



# Magnetically coupled pneumatic cylinder P1Z ...

**No leakage**, with high magnetic  
coupling force



The P1Z is a rodless pneumatic cylinder with piston and carriage equipped with ring magnets.

Motion is transmitted via the magnetic force locking between the piston and the carriage.

The guided version consists of a carriage fitted with 4 plain bearings, guided on 2 guide rods the design provides high rigidity, accurate guidance and a non rotating movement.

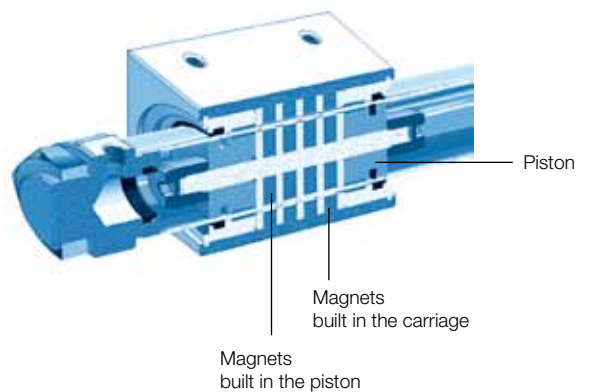
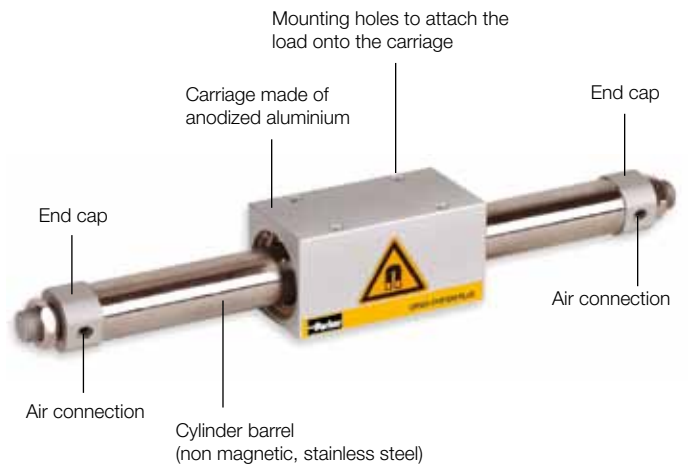
- Double acting with guide
- Magnetically coupled without mechanical connection
- Mechanical protection in case of occasional overload due to magnetic uncoupling
- Piston chamber and Slide are pressure tight
- Pressure tight and leak free system
- With adjustable pneumatic end cushioning on both sides
- Carriage is free to rotate 360° around the cylinder axis
- Air connection at one end (option)
- Position sensing: Al-profile rail for magnetic switches (option). Magnetic switches available as reed switches or as electronic sensors (option).
- Various mounting arrangements

**P1Z Series - Basic Version**  
**Ø 16-40 mm**

The P1Z is a rodless pneumatic cylinder. The piston and the carriage are equipped with ring magnets. The motion is transmitted via the magnetic force locking between the piston and the carriage.

**Features:**

- Double acting
- Magnetically coupled without mechanical connection
- Mechanical protection in case of occasional overload due to magnetic uncoupling
- Piston chamber and carriage are pressure tight
- Pressure tight and leak free system
- Dirt and dust cannot enter
- With adjustable pneumatic end cushioning on both sides
- Carriage is free to rotate 360° around the cylinder axis
- Various mounting arrangements



## Mounting and Technical Data Basic Version

- The loads can be fitted onto the carriage by 4 tapped holes.
- The cylinder is mounted at the end caps with hexagonal nuts, flange or foot mountings.

### Materials

Cylinder barrel	Stainless steel
Carriage	Al, anodised
End cap	Al, anodised
Seals	NBR



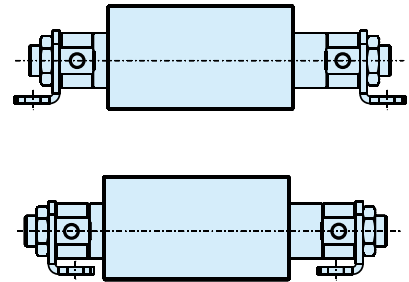
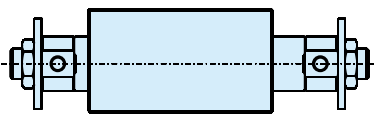
With 2 hexagonal nuts to fix the cylinder (included in scope of delivery)



