ROLLON®
BY TIMKEN

# Smart System


NEW

# TO SUPPORT YOU, WE DESIGN AND PRODUCE

An industrialized process with various levels of customization

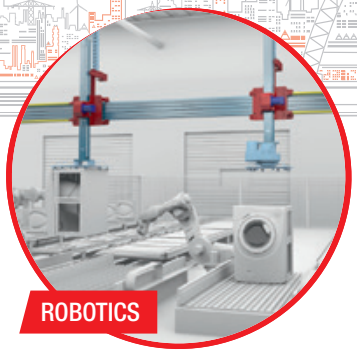


**For over 45 years, Rollon has adopted an approach entailing responsibility and ethics in the design and production of our linear motion solutions for different industrial sectors.** The reliability of an international technology group has now been combined with the availability of a local support and service network

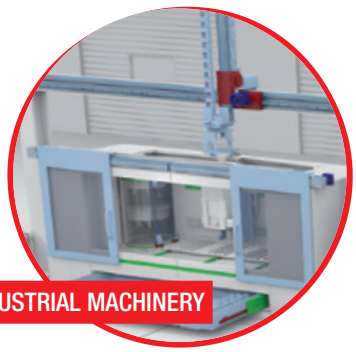
**VALUES**

**PERFORMANCE**

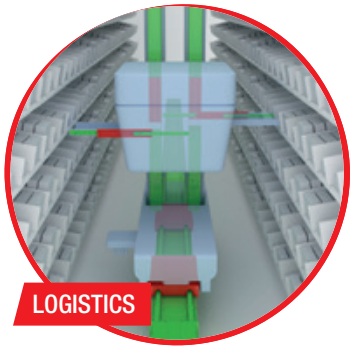
**Rollon's goal is to help our clients become more competitive in their markets** through technological solutions, design simplification, productivity, reliability, duration, and low maintenance.



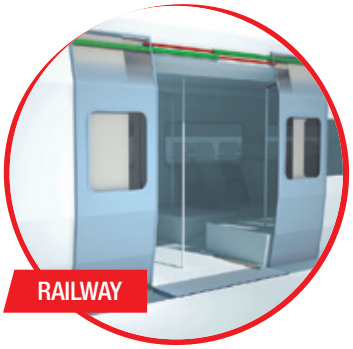
ROBOTICS



INDUSTRIAL MACHINERY



LOGISTICS



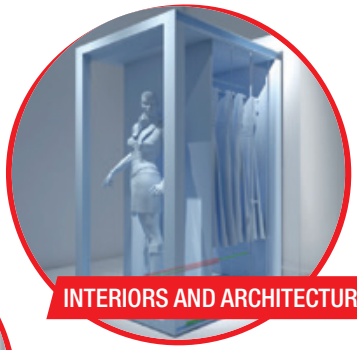
RAILWAY

## COLLABORATION

**High-level technical consulting and cross-competence allow us to identify the needs of our clients** and transform them into guidelines for continuous exchange, while**our strong specialization in the different industrial sectors becomes an factor in developing projects and innovative applications.**

**Rollon takes on the task of design and development of linear motion solutions,** taking care of everything for our customers, so that they can concentrate on their core business. **We offer everything from individual components to specifically designed, mechanically integrated systems: the quality of our applications is an expression of our technology and competence.**

## SOLUTIONS APPLICATIONS



INTERIORS AND ARCHITECTURE

MEDICAL

SPECIAL VEHICLES

AERONAUTICS

# DIVERSIFIED LINEAR SOLUTIONS FOR EVERY APPLICATION REQUIREMENT

## Linear and telescopic rails

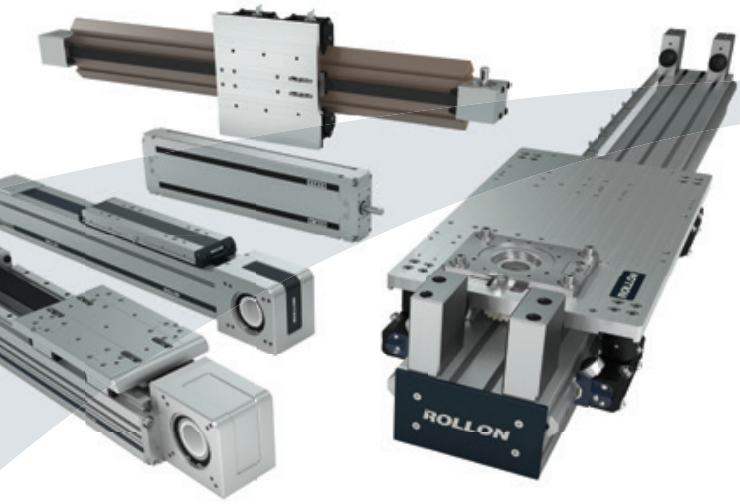

### Linear Line

**Linear and curved rails with ball and roller bearings,** with hardened raceways, high load capacity, self-alignment, and capable of working in dirty environments.

### Telescopic Line

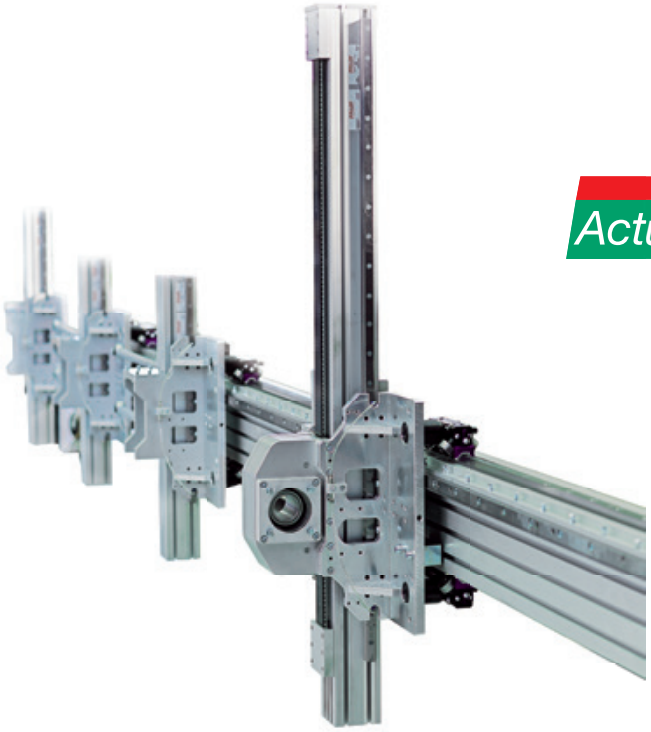
**Telescopic rails with ball and roller bearings,** with hardened raceways, high load capacities, low bending, resistant to shocks and vibrations. For partial, total or extended extraction up to 200% of the length of the guide.

# Linear actuators and automation systems




## Actuator Line

**Linear actuators with different rail configurations and transmissions,** available with belt, screw, or rack and pinion drives for different needs in terms of precision and speed. Rails with bearings or ball recycle systems for different load capacities and critical environments.



## Actuator System Line

**Integrated actuators for industrial automation,** used in applications in several industrial sectors: automated industrial machinery, precision assembly lines, packaging lines and high speed production lines. The Actuator Line evolves to satisfy the requests of our most discerning clients.

# Smart System

# E-SMART series

## E-SMART series description

Fig. 1

**E-SMART**

The E-SMART series linear units are available in four sizes: 30 - 50 - 80 - 100 mm. They have a self-supporting structure with a robust profile of extruded and anodized aluminum. The thrust force is transmitted by a steel reinforced, polyurethane belt. The moving carriage is guided and supported by a recirculating ball guide system featuring one or more blocks.

## The components

### Extruded bodies

The anodized aluminum extrusions used for the bodies of the E-SMART series linear units are designed and manufactured by industry experts to optimize weight while maintaining mechanical strength. (see physical-chemical characteristics below).The dimensional tolerances comply with EN 755-9 standard.

Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

### Driving belt

The Rollon SMART series linear units use steel reinforced polyurethane drive belts with AT pitch. This type of belt is ideal due to its high load transmission characteristics, compact size, and low noise. Used in conjunction with a backlash-free pulley, smooth alternating motion can be achieved.

### Carriage

The carriage of the E-SMART series linear units is made of machined anodized aluminum. The dimensions vary depending on the type. Rollon offers multiple carriages to accomodate a vast array of applications.

## The linear motion system

The linear motion system has been designed to meet the load capacity, speed, and maximum acceleration conditions of a wide variety of applications.

**Performance characteristics:**

- The ball bearing guides with high load capacity are mounted in a dedicated seat on the aluminum body.
- The carriage of the linear unit is assembled on preloaded ball bearing blocks that enables the carriage to withstand loading in the four main directions.
- The ball bearing carriages of the SP versions are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment.
- The blocks have seals on both sides and, when necessary, an additional scraper can be fitted for very dusty conditions.

**The linear motion system described above offers:**

- High speed and acceleration
- High load capacity
- High permissible bending moments
- Low friction
- Long life
- Low noise

## The driving heads

The couple of symmetrical heads is designed to allow the highest freedom while sizing the application and mounting the gearbox on the E-SMART series linear actuators. Therefore, it is possible to assembly the gearbox on both the heads, either on the right or the left side, by means of a standard assembly kit. This feature is also useful when the unit is assembled to be part of a multiaxis system.

The assembly kit includes: shrink disk; adapter plate and fixing hardware; and can be ordered with the actuator. Different kits are available to accomodate gearboxes from the major brands on the market. For more information see pag. SS-15.

The same logic is valid when mounting the shaft to connect two units in parallel.

**E-SMART section**

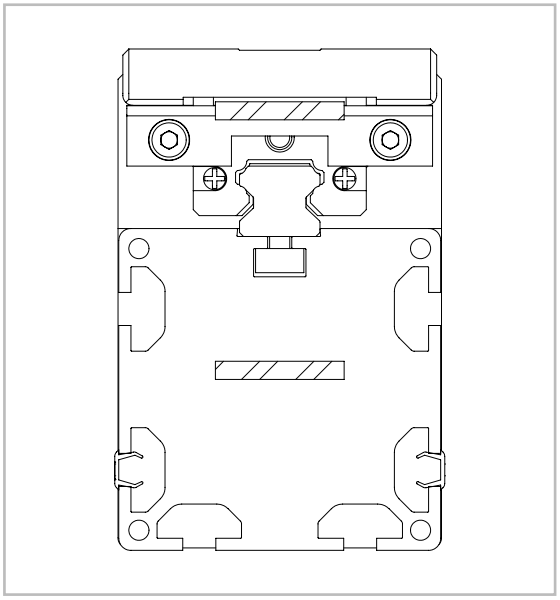
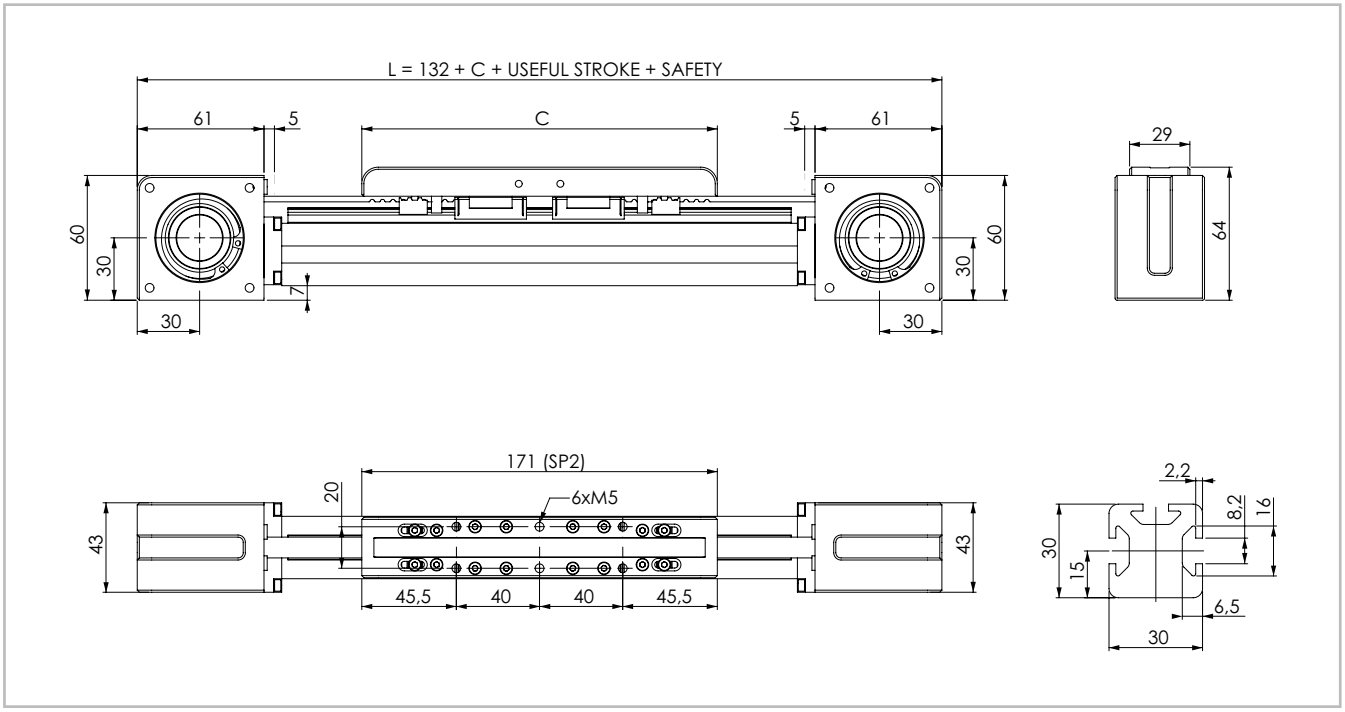


Fig. 2

# E-SMART 30 SP2

## E-SMART 30 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 3

## Technical data

| | Type |
|---|---|
| | E-SMART 30 SP2 |
| Max. useful stroke length [mm] | 3700 |
| Max. positioning repeatability [mm]*1 | ± 0.05 |
| Max. speed [m/s] | 4.0 |
| Max. acceleration [m/s²] | 50 |
| Type of belt | 10 AT 5 |
| Type of pulley | Z 24 |
| Pulley pitch diameter [mm] | 38.2 |
| Carriage displacement per pulley turn [mm] | 120 |
| Carriage weight [kg] | 0.263 |
| Zero travel weight [kg] | 1.873 |
| Weight for 100 mm useful stroke [kg] | 0.343 |
| Starting torque [Nm] | 0.15 |
| Moment of inertia of pulleys [g · mm²] | 57.630 |
| Rail size [mm] | 12 mini |

*1) Positioning repeatability is dependent on the type of transmission used.

Tab. 1

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| E-SMART 30 SP2 | 0.003 | 0.003 | 0.007 |

Tab. 2

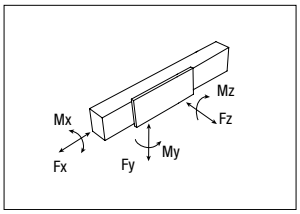
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| E-SMART 30 SP2 | 10 AT 5 | 10 | 0.033 |

Tab. 3

**Belt length (mm) =** 2 x L - 100 (SP2)




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| E-SMART 30 SP2 | 385 | 242 | 7060 | 6350 | 7060 | 46.2 | 166 | 166 |

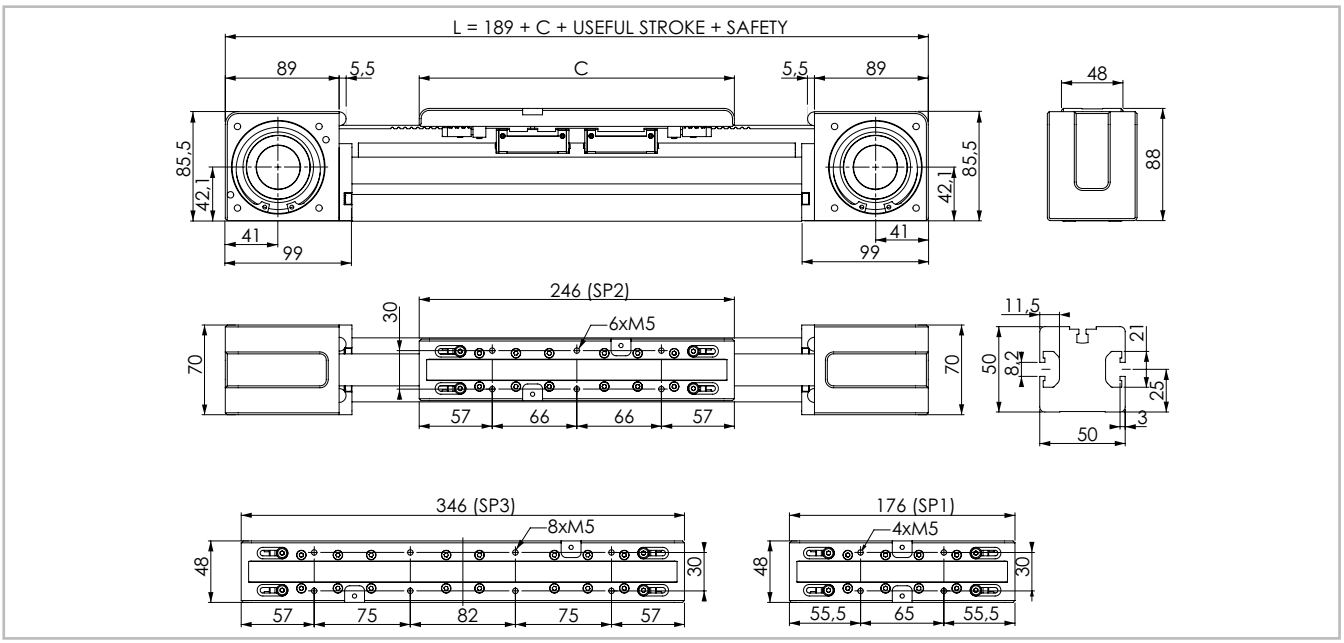
See verification under static load and lifetime on page SL-2 and SL-3

Tab. 4

$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-15).

# E-SMART 50 SP1 - SP2 - SP3

## E-SMART 50 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 4

## Technical data

| | Type | | |
|---|---|---|---|
| | E-SMART 50 SP1 | E-SMART 50 SP2 | E-SMART 50 SP3 |
| Max. useful stroke length [mm]*1 | 6145 | 6075 | 5975 |
| Max. positioning repeatability [mm]*2 | ± 0.05 | ± 0.05 | ± 0.05 |
| Max. speed [m/s] | 4.0 | 4.0 | 4.0 |
| Max. acceleration [m/s²] | 50 | 50 | 50 |
| Type of belt | 25 AT 5 | 25 AT 5 | 25 AT 5 |
| Type of pulley | Z 40 | Z 40 | Z 40 |
| Pulley pitch diameter [mm] | 63.66 | 63.66 | 63.66 |
| Carriage displacement per pulley turn [mm] | 200 | 200 | 200 |
| Carriage weight [kg] | 0.614 | 0.99 | 1.42 |
| Zero travel weight [kg] | 4.961 | 5.665 | 6.469 |
| Weight for 100 mm useful stroke [kg] | 0.441 | 0.376 | 0.431 |
| Starting torque [Nm] | 0.35 | 0.35 | 0.55 |
| Moment of inertia of pulleys [g · mm²] | 891.270 | 891.270 | 891.270 |
| Rail size [mm] | 15 | 15 | 15 |

*1) It is possible to obtain stroke up to 11.270 (SP1), 11.200 (SP2), 11.100 (SP3) by means of special Rollon joints.
*2) Positioning repeatability is dependent on the type of transmission used.

