Suction Cup Accessories

Chapter 4

TS11

Level Compensators

- Stroke available from 7 to 40 mm
- Protected internal spring

- The TS 11 series spring systems are recommended for horizontal handling of objects located on different levels. The spring function also ensures the gripping points are applied on the same plane when gripping using multiple suction cups.

P 4/3

TS

Level Compensators TS1 – TS2 – TS3

- 4 models
- 5 to 70 mm stroke available

- TS Series spring systems are recomended for horizontal handling of parts at different levels. The spring function also ensures the gripping points are applied on the same plane when gripping using multiple suction cups.

P 4/4

TS

Level Compensators TS4 - TS5

- 3 models available
- Stroke 40 mm and 60 mm
- Available connections to suction cups: G3/8"-M and G1/2"-M

- TS Series spring systems are recomended for horizontal handling of parts at different levels. The spring function also ensures the gripping points are applied on the same plane when gripping using multiple suction cups.

P 4/5

RSC

Multi-Compensator Systems

- 2 models
- 30 mm stroke + 10° ball-joint effect
- Possibility of mounting on square tube with fitting system

- The system of 4 compensated springs is particularly recommended for horizontal handling requiring large diameter suction cups. The springs compensate for different levels between the suction cups (ball-joint effect).

P 4/5

TSOP

Anti-Rotation Level Compensators

- 4 models
- Anti-rotation
- 7 to 40 mm stroke available
- Protected spring

- The TSOP series anti-rotation spring systems are used for horizontal handling of objects at different levels. The anti-rotation function ensures that objects are always gripped in the same position.

P 4/6

TSOG

Anti-Rotation Level Compensators

- 8 models
- Anti-rotation
- 10 to 80 mm stroke available
- Protected spring

- The TSOG series anti-rotation spring systems are used for horizontal handling of objects at different levels. The anti-rotation function ensures that objects are always gripped in the same position.

P 4/7

Suction Cup Accessories

Chapter 4

L

Mounting Extensions

- 4 ranges (G1/4"-M, G1/8"-M, G3/8"-M and G3/8"-F)
- 3 possible strokes

- The L series extensions are used for gripping on various levels using the same installation plate. These extensions are adjustable to different heights.

P 4/8

Flow Control Fittings

Groups 1 and 2

- 13 models
- (Hollow screw or hollow shaft fitting)

- These fittings are designed for installations requiring a large number of suction cups connected to the same vacuum source, particularly for situations where parts may be missing in the layer to be handled. Using flow-controlled fittings reduces the loss of flow and therefore optimizes the size of the vacuum generator.

P 4/10

PMG2

Mechanical Feelers

- Mechanical feelers
- 5 models
- For VP series Ø30 to 60 mm suction cups

- The PMG2 series mechanical feelers are mounted on VP series diameter 30 to 60 mm flat suction cups in all types of material. The feeler is activated by the object to be handled, causing it to open and free the route for the vacuum.

P 4/11

IMU

Axial Ball-Joints

- Ball-joint fitting
- 4 models

- IMU series ball-joints are recommended for gripping rounded products.
- When installed on a flat suction cup, they provide greater force than a bellows suction cup.

P 4/12

CSP

Piloted Safety Valves

- Vacuum check-valve
- Directly mounted on the suction cup
- Release by blow-off

- The piloted safety valve CSP series mounts directly on the suction cup and allows to maintain the vacuum in it, in case of emergency stop or malfuntioning of the vacuum generator. The controlled dropping is done by connecting the fitting attached to the compressed air.

P 4/13

BM

Foam Seals

- Foam strip (airtight cells)
- 9 models
- 2 types of material (Nitrile and Natural rubber)

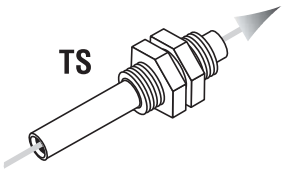
- The foam strip is designed for gripping products with an uneven or ridged surface: sawn wood, metal sheets, flat surfaces with bumps or hollows.
- All granular surfaces to which suction cups cannot adhere correctly and therefore cannot be airtight.

P 4/14

TS 11
Level Compensators

The TS 11 series compensated spring systems are recommended for horizontal handling of objects at different levels. The spring function also ensures that the gripping points are applied on the same plane when gripping with multiple suction cups.

■ Protected spring.



