

CAS4xB

Cantilever axis

Product manual

V2.05, 03.2015



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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information



Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Hazard categories

Safety instructions to the user are highlighted by safety alert symbols in the manual. In addition, labels with symbols and/or instructions are attached to the product that alert you to potential hazards.

Depending on the seriousness of the hazard, the safety instructions are divided into 4 hazard categories.

DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

NOTICE

NOTICE indicates a potentially hazardous situation, which, if not avoided, **can result** in equipment damage.

Qualification of personnel

Only appropriately trained persons who are familiar with and understand the contents of this manual and all other pertinent product documentation are authorized to work on and with this product. In addition, these persons must have received safety training to recognize and avoid hazards involved. These persons must have sufficient technical training, knowledge and experience and be able to foresee and detect potential hazards that may be caused by using the product, by changing the settings and by the mechanical, electrical and electronic equipment of the entire system in which the product is used.

All persons working on and with the product must be fully familiar with all applicable standards, directives, and accident prevention regulations when performing such work.

Intended use

This product is a linear axis and intended for industrial use according to this manual.

The product may only be used in compliance with all applicable safety regulations and directives, the specified requirements and the technical data.

Prior to using the product, you must perform a risk assessment in view of the planned application. Based on the results, the appropriate safety measures must be implemented.

Since the product is used as a component in an entire system, you must ensure the safety of persons by means of the design of this entire system (for example, machine design).

Operate the product only with the specified cables and accessories. Use only genuine accessories and spare parts.

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere.

DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

Any use other than the use explicitly permitted is prohibited and can result in hazards.

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.

Basic information

High voltages may be present at the motor connection. The motor itself generates voltage when the motor shaft is rotated. AC voltage can couple voltage to unused conductors in the motor cable.

DANGER

ELECTRIC SHOCK

- Verify that no voltage is present (this includes the DC bus capacitors) prior to performing any type of work on the drive system.
- Block the motor shaft to prevent rotation prior to performing any type of work on the drive system.
- Insulate both ends of unused conductors of the motor cable.
- Supplement the motor cable grounding conductor with an additional protective ground conductor to the motor housing.
- Verify compliance with all local and national electrical code requirements as well as all other applicable regulations with respect to grounding of all equipment.

Failure to follow these instructions will result in death or serious injury.

WARNING

GREAT MASS OR FALLING PARTS

- Use a suitable crane or other suitable lifting gear for mounting the product if this is required by the mass of the product.
- Use the necessary personal protective equipment (for example, safety shoes, safety glasses and protective gloves).
- Mount the product in such a way (tightening torque, securing screws) that parts cannot come loose, even in the case of shocks and vibration.
- Take all necessary measures to avoid unanticipated movements of linear axes mounted in vertical or tilted positions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING**LOSS OF CONTROL**

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop, overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical functions.
- System control paths may include communication links. Consideration must be given to the implication of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.¹⁾
- Each implementation of the product must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

1) For USA: Additional information, refer to NEMA ICS 1.1 (latest edition), "Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control" and to NEMA ICS 7.1 (latest edition), "Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems".

Standards and terminology

Technical terms, terminology and the corresponding descriptions in this manual are intended to use the terms or definitions of the pertinent standards.

In the area of drive systems, this includes, but is not limited to, terms such as "safety function", "safe state", "fault", "fault reset", "failure", "error", "error message", "warning", etc.

Among others, these standards include:

- IEC 61800 series: "Adjustable speed electrical power drive systems"
- IEC 61158 series: "Digital data communications for measurement and control – Fieldbus for use in industrial control systems"
- IEC 61784 series: "Industrial communication networks – Profiles"
- IEC 61508 series: "Functional safety of electrical/electronic/programmable electronic safety-related systems"

In addition, the term "zone of operation" is used in conjunction with the description of specific hazards, and is defined as it is for a "hazard zone" or "danger zone" in the EC Machinery Directive (2006/42/EC) and in ISO 12100-1.

Also see the glossary at the end of this manual.

About the book



This manual is valid for CASxB standard products. Chapter "1 Introduction" lists the type code for this product. The type code allows you to identify whether your product is a standard product or a customized version.

Source manuals The latest versions of the manuals can be downloaded from the Internet at:

<http://www.schneider-electric.com>

Source CAD data For easier engineering, CAD data (drawings or EPLAN macros) are available for download from the Internet at:

<http://www.schneider-electric.com>

Work steps If work steps must be performed consecutively, this sequence of steps is represented as follows:

- Special prerequisites for the following work steps
- ▶ Step 1
- ◁ Specific response to this work step
- ▶ Step 2

If a response to a work step is indicated, this allows you to verify that the work step has been performed correctly.

Unless otherwise stated, the individual steps must be performed in the specified sequence.

Making work easier Information on making work easier is highlighted by this symbol:



Sections highlighted this way provide supplementary information on making work easier.

SI units Technical data are specified in SI units. Converted units are shown in parentheses behind the SI unit; they may be rounded.

Example:

Minimum conductor cross section: 1.5 mm² (AWG 14)

Glossary Explanations of special technical terms and abbreviations.

Index List of keywords with references to the corresponding page numbers.

1 Introduction

1.1 Overview of product properties

The toothed belt axes excel with outstanding flexibility in terms of motor mounting as well as numerous options such as roller guide or recirculating ball bearing guide. The toothed belt axes lend themselves for dynamic positioning of loads over short and long distances.

1.1.1 Product family

The linear axes product family consists of the following sizes:

- CAS41B - cross section axis body 40 x 40 mm (1.57 x 1.57 in)
- CAS42B - cross section axis body 60 x 60 mm (2.36 x 2.36 in)
- CAS43B - cross section axis body 80 x 80 mm (3.15 x 3.15 in)
- CAS44B - cross section axis body 110 x 110 mm (4.33 x 4.33 in)

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

1.1.2 Features and options of the linear axis

The linear axis provides the following features and options:

- Different stroke lengths available
- Mounting threads with counterbores for locating dowels at the end plates for reproducible mounting of the payload
- Grease nipples at the side of the carriage for external lubrication
- Contact plate for sensors adjustable in T slots
- Motor mounting via compact coupling system
- The cover strip and the wiper in the carriage further help to keep pollution, chips, dust and foreign objects away from the linear guide inside the axis
- Options
 - Antistatic toothed belt
 - Increased corrosion resistance, see "2.2 Information on increased corrosion resistance"
 - Cover strip and wiper in the carriage
 - Sensors as normally open contacts / normally closed contacts and NPN/ PNP version

1.1.3 Characteristics of the linear guide

- | | |
|---|---|
| <i>Roller guide</i> | <ul style="list-style-type: none">• High velocity• Smooth operation• Low-noise operation |
| <i>Recirculating ball bearing guide</i> | <ul style="list-style-type: none">• High acceleration• High payload• High torque load• High accuracy• Long service life |

1.1.4 Motor mounting

The motor or the gearbox are coupled by means of a preloaded elastomer coupling.

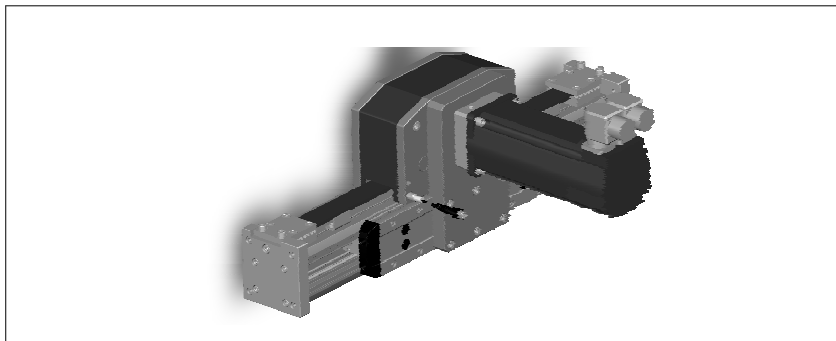


Figure 1: Motor mounting

1.2 Product overview

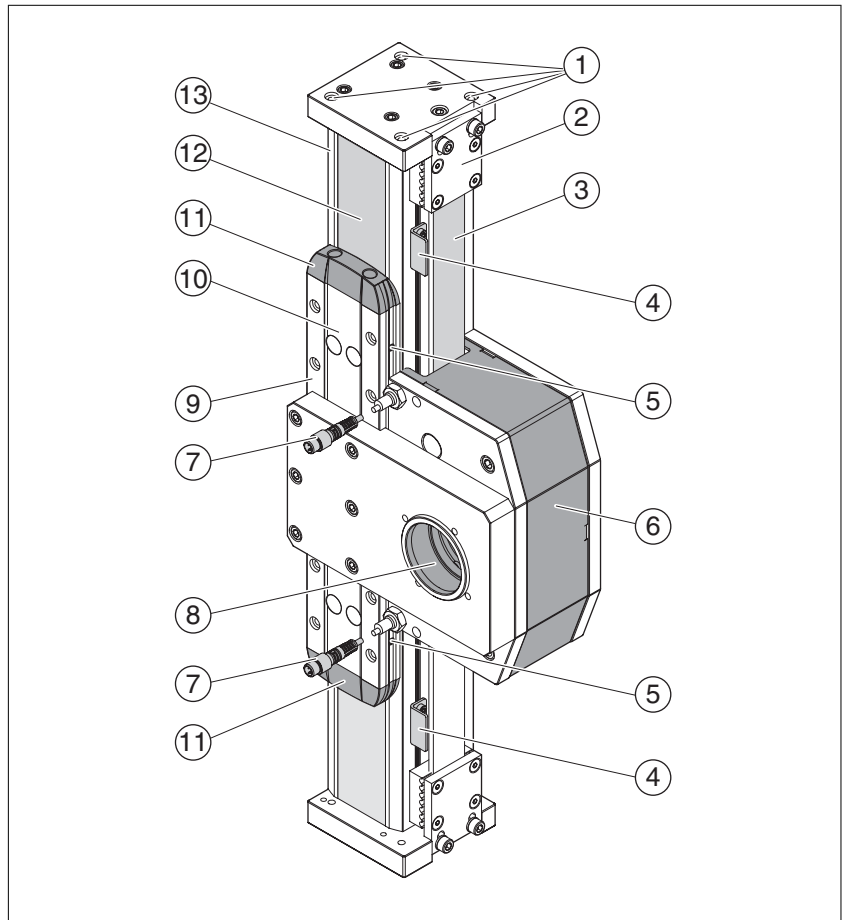


Figure 2: Product overview

- (1) Threads for fastening the payload
- (2) Belt tensioner
- (3) Toothed belt
- (4) Contact plates for sensors
- (5) Grease nipples, 2 pieces
- (6) Housing cover
- (7) Sensors with cable and connector
- (8) Hollow shaft for elastomer coupling or shaft extension
- (9) Carriage
- (10) Strip deflection
- (11) Rubber buffer
- (12) Cover strip
- (13) Axis body

1.3 Nameplate

The nameplate contains the following data:

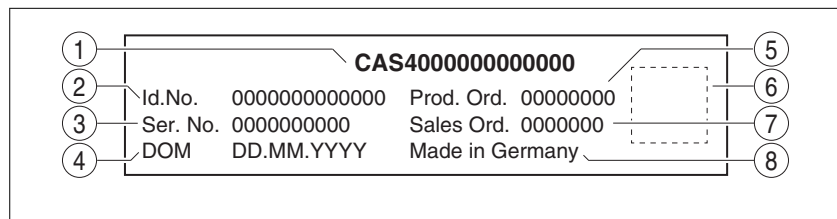


Figure 3: Nameplate

- (1) Axis type, see type code
- (2) Identification number
- (3) Serial number
- (4) Date of manufacture
- (5) Production number
- (6) Data matrix code
- (7) Order number
- (8) Country of manufacture

1.4 Type code

	CAS4	1	B	R	M	0300	A	3	B	R
Product designation CAS4 = Cantilever axis										
Size - cross section axis body 1 = 40 x 40 mm (1.57 x 1.57 in) 2 = 60 x 60 mm (2.36 x 2.36 in) 3 = 80 x 80 mm (3.15 x 3.15 in) 4 = 110 x 110 mm (4.33 x 4.33 in)										
Drive element B = Toothed belt										
Guide type R = Roller guide (sizes 1, 2, 3) B = Recirculating ball bearing guide (sizes 2, 3, 4)										
Feed per revolution M = 84 mm (3.31 in) for size 1, M = 155 mm (6.10 in) for size 2, M = 205 mm (8.07 in) for size 3, M = 264 mm (10.39 in) for size 4										
Stroke xxxx = in mm (maximum stroke per size see Technical Data)										
Limit switch ¹⁾ A = 2 x PNP sensors as normally closed contacts, not wired C = 2 x PNP sensors as normally open contacts, not wired E = 2 x NPN sensors as normally closed contacts, not wired G = 2 x NPN sensors as normally open contacts, not wired N = No sensors, no contact plate										
Carriages (all driven) 3 = Type 3										
Options N = Without B = With cover strip C = Increased corrosion resistance, with cover strip A = Antistatic toothed belt, without cover strip A = Increased corrosion resistance, antistatic toothed belt, without cover strip L = Antistatic toothed belt, with cover strip										
Drive interface R = With H = Without (hollow shaft)										

1) Cable length 100 mm (3.94 in), connector at one cable end, other versions and extension cables as accessories.

CAS4 1B R M 0300 A 3 B R /	2	1G	0	H7	0
Motor / gearbox interface (see Figure 4)					
1 = Motor only					
2 = Motor and gearbox					
3 = Gearbox only					
4 = Without motor, without gearbox, with adaptation material (select motor/gearbox type)					
X = Without motor, without gearbox					
Gearbox interface					
0G = Planetary gear - PLE 40					
1G = Planetary gear - PLE 60					
3G = Planetary gear - PLE 80					
5G = Planetary gear - PLE 120					
0A = Planetary gear - WPLE 40					
1A = Planetary gear - WPLE 60					
3A = Planetary gear - WPLE 80					
5A = Planetary gear - WPLE 120					
YY = Third-party gearbox without mounting by Schneider Electric (gearbox drawing required)					
ZZ = Third-party gearbox with mounting by Schneider Electric (gearbox must be provided)					
XX = No gearbox					
Mounting direction gearbox					
(with clamping hub mounting screw of adapter plate)					
3 = 0°					
0 = 90°					
9 = 180°					
6 = 270°					
X = No gearbox					
Motor interface					
V8 = Stepper motors BRS 368					
V9 = Stepper motors BRS 397, 39A					
V0 = Stepper motors BRS 39B					
V1 = Stepper motors BRS 3AC, 3AD					
I6 = Integrated drive with stepper motor ILS•• 571, 572					
I7 = Integrated drive with stepper motor ILS•• 573					
I9 = Integrated drive with stepper motor ILS•• 851, 852					
I8 = Integrated drive with stepper motor ILS•• 853					
E7 = Integrated drive with brushless DC motor ILE•• 66 with spur wheel gear					
A6 = Integrated drive with servo motor ILA•• 57					
H5 = Servo motors BSH/SH3 055					
H7 = Servo motors BSH/BMH/MH3/SH3/ILM 0701, 0702					
H8 = Servo motors BSH/BMH/MH3/SH3/ILM 0703					
H1 = Servo motors BSH/BMH/MH3/SH3/ILM 1001, 1002, 1003					
H4 = Servo motors BSH 10040.63					
H2 = Servo motors BSH/BMH/MH3/SH3/ILM 1401, 1402, 1403					
YY = Third-party motor without mounting by Schneider Electric (motor drawing required)					
ZZ = Third-party motor with mounting by Schneider Electric (motor drawing required; motor must be provided)					
XX = No motor					
Mounting direction motor with reference to motor connection					
(with clamping hub mounting screw of adapter plate)					
3 = 0°					
0 = 90°					
9 = 180°					
6 = 270°					
X = No motor					

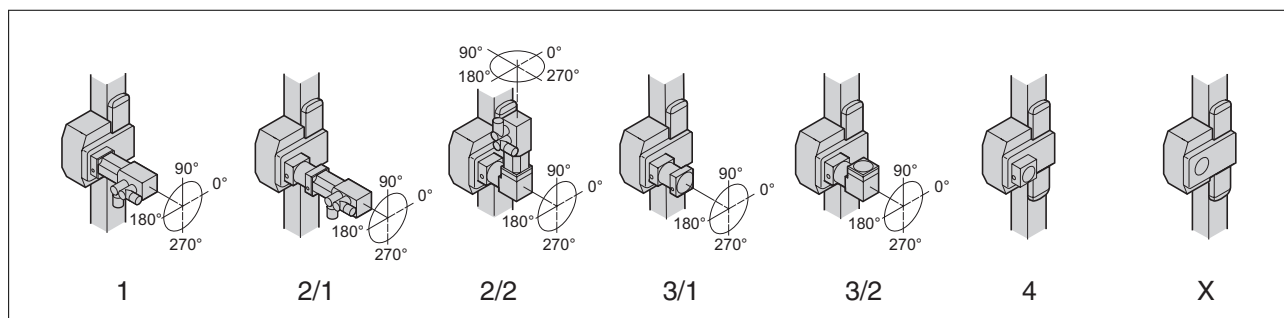


Figure 4: Mounting direction motor and gearbox

If you have questions concerning the type code, contact your Schneider Electric sales office.

Designation customized version

In the case of a customized version, the type code contains one or several dollar signs "\$". Example: CAS42BR\$0600C3NBR/23G0V90

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

1.5 Declaration of Incorporation

Einbauerklärung

gemäß EG-Maschinenrichtlinie 2006/42/EG (Anhang II Teil B)

- Original -

Dokumentnummer / Monat.Jahr: 1000000143_01 / 03.2013

**Wir: Schneider Electric industries SA****35, rue Joseph Monier / 92506 Rueil Malmaison , France**

erklären hiermit, dass die nachstehend bezeichnete, unvollständige Maschine

Handelsmarke	Schneider Electric
Produktbenennung	Auslegerachse mit Zahnriemenantrieb
Bauform / Type	CAS41x, CAS42x, CAS43x, CAS44x
Seriennummer	73xx xxxx xxx

in der Kombination von Achstyp und Motortyp allen grundlegenden Anforderungen der Maschinenrichtlinie 2006/42/EG (Anhang II Teil B) entspricht, soweit das der Lieferumfang erlaubt. Zusätzlich erklären wir, dass die speziellen technischen Unterlagen nach Anhang VII Teil B erstellt wurden.

Richtlinie	Anforderungen	Normen
RICHTLINIE 2006/42/EG DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 17. Mai 2006 über Maschinen und zur Änderung der Richtlinie 95/16/EG (Neufassung)	1.1.1, 1.1.2, 1.1.3 1.1.5, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.5.4, 1.5.7, 1.5.8, 1.5.9, 1.5.10, 1.5.11, 1.5.13, 1.7.1.1, 1.7.3, 1.7.4, 1.7.4.2, 1.7.4.3, 4.1.1, 4.1.2.3, 4.1.2.4, 4.1.2.5	EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010);

Darüber hinaus entspricht die unvollständige Maschine oder Teile der unvollständigen Maschine anderen Richtlinie(n), die in anderen Erklärungen genannt sind.

Wir verpflichten uns, die speziellen Unterlagen zur oben bezeichneten, unvollständigen Maschine einzelstaatlichen Stellen auf Verlangen zu übermitteln. Die Unterlagen werden auf elektronischem Wege von unserer Abteilung Technische Dokumentation übermittelt

Person, die bevollmächtigt ist, die technischen Unterlagen zusammenzustellen:

Klaus-Dieter Schmitt, Schneider Electric, Gewerbestraße 9, 77749 Hohberg-Niederschopfheim / Germany

Die unvollständige Maschine darf erst dann in Betrieb genommen werden, wenn festgestellt wurde, dass die Maschine, in die die unvollständige Maschine eingebaut werden soll, den Bestimmungen der Richtlinie Maschinen 2006/42/EG entspricht, gegebenenfalls durch die EG-Konformitätserklärung gemäß Anhang II Teil A.

France -Rueil Malmaison, März 2013

Peter Spitzfaden
Certification Manager

2 Technical Data

See chapter " Glossary" for definitions and explanations of terms.

2.1 Ambient conditions

Ambient temperature during operation

Temperature	°C (°F)	0 ... 50 (32 ... 122)
-------------	------------	--------------------------

The following relative humidity is permissible during operation:

Relative humidity		As per IEC 60721-3-3, class 3K3, no condensation
-------------------	--	---

Climatic environmental conditions transportation and storage

The environment during transportation and storage must be dry and free from dust.

Temperature	°C (°F)	-25 ... +70 (-13 ... 158)
-------------	------------	------------------------------

Installation altitude

Installation altitude above sea level for linear axis without motor	m (ft)	<1500 (<4921.26)
---	-----------	---------------------

Vacuum

Operation in vacuum is not permissible.

Lubricants and lubrication

See chapters "7.4.2 Lubrication" and "7.4.3 Lubricating the linear guide and the drive elements".

Compatibility with foreign substances

See See chapter "3.2 Compatibility with foreign substances".

2.2 Information on increased corrosion resistance

The linear axes are not suitable for contact with wash down water and chemical cleaning agents.

The linear axes are not approved for direct use in food applications.

Coated materials lose the corrosion resistance if the coating is damaged or worn.

Component		Standard version	Increased corrosion resistance
Axis body		Aluminum, anodized	
Carriage		Aluminum, anodized	
End plates		Aluminum, anodized	
Roller guide	Guide rods	Steel 100 CR 6	Stainless steel X 46 Cr 13
	Roller	Steel 100 CR 6	Stainless steel 1.4112
Recirculating ball bearing guide	Guide rail	Steel	Armology-coated
	Guide carriage	Steel	
Toothed belt pulley	Toothed belt pulley	Aluminum, anodized	
	Flanged wheel	Steel, galvanized	
	Ball bearings	Steel 100 CR 6	Stainless steel 1.4112
Deflection pulleys	Deflection pulleys	Aluminum, not anodized	
	Ball bearings	Steel 100 CR 6	Stainless steel 1.4112
Ball bearing seal		NBR	
Contact plate sensor		Stainless steel	
Sensor		Brass, nickel-plated	
Sensor holder		POM	
Sensor cable		PUR	
Rubber buffer		P-Chlorop-K-sw-75ShA	
Expanding hub		Aluminum, not anodized; cone stainless steel 1.4112	
Clamping hub		Aluminum, not anodized	
Elastomer spider		PUR 98 Sh A-GS	
Shaft extension		Aluminum, not anodized; cone stainless steel 1.4112	

Component		Standard version	Increased corrosion resistance
Toothed belt tensioner		Aluminum, anodized	
Toothed belt	Belt	PUR 92 Sh A	
	Fibres	PA	
	Tension members	Steel, galvanized	
Toothed belt, antistatic	Belt	PUR 92 Sh A, conductive	
	Fibres	PA	
	Tension members	Steel, galvanized	
Grease nipples		Stainless steel	
Option: cover strip		Steel, not stainless, Teflon-coated	
Strip deflection	Housing	Aluminum, anodized	
	Deflection unit	PA6.6	
	Brush	PA6.6	
Cover strip clamp	Housing	PPS	
	Clamping plate	Stainless steel: X5 Cr Ni1 8-10	
Housing cover		Steel, powder-coated	
Screws		Steel, galvanized	
Circlips		Steel, galvanized	
Slot nuts		Steel, galvanized	
Locating dowel		Stainless steel: X8CrNiS 18-9	
Clamping claws		Aluminum, anodized	
Gearbox and motor adaptation		Aluminum, not anodized	

2.3 CAS41

2.3.1 Technical data CAS41

Value pairs with / without cover strip are separated by "/".

Technical data cantilever axis		CAS41BR
Drive element		Toothed belt 15HTD-3M
Guide type		Roller guide (W06)
Payload	kg (lb)	5 (11.02)
Carriage type		Type 3
Carriage length	mm (in)	327 / 230 (12.87 / 9.06)
Feed per revolution	mm/rev.	84 (10.39)
Effective diameter toothed belt pulley	mm (in)	26.738 (1.052677)
Maximum feed force $F_{X_{max}}^{1)}$	N (lbf)	250 (56.20)
Maximum velocity $^{2)}$	m/s (ft/s)	3 (9.84)
Maximum acceleration $^{2)}$	m/s ² (ft/s ²)	20 (65.62)
Maximum driving torque $M_{max}^{1)}$	Nm (lb·in)	3.5 (30.98)
Breakaway torque 0 stroke axis	Nm (lb·in)	0.2 (1.77)
Moment of inertia 0 stroke axis	kgcm ² (oz·in·s ²)	2.4 / 1.9 (0.34 / 0.27)
Moment of inertia per 1 m of stroke	kgcm ² (oz·in·s ²)	4.0 (0.57)
Moment of inertia per 1 kg of payload	kgcm ² (oz·in·s ²)	1.8 (0.25)

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves)

2) Load- and stroke-dependent

Technical data cantilever axis		CAS41BR
Maximum force $F_{y_{dynmax}}^{1)}$	N (lbf)	930 (209.07)
Maximum force $F_{z_{dynmax}}^{1)}$	N (lbf)	600 (134.89)
Maximum torque $M_{y_{dynmax}}^{1)}$	Nm (lb·in)	24 (212.42)
Maximum torque $M_{z_{dynmax}}^{1)}$	Nm (lb·in)	37 (327.48)
Max. torque $M_{x_{dynmax}}^{1)}$	Nm (lb·in)	7 (61.96)
Mass 0 stroke axis	kg (lb)	2.8 / 2.4 (6.17 / 5.29)
Mass per 1 m of stroke	kg (lb)	2.3 (5.07)
Moving mass cantilever / 0 stroke axis	kg (lb)	1.1 / 0.9 (2.43 / 1.98)
Maximum stroke ²⁾	mm (in)	400 (15.75)
Minimum stroke ³⁾	mm (in)	125 (4.92)
Repeatability ³⁾	mm (in)	± 0.05 (± 0.00012)
Diameter motor shaft	mm (in)	6.35 ... 14 (0.25 ... 0.55)
Cross section axis body (W x H)	mm (in)	40 x 40 (1.57 x 1.57)
Axial area moment of inertia I_x I_y	mm ⁴	76640 108930
Modulus of elasticity (aluminum) E	N/mm ²	72000
Load rating linear guide C_{stat}	N (lbf)	2230 (501.32)
Load rating linear guide C_{dyn}	N (lbf)	3950 (888.00)
Service life ⁴⁾	km (mi)	15000 (9321)

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves).

2) Inquire for greater stroke

3) Minimum stroke required for lubrication of the linear guide

4) The service life depends on the forces and torques, see chapter "2.7 Service life".

