How to select the proper vacuum pump

Sealed system

For sealed system the capacity of the pump is determined by how fast the system can be evacuated to a certain vacuum level. This capacity is called the evacuation time of the pump and is normally specified in sec/l. This value is multiplied by the volume of the system in order to obtain the evacuation time to the desired vacuum level.

Non-sealed system

With non-sealed system (lifting of porous material) the case is different. To maintain the desired vacuum level the pump must have the capacity to pump away the air-leaking in by establishing the leaking flow ; it is possible, by reading the pump data, to find the right pump for the application in question. If the leakage occurs via a known aperture, the flow can be established according to the diagram. When the leakage occurs through a porous material or in an unknown way, the flow can be established by a test with a vacuum pump. The pump is connected to the system and the obtained vacuum level is read. (It should be at least -20kPa)

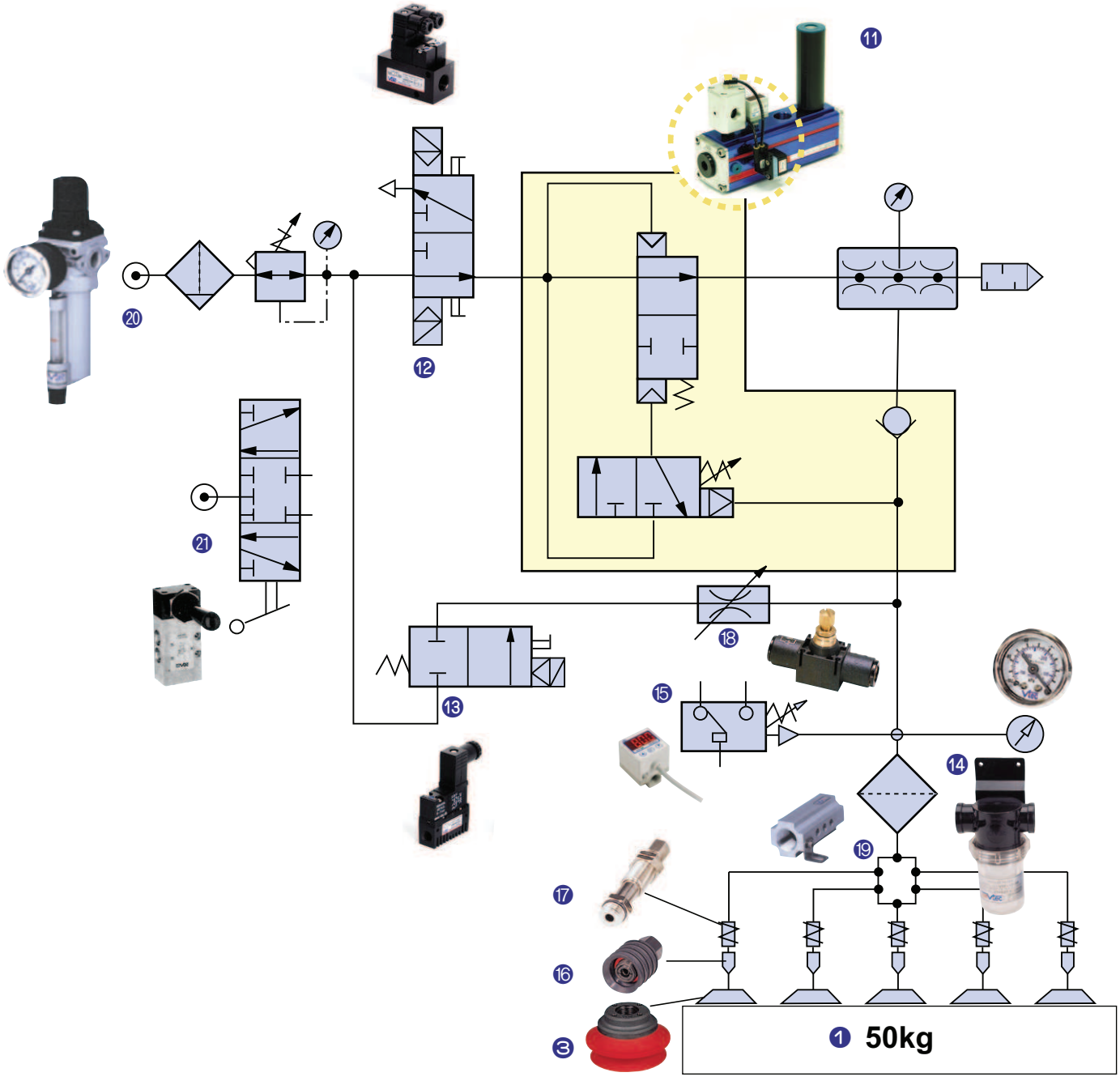
AS-KIT (Air saving system)

Electrically driven, mechanical vacuum pumps normally work during the whole working period and the vacuum requirements are controlled by a valve on the vacuum side. In system with compressed air-driven vacuum pumps it is often possible to save a lot of energy. As these pumps have a faster reaction time (fast start-up) the pump can be shut off when the vacuum is no longer needed. Many pumps can be delivered with an Air saving system as option.

The example for vacuum system

EX) If, you have to move in packing box (50kg) with suction cup and suction time-within 0.3sec
using to the condition as follows :

Condition : air pipe length=3m, air pipe(hose) inner diameter=6mm, Quantity of suction cup ; 5 pcs
What is proper vacuum pump & suction cup model?



① Moving weight (kg)	: 50
② Suction time	: 0.3 second
③ Selected suction cup	: VB75(B) Pu-12F
④ Suction cup material	: PU
⑤ Suction cup quantity (Pcs)	: 5
⑥ Diameter of suction cup (mm)	: 75
⑦ Air vacuum hose length (m)	: 3
⑧ Inner diameter of air hose (mm)	: 6
⑨ Volume of suction cup (Nl)	: 0.55
⑩ Volume of vacuum air hose (Nl)	: 0.085
⑪ Selected vacuum Pump	: VTM 50L - 1834 - AS
⑫ Air supply control valve	: VMS14 D-3-2
⑬ Vacuum release control valve	: VMS18D-3-2
⑭ Selected vacuum filter (You can to be select to size of a vacuum filter according to capability of infected material.)	: VTF 34 - 2
⑮ Vacuum switch (transiton singal for next movement)	: VP20C..
⑯ Ball joint (to use in curve or uneven objects)	: BJ 12
⑰ Level spring (to use to compensater differences in level)	: L1230T
⑱ Needle valve (vacuum level controlling valve)	
⑲ Vacuum manifold	: VTDC34-14X5
⑳ Air filter / regulator (remove to dust, water, rust, etc.)	
㉑ Hand valve (using to manual)	

▸ HOW TO SELECT SUCTION CUP SIZE

$$D=113X\sqrt{\frac{MXN}{UXS}}=113\ X\sqrt{\frac{50\ X\ 2}{60\ X\ 5}}=65.2\ mm$$

D = diameter size of suction cup (mm)
M = weight (kg)
U = vacuum level (-kPa, %)
N = safety factor (2)
S = quantity of suction cup

★ VB75 = (You are desirable to select a little big size suction cup than the actual they size)

▸ WHAT IS PROPER SUCTION CUP SIZE

VB75 ($110cm^{3)}$ = 0.11ℓ X 5 (Pcs) = 0.55ℓ (※Please refer to page 18.19 for the Volume of suction cup)

- 0.55 ℓ (Quantity of vacuum pad : 5 Pcs)

▸ AIR PIPE, SUCTION CUP & VACUUM FILTER

$$\cdot V=\frac{\pi Xd^2xL}{4}\ X\ \frac{1}{1000}=\frac{3.14X0.6^2X300}{4}\ X\ \frac{1}{1000}\fallingdotseq 0.085\ell$$

V = Capacity (liter)
d = inside diameter of air pipe (cm)
L = the length of air pipe (cm)

- Filter (VTF34-2) : $160cm^3$ = 0.16ℓ

■ Needed vacuum capacit = the capacity of suction cup + the capacity of air pipe + the vacuum filter

0795ℓ = 0.55ℓ + 0.085ℓ + 0.16ℓ

▸ THE SELECTION OF VACUUM PUMP

VTM25L : 0.795(ℓ) X 0.66 = 0.53
VTM50L : 0.795(ℓ) X 0.33 = 0.27
VTM75L : 0.795(ℓ) X 0.248 = 0.20
VTM100L : 0.795(ℓ) X 0.166 = 0.13
★ VTM50L or VTM75L

⚠ Because when there is a vacuum leak from the work piece or the piping and a drop in vacuum pressure which causes the air pressure drop.

AS - KIT

Air Saving

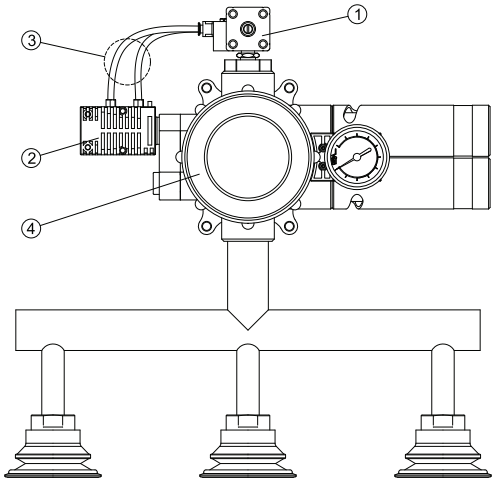
Has anyone ever told you that air is free? Well, think again because compressed air still uses energy and costs money to use it. VMECA / VTEC´s ongoing principle on saving air and giving you the highest performance have always been our standard.

Air Saving Kit

VMECA / VTEC have always offered various ranges of compressed air-driven vacuum pumps in the market.
VMECA / VTEC ensures the best solutions to customers by offering the most efficient products in the market.