Flange mounting (pair) option



Foot mounting (pair) option



### Technical Data

Piston diameter Ø [mm]	16	20	25	32	40
Max. stroke length [mm]	1000	1500	2000	2000	2000
Stroke tolerance [mm] up to 1000 mm	0/+1.5				
Stroke tolerance [mm] > 1000 mm	0/+2				
Temperature range [°C]	0 to 60				
Operating medium	Filtered compressed air, dry, lubricated or unlubricated * (other media on request)				
Air supply port size	M5	G1/8	G1/8	G1/8	G1/4
Max. magnetic coupling force [N]	157	236	383	703	942
Velocity range [m/s]	0.1 to 1.3				
Min. operating pressure [bar]	1.8				
Max. operating pressure [bar]	6.5	7			
Cushion length [mm]	9	15	15	12	19
Weight [kg]					
at 0 mm stroke	0.28	0.46	0.83	1.35	2.01
per 100 mm stroke	0.043	0.082	0.088	0.14	0.16

\* if external lubrication is added, this must always be continued.

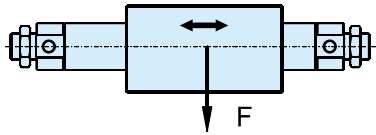
## Loads, forces and moments Basic Version

If the operating conditions are outside of the permissible values, either the P1Z guided version or the P1Z in combination with an external guide should be used !

### Forces [N]

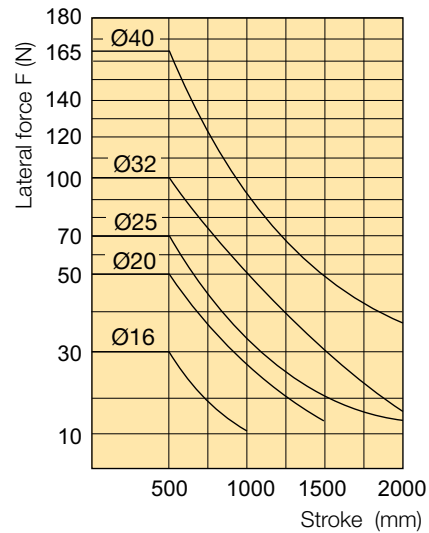
Piston (mm)	16	20	25	32	40
Theoretical force at 6 bar [N]	120	188	295	483	754
Max. magnetic coupling force [N]	157	236	383	703	942

### Permissible lateral force, depending on the stroke length

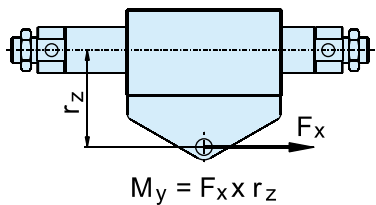


Ø (mm)	Permissible lateral force F [N]
16	30.0
20	50.0
25	70.0
32	100.0
40	165.0

The values are based on velocities  $v \leq 0.4 \text{ m/s}$

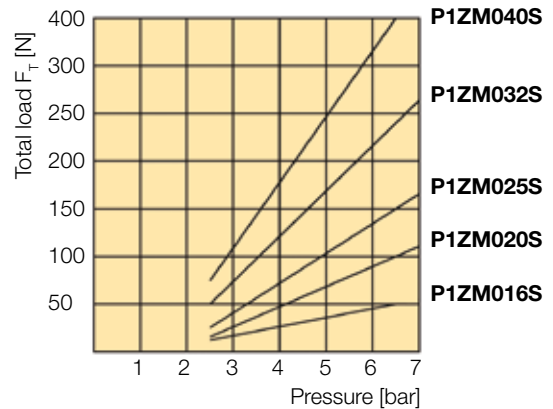
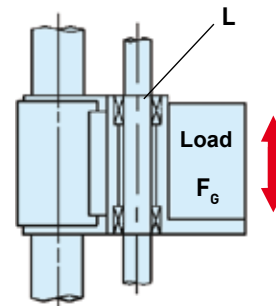