Materials

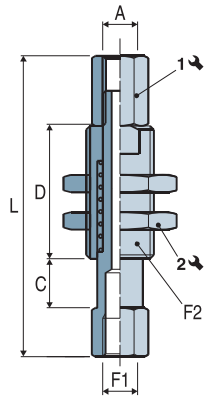
Spring Stainless steel
Tubing Zinc-plated steel
Slider Brass

Characteristics

References	A	F1	F2	C	D	L	1	2	k (N/mm)	Frep (N)	(g)
TS11 7	M5-F	M5-F	G1/8"-M	7	19	43	7	14	0.68	1.3	20
TS11 10	M5-F	M5-F	G1/8"-M	10	22	49	7	14	0.45	1.8	22
TS11 20	M5-F	M5-F	G1/8"-M	20	39	76	7	14	0.24	1.7	33
TS11 40	M5-F	M5-F	G1/8"-M	40	64	121	7	14	0.13	1.6	50

Note: All dimensions are in mm **C** = Stroke **k** = Spring stiffness **Frep** = Force at rest

TS11



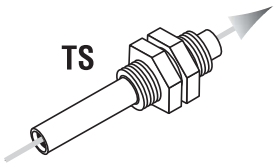
Please specify the part n° e.g.: TS1140
See part n° table above.

Suction cup mounting

The TS 11 series spring system can be fitted on all suction cups in group 1 (VP, VSA, VS Ø 5 to 25 mm) for IM21 and on suction cups in series VPG 5 to 20.

TS
Level Compensators

TS series compensated spring systems are recommended for horizontal handling of parts at different levels. The spring function also ensures that the gripping points are applied on the same plane when gripping with multiple suction cups.



Materials

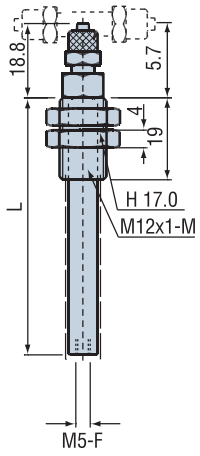
Spring Stainless steel
Tubing Zinc-plated steel
Slider Brass

Characteristics

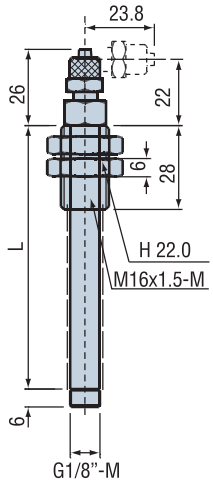
Models	TS1				TS2				TS3				TS1.20 LG
Stroke	05	10	20	30	10	30	50	70	10	30	50	70	20
L	29	39	59	79	48	88	128	168	48	88	128	168	59
k (N/mm)	0.36	0.15	0.07	0.045	0.9	0.2	0.115	0.08	0.9	0.2	0.115	0.08	0.07
Frep (N)	1.00	1.70	1.45	2	8.1	4.2	4.5	4.5	5.1	4.2	4.5	4.5	1.45

Note: All dimensions are in mm **k** = Spring stiffness **Frep** = Force at rest

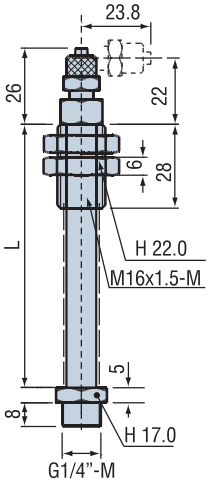
TS1



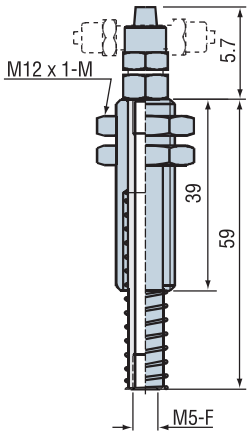
TS2



TS3



TS1.20 LG



Please specify the part n° e.g.:
Model + Spring stroke + Fitting
e.g.: TS350C46

1: Model	2: Spring stroke		3: Fittings (for TS series)	
TS1 **TS2** **TS3**	**05 - 10 - 20 - 30** **10 - 30 - 50 - 70**	(TS1) (TS2, TS3)	**D46** **D68** **C46** **C68** **T46**[1] **N**[2]	(Straight 4 x 6 - TS1, TS2, TS3) (Straight 6 x 8 - TS2, TS3) (Elbow 4 x 6 - TS1, TS2, TS3) (Elbow 6 x 8 - TS2, TS3) (T-shape 4 x 6 - TS1) (Without fitting)

Advantage of the TS120LG

The adjustment height is twice that of the standard TS1 spring system and its spring is protected.

(1) versions T46 and T68 on request for TS2 and TS3.
(2) For TS1 model, vacuum connection M5-F and for models TS2 and TS3 vacuum connection G1/8"-M.