VMECA / VTEC´s Air Saving-Kit(AS-Kit) effectively prevents compressed air loss. Air Saving-Kit is a pneumatic control system that cuts off the vacuum pump once the desired vacuum level has been achieved, thus minimizing the energy (compressed air) consumption of the vacuum pump.

In case the vacuum level drops below the working level (requried vacuum level), then the Air Saving-Kit reactivates the vacuum pump allowing for safe handling of product. The Air Saving-Kit is the most suitable in sealed systems (applications).



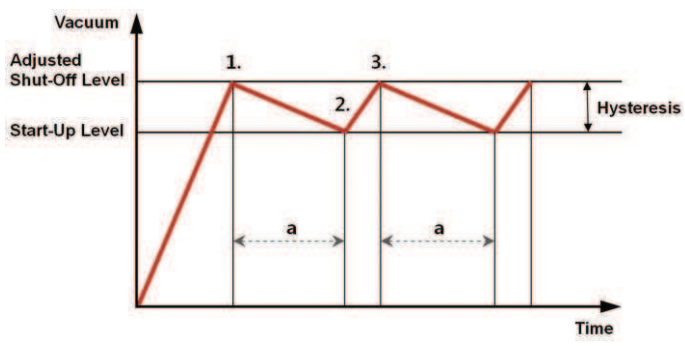
AS - Kit - Turtle Pump

① Pneumatical vacuum switch, VPS-01 NC

② Pneumatical Air ON/OFF Valve, 1/4 ″

③ Hose of Poly-Urethane, D=4/1.5

④ Turtle Vacuum pump, Non-return type



Function

A vacuum control valve shuts off the flow of compressed air to the pump when the pre-set vacuum level is reached (1).
The vacuum level is set by a screw. Because of minor leakage in a vacuum system the vacuum level drops and after a while the start up level of the valve is reached (2).
Then the pump will start and work until the shut off level is reached again (3), etc.
(the section (a) is possible to be changed depending on the level of airtight.)

AS - KIT

- **AS - Kit Products line-up**

Pump Characteristics

	Model	MAX. Vacuum - kPa (-inHg)	Supply Air pressure (MPa)	Max.Vacuum Flow (Nl/m)	Air consumption (Nl/m)	Noise level (dBA)	Min. hose inner ø (within 2m)		
							Air supply	Vacuum	Exhaust
132~137	VTC 3021	75 (22.15)	0.22	164	97	50 ~60	6	8	10
		93 (27.46)	0.3	170	118				
		93 (27.46)	0.4	171	152				
132~137	VTC 3031	75 (22.15)	0.22	302	97		6	8	10
		93 (27.46)	0.3	338	118				
		93 (27.46)	0.4	341	152				
134~137	VTCL 3021	60 (17.72)	0.4	188	70		6	8	10
		70 (20.67)	0.5	195	85				
		75 (22.15)	0.6	200	104				
134~137	VTCL 3031	60 (17.72)	0.4	302	70		6	8	10
		70 (20.67)	0.5	344	85				
		75 (22.15)	0.6	362	104				
138~143	VTC 3022	75 (22.15)	0.22	328	194	60~65	8	12	18
		93 (27.46)	0.3	340	236				
		93 (27.46)	0.4	342	304				
138~143	VTC 3032	75 (22.15)	0.22	604	194		8	12	18
		93 (27.46)	0.3	676	236				
		93 (27.46)	0.4	682	304				
140~143	VTCL 3022	60 (17.72)	0.4	376	140		6	12	18
		70 (20.67)	0.5	390	170				
		75 (22.15)	0.6	400	208				
140~143	VTCL 3032	60 (17.72)	0.4	604	140		6	12	18
		70 (20.67)	0.5	688	170				
		75 (22.15)	0.6	724	208				
144~153	VTC 3122	75 (22.15)	0.22	328	194	60 ~65	8	15	15
		93 (27.46)	0.3	340	236				
		93 (27.46)	0.4	342	304				
144~153	VTC 3123	75 (22.15)	0.22	492	291		10	19	22
		93 (27.46)	0.3	510	354				
		93 (27.46)	0.4	513	456				
144~153	VTC 3124	75 (22.15)	0.22	656	388		10	22	32
		93 (27.46)	0.3	680	472				
		93 (27.46)	0.4	684	608				
144~153	VTC 3132	75 (22.15)	0.22	604	194		8	15	15
		93 (27.46)	0.3	676	236				
		93 (27.46)	0.4	682	304				
144~153	VTC 3133	75 (22.15)	0.22	902	291		10	19	22
		93 (27.46)	0.3	1014	354				
		93 (27.46)	0.4	1023	456				
144~153	VTC 3134	75 (22.15)	0.22	1208	388		10	22	32
		93 (27.46)	0.3	1352	472				
		93 (27.46)	0.4	1364	608				
148~153	VTCL 3122	60 (17.72)	0.4	376	140	60 ~65	8	15	15
		70 (20.67)	0.5	390	170				
		75 (22.15)	0.6	400	208				
148~153	VTCL 3123	60 (17.72)	0.4	564	210		10	19	22
		70 (20.67)	0.5	585	255				
		75 (22.15)	0.6	600	312				
148~153	VTCL 3124	60 (17.72)	0.4	752	280		10	22	32
		70 (20.67)	0.5	780	340				
		75 (22.15)	0.6	800	416				
148~153	VTCL 3132	60 (17.72)	0.4	604	140		8	15	15
		70 (20.67)	0.5	688	170				
		75 (22.15)	0.6	724	208				
148~153	VTCL 3133	60 (17.72)	0.4	906	210		10	19	22
		70 (20.67)	0.5	1032	255				
		75 (22.15)	0.6	1086	312				
148~153	VTCL 3134	60 (17.72)	0.4	1208	280		10	22	32
		70 (20.67)	0.5	1376	340				
		75 (22.15)	0.6	1448	416				

Specifications subject to change without notice.

Pump Characteristics

Model	MAX. Vacuum -kPa (-inHg)	Supply Air pressure (MPa)	Max.Vacuum Flow (Nl/m)	Air consumption (Nl/m)	Noise level (dBA)	Min. hose inner ø (within 2m)		
						Air supply	Vacuum	Exhaust
VS 144 (159 ~ 165)	75 (22.15)	0.22	302	97	50 ~ 60	6	8	10
	93 (27.46)	0.3	338	118				
	93 (27.46)	0.4	341	152				
VS 146 (159 ~ 165)	75 (22.15)	0.22	302	97		6	8	10
	93 (27.46)	0.3	338	118				
	93 (27.46)	0.4	341	152				
VS 148 (159 ~ 165)	75 (22.15)	0.22	302	97		6	8	10
	93 (27.46)	0.3	338	118				
	93 (27.46)	0.4	341	152				
VLS 144 (161 ~ 165)	60 (17.72)	0.4	302	70	50 ~ 60	6	8	10
	70 (20.67)	0.5	344	85				
	75 (22.15)	0.6	362	104				
VLS 146 (161 ~ 165)	60 (17.72)	0.4	302	70		6	8	10
	70 (20.67)	0.5	344	85				
	75 (22.15)	0.6	362	104				
VLS 148 (161 ~ 165)	60 (17.72)	0.4	302	70		6	8	10
	70 (20.67)	0.5	344	85				
	75 (22.15)	0.6	362	104				
MD 302 (171 ~ 177)	75 (22.15)	0.22	164	97	50 ~ 60	6	8	10
	93 (27.46)	0.3	170	118				
	93 (27.46)	0.4	171	152				
MD 303 (171 ~ 177)	75 (22.15)	0.22	302	97		6	8	10
	93 (27.46)	0.3	338	118				
	93 (27.46)	0.4	341	152				
MDL 302 (173 ~ 177)	60 (17.72)	0.4	188	70		6	8	10
	70 (20.67)	0.5	195	85				
	75 (22.15)	0.6	200	104				
MDL 303 (173 ~ 177)	60 (17.72)	0.4	302	70		6	8	10
	70 (20.67)	0.5	344	85				
	75 (22.15)	0.6	362	114				
PM 303 X 1 (184 ~ 193)	75 (22.15)	0.22	302	97	60 ~ 65	8	12	12
	93 (27.46)	0.3	338	118				
	93 (27.46)	0.4	341	158				
PM 303 X 2 (184 ~ 193)	75 (22.15)	0.22	604	194		8	15	15
	93 (27.46)	0.3	676	236				
	93 (27.46)	0.4	682	304				
PM 303 X 3 (184 ~ 193)	75 (22.15)	0.22	902	291		10	19	22
	93 (27.46)	0.3	1014	354				
	93 (27.46)	0.4	1023	456				
PM 303 X 4 (184 ~ 193)	75 (22.15)	0.22	1208	388		10	22	32
	93 (27.46)	0.3	1352	472				
	93 (27.46)	0.4	1364	608				
PML 303 X 1 (188 ~ 193)	60 (17.72)	0.4	302	70	60 ~ 65	8	12	12
	70 (20.67)	0.5	344	85				
	75 (22.15)	0.6	362	104				
PML 303 X 2 (188 ~ 193)	60 (17.72)	0.4	604	140		8	15	15
	70 (20.67)	0.5	688	170				
	75 (22.15)	0.6	724	208				
PML 303 X 3 (188 ~ 193)	60 (17.72)	0.4	906	210		10	19	22
	70 (20.67)	0.5	1032	255				
	75 (22.15)	0.6	1086	312				
PML 303 X 4 (188 ~ 193)	60 (17.72)	0.4	1208	280		10	22	32
	70 (20.67)	0.5	1376	340				
	75 (22.15)	0.6	1448	416				

