

## ID EXPANSION GRIPPERS (SERIES MFD/MFU)

- New concept for innovative expansion grippers.
- Downward movement (MFD), or upward movement (MFU).
- The elastic expander can be in Silicone or EPDM.
- Grip diameters from 8 to 85 mm.
- Optional centering cones.
- Optional magnetic sensors.
- Several mounting accessories are available.



MFD



MFU



**M F D 1 6 E 0 2 C L**

### Movement direction

D - Downward

U - Upward

### Base diameter

08 - 10 - 12 - 14 - 16 - 18 - 22  
27 - 33 - 41 - 47 - 51 - 63

### Porting

C - With coaxial air fitting

H - With side air fitting and thru hole

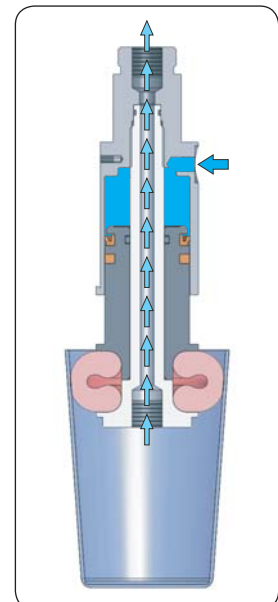
### Elastic part

S01 - in red Silicone

E02 - in black EPDM

### THRU HOLE

The ...HL models have a central thru hole. It can be used to blow compressed air or to generate a vacuum to cool a part or check the leaks.



**SILICONE OR EPDM?**

The elastic part can be in red Silicone, or black EPDM. Silicone can be used over a wider temperature range and assures a longer life time, but it is not suitable in some applications, because it makes it difficult to paint or to coat the parts that are touched. EPDM is mark-free and provides a higher coefficient of friction. The elastic part in Silicone or EPDM is available as a spare part and can be replaced, when worn out. The expected lifetime of the elastic expander in EPDM is about one half million cycles. The expected lifetime of the elastic expander in Silicone is about one million cycles.

Spare elastic part



Silicone



EPDM

T	MFD / MFU												
	Ø8	Ø10	Ø12	Ø14	Ø16	Ø18	Ø22	Ø27	Ø33	Ø41	Ø47	Ø51	Ø63
-94°F +392°F	IF08S01	IF10S01	IF12S01U	IF14S01U	IF16S01U	IF18S01	IF22S01	IF27S01	IF33S01	IF41S01	IF47S01	IF51S01	IF63S01
-58°F +284°F	IF08E02	IF10E02	IF12E02U	IF14E02U	IF16E02U	IF18E02	IF22E02	IF27E02	IF33E02	IF41E02	IF47E02	IF51E02	IF63E02

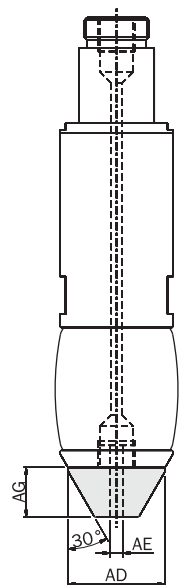
T - Operating temperature of the elastic part (41-140°F for the gripper body)

**CENTERING CONES**

Nylon centering cones with a stainless screw are available. For sizes larger than 33, the cones have a thru hole.



MFD / MFU

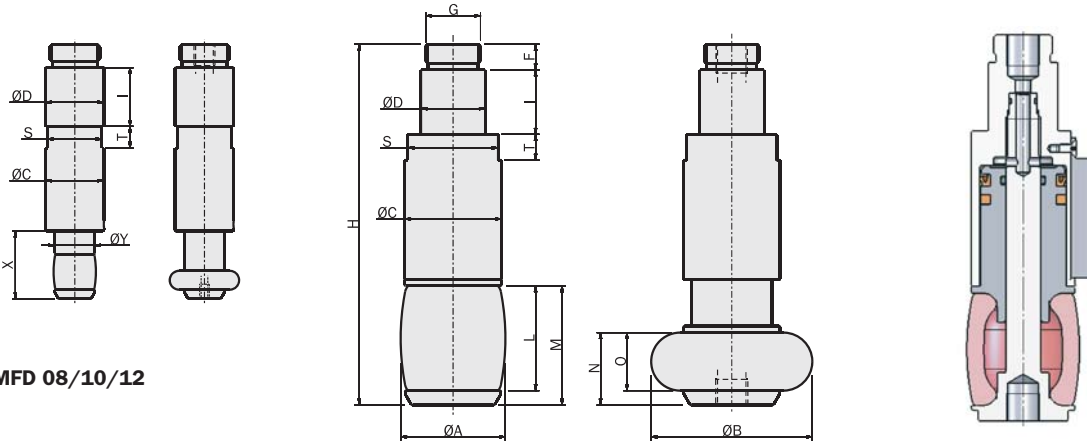


	MFC10	MFC12	MFC14	MFC18	MFC22	MFC27	MFC33	MFC41	MFC51	MFC63
Weight	0.5 g	1 g	1 g	1.5 g	2 g	5 g	7 g	12 g	21 g	30 g
ØAD [mm]	7.8	10	11.8	15.5	18.8	21.3	28	37	47	56
ØAE [mm]	-	-	-	-	-	-	4	4	4	4
ØAG [mm]	2.9	3.5	4.5	6.5	8	9.5	12	19	26	30
MFD			Ø14	Ø18	Ø22	Ø27	Ø33	Ø41	Ø51	Ø63
MFU	Ø10	Ø12	Ø16					Ø47		

09/2013

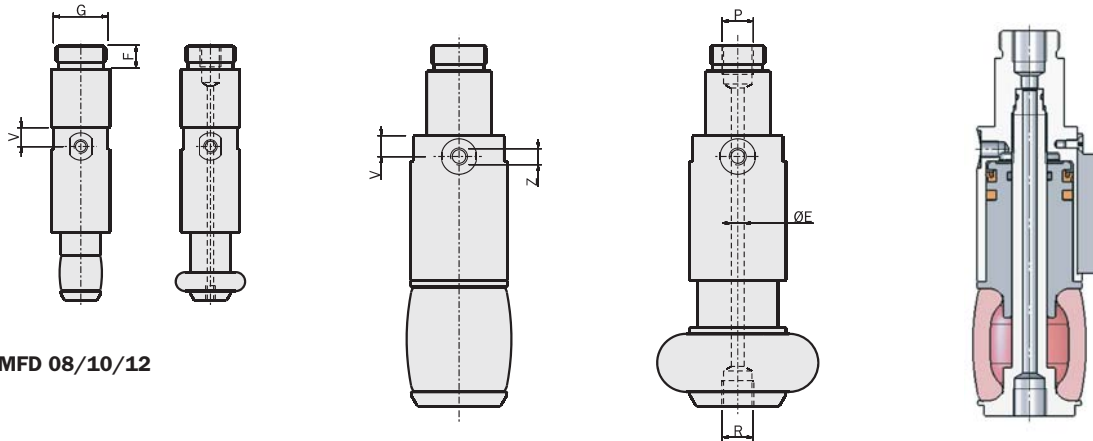
DIMENSIONS (mm)

