

Guide axes ELFR, without drive

FESTO



Characteristics

At a glance

- Driveless linear guide units with guide and freely movable slide
- The guide axis is designed to support force and torque capacity in multi-axis applications
- Higher torsional resistance
- Reduced vibrations with dynamic loads
- Drive axis and guide axis can be arranged adjacent to or above one another
- Plain-bearing guide
 - For small loads
 - Restricted operating behaviour with torque load
 - Guide not backlash-free
- Recirculating ball bearing guide
 - For medium loads
 - Very good operating behaviour with torque load
 - Backlash-free guide (preloaded guide elements)

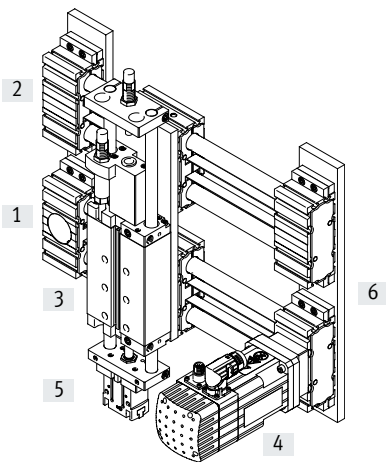
Associated drive axis

Toothed belt axis ELGR



- For size 35, 45, 55
- Load capacity up to max. 300 N or 124 Nm
- Max. feed force of 350 N

System product for handling and assembly technology



System components and accessories

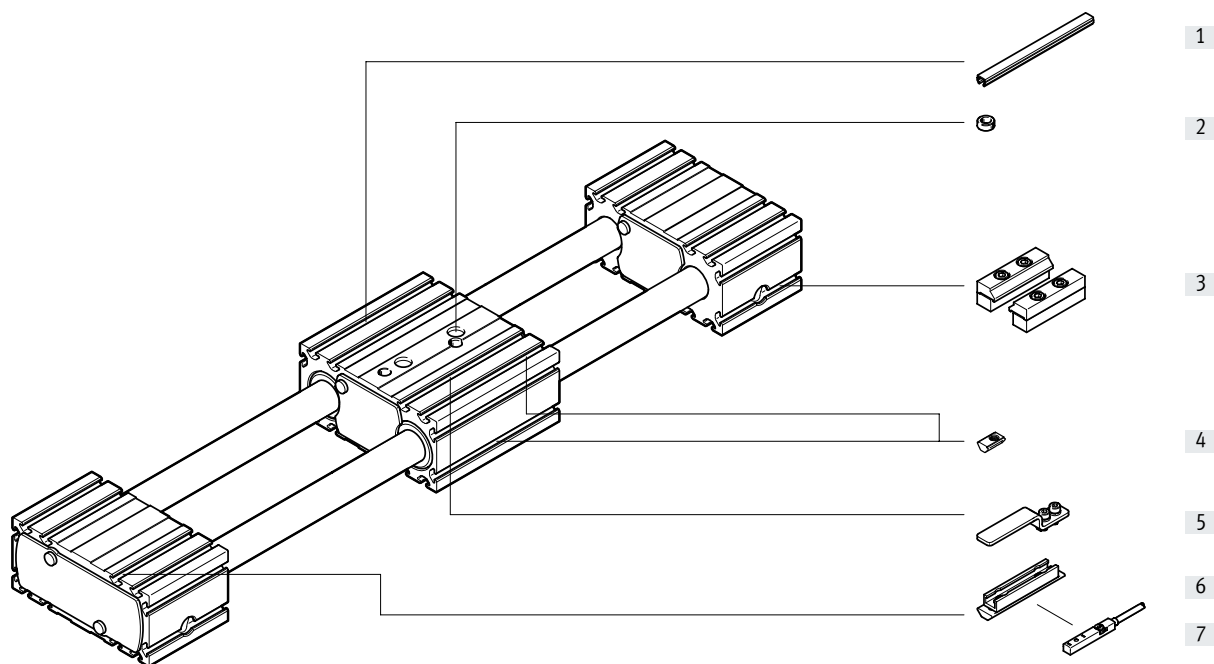
| | Description | → Page/Internet |
|----------------|---|-----------------|
| [1] Axes | Wide range of combinations possible within handling and assembly technology | axis |
| [2] Guide axes | To support force and torque capacity in multi-axis applications | guide axis |
| [3] Drives | Wide range of combinations possible within handling and assembly technology | drive |
| [4] Motors | Servo and stepper motors, with or without gear unit | motor |
| [5] Grippers | Wide range of variations possible within handling and assembly technology | gripper |
| [6] Adapters | For drive/drive and drive/gripper connections | adapter kit |