Pump Characteristics

	Model	MAX. Vacuum -kPa (-inHg)	Supply Air pressure (bar)	Max.Vacuum Flow (Nl/m)	Air consumption (Nl/m)	Capacity equivaient to electricity moter pump size(kw)	Noise level (dBA)	Min. hose inner ø (within 2m)		
								Air supply	Vacuum	Exhaust
196~199	VKX5	92 (27.17)	3-6	23	13-22	0.03	50-65	>2	>2	
	VKM5	85 (25.1)	3-6	26	12-21	0.03		>2	>2	
200~211	VKM61	85 (25.1)	3-6	37	15-21	0.05	50-65	>4~10	>6	>10
	VKM62		3-6	74	30-42	0.1		>4~10	>6	>10
200~211	VKX61	92 (27.17)	3-6	31	21.6-24	0.05	50-65	>4~10	>6	>10
	VKX62		3-6	62	43.2-48	0.1		>4~10	>6	>10
212~223	VKX73	92 (27.17)	3-6	94	49-66	0.15	50-65	>4~10	>8	>12
	VKX74		3-6	109	66-88	0.2		>4~10	>8	>12
212~223	VKM73	85 (25.1)	3-6	111	40-58	0.15	50-65	>4~10	>8	>12
	VKM74		3-6	135	54-78	0.2		>4~10	>8	>12
232~235	VTOM5-(N)Stack	85 (25.1)	5.5	27XN	15 X N-21 X N	0.05 X N	50-65	>8~10	>2.5	>10
	VTOM10-(N)Stack		5.5	35XN	30 X N-42 X N	0.1 X N		>8~10	>4	>12
232~235	VTOX5-(N)Stack	92 (27.17)	5.5	24XN	21.6 X N-24 X N	0.05 X N	50-65	>8~10	>2.5	>10
	VTOX10-(N)Stack		5.5	32XN	43.2X N-48 X N	0.1 X N		>8~10	>4	>12
236~241	VTM5-(N)Stack	85 (25.1)	5.5	27XN	15 X N-21 X N	0.05 X N	50-65	>8~10	>2.5	>10
	VTM10-(N)Stack		5.5	35XN	30 X N-42 X N	0.1 X N		>8~10	>4	>12
242~247	VTM10X(N)B(BA,...NC)	85 (25.1)	5.5	74	30 X N-42 X N	0.1	50-65	>8~10	>8	>10x(N)
	VTM20X(N)B(BA,...NC)		5.5	149	60 X N-84 X N	0.2		>8~10	>10	>12x(N)
	VTM30X(N)B(C,...NC)		5.5	220	90 X N-126 X N	0.3		>8~10	>12	>12x(N)
226~231	VTM5-A(B,...NC)	85 (25.1)	5.5	37	15-25	0.05	50-65	>2	>5	>8
	VTM10-A(B,...NC)		5.5	74	30-42	0.1		>2	>8	>10
	VTM20-B(C,...NC)		5.5	149	60-84	0.2		>4	>10	>12
	VTM30-B(C,...NC)		5.5	220	90-126	0.3		>6	>12	>15
248~255	VTM20KD	85 (25.1)	5.5	149	60-84	0.2	50-65	>4	>10	>12
	VTM30KD		5.5	220	90-126	0.3		>6	>10	>15
	VTM40KD		5.5	292	120-168	0.4		>6	>12	>15
	VTM50KD		5.5	341	150-216	0.5		>8	>12	>18
	VTM60KD		5.5	390	180-252	0.6		>8	>15	>18
262~265	VTM25L	91 (26.87)	3.4	365	114	0.25	50-65	>4	>12	>12
	VTM50L		3.4	622	228	0.5		>6	>15	>15
	VTM75L		3.4	841	342	0.75		>8	>19	>22
	VTM100L		3.4	1060	456	1.0		>8	>19	>22
	VTM125L		3.4	1195	570	1.25		>10	>25	>32
	VTM150L		3.4	1370	684	1.5		>10	>25	>32
266~269	VTL25	80 (23.62)	6	379	78-105	0.25	50-65	>4	>12	>12
	VTL50		6	650	156-210	0.5		>6	>15	>15
	VTL75		6	820	234-315	0.75		>8	>19	>22
	VTL100		6	990	312-420	1		>8	>19	>22
	VTL125		6	1090	390-528	1.25		>10	>25	>32
	VTL150		6	1303	468-630	1.5		>10	>25	>32
	VTL175		6	1682	546-735	1.75		>10	>32	>40
	VTL200		6	2061	624-840	2		>10	>32	>40
270~273	VTM25	92 (27.17)	5.8	389	78-108	0.25	50-65	>4	>12	>12
	VTM50		5.8	647	150-210	0.5		>6	>15	>15
	VTM75		5.8	890	228-318	0.75		>8	>19	>22
	VTM100		5.8	1100	300-420	1		>8	>19	>22
	VTM125		5.8	1200	378-528	1.25		>8	>25	>32
	VTM150		5.8	1380	450-630	1.5		>10	>25	>32
	VTM175		5.8	1490	528-738	1.75		>10	>32	>40
	VTM200		5.8	1580	600-840	2		>10	>32	>40

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Pump Characteristics

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							Air supply	Vacuum	Exhaust
VTMM100	92 (27.17)	5.8	1290	300–420	1	55-65	>8	>19	>22
VTMM150		5.8	1740	450–630	1.5		>10	>25	>32
278 ~ 281 VTMM200		5.8	2150	600–780	2		>10	>32	>40
VTMM200F		5.8	2200	600–780	2		>10	>32	>40
VTM150LEF	91 (26.87)	3.4	1680	684	1.5	55-68	>8	>25	>32
VTM200LEF		3.4	2100	912	2		>10	>32	>40
VTM300LEF		3.4	2600	1368	3		>12	>40	>60
292 ~ 297 VTM400LEF		3.4	3180	1824	4		>12	>40	>60
VTM500LEF		3.4	4200	2280	5		>14	>45	>70
VTM600LEF		3.4	5010	2736	6		>14	>50	>70
VTM800LEF		3.4	6100	3648	8		>15	>50	>75
VTMM200EF	92 (27.17)	6	2200	600–780	2	55-68	>10	>32	>40
VTMM300EF		6	3300	900–1260	3		>12	>40	>60
VTMM400EF		6	4400	1200–1680	4		>12	>40	>60
298 ~ 303 VTMM500EF		6	5500	1500–2100	5		>14	>45	>70
VTMM600EF		6	6600	1800–2520	6		>14	>50	>70
VTMM800EF		6	8800	2400–3360	8		>15	>50	>75
VTMM1000EF		6	11000	3000–4200	10		>18	>65	>95
VTML200	92 (27.17)	6	2410	600–780	2	68-76	>10	>32	>40
VTML400		6	4820	1200–1680	4		>12	>40	>60
VTML600		6	7230	1800–2520	6		>14	>50	>70
306 ~ 309 VTML800		6	9640	2400–3360	8		>15	>50	>75
VTML1000		6	12050	3000–4140	10		>18	>65	>90
VTML1200		6	14460	3600–4920	12		>20	>75	>100
VTX5-(N)Stack	92 (27.17)	6	24xN	21.6xN–24xN	0.05xN	55-65	>8~10	>2.5	>12
228 ~ 231 VTX10-(N)Stack		6	32xN	43.2xN–48xN	0.1xN		>8~10	>4	>12
VTX10x(N-B(BA,...NC)	92 (27.17)	5.3	62	43.2xN–48xN	0.1	50-65	>8~10	>8	>10xN
238 ~ 241 VTX20x(N-B(BA,...NC)		5.3	124	86.4xN–96xN	0.2		>8~10	>10	>12xN
VTX30x(N-B(BA,...NC)		5.3	185	129.6xN–144xN	0.3		>8~10	>12	>12xN
VTX5-A(B,...NC)	92 (27.17)	5.3	32	21.6–24	0.05	50-68	>2	>5	>8
VTX10-A(B,...NC)		5.3	62	43.2–48	0.1		>2	>8	>10
244 ~ 247 VTX20-B(C,...NC)		5.3	124	86.4–96	0.2	55-65	>4	>10	>12
VTX30-B(C,...NC)		5.3	185	129.6–144	0.3		>6	>12	>15
VTX20KD	92 (27.17)	5.3	124	86.4–96	0.2	57-65	>4	>10	>12
VTX30KD		5.3	185	129.6–144	0.3		>6	>10	>15
250 ~ 255 VTX40KD		5.3	247	172.8–192	0.4		>6	>12	>15
VTX50KD		5.3	290	216–240	0.5		>6	>12	>18
VTX60KD		5.3	332	259.2–288	0.6		>6	>15	>18
VTX25	97 (28.64)	6	185	150–210	0.4	55-65	>4	>12	>12
274 ~ 277 VTX50		6	365	228–318	0.8		>6	>15	>15
VTX75		6	521	300–420	1.2		>8	>19	>22
VTMX100	97 (28.64)	6	695	504–600	1	63-68	>8	>19	>22
282 ~ 285 VTMX200		6	1037	756–900	2		>8	>25	>32
VTMX300		6	1355	1008–1200	3		>10	>32	>40
VTH50	100.8 (29.76)	6	185	120–156	0.3	60-65	>6	>12	>12
286 ~ 291 VTH150		6	521	420–456	0.9		>8	>15	>15
VTH300		6	1042	870–912	1.2		>10	>19	>22

Vacuum flow (Nl/m) at different vacuum level (-kPa)

