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GAS SPRINGS

AZOL GAS

SLOWED RETURN VAM

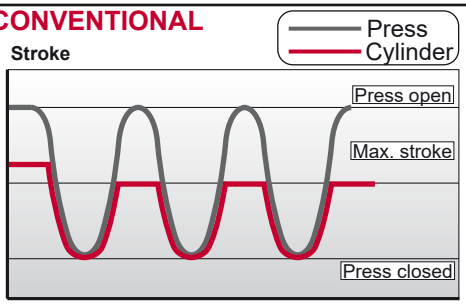
- Return stroke at a constant slowed speed
- Prevents blank holder bounce
- Compatible with ISO dimensions
- Increases productivity improving part transfer
- Cost saving compared to alternatives

AZOL GAS

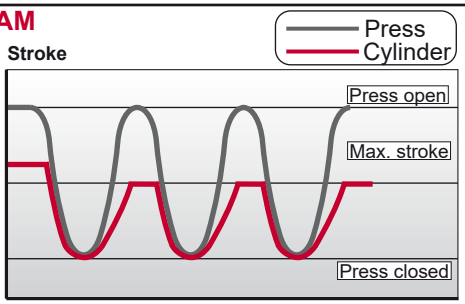
VAM SLOWED RETURN

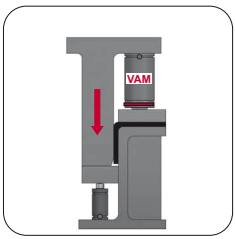
MODEL	F_0 daN / lb	Ø mm / inch	S mm / inch	L1 mm / inch	Pmax bar / psi	Charge Port		
VAM 750	750 1686	Ø75 Ø2.95	25 - 125 0.98 - 4.92	160 - 360 6.30 - 14.17	75 1088	G1/8”	✔	✔
VAM 1500	1500 3372	Ø95 Ø3.74	25 - 125 0.98 - 4.92	170 - 370 6.69 - 14.57	75 1088	G1/8”	✔	✔
VAM 3000	3000 6744	Ø120 Ø4.72	25 - 125 0.98 - 4.92	190 - 390 7.48 - 15.35	90 1305	G1/8”	✔	✔
VAM 5000	5000 11240	Ø150 Ø5.91	25 - 125 0.98 - 4.92	205 - 405 8.07 - 15.94	100 1450	G1/8”	✔	✔
VAM 7500	7500 16861	Ø195 Ø7.68	25 - 125 0.98 - 4.92	210 - 410 8.27 - 16.14	105 1523	G1/8”	✔	✔

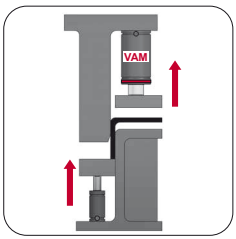
CONVENTIONAL



VAM





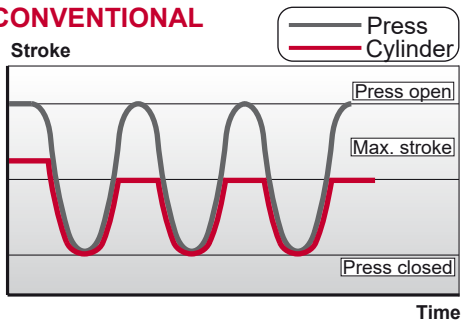


VAM gas spring meets the needs of applications requiring a **delayed return** of the rammer about the matrix.
VAM gas spring when returns to its initial position, the first mm backs at the same speed as a conventional gas spring, and subsequently slowed.

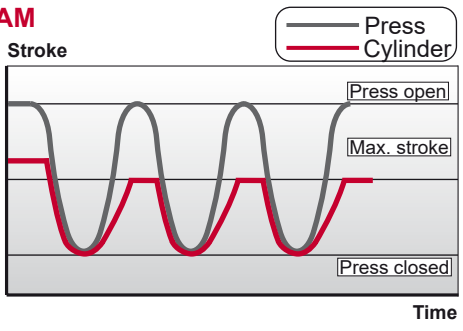
VAM SLOWED RETURN

AZOL GAS

CONVENTIONAL

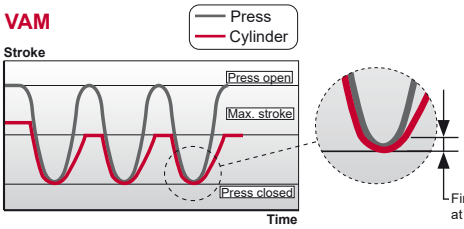


VAM



VAM gas springs are designed to return stroke at a constant slowed speed.

HOW IT WORKS



NOMINAL FORCE (daN)	CONSTANT (k)	MAXIMUM SLOWED RETURN (t_{max})
300	0.015	$t_{max} = k \times S_U$

EXAMPLE: VAM 300 080 (300 daN)

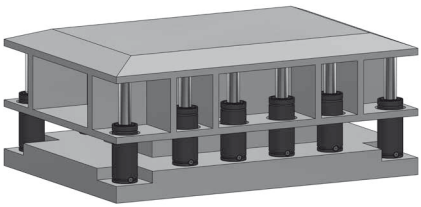
$t_{max} = k \times S_U = 0.015 \times 80 = 1,2$ seconds

Stroke used (S_U)

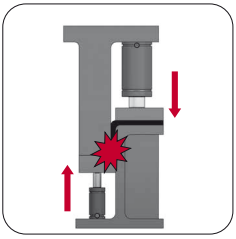
VAM gas spring when return to its initial position, the first mm backs at the same speed as a conventional gas spring and subsequently slowed.

Maximum slowed return stroke is defined to every model depending on used stroke.

APPLICATIONS



BLANK HOLDER BOUNCE



RAMMER RISE & MATRIX REMOVE

A) Increasing return speed in high speed presses (e.g. link drive presses) cause blank holder bounce back.

B) The ejector part starts working when the rammer is still holding it.

AZOL GAS

VAM SLOWED RETURN

CHALLENGE AND SOLUTION

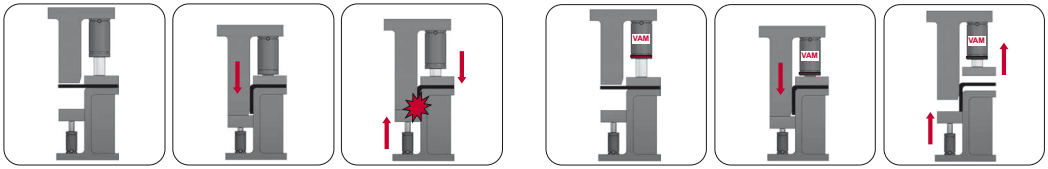
CHALLENGE: Blank holder bounce, difficult part transfer.

SOLUTION: VAM slow return piston rod eliminates blank holder bounce.

CHALLENGE AND SOLUTION

CHALLENGE

SOLUTION



CHALLENGE: Synchronized movement of rammer rise and removal of matrix causes deformation of metal part.

SOLUTION: VAM slowed return piston rod makes possible the removal of metal part without being deformed.

ADVANTAGES

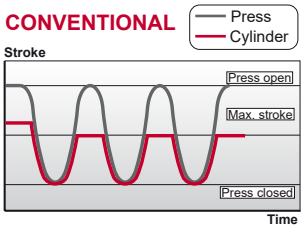
- Prevents blank holder **bounce**.
- Increases **productivity**.
- **Easy** implementation.
- Use **self-contained** or **hosed**.
- Compatible with **ISO** dimensions.
- **Cost savings** to alternatives.