TS
Level Compensators

Characteristics

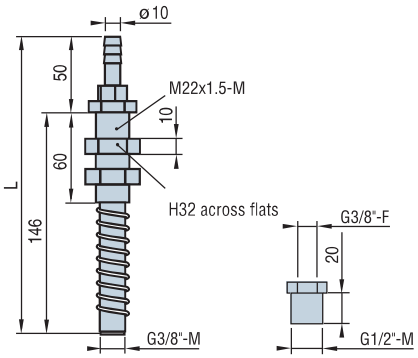
Models	TS4 50	TS5 60
Stroke	45	60
L	196	234
k (N/mm)	0.47	1.23
Force at rest (N)	4	0

k = Spring stiffness

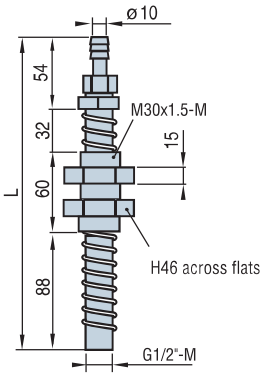
Materials

Spring Stainless steel
Tubing Zinc-plated steel
Slider Zinc-plated steel

Note: All dimensions are in mm



TS4 50 VPI **TS4 50 VPG**



TS5 60

4

TS - RSC

RSC
Multi-Compensator Systems

Use

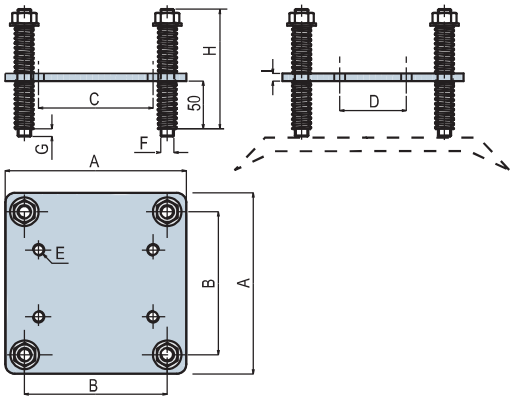
The system of 4 compensated springs is particularly recommended for horizontal handling requiring large diameter suction cups. The upper stainless steel springs act as dampers for all vertical movements. They compensate for different levels between the suction cups. The system of 4 compensated springs mounted in a square gives the assembly a ball-joint effect.

Materials

Spring Stainless steel
Damper Stainless steel
Studs A 60
Colour Yellow RAL 1023

Characteristics

Models	Max. load (N)	Stroke under traction	Vertical force (N)	Maxi. weigth (kg)	Ball-joint angle	Tube mounted	A	B	C	D	E	F	G	H	I	J	K	L
RSC1	2000	30	160	1	10 °	50	140	106	88	50	M8-F	M10-M	8	120	5	52	52	9
RSC2	4000	30	340	2.7	10 °	80	190	150	120	70	M12-F	M14-M	8	130	8	83	83	13



RSC option...VAC

Square tube mounting options (Tightening by indexable lever).

- RSC1 VAC on 50 mm square tube.
- RSC2 VAC on 80 mm square tube.

Note: All dimensions are in mm

Note:

- RSC1: for SPL 240 suction cups, 5085 steel suction cups.
- RSC2: for SPL 340 suction cups, 5150 steel suction cups.

Please specify the part:
Model + Type + Tube mounting option
e.g.: RSC2VAC

1: Model	2: Type		3: Tube-mounting option	
RSC	1	max. 2000 N	VAC	with tube-mounting option
	2	max. 4000 N		

TSOP
Anti-Rotation Level Compensators

The TSOP and TSOG series spring systems are anti-rotation spring systems. They are used for horizontal handling of parts at different levels. The anti-rotation function ensures that objects are always gripped in the same position

The TSOP range is designed for applications requiring very precise handling.

- The hexagonal rod prevents the suction cup from rotating.
- Protected spring.

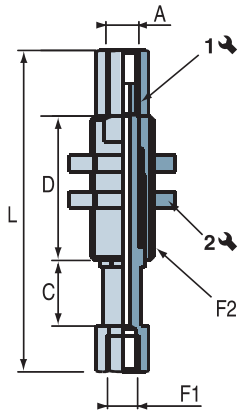
Characteristics - TSOP

References	A	F1	F2	C	D	L	1	2	k (N/mm)	Frep (N)	(g)
TSOP 107	M5-F	M5-F	G1/8"-M	7	18	42	7	14	0.68	1.3	20
TSOP 110	M5-F	M5-F	G1/8"-M	10	22	49	7	14	0.45	1.8	22
TSOP 120	M5-F	M5-F	G1/8"-M	20	39	73.5	7	14	0.24	1.7	33
TSOP 140	M5-F	M5-F	G1/8"-M	40	64	118.5	7	14	0.13	1.6	50

