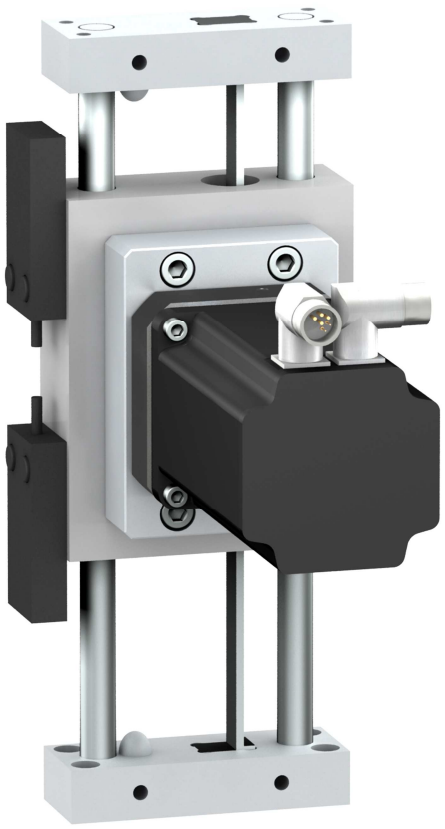
CAS3x Cantilever axes

Minute Linear Actuator
Product Manual

V1.0, 02.2022



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Important information

This manual is part of the product.

Carefully read this manual and observe all instructions.

Keep this manual for future reference.

Hand this manual and all other pertinent product documentation over to all users of the product.

Carefully read and observe all safety instructions and the chapter "Before you begin - safety information".

Some products are not available in all countries. For information on the availability of products, please consult the catalog.

Subject to technical modifications without notice.

All details provided are technical data which do not constitute warranted qualities.

Most of the product designations are registered trademarks of their respective owners, even if this is not explicitly indicated.

1. Introduction

1.1 Overview of product properties

The cantilever axis with round bar design are based on specially developed and particularly torsion-resistant aluminium profiles.

The axis body consists of a two rod guide wich provides both low weigth and high rigidity for short strokes.

They excel with the their ability to position heavy loads at changing torques with high feed forces and high accuracy.

1.1.1 Product family

The cantilever axes product family consists of the following sizes:

- CAS31BC (cross section axis body 80x30 mm)
- CAS32BC (cross section axis body 100x40 mm)
- CAS33BC (cross section axis body 120x50 mm)
- CAS34BC (cross section axis body 160x50 mm)

The sizes differ in terms of outer dimensions, drive data, payload capacities and maximum strokes.

1.1.2 Features and options of the cantilever axis

The cantilever axis excels with the following features and options:

- high stiffness for short strokes
- low travel weight
- takes up little space
- different strokes lengths available
- anti-corrosion version
- lifetime lubricated
- various possible mounting combinations for easy integration into wider solutions
- load can be fixed to the endplate
- Option:
  - Antistatic thooted belt
  - Corrosion resistance, see Chapter “3.2 Information on corrosion resistance“

1.1.3 Characteristics of the linear guide

Recirculating ball bearing guide

- High acceleration
- High load capacity
- High accuracy
- High torque capacity

1.1.4 Motor mounting

The motor or the gearbox is mounted directly on the drive pinion without feather key, eliminating any play in the connection as well as the need for additional couplings.

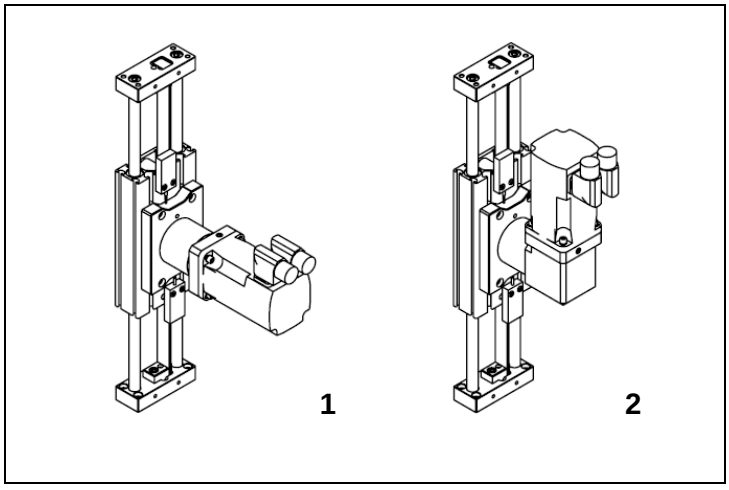
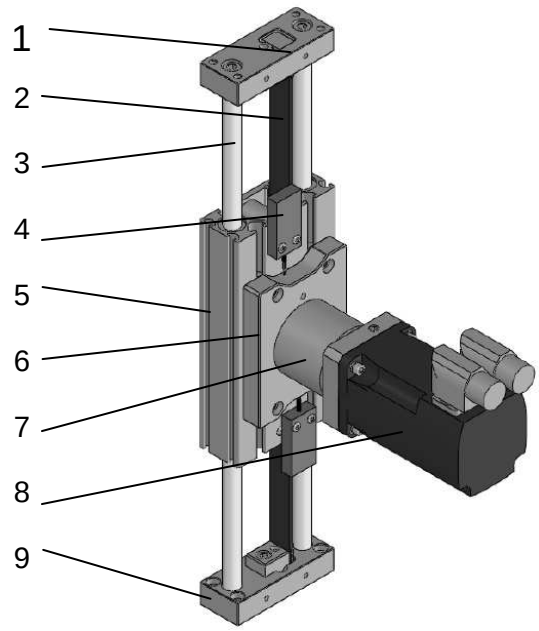


Figure 1.1 Options of motor mounting

(1) Motor mounting straight
(2) Motor mounting with angle gear, rotable 4x 90°

1.2 Product overview

Cantilever axis with Round bar design



axis with belt drive

Figure 1.2 Product overview cantilever axes

1. adjusting block
2. thooted belt
3. guide bar
4. sensor
5. axis body
6. flange plate for adaption motor or gear
7. gearbox
8. motor
9. endplate

1.3 Type code

References *(1)*

To order a Lexium CAS 3 cantilever axis, complete each reference by replacing the "●" *(2)*:

Example: CAS 3 1 B C M 0200 A 1 C R/… rest of the reference on page 27

		CAS 3	●	●	C	M	●●●●	●	1	●	R	/(2)
Size (profile cross-section)	66 x 28 mm		0									/
	80 x 30 mm		1									/
	100 x 40 mm		2									/
	120 x 50 mm		3									/
	160 x 50 mm		4									/
Type of drive for mobile axis structure	Rack (for CAS 30)			R								/
	Toothed belt (for CAS 31, 32, 33, 34)			B								/
Type of guide for mobile axis structure	Ball				C							/
Feed per revolution	50 mm/revolution (for CAS 30)					M						/
	75 mm/revolution (for CAS 31)					M						/
	100 mm/revolution (for CAS 32, 33, 34)					M						/
Stroke	Maximum 150 mm (for CAS 30)						●●●●					/
	Maximum 200 mm (for CAS 31)						●●●●					/
	Maximum 300 mm (for CAS 32)						●●●●					/
	Maximum 400 mm (for CAS 33)						●●●●					/
	Maximum 500 mm (for CAS 34)						●●●●					/
Limit switches	2 sensors with PNP output, NC contact, not connected *(3)*							A				/
	2 sensors with PNP output, NC contact, not connected *(4)*							B				/
	Without sensors							N				/
Type of fixing support *(5)*	Type 1								1			/
Options	Anti-corrosion version (only for CAS 31, 32, 33, 34)									C		/
	With anti-static toothed belt									A		/

If you have questions concerning the type code, contact our sales office.