...CL



MFD 08/10/12

...HL



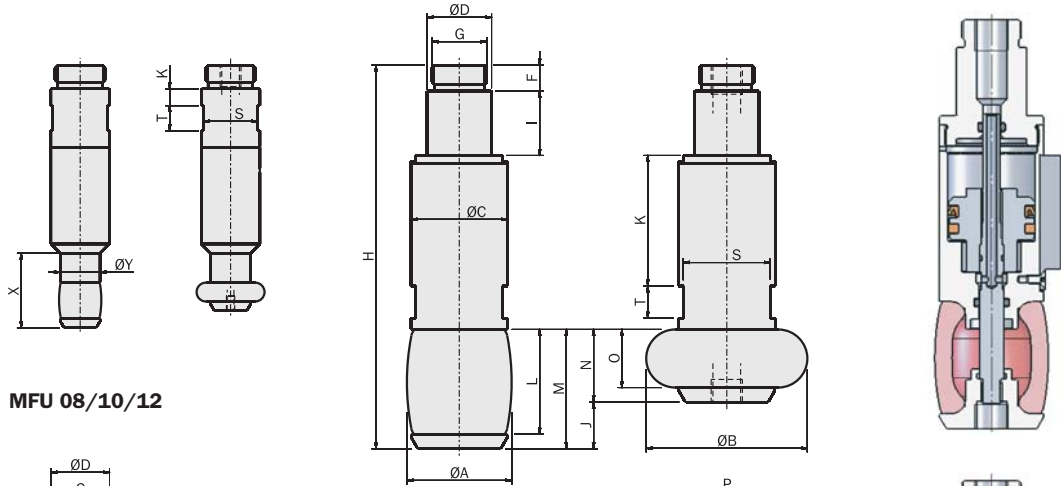
MFD 08/10/12

	m	ØA	ØB	ØC	ØD	ØE	F	G	H	I	L	M	N	O	P	R	S	T	V	Z	X	ØY
MFD08...CL MFD08...HL	15g	8	11	14	14	-1.5	5.5	M12x1	59.2	14	7	9.2	5.7	3.5	M5	M2	13	6	-4.5	-M3	14.7	7.6
MFD10...CL MFD10...HL	16g	10.5	13.5	14	14	-1.5	5.5	M12x1	60.7	14	8.5	10.7	6.7	4.5	M5	M2	13	6	-4.5	-M3	16.2	9.5
MFD12...CL MFD12...HL	17g	13	17	14	14	-2	5.5	M12x1	62	14	10.5	13	7.5	5	M5	M3	13	6	-4.5	-M3	16.8	11.8
MFD14...CL MFD14...HL	17g	15	19.5	14	14	-2	5.5	M12x1	62.3	14	13	15.8	8.8	6	M5	M3	13	6	-4.5	-M3	-	-
MFD16...CL MFD16...HL	17g	18	21.5	14	14	-2	5.5	M12x1	62.3	14	13	15.8	8.8	6	M5	M3	13	6	-4.5	-M3	-	-
MFD18...CL MFD18...HL	28g	19.5	25	18	14	-2.5	5.5	M12x1	70.5	14	16.5	19.5	12	9	M5	M3	16	6	-5.3	-M5	-	-
MFD22...CL MFD22...HL	43g	24	31.5	21.5	14	-2.5	5.5	M12x1	80	14	21	24.2	12.2	11	M5	M3	19	7	-5.5	-M5	-	-
MFD27...CL MFD27...HL	79g	28	37	25	20	-3	8	M17x1	98	20	26	30	18	14	G1/8	M5	22	8	-7	-M5	-	-
MFD33...CL MFD33...HL	118g	34	45	30	20	-4	8	M17x1	112	20	32.5	37	22.5	18	G1/8	G1/8	28	8	-6.5	-M5	-	-
MFD41...CL MFD41...HL	280g	42	54	40	30	-4.3	11	M27x1	142.5	30	39.5	45	29.5	24	G1/8	G1/8	36	11	-7.5	-M5	-	-
MFD47...CL MFD47...HL	280g	50	58	40	30	-4.3	11	M27x1	142.5	30	39.5	45	29.5	24	G1/8	G1/8	36	11	-7.5	-M5	-	-
MFD51...CL MFD51...HL	490g	54	68	50	30	-5.5	11	M27x1	168	30	48	55	37	30	G1/8	G1/8	45	13	-10.5	-G1/8	-	-
MFD63...CL MFD63...HL	800g	66	85	60	30	-6	11	M27x1	198	30	61	70	45	36	G1/8	G1/8	54	16	-14	-G1/8	-	-

m [Weight]

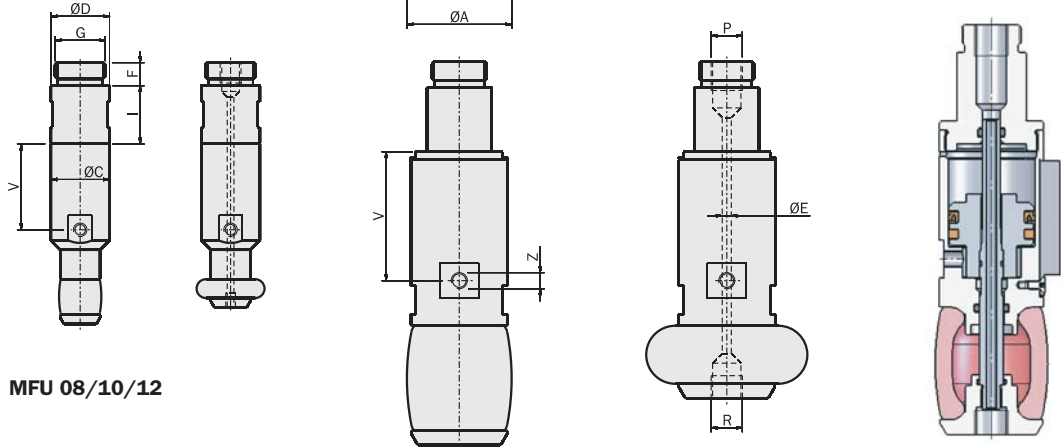
DIMENSIONS (mm)

...CL



MFU 08/10/12

...HL



MFU 08/10/12

	m	ØA	ØB	ØC	ØD	ØE	F	G	H	I	J	K	L	M	N	O	P	R	S	T	V	Z	X	ØY
MFU08...CL MFU08...HL	16g	8	11	14	14	- 1.1	5.5	M12x1	61.5	14	3.5	4	7	9.2	5.7	3.5	M5	M2	13	6	- 20	- M3	16.3	7.6
MFU10...CL MFU10...HL	17g	10.5	13.5	14	14	- 1.1	5.5	M12x1	62.5	14	4	4	8.5	10.7	6.7	4.5	M5	M2	13	6	- 20.5	- M3	17.7	9.5
MFU12...CL MFU12...HL	18g	13	17	14	14	- 1.3	5.5	M12x1	65	14	5.5	4	10.5	13	7.5	5	M5	M3	13	6	- 21.5	- M3	20	11.8
MFU14...CL MFU14...HL	20g	15	19.5	14	14	- 1.3	5.5	M12x1	68.5	14	7	24.2	13	15.8	8.8	6	M5	M3	13	6	- 23.2	- M3	-	-
MFU16...CL MFU16...HL	20g	18	21.5	14	14	- 1.3	5.5	M12x1	68.5	14	7	24.2	13	15.8	8.8	6	M5	M3	13	6	- 23.2	- M3	-	-
MFU18...CL MFU18...HL	35g	19.5	25	18	14	- 1.3	5.5	M12x1	78	14	7.5	29	16.5	19.5	12	9	M5	M3	16	7	- 28	- M5	-	-
MFU22...CL MFU22...HL	50g	24	31.5	21.5	14	- 1.8	5.5	M12x1	86.5	14	10	31.8	21	24.2	14.2	11	M5	M3	20	8	- 31.5	- M5	-	-
MFU27...CL MFU27...HL	100g	28	37	25	20	- 2.5	8	M17x1	108	20	12	37.5	26	30	18	14	G1/8	M5	22	9	- 37	- M5	-	-
MFU33...CL MFU33...HL	130g	34	45	30	20	- 2.8	8	M17x1	119	20	14.5	40.5	32.5	37	22.5	18	G1/8	G1/8	28	10	- 40	- M5	-	-
MFU41...CL MFU41...HL	300g	42	54	40	30	- 4.5	11	M27x1	147	30	15.5	45	39.5	45	29.5	24	G1/8	G1/8	36	12	- 45	- M5	-	-
MFU47...CL MFU47...HL	300g	50	58	40	30	- 4.5	11	M27x1	147	30	15.5	45	39.5	45	29.5	24	G1/8	G1/8	36	12	- 45	- M5	-	-
MFU51...CL MFU51...HL	500g	54	68	50	30	- 5	11	M27x1	169	30	18	54	48	55	37	30	G1/8	G1/8	45	14	- 56.5	- G1/8	-	-
MFU63...CL MFU63...HL	785g	66	85	60	30	- 5	11	M27x1	194	30	25	62	61	70	45	36	G1/8	G1/8	54	16	- 64.5	- G1/8	-	-

m [Weight]

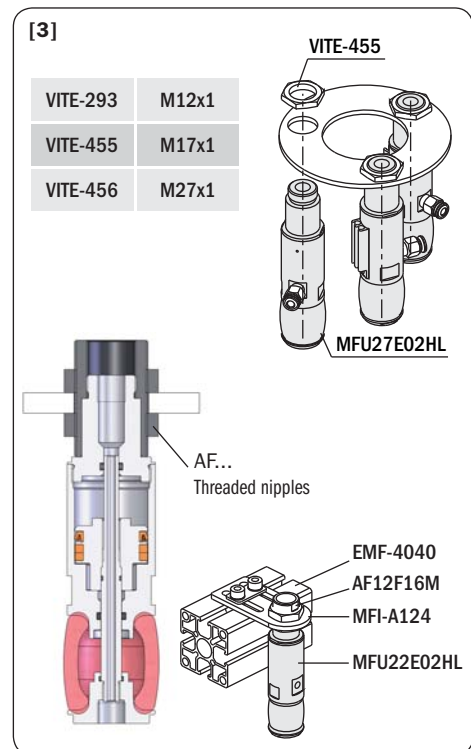
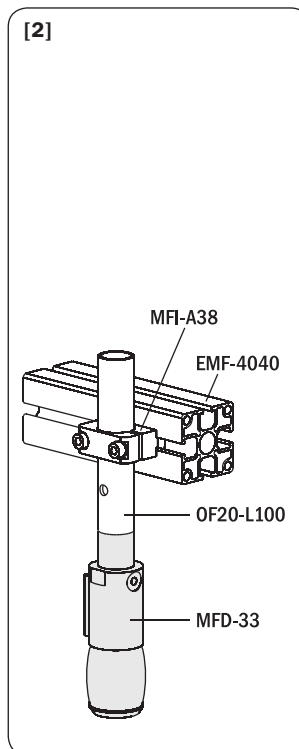
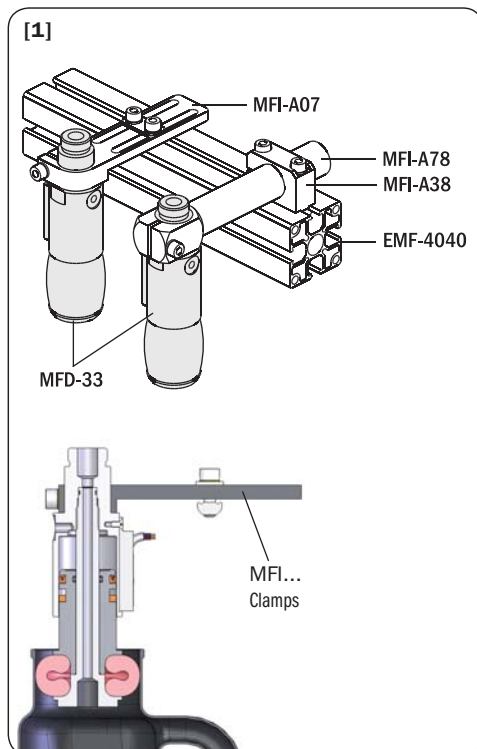
## GRIP DIAMETERS

