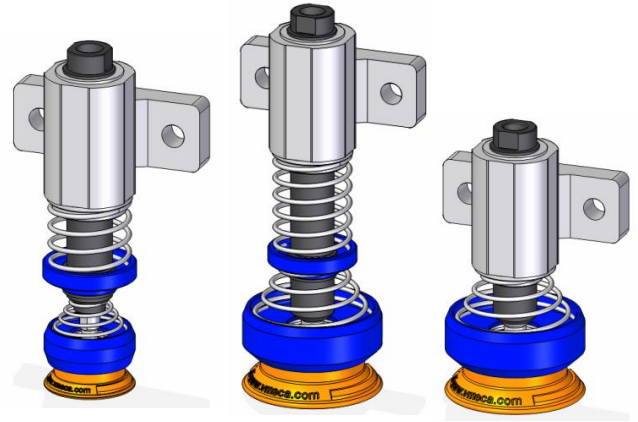


## Smart Plunger - FCF Series

### Feature

- Easy replace suction cup rubber
- Always return back to center position (wide ball-joint angle)
- Less slide friction (with ball bush)
- Light weight and long lifetime (hard anodized aluminum)
- Very compact size (compare with typical ball-joint mount)
- Easy installation and flexible mount (Integral bracket with level spring plunger)



### PAD Feature

- Excellent for flat and curved material in vertical and horizontal application
- Great designed pattern for anti-sliding
- Excellent for transfer without slipperiness
- Available transferring without vibration

### Suitable for handling

- Metal sheet
- Car panel
- Press metal sheet
- Panel
- Electrical goods
- Curved glass

## Order No.

SP30 - BJ03 - FCF50- PU



### ① Stroke

SP20	-	20mm
● SP30	-	30mm
SP50	-	50mm
SP70	-	70mm

### ② Ball Joint

BJ02	-	Ball Joint (FCF30.40)
● BJ03	-	Ball Joint (FCF50.60.70.80.100.125)
SM02	-	Without Ball Joint (FCF25.30.40)
SM03	-	Without Ball Joint (FCF50.60.70.80.100.125)

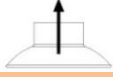
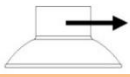
### ③ Pad

FCF30	-	ø30
FCF40	-	ø40
● FCF50	-	ø50
FCF60	-	ø60
FCF70	-	ø70
FCF80	-	ø80
FCF100	-	ø100
FCF125	-	ø125

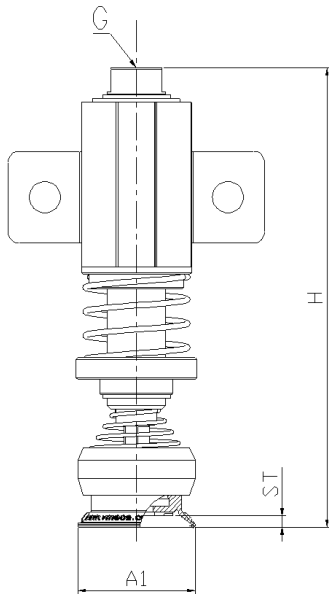
### ④ Material

N	-	NBR
S	-	Silicon
● PU	-	Poly Urethane

## Recommended (max.) lifting forces

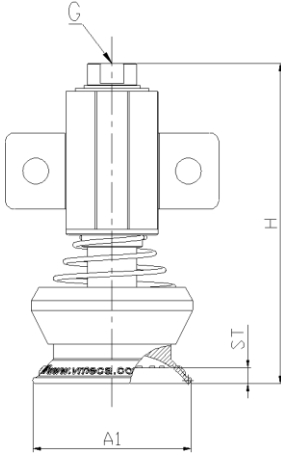
Model	Volume ( cm <sup>3</sup> )	Lifting Force (kg) - Perpendicular 			Lifting Force (kg) - Parallel 		
		-20 kPa	-60 kPa	-90 kPa	-20 kPa	-60 kPa	-90 kPa
FCF 30	2.0	2	4.6	6.4	0.8	2.0	2.9
FCF 40	4.4	2.9	6.9	9.9	2.1	5.0	7.2
FCF 50	8	4.2	10.8	15.4	3.7	6.7	8.9
FCF 60	14.6	5.6	15.2	22.3	5.5	13.3	16.7
FCF 70	20.7	7.6	19.6	28.2	6.3	15.8	20.1
FCF 80	36.0	10.3	25.9	34.4	6.7	17.7	23.8
FCF 100	58.0	14.7	37.1	50.6	13.6	35.4	43.7
FCF 125	115.0	19.4	44.5	57.9	19.1	42.5	64.9