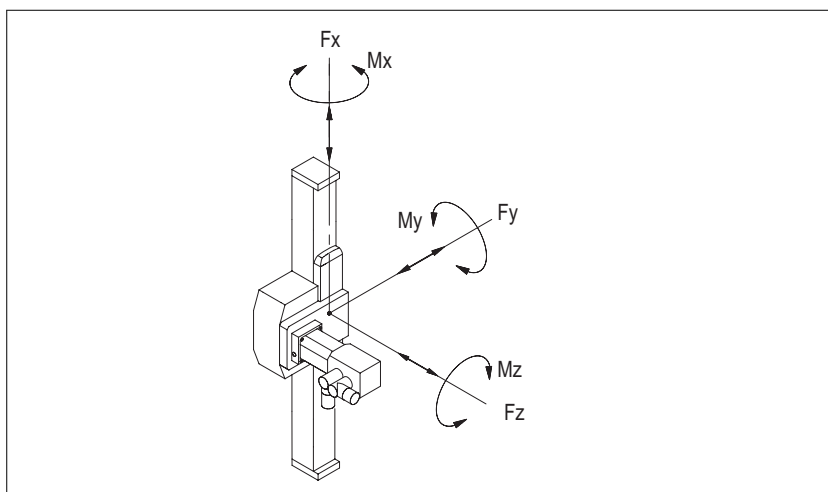


Figure 5: Forces and torques

2.3.2 Characteristic curves CAS41BR

Maximum feed force F_x

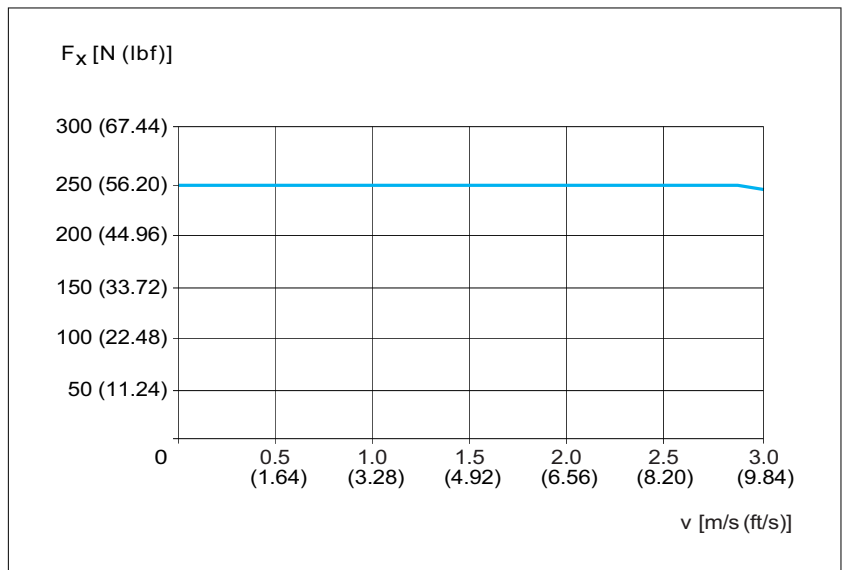


Figure 6: CAS41BR Maximum feed force F_x

Maximum force $F_{y\text{dyn}}$

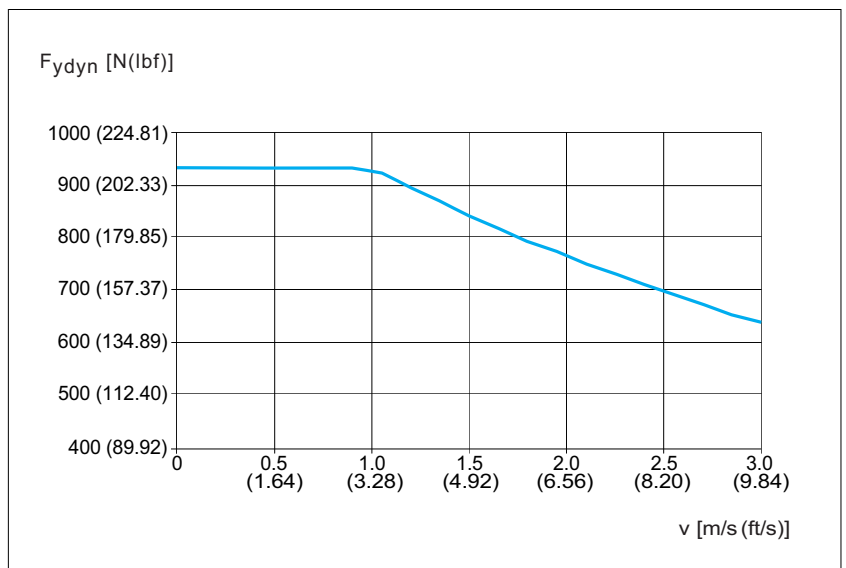


Figure 7: CAS41BR Maximum force $F_{y\text{dyn}}$

Maximum force F_{zdyn}

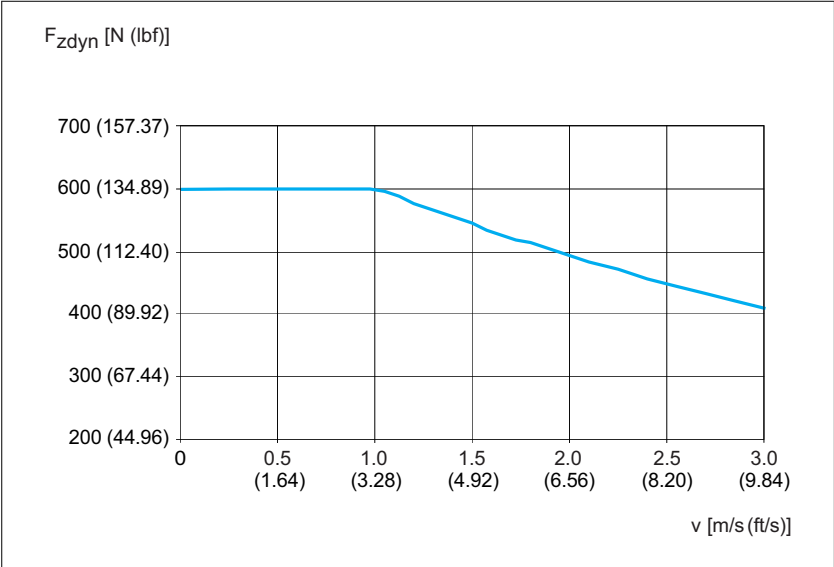


Figure 8: CAS41BR Maximum force F_{zdyn}

Maximum driving torque M_{max}

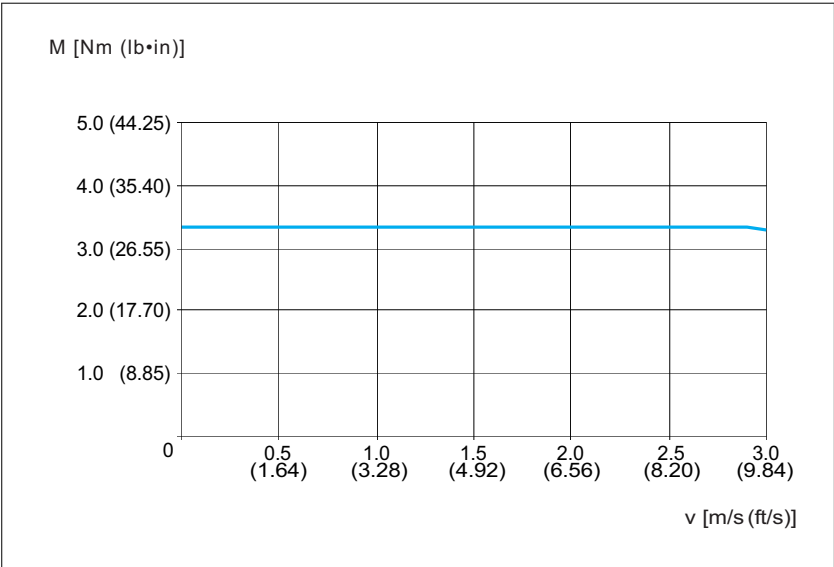


Figure 9: CAS41BR Maximum driving torque M_{max}

Maximum torque carriage M_{xdyn}

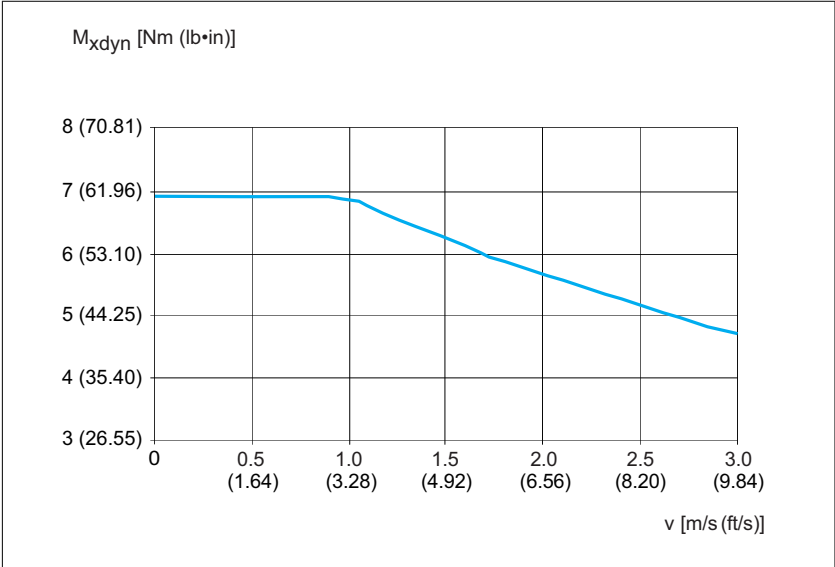


Figure 10: CAS41BR Maximum torque carriage M_{xdyn}

Maximum torque carriage M_{ydyn}

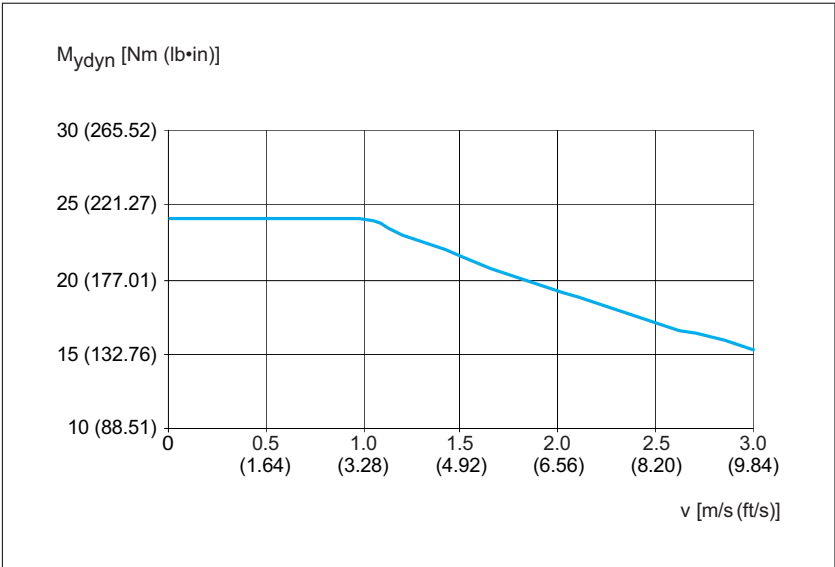


Figure 11: CAS41BR Maximum torque carriage M_{ydyn}

Maximum torque carriage M_{zdyn}

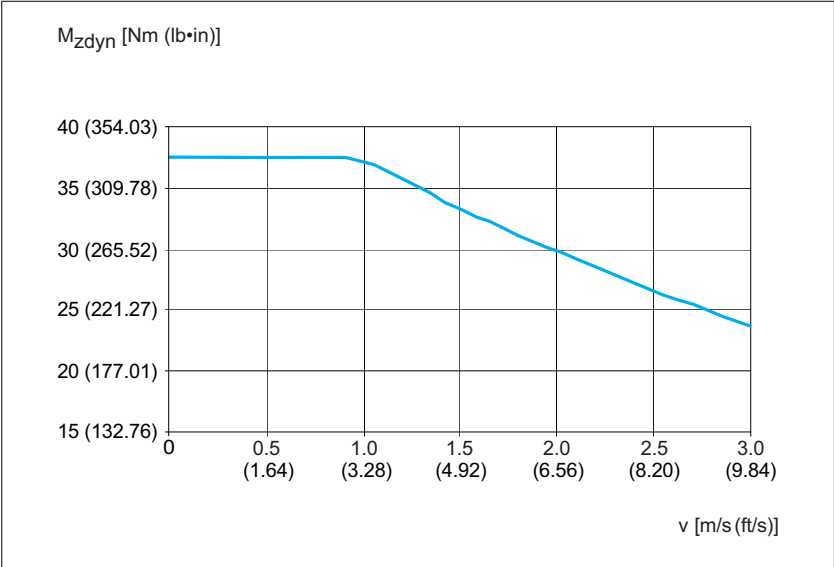


Figure 12: CAS41BR Maximum torque carriage M_{zdyn}

Service life load curve

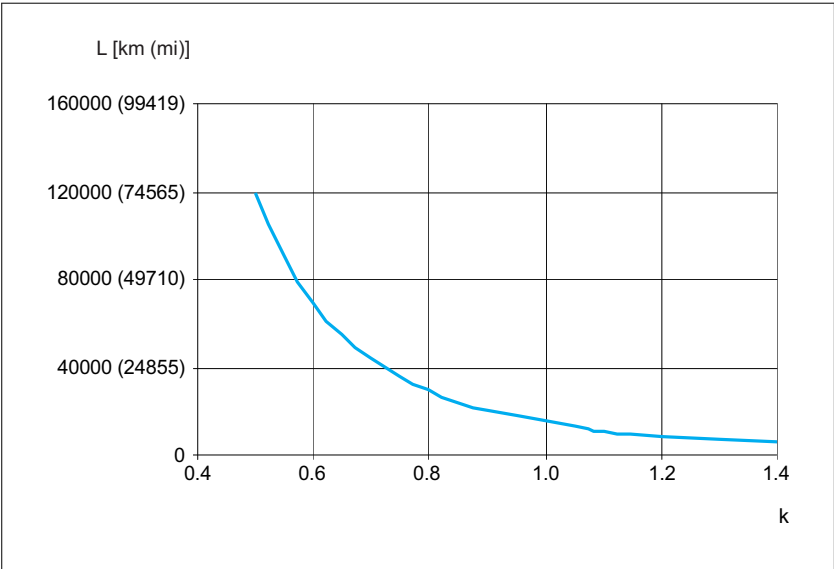


Figure 13: CAS41BR Service life load curve

2.3.3 Dimensional drawings CAS41BR

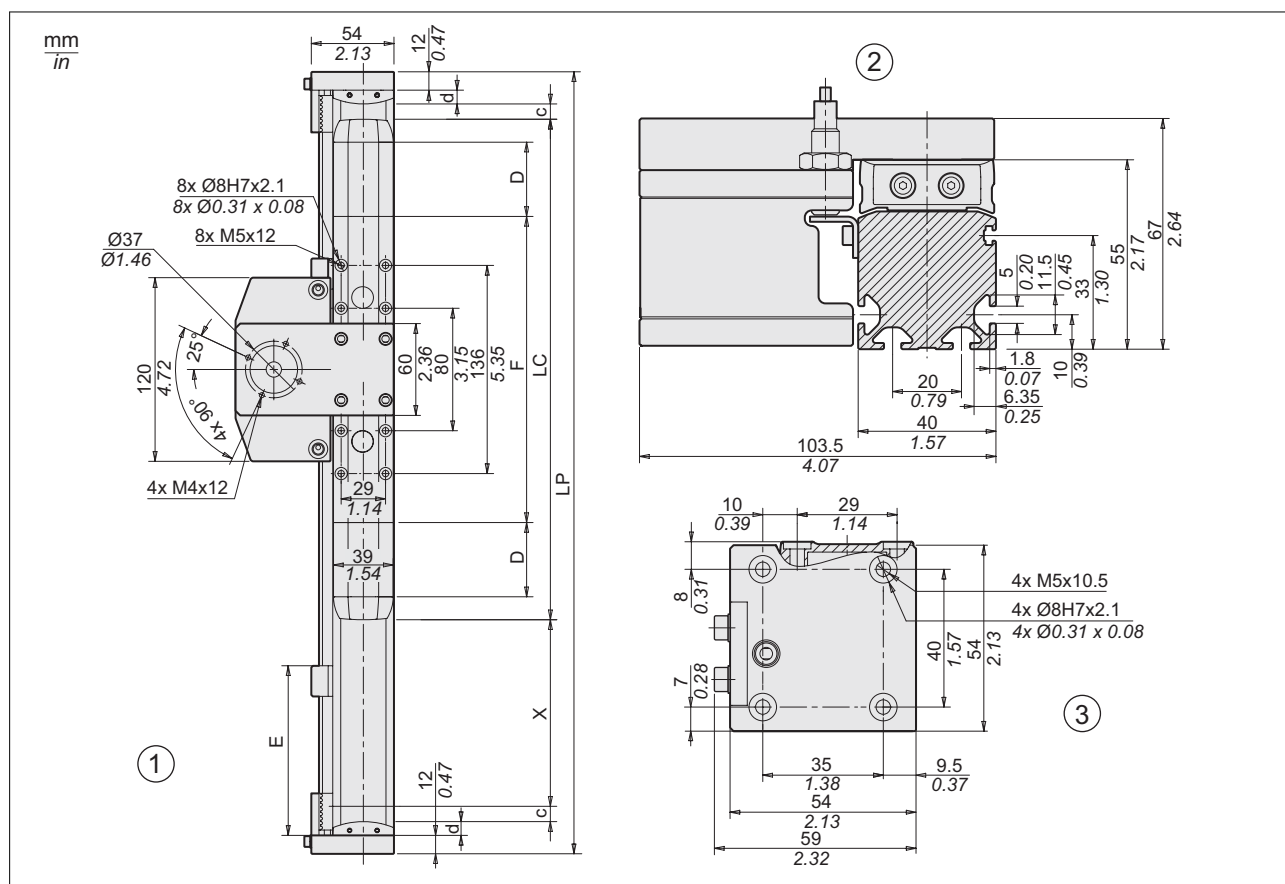


Figure 14: Dimensional drawings CAS41BR

- (1) Axis
 (2) Section of axis
 (3) Adapter plate for the load

Cover strip			No	Yes
Total length of axis	LP	mm (in)	274 + X (10.79 + X)	389 + X (15.31 + X)
Stroke	X	mm (in)	See page 24	
Carriage length	LC	mm (in)	230 (9.06)	327 (12.87)
Profile length of carriage	F	mm (in)	200 (7.87)	
Number of tapped holes for mounting ¹⁾	n		8	
Position of contact plate	E	mm (in)	73 (2.87)	130 (5.12)
Stroke reserve up to mechanical stop	c	mm (in)	10 (0.39)	
Length of clamp fastener of cover strip	d	mm (in)	-	9
Deflection of cover strip	D	mm (in)	-	48.5 (1.91)

1) Prepared for locating rings (see Accessories)

2.4 CAS42

2.4.1 Technical data CAS42

Value pairs with / without cover strip are separated by "/".

Technical data cantilever axis		CAS42BR	CAS42BB
Drive element		Toothed belt 25HTD-5M	Toothed belt 25HTD-5M
Guide type		Roller guide (W06)	Recirculating ball bearing guide (size 15)
Payload	kg (lb)	8 (17.64)	15 (33.07)
Carriage type		Type 3	Type 3
Carriage length	mm (in)	393 / 296 (15.47 / 11.65)	393 / 296 (15.47 / 11.65)
Feed per revolution	mm/rev.	155 (6.10)	155 (6.10)
Effective diameter toothed belt pulley	mm (in)	49.338 (1.94244)	49.338 (1.94244)
Maximum feed force $F_{x_{max}}^{1)}$	N (lbf)	650 (146.13)	650 (146.13)
Maximum velocity $^{2)}$	m/s (ft/s)	3 (9.84)	3 (9.84)
Maximum acceleration $^{2)}$	m/s ² (ft/s ²)	20 (65.62)	20 (65.62)
Maximum driving torque $M_{max}^{1)}$	Nm (lb-in)	16 (141.61)	16 (141.61)
Breakaway torque 0 stroke axis	Nm (lb-in)	1.0 (8.85)	1.6 (14.16)
Moment of inertia 0 stroke axis	kgcm ² (oz-in-s ²)	17.8 / 14.4 (2.52 / 2.04)	20.7 / 16.4 (2.93 / 2.32)
Moment of inertia per 1 m of stroke	kgcm ² (oz-in-s ²)	27.1 (3.84)	33.5 (4.74)
Moment of inertia per 1 kg of payload	kgcm ² (oz-in-s ²)	6.1 (0.86)	6.1 (0.86)
Maximum force $F_{y_{dynmax}}^{1)}$	N (lbf)	930 (209.07)	3540 (795.82)
Maximum force $F_{z_{dynmax}}^{1)}$	N (lbf)	600 (134.89)	3540 (795.82)
Maximum torque $M_{y_{dynmax}}^{1)}$	Nm (lb-in)	29 (256.67)	250 (2212.69)
Maximum torque $M_{z_{dynmax}}^{1)}$	Nm (lb-in)	45 (398.28)	250 (2212.69)
Max. torque $M_{x_{dynmax}}^{1)}$	Nm (lb-in)	13 (115.06)	24 (212.42)

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves).

2) Load- and stroke-dependent

Technical data cantilever axis		CAS42BR	CAS42BB
Mass 0 stroke axis	kg (lb)	7.4 / 6.6 (16.31 / 14.55)	7.9 / 7.1 (17.42 / 15.65)
Mass per 1 m of stroke	kg (lb)	4.5 (9.92)	5.5 (12.13)
Moving mass cantilever / 0 stroke axis	kg (lb)	2.7 / 2.1 (5.95 / 4.63)	3.2 / 2.5 (7.05 / 5.51)
Maximum stroke ¹⁾	mm (in)	600 (23.62)	600 (23.62)
Minimum stroke ²⁾	mm (in)	130 (5.12)	9 (0.35)
Repeatability ³⁾	mm (in)	± 0.05 (0.00197)	± 0.05 (0.00197)
Diameter motor shaft	mm (in)	6.35 ... 20 (0.25 ... 0.79)	6.35 ... 20 (0.25 ... 0.79)
Cross section axis body (W x H)	mm (in)	60 x 60 (2.36 x 2.36)	60 x 60 (2.36 x 2.36)
Axial area moment of inertia I _x I _y	mm ⁴	435390 651610	435390 651610
Modulus of elasticity (aluminum) E	N/mm ²	72000	72000
Load rating linear guide C _{stat}	N (lbf)	2230 (501.32)	24200 (5440.38)
Load rating linear guide C _{dyn}	N (lbf)	3950 (888.00)	14200 (3192.29)
Service life ³⁾	km (mi)	15000 (9321)	15000 (9321)

1) Inquire for greater stroke

2) Minimum stroke required for lubrication of the linear guide

3) The service life depends on the forces and torques, see chapter "2.7 Service life".

