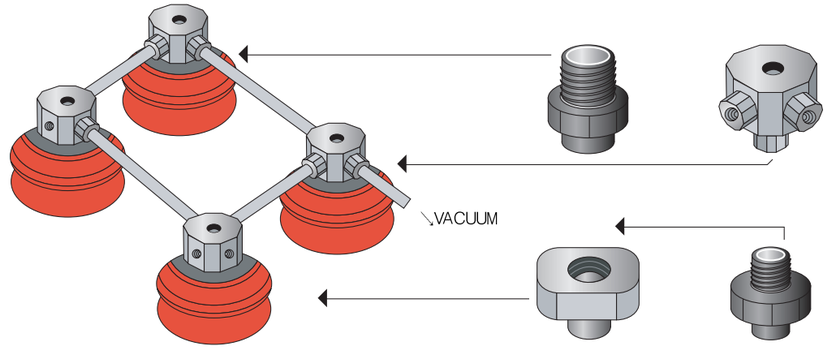
When the position of the objects to be handled is different from the level, even if the object has the angular difference, ±12° with vacuum pad, it is the TOTAL ball joint (TBJ–Series) that can lift and move the objects without any problems.



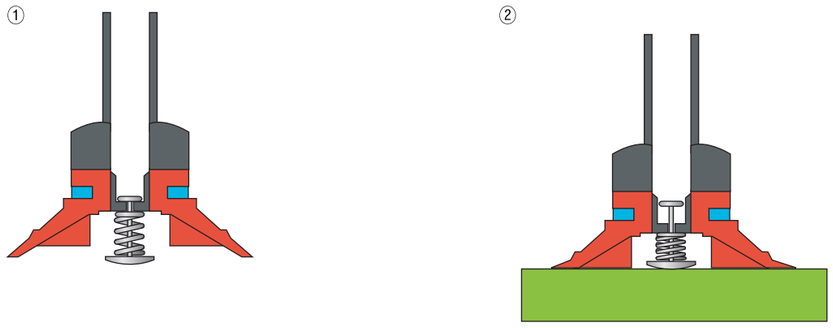
– Angle Adapter

When connecting a series of suction cups in a system or when not enough space available in the top of suction cups, using angle adapter is a great help to vacuum arrangement.

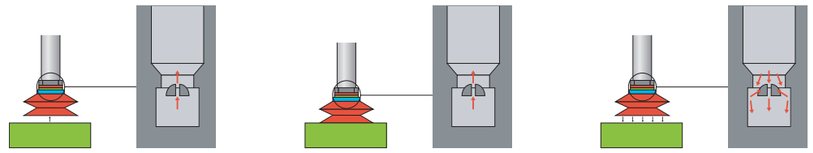
Connector/Fitting

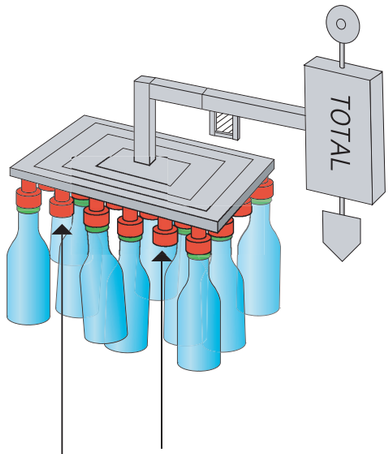


– Cone Valve
TOTAL's cone valve with fittings is functioning to stop automatically vacuum leakage which can be generated between suction cup and the objects to be handled. By using this Cone Valve, if both porous and no-porous materials of products are existed, can make lift and move easily.



– Dual Flow Control Valve
If the suction cup does not make contact with the object, the leakage can cause the objects to be dropped due to vacuum down in total system. Even if there is a little leakage, this Dual Flow Control Valve do sucking and lifting smoothly and normalize system by doing the rapid vacuum breaking when releasing.





Even if leakage happens, Dual Flow Control Valve let minimal limited air flow through the atmospheric to maintain a whole vacuum level, and can make the objects to be carried well.

9) Suction Cup's Materials and Characteristics

Material	Temperature	Wear resistance	Oil Resistance	Weather & ozone resistance
NBR(Nitrile)	-30℃~+90℃ -22℉~+194℉	Excellent(＊＊＊)	Excellent(＊＊＊)	Very Good(＊＊)
Silicon	-70℃~+200℃ -94℉~+392℉	Good(＊)	Good(＊)	Excellent(＊＊＊)
Conductive silicon	-55℃~+230℃ -67℉~+446℉	Good(＊)	Good(＊)	Excellent(＊＊＊)
TPU(Urethane)	-20℃~+80℃ -4℉~+176℉	Excellent(＊＊＊)	Excellent(＊＊＊)	Excellent(＊＊＊)
EPDM(Ethylene propylene)	-40℃~+100℃ -40℉~+212℉	Very Good(＊＊)	Good(＊)	Excellent(＊＊＊)

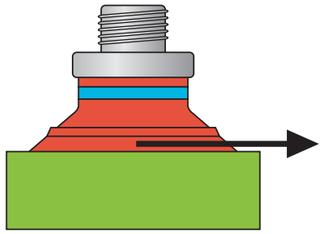
Cf. About other chemical characteristics or each materials data, pls. refer to the section of "Chemical Resistance Data" on page 19

10) How to Select the Correct Suction Cup

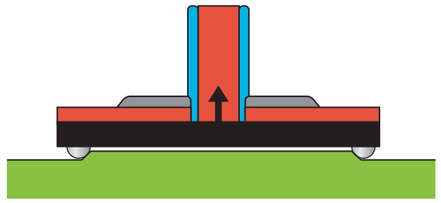
This final model selection table was finished by the classification work like below after general technical reviewing so far.

Model	Effectiveness of Models Surfaces and Status of the Objects to be handled												
	Flat	Covex	Concaved	Clean & Flat	Uneven	Adjust Level	Curved	Hard & Heavy	Mark-Free	Vertical Movement	Safety	A Change of Direction	Thin Film
TU	＊＊＊	＊＊＊	—	＊＊＊	—	—	—	＊＊	＊＊＊	＊＊	＊	＊	＊＊
TF	＊＊＊	＊	—	＊＊＊	—	—	—	＊＊＊	＊＊＊	＊＊＊	＊＊＊	＊	—
TCC	＊＊＊	＊＊	＊＊＊	＊＊＊	＊	—	＊＊	＊＊＊	—	＊＊＊	＊＊＊	＊＊＊	—
TB	＊＊＊	＊＊＊	—	＊＊＊	＊＊	＊＊＊	＊＊＊	＊＊	＊＊	＊＊	＊＊	＊	＊＊
TD	＊＊	＊	—	＊	—	—	＊＊	＊	—	—	＊	＊	—
TBL	＊	＊＊＊	＊＊	＊	＊	＊＊＊	＊＊＊	＊	—	—	＊	—	—
TFC	＊＊＊	＊＊＊	＊＊＊	＊＊＊	＊	—	＊＊	＊＊＊	—	—	＊＊＊	—	—
TS	＊＊＊	—	＊	＊＊＊	＊＊＊	＊	＊	＊	—	＊＊＊	＊＊＊	—	—
TPS	＊＊＊	—	＊	＊＊＊	—	—	＊	＊	—	＊＊＊	＊＊	—	＊＊＊

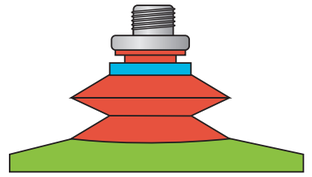
＊＊＊Excellent ＊＊Very good ＊good —not available



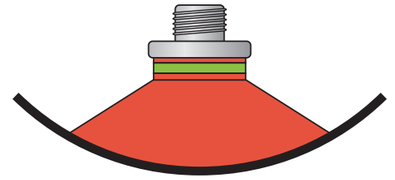
Force parallel to
the surface, for example
model TF



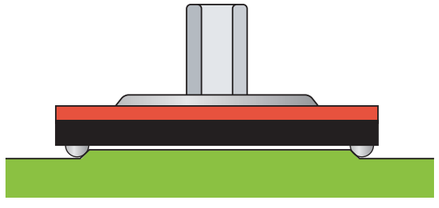
Thin objects,
for example model TP
with adjustable support



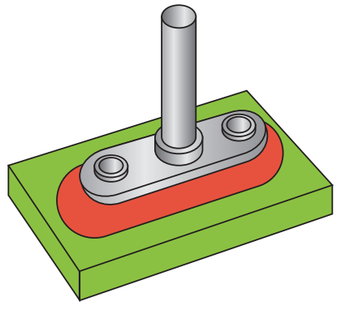
Slightly curved surface,
for example model TB



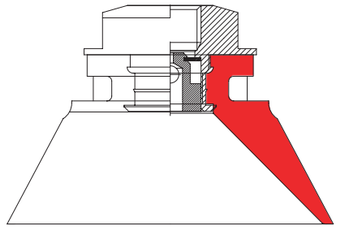
Concave surface,
for example model TU



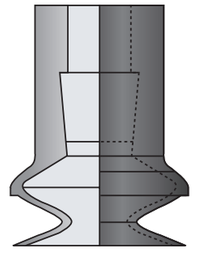
Uneven surface,
for example model TP



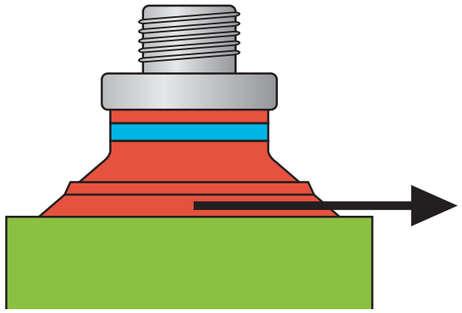
Oblong objects,
for example model TOC



Around corners,
for example model TD

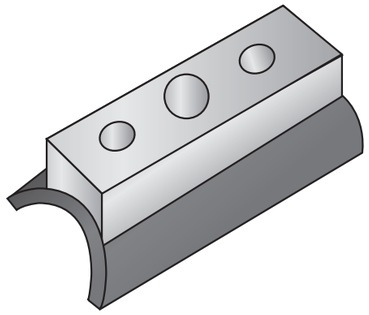


Assembly without fitting,
for example model



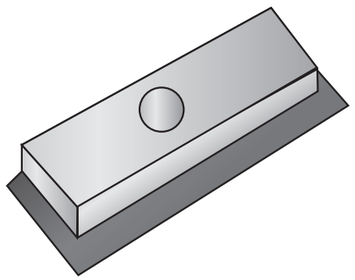
TPS-type

Use for thin plastic bag opening



TORC-type

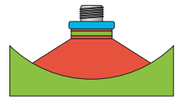
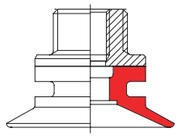
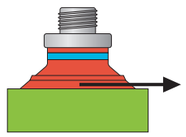
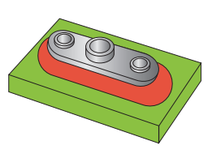
Use for moving and stacking round tube or pipe

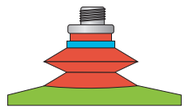
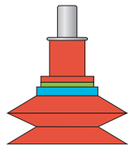
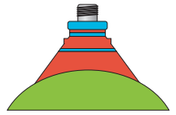
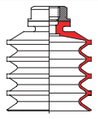
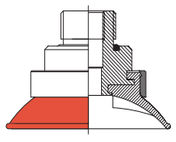
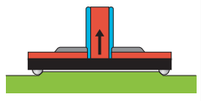


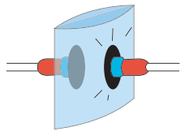
TOR-type

Use for lifting hundreds of kg to thousands of kg of large metal sheet, concrete, stone, etc.

11) Characteristics of Models

	Model	Diameter of Vacuum Pad (Ø)	Area of Vacuum Pad(㎠)	Material					Perpendicular(㎏)			Parallel(㎏)		
				N	S	CS	U	E	-20kPa	-60kPa	-90kPa	-20kPa	-60kPa	-90kPa
	TU2	2 [0.08"]	0.0026	*	*	*			0.03	0.01	0.015	—	—	—
	TU2B	2 [0.08"]	0.0026	*	*	*			0.03	0.01	0.015	—	—	—
	TU3	3 [0.12"]	0.006	*	*	*			0.009	0.042	0.066	—	—	—
	TU4	4 [0.16"]	0.04	*	*	*			0.02	0.092	0.133	0.02	0.082	0.102
	TU4B	4 [0.16"]	0.04	*	*	*			0.02	0.092	0.133	0.02	0.082	0.102
	TU6	6 [0.24"]	0.06	*	*	*			0.05	0.17	0.26	0.05	0.15	0.204
	TU8	8 [0.31"]	0.2	*	*	*			0.10	0.3	0.4	0.10	0.3	0.35
	TU10	10 [0.39"]	0.19	*	*	*	*		0.15	0.45	0.7	0.15	0.5	0.5
	TU15	15 [0.59"]	0.6	*	*	*	*		0.36	0.86	1.12	0.36	0.55	0.6
	TU20	20 [0.79"]	1.1	*	*	*	*		0.6	1.22	1.63	0.6	0.9	1
	TU25	25 [0.98"]	1.6	*	*	*	*		0.91	2	2.7	0.8	1	1.1
	TU30	30 [1.18"]	2.1	*	*	*	*		1.22	2.55	3.06	0.81	1	1.12
	TU40	40 [1.57"]	5.5	*	*	*	*		2.04	3.98	5	1.43	2.24	2.76
	TU50	50 [1.97"]	13.0	*	*	*	*		3.57	7.45	9.39	2.04	3.78	4.49
	TF15	15 [0.59"]	0.38	*	*	*	*		0.36	0.87	1.12	0.38	0.66	0.77
	TF20	20 [0.79"]	1.1	*	*	*	*		0.61	1.48	1.93	0.51	0.82	0.87
	TF25	25 [0.98"]	1.2	*	*	*	*		0.92	1.99	2.55	0.82	0.92	1.02
	TF30	30 [1.18"]	2.1	*	*	*	*		1.22	2.55	3.16	1.12	1.63	2.04
	TF40	40 [1.57"]	4.8	*	*	*	*		2.04	4.08	5.10	1.53	2.55	3.06
	TF50	50 [1.97"]	10.1	*	*	*	*		3.67	7.55	9.8	2.45	4.08	5.1
	TF75	75 [2.95"]	20.1	*	*	*	*		8.2	20.4	28	6.12	11.22	14.3
	TF110	110 [4.33"]	70.1	*	*	*	*		14.3	42.9	57.14	14.3	25.5	30.6
	TF150	150 [5.91"]	160.1	*	*	*	*		30.6	86.7	112.2	25.5	61.2	82
	TOC36×90	38×93	21	*	*	*	*		5	11.93	17.44	5.41	11.43	15
	TOC36×110	38×113	32	*	*	*	*		6.3	17	22	8.8	21	26
	TOC60×140	62×143	53	*	*	*	*		13.47	38.06	53.06	18.98	38.06	52.04
	TOC60×780	62×183	61	*	*	*	*		19.3	54	76	27	54.4	74

	Model	Diameter of Vacuum Pad (Ø)	Area of Vacuum Pad(㎠)	Material					Perpendicular(㎏)			Parallel(㎏)		
				N	S	CS	U	E	-20kPa	-60kPa	-90kPa	-20kPa	-60kPa	-90kPa
	TB 5	5 [0.20″]	0.06	*	*	*			0.03	0.08	0.10	—	—	—
	TB 8	8 [0.31″]	0.16	*	*	*			0.08	0.16	0.26	—	—	—
	TB 10	10 [0.39″]	0.49	*	*	*	*		0.15	0.35	0.5	—	—	—
	TB 15	15 [0.59″]	1.2	*	*	*	*		0.3	0.6	0.91	—	—	—
	TB 20	20 [0.79″]	2.8	*	*	*	*		0.6	1	1.43	—	—	—
	TB 30	30 [1.18″]	10.1	*	*	*	*		1.22	2.24	2.76	—	—	—
	TB 40	40 [1.57″]	16.0	*	*	*	*		2.24	3.98	5	—	—	—
	TB 50	50 [1.97″]	33.0	*	*	*	*		3.37	6.63	8.37	—	—	—
	TB 75	75 [2.95″]	111.0	*	*	*	*		7.55	17.1	23.1	—	—	—
	TB 110	110 [4.33″]	311.0	*	*	*	*		14	35	47.1	—	—	—
	TB 150	150 [5.91″]	651.0	*	*	*	*		30	70	90.1	—	—	—
	TD 15	15 [0.59″]	1.0	*	*	*	*		0.3	0.8	1.12	—	—	—
	TD 20	20 [0.79″]	2.6	*	*	*	*		0.6	1.53	1.84	—	—	—
	TD 30	30 [1.18″]	5.1	*	*	*	*		1.43	2.7	3.16	—	—	—
	TD 50	50 [1.97″]	16	*	*	*	*		3.67	7.96	10	—	—	—
	TBL 20	20 [0.79″]	4.2	*	*	*	*		0.03	0.06	—	—	—	—
	TBL 30	30 [1.18″]	13.2	*	*	*	*		0.07	0.16	—	—	—	—
	TBL 40	40 [1.57″]	27.1	*	*	*	*		0.11	0.22	—	—	—	—
	TFC 35	35 [1.38″]	5.1	*	*	*	*		1.16	3.67	5.2	2.76	5.2	6.33
	TFC 50	50 [1.97″]	11.0	*	*	*	*		2.86	7.86	10.51	5	8.37	10.2
	TFC 75	75 [2.95″]	31.0	*	*	*	*		7.45	16.02	21.94	10.92	20.41	23.47
	TFC 100	100 [3.94″]	81.0	*	*	*	*		13.98	28.98	38.47	17.96	32.45	42.86
	TP 35	35 [1.38″]	6.2					*	2.04	5.1	7.14	—	—	—
	TP 65	65 [2.56″]	21.0					*	6.12	15.31	22.45	—	—	—
	TP 110	110 [4.33″]	56.0					*	18.37	45.92	67.35	—	—	—
	TP 150	150 [5.91″]	382.0					*	38.3	97.2	138.6	—	—	—
	TP 200	200 [7.87″]	544.0					*	76.53	193.88	275.5	—	—	—
	TP 300	300 [11.81″]	1286.0					*	163.3	438.8	653.1	—	—	—

	Model	Diameter of Vacuum Pad (Ø)	Area of Vacuum Pad(㎠)	Material					Perpendicular(㎏)			Parallel(㎏)		
				N	S	CS	U	E	-20kPa	-60kPa	-90kPa	-20kPa	-60kPa	-90kPa
	TPS 15	15 [0.59″]	0.5	*	*				0.34	0.82	1.0	0.32	0.52	0.58
	TPS 20	20 [0.79″]	0.9	*	*				0.58	1.19	1.57	0.56	0.84	0.95
	TPS 25	25 [0.98″]	1.50	*	*				0.89	1.80	2.28	0.65	0.90	0.99
	TPS 30	30 [1.18″]	1.92	*	*				1.18	2.44	2.98	0.75	0.95	1.04
	TPS 40	40 [1.57″]	5.45	*	*				2.0	3.88	4.87	1.35	2.12	2.64
	TPS 50	50 [1.97″]	11.8	*	*				3.48	7.22	9.11	1.98	3.64	4.30
	〈Other custom-made Pad〉 TORC-Series(Ø25 [0.98″], 50 [1.97″], 80 [3.15″], 100 [3.94″], 120 [4.72″], 150 [5.91″], 200 [7.87″]) Use: Round pipe or casted product's design manufacturing													
	TOR-Series(40×80, 60×150, 80×200, 120×250, 200×480, 240×600) Use: Oblong sheet or large stone sheet, oval table, furniture, MDF, etc, heavy objects' lifting													

1 Model TU Type

• Features and Application

Smooth and no cleats in the base side.
Suitable for handling the objects with flat or slightly curved surface.
Use for holding thin products.

• Use of Application

thin steel sheet, veneer board, vinyl, paper, semiconductor chip, etc.

Ordering Information

①	②	③	④	⑤	⑥
TU25	-N	-18M	-CV	-TLC18M30L	-TBJ18

① Pad Diameter (Ø)

TU2 : 2Ø [0.08″]
TU3 : 3Ø [0.12″]
TU4 : 4Ø [0.16″]
TU6 : 6Ø [0.24″]
TU8 : 8Ø [0.31″]
TU10 : 10Ø [0.39″]
TU15 : 15Ø [0.59″]
TU20 : 20Ø [0.79″]
TU25 : 25Ø [0.98″]
TU30 : 30Ø [1.18″]
TU40 : 40Ø [1.57″]
TU50 : 50Ø [1.97″]

② Material

N : NBR
S : Silicon
U : Urethane
C.S : C.Silicon
E : EPDM

③ Thread Size

M5M : Male thread M5
18M : Male thread G1/8″
18F : Female thread G1/8″
14M : Male thread G1/4″
38M : Male thread G3/8″

④ Check Valve

-CV : With check valve
-None : No check valve

⑤ Level Compensator

TLC : TOTAL Level Compensator
M5F7 I : M5F×7 Stroke
M5F15 I : M5F×15 Stroke
M5M10 I : M5M×10Stroke
M5M20 I : M5M×20 Stroke
18F5 L : 18F×5 Stroke
18M10 I : 18M×10 Stroke
18M20 I : 18M×20 Stroke
18M30 L : 18M×30 Stroke
18M50 L : 18M×50 Stroke
18M50 I : 18M×50 Stroke

(Possible Option Stroke)

⑥ Ball Joint

TBJ18 : Ball Joint 1/8″

Model TU Type

• Lifting force at vacuum level

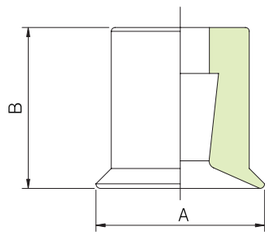
Model	Perpendicular			Parallel			Volume (㎤)	Min. Radial Motion (mm) (inches)	Remarks
	-20kpa	-60kpa	-90kpa	-20kpa	-60kpa	-90kpa			
TU2	0.003	0.01	0.015	–	–	–	0.0025	4.0 [0.16″]	
TU3	0.89	0.043	0.06	–	–	–	0.005	5.0 [0.20″]	
TU4	0.02	0.091	0.13	0.02	0.08	0.1	0.03	3.0 [0.12″]	
TU6	0.5	0.18	0.25	0.05	0.14	0.2	0.05	5.0 [0.20″]	
TU8	0.1	0.29	0.39	0.11	0.28	0.35	0.1	6.0 [0.24″]	
TU10	0.15	0.45	0.68	0.15	0.43	0.48	0.18	8.0 [0.31″]	
TU15	0.35	0.83	1.1	0.35	0.55	0.60	0.5	8.0 [0.31″]	
TU20	0.59	1.21	1.6	0.59	0.88	0.99	1.0	13 [0.51″]	
TU25	1.0	1.94	2.4	0.71	0.94	1.02	1.87	18 [0.71″]	
TU30	1.2	2.52	3.1	0.78	0.98	1.09	2.1	20 [0.79″]	
TU40	2.0	3.92	4.8	1.41	2.22	2.73	5.4	30 [1.18″]	
TU50	3.5	7.2	9.1	2.04	3.80	4.50	12	35 [1.38″]	

Model TU Type

• Dimensional information

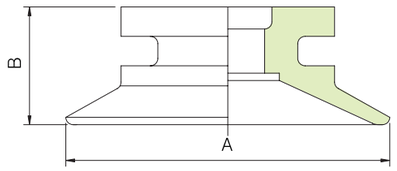
Very Small(Ø2[0.08″] ~ Ø15[0.59″])

Model	ØA	B
TU2	2.6 [0.10″]	3.5 [0.14″]
TU3	3.8 [0.15″]	4.5 [0.18″]
TU4	5 [0.20″]	6.1 [0.24″]
TU6	7 [0.28″]	6.5 [0.26″]
TU8	9 [0.35″]	7 [0.28″]
TU10	11 [0.43″]	10.5 [0.41″]
TU15	16.5 [0.65″]	11.5 [0.45″]



Small (Ø20[0.79″] ~ Ø50[1.97″])

Model	ØA	B
TU20	22 [0.87″]	8 [0.31″]
TU25	27 [1.06″]	9 [0.35″]
TU30	32 [1.26″]	9.5 [0.37″]
TU40	42 [1.65″]	13 [0.51″]
TU50	53 [2.09″]	17.5 [0.69″]

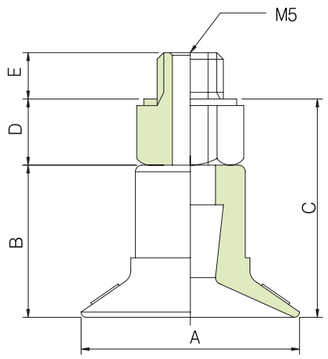


Model TU Type

• Dimensional information included Fitting

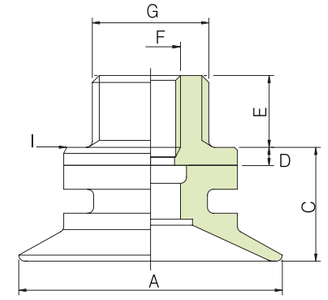
Very Small Male Thread

Model	ØA	B	C	D	E
TU2-M5	2.6 [0.10″]	3.5 [0.14″]	6 [0.24″]	2.5 [0.10″]	2 [0.08″]
TU3-M5	3.8 [0.15″]	4.5 [0.18″]	7 [0.28″]	2.5 [0.10″]	2 [0.08″]
TU4-M5	5 [0.20″]	6.1 [0.24″]	10.1 [0.40″]	4 [0.16″]	3.5 [0.14″]
TU6-M5	7 [0.28″]	6.5 [0.26″]	10.5 [0.41″]	4 [0.16″]	3.5 [0.14″]
TU8-M5	9 [0.35″]	7 [0.28″]	11 [0.43″]	4 [0.16″]	3.5 [0.14″]
TU10-M5	11 [0.43″]	10.5 [0.41″]	15.5 [0.61″]	5 [0.20″]	3.5 [0.14″]
TU15-M5	16.5 [0.65″]	11.5 [0.45″]	16.5 [0.65″]	5 [0.20″]	3.5 [0.14″]



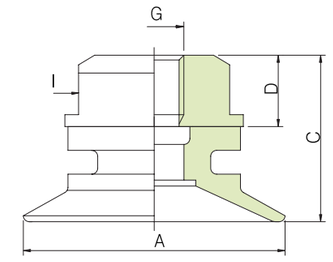
Small Male Thread

Model	ØA	C	D	E	F	G	I
TU20-18M	22 [0.87″]	9.5 [0.37″]	1.5 [0.06″]	6 [0.24″]	M5	G1/8″	SW12
TU25-18M	27 [1.06″]	10.5 [0.41″]	1.5 [0.06″]	6 [0.24″]	M5	G1/8″	SW12
TU30-18M	32 [1.26″]	11 [0.43″]	1.5 [0.06″]	6 [0.24″]	M5	G1/8″	SW12
TU40-18M	42 [1.65″]	18 [0.71″]	5 [0.20″]	7 [0.28″]	–	G1/8″	SW17
TU40-14M	42 [1.65″]	19 [0.75″]	6 [0.24″]	9 [0.35″]	–	G1/4″	SW17
TU50-14M	53 [2.09″]	23.5 [0.93″]	6 [0.24″]	9 [0.35″]	–	G1/4″	SW24
TU50-38M	53 [2.09″]	23.5 [0.93″]	6 [0.24″]	10 [0.39″]	–	G3/8″	SW24