Designation customized version

In the case of a customized version, the type code contains one or several dollar signs "$".

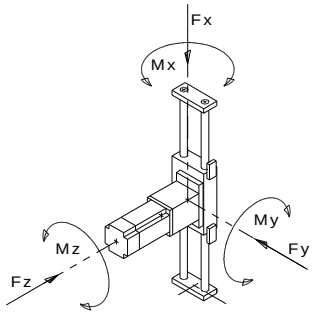
Example: CAS32BCM0100A1

Contact your machine vendor if you have questions concerning customized versions.

2.1 CAS31BC

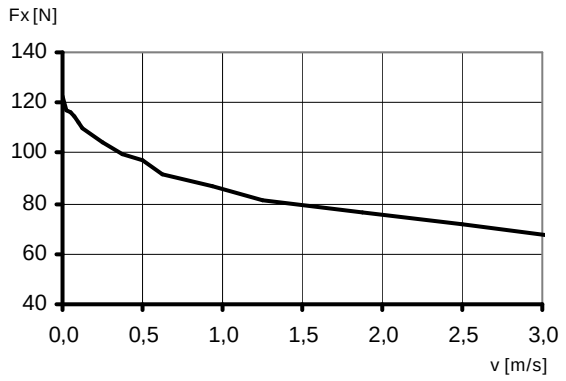
Technical data cantilever axis		CAS31BC
Drive element		Thoothed belt b10T5
Guide type		Round bar (W10)
Payload	kg	3
Carriage type		**Typ3**
Carriage length	mm	100
Feed constant	mm/rev.	75
Effective diameter toothed belt pulleyl	mm	23,873
Maximum feed force Fxmax 1)	N	125
Maximum velocity 2)	m/s	3
Maximum acceleration 2)	m/s^2	20
Maximum driving torque Mmax 1)	Nm	1,5
Breakaway tourque 0 stroke axis	Nm	0,15
Moment of inertia 0 stroke axis	$kgcm^2$	0,9
Moment of inertia per 1 m of stroke	$kgcm^2/m$	1,8
Moment of inertia per 1 kg of payload	$kgcm^2/kg$	1,45
Maximum force Fydynmax 1)	N	210
Maximum force Fzdynmax 1)	N	180
Maximum torque Mydynmax 1)	Nm	6,7
Maximum torque Mzdynmax 1)	Nm	7,8
Maximum torque Mxdynmax 1)	Nm	5,1
Mass 0 stroke axis	kg	1,0
Mass per 1 m of stroke	kg/m	1,3
Moving mass cantilever	kg	0,6
Maximum stroke 3)	mm	200
Minimum stroke 4)	mm	8
Repeatability 2)	mm	± 0,05
Diameter motor shaft	mm	6,35 … 14
Load rating linear guide Cstat	N	520
Load rating linear guide Cdyn	N	590
Service life 5)	km	15000

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves)
2) Load- and stroke-dependent
3) Please inquire for greater stroke
4) Minimum stroke required for lubrication of the linear guide
5) Forces and torques relate to the service life

