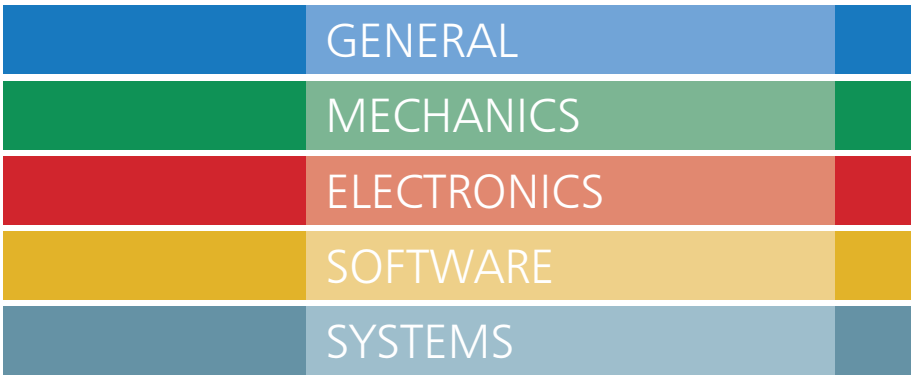
Automation
2014/15 E

From Components to Systems

isel®



iselGermany AG

iselGermany AG

Business hours

Dermbach plant
- sales, order processing and registry
  Monday–Thursday 07:30 a.m.– 5 p.m.
  Friday 07:30 a.m. – 2 p.m.

Eichenzell plant
- shipping and receiving
  Monday–Thursday 7 a.m. – 3 p.m.
  Friday 7 a.m. – 12:30 p.m.

Eichenzell plant
- Personal collection
  Monday–Thursday 8 a.m. - 1 p.m.
  Friday 8 a.m. - 11 a.m.

Switchboard

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Shipment: national and international

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Email: automation@isel.com | www.isel-germany.de

Dear business partners,

today you receive our current catalogue „Automation 2014/15E", together with our thanks for your interest shown in our products!
With the beginning of the year, we resolved to complete a lot of new projects, placing special emphasis on being able to offer you functionality and quality at a fair price.

Professional advice, planning and performance

Our technically competent customer advisors are now working together in teams. The new segmentation allows, through an active exchange of experience, to improved continually expert advice and makes it easier for you to contact us by telephone.
The new established application centre in Dermbach received quickly very positive feedback after it was set up:
Feasibility analyses can be performed for your application here. This means you are aware of what to expect before you receive your system.
Our „Central order management" department makes it possible to determine delivery dates even more precisely, based on all necessary resources and to notify you at an early stage of delay.
The isel webshop is a further important step in the quicker and easier processing of your orders. In the area of development, production, sales and service of automation components and systems, we have introduced a quality management system in accordance with DIN ISO 9001:2008 regulations.

Fair prices and conditions

It is a priority for us to deliver our components and systems tailored to your individual requirements.
For decades we are anxious to realize taht with a consistently good price-/performance ratio. We are especially proud of keeping pace with the international competition with our 'Made in Germany' products. Free delivery within Germany has made deliveries a lot easier both for you and us

Service

We set great store by good service – you will therefore benefit from our free online support not just during the warranty period, but also thereafter. Our hotline allows you to contact us even outside the business hours and aims you to provide direct remedial action in the case of a problem.
Our service technicians are experienced at working on site. Training sessions at your company or in our application centre prepare you to work effectively with our products.

Global presence

With new offices in the USA, England, France, Austria and Hungary and numerous partners in Germany, Europe and globally, we are never far away.

Successful together

Our catalogue contains our time-proven and newest products and shows you a great number of different sample combinations.
If you have any questions, please do not hesitate to contact our team.
We can only benefit together, if you are successful too! I´m at your`s disposal for any suggestion for improvement any time.

Trabert

Andreas Trabert
Sales Manager
isel Germany AG

isel Group locations in Germany

Eiterfeld plant (Hesse)
with approx. 8,000 m² of production, warehousing and office space

Eichenzell plant (Hesse)
with approx. 11,000 m² of production, warehousing and office space

Dermbach plant (Thuringia)
with approx. 14,000 m² of production, warehousing and office space

Berlin plant
with 2 assembly halls, high bay warehouse with offices and exhibition hall as well as the future isel-Store with parking garage

Contents

Technical data is accurate to the best of our knowledge and belief. Future developments are subject to change without notice. This catalogue supersedes all previous versions.

The isel-Group

The international isel group of companies was founded in 1972 as a one-man operation in Eiterfeld (Hesse) under the company name isert electronics. The company dealt with the manufacture and distribution of equipment "around the conductor board" in the first few years. Object of the company today is the development, production, sales and service of components and systems for automation.

The product range from components to systems made by isel includes CNC units, CNC machines, automation, handling and robotics with step, servo, linear and torque motors including controls.

Members in Germany are the companies isel GmbH & Co.KG, **isel Germany AG**, imes-icore GmbH and isel Facility GmbH. Other offices are located in Austria, Hungaria, France, Great Britain and the USA.

isel Gemany AG

The isel Germany AG is a hundert percent company of the isel group and located in Germany in Eichenzell (Hesse) and Dermbach (Thuringia) with a total of 25,000 m² of production, warehouse and office space.

Main area of business of the isel Germany AG is the provision of components from MECHANICS, ELECTRONICS and SOFTWARE. Furthermore CNC units and CNC machines are available with extensive accessories. This includes also commissioned work and project planning for OEM customers in all sectors.

In addition to an expert advice, the isel Germany AG also offers services like trainings and project planning.

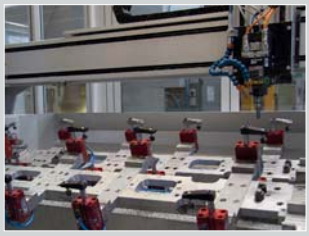
Benefit from our years of experience on the market! We deliver from components to system from a single source.

Life Cycle Service

... to ensure, that you can use your CNC machine every day without any worries

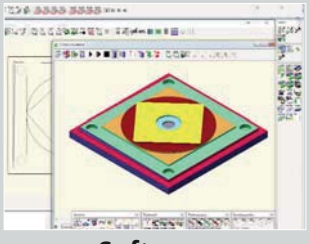
Maintenance

Reconditioning



Automation

Measurement / testing



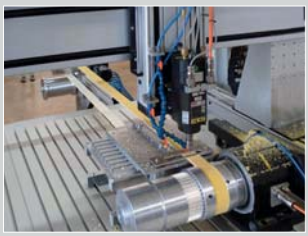
Software

Life Cycle Service

... to ensure, that you can use your CNC machine every day without any worries

Service

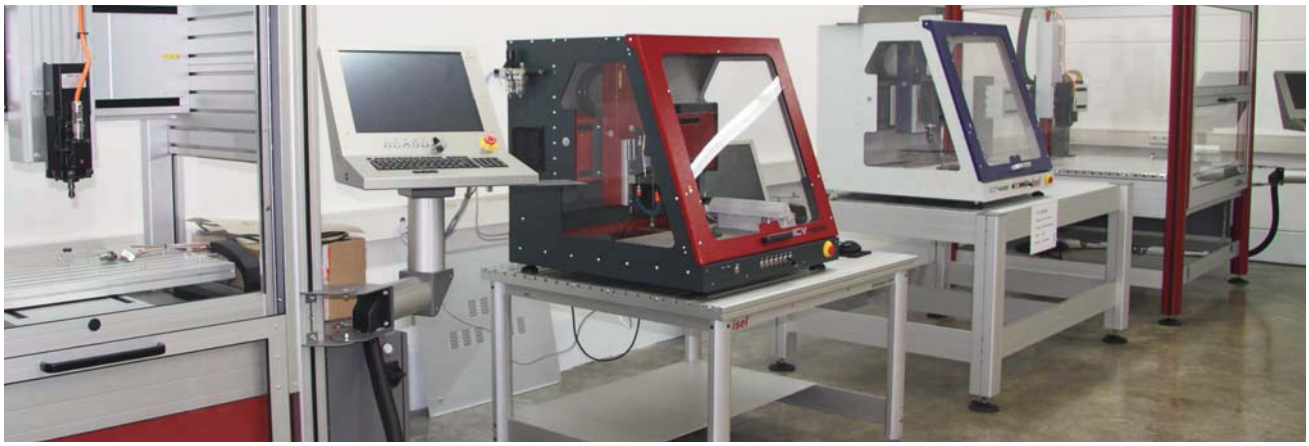
Spare parts



Retrofitting

Training

Application Center



Visit our factory in Dermbach, Thuringia and convince yourself on-site of the efficiency of our cnc machines. We like to draw your attention to present a cross-section of our range of products, furthermore we offer you the opportunity of practically orientated demonstrations.

Do you have any questions regarding specific topics concerning particular applications?
Don`t hesitate to arrange an appointment with our applications technologist **Andreas Schaub**.

Mr. Andreas Schaub
phone: +49 (0) 36964 / 84 525
anwendungstechnik@isel.com

In our showroom, you`ll find the following machines:

- EuroMod MP30
- ICV 4030
- ICP 4030
- FlatCom M40
- FlatCom S40
- EuroMod MP65
- FlatCom XL

References

Daimler AG

Quality assurance according to DIN ISO 9001:2008

The quality assurance system for our products comprises all areas which contribute to achieving the quality goals. It is based on legal requirements, customer requirements and the internal isel Germany AG quality requirements. The quality assurance system ensures the production processes are manageable and that products are only sent on to the next production step if they meet the respective specifications. We are certified according to DIN ISO 9001:2008.

Coordinate measuring equipment

Mitutoyo CRYSTA Apex S 123010

Specifications: X-axis = 1,205 mm
Y-axis = 3,005 mm
Z-axis = 1,005 mm
Touch system: TP 200
Changer magazin: SCR 200
Length measuring deviation:
MPE = (2,5+4,0L/1000)µm

Mitutoyo Euro C 544 Apex

Specifications: X-axis = 500 mm
Y-axis = 400 mm
Z-axis = 400 mm
Touch system: TP 200
Changer magazin: SCR 200
Length measuring deviation:
MPE = (2,9+4,0L/1000)µm

Mitutoyo Euro C 574 Apex

Specifications: X-axis = 500 mm
Y-axis = 700 mm
Z-axis = 400 mm
Touch system: TP 200
Changer magazin: SCR 200
Length measuring deviation:
MPE = (2,9+4,0L/1000)µm

Technical specifications subject to change.

… and the quality requirements of our customers and isel Germany AG

Surface roughness tester Mitutoyo

Type: SJ - 201 P
Test procedure: Ra, Ry, Rz, Rq, Rt

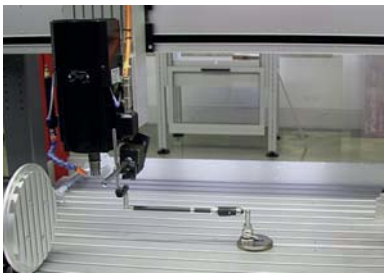
Hardness tester Wolpert

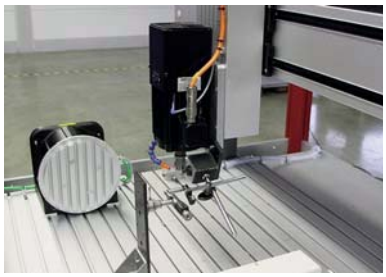
Type: Dia Testor 2 Rc
Test procedure: Vickers, Brinell and Rockwell

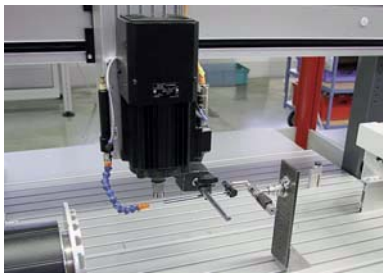
Layer thickness measurement device Elektro Physik

Type: Minitest 600 B
Probe for iron and non-iron measurements.

QC 10 accuracy check







The QC 20 system allows the routine inspection of our machines. The measurement of the circularity detects geometric and control machine faults such as for example squareness, contouring errors, guide clearance, straightness faults and backlash. The system is traceable and is checked by the manufacturer on a regular basis.

XL-80 Laser Interferometer

We use the laser system for calibrating machine tools and coordinate measuring equipment for ...

... position measurement

Position measurement is the most common measurement performed on machines. The system captures the positioning and repeat accuracy by comparing the position value indicated by the machine and the actual position captured by the Laser Interferometer System.

.... tilt angle measurement

On machine tools and coordinate measuring equipment the cause for positioning faults is oftentimes the tilt of the axis. With the Abbe effect the faults continue to increase with an increasing distance from the axle location.

... Measuring the dynamic behaviour

The software for dynamic measurements allows for motion sequences, speeds, accelerations, vibrations and the capabilities of servo drives to be determined.

... Measuring the straightness

The straightness measurement is used to determine the horizontal and vertical straightness of the guide of the machine. Straightness errors have a direct influence on the positioning and the path accuracy of the machine.

Technical specifications subject to change.

mechan

MECHANICS

Aluminium profiles

Overview

Aluminium profiles

Overview

CAD data on our website **www.isel-germany.de**

Panel profiles

PP profiles

Features

- For fast and easy erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced to DIN EN 12020-2
- Easy, very strong under load
- Top edge particularly suitable as a load-bearing cladding, also takes very high loads
- The drilled holes and PS profile socket head screws of our profile linkages offer extremely rigid connections, resistant to tension, distortion and bending.
- Profile cutting to order
- Extensive range of accessories (see page B-14)

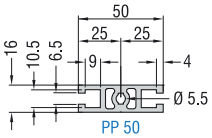
Technical specifications

	PP 50 L	PP 50	PP 100	PP 150	PP 200	PP 250
Dimensions (W × H)	50 x 50 mm	50 x 16 mm	100 x 16 mm	150 x 16 mm	200 x 16 mm	250 x 16 mm
Length	up to 3 metres (special lengths upon request)					
Weight	approx. 1.7 kg/m	approx. 1.1 kg/m	approx. 1.9 kg/m	approx. 2.6 kg/m	approx. 3.4 kg/m	approx. 4.1 kg/m
	2 cavity inserts Ø 5.5 mm für M6 screw	1 cavity insert Ø 5.5 mm für M6 screw	2 cavity inserts Ø 5.5 mm for M6 screw in 50 mm raster	3 cavity inserts Ø 5.5 mm for M6 screw in 50 mm raster	4 cavity inserts Ø 5.5 mm for M6 screw in 50 mm raster	5 cavity inserts Ø 5.5 mm for M6 screw in 50 mm raster
Moment of inertia I_x	13.25 cm⁴	8.13 cm⁴	67.27 cm⁴	213.92 cm⁴	482.77 cm⁴	908.52 cm⁴
Moment of inertia I_y	13.25 cm⁴	1.37 cm⁴	2.46 cm⁴	3.55 cm⁴	4.64 cm⁴	5.74 cm⁴
Moment of resistance W_x	4.39 cm³	3.25 cm³	13.45 cm³	28.52 cm³	48.27 cm³	72.68 cm³
Moment of resistance W_y	4.39 cm³	1.71 cm³	3.08 cm³	4.44 cm³	5.80 cm³	7.17 cm³

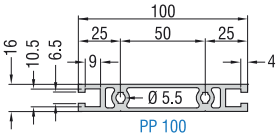
Ordering data

Part-No. for L=**1000 mm**	**201 045 1000**	**201 040 1000**	**201 041 1000**	**201 042 1000**	**201 043 1000**	**201 009 1000**
Part-No. for L=**3000 mm** (Raw profile length L=3050...3100 mm)	**201 045 3000**	**201 040 3000**	**201 041 3000**	**201 042 3000**	**201 043 3000**	**201 009 3000**

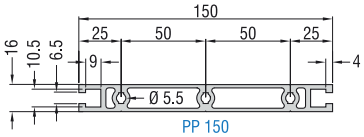
Dimensioned drawings



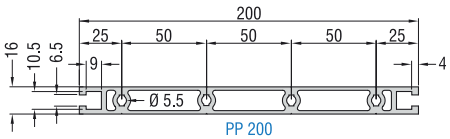
PP 50



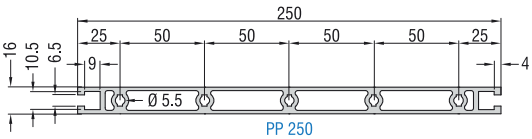
PP 100



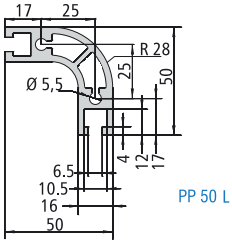
PP 150



PP 200



PP 250



PP 50 L

Universal profiles

PU 25 / PU 50

Features

- For the fast and simple erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced in accordance with DIN EN 12020-2
- Light, compact & stable
- For universal use
- Suitable for very high loads
- The clamping elements and drilled holes of our clamped linkages produce very rigid connections, resistant to tension, distortion and inter-profile bending.
- Profile cutting to order
- Extensive range of accessories (see page B-14)

Option: - powder coatings in anthracite and light grey

Technical specifications

	PU 25	PU 50
Dimensions (W × H)	25 x 25 mm	50 x 25 mm
Length	up to 3 metres (special lengths upon request)	
Weight	appr. 0.7 kg/m	appr. 1.3 kg/m
	4 T-key inserts for M6 sliding nuts Cavity insert, Ø 5.5 mm for M6	4 T-key inserts for M6 sliding nuts 2 cavity inserts, Ø 5.5 mm for M6
Moment of inertia I_x	1.43 cm^4	10.99 cm^4
Moment of inertia I_y	1.43 cm^4	2.81 cm^4
Moment of resistance W_x	1.14 cm^3	4.40 cm^3
Moment of resistance W_y	1.14 cm^3	2.25 cm^3

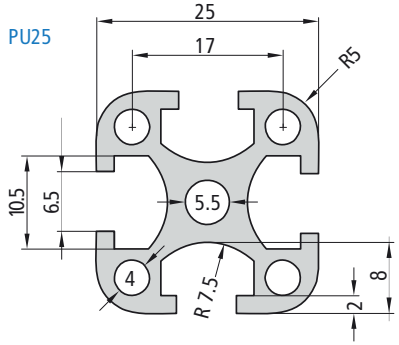
Ordering data

Description	Part-No.: L = **1000 mm** Part-No.: L = **3000 mm***
PU 25 B 25 x H 25 mm	200 001 **1000** 200 001 **3000***
PU 50 B 50 x H 25 mm	200 002 **1000** 200 002 **3000***

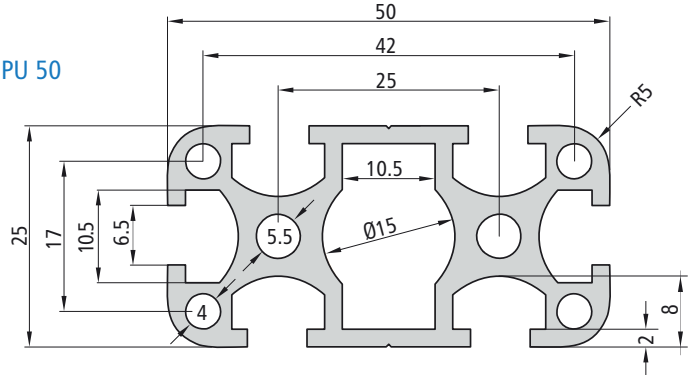
*Raw profile length L=3050 ... 3100 mm

Dimensioned drawings

PU25



PU 50



mechanics

T-slot plates

PT 25

Features

- Universal precision, clamping and machining surface
- Aluminium, naturally anodised
- Produced in accordance with DIN EN 12020-2
- Milled flat on both sides
- For use with any machine
- Thick walled, distortion-free and extremely form-retaining
- Profile cutting to order
- Extensive range of accessories (see page B-14)
- Option:
  - Drainage channel for small quantities of liquid

Technical specifications

	PT 25		
Dimensions (W × H)	125 x 20 mm	250 x 20 mm	375 x 20 mm
Length	up to 3 metres (special lengths upon request)		
Weight	appr. 4.8 kg/m	appr. 9.6 kg/m	appr. 13.7 kg/m
T-slots	one-sided in 25 mm raster		
Moment of inertia I_x	243.36 cm^4	1848.57 cm^4	5996.01 cm^4
Moment of inertia I_y	6.46 cm^4	12.77 cm^4	17.90 cm^4
Moment of resistance W_x	38.94 cm^3	147.88 cm^3	319.79 cm^3
Moment of resistance W_y	6.46 cm^3	12.77 cm^3	17.90 cm^3

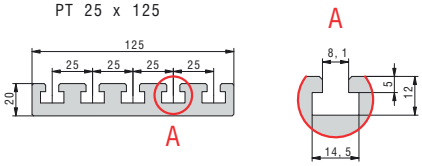
Ordering data

L [mm]	**PT 25** W 125 x H 20 mm	**PT 25** W 250 x H 20 mm	**PT 25** W 375 x H 20 mm
	Part no.	Part no.	Part no.
400	201 014 **0400**	201 018 **0400**	201 020 **0400**
500	201 014 **0500**	201 018 **0500**	201 020 **0500**
600	201 014 **0600**	201 018 **0600**	201 020 **0600**
700	201 014 **0700**	201 018 **0700**	201 020 **0700**
800	201 014 **0800**	201 018 **0800**	201 020 **0800**
900	201 014 **0900**	201 018 **0900**	201 020 **0900**
1000	201 014 **1000**	201 018 **1000**	201 020 **1000**
1100	201 014 **1100**	201 018 1100	201 020 **1100**
1200	201 014 **1200**	201 018 **1200**	201 020 **1200**
1300	201 014 **1300**	201 018 **1300**	201 020 **1300**
1400	201 014 **1400**	201 018 **1400**	201 020 **1400**
1500	201 014 **1500**	201 018 **1500**	201 020 **1500**
1800	201 014 **1800**	201 018 **1800**	201 020 **1800**
2000	201 014 **2000**	201 018 **2000**	201 020 **2000**
2500	201 014 **2500**	201 018 **2500**	201 020 **2500**
3000*	201 014 **3000***	201 018 **3000***	201 020 **3000***

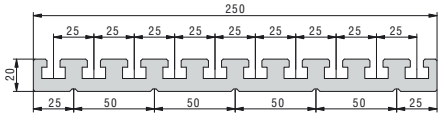
*Raw profile length L=3050 ... 3100 mm

Maßzeichnungen

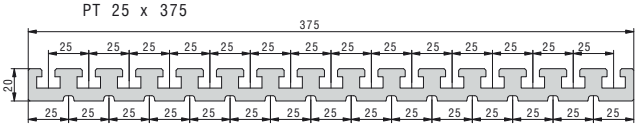
PT 25 x 125



PT 25 x 250



PT 25 x 375



T-nuts see accessories for aluminium profiles.

T-slot plates

PT 50

Features

- Universal precision, clamping and machining surface
- Aluminium, naturally anodised
- Produced in accordance with DIN EN 12020-2
- Milled flat on both sides
- For use with any machine
- Thick walled, distortion-free and extremely form-retaining
- Profile cutting upon request
- Extensive range of accessories (see page B-14)

Technical specifications

	PT 50	
Dimensions (W × H)	250 x 20 mm	375 x 20 mm
Length	up to 3 metres (special lengths upon request)	
Weight	approx. 10.0 kg/m	approx. 14.8 kg/m
T-slots	both-sided in 50 mm raster	
Moment of inertia I_x	2062.99 cm^4	6745.96 cm^4
Moment of inertia I_y	13.85 cm^4	20.63 cm^4
Moment of resistance W_x	165.04 cm^3	359.78 cm^3
Moment of resistance W_y	13.85 cm^3	20.63 cm^3

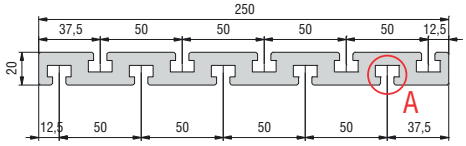
Ordering data

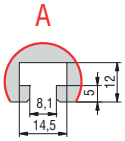
L [mm]	**PT 50** W 250 x H 20 mm	**PT 50** W 375 x H 20 mm
	Part no.	Part no.
400	201 016 **0400**	201 019 **0400**
500	201 016 **0500**	201 019 **0500**
600	201 016 **0600**	201 019 **0600**
700	201 016 **0700**	201 019 **0700**
800	201 016 **0800**	201 019 **0800**
900	201 016 **0900**	201 019 **0900**
1000	201 016 **1000**	201 019 **1000**
1100	201 016 **1100**	201 019 **1100**
1200	201 016 **1200**	201 019 **1200**
1300	201 016 **1300**	201 019 **1300**
1400	201 016 **1400**	201 019 **1400**
1500	201 016 **1500**	201 019 **1500**
1800	201 016 **1800**	201 019 **1800**
2000	201 016 **2000**	201 019 **2000**
2500	201 016 **2500**	201 019 **2500**
3000*	201 016 **3000***	201 019 **3000***

*Raw profile length L=3050 ... 3100 mm

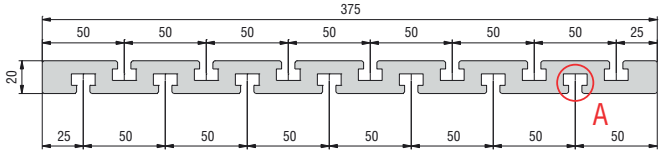
Maßzeichnungen

PT 50 x 250





PT 50 x 375



T-nuts see accessories for aluminium profiles.

Rectangular profiles

RE 40

Features

- Universal precision, clamping and machining surface
- As a stabiliser for machine and subframe constructions
- Aluminium, naturally anodised
- Produced in accordance with DIN EN 12020-2
- Light & very stable
- Numerous applications with the accessories are possible
- Profile cutting upon request
- Extensive range of accessories (see page B-14)

Technical specifications

	RE 40		
Dimensions (W × H)	150 x 40 mm	250 x 40 mm	350 x 40 mm
Length	up to 3 metres (special lengths upon request)		
Weight	approx. 4.8 kg/m	approx. 7.6 kg/m	approx. 13.380 g/m
	various cavities and T-key inserts for sliding nuts or M6 tapped strips for frontal inserts for M6 screws		
Moment of inertia I_x	393.7 cm⁴	1654.53 cm⁴	5,626.00 cm⁴
Moment of inertia I_y	33.42 cm⁴	54.18 cm⁴	97.45 cm⁴
Moment of resistance W_x	52.49 cm³	131.64 cm³	321.48 cm³
Moment of resistance W_y	16.71 cm³	27.09 cm³	48.5 cm³

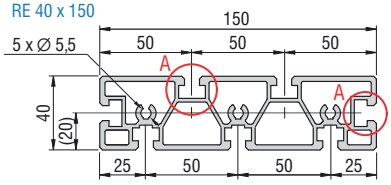
Ordering data

Profile description	Part no.: L = **1000 mm** Part no.: L = **3000 mm***
RE 40 W 150 x H 40 mm	201 035 **1000** 201 035 **3000***
RE 40 W 250 x H 40 mm	201 030 **1000** 201 030 **9000***
RE 40 W 350 x H 40 mm	201 031 **1000** 201 031 **3000***

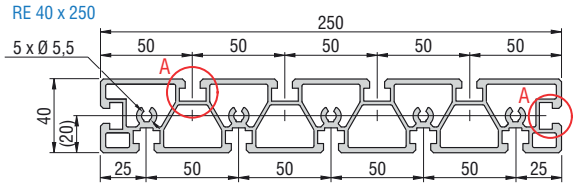
*Raw profile length L=3050 ... 3100 mm

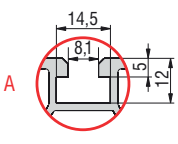
Dimensioned drawings

RE 40 x 150

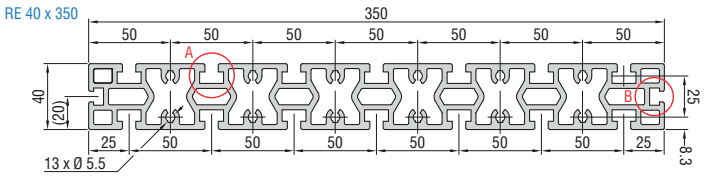


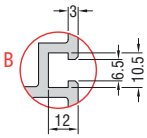
RE 40 x 250





RE 40 x 350





Rectangular profiles

RE 65

Features

- Universal precision, clamping and machining surface
- As a stabiliser for machine and subframe constructions
- Aluminium, naturally anodised
- Produced in accordance with DIN EN 12020-2
- Light & very stable
- Milled flat on both sides
- Numerous applications with the accessories are possible
- Profile cutting upon request
- Extensive range of accessories (see page B-14)

Technical specifications

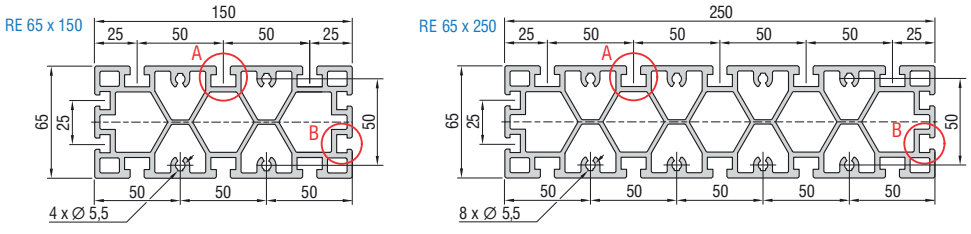
	RE 65	
Dimensions (W × H)	150 x 65 mm	250 x 65 mm
Length	up to 3 metres (special lengths to order)	
Weight	approx. 7.7 kg/m	approx. 12.4 kg/m
	various cavities and T-key inserts for sliding nuts or M6 tapped strips for frontal inserts for M6 screws	
Moment of inertia I_x	633.47 cm⁴	2,658.48 cm⁴
Moment of inertia I_y	148.87 cm⁴	243.85 cm⁴
Moment of resistance W_x	84.46 cm³	212.68 cm³
Moment of resistance W_y	45.83 cm³	75.03 cm³

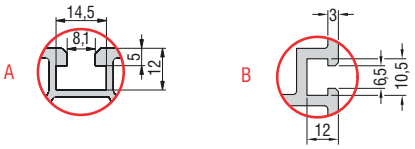
Ordering data

Profile description	Part no.: L=**1000 mm** Part no.: L=**3000 mm***
RE 65 W 150 x H 65 mm	201 034 **1000** 201 034 **3000***
RE 65 W 250 x H 65 mm	201 032 **1000** 201 032 **3000***

*Raw profile length L=3050 ... 3100 mm

Dimensioned drawings





Light frame profiles

PL 40 / PL 80

Features

- For the fast and simple erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced in accordance with DIN EN 12020-2
- Light, compact & stable
- Suitable for very high loads
- The clamping elements and drilled holes of our clamped linkages produce very rigid connections, resistant to tension, distortion and bending between the profiles.
- Profile cutting upon request
- Extensive range of accessories (see page B-14)

Option: - powder coatings

Technical specifications

	PL 40	PL 80
Dimensions (W × H)	40 x 40 mm	80 x 40 mm
Length	up to 3 metres (special lengths to order)	
Weight	approx. 1.5 kg/m	approx. 2.9 kg/m
	4 T-key inserts for M6 sliding nuts 5 cavity inserts, Ø 8.5 mm for M10	6 T-key inserts for M6 sliding nuts 6 cavity inserts, Ø 8.5 mm for M10 Cavity insert, Ø 10.2 mm for M12
Moment of inertia I_x	8.38 cm⁴	64.40 cm⁴
Moment of inertia I_y	8.38 cm⁴	16.36 cm⁴
Moment of resistance W_x	4.19 cm³	16.10 cm³
Moment of resistance W_y	4.19 cm³	8.18 cm³

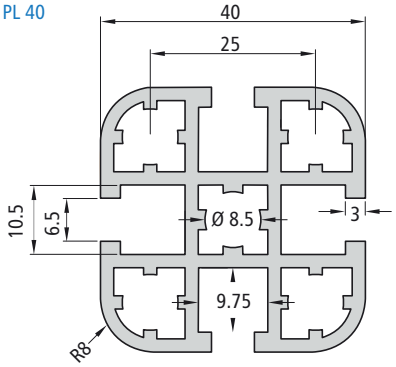
Ordering data

Profile description	Part no.: L=**1000 mm** Part no.: L=**3000 mm***
PL 40 W 40 x H 40 mm	200 008 **1000** 200 008 **3000***
PL 80 W 80 x H 40 mm	200 009 **1000** 200 009 **3000***

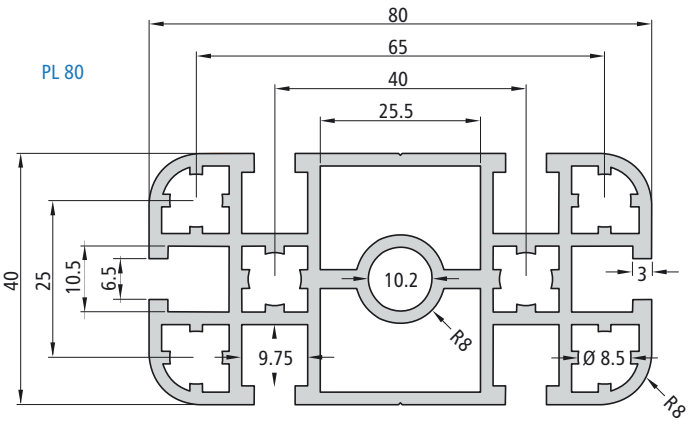
*Raw profile length L=3050 ... 3100 mm

Dimensioned drawings

PL 40



PL 80



Stand profiles

PS 50 / PS 80

Features

- For the fast and simple erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced in accordance with DIN EN 12020-2
- Light, compact & stable
- Suitable for high loads
- Our clamped linkages produce very rigid connections, resistant to tension, distortion and bending, between profiles
- Profile cutting upon request
- Extensive range of accessories (see page B-14)

Option: - powder coatings

Technical specifications

	PS 50	PS 80
Dimensions (W × H)	50 x 50 mm	80 x 80 mm
Length	up to 3 metres (special lengths upon request)	
Weight	approx. 2.3 kg/m	approx. 4.5 kg/m
	4 T-key inserts for M6 sliding nuts 4 cavity inserts, Ø 5.5 mm for M6 Cavity insert, Ø 8.5 mm for M10	4 T-key inserts for M6 sliding nuts 4 cavity inserts, Ø 5.5 mm for M6 Cavity insert, Ø 10.2 mm for M12
Moment of inertia I_x	22.06 cm⁴	111.8 cm⁴
Moment of inertia I_y	22.06 cm⁴	111.8 cm⁴
Moment of resistance W_x	8.82 cm³	27.95 cm³
Moment of resistance W_y	8.82 cm³	27.95 cm³

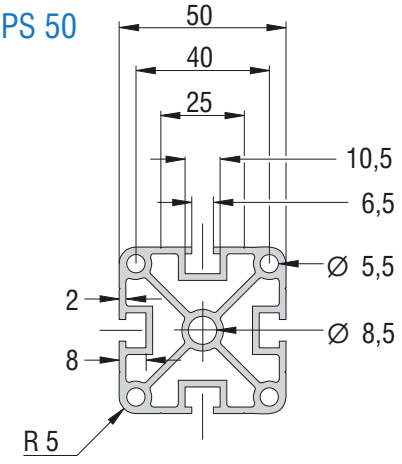
Ordering data

Profile description	Part no.: L=**1000 mm** Part no.: L=**3000 mm***
PS 50 W 50 x H 50 mm	200 003 **1000** 200 003 **3000***
PS 80 W 80 x H 80 mm	200 014 **1000** 200 014 **3000***

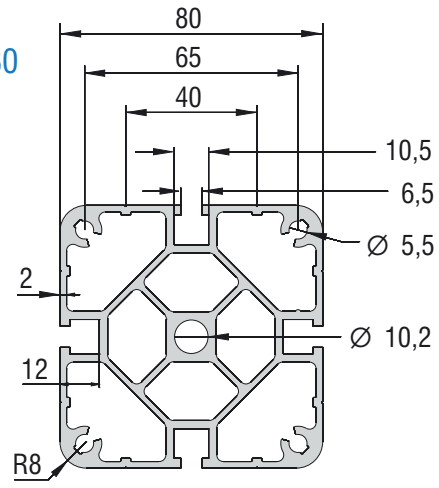
*Raw profile length L=3050 ... 3100 mm

Dimensioned drawings

PS 50



PS 80



Stand profiles

PS 100 / PS 140

Features

- For fast and easy erection of frames, benches and racks
- Aluminium, naturally anodised
- Produced in accordance with DIN EN 12020-2
- Light, compact & stable
- Suitable for high loads
- Our clamped linkages produce very rigid connections, resistant to tension, distortion and bending, between profiles
- Profile cutting upon request
- Extensive range of accessories (see page B-14)

Option: - powder coatings

Technical specifications

	PS 100	PS 140
Dimensions (W × H)	100 x 100 mm	140 x 140 mm
Length	up to 3 metres (special lengths to order)	
Weight	appr. 5.1 kg/m	appr. 9.2 kg/m
	4 T-key inserts for M6 sliding nuts 4 cavity inserts, Ø 5.55 mm for M6 Cavity insert, Ø 10.2 mm for M12	4 T-key inserts for M6 sliding nuts 4 cavity inserts, Ø 5.5 mm for M6 4 cavity inserts, Ø 3.4 mm for M4 Cavity insert, Ø 4 mm for M16
Moment of inertia I_x	163.00 cm⁴	601.80 cm⁴
Moment of inertia I_y	163.00 cm⁴	598.11 cm⁴
Moment of resistance W_x	32.60 cm³	85.97 cm³
Moment of resistance W_y	32.60 cm³	85.44 cm³

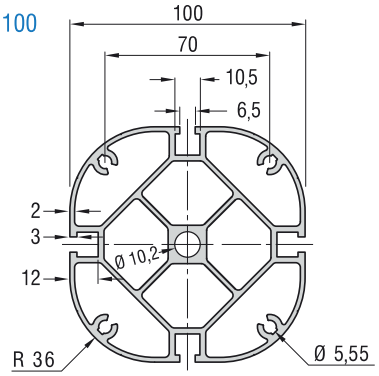
Ordering data

Profile description	Part no.: L=**1000 mm** Part no.: L=**3000 mm***
PS 100 W 100 x H 100 mm	200 015 **1000** 200 015 **3000***
PS 140 B 140 x H 140 mm	200 016 **1000** 200 016 **3000***

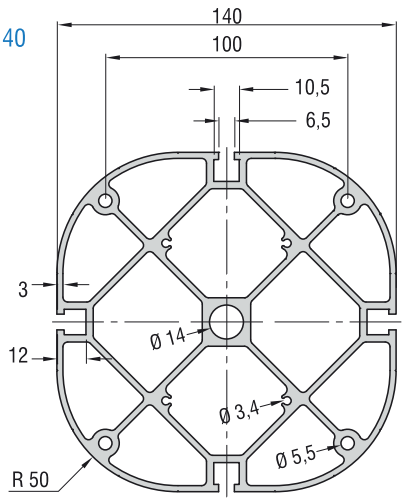
*Raw profile length L=3050 ... 3100 mm

Maßzeichnungen

PS 100



PS 140



Workbenches

AT

Figure with insert base option

Features

Workbenches AT for clamping devices, clamping means, for measurement, checking, testing, etc.

- Sub-frame from aluminium profiles PS series with braces made from aluminium panel profiles PP series
- Aluminium bench plate RE series of rectangular profiles 40 × 250 mm with T-slots

Options

- Length up to 2 m
- Various accessories

Accessories

Insert base for AT 1
Part no.: **248551 0010**

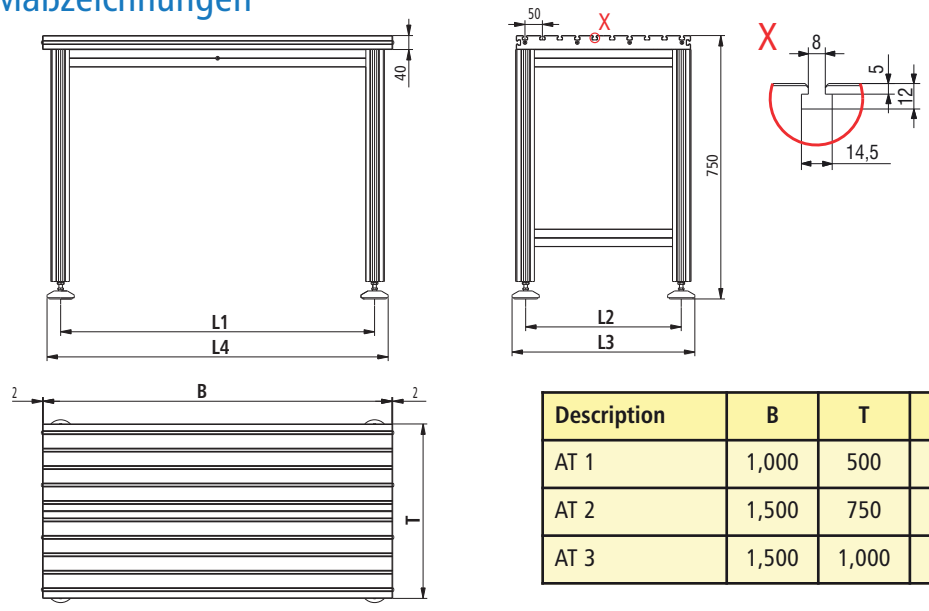
Insert base for AT 2
Part no.: **248551 0012**

Insert base for AT 3
Part no.: **248551 0013**

Ordering data

Part no.	Description	Load: Surface load	Weight	suitable for
248 550 0010	AT 1, W 1,000 x D 500 x H 750 mm	200 kg	approx. 30 kg	
248 550 0012	AT 2, W 1,500 x D 750 x H 750 mm	400 kg	approx. 60 kg	
248 550 0013	AT 3, W 1,500 x D 1,000 x H 750 mm	400 kg	approx. 75 kg	ICP/ICV 4030

Maßzeichnungen



Description	B	T	L 1	L 2	L 3	L 4
AT 1	1,000	500	900	446	526	980
AT 2	1,500	750	1,380	660	780	1,500
AT 3	1,500	1,000	1,380	910	1,030	1,500

Accessories

Tapped rails

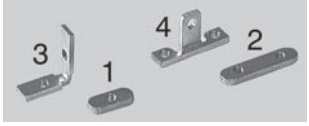
M6 tapped rail
- 13 x 6 mm
- M6 Ra 50 mm
- Galvanised
- VE 3 units at 1 m
- For PT/RE 40, 65

Part no.: 209010

M6 tapped rail
- 10 x 4 mm
- M6 Ra 50 mm
- Galvanised
- VE 3 units at 1 m
- For all except PT/RE 40, 65/SP

Part no.: **209011**

Sliding nuts



M6 sliding nut (Figure 1)
- L25 × W10 × H3.5
- Galvanised
- VE 100 units
- All except PT/RE 40, 65

Part no.: **209001 0005**

M6 sliding nut (Figure 1)
- L 25 × W 13 × H 5
- Galvanised
- VE 50 units
- For PT/RE 40, 65

Part no.: **209004 0001**

2 × M6 sliding nuts (Figure 2)
- L45 x W10 x H3.5
- Galvanised
- VE 50 units
- For all except PT/RE 40, 65

Part no.: **209002 0004**

2 × M6 sliding nuts (Figure 2)
- L 45 × W 13 × H 6
- Galvanised
- 2xM6 Ra 25mm
- VE 25 units
- For PT/RE 40, 65

Part no.: **209005 0001**

M5 sliding nut
- L25 × W10 × H3.5
- Galvanised
- VE 20 units
- For all except PT/RE 40, 65

Part no.: **209006 0001**

Angle sliding nut 2 × M6 (Figure 3)
- Galvanised
- VE 25 units
- For all except PT/RE 40, 65

Part no.: **209021 0003**

Special angle sliding nut 3 x M6 (Figure 4)
- Galvanised
- VE 25 units
- For all except PT/RE 40, 65

Part no.: **209022 0003**

Sliding nuts

M5/M6 sliding nuts
- Galvanised
- VE 20 units
- for PT25 , PT 50, PS 200, RE 40 and RE 65 (securing only possible at the top)

with spring

Part no.: **209005 0002** (M5/Figure 1)

Part no.: **209005 0003** (M6/Figure 2)

with large chamfer

Part no.: **209005 0004** (M6/Figure 3)

in rhombus shape

Part no.: **209005 0005** (M5/Figure 4)

Part no.: **209005 0006** (M6/Figure 5)

Tension rods

Tension rods SE
- With M6 setting screw
- VE 2 units
- For RE/PT

Part no.: **290051**

Clamping devices

Hand lever clamping device SH 1
- for RE/PT

Part no.: **290001**

Hand lever clamping device SH 2
- For RE/PT

Part no.: **290002**

Stop rails

Stop rail (galvanised)
- W 20 × H 10
- Ra 50
- VE 2 units + fixing material

L 125 mm

Part no.: **290021 0125**

L 175 mm

Part no.: **290021 0175**

L 225 mm

Part no.: **290021 0225**

T-keys

M6 T-keyways
- DIN 508
- Hardened
- VE 20 units
- For PT/ RE 40, 65

Part no.: **209119 0003**

Edging strip

Black edging strip 1-part
- For plate thicknesses 3 - 4 mm
- VE 10 m

Part no.: **209202 0002** (PU profiles)

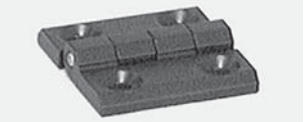
Part no: **209202 0001** (PP-/ RE- and PS profiles)

PP 50 cross-braces

PP 50 cross-braces
- L 490 mm
- Mitred
- M6 drillings
- for all except PT/RE 40, 65

Part no.: **209300 0000**

Hinge strip



Plastic hinge strip
- L 65 × W 40
- VE 10 units + fixing
- Ra 43 × 20 mm
- For PL

Part no.: **209050 0012**

Aluminium hinge strip
- L 40 x W 40 mm
- VE 10 units + fixing
- Ra 25 x 25 mm
- For all except PT/RE 40, 65

Part no.: **209050 0011**

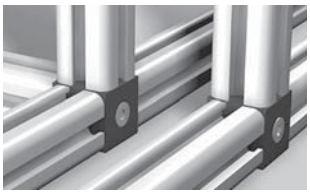
Accessories

Profile connection cubes

Profile connection cubes black

- VE 10 units + fixing material
- For PU 25

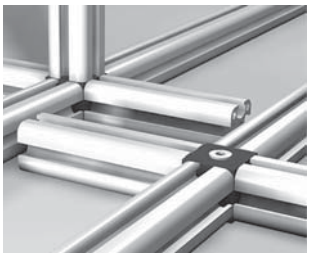
2 x Part no.: **209104 0002**
Part no.: Part no.: **209103 0002**



Profile connection cubes, black

- VE 10 units + fixing material
- For PU 25

Part no.: Part no.: **209106 0002**
Part no.: Part no.: **209107 0002**

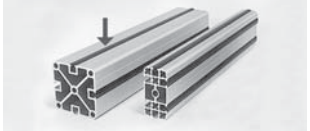


Profile connection cubes black

- VE 10 units + fixing material
- For PU 25

Four-fold Part no.: **209108 0002**
Five-fold Part no.: **209109 0002**

T-slot cover

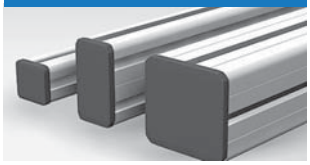


T-slot cover

- VE 30 m
- (turquoise = similar to RAL 5018)
- For all except PT/RE 40, 65

black Part no.: **209201 0004**
turquoise Part no.: **209201 0003**
light grey Part no.: **209201 0007**

Profile covers



Profile covers, black

- PU 25 - 25 units
  Part no.: **209105 0003**
- PU 50 - 25 units
  Part no.: **209126 0003**
- PL 40 - 20 units
  Part no.: **209127 0003**
- PL 80 - 20 units
  Part no.: **209128 0003**
- PS 50 - 25 units
  Part no.: **209129 0003**
- PS 80 - 20 units
  Part no.: **209130 0003**
- PS 140 - 10 units
  Part no.: **209130 1001**

Aluminium corner connector

Aluminium corner connector

- L 25 × W 25 × H 15 mm
- VE 10 units + fixing material
- For PL, PS, PU, PP

natural
Part no.: **209114 0101**
black
Part no.: **209114 0111**

- L 40 × W 40 × H 22 mm
- VE 10 units + fixing material
- For PP/PL/PS/PU

natural
Part no.: **209115 0101**
black
Part no.: **209115 0111**

- L 50 x W 50 x H 15
- VE 10 units + fixing material
- For RE/PU/PS

natural
Part no.: **209116 0101**
black
Part no.: **209116 0111**

- L 80 x W 80 x H 22
- VE 10 units + fixing material
- For PP/PL/PS/PU

natural
Part no.: **209117 0101**
black
Part no.: **209117 0111**

Plastic equipment bases

Plastic equipment bases
with rubber plate

- VE 4 units + setting screws
- Black

For PL 40/PS 50
- Ø 60
- M10 × 50 setting screws

Part no.: **209032 0003**

for PL 80 / PS 80
- Ø 80
- M12 × 50 setting screws

Part no.: **209034 0001**

for PL 80 / PS 80
- Ø 120
- Setting screws M12 × 50
- Black

Part no.: **209033 0003**

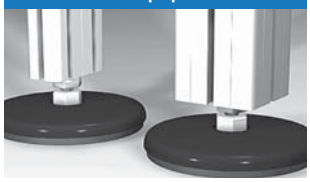
Guide rollers

Rubber-tired guide rollers Ø 75 (M10)

- VE 4 units
- 2 with and 2 without locking device
- for PL 40/PS 50

Part no.: **209043 0011**

Aluminium equipment bases



Aluminium equipment bases
with rubber plate

for PU 50
- VE 4 units, with setting screws and reducing bushings
- Ø 50
- M6 × 30 setting screws
- Natural

Part no.: **209030 0000**

for PS 100/140
- Ø 170
- M16 × 100 setting screws
- Black

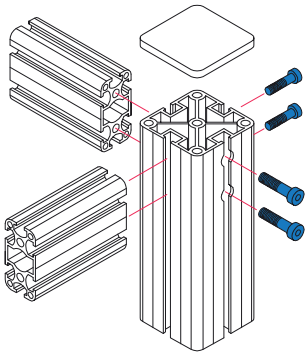
Part no.: **209035 0001**

Technical specifications subject to change.

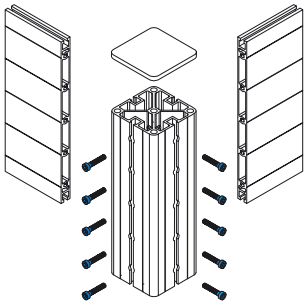
Profile connections

Examples:

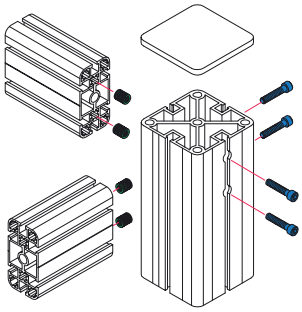
PS 50 with PU 50



PS 50 with PP 250



PS 80 with PL 80



Allen screws

Allen screws
M6 × 25 mm

- VE 10 units
  Part no.: **209147 0009**
- VE 50 units
  Part no.: **209147 0010**

Allen screws
M6 x 50 mm

- VE 10 units
  Part no.: **209147 0003**
- VE 50 units
  Part no.: **209147 0004**

Allen key
SW 5

- DIN 911
- VE 1 unit

Part no.: **931152**

Tapped bushings

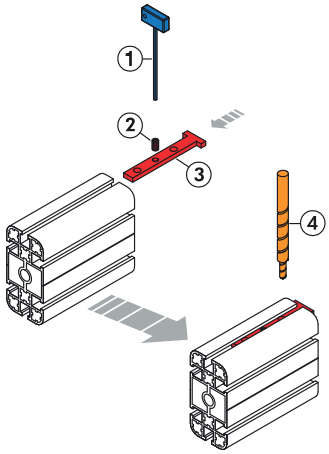
Tapped bushings
M9/M6

- VE 10 units
  Part no.: **209147 0001**
- VE 50 units
  Part no.: **209147 0002**

Tapped bushings
M10/M6

- VE 10 units
  Part no.: **209147 0124**
- VE 50 units
  Part no.: **209147 0125**

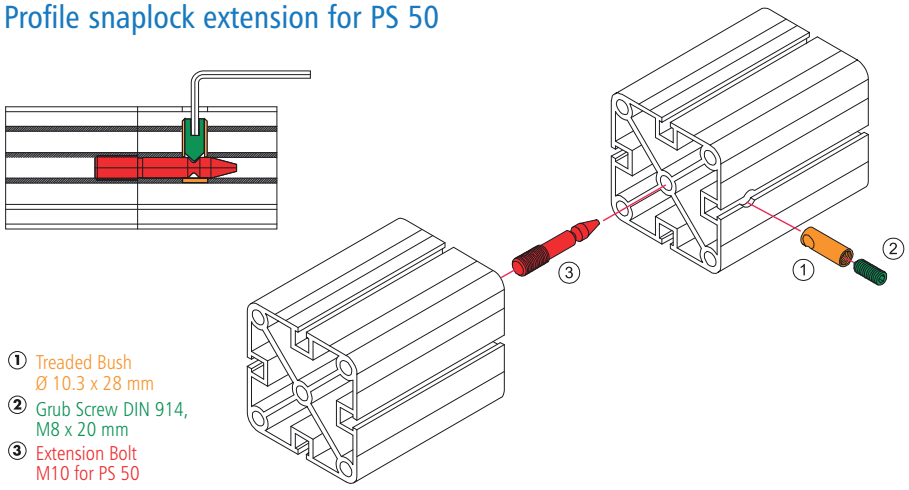
Example PL 80



① Hexagon-Socket Screwdriver
② Grub Srew
③ Drilling Template
④ Twist Drill
Ø 6 mm / Ø 10.4 mm

Example:

Profile snaplock extension for PS 50



① Treaded Bush
Ø 10.3 x 28 mm
② Grub Screw DIN 914,
M8 x 20 mm
③ Extension Bolt
M10 for PS 50

for PS 50/PL 40 (M10)

- Locking bush, tapped pin, extension bolts

Part no.: **209147 0120**

- 50 sets
  Part no.: **209147 0121**

for PS 80/PL 80 (M12)

- Locking bush, tapped pin, extension bolts
- 10 sets
  Part no.: **209147 0122**
- 50 sets
  Part no.: **209147 0123**

matching drill pattern 2
Part no.: **290015 0002**

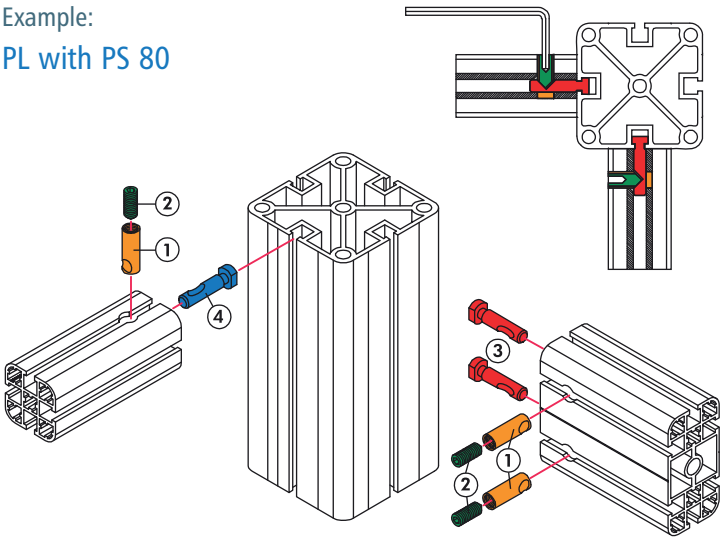
Stepped drill

- Ø 6/Ø 10.4 mm
  Part no.: **400090**

Profile snaplock connections

Example:

PL with PS 80

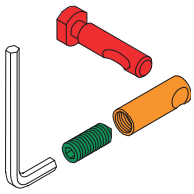


① Treaded Bush Ø 10.3 x 28 mm
② Grub Screw DIN 914, M6 x 20 mm
③ Connection Bolt 0° for PL 40 and PL 80
④ Connection Bolt 90° for PL 40 and PL 80

Snaplock connection 0 degrees

e.g. for

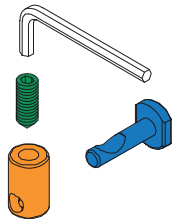
PL / PS 80



Snaplock connection 90 degrees

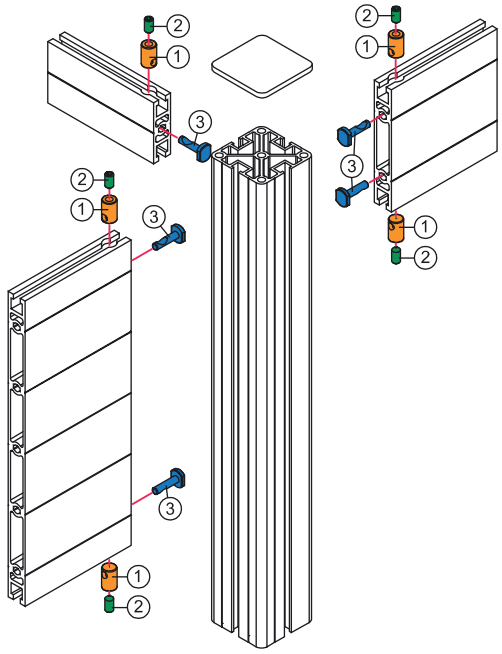
e.g. for

PP / PU / PS



Example:

PP with PS 50



① Treaded Bush Ø 10.3 x 16,5 mm
② Grub Screw DIN 914, M6 x 12 mm
③ Connection Bolt 90°

Snaplock connection

for PL

- Locking bush, tapped pin and bolts 0°
- 10 sets:
  Part no.: **209147 0102**
- 50 sets:
  Part no.: **209147 0103**

for PL

- Locking bush, tapped pin and bolts 90°
- 10 sets:
  Part no.: **209147 0112**
- 50 sets:
  Part no.: **209147 0113**

for PP/PU

- Locking bush, tapped pin and bolts 0°
- 10 sets:
  Part no.: **209147 0100**
- 50 sets:
  Part no.: **209147 0101**

for PP/PU

- Locking bush, tapped pin and bolts 90°
- 10 sets:
  Part no.: **209147 0110**
- 50 sets:
  Part no.: **209147 0111**

Stepped drill

- Ø 6 mm/Ø 10.4 mm

Part no.: **400090**

matching drill pattern 2

Part no.: **290015 0002**

Allen key SW 3

- DIN 911

Part no.: **931150**

Linear guides

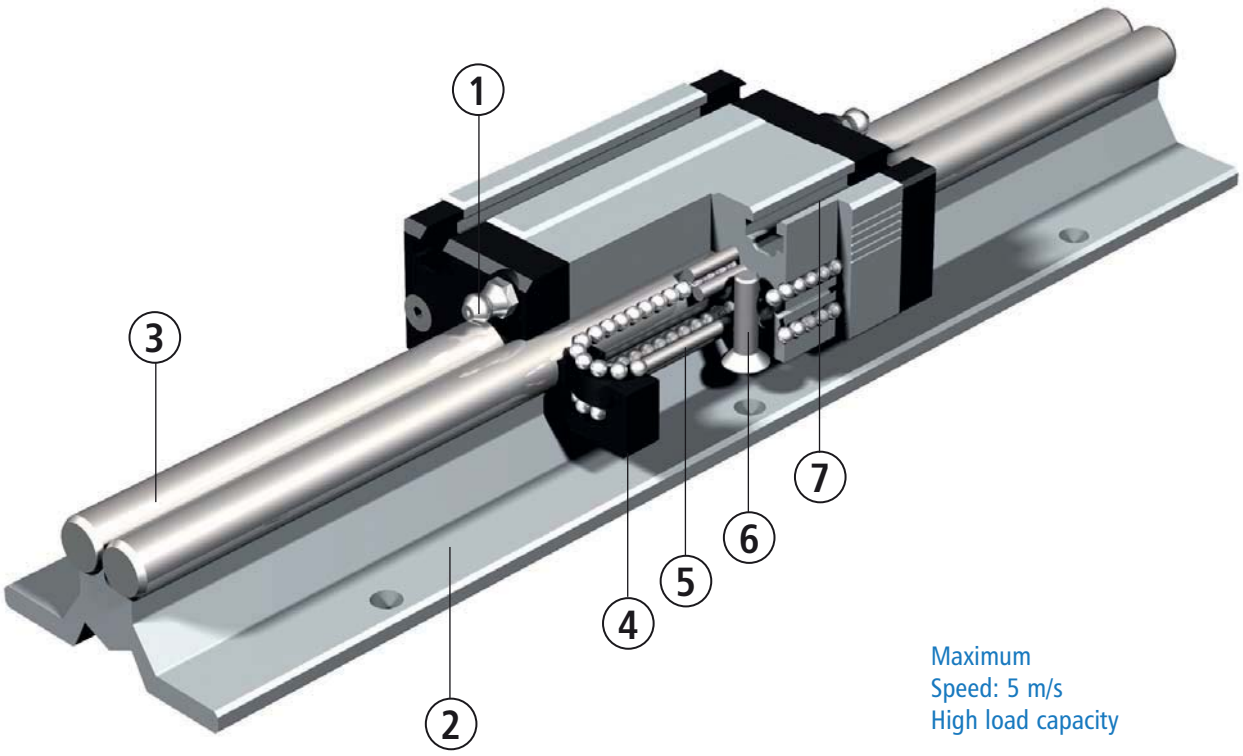
Overview

Linear guides

Overview

CAD data on our website **www.isel-germany.de**

Linear guide slide function



Maximum
Speed: 5 m/s
High load capacity

Aluminium shaft slides

The patented shaft slides are perfectly suited for assembling of complex multiple axis systems for handling and machining.

The wide range of models covers a multitude of applications.

All models can be produced to order with various profile lengths (70, 100, 150 and 200 mm).

1. Lubrication options to both sides for the recirculating balls.

2. The basic supports for all linear guides are extruded aluminium profiles compliant with DIN EN 12020-2, which are provided with T-slot inserts for fastening in the body of the profile or with drilled hole fixing points.

3. Precision steel shafts with a hardness of 60 ± 2 HRC are used as guide rails. All LFS-8 versions are optionally available with stainless steel shafts.

4. The recirculating ball steering systems are glass fibre reinforced.

5. There are patented recirculating balls in the linear slide. Ball bearings run in each case between two ground steel pins and the guidance shaft.

6. The slide is adjusted with self-lokking setting screws. This is how the rows of balls and shafts or pins are used with each other and thus prestressed. The slide are preset in the factory to the correct stress. All shaft slides are optionally available in a stainless version.

7. To secure transport loads, slot plates, etc., the shaft slide are provided with T-slot inserts or fixing borings.

General notes

Load capacity and working life

Installation site

In principal, the installation site for linear guides can be chosen anywhere. You merely have to consider whether all the forces and moments arising are below the maximum values for the relevant axes.

Temperatures

All linear guides are designed for continuous operation at ambient temperatures of up to 60 °C. In short-term operation, maximum temperatures of 80 °C are permissible.

Linear guides are unsuitable for temperatures below freezing.

Straightness/Warping

The aluminium profiles used are extruded profiles, which exhibit divergences regarding straightness and may be warped, owing to the manufacturing process.
The tolerance of this deviation is set out in DIN EN 12020-2.
In the worst case, the linear guide deviations equal these limits, but typically they are lower.

In order to achieve the desired guidance accuracy, the guide must be aligned using shims or clamped to a bearing service machined to the corresponding accuracy. This achieves tolerances of 0.1 mm/1000 mm.

Principles Load capacity and working life

The dimensioning of a linear guide is based on the load capacity of the individual elements. The load capacity is described by:

- the dynamic load factor C
- the static load factor C0
- the static torques M0X, M0Y and M0Z

The basis of the dynamic load factors according to DIN is a nominal working life of 100,000 m displacement path. Far East suppliers often quote load factors for a nominal working life of 50,000 m displacement path; this produces load factor figures which are approximately 20% higher than those according to DIN.

Dynamic load capacity

The fatigue characteristics of the material determine the dynamic load capacity. The working life - the fatigue period - also depends on:

- the stress on the linear guide
- the speed at which the linear guide moves
- the statistical randomness of the first damage occurring

Useful life

Useful life means the working life actually achieved by a linear guide.
The useful life may differ from the computed working life.

The following can lead to premature failure through wear or fatigue:

- Misalignments between guide rails or guidance elements
- Contamination of the guide rails
- Insufficient lubrication
- Oscillating motion with very small lifts (formation of grooves)
- Vibrations at rest (formation of grooves)

Owing to the multiplicity of installation and operating relationships, it is impossible to determine the useful life of a linear guide exactly in advance. The safest way to make an accurate estimate of the useful life is, as before, a comparison with similar installations.

mechanics

Linear guide rails

LFS-8-1
LFS-8-2

Figure:
LFS-8-1 with
aluminium slide WS 1/70

Figure:
LFS-8-2 with
aluminium slide WS 1/70

Features

- W 30 x H 20 mm (LFS-8-1)
  W 30 x H 32.5 mm (LFS-8-2)
- 2 precision steel shafts Ø 8
- Anti-twist lock
- Aluminium shaft housing profile, naturally anodised
- Fixing from below with M6 tapped rails in the T-key insert
- Conditionally self-supporting
- Special lengths to order
- Weights: approx. 1.6 kg/m (LFS-8-1)
  approx. 2.0 kg/m (LFS-8-2)

Options:
- Stainless steel version
- Drilled for M6 (LFS-8-1 only)

Ordering key

235 00X XXXX

LFS-8-1 / standard = **0**
LFS-8-1 / stainless = **1**
LFS-8-2 / standard = **2**
LFS-8-2 / stainless = **3**

Length LFS-8-1
in mm (in a grid of 100 mm)
e.g. **0029** = Length 298
0299 = Length 2998

Length LFS-8-2
in mm (in a grid of 100 mm)
e.g. **0298** = Length 298
2998 = Length 2998

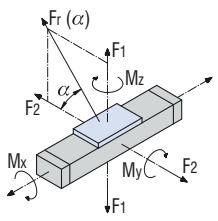
Steel shaft length: total length L - 3 mm
Profile up to 6000 mm available without impact connection, steel shafts divided.

Load data

Shaft slide WS 1/70	
C_o	3114 N
C	1846 N
F_1 static	2659 N
F_1 dynamic	1576 N
F_2 static	3114 N
F_2 dynamic	1846 N
M_x static	37.3 Nm
M_y static	100.5 Nm
M_z static	117.6 Nm
M_x dynamic	22.1 Nm
M_y dynamic	59.5 Nm
M_z dynamic	69.7 Nm

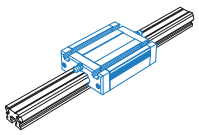
Shaft slide WS 1	
C_o	4590 N
C	2390 N
F_1 static	3920 N
F_1 dynamic	2041 N
F_2 static	4590 N
F_2 dynamic	2390 N
M_x static	55.0 Nm
M_y static	148.1 Nm
M_z static	173.4 Nm
M_x dynamic	28.6 Nm
M_y dynamic	77.1 Nm
M_z dynamic	90.2 Nm

Trolley LW 6	
C_o	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3792 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	121.1 Nm
M_y static	194.4 Nm
M_z static	97.2 Nm
M_x dynamic	106.3 Nm
M_y dynamic	170.6 Nm
M_z dynamic	180.0 Nm



$$Fr(\alpha) = \frac{F_2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F_1}{\sin \alpha}$$

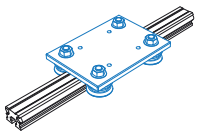


Aluminium slide

- With recirculating ball guide
- Clamping surface plane milled
- M6 T-key inserts
- Central lubrication option
- Adjustable for no play
- Option: stainless steel version

L 96 × W 72 × H 28.5 mm (WS 1/70)
(weight: approx. 0.4 kg)
Part no.: **223100 0070**
Stainless steel: **223101 0070**

L 126 × W 72 × H 28.5 mm (WS 1)
(weight: approx. 0.5 kg)
Part no.: **223100**
Stainless steel: **223101**



Trolley LW 6

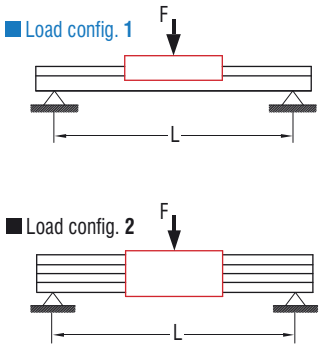
- L 125 x W 90 x H 7.7 mm
- ground steel plate
- 4 rollers Ø 31, sealed for life
- adjustable for no play
- weight: approx. 1 kg

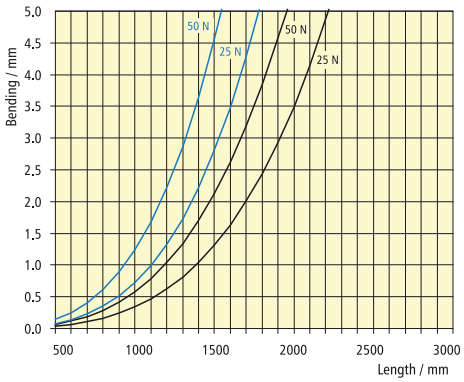
Part no.: **223011**

Linear guide rails

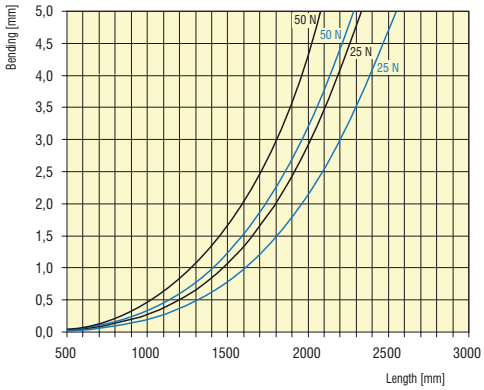
LFS-8-1
LFS-8-2

Bending



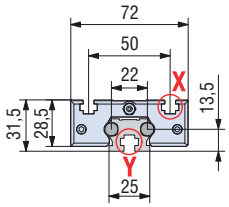


LFS-8-1

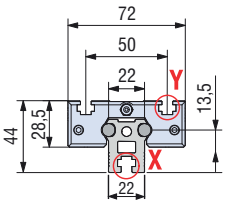


LFS-8-2

Dimensioned drawings

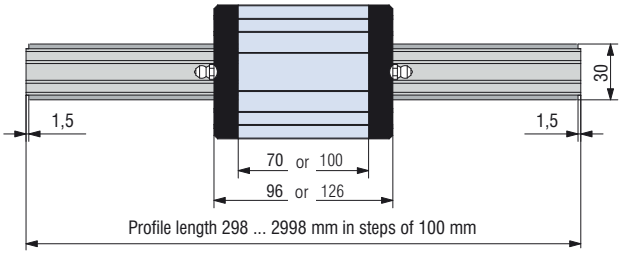


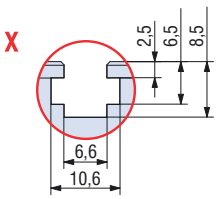
LFS-8-1

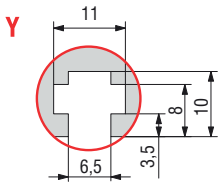


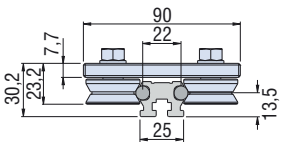
LFS-8-2

LFS-8-1 or **LFS-8-2** with aluminium slide **WS 1/70** or **WS 1**

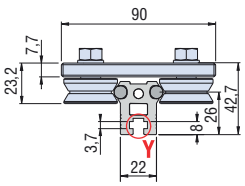






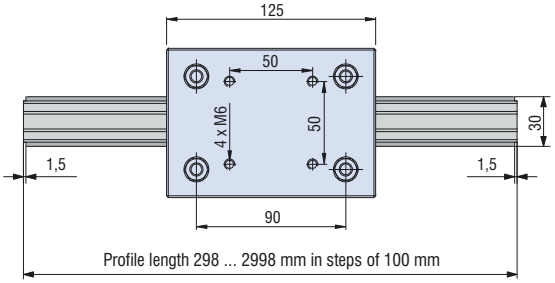


LFS-8-1



LFS-8-2

LFS-8-1 or **LFS-8-2** with trolley **LW 6**



mechanics

Linear guide rails

LFS-8-3

Features

- W 115 x H 25.5 mm
- 2 precision steel shafts Ø 8
- Particularly resistant to twisting
- Aluminium shaft housing profile, naturally anodised
- Fixing from above through M6 drillings in the raster 100 mm
- Conditionally self-supporting
- Special lengths to order
- Weight: approx. 3.2 kg/m
- Option: stainless steel version

Ordering key

235 00X XXXX

Standard = **4**
Stainless = **5**

Length in mm (in 100 mm raster)
e.g. **0029** = Length 296
0299 = Length 2996

Length overall L -1 mm

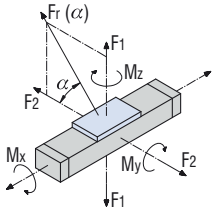
Profile up to 6000 mm available without impact connection, steel shafts divided.

Load data

Shaft slide WS 3/70	
C_o	3141 N
C	1879 N
F_1 static	2682 N
F_1 dynamic	1604 N
F_2 static	3141 N
F_2 dynamic	1879 N
M_x static	115.7 Nm
M_y static	105.3 Nm
M_z static	123.3 Nm
M_x dynamic	69.2 Nm
M_y dynamic	62.9 Nm
M_z dynamic	73.7 Nm

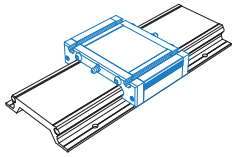
Shaft slide WS 3	
C_o	6945 N
C	3190 N
F_1 static	5931 N
F_1 dynamic	2724 N
F_2 static	6945 N
F_2 dynamic	3190 N
M_x static	255.9 Nm
M_y static	232.8 Nm
M_z static	272.5 Nm
M_x dynamic	117.5 Nm
M_y dynamic	106.9 Nm
M_z dynamic	125.1 Nm

Trolley LW 7	
C_o	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3792 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	246.8 Nm
M_y static	302.4 Nm
M_z static	151.2 Nm
M_x dynamic	216.7 Nm
M_y dynamic	265.4 Nm
M_z dynamic	280 Nm



$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$

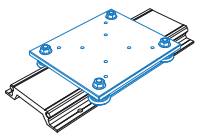


Aluminium slide

- With recirculating ball guide
- Clamping surface plane milled
- M6 T-key inserts
- Central lubrication option
- Adjustable for no play
- Option: stainless steel version

L 96 x W 130 x H 32 mm (WS 3/70)
(weight: approx. 0.5 kg)
Part no.: **223103 0070**
Stainless steel: **223103 1070**

L 176 x W 130 x H 32 mm (WS 3)
(weight: approx. 0.9 kg)
Part no.: **223103**
Stainless steel: **223103 1000**



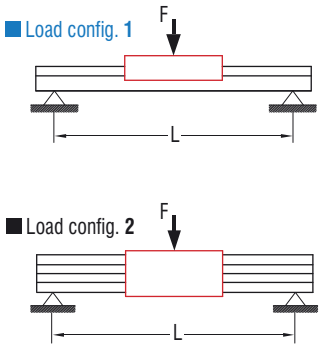
Trolley LW 7

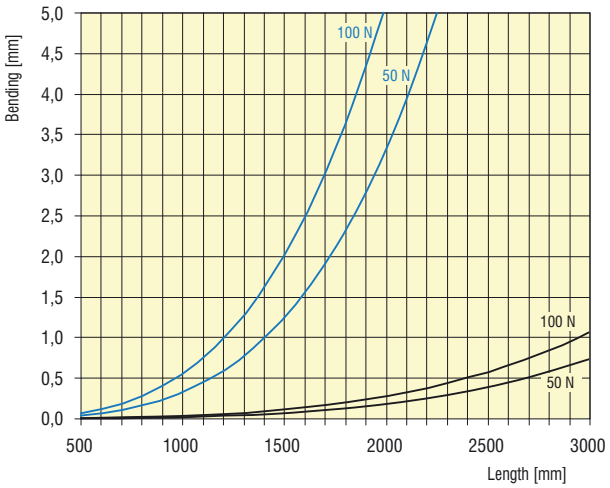
- L 175 x W 150 x H 7.5 mm
- ground steel plate
- 4 rollers Ø 31, sealed for life
- adjustable for no play
- weight: approx. 2 kg

Part no.: **223012**

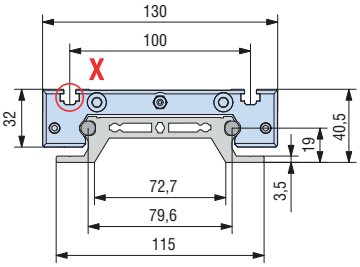
Linear guide rails LFS-8-3

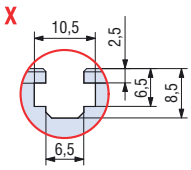
Bending



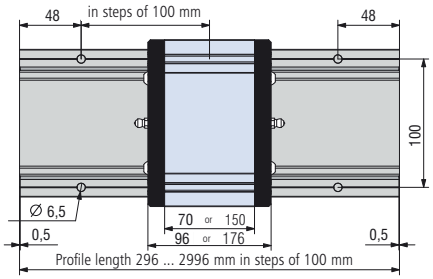


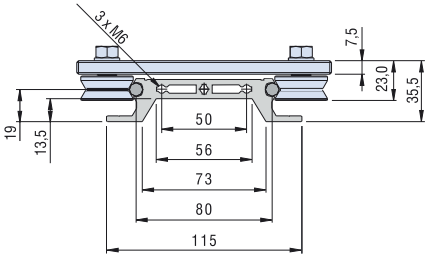
Dimensioned drawings



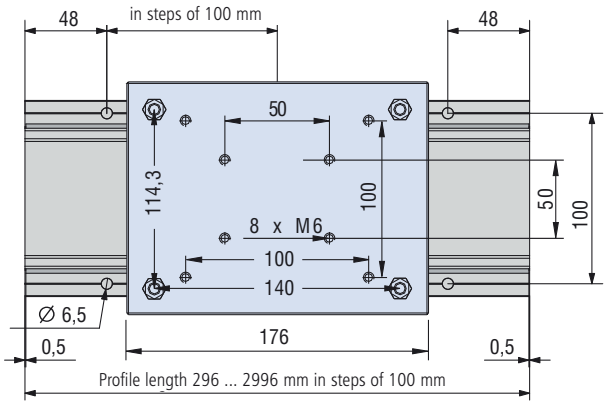


LFS-8-3 with aluminium slide **WS 3/70 or WS 3**





LFS-8-3 with trolley **LW 7**



mechanics

Linear guide rails

LFS-8-4

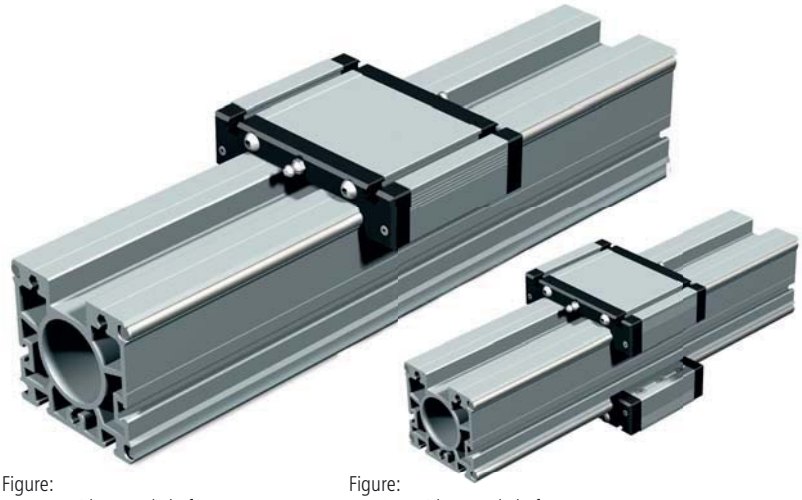


Figure:
LFS-8-4 with 2 steel shafts
and an aluminium slot

Figure:
LFS-8-4 with 4 steel shafts
and two aluminium slide (optional)

Features

- W 80 x H 80 mm
- 4 precision steel shafts Ø 8
- anti-twist
- aluminium shaft housing profiles, naturally anodised
- fixing from below with M6 tapped rails in the T-slot inserts or in the head side through M8 drillings
- side T-key inserts for limit switch securing
- conditionally self-supporting
- special lengths to order
- weight: approx. 7.2 kg/m
- options: stainless steel version
  with 2 steel shafts
  2 slide or trolley

Ordering key

235 00X XXXX

Standard = **6**
Stainless = **7**

Length in mm (in 100 mm raster)
e.g. **0029** = Length 298
0299 = Length 2998

Steel shaft length: total length L - 3 mm

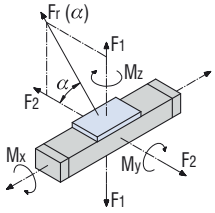
Profile up to 6000 mm available without impact connection, steel shafts divided.

