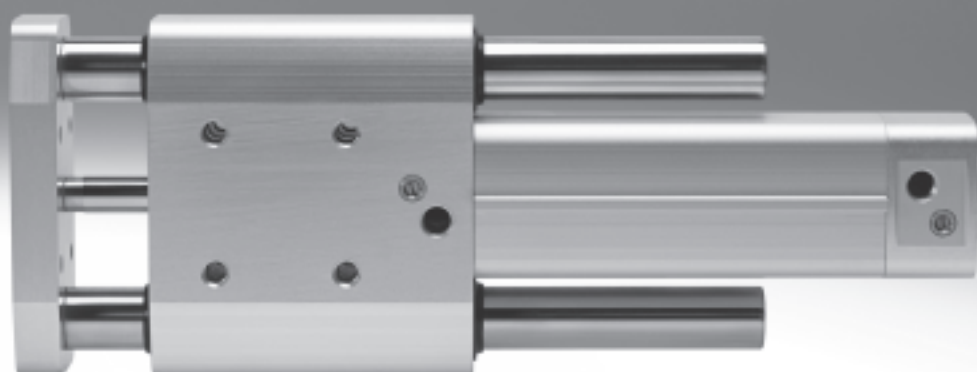


## Guided drives DGRF, Clean Design

**FESTO**



## Guided drives DGRF, Clean Design

Key features

**FESTO**

### At a glance

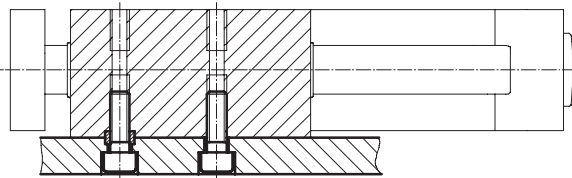
- The guided drive is used wherever hygiene, ease of cleaning and resistance are important, predominantly in dry and splash zones in the food and packaging industry
- Corrosion-resistant in harsh ambient conditions
- Easy-to-clean design
- FDA-compliant
- Suitable for unlubricated operation
- Resistant to conventional cleaning agents
- For hygiene reasons, the threads on the end caps should be sealed with blanking screws
- Variant (A3): special piston rod seal and guide rod wiper seal increase the service life of the drive

### Areas of application:

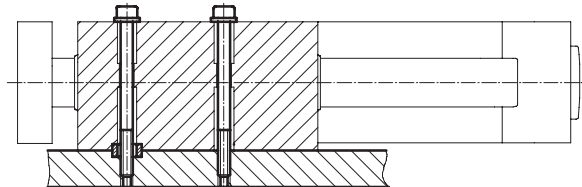
- Bottling systems in the beverage industry
  - Labelling and palletising machines
- Milk processing
  - Filling ice cream and yoghurt containers, etc.
- Meat processing
- Confectionery production
- Bakery production
- Packaging industry
  - Foodstuffs, pharmaceuticals, cosmetics, chemicals, beverages and tobacco

