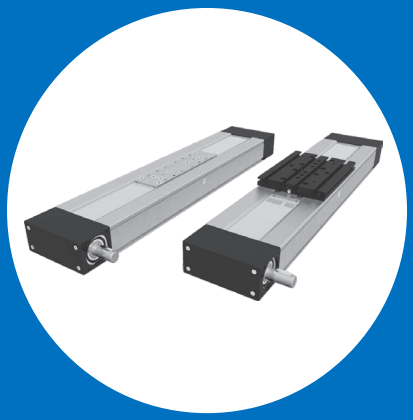

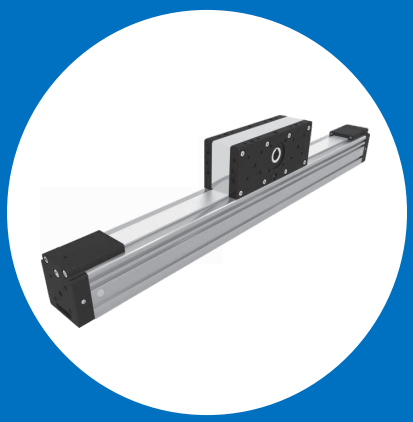

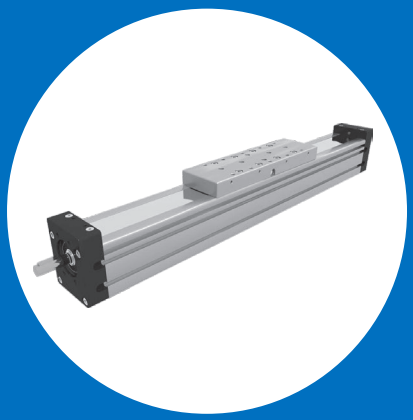

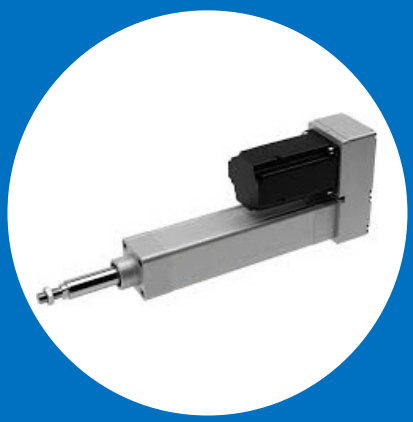

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LINEAR ACTUATORS

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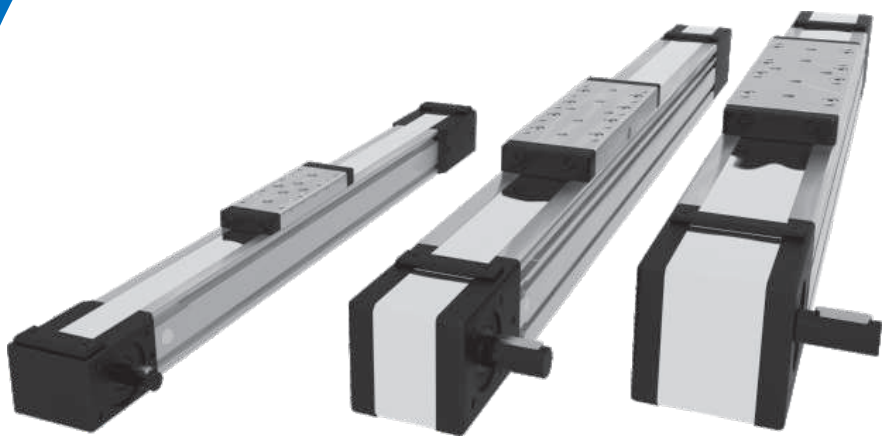
EDITION 01 – 2017



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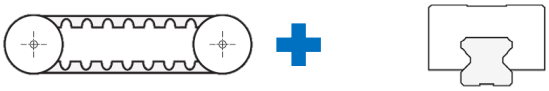
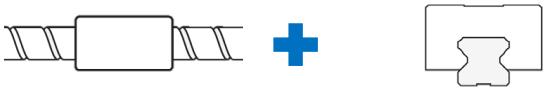


MTJ

MRJ



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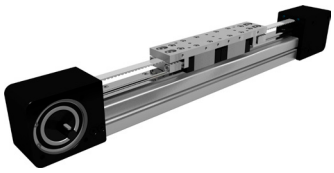

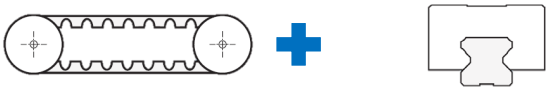

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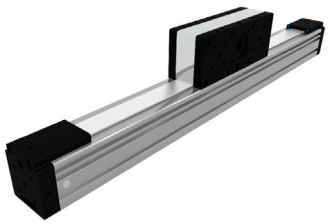
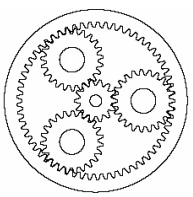


MTJZ

CTJ

CTV

PNCE



AE & PE

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Interactive Contents
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Welcome to WMH Transmissions Ltd

WMH have been a market leader in power transmission component design and manufacture for over 50 years.

Our professional sales team and technical support staff are dedicated to quality customer service, reliability and product excellence.

With years of commercial experience, ISO 9001/2008 accreditation and a highly skilled workforce from the shop floor through to management, you can be confident in choosing WMH for all you power transmission needs.

We hold extensive stock of over £1.5 million at our headquarters in Tamworth, Staffordshire situated on junction 10 of the M42 just north of the N.E.C, Birmingham providing excellent access to the motorway network and our customers.

WMH now stocks a wide range of linear actuators covering:

- Standard belt or ball screw driven actuators -

- Economy belt driven linear actuator -

- Bespoke Z-axis actuators with omega style belt drive -

- Heavy duty two-row belt or ballscrew driven linear actuators -

- Ball screw driven electric cylinders to replace pneumatic cylinders -

- A wide range of accessories for all actuators -

Our in-house, fully equipped CNC machine shop and years of industry experience gives us the capability to tailor any products to specific customer requirements – contact our sales team with your requirements.

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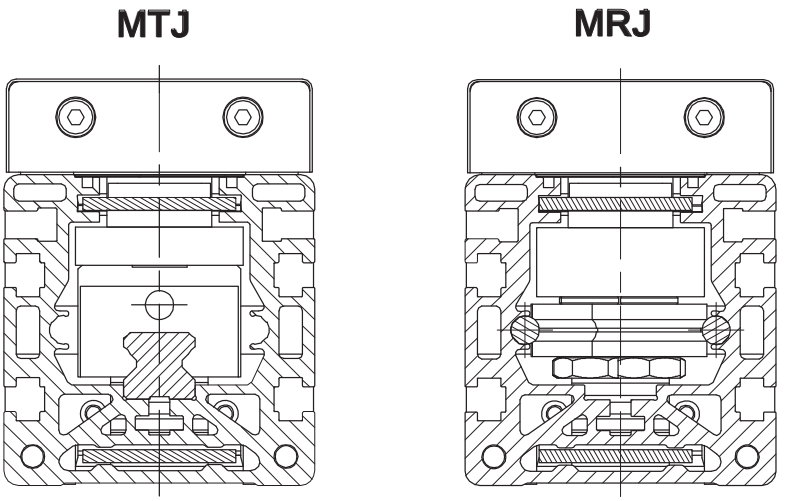
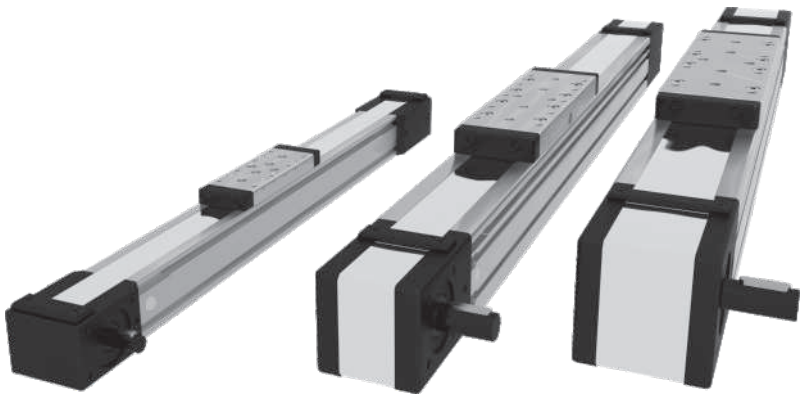
MTJ & MRJ Series
Standard Belt Driven Actuators

