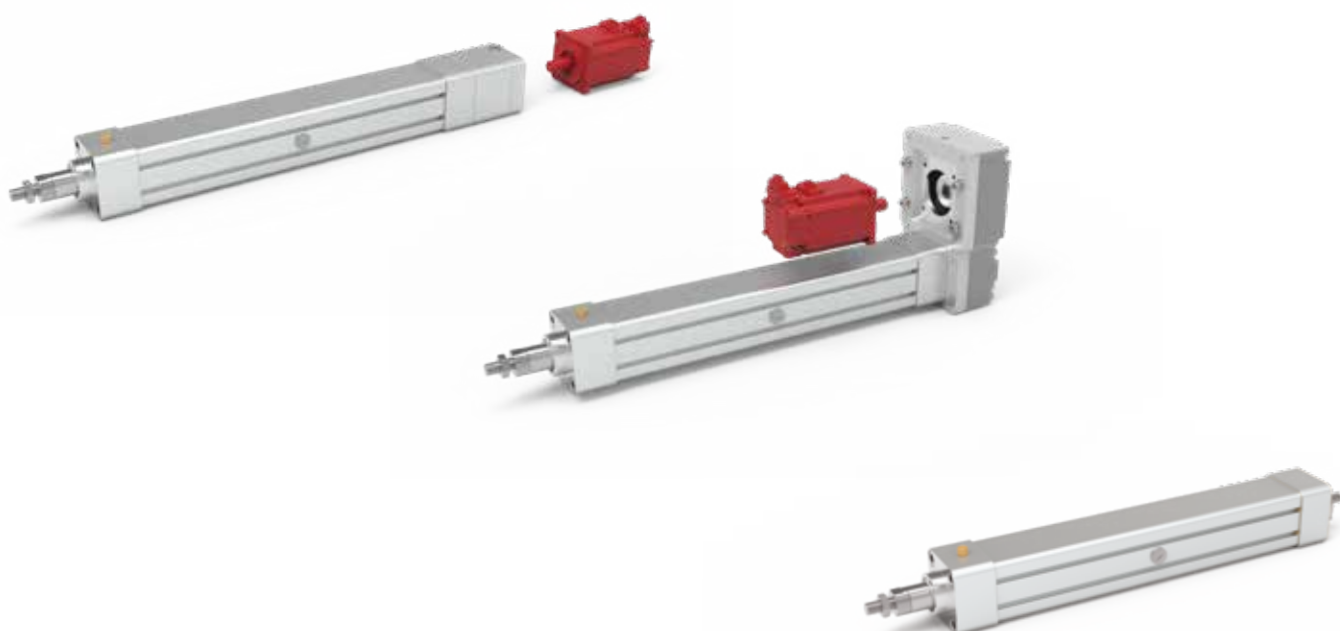




# LINEAR SERVOACTUATORS

CATALOGUE



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# LINEAR SERVOACTUATORS

CATALOGUE



SAM IL Series



SAM PD Series



SAM Series



|                                      |           |                                               |           |
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# Linear servoactuators

**MORE  
PRODUCTIVITY,  
LESS ENERGY  
CONSUMPTION**

**Linearmech linear servoactuators** are **high performances** electromechanical cylinders, with high precision ball screw drive, also produced in-house by Servomech, to be motorized mainly with brushless servomotors.

**Linearmech linear servoactuators** have been designed and built by Servomech to overcome the performance limits of pneumatic cylinders. Ideal for **high dynamics applications**, high precision and positioning accuracy, reliability over the time. Linearmech servoactuators grant excellent **speed control**, from speed close to zero up to the max permissible speed, excellent **positioning control** in any stroke position, intermediate or extreme, excellent **load control**, within a wide range of values.

Linearmech linear servoactuators best combine the demands for ever higher performance and **higher productivity** with competitive industrial costs.

Also ideal for **replacing pneumatic cylinders** in applications requiring high position, speed and force control.

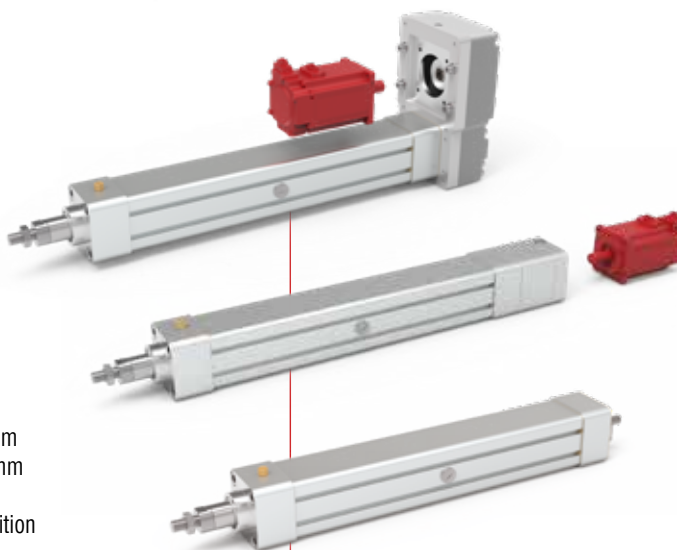
The **mechanical construction** of these servoactuators, in compliance with **ISO 15552 standard** for cylinders, allows the mounting of different standard types of fixing elements. This simplify the use and the assembly in systems where movements of controlled axis are required. Also the replacement of the traditional pneumatic cylinders with electromechanical servoactuators is easier, maintaining exactly the same type and size of the fixing.

There are many different **application fields for the servoactuators products**, but most of all they are suggested in case of applications with high levels of automation, productivity, efficiency and reliability.

**Linearmech** is a brand of the Servomech Group that brings together products focused on automation and mechatronics.

## SAM SERIES

- High precision ball screw drive
- Low inertia and zero backlash
- Extreme positioning control
- Excellent for high dynamics and high speed conditions
- Parallel or in-line motor
- Prepared for brushless servomotors mounting
- Linear speed up to 1,5 m/s
- 7 sizes, ball screw from Ø 12 mm to Ø 40 mm
- ISO 15552 profile from Ø 32 mm to Ø 125 mm
- ISO 15552 standard accessories
- Nut relubrication system with "homing" position
- Electric limit switches



SERVOMECH products are **designed and manufactured inside the production factory in Anzola dell'Emilia (Bologna) - ITALY** using high technology and CNC machine tools.

Check tests are carried out in-line during all manufacturing processes to monitor and adjust possible errors, obtaining a constant quality of the production with target zero scraps. Final control and functional checks are carried out to ensure high quality and reliability of the final product.

Each finished product is uniquely identified by the serial

number on the product identification nameplate. For each finished product, SERVOMECH fills a specific final test sheet which is supplied to the customer within the shipment together with the product and certifies its conformity. The final test sheet also contains important information for the correct functioning of the product. All working processes inside SERVOMECH comply to its **Quality Management System**, developed according to **ISO 9001:2015** and certified by TÜV Italia.



## / Main features

- Modular structure, robust and compact.
- **7 standard sizes** available at catalogue.
- **In-line or parallel motor.**
- **High precision ball screw drive**, made in Servomech. Standard execution with rolled ball screw ISO IT7 accuracy grade. Available upon request ball screw ISO IT3 and IT5 accuracy grade, ball nuts zero backlash or preloaded.
- **Integrated lubrication system for the ball nut** with sealing for lubricant. The lubricant is only where needed, no leakage even in case of high dynamic conditions.
- **Transmission of motion with zero backlash and low inertia**, to get maximum performances with high dynamics and speed conditions.
- Wide range of fixing elements according to the **ISO 15552 standards**.
- Compensation of air flows and the relative pressure through breathers both outwards and inwards. No seals failure, no energy waste, no lubricant leakage thanks to the special design of the ball nut.
- Non-sliding contact lubricant seals to prevent wear, overheating and frictional losses.
- Elastic cushioning elements at stroke-end position protect the mechanics in case of accidental impacts.
- **Anti-turn device** of the push rod included as standard.
- **Stroke end limit sensors** integrated into the profile.
- On demand: IP65 protection. For more informations, please contact our technical support.

## / Product overview

Linearmech servoactuators product range of is based upon **3 series**, differentiated by design, mounting position and input drive.

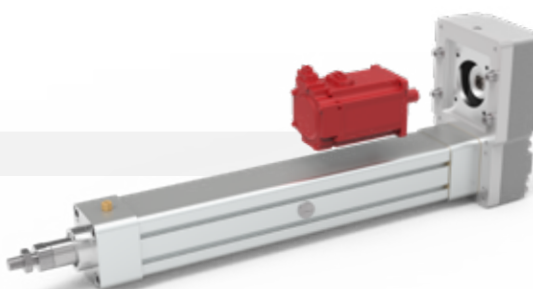
### SAM IL Series

- In-line motor
- Prepared to easy-fit third party servomotors
- Transmission of motion by torsionally rigid coupling



### SAM PD Series

- Parallel motor
- Prepared to easy-fit third party servomotors
- Transmission of motion by high performance and accuracy timing belt



### SAM Series

- Mechanical linear unit with cylindrical input shaft
- Simple and flexible, to adapt to any type assembly with motor or gearmotor



## / Size overview

Thanks to the completely modular construction system, each family is available in **7 standard sizes**, to cover a wide range of performances.

| SIZE  | ISO 15552 profile<br>[mm] | Push rod diameter<br>[mm] | Ball screw $d_o \times Ph$<br>[mm] |
|-------|---------------------------|---------------------------|------------------------------------|
| SAM 0 | Ø 32                      | Ø 20                      | 12 × 5                             |
|       |                           |                           | 12 × 10                            |
| SAM 1 | Ø 40                      | Ø 22                      | 14 × 5                             |
|       |                           |                           | 14 × 10                            |
| SAM 2 | Ø 50                      | Ø 25                      | 16 × 5                             |
|       |                           |                           | 16 × 10                            |
|       |                           |                           | 16 × 16                            |
| SAM 3 | Ø 63                      | Ø 30                      | 20 × 5                             |
|       |                           |                           | 20 × 10                            |
|       |                           |                           | 20 × 20                            |
| SAM 4 | Ø 80                      | Ø 35                      | 25 × 5                             |
|       |                           |                           | 25 × 10                            |
|       |                           |                           | 25 × 25                            |
| SAM 5 | Ø 100                     | Ø 50                      | 32 × 5                             |
|       |                           |                           | 32 × 10                            |
|       |                           |                           | 32 × 20                            |
|       |                           |                           | 32 × 32                            |
| SAM 6 | Ø 125                     | Ø 60                      | 40 × 5                             |
|       |                           |                           | 40 × 10                            |
|       |                           |                           | 40 × 20                            |
|       |                           |                           | 40 × 40                            |

## / 5 reasons to go electric

**Linear servoactuators SAM Series** are included inside the **5 Reasons To Go Electric** campaign, to prefer the Servomech electromechanical solution to hydraulic and pneumatic cylinders.

**1. Greater efficiency and lower energy consumption** of Servomech linear actuators when compared to traditional hydraulic or pneumatic cylinders.

**2. Greater control of position, speed, and force**, Servomech linear actuators offer significantly superior control options compared to hydraulic or pneumatic alternatives.

**3. Exact position repeatability**, essential for applications requiring high positioning accuracy, even when synchronizing multiple actuators.

**4. Greater safety and reliability**, thanks to the absence of pressurized fluids, there is no risk of explosion or environmental contamination. Furthermore, the ability to hold the load even in emergency situations further increases operational safety.

**5. Lower maintenance costs and increased productivity**, thanks to superior performance and flexibility in format changeovers, increases the quality and quantity of work performed.



## / Sizing and selection

Linearmech electromechanical servoactuators have been specially developed for applications with **high dynamics**, and in general where the precise and **accurate control of position, speed and force** is a crucial factor. Sizing your electromechanical cylinder correctly means finding the most cost-effective solution that meets the application requirements.

### 1 Identify the performances and technical specifications required by the application.

- **Load** (static and dynamic load, pull and push load, moving mass, side loads, shock loads, vibrations).
- **Working position** (horizontal, vertical, inclined, load guided, holding the position).
- **Stroke** (stroke length required, max. dimension in closed position).
- **Linear speed** (max. speed, min. speed).
- **Precision** (accuracy, max. backlash).
- **Duty cycle** (total cycle time, required lifetime, accurate description of the working cycle with load and speed diagram referred to time).
- **Environmental condition** (operating temperature, outdoor, washdown, IP grade required).
- Presence of **contaminants** (powders, liquids).
- **Motor and driver** required.

### 2 Select the product series.

Depending on the mounting position of the motor (in line or parallel mounting).

### 3 Select the size of the servoactuator.

Using the summary tables in the Technical data section of each series.

### 4 Mechanical checks.

- **Lifetime check.**  
According to the duty cycle, check the life of the ball screw. Refer to the information in chapter **7.2 / Ball screw sizing and service life** (page 42).

- **Buckling resistance.**  
In case of push load (static or dynamic) applied on the servoactuator, the buckling resistance of the screw must be checked. Refer to the information and diagrams in chapter **7.3 / Push load limit** (page 47).
- **Critical speed / Max rotating speed of the screw.**  
Refer to the information and diagrams in the chapter **7.4 / Critical speed limit** (page 48).
- **Permissible side load.** In case of side load applied on the push rod, this must be lower than max permissible side load. Refer to the information and diagrams in chapter **7.5 / Side load limit** (page 50).

### 5 Motor sizing.

See chapter **7.1 / Motor sizing** (page 40).

### 6 Options and accessories.

Mounting options and rod end options see chapter **5 / Mounting options** (page 30).

Stroke end limit switches sensors see chapter **6 / Limit sensors** (page 37).

### 7 Check actuator dimensions and fixing options.

Refer to the tables to know the overall dimensions of the actuator and accessories and verify that they are compatible with the application. By visiting our website **www.servomech.com** you can download the 3D models of our products for free.

### 8 Fill the ordering code.

See chapter **9 / Ordering code** (page 61).

Our team of application engineers are at your disposal for more information and to support you in the correct product selection. We ask you to fill in the **application worksheet form** available on page 54 of this catalog and send it by e-mail to: [sales@linearmech.com](mailto:sales@linearmech.com)

## 2 / ACTUATORS SAM IL Series



**2.1 / Technical data SAM IL Series**

| SIZE                                                                     | SAM 0 IL |       | SAM 1 IL |       | SAM 2 IL |       |       | SAM 3 IL   |       |       |
|--------------------------------------------------------------------------|----------|-------|----------|-------|----------|-------|-------|------------|-------|-------|
| Profile ISO 15552 [mm]                                                   | Ø32      |       | Ø40      |       | Ø50      |       |       | Ø63        |       |       |
| Rod diameter [mm]                                                        | Ø20      |       | Ø22      |       | Ø25      |       |       | Ø30        |       |       |
| Ball screw BS                                                            | BS1      | BS2   | BS1      | BS2   | BS1      | BS2   | BS3   | BS1        | BS2   | BS3   |
| Diameter × Lead $d_o \times P_h$ [mm]                                    | 12×5     | 12×10 | 14×5     | 14×10 | 16×5     | 16×10 | 16×16 | 20×5       | 20×10 | 20×20 |
| Ball diameter $D_w$ [mm]                                                 | Ø 2.381  |       | Ø3.175   |       | Ø3.175   |       |       | Ø3.175     |       |       |
| Accuracy grade (°)                                                       | IT 7     |       | IT 7     |       | IT 7     |       |       | IT 7       |       |       |
| N° of circuits                                                           | 3        | 2     | 3        | 2     | 4        | 3     | 2     | 4          | 3     | 2     |
| N° of starts                                                             | 1        | 2     | 1        | 1     | 1        | 1     | 2     | 1          | 1     | 2     |
| Dynamic load $C_a$ [N]                                                   | 5300     | 6600  | 7800     | 5300  | 11100    | 8900  | 10500 | 12800      | 10200 | 12100 |
| Static load $C_{0a}$ [N]                                                 | 8000     | 9500  | 11100    | 6900  | 18100    | 14400 | 15700 | 24400      | 18900 | 20900 |
| Ratio $u$                                                                | 1        |       | 1        |       | 1        |       |       | 1          |       |       |
| Linear travel for 1 motor shaft revolution [mm]                          | 5        | 10    | 5        | 10    | 5        | 10    | 16    | 5          | 10    | 20    |
| Motor attachment                                                         | F1 ; F2  |       | F1; F2   |       | F1; F2   |       |       | F1; F2; F3 |       |       |
| Max. force $F_{max}^{(2)}$ [N]                                           | 920      | 440   | 2130     | 1080  | 2080     | 1040  | 640   | 4750       | 2430  | 1220  |
| Max. input torque $T_{max}$ [Nm]                                         | 1        | 1     | 2.2      | 2.2   | 2.2      | 2.2   | 2.2   | 5          | 5     | 5     |
| Max. linear speed $v_{max}$ [mm/s]                                       | 500      | 1000  | 417      | 833   | 375      | 750   | 1200  | 300        | 600   | 1200  |
| Max. rotational speed $n_{max}$ [min <sup>-1</sup> ]                     | 6000     | 6000  | 5000     | 5000  | 4500     | 4500  | 4500  | 3600       | 3600  | 3600  |
| Max. acceleration $a_{max}$ [m/s <sup>2</sup> ]                          | 10       | 10    | 10       | 10    | 10       | 10    | 10    | 10         | 10    | 10    |
| Total actuator efficiency $\eta$                                         | 0.86     | 0.88  | 0.85     | 0.88  | 0.85     | 0.87  | 0.88  | 0.84       | 0.87  | 0.88  |
| Friction torque $T_a$ [Nm]                                               | 0.15     | 0.20  | 0.20     | 0.25  | 0.25     | 0.30  | 0.35  | 0.50       | 0.55  | 0.60  |
| $J_o$ ref. to 0 mm stroke actuator [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.070    | 0.077 | 0.165    | 0.175 | 0.263    | 0.277 | 0.306 | 0.545      | 0.569 | 0.659 |
| $J_{100}$ each 100 mm extra-stroke [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.018    | 0.020 | 0.026    | 0.029 | 0.045    | 0.049 | 0.057 | 0.11       | 0.12  | 0.13  |
| Motor attachment                                                         | -        |       | -        |       | F3       |       |       | F4         |       |       |
| Max. force $F_{max}^{(2)}$ [N]                                           | -        | -     | -        | -     | 5070     | 2570  | 1610  | 5941       | 3800  | 1910  |
| Max. input torque $T_{max}$ [Nm]                                         | -        | -     | -        | -     | 5        | 5     | 5     | 6.1        | 7.5   | 7.5   |
| Max. linear speed $v_{max}$ [mm/s]                                       | -        | -     | -        | -     | 375      | 750   | 1200  | 300        | 600   | 1200  |
| Max. rotational speed $n_{max}$ [min <sup>-1</sup> ]                     | -        | -     | -        | -     | 4500     | 4500  | 4500  | 3600       | 3600  | 3600  |
| Max. acceleration $a_{max}$ [m/s <sup>2</sup> ]                          | -        | -     | -        | -     | 10       | 10    | 10    | 10         | 10    | 10    |
| Total actuator efficiency $\eta$                                         | -        | -     | -        | -     | 0.85     | 0.87  | 0.88  | 0.84       | 0.87  | 0.88  |
| Friction torque $T_a$ [Nm]                                               | -        | -     | -        | -     | 0.25     | 0.30  | 0.35  | 0.50       | 0.55  | 0.60  |
| $J_o$ ref. to 0 mm stroke actuator [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | -        | -     | -        | -     | 0.326    | 0.340 | 0.369 | 1.061      | 1.085 | 1.174 |
| $J_{100}$ each 100 mm extra-stroke [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | -        | -     | -        | -     | 0.045    | 0.049 | 0.057 | 0.11       | 0.12  | 0.13  |
| $m_o$ ref. to 0 mm stroke [kg]                                           | 0.32     | 0.32  | 0.47     | 0.48  | 0.64     | 0.65  | 0.65  | 1.06       | 1.07  | 1.05  |
| $m_{100}$ each 100 mm extra-stroke [kg]                                  | 0.13     | 0.13  | 0.14     | 0.14  | 0.19     | 0.19  | 0.19  | 0.20       | 0.20  | 0.20  |
| Weight of 100 mm stroke actuator (°) [kg]                                | 2.0      | 2.0   | 2.6      | 2.6   | 4.1      | 4.1   | 4.1   | 5.8        | 5.8   | 5.8   |
| Weight for each 100 mm extra-stroke [kg]                                 | 0.44     | 0.44  | 0.51     | 0.51  | 0.67     | 0.67  | 0.67  | 0.79       | 0.79  | 0.79  |

$J_o$  - Moment of inertia of the actuator reduced to motor shaft referred to 0 mm stroke actuator

$J_{100}$  - Moment of inertia of the actuator referred to each 100 mm extra-stroke

$m_o$  - Mass in linear motion referred to 0 mm stroke actuator

$m_{100}$  - Mass in linear motion referred to each 100 mm extra-stroke



| SIZE                                       |                                       | SAM 4 IL |        |        | SAM 5 IL   |        |        |        | SAM 6 IL   |        |        |        |
|--------------------------------------------|---------------------------------------|----------|--------|--------|------------|--------|--------|--------|------------|--------|--------|--------|
| Profile ISO 15552                          | [mm]                                  | Ø80      |        |        | Ø100       |        |        |        | Ø125       |        |        |        |
| Rod diameter                               | [mm]                                  | Ø35      |        |        | Ø50        |        |        |        | Ø60        |        |        |        |
| Ball screw BS                              |                                       | BS1      | BS2    | BS3    | BS1        | BS2    | BS3    | BS4    | BS1        | BS2    | BS3    | BS4    |
| Diameter × Lead $d_o \times P_h$           | [mm]                                  | 25×5     | 25×10  | 25×25  | 32×5       | 32×10  | 32×20  | 32×32  | 40×5       | 40×10  | 40×20  | 40×40  |
| Ball diameter $D_w$                        | [mm]                                  | Ø3.175   | Ø3.969 | Ø3.175 | Ø3.175     | Ø6.350 | Ø6.350 | Ø6.350 | Ø3.175     | Ø6.350 | Ø6.350 | Ø6.350 |
| Accuracy grade (1)                         |                                       | IT 7     |        |        | IT 7       |        |        |        | IT 7       |        |        |        |
| N° of circuits                             |                                       | 4        | 3      | 2      | 6          | 4      | 3      | 2      | 6          | 4      | 3      | 2      |
| N° of starts                               |                                       | 1        | 1      | 2      | 1          | 1      | 1      | 2      | 1          | 1      | 1      | 2      |
| Dynamic load $C_a$                         | [N]                                   | 14500    | 14800  | 13600  | 23000      | 37000  | 29800  | 35000  | 25300      | 42800  | 34300  | 40300  |
| Static load $C_{0a}$                       | [N]                                   | 31500    | 28000  | 27300  | 60200      | 66800  | 53200  | 58100  | 76900      | 88900  | 70000  | 77100  |
| Ratio $u$                                  |                                       | 1        |        |        | 1          |        |        |        | 1          |        |        |        |
| Linear travel for 1 motor shaft revolution | [mm]                                  | 5        | 10     | 25     | 5          | 10     | 20     | 32     | 5          | 10     | 20     | 40     |
| Motor attachment                           |                                       | F1; F2   |        |        | F1; F2; F3 |        |        |        | F1; F2     |        |        |        |
| Max. force $F_{max}$ (2)                   | [N]                                   | 6730     | 6870   | 3120   | 10680      | 15330  | 7820   | 4910   | 11740      | 19790  | 10220  | 5140   |
| Max. input torque $T_{max}$                | [Nm]                                  | 7.3      | 13.5   | 15     | 11.8       | 30     | 30     | 30     | 14.4       | 40     | 40     | 40     |
| Max. linear speed $v_{max}$                | [mm/s]                                | 250      | 500    | 1250   | 230        | 470    | 930    | 1490   | 190        | 370    | 750    | 1500   |
| Max. rotational speed $n_{max}$            | [min <sup>-1</sup> ]                  | 3000     | 3000   | 3000   | 2800       | 2800   | 2800   | 2800   | 2250       | 2250   | 2250   | 2250   |
| Max. acceleration $a_{max}$                | [m/s <sup>2</sup> ]                   | 10       | 10     | 10     | 10         | 10     | 10     | 10     | 10         | 10     | 10     | 10     |
| Total actuator efficiency $\eta$           |                                       | 0.82     | 0.86   | 0.88   | 0.80       | 0.85   | 0.87   | 0.88   | 0.78       | 0.84   | 0.87   | 0.88   |
| Friction torque $T_a$                      | [Nm]                                  | 0.75     | 0.80   | 0.90   | 1.2        | 1.3    | 1.4    | 1.6    | 2.4        | 2.5    | 2.6    | 2.8    |
| $J_o$ ref. to 0 mm stroke actuator         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 2.26     | 2.30   | 1.28   | 6.65       | 6.73   | 7.04   | 7.66   | 16.57      | 16.69  | 17.19  | 19.13  |
| $J_{100}$ each 100 mm extra-stroke         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.27     | 0.28   | 0.31   | 0.69       | 0.71   | 0.75   | 0.84   | 1.8        | 1.8    | 1.8    | 2.1    |
| Motor attachment                           |                                       | F3; F4   |        |        | F4; F5     |        |        |        | F3; F4; F5 |        |        |        |
| Max. force $F_{max}$ (2)                   | [N]                                   | 6730     | 6870   | 6313   | 10680      | 17170  | 10550  | 6635   | 11740      | 19870  | 15920  | 9980   |
| Max. input torque $T_{max}$                | [Nm]                                  | 7.3      | 13.5   | 29.5   | 11.8       | 33.5   | 40     | 40     | 14.4       | 40.1   | 60.8   | 75     |
| Max. linear speed $v_{max}$                | [mm/s]                                | 250      | 500    | 1250   | 230        | 470    | 930    | 1490   | 190        | 370    | 750    | 1500   |
| Max. rotational speed $n_{max}$            | [min <sup>-1</sup> ]                  | 3000     | 3000   | 3000   | 2800       | 2800   | 2800   | 2800   | 2250       | 2250   | 2250   | 2250   |
| Max. acceleration $a_{max}$                | [m/s <sup>2</sup> ]                   | 10       | 10     | 10     | 10         | 10     | 10     | 10     | 10         | 10     | 10     | 10     |
| Total actuator efficiency $\eta$           |                                       | 0.82     | 0.86   | 0.88   | 0.80       | 0.85   | 0.87   | 0.88   | 0.78       | 0.84   | 0.87   | 0.88   |
| Friction torque $T_a$                      | [Nm]                                  | 0.75     | 0.80   | 0.90   | 1.2        | 1.3    | 1.4    | 1.6    | 2.4        | 2.5    | 2.6    | 2.8    |
| $J_o$ ref. to 0 mm stroke actuator         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 4.16     | 4.19   | 4.44   | 11.39      | 11.47  | 11.78  | 12.40  | 27.62      | 27.75  | 28.25  | 30.18  |
| $J_{100}$ each 100 mm extra-stroke         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.27     | 0.28   | 0.31   | 0.69       | 0.71   | 0.75   | 0.84   | 1.8        | 1.8    | 1.8    | 2.1    |
|                                            |                                       |          |        |        |            |        |        |        |            |        |        |        |
| $m_o$ ref. to 0 mm stroke                  | [kg]                                  | 1.61     | 1.60   | 1.62   | 3.69       | 3.55   | 3.60   | 3.53   | 5.82       | 5.70   | 5.77   | 5.68   |
| $m_{100}$ each 100 mm extra-stroke         | [kg]                                  | 0.24     |        |        | 0.49       |        |        |        | 0.62       |        |        |        |
| Weight of 100 mm stroke actuator (3)       | [kg]                                  | 10.4     |        |        | 20         |        |        |        | 36         |        |        |        |
| Weight for each 100 mm extra-stroke        | [kg]                                  | 1.1      |        |        | 1.9        |        |        |        | 2.7        |        |        |        |