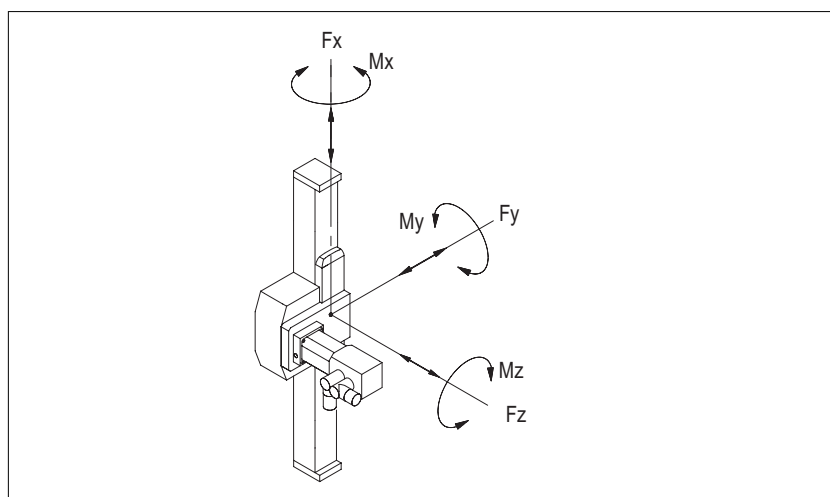


Figure 15: Forces and torques

2.4.2 Characteristic curves CAS42BR

Maximum feed force F_x

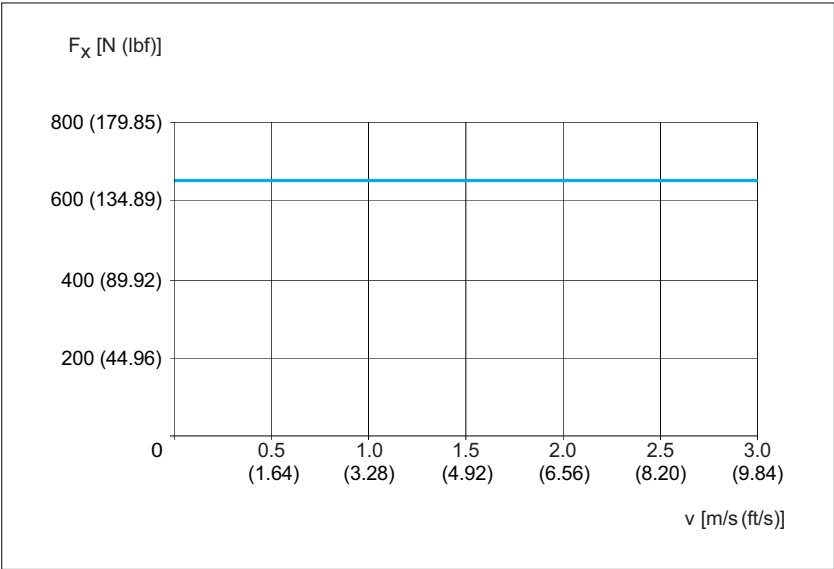


Figure 16: CAS42BR Maximum feed force F_x

Maximum force F_{ydyn}

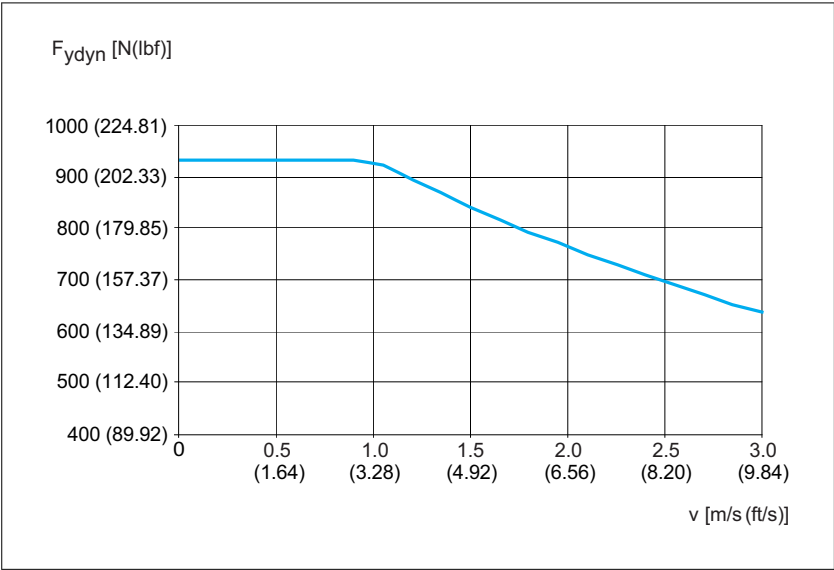


Figure 17: CAS42BR Maximum force F_{ydyn}

Maximum force F_{zdyn}

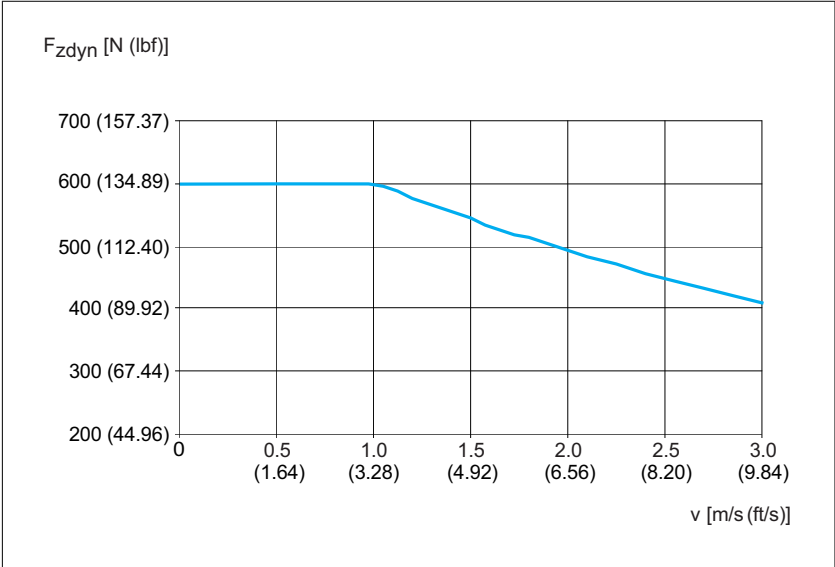


Figure 18: CAS42BR Maximum force F_{zdyn}

Maximum driving torque M_{max}

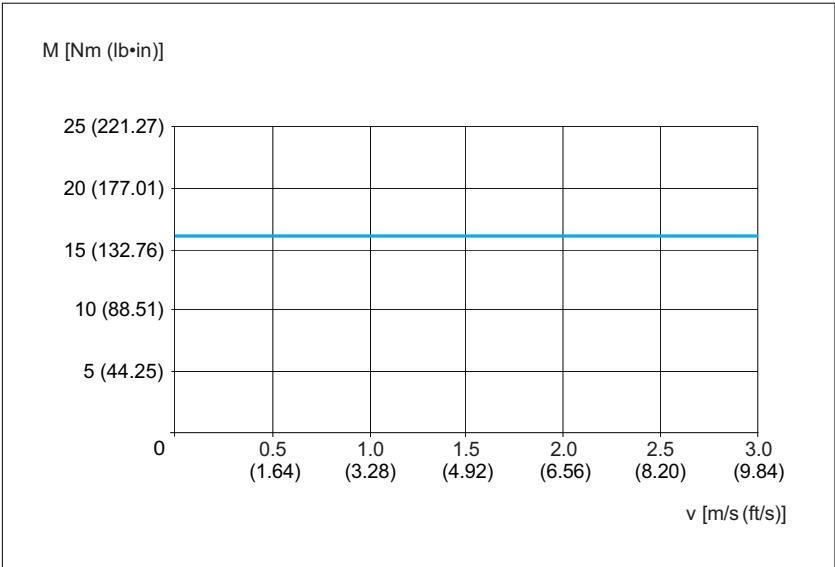


Figure 19: CAS42BRMaximum driving torque M_{max}

Maximum torque carriage M_{xdyn}

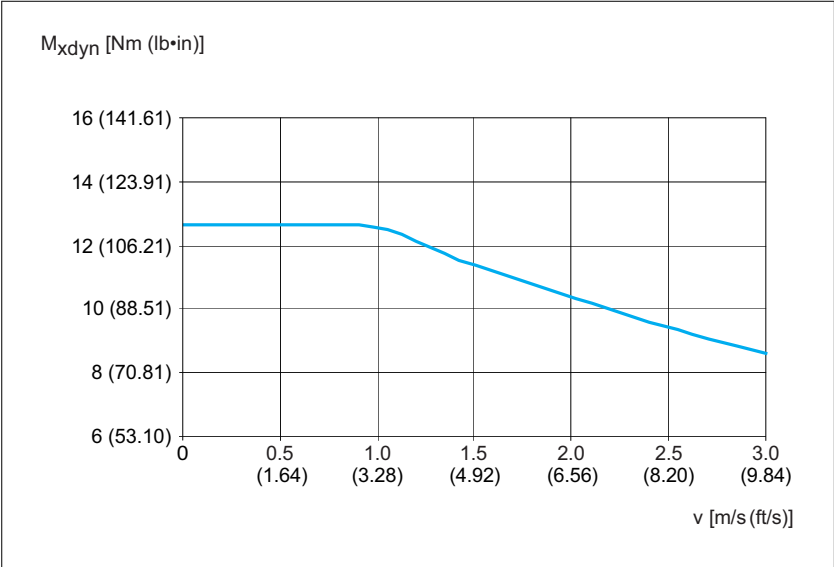


Figure 20: CAS42BR Maximum torque carriage M_{xdyn}

Maximum torque carriage M_{ydyn}

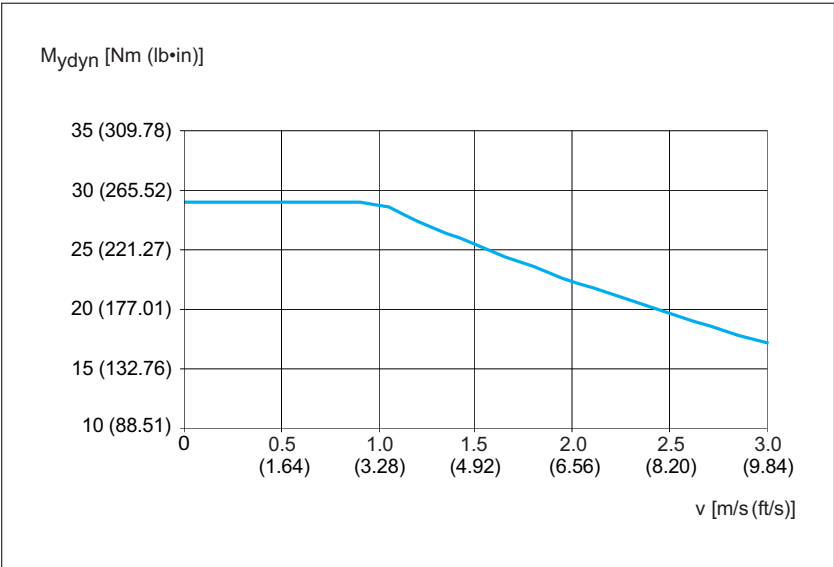


Figure 21: CAS42BR Maximum torque carriage M_{ydyn}

Maximum torque carriage M_{zdyn}

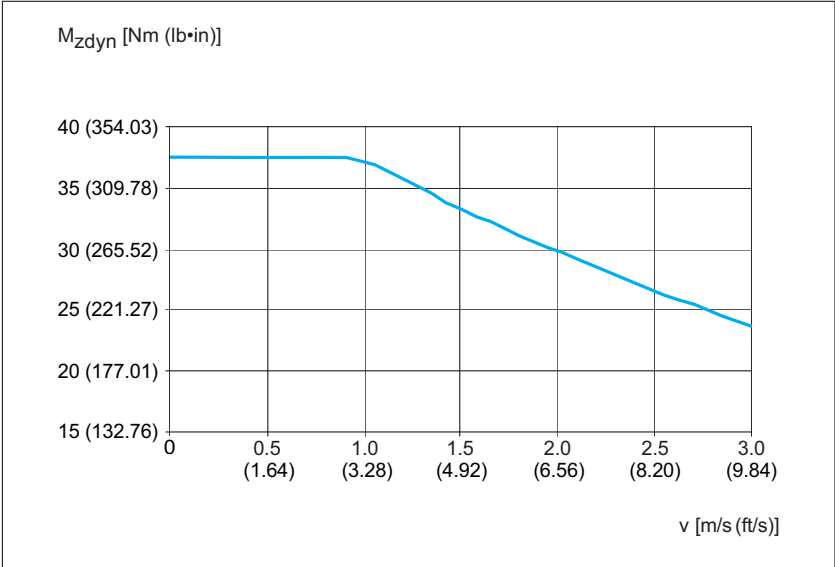


Figure 22: CAS42BR Maximum torque carriage M_{zdyn}

Service life load curve

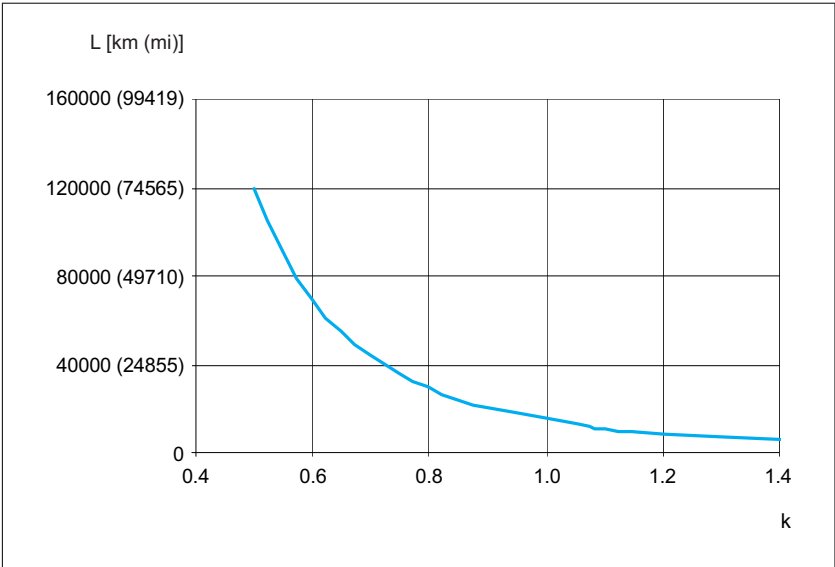


Figure 23: CAS42BR Service life load curve

2.4.3 Characteristic curves CAS42BB

Maximum feed force F_x

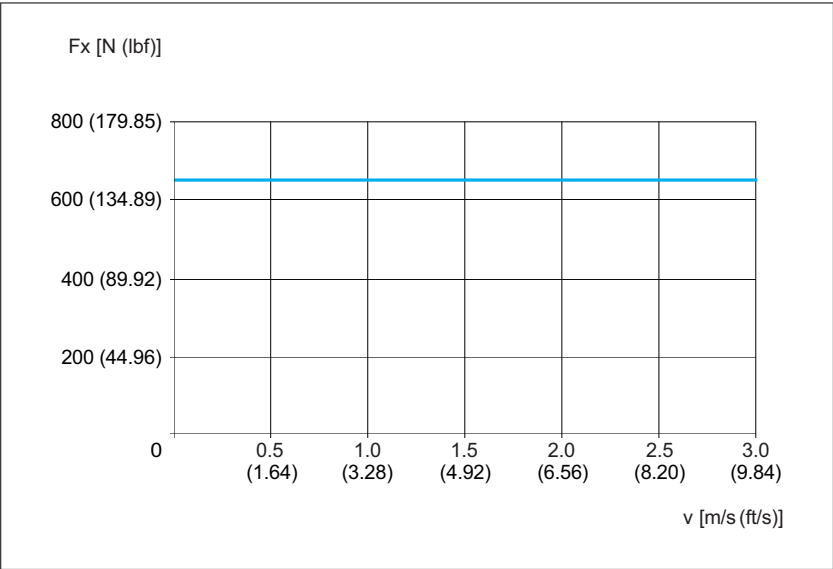


Figure 24: CAS42BB Maximum feed force F_x

Maximum force $F_{y\text{dyn}}$

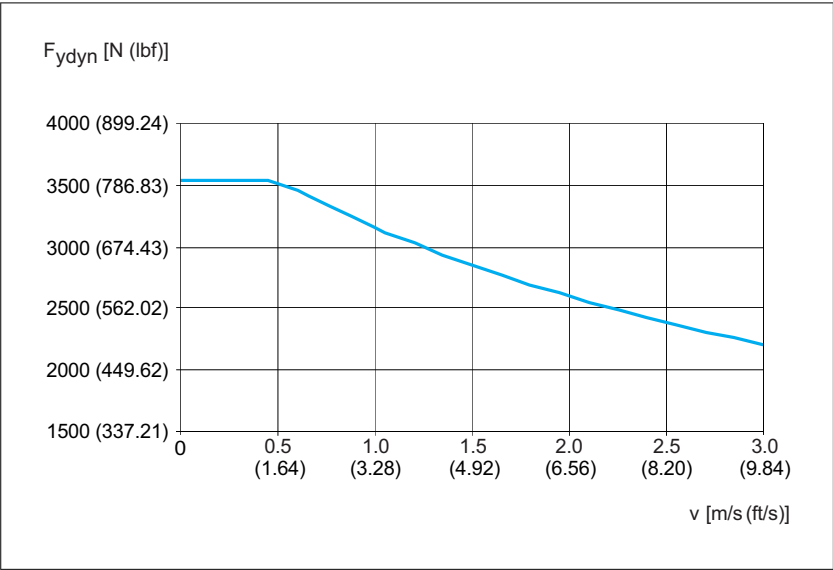


Figure 25: CAS42BB Maximum force $F_{y\text{dyn}}$

Maximum force F_{zdyn}

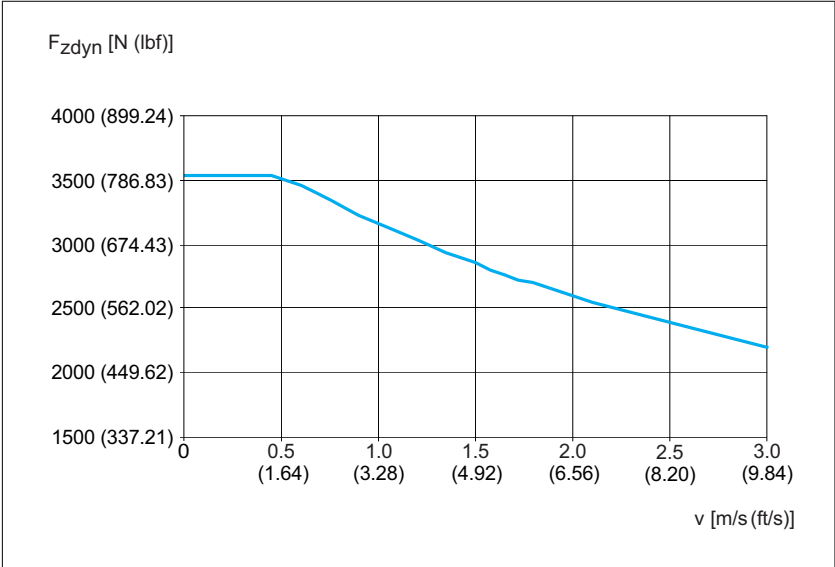


Figure 26: CAS42BB Maximum force F_{zdyn}

Maximum driving torque M_{max}

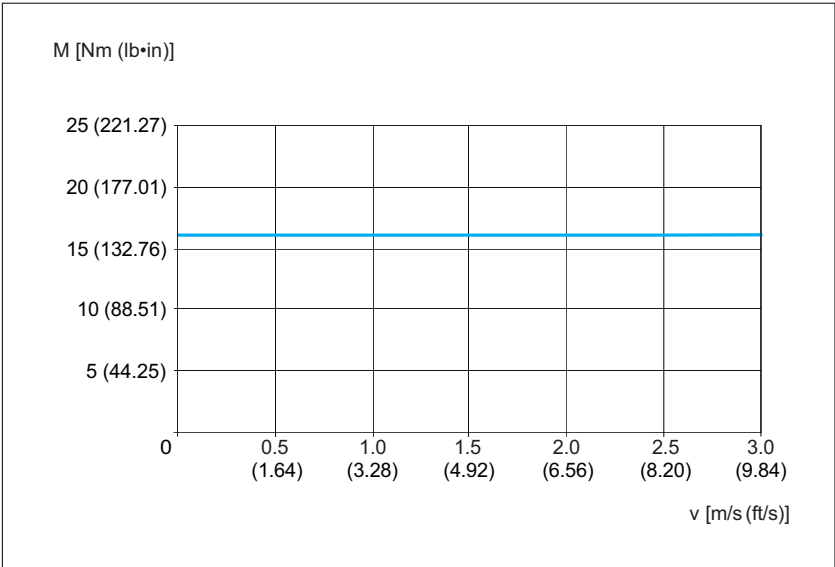


Figure 27: CAS42BBMaximum driving torque M_{max}

Maximum torque carriage M_{xdyn}

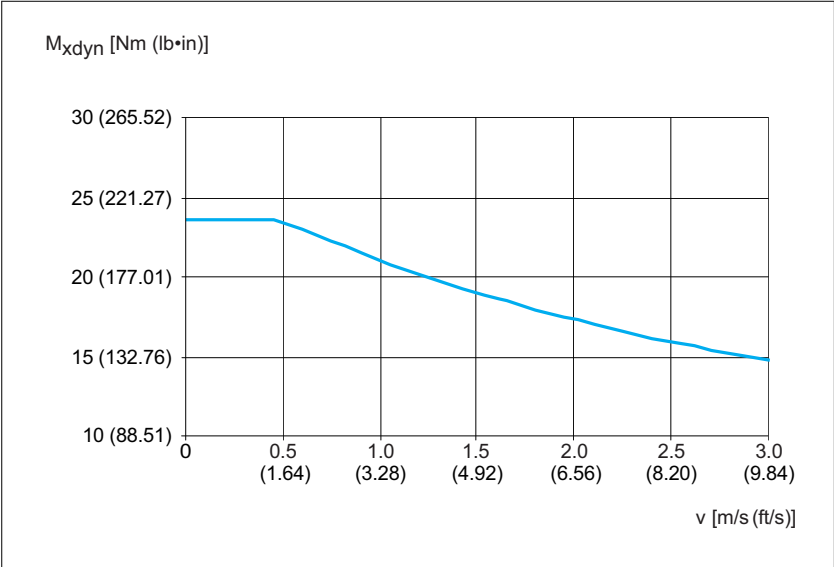


Figure 28: CAS42BB Maximum torque carriage M_{xdyn}

Maximum torque carriage M_{ydyn}

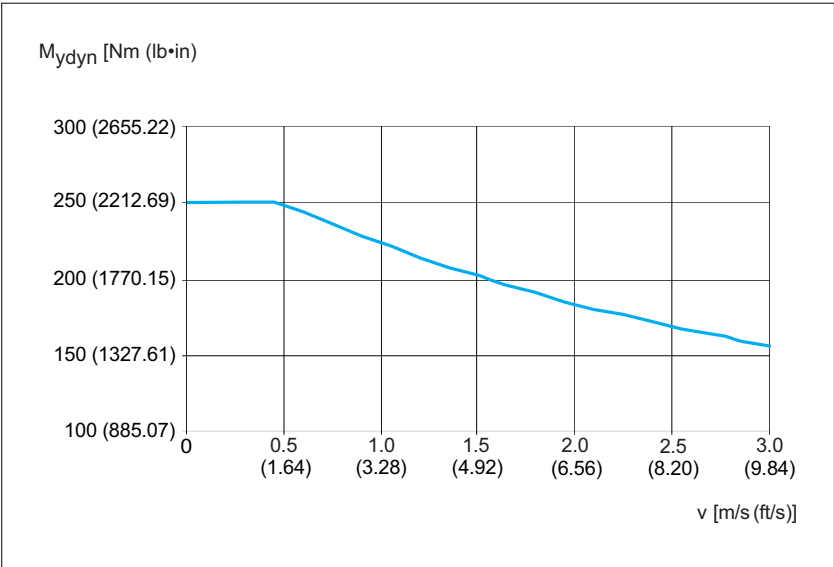


Figure 29: CAS42BB Maximum torque carriage M_{ydyn}

Maximum torque carriage M_{zdyn}

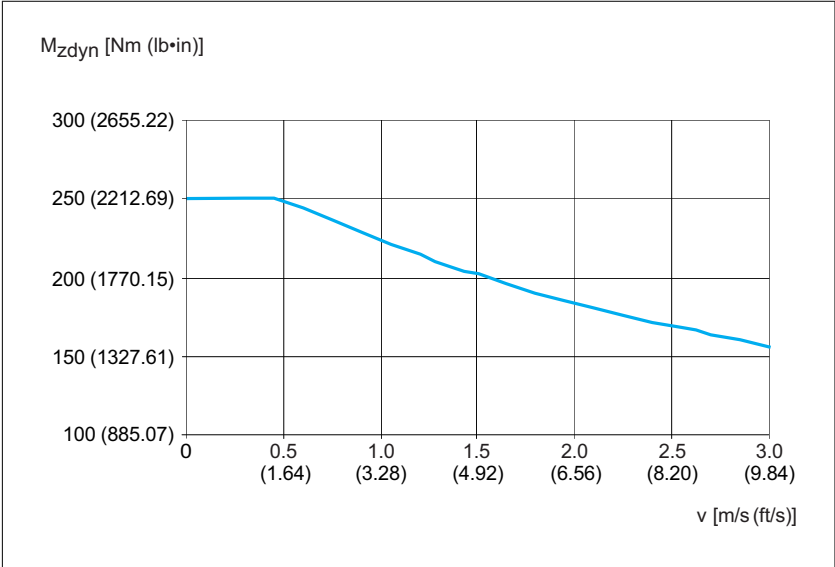


Figure 30: CAS42BB Maximum torque carriage M_{zdyn}

Service life load curve

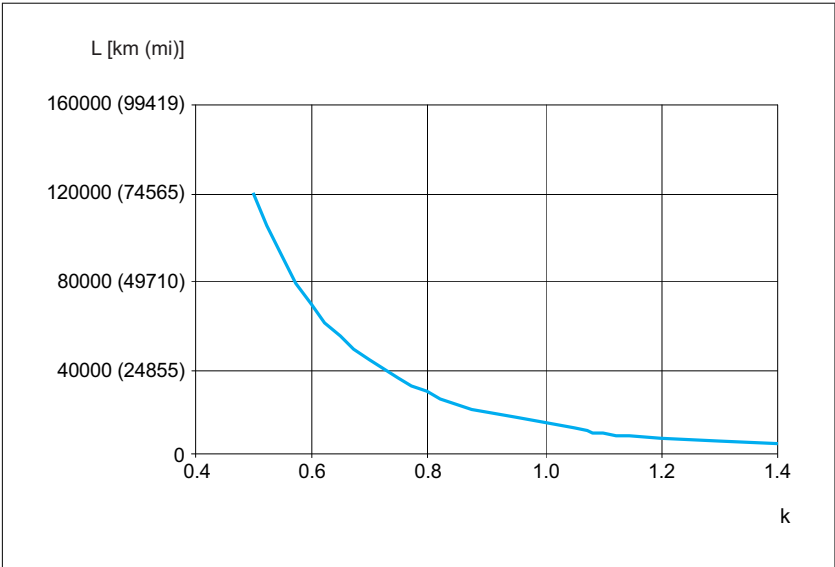


Figure 31: CAS42BB Service life load curve

2.4.4 Dimensional drawings CAS42

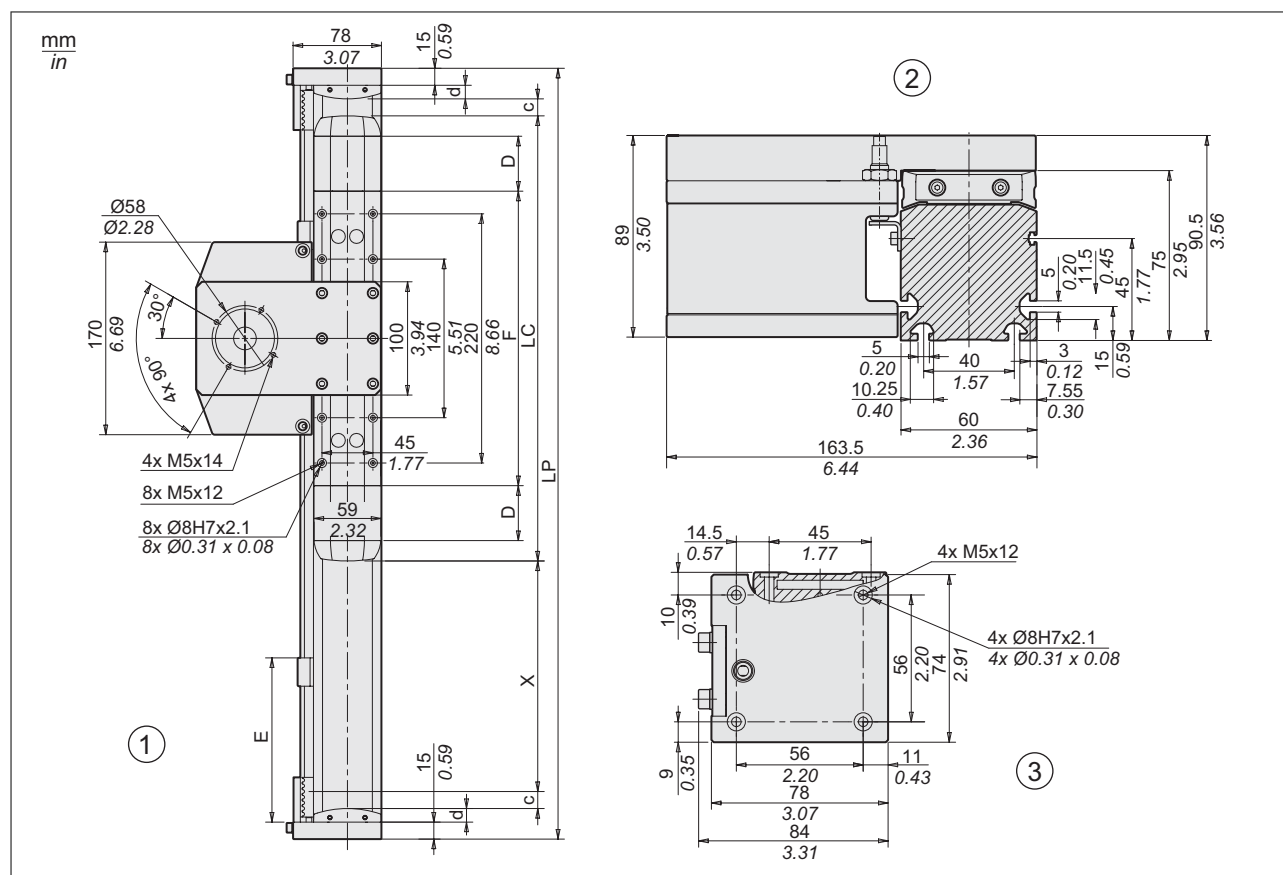


Figure 32: Dimensional drawings CAS42Bx

- (1) Axis
 (2) Section of axis
 (3) Adapter plate for the load

Cover strip			No	Yes
Total length of axis	LP	mm (in)	356 + X (14.02 + X)	476 + X (18.74 + X)
Stroke	X	mm (in)	See page 32	
Carriage length	LC	mm (in)	296 (11.65)	393 (15.47)
Profile length of carriage	F	mm (in)	260 (10.24)	
Number of tapped holes for mounting ¹⁾	n		8	
Position of contact plate	E	mm (in)	85 (3.35)	145 (5.71)
Stroke reserve up to mechanical stop	c	mm (in)	15 (0.59)	
Length of clamp fastener of cover strip	d	mm (in)	-	11.5 (0.45)
Deflection of cover strip	D	mm (in)	-	48.5 (1.91)

1) Prepared for locating rings (see Accessories)

2.5 CAS43

2.5.1 Technical data CAS43

Value pairs with / without cover strip are separated by "/".

Technical data cantilever axis		CAS43BR	CAS43BB
Drive element		Toothed belt 30HTD-5M	Toothed belt 30HTD-5M
Guide type		Roller guide (W10)	Recirculating ball bearing guide (size 20)
Payload	kg (lb)	12 (26.46)	25 (55.12)
Carriage type		Type 3	Type 3
Carriage length	mm (in)	484 / 364 (19.06 / 14.33)	484 / 364 (19.06 / 14.33)
Feed per revolution	mm/rev.	205 (8.07)	205 (8.07)
Effective diameter toothed belt pulley	mm (in)	65.254 (2.569055)	65.254 (2.569055)
Maximum feed force $F_{x_{max}}^{1)}$	N (lbf)	900 (202.33)	900 (202.33)
Maximum velocity $^{2)}$	m/s (ft/s)	3 (9.84)	3 (9.84)
Maximum acceleration $^{2)}$	m/s ² (ft/s ²)	20 (65.62)	20 (65.62)
Maximum driving torque $M_{max}^{1)}$	Nm (lb-in)	30 (265.52)	30 (265.52)
Breakaway torque 0 stroke axis	Nm (lb-in)	2.0 (17.70)	3.0 (26.55)
Moment of inertia 0 stroke axis	kgcm ² (oz-in-s ²)	65.8 / 52.6 (9.32 / 7.45)	74.7 / 59.1 (10.58 / 8.37)
Moment of inertia per 1 m of stroke	kgcm ² (oz-in-s ²)	83.9 (11.88)	100 (14.16)
Moment of inertia per 1 kg of payload	kgcm ² (oz-in-s ²)	10.7 (1.52)	10.7 (1.52)
Maximum force $F_{y_{dynmax}}^{1)}$	N (lbf)	2430 (546.29)	5550 (1247.69)
Maximum force $F_{z_{dynmax}}^{1)}$	N (lbf)	1430 (321.48)	5550 (1247.69)
Maximum torque $M_{y_{dynmax}}^{1)}$	Nm (lb-in)	85 (752.31)	487 (4310.31)
Maximum torque $M_{z_{dynmax}}^{1)}$	Nm (lb-in)	144 (1274.51)	487 (4310.31)
Max. torque $M_{x_{dynmax}}^{1)}$	Nm (lb-in)	40 (354.03)	53 (469.09)

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves).

2) Load- and stroke-dependent

Technical data cantilever axis		CAS43BR	CAS43BB
Mass 0 stroke axis	kg (lb)	14.9 / 13.2 (32.85 / 29.10)	15.7 / 13.8 (34.61 / 30.42)
Mass per 1 m of stroke	kg (lb)	7.9 (17.42)	9.4 (20.72)
Moving mass cantilever / 0 stroke axis	kg (lb)	5.8 / 4.6 (12.79 / 10.14)	6.7 / 5.2 (14.77 / 11.46)
Maximum stroke ¹⁾	mm (in)	800 (31.50)	800 (31.50)
Minimum stroke ²⁾	mm (in)	175 (6.89)	11 (0.43)
Repeatability ³⁾	mm (in)	± 0.05 (0.00197)	± 0.05 (0.00197)
Diameter motor shaft	mm (in)	12 ... 25 (0.47 ... 0.98)	12 ... 25 (0.47 ... 0.98)
Cross section axis body (W x H)	mm (in)	80 x 80 (3.15 x 3.15)	80 x 80 (3.15 x 3.15)
Axial area moment of inertia I _x I _y	mm ⁴	1285260 1867210	1285260 1867210
Modulus of elasticity (aluminum) E	N/mm ²	72000	72000
Load rating linear guide C _{stat}	N (lbf)	4850 (1090.32)	38400 (8632.66)
Load rating linear guide C _{dyn}	N (lbf)	8500 (1910.88)	22300 (5013.24)
Service life ³⁾	km (mi)	15000 (9321)	15000 (9321)

1) Inquire for greater stroke

2) Minimum stroke required for lubrication of the linear guide

3) The service life depends on the forces and torques, see chapter "2.7 Service life".