Model	MAX. Vacuum -kPa (-inHg)	Feed pressure (MPa) \ (-kPa) (-inHg)	0 0	10 2.95	20 5.9	30 8.85	40 11.8	50 14.76	60 17.7	70 20.67	80 23.62	90 26.57
VTC 3021	75 (22.15)	0.22	164	122.5	88	53	31.4	28.5	16.5	4.6	-	-
132~137	93 (27.46)	0.3	170	152	106	64	33	32	22	16.5	6.4	1.9
	93 (27.46)	0.4	171	154	127.5	94	69	43	23.3	17.3	6.9	2.1
VTC 3031	75 (22.15)	0.22	302	122.5	88	53	31.4	28.5	16.5	4.6	-	-
132~137	93 (27.46)	0.3	338	152	106	64	33	32	22	16.5	6.4	1.9
	93 (27.46)	0.4	341	154	127.5	94	69	43	23.3	17.3	6.9	2.1
VTCL 3021	60 (17.72)	0.4	188	158	110	70	46	28	6.8	-	-	-
134~137	70 (20.67)	0.5	195	176	130	82	50	37.5	23	11.3	-	-
	75 (22.15)	0.6	200	183	154	100	52	38	32	22	-	-
VTCL 3031	60 (17.72)	0.4	302	176	110	70	46	28	6.8	-	-	-
134~137	70 (20.67)	0.5	344	200	130	82	50	37.5	23	11.3	-	-
	75 (22.15)	0.6	362	194	154	100	52	38	32	22	-	-
VTC 3022	75 (22.15)	0.22	328	245	176	106	62.8	57	33	9.2	-	-
138~143	93 (27.46)	0.3	340	304	212	128	66	64	44	33	12.8	3.8
	93 (27.46)	0.4	342	308	255	188	138	86	46.6	34.6	13.8	4.2
VTC 3032	75 (22.15)	0.22	604	245	176	106	62.8	57	33	9.2	-	-
138~143	93 (27.46)	0.3	676	304	212	128	66	64	44	33	12.8	3.8
	93 (27.46)	0.4	682	308	255	188	138	86	46.6	34.6	13.8	4.2
VTCL 3022	60 (17.72)	0.4	376	316	220	140	92	56	13.6	-	-	-
140~143	70 (20.67)	0.5	390	352	260	164	100	75	46	23.8	-	-
	75 (22.15)	0.6	400	366	308	200	104	76	64	44	-	-
VTCL 3032	60 (17.72)	0.4	604	352	220	140	92	56	13.6	-	-	-
140~143	70 (20.67)	0.5	688	392	260	164	100	75	46	23.8	-	-
	75 (22.15)	0.6	724	415	308	200	104	76	64	44	-	-
VTC 3122	75 (22.15)	0.22	328	245	176	106	62.8	57	33	9.2	-	-
144~153	93 (27.46)	0.3	340	304	212	128	66	64	44	33	12.8	3.8
	93 (27.46)	0.4	342	308	255	188	138	86	46.6	34.6	13.8	4.2
VTC 3123	75 (22.15)	0.22	492	367	264	159	94	86	50	14	-	-
144~153	93 (27.46)	0.3	510	456	318	192	99	96	66	50	19	6
	93 (27.46)	0.4	513	462	383	282	207	129	70	52	21	6.3
VTC 3124	75 (22.15)	0.22	656	490	352	212	126	114	66	18	-	-
144~153	93 (27.46)	0.3	680	608	424	256	132	128	88	66	26	7.6
	93 (27.46)	0.4	684	616	510	376	276	172	93	69	28	8.4
VTC 3132	75 (22.15)	0.22	604	245	176	106	62.8	57	33	9.2	-	-
144~153	93 (27.46)	0.3	676	304	212	128	66	64	44	33	12.8	3.8
	93 (27.46)	0.4	682	308	255	188	138	86	46.6	34.6	13.8	4.2
VTC 3133	75 (22.15)	0.22	902	368	264	159	94	86	50	14	-	-
144~153	93 (27.46)	0.3	1014	456	318	192	99	96	66	50	19	6
	93(27.46)	0.4	1023	462	383	282	207	129	70	52	21	6.3
VTC 3134	75 (22.15)	0.22	1208	490	352	212	126	114	66	18	-	-
144~153	93 (27.46)	0.3	1352	608	424	256	132	128	88	66	26	7.6
	93 (27.46)	0.4	1364	616	510	376	276	172	93	69	28	8.4
VTCL 3122	60 (17.72)	0.4	376	316	220	140	92	56	13.6	-	-	-
148~153	70 (20.67)	0.5	390	352	260	164	100	75	46	23.8	-	-
	75 (22.15)	0.6	400	366	308	200	104	76	64	44	-	-
VTCL 3123	60 (17.72)	0.4	564	474	330	210	138	84	20.4	-	-	-
148~153	70 (20.67)	0.5	585	528	390	246	150	112.5	69	33.9	-	-
	75 (22.15)	0.6	600	549	462	300	156	114	96	66	-	-
VTCL 3124	60 (17.72)	0.4	752	632	440	280	184	112	27.2	-	-	-
148~153	70 (20.67)	0.5	780	704	520	328	200	150	92	45.2	-	-
	75 (22.15)	0.6	800	732	616	400	208	152	128	88	-	-
VTCL 3132	60 (17.72)	0.4	604	344	220	140	92	56	13.6	-	-	-
148~153	70 (20.67)	0.5	688	392	260	164	100	75	46	23.8	-	-
	75 (22.15)	0.6	724	415	308	200	104	76	64	44	-	-
VTCL 3133	60 (17.72)	0.4	906	516	330	210	138	84	20.4	-	-	-
148~153	70 (20.67)	0.5	1032	588	390	246	150	112.5	69	34	-	-
	75 (22.15)	0.6	1086	621	462	300	156	114	96	66	-	-
VTCL 3134	60 (17.72)	0.4	1208	688	440	280	184	112	27	-	-	-
148~153	70 (20.67)	0.5	1376	784	520	328	200	150	92	45	-	-
	75 (22.15)	0.6	1448	828	616	400	208	152	128	88	-	-

Vacuum flow (Nl/m) at different vacuum level (-kPa)

Model	MAX. Vacuum -kPa (-inHg)	(-kPa) (-inHg) / Feed pressure (MPa)	0 0	10 2.95	20 5.9	30 8.85	40 11.8	50 14.76	60 17.7	70 20.67	80 23.62	90 26.57
VS 144	75 (22.15)	0.22	302	122.5	88	53	31.4	28.5	16.5	4.6	-	-
159 ~ 165	93 (27.46)	0.3	338	152	106	64	33	32	22	16.5	6.4	1.9
	93 (27.46)	0.4	341	154	127.5	94	69	43	23.3	17.3	6.9	2.1
VS 146	75 (22.15)	0.22	302	122.5	88	53	31.4	28.5	16.5	4.6	-	-
159 ~ 165	93 (27.46)	0.3	338	152	106	64	33	32	22	16.5	6.4	1.9
	93 (27.46)	0.4	341	154	127.5	94	69	43	23.3	17.3	6.9	2.1
VS 148	75 (22.15)	0.22	302	122.5	88	53	31.4	28.5	16.5	4.6	-	-
159 ~ 165	93 (27.46)	0.3	338	152	106	64	33	32	22	16.5	6.4	1.9
	93 (27.46)	0.4	341	154	127.5	94	69	43	23.3	17.3	6.9	2.1
VLS 144	60 (17.72)	0.4	302	176	110	70	46	28	6.8	-	-	-
161 ~ 165	70 (20.67)	0.5	344	200	130	82	50	37.5	23	11.3	-	-
	75 (22.15)	0.6	362	194	154	100	52	38	32	22	-	-
VLS 146	60 (17.72)	0.4	302	176	110	70	46	28	6.8	-	-	-
161 ~ 165	70 (20.67)	0.5	344	200	130	82	50	37.5	23	11.3	-	-
	75 (22.15)	0.6	362	194	154	100	52	38	32	22	-	-
VLS 148	60 (17.72)	0.4	302	176	110	70	46	28	6.8	-	-	-
161 ~ 165	70 (20.67)	0.5	344	200	130	82	50	37.5	23	11.3	-	-
	75 (22.15)	0.6	362	194	154	100	52	38	32	22	-	-
MD 302	75 (22.15)	0.22	164	122.5	88	53	31.4	28.5	16.5	4.6	-	-
171 ~ 177	93 (27.46)	0.3	170	152	106	64	33	32	22	16.5	6.4	1.9
	93 (27.46)	0.4	171	154	127.5	94	69	43	23.3	17.3	6.9	2.1
MD 303	75 (22.15)	0.22	302	122.5	88	53	31.4	28.5	16.5	4.6	-	-
171 ~ 177	93 (27.46)	0.3	338	152	106	64	33	32	22	16.5	6.4	1.9
	93 (27.46)	0.4	341	154	127.5	94	69	43	23.3	17.3	6.9	2.1
MDL 302	60 (17.72)	0.4	188	158	110	70	46	2.8	6.8	-	-	-
173 ~ 177	70 (20.67)	0.5	195	176	130	82	50	37.5	23	11.3	-	-
	75 (22.15)	0.6	200	183	154	100	52	38	32	22	-	-
MDL 303	60 (17.72)	0.4	302	176	110	70	46	28	6.8	-	-	-
173 ~ 177	70 (20.67)	0.5	344	200	130	82	50	37.5	23	11.3	-	-
	75 (22.15)	0.6	362	194	154	100	52	38	32	22	-	-
PM 303X1	75 (22.15)	0.22	302	122.5	88	53	31.4	28.5	16.5	4.6	-	-
184 ~ 193	93 (27.46)	0.3	338	152	106	64	33	32	22	16.5	6.4	1.9
	93 (27.46)	0.4	341	154	127.5	94	69	43	23.3	17.3	6.9	2.1
PM 303X2	75 (22.15)	0.22	604	245	176	106	62.8	57	33	9.2	-	-
184 ~ 193	93 (27.46)	0.3	676	304	212	128	66	64	44	33	12.8	3.8
	93 (27.46)	0.4	682	308	255	188	138	86	46.6	34.6	13.8	4.2
PM 303X3	75 (22.15)	0.22	902	368	264	159	94	86	50	14	-	-
184 ~ 193	93 (27.46)	0.3	1014	456	318	192	99	96	66	50	19	6
	93 (27.46)	0.4	1023	462	383	282	207	129	70	52	21	6.3
PM 303X4	75 (22.15)	0.22	1208	490	352	212	126	114	66	18	-	-
184 ~ 193	93 (27.46)	0.3	1352	608	424	256	132	128	88	66	26	7.6
	93 (27.46)	0.4	1364	616	510	376	276	172	93	69	28	8.4
PML 303X1	60 (17.72)	0.4	302	176	110	70	46	28	6.8	-	-	-
188 ~ 193	70 (20.67)	0.5	344	200	130	82	50	37.5	23	11.3	-	-
	75 (22.15)	0.6	362	194	154	100	52	38	32	22	-	-
PML 303X2	60 (17.72)	0.4	604	344	220	140	92	56	13.6	-	-	-
188 ~ 193	70 (20.67)	0.5	688	392	260	164	100	75	46	23.8	-	-
	75 (22.15)	0.6	724	415	308	200	104	76	64	44	-	-
PML 303X3	60 (17.72)	0.4	906	516	330	210	138	84	20.4	-	-	-
188 ~ 193	70 (20.67)	0.5	1032	588	390	246	150	112.5	69	34	-	-
	75 (22.15)	0.6	1086	621	462	300	156	114	96	66	-	-
PML 303X4	60 (17.72)	0.4	1208	688	440	280	184	112	27	-	-	-
188 ~ 193	70 (20.67)	0.5	1376	784	520	328	200	150	92	45	-	-
	75 (22.15)	0.6	1448	828	616	400	208	152	128	88	-	-