### Mounting options

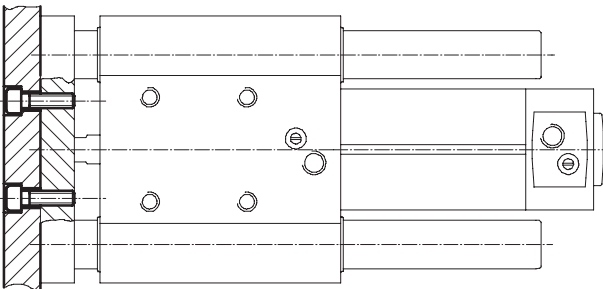
From underneath



From above



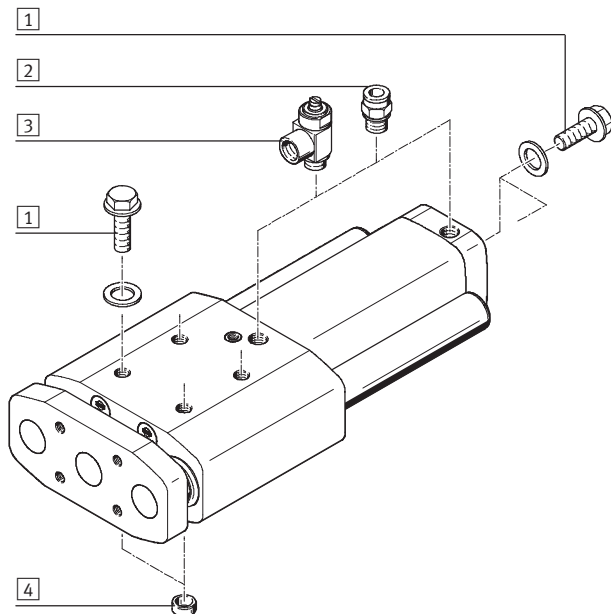
On the yoke plate



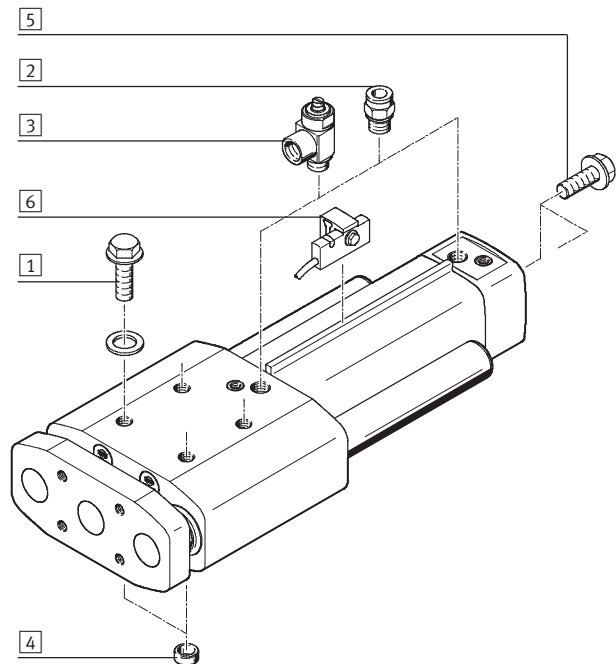
# Guided drives DGRF, Clean Design

Peripherals overview

Piston Ø 20, 25, 32



Piston Ø 32, 40, 50, 63



Accessories			
		Brief description	→ Page/Internet
1	Blanking screw DAMD	<ul style="list-style-type: none"> <li>For sealing unused mounting threads</li> <li>The cover disc is included with the screw</li> <li>The screws are not included with the drive</li> </ul>	13
2	Push-in fitting QS-F/QSL-F/CRQS/CRQSL/NPQP	For connecting compressed air tubing with standard O.D.	11
3	One-way flow control valve CRGRLA/GRLA-F	For regulating speed	13
4	Centring sleeve ZBH	<ul style="list-style-type: none"> <li>For centring the guided drive</li> <li>Two centring sleeves included in the scope of delivery</li> </ul>	13
5	Blanking screw CR	<ul style="list-style-type: none"> <li>For sealing unused mounting threads</li> <li>The screws are not included with the drive</li> </ul>	13
6	Proximity sensor SMT-C1	<ul style="list-style-type: none"> <li>For sensing the position</li> <li>Proximity sensor is mounted on the sensor mounting rail</li> </ul>	11

## Guided drives DGRF, Clean Design

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Type codes

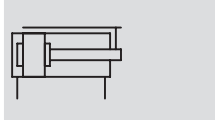
		DGRF	-	C	-	GF	-	25	-	200	-	PPV	-	A	-	R	-	A3
<b>Type</b>																		
Double-acting																		
DGRF	Guided drive																	
<b>Version</b>																		
C	Easy-to-clean design																	
<b>Guide</b>																		
GF	Plain-bearing guide																	
<b>Piston Ø [mm]</b>																		
<b>Stroke [mm]</b>																		
<b>Cushioning</b>																		
P	Flexible cushioning rings at both ends																	
PPV	Pneumatic cushioning, adjustable at both ends																	
<b>Position sensing</b>																		
A	Via proximity sensor																	
<b>Sensor mounting, external</b>																		
-	None																	
R	Mounting rail for proximity sensor																	
<b>Wiper seal material</b>																		
-	Standard																	
A3	Suitable for unlubricated operation																	

# Guided drives DGRF, Clean Design

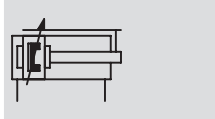
Technical data

Function

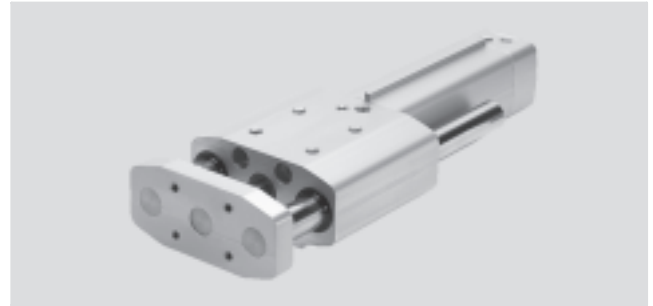
Piston Ø 20, 25, 32



Piston Ø 32, 40, 50, 63



- Ø - Diameter  
20 ... 63 mm
- l - Stroke length  
10 ... 400 mm



General technical data						
Piston Ø	20	25	32	40	50	63
Pneumatic connection	M5	M5	G1/8	G1/4	G1/4	G3/8
Mode of operation	Double-acting					
Design	Guide					
	Guide rods with yoke					
Guide	Plain-bearing guide					
Cushioning	P	Flexible cushioning rings at both ends			–	
	PPV	–		Pneumatic cushioning, adjustable at both ends		
Cushioning length	[mm]	–		20	20	22
Position sensing	–		Via proximity sensor			
Type of mounting	Via through-hole					
	Via female thread					
Mounting position	Any					
Torsional backlash <sup>1)</sup>	[°]	0.13	0.11	0.10	0.09	0.07
					0.06	