Note: All dimensions are in mm **C** = Stroke **k** = Spring stiffness **Frep** = Force at rest

Materials

Spring Stainless steel
Tubing Anodized aluminum
Slider Nickel-plated steel

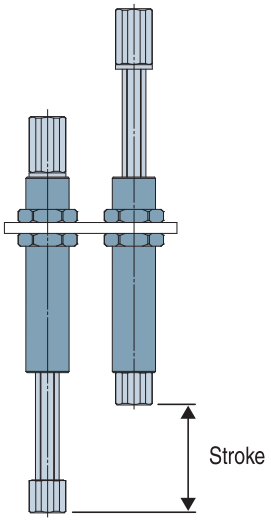


Please specify the part e.g.: TSOP140
See part n° table above.

TSOG
Anti-Rotation Level Compensators

The anti-rotation spring system TSOG serie allows to compensate for differences in height and to handle parts at different levels with ensuring precise positioning of the suction cup.

They are perfect to equip end of arm tooling in plastics processing and packaging.



The TSOG range is designed for applications requiring very precise handling.

- Lightness thanks to the aluminium design
- Protected spring
- Accurate anti-rotation system
- Wide range of stroke and connections

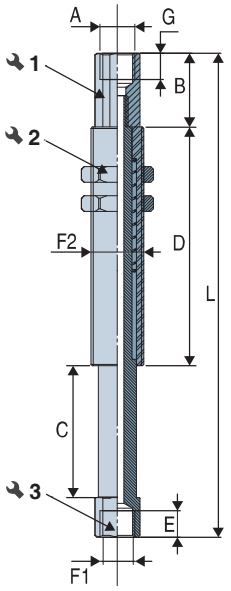
Characteristics - TSOG

References	A	F1	F2	C	B	D	E	G	L	1	2	3	k (N/mm)	Frep (N)	Fcomp (N)	(g)
TSOG110FM12	M5-F	M5-F	M12x1-M	10	17	25	5.5	5.5	60	10	15	10	0.21	1.9	4.1	17
TSOG125FM12	M5-F	M5-F	M12x1-M	25	17	44	5.5	5.5	94	10	15	10	0.12	2	5	23
TSOG220FM16	G1/8"-F	G1/8"-F	M16x1-M	20	20	38.5	9	7	100	12	19	12	0.27	3.6	9	36
TSOG235FM16	G1/8"-F	G1/8"-F	M16x1-M	35	20	58.5	9	7	131.5	12	19	12	0.15	4.3	9.5	46
TSOG325FM20	G1/4"-F	G1/4"-F	M20x1.5-M	25	23	50	10	10	113	16	24	16	0.27	4.1	11	64
TSOG350FM20	G1/4"-F	G1/4"-F	M20x1.5-M	50	23	82.5	10	10	170.5	16	24	16	0.14	4.3	11.4	90
TSOG440FM25	G3/8"-F	G3/8"-F	M25x1.5-M	40	33	71	11	11	159	22	32	22	0.27	5.6	16.5	164
TSOG480FM25	G3/8"-F	G3/8"-F	M25x1.5-M	80	33	121	11	11	249	22	32	22	0.14	6	17	231

Note: All dimensions are in mm **C** = Stroke **k** = Spring stiffness **Frep** = Spring force **Fcomp** = Force at rest

Materials

Spring Stainless steel
Tubing Anodized aluminum
Slider Anodized aluminum
Nuts Anodized aluminum



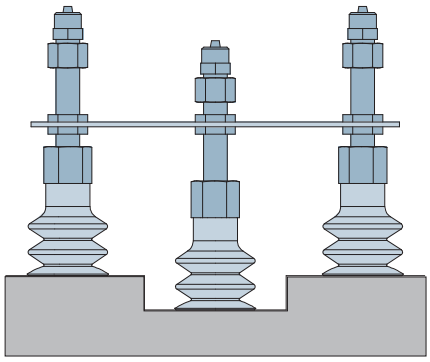
Please specify the part e.g.: TSOG350FM20
See part n° table above.

L
Mounting Extensions

The L series extensions are used for gripping on various levels using the same installation plate. These extensions are adjustable to different heights.

This system is especially useful for 2.5 bellows type suction cups, as height adjustment is made easier by the deflection of the suction cup.

Spring systems should be chosen, instead, for flat suction cups with low deflection.



