

Stopper cylinders DFST



# Stopper cylinders DFST

Key features

## At a glance

- Gentle stopping without impact vibration or noise
- Single-acting or double-acting
- Powerful shock absorber for high energy absorption
- Wide range of applications thanks to adjustable shock absorber
- Supply ports at side or underneath
- Adjustable active direction thanks to rotatable toggle lever arrangement (90°, 180°, 270°)
- Position sensing via inductive proximity sensor SIEN on the toggle lever or via proximity sensor for T-slot SME-/SMT-8 on the piston
- Sturdy design for long service life
- Stable guide rod
- Seal for protection against dirt and moisture

## The technology in detail

### Cushioning adjustment

- Adaptable shock absorber depending on the load on the workpiece carrier
- Easy adjustment via knurled adjusting wheel **1**
- Shock absorber can be replaced in the fitted position



### Optional: toggle lever lock

- For locking the toggle lever **1**
- The toggle lever lock **2** can be ordered as a variant of the stopper cylinder or as an accessory
- Simple design
- Reliable function

Piston Ø 50:



Piston Ø 63, 80:



### Toggle lever deactivator

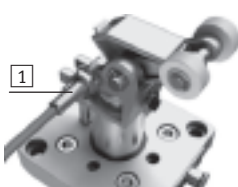
- For deactivation of the stop function
- The toggle lever deactivator can be ordered as an accessory
- Simple design



### Position sensing

- Sensing of the toggle lever position (workpiece carrier in stop position) via inductive proximity sensor SIEN-M8 **1**
- Sensing of the piston position (cylinder retracted or advanced) via proximity sensor SME-/SMT-8 in the slot **2**

Sensing of the toggle lever position



Sensing of the piston position

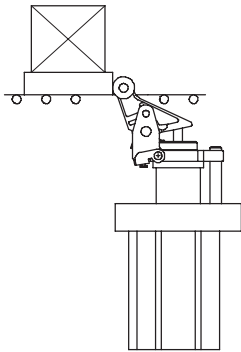


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Key features

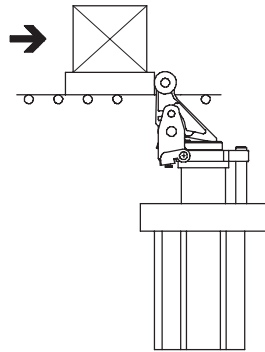
## Functional sequence

Step 1



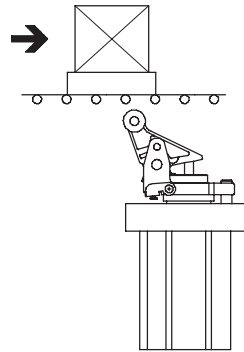
1. Gentle stopping of heavy masses via a hydraulic shock absorber in the piston rod.

Step 2



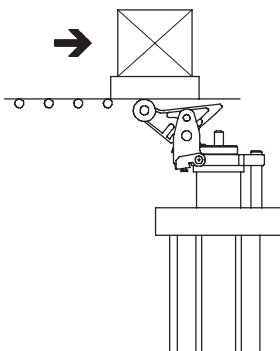
2. The toggle lever (optional) is locked into the retracted end position so that the workpiece carrier cannot be pushed back by the shock absorber.

Step 3



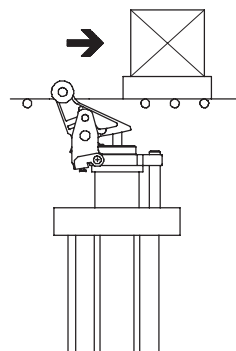
3. The workpiece carrier is released by means of compressed air, and the toggle lever is released simultaneously.

Step 4



4. The piston is advanced by means of spring force or compressed air. The toggle lever tips back which prevents the workpiece carrier from being pushed up.