## Dimension (Ball Joint type)

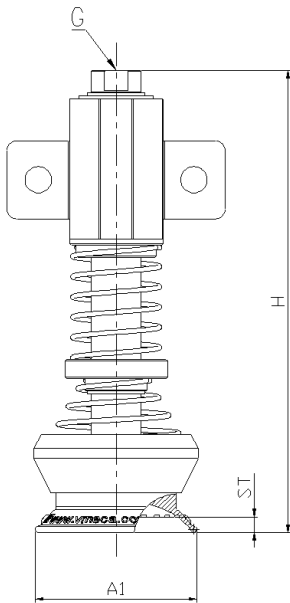


Model		A1	ST	H	G
SP20-BJ02	FCF30	32	3.3	125.2	G1/8
	FCF40	42	4	126.9	
SP30-BJ02	FCF30	32	3.3	139.2	
	FCF40	42	4	140.9	
SP50-BJ02	FCF30	32	3.3	165.2	
	FCF40	42	4	166.9	
SP70-BJ02	FCF30	32	3.3	191.2	
	FCF40	42	4	192.9	

## Dimension (Level Spring Ball Joint Type)

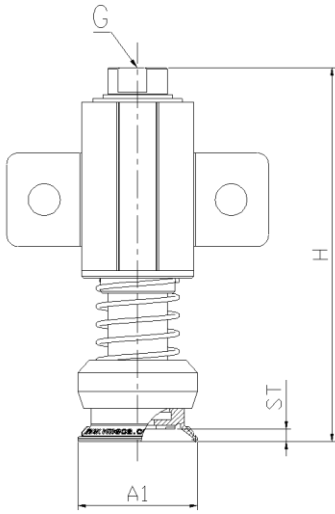


Model		A1	ST	H	G
SP20-BJ03	FCF50	52	5	104.7	G1/8
	FCF60	62	6	107.7	
	FCF70	72	6.5	107.7	
	FCF80	82.5	7.6	111.2	
	FCF100	104	9.5	111.2	
	FCF125	128	13	117.7	

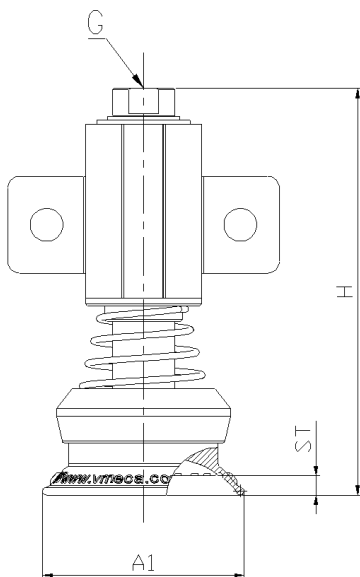


Model		A1	ST	H	G
SP30-BJ03	FCF50	52	5	149.2	G1/8
	FCF60	62	6	152.2	
	FCF70	72	6.5	152.2	
	FCF80	82.5	7.6	155.7	
	FCF100	104	9.5	155.7	
	FCF125	128	13	162.2	
SP50-BJ03	FCF50	52	5	175.2	G1/8
	FCF60	62	6	178.2	
	FCF70	72	6.5	178.2	
	FCF80	82.5	7.6	181.7	
	FCF100	104	9.5	181.7	
	FCF125	128	13	188.2	
SP70-BJ03	FCF50	52	5	200.2	G1/8
	FCF60	62	6	203.2	
	FCF70	72	6.5	203.2	
	FCF80	82.5	7.6	206.7	
	FCF100	104	9.5	206.7	
	FCF125	128	13	213.2	