Type codes

| | | |
|-------------|----------------------------------|--|
| 001 | Series | |
| ELFR | Guide axis, without drive | |
| 002 | Guide | |
| GF | Plain bearing | |
| | Recirculating ball bearing guide | |
| 003 | Size | |
| 35 | 35 | |
| 45 | 45 | |
| 55 | 55 | |
| 004 | Stroke | |
| ... | 50 ... 1500 | |
| 005 | Stroke reserve | |
| 0H | None | |
| ...H | 0 ... 999 mm | |
| 006 | Slide design | |
| | Standard | |
| L | Slide, long | |

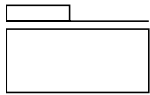
| | | |
|--------------|---|--|
| 007 | Additional slide | |
| | None | |
| ZR | 1 slide right | |
| ZL | 1 slide left | |
| ZB | Additional slide 1x left, 1x right | |
| 008 | Proximity sensor, inductive, slot 8, N/O contact, cable 7.5 m | |
| | Without | |
| ...SA | 1 ... 6 units | |
| 009 | Proximity sensor, inductive, slot 8, N/C contact, cable 7.5 m | |
| | Without | |
| ...SB | 1 ... 6 units | |
| 010 | Mounting slot covering | |
| | None | |
| ...NC | 1 ... 50 units | |
| 011 | Slot nut for mounting slot | |
| | Without | |
| ...NM | 1 ... 99 units | |
| 012 | Profile mounting | |
| | None | |
| ...MA | 1 ... 2 units | |




Peripherals overview

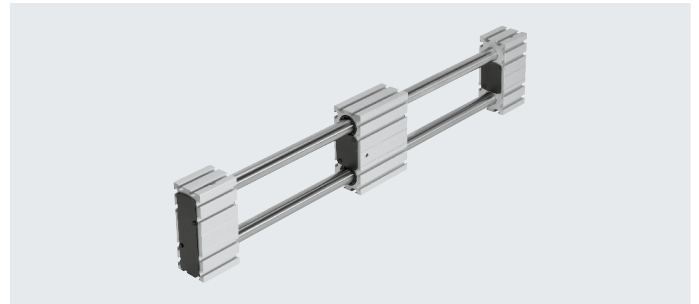


| Variants and accessories | | |
|--|--|-----------------|
| Type/order code | Description | → Page/Internet |
| [1] Slot cover NC | <ul style="list-style-type: none"> For protection against contamination | 13 |
| [2] Centring sleeve ZBH | <ul style="list-style-type: none"> For centring loads and attachments on the slide 2 centring sleeves included in the scope of delivery of the axis | 13 |
| [3] Profile mounting MA | For mounting the axis on the bearing cap | 12 |
| [4] Slot nut NM | For mounting attachments | 13 |
| [5] Switch lug SA, SB | For sensing the slide position | 12 |
| [6] Sensor bracket SA, SB | Adapter for mounting the inductive proximity switches on the axis | 12 |
| [7] Proximity switch, T-slot SA, SB | <ul style="list-style-type: none"> Inductive proximity switch, for T-slot 1 switch lug and 1 sensor bracket are included in the scope of delivery with the order code SA, SB | 13 |
| – Connecting cable NEBU | For proximity switch (order code SA and SB) | 13 |

Data sheet



-  Size
35 ... 55
-  Stroke length
50 ... 1500 mm
-  www.festo.com



| General technical data | | | | |
|-------------------------------------|---------------------|----------------------------------|-------------|-------------|
| Size | | 35 | 45 | 55 |
| Design | | Guide axis without drive | | |
| Guide | | Recirculating ball bearing guide | | |
| | | Plain-bearing guide | | |
| Mounting position | | Any | | |
| Working stroke | [mm] | 50 ... 800 | 50 ... 1000 | 50 ... 1500 |
| Max. no-load resistance to shifting | [N] | 3 | 6 | 10 |
| Max. speed | | | | |
| Recirculating ball bearing guide | [m/s] | 3 | | |
| Plain-bearing guide | [m/s] | 1 | | |
| Max. acceleration | [m/s ²] | 50 | | |

| Operating and environmental conditions | | | |
|--|------|-------------|--|
| Ambient temperature | | | |
| Recirculating ball bearing guide | [°C] | -10 ... +50 | |
| Plain-bearing guide | [°C] | 0 ... +40 | |
| Degree of protection | | IP20 | |

| Weight [kg] | | | | |
|---|--|-----|-----|-----|
| Size | | 35 | 45 | 55 |
| Recirculating ball bearing guide | | | | |
| Basic weight with 0 mm stroke ¹⁾ | | | | |
| Standard slide | | 1.2 | 2.7 | 4.6 |
| Long slide | | 1.6 | 3.8 | 6.5 |
| Additional weight per 1000 mm stroke | | 2.4 | 5.0 | 7.7 |
| Moving mass | | 0.4 | 0.9 | 1.7 |
| Slide | | | | |
| Standard slide | | 0.4 | 0.9 | 1.7 |
| Long slide | | 0.7 | 1.5 | 2.8 |
| Additional slide | | 0.4 | 0.9 | 1.7 |

