Stopper cylinder STAF

FESTO

Key features

At a glance

- Single-acting or double-acting
- Fast and simple set-up of conveyor lines
- Workpiece carriers, pallets and packages weighing up to 150 kg can be safely stopped

- Simple actuation via valve terminal (e.g. together with other cylinders in one installation site)
- Flange-mounted solenoid valve permits fast actuation even at great distances and with individual stopper cylinders

- Space-saving sensing via integrated proximity switches
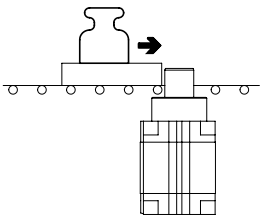
Roller version

Mounting options
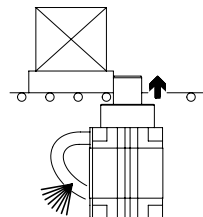### Flange mounting
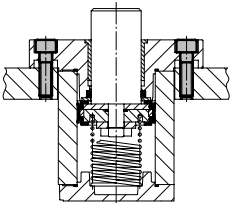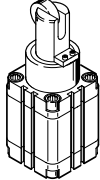

Applications

For heavy loads

Safety

Thanks to the spring return of the piston rod in case of pressure failure

Product range overview

Function	Design	Type	Piston ⌀ [mm]	Stroke [mm]	Type of mounting Via flange	Cushioning	Position sensing	→ Page/Internet
						P	A	
Single- or double-acting	**Roller version**							
		STAF-...-P-A-R	80	30, 40	▪	▪	▪	4

Functional sequence and type codes

Functional sequence
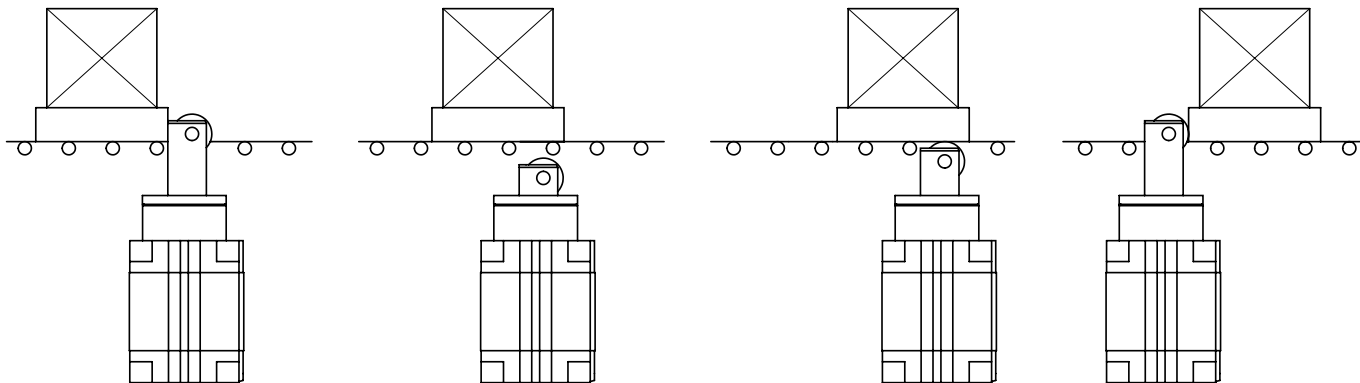
1. Sudden braking of the workpiece carrier via the piston rod.

2. The workpiece carrier is released by actuating the cylinder.

3. The cylinder then advances by means of spring force or compressed air until the roller makes contact with the workpiece carrier. The workpiece carrier continues to move forward.

4. After the workpiece carrier has passed, the cylinder advances to its end position. The next workpiece carrier can then be stopped.