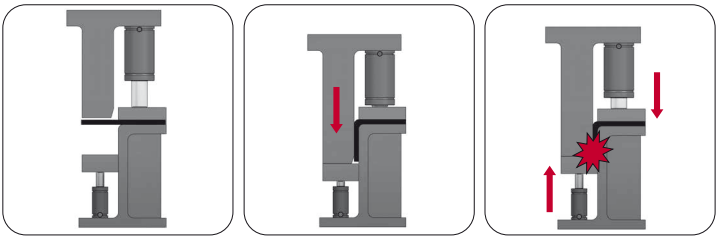
VAM *SLOWED RETURN*

AZOL GAS

CHALLENGE

CONVENTIONAL

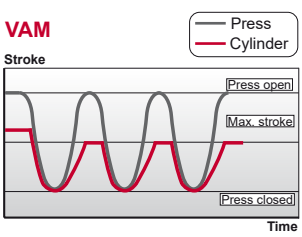


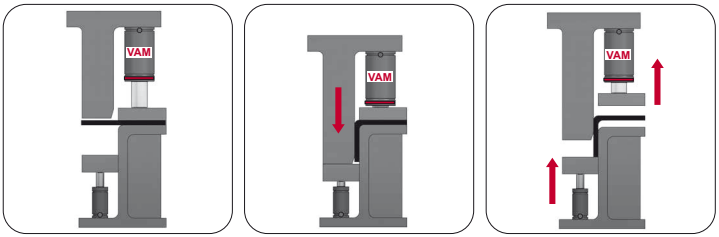


Certain operations involve the ejector piece begins to work when the rammer is still holding it. The use of conventional gas springs in these operations causes the **deformation of the metalsheet piece**.

SOLUTION

VAM





VAM when returns to its initial position, the first mm backs at the same speed as a conventional gas spring, and subsequently slowed, what makes possible the **removal of the metalsheet piece without deforming**.

REQUIRED DATA

- Do piston rod have to keep locked down? **(yes / no)**.....

- Desired force **(daN)**.....

- Total stroke **(mm)**.....

- Stroke used **(mm)**.....

- Number of cycles per minute.....

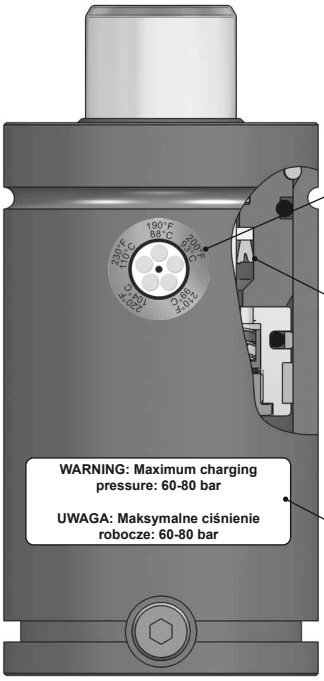
- Desired delay time **(eg. 1 second)**.....

- Stamping plant.....

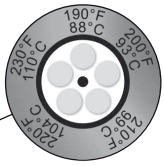
AZOL GAS

VAM SLOWED RETURN

VAM GAS SPRING

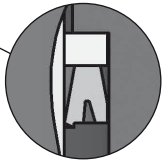


1 - THERMOMETER



VAM gas springs equipped with temperature thermometer.
If thermometer shows 3 out of 5 points in black color, the gas spring started becoming overheated

2 - HIGH TEMPERATURE SEALS

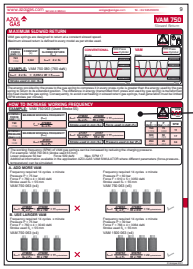


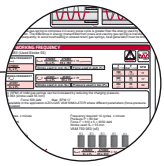
VAM gas springs equipped with high temperature seals

3 - LABELLING

VAM gas springs labelled with max. pressure charge

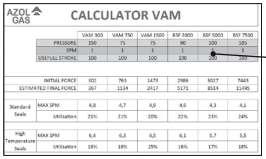
4 - CATALOGUE SPECIFICATION

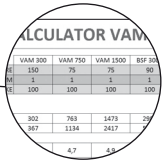




Examples to clarify how to increase working frequency.

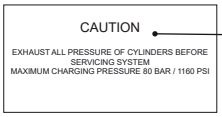
5 - SIMULATOR





VAM gas springs application to simulate working conditions (pressure-force-temperature)

6 - DIE INFORMATION TAG



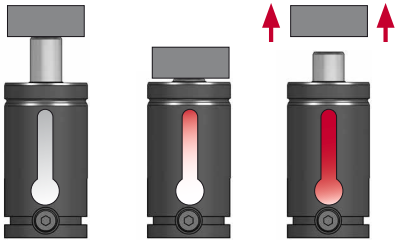
Die identification tag to show the maximum charging pressure to the end user when charging from control panel

HEAT FACTOR

AZOL GAS

CONVENTIONAL GAS SPRING

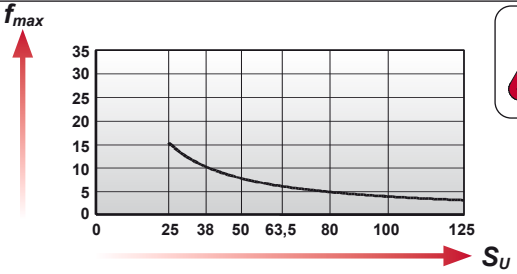
SLOWED RETURN GAS SPRING



When the press goes down and compress the gas spring, the press energy is transmitted to the gas spring.
When the press goes up and returns to its initial position:

- a conventional gas spring is always in contact with the press, so that transfer the majority of energy received
- a VAM gas spring does not return upwards with the press, so it cannot tranfer the energy received

FORCE (daN)	MAXIMUM WORKING FREQUENCY (f_{max})
750	$f_{max} = \frac{479880}{S_U \times F_U}$
1500	$f_{max} = \frac{959760}{S_U \times F_U}$
3000	$f_{max} = \frac{1823544}{S_U \times F_U}$
5000	$f_{max} = \frac{2879280}{S_U \times F_U}$
7500	$f_{max} = \frac{4078980}{S_U \times F_U}$



Maximum working frequency allowed on BSF for 150 bar charge and 20ºC environment temperature.

The energy provided by the press to VAM gas spring to compress it in every press cycle is greater than the energy used by VAM to return to its extended position.

The difference in energy (transmitted by the press and used from gas spring) is transformed into heat inside VAM gas spring.

A. ADD MORE BSF

VAM 3000 050 (x4)

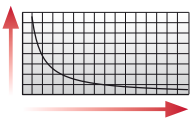
VAM 3000 050 (x6)

B. USE LARGER BSF

VAM 3000 050 (x4)

VAM 5000 050 (x4)

C. LIMIT SPM



D. COOLING

Consequently, to avoid overheating in VAM gas springs, heat generation must be either limited (A / B / C) or dissipated (D).

AZOL GAS

HEAT FACTOR

HOW TO REDUCE HEAT FACTOR

A. ADD MORE VAM

Frequency required 13 cycles x minute
Pressure P = 90 bar
Force F = 2985 x 4 = 11940 daN

VAM 3000 063 (x4)

$$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 2985} = 11 \text{ cycles/minute}$$

Frequency required 13 cycles x minute
Pressure P = 72 bar
Force F = 2389 x 5 = 11945 daN

VAM 3000 063 (x5)

$$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 2389} = 13 \text{ cycles/minute}$$

By adding additional VAM gas springs, the pressure on each VAM is reduced in order to keep the same total force in the tool as planned.