The gripper size is indicated in the part number with a nominal diameter of the elastic part.  
Each model can work in a diameter range between a minimum and a maximum value.

		Diameter (mm)												
		10	20	30	40	50	60	70	80					
MFD-MFU size	08	8	11											
	10	10.5	13.5											
	12		13	17										
	14			15	19.5									
	16				18	21.5								
	18					19.5	25							
	22						24	31.5						
	27							28	37					
	33								34	45				
	41									42	54			
	47										50	58		
	51											54	68	
	63												66	85

## MOUNTING

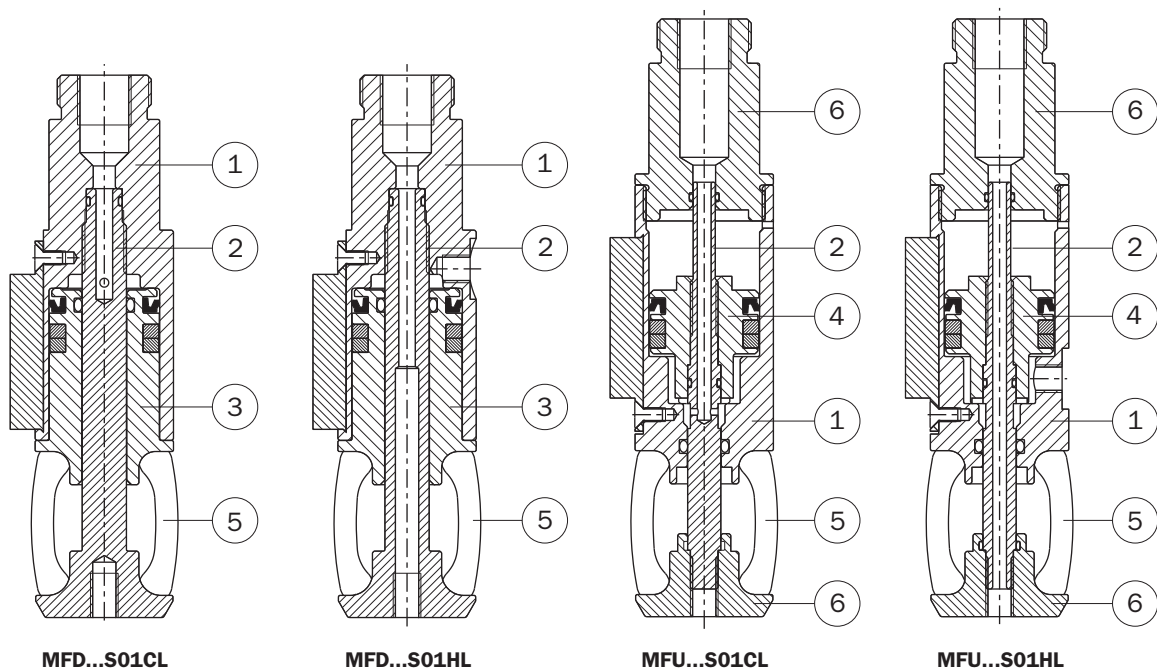
The gripper can be mounted directly on its tail [1] with a clamp.  
It can also be mounted on the optional extension tube with a clamp [2].  
The third way to mount it would use by of the optional threaded nipples [3].



**APPLICATIONS IN THE FOOD INDUSTRY**

The S01 versions with the Silicone expanders are suitable for use in most food applications. See the chart below for the components that might come into contact with food.

1	Body	EN AW-6026-T6	Oxidized aluminum ANSI/NSF 51
2	Rod	EN AW-6026-T6	Oxidized aluminum ANSI/NSF 51
3	Piston MFD	POM-C	Acetal resin FDA CFR 21 Part section 177.2470
4	Piston MFU	EN AW-6026-T6	Oxidized aluminum ANSI/NSF 51
5	Elastic part	VMQ	Silicone Elastomer FDA CFR 21 Part section 177.2600
6	End cap	EN AW-6026-T6	Oxidized aluminum ANSI/NSF 51
	Grease	BERULUB FG-H 2 SL	Lubricant NSF H1 Registration no. 135919



## GRIPPING FORCE

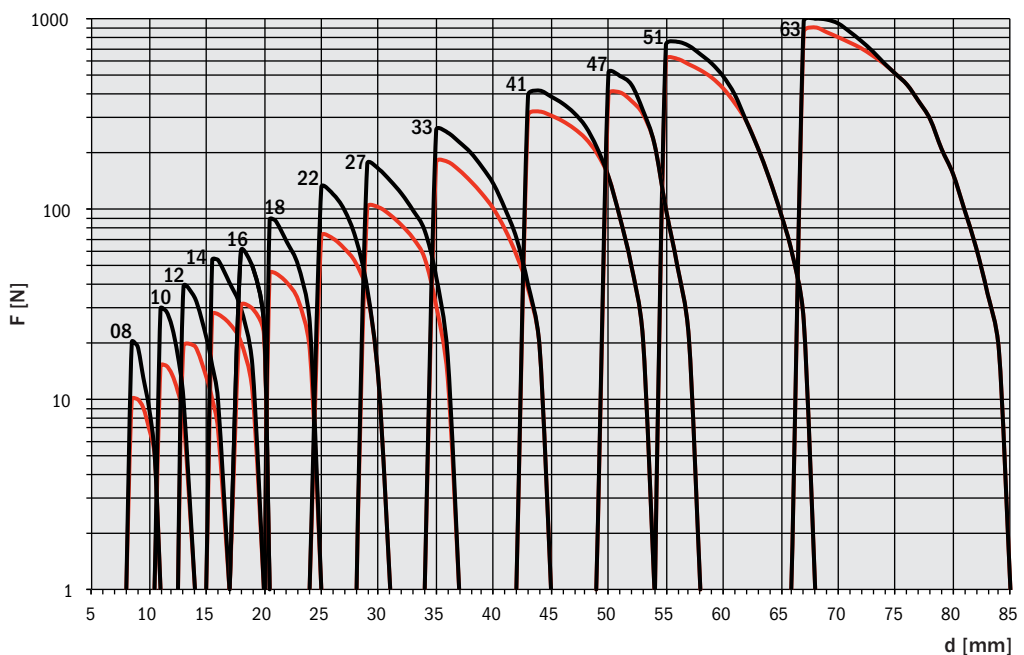
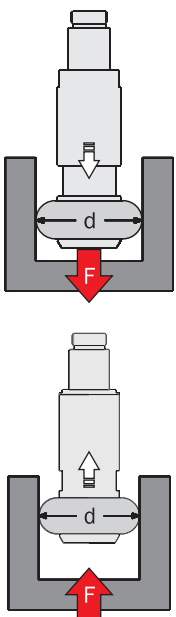
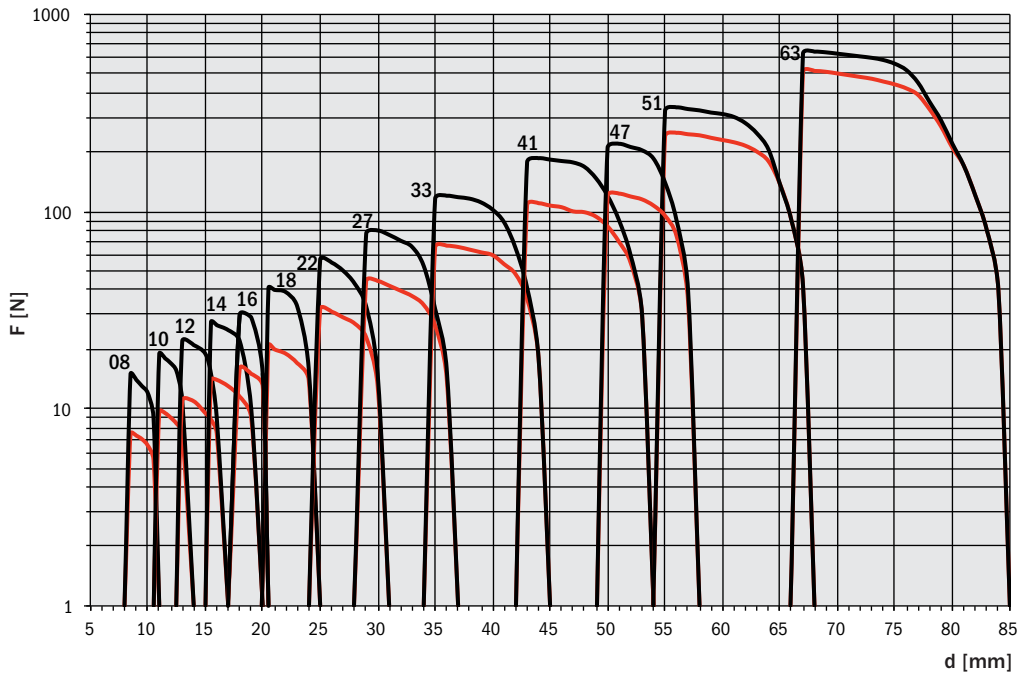
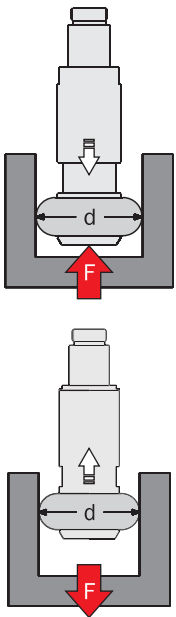
The force output of an MFD/MFU gripper depends on several variables.