Type codes

001	Series	
STAF	Stopper cylinder with flange mounting, single-or double-acting	

002	Piston diameter	
80	80	

003	Stroke	
...	30 ... 40	

004	Cushioning	
P	Elastic cushioning rings/plates on both sides	

005	Position sensing	
A	For proximity sensor	

006	Version	
R	Roller version	

Peripherals overview
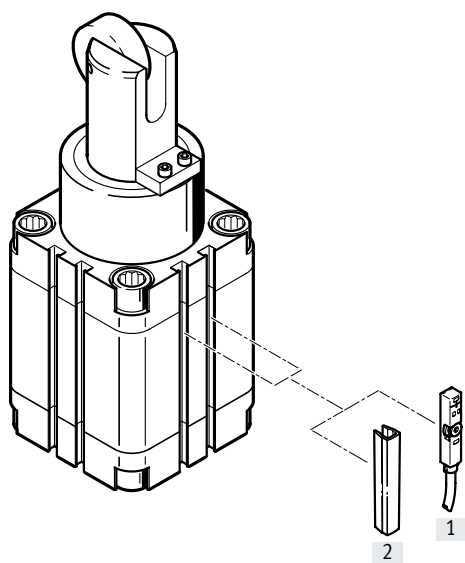
Accessories			
		Description	→ Page/Internet
[1]	Proximity switch SME/SMT-8	Can be integrated in the cylinder profile barrel	13
[2]	Slot cover ABP	For protection against contamination	13

Data sheet

Function

- ⌀ - **Diameter**
  80 mm

- ▮ - **Stroke length**
  30, 40 mm

- 🧰 - www.festo.com

- ▦ - **Note**

Contact with liquids should be avoided during use.

General technical data		
Pneumatic connection		G1/8
Stroke	[mm]	30, 40
Piston rod diameter	[mm]	50
Operating pressure	[bar]	1 ... 10
Operating medium		Compressed air to ISO 8573-1:2010 [7:–:–]
Design		Piston cylinder with spring return
Cushioning		Elastic cushioning rings/pads at both ends
Position sensing		Via proximity switch
Type of mounting		Via through-hole
		With female thread
Mounting position		Any
Mode of operation		Single- or double-acting
Protection against rotation		Flat-sided piston rod
Ambient temperature[1]	[°C]	0 ... +60
Product weight	[g]	4630, 4850

1) Note operating range of proximity switches

- ▦ - **Note**

This product conforms to ISO 1179-1 and ISO 228-1.

Forces [N]		
Piston ⌀	80	
Stroke	30	40
Permissible impact force on the advanced piston rod	14600	13300
Spring torque	79 ... 115	101 ... 170

The impact force refers here to the maximum of a force-time curve with unknown details during impact/braking of the moving mass. It acts perpendicular to the direction of motion of the piston rod. Treating the elastic components as linear springs, it is possible to use the permissible impact force to calculate a permissible impact energy for use in selecting the right stopper.

The stopper must not be switched below this force.
Depending on the type of load to be stopped, it is a good idea to provide an elastic buffer to cushion the impact, reduce the noise and optimise the impact energy.
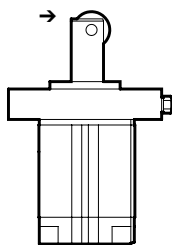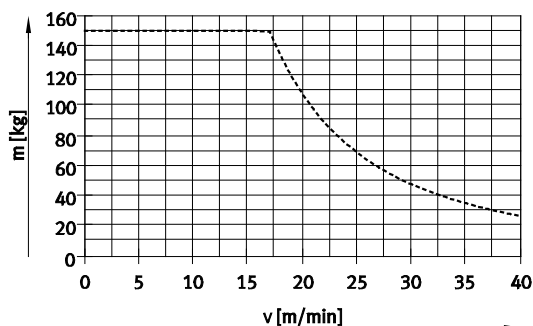

➔ = Direction of impact force

Data sheet

## Permissible load m as a function of conveyor speed v

The values in the graph opposite are based on the assumption that the workpiece carrier is fitted with a flexible buffer with a deformation path of 1 mm.