Heat factor reduction on VAM is directly related to its pressure reduction.

B. USE LARGER BSF

Frequency required 13 cycles x minute
Pressure P = 90 bar
Force F = 2985 x 4 = 11940 daN

VAM 3000 063 (x4)

$$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 2985} = 11 \text{ cycles/minute}$$

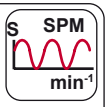
Frequency required 13 cycles x minute
Pressure P = 60 bar
Force F = 3016 x 4 = 12064 daN

VAM 5000 063 (x4)

$$f_{max} = \frac{2879280}{S_U \times F_U} = \frac{2879280}{55 \times 3016} = 17 \text{ cycles/minute}$$

By using larger VAM gas springs than originally estimated, the pressure on each VAM is also reduced in order to keep the same total force in the tool as planned.

C. LIMIT WORKING FREQUENCY

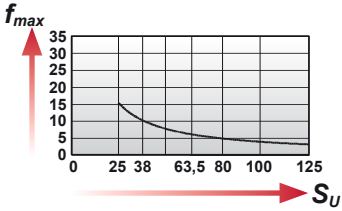


Frequency required 13 cycles x minute
Pressure P = 90 bar
Force F = 2985 x 4 = 11940 daN

VAM 3000 063 (x4)

$$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 2985} = 11 \text{ cycles/minute}$$

Frequency allowed 11 cycles x minute
Pressure P = 90 bar
Force F = 2985 x 4 = 11940 daN

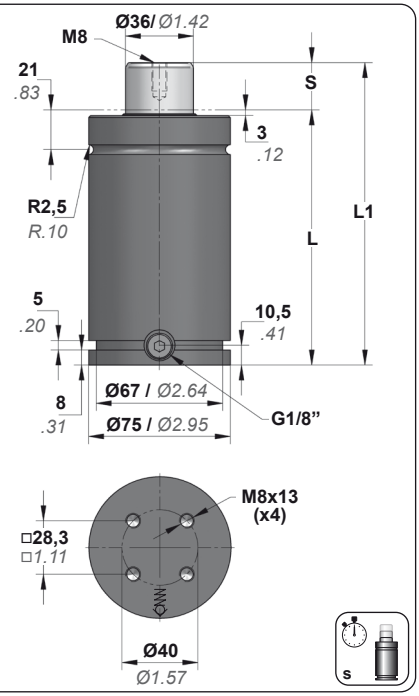


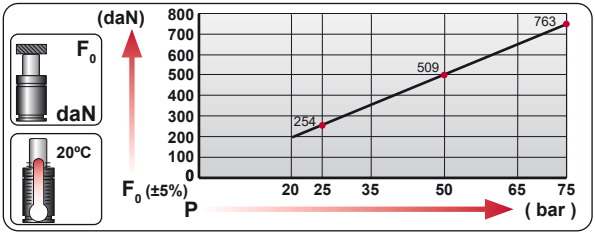
Another option to prevent overheating on VAM gas springs is to reduce or limit the working frequency, from originally planned to the maximum frequency allowed.

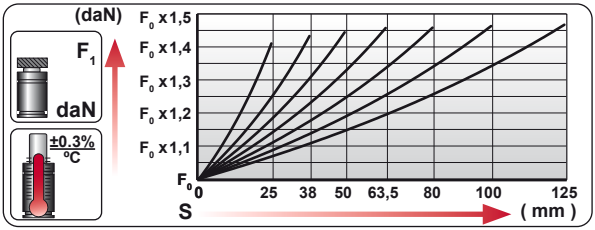
VAM 750

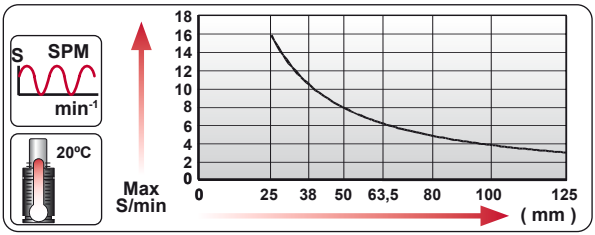
Slowed Return

AZOL GAS









VDI SAFETY > Vmax

STANDARDS APPROVED PED 2014/68/EU

ORDER	S		L1 ±0.25		L		F0 Initial Force		F1 (ISOTHERMAL) End Force		Vol.			
	mm	inch	mm	inch	mm	inch	daN	lb	daN	lb	cm³	in³	Kg.	lb
VAM 750 025	25	0.98	160	6.30	135	5.31	760	1709	1073	2412	87	5.3	3.75	8.27
VAM 750 038	38	1.50	186	7.32	148	5.83	±5% 75 bar 1088 psi at 20ºC 68ºF		1090	2450	128	7.8	3.99	8.80
VAM 750 050	50	1.97	210	8.27	160	6.30			1098	2469	165	10.1	4.21	9.28
VAM 750 063	63.5	2.50	237	9.33	173.5	6.83			1104	2483	207	12.7	4.45	9.81
VAM 750 080	80	3.15	270	10.63	190	7.48			1109	2493	259	15.8	4.75	10.47
VAM 750 100	100	3.94	310	12.20	210	8.27			1113	2502	321	19.6	5.12	11.29
VAM 750 125	125	4.92	360	14.17	235	9.25			1116	2508	399	24.3	5.57	12.28

- Spring-back depending on used stroke.
- Return stroke at constant slowed speed.
- Prevent over-heating by limiting SPM.

MOUNTING OPTIONS

HOW TO ORDER

Drop-in

Top Mount

A14-075 584
A34-075 585

Base Mount

B21-075 593
B76-075 597

Foot Mount

C05-075 599
C20-075 601

Support Mount

D02-075 604
D67-075 605

TECHNICAL DATA

Fluid	N_2	Pmin Pmax 20ºC / 68ºF	20 bar 290 psi	75 bar 1088 psi	Charging Adapter	18 CG 1-Q
Smax	< 90%	Tmin Tmax	0 ºC 32 ºF	80 ºC 176 ºF	Connection	VAM-H 750 XXX
Vmax	0,5 m/s	Force variation by temperature	±0,3% / ºC		Cartridge Kit	3663R440M

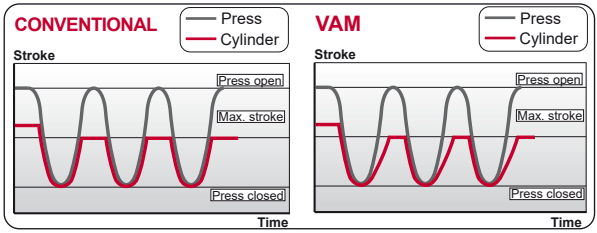
AZOL GAS

VAM 750
Slowed Return

MAXIMUM SLOWED RETURN

VAM gas springs are designed to return at a constant slowed speed.
Maximum slowed return is defined to every model as per stroke used.

NOMINAL FORCE (daN / lb)	CONSTANT (k)	MAXIMUM SLOWED RETURN (t_{max})
760 / 1709	0,062	$t_{max} = k \times S_U$



EXAMPLE: VAM 750 080 (760 daN)

$t_{max} = k \times S_U = 0{,}062 \times 80 = 5$ seconds

Stroke used in mm (S_U)

The energy provided by the press to the gas spring to compress it in every press cycle is greater than the energy used by the gas spring to return to its extended position. The difference in energy (transmitted from press and used by gas spring) is transformed into heat inside the gas spring. Consequently, to avoid overheating in slowed return gas springs, heat generation must be limited (SPM strokes per minute).