Load data

Shaft slide WS 3/70	
C_o	3141 N
C	1879 N
F_1 static	2682 N
F_1 dynamic	1604 N
F_2 static	3141 N
F_2 dynamic	1879 N
M_x static	115.7 Nm
M_y static	105.3 Nm
M_z static	123.3 Nm
M_x dynamic	69.2 Nm
M_y dynamic	62.9 Nm
M_z dynamic	73.7 Nm

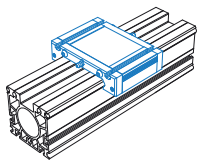
Shaft slide WS 3	
C_o	6945 N
C	3190 N
F_1 static	5931 N
F_1 dynamic	2724 N
F_2 static	6945 N
F_2 dynamic	3190 N
M_x static	255.9 Nm
M_y static	232.8 Nm
M_z static	272.5 Nm
M_x dynamic	117.5 Nm
M_y dynamic	106.9 Nm
M_z dynamic	125.1 Nm

Trolley LW 7	
C_o	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3792 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	246.8 Nm
M_y static	302.4 Nm
M_z static	151.2 Nm
M_x dynamic	216.7 Nm
M_y dynamic	265.4 Nm
M_z dynamic	280 Nm



$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$

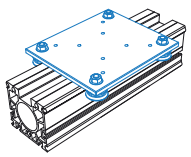


Aluminium slide

- Clamping surface plane milled
- M6 T-slot inserts
- Central lubrication option
- Adjustable for no play
- Option: stainless steel version

L 96 x W 130 x H 32 mm (WS 3/70)
(weight: approx. 0.5 kg)
Part no.: **223103 0070**
Stainless steel: **223103 1070**

L 176 x W 130 x H 32 mm (WS 3)
(weight: approx. 0.9 kg)
Part no.: **223103**
Stainless steel: **223103 1000**



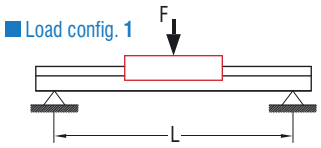
Trolley LW 7

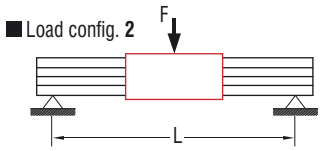
- L 175 x W 150 x H 7.5 mm
- ground steel plate
- 4 rollers Ø 31,
  sealed for life
- adjustable for no play
- weight: approx. 2 kg

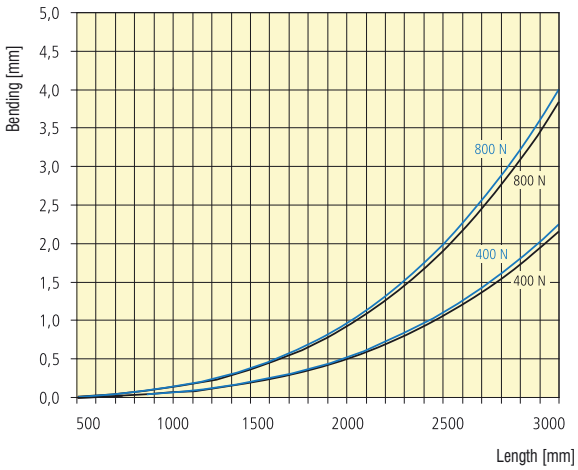
Part no.: **223012**

Linear guide rails LFS-8-4

Bending

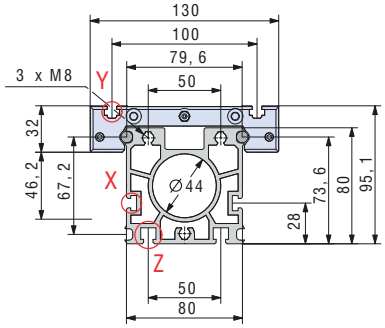


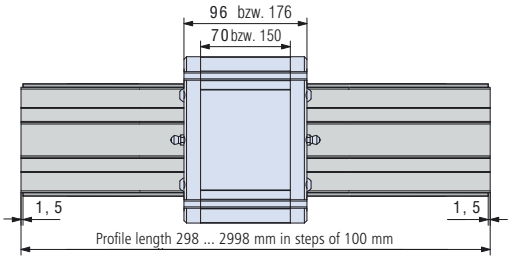




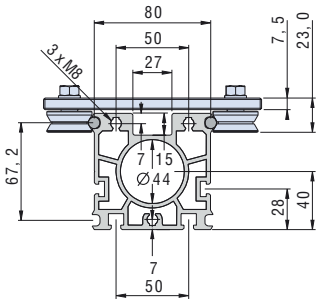
Dimensioned drawings

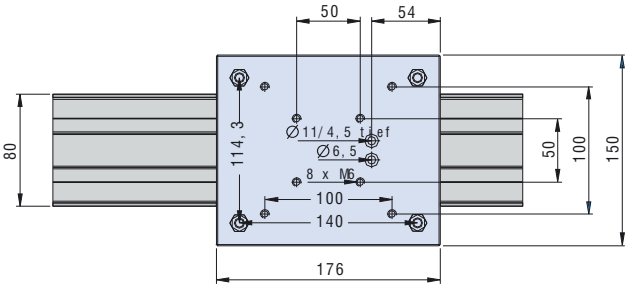
LFS-8-3 with aluminium slide **WS 3/70 or WS 3**

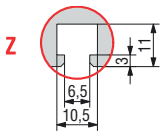




LFS-8-4 with trolley **LW 7**







mechanics

Linear guide rails

LFS-8-7

Figure:
Linear guide rails and
Linear guide carriage

Features

- W 78 x H 36 mm
- 2 precision steel shafts Ø 8 mm
  mounting grid 100 mm
- shaft housing contour
  (terminal connection)
- aluminium profile rail with T-slots,
  natural anodized
- conditionally cantilevered
- Standard length 3 m,
  segmentable at will
- weight: 2,9 kg/m
- Optionen: other lengths

Ordering key

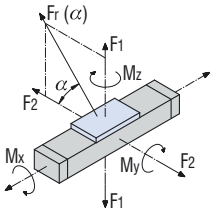
235 012 XXXX

Length in mm (in a grid of 100 mm)
e.g. **0019** = Length 196
0299 = Length 2996

Load data

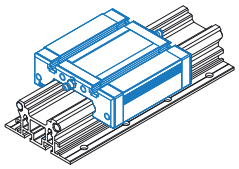
Shaft slide WS 11/70	
C_o	3114 N
C	1846 N
F_1 static	2659 N
F_1 dynamic	1576 N
F_2 static	3114 N
F_2 dynamic	1846 N
M_x static	67.3 Nm
M_y static	100.5 Nm
M_z static	117.6 Nm
M_x dynamic	39.9 Nm
M_y dynamic	59.5 Nm
M_z dynamic	69.7 Nm

Trolley LW 10	
C_o	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3792 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	170.4 Nm
M_y static	248.4 Nm
M_z static	124.2 Nm
M_x dynamic	149.5 Nm
M_y dynamic	218.0 Nm
M_z dynamic	230.0 Nm



$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

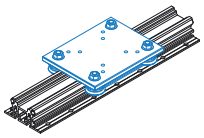
$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$



Linearführungsschlitten WS 11/70

- Alu-Schlitten mit 8 Stahleinlagen
  L 96 x B 96 x H 32 mm
- 4 Kugelumläufe, spielfrei einstellbar
- Schmiernippel stirnseitig
- Gewicht: 0,40 kg

Art.-Nr.: **223111 0070**



Laufwagen LW 10

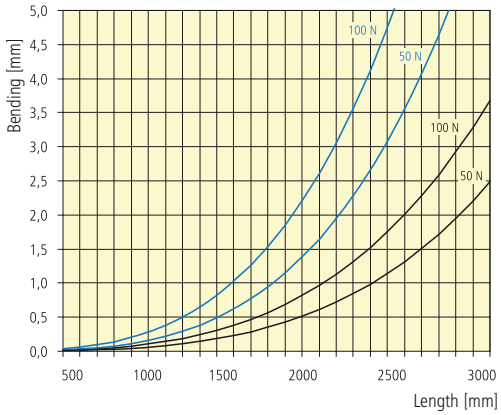
- L 150 x B 115 x H 7,7 mm
- geschliffene Stahlplatte
- 4 Laufrollen Ø 31 mm
- lebensdauergeschmiert
- spielfrei einstellbar
- Gewicht: 1,47 kg

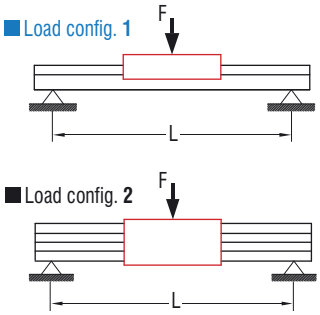
Art.-Nr.: **223 014**

Linear guide rails

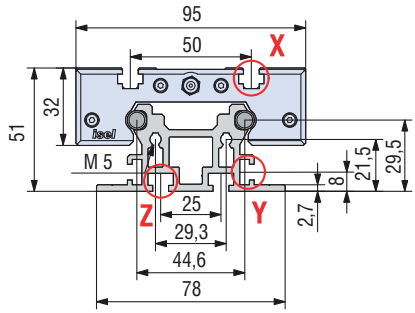
LFS-8-7

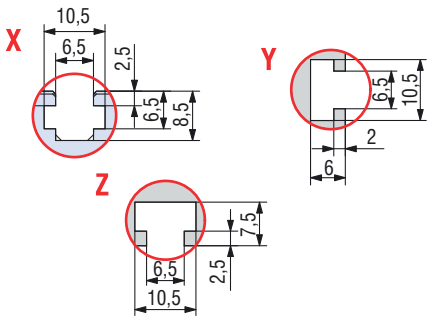
Bending

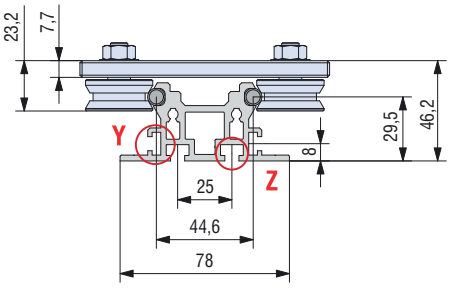




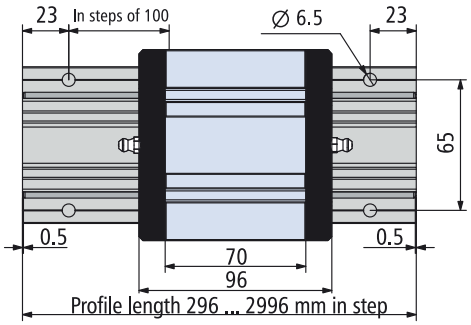
Dimensioned drawings



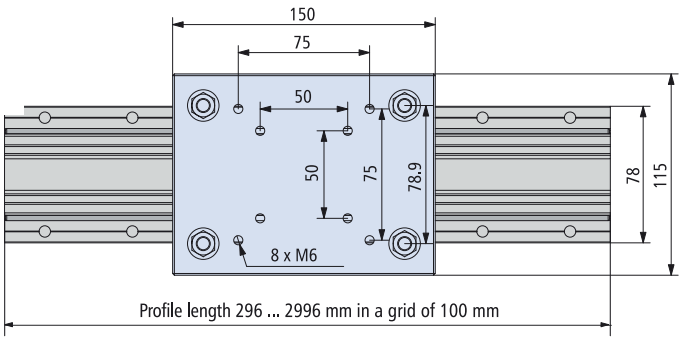




LFS-8-7 with shaft slide **WS 11/70**



LFS-8-7 with trolley **LW10**



mechanics

Linear guide rails

LFS-12-1

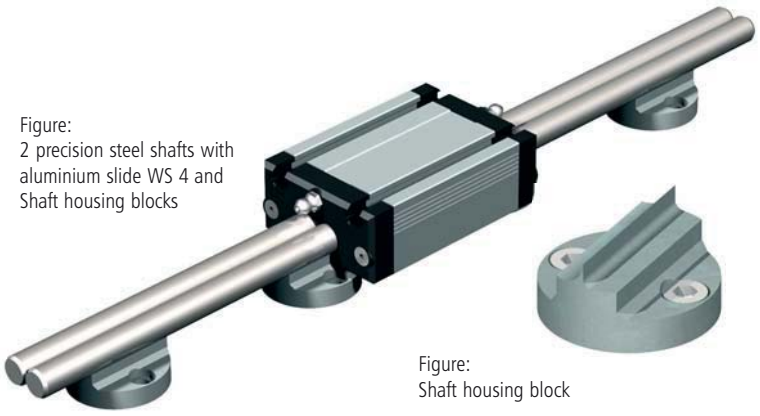


Figure:
2 precision steel shafts with aluminium slide WS 4 and Shaft housing blocks

Figure:
Shaft housing block

Features

- W 40 x H 27 mm
- 2 precision steel shafts Ø 12
- anti-twist
- aluminium shaft housing blocks
- securing from above or below with M6 drillings in the housing blocks
- guide any length up to 3m
- special lengths to order
- weight: approx. 1.9 kg/m

Ordering key

227 312 XXXX

Length in mm (in 100 mm raster)
e.g. **0298** = Length 298
2998 = Length 2998

Special lengths to order

N.B.!
The part no. refers to one steel shaft only !

Load data

Shaft slide WS 4/70	
C_o	3003 N
C	1873 N
F_1 static	2821 N
F_1 dynamic	1599 N
F_2 static	3303 N
F_2 dynamic	1873 N
M_x static	29.8 Nm
M_y static	105.3 Nm
M_z static	123.3 Nm
M_x dynamic	16.8 Nm
M_y dynamic	59.7 Nm
M_z dynamic	69.9 Nm

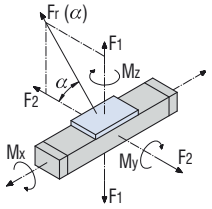
Shaft slide WS 4	
C_o	4868 N
C	2426 N
F_1 static	4157 N
F_1 dynamic	2071 N
F_2 static	4868 N
F_2 dynamic	2426 N
M_x static	43.9 Nm
M_y static	155.2 Nm
M_z static	181.7 Nm
M_x dynamic	21.8 Nm
M_y dynamic	77.3 Nm
M_z dynamic	90.5 Nm

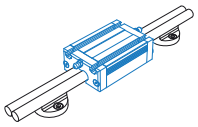
Steel slide LS 1	
C_o	3508 N
C	2105 N
F_1 static	3549 N
F_1 dynamic	2130 N
F_2 static	3508 N
F_2 dynamic	2105 N
M_x static	36.2 Nm
M_y static	129.0 Nm
M_z static	127.5 Nm
M_x dynamic	21.7 Nm
M_y dynamic	77.4 Nm
M_z dynamic	76.5 Nm

Trolley LW 8	
C_o	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3846 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	109.5 Nm
M_y static	194.4 Nm
M_z static	97.2 Nm
M_x dynamic	97.4 Nm
M_y dynamic	173.0 Nm
M_z dynamic	180.0 Nm

$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$



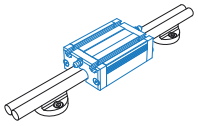


Aluminium slide

- clamping surface plane milled
- weight: approx. 0.3 kg
- option: stainless steel version

L 94 x W 62 x H 31.5 mm (WS 4/70)
Part no.: **223104 0070**
Stainless steel: **223104 1070**

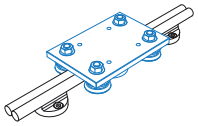
L 124 x W 62 x H 31.5 mm (WS 4)
Part no.: **223104**
Stainless steel: **223104 1000**



Steel slide LS 1

L 91 x W 60 x H 32 mm
- clamping surface ground
- weight: approx. 0.8 kg

Part no.: **223006**



Trolley LW 3

L 125 x W 85 x H 7.7 mm
- ground steel plate
- weight: approx. 0.9 kg

Part no.: **223008**

Shaft housing blocks

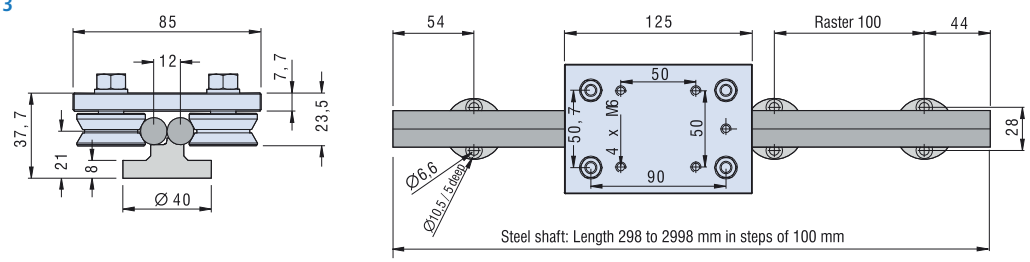
- Ø 40 mm, hole spacing 28 mm
- cast zinc, VE 10 units

Part no.: **221501**

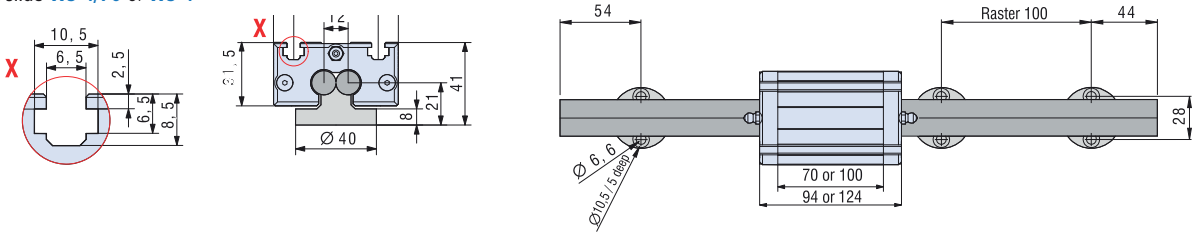
Linear guide rails LFS-12-1

Dimensioned drawings

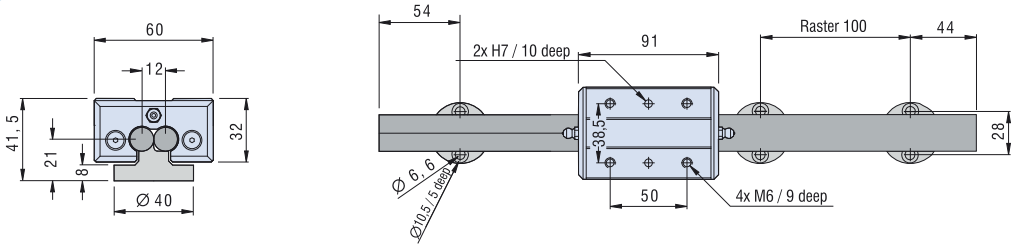
LFS-12-1 with trolley **LW 3**



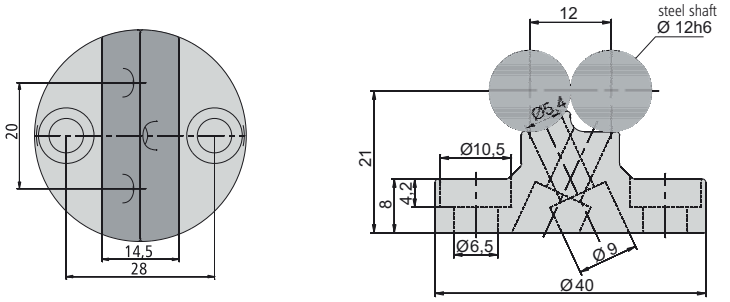
LFS-12-1 with
Shaft slide **WS 4/70** or **WS 4**



LFS-12-1 with steel slide **LS 1**



Shaft housing block



mechanics

Linear guide rail

LFS-12-11

Features

- W 20 x H 31 mm
- Precision steel shaft Ø 12
- Aluminium shaft housing profile, naturally anodised
- Securing from below with M6 tapped rail in T-slot insert on flat surface
- Special lengths available on request
- Weight: approx. 1.3 kg/m

Ordering key

220 002 XXXX

Length in mm
e.g. **0298** = Length 298
0998 = Length 998

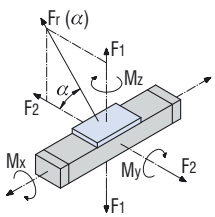
Profile length = Length overall L -2 mm

Load data

Shaft slides WS 6/70	
C_o	3303 N
C	1873 N
F_1 static	2821 N
F_1 dynamic	1599 N
F_2 static	3303 N
F_2 dynamic	1873 N
M_x static	-
M_y static	105.3 Nm
M_z static	123.3 Nm
M_x dynamic	-
M_y dynamic	59.7 Nm
M_z dynamic	69.9 Nm

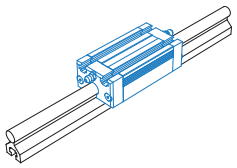
Shaft slides WS 6	
C_o	4868 N
C	2426 N
F_1 static	4157 N
F_1 dynamic	2071 N
F_2 static	4868 N
F_2 dynamic	2426 N
M_x static	-
M_y static	155.2 Nm
M_z static	181.7 Nm
M_x dynamic	-
M_y dynamic	77.3 Nm
M_z dynamic	90.5 Nm

Trolley LW 5	
C_o	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3846 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	-
M_y static	162.0 Nm
M_z static	81.0 Nm
M_x dynamic	-
M_y dynamic	144.2 Nm
M_z dynamic	150.0 Nm



$$Fr(\alpha) = \frac{F_2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F_1}{\sin \alpha}$$

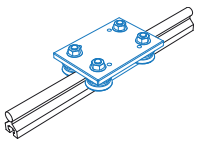


Aluminium slides

- With recirculating ball guide
- M6 T-slot inserts
- Central lubrication system option
- Adjustable for no play
- Option: stainless steel version

L 96 x W 50 x H 31.5 mm (WS 6/70)
(weight: approx. 0.3 kg)
Part no.: **223106 0070**
Stainless steel: **223106 1070**

L 126 x W 50 x H 31,5 mm (WS 6)
(weight: approx. 0.5 kg)
Part no.: **223106**
Stainless steel: **223106 1000**



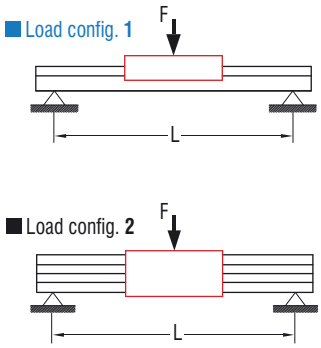
Trolley LW 5

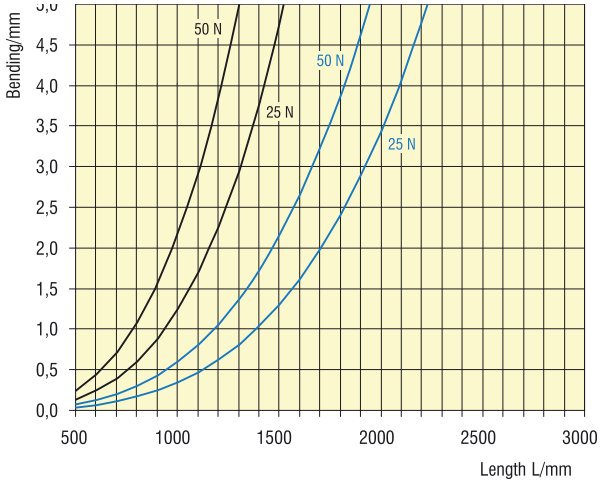
- L 110 x W 75 x H 7.7 mm
- Ground steel plate
- 4 rollers Ø 31, sealed for life
- Adjustable for no play
- Weight: 0.81 kg

Part no.: **223010**

Linear guide rail LFS-12-11

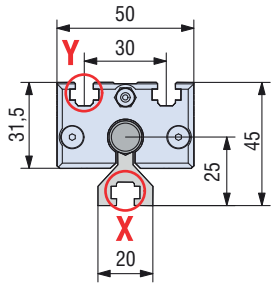
Bending

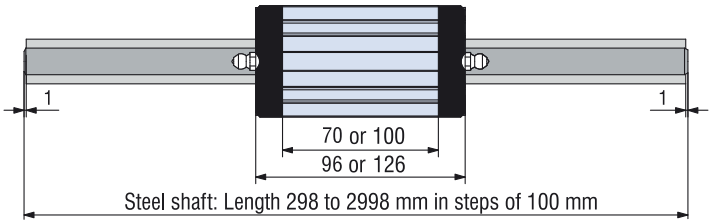


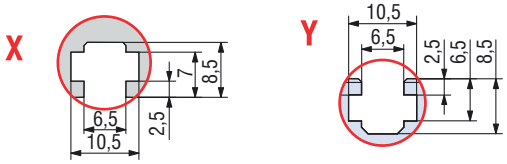


Dimensioned drawings

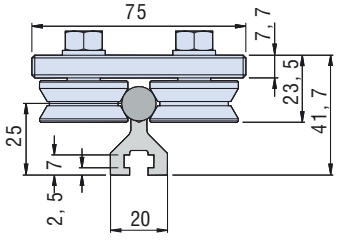
LFS-12-11 with aluminium slides **WS 6/70 or WS 6**

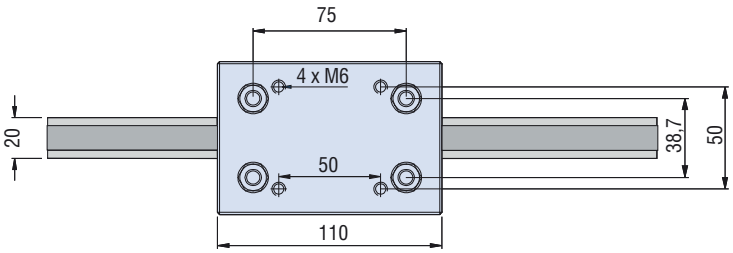






LFS-12-11 with trolley **LW5**





mechanics

Linear guide rail

LFS-12-2

Features

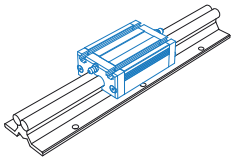
- W 62 x H 31 mm
- 2 precision steel shafts Ø 12
- Anti-twist lock
- Aluminium shaft housing profile, naturally anodised
- High parallelism through patented shaft housing outline
- High guidance accuracy
- Securing from above or below using drilled holes Ø 6.5 in 100 mm raster on flat surface
- Lengths in 100 mm raster
- Max. length up to 2998 mm
- Special lengths to order
- Weight: approx. 3.3 kg/m

Ordering key

235 200 XXXX

Length in mm
e.g. **0298** = Length 298
0998 = Length 998

Profile length = Length overall L -2 mm



Aluminium slides

- With recirculating ball guide
- Clamping surface plane milled
- Option: stainless steel version

L 94 x W 62 x H 31.5 mm (WS 4/70)
(weight: approx. 0.33 kg)
Part no.: **223104 0070**
Stainless steel: **223104 1070**

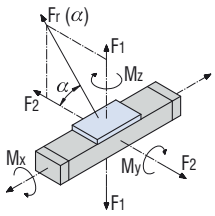
L 124 x W 62 x H 31.5 mm (WS 4)
(weight: approx. 0.46 kg)
Part no.: **223104**
Stainless steel: **223104 1000**

Load data

Shaft slides WS 4/70	
C_0	3003 N
C	1873 N
F_1 static	2821 N
F_1 dynamic	1599 N
F_2 static	3303 N
F_2 dynamic	1873 N
M_x static	29.8 Nm
M_y static	105.3 Nm
M_z static	123.3 Nm
M_x dynamic	16.8 Nm
M_y dynamic	59.7 Nm
M_z dynamic	69.9 Nm

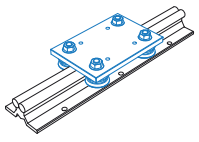
Shaft slides WS 4	
C_0	4868 N
C	2426 N
F_1 static	4157 N
F_1 dynamic	2071 N
F_2 static	4868 N
F_2 dynamic	2426 N
M_x static	43.9 Nm
M_y static	155.2 Nm
M_z static	181.7 Nm
M_x dynamic	21.8 Nm
M_y dynamic	77.3 Nm
M_z dynamic	90.5 Nm

Trolley LW 3	
C_0	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3846 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	109.5 Nm
M_y static	194.4 Nm
M_z static	97.2 Nm
M_x dynamic	97.4 Nm
M_y dynamic	173.0 Nm
M_z dynamic	180.0 Nm



$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$



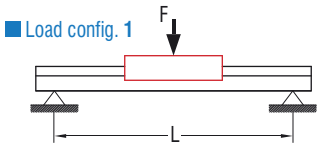
Trolley LW 3

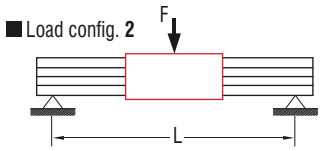
- L 125 x W 85 x H 7.7 mm
- Ground steel plate
- Weight: 0.93 kg

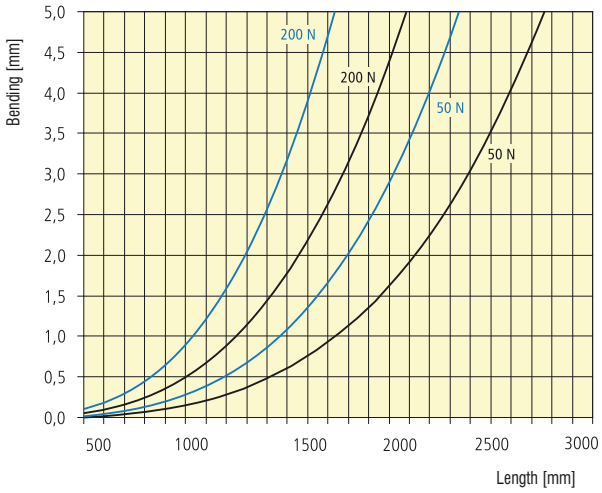
Part no.: **223008**

Linear guide rail LFS-12-2

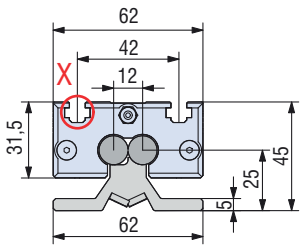
Bending

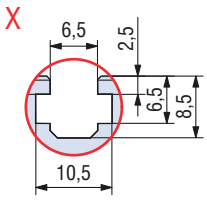




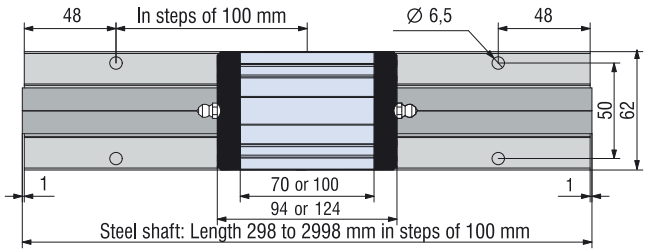


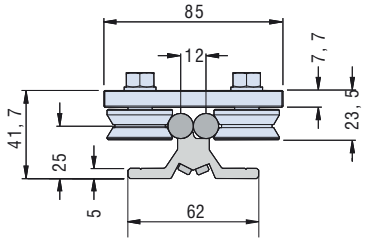
Dimensioned drawings



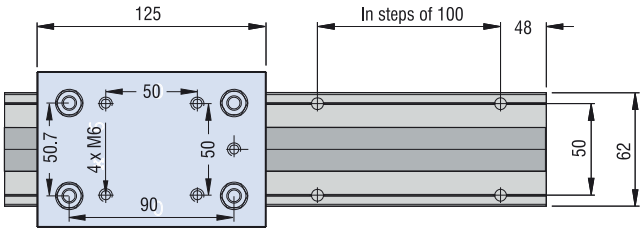


LFS-12-2 with aluminium slides **WS 4/70 or WS 4**





LFS-12-2 with trolley **LW 3**



Linear guide rail

LFS-12-3

Features

- W 90 x H 31 mm
- 2 precision steel shafts Ø 12
- Anti-twist
- Aluminium shaft housing profile, naturally anodised
- increased shaft spacing allows higher torques to be absorbed
- Securing from above or below with M6 drillings in 100 mm raster
- Any guide length
- Weight: approx. 3.9 kg/m

Ordering key

235 300 XXXX

Length in mm (in 100 mm raster)
e.g. **0029** = Length 298
0299 = Length 2998

Profile length = Length overall L -2 mm

Special lengths over 3000 mm with rod linkage to order.

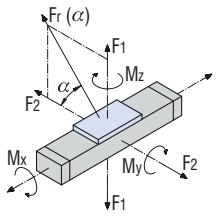
Load data

Shaft slides WS 7/70	
C_o	3303 N
C	1873 N
F_1 static	2821 N
F_1 dynamic	1599 N
F_2 static	3303 N
F_2 dynamic	1873 N
M_x static	82.0 Nm
M_y static	105.3 Nm
M_z static	123.3 Nm
M_x dynamic	46.4 Nm
M_y dynamic	59.7 Nm
M_z dynamic	69.9 Nm

Shaft slides WS 7	
C_o	7303 N
C	3179 N
F_1 static	6237 N
F_1 dynamic	2715 N
F_2 static	7303 N
F_2 dynamic	3179 N
M_x static	181.2 Nm
M_y static	232.8 Nm
M_z static	272.5 Nm
M_x dynamic	78.8 Nm
M_y dynamic	101.3 Nm
M_z dynamic	118.6 Nm

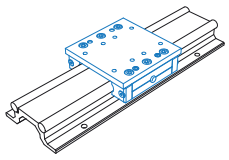
Trolley LW 2	
C_o	3114 N
C	1846 N
F_1 static	2659 N
F_1 dynamic	1576 N
F_2 static	3114 N
F_2 dynamic	1846 N
M_x static	216.0 Nm
M_y static	100.5 Nm
M_z static	108.0 Nm
M_x dynamic	168.4 Nm
M_y dynamic	192.3 Nm
M_z dynamic	200.0 Nm

Trolley LW 8	
C_o	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3846 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	189.2 Nm
M_y static	248.4 Nm
M_z static	124.2 Nm
M_x dynamic	168.4 Nm
M_y dynamic	221.1 Nm
M_z dynamic	230.0 Nm



$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$

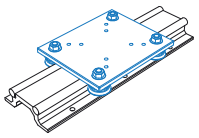


Slides

- Ground steel plate
- Central lubrication system option
- Adjustable for no play

L 100 x W 100 x H 32 mm (WS 7/70)
(weight: approx. 0.8 kg)
Part no.: **223107 0070**

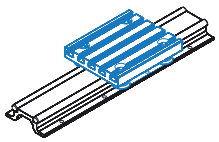
L 200 x W 100 x H 32 mm (WS 7)
(weight: approx. 1.7 kg)
Part no.: **223107**



Trolley LW 8

- L 150 x W 125 x H 7.5 mm
- Ground steel plate
- 4 rollers Ø 31, sealed for life
- Adjustable for no play
- Weight: 1.51 kg

Part no.: **223013**



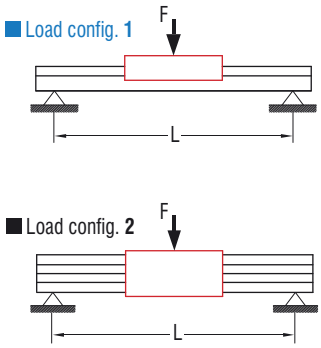
Trolley LW 2

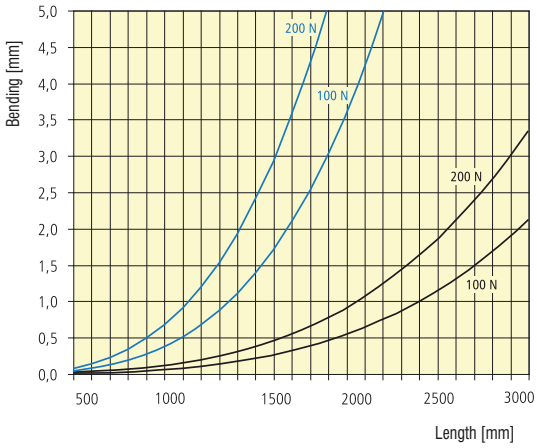
- L 150 x W 125 x H 34.5 mm
- Aluminium T-slot plate
- 4 rollers Ø 31, sealed for life
- Adjustable for no play
- Weight: 0.97 kg

Part no.: **223005**

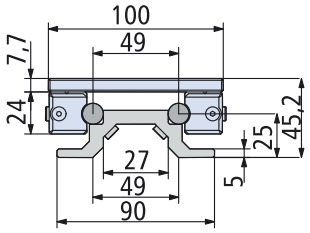
Linear guide rail LFS-12-3

Bending

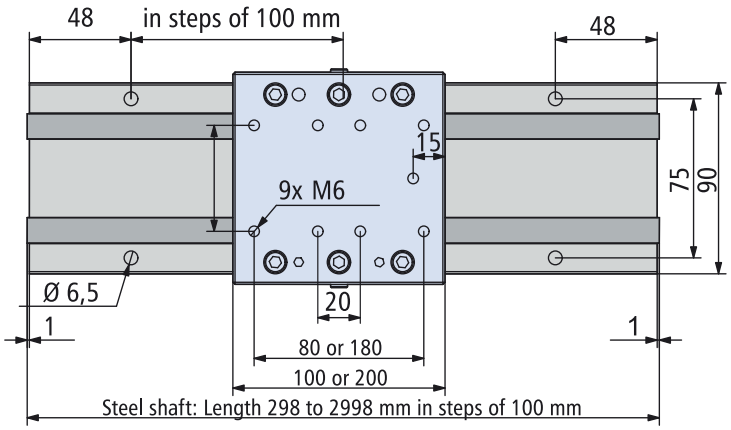


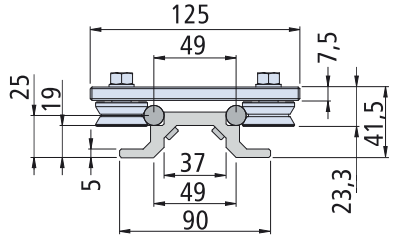


Dimensioned drawings

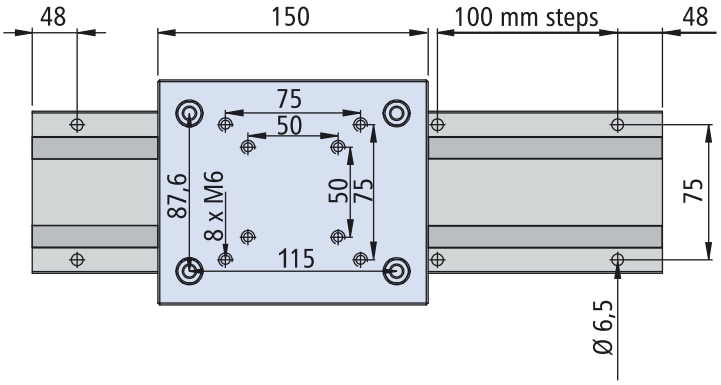


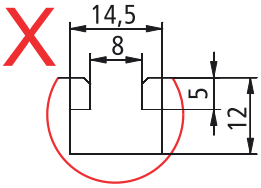
LFS-12-3 with aluminium slides **WS 7**

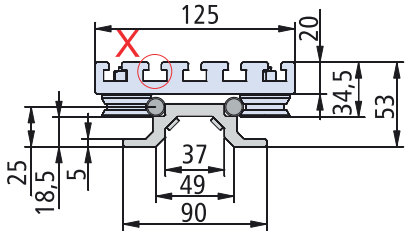




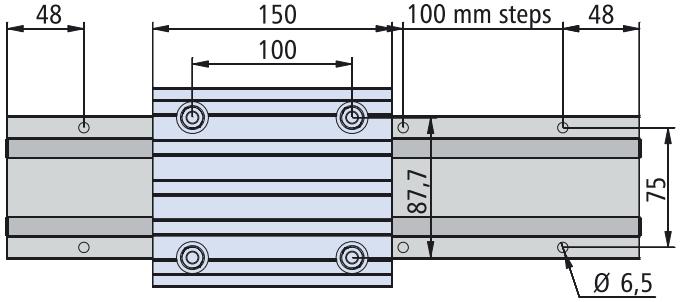
LFS-12-3 with trolley **LW 8**







LFS-12-3 with trolley **LW 2**



Linear guide rail

LFS-12-10

Features

- W 36 x H 24.5 mm
- 2 precision steel shafts Ø 12
- Anti-twist
- Aluminium shaft housing profile, naturally anodised
- Fixing from below with M6 tapped rail in T-slot insert and from above M6 drillings in the Raster 50 mm
- Conditionally self-supporting
- Special lengths to order
- Weight: approx. 2.9 kg/m

Ordering key

220 001 XXXX

Length in mm (in 100 mm raster)
e.g. **0300** = Length 296
3000 = Length 2996

Profile length = Length overall L -1 mm

Special lengths over 3000 mm with rod linkage to order.

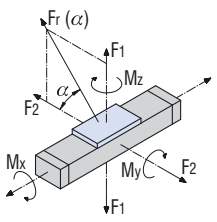
Load data

Slides WS 8/70	
C_o	3303 N
C	1873 N
F_1 static	2821 N
F_1 dynamic	1599 N
F_2 static	3303 N
F_2 dynamic	1873 N
M_x static	46.7 Nm
M_y static	105.3 Nm
M_z static	123.3 Nm
M_x dynamic	26.4 Nm
M_y dynamic	59.7 Nm
M_z dynamic	69.9 Nm

Slides WS 8	
C_o	4868 N
C	2426 N
F_1 static	4157 N
F_1 dynamic	2071 N
F_2 static	4868 N
F_2 dynamic	2426 N
M_x static	68.8 Nm
M_y static	155.2 Nm
M_z static	181.7 Nm
M_x dynamic	34.2 Nm
M_y dynamic	77.3 Nm
M_z dynamic	90.5 Nm

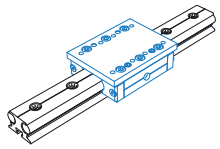
Trolley LW 4	
C_o	2160 N
C	4000 N
F_1 static	4320 N
F_1 dynamic	3846 N
F_2 static	2160 N
F_2 dynamic	4000 N
M_x static	135.4 Nm
M_y static	194.4 Nm
M_z static	97.2 Nm
M_x dynamic	120.5 Nm
M_y dynamic	173.0 Nm
M_z dynamic	180.0 Nm

	Dual track set 1	Dual track set 2
C_o	645 N	1905 N
C	600 N	1125 N
F_1 static	652 N	1927 N
F_1 dynamic	607 N	1138 N
F_2 static	645 N	1905 N
F_2 dynamic	600 N	1125 N
M_x static	16.0 Nm	46.0 Nm
M_y static	13.0 Nm	119 Nm
M_z static	13.0 Nm	118 Nm
M_x dynamic	15.0 Nm	27.0 Nm
M_y dynamic	12.0 Nm	71.0 Nm
M_z dynamic	12.0 Nm	70.0 Nm



$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$

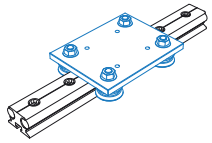


Slides

- Ground steel plate
- Lubrication system option
- Adjustable for no play

L 100 x W 75 x H 31.5 mm (WS 8/70)
(weight: approx. 0.7 kg)
Part no.: **223108 0070**

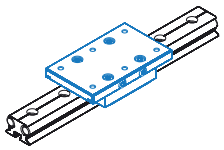
L 150 x W 75 x H 31.5 mm (WS 8)
(weight: approx. 1,0 kg)
Part no.: **223108**



Trolley LW 4

- L 125 x W 97 x H 7.7 mm
- Ground steel plate
- 4 rollers Ø 31, sealed for life
- Adjustable for no play
- Weight: 1.02 kg

Part no.: **223009**



For steel shafts Ø 12 mm

Dual track set 1

- L75 x W75 x H30.2 mm
- With 2 SMALL linear ball bearings

Part no.: **223001**

Dual track set 2

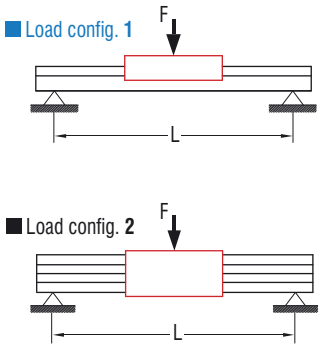
- L125 x W75 x H30.2 mm
- With 2 LARGE linear ball bearings

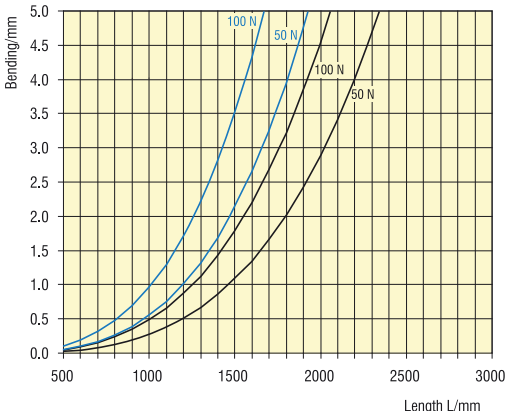
Part no.: **223002**

Linear guide rail

LFS-12-10

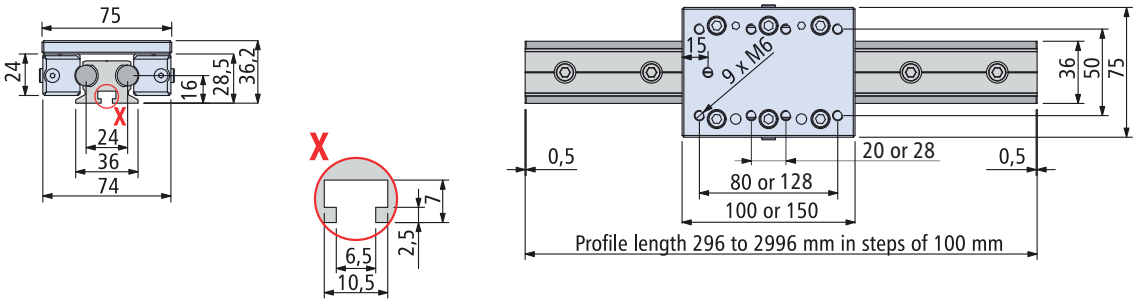
Bending



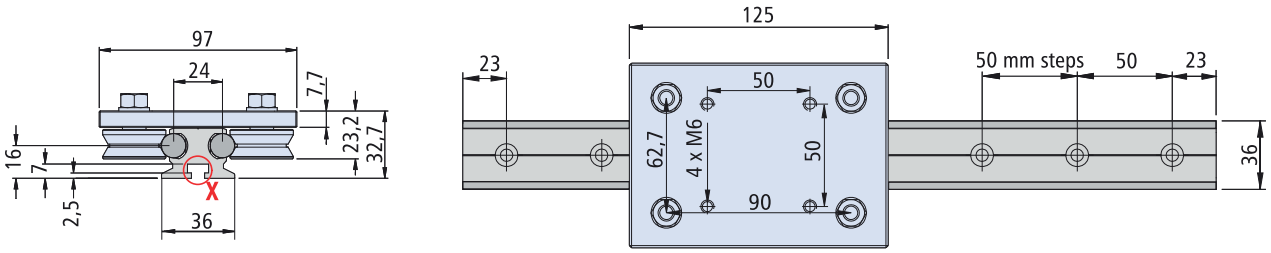


Dimensioned drawings

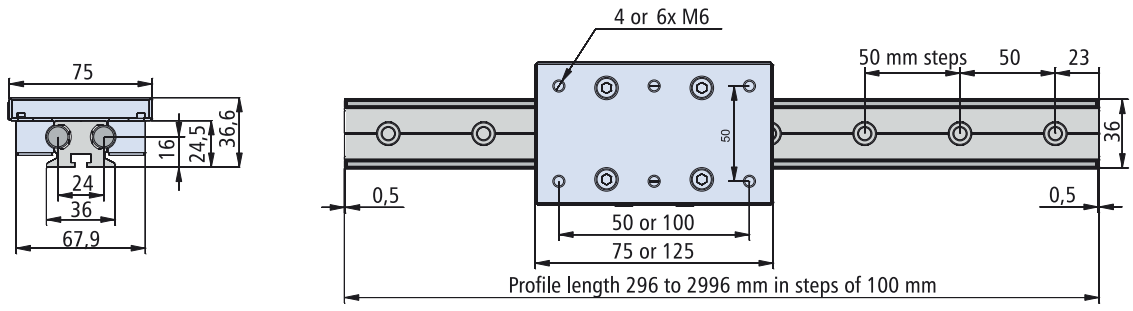
LFS-12-10 with slides **WS 8**



LFS-12-10 with trolley LW 4



LFS-12-10 with dual track set



mechanics

Linear guide rail

LFS-16-120

Features

- W 190 x H 61 mm
- 2 precision steel shafts Ø 16
- Anti-twist
- Aluminium shaft housing profile naturally anodised
- Securing from below with M6 tapped rail in T-slot profile
- Conditionally self-supporting
- Any guide length
- Weight: 10.2 kg/m

Ordering key

220 008 XXXX

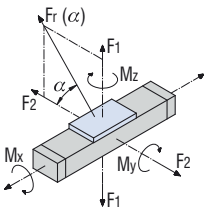
Length in mm (in 100 mm raster)
e.g. **0029** = Length 298
0299 = Length 2998

Profile length = Length overall L -2 mm
Special lengths available on request!

Load data

$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$



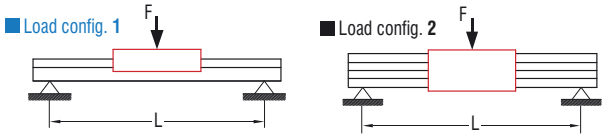
Einheit mit 2x IWS 1	
C_0	4929 N
C	2660 N
F_1 stat.	4209 N
F_1 dyn.	2271 N
F_2 stat.	4929 N
F_2 dyn.	2660 N
M_x stat.	253 Nm
M_y stat.	147 Nm
M_z stat.	173 Nm
M_x dyn.	136 Nm
M_y dyn.	79 Nm
M_z dyn.	93 Nm

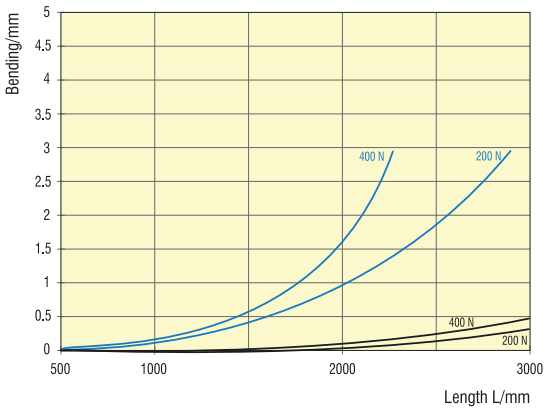
Einheit mit 2x ILS 1	
C_0	7598 N
C	4857 N
F_1 stat.	6488 N
F_1 dyn.	4148 N
F_2 stat.	7598 N
F_2 dyn.	4857 N
M_x stat.	389 Nm
M_y stat.	195 Nm
M_z stat.	228 Nm
M_x dyn.	249 Nm
M_y dyn.	124 Nm
M_z dyn.	146 Nm

Einheit mit 4x IWS 1	
C_0	6572 N
C	3546 N
F_1 stat.	5612 N
F_1 dyn.	3028 N
F_2 stat.	6572 N
F_2 dyn.	3546 N
M_x stat.	337 Nm
M_y stat.	309 Nm
M_z stat.	361 Nm
M_x dyn.	182 Nm
M_y dyn.	167 Nm
M_z dyn.	195 Nm

Einheit mit 4x ILS 1	
C_0	10130 N
C	6476 N
F_1 stat.	8650 N
F_1 dyn.	5530 N
F_2 stat.	10130 N
F_2 dyn.	6476 N
M_x stat.	519 Nm
M_y stat.	476 Nm
M_z stat.	557 Nm
M_x dyn.	332 Nm
M_y dyn.	304 Nm
M_z dyn.	356 Nm

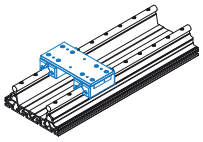
Bending





Linear guide rail LFS-16-120

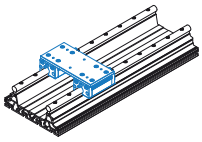
Slide unit
with 2 × steel slides
ILS 1 (kit)



- L 84 x W 178 x H 8 mm
- Ground steel plate
- 2 x ILS 1, central lubrication option
- Adjustable for no play
- Total weight: 2.30 kg

Part no.: **223240 0009**

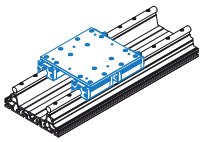
Slide unit
with 2 × aluminium slides
IWS 1 (kit)



- L 84 x W 178 x H 8 mm
- Ground steel plate
- 2 × IWS 1, central lubrication option
- Adjustable for no play
- Total weight: 1.50 kg

Part no.: **223240 0007**

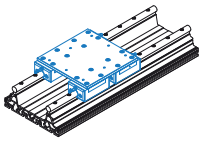
Slide unit
with 4 × aluminium slides
IWS 1 (kit)



- L 180 x W 178 x H 8 mm
- Ground steel plate
- 4 x IWS 1, central lubrication option
- Adjustable for no play

Part no.: **223240 0008**

Slide unit
with 4 × steel slides
ILS 1 (kit)

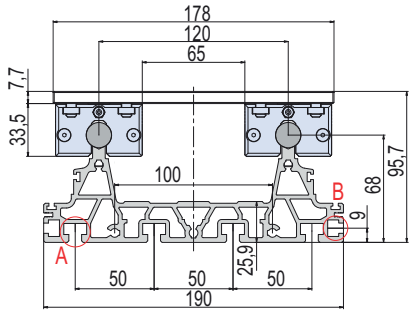


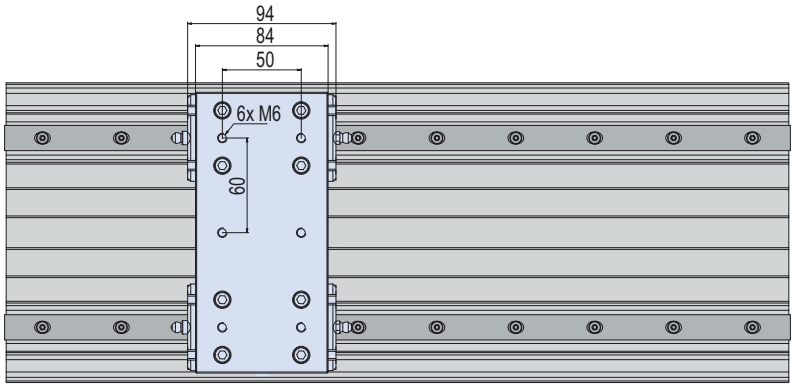
- L 180 x W 178 x H 8 mm
- ground steel plate
- 4 x ILS 1, central lubrication option
- Adjustable for no play

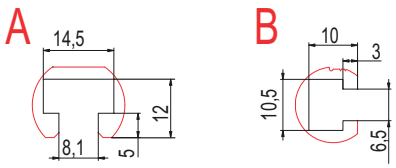
Part no.: **223240 0010**

Dimensioned drawings

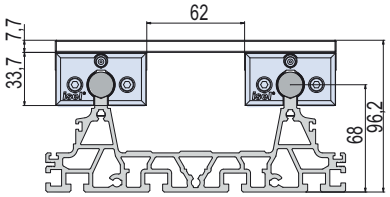
Aluminium slides IWS 1

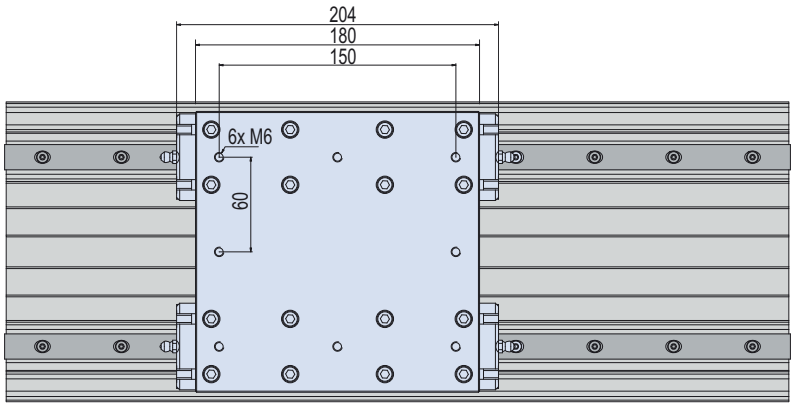






Steel slides ILS 1





mechanics

Accessories

Tapped rail

M6 tapped rail
- 10 x 4 mm
- Galvanised
- M6 Ra 50 mm
- VE 3 units at 1 m

Part no.: **209 011**

Sliding nuts

M6 sliding nut (Figure 1)
- L 25 × W 10 × H 3.5 mm
- Galvanised
- VE 100 unit
- All except PT/RE 40, 65

Part no.: **209 001 0005**

2 × M6 sliding nuts (Figure 2)
- L 45 x W 10 x H 3.5
- Galvanised
- VE 50 unit
- For all except PT/RE 40, 65

Part no.: **209 002 0004**

2 × M6 sliding nuts (Figure 2)
- L 45 × W 13 × H 6 mm
- Galvanised
- 2 × M6 Ra 25 mm
- VE 25 unit
- For PT/RE 40, 65

Part no.: **209 005 0001**

Angle sliding nut 2 × M6 (Figure 3)
- Galvanised
- VE 25 units
- For all except PT/RE 40, 65

Part no.: **209 021 0003**

Special angle sliding nut 3 x M6 (Figure 4)
- Galvanised, VE 25 unit
- For all except PT/RE 40, 65

Part no.: **209 022 0003**

Sliding nuts

M5 sliding nuts
- Galvanised • VE 20 unit
- For all except PT25, PT 50, PS 200, RE 40 and RE 65

(Securing only possible from above)

with spring
Part no.: **209005 0002**
(M5/Figure 1)
Part no.: **209005 0003**
(M6/Figure 2)

with large chamfer
Part no.: **209005 0004**
(M6/Figure 3)

in rhombus shape
Part no.: **209005 0005**
(M5/Figure 4)
Part no.: **209005 0006**
(M6/Figure 5)

Linear ball bearing

For steel shafts Ø 12 mm

Linear ball bearing **large**
- L80 × W20 × H19 mm, VE 2 units

Part no.: **222 002 0001**

Linear ball bearing **medium**
- L60 × W20.5 × H17.8 mm, VE2 units

Part no.: **222 000**

Linear ball bearing **small**
- L40 x W20 x H19 mm, VE 2 units

Part no.: **222 001**

Grease/grease gun

Grease
Part no.: **299 031**

Impact press for grease and oil
Part no.: **931 170**

Guide shafts

Guide shaft SF 12/SF 16
- Precision steel shafts Ø 12 or 16 mm, length 3 m
- Hardened and ground
- With M5 blind hole tapping (SF12) or M6 (SF16) in 100 mm raster or with drilled holes for M4 (SF 12) or M5 (SF 16) in 100 mm raster

Part no.: **220019 0299**
(SF12, 3m, with blind holes for M5)
Part no.: **220020 0299**
(SF12, 3m, with stepped holes for M4)
Part no.: **220023 0299**
(SF16, 3m, with stepped holes for M5)
Part no.: **220024 0299**
(SF16, 3m, with blind holes for M6)

Rollers

Roller Ø 20 mm for SF 12
- With M4 tapped drilling
- VE 2 units

Part no.: **222 010**

Rollers

Roller Ø 21 mm
- Concentric
- VE 2 units

Part no.: **222 003**
- Eccentric
- VE 2 units

Part no.: **222 004**

Roller Ø 31 mm
- Concentric
- VE 2 units

Part no.: **222 006**
- Eccentric
- VE 2 units

Part no.: **222 007**

Operating loads calculation

Effective loading calculation

Various factors affect the calculation of the loading of isel guides. This includes the position of the
C of G of the load, tensile and compressive forces, torques, load and acceleration forces.

For a linear bench on 4 bearings, the bearing forces are calculated according to the force application point for various load directions.

The calculation can also be applied to a slide configuration with 2 slides.

The dimension LL/2 is used as the dimension L (see dimensioned drawings for the relevant guides).

The load factor in this case is CO/2.

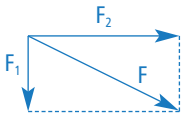
Combined load

If the load alignment of an element does not coincide with one of the main load directions, then the equivalent load is calculated:

$$P = |F_1| + |F_2|$$

If a force F and a torque M load an element simultaneously, then the dynamically equivalent load is:

$$P = |F| + |M| \cdot \frac{C_0}{M_{0(XYZ)}}$$



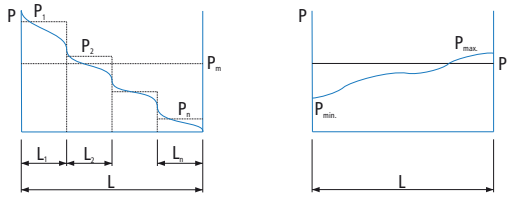
P [N]	dynamically equivalent load
F [N]	opposing force $= \sqrt{1^2 + F_2^2}$
F1 [N]	vertical component see sketch (4)
F2 [N]	horizontal component see sketch (4)
C0 [N]	static load factor
M [Nm]	opposing torque
M0(XYZ) [Nm]	static torque in the direction of the opposing torque

According to DIN, the dynamically equivalent load should not exceed the value $P = 0.5 \cdot C$.

Equivalent load calculation

Operating conditions

A incremental change **B** uniform change



Equivalent load

$$P = \sqrt[3]{\frac{1}{L} \cdot (P_1^3 \cdot L_1 + P_2^3 \cdot L_2 + P_3^3 \cdot L_{3.....} + P_n^3 \cdot L_n)}$$

$$P = \frac{1}{3} \cdot (P_{min} + 2 \cdot P_{max})$$

P	dynamically equivalent load [N]
$P_{1...n}$	Individual load [N]
L	Total travel [m]
$L_{1...n}$	Individual travel [m]

P_{min}	smallest load [N]
P_{max}	largest load [N]

Static safety

Operating conditions	S_0
Normal motion	1.0 - 3.0
High speed	2.0 - 4.0
With impacts and vibration	3.0 - 5.0

$$S_0 = \frac{C_0}{P_0} = \frac{M_0}{M}$$

S_0	static load safety
C_0	static load factor [N]
P_0	statically equivalent bearing loading [N]
M_0	static loading torque [Nm]
M	equivalent static torque [Nm]

Nominal working life

The nominal working life is achieved or exceeded by 90% of an adequately large quantity of identical bearings, before the first signs of material fatigue become apparent.

$$L = \left(\frac{C}{P}\right)^3$$

$$L_h = \frac{833}{H \cdot n_{OSZ}} \cdot \left(\frac{C}{P}\right)^3$$

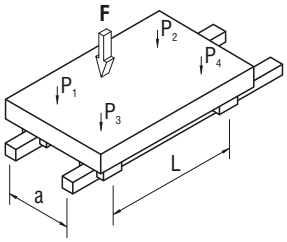
$$L_h = \frac{1666}{V} \cdot \left(\frac{C}{P}\right)^3$$

L [m]	nominal working life in units of 100,000 m
L_h [h]	nominal working life in hours run
C [N]	dynamic load factor
P [N]	dynamically equivalent load
H [m]	single stroke of the oscillating motion
n_{OSZ} [min]	Number of double strokes per minute
v [m/min]	average speed of movement

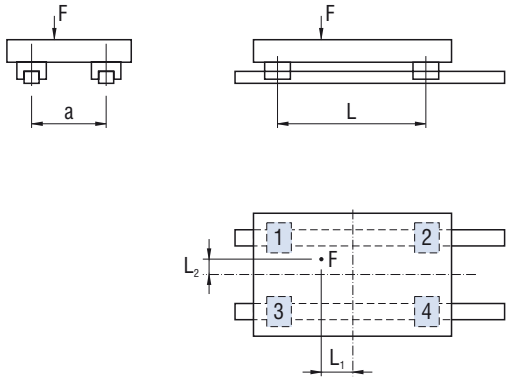
Operating loads calculation

Load vertical on the **bench surface**

Loading



Dimensioned figure



Load on a trolley

$$P_1 = \frac{F}{4} + \frac{F \cdot L_1}{2L} + \frac{F \cdot L_2}{2a}$$

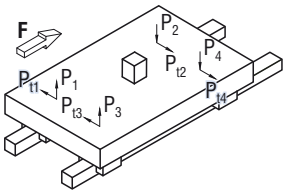
$$P_2 = \frac{F}{4} - \frac{F \cdot L_1}{2L} + \frac{F \cdot L_2}{2a}$$

$$P_3 = \frac{F}{4} + \frac{F \cdot L_1}{2L} - \frac{F \cdot L_2}{2a}$$

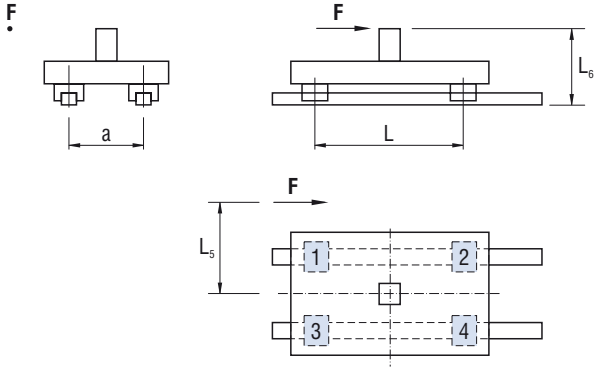
$$P_4 = \frac{F}{4} - \frac{F \cdot L_1}{2L} - \frac{F \cdot L_2}{2a}$$

Load in **direction of motion**

Loading



Dimensioned figure



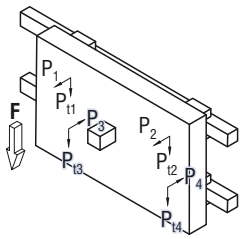
Load on a trolley

$$P_1 \ldots P_4 = \frac{F \cdot L_6}{2L}$$

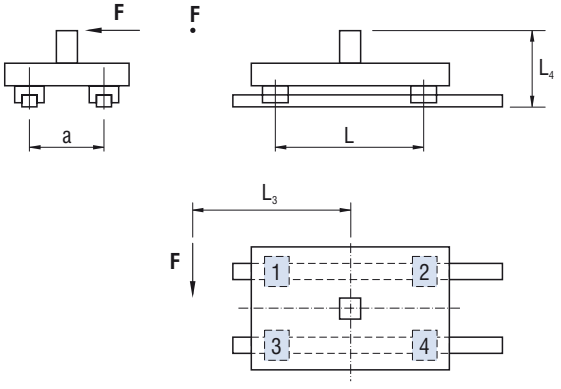
$$P_{t1} \ldots P_{t4} = \frac{F \cdot L_5}{2L}$$

Load at right angles to the **direction of motion**

Loading



Dimensioned figure



Load on a trolley

$$P_1 \ldots P_4 = \frac{F \cdot L_4}{2a}$$

$$P_{t1} = P_{t3} = \frac{F}{4} + \frac{F \cdot L_3}{2L}$$

$$P_{t2} = P_{t4} = \frac{F}{4} - \frac{F \cdot L_3}{2L}$$

Space for your notes

mechanics

Drive elements

Overview

Information

Ball screw nuts supplied by isel Germany are high-quality, precise and wear-free (hardened and ground). Combined with ball screw spindles, ball screw nuts ensure that rotary motion is converted into linear motion at extremely low values of friction.

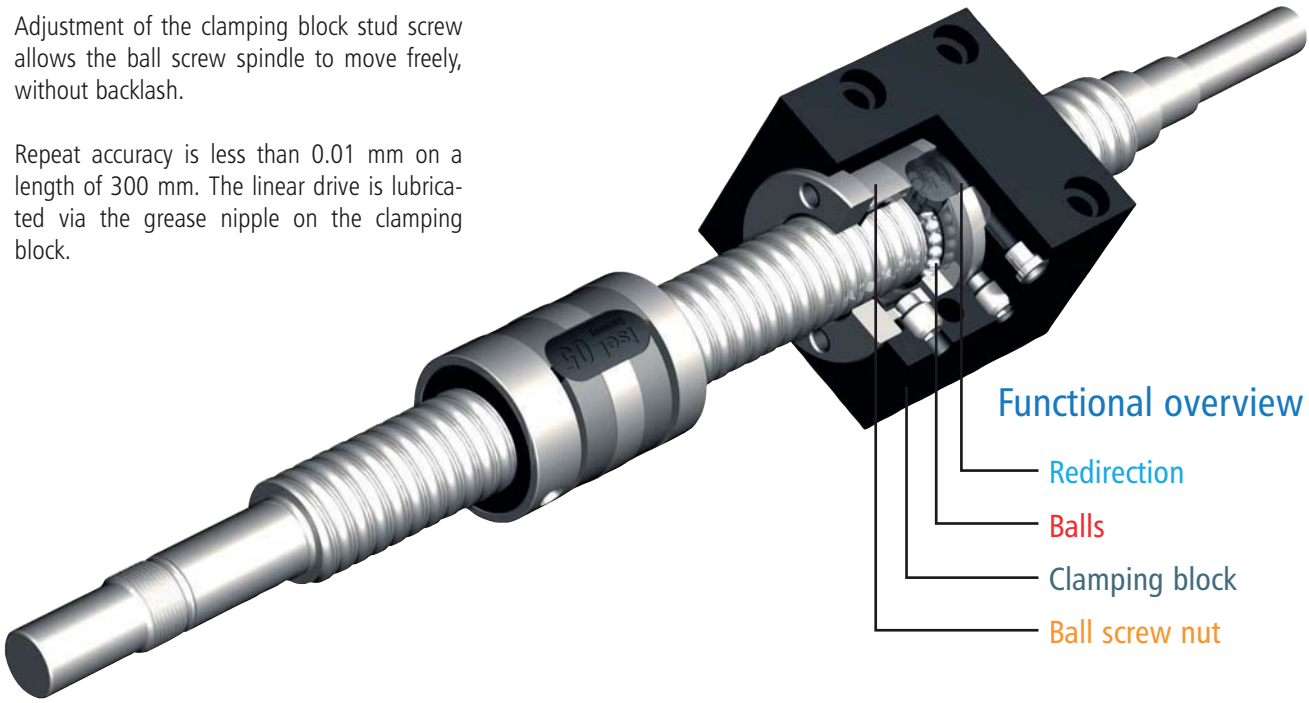
The ball screw nut is positioned and held in the clamping block using a stud screw. The ball screw nuts contain multiple circulating balls and an internal ball return mechanism.

Adjustment of the clamping block stud screw allows the ball screw spindle to move freely, without backlash.

Repeat accuracy is less than 0.01 mm on a length of 300 mm. The linear drive is lubricated via the grease nipple on the clamping block.

Ball screw spindles are roll manufactured using modern machines prior to hardening and polishing.

Our linear drives are technically advanced and have proven themselves over a period of more than 20 years of practical application.



Contract Manufacturing

With more than 1 million units soled, "isel" has created core competence in the area of ball screws. Our drives are technically mature and have proved themselves in many applications in practical use. The specialist skills of our highly qualifi ed employees are a significant contributing factor on our path to creating technically perfect and economically successful solutions. isel Germany AG offers products to meet every special customer requirement. Thanks to our very modern manufacturing plants, we are able to carry out all work processes (rolling, hardening and polishing) efficiently and according to the customer's specifications. They precisely meet the special requirements that you give to us. Please get in contact with us or give us a call to discuss your area of application or individual case. You will find us an attentive and skilled partner. Our in-house design department checks all technical requirements and works in close collaboration with the production engineers to ensure your order can be quickly and flexibly integrated into the production process.

Visit us on our website and look at our current product video:

The company isel Germany AG has been manufacturing ball screw spindles on modern CNC controlled production machines also using robotics for over 25 years. Included amongst our long-standing clients are companies from the areas of

- machine and equipment construction
- electronics industry
- wood-working
- medical technology
- semiconductor industry
- training and other related areas

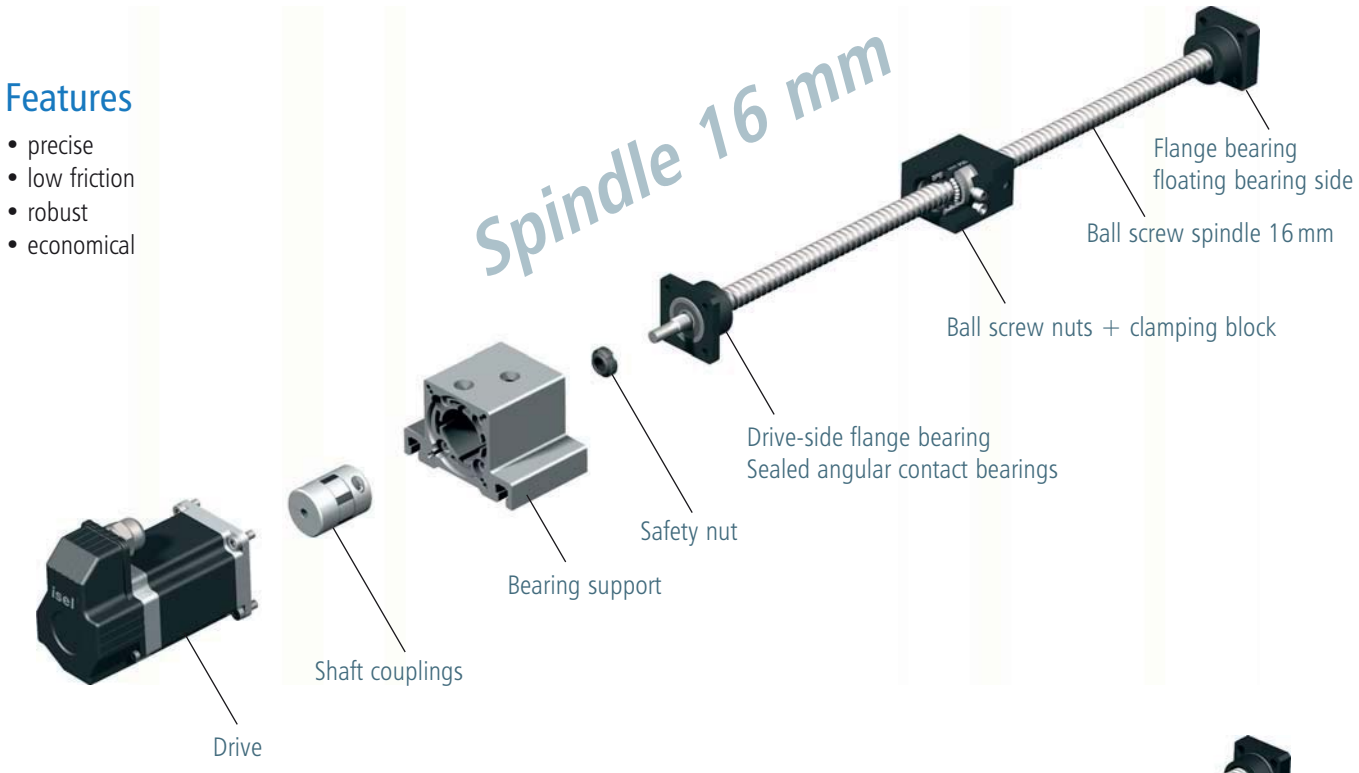
Drive elements

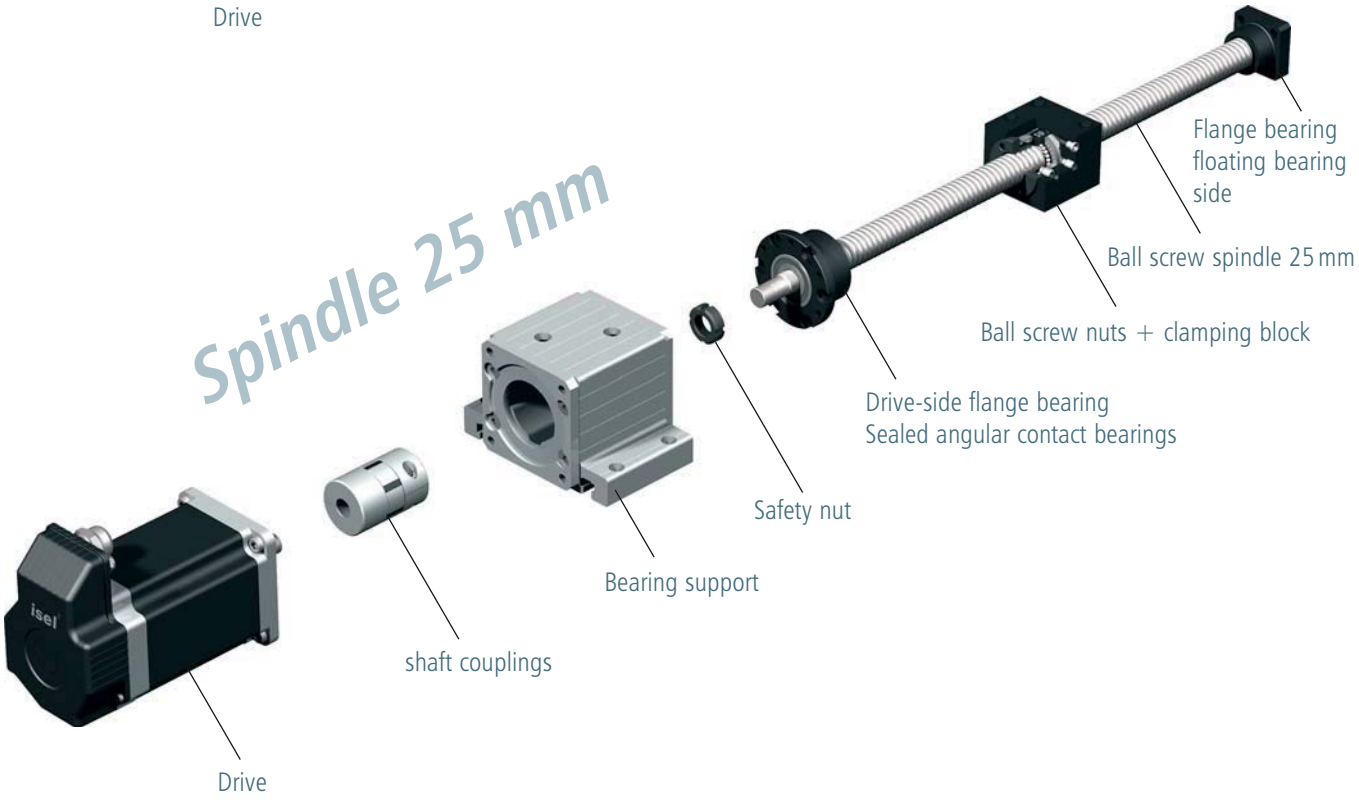
Linear drive

The most common variable when using linear drives is wheter the spindles are driven directly or via toothed-belt.

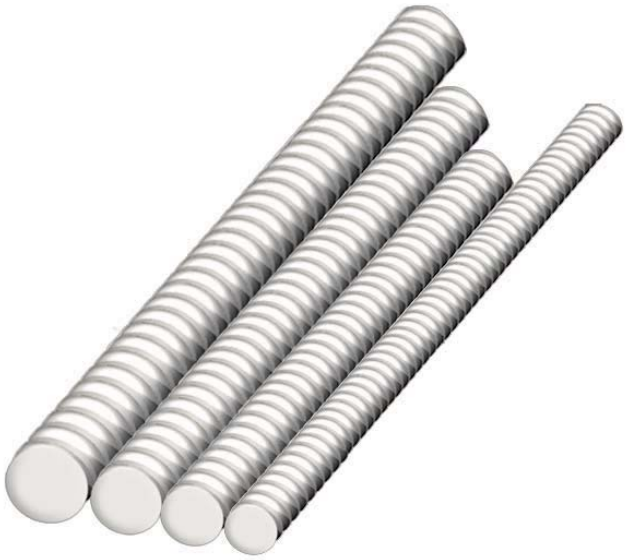
Features

- precise
- low friction
- robust
- economical





Ball screw spindles Ø 16, 20, 25, 32 mm



Features

- rolled, hardened and polished
- Material CF 53,
  inductively hardened (HRC 60±2);
  (for detailled information see DIN 17212)
- Spindle pitches:
  2,5 / 4 / 5 / 10 and 20 mm (Ø 16mm)
  5 / 10 / 20 mm (Ø 20, 25 mm)
  5 mm (Ø 32 mm)
- End machining to isel standard
  or according to customer specification
  (see „Available lengths")
- Produced to DIN 69051, Part 3,
  Tolerance class 7

Options

- **End machining according to customer specification**
- **available in other lengths**

Ordering data

211 1XX XXXX

Diameter	Spindle pitch	End machining	Lengths
3 = 16 mm	**2** = 2,5 mm**	**0** = not machined	z.B. **045** = 452 mm
4 = 25 mm	**3** = 4 mm**	**1** = one-sided machining	**086** = 868 mm
5 = 20 mm	**4** = 5 mm	**2** = both-sided machining	**305** = 3052 mm
6 = 32 mm*	**5** = 10 mm	suitable for all feeds (aluminium profile length 78 mm)	(rounded to the final digit)
* previously only available with a pitch of 5mm	**6** = 20 mm		

Attention!
Please note, that the screw pitches with** are only available for diameter Ø16mm .