(1) - Ball screws with accuracy grade IT 3 or IT 5 available on demand

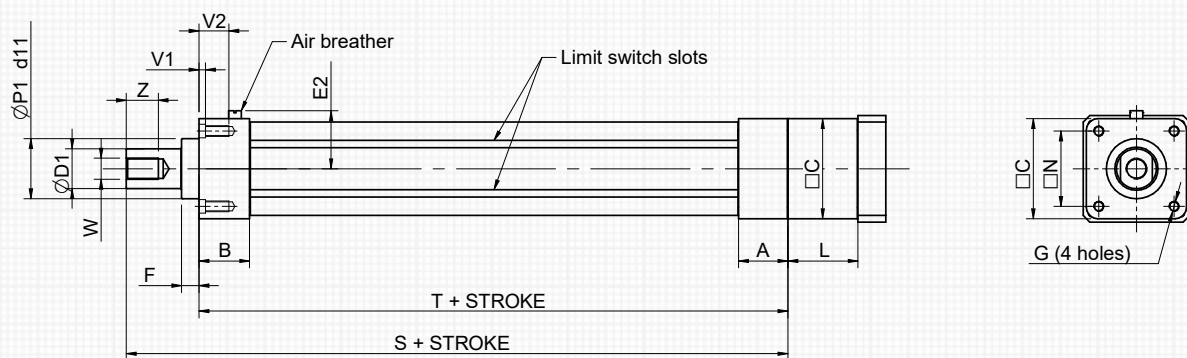
(2) - Values highlighted in orange: force limit due to mechanical transmission

Values highlighted in yellow: force limit due to a ball screw life of 10 million revolutions

(3) - Weight of the actuator without fixing accessories

## 2.2 / Dimensions SAM IL Series

### SAM 0 - 1 - 2 - 3 - 4 IL

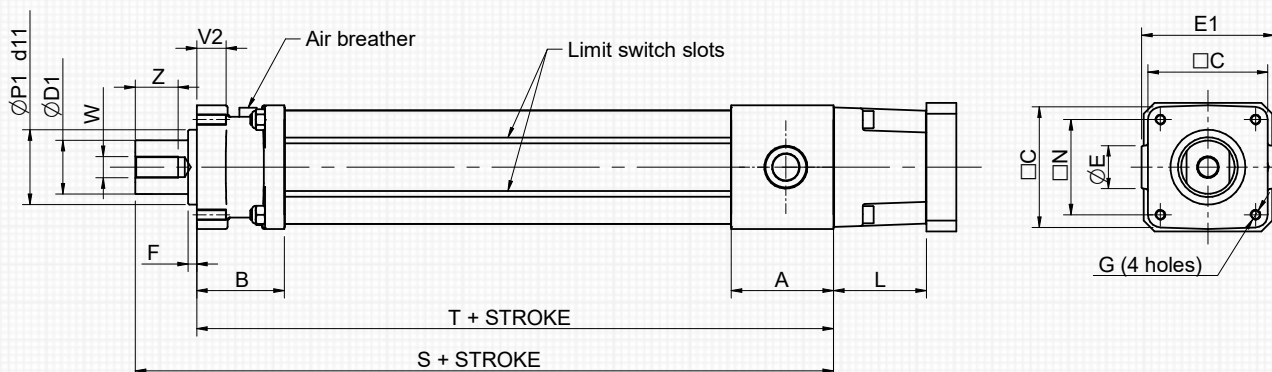


Ordering code  
stroke:

|   |              |
|---|--------------|
| C | 200          |
|   | Stroke in mm |

**NOTE** - Standard slot positions for limit switches are as shown above.  
If you require a different position, please contact our technical support.

### SAM 5 - 6 IL



Ordering code  
stroke:

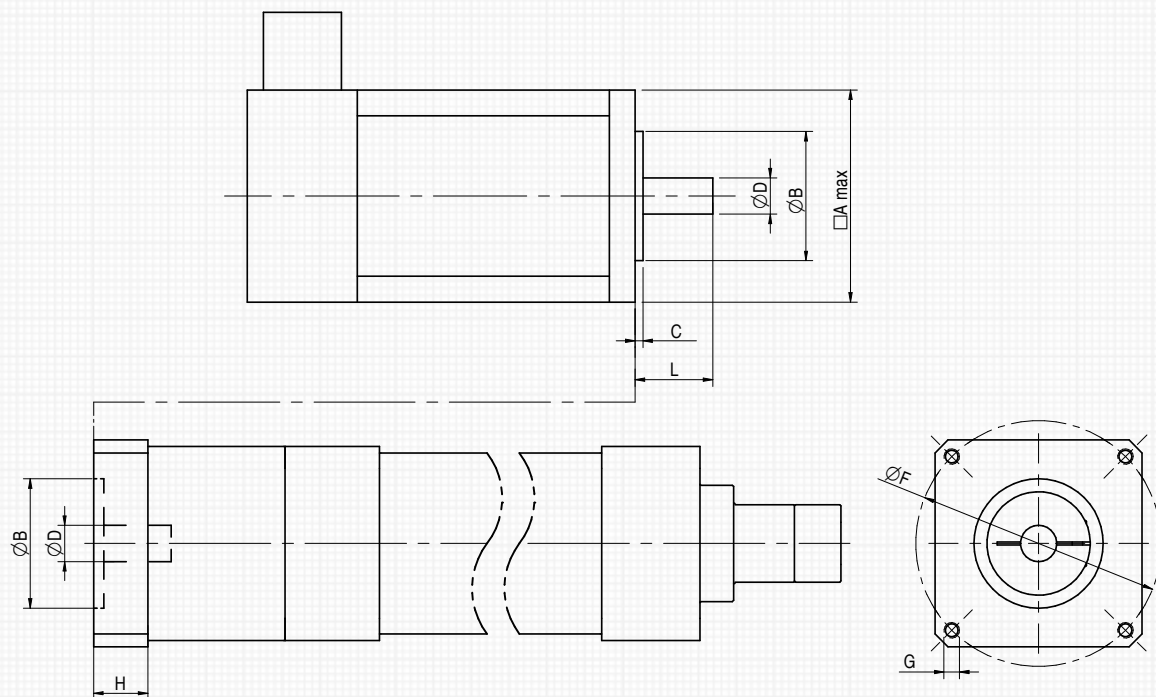
|   |              |
|---|--------------|
| C | 200          |
|   | Stroke in mm |

**NOTE** - Standard slot positions for limit switches are as shown above.  
If you require a different position, please contact our technical support.



| SIZE | SAM 0 IL | SAM 1 IL | SAM 2 IL | SAM 3 IL | SAM 4 IL | SAM 5 IL | SAM 6 IL |
|------|----------|----------|----------|----------|----------|----------|----------|
| A    | 30       | 30       | 37       | 37       | 48       | 96       | 116      |
| B    | 40       | 34       | 40       | 38       | 52       | 82       | 108      |
| □ C  | 46       | 52       | 65       | 75       | 95       | 112      | 138      |
| Ø D1 | 20       | 22       | 25       | 30       | 35       | 50       | 60       |
| Ø E  | -        | -        | -        | -        | -        | 40       | 70       |
| E1   | -        | -        | -        | -        | -        | 124      | 152      |
| E2   | 30       | 32       | 39       | 44       | 54       | -        | -        |
| F    | 5        | 10       | 13       | 13       | 5        | 8        | 8        |
| G    | M6       | M6       | M8       | M8       | M10      | M10      | M12      |
| L    | 34       | 40       | 49       | 53       | 67       | 86       | 93       |
| □ N  | 32.5     | 38       | 46.5     | 56.5     | 72       | 89       | 110      |
| Ø P1 | 30       | 35       | 40       | 45       | 45       | 70       | 80       |
| S    | 229      | 246      | 264      | 296      | 330      | 453      | 538      |
| T    | 203      | 205      | 217      | 241      | 284      | 396      | 474      |
| V1   | 4.5      | 4.5      | 5.5      | 5.5      | 5.5      | -        | -        |
| V2   | 17       | 17       | 22       | 22       | 27       | 25       | 30       |
| W    | M10×1.25 | M12×1.25 | M12×1.25 | M16×1.5  | M20×1.5  | M20×1.5  | M27×2    |
| Z    | 15       | 20       | 20       | 24       | 30       | 40       | 54       |

## 2.3 / Motor attachment SAM IL Series



### Ordering code motor attachment:

| F2 | 24 | - | 50 |
|----|----|---|----|
| 1  | 2  | - | 3  |

- 1 - Flange code
- 2 - Shaft diameter  $\varnothing D$
- 3 - Shaft length L

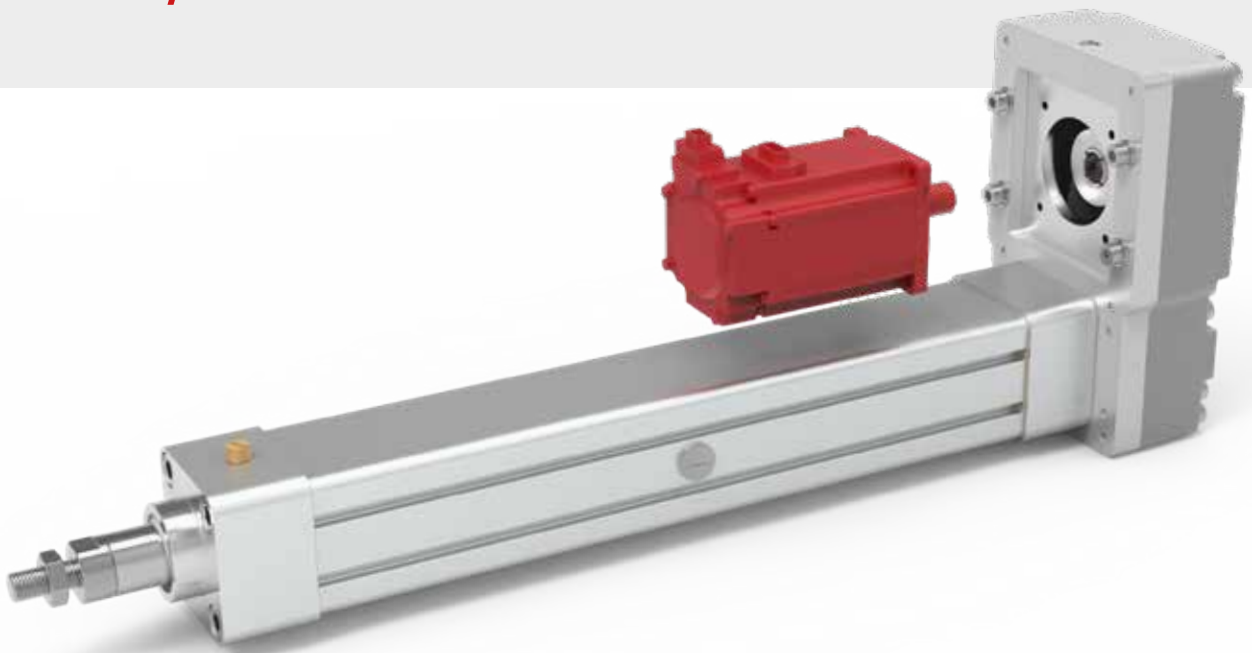
**NOTE** - In case of different motor attachment not included in the table, contact our technical support.



| SIZE     | Flange code | □ A [mm] | Ø B [mm] | C [mm] | Ø F × G [mm] | H [mm] | Ø D × L [mm]                                                  |
|----------|-------------|----------|----------|--------|--------------|--------|---------------------------------------------------------------|
| SAM 0 IL | F1          | 45       | Ø30      | 2.5    | Ø45 × M3     | 19     | Ø8×20 - Ø8×25                                                 |
|          | F2          | 45       | Ø30      | 2.5    | Ø46 × M4     | 19     | Ø6×25 - Ø8×18- Ø8×25                                          |
| SAM 1 IL | F1          | 65       | Ø40      | 2.5    | Ø63 × M5     | 23     | Ø9×20 - Ø11×23 - Ø14×30                                       |
|          | F2          | 65       | Ø50      | 3      | Ø70 × M5     | 23     | Ø8×25 - Ø11×30 - Ø14×30 - Ø14×31                              |
| SAM 2 IL | F1          | 65       | Ø40      | 2.5    | Ø63 × M5     | 18     | Ø11×23 - Ø14×30                                               |
|          | F2          | 65       | Ø50      | 3      | Ø70 × M5     | 18     | Ø8×25 - Ø11×30 - Ø14×30 - Ø14×31                              |
|          | F3          | 75       | Ø60      | 3      | Ø75 × M5     | 22     | Ø11×23 - Ø14×30                                               |
| SAM 3 IL | F1          | 75       | Ø60      | 3      | Ø75 × M5     | 21     | Ø14×30                                                        |
|          | F2          | 80       | Ø70      | 3      | Ø90 × M6     | 26     | Ø11×30 - Ø14×30 - Ø19×35                                      |
|          |             |          |          |        |              | 33     | Ø16×40 - Ø19×40                                               |
|          | F3          | 82       | Ø50      | 3      | Ø95 × M6     | 21     | Ø14×30                                                        |
|          | F4          | 96       | Ø80      | 3      | Ø100 × M6    | 26     | Ø14×30 - Ø16×35 - Ø19×35                                      |
|          |             |          |          |        |              | 33     | Ø14×37 - Ø16×40 - Ø19×40                                      |
| SAM 4 IL | F1          | 96       | Ø80      | 3      | Ø100 × M6    | 26     | Ø16×35 - Ø16×40 - Ø19×35 - Ø19×40                             |
|          | F2          | 105      | Ø95      | 3      | Ø115 × M8    | 30     | Ø19×40 - Ø19×45 - Ø22×45 - Ø24×45                             |
|          |             |          |          |        |              | 37     | Ø19×50 - Ø24×50                                               |
|          |             |          |          |        |              | 42     | Ø19×55                                                        |
|          | F3          | 126      | Ø95      | 3      | Ø130 × M8    | 37     | Ø24 × 50                                                      |
|          | F4          | 126      | Ø110     | 3.5    | Ø130 × M8    | 37     | Ø19×40 - Ø24×50                                               |
| SAM 5 IL | F1          | 120      | Ø95      | 3      | Ø130 × M8    | 28     | Ø24 × 50                                                      |
|          | F2          | 126      | Ø110     | 3.5    | Ø130 × M8    | 28     | Ø19×40 - Ø24×50                                               |
|          | F3          | 130      | Ø110     | 3.5    | Ø145 × M8    | 30     | Ø16×40 - Ø19×40                                               |
|          |             |          |          |        |              | 43     | Ø19×58 - Ø22×55 - Ø22×58 - Ø24×58<br>Ø24×65 - Ø28×55 - Ø28×63 |
|          | F4          | 140      | Ø110     | 3.5    | Ø165 × M10   | 39     | Ø24×50                                                        |
|          | F5          | 155      | Ø130     | 3.5    | Ø165 × M10   | 39     | Ø24×50 - Ø28×60 - Ø32×58                                      |
|          |             |          |          |        |              | 59     | Ø32×80                                                        |
| SAM 6 IL | F1          | 140      | Ø110     | 3.5    | Ø165 × M10   | 34     | Ø24×50                                                        |
|          | F2          | 155      | Ø130     | 3.5    | Ø165 × M10   | 34     | Ø24×50 - Ø28×60 - Ø32×58                                      |
|          |             |          |          |        |              | 54     | Ø32×80                                                        |
|          | F3          | 163      | Ø155     | 4      | Ø190 × M10   | 34     | Ø32×60                                                        |
|          | F4          | 180      | Ø114.3   | 3.5    | Ø200 × M12   | 52     | Ø35×65 - Ø35×70 - Ø35×79 - Ø35×80                             |
|          | F5          | 200      | Ø180     | 4      | Ø215 × M12   | 52     | Ø28×60 - Ø32×58 - Ø38×80                                      |



## 3 / ACTUATORS SAM PD Series



### 3.1 / Technical data SAM PD Series

| SIZE                                       |                                       | SAM 0 PD    |       | SAM 1 PD    |       | SAM 2 PD    |       |        | SAM 3 PD      |       |       |
|--------------------------------------------|---------------------------------------|-------------|-------|-------------|-------|-------------|-------|--------|---------------|-------|-------|
| Profile ISO 15552                          | [mm]                                  | Ø32         |       | Ø40         |       | Ø50         |       |        | Ø63           |       |       |
| Rod diameter                               | [mm]                                  | Ø20         |       | Ø22         |       | Ø25         |       |        | Ø30           |       |       |
| Ball screw BS                              |                                       | BS1         | BS2   | BS1         | BS2   | BS1         | BS2   | BS3    | BS1           | BS2   | BS3   |
| Diameter × Lead $d_o \times P_h$           | [mm]                                  | 12×5        | 12×10 | 14×5        | 14×10 | 16×5        | 16×10 | 16×16  | 20×5          | 20×10 | 20×20 |
| Ball diameter $D_w$                        | [mm]                                  | Ø 2.381     |       | Ø3.175      |       | Ø3.175      |       |        | Ø3.175        |       |       |
| Accuracy grade (')                         |                                       | IT 7        |       | IT 7        |       | IT 7        |       |        | IT 7          |       |       |
| N° of circuits                             |                                       | 3           | 2     | 3           | 2     | 4           | 3     | 2      | 4             | 3     | 2     |
| N° of starts                               |                                       | 1           | 2     | 1           | 1     | 1           | 1     | 2      | 1             | 1     | 2     |
| Dynamic load $C_a$                         | [N]                                   | 5300        | 6600  | 7800        | 5300  | 11100       | 8900  | 10500  | 12800         | 10200 | 12100 |
| Static load $C_{0a}$                       | [N]                                   | 8000        | 9500  | 11100       | 6900  | 18100       | 14400 | 15700  | 24400         | 18900 | 20900 |
| Ratio $u$                                  | RV                                    | 1 (26:26)   |       | 1 (32:32)   |       | 1 (36:36)   |       |        | 1 (28:28)     |       |       |
| Linear travel for 1 motor shaft revolution | [mm]                                  | 5           | 10    | 5           | 10    | 5           | 10    | 16     | 5             | 10    | 20    |
| Max. force $F_{max}^{(*)}$                 | [N]                                   | 1080        | 520   | 1320        | 650   | 3310        | 1670  | 1040   | 4070          | 2090  | 1050  |
| Max. input torque $T_{max}$                | [Nm]                                  | 1.2         | 1.2   | 1.5         | 1.5   | 3.5         | 3.5   | 3.5    | 4.6           | 4.6   | 4.6   |
| Max. linear speed $v_{max}$                | [mm/s]                                | 500         | 1000  | 417         | 833   | 375         | 750   | 1200   | 300           | 600   | 1200  |
| Max. rotational speed $n_{max}$            | [min <sup>-1</sup> ]                  | 6000        | 6000  | 5000        | 5000  | 4500        | 4500  | 4500   | 3600          | 3600  | 3600  |
| Max. acceleration $a_{max}$                | [m/s <sup>2</sup> ]                   | 10          | 10    | 10          | 10    | 10          | 10    | 10     | 10            | 10    | 10    |
| Total actuator efficiency $\eta$           |                                       | 0.82        | 0.83  | 0.81        | 0.83  | 0.81        | 0.83  | 0.84   | 0.79          | 0.82  | 0.84  |
| Friction torque $T_a$                      | [Nm]                                  | 0.15        | 0.20  | 0.20        | 0.25  | 0.25        | 0.30  | 0.35   | 0.50          | 0.55  | 0.60  |
| $J_o$ ref. to 0 mm stroke actuator         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.082       | 0.090 | 0.151       | 0.161 | 0.353       | 0.367 | 0.398  | 1.335         | 1.359 | 1.454 |
| $J_{100}$ each 100 mm extra-stroke         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.019       | 0.021 | 0.027       | 0.030 | 0.047       | 0.051 | 0.060  | 0.117         | 0.122 | 0.140 |
| Ratio $u$                                  | RN                                    | 1.5 (39:26) |       | 1.5 (48:32) |       | 1.5 (48:32) |       |        | 1.538 (40:26) |       |       |
| Linear travel for 1 motor shaft revolution | [mm]                                  | 3.333       | 6.667 | 3.333       | 6.667 | 3.333       | 6.667 | 10.667 | 3.25          | 6.5   | 13    |
| Max. force $F_{max}^{(*)}$                 | [N]                                   | 1620        | 780   | 2140        | 1050  | 4350        | 2190  | 1360   | 5340          | 2730  | 1380  |
| Max. input torque $T_{max}$                | [Nm]                                  | 1.2         | 1.2   | 1.6         | 1.6   | 3.1         | 3.1   | 3.1    | 4.0           | 4.0   | 4.0   |
| Max. linear speed $v_{max}$                | [mm/s]                                | 333         | 667   | 333         | 667   | 333         | 667   | 1067   | 300           | 600   | 1200  |
| Max. rotational speed $n_{max}$            | [min <sup>-1</sup> ]                  | 6000        | 6000  | 6000        | 6000  | 6000        | 6000  | 6000   | 5540          | 5540  | 5540  |
| Max. acceleration $a_{max}$                | [m/s <sup>2</sup> ]                   | 10          | 10    | 10          | 10    | 10          | 10    | 10     | 10            | 10    | 10    |
| Total actuator efficiency $\eta$           |                                       | 0.82        | 0.83  | 0.81        | 0.83  | 0.81        | 0.83  | 0.84   | 0.79          | 0.82  | 0.84  |
| Friction torque $T_a$                      | [Nm]                                  | 0.15        | 0.20  | 0.20        | 0.25  | 0.25        | 0.30  | 0.35   | 0.50          | 0.55  | 0.60  |
| $J_o$ ref. to 0 mm stroke actuator         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.071       | 0.074 | 0.152       | 0.157 | 0.260       | 0.266 | 0.280  | 1.124         | 1.134 | 1.174 |
| $J_{100}$ each 100 mm extra-stroke         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.008       | 0.009 | 0.012       | 0.013 | 0.021       | 0.023 | 0.027  | 0.050         | 0.051 | 0.059 |
| Ratio $u$                                  | RL                                    | -           |       | -           |       | 2 (64:32)   |       |        | 1.923 (50:26) |       |       |
| Linear travel for 1 motor shaft revolution | [mm]                                  | -           |       | -           |       | 2.5         | 5     | 8      | 2.6           | 5.2   | 10.4  |
| Max. force $F_{max}^{(*)}$                 | [N]                                   | -           |       | -           |       | 5150        | 2920  | 1810   | 5940          | 3420  | 1720  |
| Max. input torque $T_{max}$                | [Nm]                                  | -           |       | -           |       | 2.8         | 3.1   | 3.1    | 3.6           | 4.0   | 4.0   |
| Max. linear speed $v_{max}$                | [mm/s]                                | -           |       | -           |       | 250         | 500   | 800    | 260           | 520   | 1040  |
| Max. rotational speed $n_{max}$            | [min <sup>-1</sup> ]                  | -           |       | -           |       | 6000        | 6000  | 6000   | 6000          | 6000  | 6000  |
| Max. acceleration $a_{max}$                | [m/s <sup>2</sup> ]                   | -           |       | -           |       | 10          | 10    | 10     | 10            | 10    | 10    |
| Total actuator efficiency $\eta$           |                                       | -           |       | -           |       | 0.81        | 0.83  | 0.84   | 0.79          | 0.82  | 0.84  |
| Friction torque $T_a$                      | [Nm]                                  | -           |       | -           |       | 0.25        | 0.30  | 0.35   | 0.50          | 0.55  | 0.60  |
| $J_o$ ref. to 0 mm stroke actuator         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | -           |       | -           |       | 0.317       | 0.320 | 0.328  | 1.314         | 1.321 | 1.346 |
| $J_{100}$ each 100 mm extra-stroke         | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | -           |       | -           |       | 0.012       | 0.013 | 0.015  | 0.032         | 0.033 | 0.038 |
| $m_o$ ref. to 0 mm stroke                  | [kg]                                  | 0.32        | 0.32  | 0.47        | 0.48  | 0.64        | 0.65  | 0.65   | 1.06          | 1.07  | 1.05  |
| $m_{100}$ each 100 mm extra-stroke         | [kg]                                  | 0.13        |       | 0.14        |       | 0.19        |       |        | 0.20          |       |       |
| Weight of 100 mm stroke actuator (°)       | [kg]                                  | 2.5         |       | 3.2         |       | 5.0         |       |        | 7.6           |       |       |
| Weight for each 100 mm extra-stroke        | [kg]                                  | 0.44        |       | 0.51        |       | 0.67        |       |        | 0.79          |       |       |

$J_o$  - Moment of inertia of the actuator reduced to motor shaft ref. to 0 mm stroke  
 $J_{100}$  - Moment of inertia of the actuator referred to each 100 mm extra-stroke  
 $m_o$  - Mass in linear motion referred to 0 mm stroke actuator  
 $m_{100}$  - Mass in linear motion referred to each 100 mm extra-stroke