Tab. 5

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| E-SMART 50 SP | 0.021 | 0.020 | 0.041 |

Tab. 6

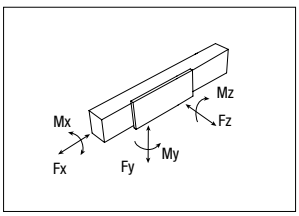
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| E-SMART 50 SP | 25 AT 5 | 25 | 0.080 |

Tab. 7

**Belt length (mm) =** 2 x L - 60 (SP1)
2 x L - 125 (SP2)
2 x L - 225 (SP3)




## Load capacity

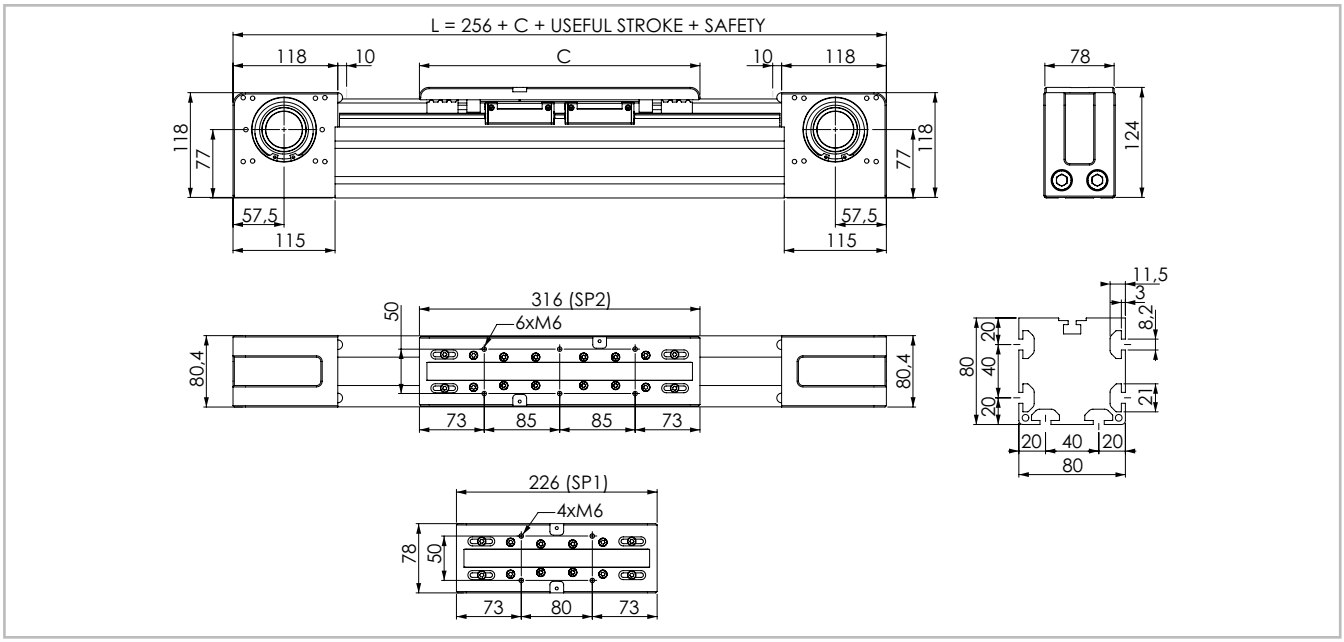
| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| E-SMART 50 SP1 | 1050 | 750 | 12700 | 9860 | 12700 | 120 | 87 | 87 |
| E-SMART 50 SP2 | 1050 | 750 | 25400 | 19720 | 25400 | 240 | 712 | 712 |
| E-SMART 50 SP3 | 1050 | 750 | 38100 | 29580 | 38100 | 360 | 2146 | 2146 |

See verification under static load and lifetime on page SL-2 and SL-3
$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-15).

Tab. 8

# E-SMART 80 SP1 - SP2

## E-SMART 80 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 5

## Technical data

| | Type | |
|---|---|---|
| | E-SMART 80 SP1 | E-SMART 80 SP2 |
| Max. useful stroke length [mm]*1 | 6060 | 5970 |
| Max. positioning repeatability [mm]*2 | ± 0.05 | ± 0.05 |
| Max. speed [m/s] | 4.0 | 4.0 |
| Max. acceleration [m/s$^2$] | 50 | 50 |
| Type of belt | 32 AT 10 | 32 AT 10 |
| Type of pulley | Z 21 | Z 21 |
| Pulley pitch diameter [mm] | 66,84 | 66,84 |
| Carriage displacement per pulley turn [mm] | 210 | 210 |
| Carriage weight [kg] | 1.52 | 2.31 |
| Zero travel weight [kg] | 10.17 | 11.71 |
| Weight for 100 mm useful stroke [kg] | 0.87 | 0.84 |
| Starting torque [Nm] | 0.95 | 1.3 |
| Moment of inertia of pulleys [g · mm$^2$] | 938.860 | 938.860 |
| Rail size [mm] | 20 | 20 |

*1) It is possible to obtain stroke up to 11.190 (SP1), 11.100 (SP2) by means of special Rollon joints.
*2) Positioning repeatability is dependent on the type of transmission used.

Tab. 9

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm$^4$] | $I_y$ [$10^7$ mm$^4$] | $I_p$ [$10^7$ mm$^4$] |
|---|---|---|---|
| E-SMART 80 SP | 0.143 | 0.137 | 0.280 |

Tab. 10

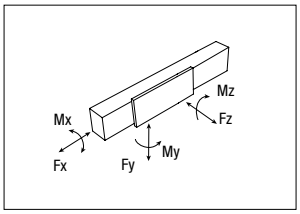
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| E-SMART 80 SP | 32 AT 10 | 32 | 0.186 |

Tab. 11

**Belt length (mm) =** 2 x L - 135 (SP1)
2 x L - 225 (SP2)




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| E-SMART 80 SP1 | 2523 | 1672 | 27700 | 22200 | 27700 | 350 | 240 | 240 |
| E-SMART 80 SP2 | 2523 | 1672 | 55400 | 44400 | 55400 | 700 | 2025 | 2025 |

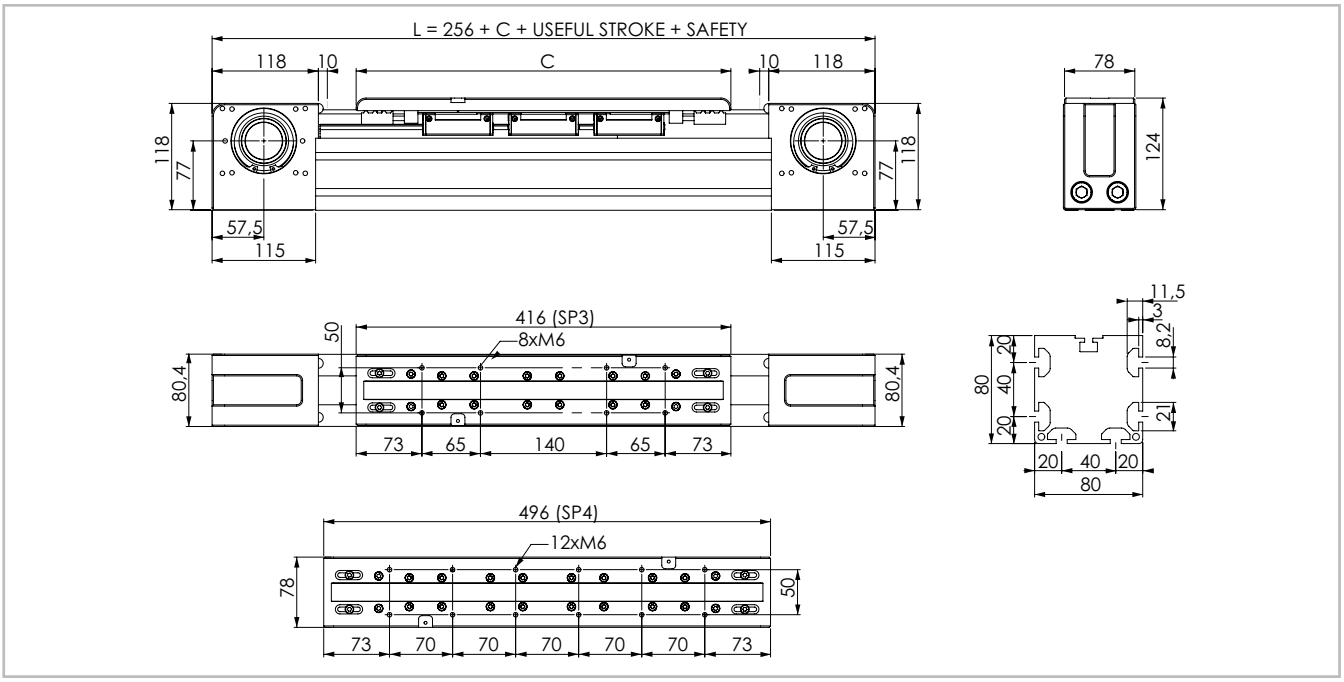
See verification under static load and lifetime on page SL-2 and SL-3

Tab. 12

$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-15).

# E-SMART 80 SP3 - SP4

## E-SMART 80 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 6

## Technical data

| | Type | |
|---|---|---|
| | E-SMART 80 SP3 | E-SMART 80 SP4 |
| Max. useful stroke length [mm]*1 | 5870 | 5790 |
| Max. positioning repeatability [mm]*2 | ± 0.05 | ± 0.05 |
| Max. speed [m/s] | 4.0 | 4.0 |
| Max. acceleration [m/s²] | 50 | 50 |
| Type of belt | 32 AT 10 | 32 AT 10 |
| Type of pulley | Z 21 | Z 21 |
| Pulley pitch diameter [mm] | 66,84 | 66,84 |
| Carriage displacement per pulley turn [mm] | 210 | 210 |
| Carriage weight [kg] | 3.13 | 3.89 |
| Zero travel weight [kg] | 13.39 | 14.80 |
| Weight for 100 mm useful stroke [kg] | 0.83 | 0.87 |
| Starting torque [Nm] | 1.4 | 1.52 |
| Moment of inertia of pulleys [g · mm²] | 938.860 | 938.860 |
| Rail size [mm] | 20 | 20 |

*1) It is possible to obtain stroke up to 11.000 (SP3), 10.920 (SP4) by means of special Rollon joints.
*2) Positioning repeatability is dependent on the type of transmission used.

Tab. 13

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| E-SMART 80 SP | 0.143 | 0.137 | 0.280 |

Tab. 14

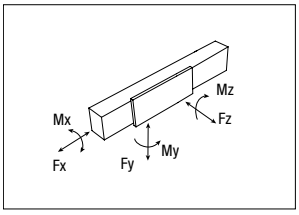
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| E-SMART 80 SP | 32 AT 10 | 32 | 0.186 |

Tab. 15

**Belt length (mm) =** 2 x L - 325 (SP3)
2 x L - 405 (SP4)




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| E-SMART 80 SP3 | 2523 | 1672 | 83100 | 66600 | 83100 | 1050 | 5263 | 5263 |
| E-SMART 80 SP4 | 2523 | 1672 | 110800 | 88800 | 110800 | 1400 | 7479 | 7479 |

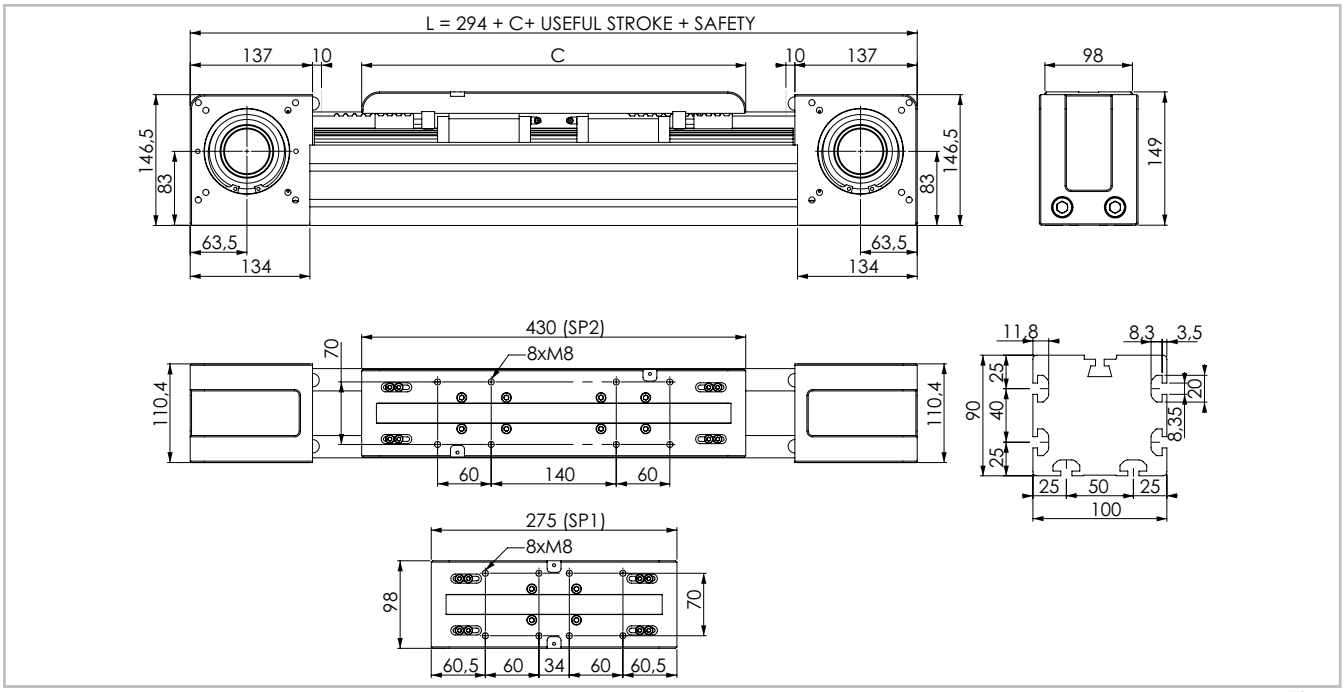
See verification under static load and lifetime on page SL-2 and SL-3

Tab. 16

$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-15).

# E-SMART 100 SP1 - SP2

## E-SMART 100 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 7

## Technical data

| | Type | |
|---|---|---|
| | E-SMART 100 SP1 | E-SMART 100 SP2 |
| Max. useful stroke length [mm]*1 | 6025 | 5870 |
| Max. positioning repeatability [mm]*2 | ± 0.05 | ± 0.05 |
| Max. speed [m/s] | 4.0 | 4.0 |
| Max. acceleration [m/s²] | 50 | 50 |
| Type of belt | 50 AT 10 | 50 AT 10 |
| Type of pulley | Z 27 | Z 27 |
| Pulley pitch diameter [mm] | 85.94 | 85.94 |
| Carriage displacement per pulley turn [mm] | 270 | 270 |
| Carriage weight [kg] | 3.22 | 5.19 |
| Zero travel weight [kg] | 19.396 | 23.165 |
| Weight for 100 mm useful stroke [kg] | 1.186 | 1.188 |
| Starting torque [Nm] | 2.1 | 2.4 |
| Moment of inertia of pulleys [g · mm²] | 4.035.390 | 4.035.390 |
| Rail size [mm] | 25 | 25 |

*1) It is possible to obtain stroke up to 11.155 (SP1), 11.000 (SP2) by means of special Rollon joints.
*2) Positioning repeatability is dependent on the type of transmission used.

Tab. 17

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| E-SMART 100 SP | 0.247 | 0.316 | 0.536 |

Tab. 18

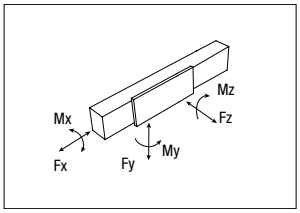
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| E-SMART 100 SP | 50 AT 10 | 50 | 0.290 |

Tab. 19

**Belt length (mm) =** 2 x L - 120 (SP1)
2 x L - 275 (SP2)




## Load capacity

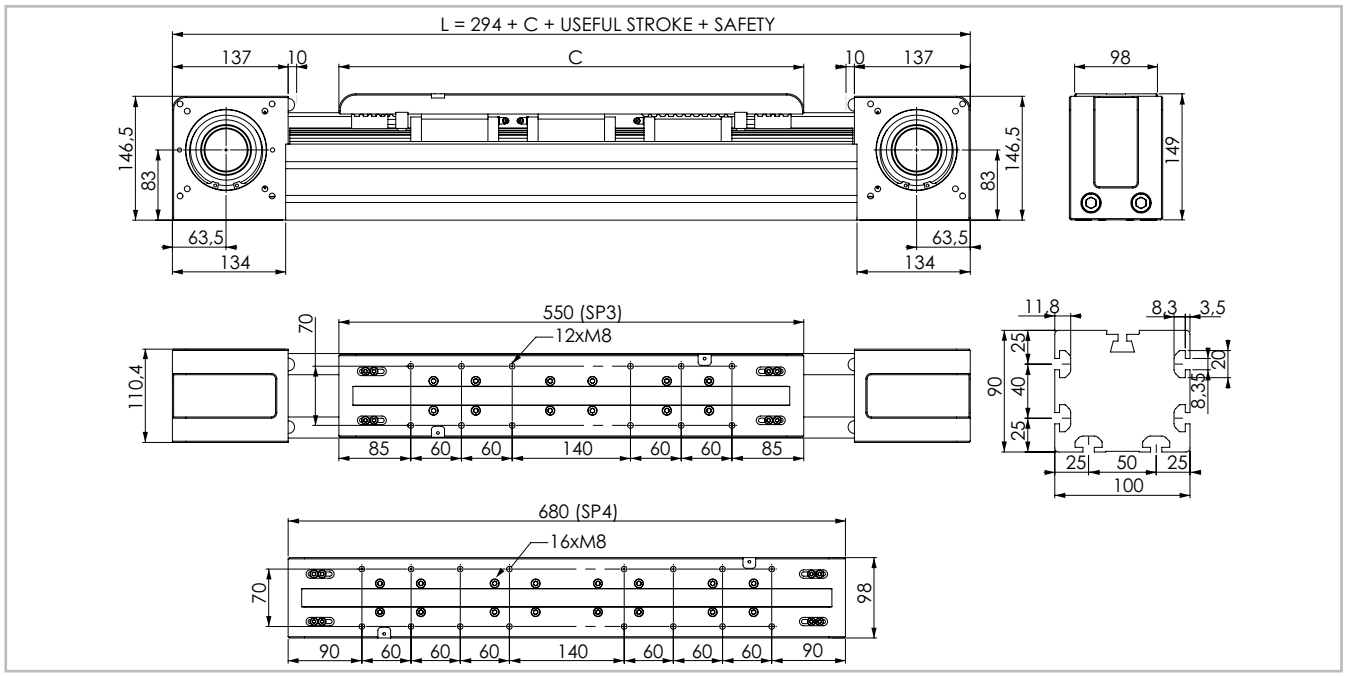
| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| E-SMART 100 SP1 | 4980 | 3390 | 47300 | 34800 | 47300 | 670 | 670 | 670 |
| E-SMART 100 SP2 | 4980 | 3390 | 94600 | 69600 | 94600 | 1340 | 7379 | 7379 |

See verification under static load and lifetime on page SL-2 and SL-3
$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-15).