1) Including slide

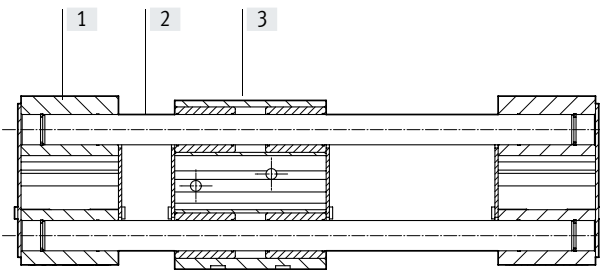
Data sheet

| Weight [kg] | | | |
|---|-----|-----|-----|
| Size | 35 | 45 | 55 |
| Plain-bearing guide | | | |
| Basic weight with 0 mm stroke ¹⁾ | | | |
| Standard slide | 1.1 | 2.5 | 4.2 |
| Long slide | 1.6 | 3.7 | 6.4 |
| Additional weight per 1000 mm stroke | 2.3 | 5.0 | 7.7 |
| Moving mass | 0.3 | 0.7 | 1.3 |
| Slide | | | |
| Standard slide | 0.3 | 0.7 | 1.3 |
| Long slide | 0.6 | 1.5 | 2.6 |
| Additional slide | 0.3 | 0.7 | 1.3 |

1) Including slide

Materials

Sectional view

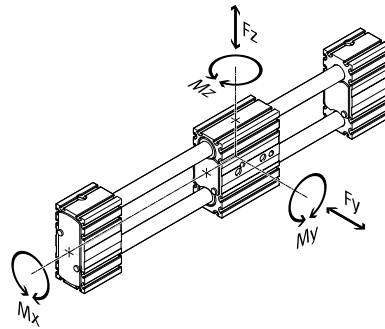


| Axis | | |
|------|----------------------|--|
| [1] | Bearing cap, profile | Anodised wrought aluminium alloy |
| [2] | Guide rods | Steel |
| [3] | Slide, profile | Anodised wrought aluminium alloy |
| | Note on materials | RoHS-compliant |
| | | Contains paint-wetting impairment substances |

Data sheet

Characteristic load values

The indicated forces and torques refer to the centre of the guide. The point of application of force is the point where the centre of the guide and the longitudinal centre of the slide intersect. These values must not be exceeded during dynamic operation. Special attention must be paid to the deceleration phase.



If the axis is subjected to two or more of the indicated forces and torques simultaneously, the following equation must be satisfied in addition to the indicated maximum loads:

Calculating the load comparison factor:

$$f_v = \frac{|F_{y1}|}{F_{y2}} + \frac{|F_{z1}|}{F_{z2}} + \frac{|M_{x1}|}{M_{x2}} + \frac{|M_{y1}|}{M_{y2}} + \frac{|M_{z1}|}{M_{z2}} \leq 1$$

F_1/M_1 = dynamic value

F_2/M_2 = maximum value

Permissible forces and torques for a service life of 5000 km

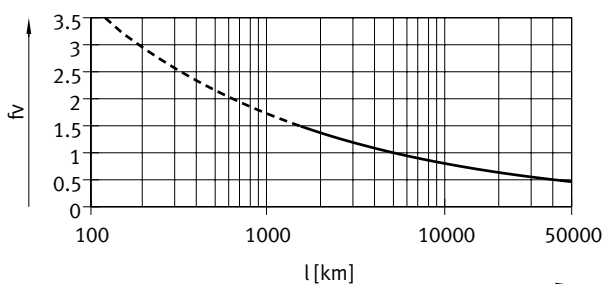
| Guide | Plain-bearing guide | | | Recirculating ball bearing guide | | |
|--------------------------------|---------------------|-----|-----|----------------------------------|-----|-----|
| Size | 35 | 45 | 55 | 35 | 45 | 55 |
| $F_{y_{max}}, F_{z_{max}}$ [N] | 50 | 100 | 300 | 50 | 100 | 300 |
| Standard slide | | | | | | |
| $M_{x_{max}}$ [Nm] | 1 | 2.5 | 5 | 2.5 | 5 | 15 |
| $M_{y_{max}}$ [Nm] | 4 | 8 | 16 | 8 | 16 | 48 |
| $M_{z_{max}}$ [Nm] | 4 | 8 | 16 | 8 | 16 | 48 |
| Long slide | | | | | | |
| $M_{x_{max}}$ [Nm] | 1 | 2.5 | 5 | 2.5 | 5 | 15 |
| $M_{y_{max}}$ [Nm] | 10 | 20 | 40 | 20 | 40 | 124 |
| $M_{z_{max}}$ [Nm] | 10 | 20 | 40 | 20 | 40 | 124 |

Service life

The service life of the guide depends on the load. To provide a rough indication of the service life of the guide, the graph below plots the load comparison factor f_v against the service life.

