Stopper cylinders DFST

FESTO

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

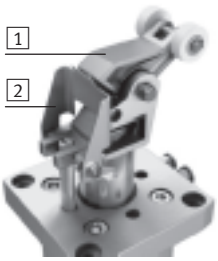
Cushioning adjustment

- 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

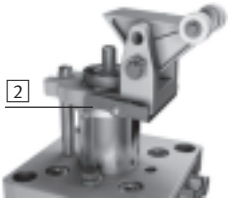
Optional: toggle lever lock

- 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 ∅ 50:

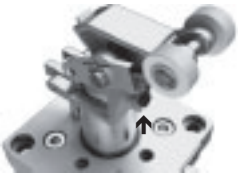


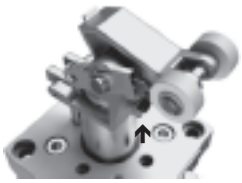
Piston ∅ 63, 80:



Toggle lever deactivator

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

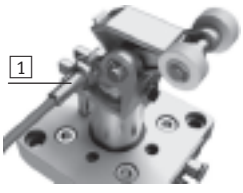




Position sensing

- 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



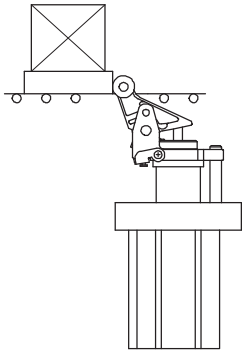
Sensing of the piston position

Stopper cylinders DFST

Key features

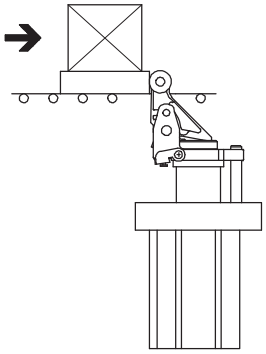
Functional sequence

Step 1



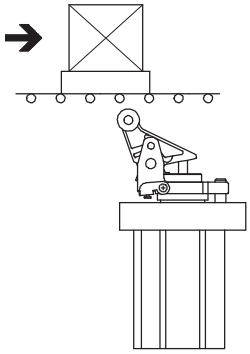
1. Gentle stopping of heavy masses via a hydraulic shock absorber in the piston rod.

Step 2



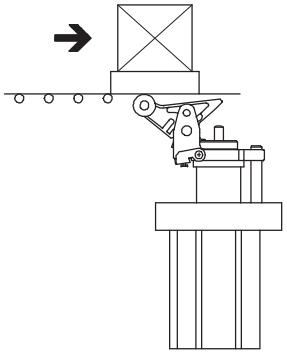
2. The toggle lever (optional) is locked into the retracted end position so that the workpiece carrier cannot be pushed back by the shock absorber.

Step 3



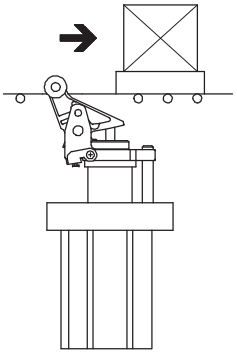
3. The workpiece carrier is released by means of compressed air, and the toggle lever is released simultaneously.

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.