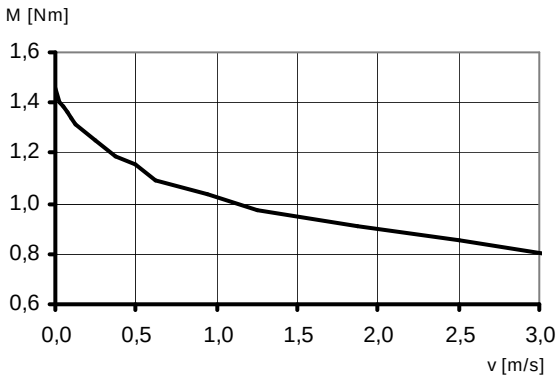


Characteristic curves CAS31BC

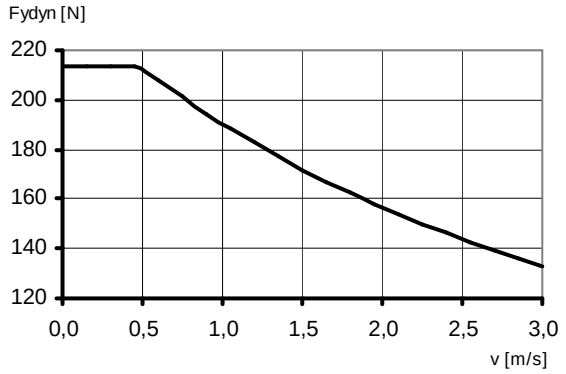
Max. feed force Fx



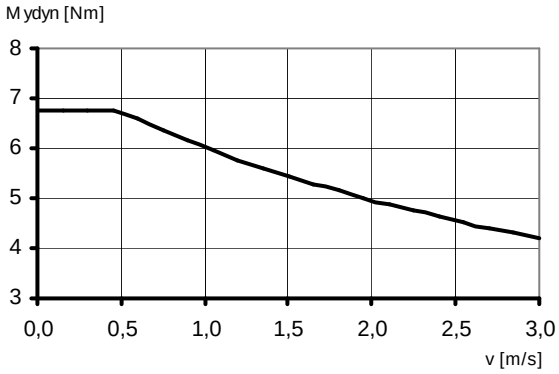
Max. driving torque M_{max}



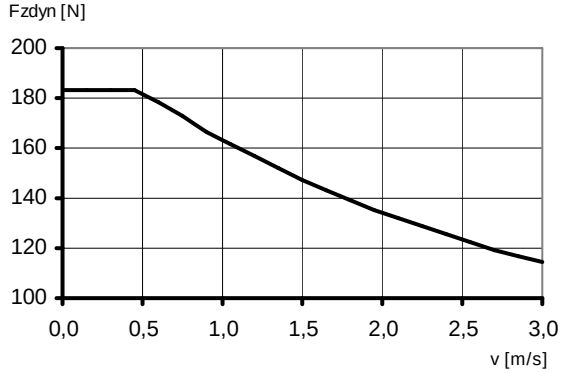
Max. force Fy_{dynmax}



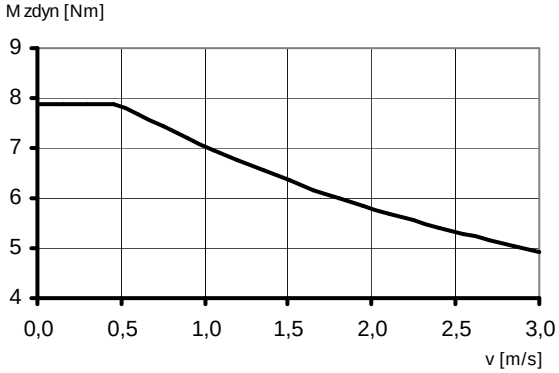
Max. torque carriage My_{dynmax}



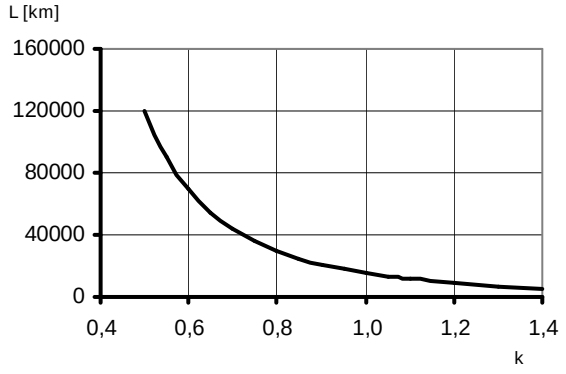
Max. force Fz_{dynmax}



Max. torque carriage Mz_{dynmax}



Service life



Max. torque carriage Mx_{dynmax}

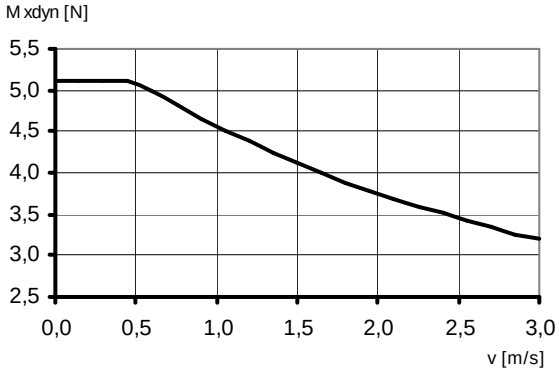
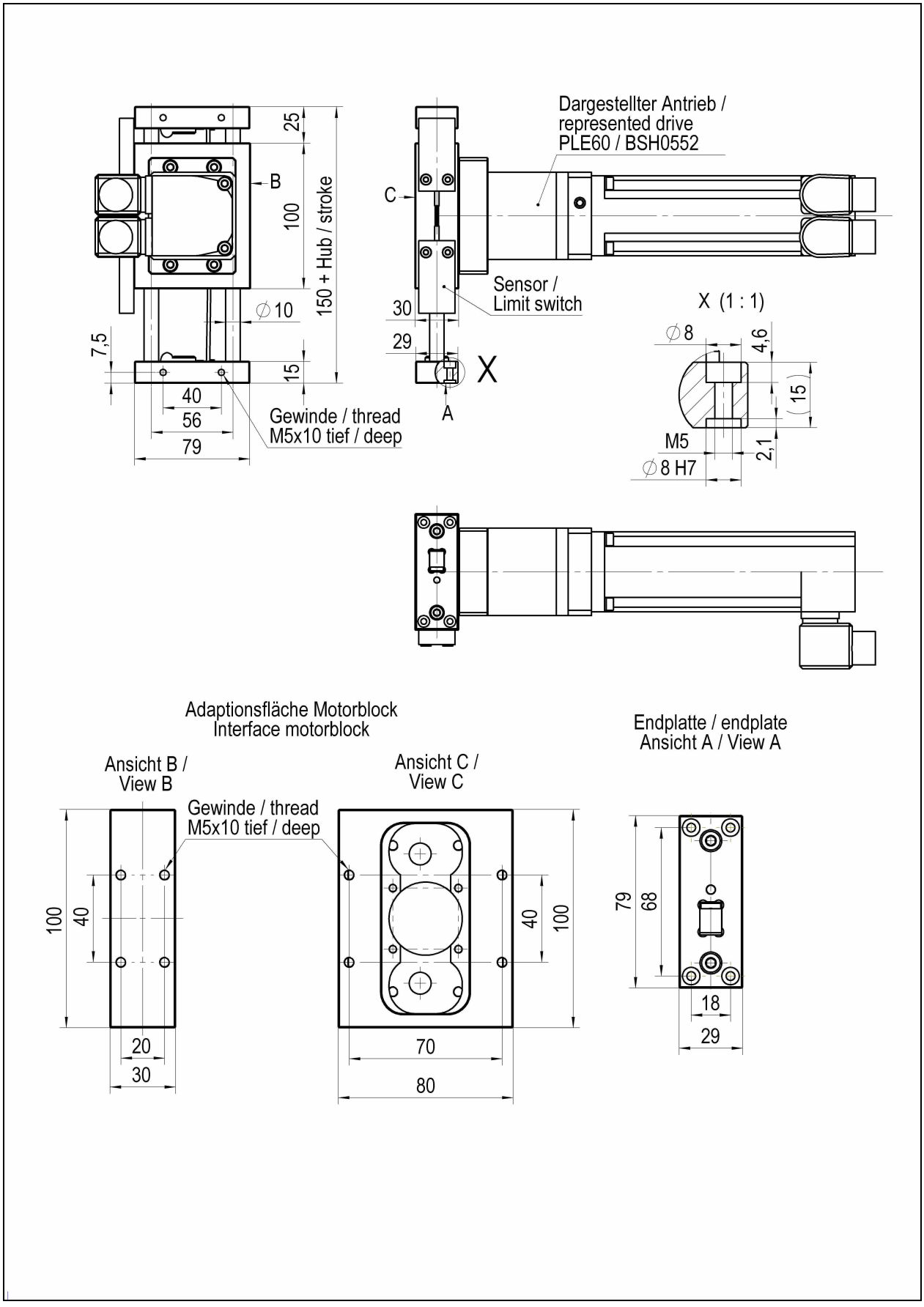


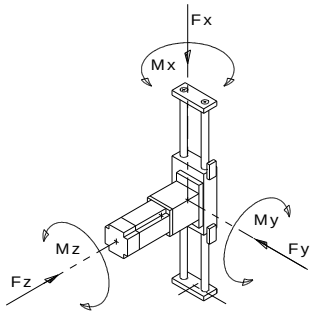
Figure 2.2 Dimensional drawings CAS31BC



2.2 CAS32BC

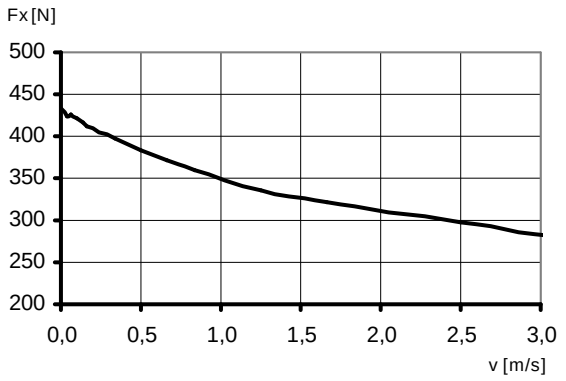
Technical data cantilever axis		CAS32BC
Drive element		Thoothed belt b20AT5
Guide type		Round bar (W14)
Payload	kg	5
Carriage type		**Typ3**
Carriage length	mm	200
Feed constant	mm/rev.	100
Effective diameter toothed belt pulleyl	mm	31,831
Maximum feed force Fxmax 1)	N	435
Maximum velocity 2)	m/s	3
Maximum acceleration 2)	m/s^2	20
Maximum driving torque Mmax 1)	Nm	7,0
Breakaway tourque 0 stroke axis	Nm	0,30
Moment of inertia 0 stroke axis	$kgcm^2$	4,8
Moment of inertia per 1 m of stroke	$kgcm^2/m$	6,3
Moment of inertia per 1 kg of payload	$kgcm^2/kg$	2,55
Maximum force Fydynmax 1)	N	290
Maximum force Fzdynmax 1)	N	250
Maximum torque Mydynmax 1)	Nm	21
Maximum torque Mzdynmax 1)	Nm	25
Maximum torque Mxdynmax 1)	Nm	9
Mass 0 stroke axis	kg	2,8
Mass per 1 m of stroke	kg/m	2,5
Moving mass cantilever	kg	1,7
Maximum stroke 3)	mm	300
Minimum stroke 4)	mm	10
Repeatability 2)	mm	± 0,05
Diameter motor shaft	mm	12 … 20
Load rating linear guide Cstat	N	760
Load rating linear guide Cdyn	N	830
Service life 5)	km	15000

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves)
2) Load- and stroke-dependent
3) Please inquire for greater stroke
4) Minimum stroke required for lubrication of the linear guide
5) Forces and torques relate to the service life