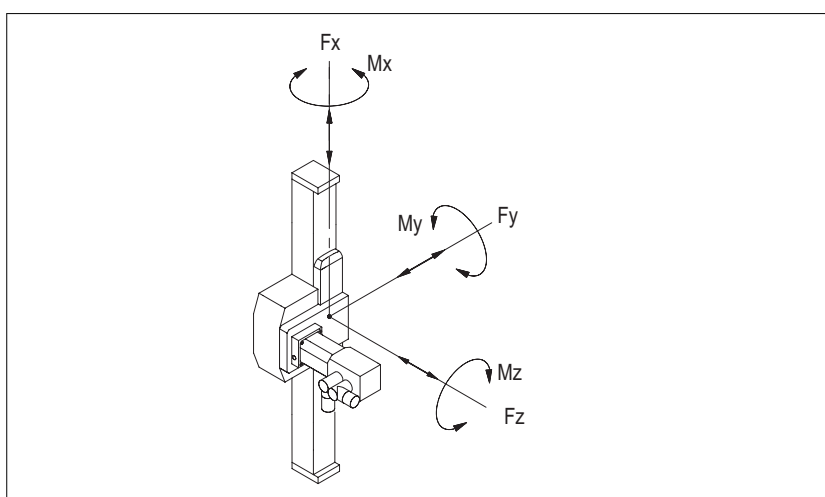


Figure 33: Forces and torques

2.5.2 Characteristic curves CAS43BR

Maximum feed force F_x

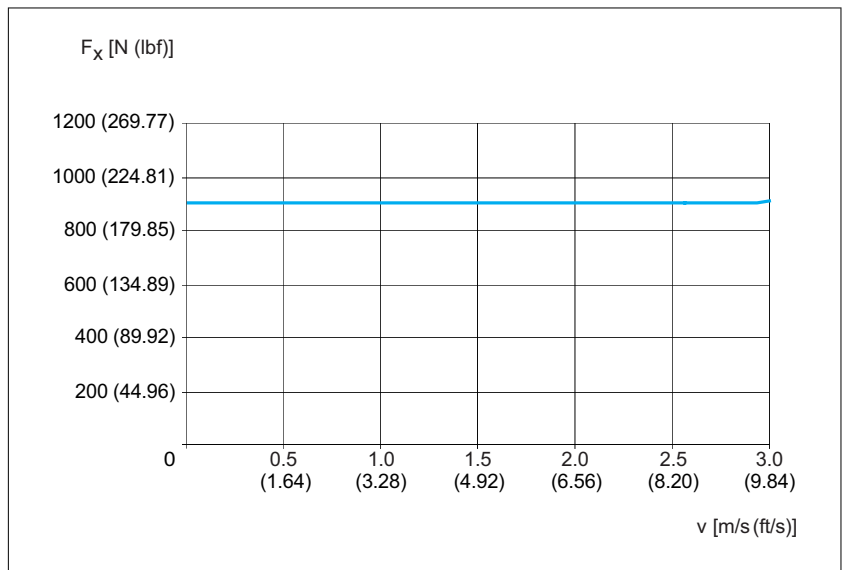


Figure 34: CAS43BR Maximum feed force F_x

Maximum force $F_{y\text{dyn}}$

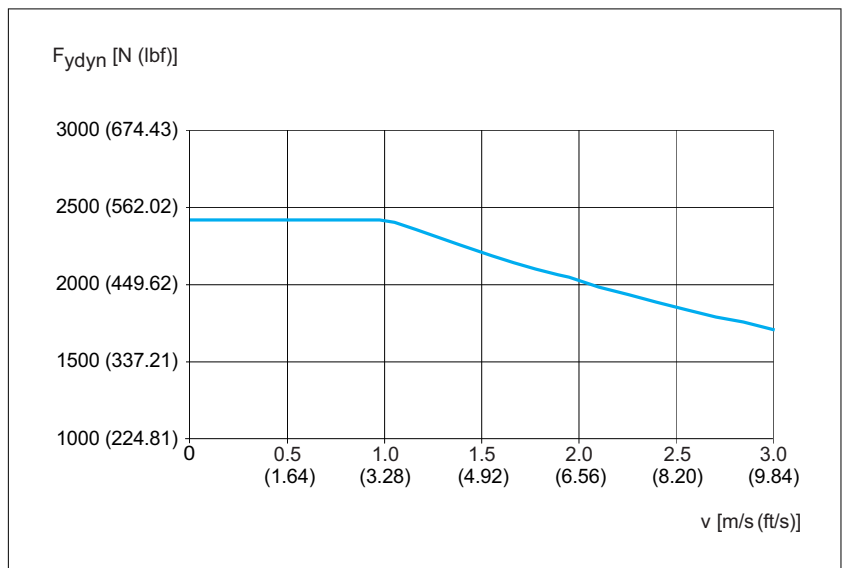


Figure 35: CAS43BR Maximum force $F_{y\text{dyn}}$

Maximum force F_{zdyn}

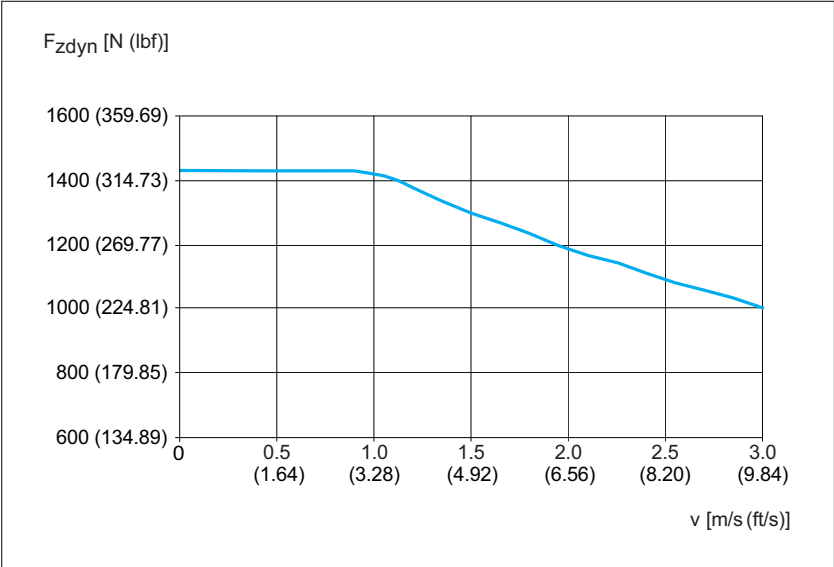


Figure 36: CAS43BR Maximum force F_{zdyn}

Maximum driving torque M_{max}

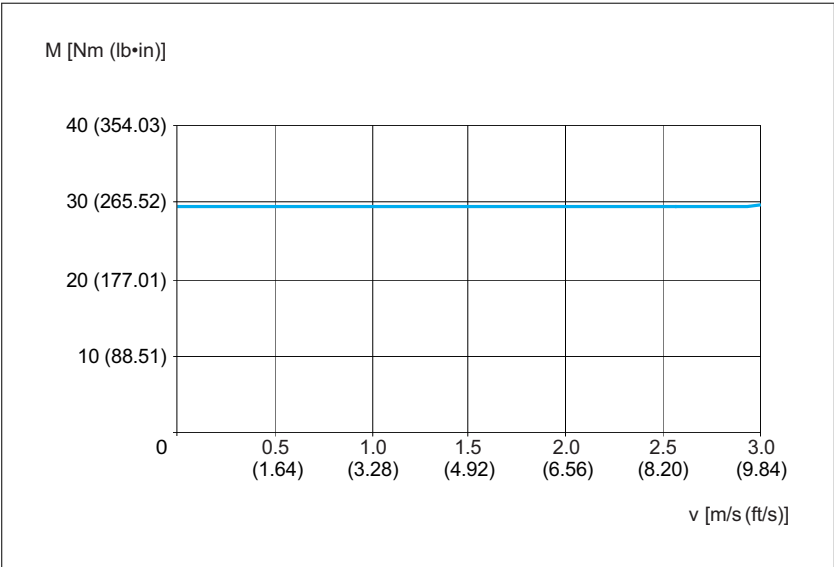


Figure 37: CAS43BR Maximum driving torque M_{max}

Maximum torque carriage M_{xdyn}

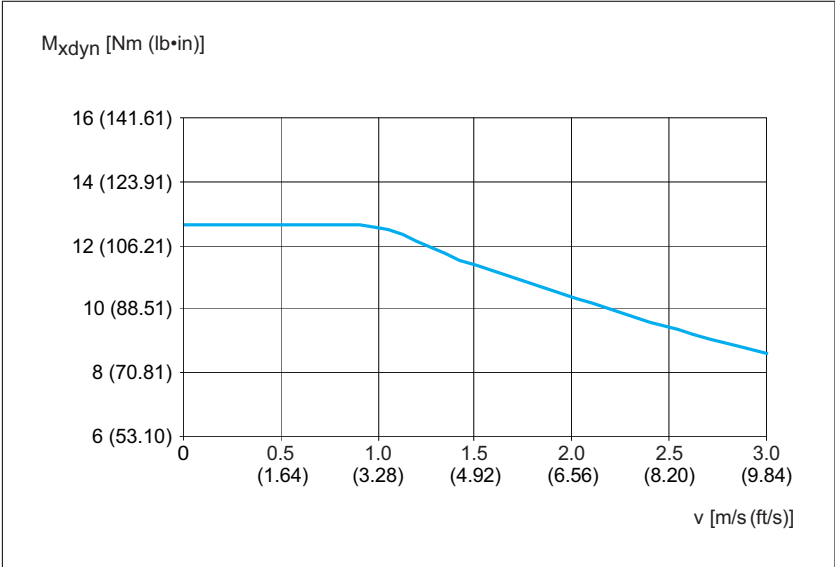


Figure 38: CAS42BR Maximum torque carriage M_{xdyn}

Maximum torque carriage M_{ydyn}

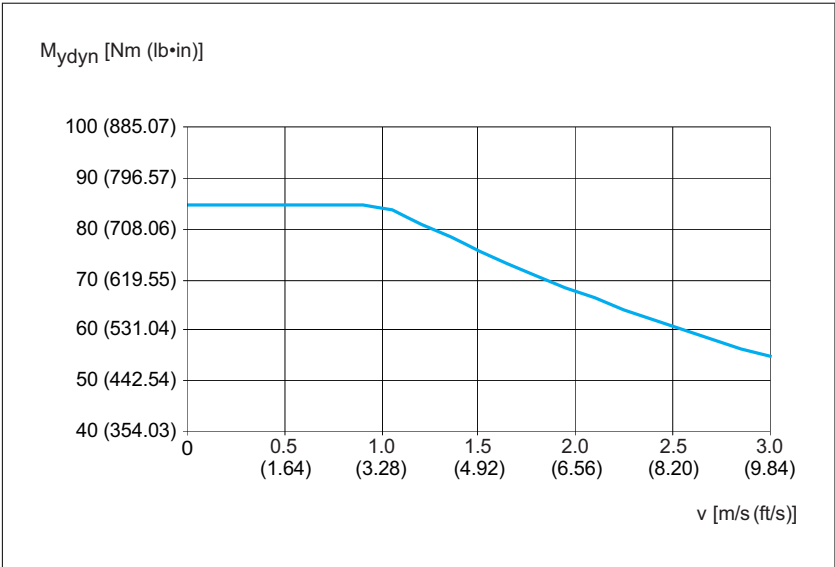


Figure 39: CAS43BR Maximum torque carriage M_{ydyn}

Maximum torque carriage M_{zdyn}

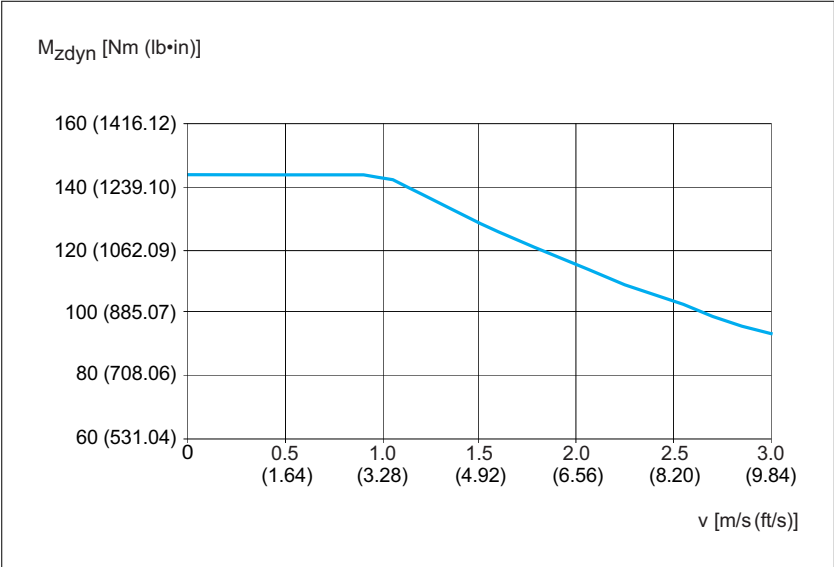


Figure 40: CAS43BR Maximum torque carriage M_{zdyn}

Service life load curve

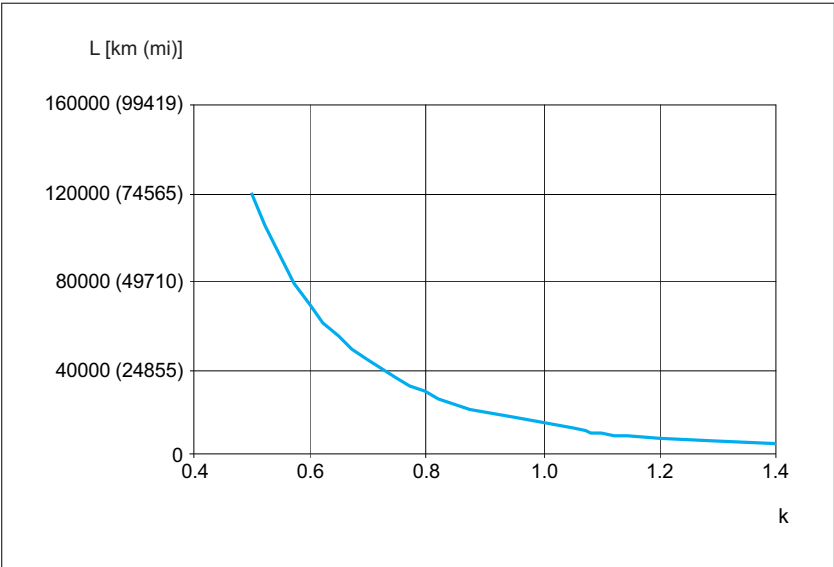


Figure 41: CAS43BR Service life load curve

2.5.3 Characteristic curves CAS43BB

Maximum feed force F_x

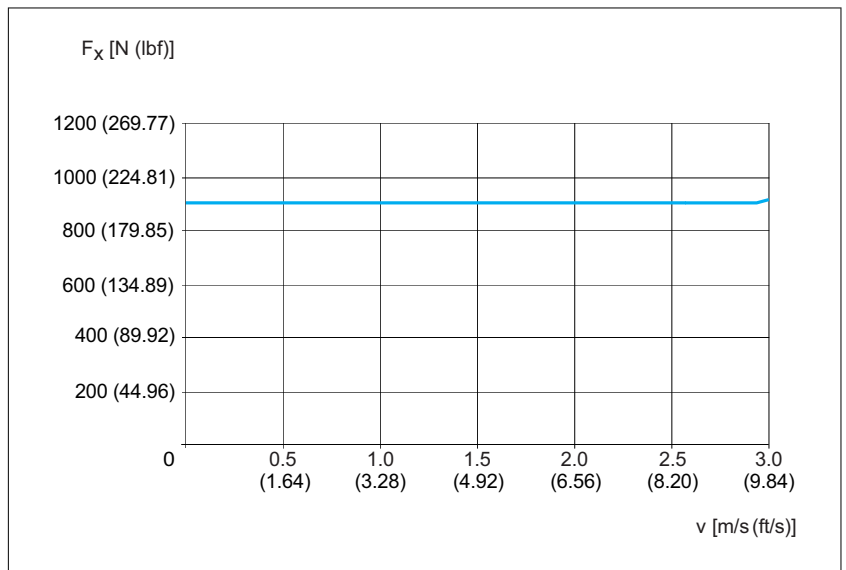


Figure 42: CAS43BB Maximum feed force F_x

Maximum force $F_{y\text{dyn}}$

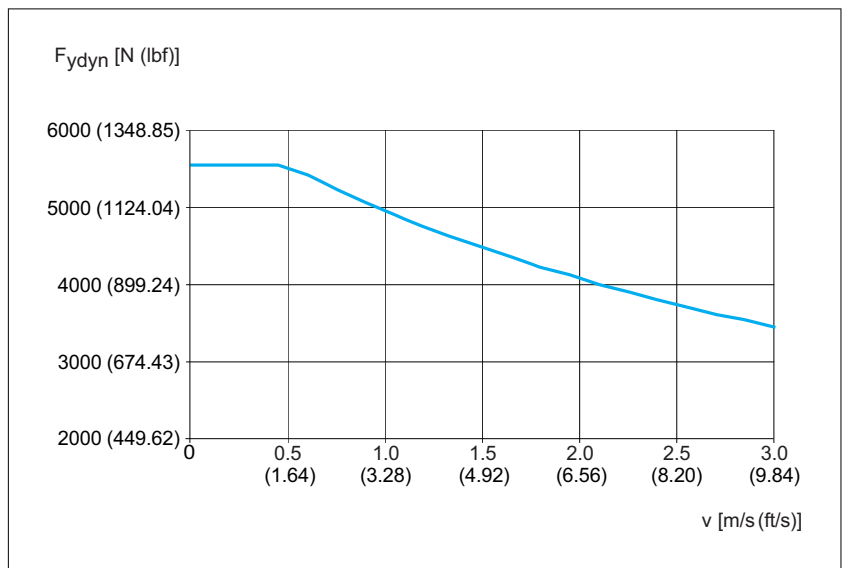


Figure 43: CAS43BB Maximum force $F_{y\text{dyn}}$

Maximum force F_{zdyn}

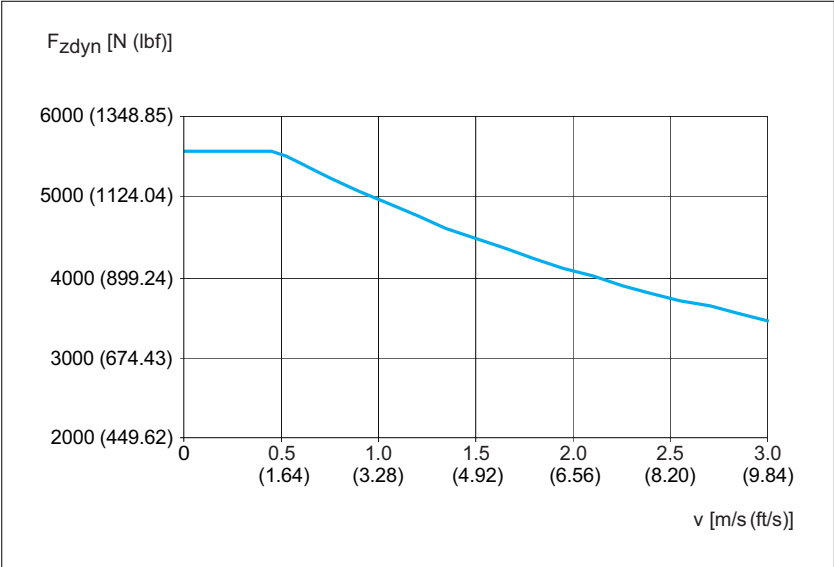


Figure 44: CAS43BB Maximum force F_{zdyn}

Maximum driving torque M_{max}

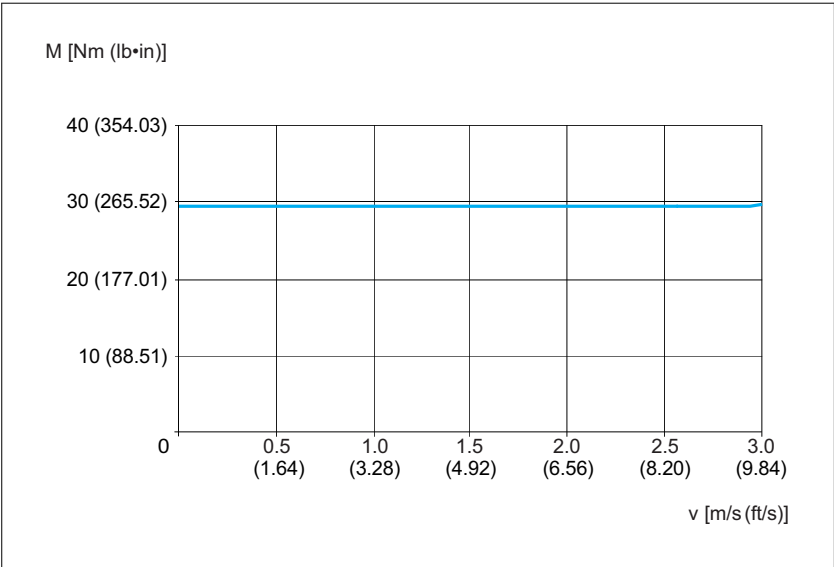


Figure 45: CAS43BB Maximum driving torque M_{max}

Maximum torque carriage M_{xdyn}

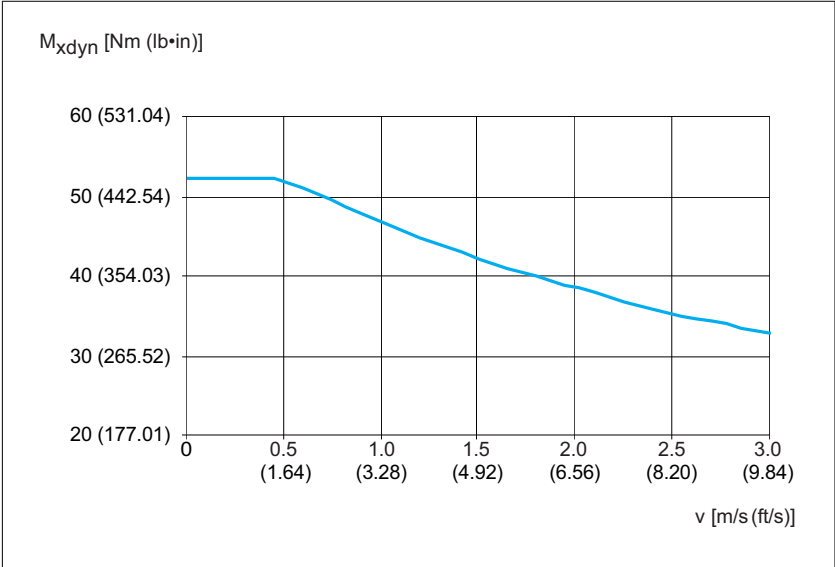


Figure 46: CAS43BB Maximum torque carriage M_{xdyn}

Maximum torque carriage M_{ydyn}

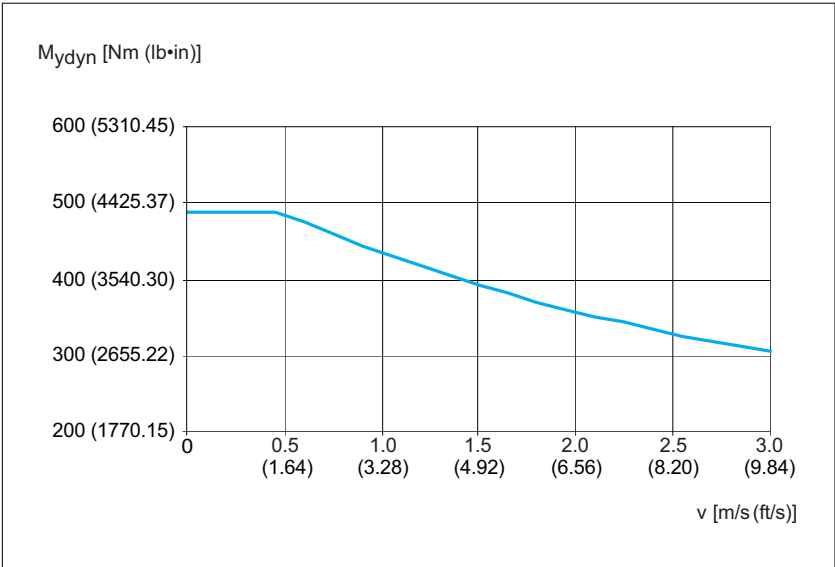


Figure 47: CAS43BB Maximum torque carriage M_{ydyn}

Maximum torque carriage M_{zdyn}

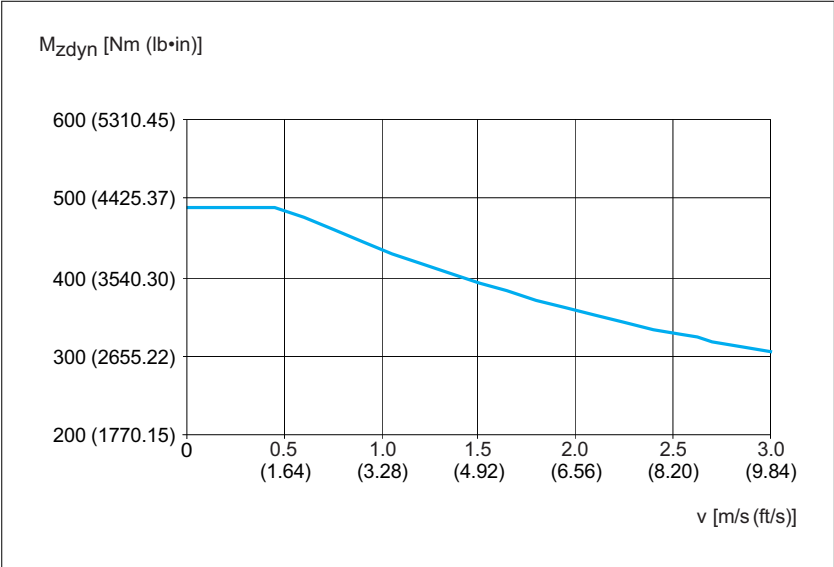


Figure 48: CAS43BB Maximum torque carriage M_{zdyn}

Service life load curve

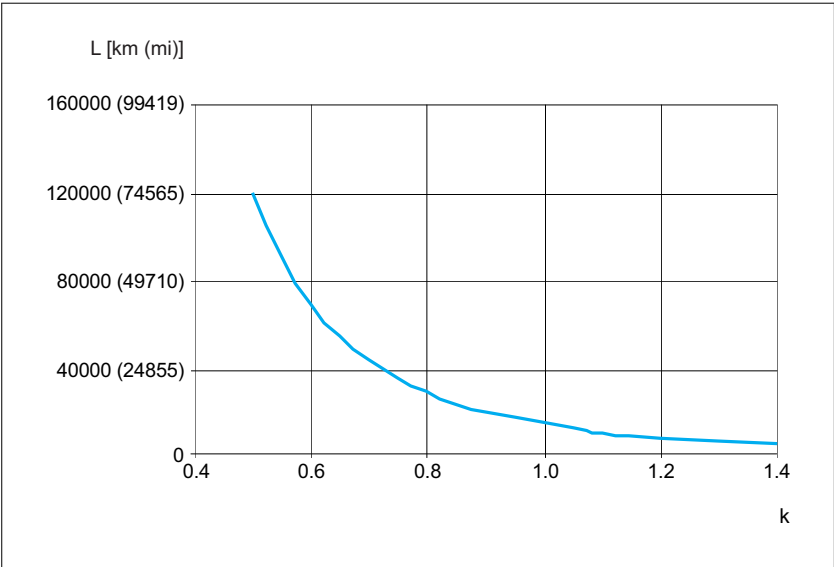


Figure 49: CAS43BB Service life load curve

2.5.4 Dimensional drawingsCAS43

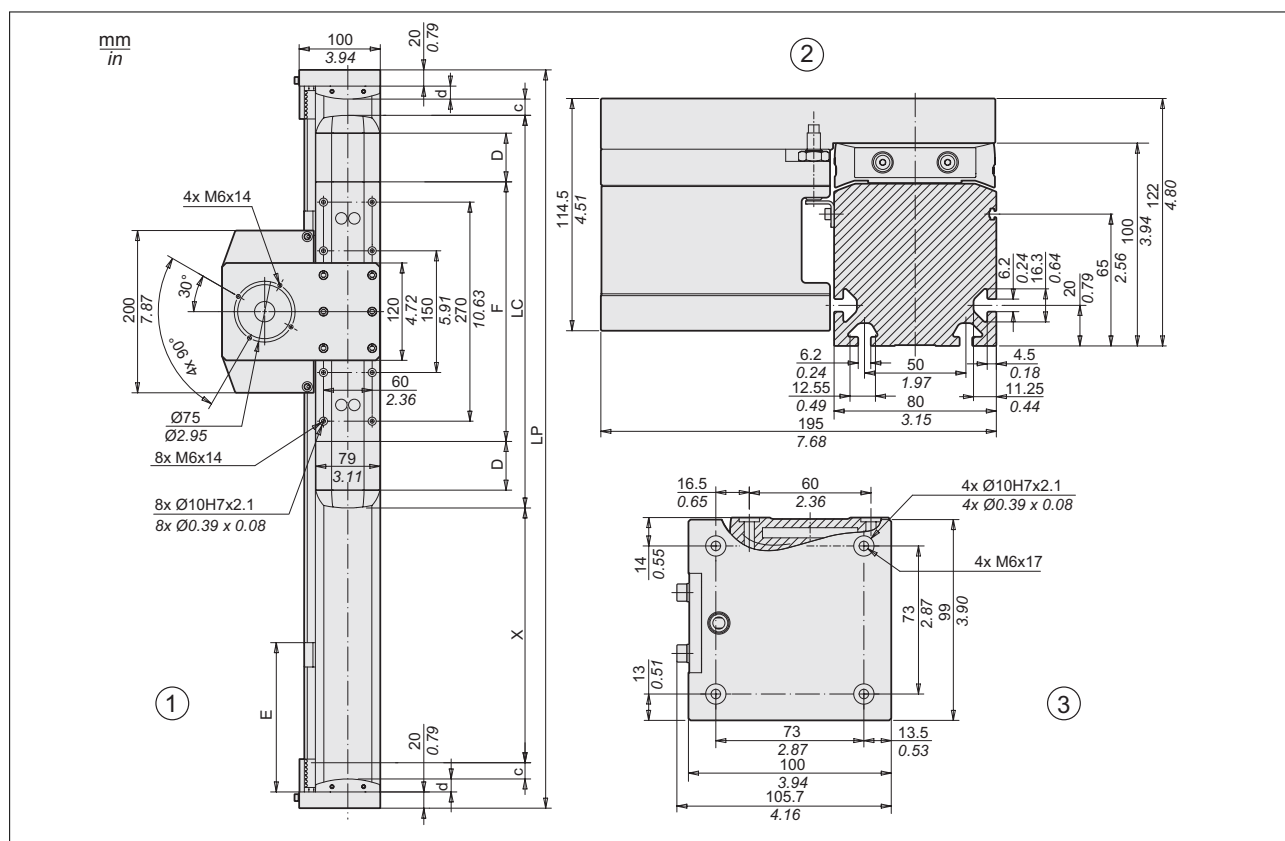


Figure 50: Dimensional drawings CAS43Bx

- (1) Axis
- (2) Section of axis
- (3) Adapter plate for the load

Cover strip			No	Yes
Total length of axis	LP	mm (in)	444 + X (17.48 + X)	594 + X (23.39 + X)
Stroke	X	mm (in)	See page 43	
Carriage length	LC	mm (in)	364 (14.33)	484 (19.06)
Profile length of carriage	F	mm (in)	320 (12.60)	
Number of tapped holes for mounting ¹⁾	n		8	
Position of contact plate	E	mm (in)	109 (4.29)	184 (7.24)
Stroke reserve up to mechanical stop	c	mm (in)	20 (0.79)	
Length of clamp fastener of cover strip	d	mm (in)	-	15
Deflection of cover strip	D	mm (in)	-	60 (2.36)

1) Prepared for locating rings (see Accessories)

2.6 CAS44

2.6.1 Technical data CAS44

Value pairs with / without cover strip are separated by "/".