These values are only theoretical. You must consult your local contact person at Festo for load comparison factors f_v greater than 1.5.

Load comparison factor f_v as a function of service life



Example:

A user wants to move an X kg load. Using the above formula gives a value of 1.5 for the load comparison factor f_v . According to the graph, the guide would have a service life of approx. 1500 km. Reducing the acceleration reduces the M_z and M_y values. A load comparison factor of 1 now gives a service life of 5000 km.

Note

Engineering software
 Electric Motion Sizing
www.festo.com/x/electric-motion-sizing

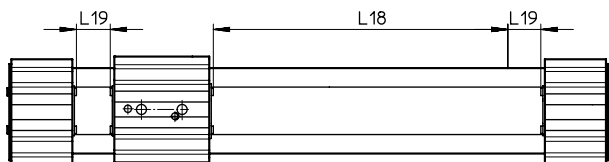
Data sheet

Minimum nominal stroke

With standard slide or long slide L with additional slide ZR/ZL/ZB

| Size | 35 | | | 45 | | | 55 | | |
|--------------------------|-----|-------|-----|-----|-------|-----|-----|-------|-----|
| Variant | -/L | ZR/ZL | ZB | -/L | ZR/ZL | ZB | -/L | ZR/ZL | ZB |
| Min. nominal stroke [mm] | 50 | 126 | 202 | 50 | 146 | 242 | 50 | 166 | 282 |

Stroke reserve



L18 = Nominal stroke
L19 = Stroke reserve

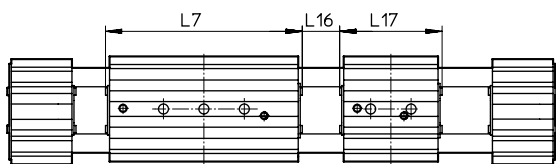
- The stroke reserve is a safety distance from the mechanical end position and is not used in normal operation
- The sum of the nominal stroke and 2x stroke reserve must not exceed the maximum permissible working stroke
- The stroke reserve length can be freely selected
- The stroke reserve is defined via the "stroke reserve" characteristic in the modular product system.

Example:

Type ELFR-45-500-20H-...
 Nominal stroke = 500 mm
 2x stroke reserve = 40 mm
 Working stroke = 540 mm
 (540 mm = 500 mm + 2x 20 mm)

Working stroke reduction

With standard slide or long slide L with additional slide ZR/ZL/ZB



L7 = Length of slide
L16 = Distance between the two slides
L17 = Length of additional slide

- For a toothed belt axis with additional slide, the working stroke is reduced by the length of the additional slide and the distance between the two slides
- If the variant long slide L is ordered, the additional slide is not extended

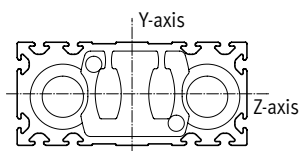
Example:

Type ELFR-35-500-...-ZR
 Working stroke = 500 mm
 L16 = 10 mm
 L7, L17 = 76 mm
 Working stroke with additional slide = 414 mm
 (500 mm - 10 mm - 76 mm)

Dimensions – Additional slide

| Size | 35 | | | 45 | | | 55 | | |
|--------------------------------------|-----|--|--|----|--|--|-----|--|--|
| Length L17 [mm] | 76 | | | 96 | | | 116 | | |
| Distance between the slides L16 [mm] | ≥ 0 | | | | | | | | |

2nd moments of area



| Size | 35 | | | 45 | | | 55 | | |
|-----------------------------------|----------------------|--|--|-----------------------|--|--|-----------------------|--|--|
| I _y [mm ⁴] | 4.19x10 ³ | | | 17.95x10 ³ | | | 41.18x10 ³ | | |
| I _z [mm ⁴] | 3.77x10 ³ | | | 15.71x10 ³ | | | 38.35x10 ³ | | |