### Permissible axial load, horizontal mounting



Ø (mm)	Max. Moment My [Nm]
16	1.2
20	2.5
25	3.8
32	8.5
40	13.0

### Permissible axial load, vertical mounting



$L$  = Weight of the external carriage

$F_G$  = Load

$F_T$  = Total load = Load  $F_G$  + Weight of the external carriage

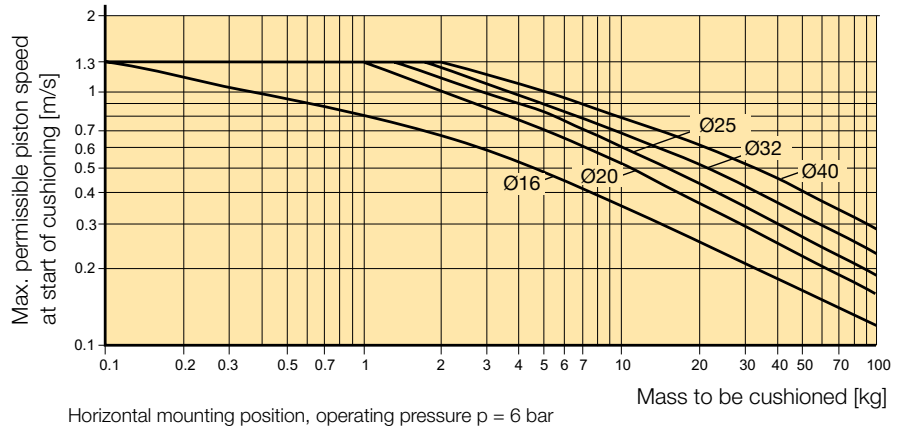
$L$  + Force due to friction



**Dynamic forces must not exceed the maximum magnetic coupling force!**

### Cushioning diagram

If the permitted limit values are exceeded, additional shock absorbers should be fitted in the area of the centre of gravity.

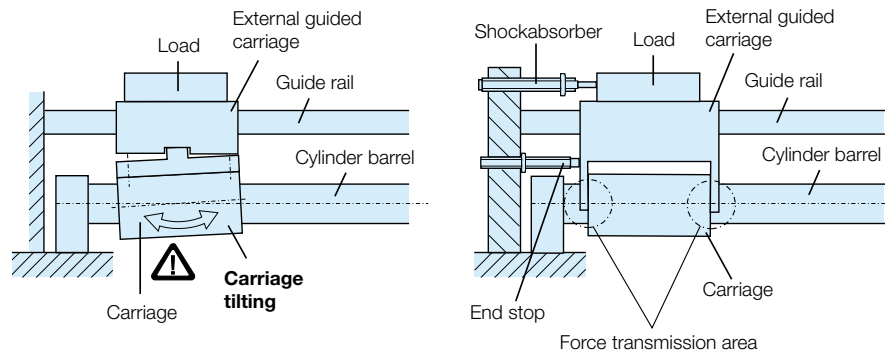


### Installation tips for use with external guides

When stopping a load having a large inertia force at the stroke end, tilting of the carriage and damage to the bearings and cylinder barrel may occur (fig. left).

To prevent this, the force transmission should be realized at the middle axis of the cylinder.

The combination of the shock absorber with an end stop, can help to prevent the tilting of the carriage (fig. right).



Order Instructions - Basic Cylinder - Series P1Z

Basic cylinder (15 digits)													With option (18 digits)				
<b>P</b>	<b>1</b>	<b>Z</b>	<b>M</b>	<b>0</b>	<b>1</b>	<b>6</b>	<b>S</b>	<b>A</b>	<b>N</b>	<b>0</b>	<b>8</b>	<b>5</b>	<b>0</b>	<b>W</b>	<b>F</b>	<b>M</b>	<b>N</b>

Piston diameter	
<b>016</b>	Ø 16 mm
<b>020</b>	Ø 20 mm
<b>025</b>	Ø 25 mm
<b>032</b>	Ø 32 mm
<b>040</b>	Ø 40 mm

End of stroke cushioning	
<b>A</b>	Pneumatically adjustable (Ø 16, 20, 25, 32 and 40 mm)

Stroke length	
max. stroke [mm]	Piston Ø [mm]
1000	Ø 16
1500	Ø 20
2000	Ø 25
2000	Ø 32
2000	Ø 40

Options	
<b>B</b>	without
<b>W</b>	with

Mountings	
<b>N</b>	without
<b>F</b>	Foot mounting
<b>L</b>	Flange mounting

Air supply port type	
<b>M</b>	Metric thread (Ø 16 mm)
<b>B</b>	G-thread (Ø 20 - 40 mm)
(Other types on request)	

**Order code examples:**

- **P1ZM016SAN0100B**      Ø 16 mm, stroke 100 mm, supplied with hexagonal nuts on each end cap.
- **P1ZM020SAN1000WFBN**      Ø 20 mm, stroke 1000 mm, with foot mounting at both end caps.