(\*) - The marked column is only valid for **SAM 6 PD** with motor adapter:  
 - F4 | 35 - 79  
 - F4 | 35 - 80  
 - F5 | 38 - 80



| SIZE                                 |                                       | SAM 4 PD      |        |        | SAM 5 PD    |        |        |        | SAM 6 PD      |        |        |        | SAM 6 PD (*)  |        |        |        |
|--------------------------------------|---------------------------------------|---------------|--------|--------|-------------|--------|--------|--------|---------------|--------|--------|--------|---------------|--------|--------|--------|
| Profile ISO 15552                    | [mm]                                  | Ø80           |        |        | Ø100        |        |        |        | Ø125          |        |        |        | Ø125          |        |        |        |
| Rod diameter                         | [mm]                                  | Ø35           |        |        | Ø50         |        |        |        | Ø60           |        |        |        | Ø60           |        |        |        |
| Ball screw BS                        |                                       | BS1           | BS2    | BS3    | BS1         | BS2    | BS3    | BS4    | BS1           | BS2    | BS3    | BS4    | BS1           | BS2    | BS3    | BS4    |
| Diameter × Lead $d_o \times P_h$     | [mm]                                  | 25×5          | 25×10  | 25×25  | 32×5        | 32×10  | 32×20  | 32×32  | 40×5          | 40×10  | 40×20  | 40×40  | 40×5          | 40×10  | 40×20  | 40×40  |
| Ball diameter $D_w$                  | [mm]                                  | Ø3.175        | Ø3.969 | Ø3.175 | Ø3.175      | Ø6.350 | Ø6.350 | Ø6.350 | Ø3.175        | Ø6.350 | Ø6.350 | Ø6.350 | Ø3.175        | Ø6.350 | Ø6.350 | Ø6.350 |
| Accuracy grade (')                   |                                       | IT 7          |        |        | IT 7        |        |        |        | IT 7          |        |        |        | IT 7          |        |        |        |
| N° of circuits                       |                                       | 4             | 3      | 2      | 6           | 4      | 3      | 2      | 6             | 4      | 3      | 2      | 6             | 4      | 3      | 2      |
| N° of starts                         |                                       | 1             | 1      | 2      | 1           | 1      | 1      | 2      | 1             | 1      | 1      | 2      | 1             | 1      | 1      | 2      |
| Dynamic load $C_a$                   | [N]                                   | 14500         | 14800  | 13600  | 23000       | 37000  | 29800  | 35000  | 25300         | 42800  | 34300  | 40300  | 25300         | 42800  | 34300  | 40300  |
| Static load $C_{0a}$                 | [N]                                   | 31500         | 28000  | 27300  | 60200       | 66800  | 53200  | 58100  | 76900         | 88900  | 70000  | 77100  | 76900         | 88900  | 70000  | 77100  |
| Ratio $u$                            | RV                                    | 1 (40:40)     |        |        | 1 (32:32)   |        |        |        | 1 (36:36)     |        |        |        | 1 (36:36)     |        |        |        |
| Linear travel for 1 motor shaft rev. | [mm]                                  | 5             | 10     | 25     | 5           | 10     | 20     | 32     | 5             | 10     | 20     | 40     | 5             | 10     | 20     | 40     |
| Max. force $F_{max}^{(2)}$           | [N]                                   | 6730          | 6870   | 3080   | 10670       | 17170  | 9540   | 6000   | 11740         | 19860  | 12000  | 6120   | 11740         | 19860  | 15920  | 10920  |
| Max. input torque $T_{max}$          | [Nm]                                  | 7.6           | 14.1   | 15.5   | 12.4        | 35.0   | 38.0   | 38.0   | 15.0          | 42.5   | 49.2   | 49.2   | 15.0          | 42.5   | 64.4   | 85.6   |
| Max. linear speed $v_{max}$          | [mm/s]                                | 250           | 500    | 1250   | 230         | 470    | 930    | 1490   | 190           | 370    | 750    | 1500   | 190           | 370    | 750    | 1500   |
| Max. rotational speed $n_{max}$      | [min <sup>-1</sup> ]                  | 3000          | 3000   | 3000   | 2800        | 2800   | 2800   | 2800   | 2250          | 2250   | 2250   | 2250   | 2250          | 2250   | 2250   | 2250   |
| Max. acceleration $a_{max}$          | [m/s <sup>2</sup> ]                   | 10            | 10     | 10     | 10          | 10     | 10     | 10     | 10            | 10     | 10     | 10     | 10            | 10     | 10     | 10     |
| Total actuator efficiency $\eta$     |                                       | 0.78          | 0.82   | 0.84   | 0.76        | 0.81   | 0.83   | 0.84   | 0.74          | 0.79   | 0.82   | 0.84   | 0.74          | 0.79   | 0.82   | 0.84   |
| Friction torque $T_a$                | [Nm]                                  | 0.75          | 0.80   | 0.90   | 1.2         | 1.3    | 1.4    | 1.6    | 2.4           | 2.5    | 2.6    | 2.8    | 2.4           | 2.5    | 2.6    | 2.8    |
| $J_o$ ref. to 0 mm stroke actuator   | [kgxm <sup>2</sup> ] $\times 10^{-4}$ | 6.79          | 6.83   | 7.09   | 22.51       | 22.59  | 22.92  | 23.57  | 60.21         | 60.34  | 60.87  | 62.91  | 70.77         | 70.90  | 71.43  | 73.47  |
| $J_{100}$ each 100 mm extra-stroke   | [kgxm <sup>2</sup> ] $\times 10^{-4}$ | 0.285         | 0.290  | 0.327  | 0.732       | 0.743  | 0.788  | 0.880  | 1.877         | 1.892  | 1.948  | 2.170  | 1.877         | 1.892  | 1.948  | 2.170  |
| Ratio $u$                            | RN                                    | 1.467 (44:30) |        |        | 1.5 (36:24) |        |        |        | 1.467 (44:30) |        |        |        | 1.467 (44:30) |        |        |        |
| Linear travel for 1 motor shaft rev. | [mm]                                  | 3.409         | 6.818  | 17.045 | 3.333       | 6.667  | 13.333 | 21.333 | 3.409         | 6.818  | 13.636 | 27.273 | 3.409         | 6.818  | 13.636 | 27.273 |
| Max. force $F_{max}^{(2)}$           | [N]                                   | 6730          | 6870   | 2880   | 10670       | 17020  | 8680   | 5440   | 11740         | 19860  | 13560  | 6910   | 11740         | 19860  | 15920  | 12420  |
| Max. input torque $T_{max}$          | [Nm]                                  | 5.4           | 9.9    | 10.2   | 8.7         | 23.6   | 23.6   | 23.6   | 11.0          | 29.8   | 38.5   | 38.5   | 11.0          | 29.8   | 44.7   | 67.0   |
| Max. linear speed $v_{max}$          | [mm/s]                                | 250           | 500    | 1250   | 230         | 470    | 930    | 1490   | 190           | 370    | 750    | 1500   | 190           | 370    | 750    | 1500   |
| Max. rotational speed $n_{max}$      | [min <sup>-1</sup> ]                  | 4400          | 4400   | 4400   | 4200        | 4200   | 4200   | 4200   | 3300          | 3300   | 3300   | 3300   | 3300          | 3300   | 3300   | 3300   |
| Max. acceleration $a_{max}$          | [m/s <sup>2</sup> ]                   | 10            | 10     | 10     | 10          | 10     | 10     | 10     | 10            | 10     | 10     | 10     | 10            | 10     | 10     | 10     |
| Total actuator efficiency $\eta$     |                                       | 0.78          | 0.82   | 0.84   | 0.76        | 0.81   | 0.83   | 0.84   | 0.74          | 0.79   | 0.82   | 0.84   | 0.74          | 0.79   | 0.82   | 0.84   |
| Friction torque $T_a$                | [Nm]                                  | 0.75          | 0.80   | 0.90   | 1.2         | 1.3    | 1.4    | 1.6    | 2.4           | 2.5    | 2.6    | 2.8    | 2.4           | 2.5    | 2.6    | 2.8    |
| $J_o$ ref. to 0 mm stroke actuator   | [kgxm <sup>2</sup> ] $\times 10^{-4}$ | 2.98          | 3.00   | 3.12   | 9.75        | 9.79   | 9.93   | 10.22  | 25.98         | 25.95  | 26.20  | 27.15  | 30.60         | 30.66  | 30.90  | 31.85  |
| $J_{100}$ each 100 mm extra-stroke   | [kgxm <sup>2</sup> ] $\times 10^{-4}$ | 0.132         | 0.135  | 0.152  | 0.325       | 0.330  | 0.350  | 0.391  | 0.873         | 0.879  | 0.906  | 1.009  | 0.873         | 0.879  | 0.906  | 1.009  |
| Ratio $u$                            | RL                                    | 2 (60:30)     |        |        | 2 (48:24)   |        |        |        | 2 (60:30)     |        |        |        | 2 (60:30)     |        |        |        |
| Linear travel for 1 motor shaft rev. | [mm]                                  | 2.5           | 5      | 12.5   | 2.5         | 5      | 10     | 12.5   | 2.5           | 5      | 10     | 20     | 2.5           | 5      | 10     | 20     |
| Max. force $F_{max}^{(2)}$           | [N]                                   | 6730          | 6870   | 3927   | 10670       | 17170  | 11580  | 7260   | 11740         | 19860  | 15920  | 9420   | 11740         | 19860  | 15920  | 16940  |
| Max. input torque $T_{max}$          | [Nm]                                  | 4.2           | 7.5    | 10.2   | 6.8         | 18.2   | 23.6   | 23.6   | 8.7           | 22.5   | 33.5   | 38.5   | 8.7           | 22.5   | 33.5   | 67.0   |
| Max. linear speed $v_{max}$          | [mm/s]                                | 250           | 500    | 1250   | 230         | 470    | 930    | 1490   | 190           | 370    | 750    | 1500   | 190           | 370    | 750    | 1500   |
| Max. rotational speed $n_{max}$      | [min <sup>-1</sup> ]                  | 6000          | 6000   | 6000   | 5600        | 5600   | 5600   | 5600   | 4500          | 4500   | 4500   | 4500   | 4500          | 4500   | 4500   | 4500   |
| Max. acceleration $a_{max}$          | [m/s <sup>2</sup> ]                   | 10            | 10     | 10     | 10          | 10     | 10     | 10     | 10            | 10     | 10     | 10     | 10            | 10     | 10     | 10     |
| Total actuator efficiency $\eta$     |                                       | 0.78          | 0.82   | 0.84   | 0.76        | 0.81   | 0.83   | 0.84   | 0.74          | 0.79   | 0.82   | 0.84   | 0.74          | 0.79   | 0.82   | 0.84   |
| Friction torque $T_a$                | [Nm]                                  | 0.75          | 0.80   | 0.90   | 1.2         | 1.3    | 1.4    | 1.6    | 2.4           | 2.5    | 2.6    | 2.8    | 2.4           | 2.5    | 2.6    | 2.8    |
| $J_o$ ref. to 0 mm stroke actuator   | [kgxm <sup>2</sup> ] $\times 10^{-4}$ | 3.73          | 3.74   | 3.81   | 11.68       | 11.70  | 11.78  | 11.94  | 34.74         | 34.78  | 34.91  | 35.42  | 39.45         | 39.48  | 39.62  | 40.12  |
| $J_{100}$ each 100 mm extra-stroke   | [kgxm <sup>2</sup> ] $\times 10^{-4}$ | 0.071         | 0.072  | 0.082  | 0.183       | 0.186  | 0.197  | 0.220  | 0.469         | 0.473  | 0.487  | 0.542  | 0.469         | 0.473  | 0.487  | 0.542  |
| $m_o$ ref. to 0 mm stroke            | [kg]                                  | 1.61          | 1.60   | 1.62   | 3.69        | 3.55   | 3.60   | 3.53   | 5.82          | 5.70   | 5.77   | 5.68   | 5.82          | 5.70   | 5.77   | 5.68   |
| $m_{100}$ each 100 mm extra-stroke   | [kg]                                  | 0.24          |        |        | 0.49        |        |        |        | 0.62          |        |        |        | 0.62          |        |        |        |
| Weight of 100 mm stroke actuator (3) | [kg]                                  | 13.5          |        |        | 26          |        |        |        | 46            |        |        |        | 46            |        |        |        |
| Weight for each 100 mm extra-stroke  | [kg]                                  | 1.1           |        |        | 1.9         |        |        |        | 2.7           |        |        |        | 2.7           |        |        |        |

(1) - Ball screws with accuracy grade IT 3 or IT 5 available on demand

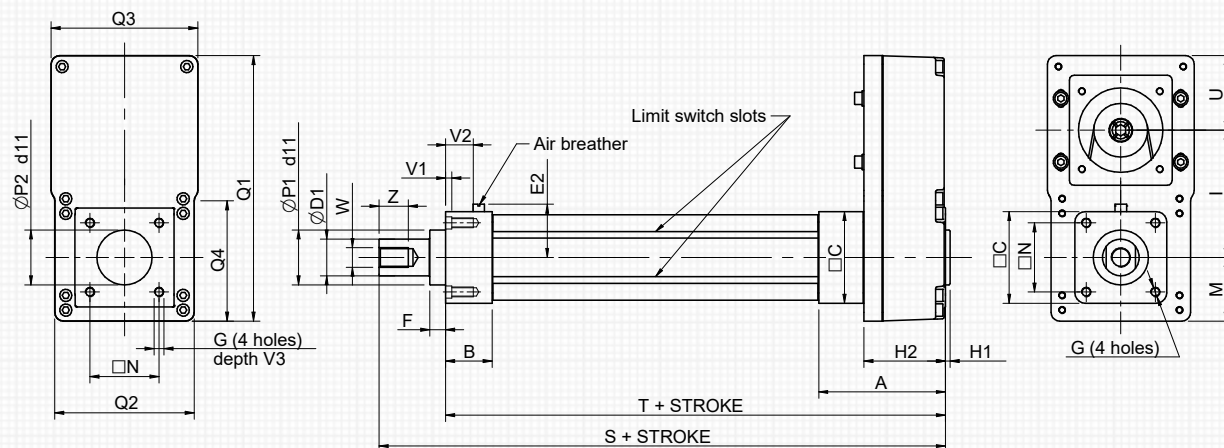
(2) - Values highlighted in orange: force limit due to mechanical transmission

Values highlighted in yellow: force limit due to a ball screw life of 10 million revolutions

(3) - Weight of the actuator without fixing accessories

### 3.2 / Dimensions SAM PD Series

#### SAM 0 - 1 - 2 - 3 - 4 PD

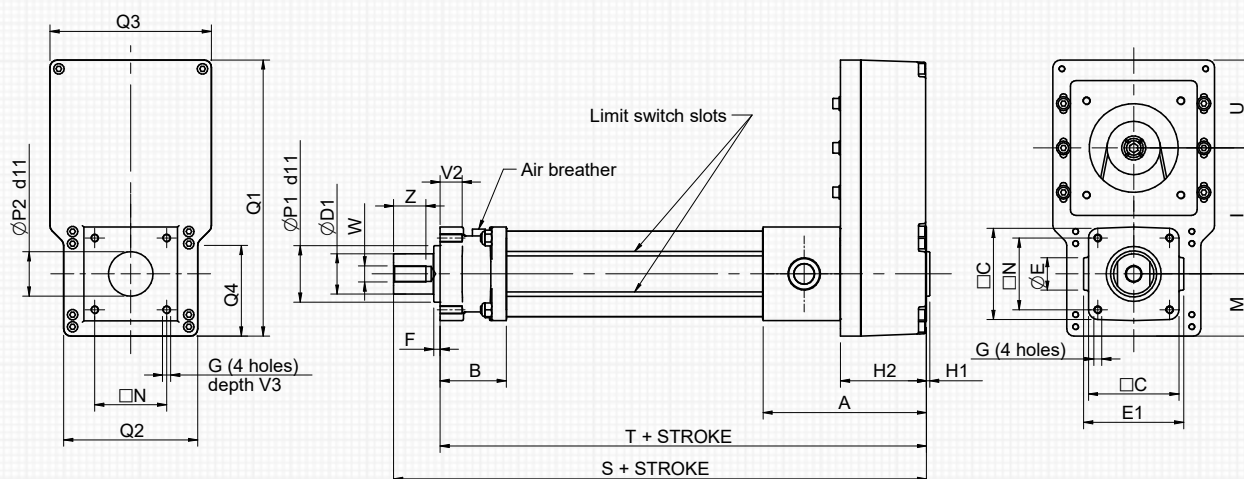


Ordering code  
stroke:

|   |              |
|---|--------------|
| C | 200          |
|   | Stroke in mm |

**NOTE** - Standard slot positions for limit switches are as shown above.  
If you require a different position, please contact our technical support.

#### SAM 5 - 6 PD



Ordering code  
stroke:

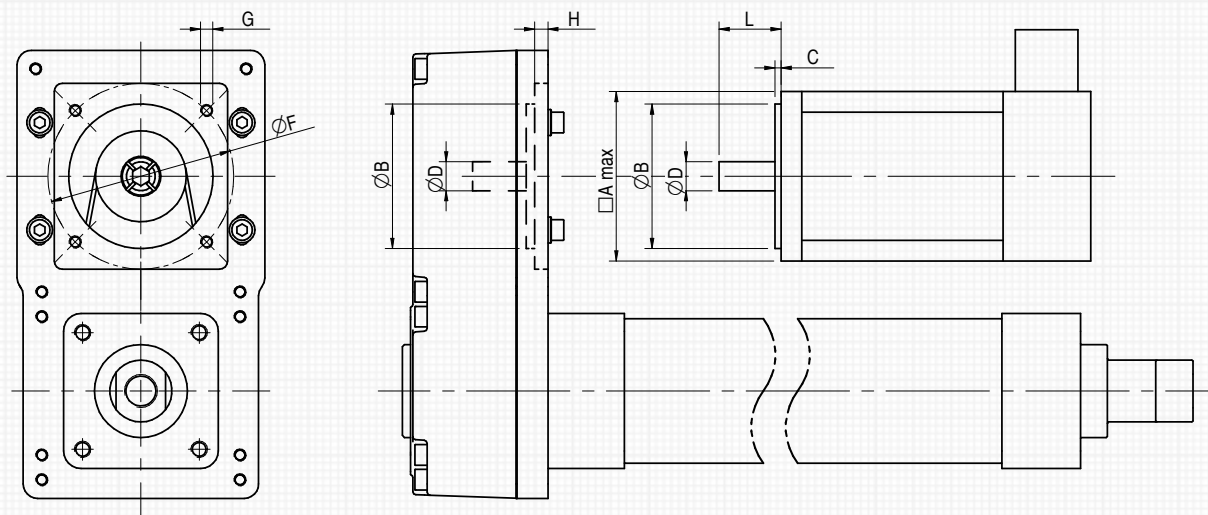
|   |              |
|---|--------------|
| C | 200          |
|   | Stroke in mm |

**NOTE** - Standard slot positions for limit switches are as shown above.  
If you require a different position, please contact our technical support.



| SIZE | SAM 0 PD | SAM 1 PD | SAM 2 PD | SAM 3 PD                 | SAM 4 PD                 | SAM 5 PD | SAM 6 PD |
|------|----------|----------|----------|--------------------------|--------------------------|----------|----------|
| A    | 74       | 81       | 97       | 104                      | F1,F2: 133<br>F3,F4: 138 | 203      | 244      |
| B    | 40       | 34       | 40       | 38                       | 52                       | 82       | 108      |
| □ C  | 46       | 52       | 65       | 75                       | 95                       | 112      | 138      |
| Ø D1 | 20       | 22       | 25       | 30                       | 35                       | 50       | 60       |
| Ø E  | -        | -        | -        | -                        | -                        | 40       | 70       |
| E1   | -        | -        | -        | -                        | -                        | 124      | 152      |
| E2   | 30       | 32       | 39       | 44                       | 54                       | -        | -        |
| F    | 5        | 10       | 13       | 13                       | 5                        | 8        | 8        |
| G    | M6       | M6       | M8       | M8                       | M10                      | M10      | M12      |
| H1   | 4        | 4        | 4        | 4                        | 4                        | 4        | 5        |
| H2   | 43       | 50       | 59       | 66                       | F1,F2: 84<br>F3,F4: 89   | 106      | 127      |
| I    | 59       | 73       | 83       | F1,F2,F3: 104<br>F4: 117 | F1,F2: 130<br>F3,F4: 139 | 156      | 214      |
| M    | 28       | 33       | 41       | 52                       | 62                       | 77       | 95       |
| □ N  | 32.5     | 38       | 46.5     | 56.5                     | 72                       | 89       | 110      |
| Ø P1 | 30       | 35       | 40       | 45                       | 45                       | 70       | 80       |
| Ø P2 | 30       | 35       | 40       | 45                       | 45                       | 55       | 60       |
| Q1   | 128      | 156      | 184      | F1,F2,F3: 217<br>F4: 240 | F1,F2: 272<br>F3,F4: 290 | 342      | 448      |
| Q2   | 72       | 82       | 100      | 114                      | 136                      | 166      | 202      |
| Q3   | 80       | 90       | 110      | F1,F2,F3: 120<br>F4: 130 | F1,F2: 150<br>F3,F4: 170 | 200      | 250      |
| Q4   | 46       | 56       | 69       | F1,F2,F3: 98<br>F4: 93   | F1,F2: 114<br>F3,F4: 110 | 112      | 151      |
| S    | 273      | 297      | 324      | 363                      | F1,F2: 415<br>F3,F4: 420 | 560      | 666      |
| T    | 247      | 256      | 277      | 308                      | F1,F2: 369<br>F3,F4: 374 | 503      | 602      |
| U    | 41       | 50       | 60       | F1,F2,F3: 61<br>F4: 71   | F1,F2: 80<br>F2,F4: 89   | 109      | 139      |
| V1   | 4.5      | 4.5      | 5.5      | 5.5                      | 5.5                      | -        | -        |
| V2   | 17       | 17       | 22       | 22                       | 27                       | 25       | 30       |
| V3   | 12       | 12       | 14       | 15                       | 19                       | 19       | 23       |
| W    | M10×1.25 | M12×1.25 | M12×1.25 | M16×1.5                  | M20×1.5                  | M20×1.5  | M27×2    |
| Z    | 15       | 20       | 20       | 24                       | 30                       | 40       | 54       |

### 3.3 / Motor attachment **SAM PD** Series



#### Ordering code motor attachment:

| F2 | 19 | - | 40 |
|----|----|---|----|
| 1  | 2  | - | 3  |

- 1 - Flange code
- 2 - Shaft diameter  $\varnothing D$
- 3 - Shaft length L

**NOTE** - In case of different motor attachment not included in the table, contact our technical support.



| SIZE     | Flange code | □ A [mm] | Ø B [mm] | C [mm] | Ø F × G [mm] | H [mm] | Ø D × L [mm]                                        |
|----------|-------------|----------|----------|--------|--------------|--------|-----------------------------------------------------|
| SAM 0 PD | F1          | 45       | Ø30      | 2.5    | Ø45 × M3     | 4.5    | Ø8×20                                               |
|          |             |          |          |        |              | -0.5   | Ø8×25                                               |
|          | F2          | 45       | Ø30      | 2.5    | Ø46 × M4     | 4.5    | Ø8×18                                               |
|          |             |          |          |        |              | -0.5   | Ø6×25 - Ø8×25                                       |
| SAM 1 PD | F1          | 63       | Ø40      | 2.5    | Ø63 × M5     | 5.5    | Ø9×20 - Ø11×23                                      |
|          |             |          |          |        |              | -1.5   | Ø14×30                                              |
|          | F2          | 63       | Ø50      | 3      | Ø70 × M5     | 5.5    | Ø8×25                                               |
|          |             |          |          |        |              | -1.5   | Ø11×30 - Ø14×30 - Ø14×31                            |
| SAM 2 PD | F1          | 75       | Ø40      | 2.5    | Ø63 × M5     | 11.5   | Ø11×23                                              |
|          |             |          |          |        |              | 7.5    | Ø14×30                                              |
|          | F2          | 75       | Ø50      | 3      | Ø70 × M5     | 7.5    | Ø8×25 - Ø11×30 - Ø14×30 - Ø14×31                    |
|          | F3          | 75       | Ø60      | 3      | Ø75 × M5     | 7.5    | Ø11×23 - Ø14×30                                     |
| SAM 3 PD | F1          | 82       | Ø60      | 3      | Ø75 × M5     | 6.5    | Ø14×30                                              |
|          | F2          | 82       | Ø70      | 3      | Ø90 × M6     | 6.5    | Ø11×30 - Ø14×30 - Ø19×35                            |
|          |             |          |          |        |              | -0.5   | Ø16×40 - Ø19×40                                     |
|          | F3          | 82       | Ø50      | 3      | Ø95 × M6     | 6.5    | Ø14×30                                              |
|          | F4          | 96       | Ø80      | 3      | Ø100 × M6    | 6.5    | Ø14×30 - Ø16×35 - Ø19×35                            |
|          |             |          |          |        |              | -0.5   | Ø14×37 - Ø16×40 - Ø19×40                            |
| SAM 4 PD | F1          | 105      | Ø80      | 3      | Ø100 × M6    | 20.5   | Ø16×35 - Ø19×35                                     |
|          |             |          |          |        |              | 10.5   | Ø16×40 - Ø19×40                                     |
|          | F2          | 105      | Ø95      | 3      | Ø115 × M8    | 10.5   | Ø19×40 - Ø19×45 - Ø22×45 - Ø24×45                   |
|          |             |          |          |        |              | 3.5    | Ø19×50 - Ø24×50                                     |
|          |             |          |          |        |              | -1.5   | Ø19×55                                              |
|          | F3          | 126      | Ø95      | 3      | Ø130 × M8    | 10.5   | Ø24 × 50                                            |
|          | F4          | 126      | Ø110     | 3.5    | Ø130 × M8    | 10.5   | Ø19×40 - Ø24×50                                     |
| SAM 5 PD | F1          | 155      | Ø95      | 3      | Ø130 × M8    | 14.5   | Ø24 × 50                                            |
|          | F2          | 155      | Ø110     | 3.5    | Ø130 × M8    | 20.5   | Ø19×40                                              |
|          |             |          |          |        |              | 14.5   | Ø24×50                                              |
|          | F3          | 155      | Ø110     | 3.5    | Ø145 × M8    | 20.5   | Ø16×40 - Ø19×40                                     |
|          |             |          |          |        |              | 14.5   | Ø19×58 - Ø22×55 - Ø22×58 - Ø24×58 - Ø28×55 - Ø28×63 |
|          |             |          |          |        |              | 1.5    | Ø24×65                                              |
|          | F4          | 155      | Ø110     | 3.5    | Ø165 × M10   | 14.5   | Ø24×50                                              |
|          | F5          | 155      | Ø130     | 3.5    | Ø165 × M10   | 14.5   | Ø24×50 - Ø28×60 - Ø32×58                            |
|          |             |          |          |        |              | -5.5   | Ø32×80                                              |
| SAM 6 PD | F1          | 196      | Ø110     | 3.5    | Ø165 × M10   | 15     | Ø24×50                                              |
|          | F2          | 196      | Ø130     | 3.5    | Ø165 × M10   | 15     | Ø24×50 - Ø28×60 - Ø32×58                            |
|          |             |          |          |        |              | 0      | Ø32×80                                              |
|          | F3          | 196      | Ø155     | 4      | Ø190 × M10   | 15     | Ø32×60                                              |
|          | F4          | 196      | Ø114.3   | 3.5    | Ø200 × M12   | 15     | Ø35×65 - Ø35×70 - Ø35×79 - Ø35×80                   |
|          | F5          | 196      | Ø180     | 4      | Ø215 × M12   | 15     | Ø28×60 - Ø32×58 - Ø38×80                            |