HOW TO INCREASE WORKING FREQUENCY

EXAMPLE: VAM 750 063 (Used Stroke 55)

NOMINAL FORCE (daN / lb)	MAXIMUM WORKING FREQUENCY (f_{max})
760 / 1709	$f_{max} = \frac{479880}{S_U \times F_U}$

$f_{max} = \frac{479880}{S_U \times F_U} = \frac{479880}{55 \times 760} = 11$ cycles/minute

Stroke used in mm (S_U) *Force used in daN (F_U)*

NOMINAL PRESSURE (bar / psi)	MAXIMUM WORKING FREQUENCY (f_{max})
75 / 1088	$f_{max} = \frac{47357}{S_U \times P_U}$

$f_{max} = \frac{47357}{S_U \times P_U} = \frac{47357}{55 \times 75} = 11$ cycles/minute

Stroke used in mm (S_U) *Pressure used in bar (P_U)*

WARNING! S SPM min⁻¹

F (daN / lb)	P (bar / psi)	SPM
760 / 1709	75 / 1088	11
509 / 1144	50 / 725	17
254 / 571	25 / 363	34

The working frequency (SPM) of VAM gas springs can be increased by reducing the charging pressure.
For example: VAM 750 063 (stroke used 55 mm)
Lower pressure 50 bar Force 509 daN Max. SPM 17
Additional information available in the application AZOLGAS VAM SIMULATOR where different parameters (force-pressure-temperature) can be simulated.

A. ADD MORE VAM

Frequency required 14 cycles x minute
Pressure P = 75 bar
Force F = 760 x 4 = 3040 daN
Stroke used S_U = 55 mm
VAM 750 063 (x4)

$f_{max} = \frac{479880}{S_U \times F_U} = \frac{479880}{55 \times 760} = 11$ cycles/minute ✗

Frequency required 14 cycles x minute
Pressure P = 60 bar
Force F = 610 x 5 = 3050 daN
Stroke used S_U = 55 mm
VAM 750 063 (x5)

$f_{max} = \frac{479880}{S_U \times F_U} = \frac{479880}{55 \times 610} = 14$ cycles/minute ✓

B. USE LARGER VAM

Frequency required 14 cycles x minute
Pressure P = 75 bar
Force F = 760 x 4 = 3040 daN
Stroke used S_U = 55 mm
VAM 750 063 (x4)

$f_{max} = \frac{479880}{S_U \times F_U} = \frac{479880}{55 \times 760} = 11$ cycles/minute ✗

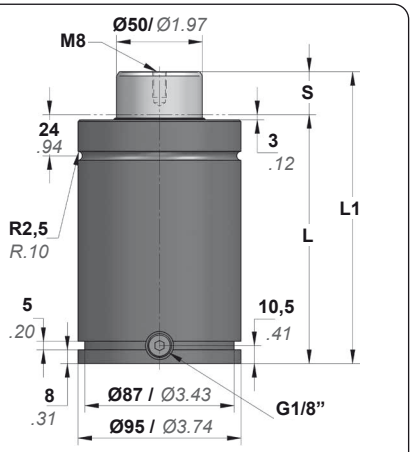
Frequency required 14 cycles x minute
Pressure P = 39 bar
Force F = 766 x 4 = 3064 daN
Stroke used S_U = 55 mm
VAM 1500 063 (x4)

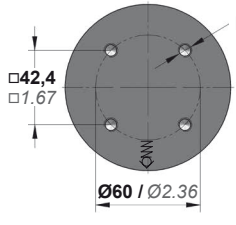
$f_{max} = \frac{959760}{S_U \times F_U} = \frac{959760}{55 \times 766} = 22$ cycles/minute ✓

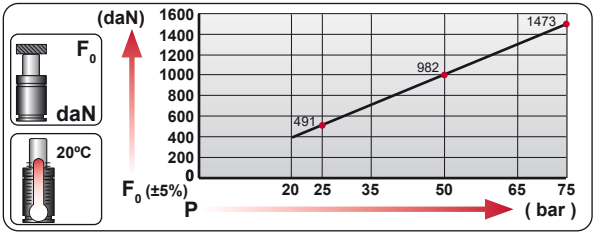
VAM 1500

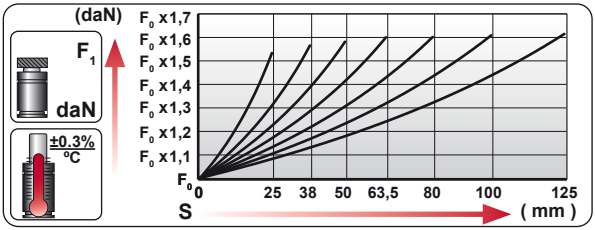
Slowed Return

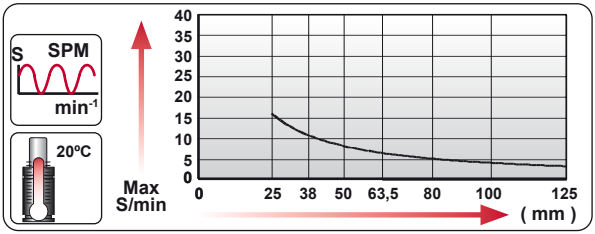
AZOL GAS











VDI SAFETY > Vmax

STANDARDS PED

ORDER	S		L1 ±0.25		L		F0 Initial Force		F1 (ISOTHERMAL) End Force		Vol.			
	mm	inch	mm	inch	mm	inch	daN	lb	daN	lb	cm³	in³	Kg.	lb
VAM 1500 025	25	0.98	170	6.69	145	5.71	1470	3305	2257	5075	141	8.6	6.67	14.70
VAM 1500 038	38	1.50	196	7.72	158	6.22			2304	5180	206	12.6	7.08	15.61
VAM 1500 050	50	1.97	220	8.66	170	6.69			2328	5233	266	16.3	7.46	16.45
VAM 1500 063	63.5	2.50	247	9.72	183.5	7.22			2345	5271	334	20.4	7.89	17.39
VAM 1500 080	80	3.15	280	11.02	200	7.87			2358	5300	417	25.5	8.41	18.54
VAM 1500 100	100	3.94	320	12.60	220	8.66			2368	5324	518	31.6	9.04	19.93
VAM 1500 125	125	4.92	370	14.57	245	9.65			2377	5343	643	39.3	9.83	21.67

±5% 75 bar 1088 psi at 20ºC 68ºF

- Spring-back depending on used stroke.
- Return stroke at constant slowed speed.
- Prevent over-heating by limiting SPM.

