MONTECH®

# Operating Instructions

# Handling Components
# Lifting device
# HE

## BA-100030

ENGLISH

Edition: 06/2006

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# **EC Declaration of Conformity** (to MRL Appendix II A)

**Regulations and standards complied with:**
- **Machinery guidelines 89/392/EC, 91/368/EC**

**Manufacturer**

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**Product description and purpose**

The lifting device HE is a handling component for performing linear horizontal or vertical movements. It is used for short travel distances with high load.

Strokes up to 50 mm (HE-50) or up to 100 mm (HE-100) are possible, depending on the nominal stroke. Any devices or structures can be added on, provided that the admissible loads are complied with.

**Hazards**

It is only permissible to use Lifting devices (HE) in installations when they are protected by movable, separating protective devices complying with EN 292-2, para.4.2.2.3. Failure to comply with this rule can result in fingers being squeezed, or to injury caused by impact, especially on machines which start up automatically.

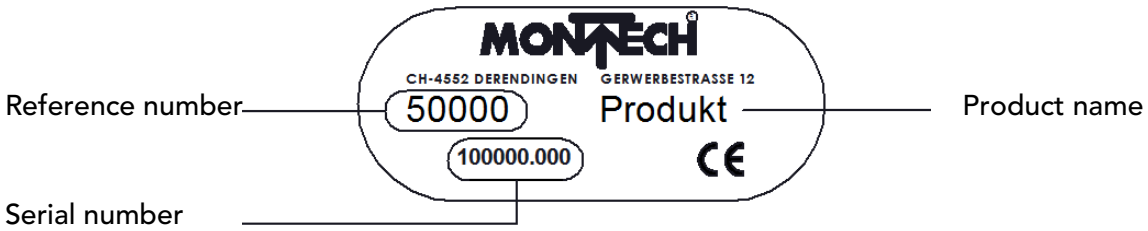
The stated loads must be complied with.

When working on the device, it must be ensured that the compressed air cannot be switched on by unauthorized persons.

## Additional information

The aim of the present User Manual is to enable users to employ the Lifting device HE and safely. Should further information be required in relation to your particular application, please contact the manufacturer. When reordering User Manuals, it is essential to quote the reference number, the product name and serial number. This document can be obtained from our homepage www.montech.com.

Fig. 1: Description of type plate




Montech AG
Management

U. D. Wagner

C. Wullschleger

## Validity of the User Manual

Our products are continually updated to reflect the latest state of the art and practical experience. In line with product developments, our User Manuals are continually updated.
Every User Manual has an order number (e.g. BA-100030) and an edition number (e.g. 02/2006). The order number and the addition number are shown on the title page.

## Technical data

| Size | | | HE-50 | HE-100 |
|---|---|---|---|---|
| Max. strokes | | (mm) | 50 | 100 |
| Min. strokes | | (mm) | 10 | 10 |
| Piston diameter | | (mm) | 32 | 32 |
| Piston rod diameter | | (mm) | 12 | 12 |
| Permissible load | | | See sections “Permissible loads”, “Definition of the loads” and “Deformation diagrams” | |
| Extension time | | | Guide values according to “Travel time diagrams” | |
| Retraction time | | | Guide values according to “Travel time diagrams” | |
| Own weight | | (kg) | 4,7 | 6 |
| Repeatability | 1) | (mm) | < 0,01 | < 0,01 |
| Operating pressure | | (bar) | 3 - 6 | 3 - 6 |
| Actuating medium | | | Compressed air filtered to 5 µm, oiled or unoiled, dewpoint < 6°C | |
| Damping in end positions | | | Hydraulic shock absorbers | |
| Check on end positions | 2) | | Inductive proximity switches | |
| Pneumatic connection plug-in | | (mm) | NG 6 | NG 6 |
| Speed regulation | | | Adjustable exhaust throttles M5 with plug connection | |
| Service life, min. | | (double strokes) | $10^7$ | $10^7$ |
| Ambient: Temperature | | (°C) | + 10 to 50 | + 10 to 50 |
| Rel. Atmospheric humidity | | | < 95% (without condensation) | |
| Purity of the air | | | normal workshop atmosphere | |
| Noise level | 3) | (dBA) | < 64 | < 64 |
| Ref. No. | | | 46911 | 47189 |

1) Difference between end positions of 100 successive strokes.

2) See Special accessories.

3) Measured at 5 bar, 50 mm stroke (vertical), m = 12 kg, throttles completely open.

**Special accessories:**

Inductive proximity switch PNP, 6.5 mm dia. with LED, proof against short circuit and wrong polarity, with a switching clearance of 2 mm and a cable 2.5 m long, Ref.No. 504 513; cable 5 m long, Ref.No. 504 755; plug-in Ref.No. 504 609.

## Permissible loads

| | | | |
|---|---|---|---|
| $F_{x\ adm}$ | | (N) | 700 |
| $F_{y\ adm}$ | | (N) | 300 |
| $F_{z\ adm}$ | | (N) | See “Load diagrams” |
| $M_{x\ adm}$, $M_{xm\ adm}$ | $(M_x = M_{xm} + F_z \bullet L_y + F_y \bullet L_z)$ 1) | (Nm) | 40 |
| $M_{y\ adm}$ , $M_{ym\ adm}$ | $(M_y = M_{ym} + F_z \bullet L_x + F_x \bullet L_z)$ 1) | (Nm) | 80 |
| $M_{z\ adm}$ | $(M_z = F_x \bullet L_y + F_y \bullet L_x)$ | (Nm) | 60 |

for combined loads

$$12 \bullet |F_x| + 28 \bullet |F_y| + 220 \bullet |M_x| + 110 \bullet |M_y| + 80 \bullet |M_z| \leq 8800$$

$F_x$ , $F_y$ in (N)

$M_x$ , $M_y$, $M_z$ in (Nm)

1) $M_{xm}$ , or $M_{ym}$ : See appropriate diagrams for horizontal or vertical movement.

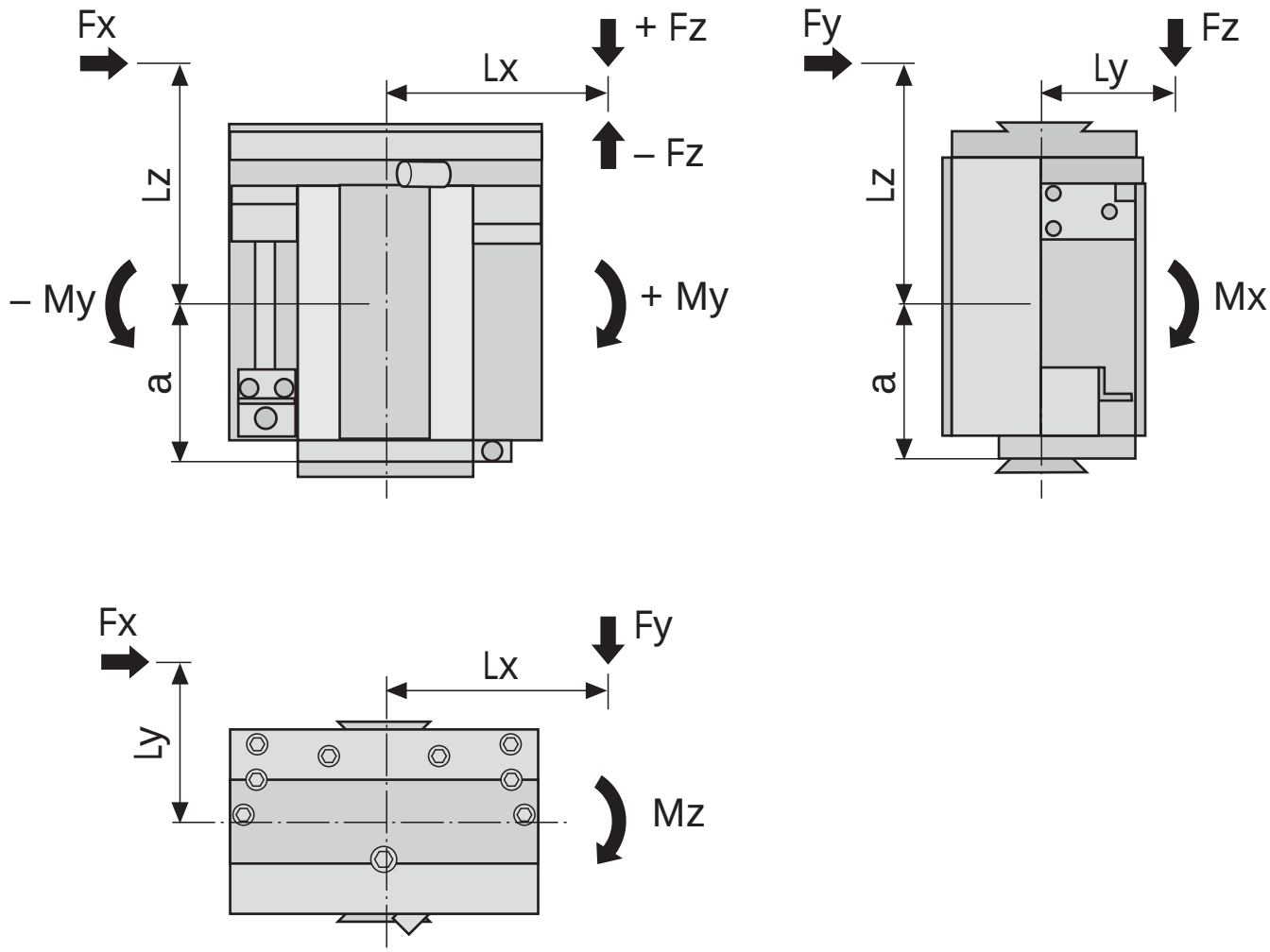
The moments are calculated by multiplying the weight and acceleration force (vertical movement) or acceleration force (horizontal movement) of a moving mass by its distance from the centre of gravity.

$M_{xadm}$, or $M_{yadm}$: Sum of all moments about the corresponding axes, including Mxm or Mym.

## Definition of the loads

The values stated under “Permissible loads” are defined by the following data.