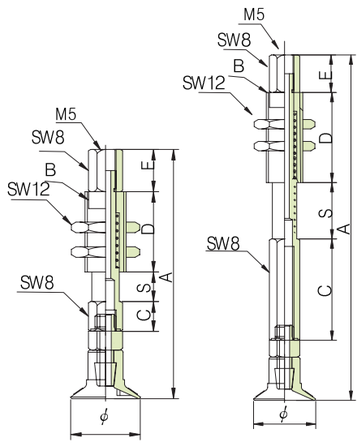
Small Female Thread

Model	ØA	C	D	G	I
TU20-M5	22 [0.87″]	16 [0.63″]	8 [0.33″]	G1/8″	SW12
TU25-M5	27 [1.06″]	17 [0.67″]	8 [0.33″]	G1/8″	SW12
TU30-M5	32 [1.26″]	17.5 [0.69″]	8 [0.33″]	G1/8″	SW12
TU40-18F	42 [1.65″]	21 [0.83″]	8 [0.33″]	G1/8″	SW17
TU50-18F	53 [2.09″]	26.5 [1.04″]	9 [0.35″]	G1/8″	SW24

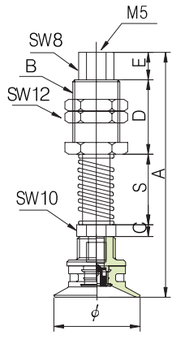


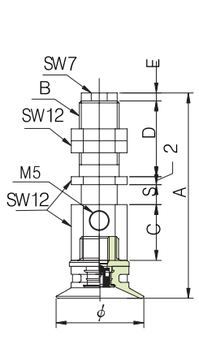
Model TU Type

Dimensional information included Level Compensator



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TU 2	TLC M5F-7 I	2.7 [0.11"]	48 [1.89"]	M8× P1.25	7 [0.28"]	19 [0.75"]	10 [0.39"]	7 [0.28"]
TU 3		3.2 [0.13"]	48 [1.89"]					
TU 4		4.8 [1.19"]	48 [1.89"]					
TU 2	TLC M5F-15 I	2.7 [0.11"]	80 [3.15"]	M8× P1.0	27 [1.06"]	24 [0.94"]	10 [0.39"]	15 [0.59"]
TU 3		3.2 [0.13"]	80 [3.15"]					
TU 4		48 [0.19"]	80 [3.15"]					
TU 6	TLC M5F-7 I	8 [0.31"]	54 [2.13"]	M8× P1.25	7 [0.28"]	19 [0.75"]	10 [0.39"]	7 [0.28"]
TU 8		10 [0.39"]	55 [2.17"]					
TU 10		12 [0.47"]	59 [2.24"]					
TU 15		17 [0.67"]	60 [2.36"]					
TU 6	TLC M5F-15 I	8 [0.31"]	86 [3.39"]	M8× P1.0	27 [1.06"]	24 [0.94"]	10 [0.39"]	15 [0.59"]
TU 8		10 [0.39"]	87 [3.43"]					
TU 10		12 [0.47"]	91 [3.58"]					
TU 15		17 [0.67"]	92 [3.62"]					

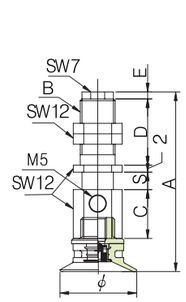


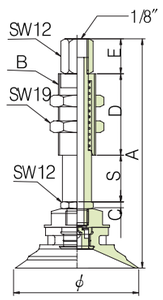


Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TU 20	TLC M5M-10 I	22 [0.87"]	63 [2.48"]	M12× P1.0	3 [0.12"]	19 [0.75"]	7 [0.28"]	10 [0.39"]
TU 25		27 [1.06"]	64 [2.52"]					
TU 30		32 [1.26"]	64.5 [2.54"]					
TU 20	TLC M5M-20 I	22 [0.87"]	73 [2.87"]	M12× P1.0	3 [0.12"]	19 [0.75"]	7 [0.28"]	20 [0.79"]
TU 25		27 [1.06"]	74 [2.91"]					
TU 30		32 [1.26"]	74.5 [2.93"]					
TU 20	TLC 18F-5 L	22 [0.87"]	52 [2.05"]	M10× P1.0	15 [0.59"]	19.5 [0.77"]	3 [0.12"]	5 [0.20"]
TU 25		27 [1.06"]	53 [2.09"]					
TU 30		32 [1.26"]	53.5 [2.11"]					

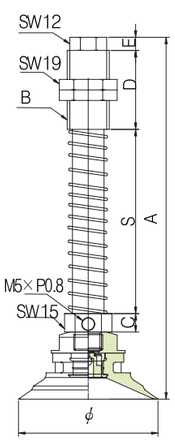
Model TU Type

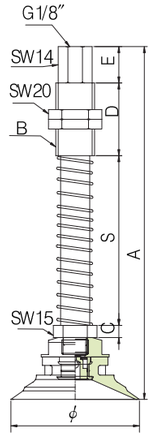
Dimensional information included Level Compensator





Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TU 40	TLC 18F-5 L	42 [1.65"]	56 [2.20"]	M10× P1.0	15 [0.59"]	19 [0.75"]	3 [0.12"]	5 [0.20"]
TU 50		53 [2.09"]	62 [2.44"]					
TU 40	TLC 18M-10 I	42 [1.65"]	72 [2.83"]	M14× P1.5	4 [0.16"]	35 [1.38"]	16 [0.63"]	10 [0.39"]
TU 50		53 [2.09"]	77.5 [3.05"]					
TU 40	TLC 18M-20 I	42 [1.65"]	95 [3.74"]	M16× P1.0	4 [0.16"]	35 [1.38"]	16 [0.63"]	20 [0.79"]
TU 50		53 [2.09"]	100 [3.94"]					

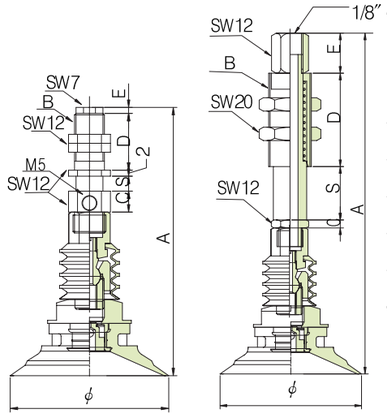




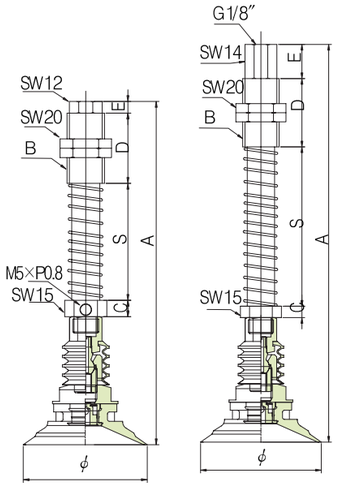
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TU 40	TLC 18M-30 L	42 [1.65"]	117 [4.61"]	M14× P1.5	11 [0.43"]	31 [1.22"]	6 [0.24"]	30 [1.18"]
TU 50		53 [2.09"]	122 [4.80"]					
TU 40	TLC 18M-50 L	42 [1.65"]	137 [5.39"]	M14× P1.5	11 [0.43"]	31 [1.22"]	6 [0.24"]	50 [1.97"]
TU 50		53 [2.09"]	142 [5.59"]					
TU 40	TLC 18M-50 I	42 [1.65"]	142 [5.59"]	M16× P1.0	6 [0.24"]	31 [1.22"]	16 [0.63"]	50 [1.97"]
TU 50		53 [2.09"]	147 [5.79"]					

Model TU Type

Dimensional information included Level Compensator & Ball Joint



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TU40	TLC18M-5L TBJ18	42 [1.65″]	83 [3.27″]	M10× P1.0	15 [0.59″]	19 [0.75″]	3 [0.12″]	5 [0.20″]
TU50		53 [2.09″]	90 [3.54″]					
TU40	TLC18M-10I TBJ18	42 [1.65″]	99 [3.90″]	M14× P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TU50		53 [2.09″]	104 [4.09″]					
TU40	TLC18M-20I TBJ18	42 [1.65″]	122 [4.80″]	M16× P1.0	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TU50		53 [2.09″]	127 [5.00″]					



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TU40	TLC18M-30L TBJ18	42 [1.65″]	144 [5.67″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TU50		53 [2.09″]	149 [5.87″]					
TU40	TLC18M-50L TBJ18	42 [1.65″]	164 [6.46″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TU50		53 [2.09″]	169 [6.65″]					
TU40	TLC18M-50I TBJ18	42 [1.65″]	169 [6.65″]	M16× P1.0	6 [0.24″]	31 [1.22″]	16 [0.63″]	50 [1.97″]
TU50		53 [2.09″]	174 [6.85″]					

② Model TF Type

● Features and Application

With cleats in the base side to increase suction and escape the slippery on the surface of suction cup.
Use for lifting without any separation.

● Use of Application

- flat metal sheet, veneer board, refrigerator, home appliances, etc.

Ordering Information

①	②	③	④	⑤	⑥
TF15	-N	-18M	-CV	-TLC18M30L	-TBJ18
① Pad Diameter Ø	**② Material**	**③ Thread Size**		**⑤ Level Compensator**	**⑥ Ball Joint**
TF15 : 15Ø [0.59″] TF20 : 20Ø [0.79″] TF25 : 25Ø [0.98″] TF30 : 30Ø [1.18″] TF40 : 40Ø [1.57″] TF50 : 50Ø [1.97″] TF75 : 75Ø [2.95″] TF110 : 110Ø [4.33″] TF150 : 150Ø [5.91″]	N : NBR S : Silicon U : Urethane C.S : C.Silicon E : EPDM	M5M : Male thread M5 M5F : Female thread M5 18M : Male thread G1/8″ 18F : Female thread G1/8″ 14M : Male thread G1/4″ 38M : Male thread G3/8″ 38F : Female thread G3/8″ 12F : Female thread G1/2″ **④ Check Valve** -CV : With check valve -None : No check valve		TLC : TOTAL Level Compensator M5F7 I : M5F×7 Stroke M5F15 I : M5F×15 Stroke M5M10 I : M5M×10Stroke M5M20 I : M5M×20 Stroke 18F5 L : 18F×5 Stroke 18M5 L : 18M×5 Stroke 18M10 I : 18M×10 Stroke 18M20 I : 18M×20 Stroke 18M30 L : 18M×30 Stroke 18M50 L : 18M×50 Stroke 18M50 I : 18M×50 Stroke 12M30 L : 12M×30 Stroke 12M50 L : 12M×50 Stroke 12M30 I : 12M×30 Stroke (Possible Option Stroke)	TBJ18 : Ball Joint 1/8″ TBJ12 : Ball Joint 1/2″

Model TF Type

• Lifting Force (Kg) at vacuum level

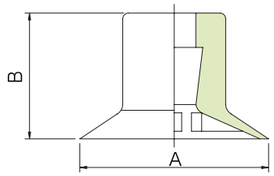
Model	Perpendicular			Parallel			Volume	Min. Radial Motion (mm) (inches)	Remarks
	-20kpa	-60kpa	-90kpa	-20kpa	-60kpa	-90kpa	cm^3		
TF15	0.36	0.87	1.12	0.38	0.66	0.77	0.37	13 [0.51″]	
TF20	0.61	1.48	1.93	0.51	0.82	0.87	1.0	18 [0.71″]	
TF25	0.92	1.99	2.55	0.82	0.92	1.02	1.1	22 [0.87″]	
TF30	1.22	2.55	3.16	1.12	1.63	2.04	2	25 [0.98″]	
TF40	2.04	4.08	5.10	1.53	2.55	3.06	4.8	52 [2.05″]	
TF50	3.67	7.55	9.8	2.45	4.08	5.1	10	55 [2.17″]	
TF75	8.2	20.4	28	6.12	11.22	14.3	20	150 [5.91″]	
TF110	14.3	42.9	57.14	14.3	25.5	30.6	70	250 [9.84″]	
TF150	30.6	86.7	112.2	25.5	61.2	82	160	500 [19.69″]	

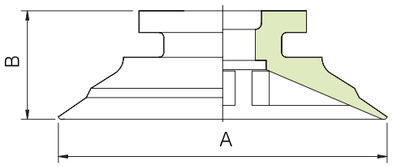
Model TF Type

• Dimensional information

Small (Ø15 [0.59″] ~ Ø50 [1.97″])

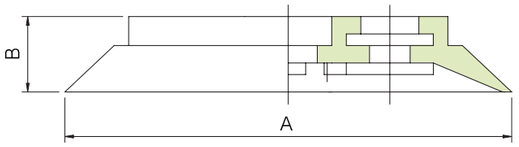
Model	ØA	B
TF15	16.5 [0.65″]	11 [0.43″]
TF20	22 [0.87″]	8 [0.31″]
TF25	26.7 [1.05″]	9 [0.35″]
TF30	32 [1.26″]	10 [0.39″]
TF40	42 [1.65″]	13 [0.51″]
TF50	53 [2.09″]	17.5 [0.69″]





Large (Ø75 [2.95″] ~ Ø150 [5.91″])

Model	ØA	B
TF75	77 [3.03″]	13 [0.51″]
TF110	112 [4.41″]	20 [0.79″]
TF150	152 [5.98″]	26 [1.02″]

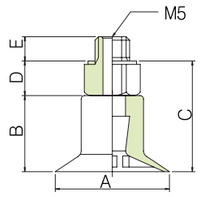


Model TF Type

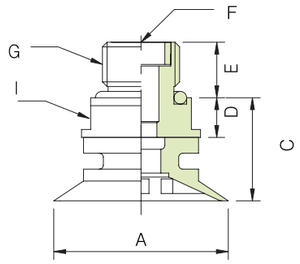
• Dimensional information included Fitting

Small Male Thread

Model	ØA	B	C	D	E
TF 15-M5	16.5 [0.65"]	11 [0.43"]	16 [0.63"]	5 [0.20"]	4 [0.16"]

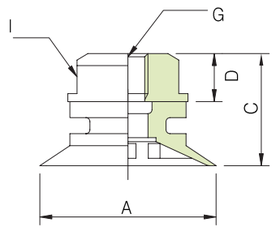


Model	ØA	C	D	E	F	G	I
TF20-18M	22 [0.87"]	9.5 [0.37"]	1.5 [0.06"]	6 [0.24"]	M5	G1/8"	SW12
TF25-18M	26.7 [1.05"]	10.5 [0.41"]	1.5 [0.06"]	6 [0.24"]	M5	G1/8"	SW12
TF30-18M	32 [1.26"]	11.5 [0.45"]	1.5 [0.06"]	6 [0.24"]	M5	G1/8"	SW12
TF40-18M	42 [1.65"]	18 [0.71"]	5 [0.20"]	7 [0.28"]	–	G1/8"	SW17
TF40-38M	42 [1.65"]	23.5 [0.93"]	6 [0.24"]	10 [0.39"]	–	G3/8"	SW24
TF50-14M	53 [2.09"]	22.5 [0.89"]	6 [0.24"]	9 [0.35"]	–	G1/4"	SW24
TF50-38M	53 [2.09"]	23.5 [0.93"]	6 [0.24"]	10 [0.39"]		G3/8"	SW24



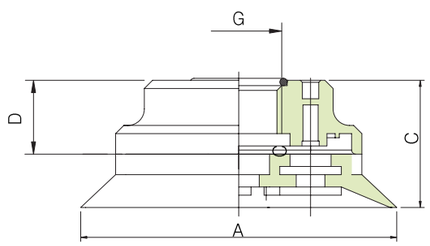
Small Female Thread

Model	ØA	C	D	G	I
TF20-M5	22 [0.87"]	14 [0.55"]	6 [0.24"]	M5	SW12
TF25-M5	26.7 [1.05"]	15 [0.59"]	6 [0.24"]	M5	SW12
TF30-M5	32 [1.26"]	16 [0.63"]	6 [0.24"]	M5	SW12
TF40-18F	42 [1.65"]	21 [0.83"]	8 [0.31"]	G1/8"	SW17
TF50-18F	53 [2.09"]	26.5 [1.04"]	9 [0.35"]	G1/8"	SW22



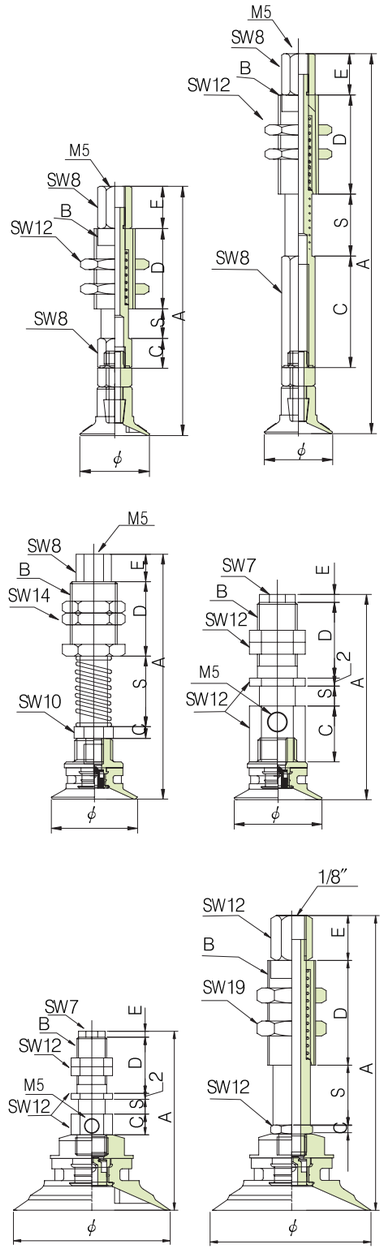
Large Female Thread

Model	ØA	C	D	G
TF75-18F	77 [3.03"]	26 [1.02"]	18 [0.71"]	G1/8"
TF75-38F	77 [3.03"]	26 [1.02"]	18 [0.71"]	G3/8"
TF75-12F	77 [3.03"]	26 [1.02"]	18 [0.71"]	G1/2"
TF110-12F	112 [4.41"]	29 [1.14"]	15 [0.59"]	G1/2"
TF150-12F	152 [5.98"]	33 [1.30"]	14 [0.55"]	G1/2"



Model TF Type

Dimensional information included Level Compensator



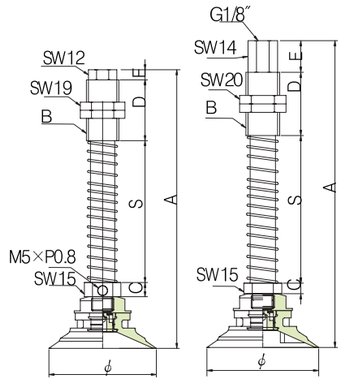
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TF15	TLCM5F-7I	16.5 [0.65"]	60 [2.36"]	M8× P1.25	7 [0.28"]	19 [0.75"]	10 [0.39"]	7 [0.28"]
	TLCM5F-15I	16.5 [0.65"]	92 [3.62"]	M8× P1.0	27 [1.06"]	24 [0.94"]	10 [0.39"]	15 [0.06"]

Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TF20	TLCM5M-10I	22 [0.87"]	63 [2.48"]	M12× P1.0	3 [0.12"]	19 [0.75"]	7 [0.28"]	10 [0.39"]
TF25		26.7 [1.05"]	64 [2.52"]					
TF30		32 [1.26"]	65 [2.56"]					
TF20	TLCM5M-20I	22 [0.87"]	73 [2.87"]	M12× P1.0	3 [0.12"]	19 [0.75"]	7 [0.28"]	20 [0.79"]
TF25		26.7 [1.05"]	74 [2.91"]					
TF30		32 [1.26"]	75 [2.95"]					
TF20	TLC18F-5L	22 [0.87"]	52 [2.05"]	M10× P1.0	15 [0.59"]	19 [0.75"]	3 [0.12"]	5 [0.20"]
TF25		26.7 [1.05"]	53 [2.09"]					
TF30		32 [1.26"]	54 [2.13"]					

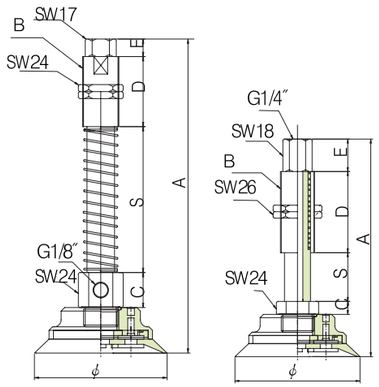
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TF40	TLC18M-5L	42 [1.65"]	56.5 [2.22"]	M10× P1.0	15 [0.59"]	19 [0.75"]	3 [0.28"]	5 [0.20"]
TF50		53 [2.09"]	62 [2.44"]					
TF75		77 [3.03"]	61 [2.40"]					
TF40	TLC18M-10I	42 [1.65"]	72 [2.83"]	M14× P1.0	4 [0.16"]	35 [1.38"]	16 [0.63"]	10 [0.39"]
TF50		53 [2.09"]	77 [3.03"]					
TF75		77 [3.03"]	78 [3.07"]					
TF40	TLC18M-20I	42 [1.65"]	95 [3.74"]	M16× P1.0	4 [0.16"]	35 [1.38"]	16 [0.63"]	20 [0.79"]
TF50		53 [2.09"]	100 [3.94"]					
TF75		77 [3.03"]	101 [3.98"]					

Model TF Type

Dimensional information included Level Compensator



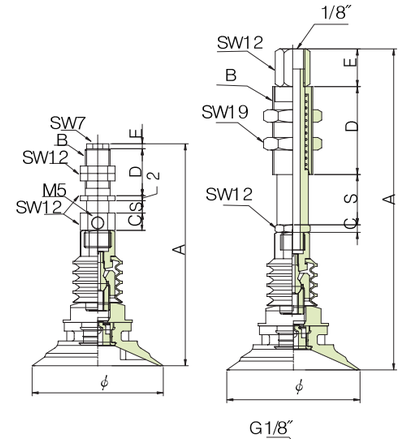
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TF40	TLC18M-30L	42 [1.59″]	117 [4.61″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TF50		53 [2.09″]	122 [4.90″]					
TF75		77 [3.03″]	123 [4.84″]					
TF40	TLC18M-50L	42 [1.59″]	137 [5.39″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TF50		53 [2.09″]	142 [5.59″]					
TF75		77 [3.03″]	143 [5.63″]					
TF40	TLC18M-50I	42 [1.59″]	142 [5.59″]	M16× P1.0	6 [0.24″]	31 [1.22″]	16 [0.63″]	50 [1.97″]
TF50		53 [2.09″]	147 [5.79″]					
TF75		77 [3.03″]	148 [5.83″]					



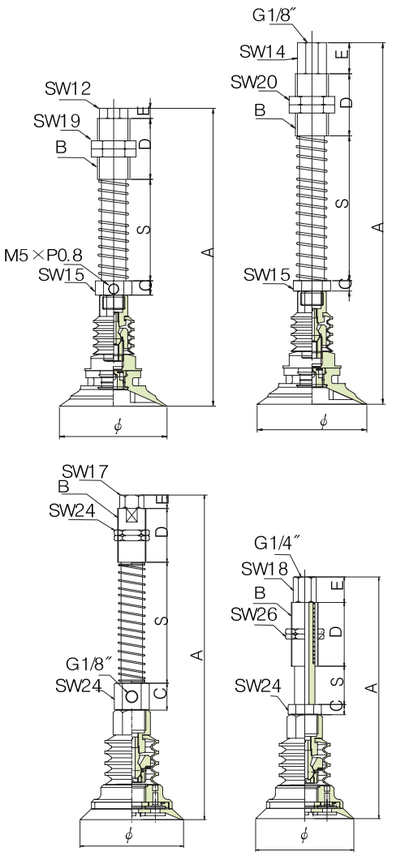
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TF75	TLC12M-30L	42 [1.59″]	147 [5.79″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	30 [1.18″]
TF110		53 [2.09″]	150 [5.91″]					
TF150		77 [3.03″]	154 [6.06″]					
TF75	TLC12M-50L	77 [3.03″]	187 [7.36″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	50 [1.97″]
TF110		112 [4.41″]	190 [7.48″]					
TF150		152 [5.98″]	194 [7.64″]					
TF75	TLC12M-30I	77 [3.03″]	135 [5.31″]	M22× P1.5	8 [0.31″]	50 [0.97″]	20 [0.79″]	30 [1.18″]
TF110		112 [4.41″]	138 [5.43″]					
TF150		152 [5.98″]	142 [5.59″]					

Model TF Type

Dimensional information included Level Compensator & Ball Joint



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TF40	TLC18M-5L TBJ18	42 [1.59″]	83 [3.27″]	M10× P1.0	15 [0.06″]	19 [0.75″]	3 [0.12″]	5 [0.20″]
TF50		53 [2.09″]	89 [3.50″]					
TF75		77 [3.03″]	88 [3.46″]					
TF40	TLC18M-10I TBJ18	42 [1.59″]	99 [3.90″]	M14× P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TF50		53 [2.09″]	104 [4.09″]					
TF75		77 [3.03″]	104 [4.09″]					
TF40	TLC18M-20I TBJ18	42 [1.59″]	122 [4.80″]	M16× P1.0	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TF50		53 [2.09″]	127 [5.00″]					
TF75		77 [3.03″]	127 [5.00″]					



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TF40	TLC18M-30L TBJ18	42 [1.59″]	144 [5.67″]	M14× P1.5	15 [0.06″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TF50		53 [2.09″]	149 [5.87″]					
TF75		77 [3.03″]	149 [5.87″]					
TF40	TLC18M-50L TBJ18	42 [1.59″]	164 [6.46″]	M14× P1.5	11 [0.43″]	35 [1.38″]	6 [0.24″]	50 [1.97″]
TF50		53 [2.09″]	169 [6.65″]					
TF75		77 [3.03″]	169 [6.65″]					
TF40	TLC18M-50I TBJ18	42 [1.59″]	169 [6.65″]	M16× P1.0	6 [0.24″]	35 [1.38″]	16 [0.63″]	50 [1.97″]
TF50		53 [2.09″]	174 [6.85″]					
TF75		77 [3.03″]	174 [6.85″]					

Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TF75	TLC12M-30L TBJ12	77 [3.03″]	191 [7.50″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	30 [1.18″]
TF110		112 [4.41″]	194 [7.64″]					
TF150		152 [5.98″]	198 [7.78″]					
TF75	TLC12M-50L TBJ12	77 [3.03″]	231 [9.14″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	50 [1.97″]
TF110		112 [4.41″]	234 [9.26″]					
TF150		152 [5.98″]	238 [9.30″]					
TF75	TLC12M-30I TBJ12	77 [3.03″]	179 [7.05″]	M22× P1.5	8 [0.31″]	50 [1.97″]	20 [0.79″]	30 [1.18″]
TF110		112 [4.41″]	182 [7.17″]					
TF150		152 [5.98″]	186 [7.30″]					

③ Model TOC Type

• Features and Application

As an oval type, use for the objects to be handled with longish and slightly curved surface.
To be used when the direction requirement is necessary.

• Use of Application

– curved glass, auto's plate, doors, refrigerator, TV monitors, auto's bumper, etc.

