














- Strength in motion
- Precision measurement
- Two perfect partners – Servo-pneumatic drive technology

## Cylinders with displacement encoder

Product range overview

Function	Type	Brief description
<b>Drives</b>	<b>Rodless</b>	
	DGCI 	 <ul style="list-style-type: none"> <li>• With guide</li> <li>• With contactless displacement measuring encoder</li> <li>• Based on linear drive DGC</li> <li>• Supply ports optionally on end face or front</li> <li>• Wide range of options for attaching drive units</li> <li>• System product for handling and assembly technology</li> </ul>
	DGPI/DGPIL	 <ul style="list-style-type: none"> <li>• With or without guide</li> <li>• With contactless displacement measuring encoder, integrated</li> <li>• Wide range of options for attaching drive units</li> <li>• System product for handling and assembly technology</li> </ul>
	DGP/DGPL	 <ul style="list-style-type: none"> <li>• With or without guide</li> <li>• With potentiometer or contactless displacement measuring encoder, attached</li> <li>• With clamping unit</li> <li>• Wide range of options for attaching drive units</li> <li>• System product for handling and assembly technology</li> </ul>
	<b>With piston rod</b>	
	DNCI	 <ul style="list-style-type: none"> <li>• With contactless displacement measuring encoder</li> <li>• Several piston rod variants</li> <li>• Standards-based cylinders to ISO 15552</li> </ul> <p> <b>DIN</b> </p>
DNCM	 <ul style="list-style-type: none"> <li>• With attached potentiometer</li> <li>• Several piston rod variants</li> <li>• Standards-based cylinders to ISO 15552</li> </ul> <p> <b>DIN</b> </p>	
<b>Semi-rotary drive</b>	<b>Swivel module</b>	
	DSMI	 <ul style="list-style-type: none"> <li>• Based on swivel module DSM</li> <li>• Rotary encoder integrated</li> <li>• Compact design</li> <li>• Wide choice of mounting options</li> </ul>

# Cylinders with displacement encoder

Product range overview

Piston Ø [mm]	Stroke/swivel angle [mm/°]	Suitable			→ Page
		for positioning with SPC200	for end position controller SPC11	as a measuring cylinder	
<b>Rodless</b>					
18, 25, 32, 40	100, 160, 225, 300, 360, 450, 500, 600, 750, 850, 1000, 1250, 1500, 1750, 2000	■	■	-	5 / 1.1-38
25, 32, 40, 50, 63	225, 300, 360, 450, 500, 600, 750, 1000, 1250, 1500, 1750, 2000	■	■	-	5 / 1.1-82
25, 32, 40, 50, 63	225, 300, 360, 450, 500, 600, 750, 1000, 1250, 1500, 1750, 2000	■	■	■	Drive: 5 / 1.1-64 Displacement encoder: 5 / 1.2-2
<b>With piston rod</b>					
32, 40, 50, 63	10 ... 2000	■	■	■	5 / 1.1-4
32, 50	100, 160, 200, 250, 320, 400, 500	■	■	■	5 / 1.1-22
<b>Swivel module</b>					
25, 40	270	■	■	■	5 / 1.1-118

# Standard cylinders DNCI, with integrated displacement encoder

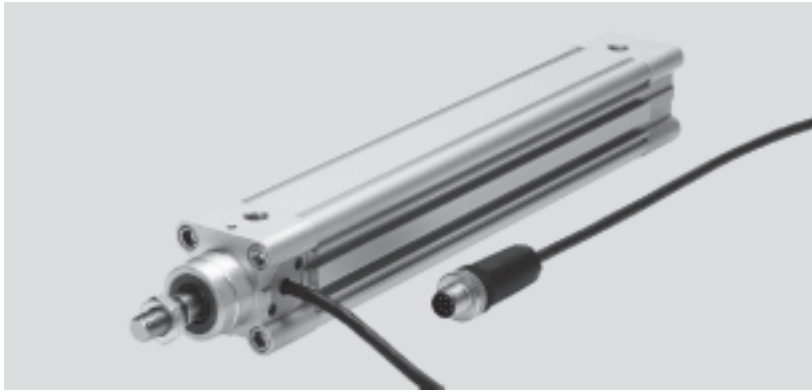
Key features



Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1

## Components for positioning and measuring using the standard cylinder DNCI



### Positioning with end-position controller SPC11 or axis controller SPC200

Proportional directional control valve  
MPYE-...  
→ 5 / 1.5-2



Soft Stop  
→ 5 / 1.4-2

Closed loop end-position controller  
SPC11-INC



Positioning technology  
→ 5 / 1.3-2

Axis interface  
SPC-AIF-INC



Axis controller  
SPC200



### Measuring with measuring transducer DADE

Measuring transducer  
DADE-...  
→ 5 / 1.1-144



PLC controller  
e.g. FEC-...  
→ Volume 4

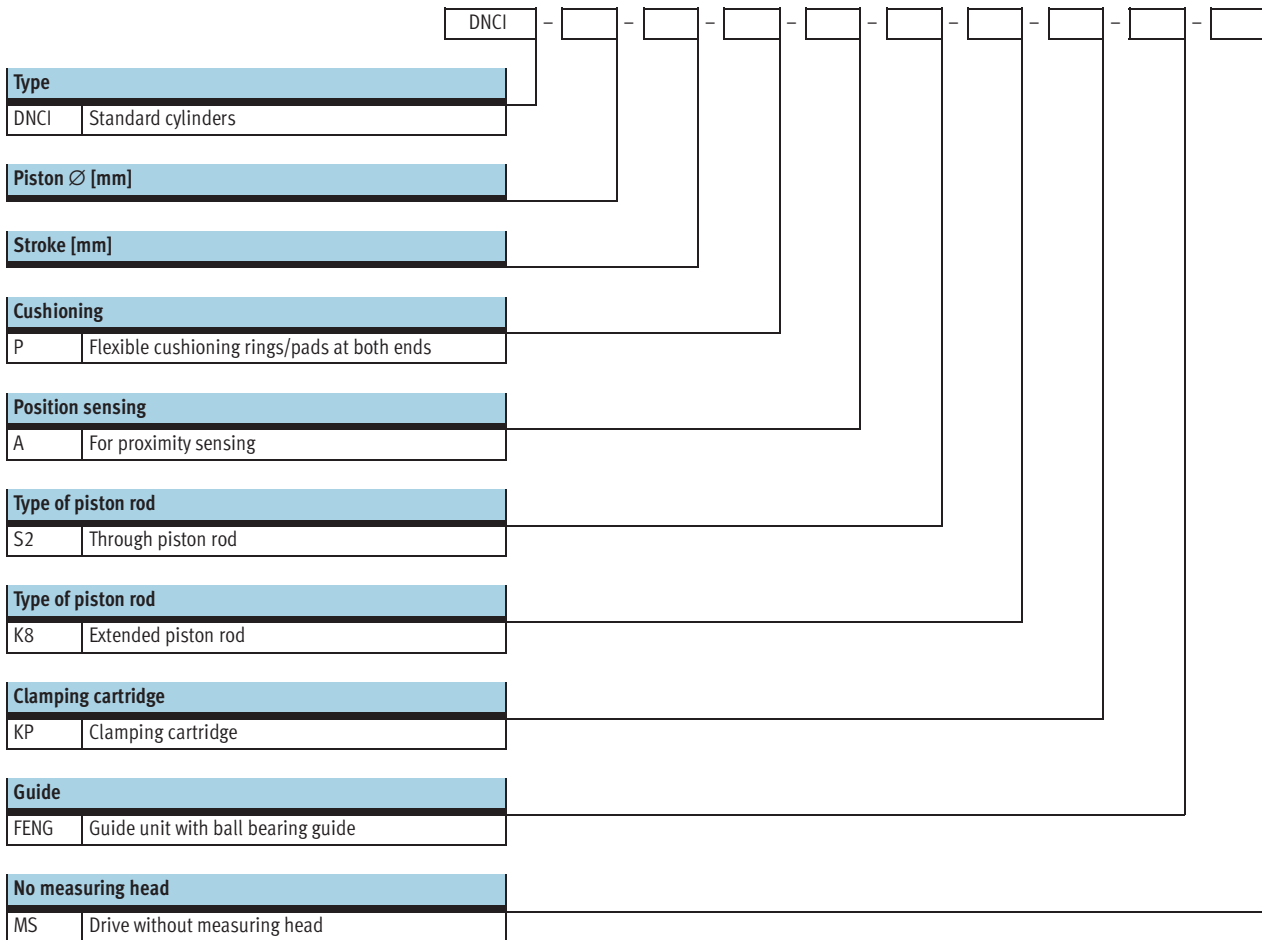


Display and control unit  
e.g. FED-...  
→ Volume 4



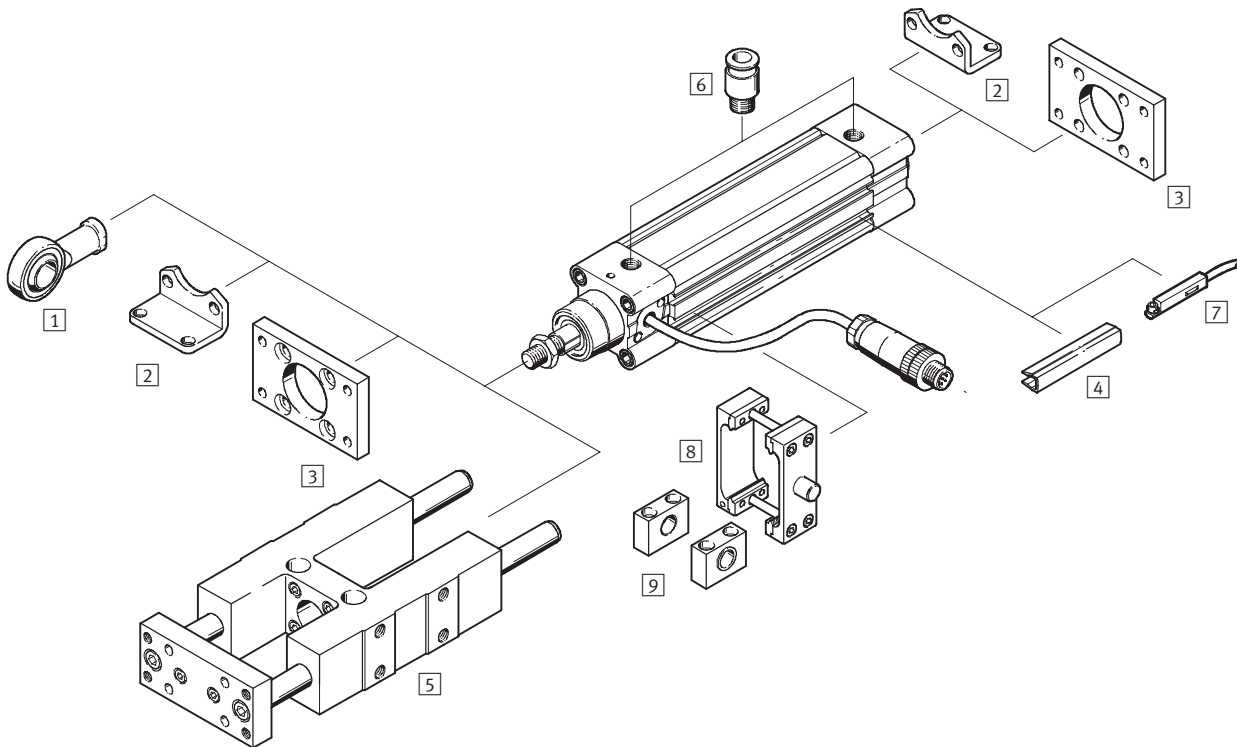
# Standard cylinders DNCI, with integrated displacement encoder


Type code



# Standard cylinders DNCl, with integrated displacement encoder

Peripherals overview



-  - Note  
If the drive DNCl is used without an end position controller SPC11 or an axis controller SPC200, e.g. as a measuring cylinder, then the standard accessories of the drive DNC can be used.

# Standard cylinders DNCI, with integrated displacement encoder

Peripherals overview

Accessories		
Type	Brief description	→ Page
1 Rod eye SGS	With spherical bearing	5 / 1.1-19
2 Foot mounting HNC	For mounting the drive on the bearing and end cap	5 / 1.1-18
3 Flange mounting FNC	For mounting the drive on the bearing and end cap	5 / 1.1-19
4 Slot cover ABP-5-S	For protecting against ingress of dirt	5 / 1.1-21
5 Guide unit <sup>1)</sup> FENG-KF	For protecting against torsion at high torque loads	5 / 1.1-16
6 Push-in fitting QS	For connecting compressed air tubing with standard external diameters	5 / 1.1-21
7 Proximity sensor SME/SMT-8	For additional sensing of the piston position, can be ordered optionally, only in conjunction with the order code A in the drive's modular product section	Volume 1
8 Trunnion mounting kit ZNCM	For swivelling movements of the drive	5 / 1.1-20
9 Trunnion support LNZG	For securing the trunnion mounting kit ZNCM	5 / 1.1-20

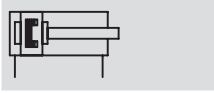
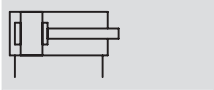
1) Guide unit FENG-KF must be attached to the piston rod such that backlash is eliminated

# Standard cylinders DNCI, with integrated displacement encoder

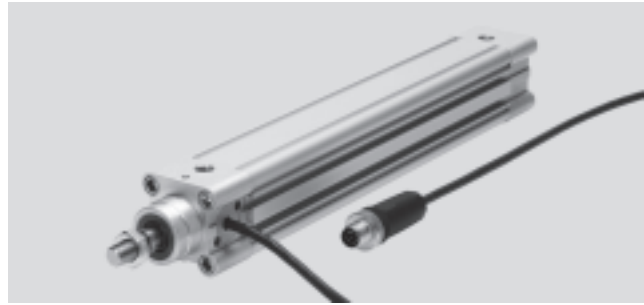
Technical data



## Function



- - Diameter  
32 ... 63 mm
- - Stroke length  
10 ... 2,000 mm



General technical data				
Piston Ø	32	40	50	63
Constructional design	Piston Piston rod Profile barrel			
Mode of operation	Double-acting			
Cushioning	Flexible cushioning rings/pads at both ends			
Position sensing	Integrated displacement encoder For proximity sensing <sup>1)</sup>			
Measuring principle (displacement encoder)	Digital			
Type of mounting	Foot mounting			
Stroke <sup>2)4)</sup>	[mm] 10 ... 2,000			
Torsion protection/Guide <sup>3)</sup>	Guide rod with yoke, with ball bearing guide			
Stroke	[mm] 100 ... 500			
Piston rod extension	[mm] 1 ... 500			
Pneumatic connection	G1/8	G1/4	G1/4	G3/8
Electrical connection	Cable with 8-pin plug, round type M12			
Cable length	[m] 1.5			

- 1) Not included in the scope of delivery, can be ordered as an option
- 2) Note stroke reduction in conjunction with SPC200
- 3) Guide unit FENG-KF must be ordered as an option and will be supplied attached, the max. stroke is reduced
- 4) Can only be used as a positioning drive without reservation in the range from 100 ... 500 mm

Forces [N] and impact energy [Nm]				
Piston Ø	32	40	50	63
Theoretical force at 6 bar advancing	483	754	1,178	1,870
Theoretical force at 6 bar retracting	415	633	990	1,682
Impact energy at end positions	0.1	0.2	0.2	0.5

Permissible impact velocity:

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

Maximum permissible load:

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

- - Note

This data represents the maximum values that can be achieved. Values fluctuate in practice relative to the size of the effective load. Allowance

must also be made for the limits of the cushioning capacity of the drive and the permissible impact energy.



# Standard cylinders DNCI, with integrated displacement encoder

Technical data

Operating and environmental conditions		
Operating pressure <sup>1)</sup>	[bar]	4 ... 8
Operating medium <sup>2)</sup>		Compressed air, filtered and unlubricated, filter unit 5 µm
Ambient temperature <sup>3)</sup>	[°C]	-20 ... +80
Vibration resistance		To DIN/IEC 68 Parts 2 – 6, severity level 2
Continuous shock resistance		To DIN/IEC 68 Parts 2 – 82, severity level 2
CE symbol (declaration of conformance)		In accordance with EU EMC Directive
Protection class (displacement encoder)		IP65 to IEC 60 529
Corrosion resistance class CRC <sup>4)</sup>		1

1) Only applies for applications with the Soft Stop end position controller SPC11 and axis controller SPC200

2) The proportional directional control valve MPYE used requires the characteristic values

3) Note operating range of proximity sensors

4) Corrosion resistance class 1 according to Festo standard 940 070

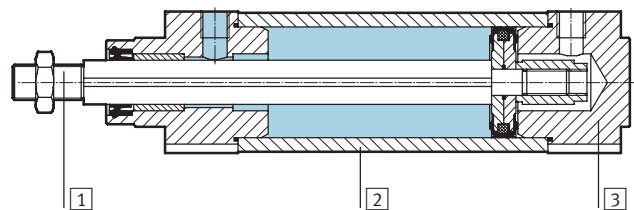
Components requiring low corrosion resistance. Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers.

Weights [g] with displacement encoder					
Piston Ø		32	40	50	63
Basic drive DNCI-...					
	Product weight with 0 mm stroke	521	853	1,319	1,914
	Additional weight per 10 mm stroke	30	44	62	71
	Moving load with 0 mm stroke	95	175	316	383
	Additional weight per 10 mm stroke	8	14	23	23
Drive with through piston rod DNCI-...-S2					
	Product weight with 0 mm stroke	586	981	1,553	2,165
	Additional weight per 10 mm stroke	39	60	87	96
	Moving load with 0 mm stroke	155	164	297	364
	Additional weight per 10 mm stroke	17	30	48	48
Additional weight with extended piston rod K8					
	Additional weight per 10 mm stroke	8	14	23	23
Additional weight with clamping cartridge KP					
	Product weight	234	394	700	1,147
Additional weight with guide unit FENG-...					
	Product weight with 0 mm stroke	1,530	2,370	4,030	5,410
	Additional weight per 10 mm stroke	18	32	50	62

## Materials

### Sectional view

Standard cylinders	
1) Piston rod	High-alloy steel
2) Cylinder barrel	Anodised aluminium
3) Bearing/end caps	Die-cast aluminium
- Dynamic seals	Polyurethane TPE-U
- Static seals	Nitrile rubber
- Lubricant	Klüberplex BE31-102
Displacement encoder	
- Sensor housing	Polyacetate
- Cable sheath	Polyurethane
- Plug housing	Polybuteneterephthalate
- Wall mounting plate	Polyacetate
- Screws for mounting plate	Steel



# Standard cylinders DNCI, with integrated displacement encoder

FESTO

Technical data

Positioning characteristics with axis controller SPC200						
Piston Ø			32	40	50	63
Repetition accuracy	horizontal	[mm]	< ±0.5			
	vertical	[mm]	< ±0.5			
Assembly position			Any			
Minimum load, horizontal		[kg]	3	5	8	12
Maximum load, horizontal		[kg]	45	75	120	180
Minimum load, vertical <sup>1)</sup>		[kg]	3	5	8	12
Maximum load, vertical <sup>1)</sup>		[kg]	15	25	40	60
Min. travel speed		[m/s]	0.05			
Max. speed of travel		[m/s]	1.5			
Typ. positioning time, long stroke <sup>3)</sup>		[s]	0.45/0.70	0.50/0.75	0.65/0.80	0.55/0.75
Typ. positioning time, short stroke <sup>4)</sup>		[s]	0.35/0.55	0.40/0.55	0.45/0.60	0.40/0.55
Minimum positioning stroke <sup>2)</sup>		[%]	< 3			
Stroke reduction <sup>5)</sup>		[mm]	10		15	
Recommended proportional directional control valve			→ 5 / 1.1-21			

- 1) Only in conjunction with an external guide
- 2) In relation to the maximum stroke of the drive, but never more than 20 mm
- 3) At 6 bar, horizontal mounting position, DNCI-XX-500, 400 mm positioning travel at min./max. load
- 4) At 6 bar, horizontal mounting position, DNCI-XX-500, 100 mm positioning travel at min./max. load
- 5) The stroke reduction is to be maintained on every side of the drive, the max. positionable stroke is therefore: stroke – 2x stroke reduction

Positioning characteristics with end position controller SPC11						
Piston Ø			32	40	50	63
Repetition accuracy of a mid-position <sup>1)</sup>		[mm]	±2			
Assembly position			Horizontal			
Minimum load, horizontal <sup>2)</sup>		[kg]	3	5	8	12
Maximum load, horizontal <sup>2)</sup>		[kg]	45	75	120	180
Travel time			→ Software Tool "SoftStop": <a href="http://www.festo.com/en/engineering">www.festo.com/en/engineering</a>			
Recommended proportional directional control valve			→ 5 / 1.1-21			

- 1) In the stroke range from 100 ... 500 mm
- 2) Load = effective load + mass of all moving parts on the drive

Electrical data, displacement encoder		
Linearity error <sup>1)</sup>	[mm]	±(0.07±0.02xL)
Max. speed of travel	[m/s]	1.5
Ambient temperature	[°C]	-20 ... +80
Max. temperature coefficient	[ppm/°K]	30
Protection class		
IP65		
CE symbol (declaration of conformance)		
In accordance with EU EMC Directive		
Max. permitted magnetic disruption field at 100 mm interval from the sensor <sup>2)</sup>	[kA/m]	10
Electrical connection		
Cable with 8-pin plug, round type M12		
Cable length	[m]	1.5

- 1) Maximum deviation of the output signal from "best fit" line (characteristic curve with nominal gradient).  
L = Length of measuring system in meters
- 2) See also mounting conditions

# Standard cylinders DNCI, with integrated displacement encoder

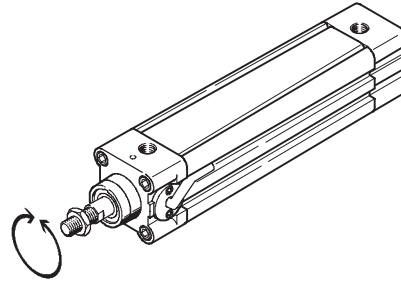
Technical data

## Torques and lateral forces

The piston rod must not absorb any torque. We therefore recommend that an external guide FENG-KF be used with the drive DNCI. The guide unit is delivered installed.

The permissible static and dynamic characteristic load values with and without attached guide as well as with regard to the technical data of the variants (S2, S8, S9)

→ Volume 1 (standard cylinder DNC)



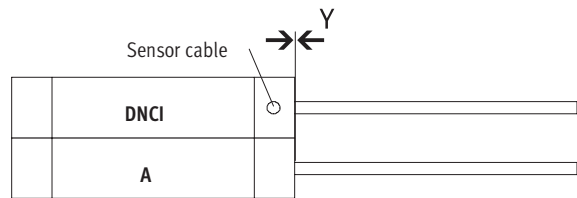
## Mounting conditions

When mounting a drive A with magnet (for position sensing), in addition to a standard cylinder DNCI, the following conditions must be observed:

- X Minimum distance between the drives
- Y Offset between the drives on the bearing cap

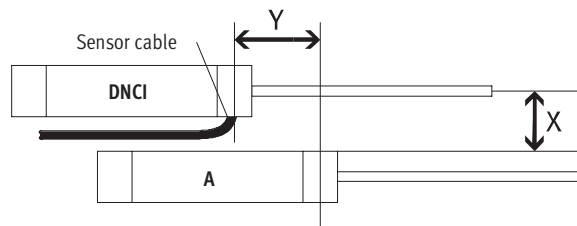
### Parallel assembly

If the offset  $Y = 0$  mm, the drives can be assembled directly next to one another.



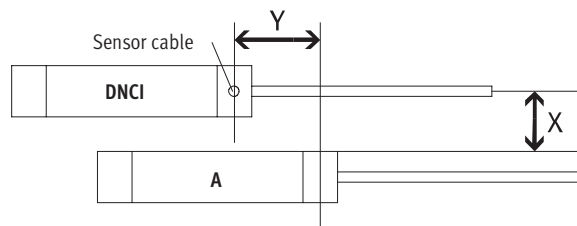
### Offset assembly, cable outlet between the drives

If the offset  $Y > 0$  mm and the cable outlet is between the drives, the distance from  $X > 70$  mm must be observed.



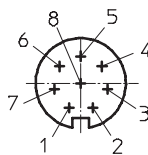
### Offset assembly, cable outlet upwards or downwards

If the offset  $Y > 0$  mm and the cable outlet is up or down, the distance from  $X > 60$  mm must be observed.



## Pin assignment of plug, view of plug

Pin	Function	Colour
1	5 V	black
2	GND	brown
3	sin+	red
4	sin-	orange
5	cos-	green
6	cos+	yellow
7	Screening	Screening
8	-	-



# Standard cylinders DNCI, with integrated displacement encoder

Technical data

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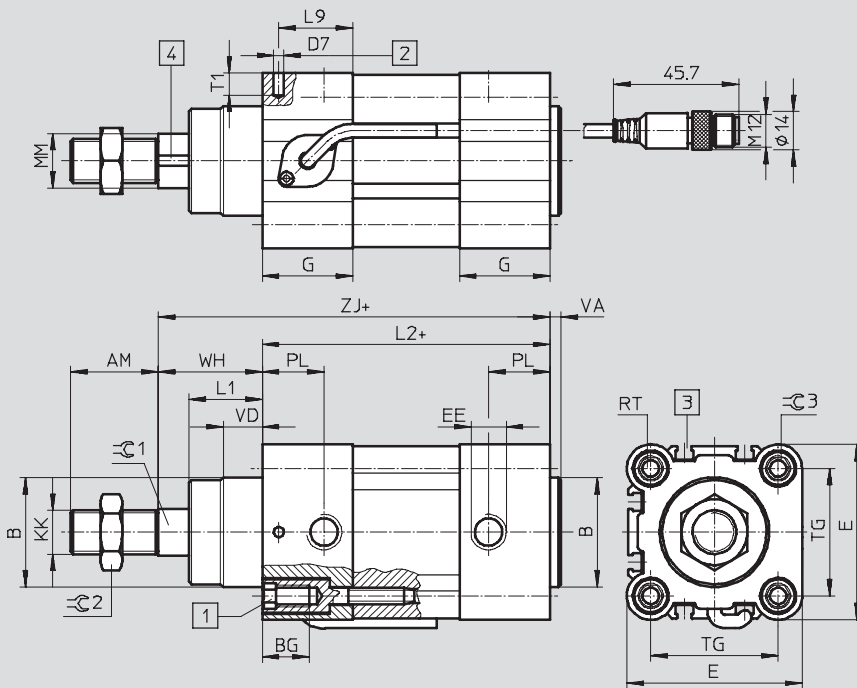
Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1

## Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

### Basic version

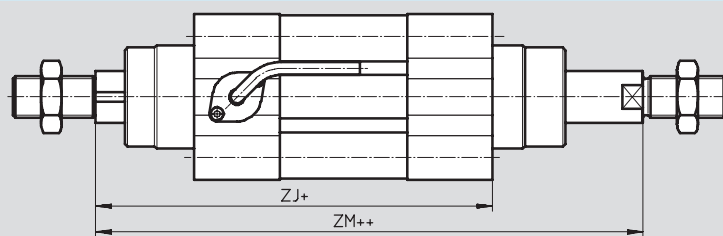


- 1 Socket head screw with female thread for mounting attachments
- 2 Hole for securing the earthing self-tapping M4 screw according to DIN 7500
- 3 Sensor slot for proximity sensor SME/SMT-8
- 4 Magnetic measuring band

+ = plus stroke length

++ = plus 2x stroke length

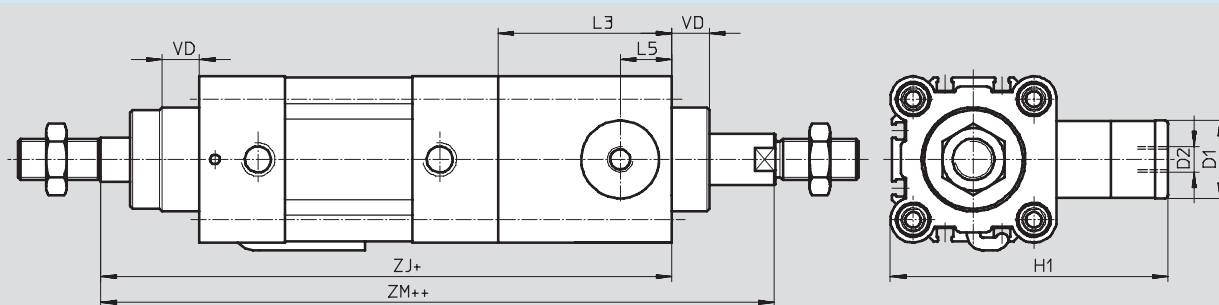
### S2 – Through piston rod



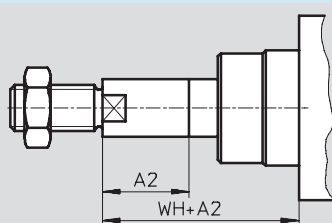
+ = plus stroke length

++ = plus 2x stroke length

### S2 / KP – Through piston rod with clamping cartridge



### K8 – Extended piston rod



# Standard cylinders DNCl, with integrated displacement encoder

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Technical data

∅ [mm]	AM	A2 max.	B ∅ d11	BG	D1 ∅ f9	D2	D7 ∅	E	EE	G	H1
32	22	500	30	16	20	M5	3.7	45	G $\frac{1}{8}$	28	67
40	24	500	35	16	24	G $\frac{1}{8}$	3.7	54	G $\frac{1}{4}$	33	88
50	32	500	40	17	30	G $\frac{1}{8}$	3.7	64	G $\frac{1}{4}$	33	107
63	32	500	45	17	38	G $\frac{1}{8}$	3.7	75	G $\frac{3}{8}$	40.5	123

∅ [mm]	KK	L1	L2	L3	L5	L9	MM ∅ f8	PL	RT	T1	TG
32	M10x1.25	18	94	45	14	22.5	12	15.6	M6	8	32.5
40	M12x1.25	21.3	105	53	16	27	16	14	M6	8	38
50	M16x1.5	26.8	106	67	20	27	20	14	M8	8	46.5
63	M16x1.5	27	121	76	24	33	20	17	M8	8	56.5

∅ [mm]	PI	VD	WH	ZJ		ZM		≈C1	≈C2	≈C3
					KP		KP			
32	4	10	26	120	165	148	193	10	16	6
40	4	10.8	30	135	188	167	220	13	18	6
50	4	14.3	37	143	210	183	250	17	24	8
63	4	14.5	37	158	234	199	275	17	24	8

Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1

# Standard cylinders DNCI, with integrated displacement encoder

Technical data



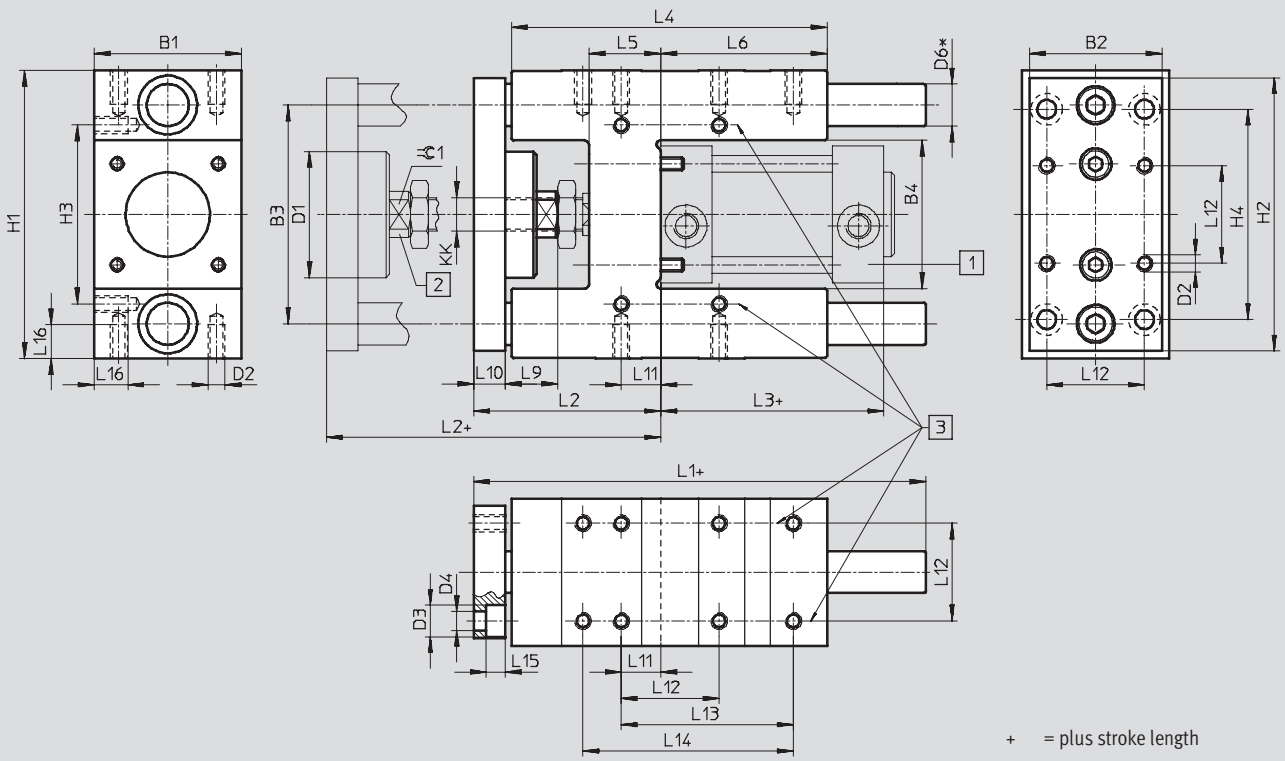
Servopneumatic positioning systems  
Cylinders with displacement encoders

## 1.1

### Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Guide unit FENG-KF



# Standard cylinders DNCl, with integrated displacement encoder

FESTO

Technical data

For Ø	B1	B2	B3	B4	D1	D2	D3	D4	D6	H1
[mm]	-0.3		±0.2	±0.3	Ø		Ø	Ø	Ø	h6
32	50	45	74	50.5	44	M6	11	6.6	12	97-0.4
40	58	54	87	58.5	44	M6	11	6.6	16	115-0.4
50	70	63	104	70.5	60	M8	15	9	20	137-0.5
63	85	80	119	85.5	60	M8	15	9	20	152-0.5

For Ø	H2	H3	H4	KK	L1	L2	L3	L4	L5	L6
[mm]		±0.2	±0.2							
32	90	61	78	M10x1.25	155	67 <sub>+5</sub>	94	125	24	76
40	110	69	84	M12x1.25	170	75 <sub>+5</sub>	105	140	28	81
50	130	85	100	M16x1	188	89 <sub>+10</sub>	106	150	34	79
63	145	100	105	M16x1	220	89 <sub>+10</sub>	121	182	34	111

For Ø	L9	L10	L11	L12	L13	L14	L15	L16	≈G1
[mm]				±0.2	±0.2	±0.2			
32	20	12	4.3	32.5	70.3	78	6.5	12	15
40	22	12	11	38	84	-	6.5	14	15
50	25	15	18.8	46.5	81.8	100	9	16	19
63	25	15	15.3	56.5	105	-	9	16	19

# Standard cylinders DNCI, with integrated displacement encoder

Ordering data – Modular products



Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1

**M** Mandatory data →

Module No.	Function	Piston Ø	Stroke	Cushioning	Position sensing
535 411	DNCI	32	10 ... 2,000	P	A
535 412		40			
535 413		50			
535 414		63			
<b>Order example</b>					
535 411	DNCI	- 32	- 100	- P	- A

Ordering table							
Piston Ø	32	40	50	63	Condi- tions	Code	Enter code
<b>M</b> Module No.	535 411	535 412	535 413	535 414			
Function	Standard cylinder with integrated displacement encoder, non-rotating piston rod					DNCI	DNCI
Piston Ø [mm]	32	40	50	63		-...	
Stroke [mm]	10 ... 2,000				1	-...	
Cushioning	Flexible cushioning rings/pads at both ends					-P	-P
Position sensing	For proximity sensing					-A	-A

**1** **Stroke** Can only be used as a positioning drive without reservation in the range from 100 ... 500 mm

Transfer order code



# Standard cylinders DNCI, with integrated displacement encoder

Ordering data – Modular products

**0 Options**

Type of piston rod	Piston rod extended at front	Clamping unit	Guide	Measuring head
S2	...K8	KP	FENG	MS

Ordering table							
Piston Ø	32	40	50	63	Condi- tions	Code	Enter code
<b>0</b> Type of piston rod	Through piston rod					-S2	
Piston rod extended [mm]	1 ... 500				<b>2</b>	-...K8	
Clamping unit	Clamping cartridge				<b>3</b>	-KP	
Guide	Guide unit with ball bearing guide on the sensor head side				<b>4</b>	-FENG	
Measuring head	No measuring head					-MS	

- 2** **K8** In combination with piston rod type S2, the piston rod is only extended at the front (the side facing the measuring head)
- 3** **K9** Only with piston rod type S2
- 4** **FENG** Maximum stroke length 500 mm

Transfer order code

- [ ] - [ ] - [ ] - [ ] - [ ] - [ ]

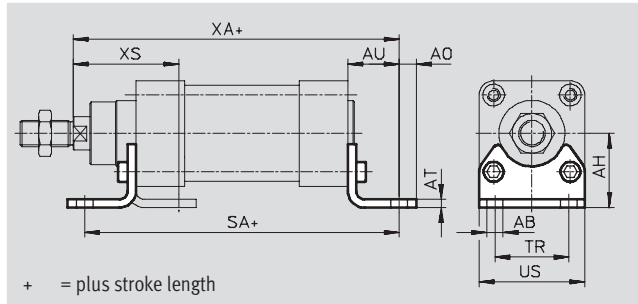
# Standard cylinders DNCI, with integrated displacement encoder

Accessories



## Foot mounting HNC

Material:  
galvanised steel  
Free of copper, PTFE and silicone



Dimensions and ordering data							
For Ø [mm]	AB Ø	AH	AO	AT	AU	SA	
						Basic cylinder	KP
32	7	32	6.5	5	24	142	187
40	10	36	9	5	28	161	214
50	10	45	10.5	6	32	170	237
63	10	50	12.5	6	32	185	261

For Ø [mm]	TR	US	XA		XS	CRC <sup>1)</sup>	Weights [g]	Part No.	Type
			Basic cylinder	KP					
32	32	45	144	189	45	2	135	<b>174 369</b>	<b>HNC-32</b>
40	36	54	163	216	53	2	180	<b>174 370</b>	<b>HNC-40</b>
50	45	64	175	242	62	2	325	<b>174 371</b>	<b>HNC-50</b>
63	50	75	190	266	63	2	405	<b>174 372</b>	<b>HNC-63</b>

1) Corrosion resistance class 2 according to Festo standard 940 070  
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents

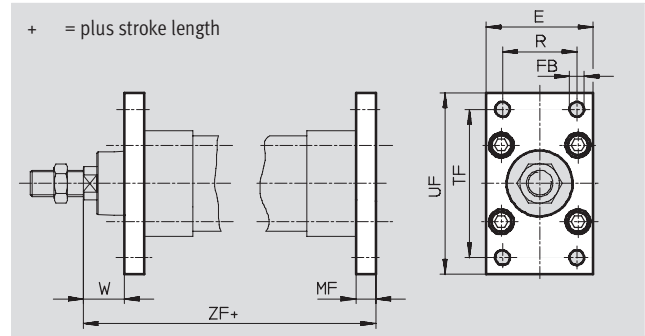
# Standard cylinders DNCI, with integrated displacement encoder



Accessories

## Flange mounting FNC

Material:  
FNC: galvanised steel  
Free of copper, PTFE and silicone



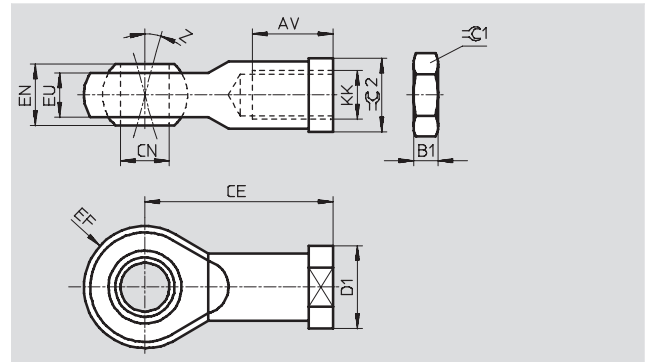
Dimensions and ordering data													
For Ø [mm]	E	TC Ø H13	MF	R	TF	UF	W	ZF		CRC <sup>1)</sup>	Weights [g]	Part No.	Type
								Basic cylinder	KP				
32	45	7	10	32	64	80	16	130	175	2	240	174 376	FNC-32
40	54	9	10	36	72	90	20	145	198	2	280	174 377	FNC-40
50	65	9	12	45	90	110	25	155	222	2	520	174 378	FNC-50
63	75	9	12	50	100	120	25	170	246	2	690	174 379	FNC-63

1) Corrosion resistance class 2 according to Festo standard 940 070  
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents

## Rod eye SGS

Scope of delivery:  
1 rod eye, 1 hex nut to DIN 439

Material:  
galvanised steel



Dimensions and ordering data														
For Ø [mm]	AV	B1	CE	CN Ø H7	D1 Ø	EF ±0.5	EN	Z [°]	$\approx C1$	$\approx C2$	CRC <sup>1)</sup>	Weights [g]	Part No.	Type
M12x1.25	22 -2	6	50	12	22	16	16	13	19	19	2	105	9 262	SGS-M12x1,25
M16x1.5	28 -2	8	64	16	27	21	21	15	24	22	2	210	9 263	SGS-M16x1,5

1) Corrosion resistance class 2 according to Festo standard 940 070  
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents

# Standard cylinders DNCI, with integrated displacement encoder

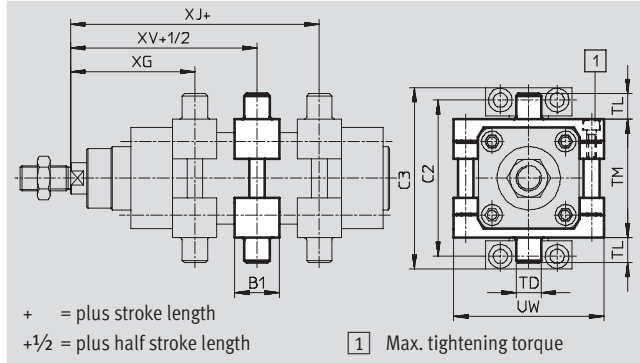
Accessories



## Trunnion mounting kit ZNCM

The mounting kit can be attached at any position along the profile barrel of a cylinder.