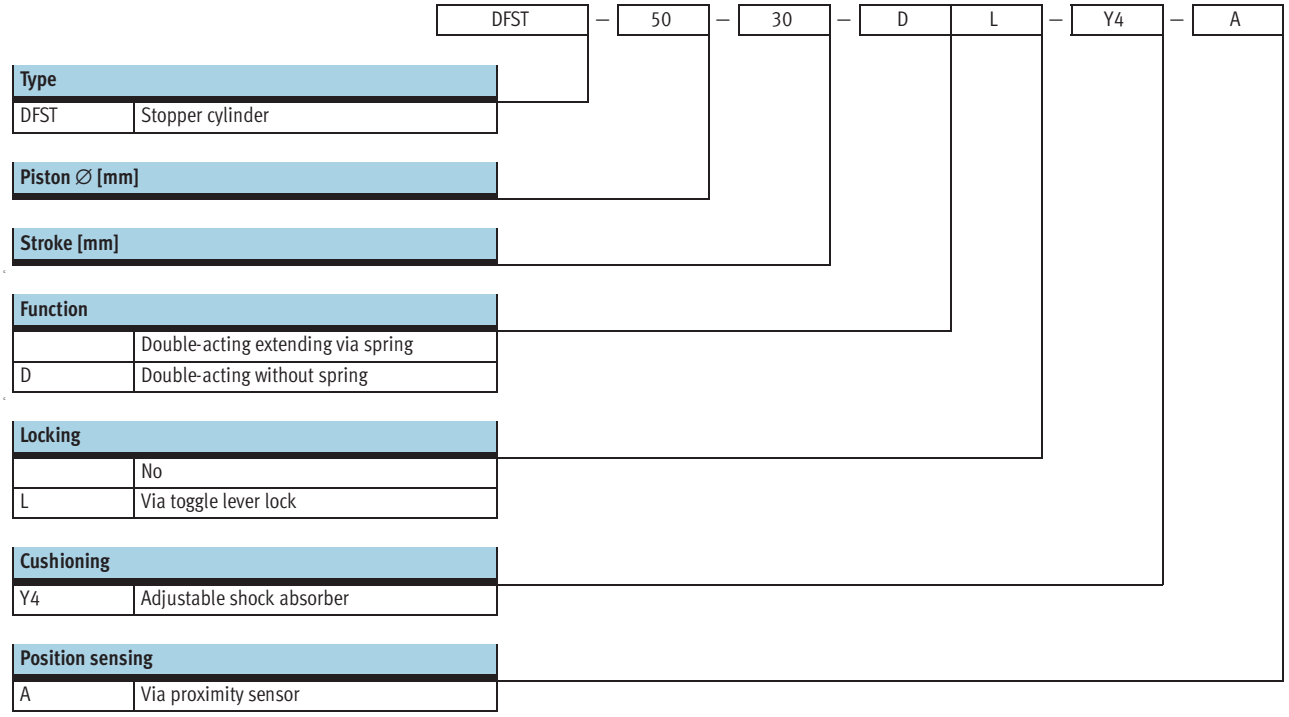
Step 5



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

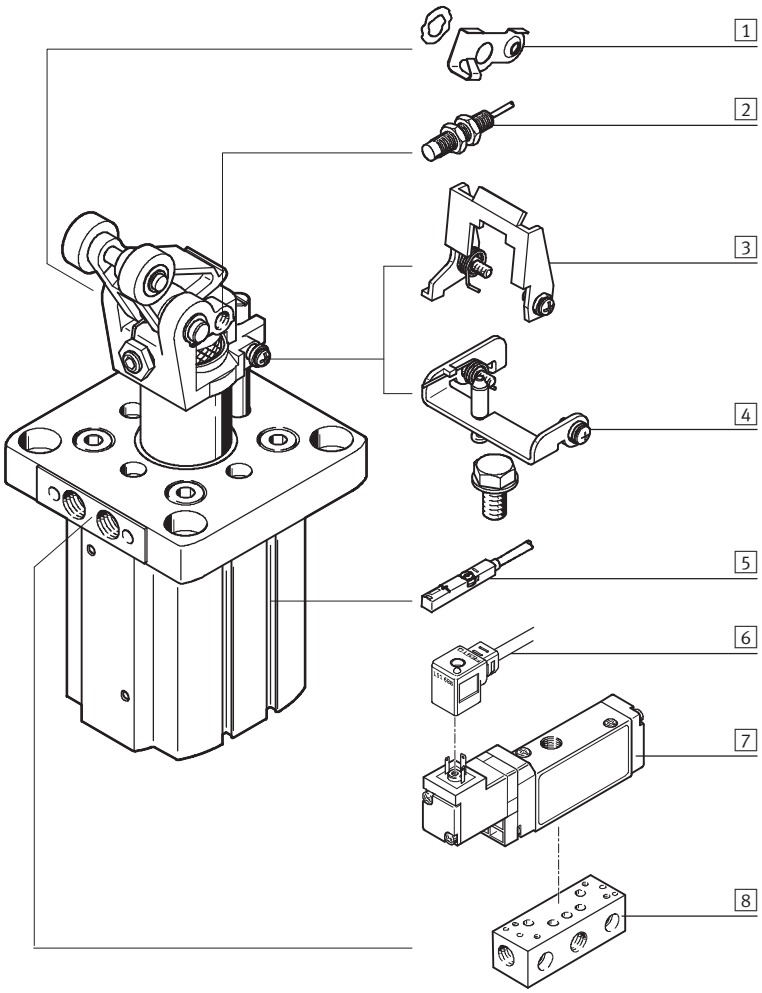
Stopper cylinders DFST

Type codes



Stopper cylinders DFST

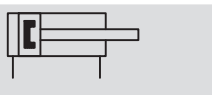
Peripherals overview



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	15
2	Proximity sensor, inductive SIEN-M8	For sensing of the toggle lever position	15
3	Toggle lever lock DADP-TL	• For piston ∅ 50 • For locking the toggle lever in the retracted position. With pressurisation, the workpiece carrier and the toggle lever are released simultaneously	15
4	Toggle lever lock DADP-TL	• For piston ∅ 63, 80 • For locking the toggle lever in the retracted position. With pressurisation, the workpiece carrier and the toggle lever are released simultaneously	15
5	Proximity sensor SME-/SMT-8	For sensing the piston position	15
6	Plug socket with cable KMEB	–	14
7	Solenoid valve MEBH	For quick and direct actuation of the stopper cylinder	14
8	Intermediate plate ZVA-2	For attaching the valve	15