Ordering Information

①	②	③	④	⑤	⑥
TOC36×90	-N	-18F	-CV	-	-
①Pad Diameter Ø	**② Material**	**③ Thread Size**		**⑤Level Compensator**	**⑥ Ball Joint**
TOC36×90 : 38×93 TOC36×110 : 38×113 TOC60×140 : 62×143 TOC60×180 : 62×183	N : NBR S : Silicon U : Urethane C.S : C.Silicon	18F : Female thread 1/8″ 38F : Female thread 3/8″		_	_
		④ Check Valve			
		– CV : With check valve – None : No check valve			

Model TOC Type

• Lifting Force (Kg) at vacuum level

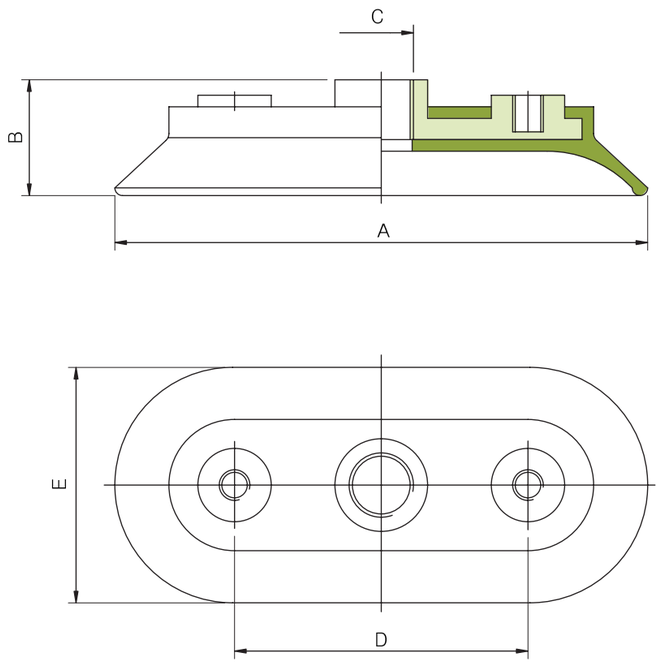
Model	Perpendicular			Parallel			Volume cm³	Min. Radial Motion (mm) (inches)	Remarks
	-20kpa	-60kpa	-90kpa	-20kpa	-60kpa	-90kpa			
TOC36×90	5	11.93	17.44	5.41	11.4	15	20	—	
TOC36×110	6.3	17	22	8.8	21	26	25	—	
TOC60×140	13.47	38.06	53.06	18.98	38.1	52.0	52	200 [7.87″]	
TOC60×180	19.3	54	76	27	54.4	74	67	250 [9.84″]	

Model TOC Type

• Dimensional information included Fitting

Medium Female Thread

Model	ØA	B	C	D	E
TOC36×90	95 [3.74″]	23 [0.91″]	G1/8″ [1.59″]	57 [2.24″]	38 [1.50″]
TOC36×110	115 [4.57″]	23 [0.91″]	G3/8″ [2.09″]	77 [3.03″]	38 [1.50″]
TOC60×140	140 [5.51″]	32 [1.26″]	G3/8″ [3.03″]	77 [3.03″]	62 [2.44″]
TOC60×180	180 [7.09″]	32 [1.26″]	G3/8″ [3.03″]	116 [4.57″]	62 [2.44″]



4 Model TB Type

• Features and Application

For 1(one) ~ 2(two) ea of bellows, this can handle the objects with height differences.
TB vacuum pad series enable you to handle various types of objects to be handled with irregular surfaces.
Also suitable for handling thin products.

• Use of Application

– glass sheet, plastics, milk package, curved glasses, corrugated cardboard, paper box, electronic parts, thin film lifting

Ordering Information

①	②	③	④	⑤	⑥
TB-50	-N	-18M	-CV	-TLC18M20I	

① Pad Diameter Ø	② Material	③ Thread Size	⑤ Level Compensator	⑥ Ball Joint
TB 5 : 5Ø [0.20″] TB 8 : 8Ø [0.31″] TB 10 : 10Ø [0.39″] TB 15 : 15Ø [0.59″] TB 20 : 20Ø [0.79″] TB 30 : 30Ø [1.18″] TB 40 : 40Ø [1.57″] TB 50 : 50Ø [1.97″] TB 75 : 75Ø [2.95″] TB 110 : 110Ø [4.33″] TB 150 : 150Ø [5.91″]	N : NBR S : Silicon U : Urethane C.S : C.Silicon E : EPDM	M5M : Male thread M5 18M : Male thread G1/8″ 18F : Female thread G1/8″ 14M : Male thread G1/4″ 38M : Male thread G3/8″ 38F : Female thread G3/8″ 12F : Female thread G1/2″ **④ Check Valve** -CV : With check valve - None : No check valve	TLC : TOTAL Level Compensator M5F7 I : M5×7 Stroke M5F15 I : M5×15 Stroke M5M10 I : M5×10Stroke M5M20 I : M5×20 Stroke 18F5 L : 18F×5 Stroke 18M10 I : 18M×10 Stroke 18M20 I : 18M×20 Stroke 18M30 L : 18M×30 Stroke 18M50 L : 18M×50 Stroke 18M50 I : 18M×50 Stroke 12M30 L : 12M×30 Stroke 12M50 L : 12M×50 Stroke 12M30 I : 12M×30 Stroke (Possible Option Stroke)	

Model TB Type

• Lifting Force (Kg) at vacuum level

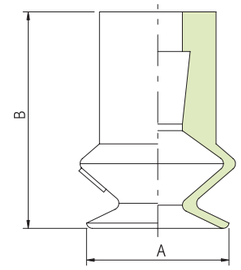
Model	Perpendicular			Parallel			Volume	Min. Radial Motion (mm) (inches)	Remarks
	-20kpa	-60kpa	-90kpa	-20kpa	-60kpa	-90kpa	cm^3		
TB5	0.03	0.08	0.1	–	–	–	0.05	1.4 [0.06″]	
TB8	0.08	0.16	0.26	–	–	–	0.15	1.8 [0.07″]	
TB10	0.15	0.35	0.5	–	–	–	0.4	4 [0.16″]	
TB15	0.3	0.6	0.91	–	–	–	1.1	4.8 [0.19″]	
TB20	0.6	1	1.43	–	–	–	2.7	10 [0.39″]	
TB30	1.22	2.24	2.76	–	–	–	10	15 [0.59″]	
TB40	2.24	3.98	5	–	–	–	15	20 [0.79″]	
TB50	3.37	6.63	8.37	–	–	–	32	30 [1.18″]	
TB75	7.55	17.1	23.1	–	–	–	110	40 [1.57″]	
TB110	14	35	47.1	–	–	–	310	60 [2.36″]	
TB150	30	70	90.1	–	–	–	650	75 [2.95″]	

Model TB Type

• Dimensional information

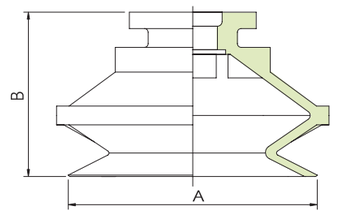
Very Small Pad(Ø2[0.08″]~Ø15[0.59″])

Model	ØA	B
TB5	Ø5.5 [3.74″]	9.5 [3.74″]
TB8	Ø8.7 [4.57″]	12 [4.57″]
TB10	Ø11 [5.51″]	16 [5.51″]
TB15	Ø16 [7.09″]	20 [7.09″]



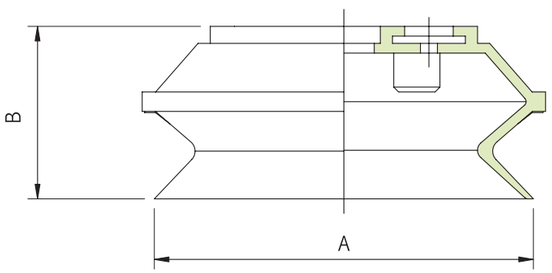
Small Pad(Ø20[0.79″]~Ø50[1.97″])

Model	ØA	B
TB20	Ø22 [0.87″]	20 [0.79″]
TB30	Ø32 [1.26″]	26 [1.02″]
TB40	Ø42 [1.65″]	28 [1.10″]
TB50	Ø53 [2.09″]	35 [1.38″]



Medium·Large Pad(Ø75[2.95″]~Ø130[5.12″])

Model	ØA	B
TB75	Ø78 [3.07″]	37 [1.46″]
TB110	Ø116 [4.57″]	54 [2.13″]
TB150	Ø156 [6.14″]	71 [2.80″]

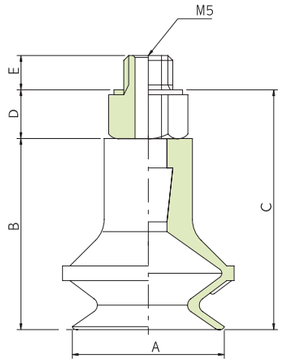


Model TB Type

• Dimensional information included Fitting

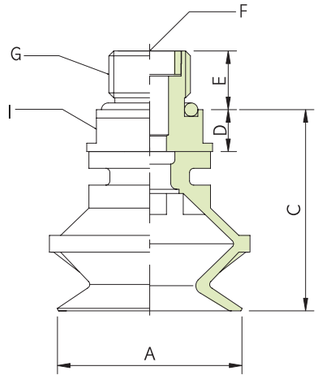
Very Small Male Thread

Model	ØA	B	C	D	E
TB5-M5	5.5 [0.22"]	9.5 [0.37"]	13.5 [0.53"]	4 [0.16"]	4 [0.16"]
TB8-M5	8.7 [0.34"]	12 [0.47"]	16 [0.63"]	4 [0.16"]	4 [0.16"]
TB10-M5	11 [0.43"]	16 [0.63"]	21 [0.83"]	5 [0.20"]	4 [0.16"]
TB15-M5	16 [0.63"]	20 [0.79"]	25 [0.98"]	5 [0.20"]	4 [0.16"]



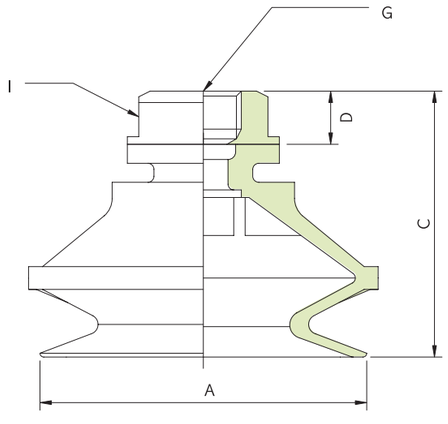
Small Male Thread

Model	ØA	C	D	E	F	G	I
TB20-M5-18F	22 [0.87"]	22 [0.87"]	2 [0.08"]	7 [0.28"]	M5	G1/8"	SW12
TB30-18M	32 [1.26"]	31 [1.22"]	5 [0.20"]	7 [0.28"]	–	G1/8"	SW17
TB30-14M	32 [1.26"]	32 [1.26"]	6 [0.24"]	9 [0.35"]	–	G1/4"	SW17
TB40-18M	42 [1.65"]	33 [1.30"]	5 [0.20"]	7 [0.28"]	–	G1/8"	SW17
TB40-14M	42 [1.65"]	34 [1.34"]	6 [0.24"]	9 [0.35"]	–	G1/4"	SW17
TB50-14M	53 [2.09"]	41 [1.61"]	6 [0.24"]	9 [0.35"]	–	G1/4"	SW24
TB50-38M	53 [2.09"]	41 [1.61"]	6 [0.24"]	9 [0.35"]	–	G3/8"	SW24



Very Small Female Thread

Model	ØA	C	D	G	I
TB20-M5F	22 [0.87"]	28 [1.10"]	8 [0.31"]	G1/8"	SW12
TB30-18F	32 [1.26"]	36 [1.42"]	10 [0.39"]	G1/8"	SW17
TB40-18F	42 [1.65"]	38 [1.50"]	10 [0.39"]	G1/8"	SW17
TB50-18F	53 [2.09"]	45 [1.77"]	12 [0.47"]	G1/8"	SW24

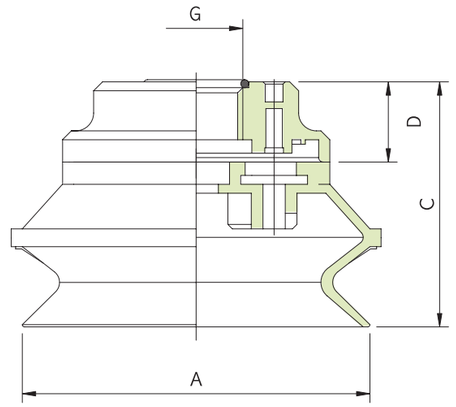


Model TB Type

• Dimensional information included Fitting

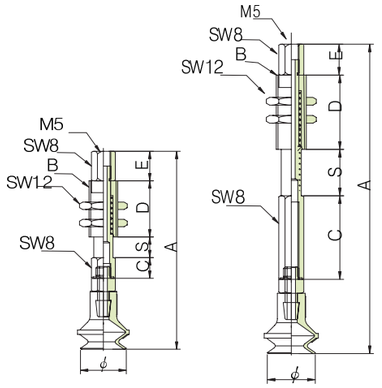
Medium Male Thread

Model	ØA	C	D	G
TB75-18F	78 [3.07"]	57 [2.24"]	20 [0.79"]	G1/8"
TB75-14F	78 [3.07"]	57 [2.24"]	20 [0.79"]	G1/4"
TB75-38F	78 [3.07"]	57 [2.24"]	20 [0.79"]	G3/8"
TB75-12F	78 [3.07"]	57 [2.24"]	20 [0.79"]	G1/2"
TB110-12F	116 [4.57"]	74 [2.91"]	20 [0.79"]	G1/2"
TB150-12F	156 [6.14"]	91 [3.58"]	20 [0.79"]	G1/2"

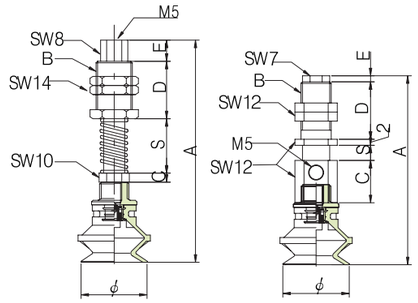


Model TB Type

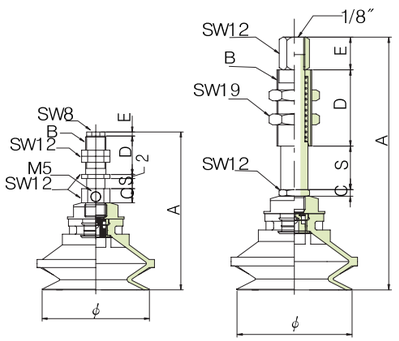
● Dimensional information included Level Compensator



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TB5	TLCM5F-7I	5.5 [0.22"]	57 [2.24"]	M8× P1.25	7 [0.28"]	19 [0.75"]	10 [0.39"]	7 [0.28"]
TB8		8.5 [0.33"]	59 [2.32"]					
TB10		11 [0.43"]	65 [2.56"]					
TB15		16 [0.63"]	68 [2.68"]					
TB5	TLCM5F-15I	5.5 [0.22"]	89 [3.50"]	M8× P1.0	27 [1.06"]	24 [0.94"]	10 [0.39"]	15 [0.59"]
TB8		8.7 [0.34"]	91 [3.58"]					
TB10		11 [0.43"]	97 [3.82"]					
TB15		16 [0.63"]	100 [3.94"]					



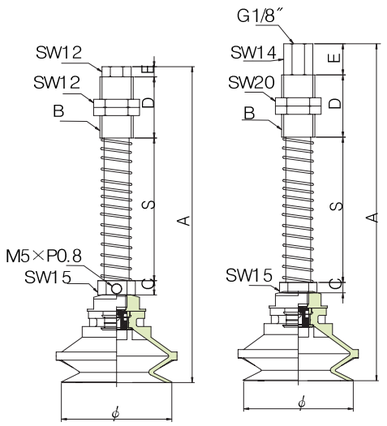
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TB20	TLCM5M-10I	22 [0.87"]	74 [2.91"]	M12× P1.0	3 [0.12"]	19 [0.75"]	7 [0.28"]	10 [0.39"]
	TLCM5M-20I	22 [0.87"]	84 [3.31"]	M12× P1.0	3 [0.12"]	19 [0.75"]	7 [0.28"]	20 [0.79"]
TB20	TLC18F-5L	22 [0.87"]	63 [2.48"]	M10× P1.0	15 [0.59"]	19 [0.75"]	3 [0.12"]	5 [0.20"]



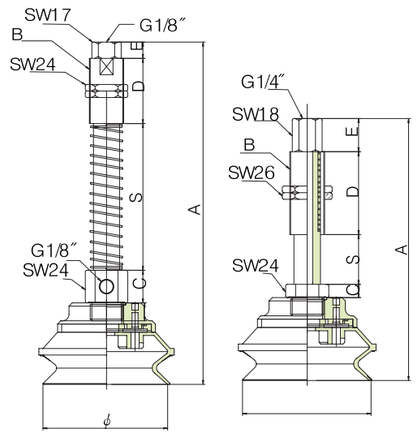
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TB30	TLC18M-5L	32 [1.26"]	69 [2.72"]	M10× P1.0	7 [0.28"]	18 [0.71"]	2 [0.08"]	5 [0.20"]
TB40		42 [1.65"]	71 [2.80"]					
TB50		53 [2.09"]	79 [3.11"]					
TB75		78 [3.07"]	85 [3.35"]					
TB30	TLC18M-10I	32 [1.26"]	85 [3.35"]	M14× P1.5	4 [0.16"]	35 [1.38"]	16 [0.63"]	10 [0.39"]
TB40		42 [1.65"]	87 [3.43"]					
TB50		53 [2.09"]	95 [3.74"]					
TB75		78 [3.07"]	100 [3.94"]					
TB30	TLC18M-20I	32 [1.26"]	108 [4.25"]	M16× P1.0	4 [0.16"]	35 [1.38"]	16 [0.63"]	20 [0.79"]
TB40		42 [1.65"]	110 [4.33"]					
TB50		53 [2.09"]	118 [4.65"]					
TB75		78 [3.07"]	124 [4.88"]					

Model TB Type

● Dimensional information included Level Compensator



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TB30	TLC18M-30L	32 [1.26"]	130 [5.12"]	M14× P1.5	11 [0.43"]	31 [1.22"]	6 [0.24"]	30 [1.18"]
TB40		42 [1.65"]	132 [5.12"]					
TB50		53 [2.09"]	140 [5.51"]					
TB75		78 [3.07"]	146 [5.75"]					
TB30	TLC18M-50L	32 [1.26"]	150 [5.91"]	M14× P1.5	11 [0.43"]	31 [1.22"]	6 [0.24"]	50 [1.97"]
TB40		42 [1.65"]	152 [5.98"]					
TB50		53 [2.09"]	160 [6.30"]					
TB75		78 [3.07"]	166 [6.54"]					
TB30	TLC18M-50I	32 [1.26"]	155 [6.10"]	M16× P1.0	6 [0.24"]	31 [1.22"]	16 [0.63"]	50 [1.97"]
TB40		42 [1.65"]	157 [6.18"]					
TB50		53 [2.09"]	165 [6.50"]					
TB75		78 [3.07"]	171 [6.73"]					



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TB75	TLC12M-30L	78 [3.07"]	171 [6.73"]	M20× P1.5	20 [0.79"]	40 [1.57"]	10 [0.39"]	30 [1.18"]
TB110		116 [4.57"]	184 [7.24"]					
TB150		156 [6.14"]	199 [7.83"]					
TB75	TLC12M-50L	78 [3.07"]	211 [8.31"]	M20× P1.5	20 [0.79"]	40 [1.57"]	10 [0.39"]	50 [1.97"]
TB110		116 [4.57"]	224 [8.82"]					
TB150		156 [6.14"]	239 [9.41"]					
TB75	TLC12M-30I	78 [3.07"]	159 [6.26"]	M22× P1.5	8 [0.31"]	50 [1.97"]	20 [0.79"]	30 [1.18"]
TB110		116 [4.57"]	172 [6.77"]					
TB150		156 [6.14"]	187 [7.36"]					

5 Model TD Type

• Features and Application

For having large internal volume, TD is suitable for handling the objects to be handled with longish and peaky like the top of egg.

• Use of Application

– metal sphere, large curved metal sheet, box packaging

Ordering Information

①	②	③	④	⑤	⑥
TD15	-N	-18M	-CV	-TLC18M30L	-TBJ 18

① Pad Diameter Ø	② Material	③ Thread size	⑤ Level Compensator	⑥ Ball Joint
TD15 : 15Ø [0.59″] TD20 : 20Ø [0.79″] TD30 : 30Ø [1.18″] TD50 : 50Ø [1.97″]	N : NBR S : Silicon U : Urethane C.S : C.Silicon E : EPDM	M5M : Male Thread M5 M5F : Female Thread M5 18M : Male Thread G1/8″ 18F : Female Thread G1/8″ 14M : Male Thread G1/4″ 38M : Male Thread G3/8″	TLC : TOTAL Level Compensator 18M5 L : 18M×5 Stroke 18M10 L : 18M×10 Stroke 18M20 L : 18M×20 Stroke 18M30 L : 18M ×30 Stroke 18M50 L : 18M ×50 Stroke 18M50 I : 18M×50 Stroke (Possible Option Stroke)	TBJ18 : Ball Joint 1/8″

④ Check Valve

- CV : With check valve
- None : No check valve

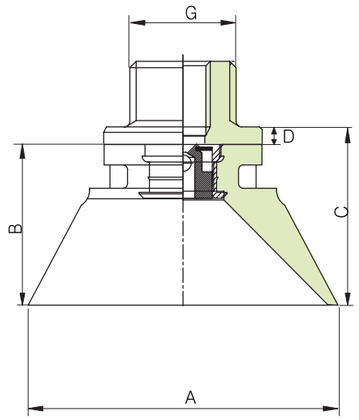
• Lifting Force (Kg) at vacuum level

Model	Perpendicular			Parallel			Volume cm³	Min. Radial Motion (mm) (inches)	Remarks
	-20kpa	-60kpa	-90kpa	-20kpa	-60kpa	-90kpa			
TD15	0.3	0.8	1.12	—	—	—	0.9	6.0 [0.24″]	
TD20	0.6	1.53	1.84	—	—	—	2.5	8.0 [0.31″]	
TD30	1.43	2.7	3.16	—	—	—	5.0	13 [0.51″]	
TD50	3.67	7.96	10	—	—	—	15	25 [0.98″]	

Model TD Type

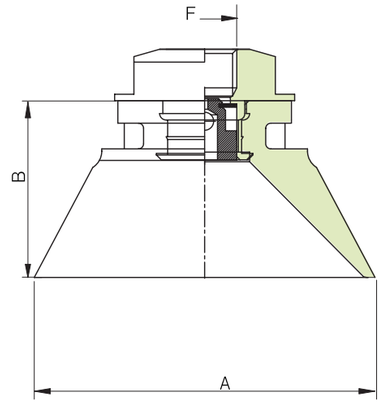
• Dimensional information

Model	ØA	B	C	D	G
TD20-18M	22 [0.87″]	13 [0.51″]	25 [0.98″]	12 [0.47″]	G1/8″
TD30-18M	32 [1.26″]	19 [0.75″]	31 [1.22″]	12 [0.47″]	G1/8″
TD50-14M	53 [2.09″]	31.5 [1.24″]	46.5 [1.83″]	15 [0.59″]	G1/4″
TD50-38M	53 [2.09″]	31.5 [1.24″]	47.5 [1.87″]	16 [0.63″]	G3/8″



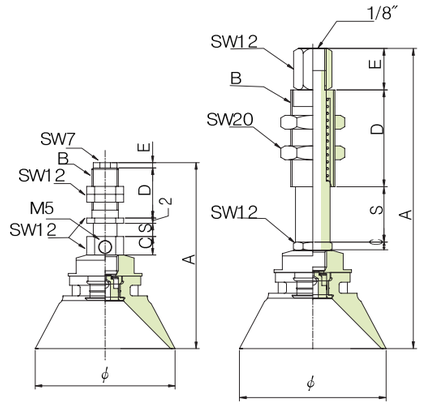
Small Female Thread

Model	ØA	B	F
TD20-M5	22 [0.87″]	20 [0.79″]	M5
TD30-M5	32 [1.26″]	26 [1.02″]	M5
TD50-18F	53 [2.09″]	39.5 [1.56″]	G1/8″

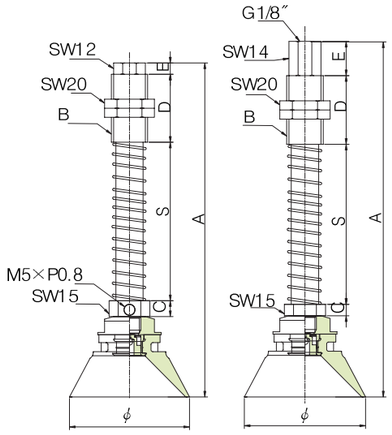


Model TD Type

● Dimensional information included Level Compensator



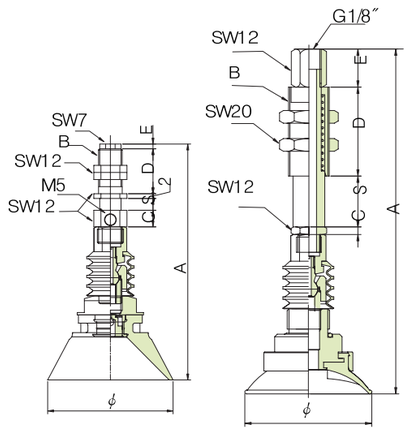
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TD20	TLC18M-5L	22 [0.87″]	60 [2.36″]	M10× P1.0	15 [0.59″]	19 [0.75″]	3 [0.12″]	5 [0.20″]
TD30		32 [1.26″]	60 [2.36″]					
TD50		53 [2.09″]	60 [2.36″]					
TD30	TLC18M-10I	32 [1.26″]	76 [2.99″]	M14 ×P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TD50		53 [2.09″]	76 [2.99″]					
TD30	TLC18M-20I	32 [1.26″]	99 [3.90″]	M16 ×P1.0	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TD50		53 [2.09″]	99 [3.90″]					



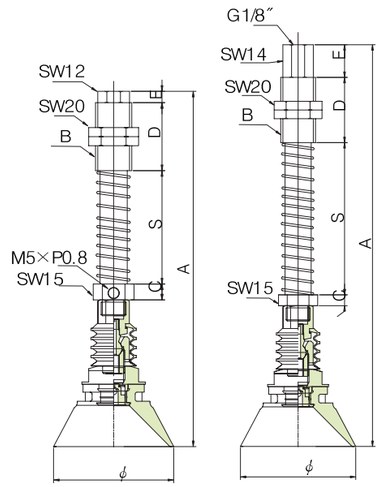
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TD30	TLC18M-30L	32 [1.26″]	121 [4.76″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TD50		53 [2.09″]	121 [4.76″]					
TD30	TLC18M-50L	32 [1.26″]	141 [5.55″]	M14 ×P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TD50		53 [2.09″]	141 [5.55″]					
TD30	TLC18M-50I	32 [1.26″]	146 [5.75″]	M16 ×P1.0	6 [0.24″]	31 [1.22″]	16 [0.63″]	50 [1.97″]
TD50		53 [2.09″]	146 [5.75″]					

Model TD Type

● Dimensional information included Level Compensator & Ball joint



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TD30	TLC18M-5L TBJ18	32 [1.26″]	87 [3.43″]	M10× P1.0	15 [0.59″]	19 [0.75″]	3 [0.12″]	5 [0.20″]
TD50		53 [2.09″]	87 [3.43″]					
TD30	TLC18M-10I TBJ18	32 [1.26″]	103 [4.06″]	M14× P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TD50		53 [2.09″]	103 [4.06″]					
TD30	TLC18M-20I TBJ18	32 [1.26″]	126 [4.96″]	M16× P1.0	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TD50		53 [2.09″]	126 [4.96″]					



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TD30	TLC18M-30L TBJ18	32 [1.26″]	148 [5.83″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TD50		53 [2.09″]	148 [5.83″]					
TD30	TLC18M-50L TBJ18	32 [1.26″]	168 [6.61″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TD50		53 [2.09″]	168 [6.61″]					
TD30	TLC18M-50I TBJ18	32 [1.26″]	173 [6.81″]	M16× P1.0	6 [0.24″]	31 [1.22″]	16 [0.63″]	50 [1.97″]
TD50		53 [2.09″]	173 [6.81″]					

⑥ Model TBL Type

• Features and Application

With 4 ea of bellows, this TBL suction cup can handle the large objects with height differences like TB vacuum pad's use.
Suitable for handling fragile objects to be handled by having a certain degree of shock absorption.