Material:  
tempered steel



Dimensions and ordering data									
For Ø [mm]	B1	C2	C3	TD Ø e9	TL	TM	UW	XG	
								Basic cylinder	KP
32	30	71	86	12	12	50	65	66.1	111.1
40	32	87	105	16	16	63	75	75.6	128.6
50	34	99	117	16	16	75	95	83.6	150.6
63	41	116	136	20	20	90	105	93.1	169.1

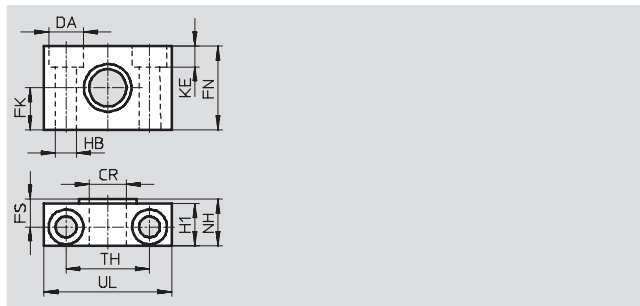
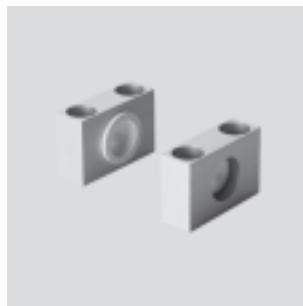
For Ø [mm]	XJ		XV		Max. tightening torque [Nm]	CRC <sup>1)</sup>	Weights [g]	Part No.	Type
	Basic cylinder	KP	Basic cylinder	KP					
32	79.9	124.9	73	118	4+1	2	210	<b>163 525</b>	<b>ZNCM-32</b>
40	89.4	142.4	82.5	135.5	8+1	2	385	<b>163 526</b>	<b>ZNCM-40</b>
50	96.4	163.4	90	157	8+2	2	595	<b>163 527</b>	<b>ZNCM-50</b>
63	101.9	177.9	97.5	173.5	18+2	2	890	<b>163 528</b>	<b>ZNCM-63</b>

1) Corrosion resistance class 2 according to Festo standard 940 070  
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents

## Trunnion supports LNZG

Material:  
Trunnion support:  
Anodised aluminium  
Plain bearing: Plastic

Free of copper, PTFE and silicone




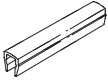
Dimensions and ordering data															
For Ø [mm]	CR	DA	FK	FN	FS	H1	HB	KE	NH	TH	UL	CRC <sup>1)</sup>	Weights [g]	Part No.	Type
	Ø D11	Ø H13	Ø ±0.1			Ø H13			±0.2						
32	12	11	15	30	10.5	15	6.6	6.8	18	32	46	2	125	<b>32 959</b>	<b>LNZG-32</b>
40, 50	16	15	18	36	12	18	9	9	21	36	55	2	400	<b>32 960</b>	<b>LNZG-40/50</b>
63	20	18	20	40	13	20	11	11	23	42	65	2	480	<b>32 961</b>	<b>LNZG-63/80</b>

1) Corrosion resistance class 2 according to Festo standard 940 070  
Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents

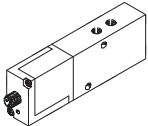
# Standard cylinders DNCI, with integrated displacement encoder




Accessories

Ordering data					
	For Ø	Remarks	Part No.	Type	PU <sup>1)</sup>
Push-in fitting <span style="float: right;">Technical data → Volume 3</span>					
	32	-	<b>186 098</b>	<b>QS-G<math>\frac{1}{8}</math>-8</b>	10
	40		<b>186 099</b>	<b>QS-G<math>\frac{1}{4}</math>-8</b>	10
	50		<b>186 101</b>	<b>QS-G<math>\frac{1}{4}</math>-10</b>	10
	63		<b>186 100</b>	<b>QS-G<math>\frac{3}{8}</math>-8</b>	10
			<b>186 102</b>	<b>QS-G<math>\frac{3}{8}</math>-10</b>	10
Slot cover <span style="float: right;">Technical data → Volume 1</span>					
	32, 40, 50, 63	every 0.5 m	<b>151 680</b>	<b>ABP-5-S</b>	2

1) Packaging unit quantity

Ordering data – Proportional directional control valves				Technical data → 5 / 1.5-2	
	For Ø [mm]	Stroke [mm]	Part No.	Type	
	For applications with axis controller SPC200				
	32	50 ... 150	<b>154 200</b>	<b>MPYE-5-M5-010-B</b>	
		150 ... 400	<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>	
		> 400	<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>	
	40	50 ... 300	<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>	
		> 300	<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>	
	50	50 ... 200	<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>	
		200 ... 900	<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>	
		> 900	<b>151 694</b>	<b>MPYE-5-<math>\frac{1}{4}</math>-010-B</b>	
	63	50 ... 300	<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>	
		300 ... 1,000	<b>151 694</b>	<b>MPYE-5-<math>\frac{1}{4}</math>-010-B</b>	
		> 1,000	<b>151 695</b>	<b>MPYE-5-<math>\frac{3}{8}</math>-010-B</b>	
	For applications with Soft Stop end position controller SPC11				
	32	100 ... 500	<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>	
		> 500	<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>	
	40	100 ... 320	<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>	
		320 ... 500	<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>	
		> 500	<b>151 694</b>	<b>MPYE-5-<math>\frac{1}{4}</math>-010-B</b>	
	50	100 ... 250	<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>	
		250 ... 400	<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>	
> 500		<b>151 694</b>	<b>MPYE-5-<math>\frac{1}{4}</math>-010-B</b>		
63	100 ... 200	<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>		
	200 ... 400	<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>		
	400 ... 650	<b>151 694</b>	<b>MPYE-5-<math>\frac{1}{4}</math>-010-B</b>		
	> 650	<b>151 695</b>	<b>MPYE-5-<math>\frac{3}{8}</math>-010-B</b>		

 Note  
 Recommended proximity sensor  
 → Standard cylinder DNC, Volume 1

# Standard cylinders DNCM, external displacement encoder

Key features

Individual positioning components with standard cylinder DNCM ...

Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1



Proportional directional control valve  
MPYE-...  
→ 5 / 1.5-2



Soft Stop → 5 / 1.4-2

Positioning technology → 5 / 1.3-2

End position controller  
SPC11-POT-TLF



Axis interface  
SPC-AIF-POT

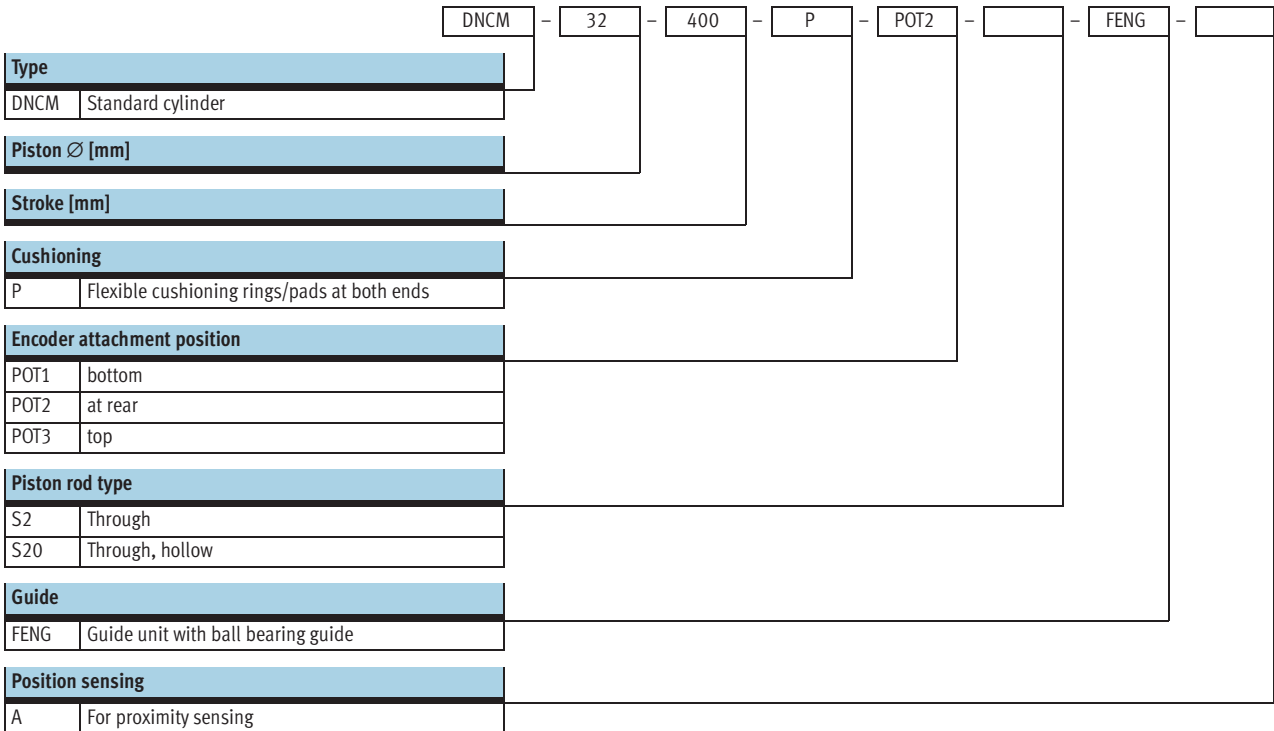


Axis positioning controller  
SPC200



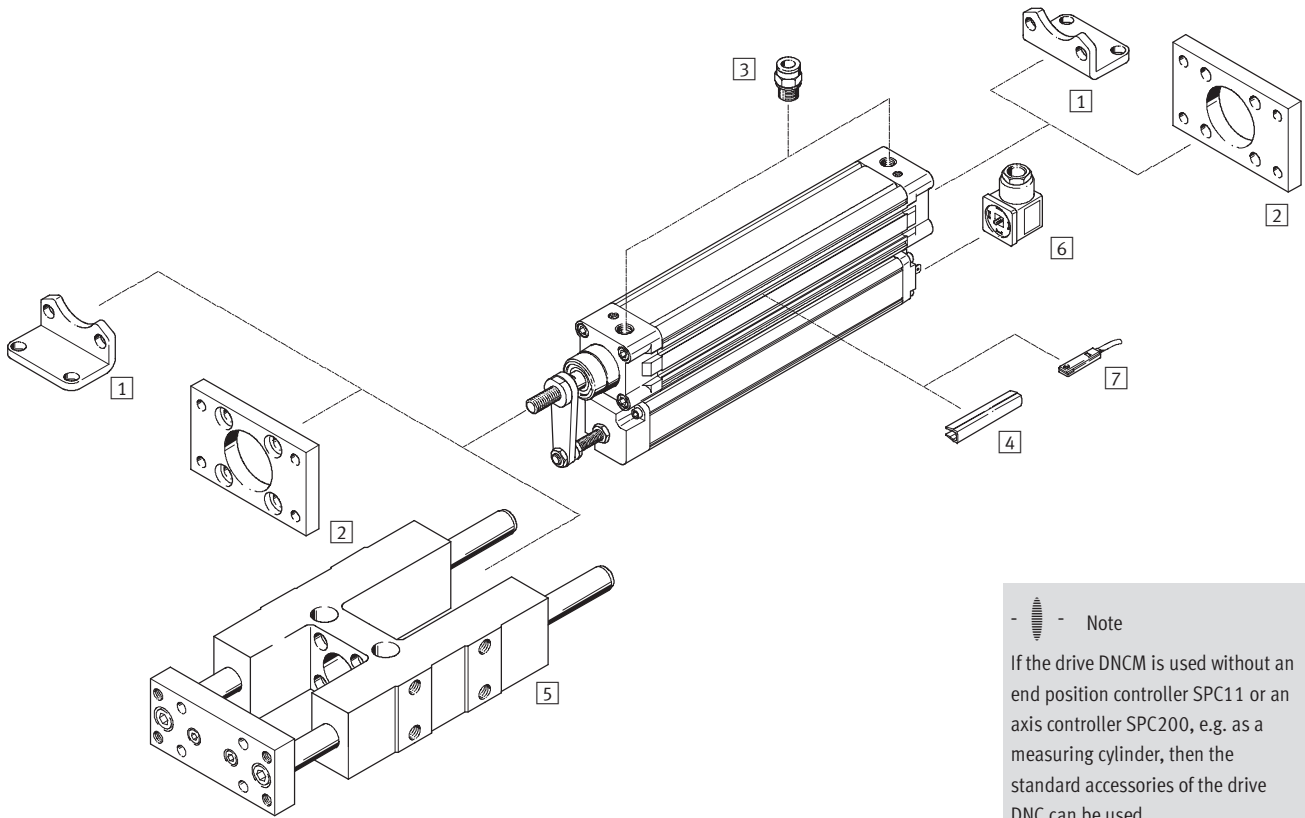
# Standard cylinders DNCM, external displacement encoder


Type code



# Standard cylinders DNCM, external displacement encoder

Peripherals overview



 Note

If the drive DNCM is used without an end position controller SPC11 or an axis controller SPC200, e.g. as a measuring cylinder, then the standard accessories of the drive DNC can be used.



## Standard cylinders DNCM, external displacement encoder

Peripherals overview

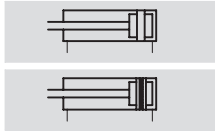
Accessories		
Type	Brief description	→ Page
1) Foot mounting HNC	to mount the drive on the bearing and end cap	5 / 1.1-36
2) Flange mounting FNC	to mount the drive on the bearing and end cap	5 / 1.1-36
3) Push-in fitting QS	for connecting compressed air tubing with standard O.D.	5 / 1.1-37
4) Slot cover ABP-5-S	to protect against the ingress of dirt	5 / 1.1-36
5) Guide unit <sup>1)</sup> FENG-KF	to protect against torsion at high torque loads	5 / 1.1-36
6) Plug socket MSSD-C-4P	to connect the displacement encoder, is part of the end position controller SPC11 and the axis controller SPC200	5 / 1.1-37
7) Proximity sensors SME-/SMT-8	for additional sensing of the piston position, can be ordered optionally, only in conjunction with the order code A in the drive's modular product section.	Volume 1



1) FENG-KF must be attached to the piston rod such that backlash is excluded.

# Standard cylinders DNCM, external displacement encoder

Technical data

Function



-  Diameter  
32 mm and 50 mm
-  Stroke length  
100 ... 500 mm



General technical data		
Piston Ø	32	50
Design	Piston	
	Piston rod	
	Profile barrel	
Mode of operation	Double-acting	
Operating medium <sup>1)</sup>	Compressed air, filtered and unlubricated, filter unit 5 µm	
Cushioning	Flexible cushioning rings/pads at both ends	
Position sensing	Displacement encoder, attached externally	
	Proximity sensor <sup>2)</sup>	
Measuring principle (displacement encoder)	Analogue with encoder, contacting and absolute measurement	
Type of mounting	Foot mounting	
Stroke <sup>3)</sup>	[mm]	100, 160, 200, 250, 320, 400, 500
Torsion protection/Guide <sup>4)</sup>	Guide rod with yoke, with ball bearing guide	
Stroke	[mm]	100, 160, 200, 250
Pneumatic connection	G1/8	G1/4
Electrical connection	4-pin plug, type A DIN 43 650	

- 1) The proportional directional control valve MPYE used requires the characteristic values.
- 2) Not included in the scope of delivery, can be ordered as an option.
- 3) Note stroke reduction in conjunction with SPC200.
- 4) FENG-KF guide must be ordered as an option and will be supplied attached, the max. stroke is reduced.


Forces [N] and impact energy [Nm]		
Piston Ø	32	50
Theoretical force at 6 bar advancing	483	1,178
Theoretical force at 6 bar retracting	415	990
Max. impact energy at end positions	0.1	0.2

Permissible impact velocity:

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

Maximum permissible load:

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

 **Note**

This data represents the maximum values which can be achieved. Values fluctuate in practice relative to the size of the effective load. Allowance must also be made for the limits of the cushioning capacity of the drive and the permissible impact energy.

# Standard cylinders DNCM, external displacement encoder

Technical data

Positioning characteristics with axis controller SPC200			
Piston Ø		32	50
Repetition accuracy	horizontal	[mm]	±0.2
	vertical	[mm]	±0.2 (for stroke 0 ... 200 mm)
		[mm]	±0.4 (for stroke 200 ... 500 mm)
Mounting position		Any	
Minimum load, horizontal <sup>1)</sup>		[kg]	3
Maximum load, horizontal <sup>1)6)</sup>		[kg]	45
Minimum load, vertical <sup>1)</sup>		[kg]	3
Maximum load, vertical <sup>1)6)</sup>		[kg]	15
Min. speed of travel		[m/s]	0.05
Max. speed of travel		[m/s]	2.2
Typ. positioning time, long stroke <sup>2)</sup>		[s]	0.45/0.75
Typ. positioning time, short stroke <sup>3)</sup>		[s]	0.35/0.55
Minimum positioning stroke <sup>4)</sup>		[mm]	3
Stroke reduction <sup>5)</sup>		[mm]	≥ 10
Recommended proportional directional control valve		➔ 5 / 1.1-37	

- 1) Load = effective load + mass of all moving parts on the drive
- 2) At 6 bar, horizontal mounting position, DNCM-XX-500, 400 mm positioning travel at min./max. load
- 3) At 6 bar, horizontal mounting position, DNCM-XX-500, 100 mm positioning travel at min./max. load
- 4) In relation to the maximum stroke of the drive, but never more than 20 mm.
- 5) The stroke reserve is to be maintained on every side of the drive, the max. positionable stroke is therefore: Stroke – 2x stroke reserve
- 6) With external guide

Positioning characteristics with Soft Stop end position controller SPC11			
Piston Ø		32	50
Repetition accuracy of a mid-position <sup>1)</sup>		[mm]	±2
Mounting position		horizontal	
Minimum load, horizontal <sup>2)</sup>		[kg]	3
Maximum load, horizontal <sup>2)</sup>		[kg]	45
Travel time		➔ Software Tool "SoftStop": <a href="http://www.festo.com/en/engineering">www.festo.com/en/engineering</a>	
Recommended proportional directional control valve		➔ 5 / 1.1-37	

- 1) In the stroke range from 100 ... 500 mm
- 2) Load = effective load + mass of all moving parts on the drive

Operating and environmental conditions			
Piston Ø		32	50
Operating pressure <sup>1)</sup>		[bar]	4 ... 8
Ambient temperature <sup>2)</sup>		[°C]	-10 ... +80
Vibration resistance		To DIN/IEC 68 Parts 2 -6, severity level 2	
Continuous shock resistance		To DIN/IEC 68 Parts 2 -27, severity level 2	
CE marking symbol (see conformity declaration)		As per EU EMC directive	
Protection class (displacement encoder)		IP54 to IEC 60 529	
Corrosion resistance class CRC <sup>3)</sup>		1	

- 1) Only applies for applications with the Soft Stop end position controller SPC11 and axis controller SPC200.
- 2) Note operating range of proximity sensors
- 3) Corrosion resistance class 1 according to Festo standard 940 070  
Components requiring low corrosion resistance. Transport and storage protection.

Weights [g] with displacement encoder								
Piston Ø		Stroke						
		100	160	200	250	320	400	500
32	Product weight	1,160	1,406	1,640	1,990	2,312	2,640	3,190
	Moving load	310	375	430	490	565	660	760
50	Product weight	2,270	2,684	3,030	3,520	4,038	4,590	5,420
	Moving load	850	1,010	1,125	1,265	1,455	1,675	1,935

# Standard cylinders DNCM, external displacement encoder

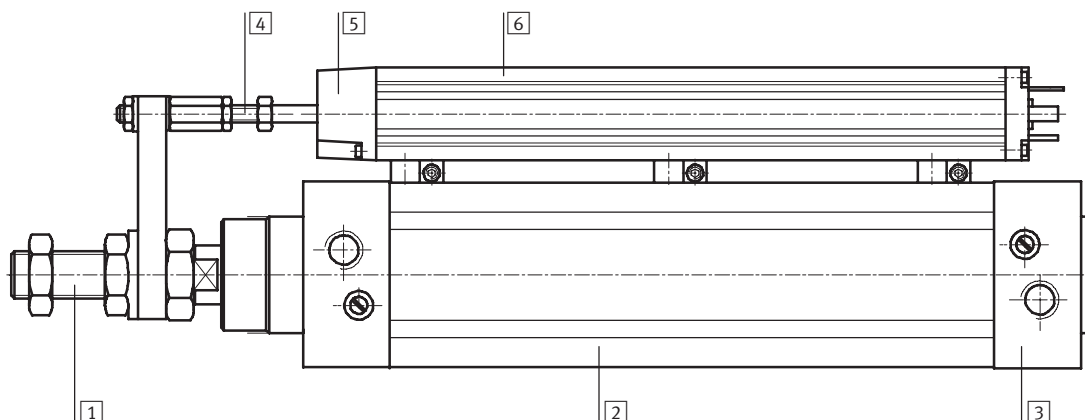
Technical data

Electrical data, displacement encoder			100	160	200	250	320	400	500
Stroke									
Power supply <sup>1)</sup>	[V DC]		10						
Max. current consumption	[mA]		4						
Wiper current	recommended	[µA]	< 1						
	maximum <sup>2)</sup>	[mA]	10						
Connection resistance	[kΩ]		3	5					
Connection resistance tolerance	[%]		±20						
Resolution	[mm]		≤ 0.01						
Independent linearity	maximum	[%]	0.09	0.08	0.07	0.06	0.05	0.05	0.05
Temperature coefficient	[ppm/°K]		≤ 5						
Interface			Analogue						

- 1) Stabilised power supply is recommended, max. 42 VDC permissible.
- 2) Only permissible in the short-term in the event of a fault.

## Materials

Sectional view

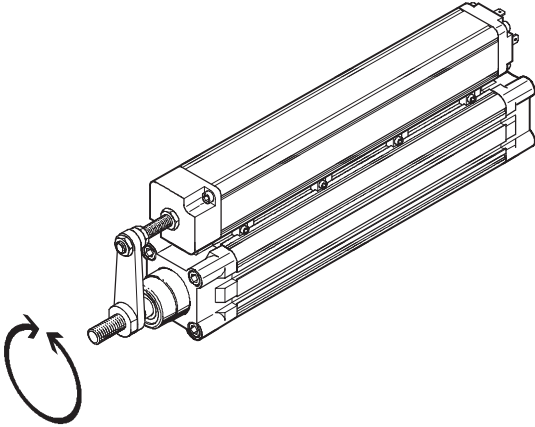



Drive			
<b>1</b>	Piston rod	High-alloy steel	
<b>2</b>	Cylinder barrel	Anodised aluminium	
<b>3</b>	Bearing/end caps	Die-cast aluminium	
-	Dynamic seals	Polyurethane TPE-U	
-	Static seals	Nitrile rubber	
-	Lubricant	Klüberplex BE31-102	
Displacement encoder			
<b>4</b>	Connecting rod	High-alloy steel	
<b>5</b>	Bearing cap	Reinforced polyester	
<b>6</b>	Profile	Anodised aluminium	
-	Resistor element	Conductive plastic	
-	Wiper	Contact	Precious metal
-		Silencer	Elastomer
-	Cover seal	Nitrile rubber	
-	Rod seal	Tetrafluoroethylene	
-	Lubricant	ISOFLEX Topas MB52	

# Standard cylinders DNCM, external displacement encoder

Technical data

## Torques and lateral forces



 Note

Torques or lateral forces can result in inaccurate measurement results. We therefore recommend that an external guide be used with the drive DNCM.

This must be attached to the piston rod such that backlash is excluded.

Use of the DNCM with the FENG-KF is recommended. The drive is delivered with the guide attached.

The permissible static and dynamic characteristic load values with and without attached guide  
➔ Volume 1 (standard cylinder DNC)

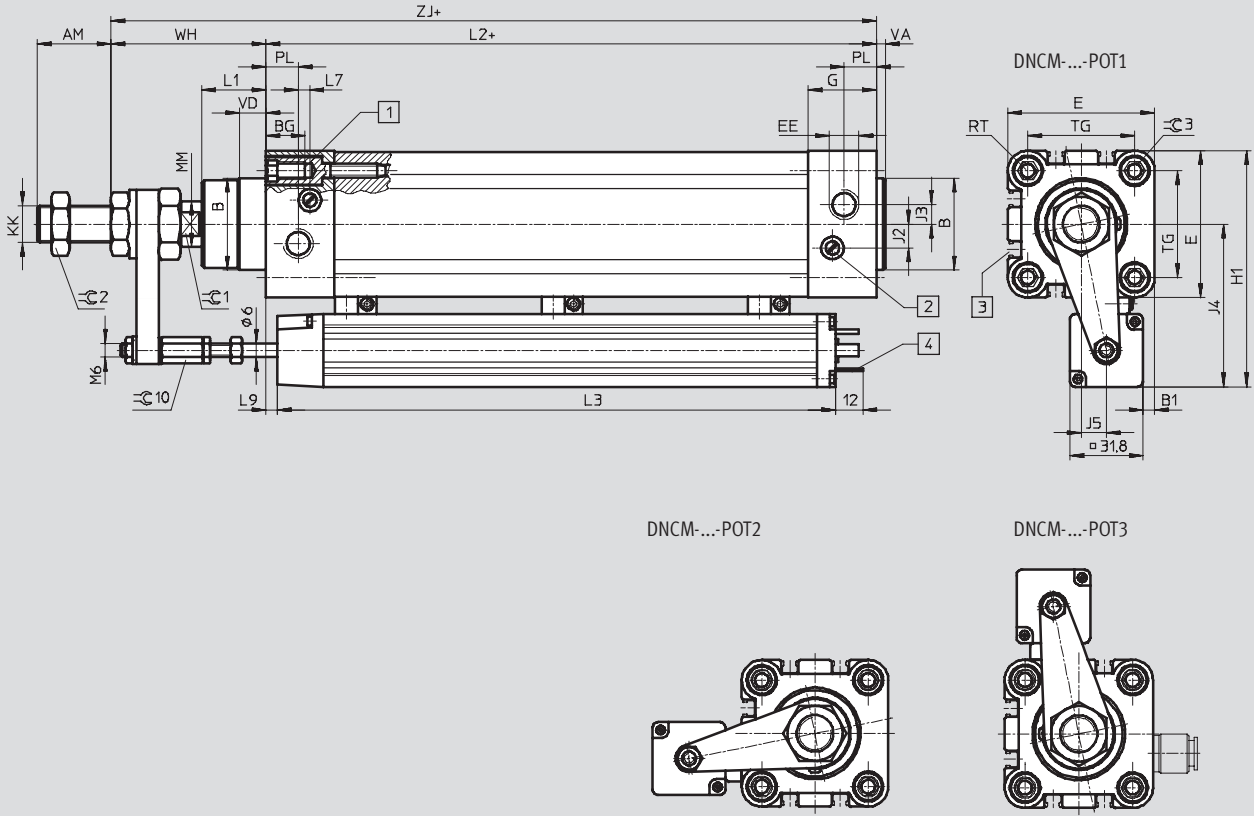
Technical data for the S2 and S20 designs of the piston rod  
➔ Volume 1 (standard cylinder DNC)

# Standard cylinders DNCM, external displacement encoder

Technical data

**Dimensions**

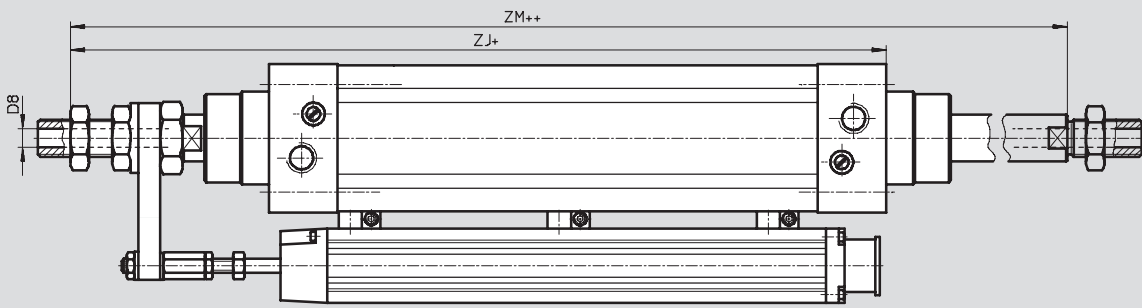
Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)



Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1

**DNCM-...-S2/DNCM-...-S20**



- |   |   |   |
|---|---|---|
| <p><b>1</b> Socket head screw with female thread for mounting attachments</p> <p><b>2</b> Regulating screw for adjustable end-position cushioning</p> | <p><b>3</b> Sensor slot for proximity sensor SME/SMT-8</p> <p><b>4</b> Plug connector to DIN 43 650-A</p> | <p>+ = plus stroke length</p> <p>++ = plus 2x stroke length</p> |
|---|---|---|

# Standard cylinders DNCM, external displacement encoder

Technical data

∅	AM	B ∅ d11	BG	B1 ±0.8	D8 ∅	E	EE	G	H1 ±1.5
32	22	30	16	0.24	4.5	45	G1/8	25.1	84.4
50	32	40	17	5.6	8	64	G1/4	29.6	103.4

∅	J2	J3	J4 ±1	J5 ±1	KK	L1	L2
32	6	5.2	45.8	6.3	M10x1.25	18	94
50	10.4	8.5	55.3	10.6	M16x1.5	28	106

∅	Stroke [mm]	L3	L7	L9	MM ∅ f8	PL	RT	TG	VA	VD
32	100	201	3.3	6.5 ±2	12	15.6	M6	32.5	4	10
	160	248		1 +2/-1						
	200	298		5 ±2						
	250	349		5.5 ±2						
	320	436		13 ±2						
	400	502		6 ±2						
	500	629		20 ±2						
50	100	201	5.1	6.5 ±2	20	14	M8	46.5	4	11.5
	160	248		1 +2/-1						
	200	298		5 ±2						
	250	349		5.5 ±2						
	320	436		13 ±2						
	400	502		6 ±2						
	500	629		0 ±2						

∅	WH	ZJ	ZM	∅G1	∅G2	∅G3
32	44.4	138.4	166.4	10	16	6
50	67.4	173.4	213.4	17	24	8

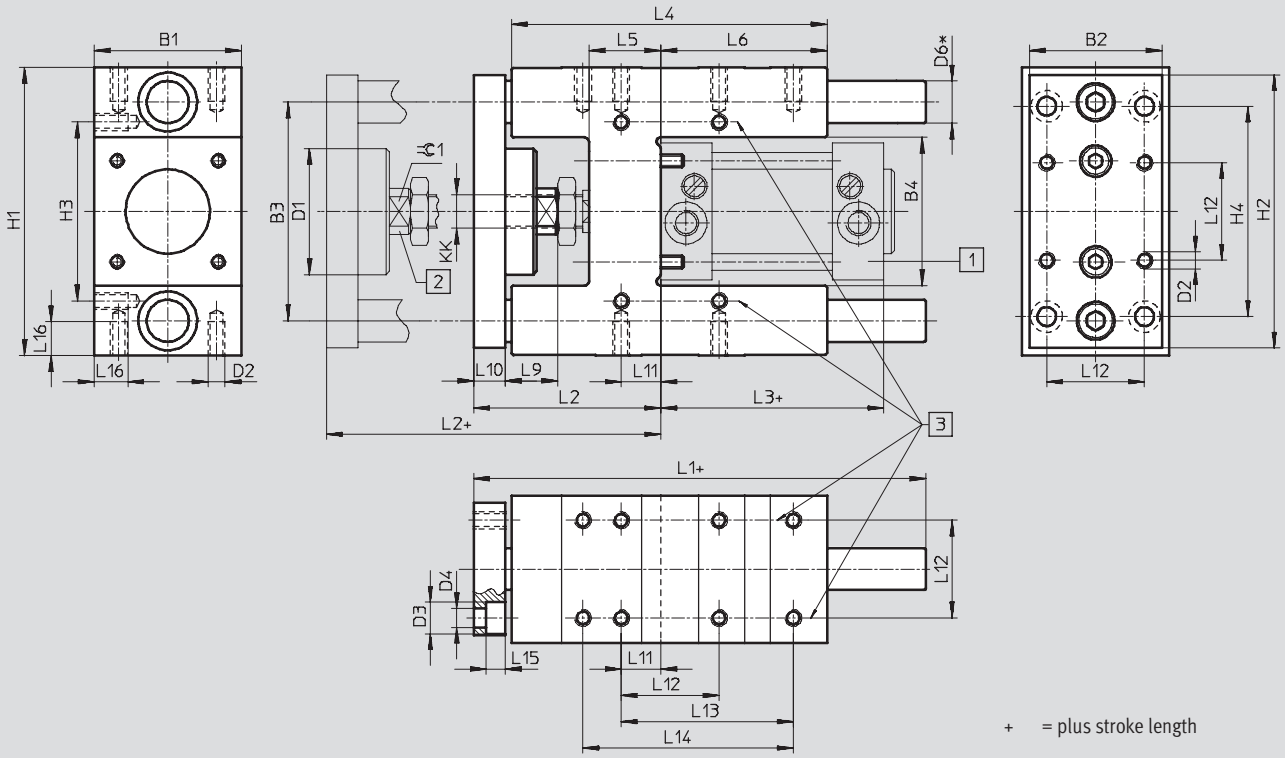
# Standard cylinders DNCM, external displacement encoder

Technical data

**Dimensions**

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Guide unit FENG-KF



Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1



## Standard cylinders DNCM, external displacement encoder

Technical data

for $\varnothing$	B1	B2	B3	B4	D1 $\varnothing$	D2	D3 $\varnothing$	D4 $\varnothing$
[mm]	-0.3		$\pm 0.2$	$\pm 0.3$				
32	50	45	74	50.5	44	M6	11	6.6
50	70	63	104	70.5	60	M8	15	9

for $\varnothing$	D6 $\varnothing$	H1	H2	H3	H4	KK	L1	L2
[mm]	h6			$\pm 0.2$	$\pm 0.2$			
32	12	97 <sub>-0.4</sub>	90	61	78	M10x1.25	155	67 <sub>+5</sub>
50	20	137 <sub>-0.5</sub>	130	85	100	M16x1.5	188	89 <sub>+10</sub>

for $\varnothing$	L3	L4	L5	L6	L9	L10	L11	L12
[mm]								$\pm 0.2$
32	94	125	24	76	20	12	4.3	32.5
50	106	150	34	79	25	15	18.8	46.5

for $\varnothing$	L13	L14	L15	L16	$\approx \varnothing 1$	Stroke	Weight per 10 mm stroke	Weight
[mm]	$\pm 0.2$	$\pm 0.2$				[mm]	[g]	[g]
32	70.3	78	6.5	12	15	10 ... 500	18	1 530
50	81.8	100	9	16	19	10 ... 500	50	4 030

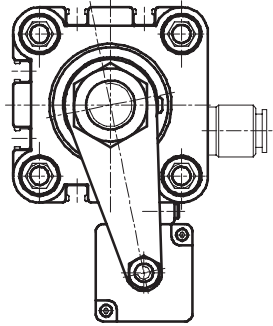
# Standard cylinders DNCM, external displacement encoder

Ordering data – Modular product system

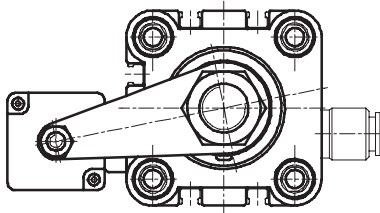


## Arrangement of the displacement encoder

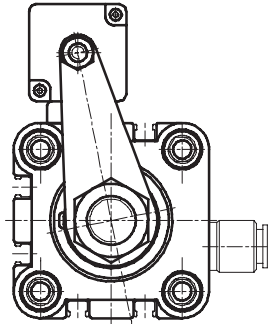
DNCM-...-POT1 (encoder underneath)



DNCM-...-POT2 (encoder at rear)



DNCM-...-POT3 (encoder on top)



# Standard cylinders DNCM, external displacement encoder

Ordering data – Modular product system



M Mandatory data						O Options			
Module No.	Basic function	Size	Stroke	Cushioning	Encoder attachment position	Piston rod type	Guide	Position sensing	
528 940	DNCM	32	100	P	POT1 POT2 POT3	S2 S20	FENG	A	
528 941		50	160						
		200							
		250							
		320							
		400							
		500							
<b>Ordering example</b>									
528 941	DNCM	- 50	- 500	- P	- POT3	- S20	-	- A	

Ordering table						
Size	32	50	Conditions	Code	Enter code	
M Module No.	528 940		528 941			
Basic function	Standard cylinder with displacement encoder				DNCM	DNCM
Size [mm]	32	50		-...		
Stroke [mm]	100			-100		
	160			-160		
	200			-200		
	250			-250		
	320			-320	[1]	
	400			-400	[1]	
	500			-500	[1]	
Cushioning	Flexible cushioning rings/plates at both ends				-P	-P
Encoder attachment position	Encoder underneath				-POT1	
	Encoder at rear				-POT2	
	Encoder on top				-POT3	
O Piston rod type	Through piston rod		[1]	-S2		
	Through, hollow piston rod		[1]	-S20		
Guide	Guide unit with ball bearing guide KF				[2]	-FENG
Position sensing	For proximity sensing					-A

[1] 320, 400, 500, S2, S20

Not with guide FENG.

[2] FENG

Only with POT2 encoder. FENG is mounted without backlash.