Technical data cantilever axis		CAS44BB
Drive element		Toothed belt 50HTD-8M
Guide type		Recirculating ball bearing guide (size 25)
Payload	kg (lb)	50 (110.23)
Carriage type		Type 3
Carriage length	mm (in)	650 / 490 (25.59 / 19.29)
Feed per revolution	mm/rev.	264 (10.39)
Effective diameter toothed belt pulley	mm (in)	84.034 (0.03937)
Maximum feed force $F_{x\max}^{1)}$	N (lbf)	2150 (483.34)
Maximum velocity $^{2)}$	m/s (ft/s)	3 (9.84)
Maximum acceleration $^{2)}$	m/s ² (ft/s ²)	20 (65.62)
Maximum driving torque $M_{\max}^{1)}$	Nm (lb·in)	90 (796.57)
Breakaway torque 0 stroke axis	Nm (lb·in)	4.0 (35.40)
Moment of inertia 0 stroke axis	kgcm ² (oz·in·s ²)	299.9 / 239.3 (42.47 / 33.89)
Moment of inertia per 1 m of stroke	kgcm ² (oz·in·s ²)	292.1 (41.36)
Moment of inertia per 1 kg of payload	kgcm ² (oz·in·s ²)	17.7 (2.51)
Maximum force $F_{y\text{dynmax}}^{1)}$	N (lbf)	7890 (1773.74)
Maximum force $F_{z\text{dynmax}}^{1)}$	N (lbf)	7890 (1773.74)
Maximum torque $M_{y\text{dynmax}}^{1)}$	Nm (lb·in)	1021 (9036.61)
Maximum torque $M_{z\text{dynmax}}^{1)}$	Nm (lb·in)	1021 (9036.61)
Max. torque $M_{x\text{dynmax}}^{1)}$	Nm (lb·in)	85 (752.31)

1) The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves).

2) Load- and stroke-dependent

Technical data cantilever axis		CAS44BB
Mass 0 stroke axis	kg (lb)	36.5 / 32.1 (80.47 / 70.77)
Mass per 1 m of stroke	kg (lb)	16.6 (36.60)
Moving mass cantilever / 0 stroke axis	kg (lb)	15.9 / 12.5 (35.05 / 27.56)
Maximum stroke ¹⁾	mm (in)	1200 (47.24)
Minimum stroke ²⁾	mm (in)	13 (0.51)
Repeatability ³⁾	mm (in)	± 0.05 (0.00197)
Diameter motor shaft	mm (in)	12 ... 32 (0.47 ... 1.26)
Cross section axis body (W x H)	mm (in)	110 x 110 (4.33 x 4.33)
Axial area moment of inertia I _x I _y	mm ⁴	4713490 6624690
Modulus of elasticity (aluminum) E	N/mm ²	72000
Load rating linear guide C _{stat}	N (lbf)	52400 (11779.99)
Load rating linear guide C _{dyn}	N (lbf)	31700 (7126.44)
Service life ³⁾	km (mi)	15000 (9321)

1) Inquire for greater stroke

2) Minimum stroke required for lubrication of the linear guide

3) The service life depends on the forces and torques, see chapter "2.7 Service life".

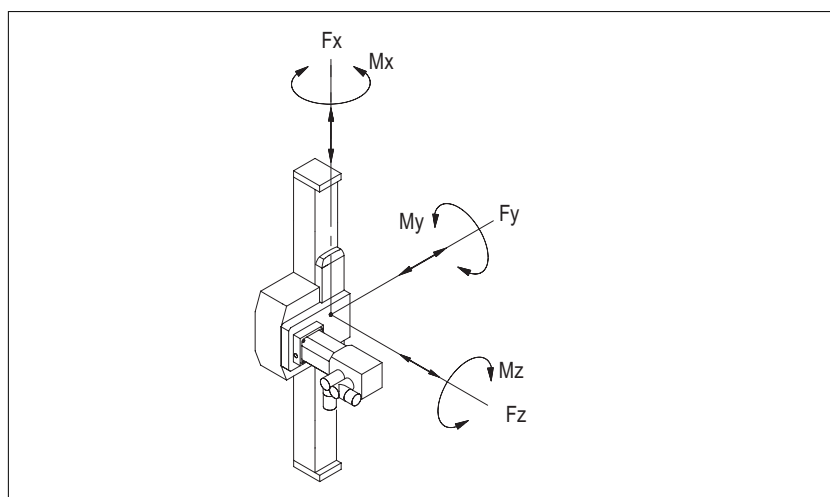


Figure 51: Forces and torques

2.6.2 Characteristic curves CAS44BB

Maximum feed force F_x

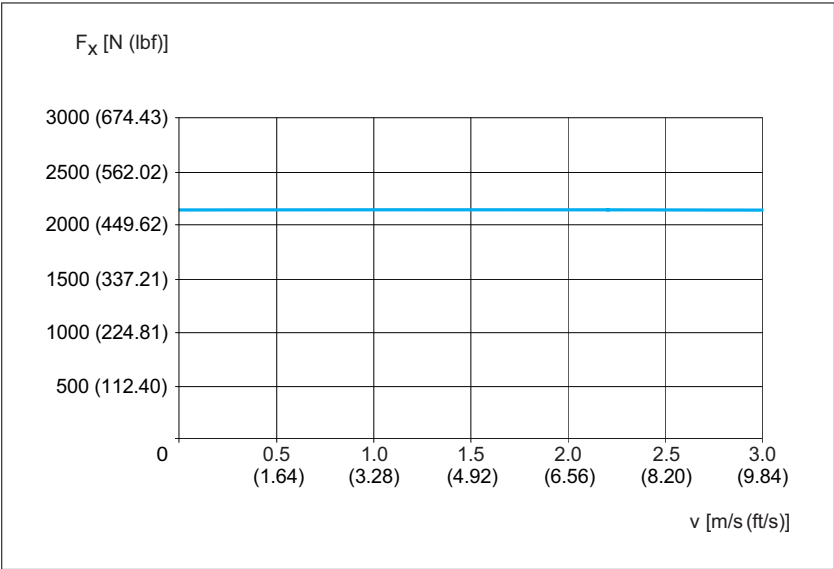


Figure 52: CAS44BB Maximum feed force F_x

Maximum force $F_{y\text{dyn}}$

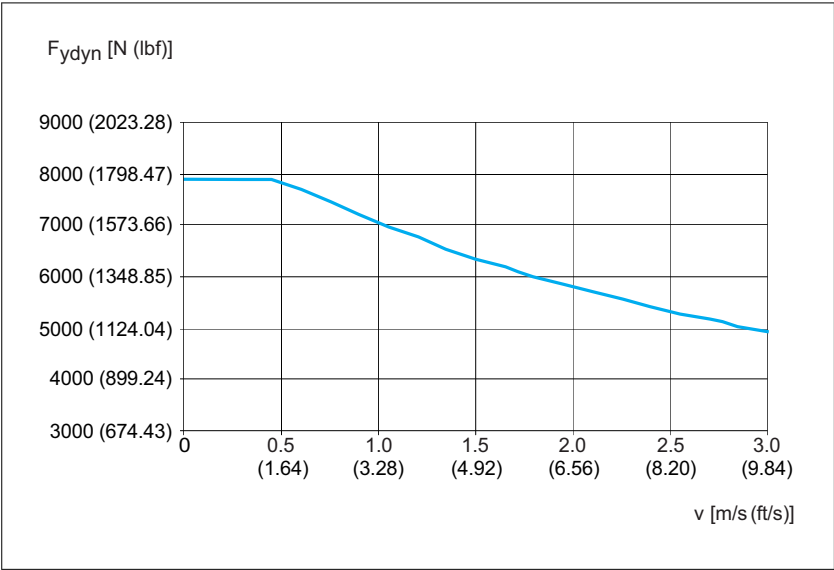


Figure 53: CAS44BB Maximum force $F_{y\text{dyn}}$

Maximum force F_{zdyn}

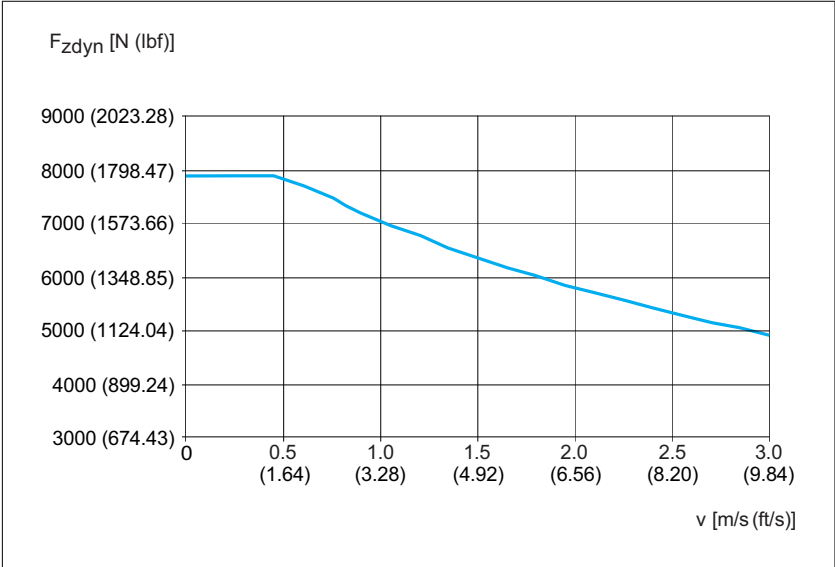


Figure 54: CAS44BB Maximum force F_{zdyn}

Maximum driving torque M_{max}

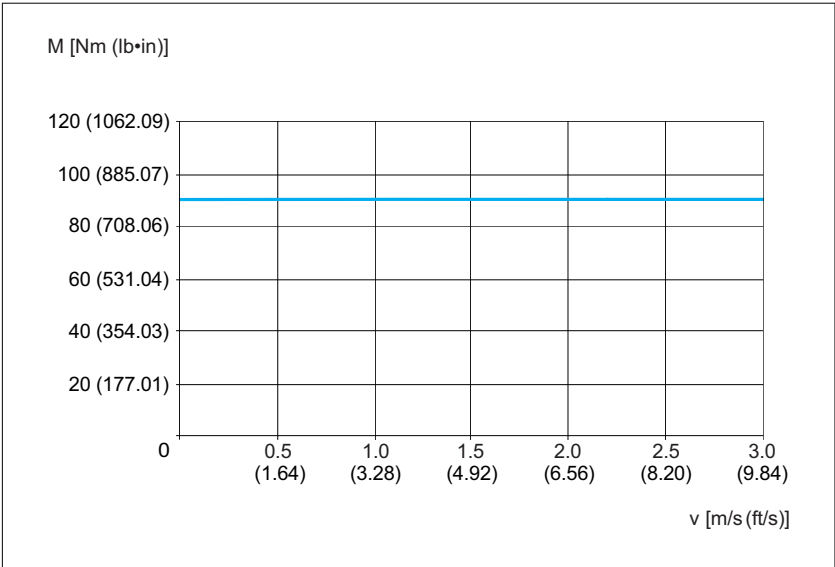


Figure 55: CAS44BB Maximum driving torque M_{max}

Maximum torque carriage M_{xdyn}

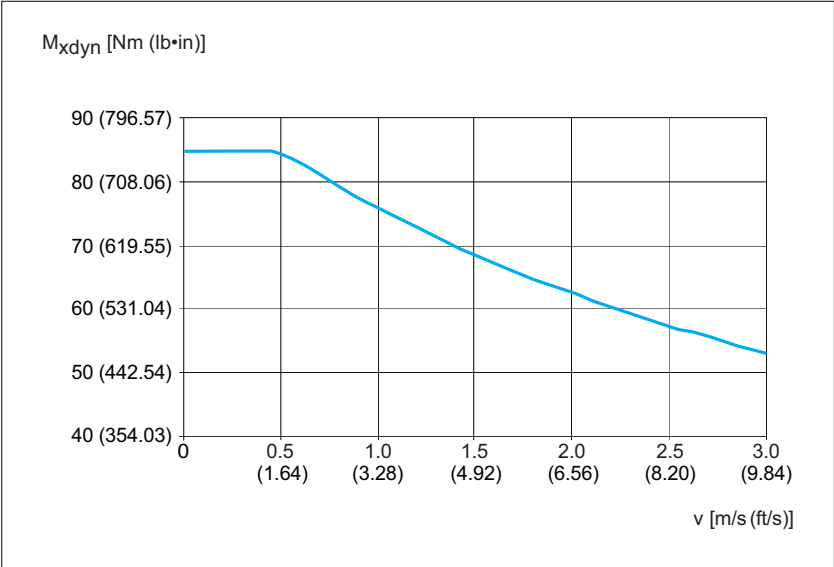


Figure 56: CAS44BB Maximum torque carriage M_{xdyn}

Maximum torque carriage M_{ydyn}

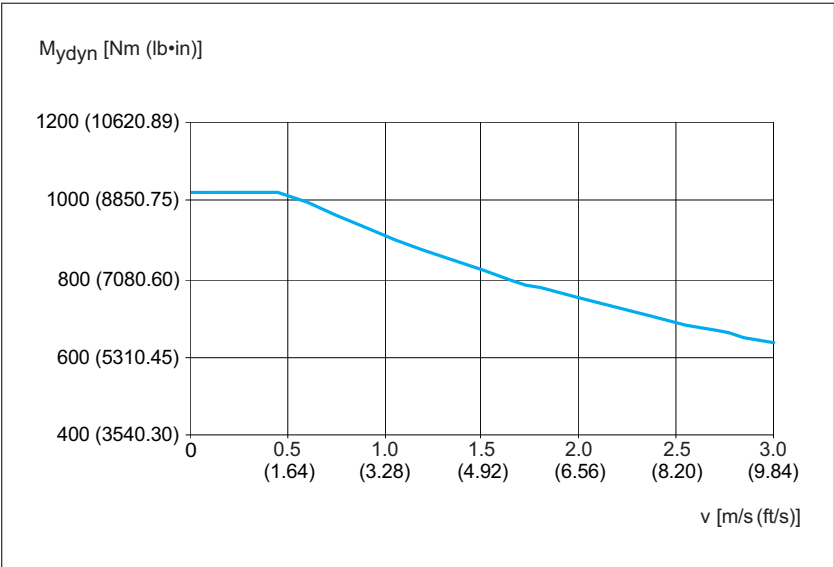


Figure 57: CAS44BB Maximum torque carriage M_{ydyn}

Maximum torque carriage M_{zdyn}

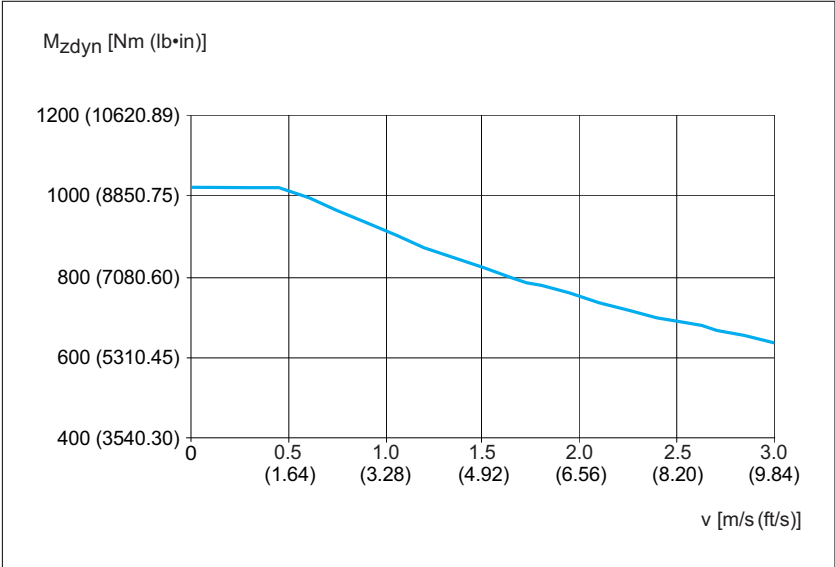


Figure 58: CAS44BB Maximum torque carriage M_{zdyn}

Service life load curve

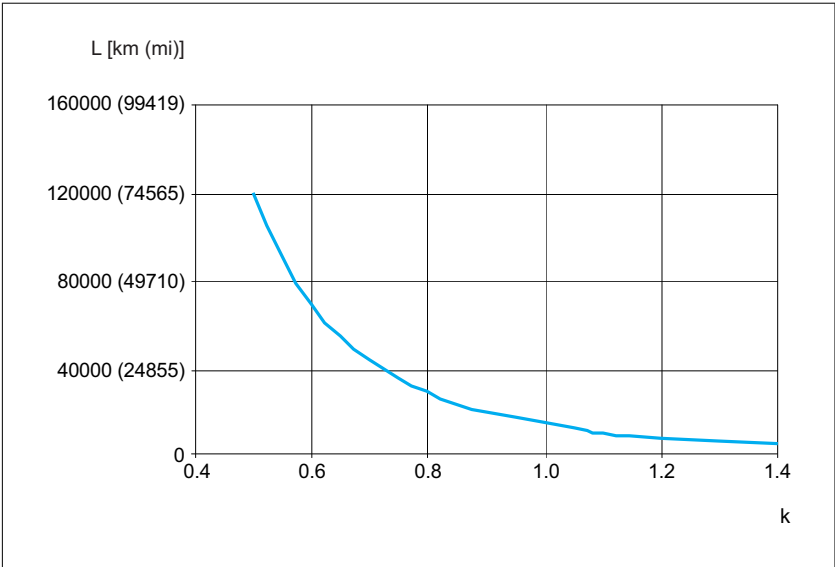


Figure 59: CAS44BB Service life load curve

2.6.3 Dimensional drawings CAS44

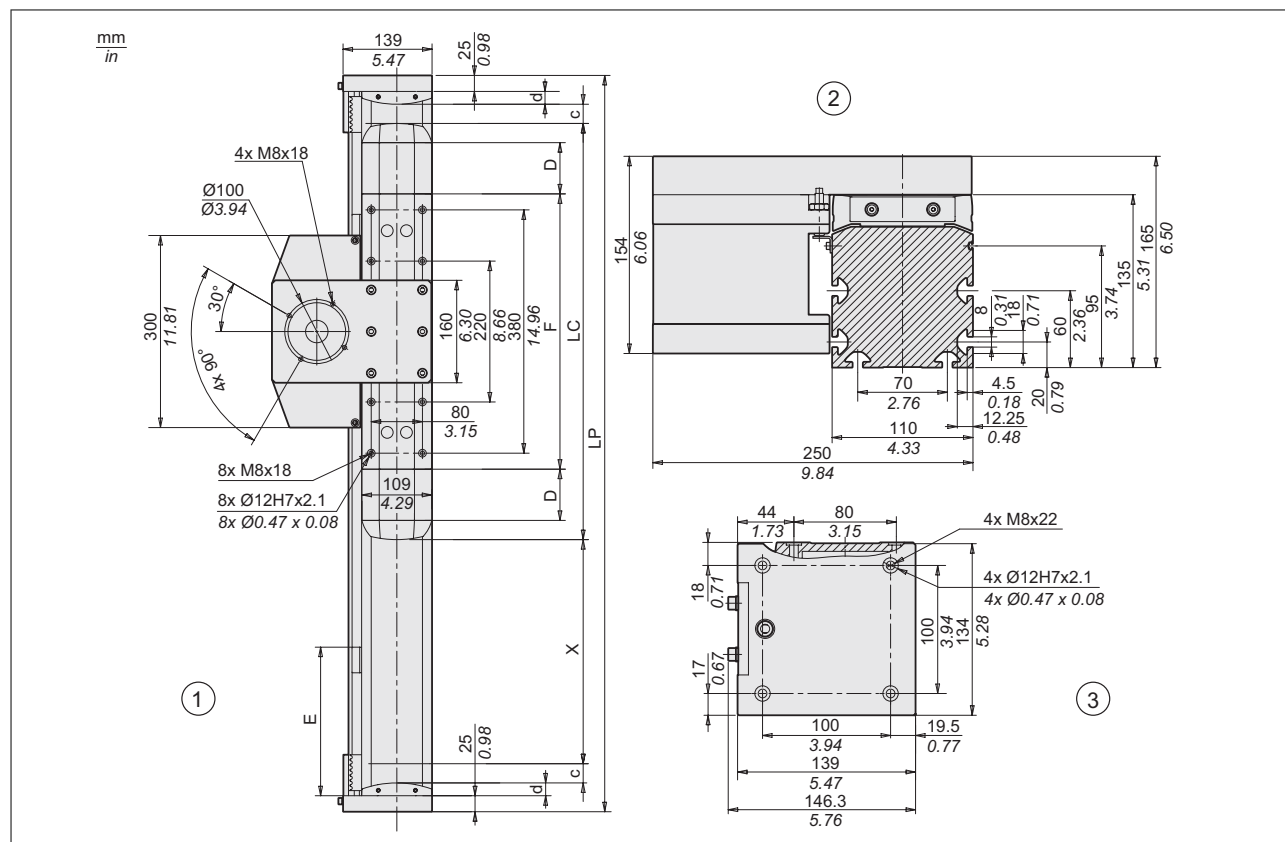


Figure 60: Dimensional drawings CAS44BB

- (1) Axis
(2) Section of axis
(3) Adapter plate for the load

Cover strip			No	Yes
Total length of axis	LP	mm (in)	600 + X (23.62 + X)	800 + X (31.50 + X)
Stroke	X	mm (in)	See page 54	
Carriage length	LC	mm (in)	490 (19.29)	650 (25.59)
Profile length of carriage	F	mm (in)	430 (16.93)	
Number of tapped holes for mounting ¹⁾	n		8	
Position of contact plate	E	mm (in)	142 (5.59)	232 (9.13)
Stroke reserve up to mechanical stop	c	mm (in)	30 (1.18)	
Length of clamp fastener of cover strip	d	mm (in)	-	20 (0.79)
Deflection of cover strip	D	mm (in)	-	80 (3.15)

1) Prepared for locating rings (see Accessories)

2.7 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 .

$$\frac{F_y}{F_{y\max}} + \frac{F_z}{F_{z\max}} + \frac{M_x}{M_{x\max}} + \frac{M_y}{M_{y\max}} + \frac{M_z}{M_{z\max}} = k$$

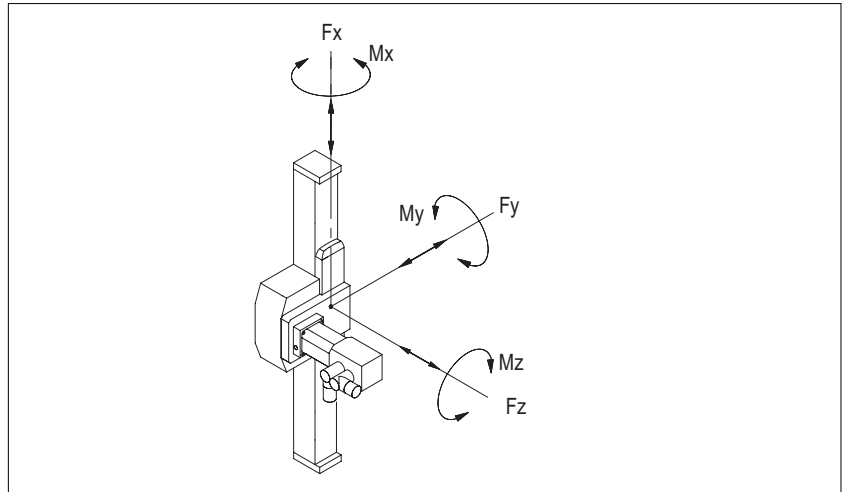


Figure 61: Forces and torques

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 "2 Technical Data".

2.8 Positioning accuracy and repeatability

Positioning accuracy is the tolerance between the specified position and end position reached, measured at the carriage. To determine this value, the carriage is moved to the end position from different directions at different velocities.

Repeatability is the accuracy with which it is possible to move to a previous position again under the same conditions. To determine this value, the carriage is moved to the end position from the same direction at the same velocity.

Positioning accuracy and repeatability depend on various factors such as:

- Temperature
- Load changes
- Different velocities
- Different accelerations
- Pitch of the toothed belt
- Stiffness of the toothed belt
- Accuracy of the switching point of the sensors
- Backlash of various components (for example, gearbox)
- Friction (for example, ball bearings, guide carriage, rollers, ball screw drive, toothed belt, cover strip)

2.9 Motor

See the motor manual for information on the motor.

3 Installation

WARNING

GREAT MASS OR FALLING PARTS

- Use a suitable crane or other suitable lifting gear for mounting the product if this is required by the mass of the product.
- Use the necessary personal protective equipment (for example, safety shoes, safety glasses and protective gloves).
- Mount the product in such a way (tightening torque, securing screws) that parts cannot come loose, even in the case of shocks and vibration.
- Take all necessary measures to avoid unanticipated movements of linear axes mounted in vertical or tilted positions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

If the power stage is disabled unintentionally, for example as a result of power outage, errors or functions, the motor is no longer decelerated in a controlled way.

WARNING

UNINTENDED EQUIPMENT OPERATION

Verify that movements without braking effect cannot cause injuries or equipment damage.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The metal surfaces of the product may exceed 100 °C (212 °F) during operation.

WARNING

HOT SURFACES

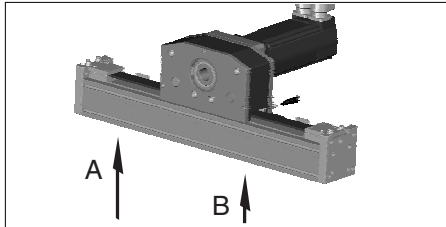
- Avoid unprotected contact with hot surfaces.
- Do not allow flammable or heat-sensitive parts in the immediate vicinity of hot surfaces.
- Verify that the heat dissipation is sufficient by performing a test run under maximum load conditions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.1 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.

Transport the product in its packaging as close as possible to the installation site.



The linear axis may only be lifted at points A and B (see figure). The distance between the end block and point A and between the end block and point B must be one fourth of the total length of the linear axis. If an axis with a mounted motor is lifted, points A and B are to be moved to balance the load. The axis must not be lifted via the motor. Support the motor when lifting the axis.

3.2 Compatibility with foreign substances

The axis has been tested for compatibility with foreign substances according to the latest knowledge. However, it is impossible to follow up on all further developments of all substances such as lubricants, cleaning agents or solvents. Therefore, you must perform a compatibility test prior to using new substances.

The magnetic strips for fastening the cover strips (optional) are glued. The glue is not resistant to environments containing oil or solvents.

NOTICE

INOPERABLE EQUIPMENT

Do not install axes with cover strips in environments containing oil or solvents.

Failure to follow these instructions can result in equipment damage.

3.3 Mechanical installation

- Accessibility for servicing* When mounting the linear axis, the motor and the sensors, keep in mind that they may have to be accessed for servicing.
- Mounting position* The linear axis can be installed in any position. However, all external forces and torques must be within the permissible value ranges. Take into account the mass of the linear axis that may act as a load, depending on the mounting position.

3.3.1 Standard tightening torques

Special tightening torques are applicable for mounting sensors and elastomer couplings; these tightening torques are listed in the appropriate chapters.