## 4 / ACTUATORS SAM Series



**4.1 / Technical data SAM Series**

| SIZE                                                                               |                                       | SAM 0   |       | SAM 1  |       | SAM 2  |       |       | SAM 3  |       |       |
|------------------------------------------------------------------------------------|---------------------------------------|---------|-------|--------|-------|--------|-------|-------|--------|-------|-------|
| Profile ISO 15552                                                                  | [mm]                                  | Ø32     |       | Ø40    |       | Ø50    |       |       | Ø63    |       |       |
| Rod diameter                                                                       | [mm]                                  | Ø20     |       | Ø22    |       | Ø25    |       |       | Ø30    |       |       |
| Ball screw BS                                                                      |                                       | BS1     | BS2   | BS1    | BS2   | BS1    | BS2   | BS3   | BS1    | BS2   | BS3   |
| Diameter × Lead $d_o \times P_h$                                                   | [mm]                                  | 12×5    | 12×10 | 14×5   | 14×10 | 16×5   | 16×10 | 16×16 | 20×5   | 20×10 | 20×20 |
| Ball diameter $D_w$                                                                | [mm]                                  | Ø 2.381 |       | Ø3.175 |       | Ø3.175 |       |       | Ø3.175 |       |       |
| Accuracy grade (°)                                                                 |                                       | IT 7    |       | IT 7   |       | IT 7   |       |       | IT 7   |       |       |
| N° of circuits                                                                     |                                       | 3       | 2     | 3      | 2     | 4      | 3     | 2     | 4      | 3     | 2     |
| N° of starts                                                                       |                                       | 1       | 2     | 1      | 1     | 1      | 1     | 2     | 1      | 1     | 2     |
| Dynamic load $C_a$                                                                 | [N]                                   | 5300    | 6600  | 7800   | 5300  | 11100  | 8900  | 10500 | 12800  | 10200 | 12100 |
| Static load $C_{0a}$                                                               | [N]                                   | 8000    | 9500  | 11100  | 6900  | 18100  | 14400 | 15700 | 24400  | 18900 | 20900 |
| Linear travel for 1 motor shaft revolution                                         | [mm]                                  | 5       | 10    | 5      | 10    | 5      | 10    | 16    | 5      | 10    | 20    |
| Max. force $F_{max}^{(2)}$                                                         | [N]                                   | 1780    | 885   | 2350   | 1190  | 5150   | 4130  | 4870  | 5940   | 4730  | 5610  |
| Max. input torque $T_{max}$                                                        | [Nm]                                  | 1.8     | 1.8   | 2.4    | 2.4   | 5.1    | 7.9   | 14.5  | 6.1    | 9.2   | 20.9  |
| Max. linear speed $v_{max}$                                                        | [mm/s]                                | 500     | 1000  | 417    | 833   | 375    | 750   | 1200  | 300    | 600   | 1200  |
| Max. rotational speed $n_{max}$                                                    | [min <sup>-1</sup> ]                  | 6000    | 6000  | 5000   | 5000  | 4500   | 4500  | 4500  | 3600   | 3600  | 3600  |
| Max. acceleration $a_{max}$                                                        | [m/s <sup>2</sup> ]                   | 10      | 10    | 10     | 10    | 10     | 10    | 10    | 10     | 10    | 10    |
| Total actuator efficiency $\eta$                                                   |                                       | 0.86    | 0.88  | 0.85   | 0.88  | 0.85   | 0.87  | 0.88  | 0.84   | 0.87  | 0.88  |
| Friction torque $T_a$                                                              | [Nm]                                  | 0.15    | 0.20  | 0.20   | 0.25  | 0.25   | 0.30  | 0.35  | 0.50   | 0.55  | 0.60  |
| Mass in linear motion ( $m$ ) and moment of inertia ( $J$ ) reduced to motor shaft |                                       |         |       |        |       |        |       |       |        |       |       |
| $m_o$ referred to 0 mm stroke actuator                                             | [kg]                                  | 0.32    | 0.32  | 0.47   | 0.48  | 0.64   | 0.65  | 0.65  | 1.06   | 1.07  | 1.05  |
| $m_{100}$ each 100 mm extra-stroke                                                 | [kg]                                  | 0.13    |       | 0.14   |       | 0.19   |       |       | 0.20   |       |       |
| $J_o$ referred to 0 mm stroke actuator                                             | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.039   | 0.046 | 0.055  | 0.065 | 0.139  | 0.153 | 0.182 | 0.347  | 0.370 | 0.460 |
| $J_{100}$ each 100 mm extra-stroke                                                 | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.018   | 0.020 | 0.026  | 0.029 | 0.045  | 0.049 | 0.057 | 0.11   | 0.12  | 0.13  |
| Weight of 100 mm stroke actuator (°)                                               | [kg]                                  | 1.8     |       | 2.3    |       | 3.4    |       |       | 4.8    |       |       |
| Weight for each 100 mm extra-stroke                                                | [kg]                                  | 0.44    |       | 0.51   |       | 0.67   |       |       | 0.79   |       |       |



| SIZE                                                                               |                                       | SAM 4  |        |        | SAM 5  |        |        |        | SAM 6  |        |        |        |
|------------------------------------------------------------------------------------|---------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Profile ISO 15552                                                                  | [mm]                                  | Ø80    |        |        | Ø100   |        |        |        | Ø125   |        |        |        |
| Rod diameter                                                                       | [mm]                                  | Ø35    |        |        | Ø50    |        |        |        | Ø60    |        |        |        |
| Ball screw BS                                                                      |                                       | BS1    | BS2    | BS3    | BS1    | BS2    | BS3    | BS4    | BS1    | BS2    | BS3    | BS4    |
| Diameter × Lead $d_o \times P_h$                                                   | [mm]                                  | 25×5   | 25×10  | 25×25  | 32×5   | 32×10  | 32×20  | 32×32  | 40×5   | 40×10  | 40×20  | 40×40  |
| Ball diameter $D_w$                                                                | [mm]                                  | Ø3.175 | Ø3.969 | Ø3.175 | Ø3.175 | Ø6.350 | Ø6.350 | Ø6.350 | Ø3.175 | Ø6.350 | Ø6.350 | Ø6.350 |
| Accuracy grade <sup>(1)</sup>                                                      |                                       | IT 7   |        |        | IT 7   |        |        |        | IT 7   |        |        |        |
| N° of circuits                                                                     |                                       | 4      | 3      | 2      | 6      | 4      | 3      | 2      | 6      | 4      | 3      | 2      |
| N° of starts                                                                       |                                       | 1      | 1      | 2      | 1      | 1      | 1      | 2      | 1      | 1      | 1      | 2      |
| Dynamic load $C_a$                                                                 | [N]                                   | 14500  | 14800  | 13600  | 23000  | 37000  | 29800  | 35000  | 25300  | 42800  | 34300  | 40300  |
| Static load $C_{0a}$                                                               | [N]                                   | 31500  | 28000  | 27300  | 60200  | 66800  | 53200  | 58100  | 76900  | 88900  | 70000  | 77100  |
| Linear travel for 1 motor shaft revolution                                         | [mm]                                  | 5      | 10     | 25     | 5      | 10     | 20     | 32     | 5      | 10     | 20     | 40     |
| Max. force $F_{max}$ <sup>(2)</sup>                                                | [N]                                   | 6730   | 6870   | 6310   | 10670  | 17170  | 13830  | 16240  | 11740  | 19860  | 15920  | 18700  |
| Max. input torque $T_{max}$                                                        | [Nm]                                  | 7.3    | 13.5   | 29.4   | 11.8   | 33.5   | 52.0   | 95.6   | 14.4   | 40.1   | 60.8   | 138    |
| Max. linear speed $v_{max}$                                                        | [mm/s]                                | 250    | 500    | 1250   | 230    | 470    | 930    | 1490   | 190    | 370    | 750    | 1500   |
| Max. rotational speed $n_{max}$                                                    | [min <sup>-1</sup> ]                  | 3000   | 3000   | 3000   | 2800   | 2800   | 2800   | 2800   | 2250   | 2250   | 2250   | 2250   |
| Max. acceleration $a_{max}$                                                        | [m/s <sup>2</sup> ]                   | 10     | 10     | 10     | 10     | 10     | 10     | 10     | 10     | 10     | 10     | 10     |
| Total actuator efficiency $\eta$                                                   |                                       | 0.82   | 0.86   | 0.88   | 0.80   | 0.85   | 0.87   | 0.88   | 0.78   | 0.84   | 0.87   | 0.88   |
| Friction torque $T_a$                                                              | [Nm]                                  | 0.75   | 0.80   | 0.90   | 1.2    | 1.3    | 1.4    | 1.6    | 2.4    | 2.5    | 2.6    | 2.8    |
| Mass in linear motion ( $m$ ) and moment of inertia ( $J$ ) reduced to motor shaft |                                       |        |        |        |        |        |        |        |        |        |        |        |
| $m_o$ referred to 0 mm stroke actuator                                             | [kg]                                  | 1.61   | 1.60   | 1.62   | 3.69   | 3.55   | 3.60   | 3.53   | 5.82   | 5.70   | 5.77   | 5.68   |
| $m_{100}$ each 100 mm extra-stroke                                                 | [kg]                                  | 0.24   |        |        | 0.49   |        |        |        | 0.62   |        |        |        |
| $J_o$ referred to 0 mm stroke actuator                                             | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.93   | 0.96   | 1.21   | 3.28   | 3.36   | 3.67   | 4.29   | 8.27   | 8.39   | 8.89   | 10.83  |
| $J_{100}$ each 100 mm extra-stroke                                                 | [kg×m <sup>2</sup> ]×10 <sup>-4</sup> | 0.27   | 0.28   | 0.31   | 0.69   | 0.71   | 0.75   | 0.84   | 1.8    | 1.8    | 1.8    | 2.1    |
| Weight of 100 mm stroke actuator <sup>(3)</sup>                                    | [kg]                                  | 8.4    |        |        | 19     |        |        |        | 32     |        |        |        |
| Weight for each 100 mm extra-stroke                                                | [kg]                                  | 1.1    |        |        | 1.9    |        |        |        | 2.7    |        |        |        |

**(1)** - Ball screws with accuracy grade IT 3 or IT 5 available on demand

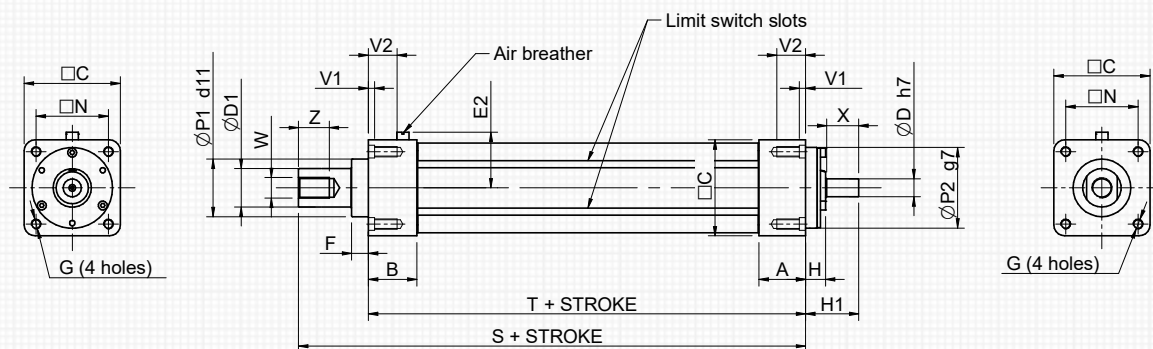
**(2)** - Values highlighted in **orange**: force limit due to mechanical transmission

Values highlighted in **yellow**: force limit due to a ball screw life of 10 million revolutions

**(3)** - Weight of the actuator without fixing accessories

## 4.2 / Dimensions SAM Series

### SAM 0 - 1 - 2 - 3 - 4

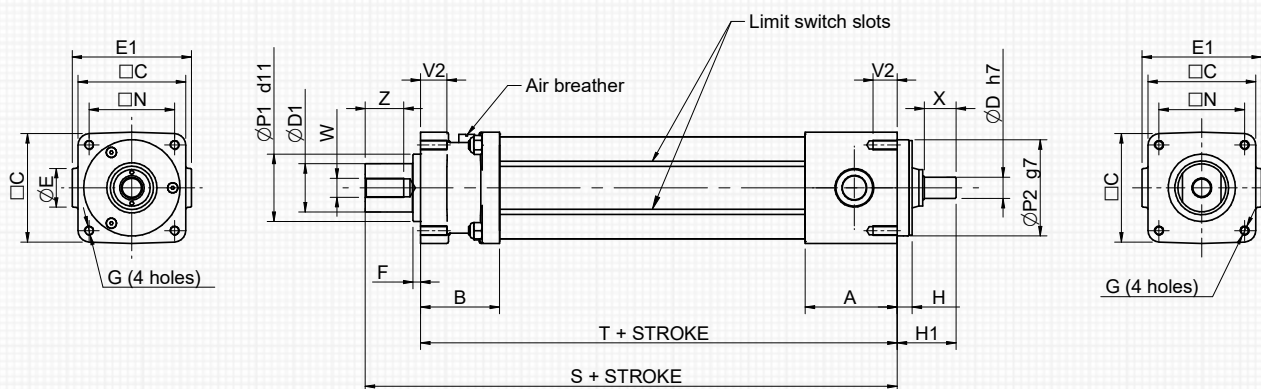


**Ordering code  
stroke:**

|          |              |
|----------|--------------|
| <b>C</b> | <b>200</b>   |
|          | Stroke in mm |

**NOTE** - Standard slot positions for limit switches are as shown above.  
If you require a different position, please contact our technical support.

### SAM 5 - 6



**Ordering code  
stroke:**

|          |              |
|----------|--------------|
| <b>C</b> | <b>200</b>   |
|          | Stroke in mm |

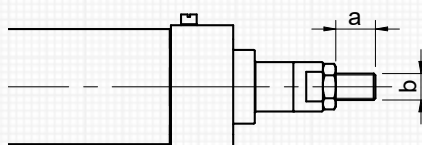
**NOTE** - Standard slot positions for limit switches are as shown above.  
If you require a different position, please contact our technical support.



| SIZE | SAM 0    | SAM 1    | SAM 2    | SAM 3   | SAM 4   | SAM 5   | SAM 6 |
|------|----------|----------|----------|---------|---------|---------|-------|
| A    | 30       | 30       | 37       | 37      | 48      | 96      | 116   |
| B    | 40       | 34       | 40       | 38      | 52      | 82      | 108   |
| □ C  | 46       | 52       | 65       | 75      | 95      | 112     | 138   |
| Ø D  | 8        | 9        | 11       | 14      | 19      | 22      | 28    |
| Ø D1 | 20       | 22       | 25       | 30      | 35      | 50      | 60    |
| Ø E  | -        | -        | -        | -       | -       | 40      | 70    |
| E1   | -        | -        | -        | -       | -       | 124     | 152   |
| E2   | 30       | 32       | 39       | 44      | 54      | -       | -     |
| F    | 5        | 10       | 13       | 13      | 5       | 8       | 8     |
| G    | M6       | M6       | M8       | M8      | M10     | M10     | M12   |
| H    | 11       | 11       | 14       | 15.5    | 16.5    | 15.5    | 17.5  |
| H1   | 26       | 30       | 34       | 41      | 47      | 61      | 62    |
| □ N  | 32.5     | 38       | 46.5     | 56.5    | 72      | 89      | 110   |
| Ø P1 | 30       | 35       | 40       | 45      | 45      | 70      | 80    |
| Ø P2 | 40       | 40       | 50       | 63      | 80      | 100     | 125   |
| S    | 229      | 246      | 264      | 296     | 330     | 453     | 538   |
| T    | 203      | 205      | 217      | 241     | 284     | 396     | 474   |
| V1   | 4.5      | 4.5      | 5.5      | 5.5     | 5.5     | -       | -     |
| V2   | 17       | 17       | 22       | 22      | 27      | 25      | 30    |
| W    | M10×1.25 | M12×1.25 | M12×1.25 | M16×1.5 | M20×1.5 | M20×1.5 | M27×2 |
| X    | 14       | 18       | 18       | 25      | 28      | 33      | 33    |
| Z    | 15       | 20       | 20       | 24      | 30      | 40      | 54    |

# 5 / Mounting options

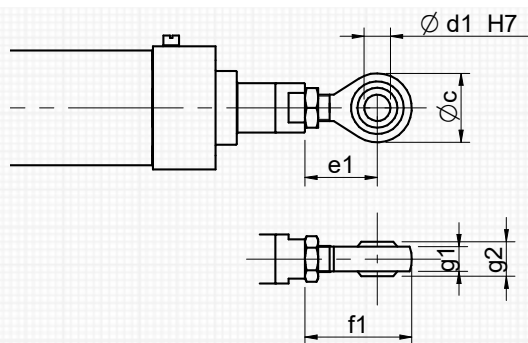
## 5.1 / Male threaded rod end TM



| SIZE   | SAM 0    | SAM 1    | SAM 2    | SAM 3   | SAM 4   | SAM 5   | SAM 6 |
|--------|----------|----------|----------|---------|---------|---------|-------|
| a [mm] | 15       | 20       | 20       | 24      | 30      | 40      | 54    |
| b [mm] | M10×1.25 | M12×1.25 | M12×1.25 | M16×1.5 | M20×1.5 | M20×1.5 | M27×2 |

Ordering code: **TM**

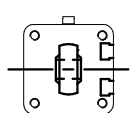
## 5.2 / Ball joint rod end TS



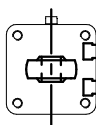
| SIZE      | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|-----------|-------|-------|-------|-------|-------|-------|-------|
| Ø c [mm]  | 28    | 32    | 32    | 42    | 50    | 50    | 70    |
| Ø d1 [mm] | 10    | 12    | 12    | 16    | 20    | 20    | 30    |
| e1 [mm]   | 35    | 36    | 36    | 44    | 50    | 50    | 125   |
| f1 [mm]   | 49    | 52    | 52    | 65    | 75    | 75    | 160   |
| g1 [mm]   | 10.5  | 12    | 12    | 15    | 18    | 18    | 25    |
| g2 [mm]   | 14    | 16    | 16    | 21    | 25    | 25    | 37    |

Ordering code: **TS** or **TS90**

### SAM Series • SAM IL Series

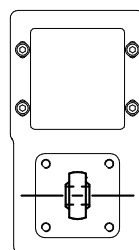


**TS**

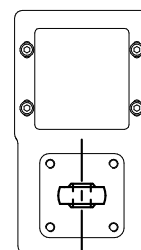


**TS90**

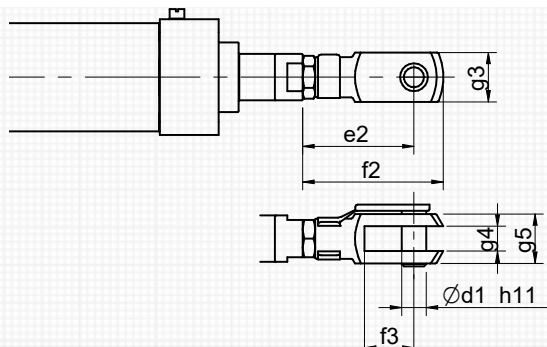
### SAM PD Series



**TS**



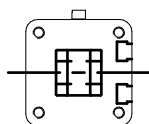
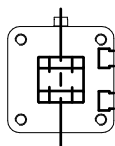
**TS90**

5.3 / Clevis rod end **F0**


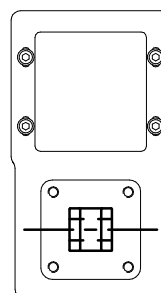
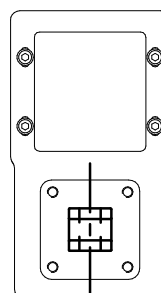
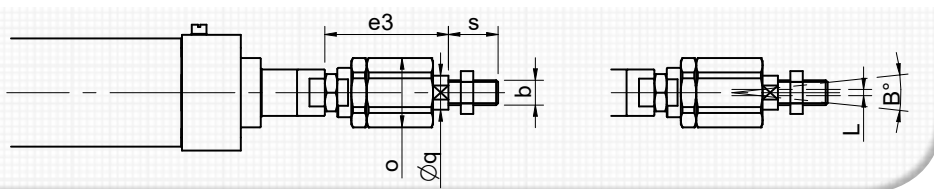
| SIZE      | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|-----------|-------|-------|-------|-------|-------|-------|-------|
| Ø d1 [mm] | 10    | 12    | 12    | 16    | 20    | 20    | 30    |
| e2 [mm]   | 46    | 55    | 55    | 72    | 89    | 89    | 122   |
| f2 [mm]   | 58    | 69    | 69    | 91    | 114   | 114   | 160   |
| f3 [mm]   | 20    | 24    | 24    | 32    | 40    | 40    | 54    |
| g3 [mm]   | 20    | 24    | 24    | 32    | 40    | 40    | 55    |
| g4 [mm]   | 10    | 12    | 12    | 16    | 20    | 20    | 30    |
| g5 [mm]   | 20    | 24    | 24    | 32    | 40    | 40    | 55    |

Ordering code: **FO** or **FO90**

## SAM Series • SAM IL Series

**FO**

**FO90**


## SAM PD Series

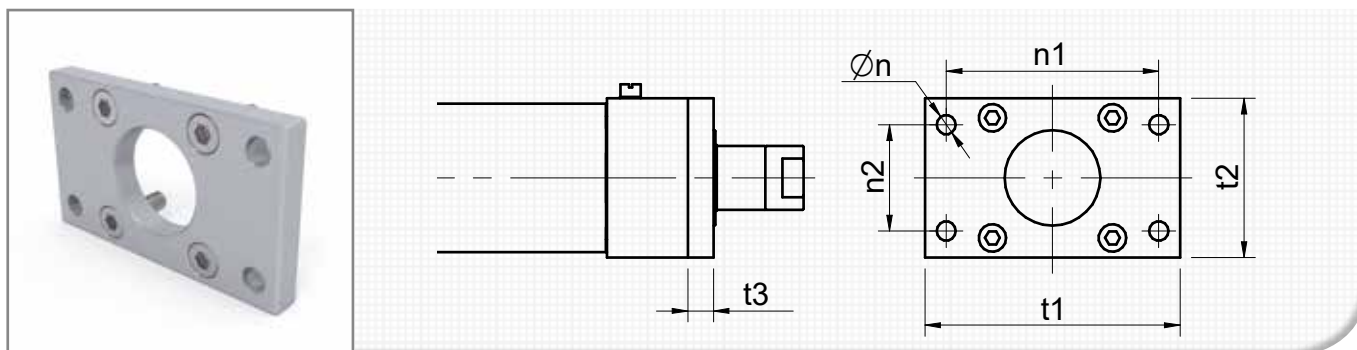
**FO**

**FO90**

5.4 / Self-aligning joint **GA**


| SIZE            | SAM 0      | SAM 1      | SAM 2      | SAM 3      | SAM 4      | SAM 5      | SAM 6      |
|-----------------|------------|------------|------------|------------|------------|------------|------------|
| b [mm]          | M10×1.25   | M12×1.25   | M12×1.25   | M16×1.5    | M20×1.5    | M20×1.5    | M27×2      |
| e3 [mm]         | 57.5       | 58.5       | 58.5       | 80         | 88         | 88         | 105        |
| o [mm]          | 32         | 32         | 32         | 45         | 45         | 45         | 70         |
| Ø q [mm]        | 14         | 14         | 14         | 22         | 22         | 22         | 32         |
| s [mm]          | 20         | 24         | 24         | 32         | 40         | 40         | 54         |
| β [°] (*)       | 8°         | 8°         | 8°         | 6°         | 6°         | 6°         | 8°         |
| L [mm] (**)     | 2          | 2          | 2          | 2          | 2          | 2          | 2          |
| Axial play [mm] | 0.05 – 0.5 | 0.05 – 0.5 | 0.05 – 0.5 | 0.05 – 0.5 | 0.05 – 0.5 | 0.05 – 0.5 | 0.05 – 0.5 |

(\*) Max angular oscillation - (\*\*) Max axial oscillation

Ordering code: **GA**

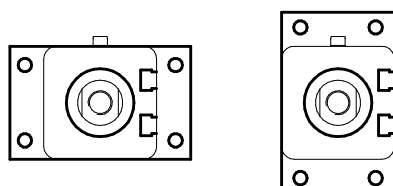
**5.5 / Plate mount FL**



| SIZE     | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|----------|-------|-------|-------|-------|-------|-------|-------|
| Ø n [mm] | 7     | 9     | 9     | 9     | 12    | 14    | 16    |
| n1 [mm]  | 64    | 72    | 90    | 100   | 126   | 150   | 180   |
| n2 [mm]  | 32    | 36    | 45    | 50    | 63    | 75    | 90    |
| t1 [mm]  | 80    | 90    | 110   | 120   | 150   | 170   | 205   |
| t2 [mm]  | 45    | 52    | 65    | 75    | 95    | 115   | 140   |
| t3 [mm]  | 10    | 10    | 12    | 12    | 16    | 16    | 20    |