Transfer order code

	DNCM	-		-		-	P	-		-		-		-	
--	------	---	--	---	--	---	---	---	--	---	--	---	--	---	--

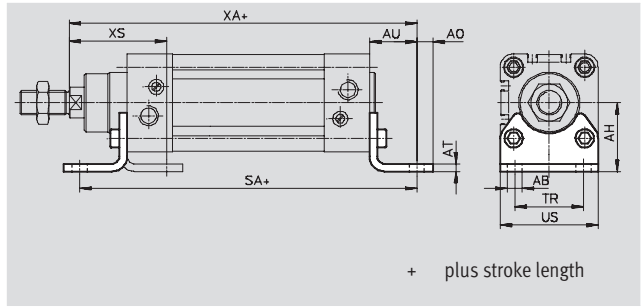
# Standard cylinders DNCM, external displacement encoder

Accessories



## Foot mounting HNC

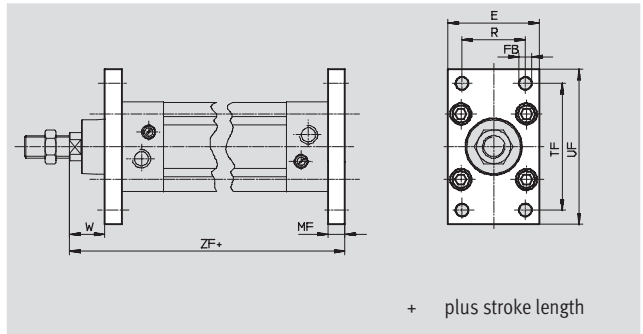
Material:  
Galvanised steel  
Free of copper, PTFE and silicone



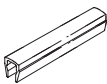
Dimensions and ordering data													
for $\varnothing$	AB	AH	AO	AT	AU	SA	TR	US	XA	XS	Weight	Part No.	Type
[mm]	$\varnothing$										[g]		
32	7	32	6.5	4	24	142	32	45	144	45	135	<b>174 369</b>	<b>HNC-32</b>
50	10	45	9.5	5	31	170	45	64	175	62	325	<b>174 371</b>	<b>HNC-50</b>

## Flange mounting FNC

Material:  
Galvanised steel  
Free of copper, PTFE and silicone



Dimensions and ordering data											
for $\varnothing$	E	FB	MF	R	TF	UF	W	ZF	Weight	Part No.	Type
[mm]		$\varnothing$ H13							[g]		
32	45	7	10	32	64	80	16	130	240	<b>174 376</b>	<b>FNC-32</b>
50	65	9	12	45	90	110	25	155	520	<b>174 378</b>	<b>FNC-50</b>


Ordering data – Slot cover				Technical data → Volume 1	
	for $\varnothing$	Remarks	Part No.	Type	PU <sup>1)</sup>
	[mm]				
Slot cover ABP-S					
	32, 50	0.5 m each	<b>151 680</b>	<b>ABP-5-S</b>	2

1) Packaging unit quantity

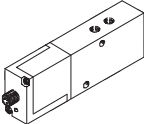
# Standard cylinders DNCM, external displacement encoder

Accessories

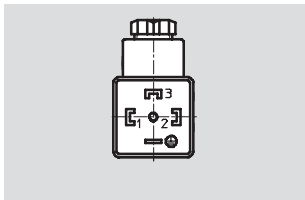


Ordering data – Push-in/threaded fittings			Technical data → Volume 3		
	for Ø [mm]	Remarks	Part No.	Type	PU <sup>1)</sup>
	32	for connecting compressed air tubing with standard O.D.	<b>186 098</b>	<b>QS-G<math>\frac{1}{8}</math>-8</b>	10
	50		<b>186 099</b>	<b>QS-G<math>\frac{1}{4}</math>-8</b>	


1) Packaging unit quantity

Ordering data – Proportional directional control valves			Technical data → 5 / 1.5-2		
	for Ø [mm]	Stroke [mm]	Part No.	Type	
	for applications with axis controller SPC200				
	32	100/160/200/250/320		<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>
		400/500		<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>
	50	100/160/200/250/320/400/500		<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>
	for applications with Soft Stop end position controller SPC11				
	32	100/160/200/250/320/400		<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>
		500		<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>
	50	100/160/200/250		<b>151 692</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-LF-010-B</b>
		320/400		<b>151 693</b>	<b>MPYE-5-<math>\frac{1}{8}</math>-HF-010-B</b>
		500		<b>151 694</b>	<b>MPYE-5-<math>\frac{1}{4}</math>-010-B</b>

## Ordering data – Plug socket



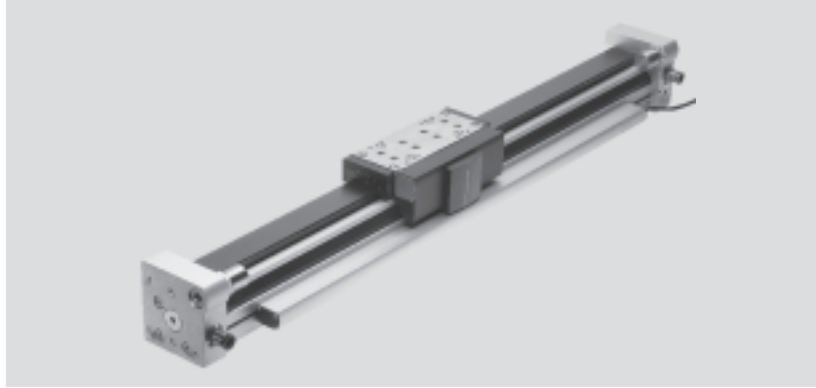
PIN	Pin allocations	Designation	Part No.	Type
1	Power supply	Plug socket	<b>171 157</b>	<b>MSSD-C-4P</b>
2	Signal			
3	0 V			
PE	PE (yellow), screen			

 Note  
 Recommended proximity sensor  
 → Drive DNC, Volume 1

# Linear drives DGCI, with displacement encoder

Key features

## Individual positioning components with linear drive DGCI



Proportional directional control valve  
MPYE-...  
→ 5 / 1.5-2



Soft Stop → 5 / 1.4-2

Positioning technology → 5 / 1.3-2

End position controller  
SPC11-MTS-AIF-2



Axis interface  
SPC-AIF-MTS-2



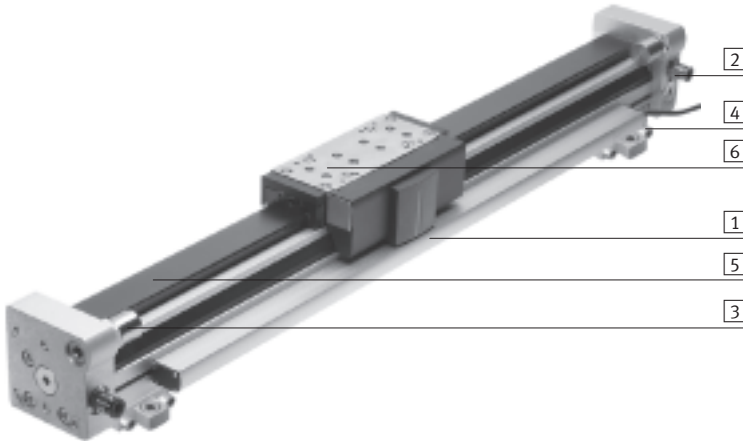
Axis controller  
SPC200



# Linear drives DGCI, with displacement encoder

Key features

## At a glance



### 1 Displacement encoder → 5 / 1.1-46

- High degree of protection IP67
- Non-contacting
- Measures absolute values

### 2 Supply ports → 5 / 1.1-52

- Optionally on 2 sides (end face or from the front)
- Optionally with different coloured push-in fittings for simple and error-free tubing

### 3 End stops → 5 / 1.1-48

- Metallic fixed stop
- Shock absorber, precisely adjustable

### 4 Profile mounting → 5 / 1.1-47

- Profile mountings remain on the base plate after the drive is dismantled. This saves time during assembly and removal

### 5 Recirculating ball bearing guide → 5 / 1.1-44

- Piston  $\varnothing$  18 ... 40 mm
- Stroke lengths 100 ... 2,000 mm
- Guide backlash = 0 mm
- For medium and large loads
- Precision mounting interface with stainless steel slide
- Operating behaviour under torque load = Very good

### 6 Recirculating ball bearing guide with protected guide → 5 / 1.1-44

- Piston  $\varnothing$  18 ... 40 mm
- Stroke lengths 100 ... 2,000 mm
- Guide backlash = 0 mm
- The protected guide cleans the guide rail and protects the recirculating ball bearing guide by means of an additional wiper seal and lubrication unit

### - Passive guide axis DGC-FA → 5 / 3.1-7


- Without drive
- Piston  $\varnothing$  8 ... 40 mm
- Stroke lengths 1 ... 5,000 mm
- Guide backlash = 0 mm
- Precision guide, suitable for DGCI. Can be used as a machine component or as a twin guide with DGCI

### - Passive guide axis with protected guide DGC-FA-GP → 5 / 3.1-7

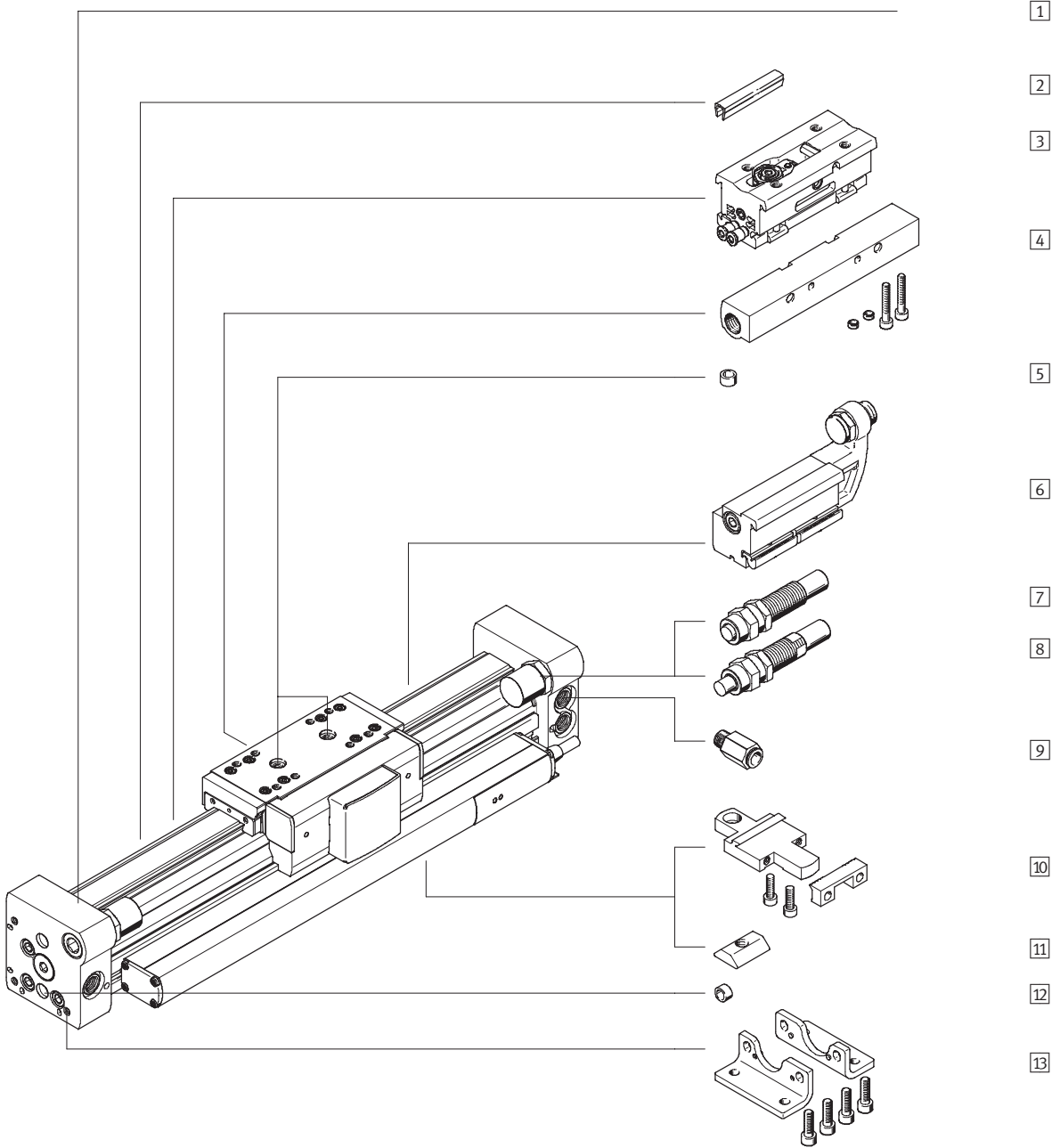
- Without drive
- Piston  $\varnothing$  18 ... 40 mm
- Stroke lengths 1 ... 5,000 mm
- The protected guide cleans the guide rail and protects the recirculating ball bearing guide by means of an additional wiper seal and lubrication unit

# Linear drives DGCI, with displacement encoder

Peripherals overview

 **Note**  
 Drive must not be operated without end stops or shock absorbers.

Servopneumatic positioning systems  
 Cylinders with displacement encoders  
**1.1**



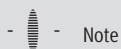


## Linear drives DGCI, with displacement encoder

Peripherals overview

Variants and accessories			
Type	For piston $\varnothing$	Brief description	→ Page
1 Linear drive DGCI-KF	18 ... 40	Linear drive without accessories, with recirculating ball bearing guide.	5 / 1.1-44
2 Slot cover L	18 ... 40	For protecting against ingress of dirt and securing proximity sensor cables.	5 / 1.1-62
3 Intermediate position module DADM-DGC	25, 32	Facilitates intermediate positions with metallic fixed stop. The module can be attached.	5 / 1.1-60
4 Shock absorber retainer DADP-DGC	18 ... 40	For variable end position adjustment in combination with the stop KYC.	5 / 1.1-58
5 Centring pin/sleeve <sup>1)</sup> ZBS/ZBH	18 ... 40	For centring loads and attachments on the slide.	5 / 1.1-62
6 Stop KYC	18 ... 40	For variable end position adjustment in combination with the shock absorber retainer DADP-DGC.	5 / 1.1-58
7 Shock absorber YSR	18 ... 40	Self-adjusting hydraulic shock absorber with spring return and linear cushioning characteristic.	5 / 1.1-54
8 Shock absorber YSRW	18 ... 40	Self-adjusting hydraulic shock absorber with spring return and progressive cushioning characteristic.	5 / 1.1-54
9 Push-in fitting QS	18 ... 40	For connecting compressed air tubing with standard external diameters.	5 / 1.1-52
10 Profile mounting M	18 ... 40	Simple and precise mounting option via dovetail connection.	5 / 1.1-57
11 Slot nut B	25 ... 40	For mounting attachments.	5 / 1.1-62
12 Centring pin/sleeve <sup>1)</sup> ZBS/ZBH	18 ... 40	For centring the drive without foot mountings (user-specific).	5 / 1.1-62
13 Foot mounting F	18 ... 40	For mounting on end cap.	5 / 1.1-56
– Proportional directional control valve MPYE	18 ... 40	Regulates the compressed air and therefore the position of the slide.	5 / 1.1-63

1) Included in the scope of delivery of the drive.

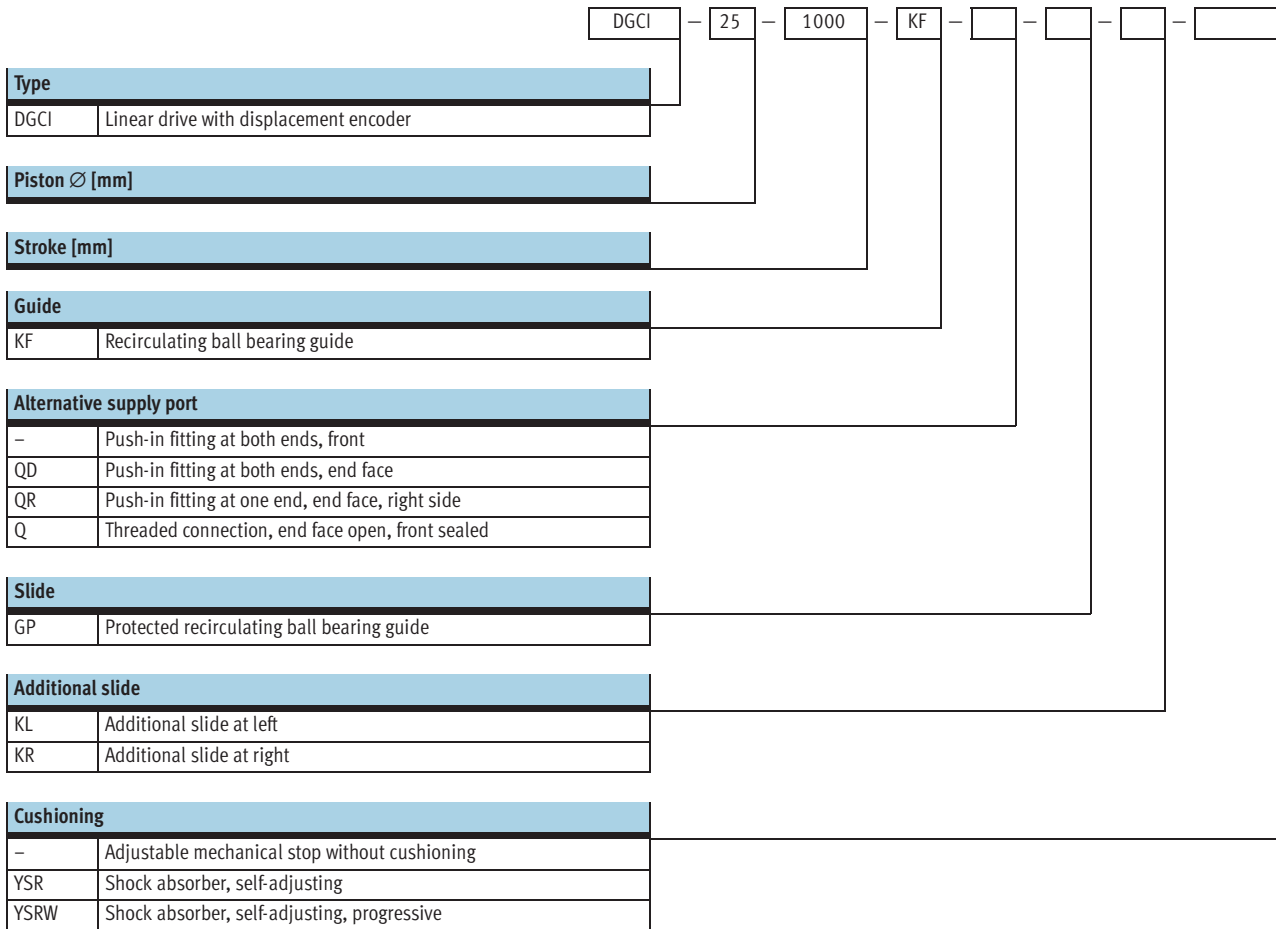


Note

Allocation table of drives and associated proportional directional control valves → 5 / 1.1-63

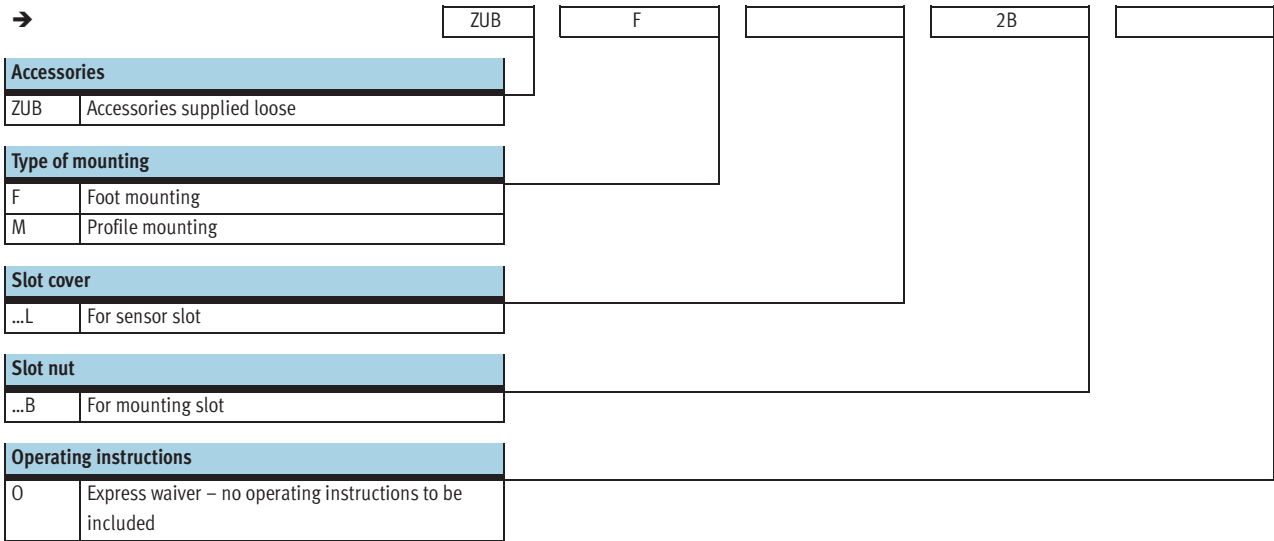
# Linear drives DGCI, with displacement encoder

Type codes



# Linear drives DGCI, with displacement encoder

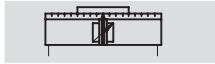
Type codes



# Linear drives DGCI, with displacement encoder



Technical data

Function



[www.festo.com/en/Spare\\_parts\\_service](http://www.festo.com/en/Spare_parts_service)



-  Diameter  
18 ... 40 mm
-  Stroke length  
100 ... 2,000 mm

General technical data				
Piston Ø	18	25	32	40
Constructional design	Rodless linear drive with displacement encoder			
Mode of operation	Double-acting			
Driver principle	Slotted cylinder, mechanically coupled			
Guide	External recirculating ball bearing guide			
Mounting position	Any			
Type of mounting	Profile mounting			
	Foot mounting			
	Direct mounting			
Pneumatic connection	M5	G $\frac{1}{8}$	G $\frac{1}{4}$	
Cushioning ➔ 5 / 1.1-47	<ul style="list-style-type: none"> <li>• Via metallic fixed stop</li> <li>• Optionally via shock absorber, self-adjusting at both ends</li> </ul>			
Position sensing	Via displacement encoder			
Stroke <sup>1)</sup>	[mm]	100, 160, 225, 300, 360, 450, 500, 600, 750, 850, 1000, 1250, 1750, 2000		
Protected version	Optional			
Max. speed <sup>2)</sup>	[m/s]	5		
Stroke tolerance	[mm]	0 ... 2.5		

1) Note stroke reduction in combination with SPC200  
 2) Only applies to positioning using axis controller SPC200 and end position controller SPC11. Otherwise a maximum speed of 3 m/s is permitted

Operating and environmental conditions				
Piston Ø	18	25	32	40
Operating pressure	[bar]	2 ... 8		1.5 ... 8
Operating medium	Filtered and unlubricated compressed air, grade of filtration 5 µm			
Ambient temperature	[°C]	-10 ... +60		
Corrosion resistance class CRC <sup>1)</sup>	1			

1) Corrosion resistance class 1 to Festo standard 940 070  
 Components requiring low corrosion resistance. Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers

Forces [N] and impact energy [Nm]				
Piston Ø	18	25	32	40
Theoretical force at 6 bar	153	295	483	754
Impact energy at the end positions	with fixed stop	0.4	0.5	0.7
	with shock absorber YSR/YSRW	➔ 5 / 1.1-47		

# Linear drives DGCI, with displacement encoder

Technical data

FESTO

Positioning characteristics with axis controller SPC200				
Piston Ø	18	25	32	40
Repetition accuracy [mm]	→ 5 / 1.1-46			
Mounting position	Any			
Minimum load, horizontal <sup>1)</sup> [kg]	1	2	3	5
Maximum load, horizontal <sup>1)</sup> [kg]	15	30	50	75
Minimum load, vertical <sup>1)</sup> [kg]	1	2	3	5
Maximum load, vertical <sup>1)</sup> [kg]	5	10	15	25
Min. travel speed [m/s]	0.05			
Max. travel speed [m/s]	5			
Typ. positioning time, long stroke <sup>2)</sup> [s]	0.75/1.15	0.65/1.00	0.65/1.05	0.70/1.05
Typ. positioning time, short stroke <sup>3)</sup> [s]	0.38/0.65	0.38/0.60	0.38/0.60	0.38/0.60
Minimum positioning stroke <sup>4)</sup> [%]	3			
Stroke reduction <sup>5)</sup> [mm]	20	25	25	35
Recommended proportional directional control valve	→ 5 / 1.1-63			

- 1) Load = effective load + mass of all moving parts on the drive
- 2) At 6 bar, horizontal mounting position, DGCI-XX-1000, 800 mm positioning travel at min./max. load
- 3) At 6 bar, horizontal mounting position, DNCI-XX-1000, 100 mm positioning travel at min./max. load
- 4) Referred to the maximum stroke of the drive, but never more than 20 mm
- 5) The stroke reduction is to be maintained on every side of the drive, the max. positionable stroke is therefore: stroke – 2x stroke reduction

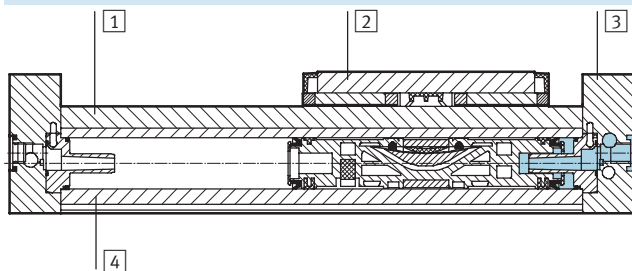
Positioning characteristics with end position controller SPC11				
Piston Ø	18	25	32	40
Repetition accuracy of an intermediate position [mm]	±2			
Mounting position	Any			
Minimum load, horizontal <sup>1)</sup> [kg]	1	2	3	5
Maximum load, horizontal <sup>1)</sup> [kg]	15	30	50	75
Minimum load, vertical <sup>1)</sup> [kg]	1	2	3	5
Maximum load, vertical <sup>1)</sup> [kg]	5	10	15	25
Travel time [s]	→ "SoftStop" software tool: <a href="http://www.festo.com/en/engineering">www.festo.com/en/engineering</a>			
Recommended proportional directional control valve	→ 5 / 1.1-63			

- 1) Load = effective load + mass of all moving parts on the drive

Weight [g]				
Piston Ø	18	25	32	40
Basic weight with 0 mm stroke	1200	2400	3100	7300
Additional weight per 10 mm stroke	38	56	81	124
Moving load	360	770	1170	2360
Moving load on additional slide	300	650	1200	2000

## Materials

Sectional view



Linear drives		
1	Guide rail	High-alloy steel
2	Slide	High-alloy steel
3	End cap	Anodised aluminium
4	Cylinder profile, housing	Anodised aluminium
-	Seals, sealing band	Polyurethane
-	Guide band, dirt wiper, reversing roller	Polyacetate
-	Cover	Polyacetate; polyamide; powder coated aluminium
-	Displacement encoder	Anodised aluminium; glass fibre reinforced polyphthalamide
-	Cable	Polyurethane
-	Note on materials	Free of copper, PTFE and silicone

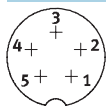
# Linear drives DGCI, with displacement encoder

Technical data



Electrical data for displacement encoder		
Linearity	[%]	±0.02 FS (min. ±50µm)
Resolution	[mm]	≤0.01
Interface		CAN to ISO/DIS 11898
Power supply	[V DC]	24 (±25%)
Current consumption	[mA]	Typically 100
Max. temperature coefficient	[ppm/°K]	15
Protection class		IP67
CE mark (see declaration of conformity)		In accordance with EU EMC directive
Electrical connection		Cable with 5-pin plug, round type M9
Cable length	[m]	1.5
Cable quality		Suitable for chain link trunking

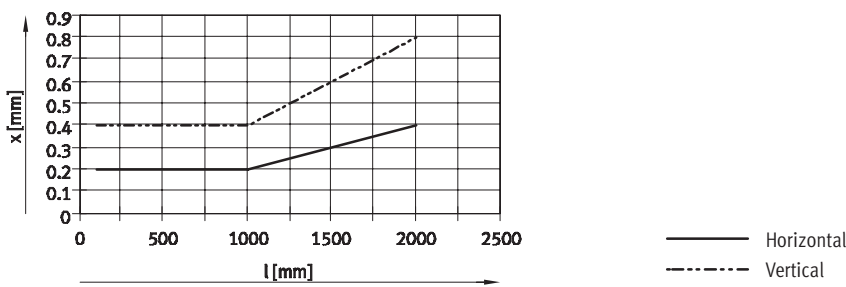
## Pin allocation of plug for displacement encoder



Pin	Function
1	24 V
2	-
3	0 V

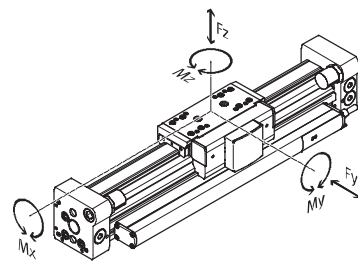
Pin	Function
4	CAN_H
5	CAN_L
-	Screen

## Repetition accuracy x as a function of the stroke l

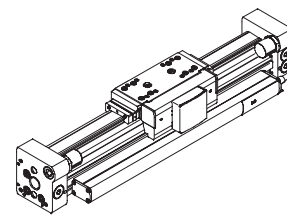


## Characteristic load values for linear drive with recirculating ball bearing guide and guide

The indicated forces and torques refer to the slide surface and the centre of the slide. They must not be exceeded in operational use. Special attention must be paid to the cushioning phase.



GP – Protected guide



If the drive is simultaneously subjected to several of the indicated forces and torques listed below, the following equation must be satisfied in addition to the indicated maximum loads:

$$\frac{F_y}{F_{y_{max}}} + \frac{F_z}{F_{z_{max}}} + \frac{M_x}{M_{x_{max}}} + \frac{M_y}{M_{y_{max}}} + \frac{M_z}{M_{z_{max}}} \leq 1$$

Note  
To avoid distortion in the slide, the bearing surfaces of the attachments must maintain a flatness of 0.01 mm.

Permissible forces and torques					
Piston ∅		18	25	32	40
F <sub>y</sub> <sub>max.</sub>	[N]	1850	3050	3310	6890
F <sub>z</sub> <sub>max.</sub>	[N]	1850	3050	3310	6890
M <sub>x</sub> <sub>max.</sub>	[Nm]	16	36	54	144
M <sub>y</sub> <sub>max.</sub>	[Nm]	51	97	150	380
M <sub>z</sub> <sub>max.</sub>	[Nm]	51	97	150	380

# Linear drives DGCI, with displacement encoder

Technical data



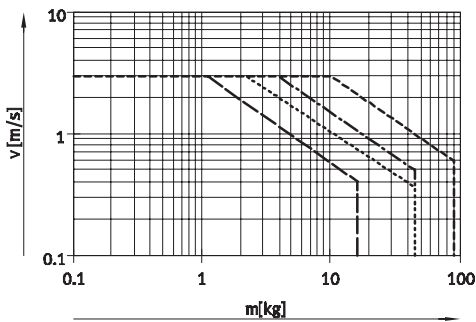
## Number of profile mountings MUC as a function of the overall length

Excessive distances between the profile mountings can reduce the positioning accuracy. The following table shows the required minimum number of profile and foot mountings.

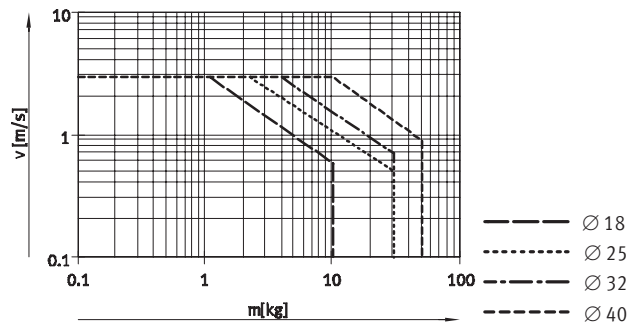
Stroke [mm]	Number of mounting attachments		
	Order code M		Order code F
	Profile mounting	Foot mounting + profile mounting	
100 ... 400	2	2	0
401 ... 600	2	2	1
601 ... 1200	3	2	1
1201 ... 1400	3	2	2
1401 ... 2000	4	2	2

## Maximum permissible piston speed with shock absorber v as a function of the effective load m

Piston Ø 18 ... 40 with YSR cushioning



Piston Ø 18 ... 40 with YSRW cushioning



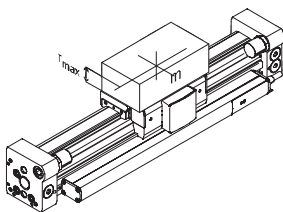
Note

This data represents the maximum values that can be achieved. Values fluctuate in practice relative to the size of the effective load.

## Operating range of cushioning

The end position cushioning must be adjusted to ensure jerk-free operation. If the operating conditions are outside the permissible range, the

load to be moved must be cushioned using suitable equipment (shock absorbers, stops, etc.), preferably at the centre of gravity of the mass.



The data applies to a horizontal assembly position:

Piston Ø	18	25	32	40
Distance $r_{max}$ [mm]	35	50	50	50

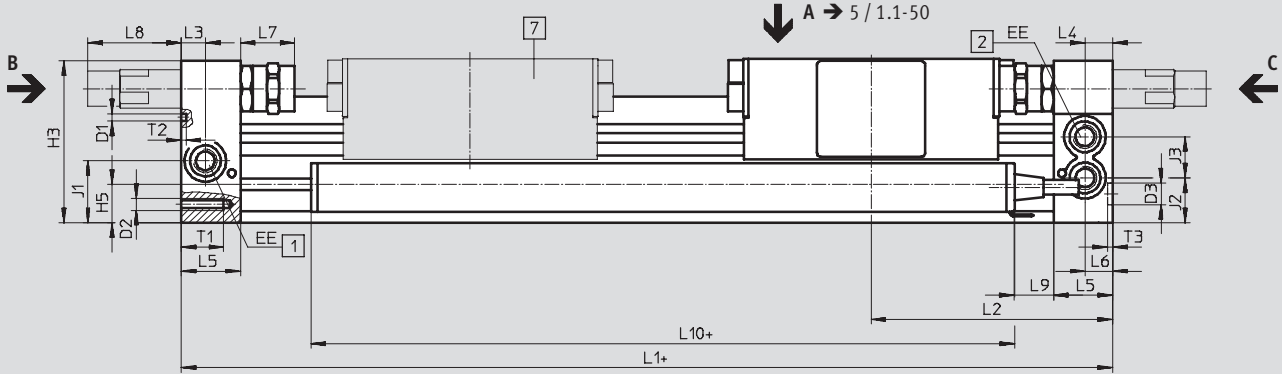
# Linear drives DGCI, with displacement encoder

Technical data

**Dimensions**

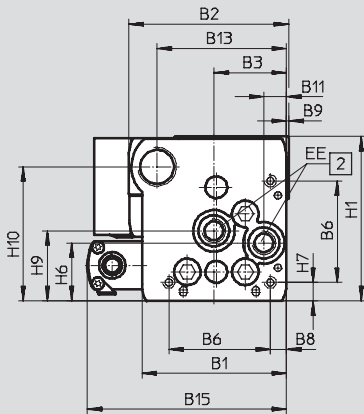
Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Ø 18 ... 40



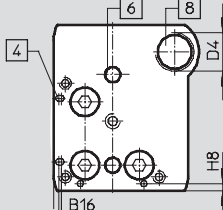
View C

Ø 18 ... 40

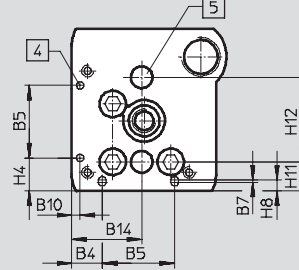


View B

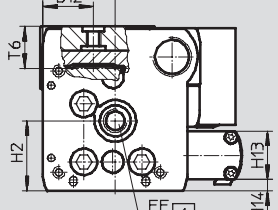
Ø 18



Ø 25 ... 40



Ø 18 ... 40




+ plus stroke length

1 Option of supply port at both ends (on the end face or from the front)

2 Option of supply port at both ends. For ports at one end (on the end face, right-hand side)

4 Mounting hole for foot mounting HPC  
5 Hole for centring pin ZBS

6 Hole for centring sleeve ZBH  
7 Additional slide

 Note

For reasons of functional safety of the displacement encoder and stability of the linear drive DGCI, the distance L7 must not fall below the values in the table opposite.



# Linear drives DGCI, with displacement encoder

Technical data

FESTO

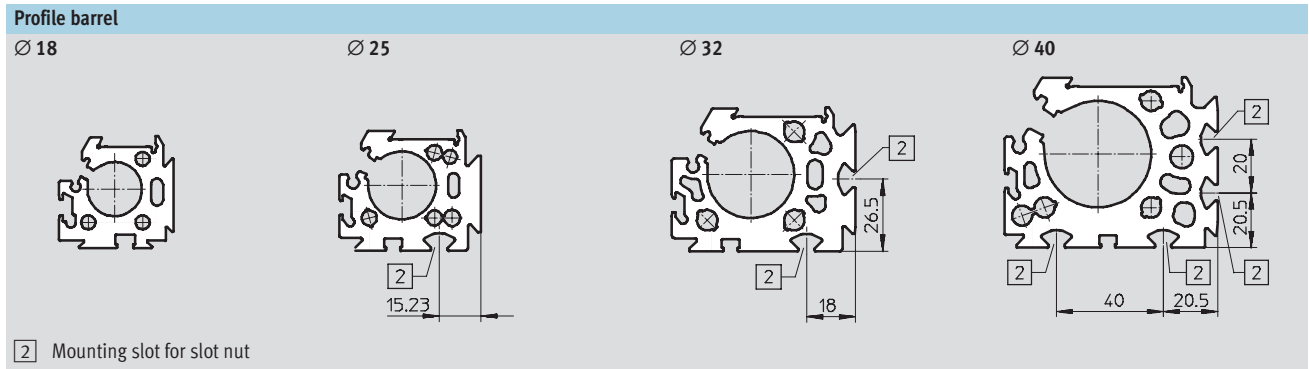
∅	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
[mm]				±0.1	±0.05			±0.1				
18	44.5	49.9	19.5	8.8	21	31	-	3.8	1	2.4	5.5	15.5
25	59.8	66	30	12.65	30	42	1	6.65	1	3.5	9.3	21
32	73	79	38.5	5.7	63.1	57.5	-	8.5	1.5	14	14.9	18
40	91	98.5	45	17.2	55	65	-	12.2	2	8	16.5	24.8

∅	B13	B14	B15	B16	D1	D2	D3	D4	EE	H1	H2	H3
[mm]		±0.05			∅ ±0.05		∅ H7					
18	39	19.5	68.3	0.8	2	M4	5	M12x1	M5	56.3	23.1	55
25	53	29	82.4	1	3	M5	9	M16x1	G $\frac{1}{8}$	68	29	67
32	65	38.5	97.8	-	3	M6	9	M16x1	G $\frac{1}{8}$	78.5	30	77
40	80.5	45	110.3	-	4	M6	9	M22x1.5	G $\frac{1}{4}$	99.5	41.5	97.5

∅	H4	H5	H6	H7	H8	H9	H10	H11	H12	H13	H14	J1	J2
[mm]	±0.1							±0.15	±0.05				
18	9.6	13.4	20	4.6	2.4	25.2	46	8.5	30	20	2.3	20	16.5
25	13.65	15.8	24	7.65	4.5	29	55.5	12	35	20	4.7	26.1	18.6
32	5.7	17	27.7	8.5	14	35.2	63.8	11.45	50	20	5.9	30	22
40	17.2	25	36.5	12.2	8	44	81.5	15	60	20	13.9	35	26

∅	J3	L1		L2		L3	L4	L5	L6	L7		
		KF +0.9/-0.2	KF-GP +0.9/-0.2	KF	KF-GP					KF	KF-GP	KF-YSR(W)
[mm]												
18	11	150	157	74.5	78	5.7	5.8	15	5.5	14.5 ... 16.5	18 ... 20	14.5 ... 34.5
25	17	200	205	100	102.5	10.5	10.6	24.5	10.6	22.5 ... 26.5	25 ... 29	22.5 ... 47.5
32	18.5	250	250	124.8	124.8	14.5	14.5	30.5	14.5	27.3 ... 32.3	27.3 ... 32.3	27.3 ... 52.3
40	26	300	312	150	156	14.6	14.6	33.5	14.6	31 ... 36	37 ... 42	31 ... 56

∅	L8		L9		L10	T1	T2	T3	T6
	YSR	YSRW	KF ±0.2	KF-GP ±0.2					
[mm]								+0.2	
18	29.9	32.6	-	3.5	119	9	2	3.1	15
25	35.6	38.6	16.3	18.8	119	17.5	2	2.1	17.3
32	19.5	28	35.3	35.3	119	15	2	2.1	20
40	38.5	43.5	57.7	63.5	119	20	2	2.1	25.7



# Linear drives DGCI, with displacement encoder

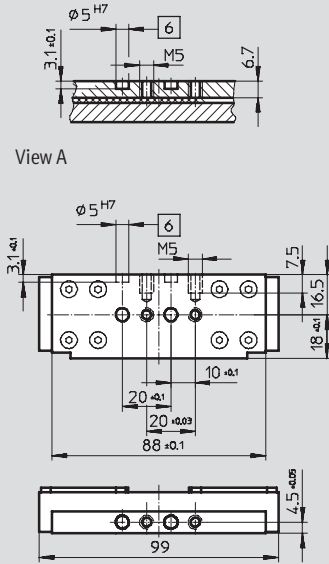
Technical data

**Dimensions**

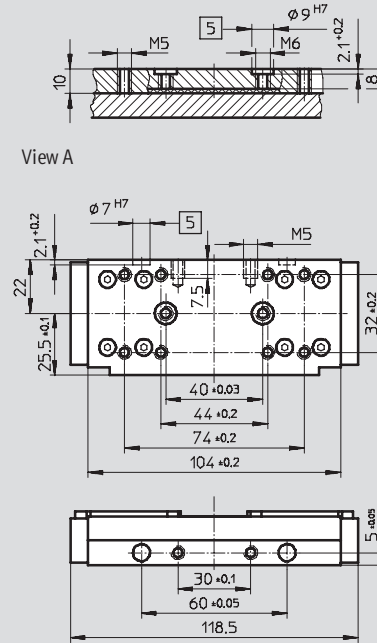
Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Slide

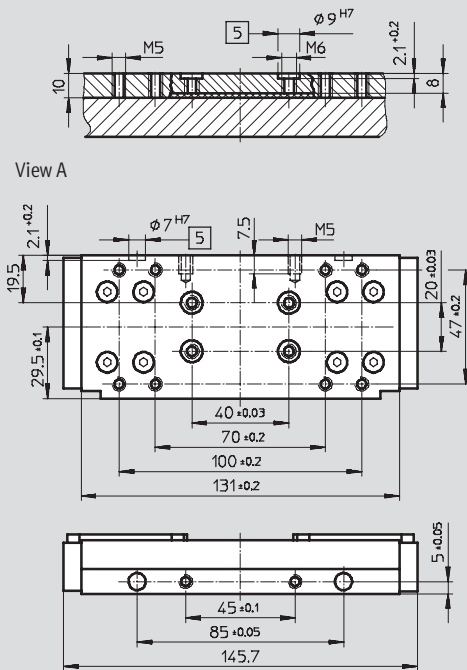
Ø 18



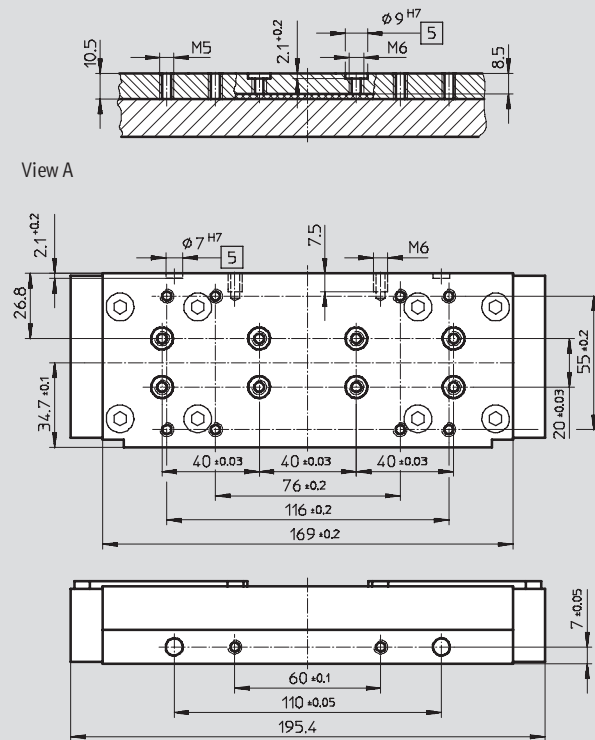
Ø 25



Ø 32



Ø 40



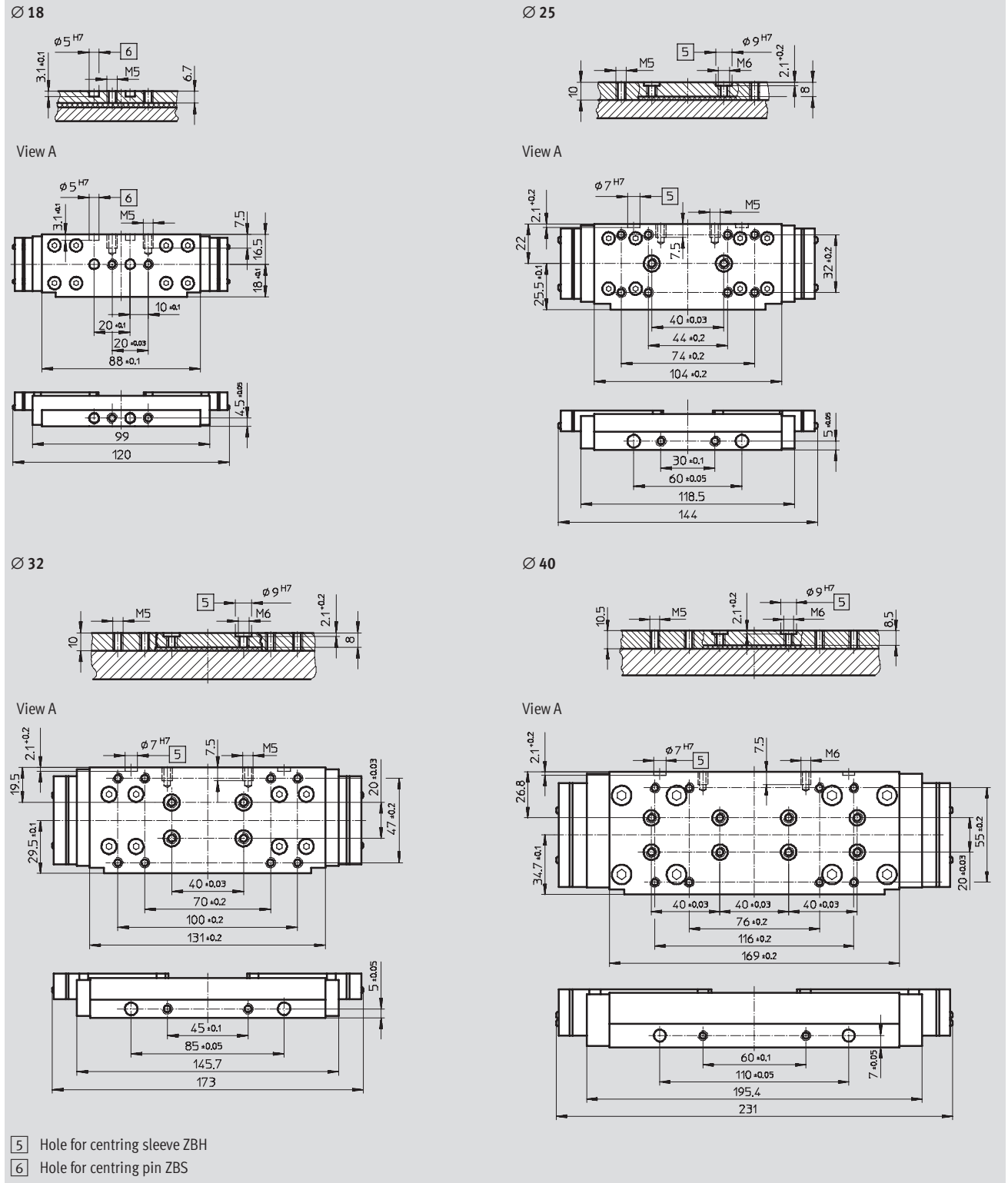
- 5 Hole for centring sleeve ZBH
- 6 Hole for centring pin ZBS

# Linear drives DGCI, with displacement encoder

Technical data

Dimensions Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)


Slide, variant GP – Protected recirculating ball bearing guide

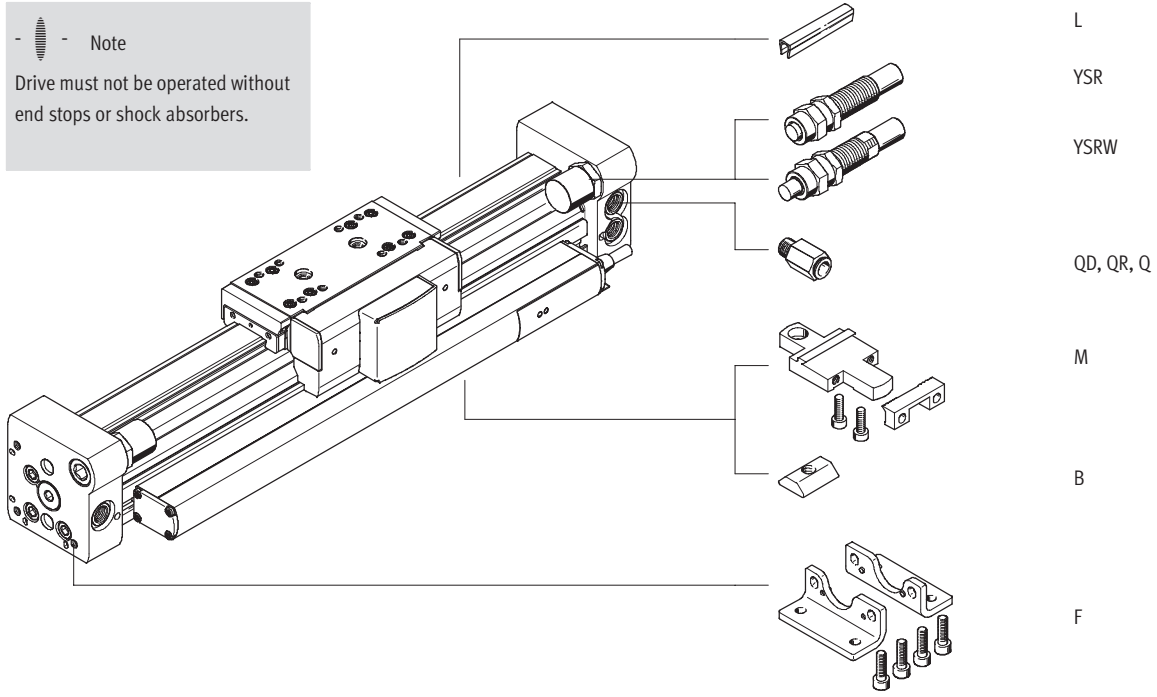


# Linear drives DGCI, with displacement encoder

Ordering data – Modular products

**Order code**  
Mandatory data/options

 - Note  
Drive must not be operated without end stops or shock absorbers.



