



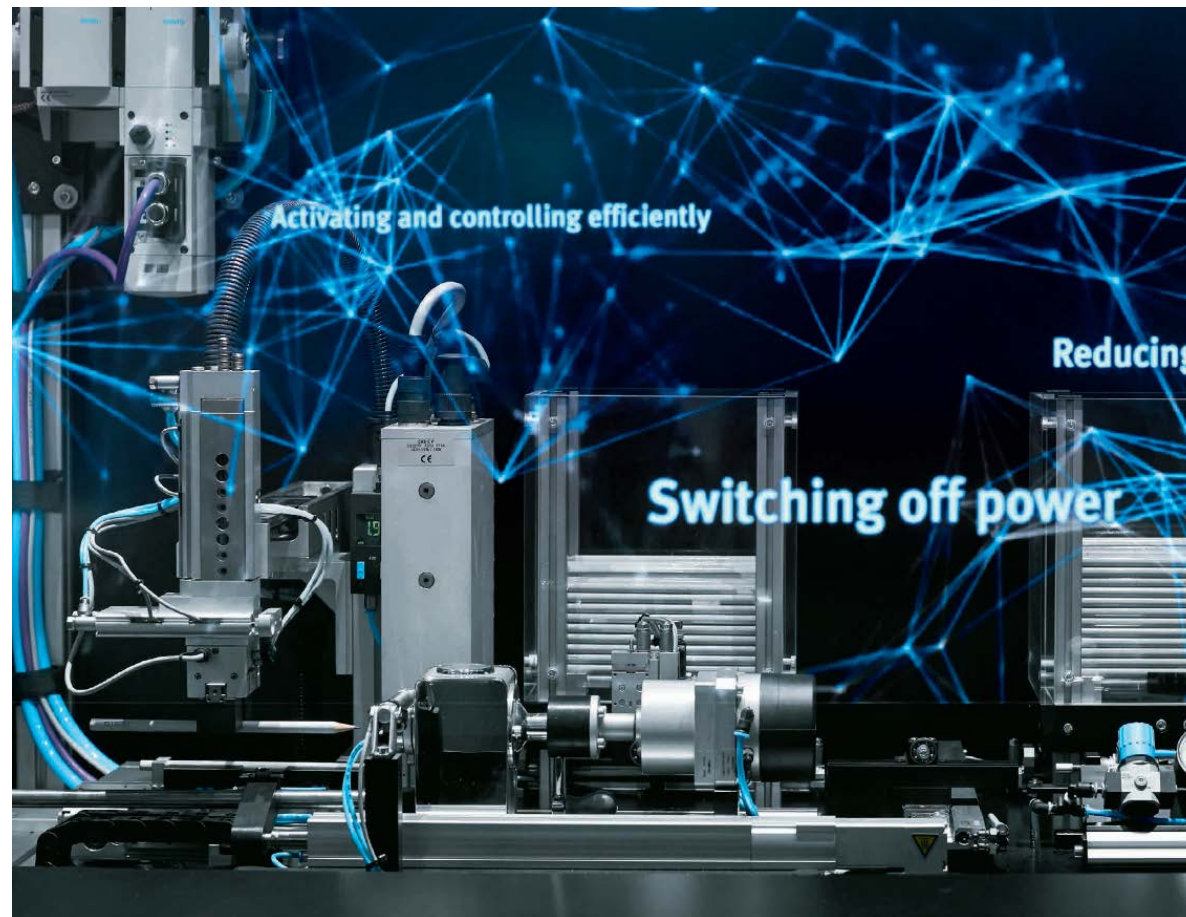
*"Energie-efficiëntie: méér
dan persluchtlekken alleen"*

Aldo Zottos
Festo Belgium

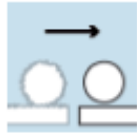
FESTO



« Méér dan persluchtlekken alleen »



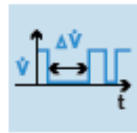
12 punten om energie te sparen



Reduce friction

- Use low-friction components
→ Mini-slide DGSL

-15%



Use air-saving circuits

- Handling vacuum with monitored switch-off
→ use OVEM

-60%



Reduce the pressure level

- With a pressure regulator
- Return stroke with reduced pressure 6 → 3 bar
→ MS series, VABF