Step 5



5. The toggle lever is raised by means of spring force and stops the next workpiece carrier.

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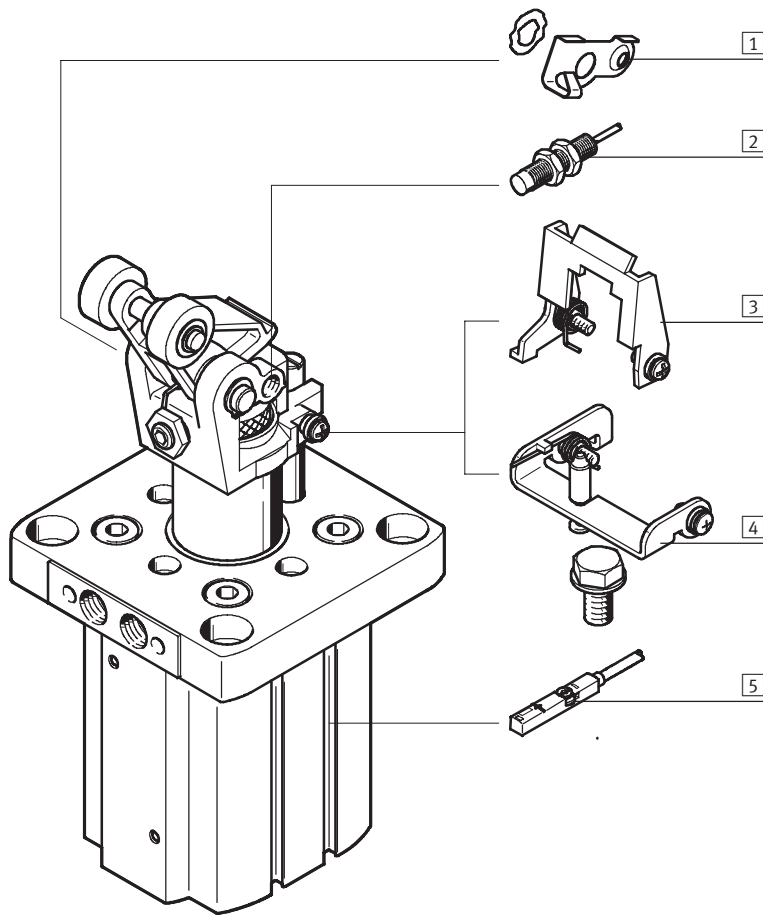
Type codes

DFST – 50 – 30 – D L – Y4 – A

<b>Type</b>	
DFST	Stopper cylinder
<b>Piston Ø [mm]</b>	
50	
<b>Stroke [mm]</b>	
30	
<b>Function</b>	
	Double-acting extending via spring
D	Double-acting without spring
<b>Locking</b>	
	No
L	Via toggle lever lock
<b>Cushioning</b>	
Y4	Adjustable shock absorber
<b>Position sensing</b>	
A	Via proximity sensor

# Stopper cylinders DFST

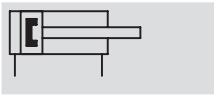
Peripherals overview




Variants and accessories		
Type	Brief description	→ Page/Internet
1 Toggle lever deactivator DADP-TF	For deactivation of the stop function. The workpiece carrier is able to pass the stopper cylinder without activating the cylinder	14
2 Proximity sensor, inductive SIEN-M8	For sensing of the toggle lever position	14
3 Toggle lever lock DADP-TL	<ul style="list-style-type: none"> <li>For piston <math>\varnothing</math> 50</li> <li>For locking the toggle lever in the retracted position. With pressurisation, the workpiece carrier and the toggle lever are released simultaneously</li> </ul>	14
4 Toggle lever lock DADP-TL	<ul style="list-style-type: none"> <li>For piston <math>\varnothing</math> 63, 80</li> <li>For locking the toggle lever in the retracted position. With pressurisation, the workpiece carrier and the toggle lever are released simultaneously</li> </ul>	14
5 Proximity sensor SME-/SMT-8	For sensing the piston position	14

# Stopper cylinders DFST

Technical data



 Diameter  
50 ... 80 mm

 Stroke length  
30 ... 40 mm



General technical data				
Piston Ø		50	63	80
Pneumatic connection		G $\frac{1}{8}$		
Stroke	[mm]	30		40
Constructional design		Piston rod with toggle lever		
Mode of operation		Single-acting/double-acting		
		Pulling		
Protection against torsion/guide		Guide rod		
Type of mounting		Via through-holes		
Cushioning (of piston movement)		Flexible cushioning rings/pads at both ends		
Position sensing		Via proximity sensor		
Mounting position		Vertical		
Product weight	[g]	1,800	3,500	6,850

Operating and environmental conditions	
Operating medium	Filtered compressed air, lubricated or unlubricated
Operating pressure <sup>1)</sup>	[bar] 2 ... 10
Ambient temperature	[°C] 5 ... 60
Corrosion resistance class CRC <sup>2)</sup>	1

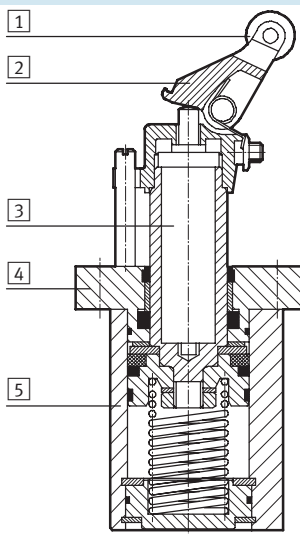
1) Min. operating pressure for piston Ø 50 with toggle lever lock is 3 bar

2) Corrosion resistance class 1 as per 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.