## P1Z Series - Guided Version

### Ø 16-40 mm

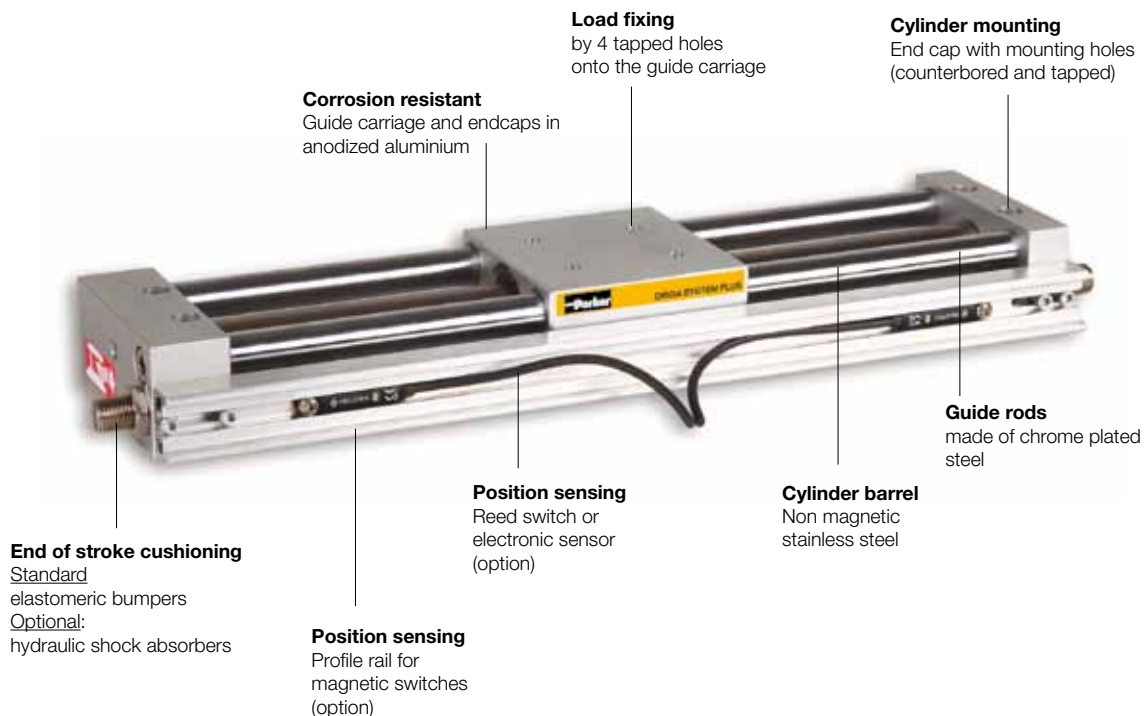
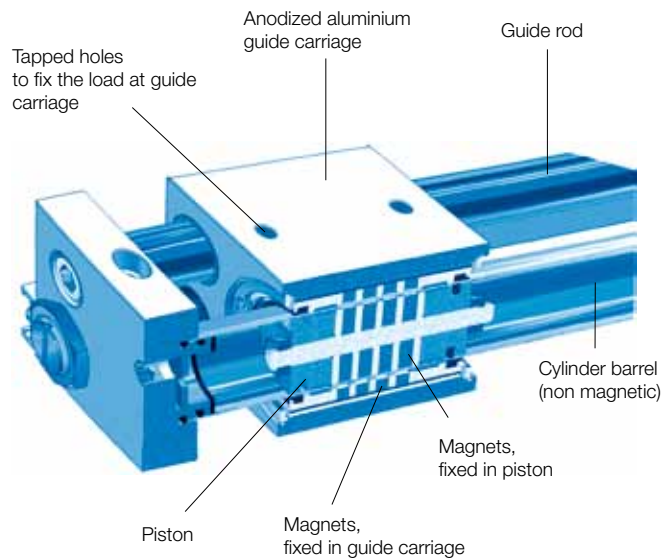
The P1Z is a rodless pneumatic cylinder with guide. The piston and the guide carriage are equipped with ring magnets.