Stopper cylinders DFST

Technical data



- Ø - Diameter
  50 ... 80 mm

- | - Stroke length
  30 ... 40 mm

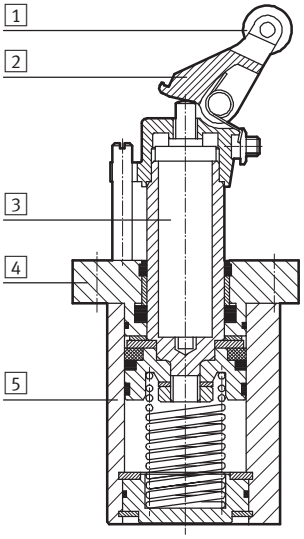
General technical data				
Piston ∅		50	63	80
Pneumatic connection		G⅛		
Stroke	[mm]	30		40
Constructional design		Piston rod with toggle lever		
Mode of operation		Single-acting/double-acting		
		Pulling		
Protection against torsion/guide		Guide rod		
Type of mounting		Via through-holes		
Cushioning (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[1]	[bar]	2 ... 10
Ambient temperature	[°C]	5 ... 60
Corrosion resistance class CRC[2]		1

1) Min. operating pressure for piston ∅ 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

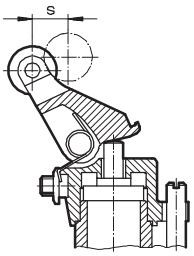
Sectional view



Stopper cylinder			
Piston ∅		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	

Braking distance

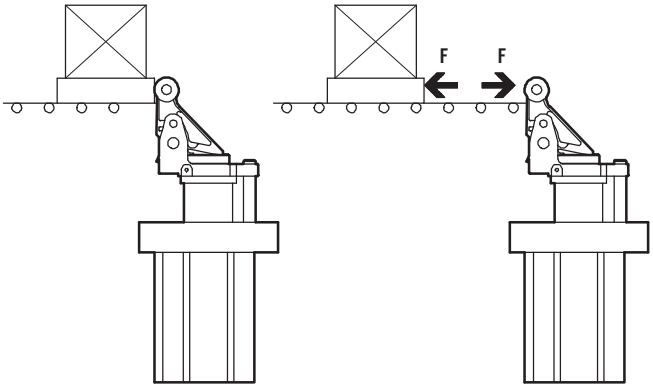
The braking distance refers to the distance from when contact is made with the toggle lever to the end stop.



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

Resetting force F_R of the toggle lever against the delivery direction

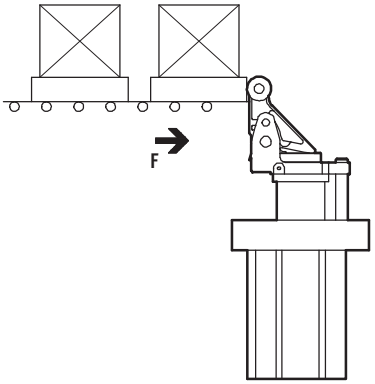
The resetting force refers to the minimum force that must be applied to press the toggle lever into the end position.