Tab. 20

# E-SMART 100 SP3 - SP4

## E-SMART 100 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 8

## Technical data

| | Type | |
|---|---|---|
| | E-SMART 100 SP3 | E-SMART 100 SP4 |
| Max. useful stroke length [mm]*1 | 5750 | 5620 |
| Max. positioning repeatability [mm]*2 | ± 0.05 | ± 0.05 |
| Max. speed [m/s] | 4.0 | 4.0 |
| Max. acceleration [m/s²] | 50 | 50 |
| Type of belt | 50 AT 10 | 50 AT 10 |
| Type of pulley | Z 27 | Z 27 |
| Pulley pitch diameter [mm] | 85.94 | 85.94 |
| Carriage displacement per pulley turn [mm] | 270 | 270 |
| Carriage weight [kg] | 6.943 | 8.755 |
| Zero travel weight [kg] | 26.274 | 29.573 |
| Weight for 100 mm useful stroke [kg] | 1.188 | 1.192 |
| Starting torque [Nm] | 2.6 | 2.8 |
| Moment of inertia of pulleys [g · mm²] | 4.035.390 | 4.035.390 |
| Rail size [mm] | 25 | 25 |

*1) It is possible to obtain stroke up to 10.880 (SP3), 10.750 (SP4) by means of special Rollon joints.
*2) Positioning repeatability is dependent on the type of transmission used.

Tab. 21

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| E-SMART 100 SP | 0.247 | 0.316 | 0.536 |

Tab. 22

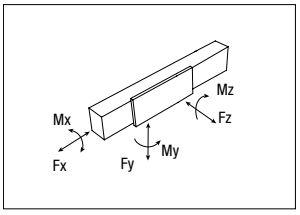
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| E-SMART 100 SP | 50 AT 10 | 50 | 0.290 |

Tab. 23

**Belt length (mm) =** 2 x L - 395 (SP3)
2 x L - 526 (SP4)




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| E-SMART 100 SP3 | 4980 | 3390 | 141900 | 104400 | 141900 | 2010 | 13055 | 13055 |
| E-SMART 100 SP4 | 4980 | 3390 | 189200 | 139200 | 189200 | 2680 | 19204 | 19204 |

See verification under static load and lifetime on page SL-2 and SL-3
$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-15).

Tab. 24

# Lubrication

### SP linear units with ball bearing guides

The ball bearing carriages of the SP versions are fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment of these in the circuits.
This system guarantees a long interval between maintenances: SP version: every 2000 km or 1 year of use, based on the value reached first. If a longer service life is required or in case of high dynamic or high loaded applications please contact our offices for further verification.

### E-SMART

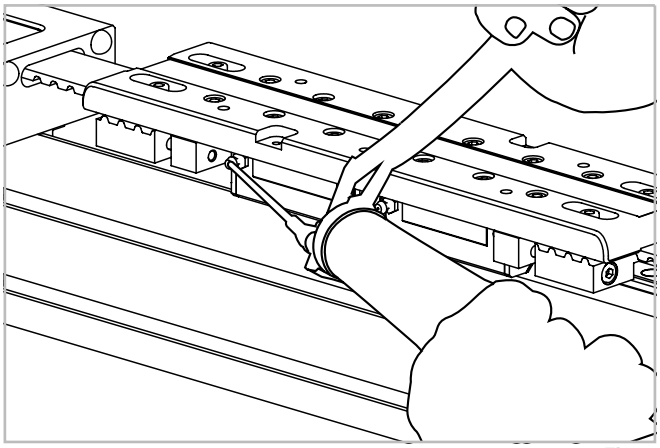


Fig. 9

- Insert the tip of the grease gun into the specific grease blocks.
- Type of lubricant: Lithium soap grease of class NLGI 2.
- For specially stressed applications or hostile environmental conditions, lubrication should be applied out more frequently.
  Contact Rollon for further advice

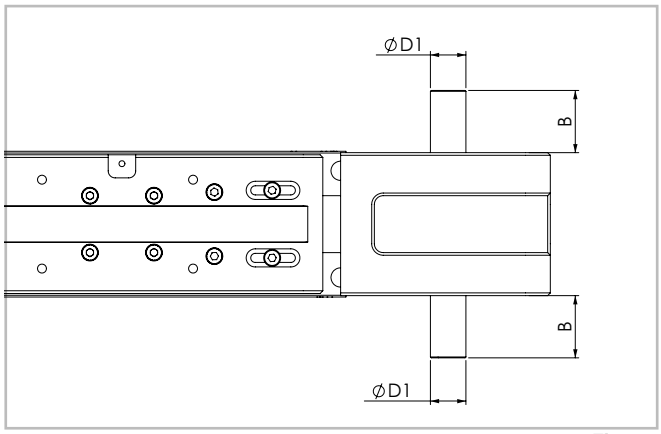
Quantity of lubricant necessary for re-lubrication of each block:

| Type | Unit [$cm^3$] |
|---|---|
| E-SMART 30 | 0.5 |
| E-SMART 50 | 0.2 |
| E-SMART 80 | 0.5 |
| E-SMART 100 | 0.6 |

Tab. 25

## Simple shafts

### AS type simple shafts




Position of the simple shaft can be to the right or to the left of the drive head. Fig. 10

This head configuration is obtained by utilizing an assembly kit delivered as a separate accessory item.
Shaft can be installed on the left or right side of the drive head as decided by the customer.

Units (mm)

| Applicable to unit | Shaft type | B | D1 | AS assembly kit code |
|---|---|---|---|---|
| E-SMART 30 | AS 12 | 25 | 12h7 | G000348 |
| E-SMART 50 | AS 15 | 35 | 15h7 | G000851 |
| E-SMART 80 | AS 20 | 36.5 | 20h7 | G000828 |
| E-SMART 100 | AS 25 | 50 | 25h7 | G000649 |

Tab. 26

## Hollow shaft

### Hollow shaft type AC - Standard supply

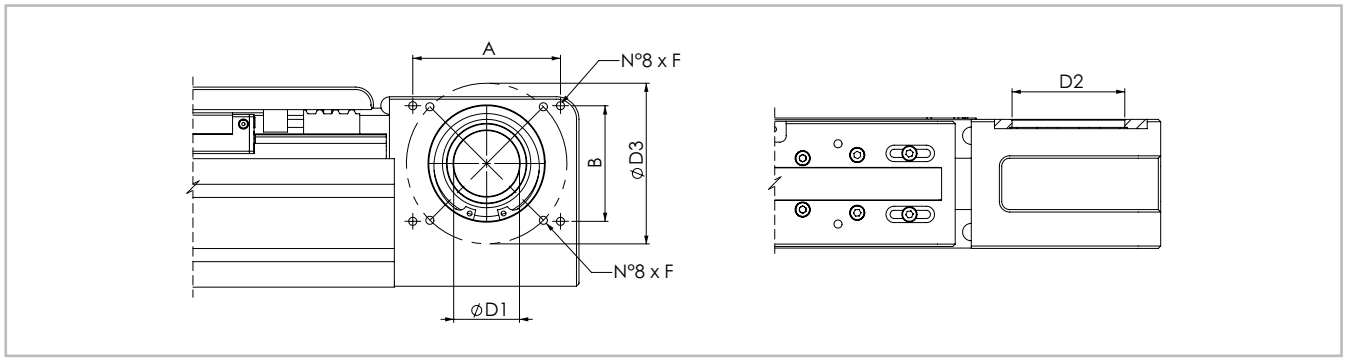



Fig. 11

Units (mm)

| Applicable to unit | Shaft type | D1 | D2 | D3 | F | A x B | Drive head code |
|---|---|---|---|---|---|---|---|
| E-SMART 30 | AC 22 | 22H7 | 42 | 68 | M5 | - | 2R |
| E-SMART 50 | AC 34 | 34H7 | 72 | 90 | M6 | - | 2R |
| E-SMART 80 | AC 41 | 41H7 | 72 | 100 | M6 | 92x72 | 2R |
| E-SMART 100 | AC 50 | 50H7 | 95 | 130 | M8 | 109x109 | 2R |

Tab. 27

An (optional) connection flange is required to fit the standard reduction units selected by Rollon.
For further information contact our offices.

## Linear units in parallel

**Synchronization kit for use of SMART linear units in parallel**

When movement consisting of two linear units in parallel is essential, a synchronization kit must be used. This consists of original Rollon lamina type precision joints complete with tapered splines and hollow aluminum drive shafts.

**Moment of inertia [g·mm²] C1 + C2 · (X-Y)**

| | C1 | C2 | Weight [ Kg] D1+D2 · (X-Y) | |
|---|---|---|---|---|
| | [g·mm²] | [g·mm²] | D1 [Kg] | D2 [Kg mm] |
| **GK12P** | 61.456 | 69 | 0.308 | 0.00056 |
| **GK15P** | 906.928 | 464 | 2.28 | 0.00148 |
| **GK20P** | 1.014.968 | 464 | 2.48 | 0.00148 |
| **GK25P** | 5.525.250 | 4.708 | 6.24 | 0.0051 |

Tab. 28

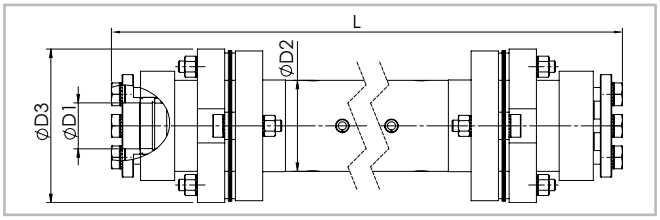



Fig. 12

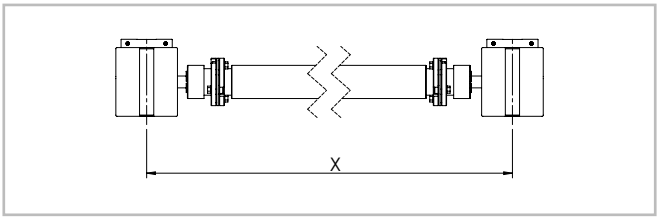



Fig. 13

**Dimensions (mm)**

| Applicable to unit | Shaft type | D1 | D2 | D3 | Y [mm] | Code | Formula for length calculation |
|---|---|---|---|---|---|---|---|
| **E-SMART 30** | **AP 12** | 12 | 25 | 45 | 166 | GK12P...1A | L= X-51 [mm] |
| **E-SMART 50** | **AP 15** | 15 | 40 | 69.5 | 210 | GK15P...1A | L= X-79 [mm] |
| **E-SMART 80** | **AP 20** | 20 | 40 | 69.5 | 250 | GK20P...1A | L= X-97 [mm] |
| **E-SMART 100** | **AP 25** | 25 | 70 | 99 | 356 | GK25P...1A | L= X-145 [mm] |

Tab. 29

## Accessories

**Fixing by brackets**

The ball bearing guide linear drive system of Rollon SMART System series linear units enables them to support loads in any direction.

They can therefore be installed in any position.

To install the SMART System series units, we recommend use of one of the systems indicated below:

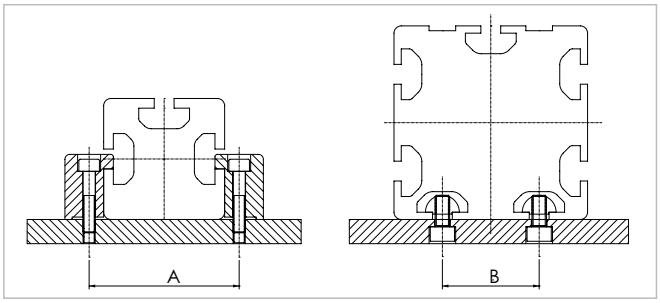



Fig. 14

**Dimensions (mm)**

| | A | B |
|---|---|---|
| **E-SMART 30** | 42 | - |
| **E-SMART 50** | 62 | - |
| **E-SMART 80** | 92 | 40 |
| **E-SMART 100** | 120 | 50 |

Tab. 30

### Fixing brackets

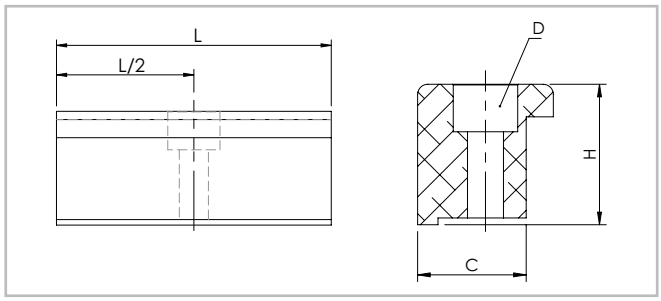
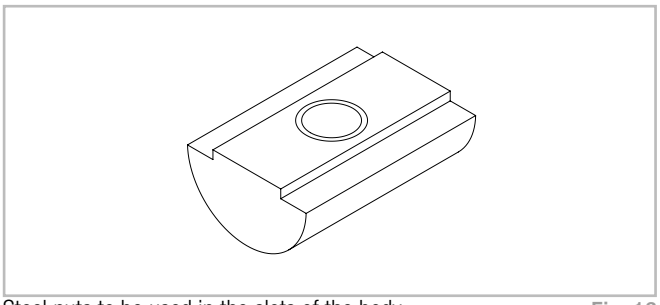



Fig. 15

### T-nuts



Steel nuts to be used in the slots of the body.

Fig. 16

### Dimensions (mm)

| | C | H | L | D | Cod. Rollon |
|---|---|---|---|---|---|
| **E-SMART 30** | 16 | 17.5 | 50 | M5 | 1001490 |
| **E-SMART 50** | 16 | 26.9 | 50 | M5 | 1000097 |
| **E-SMART 80** | 16 | 20.7 | 50 | M5 | 1000111 |
| **E-SMART 100** | 31 | 28.5 | 100 | M10 | 1002377 |

Tab. 31

### Units (mm)

| | Hole | Length | Cod. Rollon |
|---|---|---|---|
| **E-SMART 30** | M5 | 20 | 6000436 |
| **E-SMART 50** | M6 | 20 | 6000437 |
| **E-SMART 80** | M6 | 20 | 6000437 |
| **E-SMART 100** | M6 | 20 | 6000437 |

Tab. 32

### Proximity

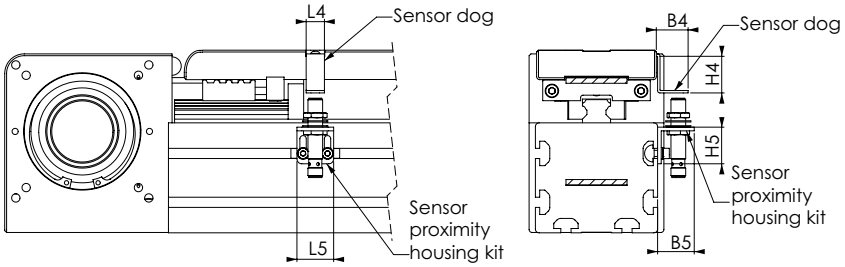



Fig. 17

### Sensor proximity housing kit

Aluminum block equipped with T-nuts for fixing

### Sensor dog

Iron plate mounted on the carriage used for the proximity operation

### Units (mm)

| | B4 | B5 | L4 | L5 | H4 | H5 | For proximity | Sensor dog code | Sensor proximity kit code |
|---|---|---|---|---|---|---|---|---|---|
| **E-SMART 30** | 30 | 30 | 30 | 30 | 15 | 30 | Ø 8 | G000847 | G000901 |
| **E-SMART 50** | 26 | 30 | 15 | 30 | 32 | 30 | Ø 8 | G000833 | G000838 |
| **E-SMART 80** | 26 | 30 | 15 | 30 | 32 | 30 | Ø 8 | G000833 | G000838 |
| **E-SMART 100** | 26 | 30 | 15 | 30 | 32 | 30 | Ø 8 | G000833 | G000838 |

Tab. 33

### Adapter flange for gearbox assembly

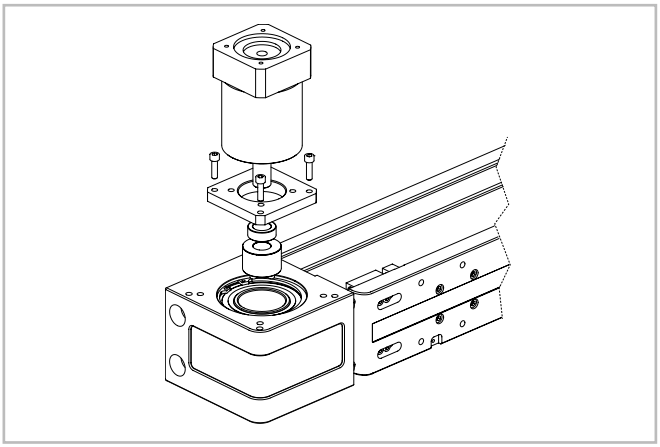


Fig. 18

Assembly kit includes: shrink disk; adapter plate; fixing hardware

| Unit type | Gearbox type (not included) | Kit Code |
|---|---|---|
| E-SMART 30 | MP053 | G000356 |
| | LC050; NPO05S; PE2 | G000357 |
| | SW030 | G000383 |
| E-SMART 50 | MP060; PLE60 | G000852 |
| | LC070; MPV00; NPO15S; PE3 | G000853 |
| | SW040 | G000854 |
| E-SMART 80 | P3 | G000824 |
| | MP080 | G000826 |
| | LC090; MPV01; NPO25S; PE4 | G000827 |
| | MP105 | G000830 |
| | PE3; NPO15S; LC070 | G001078 |
| | SP075; PLN090 | G000859 |
| | SP060; PLN070 | G000829 |
| | SW040 | G000866 |
| | SW050 | G000895 |
| E-SMART 100 | MP130 | G000482 |
| | LC120; MPV02; NPO35S; PE5 | G000483 |
| | LC090; PE4; NPO25S | G000525 |
| | MP105 | G000527 |
| | SW050 | G000717 |

Tab. 34

For other gearbox type ask Rollon

### Single shrink disc

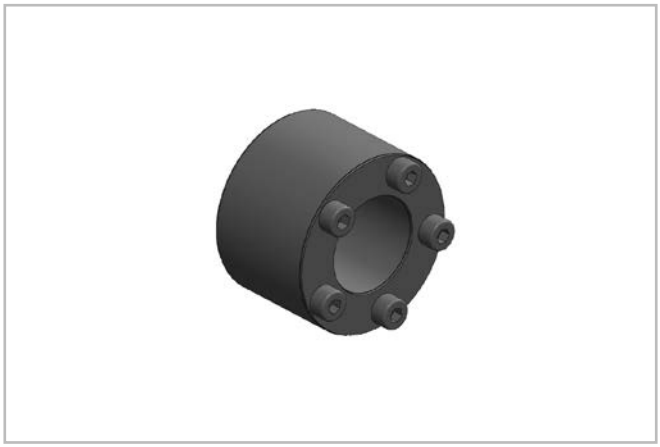


Fig. 19

Codes on the table below refer to a shink disc ordered as single element.

| Unit type | Hollow shaft [mm] | Shrink disc dxD [mm] | Transmittable torque* [Nm] | Shrink disc code |
|---|---|---|---|---|
| E-SMART 30 | 22 | 12x22 | 29 | 6000791 |
| E-SMART 50 | 34 | 14x34 | 64 | 6005737 |
| | | 16x34 | 73 | 6005738 |
| | | 19x34 | 87 | 6005739 |
| E-SMART 80 | 41 | 19x41 | 150 | 6005734 |
| | | 22x41 | 174 | 6005735 |
| | | 25x41 | 198 | 6005736 |
| E-SMART 100 | 50 | 22x50 | 286 | 6005730 |
| | | 25x50 | 324 | 6005731 |
| | | 32x50 | 415 | 6005732 |

* Transmittable torque in the table represents the maximum capacity of the shrink disk. For the application, the limit of $F_x$ must be considered too.