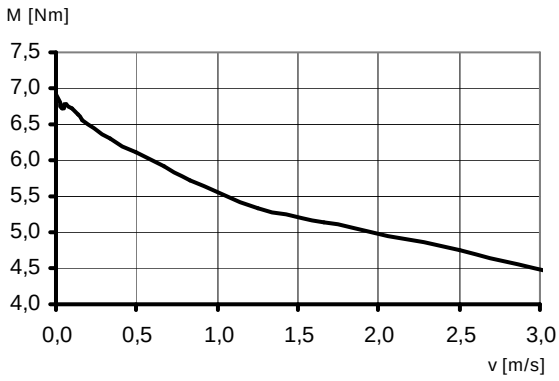


Characteristic curves CAS32BC

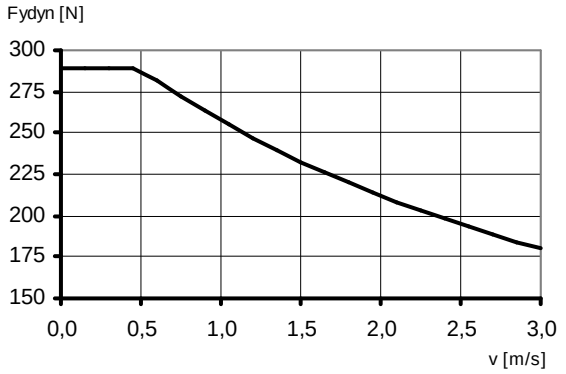
Max. feed force Fx



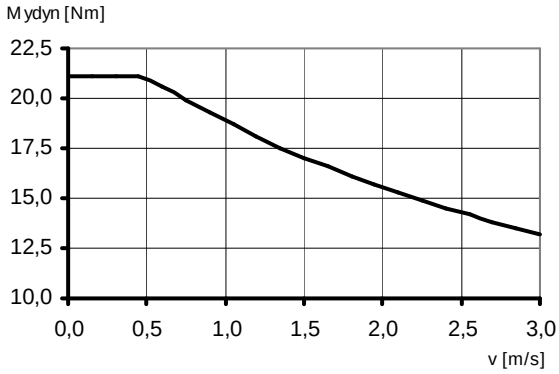
Max. driving torque M_{max}



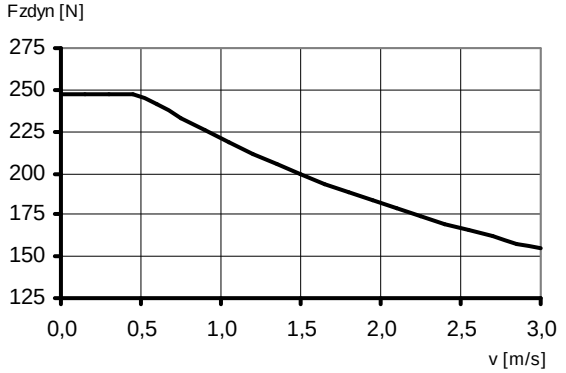
Max. force Fy_{dynmax}



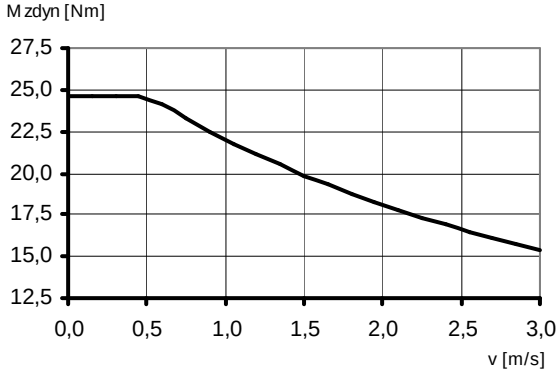
Max. torque carriage My_{dynmax}



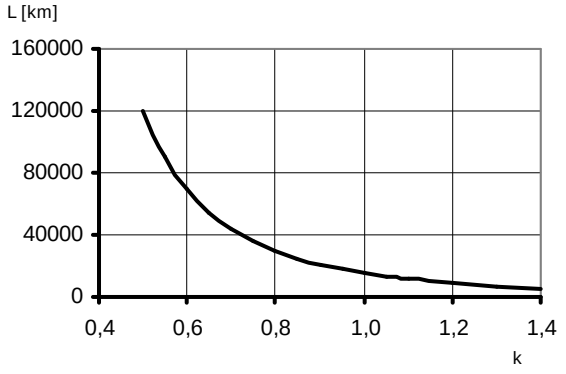
Max. force Fz_{dynmax}



Max. torque carriage Mz_{dynmax}



Service life



Max. torque carriage Mx_{dynmax}

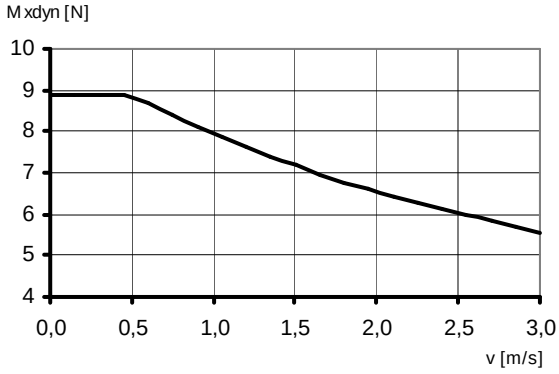
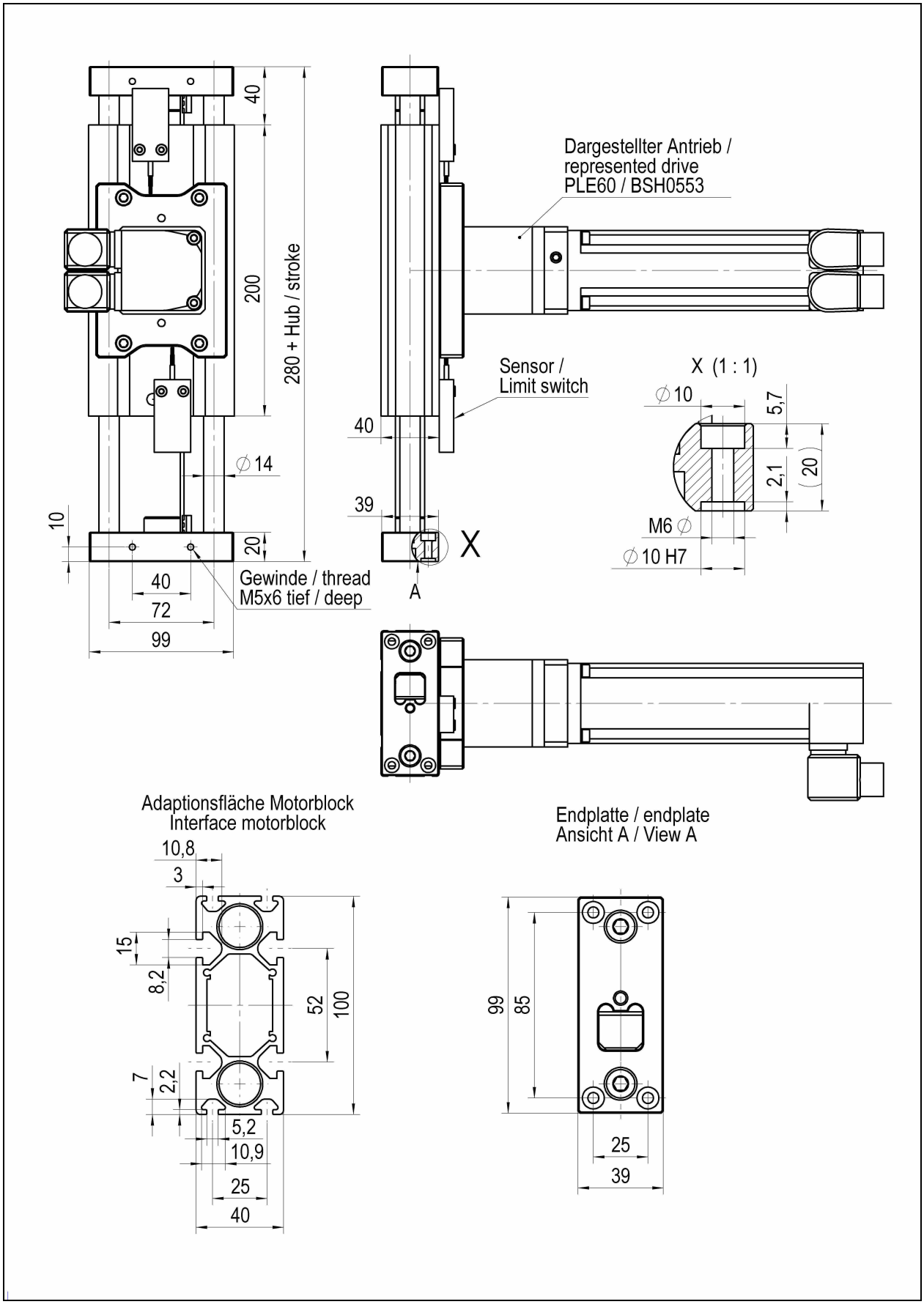