Piston ∅		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

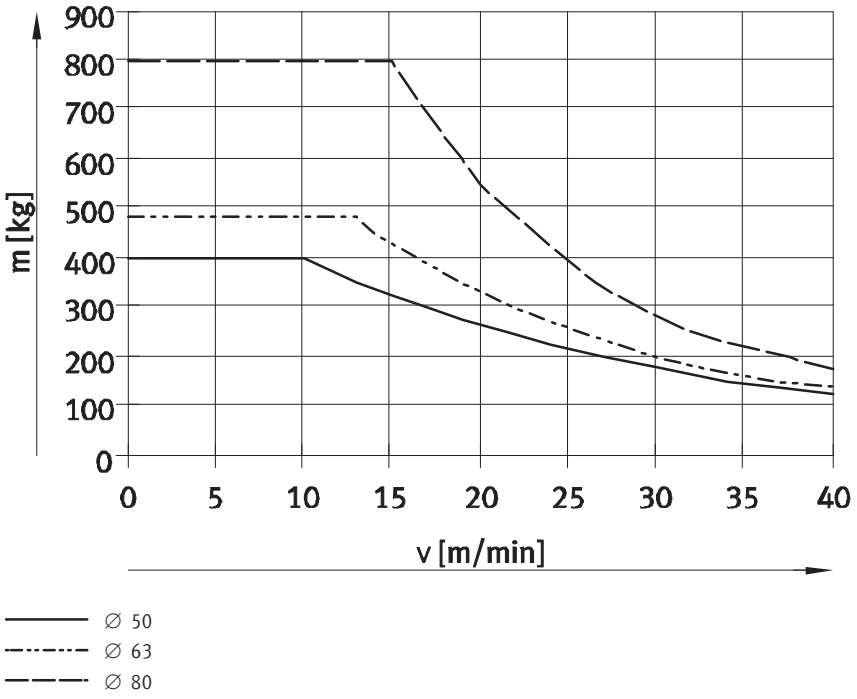
The permissible impact force refers to the momentary force that may act on the toggle lever when it is already pushed into its end position without damaging the rod bearing or the toggle lever mechanism.



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

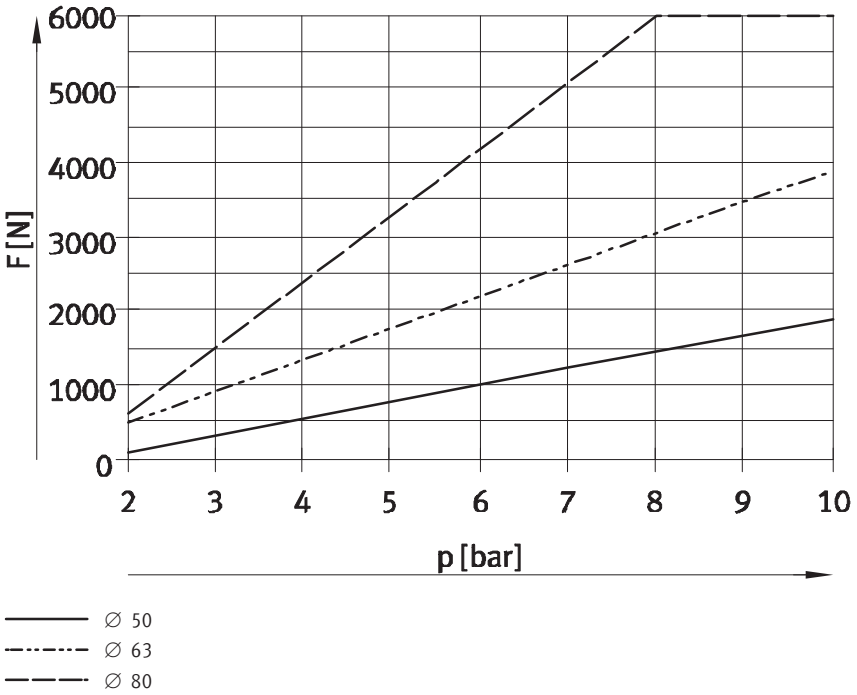
Permissible mass m as a function of the conveyor speed v

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



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

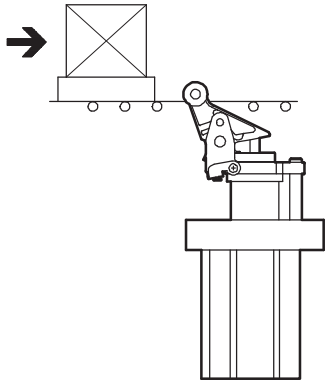
The applied load causes a transverse force to act on the piston rod. To ensure the function of the cylinder, a certain minimum pressure must be applied.



Selection aid

Stopping a workpiece carrier

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



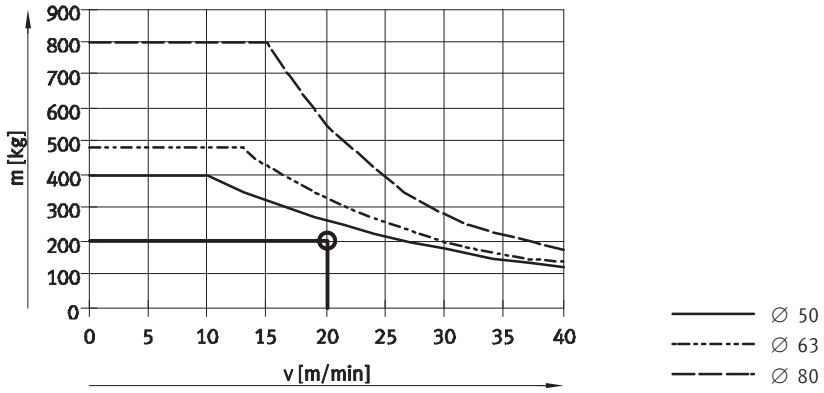
Example

Given:
Friction value μ = 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.