**Fig. 3**



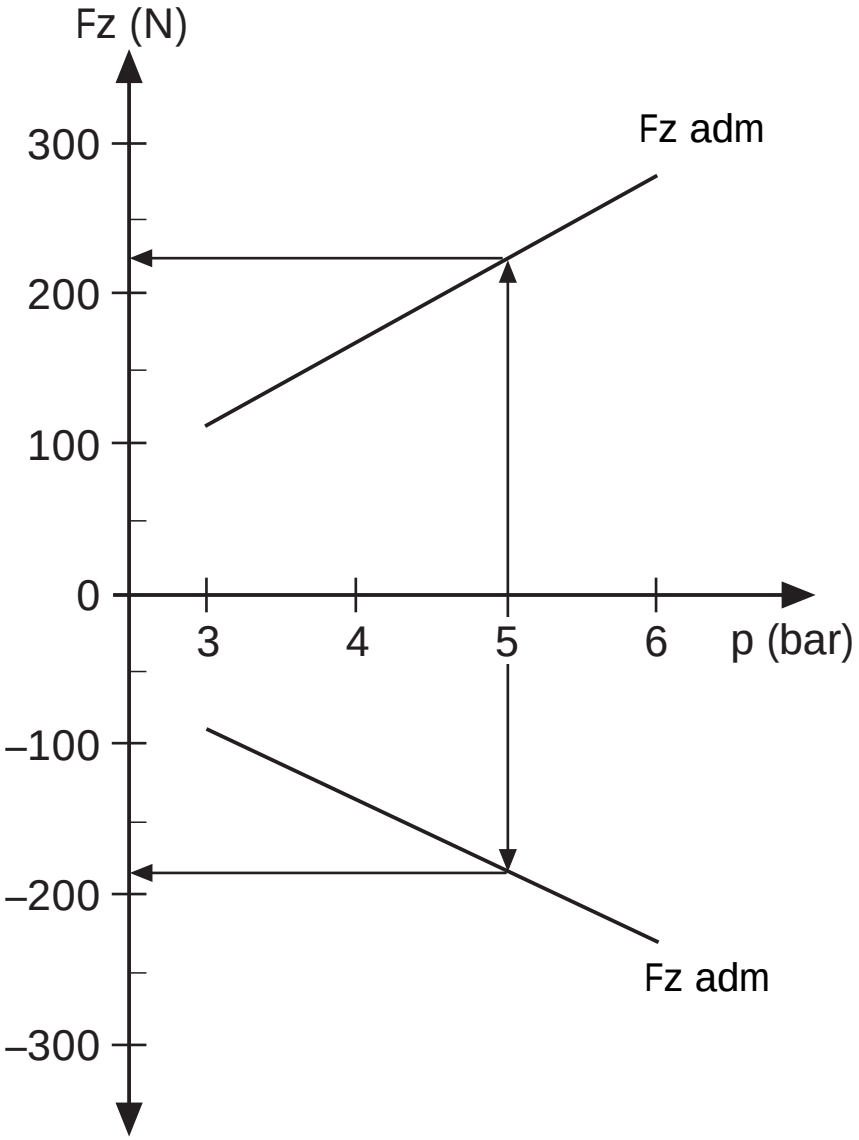

| | HE-50 | HE-100 |
|---|---|---|
| a (retracted, mm) | 70 | 95 |
| a (extended, mm) | 95 | 145 |

Note: The definitions ± Fz and ± My are applicable for a fixed housing. (If the lifting movement is performed by the housing, the signs of Fz and My are interchanged.)