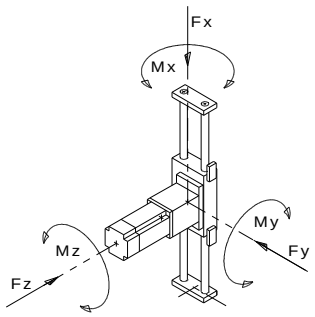
Figure 2.3 Dimensional drawings CAS32BC



2.4 CAS33BC

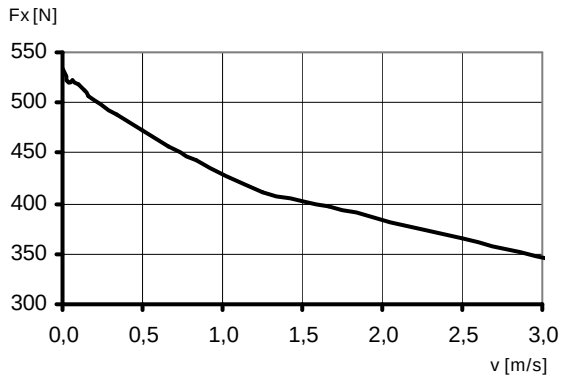
Technical data cantilever axis		CAS33BC
Drive element		Thoothed belt b25AT5
Guide type		Round bar (W20)
Payload	kg	10
Carriage type		**Typ3**
Carriage length	mm	200
Feed constant	mm/rev.	100
Effective diameter toothed belt pulleyl	mm	31,831
Maximum feed force Fxmax 1)	N	535
Maximum velocity 2)	m/s	3
Maximum acceleration 2)	m/s^2	20
Maximum driving torque Mmax 1)	Nm	8,5
Breakaway tourque 0 stroke axis	Nm	0,45
Moment of inertia 0 stroke axis	$kgcm^2$	9,1
Moment of inertia per 1 m of stroke	$kgcm^2/m$	12,6
Moment of inertia per 1 kg of payload	$kgcm^2/kg$	2,55
Maximum force Fydynmax 1)	N	460
Maximum force Fzdynmax 1)	N	400
Maximum torque Mydynmax 1)	Nm	34
Maximum torque Mzdynmax 1)	Nm	39
Maximum torque Mxdynmax 1)	Nm	16
Mass 0 stroke axis	kg	4,4
Mass per 1 m of stroke	kg/m	5,0
Moving mass cantilever	kg	3,2
Maximum stroke 3)	mm	400
Minimum stroke 4)	mm	12
Repeatability 2)	mm	± 0,05
Diameter motor shaft	mm	12 … 20
Load rating linear guide Cstat	N	1010
Load rating linear guide Cdyn	N	1170
Service life 5)	km	15000

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves)
2) Load- and stroke-dependent
3) Please inquire for greater stroke
4) Minimum stroke required for lubrication of the linear guide
5) Forces and torques relate to the service life