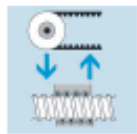
-22%



Reduce leakages

- Routine leakage detection, condition monitoring
→ Energy Saving Services

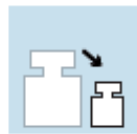
-20%



Choose the right components

- Motor with holding brake for long standstills

-14%



Reduce weight

- Optimum technology mix
- Electric handling unit with pneumatic Z-axis

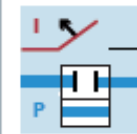
-18%



Recover energy

- Save braking energy in the coupled intermediate circuits
→ Multi-axis controller CNMD

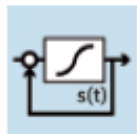
-10%



Switch off power

- Leakages reduced by up to 10%
- In this case for the entire compressed air system

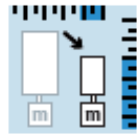
-10%



Efficient open- and closed-loop control

- Adapt positioning profiles
- Optimise the controller
→ Festo FCT

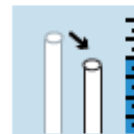
-10%



Correct sizing

- Ideal size
- Use the next smaller size for pneumatic drives
→ Festo Engineering Tools

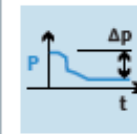
-35%



Reduce tubing lengths

- Decentralised valve terminal
- Optimised tubing layout
→ Pipe and tubing cutter ZRS

-25%



Reduce pressure loss

- Ideal tubing diameters, less resistance
- Reduced network pressure 8 → 7 bar
→ MS series size combinations