Those include the diameter of the picked object, the surface finish of it, and the air pressure.

The graphs show the extraction force (F) on the gripped object as a function of its diameter (d).

Measurements were performed with aluminum rings, with roughness Ra=0.8 while the grippers were supplied with compressed air at 87 psi .

The black lines refer to the grippers in EPDM, while the red ones to the grippers in Silicone.



## PIPING THE UNIT

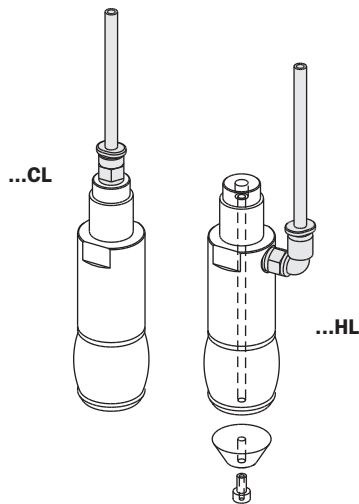
The compressed air must be filtered using a 5 to 40 micron filter.

The initial choice on air lubrication (lubricated or not) must be kept for the entire service life of the gripper.

The pneumatic circuit must be pressurized progressively, to avoid uncontrolled movements.

The gripping force can be regulated by suitably adjusting the air pressure.

The pressure range is 58÷116 psi.



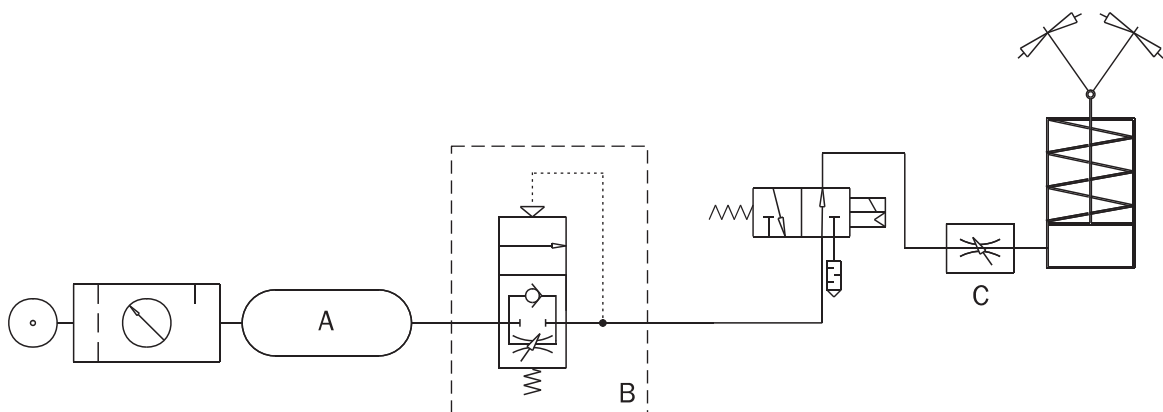
## PNEUMATIC CIRCUIT

Possible problems on a compressed air circuit:

- 1- Pressure variations.
- 2- Pressurizing the empty gripper at start-up.
- 3- Excessive drive speed.

Possible solutions to the above issues:

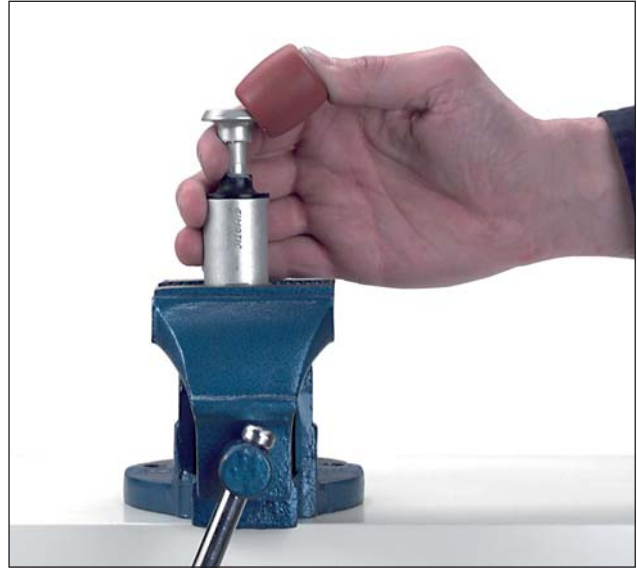
- 1- External compressed air storage (A).
- 2- Start-up valve (B).
- 3- Flow controllers (C).





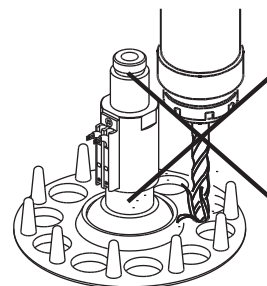
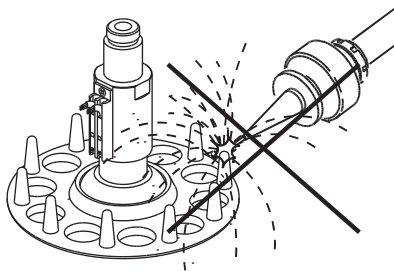
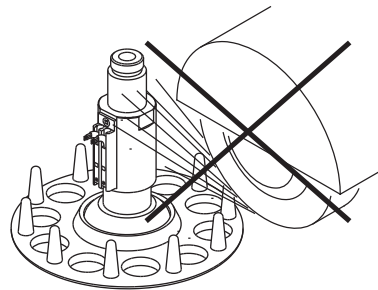
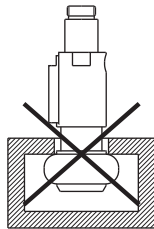
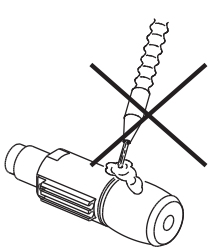
## MAINTENANCE

No periodic maintenance is required.  
 The elastic part in Silicone or EPDM is available as a spare part and can be replaced when worn out.  
 It can be cut (direction shown in the photo) to remove it from the gripper body.  
 It is not necessary to disassemble the gripper to fit the new elastic part.  
 It must not be glued nor greased.



## CAUTION

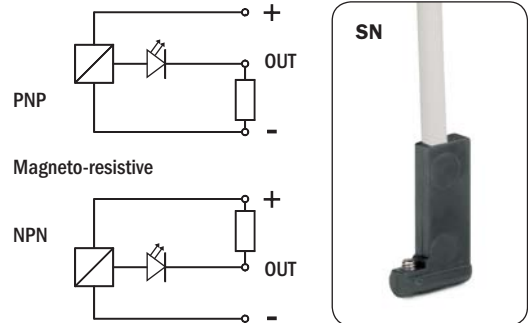
Never let the unit come into contact with corrosive substances, powders, or soldering or welding spatter as they will damage the gripper.  
 Never let non-authorized persons or objects be within the operating range of the gripper.  
 Never operate the gripper on a machine that does not comply with the safety standards and laws of your country.