1) Retracted state, without load

Operating and environmental conditions						
Piston Ø	20	25	32	40	50	63
Variant			P	PPV		
Operating medium	Filtered compressed air, lubricated or unlubricated					
Operating pressure	[bar]	2.5 ... 10	2 ... 10	2 ... 12	2 ... 12	1.5 ... 12
	A3 [bar]	2 ... 10		2 ... 12	1.5 ... 12	
Ambient temperature	[°C]	–20 ... +80				
Corrosion resistance class CRC <sup>1)</sup>		3				

1) Corrosion resistance class 3 according to Festo standard 940 070  
Components subject to high corrosion stress. External visible parts in direct contact with industrial atmospheres or media such as solvents and cleaning agents, with a predominantly functional requirement for the surface

Force [N] and impact energy [J]						
Piston Ø	20	25	32	40	50	63
Theoretical force at 6 bar, advancing	189	295	483	754	1,178	1,870
Theoretical force at 6 bar, retracting	141	247	415	633	990	1,682
Max. impact energy in the end positions with P cushioning	0.2	0.3	0.4	–	–	–

Permissible impact velocity:

$$v_{perm.} = \sqrt{\frac{2 \times E_{perm.}}{m_{dead} + m_{load}}}$$

Maximum permissible load:

$$m_{load} = \frac{2 \times E_{perm.}}{v^2} - m_{dead}$$

$v_{perm.}$  Permissible impact velocity  
 $E_{perm.}$  Max. impact energy  
 $m_{intrinsic}$  Moving load (drive)  
 $m_{load}$  Moving effective load

## Note

This data represents the maximum values that can be achieved. The maximum permissible impact energy must be observed.

## Guided drives DGRF, Clean Design

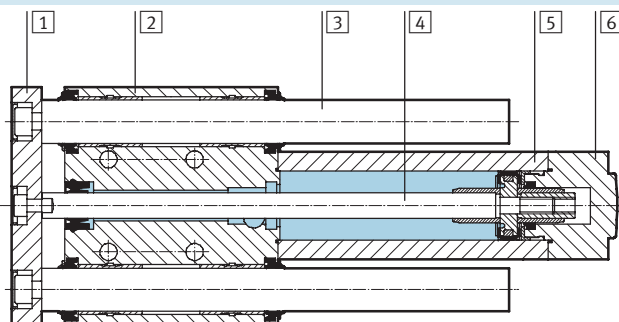
Technical data

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Weight [g]							
Piston Ø	20	25	32		40	50	63
Variant			P	PPV			
Product weight with 0 mm stroke	900	1,200	2,100	2,300	2,950	4,700	6,100
Additional weight per 10 mm stroke	52	55	80	83	92	142	147
Moving load with 0 mm stroke	420	490	900	910	1,100	1,800	2,100
Additional load per 10 mm stroke	38	38	58	58	65	102	102

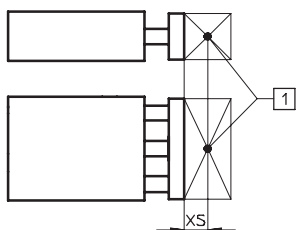
### Materials

Sectional view



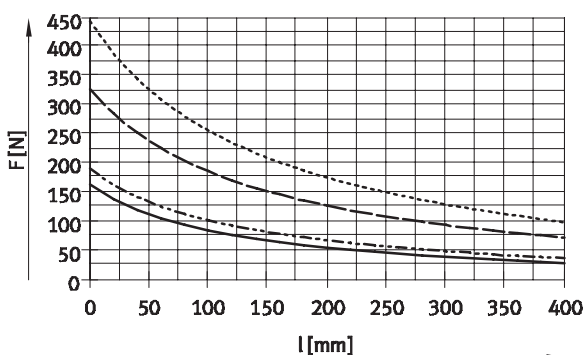
Guided drive	Standard	A3
1 Yoke plate	Wrought aluminium alloy	
2 Housing	Wrought aluminium alloy	
3 Guide rod	High-alloy stainless steel	
4 Piston rod	High-alloy stainless steel	
5 Cylinder barrel	Wrought aluminium alloy	
6 End cap	Wrought aluminium alloy	
– Seal	Polyurethane elastomer	Polyethylene
– Note on materials	RoHS-compliant	

### Max. effective load F as a function of stroke l



1 Centre of gravity of effective load

- Load data are based on a distance from the centre of gravity of XS = 50 mm
- Load data can be requested for larger distances