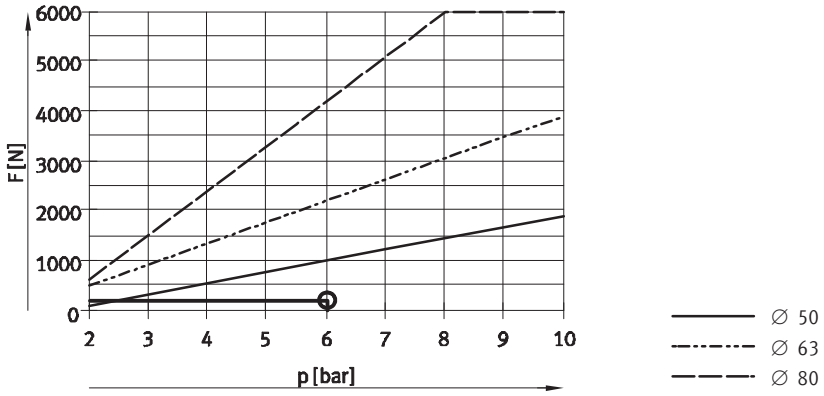


2. Checking the permissible transverse force during the switching operation

Transverse force F_Q = friction force $F_{Friction}$

$F_{Friction}$ = μ x m x g
= 0.1 x 200 kg x 9.81 m/s^2
= approx. 200 N

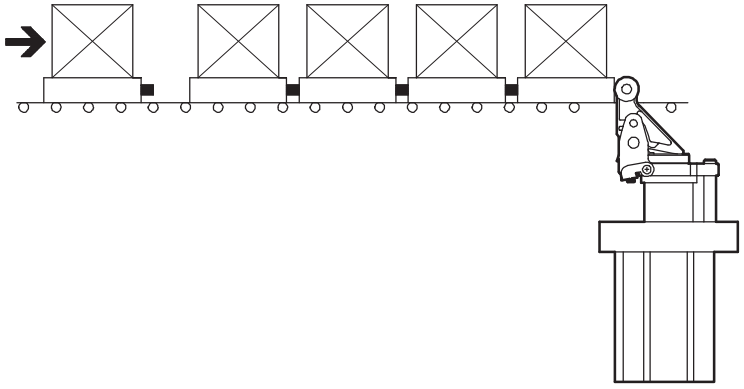
The maximum permissible transverse force at an operating pressure of 6 bar is 1,000 N.
This means that the transverse force of 200 N is permissible.



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).



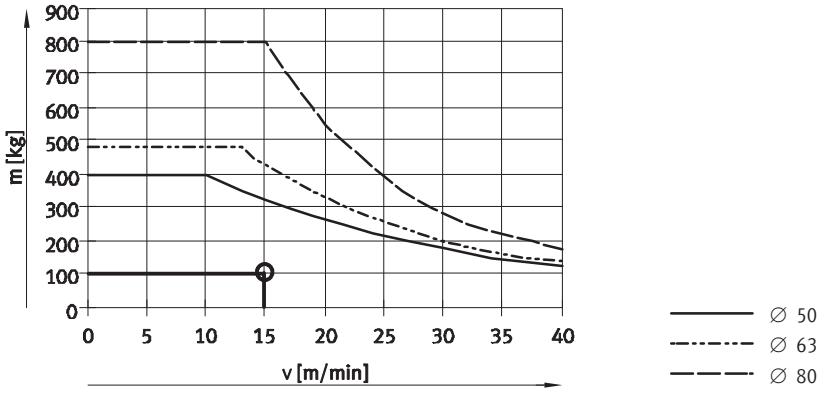
Example

Given:
Friction value $\mu = 0.1$
Delivery speed $v = 15$ m/min
Workpiece carrier with workpiece $m = 100$ kg
Operating pressure $p = 6$ bar
Maximum number of workpiece carriers accumulating simultaneously $n_{Group} = 1$
Maximum number of all queued workpiece carriers $n_{Queue} = 5$
Maximum number of all advancing workpiece carriers $n_{Queue-1} = 4$
Spring travel of the workpiece carrier buffer $s_F = 10$ 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:

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

Friction force:

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

Max. total force:

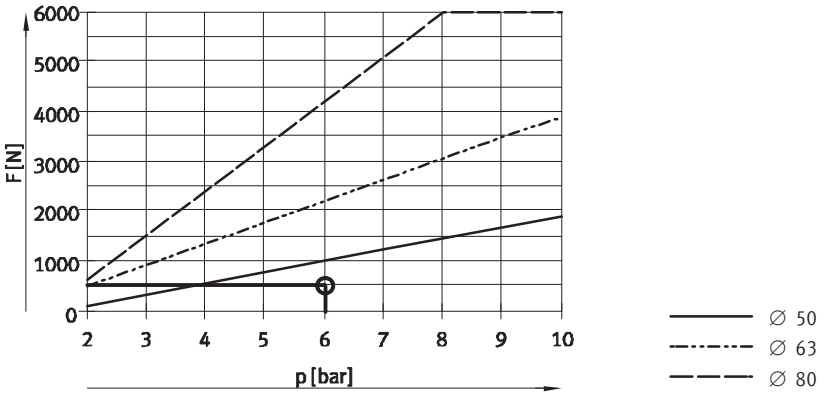
$$F_{Total\ force} = F_{Impact} + F_{Friction} = 650N + 500N = 1150N$$

Selection aid

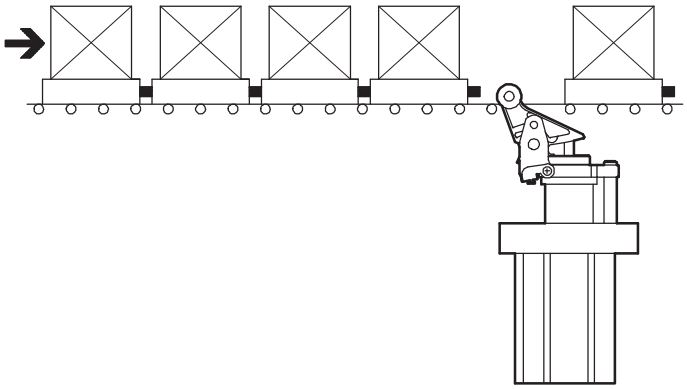
2b. Checking the permissible transverse force during the switching operation

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

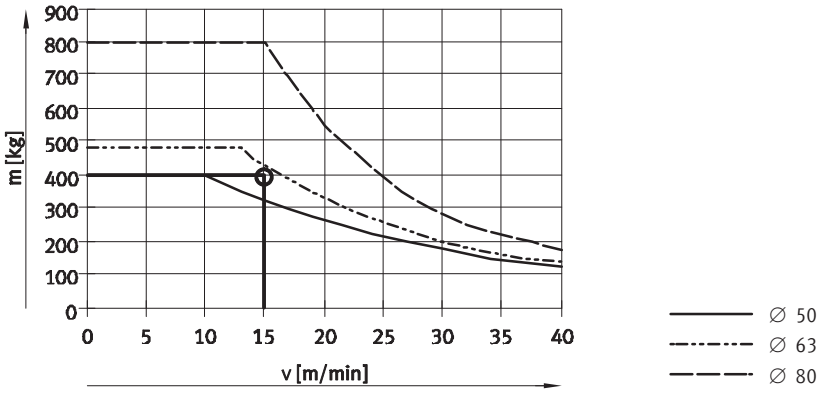
The maximum permissible transverse force at an operating pressure of 6 bar is 1,000 N.
This means that the transverse force of 500 N is permissible.



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.