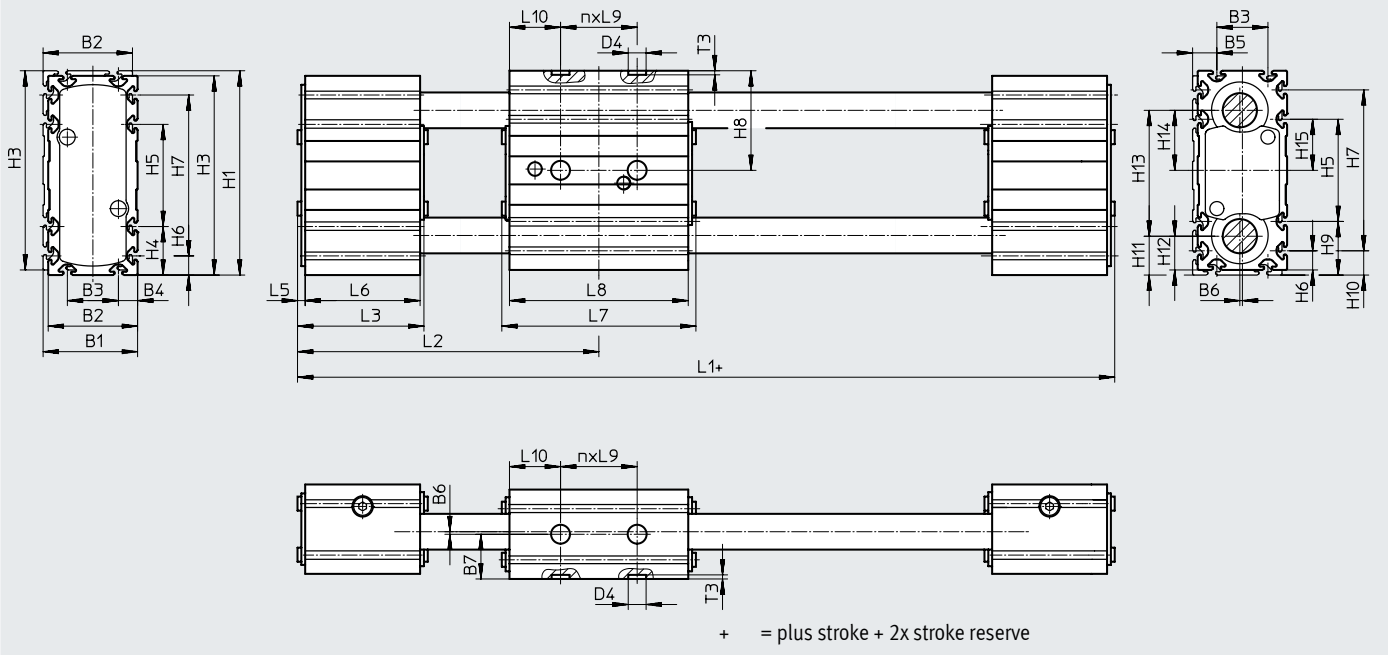
Recommended deflection limits

Adherence to a maximum deflection of 0.5 mm is recommended so as not to impair the functionality of the axes. Greater deformation can result in increased friction, greater wear and reduced service life.

Data sheet

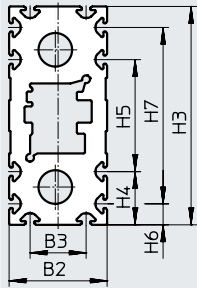
Dimensions

Download CAD data → www.festo.com

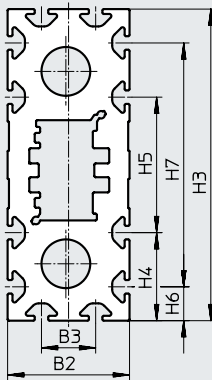


Profile

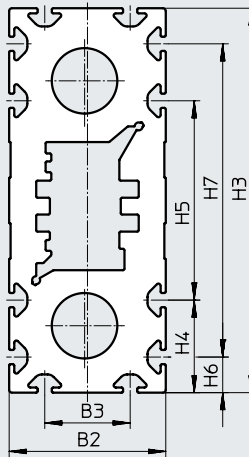
ELFR-35



ELFR-45



ELFR-55



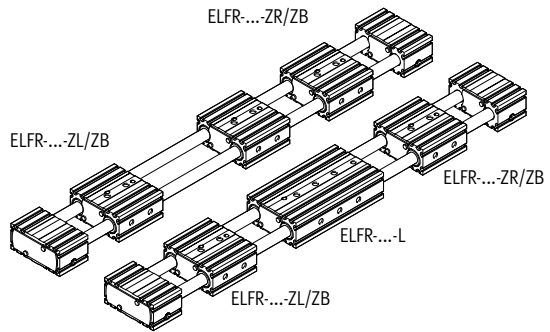
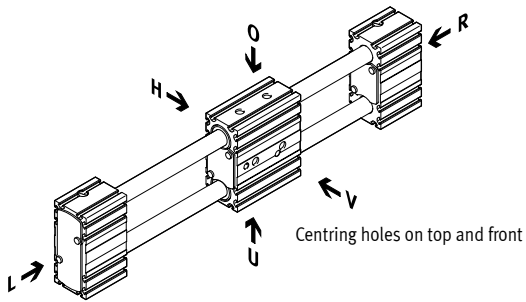
| Size | B1 | B2 | B3 | B4 | B5 | B6 | B7 | D4 ∅ H7 | H1 | H3 | H4 | H5 | H6 | H7 | H8 | H9 |
|-----------|----|----|----|------|------|----|------|---------------|-----|-----|------|----|------|-----|------|------|
| ELFR-35 | 37 | 35 | 20 | 7.5 | 9.5 | | 17.5 | | 80 | 78 | 19 | 40 | 7.5 | 63 | 39 | 21 |
| ELFR-35-L | | | | | | | | | | | | | | | | |
| ELFR-45 | 47 | 45 | 20 | 12.5 | 14.5 | 1 | 22.5 | 7 | 117 | 115 | 32.5 | 50 | 12.5 | 90 | 57.5 | 34.5 |
| ELFR-45-L | | | | | | | | | | | | | | | | |
| ELFR-55 | 57 | 55 | 30 | 12.5 | 14.5 | | 27.5 | | 137 | 135 | 32.5 | 70 | 12.5 | 110 | 67.5 | 34.5 |
| ELFR-55-L | | | | | | | | | | | | | | | | |