# Load diagrams

## Force in direction of movement

**Fig. 4**

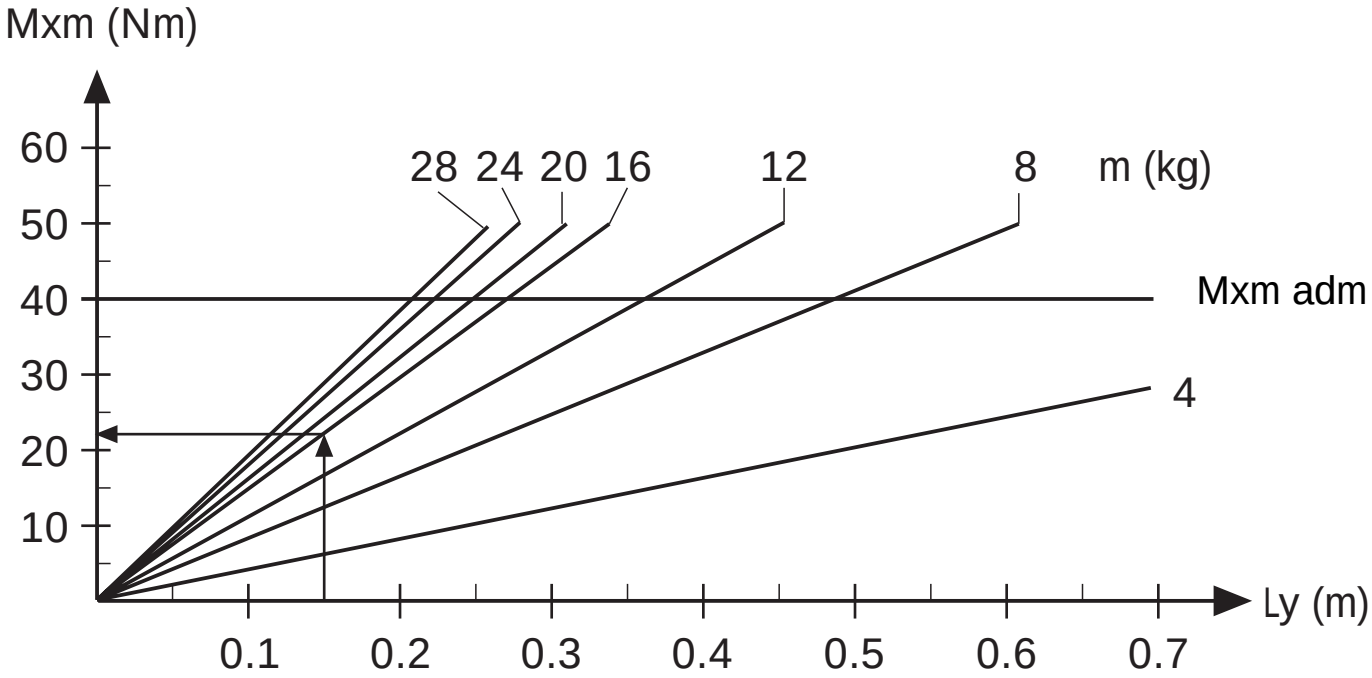



p (bar): Operating pressure

**Horizontal movement**

**Moment $M_{xm}$**

**Fig. 5**

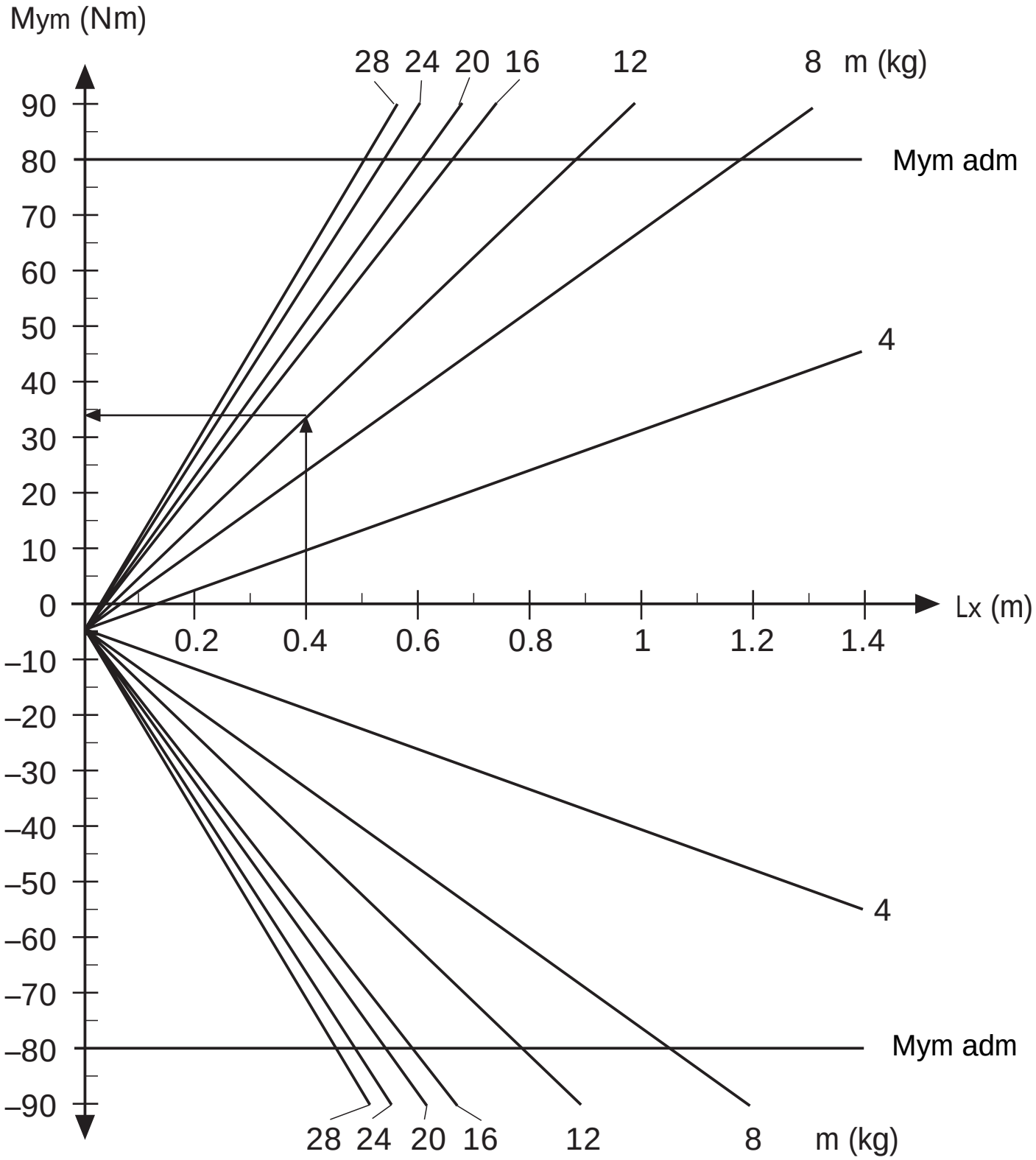



Ly: Distance of mass from centre of gravity in y direction

**Horizontal movement**

**Moment $M_{ym}$**

**Fig. 6**

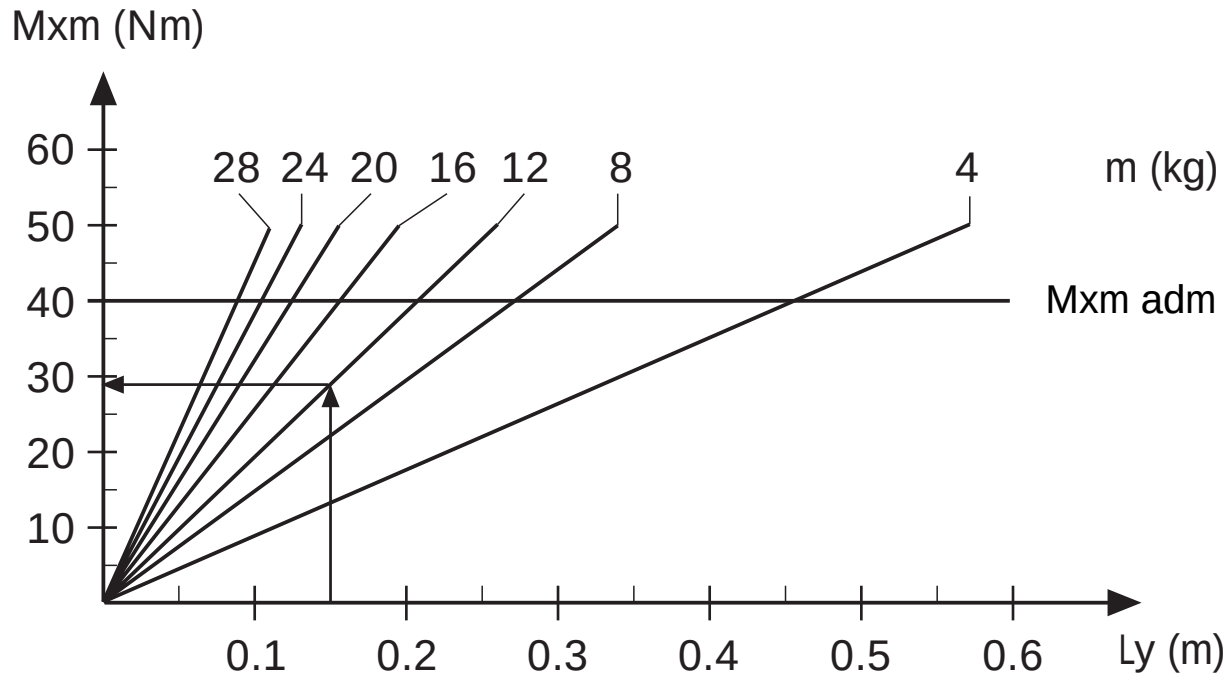



Lx: Distance of mass from centre of gravity in x direction

**Vertical movement**

**Moment $M_{xm}$**

**Fig. 7**

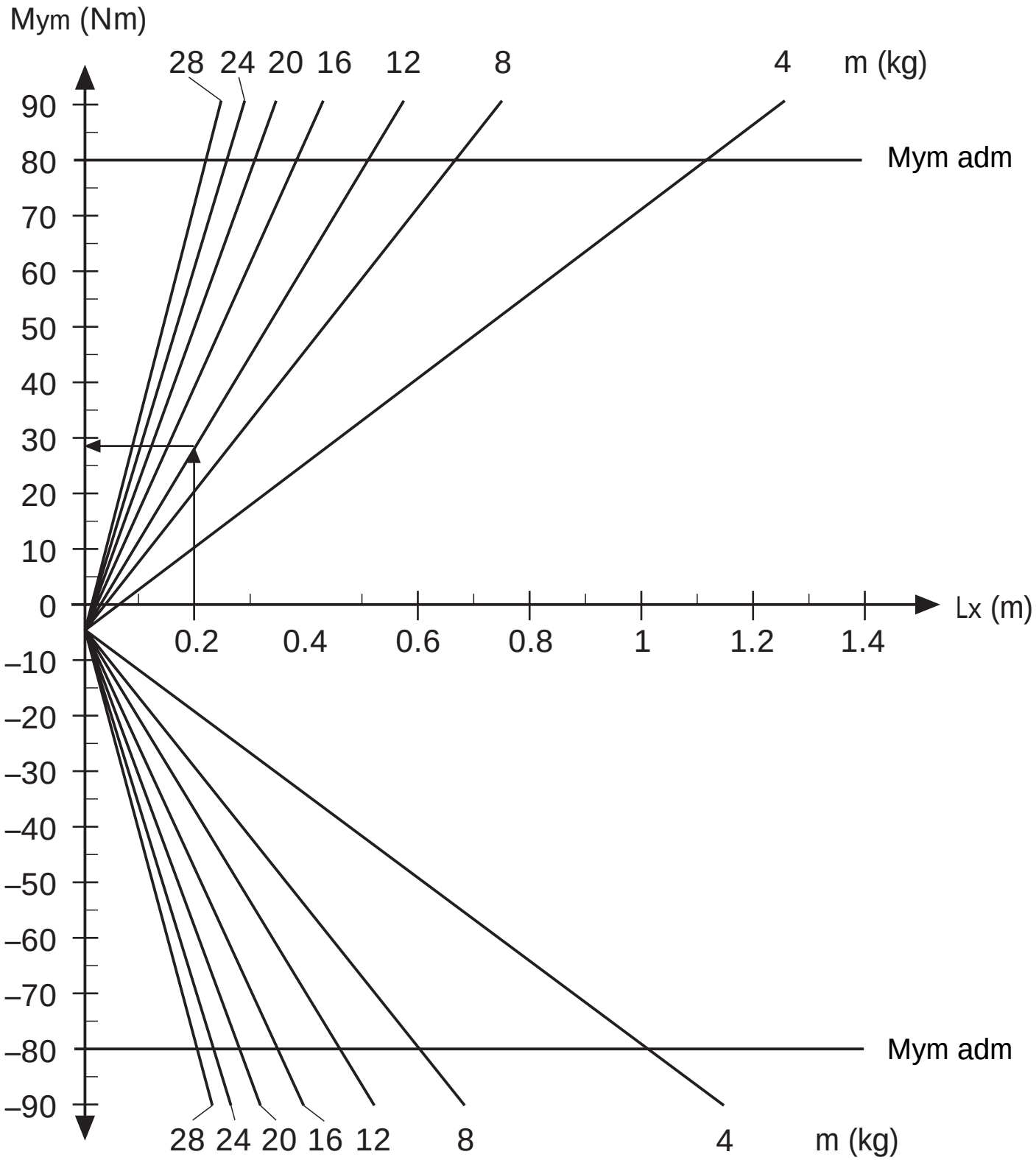



Ly: Distance of mass from centre of gravity in y direction

**Vertical movement**

**Moment $M_{ym}$**

**Fig. 8**



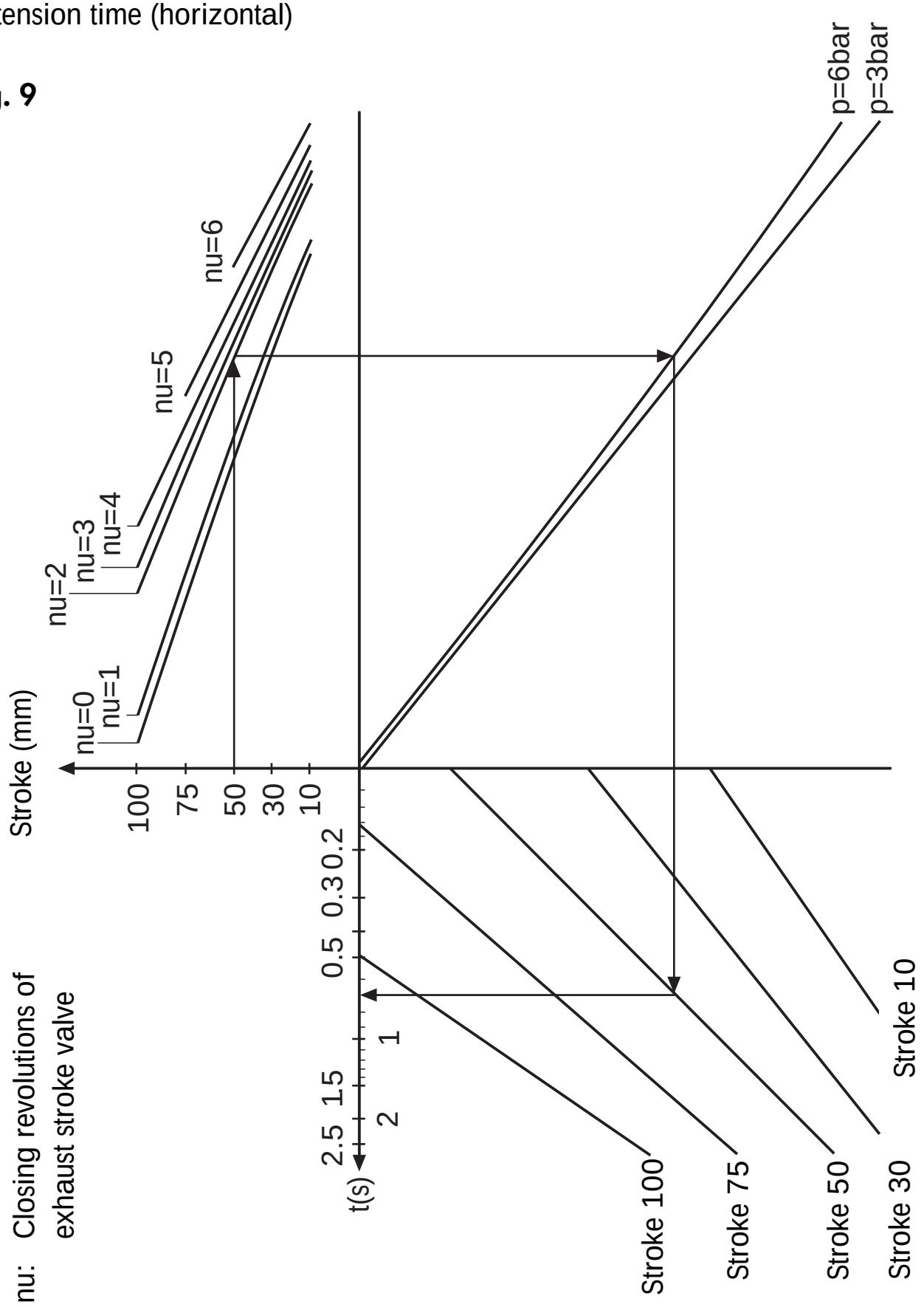

Lx: Distance of mass from centre of gravity in x direction

# Travel time diagrams

## Horizontal movement

Extension time (horizontal)