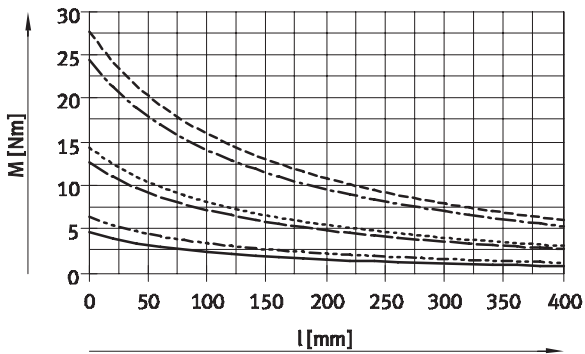
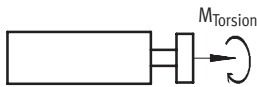
— Ø 20  
 - - - Ø 25  
 - · - Ø 32/40  
 · · · Ø 50/63  
 - - - - - Ø 63

# Guided drives DGRF, Clean Design

Technical data

FESTO

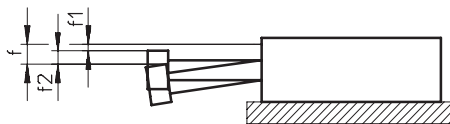
## Max. torque load M as a function of stroke l



- Ø 20
- - - Ø 25
- Ø 32
- - - Ø 40
- Ø 50
- - - Ø 63

## Deflection of piston rod

Deflection f<sub>1</sub> due to bearing backlash as a function of stroke l



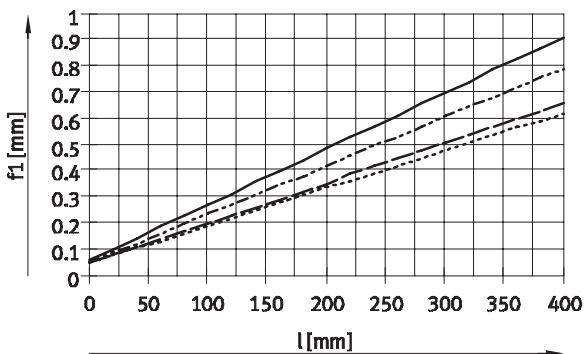
$$f = f_1 + f_2$$

f = Total deflection of piston rod

f<sub>1</sub> = Deflection due to bearing backlash

f<sub>2</sub> = Deflection due to lateral force

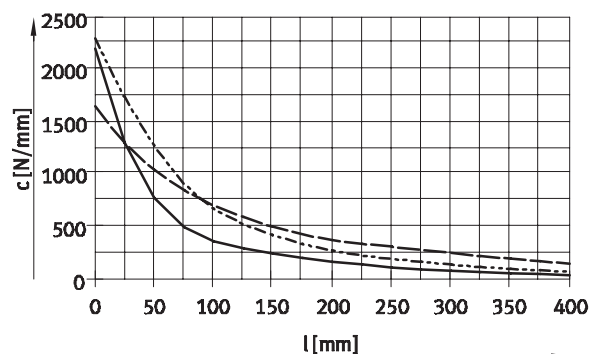
Deflection f<sub>1</sub>,  
due to bearing backlash as a function of stroke l



- Ø 20
- - - Ø 25
- Ø 32/40
- - - Ø 50/63

Deflection f<sub>2</sub>,  
due to effective load F and rigidity c as a function of stroke l

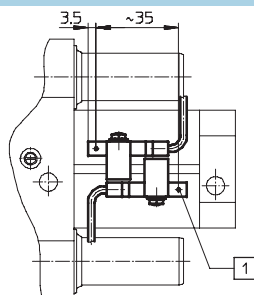
$$f_2 = \frac{F}{c}$$



- Ø 20/25
- - - Ø 32/40
- Ø 50/63

## End-position sensing

A minimum stroke is required to be able to sense both end positions at the cylinder.