MOUNTING OPTIONS

HOW TO ORDER

Drop-in

Top Mount

A14-095 584
A34-095 585

Base Mount

B21-095 593
B76-095 597

Foot Mount

C05-095 600
C20-095 601

Support Mount

D02-095 604
D67-095 606

TECHNICAL DATA

Fluid	N_2	Pmin Pmax 20ºC / 68ºF	20 bar 290 psi	75 bar 1088 psi	Charging Adapter	18 CG 1-Q
Smax	< 90%	Tmin Tmax	0 ºC 32 ºF	80 ºC 176 ºF	Connection	VAM-H 1500 XXX
Vmax	0,5 m/s	Force variation by temperature	±0,3% / ºC		Cartridge Kit	5080U460M

AZOL GAS

VAM 1500
Slowed Return

MAXIMUM SLOWED RETURN

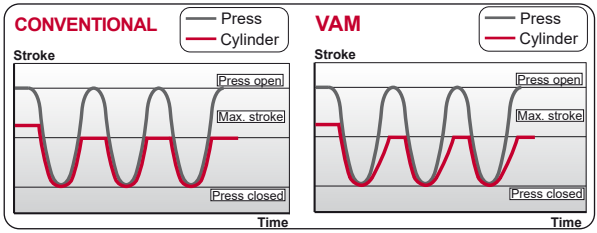
VAM gas springs are designed to return at a constant slowed speed.
Maximum slowed return is defined to every model as per stroke used.

NOMINAL FORCE (daN / *lb*)	CONSTANT (k)	MAXIMUM SLOWED RETURN (t_{max})
1470 *3305*	0,09	$t_{max} = k \times S_U$

EXAMPLE: VAM 1500 080 (1470 daN)

$t_{max} = k \times S_U = 0{,}09 \times 80 = 7$ seconds

Stroke used in mm (S_U)



The energy provided by the press to the gas spring to compress it in every press cycle is greater than the energy used by the gas spring to return to its extended position. The difference in energy (transmitted from press and used by gas spring) is transformed into heat inside the gas spring. Consequently, to avoid overheating in slowed return gas springs, heat generation must be limited (SPM strokes per minute).

HOW TO INCREASE WORKING FREQUENCY

EXAMPLE: VAM 1500 063 (Used Stroke 55)

NOMINAL FORCE (daN / *lb*)	MAXIMUM WORKING FREQUENCY (f_{max})
1470 *3305*	$f_{max} = \frac{959760}{S_U \times F_U}$

$f_{max} = \frac{959760}{S_U \times F_U} = \frac{959760}{55 \times 1470} = 11$ cycles/minute

Stroke used in mm (S_U) *Force used in daN (F_U)*

NOMINAL PRESSURE (bar / *psi*)	MAXIMUM WORKING FREQUENCY (f_{max})
75 *1088*	$f_{max} = \frac{48967}{S_U \times P_U}$

$f_{max} = \frac{48967}{S_U \times P_U} = \frac{48967}{55 \times 75} = 11$ cycles/minute

Stroke used in mm (S_U) *Pressure used in bar (P_U)*

F (daN / *lb*)	P (bar / *psi*)	SPM
1470 *3305*	75 *1088*	11
982 *2208*	50 *725*	17
491 *1104*	25 *363*	35

The working frequency (SPM) of VAM gas springs can be increased by reducing the charging pressure.
For example: VAM 1500 063 (stroke used 55 mm)
Lower pressure 50 bar Force 982 daN Max. SPM 17
Additional information available in the application AZOLGAS VAM SIMULATOR where different parameters (force-pressure-temperature) can be simulated.

A. ADD MORE VAM

Frequency required 14 cycles x minute
Pressure P = 75 bar
Force F = 1470 x 4 = 5880 daN
Stroke used S_U = 55 mm
VAM 1500 063 (x4)

$f_{max} = \frac{959760}{S_U \times F_U} = \frac{959760}{55 \times 1470} = 11$ cycles/minute ✗

Frequency required 14 cycles x minute
Pressure P = 60 bar
Force F = 1178 x 5 = 5890 daN
Stroke used S_U = 55 mm
VAM 1500 063 (x5)

$f_{max} = \frac{959760}{S_U \times F_U} = \frac{959760}{55 \times 1178} = 14$ cycles/minute ✓

B. USE LARGER VAM

Frequency required 14 cycles x minute
Pressure P = 75 bar
Force F = 1470 x 4 = 5880 daN
Stroke used S_U = 55 mm
VAM 1500 063 (x4)

$f_{max} = \frac{959760}{S_U \times F_U} = \frac{959760}{55 \times 1470} = 11$ cycles/minute ✗

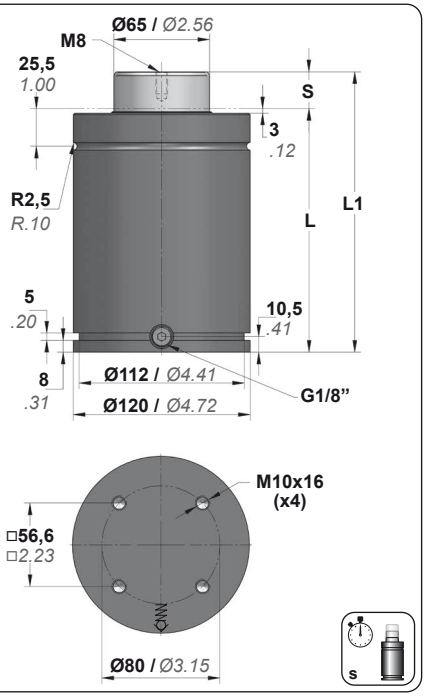
Frequency required 14 cycles x minute
Pressure P = 45 bar
Force F = 1493 x 4 = 5972 daN
Stroke used S_U = 55 mm
VAM 3000 063 (x4)

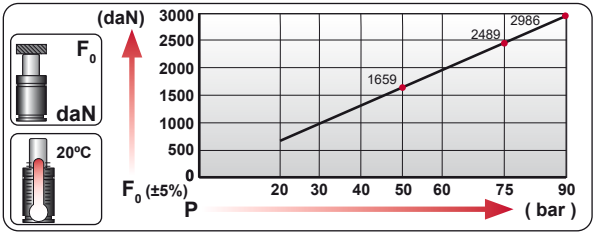
$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 1493} = 22$ cycles/minute ✓

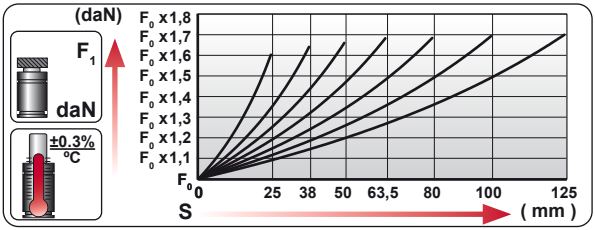
VAM 3000

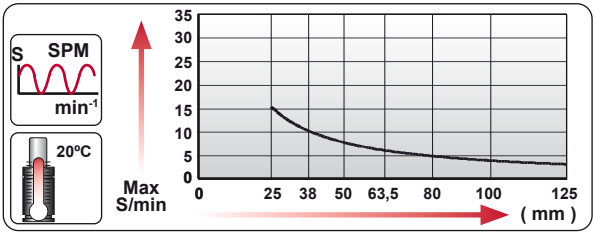
Slowed Return

AZOL GAS









VDI SAFETY > Vmax

STANDARDS APPROVED PED 2014/68/EU

ORDER	S		L1 ±0.25		L		F_0 Initial Force		F_1 (ISOTHERMAL) End Force		Vol.			
	mm	inch	mm	inch	mm	inch	daN	lb	daN	lb	cm^3	in^3	Kg.	lb
VAM 3000 025	25	0.98	190	7.48	165	6.50	2985	6711	4793	10775	220	13.4	12.60	27.78
VAM 3000 038	38	1.50	216	8.50	178	7.01	±5% 90 bar 1305 psi at 20ºC 68ºF		4906	11030	322	19.7	13.29	29.30
VAM 3000 050	50	1.97	240	9.45	190	7.48			4963	11158	416	25.4	13.93	30.71
VAM 3000 063	63.5	2.50	267	10.51	203.5	8.01			5004	11249	522	31.9	14.64	32.28
VAM 3000 080	80	3.15	300	11.81	220	8.66			5036	11321	652	39.8	15.52	34.22
VAM 3000 100	100	3.94	340	13.39	240	9.45			5061	11378	809	49.4	16.59	36.57
VAM 3000 125	125	4.92	390	15.35	265	10.43			5082	11424	1005	61.3	17.91	39.48

- Spring-back depending on used stroke.
- Return stroke at constant slowed speed.
- Prevent over-heating by limiting SPM.