Vacuum flow (Nl/m) at different vacuum levels (-kPa)

Model	MAX. Vacuum -kPa(-inHg) / -kPa / -inHg	0 0	10 2.95	20 5.9	30 8.85	40 11.81	50 14.76	60 17.71	70 20.67	80 23.62	90 26.57	95 28.05	99 29.23
VKX5	92 (27.17)	23	12	8	7	6	5	4	2.7	1.2	0.45		
196~199 VKM5	85 (25.1)	26	15	12	11	10	8	5.5	2.8	0.7			
VKM61	85 (25.1)	37	26	16	14	10	8	6	2.4	0.66			
200~211 VKM62		74	52	31	28	20	16	12	4.8	1.32			
VKX61	92 (27.17)	31	18	9	8	7	5	4	2.7	1.2	0.46		
200~211 VKX62		62	36	18	16	13	11	9	5.4	2.4	0.9		
VKX73	92 (27.17)	94	54	27	24	21	17	13.5	9	3.6	1.35		
212~223 VKX74		109	72	35	32	27	22	18	12	4.8	1.8		
VKM73	85 (25.1)	111	78	47	42	30	24	18	7.2	1.98			
212~223 VKM74		135	99	62	54	40	32	24	9.6	2.64			
VTOM5-(N)Stack	85 (25.1)	27	16	13	12	11	8	6	2.4	0.66 - (N)Stack			
232~235 VTOM10-(N)Stack		35	29	25	23	19	16	12	4.8	1.32 - (N)Stack			
VTOX5-(N)Stack	92 (27.17)	24	13	9	8	7	5	4	2.7	1.2	0.45 - (N)Stack		
232~235 VTOX10-(N)Stack		32	21	17	15	14	11	9	5.4	2.4	0.9 - (N)Stack		
VTM5-(N)Stack	85 (25.1)	27	16	13	12	11	8	6	2.4	0.66 - (N)Stack			
236~241 VTM10-(N)Stack		35	29	25	23	19	16	12	4.8	1.32 - (N)Stack			
VTM10X(N)B(BA,...NC)	85 (25.1)	74	52	31	28	20	16	12	4.8	1.32 - (N)Stack			
242~247 VTM20X(N)B(BA,...NC)		149	99	62	54	40	32	22	10.5	2.7 - (N)Stack			
VTM30X(N)B(C,...NC)		220	147	92	73	60	47	32	16	4.1 - (N)Stack			
VTM5-A(B,...NC)	85 (25.1)	37	26	16	14	10	8	6	2.4	0.66			
VTM10-A(B,...NC)		74	52	31	28	20	16	12	4.8	1.32			
226~231 VTM20-B(C,...NC)		149	99	62	54	40	32	22	10.5	2.7			
VTM30-B(C,...NC)		220	147	92	73	60	47	32	16	4.1			
VTM20KD	85 (25.1)	149	99	62	54	40	32	22	10.5	2.7			
VTM30KD		220	147	92	73	60	47	32	16	4.1			
248~255 VTM40KD		292	200	110	93	80	63	43	21	5.4			
VTM50KD		341	228	135	115	100	79	60	24	6.6			
VTM60KD		390	256	259	137	119	94	64	32	8.5			
VTM25L	91 (26.87)	365	169	124	76	43	33	25	17	7	0.8		
VTM50L		622	327	236	149	83	65	49	33	14	1.6		
VTM75L		841	481	354	221	122	97	73	49	21	2.4		
262~265 VTM100L		1060	634	449	293	161	129	96	64	27	3.2		
VTM125L		1195	789	522	360	193	152	120	80.6	33.3	3.8		
VTM150L		1370	937	589	418	237	187	144	97.2	39.6	4.32		
VTL25	80 (23.62)	379	200	139	94	51	40	28	18				
VTL50		650	374	266	176	102	77	56	36				
VTL75		820	490	370	245	138	116	92	49				
VTL100		990	607	473	323	197	152	109	69				
266~269 VTL125		1090	750	547	390	241	192	138	87				
VTL150		1303	907	614	456	282	228	162	102				
VTL175		1682	1060	678	515	314	267	189	118				
VTL200		2061	1217	729	574	363	294	218	134				
VTM25	90 (26.57)	389	220	149	74	37	27	18	10	5	0.8		
VTM50		647	400	279	146	73	54	36	20	10	1.6		
VTM75		890	600	366	220	110	82	54	30	15	2.4		
VTM100		1100	750	453	291	146	109	72	40	20	3.2		
270~273 VTM125		1200	900	530	356	182	135	90	50	25	4		
VTM150		1380	1020	597	416	218	162	108	60	30	4.8		
VTM175		1490	1120	654	471	254	189	126	70	35	5.6		
VTM200		1580	1200	701	521	290	216	144	80	40	6.4		

Vacuum flow (Nl/m) at different vacuum levels (-kPa)

Model	MAX. Vacuum -kPa (-inHg)	0 0	10 2.95	20 5.9	30 8.85	40 11.81	50 14.76	60 17.71	70 20.67	80 23.62	90 26.57	95 28.05	99 29.23
VTMM100	90 (26.57)	1290	844	562	291	146	109	72	40	20	3.2		
VTMM150		1740	1206	700	420	216	162	180	60	27	4.5		
VTMM200		2150	1530	1010	520	290	216	144	80	40	6.4		
VTMM200F		2200	1540	1016	528	290	216	144	80	40	6.4		
VTM150LEF	91 (26.87)	1680	838	642	439.2	244.8	190.8	144	97.2	39.6	4.32		
VTM200LEF		2100	1260	900	585.6	326.4	254.4	192	129.6	52.8	5.76		
VTM300LEF		2600	1800	1260	878.4	489.6	381.6	288	194.4	92	8.67		
VTM400LEF		3100	2400	1608	1171	652.8	508.8	384	259.2	105.6	11.52		
VTM500LEF		4200	2950	2020	1464	816	636	480	324	132	14.4		
VTM600LEF		5010	3450	2450	1757	979.2	763.2	576	388.8	158.4	17.28		
VTM800LEF		6100	4200	3340	2342	1306	1018	768	518.4	211.2	23		
VTMM200EF	92 (27.17)	2200	1540	1016	528	290	216	144	80	40	6.4		
VTMM300EF		3300	2310	1781	793	435	324	216	120	60	9.6		
VTMM400EF		4400	3080	2036	1058	580	432	288	160	80	12.8		
VTMM500EF		5500	3850	2545	1323	725	540	360	200	100	16		
VTMM600EF		6600	4620	3055	1588	870	648	432	240	120	19.2		
VTMM800EF		8800	6164	4076	2119	1160	864	576	320	160	25.6		
VTMM1000EF		11000	7700	5090	2646	1450	1080	720	400	200	32		
VTML200	92 (27.17)	2410	1688	1116	580	290	216	144	80	40	6.4		
VTML400		4820	3376	2232	1160	580	432	288	160	80	12.8		
VTML600		7230	5064	3348	1740	870	648	432	240	120	19.2		
VTML800		9640	6752	4464	2320	1160	864	576	320	160	25.6		
VTML1000		12050	8440	5580	2900	1450	1080	720	400	200	32		
VTML1200		14460	10128	6696	3480	1740	1296	864	480	240	38.4		
VTX5-(N)Stack	92 (27.17)	24	13	9	8	7	5	4	2.7	1.2	0.45	- (N)Stack	
VTX10-(N)Stack		32	21	17	15	14	11	9	5.4	2.4	0.9	- N)Stack	
VTX10x(N-B(BA,...NC)	92 (27.17)	62	36	18	16	14	11	9	6	2.4	0.9	- (N)Stack	
VTX20x(N-B(BA,...NC)		124	72	35	32	27	22	18	12	4.8	1.8	- (N)Stack	
VTX30x(N-B(BA,...NC)		185	108	52	47	41	33	26	18	7.2	2.7	- (N)Stack	
VTX5-A(B,...NC)	92 (27.17)	32	18	9	8	7	6	5	3	1.2	0.45		
VTX10-A(B,...NC)		62	36	18	16	14	11	9	6	2.4	0.9		
VTX20-B(C,...NC)		124	72	35	32	27	22	18	12	4.8	1.8		
VTX30-B(C,...NC)		185	108	52	47	41	33	26	18	7.2	2.7		
VTX20KD	92 (27.17)	124	72	35	32	27	22	18	12	4.8	1.8		
VTX30KD		185	108	52	47	41	33	26	18	7.2	2.7		
VTX40KD		247	144	69	63	54	44	35	23	9.6	3.6		
VTX50KD		290	171	86	78	66	55	43	29	12	4.5		
VTX60KD		332	198	102	93	78	65	51	34	14.4	5.4		
VTX25	97 (28.64)	185	148	105	66	35	27	21	15	12	4.2	1.5	
VTX50		365	292	207	132	69	54	42	30	23	8.4	3	
VTX75		521	424	309	198	102	81	63	45	35	12.6	4.5	
VTMX100	97 (28.64)	695	568	411	260	139	108	84	60	45	17	6	
VTMX200		1037	844	615	398	211	162	126	90	69	26	9	
VTMX300		1355	1096	813	530	289	216	168	120	92	33	12	
VTH50	100.8 (29.76)	185	147	106	66	32	21	15	9.6	7.2	3.6	1.2	0.3
VTH150		521	423	307	198	105	78	54	39	27	7.8	3.6	0.48
VTH300		1042	846	614	396	210	156	108	78	54	15.6	7.2	0.96