• Use of Application

– smooth material, fragile eggs, cup of glass, plate of glass, ice cream, etc.

Ordering Information

①	②	③	④	⑤	⑥
TBL20	– N	– 18M	– CV	– TLC18M30L	

① Pad Diameter Ø	② Material	③ Thread Size	⑤ Level Compensator	⑥ Ball Joint
TBL20 [0.79″] TBL30 [1.18″] TBL40 [1.57″]	N : NBR S : Silicon U : Urethane C.S : C.Silicon E : EPDM	M5F : Female Thread M5 18M : Male Thread G1/8″ 18F : Female Thread G1/8″ 14M : Male Thread G1/4″ 38M : Male Thread 3/8″	TLC : TOTAL Level Compensator M5M10 I : M5M×10Stroke M5M20 I : M5M×20 Stroke 18F5 L : 18F ×5 Stroke 18M5 L : 18M×5 Stroke 18M10 I : 18M×10 Stroke 18M20 I : 18M×20 Stroke 18M30 L : 18M×30 Stroke 18M50 L : 18M×50 Stroke 18M50 I : 18M×50 Stroke (Possible Option Stroke)	

④ Check Valve
– CV : With check valve
– None : No check valve

Model TBL Type

• Lifting Force (Kg) at vacuum level

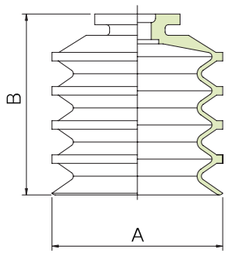
Model	Perpendicular			Parallel			Volume cm³	Min. Radial Motion (mm) (inches)	Remarks
	–20kpa	–60kpa	–90kpa	–20kpa	–60kpa	–90kpa			
TBL20	0.03	0.06	—	—	—	—	4.0	4.0 [0.16″]	
TBL30	0.07	0.16	—	—	—	—	13	8.0 [0.31″]	
TBL40	0.11	0.22	—	—	—	—	27	15 [0.59″]	

Model TBL Type

• Dimensional information

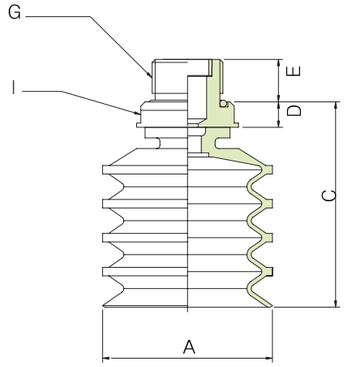
Small Male Thread(Ø20[0.79″] ~ Ø40[1.57″])

Model	ØA	B
TBL20	21 [0.83″]	22 [0.87″]
TBL30	31 [1.22″]	33 [1.30″]
TBL40	41 [1.61″]	43 [1.69″]



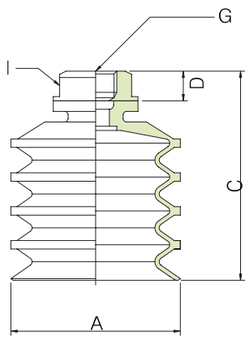
Small Male Thread

Model	ØA	C	D	E	G	I
TBL20-18M	21 [0.83″]	35 [1.38″]	5 [0.20″]	7 [0.28″]	G1/8″	SW12
TBL30-14M	31 [1.22″]	38 [1.50″]	6 [0.24″]	9 [0.35″]	G1/4″	SW17
TBL30-38M	31 [1.22″]	38 [1.50″]	6 [0.24″]	10 [0.39″]	G3/8″	SW24
TBL40-14M	41 [1.61″]	48 [1.89″]	6 [0.24″]	9 [0.35″]	G1/4″	SW24
TBL40-38M	41 [1.61″]	48 [1.89″]	6 [0.24″]	10 [0.39″]	G3/8″	SW24



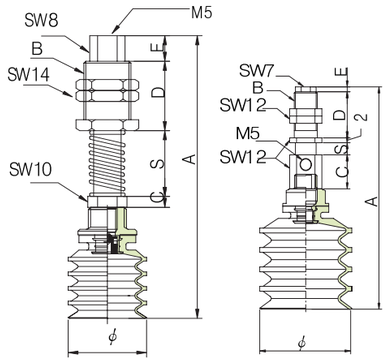
Small Female Thread

Model	ØA	C	D	G	I
TBL20-M5	21 [0.83″]	29 [1.14″]	6 [0.24″]	M5	SW12
TBL30-18F	31 [1.22″]	39 [1.54″]	7 [0.28″]	G1/8″	SW17
TBL40-18F	41 [1.61″]	49 [1.93″]	7 [0.28″]	G1/8″	SW17

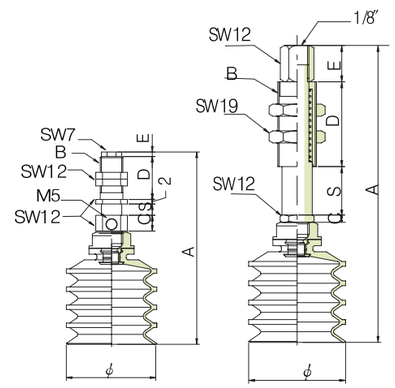


Model TBL Type

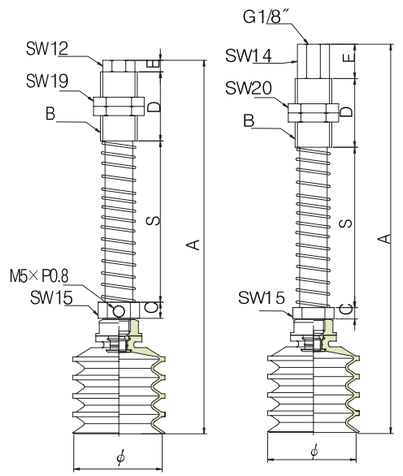
• Dimensional information included Level Compensator



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TBL20	TLCM5M-10 I	21 [0.83″]	78 [3.07″]	M12× P1.0	3 [0.12″]	19 [0.75″]	7 [0.28″]	10 [0.39″]
	TLCM5M-20 I	21 [0.83″]	88 [3.46″]	M12× P1.0	3 [0.12″]	19 [0.75″]	7 [0.28″]	20 [0.79″]
TBL20	TLC18F-5 L	21 [0.83″]	67 [2.64″]	M10× P1.0	15 [0.59″]	19 [0.75″]	3 [0.12″]	5 [0.20″]



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TBL30	TLC18M-5 L	31 [1.22″]	75 [2.95″]	M10× P1.0	15 [0.59″]	19 [0.75″]	3 [0.12″]	5 [0.20″]
TBL40		41 [1.61″]	85 [3.35″]					
TBL50		51 [2.01″]	96 [3.78″]					
TBL30	TLC18M-10 I	31 [1.22″]	91 [3.58″]	M14×P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TBL40		41 [1.61″]	100 [3.94″]					
TBL50		51 [2.01″]	112 [4.41″]					
TBL30	TLC18M-20 I	31 [1.22″]	114 [4.49″]	M16× P1.0	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TBL40		41 [1.61″]	124 [4.88″]					
TBL50		51 [2.01″]	135 [5.31″]					



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TBL30	TLC18M-30 L	31 [1.22″]	136 [5.35″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TBL40		41 [1.61″]	146 [5.75″]					
TBL50		51 [2.01″]	157 [6.18″]					
TBL30	TLC18M-50 L	31 [1.22″]	156 [6.14″]	M14×P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TBL40		41 [1.61″]	166 [6.54″]					
TBL50		51 [2.01″]	177 [6.97″]					
TBL30	TLC18M-50 I	31 [1.22″]	161 [6.34″]	M16× P1.0	6 [0.24″]	31 [1.22″]	16 [0.63″]	50 [1.97″]
TBL40		41 [1.61″]	171 [6.73″]					
TBL50		51 [2.01″]	182 [7.17″]					

7 Model TFC Type

• Features and Application

With slightly curved and "TF" type of cleats in the base side, can handle both of flat and curved objects at the same time.
Designed to fit for perpendicular and horizontal lifting, and be used mainly for auto manufacturing process

• Use of Application

– auto's glass, auto's roof, auto's door, metal sheet lifting, feeding metal sheet into press, curved metal sheet, mechanical industry field.

Ordering Information

①	②	③	④	⑤	⑥
TFC35	-N	-18F	-CV	-TLC18M30L	-TBJ18
① Pad Diameter Ø	**② Material**	**③ Thread Size**		**⑤ Level Compensator**	**⑥ Ball Joint**
TFC35 : 35Ø [1.38″]	N : NBR	18F : Female Thread 1/8″		TLC : TOTAL Level Compensator	TBJ18 : Ball Joint 1/8″
TFC50 : 50Ø [1.38″]	S : Silicon	14M : Male Thread 1/4″		18M10 L : 18M×10 Stroke	
TFC75 : 75Ø [1.38″]		38M : Male Thread 3/8″		18M20 L : 18M×20 Stroke	TBJ12 : Ball Joint 1/2″
TFC100 : 100Ø [1.38″]	U : Urethane	12F : Female Thread 1/2″		18M30 L : 18M×30 Stroke	
	C.S : C.Silicon	38F : Female Thread 3/8″		18M50 L : 18M×50 Stroke	
	E : EPDM			18M50 L : 18M×50 Stroke	
				12M30 L : 12M×30 Stroke	
				12M50 L : 12M×50 Stroke	
				12M30 L : 12M×30 Stroke	
		④ Check Valve		(Possible Option Stroke)	
		-CV : With check valve			
		-None : No check valve			

Model TFC Type

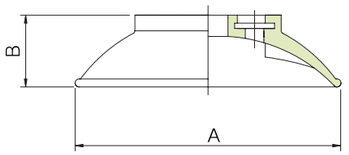
• Lifting Force (Kg) at vacuum level

Model	Perpendicular			Parallel			Volume cm³	Min. Radial Motion (mm) (inches)	Remarks
	-20kpa	-60kpa	-90kpa	-20kpa	-60kpa	-90kpa			
TFC35	1.16	3.67	5.2	2.76	5.2	6.33	5.0	32 [1.26″]	
TFC50	2.86	7.86	10.51	5	8.37	10.2	10	53 [2.09″]	
TFC75	7.45	16.02	21.94	10.92	20.41	23.47	30	78 [3.07″]	
TFC100	13.98	28.98	38.47	17.96	32.45	42.86	80	110 [4.33″]	

• Dimensional information

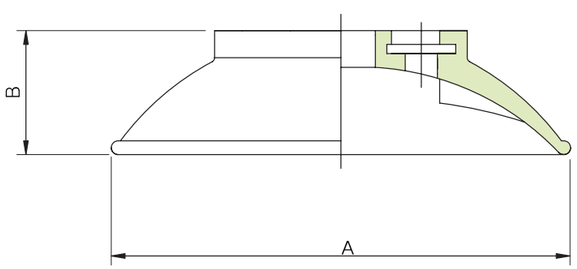
Small (Ø35 [1.38″] ~ Ø50 [1.97″])

Model	ØA	B
TFC35	36.5 [1.44″]	15 [0.59″]
TFC50	51 [2.01″]	16.5 [0.65″]



Large (Ø75 [2.95″] ~ Ø100 [3.94″])

Model	ØA	B
TFC75	77 [3.03″]	23.5 [0.93″]
TFC100	100 [3.94″]	27 [1.05″]

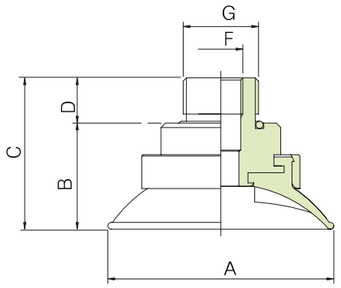


Model TFC Type

• Dimensional information included Fitting

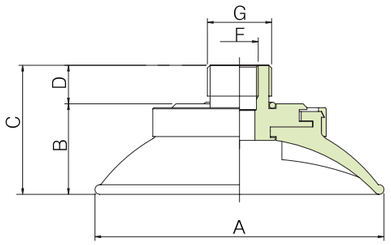
Small Male Thread

Model	ØA	B	C	D	F	G
TFC50-38M	51 [2.01″]	16.5 [0.65″]	27 [1.06″]	10 [0.39″]	G1/8″	G3/8″



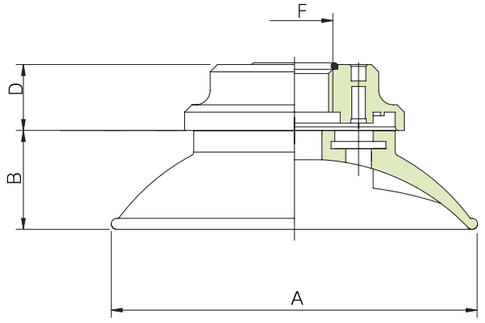
Large Male Thread

Model	ØA	B	C	D	F	G
TFC75-38M	77 [3.03″]	23.5 [0.93″]	34 [1.34″]	10 [0.39″]	G1/8″	G3/8″



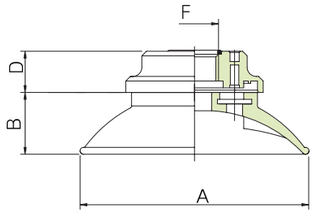
Large Female Thread

Model	ØA	B	D	F
TFC100-12M	100 [3.94″]	27 [1.06″]	17 [0.67″]	G1/2″



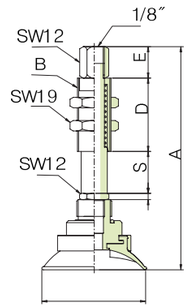
Small Female Thread

Model	ØA	B	D	F
TFC35-18F	36.5 [1.44″]	24 [0.94″]	8 [0.31″]	G1/8″

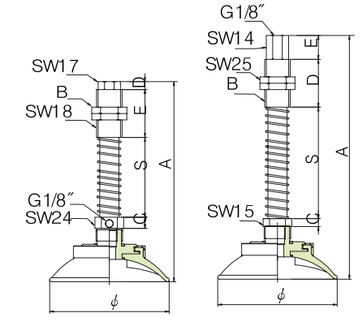


Model TFC Type

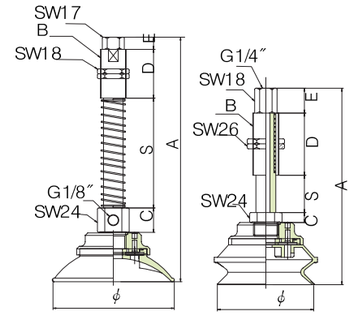
• Dimensional information included Level Compensator



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TFC35	TLC18M-10I	36.5 [1.44″]	74 [2.91″]	M14× P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TFC50		51 [2.01″]	77 [3.03″]					
TFC75		77 [3.03″]	84 [3.31″]					
TFC35	TLC18M-20I	36.5 [1.44″]	97 [3.82″]	M14×P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TFC50		51 [2.01″]	100 [3.94″]					
TFC75		77 [3.03″]	107 [4.21″]					



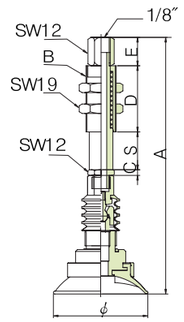
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TFC35	TLC18M-30L	36.5 [1.44″]	119 [4.69″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TFC50		51 [2.01″]	122 [4.80″]					
TFC75		77 [3.03″]	129 [5.08″]					
TFC35	TLC18M-50L	36.5 [1.44″]	139 [5.47″]	M14×P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TFC50		51 [2.01″]	142 [5.59″]					
TFC75		77 [3.03″]	149 [5.87″]					
TFC35	TLC18M-50I	36.5 [1.44″]	144 [5.67″]	M16×P1.0	6 [0.24″]	32 [1.26″]	17 [0.67″]	50 [1.97″]
TFC50		51 [2.01″]	147 [5.79″]					
TFC75		77 [3.03″]	154 [6.06″]					



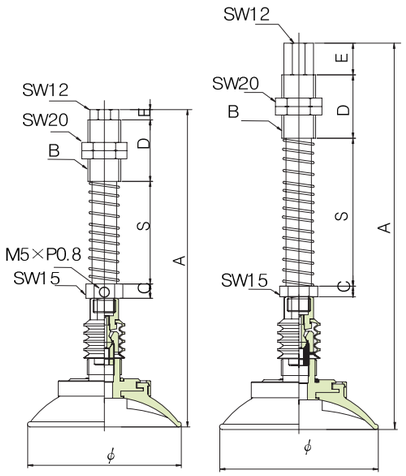
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TFC 100	TLC12M-30L	100 [3.94″]	164 [6.46″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	30 [1.18″]
TFC 100	TLC12M-50L	100 [3.94″]	204 [8.03″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	50 [1.97″]
TFC 100	TLC12M-30I	100 [3.94″]	152 [5.98″]	M20× P1.5	8 [0.31″]	50 [1.97″]	20 [0.79″]	30 [1.18″]

Model TFC Type

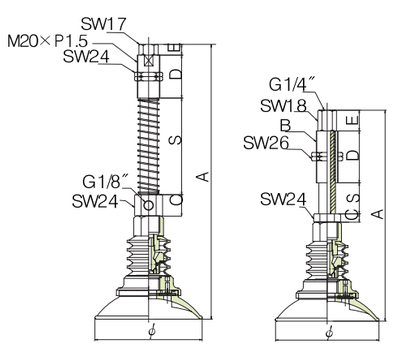
● **Dimensional information included Level Compensator & Ball Joint**



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TFC35	TLC18M-10I TBJ18	36.5 [1.44″]	102 [4.02″]	M14× P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TFC50		51 [2.01″]	104 [4.09″]					
TFC75		77 [3.03″]	111 [4.37″]					
TFC35	TLC18M-20I TBJ18	36.5 [1.44″]	124 [4.88″]	M14×P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TFC50		51 [2.01″]	127 [5.00″]					
TFC75		77 [3.03″]	133 [5.24″]					



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TFC35	TLC18M-30L TBJ18	36.5 [1.44″]	119 [4.69″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TFC50		51 [2.01″]	122 [4.80″]					
TFC75		77 [3.03″]	129 [5.08″]					
TFC35	TLC18M-50L TBJ18	36.5 [1.44″]	139 [5.47″]	M14×P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TFC50		51 [2.01″]	142 [5.59″]					
TFC75		77 [3.03″]	149 [5.87″]					
TFC35	TLC18M-50I TBJ18	36.5 [1.44″]	144 [5.67″]	M16×P1.0	6 [0.24″]	32 [1.26″]	17 [0.67″]	50 [1.97″]
TFC50		51 [2.01″]	147 [5.79″]					
TFC75		77 [3.03″]	154 [6.06″]					



Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TFC100	TLC12M-30L TBJ12	100 [3.94″]	205 [8.07″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	30 [1.18″]
TFC100	TLC12M-50L TBJ12	100 [3.94″]	245 [9.65″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	30 [1.18″]
TFC100	TLC12M-30I TBJ12	100 [3.94″]	193 [7.60″]	M22× P1.5	8 [0.31″]	50 [1.97″]	20 [0.79″]	30 [1.18″]

⑧ Model TP Type

● **Features and Application**

Suitable for handling the objects with rough surfaces like blocks of stone, aggregate, concrete, and stone.
Soft sponge type of vacuum pad's holding on rough surfaces, completely not to make a leak
Use mainly for heavy weight product.
Repairable the part of pad.

● **Use of Application**

– blocks of stone, aggregate, concrete, etc.,
lifting heavy weight materials with rough surface

Ordering Information

①	②	③	④	⑤	⑥
TP35	-N	-18F	-CV	-TLC18M30L	-TBJ18

① Pad Diameter Ø

TP35 : 35Ø [1.38″]
TP65 : 65Ø [1.38″]
TP110 : 110Ø [1.38″]
TP150 : 150Ø [1.38″]
TP200 : 200Ø [1.38″]
TP300 : 300Ø [1.38″]

② Material

N : NBR
S : Silicon
U : Urethane
C.S : C.Silicon
E : EPDM

③ Thread Size

18F : Female Thread 1/8″
12F : Female Thread 1/2″

④ Check Valve

-CV : With check valve
-None : No check valve

⑤ Level Compensator

TLC : TOTAL Level Compensator

18M5L : 18M×5 Stroke
18M10I : 18M×10 Stroke
18M20I : 18M×20 Stroke
18M30L : 18M×30 Stroke
18M50L : 18M×50 Stroke
18M50I : 18M×50 Stroke
12M30L : 12M×30 Stroke
12M50L : 12M×50 Stroke
12M30I : 12M×30 Stroke

(Possible Option Stroke등)

⑥ Ball Joint

TBJ18
: Ball Joint 1/8″

TBJ12
: Ball Joint 1/2″

Model TP Type

• Lifting Force (Kg) at vacuum level

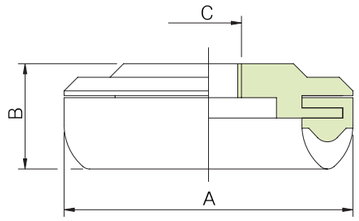
Model	Perpendicular			Parallel			Volume	Min. Radial Motion (mm) (inches)	Remarks
	-20kpa	-60kpa	-90kpa	-20kpa	-60kpa	-90kpa	cm^3		
TP35	2.04	5.1	7.14	—	—	—	6	—	
TP65	6.12	15.31	22.45	—	—	—	23	—	
TP110	18.37	45.92	67.35	—	—	—	60	—	
TP150	38.3	97.2	138.6	—	—	—	127	—	
T200	76.53	193.8	275.5	—	—	—	545	—	
TP300	163.3	438.8	653.1	—	—	—	1290	—	

Model TP Type

• Dimensional information included Fitting

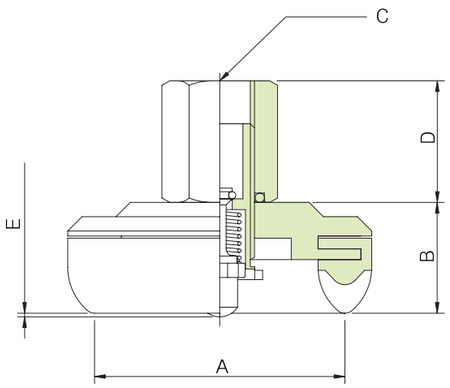
Small Female Thread

Model	ØA	B	C
TP35-18F	35 [1.38"]	15.5 [0.61"]	G1/8"
TP65-18F	65 [2.56"]	15.5 [0.61"]	G1/8"



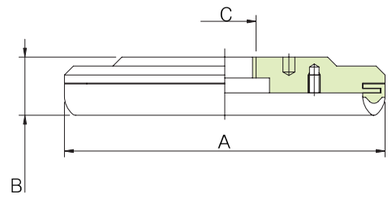
cone valve type

Model	ØA	B	C	D	E
TP35-18F-CV	35 [1.38"]	15.5 [0.61"]	G1/8"	17 [0.67"]	0.2~0.5 [0.01"][0.02"]
TP65-18F-CV	65 [2.56"]	15.5 [0.61"]	G1/8"	17 [0.67"]	0.2~0.5 [0.01"][0.02"]



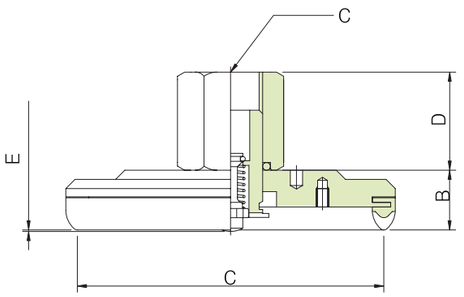
Large Female Thread

Model	ØA	B	C
TP110-12F	110 [4.33"]	19.5 [0.77"]	G1/2"
TP150-12F	150 [5.91"]	19.5 [0.77"]	G1/2"
TP200-12F	200 [7.87"]	19.5 [0.77"]	G1/2"
TP300-12F	300 [11.81"]	19.5 [0.77"]	G1/2"



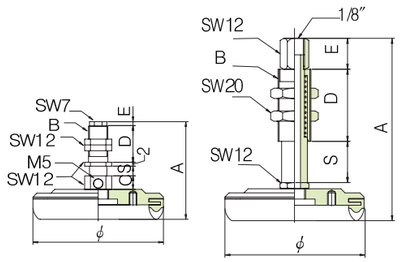
cone valve type

Model	ØA	B	C	D	E
TP110-12F-CV	110 [4.33"]	19.5 [0.77"]	G1/2"	32 [1.26"]	0.2~0.5 [0.01"][0.02"]
TP150-12F-CV	150 [5.91"]	19.5 [0.77"]	G1/2"	32 [1.26"]	0.2~0.5 [0.01"][0.02"]
TP200-12F-CV	200 [7.87"]	19.5 [0.77"]	G1/2"	32 [1.26"]	0.2~0.5 [0.01"][0.02"]
TP300-12F-CV	300 [11.81"]	19.5 [0.77"]	G1/2"	32 [1.26"]	0.2~0.5 [0.01"][0.02"]

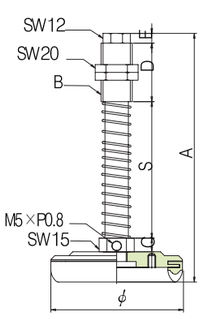


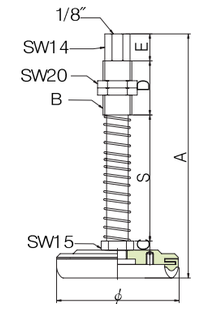
Model TP Type

● Dimensional information included level Compensator

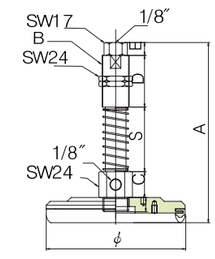


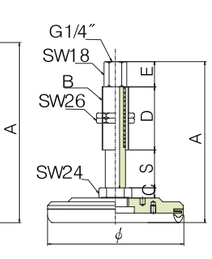
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TP35	TLC18M-5L	35 [1.38″]	51 [2.01″]	M10× P1.0	15 [0.59″]	19 [0.75″]	3 [0.12″]	5 [0.20″]
TP65		65 [2.56″]						
TP35	TLC18M-10I	35 [1.38″]	66 [2.60″]	M14× P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TP65		65 [2.56″]	66 [2.60″]					
TP35	TLC18M-20I	35 [1.38″]	89 [3.50″]	M16× P1.0	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TP65		65 [2.56″]	89 [3.50″]					





Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TP35	TLC18M-30L	35 [1.38″]	111 [4.37″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TP65		65 [2.56″]						
TP35	TLC18M-50L	35 [1.38″]	131 [5.16″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TP65		65 [2.56″]						
TP35	TLC18M-50I	35 [1.38″]	136 [5.35″]	M16× P1.0	6 [0.24″]	31 [1.22″]	16 [0.63″]	50 [1.97″]
TP65		65 [2.56″]	136 [5.35″]					