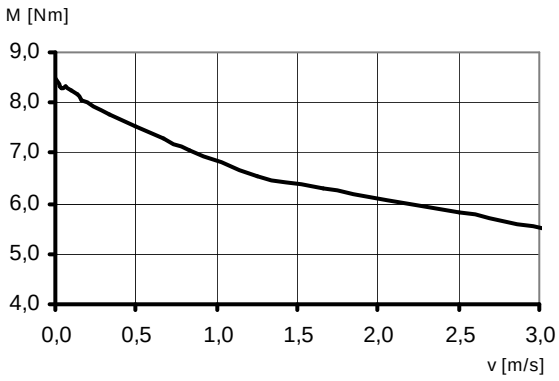


Characteristic curves CAS33BC

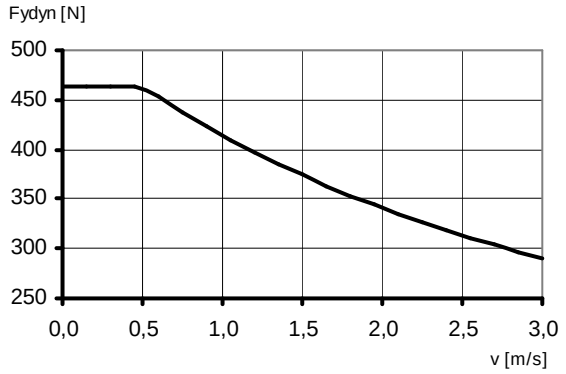
Max. feed force Fx



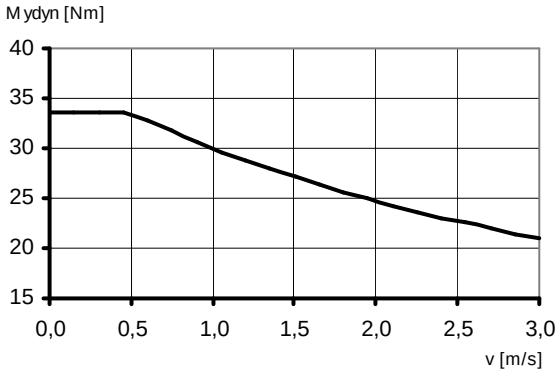
Max. driving torque M_{max}



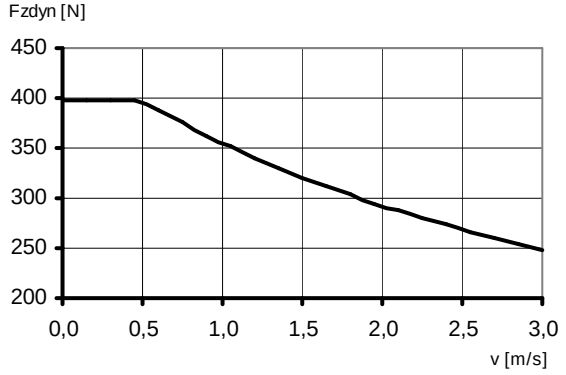
Max. force Fy_{dynmax}



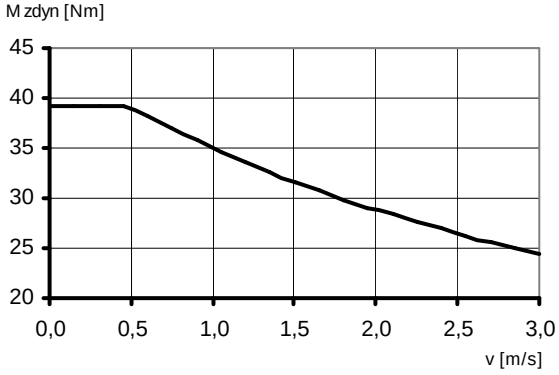
Max. torque carriage My_{dynmax}



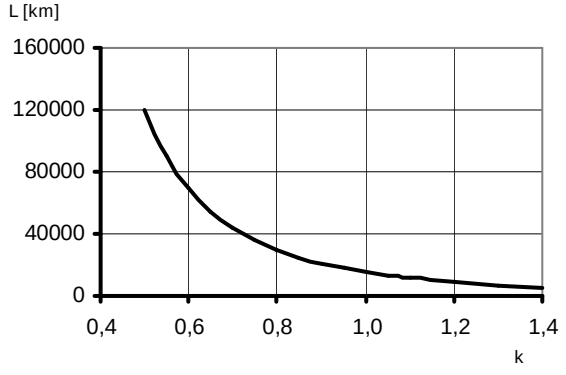
Max. force Fz_{dynmax}



Max. torque carriage Mz_{dynmax}



Service life



Max. torque carriage Mx_{dynmax}

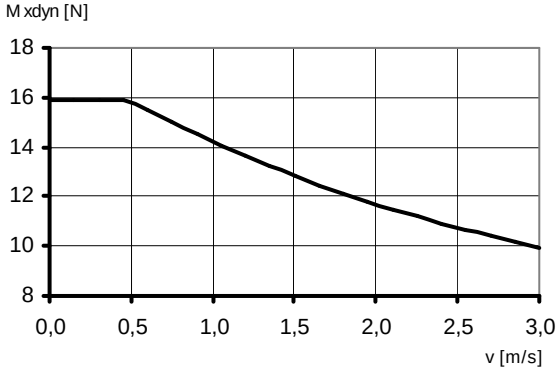
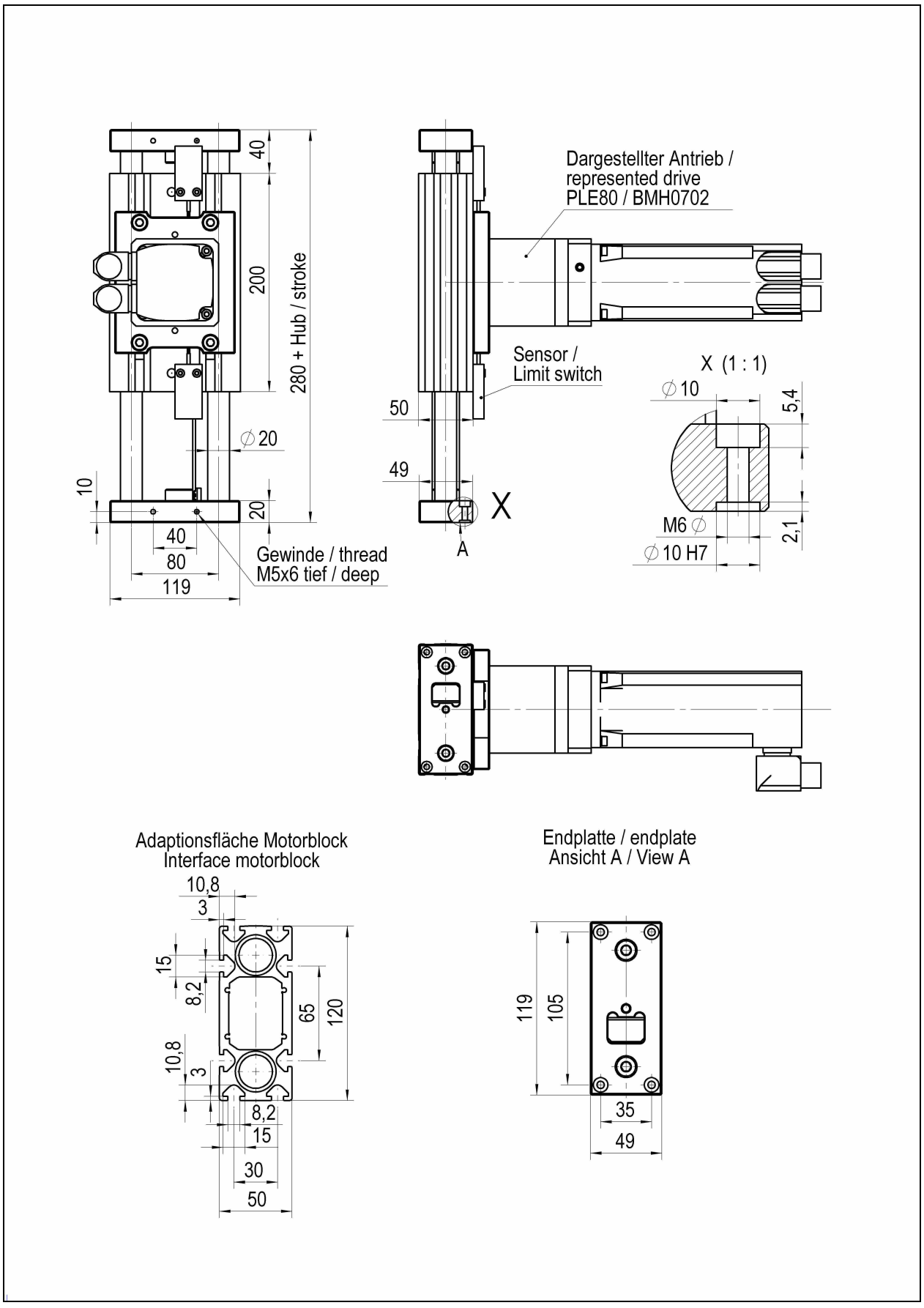


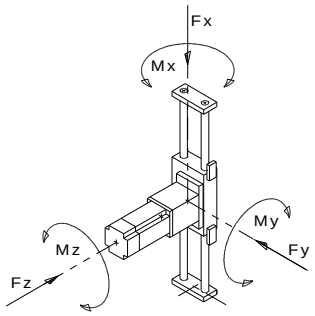
Figure 2.4 Dimensional drawings CAS33BC



2.5 CAS34BC

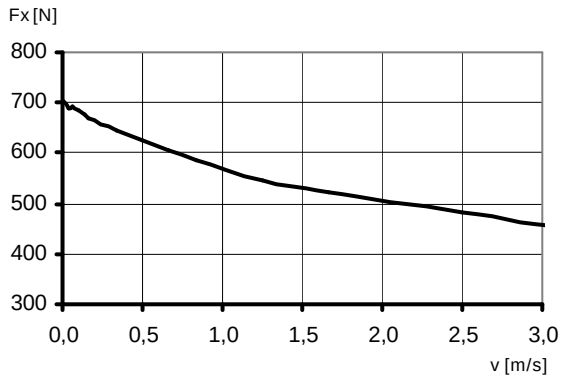
Technical data cantilever axis		CAS34BC
Drive element		Thoothed belt b32AT5
Guide type		Round bar (W25)
Payload	kg	18
Carriage type		**Typ3**
Carriage length	mm	250
Feed constant	mm/rev.	100
Effective diameter toothed belt pulleyl	mm	31,831
Maximum feed force Fxmax 1)	N	705
Maximum velocity 2)	m/s	3
Maximum acceleration 2)	m/s^2	20
Maximum driving torque Mmax 1)	Nm	11,5
Breakaway tourque 0 stroke axis	Nm	0,60
Moment of inertia 0 stroke axis	$kgcm^2$	11,4
Moment of inertia per 1 m of stroke	$kgcm^2/m$	12,2
Moment of inertia per 1 kg of payload	$kgcm^2/kg$	2,55
Maximum force Fydynmax 1)	N	950
Maximum force Fzdynmax 1)	N	820
Maximum torque Mydynmax 1)	Nm	85
Maximum torque Mzdynmax 1)	Nm	100
Maximum torque Mxdynmax 1)	Nm	45
Mass 0 stroke axis	kg	5,9
Mass per 1 m of stroke	kg/m	4,8
Moving mass cantilever	kg	4,0
Maximum stroke 3)	mm	500
Minimum stroke 4)	mm	14
Repeatability 2)	mm	± 0,05
Diameter motor shaft	mm	12 … 20
Load rating linear guide Cstat	N	2130
Load rating linear guide Cdyn	N	2420
Service life 5)	km	15000