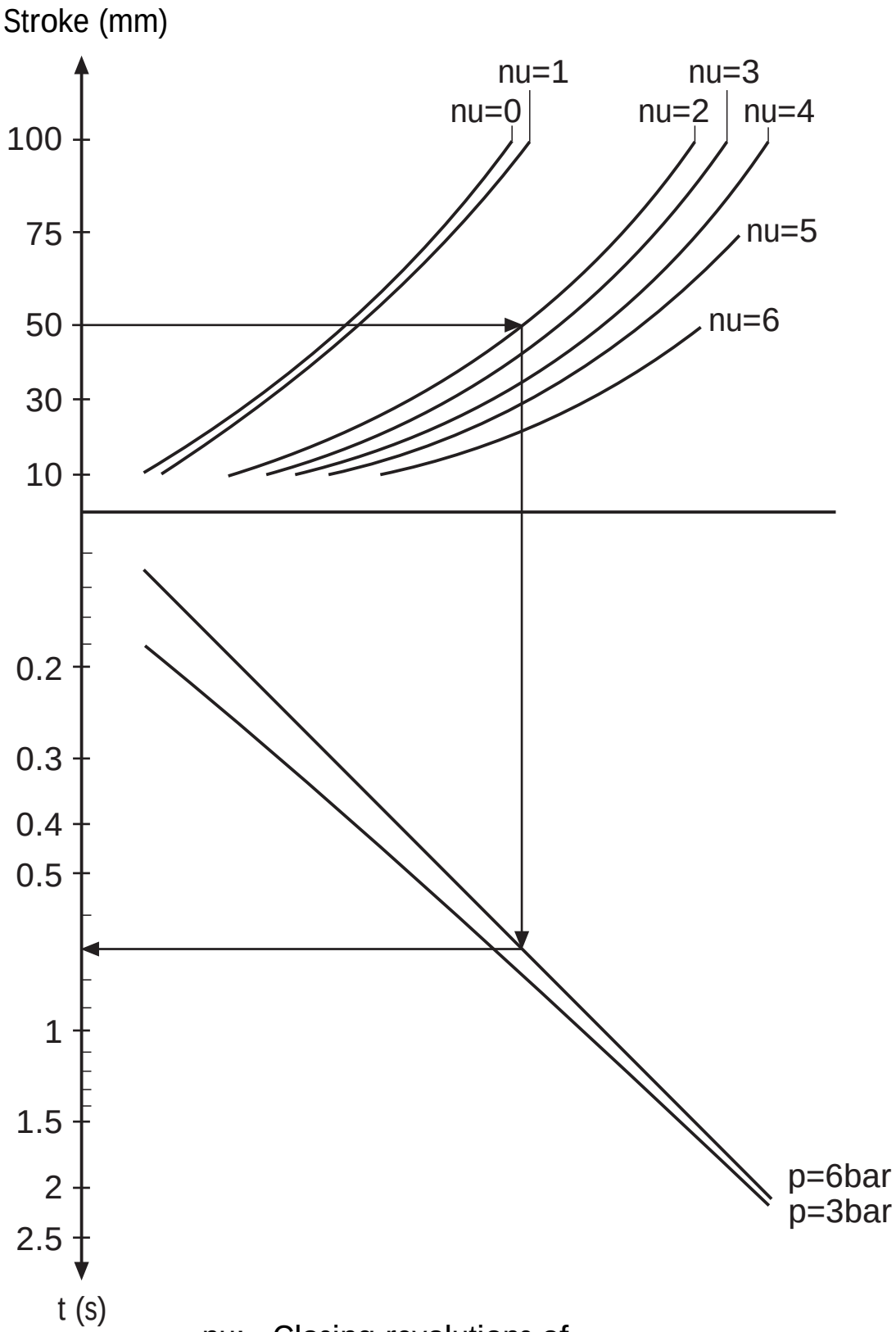
**Fig. 9**



## Horizontal movement

Retraction time (horizontal)

**Fig. 10**

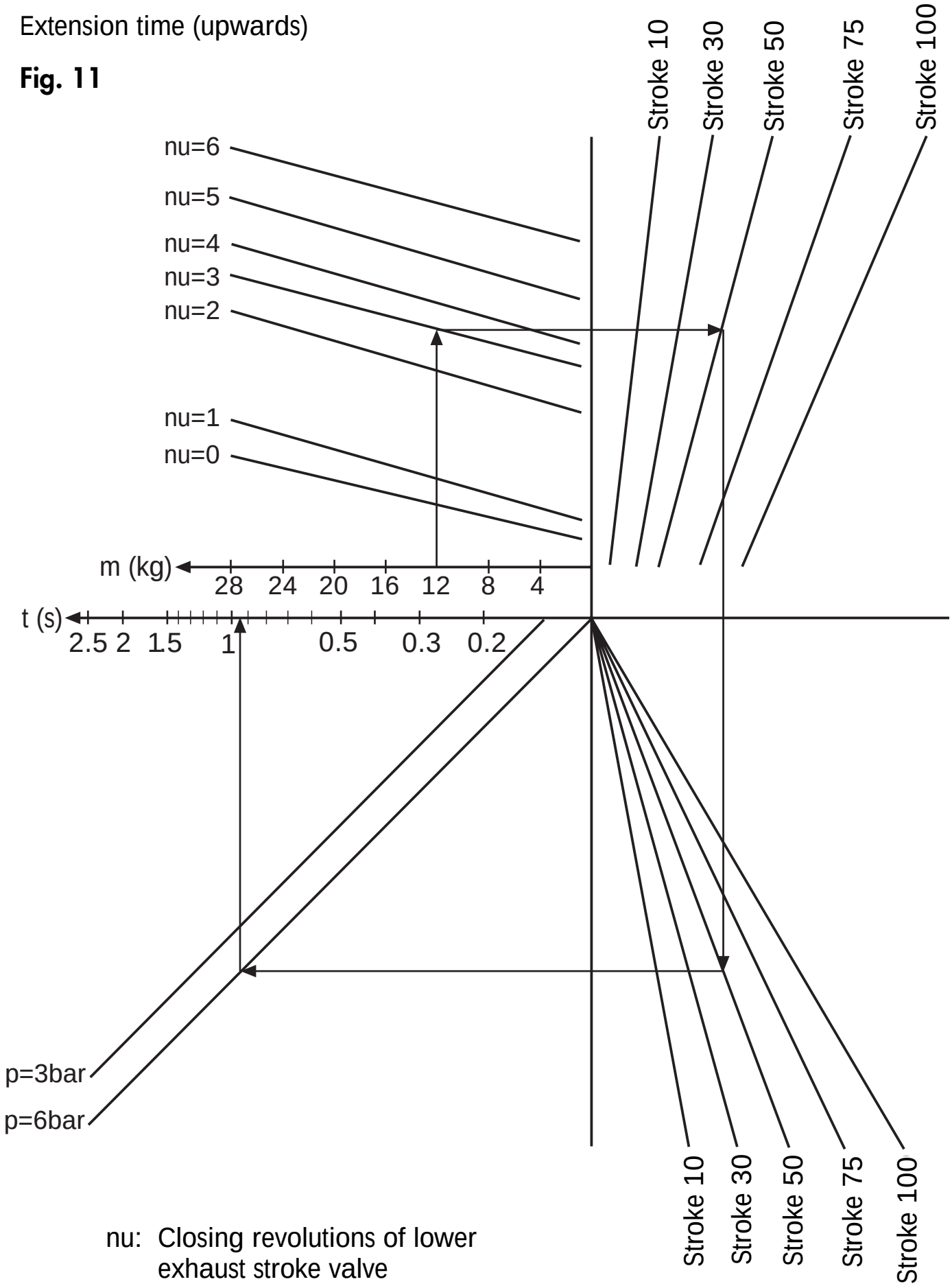



nu: Closing revolutions of exhaust stroke valve

## Vertical movement

Extension time (upwards)