**SENSORS**

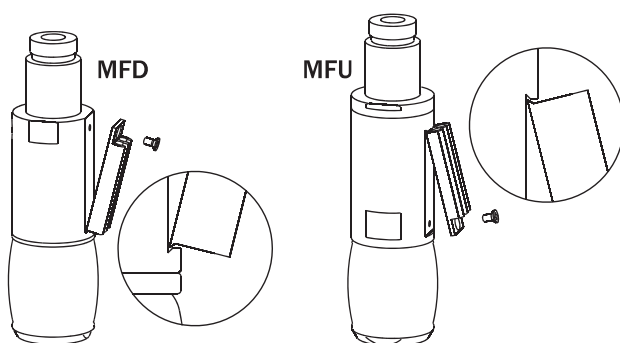
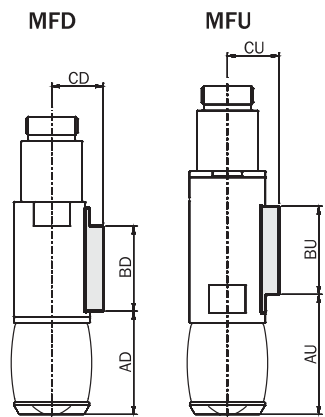
In the larger sizes a magnet is integrated in the piston. An optional accessory to fit the sensors of the SN series is available. One or two sensors can be fitted on a gripper.

SN		
SN4N225-G	PNP	2.5m cable
SN4M225-G	NPN	2.5m cable
SN3N203-G	PNP	M8 snap plug connector
SN3M203-G	NPN	M8 snap plug connector



	MFD27-K	MFD33-K	MFD41-K	MFD51-K	MFD63-K
Weight	4 g	5 g	5 g	6 g	7 g
AD [mm]	34	41.5	52	65	85.5
BD [mm]	28	34.5	40.5	49	54.5
CD [mm]	17	19.7	23.8	28.5	33.5
MFD	Ø27	Ø33	Ø41 Ø47	Ø51	Ø63

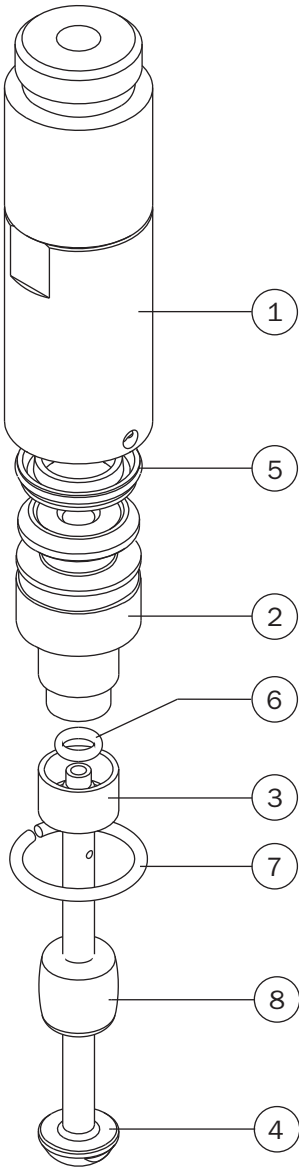
	MFU27-K	MFU33-K	MFU41-K	MFU51-K	MFU63-K
Weight	4 g	5 g	5 g	6 g	7 g
AU [mm]	39.5	46.5	55.5	71.5	87.5
BU [mm]	29	33	36.5	39	45
CU [mm]	17	19.8	23.8	28.5	33.5
MFU	Ø27	Ø33	Ø41 Ø47	Ø51	Ø63



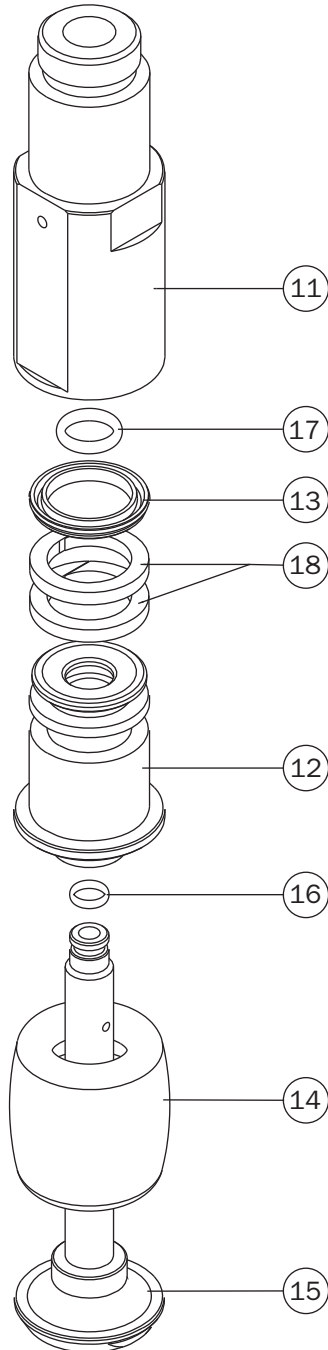
EXPLODED VIEW

EXPANSION GRIPPERS

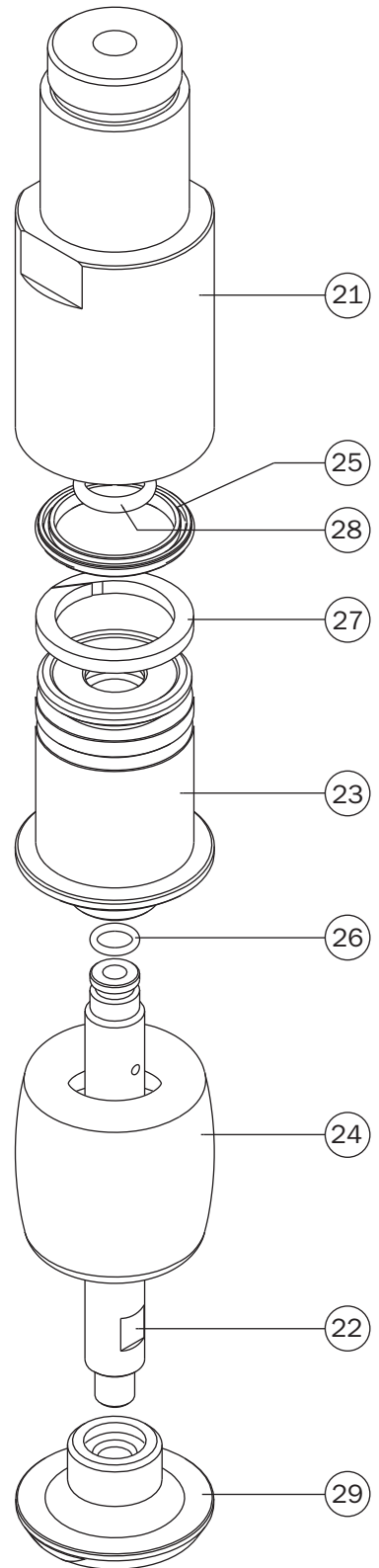
MFD08CL  
MFD10CL



MFD12CL  
MFD14CL  
MFD16CL  
MFD18CL  
MFD22CL  
MFD27CL  
MFD33CL



MFD41CL  
MFD47CL  
MFD51CL  
MFD63CL



## PARTS LIST

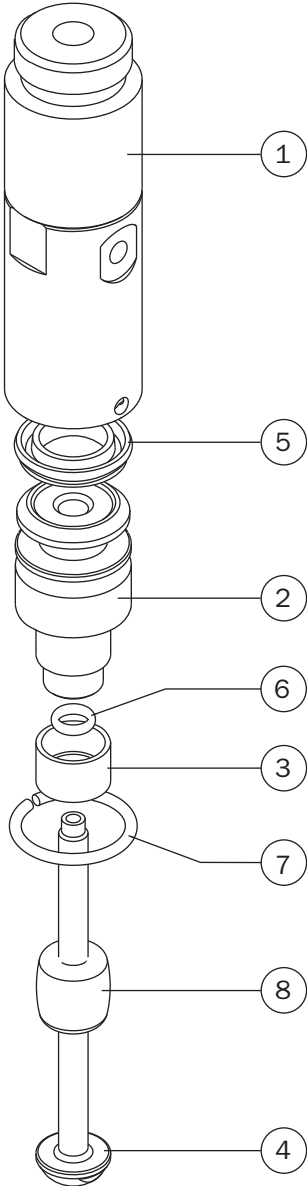
		MFD08CL	MFD10CL	
1	Body	MFD08-02	MFD08-02	1
2	Piston	FFD08-01	FFD10-02	2
3	Cover	IFD08-02	IFD10-03	3
4	Piston rod	FFD08-03	FFD10-05	4
5	Dynamic gasket	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	5
6	O-Ring	1x3 (GUAR-082H)	1x3 (GUAR-082H)	6
7	Snap ring	D1=12 DIN-7993B (SEEGER-027)	D1=12 DIN-7993B (SEEGER-027)	7
8	Elastic part	IF08-11	IF10-11	8