Available lengths

Ø 16 mm

Without end machining
in 100 mm raster
- 352 to 3052 mm

Two-sided end machining
in 100 mm raster
- 368 mm to 3068 mm

Special length to dimensioned drawing:
211 13X XXXX

Ø 25 mm

Without end machining
in 100 mm raster
- 500 to 3000 mm

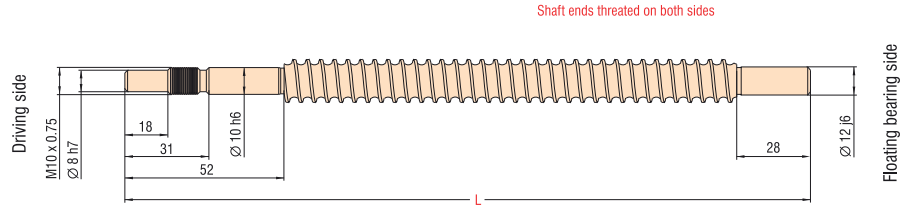
Special length to dimensioned drawing:
211 14X 0999

Two-sided end machining
in 100 mm raster
- 295 to 2995 mm

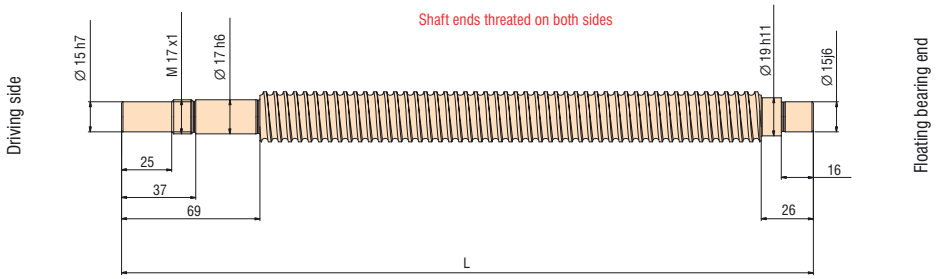
Special length to dimensioned drawing:
21114X XXXX

Dimensioned drawings

Ø 16 mm



Ø 25 mm



mechanics

Ball screw nut with single-path return

Rectangle nut – Ø16

Features

- Material 16MnCr5 or 20MnCr5, pressed, hardened, polished
- Versions for recirculating ball spindle Ø16 mm
- Nut pitches: 2.5 / 4 / 5 / 10 mm
- Balls are rerouted internally
- As block housing with base fixing
- Regreasing through grease nipples 90°, 0°

Load factors

Pitch	Nominal Ø	dynamic load factor	static load factor
2.5 mm	16 mm	3500 N	5500 N
4.0 mm	16 mm	4600 N	7200 N
5.0 mm	16 mm	4600 N	7200 N
10.0 mm	16 mm	4200 N	6500 N

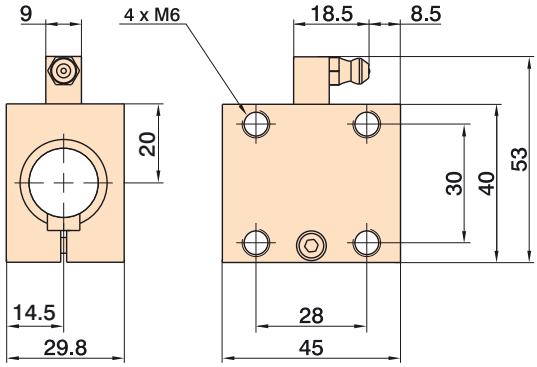
Ordering data

only for spindles Ø16

Pitch	Part no.
2.5 mm	213 003 1003
4.0 mm	213 003 1004
5.0 mm	213 003 1005
10.0 mm	213 003 1010

with matching:
dirt scraper
- VE 2 unit Part no.: 213500 0001

Dimensioned drawings



Round nut – Ø16 Ø25

Features

- Material 16MnCr5, ground
- Versions for recirculating ball spindles Ø16 and Ø25 mm
- Nut pitches: 2.5 / 4 / 5 / 10 mm 20 mm (Ø 16 mm), 5/10 and 20 mm (Ø25 mm)
- Balls are rerouted internally
- The version with nut pitch 20 mm is supplied with scrapers

Load factors

Pitch (mm)	Nominal Ø (mm)	Dyn. load factor (N)	Static load factor (N)
2.5	16	3500	5500
4.0	16	4600	7200
5.0	16	4600	7200
10.0	16	4200	6500
5.0	25	5100	12600
10.0	25	5100	12600
20	25	3570	8800

Ordering data

only for spindles Ø25

Pitch	Part no.
5.0 mm	213 700 0005
10.0 mm	213 700 0010
20.0 mm	213 700 0020

with matching:
dirt scraper
- VE 2 unit

Part no.: 213700 9000

only for spindles Ø16

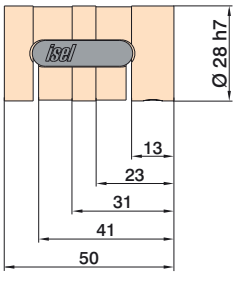
Pitch	Part no.
2.5 mm	213 503
4.0 mm	213 514
5.0 mm	213 505
10.0 mm	213 510
20.0 mm	213 520

with matching:
dirt scraper
- VE 2 unit

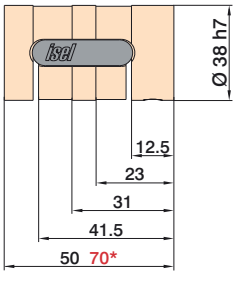
Part no.: 213500 0001

Dimensioned drawings

for spindle Ø 16



for spindle Ø 25



*) At pitch = 20

Ball screw nut with complete ball return

Round nut for spindles
Ø 16 / 20 / 25 mm

Flange nut for spindles
Ø 16 / 20 / 25 / 32 mm

Features

- Material 16MnCr5, sharpened
- version for spindles Ø16, 20, 25mm (round nut) and spindles Ø16, 20, 25, 32mm (flange nut)
- Pitches: 5 / 10 / 20 mm
- with integrated end-cap ball return

Load factors

Pitch	Nominal Ø	dynamic load factor [N]	static load factor [N]
5,0 mm	16 mm	10000	19000
10,0 mm	16 mm	10000	19000
20,0 mm	16 mm	13000	29000
5,0 mm	20 mm	12000	27000
10,0 mm	20 mm	12000	27000
20,0 mm	20 mm	15000	35000
5,0 mm	25 mm	18000	45000
10,0 mm	25 mm	18000	45000
20,0 mm	25 mm	16000	40000
5,0 mm	32 mm	20000	60000

Ordering key

211 X X X XXXX

Type
2=Flange
3=Round

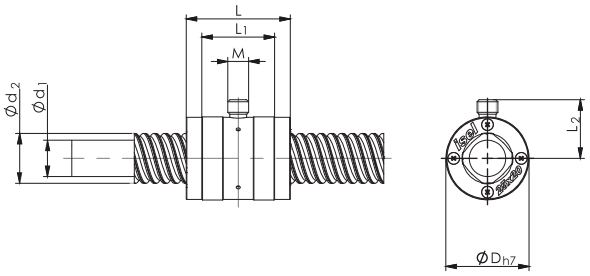
Diameter
3=16 mm
4=25 mm
5=20 mm
6=32 mm

Pitch
4=5 mm
5=10 mm
6=20 mm

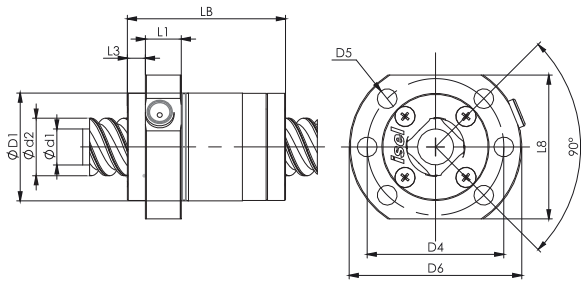
End machining
0=not machined
5=both-sided machined

Length in mm (in 100 mm raster)
e.g. **045** = Length 452 mm
305 = Length 3052 mm
(rounded to the final digit)

Dimensioned drawing



Pitch	d2	d1	Ø D_{h7}	L	L_1	M	L_2
5	16	10	30	35,5	25,5	M8x0,75	22,5
10	16	10	30	34,5	24,5	M8x0,75	22,5
20	16	10	30	44	34	M8x0,75	22,5
5	20	14	35	36	26	M8x0,75	25,5
10	20	14	35	35,5	25,5	M8x0,75	25,5
20	20	14	35	46,5	34,5	M8x0,75	25,5
5	25	21	40	51	26	M10x0,75	28
10	25	21	40	50	35	M10x0,75	28
20	25	21	40	50	35	M10x0,75	28



Pitch	d2	d1	D1 g6	LB	L1	L3	L8 h13	D4	D6 h13	D5
5	16	10	30	35,5	10	10	40	38	48	5,5
10	16	10	30	34,5	10	10	40	38	48	5,5
20	16	10	30	44	10	10	40	38	48	5,5
5	20	14	35	36	10	10	44	47	58	6,6
10	20	14	35	35,5	10	10	44	47	58	6,6
20	20	14	35	46,5	11	10	44	47	58	6,6
5	25	21	40	51	12,5	10	48	51	62	6,6
10	25	21	40	50	12,5	10	48	51	62	6,6
20	25	21	40	50	12,5	10	48	51	62	6,6
5	32	26	50	51	10	12	62	65	80	9

Clamping blocks for round nut with single-path return

Flange securing

Base securing

Features

- Material steel, gunmetal finish
- Versions for recirculating ball spindles Ø 25 and Ø 16 mm
- Nut pitches
  5/10 and 20 mm (Ø 25 mm)
  2.5/4/5/10 and 20 mm (Ø 16 mm)
- Recirculating ball nuts are adjustable for no-play
- Clamping blocks for base and flange securing

Ordering data

Clamping block 2 Ø16
Flange securing

Pitch	Part no.
all	213 501

Clamping block 1 Ø16
Base securing

Pitch	Part no.
all	213 500

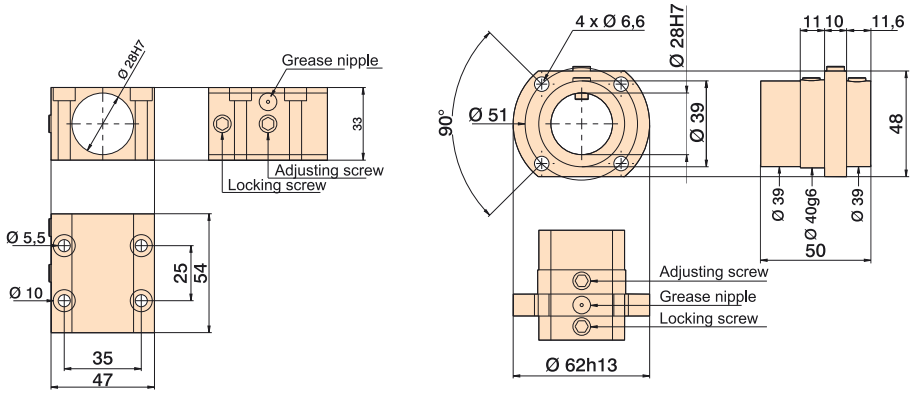
Clamping block 2 Ø25
Flange securing

Pitch	Part no.
5 / 10	213 700 9003
20	213 700 9004

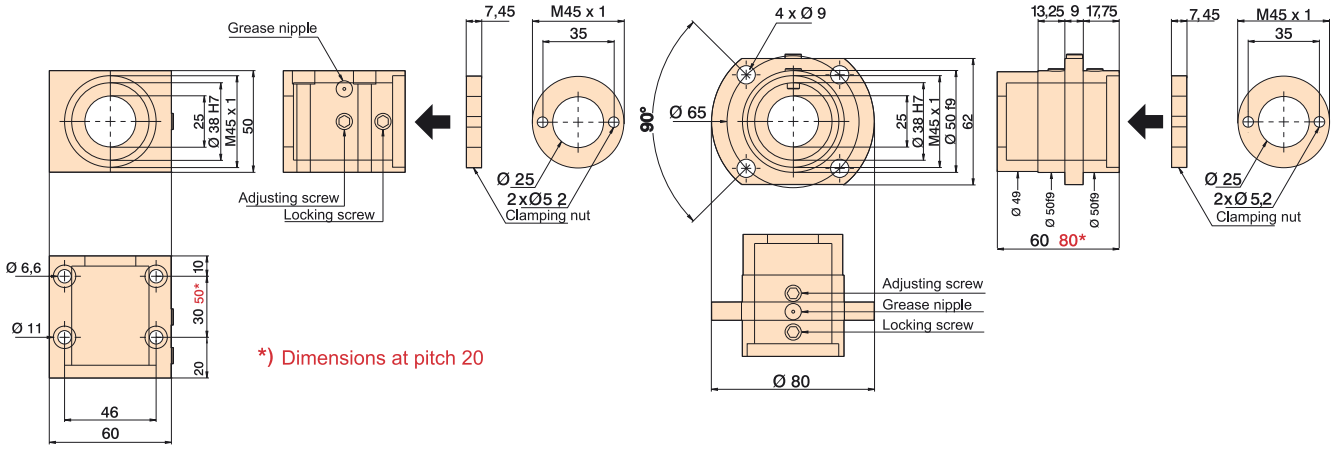
Clamping block 1 Ø25
Base securing

Pitch	Part no.
5 / 10	213 700 9001
20	213 700 9002

Dimensioned drawings - spindle clamping blocks Ø 16



Dimensioned drawings - spindle clamping blocks Ø 25



Flange bearing

for spindle ∅ 16 mm

Flange bearing
drive side

Flange bearing
floating bearing side

Ordering data

Flange bearing, drive side

Part no.: 216 504 0001

Flange bearing, floating bearing side

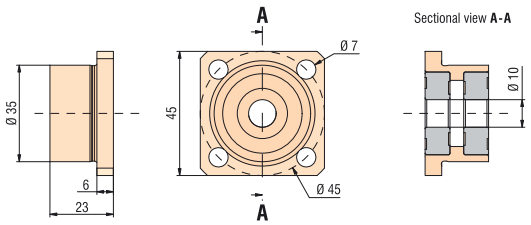
Part no.: 216 504 0002

Features

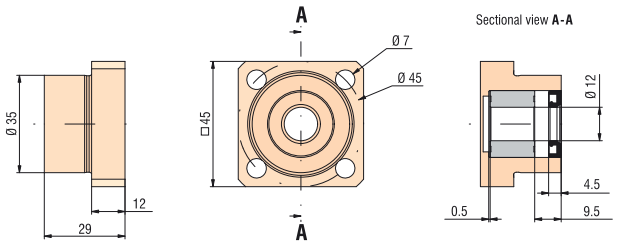
- Bearing, spindle drive side (fixed bearing side) and the spindle floating bearing side
- Flange bearing, drive side: bushing with two pressed angular contact ball bearings in an O-configuration
- Flange bearing, floating bearing side (counter-bearing): bushing with pressed needle bearing

Dimensioned drawings

Flange bearing
drive side



Flange bearing
floating bearing side



for spindle ∅ 25 mm

Flange bearing
drive side

Flange bearing
floating bearing side

Ordering data

Flange bearing, drive side

Part no.: 216 504 0006

Flange bearing, floating bearing side

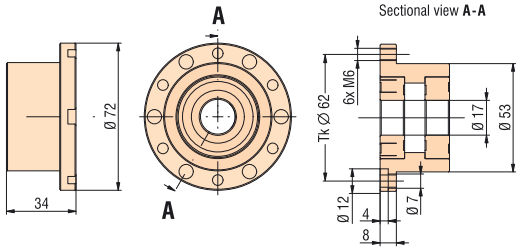
Part no.: 216 504 0005

Features

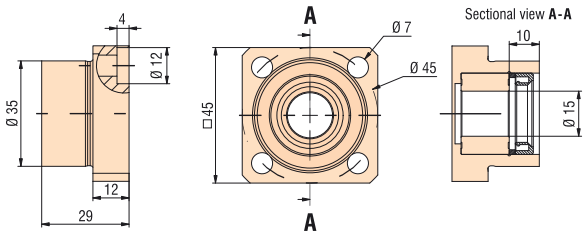
- Bearing, spindle drive side (fixed bearing side) and the spindle floating bearing side
- Flange bearing, drive side: bushing with two pressed angular contact ball bearings in an O-configuration
- Flange bearing, floating bearing side (counter-bearing): bushing with pressed needle bearing

Dimensioned drawings

Flange bearing
drive side

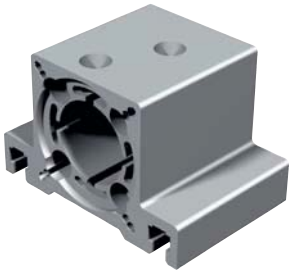


Flange bearing
floating bearing side



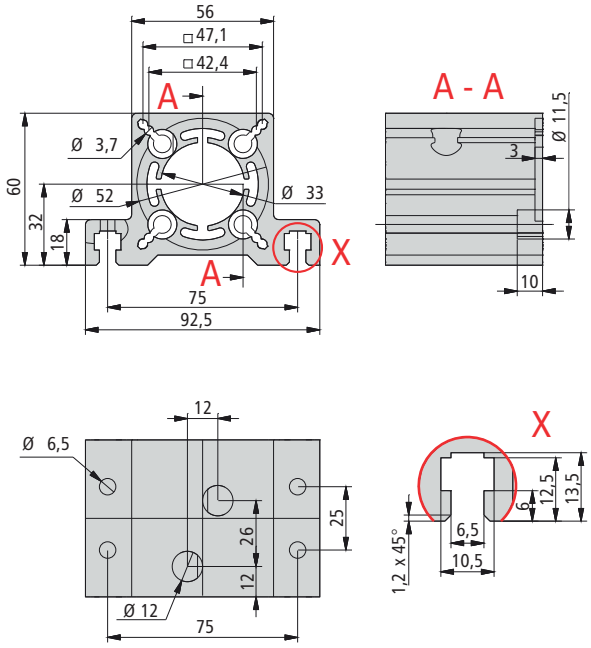
Bearing supports

Bearing support 1

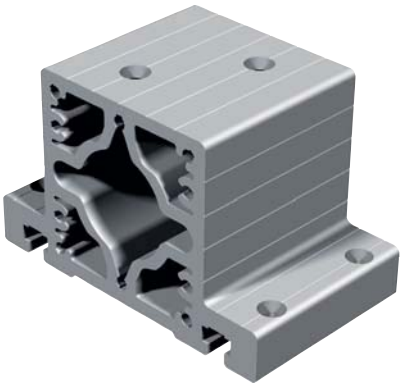


- Aluminium profile compliant with DIN EN 12020-2
- As a parallel connection between the flange bearing and motor flange
- Flat milled securing surfaces
- Version for recirculating ball spindle Ø 16 mm
- Universal securing options

Part no.: **216504 0007**

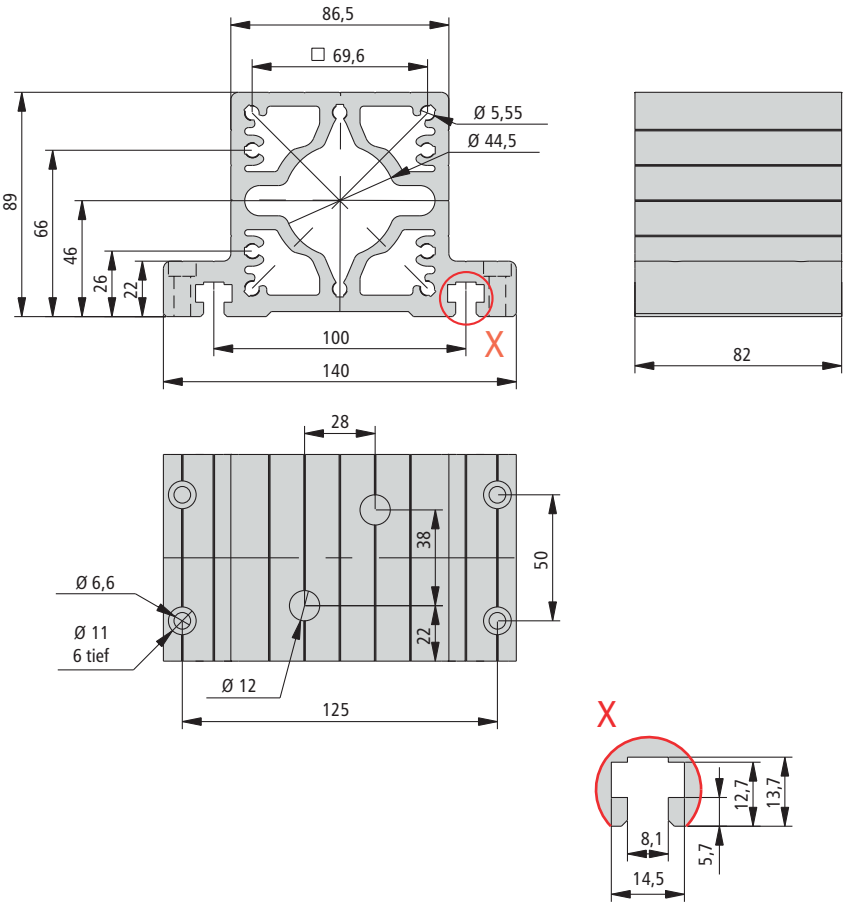


Bearing support 2



- Aluminium profile compliant with DIN EN 12020-2
- As a parallel connection between the flange bearing and motor flange
- Version for recirculating ball spindle Ø 25 mm
- Universal securing options

Part no.: **216504 0008**



Space for your notes

Linear units

Overview

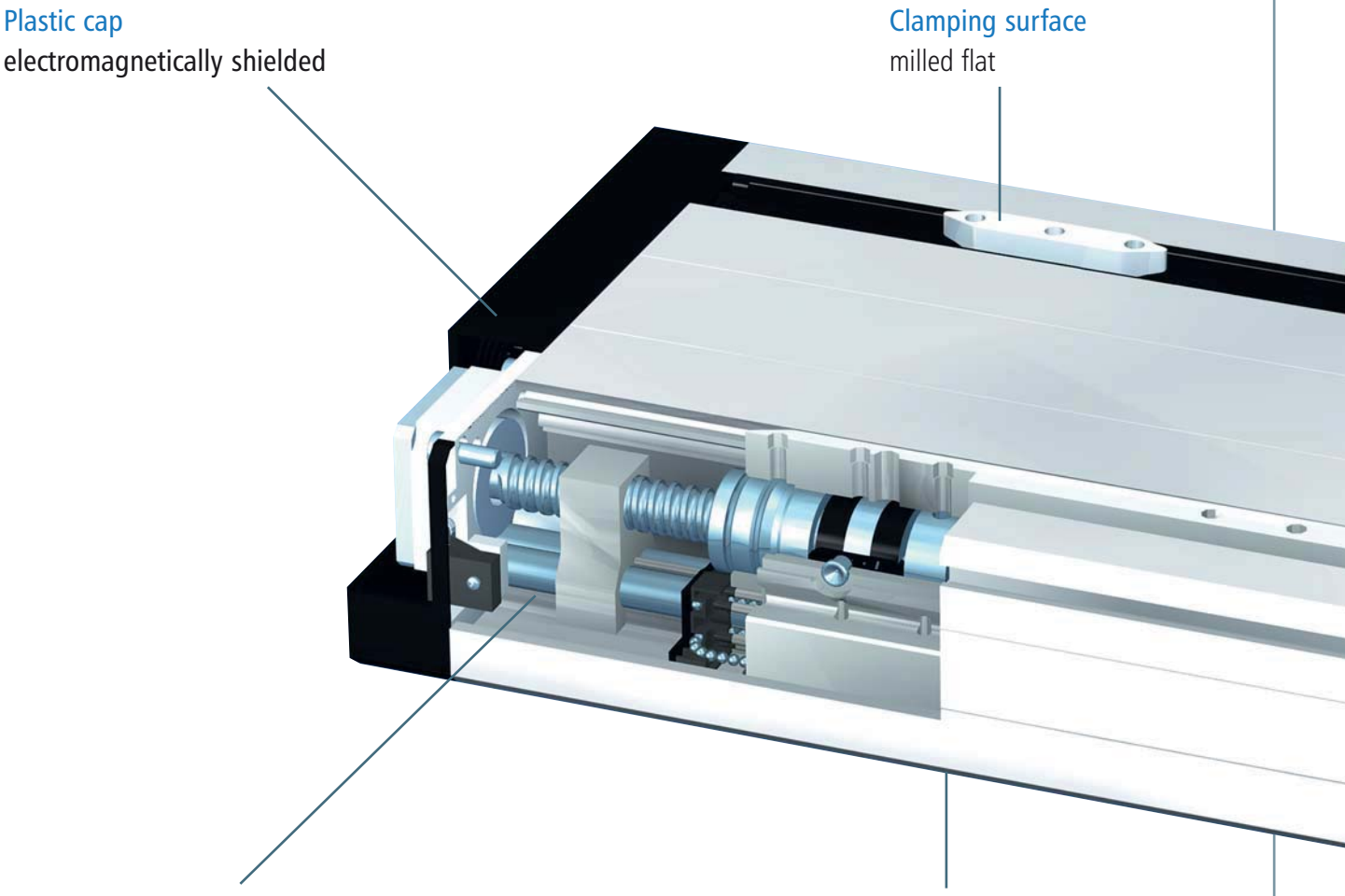
Linear units

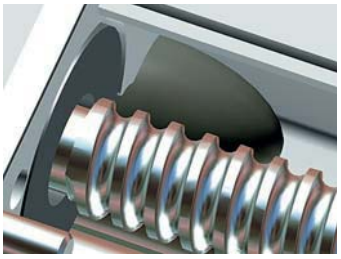
Overview

CAD data on our website **www.isel-germany.de**

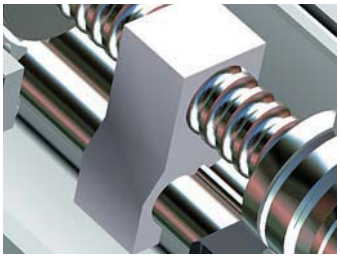
Functional overview

at example LES 5

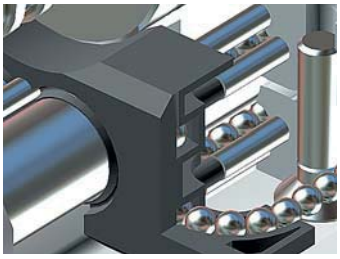




- End position buffering both sides with soft PVC parabolic springs
- Counter-bearing with 2 needle sleeves



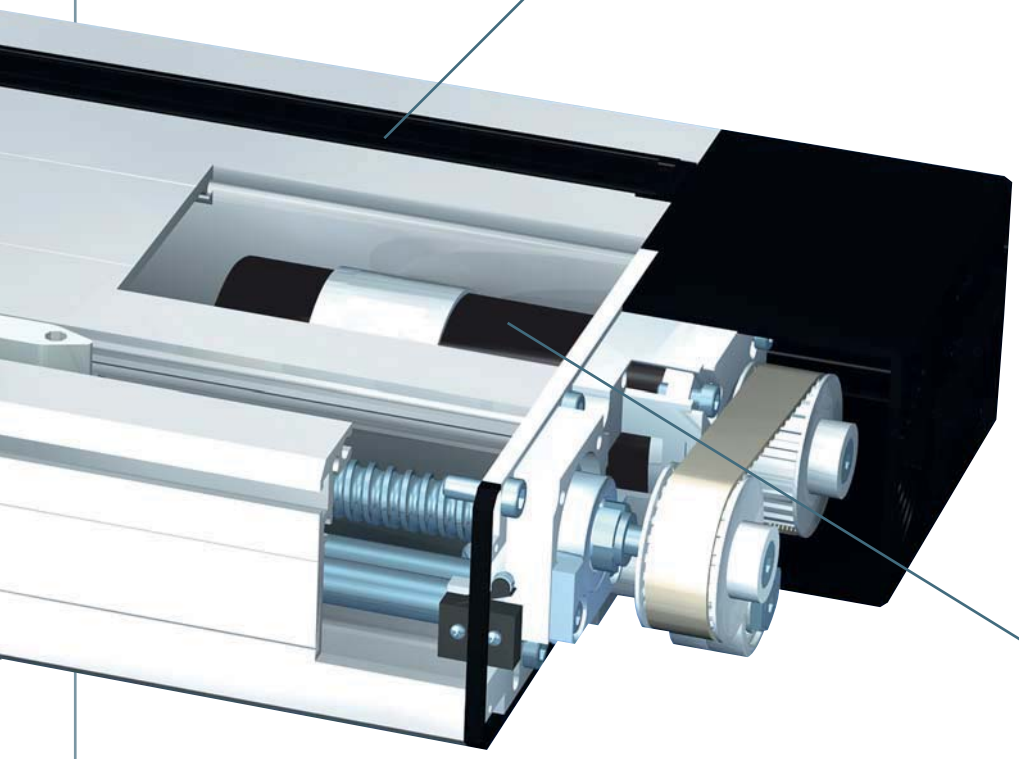
- Spindle support from a profile length of 1500 mm without limiting the process range



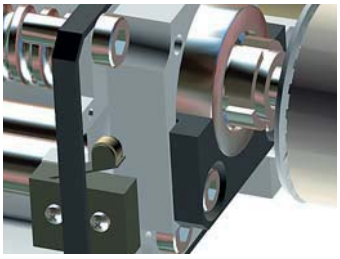
- Recirculating ball in patented aluminium linear slides
- Glass fibre reinforced loop components with scrapers

Functional overview

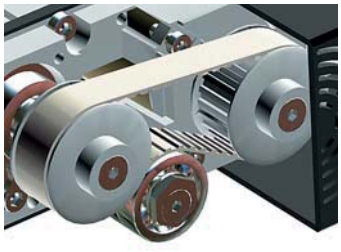
at example LES 5



- Preset play-free recirculating ball nut with scrapers
- Central lubrication system for recirculating ball nut and circulations



- Integrated overrun limit switch
- Spindle bearing with angular contact bearings
- Axially free from play by means of self-locking special nuts



- Belt return and connecting electronics covered completely by protective cap

mechanics

Linear units
with spindle drive

LES 4

LES 4 with side-mounted belt drive module

Features

- Aluminium shaft housing profile W75 × H75 mm, naturally anodised
- Clamping area and profile underside milled flat
- with 2 precision steel shafts Ø 12 h6, material Cf53, Hardness 60 ± 2 HRC
- Aluminium shaft slides WS 5/70, 2 x WS 5/70 (70 mm long), adjustable for no play, central lubrication system
- Recirculating ball drive 2.5/4/5/10 and 20 mm pitches
- Profile sealing with friction-resistant lip seals
- Cast aluminium end plates
- With 2 limit or reference switches, Repeat accuracy ± 0.02 mm
- Sealed angular contact bearings in drive - steel flange

Options:
- Black anodized aluminium profile
- Electromagnetic brakes in the motor module or in drive spindle extension
- Steel slide LS2 (Part no. 223007)
- External limit switch attachment set (see accessories)

Available on request:
- Length measuring system
- Bellows gaiter cover
- Assembly left of the motor module

Ordering key

234 XXX 0XXX

Drive
0 = Preparation Direct drive modules
1 = Preparation Belt drive module

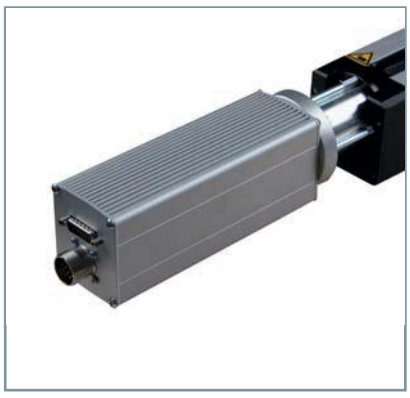
Shaft slides
0 = 1 Shaft slides 70 mm
1 = 1 Shaft slides 200 mm
2 = 2 Shaft slides 70 mm

Profile length (L1)
e.g. 029 = 290 mm (min.)
299 = 2990 mm (max.)
(rounded to the last digit)
Standard profile lengths available in 100 mm raster

Recirculating ball drive
0 = without
1 = Pitch 2.5 mm
2 = Pitch 4.0 mm
3 = Pitch 5.0 mm
4 = Pitch 10 mm
5 = Pitch 20 mm

Drive modules

see pages 2-66 et seq. of the catalogue



Technical specification
Aluminium profile

Aluminium profile LES 4	
Moment of inertia I_x	107.711 cm⁴
Moment of inertia I_y	125.843 cm⁴
*Centre of gravity see dimensioned drawing	33.23 mm
Cross-sectional area	18.81 cm²
Material	AlMgSiO, 5F22
Anodising	E6/EV1
Weight with steel shafts	6.2 kg/m
Weight with steel shafts and spindles	7.6 kg/m

No load running torques

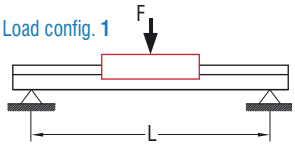
No load torques (Ncm)					
Speed (rpm)	Spindle pitch				
	2.5	4	5	10	20
500	15	15	16	17	18
1500	19	19	19	20	21
3000	23	24	24	25	26

Linear units
with spindle drive

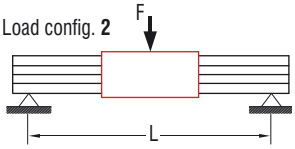
LES 4

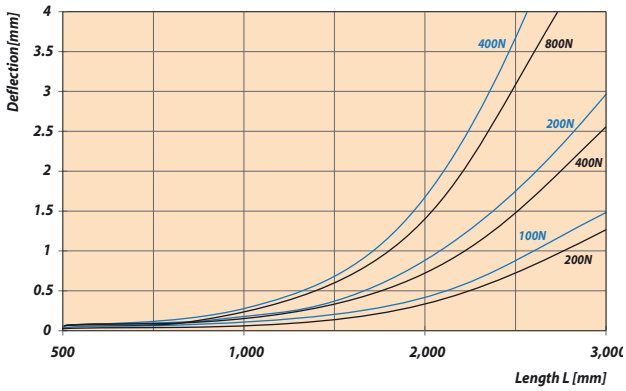
Bending

Load config. **1**



Load config. **2**

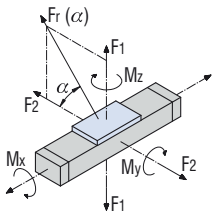




Load factors

$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$



LES 4 with one WS 5/70	
C_0	2,576.65 N
C	1,461.14 N
F_1 stat.	2,200.67 N
F_1 dyn.	1,247.93 N
F_2 stat.	2,576.65 N
F_2 dyn.	1,461.14 N
M_x stat.	36.45 Nm
M_y stat.	82.16 Nm
M_z stat.	96.20 Nm
M_x dyn.	20.67 Nm
M_y dyn.	46.59 Nm
M_z dyn.	54.55 Nm

LES 4 with two WS 5/70	
C_0	4,954.5 N
C	2,809.5 N
F_1 stat.	4,231.5 N
F_1 dyn.	2,398.5 N
F_2 stat.	4,954.5 N
F_2 dyn.	2,809.5 N
M_x stat.	44.7 Nm
M_y stat.	126.945 Nm
M_z stat.	148.635 Nm
M_x dyn.	25.2 Nm
M_y dyn.	71.955 Nm
M_z dyn.	84.285 Nm

permissible spindle speeds

LES 4 / 5 / 6	Spindle pitch p [mm]	2.5	4	5	10	20
Profile length L [mm]	max. permissible spindle speed n [rpm]	max. permissible feed speed v permissible [mm/s]				
490	4000	167	267	333	667	1333
990	3000	125	200	250	500	1000
1390	1500	63	100	125	250	500
1490 *	3000	125	200	250	500	1000
1990 *	1650	69	110	138	275	550
2490 *	1050	44	70	88	175	350
2990 *	750	31	50	63	125	250

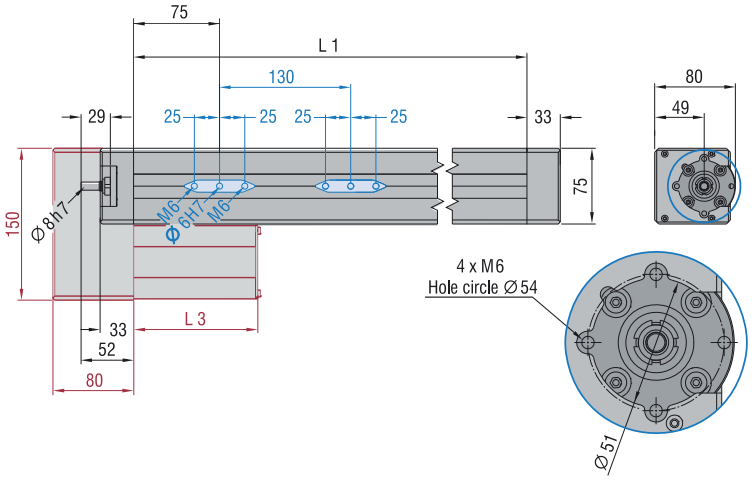
* with spindle support

dimensioned drawing

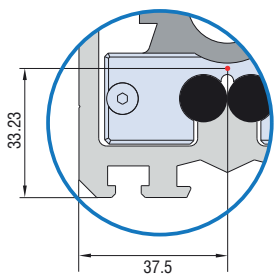
process travel

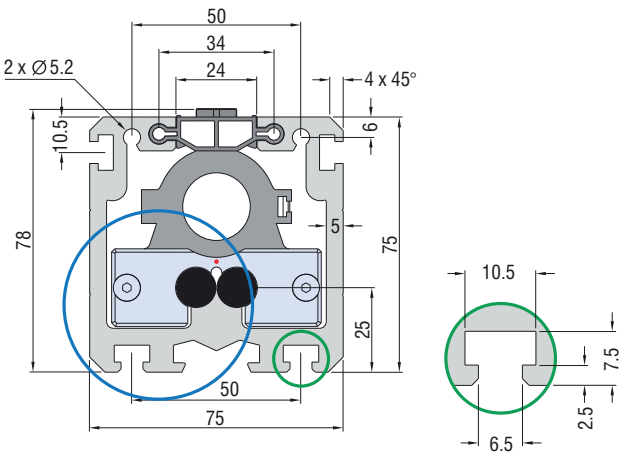
at 1 × WS 5/70 = L1 -150 mm
at 2 × WS 5/70 = L1 -280 mm

external limit switches see pages **2-83**



dimensioned drawing
Aluminium profile





mechanics

Linear units
with spindle drive

LES 6

LES 6 with side belt drive module

Features

- Aluminium shaft housing profile W150 × H75 mm, naturally anodised
- Clamping area and profile underside milled flat
- With 4 precision steel shafts Ø 12 h6, material Cf53, Hardness 60 ± 2 HRC
- Aluminium shaft slides WS 5/70, 2 x WS 5/70 (70 mm long), adjustable for no play, central lubrication system
- Recirculating ball drive 2.5/4/5/10 and 20 mm pitches
- Profile sealing with friction-resistant lip seals
- Cast aluminium end plates
- With 2 limit or reference switches, Repeat accuracy ± 0.02 mm
- Sealed angular contact bearings in drive - steel flange

Options:
- Black anodized aluminium profile
- Electromagnetic brake
- Steel slides LS2 (Part no. 223007)
- Limit switch attachment kit (see accessories)

To order:
- Length measuring system
- Bellows gaiter cover
- Assembly left of the motor module

Ordering key

234 XXX 0XXX

Profile length (L1)
e.g. 029 = 290 mm (min.)
299 = 2990 mm (max.)
(rounded to the last digit)
Standard profile lengths available in 100 mm raster

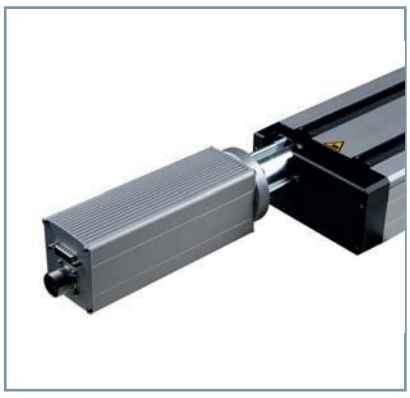
Recirculating ball drive
0 = without
1 = Pitch 2.5 mm
2 = Pitch 4.0 mm
3 = Pitch 5.0 mm
4 = Pitch 10 mm
5 = Pitch 20 mm

Drive
6 = Preparation Direct drive modules
7 = Preparation Belt drive module

Shaft slides
0 = 2 Shaft slides 70 mm
1 = 2 Shaft slides 200 mm
2 = 4 Shaft slides 70 mm

Drive modules

see pages 2-68 et seq. of the catalogue



Technical specification
Aluminium profile

Aluminium profile LES 6	
Moment of inertia I_x	707.100 cm⁴
Moment of inertia I_y	212.200 cm⁴
*Centre of gravity see dimensioned drawing	32.78 mm
Cross-sectional area	30.07 cm²
Material	AlMgSiO, 5F22
Anodising	E6/EV1
Weight with steel shafts	11.4 kg/m
Weight with steel shafts and spindles	12.8 kg/m

No load running torques

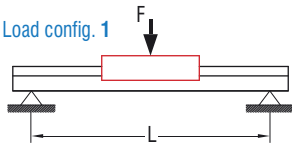
No load torques (Ncm)					
Speed (rpm)	Spindle pitch				
	2.5	4	5	10	20
500	17	17	18	20	21
1500	20	20	22	24	25
3000	24	25	26	29	30

Linear units
with spindle drive

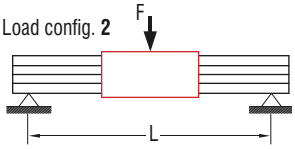
LES 6

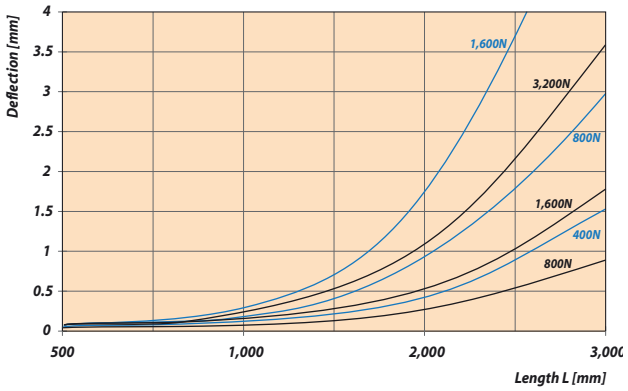
Bending

Load config. **1**



Load config. **2**

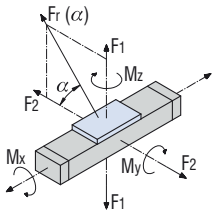




Load factors

$$Fr(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr(\alpha) = \frac{F1}{\sin \alpha}$$



LES 6 with two WS 5/70	
C_0	5,153.30 N
C	2,319.41 N
F_1 stat.	4,401.33 N
F_1 dyn.	1,980.96 N
F_2 stat.	5,153.30 N
F_2 dyn.	2,319.14 N
M_x stat.	211.54 Nm
M_y stat.	164.31 Nm
M_z stat.	192.39 Nm
M_x dyn.	95.21 Nm
M_y dyn.	73.95 Nm
M_z dyn.	86.59 Nm

LES 6 with four WS 5/70	
C_0	6,606 N
C	3,746 N
F_1 stat.	5,642 N
F_1 dyn.	3,198 N
F_2 stat.	6,606 N
F_2 dyn.	3,746 N
M_x stat.	211.575 Nm
M_y stat.	366.73 Nm
M_z stat.	429.39 Nm
M_x dyn.	119.925 Nm
M_y dyn.	207.87 Nm
M_z dyn.	243.49 Nm

permissible spindle speeds

LES 4 / 5 / 6	Spindle pitch [mm]	2.5	4	5	10	20
Profil length L [mm]	max. permissible feed speed [rpm]	max. permissible feed speed v permissible [mm/s]				
490	4000	167	267	333	667	1333
990	3000	125	200	250	500	1000
1390	1500	63	100	125	250	500
1490 *	3000	125	200	250	500	1000
1990 *	1650	69	110	138	275	550
2490 *	1050	44	70	88	175	350
2990 *	750	31	50	63	125	250

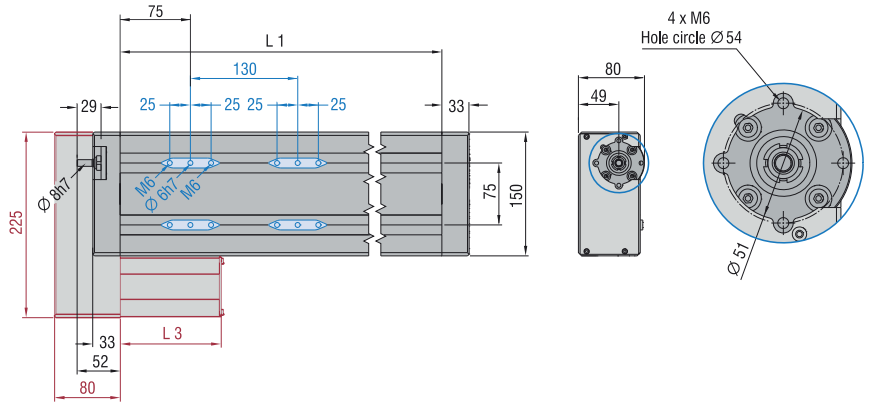
* with spindle support

dimensioned drawing

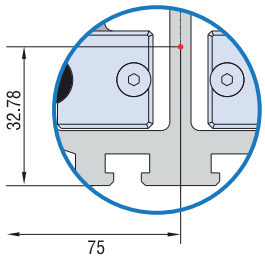
process travel

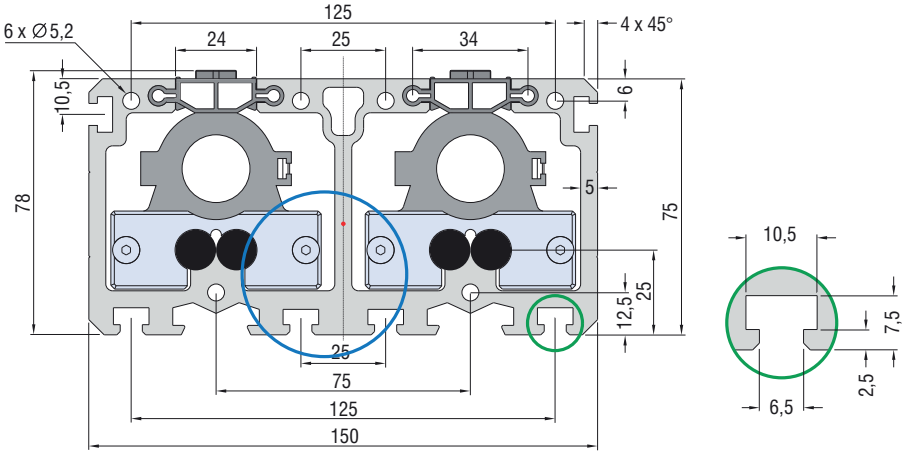
at 2xWS 5/70 = L1 -150 mm
at 4xWS 5/70 = L1 -280 mm

external limit switches see page **2-83**



dimensioned drawing
Aluminium profile





mechanics

Linear units
with spindle drive

LES 5

LES 5 with integrated belt drive module

Features

- Aluminium shaft housing profile W225 × H75 mm, naturally anodised
- Clamping area and profile underside milled flat
- With 4 precision steel shafts Ø 12 h6, material Cf53, Hardness 60 ± 2 HRC
- Aluminium shaft slides WS 5/70, 2 x WS 5/70 (70 mm long), adjustable for no play, central lubrication system
- Recirculating ball drive 2.5/4/5/10 and 20 mm pitches
- Profile sealing with friction-resistant lip seals
- Cast aluminium end plates
- With 2 limit or reference switches, Repeat accuracy ± 0.02 mm
- Sealed angular contact bearings in drive - steel flange

Ordering key

234 XXX 0XXX

Drive
3 = Preparation Direct drive modules
4 = Preparation Belt drive module

Shaft slides
0 = 2 Shaft slides 70 mm
1 = 2 Shaft slides 200 mm
2 = 4 Shaft slides 70 mm

Recirculating ball drive
0 = without
1 = Pitch 2.5 mm
2 = Pitch 4.0 mm
3 = Pitch 5.0 mm
4 = Pitch 10 mm
5 = Pitch 20 mm

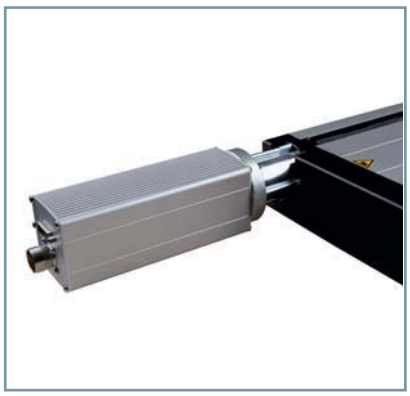
Profile length (L1)
e.g. 029 = 290 mm (min.)
299 = 2990 mm (max.)
(rounded to the last digit)
Standard profile lengths available in 100 mm raster

Options:
- Black anodized aluminium profile
- Electromagnetic brake
- Steel slides LS2 (Part no. 223007)
- Limit switch attachment kit (see accessories)

Available on request:
- Length measuring system
- Bellows gaiter cover

Drive modules

see pages 2-66 et seq. of the catalogue



Technical specification
Aluminium profile

Aluminium profile LES 5	
Moment of inertia I_x	2,361.654 cm^4
Moment of inertia I_y	298.925 cm^4
*Centre of gravity see dimensioned drawing	33.39 mm
Cross-sectional area	42.49 cm^2
Material	AlMgSiO, 5F22
Anodising	E6/EV1
Weight with steel shafts	13.8 kg/m
Weight with steel shafts and spindles	15.2 kg/m

No load running torques

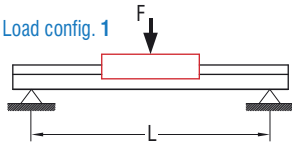
No load torques (Ncm)					
Speed (rpm)	Spindle pitch				
	2.5	4	5	10	20
500	15	15	16	17	18
1500	19	19	19	20	21
3000	23	24	24	25	26

Linear units
with spindle drive

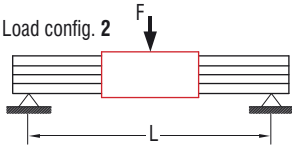
LES 5

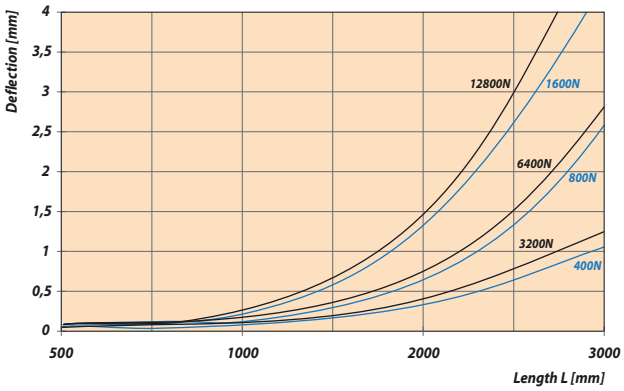
Bending

Load config. **1**



Load config. **2**

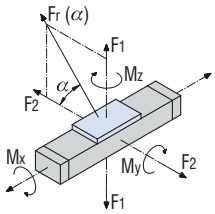




Load factors

$$Fr\,(\alpha) = \frac{F2}{\cos \alpha}$$

$$Fr\,(\alpha) = \frac{F1}{\sin \alpha}$$



LES 5 with two WS 5/70	
C_0	5,153.30 N
C	2,319.41 N
F_1 stat.	4,401.33 N
F_1 dyn.	1,980.96 N
F_2 stat.	5,153.30 N
F_2 dyn.	2,319.14 N
M_x stat.	376.59 Nm
M_y stat.	164.31 Nm
M_z stat.	192.39 Nm
M_x dyn.	169.49 Nm
M_y dyn.	73.95 Nm
M_z dyn.	86.59 Nm

LES 5 with four WS 5/70	
C_0	6,606 N
C	3,746 N
F_1 stat.	5,642 N
F_1 dyn.	3,198 N
F_2 stat.	6,606 N
F_2 dyn.	3,746 N
M_x stat.	423.15 Nm
M_y stat.	366.73 Nm
M_z stat.	429.39 Nm
M_x dyn.	239.85 Nm
M_y dyn.	207.87 Nm
M_z dyn.	243.49 Nm

Permissible spindle speeds

LES 4 / 5 / 6	Spindle pitch p [mm]	2.5	4	5	10	20
Profil length L [mm]	max. permissible spindle speed n [rpm]	max. permissible feed speed v permissible [mm/s]				
490	4000	167	267	333	667	1333
990	3000	125	200	250	500	1000
1390	1500	63	100	125	250	500
1490 *	3000	125	200	250	500	500
1990 *	1650	69	110	138	275	550
2490 *	1050	44	70	88	175	350
2990 *	750	31	50	63	125	250

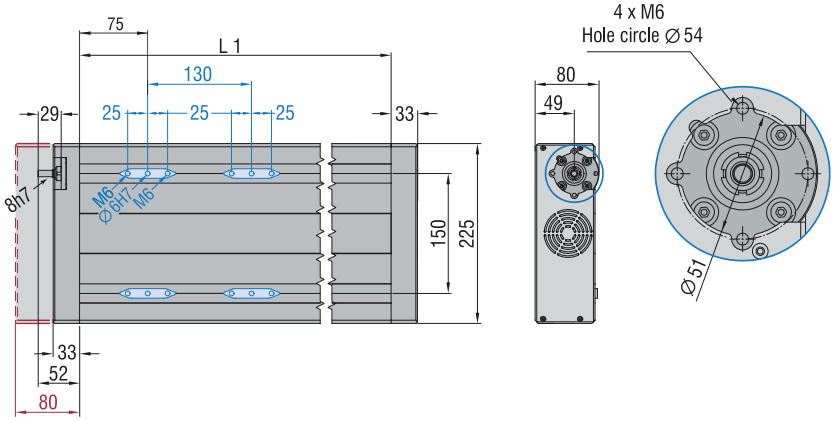
* with spindle support

Dimensioned drawing

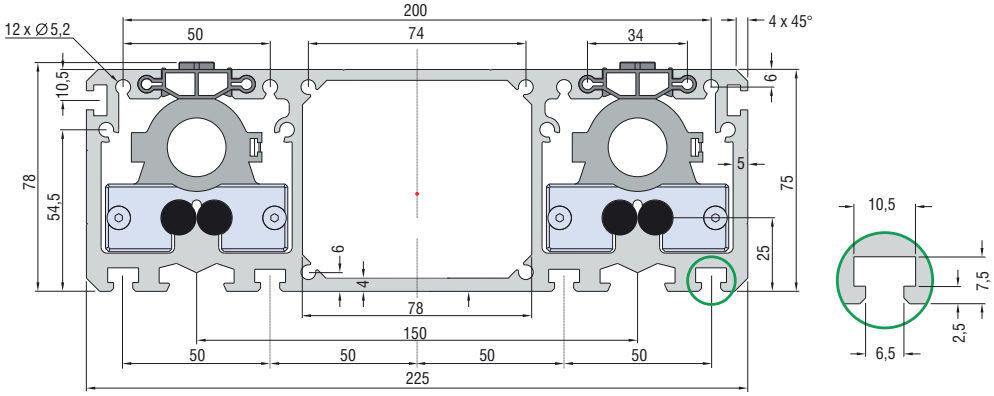
Process travel

at 2xWS 5/70 = L1 -150 mm
at 4xWS 5/70 = L1 -280 mm

external limit switches see pages **2-81**



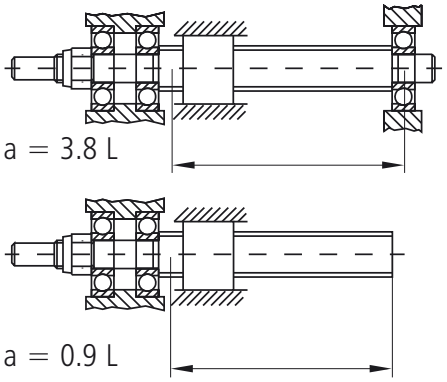
Dimensioned drawing
Aluminium profile



mechanics

Theoretically critical speed

Calculations



Definitions

$n_{perm.}$	[min^{-1}]	maximum permissible speed
a		Installation coefficient
d_2	[mm]	Spindle core diameter
L	[mm]	Spindle length between the spindle bearings and spindle ends

Critical speed

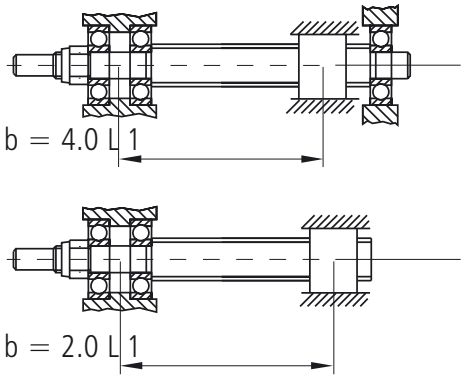
In most applications, you need to check tapped spindles at their critical speed.

The critical speed is that speed which causes resonance oscillations of this spindle.

This critical speed depends on the core diameter, the free load-bearing length and on the way the tapped spindle is constructed.

Given a general safety factor of 0.8, the maximum permissible speed can be calculated as follows:

$$n_{perm} = 392 \bullet \frac{a \bullet d_2}{L^2} 10^5$$



Definitions

F_{perm}	[N]	permissible compressive loading
d_2	[mm]	Spindle core diameter
L_1	[mm]	free buckling length, i.e. the maximum distance between the central bearing and the centre of the tapped nut
b		Installation coefficient

Buckling load

The recirculating ball spindle should as far as possible be subjected only to tensile stress. If it is subjected to compressive loads, then the spindle may buckle.

With a safety factor of 3.0 against buckling, the result is

$$F_{zul} = \frac{34\,000 \bullet b \bullet d_2^4}{L_1^2}$$

Drive dimensioning

Calculations

Drive torque calculation

The required drive torque is made up of
- Load torque M_{load}
- Acceleration torques M_{trans} and M_{rot}
- No load torque $M_{no\ load}$

$$M_A = M_{load} + M_{trans} + M_{rot} + M_{no\ load}$$

Load torque

$$M_{last} = \frac{F_X \bullet p}{2 \bullet \pi \bullet 1000}$$

with feed force $F_X = m \bullet g \bullet \mu$

Translational Acceleration torque

$$M_{trans} = \frac{F_a \bullet p}{2 \bullet \pi \bullet 1000}$$

with feed force $F_a = m \bullet a$

If used vertically, the mass acceleration a must be added to the acceleration due to gravity g (9.81 m/s^2).

Rotational acceleration torque

$$M_{rot} = \frac{J_{sp} \bullet L \bullet n_{max} \bullet a \bullet 2 \bullet \pi}{V_{max} \bullet 60 \bullet 1000}$$

Drive power

$$P = \frac{M_A \bullet n_{max}}{9550}$$

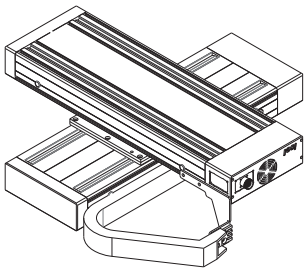
Definitions

M_A	[Nm]	required drive torque
M_{leer}	[Nm]	Torque, resulting from the various loads
M_{leer}	[Nm]	No load torque
M_{rot}	[Nm]	Rotational acceleration torque
M_{trans}	[Nm]	translational acceleration torque
Fx	[N]	Feed force
g	[m/s^2]	Acceleration due to gravity
v_{max}	[m/s]	maximum process speed
m	[kg]	The weight tob e conveyed
a	[m/s2]	Acceleration
p	[mm]	Spindle pitch
P	[kW]	Power
L	[mm]	Lenght
n_{max}	[rpm]	maximum speed
μ		coefficient of friction
J_{sp}	[kgm^2/m]	Inertial torque of inertia of the spindle per meter
F_a	[N]	Accelerating force

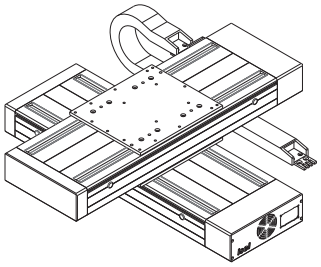
Mechanical specification

Linear unit	LES 4	LES 5	LES 6
Aluminium profile WxH (mm)	75 x 75	225 x 75	150 x 75
Guide weight (kg/m)	6.2	13.8	11.4
Moment of inertia I_x (cm^4)	126	299	212
Moment of inertia I_y (cm^4)	107	2362	707
Weight with spindle (kg/m)	7.6	15.2	12.8
Guide slides	1x WS 5-70 2x WS 5-70	2x WS 5-70 4x WS 5-70	
Slide weight (kg)	0.34 / 0.68	0.68 / 1.36	
Spindle pitch (mm)	2.5 / 4 / 5 / 10 / 20		
Max. permissible feed force (N)	2626 / 3450 / 3450 / 3150 / 1425		
Repeat accuracy (mm)	± 0.02		
Process path (mm)	L 1 - 150 / L 1 - 280		
Noise level (dBA)	< 85		
Storage temperature range (°C)	0 – 40		
Operating temperature range (°C)	0 – 60 (80)		
Relative air humidity (%)	< 90		

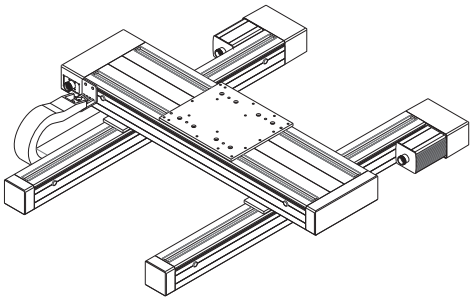
Combination examples LES ... with cable drag chain 9



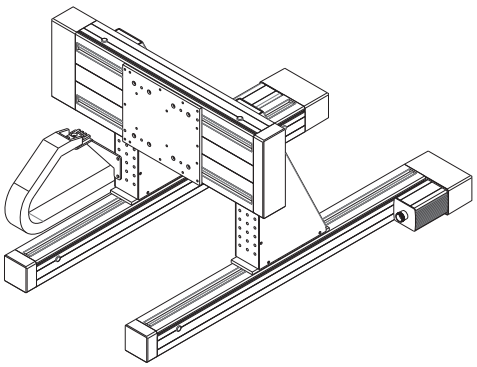
Crossbench
2 x LES 5
PS 4 with VP 2
Fixing cable drag chain 9
Slide on slide assembly



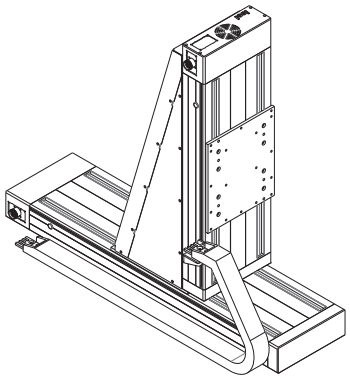
Crossbench
2 x LES 5
PS 4 with VP 2
Fixing cable drag chain 9
Profile on slide assembly



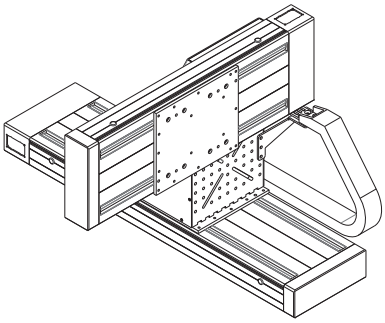
2-axis H-design
2 x LES 4, LES 5, 2 x PS 2, PS 4,
Fixing cable drag chain 9
Gantry mode



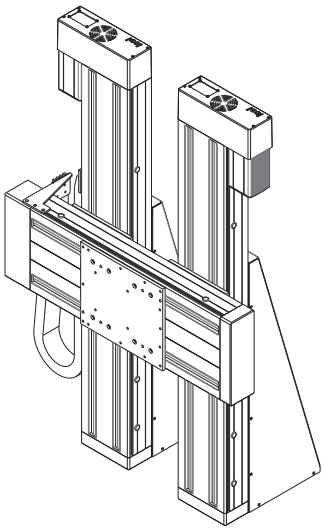
2-axis flatbed configuration
2 x LES 4, LES 5, 2 x PS 2
2 x WV 2, PS 4, Fixing cable drag chain 9
Gantry mode



2-axis lifting configuration
2 x LES 5, 2 x PS 4, WV 6,
Fixing cable drag chain 9

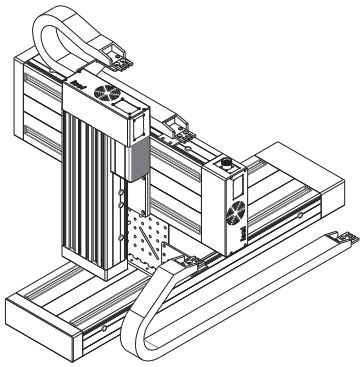


2-axis boom configuration
2 x LES 5
2 x PS 4
WV 3
Fixing cable drag chain 9



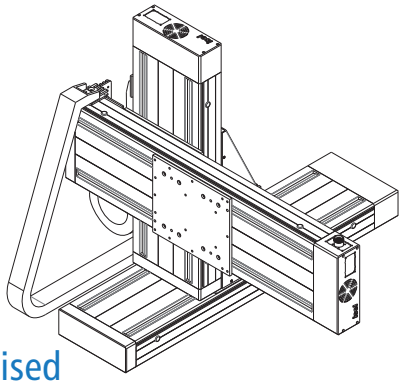
2-axis H-design
LES 5, 2 x LES 6, 2 x WV 7,
2 x PS 12, PS 4,
Fixing cable drag chain 9,
Gantry mode

Combination examples LES ... with cable drag chain 9



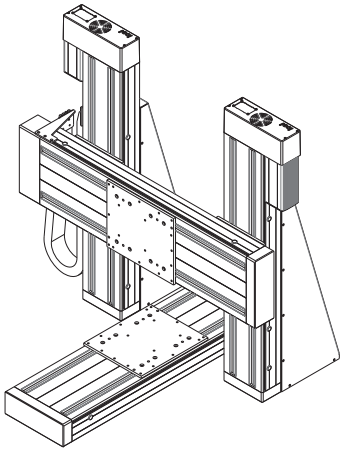
3-axis boom configuration

2 x LES 5, LES 6, WV 3, PS 4, PS 7, Fixing cable drag chain 9



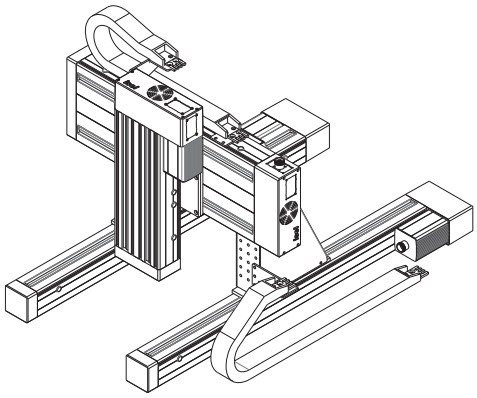
3-axis raised configuration

3 x LES 5, WV 3, 2 x PS 4, VP 2, Fixing cable drag chain 9



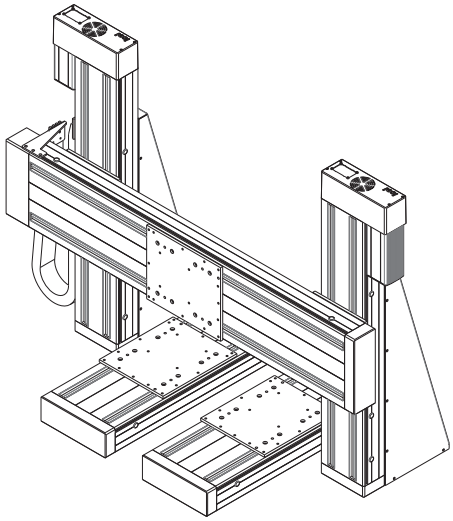
3-axis portal configuration

2 x LES 5, 2 x LES 6, 2 x WV 7, 2 x PS 4, 2 x PS 12,
Gantry mode, Fixing cable drag chain 9



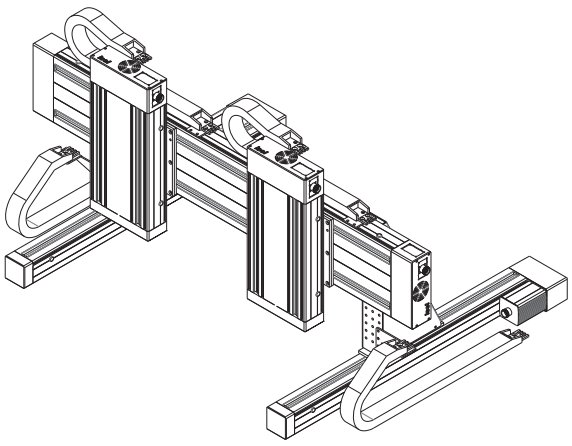
3-axis flatbed configuration

2 x LES 4, LES 5, LES 6, 2 x PS 2, 2 x WV 2,
PS 4, PS 7, Fixing cable drag chain 9, Gantry mode



4-axis portal configuration

3 x LES 5, 2 x LES 6, 2 x WV 7,
3 x PS 4, 2 x PS 12, Fixing cable drag chain 9



5-axis flatbed configuration

2 x LES 5 (Z-axis), LES 5 (2 spindle drives)
2 x LES 4, 2 x PS 2, 2 x WV 2,
2 x PS 4 with VP 2
Fixing cable drag chain 9

Motor modules

Ordering overview

LES 4/5/6 direct drives	Circular plug	Circular plug with brake	Single axis controller	Multiple axis controller
DC servomotor DC 100	396112 0060	-	MC 1-10	iCU-DC / iPU-DC
Stepper motor MS 200 HT - 2	396058 0060	396058 0260	IT 116 Flash	iMC-P / iMC-S8
EC servomotor EC 60S	396415 0060	396415 0260	MC 1-20	iCU-EC / iPU-EC
EC servomotor EC 60L 48V	396423 0060	-	MC 1-20	iCU-EC / iPU-EC
EC servomotor EC 60L 310V	396423 0070	396423 0270	MC 1-40	iCU-EC / iPU-EC
EC servomotor EC 86L	396466 0070	-	MC 1-40	Switching cabinet
EC servomotor EC 86S	396444 0070	-	MC 1-40	Switching cabinet
Stepper motor MS 300 HT - 2	396082 0060	396082 0260	iMC-S8	iMC-S8
Stepper motor MS 600 HT	396085 0060	-	iMC-S8	iMC-S8
Stepper motor MS 900 HT	396088 0060	-	iMC-S8	iMC-S8
LES 5 integrated	**Circular plug**	**Circular plug with brake**	**Single axis controller**	**Multiple axis controller**
Stepper motor MS 200 HT - 2	396058 1060	396058 1260	IT 116 Flash	iMC-P / iMC-S8
DC servomotor DC 100	396112 1060	-	MC 1-10	iCU-DC / iPU-DC
EC servomotor EC 60S	396415 1060	396415 1260	MC 1-20	iCU-EC / iPU-EC
EC servomotor EC 60L 48V	396423 1060	-	MC 1-20	iCU-EC / iPU-EC
EC servomotor EC 60L 310V	396423 1070	396423 1270	MC 1-40	Switching cabinet

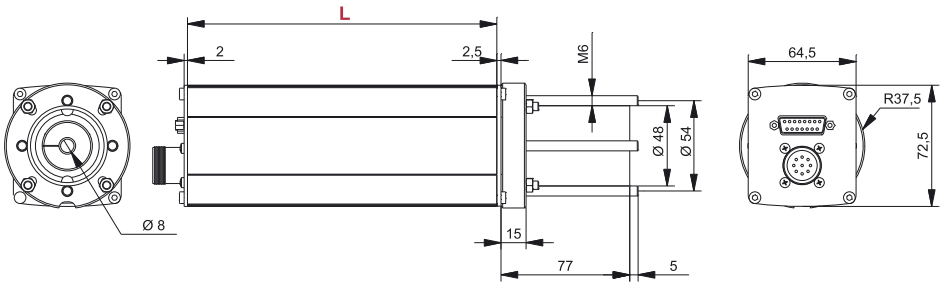
LES 4/LES 6 side mounting	Circular plug	Circular plug with brake	Single axis controller	Multiple axis controller
Stepper motor MS 200 HT - 2	396058 2060	396058 2260	IT 116 Flash	iMC-P
DC servomotor DC 100	396112 2060	-	MC 1-10	iCU-DC
EC servomotor EC 60S	396415 2060	396415 2260	MC 1-20	iCU-EC
EC servomotor EC 60L 48V	396423 2060	-	MC 1-20	iCU-EC
EC servomotor EC 60L 310V	396423 2070	396423 2270	MC 1-40	iCU-EC

Motor modules

Dimensioned drawing

Motor module 1

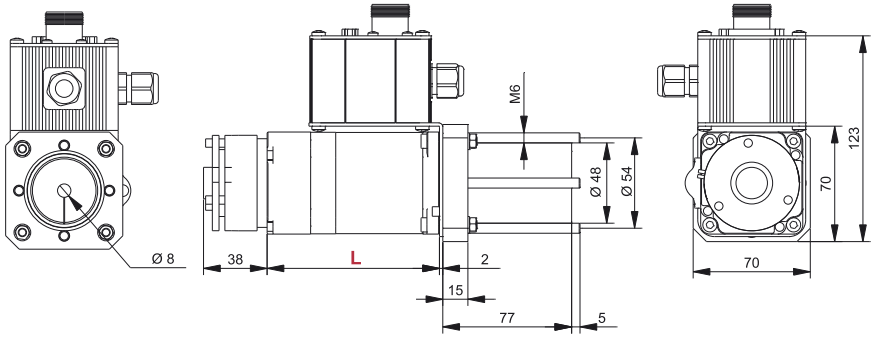
Part no.	Motor module	Length L
396112 0060	DC 100	185 mm
396058 0360	MS 200 HT-2 with brake	165 mm
396058 0060	MS 200 HT-2 without brake	105 mm



Dimensioned drawing

EC 60

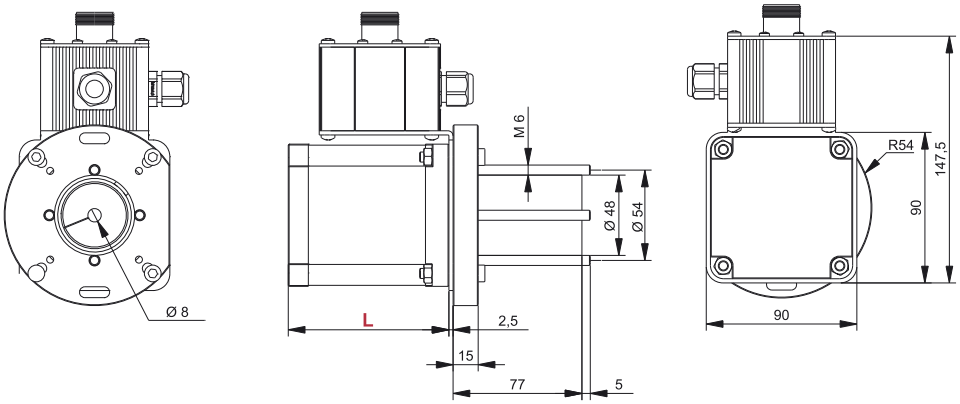
Part no.	Motor module	Length L
396415 0260	EC 60S with brake	99 mm
396415 0060	EC 60S without brake	99 mm
396423 0060	EC 60L 48V	120 mm
396423 0070	EC 60L 310V	120 mm



Dimensioned drawing

Motor module 2

Part no.	Motor module	Length L
396466 0070	EC 86L	151 mm
396444 0070	EC 86S	126 mm
396085 0060	MS 600HT	96 mm
396088 0060	MS 900 HT	126 mm



Clutch housing

Drive element accessories

Connection options

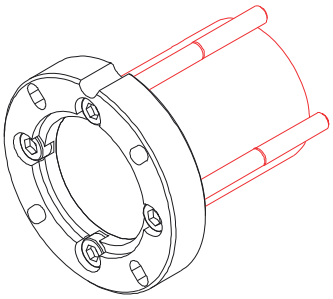
Direct drive preparation

Connecting options Direct drive	LES 4	LES 6	LES 5	Angular gear fixing 0°	Angular gear fixing 90°
MS 200 HT-2 DC 100 EC 60	Connection via coupling casing 1 short sleeve with adequate shaft coupling				Coupling casing 1 long sleeve
MS 600 HT MS 900 HT EC 86	Connection via coupling casing 2 short sleeve with adequate shaft coupling				Coupling casing 2 long sleeve
Angular gear fixing 0°	split coupling casing short sleeve with adequate shaft coupling			Connection via transmission shaft set	
Angular gear fixing 90°	split coupling casing short sleeve with adequate shaft coupling				

Ordering overview

Clutch housing

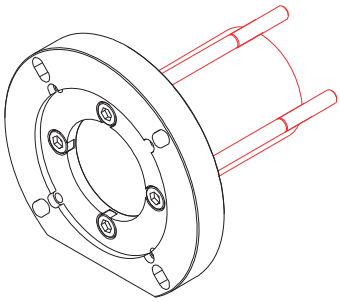
Clutch housing 1



short sleeve
Part no.: **218 100 0001**

long sleeve
Part no.: **218 100 0002**

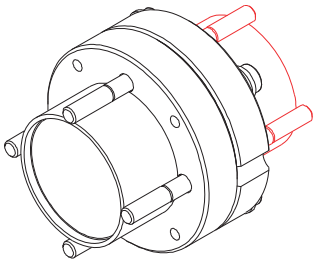
Clutch housing 2



short sleeve
Part no.: **218 100 1001**

long sleeve
Part no.: **218 100 1002**

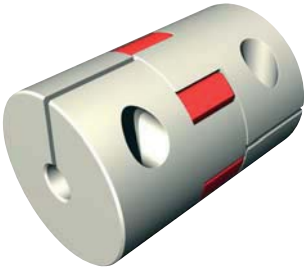
Split clutch housing

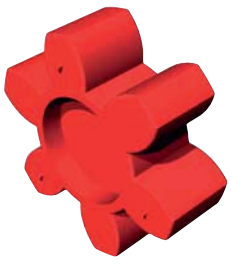


short sleeve
Part no.: **218 100 2001**

long sleeve
Part no.: **218 100 2002**

Clutches



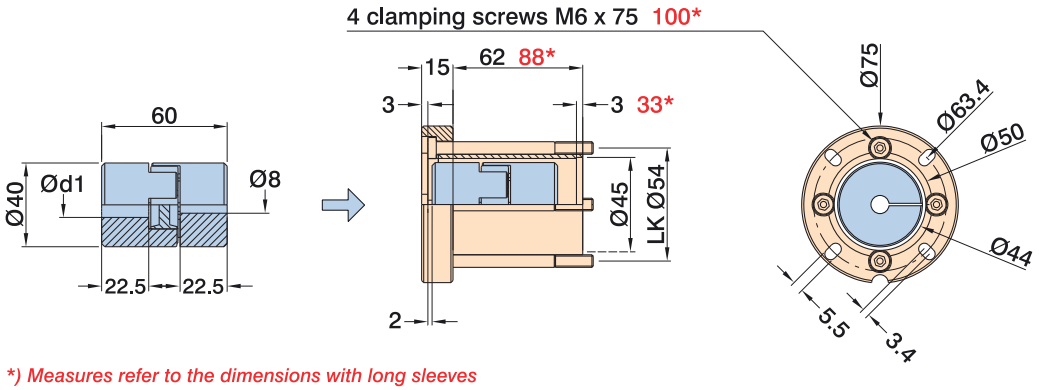


coupling	Item no.:	d_1	d_2
20/30	218 001 5060	5,0	6,0
	218 001 9999	from 4 to 7 mm	
30/40	218 002 6380	6,35	8,0
	218 002 8080	8,0	8,0
	218 002 9999	from 6 to 13 mm	
40/60	218 003 9580	9,52	8,0
	218 003 9999	from 8 to 18 mm	

Clutch housing

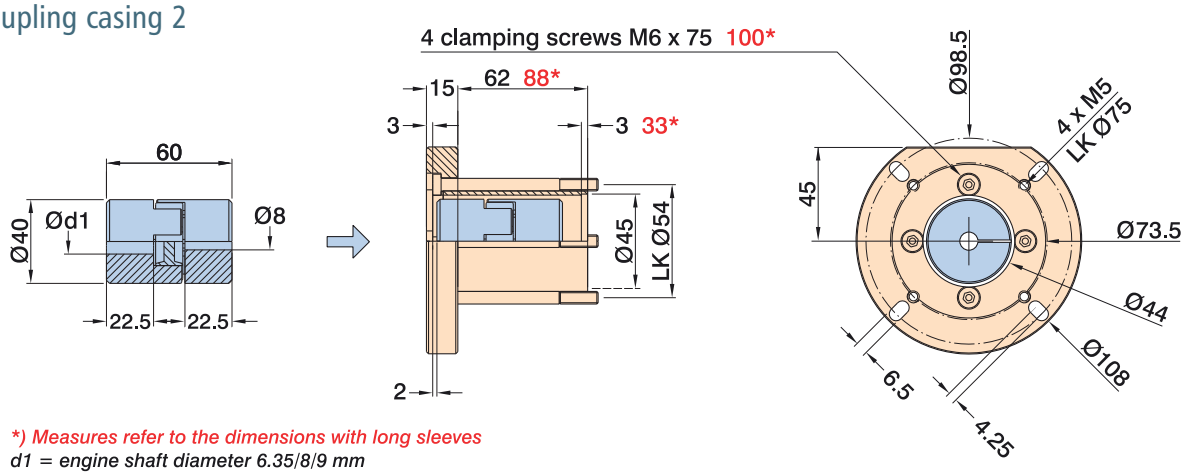
Drive element accessories

Dimensioned drawing
Coupling casing 1



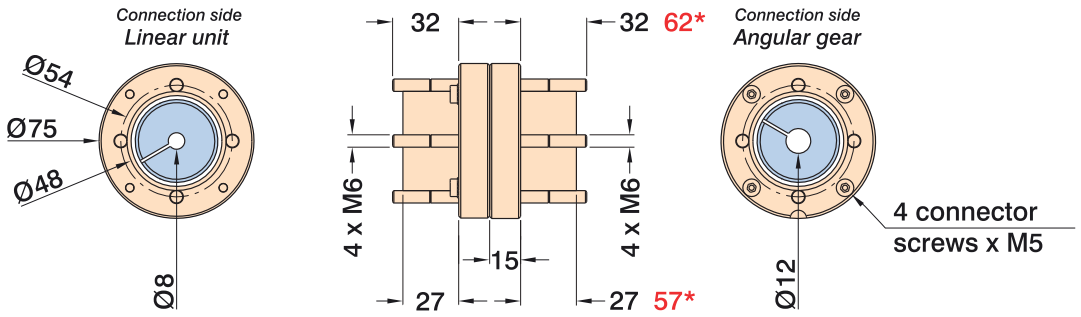
*) Measures refer to the dimensions with long sleeves
d1 = engine shaft diameter 6.35/8/9 mm
Suitable shaft coupling WK 40/60 on page 2-68 (not included in scope of delivery)

Dimensioned drawing
Coupling casing 2



*) Measures refer to the dimensions with long sleeves
d1 = engine shaft diameter 6.35/8/9 mm
Suitable shaft coupling WK 40/60 on page 2-68 (not included in scope of delivery)

Dimensioned drawing
Split coupling casing



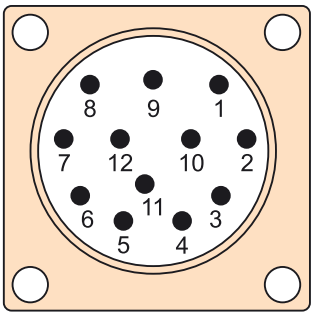
*) Measures refer to the dimensions with long sleeves
Suitable shaft coupling WK 40/60 on page 2-68 (not included in scope of delivery)

mechanics

Motor pin assignments

Pin assignment for stepper motors

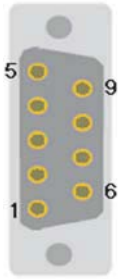
Motor connection



View of pin insert at the insertion side

M23 12-pin Pin	
1	Motor phase 1A
2	Motor phase 1B
3	Motor phase 2A
4	Motor phase 2B
5	+24V switch
6	+24V brake
7	GND switch
8	GND brake
9	Limit switch 1
10	Limit switch 2
11	---
12	---
Housing - cable shield	

Motor connection

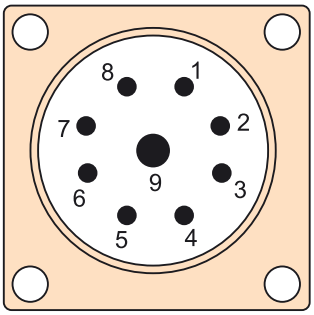


View of pin insert
on the socket side

Sub-D 9-pin Pin	
1	Motor phase 1A
2	Motor phase 1B
3	Motor phase 2A
4	Motor phase 2B
5	+24V switch
6	+24V brake
7	Limit switch 2
8	GND brake
9	Limit switch 1
Housing - cable shield	

Pin assignment for DC servo motors with brushes (BDC)

Motor connection

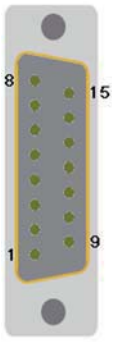


View of pin insert on the socket side

M23 9-pol. (8+1) pin	
1	Motor phase 1 (V+)
2	Motor phase 1 (V-)
3	Motor phase 1 (V+)*
4	Motor phase 1 (V-)*
5	+24V brake
6	GND brake
7	---
8	---
9	Earthing lead
Housing - cable shield	

* Part motor phase connection
also by means of 2 wires.

Encoder connection

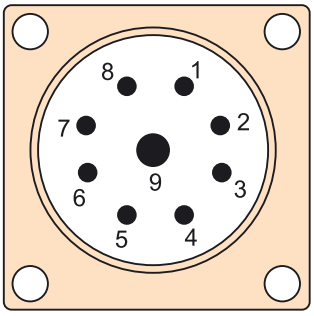


View of pin insert
on the socket side

Sub-D 15-pin Pin	
1	---
2	+5V encoder
3	Encoder track/Z
4	Encoder track/B
5	Encoder track/A
6	+24V switch
7	Limit switch 1
8	GND switch
9	---
10	GND encoder
11	Encoder track Z
12	Encoder track B
13	Encoder track A
14	Reference switch
15	Limit switch 2
Housing - cable shield	

Pin assignment for brushless EC servo motors (BLDC) 48V

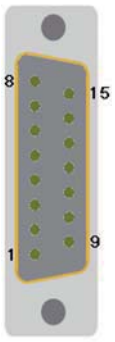
Motor connection



View of pin insert on the socket side

M23 9-pol. (8+1) pin	
1	Motor phase U
2	Motor phase V
3	Motor phase W
4	---
5	+24V brake
6	GND brake
7	---
8	---
9	Earthing lead
Housing - cable shield	

Encoder connection



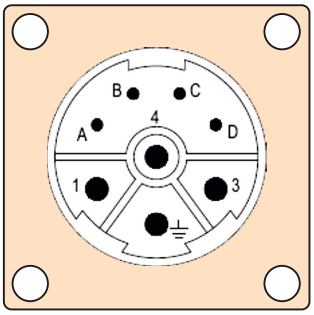
View of pin insert
on the socket side

Sub-D 15-pin Pin	
1	Hall signal A
2	+5V encoder/Hall
3	Encoder track/Z
4	Encoder track/B
5	Encoder track/A
6	+24V switch
7	Limit switch 1
8	GND switch
9	Hall signal B
10	GND encoder
11	Encoder track Z
12	Encoder track B
13	Encoder track A
14	Hall signal C
15	Limit switch 2
Housing - cable shield	

Motor leads

Pin assignment for brushless EC servomotors (BLDC) 310V

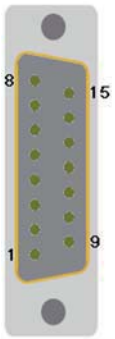
Motor connection



View of pin insert at the insertion side

M23 9-pol. (4+3+1) pin	
1	Motor phase U
PE	Earthing lead
3	Motor phase W
4	Motor phase V
A	+24V brake
B	GND brake
C	Temp +
D	Temp -
Housing - cable shield	

Encoder connection



View of pin insert
at the insertion side

Sub-D 15-pin Pin	
1	Hall signal A
2	+5V encoder/Hall
3	Encoder track/Z
4	Encoder track/B
5	Encoder track/A
6	+24V switch
7	Limit switch 2
8	GND switch
9	Hall signal B
10	GND encoder
11	Encoder track Z
12	Encoder track B
13	Encoder track A
14	Hall signal C
15	Limit switch 2
Housing - cable shield	

Overview of motor leads for stepper, DC servo and EC motors*

Part number	Description
392750 0500	5-metre stepper motor lead M23 12-pin plug - socket 1:1
392755 0500	5-metre stepper motor lead D-sub 9-pin plug - M23 12-pin socket
392781 0500	5-metre stepper motor lead D-sub 9-pin plug - socket 1:1
392759 0500	5-metre DC/EC servo motor lead M23 9-pin (8 + PE) plug - socket 1:1
392760 0500	5-metre DC/EC servo motor lead M23 9-pin (8+PE) socket - wire end ferrules
392740 0500	5-metre encoder lead D-sub 15-pin plug - socket 1:1
392325 0500	5-metre encoder lead M23 17-pin socket - D-sub 15-pin plug
392305 0500	3-metre EC/AC servo motor lead M23 310V (4+3+PE) socket - wire end ferrules
392307 0500	5-metre EC servo motor lead M23 (4+3+PE) plug - socket 1:1

All listed motor and encoder leads are fit for use with tow chains.

* Different lengths available on request!