## Materials

Sectional view



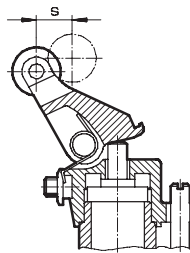
Stopper cylinder			
Piston Ø		50	63, 80
1	Rollers	Polyacetate	
2	Attachments	Nickel-plated cast steel	
3	Piston rod	High-alloy stainless steel	
4	End cap	Die-cast aluminium	Wrought aluminium alloy
5	Housing	Wrought aluminium alloy	
-	Seals	Nitrile rubber	
	Note on materials	RoHS-compliant	

# Stopper cylinders DFST

Technical data

## Braking distance

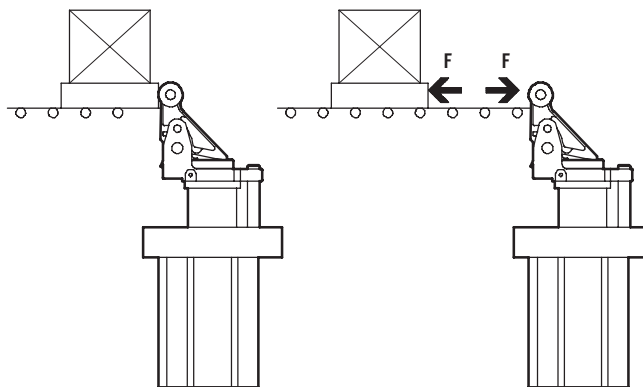
The braking distance refers to the distance from when contact is made with the toggle lever to the end stop.



Piston Ø		50	63	80
Braking distance	[mm]	14.75	14.75	20

## Resetting force $F_R$ of the toggle lever against the delivery direction

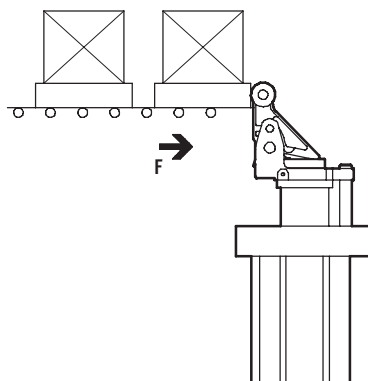
The resetting force refers to the minimum force that must be applied to press the toggle lever into the end position.



Piston Ø		50	63	80
Resetting force at the toggle lever	[N]	11	23	36

## Permissible impact force $F_{Impact}$ on the rollers of the toggle lever when the piston rod is advanced and the toggle lever is pushed into its end position

The permissible impact force refers to the momentary force that may act on the toggle lever when it is already pushed into its end position without damaging the rod bearing or the toggle lever mechanism.



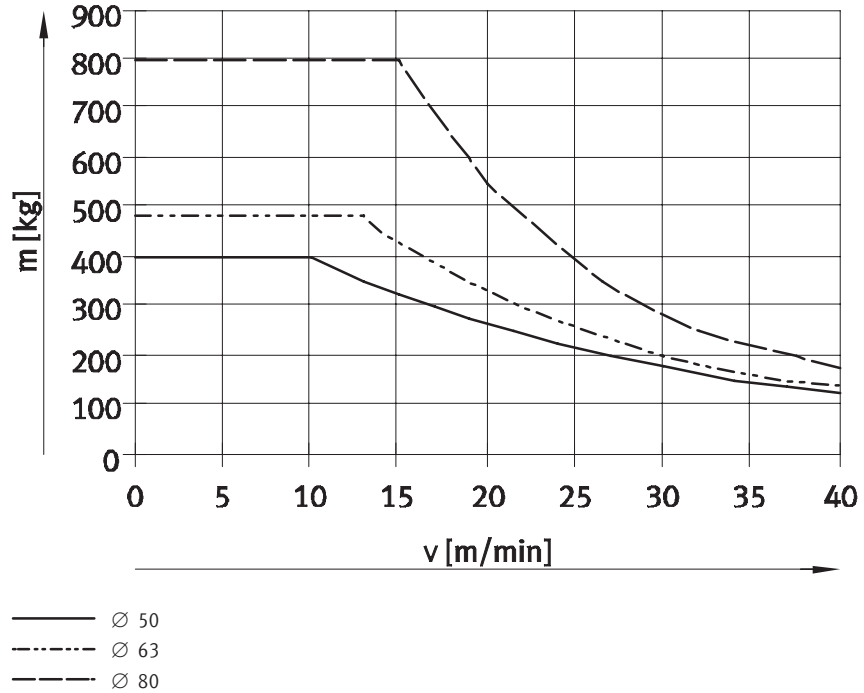
Piston Ø		50	63	80
Impact force	[N]	3,000	5,000	6,000