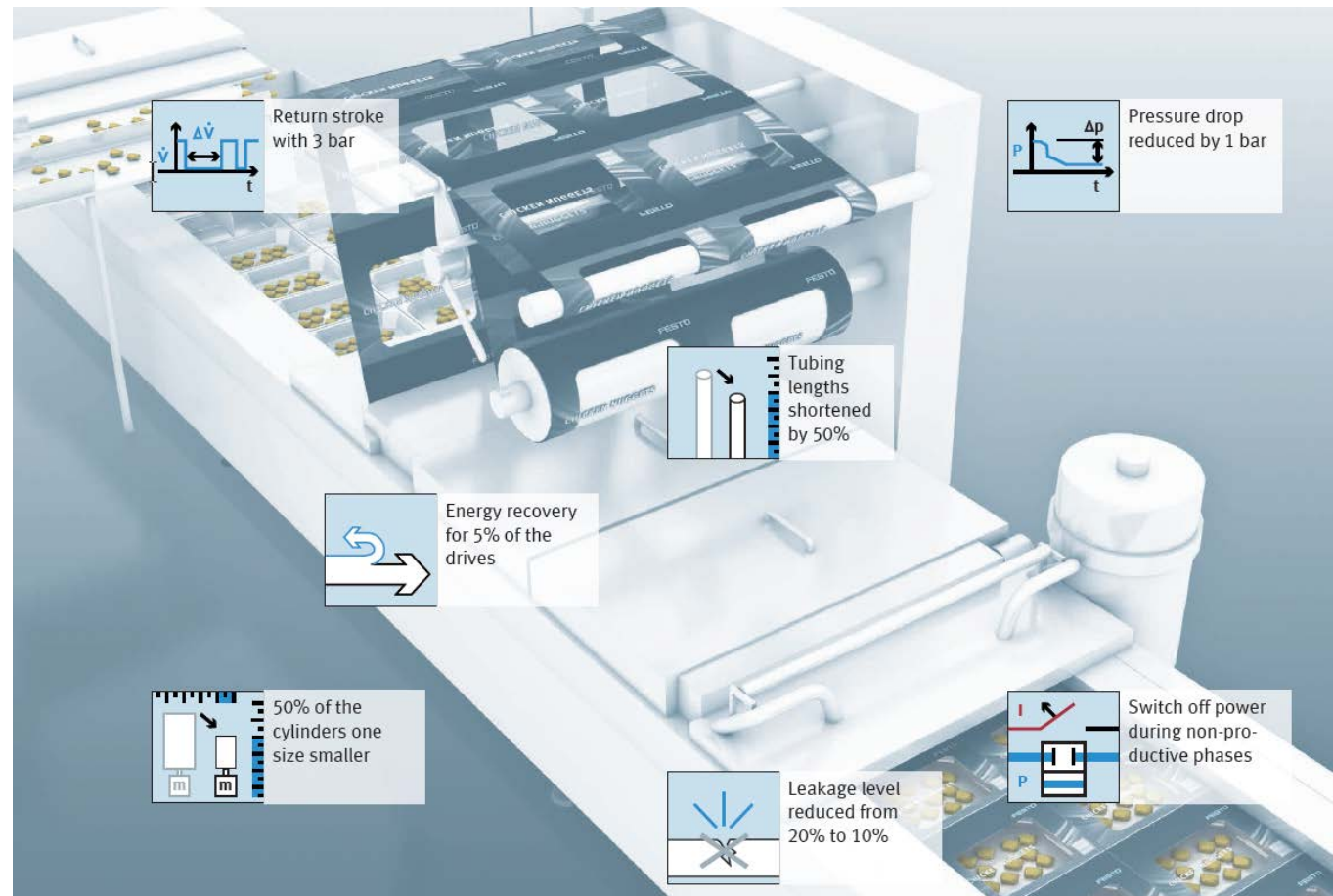
-6%

250 dagen / 16 uren / 6 bar werkdruk

Energy efficiency measure	Description	Working parameters	Sample applications with potential savings										
			Automotive: parts handling		Automotive: clamping		Food: forming, filling, sealing			Small parts assembly: feeding and joining parts		Electronics: through-hole technology (THT)	
		Number of cylinders [pcs.]	60	30	100	100	4	2	2	10	10	100	100
		Cylinder diameter [mm]	63	40	63	50	16	100	80	16	25	16	25
		Stroke [mm]	80	40	100	100	150	220	150	10	20	10	10
		Distance from cylinder to valve [m]	7		4		6			4		4	
		Cycle rate [s]	30		15		6			1		5	
 Reduce pressure	From 6 to 5 bar		15% €880 3.71 tons CO ₂		15% €4,131 17.44 tons CO ₂		14% €825 3.48 tons CO ₂			16% €712 3.01 tons CO ₂		16% €1,425 6.02 tons CO ₂	
 Correct sizing	50% of the cylinders one size smaller		8% €472 1.99 tons CO ₂		10% €2,824 11.92 tons CO ₂		13% €721 3.05 tons CO ₂			2% €97 0.41 tons CO ₂		2% €194 0.82 tons CO ₂	
 Reduce tubing lengths	Tubing volume cut in half (tubing 50% shorter)		17% €974 4.11 tons CO ₂		11% €3,035 12.82 tons CO ₂		4% €228 0.96 tons CO ₂			32% €1,439 6.08 tons CO ₂		32% €2,878 12.15 tons CO ₂	
 Reduce pressure losses	With an optimised compressed air network, pressure can be reduced at the compressor by 1 bar		6% €350 1.48 tons CO ₂		6% €1,674 7.07 tons CO ₂		6% €342 1.44 tons CO ₂			6% €270 1.14 tons CO ₂		6% €541 2.28 tons CO ₂	
 Reduce leakages	Reduce leakages from 20% to 10%		12% €714 3.01 tons CO ₂		12% €3,413 14.41 tons CO ₂		12% €697 2.94 tons CO ₂			12% €551 2.33 tons CO ₂		12% €1,102 4.66 tons CO ₂	
 Recover energy	Energy recovery for 5% of the pneu- matic drives		3% €166 0.70 tons CO ₂		3% €805 3.40 tons CO ₂		3% €163 0.69 tons CO ₂			3% €127 0.53 tons CO ₂		3% €253 1.07 tons CO ₂	
 Switch off power	Switch off for 3rd shift (20% leakage)		8% €482 2.03 tons CO ₂		8% €2,304 9.73 tons CO ₂		8% €470 1.99 tons CO ₂			8% €372 1.57 tons CO ₂		8% €744 3.14 tons CO ₂	
 Use air-saving circuit	50% of the drives with return stroke at 3 bar		14% €800 3.38 tons CO ₂		13% €3,733 15.76 tons CO ₂		13% €754 3.18 tons CO ₂			14% €649 2.74 tons CO ₂		14% €1,298 5.48 tons CO ₂	