MOUNTING OPTIONS

HOW TO ORDER | Drop-in | Top Mount | Base Mount | Foot Mount | Support Mount

A14-120	584	B21-120	594	C05-120	600	D02-120	604
A34-120	586	B76-120	598	C20-120	602	D67-120	606

TECHNICAL DATA

Fluid	N_2	Pmin Pmax 20ºC / 68ºF	20 bar 290 psi	90 bar 1305 psi	Charging Adapter	18 CG 1-Q
Smax	< 90%	Tmin Tmax	0 ºC 32 ºF	80 ºC 176 ºF	Connection	VAM-H 3000 XXX
Vmax	0,5 m/s	Force variation by temperature	±0,3% / ºC		Cartridge Kit	65A0W560M

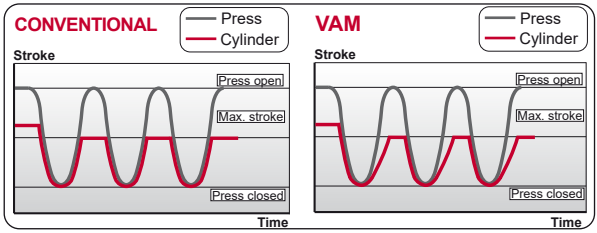
AZOL GAS

VAM 3000
Slowed Return

MAXIMUM SLOWED RETURN

VAM gas springs are designed to return at a constant slowed speed.
Maximum slowed return is defined to every model as per stroke used.

NOMINAL FORCE (daN / lb)	CONSTANT (k)	MAXIMUM SLOWED RETURN (t_{max})
2985 / 6711	0,131	$t_{max} = k \times S_U$



EXAMPLE: VAM 3000 080 (2985 daN)

$t_{max} = k \times S_U = 0{,}131 \times 80 = 10$ seconds

Stroke used in mm (S_U)

The energy provided by the press to the gas spring to compress it in every press cycle is greater than the energy used by the gas spring to return to its extended position. The difference in energy (transmitted from press and used by gas spring) is transformed into heat inside the gas spring. Consequently, to avoid overheating in slowed return gas springs, heat generation must be limited (SPM strokes per minute).

HOW TO INCREASE WORKING FREQUENCY

EXAMPLE: VAM 3000 063 (Used Stroke 55)

NOMINAL FORCE (daN / lb)	MAXIMUM WORKING FREQUENCY (f_{max})
2985 / 6711	$f_{max} = \frac{1823544}{S_U \times F_U}$

$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 2985} = 11$ cycles/minute

Stroke used in mm (S_U) *Force used in daN (F_U)*

NOMINAL PRESSURE (bar / psi)	MAXIMUM WORKING FREQUENCY (f_{max})
90 / 1305	$f_{max} = \frac{54981}{S_U \times P_U}$

$f_{max} = \frac{54981}{S_U \times P_U} = \frac{54981}{55 \times 90} = 11$ cycles/minute

Stroke used in mm (S_U) *Pressure used in bar (P_U)*

WARNING! S SPM min⁻¹

F (daN / lb)	P (bar / psi)	SPM
2985 / 6711	90 / 1305	11
2489 / 5595	75 / 1088	13
1659 / 3730	50 / 725	20

The working frequency (SPM) of VAM gas springs can be increased by reducing the charging pressure.
For example: VAM 3000 063 (stroke used 55 mm)
Lower pressure 75 bar Force 2489 daN Max. SPM 13
Additional information available in the application AZOLGAS VAM SIMULATOR where different parameters (force-pressure-temperature) can be simulated.

A. ADD MORE VAM

Frequency required 13 cycles x minute
Pressure P = 90 bar
Force F = 2985 x 4 = 11940 daN
Stroke used S_U = 55 mm
VAM 3000 063 (x4)

$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 2985} = 11$ cycles/minute ✗

Frequency required 13 cycles x minute
Pressure P = 72 bar
Force F = 2389 x 5 = 11945 daN
Stroke used S_U = 55 mm
VAM 3000 063 (x5)

$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 2389} = 13$ cycles/minute ✓

B. USE LARGER VAM

Frequency required 13 cycles x minute
Pressure P = 90 bar
Force F = 2985 x 4 = 11940 daN
Stroke used S_U = 55 mm
VAM 3000 063 (x4)

$f_{max} = \frac{1823544}{S_U \times F_U} = \frac{1823544}{55 \times 2985} = 11$ cycles/minute ✗

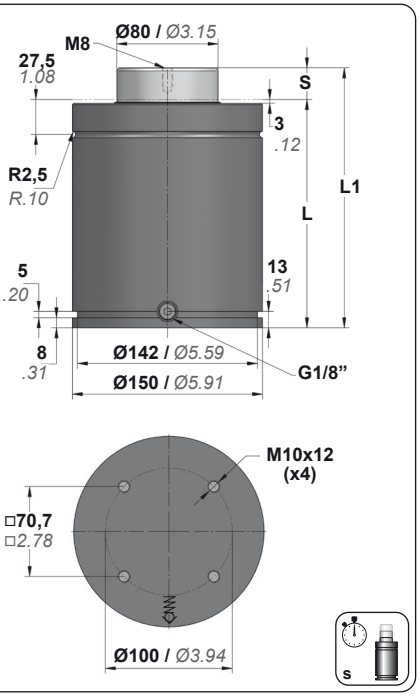
Frequency required 13 cycles x minute
Pressure P = 60 bar
Force F = 3016 x 4 = 12064 daN
Stroke used S_U = 55 mm
VAM 5000 063 (x4)

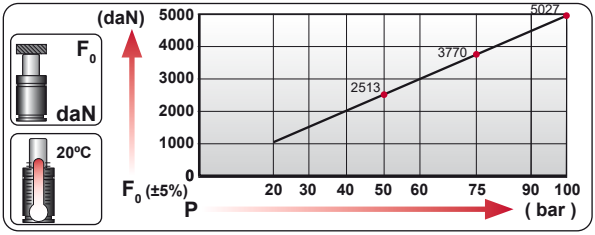
$f_{max} = \frac{2879280}{S_U \times F_U} = \frac{2879280}{55 \times 3016} = 17$ cycles/minute ✓