## Dimension (Level Spring without Ball Joint Type)

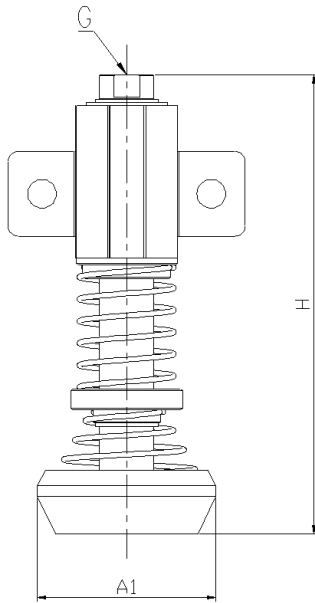


Model		A1	ST	H	G
SP20-SM02	FCF30	32	3.3	99.8	G1/8
	FCF40	42	4	101.5	
SP30-SM02	FCF30	32	3.3	114.3	
	FCF40	42	4	116	
SP50-SM02	FCF30	32	3.3	140.3	
	FCF40	42	4	142	
SP70-SM02	FCF30	32	3.3	168.3	
	FCF40	42	4	170	

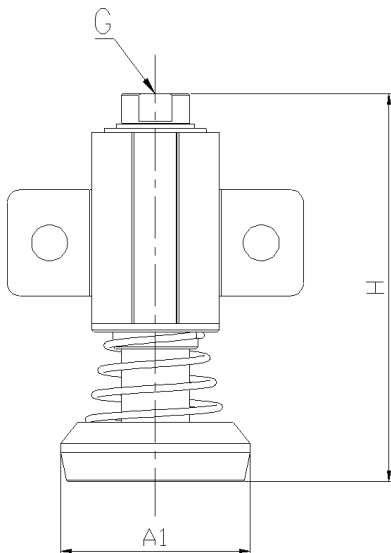


Model		A1	ST	H	G
SP20-SM03	FCF50	52	5	105	G1/8
	FCF60	62	6	108	
	FCF70	72	6.5	108	
	FCF80	82.5	7.6	111.5	
	FCF100	104	9.5	111.5	
	FCF125	128	13	118	
SP30-SM03	FCF50	52	5	126	
	FCF60	62	6	129	
	FCF70	72	6.5	129	
	FCF80	82.5	7.6	132.5	
	FCF100	104	9.5	132.5	
	FCF125	128	13	139	
SP50-SM03	FCF50	52	5	146	
	FCF60	62	6	149	
	FCF70	72	6.5	149	
	FCF80	82.5	7.6	152.5	
	FCF100	104	9.5	152.5	
	FCF125	128	13	159	
SP70-SM03	FCF50	52	5	168	
	FCF60	62	6	171	
	FCF70	72	6.5	171	
	FCF80	82.5	7.6	174.5	
	FCF100	104	9.5	174.5	
	FCF125	128	13	181	

## Dimension (without Pad)



Stroke	A1	H	G
SP20-BJ02	32	116.4	G1/8
SP30-BJ02		130.4	
SP50-BJ02		156.4	
SP70-BJ02		182.4	
SP20-BJ03	52.8	91.9	
SP30-BJ03		136.4	
SP50-BJ03		162.4	
SP70-BJ03		187.4	

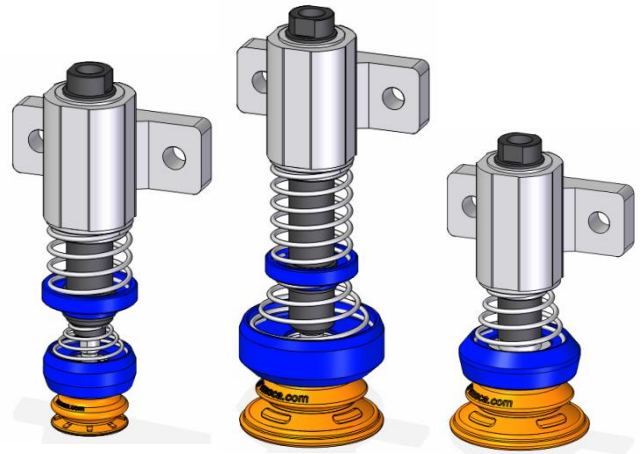


Stroke	A1	H	G
SP20-SM02	32	91	G1/8
SP30-SM02		105.5	
SP50-SM02		131.5	
SP70-SM02		159.5	
SP20-SM03	44.8	91.5	
SP30-SM03		112.5	
SP50-SM03		132.5	
SP70-SM03		154.5	

## Smart Plunger - VBF Series

### Feature

- Easy replace suction cup rubber
- Always return back to center position (wide ball-joint angle)
- Less slide friction (with ball bush)
- Light weight and long lifetime (hard anodized aluminum)
- Very compact size (compare with typical ball-joint mount)
- Easy installation and flexible mount  
(Integral bracket with level spring plunger)