		MFD12CL	MFD14CL	MFD16CL	MFD18CL	MFD22CL	MFD27CL	MFD33CL	
11	Body	MFD12-02	MFD12-02	MFD12-02	MFD18-02	MFD22-02	MFD27-02	MFD33-01	11
12	Piston	FFD12-01	FFD14-02	FFD14-02	FFD18-02	FFD22-02	FFD27-03	FFD33-03	12
13	Dynamic gasket	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	15x9x3 (GUAR-019)	18x12x3 (GUAR-133)	20x14x3 (GUAR-058)	25x19x3.5 (GUAR-064)	13
14	Elastic part	IF12-12	IF14-12	IF16-12	IF18-11	IF22-12	IF27-11	IF33-11	14
15	Piston rod	FFD12-03	FFD14-05	FFD14-05	FFD18-06	FFD22-06	FFD27-06	FFD33-06	15
16	O-Ring	-	-	-	-	-	1x4.5 (GUAR-171)	1x6 (GUAR-098)	16
17	O-Ring	1x4 (GUAR-091H)	1x4 (GUAR-091H)	1x4 (GUAR-091H)	1x5 (GUAR-021H)	1x6 (GUAR-098H)	1.78x7.66 (GUAR-045H)	1.78x9.25 (GUAR-065H)	17
18	Magnet	-	-	-	-	-	PAR-20-10B	PAR-25-10B	18

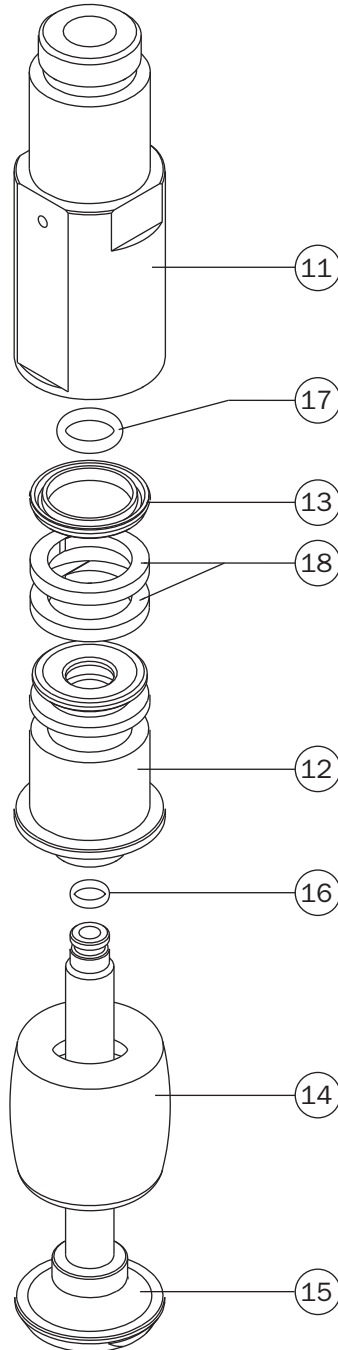
		MFD41CL	MFD47CL	MFD51CL	MFD63CL	
21	Body	MFD41-02	MFD41-02	MFD51-02	MFD63-02	21
22	Piston rod	FFD41-09	FFD41-09	FFD51-07	FFD63-07	22
23	Piston	FFD41-03	FFD41-03	FFD51-03	FFD63-03	23
24	Elastic part	IF41-11	IF47-11	IF51-11	IF63-11	24
25	Dynamic gasket	32x24x3.5 (GUAR-063)	32x24x3.5 (GUAR-063)	40x32x3.5 (GUAR-092)	50x42x3.5 (GUAR-114E)	25
26	O-Ring	1.5x7 (GUAR-115)	1.5x7 (GUAR-115)	1.78x8.73 (GUAR-013)	1.78x9.25 (GUAR-065)	26
27	Magnet	FES-32-3-5	FES-32-3-5	RAD-40-10	FES-50-3-6	27
28	O-Ring	2.62x11.91 (GUAR-033H)	2.62x11.91 (GUAR-033H)	2.62x15.08 (GUAR-105H)	2.62x15.88 (GUAR-169H)	28
29	End cap	FFD41-04	FFD41-04	FFD51-04	FFD63-05	29

EXPLODED VIEW

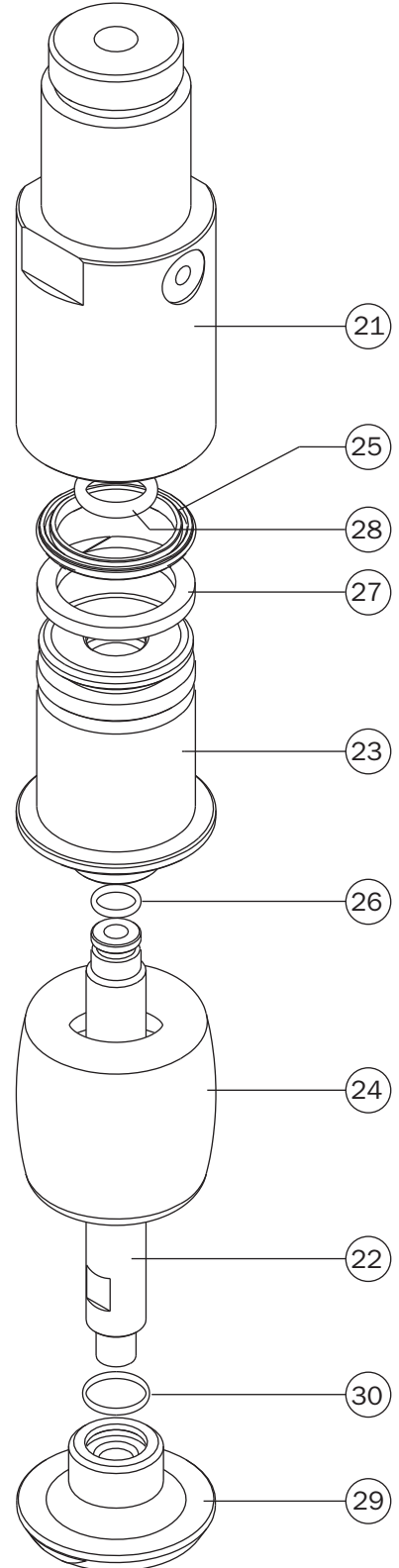
MFD08HL  
MFD10HL



MFD12HL  
MFD14HL  
MFD16HL  
MFD18HL  
MFD22HL  
MFD27HL  
MFD33HL



MFD41HL  
MFD47HL  
MFD51HL  
MFD63HL



## PARTS LIST

		MFD08HL	MFD10HL	
1	Body	MFD08-01	MFD08-01	1
2	Piston	MFD08-01	MFD10-02	2
3	Cover	IFD08-02	IFD10-03	3
4	Piston rod	FFD08-02	FFD10-03	4
5	Dynamic gasket	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	5
6	O-Ring	1x3 (GUAR-082H)	1x3 (GUAR-082H)	6
7	Snap ring	D1=12 DIN-7993B (SEEGER-027)	D1=12 DIN-7993B (SEEGER-027)	7
8	Elastic part	IF08-11	IF10-11	8

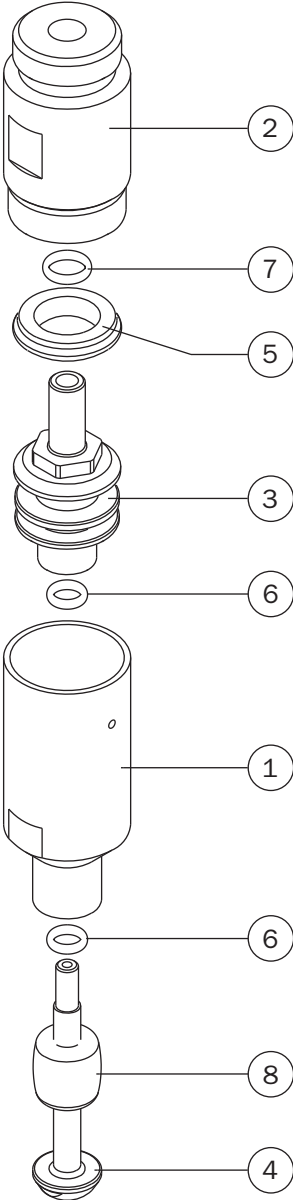
		MFD12HL	MFD14HL	MFD16HL	MFD18HL	MFD22HL	MFD27HL	MFD33HL	
11	Body	MFD12-01	MFD12-01	MFD12-01	MFD18-01	MFD22-01	MFD27-01	MFD33-03	11
12	Piston	FFD12-01	FFD14-02	FFD14-02	FFD18-02	FFD22-02	FFD27-03	FFD33-03	12
13	Dynamic gasket	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	15x9x3 (GUAR-019)	18x12x3 (GUAR-133)	20x14x3 (GUAR-058)	25x19x3.5 (GUAR-063)	13
14	Elastic part	IF12-12	IF14-12	IF16-12	IF18-11	IF22-12	IF27-11	IF33-11	14
15	Piston rod	FFD12-02	FFD14-03	FFD14-03	FFD18-03	FFD22-03	FFD27-02	FFD33-02	15
16	O-Ring	-	-	-	-	-	1x4.5 (GUAR-171)	1x6 (GUAR-098)	16
17	O-Ring	1x4 (GUAR-091H)	1x4 (GUAR-091H)	1x4 (GUAR-091H)	1x5 (GUAR-021H)	1x6 (GUAR-098H)	1.78x7.66 (GUAR-045H)	1.78x9.25 (GUAR-065H)	17
18	Magnet	-	-	-	-	-	PAR-20-10B	PAR-25-10B	18