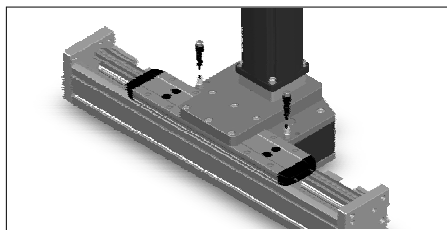
The following, generally applicable tightening torques apply to mounting the payload and fastening slot nuts, clamping claws, motor and contact plate with hex socket screws.

Thread	Wrench size in mm	Maximum tightening torque in Nm (lb·in)
M3	2.5	1.1 (9.74)
M4	3	2.5 (22.13)
M5	4	5 (44.25)
M6	5	8.5 (75.23)
M8	6	21 (185.87)
M10	8	42 (371.73)
M12	10	70 (619.55)

3.3.2 Mounting the linear axis



Unless otherwise specified, the standard tightening torques indicated on page 65 apply.



A mounting surface with threads is located at the left and right top of the carriage for mounting the linear axis.

Each thread is provided with a counterbore for a locating dowel for reproducible mounting of the linear axis. See chapter "6 Accessories and spare parts" for suitable locating dowels.

Carriage

Carriage		CAS41	CAS42	CAS43	CAS44
Thread		M5	M5	M6	M8
Depth	mm (in)	10 (0.39)	10 (0.39)	12 (0.47)	16 (0.63)
Diameter counterbore for locating dowel	mm (in)	8 (0.31)	8 (0.31)	10 (0.39)	12 (0.47)

3.3.3 Mounting the contact plate

2 contact plates for sensors are provided at the carriage.

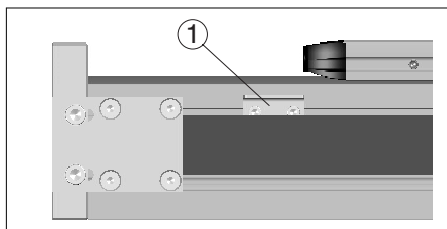
Special tightening torques

Contact plate		CAS4x
Screw ISO 4762 - 8.8		M3 x 4
Wrench size	mm	2.5
Tightening torque	Nm (lb·in)	0.6 (5.31)

Before mounting

You need a set of hex keys and a torque wrench with hexagon socket.

Procedure



- ▶ Loosen the two M3 screws at the contact plate (1) until the contact plate can be moved.
- ▶ Slide the contact plate to the desired position along the T slot.
- ▶ Tighten the screws with the tightening torque specified on page 66.

If the tightening torque is too high, this will destroy the thread of the fastening nut.

3.3.4 Mounting the sensors

The use of limit switches can provide some protection against hazards (for example, collision with mechanical stop caused by incorrect reference values).

⚠ WARNING

LOSS OF CONTROL

- Ensure that limit switches are installed if your application, based on your risk assessment, requires limit switches.
- Verify correct connection of the limit switches.
- Verify that the limit switches are mounted in a position far enough away from the mechanical stop to allow for an adequate stopping distance.
- Verify correct parameterization and function of the limit switches.

Failure to follow these instructions can result in death, serious injury, or equipment damage.



If possible, use normally closed contacts as limit switches so that a wire break can be signaled as an error.

2 fastening threads for mounting of sensors are located at the side plate of the carriage.



Unless otherwise specified, the standard tightening torques indicated on page 65 apply.

Before mounting

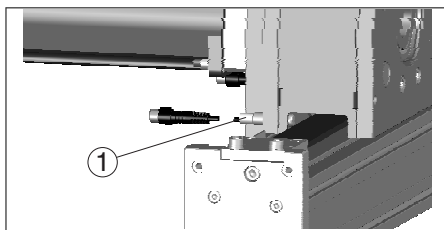
See chapter "6 Accessories and spare parts" for suitable sensors.

You need a set of hex keys and a feeler gauge.

- ▶ Clean all parts.
- ▶ Inspect all parts for damage.
- ▶ Verify the sensor for correct type and function.
- ▶ Verify that your controller and your interface are suitable for the sensor.

Procedure

Since the sensor operates inductively, it must have a specific distance from the contact plate. This so-called "switching distance" amounts to $0.5 \pm 0.1 \text{ mm}$ ($0.0019685 \pm 0.000394 \text{ in}$).



- ▶ Move the axis body until the contact plate is above the fastening thread at the side plate (1).
- ▶ Screw the sensor into the fastening thread until the switching distance is obtained.

Measure the distance using a feeler gauge.

- ▶ Tighten the screw for holding the sensor with a tightening torque of 2 Nm (17.70 lb-in).
- ▶ Finally, verify correct switching distance with the feeler gauge.

3.3.5 Mounting the motor and the gearbox

The motor or the gearbox are coupled by means of a preloaded elastomer coupling.

The motor or the gearbox can be mounted in different arrangements (turned in increments of $4 \times 90^\circ$).



Unless otherwise specified, the standard tightening torques indicated on page 65 apply.

Special tightening torques

Expanding hub		CAS41	CAS42	CAS43	CAS44
Screw ISO 4762 - 8.8		M4 x 16	M6 x 18	M8 x 30	M10 x 60
Wrench size	mm	3	5	6	8
Tightening torque	Nm (lb-in)	2.9 (25.67)	10 (88.51)	25 (221.27)	49 (433.69)

Clamping hub		CAS41	CAS42	CAS43	CAS44
Screw ISO 4762 - 10.9		M3 x 10	M6 x 16	M6 x 20	M8 x 25
Wrench size	mm	2.5	5	5	6
Tightening torque	Nm (lb-in)	1.9 (16.82)	14 (123.91)	14 (123.91)	35 (309.78)
Mounting dimension	mm (in)	8 (0.31)	12 (0.47)	14 (0.55)	14 (0.55)

Before mounting

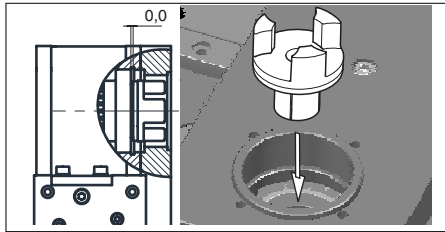
See chapter "6 Accessories and spare parts" for suitable elastomer couplings (expanding hubs, elastomer spiders, clamping hubs).

You need a set of hex keys and a torque wrench with hexagon socket.

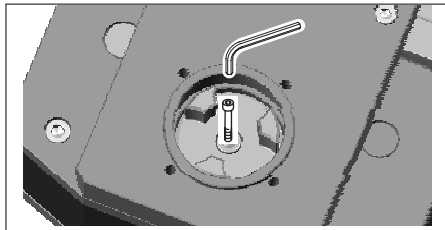
NOTE: Do not use ball head hex keys. Excessive torque may cause the ball head to tear off. A torn off ball head is difficult to remove from the screw.

- Clean all parts.
- Inspect all parts for damage.

NOTE: Polluted or damaged parts may cause run-out which has an adverse effect on the service life of the elastomer coupling and the linear axis.

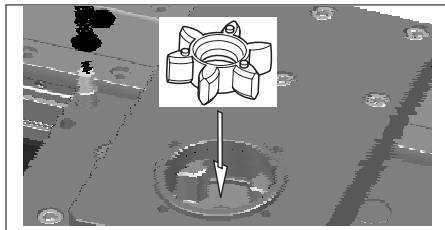
Mounting the elastomer coupling

- ▶ Push the expanding hub into the hollow shaft of the toothed belt pulley until the expanding hub has even contact.



- ▶ Tighten the screw of the expanding shaft with the tightening torque specified on page 68.

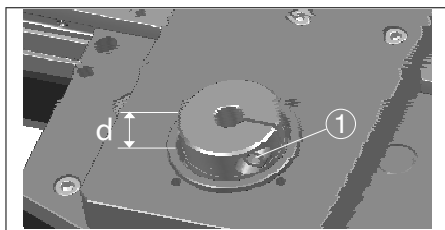
If the end block is in the end position, the toothed belt pulley does not turn along.



- ▶ Fit the elastomer spider onto the expanding hub.

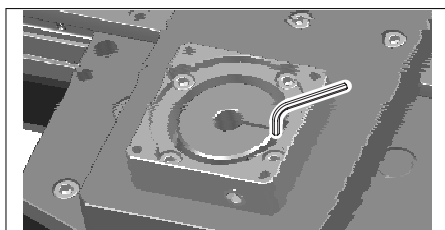
Slightly greasing the elastomer spider or the hub facilitates the fitting process. Use only mineral oil based lubricants without additives or silicon based lubricants.

NOTE: If the elastomer spider can be fitted too easily (without pre-loading), it must be replaced.



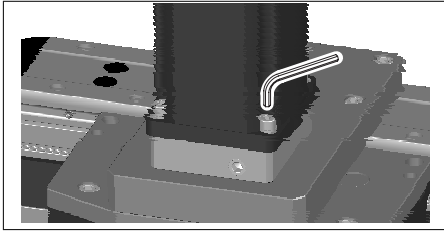
- ▶ Fit the second clamping hub. Note the installation dimension d measured to the collar specified on page 68.

Verify the orientation of the clamping screw (1), it should be upwards, if possible. The clamping screw is tightened at a later point in time through the hole in the motor adapter plate.

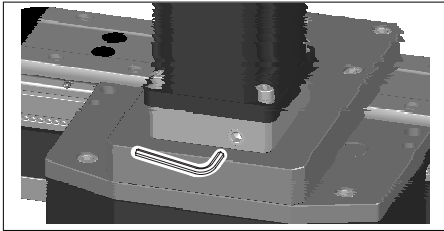


- ▶ Fit the motor adapter plate with even contact. Verify correct position of the hole at the side so that you can tighten the clamping hub screw through the hole.
- ▶ Tighten the 4 screws.

Motor mounting only

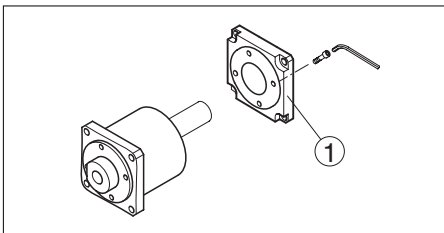


- ▶ If possible, position the linear axis in such a way that the motor is vertically upwards during mounting. Fit the motor onto the motor adapter plate with even contact. Secure the motor to keep it from falling down.
- ▶ If the gearbox has a parallel keyway, align the keyway and the slot of the clamping hub.
- ▶ Fasten the motor to the motor adapter plate with the 4 screws and washers.

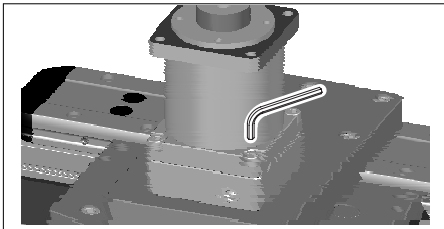


- ▶ Remove the screw plug in the hole at the side of the motor adapter plate.
- ▶ Tighten the screw of the clamping hub through the hole with the tightening torque specified on page 68.
- ▶ Close the hole with the screw plug.

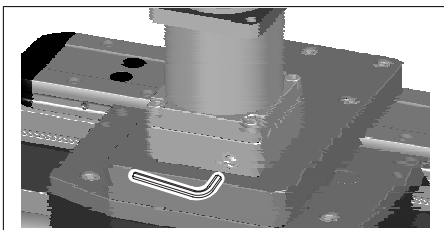
Gearbox mounting only



- A flange plate (1) is required if the gearbox does not have its own flange.
- ▶ Mount the flange plate to the gearbox with the 4 screws. Verify that the flange plate has even contact.



- ▶ Fit the gearbox onto the motor adapter plate with even contact. Secure the gearbox to keep it from falling down.
- ▶ If the gearbox has a parallel keyway, align the keyway and the slot of the clamping hub to avoid run-out.
- ▶ Fasten the motor to the motor adapter plate with the 4 screws and washers.



- ▶ Remove the screw plug in the hole at the side of the motor adapter plate.
- ▶ Tighten the screw of the clamping hub through the hole with the tightening torque specified on page 68.
- ▶ Close the hole with the screw plug.



Refer to the gearbox manual for mounting a motor to the gearbox.

3.3.6 Mounting a shaft extension

A shaft extension can be used to couple a motor or an encoder.

Special tightening torques

Shaft extension		CAS41	CAS42	CAS43	CAS44
Screw ISO 4762 - 8.8		M4 x 16	M6 x 18	M8 x 30	M10 x 60
Wrench size	mm	3	5	6	8
Tightening torque	Nm (lb-in)	2.9 (25.67)	10 (88.51)	25 (221.27)	49 (433.69)

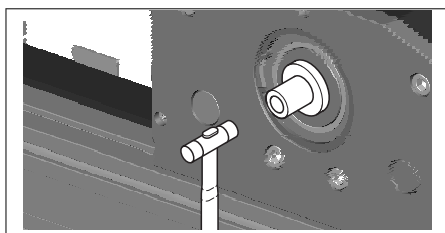
Before mounting

See chapter "6 Accessories and spare parts" for suitable shaft extensions.

You need a set of hex keys and a torque wrench with hexagon socket and a dead blow hammer.

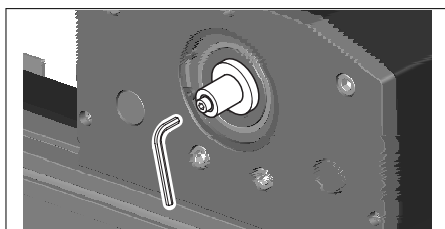
- ▶ Clean all parts.
- ▶ Inspect all parts for damage.

Procedure



- ▶ Slide the shaft extension into the hollow shaft on the end block until it has even contact with the pulley.

The fit of approx. 2 mm may require slight taps on the shaft extension with a dead blow hammer (not on the screw head).

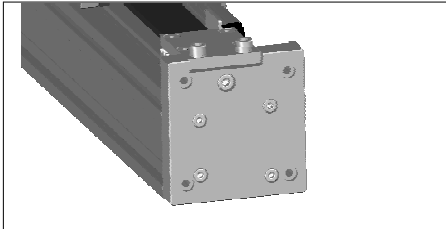


- ▶ Tighten the screw with the tightening torque specified on page 71. If the axis body is in the end position, the toothed belt pulley does not turn along.

3.3.7 Mounting the payload



Unless otherwise specified, the standard tightening torques indicated on page 65 apply.



Mounting threads in the end blocks allow you to fasten the payload. Each thread is provided with a counterbore for a locating dowel for reproducible mounting of the payload. See chapter "6 Accessories and spare parts" for suitable locating dowels.

End block

End block		CAS41	CAS42	CAS43	CAS44
Thread		M5	M5	M6	M8
Depth	mm (in)	10 (0.39)	10 (0.39)	12 (0.47)	16 (0.63)
Diameter counterbore for locating dowel	mm (in)	8 (0.31)	8 (0.31)	10 (0.39)	12 (0.47)

3.4 Electrical installation

3.4.1 Connecting the sensors

The sensors are equipped with an M8 x 1 connector.

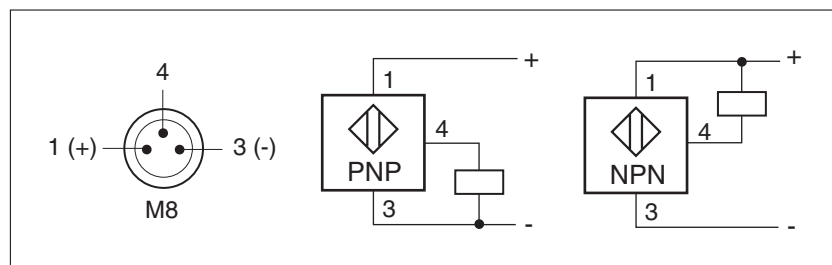


Figure 62: Connection assignment sensors

Pin	Description	Color
1	PELV supply voltage (+)	BN (brown)
3	PELV supply voltage (-)	BU (blue)
4	Output	BK (black)

The maximum cable length is 100 mm (3.94 in). Extension cables with various lengths are available as accessories, see chapter "6 Accessories and spare parts".

3.4.2 Motor connection

See the motor manual for details on connecting the motor.

3.5 Verifying installation

Verify that you have correctly installed the product after having performed the above steps.

- ▶ Verify correct mounting and cabling of the product. In particular, check the mains connection and the 24V connection.
- Did you connect all protective ground conductors?
- Do you use correct fuses?
- Did you isolate all unused cable ends?
- Did you properly install and connect all cables and connectors?
- Did you properly install the sensors?
- Do the sensors function as required?
- Can the cantilever move unobstructed along the entire stroke?

4 Commissioning

When the axis is operated for the first time, there is a risk of unintended equipment operation caused by possible wiring errors or unsuitable parameters. The carriage of linear axes mounted in vertical or tilted positions can move in an unanticipated way.

WARNING

UNINTENDED EQUIPMENT OPERATION

- Verify that the axis is properly fastened so it cannot come loose even in the case of fast acceleration.
- Take all necessary measures to ensure that the carriage of linear axes mounted in vertical or tilted positions cannot move in an unanticipated way.
- Verify that a functioning button for emergency stop is within reach.
- Verify that the system is free and ready for the movement before starting the system.
- Run initial tests at reduced velocity.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

4.1 Commissioning procedure



You must also re-commission an already configured product if you want to use it under changed operating conditions.

- ▶ Verify correct installation, see chapter "3.5 Verifying installation".
- ▶ For commissioning, respect the instructions provided in the manual of the motor used and in the manual of the drive used.
- ▶ Verify that the actual loads conform to the required and engineering data prior to operating the product.
- ▶ Limit the maximum torque of the motor in accordance with the maximum driving torque of the linear axis.

The maximum permissible dynamic forces and torques decrease at increasing velocities (see characteristic curves).

- ▶ Verify the function of the sensors. The integrated LED must indicate the switching state correctly.
- ▶ Verify the distance between the sensors and the mechanical stops. The movement must be stopped by the sensors before the carriage reaches a mechanical stop.
- ▶ Perform initial tests at reduced velocity. During these tests, verify that the controller responds correctly to the sensors in both directions of movement.
- ▶ Verify that the ambient conditions and actual loads conform to the required and engineering data. See chapter "2.1 Ambient conditions".

5 Diagnostics and troubleshooting

5.1 Troubleshooting

Error	Cause	Troubleshooting
Sensor overtraveled	Sensor	Adjust or replace sensors, see page 97
	Controller	Check controller
Motor load increases, controller switches off because of overload.	Guides under mechanical tension or excessive friction caused by poor lubrication.	Contact service
Noise and vibrations at high velocities	Velocity too high	Reduce velocity
	Poor lubrication (in the case of noise)	Lubricate, see page 111
Running inaccuracy and noise of the guides	Poor lubrication	Lubricate, see page 111
	Damage to the guides, for example by shock or impact on the carriage	Replace guides, contact service
Carriage has backlash and positions inaccurately	Play in guides after a collision or poor lubrication	Contact service

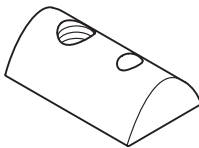
6 Accessories and spare parts



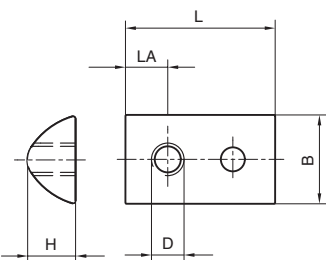
Contact your local sales office if you have questions or need spare parts that are not listed.

6.1 Slot nuts

Order data

	Description			Order no.
	The slot nuts are inserted into the T slots of the axis body to fasten the axis or parts of the axis. Contains 10 piece	For axis ...	Slot nut type	
		CAS41 / CAS42	5 steel M5	VW33MF010T5N5
		CAS43	6 steel M6	VW33MF010T6N6
		CAS44	8 steel M6	VW33MF010T8N6
			8 steel M8	VW33MF010T8N8

Dimensional drawings

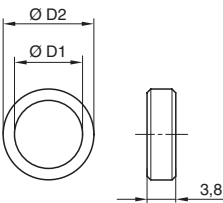
	Slot nut type	B	D	H	L	LA
	For axis ...	mm (in)	mm (in)	mm (in)	mm (in)	mm (in)
	CAS41 / CAS42	5 steel M5 8 (0.31)	5 (0.20)	4 (0.16)	11.5 (0.45)	4 (0.16)
	CAS43	6 steel M6 10.6 (0.42)	6 (0.24)	6.4 (0.25)	17 (0.67)	5.5 (0.22)
	CAS44	8 steel M6 13.8 (0.54)	6 (0.24)	7.3 (0.29)	23 (0.91)	6.5 (0.26)
	8 steel M8	13.8 (0.54)	8 (0.31)	7.3 (0.29)	23 (0.91)	7.5 (0.30)

6.2 Locating dowels

Order data

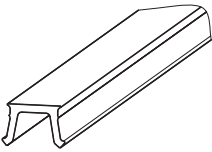
	Description		Order no.
	For precise and reproducible mounting of the payload, the locating dowels are inserted into the holes at the carriage. Contains 20 piece	For axis ...	
		CAS41 / CAS42	VW33MF020LD01
		CAS43	VW33MF020LD02
		CAS44	VW33MF020LD03

Dimensional drawings

	D1	D2
For axis ...	mm (in)	mm (in)
CAS41 / CAS42	5.5 (0.22)	8 h6 (0.31 h6)
CAS43	6.6 (0.26)	10 h6 (0.39 h6)
CAS44	9 (0.35)	12 h6 (0.47 h6)

6.3 T slot covers

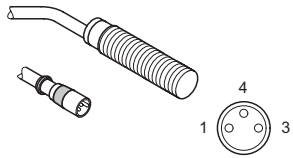
Order data

	Description			Order no.
	Length 2 m	For axis ...	T slot size	
	Contains 5 piece	CAS41 / CAS42	5	VW33MC05B05
		CAS43	6	VW33MC05A06
		CAS44	8	VW33MC05A08

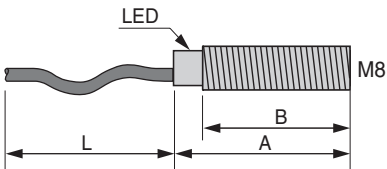
6.4 Sensors and additional parts

6.4.1 Sensors

Order data

	Description		Order no.
	With signal display with 100 mm (3.94 in) cable and 3-pin M8 circular plug-in connector. 1 piece	PNP, normally closed contact	XS508B1PBP01M8
		PNP, normally open contact	XS508B1PAP01M8
		NPN, normally closed contact	XS508B1NBP01M8
		NPN, normally open contact	XS508B1NAP01M8

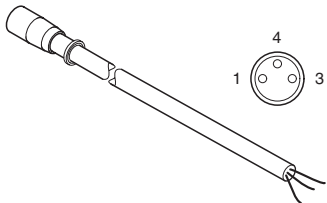
Dimensional drawings

	Total length	Thread length	Cable length
	A	B	L
	mm (in)	mm (in)	mm (in)
	33 (1.30)	25 (0.98)	100 (3.94)
	See chapter "3.4.1 Connecting the sensors" for the connection assignment.		

Technical data

Model		Cylindrical thread M8 x 1
Approvals		CE
Electrical connection (PUR cable with M8 connector)	mm (in)	100 (3.94)
Nominal switching distance S_n (in the case of steel)	mm (in)	1.5 (0.06)
Hysteresis		1 to 15% of the real switching distance
Degree of protection as per IEC 60529		IP67
Temperature (storage)	°C (°F)	-40 ... 85 (-40 ... 185)
Temperature (operation)	°C (°F)	-25 ... 70 (-13 ... 158)
Housing material		Nickel-plated brass
Cable material		PUR, 3 x 0.12 mm ²
Function indicator output		Yellow LED
Function indicator supply voltage		No
Supply voltage (PELV)	Vdc	12 ... 24 with reverse polarity protection
Supply voltage (including residual ripple)	Vdc	10 ... 36
Switching current (overload and short-circuit protection)	mA	< 200
Voltage drop, output conducting	V	< 2
No-load current	mA	< 10
Maximum switching frequency	Hz	5000
Switch-on time	ms	< 0.1
Switch-off time	ms	< 0.1

6.4.2 Sensor extension cable*Order data*

	Description			Order no.
	Suitable for drag chain applications; sensor side end 3-pin M8 circular connector, second cable end open	m (ft)	5 (16.40)	VW32SBCBGA050
	Contains 1 piece	m (ft)	10 (32.81)	VW32SBCBGA100
		m (ft)	20 (65.62)	VW32SBCBGA200

6.5 Coupling assemblies

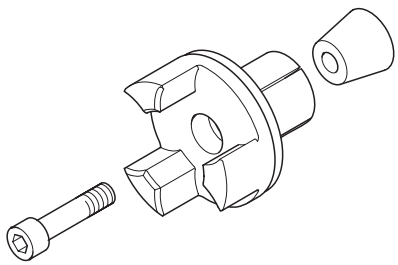


*Respect the maximum permissible driving torque of the linear axis.
The coupling elements can transmit a greater torque than the linear axis can accept.*

	Coupling assemblies are required to mount motors to axes. A coupling assembly consists of the following components: • 1 expanding hub for the axis end • 1 clamping hub for the motor end • 1 elastomer spider, as a decoupling element between the hubs • 2 screws
Coupling assembly (1) Clamping hub (2) Elastomer spider (3) Expanding hub	

6.5.1 Expanding hubs

Order data

	Description		Order no.
	Expanding hub for the axis end Contains 1 piece	For axis ...	
		CAS41	SPM3MFSC10A14
		CAS42	SPM3MFSC20A20
		CAS43	SPM3MFSC25A30
		CAS44	SPM3MFSC35A36

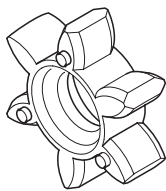
Dimensional drawings

Technical drawing of the expanding hub assembly. The drawing shows a cross-section of the hub and shaft. Key dimensions are labeled: A (total length), B (installation length), C (hub length), D1 (inner diameter), D2 (outer diameter), E (ISO 4762 screw), and F (hub thickness).