**Order code – Alternative supply port**

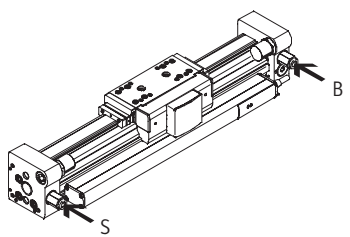
Four different supply port options (see below) can be selected when ordering the linear drive.

To facilitate commissioning, the linear drive is supplied with different

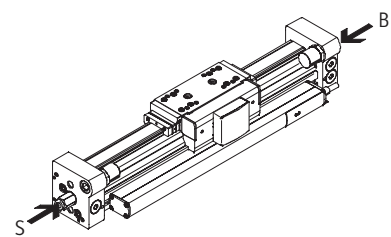
coloured push-in fittings (black or blue releasing ring) and without

push-in fittings in the case of the variant DGCI...Q.

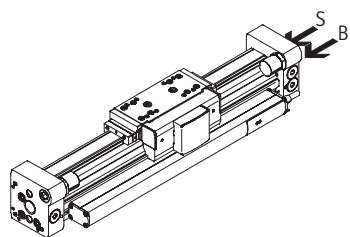
Push-in fitting at both ends, front face (standard)  
DGCI...




Push-in fitting at both ends, end face  
DGCI...-QD

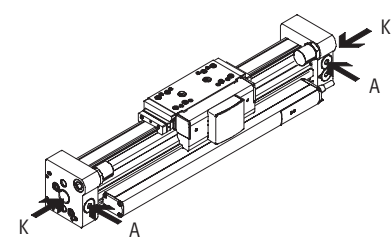


Push-in fitting at one end, end face  
DGCI...-QR



 - Note  
Compressed air supply at one end is only recommended for strokes up to 600 mm.

No push-in fitting, end face open  
DGCI...Q



**Direction of movement of the slide**

S To the right: Fitting with black release ring  
B To the left: Fitting with blue release ring

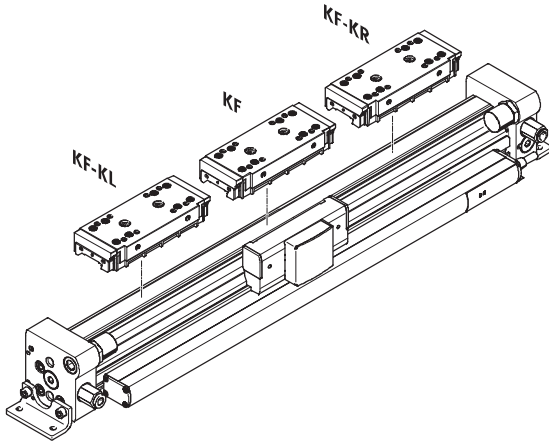
**Alternative port option**

K Supply ports without fittings  
A Supply ports sealed

# Linear drives DGCI, with displacement encoder

Ordering data – Modular products

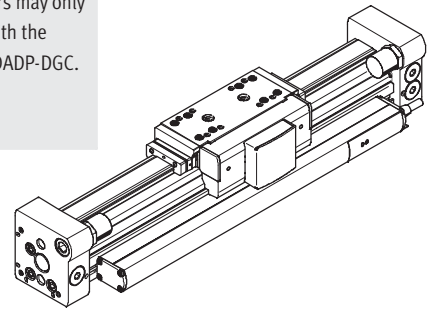
## KL/KR – With additional slide



## GP – With protected recirculating ball bearing guide

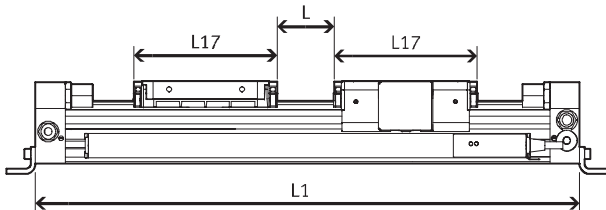
 Note

In the case of the variant with GP, only fixed stops may be used in the end caps. Shock absorbers may only be used in conjunction with the shock absorber retainer DADP-DGC.



### Effective stroke reduction when ordering an additional slide KL or KR

For a linear drive DGCI with additional slide, the effective stroke is reduced by the length of the additional slide and the distance between both slides.



Given:  
DGCI-18-500-...  
L = 20 mm  
L17= 99 mm

The effective stroke is reduced to  
 $381 \text{ mm} = 500 \text{ mm} - 20 \text{ mm} - 99 \text{ mm}$

∅ [mm]	L17	
	DGCI-...-KF	DGCI-...-KF-...-GP
18	99	120
25	118.5	144
32	145.7	173
40	195.4	231

# Linear drives DGCI, with displacement encoder

Ordering data – Modular products

**M** Mandatory data **O** Options →

Module No.	Function	Piston Ø	Stroke	Guide	Alternative supply port
544 425	DGCI	18	100, 160, 225, 300, 360, 450, 500, 600, 850, 750, 1000, 1250, 1500, 1750, 2000	KF	– QD QR Q
544 426		25			
544 427		32			
544 428		40			
<b>Order example</b>	<b>DGCI</b>	–	–	<b>KF</b>	–

Ordering table							
Size	18	25	32	40	Condi- tions	Code	Enter code
<b>M</b> Module No.	<b>544 425</b>	<b>544 426</b>	<b>544 427</b>	<b>544 428</b>			
Function	Linear drive with displacement encoder					<b>DGCI</b>	DGCI
Piston Ø [mm]	18	25	32	40		-...	
Stroke [mm]	100, 160, 225, 300, 360, 450, 500, 600, 750, 850, 1000, 1250, 1500, 1750, 2000					-...	
Guide	Recirculating ball bearing guide					<b>-KF</b>	-KF
<b>O</b> Alternative supply port	Push-in fitting at both ends, front face (standard)						
	Push-in fitting at both ends, end face					<b>-QD</b>	
	Push-in fitting at one end, end face, right side				<b>1</b>	<b>-QR</b>	
	Threaded connection (end face open, front face sealed)					<b>-Q</b>	
<b>↓</b>	M5	G1/8	G1/8	G1/4			

**1** **QR** Only for strokes 100 ... 600 mm

Transfer order code

**DGCI**  –  –  **KF**  –

# Linear drives DGCI, with displacement encoder

Ordering data – Modular products

→ 0 Options								
Slide	Additional slide at left	Additional slide at right	Cushioning	Accessories	Type of mounting	Slot cover for sensor slot	Slot nut for mounting slot	User documentation
GP	KL	KR	– YSR YSRW	ZUB	F M	...L	...B	0
-	-	-	-	ZUB	-	-	-	-

Ordering table								
Size	18	25	32	40	Condi- tions	Code		Enter code
Slide	Protected recirculating ball bearing guide				2	-GP		
Additional slide at left	Additional slide, standard, at left				3	-KL		
Additional slide at right	Additional slide, standard, at right				3	-KR		
Cushioning	Adjustable mechanical stop without cushioning (standard)							
	Shock absorber, self-adjusting					-YSR		
	Shock absorber, self-adjusting, progressive					-YSRW		
Accessories						ZUB-	ZUB-	
Type of mounting	Foot mounting (includes 0 ... 2 profile mountings depending on the stroke)				4	F		
	Profile mounting (2 ... 4 depending on the stroke)				4	M		
Slot cover for sensor slot	1 ... 9					...L		
Slot nut for mounting slot	– 1 ... 9					...B		
User documentation	Express waiver – no user documentation to be included (already available) (operating instructions in pdf format are available free of charge via the Internet <a href="http://www.festo.com">http://www.festo.com</a> )					0		

- 2 GP Not in combination with YSR and YSRW
- 3 KL, KR For a linear drive DGCI with additional slide (KL, KR), the effective stroke per additional slide is reduced by the dimension in the table → 5 / 1.1-53 plus the distance between the slides
- 4 F, M Allocation table → 5 / 1.1-47

**Transfer order code**

-  -  -  -  -  -  -  -  -


# Linear drives DGCI, with displacement encoder

Accessories



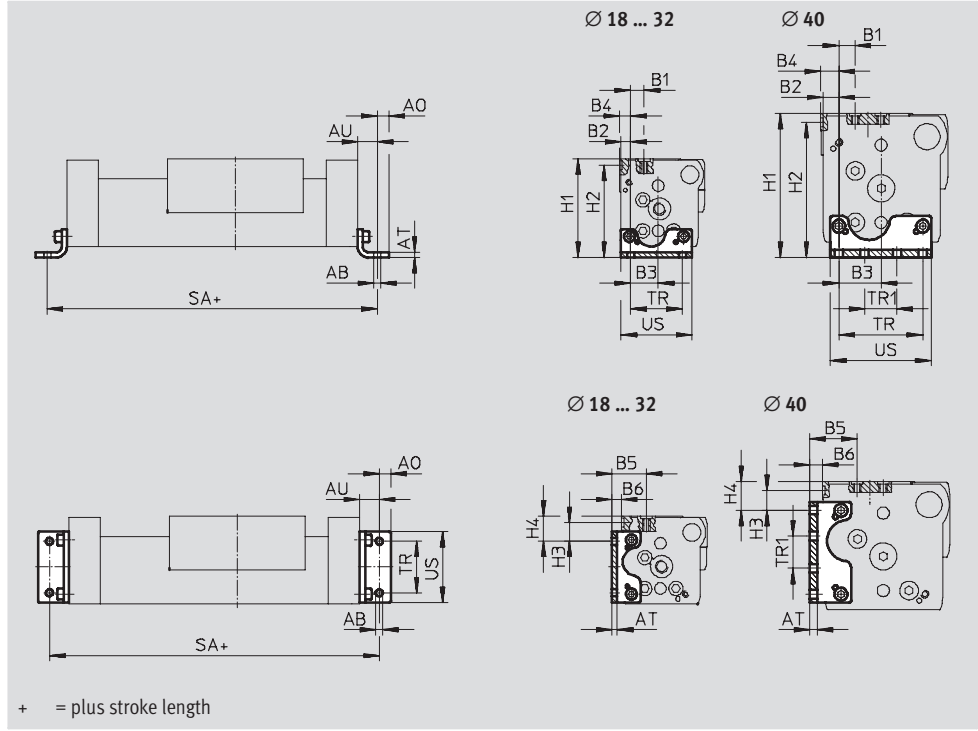
**Foot mounting HPC**  
(order code: F)

Material:  
Galvanised steel

 **Note**  
Additional profile mountings MUC are required for strokes above 400 mm → 5 / 1.1-47.

Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1



**Dimensions and ordering data**

For Ø	AB	AH	AO	AT	AU	B1	B2
[mm]	Ø						
18	5.5	-	6.75	3	13.25	11.2	4.3
25	5.5	-	9	4	15	13.35	7.65
32	6.6	-	10	5	19	9	9
40	6.6	-	10	6	20	12.6	12.2

For Ø	B3	B4	B5	B6	H1	H2	H3
[mm]							
18	15.2	5.3	23.2	6.7	64	59.5	16.7
25	22.35	8.65	30	8	76.5	71.5	15
32	29.5	10.5	27	7.5	87.5	82.5	8
40	32.8	14.2	36.8	10	111.5	104.5	15.3

For Ø	H4	SA	TR	TR1	US	Weight	Part No.	Type
[mm]		+0.9/-0.2	±0.1	±0.1		[g]		
18	21.5	176	30	-	38.6	58	533 667	HPC-18
25	20	230	40	-	55	131	533 668	HPC-25
32	13	288	56.5	19.5	68	239	533 669	HPC-32
40	22.3	340	65	25	78	348	533 670	HPC-40



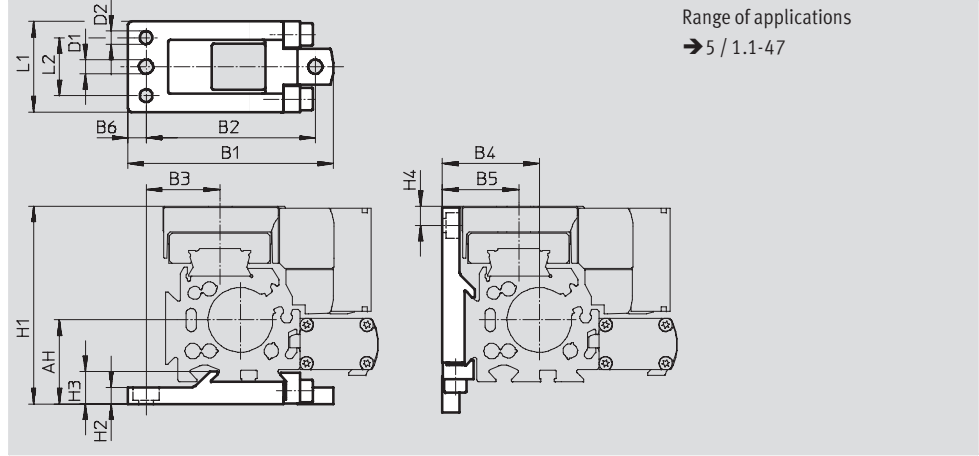
# Linear drives DGCI, with displacement encoder

Accessories



**Profile mounting MUC**  
(order code: M)

Material:  
High-alloy steel



Range of applications  
→ 5 / 1.1-47

Dimensions and ordering data									
For Ø	AH	B1	B2	B3	B4	B5	B6	D1	D2
[mm]			±0.2					Ø	Ø
18	27.2	67.8	56	28.7	27.2	23.2	5.7	5.5	5
25	32.5	79.5	65.5	28.5	37.5	29.5	7	5.5	5
32	37.5	94	80	35	47.5	37	7	5.5	5
40	47	110.5	96	43	57	46.8	7	6.5	6

For Ø	H1	H2	H3	H4	L1	L2	Weight	Part No.	Type
[mm]							[g]		
18	64	5.7	9.9	6.4	33	20.5	78	531 752	MUC-18
25	76.5	6.5	12.5	7.43	35	22.5	113	531 753	MUC-25
32	87.5	6.5	13	4	45	30	174	531 754	MUC-32
40	111.5	8.5	16	11.3	60	44	346	531 755	MUC-40

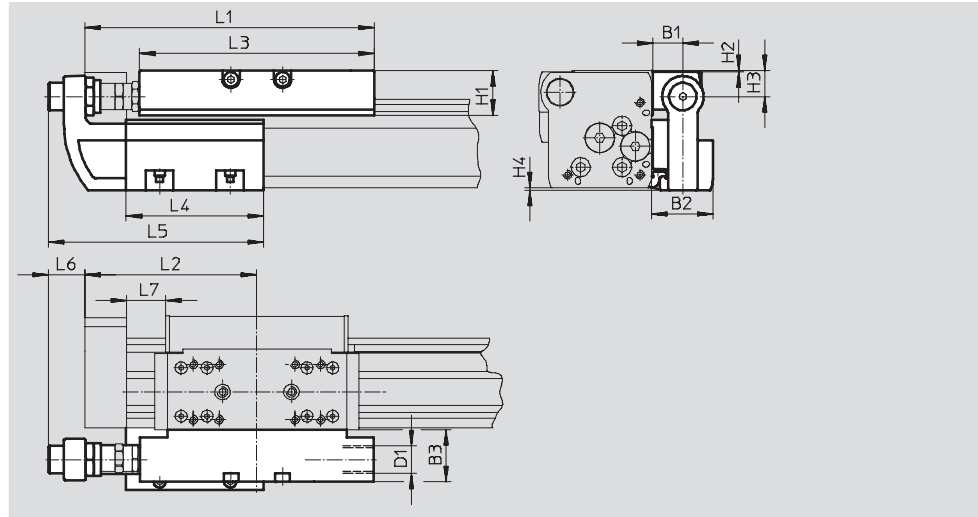
# Linear drives DGCI, with displacement encoder


Accessories

**Shock absorber retainer DADP-DGC**  
**Stop KYC**

Materials: Stop  
Housing: Anodised aluminium  
Stop bracket: Special steel casting  
Clamp: High-alloy steel  
Free of copper and PTFE

Materials: Shock absorber retainer  
Housing: Anodised aluminium  
Free of copper and PTFE




 Note

- Shock absorber not included in scope of delivery. Existing stop elements can be removed from the end caps of the linear drive and installed in the shock absorber retainer.

Dimensions									
For Ø [mm]	B1	B2	B3	D1	H1	H2	H3	H4	L1
18	16	34.5	29	M12x1	20.7	0.2	12.5	0.7	128
25	16.5	35	30	M16x1	25.5	0.5	15	1.4	168
32	16.5	35	30	M16x1	25.5	0.5	15	1.7	206.8
40	16	35.7	35	M22x1.5	37	0.5	21.5	2	255

For Ø [mm]	L2	L3	L4	L5	L6	L7		
						KF	KF-GP	KF-YSR(W)
18	74.5	107	80	118.5	23.5	≥14.5	≥18	≥14.5
25	100	136	80	125	20.5	≥22.5	≥25	≥22.5
32	124.8	164	120	165	14.5	≥27.3	≥27.3	≥27.3
40	150	210	156	220.5	31	≥31	≥37	≥31

 Note

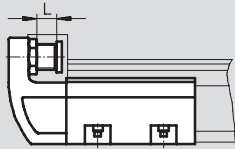
For reasons of functional safety of the displacement encoder and stability of the linear drive DGCI, the distance L7 must not fall below the values in the table.

# Linear drives DGCI, with displacement encoder

Accessories

## Technical data and ordering codes

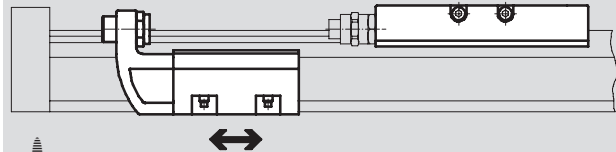
### Precision adjustment



- - Note

The stop KYC can be used in both directions.

### Installation example



- - Note

- The stop KYC can be mounted at any position within the stroke.
- Note dimension L7 → 5 / 1.1-58

For Ø [mm]	Precision adjustment L [mm]	Ambient temperature [°C]	CRC <sup>1)</sup>	Weight [g]	Part No.	Type
<b>Shock absorber retainer DADP-DGC</b>						
18	10	-10 ... +80	2	130	541 729	DADP-DGC-18-KF
25	10			180	541 730	DADP-DGC-25-KF
32	10			215	541 731	DADP-DGC-32-KF
40	15			460	541 732	DADP-DGC-40-KF
<b>Stop KYC</b>						
18	10	-10 ... +80	2	400	541 691	KYC-18
25	10			560	541 692	KYC-25
32	10			790	541 693	KYC-32
40	15			1525	541 694	KYC-40

1) Corrosion resistance class 2 to Festo standard 940 070

Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents

- - Note

Permissible impact energy

→ 5 / 1.1-44

# Linear drives DGCI, with displacement encoder

Accessories



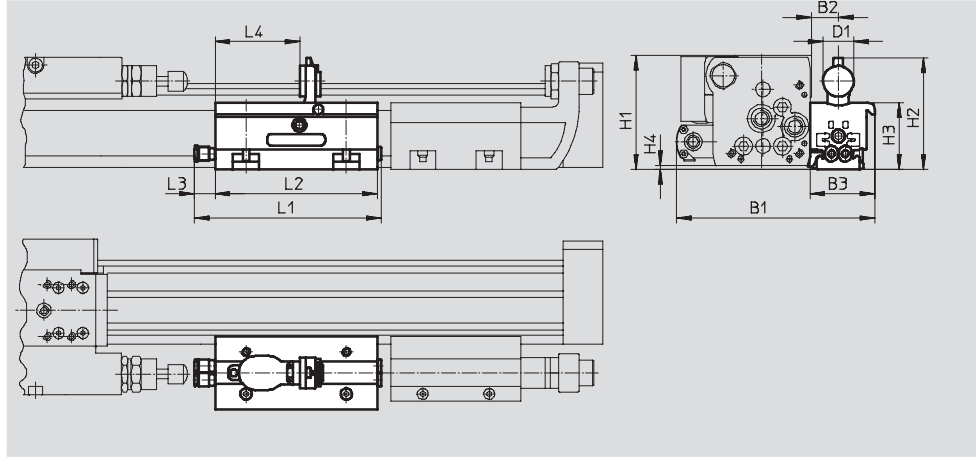
Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1

## Intermediate position module DADM-DGC

Materials:  
Housing: Anodised aluminium  
Stop screw, nut:  
Galvanised steel

Clamp, lever:  
High-alloy steel  
Free of copper and PTFE




 - Note

- Shock absorber not included in scope of delivery. Existing shock absorbers can be removed from the end caps of the linear drive and installed in the shock absorber retainer. Under no circumstances may the linear drive and the intermediate position module be operated without a shock absorber.
- A shock absorber retainer DADP-DGC and a stop KYC are additionally needed when using an intermediate position module.
- The projection (dimension H4) must be noted when using the drive in combination with the intermediate position module DADM-DGC. Mounting via foot mountings HPC or profile mountings MUC is recommended in this case.

Dimensions						
For Ø [mm]	B1	B2	B3	D1	H1	H2
25	122.5	16.5	40	19	69.4	68.6
32	138	16.5	40	19	80.2	79.7

For Ø [mm]	H3	H4	L1	L2	L3	L4
25	41	1.4	116	100	13.4	52.2
32	52	1.7	116	100	13.4	52.2

 - Note

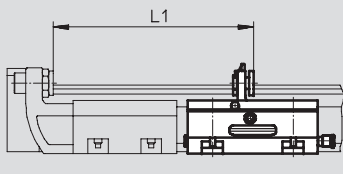
Permissible impact energy  
→ 5 / 1.1-44

# Linear drives DGCI, with displacement encoder

Accessories

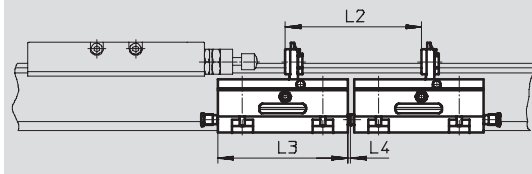
## Minimum distance

between end stop and intermediate position



∅	L1
25	145.3
32	185.3

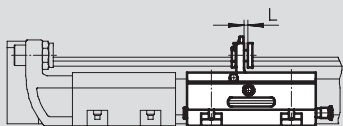
between two intermediate positions




∅	L2	L3	L4
25	105	100	2.5
32	105	100	2.5

## Technical data and ordering codes

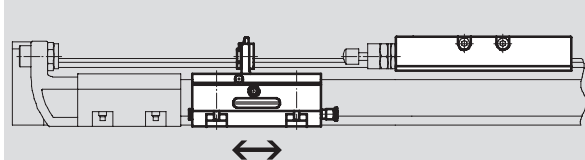
Precision adjustment L



 Note

The intermediate position module DADM-DGC can be used in both directions. A shock absorber retainer DADP-DGC and a stop KYC are additionally needed when using an intermediate position module.

Installation example



 Note

The intermediate position module DADM-DGC can be mounted at any position within the stroke.

For ∅ [mm]	Operating pressure [bar]	Impact velocity [m/s]	Swivel time [ms]	Repetition accuracy [mm]	Pneumatic connection	Precision adjustment L [mm]
25	2.5 ... 8	→ 5 / 1.1-47	<100	0.02	QS-4	2
32						

For ∅ [mm]	Ambient temperature [°C]	CRC <sup>1)</sup>	Mounting position	Position sensing	Weight [g]	Part No.	Type
25	-10 ... +60	2	Any	Via proximity sensor SME/SMT-10	430	541 700	DADM-DGC-25-A
32					530	541 701	DADM-DGC-32-A

1) Corrosion resistance class 2 to Festo standard 940 070  
Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents



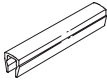
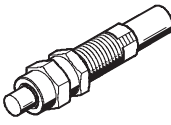
# Linear drives DGCI, with displacement encoder



Accessories

Servopneumatic positioning systems  
Cylinders with displacement encoders

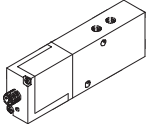
1.1

Ordering data						
	For Ø	Remarks	Order code	Part No.	Type	PU <sup>1)</sup>
Slot nut NST						Technical data → 1 / 10.1-3
	25 ... 40	For mounting slot	B	<b>547 264</b>	<b>HMBN-5-1M5</b>	10
Centring pin/sleeve ZBH						
						Technical data → 1 / 10.1-3
	18	For slide	-	<b>150 928</b>	<b>ZBS-5</b>	10
	25 ... 40			<b>150 927</b>	<b>ZBH-9</b>	
	18	For end cap	-	<b>150 928</b>	<b>ZBS-5</b>	
	25 ... 40			<b>150 927</b>	<b>ZBH-9</b>	
Slot cover ABP-S						Technical data → 1 / 10.1-3
	18 ... 40	For sensor slot 0.5 m each	L	<b>151 680</b>	<b>ABP-5-S</b>	2
Shock absorber YSRW						Technical data → 1 / 9.0-1
	18		YSRW	<b>540 347</b>	<b>YSRW-DGC-18-KF</b>	1
	25			<b>540 349</b>	<b>YSRW-DGC-25-KF</b>	
	32			<b>540 351</b>	<b>YSRW-DGC-32-KF</b>	
	40			<b>540 353</b>	<b>YSRW-DGC-40-KF</b>	

# Linear drives DGCI, with displacement encoder

Accessories

**FESTO**

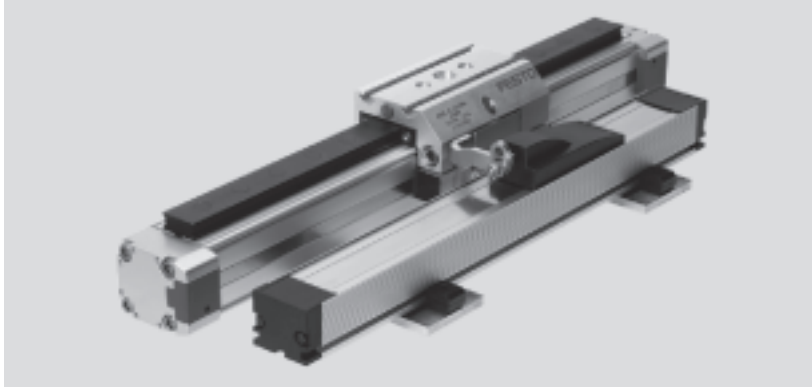
Ordering data – Proportional directional control valves and push-in fittings						
	For Ø [mm]	Stroke [mm]	Proportional directional control valve		Push-in fitting	
			Part No.	Type	Part No.	Type
	For applications with axis controller SPC200					
	18	100 ... 300	154 200	MPYE-5-M5-10-B	153 306	QSM-M5-6
		360 ... 2000	151 692	MPYE-5-1/8-LF-10-B	153 306	QSM-M5-6
	25	100 ... 160	154 200	MPYE-5-M5-10-B	153 002	QS-1/8-6
		225 ... 750	151 692	MPYE-5-1/8-LF-10-B	153 004	QS-1/8-8
		1000 ... 2000	151 693	MPYE-5-1/8-HF-10-B	153 004	QS-1/8-8
	32	100	154 200	MPYE-5-M5-10-B	153 002	QS-1/8-6
		160 ... 360	151 692	MPYE-5-1/8-LF-10-B	153 004	QS-1/8-8
		450 ... 2000	151 693	MPYE-5-1/8-HF-10-B	153 004	QS-1/8-8
	40	100 ... 300	151 692	MPYE-5-1/8-LF-10-B	153 005	QS-1/4-8
		360 ... 750	151 693	MPYE-5-1/8-HF-10-B	153 005	QS-1/4-8
		1000 ... 2000	151 694	MPYE-5-1/4-10-B	153 007	QS-1/4-10
	For applications with Soft Stop end position controller SPC11, horizontal					
	18	100 ... 300	154 200	MPYE-5-M5-10-B	153 306	QSM-M5-6
		360 ... 1750	151 692	MPYE-5-1/8-LF-10-B	153 306	QSM-M5-6
		2000	151 693	MPYE-5-1/8-HF-10-B	153 306	QSM-M5-6
	25	100 ... 160	151 692	MPYE-5-1/8-LF-10-B	153 002	QS-1/8-6
		225 ... 300	151 692	MPYE-5-1/8-LF-10-B	153 004	QS-1/8-8
		360 ... 2000	151 693	MPYE-5-1/8-HF-10-B	153 004	QS-1/8-8
	32	100	151 692	MPYE-5-1/8-LF-10-B	153 002	QS-1/8-6
		160 ... 1000	151 693	MPYE-5-1/8-HF-10-B	153 004	QS-1/8-8
		1250 ... 2000	151 694	MPYE-5-1/4-10-B	153 004	QS-1/8-8
	40	100 ... 500	151 693	MPYE-5-1/8-HF-10-B	153 005	QS-1/4-8
		600 ... 750	151 694	MPYE-5-1/4-10-B	153 005	QS-1/4-8
		1000 ... 2000	151 694	MPYE-5-1/4-10-B	153 007	QS-1/4-10
	For applications with Soft Stop end position controller SPC11, vertical					
	18	100 ... 300	154 200	MPYE-5-M5-10-B	153 306	QSM-M5-6
		360 ... 1750	151 692	MPYE-5-1/8-LF-10-B	153 306	QSM-M5-6
		2000	151 693	MPYE-5-1/8-HF-10-B	153 306	QSM-M5-6
	25	100 ... 160	151 692	MPYE-5-1/8-LF-10-B	153 002	QS-1/8-6
		225 ... 750	151 692	MPYE-5-1/8-LF-10-B	153 004	QS-1/8-8
		1000 ... 2000	151 693	MPYE-5-1/8-HF-10-B	153 004	QS-1/8-8
	32	100	151 692	MPYE-5-1/8-LF-10-B	153 002	QS-1/8-6
160 ... 300		151 692	MPYE-5-1/8-LF-10-B	153 004	QS-1/8-8	
360 ... 1750		151 693	MPYE-5-1/8-HF-10-B	153 004	QS-1/8-8	
2000		151 694	MPYE-5-1/4-10-B	153 004	QS-1/8-8	
40	100 ... 225	151 692	MPYE-5-1/8-LF-10-B	153 005	QS-1/4-8	
	300 ... 750	151 693	MPYE-5-1/8-HF-10-B	153 005	QS-1/4-8	
	1000	151 693	MPYE-5-1/8-HF-10-B	153 007	QS-1/4-10	
	1250 ... 2000	151 694	MPYE-5-1/4-10-B	153 007	QS-1/4-10	

# Linear drives DGPL, external displacement encoder

Features



## Individual positioning components with linear drive DGPL ...



Proportional directional control valve  
MPYE-...  
→ 5 / 1.5-2



Soft Stop → 5 / 1.4-2

Positioning technology → 5 / 1.3-2

End position controller  
SPC11-POT-TLF



Axis interface  
SPC-AIF-POT



Axis positioning controller  
SPC200



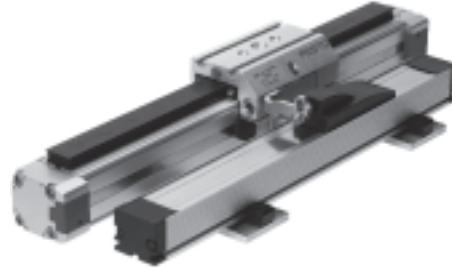


# Linear drives DGPL, external displacement encoder

## Features

### DGPL, with recirculating ball bearing guide

- Piston  $\varnothing$  25 ... 63 mm
- Stroke 225 ... 2,000 mm
- Standard slide or extended slide
- High characteristic load values
- Air connections on both sides



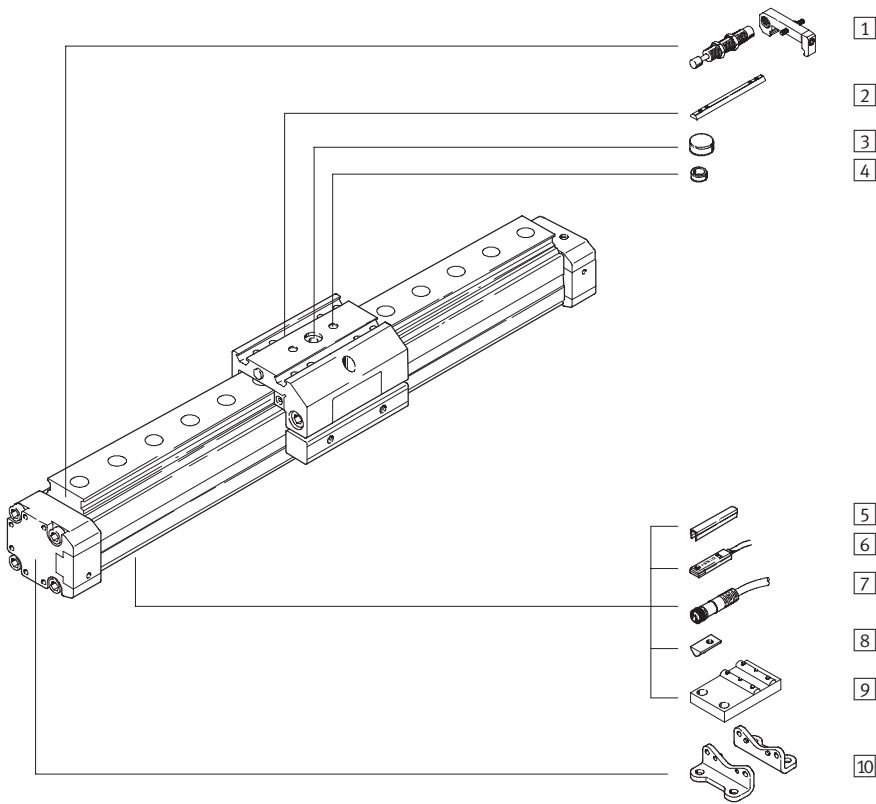
### DGPL, with recirculating ball bearing guide and clamping unit

- Piston  $\varnothing$  25...40 mm
- Stroke 225 ... 2,000 mm
- Standard slide or extended slide
- In the event of a loss of pressure, the slide can be fixed in vertical operation using the clamping unit.
- High characteristic load values
- Air connections on both sides



# Linear drives DGPL, external displacement encoder

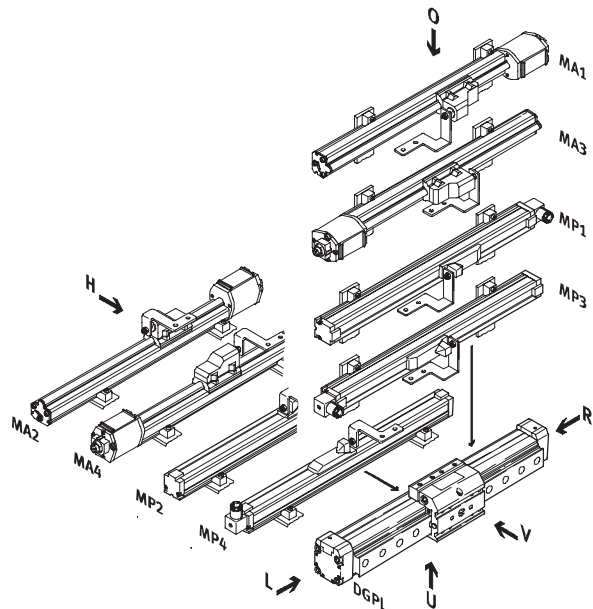
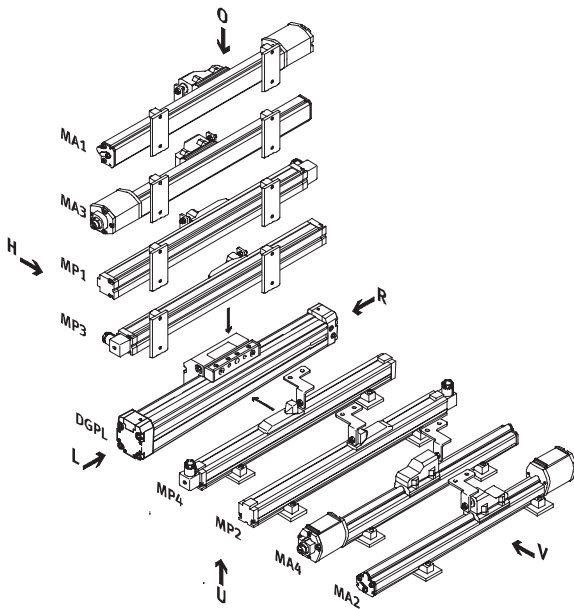
Peripherals overview



## Displacement encoder attachment position 11

Slide at rear (SH)

Slide at front (SV)



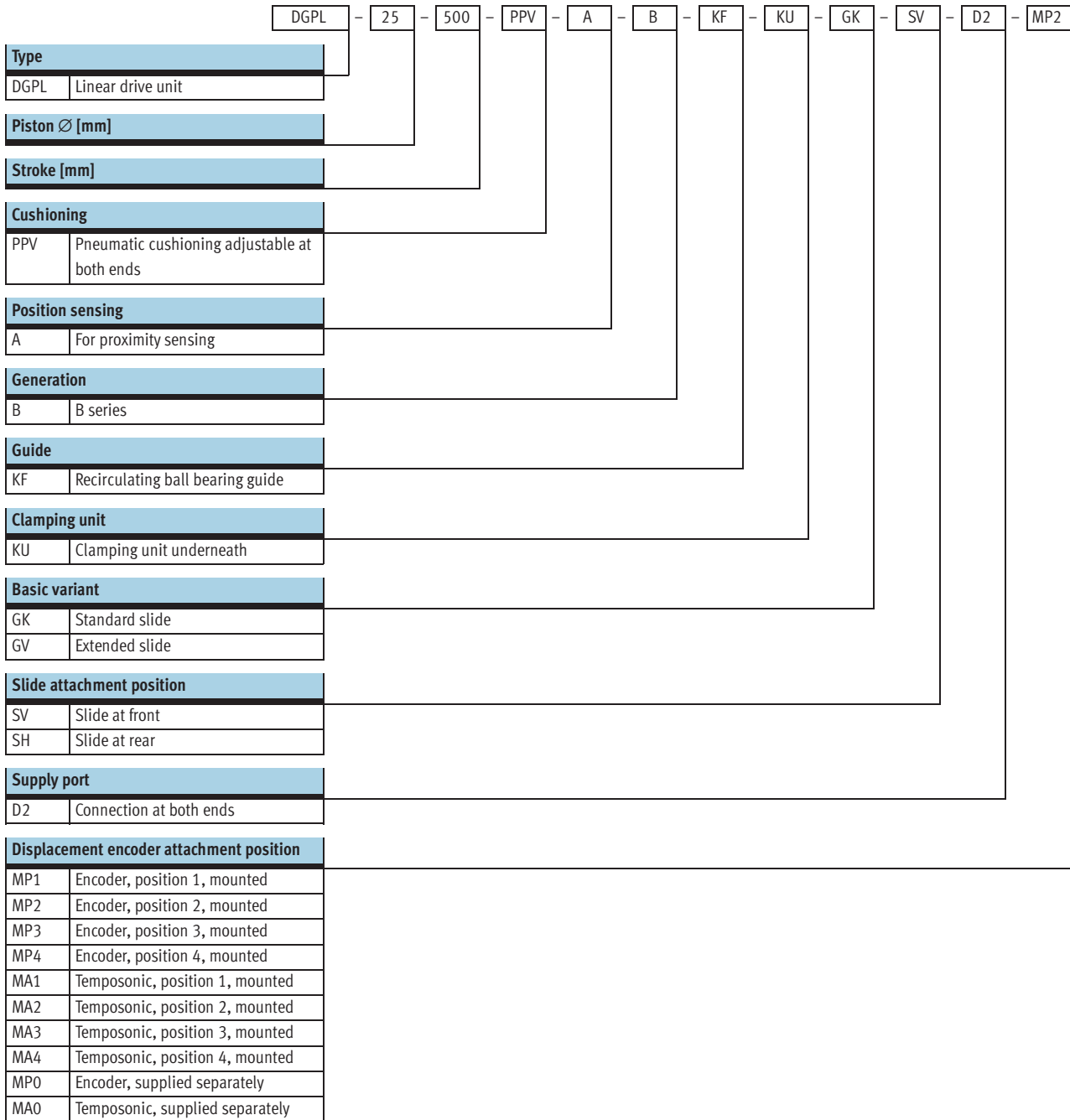
# Linear drives DGPL, external displacement encoder