Ordering code: **FL** or **FL90**

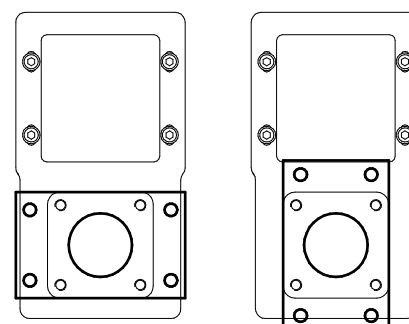
**SAM Series • SAM IL Series**



**FL**

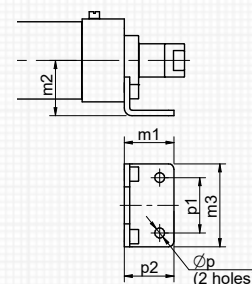
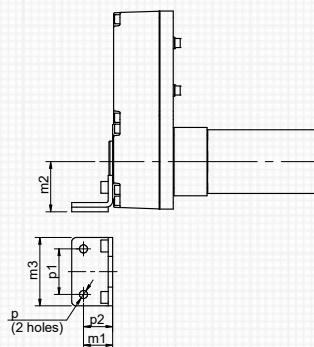
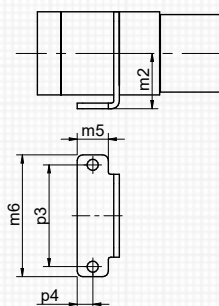
**FL90**

**SAM PD Series**



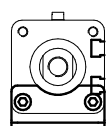
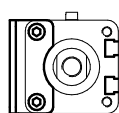
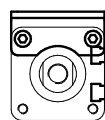
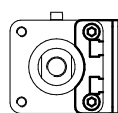
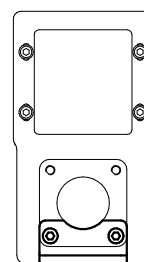
**FL**

**FL90**

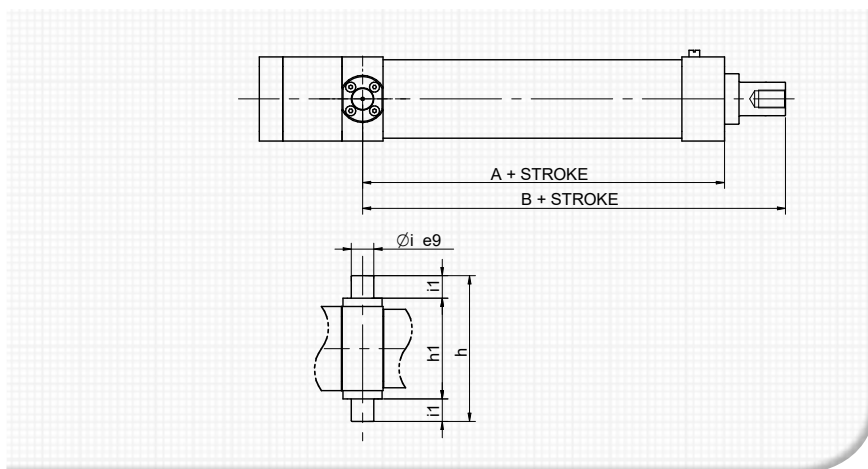
5.6 / Foot mount **PB**


| SIZE     | SAM 0 | SAM 1 | SAM 2 | SAM 3     | SAM 4     | SAM 5     | SAM 6      |
|----------|-------|-------|-------|-----------|-----------|-----------|------------|
| m1 [mm]  | 35    | 36    | 47    | 45        | 55        | 57        | 70         |
| m2 [mm]  | 32    | 36    | 45    | 50 (55) * | 63 (68) * | 71 (81) * | 90 (100) * |
| m3 [mm]  | 45    | 52    | 65    | 75        | 95        | 115       | 140        |
| m4 [mm]  | 31    | 34    | 38    | 38        | 44        | 44        | 66         |
| m5 [mm]  | 22    | 25    | 28    | 28        | 32        | 32        | 50         |
| m6 [mm]  | 75    | 82    | 100   | 110       | 147       | 172       | 210        |
| Ø p [mm] | 7     | 7     | 9     | 9         | 11        | 11        | 14         |
| p1 [mm]  | 32    | 36    | 45    | 50        | 63        | 75        | 90         |
| p2 [mm]  | 24    | 28    | 32    | 32        | 41        | 41        | 45         |
| p3 [mm]  | 58    | 65    | 82    | 92        | 115       | 132       | 160        |
| p4 [mm]  | 11    | 12.5  | 14    | 14        | 14        | 16        | 25         |

(\*) Value in brackets valid for SAM PD actuator

Ordering code: **PBS** or **PBW** or **PBN** or **PBE** or **PB**
**SAM Series • SAM IL Series**

**PBS**

**PBW**

**PBN**

**PBE**
**SAM PD Series**

**PB**

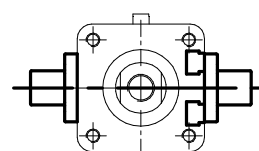
## 5.7 / Trunnion mount CI



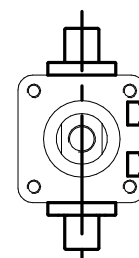
Available only for **SAM** , **SAM IL** actuators

Ordering code: **CI** or **CI90**

**SAM Series • SAM IL Series**



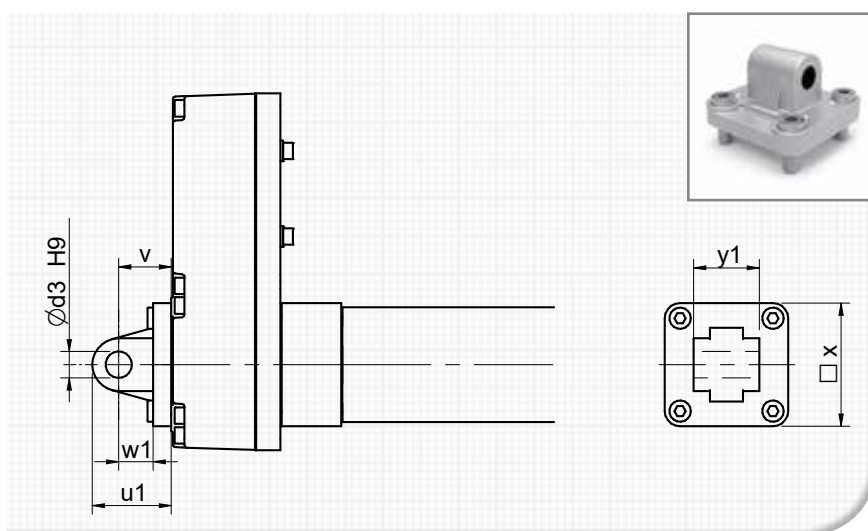
**CI**



**CI90**

| SIZE     | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|----------|-------|-------|-------|-------|-------|-------|-------|
| A [mm]   | 188   | 190   | 198   | 222   | 260   | 351   | 419   |
| B [mm]   | 214   | 231   | 245   | 277   | 306   | 408   | 483   |
| Ø i [mm] | 12    | 16    | 16    | 20    | 20    | 25    | 25    |
| i1 [mm]  | 12    | 16    | 16    | 20    | 20    | 25    | 25    |
| h [mm]   | 83    | 100   | 112   | 130   | 144   | 182   | 210   |
| h1 [mm]  | 59    | 68    | 80    | 90    | 114   | 132   | 160   |

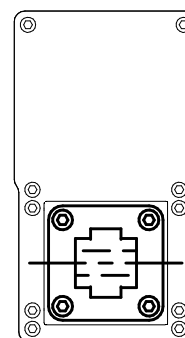
## 5.8 / Rear hinge CM



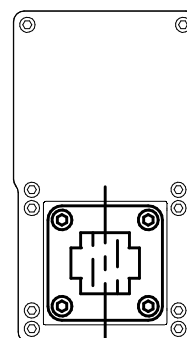
Available only for **SAM PD** actuators

Ordering code: **CM** or **CM90**

**SAM PD Series**



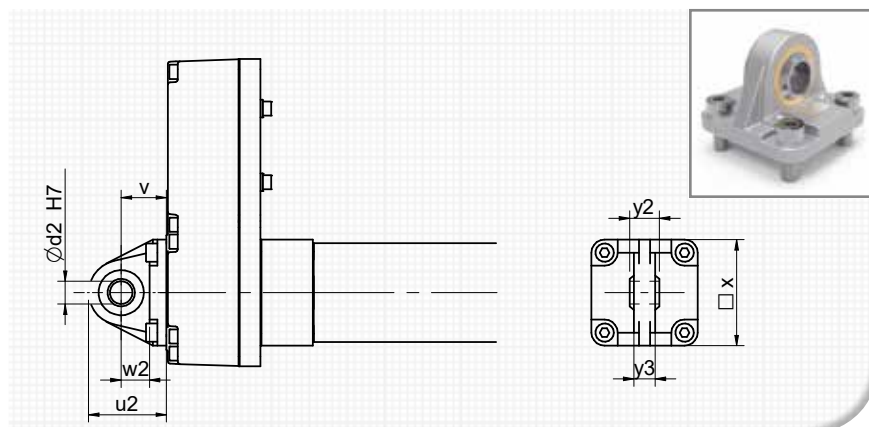
**CM**



**CM90**

| SIZE      | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|-----------|-------|-------|-------|-------|-------|-------|-------|
| Ø d3 [mm] | 10    | 12    | 12    | 16    | 16    | 20    | 25    |
| u1 [mm]   | 32    | 37    | 39    | 48    | 52    | 61    | 75    |
| v [mm]    | 22    | 25    | 27    | 32    | 36    | 41    | 50    |
| w1 [mm]   | 13    | 16    | 16    | 21    | 22    | 27    | 30    |
| □ x [mm]  | 45    | 52    | 65    | 75    | 95    | 115   | 140   |
| y1 [mm]   | 26    | 28    | 32    | 40    | 50    | 60    | 70    |

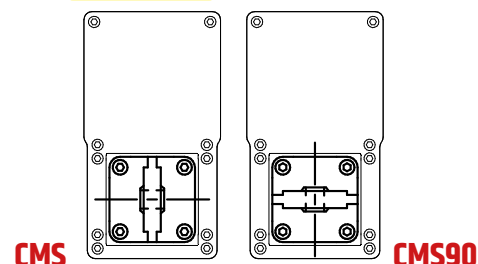
### 5.9 / Rear hinge with ball joint CMS



Available only for **SAM PD** actuators

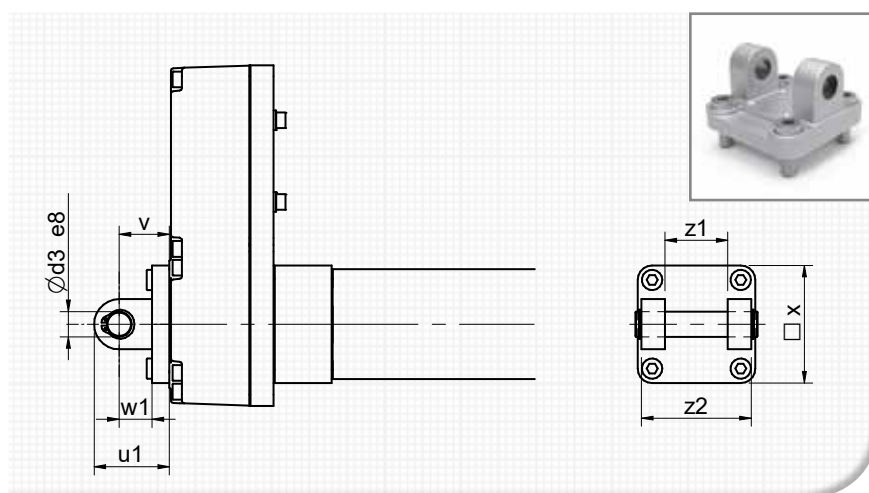
Ordering code: **CMS** or **CMS90**

**SAM PD Series**



| SIZE      | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|-----------|-------|-------|-------|-------|-------|-------|-------|
| Ø d2 [mm] | 10    | 12    | 16    | 16    | 20    | 20    | 30    |
| u2 [mm]   | 38    | 43    | 48    | 55    | 64    | 71    | 90    |
| v [mm]    | 22    | 25    | 27    | 32    | 36    | 41    | 50    |
| w2 [mm]   | 12    | 15    | 15    | 20    | 20    | 25    | 30    |
| □ x [mm]  | 45    | 52    | 65    | 75    | 95    | 115   | 140   |
| y2 [mm]   | 14    | 16    | 21    | 21    | 25    | 25    | 37    |
| y3 [mm]   | 10.5  | 12    | 15    | 15    | 18    | 18    | 25    |

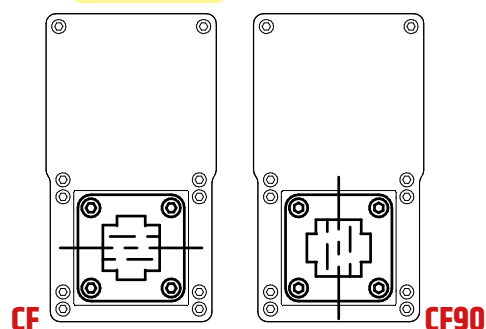
### 5.10 / Rear clevis CF



Available only for **SAM PD** actuators

Ordering code: **CF** or **CF90**

**SAM PD Series**



**Note:** zinc-plated steel pin and fixing rings included in the supply.

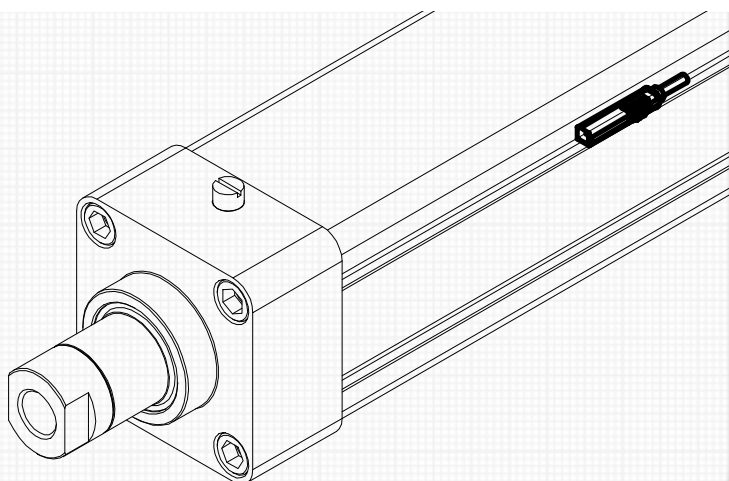
| SIZE      | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|-----------|-------|-------|-------|-------|-------|-------|-------|
| Ø d3 [mm] | 10    | 12    | 12    | 16    | 16    | 20    | 25    |
| u1 [mm]   | 32    | 37    | 39    | 48    | 52    | 61    | 75    |
| v [mm]    | 22    | 25    | 27    | 32    | 36    | 41    | 50    |
| w1 [mm]   | 13    | 16    | 16    | 21    | 22    | 27    | 30    |
| □ x [mm]  | 45    | 52    | 65    | 75    | 95    | 115   | 140   |
| z1 [mm]   | 26    | 28    | 32    | 40    | 50    | 60    | 70    |
| z2 [mm]   | 45    | 52    | 60    | 70    | 90    | 110   | 130   |



## 6 / Limit sensors

The linear servo actuators have two slots in the extruded aluminum profile, as shown in the image alongside, for the magnetic position sensors.

These sensors are activated by a magnet mounted on the translating nut inside the profile.

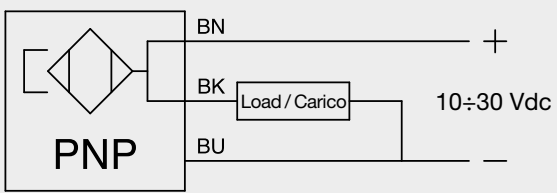


Ordering code:

**FCM (NC)**

or

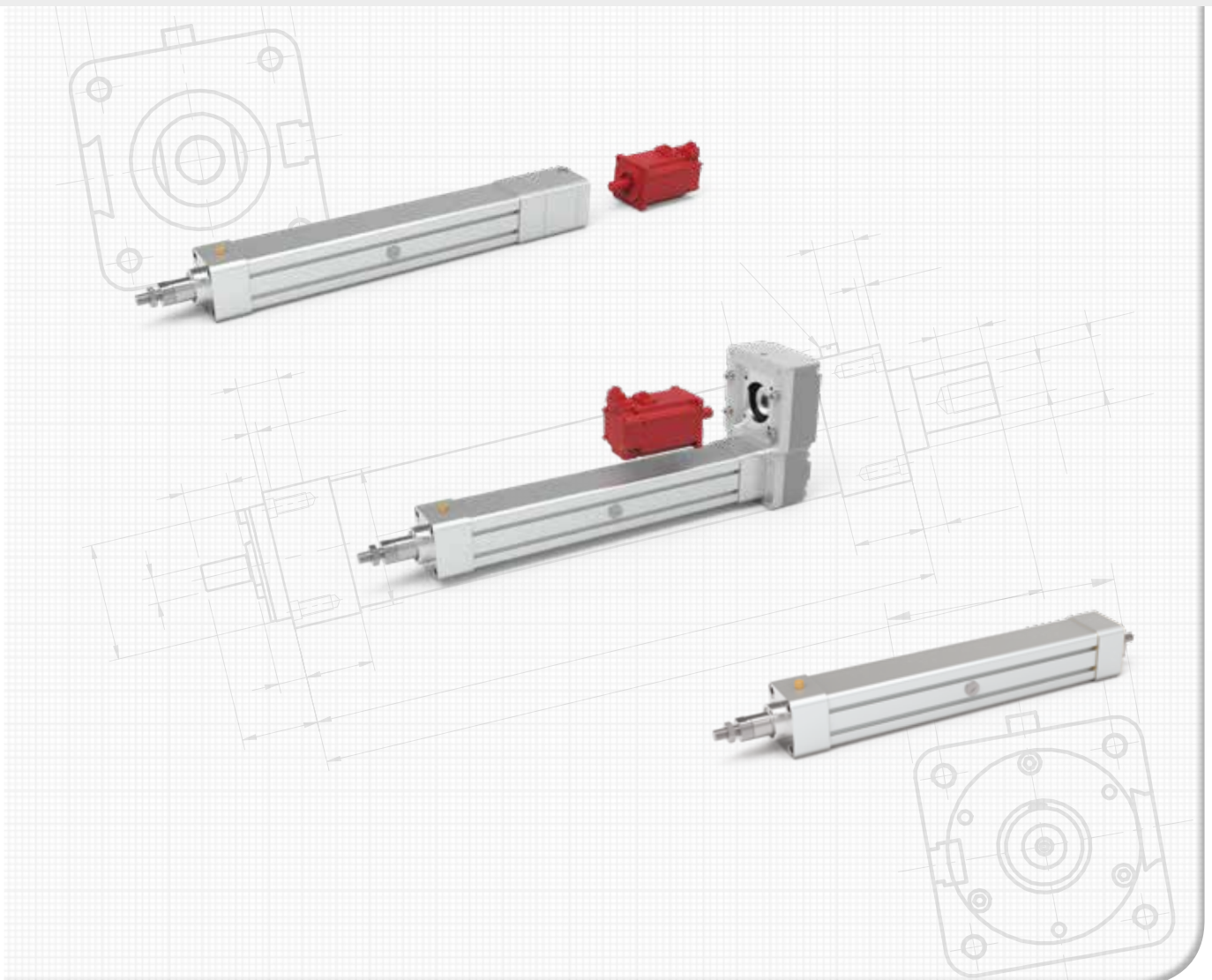
**FCM (NO)**

| Limit sensor                  | FCM (NC)                                                                                                                                                                  | FCM (NO) |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Mounting position             | T slot                                                                                                                                                                    |          |
| Contact type                  | NC                                                                                                                                                                        | NO       |
| Switching output              | PNP                                                                                                                                                                       |          |
| LED signal                    | YES                                                                                                                                                                       |          |
| Supply voltage                | 10÷30 Vdc                                                                                                                                                                 |          |
| Voltage drop                  | ≤ 2V                                                                                                                                                                      |          |
| Max current                   | 100 mA                                                                                                                                                                    |          |
| Reverse polarity protection   | SI                                                                                                                                                                        |          |
| Short-circuit protection      | SI                                                                                                                                                                        |          |
| Ambient operating temperature | -30°C ÷ +80°C                                                                                                                                                             |          |
| IP Protection rate            | IP65                                                                                                                                                                      |          |
| Housing material              | Plastica                                                                                                                                                                  |          |
| Output cable                  | PUR black cable<br>3x0.14mm <sup>2</sup> - L = 2m                                                                                                                         |          |
| Circuit                       |  <p><b>BN</b> Brown / Marrone<br/><b>BK</b> Black / Nero<br/><b>BU</b> Blue / Blu</p> |          |



# 7 / Sizing and selection

## LINEAR SERVOACTUATORS



## 7.1 / Motor sizing

This chapter provides the basics of servomotor sizing and selection.

### / Inertia calculation

#### Moment of inertia of the actuator reduced to motor shaft $J_{load}$

$$J_{load} = J_0 + J_{100} \cdot \frac{C}{100} + \frac{M}{\eta} \cdot \left( \frac{P_h}{2000 \pi \cdot u} \right)^2 [\text{kg} \times \text{m}^2]$$

|                                         |                                                                                        |
|-----------------------------------------|----------------------------------------------------------------------------------------|
| $J_0 [\text{kg} \times \text{m}^2]$     | = moment of inertia of the actuator referred to the motor shaft for stroke 0 mm        |
| $J_{100} [\text{kg} \times \text{m}^2]$ | = moment of inertia of the actuator referred to the motor shaft for each 100 mm stroke |
| $C [\text{mm}]$                         | = linear travel (stroke) of the actuator                                               |
| $M [\text{kg}]$                         | = external mass to be moved                                                            |
| $P_h [\text{mm}]$                       | = thread helix lead of the ball screw                                                  |
| $u$                                     | = ratio of the actuator                                                                |
| $\eta$                                  | = total efficiency of the actuator                                                     |

#### Inertia ratio $IR$

$$IR = \frac{J_{load}}{J_{mot}}$$

|                                          |                                    |
|------------------------------------------|------------------------------------|
| $J_{mot} [\text{kg} \times \text{m}^2]$  | = moment of inertia of motor rotor |
| $J_{load} [\text{kg} \times \text{m}^2]$ | = moment of inertia of load        |

For correct load control and high quality regulation we recommend to use the following indicative values:

- Applications with high dynamics conditions:  $IR < 2$
- Applications with medium to low dynamics conditions:  $IR < 10$

### / Motor torque calculation

#### Motor torque due to external forces $T_e$

$$T_e = \frac{(F_p + F_a + F_e) P_h}{2000 \pi \cdot u \cdot \eta} [\text{Nm}]$$

|                       |                                                                                   |
|-----------------------|-----------------------------------------------------------------------------------|
| $F_p$                 | = $9.81 \left( m_0 + m_{100} \cdot \frac{C}{100} + M \right) [\text{N}]$ = weight |
| $m_0 [\text{kg}]$     | = mass in linear motion for actuator referred to 0 mm stroke                      |
| $m_{100} [\text{kg}]$ | = mass in linear motion for each 100 mm stroke                                    |
| $F_a [\text{N}]$      | = friction force                                                                  |
| $F_e [\text{N}]$      | = other external forces                                                           |

#### Acceleration motor torque $T_J$

$$T_J = (J_{load} + J_{mot}) \frac{a \cdot 2000 \pi \cdot u}{P_h} [\text{Nm}]$$

|                    |                                     |
|--------------------|-------------------------------------|
| $a [\text{m/s}^2]$ | = acceleration suffered by the load |
|--------------------|-------------------------------------|

#### Total motor torque $T_M$

$$T_M = T_J + T_e + T_a [\text{Nm}]$$

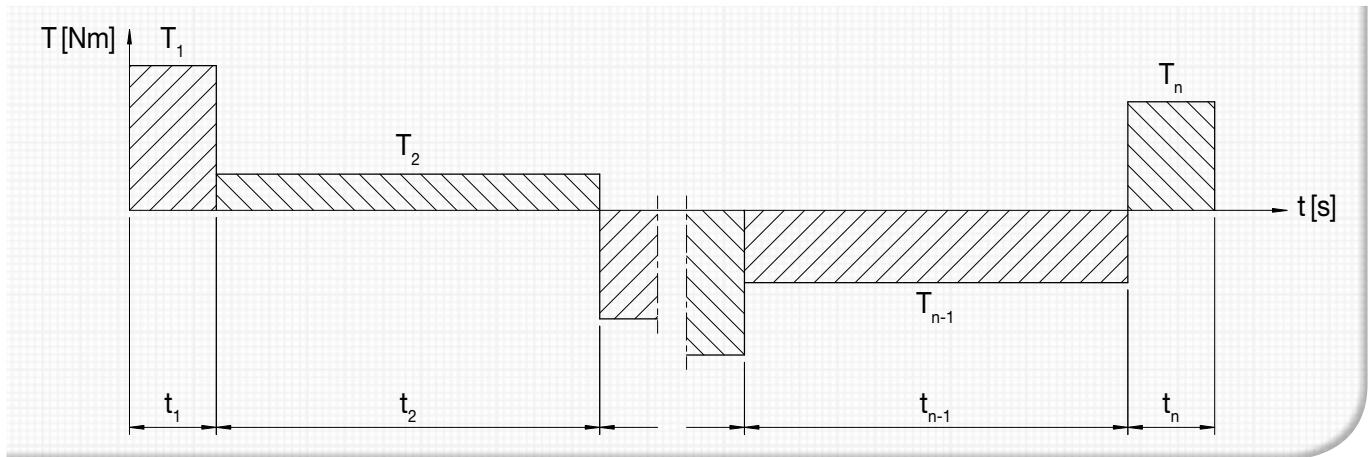
|                   |                                   |
|-------------------|-----------------------------------|
| $T_a [\text{Nm}]$ | = friction torque of the actuator |
|-------------------|-----------------------------------|

### Thermal verification of the motor

#### RMS torque

When the drive working cycle is defined, i.e. the motor torque trend in a variable period, you can calculate the RMS value of the motor torque: it is the torque which generates inside the servomotor so much

heat as during the effective working cycle. The simplest conditions, when the working cycle has constant acceleration or zero acceleration phases, provide a torque with constant intervals trend, as shown below.