**Fig. 11**

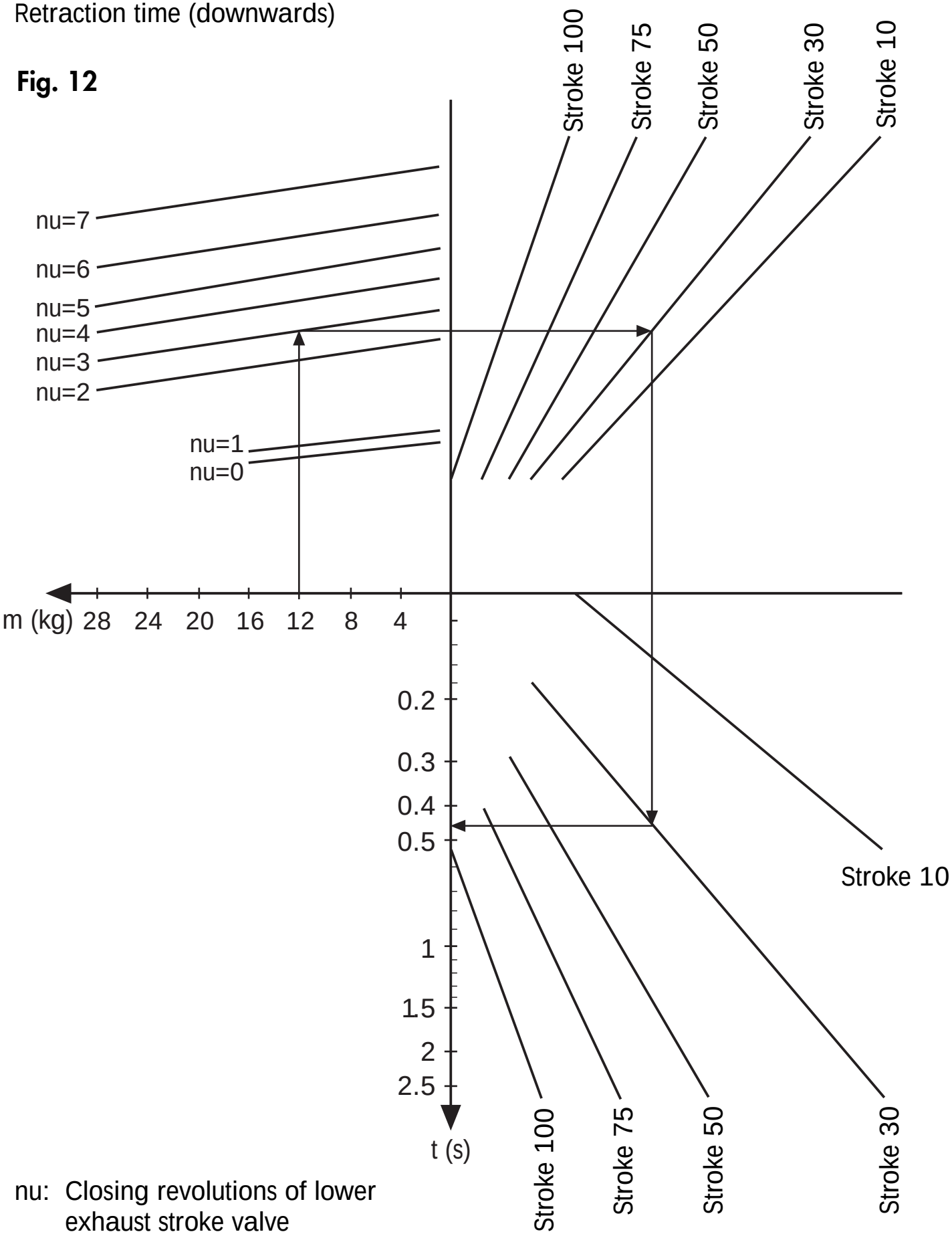



nu: Closing revolutions of lower exhaust stroke valve

**Vertical movement**

Retraction time (downwards)

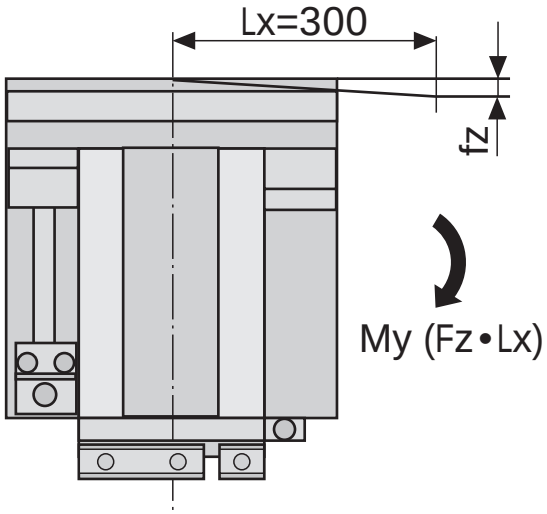
**Fig. 12**



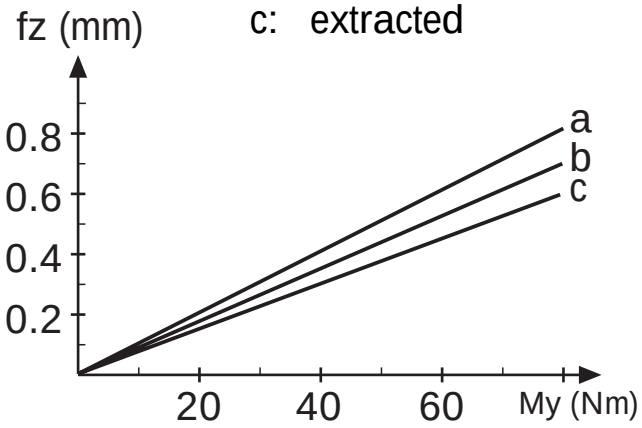

nu: Closing revolutions of lower exhaust stroke valve

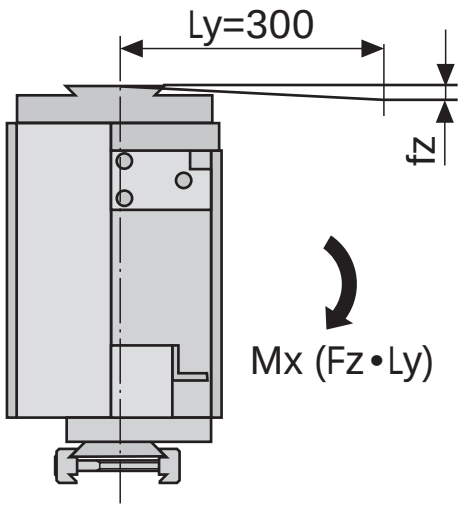
# Deformation diagrams

**Fig. 13**

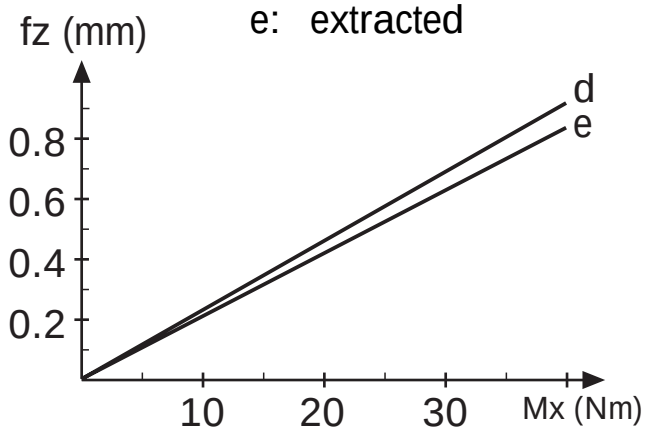


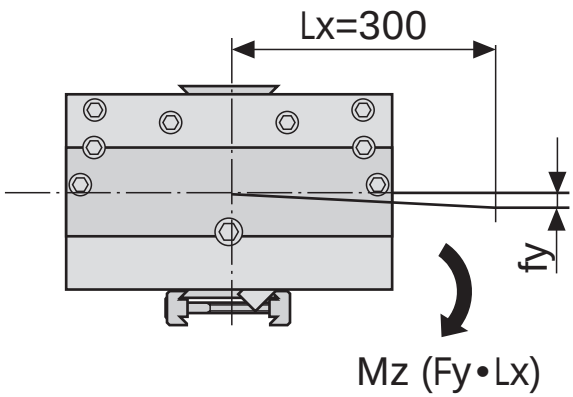

a: HE-100 extended
b: HE- 50 extended
c: extracted

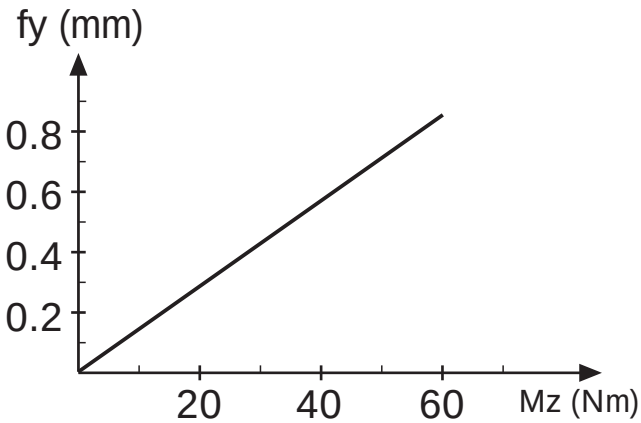



d: extended
e: extracted



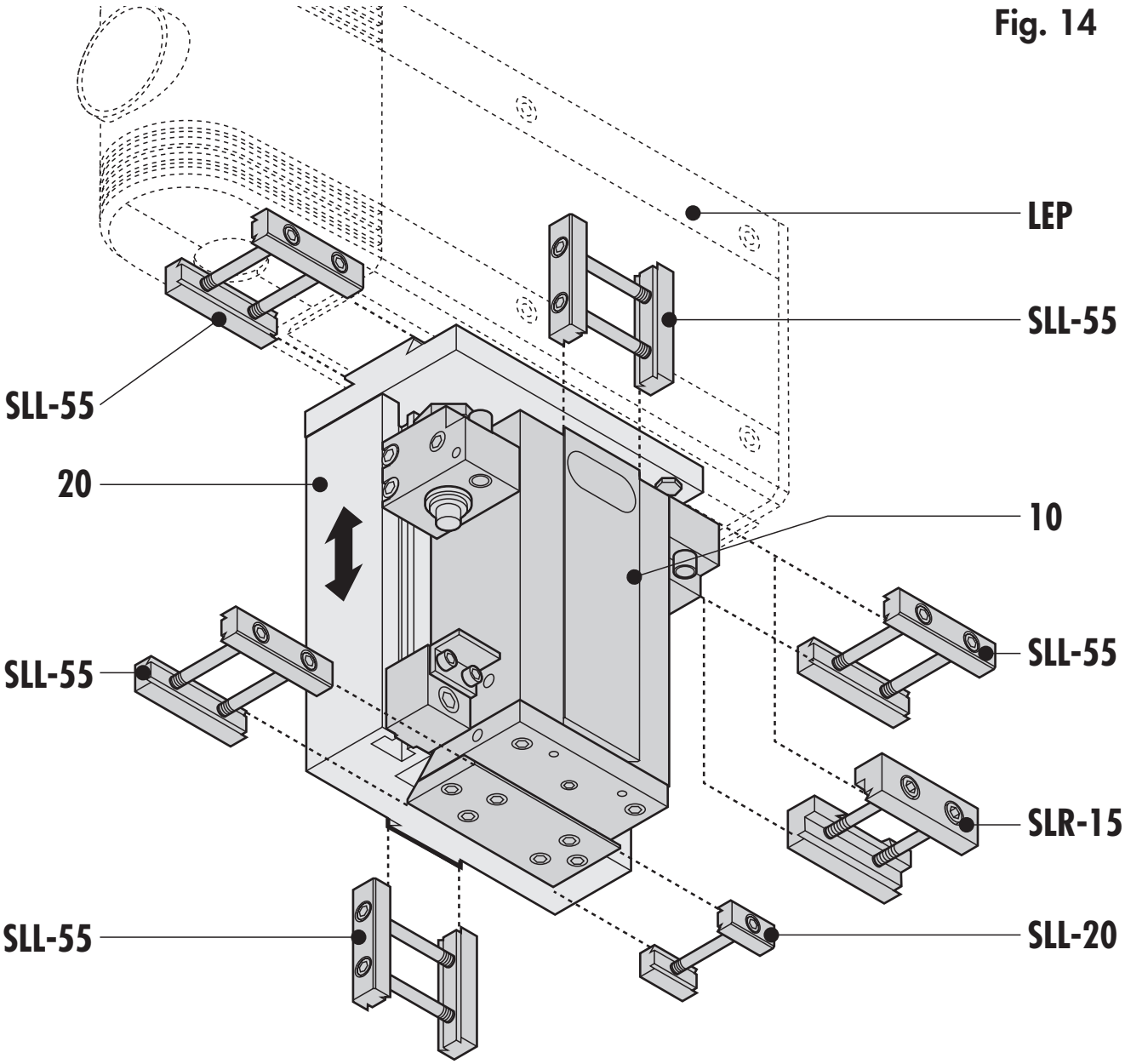
## **Mounting position and assembly** (Fig. 14)

The lifting device can be installed both in the horizontal and in the vertical position. As a rule, the housing (10) is mounted in a fixed position and the lifting movement is performed by the slide (20).