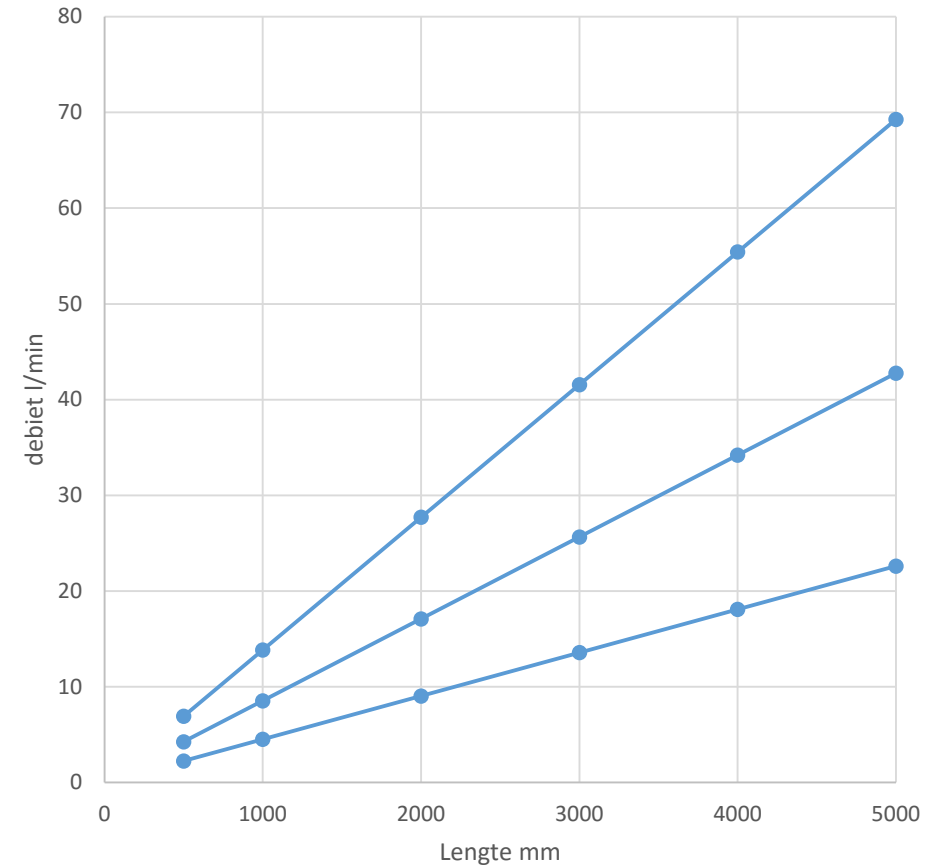
Annual savings

« Méér dan persluchtlekken alleen »