# Stopper cylinders DFST

Technical data

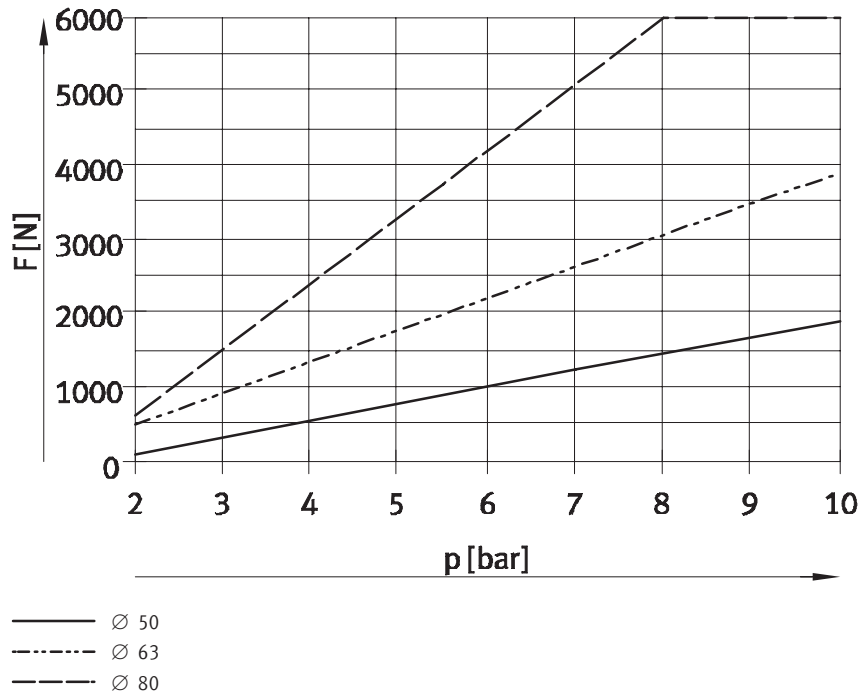
## Permissible mass $m$ as a function of the conveyor speed $v$

The values in the graph opposite take into account a friction value of  $\mu = 0.1$ .



## Permissible transverse force $F_Q$ during the switching operation as a function of the pressure $p$

The applied load causes a transverse force to act on the piston rod. To ensure the function of the cylinder, a certain minimum pressure must be applied.





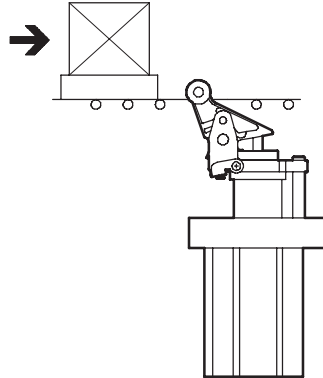
# Stopper cylinders DFST

Technical data

## Selection aid

### Stopping a workpiece carrier

The stopper cylinder is used to brake an individual workpiece carrier, with-out or without end position locking. The toggle lever and oil damper are pushed into the end position again for each new workpiece carrier.



## Example

Given:

Friction value  $\mu = 0.1$

Delivery speed  $v = 20$  m/min

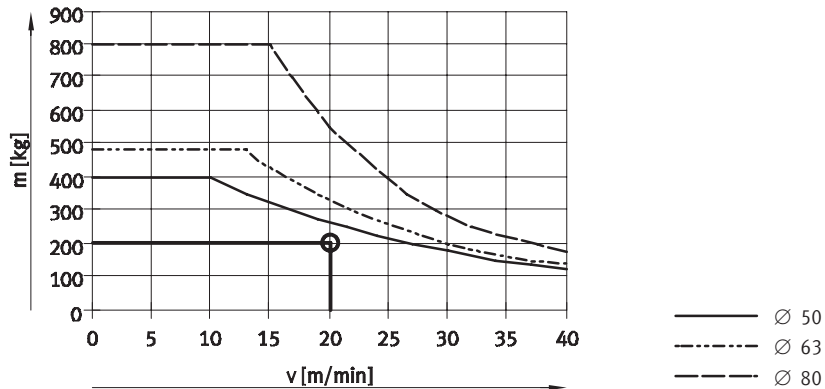
Workpiece carrier with workpiece  $m = 200$  kg

Operating pressure  $p = 6$  bar

Choice: Stopper cylinder DFST-50

### 1. Checking the permissible mass

The maximum permissible mass at a delivery speed of 20 m/min is 250 kg. This means that the total mass of the workpiece carrier and workpiece of 200 kg is permissible.