MTJ and MRJ Linear Units with toothed belt drive and compact dimensions provide high performance features such as, high speed, good accuracy and repeatability.
They can easily be combined to multi-axis systems.
Excellent price-/performance ratio and quick delivery time are ensured.
The compact, precision-extruded aluminum Profile from 6063 AL with integrated Zero-backlash Ball rail guide system, allows high load capacities and optimal cycles for the movement of larger masses at high speed.
For very high speeds, up to 10m/s, the Track Rollers (journal Bearings) of the type MRJ are particularly suitable.
In the Linear Units MTJ and MRJ is used a pre-tensioned steel reinforced AT polyurethane timing toothed belt. In conjunction with a Zero-backlash drive pulley high moments with alternating loads with good positioning accuracy, low wear and low noise can be realized.
The in the Profile slot driving Polyurethane timing belt protects all the parts in the Profile from dust and other contaminations. As optional, a corrosion-resistant protection strip is available.
The aluminum profile includes T-slots for fixing the Linear Unit and for attaching sensors and switches. Also, a Reed switch can be used here.
Different carriage lengths with central lubrication port, allow easy re-lubrication of the Linear Unit and allow the possibility to attach additional accessories on the side.
For the Linear Units MTJ and MRJ various adaptation options, for attaching (or redirecting), for Motors or Gearboxes are available.



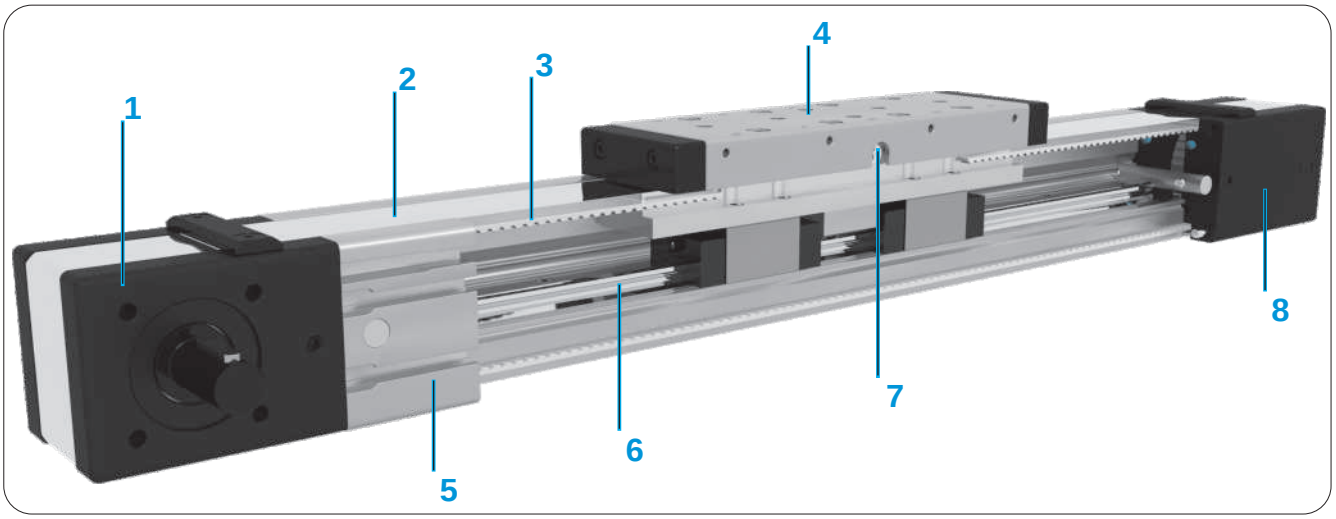


The aluminium profiles are manufactured according to the medium EN 12020-2 standard /

Straightness = 0,35 mm/m; Max. torsion = 0,35 mm/m; Angular torsion = 0,2 mm/40 mm; Parallelism = 0,2 mm

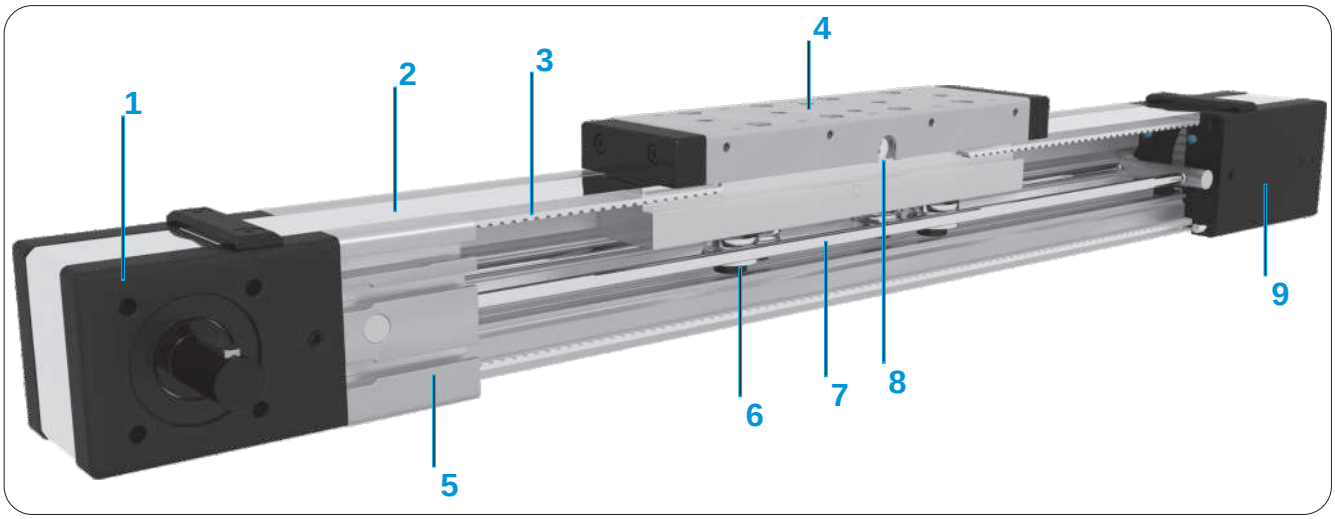
MTJ & MRJ Series
Belt Driven Actuators – Structure