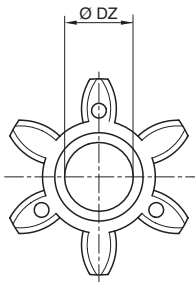
For axis ...			CAS41	CAS42	CAS43	CAS44
Moment of inertia	J	kgcm ² (oz·in·s ²)	0.009 (0.0013)	0.09 (0.0127)	0.32 (0.0453)	0.77 (0.1090)
Max. torque	M _{max}	Nm (lb·in)	7.7 (68.15)	35.7 (315.97)	82 (725.76)	182 (1610.84)
Screw ISO 4762	E		M4	M6	M8	M10
Wrench size		mm	3	5	6	8
Tightening torque		Nm (lb·in)	2.9 (25.67)	10 (88.51)	25 (221.27)	49 (433.69)
	A	mm (in)	16 (0.63)	22 (0.87)	24 (0.94)	25.5 (1.00)
Installation length	B	mm (in)	14 (0.55)	20 (0.79)	30 (1.18)	36 (1.42)
	C	mm (in)	7 (0.28)	8 (0.31)	12 (0.47)	13 (0.51)
Expanding hub h9	D1	mm (in)	10 (0.39)	20 (0.79)	25 (0.98)	35 (1.38)
	D2	mm (in)	25 (0.98)	40 (1.57)	55 (2.17)	65 (2.56)
	F	mm (in)	5 (0.20)	8 (0.31)	8 (0.31)	8 (0.31)

6.5.2 Elastomer spiders

Order data

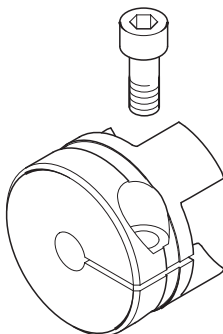
	Description		Order no.
	Decoupling element between the hubs	For axis ...	
	Contains 1 piece, color red	CAS41	SPM3MFR09A018
		CAS42	SPM3MFR14A034
		CAS43	SPM3MFR20A120
		CAS44	SPM3MFR25A320

Dimensional drawings

	For axis ...			CAS41	CAS42	CAS43	CAS44
	Shore hardness			98 Sh A	98 Sh A	98 Sh A	98 Sh A
	Color			Red	Red	Red	Red
	Max. torque	M _{max}	Nm (lb·in)	18 (159.31)	34 (300.93)	120 (1062.09)	320 (2832.24)
	Nominal torque	M _N	Nm (lb·in)	7 (61.96)	17 (150.46)	60 (531.04)	160 (1416.12)
	Moment of inertia	J	kgcm ² (oz·in·s ²)	0.001 (0.0001)	0.013 (0.0018)	0.067 (0.0095)	0.150 (0.0212)
	Diameter	DZ	mm (in)	9 0.35	14 (0.55)	20 (0.79)	25 (0.98)

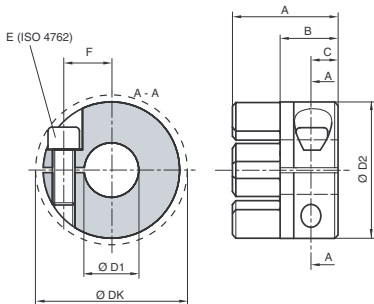
6.5.3 Clamping hubs

Order data

	Description			Order no.
	Clamping hub			
	Contains 1 piece			
		D1 [mm (in)] ¹⁾	M _{max} [Nm (lb-in)]	
	For axis ...	Inquire for other diameters	Maximum torque that can be transmitted	
	CAS41	6.35 (0.25)	6.8 (60.19)	SPM3MFCC06A06
		8 (0.31)	7.4 (65.50)	SPM3MFCC08A06
		9 (0.35)	7.8 (69.04)	SPM3MFCC09A06
		10 (0.39)	9.7 (85.85)	SPM3MFCC10A06
		11 (0.43)	10.7 (94.70)	SPM3MFCC11A06
		12 (0.47)	11.6 (102.67)	SPM3MFCC12A06
		14 (0.55)	12.2 (107.98)	SPM3MFCC14A06
	CAS42	6.35 (0.25)	32.5 (287.65)	SPM3MFCC06A07
		8 (0.31)	35 (309.78)	SPM3MFCC08A07
		9 (0.35)	36 (318.63)	SPM3MFCC09A07
		10 (0.39)	41 (362.88)	SPM3MFCC10A07
		11 (0.43)	45 (398.28)	SPM3MFCC11A07
		12 (0.47)	50 (442.54)	SPM3MFCC12A07
		14 (0.55)	53 (469.09)	SPM3MFCC14A07
		16 (0.63)	55 (486.79)	SPM3MFCC16A07
		19 (0.75)	58 (513.34)	SPM3MFCC19A07
		20 (0.79)	60 (531.04)	SPM3MFCC20A07
	CAS43	12 (0.47)	49 (433.69)	SPM3MFCC12A08
		14 (0.55)	54 (477.94)	SPM3MFCC14A08
		19 (0.75)	75 (663.81)	SPM3MFCC19A08
		20 (0.79)	76 (672.66)	SPM3MFCC20A08
		22 (0.87)	78 (690.36)	SPM3MFCC22A08
		24 (0.94)	85 (752.31)	SPM3MFCC24A08
		25 (0.98)	98 (867.37)	SPM3MFCC25A08
	CAS44	12 (0.47)	108 (955.88)	SPM3MFCC12A09
		14 (0.55)	111 (982.43)	SPM3MFCC14A09
		19 (0.75)	128 (1132.90)	SPM3MFCC19A09
		20 (0.79)	138 (1221.40)	SPM3MFCC20A09
		22 (0.87)	154 (1363.01)	SPM3MFCC22A09
		24 (0.94)	158 (1398.42)	SPM3MFCC24A09
		25 (0.98)	160 (1416.12)	SPM3MFCC25A09

1) See dimensional drawings

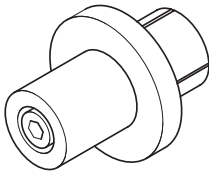
Dimensional drawings

			For axis ...		CAS41	CAS42	CAS43	CAS44
Moment of inertia	J	kgcm ² (oz-in-s ²)	0.015 (0.0021)	0.15 (0.0212)	0.55 (0.0779)	1.22 (0.1728)		
Screw ISO 4762	E		M3	M6	M6	M8		
Wrench size		mm (in)	2.5 (0.10)	5 (0.20)	5 (0.20)	6 (0.24)		
Tightening torque		Nm (lb-in)	1.9 (16.82)	14 (123.91)	14 (123.91)	35 (309.78)		
Hub length	A	mm (in)	22 (0.87)	31 (1.22)	36 (1.42)	39 (1.54)		
Hole depth	B	mm (in)	11 (0.43)	17 (0.67)	20 (0.79)	21 (0.83)		
Distance between centers	C	mm (in)	5 (0.20)	8 (0.31)	10 (0.39)	9 (0.35)		
Inside diameter H7	D1	mm (in)	1)	1)	1)	1)		
	D2	mm (in)	25 (0.98)	40 (1.57)	55 (2.17)	65 (2.56)		
Outside diameter	DK	mm (in)	25.8 (1.02)	45 (1.77)	57.5 (2.26)	73 (2.87)		
	F	mm (in)	8 (0.31)	14 (0.55)	20 (0.79)	25 (0.98)		

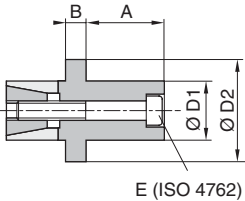
1) See order data

6.6 Shaft extension

Order data

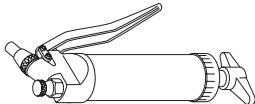
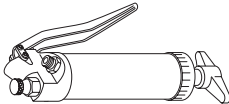
	Description		Order no.
	Components such as a motor or an encoder can be coupled to the shaft extension. Contains 1 piece	For axis ...	
		CAS41	VW33MF1S12A12
		CAS42	VW33MF1S27A20
		CAS43	VW33MF1S32A25
		CAS44	VW33MF1S37A32

Dimensional drawings

 E (ISO 4762)	For axis ...			CAS41	CAS42	CAS43	CAS44
	Mass	m	kg (lb)	0.012 (0.03)	0.073 (0.16)	0.148 (0.33)	0.311 (0.69)
	Maximum radial force	F_R	N (lbf)	230 (51.71)	400 (89.92)	700 (157.37)	1300 (292.25)
	Moment of inertia	J	kgcm ² (oz·in·s ²)	0.002 (0.0003)	0.05 (0.0071)	0.16 (0.0227)	0.54 (0.0765)
	Max. torque	M_{max}	Nm (lb·in)	7.7 (68.15)	35.7 (315.97)	82 (725.76)	182 (1610.84)
	Screw ISO 4762	E		M4	M6	M8	M10
	Wrench size	-	mm	3	5	6	8
	Tightening torque	-	Nm (lb·in)	2.9 (25.67)	10 (88.51)	25 (221.27)	49 (433.69)
	Shaft length	A	mm (in)	12 (0.47)	27 (1.06)	32 (1.26)	37 (1.46)
	Collar length	B	mm (in)	5.5 (0.22)	7 (0.28)	7.5 (0.30)	9 (0.35)
	Shaft extension diameter H7	D1	mm (in)	12 (0.47)	20 (0.79)	25 (0.98)	32 (1.26)
	Diameter	D2	mm (in)	17 (0.67)	35 (1.38)	45 (1.77)	55 (2.17)

6.7 Grease guns

Order data

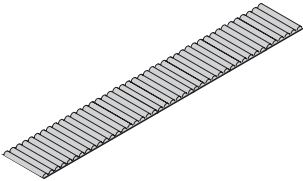
Designation	Description	Order no.
Single-hand high-pressure grease gun 	With nozzle for the lubrication of the linear axes with recirculating ball bearing guide. Suitable nozzle type D. Volume: 120 cm ³ (7.32 in ³); delivery volume: 0.5 cm ³ (0.03 in ³) / stroke	VW33MAP01
Single-hand high-pressure oil gun 	With nozzle for the lubrication of the linear axes with roller guide. Suitable nozzle type D. Volume: 120 cm ³ (7.32 in ³); delivery volume: 0.5 cm ³ (0.03 in ³) / stroke	VW33MAP02
Nozzle type D6 90° 	For grease nipple type D6; nipple 90°, Ø 6 mm (0.24 in); length 20 mm (0.79 in); with M4 pointed nozzle 90° lateral	VW33MAT01
Nozzle type D6 20° 	For grease nipple type D6; nipple 20°, Ø 6 mm (0.24 in); length 20 mm (0.79 in); with M4 pointed nozzle 20° angled	VW33MAT02

6.8 Toothed belt

Calculation of the required toothed belt length:

$$L = \text{Total length of axis} + 100 \text{ mm (3.94 in)}$$

Order data

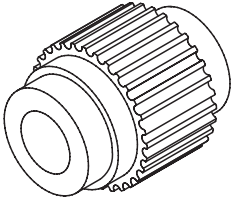
	Description			Order no.
	For axis ...	Length m (ft)		
	CAS41	1.5 (4.92)		SPM3MAS15L015
		3 (9.84)		SPM3MAS15L030
		10 (32.81)		SPM3MAS15L100
		1.5 (4.92)	Antistatic	SPM3MAA15L015
		3 (9.84)	Antistatic	SPM3MAA15L030
		10 (32.81)	Antistatic	SPM3MAA15L100
	CAS42	1.5 (4.92)		SPM3MAS25L015
		3 (9.84)		SPM3MAS25L030
		10 (32.81)		SPM3MAS25L100
		1.5 (4.92)	Antistatic	SPM3MAA25L015
		3 (9.84)	Antistatic	SPM3MAA25L030
		10 (32.81)	Antistatic	SPM3MAA25L100
	CAS43	1.5 (4.92)		SPM3MAS30L015
		3 (9.84)		SPM3MAS30L030
		10 (32.81)		SPM3MAS30L100
		1.5 (4.92)	Antistatic	SPM3MAA30L015
		3 (9.84)	Antistatic	SPM3MAA30L030
		10 (32.81)	Antistatic	SPM3MAA30L100
	CAS44	1.5 (4.92)		SPM3MAS50L015
		3 (9.84)		SPM3MAS50L030
		10 (32.81)		SPM3MAS50L100
		1.5 (4.92)	Antistatic	SPM3MAA50L015
		3 (9.84)	Antistatic	SPM3MAA50L030
		10 (32.81)	Antistatic	SPM3MAA50L100

Technical data

Toothed belt	For axis ...	Width	Pitch	Density	Specific spring constant	Belt tension F_v
		mm (in)	mm (in)	g/m	N (lbf)	N (lbf)
15HTD-3M	CAS41	15 (0.59)	3 (0.12)	32	0.145×10^6 (0.0326×10^6)	145 ... 180 (32.60 ... 40.47)
25HTD-5M	CAS42	25 (0.98)	5 (0.20)	96	0.572×10^6 (0.1286×10^6)	570 ... 710 (128.14 ... 159.61)
30HTD-5M	CAS43	30 (1.18)	5 (0.20)	118	0.672×10^6 (0.1511×10^6)	670 ... 870 (150.62 ... 195.58)
50HTD-8M	CAS44	50 (1.97)	8 (0.31)	311	1.917×10^6 (0.4310×10^6)	1915 ... 2400 (430.51 ... 539.54)

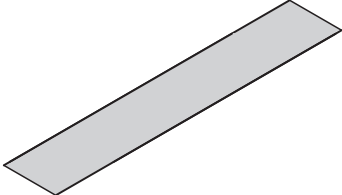
6.9 Toothed belt pulleys

Order data

	Description			Order no.
	Toothed belt pulley with bearing	For axis ...		
		CAS41		SPM3MAW5S084
			Increased corrosion resistance	SPM3MAW5C084
		CAS42		SPM3MAW6S155
			Increased corrosion resistance	SPM3MAW6C155
		CAS43		SPM3MAW7S205
			Increased corrosion resistance	SPM3MAW7C205
		CAS44		SPM3MAW8S264
			Increased corrosion resistance	SPM3MAW8C264

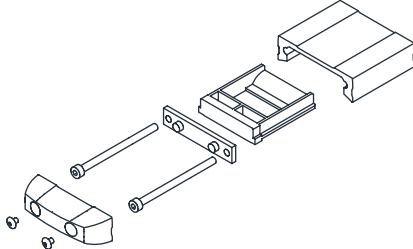
6.10 Cover strips

Order data

	Description				Order no.
	For axis ...	Width [mm (in)]	Height [mm (in)]	Length m (ft)	
	CAS41	22 (0.87)	0.15 (0.01)	3 (9.84)	SPM3MAC22L030
				6 (19.69)	SPM3MAC22L060
	CAS42	36 (1.42)	0.15 (0.01)	3 (9.84)	SPM3MAC36L030
				6 (19.69)	SPM3MAC36L060
	CAS43	45 (1.77)	0.15 (0.01)	3 (9.84)	SPM3MAC45L030
				6 (19.69)	SPM3MAC45L060
	CAS44	65 (2.56)	0.15 (0.01)	3 (9.84)	SPM3MAC65L030
				6 (19.69)	SPM3MAC65L060

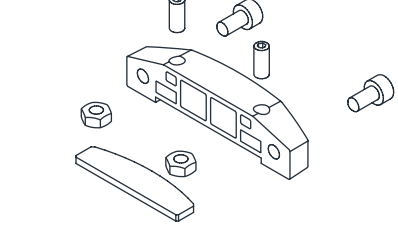
6.11 Strip deflection

Order data

	Description			Order no.
	Kit with 1 housing for strip deflection 1 deflection unit with brush 1 holding plate 1 rubber buffers 4 screws	For axis ...		
		CAS41		SPM3MAC1D0041
		CAS42		SPM3MAC2D0042
		CAS43		SPM3MAC3D0043
		CAS44		SPM3MAC4D0044

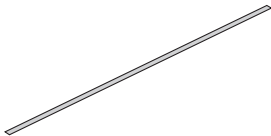
6.12 Cover strip clamp

Order data

	Description			Order no.
	Kit with 1 cover strip clamp 1 clamping plate 2 screws 2 set screws 2 nuts	For axis ...		
		CAS41		SPM3MAC1F041
		CAS42		SPM3MAC1F042
		CAS43		SPM3MAC1F043
		CAS44		SPM3MAC1F044

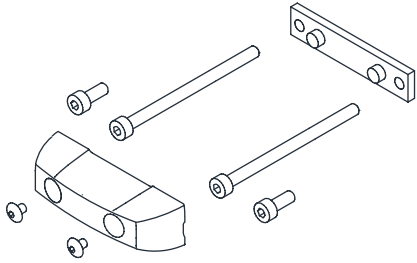
6.13 Magnetic strips

Order data

	Description				Order no.
	Contains 2 piece				
	For axis ...	Width [mm (in)]	Height [mm (in)]	Length m (ft)	
	CAS41	2.5 (0.10)	1 (0.04)	1.5 (4.92)	SPM3MAW1S215
				3 (9.84)	SPM3MAW1S230
				6 (19.69)	SPM3MAW1S260
	CAS42	4.0 (0.16)	1 (0.04)	1.5 (4.92)	SPM3MAW1S415
				3 (9.84)	SPM3MAW1S430
				6 (19.69)	SPM3MAW1S460
	CAS43 / CAS44	6.0 (0.24)	1 (0.04)	1.5 (4.92)	SPM3MAW1S615
				3 (9.84)	SPM3MAW1S630
				6 (19.69)	SPM3MAW1S660

6.14 Rubber buffer

Order data

	Description		Order no.
	Kit with 2 rubber buffers 2 holding plates 12 screws	For axis ...	
		CAS41	SPM3MAC1B041
		CAS42	SPM3MAC2B042
		CAS43	SPM3MAC3B043
		CAS44	SPM3MAC4B044

7 Service, maintenance and disposal

WARNING

GREAT MASS OR FALLING PARTS

- Use a suitable crane or other suitable lifting gear for mounting the product if this is required by the mass of the product.
- Use the necessary personal protective equipment (for example, safety shoes, safety glasses and protective gloves).
- Mount the product in such a way (tightening torque, securing screws) that parts cannot come loose, even in the case of shocks and vibration.
- Take all necessary measures to avoid unanticipated movements of linear axes mounted in vertical or tilted positions.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

7.1 Service address

If you cannot resolve an error yourself please contact your sales office. Have the following details available:

- Nameplate (type, identification number, serial number, DOM, ...)
- Type of error (with LED flash code or error number)
- Previous and concomitant circumstances
- Your own assumptions concerning the cause of the error

Also include this information if you return the product for inspection or repair.



If you have any questions please contact your sales office. Your sales office staff will be happy to give you the name of a customer service office in your area.

<http://www.schneider-electric.com>

7.2 Inspections after collisions

Components of the linear axis may be damaged or destroyed as a result of a collision.

- ▶ After a collision, inspect the drive elements, the linear guide and the elastomer coupling for damage according to the instructions in the following chapters.

WARNING

INOPERABLE EQUIPMENT AND FALLING PARTS

- Thoroughly inspect all components of the linear axis and all components attached to the linear axis, including the motor and the gearbox, for damage after a collision.
- Do not use the linear axis if any of the components are damaged or suspected to be damaged.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

7.2.1 Toothed belt

- ▶ Perform a visual inspection of the toothed belt for damage to the teeth and abrasion at the sides. To do so, remove the toothed belt as described in chapter "7.3.6 Replacing the toothed belt".

A damaged toothed belt must be replaced.

7.2.2 Linear guide

The linear guide consists of the guide carriage and the roller guide or the recirculating ball bearing guide.

- ▶ Inspect the guide carriage for backlash. If the guide carriage has backlash, the preload has been modified. The preload of the guide carriage can only be adjusted by the manufacturer. Note the serial number of the linear axis and contact your local sales office.
- ▶ Perform a visual inspection of the linear guide for damage. To do so, remove the toothed belt as described in chapter "7.3.6 Replacing the toothed belt".
- ▶ Manually move the axis body (without toothed belt). Inspect for irregular noise or vibration. Irregular noise or vibration indicates a deformation in the linear guide. Deformation will cause rapid wear.



A damaged linear guide must be replaced. Contact your local sales office.

7.2.3 Elastomer coupling

- ▶ Perform a visual inspection of the elastomer coupling for damage. To do so, remove the motor or the gearbox as described in chapter "7.3.2 Replacing the motor or the gearbox".

NOTE: A damaged elastomer coupling must be replaced. See chapter "7.3.2 Replacing the motor or the gearbox" for the procedure.

7.3 Replacing parts

Only replace the parts described. Any other parts may only be replaced by technicians trained by the manufacturer.

To replace the entire linear axis, install the new axis as per chapter "3 Installation".

Adjust and verify the linear axis as per chapter "4.1 Commissioning procedure" after replacing parts.

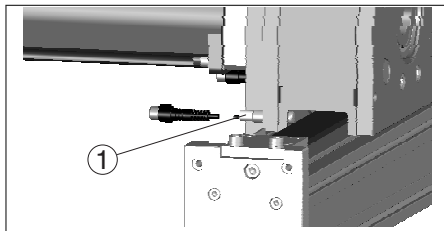
7.3.1 Replacing a sensor

You can replace a sensor without changing the position of the sensor holder.



Unless otherwise specified, the standard tightening torques indicated on page 65 apply.

Prerequisites See chapter "6 Accessories and spare parts" for suitable spare parts.
You need a set of hex keys and a feeler gauge.



- ▶ Remove the nut holding the sensor.
- ▶ Unscrew the sensor from the fastening thread.
- ▶ Mount the new sensor as described on page 66.

7.3.2 Replacing the motor or the gearbox

Dismounting of parts can cause unanticipated movements.

⚠ WARNING

UNINTENDED MOVEMENTS DUE TO DISMOUNTING

Secure the moving parts of linear axes mounted in a vertical or tilted position against movements.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The motor or the gearbox are coupled by means of a preloaded elastomer coupling.



Unless otherwise specified, the standard tightening torques indicated on page 65 apply.

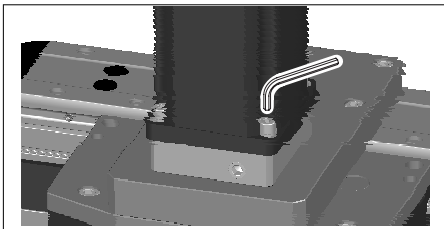
Prerequisites

See chapter "6 Accessories and spare parts" for suitable spare parts.

You need a set of hex keys and a torque wrench with hexagon socket.

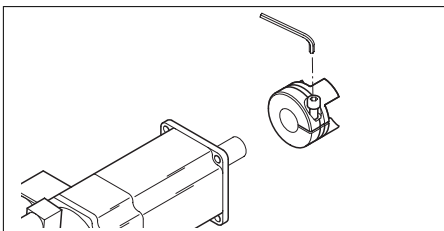
NOTE: Do not use ball head hex keys. Excessive torque may cause the ball head to tear off. A torn off ball head is difficult to remove from the screw.

Dismounting, motor only



- ▶ Secure the motor to keep it from falling down.
- ▶ Remove the 4 screws and washers at the motor.
- ▶ Pull the motor and the clamping hub off of the motor adapter plate.

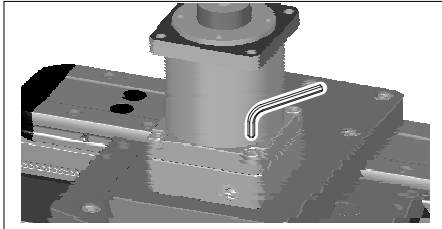
This requires a greater force of up to 450 N (101.16 lbf).



- ▶ Loosen the clamping screw at the clamping hub.
- ▶ Pull the clamping hub off the motor shaft.

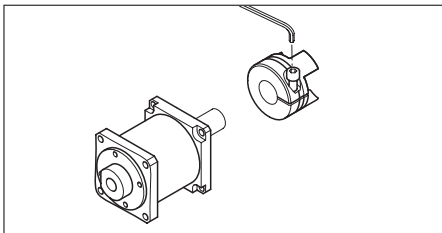
Dismounting, gearbox only

See the gearbox manual for details on removing a motor from the gearbox.

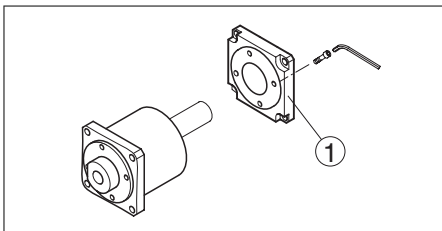


- ▶ Remove the 4 screws and washers at the gearbox flange.
- ▶ Pull the gearbox and the clamping hub off of the motor adapter plate.

This requires a greater force of up to 450 N (101.16 lbf).



- ▶ Loosen the clamping screw at the clamping hub.
- ▶ Pull the clamping hub off the gearbox shaft.



- If the gearbox does not have its own flange, the flange plate (1) must also be dismantled.
- ▶ Remove the 4 screws at the flange plate.
- ▶ Remove the flange plate.

Mounting

- ▶ Mount the motor or the gearbox as described on page 68.

NOTE: If the new motor or the new gearbox has shaft dimensions different from the old motor or gearbox, you must use a suitable new elastomer coupling. See chapter "7.3.3 Replacing the elastomer coupling" for details on replacing an elastomer coupling.



Refer to the gearbox manual for mounting a motor to the gearbox.

7.3.3 Replacing the elastomer coupling



Unless otherwise specified, the standard tightening torques indicated on page 65 apply.

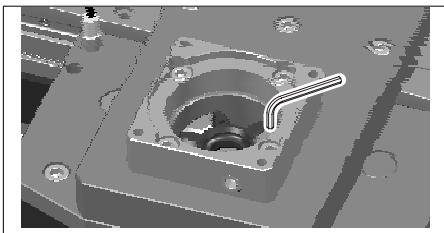
Prerequisites

See chapter "6 Accessories and spare parts" for suitable spare parts.

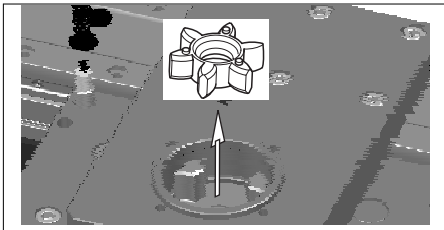
You need a set of hex keys and a torque wrench with hexagon socket.

NOTE: Do not use ball head hex keys. Excessive torque may cause the ball head to tear off. A torn off ball head is difficult to remove from the screw.

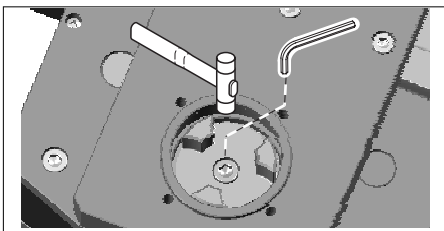
- ▶ Remove the motor or the gearbox as described in chapter "7.3.2 Replacing the motor or the gearbox".



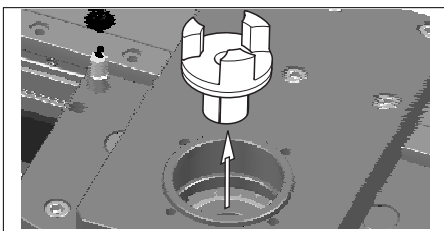
- ▶ Remove the 4 screws at the motor adapter plate.
- ▶ Remove the motor adapter plate.



- ▶ Pull the elastomer spider off of the expanding hub.



- ▶ Loosen the screw of the expanding hub.
If the end block is in the end position, the toothed belt pulley does not turn along.
- ▶ Tap the screw head lightly with a dead blow hammer so the cone comes loose. The expanding hub is now loose and be removed.



- ▶ Pull the expanding hub out of the hollow shaft of the toothed belt pulley.

- ▶ Mount the elastomer coupling as well as the motor or the gearbox as described on page 68.

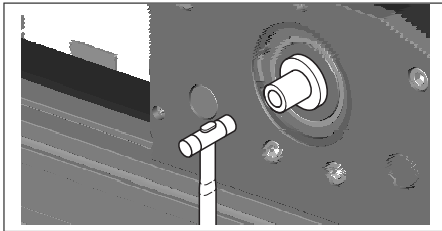
7.3.4 Replacing the shaft extension

Prerequisites See chapter "6 Accessories and spare parts" for suitable spare parts.

You need a set of hex keys and a torque wrench with hexagon socket and a dead blow hammer.

NOTE: Do not use ball head hex keys. Excessive torque may cause the ball head to tear off. A torn off ball head is difficult to remove from the screw.

Procedure



- ▶ Loosen the screw at the shaft extension.
If the end block is in the end position, the toothed belt pulley does not turn along.
- ▶ Tap the screw head lightly with a dead blow hammer so the cone comes loose.
- ▶ Pull the shaft extension out of the end block.
This requires a greater force.
- ▶ Mount the shaft extension as described on page 71.

7.3.5 Replacing the cover strip and the strip deflection

The cover strip has sharp edges. When the cover strip is cut to length, the edges may be particularly sharp.

⚠ WARNING

SHARP EDGES

Wear protective gloves.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

When the cover strip is worn, it is recommended that the two strip deflections be replaced at the same time (deflection unit with brush).

Unless otherwise specified, the standard tightening torques indicated on page 65 apply.



Special tightening torques

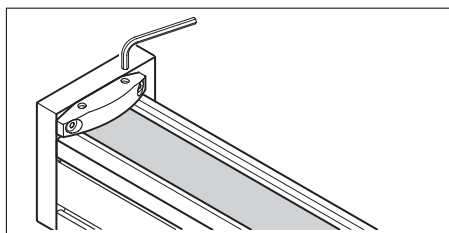
Cover strip clamp		CAS41	CAS42	CAS43	CAS44
Screw ISO 4762 - 8.8		M3 x 8	M4 x 8	M5 x 10	M6 x 14
Wrench size	mm	2.5	3	4	5
Tightening torque	Nm (lb-in)	0.6 (5.31)	1.0 (8.85)	1.5 (13.28)	3 (26.55)

Clamping plate		CAS41	CAS42	CAS43	CAS44
Set screw DIN 913 - 45H		M3 x 10	M4 x 10	M5 x 16	M6 x 20
Wrench size	mm	2.5	3	4	5
Tightening torque	Nm (lb-in)	0.2 (1.77)	0.3 (2.66)	0.4 (3.54)	0.5 (4.43)

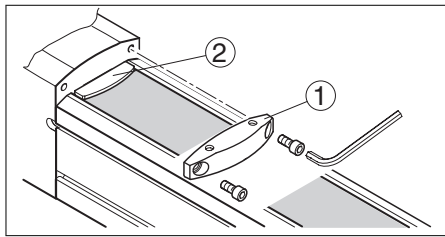
Prerequisites See chapter "6 Accessories and spare parts" for suitable spare parts.
You need a set of Allen keys and a torque wrench with hexagon socket and a pair of tin snips.

NOTE: Do not use ball head hex keys. Excessive torque may cause the ball head to tear off. A torn off ball head is difficult to remove from the screw.

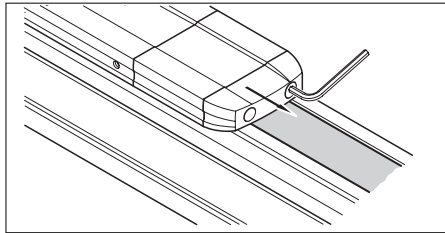
Procedure Perform the steps described below at both ends of the carriage and at both end of the linear axis.



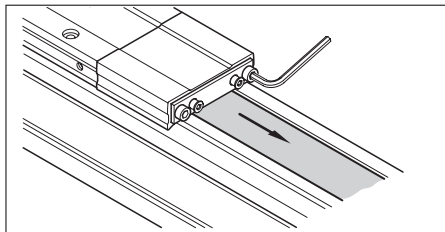
- 2 set screws at the cover strip clamp fixate the clamping plate below and the cover strip.
- Loosen the two set screws.



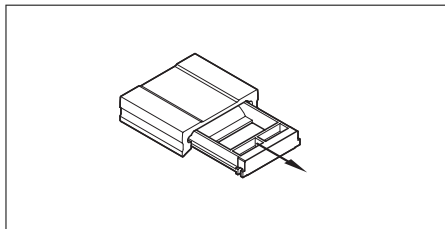
- ▶ Remove the cover strip clamp (1). To do so, loosen the two screws.
Keep the screws and the clamping plate (2) from falling down.