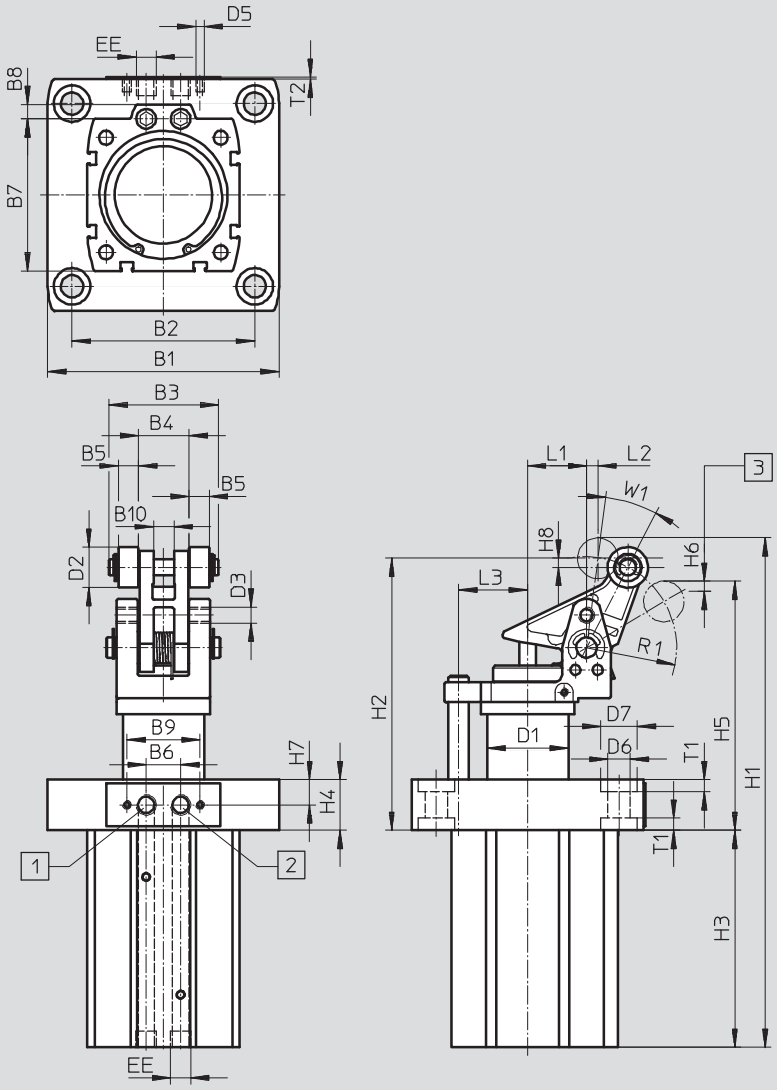
Max. total mass:

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

Result

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

Dimensions Download CAD data ➔ **www.festo.com**



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

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

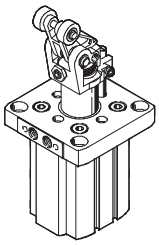
∅ [mm]	D7 ∅	EE	H1	H2	H3	H4	H5	H6	H7	H8	L1	L2	L3	R1	T1	T2	W1
50	14		219	118	91	17.5	107.5	5	8.75	5.5	14	5	26	36.3	5	1	25
63	18	G⅛	251	134	107	25	123	5	12.5	4.5	29	6	34	44.4	6	–	20
80	20		322.5	159	151	19	144	4.2	9.5	6.8	36	8	42	55.5	6	–	22

Stopper cylinders DFST

Technical data

FESTO

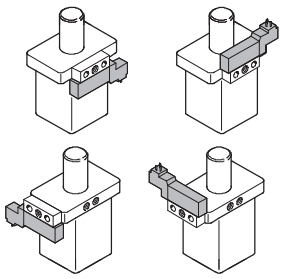
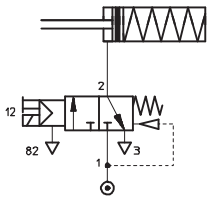
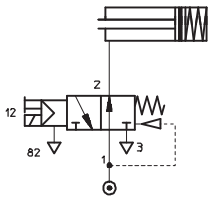
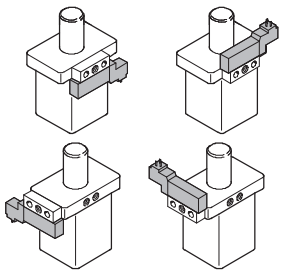
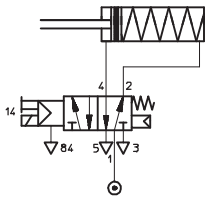
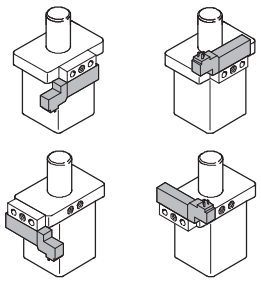
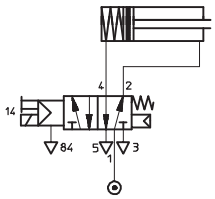
Ordering data

	Piston ∅	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**

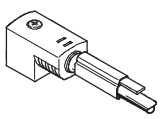
Mounting options for solenoid valves and valve functions

A solenoid valve MEH, MEBH, MOEH or MOEBH can be mounted on the stopper cylinder for quick, direct actuation of the cylinder. The valve must be connected to the cylinder via an intermediate plate ZVA. The position of the piston rod when the solenoid valve is in the normal position depends on the valve type and the position of the valve on the cylinder.