| Size | H10 | H11 | H12 | H13 | H14 | H15 | L1 | L2 | L3 | L5 | L6 | L7 | L8 | L9 | L10 | n | T3 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|----|----|----|-----|-----|----|-----|---|-----|
| ELFR-35 | | | | | | | 178 | 89 | 51 | | 45 | 76 | 70 | 30 | 20 | 1 | 1.6 |
| ELFR-35-L | | | | | | | 248 | 124 | | | | 146 | 140 | | 40 | 2 | |
| ELFR-45 | | | | | | | 219 | 108 | 60 | 3 | 54 | 96 | 90 | 40 | 25 | 1 | |
| ELFR-45-L | | | | | | | 309 | 153 | | | | 186 | 180 | | 50 | 2 | |
| ELFR-55 | | | | | | | 243 | 120 | 62 | | 56 | 116 | 110 | 40 | 35 | 1 | |
| ELFR-55-L | | | | | | | 353 | 175 | | | | 226 | 220 | | 70 | 2 | |

Ordering data – Modular product system

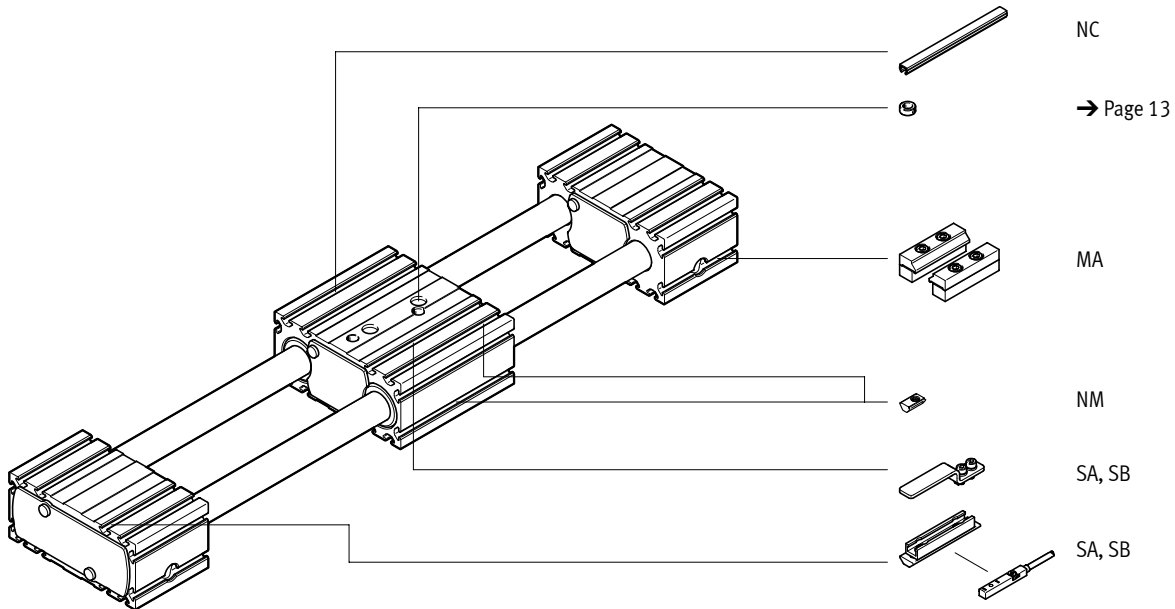
Order code

Mandatory data



- | | |
|----------|---------|
| O top | L left |
| U bottom | V front |
| R right | H rear |