### 2. Checking the permissible transverse force during the switching operation

Transverse force  $F_Q =$  friction force

$F_{\text{Friction}}$

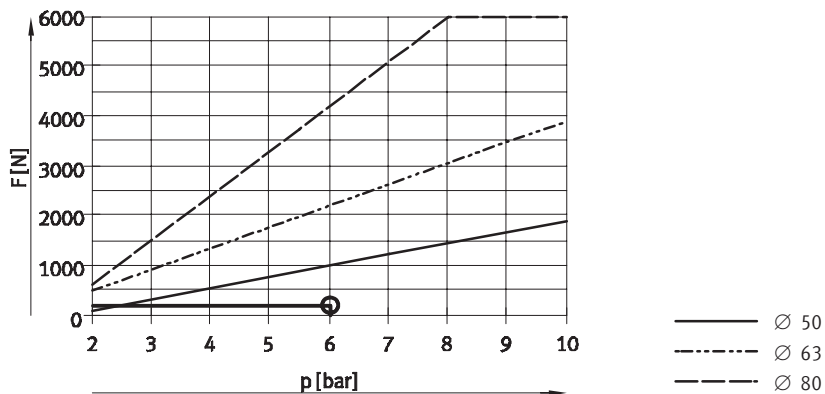
$$F_{\text{Friction}} = \mu \times m \times g$$

$$= 0.1 \times 200 \text{ kg} \times 9.81 \text{ m/s}^2$$

$$= \text{approx. } 200 \text{ N}$$

The maximum permissible transverse force at an operating pressure of 6 bar is 1,000 N.

This means that the transverse force of 200 N is permissible.



# Stopper cylinders DFST

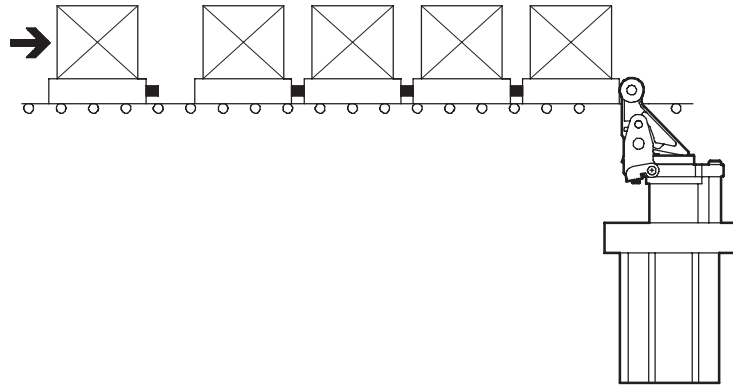
Technical data

## Selection aid

Stopping or separating several workpiece carriers

The stopper cylinder is used to separate workpiece carriers. Further workpiece carriers accumulate behind carriers that have already pushed the toggle lever into its end position.

Since the oil damper in the stopper cylinder is inoperative in this case, a certain amount of cushioning between the workpiece carriers must be guaranteed (e.g. elastomer elements).



## Example

Given:

Friction value  $\mu = 0.1$

Delivery speed  $v = 15 \text{ m/min}$

Workpiece carrier with workpiece  $m = 100 \text{ kg}$

Operating pressure  $p = 6 \text{ bar}$

Maximum number of workpiece carriers accumulating simultaneously  $n_{\text{Group}} = 1$

Maximum number of all queued workpiece carriers  $n_{\text{Queue}} = 5$

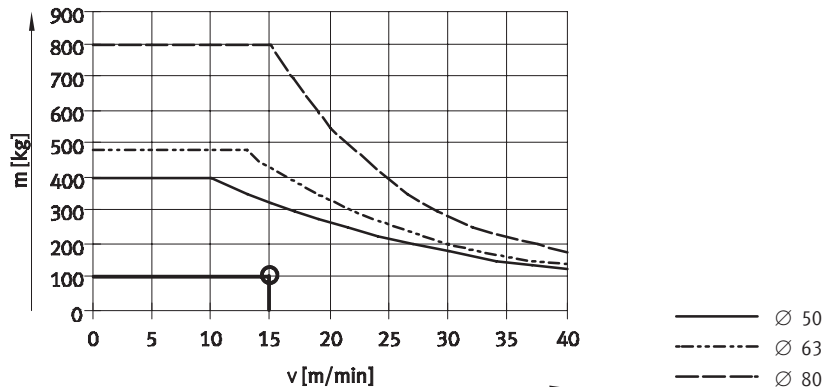
Maximum number of all advancing workpiece carriers  $n_{\text{Queue-1}} = 4$

Spring travel of the workpiece carrier buffer  $s_F = 10 \text{ mm}$

Choice: Stopper cylinder DFST-50

## 1. Checking the permissible mass of the first workpiece carrier

The maximum permissible mass at a delivery speed of 15 m/min is 320 kg. This means that the total mass of the workpiece carrier and workpiece of 100 kg is permissible.