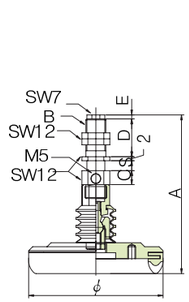


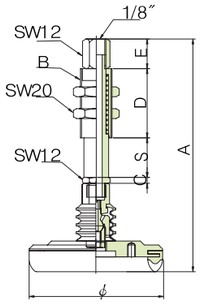


Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TP110	TLC12M-30L	110 [5.33″]	140 [5.51″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	30 [1.18″]
TP150		150 [5.91″]	140 [5.51″]					
TP200		200 [7.87″]	154 [6.06″]					
TP300		300 [11.81″]	154 [6.06″]					
TP110	TLC12M-50L	110 [4.33″]	180 [7.09″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	50 [1.97″]
TP150		150 [5.91″]	180 [7.09″]					
TP200		200 [7.87″]	195 [7.68″]					
TP300		300 [11.81″]	195 [7.68″]					
TP110	TLC12M-30I	110 [4.33″]	128 [5.04″]	M22× P1.5	8 [0.31″]	50 [1.97″]	20 [0.79″]	30 [1.18″]
TP150		150 [5.91″]	128 [5.04″]					
TP200		200 [7.87″]	143 [5.63″]					
TP300		300 [11.81″]	143 [5.63″]					

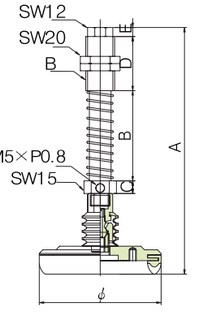
Model TP Type

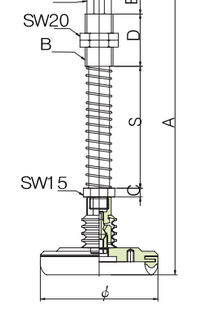
● Dimensional information included Level Compensator & Ball Joint



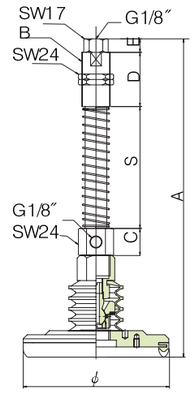


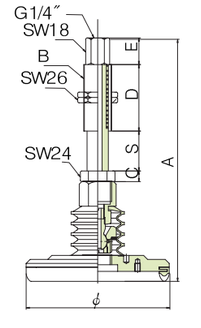
Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TP35	TLC18M-5L TBJ18	35 [1.38″]	78 [3.07″]	M10× P1.0	15 [0.59″]	19 [0.75″]	3 [0.12″]	5 [0.20″]
TP65		65 [2.56″]						
TP35	TLC18M-10I TBJ18	35 [1.38″]	93 [3.66″]	M14× P1.5	4 [0.16″]	35 [1.38″]	16 [0.63″]	10 [0.39″]
TP65		65 [2.56″]						
TP35	TLC18M-20I TBJ18	35 [1.38″]	116 [4.57″]	M16× P1.0	4 [0.16″]	35 [1.38″]	16 [0.63″]	20 [0.79″]
TP65		65 [2.56″]						





Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TP35	TLC18M-30L TBJ18	35 [1.38″]	138 [5.43″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	30 [1.18″]
TP65		65 [2.56″]						
TP35	TLC18M-50L TBJ18	35 [1.38″]	158 [6.22″]	M14× P1.5	11 [0.43″]	31 [1.22″]	6 [0.24″]	50 [1.97″]
TP65		65 [2.56″]						
TP35	TLC18M-50I TBJ18	35 [1.38″]	163 [6.42″]	M16× P1.0	6 [0.24″]	31 [1.22″]	16 [0.63″]	50 [1.97″]
TP65		65 [2.56″]						





Pad Model	Level Compensator	Dimension Ø	A	B	C	D	E	S
TP110	TLC12M-30L TBJ12	110 [4.33″]	184 [7.24″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	30 [1.18″]
TP150		150 [5.91″]						
TP200		200 [7.87″]	199 [7.83″]					
TP300		300 [11.81″]						
TP110	TLC12M-50L TBJ12	110 [4.33″]	224 [8.82″]	M20× P1.5	20 [0.79″]	40 [1.57″]	10 [0.39″]	50 [1.97″]
TP150		150 [5.91″]						
TP200		200 [7.87″]	239 [9.41″]					
TP300		300 [11.81″]						
TP110	TLC12M-30I TBJ12	110 [4.33″]	172 [6.77″]	M22× P1.5	8 [0.31″]	50 [1.97″]	20 [0.79″]	30 [1.18″]
TP150		150 [5.91″]						
TP200		200 [7.87″]	187 [7.36″]					
TP300		300 [11.81″]						

⑨ Custom-Designed Pad

Example of TPS Type Manufacturing

● Features and Application

As a thin round pad with no cleats and smooth surface
Be used easily for very smooth and deformable products such as thin vinyl bag, pouch envelop, film.

● Use of Application

foodstuffs packaging, PDP, LCD skin film lifting, paper handling, semiconductor's mark-free lifting

Ordering Information

①	②	③	④	⑤	⑥
TPS -	S	- 18F	- CV	- TLC1810	- BJ 18
① Pad Diameter Ø	**② Material**	**③ Thread Size**		**⑤ Level Compensator**	**⑥ Ball Joint**
TPS15 [0.59″]	N : NBR	M5 : Male Thread M5		TLC : TOTAL Level Compensator	BJ 18 : Ball Joint 1/8″
TPS20 [0.79″]	S : Silicon	F5 : Female Thread 1/4″			
TPS25 [0.98″]		18M : Male Thread 1/8″		M507 : M5×7 Stroke	
TPS30 [1.18″]	U : Urethane	18F : Female Thread 1/8″		M510 : M5×10 Stroke	
TPS40 [1.57″]	C.S : C.Silicon	14M : Male Thread G 1/4″		1810 : G1/8″×10 Stroke	
TPS50 [1.97″]	E : EPDM			1820 : G1/8″×20 Stroke	
				(Possible Option Stroke)	

Model TPS Type

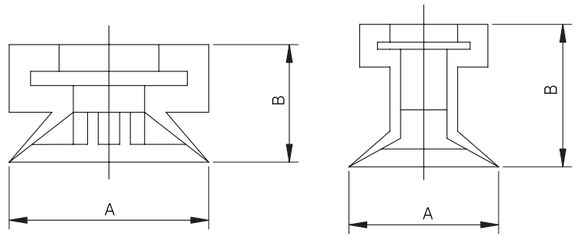
● Lifting Force (Kg) at vacuum level

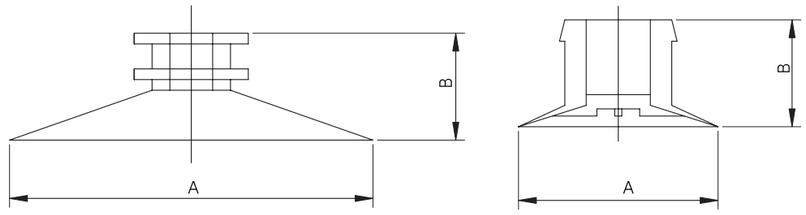
Model	Perpendicular			Parallel			Volume cm³	Min. Radial Motion (mm) (inches)	Remarks
	-20kpa	-60kpa	-90kpa	-20kpa	-60kpa	-90kpa			
TPS 15	0.34	0.82	1.0	0.32	0.52	0.58	0.5	8 [0.31″]	
TPS 20	0.58	1.19	1.57	0.56	0.84	0.95	0.9	12 [0.47″]	
TPS 25	0.89	1.80	2.28	0.65	0.90	0.99	1.50	16 [0.63″]	
TPS 30	1.18	2.44	2.98	0.75	0.95	1.04	1.92	19 [0.75″]	
TPS 40	2.0	3.88	4.87	1.35	2.12	2.64	5.45	28 [1.10″]	
TPS 50	3.48	7.22	9.11	1.98	3.64	4.30	11.8	34 [1.34″]	

● Dimensional information

Small Pad(Ø15[0.59″]~Ø50[1.97″])

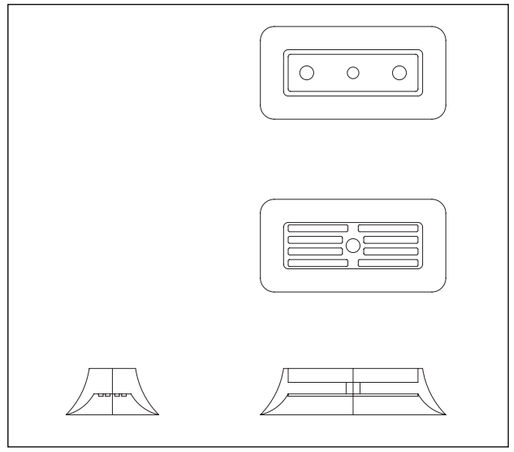
Model	ØA	B
TPS 15	16.7	9
TPS 20	22.0	10
TPS 25	26.8	12
TPS 30	32.2	13
TPS 40	42.4	14
TPS 50	53.5	16





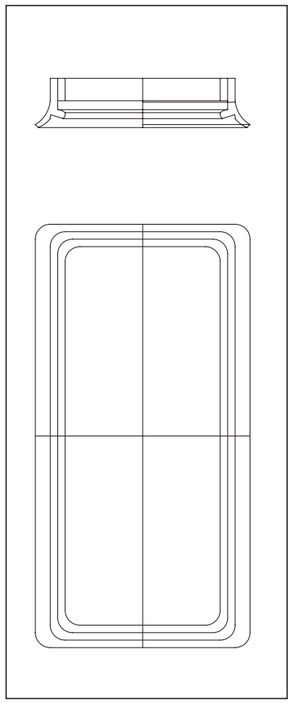
Example of TORC Type Manufacturing

TORC 20×40



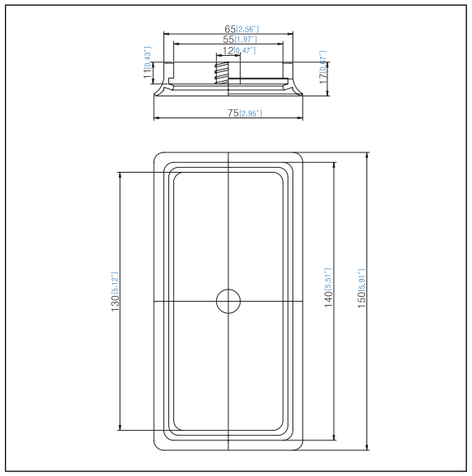
Model : TORC 20×40
Material : NBR, Si, PUR, SBR
Stroke : 2.0㎜ [0.08″]
Net wt : 20g

TORC 70×140



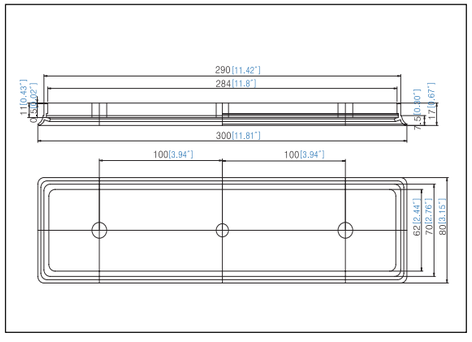
Model : TORC 70×140
Material : NBR, Si, NR
Stroke : 1.5㎜ [0.06″]
Net wt : 50g

TORC 75×150



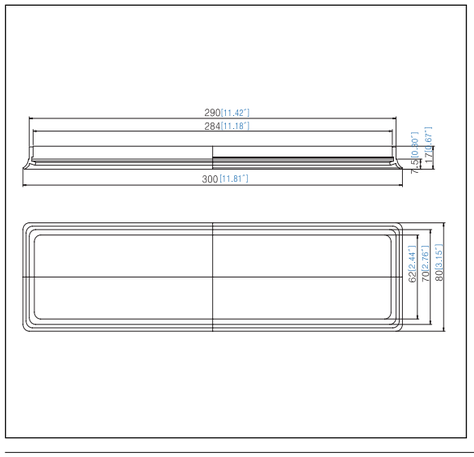
Model : TORC 75×150
Material : NBR, Si, NR
Stroke : 1.5㎜ [0.06″]
Net wt : 260g

TORC 80×300A



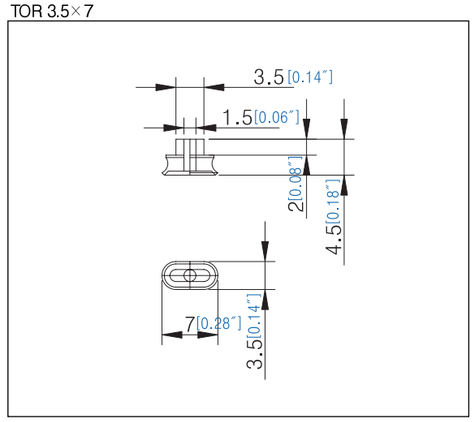
Model : TORC 80×300A
Material : NBR, NR
Stroke : 1.5㎜ [0.06″]
Net wt : 500g

TORC 80×300B



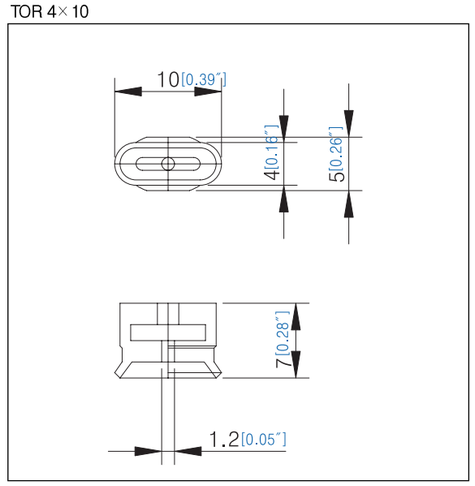
Model : TORC 80×300B
Material : NBR, NR
Stroke : 1.5㎜ [0.06″]
Net wt : 100g

TOR 3.5×7



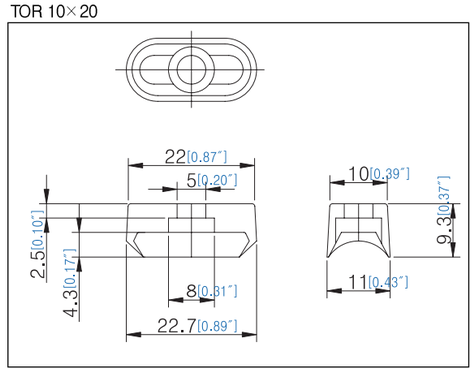
Model : TOR 7.5×7
Material : NBR, NBR-AS, Si, PUR
Stroke : 0.8㎜ [0.03"]
Net wt : 5g

TOR 4×10



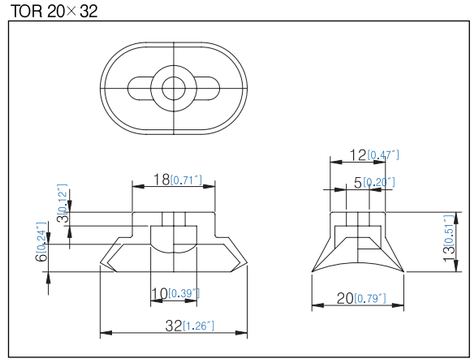
Model : TOR 5×7
Material : Si
Stroke : 1.0㎜ [0.04"]
Net wt : 10g

TOR 10×20



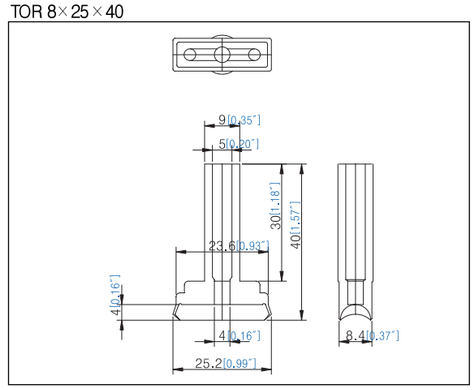
Model : TOR 10×20
Material : NBR, Si, PUR
Stroke : 0.8㎜ [0.03"]
Net wt : 15g

TOR 20×32



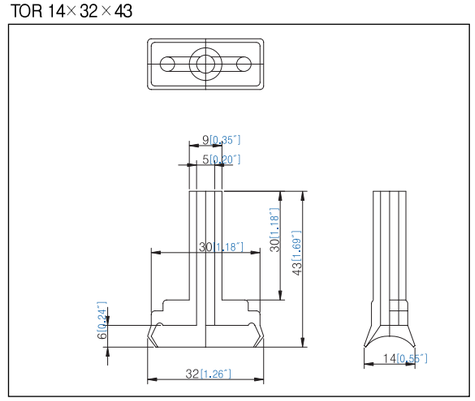
Model : TOR 20×32
Material : NBR, Si, PUR
Stroke : 1.2㎜ [0.05"]
Net wt : 30g

TOR 8×25×40



Model : TOR 8×25×40
Material : NBR, Si, PUR
Stroke : 0.5㎜ [0.02"]

TOR 14×32×43



Model : TOR 14×32×43
Material : NBR, Si, PUR
Stroke : 0.5㎜ [0.02"]

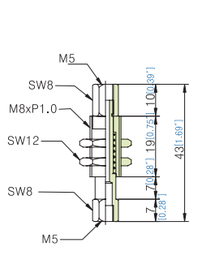
10 Level Spring & Ball Joint

-Level Compensator's specification & dimensioin

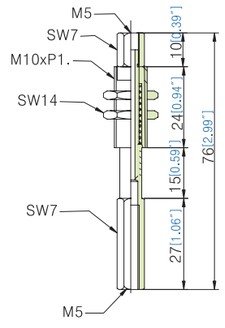
Use: When the objects to be handled are stacked in parallel to the earth, this absorbs the pad's height differences to keep in the certain position. Also provides a certain degree of shock absorption to protect products.

Model	Specification	Stroke (mm) (inches)	Remarks
TLC-M5F-7I	Port size: M5 (Female; Male) Material: steel Max. load : 3.2 kg	0~7 mm [0″~0.28″]	Use for suction cup up to Ø2~30 [Ø0.08″~1.18″]
TLC-M5F-15I		0~15 mm [0″~0.59″]	
TLC-M5F-10I		0~10 mm [0″~0.39″]	
TLC-M5F-20I		0~20 mm [0″~0.79″]	

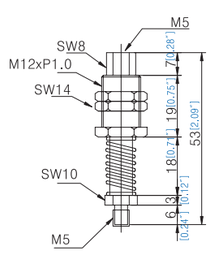
Dimension



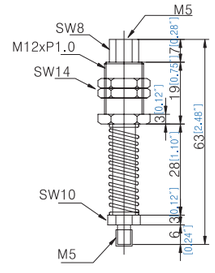
TLC-M5F-7I



TLC-M5F-15I



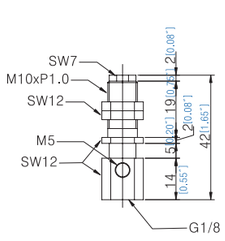
TLC-M5M-10I



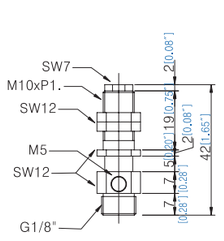
TLC-M5M-20I

Model	Specification	Stroke (mm) (inches)	Remarks
TLC-18F-5L	Port size: G 1/8″ (Female; Male) Material: steel Max. load : 24 kg	0~5 mm [0″~0.20″]	Use for suction cup up to Ø10~100 [Ø0.39″~3.94″]
TLC-18M-5L		0~5 mm [0″~0.20″]	
TLC-18M-10I		0~10 mm [0″~0.39″]	
TLC-18M-20I		0~20 mm [0″~0.79″]	
TLC-18M-30I		0~30 mm [0″~1.18″]	
TLC-18M-30L		0~50 mm [0″~1.97″]	
TLC-18M-50L		0~30 mm [0″~1.18″]	
TLC-18M-50I		0~50 mm [0″~1.97″]	

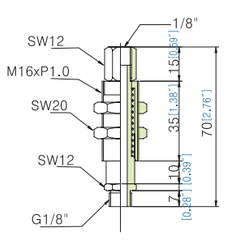
Dimension



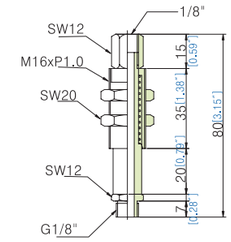
TLC-18F-5L



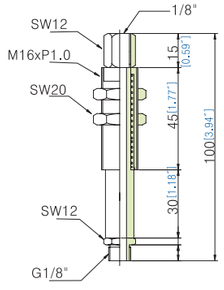
TLC-18M-5L



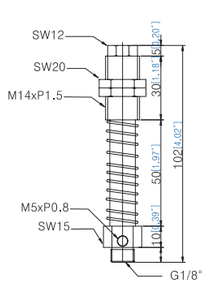
TLC-18M-10I



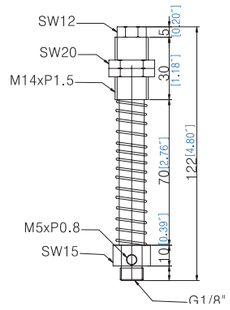
TLC-18M-20I



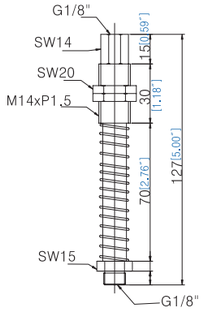
TLC-18M-30I



TLC-18M-30L



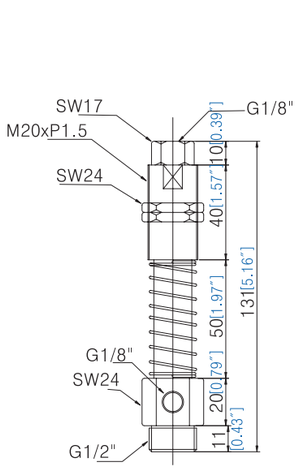
TLC-18M-50L



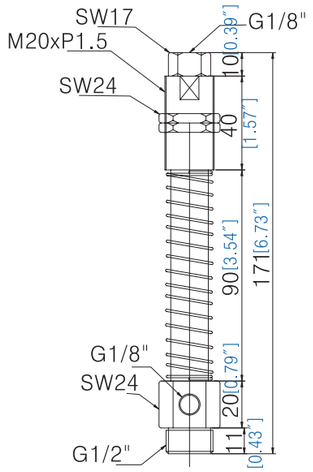
TLC-18M-50I

Model	Specification	Stroke (mm) (inches)	Remarks
TLC-12M-30L	Port size: G 1/2″ (Female; Male) Material: steel Max. load: 64kg	0~30 mm [0″~0.18″]	Use for suction cup up to Ø75~200 [Ø2.95″~7.87″]
TLC-12M-50L		0~50 mm [0″~1.97″]	
TLC-12M-30I		0~30 mm [0″~1.18″]	
Option	Possible to be made for the user's request of metric, U.S. Imperial, PT, PF, NPT, screw thread, stroke, etc		

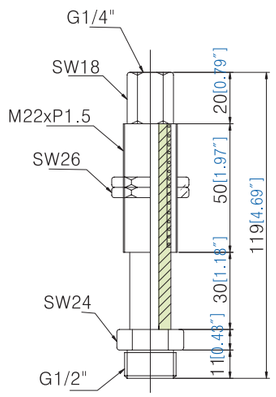
Plan & Dimension



TLC - 12M-30L



TLC - 12M-50L

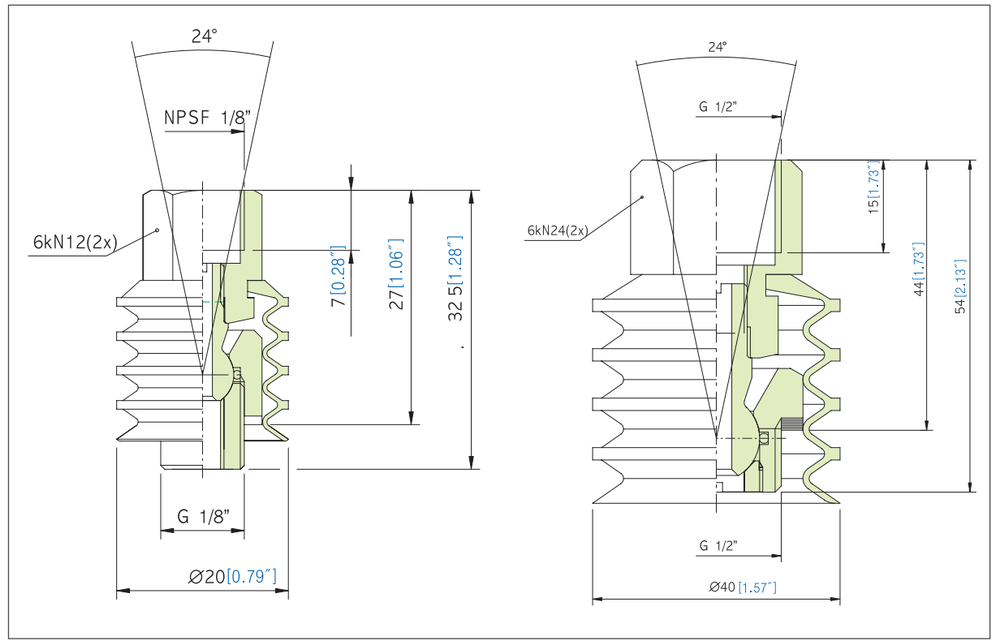


TLC - 12M-30I

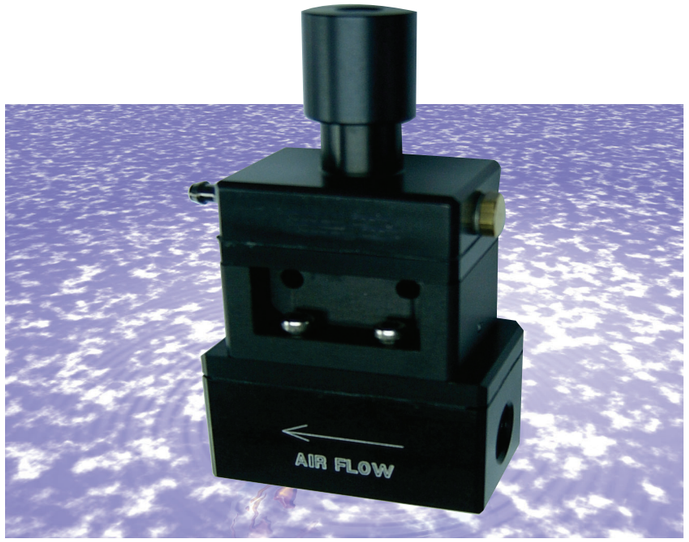
Ball Joint's specification & dimension

Use: When the position of the objects to be handled is different from the level, even if the object has the angular difference, ±12°with vacuum pad, it is the TOTAL ball joint (TBJ-Series) that can lift and move the objects without any problems.

Model	Specification	
TBJ18	Material: steel	⅛″ NPSF
	Degree of angular compliance : ±12° (totally 24°)	⅛″ Male
TBJ12	Material: steel	G ½″ Female
	Degree of angular compliance : ±12° (totally 24°)	G ½″ Male

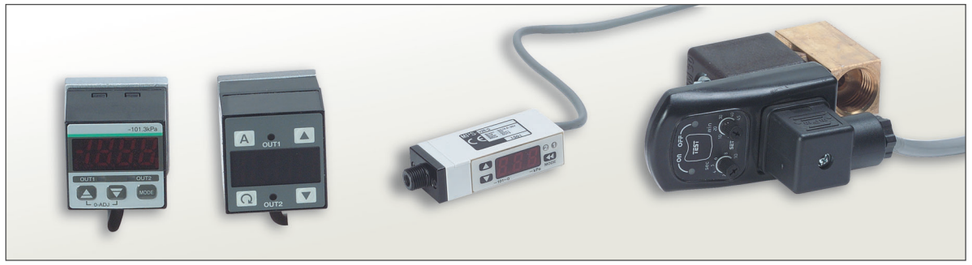


Chap. 5 Accessories & Chemical Resistance Data



1)Accessories

① Vacuum Switch



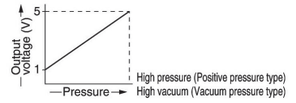
Use: Enable valve or other operating device to start by transferring vacuum generated by vacuum pump or vacuum generator into electrical signals to send to the PLC or RELAY.
This displays vacuum level concurrently (also playing a vacuum gauge's role), and by user's easy handling, is possible to be used up to Low-High's 2 points in the units of -kPa, mmHg.G, inHg, bar, etc.
It is based on the specifications below.