Fixing is performed by means of Quick-Set elements on the two dovetails mounted on the housing (10) and the two mounted on the slide (20). For strength reasons, the whole dovetail length on the lifting device should be used for fixing.

To improve the rigidity of the structure with high loads, the housing (10) should be fixed to both dovetails.

Fig. 14



## **Pneumatic connection** (Fig. 15)

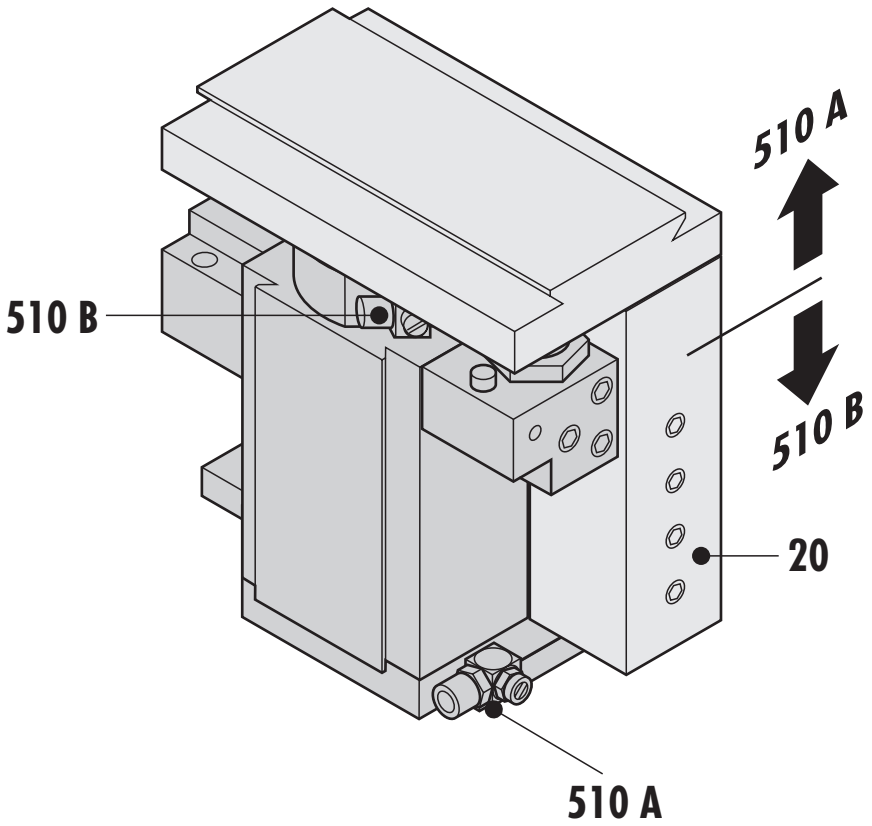
### Extend slide

The slide (20) is extended by means of the pneumatic connection 510 A.

### Retract slide

The slide (20) is retracted by means of the pneumatic connection 510 B.

**Fig. 15**




## **Speed regulation**

The travel speeds of the slide can be adjusted by throttling the cylinder exhaust.

If the superstructures have long booms, the speeds should be appropriately reduced to minimize the vibrations.

The extension speed is adjusted at the exhaust throttle (510B, Fig. 15). Guide values for the extension time are shown in the “Extension time (horizontal)” (Fig. 9) and “Extension time (upwards)” (Fig. 11) diagrams.

The retraction speed is adjusted at the exhaust throttle (510A, Fig. 15). Guide values for the retraction time are shown in the “Retraction time (horizontal)” (Fig. 10) and “Retraction time (downwards)” (Fig. 12) diagrams.

It should be noted that the exhaust throttle (510A, Fig. 15) must be closed by at least 2 revolutions in the case of downward movements with masses greater than 16 kg.

By setting the maximum travel time permitted by the process, the lifting device is protected and the limiting use time is increased.

## Adjusting the range of movement

The end position “retracted” is a fixed position. The stop is formed by the cylinder cover (40, Fig. 17). The adjustment of this end position is performed only by means of the dovetail connections.

### Coarse adjustment of the end position “extended”

- Loosen screw (410, Fig. 16) and move stop (150, Fig. 16) in the T-groove of the slide (20, Fig. 16).

  Tightening torque of screw (410, Fig. 16) = 9 Nm

### Fine adjustment of the end position “extended”

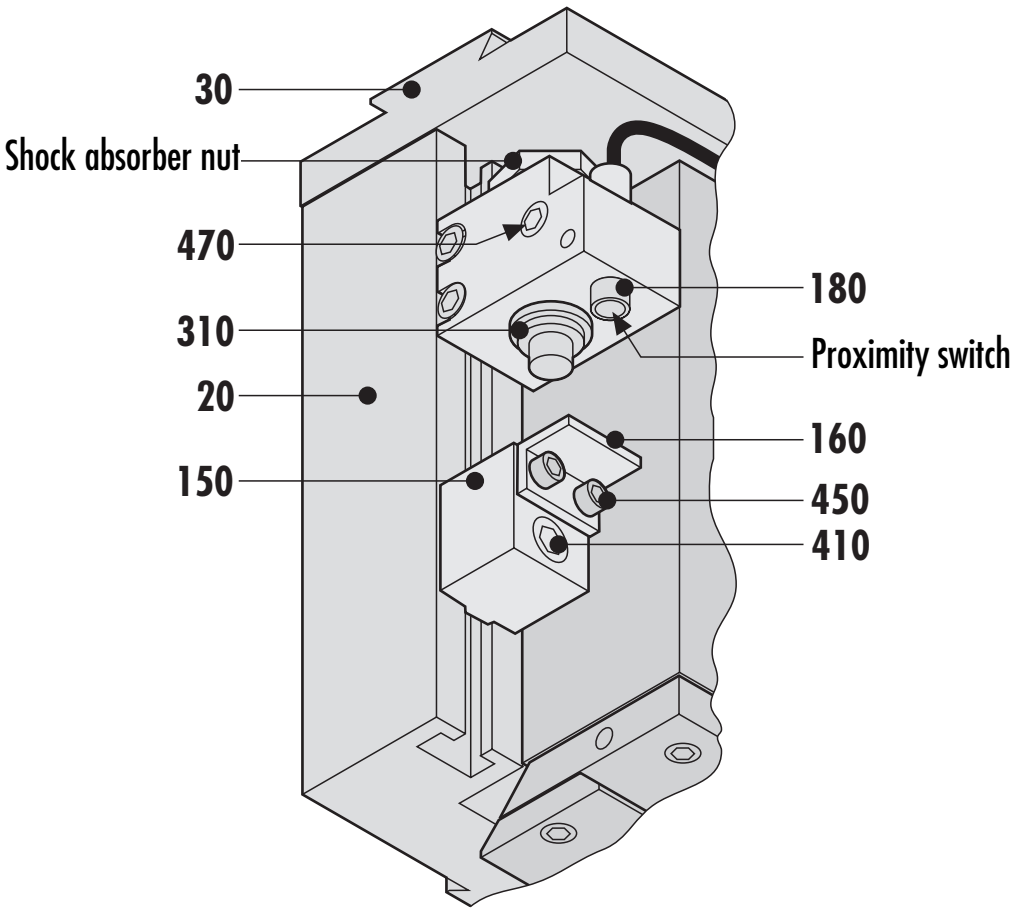
- Loosen set-screw (470, Fig. 16) and pull proximity switch out of the clamping sleeve (180, Fig. 16).
- Loosen shock absorber nut (Fig. 16) and screw shock absorber (310, Fig. 16) in or out until the desired position is reached.

  When adjusting the shock absorber, ensure that it does not rest against the cover (30, Fig. 16) in the end position “retracted”.

KEEP HANDS AND TOOLS OUT OF THE WAY WHEN UNIT IS IN OPERATION

After adjustment of the shock absorber (310, Fig. 16), tighten the shock absorber nut and adjust the proximity switch according to the section “Connection and adjustment of the inductive proximity switches”.

**Fig. 16**



## Setting the shock-absorbers

The hydraulic shock absorbers (310, Fig. 16 and 17) serve for gentle retraction to the end positions by absorbing energy in the final phase of travel. A fully operable shock absorber is indispensable for the proper running, reliability and accuracy of the system.

### Piston stroke end position "extended"

- The piston stroke of the shock absorber (310, Fig. 16) is not adjustable since the shock absorber housing is used as a stop.

### Piston stroke end position "retracted"

- Loosen set-screw (470, Fig. 17) and pull proximity switch out of the clamping sleeve (180, Fig. 17).
- Push back clamping sleeve (180, Fig. 17) flush into the shock absorber holder (130, Fig. 17) and loosen the shock absorber nut (Fig. 17).
- Screw shock absorber (310, Fig. 17) in or out until the desired piston stroke is reached.

  A larger piston stroke is achieved by unscrewing the shock absorber and a smaller piston stroke by screwing it in. It should be ensured that the end position "retracted" is always at the cylinder cover (40, Fig. 17).

  The optimal setting of the shock absorber is achieved when, under operating conditions (drive pressure, mass, speed), the slide travels at apparently constant speed and without impact to the end position.