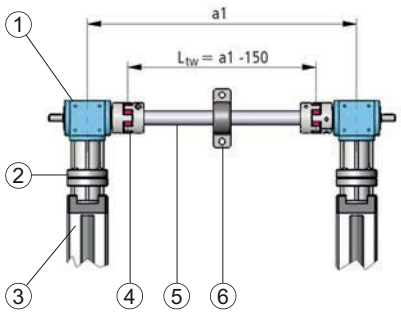
mechanics

Installation kit with angular transmission

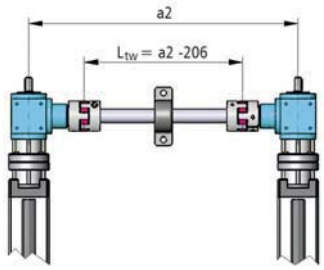
Drive element accessories

Installation alternatives

Clutch housing kit 90°



Clutch housing kit 0°



① Angular gear

② Split coupling casing with shaft coupling WK 40/60

③ LES 4, LES 6 or LES 5 (preparation for direct drive)

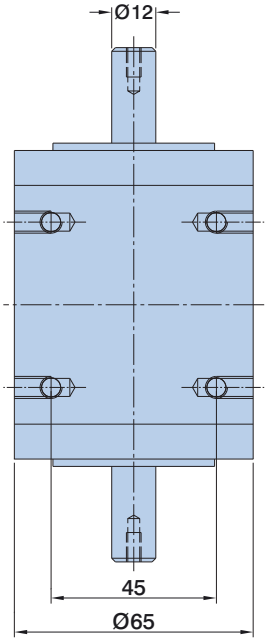
④ Coupling for transmission shaft Ø 25

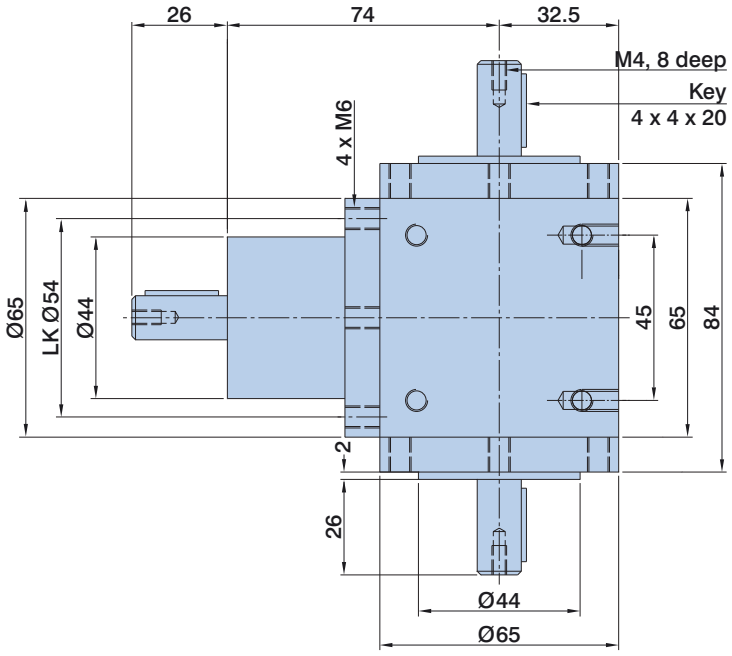
⑤ Transmission shaft Ø 25

⑥ Pedestal bearing - recommendable from a transmission shaft length of 1,500 mm up

Dimensioned drawing

Angular transmission





Ordering overview

Installation kit with angular transmission

for H-design on LES 4/LES 6/LES 5, 0° mounting
Scope of delivery: 2 x①, 2 x②, 2 x④
Part no.: 216150 0001

for H-design on LES 4/LES 6/LES 5, 90° mounting
Scope of delivery: 2 x①, 2 x②, 2 x④
Part no.: 216150 0002

Transmission shaft

Hollow shaft Ø 25 mm × 4 mm, blank 1000 mm
Part no.: **219001 0125**

Hollow shaft Ø 25 mm × 4 mm, blank 2000 mm
Part no.: 219001 0225

Coupling/stationary bearing

Coupling for transmission shaft 12 to 25 mm adaptor, VE 2 units
Part no.: 218050 0002

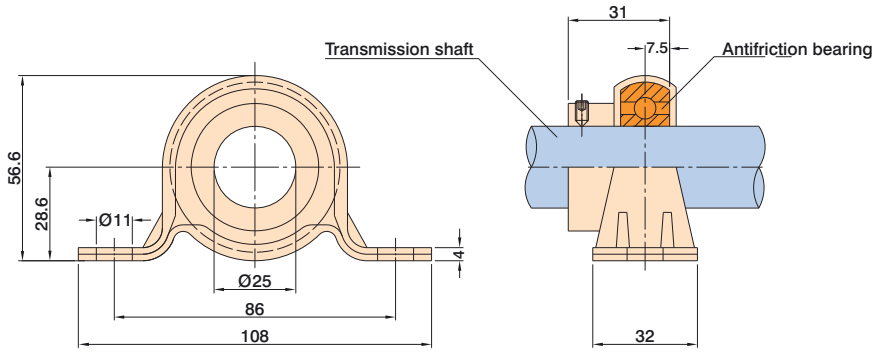
Stationary bearing for transmission shaft VE 1 unit
Part no.: 896202 5562

For matching direct drive modules LES 4/5/6 see table on page **B-70**

Installation kit with angular transmission

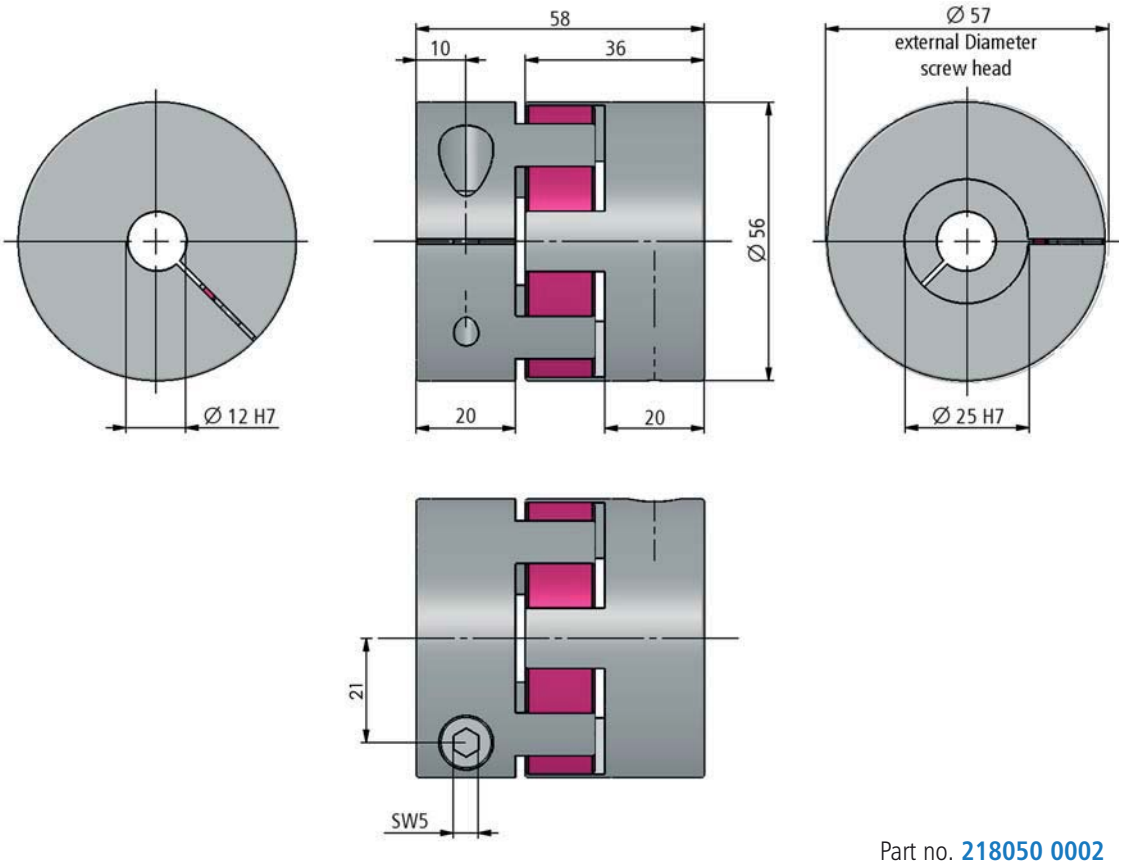
Drive element accessories

Dimensioned drawing and technical specification



Pedestal bearing- to avoid vibrations/to support the transmission shaft (recommendablefrom a transmission shaft length of 1,500 mm up)	
Transmissible torque	18 Nm
Weight of coupling	0.3 kg
Weight of shaft	0.540 kg/m
Moment of inertia of both couplings	2.68 " 10^{-4} kgm^2
Moment of inertia of shaft	8.171 " 10^{-6} kgm^2/100 mm

Dimensioned drawing - coupling



Part no. **218050 0002**

mechanics

Slide/crossbench plates

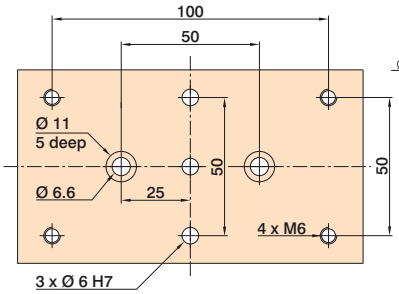
Connectors

Hole diagram, slide plate PS 1

L 125 x W 70 x H 7.7 mm

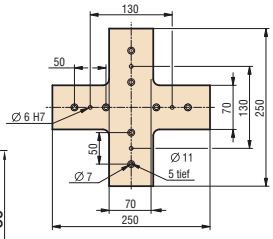
Mounting on:
LES 4 with 1 x WS 5/70

Part no.: **277001**



Connecting cross 2 x LES 4

Part no.: **277007**



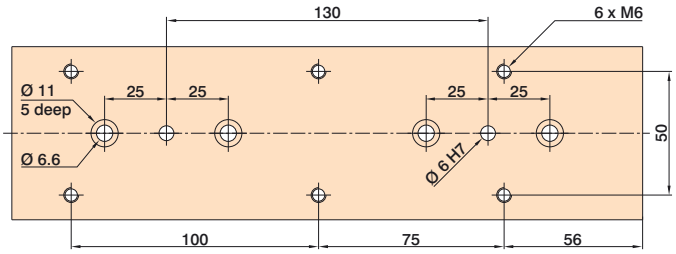
Hole diagram, slide plate PS 2

L 255 x W 70 x H 7.7 mm

Mounting on:
LES 4 with 2 x WS 5/70

Fixing option for:
Angle bracket WV 2 / WV 5

Part no.: **277002**

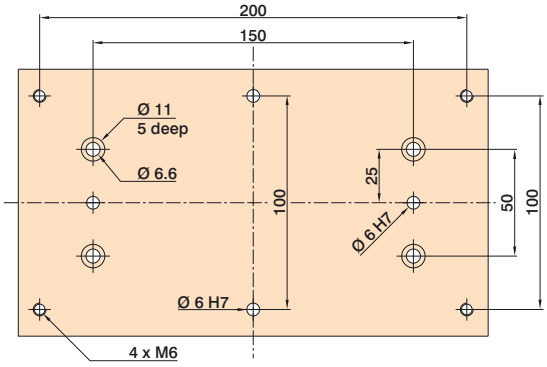


Hole diagram, slide plate PS 3

L 220 x W 125 x H 7.5 mm

Mounting on:
LES 5 with 2 x WS 5/70

Part no.: **277003**

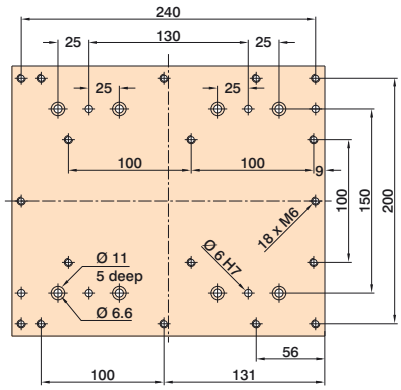


Hole diagram, slide plate PS 4

L 225 x W 220 x H 7.5 mm

Mounting on: LES 5 with 4 x WS 5/70
Mounting on crossbench: LES 5 with LES 5 (in conjunction with VP 2) Fixing option for: Angle bracket WV 3 / WV 6

Part no.: **277004**

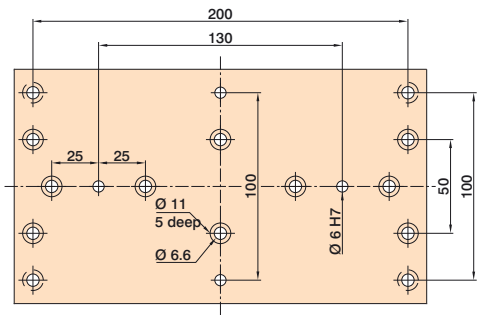


Hole diagram, slide plate PS 6

L 220 × W 125 × H 7.5 mm

Mounting on: LES 4 with 2 × WS 5/70
Mounting on crossbench: LES 4 with LES 5 (in conjunction with PS 3). Fixing option for: LES 4/LES 5

Part no.: **277011**

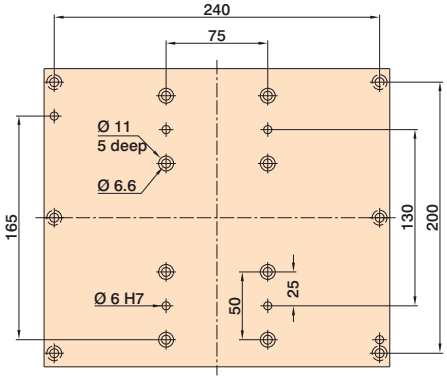


Hole diagram, slide plate PS 7

L 255 × W 220 × H 7.5 mm

Mounting on: LES 6 with 4 × WS 5/70
Mounting on crossbench: LES 6 with LES 5
(in conjunction with PS 4)

Part no.: **277016**



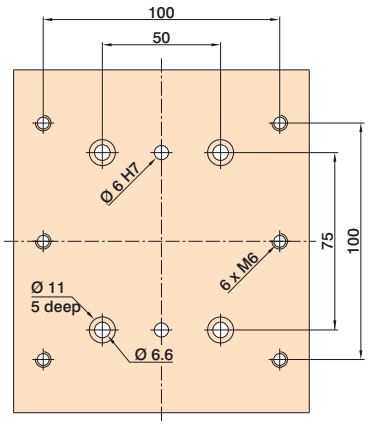
Slide/crossbench plates

Connectors

Hole diagram, slide plate PS 8

L 125 × W 145 × H 7.7 mm

Mounting on:
LES 6 with 2 × WS 5/70 Part no.: **277017**

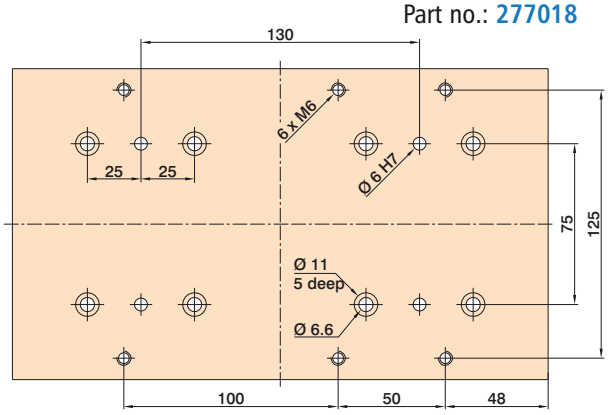


Hole diagram, slide plate PS 9

L 250 × W 145 × H 7.5 mm

Mounting on: LES 6 with 4 × WS 5/70
Fixing option for: Angle bracket WV 7

Part no.: **277018**

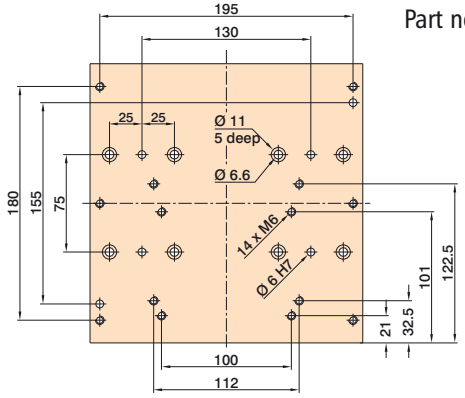


Hole diagram, slide plate PS 10

L 210 × W 215 × H 7.5 mm

Mounting on: LES 6 with 4 × WS 5/70
Mounting on crossbench: LES 6 with LES 6 (in conjunction with PS 11)

Part no.: **277019**

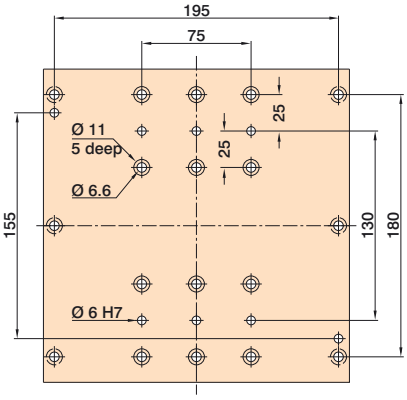


Hole diagram, slide plate PS 11

L 210 × W 215 × H 7.5 mm

Mounting on: LES 6 with 4 × WS 5/70
Mounting on crossbench: LES6 with LES4 (in conjunction with PS10) Fixing option for: LES 6

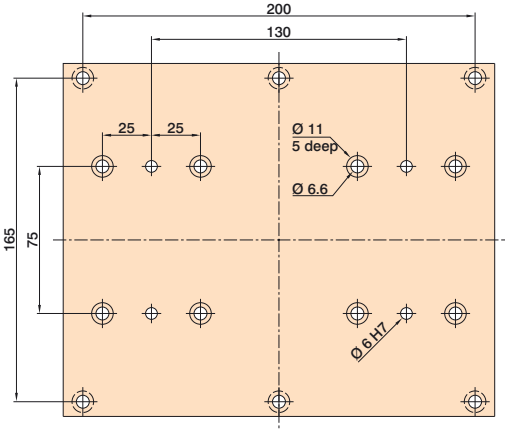
Part no.: **277020**



Hole diagram, slide plate PS 12

L 220 × W 180 × H 7.5 mm

Mounting on: LES 6 with 4 × WS 5/70
Fixing option for: LES 5 Part no.: **277021**

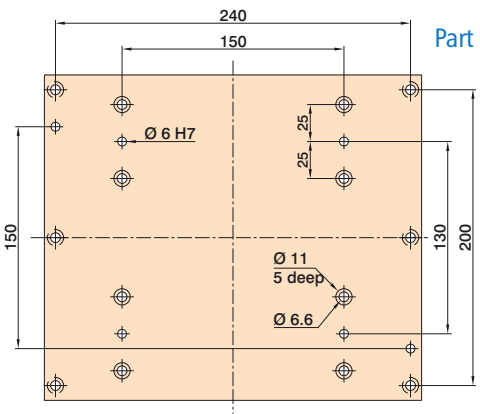


Hole diagram, connection plate VP 2

L 255 × W 220 × H 7.5 mm

Mounting on: LES 5 with 4 × WS 5/70
Fixing option for: LES 5

Part no.: **277006**



Slide/crossbench plates

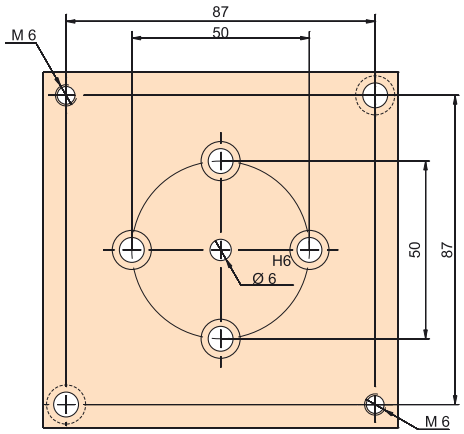
Connectors

Hole diagram, slide plate set for crossbench LES 4

L 100 x W 100 x H 8 mm

Mounting on: LES 4
Fixing option for: LES 4

Part no.: **277008**



Crossbench connection plates 1

Crossbench connection plates 1

2 × L 255 × W 220 x H 8 mm

one set from PS 4 and VP 2,
for right-angled connection
two linear guides LES 5

Part no.: **277010**

Crossbench connection plates 2

Crossbench connection plates 2

2 x L 220 x W 125 x H 8 mm

one set from PS 3 and PS 6,
for right-angled connection
one linear guide LES 5 with one
linear guide LES 4

Part no.: **277012**

Additional combination examples

Crossbench LES 5 and LES 6
PS 4 and PS 7

Crossbench 2 × LES 6
PS 10 and PS 11

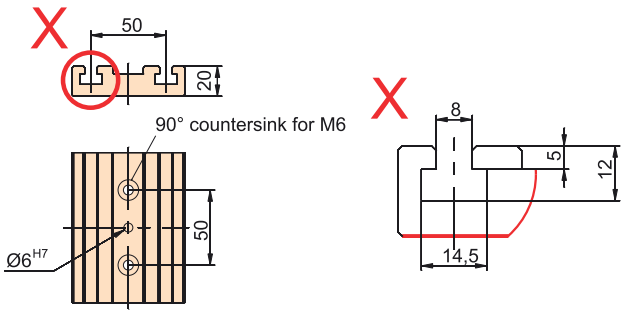
Crossbench LES 4 and LES 6
PS 11 and PS 10

T-slot slide plates

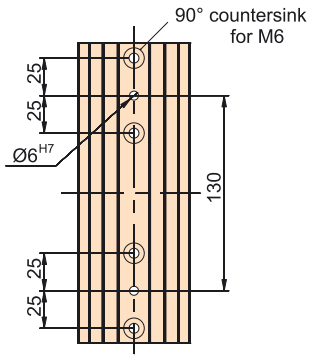
Connectors

Hole pattern T-slot plate PT 25 × 250 for LES 4

L 100 x W 75 x H 20 mm
Mounting on: LES 4 with 1 x WS 5/70
Part no.: **277030 0001**

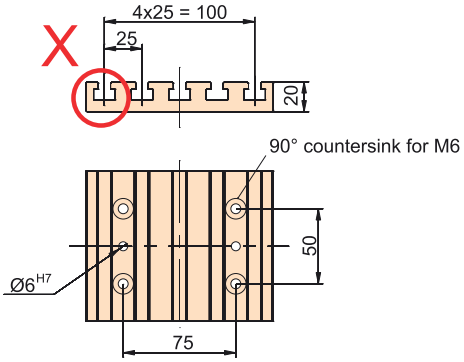


L 200 x W 75 x H 20 mm
Mounting on: LES 4 with 2 x WS 5/70
Part no.: **277030 0002**

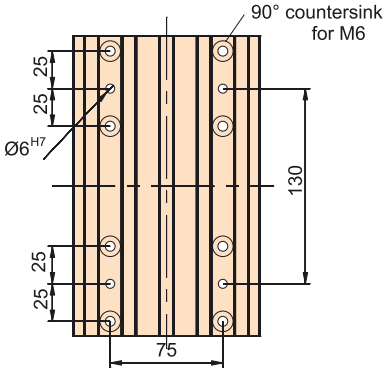


Hole pattern T-slot plate PT 25 × 250 for LES 6

L 100 x W 125 x H 20 mm
Mounting on: LES 6 with 2 x WS 5/70
Part no.: **277030 0003**

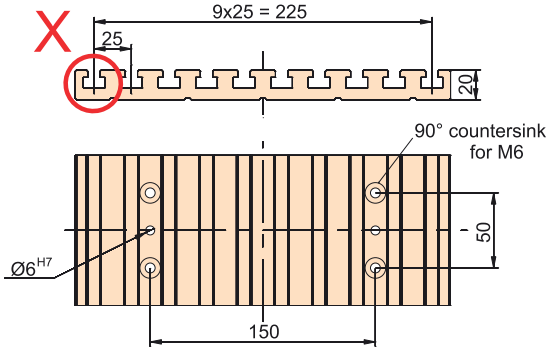


L 200 x W 125 x H 20 mm
Mounting on: LES 6 with 4 x WS 5/70
Part no.: **277030 0004**

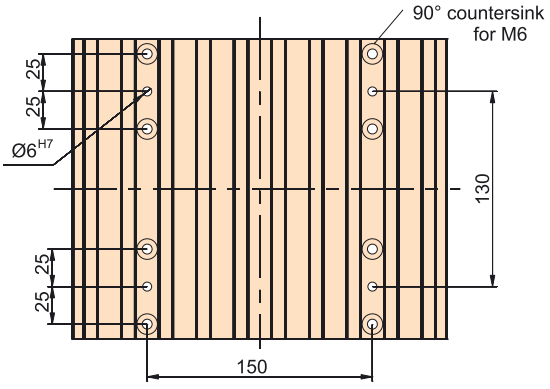


Hole pattern T-slot plate PT 25 × 250 for LES 5

L 100 x W 250 x H 20 mm
Mounting on: LES 5 with 2 x WS 5/70
Part no.: **277030 0005**



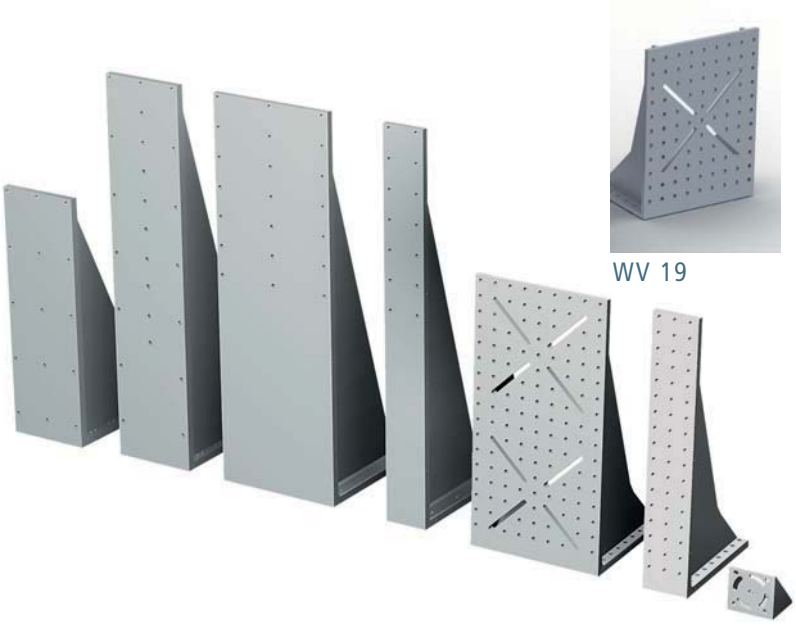
L 200 x W 250 x H 20 mm
Mounting on: LES 5 with 4 x WS 5/70
Part no.: **277030 0006**



Angle brackets

Connectors

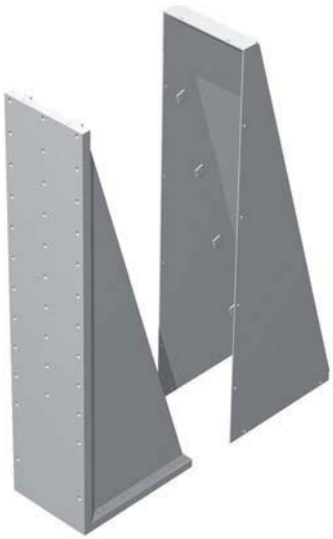
Angle bracket with clamping surfaces milled flat



WV 19

WV 8 WV 7 WV 6 WV 5 WV 3 WV 2 WV 1

matching cover plates



Angle bracket **WV 1**
- blank
- Aluminium casting (0.2 kg)
- L71 x W75 x H71

Part no.: **209110 0010**

Angle bracket **WV 2**
- blank
- Aluminium casting (2.6 kg)
- L221 x W75 x H446

Part no.: **209110 0022**

Angle bracket **WV 3**
- blank
- Aluminium casting (5.8 kg)
- L221 x W221 x H446

Part no.: **209110 0032**

Angle bracket **WV 5**
- blank
- Aluminium welded (5.26 kg)
- L220 x W75 x H670

Part no.: **209 110 0050**

Angle bracket **WV 6**
- blank
- Aluminium welded (13.3 kg)
- L220 x W220 x H670

Part no.: **209110 0060**

Angle bracket **WV 7**
- blank
- Aluminium welded (10.8 kg)
- L220 x W145 x H670

Part no.: **209110 0070**

Angle bracket **WV 8**
- blank
- Aluminium welded (7.4 kg)
- L222 x W145 x H446

Part no.: **209110 0080**

Angle bracket **WV 19**
- blank
- Aluminium welded (2.5 kg)
- L150 x W221 x H300

Part no.: **209110 0190**

Cover plate for **WV 2**
- naturally anodised
- Aluminium sheet (0.8 kg)

Part no.: **209110 0021**

Cover plate for **WV 3**
- naturally anodised
- Aluminium sheet (1.15 kg)

Part no.: **209110 0031**

Cover plate for **WV 5**
- naturally anodised
- Aluminium sheet (1.20 kg)

Part no.: **209 110 0051**

Cover plate for **WV 6**
- naturally anodised
- Aluminium sheet (1.8 kg)

Part no.: **209110 0061**

Cover plate for **WV 7**
- naturally anodised
- Aluminium sheet (1.5 kg)

Part no.: **209110 0071**

Cover plate for **WV 8**
- naturally anodised
- Aluminium sheet (1 kg)

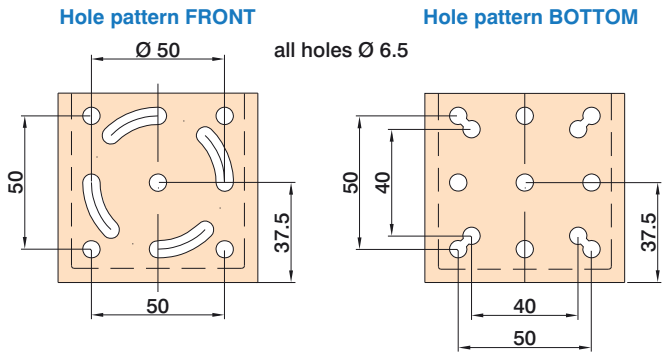
Part no.: **209110 0081**

Angle brackets

Connectors

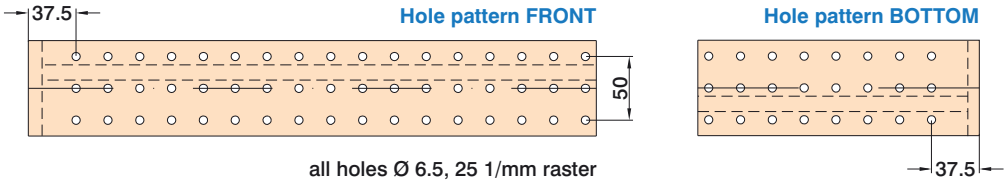
Hole diagram
Angle bracket WV 1

L 71 x W 75 x H 71 mm



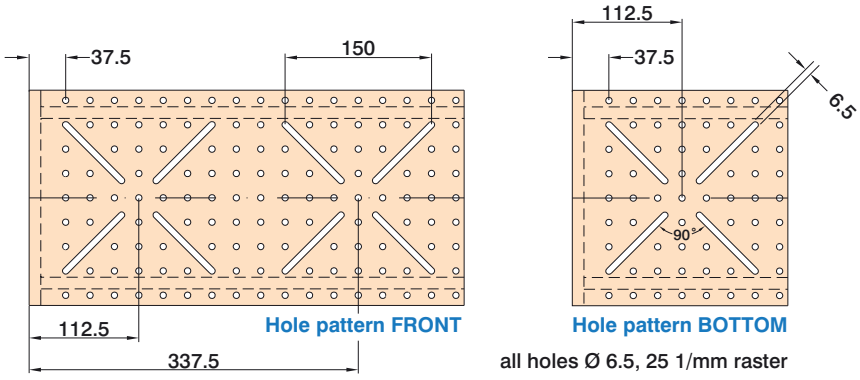
Hole diagram
Angle bracket WV 2

L 221 x W 75 x H 446 mm



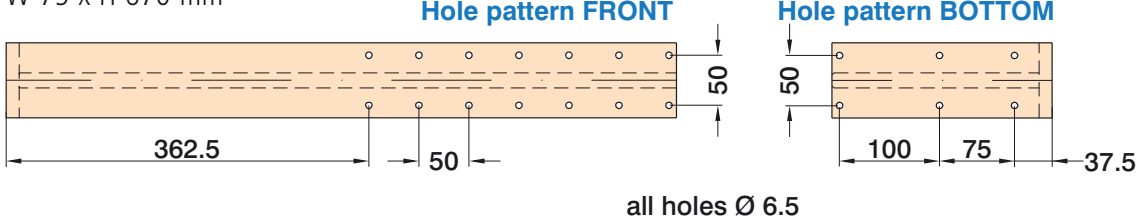
Hole diagram
Angle bracket WV 3

L 221 x W 221 x H 446 mm



Hole diagram
Angle bracket WV 5

L 220 x W 75 x H 670 mm

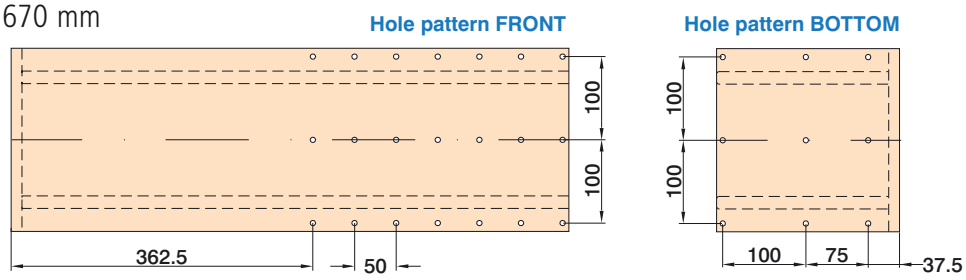


Angle brackets

Connectors

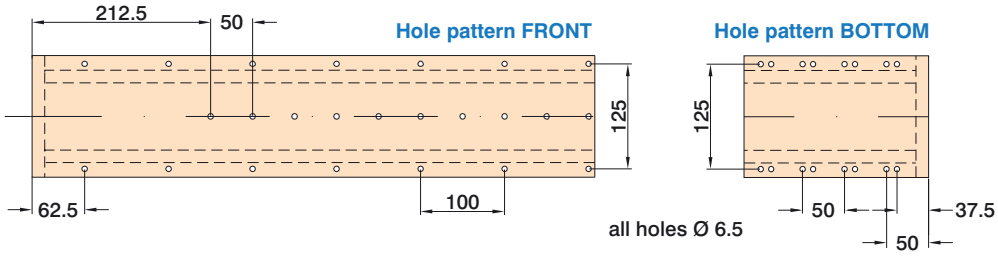
Hole diagram

Angle bracket WV 6
L 220 x W 220 x H 670 mm



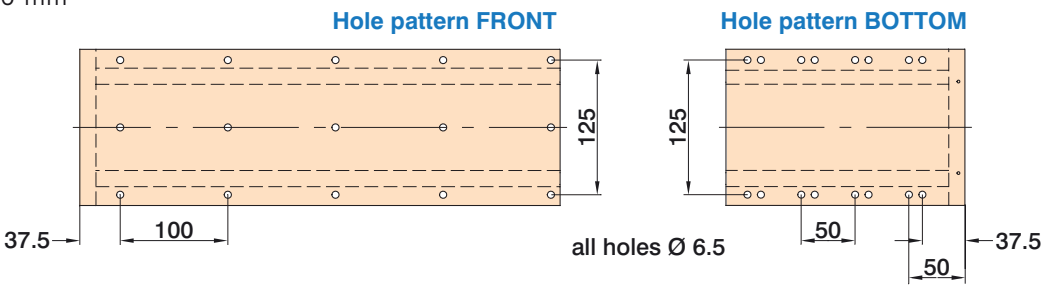
Hole diagram

Angle bracket WV 7
L 220 x W 145 x H 670 mm



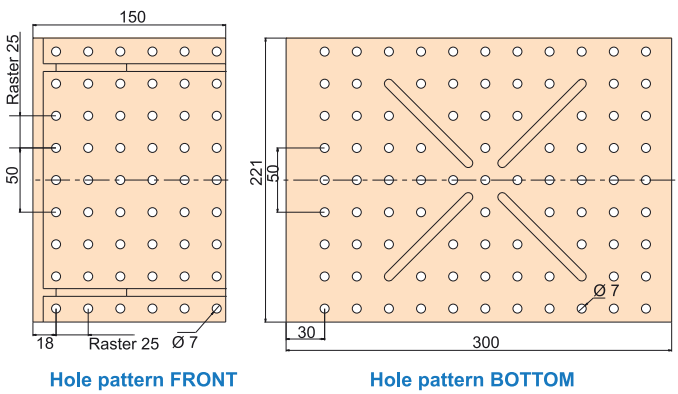
Hole diagram

Angle bracket WV 8
L 222 x W 145 x H 446 mm



Hole diagram

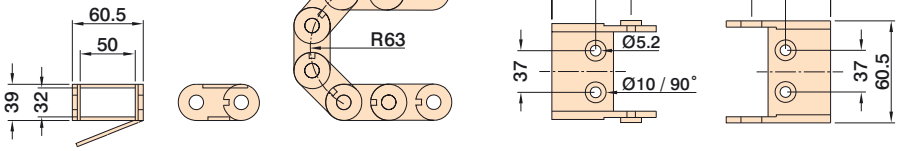
Angle bracket WV 19
L 150 x W 221 x H 300 mm



Accessories

Energy guidance chain

Dimensioned drawing
Energy guidance chain



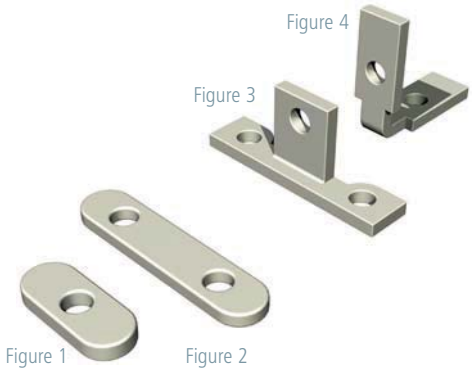
Energy guide chain 3
- VE 1 unit at 1 m

Part no.: **219204 1000**

Connectors for energy chain 3
- with strain relief
- VE 1 kit

Part no.: **219205 0002**

Tapped strips/sliding nuts



Tapped strips M6 (no figure)
- Galvanised
- Ra 50 mm
- 3 x VE 1 m piece

Part no.: **209011**

Sliding nut 2 × M6 (Figure 2)
- Galvanised
- VE 50 pieces

Part no.: **209002 0004**

Special angle sliding nut 3 x M6 (Figure 3)
- Galvanised
- VE 25 pieces

Part no.: **209022 0003**

Sliding nut M6 (Figure 1)
- Galvanised
- VE 100 pieces

Part no.: **209001 0005**

Angle sliding nut 2 × M6 (Figure 4)
- Galvanised
- VE 25 pieces

Part no.: **209021 0003**

Sliding nut M5 (no figure)
- Galvanised
- VE 20 pieces

Part no.: **209006 0001**

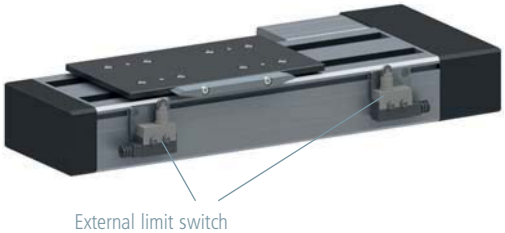
Attachment kits

Gas strut attachment kit
- Hub 220 mm
- Nominal length 490 mm

Part no.: **216450 0001**

Gas strut attachment kit
- Stroke 300 mm
- Nominal length 690 mm

Part no.: **216451 0001**



Limit switch attachment kit for LES 4
- for external limit switches

Part no.: **216460 0001**

Limit switch attachment kit LES 6
- for external limit switches

Part no.: **216460 0003**

Limit switch attachment kit LES 5
- for external limit switches

Part no.: **216460 0002**

Mounting set for sealing air
- for LES4 - LES6

Part no.: **216460 0006**

Linear unit
with linear motor

iLD 50-6

Features

- Robust design in industrial quality
- Pinpoint positioning accuracy
- Wear-free design with no mechanical connecting links
- high dynamic acceleration up to 30 m/s²
- Multi-motor operation with multiple, separately moveable slides
- Extendable to 15 m travel

Options:

- Complete linear unit (see Order Information Table)
- Energy guide chain + guide plate to required length
- Brake
- Control package Metronix ARS 2310 (3-phase, 6 kVA, incl. configuration software)
- diverse Control packages (1- and 3-phase, up to 6 kVA)
- Drive controller ISEL iMD 40
- CAN CPC 12 positioning module
- Cable set iLD 50-6 for ISEL iMD 40

General

Linear units with linear motors are advantageous in precisely those areas where linear units with typical spindle drives are limited - they achieve high values of acceleration, offer pinpoint positioning and operate practically wear-free due to the absence of mechanical linkages.

Linear motors are increasingly used in linear technology machine tool applications, positioning systems and handling systems. Linear units with profile guides are particularly suitable for use in both machine tools and positioning systems.

isel iLD series linear units are constructed from rigid aluminium profiles. Guides consist of proven guide rails and recirculating ball shaft slots. A magnetic length-measuring system is also included. In this regard, isel linear motor units have the advantage of greater acceleration and higher traverse velocity. Iron-core linear motors can produce very high forces. An integrated brake is offered as an option, to allow the iLD to also be used in the vertical mode. The "made by isel" concept stands for optimum price/performance-ratio. This in turn means very short amortisation periods for customers.

Ordering data

Part number	L	L1
237110 0069	691	181
237110 0089	892	382
237110 0109	1094	584
237110 0129	1296	786
237110 0149	1497	987
237110 0169	1699	1189
237110 0190	1900	1390
237110 0210	2102	1592
237110 0230	2304	1794
237110 0250	2505	1995
237110 0270	2707	2197
237110 0290	2908	2398
237110 0311	3110	2600
237110 0331	3312	2802
237110 0351	3513	3003

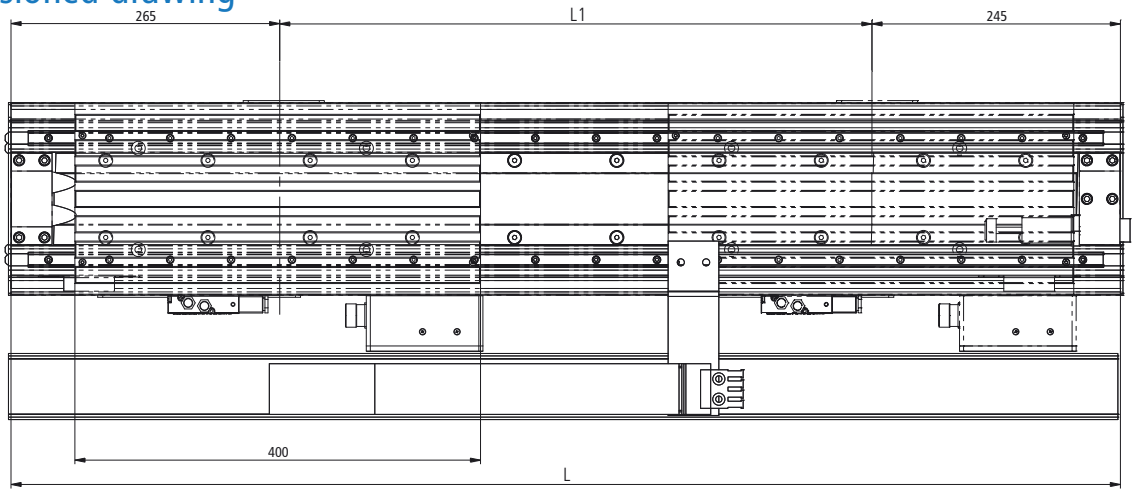
Linear unit
with linear motor

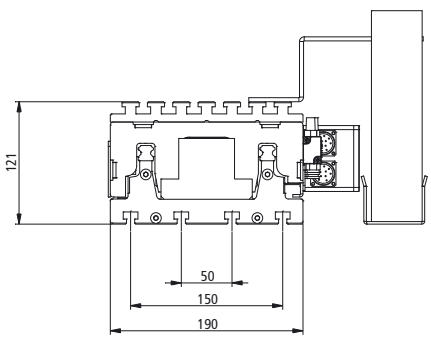
iLD 50-6

Technical specification

General	
Areas of application	Positioning axes for the semiconductor industry and for general industrial applications, CNC machine axis
Processing speed (m/s)	to 4.5
Acceleration (m/s)	to 30
Repeatability (mm)	< 0.01
Process path (mm)	181 to 3003, optionally extendible to 15000
Drive electronics	Servo amplifier, communication via CAN bus or analogue input (+/- 10 V)
Maintenance	Maintenance-free, rapid component replacement (MTTR approx. 2 hours)
Mechanics	
Profile	Bend-proof hollow chamber profile (isel ILF 6), straightness of 0.1 mm per 1 m length, Bending max. 0.2 mm per 1 m length under 50 kg load, max. load 100 kg
Guides	Profile rail guide Series 15 to DIN EN 120/20
Mechanical brake (optional)	Profile guide brake, pneumatically operated, Braking power Z-axis < 0.1 mm stationary, 50 mm at full speed
Stop position damping	Adjustable or parabolic spring for opposite side + pneumatic spring respectively
Installation options	X-axis, X,Y-axis, Z-axis
Maximum adjustment force	285 N
Electronics	
Limit position switch	inductive with adjustable limit position, circular plug connection (8x8x40)
Magnetic strip	isel MS 50
Linear motor	isel LS 50, iron core linear motor with magnetic rails, with or without audio signal, nominal current 6 A, peak current 15 A, max. feed force 600 N
Length measuring system	isel IMS, incremental measuring system
Motor / encoder connection	Protection type IP 67, M23 connecting socket for motor and encoder cable
Energy chain	Optional
Supported interfaces	Standard RS422 A,/A, B, /B optional z, /z, Option SIN/COS 1Vss +20%, -40%, Z and /Z Right-sign

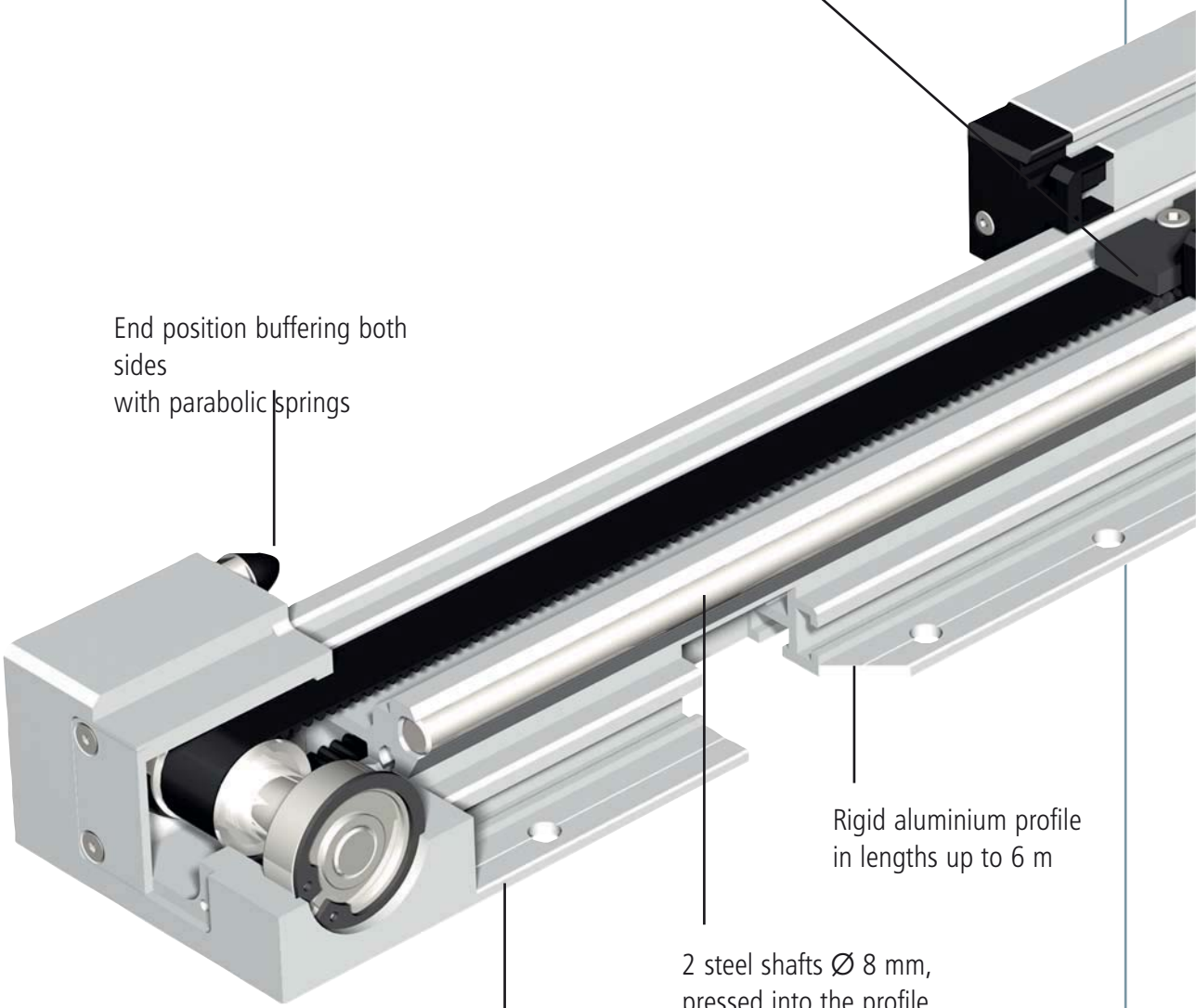
Dimensioned drawing





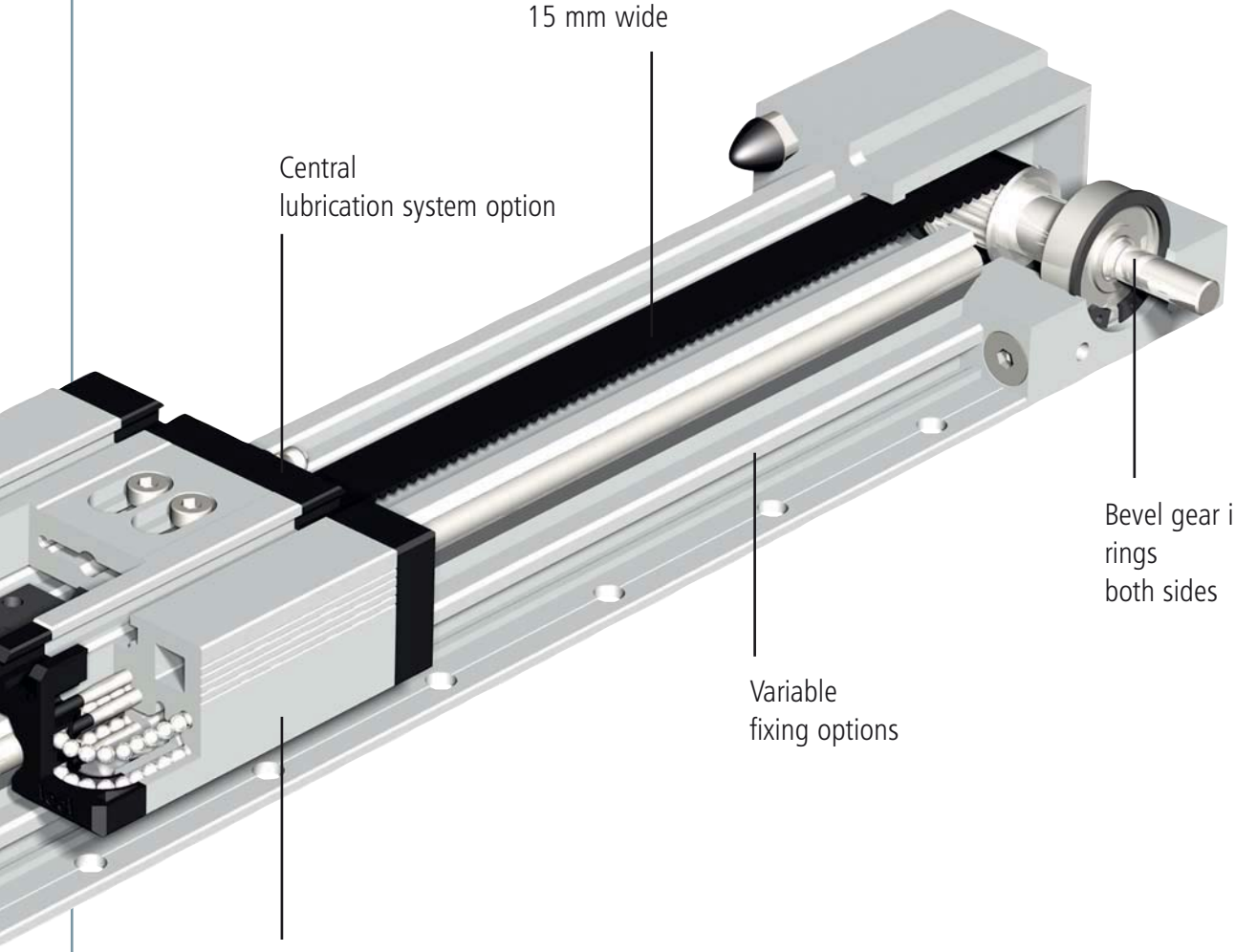
Functional overview

Linear unit with toothed belt drive



Functional overview

Linear unit with toothed belt drive

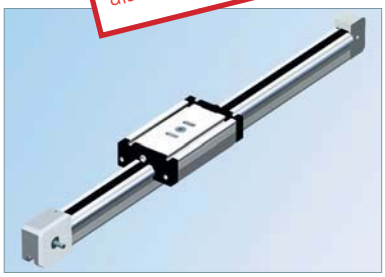


mechanics

Linear units
with toothed belt drive

LEZ 1

Guides and shaft slides also available stainless.



with shaft slide

with trolley

Features

- Aluminium profile, miniature linear guide LFS-8-2
- No-play feed with toothed belt drive
  - toothed belt with 3 mm interval, width 9 mm
- Feed per turn: 60 mm
- Repeatability less than or equal to ± 0.2 mm
- Max. feed. 1.5 m/s

Accessories can be found on pages **B-100**.

Options:
- Special 100 mm raster lengths to order, max. 6000 mm
- Securing with integrated M6 tapped rail, raster 50 mm

Ordering key

232 005 XXXX

Drives/Slides Trolley
8 = without motor, with shaft slide
9 = without motor, with trolley

Profile lengths LFS-8-2 (mm)
298, 398, 498, 598, 675, 698, 798, 998, 1498, 1798, 1998, 2498, 2998
(e. g. 398 mm = 040
675 mm = 068)
Option: up to 6000 mm

Technical specification

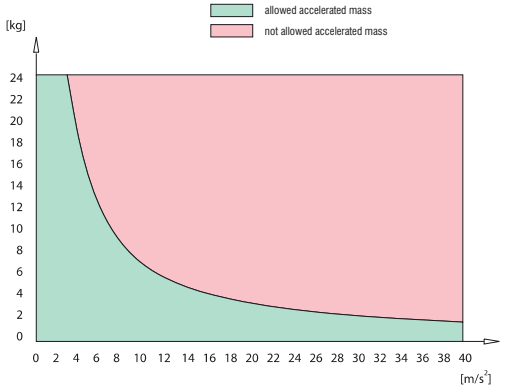
Belt type	HTD 3M, width 9 mm
Slide weight	0.430 kg
Weight without drive module	1000 mm = 3 kg
specific weight of the toothed belt	0.0225 kg/m
Trolley weight	1.03 kg
specific guide weight	0.200 kg/100 mm
Effective Ø of the synchronous disks	19.10 mm
Moment of inertia of the synchronous discs	5.585×10^{-7} kgm²
Feed per turn	60 mm

Drive module with stepper motor MS-045 HT

Drive module with stepper motor MS-135 HT

Load diagram

Permitted accelerated weights relative to the belt strength.*



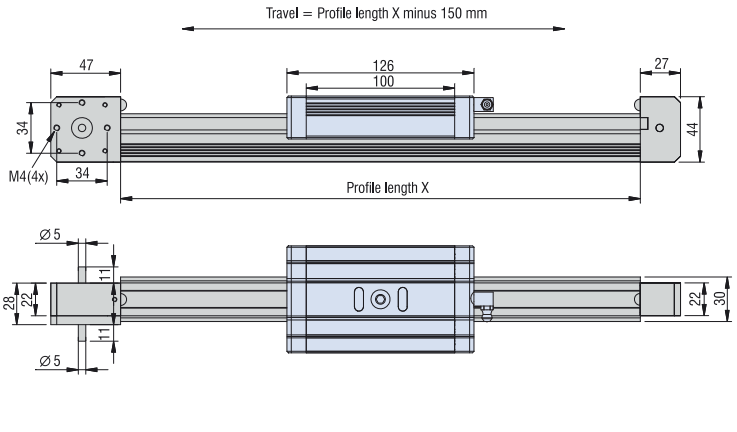
* with vertical construction, the acceleration due to gravity (g = 9.81 m/s2) must be taken into account

Bending data is on page **B-23.**

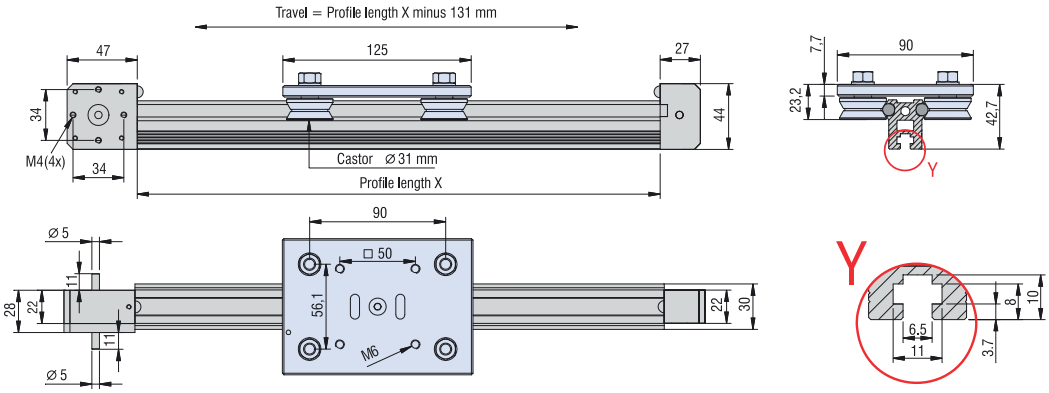
Linear units
with toothed belt drive

LEZ 1

Dimensioned drawings
without motor, with shaft slides



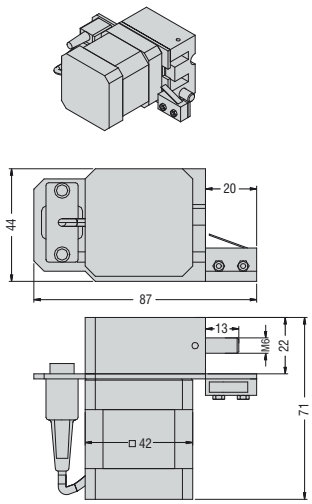
without motor, with trolley



Motor modules (Motor pin assignments are on Page B-74.)

Drive module with stepper motor
MS-045 HT (direct drive)
Feed: 60 mm / turn

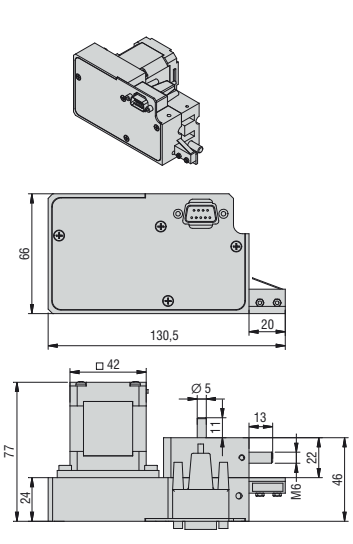
Part no.: **396048 3015**



Total length with motor module: profile length +94 mm

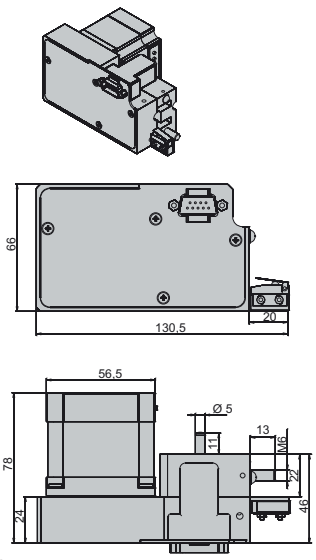
Drive module with stepper motor
MS-045 HT (reduction 2:1)
Feed: 30 mm / turn

Part no.: **396049 3015**



Drive module with stepper motor
MS-135 HT (reduction 2:1)
Feed: 30 mm / turn

Part no.: **396056 3015**



Total length with motor module: profile length +138 mm

mechanics

Linear units
with toothed belt drive

LEZ 1G Blue Line

with profile carriage plate

Features

- Aluminium profile with midget linear guide LFS-8-1
- Clearance-free feed with timing belt feed axis - timing belt with 3 mm pitch, width 15 mm
- Feed 2.4 m/s, at the most
- Shaft slide WS 1 L 126 x W 72 mm
- Repetitive accuracy less or equal ± 0.2 mm
- Limit and/or reference switch accuracy < 0.1 mm
- Available in lengths up to 2.05 m
- Motor can be mounted on both sides due to an extended shaft end on the driving side
- Numerous combination possibilities due to additional special and angle profiles
- Integrated reference switch

Ordering key

232 1XX XXXX

Motor
0 = without motor
3 = with step motor MS 200-HT
4 = with DC-Servo motor DC 100
5 = with EC-Servo motor EC 60-S

Driving Side
0 = motor connection, right*
1 = motor connection, left*
* motor flange for drive is mounted on the right resp. left side

Slide / Connection
0 = with standard slide profile
1 = with connecting slides for compound tables
2 = with angle slide, right
3 = with angle slide, left

Travel = L -307 mm

Basic Profile Length (mm)
450, 550 , 650, 750, 850, 950, 1050, 1150, 1250, 1350, 1450, 1550, 1650, 1750, 1850, 1950, 2050
(e.g. 450 mm = 045
2050 mm = 205)

Technical specification

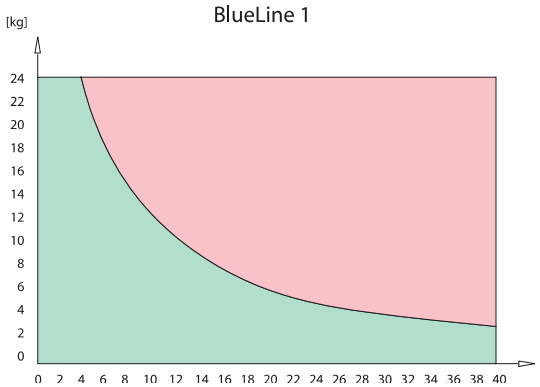
Belt version	HTD 3M, width 15 mm
Mass of slide	0.730 kg
Weight without drive module	1,000 mm ≙ 6.25 kg
Nominal mass of timing belt	0.0375 kg/m
Nominal weight of feed axis	0.440 kg/100 mm
Effective diameter of the synchronized pulleys	Ø 15.28 mm
Moment of interia of the synchronized pulleys	$1.461 \cdot 10^{-6}$ kgm²
Feed per revolution	48 mm

Basic profile + LFS-8-1

Moment of inertia I_x	68.73 cm⁴
Moment of inertia I_y	15.92 cm⁴
Moment of resistance W_x	17.18 cm³
Moment of resistance W_y	5.49 cm³

Load Diagramm

Zulässig beschleunigte Massen auf die Riemenfestigkeit bezogen *

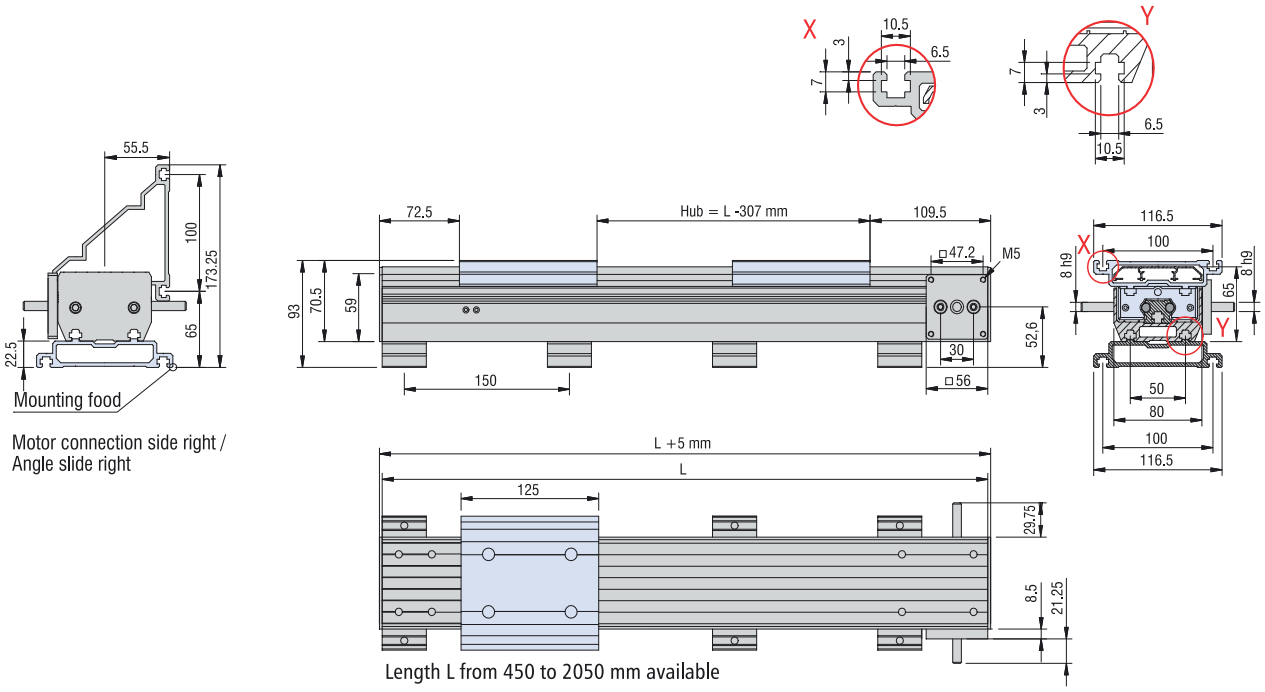


* with vertical construction, the acceleration due to gravity (g = 9.81 m/s2) must be taken into account

Linear units
with toothed belt drive

LEZ 1G Blue Line

Dimensioned drawings
without motor, with profile carriage plate and angle slide



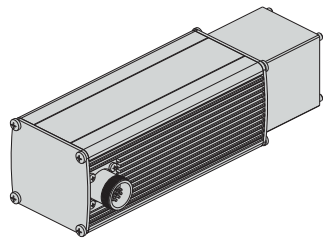
Motor connection side right /
Angle slide right

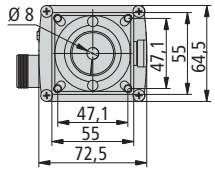
Length L from 450 to 2050 mm available

Motor modules (Motor pin assignments are on page B-74)

Drive module with stepper motor
MS 200-HT

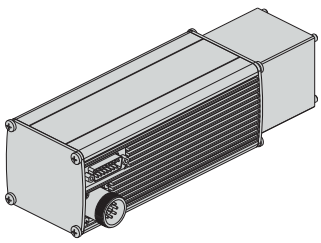
Part-no.: **396058 4060**

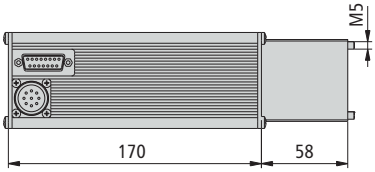




Drive module with servo motor
DC 100

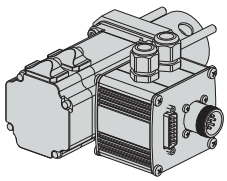
Part-no.: **396112 3060**

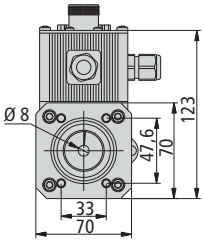


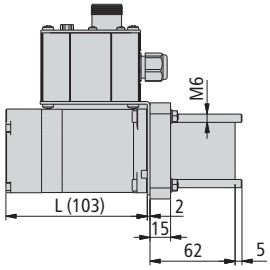


Drive module with servo motor
EC 60-S

Part-no.: **396415 3061**







mechanics

Linear units
with toothed belt drive

LEZ 2

Guides and shaft slides also available in a stainless version

with shaft slide

with trolley

Features

- Aluminium profile with miniature linear guide LFS-8-5
- No-play feed with toothed belt drive - toothed belt with 5 mm interval, width 25 mm
- Max. feed. 5 m/s
- Shaft slides WS 3, L 176 × W 130 mm
- Feed per turn: 70 mm
- Repeat accuracy less than or equal to ± 0.2 mm
- available in lengths up to 6,000 mm

Accessories can be found on pages **B-100**

Options:
- Special 100 mm raster lengths available to order, max. 6000 mm
- Also as direct drive with
  - stepper motor
  - Servomotor
- Overrun limit switch with lead (only integrated in conjunction with drive module)

Ordering key

232 002 XXXX

Drives/Slides, Trolley

8 = without motor, with shaft slides

9 = without motor, with trolley

Profile lengths (mm)

696, 996, 1496, 1996, 2496, 2996

(e. g. 696 mm = 070
1496 mm = 150)

Option: up to 6000 mm

Technical specification

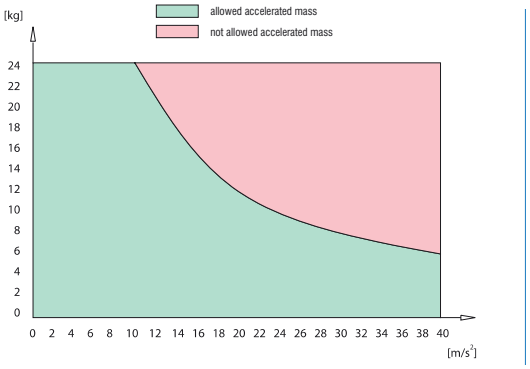
Belt type	HTD 5M, width 25 mm
Slide weight	0,940 kg
Weight without drive module	1000 mm ≙ 7.9 kg
specific weight of the toothed belt	0.09 kg/m
Roller carriage weight	2.03 kg
specific guide weight	0.472 kg/100 mm
Effective diameter of the synchronous disks	Ø 22.28 mm
Moment of inertia of the synchronous disks	5.58·10-6 kgm^2
Feed per turn	70 mm

Linear guide rail LFS-8-5

Moment of inertia I_x	137,48 cm^4
Moment of inertia Iy	27,98 cm^4
Resistance torque W_x	23,91 cm^3
Resistance torque Wy	13,09 cm^3

Load diagram

Permitted accelerated weights relative to the belt strength.*



* with vertical construction, the acceleration due to gravity (g = 9.81 m/s2) must be taken into account

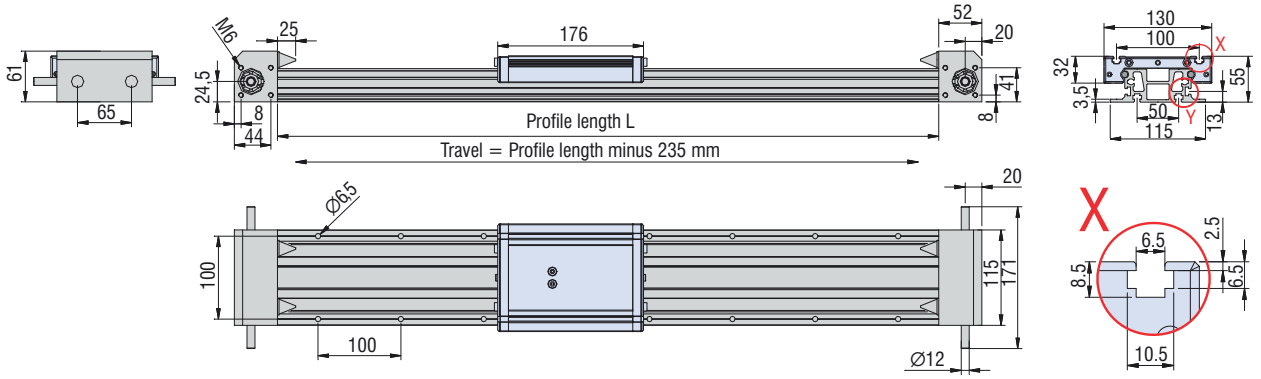
Drive module with servo motor EC 60 L

Linear units
with toothed belt drive

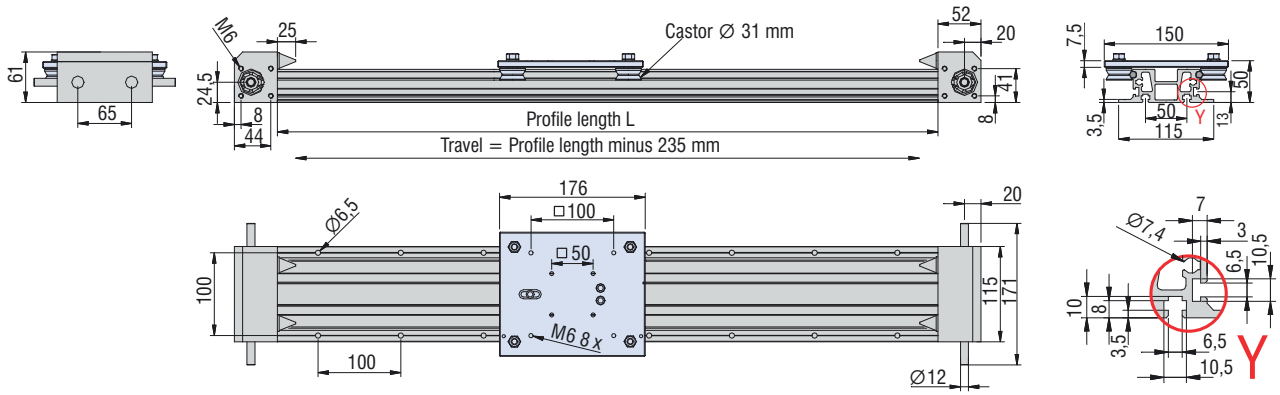
LEZ 2

Dimensioned drawings

without motor, with shaft slides



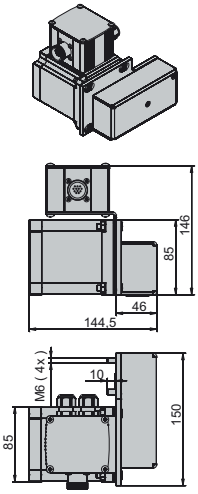
without motor, with trolley



Motor modules (Motor pin assignments are on Page B-74)

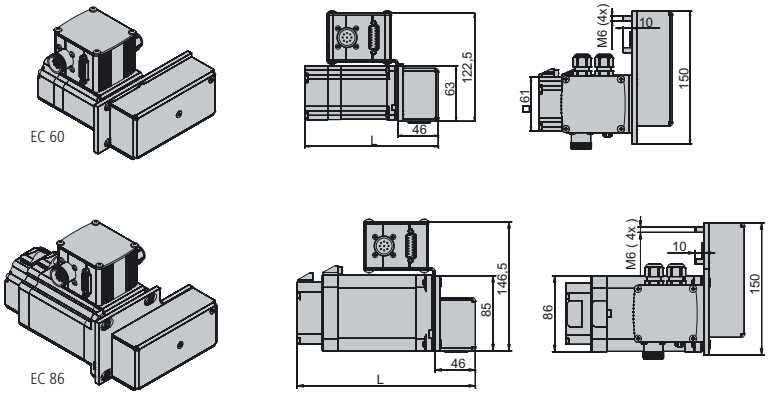
Drive module with stepper motor
MS-600 HT (reduction 2:1)
Feed: 35 mm / turn

Part no.: **396086 3060**



Drive module with EC servomotors
(Reduction 2:1)
Feed: 35 mm / turn

Part number	Motor module	Length L
396 415 3260	EC 60S with brake	151.5 mm
396 415 3060	EC 60S without brake	198.5 mm
396 423 3060	EC 60L	186.5 mm
396 444 3070	EC 86S	177.5 mm
396 466 3070	EC 86L	202.5 mm



mechanics

Linear units
with toothed belt drive

LEZ 3

Guides and shaft slides also available stainless.

with shaft slide

with trolley

Features

- Aluminium profile, miniature linear guide LFS-8-4
- No-play feed with toothed belt drive, toothed belt with 5 mm interval, width 25 mm
- Max. feed. 5 m/s
- Shaft slides WS3, L176 × W130 mm
- Feed per turn: 70 mm or 150 mm
- Repeat accuracy less than or equal to ± 0.2 mm
- Limit or reference switch accuracy < 0.1 mm
- Available in lengths up to 6,000 mm
- Motor modules can be flange-mounted on left or right side

Ordering key

23200X XXXX

Profile lengths (mm)
698, 998, 1498, 1998, 2498, 2998
(e. g. 698 mm = 070
1498 mm = 150)

Feed
6 = 150 mm / turn
7 = 70 mm / turn

Slides, trolley
0 = with shaft slides
1 = with trolley

Accessories can be found on page **B-100**.

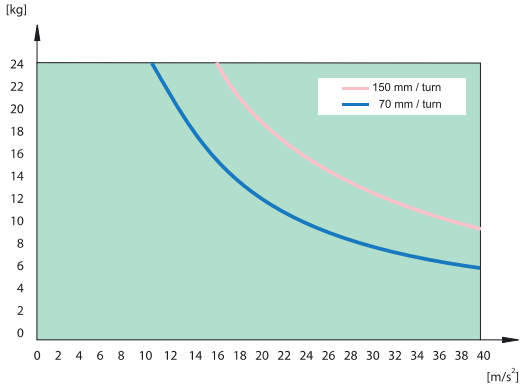
Options:
- Special 100 mm raster lengths available to order, max. 6000 mm

Technical specification

Belt type.....HTD 5M, width 25 mm
Slide weight.....0.940 kg
Weight without drive module.....1000 mm$\hat{}$ = 10.5 kg
specific weight of the toothed belt.....0.09 kg/m
Roller carriage weight..... 2.03 kg
specific guide weight.....0.648 kg/100 mm
Feed per turn.....70 mm or 150 mm
Effective diameter of the synchronous disks
Feed 70 mm/turn.....22.28 mm
Feed 150 mm/turn.....47.75 mm
Moment of inertia of the synchronous disks
Feed 70 mm/turn.....5.58E-6 kgm^2
Feed 150 mm/turn.....1,796.10^{-4} kgm^2

Load diagram

Permitted accelerated weights relative to the belt strength.*



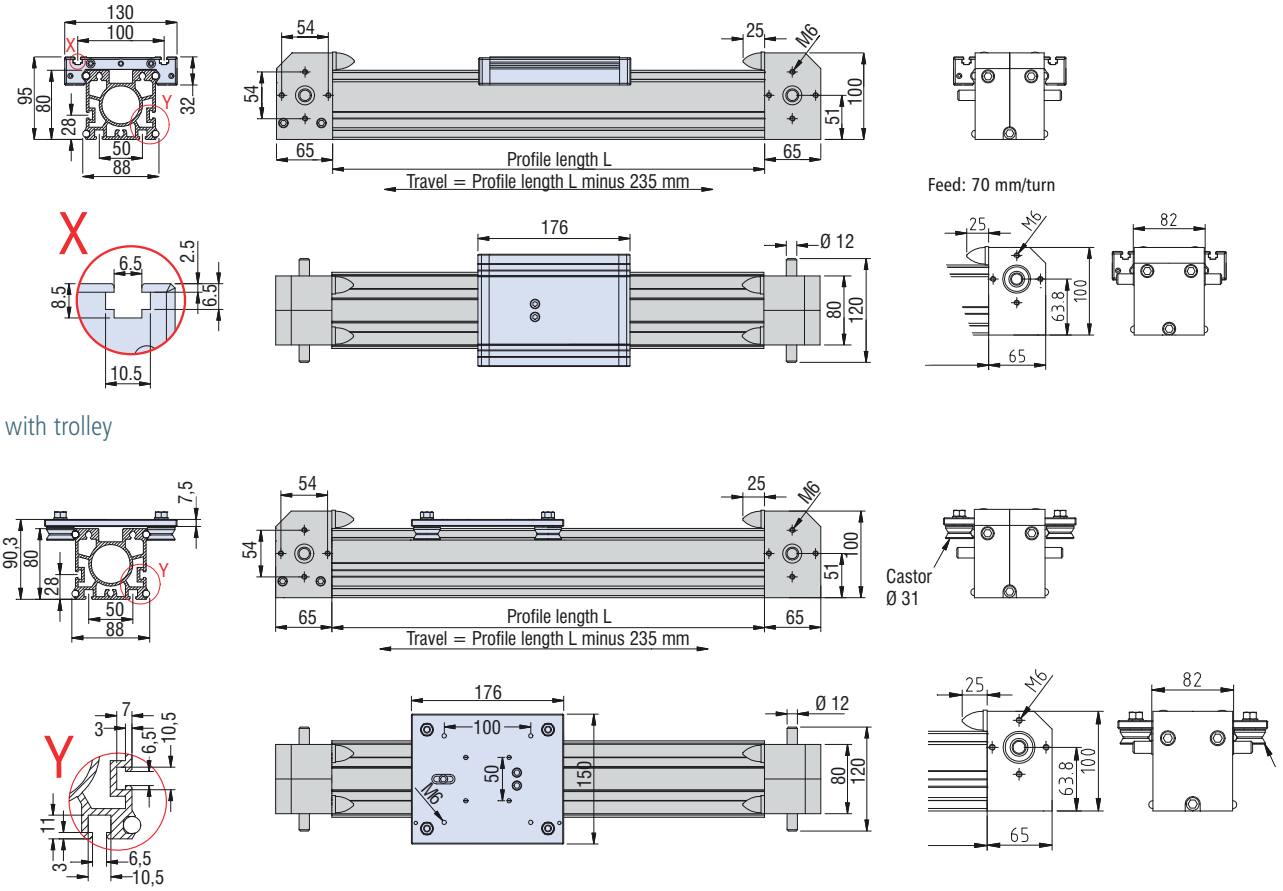
* with vertical construction, the acceleration due to gravity (g=9.81 m/s2) must be considered

Bending data can be found on page **B-27**.

Linear units
with toothed belt drive

LEZ 3

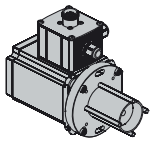
Dimensioned drawings
with shaft slides



with trolley

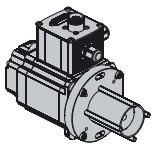
Motor modules
(Motor pin assignments are on Page **B-74**)

Drive module with stepper motor (direct drive)

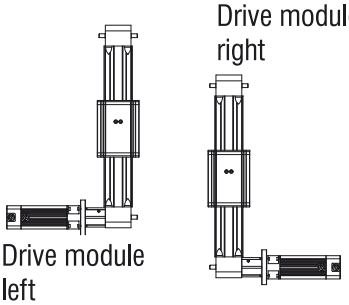


Part number	Motor module	
396 085 0060	MS 600 HT	right
396 085 0061	MS 600 HT	left
396 088 0060	MS 900 HT	right
396 088 0061	MS 900 HT	left

Drive module with EC servomotor EC 60 and EC 86 (direct drive)



Part number	Motor module
396 423 006012	EC 60L
396 444 0070	EC 86S
396 466 0070	EC 86L



mechanics

Linear units
with toothed belt drive

LEZ 9

with shaft slide

Features

- Aluminium profile
  Linear guide LFS-8-7
- no-play feed with toothed belt drive
- toothed belt with 3 mm interval
  Width 15 mm
- Max. feed. 2 m/s
- Shaft slides WS 11
  L 96 × W 95 mm
- Feed per turn: 60 mm
- Repeatability less than or
  equal to ± 0,2 mm
- inductive limit switches

Accessories can be found on page **B-100**.

Options:
- Special length in 100 mm raster
  to order

Ordering key

2 3 2 0 1 X X X X X*

Version
0 ... with shaft side
1 ... with trolley

Profile length (mm)
496, 996, 1496, 1996, 2496, 2996
(e.g. 496 mm = 0050
1496 mm = 0150)

Note:
Please order drive modules separately on the listed part numbers and specify here, whether the delivery should take place with or without attachment.

Technical specification

Belt type..... HTD 3M, width 15 mm
Slide weight.....0.4 kg
Weight without drive module.....1000 mm = 4.4 kg
specific weight of the toothed belt.....0.04 kg/m
specific guide weight.....0.29 kg/100 mm

Effective diameter
of the synchronous disks..... Ø 19.1 mm

Moment of inertia
of the synchronous disks..... 5.58E-6 kgm^2

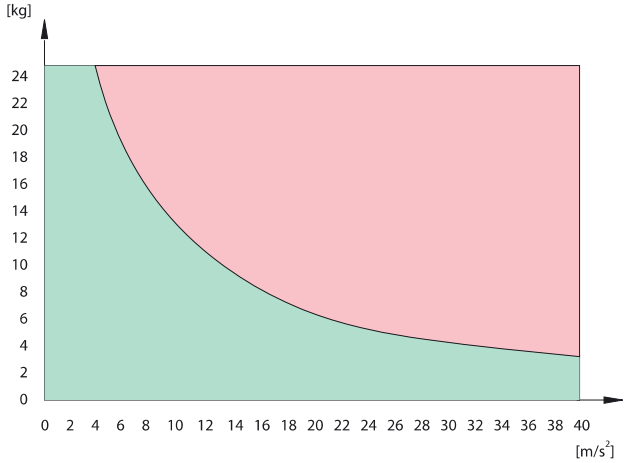
Feed per turn.....60 mm

Linear guide rail LFS-8-7

Moment of inertia I_x ..... 29.34 cm$_4$
Moment of inertia I_y..... 10.86 cm$_4$
Resistance torque W_x ..... 7.52 cm$_3$
Resistance torque W_y..... 5.68 cm$_3$

Load diagram

Permitted accelerated weights relative to the belt strength.*

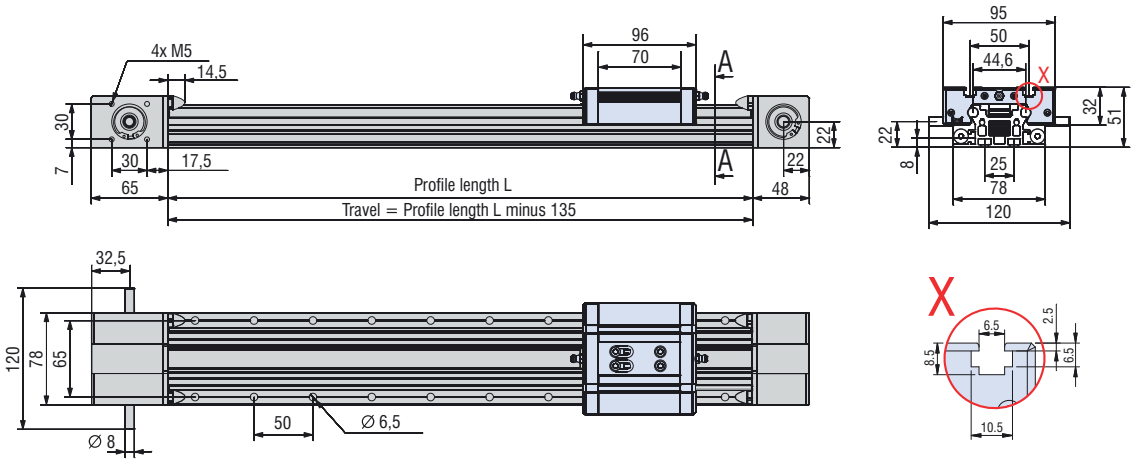


* with vertical construction, the acceleration due to gravity (g=9.81 m/s^2) must be considered

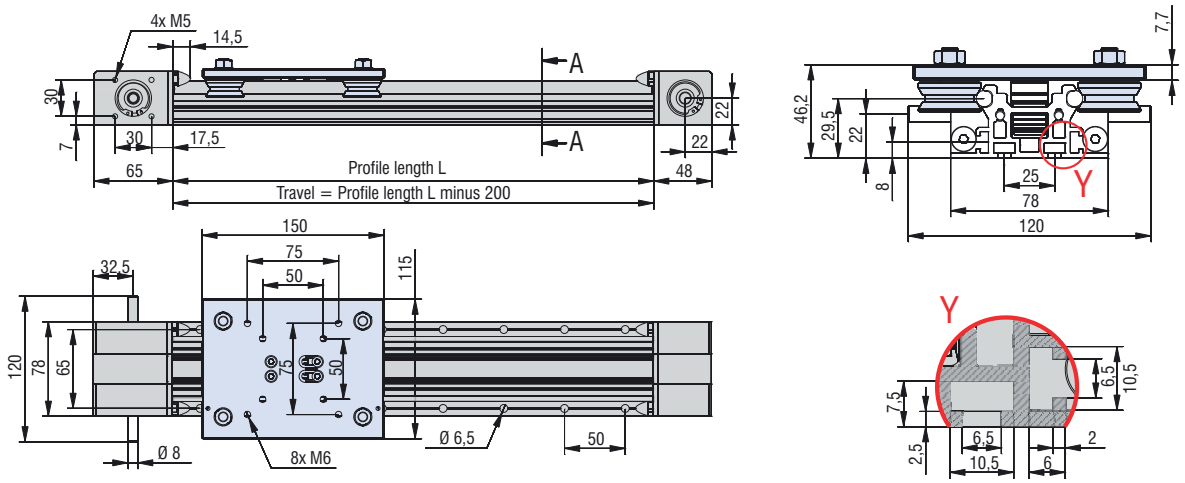
Linear units
with toothed belt drive

LEZ 9

Dimensioned drawings
with shaft slides



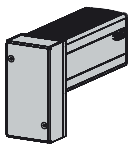
with trolley

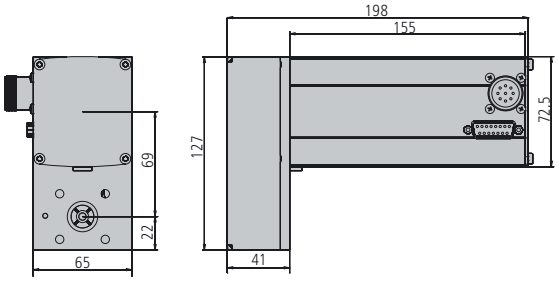


Motor modules (Motor pin assignments are on page B-74.)