Materials

Threaded rod and nut	Brass
Screwed vacuum fitting	Nickel-plated brass

4

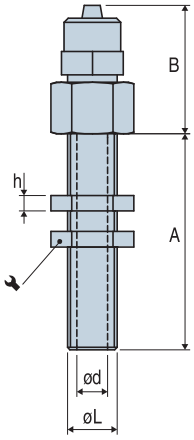
Characteristics

Models	A (1)			B	C	h		Ød	ØL	D	P
G1/8"-M	22	42	52	25	19	3	14	6	G1/8"-M	-	-
G1/4"-M	19	49	69	29	24	4	19	9	G1/4"-M	-	-
G3/8"-F	19	49	69	20.5	19.5	4	23	-	G3/8"-F	19	22
G3/8"-M	19	49	69	20.5	19.5	4	23	10	G3/8"-M	-	-

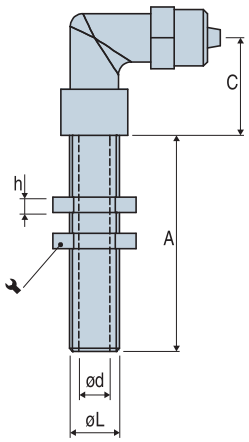
(1) Other lengths available on request for a minimum quantity of 10 pieces.

G1/4"-M - G1/8"-M

Straight

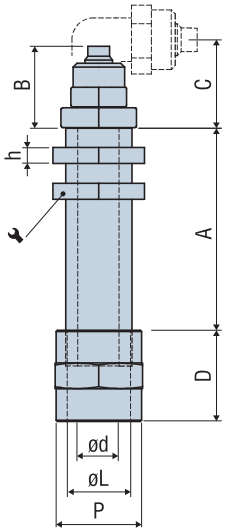


Elbow



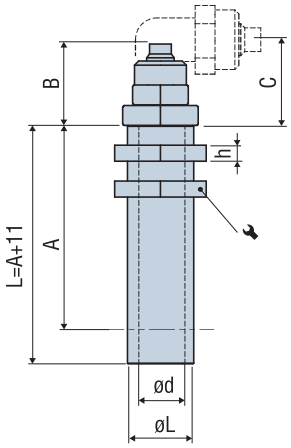
G3/8"-F

Straight or elbow 6x8 or 8x10



G3/8"-M

Straight or elbow 6x8 or 8x10



Please specify the part:
Model + Thread + Adjustable stroke + Fitting + Suction cup fitting
e.g.: L1449C68F

1: Model	2: Thread		3: Adjustable stroke		4: Fittings		5: Suction cup fitting G3/8" version	
L	**18**	G1/8"	**22 - 42 - 52**	G1/8"	**D46**	Straight 4 x 6	**F**	Female
	14	G1/4"	**19 - 49 - 69**	G1/4"	**D68**	Straight 6 x 8	**M**	Male
	38	G3/8"		G3/8"	**C46**	Elbow 4 x 6		
					C68	Elbow 6 x 8		
					N	Without fitting		
					D810	Straight 8 x 10		
					C810	Elbow 8 x 10		

Note: All dimensions are in mm

G3/8" extensions are compatible with C Series high performance suction pads (see page 2/59) and CTC Series (see page 2/63).

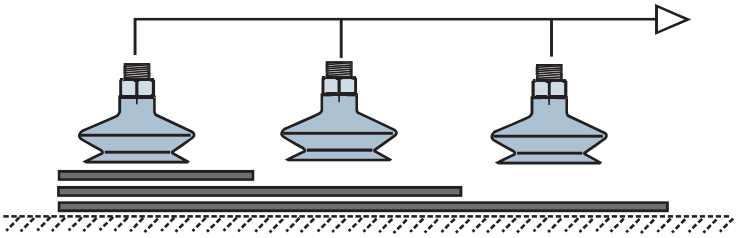
Miscellaneous Gripping

Principle

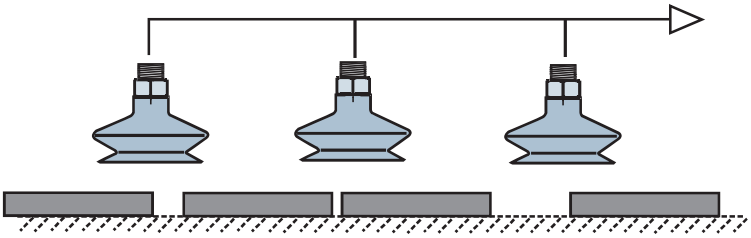
In many cases when using a multi-suction cup installation, some of the cups will not be covered by the product(s) to be handled. This leads to a high risk of reduced grip from the covered suction cups, or may even prevent them gripping at all.