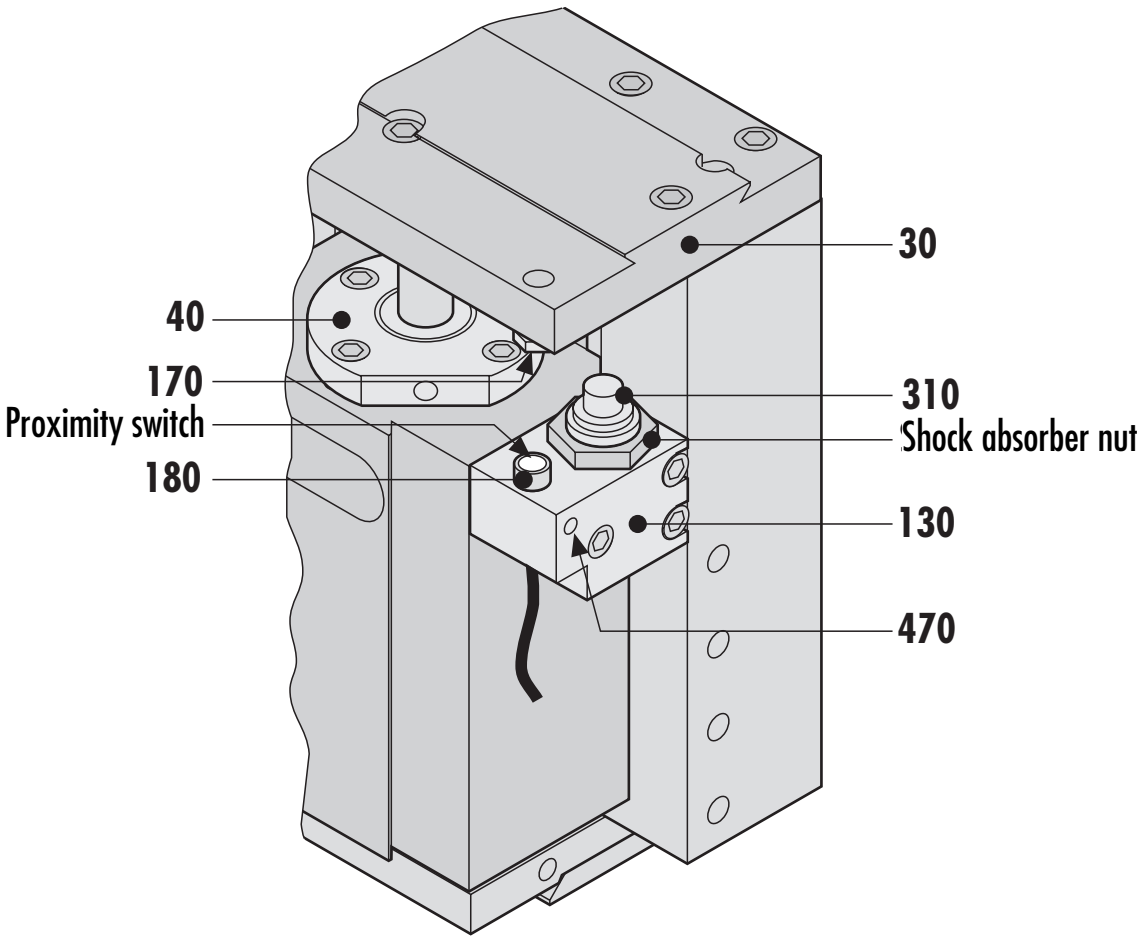
  – If an impact occurs, the piston stroke must be increased.

  – If there is a visible delay of the last 2-3 mm in approaching the end position, the piston stroke must be reduced.

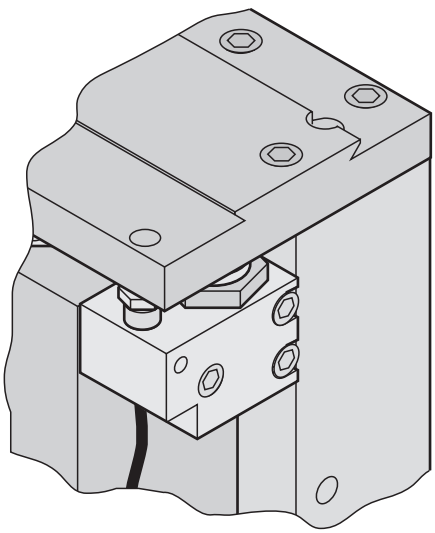
KEEP HANDS AND TOOLS OUT OF THE WAY WHEN UNIT IS IN OPERATION

- After adjustment of the piston stroke, tighten the shock absorber nut (Fig. 17) and adjust the proximity switch (Fig. 17) according to the section “Connection and adjustment of the inductive proximity switches”.

**Fig. 17**




End position “retracted”

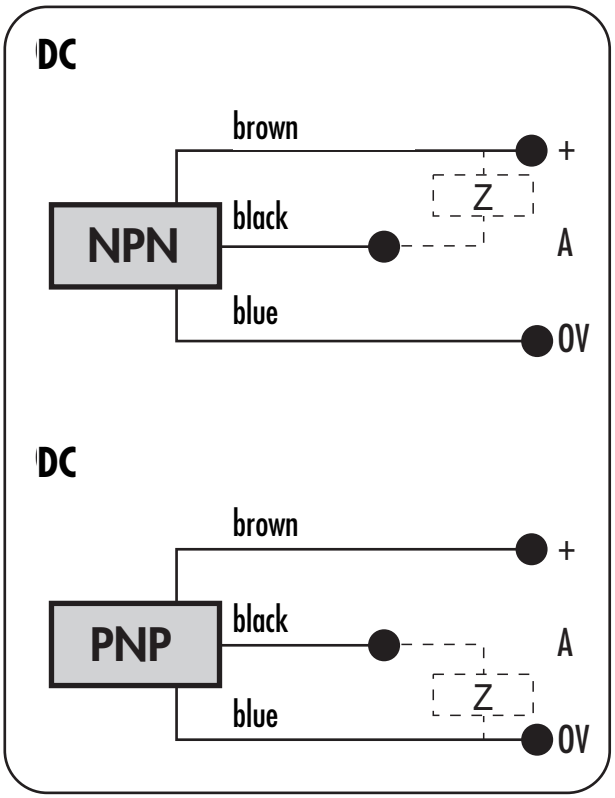


## Connecting and adjusting the inductive proximity switches

The proximity switches used must have a switching distance Sn of 2 mm, be designed for flush mounting and have a housing 6.S mm in diameter.

The maximum housing length is 41 mm. The electrical connection is shown in the diagram (Fig. 18).

**Fig. 18**




### End position "retracted"

- Push proximity switch (Fig. 17) into the clamping sleeve (180, Fig. 17) in the damping direction (170, Fig. 17) until the LED of the electrically connected proximity switch lights up. It should be ensured that the clamping sleeve does not rest against the damper.
- Lightly tighten the set-screw (470, Fig. 17).

**End position “extended”**

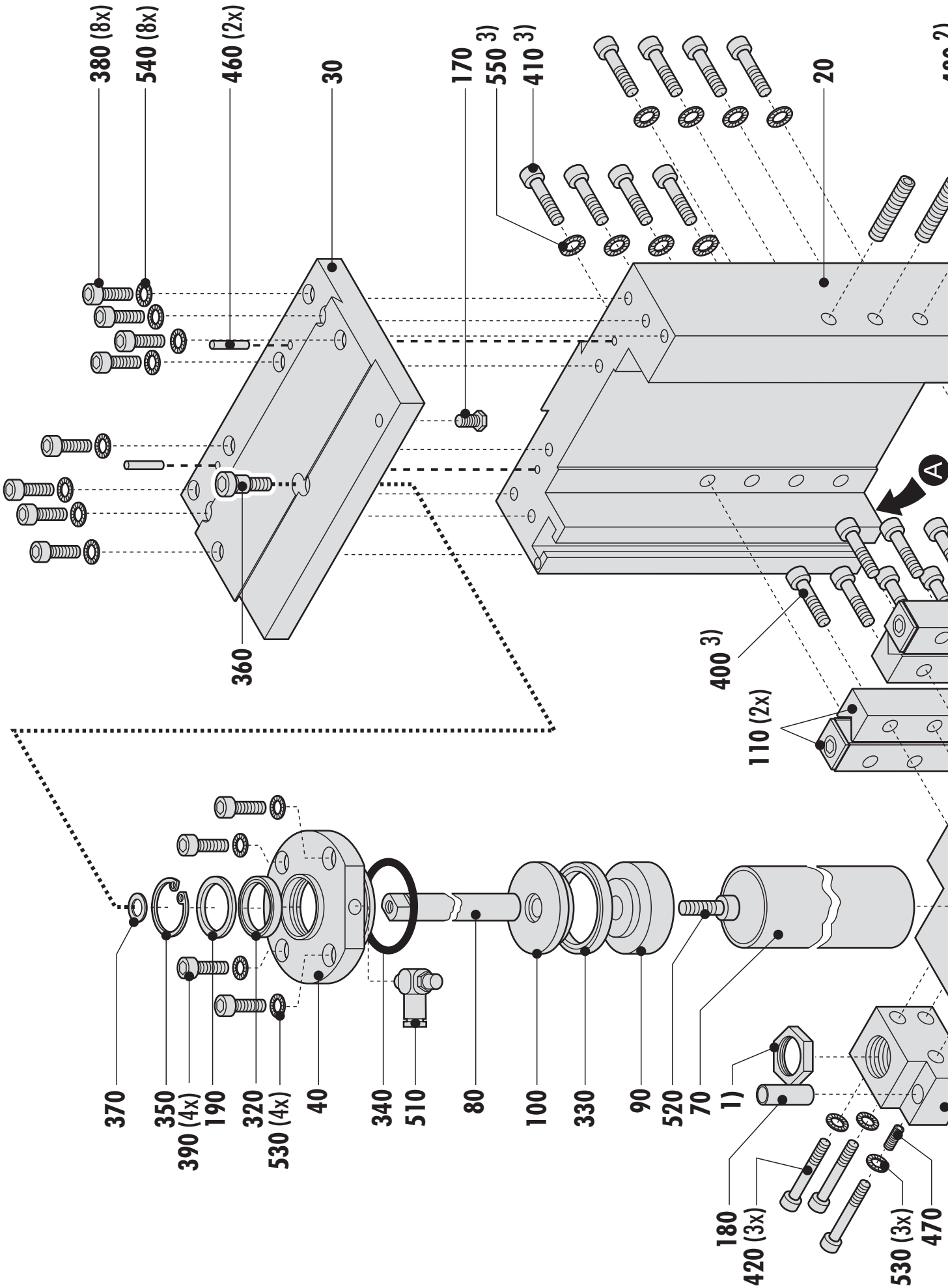
- Push proximity switch (Fig. 16 ) into the clamping sleeve (180, Fig. 16) in the direction of the damping bracket (160, Fig. 16) until the LED of the electrically connected proximity switch lights up. It should be ensured that the clamping sleeve does not rest against the damping bracket.
- Lightly tighten the set-screw (470, Fig. 16).