		MFD41HL	MFD47HL	MFD51HL	MFD63HL	
21	Body	MFD41-01	MFD41-01	MFD51-01	MFD63-01	21
22	Piston rod	FFD41-02	FFD41-02	FFD51-02	FFD63-02	22
23	Piston	FFD41-03	FFD41-03	FFD51-03	FFD63-03	23
24	Elastic part	IF41-11	IF47-11	IF51-11	IF63-11	24
25	Dynamic gasket	32x24x3.5 (GUAR-063)	32x24x3.5 (GUAR-063)	40x32x3.5 (GUAR-092)	50x42x3.5 (GUAR-114E)	25
26	O-Ring	1.5x7 (GUAR-115)	1.5x7 (GUAR-115)	1.78x8.73 (GUAR-013)	1.78x9.25 (GUAR-065)	26
27	Magnet	FES-32-3-5	FES-32-3-5	RAD-40-10	FES-50-3-6	27
28	O-Ring	2.62x11.91 (GUAR-033H)	2.62x11.91 (GUAR-033H)	2.62x15.08 (GUAR-105H)	2.62x15.88 (GUAR-169H)	28
29	End cap	FFD41-04	FFD41-04	FFD51-04	FFD63-05	29
30	O-Ring	1x2 (GUAR-071)	1x2 (GUAR-071)	1.78x14 (GUAR-007)	1.78x15.6 (GUAR-023)	30

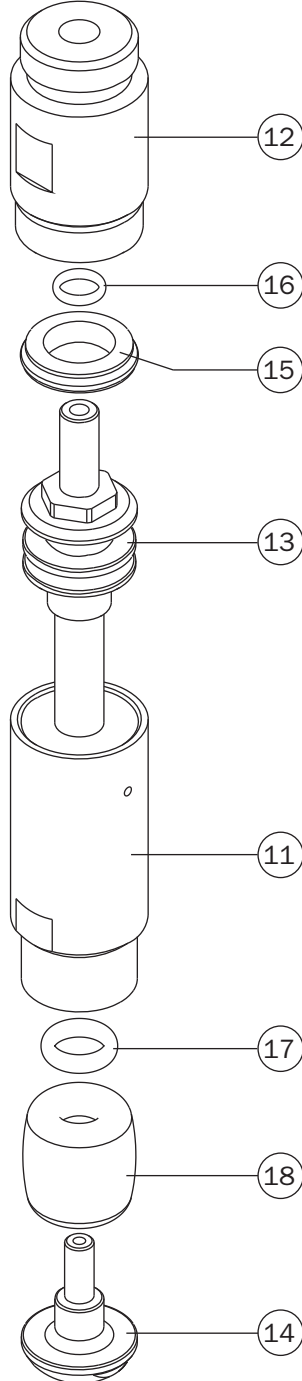
EXPLODED VIEW

EXPANSION GRIPPERS

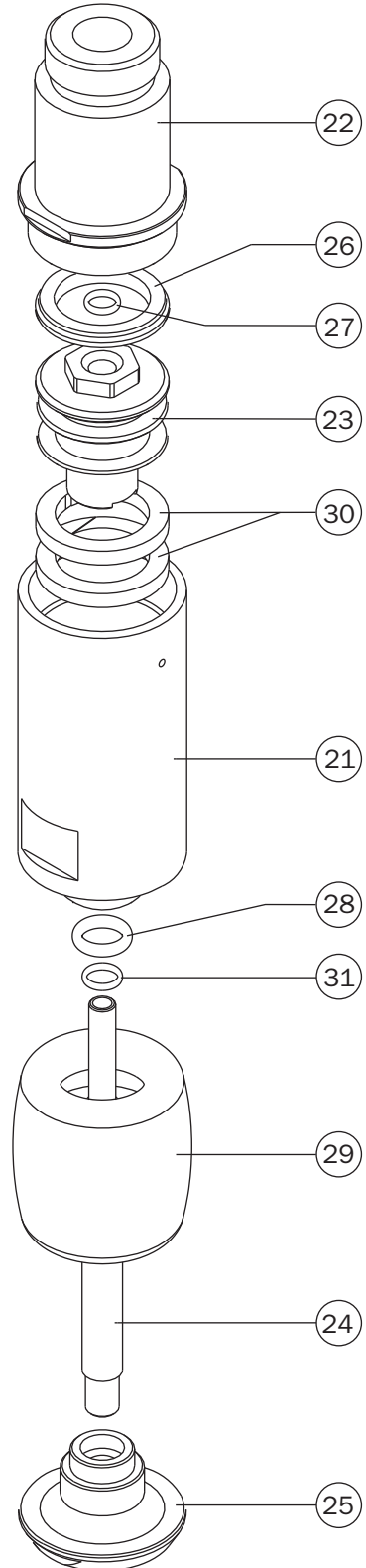
MFU08CL  
MFU10CL



MFU12CL  
MFU14CL  
MFU16CL  
MFU18CL



MFU22CL  
MFU27CL  
MFU33CL  
MFU41CL  
MFU47CL  
MFU51CL  
MFU63CL



## PARTS LIST

		MFU08CL	MFU10CL		
1	Body	FFU08-06	FFU10-04		1
2	Head	MFU08-01	MFU08-01		2
3	Piston	FFU08-02	FFU08-02		3
4	Piston rod	FFU08-05	FFU10-03		4
5	Dynamic gasket	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)		5
6	O-Ring	1x3 (GUAR-082H)	1x3 (GUAR-082H)		6
7	O-Ring	1x4 (GUAR-091H)	1x4 (GUAR-091H)		7
8	Elastic part	IF08-11	IF10-11		8

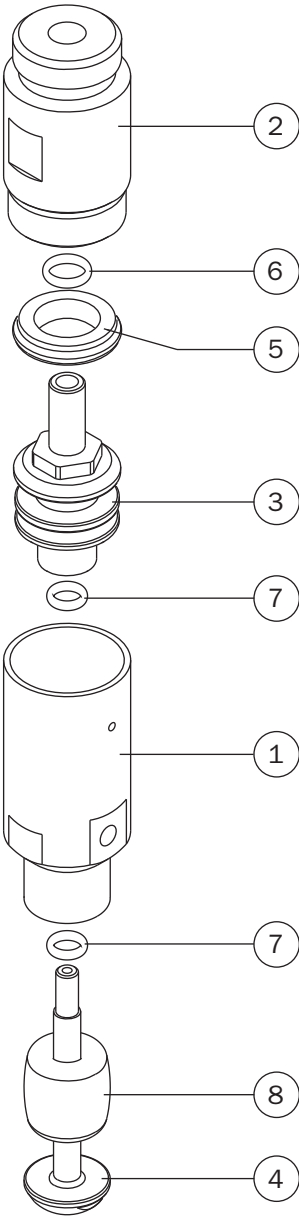
		MFU12CL	MFU14CL	MFU16CL	MFU18CL		
11	Body	FFU12-04	FFU14-04	FFU14-04	FFU18-05		11
12	Head	MFU08-01	MFU08-01	MFU08-01	MFU18-01		12
13	Piston	FFU12-05	FFU14-05	FFU14-05	FFU18-06		13
14	End cap	FFU12-03	FFU14-03	FFU14-03	FFU18-04		14
15	Dynamic gasket	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	15x9x3 (GUAR-019)		15
16	O-Ring	1x4 (GUAR-091H)	1x4 (GUAR-091H)	1x4 (GUAR-091H)	1x4 (GUAR-091H)		16
17	O-Ring	1x4.48 (GUAR-029H)	1x4.48 (GUAR-029H)	1x4.48 (GUAR-029H)	1x4.48 (GUAR-029H)		17
18	Elastic part	IF12-12	IF14-12	IF16-12	IF18-11		18