### PAD Feature

- Excellent for flat and curved material in vertical and horizontal application
- Great designed pattern for anti-sliding
- Excellent for transfer without slipperiness
- Available transferring without vibration

- Metal sheet
- Car panel
- Press metal sheet
- Panel
- Electrical goods
- Curved glass

## Order No.

SP30 - BJ03 - VBF50- PU

①

②

③

④

### ① Stroke

SP20 - 20mm

● SP30 - 30mm

SP50 - 50mm

SP70 - 70mm

### ② Ball Joint

BJ02 - Ball Joint (VBF25.30.40)

● BJ03 - Ball Joint (VBF50.60.80.100)

SM02 - Without Ball Joint (VBF25.30.40)

SM03 - Without Ball Joint (VBF50.60.80.100)

### ③ Pad

VBF25 - ø30

VBF30 - ø40

VBF40 - ø50

● VBF50 - ø60

VBF60 - ø70

VBF80 - ø80

VBF100 - ø100

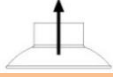
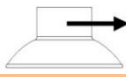
### ④ Material

N - NBR

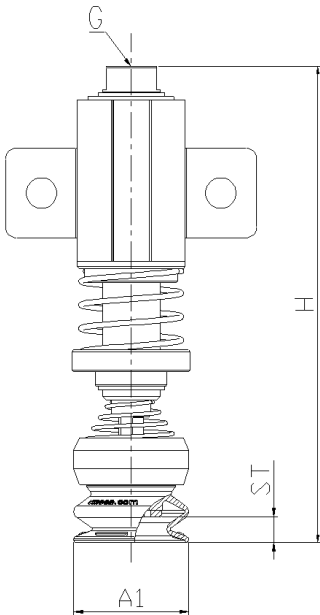
S - Silicon

● PU - Poly Urethane

## Recommended (max.) lifting forces

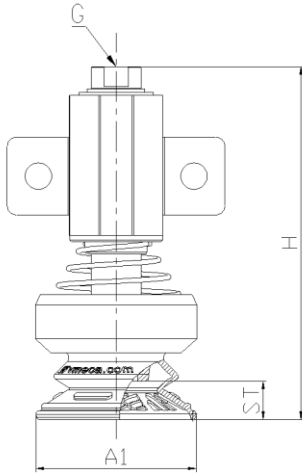
Model	Volume (cm <sup>3</sup> )	Lifting Force (kg) - Perpendicular 			Lifting Force (kg) - Parallel 		
		-20 kPa	-60 kPa	-90 kPa	-20 kPa	-60 kPa	-90 kPa
VBF 25	2.6	1.1	3.2	3.8	0.61	1.37	1.89
VBF 30	6	1.77	6.26	9.48	0.86	3.09	7.75
VBF 40	7.2	2.5	9.66	12.8	1.18	6.5	11.3
VBF 50	11	4.18	13.2	16.28	2.09	9.6	14.7
VBF 60	22	8.94	16.26	18.54	6.84	12.84	16.92
VBF 80	59.5	11.92	21.68	24.72	9.12	17.12	22.56
VBF 100	103.5	14.9	27.1	30.9	11.4	21.4	28.2

## Dimension (Ball Joint type)

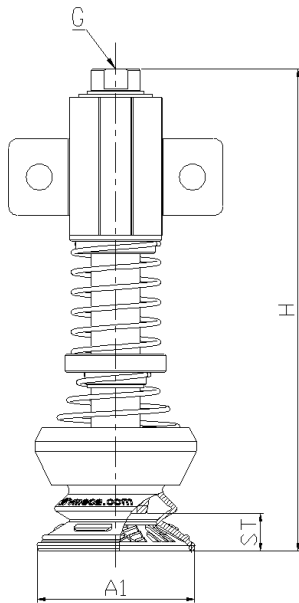


Model		A1	ST	H	G
SP20-BJ02	VBF25	26.5	6	130.9	G1/8
	VBF30	32	7	132.4	
	VBF40	42	9.6	135	
SP30-BJ02	VBF25	26.5	6	144.9	
	VBF30	32	7	146.4	
	VBF40	42	9.6	149	
SP50-BJ02	VBF25	26.5	6	170.9	
	VBF30	32	7	172.4	
	VBF40	42	9.6	175	
SP70-BJ02	VBF25	26.5	6	196.9	
	VBF30	32	7	198.4	
	VBF40	42	9.6	201	