The motion is transmitted via the magnetic force between the piston and the guide carriage.

The guided version consists of a carriage fitted with 4 plain bearings, guided on 2 guide rods. The design provides high rigidity, accurate guidance and a non rotating movement.

#### Features:

- Double acting with guide
- Magnetically coupled without mechanical connection
- Mechanical protection in case of occasional overload due to magnetic uncoupling
- Piston chamber and Slide are pressure tight
- Pressure tight and leak free system
- Air connection at one end (option)
- End of stroke cushioning: with elastomeric bumpers (standard), with hydraulic shock absorbers (option)
- Position sensing: AI-profile rail for magnetic switches (option). Magnetic switches available as reed switches or as electronic sensors (option).



## Mounting and Technical Data

### Guided Version

The loads can be fixed onto the guide carriage by 4 tapped holes.

Cylinder mounting provided with 4 tapped and counterbored holes. Additional mountings are not required.

#### Materials

Cylinder barrel	Stainless steel
Carriage	Al, anodised
End cap	Al, anodised
Seals	NBR
Guide rods	Steel, chrome plated

#### Technical Data

Piston diameter Ø [mm]	16	20	25	32	40
Max. stroke length [mm]	750	1000	1500	1500	1500
Stroke tolerance [mm] up to 1000 mm	0/+1.5				
Stroke tolerance [mm] > 1000 mm	0/+2				
Temperature range [°C]	0 to 60				
Operating medium	Filtered compressed air, dry, lubricated or unlubricated * (other media on request)				
Air supply port size	M5	G1/8	G1/8	G1/8	G1/4
Max. magnetic coupling force [N]	157	236	383	703	942
Velocity range [m/s]	0.5 to 0.4				
Min. operating pressure [bar]	2.3	2			
Max. operating pressure [bar]	6.5	7			
Weight [kg]					
at 0 mm stroke	0.9	1.52	1.70	3.63	5.44
per 100 mm stroke	0.2	0.33	0.42	0.53	0.86

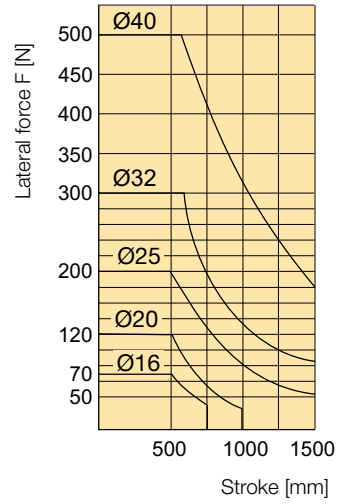
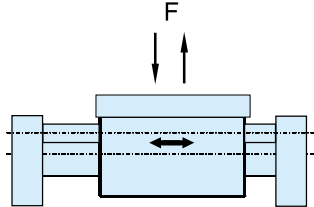
\* if external lubrication is added, this must always be continued.

**Loads, forces and moments**  
**Guided Version**

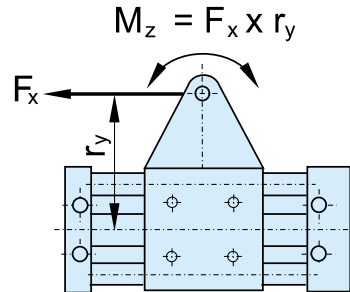
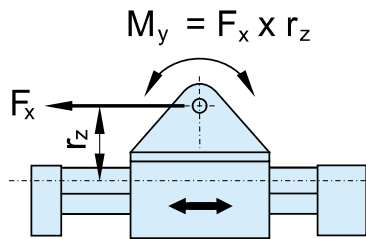
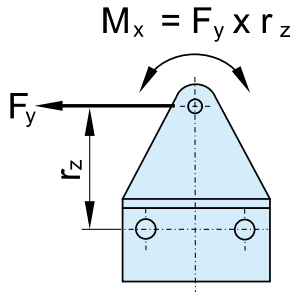
**Forces [N]**

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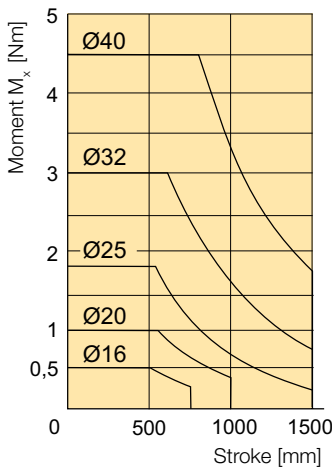
**Permissible lateral force, depending on the stroke length**