Peripherals overview

Variants and accessories		
Type	Brief description	→ Page
1 Shock absorber kits C	to avoid damage at the end stop, in the event of malfunctions	5 / 1.1-114
2 Slot nut for slide X	for mounting loads and attachments on the slide	5 / 1.1-115
3 Central mounting Q	for centring loads and attachments on the slide	5 / 1.1-115
4 Centring sleeves Z	for centring loads and attachments on the slide	5 / 1.1-115
5 Slot cover B/S	to protect against the ingress of dirt	5 / 1.1-115
6 Proximity sensors G/H/I/J/N	for additional sensing of the piston position, can be ordered optionally, only in conjunction with the order code A in the drive's modular product section.	5 / 1.1-117
7 Cable with socket V	for proximity sensor	5 / 1.1-117
8 Slot nut for mounting slot Y	for mounting attachments	5 / 1.1-115
9 Central support M	to mount the axis	5 / 1.1-112
10 Foot mounting F	to mount the axis	5 / 1.1-112
11 Displacement encoder attachment position MA1 ... MA4/MP1 ... MP4	for drive position measurement	5 / 1.1-78

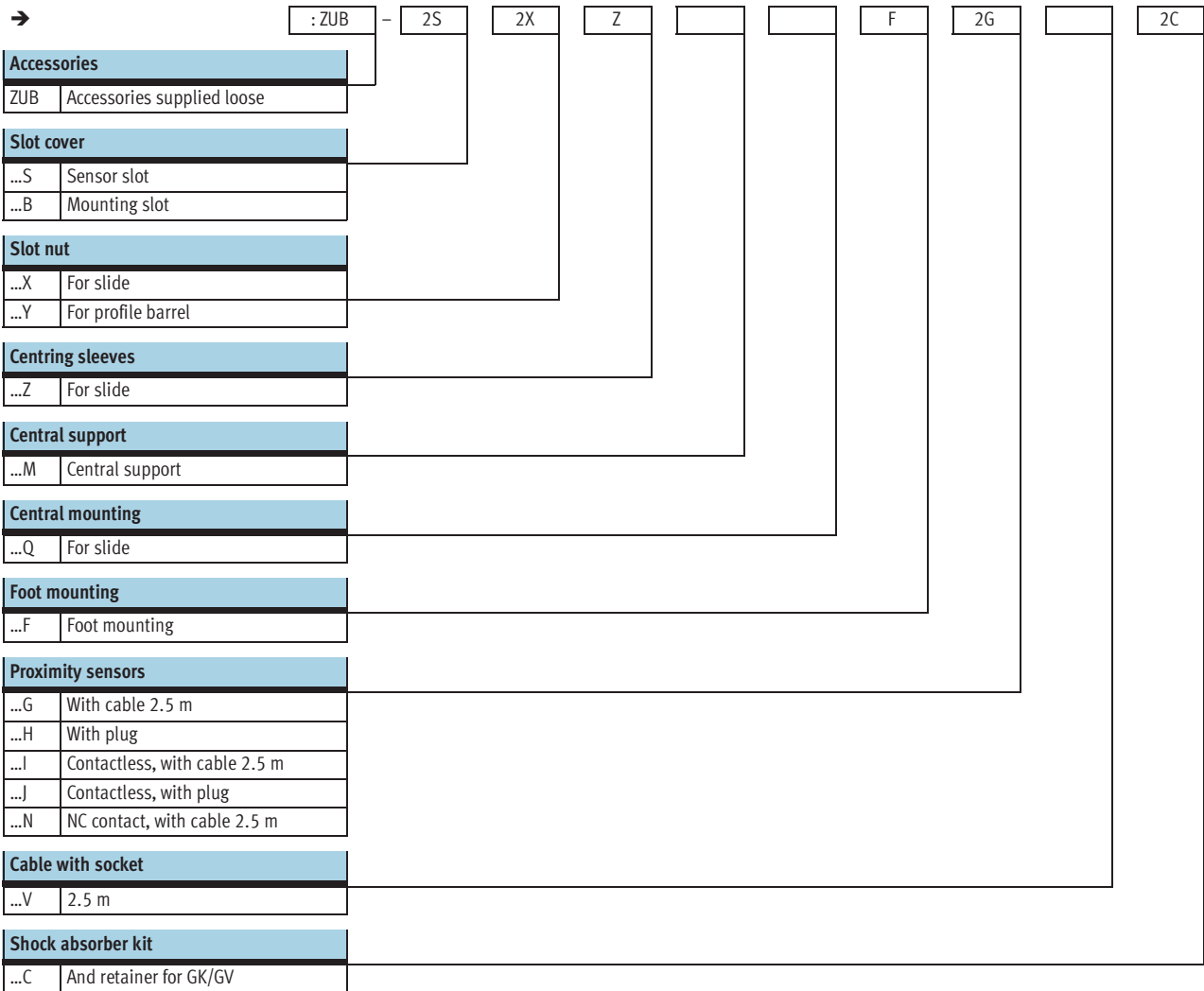
# Linear drives DGPL, external displacement encoder

Type codes



# Linear drives DGPL, external displacement encoder

Type codes

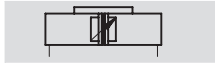




# Linear drives DGPL, external displacement encoder

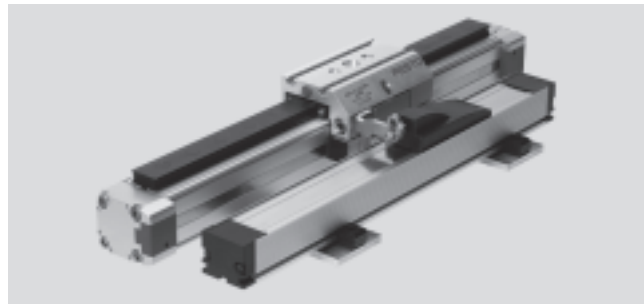
Technical data



## Function



-  - Diameter  
25 ... 63 mm
-  - Stroke length  
225 ... 2,000 mm



General technical data					
Piston Ø	25	32	40	50	63
Design	Piston				
	Driver				
	Profile barrel				
Mode of operation	Double-acting				
Operating medium <sup>1)</sup>	Compressed air, filtered and unlubricated, filter unit 5 µm				
Cushioning	Pneumatic cushioning adjustable at both ends				
Cushioning length [mm]	18	20	30		
Position sensing	Displacement encoder, attached externally				
	For proximity sensing				
Measuring principle (displacement encoder)	→ 5 / 1.2-3 Displacement encoders				
Type of mounting	Foot mounting				
Stroke <sup>2)3)</sup> [mm]	225, 300, 360, 450, 500, 600, 750, 1,000, 1,250, 1,500, 1,750, 2,000				
Protection against torsion/guide	Guide rail with slide				
	Recirculating ball bearing				
Clamping unit	→ Volume 1 (Linear drives DGPL)				
Pneumatic connection	G1/8		G1/4		G3/8
Electrical connection	→ 5 / 1.2-3 Displacement encoders				

- 1) The proportional directional control valve MPYE used requires the characteristic values.
- 2) Note stroke reduction in conjunction with SPC200.
- 3) Supply of compressed air to each end of the cylinder (feature D2) is absolutely essential for Soft Stop SPC11 and axis controller SPC200 as of a length of 500 mm.

Forces [N] and impact energy [Nm]					
Piston Ø	25	32	40	50	63
Theoretical force at 6 bar	295	483	754	1,178	1,870
Max. impact energy at the end positions <sup>1)</sup>	0.1	0.2	0.4	0.8	0.8


- 1) Cushioning PPV must be completely open for applications with Soft Stop SPC11 and axis controller SPC200.

Permissible impact velocity:

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

Maximum permissible load:

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

 Note

This data represents the maximum values which can be achieved. Values fluctuate in practice relative to the size of the effective load. Allowance must also be made for the limits of the cushioning capacity of the drive and the permissible impact energy.

# Linear drives DGPL, external displacement encoder

Technical data

Positioning characteristics with axis controller SPC200					
Piston Ø	25	32	40	50	63
Repetition accuracy [mm]	→ 5 / 1.1-72				
Mounting position	Any				
Minimum load, horizontal <sup>1)</sup> [kg]	2	3	5	8	12
Maximum load, horizontal <sup>1)</sup> [kg]	30	45	75	120	180
Minimum load, vertical <sup>1)</sup> [kg]	2	3	5	8	12
Maximum load, vertical <sup>1)</sup> [kg]	10	15	25	40	60
Min. speed of travel [m/s]	0.05				
Max. speed of travel [m/s]	3				
Typ. positioning time, long stroke <sup>2)</sup> [s]	0.80/1.20	0.90/1.25	0.80/1.20	1.00/1.25	0.95/1.25
Typ. positioning time, short stroke <sup>3)</sup> [s]	0.50/0.70	0.50/0.65	0.45/0.65	0.55/0.65	0.55/0.65
Minimum positioning stroke <sup>4)</sup> [%]	3				
Stroke reduction <sup>5)</sup> [mm]	25		35		
Recommended proportional directional control valve	→ 5 / 1.1-116				

- 1) Load = effective load + mass of all moving parts on the drive
- 2) At 6 bar, horizontal mounting position, DGPL-XX-1250, 1000 mm positioning travel at min./max. load
- 3) At 6 bar, horizontal mounting position, DNCM-XX-1250, 100 mm positioning travel at min./max. load
- 4) In relation to the maximum stroke of the drive, but never more than 20 mm.
- 5) The stroke reserve is to be maintained on every side of the drive, the max. positionable stroke is therefore: Stroke – 2x stroke reserve

Positioning characteristics with end position controller SPC11					
Piston Ø	25	32	40	50	63
Repetition accuracy of a mid-position <sup>1)</sup> [mm]	±2				
Mounting position	Any				
Minimum load, horizontal <sup>2)</sup> [kg]	2	3	5	8	12
Maximum load, horizontal <sup>2)</sup> [kg]	30	45	75	120	180
Minimum load, vertical <sup>2)</sup> [kg]	2	3	5	8	12
Maximum load, vertical <sup>2)</sup> [kg]	10	15	25	40	60
Travel time [s]	→ Software Tool "SoftStop": <a href="http://www.festo.com/en/engineering">www.festo.com/en/engineering</a>				
Recommended proportional directional control valve	→ 5 / 1.1-116				

- 1) In the stroke range from 225 ... 2,000 mm
- 2) Load = effective load + mass of all moving parts on the drive

Operating and environmental conditions					
Piston Ø	25	32	40	50	63
Operating pressure <sup>1)</sup> [bar]	4 ... 8				
Ambient temperature <sup>2)</sup> [°C]	-10 ... +60				
Vibration resistance	To DIN/IEC 68 Parts 2 -6, severity level 2				
Continuous shock resistance	To DIN/IEC 68 Parts 2 -27, severity level 2				
CE symbol	To 89/336/EEC (EMC regulation)				
Protection class (displacement encoder)	→ 5 / 1.2-3 Displacement encoders				

- 1) Only applies for applications with Soft Stop SPC11 and axis controller SPC200.
- 2) Note operating range of proximity sensors.

# Linear drives DGPL, external displacement encoder

Technical data



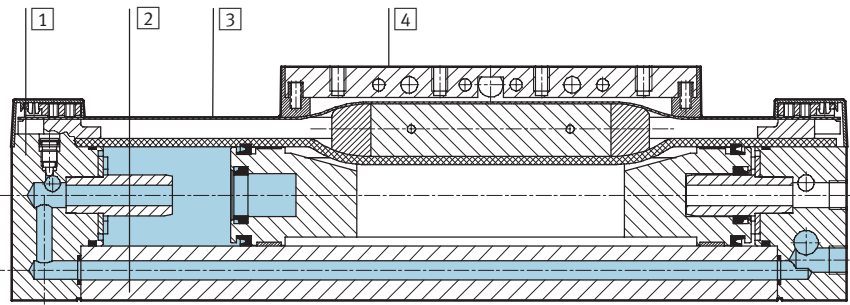
Weights [g] without displacement encoder						
Piston Ø	25	32	40	50	63	
Basic weight	1,520	2,720	4,480	9,600	15,370	
Additional weight per 10 mm stroke	53	69	97	167	236	
Clamping unit	714	1,100	1,694	–	–	
Additional weight of clamping unit per 10 mm stroke	27	34	42	–	–	
Moving load	Standard slide GK	605	895	1,700	3,000	4,990
	Extended slide GV	950	1,375	2,603	4,700	7,860
	Clamping unit	185	250	461	–	–

- - Note

Electrical data, displacement encoder:	Analogue displacement encoder (Order code: MP) → 5 / 1.2-4	Digital displacement encoder (Order code: MA) → 5 / 1.2-8
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## Materials

Sectional view

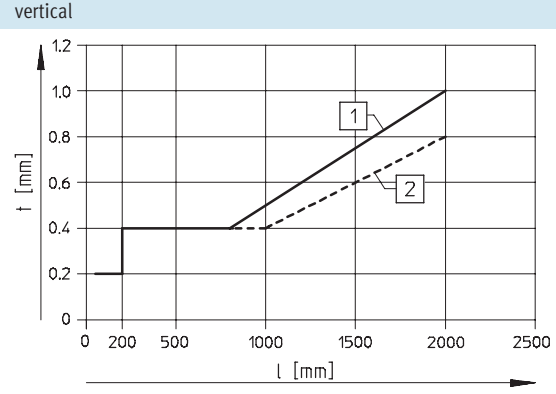
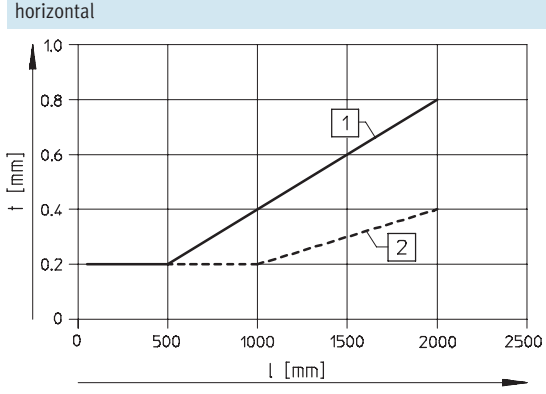


Displacement encoder materials  
→ 5 / 1.2-10

Drive	
1 End cap	Anodised aluminium
2 Profile	Anodised aluminium
3 Cover strip	Steel, corrosion resistant
4 Driver	Anodised aluminium
- Slide	Anodised aluminium
- Guide rail	Corrosion resistant steel
- Seals	Nitrile rubber, polyurethane

## Repetition accuracy

Tolerance t [mm] as a function of the stroke l [mm]



- 1 with analogue displacement encoder
- 2 with digital displacement encoder



# Linear drives DGPL, external displacement encoder

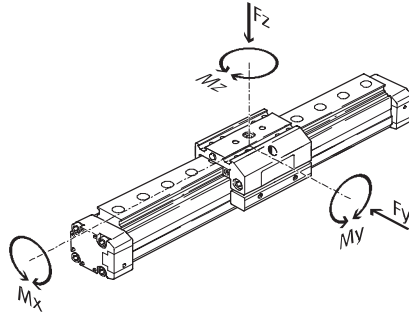
Technical data



## Characteristic load values

The forces and torques specified refer to the centre line of the profile barrel internal diameter.

They must not be exceeded during dynamic operation. Special attention must be paid to the cushioning phase.



If the drive is subjected to more than two of the indicated forces and torques simultaneously, the following equations must be satisfied in addition to the indicated maximum loads.

$$0,4 \times \frac{F_z}{F_{z_{max}}} + \frac{M_x}{M_{x_{max}}} + \frac{M_y}{M_{y_{max}}} + 0,2 \times \frac{M_z}{M_{z_{max}}} \leq 1$$

$$\frac{F_z}{F_{z_{max}}} \leq 1 \quad \frac{M_z}{M_{z_{max}}} \leq 1$$

## Permissible forces and torques

Piston Ø	Variant	25		32		40		50		63	
		GK	GV	GK	GV	GK	GV	GK	GV	GK	GV
$F_{y_{max}}$	[N]	3,080	3,080	3,080	3,080	7,300	7,300	7,300	7,300	14,050	14,050
$F_{z_{max}}$	[N]	3,080	3,080	3,080	3,080	7,300	7,300	7,300	7,300	14,050	14,050
$M_{x_{max}}$	[Nm]	45	45	63	63	170	170	240	240	580	580
$M_{y_{max}}$	[Nm]	85	170	127	250	330	660	460	920	910	1,820
$M_{z_{max}}$	[Nm]	85	170	127	250	330	660	460	920	910	1,820

## Maximum permissible support span l as a function of the force F

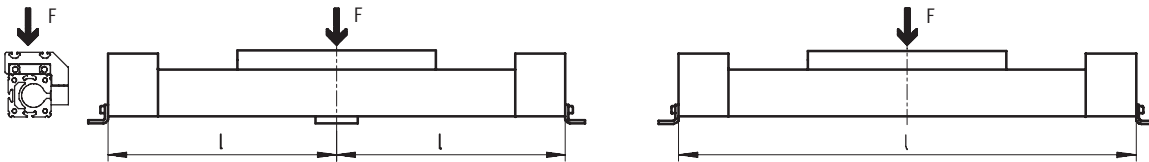
The axis may need to be supported with central supports MUP in order to

limit deflection in the case of large strokes. The following diagrams serve

to determine the maximum permissible support span l as a

function of the force F.

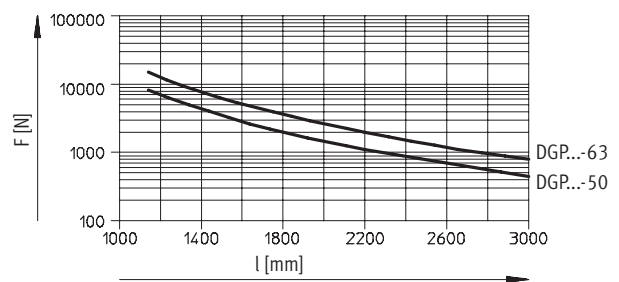
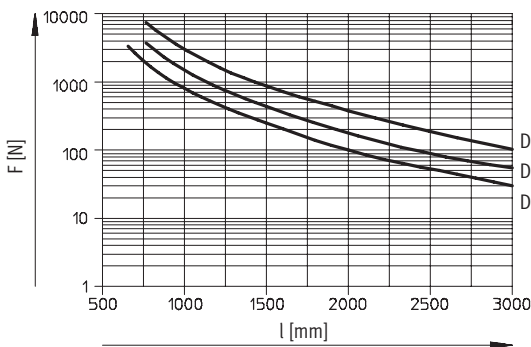
### Force on the surface of the slide



## Maximum support span l (without central support) as a function of the force F

Piston Ø 25 ... 40

Piston Ø 50/63



# Linear drives DGPL, external displacement encoder

Technical data

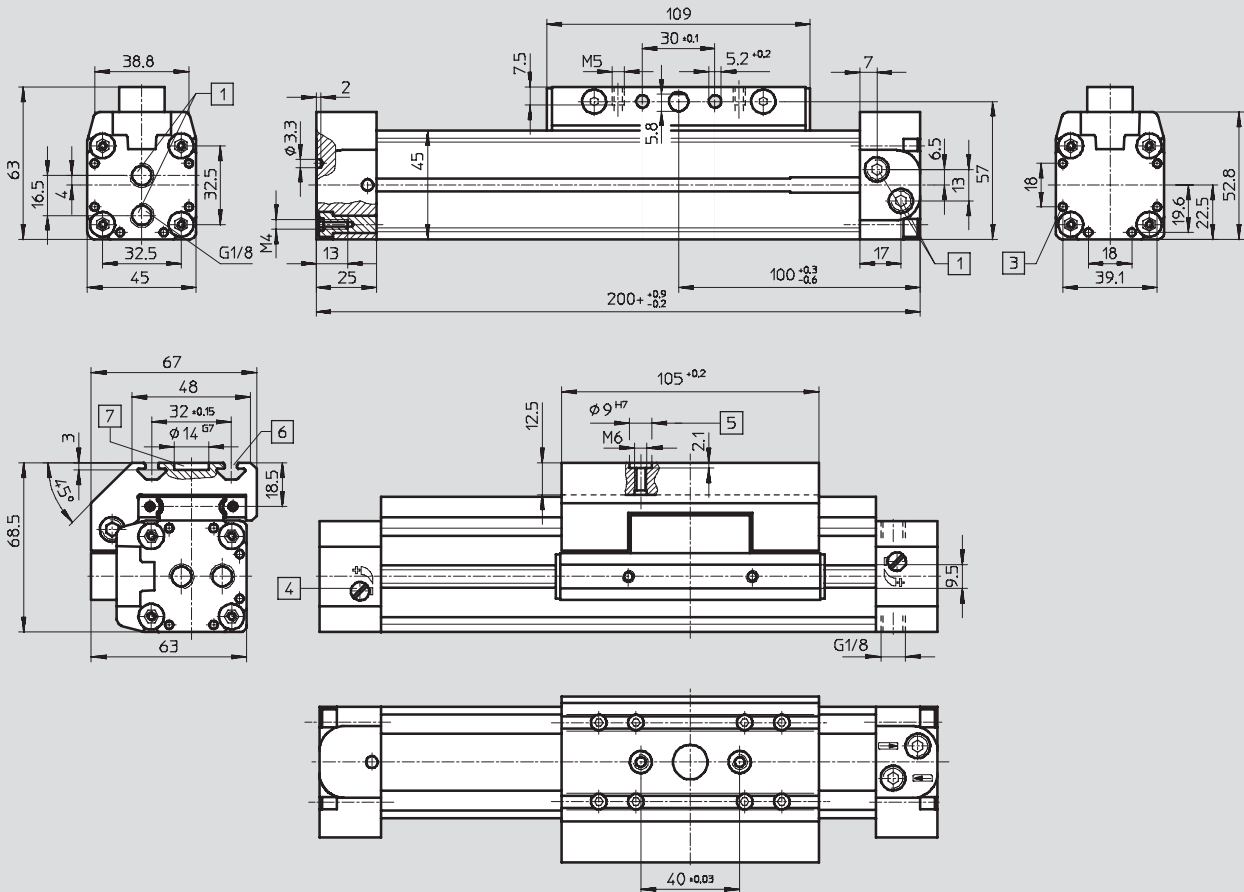
FESTO

## Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Standard slide GK

Piston Ø 25



- |   |  |  |                               |
|---|--|--|-------------------------------|
| <p>1 Supply ports at one end, option of three sides of an end cap (D2 variant: supply port at both ends, option of three sides per end cap)</p> | <p>3 Mounting hole for foot mounting HP</p> <p>4 Regulating screw for adjustable end-position cushioning</p> <p>5 Hole for centring sleeve ZBH-9</p> | <p>6 Mounting slot for slot nut NSTL</p> <p>7 Drilled hole for central mounting SLZZ</p> | <p>+ = plus stroke length</p> |
|---|--|--|-------------------------------|

Servopneumatic positioning systems  
 Cylinders with displacement encoders

1.1

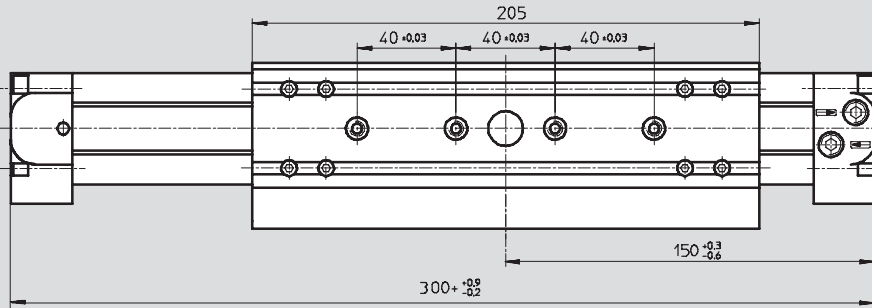
# Linear drives DGPL, external displacement encoder

Technical data



Extended slide GV

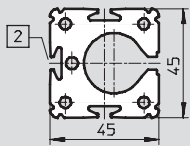
Piston  $\varnothing 25$



+ = plus stroke length

Profile barrel

Piston  $\varnothing 25$



2 Sensor slot for proximity sensor

# Linear drives DGPL, external displacement encoder

Technical data

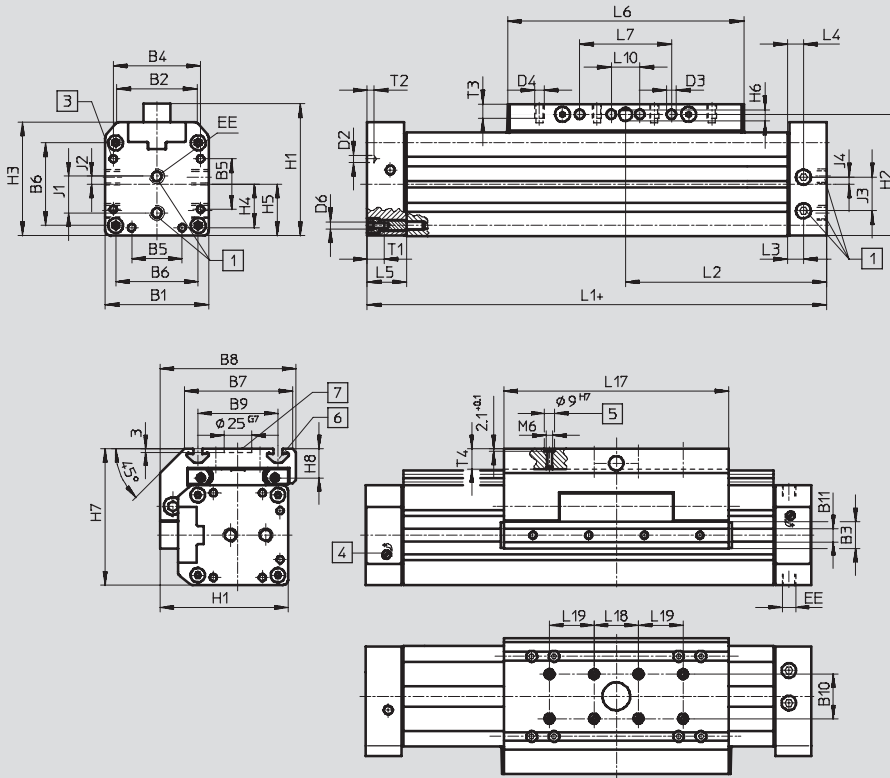


## Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Standard slide GK

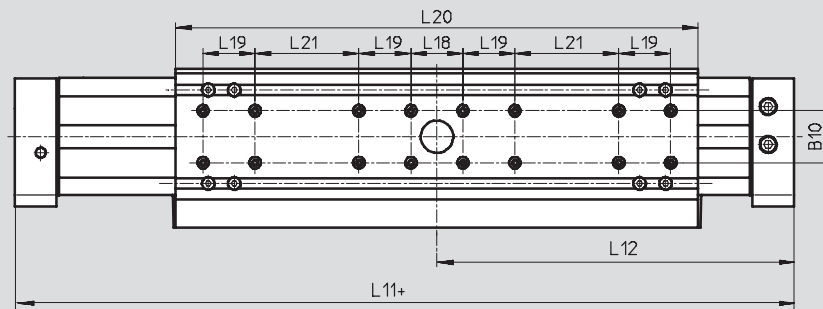
Piston Ø 32 ... 63



- 1 Supply ports at one end, option of three sides of an end cap (D2 variant: supply port at both ends, option of three sides per end cap)
  - 2 Regulating screw for adjustable end-position cushioning
  - 3 Mounting hole for foot mounting HP
  - 4 Slot for end-position cushioning
  - 5 Hole for centring sleeve ZBH-9
  - 6 Mounting slot for slot nut NSTL
  - 7 Drilled hole for central mounting SLZZ
- + = plus stroke length

Extended slide GV

Piston Ø 32 ... 63



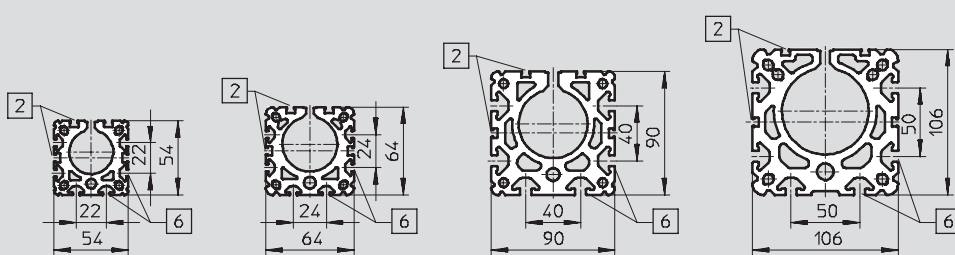
Profile barrel

Piston Ø 32

Piston Ø 40

Piston Ø 50

Piston Ø 63



- 2 Sensor slot for proximity sensor
- 6 Mounting slot for slot nut NST

# Linear drives DGPL, external displacement encoder




Technical data

∅	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	D2
[mm]			+0.2							±0.03		∅
32	54	35.8	19	46	21	40	63	79	47 ±0.15	20	9.5	4.3
40	64	45.7	21	53	28	49	78.5	96.5	55 ±0.2			
50	90	69.2	24	76	44	72	97	122	72 ±0.2	40	12	6.3
63	106	84.8		89		83	121	142	90 ±0.25			

∅	D3	D4	D6	EE	H1	H2	H3	H4	H5	H6	H7	H8
[mm]	∅											
	+0.2											
32	5.2	M5	M5	G1/8	72	66	62	23	27	5.8	77.5	18.5
40	6.5	M6		G1/4	86	78	71.8	26.5	32	7.7	90.5	20
50	8.5	M8	M6		115	106	99	36	45	9.7	122.5	26
63			M8	G3/8	131	122	115	44.5	53		144.5	30

∅	J1	J2	J3	J4	L1	L2	L3	L4	L5	L6	L7	L10
[mm]					+0.9/-0.2	+0.3/-0.6						±0.15
32	19	4.2	14	4.7	250	125	17	8.5	31	135	50 ±0.1	-
40	22	5	21	9.1	300	150	11.5	11.5		171	70 ±0.1	
50	31.8	6.8	29.3	6	350	175	14	14	34	206	80 ±0.1	
63	36	8	31	14	400	200				234	110 ±0.1	

∅	L11	L12	L17	L18	L19	L20	L21	T1	T2	T3	T4
[mm]	+0.9/-0.2	+0.3/-0.6		±0.03	±0.03		±0.1				max.
32	380	190	131 ±0.2	40	-	261	40	13.2	3	7.5	12.5
40	470	235	167 ±0.2		40	337	4		10.5		
50	550	275	202 ±0.2		402	80	15.2	6	12.5	18.5	
63	650	325	230 ±0.2		480	120	21.2	20.5			

-  - Note  
 Accessories → 5 / 1.1-112

Servopneumatic positioning systems  
 Cylinders with displacement encoders

**1.1**

# Linear drives DGPL, external displacement encoder

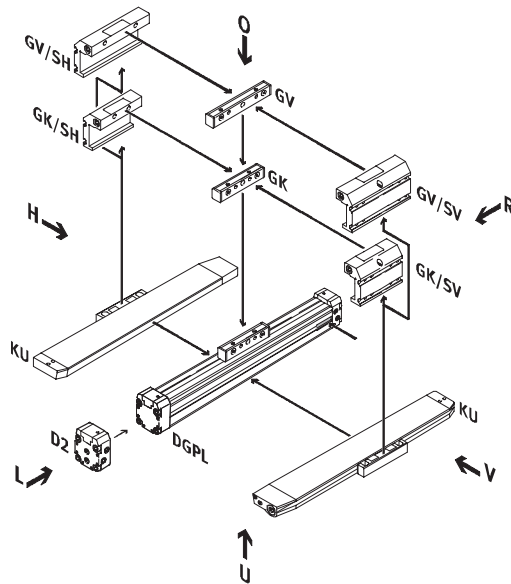
Ordering data – Modular product system



## Order code

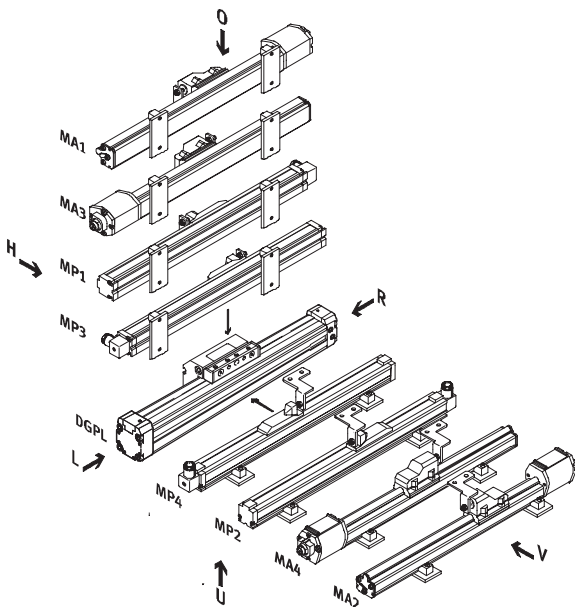
### Mandatory data/Options

- KU Clamping unit underneath
- GK Standard slide
- GV Extended slide
- SV Slide at rear
- SH Slide at front
- D2 Air connection at both ends

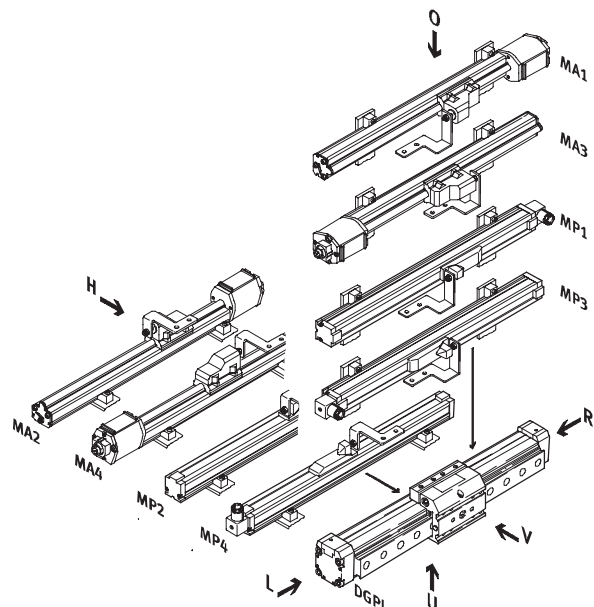


### Attachment position for slides at rear (SH)

- MP Analogue displacement encoder
- MA Digital displacement encoder



### Attachment position for slides at front (SV)



- - Note
- O top
- U underneath
- R right
- L left
- V front
- H rear

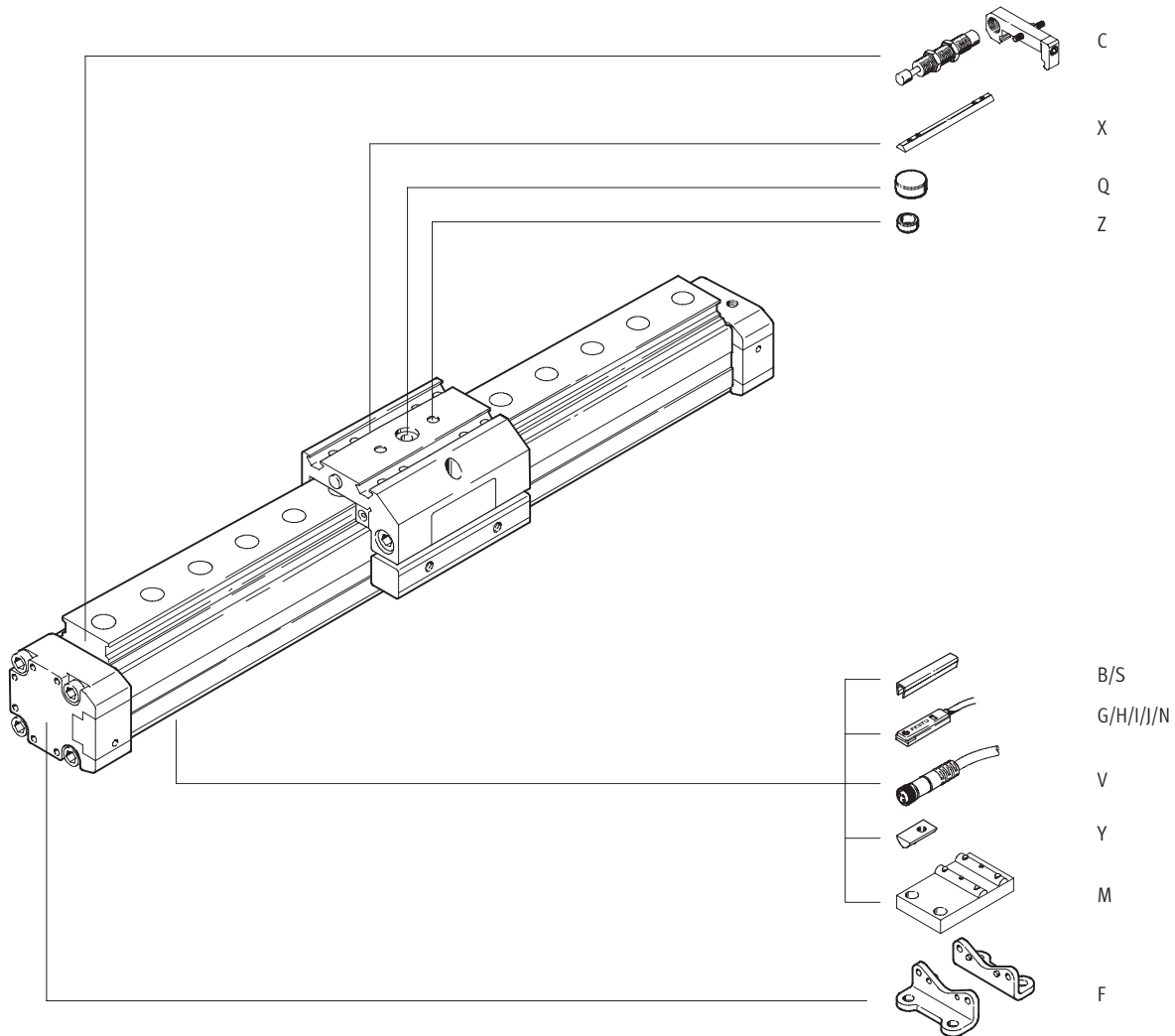
# Linear drives DGPL, external displacement encoder

Ordering data – Modular product system



## Order code

## Options



# Linear drives DGPL, external displacement encoder

Ordering data – Modular product system



## 1.1

M Mandatory data								O Options				
Module No.	Drive function	Size	Stroke	Cushioning	Position sensing	Generation	Guide	Clamping unit	Basic variant	Slide attachment position	Supply port	Displacement encoder
175 134	DGPL	25	225 ... 2 000	PPV	A	B	KF	KU	GK GV	SV SH	D2	MP1
175 135		32										MP2
175 136		40										MP3
175 137		50										MP4
175 138		63										MA1 MA2 MA3 MA4 MP0 MA0
<b>Ordering example</b>												
175 136	DGPL	40	750	PPV	A	B	KF		GV	SH	D2	MA2

Ordering table										
Size	25	32	40	50	63	Condi- tions	Code	Enter code		
M Module No.	175 134	175 135	175 136	175 137	175 138					
Drive function	Pneumatic linear drive with slide							DGPL	DGPL	
Size	25	32	40	50	63		-...			
Stroke [mm]	225, 300, 360, 450, 500, 600, 750, 1 000, 1 250, 1 500, 1 750, 2 000							-...		
Cushioning	Pneumatic cushioning adjustable at both ends							-PPV	-PPV	
Position sensing	For proximity sensing							-A	-A	
Generation	B series							-B	-B	
Guide	Recirculating ball bearing guide							-KF	-KF	
O Clamping unit	Underneath			-	-			-KU		
Basic variant	Standard piston/slide						1	-GK		
	Extended piston/slide							-GV		
Slide attachment position	Slide at front						2	-SV		
	Slide at rear							-SH		
Supply port	at both ends							-D2		
Displacement encoder	Encoder, position 1, mounted							-MP1		
	Encoder, position 2, mounted						3	-MP2		
	Encoder, position 3, mounted							-MP3		
	Encoder, position 4, mounted						3	-MP4		
	Temposonic with CAN axis interface, position 1, mounted							-MA1		
	Temposonic with CAN axis interface, position 2, mounted						3	-MA2		
	Temposonic with CAN axis interface, position 3, mounted							-MA3		
	Temposonic with CAN axis interface, position 4, mounted						3	-MA4		
	Encoder, supplied separately							-MP0		
	Temposonic with CAN axis interface, supplied separately							-MA0		

- 1 GK or GV Must be selected
- 2 SV or SH Must be selected
- 3 MP2, MP4, MA2, MA4 Not with clamping unit KU

### Transfer order code



# Linear drives DGPL, external displacement encoder

Ordering data – Modular product system



Options									
Accessories	Slot cover	Slot nut	Centring sleeve	Central support	Central mounting	Foot mounting	Proximity sensor, magnetic	Plug socket	Shock absorber kit
ZUB	...S ...B	...X ...Y	...Z	...M	...Q	...F	...G ...H ...I ...J ...N	...V	...C
: ZUB	- 2S2B	2XY	Z		Q	F			2C