In this case, the RMS value of the motor torque can be calculated as follows:

$$T_{RMS} = \sqrt{\sum_i \frac{T_{Mi}^2 \cdot t_i}{t_{tot}}} \text{ [Nm]}$$

$T_{Mi}$  [Nm] = motor torque of the i-th cycle phase  
 $t_i$  [s] = time of the i-th cycle phase

$t_{tot}$  =  $\sum_i t_i$  [s] = total cycle time

For the thermal check of the motor it is necessary to have:

$$T_{RMS} \leq T_{nom,100K}$$

$T_{nom,100K}$  [Nm] = constant rated torque of the servomotor

#### MAX Torque

For correct motor selection, the maximum torque required during the operating cycle must not exceed the peak torque that can be delivered by the motor:

$$(T_M)_{max} < T_p$$

$T_p$  [Nm] = peak torque of motor

#### MAX Speed

Check that the motor is able to reach the maximum linear speed required by the operating cycle:

$$n = \frac{60 \cdot v_{max} \cdot u}{P_h} \text{ [rpm]}$$

$v_{max}$  [mm/s] = max linear speed

$$n \leq n_{nom}$$

$n_{nom}$  [rpm] = motor rated speed

## 7.2 / Ball screw sizing and service life

Ball screws life corresponds to the number of revolutions that the screw can perform with regard to its nut before any sign of fatigue appears on the material

of screw, nut and rolling elements.

The **nominal ball screw life** ( $L_{10}$ ) is calculated with the following formula:

$$L_{10} = \left( \frac{C_a}{F_m \cdot f_{sh}} \right)^3 \cdot 10^6 \text{ [rev]}$$

$C_a$  [N]

= ball screw dynamic load

$F_m$  [N]

= equivalent dynamic load

$f_{sh}$

= shock factor

- $f_{sh} = 1$  load without shocks
- $1 < f_{sh} \leq 1.3$  load with light shocks
- $1.3 < f_{sh} \leq 1.8$  load with medium shocks
- $1.8 < f_{sh} \leq 3$  load with heavy shocks

The result of the calculation corresponds to the number of revolutions of the screw with regard to the nut, reached by the

90 % of the ball screws, apparently identical, subject to the same load conditions, motion laws and environment conditions.

The **equivalent dynamic load** ( $F_m$ ) is defined as a hypothetical load concentric to the screw, axial only, with constant width and direction that, if applied, would have the same effects on the ball screw life as the real applied load.

To determine it, the working cycle is divided in distinct and separate phases, each of them characterized by its load level, the specific rotating speed and the relevant time of load application.

$$F_m = \sqrt[3]{\sum_i F_i^3 \cdot \frac{v_i}{v_m} \cdot \frac{t_i}{t_{tot}}} \text{ [N]}$$

$t_i$  [s]

= duration of the i-th phase of the cycle

$F_i$  [N]

= load applied during the i-th phase

$v_i$

= linear speed during the i-th phase

$v_m$

=  $\sum_i v_i \cdot \frac{t_i}{t_{tot}}$  [mm/s] = average speed

$t_{tot}$

=  $\sum_i t_i$  [s] = total cycle time

The equivalent dynamic load  $F_m$  must be calculated as indicated above, where for each phase external loads,

mass loads (weight and inertial) and friction loads must be considered.

The **service life of ball screw expressed in hours** ( $L_{10h}$ ) is calculated as follows:

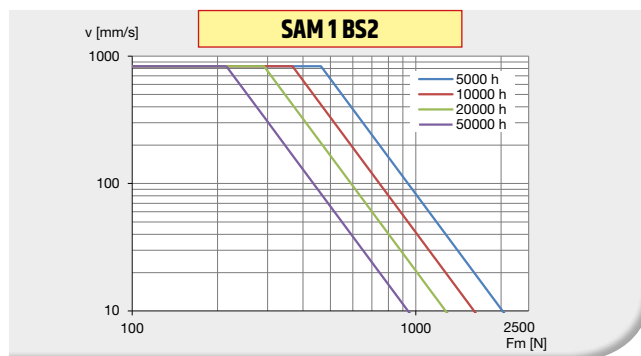
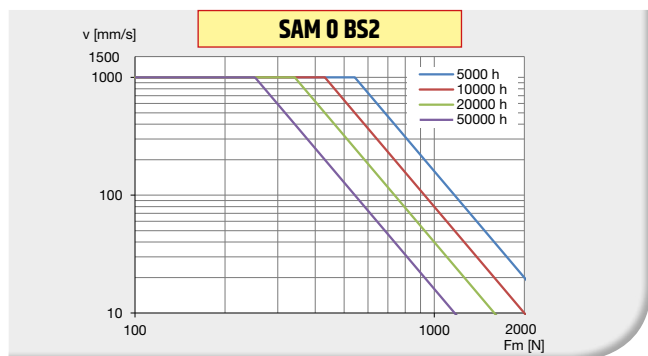
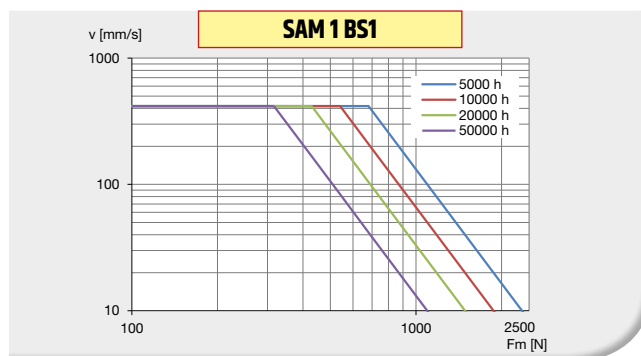
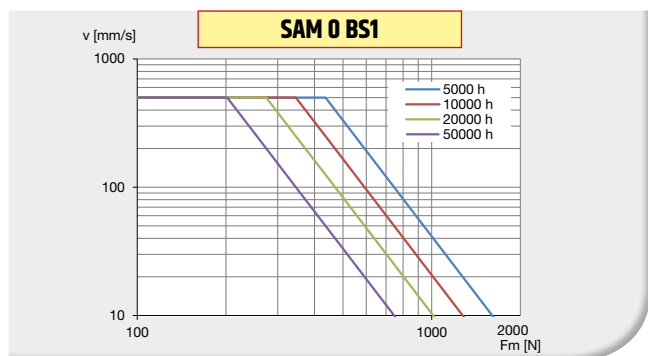
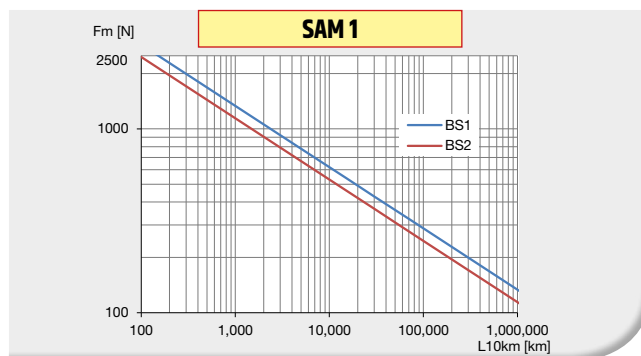
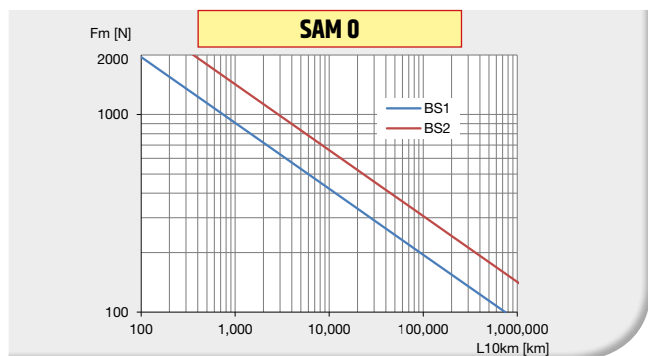
$$L_{10h} = \frac{L_{10} \cdot P_h}{3600 \cdot v_m} \text{ [hours]}$$

The **service life of ball screw expressed in km of travel** ( $L_{10km}$ ) is calculated as follows:

$$L_{10km} = \left( \frac{C_a}{F_m \cdot f_{sh}} \right)^3 \cdot P_h \text{ [km]}$$

$P_h$  [mm]

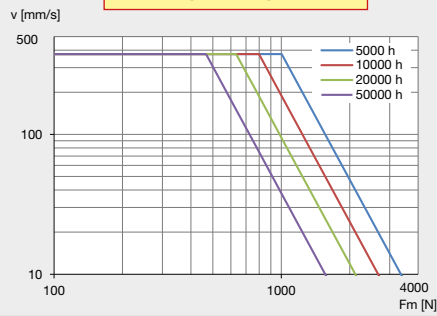
= thread helix lead



**SAM 2**



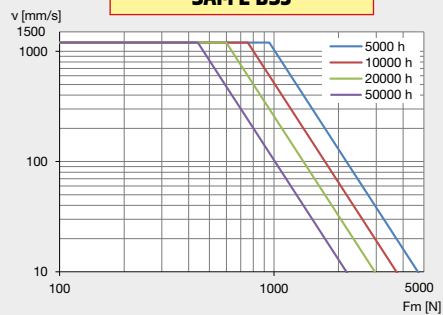
**SAM 2 BS1**



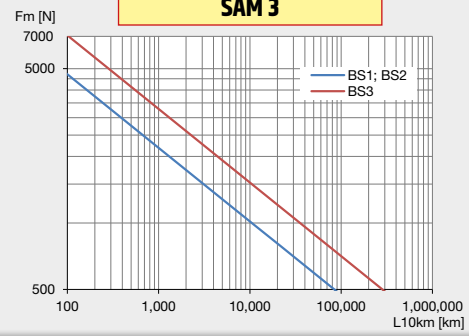
**SAM 2 BS2**



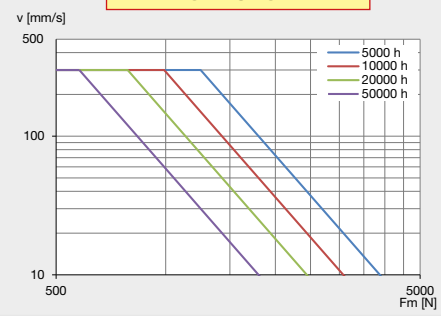
**SAM 2 BS3**



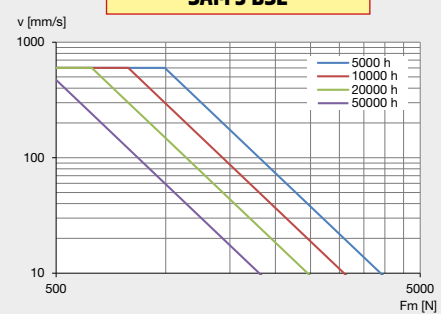
**SAM 3**



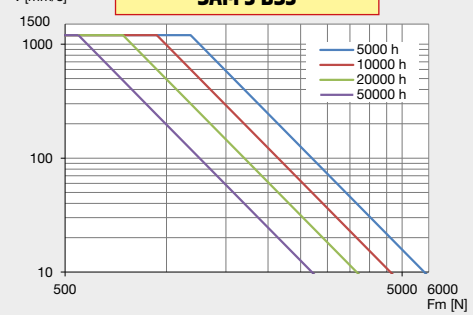
**SAM 3 BS1**



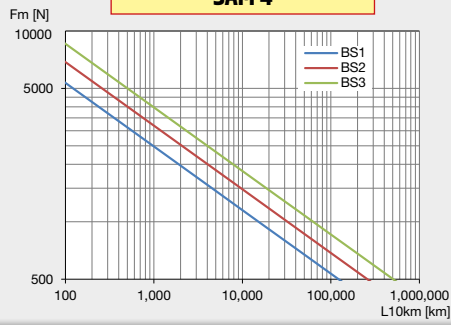
**SAM 3 BS2**



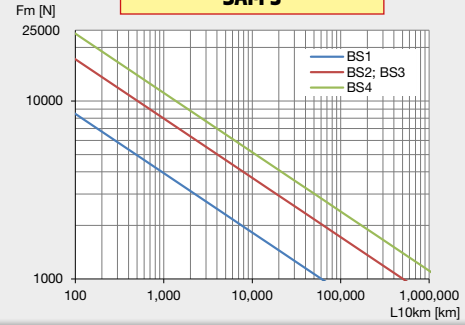
**SAM 3 BS3**



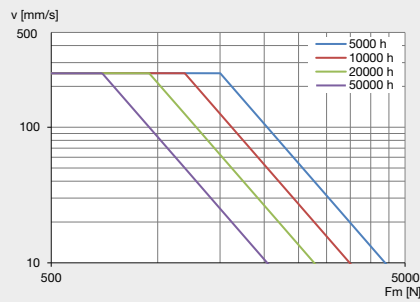
SAM 4



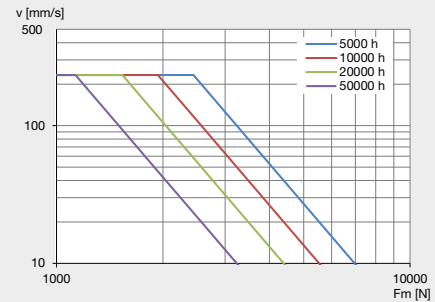
SAM 5



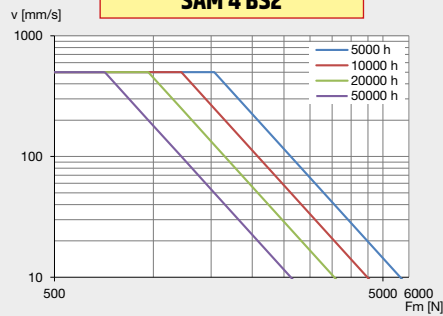
SAM 4 BS1



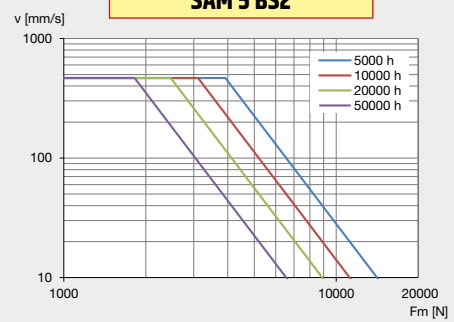
SAM 5 BS1



SAM 4 BS2



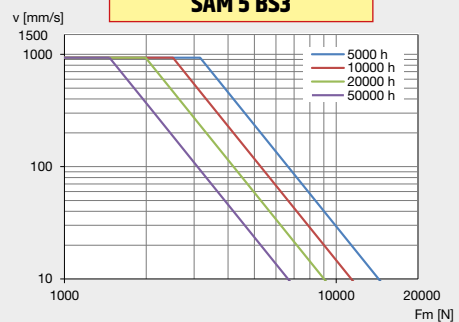
SAM 5 BS2



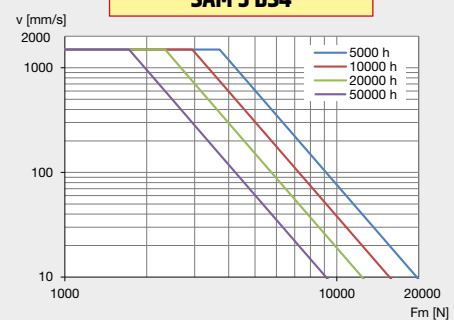
SAM 4 BS3

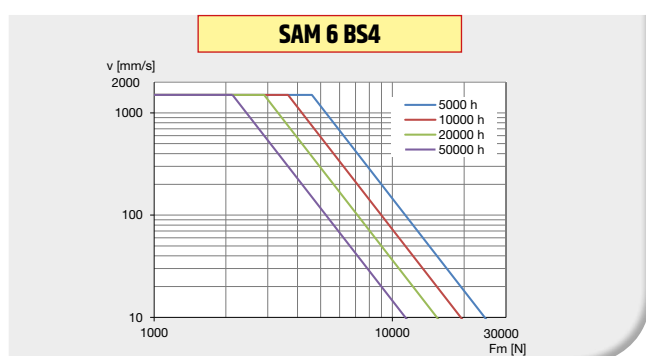
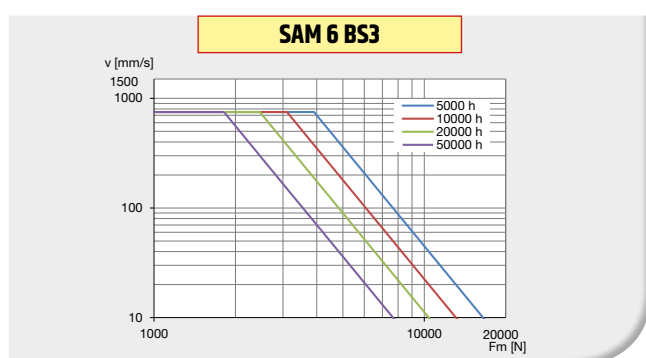
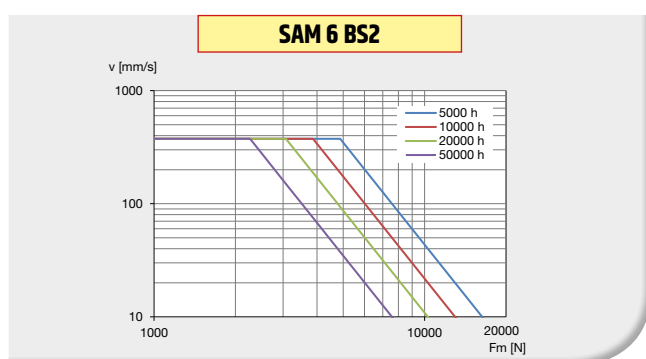
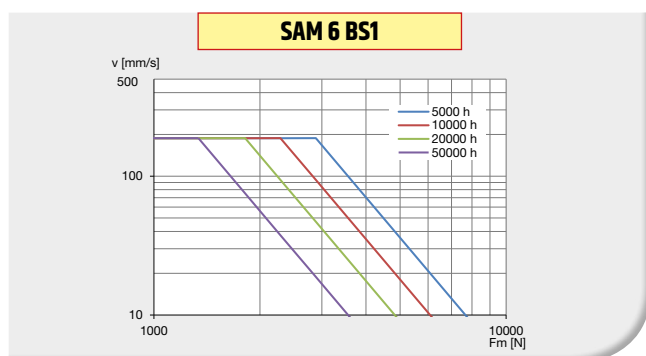
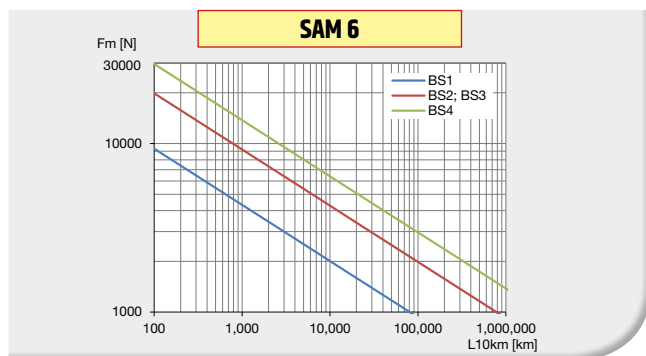


SAM 5 BS3



SAM 5 BS4





## 7.3 / Push load limit

In case of push load (static or dynamic) applied on the servoactuator, the buckling resistance of the screw must be checked.

The maximum compression load allowed on the actuator is determined by:

$$F_{max} = \frac{6437.5 \cdot \pi^3 \cdot (d_0 - D_w)^4}{(C + x)^2 \cdot sf} \text{ [N]}$$

$d_0$  [mm] = ball screw nominal diameter

$D_w$  [mm] = balls diameter

$C$  [mm] = linear travel (stroke)

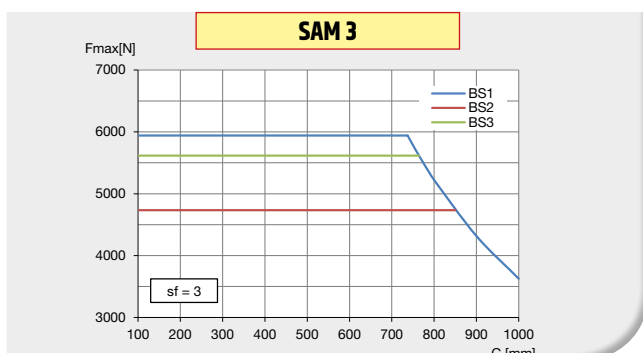
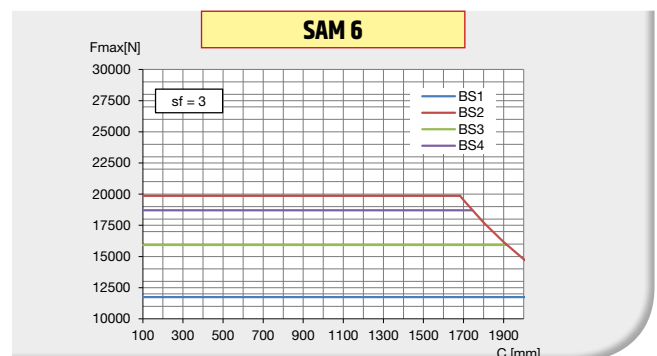
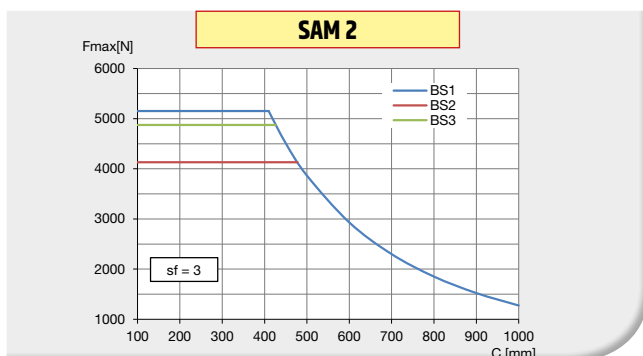
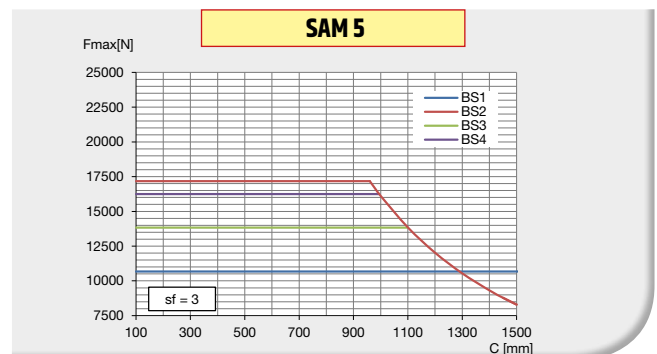
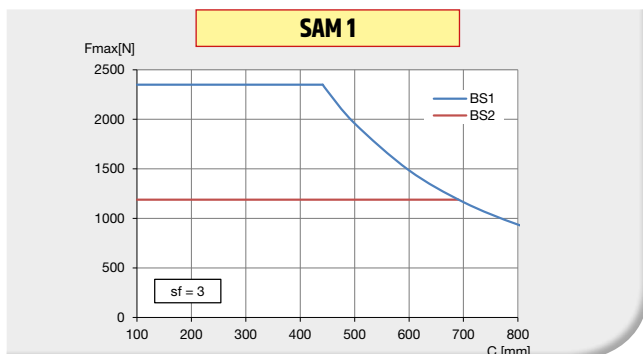
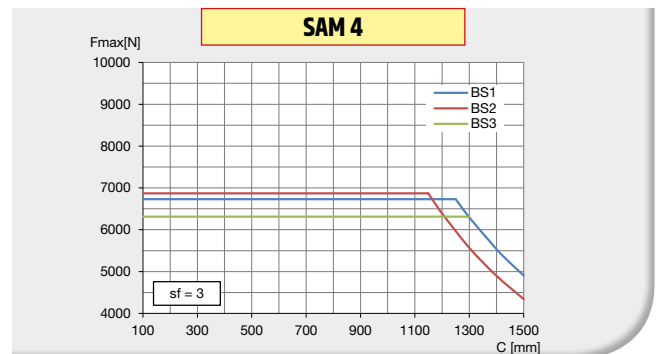
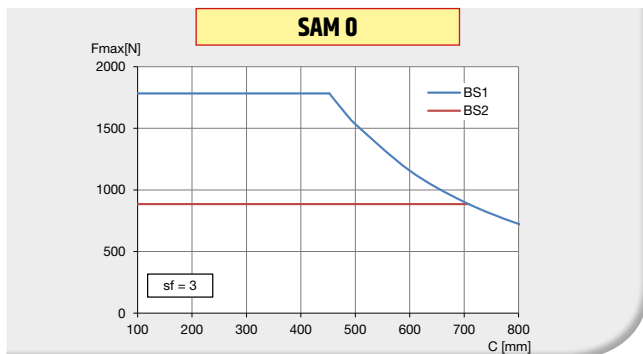
$x$  = calculation coefficient

(see below table)

$sf$  = safety factor

| SIZE            | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| Coefficient $x$ | 158.5 | 173.5 | 174.5 | 201.5 | 210   | 270   | 310   |

**NOTE:** value resulting from calculation must not exceed the max force value as for Technical Data (see chap. 2.1, 3.1, 4.1).



## 7.4 / Critical speed limit

The rotating speed of the screw generates the rod linear movement.  
Therefore, the linear speed of the servoactuator, is limited by the following factors:

**A - External factors** (length, diameter and type of screw end supports).

**B - Internal factors** (balls material, geometry and material of all the recirculation elements).

Once the respective values have been established according to these two criteria, the lower of the two values is adopted as the maximum speed of the system.