## 2a. Calculation of the maximum permissible impact force when workpiece carriers accumulate behind a carrier at the stopper cylinder

With the DFST-50, the maximum permissible impact force is 3,000 N. This means that at a total force of 1,150 N, the number of workpiece carriers is permissible.

Impact force calculation:

$$F_{\text{Impact}} = \frac{(n_{\text{Group}} \times m) \times v^2}{s_F} = \frac{(1 \times 100\text{kg}) \times (15\text{m}/60\text{s})^2}{0.01\text{m}} = \text{ca.}650\text{N}$$

Friction force:

$$F_{\text{Friction}} = \mu \times (n_{\text{Queue}} \times m) \times g = 0.1 \times (5 \times 100\text{kg}) \times 9.81\text{m}/\text{s}^2 = \text{ca.}500\text{N}$$

Max. total force:

$$F_{\text{Total force}} = F_{\text{Impact}} + F_{\text{Friction}} = 650\text{N} + 500\text{N} = 1150\text{N}$$

# Stopper cylinders DFST

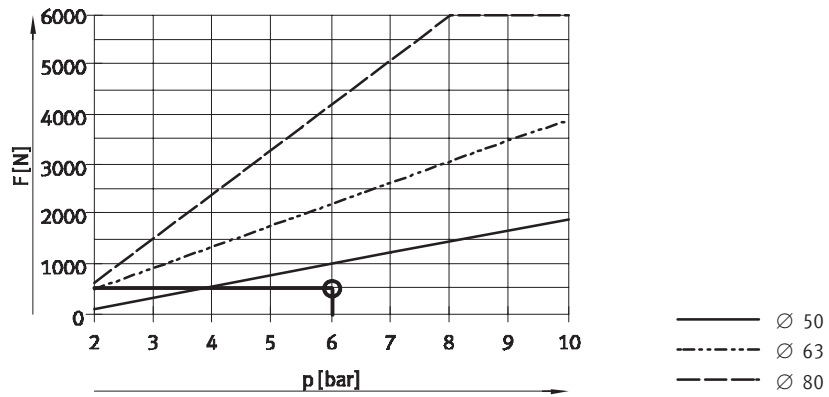
Technical data

## Selection aid

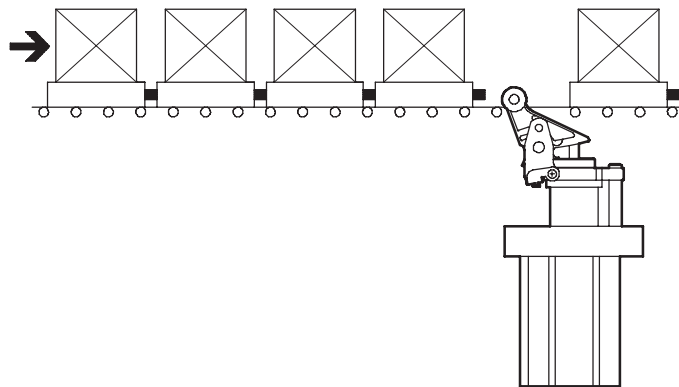
### 2b. Checking the permissible transverse force during the switching operation

Transverse force  $F_Q =$   
friction force  $F_{Friction}$   
 $F_{Friction} = 500 \text{ N}$

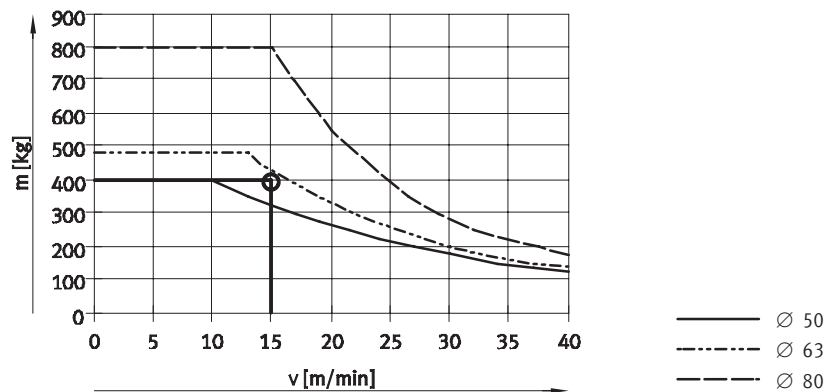
The maximum permissible transverse force at an operating pressure of 6 bar is 1,000 N.  
This means that the transverse force of 500 N is permissible.