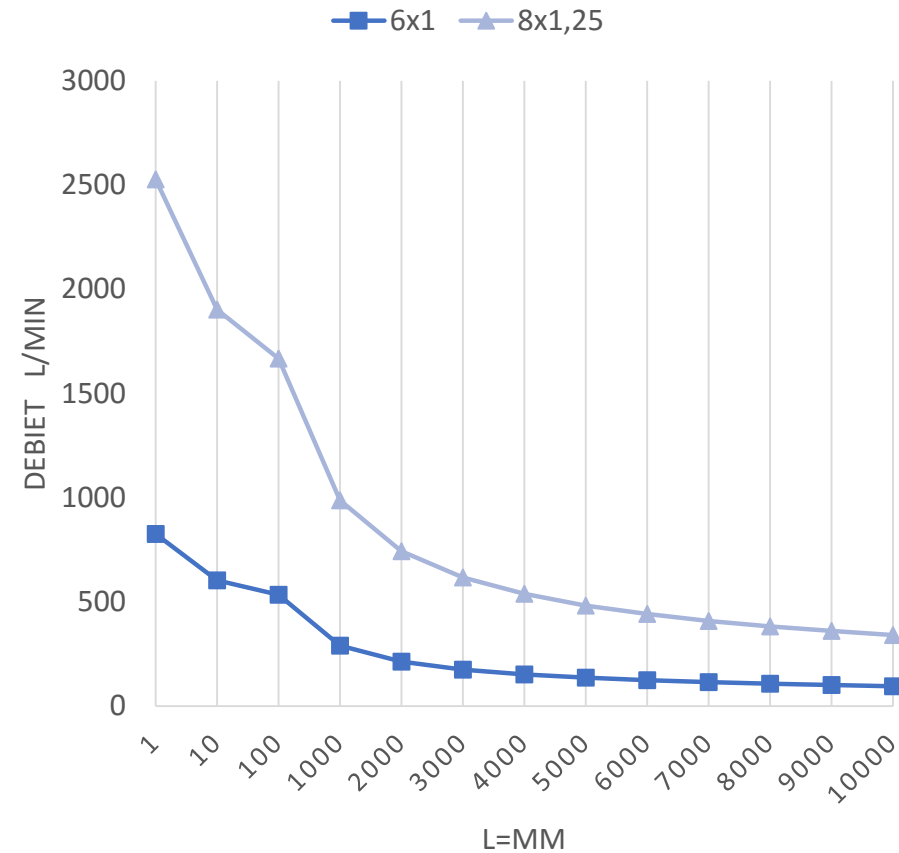
Reduceren van leidinglengte met 50%

Ø int (mm)	Lengte (mm)	Druk (bar)	Aantal cycli (1/ min)	Luchtverbruik	
				per cyclus	per minuut (l)
4	500	6.0	60	0,0377	2,2619
4	1000	6.0	60	0,0754	4,5239
4	2000	6.0	60	0,1508	9,0478
4	3000	6.0	60	0,2262	13,5717
4	4000	6.0	60	0,3016	18,0956
4	5000	6.0	60	0,3770	22,6195
5,5	500	6.0	60	0,0713	4,2765
5,5	1000	6.0	60	0,1425	8,5530
5,5	2000	6.0	60	0,2851	17,1060
5,5	3000	6.0	60	0,4276	25,6590
5,5	4000	6.0	60	0,5702	34,2119
5,5	5000	6.0	60	0,7127	42,7649
7	500	6.0	60	0,1155	6,9272
7	1000	6.0	60	0,2309	13,8544
7	2000	6.0	60	0,4618	27,7088
7	3000	6.0	60	0,6927	41,5633
7	4000	6.0	60	0,9236	55,4177
7	5000	6.0	60	1,1545	69,2721