278 ~ 281
292 ~ 297
298 ~ 303
306 ~ 309
228 ~ 231
238 ~ 241
244 ~ 247
250 ~ 255
274 ~ 277
282 ~ 285
286 ~ 291

Time, s/l, evacuate a volume to different vacuum level (-kPa)

	Model	MAX. Vacuum (-kPa)	Feed pressure (MPa) \ (-kPa) (-inHg)	10 2.95	20 5.9	30 8.85	40 11.8	50 14.76	60 17.7	70 20.67	80 23.62	90 26.57
132~137	VTC 3021	75 (22.15)	0.22	0.03	0.12	0.21	0.38	0.47	0.73	1.62	-	-
		93 (27.46)	0.3	0.027	0.1	0.19	0.3	0.4	0.64	0.8	1.2	3.8
		93 (27.46)	0.4	0.26	0.058	0.09	0.1	0.25	0.5	0.69	1.05	3.5
132~137	VTC 3031	75 (22.15)	0.22	0.019	0.09	0.1	0.32	0.42	0.73	1.62	-	-
		93 (27.46)	0.3	0.015	0.07	0.18	0.28	0.38	0.64	0.8	1.2	3.8
		93 (27.46)	0.4	0.01	0.048	0.07	0.09	0.2	0.42	0.6	1	3.4
134~137	VTCL 3021	60 (17.72)	0.4	0.035	0.084	0.17	0.29	0.38	0.8	-	-	-
		70 (20.67)	0.5	0.027	0.08	0.15	0.25	0.3	0.4	0.8	-	-
		75 (22.15)	0.6	0.028	0.08	0.12	0.2	0.28	0.36	0.6	-	-
134~137	VTCL 3031	60 (17.72)	0.4	0.028	0.09	0.17	0.29	0.38	0.8	-	-	-
		70 (20.67)	0.5	0.013	0.08	0.15	0.25	0.3	0.4	0.8	-	-
		75 (22.15)	0.6	0.012	0.07	0.12	0.2	0.28	0.36	0.6	-	-
138~143	VTC 3022	75 (22.15)	0.22	0.018	0.065	0.108	0.2	0.25	0.395	0.81	-	-
		93 (27.46)	0.3	0.016	0.05	0.07	0.16	0.23	0.34	0.5	0.795	2.01
		93 (27.46)	0.4	0.014	0.029	0.043	0.05	0.13	0.25	0.355	0.71	1.75
138~143	VTC 3032	75 (22.15)	0.22	0.011	0.043	0.05	0.17	0.23	0.38	0.81	-	-
		93 (27.46)	0.3	0.01	0.032	0.055	0.15	0.22	0.33	0.48	0.78	1.98
		93 (27.46)	0.4	0.01	0.026	0.037	0.047	0.12	0.23	0.35	0.7	1.72
140~143	VTCL 3022	60 (17.72)	0.4	0.018	0.04	0.08	0.145	0.195	0.5	-	-	-
		70 (20.67)	0.5	0.014	0.036	0.075	0.125	0.15	0.2	0.4	-	-
		75 (22.15)	0.6	0.013	0.032	0.06	0.1	0.155	0.18	0.35	-	-
140~143	VTCL 3032	60 (17.72)	0.4	0.013	0.037	0.073	0.14	0.19	0.45	-	-	-
		70 (20.67)	0.5	0.009	0.032	0.06	0.128	0.16	0.25	0.43	-	-
		75 (22.15)	0.6	0.008	0.03	0.047	0.098	0.15	0.2	0.32	-	-
144~153	VTC 3122	75 (22.15)	0.22	0.018	0.065	0.108	0.2	0.25	0.395	0.81	-	-
		93 (27.46)	0.3	0.016	0.05	0.07	0.16	0.23	0.34	0.5	0.795	2.01
		93 (27.46)	0.4	0.014	0.029	0.043	0.05	0.13	0.25	0.355	0.71	1.75
144~153	VTC 3123	75 (22.15)	0.22	0.01	0.04	0.07	0.13	0.16	0.24	0.54	-	-
		93 (27.46)	0.3	0.009	0.03	0.06	0.1	0.13	0.21	0.26	0.4	1.27
		93 (27.46)	0.4	0.008	0.019	0.03	0.033	0.08	0.16	0.23	0.35	1.17
144~153	VTC 3124	75 (22.15)	0.22	0.008	0.03	0.05	0.095	0.12	0.18	0.4	-	-
		93 (27.46)	0.3	0.007	0.025	0.048	0.08	0.1	0.16	0.2	0.3	0.95
		93 (27.46)	0.4	0.006	0.015	0.023	0.025	0.06	0.12	0.17	0.26	0.87
144~153	VTC 3132	75 (22.15)	0.22	0.011	0.043	0.05	0.17	0.23	0.38	0.81	-	-
		93 (27.46)	0.3	0.01	0.032	0.045	0.15	0.22	0.33	0.48	0.78	1.98
		93 (27.46)	0.4	0.01	0.026	0.037	0.047	0.12	0.23	0.35	0.7	1.72
144~153	VTC 3133	75 (22.15)	0.22	0.006	0.03	0.038	0.1	0.14	0.24	0.54	-	-
		93 (27.46)	0.3	0.005	0.02	0.03	0.09	0.12	0.21	0.24	0.4	1.27
		93 (27.46)	0.4	0.004	0.01	0.02	0.03	0.06	0.14	0.02	0.33	1.13
144~153	VTC 3134	75 (22.15)	0.22	0.005	0.02	0.027	0.08	0.1	0.18	0.4	-	-
		93 (27.46)	0.3	0.004	0.018	0.02	0.07	0.09	0.16	0.2	0.3	0.95
		93 (27.46)	0.4	0.003	0.01	0.01	0.02	0.05	0.1	0.15	0.25	0.85
148~153	VTCL 3122	60 (17.72)	0.4	0.018	0.04	0.08	0.145	0.195	0.5	-	-	-
		70 (20.67)	0.5	0.014	0.036	0.075	0.125	0.15	0.2	0.4	-	-
		75 (22.15)	0.6	0.013	0.032	0.06	0.1	0.155	0.18	0.35	-	-
148~153	VTCL 3123	60 (17.72)	0.4	0.012	0.029	0.057	0.097	0.127	0.27	-	-	-
		70 (20.67)	0.5	0.009	0.028	0.05	0.083	0.1	0.13	0.26	-	-
		75 (22.15)	0.6	0.009	0.027	0.04	0.06	0.09	0.12	0.2	-	-
148~153	VTCL 3124	60 (17.72)	0.4	0.01	0.025	0.04	0.07	0.09	0.02	-	-	-
		70 (20.67)	0.5	0.0067	0.02	0.037	0.065	0.075	0.1	0.2	-	-
		75 (22.15)	0.6	0.006	0.02	0.03	0.055	0.073	0.09	0.15	-	-
148~153	VTCL 3132	60 (17.72)	0.4	0.017	0.037	0.073	0.14	0.19	0.45	-	-	-
		70 (20.67)	0.5	0.014	0.032	0.06	0.128	0.16	0.25	0.43	-	-
		75 (22.15)	0.6	0.012	0.03	0.047	0.098	0.15	0.2	0.32	-	-
148~153	VTCL 3133	60 (17.72)	0.4	0.016	0.03	0.05	0.09	0.12	0.26	-	-	-
		70 (20.67)	0.5	0.0085	0.028	0.05	0.08	0.01	0.13	0.26	-	-
		75 (22.15)	0.6	0.0079	0.02	0.04	0.06	0.09	0.12	0.2	-	-
148~153	VTCL 3134	60 (17.72)	0.4	0.0089	0.023	0.04	0.07	0.09	0.2	-	-	-
		70 (20.67)	0.5	0.0057	0.018	0.03	0.063	0.075	0.1	0.2	-	-
		75 (22.15)	0.6	0.0053	0.015	0.029	0.052	0.071	0.09	0.15	-	-

Time, s/l, evacuate a volume to different vacuum level (-kPa)