·············· STAF-80-...-P-A-R

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

The "permissible lateral force during switching operation" refers here to the force which is still applied perpendicularly to the direction of movement of the piston rod even after the end of the impact or braking process, e.g. as a result of belts that are still running or the downhill force of a steep raceway. The force acts statically. The stopper can be switched below this force. A certain minimum pressure must be applied in order to guarantee the cylinder function.
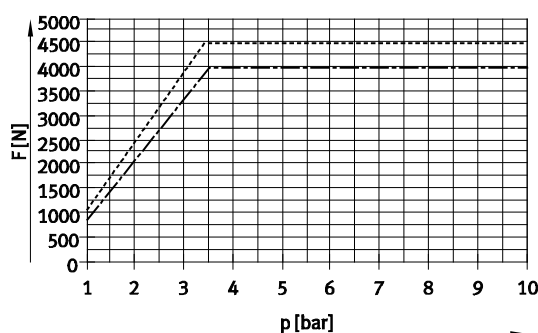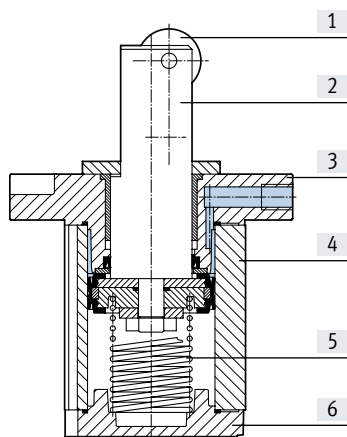

·············· STAF-80-30-P-A-R
— · — · — · STAF-80-40-P-A-R

Note

Selection aid ➔ page 9

Materials
Sectional view

Stopper cylinders		
[1]	Role	Steel
[2]	Piston rod	Stainless steel
[3]	Flange	Die-cast aluminium
[4]	Cylinder barrel	Anodised aluminium
[5]	Springs	Spring steel
[6]	Cover	Anodised aluminium
–	Seals	NBR
–	Note on materials	Free of copper and PTFE

Data sheet

Dimensions

Download CAD data ➜ www.festo.com

Flange mounting
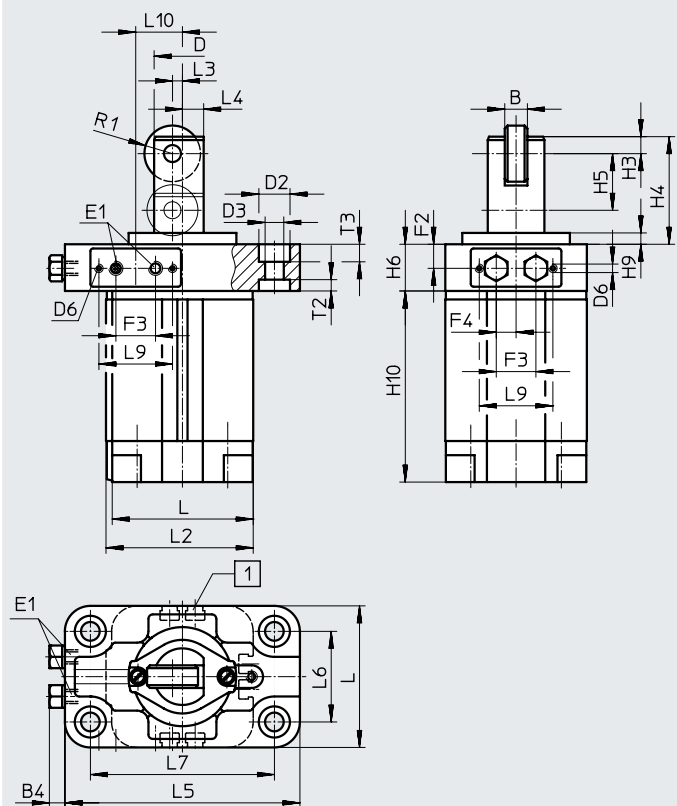
[1]   Sensor slot for proximity switch SME/SMT-8