Switch's specification and how to use

▪Model	DP-20
	DP-60
	DP-80
▪Origin	Sunx (Made in Japan)
	Keyence (Made in Japan)
	Copal (Made in Japan)
	Motorolla (Made in U.S.A)

▪ Electric, mechanical, non-touch, pneumatic, etc. are there many types of switch that can be selected to fit your own working condition by you, and they all are compatible with TOTAL vacuum pump.

SPECIFICATIONS

Item \ Type		Vacuum pressure				Positive pressure					
		-101kPa type				100kPa type			1MPa type		
		Standard	Light weight	Flat	IP67	Standard	Flat	IP67	Standard	Flat	IP67
Model No.	Asian	DP2-20	DP2-80	———	DP2-60	DP2-21	DP2-41	DP2-61	DP2-22	DP2-42	DP2-62
	North American (Note)	DP2-20F(-P)	———	DP2-40N	DP2-60N	DP2-21F(-P)	DP2-41N	DP2-61N	DP2-22F(-P)	DP2-42N	DP2-62N
	European	———	———	DP2-40E	DP2-60E	———	DP2-41E	DP2-61E	———	DP2-42E	DP2-62E
Type of pressure		Gauge pressure									
Rated pressure range		0 to -101.3kPa				0 to 100.0kPa			0 to 1.000MPa		
Set pressure range		5.1 to -101.3kPa {0.052 to -1.033kgf/cm², 0.051 to -1.013bar 0.74 to -14.70psi, 38 to -760mmHg 1.5 to -29.9inHg}				-5.0 to 100.0kPa {-0.051 to 1.020kgf/cm² -0.050 to 1.000bar -0.72 to 14.50psi}			-0.050 to 1.000MPa {-0.51 to 10.20kgf/cm² -0.50 to 10.00bar -7.2 to 145.0psi}		
Pressure withstandability		490kPa							1.47MPa		
Applicable fluid		Non-corrosive gas									
Selectable units		kPa, kgf/cm², bar, psi, mmHg, inHg				kPa, kgf/cm², bar, psi			MPa, kgf/cm², bar, psi		
Supply voltage		12 to 24V DC $^{+10}_{-15}$% Ripple P-P 10% or less									
Current consumption		50mA or less									
Comparative outputs (Comparative Output 1, Comparative Output 2)		<Asian, North American (Standard NPN output, flat and IP67 types)> NPN open-collector transistor • Maximum sink current: 100mA • Applied voltage: 30V DC or less (between comparative output and 0V) • Residual voltage: 1V or less (at 100mA sink current) 0.4V or less (at 16mA sink current)				<North American (Standard PNP output type), European> PNP open-collector transistor • Maximum source current: 100mA • Applied voltage: 30V DC or less (between comparative output and +V) • Residual voltage: 2V or less (at 100mA source current)					
	Utilization category	DC-12 or DC-13									
	Output modes	Equipped with 4 types of modes: hysteresis mode, window comparator mode, dual output mode, automatic sensitivity setting mode (selectable by key operation)									
	Hysteresis	1 digit (however, variable in hysteresis mode and 2 digits when using psi unit)									
	Repeatability	Within ±0.2% F.S. ±1digit									
	Response time	2.5ms or less									
	Short-circuit protection	Incorporated									
Analog voltage output		Output voltage: 1 to 5V (over rated pressure range) Zero-point: within 1V ±5% F.S. Span: within 4V ±5% F.S. Linearity: within ±1% F.S. Output impedance: 1kΩ approx. 									
Display		3½ digit red LED display (Sampling rate: 4 times/sec. approx.)									
	Displayable pressure range	5.1 to -101.3kPa {0.052 to -1.033kgf/cm², 0.051 to -1.013bar 0.74 to -14.70psi, 38 to -760mmHg 1.5 to -29.9inHg}				-5.0 to 100.0kPa {-0.051 to 1.020kgf/cm² -0.050 to 1.000bar -0.72 to 14.50psi}			-0.050 to 1.000MPa {-0.51 to 10.20kgf/cm² -0.50 to 10.00bar -7.2 to 145.0psi}		
Analog bar display		LED bar display in steps of 10% F.S. approx.									
Operation indicators	Comparative Output 1	Orange LED (lights up when Comparative Output 1 is ON)									
	Comparative Output 2	Green LED (lights up when Comparative Output 2 is ON)									
Environmental resistance	Pollution degree	3 (Industrial environment)									
	Protection	Standard, Flat and Light weight types: IP40 (IEC), IP67 type: IP67 (IEC)									
	Ambient temperature	-10 to +50°C (No dew condensation or icing allowed), Storage: -10 to +60°C									
	Ambient humidity	35 to 85% RH, Storage: 35 to 85% RH									
	EMC	Emission: EN50081-2, Immunity: EN61000-6-2									
	Voltage withstandability	1,000V AC for one min. between all supply terminals connected together and enclosure									
	Insulation resistance	50MΩ, or more, with 500V DC megger between all supply terminals connected together and enclosure									
	Vibration resistance	10 to 150Hz frequency, 0.75mm amplitude in X, Y and Z directions for two hours each									
	Shock resistance	100m/s² acceleration (10G approx.) in X, Y and Z directions for three times each									
Temperature characteristics		Over ambient temperature range -10 to +50°C: within ±1% F.S. of detected pressure at 20°C									
Pressure port	Asian	Standard, Flat and IP67 types: Rc (PT) 1/8 female thread, Light weight type: M5 female thread									
	North American	Standard type: NPTF 1/8 female thread, Flat and IP67 types: NPT 1/8 female thread									
	European	Flat and IP67 types: G (PF) 1/8 female thread									
Material		Front case: ABS, Rear case: PPS (glass fiber reinforced), Display surface: Acrylic Pressure port attachment: Die-cast zinc alloy [Light weight type: POM (glass fiber reinforced), pressure port is brass (nickel plated)] Front cover (IP67 type only): Polycarbonate									
Cable		0.15mm² 5-core oil resistant cabtyre cable, 2m long (IP67 type: 5m long)									
Cable extension		Extension up to total 100m [in order to conform to CE, less than 10m (power line only)] is possible with 0.3mm², or more, cable.									
Weight		Standard type: 95g approx., Flat type: 120g approx., IP67 type: 370g approx., Light weight type: 70g approx.									
Accessories		Hexagon-socket-head plug for pressure port: 1 No. (Standard type only), Pressure unit label: 1 No.									

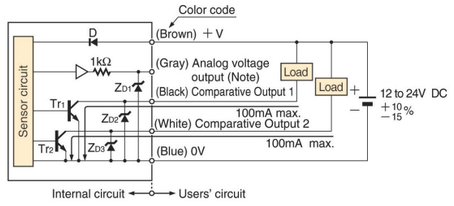
Note: Model Nos. of North American standard type having the suffix '**-P**' are PNP output type.

Technical Information

I/O CIRCUIT AND WIRING DIAGRAMS

NPN output type

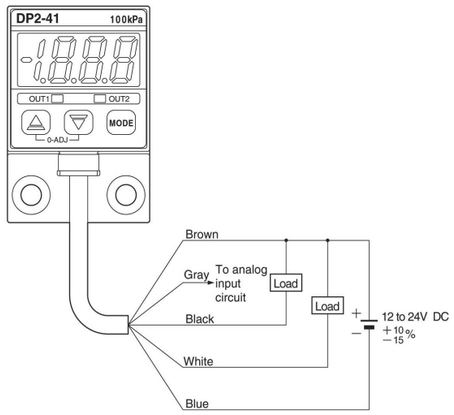
I/O circuit diagram



Note: When using the analog voltage output, take care to connect external device of proper input impedance. Also, when a cable extension is used, voltage drop due to cable resistance should be taken into account.

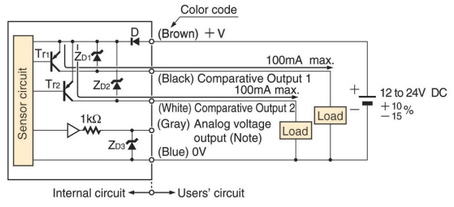
Symbols ... D: Reverse supply polarity protection diode
Z_{D1}, Z_{D2}, Z_{D3}: Surge absorption zener diode
Tr_1, Tr_2: NPN output transistor

Wiring diagram



PNP output type

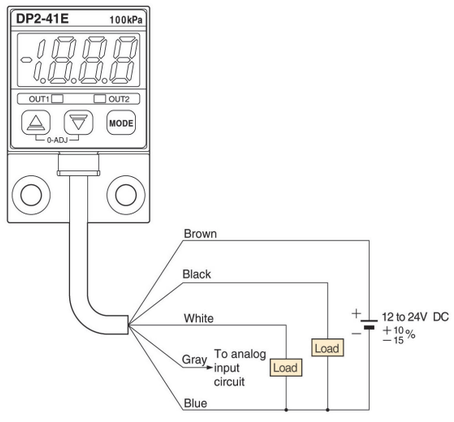
I/O circuit diagram



Note: When using the analog voltage output, take care to connect external device of proper input impedance. Also, when a cable extension is used, voltage drop due to cable resistance should be taken into account.

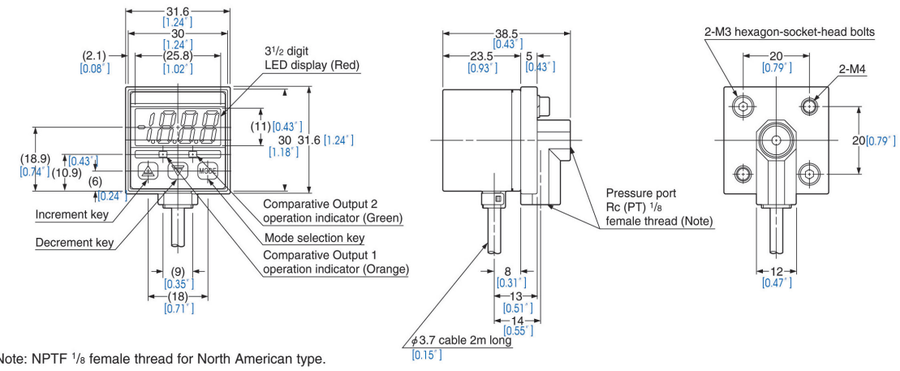
Symbols ... D: Reverse supply polarity protection diode
Z_{D1}, Z_{D2}, Z_{D3}: Surge absorption zener diode
Tr_1, Tr_2: PNP output transistor

Wiring diagram



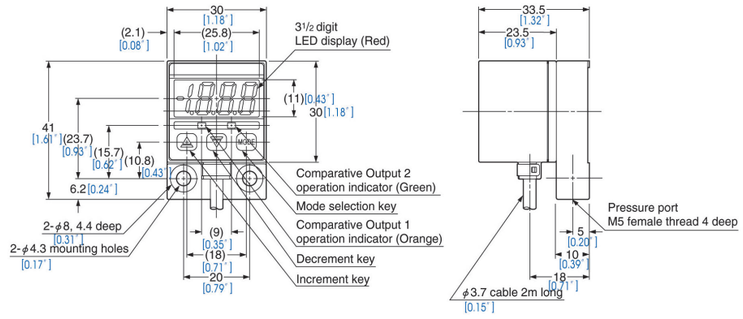
DIMENSIONS (Unit: mm)

DP2-20□ DP2-21□ DP2-22□ Standard type

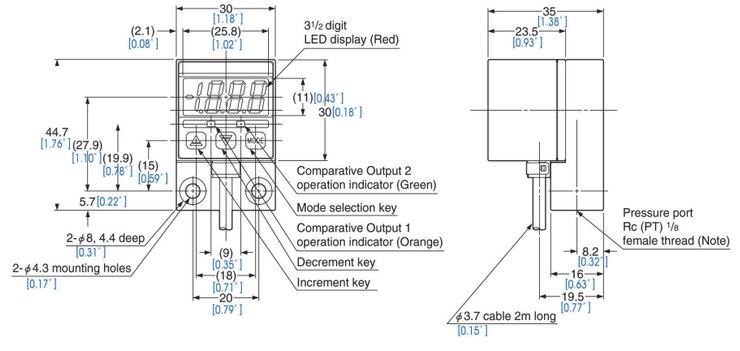


Note: NPTF 1/8 female thread for North American type.

DP2-80 Light weight type



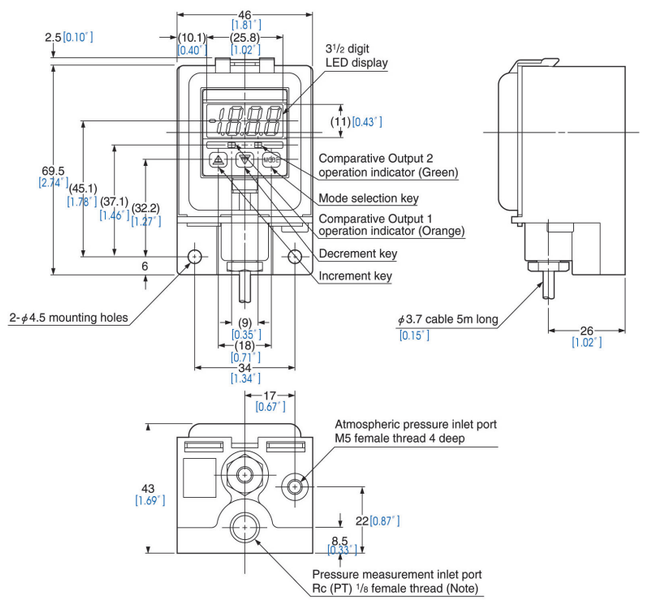
DP2-40□ DP2-41□ DP2-42□ Flat type



Note: NPT 1/8 female thread for North American type, and G (PF) 1/8 female thread for European type.

DIMENSIONS (Unit: mm)

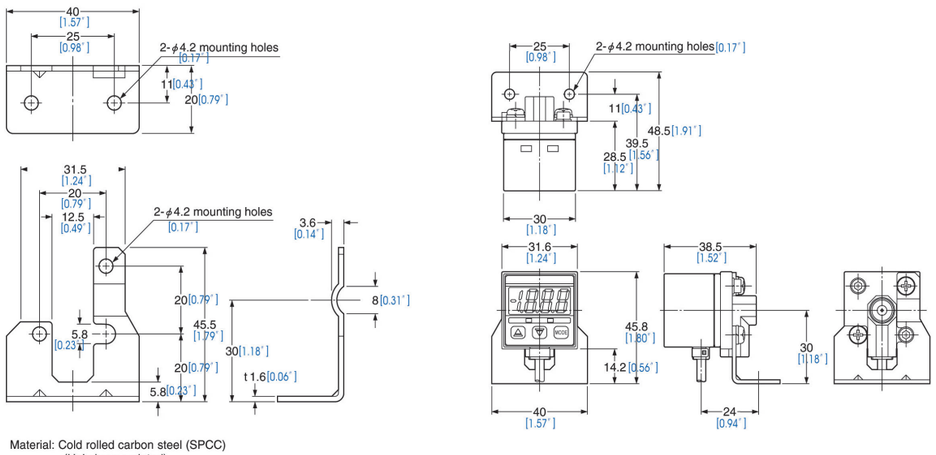
DP2-60□ DP2-61□ DP2-62□ IP67 type



Note: NPT 1/8 for North American type, and G (PF) 1/8 for European type.

MS-DPX Sensor mounting bracket for standard type (Optional)

Assembly dimensions



Material: Cold rolled carbon steel (SPCC)
(Uni-chrome plated)
Two M4 (length 6mm) pan head screws
and two spring washers are attached.

1 SETTING

- If key-protect has been set, make sure to release key-protect before operating the keys. (Please refer to 15 **KEY-PROTECT FUNCTION** for the procedure.)
- The conditions which are set are stored in an EEPROM. Kindly note that the EEPROM has a life span and its guaranteed life is 100,000 write operation cycles.

Setting procedure

① Zero-point adjustment	② Initial setting	③ Pressure value setting	Measurement
Adjust zero-point	Set [Display], [Output mode], and [Unit]	Enter Set Value 1 (P1) Set Value 2 (P2) Set Value 3 (P3)	Commence measurement on completion of setting

① Zero-point adjustment

- The displayed pressure when the pressure port is left open is adjusted to zero.

Set to sensing mode

- The sensor will automatically enter the sensing mode when power is supplied.
  - The figure on the left shows the display when the pressure unit and display are set to 'kPa' and 'digital display', respectively.

Perform zero-point adjustment

- Let the pressure port be at atmospheric pressure (i.e., no applied pressure condition), and press, simultaneously, the increment and decrement keys continuously.
- [000] is displayed and, when the finger is released, zero-point adjustment is completed and the sensor returns to the sensing mode.

- If pressure has been applied during zero-point adjustment, [E-3] is displayed when the keys are pressed. Bring the applied pressure to atmospheric pressure (i.e., no applied pressure condition) and carry out the zero-point adjustment once again.

② Initial setting

- Pressure [Unit], [Display] and [Output mode] of the comparative outputs are set.

Set to initial setting mode

- In the sensing mode, press (MODE) key while pressing (△) key.
  - Initial setting is displayed.
  - If sensor is being used for the first time, [PHd] is displayed.

Set initial conditions

- The settable digit blinks.
- The settable digit changes when (△) key is pressed.

- Change the setting of each digit as desired.
- The setting is changed when (▽) key is pressed.

Change with (△) key.

3rd digit ← 2nd digit ← 1st digit

3rd digit: Unit	2nd digit: Output mode	1st digit: Display
P: kPa or MPa	H: Hysteresis mode	d: Digital display
J: kgf/cm²	C: Window comparator mode	A: Analog bar display
b: bar	d: Dual output mode	
S: psi	R: Automatic sensitivity setting mode	
H: mmHg		
I: inHg		

(Positive pressure type / Vacuum pressure type)

Set to sensing mode

- Press (MODE) key.
  - The sensor returns to sensing mode after the initial conditions have been set.
  - Since the initial conditions which have been set are stored in an EEPROM, they are not erased even if the power supply is switched off.
  - The figure on the left shows the display when the unit and display are set to 'kPa' and 'digital display', respectively.

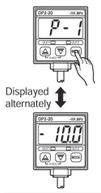
③ Setting of pressure values

For the case when output mode is set to either the hysteresis mode (H), window comparator mode (C) or dual output mode (d).

- [Set Value 1 (P1)] and [Set Value 2 (P2)] of the comparative outputs are set.

- The setting of Set Value 2 (P2) with respect to Set Value 1 (P1) can only be towards the high pressure side in case of the positive pressure type sensor and only towards the high vacuum side in case of the vacuum pressure type sensor.
- Set Value 1 (P1) and Set Value 2 (P2) can be made common for all the output modes. However, when a changeover is made to the automatic sensitivity setting mode, since Set Value 3 (P3) has not been set, make sure to carry out the pressure value settings for the automatic sensitivity mode.

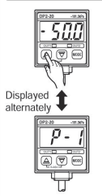
Set to Set Value 1 (P1) set mode



- In the sensing mode, press (MODE) key.
  - [P-1] and Set Value 1 (P1) which is being set are displayed alternately.
  - The figure on the left shows the display of a vacuum pressure type sensor when the pressure unit has been set to 'kPa'.

Displayed alternately

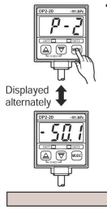
Enter Set Value 1 (P1)



- Enter using (△) key and (▽) key.
- In case of the positive pressure type sensor, if (△) key is pressed once the set value changes towards the high pressure side by 1 digit and if (▽) key is pressed once the set value changes towards the low pressure side by 1 digit.
  In case of the vacuum pressure type sensor, if (△) key is pressed once the set value changes towards the high vacuum side by 1 digit and if (▽) key is pressed once the set value changes towards the low vacuum side by 1 digit.
- If (△) key or (▽) key is pressed continuously, the set value changes quickly.
  - If the set pressure range is exceeded, either [UP] (upper limit exceeded) or [LO] (lower limit exceeded) is displayed.

Displayed alternately

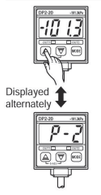
Set to Set Value 2 (P2) set mode



- In the Set Value 1 (P1) set mode, press (MODE) key.
  - [P-2] and Set Value 2 (P2) which is being set are displayed alternately.

Displayed alternately

Enter Set Value 2 (P2)

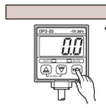


- Using (△) key and (▽) key, enter in a manner similar to that for entering Set Value 1 (P1).
  - If the set pressure range is exceeded, either [UP] (upper limit exceeded) or [LO] (lower limit exceeded) is displayed.

Displayed alternately

- If the output mode has been set to the window comparator mode (C) in the initial setting mode, Set Value 1 (P1) and Set Value 2 (P2) should be set with a difference of 3 digits or more. However, when unit is set to 'psi', the difference should be 6 digits or more.

Set to sensing mode



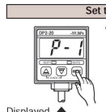
- Press (MODE) key.
  - The sensor returns to sensing mode after Set Value 1 (P1) and Set Value 2 (P2) have been set.
  - Since the values which have been set are stored in an EEPROM, they are not erased even if the power supply is switched off.

For the case when the output mode is set to automatic sensitivity setting mode (R)

- Comparative outputs' [Set Value 1 (P1)], [Set Value 2 (P2)] and [Set Value 3 (P3)] are set.

- The setting of Set Value 2 (P2) with respect to Set Value 1 (P1) can only be towards the high pressure side in case of the positive pressure type sensor and only towards the high vacuum side in case of the vacuum pressure type sensor.
- Set Value 3 (P3) is automatically set to the mid-value of Set Value 1 (P1) and Set Value 2 (P2). However, if Set Value 1 (P1) is set to a value on the vacuum pressure side for a positive pressure type sensor or to the positive pressure side for a vacuum pressure type sensor, Set Value 3 (P3) is automatically set to the mid-value of 'zero'(atmospheric pressure) and Set Value 2 (P2). Further, if both, Set Value 1 (P1) and Set Value 2 (P2) are set to a value on the vacuum pressure side for a positive pressure type sensor or to the positive pressure side for a vacuum pressure type sensor, Set Value 3 (P3) is automatically set to 'zero'(atmospheric pressure).
- The automatically set Set Value 3 (P3) can be changed manually.
- Since display of error messages is not possible during pressure value setting in the automatic sensitivity setting mode, make sure that the sensor is used within the rated pressure range.

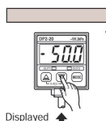
Set to Set Value 1 (P1) set mode



- In the sensing mode, press (MODE) key.
  - [P-1] and Set Value 1 (P1) which is being set are displayed alternately.
  - The figure on the left shows the display of a vacuum pressure type sensor when the pressure unit has been set to 'kPa'.

Displayed alternately

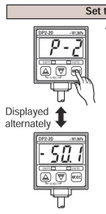
Enter Set Value 1 (P1)



- Within the required permissible pressure range, having created a pressure state which is nearest to the atmospheric pressure, press (▽) key.
  - The pressure value at the time of pressing (▽) key is entered as Set Value 1 (P1). Set Value 1 (P1) and [P-1] are displayed alternately.
  - If the set pressure range is exceeded, either [UP] (upper limit exceeded) or [LO] (lower limit exceeded) is displayed and Set Value 1 (P1) is set automatically to the upper or lower limit of the set pressure range.
  - The setting of Set Value 1 (P1) can be repeated several times in the Set Value 1 (P1) set mode.

Displayed alternately

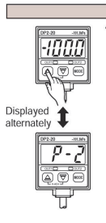
Set to Set Value 2 (P2) set mode



- In the Set Value 1 (P1) set mode, press (MODE) key.
  - [P-2] and Set Value 2 (P2) which is being set are displayed alternately.

Displayed alternately

Enter Set Value 2 (P2)

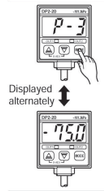


- Within the required permissible pressure range, having created a pressure state which is nearest to the high pressure end (for a positive pressure type sensor) or the high vacuum end (for a vacuum pressure type sensor), press (△) key.
  - The pressure value at the time of pressing (△) key is entered as Set Value 2 (P2). Set Value 2 (P2) and [P-2] are displayed alternately.
  - If the set pressure range is exceeded, either [UP] (upper limit exceeded) or [LO] (lower limit exceeded) is displayed and Set Value 2 (P2) is set automatically to the upper or lower limit of the set pressure range.
  - The setting of Set Value 2 (P2) can be repeated several times in the Set Value 2 (P2) set mode.

Displayed alternately

Technical Information

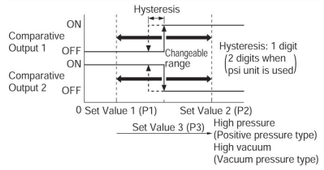
Set to Set Value 3 (P3) set mode

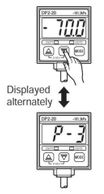


- In the Set Value 2 (P2) set mode, press MODE key.
  (P-3 and the automatically set Set Value 3 (P3) are displayed alternately.
- In case
  Set Value 1 (P1) = −50.0kPa
  Set Value 2 (P2) = −100.0kPa
  then
  Set Value 3 (P3) = $\frac{-50.0+(-100.0)}{2}$ = −75.0kPa
  (Digits smaller than the displayed digits are discarded.)

In case Set Value 3 (P3) is to be changed

- The automatically set Set Value 3 (P3) can be manually changed to a value between Set Value 1 (P1) and Set Value 2 (P2). However Set Value 3 (P3) cannot be set to a value on the vacuum pressure side for a positive pressure type sensor or to the positive pressure side for a vacuum pressure type sensor.





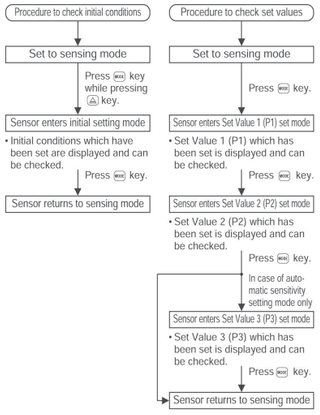
- Enter using ▲ key and ▼ key.
- In case of a positive pressure type sensor, if ▲ key is pressed once, the set value changes towards the high pressure side by 1 digit and if ▼ key is pressed once, the set value changes towards the low pressure side by 1 digit.
  In case of a vacuum pressure type sensor, if ▲ key is pressed once the set value changes towards the high vacuum side by 1 digit and if ▼ key is pressed once the set value changes towards the low vacuum side by 1 digit.
- If ▲ key or ▼ key is pressed continuously, the set value changes quickly.
  (If the set pressure range is exceeded, either UP (upper limit exceeded) or LO (lower limit exceeded) is displayed.)

Set to sensing mode

- Press MODE key.
  (The sensor returns to the sensing mode after Set Value 1 (P1), Set Value 2 (P2) and Set Value 3 (P3) have been set.
  Since the values which have been set are stored in an EEPROM, they are not erased even if the power supply is switched off.)

2 PROCEDURE FOR CHECKING SET VALUES

● The conditions which have been set in the initial setting and the pressure settings can be checked by the following procedure.



- Please note that if any key, except MODE key, is pressed in any setting mode, the set conditions shall get changed.

3 CONVERSION OF PRESSURE UNITS

● In the **DP2** series, the conversion to different units is automatically done on changing the setting of the pressure unit. However, this conversion can also be obtained by multiplying the values by the coefficients given in the following table.