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves)
2) Load- and stroke-dependent
3) Please inquire for greater stroke
4) Minimum stroke required for lubrication of the linear guide
5) Forces and torques relate to the service life

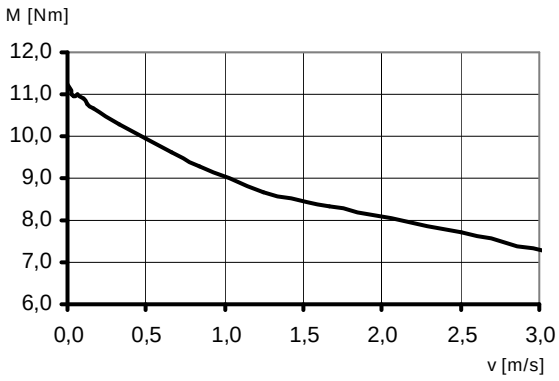


Characteristic curves CAS34BC

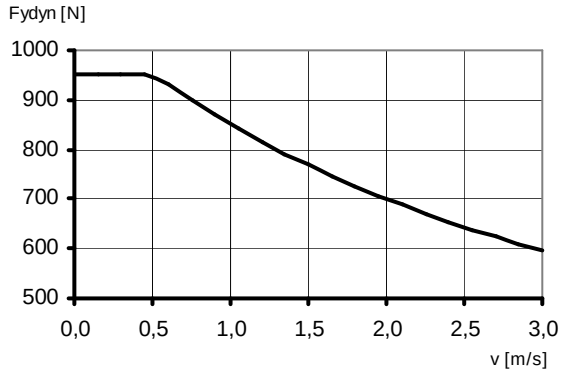
Max. feed force Fx



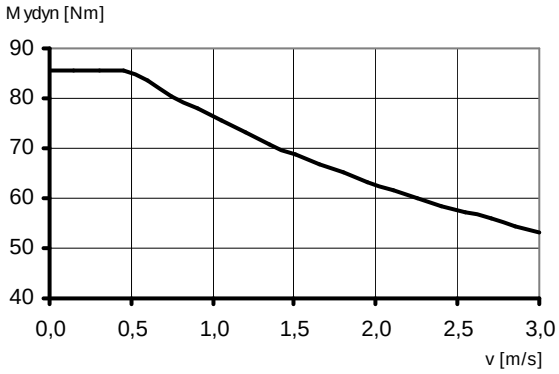
Max. driving torque M_{max}



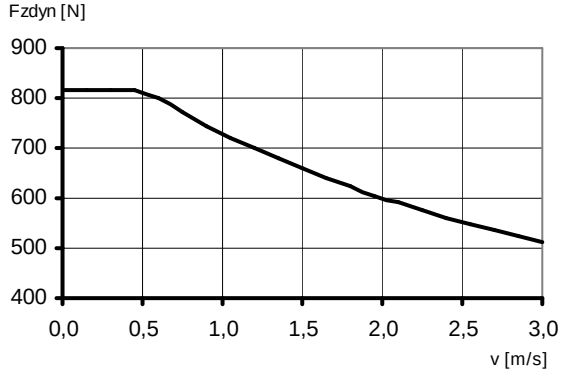
Max. force Fy_{dynmax}



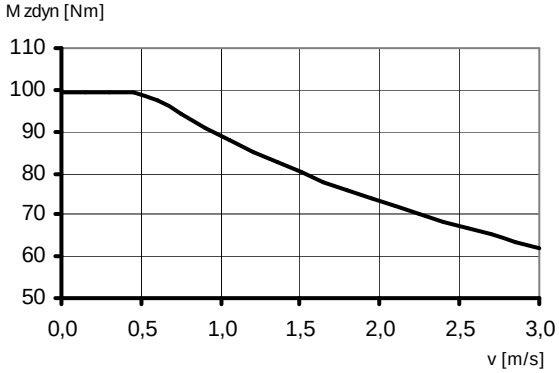
Max. torque carriage My_{dynmax}



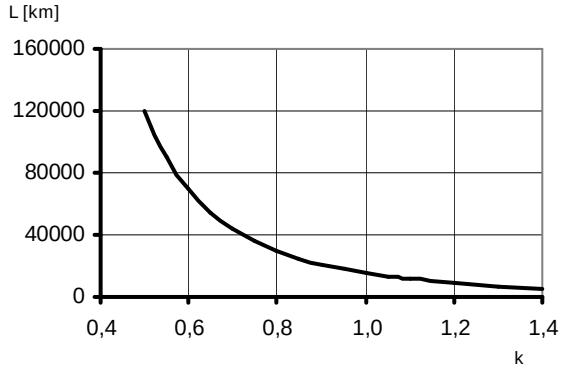
Max. force Fz_{dynmax}



Max. torque carriage Mz_{dynmax}



Service life



Max. torque carriage Mx_{dynmax}

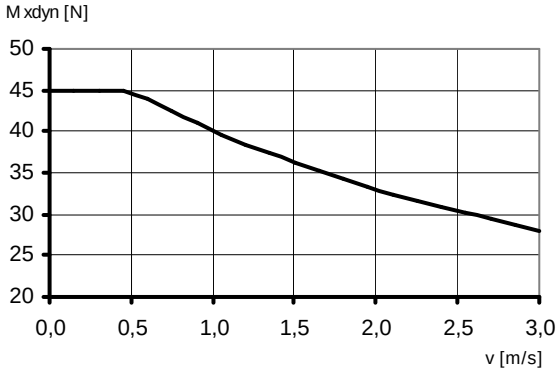
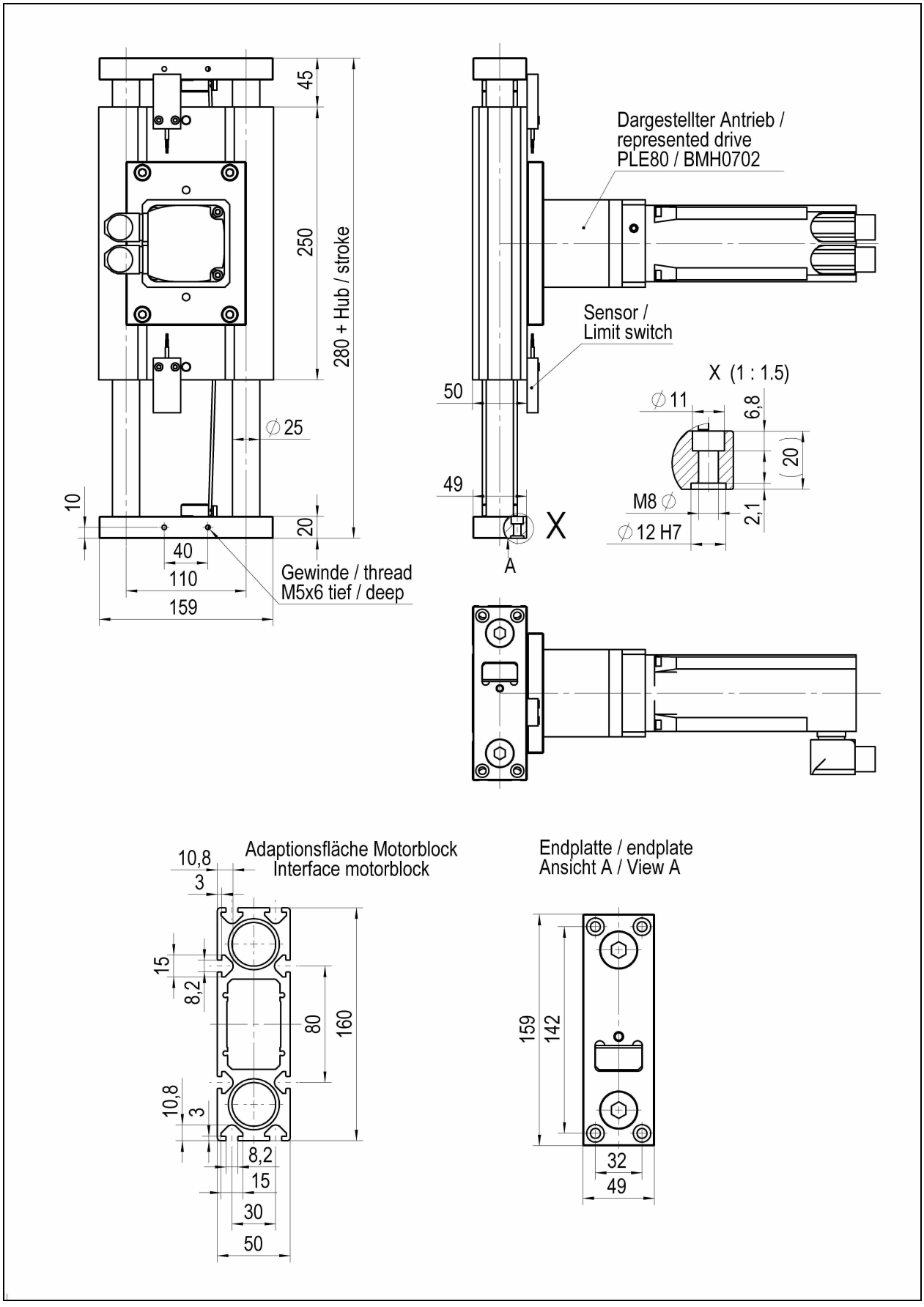