Ø [mm]	Stroke [mm]	B	B4	D Ø	D2 Ø	D3 Ø	D6	E1	F2	F3	F4	H3	H4	H5	H6
80	30	18	4.5	50	18	11	M4	G1/8	11	17	4.5	10	63	30	22
	40												73	40	

Ø [mm]	Stroke [mm]	H9	H10	L	L2	L3	L4	L5	L6	L7	L9	L10	R1	T2	T3
80	30	8	119	107	111	11	18	160	63	135	36	18.5	18	6	6
	40		129												

Note

This product conforms to ISO 1179-1 and ISO 228-1.

Ordering data

Piston Ø [mm]	Stroke [mm]	Part no.	Type
80	30	**164886**	**STAF-80-30-P-A-R**
	40	**164894**	**STAF-80-40-P-A-R**

Data sheet

Selection aid
Stopping a pallet

The stopper cylinder is used to brake an individual pallet.
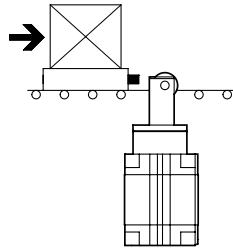
Example

Assuming:
Friction factor µ = 0.1
Conveyor speed v = 10 m/min
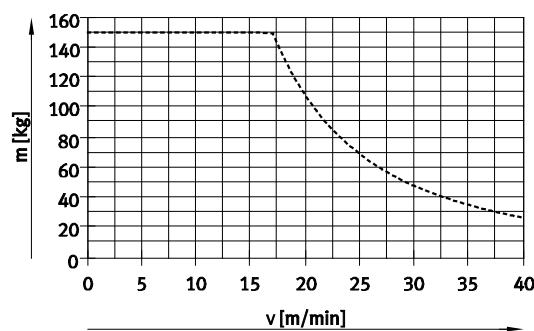Pallet with workpiece m = 40 kg
Operating pressure p = 6 bar

Selection: stopper cylinder STAF-80-30-P-A-R

1. Checking the permissible load

The maximum permissible load at a conveyor speed of 10 m/min is 150 kg. This means that a total load of 40 kg for the pallet and the workpiece is permissible.

············ STAF-80-...-P-A-R

2. Checking the permissible lateral force during the switching operation
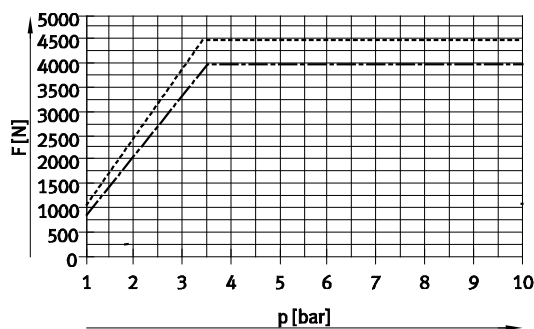
Lateral force F_Q = frictional force $F_{friction}$

$F_{friction}$ = µ x m x g
= 0.1 x 40 kg x 9.81 m/s^2
= approx. 40 N

The maximum permissible lateral force at an operating pressure of 6 bar is 4500 N.
This means that a lateral force of 40 N is permissible.

············ STAF-80-30-P-A-R
–·–·–·– STAF-80-40-P-A-R

Data sheet

Selection aid
Stopping or separating several pallets

The stopper cylinder is used to separate pallets. Further pallets accumulate behind the pallets already resting against the stopper cylinder. It is therefore vital that a buffer is mounted between the pallets (e.g. elastomer components).
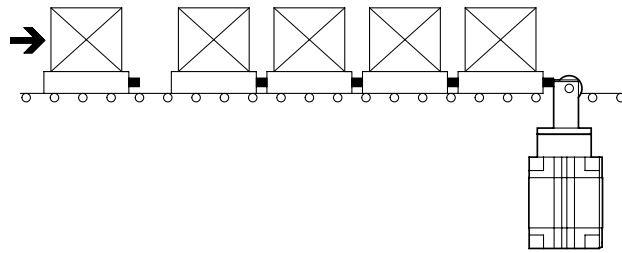
Example