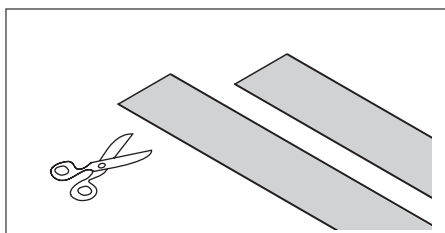
- ▶ Remove the rubber buffer at the strip deflection. To do so, loosen the two screws.



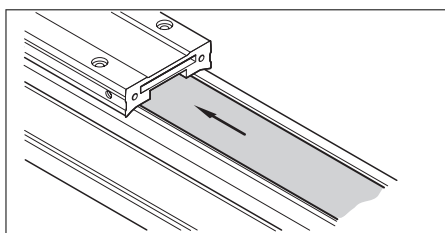
- ▶ Remove the holding plate together with the strip deflection. To do so, loosen the two screws.
- ▶ Pull out the entire cover strip.



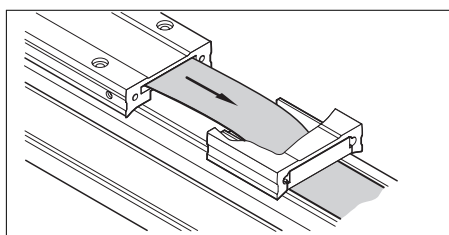
- ▶ Remove the plastic unit from the housing of the strip deflection.
- ▶ Insert the new plastic unit into the housing of the strip deflection.



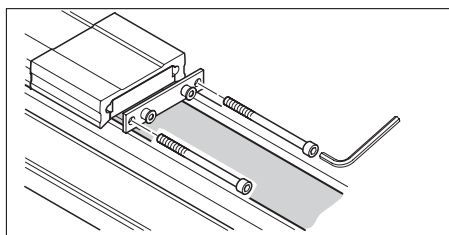
- ▶ Cut the new cover strip to the same length as the old cover strip with the tin snips.



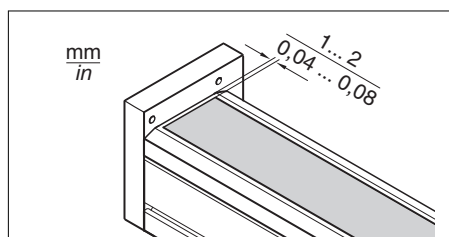
- ▶ Guide the new cover strip through the guide channel inside the carriage.



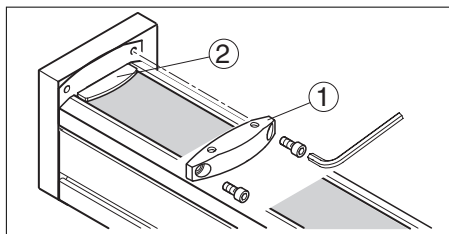
- ▶ Guide the new cover strip through the strip deflections.



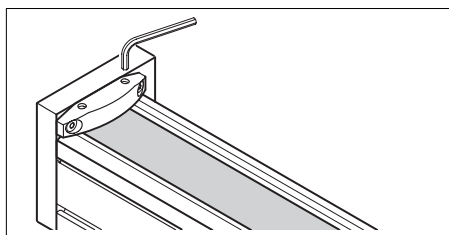
- ▶ Place the holding plate for mounting the rubber buffer into position at the strip deflection.
 - ▶ Screw the strip deflection into place.
- When doing so, align the strip deflection and the carriage.



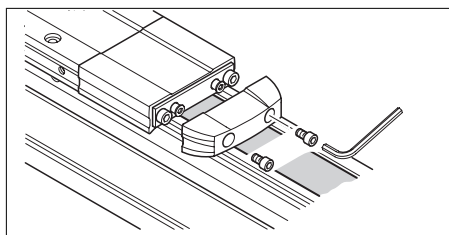
- ▶ Place the cover strip over the entire length of the axis body.
- Align the cover strip symmetrically. The distance from the two end blocks must be 1 ... 2 mm (0.04 ... 0.08 in).
- Verify that the cover strip has even contact with the magnetic strips.



- ▶ Fit the clamping plate (2) into place.
- ▶ Screw the cover strip clamp (1) into place with the tightening torque specified on page 102.



- ▶ Tighten the two set screws for holding the clamping plate with the tightening torque specified on page 102.



- ▶ Mount the rubber buffer with the two screws and the washers.

- Test movements* ▶ Run initial tests at reduced velocity. Verify proper function of the cover strip.

7.3.6 Replacing the toothed belt

Dismounting of parts can cause unanticipated movements.

WARNING

UNINTENDED MOVEMENTS DUE TO DISMOUNTING

Secure the moving parts of linear axes mounted in a vertical or tilted position against movements.

Failure to follow these instructions can result in death, serious injury, or equipment damage.



Unless otherwise specified, the standard tightening torques indicated on page 65 apply.

Special tightening torques

Clamping plate		CAS41	CAS42	CAS43	CAS44
Screw ISO 7991 - 8.8		M4 x 12	M4 x 16	M5 x 16	M6 x 25
Wrench size	mm	2.5	2.5	3	4.5
Tightening torque	Nm (lb-in)	1.0 (8.85)	1.5 (13.28)	2.0 (17.70)	3.0 (26.55)

Housing		CAS41	CAS42	CAS43	CAS44
Screw ISO 7991 - 8.8		M3 x 5	M3 x 5	M4 x 8	M4 x 8
Wrench size	mm	2.5	2.5	3	3
Tightening torque	Nm (lb-in)	0.6 (5.31)	1.0 (8.85)	2.0 (17.70)	2.0 (17.70)

Prerequisites See chapter "6 Accessories and spare parts" for suitable spare parts.

You need a set of Allen keys and a torque wrench with hexagon socket and medium strength threadlocker.

NOTE: Do not use ball head hex keys. Excessive torque may cause the ball head to tear off. A torn off ball head is difficult to remove from the screw.

Calculation of the required toothed belt length:

$$L = \text{Total length of axis} + 100 \text{ mm (3.94 in)}$$

To adjust the belt tension, you need a caliper (distance measurement) or a belt tension meter (vibration measurement).

Distance measurement Distance measurement measures the position of the belt tensioner. This method is used to preload the toothed belt as described in "Procedure".

Vibration measurement

To restore the precise factory-adjusted belt tension, you must use a belt tension meter for vibration measurement.

The factory-adjusted belt tension is shown in the table below. The measured preload values F_v depend on the density of the toothed belt Z_M and a selectable measuring distance A.

The measuring distance A is measured from the inner side of the belt tensioner to the center of the deflection pulley.

Toothed belt		CAS41	CAS42	CAS43	CAS44
Width / pitch		15HTD-3M	25HTD-5M	30HTD-5M	50HTD-8M
Density Z_M	g/m	32	96	118	311
Belt tension F_v	N (lbf)	145 ... 180 (32.60 ... 40.47)	570 ... 1710 (128.14 ... 384.42)	670 ... 1870 (150.62 ... 420.39)	1915 ... 12400 (430.51 ... 2787.63)



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

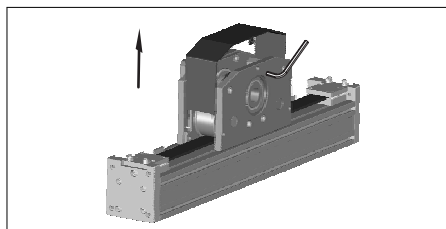
Notes on belt tension

- 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 preload decreases. The belt tension must be verified 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.

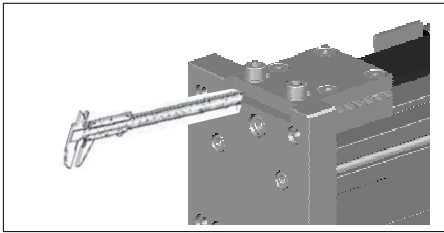
Procedure

- ▶ Move the linear axis into the center position (electrically).
- It must be possible to freely turn the toothed belt pulley.
- ▶ If installed, remove the cover strip and the strip deflections as described on page 102.

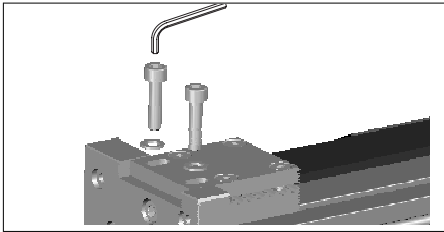
NOTE: Perform the steps described below at both ends of the carriage and at both end of the linear axis.



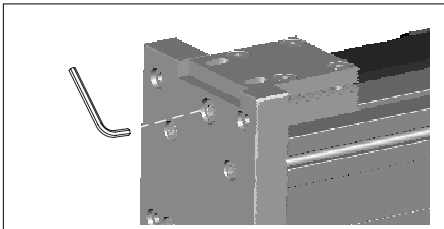
- ▶ Remove the 5 screws for the housing cover.
Use magnetic tools.
- ▶ Remove the housing cover.



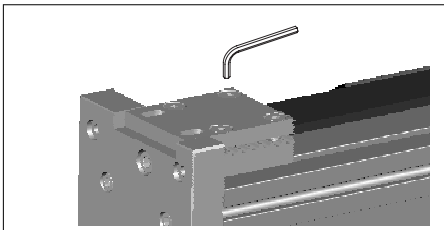
- Perform the following step for preloading with distance measurement only at the accessible end of the linear axis.
 - ▶ Measure the position of the belt tensioner with a caliper prior to releasing the belt tension.
- The end block is the stop. The belt tensioner is the measuring point.
- ▶ Record the measured value.



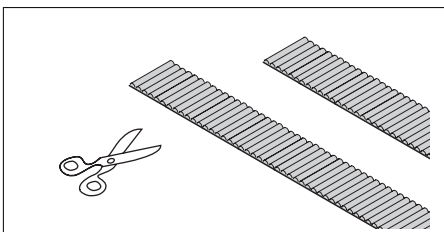
- ▶ Remove the two screws at the clamping plate.
- This requires a greater torque due to the threadlocker.



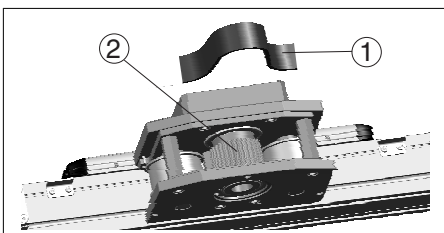
- Perform the following step only at the accessible end of the linear axis.
 - ▶ Loosen the tensioning screw at the belt tensioner (2 ... 3 turns) to release the belt tension.



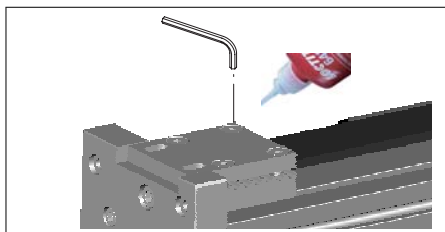
- ▶ Remove the 4 screws at both sides of the clamping plate.
- This requires a greater torque due to the threadlocker.
- ▶ Remove the clamping plate.
 - ▶ Remove the toothed belt from the linear axis.



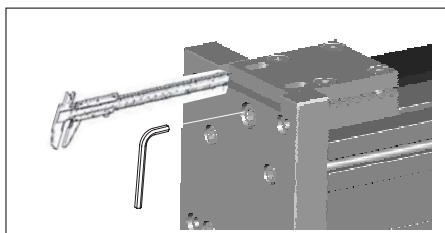
- ▶ Place the new and the old toothed belts next to each other. Align the teeth with each other.
- ▶ Cut the new toothed belt to the same length (number of teeth) as the old toothed belt.



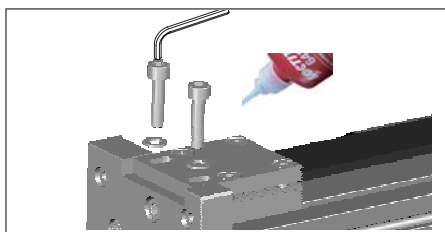
- ▶ Guide the ends of the new toothed belt (1) below the deflection pulleys to the left and the right of the toothed belt pulley (2).
- The teeth must point down.



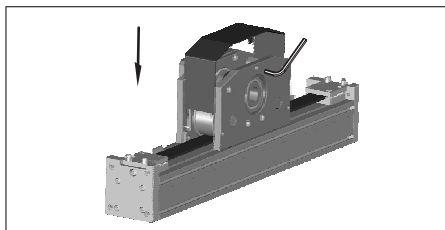
- ▶ Place the toothed belt symmetrically over the 7 teeth of the profile.
- ▶ Fit the clamping plate over the toothed belt.
- ▶ Apply a thin layer of medium strength threadlocker to the the screws for fixating the clamping plate.
- ▶ Tighten the screws with the tightening torque specified on page 71.



- Perform the following step for preloading with distance measurement only at the accessible end of the linear axis.
- ▶ Tension the toothed belt via the tensioning screw of the belt tensioner to the recorded measured value.



- ▶ Apply a thin layer of medium strength threadlocker to the the screws.
- ▶ Tighten the screws.



- ▶ Mount the housing cover with the 5 screws.
- ▶ Apply a thin layer of medium strength threadlocker to the the screws.
- ▶ Tighten the screws with the tightening torque specified on page 106.

Test movements

- ▶ Mount the motor or the gearbox as described on page 68.
- ▶ Run initial tests at reduced velocity.
- ▶ Respect the information provided in section "Notes on belt tension " in this chapter.

7.3.7 Replacing the toothed belt pulley



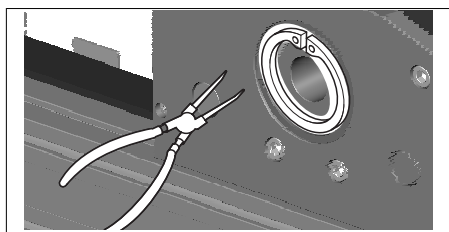
Unless otherwise specified, the standard tightening torques indicated on page 65 apply.

Prerequisites See chapter "6 Accessories and spare parts" for suitable spare parts.
You need a set of Allen keys and a pair of circlip pliers.

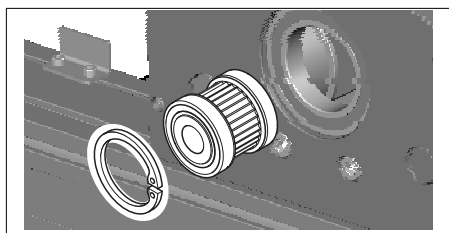
NOTE: Do not use ball head hex keys. Excessive torque may cause the ball head to tear off. A torn off ball head is difficult to remove from the screw.

Procedure

- ▶ Dismount the motor or the gearbox (page 98) and the elastomer coupling (page 96) or the shaft extension (page 101).
- ▶ Remove the toothed belt as described on page 106.



- ▶ Remove the circlip at the rear of the end block with the circlip pliers.



- ▶ Remove the toothed belt pulley with the bearing as a unit.
- ▶ Clean both bearing seats in the end block.
- ▶ Fit the new toothed belt pulley with the bearing.
- ▶ Mount the circlip.

- ▶ Mount the toothed belt as described on page 106.
- ▶ Mount the shaft extension as described on page 71.
- ▶ Mount the motor as described on page 68.

7.4 Maintenance

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

- ▶ Include the maintenance intervals in your maintenance plan.

7.4.1 Cleaning

Due to its design, the product is not susceptible to the ingress of contaminants and external objects. The guide is located inside the axis body and it is covered.

The product must be inspected and cleaned at regular intervals.

- ▶ Do not use compressed air for cleaning.
- ▶ Remove large particles and dirt from the surface at regular intervals.
- ▶ Use only neutral cleaning agents for cleaning.
- ▶ Use only damp, soft and lint-free cleaning cloths to wipe the surface.

Cover strip

The cover strip is Teflon-coated. The friction causes abrasion on the cover strip.

- ▶ Remove abrasion products at regular intervals.

7.4.2 Lubrication

Lubricant is consumed continuously during operation of the linear axis. The product must be lubricated at regular intervals. Incorrect lubricants may damage the product.

NOTICE

INOPERABLE EQUIPMENT

Only use the specified type and volume of lubricant (grease, oil).

Failure to follow these instructions can result in equipment damage.

See chapter

"7.4.3 Lubricating the linear guide and the drive elements" for information on the type and volume of the lubricant.

The lubrication system is not completely sealed. Therefore, small amounts of lubricants may leak.

Insufficient lubrication or incorrect lubricants increase wear and reduce the service life. The following factors influence the lubrication intervals:

- Dust and dirt particles
- High operating temperatures
- Heavy loads
- Heavy vibration
- Permanent short-distance positioning

7.4.3 Lubricating the linear guide and the drive elements

Compare the information on nameplate and in chapter "1.4 Type code" to verify whether your axis has a roller guide or a recirculating ball bearing guide.

7.4.3.1 Lubricating axes with roller guide

The linear screw axis is lubricated with oil from an internal reservoir. The reservoir is factory-prefilled. The carriage features 2 grease nipples at each side for relubrication. The guide rods of the rollers are lubricated and cleaned by oil-soaked lubrication elements.

The lubrication interval depends on the load, the velocity, the cycle time and the ambient conditions. The following recommended values apply to lubrication intervals:

- 2500 km (1553 mi) operational performance

Size	Lubricant ¹⁾	Relubrication volume	Strokes
CAS41	Lamora D 220	1.25 cm ³ (0.08 in ³)	2 1/2
CAS42	Lamora D 220	3 cm ³ (0.18 in ³)	6
CAS43	Lamora D 220	4.25 cm ³ (0.26 in ³)	8 1/2

1) Alternative lubricating oil CLR220 as per DIN 51517, part 3

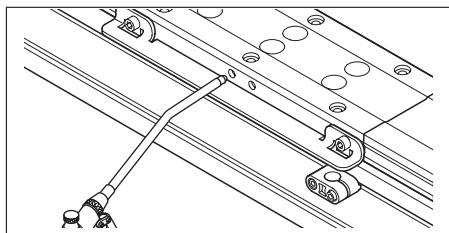
See chapter "6 Accessories and spare parts" for grease guns, nozzles and lubricants.

Notes on greasing

When applying the lubricant, you must not exceed a maximum flow rate. Therefore, the minimum injection time of 5 seconds per grease gun stroke must be adhered to.

Wait for at least 10 seconds between the strokes of the oil gun to allow the oil to penetrate the lubrication elements.

Procedure



- ▶ Position the nozzle at a right angle. Press the nozzle against the grease nipple.
- ▶ Inject the correct type and volume of oil into the two grease nipples at one side of the carriage.

7.4.3.2 Lubrication of axes with recirculating ball bearing guide

The linear axis is lubricated with grease from a factory-prefilled external reservoir. The carriage features 2 grease nipples at each side for relubrication.

The lubrication interval depends on the load, the velocity, the cycle time and the ambient conditions. The following recommended values apply to lubrication intervals:

- 5000 km (3107 mi) operational performance

Size	Lubricant ¹⁾	Relubrication volume	Strokes
CAS42	Microlube GL 261	0.25 cm ³ (0.02 in ³)	1/2
CAS43	Microlube GL 261	0.5 cm ³ (0.03 in ³)	1
CAS44	Microlube GL 261	1.0 cm ³ (0.06 in ³)	2

1) Alternative grease K1N-30 as per DIN 51825

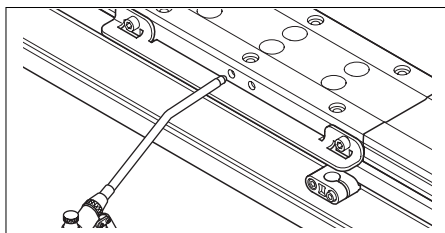
See chapter "6 Accessories and spare parts" for grease guns, nozzles and lubricants.

Notes on greasing

When applying the lubricant, you must not exceed a maximum flow rate. Therefore, the minimum injection time of 3 seconds per grease gun stroke must be adhered to.

The carriage must be moved between strokes of the grease gun to allow the grease to distribute evenly in the lubricant reservoirs.

Procedure



- Position the nozzle at a right angle. Press the nozzle against the grease nipple.
- Inject the correct type and volume of grease into the two grease nipples at one side of the carriage.

7.5 Shipping, storage, disposal

Respect the ambient conditions in chapter "2.1 Ambient conditions".

Shipping The product must be protected against shocks during transportation. If possible, use the original packaging for shipping.

Storage The product may only be stored in spaces where the specified permissible ambient conditions are met.
Protect the product from dust and dirt.

Disposal The product consists of various materials that can be recycled. Dispose of the product in accordance with local regulations.

Visit <http://www.schneider-electric.com/green-premium> for information and documents on environmental protection as per ISO 14025 such as:

- EoLi (Product End-of-Life Instructions)
- PEP (Product Environmental Profile)

Glossary



Units and conversion tables

The value in the specified unit (left column) is calculated for the desired unit (top row) with the formula (in the field).

Example: conversion of 5 meters (m) to yards (yd)

$$5 \text{ m} / 0.9144 = 5.468 \text{ yd}$$

Length

	in	ft	yd	m	cm	mm
in	-	/ 12	/ 36	* 0.0254	* 2.54	* 25.4
ft	* 12	-	/ 3	* 0.30479	* 30.479	* 304.79
yd	* 36	* 3	-	* 0.9144	* 91.44	* 914.4
m	/ 0.0254	/ 0.30479	/ 0.9144	-	* 100	* 1000
cm	/ 2.54	/ 30.479	/ 91.44	/ 100	-	* 10
mm	/ 25.4	/ 304.79	/ 914.4	/ 1000	/ 10	-

Mass

	lb	oz	slug	kg	g
lb	-	* 16	* 0.03108095	* 0.4535924	* 453.5924
oz	/ 16	-	* 1.942559*10 ⁻³	* 0.02834952	* 28.34952
slug	/ 0.03108095	/ 1.942559*10 ⁻³	-	* 14.5939	* 14593.9
kg	/ 0.45359237	/ 0.02834952	/ 14.5939	-	* 1000
g	/ 453.59237	/ 28.34952	/ 14593.9	/ 1000	-

Force

	lb	oz	p	N
lb	-	* 16	* 453.55358	* 4.448222
oz	/ 16	-	* 28.349524	* 0.27801
p	/ 453.55358	/ 28.349524	-	* 9.807*10 ⁻³
N	/ 4.448222	/ 0.27801	/ 9.807*10 ⁻³	-

Power

	HP	W
HP	-	* 746
W	/ 746	-

Rotation

	min ⁻¹ (RPM)	rad/s	deg./s
min ⁻¹ (RPM)	-	* π / 30	* 6
rad/s	* 30 / π	-	* 57.295
deg./s	/ 6	/ 57.295	-

Torque

	lb·in	lb·ft	oz·in	Nm	kp·m	kp·cm	dyne·cm
lb·in	-	/ 12	* 16	* 0.112985	* 0.011521	* 1.1521	* 1.129*10 ⁶
lb·ft	* 12	-	* 192	* 1.355822	* 0.138255	* 13.8255	* 13.558*10 ⁶
oz·in	/ 16	/ 192	-	* 7.0616*10 ⁻³	* 720.07*10 ⁻⁶	* 72.007*10 ⁻³	* 70615.5
Nm	/ 0.112985	/ 1.355822	/ 7.0616*10 ⁻³	-	* 0.101972	* 10.1972	* 10*10 ⁶
kp·m	/ 0.011521	/ 0.138255	/ 720.07*10 ⁻⁶	/ 0.101972	-	* 100	* 98.066*10 ⁶
kp·cm	/ 1.1521	/ 13.8255	/ 72.007*10 ⁻³	/ 10.1972	/ 100	-	* 0.9806*10 ⁶
dyne·cm	/ 1.129*10 ⁶	/ 13.558*10 ⁶	/ 70615.5	/ 10*10 ⁶	/ 98.066*10 ⁶	/ 0.9806*10 ⁶	-

Moment of inertia

	lb·in ²	lb·ft ²	kg·m ²	kg·cm ²	kp·cm·s ²	oz·in ²
lb·in ²	-	/ 144	/ 3417.16	/ 0.341716	/ 335.109	* 16
lb·ft ²	* 144	-	* 0.04214	* 421.4	* 0.429711	* 2304
kg·m ²	* 3417.16	/ 0.04214	-	* 10*10 ³	* 10.1972	* 54674
kg·cm ²	* 0.341716	/ 421.4	/ 10*10 ³	-	/ 980.665	* 5.46
kp·cm·s ²	* 335.109	/ 0.429711	/ 10.1972	* 980.665	-	* 5361.74
oz·in ²	/ 16	/ 2304	/ 54674	/ 5.46	/ 5361.74	-

Temperature

	°F	°C	K
°F	-	(°F - 32) * 5/9	(°F - 32) * 5/9 + 273.15
°C	°C * 9/5 + 32	-	°C + 273.15
K	(K - 273.15) * 9/5 + 32	K - 273.15	-

Conductor cross section

AWG	1	2	3	4	5	6	7	8	9	10	11	12	13
mm ²	42.4	33.6	26.7	21.2	16.8	13.3	10.5	8.4	6.6	5.3	4.2	3.3	2.6

AWG	14	15	16	17	18	19	20	21	22	23	24	25	26
mm ²	2.1	1.7	1.3	1.0	0.82	0.65	0.52	0.41	0.33	0.26	0.20	0.16	0.13

Terms and Abbreviations

	See chapter "Standards and terminology" for information on the pertinent standards on which many terms are based. Some terms and abbreviations may have specific meanings with regard to the standards.
<i>Axis body</i>	The axis body is an aluminum precision profile.
<i>Breakaway torque</i>	The breakaway torque describes the driving torque required to overcome the static friction and that initiates the transition to sliding friction.
<i>Cantilever axis</i>	In the case of a cantilever axis, the carriage is stationary while the axis body moves. Portal axes work the other way round.
<i>DOM</i>	Date of manufacturing: The nameplate of the product shows the date of manufacture in the format DD.MM.YY or in the format DD.MM.YYYY. For example: 31.12.11 corresponds to December 31, 2011 31.12.2011 corresponds to December 31, 2011
<i>Degree of protection</i>	The degree of protection is a standardized specification for electrical equipment that describes the protection against the ingress of foreign objects and water (for example: IP 20).
<i>Direction of movement</i>	In the case of a rotary motor, direction of movement is defined in accordance with IEC 61800-7-204: Positive direction is when the motor shaft rotates clockwise as you look at the end of the protruding motor shaft.
<i>Error</i>	Discrepancy between a detected (computed, measured or signaled) value or condition and the specified or theoretically correct value or condition.
<i>Feed per revolution</i>	The feed per revolution is the distance the carriage covers per motor revolution.
<i>Linear guide</i>	The linear guide consists of: - the rollers and the guide rod which comprise the roller guide (CAS4•BR). - the guide carriage and the guide rail which comprise the recirculating ball bearing guide (CAS4•BB).
<i>Load torque</i>	The permissible load torques are calculated based on the service life of the carriage guide. If the load torque exceeds the specified values, the service life of the axis will be reduced.
<i>Modulus of elasticity</i>	The modulus of elasticity is used to describe the tendency of a material to deform along an axis when opposing forces are applied along this axis; it is the ratio of tensile strain and tensile stress. The higher the value, the stiffer the material.
<i>Mounting position</i>	The linear axes can be installed in any desired mounting position. However, all external forces and torques must be within the ranges of permissible values.
<i>Portal axis</i>	In the case of a portal axis, the axis body is stationary while the carriage moves. Cantilever axes work the other way round.

<i>Positioning accuracy</i>	Positioning accuracy is the tolerance between the specified position and end position actually reached, measured at the carriage. To determine this value, the carriage is moved to the end position from different directions at different velocities.
<i>Recirculating ball bearing</i>	The axis axis body absorbs the forces and torques applied at the carriage via the recirculating ball bearing guide. The recirculating ball bearing guide can absorb high forces and torques.
<i>Repeatability</i>	Repeatability is the accuracy with which it is possible to move to a previous position again under the same conditions. To determine this value, the carriage is moved to the end position from the same direction at the same velocity.
<i>Running accuracy</i>	Due to the manufacturing process, the extruded aluminium profiles have a certain tolerance in terms in straightness and twist. The tolerances are specified in EN 12020-2. To reach the desired running accuracy, the linear axis must be mounted on a precision-machined surface.
<i>Sensor</i>	Inductive proximity switches are used as sensors for limit switches or reference switches. These switches are not a safety function.
<i>Service life</i>	The service life is the distance in kilometers before the first signs of material fatigue can be seen on the guides, the drive elements and the bearings. Service life specifications (kilometers covered) relate to the nominal values specified in the data sheet. If the nominal values are exceeded, the service life decreases accordingly.
<i>Stiffness</i>	Stiffness is a measure of the ability to move and hold with high position accuracy a part to be positioned even when the load changes.
<i>Stroke reserve</i>	The stroke reserve is the distance between a limit switch and the mechanical stop.
<i>Stroke</i>	Stroke is the maximum travel of the carriage between the switching points of the limit switches.
<i>Support axis</i>	A support axis has linear guides, but no drive elements. A support axis carries loads that are applied asymmetrically to the carriage and improves the stability and service life of the system.

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