## Dimension (Level Spring Ball Joint Type)



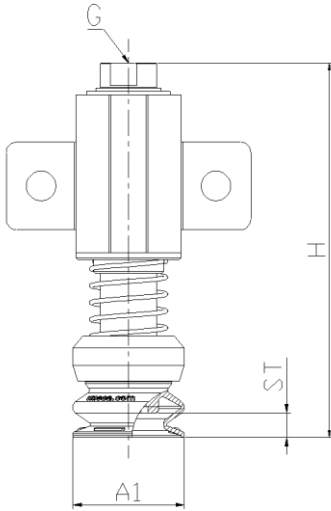
Model		A1	ST	H	G
SP20-BJ03	VBF50	50.5	12.3	113.4	G1/8
	VBF60	61.7	14.3	115.1	
	VBF80	83	24.5	126.8	
	VBF100	102	26.1	130.5	



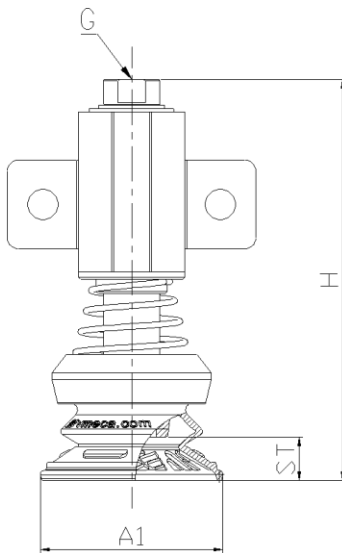
Model		A1	ST	H	G
SP30-BJ03	VBF50	50.5	12.3	157.9	G1/8
	VBF60	61.7	14.3	159.6	
	VBF80	83	24.5	171.3	
	VBF100	102	26.1	175	
SP50-BJ03	VBF50	50.5	12.3	183.9	
	VBF60	61.7	14.3	185.6	
	VBF80	83	24.5	197.3	
	VBF100	102	26.1	201	
SP70-BJ03	VBF50	50.5	12.3	208.9	
	VBF60	61.7	14.3	210.6	
	VBF80	83	24.5	222.3	
	VBF100	102	26.1	226	



## Dimension (Level Spring without Ball Joint Type)

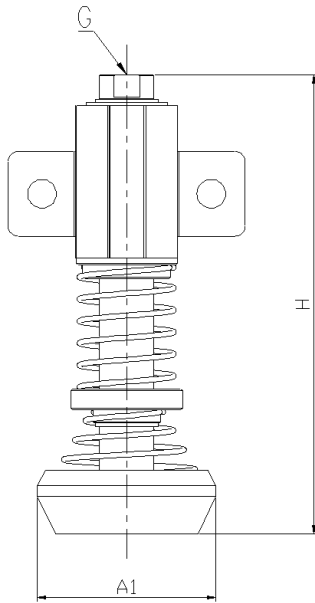


Model		A1	ST	H	G
SP20-SM02	VBF25	26.5	6	105.5	G1/8
	VBF30	32	7	107	
	VBF40	42	9.6	109.6	
SP30-SM02	VBF25	26.5	6	120	
	VBF30	32	7	121.5	
	VBF40	42	9.6	124.1	
SP50-SM02	VBF25	26.5	6	146	
	VBF30	32	7	147.5	
	VBF40	42	9.6	150.1	
SP70-SM02	VBF25	26.5	6	174	
	VBF30	32	7	175.5	
	VBF40	42	9.6	178.1	