Assuming:

Friction factor μ = 0.1
Conveyor speed v = 10 m/min
Pallet with workpiece m = 40 kg
Operating pressure p = 6 bar
Maximum number of pallets accumulating simultaneously n_{group} = 1
Maximum number of all queued pallets n_{queue} = 5
Maximum number of all advancing pallets $n_{queue-1}$ = 4
Spring travel of the pallet buffer s_F = 1 mm

Selection: stopper cylinder STAF-80-30-P-A-R

1. Checking the permissible load of the first pallet

The maximum permissible load at a conveyor speed of 10 m/min is 150 kg. This means that a total load of 40 kg for the pallet and the workpiece is permissible.
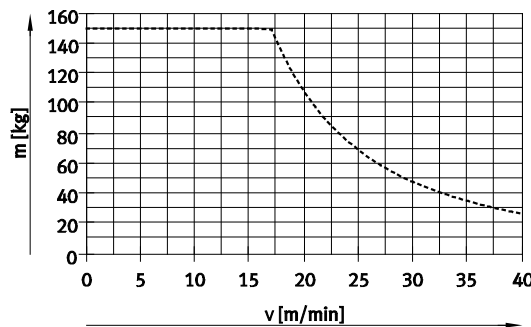
·········· STAF-80-...-P-A-R

2a. Calculation of the maximum permissible impact force when pallets collide with a pallet resting against the stopper cylinder

For STAF-80, the maximum permissible impact force is 14,600 N.
This means that with a total force of 1300 N, the number of pallets is permissible.

Impact force calculation:

$$F_{Sto\text{ß}} = \frac{(n_{Gruppe} \cdot m) \cdot v^2}{s_F} = \frac{(1 \cdot 40kg) \cdot (10\frac{m}{60s})^2}{0{,}001m} = ca.\,1100N$$

Frictional force:

$$F_{Reib} = \mu \cdot (n_{Ansteh} \cdot m) \cdot g = 0{,}1 \cdot (5 \cdot 40kg) \cdot 9{,}81\frac{m}{s^2} = ca.\,200N$$

Max. total force:

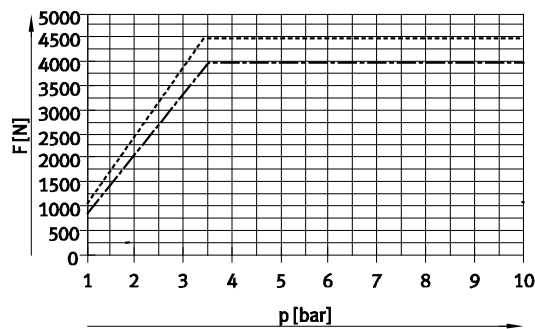$$F_{ges} = F_{Sto\text{ß}} + F_{Reib} = 1100N + 200N = 1300N$$

Data sheet

Selection aid
2b. Checking the permissible lateral force during the switching operation
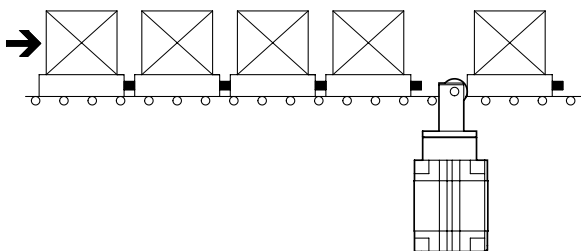
Lateral force F_Q = frictional force $F_{friction}$

$F_{friction}$ = 200 N

The maximum permissible lateral force at an operating pressure of 6 bar is 4500 N.
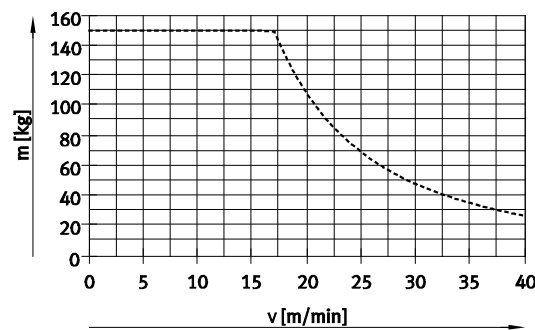This means that a lateral force of 200 N is permissible.