Examples

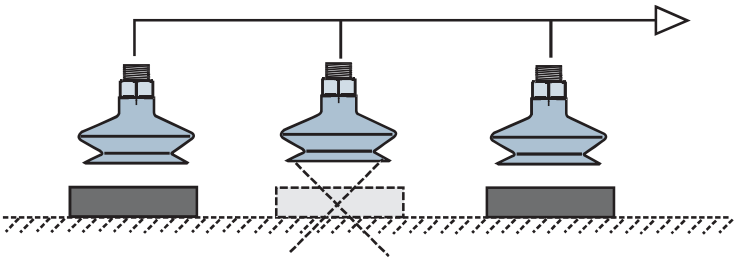
- Gripping of panels, sheet metal,etc. in a wide variety of sizes by a vacuum lifter equipped with suction cups.



- Uncertain position of the object(s).



- Gripping several objects at one time, some of which may be missing.



Solutions

- Independent ejector

Mounting an ejector for each suction cup guarantees the installation will operate perfectly even if one or more suction cups are not covered.

The COVAL solutions are the VR, GVR, CVP and CVPC series micro-ejectors.

For further information, see chapter 6.

- Flow control fittings

Flow control fittings are incorporated as part of the suction cup mounting, thus reducing leakage in that cup with no part present during the vacuum cycle.

This technical solution is particularly suitable for vacuum grippers with a large number of suction cups.

To determine the diameter of the nozzle, COVAL has developed a specific CAD.

- Mechanical feelers

See following pages. COVAL offers four solutions depending on the application, with their advantages and drawbacks.

Flow Control Fittings

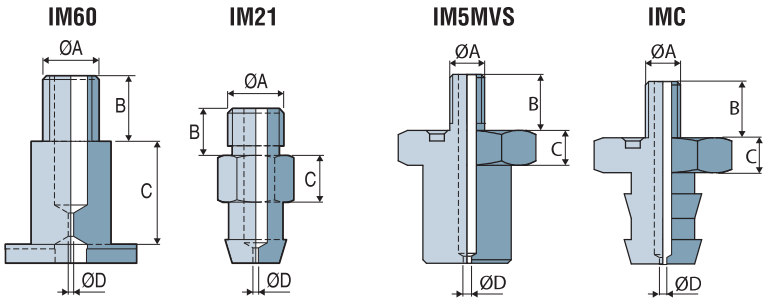
Groups 1 and 2

These fittings are designed for installations with a large number of suction cups connected to the same vacuum generator (vacuum gripper technology), particularly in cases where there may be objects missing from the layer of objects to be handled. Using flow-controlled fittings reduces the loss of flow and therefore optimizes the size of the vacuum generator.

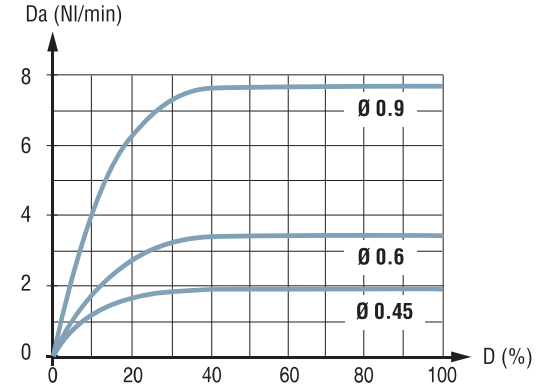
Caution, do not use this type of fitting for applications in a dusty environment.

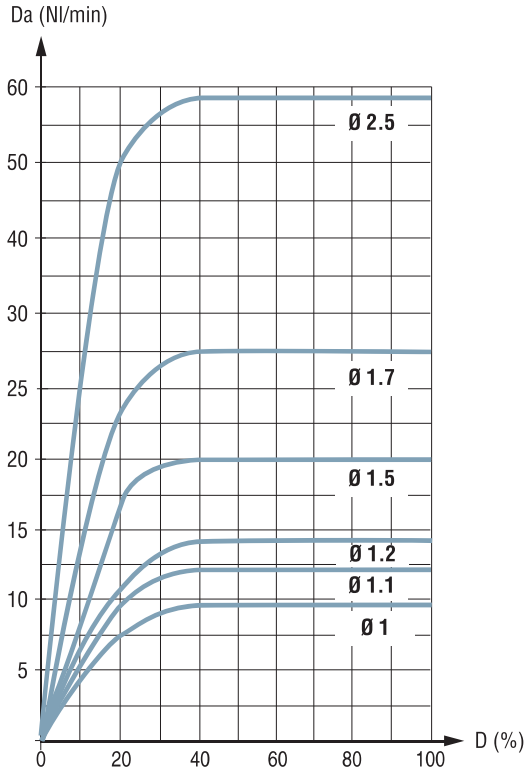
Characteristics

References	ØA	ØD	B	C
IM5 MVSD1.1	M5-M	1.1	8	5
IM21 SP058	M5-M	0.45	4.5	5
IM21 SP094	M5-M	0.6	4.5	5
IM60 SP335	M6-M	0.6	7	11
IM60 SP387	M6-M	1.2	7	11
IM60 SP461	M6-M	0.9	7	11
IM60 SP483	M6-M	1	7	11
IM60 SP510	M6-M	1.7	7	11
IM60 SP511	M6-M	2.5	7	11
IMCM5 D0.6	M5-M	0.6	8	5
IMCM5 SP691	M5-M	1.1	8	5
IMCM5 SP701	M5-M	1.5	8	5



Maximum suction per nozzle diameter





Da = Suction rate
D = Vacuum

Please specify the part e.g.: IM60SP387
See part n° table above.