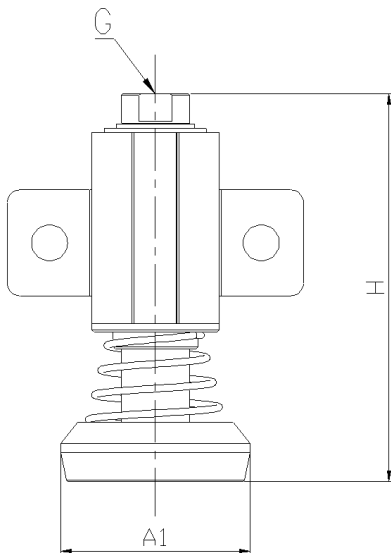


Model		A1	ST	H	G
SP20-SM03	VBF50	50.5	12.3	113.7	G1/8
	VBF60	61.7	14.3	115.4	
	VBF80	83	24.5	127.1	
	VBF100	102	26.1	130.8	
SP30-SM03	VBF50	50.5	12.3	134.7	
	VBF60	61.7	14.3	136.4	
	VBF80	83	24.5	148.1	
	VBF100	102	26.1	151.8	
SP50-SM03	VBF50	50.5	12.3	154.7	
	VBF60	61.7	14.3	156.4	
	VBF80	83	24.5	168.1	
	VBF100	102	26.1	171.8	
SP70-SM03	VBF50	50.5	12.3	176.7	
	VBF60	61.7	14.3	178.4	
	VBF80	83	24.5	190.1	
	VBF100	102	26.1	193.8	

## Dimension (without Pad)



Stroke	A1	H	G
SP20-BJ02	32	116.4	G1/8
SP30-BJ02		130.4	
SP50-BJ02		156.4	
SP70-BJ02		182.4	
SP20-BJ03	52.8	91.9	
SP30-BJ03		136.4	
SP50-BJ03		162.4	
SP70-BJ03		187.4	

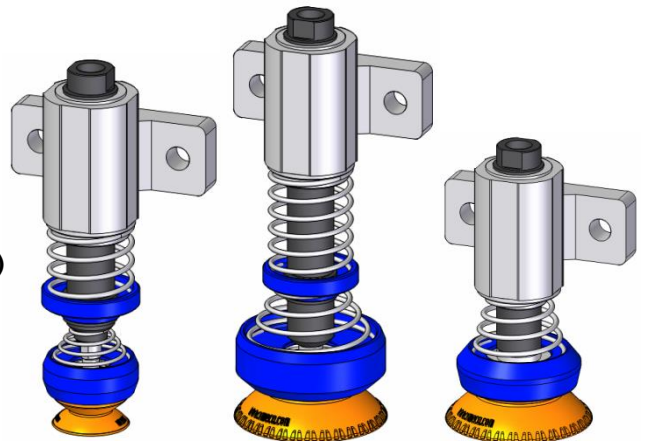


Stroke	A1	H	G
SP20-SM02	32	91	G1/8
SP30-SM02		105.5	
SP50-SM02		131.5	
SP70-SM02		159.5	
SP20-SM03	44.8	91.5	
SP30-SM03		112.5	
SP50-SM03		132.5	
SP70-SM03		154.5	

## Smart Plunger - VDF Series

### Feature

- Easy replace suction cup rubber
- Always return back to center position (wide ball-joint angle)
- Less slide friction (with ball bush)
- Light weight and long lifetime (hard anodized aluminum)
- Very compact size (compare with typical ball-joint mount)
- Easy installation and flexible mount  
(Integral bracket with level spring plunger)



### PAD Feature

- Excellent for flat and curved material in vertical and horizontal application
- Great designed pattern for anti-sliding
- Excellent for transfer without slipperiness
- Available transferring without vibration

- Metal sheet
- Car panel
- Press metal sheet
- Panel
- Electrical goods
- Curved glass

## Order No.

SP30 - BJ03 - VDF50- PU



### ① Stroke

SP20	-	20mm
● SP30	-	30mm
SP50	-	50mm
SP70	-	70mm

### ② Ball Joint

BJ02	-	Ball Joint (VDF25.30.40)
● BJ03	-	Ball Joint (VDF50.60.80.100)
SM02	-	Without Ball Joint (FCF25.30.40)
SM03	-	Without Ball Joint (FCF50.60.80.100)

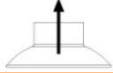
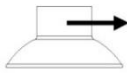
### ③ Pad

VDF25	-	ø25
VDF30	-	ø30
VDF40	-	ø40
● VDF50	-	ø50
VDF60	-	ø60
VDF80	-	ø80
VDF100	-	ø100

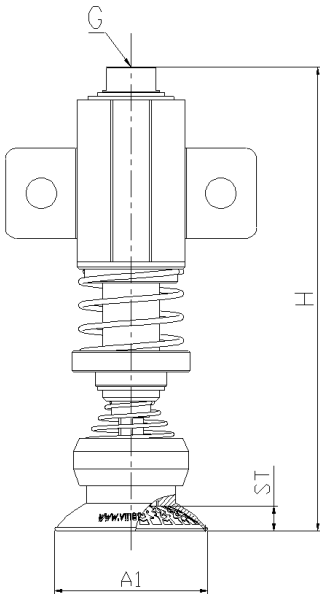
### ④ Material

● PU	-	Poly Urethane
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## Recommended (max.) lifting forces