Ø (mm)	Max. Moment $M_x$ [Nm]	Max. Moment $M_y$ [Nm]	Max. Moment $M_z$ [Nm]
16	0.5	2.4	2.4
20	1.0	5.0	5.0
25	1.8	9.5	9.5
32	3.0	15.0	15.0
40	4.5	24.0	24.0



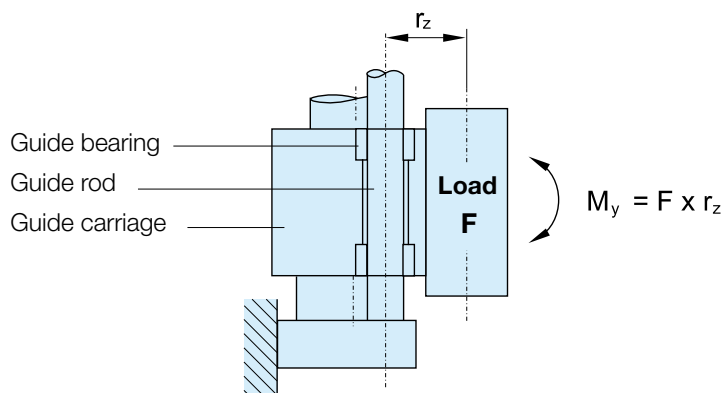
**Permissible moment  $M_x$  depending on the stroke length**



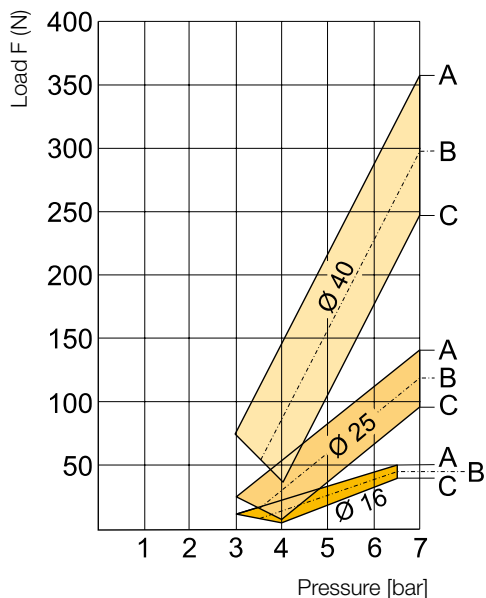
**Dynamic forces must not exceed the maximum magnetic coupling force!**

**Permissible axial load, vertical mounting**

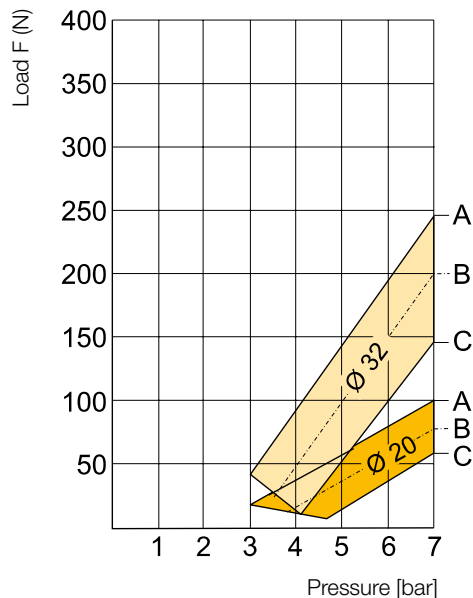
For vertical applications please refer to the values in the diagrams !



**Cylinder Ø 16, 25, 40**



**Cylinder Ø 20, 32**



Ø (mm)	Max. Load F [N]	B Max. Moment $M_y / 2$ [Nm]	C Max. Moment $M_y$ [Nm]
16	50.0	1.2	2.4
20	100.0	2.5	5.0
25	140.0	4.75	9.5
32	240.0	7.5	15.0
40	360.0	12.0	24.0

**A** = curve at moment  $M_y = 0$   
**B** = curve at moment  $M_y/2$  = see **column B**  
**C** = curve at moment  $M_{y \max}$  = see **column C**