Drive module with stepper motor
MS 200 HT
(reduction 2:1)
Feed: 30 mm / turn

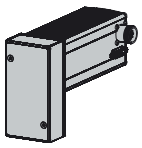
Part number	Motor module	
396 058 3017	MS 200 HT	right
396 058 3018	MS 200 HT	left





Drive module with servo motor DC 100
(reduction 2:1)
Feed: 30 mm / turn

Part-no: 396112 3063



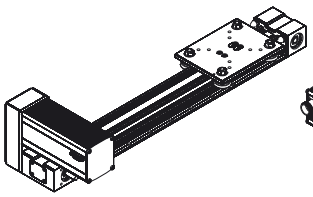


Figure:
LEZ 9 with trolley and stepper motor MS 200 HT left mounted

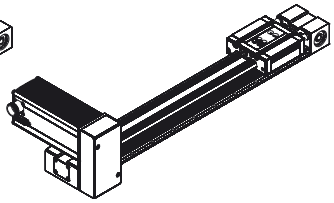


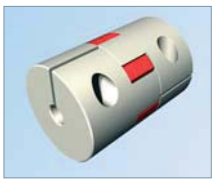
Figure:
LEZ 9 with shaft slide and servo motor DC 100 right mounted

Accessories

LEZ 1

Angle bracket
- for LEZ 1

Part-no.: 209110 0010



20/30 coupling
- for LEZ 1
- 1 VE = 1 coupling

Part-no.: 218001 5081

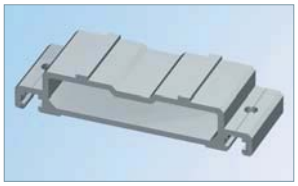
Shaft slides 1/70
- L 96 x W 72 x H 28.5 mm
- Clamping surface plane milled, T-slide thread M6
- central greasing option, adjustable for no play
- Weight: 0.35 kg
- Option: stainless steel version

Part-no.: 223100 0070
stainless steel: 223101 0070

Transmission shaft

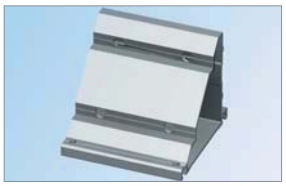
Length 1 m
Part-no.: : 227008 1000

LEZ 1G Blue Line



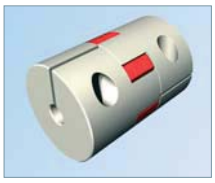
Feet
- for LEZ 1G
- 116.5 x 40 x 22.5 mm
- 1 VE = 2 pieces

Part-no.: 232199 0001



Mounting bracket
- including fixing material
- for LEZ 1G

Part-no.: 232199 0002



30/40 coupling
- for LEZ 1G Blue Line
- 1 VE = 1 coupling

Part-no.: 218002 8081

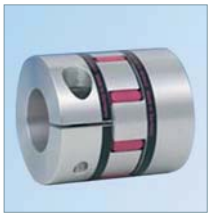
Transmission shaft

Length 1 m
Part-no.: 227008 1000

LEZ 2

Motor mounting plate
- for LEZ 2
- including fixing material
- for direct drive

Part-no.: 232199 0004



Coupling for transmission shaft
- for LEZ 2
- 1 VE = 2 pieces couplings

Part-no.: 218050 0002

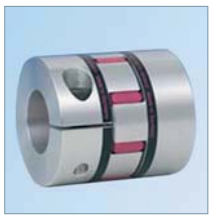
Transmission shaft ø 25 mm

Length 1 m
Part-no.: 219001 0125
Length 2 m
Part-no.: 219001 0225

Vertical bearing
for transmission shaft

VE 1 piece
Part.-no.: 896202 5562

LEZ 3



Coupling for transmission shaft
- for LEZ 3
- 1 VE = 2 pieces couplings

Part-no.: 218050 0002

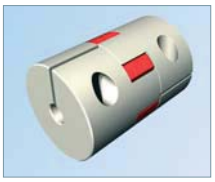
Transmissions shaft ø 25 mm

Length 1 m
Part-no.: 219001 0125
Length 2 m
Part-no.: 219001 0225

Vertical bearing
for transmission shaft

VE 1 piece
Part.-no.: 896202 5562

LEZ 9



30/40 couplings
- for LEZ 9
- 1 VE = 1 coupling

Part-no.: 218002 8081

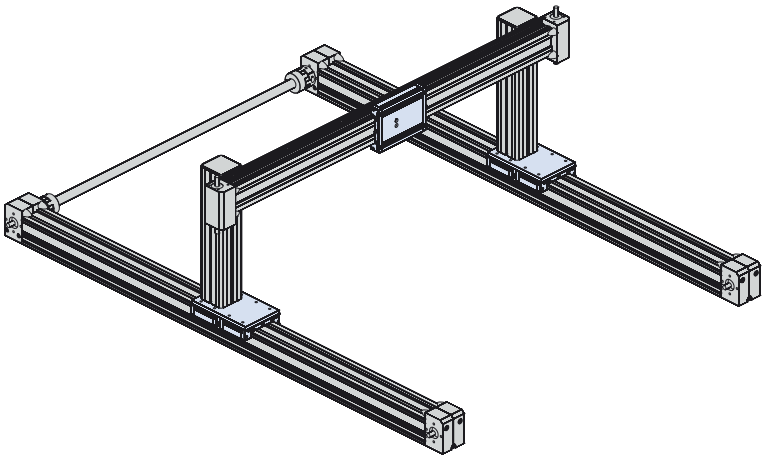
Shaft slide WS 11/70
- L 96 x W 96 x H 32 mm
- Clamping surface plane milled, T-slide thread M6
- central greasing option, adjustable for no play
- Weight: 0.4 kg
- Option: stainless steel version

Part-no.: 223111 0070
stainless steel: 223111 1070

Transmissions shaft

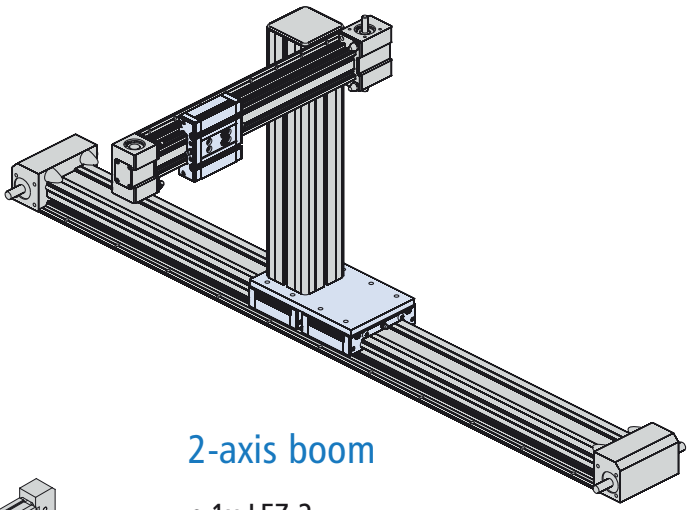
Length 1 m
Part-no.: 227008 1000

Examples in use



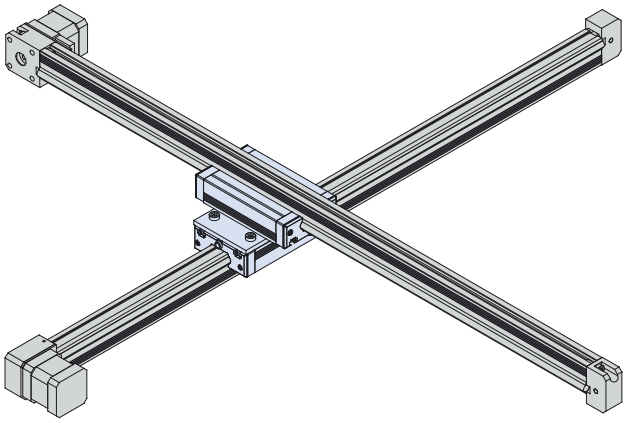
2-axis H-design

- 2 x LEZ 3
- 1 x LEZ 2
- Transmission shaft



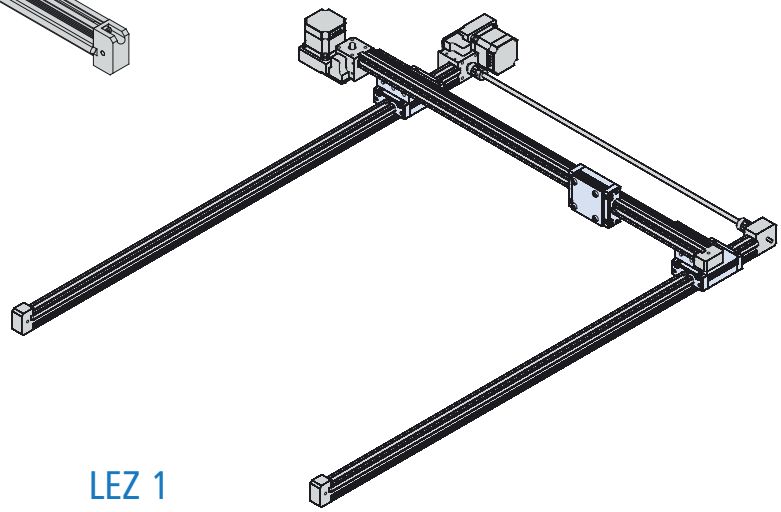
2-axis boom

- 1x LEZ 2
- 1x LEZ 9



Crossbench LEZ 1

- 2 x LEZ 1



LEZ 1

- 2-axis flatbed configuration

Rotational units

Overview

Rotational units

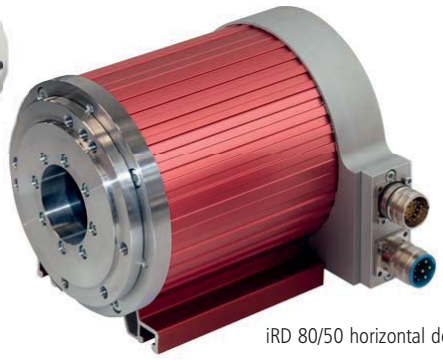
Overview

CAD data on our website **www.isel-germany.de**

Torque motors

iRD 80

iRD 80/50 vertical design



iRD 80/50 horizontal design

Features

- improved storage of the rotor shaft for high maximum moments
- horizontal and vertical design
- no mechanical transmission elements
- high torque in a compact design
- very good repeatability and positioning
- very good concentricity and axial run-out
- large hollow shaft
- measuring system directly on the rotor shaft

Technical specifications

	iRD 80/50
intermediate circuit voltage [V]	330
current [A]	6
peak current [A]	15
rated torque [Nm]	10
peak torque[Nm]	17
max. speed [rpm.]	800
rotor interia [kg/cm²]	34
concentricity ± [mm]	0.03
axial run-out ± [mm]	0.03
numbers of poles	20
permissible static load [kN]	1.7
permissible dynamic load [kN]	1.5
breakdown torque for bearings [Nm]	150
protection class	IP50
torque constant [Nm/A]	1.13
accuracy ± [arc sec]	65
repeatability ± [arc sec]	3.5
thermal protection	PTC
encoder option 1 [Inc/r] incremental	20000

Visit us on our website and look at our current product video:

Order data

Torque motor iRD 80/50
horizontal Part-no.: **267110 0020**
vertical Part-no.: **267110 0010**

Accessories

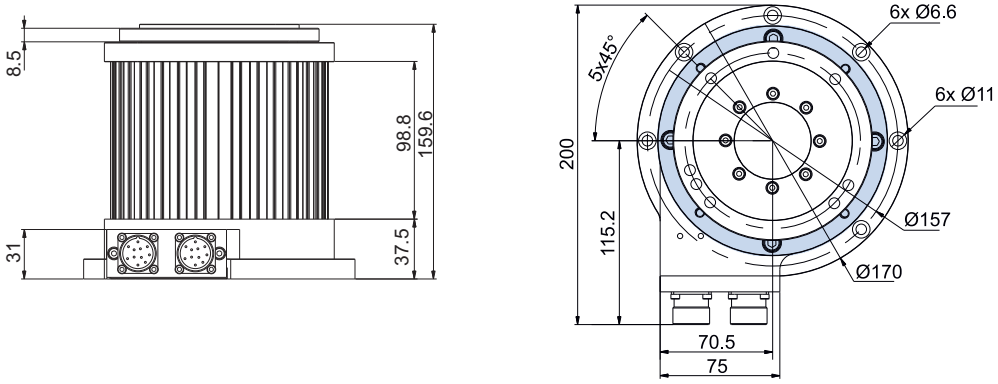
motor cable
Part-no.: **392307 XXXX**

encoder cable
Part-no.: **392325 0500**

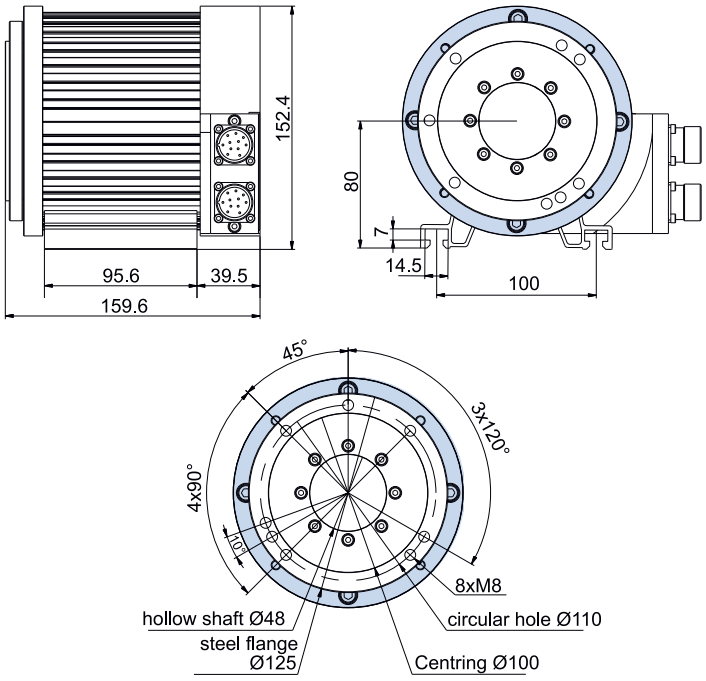
Torque motors iRD 80

Dimensioned drawings

vertical design



horizontal design



Indexing table / Rotary unit RDH-M

RDH-M as Rotary unit
(hollow shaft design)

RDH-M as Indexing table
(solid shaft design)

Features

- With precision transmission
  - High load capacity, rigid drive bearing
  - Absence of play and high torsional rigidity
- Reduction 1:51 or 1:101
- Stepper or servomotor
- Protection class IP 65
- Stainless design
- Transfer accuracy <1 minute of arc
- Repeatability < ± 6 seconds of arc
- Available in solid or hollow shaft design
- No maintenance

For pin assignment see page B-122
For transport loads see page B-123

Ordering key

2 6 6 2 X X 0 X 0 0

Flanged shaft
0 = solid shaft
1 = hollow shaft

Transmission reduction
0 = 101
1 = 51

Motors
0 = Stepper motor MS 200 HAT with encoder (400 imp., 3-channel, RS422)
3 = brushless EC servomotor EC 60S
4 = brushed DC servomotor DC 100
5 = Stepper motor without encoder

Accessories

Chuck assembly
3-jaw chuck Ø 125
Part no.: 269063 2125
* including flange

Aluminium T-slot plate
Ø 240 mm/PT 25
Part no.: 269050 0240

Ø 365 mm/PT 25
Part no.: 269050 0365

Tailstock unit RE M
Part no.: 269100 2100
(1000 mm)
Part no.: 269100 2150
(1500 mm)
Part no.: 269100 2200
(2000 mm)

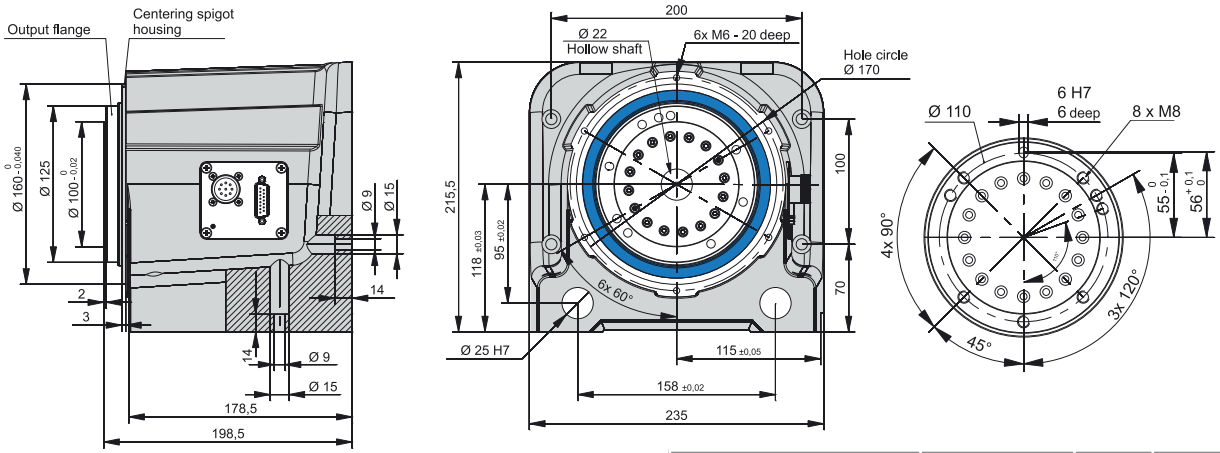
Indexing table / Rotary unit RDH-M

Technical specification

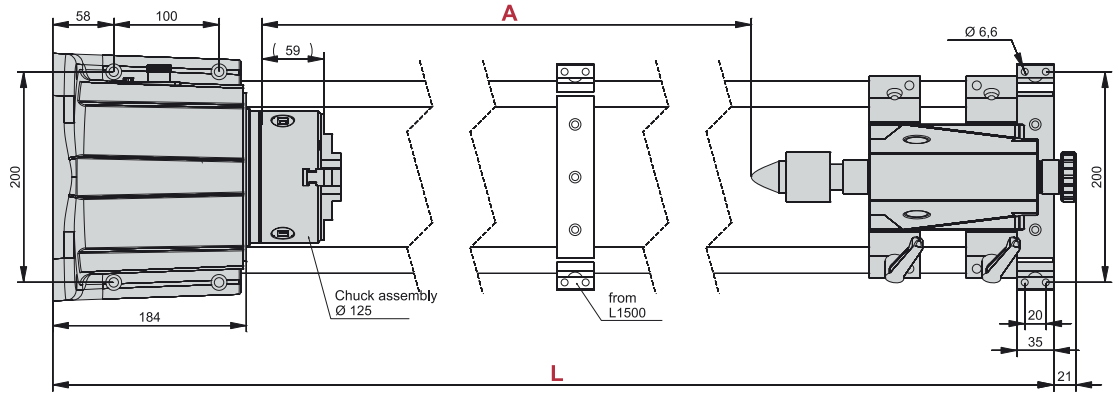
		stepper motor MS 200 HT *		EC servomotor EC 60S (brushless)		DC servo motor DC 100 (brushed)	
Reduction ratio		1:51	1:101	1:51	1:101	1:51	1:101
Nominal output speed	[1/min]	4	2	22	11	22	11
		at 1500 Hz (225 1/min)		at 1100 1/min			
Max. output speed	[1/min]	24	12	59	30	59	30
		at 8000 Hz		--			
Nominal torque	[Nm]	24	46	9	17	7	14
		at 1500 Hz		--			
Max. torque (short term)	[Nm]	--	--	42	80	39	73
Rated holding torque (static load)	[Nm]	55	108	26	51	15	30
Max. transmission load	[Nm]	98	157	98	157	98	157
		Limit for repeatable peak torque					
Dynamic load factor C	[N]	21800					
Static load factor C0	[N]	35800					
Weight	[kg]	13.7					

* Values for half-step operation

Dimensioned drawings



Versions	Part no.	L	A
Tailstock unit RE-M 1000 mm	269100 2100	1110	624.5
Tailstock unit RE-M 1500 mm	269100 2150	1610	1124.5
Tailstock unit RE-M 2000 mm	269100 2200	2110	1624.5



Indexing table / Rotary unit RDH-S

RDH-S as Rotary unit
(hollow shaft design)

RDH-S as Indexing table
(solid shaft design)

Features

- With precision transmission
  - High load capacity, rigid drive bearing
  - Absence of play and high torsional rigidity
- Reduction 1:51 or 1:101
- Stepper or servomotor
- Protection class IP 65
- Stainless design
- Transfer accuracy <1.5 minute of arc
- Repeatability < ± 6 seconds of arc
- Available in solid or hollow shaft design
- No maintenance

For pin assignment see page **B-122**
For transport loads, see page **B-123**

Ordering key

2 6 6 1 X X 0 X 0 0

Flanged shaft
0 = solid shaft
1 = hollow shaft

Transmission reduction
0 = 101
1 = 51

Motors
0 = Stepper motor MS 045 HT with encoder (400 imp., 3-channel, RS422)
2 = brushless DC servomotor RE 40
3 = brushless EC servomotor EC 42
5 = Stepper motor without encoder

Accessories

Chuck assembly
3-jaw chuck Ø 65
Part no.: **269060 3065***

3-jaw chuck Ø 80
Part no.: **269063 2080***

3-jaw chuck Ø 100
Part no.: **269063 2100***

* including flange

Circular plate
Ø 150
Part no.: **269 050 0150**

Tailstock unit RE S
for RDH-S
Part no.: **269100 1020** (200 mm)
Part no.: **269100 1030** (300 mm)
Part no.: **269100 1040** (400 mm)
Part no.: **269100 1050** (500 mm)

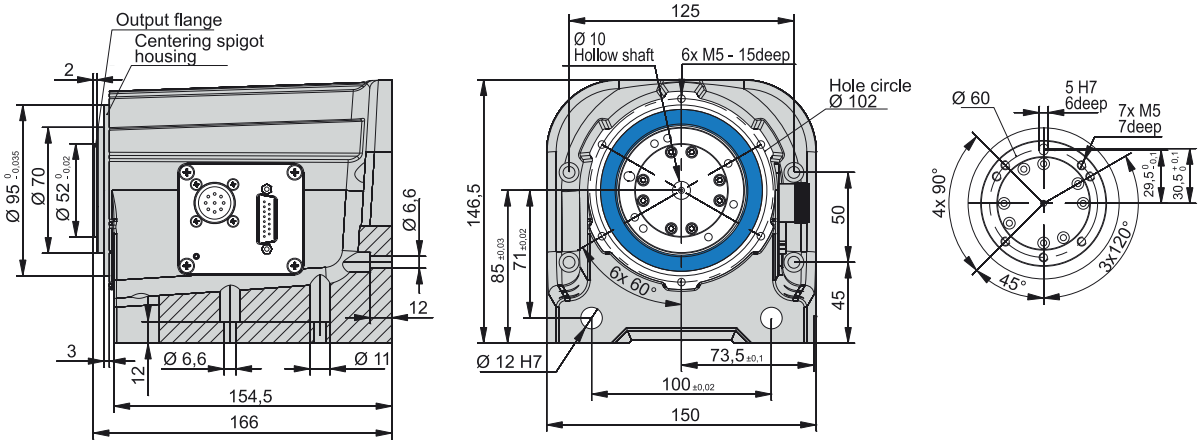
Indexing table / Rotary unit RDH-S

Technical specification

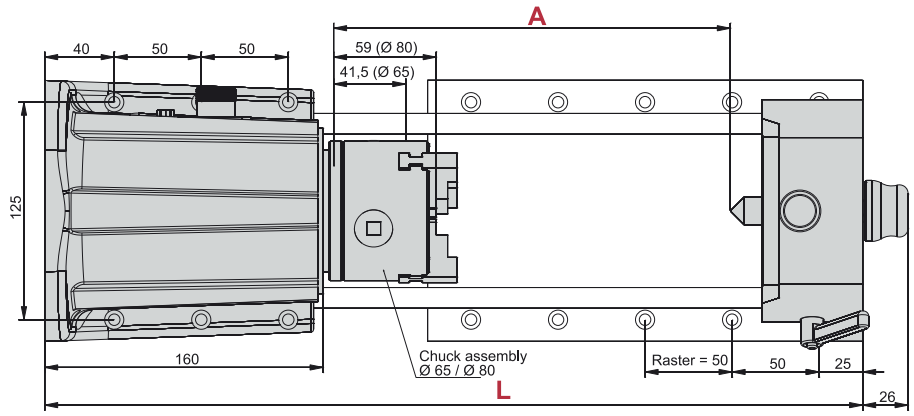
		stepper motor MS 045 HT *		EC servomotor EC 42 (brushless)		DC servo motor RE 40 (with brushes)	
Reduction ratio		1:51	1:101	1:51	1:101	1:51	1:101
Nominal output speed	[1/min]	4	2	22	11	22	11
		at 1500 Hz (225 1/min)		at 1100 1/min		at 1100 1/min	
Max. output speed	[1/min]	24	12	59	30	69	35
		at 8000 Hz		--			
Nominal torque	[Nm]	7	11	4.8	9.2	4.6	9
		at 1500 Hz		--			
Max. torque (short term)	[Nm]	--	--	7	11	7	11
Rated holding torque (static load)	[Nm]	7	11	7	11	7	11
Max. transmission load	[Nm]	18	28	18	28	18	28
		Limit for repeatable peak torque					
Dynamic load factor C	[N]	5800					
Static load factor C_0	[N]	8600					
Weight	[kg]	4.6					

* Values for half-step operation

Dimensioned drawings



Versions	Part no.	L	A
Tailstock unit RE-S 200 mm	269100 1020	370	128
Tailstock unit RE-S 300 mm	269100 1030	470	228
Tailstock unit RE-S 400 mm	269100 1040	570	328
Tailstock unit RE-S 500 mm	269100 1050	670	428



Indexing table/Rotary unit RDH-XS

RDH-XS as Rotary unit

RDH-XS as Indexing table

Features

- With precision transmission
  - High load capacity, rigid drive bearing
  - Absence of play and high torsional rigidity
- Reduction 1:50 or 1:100
- Stepper or servomotor
- Protection class IP 65
- Stainless design
- Transfer accuracy <2 minutes of arc
- Repeatability < ± 1 minute of arc
- No maintenance

For pin assignment see page **B-122**
For transport loads, see page **B-123**

Ordering key

2 6 6 0 0 X 0 X 0 0

Transmission reduction
0 = 100
1 = 50

Motors
0 = Stepper motor MS 045 HT with encoder (400 imp., 3-channel, RS422)
2 = brushed DC servomotor RE 40
3 = brushless EC servomotor EC 42
5 = Stepper motor without encoder

Accessories

Chuck assembly
3-jaw chuck Ø 65
Part no.: **269060 4065***

* including flange

Tailstock unit RE XS
for RDH-XS
Part no.: **269100 0020** (200 mm)
Part no.: **269100 0030** (300 mm)
Part no.: **269100 0040** (400 mm)
Part no.: **269100 0050** (500 mm)

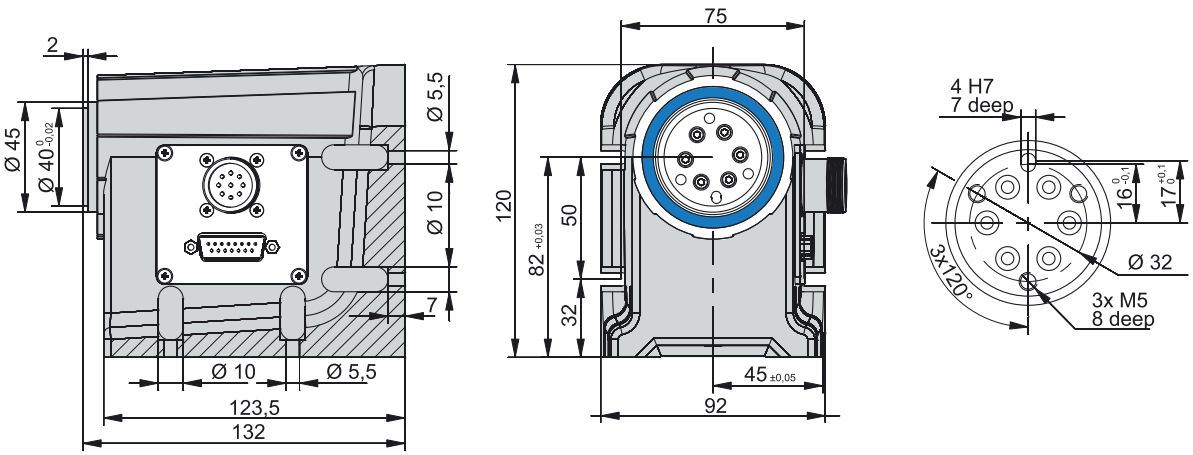
Indexing table/Rotary unit RDH-XS

Technical specification

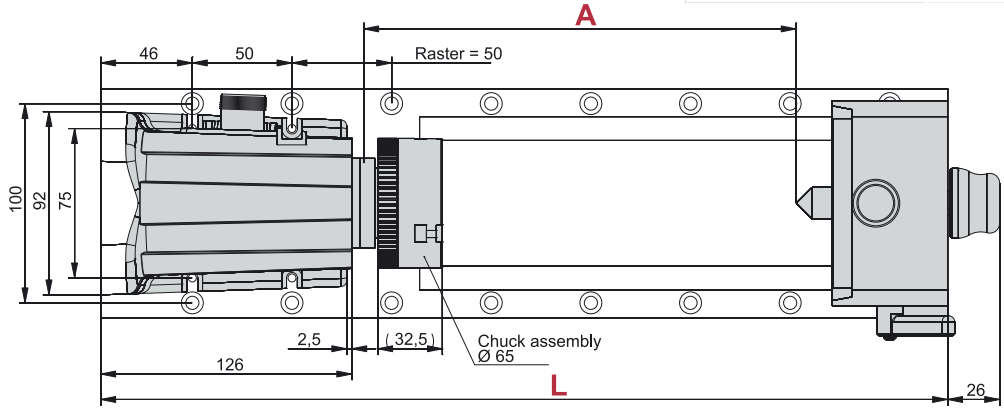
		stepper motor MS 045 HT *		EC servomotor EC 42		DC servo motor RE 40	
Reduction ratio		1:50	1:100	1:50	1:100	1:50	1:100
Nominal output speed	[1/min]	5	2	22	11	22	11
		at 1500 Hz (225 1/min)		at 1100 1/min		at 1100 1/min	
Max. output speed	[1/min]	24	12	59	30	70	35
		at 8000 Hz (1200 rpm)		--			
Nominal torque	[Nm]	5	7	5	7	5	7
		at 1500 Hz (225 1/min)		--			
Max. torque (short term)	[Nm]	--	--	5	7	5	7
Rated holding torque (static load)	[Nm]	5	7	5	7	5	7
Max. transmission load	[Nm]	9	14	9	14	9	14
		Limit for repeatable peak torque					
Dynamic load factor C	[N]	392					
Static load factor C_0	[N]	392					
Weight	[kg]	2.3					

* Values for half-step operation

Dimensioned drawings



Versions	Part no.	L	A
Tailstock unit RE-XS 200 mm	269100 0020	325	117
Tailstock unit RE-XS 300 mmm	269100 0030	425	217
Tailstock unit RE-XS 400 mmm	269100 0040	525	317
Tailstock unit RE-XS 500 mmm	269100 0050	625	417



Rotary tilting unit DSH-S

Features

- With precision transmission
  - High load capacity, rigid drive bearing
  - Absence of play and high torsional rigidity
- With rotary unit RDH-S
- Reduction 1:51 or 1:101
- Stepper or servomotor
- Protection class IP 65
- Stainless design
- Transfer accuracy <1.5 minute of arc
- Repeatability < ± 6 seconds of arc
- No maintenance
- Swivel range continuously variable

For pin assignment see page **B-122**
For transport loads, see page **B-123**

Ordering key

2 6 5 4 1 X X 0 0 0

Motors
0 = Stepper motor MS 045 HT with encoder (400 imp., 3-channel, RS422)
2 = brushed DC servomotor RE 40
3 = brushless EC servomotor EC 42
5 = Stepper motor without encoder

Transmission reduction
0 = 1 : 101
1 = 1 : 51

Accessories

Chuck assembly
3-jaw chuck Ø 65
Part no.: **269060 3065***

3-jaw chuck Ø 80
Part no.: **269063 2080***

3-jaw chuck Ø 100
Part no.: **269063 2100***

* incl. Flange

Circular plate
Ø 150
Part no.: **269 050 0150**

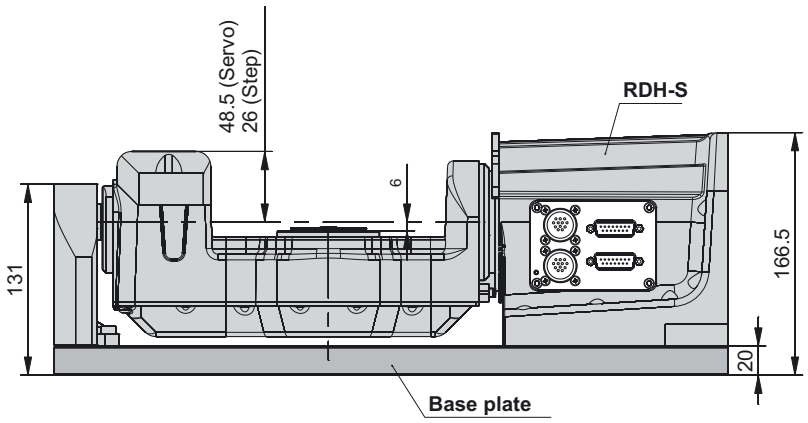
Rotary tilting unit DSH-S

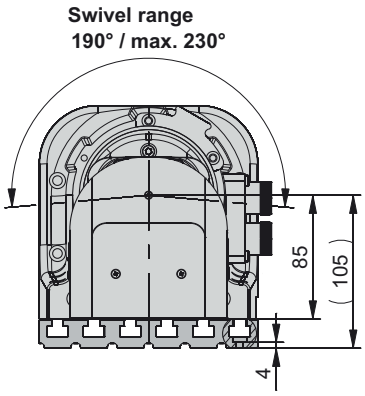
Technical specification

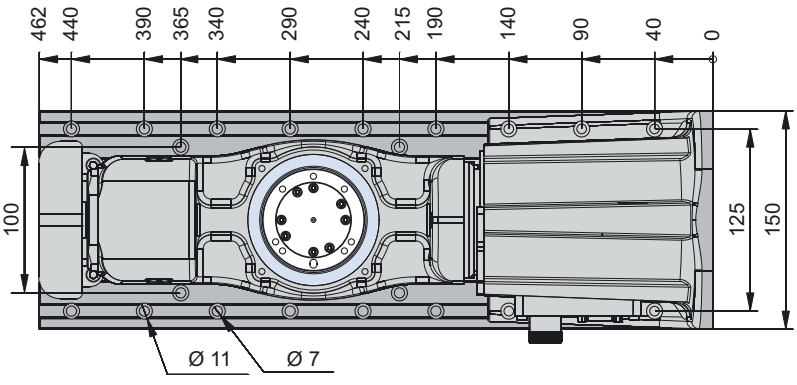
		stepper motor MS 045 HT *		EC servomotor EC 42		DC servo motor RE 40	
Reduction ratio		1:51	1:101	1:51	1:101	1:51	1:101
Nominal output speed	[1/min]	4	2	22	11	22	11
		at 1500 Hz (225 1/min)		at 1100 1/min		at 1100 1/min	
Max. output speed	[1/min]	24	12	59	30	69	35
		at 8000 Hz		--			
Nominal torque	[Nm]	7	11	4.8	9.2	4.6	9
		at 1500 Hz		--			
Max. torque (short term)	[Nm]	--	--	7	11	7	11
Rated holding torque (static load)	[Nm]	7	11	7	11	7	11
Max. transmission load	[Nm]	18	28	18	28	18	28
		Limit for repeatable peak torque					
Dynamic load factor C	[N]	5800					
Static load factor C_0	[N]	8600					
Weight	[kg]	12 kg					

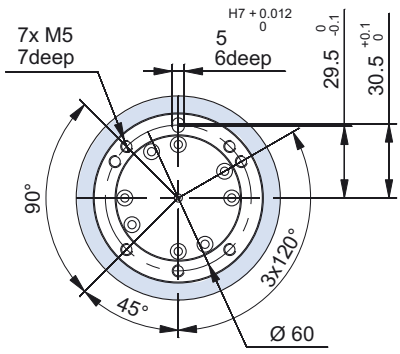
* Values for half-step operation

Dimensioned drawings



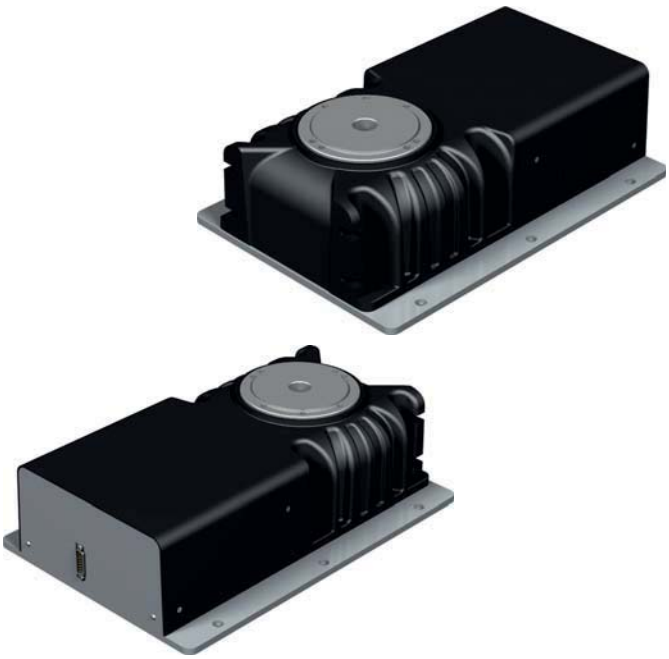






Indexing table

RF 1



Features

- Low play toothed belt drive with stepper or DC servo motor
- Reduction 1: 24 (standard)
- Weight: 14.6 kg

For pin assignment see page **B-122**
For transport loads, see page **B-123**

Options:
- Reduction installation set 1 : 52 or 1 : 100
- Electromagnetic brake [60 Nm]
- Step motor drive with encoder
- CNC controller

Ordering key

2 6 0 2 4 X X X 0 0

Motores
1 = Stepper motor MS 200 HT without encoder
4 = brushed DC servomotor DC 100
5 = brushless EC servomotor EC 60S

Brake
0 = without brake
1 = magnetic brake

Plug
1 = servomotor: M23 + SubD15
2 = Stepper motor: SubD9

Accessories

Installation set
for reduction 1:52
Part no.: **269077 0001**
for reduction 1:100
Part no.: **269077 0002**

Aluminium T-slot plate
Ø 240 mm / PT 25
Part no.: **269050 0240**
Ø 365 mm / PT 25
Part no.: **269050 0365**

Chuck assembly
3-jaw chuck Ø 125
Part no.: **269063 2125**

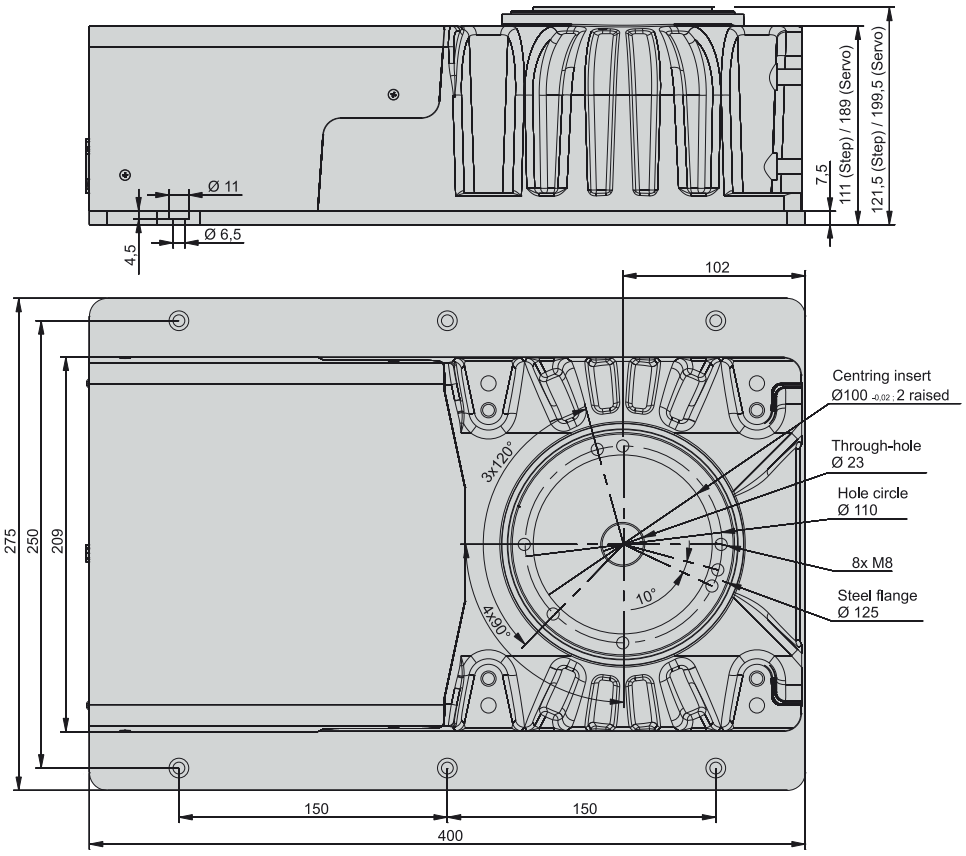
Indexing table RF 1

Technical specification

		stepper motor MS 200 HT *			Servomotor DC 100/EC 60S		
Reduction ratio		1:24	1:52	1:100	1:24	1:52	1:100
Output speed	[1/min]	0 - 50	0 - 23	0 - 12	0 - 125	0 - 58	0 - 30
Operating torque (0 - 500 Hz)	[Nm]	20	42	75	--		
Operating torque (500 - 1000 Hz)	[Nm]	18	38	75	--		
Rated torque	[Nm]	--			41070	13 / 22	25 /42
Rated holding torque (static load)	[Nm]	37	75	75	41102	16 / 26	30 /50
Angle accuracy	[°]	0.16					
Weight	[kg]	14.6					

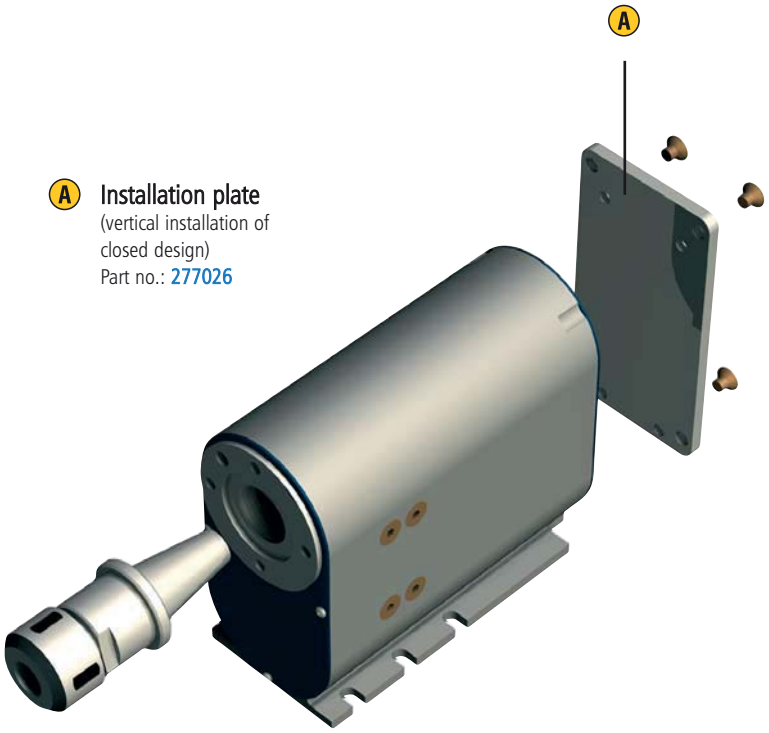
* Values for half-step operation

Dimensioned drawings



Mini rotary unit

MD 1



Ⓐ **Installation plate**
(vertical installation of closed design)
Part no.: **277026**

Features

- Low play toothed belt drive with stepper or DC servo motor
- Reduction 1 : 20
- Shaft Ø9 mm with boring
- Housing flange with inner cone SK 20
- Weight:
  depending on design, from 1.35 kg

For pin assignment see page **B-122**
For transport loads, see page **B-123**

Options:
- Additional installation plate (vertical installation possible)
- CNC controller

Ordering key

261010 0X10

Motors
0 = MS 045 HT stepper motor
2 = DC servomotor RE 40, with brushes
3 = brushless EC servomotor EC 42

Accessories

Chuck assembly
3-jaw chuck Ø 65
Part no.: **269060 2065***

* incl. Flange

Collet holder
Collet holder SK 20
for tools Ø 3 - 13 mm, with installation ring
Part no.: **239122 9001**

Collets are on page 5-32.

Mini rotary unit MD 1

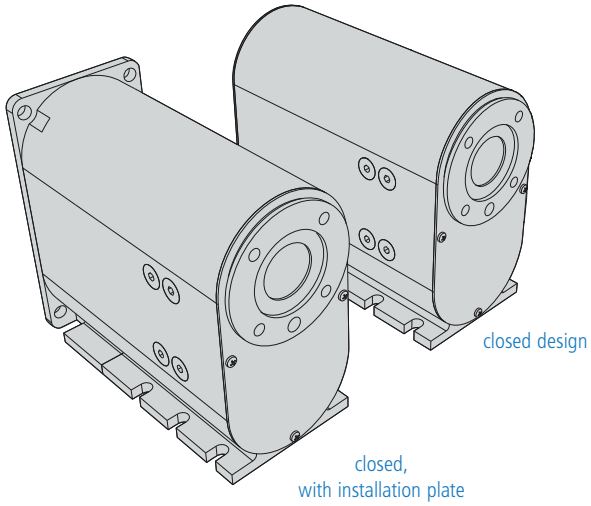
Technical specification

		MS 045 HT stepper motor *	DC servomotor RE 40	EC servomotor EC 42
Reduction ratio		1:20	1:20	1:20
Output speed	[1/min]	0 - 60	0 - 175	0 - 150
Operating torque (0 - 1600 Hz)	[Nm]	8	--	--
Rated torque	[Nm]	--	3	3.2
Rated holding torque (static load)	[Nm]	14	3.9	4
Min. step (positional accuracy)	[arcmin]	3.5	2	2
Gewicht	[kg]	1.35		

* Values for half-step operation

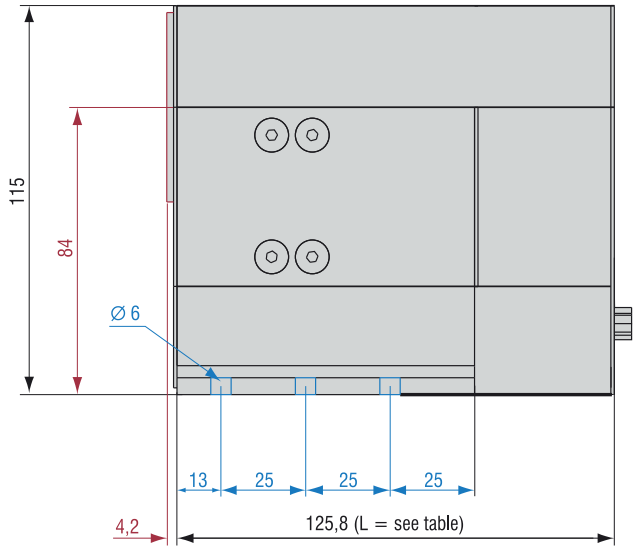
Dimensioned drawings

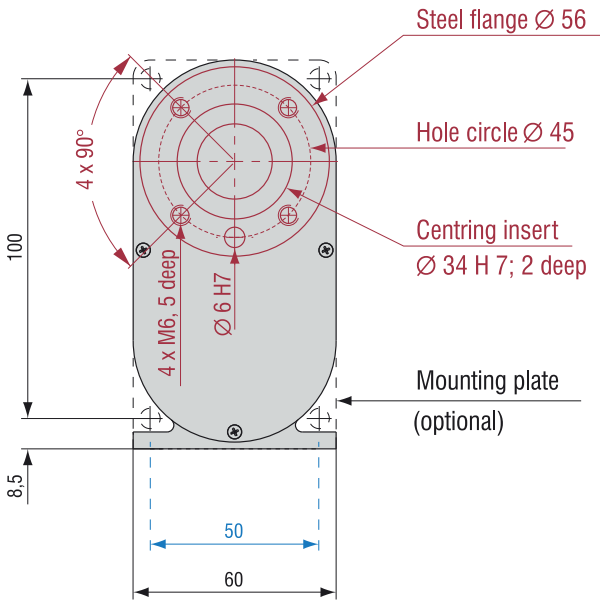
	Length L per step	Length L for DC servo
closed design	129 mm	180 mm
closed with installation plate	133 mm	184 mm



closed design

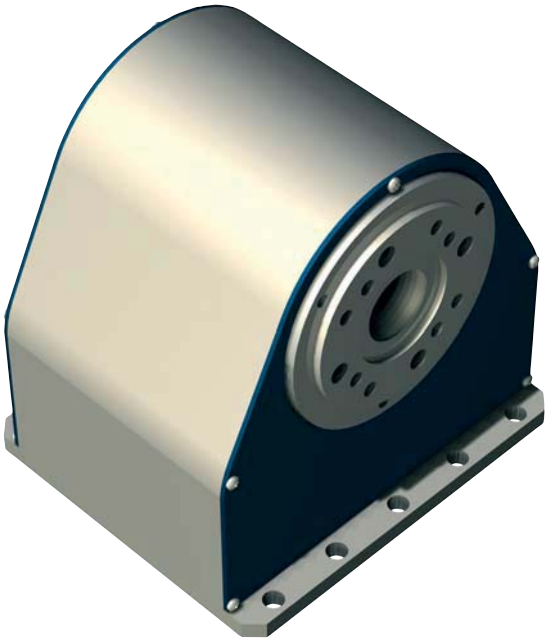
closed,
with installation plate





Rotary unit

ZD 30



Features

- Low play toothed belt drive with Stepper motor
- Reduction 1 : 30
- Shaft with Ø 15 mm boring
- Housing flange with inner cone SK 20
- Weight: 2,9 kg

For pin assignment see page **B-122**
For transport loads, see page **B-123**

Options:
- CNC controller via Sub D

Ordering data

ZD 30 rotary unit
Part no.: **261100 0000**

Accessories

Chuck assembly
3-jaw chuck Ø 65
Part no.: **269060 2065***

Chuck assembly
3-jaw chuck Ø 80
Part no.: **269063 3080***

Collet holder
Clamping ring housing SK 20 for tools Ø 3 - 13 mm, with installation ring
Part no.: **239122 9001**

Clamping rings are on page E-38.

Tailstock unit RE-ZD30
200 mm Part no.: **269 100 1060** L 331
300 mm Part no.: **269 100 1070** L 431
400 mm Part no.: **269 100 1080** L 531
500 mm Part no.: **269 100 1090** L 631

* including flange

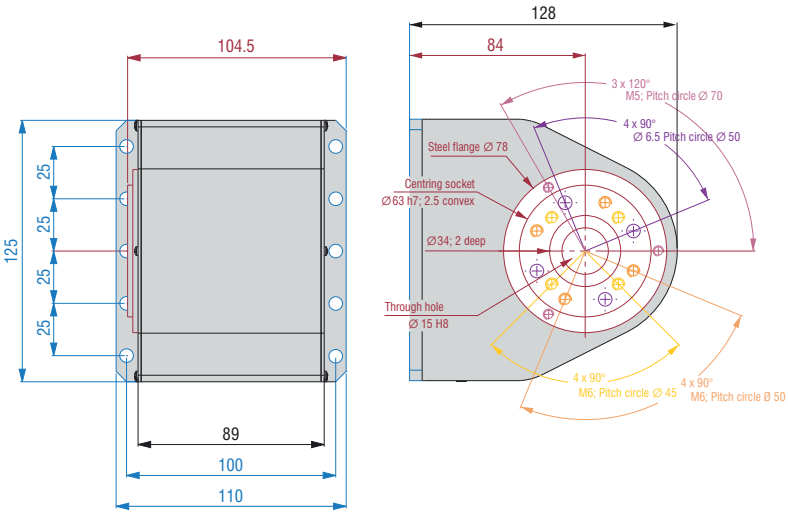
Rotary unit ZD 30

Technical specification

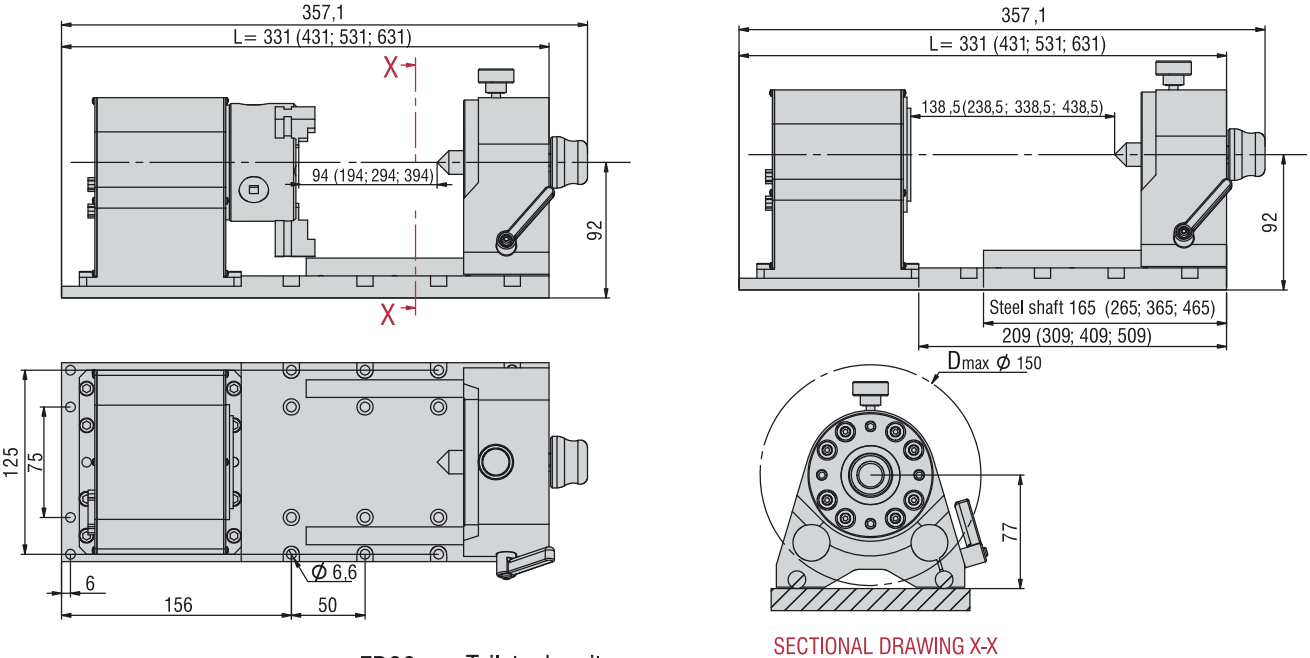
		stepper motor MS 045 HT *
Reduction ratio		0.0625
Output speed	[1/min]	0 - 40
Operating torque (0 - 1600 Hz)	[Nm]	12
Rated holding torque (static load)	[Nm]	20
Min. step (positional accuracy)	[arcmin]	2.5
Weight	[kg]	2.9

* Values for half-step operation

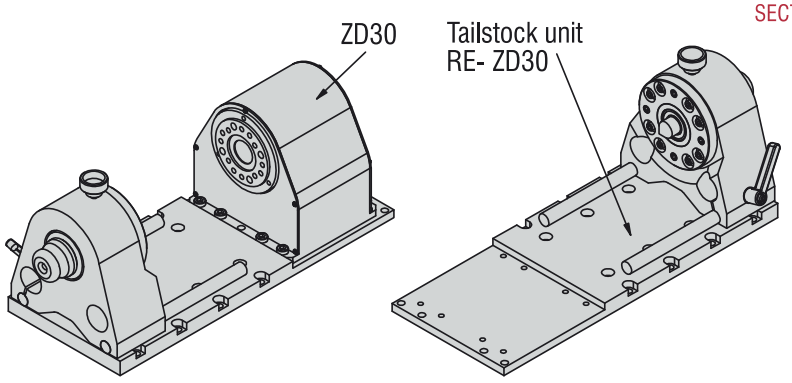
Dimensioned drawings



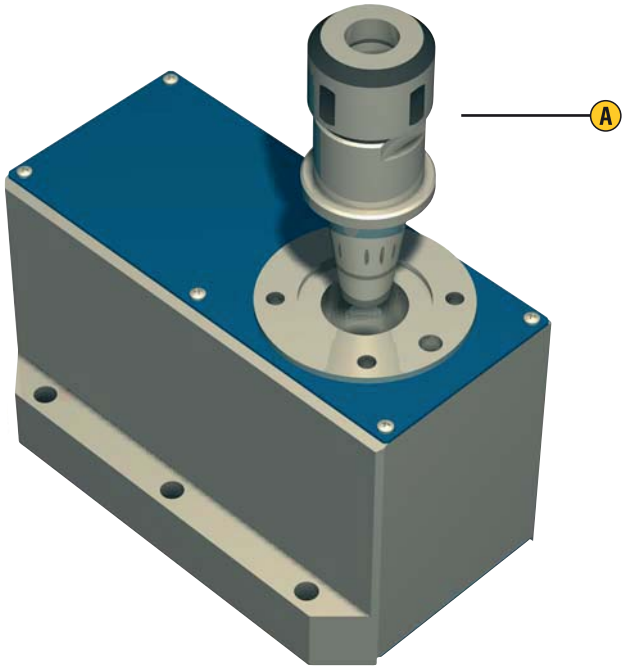
Tailstock unit RE-ZD30



SECTIONAL DRAWING X-X



Indexing table ZR 20



Features

- Low play toothed belt drive with stepper motor
- Reduction 1 : 20
- Shaft with Ø 15 mm boring
- Housing flange with inner cone SK 20• Weight: 2,1 kg

For pin assignment see page **B-122**
For transport loads, see page **B-123**

Options:
- CNC controller via Sub D

(A) **Collet holder SK 20**
(Accessories)

Ordering data

ZR 20 Indexing table
Part no.: **260300 0000**

Technical specification

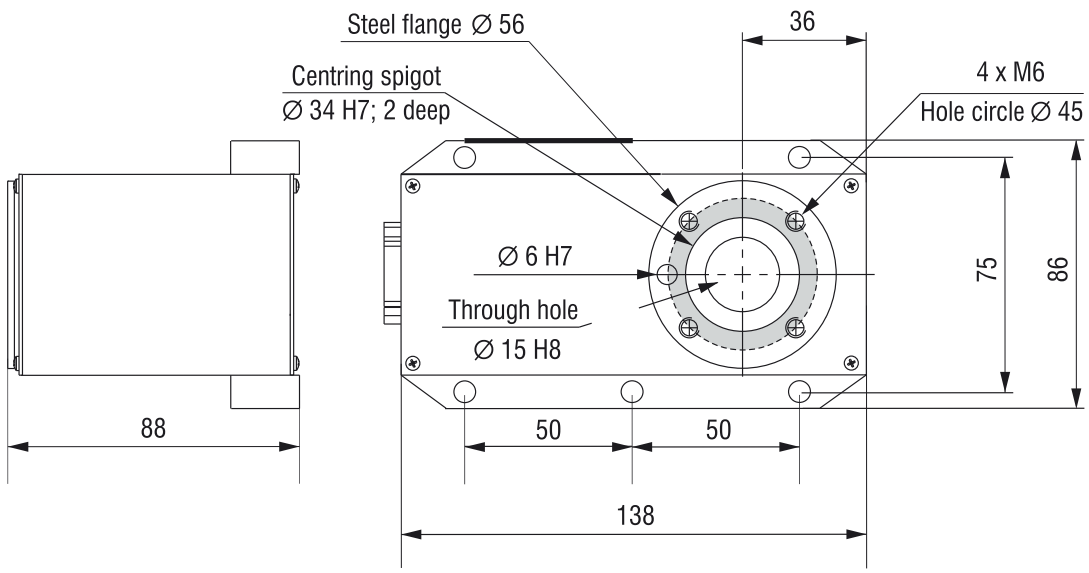
		stepper motor MS 045 HT *
Reduction ratio		1:20
Abtriebsdrehzahl	[1/min]	0 - 60
Operating torque (0 - 1600 Hz)	[Nm]	8
Rated holding torque (static load)	[Nm]	14
Min. step (positional accuracy)	[arcmin]	3.5
Weight	[kg]	2.1

* Values for half-step operation

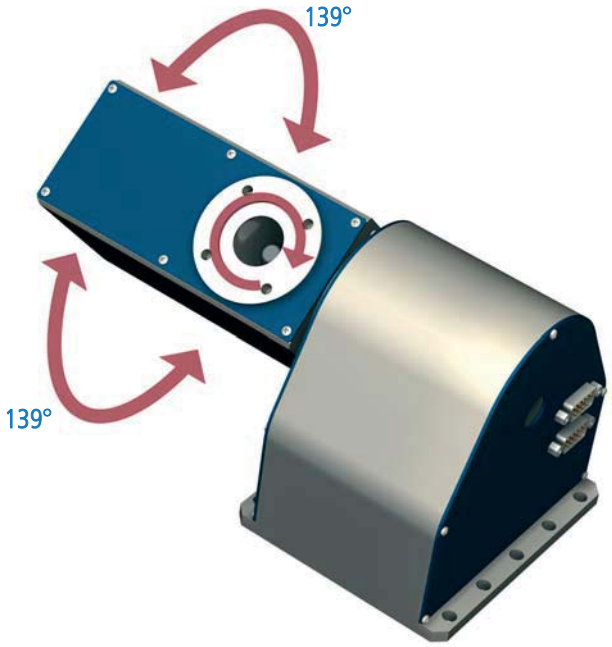
Accessories

see rotary tilting unit ZDS 2030

Dimensioned drawing



Rotary tilting unit ZDS 2030



General

The **rotary tilting unit ZDS 2030** can be used as a 4th/5th axis in CNC machines for fine workshops or in the handling area.

It is a combination of ZD 30 and the modified version of ZR 20.

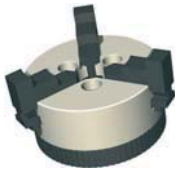
ZDS 2030 enables 5-side machining or free-form surface machining on a conventional 3-axis system of easily machinable materials (e.g. plastic).

The titling angle is 139° in both directions.

Ordering data

Rotary tilting unit ZDS 2030
Part no.: **265000 0000**

Accessories



Chuck assembly

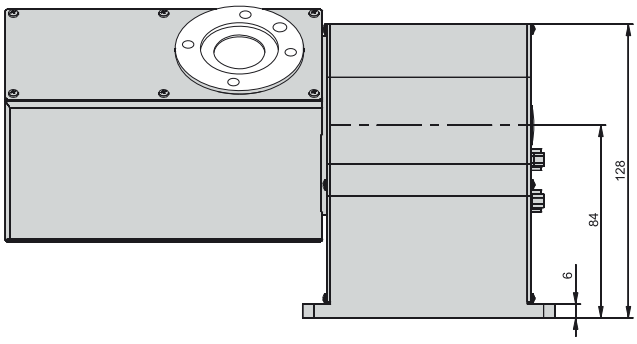
3-jaw chuck Ø 65
Part no.: **269060 2065***

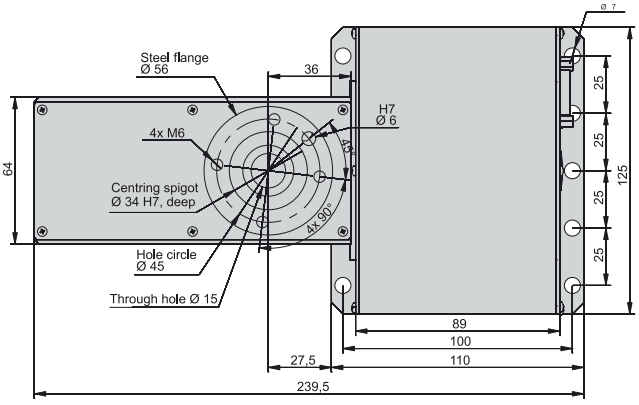
* including flange

Clamping ring housing

SK 20 clamping ring housing for tools Ø 3 - 13 mm, with installation ring
Part no.: **239122 9001**
Clamping rings are on page E-38.

Dimensioned drawing



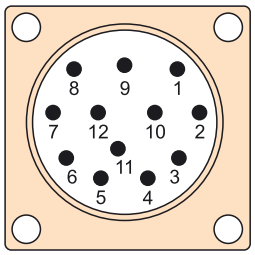


Motor pin assignments

Pin assignment for 12-pin stepper motors

(for RDH, DSH-S)

Motor connection



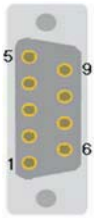
Plug side view of pin insert

M23 12-pin Pin	
1	Motor phase 1A
2	Motor phase 1B
3	Motor phase 2A
4	Motor phase 2B
5	+24V switch
6	+24V brake
7	GND switch
8	GND brake
9	Limit switch 1
10	Limit switch 2
11	---
12	---
Housing - cable shield	

Pin assignment for 9-pin stepper motors

(for RF1, iZD 54, MD 1, ZD 30, ZR 20, ZDS 2030)

Motor connection



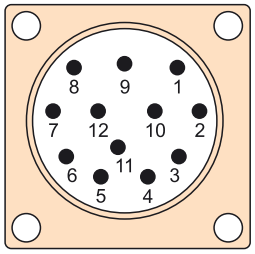
Plug side view of pin insert

Sub-D 9-pin Pin	
1	Motor phase 1A
2	Motor phase 1B
3	Motor phase 2A
4	Motor phase 2B
5	+24V switch
6	+24V brake
7	Limit switch 2
8	GND brake
9	Limit switch 1
Housing - cable shield	

Pin assignment for stepper motors with encoder

(for RDH)

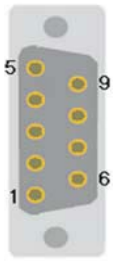
Motor connection



Plug side view of pin insert

M23 12-pin Pin	
1	Motor phase 1A
2	Motor phase 1B
3	Motor phase 2A
4	Motor phase 2B
5	+24V switch
6	+24V brake
7	GND switch
8	GND brake
9	Limit switch 1
10	Limit switch 2
11	---
12	---
Housing - cable shield	

Encoder connection

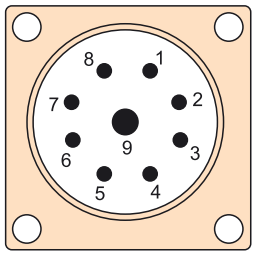


Plug side view of pin insert

Sub-D 9-pin Pin	
1	+5V encoder
2	Encoder track A
3	Encoder track B
4	Encoder track Z
5	---
6	GND encoder
7	Encoder track/A
8	Encoder track/B
9	Encoder track/Z
Housing - cable shield	

Pin assignment for DC servo motors with brushes (BDC)

Motor connection

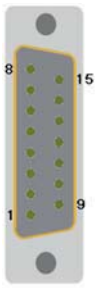


Plug side view of pin insert

M23 9-pol. (8+1) pin	
1	Motor phase 1 (V+)
2	Motor phase 1 (V-)
3	Motor phase 1 (V+)*
4	Motor phase 1 (V-)*
5	+24V brake
6	GND brake
7	---
8	---
9	Earthing lead
Housing - cable shield	

* Part motor phase connection over 2 wires.

Encoder connection

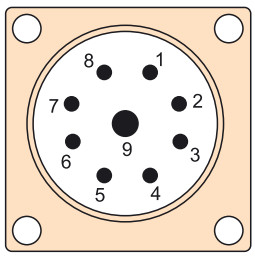


Plug side view of pin insert

Sub-D 15-pin Pin	
1	---
2	+5V encoder
3	Encoder track/Z
4	Encoder track/B
5	Encoder track/A
6	+24V switch
7	Limit switch 1
8	GND switch
9	---
10	GND encoder
11	Encoder track Z
12	Encoder track B
13	Encoder track A
14	Reference switch
15	Limit switch 2
Housing - cable shield	

Pin assignment for brushless EC servomotors (BLDC) 48V

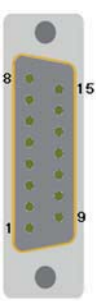
Motor connection



Plug side view of pin insert

M23 9-pol. (8+1) pin	
1	Motor phase U
2	Motor phase V
3	Motor phase W
4	---
5	+24V brake
6	GND brake
7	---
8	---
9	Earthing lead
Housing - cable shield	

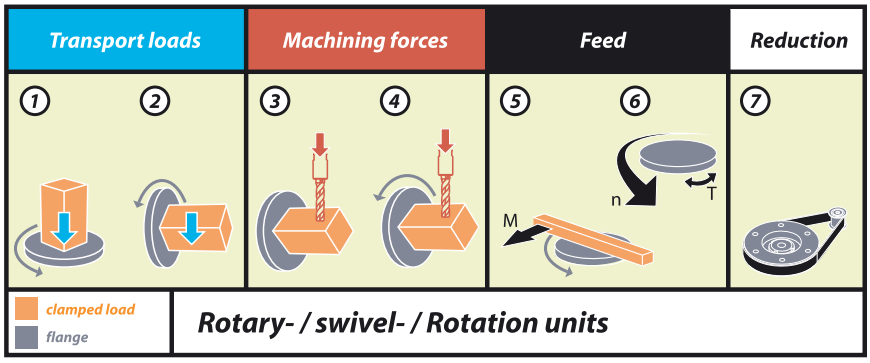
Encoder connection



Sub-D 15-pin Pin	
1	Hall signal A
2	+5V encoder/Hall
3	Encoder track/Z
4	Encoder track/B
5	Encoder track/A
6	+24V switch
7	Limit switch 1
8	GND switch
9	Hall signal B
10	GND encoder
11	Encoder track Z
12	Encoder track B
13	Encoder track A
14	Hall signal C
15	Limit switch 2
Housing - cable shield	

Turn/tilt/rotation units:

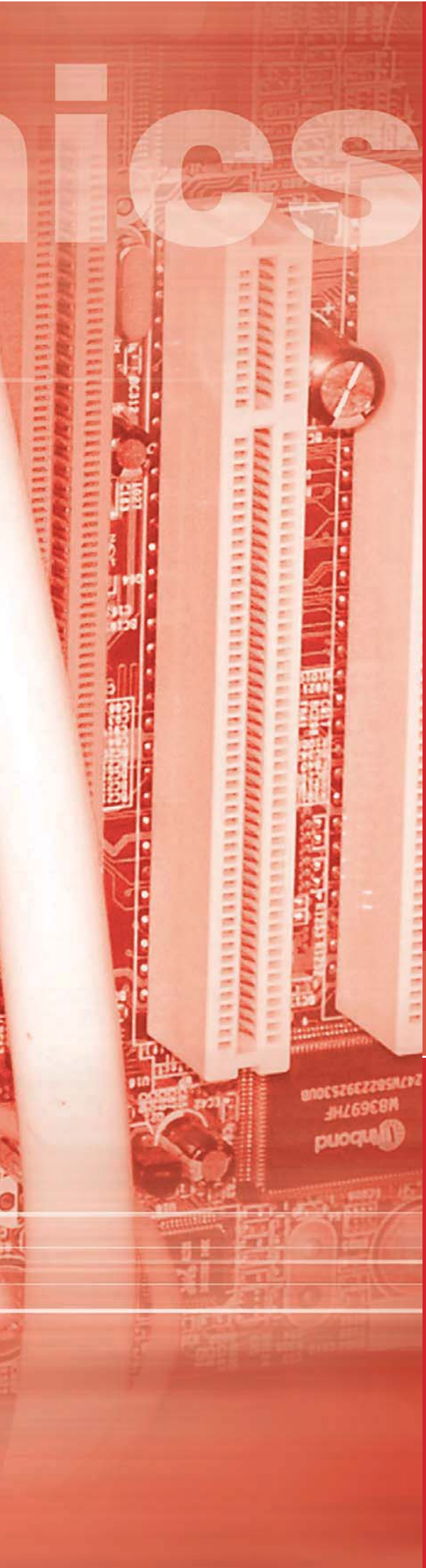
Transport loads, machining forces, feed



Rotary or tilting units	1*	2 *	3	4	5	6	7
RDH-M (step)	100 kg	45 kg	55 Nm	24 Nm	24 Nm	4 rpm	1:51
RDH-M (step)	160 kg	70 kg	108 Nm	45 Nm	45 Nm	2 rpm	1:101
RDH-M (EC-servo, brushless)	110 kg	50 kg	26 Nm	9 Nm	9 Nm	22 rpm	1:51
RDH-M (EC-servo, brushless)	180 kg	80 kg	51 Nm	17 Nm	17 Nm	11 rpm	1:101
RDH-S (step)	30 kg	15 kg	7 Nm	7 Nm	7 Nm	4 rpm	1:51
RDH-S (step)	48 kg	24 kg	11 Nm	11 Nm	11 Nm	2 rpm	1:101
RDH-S (EC-servo, brushless)	30 kg	15 kg	7 Nm	4.6 Nm	4.6 Nm	22 rpm	1:51
RDH-S (EC-servo, brushless)	48 kg	24 kg	11 Nm	4.6 Nm	9.2 Nm	11 rpm	1:101
RDH-S (DC-servo)	25 kg	13 kg	7 Nm	4.6 Nm	4.6 Nm	22 rpm	1:51
RDH-S (DC-servo)	40 kg	20 kg	11 Nm	8.7 Nm	8.7 Nm	11 rpm	1:101
RDH-XS (step)	30 kg	10 kg	5 Nm	5 Nm	5 Nm	24 rpm	1:50
RDH-XS (step)	30 kg	10 kg	7 Nm	7 Nm	7 Nm	12 rpm	1:100
RDH-XS (EC-servo, brushless)	30 kg	10 kg	5 Nm	5 Nm	5 Nm	59 rpm	1:50
RDH-XS (EC-servo, brushless)	30 kg	10 kg	7 Nm	7 Nm	7 Nm	30 rpm	1:100
RDH-XS (DC-servo)	30 kg	10 kg	5 Nm	5 Nm	5 Nm	70 rpm	1:50
RDH-XS (DC-servo)	30 kg	10 kg	7 Nm	7 Nm	7 Nm	35 rpm	1:100
RF 1 (step)	60 kg	30 kg	37 Nm	17.5 Nm	17.5 Nm	50 rpm	1:24
RF 1 (step)	100 kg	50 kg	75 Nm	38 Nm	38 Nm	23 rpm	1:52
RF 1 (step)	150 kg	75 kg	75 Nm	75 Nm	75 Nm	12 rpm	1:100
RF 1 (DC servo/EC servo)	70 kg	35 kg	7 / 12 Nm	6 / 10 Nm	6 / 10 Nm	125 rpm	1:24
RF 1 (DC servo/EC servo)	110 kg	55 kg	16 / 26 Nm	13 / 22 Nm	13 / 22 Nm	58 rpm	1:52
RF 1 (DC servo/EC servo)	160 kg	80 kg	30 / 50 Nm	25 / 42 Nm	25 / 42 Nm	30 rpm	1:100
MD 1 (step)	5 kg	2.5 kg	14 Nm	8 Nm	8 Nm	60 rpm	1:20
MD 1 (DC servo)	6 kg	3 kg	3.9 Nm	3 Nm	3 Nm	175 rpm	1:20
MD 1 (EC servo, brushless)	6 kg	3 kg	4 Nm	3.2 Nm	3.2 Nm	150 rpm	1:20
ZR 20 (step)	10 kg	5 kg	14 Nm	8 Nm	8 Nm	60 rpm	1:20
ZD 30 (step)	14 kg	8 kg	20 Nm	12 Nm	12 Nm	40 rpm	1:30

*) Guideline values will vary according to application !!


electron
NB_FAN
RTL8101L



ELECTRONICS

Overview

Overview

electronics

Two-phase stepper motors

MS 135/200 HT-2

Two-phase stepper motor MS 135 HT - 2

Features

- Step angle 1.8°, higher resolution through microstep mode
- Very high torque through rare earth magnets
- Optimised for use with position controllers
- Optimum torque/size ratio
- Smaller step angle errors, non-cumulative
- IP43 protection class
- Optional:
  - MD 24 drive module
  - Brake (MS 200 HT)
  - Second shaft end (MS 200 HT)

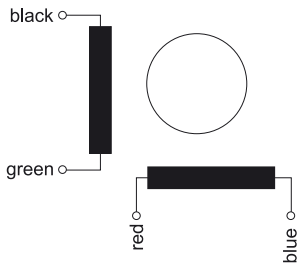
General

Two-phase stepper motors behave similarly to synchronous motors. They are easy to control and are characterised by very long working life and reliability, at a favourable price. This results in a wide range of applications. Two-phase stepper motors in the MS range are of the high torque type. A particularly high torque is achieved by the use of rare earth magnets.

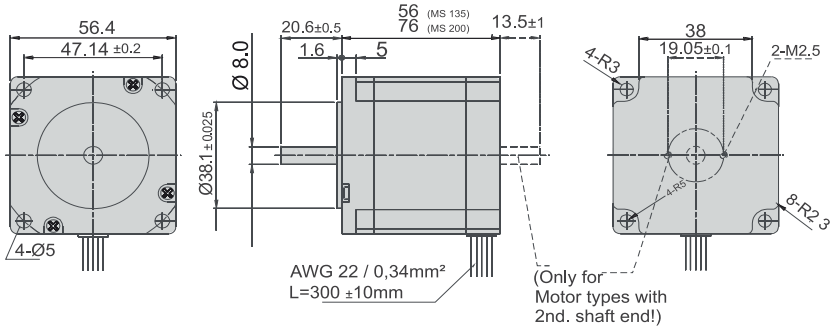
Technical specification

Description	Holding moment bipolar Nm	Winding current per phase A	Winding voltage per phase V	Winding inductance per phase mH	Weight kg	Length (without shaft) mm	Part no.
MS 135 HT-2	1.1	3.0	2.4	2.4	0.7	56	470551
MS 200 HT-2	1.8	3.0	3.0	3.5	1.0	76	470581
MS 200 HT-2 (2nd shaft end)	1.8	3.0	3.0	3.5	1.1	76	470581 0100
MS 200 HT-2 (brake)	1.8	3.0	3.0	3.5	1.8	76	470581 0200

Wiring diagram

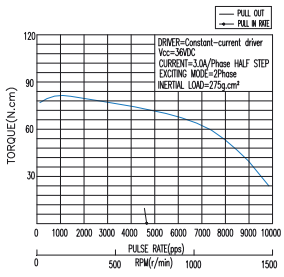


Dimensioned drawing

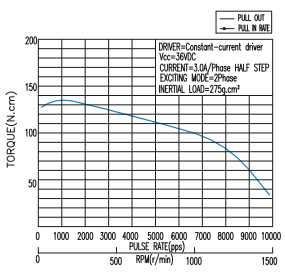


Torque curves

MS 135 HT



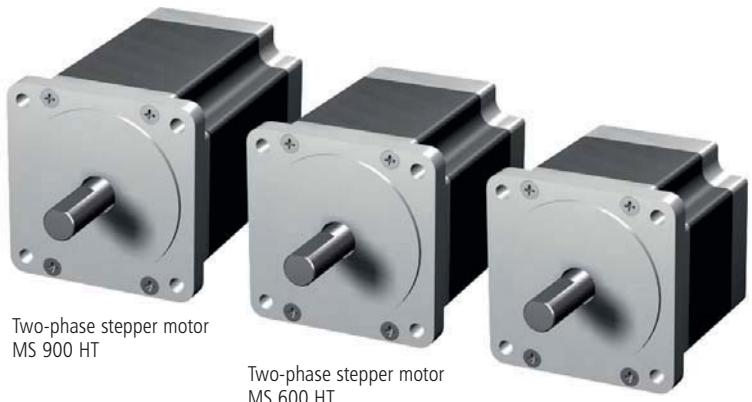
MS 200 HT



Technical specifications subject to change.

Two-phase stepper motors

MS 300/600/900 HT-2



Two-phase stepper motor
MS 900 HT

Two-phase stepper motor
MS 600 HT

Two-phase stepper motor
MS 300 HT

Features

- Step angle 1.8°, higher resolution through microstep mode
- Very high torque through rare earth magnets
- Optimised for use with position controllers
- Optimum torque/size ratio
- Smaller step angle errors, non-cumulative
- IP43 protection class
- Optional:
  - MD 28 drive module
  - Brake (MS 300 HT)

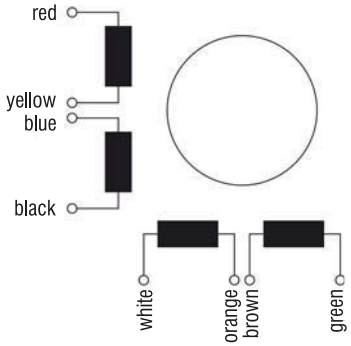
General

Two-phase stepper motors behave similarly to synchronous motors. They are easy to control and are characterised by very long working life and reliability, at a favourable price. This results in a wide range of applications. Two-phase stepper motors in the MS range are of the high torque type. A particularly high torque is achieved by the use of rare earth magnets.