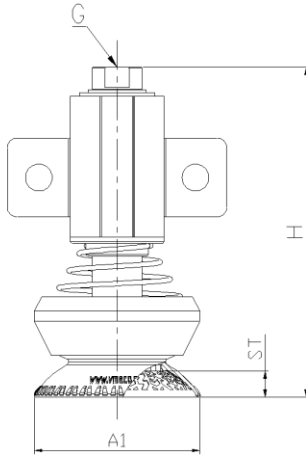
Model	Volume ( cm <sup>3</sup> )	Lifting Force (kg) - Perpendicular 			Lifting Force (kg) - Parallel 		
		-20 kPa	-60 kPa	-90 kPa	-20 kPa	-60 kPa	-90 kPa
VDF25	1.5	1.4	3.0	4.1	0.7	1.9	2.9
VDF30	2.7	1.8	4.4	5.7	1	2.8	3.8
VDF40	7	2.7	6.2	8.3	2.4	4.7	7.1
VDF50	14	4.1	10.1	14	3.5	9.2	18.5
VDF60	24	5.6	13.7	19	4.3	13.8	24.5
VDF80	50.5	8.6	21.2	29.3	7.2	18.5	27
VDF100	94	12.6	30.8	41.7	12.3	28.2	39.6

## Dimension (Ball Joint type)

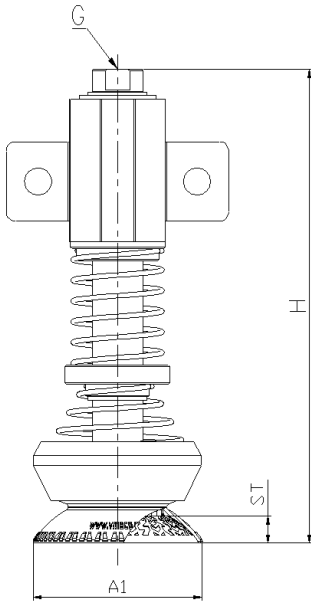


Model		A1	ST	H	G
SP20-BJ02	VDF25	26	4	128.1	G1/8
	VDF30	32.2	4.3	127.2	
	VDF40	42.5	6.9	129	
SP30-BJ02	VDF25	26	4	142.1	
	VDF30	32.2	4.3	141.2	
	VDF40	42.5	6.9	143	
SP50-BJ02	VDF25	26	4	168.1	
	VDF30	32.2	4.3	167.2	
	VDF40	42.5	6.9	169	
SP70-BJ02	VDF25	26	4	194.1	
	VDF30	32.2	4.3	193.2	
	VDF40	42.5	6.9	195	

## Dimension (Level Spring Ball Joint Type)

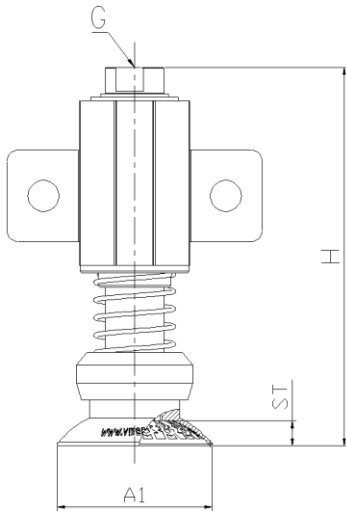


Model		A1	ST	H	G
SP20-BJ03	VDF50	53	8.4	105.2	G1/8
	VDF60	63.5	10.9	108.5	
	VDF80	83.5	13.9	112.1	
	VDF100	104.2	17.3	114.8	