### 3. Separating and advancing the workpiece carriers



The maximum permissible mass with the DFST-50 at a delivery speed of 15 m/min is 320 kg.  
Since the total mass of the four workpiece carriers advancing on the stopper cylinder is 400 kg, the next largest stopper cylinder must be selected for separating.



Max. total mass:

$$m_{Total\ force} = n_{Queue-1} \times m = 4 \times 100\text{kg} = 400\text{kg}$$

## Result

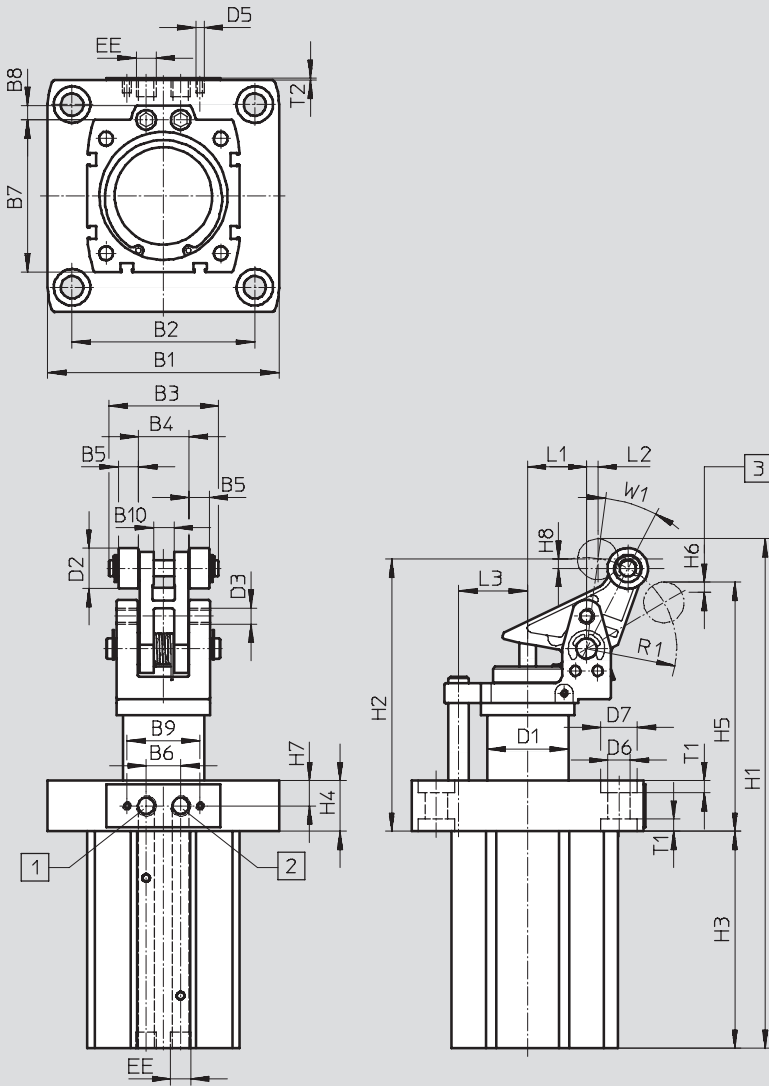
The stopper cylinder DFST-63 must be selected for separating five workpiece carriers.

# Stopper cylinders DFST

Technical data

Dimensions

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



- 1 Supply port (retract)
- 2 Supply port (advance)
- 3 Maximum permissible underside depth of workpiece carrier

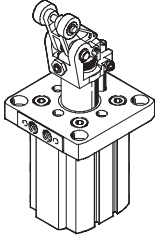
∅	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	D1	D2	D3	D5	D6
[mm]	□	□					□				∅	∅			∅
50	93	73	43	20	8	17	64	7	36	8.1	32	20	M8x1	M4	9
63	114	90	54	25	10		75			10.1	40	20			11
80	138	110	63	30	12		95			12.1	50	25			13

∅	D7	EE	H1	H2	H3	H4	H5	H6	H7	H8	L1	L2	L3	R1	T1	T2	W1
[mm]	∅																
50	14	G1/8	219	118	91	17.5	107.5	5	8.75	5.5	14	5	26	36.3	5	1	25
63	18		251	134	107	25	123	5	12.5	4.5	29	6	34	44.4	6	-	20
80	20		322.5	159	151	19	144	4.2	9.5	6.8	36	8	42	55.5	6	-	22