Conversion procedure

- For example, if 2kPa is to be expressed in kgf/cm², since 1kPa=1.01972×10⁻²kgf/cm², 2kPa becomes 2×1.01972×10⁻² ≒ 0.020kgf/cm²

Conversion table for pressure units

	kPa	MPa	kgf/cm²	bar	psi	mmHg (Torr)	inHg	atm
1kPa	1	1×10⁻³	1.01972×10⁻²	1×10⁻²	1.45038×10⁻¹	7.50062	0.2953	9.86923×10⁻³
1MPa	1×10³	1	1.01972×10	1×10	1.45038×10²	7.50062×10³	0.2953×10³	9.86923
1kgf/cm²	9.80665×10	9.80665×10⁻²	1	9.80665×10⁻¹	1.42234×10	7.35559×10²	2.8959×10	9.67841×10⁻¹
1bar	1×10²	1×10⁻¹	1.01972	1	1.45038×10	7.50062×10²	2.953×10	9.86923×10⁻¹
1psi	6.89473	6.89473×10⁻³	7.03065×10⁻²	6.89473×10⁻²	1	5.17147×10	2.036	6.80457×10⁻²
1mmHg (1Torr)	1.33322×10⁻¹	1.33322×10⁻⁴	1.35951×10⁻³	1.33322×10⁻³	1.93368×10⁻²	1	3.9370×10⁻²	1.31579×10⁻³
1inHg	3.3864	3.3864×10⁻³	3.4531×10⁻²	3.3864×10⁻²	0.4912	2.5400×10	1	3.342×10⁻²
1atm	1.01325×10²	1.01325×10⁻¹	1.03323	1.01325	1.46960×10	7.60000×10²	2.9921×10	1

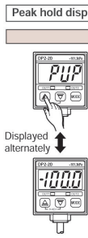
4 PEAK HOLD & BOTTOM HOLD FUNCTIONS

● Peak hold and bottom hold functions enable the display of the peak value (maximum pressure value in case of the positive pressure type sensor and maximum vacuum pressure value in case of the vacuum pressure type sensor) and the bottom value (minimum pressure value in case of the positive pressure type sensor and minimum vacuum pressure value in case of the vacuum pressure type sensor) of the varying measured pressure.
● These functions are convenient for finding the pressure variation range or for determining the reference for pressure settings.

- Please note that the peak value and the bottom value data is erased when it is no longer displayed.
- The response time of the comparative outputs becomes slower during the peak hold and bottom hold display.

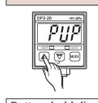
Peak hold display

Initiating peak hold display



- In the sensing mode, keep ▲ key pressed until PUP is displayed. (4 sec. approx.)
  When the finger is released after PUP is displayed, the peak value and PUP are displayed alternately.
  (If the applied pressure exceeds the displayable pressure range, error message (---- or ----) and PUP are displayed alternately. In this case, bring back the applied pressure to within the rated pressure range.
  The figure on the left shows the display of a vacuum type sensor when the pressure unit has been set to 'kPa'.)

Ending peak hold display



- Press ▲ key.
  [Sensor returns to sensing mode.]

Bottom hold display

Initiating bottom hold display

- In the sensing mode, keep ▼ key pressed until PLO is displayed. (4 sec. approx.)
  When the finger is released after PLO is displayed, the bottom value and PLO are displayed alternately.
  (If the applied pressure exceeds the displayable pressure range, error message ---- or ---- and PLO are displayed alternately. In this case, bring back the applied pressure to within the rated pressure range.
  The figure on the left shows the display of a vacuum type sensor when the pressure unit has been set to 'kPa'.)

Ending bottom hold display

- Press ▼ key.
  [Sensor returns to sensing mode.]

5 KEY-PROTECT FUNCTION

● Key-protect is a function which prevents any unintentional change in the conditions which have been entered in each setting mode by making the sensor not to respond to the key operations.

Setting of key-protect

- In the sensing mode, press MODE key continuously for about 3 sec. and release it immediately when On is displayed.
  (Key-protect is set and the sensor returns to the sensing mode.)

- Since the key-protect information is stored in an EEPROM, it is not erased even if the power supply is switched off.
- Please take care to remember if the key-protect function has been set.

Release of key-protect

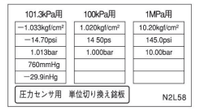
- In the sensing mode, press MODE key continuously for about 3 sec. and release it immediately when OFF is displayed.
  (Key-protect is released and the sensor returns to the sensing mode.)

- When the keys are to be operated, make sure that key-protect is released.

6 LABEL FOR CHANGE IN PRESSURE UNIT

● When a pressure unit other than 'kPa' or 'MPa' has been selected in the initial setting mode, the label (supplied as accessory) which corresponds to the selected unit should be stuck at the position shown in the figure below.

Pressure unit label (accessory)



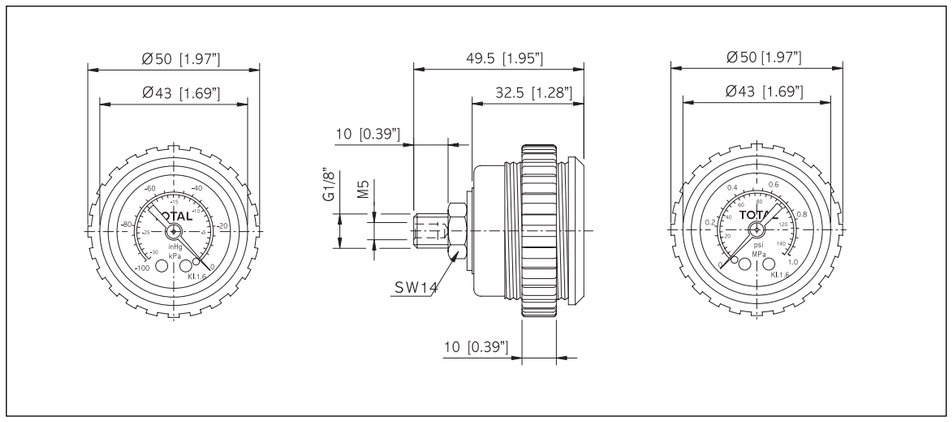
Stick the pressure unit label at the position shown.

② Vacuum Gauge

As mentioned in the previous page, vacuum switch (digital display type) do a role of vacuum gauge.
But in general, pump attachable analog type of vacuum gauge is like specification as follows.

Vacuum Gauge

Pressure Gauge



Technical Data

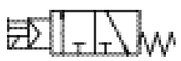
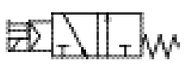
품명 : Vacuum Gauge & Manometer

Specification	Vacuum Gauge	Pressure Gauge - Manometer
MODEL	TVG 40-01	TVP 40-01
Indication area	0~-100kpa (0~760mmHg.G)	0~1Mpa (0~10kg · f/㎠)
Precision (%)	2.5	2.5
Material	Brass, ABS	
Net wt.	59g (nut wt. included)	

Vacuum Solenoid Valve

Use : Vacuum solenoid valve have various types to control the direction and vacuum 's on-off.
This is divided by pneumatic, electric or vacuum operation, and is used mainly by 2, 3, and 5 ways.
Recently, to maintain appropriate vacuum level, servo flow control valve was developed and now it is practical.
For your convenience, you can use direct operation valve, but you'd better to select to use depending on leakage levels

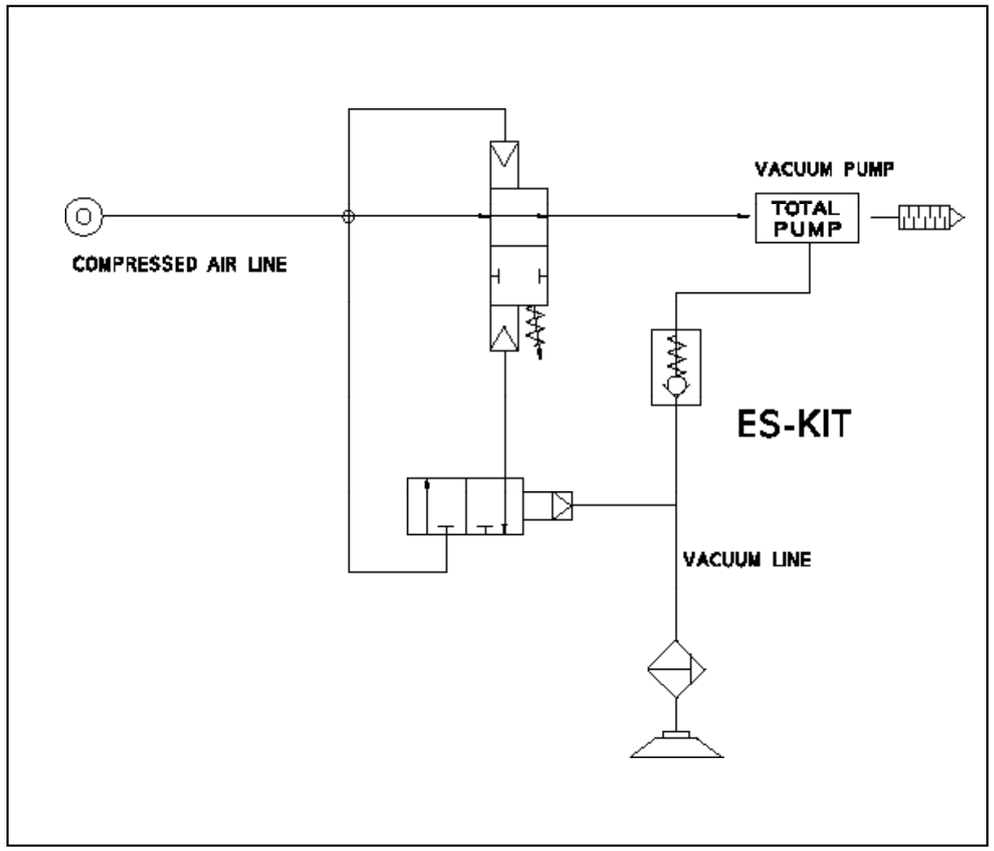
■Symbol

 N.C  N.O	3/2 way. valve Vacuum operation : 755mmHg.G⁻ 9.9kg · f/㎠
 Single 5/2  double 5/2	5/2 way. valve Vacuum operation : 755mmHg.G⁻ 9.9kg · f/㎠

Vacuum & Air Energy Saving Kits

If more than appropriate working vacuum which is established by vacuum switch artificially happen to be made, this Vacuum & Energy Saving Kit cuts supplied compressed air. If the established vacuum level is going down, this device starts supplying again to remove unnecessary compressed air.
By this time, vacuum check valve should be set in the pump to maintain the existed vacuum volume (should not be removed) and to use vacuum most efficiently.

▶Example: Easy Pneumatic Vacuum Pump 's Energy Saving Kit

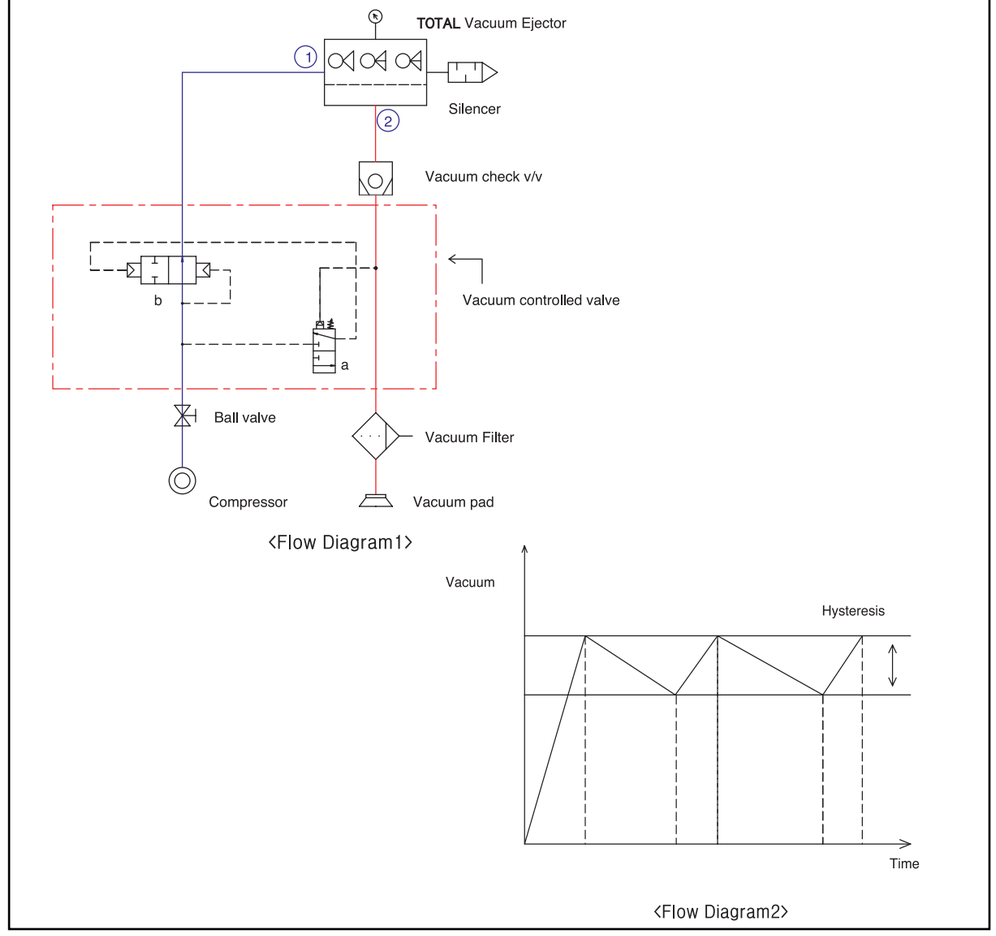


Ordering Information Code : E.S

⑤ Vacuum-Controlled Valve

Integrated vacuum 3/2 way valve, 2/2 way pneumatic valve, and vacuum switch. This device can be applied to various industrial vacuum facilities. This vacuum-controlled valve solved the inconvenient way of using lots of valves and switches together.
Especially, to vacuum ejector, this gives a revolutionary solution as energy saving kits

Model	TES-KIT-10A	TES-KIT-10B
Hysteresis, kpa	2.1 (12.75 mmHg)	6.8 (50 mmHg)
Consititution	switch, membrane valve, 2/2way valve,3/2 way membrane valve(N.O) Vacuum controlled 2/2 way valve	
Type of control	pneumatic or vacuum	
environment	compressed air, filtration 55㎛, non-lubricated	
Pressure range	3.5~7kg.f/cm^2	
Flow	11.8 N ℓ / sec	
working temp.	0℃~+75℃	
Inner Diameter	4.24mm [0.17″]	
Ku	8.85	
Material	AL, EPDM, NBR	
Connections	2×1/4" NPSF , 2×M5 Female	
Net . wt .	219g	

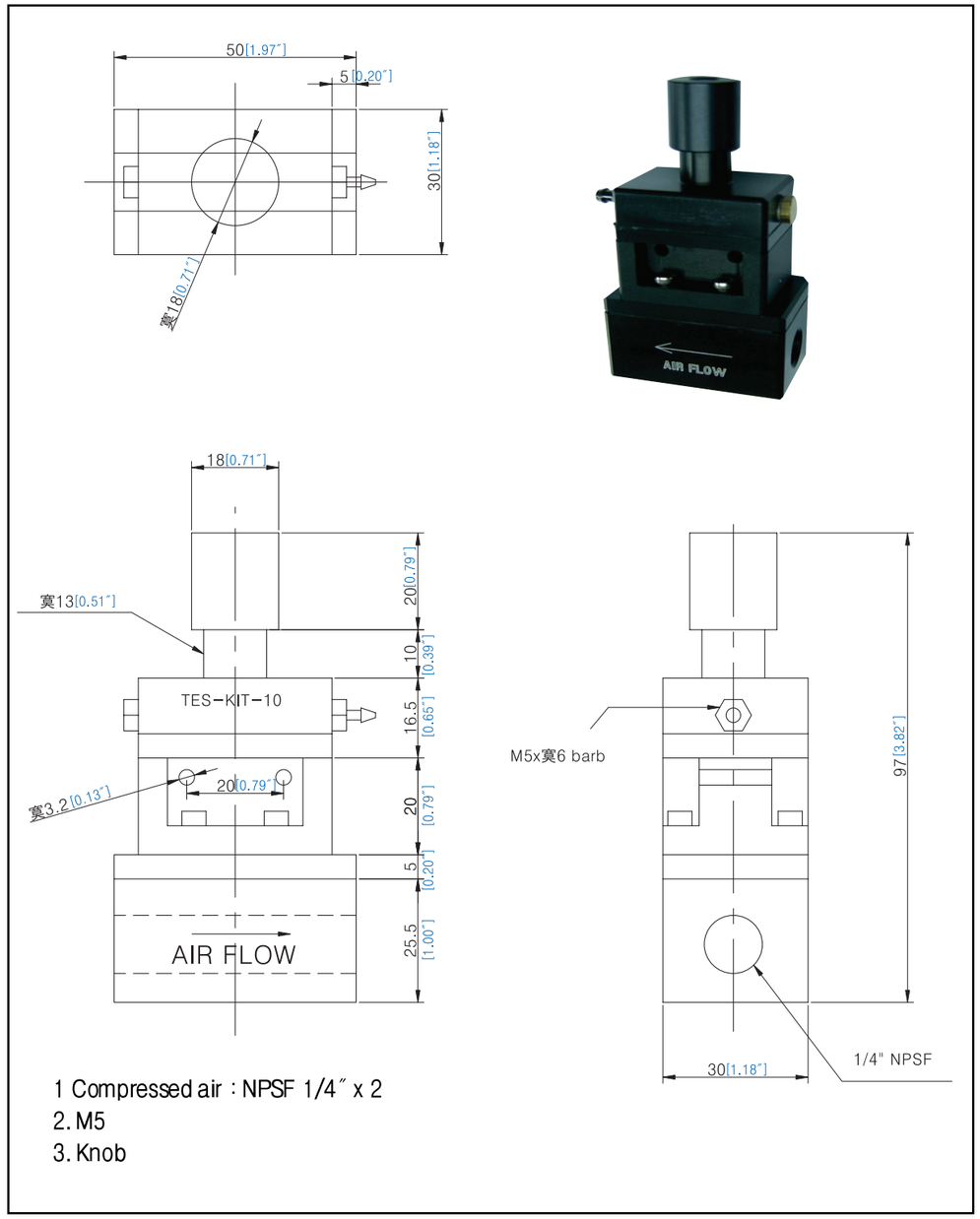


<Flow Diagram1>

<Flow Diagram2>

At the beginning, compressed air generated by the compressor is supplied to vacuum generator (①), then generates vacuum, and vacuum pad works normally, then by the setting of vacuum control knob which is placed in the vacuum controlled v/v system. If vacuum level reach up to a certain degree of vacuum, the vacuum creating pilot pressure closes main valve (2/2 way) (b).
This short time of working is done by the remains of vacuum that is existed so far, so it is not necessary to consume more compressed air.
As time goes by, if vacuum is down, again through valve (a)'s operation and then 2/2 way valve (b)'s operation, compressed air goes to vacuum ejector. And then vacuum is created.
By repeating this system's flow, we can save about 30%~40% of compressed air.
Above picture <Operation Flow Diagram 2> describes the varying vacuum, and shows the number of operations are increasing along with the volume of consumed vacuum.

TES-KIT Vacuum-Controlled Valve



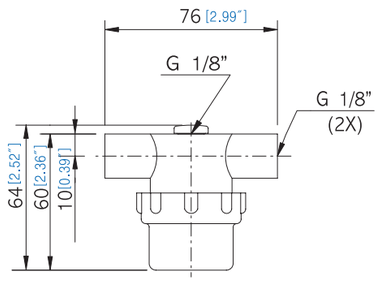
1 Compressed air : NPSF 1/4″ x 2
2. M5
3. Knob

⑥ Vacuum Filter

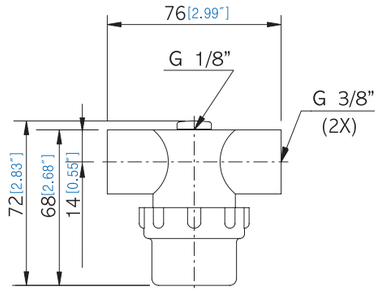
Use : When vacuum pump starts operating, all kinds of gaseous particles, dust, and other kinds of lubricated things are poured into vacuum port at the speed of about 20 m/sec.
To filter and remove these odd materials efficiently, it is necessary to use vacuum filter.
As the volume of vacuum flow, various kinds of filters are existed, are classified like below.

Model	Port Size	Density	Filter Element	Material
TVF00-M5	M 5	40 micron	EFV 0.05	PE. PA. NYLON
TVF01 - 1/8″	G 1/8″	10 micron	EFV 0.01	PE. PA. NYLON
TVF02 - 1/4″	G 1/4″	10 micron	EFV 0.02	PE. PA. NYLON
TVF03 - 3/8″	G 3/8″	10 micron	EFV 0.03	PE. PA. NYLON
TVF04 - 1/2″	G 1/2″	10 micron	EFV 0.04	PE. PA. NYLON
TVF06 - 3/4″	G 3/4″	10 micron	EFV 0.06	PE. PA. NYLON
TVF10 -1″	G 1″	10 micron	EFV 0.10	PE. PA. NYLON
TVF14 -1 1/2″	G 1 1/2″	10 micron	EFV 0.14	PE. PA. NYLON

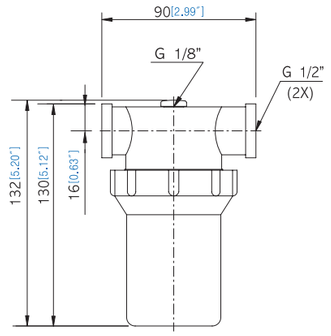
Dimension



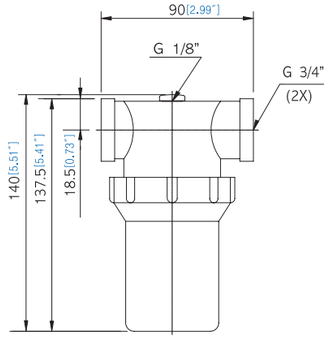
TVF01-1/8"



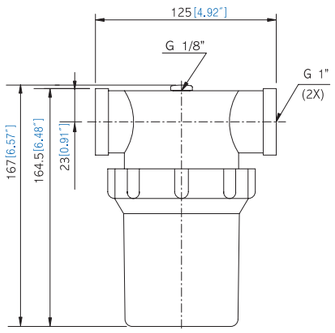
TVF03-3/8"



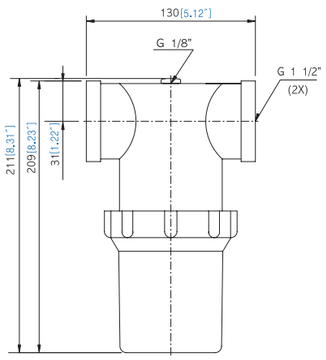
TVF04 - 1/2"



TVF06 - 3/4"



TVF10 - 1"



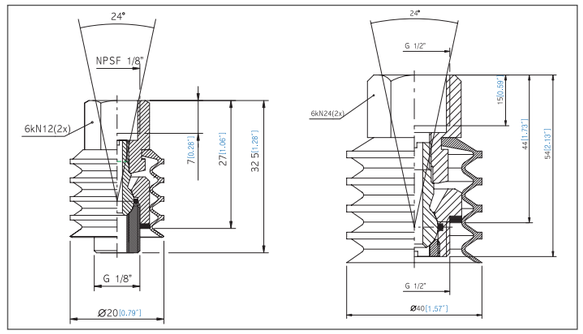
TVF14 - 1 1/2"

⑦ Ball Joint & Level Compensator

- Ball Joint

Use : When the position of the objects to be handled is different from the level, even if the object has the angular difference, ±12° with vacuum pad, it is the TOTAL ball joint (TBJ-Series) that can lift and move the objects without any problems.

Model	Specification	
TBJ01	Material: steel	1/8" NPSF
	Degree of angular compliance : ±12° (totally 24°)	1/8" Male
TBJ04	Material: steel	1/8" NPSF
	Degree of angular compliance : ±12° (totally 24°)	1/8" Male

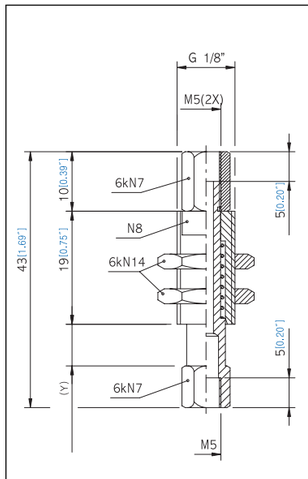


- Level Compensator

Use : When the objects to be handled are stacked in parallel to the earth, this absorbs the pad's height differences to keep in the definite position. Also provides a certain degree of shock absorption to protect products.