### A - Limits due to external factors

In order to ensure a proper working of the system and to prevent imbalances which could damage the ball screw, the rotating speed must not reach the critical level. Therefore, also the linear speed must be limited to the critical value.  
The critical speed depends on the screw diameter, the type of screw end support and the length of the free ball screw.  
The maximum permissible linear speed is calculated according to the following formula, which limits the rotation speed to a value equal to 80% of the critical speed:

$$v_{max} = 251 \cdot 10^4 \cdot \frac{d_0 - D_w}{(C + x)^2} \cdot P_h \text{ [mm/s]}$$

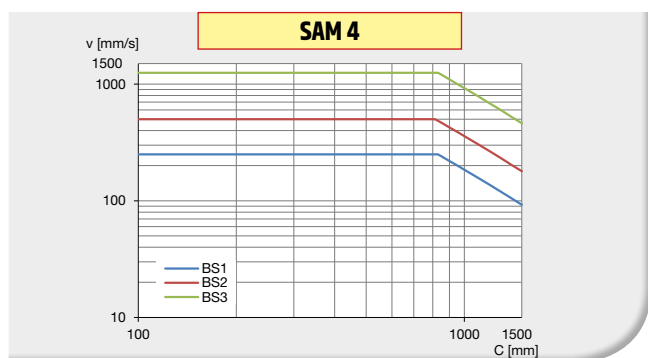
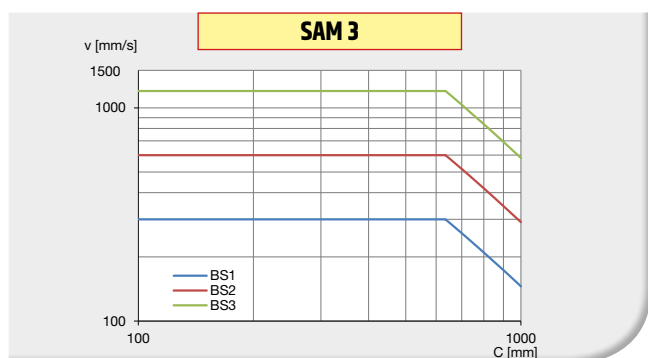
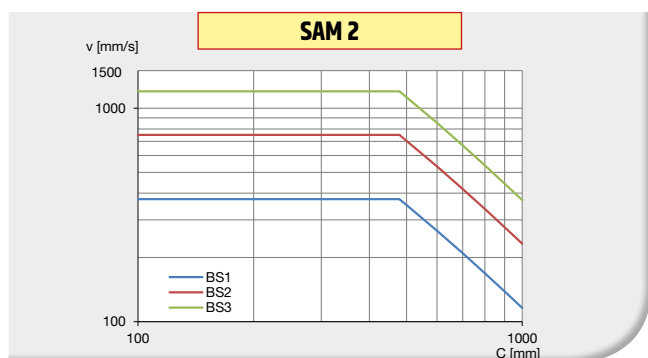
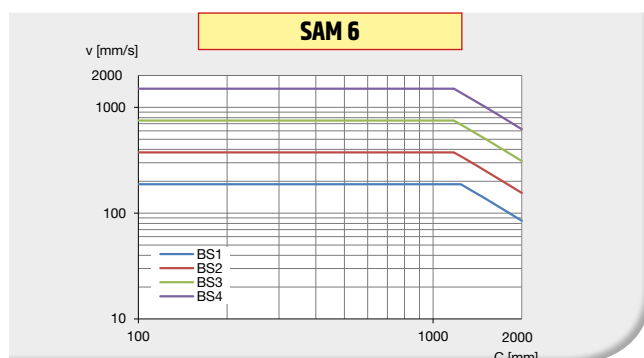
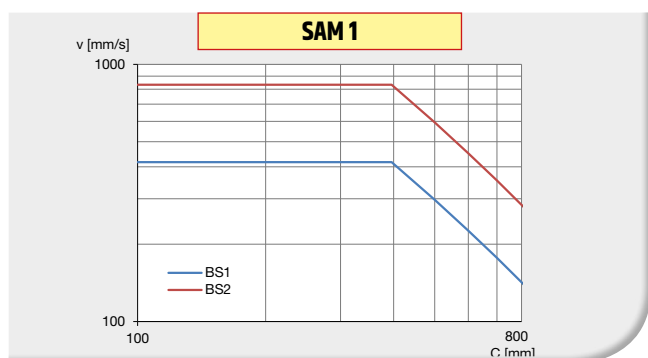
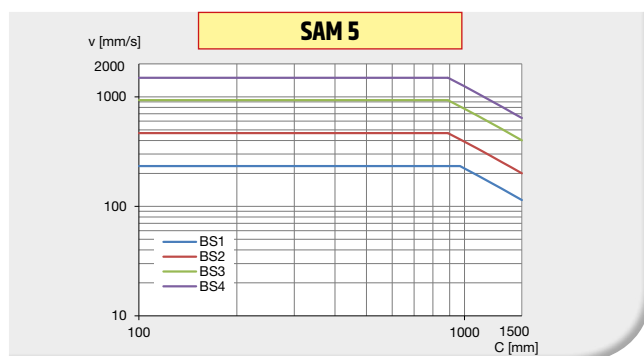
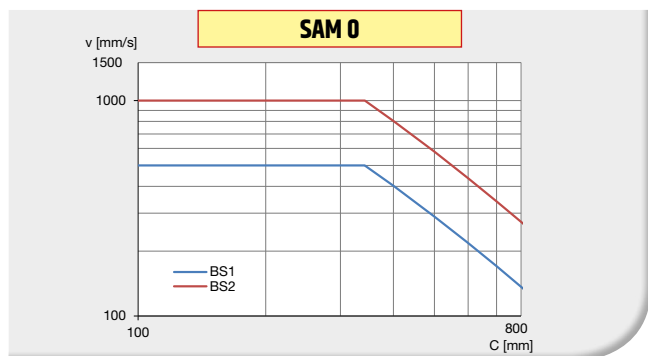
$d_0$  [mm] = ball screw nominal diameter  
 $D_w$  [mm] = balls diameter  
 $P_h$  [mm] = thread helix lead  
 $C$  [mm] = linear travel (stroke)  
 $x$  = calculation coefficient (see below table)

| SIZE            | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|-----------------|-------|-------|-------|-------|-------|-------|-------|
| Coefficient $x$ | 158.5 | 173.5 | 174.5 | 201.5 | 210   | 270   | 310   |

### B - Limits due to internal factors

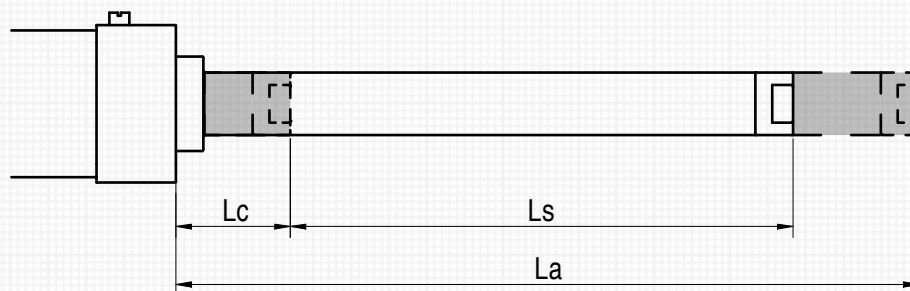
Depending on balls and screw material, geometry and material of all the recirculation elements and screw diameter, there is a specific limit of the maximum rotating speed. The values related to each actuator model and size are stated in the specific performance tables (see Technical Data chapters 2.1, 3.1, 4.1).

**NOTE:** for motorized servoactuators (SA IL Series or SA PD Series), the speed limit is determined considering also the nominal rotating speed of the motor.

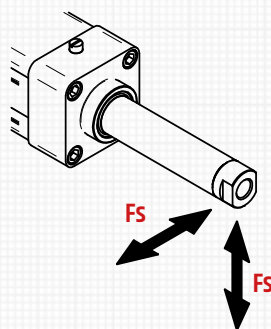


## 7.5 / Side load limit

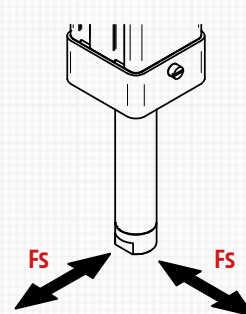
If lateral forces are applied on the linear actuator rod (static or dynamic condition), they must not exceed the limit shown in the graphs.



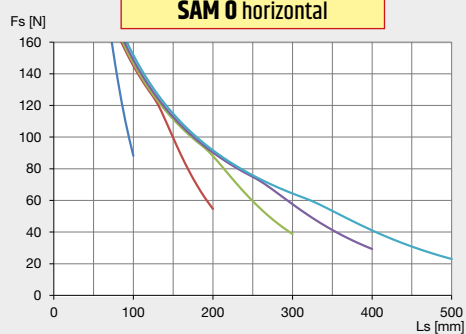
### HORIZONTAL MOUNTING



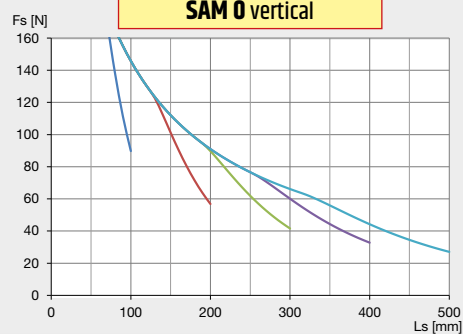
### VERTICAL MOUNTING



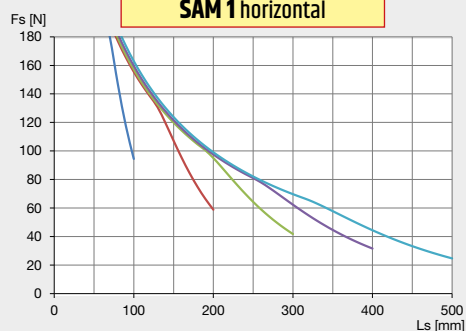
**SAM 0 horizontal**



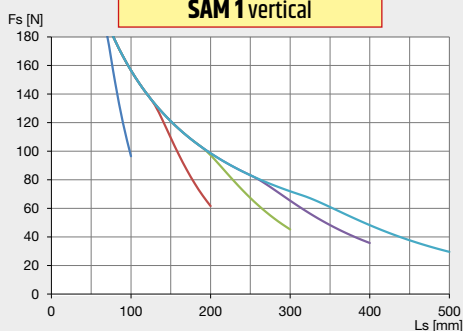
**SAM 0 vertical**

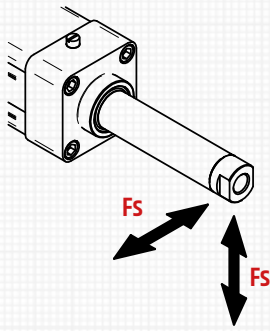
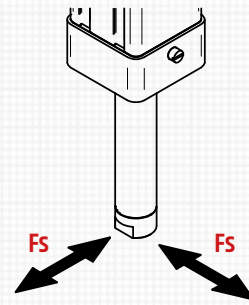


**SAM 1 horizontal**

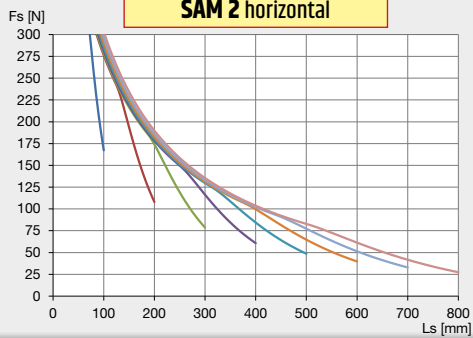


**SAM 1 vertical**

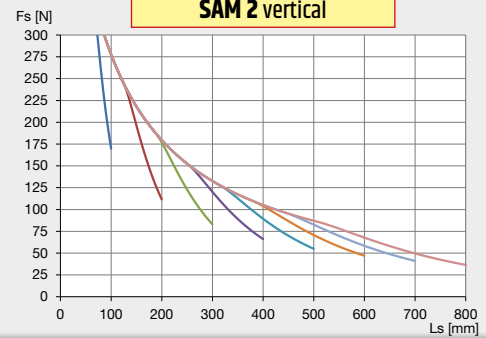


HORIZONTAL  
MOUNTING

VERTICAL  
MOUNTING


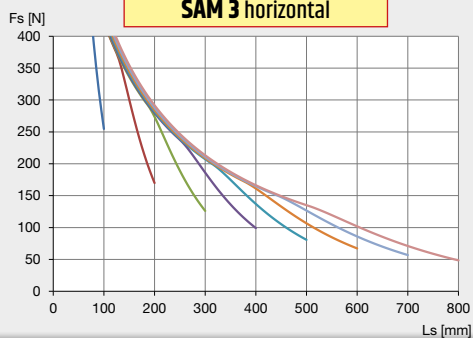
SAM 2 horizontal



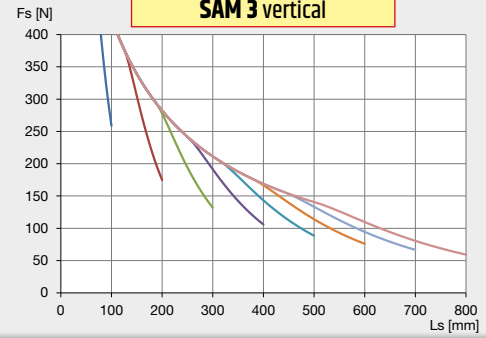
SAM 2 vertical



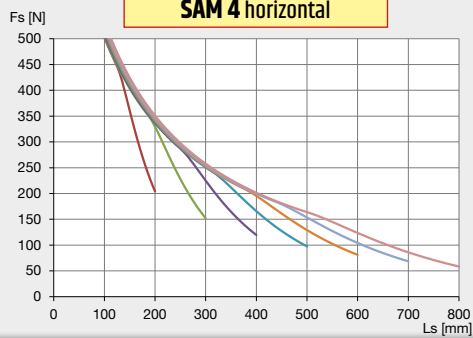
SAM 3 horizontal



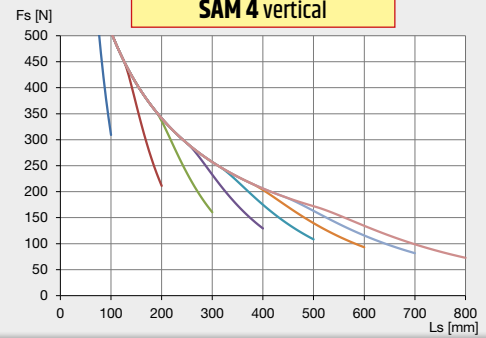
SAM 3 vertical



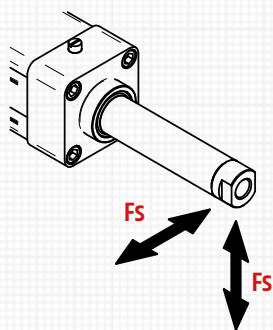
SAM 4 horizontal



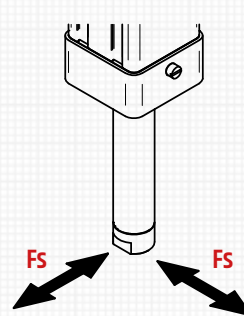
SAM 4 vertical



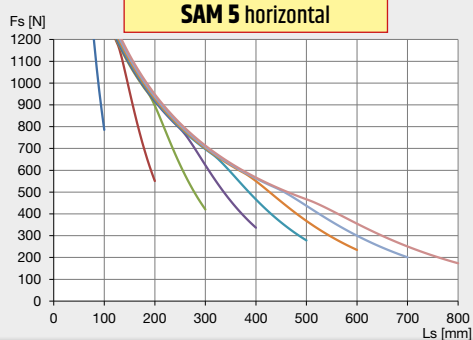
**HORIZONTAL MOUNTING**



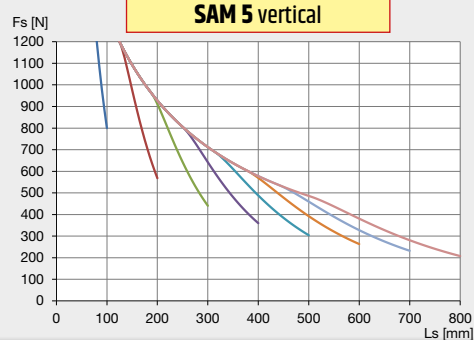
**VERTICAL MOUNTING**



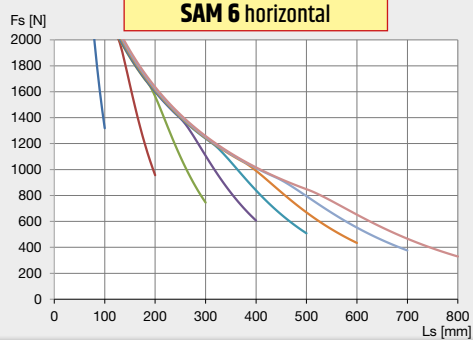
**SAM 5 horizontal**



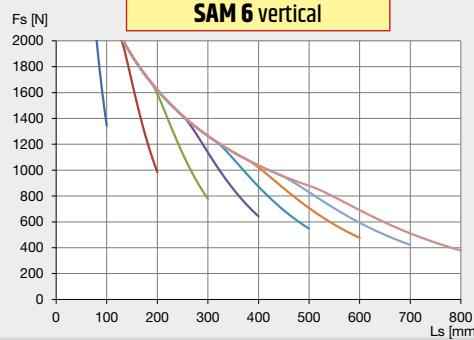
**SAM 5 vertical**



**SAM 6 horizontal**



**SAM 6 vertical**



## 7.6 / Positioning accuracy

The following tables show the tolerance value  $T$  related to the maximum positioning error  $e_M$  over the entire linear stroke of the ball screw,

according to ISO 3408 parameters.

The maximum positioning error for the entire stroke, as indicated in the table, is:

$$e_M = \pm T [\mu\text{m}]$$

The positioning error value does not include:

- Accuracy of the servomotor feedback system
- Axial play of the ball screw: standard axial play is **20 ÷ 40  $\mu\text{m}$** . Positioning accuracy may be affected by axial backlash of the ball screw in the case of applications with inversion of the axial load on the actuator. Servomech can supply **zero-backlash** nuts or preloaded nuts to avoid or limit this kind of problem.
- Elastic deformations of the mechanical components of the actuator or structure when subjected to axial load.

| Value $T$ [ $\mu\text{m}$ ] for ball screw with accuracy grade IT7 (standard) |     |     |     |     |     |     |     |     |     |      |
|-------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| STROKE [mm]                                                                   | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| <b>SAM 0</b>                                                                  | 43  | 61  | 76  | 86  | 93  | -   | -   | -   | -   | -    |
| <b>SAM 1</b>                                                                  | 43  | 61  | 76  | 86  | 93  | -   | -   | -   | -   | -    |
| <b>SAM 2</b>                                                                  | 43  | 61  | 76  | 86  | 93  | 100 | 105 | 115 | -   | -    |
| <b>SAM 3</b>                                                                  | 43  | 61  | 76  | 86  | 93  | 100 | 105 | 115 | -   | -    |
| <b>SAM 4</b>                                                                  | 43  | 61  | 76  | 86  | 93  | 100 | 105 | 115 | 120 | 129  |
| <b>SAM 5</b>                                                                  | 43  | 61  | 76  | 86  | 93  | 100 | 105 | 115 | 120 | 129  |
| <b>SAM 6</b>                                                                  | 43  | 61  | 76  | 86  | 93  | 100 | 105 | 115 | 120 | 129  |

| Value $T$ [ $\mu\text{m}$ ] for ball screw with accuracy grade IT5 (option) |     |     |     |     |     |     |     |     |     |      |
|-----------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| STROKE [mm]                                                                 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 | 1000 |
| <b>SAM 0</b>                                                                | 20  | 27  | 35  | 38  | 40  | -   | -   | -   | -   | -    |
| <b>SAM 1</b>                                                                | 20  | 27  | 35  | 38  | 40  | -   | -   | -   | -   | -    |
| <b>SAM 2</b>                                                                | 20  | 27  | 35  | 38  | 40  | 47  | 52  | 52  | -   | -    |
| <b>SAM 3</b>                                                                | 20  | 27  | 35  | 38  | 40  | 47  | 52  | 52  | -   | -    |
| <b>SAM 4</b>                                                                | 20  | 27  | 35  | 38  | 40  | 47  | 52  | 52  | 57  | 57   |
| <b>SAM 5</b>                                                                | 20  | 27  | 35  | 38  | 40  | 47  | 52  | 52  | 57  | 57   |
| <b>SAM 6</b>                                                                | 20  | 27  | 35  | 38  | 40  | 47  | 52  | 52  | 57  | 57   |

|                                                                                                                                                                                      |                                                        |                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------------|
|  <b>Servomech</b>  | <b>Linear Servoactuators<br/>Application Worksheet</b> | <b>Date:</b><br>____ / ____ / ____ |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------------|

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Name \_\_\_\_\_ Job title: \_\_\_\_\_

Phone: \_\_\_\_\_ E-mail: \_\_\_\_\_

www: \_\_\_\_\_ Company primary business: \_\_\_\_\_

**Action requires:**   ☐ Call me to discuss   ☐ Recommended product   ☐ Price quotation   ☐ Other \_\_\_\_\_

**Application / Description:** \_\_\_\_\_

|                                                      |                                           |
|------------------------------------------------------|-------------------------------------------|
| <b>Volume requirements / Each application:</b> _____ | <b>Volume requirements / Total:</b> _____ |
|------------------------------------------------------|-------------------------------------------|

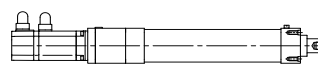
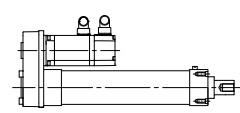
| LOAD                                                                                                  | ORIENTATION                                                                                                                |
|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Static load - PULL: _____ [N]   Side loads: <input type="checkbox"/> YES <input type="checkbox"/> NO  | <input type="checkbox"/> Vertical <input type="checkbox"/> Horizontal <input type="checkbox"/> Inclined                    |
| Static load - PUSH: _____ [N]   Shock loads: <input type="checkbox"/> YES <input type="checkbox"/> NO | Angle from horizontal plane: _____                                                                                         |
| Dynamic load - PULL: _____ [N]   Frequency: _____                                                     | Load guided: <input type="checkbox"/> YES <input type="checkbox"/> NO                                                      |
| Dynamic load - PUSH: _____ [N]   Vibrations: <input type="checkbox"/> YES <input type="checkbox"/> NO | Hold position:<br><input type="checkbox"/> UNDER LOAD<br><input type="checkbox"/> POWER OFF<br><input type="checkbox"/> NO |
| Moving mass: _____ [kg]                                                                               |                                                                                                                            |

| TRAVEL                                | LINEAR SPEED                                    | PRECISION                 |
|---------------------------------------|-------------------------------------------------|---------------------------|
| Stroke length required: _____ mm      | MAX speed _____ mm/s                            | Repeatability: _____ [mm] |
| MAX dim. in closed position: _____ mm | MIN speed _____ mm/s                            | Accuracy: _____ [mm]      |
|                                       | Time to complete the stroke (ext/retr): _____ s | MAX backlash: _____ [mm]  |

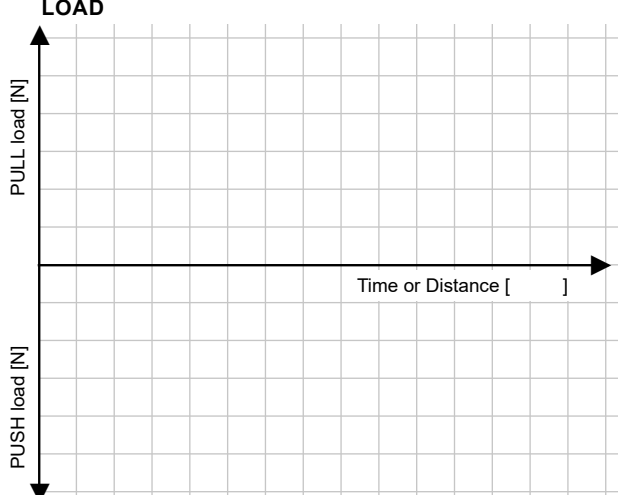
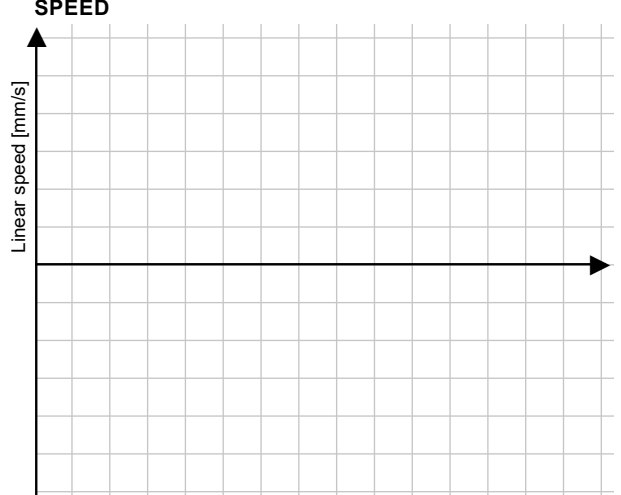
| DUTY CYCLE                           | REQUIRED LIFE TIME                                                                                                                                                                                     |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total cycle time: _____              | Units: <input type="checkbox"/> Cycles <input type="checkbox"/> km <input type="checkbox"/> Working hours <input type="checkbox"/> Days <input type="checkbox"/> Months <input type="checkbox"/> Years |
| Extend/retract cycles per day: _____ | Minimum life time required: _____                                                                                                                                                                      |
| Working hours per day: _____         |                                                                                                                                                                                                        |
| No. of cycles per hour: _____        |                                                                                                                                                                                                        |