Accessories



Ordering data – Modular product system

| Ordering table | | | | | | | | | | | | |
|---|-----------------------------------|--|--|---------------------------------------|--|--|------------|--|--|------------|-------|------------|
| Size | 35 | | | 45 | | | 55 | | | Conditions | Code | Enter code |
| Module no. | 571435 | | | 571436 | | | 571437 | | | | | |
| Design | Guide axis | | | | | | | | | | ELFR | ELFR |
| Guide | Recirculating ball bearing guide | | | | | | | | | | | |
| | Plain-bearing guide | | | | | | | | | | -GF | |
| Size | 35 | | | 45 | | | 55 | | | | -... | -... |
| Stroke length [mm] | 1 ... 800 | | | 1 ... 1000 | | | 1 ... 1500 | | | | -... | -... |
| Stroke reserve [mm] | 0 ... 999 (0 = no stroke reserve) | | | | | | | | | [1] | -...H | |
| Slide design | Standard slide | | | | | | | | | | | |
| | Long slide | | | | | | | | | | -L | |
| Additional slide | No additional slide | | | | | | | | | | | |
| | 1 slide on right | | | | | | | | | [2] | -ZR | |
| | 1 slide on left | | | | | | | | | [2] | -ZL | |
| | 1 slide on right, 1 slide on left | | | | | | | | | [2] | -ZB | |
| Accessories | Accessories enclosed separately | | | | | | | | | | + | + |
| Proximity switch (SIES), inductive, slot type 8, PNP, including switch lug and sensor bracket | N/O contact, 7.5 m cable | | | 1 ... 6 | | | | | | | ...SA | |
| | N/C contact, 7.5 m cable | | | 1 ... 6 | | | | | | | ...SB | |
| Mounting slot cover | - | | | 1 ... 50 (1 = 2 units, 500 mm length) | | | | | | | ...NC | |
| Slot nut for mounting slot | 1 ... 99 | | | | | | | | | | ...NM | |
| Profile mounting | 1 ... 2 | | | | | | | | | | ...MA | |

[1] -... The sum of nominal stroke and 2x stroke reserve must not exceed the maximum stroke length.

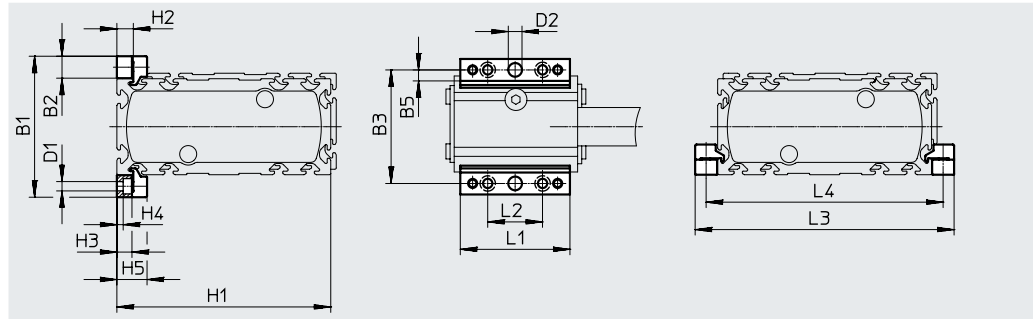
[2] ZR, ZL, ZB working stroke reduction → page 8

| Size | 35 | | | 45 | | | 55 | | |
|--------------------------|-----|-------|-----|-----|-------|-----|-----|-------|-----|
| | -/L | ZR/ZL | ZB | -/L | ZR/ZL | ZB | -/L | ZR/ZL | ZB |
| Min. nominal stroke [mm] | 50 | 126 | 202 | 50 | 146 | 242 | 50 | 166 | 282 |

Accessories

Profile mounting MUE (order code MA)