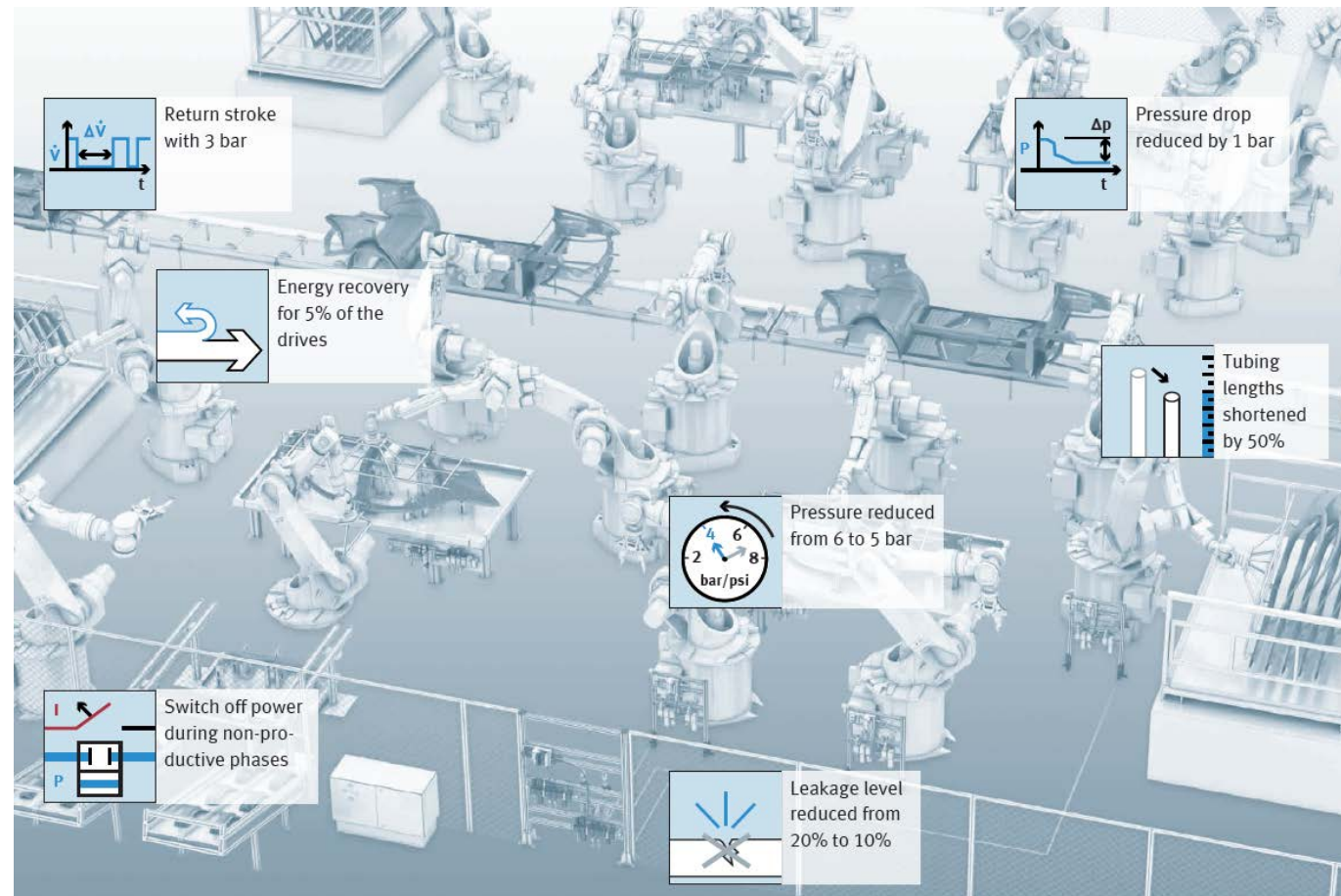


Drukverlies in leidingen

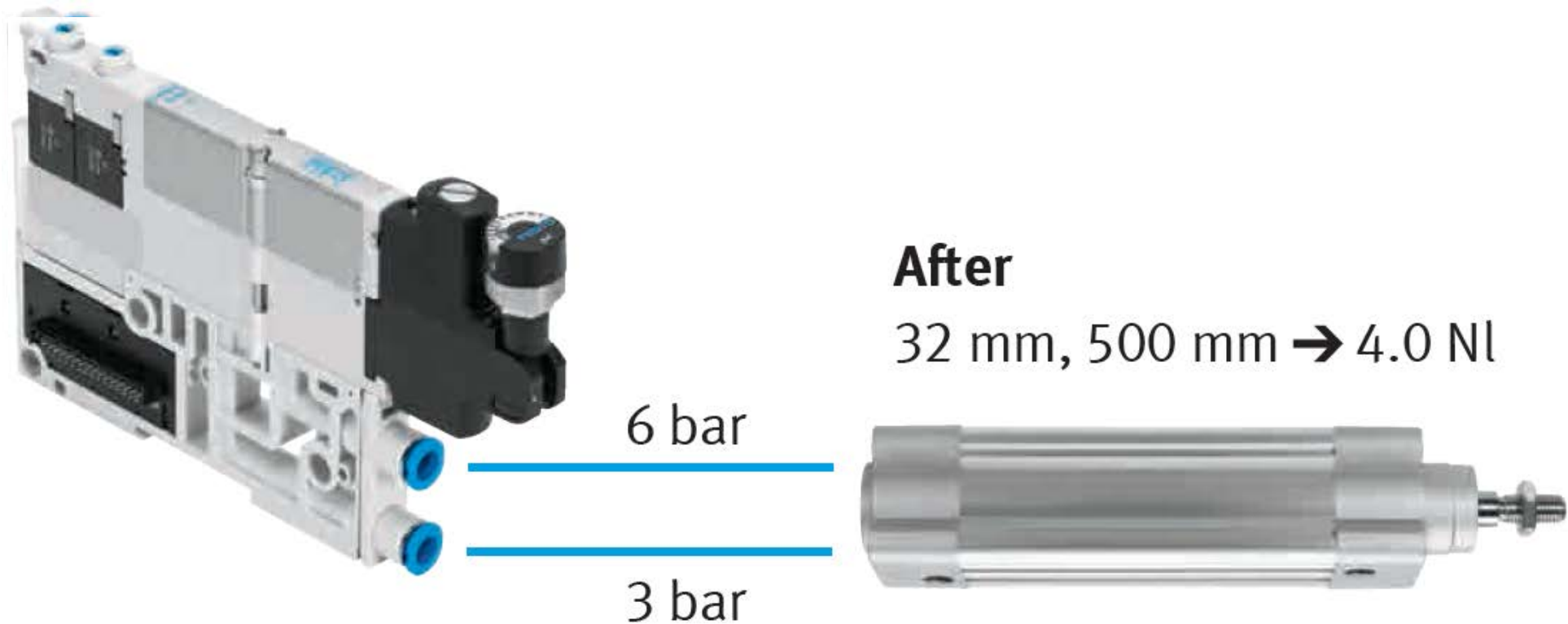
L=mm	6x1	8x1,25
1	827	1700
10	604	1299
100	534	1134
1000	290	698
2000	214	530
3000	176	441
4000	153	386
5000	137	346
6000	125	317
7000	116	293
8000	108	274
9000	102	259
10000	96	245