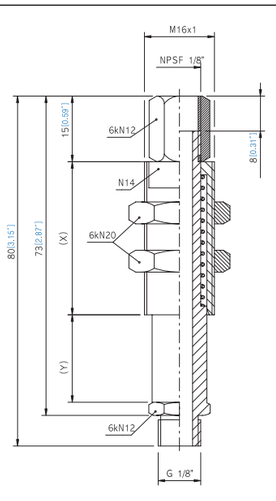
Model	Specificaton	Stroke	Remarks
TLC-M5-07	Port size: M5 (Female : Male) Material: steel Max. load : 3.2kg	0~7 mm [0.28″]	Use for suction cup up to Ø2~30 [Ø0.08″~1.18″]
TLC-M5-10		0~10 mm [0.39″]	
TLC-01-20	Port size: ⅛″ NPSF G⅛″ Material: steel Max. load : 24kg	0~20 mm [0.79″]	Use for suction cup up to Ø10~110 [Ø0.39″~4.33″]
TLC-01-30		0~30 mm [1.18″]	
TLC-01-50		0~50 mm [1.97″]	
TLC-01-70		0~70 mm [2.76″]	
TLC-04-15	Port size: ½″ Female G⅛″ Male Material: steel Max. load : 61.4kg	0~15 mm [0.59″]	Use for suction cup up to Ø50~300 [Ø1.97″~11.81″]
TLC-04-20		0~20 mm [0.79″]	
TLC-04-30		0~30 mm [1.18″]	
TLC-04-50		0~50 mm [1.97″]	
Option	Possible to be made for the user's request by metric, U.S. Imperial, PT, PF, NPT, screw thread, stroke, etc		

Plan & Dimension



TLC-M5

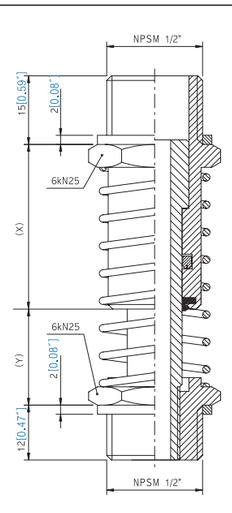
Y : 07[0.28″], 10[0.39″]



TLC-01

Y : 20[0.79″], 30[1.18″], 50[1.97″], 70[2.76″]

X : 35[1.38″], 50[1.97″], 70[2.76″], 95[3.74″]

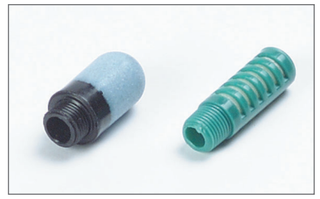


TLC-04

Y : 15[0.59″], 20[0.79″], 30[1.18″], 50[1.97″]

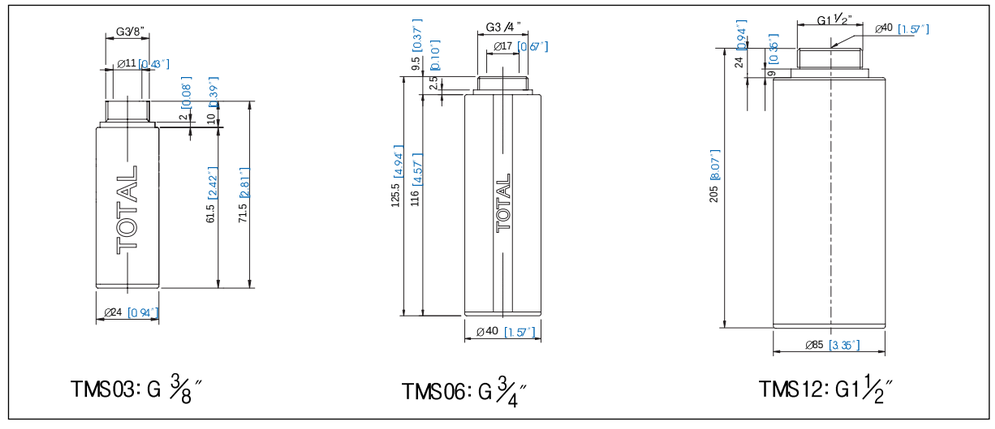
X : 30[1.18″], 40[1.57″], 60[2.36″], 100[3.94″]

⑧ Silencer



Round silencer is defined by external architecture and internal absorption material. Our products use special foams as internal absorption material, and show a good performance as vacuum and pneumatic pump's silencer

Model	Port size	Specification & Remarks	
TMS01	NPSF ⅛″	I.D : 6.5ϕ	Noise Diminution: −10dBA Material: PA, PE, PH Working Temp. :
TMS02	G ¼″	I.D : 7.1ϕ	
TMS03	G ⅜″	I.D : 11ϕ	
TMS06	G ¾″	I.D : 17ϕ	
TMS12	G 1 ½″	I.D : 40ϕ	



TMS03: G ⅜″ TMS06: G ¾″ TMS12: G1½″

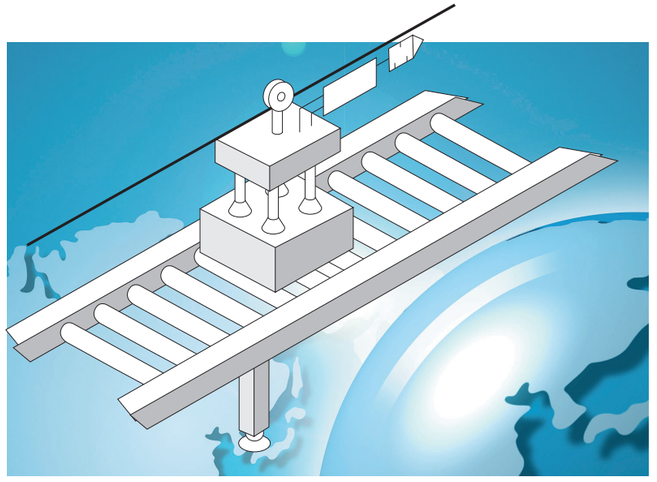
2)Chemical Resistance Data

Resistance of various materials

Resistance	PA	PPS	POM	ABS	PTEE	AL	Nitrile rubber NBR	EPDM rubber	Viton rubber
Ozone (O_3)	–	A	C	B	A	B	C	A	A
Oil, petrol	B	A	B	C	A	C	A	–	A
Hydrolysis	–	A	B	C	A	A	B	B	B
Ferrous Sulfate ($FeSO_4$)	A	A	A	C	A	–	A	A	A
Acid and alkali	C	A	C	–	A	–	B	A	B
Acetone (CH_3COCH_3)	A	A	A	–	A	A	–	A	–
Ammonia	C	B	–	–	A	B	C	A	–
Amyl alcohol	A	A	A	–	A	B	B	A	B
Benzene(C_6H_6)	A	A	A	–	A	B	–	–	A
Butane (C_4H_{10})	–	A	A	A	A	B	B	B	A
Freon13 ($ClCF_3$)	B	A	B	B	A	–	–	A	A
Cyclohexane	A	A	A	–	A	A	B	–	A
Ethanol	A	A	A	B	A	B	C	A	A
Ethyl acetate	A	A	A	–	A	B	–	B	–
Hexane	B	A	A	–	A	A	A	–	A
n-Octane (C_8H_{18})	B	A	B	B	A	–	A	–	A
Carbon tetrachlonide	–	A	B	–	A	–	–	–	A
Chloro benzene	–	A	–	–	A	A	–	–	A
Chloroform	A	A	A	–	A	C	–	–	A
Methanol	B	A	A	–	A	A	A	A	C
Zinc chloride ($ZnCl_2$)	B	B	B	B	A	B	B	A	A
Methylene chlonde	C	A	B	–	A	C	–	B	A
Methyl ethyl ketone, MEK	A	A	C	–	A	B	–	A	–
Sodium Hydroxide(NaOH)	A	A	C	C	A	–	B	A	B
Sulfuric Acid25% (H_2SO_4)	C	C	A	B	A	–	B	B	A
Propanol	–	A	A	B	A	B	A	A	A
Sulpuric acid	–	A	–	B	A	–	C	B	A
Tetrahydrofuran	A	A	A	–	A	–	–	B	–
Table salt (NaCl)	A	A	A	A	A	B	A	A	A
Tetrachlorethylene	A	A	A	–	A	–	–	–	A
Toulene	A	A	C	–	A	A	–	–	A
Ethyl Bromide (CH_3CH_2Br)	A	B	B	B	A	–	B	B	–
Trichlorethane	C	A	A	–	A	–	–	–	A
Trichlorethylene	C	A	–	–	A	–	–	–	A
Xylene $C_4H_4(CH_3)_2$	A	A	A	–	A	B	–	–	A
Acetic acid	–	A	–	–	A	C	C	A	B
Nitric Acid 25% (HNO_3)	–	–	C	C	A	–	C	B	A

A : Exclent
B : Good
C : Limited
– : Unsuitable

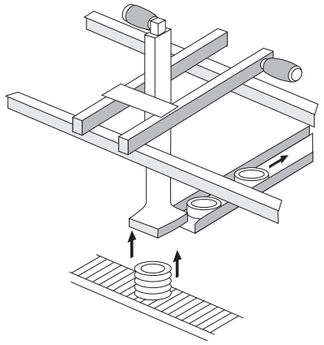
Chap. 6 Application



1) Application

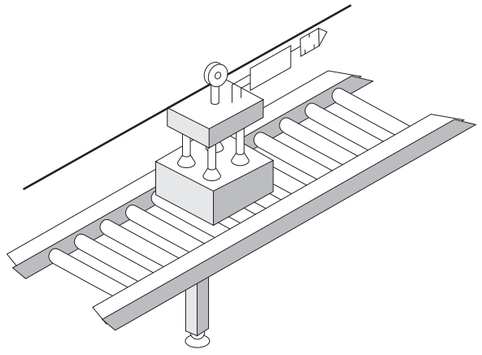
① Vacuum Lifting Device

- picking up and handling sheets of material



■ Handle products which have various and specific figures Suction JIG production, design and the correct suction cups selection are needed

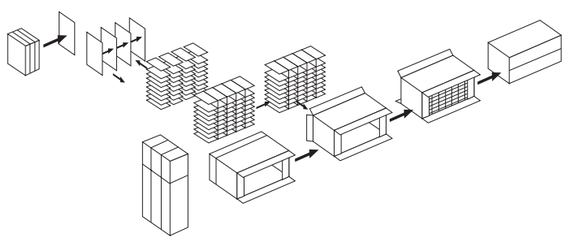
② Food Stuff Product Moving Device



■ Move and pile foodstuff's package

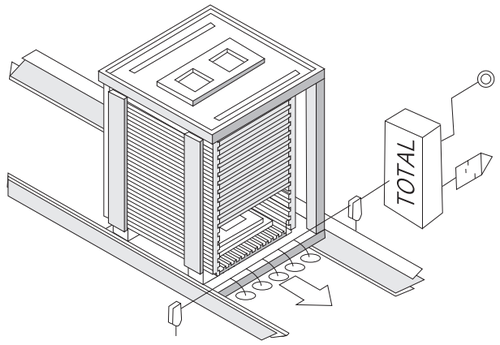
③ Cartoning M/C

- packaging and attaching



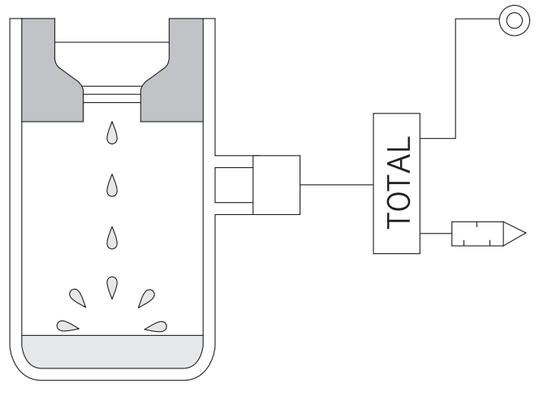
■ Hold and move for the box's folding and attaching

④ Vacuum Pick and Move Facility



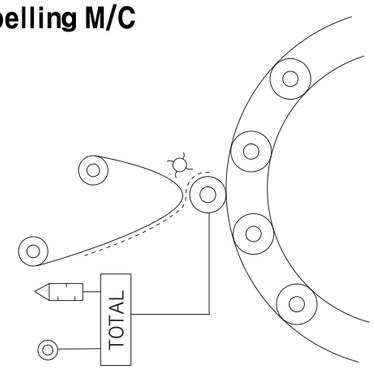
■ Pick specific parts and move to the 2nd or 3rd line.

⑤ Filtering Device



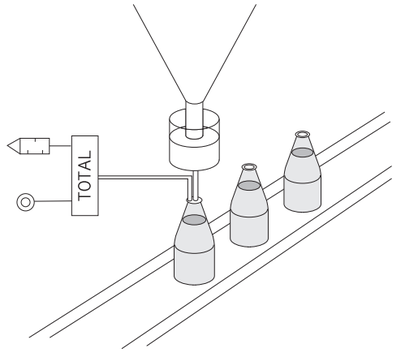
■ Due to sufficient vacuum flow, can shorten filtering time and can get more purified liquid.

⑥ Labelling M/C



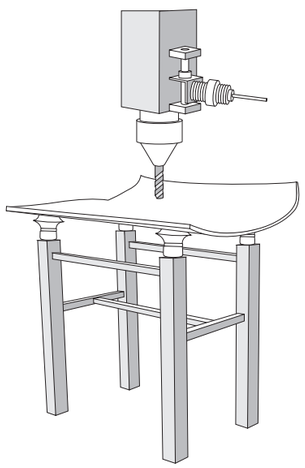
- Automatic attaching label on the side of bottle After striping label by the stripper, labels holding by vacuum are put on the bottle by the roller.

⑦ Vacuum Filling M/C



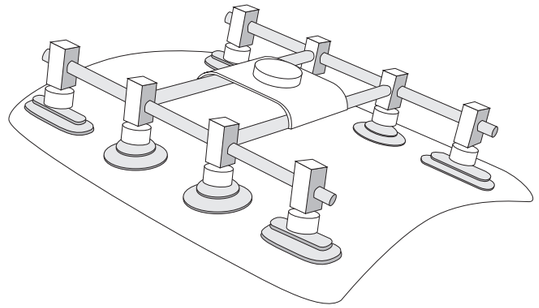
- Discard generated bubbles when filling liquid of cosmetics, pharmacy and food, Fill them quickly.

⑧ Vacuum Holding M/C



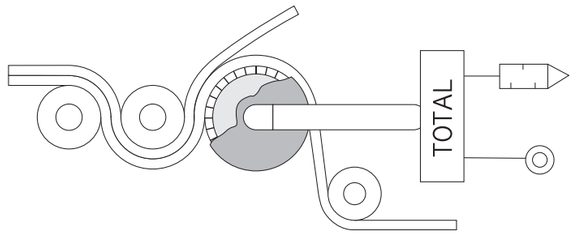
- When manufacturing furniture, woods, glasses, etc, prevent them from moving in the wrong position, overcome vibrations, and can make it easy to be attached after process.

⑨ Concaved Sheets Moving Device



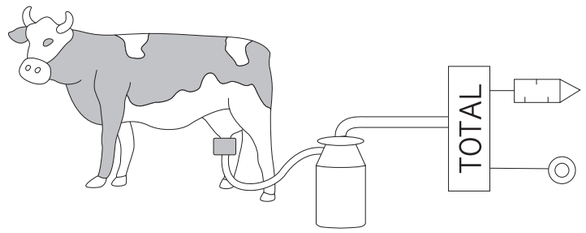
- When the objects has uneven concave surface, the system can be designed to make it possible to use.

⑩ Vacuum Bearing



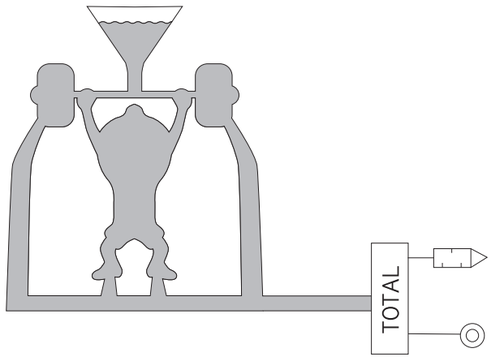
- With vacuum rotary joint, prevent film from separating for giving consistent tension to the film to be carried.

⑪ Dairy Milking Machine



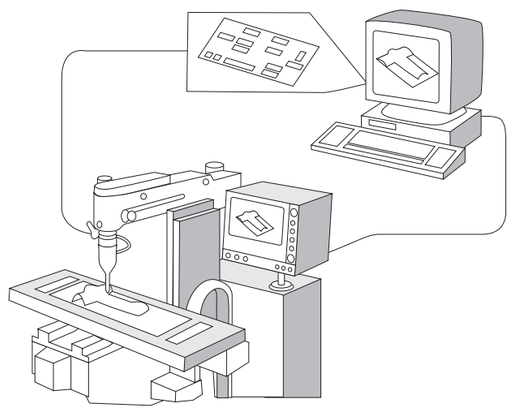
- Give a good effect on the health of milk cows for controlling a certain vacuum level.

⑫ Forming Machine



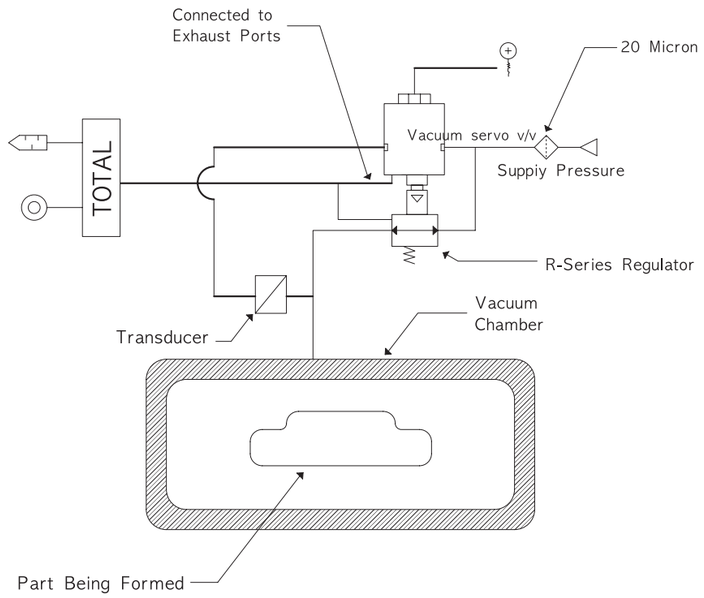
- Remove gas and bubble which can be generated by forming casting frame and give a good effect on the quality of product.

⑬ Vacuum Table and Inspection Equipment

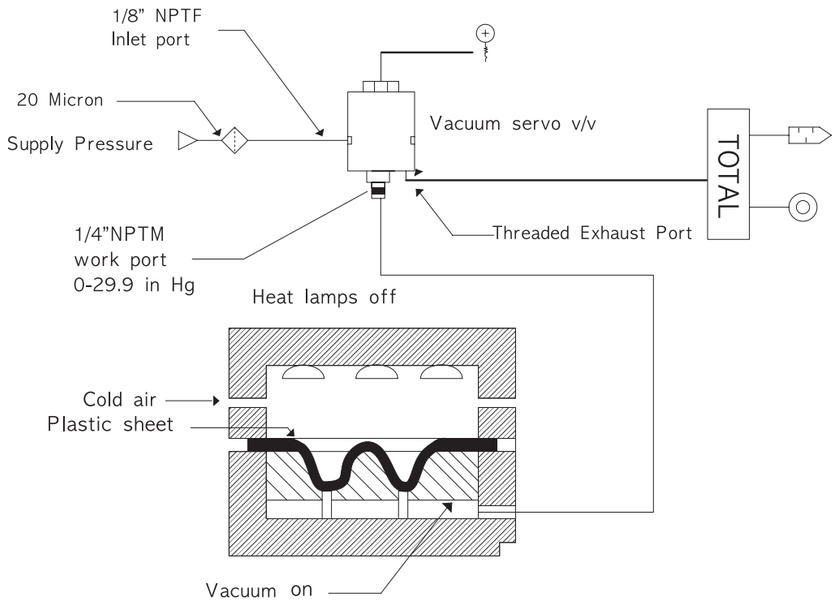


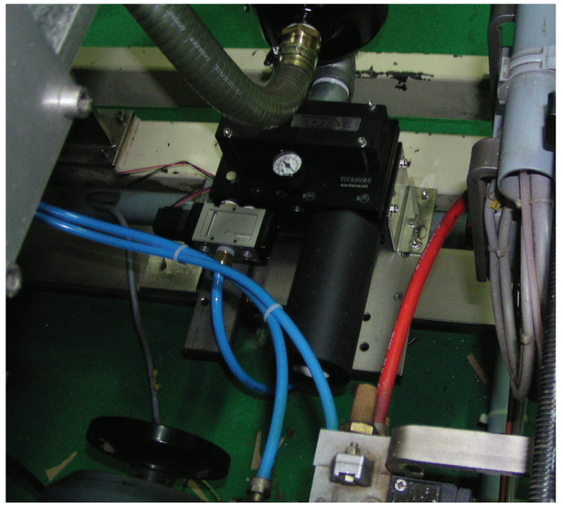
- Can be used in holding use in the semi-conductor product line, inspection equipment, and processing machine.

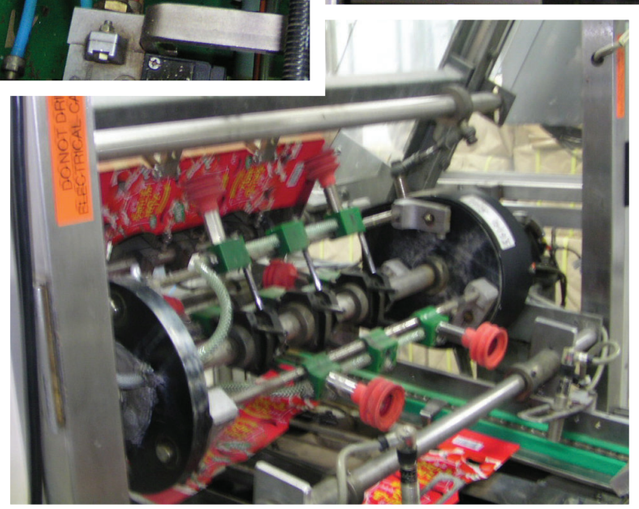
⑭ Vacuum Forming (vacuum servo control)

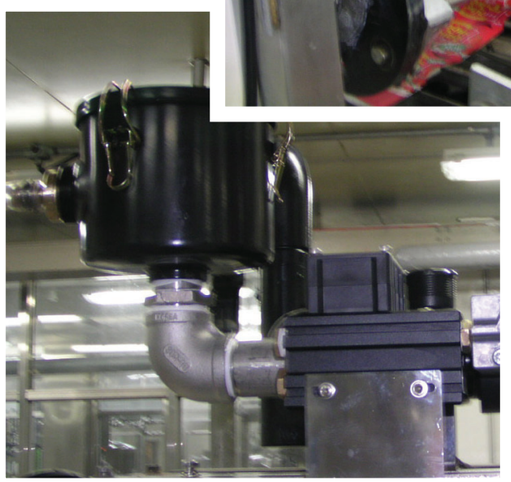


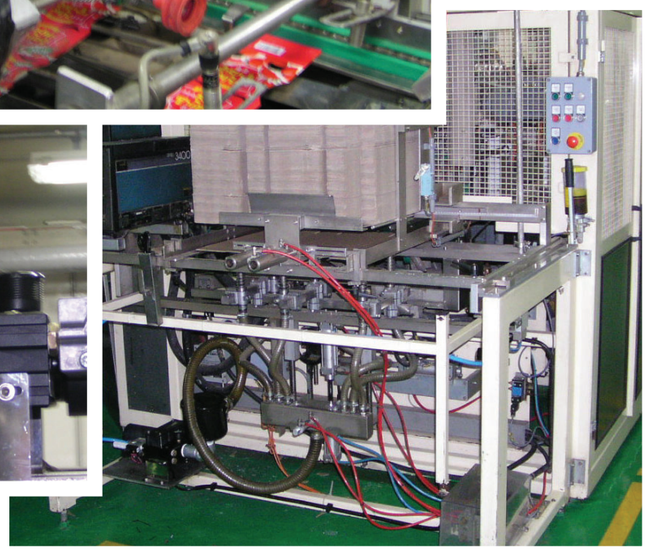
⑮ Vacuum Casting (vacuum servo control)

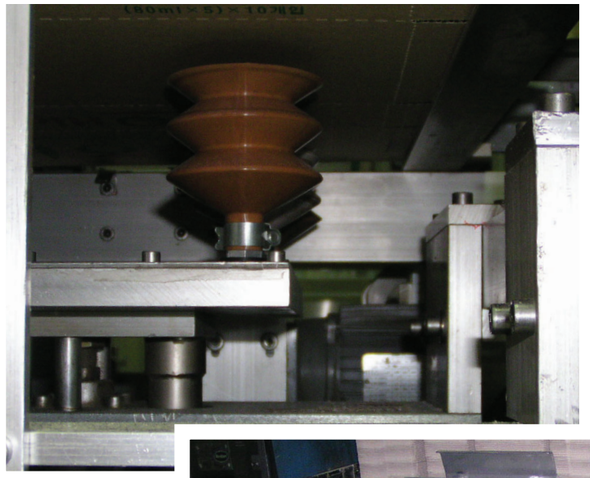


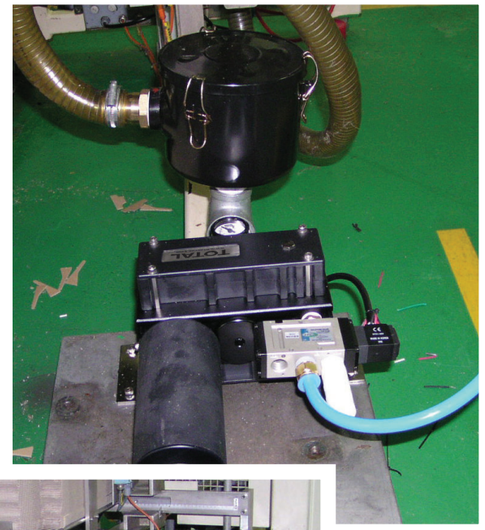


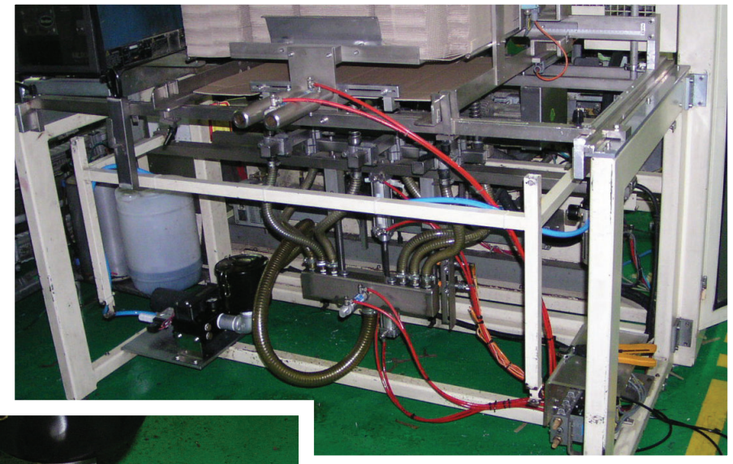


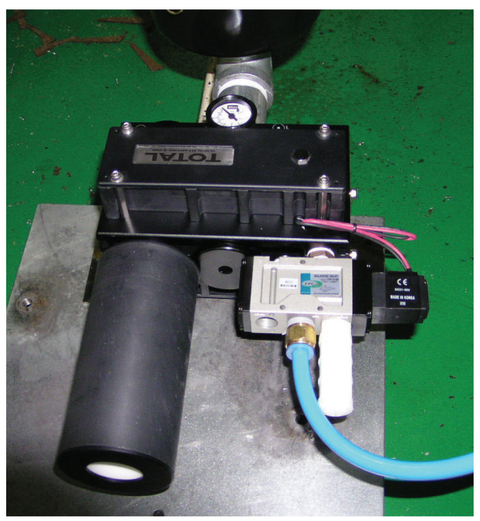


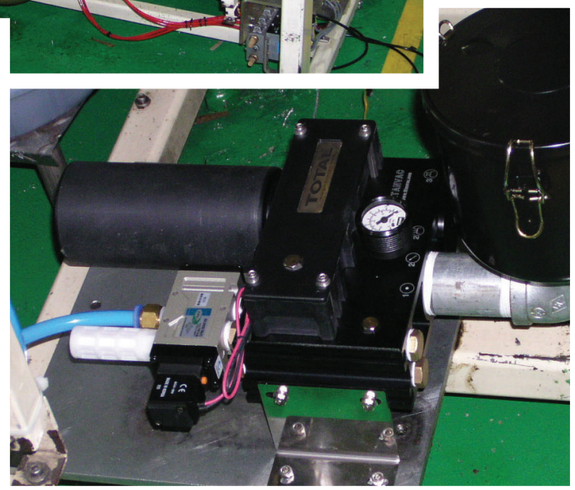












Chap. 7

Customer Supporting Center

1) Web Site: www.totalvac.co.kr / www.titanvac.com for Internet Consulting Service and Resource Support

2) Vacuum Pump System Design Support and Technical Assistance

① Qualified Engineering Sales to Support Essentially for Your Operating Field System
② Offering Education Program for the Charged Personnel to Design and Maintain Facilities
③ Faithful Consulting through Telephone, Fax, and Homepage Bulletin Board

3) After Service (A/S) Center

① Prompt Reply within 24~48 Hours when You Call for A/S and Technical Support
② Call to Our Headquarters Emergency Task Force System
Tel: 82-51-313-5531 Fax: 82-51-324-8019
③ Local A/S Center Pls. Refer to Our Web Site www.totalvac.co.kr/www.titanvac.co.kr
TOTAL Vac. USA Co. Tel: 1-818-441-2079 Fax: 1-909-989-2027

4) Warranty Policy

① Free of Charge Warranty
A 3-year free of charge warranty for vacuum pumps but user's carelessness
A guarantee period of 1 year for consumptive accessories

② Parts Supply Policy and User's Responsibility Regulation
Continuously produce and supply spare parts for 7 years from the date of delivery
In case of user's carelessness, intended damage, loss, and unsuitable filter use
(can cause strange substances input, etc), you can not receive free of charge warranty.

③ Free of Charge A/S
5-year free of charge A/S and no charge for spare parts within 1 year from the date of delivery