Tab. 35

# Ordering key

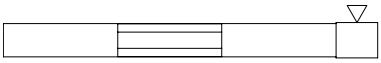
## Identification codes for the E-SMART linear unit

| | | | | |
|---|---|---|---|---|
| L | 10<br>03 = 30<br>05 = 50<br>08 = 80<br>10 = 100 | 2R | 02000 | 2R<br>Type (30) 2R=SP2<br>Type (50-80) 1R=SP1 - 2R=SP2 - 3R=SP3 - 4R=SP4<br>Type (100) 1R=SP1 - 2R=SP2 - 3R=SP3 - 4R=SP4 |
| | | | L=total length of the unit | |
| | | Drive head code *see pg. SS-12* | | |
| | Linear unit type *see from pg. SS-5 to pg. SS-10* | | | |
| Linear unit series E-SMART *see pg. SS-2* | | | | |

In order to create identification codes for Actuator Line, you can visit: **http://configureactuator.rollon.com**

Configure Actuator

**Left / right orientation**




# R-SMART series

## R-SMART series description

Fig. 20

**R-SMART**

The R-SMART series linear units are particularly suitable for: heavy loads, pulling and pushing very heavy weights, demanding work cycles, possible cantilever or gantry mounting, and operation in industrial automated lines.

The extruded and anodized aluminum self-supporting structure with a rectangular section is available in three sizes ranging from 120 to 220 mm. Transmission is achieved with a polyurethane steel reinforced driving belt. Also featured is a dual rail system with four or more recirculating ball bearing runner blocks. Multiple sliders are available to further improve load capacity.

These units are best used in applications requiring very heavy loads in extremely confined spaces, and where machines cannot be stopped to carry out ordinary system maintenance.

## The components

### Extruded bodies

The anodized aluminum extrusions used for the bodies of the R-SMART series linear units are designed and manufactured by industry experts to optimize weight while maintaining mechanical strength. (see physical-chemical characteristics below).The dimensional tolerances comply with EN 755-9 standard.

### Driving belt

The Rollon SMART series linear units use steel reinforced polyurethane drive belts with AT pitch. This belt is ideal due to its high load transmission characteristics, compact size, and low noise. Used in conjunction with a backlash-free pulley, smooth alternating motion can be achieved.

Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

### Carriage

The carriage of the Rollon SMART series linear units is made entirely of machined anodized aluminum. The dimensions vary depending on the type. Rollon offers multiple carriages to accomodate a vast array of applications.

## The linear motion system

The linear motion system has been designed to meet the load capacity, speed, and maximum acceleration conditions of a wide variety of applications. Rollon SMART series systems feature a linear motion system with ball bearing guides:

**Performance characteristics:**

- The ball bearing guides with high load capacity are mounted in a dedicated seat on the aluminum body.
- The carriage of the linear unit is assembled on preloaded ball bearing blocks that enables the carriage to withstand loading in the four main directions.
- The ball bearing carriages of the SP versions are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment.
- The blocks have seals on both sides and, when necessary, an additional scraper can be fitted for very dusty conditions.

**The linear motion system described above offers:**

- High speed and acceleration
- High load capacity
- High permissible bending moments
- Low friction
- Long life
- Low noise

## The driving heads

The couple of symmetrical heads is designed to allow the highest freedom while sizing the application and mounting the gearbox on the R-SMART series linear actuators. Therefore, it is possible to assembly the gearbox on both the heads, either on the right or the left side, by means of a standard assembly kit. This feature is also useful when the unit is assembled to be part of a multiaxis system.

The assembly kit includes: shrink disk; adapter plate and fixing hardware; and can be ordered with the actuator. Different kits are available to accomodate gearboxes from the major brands on the market. For more information see pag. SS-28.

The same logic is valid when mounting the shaft to connect two units in parallel.

**R-SMART section**

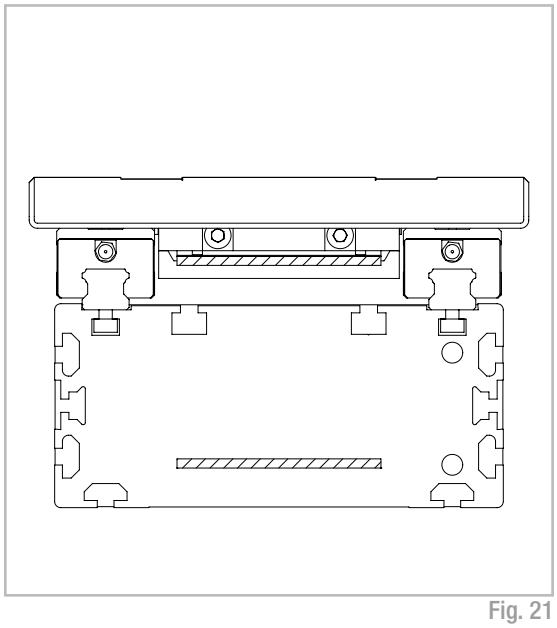
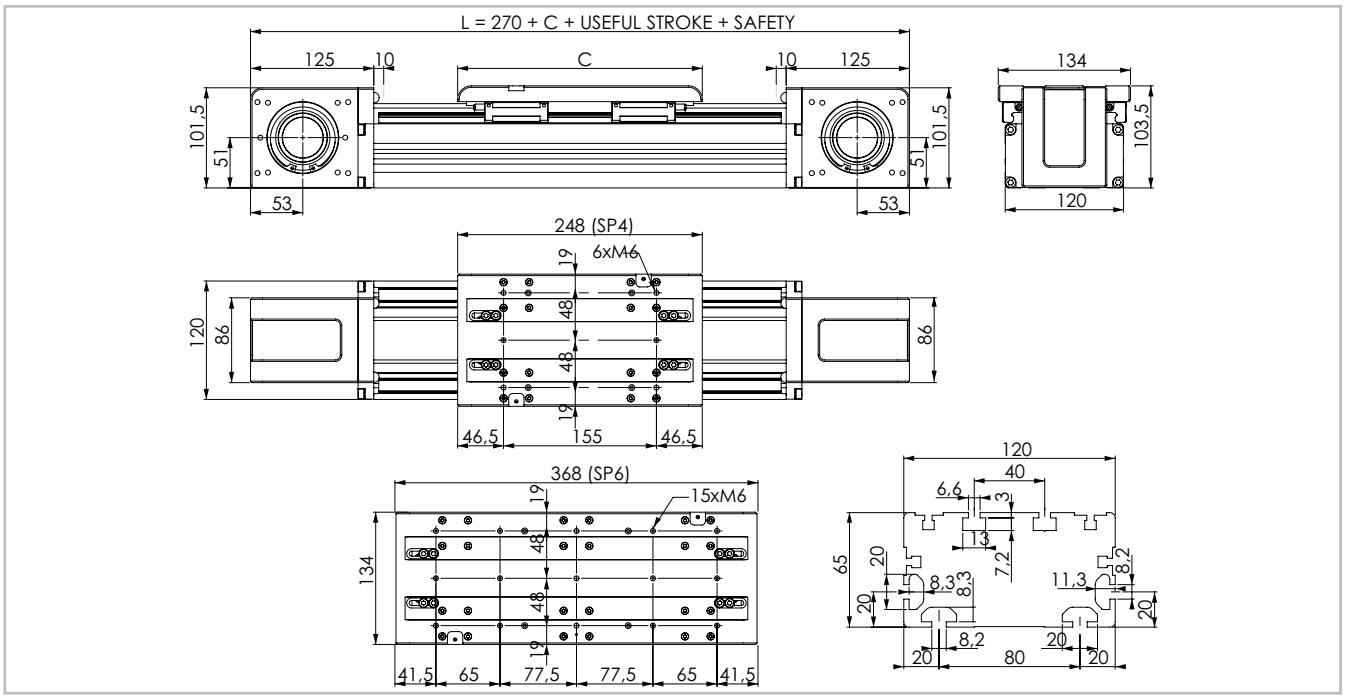


Fig. 21

# R-SMART 120 SP4 - SP6

## R-SMART 120 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 22

## Technical data

| | Type | |
|---|---|---|
| | R-SMART 120 SP4 | R-SMART 120 SP6 |
| Max. useful stroke length [mm]*1 | 6050 | 5930 |
| Max. positioning repeatability [mm]*2 | ± 0.05 | ± 0.05 |
| Max. speed [m/s] | 4.0 | 4.0 |
| Max. acceleration [m/s²] | 50 | 50 |
| Type of belt | 40 AT 10 | 40 AT 10 |
| Type of pulley | Z 21 | Z 21 |
| Pulley pitch diameter [mm] | 66.84 | 66.84 |
| Carriage displacement per pulley turn [mm] | 210 | 210 |
| Carriage weight [kg] | 2.79 | 3.94 |
| Zero travel weight [kg] | 11.801 | 13.765 |
| Weight for 100 mm useful stroke [kg] | 1.062 | 1.04 |
| Starting torque [Nm] | 1.95 | 2.3 |
| Moment of inertia of pulleys [g · mm²] | 1.054.300 | 1.054.300 |
| Rail size [mm] | 15 | 15 |

*1) It is possible to obtain stroke up to 11.200 (SP4), 11.080 (SP6) by means of special Rollon joints.
*2) Positioning repeatability is dependent on the type of transmission used.

Tab. 36

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| R-SMART 120 SP | 0.108 | 0.367 | 0.475 |

Tab. 37

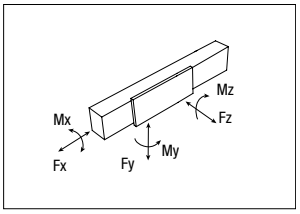
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| R-SMART 120 SP | 40 AT 10 | 40 | 0.23 |

Tab. 38

**Belt length (mm) =** 2 x L - 115 (SP4)
2 x L - 235 (SP6)




## Load capacity

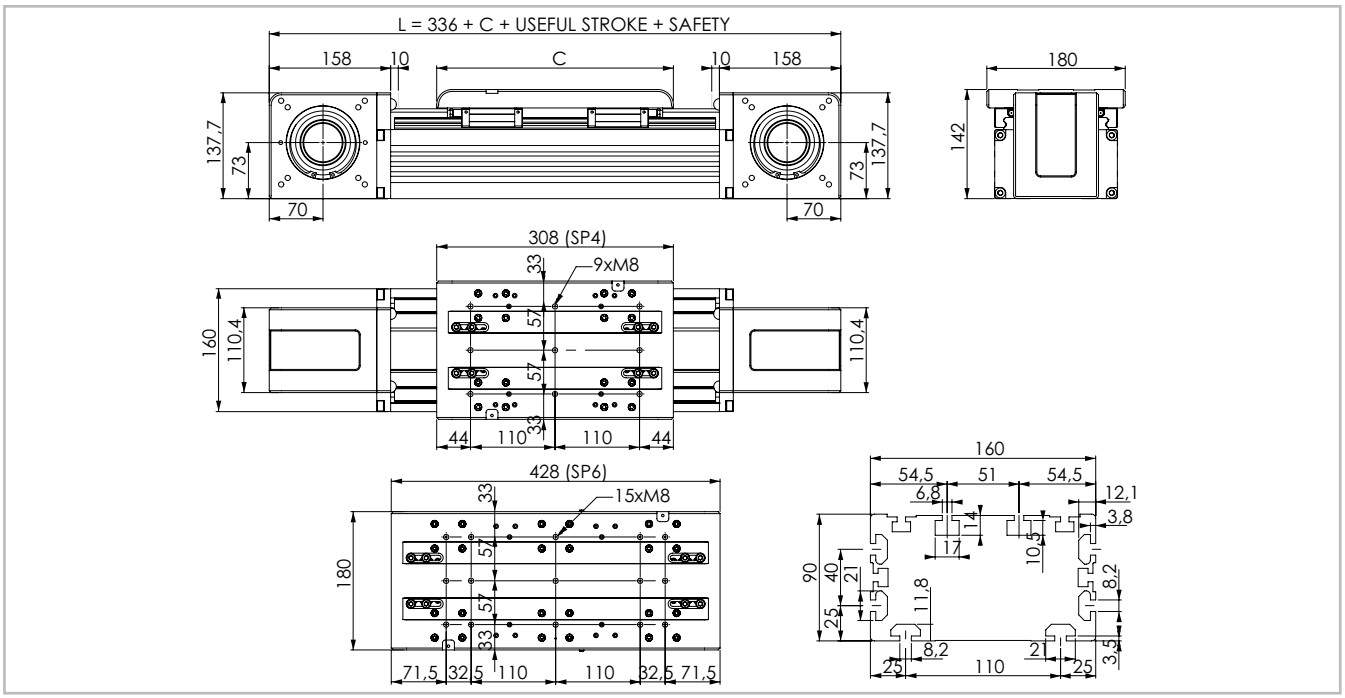
| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| R-SMART 120 SP4 | 3154 | 2090 | 50800 | 39440 | 50800 | 2337 | 3277 | 3277 |
| R-SMART 120 SP6 | 3154 | 2090 | 76200 | 59160 | 76200 | 3505 | 6248 | 6248 |

See verification under static load and lifetime on page SL-2 and SL-3
$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-28)

Tab. 39

# R-SMART 160 SP4 - SP6

## R-SMART 160 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 23

## Technical data

| | Type | |
|---|---|---|
| | R-SMART 160 SP4 | R-SMART 160 SP6 |
| Max. useful stroke length [mm]*1 | 6000 | 5880 |
| Max. positioning repeatability [mm]*2 | ± 0.05 | ± 0.05 |
| Max. speed [m/s] | 4.0 | 4.0 |
| Max. acceleration [m/s²] | 50 | 50 |
| Type of belt | 50 AT 10 | 50 AT 10 |
| Type of pulley | Z 27 | Z 27 |
| Pulley pitch diameter [mm] | 85.94 | 85.94 |
| Carriage displacement per pulley turn [mm] | 270 | 270 |
| Carriage weight [kg] | 6.06 | 8.6 |
| Zero travel weight [kg] | 25.843 | 30.488 |
| Weight for 100 mm useful stroke [kg] | 1.727 | 1.736 |
| Starting torque [Nm] | 3.4 | 3.95 |
| Moment of inertia of pulleys [g · mm²] | 4.035.390 | 4.035.390 |
| Rail size [mm] | 20 | 20 |

*1) It is possible to obtain stroke up to 11.200 (SP4), 11.080 (SP6) by means of special Rollon joints
*2) The positioning repeatability depends upon the type of transmission used

Tab. 40

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| R-SMART 160 SP | 0.383 | 1.313 | 1.696 |

Tab. 41

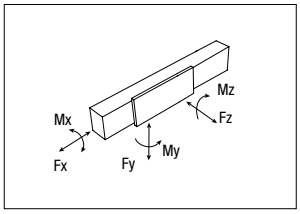
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| R-SMART 160 SP | 50 AT 10 | 50 | 0.29 |

Tab. 42

**Belt length (mm)** = 2 x L - 150 (SP4)
2 x L - 270 (SP6)




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| R-SMART 160 SP4 | 4980 | 3390 | 110800 | 88800 | 110800 | 6426 | 9086 | 9086 |
| R-SMART 160 SP6 | 4980 | 3390 | 166200 | 133200 | 166200 | 9640 | 15457 | 15457 |

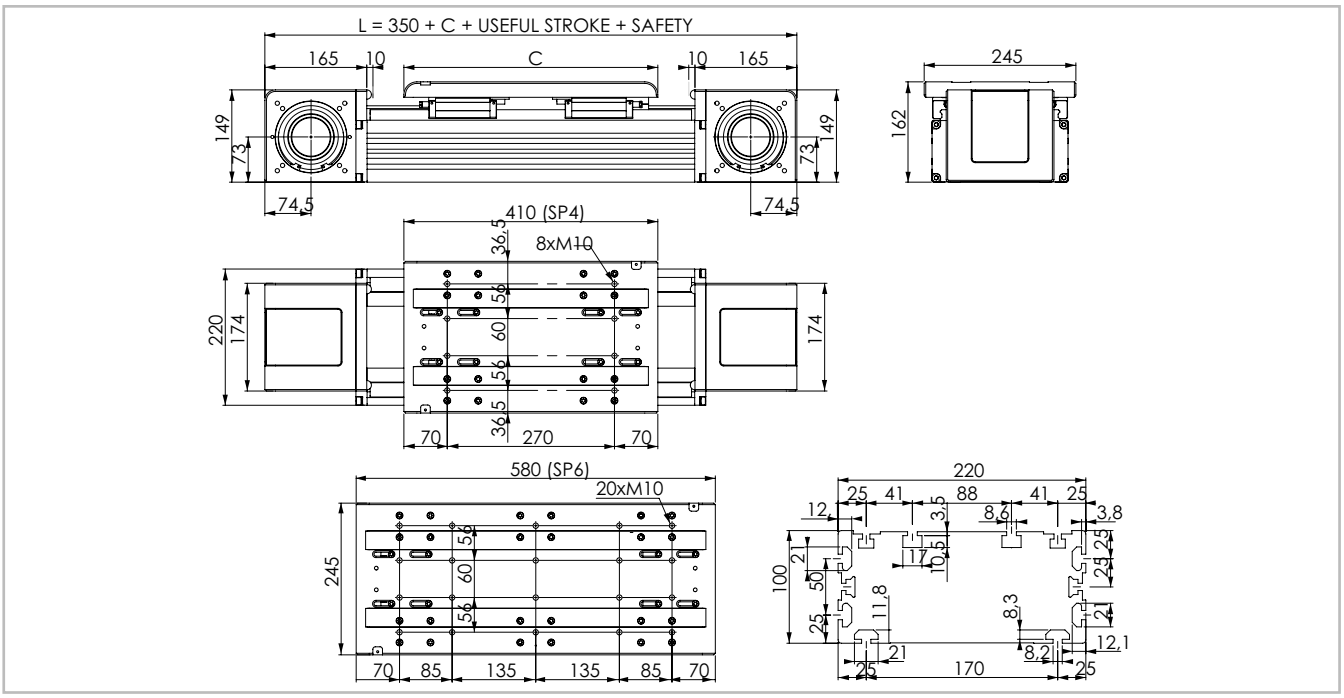
See verification under static load and lifetime on page SL-2 and SL-3

Tab. 43

$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-28)

# R-SMART 220 SP4- SP6

## R-SMART 220 Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 24

## Technical data

| | Type | |
|---|---|---|
| | R-SMART 220 SP4 | R-SMART 220 SP6 |
| Max. useful stroke length [mm]*1 | 5900 | 5730 |
| Max. positioning repeatability [mm]*2 | ± 0.05 | ± 0.05 |
| Max. speed [m/s] | 4.0 | 4.0 |
| Max. acceleration [m/s²] | 50 | 50 |
| Type of belt | 100 AT 10 | 100 AT 10 |
| Type of pulley | Z 32 | Z 32 |
| Pulley pitch diameter [mm] | 101.86 | 101.86 |
| Carriage displacement per pulley turn [mm] | 320 | 320 |
| Carriage weight [kg] | 12.41 | 17.37 |
| Zero travel weight [kg] | 45.332 | 54.437 |
| Weight for 100 mm useful stroke [kg] | 2.319 | 2.447 |
| Starting torque [Nm] | 4.3 | 7 |
| Moment of inertia of pulleys [g · mm²] | 12.529.220 | 12.529.220 |
| Rail size [mm] | 25 | 25 |

*1) It is possible to obtain stroke up to 11.100 (SP4), 10.930 (SP6) by means of special Rollon joints.
*2) Positioning repeatability is dependent on the type of transmission used.