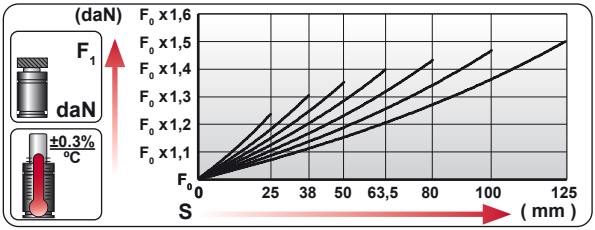
VAM 5000

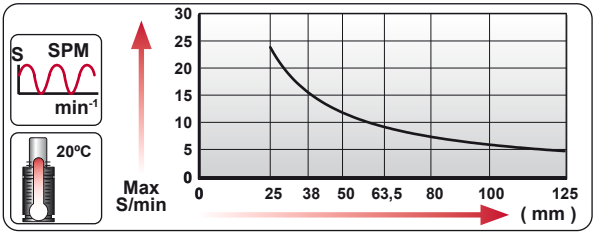
Slowed Return

AZOL GAS









VDI SAFETY > Vmax

STANDARDS PED

ORDER	S		L1 ±0.25		L		F_0 Initial Force		F_1 (ISOTHERMAL) End Force		Vol.			
	mm	inch	mm	inch	mm	inch	daN	lb	daN	lb	cm³	in³	Kg.	lb
VAM 5000 025	25	0.98	205	8.07	180	7.09	5025	11297	7922	17810	344	21.0	19.22	42.37
VAM 5000 038	38	1.50	231	9.09	193	7.60			8100	18210	503	30.7	20.27	44.69
VAM 5000 050	50	1.97	255	10.04	205	8.07			8190	18411	650	39.7	21.25	46.85
VAM 5000 063	63.5	2.50	282	11.10	218.5	8.60			8253	18553	816	49.8	22.34	49.25
VAM 5000 080	80	3.15	315	12.40	235	9.25			8303	18666	1019	62.2	23.68	52.20
VAM 5000 100	100	3.94	355	13.98	255	10.04			8343	18755	1264	77.1	25.30	55.78
VAM 5000 125	125	4.92	405	15.94	280	11.02			8375	18828	1571	95.9	27.32	60.23

±5% 100 bar 1450 psi at 20ºC 68ºF

- Spring-back depending on used stroke.
- Return stroke at constant slowed speed.
- Prevent over-heating by limiting SPM.

MOUNTING OPTIONS

HOW TO ORDER

Drop-in

Top Mount

A14-150 584
A34-150 586

Base Mount

B21-150 594
B76-150 598

Foot Mount

C05-150 600
C20-150 602

Support Mount

D02-150 604
D67-150 606

TECHNICAL DATA

Fluid	N_2	Pmin Pmax 20ºC / 68ºF	20 bar 290 psi / 100 bar 1450 psi	Charging Adapter	18 CG 1-Q
Smax	< 90%	Tmin Tmax	0 ºC 32 ºF / 80 ºC 176 ºF	Connection	VAM-H 5000 XXX
Vmax	0,5 m/s	Force variation by temperature	±0,3% / ºC	Cartridge Kit	80C5X700M

AZOL GAS

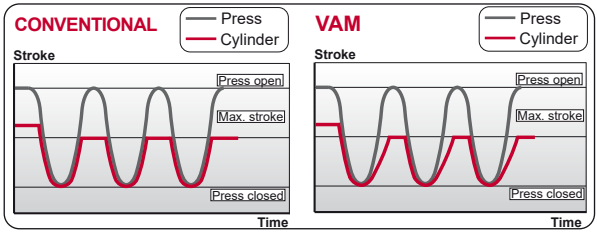
VAM 5000
Slowed Return

MAXIMUM SLOWED RETURN

VAM gas springs are designed to return at a constant slowed speed.
Maximum slowed return is defined to every model as per stroke used.

WARNING! s

NOMINAL FORCE (daN / *lb*)	CONSTANT (k)	MAXIMUM SLOWED RETURN (t_{max})
5025 *11297*	0.214	$t_{max} = k \times S_U$



EXAMPLE: VAM 5000 080 (5025 daN)

$t_{max} = k \times S_U = 0.214 \times 80 = 17$ seconds

Stroke used in mm (S_U)

The energy provided by the press to the gas spring to compress it in every press cycle is greater than the energy used by the gas spring to return to its extended position. The difference in energy (transmitted from press and used by gas spring) is transformed into heat inside the gas spring. Consequently, to avoid overheating in slowed return gas springs, heat generation must be limited (SPM strokes per minute).

HOW TO INCREASE WORKING FREQUENCY

EXAMPLE: VAM 5000 063 (Used Stroke 55)

WARNING! s SPM min⁻¹

NOMINAL FORCE (daN / *lb*)	MAXIMUM WORKING FREQUENCY (f_{max})
5025 *11297*	$f_{max} = \frac{2879280}{S_U \times F_U}$

$f_{max} = \frac{2879280}{S_U \times F_U} = \frac{2879280}{55 \times 5025} = 10$ cycles/minute

Stroke used in mm (S_U) *Force used in daN (F_U)*

NOMINAL PRESSURE (bar / *psi*)	MAXIMUM WORKING FREQUENCY (f_{max})
100 *1450*	$f_{max} = \frac{57299}{S_U \times P_U}$

$f_{max} = \frac{57299}{S_U \times P_U} = \frac{57299}{55 \times 100} = 10$ cycles/minute

Stroke used in mm (S_U) *Pressure used in bar (P_U)*

F (daN / *lb*)	P (bar / *psi*)	SPM
5025 *11297*	100 *1450*	10
4021 *9040*	80 *1160*	13
3016 *6780*	60 *870*	17

The working frequency (SPM) of VAM gas springs can be increased by reducing the charging pressure.
For example: VAM 5000 063 (stroke used 55 mm)
Lower pressure 80 bar Force 4021 daN Max. SPM 13
Additional information available in the application AZOLGAS VAM SIMULATOR where different parameters (force-pressure-temperature) can be simulated.

A. ADD MORE VAM

Frequency required 13 cycles x minute
Pressure P = 100 bar
Force F = 5025 x 4 = 20100 daN
Stroke used S_U = 55 mm
VAM 5000 063 (x4)

$f_{max} = \frac{2879280}{S_U \times F_U} = \frac{2879280}{55 \times 5025} = 10$ cycles/minute ✗

Frequency required 13 cycles x minute
Pressure P = 78 bar
Force F = 3920 x 5 = 19600 daN Stroke used S_U = 55 mm
VAM 5000 063 (x5)

$f_{max} = \frac{2879280}{S_U \times F_U} = \frac{2879280}{55 \times 3920} = 13$ cycles/minute ✓

B. USE LARGER VAM

Frequency required 13 cycles x minute
Pressure P = 100 bar
Force F = 5025 x 4 = 20100 daN
Stroke used S_U = 55 mm
VAM 5000 063 (x4)

$f_{max} = \frac{2879280}{S_U \times F_U} = \frac{2879280}{55 \times 5025} = 10$ cycles/minute ✗

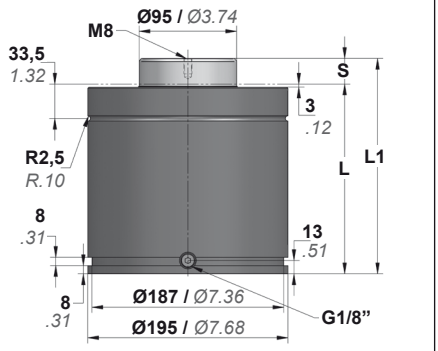
Frequency required 13 cycles x minute
Pressure P = 70 bar
Force F = 4962 x 4 = 19847 daN
Stroke used S_U = 55 mm
VAM 7500 063 (x4)