- 1 Position of the proximity sensor within the housing

Piston Ø	32	40	50	63
Minimum stroke [mm]	35	35	35	30

## Guided drives DGRF, Clean Design

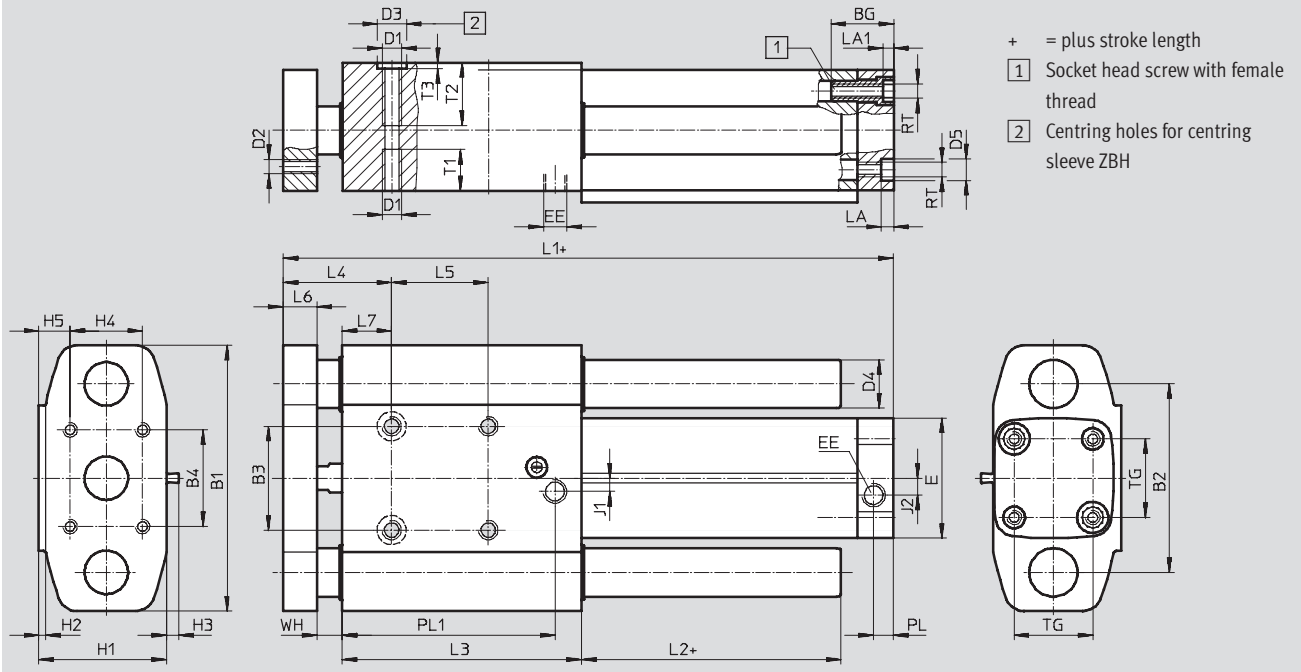
Technical data

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### Dimensions

Download CAD Data → [www.festo.com/us/cad](http://www.festo.com/us/cad)

DGRF-...-P-... – Flexible cushioning rings at both ends



Ø	BG	B1	B2	B3 <sup>2)</sup>	B4	D1	D2	D3 <sup>3)</sup>	D4	D5	E	EE
[mm]								Ø H7	Ø	Ø F9		
20	19.5	83	58	30	30	M6	M5	9	16	9	37	M5
25	19.5	95	68	35	40	M6	M6	9	16	9	42	M5
32	26	110	78	43	40	M8	M6	12	20	9	50	G <sup>1</sup> / <sub>8</sub>

Ø	H1	H2	H3 <sup>1)</sup>	H4	H5	J1	J2	L1	L2	L3	L4	L5
[mm]												
20	39	2	–	20	10.5	0	0	115 +1.4/-0.8	7	68	40 +1/-0.9	30
25	44	2	–	20	13	0	0	126 +1.4/-0.8	7	77	40 +1/-0.9	40
32	53	3	5	30	13	5.5	7	152.8 ±1.1	7.4	99	45 +0.9/-1	40

Ø	L6	L7	LA	LA1	PL	PL1	RT	T1	T2	T3	TG	WH
[mm]												
20	12	18	4.9	4.6	6	62	M5	13	20	2.1	22	10 +0.5/-0.7
25	12	18	4.9	4.6	6	71	M5	13	25	2.1	26	10 +0.5/-0.7
32	14	20.4	5.1	4.6	8.2	88	M6	17	26	2.6	32.5	10.7 +0.3/-0.9

1) Only in combination with sensor mounting rail (DGRF-...-R)