Tab. 44

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| R-SMART 220 SP | 0.663 | 3.658 | 4.321 |

Tab. 45

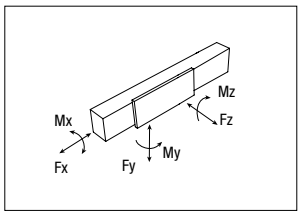
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| R-SMART 220 SP | 100 AT 10 | 100 | 0.58 |

Tab. 46

**Belt length (mm) =** 2 x L - 130 (SP4)
2 x L - 300 (SP6)




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| R-SMART 220 SP4 | 9960 | 7380 | 189200 | 139200 | 189200 | 16082 | 20812 | 20812 |
| R-SMART 220 SP6 | 9960 | 7380 | 283800 | 208800 | 283800 | 24123 | 36894 | 36894 |

See verification under static load and lifetime on page SL-2 and SL-3
$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-28)

Tab. 47

# Lubrication

**SP linear units with ball bearing guides**

SP Linear units are equipped with self lubricating linear ball guides. The ball bearing carriages of the SP versions are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment.

This system guarantees a long interval between maintenances: SP version: every 2000 Km or 1 year of use, based on the value reached first. If a longer service life is required or in case of high dynamic or high loaded applications please contact our offices for further verification.

**R-SMART**

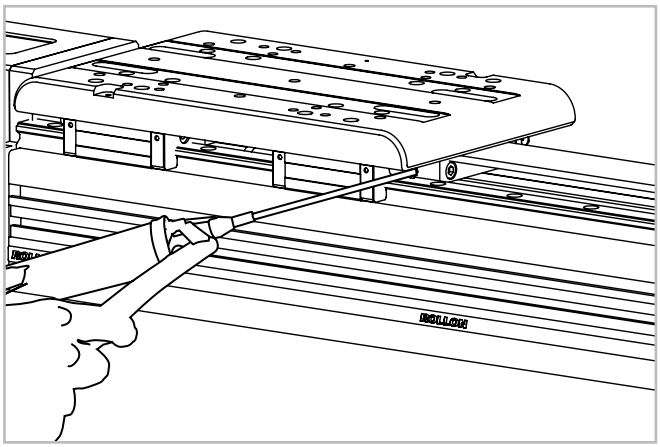


Fig. 25

- Insert the tip of the grease gun into the specific grease blocks.
- Type of lubricant: Lithium soap grease of class NLGI 2.
- For specially stressed applications or hostile environmental conditions, lubrication should be applied out more frequently.
  Contact Rollon for further advice

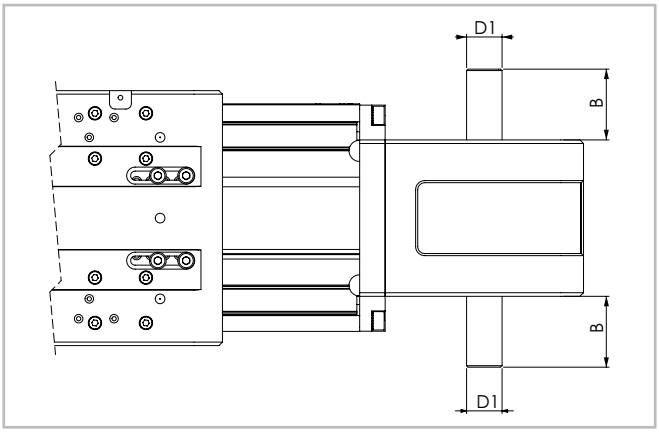
Quantity of lubricant necessary for re-lubrication of each block:

| Type | Quantity of Grease [$cm^3$] |
|---|---|
| R-SMART 120 | 0.7 |
| R-SMART 160 | 1.4 |
| R-SMART 220 | 2.4 |

Tab. 48

# Simple shafts

### AS type simple shafts




Position of the simple shaft can be to the right or to the left of the drive head. Fig. 26

This head configuration is obtained by utilizing an assembly kit delivered as a separate accessory item.
Shaft can be installed on the left or right side of the drive head as decided by the customer.

### Units (mm)

| Applicable to unit | Shaft type | B | D1 | AS assembly kit code |
|---|---|---|---|---|
| **R-SMART 120** | **AS 20** | 36 | 20h7 | G000828 |
| **R-SMART 160** | **AS 25** | 50 | 25h7 | G000649 |
| **R-SMART 220** | **AS 25** | 50 | 25h7 | G002789 |

Tab. 49

# Hollow shaft

### Hollow shaft type AC - Standard supply

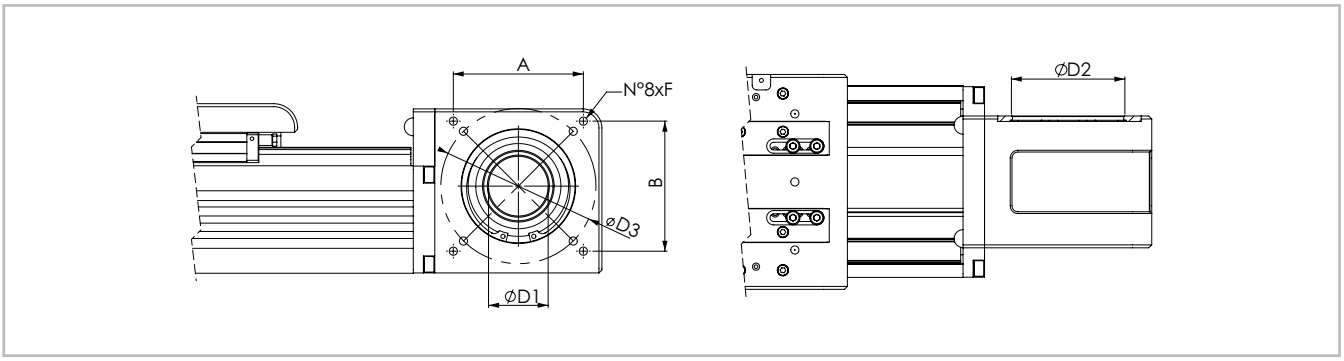



Fig. 27

### Units (mm)

| Applicable to unit | Shaft type | D1 | D2 | D3 | F | A x B | Drive head code |
|---|---|---|---|---|---|---|---|
| **R-SMART 120** | **AC 41** | 41H7 | 72 | 100 | M6 | 92x72 | 2R |
| **R-SMART 160** | **AC 50** | 50H7 | 95 | 130 | M8 | 109x109 | 2R |
| **R-SMART 220** | **AC 60** | 60H7 | 115 | 130 | M8 | 109x109 | 2R |

Tab. 50

An (optional) connection flange is required to fit the standard reduction units selected by Rollon.
For further information contact our offices.

# Accessories

### Fixing by brackets

The ball bearing guide linear drive system of Rollon SMART System series linear units enables them to support loads in any direction. They can therefore be installed in any position.

To install the SMART System series units, we recommend use of one of the systems indicated below:

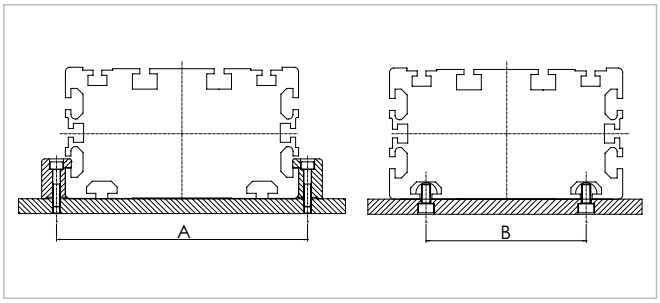



Fig. 28

Units (mm)

| | A | B |
|---|---|---|
| R-SMART 120 | 132 | 80 |
| R-SMART 160 | 180 | 110 |
| R-SMART 220 | 240 | 170 |

Tab. 51

### Fixing brackets

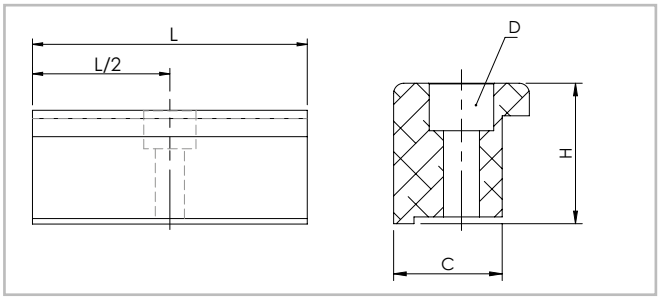


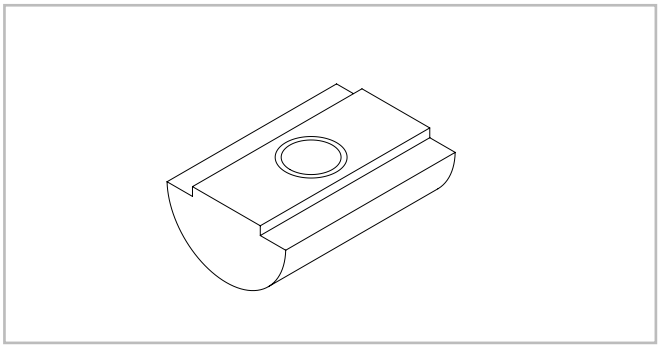

Fig. 29

Dimensions (mm)

| | C | H | L | D | Code Rollon |
|---|---|---|---|---|---|
| R-SMART 120 | 16 | 20.7 | 50 | M5 | 1000111 |
| R-SMART 160 | 31 | 28.5 | 100 | M10 | 1002377 |
| R-SMART 220 | 31 | 28.5 | 100 | M10 | 1002377 |

Tab. 52

### T-nuts



Steel nuts to be used in the slots of the body.

Fig. 30

Units (mm)

| | Hole | Length | Code Rollon |
|---|---|---|---|
| R-SMART 120 | M6 | 20 | 6000437 |
| R-SMART 160 | M6 | 20 | 6000437 |
| R-SMART 160 | M8 | 20 | 6001544 |
| R-SMART 220 | M6 | 20 | 6000437 |
| R-SMART 220 | M8 | 20 | 6001544 |

Tab. 53

## Proximity

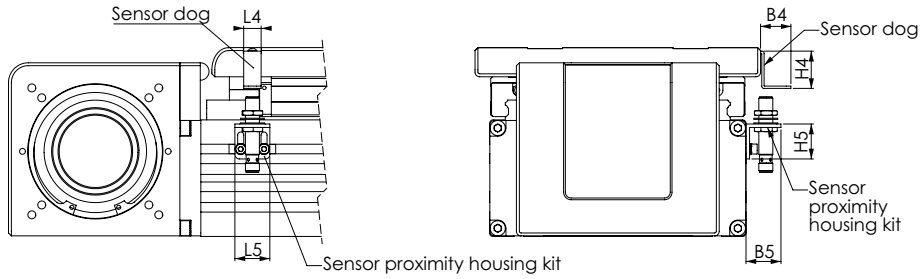



Fig. 31

### Sensor proximity housing kit

Aluminum block equipped with T-nuts for fixing

### Sensor dog

Iron plate mounted on the carriage used for the proximity operation

### Units (mm)

| | B4 | B5 | L4 | L5 | H4 | H5 | For proximity | Sensor dog | Sensor proximity housing kit |
|---|---|---|---|---|---|---|---|---|---|
| **R-SMART 120** | 26 | 30 | 15 | 30 | 32 | 30 | Ø 8 | G000833 | G000844 |
| **R-SMART 160** | 26 | 30 | 15 | 30 | 32 | 30 | Ø 8 | G000833 | G000838 |
| **R-SMART 220** | 26 | 30 | 15 | 30 | 32 | 30 | Ø 8 | G000833 | G000838 |

Tab. 54

## Assembly kits

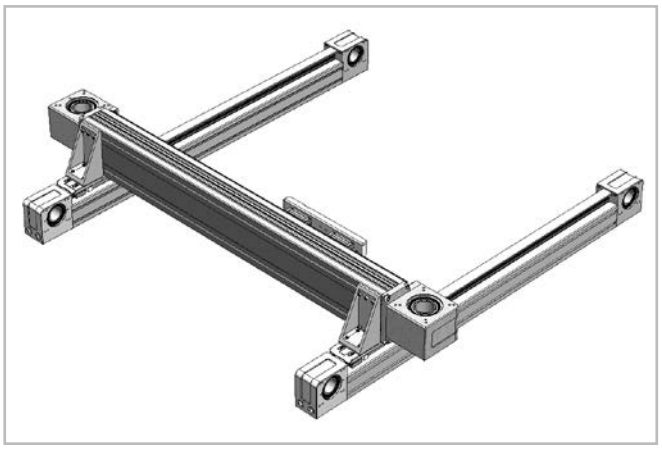


Fig. 32

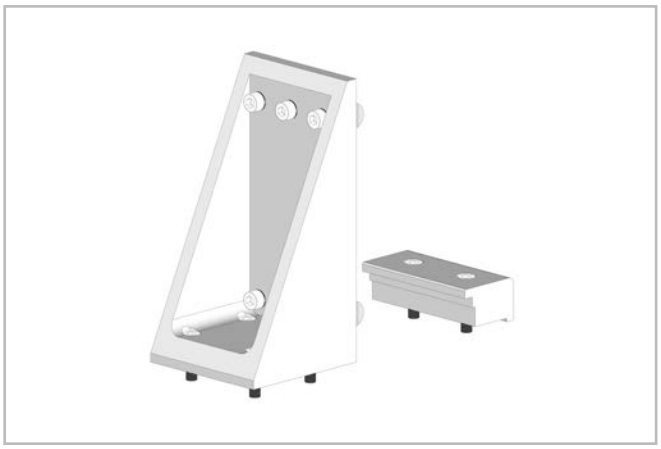


Fig. 33

For the direct assembly of R-SMART linear units on other types of actuators Rollon offers dedicated assembly kits. The table below shows the allowed combinations as well as the assembly kit codes.

| Kit | | Code | X No rail at each end (mm) |
|---|---|---|---|
|  | **R-SMART 120 on E-SMART 50** | G000899* | 60 |
|  | **R-SMART 120 on E-SMART 80** | G000863* | 90 |
|  | **R-SMART 160 on E-SMART 80** | G000902* | 90 |
|  | **R-SMART 160 on E-SMART 100** | G000903* | 110 |
|  | **R-SMART 220 on E-SMART 100** | G001207 | 110 |

* Additional fixing holes are requested on the E-SMART plate.

Tab. 55

### Adapter flange for gearbox assembly

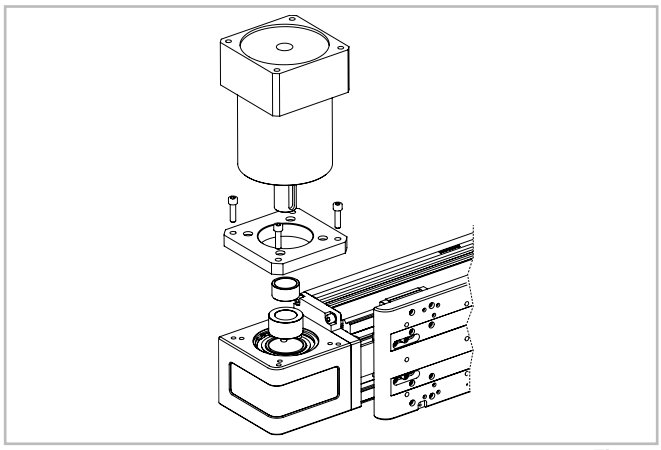


Fig. 34

Assembly kit includes: shrink disk; adapter plate; fixing hardware

| Unit type | Gearbox type (not included) | Kit Code |
|---|---|---|
| R-SMART 120 | P3 | G000824 |
| | MP080 | G000826 |
| | LC90; MPV01; NP025S; PE4 | G000827 |
| | MP105 | G000830 |
| | PE3; NP015S; LC070 | G001078 |
| | SP060; PLN070 | G000829 |
| | SP070; PLN090 | G000859 |
| | SW040 | G000866 |
| R-SMART 160 | MP130 | G000482 |
| | LC120; MPV02; NP035S; PE5 | G000483 |
| | LC090; NP025S; PE4 | G000525 |
| | MP105 | G000527 |
| | SP075; PLN090 | G000526 |
| | SW050 | G000717 |
| R-SMART 220 | MP130 | G002785 |
| | MP105 | G002786 |
| | LP120; LC120; PE5 | G002787 |
| | SP100 | G002788 |

Tab. 56

For other gearbox type ask Rollon

### Single shrink disc

Fig. 35

Codes on the table below refer to a shink disc ordered as single element.

| Unit type | Hollow shaft [mm] | Shrink disc dxD [mm] | Transmittable torque* [Nm] | Shrink disc code |
|---|---|---|---|---|
| R-SMART 120 | 41 | 19x41 | 150 | 6005734 |
| | | 22x41 | 174 | 6005735 |
| | | 25x41 | 198 | 6005736 |
| R-SMART 160 | 50 | 22x50 | 286 | 6005730 |
| | | 25x50 | 324 | 6005731 |
| | | 32x50 | 415 | 6005732 |
| R-SMART 220 | 60 | 22x60 | 343 | 6005298 |
| | | 25x60 | 389 | 6005299 |
| | | 32x60 | 498 | 6005300 |

* Transmittable torque in the table represents the maximum capacity of the shrink disk. For the application, the limit of $F_x$ must be considered too.

Tab. 57

# Ordering key

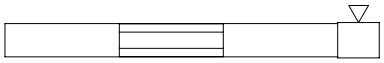
## Identification codes for the R-SMART linear unit

| | | | | |
|---|---|---|---|---|
| D | 12<br>12=120<br>16=160<br>22=220 | 2R | 02000 | 4R |
| | | | | Type (120-160-220) 4R=SP4 6R=SP6 |
| | | | L=total length of the unit | |
| | | Drive head code *see pg. SS-24* | | |
| | Linear unit type *see from pg. SS-20 to pg. SS-22* | | | |
| Linear unit series R-SMART *see pg. SS-17* | | | | |

In order to create identification codes for Actuator Line, you can visit: **http://configureactuator.rollon.com**

Configure Actuator

**Left / right orientation**



**Right**

**Left**

# S-SMART series

## S-SMART series description

Fig. 36

**S-SMART**

The S-SMART series linear units were designed to meet the vertical motion requirements in gantry applications or for applications where the aluminum profile must be moving and the carriage must be fixed.

The self-supporting extruded and anodized aluminum structure is available in three sizes. Since it is a rigid system, it is ideal for a "Z" axis in a 3-axis system by using a linear guide rail.

In addition, the S-SMART series has been specifically designed and configured to be easily assembled with the R-SMART series by using a simple bracket.

## The components

### Extruded profile

The anodized aluminum extrusions used for the bodies of the Rollon SMART series linear units were designed and manufactured in cooperation with a leading company in this field to obtain the right combination of high mechanical strength and reduced weight. The anodized aluminum alloy 6060 used (see physical chemical characteristics below for further information) was extruded with dimensional tolerances complying with EN 755-9 standards.

### Driving belt

The Rollon SMART series linear units use steel reinforced polyurethane drive belts with AT pitch. This belt is ideal due to its high load transmission characteristics, compact size and low noise. Used in conjunction with a backlash-free pulley, smooth alternating motion can be achieved. Optimization of the maximum belt width/body dimension ratio enables the following performance characteristics to be achieved:

- **High speed**
- **Low noise**
- **Low wear**

### Carriage

The carriage of the Rollon SMART series linear units is made entirely of anodized aluminum. The dimensions vary depending on the type.

## The linear motion system

The linear motion system has been designed to meet the load capacity, speed, and maximum acceleration conditions of a wide variety of applications. Rollon SMART System series systems feature a linear motion system with ball bearing guides:

**Performance characteristics:**

- The ball bearing guides with high load capacity are mounted in a dedicated seat on the aluminum body.
- The carriage of the linear unit is assembled on pre-loaded ball bearing blocks that enables the carriage to withstand loading in the four main directions.
- The ball bearing carriages of the SP versions are also fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment.
- The blocks have seals on both sides and, when necessary, an additional scraper can be fitted for very dusty conditions.