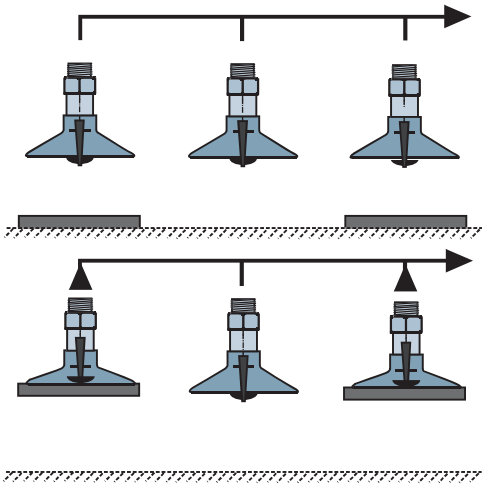
Note: All dimensions are in mm

PMG2
Mechanical Feelers

The PMG2 series mechanical feelers are mounted on VP series diameter 30 to 60 mm flat suction cups in all types of material (group 2 suction cups).

The mechanical feeler blocks the path from the vacuum source to the suction cup.

The feeler is actuated by the object, causing it to open and free the path for the vacuum.



Materials

Body Nickel-plated brass
Spring Stainless steel
Feeler Delrin and brass

Advantages

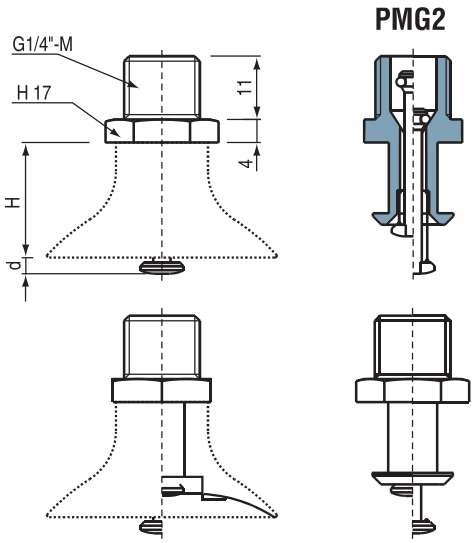
- Simple to install and operate.
- Very efficient air-tightness for non-covered suction cups.
- Little risk of marking delicate objects, as the feeler has a rounded surface.

Mounting

The feelers are mounted by press fitting. It is preferable to allow us to assemble the feeler onto the suction cup.

Characteristics

	VP 30	VP 35	VP 40	VP 50	VP 60
d (mm)	3.9	2.9	2.9	0.9	0.9
H (mm)	19	20	20	22	22



Leakage rate

No leakage if all the suction cups are correctly placed. This represents substantial savings in power with regard to the vacuum source: pneumatic ejector or electric vacuum pumps.

Please specify the part: PMG2

Accessories

Mounting on spring or ball-joint systems (see chapter **4**).

IMU
Axial Ball-Joints

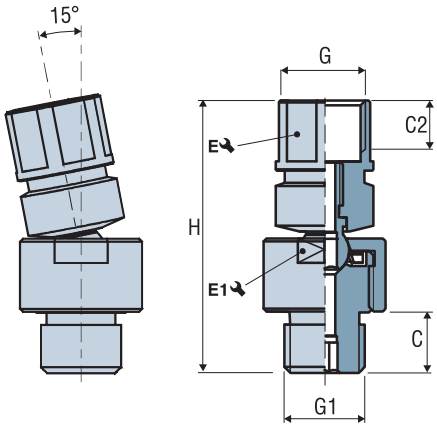
IMU series ball-joints are recommended for gripping rounded or rotating products.
When installed on a flat suction cup, they provide greater force than a bellows suction cup.
The vacuum connection is axial and sealing is ensured by a special seal always in contact with the spherical articulation.
The suction pad installed over the axial ball joint is free to rotate on its axis around 360° and can incline up to 15°
The ball joints are manufactured entirely in copper except the spherical joint made in stainless steel.