Figure 2.5 Dimensional drawings CAS34BC



2.6 Service life

The service life of the product is a function of the mean forces and torques that act in the system. If multiple forces and torques act simultaneously, use the following formula to calculate the load k.

$$\frac{Fy}{Fymax} + \frac{Fz}{Fzmax} + \frac{Mx}{Mxmax} + \frac{My}{Mymax} + \frac{Mz}{Mzmax} = k$$

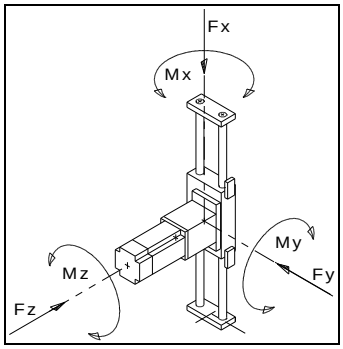


Figure 3.4 Forces and torques

The service life of the axis (in km) can be approximated using the load factor and the service life - load characteristic curve.

The application-specific load values appear in the numerator.

The numerator contains the maximum permissible forces and torques. These forces and torques decrease at increasing velocities, see characteristic curves in chapter 3

2.7 Positioning accuracy and repeatability

2.7.1 Positioning accuracy

The positioning accuracy describes the positioning deviation of the linear axis that is allowed for a positioning move to a set position.
The positioning accuracy is influenced by the following factors:

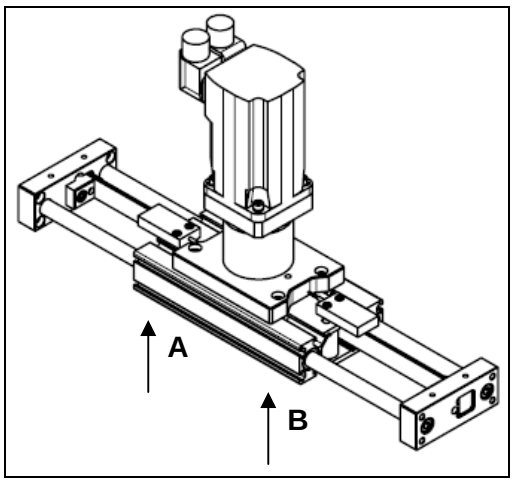
- The mechanics – manufacturing tolerances,
- The drive – motor resolution, closed loop circuit,..
- The motion profile – steep deceleration ramps, high speed,.
- Heat – environmental heat, internal friction heat

2.8 Preparing installation

The linear axis is a precision product and must be handled with care. shocks and impacts may damage the guides.
They may lead to reduced running accuracy and reduced service life. This may cause inaccuracies and even premature failure.

Transport the product in its packaging as close as possible to the installation site. Do not remove the packaging until the product is at the installation site.

The linear axis may only be lifted at points A and B. (see figure)
The motor must not be used to lift the load.



2.8.1 Mounting the linear axis

The base of the linear axis CAS30 and CAS31 consists of an aluminum body that is manufactured with precise CNC-machines. The axis-body can be mounted to a stable frame by means of several threads, that are located on both sides.

The base of the linear axis CAS32, CAS33 and CAS34 consists of an extruded aluminum-precision profile. T-slots are located on the small two sides of the profile. The T-slots offer ideal mounting and integration possibilities.

Only mount the linear axis using the T slots at the axis body.
To do so, use slot nuts.

A selection of suitable slot nuts can be found in chapter "7 Accessories and spare parts".

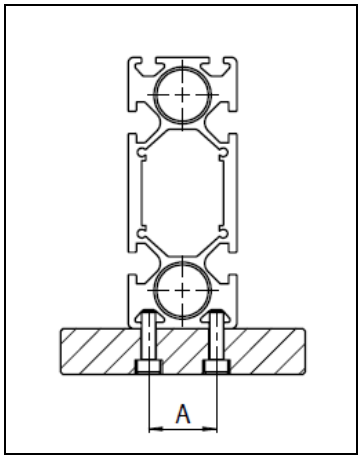


Figure 4.1 Fastening by slot nuts from the small side

Tapped hole distance 1)		**CAS32**	**CAS33**	**CAS34**
A	[mm]	25	30	30
T slot size	[mm]	5	8	8
Screw size		M5	M6 / M8	M6 / M8

1) Tapped hole distance CAS30 und CAS31 see dimensional drawings Chapter 3.2 / 3.3

Note:
- Use at least 4 or 6 fixing points at one side of the body to have a good stability.

2.9 Maintenance

The maintenance intervals for cleaning and lubrication must be adhered to:

► Include the maintenance intervals in your maintenance schedule.

2.9.1 Cleaning

Due to its design, the product is not susceptible to the ingress of contaminants and external objects.

The product must be checked and cleaned at regular intervals.

► Do not use compressed air for cleaning.

► Remove large particles and dirt from the surface at regular intervals.

► The anodized surface only has a limited resistance to alkaline cleaning agents. Therefore, use only neutral cleaning agents for cleaning.

► Use only damp, soft and lint-free cleaning cloths to wipe the surface.

2.9.2 Timing belt pre tensioning

Normally the timing belt is maintenance free and factory adjusted with the correct belt tension.

Note the following information on tensioning the belt:

- The belt tension must be so high that the belt is still tensioned under maximum operating load.
- If the tension is not high enough, this may lead to jumping. If the belt tension is too high, this increases the load on the bearings and reduces the service life.
- During the first hours of operation, the belt tension decreases. The belt tension must be checked after 50 operating hours.
- Due to pitch and rigidity tolerances of the toothed belt, the newly adjusted belt tension may differ from the originally adjusted belt tension.

Contact your local sales office if you have questions concerning the vibration measurement.