Model	MAX. Vacuum -kPa (-inHg)	Feed pressure (MPa) \ (-kPa) (-inHg)	10 2.95	20 5.9	30 8.85	40 11.8	50 14.76	60 17.7	70 20.67	80 23.62	90 26.57
VS 144 (159~165)	75 (22.15)	0.22	0.019	0.09	0.1	0.32	0.42	0.73	1.62	-	-
	93 (27.46)	0.3	0.015	0.07	0.18	0.28	0.38	0.64	0.8	1.2	3.8
	93 (27.46)	0.4	0.01	0.048	0.07	0.09	0.2	0.42	0.6	1	3.4
VS 146 (159~165)	75 (22.15)	0.22	0.019	0.09	0.1	0.32	0.42	0.73	1.62	-	-
	93 (27.46)	0.3	0.015	0.07	0.18	0.28	0.38	0.64	0.8	1.2	3.8
	93 (27.46)	0.4	0.01	0.048	0.07	0.09	0.2	0.42	0.6	1	3.4
VS 148 (159~165)	75 (22.15)	0.22	0.019	0.09	0.1	0.32	0.42	0.73	1.62	-	-
	93 (27.46)	0.3	0.015	0.07	0.18	0.28	0.38	0.64	0.8	1.2	3.8
	93 (27.46)	0.4	0.01	0.048	0.07	0.09	0.2	0.42	0.6	1	3.4
VLS 144 (161~165)	60 (17.72)	0.4	0.028	0.09	0.17	0.29	0.38	0.8	-	-	-
	70 (20.67)	0.5	0.013	0.08	0.15	0.25	0.3	0.4	0.8	-	-
	75 (22.15)	0.6	0.012	0.07	0.12	0.2	0.28	0.36	0.6	-	-
VLS 146 (161~165)	60 (17.72)	0.4	0.028	0.09	0.17	0.29	0.38	0.8	-	-	-
	70 (20.67)	0.5	0.013	0.08	0.15	0.25	0.3	0.4	0.8	-	-
	75 (22.15)	0.6	0.012	0.07	0.12	0.2	0.28	0.36	0.6	-	-
VLS 148 (161~165)	60 (17.72)	0.4	0.028	0.09	0.17	0.29	0.38	0.8	-	-	-
	70 (20.67)	0.5	0.013	0.08	0.15	0.25	0.3	0.4	0.8	-	-
	75 (22.15)	0.6	0.012	0.07	0.12	0.2	0.28	0.36	0.6	-	-
MD 302 (171~177)	75 (22.15)	0.22	0.03	0.12	0.21	0.38	0.47	0.73	1.62	-	-
	93 (27.46)	0.3	0.027	0.1	0.19	0.3	0.4	0.64	0.8	1.2	3.8
	93 (27.46)	0.4	0.026	0.058	0.09	0.1	0.25	0.5	0.69	1.05	3.5
MD 303 (171~177)	75 (22.15)	0.22	0.019	0.09	0.1	0.32	0.42	0.73	1.62	-	-
	93 (27.46)	0.3	0.015	0.07	0.18	0.28	0.38	0.64	0.8	1.2	3.8
	93 (27.46)	0.4	0.01	0.048	0.07	0.09	0.2	0.42	0.6	1	3.4
MDL 302 (173~177)	60 (17.72)	0.4	0.035	0.084	0.17	0.29	0.38	0.8	-	-	-
	70 (20.67)	0.5	0.027	0.08	0.15	0.25	0.3	0.4	0.8	-	-
	75 (22.15)	0.6	0.028	0.08	0.12	0.2	0.28	0.36	0.6	-	-
MDL 303 (173~177)	60 (17.72)	0.4	0.028	0.09	0.17	0.29	0.38	0.8	-	-	-
	70 (20.67)	0.5	0.013	0.08	0.15	0.25	0.3	0.4	0.8	-	-
	75 (22.15)	0.6	0.012	0.07	0.12	0.2	0.28	0.36	0.6	-	-
PM 303X1 (184~193)	75 (22.15)	0.22	0.019	0.09	0.1	0.32	0.42	0.73	1.62	-	-
	93 (27.46)	0.3	0.015	0.07	0.18	0.28	0.38	0.64	0.8	1.2	3.8
	93 (27.46)	0.4	0.01	0.048	0.07	0.09	0.2	0.42	0.6	1	3.4
PM 303X2 (184~193)	75 (22.15)	0.22	0.011	0.043	0.05	0.17	0.23	0.38	0.81	-	-
	93 (27.46)	0.3	0.01	0.032	0.055	0.15	0.22	0.33	0.48	0.78	1.98
	93 (27.46)	0.4	0.01	0.026	0.037	0.047	0.12	0.23	0.35	0.7	1.72
PM 303X3 (184~193)	75 (22.15)	0.22	0.006	0.03	0.038	0.1	0.14	0.24	0.54	-	-
	93 (27.46)	0.3	0.005	0.02	0.03	0.09	0.12	0.21	0.24	0.4	1.27
	93 (27.46)	0.4	0.004	0.01	0.02	0.03	0.06	0.14	0.2	0.33	1.13
PM 303X4 (184~193)	75 (22.15)	0.22	0.005	0.02	0.027	0.08	0.1	0.18	0.4	-	-
	93 (27.46)	0.3	0.004	0.018	0.002	0.07	0.09	0.16	0.2	0.3	0.95
	93 (27.46)	0.4	0.003	0.01	0.01	0.02	0.05	0.1	0.15	0.25	0.85
PML 303X1 (188~193)	60 (17.72)	0.4	0.032	0.09	0.17	0.29	0.38	0.8	-	-	-
	70 (20.67)	0.5	0.023	0.08	0.15	0.25	0.3	0.4	0.8	-	-
	75 (22.15)	0.6	0.022	0.07	0.12	0.2	0.28	0.36	0.6	-	-
PML 303X2 (188~193)	60 (17.72)	0.4	0.017	0.037	0.073	0.14	0.19	0.45	-	-	-
	70 (20.67)	0.5	0.014	0.032	0.06	0.128	0.16	0.25	0.43	-	-
	75 (22.15)	0.6	0.012	0.03	0.047	0.098	0.15	0.2	0.32	-	-
PML 303X3 (188~193)	60 (17.72)	0.4	0.016	0.03	0.05	0.09	0.12	0.26	-	-	-
	70 (20.67)	0.5	0.0085	0.028	0.05	0.08	0.1	0.13	0.26	-	-
	75 (22.15)	0.6	0.0079	0.02	0.04	0.06	0.09	0.12	0.2	-	-
PML 303X4 (188~193)	60 (17.72)	0.4	0.0089	0.023	0.04	0.07	0.09	0.2	-	-	-
	70 (20.67)	0.5	0.0057	0.018	0.03	0.063	0.075	0.1	0.2	-	-
	75 (22.15)	0.6	0.0053	0.015	0.029	0.052	0.071	0.09	0.15	-	-

Time, s/l, evacuate a volume to different vacuum level (-kPa)