MTJ Series



1 - Drive block with pulley
2 - Corrosion-resistant protection strip (available also without protection strip)
3 - AT polyurethane toothed belt with steel tension cords.
4 - Carriage; with built in Magnets
5 - Aluminium profile-Hard anodized
6 - Linear Ball Guideway
7 - Central lubrication port; both sides
8 - Tension End with integrated belt tensioning system

MRJ Series



1 - Drive block with pulley
2 - Corrosion-resistant protection strip (available also without protection strip)
3 - AT polyurethane toothed belt with steel tension cords.
4 - Carriage; with build in Magnets
5 - Aluminium profile-Hard anodized
6 - Track Roller (journal Bearing)
7 - Two hardened steel Round guide (58/60 HRC)
8 - Central lubrication port; both sides
9 - Tension End with integrated belt tensioning system

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MTJ & MRJ Series
Belt Driven Actuators – Order Codes

MTJ - 65 - 1000 - L - 1 - R - 1

Series :

MRJ

MTJ

Size :

40

65

80

110

Absolute stroke (mm) :
(Absolute stroke = Effective stroke + 2 x Safety stroke)

Carriage Version :

S : Short (only for MTJ series)

L : Long

Leave blank : For MRJ 40, MTJ 40

Type of drive pulley :

0 : Pulley with through hole

1 : Pulley with journal (with Keyway)

10 : Pulley with journal (without Keyway)

2 : Pulley with journal on both sides (with Keyway)

20 : Pulley with journal on both sides (without Keyway)

3 : Without drive unit

Drive journal position :

L : Journal on left side

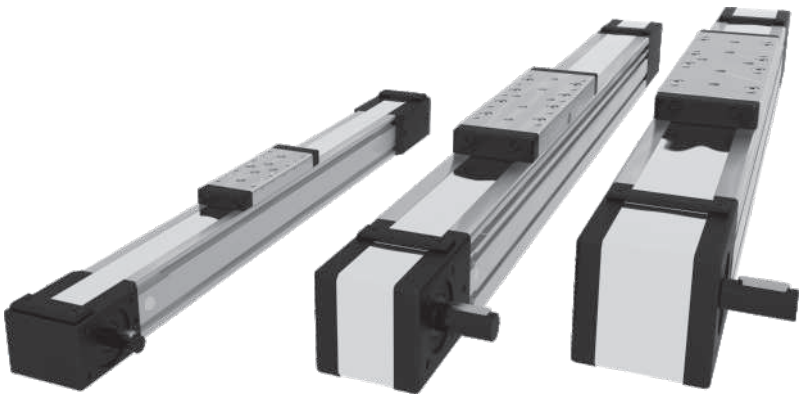
R : Journal on right side

Leave blank : For type of drive pulley 0, 2, 20 and 3

Protection cover :

0 : In profile groove guided Polyurethane toothed belt

1 : Corrosion-resistant protection strip



MTJ & MRJ Series
Belt Driven Actuators – Performance

General technical data for MTJ series

Linear Unit	Carriage length	Load capacity		Dynamic moment			Moved mass	Maximum Repeatability	*Maximum length	Planar moment of inertia	
	Lv [mm]	Dynamc C [N]	Static C0 [N]	Mx [Nm]	My [Nm]	Mz [Nm]	[kg]	[mm]	Lmax [mm]	Iy [cm⁴]	Iz [cm⁴]
MTJ 40	92	4610	6930	28	90	90	0,28	± 0,08	3000	9,8	11,6
MTJ 65 S	140	9900	17500	79	59	59	1,00	± 0,08	6000	59,7	74,4
MTJ 65 L	190	19800	35000	158	1025	1025	1,45	± 0,08			
MTJ 80 S	170	17100	30000	185	130	130	1,72	± 0,08	6000	129,1	173,4
MTJ 80 L	260	34200	60000	370	2565	2565	2,72	± 0,08			
MTJ 110 S	240	24800	42500	315	220	220	3,25	± 0,08	6000	513,0	620,0
MTJ 110 L	330	49600	85000	630	3840	3840	4,61	± 0,08			

*For lengths over the stated value in the table above please contact us

General technical data for MRJ series

Linear Unit	Carriage length	Dynamic load capacity		Dynamic moment			Max. permissible loads					Moved mass	Maximum Repeatability	*Maximum length	Planar moment of inertia	
							Forces		Moments							
	Lv [mm]	Cy [N]	Cz [N]	Mx [Nm]	My [Nm]	Mz [Nm]	Fpy [N]	Fpz [N]	Mpx [Nm]	Mpy [Nm]	Mpz [Nm]	[kg]	[mm]	Lmax [mm]	Iy [cm⁴]	Iz [cm⁴]
MRJ 40	92	3400	1700	20	21	25	1010	505	13	17	7,5	0,26	± 0,08	6000	9,8	11,6
MRJ 65 L	190	8600	4400	74	181	425	1920	980	24	169	95	1,31	± 0,08	6000	59,7	74,4
MRJ 80 L	260	17100	9000	198	502	1145	2930	1540	34	260	195	2,73	± 0,08	6000	129,1	173,4
MRJ 110 L	330	31000	14000	406	875	2325	5110	2310	67	370	380	4,78	± 0,08	6000	513,0	620,0

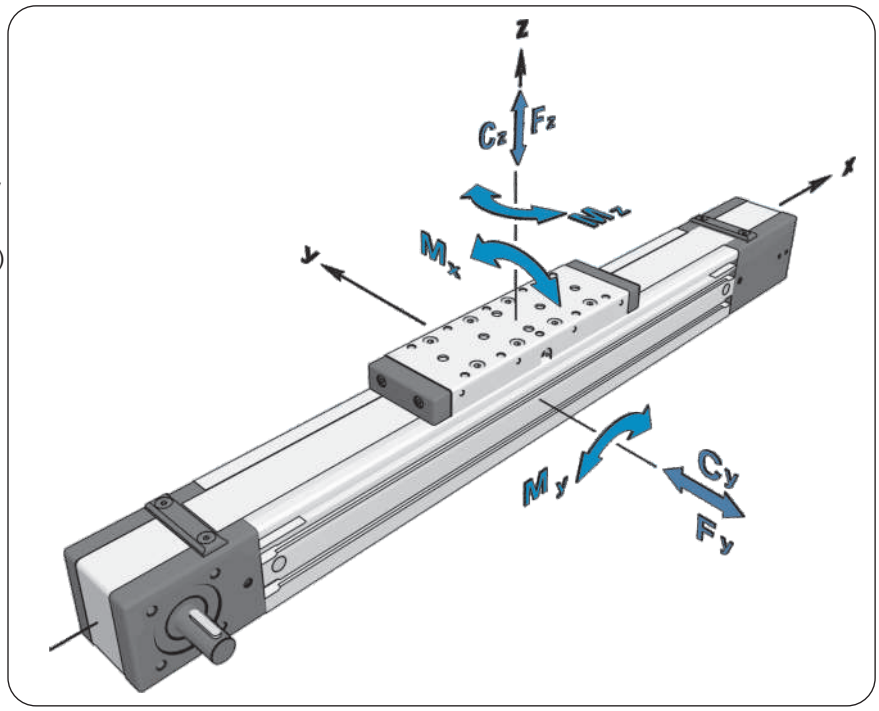
*For lengths over the stated value in the table above please contact us

Recommended values of loads

All the data of static and dynamic moments and load capacities stated in the upper table are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety. We recommend a minimum safety factor (fs =5.0)