Not in combination with DGRF-20/-25

2) Tolerance between centring holes ±0.02 mm

3) Two centring sleeves included in the scope of delivery



# Guided drives DGRF, Clean Design

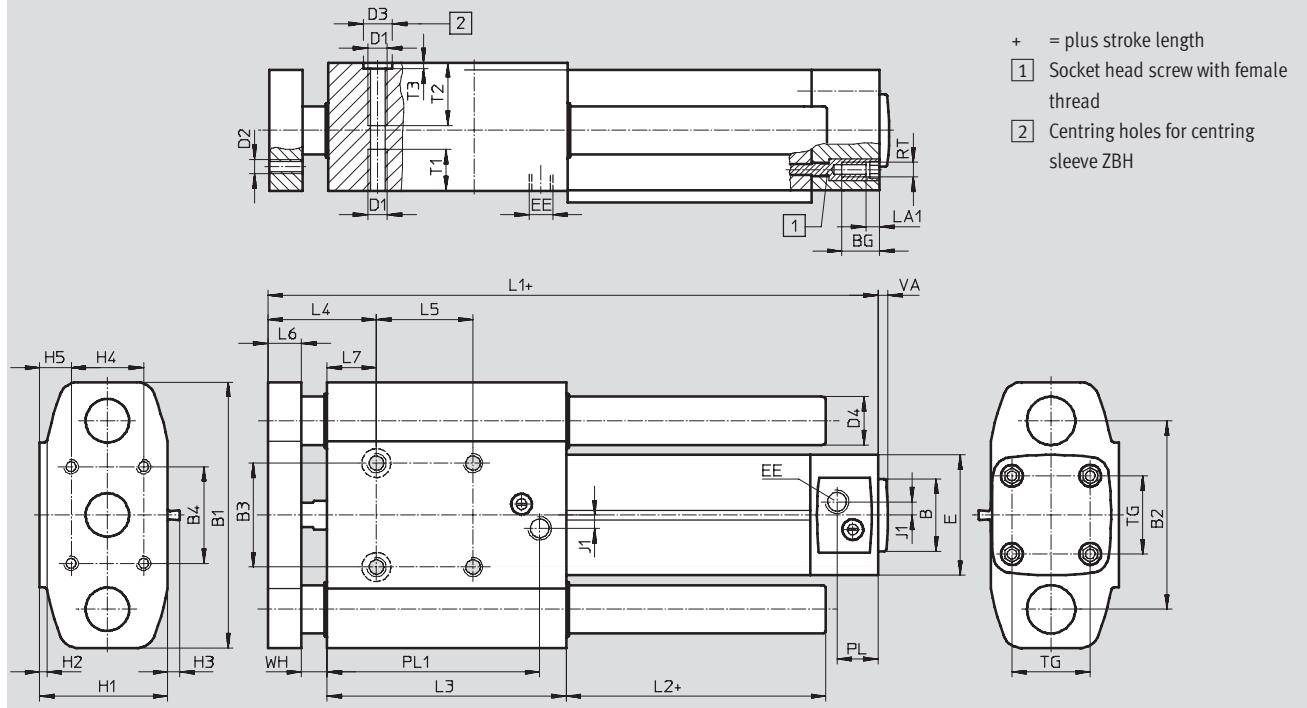
Technical data

FESTO

## Dimensions

Download CAD Data → [www.festo.com/us/cad](http://www.festo.com/us/cad)

DGRF-...-PPV-... – Pneumatic cushioning, adjustable at both ends



Ø	B	BG	B1	B2	B3 <sup>2)</sup>	B4	D1	D2	D3 <sup>3)</sup>	D4	E	EE
[mm]	Ø d11								Ø H7	Ø		
32	30	16	110	78	43	40	M8	M6	12	20	50	G <sup>1</sup> / <sub>8</sub>
40	35	16	120	88	51	50	M8	M6	12	20	58	G <sup>1</sup> / <sub>4</sub>
50	40	17	148	110	64	60	M8	M8	12	25	70	G <sup>1</sup> / <sub>4</sub>
63	45	17	162	125	80	80	M10	M8	12	25	81	G <sup>3</sup> / <sub>8</sub>

Ø	H1	H2	H3 <sup>1)</sup>	H4	H5	J1	L1	L2	L3	L4	L5
[mm]											
32	53	3	5	30	13	5.5	177.6 +1.9/-1.2	7.4	99	45 +1.5/-1.1	40
40	61	3	5	30	17	6.5	183.5 +1.9/-1.3	7.5	99	45 +1.5/-1.1	40
50	73	3	5	40	18	8.5	193.5 +1.7/-1.3	7.7	105	50 +1.3/-1.2	40
63	84	3	5	40	23.5	11	207.3 +1.7/-1.3	7.5	105	50 +1.3/-1.2	40

Ø	L6	L7	LA1	PL	PL1	RT	T1	T2	T3	TG	VA	WH
[mm]												
32	14	20.4	5.6	17	88	M6	17	26	2.6	32.5	4	10.6 +1/-0.9
40	14	20.5	5.6	19	83	M6	17	26	2.6	38	4	10.5 ±1
50	16	22.7	6.1	20	89	M8	17	20	2.6	46.5	4	11.3 +0.8/-1
63	20	18.5	6.1	25	79.5	M8	17	24	2.6	56.5	4	11.5 +0.8/-1

1) Only in combination with sensor mounting rail (DGRF-...-R)

2) Tolerance between centring holes ±0.02 mm

3) Two centring sleeves included in the scope of delivery

## Guided drives DGRF, Clean Design

Ordering data – Modular products

**FESTO**

Ordering table											
Size		20	25	32	40	50	63	Condi- tions	Code	Enter code	
[M]	Module No.	562216	562217	563366	562219	562220	562221				
	Function	Guided drive							DGRF		DGRF
	Product design	Easy-to-clean design							-C		-C
	Guide	Plain-bearing guide							-GF		-GF
	Piston diameter	20	25	32	40	50	63		-...		
	Stroke [mm]	10 ... 400							-...		
	Cushioning	Flexible cushioning rings at both ends							-P		
					Pneumatic cushioning, adjustable at both ends				-PPV		
	Position sensing				Via proximity sensor				-A		
[O]	Sensor mounting, external				–						
					Mounting rail for proximity sensor			1	-R		
	Wiper seal variant	–									
		For unlubricated operation							-A3		