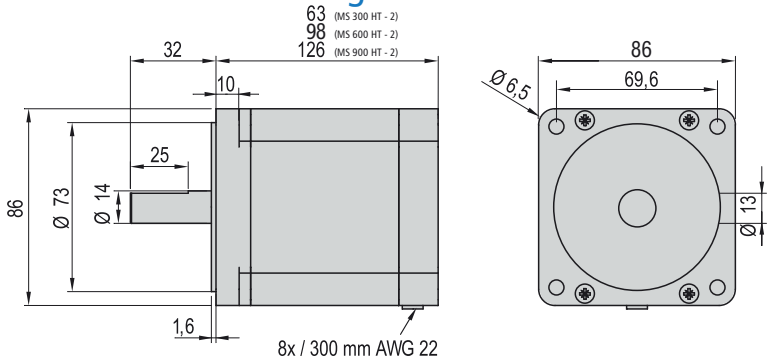
Technical specification

Description	Holding torque Bipolar Nm	Winding current per phase parallel/series A	Winding voltage per phase parallel/series V	Winding inductance per phase mH	Weight kg	Length (without shaft) mm	Part no.
MS 300 HT - 2	3.11	5.6 / 2.8	1.68 / 3.38	1.6	2.0	63	470821
MS 300 HT - 2 (brake)	3.11	5.6 / 2.8	1.68 / 3.38	1.6	2.75	104	470821 0200
MS 600 HT - 2	6.80	7.0 / 3.5	2.28 / 4.55	2.4	3.0	98	470851
MS 900 HT - 2	9.00	6.3 / 3.1	2.84 / 5.67	4.2	4.5	126	470881

Wiring diagram

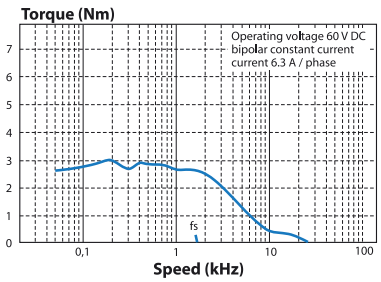


Dimensioned drawing

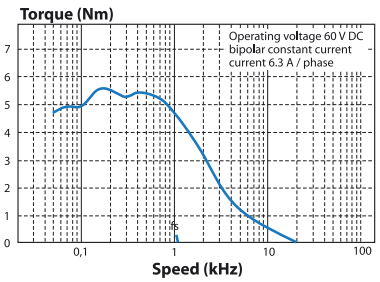


Torque curves

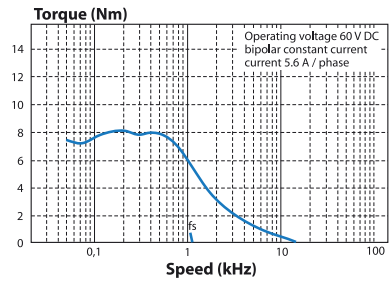
MS 300 HT



MS 600 HT



MS 900 HT



Technical specifications subject to change.

electronics

Servo motors
with brushless drive

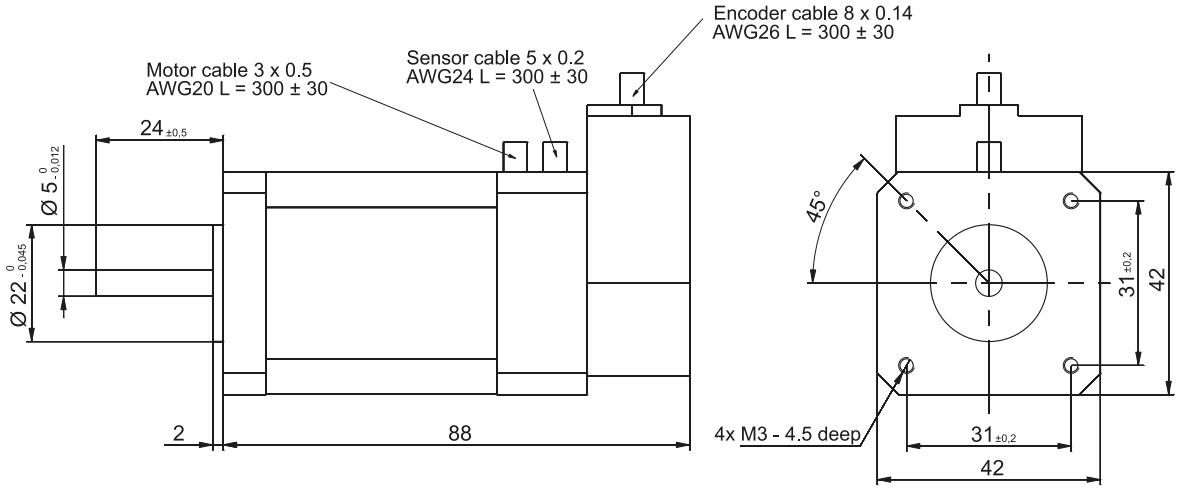
EC 42

Features

- Electronically commutated 3-phase-servo motor
- Brushless drive
- Compact configuration
- Incremental encoder with 1000 increments/turn, RS422
- Hall sensors
- Areas of application: positional control, speed control

Technical specification

Part no.	Description	Rated output W	Nominal voltage V DC	Current A	Number of poles	Rated speed rpm	torque at rated speed Nm	Peak torque Nm	Length L mm	Weight kg
474062 0048	EC 42	62	48	1.75	8	3000	0.2	0.6	88	0.55



Wire colours

Motor cable

Signal	Colour
Motor U	yellow
Motor V	blue
Motor W	green

Hall cable

Signal	Colour
Hall A	yellow
Hall B	green
Hall C	blue
Vcc +5 V	red
Gnd	black

Encoder cable

Signal	Colour
Encoder A	blue
Encoder /A	blue/black
Encoder B	green
Encoder /B	green/black
Encoder Z	yellow
Encoder /Z	yellow/black
Vcc +5 V	red
Gnd	black

Technical specifications subject to change.

Servomotors
with brushless drive

EC 60

Features

- Electronically commutated 3-phase servomotor
- Brushless drive
- High output performance concurrently with compact build
- Incremental encoder with 1000 increments/turn, RS422
- Hall sensors
- IP44 protection class
- Uses: Positioning and speed control
- Connection via circular plug
- Option: Brake

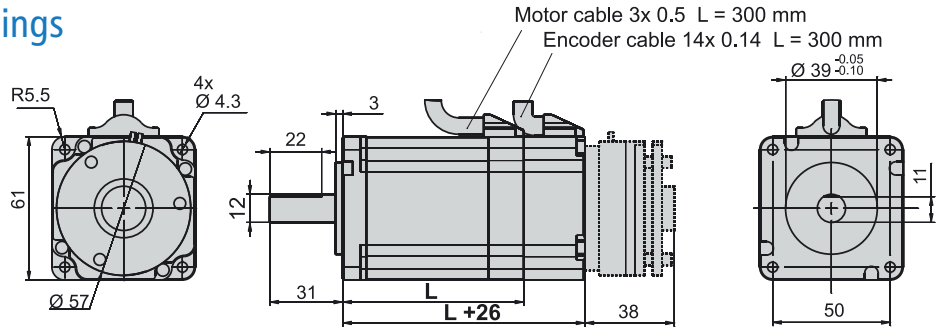
General

Brushless EC motors are designed as electronically switched 3-phase synchronous motors. Compared with brush drives, these motors have an even longer working life, because they are subjected to less wear. Moreover, in this case, high power density and dynamic response relative to size must be emphasized. These motors are used in many automation technology areas and in CNC machines.

Technical specification

Part no.	Description	Rated output W	Rated voltage V DC	Current A	Number of poles	Rated speed rpm.	Torque at rated speed Nm	Peak torque Nm	Length L (mm)	Weight kg
474156 0048	EC 60S	156	48	6.9	8	3,000	0.5	1.75	73	1.25
474156 1048	EC 60S with brake	156	48	6.9	8	3,000	0.5	1.75	73	2.0
474235 0048	EC 60L	235	48	10.5	8	3,000	0.75	2.25	94	1.6
474235 1048	EC 60L with brake	235	48	10.5	8	3,000	0.75	2.25	94	2.35
474235 0310	EC 60L	235	310	1.6	8	3,000	0.75	2.25	94	1.6
474235 1310	EC 60L with brake	235	310	1.6	8	3,000	0.75	2.25	94	2.35

Dimensioned drawings



Wire colours/ Pin assignments

Motor cable

Signal	Colour
Motor U	yellow
Motor V	blue
Motor W	green
PE	green/yellow

Encoder cable

Pin	Signal	Colour
1	Shield	Shield
2	Gnd	black
3	Vcc +5 V	red
4	Encoder B	grey
5	Encoder /B	grey/black
6	Encoder A	brown
7	Encoder /A	brown/black
8	Encoder Z	orange
9	Encoder /Z	orange/black
10	Hall A	yellow
11	Hall B	white
12	Hall C	green

Encoder cable plug connector:
12-pole female connector strip, type JST PHR-12

Technical specifications subject to change.

electronics

Servomotors
with brushless drive

EC 86

Features

- Electronically commutated 3-phase servomotor
- Brushless drive
- High output performance concurrently with compact build
- Incremental encoder with 1000 increments/turn, RS422
- Hall sensors
- IP44 protection class
- Uses: Positioning and speed control
- Connection via circular plug
- Option: Brake

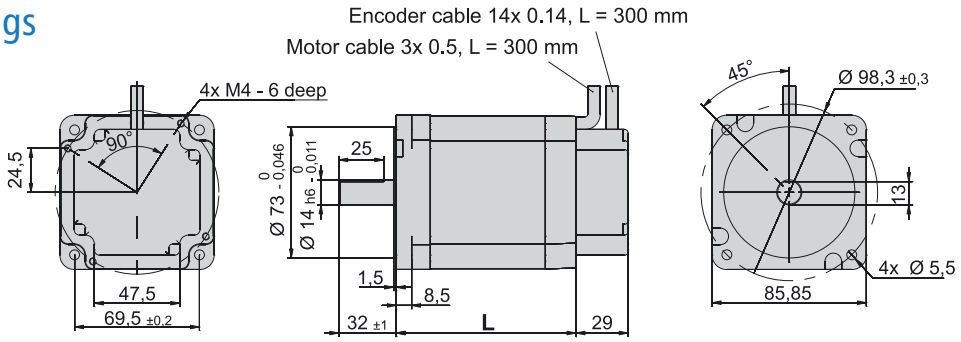
General

Brushless EC motors are designed as electronically switched 3-phase synchronous motors. Compared with brush drives, these motors have an even longer working life, because they are subjected to less wear. Moreover, in this case, high power density and dynamic response relative to size must be emphasized. These motors are used in many automation technology areas and in CNC machines.

Technical specification

Part no.	Description	Rated output W	Rated voltage V DC	Current A	Number of poles	Rated speed rpm.	Torque at rated speed Nm	Peak torque Nm	Length L mm	Weight kg
474440 0310	EC 86S	440	310	3.4	8	3,000	1.4	5.0	100	2.6
474660 0310	EC 86L	660	310	3.6	8	3,000	2.1	7.4	125	4

Dimensioned drawings



Wire colours/ Pin assignments

Motor cable

Signal	Colour
Motor U	yellow
Motor V	blue
Motor W	green
PE	green/yellow

Encoder cable

Pin	Signal	Colour
1	Shield	Shield
2	Gnd	black
3	Vcc +5 V	red
4	Encoder B	grey
5	Encoder /B	grey/black
6	Encoder A	brown
7	Encoder /A	brown/black
8	Encoder Z	orange
9	Encoder /Z	orange/black
10	Hall A	yellow
11	Hall B	white
12	Hall C	green

Encoder cable plug connector:
12-pole female connector strip, type JST PHR-12

Technical specifications subject to change.

isel®

Space for your notes

electronics

Linear motors
LS winding package with MS magnetic rail

iLM series

Diagram:
LS 25 winding package
with MS 25 magnetic rail

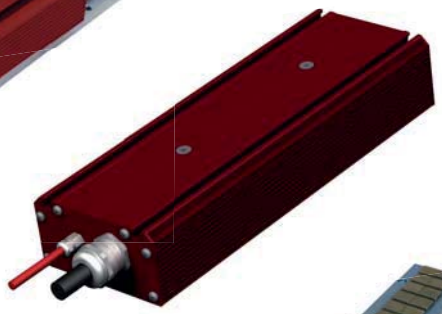


Diagram:
LS 50 winding package

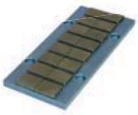


Diagram:
MS 25 magnetic rail
with 8 magnets

Features

- Ready-for-installation systems comprising primary part (LS winding package) and secondary part (MS magnetic rail)
- Compact build
- High acceleration
- High speed and dynamic response
- High efficiency
- Free from wear
- Custom motor length
- Secondary part (MS magnetic rail): Elements of any length, depending on their carrier system, can be arranged in rows
- Controllable with standard servo converters

Optional:
- iMD 40 drive controller (only in conjunction with Hall board)
- Magnetic length measurement system
- Linear guides

General

Linear motors in the iLM series are linear 3-phase servomotors of various sizes and any length at a favourable price/performance ratio. The optionally integrated Hall sensors provide the positional information for switching the motor. There is a PTC temperature sensor in the primary component to protect the motor. The electrical connections (Hall, windings and temperature sensor) are made via permanently installed cable. Owing to the direct power transfer, there is no need for any mechanical transfer elements, such as spindles and toothed belts which completely eliminates friction and play. This means that higher speeds and dynamic responses can be achieved. The resultant lower clocking times reduce production costs and increase productivity. Because there are no mechanical elements in the drive itself, noise, wear and the resultant maintenance costs are minimised. In comparison with other linear drives, drives with linear motors are more accurate, faster, free from play (without return play) and more robust.

Ordering information

Winding package

486 0X2 000X

Coil package
0 = LS 25
1 = LS 50

Number of coils
1 = 3 coils
2 = 6 coils
3 = 9 coils
4 = 12 coils

Magnetic rails

MS 25 magnetic rail with 8 magnets (L×W×H approx.124/45/11mm)
Part-no.: **486100 01241**

MS 25 magnetic rail with 32 magnets (L×W×H approx.496/45/11 mm)
Part-no.: **486100 04961**

MS 50 magnetic rail with 8 magnets (L×W×H approx. 200/80/11 mm)
Part-no.: **486110 0200**

MS 50 magnetic rail with 16 magnets (L×W×H approx. 400/80/11 mm)
Part-no.: **486110 0400**

MS 50 magnetic rail with 32 magnets (L×W×H approx. 800/80/11 mm)
Part-no.: **486110 0800**

LS 25 coil package with 6 coils and Hall boards	Part-no.: **486001 0002**
+ 2× MS 25 magnetic rails with 32 magnets	Part-no.: **486100 0496**
+ iMD 40 drive controller	Part-no.: **314040**
+ iMS-I magnetic length measuring system (5 µm resolution)	Part-no.: **390255 4412**

Technical specifications subject to change.

Linear motors
LS winding package with MS magnetic rail

iLM series

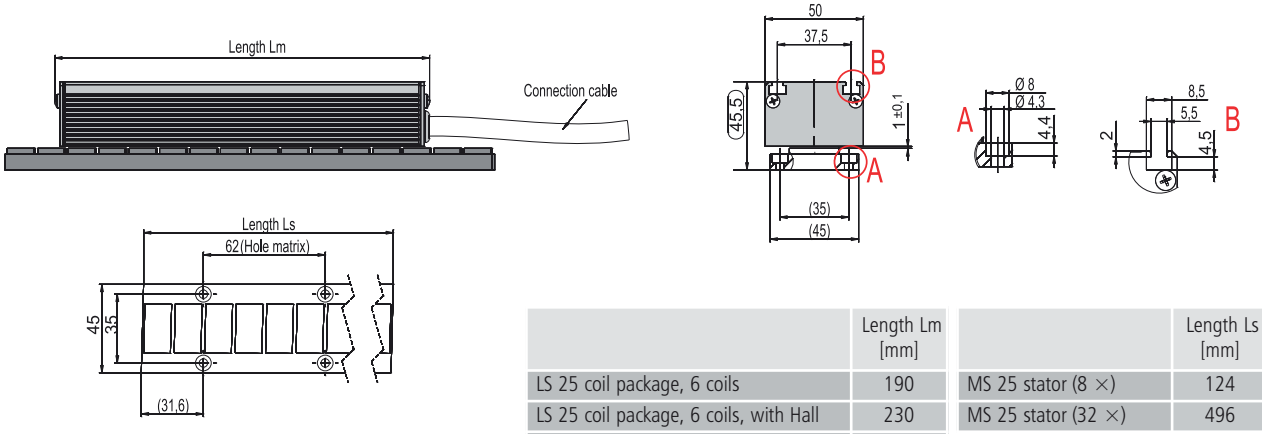
Technical specification

	Intermediate circuit voltage [V] **	Number of coils	Rated current [A]	Peak current [A]	Feed force [N]	max. feed force [N]	max. tensile force [N]*	Rated speed [m/s] at rated current
LS 25/6 coils	330	6	2.6	6.5	70	170	500	6.6
LS 25/12 coils	330	12	2.6	6.5	140	340	1,000	4.0
LS 50/6 coils	330	6	6.0	15.0	285	675	1,995	5.1
LS 50/12 coils	330	12	6.0	15.0	570	1,350	3,990	3.5

* Higher intermediate circuit voltage to order.
* * Applicable for a working air gap of 0.8 mm.

Dimensioned drawings

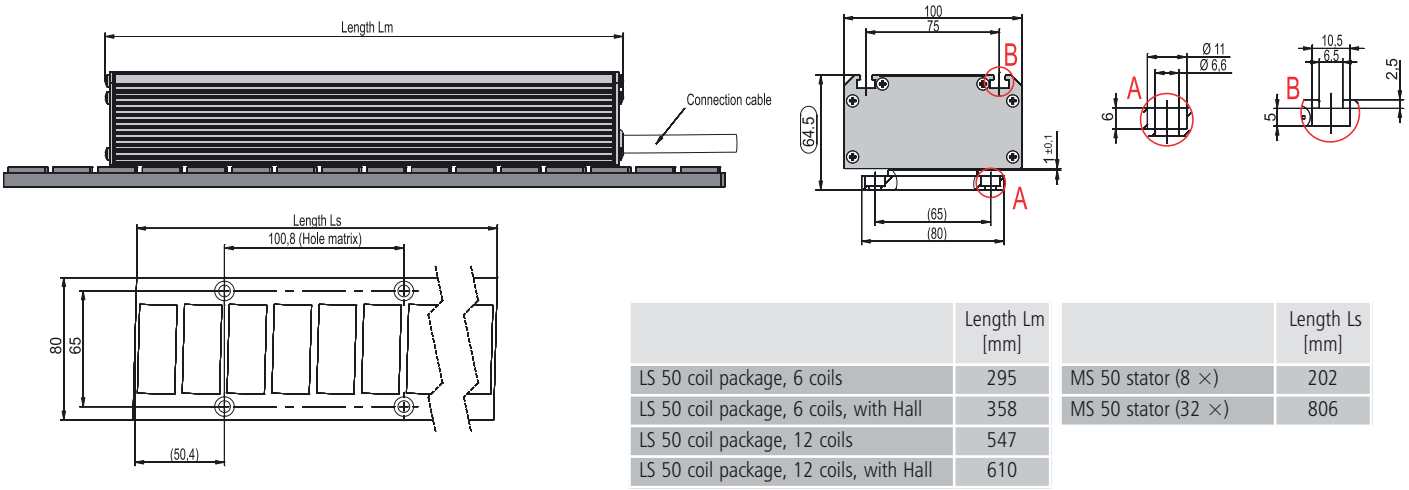
iLM 25 linear motor



	Length Lm [mm]
LS 25 coil package, 6 coils	190
LS 25 coil package, 6 coils, with Hall	230
LS 25 coil package, 12 coils	365
LS 25 coil package, 12 coils, with Hall	405

	Length Ls [mm]
MS 25 stator (8 ×)	124
MS 25 stator (32 ×)	496

iLM 50 linear motor



	Length Lm [mm]
LS 50 coil package, 6 coils	295
LS 50 coil package, 6 coils, with Hall	358
LS 50 coil package, 12 coils	547
LS 50 coil package, 12 coils, with Hall	610

	Length Ls [mm]
MS 50 stator (8 ×)	202
MS 50 stator (32 ×)	806

Technical specifications subject to change.

iMS magnetic length measuring system

Detailed information
under
www.isel-germany.de

Diagram:
iMS magnetic length measuring system

Features

- Measuring head with sensor in stable casing
- Reliable, robust, good value
- 2 channels, A and B,
  difference mode incremental RS 422 or
  difference mode analogue 1VSS
- Incremental/digital resolution (see table)
- Repeatability = ±1 increment
- Magnetic tape on self-adhesive,
  stainless steel bearer tape

optional:
- Reference pulse

General

The iMS contactless magnetic measuring system relies on scanning a magnetically coded measuring tape by means of a magnetically sensitive sensor and is suitable for detection of both linear and radial positions. A decisive advantage compared with significantly more expensive optical systems is provided by its insensitivity to contamination caused by liquids, greases and dust. Our length measuring system is therefore a cost-effective alternative to other systems on the market.

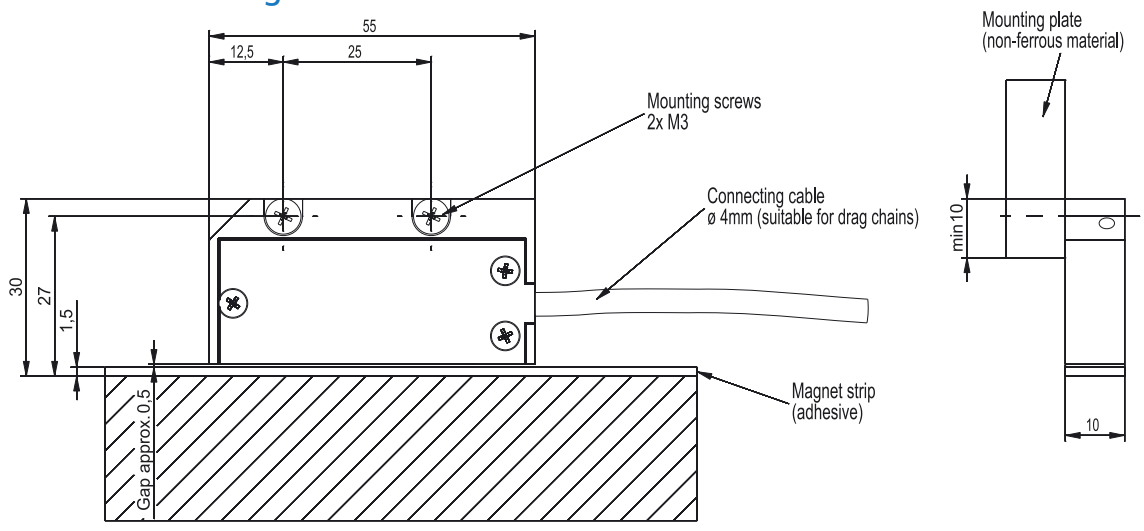
Available sensor interfaces for further processing in the peripherals are, optionally, a pulse sensor with incremental RS422 AB output (Z optional) and a SIN/COS/(Z optional) sensor with voltage amplitude 1Vss.

Ordering data

iMS-I magnetic length measuring system in casing
Resolution 5µm, edge interval 0.55 µs, Processing speed 5.25 m/s
Part no.: **390255 5512C2**

Magnetic tape on self-adhesive stainless steel bearer tape (2 mm pole pitch, 10 mm wide, 1.3 mm thick)
Part no.: **563150**

Dimensioned drawing



Technical specifications subject to change.

iMS magnetic length measuring system

Technical specification

Sensor

Mechanical specification	
Casing	Aluminium
Weight	approx. 70g
Sensor lead	PUR
Cable bending radius	>10 mm, first bend > 10 mm from sensor casing
Electronic data	
Supply voltage	4.9V - 5.1V (optional: 7V - 15V)
Current drain	< 100 mA on no load
Output signals	Standard RS422 A, /A, B, /B optional reference Z, /Z Option: SIN/ COS 1Vss +20%, -40%, Z und /Z right sign
Termination	Terminating resistor = 120 Ohm between corresponding output signals, e.g. A - /A, at receiver
Sensor distance - magnetic tape	0.4 - 0.7 mm
Sensor resolution incremental	1 µm, 2.5 µm, 5 µm, 10 µm, 20 µm
Pulse interval	0.25 µs, 0.55 ns, 1 µs, 2 µs, 4 µs, 8 µs
maximum speed	< 10 m/s, higher on request
Repeat accuracy	Incremental resolution ± 1 increment, plus errors due to angular tilting in the 3 sensor axes
accuracy	Measurement error 20 µm, plus errors due to angular tilting in the 3 sensor axes
Reference sequence	optional: NSN (special order)
Ambient conditions	
Operating temperature	-5°C to 80°C
Storage temperature	-20°C to 100°C
Air humidity (only sensor)	100%, dewing allowed

Normal measurement - magnetic tape

operating temperature	-5°C to 80°C
Material	High quality stainless steel, coding bearer elastomer, self-adhesive
Thickness	1.3 mm ± 0.15 mm + bonding layer 0.13 mm, optional: 0.1 mm stainless steel tape + 0.2 mm bonding layer
Width	10 mm
Length	up to 50m on roll
Pole pitch/PITCH	2 mm, i.e. north pole = 2 mm, south pole = 2 mm magnetic period = 4 mm
Number of tracks	Single track, 10 mm wide Option: signal track 5 mm, reference track periodically 5 mm
accuracy	± 0.04mm/m, at 20°C
Coefficient of expansion	17E-6 m/Kelvin
Ambient conditions	
with no or minimum effect on the measurement norm	Chemical resistance to contamination with motor oil, gearbox oil, ATF, hydraulic oil, kerosene, antifreeze, Clorox disinfectant, turpentine, water, brine. The materials listed have no or little effect on the long term stability of the measurement standard; this depends, among other things, on the concentration, the temperature and the time of the contamination. Please check your own case.
little/average effect on the measurement standard	Jet petrol, carburettor fuels, heptanes, alcohols
strong effect on the measurement standard	Aromatic hydrocarbons, ketones, inorganic acids

Technical specifications subject to change.

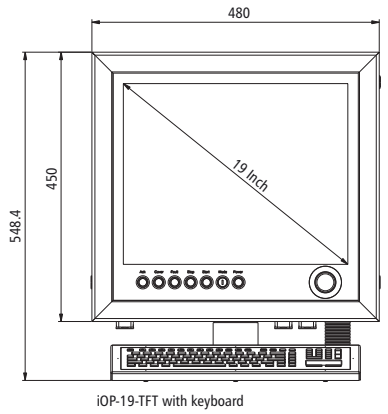
electronics

CNC control units iOP-19-TFT / iOP-19-CPU

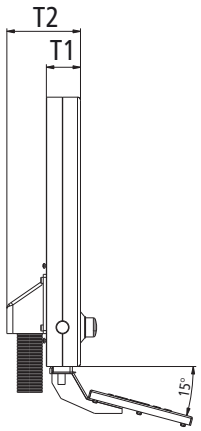
General

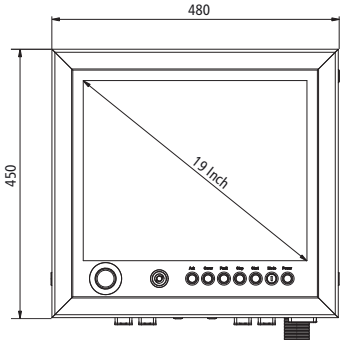
The CNC control units iOP-19 are a revised version of the previous isel control panels iBP. All experiences have been incorporated into the new development of the iOP-19. They have an integrated 19" touch screen monitor, a silicone keyboard as well as a control panel with stainless steel buttons and emergency stop switch. A PC can be connected and operated via the lead-out standard connecting cables . The iOP-19-CPU has an isel CAN.

Dimensioned drawings

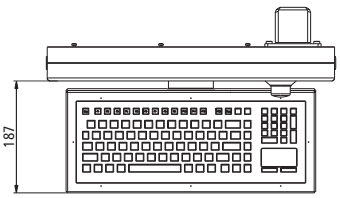


iOP-19-TFT with keyboard





iOP-19-CPU with potentiometer (optional)



	Depth T1	Depth T2
iOP-19-TFT	57	123
iOP-19-CPU	130	196

Common features

- robust aluminium housing (standard color: RAL 3011 / red)
- 19" touch screen display
- high-quality silicon keyboard (protection class: IP68)
  - in German and English
  - 105 keys, with touchpad
- easy mounting option for keyboard
- user-friendly approach via high-adjustable arm
- easy mounting via VESA mounting 100/100
- 3 USB ports

Features iOP-19-TFT

- Protection class IP 50
- Dimensions (without keyboard): W 480 x D 123 x H 450 mm
- Weight: approx. 15kg

Features iOP-19-CPU

- Protection class IP 40 and IP 50
- Motherboard 64 bit / CPU IntelCore I3
- additional a network connection (LAN)
- Dimensions (without keyboard): W 480 x D 196 x H 450 mm
- Weight: approx. 16kg

Options

- foot
- simple keyboard and mouse tray
- Two-hand operation
- RAL 9005 (black) or graphite hammer
- Potentiometer for Override (iOP-19-CPU)

Ordering Data

Control panel **iOP-19-TFT**, RAL 3011 (red)
Part-no.: **371100 1000**

Control panel **iOP-19-CPU**, RAL 3011 (red)
Part-no.: **371101 1000**

German keyboard, RAL 3011 (red)
Part-no.: **371200 0001**

English keyboard, RAL 3011 (red)
Part-no.: **371200 0002**

Swivel arm for profile PS 50
Part-no.: **371050 2020**

Swivel arm for profile PS 80
Part-no.: **371050 2040**

Swivel arm for profile 100
Part-no.: **371050 2050**

Swivel arm for profile 125
Part-no.: **371050 2060**

Swivel arm for profile PS 140
Part-no.: **371050 2070**

Swivel arm for profile PV 150
Part-no.: **371050 2080**

Technical specifications subject to change.

Drive modules MD 24/28

for 2-phase step motors

Features

- High performance, low noise
- Power supply up to 50 V DC (80 V DC)*
- Output current up to 4.2 A (7.8 A)*
- Automatic current reduction
- Suitable for 2-phase and 4-phase stepper motors
- Clock / direction interface
- Input frequency for clock input up to 300 KHz
- 15 (14)* selectable resolutions up to 25,600 steps/rev (51,200 steps/rev)*
- Opto-isolated, TTL-compatible inputs
- Protection against short-circuit, overvoltage and overcurrent*

* MD 28

General

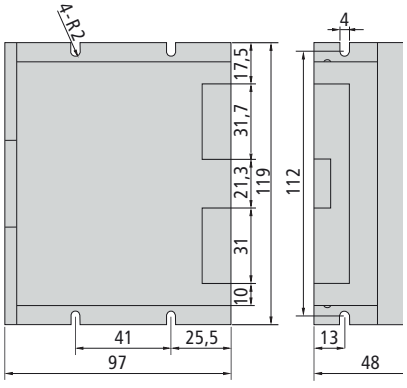
The step motor drive modules MD24/MD28 are powerful final stages for 2-phase and 4-phase step motors.
The modules are micro-step capable and thus allow very quiet running of the connected motors. Due to its particular chopper technology for the motor current, identical motors can deliver higher speeds and torques than conventional, comparable drive modules. The clocking/direction interface also allows simple connection to various motion controllers or a PLC.

Technical specification

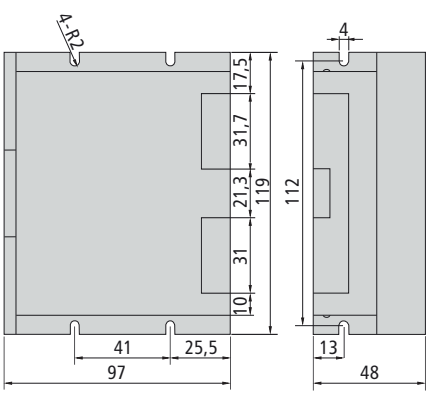
		MD 24			MD 28		
Parameter	**Unit**	Min.	Typical	Max.	Min.	Typical	Max.
Output current	**A**	1	-	4.2 (3.0 A rms)	2.8	-	7.8 (5.6 A rms)
Mains voltage	**VDC**	20	36	50	24	68	80
Current logic signals	**mA**	7	10	16	7	10	16
Clocking input frequency	**kHz**	0	-	300	0	-	300
Insulation resistance	**MΩ**	500			500		
Part no.			316303			316304	

Dimensioned drawings

MD 24



MD 28



Technical specifications subject to change.

Drive controller
for stepper and servo motors

iMD 10/20/40

iMD 10 iMD 20 iMD 40

General

The **iMD10/20** series of drive controllers are economical final stages for DC motors (iMD10) and EC servomotors (iMD20).

The fully digital **iMD40** drive controller is an economical final stage, powered directly from the mains, for EC servomotors (synchronous motors, such as linear or torque motors) up to 2 kW.

Typical applications are CNC machines and automation systems. The final stage casings are optimised for cabinet installation. The extensive configuration options allow flexible adaptation to a wide range of applications and all required settings can be made with a user-friendly commissioning software package.

There are various user interfaces available for integration with proprietary applications. Here, the CAN open interface must be emphasized. In addition to synchronous point-to-point positioning (S-PTP) and speed control, track control (CP -Continuous Path) and synchronised multiple axis applications are feasible using the implemented CANopen protocol DS402. Additional interfaces include a ±10V interface (nominal speed) and a RS232 interface.

Short controller cycle times (current, speed, position controller) ensure optimum performance for highly dynamic drives. The drive controllers are suitable both for rotary drives and for the corresponding linear direct drives and torque motors (iMD20 and iMD40). A redundant rest monitoring system has been integrated in the drive controller. It reduces work by the controller in external assemblies to a minimum and allows for convenient operation or use of the machine.

Drive controller
for stepper and servo motors

iMD 10/20/40

Technical specification

Features	iMD 10	iMD 20	iMD 40
Motor type	Brush servomotors (DC)	Brushless servomotors (EC)	Brushless servomotors (EC)
Power supply	40-95 V DC		230V AC, mains, single phase
Motor current	Constant current 12 A, peak current 25 A		Constant current 6.5 A Peak current 8 A
CAN bus interface	CANopen DS301 V4.0 and DS402 V1.0 der CiA (CAN in automation)		CANopen DS301 V4.0 and DS402 V1.0 of CiA (CAN in automation)
RS-232 interface (asynchronous, 19.2 or 57.6 kbits/s).	For commissioning (DcSetup.exe) or e.g. PLC connection; effective data transfer protocol	For commissioning (AcSetup.exe) or e.g. PLC connection; effective data transfer protocol	For commissioning (AcSetup.exe) or, e.g. PLC connection; effective data transfer protocol
Measuring system	Incremental encoder (RS422); max. input frequency: 1.25 MHz		Incremental encoder (RS422); max. input frequency: 1.25 MHz
Commutation	--	Hall sensor signals	Hall sensor signals
Analogue input (±10V)	11 bit resolution		11 bit resolution
PWM switching frequency	max. 12.5 kHz	max. 16.4 kHz	max. 16.4 kHz
Inputs for limit and reference switches	✓	✓	✓
Digital current, speed and position control	Scanning times: min. 80 µs/244 µs/ 488 µs for current/speed/position controllers	Scanning times: min. 61 µs/244 µs/ 488 µs for current/speed/position controllers	Scanning times: min. 61µs/ 244 µs/488 µs for current/ speed/position controllers
Brake controller	✓	✓	✓
Gantry mode or synchronous control	of 2 modules, Master-Slave via CAN bus		
Monitoring of the motor current	Short circuit, I^2t	Short circuit, I^2t, Pulse-by-pulse	Short circuit, I^2t, Pulse-by-pulse
Monitoring of the encoder signals	✓	✓	✓
Monitoring of the software by internal Watchdog timer	✓	✓	✓
Simple update of the firmware over RS-232	Possible locally by customer or service engineer		
Rest state monitoring	Redundancy to ISO standard		
Dimensions	180 x 35 x 110 mm	180 x 35 x 120 mm	180 x 50 x 150 mm
Part no. Drive controllers	314 020	314 030	314 040

Motor and encoder connecting leads are NOT included in delivery.

Technical specifications subject to change.

electronics

PC controller

iPC 25

Figure:
PC controller iPC 25
with possible connection alternatives

General

The iPC25 universal PC controller is a Windows- or Linux-compatible controller at a favourable price/performance ratio. Its versatile applications may be found throughout the entire industry sector and in various consumer sectors.

All connections are made on the front. The multifunctional panel offers a wide range of connection options.

Inter alia, a CAN interface with either 1 or 2 channels is available.

A remote interface is available for covered installation (e.g. in a cabinet or in the interior of a motor vehicle).

Installation is possible both in the "standing" and "lying" positions.

Techncal specifications

	iPC 25 PC controller
CPU	Intel® Dual-core Celeron® 1037U processor (1.8 GHz)
Form factor mainboard	mainboard Mini-ITX
RAM	2 x 1.5V DDR3 DIMM support up to 16 GB
Hard disks (S-ATA)	(S-ATA) 2½ Zoll ≥160 GB /SSD ≥120 GB
Graphics	Integrated Intel CPU Graphic
Monitor	VGA/HDMI
Audio	Realtek® ALC887 Codec
LAN	2 x Realtek® GbE LAN chips (10/100/1000 Mbit)
Power supply	12VDC
Operating system	Windows® Embedded Standard 7
external connections	1 x PS/2 keyboard 1 x PS/2 mouse 1 x D-Sub port 1 x HDMI port 3 x audio jacks (Line In, Line Out, Mic In) 12VDC power supply 2 x RJ-45 ports 4 x USB 2.0/1.1 ports 1 x serial port 1 x eSATA 3Gb/s connection
Internal interfaces	1 x IDE interface 1 x SATA 6Gb/s interface 2 x SATA 3Gb/s interfaces 1 x chassis intrusion header 1 x System blower header 1 x front panel header 1 x front panel audio header 2 x USB 2.0/1.1 headers 1 x parallel interface 1 x serial interface 1 x PCI slot
Humidity	Max. 90% (non-condensing)
Ambient temperature	0°C to 35°C
Protection class	IP 20
Weight	1.2 kg
Dimensions WxHxD	210 x 83 x 190 mm

Features

- Universal PC controller
- Robust, impact-proof aluminium casing
- compact configuration
- various installation options
- Energy-efficient and low-noise
- Supply voltage 12VDC
- front multifunctional panel for versatile connection options
- Design with hard disk or solid state disk (optional)
- Windows and Linux-compatible
- passive cooling
- on the front 12V connector
- Access to PC-ON/Power-LED/HDD-LED via side-mounted D-SUB9
- Access to the parallel port via side-mounted D-SUB25

Ordering Data

Part-no: **371066 0001**
PC controller iPC 25, German
Intel-Cel2K 1.8Ghz,4GB,250GB
CAN-PCI-1channel, serial, Remote,
12 VDC

Part-no: **371066 0001E**
PC controller iPC 25, English
Intel-Cel2K 1.8Ghz,4GB,250GB
CAN-PCI-1channel, serial, Remote,
12 VDC

Technical specifications subject to change.

CAN PCI board

iCC 10/20

Figure:
Single channel

Figure:
2 channels

General

CAN-PCI boards offer a simple solution for connecting a CAN bus to the PCI bus system of a PC (e.g. iPC 15).

A driver software package is supplied with the board, which controls the entire CANopen communication with the application interface (e.g. ProNC) and also provides a programming interface for your own software.

The board can also be used in conjunction with CoDeSys V2.3.

The software package also includes configuration software which can be used to install the default settings for the CAN parameters (CANset).

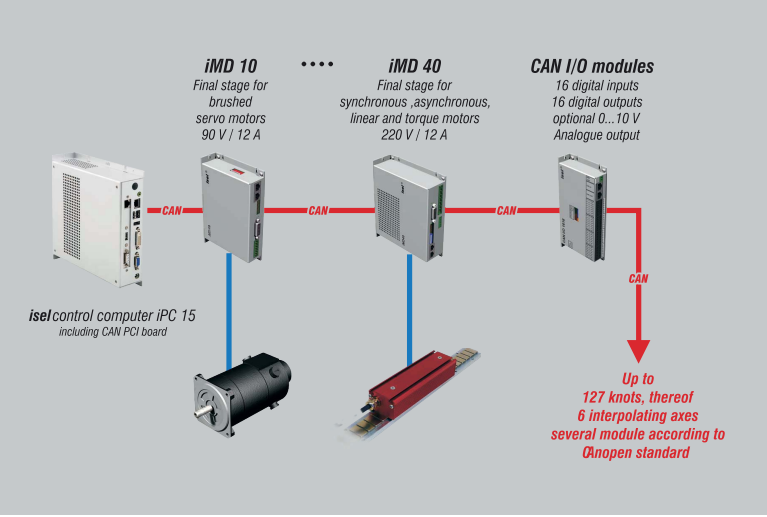
Technical specification

	iCC 10/20
Interface	PCI V2.2/32 bit
CAN channels	40910
galvanic isolation	✓
Data transfer rate of	up to 1 Mbits/s
RJ45	connector

Features

- Mechanical dimensions: 119.5 × 47.3 mm
- PCI-V2.2-compliant
- 32-bit, 33 MHz target interface chip
- 1 or 2 RJ45 CAN channel connectors, screened
- CAN bus galvanically isolated
- Data transfer rate of up to 1 Mbit/s
- Drivers for NT/2000/XP/Vista
- Driver software for isel-CAN-CNC Controller
- Driver for CoDeSys available
- PDO and SDO communication via supplied DLL
- Can be used as CANopen master for a wide range of applications

Block figure CAN bus with iPC 15



Ordering information

CAN PCI board iCC 10
Part no.: **320310** (Single channel)

CAN-PCI-Karte iCC 20
Part no.: **320311** (2 channels)

Technical specifications subject to change.

electronics

CAN controller components

CAN I/0 module 16/16 CAN I/0 module 8/12 - 4/1

General

Both isel CANopen I/O modules provide an entry level into the world of modern industrial automation. They enable installation on site or in a cabinet.

A 24V DC power supply, galvanic isolation of the inputs and outputs and the terminals available directly on the module provide a great range of operating possibilities.

Connection via plug-in terminals and the status display assigned directly to the connection make for particularly user-friendly installation and servicing.

Technical specification

	CAN I/0 module 16/16	CAN I/0 module 8/12 -4/1
Digital inputs	16 via optical coupler (Input current approx. 8 mA)	8 via optical coupler (Input current approx. 8 mA)
Digital outputs	16 8 × relays, Imax < 5A 8 × electronically, Imax < 350 mA	12 4 × relays, Imax < 5A 8 × electronically, Imax < 350 mA
Analogue output	1 0V - 10V via 8-bit D/A converter (when using the analogue output , the electronic outputs are no longer available for use)	1 0V - 10V via 8-bit D/A converter
Analogue input	--	4 0V - 10V, 10-bit resolution
Protection class	IP20	
Supply voltage	24V DC (logic voltage), 24V DC (process voltage),	
Power consumption	160 mA (logic and relays) I_{Load} is dependent on the external wiring	
Ambient temperature	-5°C to +40 °C	
Storage temperature	-25°C to +70 °C	
Relative humidity	max 95 %	
Protection class	IP20	
Weight	260 g	
Casing size	85 × 180 × 28 mm (W × H × D)	
Part no.	**321002**	**321004**

Features

CAN I/0 module 16/16

- 16 digital inputs via optical coupler (input current approx. 8 mA)
- 16 digital outputs, 8 × relays, Imax < 5A, 8 × electronically, Imax < 350 mA (thermal protection, short circuit protection)
- One analogue output, 0 V - 10 V via 8-bit D/A converter (users of an analogue output can no longer use the electronic outputs)

CAN I/0 module 8/12 - 4/1

- 8 digital inputs via optical coupler (Input current approx. 8 mA)
- 12 digital outputs, 4 × relays, Imax < 5A, 8 × electronic, Imax < 350 mA (thermal protection, short circuit protection)
- One analogue output, 0 V - 10 V via 8-bit D/A converter
- 4 analogue outputs, 0 V - 10 V 10-bit resolution

Technical specifications subject to change.

Step controller IT116 Flash

Single axis controller

Figure:
IT 116 Flash front

Figure:
IT 116 Flash back side

General

The **IT 116 Flash step controller** is a freely programmable compact controller for a linear or circular axis with 2-phase stepper motor. The step controller comprises an intelligent step motor stage, a processor core with Flash memory for downloading/storing the PAL-PC user program and the clocking/direction signal generation for the final stage of the motor, the necessary power supply units, a safety circuit (Stop category 0 to EN 60204) and a casing with mains input filter and control elements.

The integrated operating system in the Flash memory of the processor core supports both

- DNC controller mode: PC/laptop connected permanently with the step controller via the serial interface

and the

- CNC controller mode: the step controller works independently, without PC coupling of the stored user program (standalone).

Ordering information

IT 116 Flash step controller (115V AC, 60 Hz) Part no.: **381016 0115 ***
IT 116 Flash step controller (230V AC, 50 Hz) Part no.: **381016 ***

*** including PAL-PC**

Accessories

Motor lead
M23 12-pin socket - SubD 9-pin Pin
Part no.: **392755 0500** (5m)

Motor lead
SubD 9-pin socket - plug 1:1
Part no.: **392781 0500**

Other lengths on request.

Features

- Final output stage
  48 V DC / 4.2 A peak
  for 2-phase stepper motors
- max. 25,600 microsteps/turn
- Mains voltage:
  115V AC/230V AC, 50…60 Hz
- Automatic current sink at
  50% phase current at
  motor speed < 1 rpm
- Motor current/microstep resolution
  variable with DIP switch
- Integrated 32-bit RISC processor
  (Embedded controller) with Flash
  memory for firmware and
  PAL PC user program
- RS-232 interface (front) for
  coupling with PC/notebook
  (program download)
- Control signals:
  Program start/stop, reset on
  controller back side
- 4 optically isolated signal inputs
  (Signal voltage: 24 V DC)
- 4 relay outputs (24 V DC, 300 mA)
- Motor brake controller (24 V DC)
- Remote plug on rear of controller
  for external EMERGENCY SHUT-
  DOWN (2-channel), ext. power on
- Euro cooling rib casing
- Programming with PAL-PC 2.1
  for Win2000, XP, Vista, 7
- Dimensions
  W 105 × H 111 × D 320 mm

Scope of delivery

- Controller in cassette casing
- Mating plug (I/O, pulse, remote)
- Serial interface lead (SubD9 - RJ 45)
- 230V AC mains lead
- PAL-PC software CD
- Operating instructions
- Programming instructions

Technical specifications subject to change.

electronics

Step controller
Multiple axis controller

iMC-S8

Figure:
iMC-S8 step controller as bench version and with 19" housing

General

The **iMC-S8** step controller is a freely programmable compact controller for linear or circular axes with 2-phase step motors.
The controller integrates all the necessary components (power supply, safety circuit, power electronics, core processor, interfaces, operating elements) that are needed to control individual spindles all the way to entire machines. It has an intelligent core module that is controlled and programmed via a RS232 interface. The core module also converts the commands programmed in the user program into clocking/direction signals for the connected final stages. Depending on the purpose, the **iMC-S8** controller can be used either in CNC or in DNC mode.

In CNC mode, the processor processes the CNC program which was previously produced with PAL-PC and stored in the controller's Flash memory.

In DNC mode, the **iMC-S8** controller is connected permanently with a control computer (PC, laptop) via a serial interface (RS232). Processing is carried out via the isel control software Remote.

Ordering information

3 8 3 3 2 0 X X 1 X

Variant
1 = 19"-housing
2 = bench housing

Drive module
0 = MD 28
1 = MD 24

Numbers of axis
2 = 2 axis
3 = 3 axis
4 = 4 axis

Scope of delivery

Controller, mating plug (I/O, pulse, Remote), serial interface lead (null modem), 230V AC mains lead, PAL-PC software CD, operating instructions, programming instructions

Features

- 32-bit RISC processor with Flash memory for user program
- Final output stages
  - Step resolution and motor current adjustable via variable DIP switch
  - automatic current sink
- Acceleration, start-stop frequency and step output frequency variable
- both hardware limit switches configurable
- Door controller/hood controller
- Control elements in the front of the casing
- external EMERGENCY SHUTDOWN and POWER connection for integration in higher level safety circuits
- Connection for external control signals, such as START, STOP, RESET (only CNC mode)
- 230V connection for milling spindle (100-230V AC)
- 0 .. 10V analogue output for external frequency converter for speed-controlled main spindle
- Programming/Operation
  - PAL-PC in CNC mode (in the scope of delivery)
  - Remote (optional: ProNC) in DNC mode
  - isel @ - format in CNC/DNC modes

Technical specification

- Broadband mains supply 100 - 250V AC, 50..60Hz
- Processor
  - Flash memory 128 kB, Capacity to store 350 commands
  - max. step output frequency 40 kHz
- Final stages
  - Power supply 48 VDC
  - Peak current: 1,0 - 4,2 A (MD 24)
    2,8 - 7,8 A (MD 28)
  - Step resolution: 400-51200 steps
- Inputs/outputs
  - 8 inputs (24V DC)
  - 8 outputs (24V DC/300mA, Itot 2A)
  - 1 relay output (230V AC, max. 6A)
  - 1 analogue output (0 - 10V)
- RS232 operating/programming interface
- Stop category 1, safety category 2
- Versions:
  - Bench casing W 475 × H 410 × D 187.5 mm
  - 19" housing W 482.5 × H 410 × D 175.5 mm

Accessories

Motor lead M23 plug - M23 socket
Part no.: **392750 0300** (3m)
Part no.: **392750 0500** (5m)

Motor lead M23 plug - SubD9 socket
Part no.: **392752 0300** (3m)
Part no.: **392752 0500** (5m)

Controller software - Remote
Part no.: **Z12-334500**

Controller and programming software ProNC
Part no.: **Z11-333500**

Technical specifications subject to change.

Single axis controller MC1-10/20/40

iMD single axis controller for isel linear units

MC 1-40
Front view

MC 1-10/20
Rear view

MC 1-40
Rear view

General

MC 1 series servo-controllers are freely-programmable compact controllers for linear or rotating units with servomotors. The single axis controllers integrate all the components (interfaces, motion controller, power supply, drive controller, safety circuit, control elements) needed for axis control in compact bench housings. The supplied PAL-PC software can be used for programming
.

There are three MC1 variants available:

- MC1-10: for controlling brush-type DC servomotors (48 V)
- MC1-20: for controlling brushless EC servomotors (48 V)
- MC1-40: for controlling brushless EC servomotors (310 V)

Ordering information

MC 1-10 (including PAL-PC)	Part no.: **38d1518 0010**
MC 1-20 (including PAL-PC)	Part no.: **381518 0020**
MC 1-40 (including PAL-PC)	Part no.: **381518 0040**
Motor leads MC 1-10/20	Part no.: **392760 xxxx***
Motor leads MC 1-40	Part no.: **392307 xxxx***
Encoder lead	Part no.: **392740 xxxx***

* Leads available in different lengths,
e.g.: 0100 = 1 m / 0150 = 1.5 m / 0200 = 2 m ... / 1000 = 10 m

Technical specifications subject to change.

Features

MC1-10
- For controlling brush-type servomotors with an intermediate circuit voltage of 48 V DC
- Setup program "DcSetup"

MC1-20
- For controlling brushless servomotors with an intermediate circuit voltage of 48 V DC
- Analysis of Hall signals
- Setup program "AcSetup"

MC1-40
- For controlling brushless servomotors with an intermediate circuit voltage of 310V DC
- Analysis of Hall signals
- Setup program "AcSetup"

Common features

- Max. output power 500 W (MC1-10, MC1-20)
- 32-bit high performance RISC processor with 256 kB Flash memory
- User program in CNC mode for up to 650 commands
- Processing of the program in CNC or DNC mode
- Programming with PAL-PC (CNC and CNC mode), @-format (CNC mode), ProNC, Remote (DNC mode)
- LC display with 4 lines, each with 20 characters (freely programmable)
- Additional control signals (Start, Stop) adaptable
- Connection for incremental encoder
- 6(8) signal inputs (24 V DC)
- 8 relay outputs (24 V DC/700 mA)
- Stop category 0 in accordance with EN60204
- Emergency shutdown circuit via plug in higher level safety circuit integrable
- Broadband mains supply:
  110...250 V AC, 50..60 Hz (MC1-10 / MC1-20)
- 250 V AC, 50Hz (MC1-40)
- Bench casing
  W 204 × H 149 × D286

Scope of delivery

- Controller
- Mating plug (I/O, pulse, remote)
- Serial interface lead (SubD9 - RJ 45)
- 230V AC mains lead
- PAL-PC software CD
- Operating instructions
- Programming instructions

electronics

Multiple axis controller

iMD multiple axis controller for isel linear units

iCU-DC / iCU-EC

ICU-DC
Front view

ICU-DC
Rear view

General

The **CAN controllers** of the **iCU-DC** and **iCU-EC** series are compact, high-performance drive controllers for 2 - 6 DC servomotors and are offered at an optimal price / performance ratio.

The bench housing integrates all control components needed to solve a wide variety of automation tasks, ranging from the final stage via the I/O assembly to the safety controller.

The control computer has an integrated CANopen PCI card interface serving as CAN Master for the drive controller and I/O components. External upgrades are also possible, up to 128 CAN nodes. The connecting points at the rear of the control computer facilitate easy connection to (for example) a monitor. Peripherals such as a mouse and keyboard can be connected at the USB interfaces provided. LAN connection allows integration into an existing network and can be used for remote servicing.

The NC control core facilitates the interpolation of up to 6 axes (linear, circular, helical) as well as Online and Look Ahead machining. When using the ProNC software, individual axes can be controlled as handling axes (in addition to the interpolating axes).

All final stages have automatic jerk limitation and rest state monitoring (up to safety category 3).

Ordering information

3 5 4 0 0 2 X 0 X 0

Number of axes
2 = 2 axes
3 = 3 axes
4 = 4 axes
5 = 5 axes
6 = 6 axes

Versions
1 = iCU DC* (brush-type DC servomotors)
2 = iCU EC* (brushless EC servomotors)

Accessories

Motor lead M23 pin - M23 socket
Part no.: **392759 0300** (3m)
Part no.: **392759 0500** (5m)

Encoder lead SubD 15 plug - SubD15 socket
Part no.: **392740 0300** (3m)
Part no.: **392740 0500** (5m)

Features

- Drive controller for up to 6 brush or brushless DC servo motors
- NC control via CANopen field bus
- iMD10/iMD20 final output stages
  - 4-quadrant drive controller
  - Analysis for incremental encoder
  - Rest state monitoring
  - Over- and undervoltage protection,
  - Overtemperature protection, short-circuit proof
- Door control / hood control
- External emergency cut-out for integration into higher level safety circuits
- Connection for external control signals (START, STOP, RESET) via signal inputs
- Control computer connections: VGA, 4 x USB (2 x front, 2 x rear), RJ45 Ethernet (100 Mbit/s)
- Connection for milling spindle (100 -230V AC)
- 0 ...10 V output for external frequency converter for speed-controlled main spindle
- Front-sided control elements
- Industrial control computer based on Windows® with
  - CANopen PCI board
  - driver software for CNC control
- Programming/Operation
  - Remote (optional: ProNC)

Technical specification

- Broadband mains supply
  - 115 V AC / 230 V AC, 50...60 Hz
- Switching power supply 1000 W / 48 V
- iMD10/iMD20 final output stages
  - Power supply: 24...80 V DC
  - Peak / nominal current: 25 A / 12 A
- Input/output of CAN E/A module
  - 4 digital inputs, 8 digital outputs
  - 1 relay output (230V AC, max. 6 A)
  - 1 analog output (not required with frequency convertor option)
- CAN safety circuit module
  - up to safety category 3
  - door circuit control
  - spindle control
- Bench casing
  W 630 x H 230 x T 400 mm
- Options:
  - frequency converter for iSA500 - iSA2200
  - additional CAN I/O module (16 x inputs, 16 x outputs)

Scope of delivery

- Controller
- Mating plug (I/O, pulse, remote)
- 230V AC mains lead
- Operating and programming instructions

Technical specifications subject to change.

Power unit
Multiple axis controller

iPU-DC/iPU-EC

Figure:
Power unit iPU as
bench version and with 19" housing

General

The **iPU power units** are powerful drive controllers for up to four linear or circular axes with brush or brushless motors. The compact controller integrates all necessary controller components, which are needed to solve a wide range of automation tasks. These range from iMD10 or iMD20 final output stages through the I/O module to safety control and power electronics.

As its interface for NC control, the **iPU power unit** has a CANopen interface at the back of the housing, which works according to the DS301 bus protocol and DS402. By using the optional CAN PCI board iCC 10 or a iPC series control computer, the controller can control interpolation (linear, circular, helical) of all four axes as well as track processing.

The final output stages (iMD10 or iMD20) also have automatic jerk limitations and rest state monitoring. The control elements integrated in the front of the housing, such as EMERGENCY SHUTDOWN, START or STOP enable convenient operation.

Ordering information

3 5 3 0 0 0 X 0 X X

Number of axes
2 = 2 axes
3 = 3 axes
4 = 4 axes

Versions
1 = 19" housing
2 = Bench housing

Drive controller
1 = iMD 10 (brush DC servomotors)
2 = iMD 20 (brushless EC servomotors)

* in preparation, available to order

Accessories

Motor lead M23 plug - M23 socket	Part no.: **392759 0300** (3m)
	Part no.: **392759 0500** (5m)
Encoder lead SubD15 plug - SubD15 socket	Part no.: **392740 0300** (3m)
	Part no.: **392740 0500** (5m)
CAN PCI board iCC 10 (single channel)	Part no.: **320310**
CAN PCI board iCC 20 (2 channels)	Part no.: **320311**
Controller software - Remote	Part no.: **Z12-334500**
ProNC control software	Part no.: **Z11-333500**

Technical specifications subject to change.

Features

- Drive controller for up to four brush or brushless DC servo motors
- NC control via CANopen field bus
- iMD10/iMD20 final output stages
  - 4-quadrant drive controller
  - Analysis for incremental encoder
  - Rest state monitoring
  - Over- and undervoltage protection, Overtemperature protection, short-circuit proof
- Door controller / hood controller
- Connection for external control signals, (EMERGENCY SHUTDOWN, START, STOP) for integration in higher level safety circuits
- Connection for milling spindle (100 -230V AC)
- 0 .. 10V output for external frequency converter for speed-controlled main spindle
- Front-sided control elements (optionally, installed in the rear)
- Two alternative casings
- Programming/Operation
  - Remote (optional: ProNC)

Technical specification

- Broadband mains supply
  - 115 V AC / 230 V AC, 50..60 Hz
- Switching power supply 1000 W / 48 V
- Final output stages iMD10 / iMD20
  - Power supply: 24 - 80 V DC
  - Peak / nominal current: 25 A / 12 A
- Inputs/outputs
  - 4 digital inputs (24 V DC / 8 mA)
  - 8 digital outputs (24 V DC / 350 mA)
  - 1 relay output (230 V AC, max. 6 A)
  - 1 analog output (0 - 10 V)
- Safety controller
  - up to safety category 3
  - door circuit and spindle control
- RJ 45 CANopen interface
- Versions:

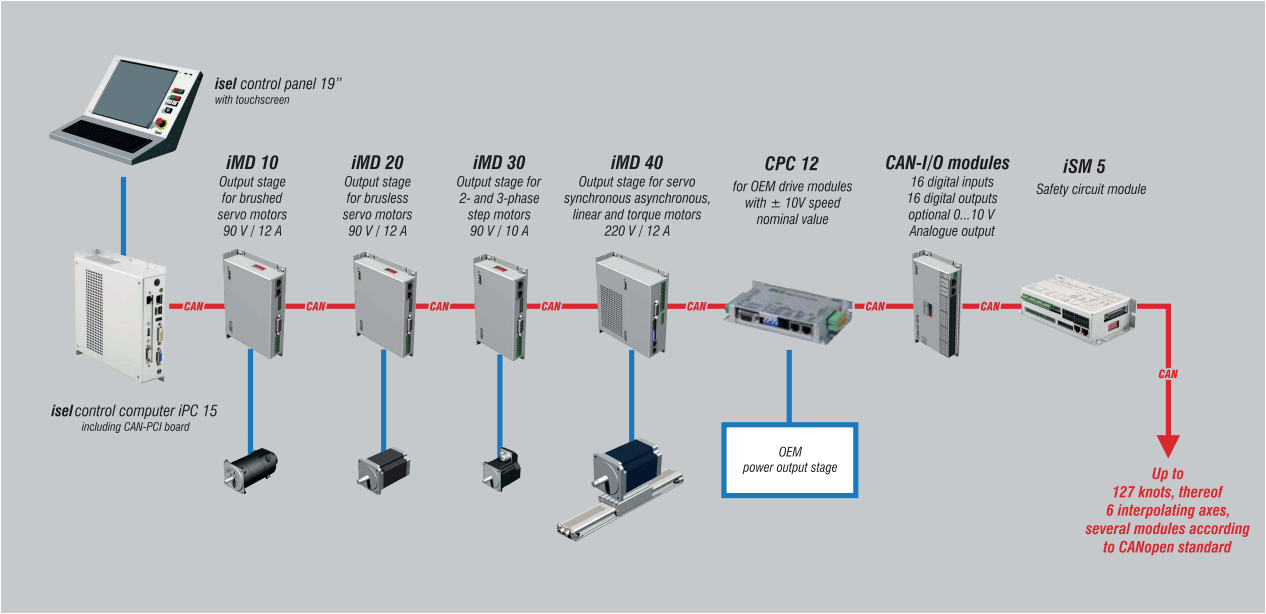
- Bench housing
  W 475 x H 410 x D 187.5 mm
- 19" housing
  W 482.5 x H 410 x T 175.5 mm

Scope of delivery

- Controller
- Mating plug (I/O, pulse, remote)
- CAN bus lead (RJ45, patch lead)
- 230 V AC mains lead
- Operating instructions

CAN-CNC controller

Example of a topology with the isel-CAN-CNC controller



With consequent use of the CiA's (CAN in automation) CANopen standards, isel Germany delivers a high quality PC-based CAN-CNC controller for intelligent positioning/drive units and I/O modules.

The CAN-CNC controller supports interpolation operation (linear, circular and helical) of up to six positioning drives per machine and up to 127 handling axes and CAN modules.

The high time demands of a CNC controller are guaranteed by a WDM driver developed by isel. An additional real time operating system for Windows will be unnecessary. This guarantees compatibility with future Windows versions

The CAN controller is a pure software solution for PCs with Windows 2000/XP/VISTA/Win7 (32/64 bit). The CANopen PCI boards iCC 10/20 also act as an interface.

Owing to the features provided, the CAN-CNC controller is equally suited for all machining tasks, such as milling, engraving, drilling, turning, water jet and laser cutting, as well as for applications in automation systems.

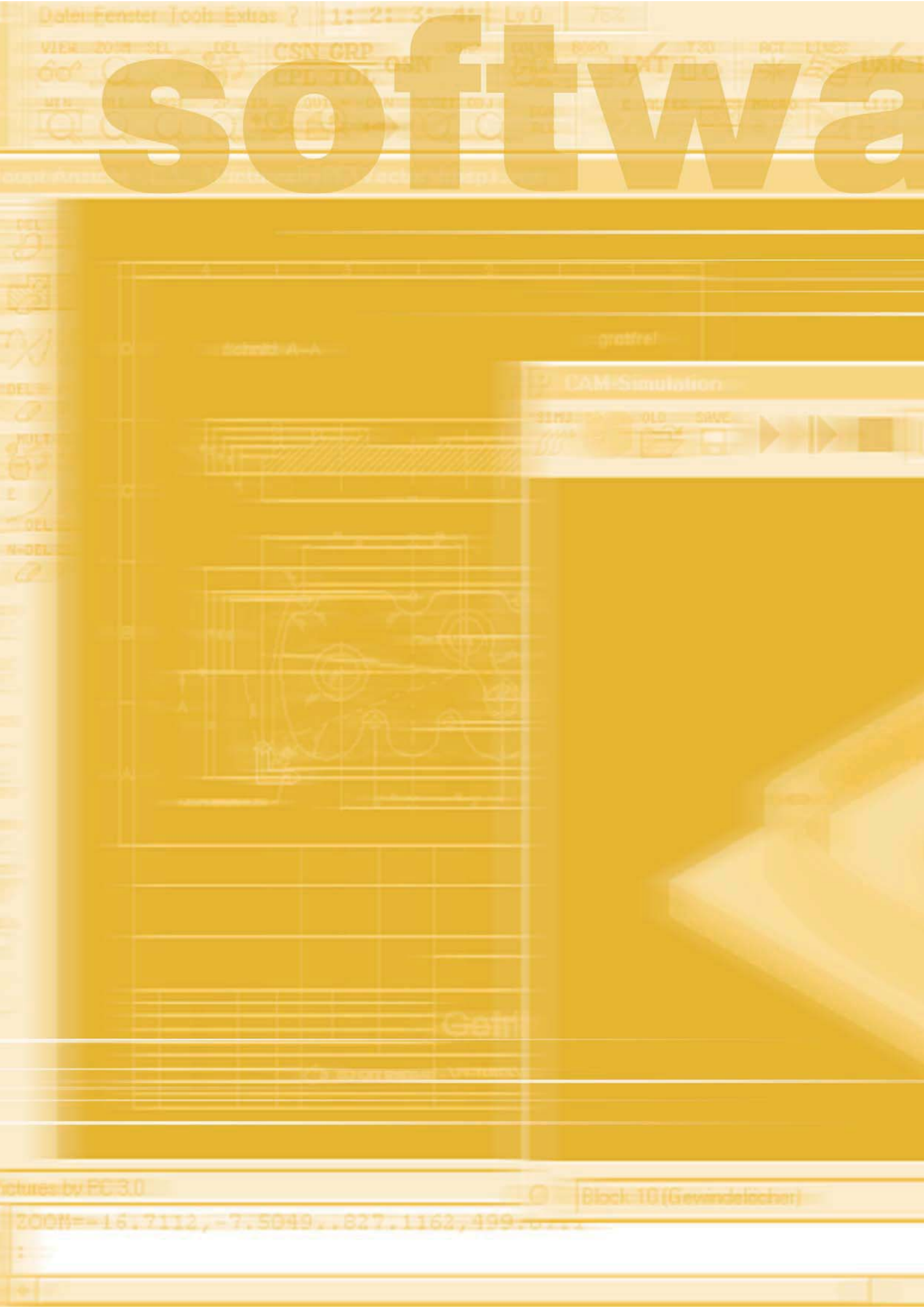
For this purpose, ProNC provides a universal programming environment.

Features

- Machine control to the CANopen standard as a pure software solution for PCs with Windows 2000/XP/VISTA/Win7 (32/64 bit)
- CiA-Standard, DS 301, DSP 401, DSP 402
- Supports up to six positioning axes and 127 handling axes and CAN modules.
- Look ahead track processing with a freely definable number of movement elements, which the controller processes while looking ahead.
- Jerk limitation for elimination of mechanical vibrations
- Upstream speed control for highly dynamic and lag error-free machining
- Software tools for setting and optimising motor final stages/positioning modules
- Interfaces for PC:
  - CANopen PCI board iCC 10 (single channel)
  - CAN bus 1
  - CANopen PCI board iCC 20 (two channels)
  - CAN buses 1 and 2

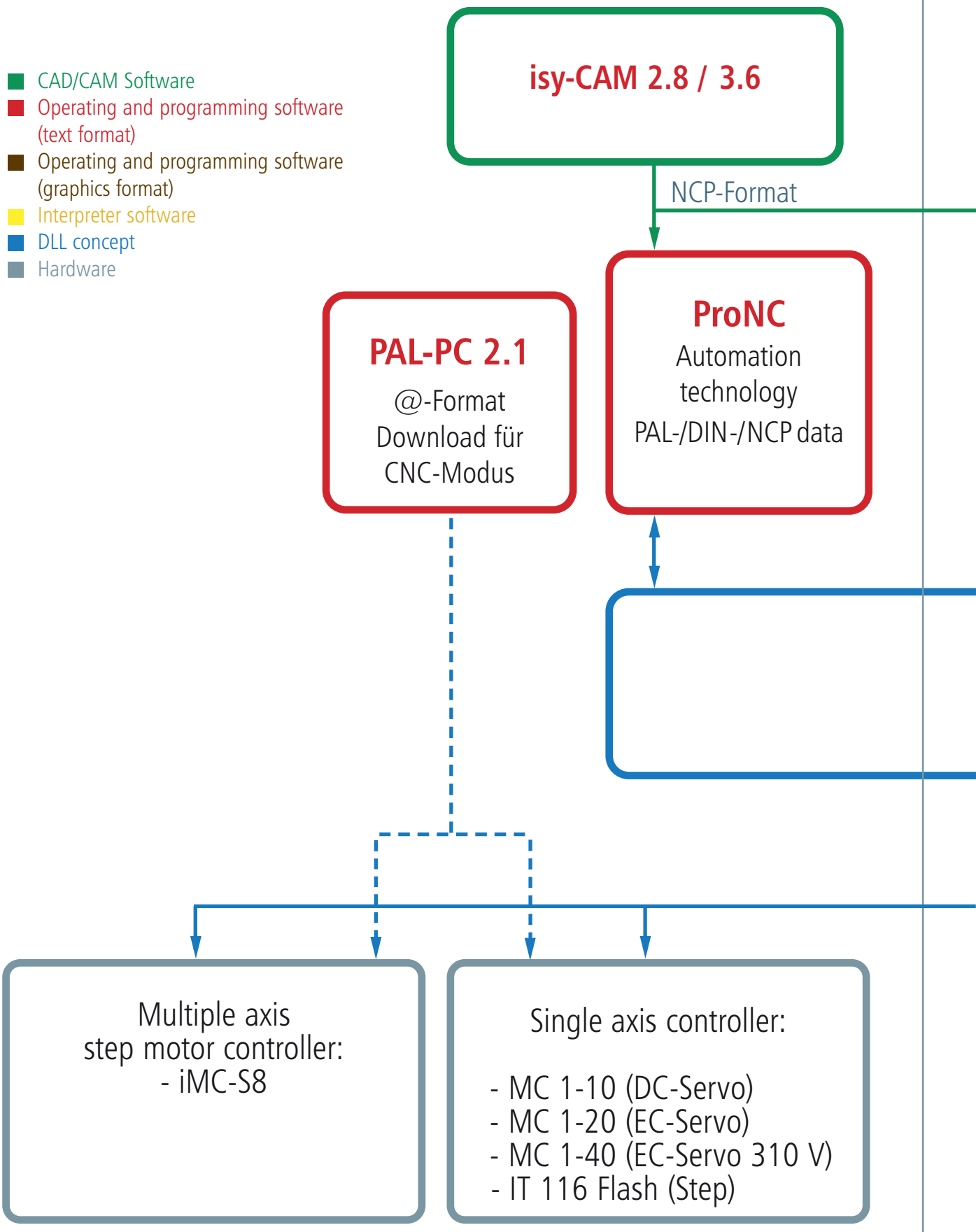
Technical specifications subject to change.

Space for your notes

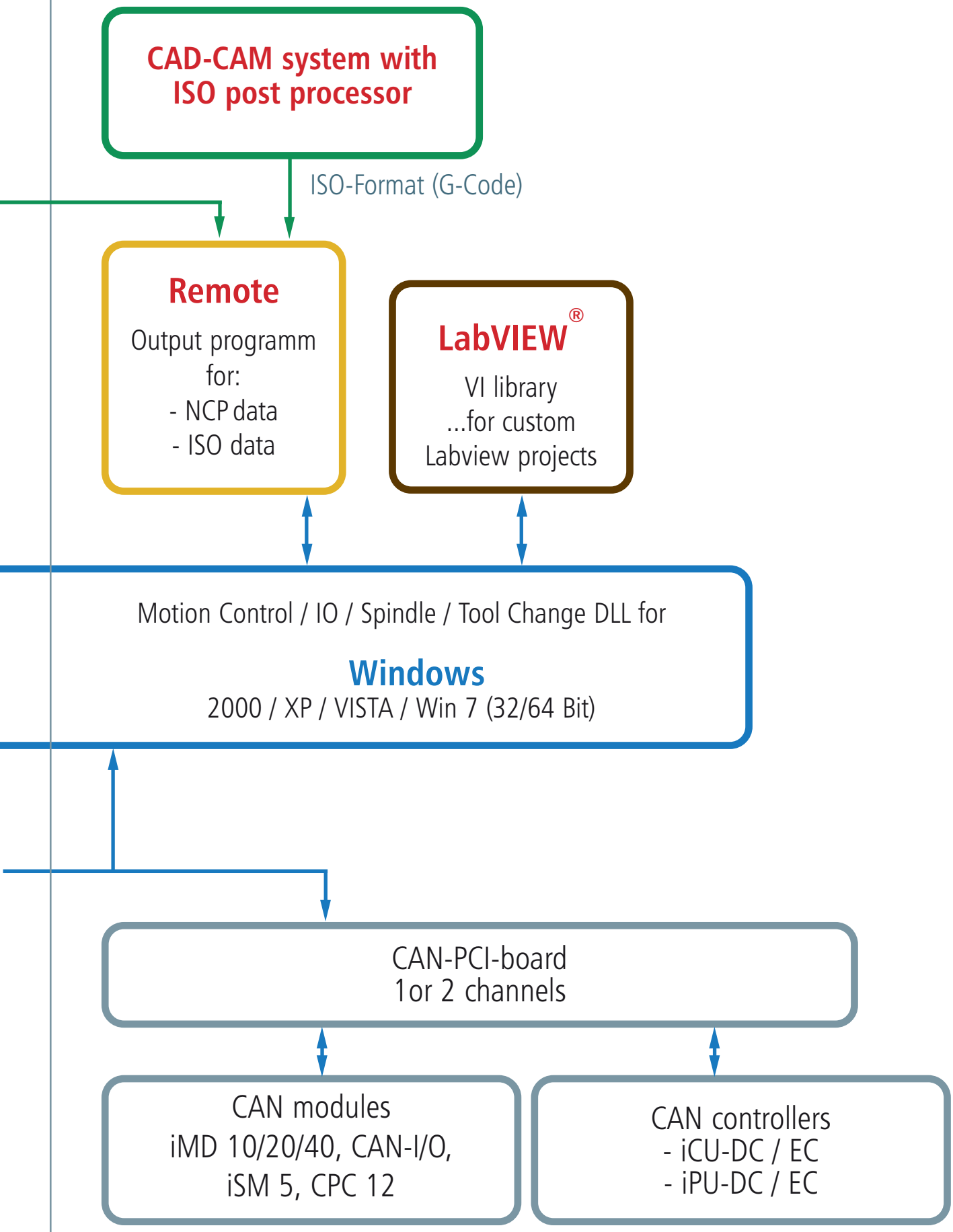

softwa
CAM-Simulation

SOFTWARE

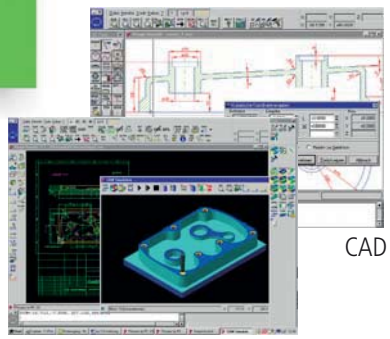
Software and controller organisation



Software- und Steuerungsstruktur



isy-CAM 2.8 and 3.6



CAD

CAM

Features isy-CAM 2.8

- CAD functionality (without volume modeller)
- works with Win XP, Windows 7 and 8, 32-/64-bit version
- Import: DXF / EPS / AI / 3D STL data
  Export: NCP format
- proven CAM strategies
- for drilling / contour and pocket milling
- engraving with thinning
- engraving on cylinder surface with 4th axis
- 3D roughing and finishing of STL data (e.g. 3D scanning models)
- direct call of REMOTE out of isy-CAM

Features isy-CAM 3.6

- advanced mesh manipulation
- 32-/64-bit version
- Hybrid milling
  (steep and flat areas in one step)
- trochoidal milling
- reviced residual material detection and handling
- Mult-sided machining (3+2 axis, hired milling)
- extendable to 5 simultaneous-moveable axes

Ordering data

isy CAM 2.8

Part-no.	Description
Z13-337070	isyCAM2.8, 2.5D CAD/CAM Software, including 3D STL manipulation, PC bound, without training
Z13-337070 0001	isyCAM2.8, 2.5D CAD/CAM Software, requirement: registered 2.5/3.0 version, including 3D STL manipulation, PC bound, without training
Z13-337070 0002	isyCAM2.8, 2.5D CAD/CAM Software, including 3D STL manipulation, PC bound, with training at isel
Z13-337070 0003	isyCAM2.8, 2.5D CAD/CAM second license, PC bound, without training

isy CAM 3.6

Part-no.	Description
Z13-337071	isyCAM3.6, 3+2 axis, including NCP - PPRO, PC bound, including training for 1 person at isel
Z13-337071 0001	Update isyCAM 2.0 / 2.5 / 2.5plus to isyCAM 3.6, 3+2 axis, including NCP - PPRO, PC bound, without training
Z13-337071 0002	Update isyCAM 3.0 / 3.2 to isyCAM 3.6, 3+2 axis, including NCP - PPRO, PC bound, without training
Z13-337071 0003	Update isyCAM 3.0 / 3.2 to isyCAM 3.6, 3+2 axis, including NCP - PPRO, PC bound, without training
Z13-337071 0004	Update isyCAM 2.8 to isyCAM 3.6, 3+2 axis, including NCP - PPRO, PC bound, without training
Z13-337071 0005	Update isyCAM 3.6 second license, PC bound, without training
Z13-337071 0006	Exchange-Package 3.6 (IGES, VDA, STEP)
Z13-337071 0007	Update Exchange-Package 2.0 to 3.6 (IGES, VDA, STEP)
Z13-337071 0008	Update Exchange-Package 3.0 to 3.6 (IGES, VDA, STEP)
Z13-337071 0009	Update Exchange-Package 3.2 and 3.4 to 3.6 (IGES, VDA, STEP)

Common features

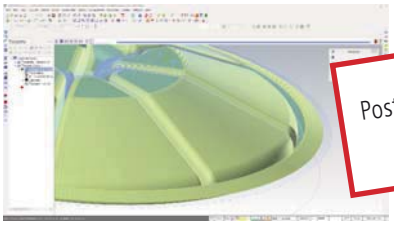
- Multi-core support
- dynamic rotable simulation
- freely definable line styles and colors
- integrated online help, configurable user interface
- parallel and independent work on several drawings
- geometric elements such as points, lines, ellipses, circles, curves (polygons, splines, bezier curves, NURBS), polygons etc.
- direct use of the Windows fonts
- professional functions for editing figures and texts
- hatching, user-defined hatch patterns
- automatic functions for positioning and aligning
- contours sketching and change interactively
- numeric input methods for absolute,relative and polar coordinates
- extensive DIN / ISO-compliant measuring- and dimensioning functions
- trimming, cutting and drawing curves and conversions of different geometrical types
- geometrical manipulation by moving and copying as translation, rotation, scaling, mirroring
- intelligent object snap
- optimal control of the calculated NCP data through integrated online simulation of tool paths
- production of processing data for all typical
- 2D and 2.5D machining tasks
- Output format: NCP format

OneCNC milling

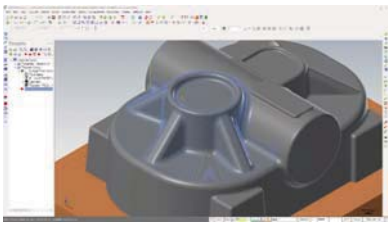
Advantages

- High speed toolpaths for 2D and 3D machining that creates a toolpath that delivers more consistent cutting
- Automatically machine flat areas using smooth entry, exit and cut motion.
- Feature based milling for hole making with automated feature detection
- High speed scallop cutting delivers a consistent finish.
- Planar and Z level finishing delivers a smooth cut with consistent material contact.
- High speed Z level cutting delivers constant Z moves with smooth entries and exits.
- Smooth, automated clean circle milling
- High speed pencil tracing removes material from the outside in with smooth motion.
- High speed pocket milling from the inside out safely around islands with the automatic rest ability
- High speed rest roughing smmothly removes material left from a previous rough pass.

Mastercam



Mastercam®



General

Mastercam is the most commonly used CAM software and the first choice among CNC programmers. It gives your manufacturing operation, the best possible foundation for fast and efficient milling. From general procedure as the optimized pocket machining to highly specialized toolpaths such as the 5-axis milling turbine, with Mastercam you are guaranteed ready for any assignment.
Whether simple or complex 2D machining - with the tools of Mastercam you optimize the time required.

Advantages

Contouring

- separate entrances and exits for contour and pocket finishing
- several roughing and finishing passes and several deep cuts for a contour
- easy processing of 2D and 3D contours with parametric and NURBS splines

Drilling

- automatic detection and pre-drilling of multiple operations at their plunge points
- automatic calculation of the countersink depth
- Optimization of drilling routines to minimize the traverse of the tool

... and much more!

Pocketing

- dynamic milling (toolpath with constant cutting conditions)
- area link for quick and easy adjustment of the areas for 2D high speed machining
- Pocketing with various rough-out strategies (HSC, zig-zag, one-way, true spiral, constant overlap and blend spiral - each with optional finishing pass)

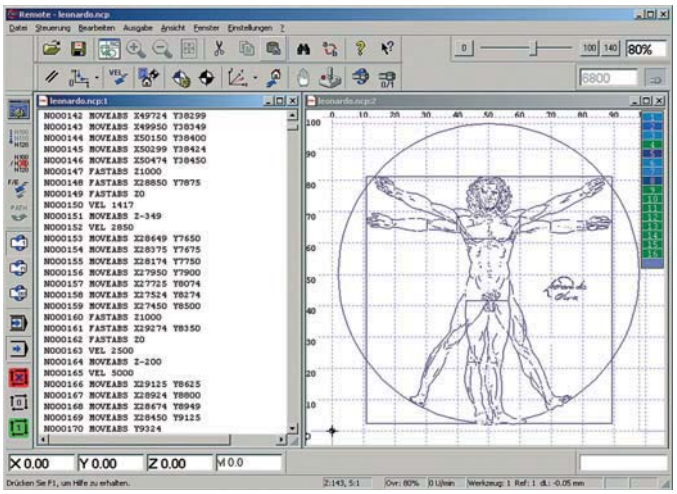
... and much more!

Rest machining
Powerful roughing
Versatile finishing
Feature based machining (FBM)
... and much more!

software

Remote

Control software for Windows



General

Remote is a universal control program for outputting files for machining methods milling, drilling, adhesive bonding, engraving, applying and water jet cutting or laser cutting/welding.

Supported file formats are the isel-specific NCP format (ASCII file with machining data generated by a CAM post-processor, the isel-specific CNC format (ASCII files in an expanded format for universal use in the process automation area, generated by ProNC) and the G-code format to DIN 66025.

Remote is used first and foremost for controlling CNC machines operating different tasks and processes, which is why flexibility is a key feature of the program. A large choice of options allows easy adaptation to current requirements in each case.

Features

- Support for digital joysticks
- "Fast file selection" control panel for serial production
- Milling/multiple output with movements
- Graphic depiction of the processing file with zero point and dimensions

isel-NCP, DIN66025/G-code file formats

- Linear and circular interpolation, helical interpolation, drilling cycles
- Access to digital and analogue inputs and outputs
- When using a CAN controller: "On-the-fly" input/output (without stopping the movement) for metering applications
- Message window, messages in the status line, time delay, input of variable values
- Definition and use of machine positions (tool zero point, park position, home position, etc.)

Additional features for the isel-CNC file format (ProNC output format)

- Repeating loops, counting loops, unconditional and conditional branches
- Arithmetic and trigonometric functions
- Sub-program systems
- Real and symbol chain variables
- Loading and storing process variables
- Access to user-specific expansions, option to call up user software

Features

- runs with Windows operating systems (Windows 2000, XP, Vista)
- compatible with previous software versions
- Processing of DIN66025 (G-code) file formats, NCP or CNC
- immediate processing without conversion, File translation or conversion
- integrated text editor with numerous features for rapid corrections to the present NC program
- Use of up to 6 interpolating axes (Cartesian coordinates system and 3 auxiliary axes)
- Look-ahead track processing with CAN controller
- Managing a milling spindle
- 2 I/O units can be used (max. 64 inputs, 64 outputs)
- Signalling inputs and outputs for process synchronisation
- manual axis movement with joystick, keyboard and mouse
- incremental processing and system monitoring for commissioning
- Configurable interface for user-friendly operation, serial production, handshake with master PLC, etc.
- Control panel for movement control, input/output, spindle and tool change with buttons
- Control panel for max. 6 handling axes independently of the interpolating axes
- available in various languages (German, English, French, Magyar)

Ordering information

Part no.: **Z12-334500**
Remote - software for CAN-CNC controllers (Windows)

PAL-PC

Process automation software for Windows

General

PAL-PC enables rapid, easy and low-cost implementation of automation projects such as handling systems, drilling machines, clocking devices, test and measurement systems, machines for individual and serial processing and much more....

PAL-PC is a modern program development environment for CNC step motor controllers and CNC machines

PAL-PC uses memory operation (CNC mode) for the target controller. PAL-PC produces automation solutions in which the controller works in standalone mode, i.e. independent of a control computer.

PAL-PC runs with Windows 2000, XP and Vista operating systems.