Model	MAX. Vacuum -kPa(-inHg) (-kPa / -inHg)	10 / 2.95	20 / 5.9	30 / 8.85	40 / 11.81	50 / 14.76	60 / 17.71	70 / 20.67	80 / 23.62	90 / 26.57	95 / 28.05	99 / 29.23
VKX5	92 (27.17)	0.26	0.80	1.52	2.4	3.38	4.91	6.89	10.16	19		
196~199 VKM5	85 (25.1)	0.22	0.56	1.18	1.58	2.36	3.44	5.27	10.22			
VKM61	85 (25.1)	0.218	0.556	1	1.576	2.356	3.44	5.27	10.216			
200~211 VKM62		0.109	0.278	0.5	0.788	1.178	1.72	2.635	5.158			
VKX61	92 (27.17)	0.258	0.796	1.516	2.4	3.56	4.91	6.896	10.16	19.19		
200~211 VKX62		0.129	0.398	0.758	1.2	1.78	2.455	3.445	5.08	5.594		
VKX73	92 (27.17)	0.1	0.3	0.57	0.9	1.34	1.84	2.58	3.81	7.2		
212~223 VKX74		0.06	0.2	0.38	0.6	0.89	1.23	1.72	2.54	4.8		
VKM73	85 (25.1)	0.08	0.21	0.38	0.59	0.88	1.29	1.98	3.87			
212~223 VKM74		0.05	0.14	0.25	0.39	0.59	0.86	1.32	2.58			
VTOM5-(N)Stack	85 (25.1)	0.247	0.628	1.128	1.748	2.529	3.63	5.45	10.4			
232~235 VTOM10-(N)Stack		0.177	0.408	0.678	1.018	1.429	1.98	2.89	5.41			
VTOX5-(N)Stack	92 (27.17)	0.277	0.848	1.619	2.688	3.889	5.46	7.45	13.95	20.53		
232~235 VTOX10-(N)Stack		0.187	0.508	0.912	1.388	1.989	2.65	3.64	5.29	9.79		
VTM5-(N)Stack	85 (25.1)	0.218	0.556	1	1.576	2.356	3.44	5.27	10.216 / (N)Stack			
236~241 VTM10-(N)Stack		0.109	0.278	0.5	0.788	1.178	1.72	2.635	5.158 / (N)Stack			
VTM10X(N)B(BA,...NC)	85 (25.1)	0.109	0.278	0.5	0.788	1.178	1.72	2.635	5.158 / (N)Stack			
242~247 VTM20X(N)B(BA,...NC)		0.054	0.139	0.25	0.394	0.589	0.86	1.317	2.579 / (N)Stack			
VTM30X(N)B(C,...NC)		0.041	0.104	0.186	0.295	0.441	0.647	0.898	1.935 / (N)Stack			
VTM5-A(B,...NC)	85 (25.1)	0.218	0.556	1	1.576	2.356	3.44	5.27	10.216			
226~231 VTM10-A(B,...NC)		0.109	0.278	0.5	0.788	1.178	1.72	2.635	5.158			
VTM20-B(C,...NC)		0.054	0.139	0.25	0.394	0.589	0.86	1.317	2.579			
VTM30-B(C,...NC)		0.041	0.014	0.186	0.295	0.441	0.647	0.898	1.935			
VTM20KD	85 (25.1)	0.054	0.139	0.25	0.394	0.589	0.86	1.317	2.579			
VTM30KD		0.041	0.104	0.186	0.295	0.441	0.647	0.898	1.935			
248~255 VTM40KD		0.027	0.069	0.125	0.197	0.294	0.431	0.658	1.289			
VTM50KD		0.023	0.058	0.104	0.164	0.245	0.359	0.549	1.074			
VTM60KD		0.018	0.046	0.083	0.131	0.196	0.286	0.439	0.859			
VTM25L	91 (26.87)	0.02	0.056	0.12	0.24	0.425	0.66	1.02	1.64	4.6		
VTM50L		0.013	0.032	0.062	0.12	0.212	0.33	0.51	0.82	2.3		
262~265 VTM75L		0.01	0.024	0.047	0.09	0.159	0.248	0.383	0.621	1.73		
VTM100L		0.007	0.016	0.031	0.06	0.106	0.165	0.255	0.41	1.15		
VTM125L		0.0061	0.0147	0.0302	0.053	0.089	0.143	0.215	0.36	1.01		
VTM150L		0.0051	0.0134	0.0294	0.046	0.071	0.115	0.175	0.31	0.87		
VTL25	80 (23.62)	0.017	0.045	0.09	0.18	0.34	0.53	0.85				
VTL50		0.012	0.027	0.05	0.1	0.18	0.27	0.43				
VTL75		0.008	0.021	0.04	0.08	0.13	0.20	0.32				
266~269 VTL100		0.0069	0.015	0.03	0.05	0.09	0.14	0.22				
VTL125		0.0058	0.014	0.026	0.044	0.076	0.118	0.19				
VTL150		0.0049	0.013	0.022	0.037	0.062	0.095	0.15				
VTL175		0.0047	0.012	0.021	0.035	0.057	0.087	0.14				
VTL200		0.0043	0.011	0.019	0.033	0.051	0.078	0.12				
VTM25	90 (26.57)	0.019	0.048	0.110	0.239	0.416	0.686	1.122	1.91	4.210		
VTM50		0.012	0.030	0.066	0.125	0.209	0.345	0.593	1.05	2.190		
VTM75		0.009	0.023	0.050	0.094	0.157	0.259	0.445	0.788	1.644		
270~273 VTM100		0.006	0.015	0.033	0.063	0.105	0.173	0.297	0.526	1.097		
VTM125		0.0055	0.0143	0.0311	0.055	0.092	0.151	0.260	0.460	1.960		
VTM150		0.0052	0.0135	0.0296	0.047	0.078	0.129	0.223	0.394	0.823		
VTM175		0.0050	0.0127	0.0279	0.039	0.065	0.108	0.186	0.329	0.686		
VTM200		0.0048	0.0113	0.0258	0.027	0.054	0.090	0.153	0.274	0.67		

Specifications subject to change without notice.

Time, s/l, evacuate a volume to different vacuum level (-kPa)

Model	MAX. Vacuum -kPa (-inHg) (-kPa / -inHg)	10 / 2.95	20 / 5.9	30 / 8.85	40 / 11.81	50 / 14.76	60 / 17.71	70 / 20.67	80 / 23.62	90 / 26.57	95 / 28.05	99 / 29.23
VTMM100	92 (27.17)	0.0053	0.0144	0.031	0.063	0.105	0.173	0.297	0.526	1.097		
VTMM150		0.0046	0.011	0.025	0.047	0.078	0.129	0.223	0.394	0.823		
VTMM200		0.0032	0.0076	0.0165	0.029	0.054	0.090	0.153	0.274	0.67		
VTMM200F		0.0031	0.0075	0.0164	0.029	0.054	0.090	0.153	0.274	0.67		
VTM150LEF	91 (26.87)	0.0033	0.009	0.02	0.04	0.071	0.11	0.17	0.31	0.87		
VTM200LEF		0.00250	0.007	0.015	0.03	0.053	0.083	0.128	0.21	0.58		
VTM300LEF		0.0017	0.005	0.01	0.02	0.035	0.055	0.085	0.16	0.44		
VTM400LEF		0.0013	0.004	0.008	0.015	0.027	0.041	0.064	0.11	0.29		
VTM500LEF		0.001	0.003	0.006	0.012	0.021	0.033	0.051	0.09	0.26		
VTM600LEF		0.0008	0.0023	0.005	0.01	0.018	0.028	0.043	0.08	0.22		
VTM800LEF		0.0006	0.0018	0.004	0.008	0.013	0.021	0.032	0.05	015		
VTMM200EF	92 (27.17)	0.0031	0.0075	0.0164	0.029	0.054	0.090	0.153	0.274	0.67		
VTMM300EF		0.0023	0.0056	0.0123	0.022	0.041	0.068	0.115	0.206	0.503		
VTMM400EF		0.0015	0.0038	0.0082	0.014	0.027	0.045	0.076	0.137	0.335		
VTMM500EF		0.0013	0.0033	0.0072	0.013	0.024	0.040	0.067	0.120	0.294		
VTMM600EF		0.0012	0.0028	0.0062	0.011	0.021	0.034	0.057	0.103	0.252		
VTMM800EF		0.0008	0.0019	0.0041	0.007	0.014	0.022	0.038	0.068	0.168		
VTMM1000EF		0.0007	0.0016	0.0036	0.006	0.012	0.018	0.031	0.057	0.147		
VTML200	92 (27.17)	0.0021	0.0055	0.0124	0.029	0.054	0.090	0.153	0.274	0.67		
VTML400		0.0011	0.0027	0.0062	0.014	0.027	0.045	0.076	0.137	0.335		
VTML600		0.0009	0.0021	0.0047	0.011	0.021	0.034	0.057	0.103	0.252		
VTML800		0.0006	0.0014	0.0031	0.007	0.014	0.023	0.038	0.068	0.168		
VTML1000		0.0005	0.0012	0.0026	0.006	0.012	0.018	0.031	0.057	0.147		
VTML1200		0.0004	0.0009	0.0021	0.005	0.009	0.014	0.024	0.045	0.125		
VTX5-(N)Stack	92 (27.17)	0.258	0.796	1.516	2.4	3.56	4.91	6.896	10.16	19.19 (N)Stack		
VTX10-(N)Stack		0.129	0.398	0.758	1.2	1.78	2.455	3.445	5.08	9.594 (N)Stack		
VTX10x(N-B(BA,...NC)	92 (27.17)	0.129	0.398	0.758	1.2	1.78	2.455	3.445	5.08	9.594 (N)Stack		
VTX20x(N-B(BA,...NC)		0.064	0.199	0.379	0.6	0.89	1.227	1.722	2.54	4.797 (N)Stack		
VTX30x(N-B(BA,...NC)		0.048	0.149	0.284	0.44	0.673	0.917	1.287	1.906	3.595 (N)Stack		
VTX5-A(B,...NC)	92 (27.17)	0.258	0.796	1.156	2.4	3.56	4.91	6.896	10.16	19.19		
VTX10-A(B,...NC)		0.129	0.398	0.758	1.2	1.78	2.455	3.445	5.08	9.594		
VTX20-B(C,...NC)		0.064	0.199	0.379	0.6	0.89	1.227	1.722	2.54	4.797		
VTX30-B(C,...NC)		0.048	0.149	0.284	0.44	0.673	0.917	1.287	1.906	3.595		
VTX20KD	92 (27.17)	0.064	0.199	0.379	0.6	0.89	1.227	1.722	2.54	4.797		
VTX30KD		0.048	0.149	0.284	0.44	0.673	0.917	1.287	1.906	3.595		
VTX40KD		0.032	0.099	0.189	0.29	0.445	0.613	0.858	1.273	2.398		
VTX50KD		0.027	0.083	0.158	0.25	0.371	0.511	0.714	1.016	1.999		
VTX60KD		0.021	0.067	0.126	0.20	0.297	0.409	0.569	0.848	1.599		
VTX25	97 (28.64)	0.028	0.068	0.134	0.26	0.49	0.736	1.126	1.598	2.7	3.76	
VTX50		0.014	0.035	0.067	0.13	0.25	0.368	0.563	0.799	1.35	1.88	
VTX75		0.011	0.023	0.046	0.095	0.167	0.246	0.376	0.533	0.9	1.264	
VTMX100	97 (28.64)	0.0093	0.017	0.036	0.064	0.123	0.184	0.272	0.397	0.674	0.948	
VTMX200		0.0064	0.012	0.024	0.047	0.082	0.123	0.186	0.256	0.448	0.631	
VTMX300		0.0049	0.009	0.018	0.031	0.061	0.092	0.141	0.197	0.336	0.473	
VTH50	100.8 (29.76)	0.029	0.07	0.12	0.25	0.55	0.92	1.446	2.2	3.39	4.986	9.18
VTH150		0.011	0.025	0.05	0.097	0.17	0.272	0.41	0.6	1.17	1.82	3.586
VTH300		0.006	0.013	0.025	0.048	0.085	0.136	0.205	0.3	0.585	0.91	1.798

278 ~ 281
292 ~ 297
298 ~ 303
306 ~ 309
228 ~ 231
238 ~ 241
244 ~ 247
250 ~ 255
274 ~ 277
282 ~ 285
286 ~ 291