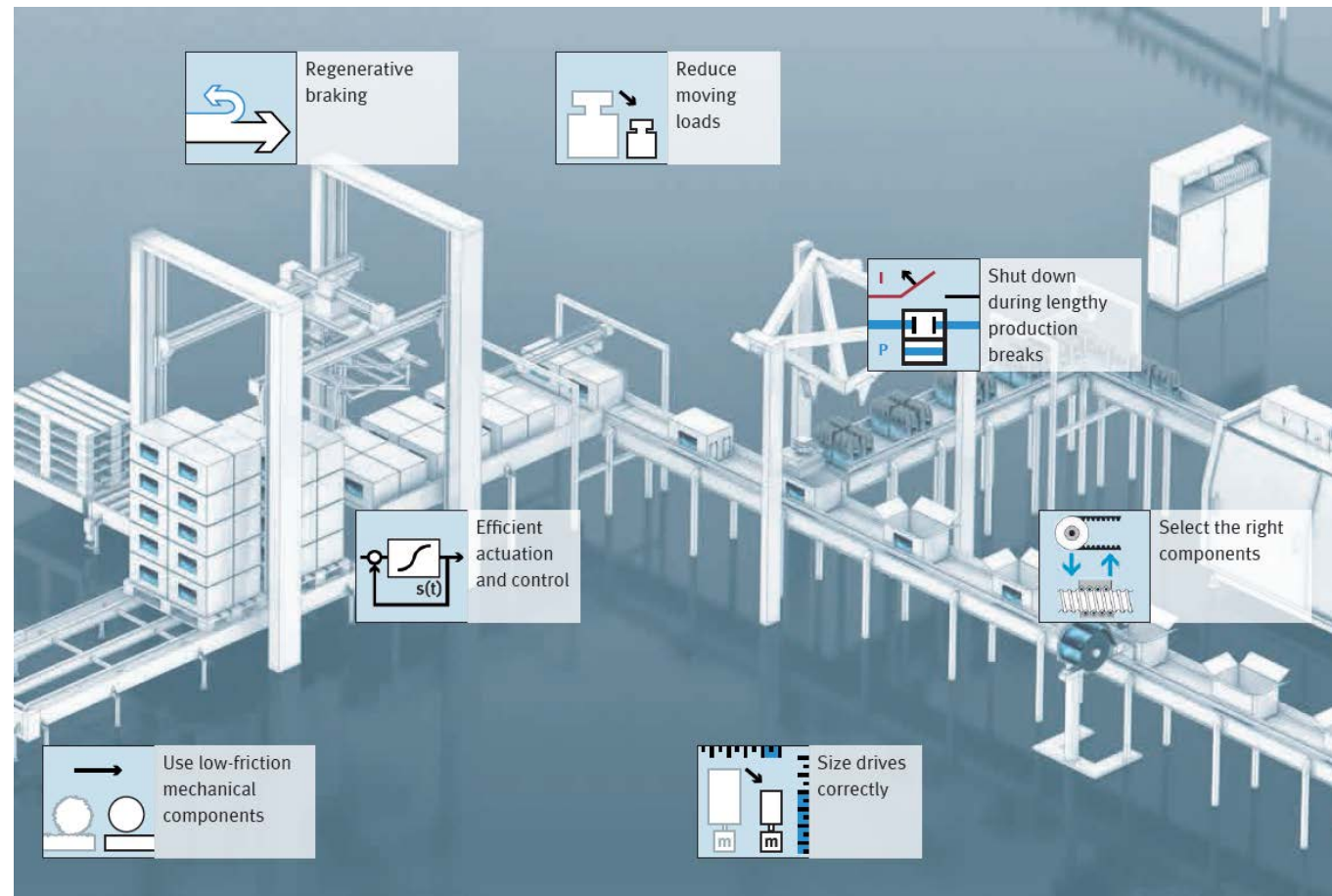
« Méér dan persluchtlekken alleen »



Terugloop aan 3 ipv 6 bar



« Méér dan persluchtlekken alleen »



Intelligent Switch Off Power





Dank voor uw aandacht!

Aldo Zottos
Aldo.zottos@festo.be

FESTO