Modulus of elasticity :

E = 70000 N / mm^2



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MTJ & MRJ Series
Belt Driven Actuators – Performance

Drive and belt data for MRJ and MTJ series

Linear Unit	* Maximum travel speed [m / s]	Maximum drive torque Ma [Nm]	** No load torque With strip [Nm]	** No load torque Without strip [Nm]	Puley drive ratio [mm / rev]	Pulley diameter [mm]	Belt type	Belt width [mm]	Max. force transmited by belt [N]	Specific spring constant Cspec [N]
MRJ 40	10	3,7	0,4	0,2	99	31,51	AT 3	20	235	225000
MTJ 40	6		0,4	0,2						
MRJ 65 L	10	13,1	1	0,7	165	52,52	AT 5	32	500	600000
MTJ 65 S	6		1,1	0,8						
MTJ 65 L			1,2	0,9						
MRJ 80 L	10	29,4	1,4	1,1	210	66,84	AT 5	50	880	960000
MTJ 80 S	6		1,5	1,2						
MTJ 80 L			1,7	1,4						
MRJ 110 L	10	68,5 with keyway 82,6 without keyway	1,8	1,5	300	95,49	AT 10	50	1730	2145000
MTJ 110 S	6		1,8	1,5						
MTJ 110 L			2	1,7						

*Maximum travel speed of Linear unit with the Corrosion-resistant protection strip is 1,5 m/s

** The stated values are for strokes up to 500mm. No Load Torque value increases with stroke elongation

Mass and mass moment of inertia for MTJ series

Linear Unit	Carriage length Lv [mm]	Mass of linear unit [kg]	Mass moment of inertia [10^{-5} kg·m ^{2}]
MTJ 40	92	1,3 + 0,0024 * Stroke [mm]	9,7 + 0,0035 * Stroke [mm]
MTJ 65 S	140	4 + 0,0055 * Stroke [mm]	98,4 + 0,0154 * Stroke [mm]
MTJ 65 L	190	4,6 + 0,0055 * Stroke [mm]	130,1 + 0,0154 * Stroke [mm]
MTJ 80 S	170	6,8 + 0,0085 * Stroke [mm]	310,6 + 0,0391 * Stroke [mm]
MTJ 80 L	260	8,4 + 0,0085 * Stroke [mm]	423,3 + 0,0391 * Stroke [mm]
MTJ 110 S	240	15 + 0,015 * Stroke [mm]	1065,0 + 0,1370 * Stroke [mm]
MTJ 110 L	330	17,7 + 0,015 * Stroke [mm]	1381,0 + 0,1370 * Stroke [mm]

Mass and mass moment of inertia for MRJ series

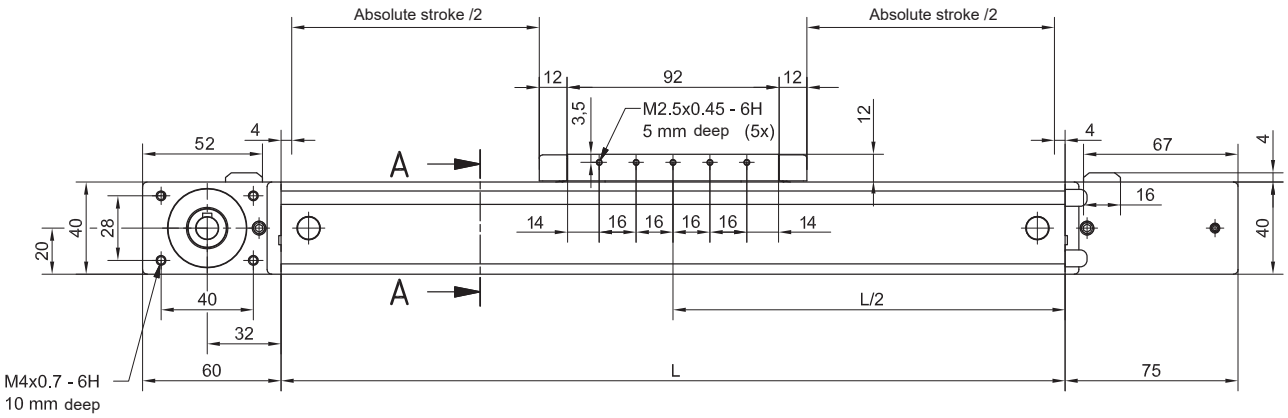
Linear Unit	Carriage length Lv [mm]	Mass of linear unit [kg]	Mass moment of inertia [10^{-5} kg·m ^{2}]
MRJ 40	92	1,25 + 0,0022 * Stroke [mm]	9,3 + 0,0035 * Stroke [mm]
MRJ 65 L	190	4,3 + 0,0047 * Stroke [mm]	120,4 + 0,0154 * Stroke [mm]
MRJ 80 L	260	8,2 + 0,0075 * Stroke [mm]	424,4 + 0,0391 * Stroke [mm]
MRJ 110 L	330	16,3 + 0,0133 * Stroke [mm]	1420,0 + 0,1370 * Stroke [mm]

Mass calculation doesn´t include mass of motor, reduction gear, switches and clamps.

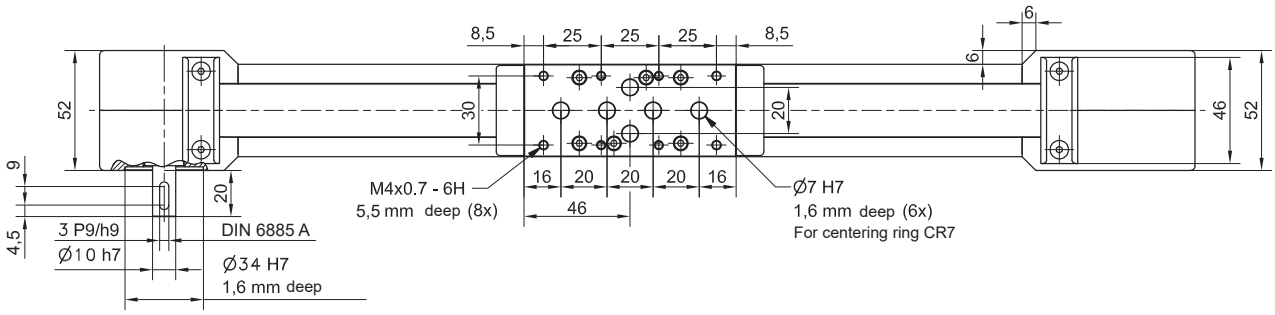
MTJ & MRJ 040
Belt Driven Actuators – Dimensions

Linear Unit doesn't include any safety stroke.

Absolute stroke = Effective stroke + 2 x Safety stroke



Lifetime lubricated!



Journal with or without Keyway.

All dimensions in mm; Drawings scales are not equal.