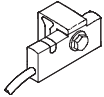
**[1] R** Always present with DGRF-32-P



Transfer order code




## Guided drives DGRF, Clean Design

Accessories

FESTO

Ordering data – Proximity sensors for T-slot, magneto-resistive					Technical data → Internet: smt	
	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part No.	Type
N/O contact						
	Is mounted on the mounting rail	PNP	Cable, 3-wire	5.0	571339	SMT-C1-PS-24V-K-5,0-OE
			Plug M8x1, 3-pin	0.3	571342	SMT-C1-PS-24V-K-0,3-M8D
			Plug M12x1, 3-pin	0.3	571341	SMT-C1-PS-24V-K-0,3-M12

Ordering data – Connecting cables for SMT-C1-...				Technical data → Internet: nebu	
	Electrical connection, left	Electrical connection, right	Cable length [m]	Part No.	Type
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541333	NEBU-M8G3-K-2.5-LE3
			5	541334	NEBU-M8G3-K-5-LE3
	Straight socket, M12x1, 5-pin	Cable, open end, 3-wire	2.5	541363	NEBU-M12G5-K-2.5-LE3
			5	541364	NEBU-M12G5-K-5-LE3
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541338	NEBU-M8W3-K-2.5-LE3
			5	541341	NEBU-M8W3-K-5-LE3
	Angled socket, M12x1, 5-pin	Cable, open end, 3-wire	2.5	541367	NEBU-M12W5-K-2.5-LE3
			5	541370	NEBU-M12W5-K-5-LE3

Ordering data – Push-in fittings				Technical data → Internet: quick star		
	Connection		Material	Part No.	Type	PU <sup>2)</sup>
	Thread	Tubing O.D.				
With external hexagon						
	M5	4	Brass, nickel and chrome-plated	533844	QS-F-M5-4 <sup>1)</sup>	10
		6		533845	QS-F-M5-6 <sup>1)</sup>	
	G1/8	4		193408	QS-F-G1/8-4 <sup>1)</sup>	
		6		193409	QS-F-G1/8-6 <sup>1)</sup>	
		8		193410	QS-F-G1/8-8 <sup>1)</sup>	
	G1/4	6		193411	QS-F-G1/4-6 <sup>1)</sup>	
		8		193412	QS-F-G1/4-8 <sup>1)</sup>	
		10		193413	QS-F-G1/4-10 <sup>1)</sup>	
	G3/8	8		193414	QS-F-G3/8-8 <sup>1)</sup>	
		10		193415	QS-F-G3/8-10 <sup>1)</sup>	
		12		193487	QS-F-G3/8-12 <sup>1)</sup>	
	M5	4	Stainless steel	162860	CRQS-M5-4 <sup>1)</sup>	1
		6		162861	CRQS-M5-6 <sup>1)</sup>	
	R1/8	4		132643	CRQS-1/8-4	
		6		162862	CRQS-1/8-6	
		8		162863	CRQS-1/8-8	
	R1/4	6		132644	CRQS-1/4-6	
		8		162864	CRQS-1/4-8	
		10		162865	CRQS-1/4-10	
	R3/8	10		162866	CRQS-3/8-10	
		12		162867	CRQS-3/8-12	
	R1/8	4	Polypropylene	132417	NPQP-D-R18-Q4	1
		6		132418	NPQP-D-R18-Q6	
		8		132419	NPQP-D-R18-Q8	
	R1/4	6		132421	NPQP-D-R14-Q6	
		8		132422	NPQP-D-R14-Q8	
		10		132423	NPQP-D-R14-Q10	
	R3/8	10		132424	NPQP-D-R38-Q10	
		12		132425	NPQP-D-R38-Q12	



1) With sealing ring

2) Packaging unit

## Guided drives DGRF, Clean Design


Accessories


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Ordering data – Push-in fittings				Technical data → Internet: quick star		
	Connection		Material	Part No.	Type	PU <sup>2)</sup>
	Thread	Tubing O.D.				
With internal hexagon						
	M5	4	Brass, nickel and chrome-plated	533924	QS-F-M5-4-I <sup>1)</sup>	10
		6		537014	QS-F-M5-6-I <sup>1)</sup>	
	G1/8	4		533927	QS-F-G1/8-4-I <sup>1)</sup>	
		6		533928	QS-F-G1/8-6-I <sup>1)</sup>	
		8		533929	QS-F-G1/8-8-I <sup>1)</sup>	
	G1/4	8		533930	QS-F-G1/4-8-I <sup>1)</sup>	
		10		533931	QS-F-G1/4-10-I <sup>1)</sup>	
	G3/8	12		533932	QS-F-G3/8-12-I <sup>1)</sup>	
	M5	4	Stainless steel	132328	CRQS-M5-4-I <sup>1)</sup>	1
		6		132329	CRQS-M5-6-I <sup>1)</sup>	
	R1/8	6		132330	CRQS-1/8-6-I	
		8		132331	CRQS-1/8-8-I	
	R1/4	8		132332	CRQS-1/4-8-I	
		10		132333	CRQS-1/4-10-I	
	R3/8	10		132334	CRQS-3/8-10-I	