Ordering table										
Size		25	32	40	50	63	Condi- tions	Code	Enter code	
↓	Accessories	Supplied separately							:ZUB-	:ZUB-
0	Slot cover, x2, 0.5 m	Sensor slot	1 ... 10						...S	
		Mounting slot	-						...B	
	Slot nut	Slide	1 ... 10						...X	
		Mounting slot	-						...Y	
	Centring sleeve (pack of 10)	10, 20, 30, 40, 50, 60, 70, 80, 90							...Z	
	Central support	1 ... 10							...M	
	Central mounting	1 ... 10							...Q	
	Foot mounting	1 ... 10							...F	
	Magnetic proximity sensor	With cable 2.5 m	1 ... 10						...G	
		With plug	1 ... 10						...H	
	Magnetic proximity sensor, contactless	With cable 2.5 m	1 ... 10						...I	
		With plug	1 ... 10						...J	
	Magnetic proximity sensor	NC contact, with cable 2.5 m	1 ... 10						...N	
	Cable with socket, 2.5 m	1 ... 10							...V	
	Shock absorber kit	1 ... 10							...C	

Transfer order code

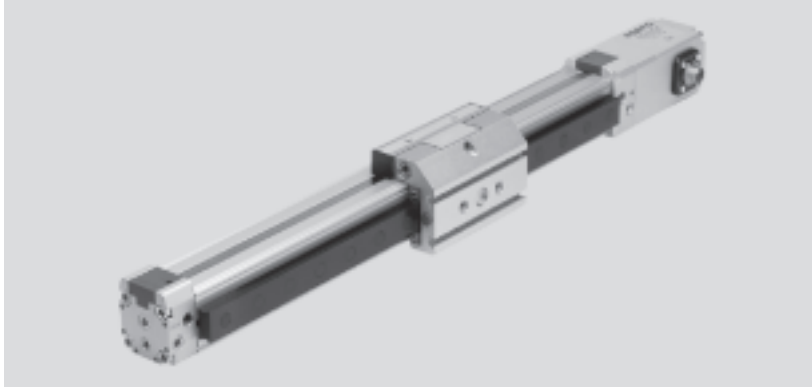
: ZUB - [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

# Linear drives DGPI/DGPIL, integrated displacement encoder

Features



## Individual positioning components with linear drive DGPI/DGPIL ...



Proportional directional control valve  
MPYE-...  
→ 5 / 1.5-2



Soft Stop → 5 / 1.4-2

Positioning technology → 5 / 1.3-2

End position controller  
SPC11-MTS-AIF



Axis interface  
SPC-AIF-MTS



Axis positioning controller  
SPC200



# Linear drives DGPI/DGPIL, integrated displacement encoder

FESTO

Features

## DGPI, without guide

5 / 1.1-84

- Piston  $\varnothing$  25 ... 63 mm
- Stroke 225 ... 2,000 mm
- Standard driver
- Low characteristic load values
- Air connections on both sides



## DGPIL, with recirculating ball bearing guide

5 / 1.1-98

- Piston  $\varnothing$  25 ... 63 mm
- Stroke 225 ... 2,000 mm
- Standard slide
- High characteristic load values
- Air connections on both sides



## DGPIL, with recirculating ball bearing guide and protected version

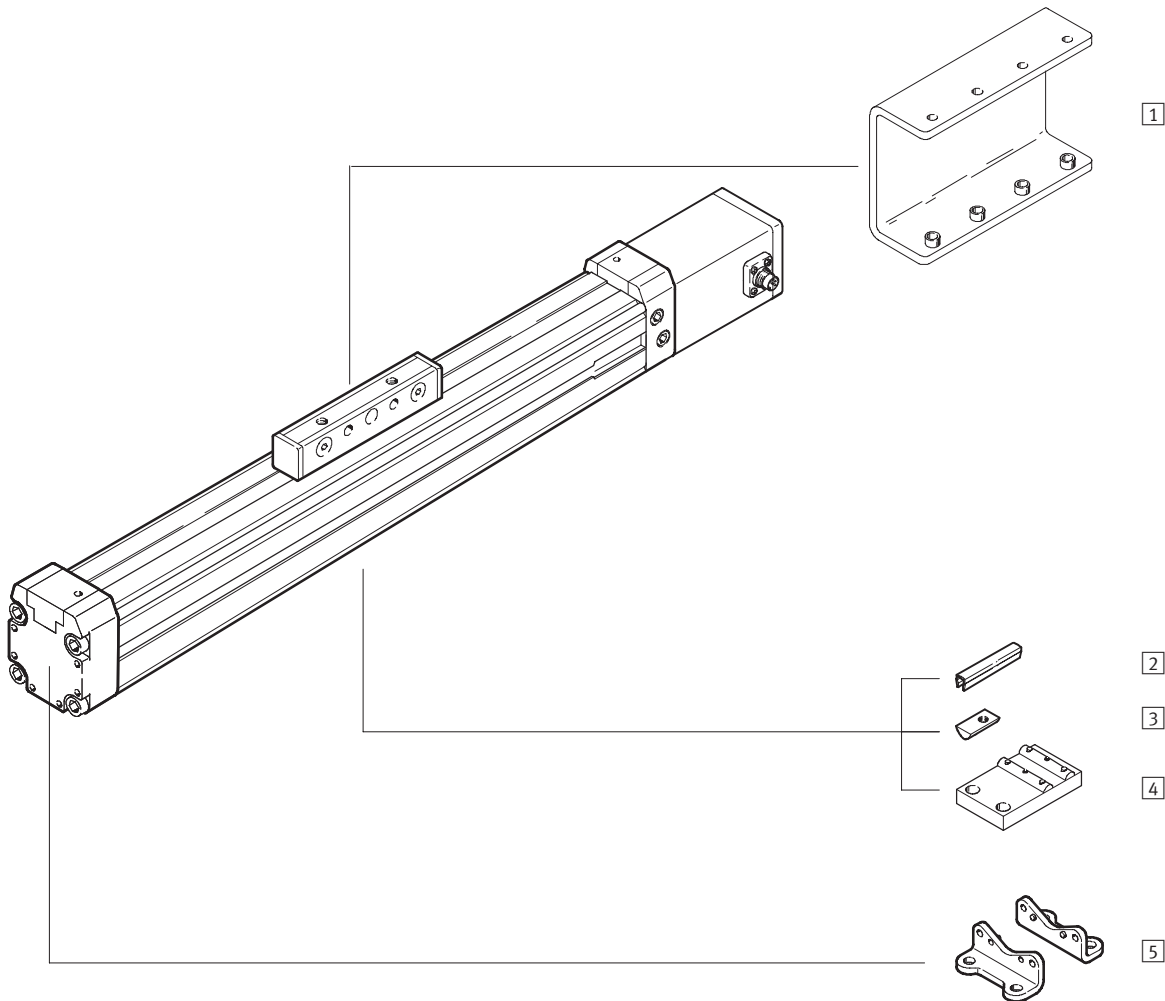
5 / 1.1-98

- Piston  $\varnothing$  25...40 mm
- Stroke 225 ... 2,000 mm
- Protected from above and the sides against the ingress of particles
- High characteristic load values
- Air connections on both sides



# Linear drives DGPI, integrated displacement encoder

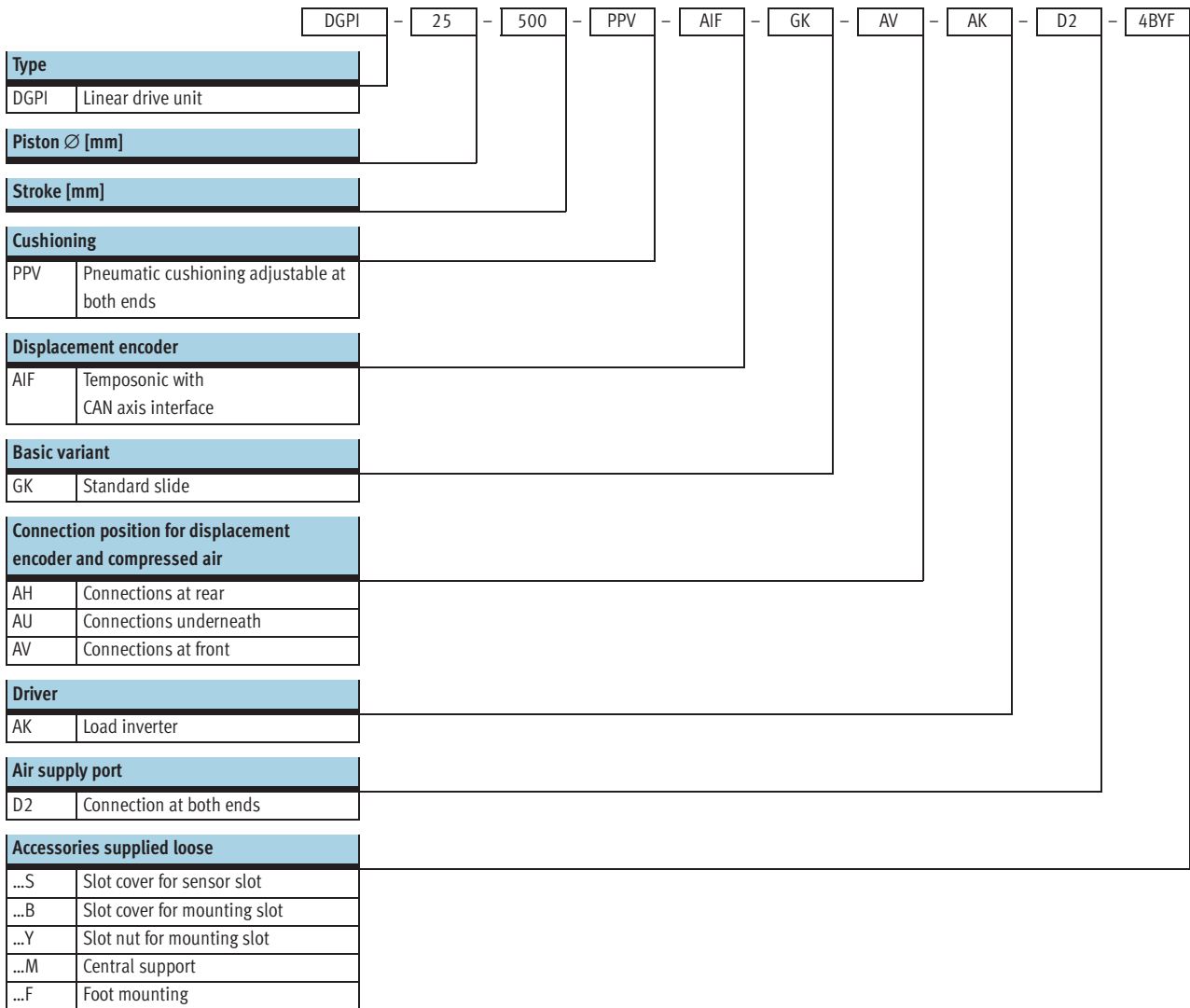
Peripherals overview



Variants and accessories		
Type	Brief description	→ Page
1 Load inverter AK	to secure the load from beneath, is supplied attached	5 / 1.1-113
2 Slot cover B/S	to protect against the ingress of dirt	5 / 1.1-115
3 Slot nut Y	for mounting attachments	5 / 1.1-115
4 Central support M	to mount the axis	5 / 1.1-112
5 Foot mounting F	to mount the axis	5 / 1.1-112

# Linear drives DGPI, integrated displacement encoder

Type codes

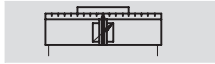


# Linear drives DGPI, integrated displacement encoder

Technical data



## Function



- - Diameter  
25 ... 63 mm
- - Stroke length  
225 ... 2,000 mm



General technical data					
Piston $\varnothing$	25	32	40	50	63
Design	Piston				
	Driver				
	Profile barrel				
Mode of operation	Double-acting				
Operating medium <sup>1)</sup>	Compressed air, filtered and unlubricated, filter unit 5 $\mu$ m				
Cushioning	Pneumatic cushioning adjustable at both ends				
Cushioning length [mm]	18	20	30		
Position sensing	Integrated displacement encoder				
Measuring principle	Digital, magnetostrictive, non-contacting, absolute measurement				
Type of mounting	Foot mounting				
Stroke <sup>2)3)</sup> [mm]	225, 300, 360, 450, 500, 600, 750, 1,000, 1,250, 1,500, 1,750, 2,000				
Pneumatic connection	G1/8		G1/4		G3/8
Electrical connection	6-pin round plug to DIN 45 322				

- 1) The proportional directional control valve MPYE used requires the characteristic values.
- 2) Note stroke reduction in conjunction with SPC200.
- 3) Supply of compressed air to each end of the cylinder (feature D2) is absolutely essential for Soft Stop SPC11 and axis controller SPC200 as of a length of 500 mm.

Forces [N] and impact energy [Nm]					
Piston $\varnothing$	25	32	40	50	63
Theoretical force at 6 bar	295	483	754	1,178	1,870
Max. impact energy at the end positions <sup>1)</sup>	0.1	0.2	0.4	0.8	0.8

- 1) Cushioning PPV must be completely open for applications with Soft Stop SPC11 and axis controller SPC200.

Permissible impact velocity:

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

Maximum permissible load:

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

- Note

This data represents the maximum values which can be achieved. Values fluctuate in practice relative to the size of the effective load. Allowance must also be made for the limits of the cushioning capacity of the drive and the permissible impact energy.

# Linear drives DGPI, integrated displacement encoder

Technical data

Positioning characteristics with axis controller SPC200					
Piston Ø	25	32	40	50	63
Repetition accuracy [mm]	→ 5 / 1.1-72				
Mounting position	Any				
Minimum load, horizontal <sup>1)</sup> [kg]	2	3	5	8	12
Maximum load, horizontal <sup>1)</sup> [kg]	30	45	75	120	180
Minimum load, vertical <sup>1)</sup> [kg]	2	3	5	8	12
Maximum load, vertical <sup>1)</sup> [kg]	10	15	25	40	60
Min. speed of travel [m/s]	0.05				
Max. speed of travel [m/s]	3				
Typ. positioning time, long stroke <sup>2)</sup> [s]	0.75/1.20	0.85/1.20	0.75/1.20	0.95/1.25	0.90/1.20
Typ. positioning time, short stroke <sup>3)</sup> [s]	0.40/0.60	0.45/0.60	0.40/0.60	0.50/0.65	0.50/0.65
Minimum positioning stroke <sup>4)</sup> [%]	3				
Stroke reduction <sup>5)</sup> [mm]	25		35		
Recommended proportional directional control valve	→ 5 / 1.1-116				

- 1) Load = effective load + mass of all moving parts on the drive
- 2) At 6 bar, horizontal mounting position, DGPL-XX-1250, 1000 mm positioning travel at min./max. load
- 3) At 6 bar, horizontal mounting position, DNCM-XX-1250, 100 mm positioning travel at min./max. load
- 4) In relation to the maximum stroke of the drive, but never more than 20 mm.
- 5) The stroke reserve is to be maintained on every side of the drive, the max. positionable stroke is therefore: Stroke – 2x stroke reserve

Positioning characteristics with end position controller SPC11					
Piston Ø	25	32	40	50	63
Repetition accuracy of a mid-position <sup>1)</sup> [mm]	±2				
Mounting position	Any				
Minimum load, horizontal <sup>2)</sup> [kg]	2	3	5	8	12
Maximum load, horizontal <sup>2)</sup> [kg]	30	45	75	120	180
Minimum load, vertical <sup>2)</sup> [kg]	2	3	5	8	12
Maximum load, vertical <sup>2)</sup> [kg]	10	15	25	40	60
Travel time [s]	→ Software Tool "SoftStop": <a href="http://www.festo.com/en/engineering">www.festo.com/en/engineering</a>				
Recommended proportional directional control valve	→ 5 / 1.1-116				

- 1) In the stroke range from 225 ... 2,000 mm
- 2) Load = effective load + mass of all moving parts on the drive

Operating and environmental conditions					
Piston Ø	25	32	40	50	63
Operating pressure <sup>1)</sup> [bar]	4 ... 8				
Ambient temperature [°C]	-10 ... +60				
Vibration resistance	To DIN/IEC 68 Parts 2 -6, severity level 1				
Continuous shock resistance	To DIN/IEC 68 Parts 2 -27, severity level 1				
CE marking symbol (see conformity declaration)	As per EU EMC directive				
Protection class (displacement encoder)	IP65 to IEC 60 529				
Corrosion resistance class CRC <sup>2)</sup>	1				

- 1) Only applies for applications with Soft Stop SPC11 and axis controller SPC200.
- 2) Corrosion resistance class 1 according to Festo standard 940 070  
Components requiring low corrosion resistance. Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers.

Weights [g]					
Piston Ø	25	32	40	50	63
Basic weight	1,540	2,150	3,500	6,980	10,600
Additional weight per 10 mm stroke	38	43	59	130	168
Moving load	180	314	551	1,045	1,775

# Linear drives DGPI, integrated displacement encoder

Technical data

FESTO

Servopneumatic positioning systems  
Cylinders with displacement encoders

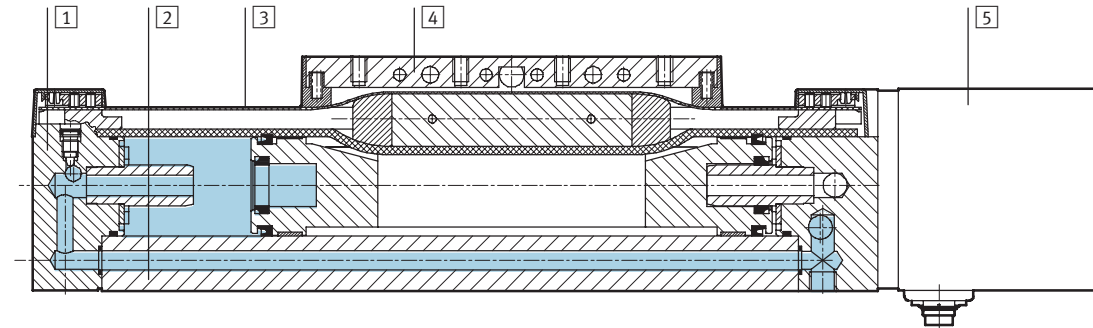
1.1

Electrical data, displacement encoder		
Power supply	[V DC]	24 (-15/+25%)
Max. current consumption	[mA]	90
Resolution	[mm]	≤ 0.01
Independent linearity <sup>1)</sup>	maximum [%]	0.02
Temperature coefficient	[ppm/°K]	≤ 15
Interface		Digital, CAN with protocol: SPC-AIF


1) Minimum ±50 µm

## Materials

Sectional view



Drive		
1	End cap	Anodised aluminium
2	Profile	Anodised aluminium
3	Cover strip	Steel, corrosion resistant
4	Driver	Anodised aluminium
5	Displacement encoder housing	Anodised aluminium
-	Seals	Nitrile rubber, polyurethane

-  - Note  
Further technical data  
➔ Volume 1 (Linear drives DGPI)



# Linear drives DGPI, integrated displacement encoder

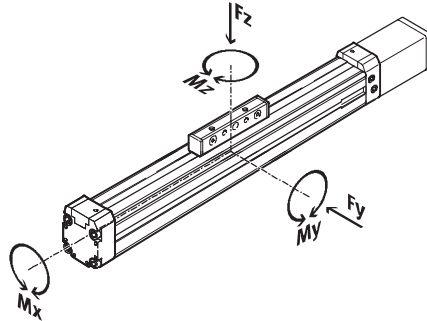
Technical data



## Characteristic load values

The forces and torques specified refer to the centre line of the profile barrel internal diameter.

They must not be exceeded during dynamic operation. Special attention must be paid to the cushioning phase.



If the drive is subjected to more than two of the indicated forces and torques simultaneously, the following equations must be satisfied in addition to the indicated maximum loads.

$$0,4 \times \frac{F_z}{F_{z_{max}}} + \frac{M_x}{M_{x_{max}}} + \frac{M_y}{M_{y_{max}}} + 0,2 \times \frac{M_z}{M_{z_{max}}} \leq 1$$

$$\frac{F_z}{F_{z_{max}}} \leq 1 \quad \frac{M_z}{M_{z_{max}}} \leq 1$$

## Permissible forces and torques

Piston Ø	25	32	40	50	63
F <sub>y</sub> <sub>max.</sub> [N]	–	–	–	–	–
F <sub>z</sub> <sub>max.</sub> [N]	330	480	800	1,200	1,600
M <sub>x</sub> <sub>max.</sub> [Nm]	1	2	4	7	8
M <sub>y</sub> <sub>max.</sub> [Nm]	20	40	60	120	120
M <sub>z</sub> <sub>max.</sub> [Nm]	3	5	8	15	24

## Maximum permissible support span l as a function of the force F

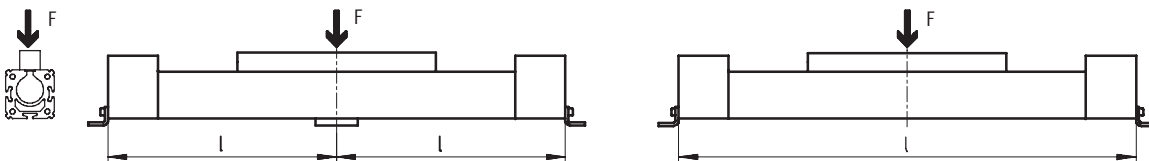
The axis may need to be supported with central supports MUP in order to

limit deflection in the case of large strokes. The following diagrams serve

to determine the maximum permissible support span l as a

function of the force F.

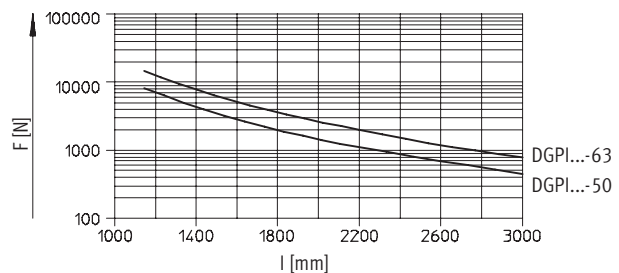
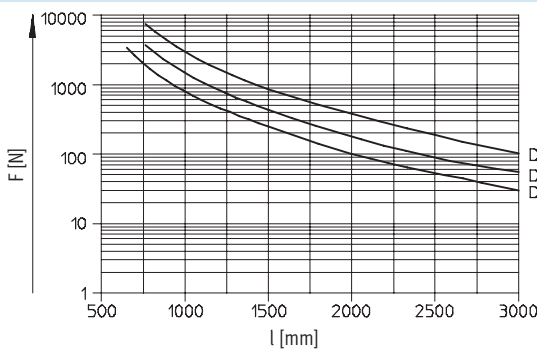
### Force on the surface of the slide



## Maximum support span l (without central support) as a function of the force F

Piston Ø 25 ... 40

Piston Ø 50/63



# Linear drives DGPI, integrated displacement encoder

Technical data

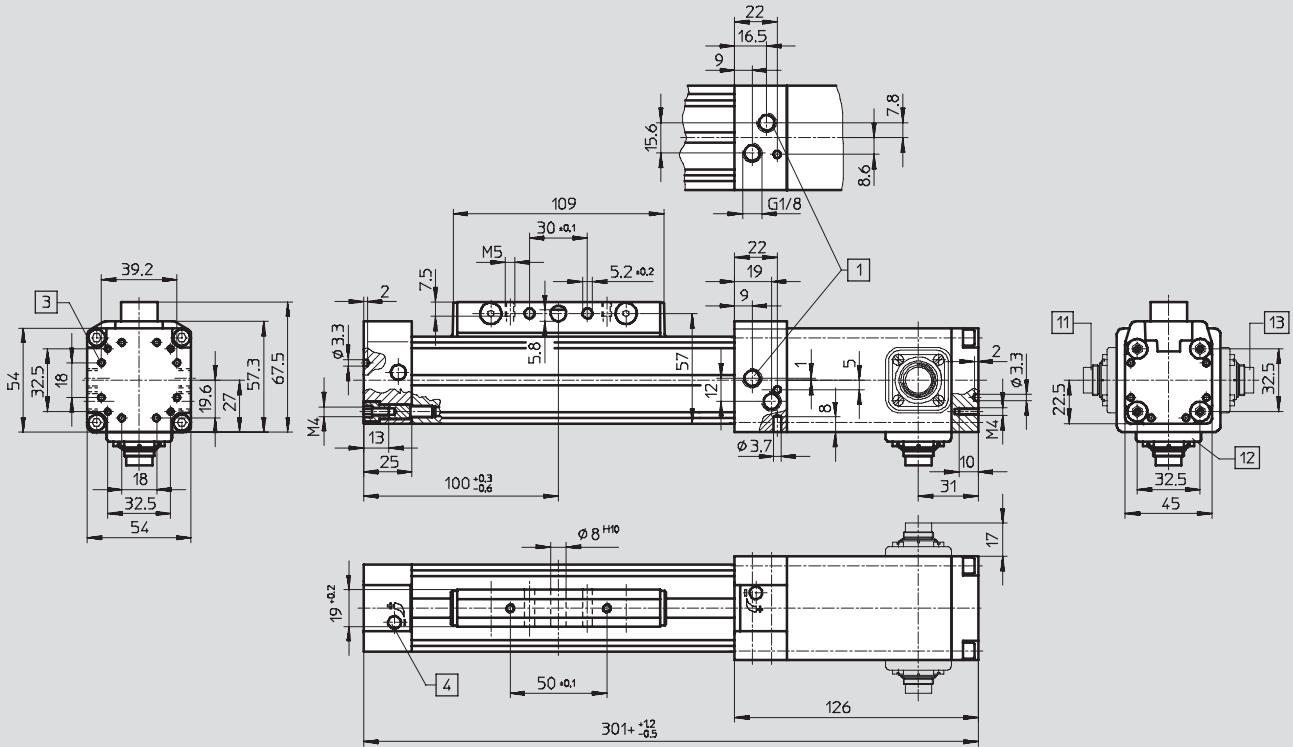


## Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Standard driver GK

Piston  $\varnothing 25$



- 1 Both compressed air connections can be optionally connected to three sides of the right-hand end cap
- 2 M4
- 3 Mounting holes for foot mounting HP
- 4 Regulating screw for adjustable end-position cushioning + = plus stroke length
- 5 19 ± 0.2
- 6 50 ± 0.1
- 7 301 ± 0.5
- 8 126
- 9 17
- 10 126
- 11 Encoder connection at rear
- 12 Encoder connection underneath
- 13 Encoder connection at front

# Linear drives DGPI, integrated displacement encoder

Technical data

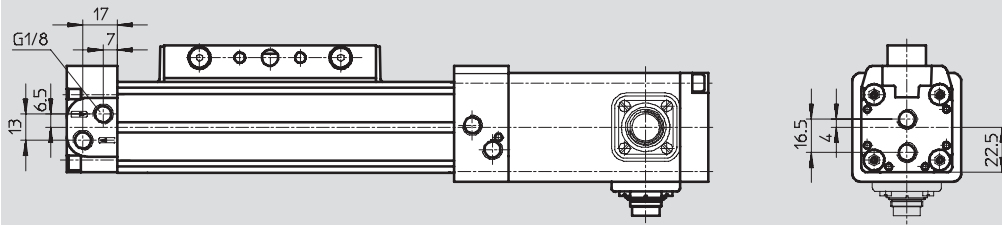
FESTO

## Dimensions

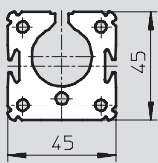
Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Supply port D2 at both sides

Piston  $\varnothing 25$



## Profile barrel



# Linear drives DGPI, integrated displacement encoder

Technical data

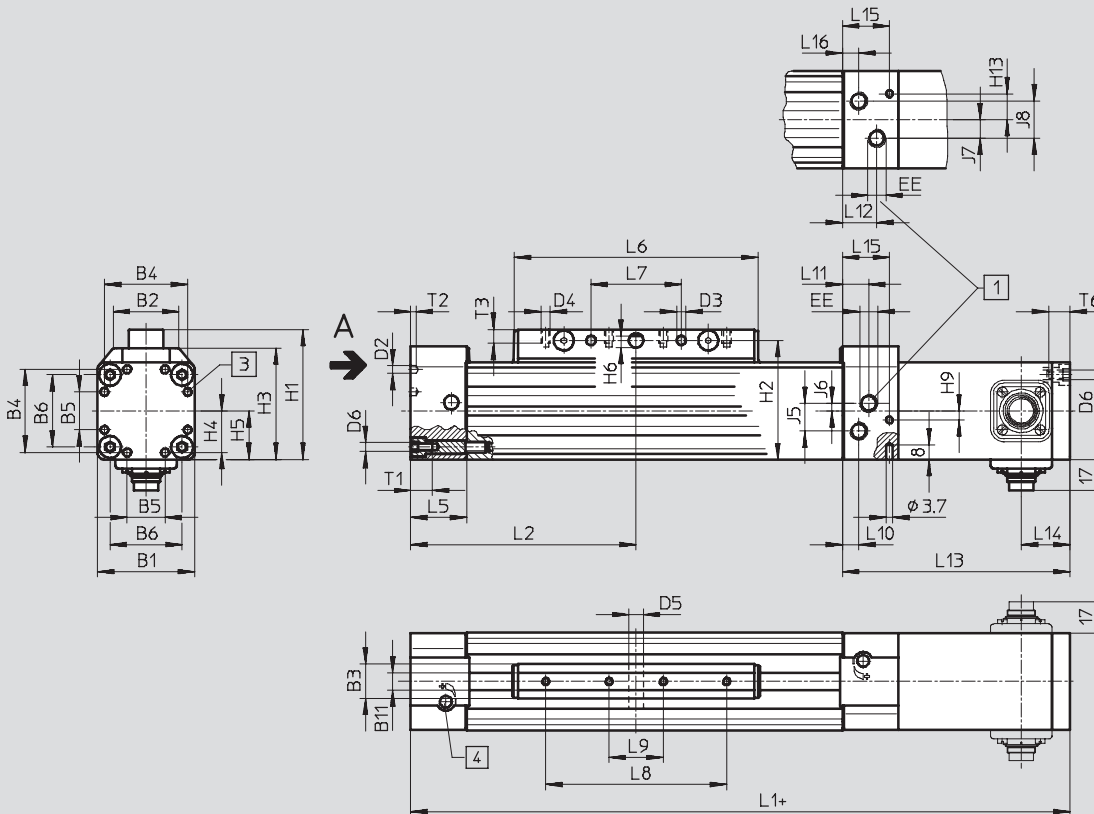


## Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Standard driver GK

Piston  $\varnothing$  32 ... 63



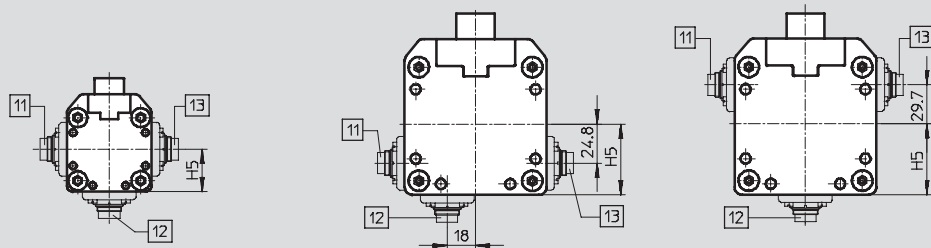
- 1 Both compressed air connections can be optionally connected to three sides of the right-hand end cap
- 2 Mounting holes for foot mounting HP
- 3 Regulating screw for adjustable end-position cushioning
- 4 Encoder connection at rear
- 5 Encoder connection underneath
- 6 Encoder connection at front
- 7 + = plus stroke length

## View A

Piston  $\varnothing$  32/40

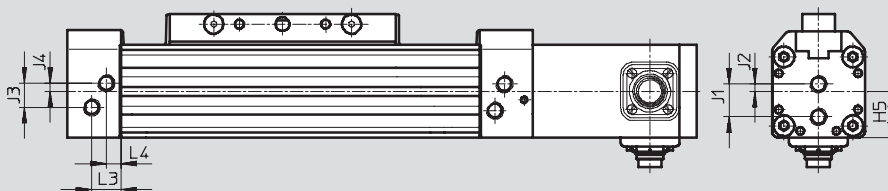
Piston  $\varnothing$  50

Piston  $\varnothing$  63



## Supply port D2 at both sides

Piston  $\varnothing$  32 ... 63



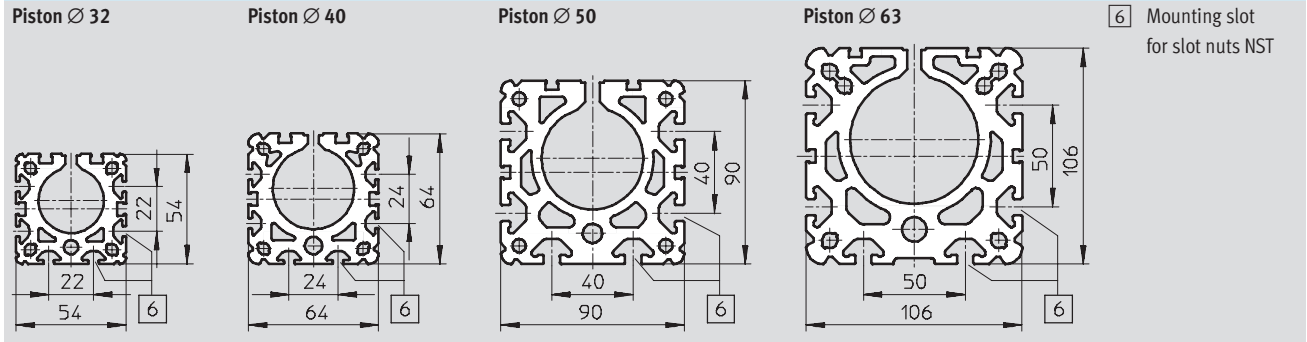
# Linear drives DGPI, integrated displacement encoder

Technical data



Dimensions Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Profile barrel



Ø	B1	B2	B3	B4	B5	B6	B11	D2	D3	D4	D5	D6
[mm]			+0.2					Ø	+0.2		Ø H10	
32	54	35.8	19	46	21	40	9.5	4.3	5.2	M5	8	M5
40	64	45.7	21	53	28	49	9.5	4.3	6.5	M6	10	M5
50	90	69.2	24	76	44	72	12	6.3	8.5	M8	12	M6
63	106	84.8	24	89	44	83	12	6.3	8.5	M8	12	M8

Ø	EE	H1	H2	H3	H4	H5	H6	H9	H13	J1	J2	J3
[mm]												
32	G $\frac{1}{8}$	72	66	62	23	27	5.8	5	10.3	19	4.2	14
40	G $\frac{1}{4}$	86	78	71.8	26.5	32	7.7	5	12.75	22	5	21
50	G $\frac{3}{8}$	115	106	99	36	45	9.7	21.8	16.6	31.8	6.8	29.3
63	G $\frac{3}{8}$	131	122	115	44.5	53	9.7	-28	30	36	8	31

Ø	J4	J5	J6	J7	J8	L1	L2	L3	L4	L5	L6	L7
[mm]						+1.2/-0.5	+0.3/-0.6					+0.1
32	4.7	15.4	4.2	10.3	20.6	345	125	17	8.5	31	135	50
40	9.1	23	9.1	12.75	25.5	397	150	11.5	11.5	31	171	70
50	6	20.6	6.8	21	21	465	175	14	14	34	206	80
63	14	27	8	25	25	513	200	14	14	34	234	110

Ø	L8	L9	L10	L11	L12	L13	L14	L15	L16	T1	T2	T3	T6
[mm]	±0.1	±0.1											
32	100	30	17	8.5	19	126	27	26	9	13.2	3	7.5	12
40	130	40	10.8	16.5	21	128	29	26	10.8	13.2	4	10.5	12
50	150	50	10.8	18	22.8	149	80	25.2	12	15.2	6	12.5	15
63	190	70	14	24.5	31	147.5	68	16.5	16.5	21.2	6	12.5	20

# Linear drives DGPI, integrated displacement encoder

Ordering data – Modular product system

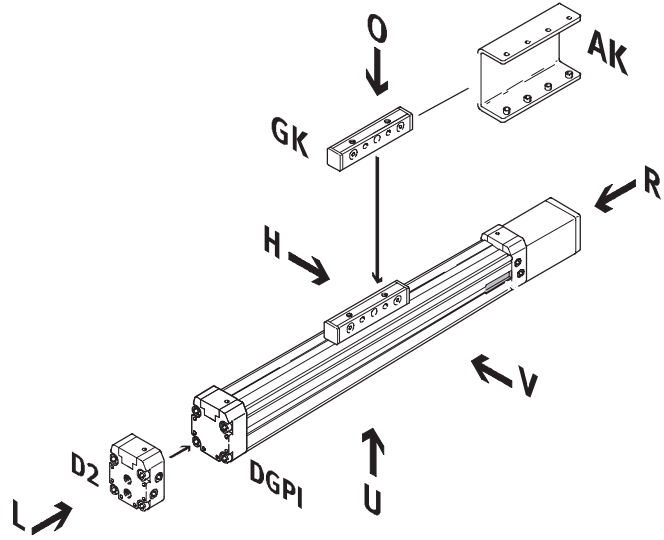


Servopneumatic positioning systems  
Cylinders with displacement encoders

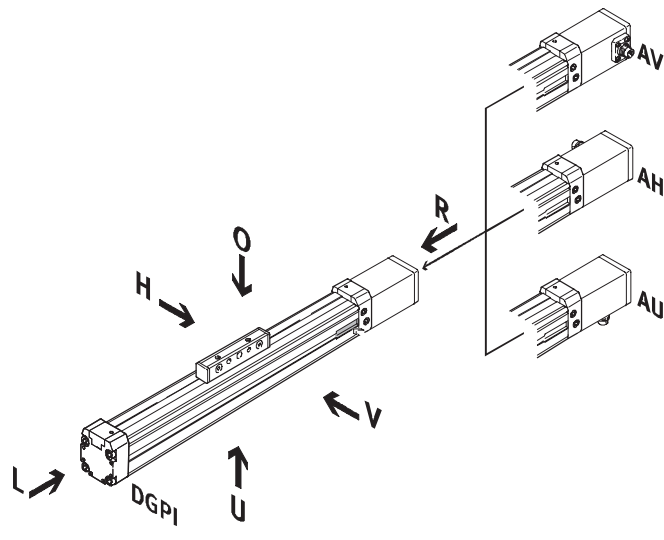
1.1

**Order code**  
Mandatory data/Options

- AK Load inverter
- D2 Air connection at both ends
- GK Standard slide



- AV Displacement encoder connection to front
- AH Displacement encoder connection to rear
- AU Displacement encoder connection underneath



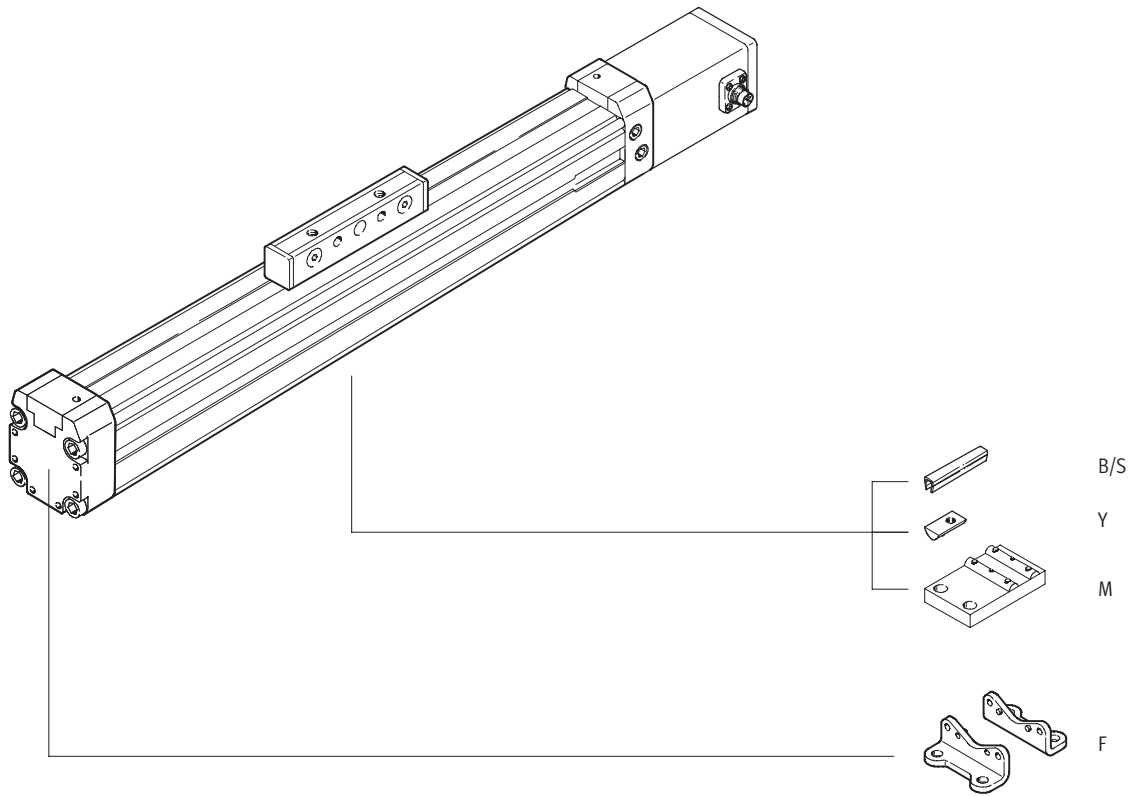
# Linear drives DGPI, integrated displacement encoder

Ordering data – Modular product system

FESTO

## Order code

Options



# Linear drives DGPI, integrated displacement encoder

Ordering data – Modular product system



**M** Mandatory data →

Module No.	Drive function	Size	Stroke	Cushioning	Displacement encoder	Basic variant	Connection position for displacement encoder
175 134	DGPI	25	225 ... 2 000	PPV	AIF	GK	AH
175 135		32					AU
175 136		40					AV
175 137		50					
175 138		63					
<b>Ordering example</b>							
<b>175 138</b>	<b>DGPI</b>	<b>- 63</b>	<b>- 750</b>	<b>- PPV</b>	<b>- AIF</b>	<b>- GK</b>	<b>- AV</b>

Ordering table										
Size	25	32	40	50	63	Condi- tions	Code	Enter code		
<b>M</b> Module No.	<b>175 134</b>	<b>175 135</b>	<b>175 136</b>	<b>175 137</b>	<b>175 138</b>					
Drive function	Pneumatic linear drive with integrated displacement encoder							<b>DGPI</b>	DGPI	
Size	25	32	40	50	63		-...			
Stroke [mm]	225, 300, 360, 450, 500, 600, 750, 1 000, 1 250, 1 500, 1 750, 2 000							-...		
Cushioning	Pneumatic cushioning adjustable at both ends							<b>-PPV</b>	-PPV	
Displacement encoder	Temposonic with CAN axis interface							<b>-AIF</b>	-AIF	
Basic variant	Standard piston/slide							<b>-GK</b>	-GK	
Connection position for displacement encoder AIF and compressed air	Connection position for displacement encoder and air supply port, rear							<b>-AH</b>		
	Connection position for displacement encoder and air supply port, underneath							<b>-AU</b>		
	Connection position for displacement encoder and air supply port, front							<b>-AV</b>		