		MFU22CL	MFU27CL	MFU33CL	MFU41CL	MFU47CL	MFU51CL	MFU63CL		
21	Body	FFU22-07	FFU27-07	FFU33-07	FFU41-07	FFU41-07	FFU51-07	FFU63-07		21
22	Head	MFU22-01	MFU27-01	MFU33-01	MFU41-01	MFU41-01	MFU51-01	MFU63-01		22
23	Piston	FFU22-03	FFU27-03	FFU33-03	FFU41-03	FFU41-03	FFU51-03	FFU63-03		23
24	Piston rod	FFU22-06	FFU27-08	FFU33-08	FFU41-08	FFU41-08	FFU51-08	FFU63-08		24
25	End cap	FFU22-05	FFU27-05	FFU33-05	FFU41-05	FFU41-05	FFU51-05	FFU63-05		25
26	Dynamic gasket	18x12x3 (GUAR-133P)	20x14x3 (GUAR-058)	25x19x3.5 (GUAR-064)	32x24x3.5 (GUAR-063)	32x24x3.5 (GUAR-063)	40x32x3.5 (GUAR-092)	50x42x3.5 (GUAR-114E)		26
27	O-Ring	1x3 (GUAR-082H)	1x4 (GUAR-091H)	1x4.48 (GUAR-029H)	2.62x7.6 (GUAR-060H)	2.62x7.6 (GUAR-060H)	2.62x7.6 (GUAR-060H)	2.62x7.6 (GUAR-060H)		27
28	O-Ring	1x5 (GUAR-021)	1.78x6.07 (GUAR-039H)	1.78x6.75 (GUAR-012H)	1.78x10.82 (GUAR-080H)	1.78x10.82 (GUAR-080H)	2.62x11.91 (GUAR-033H)	2.62x13.95 (GUAR-141H)		28
29	Elastic part	IF22-12	IF27-11	IF33-11	IF41-11	IF47-11	IF51-11	IF63-11		29
30	Magnet	-	PAR-20-10B	PAR-25-10B	FES-32-3-5	FES-32-3-5	RAD-40-10	FES-50-3-6		30
31	O-Ring	1x4.48 (GUAR-029H)	1x4 (GUAR-091H)	1x5 (GUAR-021)	1x9 (GUAR-168)	1x9 (GUAR-168)	1x10 (GUAR-089)	1x12 (GUAR-071)		31

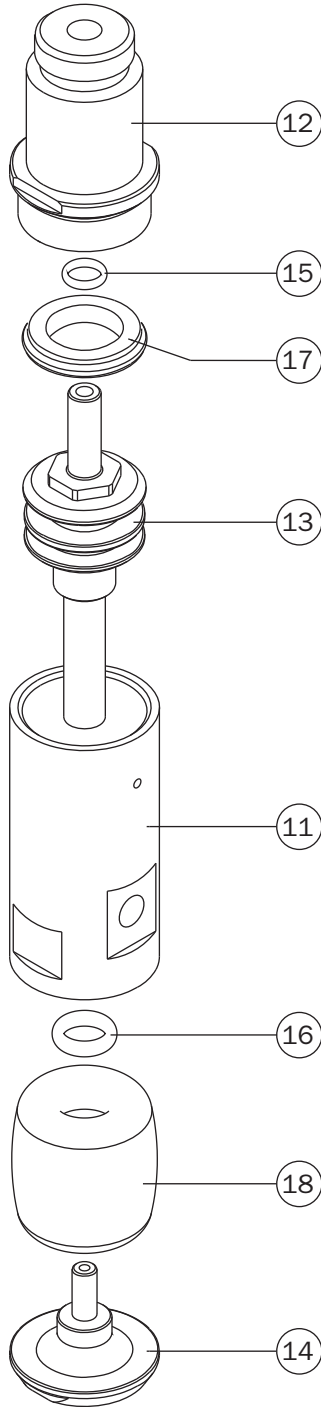


EXPLODED VIEW

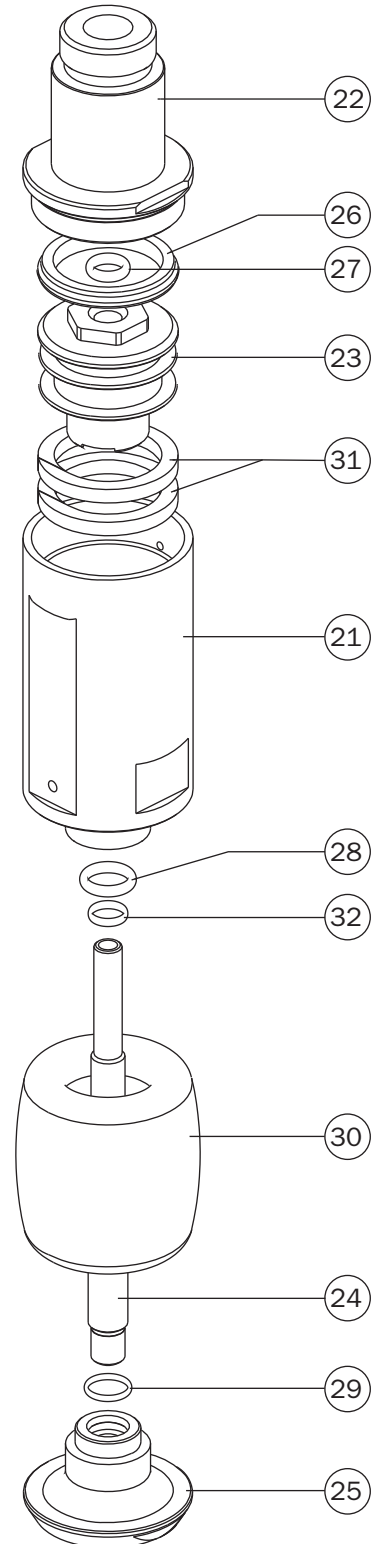
MFU08HL  
MFU10HL



MFU12HL  
MFU14HL  
MFU16HL  
MFU18HL



MFU22HL  
MFU27HL  
MFU33HL  
MFU41HL  
MFU47HL  
MFU51HL  
MFU63HL



## PARTS LIST

		MFU08HL	MFU10HL	
1	Body	FFU08-03	FFU10-01	1
2	Head	MFU08-01	MFU08-01	2
3	Piston	FFU08-02	FFU08-02	3
4	Piston rod	FFU08-04	FFU10-02	4
5	Dynamic gasket	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	5
6	O-Ring	1x4 (GUAR-091H)	1x4 (GUAR-091H)	6
7	O-Ring	1x3 (GUAR-082H)	1x3 (GUAR-082H)	7
8	Elastic part	IF08-11	IF10-11	8

		MFU12HL	MFU14HL	MFU16HL	MFU18HL	
11	Body	FFU12-01	FFU14-01	FFU14-01	FFU18-01	11
12	Head	MFU08-01	MFU08-01	MFU08-01	MFU18-01	12
13	Piston	FFU12-02	FFU14-02	FFU14-02	FFU18-03	13
14	End cap	FFU12-03	FFU14-03	FFU14-03	FFU18-04	14
15	O-Ring	1x4 (GUAR-091H)	1x4 (GUAR-091H)	1x4 (GUAR-091H)	1x4 (GUAR-091H)	15
16	O-Ring	1x4.48 (GUAR-029H)	1x4.48 (GUAR-029H)	1x4.48 (GUAR-029H)	1x4.48 (GUAR-029H)	16
17	Dynamic gasket	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	12x7x3 (GUAR-018)	15x9x3 (GUAR-019)	17
18	Elastic part	IF12-12	IF14-12	IF16-12	IF18-11	18

		MFU22HL	MFU27HL	MFU33HL	MFU41HL	MFU47HL	MFU51HL	MFU63HL	
21	Body	FFU22-01	FFU27-01	FFD33-01	FFU41-01	FFU41-01	FFU51-01	FFU63-01	21
22	Head	MFU22-01	MFU27-01	MFU33-01	MFU41-01	MFU41-01	MFU51-01	MFU63-01	22
23	Piston	FFU22-03	FFU27-03	FFU33-03	FFU41-03	FFU41-03	FFU51-03	FFU63-01	23
24	Piston rod	FFU22-04	FFU27-04	FFU33-04	FFU41-04	FFU41-04	FFU51-04	FFU63-04	24
25	End cap	FFU22-05	FFU27-05	FFU33-05	FFU41-05	FFU41-05	FFU51-05	FFU63-05	25
26	Dynamic gasket	18x12x3 (GUAR-133P)	20x14x3 (GUAR-058)	25x19x3.5 (GUAR-064)	32x24x3.5 (GUAR-063)	32x24x3.5 (GUAR-063)	40x32x3.5 (GUAR-092)	50x42x3.5 (GUAR-114E)	26
27	O-Ring	1x3 (GUAR-082H)	1x4 (GUAR-091H)	1.78x4.48 (GUAR-029H)	2.62x7.6 (GUAR-060H)	2.62x7.6 (GUAR-060H)	2.62x7.6 (GUAR-060H)	2.62x7.6 (GUAR-060H)	27
28	O-Ring	1x5 (GUAR-021)	1.78x6.07 (GUAR-039H)	1.78x6.75 (GUAR-012H)	1.78x10.82 (GUAR-080H)	1.78x10.82 (GUAR-080H)	2.62x11.91 (GUAR-033H)	2.62x13.95 (GUAR-141H)	28
29	O-Ring	-	1x6 (GUAR-098)	1x7 (GUAR-136)	1.78x10.82 (GUAR-080)	1.78x10.82 (GUAR-080)	2x12 (GUAR-088)	1.78x14 (GUAR-007)	29
30	Elastic part	IF22-12	IF27-11	IF33-11	IF41-11	IF47-11	IF51-11	IF63-11	30
31	Magnet	-	PAR-20-10B	PAR-25-10B	FES-32-3-5	FES-32-3-5	RAD-40-10	FES-50-3-6	31
32	O-Ring	1.78x4.48 (GUAR-029H)	1x4 (GUAR-091H)	1x5 (GUAR-021)	1x9 (GUAR-168)	1x9 (GUAR-168)	1x10 (GUAR-089)	1x12 (GUAR-071)	32