············ STAF-80-30-P-A-R
—·—·—· STAF-80-40-P-A-R

3. Separating and advancing the pallets

For the STAF-80-30-P-A-R, the maximum permissible load at a conveyor speed of 10 m/min is 150 kg.
The total mass of the 4 pallets advancing on the stopper cylinder is 160 kg.

············ STAF-80-...-P-A-R

Max. total mass:

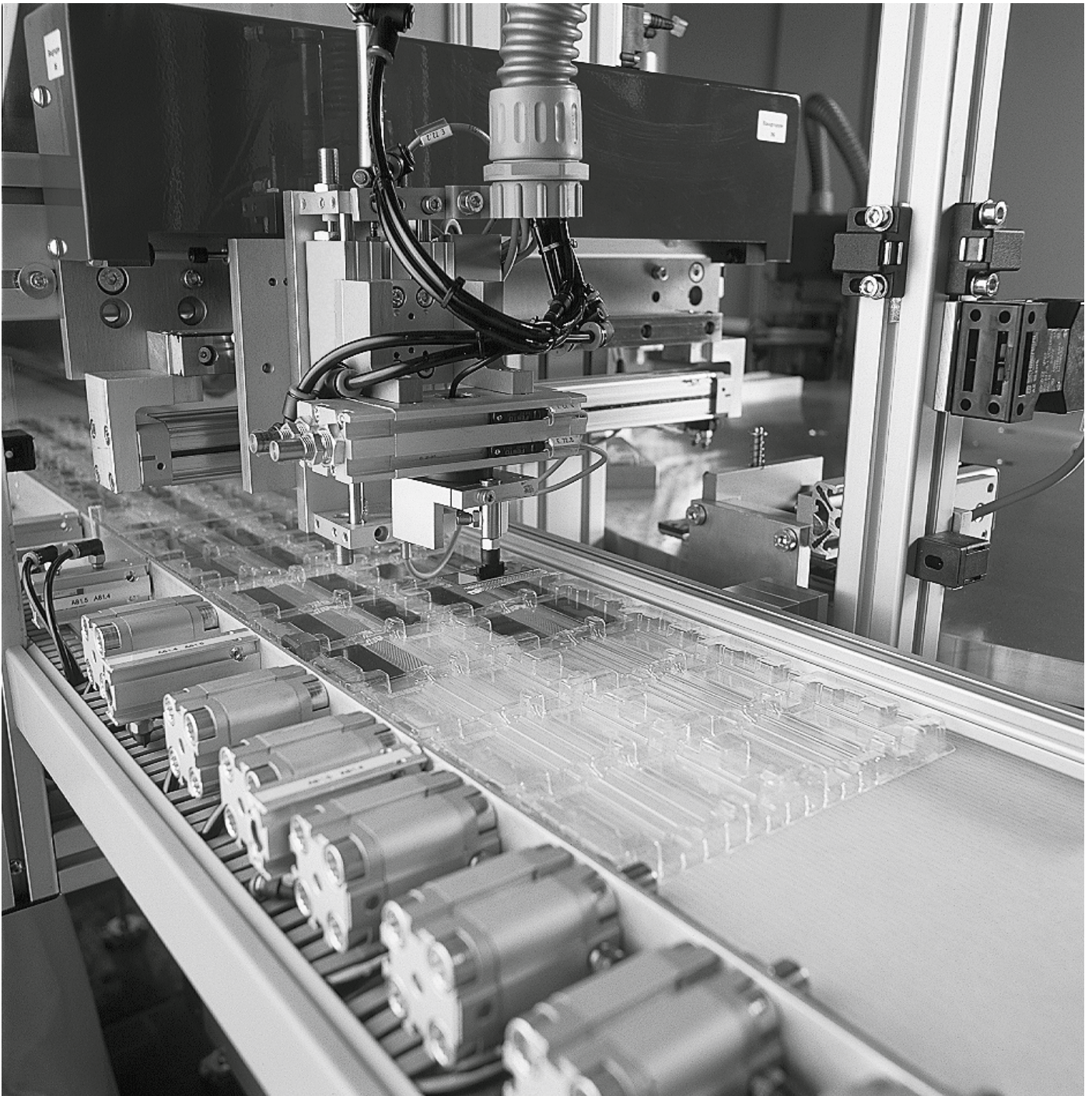$$m_{Ges} = n_{Ansteh-1} \cdot m = 4 \cdot 40kg = 160kg$$