Transfer order code

	DGPI	-		-		-	PPV	-	AIF	-	GK	-	
--	------	---	--	---	--	---	-----	---	-----	---	----	---	--



# Linear drives DGPI, integrated displacement encoder

Ordering data – Modular product system



## Options

Driver/Air supply port	Accessories	Slot cover	Slot nut	Central support	Foot mounting
AK D2	ZUB	...S ...B	...Y	...M	...F
- AK	: ZUB	- 2B2S	10Y		F

Ordering table		25	32	40	50	63	Condi- tions	Code	Enter code
↓	Driver	Load inverter						-AK	
0	Air supply port	at both ends						-D2	
	Accessories	Supplied separately						:ZUB-	:ZUB-
	Slot cover, Sensor slot x2, 0.5 m	1 ... 10						...S	
	Mounting slot		1 ... 10				...B		
	Slot nut Mounting slot		1 ... 10				...Y		
	Central support	1 ... 10						...M	
	Foot mounting	1 ... 10						...F	

Transfer order code  
 -  : ZUB -

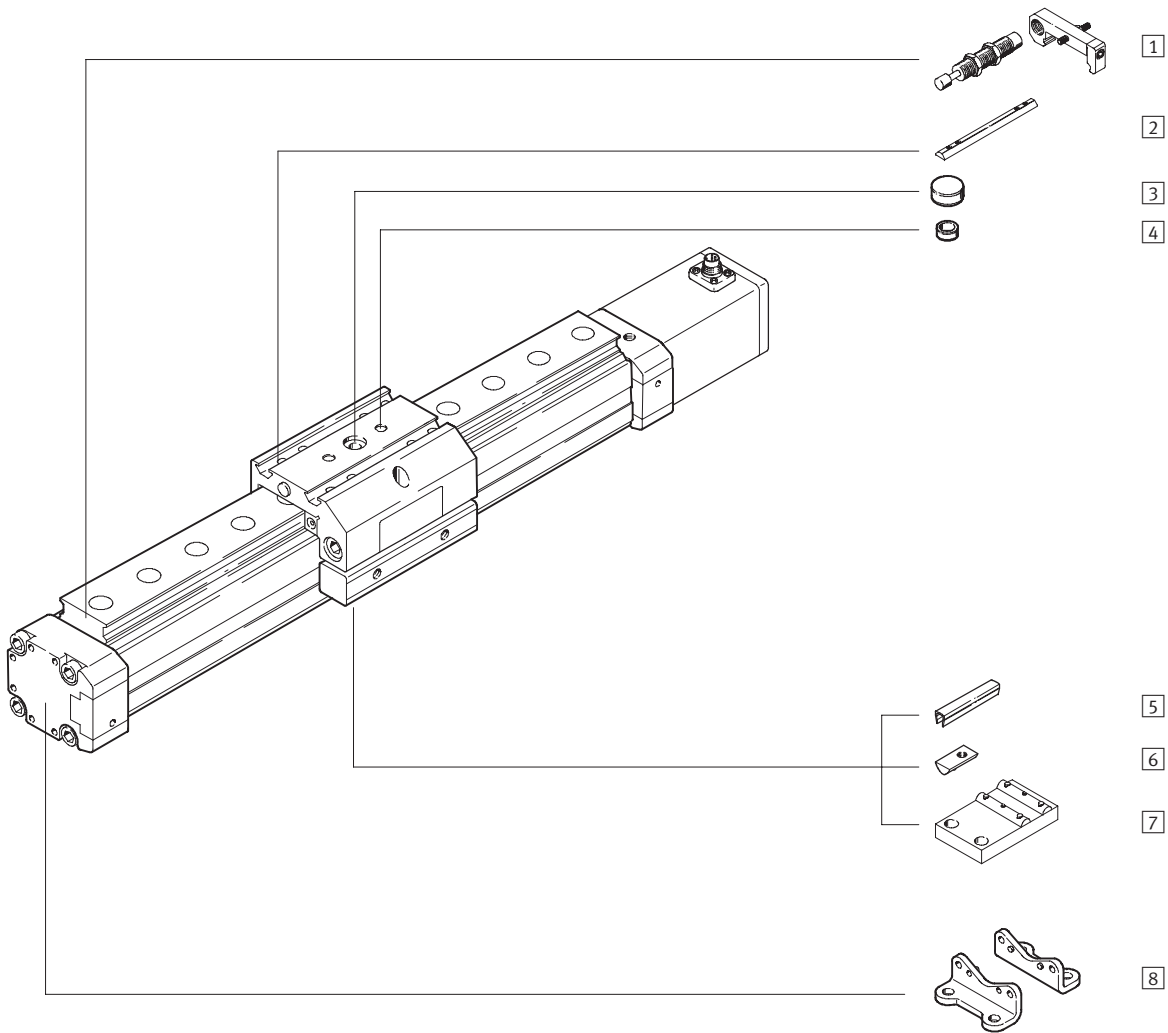
# Linear drives DGPII, integrated displacement encoder

Peripherals overview



Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1



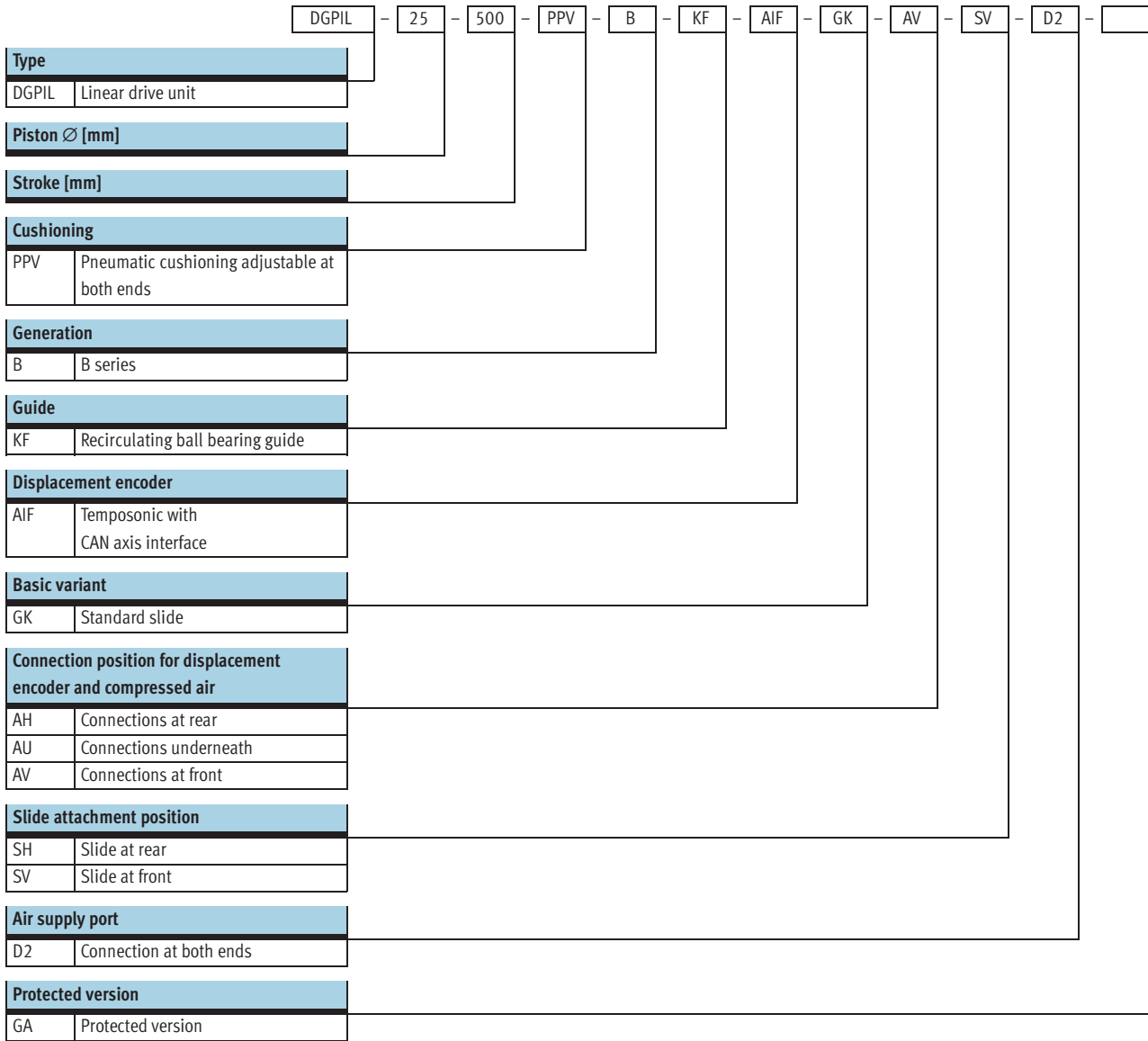
# Linear drives DGPII, integrated displacement encoder

Peripherals overview

Variants and accessories		
Type	Brief description	→ Page
1 Shock absorber kit C/E	to avoid damage at the end stop, in the event of malfunctions	5 / 1.1-114
2 Slot nut for slide X	for mounting loads and attachments on the slide	5 / 1.1-115
3 Central mounting Q	for centring loads and attachments on the slide	5 / 1.1-115
4 Centring sleeves Z	for centring loads and attachments on the slide	5 / 1.1-115
5 Slot cover B/S	to protect against the ingress of dirt	5 / 1.1-115
6 Slot nut for mounting slot Y	for mounting attachments	5 / 1.1-115
7 Central support M	to mount the axis	5 / 1.1-112
8 Foot mounting F	to mount the axis	5 / 1.1-112

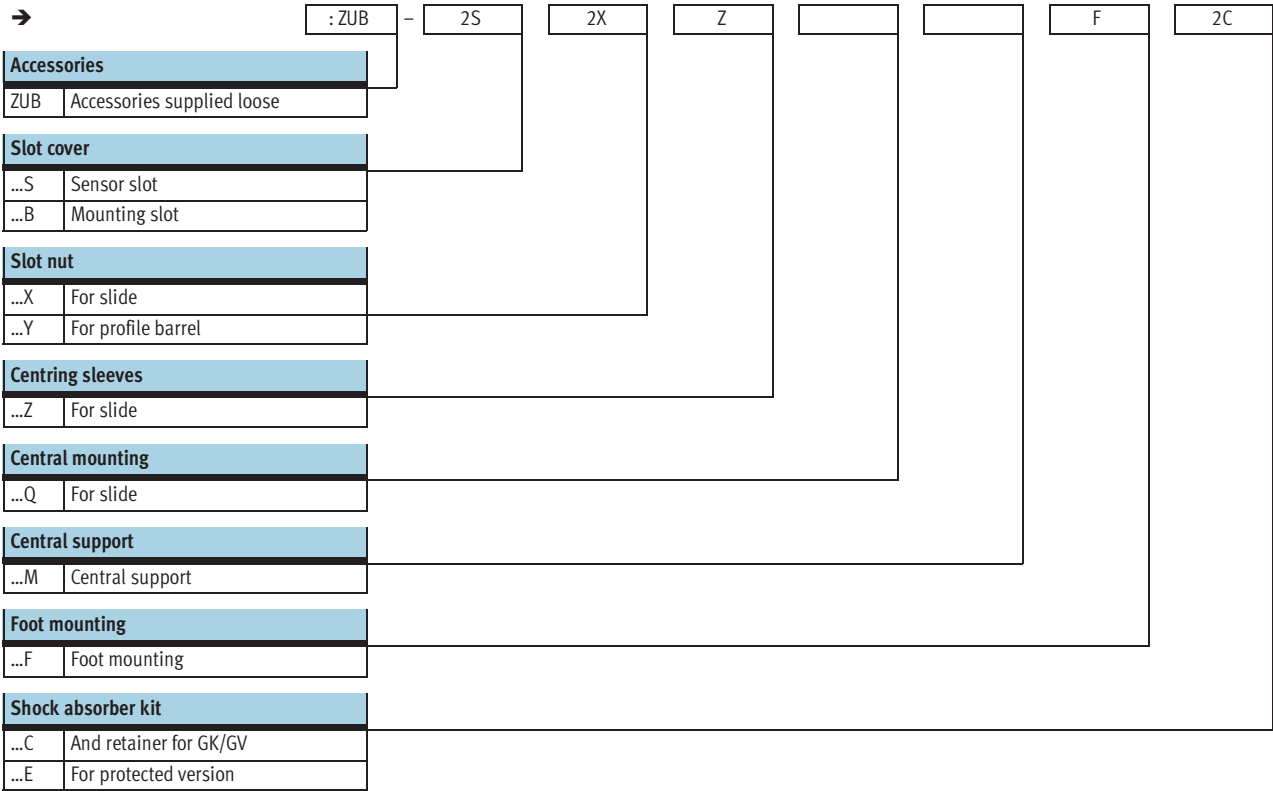
# Linear drives DGPIIL, integrated displacement encoder

Type codes



# Linear drives DGPII, integrated displacement encoder

Type codes

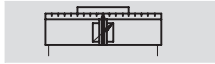


# Linear drives DGPII, integrated displacement encoder

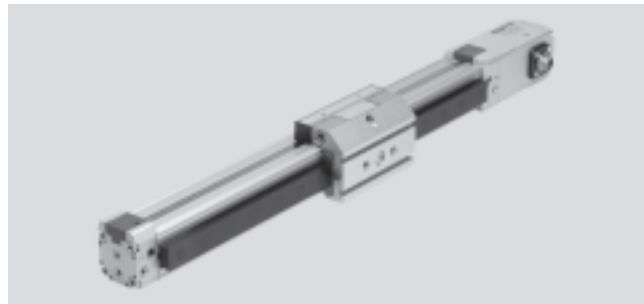
Technical data



## Function



- - Diameter  
25 ... 63 mm
- - Stroke length  
225 ... 2,000 mm



General technical data					
Piston $\varnothing$	25	32	40	50	63
Design	Piston				
	Driver				
	Profile barrel				
Mode of operation	Double-acting				
Operating medium <sup>1)</sup>	Compressed air, filtered and unlubricated, filter unit 5 $\mu$ m				
Cushioning	Pneumatic cushioning adjustable at both ends				
Cushioning length [mm]	18	20	30		
Position sensing	Integrated displacement encoder				
Measuring principle	Digital, magnetostrictive, non-contacting, absolute measurement				
Type of mounting	Foot mounting				
Stroke <sup>2)3)</sup> [mm]	225, 300, 360, 450, 500, 600, 750, 1,000, 1,250, 1,500, 1,750, 2,000				
Protection against torsion/guide	Guide rail with slide				
	Recirculating ball bearing				
Protected version <sup>4)</sup>	Optional				
Pneumatic connection	G1/8		G1/4		G3/8
Electrical connection	6-pin round plug to DIN 45 322				

- 1) The proportional directional control valve MPYE used requires the characteristic values.
- 2) Note stroke reduction in conjunction with SPC200.
- 3) Supply of compressed air to each end of the cylinder (feature D2) is absolutely essential for Soft Stop SPC11 and axis controller SPC200 as of a length of 500 mm.
- 4) Protected from above and the sides against the ingress of particles

Forces [N] and impact energy [Nm]					
Piston $\varnothing$	25	32	40	50	63
Theoretical force at 6 bar	295	483	754	1,178	1,870
Max. impact energy at the end positions <sup>1)</sup>	0.1	0.2	0.4	0.8	0.8

- 1) Cushioning PPV must be completely open for applications with Soft Stop SPC11 and axis controller SPC200.

Permissible impact velocity:

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

Maximum permissible load:

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

- - Note

This data represents the maximum values which can be achieved. Values fluctuate in practice relative to the size of the effective load. Allowance

must also be made for the limits of the cushioning capacity of the drive and the permissible impact energy.

# Linear drives DGPI, integrated displacement encoder

Technical data

Positioning characteristics with axis controller SPC200					
Piston Ø	25	32	40	50	63
Repetition accuracy [mm]	→ 5 / 1.1-72				
Mounting position	Any				
Minimum load, horizontal <sup>1)</sup> [kg]	2	3	5	8	12
Maximum load, horizontal <sup>1)</sup> [kg]	30	45	75	120	180
Minimum load, vertical <sup>1)</sup> [kg]	2	3	5	8	12
Maximum load, vertical <sup>1)</sup> [kg]	10	15	25	40	60
Min. speed of travel [m/s]	0.05				
Max. speed of travel [m/s]	3				
Typ. positioning time, long stroke <sup>2)</sup> [s]	0.75/1.20	0.85/1.20	0.75/1.20	0.95/1.25	0.90/1.20
Typ. positioning time, short stroke <sup>3)</sup> [s]	0.40/0.60	0.45/0.60	0.40/0.60	0.50/0.65	0.50/0.65
Minimum positioning stroke <sup>4)</sup> [%]	3				
Stroke reduction <sup>5)</sup> [mm]	25		35		
Recommended proportional directional control valve	→ 5 / 1.1-116				

- 1) Load = effective load + mass of all moving parts on the drive
- 2) At 6 bar, horizontal mounting position, DGPL-XX-1250, 1000 mm positioning travel at min./max. load
- 3) At 6 bar, horizontal mounting position, DNCM-XX-1250, 100 mm positioning travel at min./max. load
- 4) In relation to the maximum stroke of the drive, but never more than 20 mm.
- 5) The stroke reserve is to be maintained on every side of the drive, the max. positionable stroke is therefore: Stroke – 2x stroke reserve

Positioning characteristics with end position controller SPC11					
Piston Ø	25	32	40	50	63
Repetition accuracy of a mid-position <sup>1)</sup> [mm]	±2				
Mounting position	Any				
Minimum load, horizontal <sup>2)</sup> [kg]	2	3	5	8	12
Maximum load, horizontal <sup>2)</sup> [kg]	30	45	75	120	180
Minimum load, vertical <sup>2)</sup> [kg]	2	3	5	8	12
Maximum load, vertical <sup>2)</sup> [kg]	10	15	25	40	60
Travel time [s]	→ Software Tool "SoftStop": <a href="http://www.festo.com/en/engineering">www.festo.com/en/engineering</a>				
Recommended proportional directional control valve	→ 5 / 1.1-116				

- 1) In the stroke range from 225 ... 2,000 mm
- 2) Load = effective load + mass of all moving parts on the drive

Operating and environmental conditions					
Piston Ø	25	32	40	50	63
Operating pressure <sup>1)</sup> [bar]	4 ... 8				
Ambient temperature [°C]	-10 ... +60				
Vibration resistance	To DIN/IEC 68 Parts 2 -6, severity level 1				
Continuous shock resistance	To DIN/IEC 68 Parts 2 -27, severity level 1				
CE marking symbol (see conformity declaration)	As per EU EMC directive				
Protection class (displacement encoder)	IP65 to IEC 60 529				

- 1) Only applies for applications with Soft Stop SPC11 and axis controller SPC200.

# Linear drives DGPII, integrated displacement encoder

Technical data

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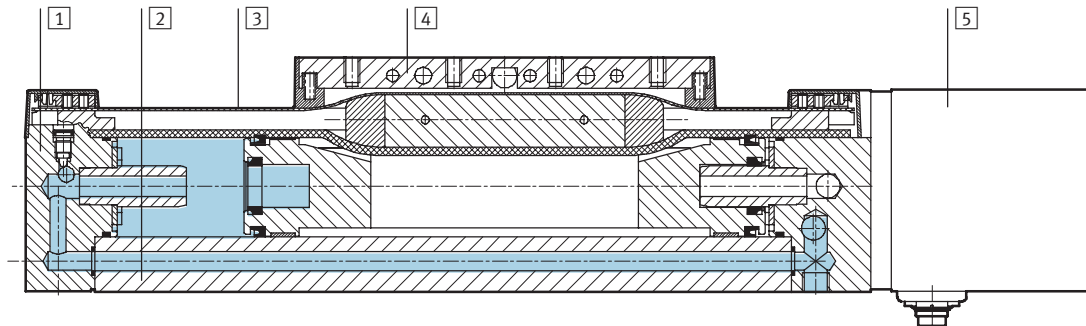
Weights [g]					
Piston Ø	25	32	40	50	63
Standard slide GK					
Basic weight	2,220	3,320	5,330	10,700	16,870
Additional weight per 10 mm stroke	55	71	99	186	256
Moving load	605	895	1,700	3,000	4,990
Additional weights for protected version GA					
Dirt protection cover	1,690	2,500	4,000	–	–
Additional weight per 10 mm stroke	26	42	65	–	–
Moving load	907	1,350	2,550	–	–

Electrical data, displacement encoder		
Power supply	[V DC]	24 (-15/+25%)
Max. current consumption	[mA]	90
Resolution	[mm]	≤ 0.01
Independent linearity <sup>1)</sup>	maximum [%]	0.02
Temperature coefficient	[ppm/°K]	≤ 15
Interface		Digital, CAN with protocol: SPC-AIF

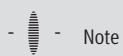
1) Minimum ±50 µm

## Materials

Sectional view



Drive		
1	End cap	Anodised aluminium
2	Profile	Anodised aluminium
3	Cover strip	Steel, corrosion resistant
4	Driver	Anodised aluminium
5	Displacement encoder housing	Anodised aluminium
–	Slide	Anodised aluminium
–	Guide rail	Corrosion resistant steel
–	Seals	Nitrile rubber, polyurethane



Note

Further technical data

➔ Volume 1 (Linear drives DGPII)



# Linear drives DGPI, integrated displacement encoder

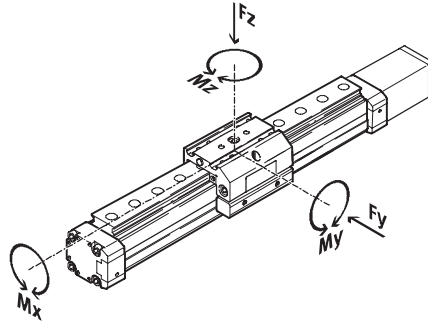
Technical data



## Characteristic load values

The forces and torques specified refer to the centre line of the profile barrel internal diameter.

They must not be exceeded during dynamic operation. Special attention must be paid to the cushioning phase.



If the drive is subjected to more than two of the indicated forces and torques simultaneously, the following equations must be satisfied in addition to the indicated maximum loads.

$$\frac{F_y}{F_{y_{max}}} + \frac{F_z}{F_{z_{max}}} + \frac{M_x}{M_{x_{max}}} + \frac{M_y}{M_{y_{max}}} + \frac{M_z}{M_{z_{max}}} \leq 1$$

## Permissible forces and torques

Piston Ø		25	32	40	50	63
F <sub>y</sub> <sub>max.</sub>	[N]	3,080	3,080	7,300	7,300	14,050
F <sub>z</sub> <sub>max.</sub>	[N]	3,080	3,080	7,300	7,300	14,050
M <sub>x</sub> <sub>max.</sub>	[Nm]	45	63	170	240	580
M <sub>y</sub> <sub>max.</sub>	[Nm]	85	127	330	460	910
M <sub>z</sub> <sub>max.</sub>	[Nm]	85	127	330	460	910

## Maximum permissible support span l as a function of the force F

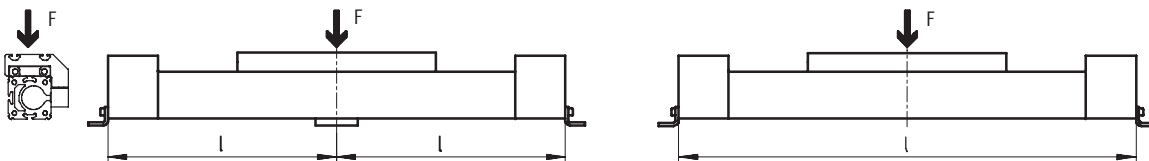
The axis may need to be supported with central supports MUP in order to

limit deflection in the case of large strokes. The following diagrams serve

to determine the maximum permissible support span l as a

function of the force F.

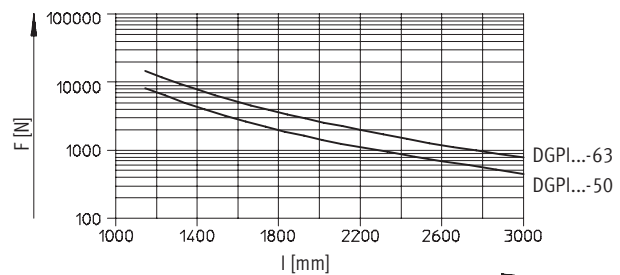
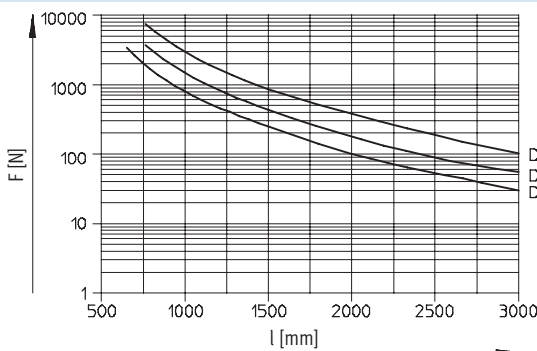
### Force on the surface of the slide



## Maximum support span l (without central support) as a function of the force F

Piston Ø 25 ... 40

Piston Ø 50/63



# Linear drives DGPII, integrated displacement encoder

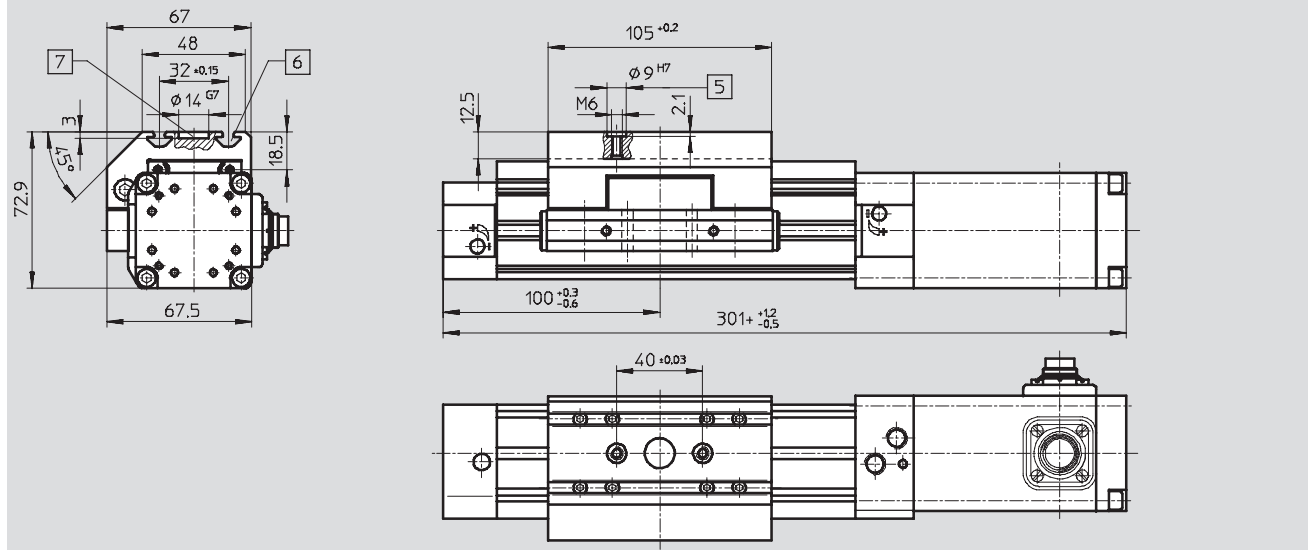
Technical data



**Dimensions** Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Standard slide GK

Piston Ø 25



- 5 Hole for centring sleeve ZBH-9
- 6 Mounting slot for slot nut NSTL

- 7 Drilled hole for central mounting SLZZ

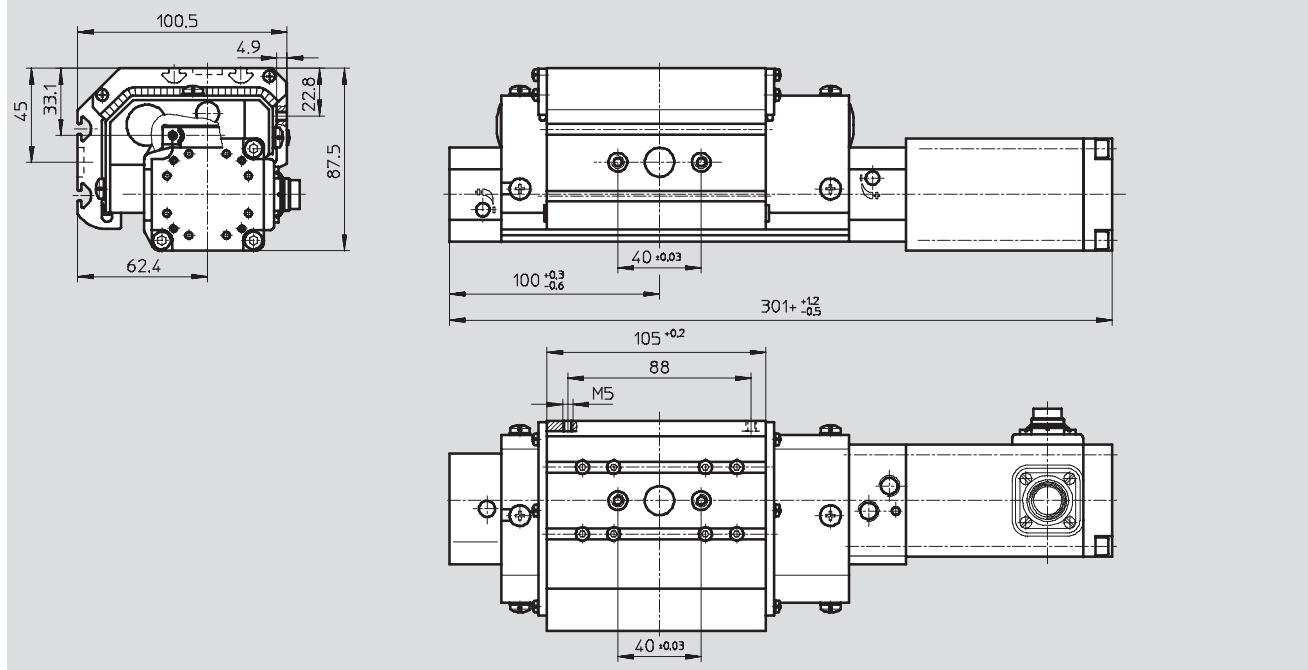
+ = plus stroke length

Basic dimensions

→ 5 / 1.1-90

Protected version GA

Piston Ø 25



+ = plus stroke length

Basic dimensions

→ 5 / 1.1-90

# Linear drives DGPII, integrated displacement encoder

Technical data



**Dimensions** Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)

Standard slide GK  
Piston  $\varnothing 32 \dots 63$

- 5 Hole for centring sleeve ZBH-9
- 6 Mounting slot for slot nut NSTL
- 7 Drilled hole for central mounting SLZZ

+ = plus stroke length

Basic dimensions  
→ 5 / 1.1-92

Protected version GA  
Piston  $\varnothing 32/40$

+ = plus stroke length

Basic dimensions  
→ 5 / 1.1-92

$\varnothing$ [mm]	B7	B8	B9	B10 $\pm 0.03$	B12	B14	D1	H1	H7	H8	H10
32	63	79	47 $\pm 0.15$	20	112.1	67.6	–	72	77.5	18.5	93.1
40	78.5	96.5	55 $\pm 0.2$	20	137.6	79.6	M5	86	90.5	20	106.6
50	97	122	72 $\pm 0.2$	40	–	–	–	115	122.5	26	–
63	121	142	90 $\pm 0.25$	40	–	–	–	131	144.5	30	–

$\varnothing$ [mm]	H11	H12	H14	L1 $+1.2/-0.5$	L2 $+0.3/-0.6$	L17 $+0.2$	L18 $\pm 0.03$	L19 $\pm 0.03$	L23	L24	L25	T4	T5
32	–	49.5	34.1	345	125	131	40	–	131	–	–	12.5	–
40	23.1	54	36.1	397	150	167	40	40	167	150	58	12.5	7
50	–	–	–	465	175	202	40	40	–	–	–	18.5	–
63	–	–	–	513	200	230	40	40	–	–	–	20.5	–

# Linear drives DGPIIL, integrated displacement encoder

Ordering data – Modular product system

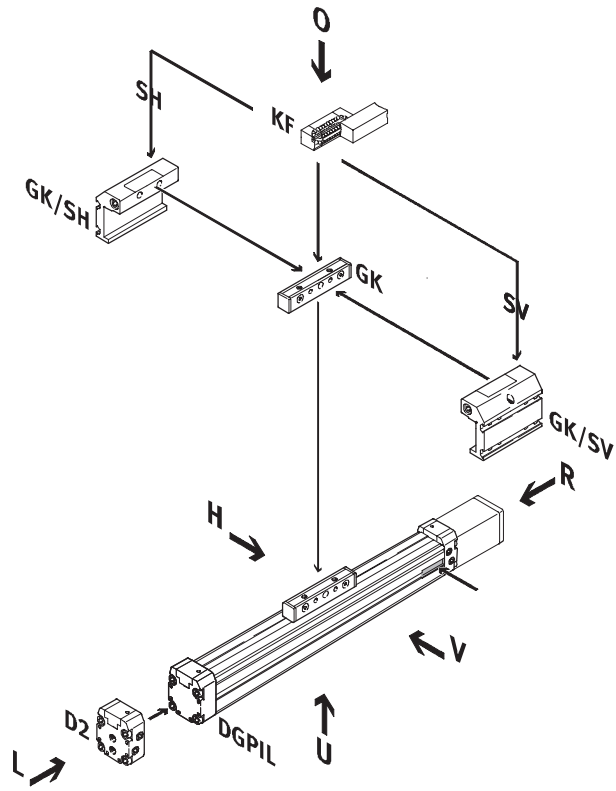


Servopneumatic positioning systems  
Cylinders with displacement encoders

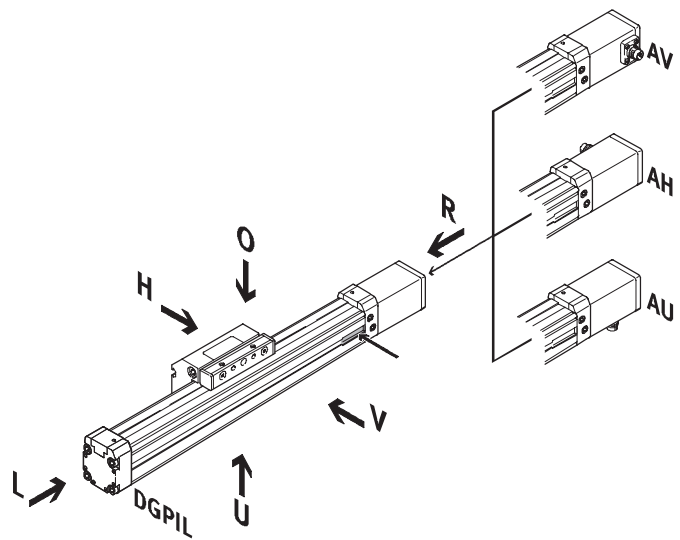
1.1

**Order code**  
Mandatory data

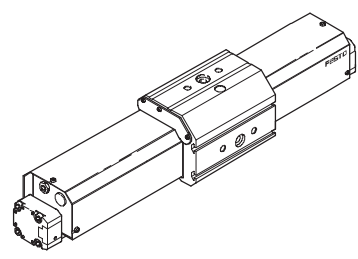
- KF Recirculating ball bearing guide
- SH Slide at rear
- SV Slide at front
- D2 Air connection at both ends
- GK Standard slide



- AV Displacement encoder connection to front
- AH Displacement encoder connection to rear
- AU Displacement encoder connection underneath



GA Protected version



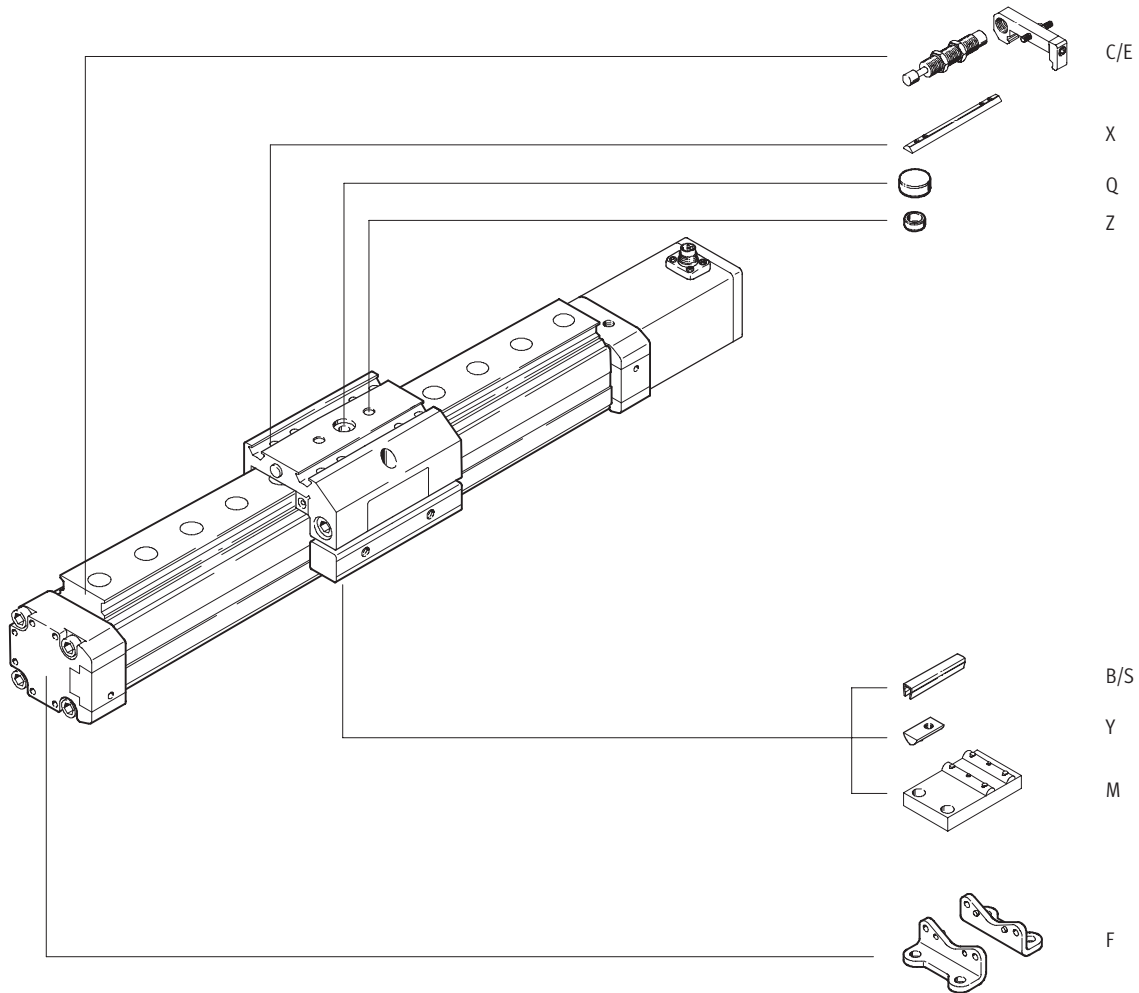
# Linear drives DGPIIL, integrated displacement encoder

Ordering data – Modular product system

FESTO

## Order code

Options



# Linear drives DGPII, integrated displacement encoder

Ordering data – Modular product system



**M** Mandatory data →

Module No.	Drive function	Size	Stroke	Cushioning	Generation	Guide	Displacement encoder	Basic variant	Connection position for displacement encoder	Slide attachment position
175 134	DGPII	25	225 ... 2 000	PPV	B	KF	AIF	GK	AH AU AV	SH SV
175 135		32								
175 136		40								
175 137		50								
175 138		63								
<b>Ordering example</b>										
<b>175 134</b>	<b>DGPIL</b>	<b>- 25</b>	<b>- 450</b>	<b>- PPV</b>	<b>- B</b>	<b>- KF</b>	<b>- AIF</b>	<b>- GK</b>	<b>- AU</b>	<b>- SH</b>

**Ordering table**

Size	25	32	40	50	63	Condi- tions	Code	Enter code	
<b>M</b> Module No.	<b>175 134</b>	<b>175 135</b>	<b>175 136</b>	<b>175 137</b>	<b>175 138</b>				
Drive function	Pneumatic linear drive with integrated displacement encoder and slide							<b>DGPIL</b>	DGPIL
Size	25	32	40	50	63		-...		
Stroke [mm]	225, 300, 360, 450, 500, 600, 750, 1 000, 1 250, 1 500.1 750, 2 000							-...	
Cushioning	Pneumatic cushioning adjustable at both ends							<b>-PPV</b>	-PPV
Generation	B series							<b>-B</b>	-B
Guide	Recirculating ball bearing guide							<b>-KF</b>	-KF
Displacement encoder	Temposonic with CAN axis interface							<b>-AIF</b>	-AIF
Basic variant	Standard piston/slide							<b>-GK</b>	-GK
Connection position for displacement encoder AIF and compressed air	Connection position for displacement encoder and air supply port, rear							<b>-AH</b>	
	Connection position for displacement encoder and air supply port, underneath							<b>-AU</b>	
	Connection position for displacement encoder and air supply port, front							<b>-AV</b>	
Slide attachment position	Slide at rear							<b>-SH</b>	
	Slide at front							<b>-SV</b>	

Transfer order code

# Linear drives DGPII, integrated displacement encoder

Ordering data – Modular product system



**Options**

Air supply port	Protected version	Accessories	Slot cover	Slot nut	Centring sleeve	Central support	Central mounting	Foot mounting	Shock absorber
D2	GA	ZUB	...S ...B	...X ...Y	...Z	...M	...Q	...F	...C ...E
- D2	-	: ZUB	- 2S2B	2X				F	2C

**Ordering table**

Size	25	32	40	50	63	Conditions	Code	Enter code	
↓ Air supply port	at both ends						-D2		
0 Protected version	Protected roller bearing design for harsh environment					-	-GA		
Accessories	Supplied separately						:ZUB-	:ZUB-	
Slot cover, x2, 0.5 m	Sensor slot	1 ... 10					...S		
	Mounting slot	-	1 ... 10				...B		
Slot nut	Slide	1 ... 10					...X		
	Mounting slot	-	1 ... 10				...Y		
Centring sleeve (pack of 10)	10, 20, 30, 40, 50, 60, 70, 80, 90						...Z		
Central support	1 ... 10						...M		
Central mounting	1 ... 10						...Q		
Foot mounting	1 ... 10						...F		
Shock absorber kit	with retainer, 1-off	1 ... 10					1	...C	
		1 ... 10				-	2	...E	

- 1 C Not with protected version GA.
- 2 E Only with protected version GA.