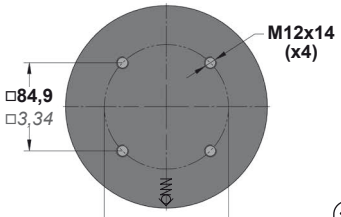
$f_{max} = \frac{4078980}{S_U \times F_U} = \frac{4078980}{55 \times 4962} = 14$ cycles/minute ✓

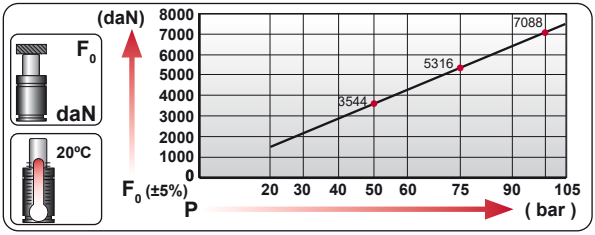
VAM 7500

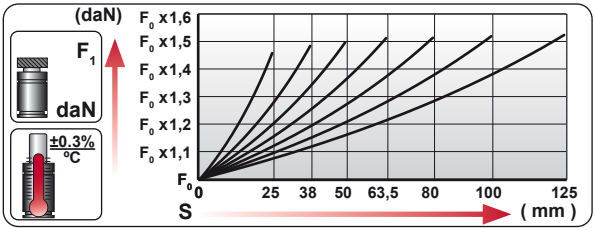
Slowed Return

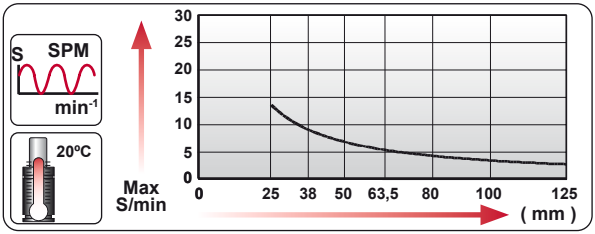
AZOL GAS











VDI SAFETY > Vmax

STANDARDS APPROVED PED

ORDER	S		L1 ±0.25		L		F0 Initial Force		F1 (ISOTHERMAL) End Force		Vol.			
	mm	inch	mm	inch	mm	inch	daN	lb	daN	lb	cm³	in³	Kg.	lb
VAM 7500 025	25	0.98	210	8.27	185	7.28	7440	16726	10858	24409	563	34.4	37.02	81.61
VAM 7500 038	38	1.50	236	9.29	198	7.80			11051	24843	824	50.3	38.74	85.41
VAM 7500 050	50	1.97	260	10.24	210	8.27			11147	25061	1066	65.0	40.33	88.91
VAM 7500 063	63.5	2.50	287	11.30	223.5	8.80			11216	25214	1337	81.6	42.12	92.86
VAM 7500 080	80	3.15	320	12.60	240	9.45			11269	25334	1669	101.8	44.30	97.66
VAM 7500 100	100	3.94	360	14.17	260	10.24			11312	25430	2071	126.4	46.94	103.48
VAM 7500 125	125	4.92	410	16.14	285	11.22			11346	25507	2574	157.1	50.25	110.78

±5% 105 bar 1520 psi at 20ºC 68ºF

- Spring-back depending on used stroke.
- Return stroke at constant slowed speed.
- Prevent over-heating by limiting SPM.

MOUNTING OPTIONS

HOW TO ORDER

Drop-in

Top Mount: A14-195 584, A34-195 586

Base Mount: B21-195 594, B76-195 598

Foot Mount: C05-195 600, C20-195 602

Support Mount: D02-195 604

TECHNICAL DATA

Fluid	N_2	Pmin Pmax 20ºC / 68ºF	20 bar 290 psi	105 bar 1520 psi	Charging Adapter: 18 CG 1-Q
Smax	< 90%	Tmin Tmax	0 ºC 32 ºF	80 ºC 176 ºF	Connection: VAM-H 7500 XXX
Vmax	0,5 m/s	Force variation by temperature	±0,3% / ºC		Cartridge Kit: 95G0Y840M

AZOL GAS

VAM 7500
Slowed Return

MAXIMUM SLOWED RETURN

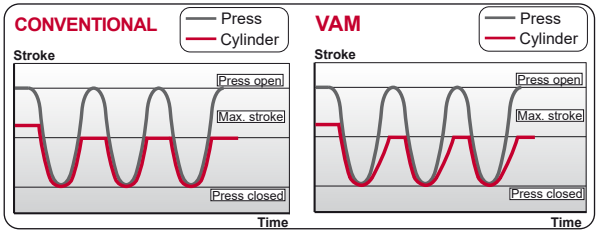
VAM gas springs are designed to return at a constant slowed speed.
Maximum slowed return is defined to every model as per stroke used.

NOMINAL FORCE (daN / lb)	CONSTANT (k)	MAXIMUM SLOWED RETURN (t_{max})
7440 / 16726	0,289	$t_{max} = k \times S_U$

EXAMPLE: VAM 7500 080 (7440 daN)

$t_{max} = k \times S_U = 0{,}289 \times 80 = 23$ seconds

Stroke used in mm (S_U)



The energy provided by the press to the gas spring to compress it in every press cycle is greater than the energy used by the gas spring to return to its extended position. The difference in energy (transmitted from press and used by gas spring) is transformed into heat inside the gas spring. Consequently, to avoid overheating in slowed return gas springs, heat generation must be limited (SPM strokes per minute).

HOW TO INCREASE WORKING FREQUENCY

EXAMPLE: VAM 7500 063 (Used Stroke 55)

NOMINAL FORCE (daN / lb)	MAXIMUM WORKING FREQUENCY (f_{max})
7440 / 16726	$f_{max} = \frac{4078980}{S_U \times F_U}$

$f_{max} = \frac{4078980}{S_U \times F_U} = \frac{4078980}{55 \times 7440} = 10$ cycles/minute

Stroke used in mm (S_U) *Force used in daN (F_U)*

NOMINAL PRESSURE (bar / psi)	MAXIMUM WORKING FREQUENCY (f_{max})
105 / 1520	$f_{max} = \frac{57566}{S_U \times P_U}$

$f_{max} = \frac{57566}{S_U \times P_U} = \frac{57566}{55 \times 105} = 10$ cycles/minute

Stroke used in mm (S_U) *Pressure used in bar (P_U)*

F (daN / lb)	P (bar / psi)	SPM
7440 / 16726	105 / XXX	10
5671 / 12749	80 / 1160	13
4253 / 9561	60 / 870	17

The working frequency (SPM) of VAM gas springs can be increased by reducing the charging pressure.
For example: VAM 7500 063 (stroke used 55 mm)
Lower pressure 80 bar Force 5671 daN Max. SPM 13
Additional information available in the application AZOLGAS VAM SIMULATOR where different parameters (force-pressure-temperature) can be simulated.

A. ADD MORE VAM

Frequency required 12 cycles x minute
Pressure P = 105 bar
Force F = 7440 x 4 = 29760 daN
Stroke used S_U = 55 mm

VAM 7500 063 (x4)

$f_{max} = \frac{4078980}{S_U \times F_U} = \frac{4078980}{55 \times 7440} = 10$ cycles/minute ✗

Frequency required 12 cycles x minute
Pressure P = 84 bar
Force F = 5954 x 5 = 29770 daN
Stroke used S_U = 55 mm

VAM 7500 063 (x5)

$f_{max} = \frac{4078980}{S_U \times F_U} = \frac{4078980}{55 \times 5954} = 12$ cycles/minute ✓