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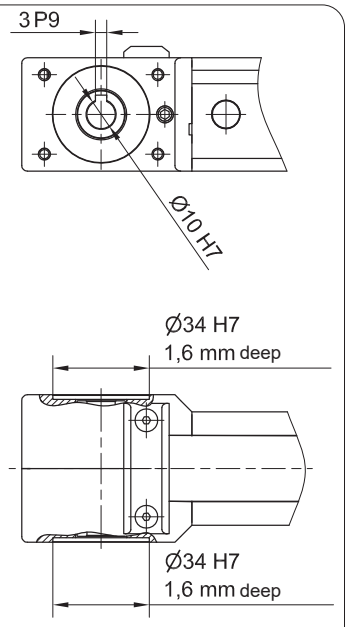

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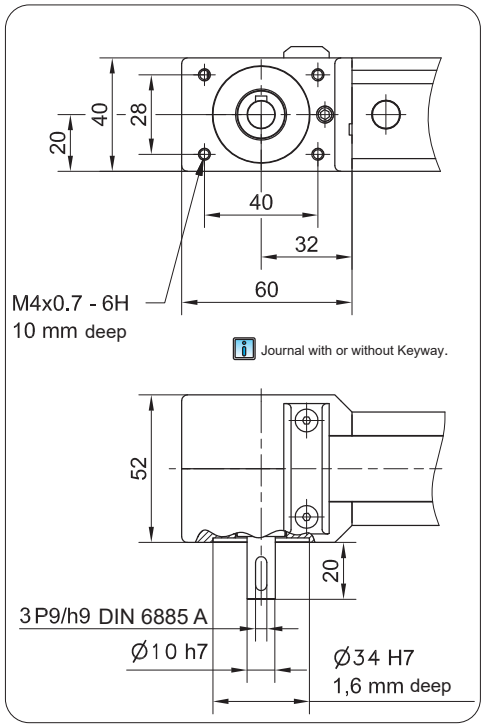

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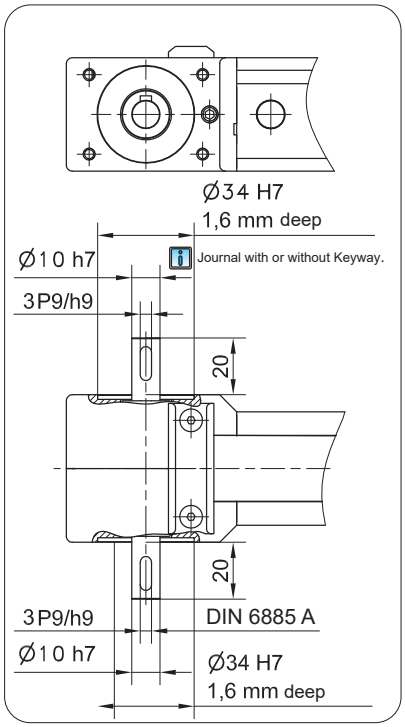

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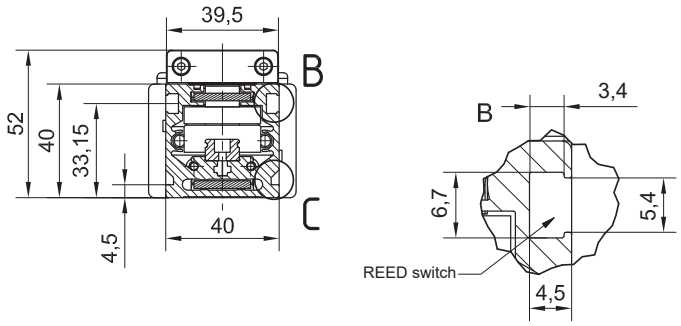
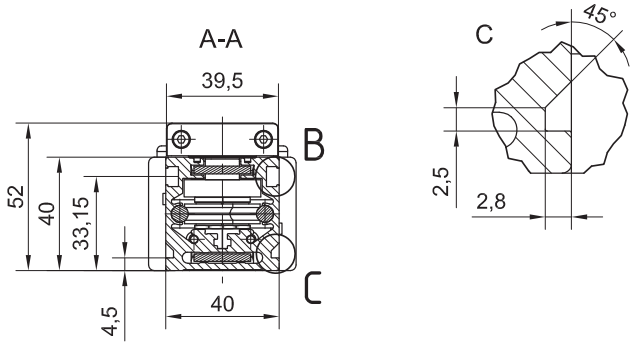
MTJ & MRJ 040
Belt Driven Actuators – Dimensions

MTJ 40



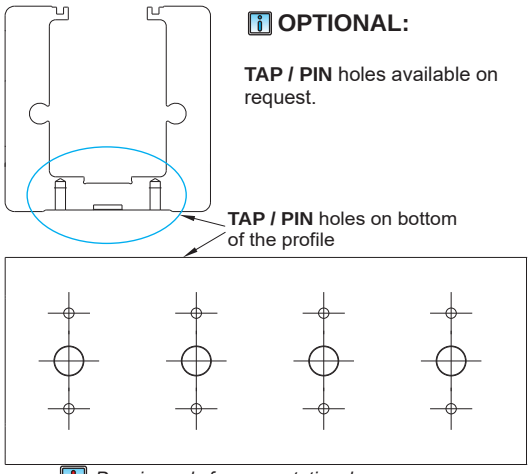
MRJ 40



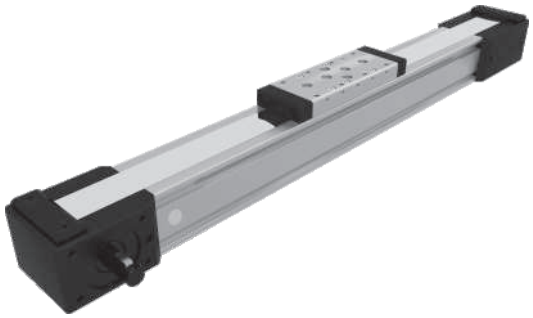
All dimensions in mm; Drawings scales are not equal.

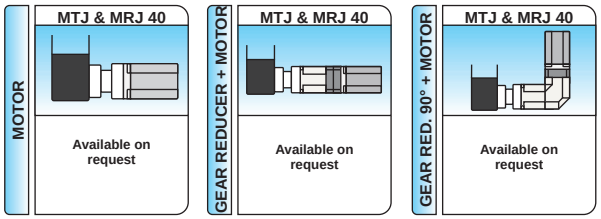
OPTIONAL:

TAP / PIN holes available on request.



Drawing only for presentational use.



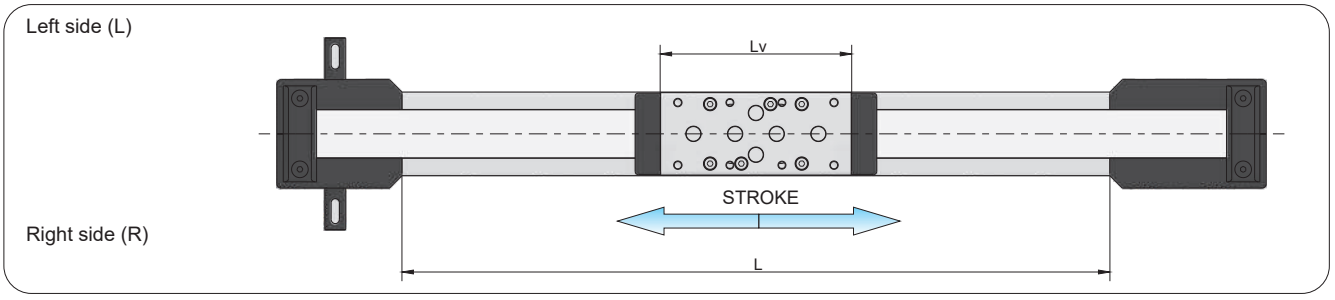


Defining of the linear module length

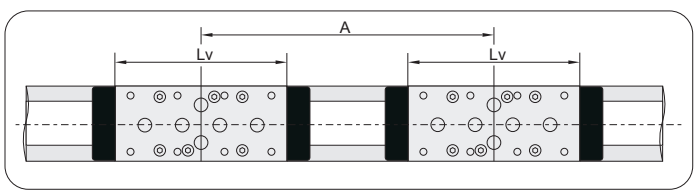
L = Effective stroke + 2 × Safety stroke + Lv + 32 mm