Materials

Ball-joint	Zinc-plated steel and brass
Seal	Nitrile (NBR)

Characteristics

References	G	G1	C2	C	E	E1	H	(g)
IMU 18	G1/8"-F	G1/8"-M	8	8.5	11	18	43	40
IMU 14	G1/4"-F	G1/4"-M	8	10	15	18	44.6	56
IMU 38	G3/8"-F	G3/8"-M	13	13	26	28	63.3	206
IMU 12	G1/2"-F	G1/2"-M	15	17	26	28	72.3	232



Please specify the part e.g.: IMU14
See part n° table above.

Note: All dimensions are in mm

CSP
Piloted Vacuum Valves

The piloted vacuum valve CSP series mounts directly on the suction cup and allows to maintain the vacuum in it, in case of emergency stop or malfuntioning of the vacuum generator.

The controlled dropping is done by connecting the fitting attached to the compressed air.

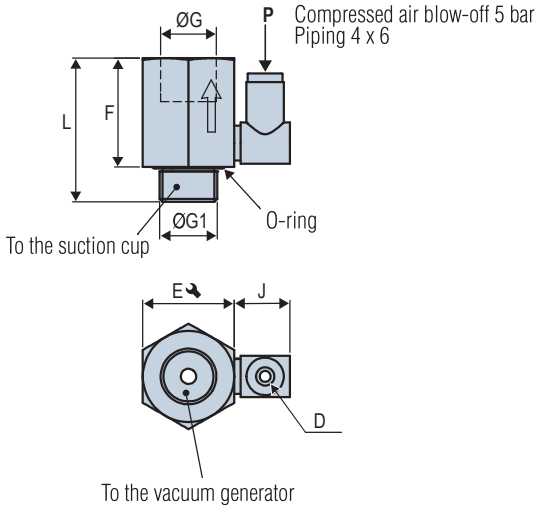
Note: The empty valve is not a positive safety feature. Regular maintenance is needed to ensure the proper functioning of the valve.

Materials

Valve Nitrile (NBR)
Body Anodized aluminum
Filter Stainless steel screen 200 µ

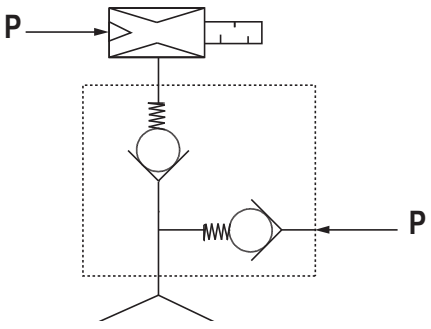
Characteristics

Reference	ØG	ØG1	D	F	L	J	E
CSP 14	G1/4"-F	G1/4"-M	4x6	25	33	12.8	21



Mounting

- One piloted vacuum valve by suction cup.
- Blow-off pressure, minimum 5 bar.



Please specify the part e.g.: CSP14
See part n° table above.

Note: All dimensions are in mm

BM
Foam Strips

Industry-specific applications

Nitrile foam strip: 10m roll

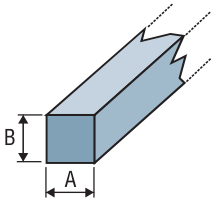
Mounting

Mounting with contact adhesive or flush-mounted at a depth adapted to the height and potential flush-mounting of the seal subject to the vacuum: 50% to 70% of the new height.

References	A	B
BM 1510	15	10
BM 1010	10	10
BM 1515	15	15
BM 2020	20	20
BM 3030	30	30

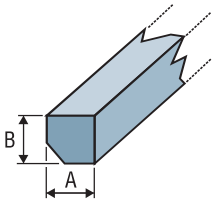
Support

- All supports, particularly steel, aluminum, etc.
- Closed cells.
- Tube of neoprene adhesive (120 ml): Part No. 095.99.006.



Nitrile beveled foam strip: 10m roll

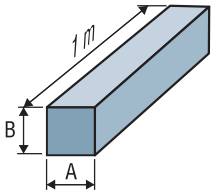
- The beveling facilitates gripping of products with uneven surfaces.
- Closed cells.
- Contact adhesive reference: BOSTIK 1400 (Neoprene adhesive).



References	A	B
BM 2020 SPTR	20	20
BM 3020 SPTR	20	30
BM 3030 SPTR	30	30

Natural rubber foam strips: Length 1m

- Flush-mounting.
- Use with turbine (strong suction) for gripping products with very uneven surfaces, such as slabs of washed gravel.
- Open cells.
- Contact adhesive reference: BOSTIK 1400 (Neoprene adhesive)



Reference	A	B
BMS 3025	30	25

Please specify the part e.g.: BM1510
See part n° table above.

Note: All dimensions are in mm