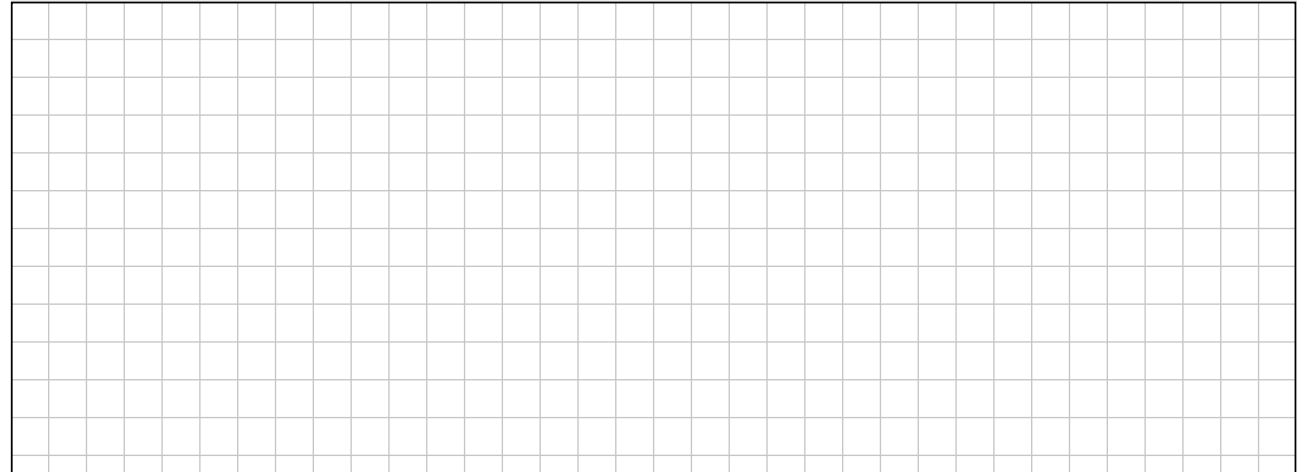
| ENVIRONMENT                                                                                                                                                                                                           | CONTAMINANTS                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature<br><input type="checkbox"/> Normal (0 - 40°C)<br><input type="checkbox"/> High temp. _____<br><input type="checkbox"/> Low temp. _____                                                          | Solids: _____<br><input type="checkbox"/> abrasive<br><input type="checkbox"/> non-abrasive<br><input type="checkbox"/> fine dust<br><input type="checkbox"/> coarse chips                                     |
| Conditions<br><input type="checkbox"/> Outdoor<br><input type="checkbox"/> Washdown<br><input type="checkbox"/> Cleanroom<br><input type="checkbox"/> Other _____<br><input type="checkbox"/> IP rate required: _____ | Liquids: _____<br><input type="checkbox"/> corrosive<br><input type="checkbox"/> non-corrosive<br><input type="checkbox"/> dips<br><input type="checkbox"/> mist / spray<br><input type="checkbox"/> splashing |

|                                                                                   |                                                        |                                    |
|-----------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------------|
|  | <b>Linear Servoactuators<br/>Application Worksheet</b> | <b>Date:</b><br>____ / ____ / ____ |
|-----------------------------------------------------------------------------------|--------------------------------------------------------|------------------------------------|

| VERSION                                                                                                                                                                 | LIMIT SWITCHES                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> In Line "IL"<br>                                              | <input type="checkbox"/> Parallel "PD"<br> |
| Magnetic limit switches    No. of switch positions ____<br><input type="checkbox"/> Normally closed contact (NC)<br><input type="checkbox"/> Normally open contact (NO) |                                                                                                                             |

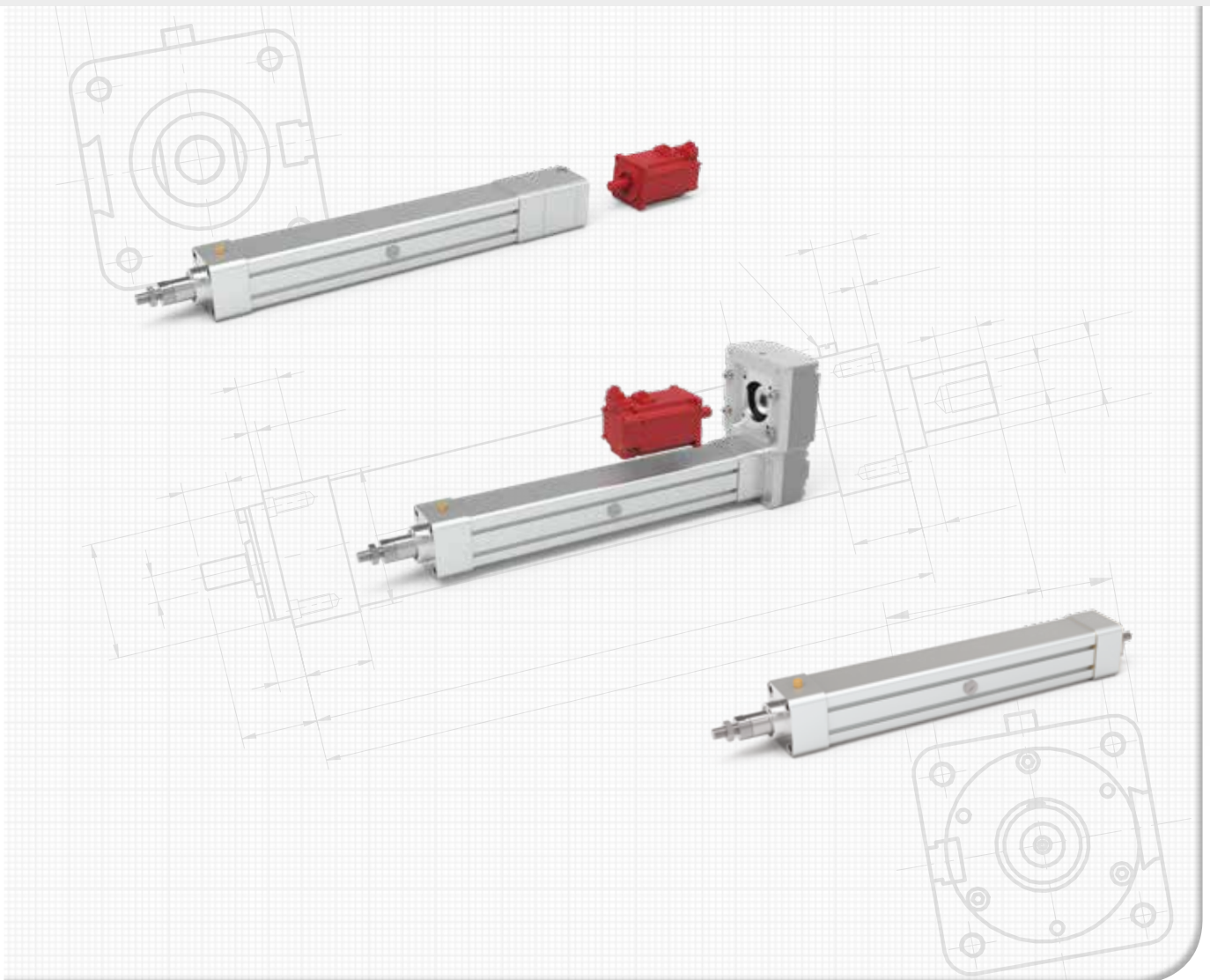
| FRONT FIXING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | REAR / BODY FIXING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> Threaded bore<br> <input type="checkbox"/> Male threaded rod end<br> <input type="checkbox"/> Ball joint rod end<br> <input type="checkbox"/> Clevis rod end<br> <input type="checkbox"/> Self-aligning joint<br> | <input type="checkbox"/> Rear hinge (only for "PD" Version)<br> <input type="checkbox"/> Rear hinge with ball joint (only for "PD" Version)<br> <input type="checkbox"/> Rear clevis (only for "PD" Version)<br> <input type="checkbox"/> Foot mount (couple)<br> <input type="checkbox"/> Plate mount<br> <input type="checkbox"/> Trunnion mount (only for "IL" Version)<br> |

| MOVE PROFILE                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>LOAD</b></p>  </div> <div style="width: 45%;"> <p><b>SPEED</b></p>  </div> </div> |

| APPLICATION SKETCH (Please show fixing method)                                       |
|--------------------------------------------------------------------------------------|
|  |



## 8 / Additional information



## 8.1 / Operating conditions

The normal operating conditions of the servoactuators are:

- Environment temperature **+0°C ÷ +40°C**
- Relative air humidity **5% ÷ 85%**  
without condensation
- Duty cycle **100%**

## 8.2 / Actuator body IP rating

The sealing gaskets on all planar couplings and the sealing scraper on the push rod guarantee effective protection against inlet of contaminants in most of the applications.

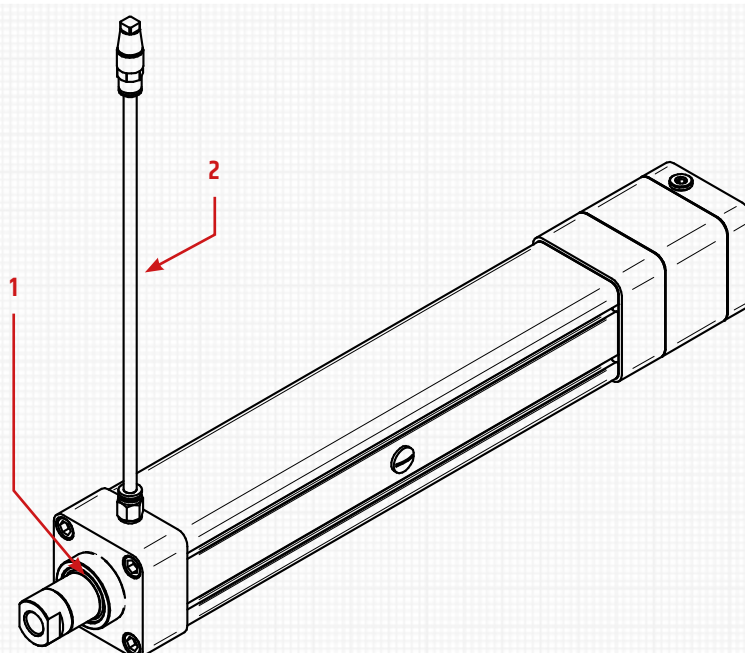
On request, the servoactuators can reach the IP65 protection rating thanks to a particular set-up, consisting of:

- 1** Reinforced actuator rod seal, able to ensure greater protection from inlet of dust and water.
- 2** Air breather threaded hole prepared for the attachment threaded joint and pipe that connect the actuator with a clean environment; in this way it is possible to ensure the compensation of air flows and pressure inside the actuator without the inlet of contaminants.

**NOTE** - joint included, tube NOT included into the supply.

**NOTE** - in case of actuator SAM series (linear unit with male input shaft) the IP rating is referred to actuator body, NOT for the rotating shaft sealing system.

**NOTE** - for SAM PD series actuators, please contact our technical support for more information.



| IP Rating       | Ordering code |
|-----------------|---------------|
| IP40 (standard) | <b>S</b>      |
| IP65 (optional) | <b>X</b>      |

Installation, use and  
maintenance manual available on:  
[www.servomech.com/download](http://www.servomech.com/download)



## 8.3 / Relubrication and maintenance

The servoactuators are grease lubricated and are supplied complete with lubricant.

The standard type of lubricant for bearings and ball screw for all servoactuator sizes is a grease of NLGI class 1 consistency according to DIN 51818: LUBCON Thermoplex ALN 1001. This lubricant is suitable for the entire possible speed range of servo actuators, with an ambient operating temperature of  $(0 \div 40) ^\circ \text{C}$ . In case of operating temperature outside the indicated range, please contact Servomech S.p.a. to evaluate the use of different lubricant.

Ball bearings are life long lubricated.

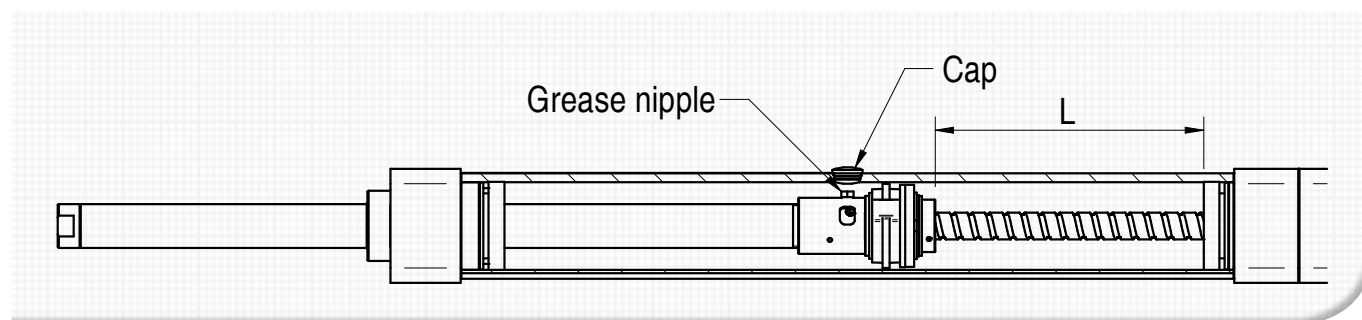
Ball nut must be periodically relubricated: for a proper lubrication, please refer to the **User and Maintenance**

**Manual** supplied with the actuator to define the right maintenance scheduling, lubricant type and quantity.

The servoactuators have a specific lubrication system for the ball screw nut: it is recommended to use LUB ferrule lubricators, specific for concave grease nipples.

To access to the grease nipple located on the nut, it is necessary to put the actuator in its completely retracted position until it stops against the bumper / shock absorber. Then open the actuator for a linear distance  $L$ , as shown on the image below, to align the nut grease nipple to the hole on the outer tube.

Now it is possible to remove the cap on the hole and put in the LUB ferrule lubricator to grease the nut.



The opening stroke length  $L$  for relubrication operations is:

$$L = \frac{C}{2} + A$$

Where:

$L$  [mm] = linear distance for the lubrication.

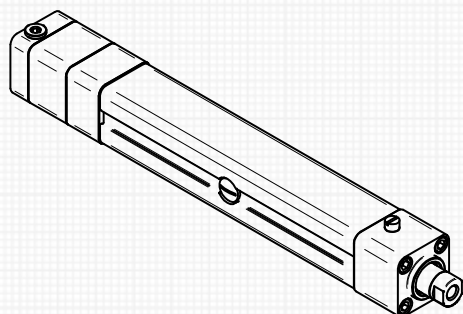
$C$  [mm] = linear travel (stroke) of the servoactuator.

$A$  = constant value specific for each size (see following table).

| SIZE     | SAM 0 | SAM 1 | SAM 2 | SAM 3 | SAM 4 | SAM 5 | SAM 6 |
|----------|-------|-------|-------|-------|-------|-------|-------|
| <b>A</b> | 4.5   | 2.5   | 3     | 7     | 6     | -3.5  | -5.5  |

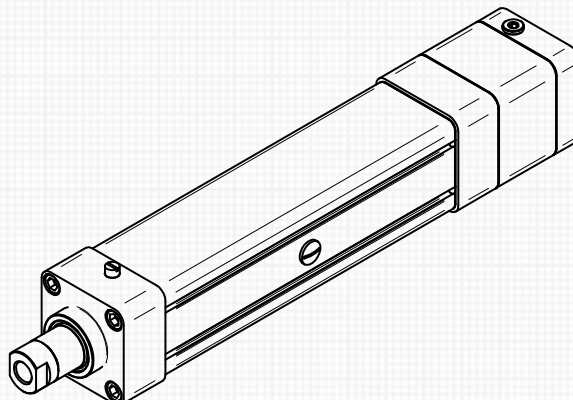
#### POSITION OF THE LUBRICATING PLUG

SAM 0 sensors opposite side



#### POSITION OF THE LUBRICATING PLUG

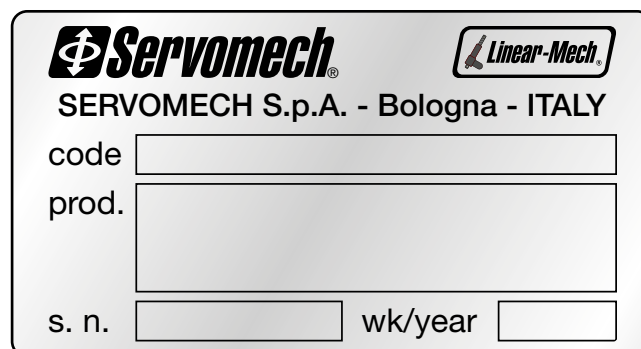
SAM 1 - 2 - 3 - 4 - 5 - 6 sensors side



## 8.4 / Product identification

Each SERVOMECH product is uniquely identified and supplied with an identification plate, shown in the figure below, which allows its identification and provides technical information on the product.

- **CODE** - Item code.
- **PROD** - Commercial code  
(See Ordering code at chap. 9).
- **S. N.** - Product serial number.  
It guarantees the complete product traceability even after long time. It must be given as reference when ordering spare parts for the unit.
- **WK / YEAR** - Assembly date, expressed in week/year (e.g.: 37/25 = week 37 / year 2025). It is commonly the same week of delivery week.



**Servomech** 

**SERVOMECH S.p.A. - Bologna - ITALY**

code

prod.

s. n.  wk/year

## 8.5 / Product supply information

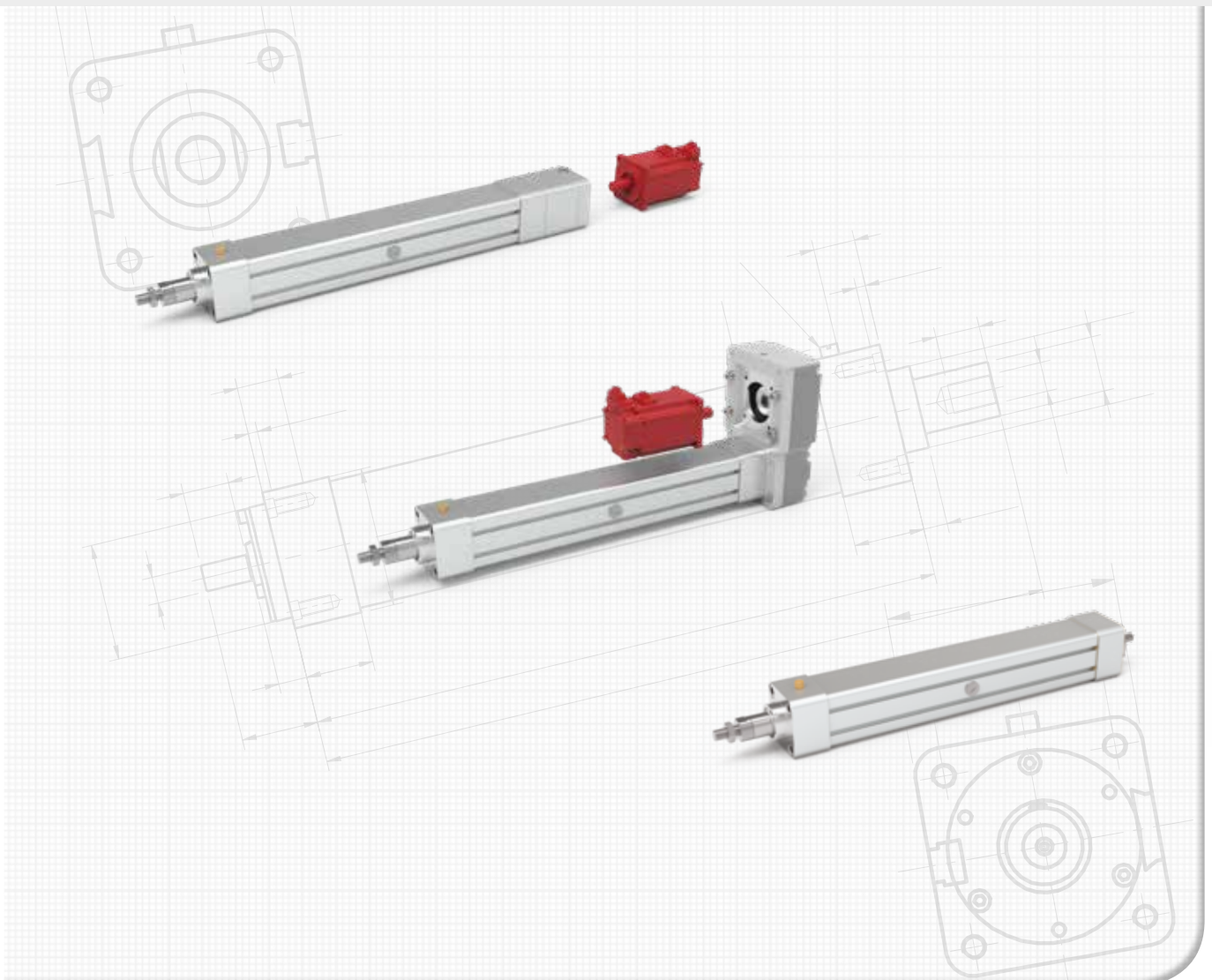
SERVOMECH linear actuators in standard execution are supplied in the set-up and finishing conditions shown below. For any special requests, please contact Servomech technical support.

- For each finished product, Servomech files a specific **test sheet** that is provided to the customer in the shipment together with the product and that certifies its conformity. The test sheet also contains important information for the correct functioning of the product itself.
- **Standard lubrication** according to the table (see Chap. 68.2 / Relubrication and maintenance). In case of special requirements (e.g. ambient temperature, food industry, environment with the presence of ionizing radiation, an environment that requires the use of biodegradable lubricants) the most suitable lubricant for the specific environment is evaluated. For more information and for any specific request, please contact SERVOMECH technical support.  
On request, specific lubricants agreed with the customer can be applied.
- **Shaft protection:** input shafts are protected with specific anti-rust products.
- **Packaging:** it is agreed with the customer and it is based on the size and quantity of the products, the final destination of the goods, and the type of transport. It is functional to preserve the goods until the destination with less possible impact on the product's value.

## 8.6 / Installation, operation and maintenance

- We recommend carefully reading the product's **Installation, Operation and Maintenance Manual** before proceeding with any product-related operations. The manual is available on our website at [www.servomech.com/download](http://www.servomech.com/download) or by scanning the QR code directly on the product.
- It is recommended to exercise caution and care when **handling and transporting linear actuators** to avoid damaging mechanical parts and/or accessories and to prevent risks to personnel assigned to this activity. Refer to the product's Installation, Operation and Maintenance Manual.
- During **storage**, linear servoactuators must be protected from atmospheric agents and from the risk of dust or contaminants depositing on the stem, moving parts, and attachments. Please refer to the product's Installation, Operation and Maintenance Manual.
- In order to proceed correctly with the **installation and commissioning** of the product, we recommend that you follow the instructions given in the Installation, Operation and Maintenance Manual.
- Linear Servoactuators require **periodic maintenance**. For further details, please refer to the product's Installation, Operation and Maintenance Manual.

## 9 / Ordering code



## 9.1 / Actuators **SAM IL Series**



| SAM 3 IL | BS 2                                                                                    | C 200 | F3 14-30                                                             | TS CI | FCM | S |
|----------|-----------------------------------------------------------------------------------------|-------|----------------------------------------------------------------------|-------|-----|---|
| 1        | 2                                                                                       | 3     | 4                                                                    | 5     | 6   | 7 |
| 1        | Actuator size                                                                           |       | SAM IL 0, 1, 2, 3, 4, 5, 6                                           |       |     |   |
| 2        | Ball screw<br>(see Chap. 2.1 / Technical data SAM IL Series)                            |       | BS1, BS2, BS3, BS4                                                   |       |     |   |
| 3        | Stroke<br>(see Chap. 2.2 / Dimensions SAM IL Series)                                    |       | C____                                                                |       |     |   |
| 4        | Motor attachment<br>(see Chap. 2.3 / Motor attachment SAM IL Series)                    |       | F1____, F2____, F3____, F4____                                       |       |     |   |
| 5        | Fixing accessories<br>(see Chap. 5 / Mounting options)<br>- Fixing end:<br>- Main body: |       | TM, TS, TS90, FO, FO90, GA<br>PBS, PBE, PBN, PBW, FL, FL90, CI, CI90 |       |     |   |
| 6        | Limit sensors<br>(see Chap. 6 / Limit sensors)                                          |       | FCM (NC), FCM (NO)                                                   |       |     |   |
| 7        | IP rating<br>(see Chap. 8.2 / Actuator body IP rating)                                  |       | S (standard), X (IP65)                                               |       |     |   |

## 9.2 / Actuators **SAM PD Series**



| SAM 3 PD | RL                                                                                      | BS2 | C 200                                                                      | F3 14-30 | TS CM | FCM | S |
|----------|-----------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------|----------|-------|-----|---|
| 1        | 2                                                                                       | 3   | 4                                                                          | 5        | 6     | 7   | 8 |
| 1        | Actuator size                                                                           |     | SAM PD 0, 1, 2, 3, 4, 5, 6                                                 |          |       |     |   |
| 2        | Ratio<br>(see Chap. 3.1 / Technical data SAM PD Series)                                 |     | RV, RN, RL                                                                 |          |       |     |   |
| 3        | Ball screw<br>(see Chap. 3.1 / Technical data SAM PD Series)                            |     | BS1, BS2, BS3, BS4                                                         |          |       |     |   |
| 4        | Stroke<br>(see Chap. 3.2 / Dimensions SAM PD Series)                                    |     | C____                                                                      |          |       |     |   |
| 5        | Motor attachment<br>(see Chap. 3.3 / Motor attachment SAM PD Series)                    |     | F1____, F2____, F3____, F4____                                             |          |       |     |   |
| 6        | Fixing accessories<br>(see Chap. 5 / Mounting options)<br>- Fixing end:<br>- Main body: |     | TM, TS, TS90, FO, FO90, GA<br>PB, FL, FL90, CM, CM90, CMS, CMS90, CF, CF90 |          |       |     |   |
| 7        | Limit sensors<br>(see Chap. 6 / Limit sensors)                                          |     | FCM, FTV                                                                   |          |       |     |   |
| 8        | IP rating<br>(see Chap. 8.2 / Actuator body IP rating)                                  |     | S (standard)                                                               |          |       |     |   |

9.3 / Actuators **SAM** Series

|   | SAM 3                                                                                          | BS 2 | C 200                                                                | TS CI | FCM | S |
|---|------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------|-------|-----|---|
|   | 1                                                                                              | 2    | 3                                                                    | 4     | 5   | 6 |
| 1 | Actuator size                                                                                  |      | SAM 0, 1, 2, 3, 4, 5, 6                                              |       |     |   |
| 2 | Ball screw<br><i>(see Chap. 4.1 / Technical data SAM Series)</i>                               |      | BS1, BS2, BS3, BS4                                                   |       |     |   |
| 3 | Stroke<br><i>(see Chap. 4.2 / Dimensions SAM Series)</i>                                       |      | C_____                                                               |       |     |   |
| 4 | Fixing accessories<br><i>(see Chap. 5 / Mounting options)</i><br>- Fixing end:<br>- Main body: |      | TM, TS, TS90, FO, FO90, GA<br>PBS, PBE, PBN, PBW, FL, FL90, CI, CI90 |       |     |   |
| 5 | Limit sensors<br><i>(see Chap. 6 / Limit sensors)</i>                                          |      | FCM, FTV                                                             |       |     |   |
| 6 | IP rating<br><i>(see Chap. 8.2 / Actuator body IP rating)</i>                                  |      | S (standard), X (IP65)                                               |       |     |   |

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