Features

- Path commands for relative and absolute positioning
- Carry out movement until event occurs at an input
- Teach-in-programming (linear)
- Linear 2D interpolation, switchable to 3D interpolation
- Circular interpolation
- Input signal analysis for process control
- Loops for repeating of instruction blocks
- Unconditional and conditional branches
- Analysis of the program selection unit
- Output of messages to a display
- Sending and receiving synchronisation marks
- Additional aids for automated processing of typical tasks

Ordering information

Part no.: **Z11-331810**
PAL-PC - software for CAN-CNC controllers (Windows)

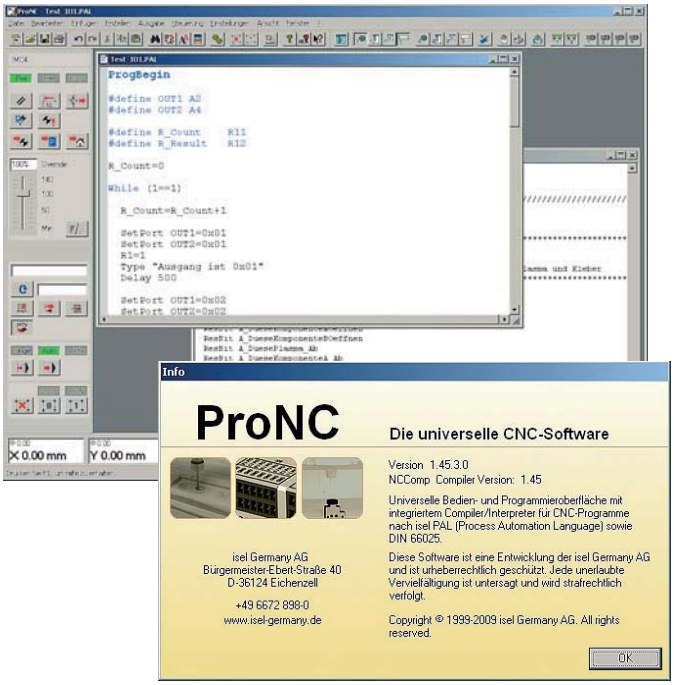
Features

- compatible with previous versions (PAL-PC programs, which were produced with an earlier release of PAL-PC, can be used without adaptation)
- Programming to isel-PAL or DIN66025:
  In addition to the PAL format, users who know programming to DIN66025, can also produce their PAL-PC applications with corresponding G-code commands.
- Integrated editor:
  fast and convenient editing of source texts, editor features such as "Search", "Replace", "Copy" and "Insert " automated code generation, multiple Undo/Redo for efficient programming
- PAL-PC can (depending of the type of controller used) control controllers with up to 4 axes
- Terminal for direct communication with the controller
- Downloading of externally generated CNC programs
- Automatic calculation of type and data transfer rate of the connected controller
- Display of compiler errors and navigating to an error in the source code
- Command rapid overview with optional insertion into the program
- Teach-in-programming with keyboard or mouse
- Acceptance in the editor of target positions as formatted source code
- Live status display at the inputs
- Setting outputs during program generation
- available in German and English

software

ProNC

Process automation software for Windows



General

The basis of any automation solution is a powerful software that enables implementation of practical solutions for existing tasks quickly and conveniently. In these cases, the operating and programming interface ProNC provides an ideal solution.

ProNC runs with the Windows 2000, XP and Vista operating systems.
ProNC is available for a variety of control systems and controllers from isel
ProNC applications can be produced to isel-PAL or DIN66025

ProNC is outstandingly suited to automation solutions in the milling, drilling, metering, installation, handling, loading and quality control fields, in which application programs are produced mainly in text format, using teach-in-features and the integration of contour data sets (e. g. NCP format).

Features

- Path commands for relative and absolute positioning of the interpolating axes
- Programming of additional axes in handling mode
- Circular interpolation, helical interpolation, drilling cycles
- Repeating loops, counting loops, unconditional and conditional branches
- various mathematical and trigonometric functions
- Sub-program systems, symbolic variables
- Real and symbol chain variables
- Message window, messages in the status line
- Loading and storing process variables
- Access to digital and analogue inputs and outputs
- "On-the-fly" input/output (without stopping the movement) for metering applications
- Access to user-specific extension DLLs
- convenient support for debugging (interruption points, monitoring of status and variable)

Ordering information

Part no.: **Z11-333500**
ProNC - software for CAN-CNC controllers (Windows)

Training courses and application solutions to order.

Features

- Programming to DIN66025 (G-codes) or isel-PAL
- compatible with previous software versions (ProDIN, ProPAL)
- integrated text editor with numerous features for rapid and efficient source code processing
- Import of geometric data (NCP, e.g. from isy-CAD/CAM)
- Use of up to 6 interpolating and up to 6 handling axes (with CAN controller)
- Look-ahead track processing with CAN controller
- up to 4 spindle motors can be used
- up to 4 I/O units can be used (max. 64 inputs, 64 outputs)
- Signalling inputs and outputs for process synchronisation
- Teach-in-with joystick, keyboard and mouse
- Offline programming with simulation modules
- incremental processing, hold points and system monitoring for commissioning
- individually expandable with software libraries
- Control panels for movement control, input/output, spindle and tool change with buttons
- Control panel for max. 6 handling axes independent of the interpolating axes
- available in German and English

Space for your notes

syste

SYSTEMS

CNC machines

Overview

CNC machines

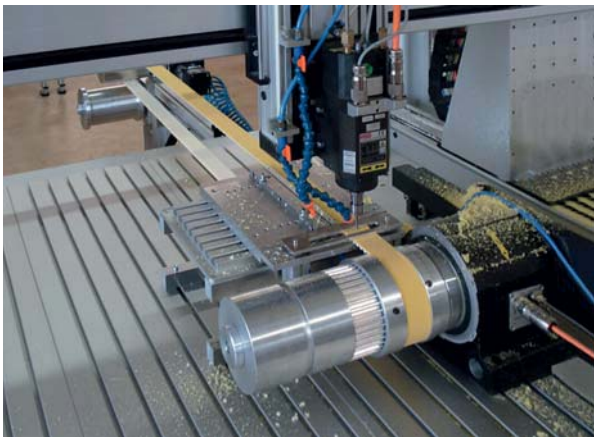
Overview








General



A decisive advantage for plant manufacturers and users: CNC machines by isel Germany AG.
Efficient serial production in mechanical and plant engineering is something that all manufacturers strive for. However, as customer areas of application become increasingly specialised, this cannot always be invariably achieved.
We, the isel Germany AG, can successfully realise your requirements with our machines - whether in the form of a plug-and-play version or an open system, in various sizes, for the problem-free integration of your application at a later time.
Modular design in light frame construction, isel linear axes, precision steel shafts and patented linear bearings have proven their worth over the course of years and undergo continuous optimisation. Our ball screws adjusted to zero-play with tempered and polished ball screw spindles in various diameters and pitches, step and servo motor operation or direct drive with linear and torque motors make it possible for you to fine-tune your plant to your requirements - leeway which also entails price advantages.
Along with common programming and interpreter software, isel offers the 3D CAD/CAM software isy 2.8 and 3.6 with the option of individual training in our facilities or on your premises.
Our slogan "From components to systems" underscores the importance we place on knowing our machines down to the smallest detail and offering you the possibility of acquiring everything you need from one place.
A comprehensive range of accessories such as speed-regulated spindle motors, tool change stations in various designs, patented tool cooling and handling systems from isel Robotics round out the assortment. Safety is a top priority in the new development and production of our plants; all isel plants are subject to Machinery Directive 2006/42EC.
Do you have questions about your application? Contact us!
Our trained technical sales staff is ready to advise you and can draw up a detailed individual offer on request. Planning, implementation and conclusion of your project in the form of design and production of special machinery are as much a key element of the services we offer as our customer-oriented after-sales service. Give us a call!

phone: +49 (0) 6659 / 981 790
sales@isel.com

Examples

General note

The choice of the ideal CNC machine for you should focus both on the clamping area for the workpiece, materials or plates to be machined and on the strategy or difficulties of the machining. In principal, all machines are perfectly suited for machining **light metals, non-ferrous metals, plastics** and **wood**. Extensive range of accessories for all our CNC machines to order. (see page E-22 et seq.)

Special version of a FlatCom XL for the orthopedic milling of foam material

Special version of a EuroMod MP series for laser processing

Special version of a FlatCom L for milling of profiles for the automotive industry

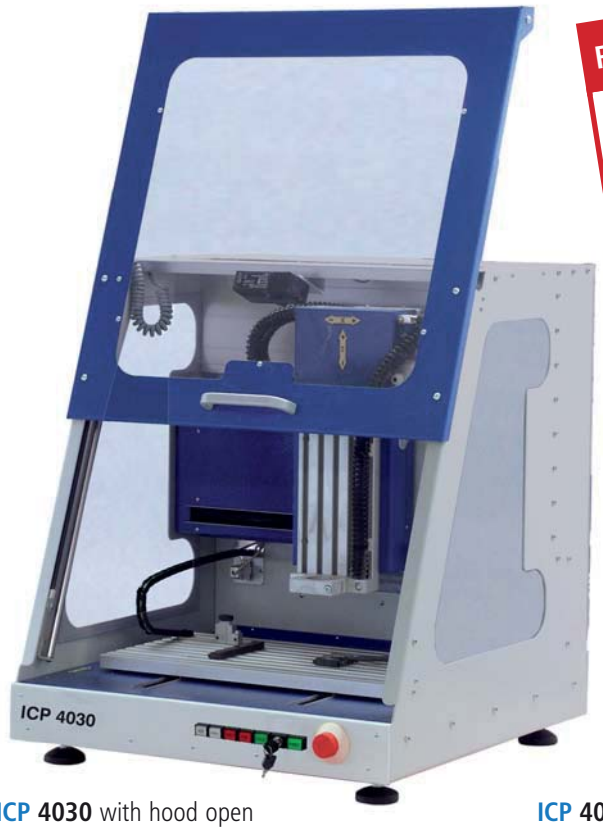
systems

CNC machine
with step motor drive

ICP 4030

Features

- tried-and-tested technology
- for over 20 years
- over 2,000 systems sold
- Operation possible without a connection to a PC
- suitable for school and training

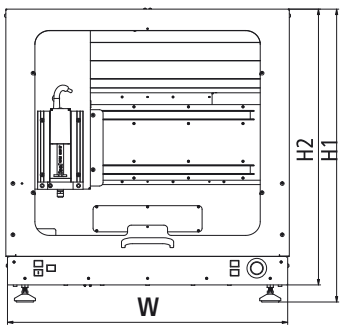


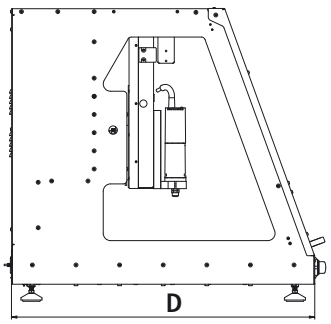
ICP 4030 with hood open

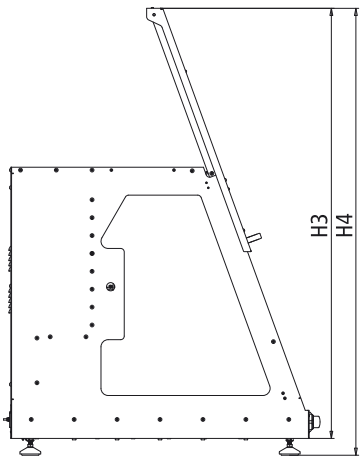
ICP 4030 with hood closed

Dimensioned drawings

	ICP 4030
Width W [mm]	780
Depth D [mm]	850
Height H1 [mm]	810
Height H2 [mm]	770
Height H3 [mm]	1,203
Height H4 [mm]	1,250







CNC machine
with step motor drive

ICP 4030

General

CNC machines in the ICP series have been developed from the proven CPM series. By introducing a sliding door, the machines can now be operated in a sitting position which, inter alia, leads to shorter cycle times when opening the hood. The chassis is completely bolted instead of being welded like its predecessors. This produces higher precision when building the machine and makes servicing easier. In addition, it was possible to optimise the resonance and vibration behaviour and therefore lower noise build-up has been achieved.

Technical specification

	ICP 4030
Traverse path X/Y/Z [mm]	400 x 300 x 140
Clamping table surface W × D [mm]	700 x 375
Throughput [mm]	170
Dimensions W × D × H [mm]	780 x 850 x 810
Guides	Linear units with precision steel shafts and recirculating ball slots, clearance free adjustable
Process speed X/Y/Z [mm/s]	100 (for Ball screw drives 16x10) 60 (for Ball screw drives 16x4)
Repeatability [mm/s]	± 0.02
Drive motors	Stepper motors
Drive elements X/Y/Z	Ball screw drives 16 x 10 / 16 x 10 / 16 x 4 mm Clearance free adjustable (optional: 16 x 4 mm in X/Y/Z)
Controller	iMC-P step controller with 4 final stages 48V/4.2A and 500W power supply unit with processor board
Operation	Function keys and emergency shutdown
Software	WinRemote (optional: ProNC, isy CAM 2.8)
Weight [kg]	appr. 120
Part-no.:	**280220 7405 ***

* The deliverables include an accompanying pack with mechanical accessories (inter alia Hand lever clamping device, stop rails Triangle wrench, open jaw wrench, hook wrench, Allen key, one 6-socket bench extension, connection lead, power lead)

Accessories

280220 9012	Cooling/spray device for ICP 3020/4030
280120 9010	Length measuring button for ICP 3020/4030
280120 9004	Workspace lighting for ICP 3020/4030
420003 0500	Milling motor UFM 500, 500 W, 11,000...25,000 r.p.m.
280110 9001	Suction device for UFM 500
Z13-337070	isy-CAM 2.8
Z11-333500	ProNC software
310704 1631	iSA 500 spindle motor up to 30,000 rpm, 500 W, with frequency converter, CoolMin tool cooling system, ER 11 clamping ring and motor lead
310707 1631	iSA 750 spindle motor up to 24,000 rpm, 750 W, with frequency converter, CoolMin tool cooling system, ER 16 clamping ring and motor lead
280210 9001	Suction device for iSA 500 / 750
280000 0046	Fixing plate for main spindle drive iSA 500 / 750
290055	Vice 1 (W 130 x H 45 x L 152 mm)
290056	Vice 2 (W 180 x H 75 x L 215 mm)

Technical specifications subject to change.

systems

CNC machine
with servo motor drive

ICV 4030

Features

- compact entry-level model in the servo area
- low maintenance
- Control with integrated PC controller
- Complete machine under € 10,000

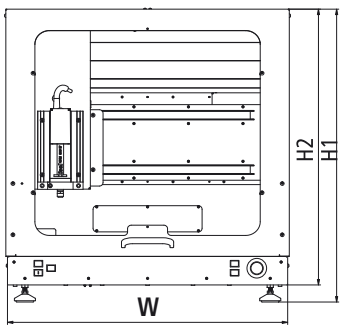
ICV 4030-F
with hood open

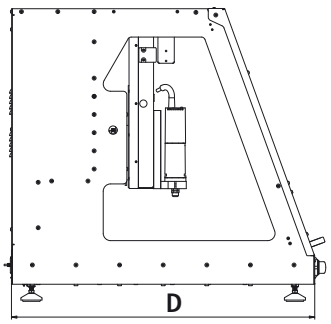
Dimensioned drawings

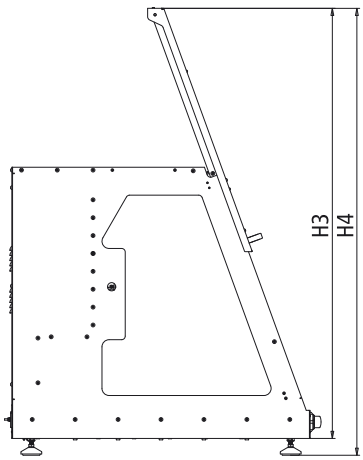
	ICV 4030
Width W [mm]	780
Depth D [mm]	835
Height H1 [mm]	806
Height H2 [mm]	765
Height H3 [mm]	1,203
Height H4 [mm]	1,250

machine bench
W 1500 D 1000 H 750

Part-no. 248550 0013







CNC machine
with servo motor drive

ICV 4030

General note

The ICV 4030 has been developed from the proven, 3D-enabled CNC machine CPV 4030, which is delivered ready for connection to the mains. The sliding hood, opening upwards, can be operated conveniently from a sitting position. The completely bolted chassis produces higher precision when building the machine and is easier to service. In addition, it was possible to optimise the resonance and vibration behaviour and therefore lower noise build-up has been achieved. Prerequisites for working with the ICV 4030 are simply basic knowledge of CNC systems, general IT literacy and basic knowledge of graphics programs!

Technical specification

	ICV 4030
Processing areas X/Y/Z [mm]	395 x 300 x 95
Bench clamping area W × D [mm]	700 x 375
Gap [mm]	150
Dimensions WxTxH [mm]	780 x 835 x 806
Guides	Linear units with precision steel shafts and recirculating ball slots, adjustable for no play
Processing speed X/Y/Z [mm/s]	max. 200
Repeat accuracy [mm]	± 0.02
Drive motors	Servo motors
Drive elements X/Y/Z	Recirculating ball transmission 16 x 10 / 16 x 10 / 16 x 4 mm adjustable for no play
Controller	iMC CAN controller with 4 drive controllers, integrated control computer, I/O module, safety circuit and rest state monitoring Power supply unit 48V/1000 W
Operation	Function keys and emergency shutdown
Software	WinRemote (optional: ProNC, isy 2.8)
Weight [kg]	approx. 120
Part-no.	280250 4400

isel CNC milling machine ICV 4030-F with spindle motor iSA 500, IMD10 controller including PC • Servo motor driven • Spindle motor 500 W, 30,000 rpm • Collets 3 and 6 mm for iSA 500 • Length measuring probe for measuring tool lengths • Four-axis controller incl. PC with Windows operating system • Drive elements: X/Y axes 16x10 mm, Z axis 16x4 mm • Set of mechanical clamping elements • LED workspace illumination • WinRemote output programme • Electrical supply data: 230 V / 16 A • Chassis colours: RAL 7016 and RAL 3003	**Part no.** 280250 4440
isel CNC Basis machine ICV 4030-B with IMD10 controller including PC • Servo motor driven • Four-axis controller incl. PC with Windows operating system • Drive elements: X/Y axes 16x10 mm, Z axis 16x4 mm • LED workspace illumination • WinRemote output programme • Electrical supply data: 230 V / 16 A • Chassis colours: RAL 7016 and RAL 3003	**Part no.** 280250 4400

Note:
Vacuum clamping plates can be clamped in sizes A5 - A3. (see Page E-39)

Technical specifications subject to change.

CNC machine
with servo motor drive

OverHead®

Features

- Compact footprint size
- Free floor standing design
- Large open machining area
- High Z-axis clearance for deep tool machining

OverHead M40
with control panel iOP-19-TFT

Technical specifications

	OverHead M20	OverHead M30	OverHead M40	OverHead M50
Processing areas X/Y/Z [mm]	710 / 610 / 310	710 / 910 / 310	1210 / 910 / 310	1,210 / 1,410 / 310
Bench clamping area WxD [mm]	1,100 x 1,000	1,100 x 1,300	1,600 x 1,300	1,600 x 1,800
Gap [mm]	340 (590)			
Dimensions WxDxH [mm]	1,400 x 1,200 x 1,960	1,400 x 1,500 x 1,960	1,900 x 1,500 x 1,960	1,900 x 2,000 x 1,960
Processing speed X/Y/Z [mm/s]	250			
Drive motors	EC servo motors			
Drive elements X/Y/Z	Recirculation ball screws 16 x 10 / 16 x 10 / 16 x 5 mm, adjustable for no play			
Controller	iMD CAN controller with 4 drive controllers, expandable to 12 axes (max. 6 interpolated & 6 handling axes), PC, I/O module, safety circuit with rest state monitoring, powe supply unit 48 V / 1,000 W			
Operation	control panel iOP-19-TFT			
Weight (kg)	appr. 450 kg			
Software	Windows, WinRemote (optional: ProNC)			
Connection values	230 V / 16 A			
Part-no.	276223 56165E	276233 56165E	276243 56165E	276253 56165E

CNC machine
with servo motor drive

OverHead®

Features

- Twin Y-axis gantry fully synchronised with Software ProNC
- CAN-bus control system with brushless servo motors for all axes
- T-slot table top for easy clamping of workpieces and accessories
- Gantry clearance options from 340mm to 590mm
- Maximum spindle motor size iSA 2200
- Linear motion upto 250mm/sec.
- Control panel i0P-19-TFT
- Control PC iPC 25 including PCI card Win 7/64 bit

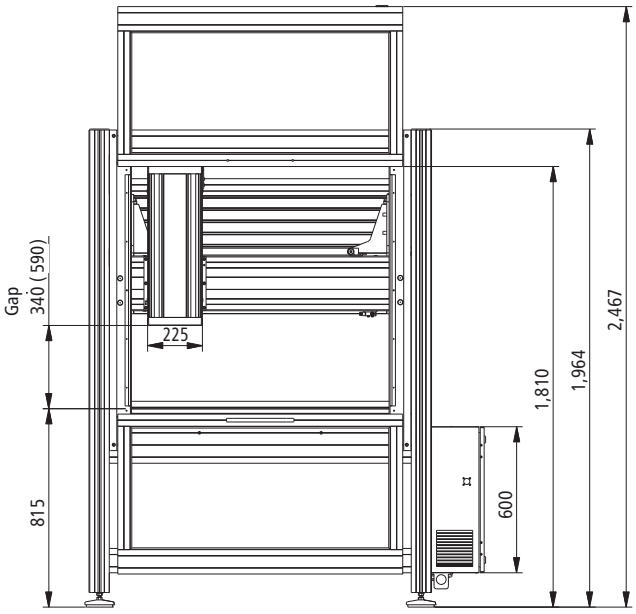
Options

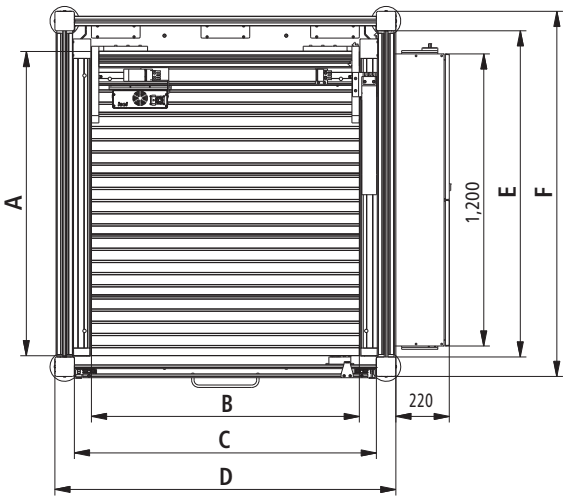
- cooling spray device
- blade tray
- tool length sensor
- spindle motors (up to iSA2200 applicable)
- Round changing systems SK 11 and SK 20
- Linear changing systems SK 11 and SK 20
- 4th axis with tailstock unit
- 4th + 5th axis as rotary tilting unit
- LED-lighting

Areas of application

- Machining
- Testing and Measuring
- Glue Dispensing

Dimensioned drawings





	A	B	C	D	E	F
Gantry OverHead M20	1,000	1,100	1,240	1,400	1,040	1,200
Gantry OverHead M30	1,250	1,100	1,240	1,400	1,340	1,500
Gantry OverHead M40	1,250	1,600	1,740	1,900	1,340	1,500
Gantry OverHead M50	1,750	1,600	1,740	1,900	1,840	2,000

Technical specifications subject to change.

systems

CNC machine
with servo motor drive

EuroMod®

Features

- Space-saving
- fixed portal, moving bench
- 5-axis machining
- also available with gantry drive

EuroMod MP 45
with control panel iOP-19-TFT
and open sliding door

Technical specifications

	EuroMod® MP 30	EuroMod® MP 45	EuroMod® MP 65
Processing areas X/Y/Z [mm] *	650 / 300 / 250	650 / 450 / 250	1,000 / 650 / 250
Bench clamping area W × D [mm]	900 x 350	900 x 500	1,200 x 700
Gap [mm] *	350		
Dimensions WxDxH [mm]	1,160 x 800 x 1,960	1,160 x 1,110 x 1960	1,480 x 1,510 x 1,960
Processing speed X/Y/Z	max. 250 mm/s		
Repeat accuracy [mm]	± 0.02		
Drive motors	Servo motos		
Drive elements X/Y/Z	Recirculating ball drive, adjustable for no play		
Controller	iMD CAN controller with 3 or 4 drive controllers, expandable to 12 axes (max. 6 interpolated & 6 handling axes), PC, I/O module, safety circuit with rest state monitoring, power supply unit 48V/1000 W		
Operation	Control panel iOP-19-TFT		
Weight (kg)	approx. 275	approx. 300	approx. 400
Software	Windows, WinRemote (optional: ProNC, isy 2.8)		
Connection values	230V, 16A		
Part no.	276133 53655E	276143 53655E	276153 73655E

*** without mounted components on the axes !**

CNC machine
with servo motor drive

EuroMod®

Features

- Portal gap: 350mm
- Maintenance-free servo motors
- Maximum spindle motor size up to 1.5 kW
- Available with or without protective hood
- Ideal for multi-shift operation
- Control panel i0P-19-TFT
- Control PC iPC 25 including PCI card Win 7/64 bit

Areas of applications

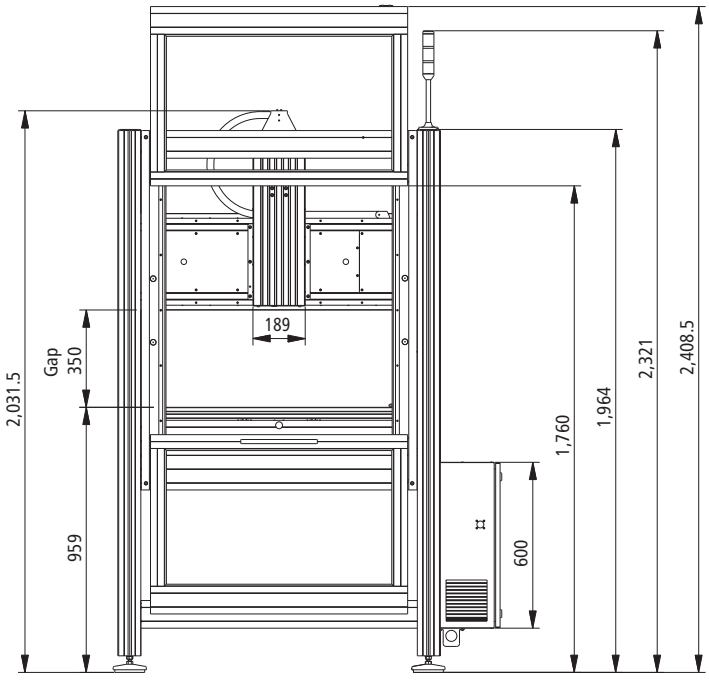
For the machining of:

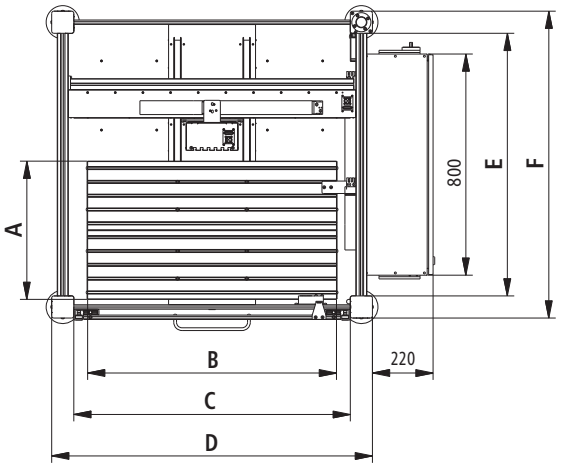
- Light metals
- Plastics
- Wood
- Foams
- Plexiglas

Options

- PC control console with free PCI plug-ins (for use by external PCI hardware)
- Stainless steel keyboard
- Safety light curtain
- Milling and engraving spindles
- SK11/SK20 automatic tool change stations
- Minimum quantity lubrication or CoolMin cooling system
- Vacuum clamping benches
- Suction device
- 4th axis e. g. RDH series installation
- pneumatic sliding door

Dimensioned drawings





	A	B	C	D	E	F
EuroMod MP30	350	900	1,000	1,160	640	800
EuroMod MP45	500	900	1,000	1,160	950	1,110
EuroMod MP65	700	1,200	1,200	1,480	1,350	1,510

Technical specifications subject to change.

CNC machine
with servo motor drive

FLATCOM® M series

Features

- 5-axis machining
- moving portal, fixed bench
- maintenance-free motors

FlatCom M 40
with open hood and options: spindle motor, tool changer, VakuFit vacuum clamping plate, length measuring key, CoolMin tool cooling, CNC joystick

Technical specifications

	FLATCOM® M 20	FLATCOM® M30	FLATCOM® M40	FLATCOM® M50
Processing areas X/Y [mm] *	700 / 600	700 / 900	1,200 / 900	1,200 / 1,400
Z lift [mm]	150 (optional 250, in each case without processing unit)			
Bench clamping area W x D [mm]	750 x 750	750 x 1,000	1,250 x 1,000	1,250 x 1,500
Z gap [mm] *	200 (optional 300,in each case without processing unit)			
Dimensions WxDxH [mm]	1,420 x1,150 x1,870	1,420 x1,450 x1,870	1,920 x1,450 x1,870	1,920 x1,950 x1,870
Processing speed X/Y/Z	max. 250 mm/s			
Repeat accuracy [mm]	± 0.02			
Drive motors	Servo motors			
Drive elements X/Y/Z	Recirculating ball drive, adjustable for no play			
Controller	iMD CAN controller with 3 drive controllers, expandable to 12 axes (max. 6 interpolated & 6 handling axes), PC, I/O module, safety circuit with rest state monitoring, power supply unit 48 V / 1000 W			
Operation	Control panel iOP-19-TFT			
Weight (kg)	approx. 300	approx. 340	approx. 450	approx. 525
Software	Windows, WinRemote (optional: ProNC, isy 2.8)			
Connection values	230V, 16A	400V, 16A		
Part-no. (Z lift = 150 mm)	276023 52455E	276033 52455E	276043 52455E	276053 52455E
Part-no. (Z lift = 250 mm)	276023 53455E	276033 53455E	276043 53455E	276053 53455E

*** without mounted components on the axes !**

CNC machine
with servo motor drive

FLATCOM® M series

Features

- Portal gap: 200mm, optional 300mm
- Maintenance-free servo motors
- Maximum spindle motor size up to 1.5 kW
- Availabe with or without protective hood
- Ideal for multi-shift operation
- Control panel i0P-19-TFT
- Control PC iPC 25 including PCI card Win 7/64 bit

Areas of applications

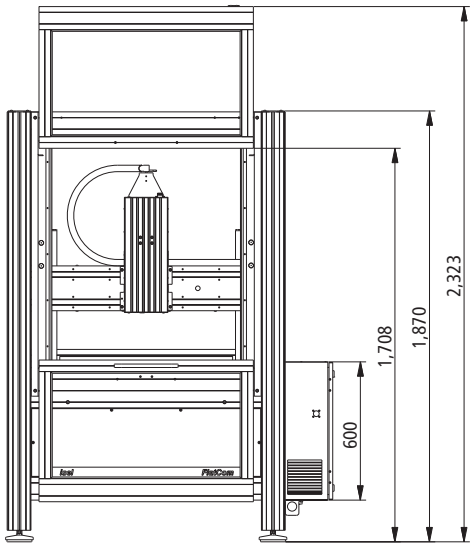
For the machining of:

- Plastics
- Wood
- Foams
- Plexiglas

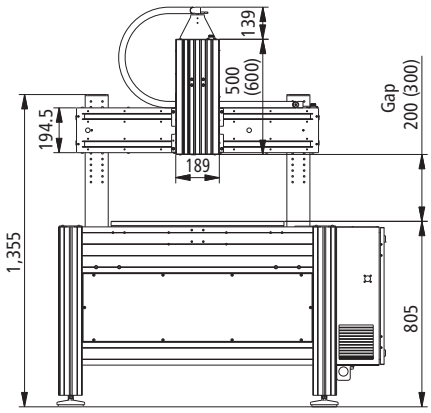
Options

- PC control console with free PCI plug-ins (for use by external PCI hardware)
- Safety light curtain
- Milling and engraving spindles
- SK11/SK20 automatic tool change stations
- Minimum quantity lubrication or CoolMin cooling system
- Vacuum clamping benches
- Suction device
- 4th axis e. g. RDH series installation
- Version without hood
- Maximum 6 interpolated axes + 6 handling axes
- Portal gap 300 mm
- Pneumatic sliding door

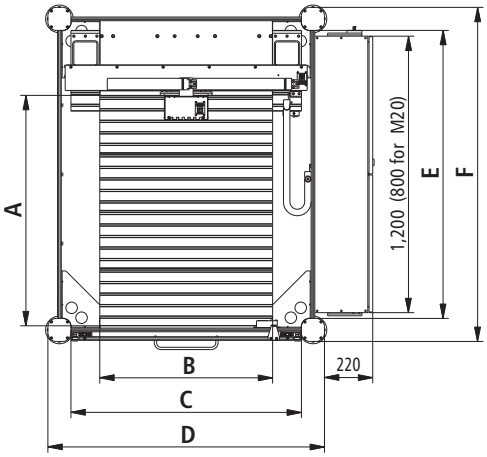
Dimensioned drawings



FlatCom with sub-frame and hood



FlatCom with sub-frame and without hood



	A	B	C	D	E	F
FlatCom M20	750	750	1,000	1,200	950	1,150
FlatCom M30	1,000	750	1,000	1,200	1,250	1,450
FlatCom M40	1,000	1,250	1,500	1,700	1,250	1,450
FlatCom M50	1,500	1,250	1,500	1,700	1,750	1,950

Technical specifications subject to change.

CNC machine
with servo motor drive

FLATCOM® L series

FlatCom L250 with iOP-19-CPU

Technical specifications

	FLATCOM® L150	FLATCOM® L250
Processing areas X/Y [mm] *	1,500 / 1,700	2,500 / 1,700
Z lift [mm]	210	
Bench clamping area WxD [mm]	1,600 x 2,250	2,600 x 2,250
Z gap [mm] *	270	
Dimensions WxDxH [mm]	2,216 x 2,430 x 1,995	3,216 x 2,430 x 1,995
Processing speed X/Y/Z	max. 250 mm/s	
Repeat accuracy [mm]	± 0.02	
Drive motors	Servo motors	
Drive elements X/Y/Z	Recirculating ball drive, adjustable for no play	
Controller	IMD CAN controller with 4 drive controllers, expandable to 12 axes (max. 6 interpolated & 6 handling axes), PC, I/O module, safety circuit with rest state monitoring, power supply unit 48V / 1000W	
Operation	Control pult iOP-19-CPU	
Weight [kg]	appr. 435	appr. 510
Software	Windows, WinRemote (optional: ProNC, isy 2.8)	
Connection values	400 V, 16 A	
Part-no.	276063 34565E	276073 34565E

*** without mounted components on the axes !**

CNC machine
with servo motor drive

FLATCOM® L series

Features

- Portal gap: 300mm
- Maintenance-free servo motors
- Particularly suitable for the whopping editing (aluminium, non-ferrous metals, ceramics etc…)
- Installation of spindle motors up to 3.6 KW, SK 30 tool holders
- Available with or without protective hood
- Ideal for multi-shift operation
- Control pult i0P-19-CPU
- Control PC iPC 25 including PCI card Win 7 / 64 bit

Areas of applications

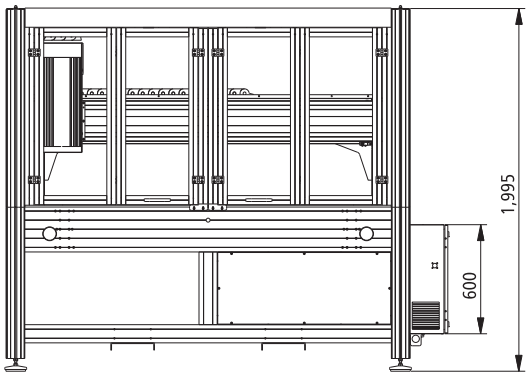
For the machining of:

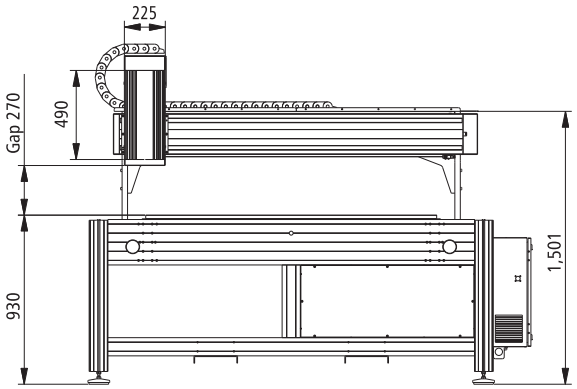
- Light metals
- non-ferrous metals (brass, bronze etc…)
- CFRP
- Ceramic
- Platics
- Wood

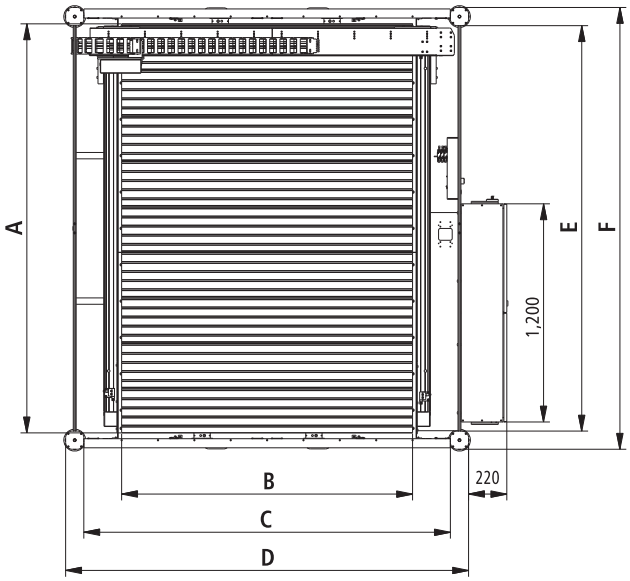
Options

- PC control console with free PCI plug-ins (for use by external PCI hardware)
- Safety light curtain
- Milling and engraving spindles
- SK11/SK20 automatic tool change stations
- Minimum quantity lubrication or CoolMin cooling system
- Vacuum clamping benches
- Suction device
- 4th axis e. g. RDH series installation
- Version without hood
- Maximum 6 interpolated axes + 6 handling axes
- Portal gap according to customers request

Dimensioned drawings







	A	B	C	D	E	F
FlatCom L 150	2,,250	1,600	2,016	2,216	2,230	2,430
FlatCom L 250	2,250	2,600	3,016	3,216	2,230	2,430

Technical specifications subject to change.

systems

CNC machine
with servo motor drive

FLATCOM® XL series

Features

- Windows-based software
- Gantry drive
- Mobile portal, fixed bench

FlatCom XL with control pult iOP-19

Technical specifications

	FLATCOM® 102/72	FLATCOM® 102/112	FLATCOM® 142/112	FLATCOM® 142/162	FLATCOM® 142/252
Processing areas X/Y [mm] *	1,020 / 720	1,020 / 1,120	1,420 / 1,120	1,420 / 1,620	1,420 / 2,520
Z lift [mm]	210 (optional: 410, in each case without processing unit)				
Bench clamping area W x D [mm]	1,125 x 1,300	1,125 x 1,700	1,500 x 1,700	1,500 x 2,200	1,500 x 3,050
Z gap [mm] *	235 (optional 435, in each case without processing unit)				
Dimensions WxDxH [mm]	2,084/1,584/1,990	2,084/1,984/1,990	2,459/1,984/1,990	2,459/2,484/1,990	2,459/3,384/1,990
Processing speed X/Y/Z	max. 250				
Repeat accuracy [mm]	± 0.02				
Drive motors	Servo motors				
Drive elements X/Y/Z	Recirculating ball drive, adjustable for no play				
Controller	iMD CAN controller with 4 drive controllers, expandable to 12 axes (max. 6 interpolated & 6 handling axes), PC, I/O module, safety circuit with rest state monitoring, power supply unit 48V/1000 W				
Operation	Control pult iOP-19-CPU				
Weight [kg]	approx. 550	approx. 600	approx. 700	approx. 800	approx. 1000
Software	Windows, WinRemote (optional: ProNC, isy 2.8)				
Connection values	400 V, 16 A				
Part-no. (Z lift = 210 mm)	276552 0013E	276553 0013E	276554 0013E	276555 0013E	276556 0013E

*** without mounted components on the axes !**

CNC machine
with servo motor drive

FLATCOM® XL series

Features

- Portal gap: 235mm optional 435mm (for bigger workpieces)
- Maintenance-free servo motors
- Particularly suitable for the whopping editing (aluminium, non-ferrous metals, ceramics etc…)
- Installation of spindle motors up to 3.6 KW, SK 30 tool holders
- Available with or without protective hood
- Ideal for multi-shift operation
- Control pult i0P-19-CPU
- Control PC iPC 25 including PCI card Win 7/64 bit

Areas of applications

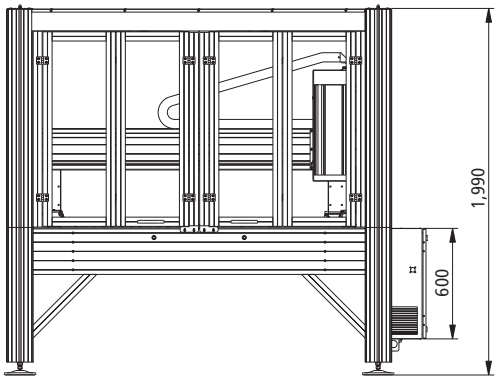
For the machining of:

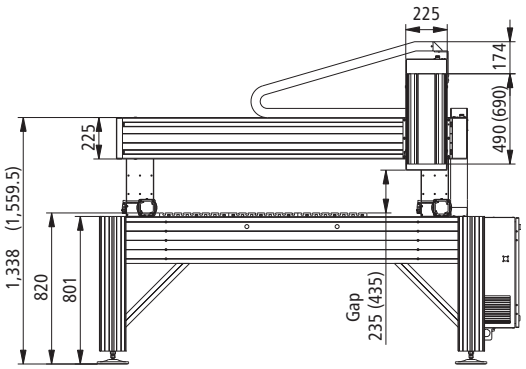
- Light metals
- non-ferrous metals (brass, bronze etc…)
- CFRP
- Ceramic
- Platics
- Wood

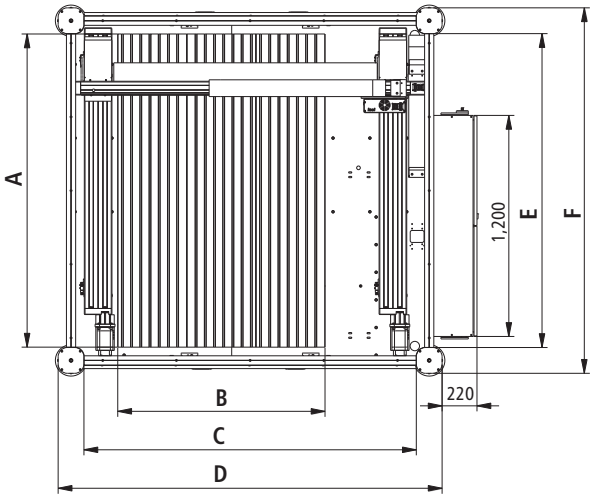
Options

- PC control console with free PCI plug-ins (for use by external PCI hardware)
- Safety light curtain
- Milling and engraving spindles
- SK11/SK20 automatic tool change stations
- Minimum quantity lubrication or CoolMin cooling system
- Vacuum clamping benches
- Suction device
- 4th axis e. g. RDH series installation
- Version without hood
- Maximum 6 interpolated axes + 6 handling axes
- Portal gap 435 mm

Dimensioned drawings







	A	B	C	D	E	F
FlatCom XL 102/72	1,300	1,125	1,804	2,084	1,304	1,584
FlatCom XL 102/112	1,700	1,125	1,804	2,084	1,704	1,984
FlatCom XL 142/112	1,700	1,500	2,179	2,459	1,704	1,984
FlatCom XL 142/162	2,200	1,500	2,179	2,459	2,204	2,484
FlatCom XL 142/252	3,050	1,500	2,179	2,459	3,100	3,380

Technical specifications subject to change.

Flat bed units

Flat bed unit with Z-axis

Flat bed unit with Z-axis and underframe

Flat bed unit with Z-axis, underframe and housing

General note

Flatbed units as defined in the machine guidelines as incomplete machines according to the modular system with processing paths of 250 to 1250 mm. Step motors (MS200HT), set for no-play, are used as spindle drives Recirculating ball drives with a repeatability of ± 0.02 mm (positioning reproducibility) are used. The linear guides used are the isel double track feeds, proven over many years, with no-play pre-stressed linear ball bearings and recirculating ball spindles with a repeatability of ± 0.02 mm. All units are equipped with two limit switches per spindle. The machining and positioning units are available in a number of versions and are characterised by smooth running and high process speeds. The use of high quality aluminium components with flat-milled surfaces achieves low weight and high accuracy. isel X/Y/Z units are the ideal basis for setting up machines and systems for fitting and assembling, pressing and engraving, drilling and milling, milling and screwing, shaping and modelling, bonding and casting, soldering and welding, measuring and checking, sawing and cutting, etc.

Ordering information

X/Y flatbed units FB2

Part no.	Chassis A × B (mm)	Clamping surface X × Y (mm)	process travel X × Y (mm)	Z gap (mm)
246203M	1,210 x 946	750 x 850	530 x 500	190
246203 2040M	1,210 x 1,196	750 x 1,100	530 x 750	
246203 2054M	1,210 x 1,446	750 x 1,350	530 x 1,000	
246203 2067M	1,460 x 1,446	1,000 x 1,350	780 x 850	
246203 2130M	1,710 x 1,846	1,250 x 1,750	1,030 x 1250	

All flatbed units are fitted with **16 x 4 mm recirculating ball** drives as standard

Z-axes for flatbed units

Part no.	Lift (mm)	
230514M	75	with magnet brake 24 V
230514 0400M	160	with magnet brake 24 V

Underframes

Part no.	suitable for flatbed unit With clamping surface:
248500 0027	750 x 850
248500 0040	750 x 1,100
248500 0054	750 x 1,350
248500 0067	1,000 x 1,350
248500 0130	1,250 x 1,750

Housings

Part no.	suitable for flatbed units with clamping surface:
248200 0000	750 x 850
248200 2040	750 x 1,100
248200 2054	750 x 1,350
248200 2067	1,000 x 1,350
248200 2130	1,250 x 1,750

Flat bed units

Options

- Appropriate Controller (e.g.: iMC-S8)
- Software modules for operating in CAM, CNC and SPS applications
- Underframe
- Housing
- Spindle motors (see pages E-22 et seq.)
- Gap: 300 and 500 mm respectively

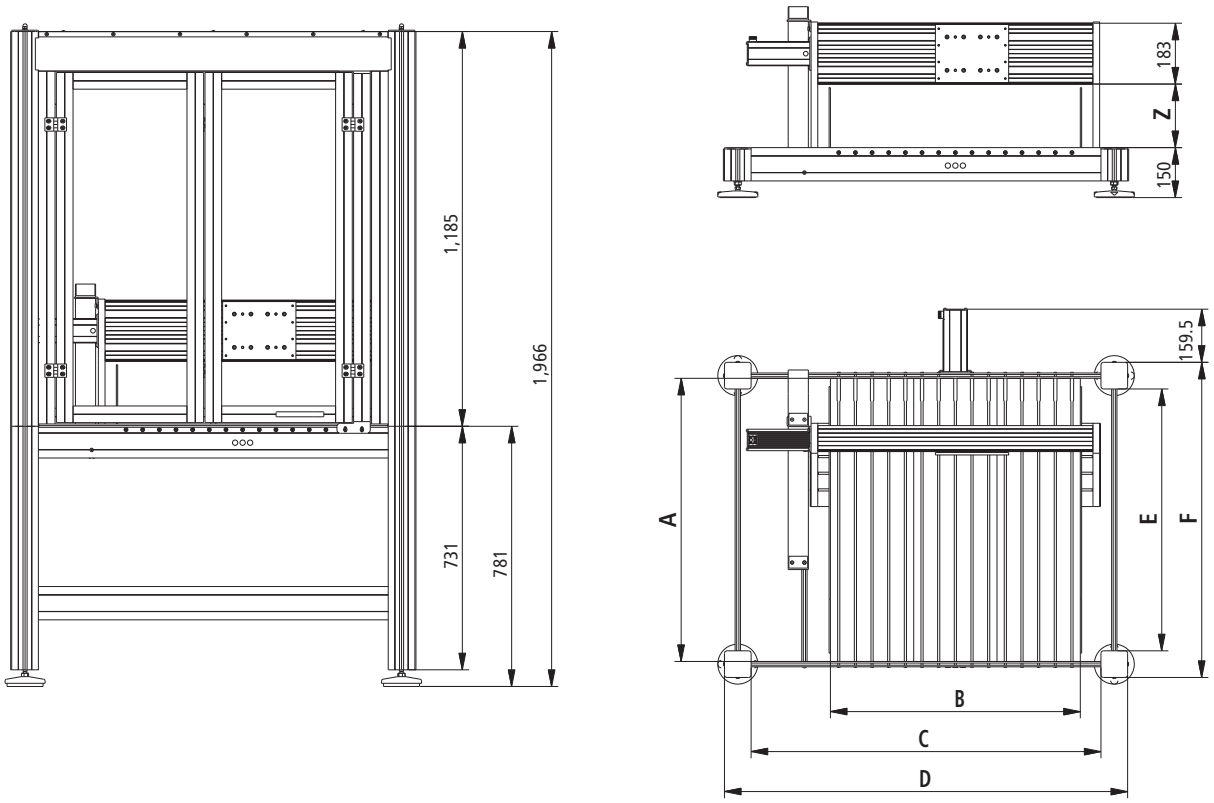
Accessories

Part no.	
219200 0001	Energy guidance chain

Software

Part-no.	
Z11 - 333 500 **Z13 - 337 070**	ProNC Software isy-CAM 2.8

Dimensioned drawings



Part-no.	Travel [mm]		Bench clamping area						
	X	Y	A	B	C	D	E	F	Z
246203M	530	500	850	750	1,050	1,210	786	946	190
246203 2040M	530	750	1,100	750	1,050	1,210	1,036	1,196	
246203 2054M	530	1,000	1,350	750	1,050	1,210	1,286	1,446	
246203 2067M	780	850	1,350	1,000	1,300	1,460	1,286	1,446	
246203 2130M	1,030	1,250	1,750	1,250	1,550	1,710	1,686	1,846	

Technical specifications subject to change.

Introduction

When developing our spindle motors, our main emphasis was on functionality, quality, and the optimum price structure. Our spindle motors are also particularly easy to maintain. The particularly slim lines and square housing cross-section allow installation in rows with minimum separation.
Our approach to electrical construction is to use an AC short circuit rotor with 2-pole windings in our motors, designed to DIN EN 60034. The insulation of the windings is produced according to heat class F. The motors are dynamically balanced to very fine tolerances, so that good running properties are achieved even at high speeds. In all, they cover a range of speeds from 3,000 to 30,000 rpm. All spindle motors are produced entirely in Germany, meet at least the criteria for IP54 protection class and are therefore approved even for areas where wood dust is present. In our product portfolio, in addition to spindle motors, you'll find all the leads you will need in various lengths and preset, reliable frequency converters for connecting to the controller.
By integrating development, production, sales and service under one roof, we have very short procedures and have our own repair service which operates year-round, unlike many of our competitors. An extensive range of accessories, such as vacuum cleaning systems, minimum amount greasing systems, collets, SK housings, tool changers and our unique, patented Coolmin system for optimum and economical tool cooling, without residues, round off our product portfolio.

Spindle motor
with manual tool changer

iSA 500

iSA 500 with manual tool change

iSA 500 with manual tool change and **CoolMin** tool cooling system

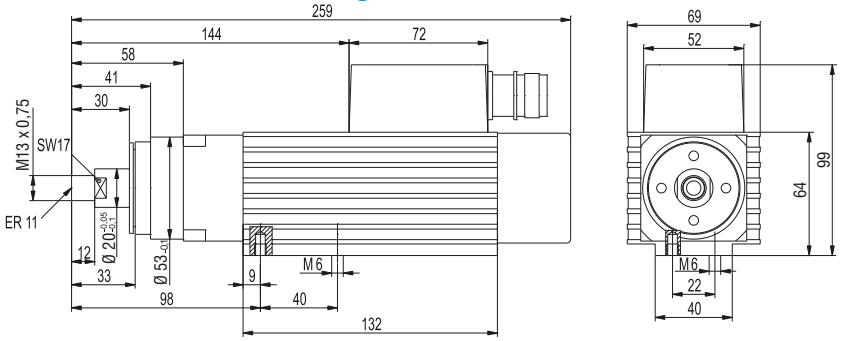
Features

- Robust 2-pole AC motor (asynchronous motor)
- Square shape, protection class IP54, isolation class F
- Cast bearing apron A-side, aluminium extrusion B-side
- Motor shaft to take ER 11 collets
- Rated output 0.5 kW (S6-40% operation)
- Speed range 5,000 rpm. - 30,000 rpm.
- Manual tool change
- M23 plug connection
- incl. ER 11 collet, Ø 6 mm
- Clamping range Ø 1 mm – Ø 7 mm
- Intrinsic ventilation B-side
- Controlled by Frequency converter
- Spindle bearing: 2 bearings A-side, 1 bearing B-side
- Optional:
  - CoolMin® (internal and external)
  - Frequency converter
  - Various collets, mounting plates, lead lengths
  - Suction device

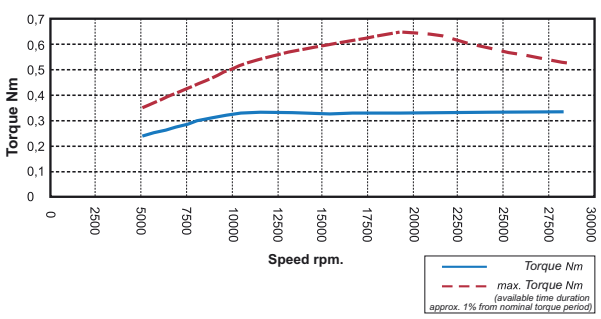
Technical specification

Description		iSA 500
Torque at rated speed 18,000 rpm	[Nm]	0.28
Speed	[rpm]	5,000 to 30,000
Cut-off frequency	[Hz]	300
Number of poles		2
Rated voltage	[V]	230
Rated current	[A]	2.6
cos ϕ		0.75
S 6 = 40% rated output	[kW]	0.5
Concentricity	[mm]	0.01
Weight	[kg]	2.8

Dimensioned drawings



Torque curves



Technical specifications subject to change.

Ordering information

iSA 500 spindle motor
Part no.: **477004 3130**

iSA 500 spindle motor with converter and lead (8m)
Part no.: **310704 1611**

iSA 500 spindle motor with CoolMin®
Part no.: **477004 5130**

iSA 500 spindle motor with converter, lead (8 m) and CoolMin®
Part no.: **310704 1631**

LES 5 mounting plate
Part no.: **277014**

LES 6 / FB 2 mounting plate
Part no.: **277028 0008 / 277013**

ICP/ICV mounting plate
Part no.: **280000 0046**

EuroMod/FlatCom mounting plate
Part no.: **277028**

- SKC 750 frequency converter see page **E-37**
- M23 motor side leads see page **E-37**
- Suction device for 38 mm hose see page **E-37**
- collet set, ER11 type see page **E-38**

systems

Spindle motor
with manual tool changer

iSA 750

iSA 750 with manual tool change

iSA 750 with manual tool change and **CoolMin**tool cooling system

Features

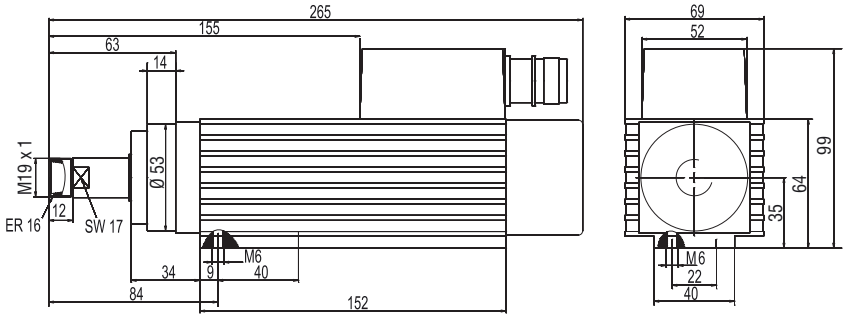
- Robust 2-pole AC motor (asynchronous motor)
- Square shape, Protection class IP54, insulation class F
- Aluminium extrusion A and B sides
- Motor shaft to take ER 16 collets
- Rated output 0.75 kW (S6-40% operation)
- Speed range 3,000 rpm. - 24,000 rpm.
- Manual tool change
- M23 plug connection
- Incl. ER16 collet, Ø 6 mm
- Clamping range Ø 1 mm – Ø 10 mm
- Intrinsic ventilation B-side
- Two precision bearings
- Controlled by frequency converter

- optional:
  - CoolMin® (internal and external)
  - Frequency converter
  - Various collets, mounting plates, lead lengths
  - Suction device

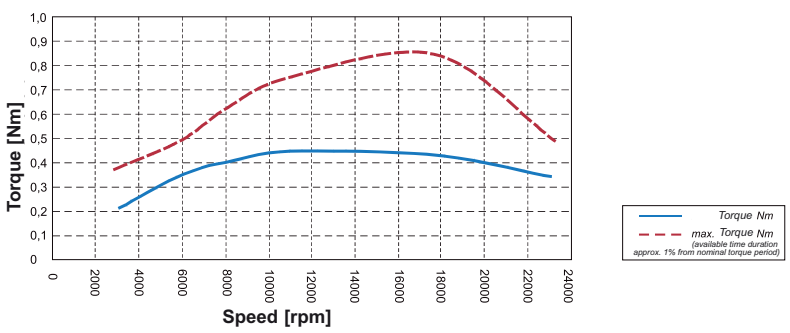
Technical specification

Description		iSA 750
Torque at rated speed 22,000 rpm	[Nm]	0.34
Speed	[rpm]	3,000 to 24,000
Cut-off frequency	[Hz]	300
Number of poles		2
Rated voltage	[V]	230
Rated current	[A]	3.4
cos ϕ		0.79
S 6 = 40% rated output	[kW]	0.75
Concentricity	[mm]	0.01
Weight	[kg]	2.6

Dimensioned drawings



Torque curves



Ordering information

iSA 750 spindle motor
Part no.: **477008 3124**

iSA 750 spindle motor with converter and lead (8 m)
Part no.: **310708 1611**

iSA 750 spindle motor with CoolMin®
Part no.: **477008 5124**

iSA 750 spindle motor with converter, lead (8 m) and CoolMin®
Part no.: **310707 1631**

LES 5 / FB 2 mounting plate
Part no.: **277014 / 277013**

LES 6 mounting plate
Part no.: **277028 0008**

ICP/ICV mounting plate
Part no.: **280000 0046**

EuroMod/FlatCom mounting plate
Part no.: **277028**

- SKC 750 frequency converter see page **E-37**
- M23 motor side leads see page **E-37**
- Suction device for 38 mm hose see page **E-37**
- collet set, ER16 type see page **E-38**

Technical specifications subject to change.

Spindle motor
with manual tool changer

iSA 1500

iSA 1500 with manual tool change

iSA 1500 with manual tool change and CoolMin tool **cooling system**

Features

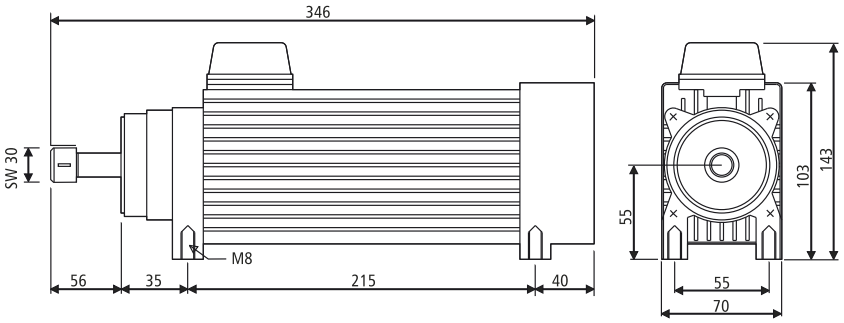
- Robust 2-pole AC motor (asynchronous motor)
- Square shape, protection class IP54, insulation class F
- Cast bearing apron A and B sides
- Motor shaft to take ER 20 collets
- Rated output 1.5 kW (S6-40% operation)
- Speed range 5,000 rpm. - 20,000 rpm.
- Manual tool change
- M23 plug connection
- Incl. ER20 collet, Ø 6 mm
- Clamping range Ø 2 mm – Ø 13 mm
- Intrinsic ventilation B-side
- Controlled by frequency converter
- Spindle bearing: 2 bearings A-side 1 bearing B-side

optional:
- CoolMin® (internal and external)
- Frequency converter
- Various collets, mounting plates, lead lengths
- Suction device
- 4-pole motor version to order

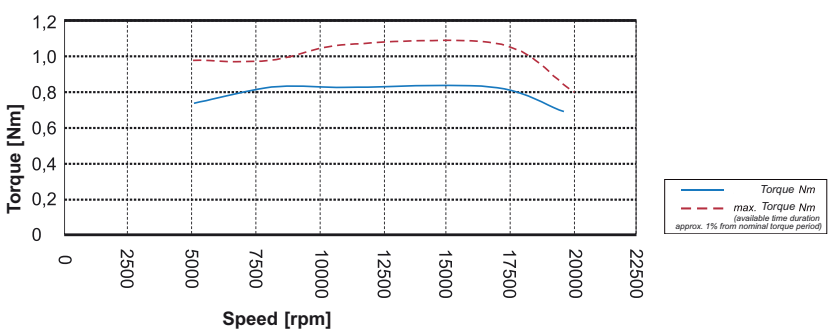
Technical specification

Description		iSA 1500
Torque at rated speed 20,000 rpm	[Nm]	0.72
Speed	[rpm]	5,000 to 20,000
Cut-off frequency	[Hz]	300
Number of poles		2
Rated voltage	[V]	230
Rated current	[A]	7
cos ϕ		0.85
S 6 = 40% rated output	[kW]	1.5
Concentricity	[mm]	0.01
Weight	[kg]	6.4

Dimensioned drawings



Torque curves



Technical specifications subject to change.

Ordering information

iSA 1500 spindle motor
Part no.: **477510 3120**

iSA 1500 spindle motor with converter and connecting lead (8 m)
Part no.: **310610 3614**

iSA 1500 spindle motor with CoolMin®
Part no.: **477510 5120**

iSA 1500 spindle motor with converter and CoolMin®
Part no.: **310610 3634**

LES 5 mounting plate
Part no.: **277028 0003**

EuroMod/FlatCom mounting plate
Part no.: **277028 0002**

- CoolMin® external with hose see page **E-32**
- SKC 1500 frequency converter see page **E-37**
- M23 motor side connecting leads see page **E-37**
- Suction device for 80 mm hose see page **E-37**
- collet set, ER20 type see page **E-38**

systems

Spindle motor
with manual tool changer

iSA 1500 L

iSA 1500 L with manual tool change

Features

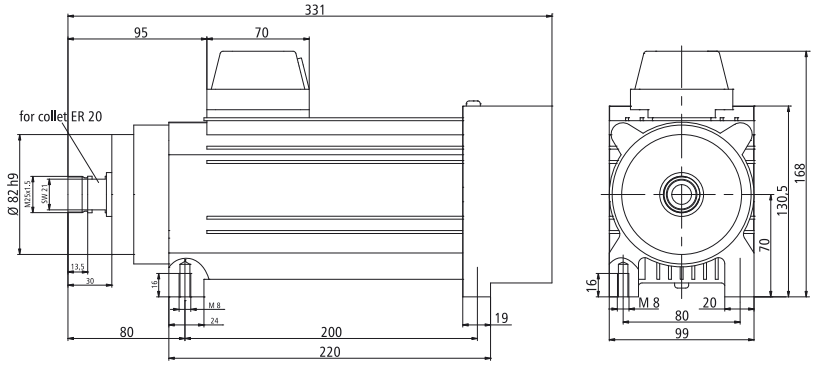
- Robust 2-pole AC motor
- Protection class IP54, insulation class F
- Motor shaft to take ER 20 collets
- Cast bearing apron A and B sides
- Rated output 1.5 kW (S6-40% operation)
- Rotational speed range 2,500 rpm – 6,000 rpm
- Torque 2.37 Nm (at 6,000 rpm)
- Rated voltage 200 V
- Manual tool change
- Clamping range Ø 2 mm – Ø 13 mm
- Intrinsic ventilation B-side
- Controlled by frequency converter
- Spindle bearing:
  A-side (milling side) double,
  B-side (ventilation side) single
- Concentricity: 0.01 mm
- Weight: 10.5 kg

- Optional:
  - CoolMin® Tool and material cooling, external
  - Frequency converter
  - collets

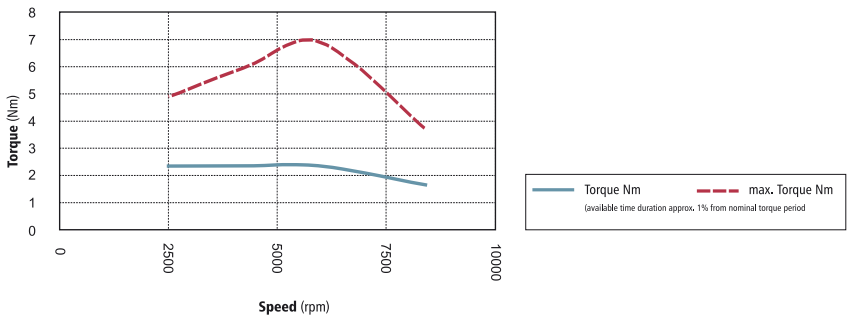
Technical specification

Description		iSA 1500 L
Torque at rated speed 6,000 rpm	[Nm]	2.37
Speed range	[rpm]	2,500 to 6,000
Cut-off frequency	[Hz]	107
Number of poles		2
Rated voltage	[V]	200
Rated current	[A]	6.5
cos ϕ		0.84
Rated power (S 6 = 40% operation)	[W]	1500
Concentricity	[mm]	0.01
Weight	[kg]	10.5

Dimensioned drawings



Torque curves



Ordering information

iSA 1500 L spindle motor
with collet ER 20 (6 mm), clamping key ER 20, jaw key SW 22, Interconnectron connection
Part no.: **477510 3106**

iSA 1500 L spindle motor with converter
with collet ER 20 (6 mm), clamping key ER 20, jaw key SW 22, Interconnectron connection
Connecting leads 8 m
Part no.: **310610 3615**

CoolMin® external
Part no.: **239011 0119**

Suction device for EuroMod / FlatCom
prepared for 38 mm diameter hose
Part no.: **239012 0001**

Clamping set ER 20
2.0 / 3.0 / 4.0 / 5.0 / 6.0 / 7.0 / 8.0 / 9.0 / 10.0 / 11.0 / 12.0 / 13.0 mm
Part no.: **239172 0001**

Mounting plate isel System (Z axis)
EuroMod / FlatCom (LES 21)
Part no.: **277028 0011**

Mounting plate isel System (Z axis)
Linear unit LES 5
Part no.: **277028 0005**

Technical specifications subject to change.

Spindle motor
with automatic tool changer

iSA 900

iSA 900 with automatic tool change

Features

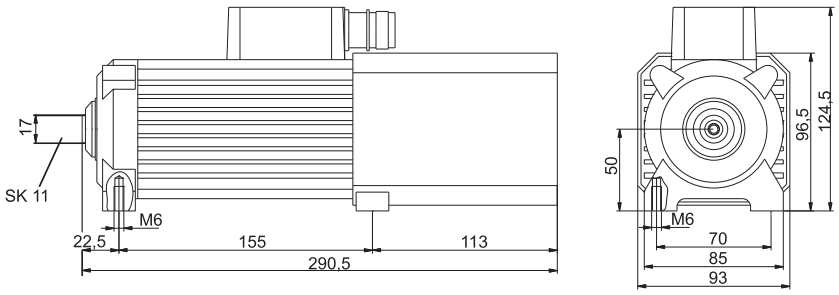
- Robust 2-pole AC motor (asynchronous motor)
- Square shape, Protection class IP55, insulation class F
- Cast bearing apron A and B sides
- Rated output 0.9 kW (S6-40% operation)
- Speed range 6,000 rpm. - 24,000 rpm.
- Automatic tool change with SK 11 tool holder and ER 11 collet, Ø 6 mm
- M23 plug connection
- Clamping range Ø 1 mm – Ø 7 mm
- Separately driven fan B-side
- Controlled by frequency converter
- Two precision bearings
- SK 11 tool changer, pneumatic (7.5 bars)

- Optional:
  - CoolMin® (external)
  - Frequency converter
  - Tool changing station
  - Various collets, mounting plates, lead lengths

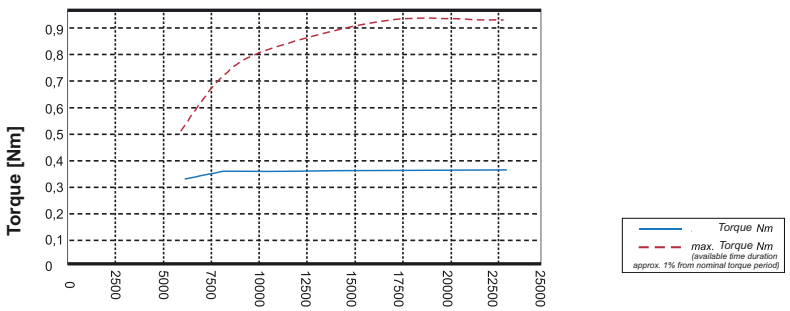
Technical specification

Description		iSA 900
Torque at rated speed 18,000 rpm	[Nm]	0.37
Speed	[rpm]	6,000 to 24,000
Cut-off frequency	[Hz]	400
Number of poles		2
Rated voltage	[V]	230
Rated current	[A]	3.25
cos ϕ		0.84
S 6 = 40% rated output	[kW]	0.9
Concentricity	[mm]	0.01
Weight	[kg]	5.8

Dimensioned drawings



Torque curves



Ordering information

iSA 900 spindle motor
Part no.: **477009 3324**

iSA 900 spindle motor
with converter and lead (8m)
Part no.: **310709 3612**

LES 5/EuroMod/FlatCom mounting plate
Part no.: **277028 0003**

- Cooling system® external with hose
  see pages **E-32**
- 5× SK 11 tool change stations
  see pages **E-34**
- 8× SK 11 tool change stations
  see pages **E-34**
- SK 11 tool holder
  see pages **E-34**
- SKC 750 frequency converter
  see pages **E-37**
- M23 motor side connecting leads
  see pages **E-37**
- collet set, ER11 type
  see pages **E-38**

Technical specifications subject to change.

systems

Spindle motor
with automatic tool changer

iSA 2200

iSA 2200 with automatic tool change

iSA 2200 with CoolMin® for internal tool cooling

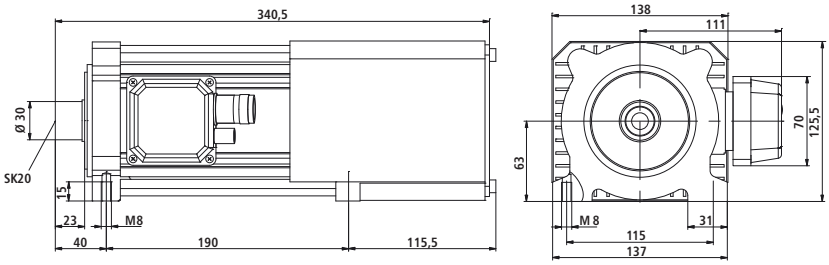
Features

- Robust 2-pole AC motor
- Protection class IP55, insulation class F
- Cast bearing apron A and B sides
- Rated output 2.2 kW (S6-40% operation)
- Rotational speed range 5,000 rpm – 20,000 rpm
- Torque 1.26 Nm (at 18,000 rpm)
- Rated voltage 3 x 230 V
- Automatic tool change
- Clamping range Ø 2 – Ø 13 mm
- Separately driven fan B-side
- Controlled by frequency converter
- Two precision bearings
- SK 20 tool changer, pneumatic (7.5 bars)
- Concentricity: 0.01 mm
- Weight: 14.6 kg
- Optional:
  - CoolMin® Tool and material cooling, external
  - CoolMin® internal with **internal tool cooling**
  - Frequency converter
  - Tool changer, collets

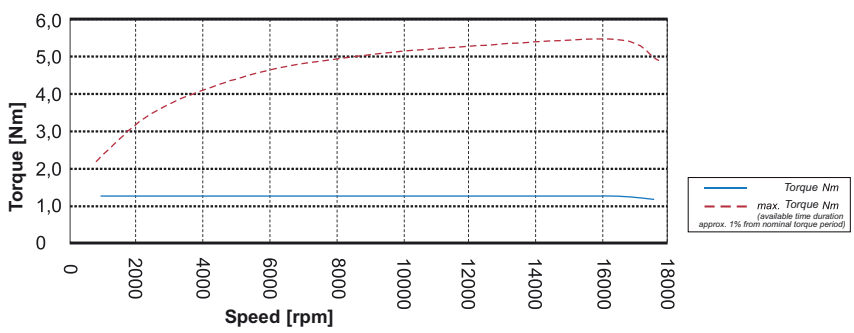
Technical specification

Description		iSA 2200
Torque at rated speed 18,000 rpm.	[Nm]	1.26
Speed range	[rpm]	5,000 to 20,000
Cut-off frequency	[Hz]	280
Number of poles		2
Rated voltage	[V]	3 x 230
Rated current	[A]	7.6
cos ϕ		0.84
Rated power (S 6 = 40% operation)	[W]	2.2
Concentricity	[mm]	0.01
Weight	[kg]	14.6

Dimensioned drawings



Torque curves



Ordering information

iSA 2200 spindle motor
with collets ER 20 (6 mm), nut ERM 20, clamping key ER 20 M, jaw key SW 22, Interconnectron connection
Part no.: **477022 3320**

iSA 2200 spindle motor as above, plus frequency converter SKC 1500, motor connecting cable 8 m
Part no.: **310722 3621**

iSA 2200 spindle motor+CoolMin® (internal)
with collets ER 20 (6 mm), nut ERM 20, clamping key ER 20 M, jaw key SW 22, Interconnectron connection
Part no.: **477022 5320**

iSA 2200 with converter+CoolMin® (internal)
as above, plus frequency convertor SKC 1500, motor connecting cable 8 m Part no.: **310722 3631**

SK 20 tool change station 4-fold with hood
Part no.: **239011 0041**

SK 20 tool holder
Part no.: **239172 0020**

Suction device for EuroMod/FlatCom, prepared for hose Ø 80 mm, pneumatic opening
Part no.: **239012 0002**

Suction device with CoolMin® (external)
for EuroMod/FlatCom, prepared for hose Ø 80 mm, pneumatic opening
Part no.: **239012 0003**

CoolMin® (external)
Part no.: **239011 0119**

Clamping set ER 20 2.0/3.0/4.0/5.0/6.0/7.0/8.0/9.0/10.0/11.0/12.0/13.0 mm Part no.:**239172 0001**

Mounting plate isel System (Z axis)
FlatCom / EuroMod Part no.: **277028 0004**
LES 5 Part no.: **277028 0005**

Technical specifications subject to change.

Spindle motor
with automatic tool changer

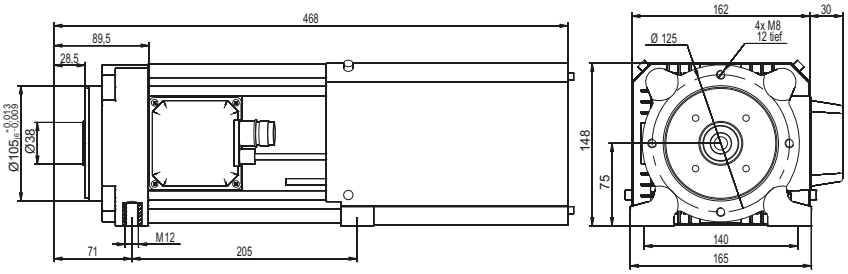
iSA 3600

iSA 3600 with automatic tool change

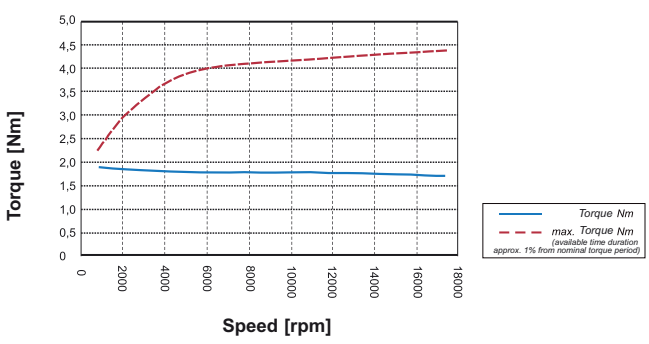
Technical specification

Description		iSA 3600
Torque at rated speed 18,000 rpm	[Nm]	4.5
Speed	[rpm]	6,000 to 18,000
Cut-off frequency	[Hz]	300
Number of poles		2
Rated voltage	[V]	3 x 400
Rated current	[A]	5.4
cos ϕ		0.87
S 6 = 40% rated output	[kW]	3.6
Concentricity	[mm]	0.01
Weight	[kg]	23.0

Dimensioned drawings



Torque curves



Technical specifications subject to change.

Features

- Robust 2-pole AC motor
- Square shape, protection class IP54, insulation class F
- Cast bearing apron A-side, aluminium extrusion B-side
- Motor shaft to take ER 32 collets
- Rated output 3.6 kW (S6-40% operation)
- Speed range 6,000 rpm. - 18,000 rpm.
- Automatic tool changer with SK 30 tool holder and ER 32 collet, Ø 6 mm
- Clamping range Ø 3 mm – Ø 20 mm
- Intrinsic ventilation B-side
- Two precision bearings
- Controlled by frequency converter
- Optional:
  - CoolMin® (external)
  - Frequency converter
  - Tool changing station
  - Various collets, mounting plates and lead lengths

Ordering information

iSA 3600 spindle motor
Part no.: **477822 3600**

iSA 3600 spindle motor with converter and connecting lead (8 m)
Part no.: **310736 3615**

LES 5 mounting plates
Part no.: **277028 0009**

- CoolMin® external with hose see page **E-32**
- 4× SK 30 tool change stations see page **E-34**
- 5× SK 30 tool change stations see page **E-34**
- SK 30 tool holder see page **E-34**
- SKC 4000 frequency converter see page **E-37**
- M23 motor side leads see page **E-37**
- collet set, type ER 32 see page **E-38**

systems

Spindle motor
for high rotational speeds, with **automatic tool changer**

iSA 1500 W

Features

- Precision angular ball bearings
- Automatic tool change with SK 20 tool holder and ER 20 collets, Ø 6 mm
- Clamping range Ø 2 mm - 13 mm
- Pneumatic tool change (7.5 bar)
- Controlled by frequency converter
- Balancing to EN/ISO standards
- IP54 protection class

- Optional
  - Tool changing station
  - Various collets

Technical specification

Description		
Max. torque	[Nm]	0.47
Max. Speed	[rpm]	40,000 (666 Hz)
Cut-off frequency	[Hz]	500 (30,000 rpm)
Number of poles		2
Rated voltage	[V]	3 x 230
tool holder	[ISO]	20
cos ϕ		0.8
Max. Output power (S 1)	[kW]	1.75
Concentricity	[mm]	under 0.01 or under 0.005 on request
Weight	[kg]	10

Ordering information

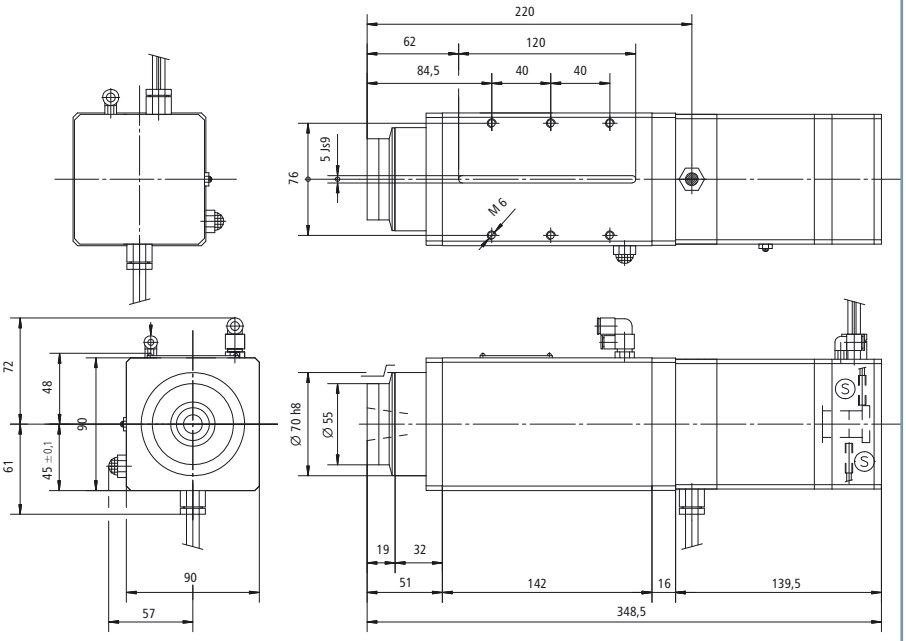
iSA 1500 W spindle motor
Part no. **477015 3340**

iSA 1500 W spindle motor with converter
Part no. **310715 3612**

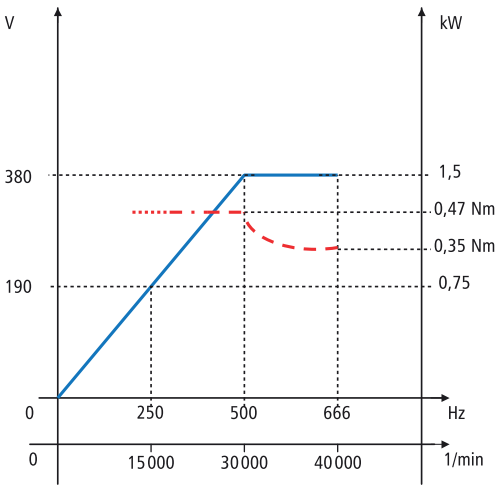
- SKC 1500 frequency converter
  see page **E-37**

- collet set, ER20 type
  see page **E-38**

Dimensioned drawings



Torque curves



Technical specifications subject to change.

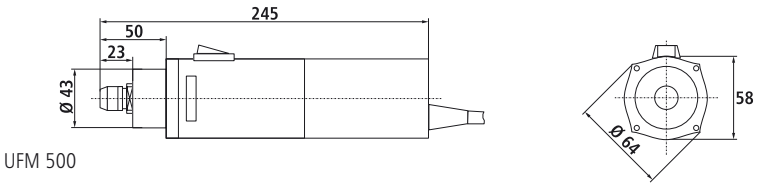
Universal milling and engraving spindles UFM 500/1050

UFM 1050 UFM 500

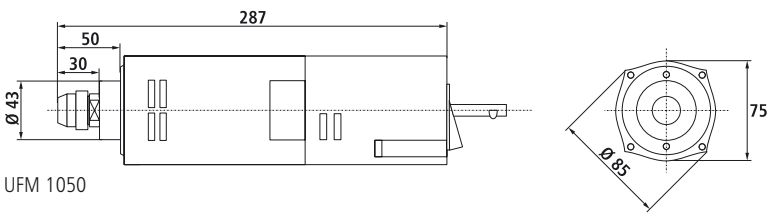
Technical specification

	Part no.	Load speed rpm	Voltage V	Efficiency %	Power consump-tion W	Power output W	Torque Nm
UFM 500	**420003 0500**	22.600	230	68	500	345	0.14
UFM 500-11	**420003 0501**	22.600	115	68	500	345	0.14
UFM 1050	**420003 1050**	21000	230	71	1050	720	0.32
UFM 1050-11	**420003 1051**	21.000	115	71	1050	720	0.32

Dimensioned drawings



UFM 500



UFM 1050

Features

- Load-independent working speed with Tacho control electronics
- Smooth start for no-backlash acceleration to rated speed
- Blocking protection
- Protective isolation
- PTC thermal monitoring
- Rated output 345 W/720 W
- Speed range 11,000 to 25,000 rpm
- Torque 0.14 Nm (at 22,600/21,000 rpm)
- Rated voltage 230 V
- Collar
- Clamping range Ø 1 – Ø 6.35 / 8 mm
- Speed control
- Rigid double ball bearing
- Weight: 1.9 / 2.1 kg

UFM 500
- Input power **500 W**
- Output power **345 W**
- Torque **0.14 Nm**

UFM 1050
- Power consumption **1050 W**
- Output power **720 W**
- Torque **0.32 Nm**

Clamping blocks

Clamping blocks Ø 43mm	Part no.
Ra 100 and Ra 150 mm fixings	**290 902**
Ra 100 mm fixing	**290 903**
Ra 125 mm fixing	**290 904**

Collets

collet sets	Part no.
for UFM 500 (Ø 1.0 - 6.35 mm)	**239110**
for UFM 1050 (Ø 1.0 - 8.0 mm)	**239112 0000**

Clamping nut

Clamping nut	Part no.
for UFM 500	**239 111**
for UFM 1050	**239 112**

Carbon brushes

Carbon brushes, VE = 2 units.	Part no.
for UFM 500	**420 003 9000**
for UFM 1050	**420 003 9001**

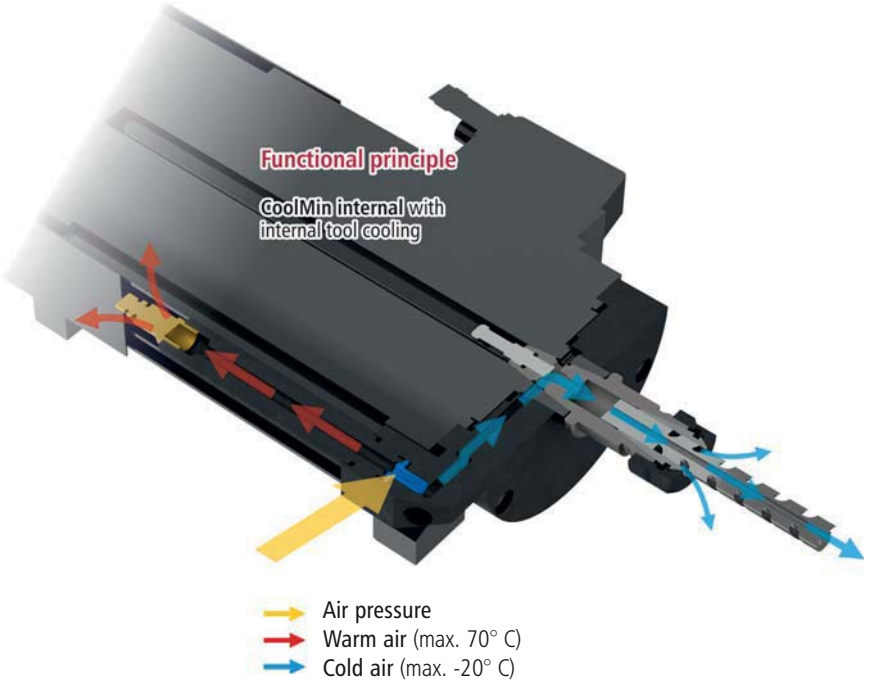
Technical specifications subject to change.

systems

Tool cooling system

CoolMin

Functional principle



Air pressure
Warm air (max. 70° C)
Cold air (max. -20° C)

1. Spindle motor
2. Temperature controller
3. Hot air exhaust
4. Vortex nozzle with cold air exhaust
5. Compressed air feed
6. Cold air blower in synthetic material
7. Tool holder for internal cooling
8. Milling cutter for internal cooling

Tool and material cooling

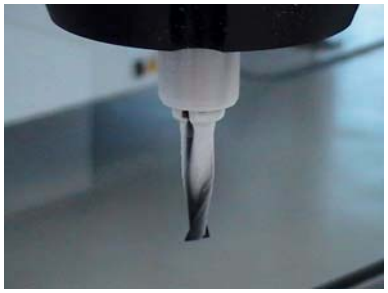
Dry cutting is today the first choice for many machining tasks.