Lv = 92 mm

Ltotal = L + 135mm



Double-Carriage



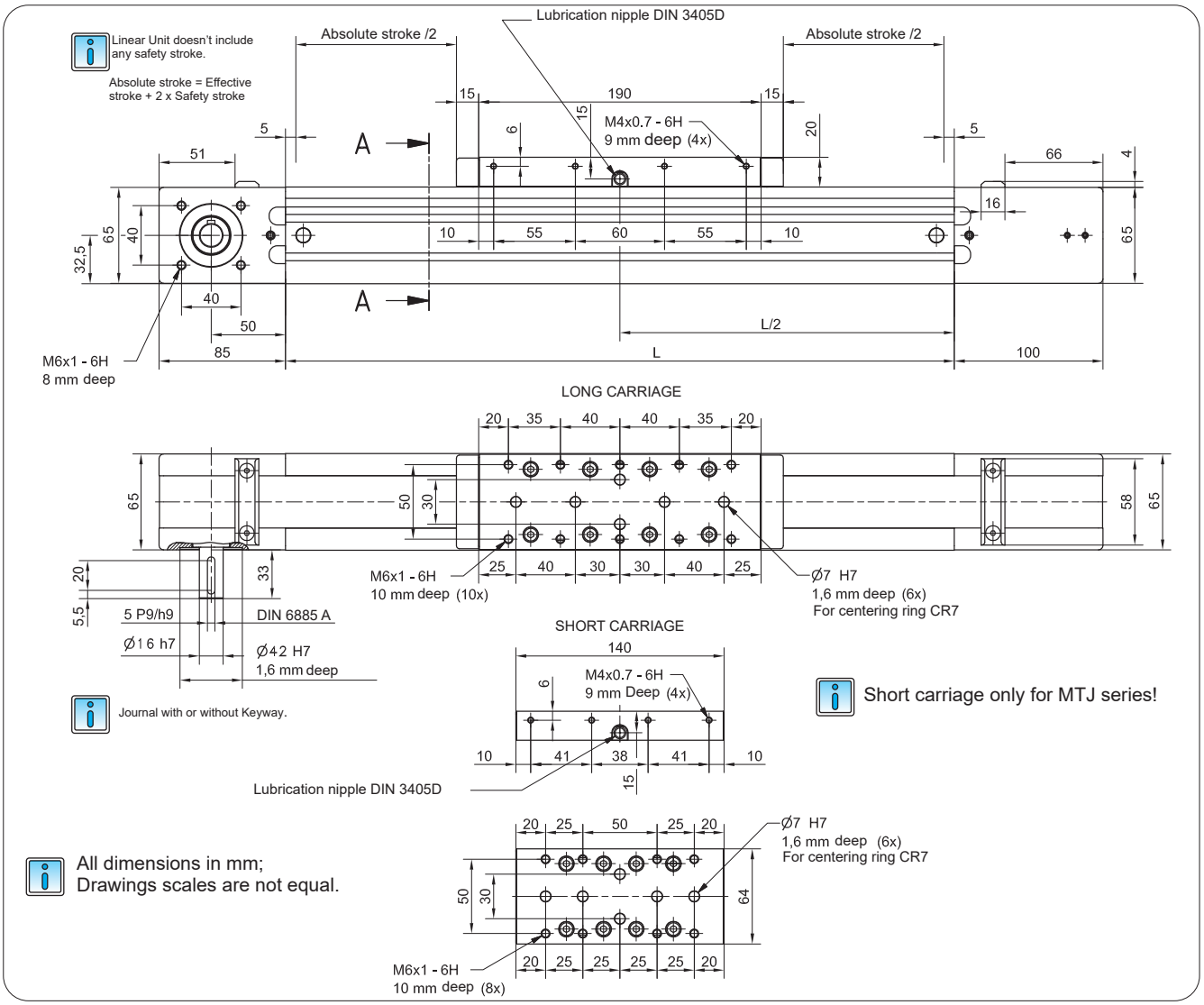
For ordering code please contact us.

L = Effective stroke + 2 × Safety stroke + Lv + A + 32 mm

Ltotal = L + 135 mm

A > Lv + 24 mm

MTJ & MRJ 065
Belt Driven Actuators – Dimensions



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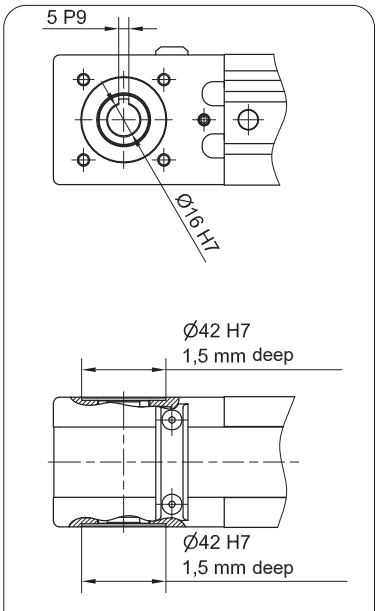

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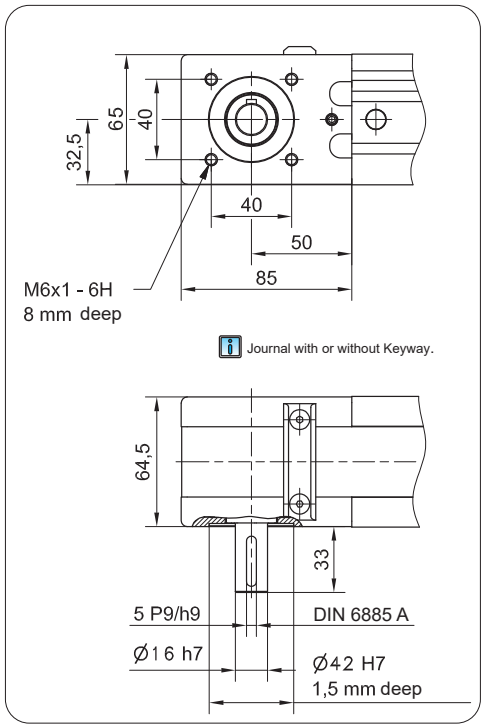

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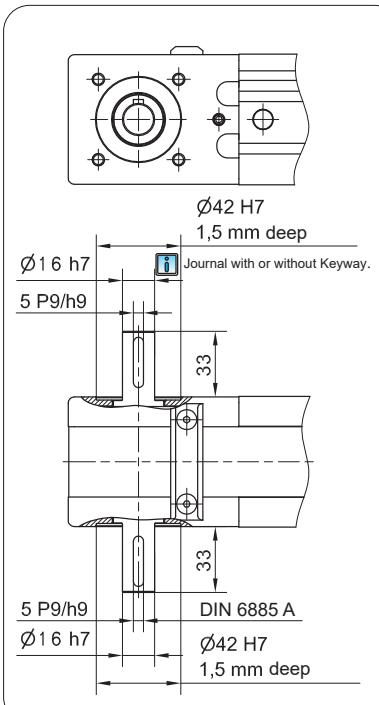