Material:
Anodised aluminium
RoHS-compliant



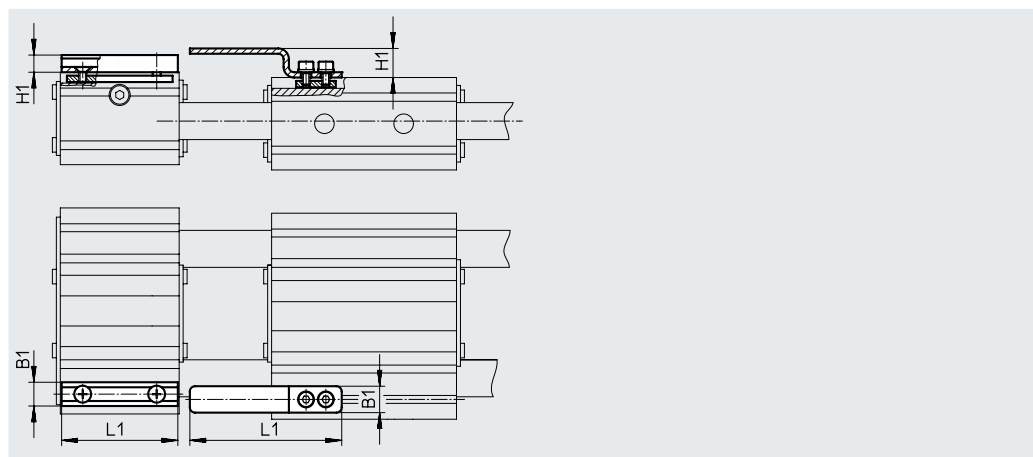
Dimensions and ordering data

| For size | B1 | B2 | B3 | B5 | D1 ∅ | D2 ∅ H7 | H1 | H2 | H3 | H4 |
|----------|----|----|----|----|---------|---------------|-----|----|-----|-----|
| 35 | 51 | 8 | 43 | 4 | 3.4 | 5 | 78 | 6 | 5.5 | 2.3 |
| 45 | 69 | 12 | 57 | 4 | 5.5 | 5 | 115 | 10 | 9 | 3.2 |
| 55 | 79 | 12 | 67 | 4 | 5.5 | 5 | 135 | 10 | 9 | 3.2 |

| For size | H5 | L1 | L2 | L3 | L4 | Weight [g] | Part no. | Type |
|----------|------|----|----|-----|-----|---------------|----------|--------|
| 35 | 11 | 40 | 20 | 94 | 86 | 20 | 558042 | MUE-50 |
| 45 | 17.5 | 52 | 40 | 139 | 127 | 32 | 562238 | MUE-45 |
| 55 | 17.5 | 52 | 40 | 159 | 147 | 32 | 562238 | MUE-45 |

Sensor bracket EAPM-...-SHS, switch lug EAPM-...-SLS (order code SA/SB)




Material:
Switch lug: galvanised steel
Sensor bracket: anodised wrought
aluminium alloy
RoHS-compliant



Dimensions and ordering data

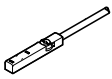
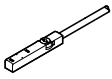
| For size | B1 | H1 | L1 | Weight [g] | Part no. | Type |
|-----------------------|----|-----|------|---------------|----------|-------------|
| Sensor bracket | | | | | | |
| 35, 45, 55 | 9 | 6.5 | 44 | 20 | 567537 | EAPM-L4-SHS |
| Switch lug | | | | | | |
| 35, 45, 55 | 10 | 11 | 57.5 | 15 | 567538 | EAPM-L4-SLS |



Accessories

| Ordering data | | | | | | |
|---|------------|---------------------------------|------------|----------|----------|------------------|
| | For size | Comment | Order code | Part no. | Type | PU ¹⁾ |
| Slot nut NST | | | | | | |
|  | 35 | For mounting slot | NM | 558045 | NST-3-M3 | 1 |
| | 45, 55 | | | 150914 | NST-5-M5 | |
| Centring sleeve ZBH²⁾ | | | | | | |
|  | 35, 45, 55 | For slide | - | 186717 | ZBH-7 | 10 |
| Slot cover ABP | | | | | | |
|  | 45, 55 | For mounting slot Each 0.5 m | NC | 151681 | ABP-5 | 2 |

1) Packaging unit

2) 2 centring sleeves included in the scope of delivery of the axis

| Ordering data – Proximity switches for T-slot, inductive | | | | | | | Data sheets → Internet: sies | |
|---|--|-----------------------|------------------|------------------|------------|----------|------------------------------|--|
| | Type of mounting | Electrical connection | Switching output | Cable length [m] | Order code | Part no. | Type | |
| N/O contact | | | | | | | | |
|  | Insertable in the slot from above, flush with the cylinder profile | Cable, 3-wire | PNP | 7.5 | SA | 551386 | SIES-8M-PS-24V-K-7.5-OE | |
| | | Plug M8x1, 3-pin | | 0.3 | - | 551387 | SIES-8M-PS-24V-K-0.3-M8D | |
| | | Cable, 3-wire | NPN | 7.5 | - | 551396 | SIES-8M-NS-24V-K-7.5-OE | |
| | | Plug M8x1, 3-pin | | 0.3 | - | 551397 | SIES-8M-NS-24V-K-0.3-M8D | |
| N/C contact | | | | | | | | |
|  | Insertable in the slot from above, flush with the cylinder profile | Cable, 3-wire | PNP | 7.5 | SB | 551391 | SIES-8M-PO-24V-K-7.5-OE | |
| | | Plug M8x1, 3-pin | | 0.3 | - | 551392 | SIES-8M-PO-24V-K-0.3-M8D | |
| | | Cable, 3-wire | NPN | 7.5 | - | 551401 | SIES-8M-NO-24V-K-7.5-OE | |
| | | Plug M8x1, 3-pin | | 0.3 | - | 551402 | SIES-8M-NO-24V-K-0.3-M8D | |

| 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 | | |