**Transfer order code**

-  -  : ZUB -

# Linear drives DGPL/DGPI/DGPIL

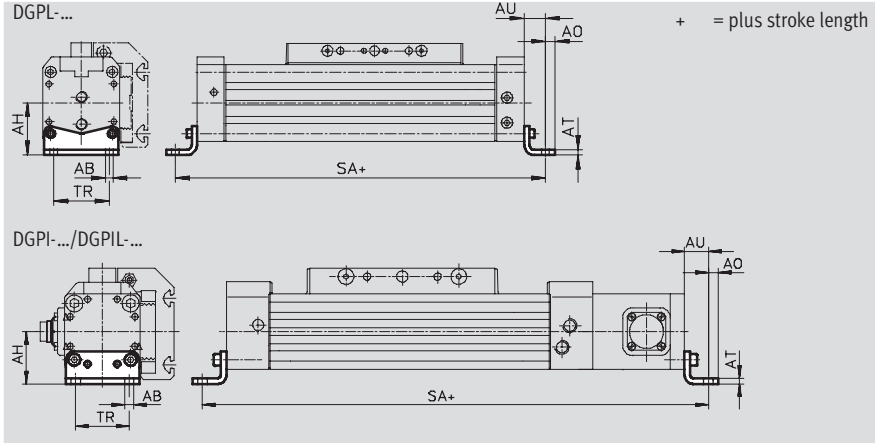
Accessories



## Foot mounting HP (Order code: F)



Material: Galvanised steel  
Free of copper, PTFE and silicone



### Dimensions and ordering data

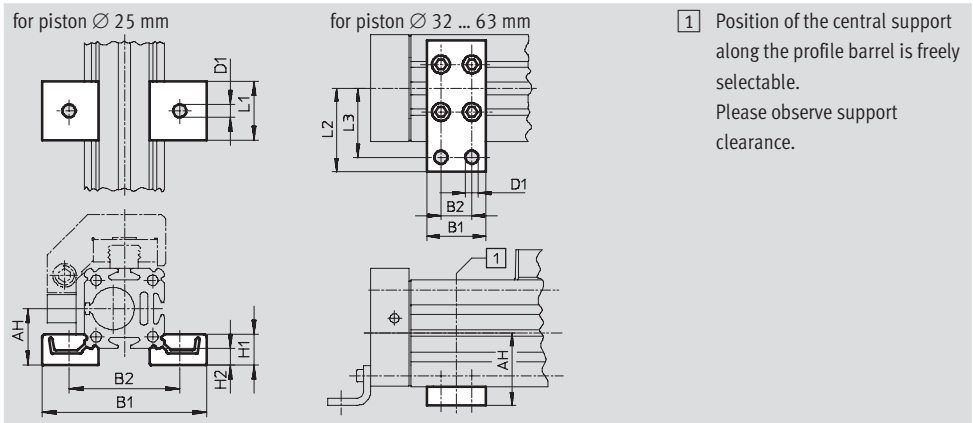
for $\varnothing$ [mm]	AB $\varnothing$	AH	AO	AT	AU	SA		TR	Weight [g]	Part No.	Type
						DGPL	DGPI(L)				
25	5.5	29.5	6	3	13	226	327	32.5	61	150 731	HP-25
32	6.6	37	7	4	17	284	379	38	117	150 732	HP-32
40	6.6	46	8.5	5	17.5	335	432	45	188	150 733	HP-40
50	9	61	11	6	25	400	515	65	243	150 734	HP-50
63	11	69	13.5	6	28	456	569	75	305	150 735	HP-63

## Central support MUP (Order code: M)



MUP-40

Material: Galvanised steel  
Free of copper, PTFE and silicone



### Dimensions and ordering data

for $\varnothing$ [mm]	AH	B1	B2	D1 $\varnothing$	H1	H2	L1	L2	L3	Weight [g]	Part No.	Type
25	29.5	81	58	5.5	13	7	25	-	-	33	150 736	MUP-18/25
32	37	35	22	6.6	-	-	-	41.5	35	89	150 737	MUP-32
40	46	35	22	6.6	-	-	-	47	40	126	150 738	MUP-40
50	61	50	26	11	-	-	-	70	58	241	150 739	MUP-50
63	69	50	26	11	-	-	-	77	65	340	150 800	MUP-63



# Linear drives DGPL/DGPI/DGPIL

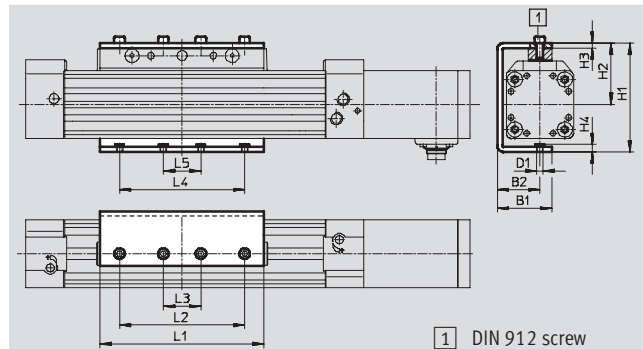
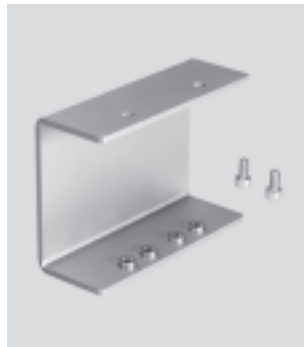
Accessories



## Load inverter AK

for DGPI  
(Order code: AK)

Material:  
Galvanised steel



Dimensions and ordering data									
for $\varnothing$	B1	B2	D1	H1	H2	H3	H4	L1	L2
[mm]									
25	39	29.5	M5	76.1	43.5	3	5	105	–
32	43.5	34	M5	87	49	4	6	131	100
40	50.5	40	M6	104	58	4	8.1	167	130
50	67	55	M8	138.5	75	5	10.5	202	150
63	77	65	M8	156.5	84	6	11.5	230	190

for $\varnothing$	L3	L4	L5	[1]	CRC <sup>1)</sup>	Weight	Part No.	Type
[mm]						[g]		
25	50	50	20	M5x10	2	380	196 106	AK-25
32	30	100	30	M5x12		690	196 107	AK-32
40	40	130	40	M6x14		1,050	196 108	AK-40
50	50	150	50	M8x16		2,080	196 109	AK-50
63	70	190	70	M8x18		2,820	196 110	AK-63

1) Corrosion resistance class 2 according to Festo standard 940 070

Components requiring moderate corrosion resistance. Externally visible parts with primarily decorative surface requirements which are in direct contact with a surrounding industrial atmosphere or media such as cooling or lubricating agents.

## Shock absorber DG-GA

for DGPIL  
Protected version GA  
(Order code: E)

Material:  
Housing: Galvanised steel; piston rod:  
high-alloy steel  
Seals: Perbunan, polyurethane  
Free of copper, PTFE and silicone



Ordering data			
for $\varnothing$	Weight	Part No.	Type
[mm]	[g]		
25	70	192 875	DG-GA-25-YSR
32	110	192 876	DG-GA-32-YSR
40	140	192 877	DG-GA-40-YSR

# Linear drives DGPL/DGPI/DGPIL

Accessories



## Shock absorber YSR-...-C

for DGPL/DGPIL

(Order code: C)

Material:


Housing: Galvanised steel; piston rod:

high-alloy steel,

Seals: Perbunan, polyurethane

Free of copper, PTFE and silicone



 Note

Shock absorber YSRW with progressive characteristic  
→ Volume 1

Ordering data		Part No.	Type
for $\varnothing$ [mm]	Weight [g]		
25	70	34 572	YSR-12-12-C
32	70	34 572	YSR-12-12-C
40	140	34 573	YSR-16-20-C
50	140	34 573	YSR-16-20-C
63	240	34 574	YSR-20-25-C

## Shock absorber retainer KYP

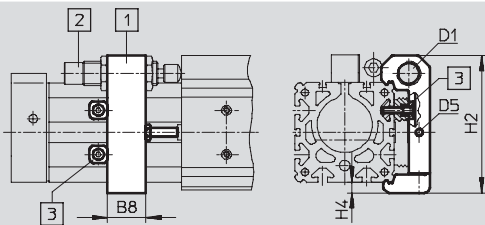
for DGPL/DGPIL

(Order code: C)

Material:

Retainer: Aluminium

Sleeve: Steel, corrosion resistant

**1** Shock absorber retainer KYP  
(if the retainer is in contact with the front cap, i.e. cap serves to secure the position, the entire stroke length can be utilised)

**2** Shock absorber YSR-...-C

**3** Position retainer  
(included in scope of delivery) either behind or underneath the shock absorber retainer KYP

Dimensions and ordering data								
for $\varnothing$ [mm]	B8	D1	D5	H2	H4	Weight [g]	Part No.	Type
25	19	M16x1	M5	69.5	6	95	158 908	KYP-25
32	25	M16x1	M5	80	8	130	158 909	KYP-32
40	32	M22x1.5	M5	102	8	209	158 910	KYP-40
50	35	M22x1.5	M8	124	10	415	158 911	KYP-50
63	44	M26x1.5	M10	152.5	11.5	609	158 912	KYP-63


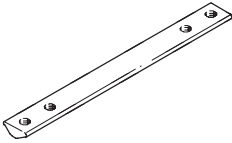


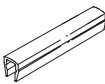
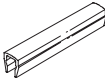
# Linear drives DGPL/DGPI/DGPIL

Accessories


**FESTO**

Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1

Ordering data				Technical data → Volume 1		
	for Ø [mm]	Remarks	Order code	Part No.	Type	PU <sup>1)</sup>
<b>Slot nut NST</b>						
	25	For mounting slot	Y	<b>526 091</b>	<b>NST-HMV-M4</b>	1
	32, 40			<b>150 914</b>	<b>NST-5-M5</b>	1
	50, 63			<b>150 915</b>	<b>NST-8-M6</b>	1
<b>Slot nut NSTL</b>						
	25	For slide	X	<b>158 410</b>	<b>NSTL-25</b>	1
	32			<b>158 411</b>	<b>NSTL-32</b>	1
	40			<b>158 412</b>	<b>NSTL-40</b>	1
	50			<b>158 413</b>	<b>NSTL-50</b>	1
	63			<b>158 414</b>	<b>NSTL-63</b>	1
<b>Centring sleeve ZBH</b>						
	25 ... 63	For slide	Z	<b>150 927</b>	<b>ZBH-9</b>	10
<b>Central mounting SLZZ</b>						
	25	For slide	Q	<b>150 900</b>	<b>SLZZ-16/10</b>	1
	32, 40			<b>150 901</b>	<b>SLZZ-25/16</b>	1
	50, 63			<b>150 904</b>	<b>SLZZ-50/40</b>	1
<b>Slot cover ABP</b>						
	32, 40	For mounting slot 0.5 m each	B	<b>151 681</b>	<b>ABP-5</b>	2
	50, 63			<b>151 682</b>	<b>ABP-8</b>	
<b>Slot cover ABP-S</b>						
	25 ... 63	For sensor slot 0.5 m each	S	<b>151 680</b>	<b>ABP-5-S</b>	2

1) Packaging unit quantity

Ordering data – Push-in/threaded fittings				Technical data → Volume 3		
	for Ø [mm]	Remarks	Part No.	Type	PU <sup>1)</sup>	
	25, 32	For connecting compressed air tubing	<b>186 098</b>	<b>QS-G<sup>1</sup>/<sub>8</sub>-8</b>	10	
	40, 50		<b>186 099</b>	<b>QS-G<sup>1</sup>/<sub>4</sub>-8</b>		
	63		<b>186 101</b>	<b>QS-G<sup>1</sup>/<sub>4</sub>-10</b>	10	
			<b>186 100</b>	<b>QS-G<sup>3</sup>/<sub>8</sub>-8</b>	10	
			<b>186 102</b>	<b>QS-G<sup>3</sup>/<sub>8</sub>-10</b>		
			<b>186 103</b>	<b>QS-G<sup>3</sup>/<sub>8</sub>-12</b>		

1) Packaging unit quantity

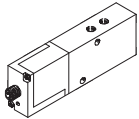
# Linear drives DGPL/DGPI/DGPIL

Accessories


FESTO

Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1

Ordering data – Proportional directional control valves													Technical data → 5 / 1.5-2		
Selection aid															
Application	for Ø [mm]	Stroke [mm]													
		225	300	360	450	500	600	750	1,000	1,250	1,500	1,750	2,000		
horizontal/vertical	<b>For applications with axis controller SPC200</b>														
	25	1/1	1/1	1/1	1/1	1/1	1/1	1/1	1/1	2/2	2/2	2/2	2/2	2/2	
	32	1/1	1/1	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	2/2	
	40	1/1	2/2	2/2	2/2	2/2	2/2	2/2	2/2	3/3	3/3	3/3	3/3	3/3	
	50	2/2	2/2	2/2	2/2	2/2	2/2	3/3	3/3	3/3	3/3	3/3	3/3	3/3	
	63	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	3/3	4/4	4/4	4/4	4/4	
	<b>For applications with Soft Stop end position controller SPC11</b>														
	25	1 <sup>1)</sup>	1/1	2/1	2/1	2/1	2/1	2/2	2/2	2/3	2/3	2/3	2/3	2/3	
	32	1 <sup>1)</sup>	2/1	2/1	2/1	2/1	2/1	2/1	3/2	3/3	3/3	3/3	3/3	3/3	
	40	2/1	2/1	2/1	2/1	2/2	3/3	3/4	3/4	3/4	3/4	3/4	3/4	3/4	
	50	1/1	2/1	2/2	3/2	3/3	4/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	
	63	2/1	2/2	3/3	3/3	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	4/4	
	Valve	Selection number								Part No.	Type				
		1								151 692	MPYE-5-1/8-LF-010-B				
2								151 693	MPYE-5-1/8-HF-010-B						
3								151 694	MPYE-5-1/4-010-B						
4								151 695	MPYE-5-3/8-010-B						

1) On request

-  - Note



The representation e.g. 2/1 in the columns means:



Selection number 2	Selection number 1
for horizontal application	for vertical application
151 693 MPYE-5-1/8-HF-010-B	151 692 MPYE-5-1/8-LF-010-B



# Linear drives DGPL/DGPI/DGPIL

Accessories

**FESTO**

Ordering data – Proximity sensors for T-slot, magneto-resistive					Technical data → <a href="http://www.festo.com/catalogue/sm">www.festo.com/catalogue/sm</a>	
	Type of mounting	Switch output	Electrical connection	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in the slot lengthwise, flush with the cylinder profile	PNP	Plug M8x1, 3-pin	0.3	<b>175 484</b>	<b>SMT-8-PS-S-LED-24-B</b>
N/C contact						
	Insertable in the slot from above, flush with cylinder profile	PNP	Cable, 3-wire	7.5	<b>543 873</b>	<b>SMT-8M-PO-24V-K7,5-OE</b>

Ordering data – Proximity sensors for T-slot, magnetic reed					Technical data → <a href="http://www.festo.com/catalogue/sm">www.festo.com/catalogue/sm</a>	
	Type of mounting	Switch output	Electrical connection	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	2.5	<b>150 855</b>	<b>SME-8-K-LED-24</b>
			Plug M8x1, 3-pin	0.3	<b>150 857</b>	<b>SME-8-S-LED-24</b>
N/C contact						
	Insertable in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	7.5	<b>160 251</b>	<b>SME-8-O-K-LED-24</b>

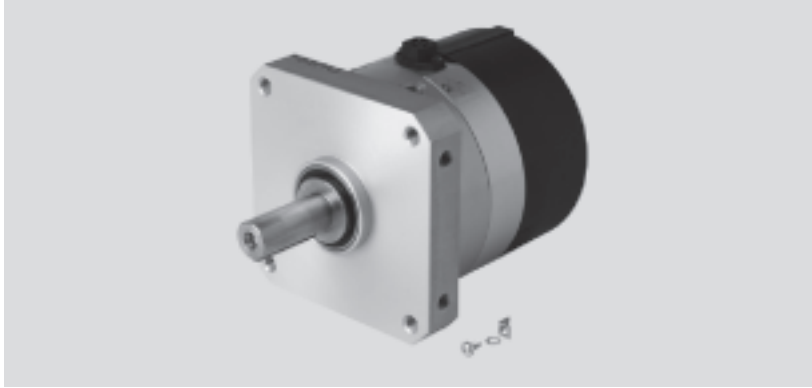
Ordering data – Connecting cables				Technical data → <a href="http://www.festo.com/catalogue/nebu">www.festo.com/catalogue/nebu</a>	
	Electrical connection, left	Electrical connection, right	Cable length [m]	Part No.	Type
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	<b>541 333</b>	<b>NEBU-M8G3-K-2.5-LE3</b>
			5	<b>541 334</b>	<b>NEBU-M8G3-K-5-LE3</b>
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	<b>541 338</b>	<b>NEBU-M8W3-K-2.5-LE3</b>
			5	<b>541 341</b>	<b>NEBU-M8W3-K-5-LE3</b>

# Swivel modules DSMI, integrated displacement encoder

Features



## Individual positioning components with swivel module DSMI ...



Proportional directional control valve  
MPYE-...  
→ 5 / 1.5-2



Soft Stop → 5 / 1.4-2

Positioning technology → 5 / 1.3-2

End position controller  
SPC11-POT-LWG



Axis interface  
SPC-AIF-POT-LWG



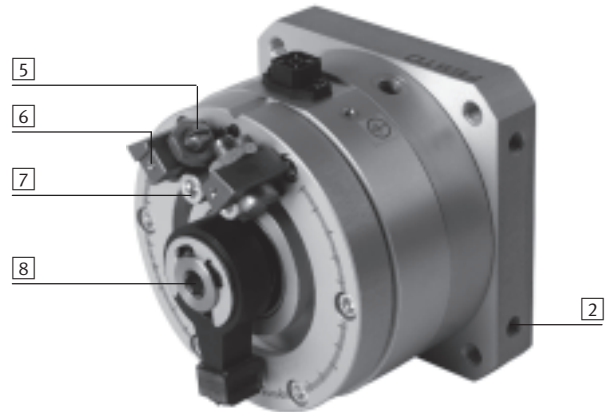
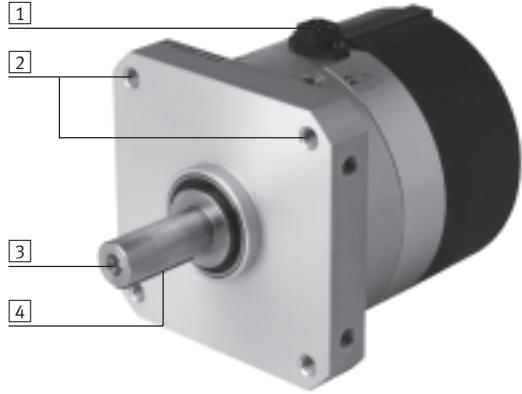
Axis positioning controller  
SPC200



# Swivel modules DSML, integrated displacement encoder

Features

## At a glance

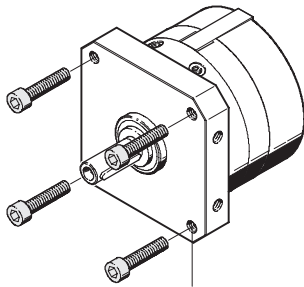


- 1 Connector plug for displacement encoder
- 2 Versatile, integrated attachment facilities
- 3 Customer's own mounting facility on the drive shaft
- 4 Woodruff key
- 5 Fixed stop with fine adjustment of the swivel angle
- 6 Brackets for mounting inductive proximity sensors for contactless position sensing

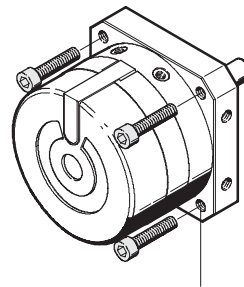
- 7 Fixed stop can be set at any point within the swivel angle
- 8 Manual operation via internal hexagon socket in the drive shaft.

A female thread is included for attachment of an additional drive shaft by the user.

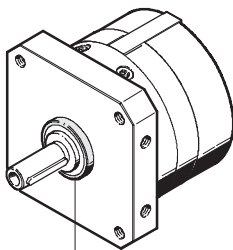
## Mounting options



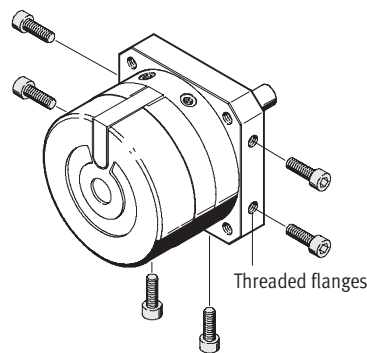
Threaded through-hole



Threaded through-hole



Centring collar



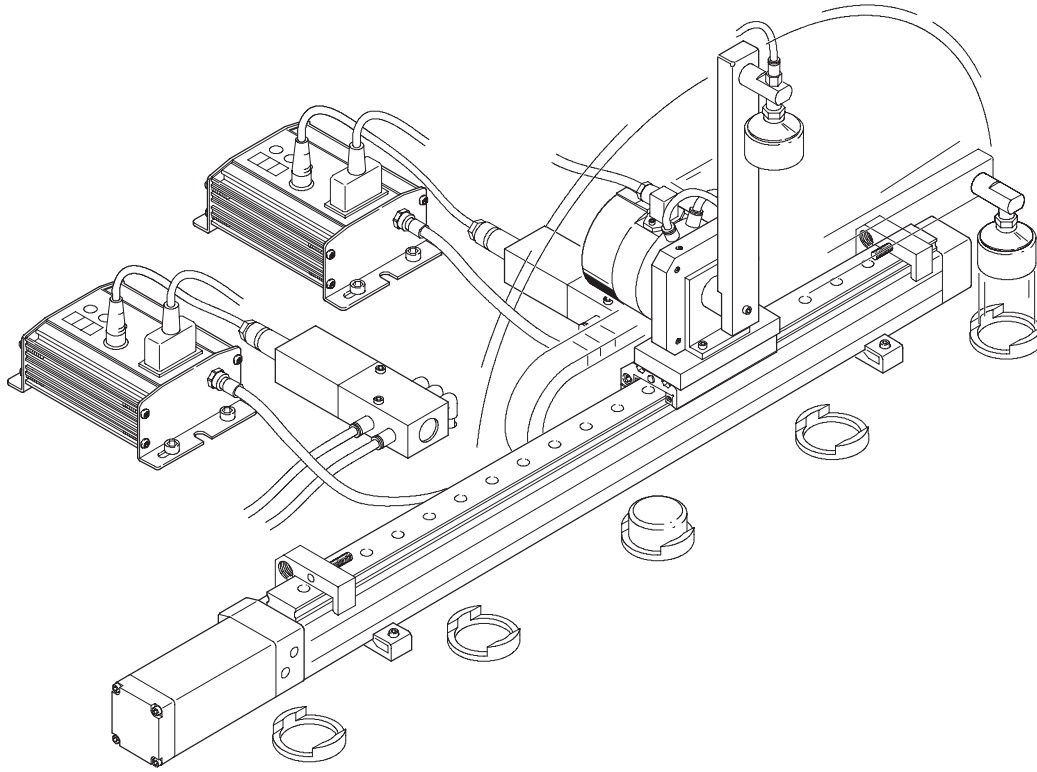
Threaded flanges

# Swivel modules DSMI, integrated displacement encoder

Application example



Combined linear and swivel motion with Soft Stop SPC11 to reposition small parts



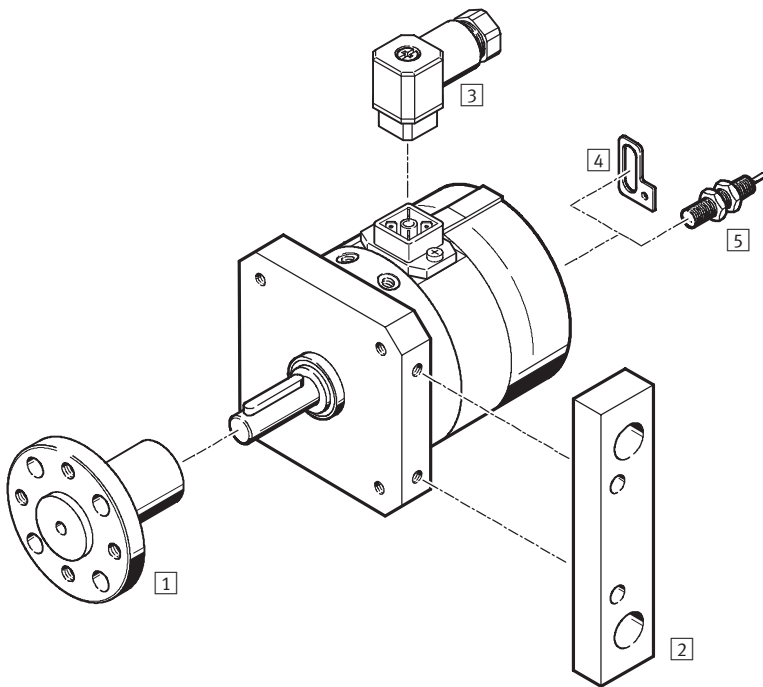
Servopneumatic positioning systems  
Cylinders with displacement encoders

1.1



# Swivel modules DSMI, integrated displacement encoder

Peripherals overview and type code



Accessories		
Type	Brief description	→ Page
1 Push-on flange FWSR	for mounting attachments	5 / 1.1-126
2 Mounting plate HSM	adapter plate to mount the drive	5 / 1.1-126
3 Plug socket SD	to connect the displacement encoder, is part of the end position controller SPC11 and the axis controller SPC200	5 / 1.1-127
4 Sensor mounting kit WSM	bracket to mount the inductive proximity sensor	5 / 1.1-126
5 Proximity sensors SIEN	for additional sensing of the swivel position (see SIEN-M8)	Volume 4

	DSMI	-	25	-	270
<b>Type</b>					
DSMI	Standard cylinder				
<b>Piston Ø [mm]</b>					
<b>Swivel angle [mm]</b>					



# Swivel modules DSMI, integrated displacement encoder

Technical data

FESTO

Function



-  - Diameter  
25 and 40 mm
-  - Force  
5, 20 Nm



General technical data		
Piston $\varnothing$	25	40
Design	Rotary vane Drive shaft	
Mode of operation	Double-acting	
Operating medium <sup>1)</sup>	Compressed air, filtered and unlubricated, filter unit 5 $\mu$ m	
Cushioning	Non-adjustable at either end	
Cushioning angle [°]	1.1 ... 1.9	1.4 ... 2.1
Position sensing	Integrated angular displacement encoder Proximity sensor <sup>2)</sup>	
Measuring principle (angular displacement encoder)	Analogue with rotary encoder, contacting with absolute measurements	
Type of mounting	Direct mounting	
Shaft	Running on ball bearings	
End stops	Adjustable	
Max. swivel angle <sup>3)</sup> [°]	272	
Pneumatic connection	M5	G $\frac{1}{8}$
Electrical connection	4-pin plug, $\square$ 16, DIN 45 322	


- 1) The proportional directional control valve MPYE used requires the characteristic values.
- 2) Can be ordered as an option.
- 3) Note stroke reduction in conjunction with SPC200.

Torque and impact energy [Nm]		
Piston $\varnothing$	25	40
Torque <sup>1)</sup>	5	20
Max. impact energy at end positions	0.05	0.1

- 1) Theoretical values, calculated at 6 bar.

Permitted forces and torques on the drive shaft		
Piston $\varnothing$	25	40
Max. perm. radial load [N]	120	350
Max. perm. axial load [N]	50	120
Max. perm. mass moment of inertia <sup>1)</sup> [ $10^{-4}$ kg m <sup>2</sup> ]	1.1	2.4
Max. operating frequency <sup>2)</sup> [Hz]	2	

- 1) Unthrottled, for applications with Soft Stop SPC11 and axis controller SPC200 → 5 / 1.1-123
- 2) For max. permissible mass moment of inertia and a stroke of 270°.

-  - Note

Further technical data  
→ Volume 1 (Swivel module DSM)

# Swivel modules DSMI, integrated displacement encoder

FESTO

Technical data

Positioning characteristics with axis controller SPC200		
Piston Ø	25	40
Repetition accuracy	[°]	±0.3
Mounting position	Any	
Min. mass moment of inertia, horizontal <sup>1)</sup>	[10 <sup>-4</sup> kg m <sup>2</sup> ]	15
Max. mass moment of inertia, horizontal <sup>1)</sup>	[10 <sup>-4</sup> kg m <sup>2</sup> ]	300
Min. mass moment of inertia, vertical <sup>2)</sup>	[10 <sup>-4</sup> kg m <sup>2</sup> ]	15
Max. mass moment of inertia, vertical <sup>2)</sup>	[10 <sup>-4</sup> kg m <sup>2</sup> ]	300
Min. speed of travel	[°/s]	50
Max. speed of travel	[°/s]	2,000
Typ. positioning time, long stroke <sup>3)</sup>	[s]	0.35/0.60
Typ. positioning time, short stroke <sup>4)</sup>	[s]	0.15/0.25
Minimum positioning stroke	[°]	5
Max. swivel stroke <sup>5)</sup>	[°]	260
Recommended proportional directional control valve	MPYE-5-M5-010-B	MPYE-5-1/8-LF-010-B

- 1) Must not change during the movement, but may be outside the centre of gravity.
- 2) Must not change during the movement, must act at the centre of gravity.
- 3) At 6 bar, vertical mounting position, 260° positioning angle at min./max. mass moment of inertia.
- 4) At 6 bar, vertical mounting position, 15° positioning angle at min./max. mass moment of inertia.
- 5) A stroke reduction of 5° on both sides must be observed.

Positioning characteristics with Soft Stop end position controller SPC11		
Piston Ø	25	40
End-position repetition accuracy <sup>1)</sup>	[°]	< 0.2
Repetition accuracy of a mid-position	[°]	< ±2
Mounting position	horizontal	
Cushioning <sup>2)</sup>	No	
Min. mass moment of inertia, horizontal <sup>3)</sup>	[10 <sup>-4</sup> kg m <sup>2</sup> ]	15
Max. mass moment of inertia, horizontal <sup>3)</sup>	[10 <sup>-4</sup> kg m <sup>2</sup> ]	300
Minimum swivel stroke	[°]	15
Recommended proportional directional control valve	MPYE-5-M5-010-B	MPYE-5-1/8-LF-010-B

- 1) When using the DSMI limit stops.
- 2) The cushioning pad on the stop lever must be removed for applications with Soft Stop. The stop lever may not swivel to the end stop at too great a speed as this could destroy the swivel module.

Operating and environmental conditions		
Piston Ø	25	40
Operating pressure <sup>1)</sup>	[bar]	4 ... 8
Ambient temperature <sup>2)</sup>	[°C]	-10 ... +60
Vibration resistance	To DIN/IEC 68 Parts 2 - 6, severity level 2	
Continuous shock resistance	To DIN/IEC 68 Parts 2 - 27, severity level 2	
CE marking symbol (see conformity declaration)	Según directiva UE para CEM	
Protection class	IP65 to IEC 60 529	
Corrosion resistance class CRC <sup>3)</sup>	1	

- 1) Only applies for applications with the Soft Stop end position controller SPC11 and axis controller SPC200.
- 2) Note operating range of proximity sensors
- 3) Corrosion resistance class 1 according to Festo standard 940 070  
Components requiring low corrosion resistance. Transport and storage protection.

# Swivel modules DSMI, integrated displacement encoder

Technical data

FESTO

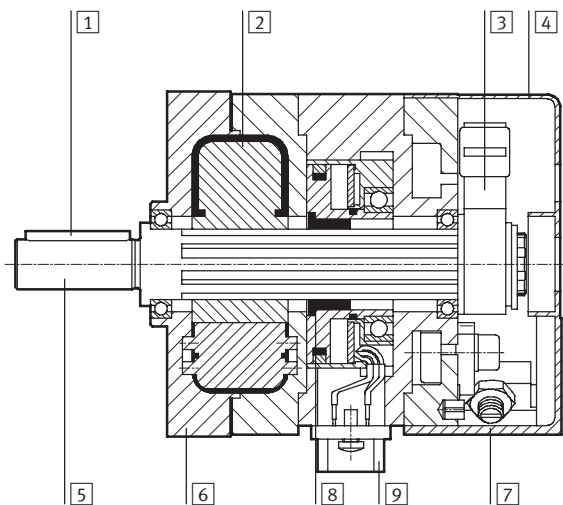
Weights			
Piston Ø		25	40
DSMI	[g]	1,060	3,750

Electrical data, displacement encoder			
Piston Ø		25	40
Power supply <sup>1)</sup>	[V DC]	10	
Max. current consumption	[mA]	4	
Wiper current	recommended	[µA]	< 1
	maximum <sup>2)</sup>	[mA]	10
Connection resistance	[kΩ]	5	
Connection resistance tolerance	[%]	±20	
Angle resolution	[°]	0.1	
Independent linearity	[%]	0.25	
Temperature coefficient	[ppm/°K]	≤ 10	
Interface		Analogue	

- 1) Stabilised power supply is recommended, max. 42 VDC permissible.  
2) Only permissible in the short-term in the event of a fault.

## Materials

Sectional view



Cylinder/Displacement encoder		
Cylinder		
1	Woodruff key	Steel
2	Rotary vane	GRP
3	Stop lever	Anodised aluminium
4	Cap	GRP
5	Shaft	Nickel plated steel
6	Housing	Anodised aluminium
7	Fixed stop/Screw	Galvanised steel
	Note on material	Free of copper, PTFE and silicone
Displacement encoder		
8	Coupling	Polyurethane
9	Housing	Anodised aluminium
-	Resistor element	Conductive plastic

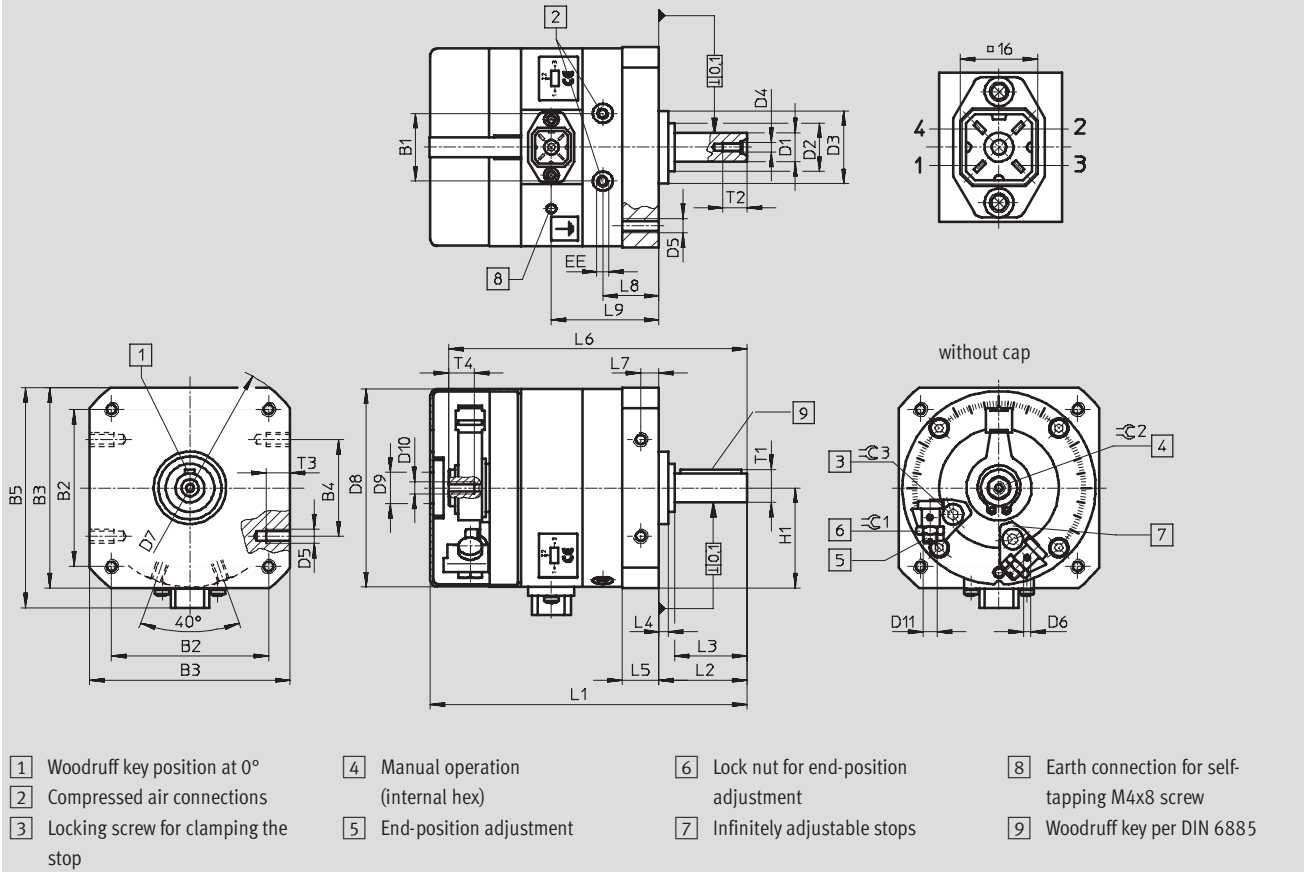
# Swivel modules DSMI, integrated displacement encoder

Technical data

FESTO

## Dimensions

Download CAD data → [www.festo.com/en/engineering](http://www.festo.com/en/engineering)



∅	B1	B2	B3	B4	B5	D1	D2	D3	D4	D5	D6	D7
[mm]	±0.5	±0.3	±0.3		±1	g7 ∅	∅	∅				∅
25	28	65	83	40±0.2	91	12	20-0.3	30	M4	M6	M3	106±0.3
40	43.8	105	130	80±0.3	139	20	36-0.4	52	M5	M10	M3	168±0.5

∅	D8	D9	D10	D11	EE	H1	L1	L2	L3	L4	L5	L6
[mm]	∅	∅ +0.5				±0.2			±0.2	±0.4	+0.2 -0.4	±0.8
25	82±0.2	13	M5	M6x0.5	M5	41.5	131±1.2	36.5+0.6/-0.7	30	4	15.2	123
40	128±0.3	23.5	M6	M10x1	G1/8	65	200±1.5	62+0.7/-0.8	50	8	23.7	184

∅	L7	L8	L9	T1	T2	T3	T4	∅C1	∅C2	∅C3	Woodruff key to DIN 6885
[mm]	±0.2		±1	max.	+2	±0.2				D12	
25	7.5	23.5	44.5	13.5	10	10	10	10	8	4	A4x4x25
40	12	36	64.5	22.5	16	15	10	17	10	8	A6x6x45

Ordering data		Part No.	Type
Type	Swivel angle [°]		
DSMI-25-270	270	192 270	DSMI-25-270
DSMI-40-270	270	192 271	DSMI-40-270

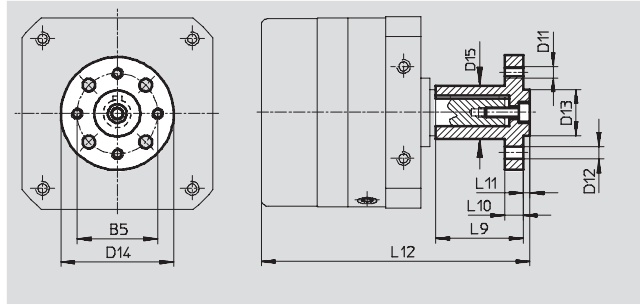
# Swivel modules DSMI, integrated displacement encoder

Accessories



## Push-on flange FWSR

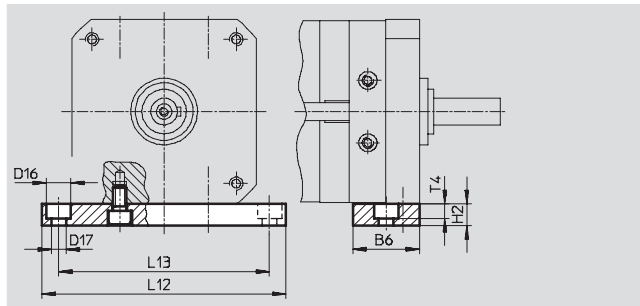
Material:  
Anodised aluminium  
Free of copper, PTFE and silicone



Dimensions and ordering data													
for $\varnothing$	B5	D11	D12	D13	D14	D15	L9	L10	L11	L12	Weight	Part No.	Type
[mm]			$\varnothing$ H13	$\varnothing$ g7	$\varnothing$	$\varnothing$					[g]		
25	35	M5	5,5	20	50	23	38	8	3	116,5	68	13 240	FWSR-25
40	54	M8	9	36	70	38	60	11	5	186,5	240	14 656	FWSR-40

## Mounting plate HSM

Material:  
Anodised aluminium  
Free of copper, PTFE and silicone




Dimensions and ordering data										
for $\varnothing$	B6	D16	D17	H2	L12	L13	T4	Weight	Part No.	Type
[mm]		$\varnothing$	$\varnothing$					[g]		
25	30	11	6,6	10	110	95	6,8	94	165 573	HSM-25
40	45	18	11	20	180	155	11	459	165 575	HSM-40

Ordering data – Mounting kits			
	for $\varnothing$	Remarks	Part No. Type
	[mm]		
	25	For inductive proximity sensors SIEN	161 043 WSM-25-JM5
	40		161 045 WSM-40-JM8

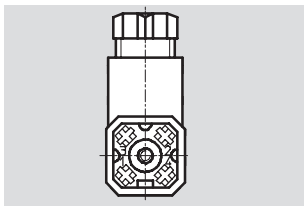
# Swivel modules DSML, integrated displacement encoder

Accessories




Ordering data – Push-in/threaded fittings			Technical data → Volume 3	
	for Ø [mm]	Remarks	Part No.	Type
	25	For connecting compressed air tubing with standard O.D.	<b>153 306</b>	<b>QSM-M5-6</b>
	40		<b>186 096</b>	<b>QS-G-1/8-6</b>

## Ordering data – Plug socket



PIN	Pin allocations	Designation	Part No.	Type
1	Power supply	Plug socket	<b>194 332</b>	<b>SD-4-WD-7</b>
2	Signal			
3	0 V			
4	PE (yellow), screen			

-  - Note  
 Recommended proximity sensor  
 → Type SIEN-M8, Volume 4