1) With sealing ring

2) Packaging unit

Ordering data – Push-in L-fittings				Technical data → Internet: crqsl		
	Connection		Material	Part No.	Type	PU <sup>2)</sup>
	Thread	Tubing O.D.				
With external hexagon						
	M5	4	Brass, nickel and chrome-plated	533849	QSL-F-M5-4 <sup>1)</sup>	10
		6		533850	QSL-F-M5-6 <sup>1)</sup>	
	G1/8	4		193418	QSL-F-G1/8-4 <sup>1)</sup>	
		6		193419	QSL-F-G1/8-6 <sup>1)</sup>	
		8		193420	QSL-F-G1/8-8 <sup>1)</sup>	
	G1/4	6		193421	QSL-F-G1/4-6 <sup>1)</sup>	
		8		193422	QSL-F-G1/4-8 <sup>1)</sup>	
		10		193423	QSL-F-G1/4-10 <sup>1)</sup>	
		12		533853	QSL-F-G1/4-12 <sup>1)</sup>	
	G3/8	8		193424	QSL-F-G3/8-8 <sup>1)</sup>	
		10		193425	QSL-F-G3/8-10 <sup>1)</sup>	
		12		197486	QSL-F-G3/8-12 <sup>1)</sup>	

	M5	4	Stainless steel	162870	CRQSL-M5-4 <sup>1)</sup>	1
		6		162871	CRQSL-M5-6 <sup>1)</sup>	
	R1/8	4		132598	CRQSL-1/8-4	
		6		162872	CRQSL-1/8-6	
		8		162873	CRQSL-1/8-8	
	R1/4	6		132599	CRQSL-1/4-6	
		8		162874	CRQSL-1/4-8	
		10		162875	CRQSL-1/4-10	
	R3/8	10		162876	CRQSL-3/8-10	
		12		162877	CRQSL-3/8-12	

	R1/8	4	Polypropylene	132428	NPQP-L-R18-Q4	1
		6		132429	NPQP-L-R18-Q6	
		8		132430	NPQP-L-R18-Q8	
	R1/4	6		132432	NPQP-L-R14-Q6	
		8		132433	NPQP-L-R14-Q8	
		10		132434	NPQP-L-R14-Q10	
	R3/8	10		132435	NPQP-L-R38-Q10	
		12		132436	NPQP-L-R38-Q12	



1) With sealing ring

2) Packaging unit


## Guided drives DGRF, Clean Design




Accessories

**FESTO**

Ordering data – One-way flow control valves					Technical data → Internet: <a href="#">crgla</a>	
	Connection		Material	Part No.	Type	PU <sup>1)</sup>
	Thread	For push-in fitting				
	M5	CRQS/CRQSL/CRQST, Quick Star	Electropolished special steel casting	161403	CRGRLA-M5-B	1
	G1/8			161404	CRGRLA-1/8-B	
	G1/4			161405	CRGRLA-1/4-B	
	G3/8			161406	CRGRLA-3/8-B	
	G1/8	Push-in connector is integrated	Chrome-plated metal	195597	GRLA-F-1/8-QS-4-D	1
	G1/4			195598	GRLA-F-1/8-QS-6-D	
				195599	GRLA-F-1/8-QS-8-D	
				195600	GRLA-F-1/4-QS-6-D	
				195601	GRLA-F-1/4-QS-8-D	

1) Packaging unit


Ordering data – Plastic tubing, standard O.D.			Technical data → Internet: tubing	
			Type	
	Approved for use in the food industry and resistant to hydrolysis		PUN-H	
	Good resistance to chemicals and hydrolysis		PLN	
	Pneumatic tubing with resistance to high temperatures and chemicals		PFAN	

Ordering data – Blanking screws, corrosion-resistant						
	For Ø	Description	Part No.	Type	PU <sup>1)</sup>	
For mounting thread on the guide						
	20, 25	With cover disc	543715	DAMD-P-M6-12-R1	4	
	32, 40, 50		543716	DAMD-P-M8-16-R1		
	63		543717	DAMD-P-M10-16-R1		
For mounting thread on the end cap						
	20, 25	With cover disc	543714	DAMD-P-M5-10-R1	4	
	32 <sup>2)</sup>		543715	DAMD-P-M6-12-R1		
	32 <sup>3)</sup> , 40	–	650120	CR-M6x12-A2-70:6KT		
	50, 63		650121	CR-M8x16-A2-70:6KT		

1) Packaging unit

2) For drive with P cushioning

3) For drive with PPV cushioning

Ordering data – Centring sleeves				Technical data → Internet: zbh	
	For Ø	Part No.	Type	PU <sup>1)</sup>	
	20, 25	150927	ZBH-9	10	
	32, 40, 50, 63	189653	ZBH-12		

1) Packaging unit

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