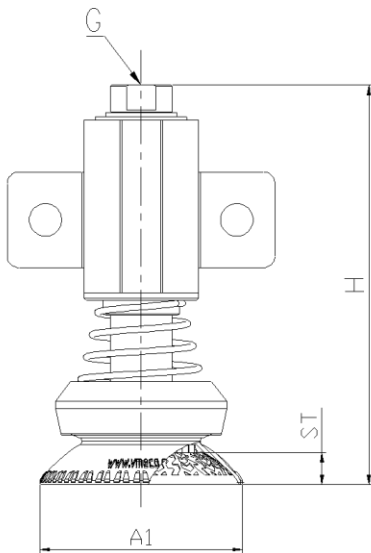


Model		A1	ST	H	G
SP30-BJ03	VDF50	53	8.4	149.7	G1/8
	VDF60	63.5	10.9	153	
	VDF80	83.5	13.9	156.6	
	VDF100	104.2	17.3	159.3	
SP50-BJ03	VDF50	53	8.4	175.7	
	VDF60	63.5	10.9	179	
	VDF80	83.5	13.9	182.6	
	VDF100	104.2	17.3	185.3	
SP70-BJ03	VDF50	53	8.4	200.7	
	VDF60	63.5	10.9	204	
	VDF80	83.5	13.9	207.6	
	VDF100	104.2	17.3	210.3	

## Dimension (Level Spring without Ball Joint Type)

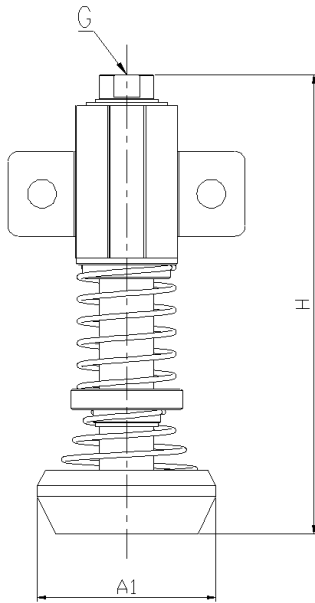


Model		A1	ST	H	G
SP20-SM02	VDF25	26	4	102.7	G1/8
	VDF30	32.2	4.3	101.8	
	VDF40	42.5	6.9	103.6	
SP30-SM02	VDF25	26	4	117.2	
	VDF30	32.2	4.3	116.3	
	VDF40	42.5	6.9	118.1	
SP50-SM02	VDF25	26	4	143.2	
	VDF30	32.2	4.3	142.3	
	VDF40	42.5	6.9	144.1	
SP70-SM02	VDF25	26	4	171.2	
	VDF30	32.2	4.3	170.3	
	VDF40	42.5	6.9	172.1	

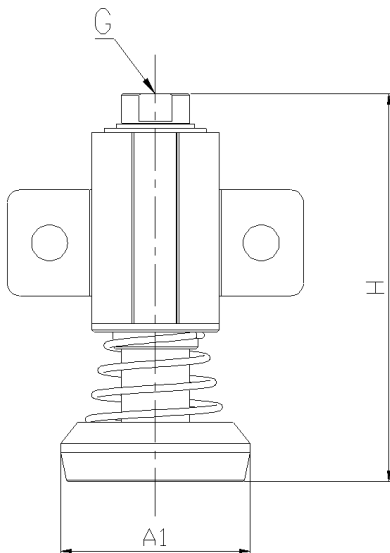


Model		A1	ST	H	G
SP20-SM03	VDF50	53	8.4	105.5	G1/8
	VDF60	63.5	10.9	108.8	
	VDF80	83.5	13.9	112.4	
	VDF100	104.2	17.3	115.1	
SP30-SM03	VDF50	53	8.4	126.5	
	VDF60	63.5	10.9	129.8	
	VDF80	83.5	13.9	133.4	
	VDF100	104.2	17.3	136.1	
SP50-SM03	VDF50	53	8.4	146.5	
	VDF60	63.5	10.9	149.8	
	VDF80	83.5	13.9	153.4	
	VDF100	104.2	17.3	156.1	
SP70-SM03	VDF50	53	8.4	168.5	
	VDF60	63.5	10.9	171.8	
	VDF80	83.5	13.9	175.4	
	VDF100	104.2	17.3	178.1	

## Dimension (without Pad)



Stroke	A1	H	G
SP20-BJ02	32	116.4	G1/8
SP30-BJ02		130.4	
SP50-BJ02		156.4	
SP70-BJ02		182.4	
SP20-BJ03	52.8	91.9	
SP30-BJ03		136.4	
SP50-BJ03		162.4	
SP70-BJ03		187.4	



Stroke	A1	H	G
SP20-SM02	32	91	G1/8
SP30-SM02		105.5	
SP50-SM02		131.5	
SP70-SM02		159.5	
SP20-SM03	44.8	91.5	
SP30-SM03		112.5	
SP50-SM03		132.5	
SP70-SM03		154.5	