Hitherto, materials, tool wear and surface finish have often necessitated cooling with appropriate coolants / greases. This always means moisture. Even minimal moisture spray cooling causes unwanted effects such as the build-up of dirt and the adhesion of swarf to the cutting tool or to the working surface and can lead to the deterioration of the material surface structure, depending on the material being machined.

Our patented cooling method ensures adequate tool and surface cooling and reduces such effects to negligible levels. This keeps the swarf dry and, depending on the material, easy to remove by either blowing or vacuuming. Surfaces are therefore protected and, as a result of direct tool cooling, tool life is significantly increased (also suitable for tools with integrated cooling).

The main component of our cooling method is a cold air nozzle, which operates on the eddy current principle and separates warm air from cold.

The system is powered by air pressure alone (6 to 10 bar).



Tool, cooled by CoolMin internal

Technical specifications subject to change.

Tool cooling system

CoolMin

Functional principle

CoolMin external

CoolMin internal without tool cooling system

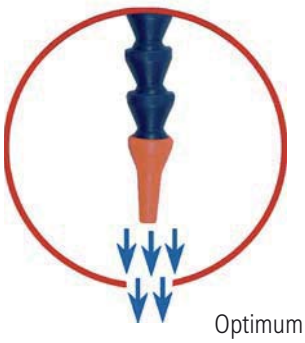
1. Compressed air feed
2. Flexible mating hose
3. Spindle motor
4. Temperature controller
5. Hot air exhaust
6. Vortex nozzle with Cold air exhaust
7. Cold air supply in synthetic material
8. Collet

Diagram: CoolMin external with mating hose

Diagram: CoolMin internal

Technical specification

Compressed air feed	6 – 10 bar
Cold air exhaust	up to max. -25° C
Hot air exhaust	up to max. 70° C
Air consumption	approx. 150 l/min.



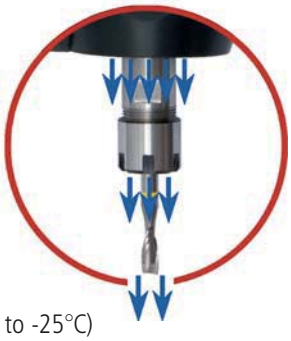


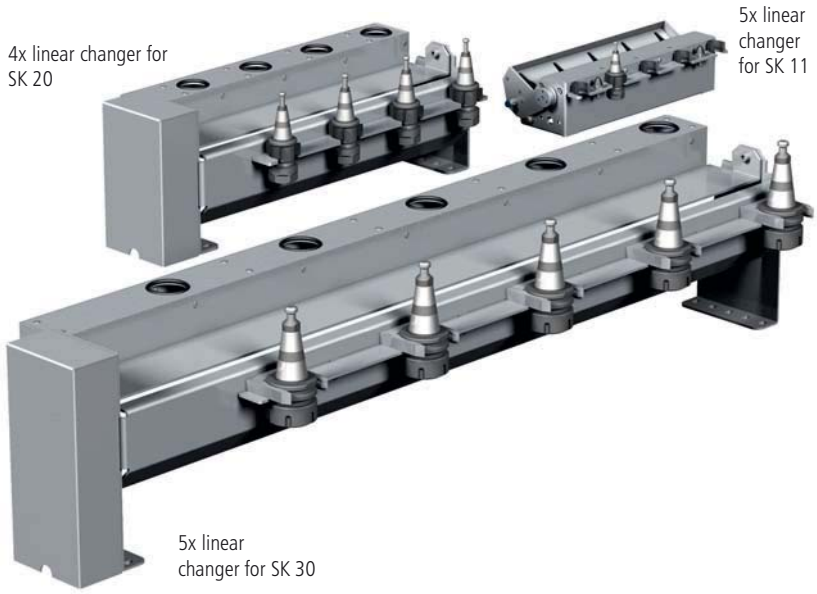
Diagram:
Optimum cold air flow (up to -25°C) for tool cooling and chip evacuation

Ordering information

Description		Part number
CoolMin external	with mating hose, incl. servicing kit and shut-off tap (manual)	239011 0119
CoolMin external	incl. servicing kit and electrically-powered valve	239011 0117
CoolMin internal		see individual motors

Technical specifications subject to change.

Linear tool change stations SK 11 / 20 / 30



Features

- Simple, functional tool changer for SK 11, SK 20 and SK 30
- Pneumatic rotary cylinder and end position monitoring for safe changing
- Control via 5/2-way valve with integration in the safety circuit
- Low-maintenance, stainless steel design (powder-coated aluminium)
- Variable positioning on the machine bench

Ordering information

SK 11 tool change station
...for iSA 900

5x, with hood + pneumatics
Part-no.: **239011 0053**

8x, with hood + pneumatics
Part-no.: **239011 0083**

SK 20 tool change station
...for iSA 2200

4x (in steps of 100mm), with hood + pneumatics
Part-no.: **239011 0041**

8x (in steps of 100mm), with hood + pneumatics
Part-no.: **239011 0081**

5x (in steps of 170mm), with hood + pneumatics
Part-no.: **239011 0050**

10x (in steps of 170mm), with hood + pneumatics
Part-no.: **239011 0100**

SK 30 tool change station
...for iSA 3600

4x, with hood + pneumatics
Part-no.: **239011 0045**

5x, with hood + pneumatics
Part-no.: **239011 0055**

Tool holders

SK 11 SK 20 SK 30

SK 11 for collets Type ER 11
Part-no.: **239111 0001**

SK 20 for collets Type ER 20
Part-no.: **239172 0020**

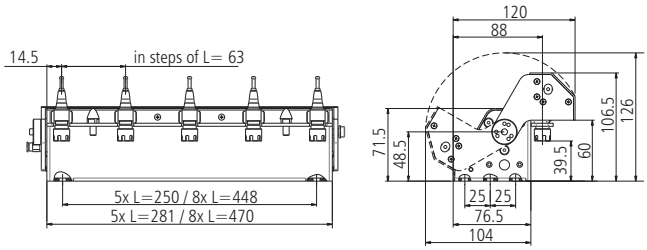
SK 30 for collets Type ER 32
Part-no.: **239130**

Collets se page **E-38.**

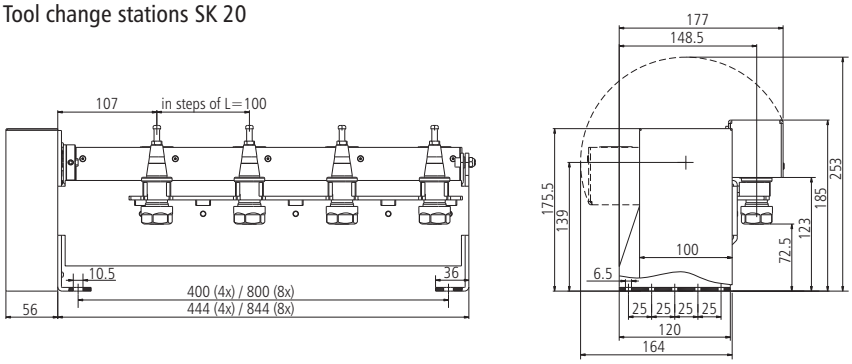
Linear tool change stations SK 11 / 20 / 30

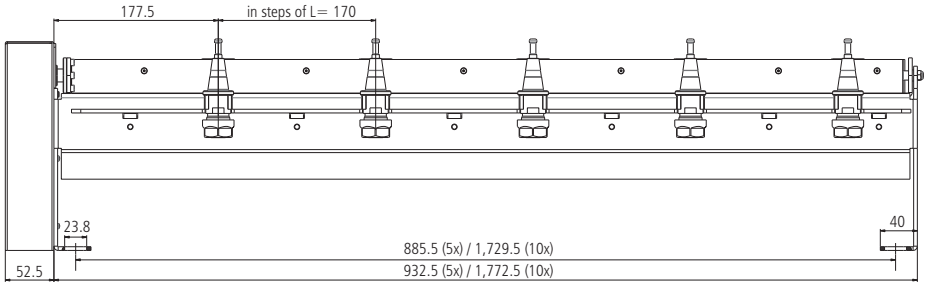
Dimensioned drawings

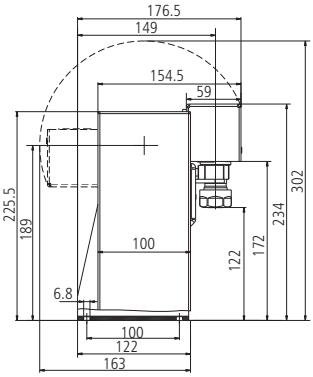
Tool change stations SK 11



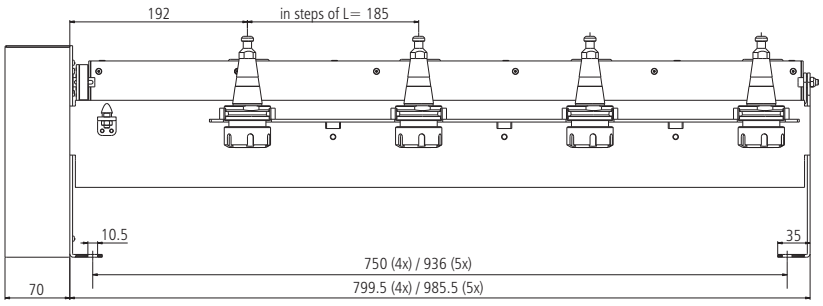
Tool change stations SK 20

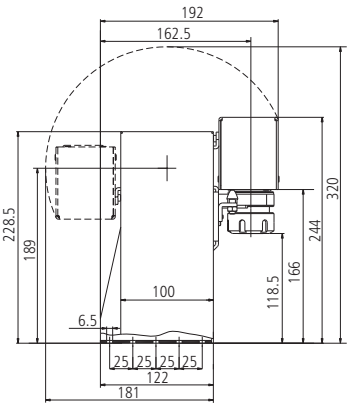






Tool change stations SK 30

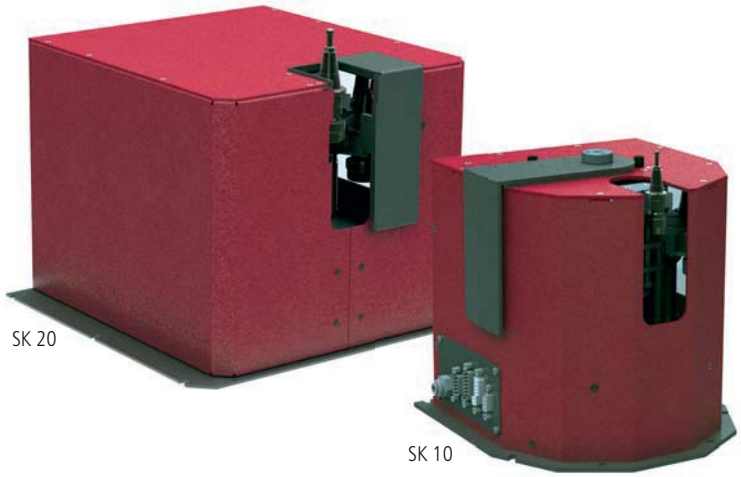




Technical specifications subject to change.

systems

Turned tool change stations SK 11 / 20



SK 20

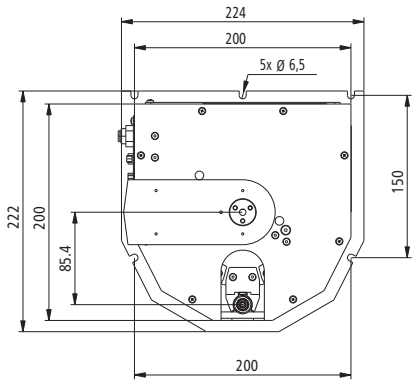
SK 10

Features

- compact, space-saving design by circular tool positions
- powder-coated aluminium housing (RAL 3011)
- integrated power electronics for controlling via isel CNC commands via RS232 interface
- monitored tool positions and tool opening via sensors
- linear movement of the tool holder and the opening changer via switchable solenoid valves (5/2-way valve)
- used on all common isel Servo CNC machines
- easy to service

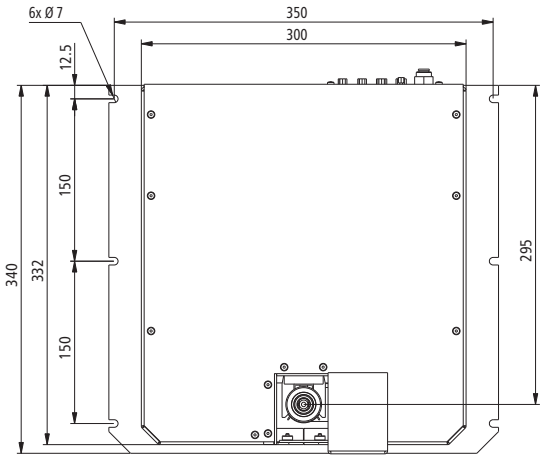
Dimensioned drawings

Turned tool change station SK 11



View from above

Turned tool change station SK 20



View from above

Technical data and ordering information

	turned tool change station SK 11	turned tool change station SK 20
Tool places	12	14
max. tool length [mm]	60	75
min.gap height [mm]	250	350
Suitable spindle motor	iSA 900	iSA 2200
Interface	RS 232	
Supply voltage	+24 VDC	
Dimensions W x D x H [mm]	224 x 222 x 228	360 x 340 x 271
Part-no.	**239100 4900**	**239100 6630**

Technical specifications subject to change.

Frequency converter, motor leads and Vacuum cleaning

Frequency converters

- Compact, pulse width modulated equipment in three output classes
- Input voltage, 230 V AC, single phase (SKC 750/1500) or 400 V AC, three phase (SKC 4000)
- Three phase, vector controlled control voltage frequency 0...1500 Hz
- Fast spindle braking with highly stressed, integrated brake resistance in the sub-frame
- Turn-off EMC filter
- Programmable inputs and outputs, relay output
- User-friendly control unit for configuring spindles
- 95 operating and display parameters for both simple and demanding applications (e. g. spindle energy sink in no load)
- Protection class: IP 20
- Control types: SPS; 0...10 V; 0...20 mA; with operating unit; CAN Bus (additional module required)
- Approved: CE; C-Tick; UL

SKC 750 frequency converter, suitable for iSA 500, iSA 750 + iSA 900
Part no.: **311707 6000**

SKC 1500 frequency converter, suitable for iSA 1500 + iSA 2200
Part no.: **311715 6000**

SKC 4000 frequency converter, suitable for iSA 3600
Part no.: **311740 6500**

Length measurement sensor and motor leads

- 8-wire (3x 0.75 mm^2 +1x PE + 2x(2 × 0.34 mm^2))
- Drag chain compatible
- External braiding and separately shielded pairs
- Pre-fabricated

Length measuring sensor for measuring tool lengths
Part no.: **239099 0001**

Motor side - M23 plug
Converter side - wire end bushings
Part no.: **392306 0300** (3 m)
Part no.: **392306 0500** (5 m)
Part no.: **392306 0800** (8 m)

Motor side - direct connection
Converter side - wire end bushings
Part no.: **392301 0300** (3 m)
Part no.: **392301 0500** (5 m)
Part no.: **392301 0800** (8 m)

Vacuum cleaning

... for iSA 500 + iSA 750 spindles — Part no.: **239012 0000**
- prepared for hose 38 mm
- manual opening

... for iSA 900 spindle — Part no.: **239012 0004**
- prepared for hose 50 mm
- automatic opening

... for iSA 1500 spindle — Part no.: **239012 0001**
- prepared for hose 80 mm
- manual opening

... for iSA 2200 spindle — Part no.: **239012 0002**
- prepared for hose 80 mm
- automatic opening

... for iSA 2200 spindle with external CoolMin — Part no.: **239012 0002**
- prepared for hose 80 mm
- automatic opening

Technical specifications subject to change.

Overview of collets and tool holders

tool holder

SK 11 SK 20 SK 30

SK 11 for collets, type ER 11
Part no.: **239111 0001**

SK 20 for collets, type ER 20
Part no.: **239172 0020**

SK 30 for collets, type ER 32
Part no.: **239130**

The following collets are also able to clamp shafts reduced in diameter by 0.5 mm:

Collets type ER 11

for iSA 500 and iSA 900

Ø (mm)	Part no.
1.0	**239170 1000**
1.5	**239170 1500**
2.0	**239170 2000**
2.5	**239170 2500**
3.0	**239170 3000**
3.5	**239170 3500**
4.0	**239170 4000**
4.5	**239170 4500**
5.0	**239170 5000**
5.5	**239170 5500**
6.0	**239170 6000**
6.5	**239170 6500**
7.0	**239170 7000**

Collet set

for spindle motor	Type	Ø (mm)	Part no.
iSA 500/iSA 900	ER 11	1.0 - 7.0	**239170 0001**

Clamping nuts

Type	Part no.
ERM 11	**239170**
ERM 16	**239171**
ERM 20	**239172**

ER 11

ER 16

ER 20

The following collets are also able to clamp shafts reduced in diameter by 1.0 mm:

Collets type ER 16

for iSA 750

Ø (mm)	Part no.
1.0	**239171 1000**
2.0	**239171 2000**
3.0	**239171 3000**
4.0	**239171 4000**
5.0	**239171 5000**
6.0	**239171 6000**
7.0	**239171 7000**
8.0	**239171 8000**
9.0	**239171 9000**
10.0	**239171 0100**

Collets type ER 20

for iSA 1500 and iSA 2200

Ø (mm)	Part no.
2.0	**239172 2000**
3.0	**239172 3000**
4.0	**239172 4000**
5.0	**239172 5000**
6.0	**239172 6000**
7.0	**239172 7000**
8.0	**239172 8000**
10.0	**239172 0100**
11.0	**239172 0110**
12.0	**239172 0120**
13.0	**239172 0130**

Collets type ER 32

for iSA 3600

Ø (mm)	Part no.
3.0	**239130 3000**
4.0	**239130 4000**
5.0	**239130 5000**
6.0	**239130 6000**
7.0	**239130 7000**
8.0	**239130 8000**
9.0	**239130 9000**
10.0	**239130 0100**
11.0	**239130 0110**
12.0	**239130 0120**
13.0	**239130 0130**
14.0	**239130 0140**
15.0	**239130 0150**
16.0	**239130 0160**
17.0	**239130 0170**
18.0	**239130 0180**
19.0	**239130 0190**
20.0	**239130 0200**

Collet sets

for spindle motor	Type	Ø (mm)	Part no.
iSA 750	ER 16	1.0 - 10	**239171 0001**
iSA 1500 / iSA 2200	ER 20	2.0 - 13	**239172 0001**
iSA 3600	ER 32	3.0 - 20	**239130 0000**

Vacuum clamping plates

VakuFit®

Sample diagram

Multiple connections for high volume flow and optimal vacuum distribution.

All our vacuum plates can be arranged to fit together to cover large areas.

Part number	Description	DIN	Clamping surface
216601 0017	VT 2115	A5	210 x 150 mm
216601 0018	VT 3021	A4	300 x 210 mm
216601 0019	VT 4230	A3	420 x 300 mm
216601 0020	VT 6042	A2	600 x 420 mm

216601 0030	Rotary vane pump (10.0 m³/h) for DIN A4 und A5
216600 0028	Servicing kit for rotary vane pump 10.0 m³/h
216601 0010	Connection set vacuum plate to rotary vane pump
616601	Rubber matting for vacuum plates

VakuFit - L

The raster plates for the vacuum clamping makes little demand on the vacuum pump. The plates are almost totally warp free and the material is therefore suitable for engraving operations when clamped.

In contrast to other vacuum clamping methods, surfaces can be milled over large areas without problem, with parts remaining securely clamped.

Material stops can be easily effected by inserting 5 mm dowelling pins into the raster plate holes. The board rubber matting is a consumable with a variety of uses. In addition to our standard plates, we offer customised variants and complete plate packages for special applications.

Note

Retaining force is proportional to the area covered, the coefficient of friction and the differential pressure.

In order to increase the coefficient of friction, rubber matting is included within the scope of delivery.

Scope of delivery

- 1x connection adapter
- 1x screw key 68 mm
- 1x rubber matting for holes
- 1x rubber matting for covering unused holes
- Operating instructions

Technical specifications subject to change.

Introduction

As a division within isel Germany AG **isel Robotik** presents a cross-section of its product portfolio of automation components for **robots, prealigners, linear units, end effectors** and accessories for the **semiconductor industry**, made in Germany.

The company's Robotics Division has been operating for more than 10 years within the semiconductor sector. Sales began in 2004 with just a few types of robot and prealigner. Today the range of components for the semiconductor industry covers the needs of all OEM customer within the semiconductor sector. Since 2004, **over 600 robot systems have been successfully put into service.** Here, **long product service life** is one of the positive factors noted by our customers. Our all-in-one designs make it possible for wafers and masks to be handled in ISO 1 clean room environments.

For these processes, in addition to clean room compatibility, **high precision** and reliability are paramount. Since these requirements affect the entire production process in the chip industry, stringent specifications also apply with regard to component handling. Handling components exemplify isel Germany's market reputation: very high quality, short delivery times, the best possible service and a very good price-performance ratio.

Talk to our technical support staff:

Visit our website at **www.iselrobotik.com**

Overview

Wafer Handling Roboter

with 2 link standard arm and standard base body

IWH series 1

Figure:
IWH-TA07S10F-1

Features

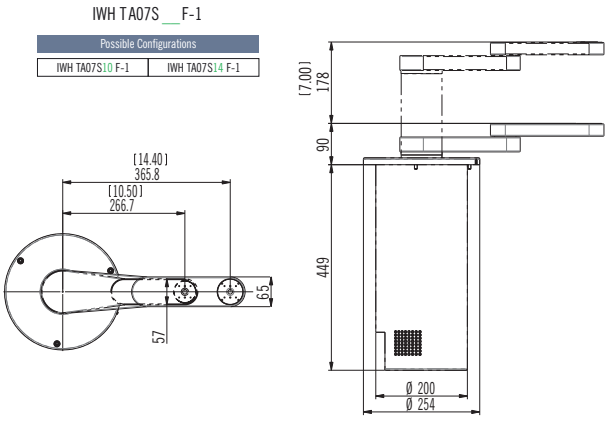
- excellent structural rigidity
- extremely high failure safety and precision
- optionally installed above (TA) or installed below (BA)
- customised adaptations possible
- absolute (digital) or incremental encoder
- simple connection of prealigners, linear track and other peripherals to the robot controller
- optional high end controller for controlling complex systems
- including standard hard- and software
- Class 1 clean room-compatible
- made in Germany

Technical specifications

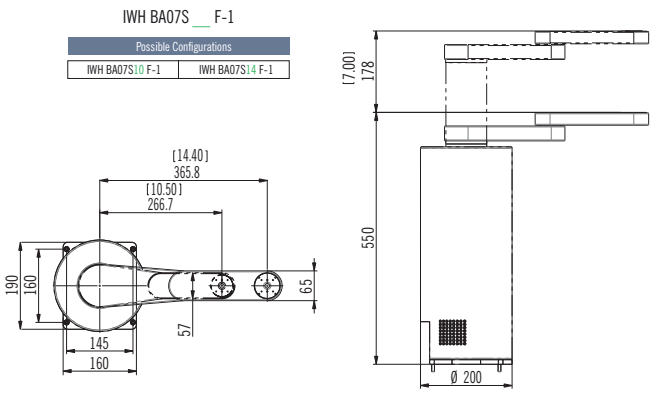
Description		IWH F-1
Repeat accuracy	T	±0.02°
	R	±0.03 mm
	Z	±0.03 mm
Work area	Z	7"
	radial	10", 14"
	theta	450°
Joint payload		up to 1kg
Max. speed	T	360°/s
	R	1,000 mm/s
	Z	450 mm/s
Mains voltage		110 / 230 V AC
Control interface		RS-232 [DB9], optional: Ethernet [RJ-45]
Interface for peripherals		RS-485 [RJ-45], RJ-11

Dimensioned drawings

IWH TA07S__F-1



IWH BA07S__F-1



Wafer Handling Roboter
with 2 link standard arm and standard base body

IWH series 1

Figure:
IWH TA10S10 F-1

Features

- excellent structural rigidity
- extremely high failure safety and precision
- optionally installed above (TA) or installed below (BA)
- customised adaptations possible
- absolute (digital) or incremental encoder
- simple connection of prealigners, linear track and other peripherals to the robot controller
- optional high end controller for controlling complex systems
- including standard hard- and software
- Class 1 clean room-compatible
- made in Germany

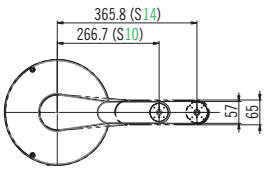
Technical specifications

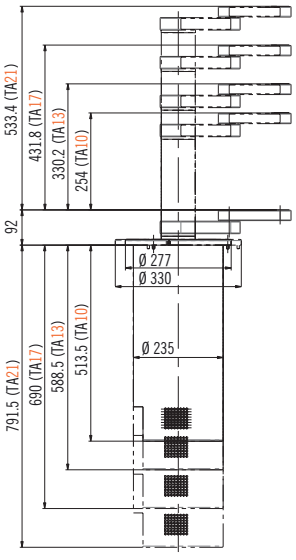
Description		IWH F-1
Repeat accuracy	T	±0.02°
	R	±0.03 mm
	Z	±0.03 mm
Work area	Z	10", 13", 17", 21"
	radial	10", 14"
	theta	450°
Joint payload		up to 1kg
Max. speed	T	360°/s
	R	1,000 mm/s
	Z	450 mm/s
Mains voltage		110 / 230 V AC
Control interface		RS-232 [DB9], optional: Ethernet [RJ-45]
Interface for peripherals		RS-485 [RJ-45], RJ-11

Dimensioned drawings

IWH TA__S__F-1

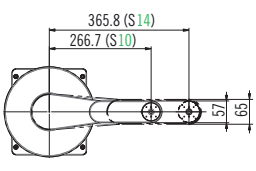
Possible Configurations	
IWH TA10S10 F-1	IWH TA10S14 F-1
IWH TA13S10 F-1	IWH TA13S14 F-1
IWH TA17S10 F-1	IWH TA17S14 F-1
IWH TA21S10 F-1	IWH TA21S14 F-1

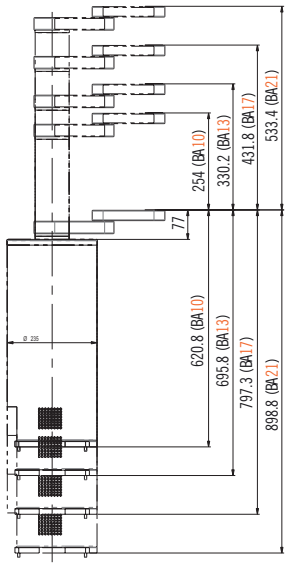




IWH BA__S__F-1

Possible Configurations	
IWH BA10S10 F-1	IWH BA10S14 F-1
IWH BA13S10 F-1	IWH BA13S14 F-1
IWH BA17S10 F-1	IWH BA17S14 F-1
IWH BA21S10 F-1	IWH BA21S14 F-1





systems

Wafer Handling Roboter
with 2 link HD arm and standard base body

IWH series 1

Figure:
IWH TA10S10HD F-1

Features

- excellent structural rigidity
- extremely high failure safety and precision
- optionally installed above (TA) or installed below (BA)
- customised adaptations possible
- absolute (digital) or incremental encoder
- simple connection of prealigners, linear track and other peripherals to the robot controller
- optional high end controller for controlling complex systems
- including standard hard- and software
- Class 1 clean room-compatible
- made in Germany

Technical specifications

Description		IWH F-1
Repeat accuracy	T	±0.02°
	R	±0.03 mm
	Z	±0.03 mm
Work area	Z	10", 13", 17", 21"
	radial	10", 12", 14", 16", 20"
	theta	450°
Joint payload		up to 3 kg
Max. speed	T	360°/s
	R	1.000 mm/s
	Z	450 mm/s
Mains voltage		110 / 230 V AC
Control interface		RS-232 [DB9], Option: Ethernet [RJ-45]
Interface for peripherals		RS-485 [RJ-45], RJ-11

Dimensioned drawings

IWH TA__S__HD F-1

Possible Configurations	
IWH TA10S10HD F-1	IWH TA17S10HD F-1
IWH TA10S12HD F-1	IWH TA17S12HD F-1
IWH TA10S14HD F-1	IWH TA17S14HD F-1
IWH TA10S16HD F-1	IWH TA17S16HD F-1
IWH TA10S20HD F-1	IWH TA17S20HD F-1
IWH TA13S10HD F-1	IWH TA21S10HD F-1
IWH TA13S12HD F-1	IWH TA21S12HD F-1
IWH TA13S14HD F-1	IWH TA21S14HD F-1
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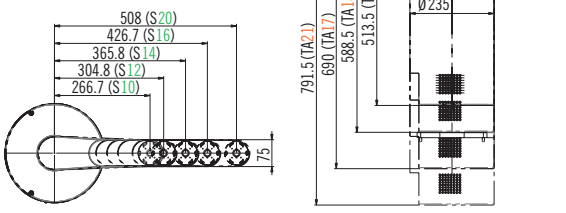
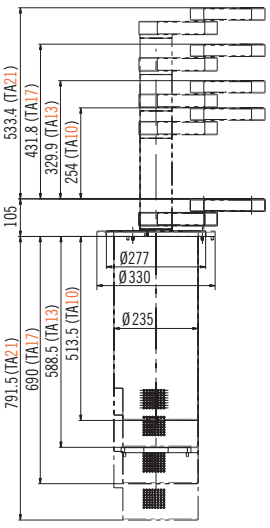
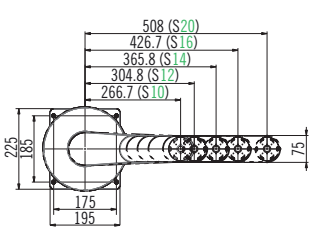
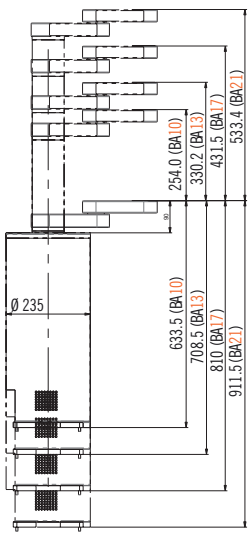




IWH BA__S__HD F-1

Possible Configurations	
IWH BA10S10HD F-1	IWH BA17S10HD F-1
IWH BA10S12HD F-1	IWH BA17S12HD F-1
IWH BA10S14HD F-1	IWH BA17S14HD F-1
IWH BA10S16HD F-1	IWH BA17S16HD F-1
IWH BA10S20HD F-1	IWH BA17S20HD F-1
IWH BA13S10HD F-1	IWH BA21S10HD F-1
IWH BA13S12HD F-1	IWH BA21S12HD F-1
IWH BA13S14HD F-1	IWH BA21S14HD F-1
IWH BA13S16HD F-1	IWH BA21S16HD F-1
IWH BA13S20HD F-1	IWH BA21S20HD F-1





Wafer Handling Roboter
with 3 link HD arm and standard base body

IWH series 1

Figure:
IWH TA10S16 F-1

Features

- excellent structural rigidity
- extremely high failure safety and precision
- optionally installed above (TA) or installed below (BA)
- customised adaptations possible
- absolute (digital) or incremental encoder
- simple connection of prealigners, linear track and other peripherals to the robot controller
- optional high end controller for controlling complex systems
- including standard hard- and software
- Class 1 clean room-compatible
- made in Germany

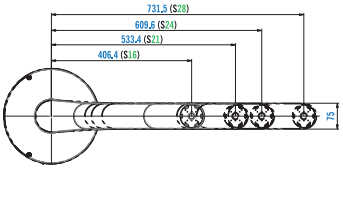
Technical specifications

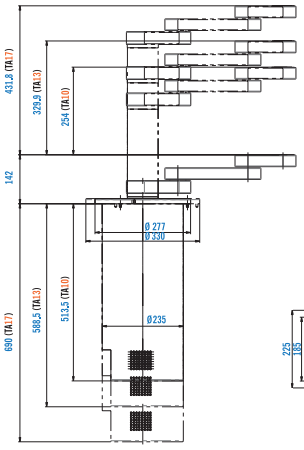
Description		IWH F-1
Repeat accuracy	T	±0.02°
	R	±0.03 mm
	Z	±0.03 mm
Work area	Z	10", 13", 17", 21"
	radial	16", 21", 24", 28"
	theta	450°
Joint payload		up to 3 kg
Max. speed	T	360°/s
	R	1,000 mm/s
	Z	450 mm/s
Mains voltage		110 / 230 V AC
Control interface		RS-232 [DB9], optional: Ethernet [RJ-45]
Interface for peripherals		RS-485 [RJ-45], RJ-11

Dimensioned drawings

IWH TA__S__F-1

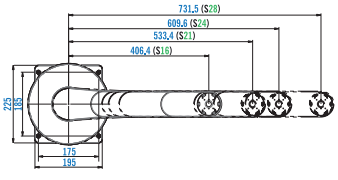
Possible Configurations	
IWH TA10S16 F-1	IWH TA13S24 F-1
IWH TA10S21 F-1	IWH TA13S28 F-1
IWH TA10S24 F-1	IWH TA17S16 F-1
IWH TA10S28 F-1	IWH TA17S21 F-1
IWH TA13S16 F-1	IWH TA17S24 F-1
IWH TA13S21 F-1	IWH TA17S28 F-1

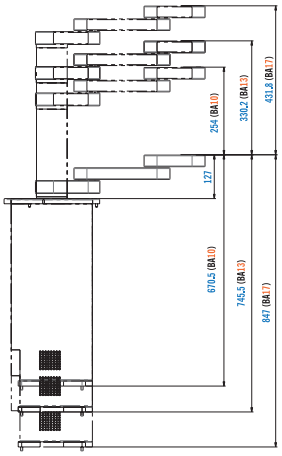




IWH BA__S__F-1

Possible Configurations	
IWH BA10S16 F-1	IWH BA13S24 F-1
IWH BA10S21 F-1	IWH BA13S28 F-1
IWH BA10S24 F-1	IWH BA17S16 F-1
IWH BA10S28 F-1	IWH BA17S21 F-1
IWH BA13S16 F-1	IWH BA17S24 F-1
IWH BA13S21 F-1	IWH BA17S28 F-1





systems

Wafer Handling Roboter
with dual arm

IWH series 3

Figure:
IWH F-3

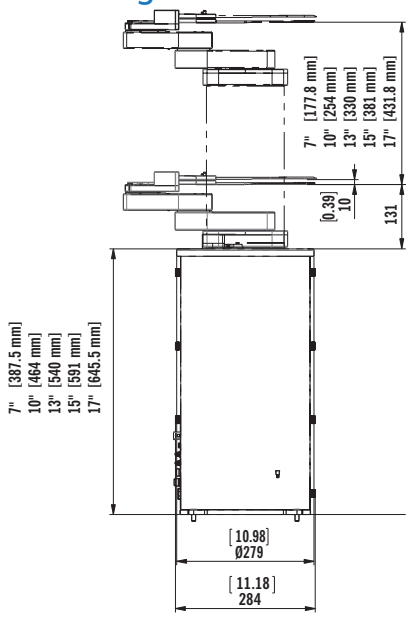
Features

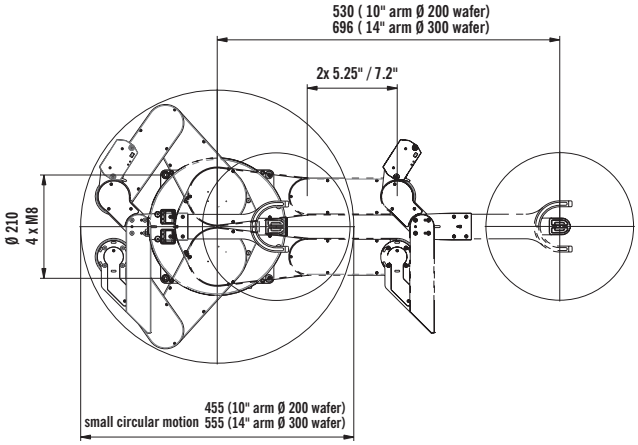
- excellent structural rigidity
- Handling wafers up to 300 mm
- extremely high reliability and accuracy
- simple connection of a linear track to the robot controller
- Real time motion control
- very quiet in operation
- brushless, no maintenance servo motors with low moment of inertia
- no-play harmonic drive® transmission
- Absolute encoder
- Versatile communication interfaces
- Class 1 clean room-compatible
- MTBF: > 50,000 operating hours
- including standard or advanced hard- and software

Technical specifications

Description		IWH F-3
Repeat accuracy	T	±0.02°
	R	±0.03 mm
	Z	±0.03 mm
Work area	Z	7", 10", 13", 15", 17"
	radial	10", 14"
	theta	450°
Joint payload		max. 1,25 kg / arm
Max. speed	T	360°/s
	R	1,100 mm/s
	Z	425 mm/s
Mains voltage		110 / 230 V AC
Control interface		RS-232 [DB9], optional: Ethernet [RJ-45]
Interface for peripherals		RS-485 [RJ-45], RJ-11

Dimensioned drawings





Wafer Handling Roboter
with SHD dual arm and HD base body

IWH series 3

Figure:
IWH F-3

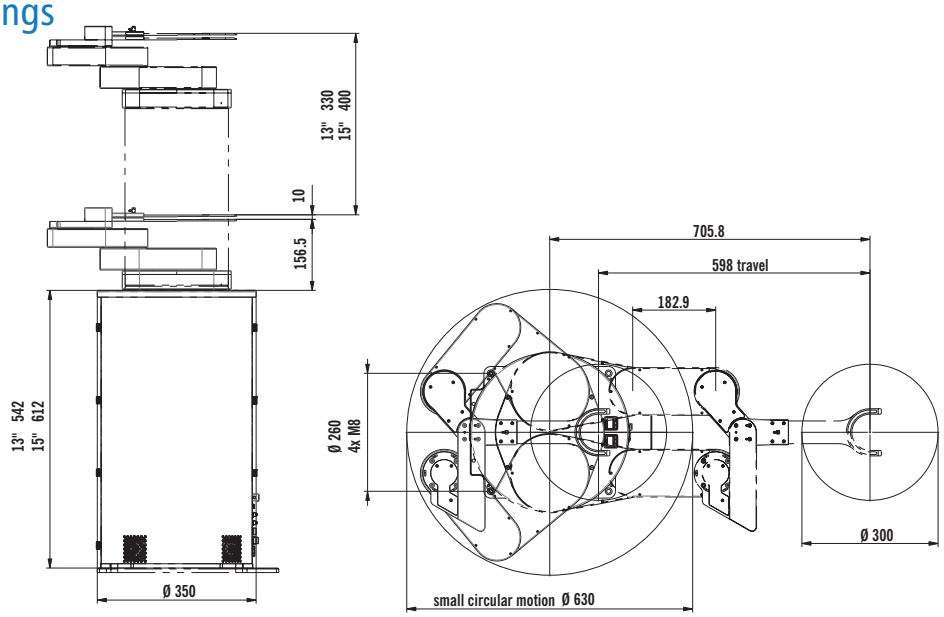
Features

- excellent structural rigidity
- Handling wafers up to 450 mm
- extremely high reliability and accuracy
- simple connection of a linear track to the robot controller
- Real time motion control
- very quiet in operation
- brushless, no maintenance servo motors with low moment of inertia
- no-play harmonic drive® transmission
- Absolute encoder
- Versatile communication interfaces
- optional: 2 flip modules iFM-300-3
- Class 1 clean room-compatible
- including advanced hard- and software
- made in Germany

Technical specifications

Description		IWH F-3
Repeat accuracy	T	±0.02°
	R	±0.03 mm
	Z	±0.03 mm
Work area	Z	13", 15"
	radial	14"
	theta	450°
Joint payload		max. 3 kg / Arm
Max. speed	T	250°/s
	R	800 mm/s
	Z	300 mm/s
Mains voltage		110 / 230 V AC
Control interface		Ethernet [RJ-45], RS-232 [DB9]
Interface for peripherals		Power Link

Dimensioned drawings



Hard- and Software „Standard“

Figure:
isel Standard Robot Control

Features

- Single-axis prealigner
- low cabling
- wide range of functions
- OTF function
- integrated power electronics (All-in-one design)
- proven over 10 years
- optional: manual control
- Interface: RS232, TelNet

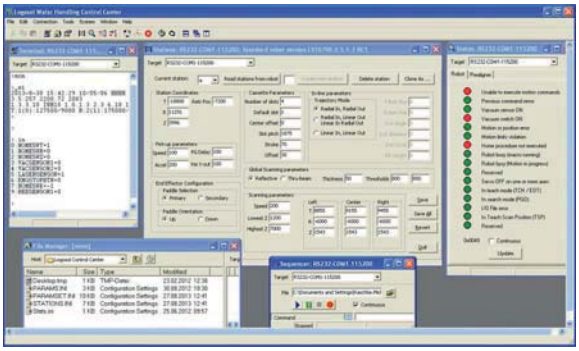


Figure:
RCC-Software

Figure:
All-in-one design

Hard- and Software „Advanced“

Figure:
Advanced controller front

Figure:
Advanced controller back

Features

- innovative user interface
- high-performance control electronics "State of the Art"
- integrated safety control according to DIN EN ISO 10218-1:2008
- Resolver or EnDat 2.2 encoder available
- as a 19 "rack or desktop housing available
- Interface: Ethernet, RS232, IMA

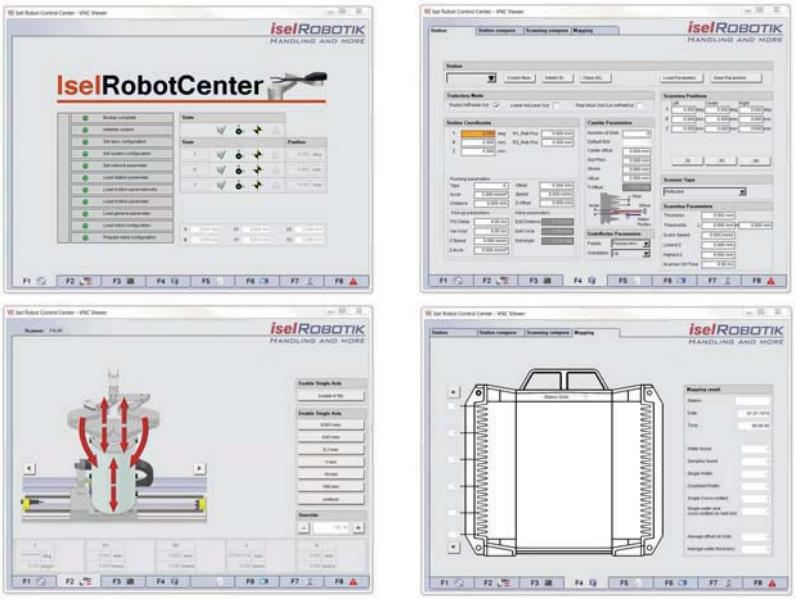


Figure:
isel Robot Center

systems

Linear track

iLD series

Figure:
iLD 50-6 as linear track
for the wafer handling roboter

General

The ILT linear track series can be integrated seamlessly into your system's handling area owing to its flexibility. Tracks are controlled in conjunction with our IWH series robots. This combination of linear tracks with isel robots makes for a very effective system and thus provides high throughputs.

Depending on the application, installation can be below or to the side of the robot. The use of brushless servo motors makes linear tracks very responsive dynamically, low maintenance and quiet in operation.

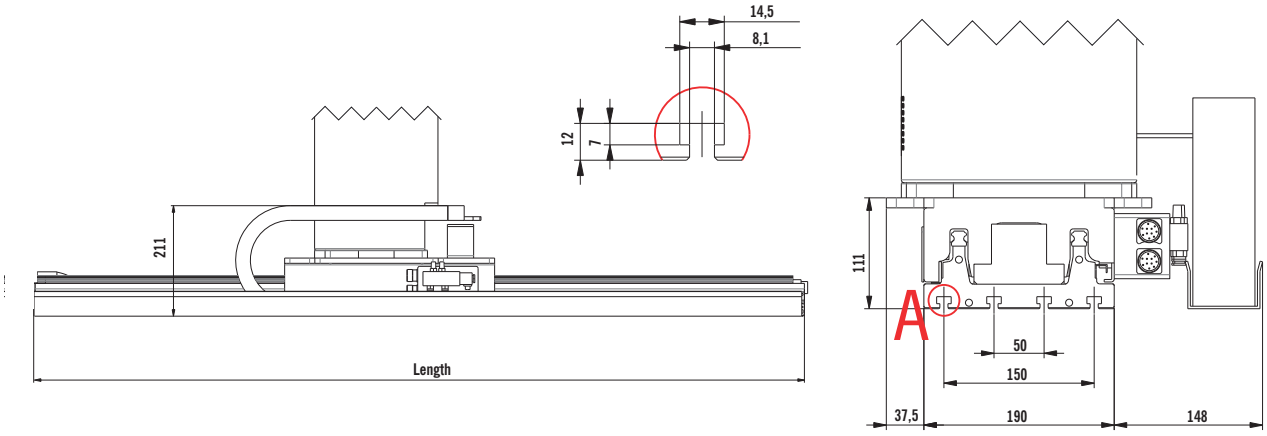
Features

- Maximum speed up to 4,5 m/s
- Maximum acceleration up to 10 m/s²
- Total length up to 15 m
- Repeatability +/-0,01mm
- MTBF of 50,000 hours
- Travel of 181mm up to 15 m available by segmental construction
- Optional lateral or floor mounting
- Full integration into the robot control
- Linear motor drive
- wearless
- Multi motor operation possible (2 robots on one axis)
- low-maintenance
- made in Germany

Technical specifications

Description	
Repeatability	±0.02 mm
Drive	Spindle or Linear motor
Maximum speed	4.5 m/s
Maximum length	15 m
Maximum acceleration	10 m/s²
Power supply	110 / 230 V AC
Control interface	RS-232 / Ethernet

Dimensioned drawings



made by isel®

End effectors

Paddle-EE
with scanner

Horse Shoe-EE
without scanner

Dual-EE with
thru beam scanner

Exclusion zone vacuum
with scanner

Edge Grip
with scanner

Customized

Exclusion Zone

Vacuum analyser unit a EE

Extended version

Features

- for wafer sizes up to 12" (300 mm)
- modular design
- low intrinsic weight
- high rigidity
- favourable price/performance ratio
- PTFE-coated

Options

- various wafer mapping sensors
- various surface finishes
- Special designs
  - Pocket EE
  - Friction wafer
  - Edge grip EE
  - Exclusion zone grip EE
  - Exclusion zone vacuum EE
  - Multiple EE

Accessories

Vacuum analyser unit

- high response pattern
- freely programmable
- Resolution 0.001 bar
- Integrated end effectors
- two-colour display
- can be used with all vacuum end effectors

Ordering key

2	5	0	0	4	x	x	x	x	x	x	x	x

Automation components for the semiconductor industry, product group end effectors IEE Series 1

Wafersize ...from

2= 2"
3= 3"
4= 4"
5= 5"
6= 6"
7= 8"
8= 12"
9= 18"
0= Custom

Wafersize ...to

2= 2"
3= 3"
4= 4"
5= 5"
6= 6"
7= 8"
8= 12"
9= 18"
0= Custom

End effector type

01= Paddle
02= Horse shoe
03= Edge Grip
04= 2x Paddle
05= Paddle / Horse shoe
06= Marginal zone handle vacuum
07= 2x Horse shoe
08= Pocket
09= Exclusion zone grip
10= Friction

Option

0 = standard
9 = customized

Scanner setting

0 = without
1 = PNP
2 = NPN
9 = customized

Contact material

0 = PTFE
1 = ELOX
2 = Ceramics
3 = PEEK
4 = Silicone
5 = NBR
6 = PU
9 = customized

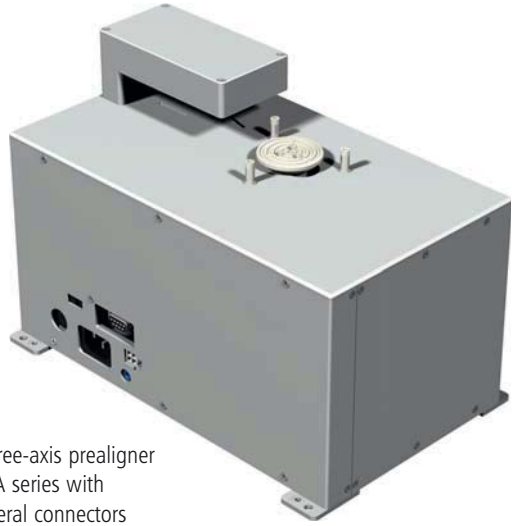
Holder

0 = without
1 = Cyber / Panasonic
2 = Banner
3 = Vacuum display
9 = customized

systems

Prealigner

LPA series



Three-axis prealigner
LPA series with
lateral connectors
and PEEK-pin/chuck

Single-axis prealigner
LPA-series with
bottom cable configuration

Three-axis edge grip
prealigner LPA-series with
lateral connectors

General

The LPA series of pre-aligners are an innovative, highly precise, Class 1 clean-room compatible prealigner solution with integrated scanning electronics.
The prealigners are developed and produced by Logosol Inc. USA and isel Germany AG is the exclusively authorised distributor for Europe.

Features

Three-axis prealigners

- innovative all-in-one design
- Alignment times < 3.5 seconds
- repeatability:
  linear ± 0.025 mm,
  circular ± 0.05°
- contactless measurement using LED and CCD sensor
- integrated scanning electronics
- standalone capability
- Chuck or pin load and change to another wafer size without rebuild
- transparent, semi-transparent, holed and opaque wafers can be aligned
- SEMI, flat and notch wafer specifications
- For wafer sizes from 2" to 12"
- Connection fields available from the side and from below

Features

Single axis prealigner

- Alignment times < 2.5 seconds
- contactless measurement using LED and CCD sensor
- integrated scanning electronics
- Chuck load
- Change to another wafer size without rebuild
- transparent, semi-transparent, holed and opaque wafers can be aligned
- SEMI, flat and notch wafer specifications
- For wafer sizes from 3" to 12"
- Connection fields available at the side and from below

Prealigner LPA series

Characteristics

Specifications		Prealigner Model													
		Standalone						Embedded						Edge Handling	
		26-3	38-3	58-3	312-3	812-3	1218-3	25-1	38-1	58-1	312-1	812-1	1218-1	4EH to 8EH	12EH
Wafer Diameter	2"	✓	-	-	-	-	-	✓	-	-	-	-	-	-	-
	3"	✓	✓	-	✓	-	-	✓	✓	-	✓	-	-	-	-
	100mm	✓	✓	-	✓	-	-	✓	✓	-	✓	-	-	4EH	-
	125mm	✓	✓	✓	✓	-	-	✓	✓	✓	✓	-	-	5EH	-
	150mm	✓	✓	✓	✓	-	-	-	✓	✓	✓	-	-	6EH	-
	200mm	-	✓	✓	✓	✓	-	-	✓	✓	✓	✓		8EH	-
	300mm	-	-	-	✓	✓	✓	-	-	-	✓	✓	✓	-	✓
	450mm	-	-	-	-	-	✓	-	-	-	-	-	✓	-	
Square Substrates		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-
Angular Accuracy (3 Sigma)	10K PPR Encoder	0.04°					NA	0.06°					NA	0.04°	
	24K PPR Encoder	0.02°						0.04°						0.02°	
Centering Accuracy (3 Sigma)		25 µm						50 µm						25 µm	
Offset Limit		10 mm	12 mm					9 mm	10 mm					2 mm	1.7 mm
Body Dimensions	W	173 mm						95 mm						173 mm	
	L	267 mm		317 mm		404 mm		266 mm				328 mm		267 mm	317 mm
	H	190 mm						191 mm						190 mm to 196 mm	
Weight [kg]		5.00 to 5.70 (option dependent)						3.40 to 3.80 (option dependent)						5.30 to 5.70	6.00
Servo Axes		Three						One						Three	
Handling		Vacuum Chuck and Pins						Vacuum Chuck						Edge Handling	
Contact Material		Peek (Standard), Viton, Kalrez, Stainless Steel, Teflon, Conductive Peek, Custom						Peek (Standard), Viton, Kalrez, Aluminium, Teflon, Conductive Peek, Custom						Peek, Viton	
Facilities Required		100-240 VAC, 50-60 Hz, 48 VA or 24 VDC/2A, Vacuum 12" Hg (Vacuum not reqired for Edge Handling models)													
Cable Entry		Side cable entry, Bottom cable entry													
Host		RS232, Ethernet													
Flat / Notch Compatibility		SEMI Standards Compliant													
Wafer Opacity		Opaque, Transparent, Semi-Transparent													
Cleanliness		Class 1													
MTBF		More than 70000 hours													

Accessories

Figure: IMS-EX43(73)QS

Figure: IMS-MDW1

Figure: Through Beam Sensor

Figure: Flip module

Figure: Hand terminal IHT
for standard controller

Figure: Teach Pendand
for advanced controller

Wafer mapping sensors IMS

IMS-EX43(73)QS

- Light source laser or LED
- Measurement distance 38 / 56 mm (1,5" / 2,2")
- Sensor flexibly configurable

IMS-MDW1

- Light source LED
- Measurement distance 45 mm (1,75")
- PNP / NPN switchable

Through Beam Sensor

- optional to reflective sensor
- integrated in end effector

Flip Modul IFM-300-3

- precise turning of wafers with highly accurate positioning through mechanical endstops
- universal end effector adapter
- Mapping sensor
- DC motor with transmission unit
- electrical damping at the end of rotary path
- continuously variable speeds

Handterminal for standard controller

- optimum support for teaching an isel wafer handler
- isel wafer handler-optimised keyboard layout
- Terminal function
- Teach function
- Diagnostic function
- RS-485
- Emergency stop button

Teach Pendand for advanced controller

- optimal support when setting up an isel wafer handler with advanced controller
- graphical user interface on a 6,5" VGA colour display
- ergonomic multi-grip for fatigue-free work
- Hand wheel for jogging operation
- Enable switch, key switch and stop button for safe manual operation (complies with EN ISO 13850)

Space for your notes

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Ordering

isel Germany AG

isel Germany AG
Order processing
Bürgermeister-Ebert-Straße 40

D-36124 Eichenzell

Phone +49(0)6659 / 981 0
Fax +49(0)6659 / 981 776

Sender

Customer no.

Company

Department / Name

Street

Post code / Town

Your order number

Your phone number

Your fax number

Your email address

Quantity	Part no.	Part description	UNit price

I am ordering the aforementioned parts in accordance with your sale, delivery and payment terms.

General delivery, payment and software use conditions

As at: 09.07.2014

I. Area of application

1 The following conditions of sale shall apply to all goods delivery contracts concluded between the purchaser and ourselves. The ordering and acceptance of goods delivered by us shall constitute knowledge and/or confirmation of the customer's agreement with our conditions. These conditions shall apply to all future business relations, even where no further agreement has been expressly concluded. Any conflicting conditions on the part of the purchaser that have not been expressly acknowledged by us shall not be binding, even where we have made no express objection to them. Any such conflicting conditions are hereby expressly repudiated in advance. The following sales conditions shall also apply where we implement customer orders in the knowledge that conflicting or diverging conditions stipulated by the purchaser exist.
2 Any agreement, alteration or arrangement shall be made in writing.
3 Any agreements made between ourselves and the customer and relating to the purchasing contracts shall be confirmed in writing.

II. Quotation and conclusion of contract

1 Purchasing contracts shall be concluded on the basis of a customer purchase order. The acceptance of a purchase order shall be confirmed either by the forwarding of an order confirmation document to the customer or by the delivery of the goods ordered, within a period of two weeks in both cases.
2 Our offers are subject to change and are non-binding, unless expressly stated otherwise. The scope of our responsibilities is established exclusively in our written order confirmation document.
3 Any drawings or illustrations included in our quotation or order confirmation documentation and any information issued with respect to weights or dimensions shall be understood as approximate, unless stated to the contrary.
4 All drawings, illustrations, calculations and other documents, materials, models, patterns and specifications are subject to property, copyright and other trade mark rights. These must be treated as confidential and may not be transferred to any third party without our written permission, irrespective of whether they are accompanied by any comment to that effect.
5 We accept no liability for any printing or calculation errors appearing in our literature or documentation and we shall entertain no claims for damages linked thereto.
6 We reserve the right to make any necessary changes in product construction, technical specifications and performance features, provided they constitute a technical improvement.

III. Prices and payment condition

1 Our prices are based on CIP clause of the Inconterms 2010 of the ICC (carriage and insurance paid to the agreed place of destination in accordance with Point V.1. of these Terms and Conditions) including standard packaging and excluding VAT. Our calculations are made on the day on which the invoice is issued and are shown on the invoice.
2 Delivery shall be made following advance payment of invoice in "Euros".
3 All orders are based on the prices and price reductions valid at the time of delivery. Discounts shall only apply whereby an agreement to that effect has been made between ourselves and the purchaser. This is a written agreement, which shall also be shown in our order confirmation document.
4 Payment on delivery terms must be expressly agreed in advance. The purchase price is shown as net (with no deduction) with immediate payment by the purchaser following receipt of invoice, provided no other payment arrangements are shown in the order confirmation document. Payment is deemed to be fulfilled when we have access to the funds transferred. Payment by cheque is deemed to be fulfilled once the cheque is cleared and the funds have been transferred to us as credit. We are not bound to accept bills of exchange.
5 Legal provisions shall apply if a purchaser falls into payment arrears.
6 All claims against the purchaser shall immediately become due if the purchaser fails to make a payment on time, breaches any other agreement made with us, or where we have reason to doubt his creditworthiness. We shall also be entitled in such cases to withhold any outstanding deliveries until such time as payment or satisfactory payment assurance has been received, even where agreement has been previously made to the contrary. Following the setting of an appropriate period, we shall also be entitled in such cases to withdraw from the contract and/or to seek damages due to non-fulfilment of contract. We shall also be entitled to waive the purchaser's right to dispose of any goods delivered and, subject to retention of title, to demand their return or transfer at the purchaser's expense and direct debit authorization shall be revoked.
7 The purchaser shall only be entitled to compensation, even where notification of defect or counter claim has been made, where such claims are legally binding, are acknowledged by us or are undisputed. The purchaser shall only be entitled to withhold payment if his counter claims relate to the same contractual relationship.

IV. Delivery and delivery times

1 Delivery dates or periods shall be understood as non-binding provided no express agreement to the contrary has been made. The delivery times specified by us shall only commence once all relevant technical and implementation issues have been resolved.
2 The purchaser shall be obliged to implement all necessary requirements correctly and promptly. The agreed delivery period shall be extended - provided our rights have not been infringed by any purchaser payment arrears - by a period equal to the payment backlog that the purchaser has on the given (or any other) account. This shall also apply when a fixed delivery date has been agreed.
3 In the case of purchase contracts based on fixed date delivery as stipulated in Art. 286 Para. 2 No. 4 of the German Civil Code or Art. 376 of the German Commercial Code, we accept liability in accordance with current statutory provisions. The same shall apply where the purchaser, following delayed delivery for which we are responsible, is entitled to discontinue his interest in the further fulfillment of the contract. In this case, our liability shall be limited to foreseeable, typically-occurring damage. No liability limitations shall apply where delayed delivery is related to any breach of contractual conditions caused by our representatives or associates.
We also accept liability in accordance with current statutory provisions for any negligence in respect of contractual conditions caused by our representatives or agents. Where delayed delivery is not related to any breach of contractual conditions, our liability shall be limited to foreseeable, typically-occurring damage.
4 Where delayed delivery relates to a breach of contractual conditions caused by our representatives or agents, we accept liability in accordance with current statutory provisions, provided that compensation liability is restricted to foreseeable, typically-occurring damage.
5 In the event of delayed delivery for which we are responsible, the purchaser shall be entitled, for each full week of non-delivery, to a one-off compensation payment of 0.5% of the value of the delivery (valid to a maximum of 5 %).
6 We shall accept no additional liability for delay in delivery. Any further legal claims or purchaser rights above and beyond those relating to damage compensation and made in respect of delays in delivery for which we are responsible shall remain unaffected.
7 We shall be entitled to make partial delivery at any time, provided this is acceptable to the customer.
8 Delivery times are considered as fulfilled if the goods have been dispatched from our factory on time.
9 Under the onset of any conditions beyond our control, we shall be entitled to reschedule delivery or retire from any delivery contract, non-fulfilment notwithstanding. Conditions beyond our control shall be taken to mean strikes, lock-outs or any other conditions that hinder delivery or make delivery impossible, irrespective of whether the said conditions affect us directly or affect our suppliers. The purchaser shall be entitled to receive a declaration from us, as to whether we continue to deliver within a set period or retire from the delivery contract. In the absence of any such declaration, the purchaser himself shall be entitled to withdraw from the contract.
10 In the event of delays in acceptance on the part of the purchaser, we shall be entitled to claim compensation for any damage incurred and any additional expenditure. The same shall apply where the purchaser culpably infringes any obligation to cooperate. In the event of delays in acceptance and debtor default, the risk of accidental deterioration or loss of the goods shall transfer to the purchaser.

V. Transfer of risk - shipment/packaging - delivery

1 Delivery is only ex works. For deliveries with different terms (eg acc. CIP clause according to Incoterm 2010, the ICC), a written consent is necessary.
If delivery is made under clause CIP according to Incoterm 2010 the ICC, then:
-- Standard deliveries nationally and Community countries to agreed delivery address (destination)
-- Standard deliveries to third countries to import-seaport/-airport as agreed destination
We reserve the right to make a surcharge for express shipment and shipment by air.
2 The risk is transferred to the customer with the delivery of the goods to the first forwarding agent or carrier, at the latest however on leaving the factory or warehouse.
3 With regard to deliveries involving goods to be installed or assembled at the purchaser's premises, risk shall transfer on the day on which the goods are commissioned into use, or at the end of a given trial period where the said period has been agreed beforehand. In the event of any delay occurring during shipment or delivery to the purchaser, any delay in the commencement or implementation of installation or assembly, any delay in commissioning or testing at the purchaser's premises or, where any delay occurs for whatever reason in the acceptance of the goods by the purchaser, risk shall be considered to have already transferred to the purchaser at the moment the goods were made available to him.
4 In accordance with packaging regulations and with the exception of palettes, we will not accept the return of any packaging used for transportation or any other purpose. The purchaser shall be responsible for the proper disposal of any packaging delivered.
5 Where shipment is delayed at the request of the purchaser, or occurs due to his negligence, any subsequent warehousing costs and risks shall be the responsibility of the purchaser. The same shall apply in the case of notification of readiness for shipment.
6 With regard to the delivery of customer orders, the minimum order values shall be 100 EUROS (domestic) and 250 EUROS (abroad). These costs do not include VAT. The preparation costs for small deliveries below the minimum value for delivery within Germany shall be 50 EUROS (excluding VAT). These costs do not include postage and packing. We are unable to ship orders below the above-stated minimum value to addresses outside Germany.
7 Special orders, including goods ordered in quantities or with dimensions not stated in our catalogue, must be made in writing by the purchaser. Such orders may be subject to an agreed advance payment. Where one-off production orders in very large quantities are accepted by us, we reserve the right to deliver the goods with an appropriate quantity margin (normally ±10%). Packaging charges are, as a general rule, calculated in accordance with manufacturing costs.

VI. Guarantee / liability

1 In contractual relationships with registered traders, we guarantee our products defect free for a period of one year from arriving at the place of destination in accordance with V.1 of these Terms.
2 Milling spindles and other consumables are guaranteed defect free for a period of 6 months. This 6-month guarantee period also applies to milling spindles already integrated into machine systems.
3 The technical advice we give is based on the best of our knowledge. However, we accept no liability for any information relating to the suitability and application of our goods and the purchaser is not exempt from the responsibility of conducting his own calculations, tests and trials. The purchaser shall be solely responsible for complying with any statutory provisions and regulations applying to the use of the goods. Liability with regard to the suitability of our goods for any given application shall only be accepted where previously expressed in writing.
4 We accept liability for material defects, excluding any further claims - subject to the following provisions and those given under VIII. and IX - as follows:
5 Any claims relating to defects submitted by the purchaser as registered trader shall only be upheld if the purchaser has properly carried out the necessary inspection and has fulfilled notification obligations in accordance with Article 377 of the German Commercial Code. Other purchasers shall forward their complaints to us in writing within 10 days of receipt of the goods. With regard to business with non-trade personnel, this shall only apply where the defects are apparent. Complaints shall only be considered where the goods are still in "as delivered" condition.
6 With regard to justified complaints relating to defects we shall be entitled, in excluding purchaser rights, to withdraw from the contract, to reduce the sales price or to honour our supplementary performance obligations unless, in accordance with statutory provisions, we are justified in refusing to honour our supplementary performance obligations. The purchaser shall allow us a reasonable period in which to provide supplementary performance. With regard to supplementary performance, we shall be entitled to choose whether to correct the defect (rectification) or deliver replacement goods. If we we choose to correct the defect, we shall bear any costs (provided these do not increase) incurred due to the object of agreement being located at a location other than the delivery address. In the event of our failure to provide this supplementary performance, the purchaser shall be entitled to choose either a reduction in the purchase price or withdrawal from the contract. Supplementary performance is deemed to have failed following a second unsuccessful attempt, unless further supplementary performance attempts are appropriate and acceptable to the purchaser on the basis of the object of agreement. Claims for damage compensation under the following conditions and with regard to defects may only be issued by the purchaser after supplementary performance is deemed to have failed. The purchaser's right to claim damage compensation shall remain unaffected under the following conditions.
7 Goods may only be returned to us with our consent. Goods shall be returned in their original packaging or in packaging of similar value. The purchaser shall bear the full costs of shipment. Compensation shall only be made where the defect complaint is deemed justified. Where the customer allows us to test the goods and a defect is discovered, we accept liability; where no defect is found, we shall be entitled to issue a charge for each component tested.
8 Warranty claims may be lodged by the purchaser up to one year after the goods are delivered, except in the case where we have knowingly hidden the fault, whereby statutory provisions shall apply. Our responsibilities, as stipulated in Section VI, 9 and Section VI, 10 shall in this case remain unaffected.
9 We are required in accordance with current legal provisions to accept the return of new goods delivered or to reduce the purchase price without the setting of any requisite period if the purchaser's customer, as the end user of the new goods (sale of consumer goods), demands the return of the goods or a price reduction from the purchaser due to a defect or asserts a claim for recourse against the purchaser. In this case, we shall also be liable for compensating the purchaser's expenses, including transportation, travel, labour and material, incurred with respect to the end user due to the replacement of the defective goods on the basis of transfer of risk from us to the purchaser. No claim made by the purchaser with regard to defect shall be supported, where the purchaser has failed to carry out the inspection and to fullfil notification obligations in accordance with Article 377 of the German Commercial Code.
10 No liability under Section VI, 9 shall be accepted where the defect relates to any advertising slogan or any contractual agreements not originating with us, or where the purchaser himself affords the end user any special guarantees. Liability shall also be denied where, based on statutory provisions, the purchaser himself has no warranty obligations in respect of the end user or where the complaints have not been made in respect of any claim made by him. The above shall also apply, where the purchaser has afforded the end user guarantees above and beyond the legal limit.
11 We shall be liable, independent of the following liability limitations and in accordance with the statutory provisions covering loss of life, bodily injury and damage to health caused by the deliberate or negligent actions of ourselves, our legal representatives or our agents, as well as for any damage covered by the German Product Liability Act. We shall be liable in accordance with statutory provisions for any damage not included in Clause 1 caused by the deliberate act, gross negligence or due to any breach of contract committed by us, our legal representatives or our agents. In this case, compensation liability shall be limited to foreseeable, typically-occurring damage, in so far as we, our legal representatives and our agents are not deemed to have acted wilfully. We shall also be liable in the context of this warranty and in respect of the goods or their components for the properties and/or life span guarantees we have given. We shall only be liable for damage relating to defects affecting the guaranteed quality or life span, but not directly relating to the goods themselves, where the risk of such damage is apparent from the quality and life span warranty.
12 No further liability will be accepted without examination of the claims made; this shall apply in particular to tort claims or claims for the compensation of wasted expenses in lieu of performance; our liability as stipulated in Section IV, 6 - Section 6, 10 of this contract shall remain unaffected. Where our liability is limited or excluded, the same shall also apply to that of our employees, sub-contractors, representatives and agents.
13 Purchaser claims for defect damage compensation shall lapse one year after initial delivery of the goods. This shall not apply where we, our legal representatives or our agents are responsible for loss of life, bodily injury or damage to health or where we or our legal representatives have acted wilfully or negligently, or where our vicarious agents have acted wilfully.
14 In general, we accept no liability for any damage resulting from the following: incorrect or inappropriate use or storage, faulty installation by the customer or by any third party, damage resulting from the customer's own attempts at servicing or modification, natural instances of wear, faulty or negligent handling, chemical attack, electrical faults, etc. over which we have no control, or damage resulting from improper use or the failure to comply with operating instructions or information sheets. Furthermore, our warranty conditions shall not apply where the customer or a third party makes any modification without prior written approval from us and without justification (any delay on our part in the removal of defects), especially where such modifications relate to controls / software and even where the fault appears in an unmodified component.
15 In the event that use of the delivered goods infringes German Copyright or Trade Mark Law, we will bear the costs of either providing the customer with the respective rights or of modifying the goods in a way acceptable to the customer, such that no further breach of copyright law exists. Where it is not possible to restore appropriate commercial conditions within an acceptable period, the customer shall be entitled to withdraw from the contract. Under these conditions, we also reserve the right to withdraw from the said contractual obligations. In addition thereto, we will exempt the customer from any incontestable or legally established claims.
16 Our acceptance of liability shall be subject to current statutory provisions governing liability for infringements of copyright and trade mark law. Any liability under Article 15 shall only be accepted by us provided the customer immediately notifies us of the infringement of any copyright or trade mark law, provided he supports us to a reasonable extent in the defence of any claims made or allows us to make any relevant modification, provided all defensive measures, including extra-judicial provisions, are available to us, provided not based on the customer's instruction and where there has been no breach of the law and provided the customer has made no modification to the delivered goods or used them in any way contrary to the provisions of the contract.

VII. Repairs and the return of goods

1 When requested, the purchaser shall be provided with cost estimates prior to any repair being undertaken. All costs relating to shipment and packaging shall be borne by the purchaser. Invoices for repair work shall be paid in full, with no deductions and immediately upon receipt. All repairs, including those made under warranty shall, under normal circumstances, be carried out in our repair facility, unless agreed to the contrary in writing.
2 Delivered goods will only be taken back with our consent and once any relevant fees have been agreed. Under normal circumstances, we will not accept the return of any specially-prepared goods or software!
Goods dispatched or returned must always be accompanied by delivery documents or copies of invoice. The costs of returning goods shall be borne by the purchaser under "free to door" conditions.

VIII. Assembly

1 Installation work will be charged separately unless agreed to the contrary in writing. Installation costs shall include travel costs and accommodation allowances, as well as the normal rates of payment for the work including supplements for overtime, night work, work carried out on Sundays and holidays and work carried out under difficult conditions, as well as for planning and commissioning.
2 We shall invoice for all costs incurred in respect of preparatory work, travel, waiting times and commuting time. The customer shall compensate us for any further waiting time, travelling time and travelling costs incurred due to any delay in the starting or final commissioning of the said works, where the causes of such delays are beyond our control.
3 The customer shall bear all costs relating to the provision of any necessary auxiliary personnel and shall ensure that any tools needed are available in the required quantities. The customer shall also ensure the provision of suitably-sized, dry premises for the storage of machinery parts, apparatus, materials, tools, etc. The customer shall take appropriate measures to protect our property and that of our service personnel, equal to those he would take for the protection of his own property. Where the customer's operating conditions require the use of special clothing or protective equipment, he shall ensure that these are made available to our service personnel.
4 Our service personnel and auxiliary staff shall not be required to undertake any tasks not directly related to the implementation of our delivery and installation duties, unless prior agreement has been reached with us. Where such tasks are agreed, we accept no liability for any works implemented by our personnel beyond the scope of our contractual responsibilities.
Any installation works carried out by the customer, or by any third party commissioned by him, must meet our current operating and installation requirements.

IX. Software, software use and additional guarantee and defect claims

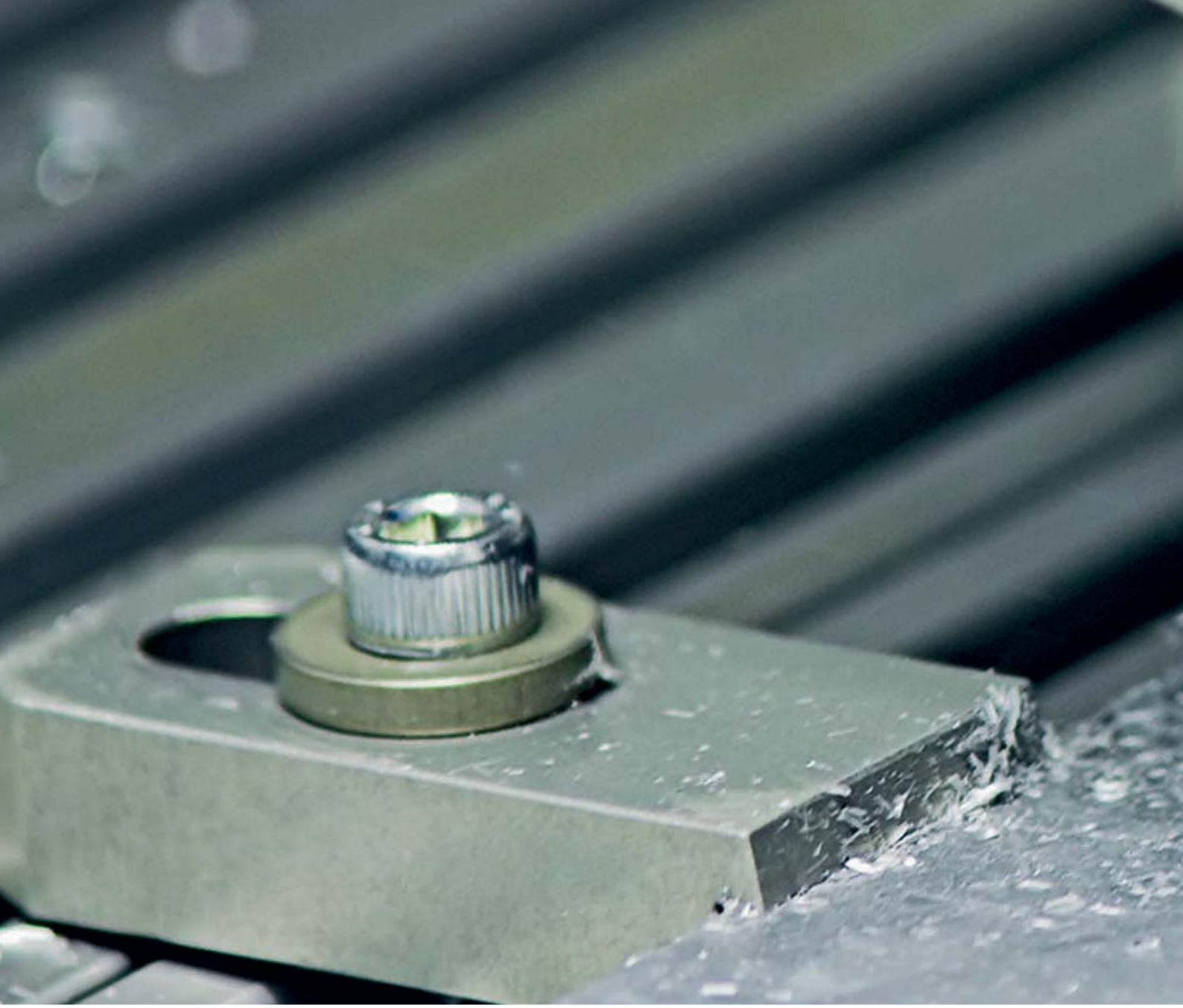
1 With regard to any software supplied by us and all documentation belonging thereto, the customer shall be provided, in return for payment, with a non-expiring, non-exclusive, non-transferable user rights on an established or, in certain cases, yet to be specified hardware product. We shall remain the owner of the copyright and all associated trade marks. Any entitlement to produce copies shall be granted solely for the purposes of securing data. Copyright information must not be removed.
2 Instructions for installation and commissioning shall be supplied by us in a printed format together with safety advice relating to your software. All other documentation shall be supplied exclusively by us, in a software data format. Following the release of new software, all necessary software data relevant to the release will be sent together with the new software. Furthermore, we reserve the right to deliver such documentation in the form of online help or online documentation.
3 Transfer to any third party may only be effected subject to our prior written consent. Acknowledgement of this condition must be obtained prior to the the transfer of software to a third party. No modifications shall be permitted.
4 Each and every infringement of these provisions shall be subject to a penalty amounting to 10 times the total value of the customer order. Any entitlement to further claims for compensation shall remain unaffected. Contractual penalties shall be levied separately and in addition to any potential further claims for damage compensation. The customer shall be entitled to provide evidence in support of any claim of reduced or negligible damage. The software and all documentation belonging thereto shall, in this case, be returned to us.
5 These conditions shall not apply to exclusive, customer-specific software developed and provided to meet individual customer requirements. Under the contract-related provision of control software, developed by us using modular multi-application software components (standard software modules), these are to be fitted and adapted in accordance with customer-specific and contractual performance requirements (customer-specific applications program).
6 On payment of the full purchase price for the customer-specific application program, we shall provide the customer with exclusive, spatially- and temporally-unrestricted user rights. The customer will not be afforded any rights with regard to the standard software module on which the customer-specific adaptations are based, irrespective of the type of module.
7 We shall be entitled, irrespective of these provisions and on the basis of other customer orders, to prepare and offer for sale the resulting customer-specific software solutions developed. We shall in each and every case retain non-exclusive user rights to customer-specific solutions for internal operational purposes.
8 Subject to the provisions in VI, we undertake the guarantee for the correct duplication of our software. Our software is designed to run on hardware products specified by us. Our warranty obligations shall be fulfilled through the delivery of replacement parts. We undertake no guarantee for the fault-free operation of the software or its data structure, unless we have agreed to the contrary in writing. Regarding customer-specific software, we guarantee compliance with the specific function and performance features outlined in the operational specifications, the order confirmation document and the established function / operating sequence documentation. We accept no liability for the fault-free functioning of programs in all the customer's planned applications and, in particular, with regard to any applications not mentioned or tested at the time of program creation / acceptance.

X. Retention of title

1 The goods delivered (goods subject to the retention of title) shall remain our property until such time as all debts, including all current account balance claims, accrued by the purchaser both now and in the future, have been paid in full. In the event of any infringement of contractual conditions on the part of the purchaser, e.g. payment arrears, we shall be entitled, after setting and upon culmination of a reasonable period, to repossess goods subject to the retention of title. The repossession of goods subject to the retention of title shall constitute our withdrawal from the contract. The seizure of goods subject to the retention of title by us shall constitute our withdrawal from the contract. Following repossession, we shall be entitled to dispose of goods subject to the retention of title. Following the deduction of an appropriate amount for the costs of the disposal, the proceeds from the disposal shall be deducted from the outstanding amounts owed to us by the purchaser.
2 The purchaser shall be responsible for the proper handling of goods subject to the retention of title and shall insure these at his own expense to their full value against damage by fire, water and theft. The costs of inspecting and servicing the goods at their appropriate intervals shall be borne by the purchaser.
3 The purchaser shall be entitled to use and/or dispose of goods subject to the retention of title in the course of his normal business activities, provided he is not in payment arrears. Pawning or chattel mortgaging shall not be permitted. Any existing claims (including all current account balance claims) with respect to goods subject to the retention of title arising due to resale or for other legal reasons (insurance, tort) shall be assigned by the purchaser by way of security and in their entirety to us; we hereby accept assignation. The purchaser has our (revocable) authorisation to collect the claims assigned to us for his invoices in his own name. We reserve the right to revoke authorisation at any time, should the purchaser not be able to meet his payment obligations. The purchaser shall not be entitled to assign the claim even for the purposes of collecting the debts by way of factoring, unless an obligation is simultaneously imposed on the factor to transfer the collected amounts directly to us, provided we still have outstanding claims against the purchaser.
4 Any processing or modification of goods subject to the retention of title shall be carried out on our behalf. Where goods subject to the retention of title are modified using items not belonging to us, we shall become co-owners of the new commodity in the ratio of the value of the goods subject to the retention of title (total amount of invoice including VAT) to the other items used, at the time of modification. The same shall apply to the processing of new products created as applies to goods subject to the retention of title. In the case of an inseparable mix of goods subject to retention of title and items not belonging to us, we shall become co-owners of the new commodity in the ratio of the value of the goods subject to retention of title (total amount of invoice including VAT) to the other items used, at the time of creation of the mix. Where the purchaser's item is the major component of the mix, the purchaser shall agree to assign co-ownership to us on a proportional basis; we hereby accept the assignation. The purchaser shall ensure that a record of sole- and co-ownership on a single item is kept on our behalf.
5 Where a third party gains access to goods subject to retention of title and in particular to pledged goods, the purchaser shall provide notification of our ownership and shall notify us immediately, so that we can assert our rights of ownership. Where the third party is unable to compensate us for the in-court and out-of-court costs incurred in respect thereof, liability shall fall to the purchaser.
6 We undertake to release the securities due to us in so far as their value exceeds the claims to be secured by more than 10%, the choice being ours as to which securities to release.

XI. Applicable law, court of jurisdiction and location

1 All legal relationships between the parties are exclusively subject to German law, to the exclusion of the United Nations Convention on Contracts for the International Sales of Goods, even if the buyer has its usual place of residence or abode abroad or delivery is being made abroad. The same applies if the buyer transfers their usual residence to another country at a later time or is unavailable.
2 If you do not have a place of residency in Germany at the time of ordering or you move your place of residency to another country following the conclusion of the contract or your place of residency is not known at the time that a claim is made, legal jurisdiction for all disputes arising from and in relation to the contractual relationship is Fulda.
3 If the customer is a merchant under the provisions of paragraph 1 section 1 of the Commercial Code (Handelsgesetzbuch, HGB), a legal person under public law or a special fund under public law, the courts in Fulda will be exclusively responsible for all disputes arising from or in connection with the relevant contractual relationship. In all other cases the customer or we are permitted to bring claims before any court that is legally cognisant.
4 Should individual provisions of this contract be wholly or partly invalid or void then the validity of the rest of the contract will not be affected. The parties undertake to replace the invalid or void provision with a valid provision that is closest to the intended commercial purpose. The same applies in cases of gaps. Changes and amendments to these General Conditions must be agreed in writing. The suspension of this requirement of the written form must also be made in writing.



Mechanics

Linear units
Rotation units
Basis units

Electronics

Motors
Controllers
Sensors

Software

Applications
CAD / CAM
Drivers

Systems

Automation
Handling
Robotics

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