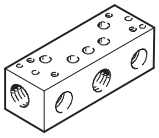
Ordering data – Solenoid valve — Technical data ➔ Internet: meh

Mounting options for the solenoid valve with intermediate plate ZVA	Position of the piston rod in normal position	Part No.	Type
Single-acting			
		173 125	MEH-3/2-5,0-B
		172 999	MEBH-3/2-5,0-B
		173 429	MOEH-3/2-5,0-B
		173 002	MOEBH-3/2-5,0-B
Double-acting			
		173 128	MEH-5/2-5,0-B
		173 005	MEBH-5/2-5,0-B
		173 128	MEH-5/2-5,0-B
		173 005	MEBH-5/2-5,0-B

Ordering data – Plug socket with cable — Technical data ➔ Internet: kmeb

	For ∅	Part No.	Type
	50, 63, 80	151 688	KMEB-1-24-2,5-LED
		151 689	KMEB-1-24-5-LED
		193 457	KMEB-1-24-10-LED

Ordering data – Intermediate plate

	For ∅	Part No.	Type
	50, 63, 80	**164 897**	**ZVA-2**

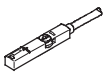
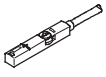
Ordering data

	For ∅	Part No.	Type
Lever locking mechanism DADP-TL			
	50	**543 751**	**DADP-TL-F3-50**
	63	**543 752**	**DADP-TL-F3-63**
	80	**543 753**	**DADP-TL-F3-80**
Free pass mechanism DADP-TF			
	50	**543 755**	**DADP-TF-F3-50**
	63	**543 756**	**DADP-TF-F3-63**
	80	**543 757**	**DADP-TF-F3-80**

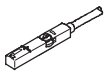
Ordering data – Proximity sensor, inductive Technical data ➔ Internet: sien

	For ∅	Contact	Electrical connection	Part No.	Type
	50, 63, 80	N/O contact	Cable, 2.5 m	**150 386**	**SIEN-M8B-PS-K-L**
			Plug	**150 387**	**SIEN-M8B-PS-S-L**
		N/C contact	Cable, 2.5 m	**150 390**	**SIEN-M8B-PO-K-L**
			Plug	**150 391**	**SIEN-M8B-PO-S-L**

Ordering data – Proximity sensor for T-slot, magneto-resistive Technical data ➔ Internet: smt

	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in slot from above, flush with cylinder profile	PNP	Cable, 3-wire	2.5	**543 867**	**SMT-8M-PS-24V-K-2,5-OE**
			Plug M8x1, 3-pin	0.3	**543 866**	**SMT-8M-PS-24V-K-0,3-M8D**
			Plug M12x1, 3-pin	0.3	**543 869**	**SMT-8M-PS-24V-K-0,3-M12**
		NPN	Cable, 3-wire	2.5	**543 870**	**SMT-8M-NS-24V-K-2,5-OE**
			Plug M8x1, 3-pin	0.3	**543 871**	**SMT-8M-NS-24V-K-0,3-M8D**
	Insertable in slot lengthwise, flush with cylinder profile	PNP	Cable, 3-wire	2.5	**175 436**	**SMT-8-PS-K-LED-24-B**
			Plug M8x1, 3-pin	0.3	**175 484**	**SMT-8-PS-S-LED-24-B**
N/C contact						
	Insertable in slot from above, flush with cylinder profile	PNP	Cable, 3-wire	7.5	**543 873**	**SMT-8M-PO-24V-K7,5-OE**

Ordering data – Proximity sensor for T-slot, magnetic reed — Technical data ➔ Internet: sme

	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part No.	Type
N/O contact						
	Insertable in slot from above, flush with cylinder profile	Contacting	Cable, 3-wire	2.5	**543 862**	**SME-8M-DS-24V-K-2,5-OE**
				5.0	**543 863**	**SME-8M-DS-24V-K-5,0-OE**
			Cable, 2-wire	2.5	**543 872**	**SME-8M-ZS-24V-K-2,5-OE**
			Plug M8x1, 3-pin	0.3	**543 861**	**SME-8M-DS-24V-K-0,3-M8D**
	Insertable in slot lengthwise, flush with cylinder profile	Contacting	Cable, 3-wire	2.5	**150 855**	**SME-8-K-LED-24**
			Plug M8x1, 3-pin	0.3	**150 857**	**SME-8-S-LED-24**
N/C contact						
	Insertable in slot lengthwise, flush with cylinder profile	Contacting	Cable, 3-wire	7.5	**160 251**	**SME-8-O-K-LED-24**

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	**541 333**	**NEBU-M8G3-K-2.5-LE3**
			5	**541 334**	**NEBU-M8G3-K-5-LE3**
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	**541 338**	**NEBU-M8W3-K-2.5-LE3**
			5	**541 341**	**NEBU-M8W3-K-5-LE3**