# Stopper cylinders DFST

Technical data


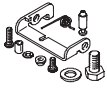

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Ordering data						
	Piston $\varnothing$	with spring	without spring	with toggle lever lock	Part No.	Type
	50	■			543 729	DFST-50-30-Y4-A
		■		■	555 572	DFST-50-30-L-Y4-A
			■		543 730	DFST-50-30-D-Y4-A
			■	■	555 573	DFST-50-30-DL-Y4-A
	63	■			543 744	DFST-63-30-Y4-A
		■		■	555 574	DFST-63-30-L-Y4-A
			■		543 745	DFST-63-30-D-Y4-A
			■	■	555 575	DFST-63-30-DL-Y4-A
	80	■			543 747	DFST-80-40-Y4-A
		■		■	555 576	DFST-80-40-L-Y4-A
			■		543 748	DFST-80-40-D-Y4-A
			■	■	555 577	DFST-80-40-DL-Y4-A

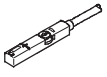

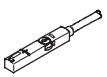
## Stopper cylinders DFST

Accessories



Ordering data			
	For Ø	Part No.	Type
<b>Toggle lever lock DADP-TL</b>			
	50	<b>543 751</b>	<b>DADP-TL-F3-50</b>
	63	<b>543 752</b>	<b>DADP-TL-F3-63</b>
	80	<b>543 753</b>	<b>DADP-TL-F3-80</b>
<b>Toggle lever deactivator DADP-TF</b>			
	50	<b>543 755</b>	<b>DADP-TF-F3-50</b>
	63	<b>543 756</b>	<b>DADP-TF-F3-63</b>
	80	<b>543 757</b>	<b>DADP-TF-F3-80</b>

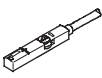


Ordering data – Proximity sensors, inductive				Technical data → Internet: sien	
	For Ø	Contact	Electrical connection	Part No.	Type
	50, 63, 80	N/O contact	Cable	<b>150 386</b>	<b>SIEN-M8B-PS-K-L</b>
			Plug	<b>150 387</b>	<b>SIEN-M8B-PS-S-L</b>
		N/C contact	Cable	<b>150 390</b>	<b>SIEN-M8B-PO-K-L</b>
			Plug	<b>150 391</b>	<b>SIEN-M8B-PO-S-L</b>



Ordering data – Proximity sensors for T-slot, magneto-resistive					Technical data → Internet: smt	
	Type of mounting	Switch output	Electrical connection	Cable length [m]	Part No.	Type
<b>N/O contact</b>						
	Insertable in the slot from above, flush with cylinder profile	PNP	Cable, 3-wire	2.5	<b>543 867</b>	<b>SMT-8M-PS-24V-K-2,5-OE</b>
			Plug M8x1, 3-pin	0.3	<b>543 866</b>	<b>SMT-8M-PS-24V-K-0,3-M8D</b>
		NPN	Cable, 3-wire	2.5	<b>543 870</b>	<b>SMT-8M-NS-24V-K-2,5-OE</b>
			Plug M8x1, 3-pin	0.3	<b>543 871</b>	<b>SMT-8M-NS-24V-K-0,3-M8D</b>
	Insertable in the slot lengthwise, flush with the cylinder profile	PNP	Cable, 3-wire	2.5	<b>175 436</b>	<b>SMT-8-PS-K-LED-24-B</b>
			Plug M8x1, 3-pin	0.3	<b>175 484</b>	<b>SMT-8-PS-S-LED-24-B</b>
<b>N/C contact</b>						
	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>

## Stopper cylinders DFST

Accessories

**FESTO**

Ordering data – Proximity sensors for T-slot, magnetic reed					Technical data → Internet: sme		
	Type of mounting	Switch output	Electrical connection	Cable length [m]	Part No.	Type	
<b>N/O contact</b>							
	Insertable in the slot from above, flush with cylinder profile	Contacting	Cable, 3-wire	2.5	<b>543 862</b>	<b>SME-8M-DS-24V-K-2,5-OE</b>	
				5.0	<b>543 863</b>	<b>SME-8M-DS-24V-K-5,0-OE</b>	
			Plug M8x1, 3-pin	Cable, 2-wire	2.5	<b>543 872</b>	<b>SME-8M-ZS-24V-K-2,5-OE</b>
				Plug M8x1, 3-pin	0.3	<b>543 861</b>	<b>SME-8M-DS-24V-K-0,3-M8D</b>
	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>	
<b>N/C contact</b>							
	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 → Internet: nebu	
	Electrical connection, left	Electrical connection, right	Cable length [m]	Part No.	Type
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	<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>