Result

When using the stopper cylinder STAF-80-30-P-A-R, max. 2 advancing pallets may accumulate simultaneously.

Max. total mass:

$$m_{Ges} = n_{Ansteh-1} \cdot m = 2 \cdot 40kg = 80kg$$

Data sheet

Application example

→ **Internet: www.festo.com/catalogue/...**

Subject to change – 2021/09

Accessories

Ordering data – Proximity switch for T-slot, magneto-resistive   Data sheets ➔ Internet: smt

	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part no.	Type
N/O						
	Inserted in the slot from above, flush with the cylinder profile, short design	PNP	Cable, 3-wire	2.5	574335	SMT-8M-A-PS-24V-E-2.5-OE
			Plug M8x1, 3-pin	0.3	574334	SMT-8M-A-PS-24V-E-0.3-M8D
			Plug M12x1, 3-pin	0.3	574337	SMT-8M-A-PS-24V-E-0.3-M12
		NPN	Cable, 3-wire	2.5	574338	SMT-8M-A-NS-24V-E-2.5-OE
			Plug M8x1, 3-pin	0.3	574339	SMT-8M-A-NS-24V-E-0.3-M8D
N/C						
	Inserted in the slot from above, flush with the cylinder profile, short design	PNP	Cable, 3-wire	7.5	574340	SMT-8M-A-PO-24V-E-7.5-OE

Ordering data – Proximity switches for T-slot, magnetic reed   Data sheets ➔ Internet: sme

	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part no.	Type
N/O						
	Inserted in the slot from above, flush with the cylinder profile	Contacting	Cable, 3-wire	2.5	543862	SME-8M-DS-24V-K-2.5-OE
				5.0	543863	SME-8M-DS-24V-K-5.0-OE
			Cable, 2-wire	2.5	543872	SME-8M-ZS-24V-K-2.5-OE
			Plug M8x1, 3-pin	0.3	543861	SME-8M-DS-24V-K-0.3-M8D
	Inserted in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	2.5	150855	SME-8-K-LED-24
			Plug M8x1, 3-pin	0.3	150857	SME-8-S-LED-24
N/C						
	Inserted in the slot lengthwise, flush with the cylinder profile	Contacting	Cable, 3-wire	7.5	160251	SME-8-O-K-LED-24

Ordering data – Connecting cables   Data sheets ➔ Internet: nebu

	Electrical connection, left	Electrical connection, right	Cable length [m]	Part no.	Type
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541333	NEBU-M8G3-K-2.5-LE3
			5	541334	NEBU-M8G3-K-5-LE3
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541338	NEBU-M8W3-K-2.5-LE3
			5	541341	NEBU-M8W3-K-5-LE3

Ordering data – Slot cover for T-slot

	Mounting	Length [m]	Part no.	Type
	Insertable	2x 0.5	151680	ABP-5-S