**The linear motion system described above offers:**

- High speed and acceleration
- High load capacity
- High permissible bending moments
- Low friction
- Long life
- Low noise

**S-SMART section**

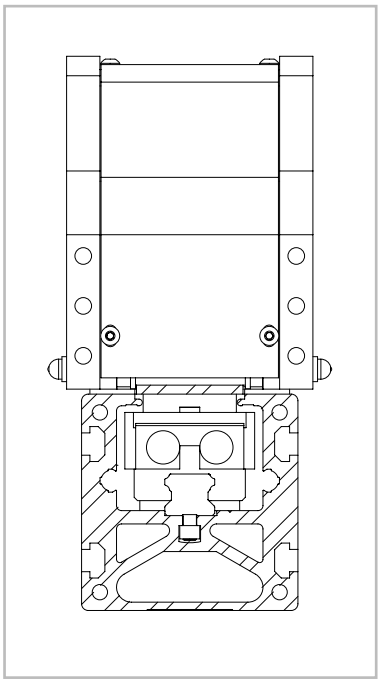
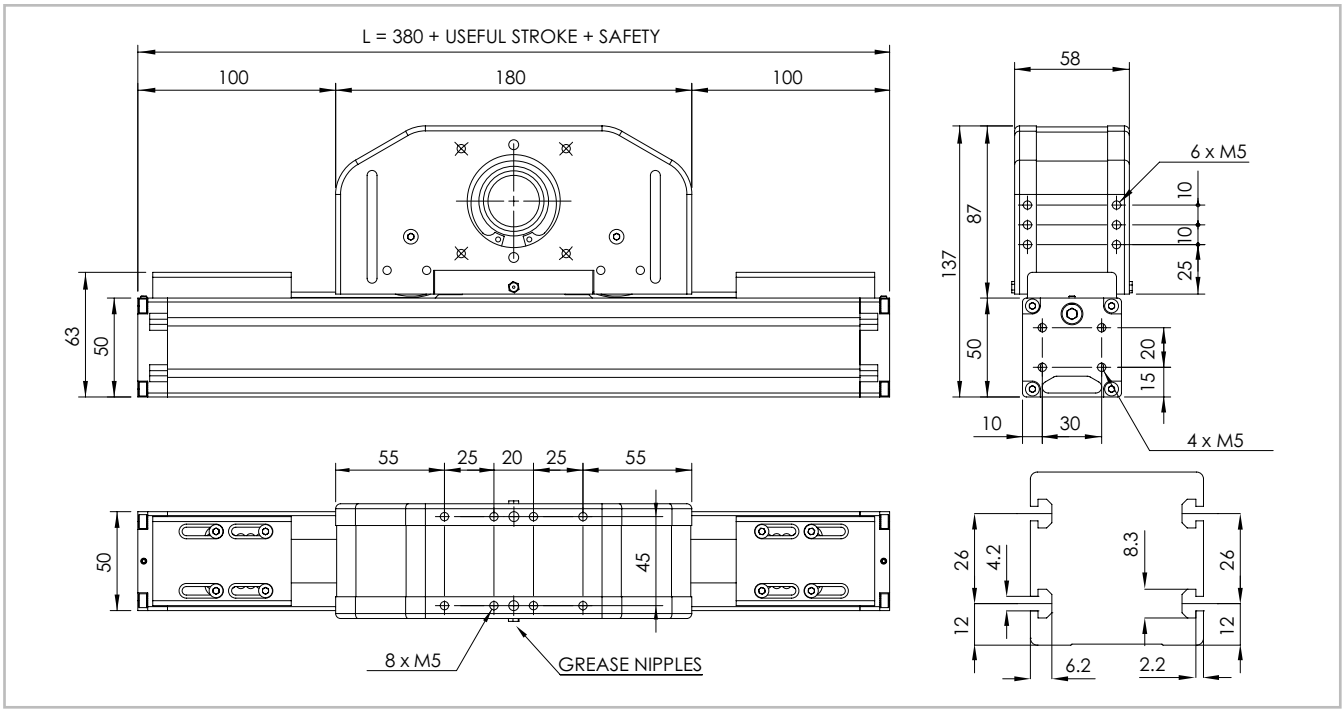


Fig. 37

# S-SMART 50 SP

## S-SMART 50 SP Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 38

## Technical data

| | Type |
|---|---|
| | S-SMART 50 SP |
| Max. useful stroke length [mm] | 1000 |
| Max. positioning repeatability [mm]*1 | ± 0.05 |
| Max. speed [m/s] | 4.0 |
| Max. acceleration [m/s²] | 50 |
| Type of belt | 22 AT 5 |
| Type of pulley | Z 23 |
| Pulley pitch diameter [mm] | 36.61 |
| Carriage displacement per pulley turn [mm] | 115 |
| Carriage weight [kg] | 2 |
| Zero travel weight [kg] | 5.7 |
| Weight for 100 mm useful stroke [kg] | 0.4 |
| Starting torque [Nm] | 0.25 |
| Rail size [mm] | 12 mini |

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 58

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| S-SMART 50 SP | 0.025 | 0.031 | 0.056 |

Tab. 59

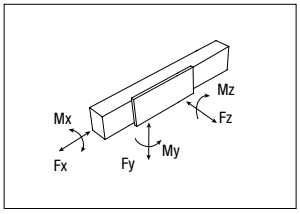
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| S-SMART 50 SP | 22 AT 5 | 22 | 0.072 |

Tab. 60

**Belt length (mm) =** L + 30




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| S-SMART 50 SP | 809 | 508 | 7060 | 6350 | 7060 | 46.2 | 233 | 233 |

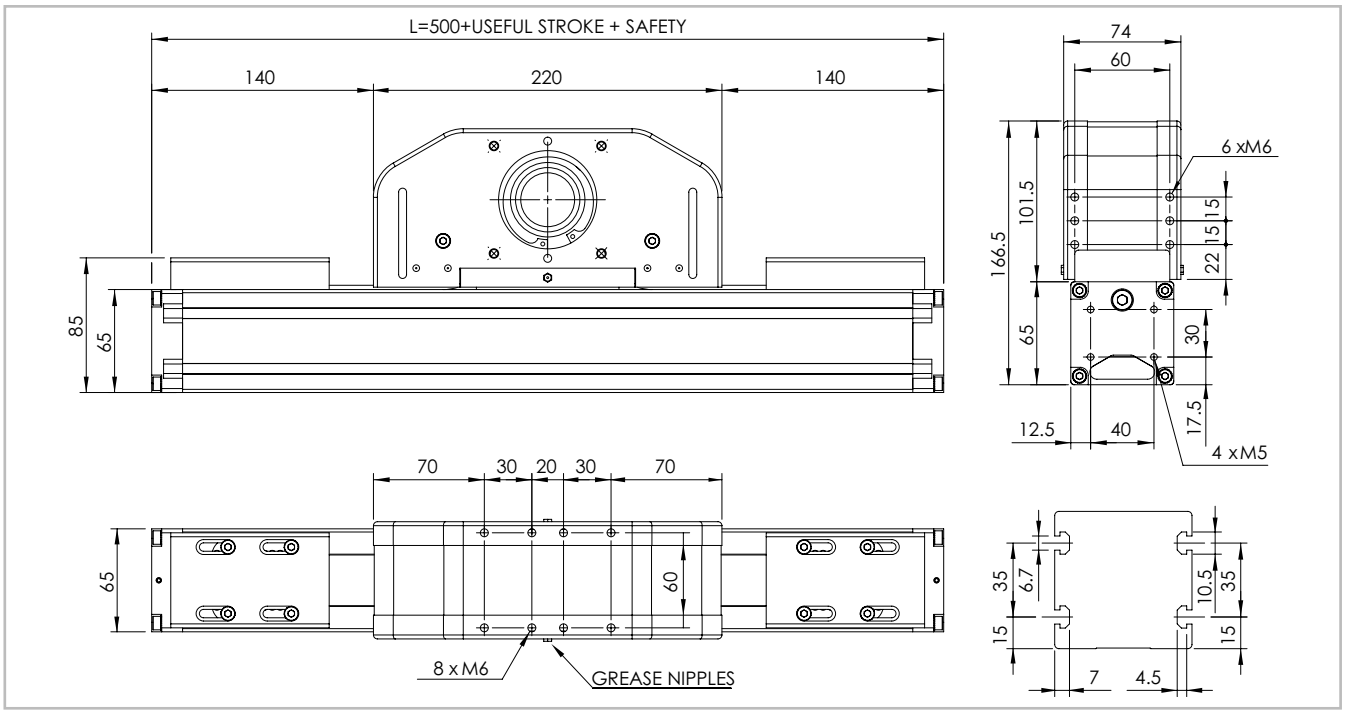
See verification under static load and lifetime on page SL-2 and SL-3

$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-40)

Tab. 61

# S-SMART 65 SP

## S-SMART 65 SP Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 39

## Technical data

| | Type |
|---|---|
| | S-SMART 65 SP |
| Max. useful stroke length [mm] | 1500 |
| Max. positioning repeatability [mm]*1 | ± 0.05 |
| Max. speed [m/s] | 4.0 |
| Max. acceleration [m/s²] | 50 |
| Type of belt | 32 AT 5 |
| Type of pulley | Z 32 |
| Pulley pitch diameter [mm] | 50.93 |
| Carriage displacement per pulley turn [mm] | 160 |
| Carriage weight [kg] | 3.6 |
| Zero travel weight [kg] | 7.3 |
| Weight for 100 mm useful stroke [kg] | 0.6 |
| Starting torque [Nm] | 0.60 |
| Rail size [mm] | 15 |

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 62

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| S-SMART 65 SP | 0.060 | 0.086 | 0.146 |

Tab. 63

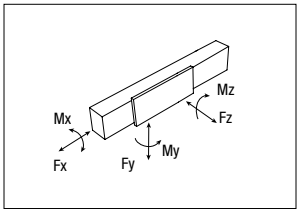
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| S-SMART 65 SP | 32 AT 5 | 32 | 0.105 |

Tab. 64

**Belt length (mm) =** L + 35




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| S-SMART 65 SP | 1344 | 960 | 25400 | 19720 | 25400 | 240 | 1008 | 1008 |

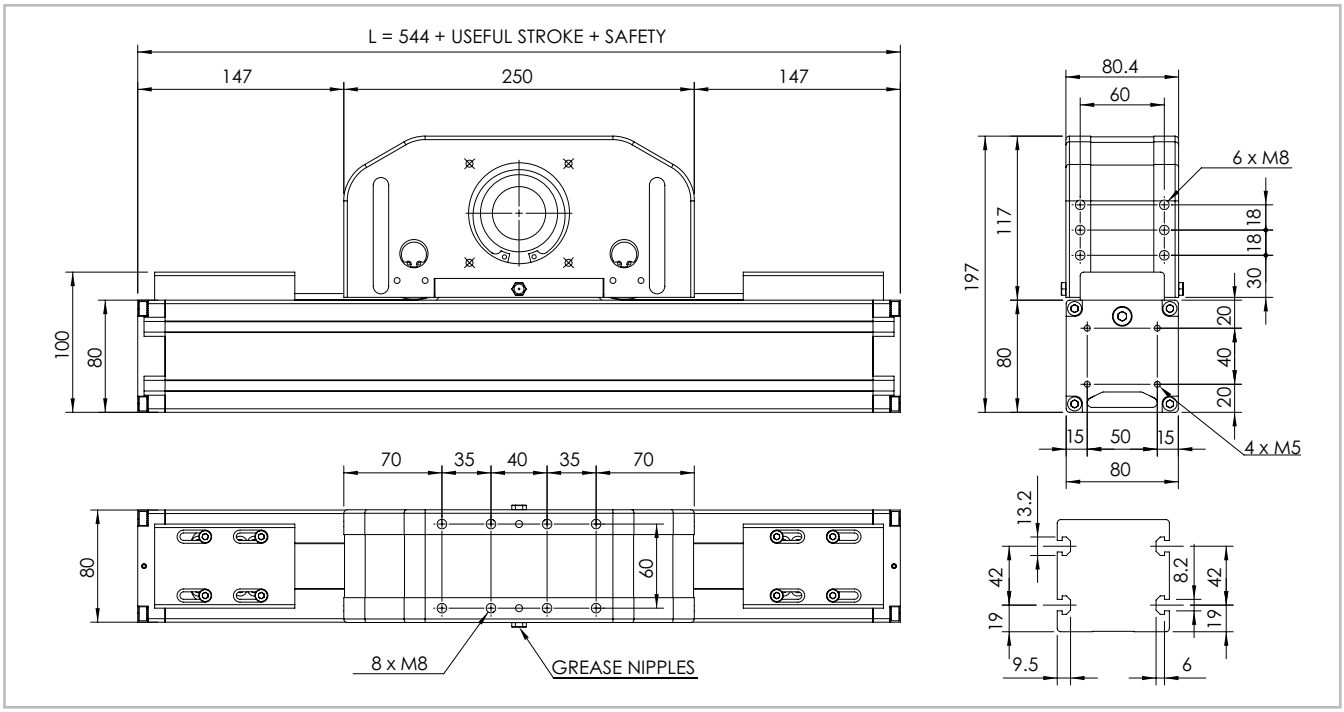
See verification under static load and lifetime on page SL-2 and SL-3

Tab. 65

$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-40)

# S-SMART 80 SP

## S-SMART 80 SP Dimensions




The length of the safety stroke is provided on request according to the customer's specific requirements.

Fig. 40

## Technical data

| | Type |
|---|---|
| | S-SMART 80 SP |
| Max. useful stroke length [mm] | 2000 |
| Max. positioning repeatability [mm]*1 | ± 0.05 |
| Max. speed [m/s] | 4.0 |
| Max. acceleration [m/s²] | 50 |
| Type of belt | 32 AT 10 |
| Type of pulley | Z 21 |
| Pulley pitch diameter [mm] | 66.85 |
| Carriage displacement per pulley turn [mm] | 210 |
| Carriage weight [kg] | 6.3 |
| Zero travel weight [kg] | 12.6 |
| Weight for 100 mm useful stroke [kg] | 1 |
| Starting torque [Nm] | 1.65 |
| Rail size [mm] | 20 |

*1) Positioning repeatability is dependent on the type of transmission used

Tab. 66

## Moments of inertia of the aluminum body

| Type | $I_x$ [$10^7$ mm⁴] | $I_y$ [$10^7$ mm⁴] | $I_p$ [$10^7$ mm⁴] |
|---|---|---|---|
| S-SMART 80 SP | 0.136 | 0.195 | 0.331 |

Tab. 67

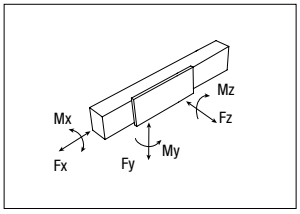
## Driving belt

The driving belt is manufactured from a friction resistant polyurethane and with steel cords for high tensile stress resistance.

| Type | Type of belt | Belt width [mm] | Weight [kg/m] |
|---|---|---|---|
| S-SMART 80 SP | 32 AT 10 | 32 | 0.186 |

Tab. 68

**Belt length (mm) =** L + 50




## Load capacity

| Type | $F_x$ [N] | | $F_y$ [N] | | $F_z$ [N] | $M_x$ [Nm] | $M_y$ [Nm] | $M_z$ [Nm] |
|---|---|---|---|---|---|---|---|---|
| | Stat. | Dyn. | Stat. | Dyn | Stat. | Stat. | Stat. | Stat. |
| S-SMART 80 SP | 2523 | 1672 | 55400 | 44400 | 55400 | 700 | 4044 | 4044 |

See verification under static load and lifetime on page SL-2 and SL-3

Tab. 69

$F_x$ in the table represents the maximum capacity of the toothed belt. For the application, the limit of transmittable torque of the shrink disk must be considered too (see page SS-40)

# Lubrication

### SP linear units with ball bearing guides

The ball bearing carriages of the SP versions are fitted with a retention cage that eliminates "steel-steel" contact between adjacent revolving parts and prevents misalignment of these in the circuits.
This system guarantees a long interval between maintenances: SP version: every 2000 Km or 1 year of use, based on the value reached first. If a longer service life is required or in case of high dynamic or high loaded applications please contact our offices for further verification.

### S-SMART

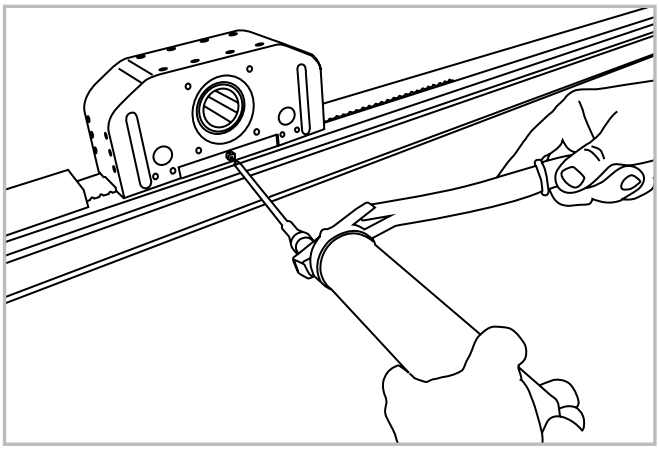


Fig. 41

- Insert the tip of the grease gun into the specific grease blocks.
- Type of lubricant: Lithium soap grease of class NLGI 2.
- For specially stressed applications or hostile environmental conditions, lubrication should be applied out more frequently.
  Contact Rollon for further advice

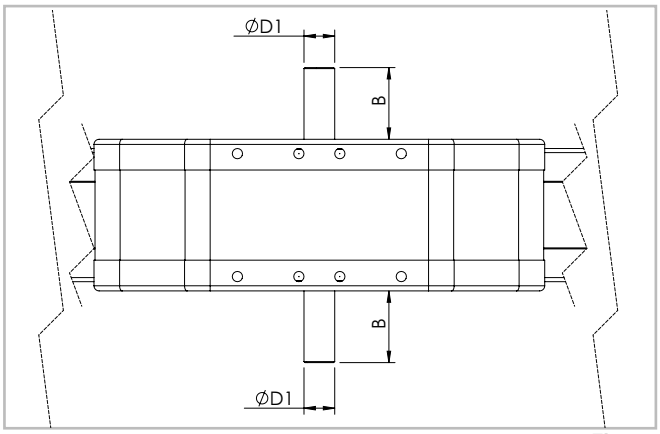
Quantity of lubricant necessary for re-lubrication of each block:

| Type | Quantity of Grease ($cm^3$) |
|---|---|
| **S-SMART 50** | 0.5 |
| **S-SMART 65** | 0.2 |
| **S-SMART 80** | 0.5 |

Tab. 70

## Simple shafts

### AS type simple shafts




Position of the simple shaft can be to the right or to the left of the drive head. Fig. 42

This head configuration is obtained by utilizing an assembly kit delivered as a separate accessory item.
Shaft can be installed on the left or right side of the drive head as decided by the customer.