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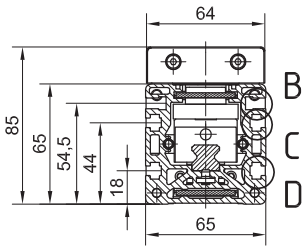
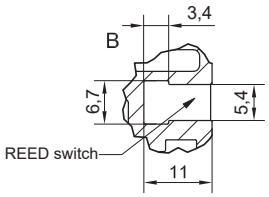
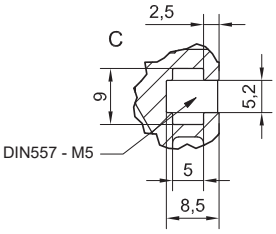
MTJ & MRJ 065
Belt Driven Actuators – Dimensions

MTJ 65

A-A

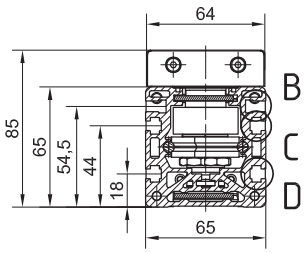


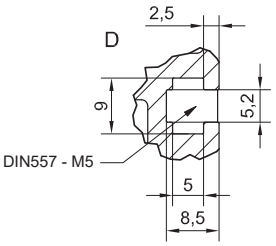




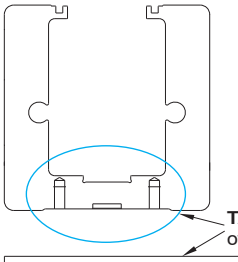
MRJ 65

A-A





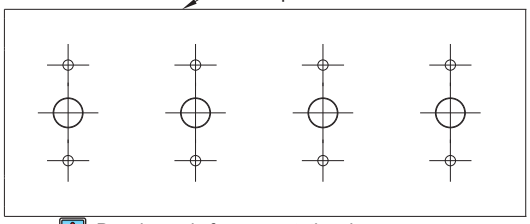
All dimensions in mm; Drawings scales are not equal.



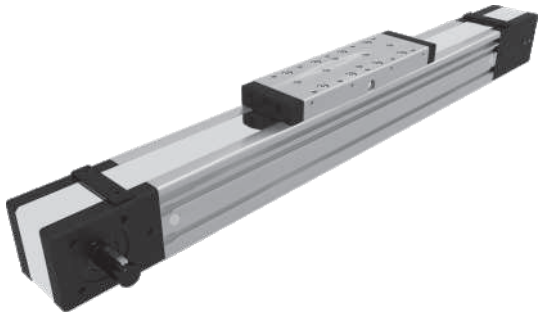
OPTIONAL:

TAP / PIN holes available on request.

TAP / PIN holes on bottom of the profile



Drawing only for presentational use.



MOTOR	GEAR REDUCER + MOTOR	GEAR RED. 90° + MOTOR
MTJ & MRJ 065	MTJ & MRJ 065	MTJ & MRJ 065
Available on request	Available on request	Available on request

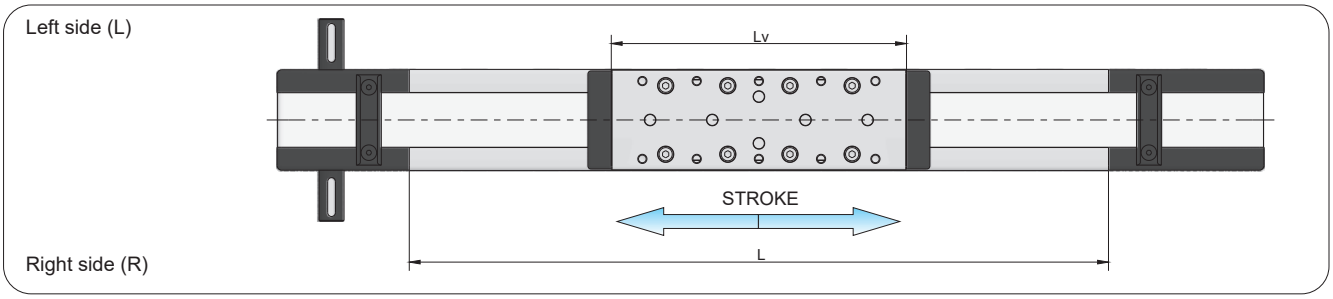
Defining of the linear module length

L = Effective stroke + 2 × Safety stroke + Lv + 40 mm

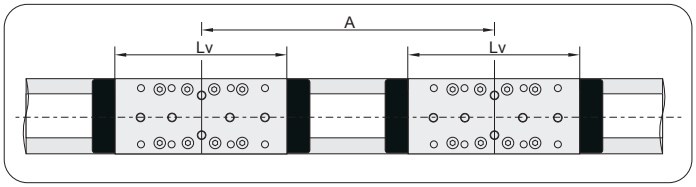
Ltotal = L + 185 mm

Lv - Long carriage = 190 mm

Lv - Short carriage = 140 mm



Double-Carriage



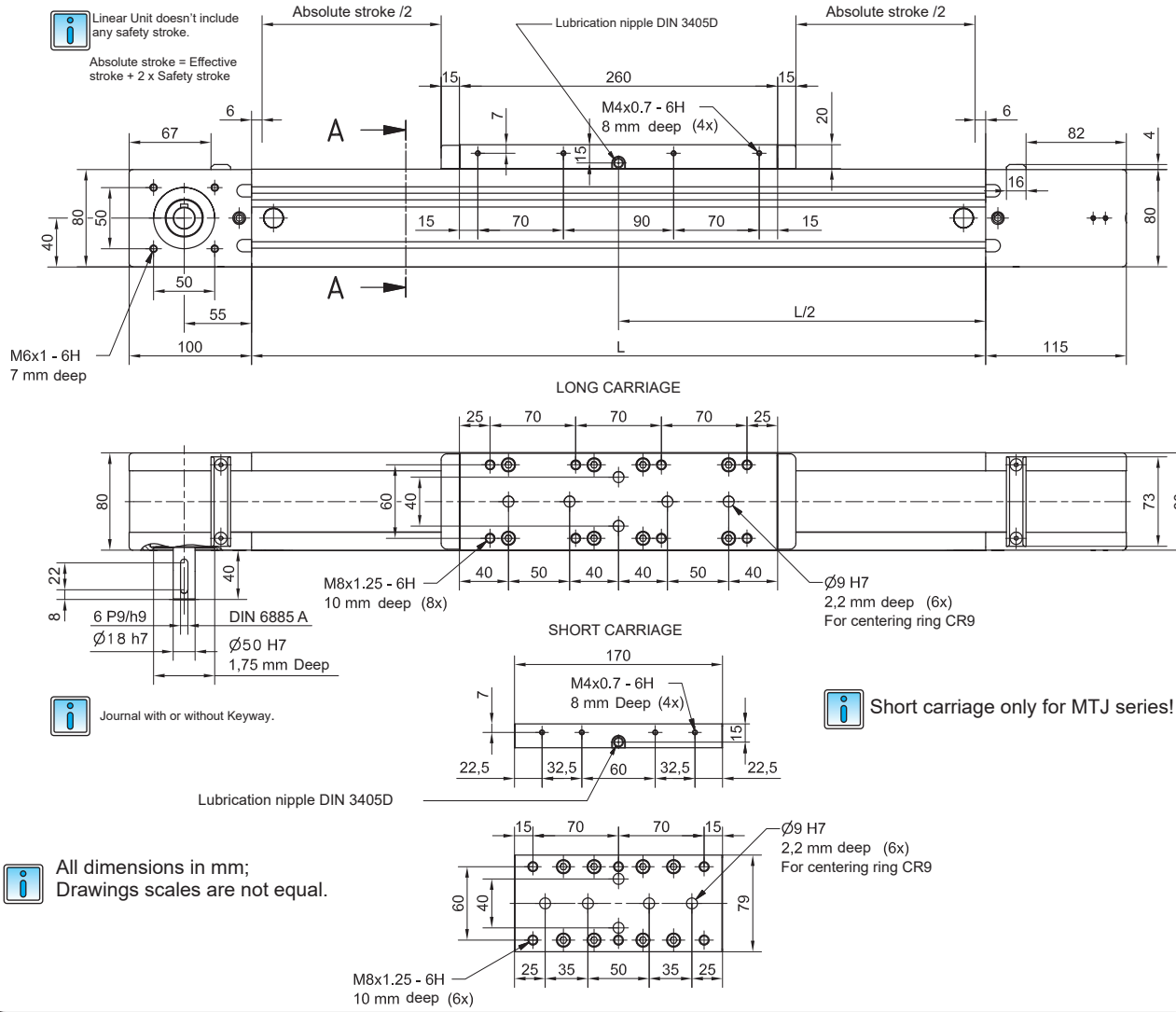
For ordering code please contact us.