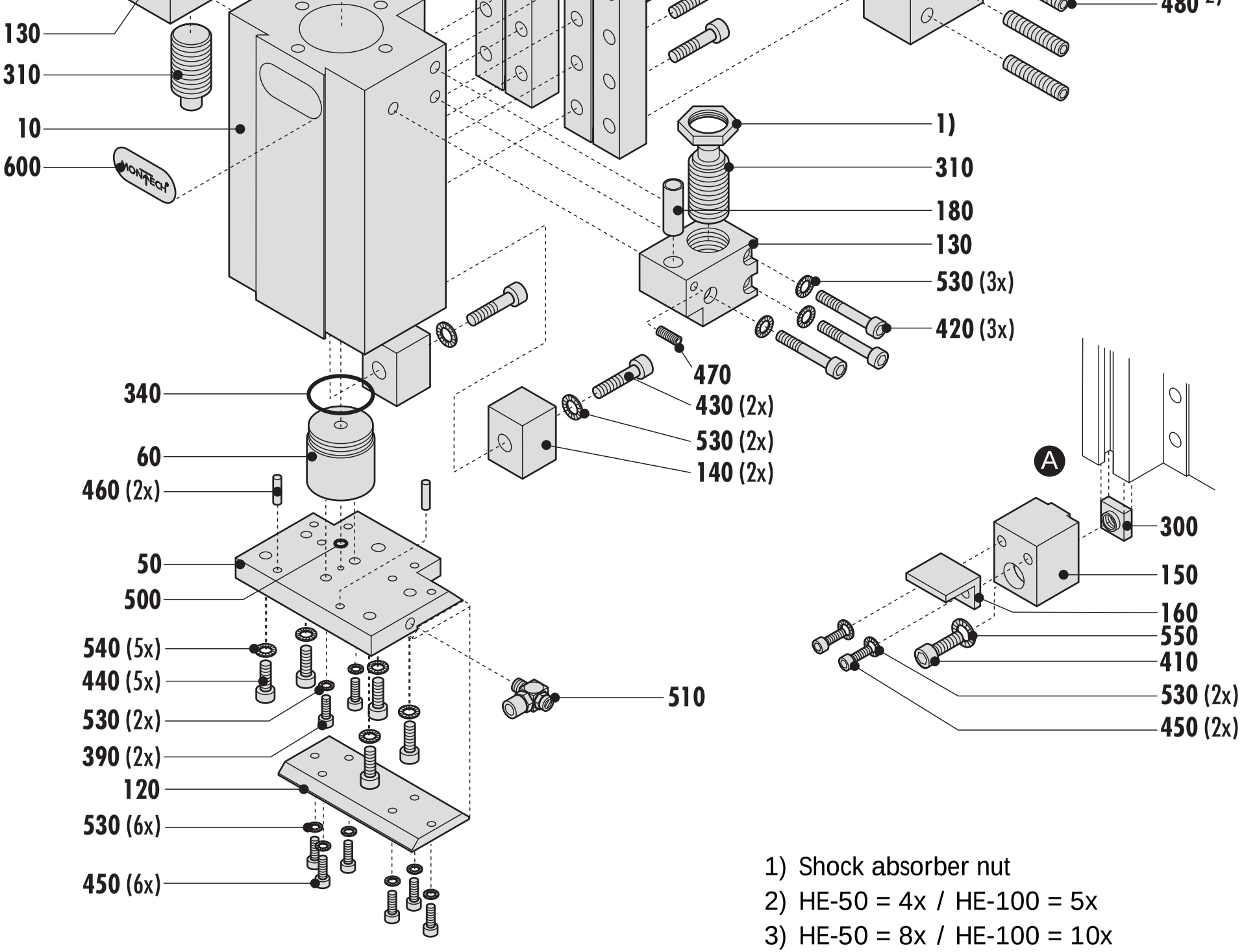
Note: If unpluggable proximity switches are used, the damping bracket (160, Fig. 16) can be turned through 180° by unscrewing the 2 screws (450, Fig. 16).

Install proximity switches only with original clamping sleeve (180).

## Maintenance

The Lifting device HE is generally maintenance-free up to 5 mio. cycles. We recommend the following preventative maintenance to ensure optimum performance of the unit:
Periodic cleaning of the unit, particularly the mechanical guide.
Inspection of the seals, possible replacement
Lubricate with Paraliq P460 (Montech article no. 504721), particularly the mechanical guide


380 (8x)
540 (8x)
460 (2x)
30
170
550 3)
410 3)
20
A
360
400 3)
110 (2x)
370
350
390 (4x)
190
320
530 (4x)
40
340
510
80
100
330
90
520
70
1)
180
420 (3x)
530 (3x)
470




1) Shock absorber nut
2) HE-50 = 4x / HE-100 = 5x
3) HE-50 = 8x / HE-100 = 10x

| Pos. | Part | Ref.no | | Supplier | Material |
|---|---|---|---|---|---|
| | | HE-50 | HE-100 | | |
| 10 | Casing | 46301 | 47183 | Montech AG | Aluminium |
| 20 | Slide | 46302 | 47184 | Montech AG | Aluminium |
| 30 | Cover | 46303 | 46303 | Montech AG | Aluminium |
| 40 | Cylinder cover | 45911 | 45911 | Montech AG | Aluminium |
| 50 | Flange | 46908 | 46908 | Montech AG | Aluminium |
| 60 | Peg | 46910 | 46910 | Montech AG | Aluminium |
| 70 | Cylinder tube | 45914 | 47188 | Montech AG | Steel |
| 80 | Piston rod | 46482 | 47187 | Montech AG | Steel |
| 90 | Piston bottom | 45916 | 45916 | Montech AG | Bronze |
| 100 | Piston top | 46107 | 46107 | Montech AG | Bronze |
| 110* | Cross roller guide | 47123 | 47185 | SKF | Steel/POM |
| 120 | Adaptor | 46485 | 46485 | Montech AG | Aluminium |
| 130 | Shock absorber holder | 46484 | 46484 | Montech AG | Aluminium |
| 140 | End piece | 46909 | 47186 | Montech AG | Aluminium |
| 150 | Stop | 47117 | 47117 | Montech AG | Aluminium |
| 160 | Damping bracket | 47120 | 47120 | Montech AG | Steel |
| 170 | Damper | 46621 | 46621 | Montech AG | Steel |
| 180* | Clamping sleeve | 42009 | 42009 | Montech AG | POM |
| 190 | Washer for cover | 44217 | 44217 | Montech AG | Bronze |
| 300 | T slot insert | 21913 | 21913 | Montech AG | Steel |
| 310* | Shock-absorber | 505830 | 505830 | SMC Pneumatik AG | Steel |
| 320* | Rod packing | 504976 | 504976 | Angst+Pfister AG | NBR |
| 330* | Piston packing | 505002 | 505002 | Angst+Pfister AG | NBR |
| 340* | O-ring | 505831 | 505831 | Busak+Shamban AG | NBR |
| 350 | Spring ring | 502489 | 502489 | Bossard AG | Steel |
| 360 | Dowel bolt | 505832 | 505832 | Bossard AG | Steel |
| 370 | Tensioning washer | 503823 | 503823 | Bossard AG | Steel |
| 380 | Chhd screw | 501642 | 501642 | Bossard AG | Steel |
| 390 | Chhd screw | 501622 | 501622 | Bossard AG | Steel |
| 400 | Chhd screw | 501641 | 501641 | Bossard AG | Steel |
| 410 | Chhd screw | 501663 | 501663 | Bossard AG | Steel |
| 420 | Chhd screw | 501628 | 501628 | Bossard AG | Steel |

| Pos. | Part | Ref.no | | Supplier | Material |
|---|---|---|---|---|---|
| | | HE-50 | HE-100 | | |
| 430 | Chhd screw | 501624 | 501624 | Bossard AG | Steel |
| 440 | Chhd screw | 501640 | 501640 | Bossard AG | Steel |
| 450 | Chhd screw | 501620 | 501620 | Bossard AG | Steel |
| 460 | Cylindrical pin | 502039 | 502039 | Bossard AG | Steel |
| 470 | Set-screw | 501898 | 501898 | Bossard AG | Steel |
| 480 | Set-screw | 501917 | 501917 | Bossard AG | Steel |
| 500* | O-ring | 503101 | 503101 | Busak+Shamban AG | NBR |
| 510 | Non-return throttle valve | 505024 | 505024 | Wirth+Schwaar AG | Steel |
| 520 | Chhd screw | 504799 | 504799 | Bossard AG | Steel |
| 530 | Ribbed washer | 502364 | 502364 | Bossard AG | Steel |
| 540 | Ribbed washer | 502365 | 502365 | Bossard AG | Steel |
| 550 | Ribbed washer | 502366 | 502366 | Bossard AG | Steel |
| 600 | Nameplate | 41620 | 41620 | Montech AG | Polyester metall. |
| 610 | Operating Instructions | 505692 | 505692 | Montech AG | Paper |

* The marked articles can be delivered within 24 hours.

# Environmental compatibility and disposal

## Materials used

- Aluminium
- Steel
- Bronze
- Acrylonitrile-butadiene rubber (NBR as per ISO 1629)
- POM Polyoxymethylene (Polyacetal)
- Polyester
- Paraffinic mineral oil, synthetic hydrocarbon

## Surface treatment

- Anodizing of aluminium
- Blackening of steel

## Shaping processes

- Machining of aluminium, bronze, POM and steel
- Moulding of NBR gaskets
- Die casting of POM

## Emissions during operation

- None

When the devices are operated with oiled air we recommend that the exhaust air be returned to the atmosphere through an oil filter or separator.

## Disposal

Lifting devices that are no longer serviceable should not be disposed of as complete units, but dismantled into their parts which can be recycled according to the material of which they are made. The kind of material used for every part is shown in the spare parts list. Material that cannot be recycled should be disposed of appropriately.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