**Units (mm)**

| Applicable to unit | Shaft type | B | D1 | AS Assembly kit code |
|---|---|---|---|---|
| **S-SMART 50** | **AS 12** | 26 | 12h7 | G000652 |
| **S-SMART 65** | **AS 15** | 35 | 15h7 | G000851 |
| **S-SMART 80** | **AS 20** | 40 | 20h7 | G000828 |

Tab. 71

## Hollow shaft

### Hollow shaft type AC - Standard supply

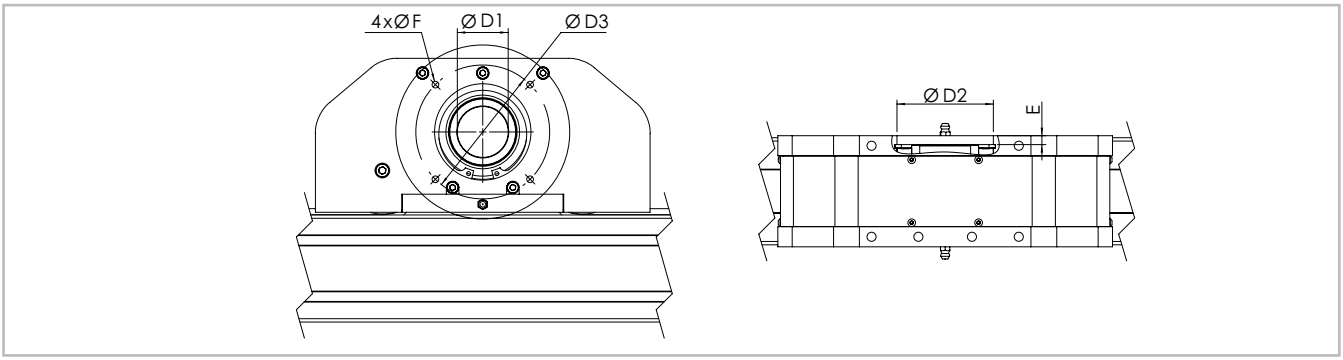



Fig. 43

**Units (mm)**

| Applicable to unit | Shaft type | D1 | D2 | D3 | E | F | Drive head code |
|---|---|---|---|---|---|---|---|
| **S-SMART 50** | **AC 26** | 26H7 | 47 | 75 | 2.5 | M5 | 2YA |
| **S-SMART 65** | **AC 34** | 34H7 | 62 | 96 | 2.5 | M6 | 2YA |
| **S-SMART 80** | **AC 41** | 41H7 | 72 | 100 | 5 | M6 | 2ZA |

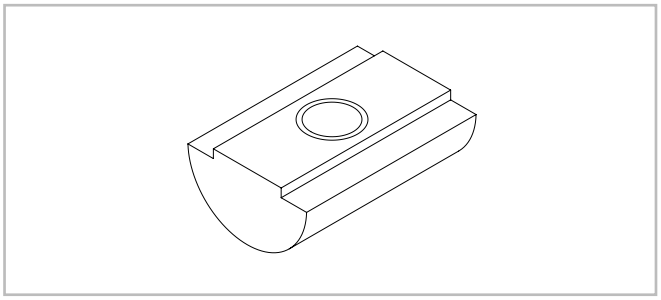
Tab. 72

An (optional) connection flange is required to fit the standard reduction units selected by Rollon.
For further information contact our offices.

## Accessories

The ball bearing guide linear drive system of Rollon SMART System series linear units enables them to support loads in any direction. They can therefore be installed in any position.
To install the SMART System series units, we recommend use of one of the systems indicated below:

### T-nuts



Steel nuts to be used in the slots of the body. Fig. 44

Units (mm)

| | Hole | Length | Code Rollon |
|---|---|---|---|
| **S-SMART 50** | M4 | 8 | 1001046 |
| **S-SMART 65** | M5 | 10 | 1000627 |
| **S-SMART 80** | M6 | 13 | 1000043 |

Tab. 73

### Proximity

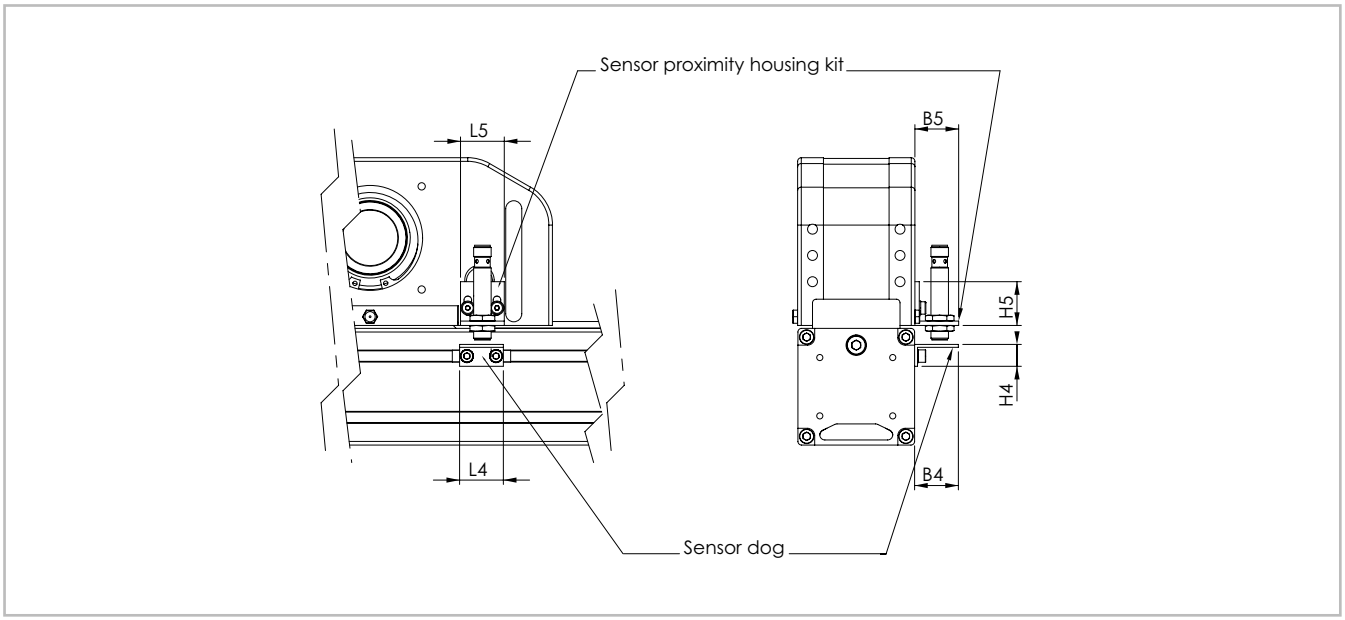



Fig. 45

**Proximity switch holder**

Aluminum block equipped with T-nuts for fixing

**Proximity switch runner**

Iron plate mounted on the carriage used for the proximity operation

Units (mm)

| | B4 | B5 | L4 | L5 | H4 | H5 | For proximity | Sensor dog code | Sensor proximity housing code |
|---|---|---|---|---|---|---|---|---|---|
| **S-SMART 50** | 30 | 30 | 30 | 30 | 15 | 30 | Ø8 / Ø12 | G000835 | G000834 / G001408 |
| **S-SMART 65** | 30 | 30 | 30 | 30 | 15 | 30 | Ø8 / Ø12 | G000836 | G000834 / G001408 |
| **S-SMART 80** | 30 | 30 | 30 | 30 | 15 | 30 | Ø8 / Ø12 | G000837 | G000834 / G001408 |

Tab. 74

## Assembly kits

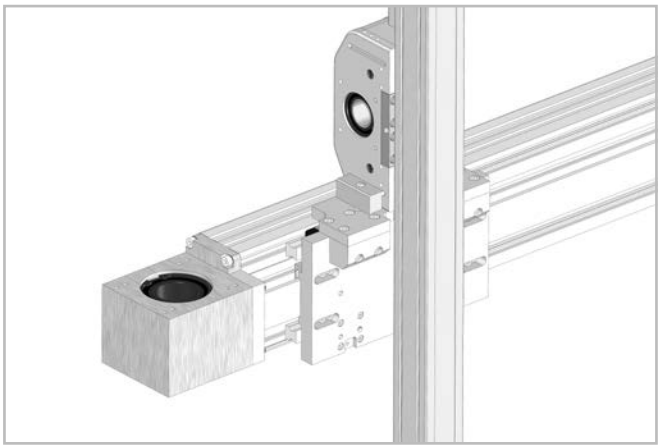


Fig. 46

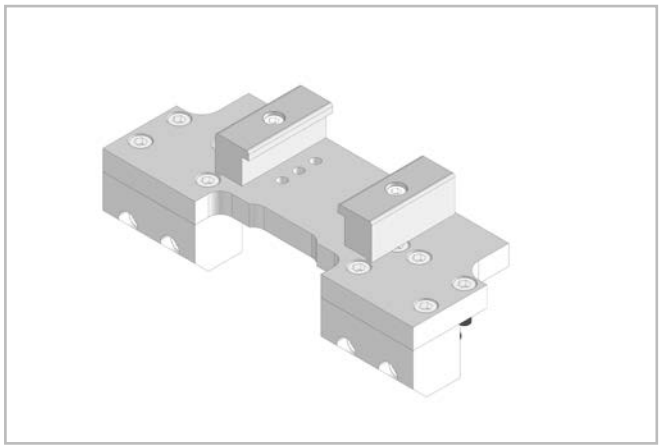
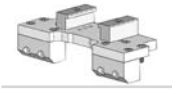
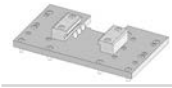
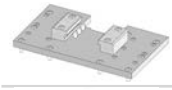


Fig. 47

While ordering two units for Y-Z assembly key has to be specified that they work together in order to drill the trolleys for the assembly of the kit.

| Actuator combination Y-Z | | Kit Code |
|---|---|---|
|  | S-SMART 50 on E-SMART 50 | G000647 |
|  | S-SMART 50 on R-SMART 120 | G000910 |
|  | S-SMART 65 on E-SMART 50 | G000654 |
|  | S-SMART 65 on E-SMART 80 | G000677 |
|  | S-SMART 65 on R-SMART 120 | G000911 |
|  | S-SMART 65 on R-SMART 160 | G000912 |
|  | S-SMART 80 on E-SMART 80 | G000653 |
|  | S-SMART 80 on E-SMART 100 | G000688 |
|  | S-SMART 80 on R-SMART 120 | G000990 |
|  | S-SMART 80 on R-SMART 160 | G000913 |

Tab. 75

### Adapter flange for gearbox assembly

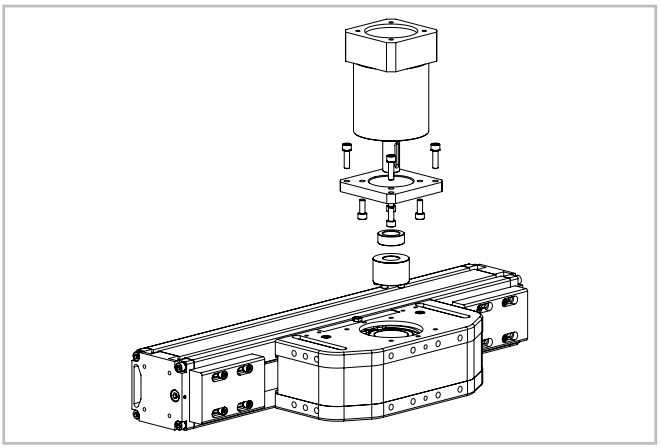


Fig. 48

Assembly kit includes: shrink disk; adapter plate; fixing hardware

| Unit | Gearbox type (not included) | Kit Code |
|---|---|---|
| S-SMART 50 | MP060 | G000566 |
| | LC050; PE2; LP050 | G001444 |
| S-SMART 65 | MP080 | G000529 |
| | MP060; PLE060 | G000531 |
| | SW030 | G000748 |
| | PE3; LP070; LC070 | G000530 |
| S-SMART 80 | P3 | G000824 |
| | MP080 | G000826 |
| | LC090; MPV01; LP090; PE4 | G000827 |
| | PLE080 | G000884 |
| | SP060; PLN070 | G000829 |
| | SW040 | G000866 |
| | SW050 | G000895 |

Tab. 76

For other gearbox type ask Rollon

### Single shrink disc

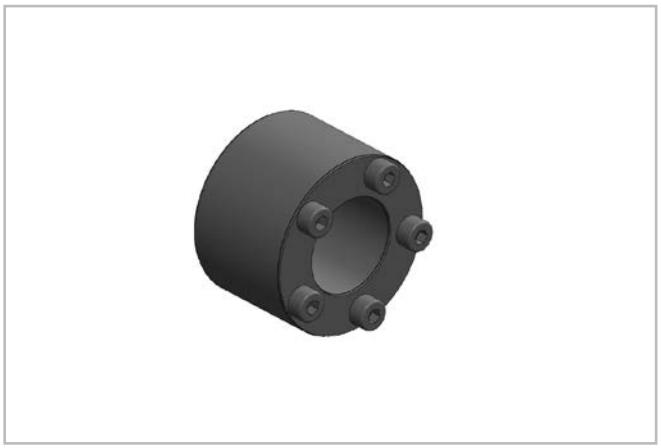


Fig. 49

Codes on the table below refer to a shink disc ordered as single element.

| Unit type | Hollow shaft [mm] | Shrink disc dxD [mm] | Transmittable torque* [Nm] | Shrink disc code |
|---|---|---|---|---|
| S-SMART 50 | 26 | 14x26 | 36 | 6005740 |
| S-SMART 65 | 34 | 14x34 | 64 | 6005737 |
| | | 16x34 | 73 | 6005738 |
| | | 19x34 | 87 | 6005739 |
| S-SMART 80 | 41 | 19x41 | 150 | 6005734 |
| | | 22x41 | 174 | 6005735 |
| | | 25x41 | 198 | 6005736 |

* Transmittable torque in the table represents the maximum capacity of the shrink disk. For the application, the limit of $F_x$ must be considered too.

Tab. 77

# Ordering key

## Identification codes for the S-SMART linear unit

| | | | | |
|---|---|---|---|---|
| F | 08<br>05 = 50<br>06 = 65<br>08 = 80 | 2ZA | 1300 | 1A<br>1A=SP |
| | | | | Linear motion system *see pg. SS-32* |
| | | | L=total length of the unit | |
| | | Drive head code *see pg. SS-37* | | |
| | Linear unit type *see from pg. SS-33 to pg. SS-35* | | | |
| Linear unit series S-SMART *see pg. SS-30* | | | | |

In order to create identification codes for Actuator Line, you can visit: **http://configureactuator.rollon.com**

Configure Actuator

# Multiaxis systems

Rollon now offers a set of components, including brackets and plates, to enable multiaxis units to be built.
In addition to the standard elements, Rollon can supply plates for special applications.

**Application examples:**

**One axis system**


**A** - X Axis: E-SMART

**Two parallel axis system**


**B** - Linear units: 2 E-SMART
**Connection kit:** Parallel Kit

**Two axis Y-Z system**


**C** - Linear units: Y Axis 1 R-SMART - Z Axis 1 S-SMART
**Connection kit:** Connection plate Kit for S-SMART (Z axis) on R-SMART (Y axis).

**Three axis X-Y-Z system**


**D** - Linear units: X Axis 2 E-SMART - Y Axis 1 R-SMART - Z Axis 1 S-SMART
**Connection kit:** 2 fixing brackets Kit for 2 R-SMART (Y axis) on 2 E-SMART (X axis). Connection plate Kit for S-SMART (Z axis) on 2 R-SMART (Y axis). Parallel Kit

# Notes

# Service life

## Service life

### Calculation of the service life

The dynamic load rating C is a conventional quantity used for calculating the service life. This load corresponds to a nominal service life of 100 km.

The calculated service life, dynamic load rating and equivalent load are linked by the following formula:

$$L_{km} = 100\ km \cdot \left(\frac{Fz\text{-}dyn}{P_{eq}} \cdot \frac{1}{f_i}\right)^3$$

$L_{km}$ = theoretical service life (km)
Fz-dyn = dynamic load rating (N)
$P_{eq}$ = acting equivalent load (N)
$f_i$ = service factor (see tab. 2)

Fig. 1

The effective equivalent load $P_{eq}$ is the sum of the forces and moments acting simultaneously on a slider. If these different load components are known, P is obtained from the following equation:

### For SP types

$$P_{eq} = P_{fy} + P_{fz} + \left(\frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z}\right) \cdot F_y$$

Fig. 2

### For CI and CE types

$$P_{eq} = P_{fy} + \left(\frac{P_{fz}}{F_z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z}\right) \cdot F_y$$

Fig. 3

The external constants are assumed to be constant over time. Short-term loads that do not exceed the maximum load ratings have no relevant effect on the service life and can therefore be neglected in the calculation.

### Belt safety factor referred to the dynamic $F_x$

| Impact and vibrations | Speed / acceleration | Orietation | Safety Factor |
|---|---|---|---|
| **No impacts and/or vibrations** | Low | horizontal | 1.4 |
| | | vertical | 1.8 |
| **Light impacts and/or vibrations** | Medium | horizontal | 1.7 |
| | | vertical | 2.2 |
| **Strong impacts and/or vibrations** | High | horizontal | 2.2 |
| | | vertical | 3 |

Tab. 1

### Service factor $f_i$

| $f_i$ | |
|---|---|
| no shocks or vibrations, smooth and low-frequency changes in direction; ($\alpha < 5 m/s^2$) clean operating conditions; low speeds (<1 m/s) | 1.5 - 2 |
| Slight vibrations; medium speeds; (1-2 m/s) and medium-high frequency of the changes in direction ($5 m/s^2 < \alpha < 10 m/s^2$) | 2 - 3 |
| Shocks and vibrations; high speeds (>2 m/s) and high-frequency changes in direction; ($\alpha > 10 m/s^2$) high contamination, very short stroke | > 3 |

Tab. 2

### Speedy Rail A Lifetime

The rated lifetime for Speedy Rail A is: SAR 80.000 km, SAB 50.000 km.

# Service life Uniline

## Service life

### Calculation of the service life

The dynamic load rating C is a conventional quantity used for calculating the service life. This load corresponds to a nominal service life of 100 km. The corresponding values for each liner unit are listed in Table 45 shown below. The calculated service life, dynamic load rating and equivalent load are linked by the following formula:

$$L_{km} = 100\ km \cdot \left(\frac{C}{P} \cdot \frac{f_c}{f_i} \cdot f_h\right)^3$$

$L_{km}$ = theoretical service life (km)
$C$ = dynamic load rating (N)
$P$ = acting equivalent load (N)
$f_i$ = service factor (see tab. 5)
$f_C$ = contact factor (see tab. 6)
$f_h$ = stroke factor (see fig. 13)

Fig. 4

The effective equivalent load P is the sum of the forces and moments acting simultaneously on a slider. If these different load components are known, P is obtained from the following equation:

$$P = P_{fy} + \left(\frac{P_{fz}}{F_Z} + \frac{M_1}{M_x} + \frac{M_2}{M_y} + \frac{M_3}{M_z}\right) \cdot F_y$$

Fig. 5

The external constants are assumed to be constant over time. Short-term loads that do not exceed the maximum load ratings have no relevant effect on the service life and can therefore be neglected in the calculation.

### Service factor $f_i$

| $f_i$ | |
|---|---|
| No shocks or vibrations, smooth and low-frequency changes in direction; clean operating conditions; low speeds (<1 m/s) | 1 - 1.5 |
| Slight vibrations; medium speeds; (1-2,5 m/s) and medium-high frequency of the changes in direction | 1.5 - 2 |
| Shocks and vibrations; high speeds (>2.5 m/s) and high-frequency changes in direction; high contamination | 2 - 3.5 |

Tab. 3

### Contact factor $f_c$

| $f_c$ | |
|---|---|
| Standard slider | 1 |
| Long slider | 0.8 |
| Double slider | 0.8 |

Tab. 4

### Stroke factor $f_h$

The stroke factor $f_h$ accounts for the higher stress on the raceways and rollers when short strokes are carried out at the same total run distance. The following diagram shows the corresponding values (for strokes above 1 m, $f_h$ remains 1):

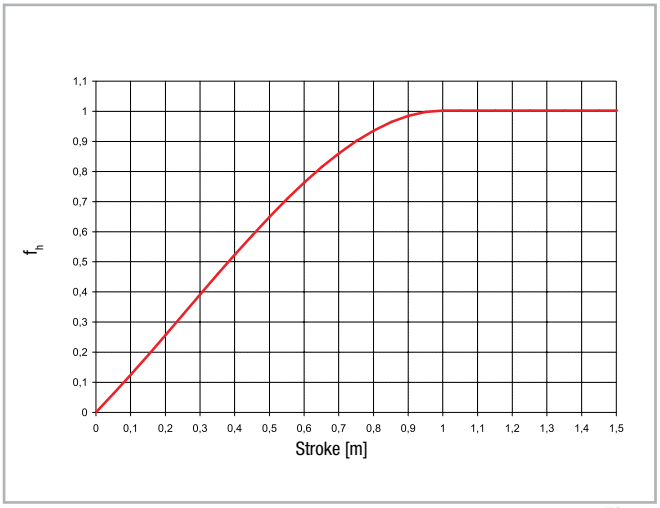



Fig. 6

## Determination of the motor torque

The torque $C_m$ required at the drive head of the linear axis is calculated by the following formula:

$$C_m = C_v + \left( F \cdot \frac{D_p}{2} \right)$$

$C_m$ = torque of the motor (Nm)
$C_v$ = starting torque (Nm)
$F$ = force acting on the toothed belt (N)
$D_p$ = pitch diameter of pulley (m)

Fig. 7

## Calculation formulae

### Moments $M_y$ and $M_z$ for linear units with long slider plate

The allowed loads for the moments $M_y$ and $M_z$ depend on the length of the slider plate. The allowed moments $M_{zn}$ and $M_{yn}$ for each slider plate length are calculated by the following formulae:

$$S_n = S_{min} + n \cdot \Delta S$$

$$M_{zn} = \left( 1 + \frac{S_n - S_{min}}{K} \right) \cdot M_{z\,min}$$

$$M_{yn} = \left( 1 + \frac{S_n - S_{min}}{K} \right) \cdot M_{y\,min}$$

$M_{zn}$ = allowed moment (Nm)
$M_{z\,min}$ = minimum values (Nm)
$M_{yn}$ = allowed moment (Nm)
$M_{y\,min}$ = minimum values (Nm)
$S_n$ = length of the slider plate (mm)
$S_{min}$ = minimum length of the slider plate (mm)
$\Delta S$ = factor of the change in slider length
$K$ = constant

Fig. 8

| Type | $M_{y\,min}$ [Nm] | $M_{z\,min}$ [Nm] | $S_{min}$ [mm] | ΔS | K |
|---|---|---|---|---|---|
| **A40L** | 22 | 61 | 240 | | 74 |
| **A55L** | 82 | 239 | 310 | | 110 |
| **A75L** | 287 | 852 | 440 | | 155 |
| **C55L** | 213 | 39 | 310 | | 130 |
| **C75L** | 674 | 116 | 440 | 10 | 155 |
| **E55L** | 165 | 239 | 310 | | 110 |
| **E75L** | 575 | 852 | 440 | | 155 |
| **ED75L ($M_z$)** | 1174 | 852 | 440 | | 155 |
| **ED75L ($M_y$)** | 1174 | 852 | 440 | | 270 |

Tab. 5

### Moments $M_y$ and $M_z$ for linear units with two slider plates

The allowed loads for the moments $M_y$ and $M_z$ are related to the value of the distance between the centers of the sliders. The allowed moments $M_{yn}$ and $M_{zn}$ for each distance between the centers of the sliders are calculated by the following formulae:

$$L_n = L_{min} + n \cdot \Delta L$$

$$M_y = \left(\frac{L_n}{L_{min}}\right) \cdot M_{y\,min}$$

$$M_z = \left(\frac{L_n}{L_{min}}\right) \cdot M_{z\,min}$$

$M_y$ = allowed moment (Nm)
$M_z$ = allowed moment (Nm)
$M_{y\,min}$ = minimum values (Nm)
$M_{z\,min}$ = minimum values (Nm)
$L_n$ = distance between the centers of the sliders (mm)
$L_{min}$ = minimum value for the distance between the centers of the sliders (mm)
$\Delta L$ = factor of the change in slider length

Fig. 9

| Type | $M_{y\,min}$ [Nm] | $M_{z\,min}$ [Nm] | $L_{min}$ [mm] | ΔL |
|---|---|---|---|---|
| **A40D** | 70 | 193 | 235 | 5 |
| **A55D** | 225 | 652 | 300 | 5 |
| **A75D** | 771 | 2288 | 416 | 8 |
| **C55D** | 492 | 90 | 300 | 5 |
| **C75D** | 1809 | 312 | 416 | 8 |
| **E55D** | 450 | 652 | 300 | 5 |
| **E75D** | 1543 | 2288 | 416 | 8 |
| **ED75D** | 3619 | 2288 | 416 | 8 |

Tab. 6

# Warnings and legal notes

Before incorporating the partly completed machinery, we recommend consulting this chapter carefully, in addition to the assembly manual supplied with the individual modules. The information contained in this chapter and in the manuals for the individual modules, is provided by highly qualified and certified personnel, possessing adequate competence in incorporating the partly completed machinery.

Precaution in installation and handling operations. Significantly heavy equipment.

When handling the axis or system of axes, always make sure that the support or anchoring surfaces do not leave room for bending.

In order to stabilize the axis or system of axes, before handling it is mandatory to securely block the mobile parts. When moving axes with vertical translation (Z AXES) or combination systems (horizontal X and/or more than one vertical Z), it is mandatory to use the vertical movement to put all of the axes at the corresponding lower limit switch.

Do not overload. Do not subject to torsion stress.

Do not leave exposed to atmospheric agents.

Before mounting the motor on the gearbox, it is advisable to perform a pre-test of the motor itself, without connection to the gear unit. The testing of this component was not carried out by the manufacturer of the machine. It will therefore be the responsibility of the customer of Rollon to perform the testing of the same, in order to verify its correct operation.

The manufacturer cannot be considered responsible for any consequences derived from improper use or any use other than the purpose the axis or system of axes was designed for, or derived from failure to comply, during incorporation phases, with the rules of Good Technique and with what is indicated in this manual.

Avoid damage. Do not operate with inadequate tools

Warning: moving parts. Do not leave objectson the axis

Special installations: check the depth of the threads on moving elements

Make sure that the system has been installed on a level floor surface.

In use, accurately comply with the specific performance values declared in the catalog or, in particular cases, the load and dynamic performance characteristics requested in the phase prior to design.

For modules or parts of modular systems with vertical movement (Z axis), it is mandatory to mount self-braking motors to neutralize the risk of the axis dropping.

The images in this manual are to be considered merely an indication and not binding; therefore, the supply received could be different from the images contained in this manual, and Rollon S.p.A has deemed it useful to insert only one example.


Systems supplied by Rollon S.p.A. were not designed/envisaged to operate in ATEX environments.

## Residual risks

- Mechanical risks due to the presence of moving elements (X, Y axes).
- Risk of fire resulting from the flammability of the belts used on the axes, for temperatures in excess of 250 °C in contact with the flame.
- The risk of the Z axis dropping during handling and installation operations on the partly completed machinery, before commissioning.
- Risk of the Z axis dropping during maintenance operations in the case of a drop in the electrical power supply voltage.
- Crushing hazard near moving parts with divergent and convergent motion.
- Shearing hazard near moving parts with divergent and convergent motion.
- Cutting and abrasion hazards.

## Basic components

The Partly Completed Machinery shown in this catalog is to be considered a mere supply of simple Cartesian axes and their accessories agreed when the contract is stipulated with the client. The following are therefore to be considered excluded from the contract:

1. Assembly on the client's premises (direct or final)
2. Commissioning on the client's premises (direct or final)
3. Testing on the client's premises (direct or final)

It is therefore understood that the aforementioned operations in points 1.,2., and 3. are not chargeable to Rollon.

Rollon is the supplier of Partly Completed Machinery, the (direct or final) client is responsible for testing and safely checking all equipment which, by definition, cannot be theoretically tested or checked at our facilities where the only movement possible is manual movement (for example: motors or reduction gears, cartesian axes movements that are not manually operated, safety brakes, stopper cylinders, mechanical or induction sensors, decelerators, mechanical limit switches, pneumatic cylinders, etc.). The partly completed machine must not be commissioned until the final machine, in which it is to be incorporated, has been declared compliant, if necessary, with the instructions in Machinery Directive 2006/42/CE.

## Instructions of an environmental nature

Rollon operates with respect for the envirorment, in order to limit environmental impact. The following is a list of some instructions of an environmental nature for correct management of our supplies. Our products are mainly composed of:

| Material | Details of the supply |
|---|---|
| Alluminum alloys | Profiles, pleates, various details |
| Steel with various composition | Screws, racks and pinions, and rails |
| Plastic | PA6 – Chains<br>PVC – Covers and sliding block scrapers |
| Rubber of various types | Plugs, seals |
| Lubrification of various types | Used for the lubrication of sliding rails and bearings |
| Rust proof protectione | Rust proof protection oil |
| Wood, polyethylene, cardboard | Transport packaging |

At the end of the product's life cycle, it is therfore possible to recover the various elements, in compliance with current regulations on waste issues.

## Safety warnings for handling and transport

- The manufacturer has paid the utmost attention to packaging to minimize risks related to shipping, handling and transport.
- Transport can be facilitated by shipping certain components dismantled and appropriately protected and packaged.
- Handling (loading and unloading) must be carried out in compliance with information directly provided on the machine, on the packing and in the user manuals.
- Personnel authorized to lift and handle the machine and its components shall possess acquired and acknowledged skills and experience in the specific sector, besides having full control of the lifting devices used.
- During transport and/or storage, temperature shall remain within the allowed limits to avoid irreversible damage to electric and electronic components.
- Handling and transport must be carried out with vehicles presenting adequate loading capacity, and the machines shall be anchored to the established points indicated on the axes.
- DO NOT attempt to bypass handling methods and the established lifting points in any way.
- During handling and if required by the conditions, make use of one or more assistants to receive adequate warnings.
- If the machine has to be moved with vehicles, ensure that they are adequate for the purpose, and perform loading and unloading without risks for the operator and for people directly involved in the process.
- Before transferring the device onto the vehicle, ensure that both the machine and its components are adequately secured, and that their profile does not exceed the maximum bulk allowed. Place the necessary warning signs, if necessary.
- DO NOT perform handling with an inadequate visual field and when there are obstacles along the route to the final location.
- DO NOT allow people to either transit or linger within the range of action when lifting and handling loads.
- Download the axes just near the established location and store them in an environment protected against atmospheric agents.
- Failure to comply with the information provided might entail risks for the safety and health of people, and can cause economic loss.
- The Installation Manager must have the project to organize and monitor all operative phases.
- The Installation Manager shall ensure that the lifting devices and equipment defined during the contract phase are available.
- The Manager of the established location and the Installation Manager shall implement a “safety plan” in compliance with the legislation in force for the workplace.
- The “safety plan” shall take into account all surrounding work-related activities and the perimeter spaces indicated in the project for the es tablished location.
- Mark and delimit the established location to prevent unauthorized personnel from accessing the installation area.
- The installation site must have adequate environmental conditions (lighting, ventilation, etc.).
- Installation site temperature must be within the maximum and minimum range allowed.
- Ensure that the installation site is protected against atmospheric agents, does not contain corrosive substances and is free of the risk of explosion and/or fire.
- Installation in environments presenting a risk of explosion and/or of fire must ONLY be carried out if the machine has been DECLARED COMPLIANT for such use.
- Check that the established location has been correctly fitted out, as defined during the contract phase and based on indications in the relative project.
- The established location must be fitted out in advance to carry out complete installation in compliance with the defined methods and schedule.

## Note

- Evaluate in advance whether the machine must interact with other production units, and that integration can be implemented correctly, in compliance with standards and without risks.
- The manager shall assign installation and assembly interventions ONLY to authorized technicians with acknowledged know-how.
- State of the art connections to power sources (electric, pneumatic, etc.) must be ensured, in compliance with relevant regulatory and legislative requirements.
- “State of the art” connection, alignment and leveling are essential to avoid additional interventions and to ensure correct machine function.
- Upon completion of the connections, run a general check to ascertain that all interventions have been correctly carried out and compliance with requirements.
- Failure to comply with the information provided might entail risks for the safety and health of people, and can cause economic loss.

## Transport

- Transport, also based on the final destination, can be done with different vehicles.
- Perform transport with suitable devices that have adequate loading capacity.
- Ensure that the machine and its components are adequately anchored to the vehicle.

## Handling and lifting

- Correctly connect the lifting devices to the established points on the packages and/or on the dismantled parts.
- Before handling, read the instructions, especially safety instructions, provided in the installation manual, on the packages and/or on the dismantled parts.
- DO NOT attempt, in any way, to bypass handling methods and the established lifting, moving and handling points of each package and/or dismantled part.
- Slowly lift the package to the minimum necessary height and move it with the utmost caution to avoid dangerous oscillations.
- DO NOT perform handling with an inadequate visual field and when there are obstacles along the route to reach the final location.
- DO NOT allow people to either transit or linger within the range of action when lifting and handling loads.
- Do not stack packages to avoid damaging them, and reduce the risk of sudden and dangerous movements.
- In case of prolonged storage, regularly ensure that there are no variations in the storage conditions of the packages.

## Check axis integrity after shipment

Every shipment is accompanied by a document (“Packing list”) with the list and description of the axes.

- Upon receipt check that the material received corresponds to specifications in the delivery note.
- Check that packaging is perfectly intact and, for shipments without packaging, check that each axis is intact.
- In case of damages or missing parts, contact the manufacturer to define the relevant procedures.

# Data sheet

**General data:**

**Date:** ..... **Inquiry N°:** .....

**Address:** .....

**Contact:** .....

**Company:** .....

**Zip Code:** .....

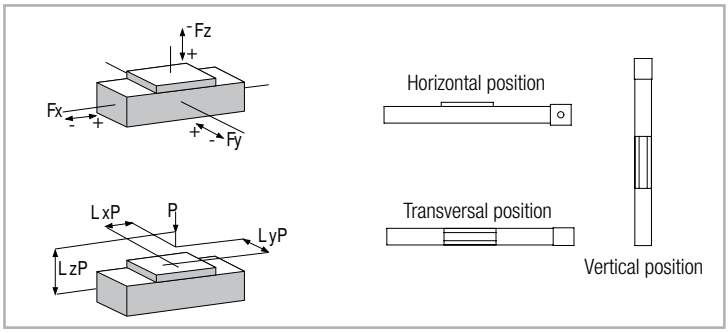
**Phone:** .....

**Fax:** .....

**E-Mail:** .....

**Technical data:**

| | | | | X axis | Y axis | Z axis |
|---|---|---|---|---|---|---|
| **Useful stroke** (Including safety overtravel) | | S | [mm] | | | |
| **Load to be translated** | | P | [kg] | | | |
| **Location of Load in the** | X-Direction | LxP | [mm] | | | |
| | Y-Direction | LyP | [mm] | | | |
| | Z-Direction | LzP | [mm] | | | |
| **Additional force** | Direction (+/-) | Fx (Fy, Fz) | [N] | | | |
| **Position of force** | X-Direction | Lx Fx (Fy, Fz) | [mm] | | | |
| | Y-Direction | Ly Fx (Fy, Fz) | [mm] | | | |
| | Z-Direction | Lz Fx (Fy, Fz) | [mm] | | | |
| **Assembly position** (Horizontal/Vertical/Transversal | | | | | | |
| **Max. speed** | | V | [m/s] | | | |
| **Max. acceleration** | | a | [m/s$^2$] | | | |
| **Positioning repeatability** | | Δs | [mm] | | | |
| **Required life** | | L | yrs | | | |




**Attention:** Please enclose drawing, sketches and sheet of the duty cycle

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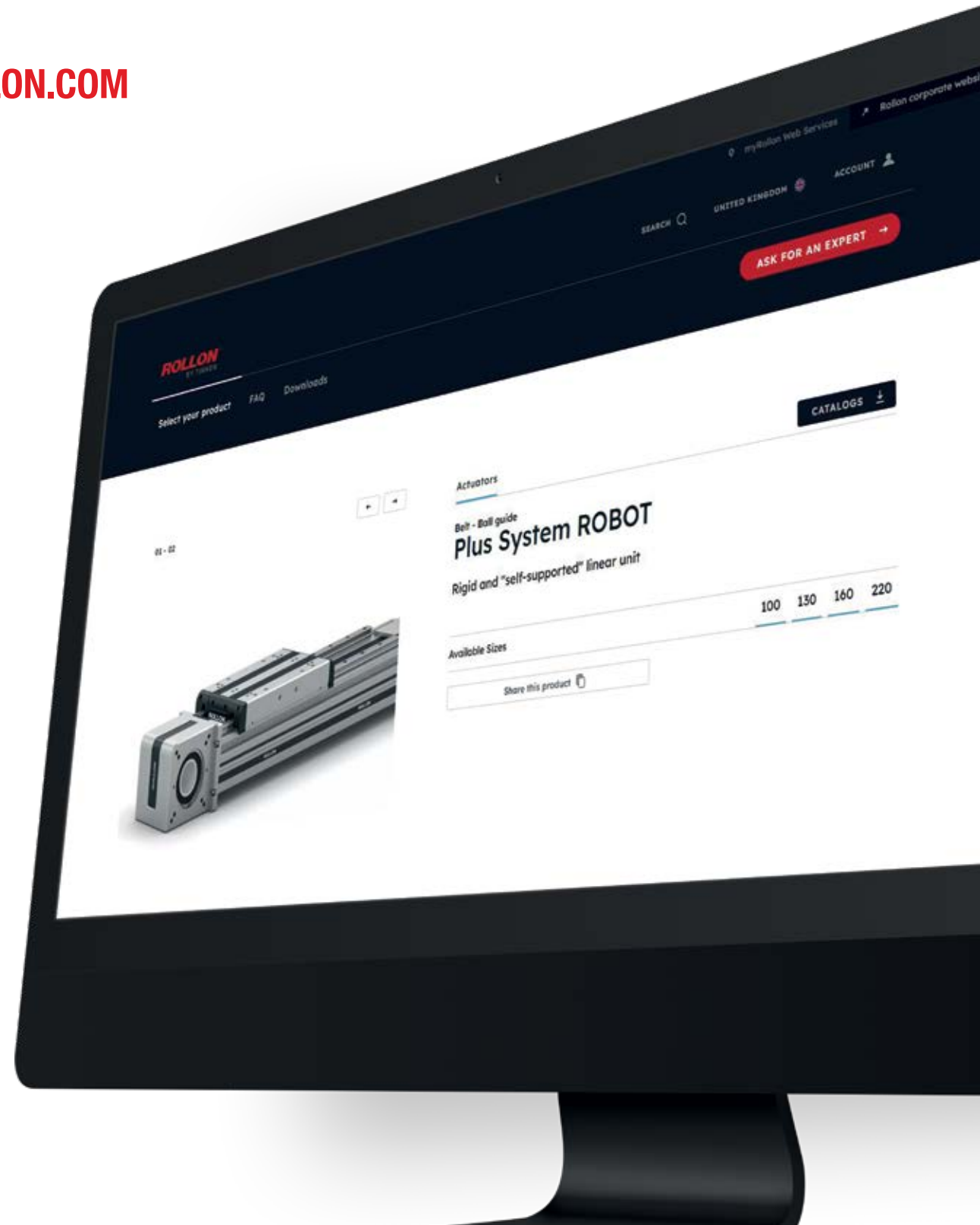

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