L = Effective stroke + 2 × Safety stroke + Lv + A + 40 mm

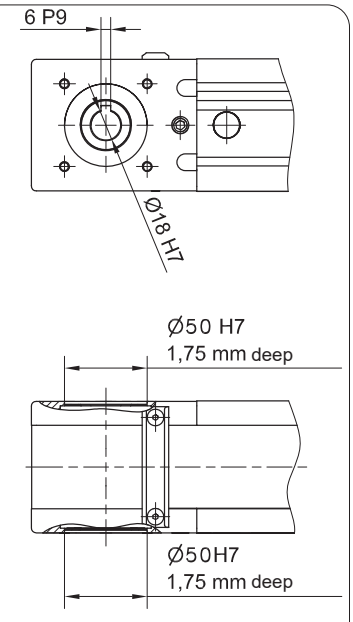
Ltotal = L + 185 mm

A > Lv + 30 mm

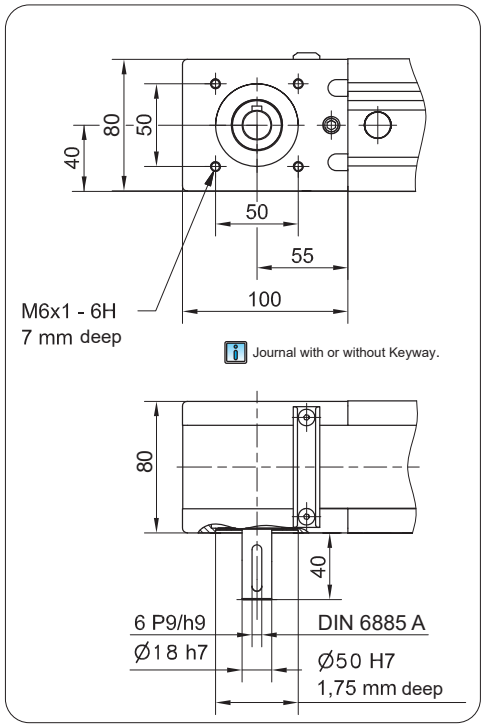
MTJ & MRJ 080
Belt Driven Actuators – Dimensions



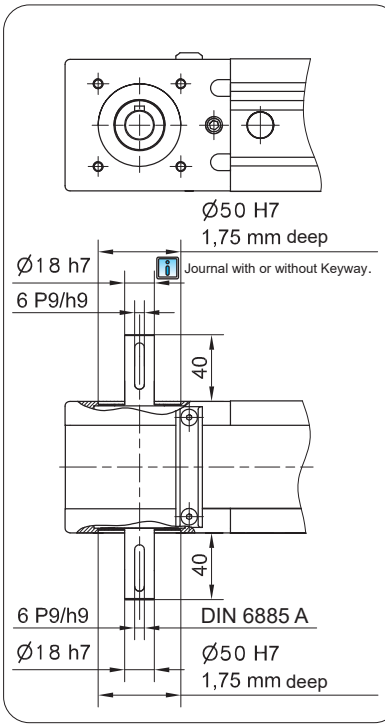
TYPE 0



TYPE 1 L and 1 R



TYPE 2



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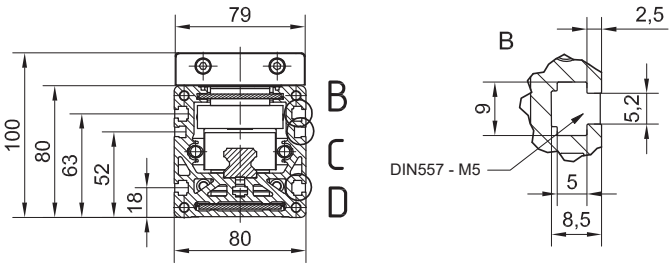
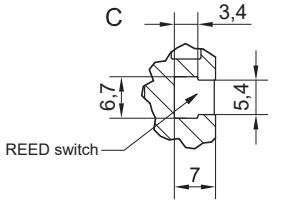
MTJ & MRJ 080
Belt Driven Actuators – Dimensions

MTJ 80

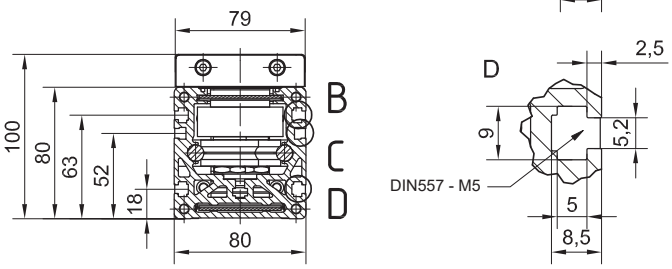
A-A





MRJ 80

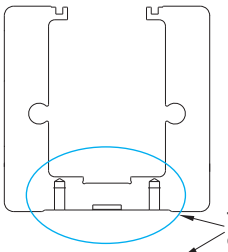
A-A



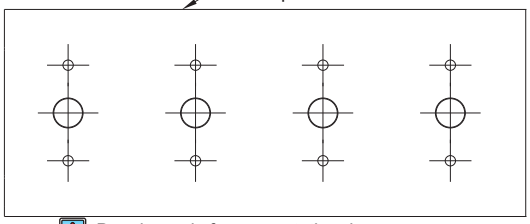
All dimensions in mm; Drawings scales are not equal.

OPTIONAL:

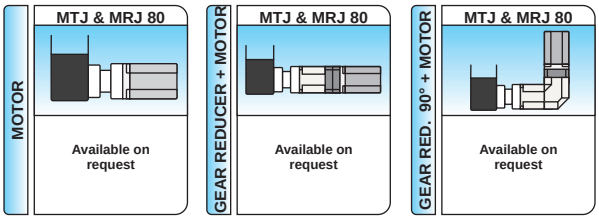
TAP / PIN holes available on request.



TAP / PIN holes on bottom of the profile



Drawing only for presentational use.



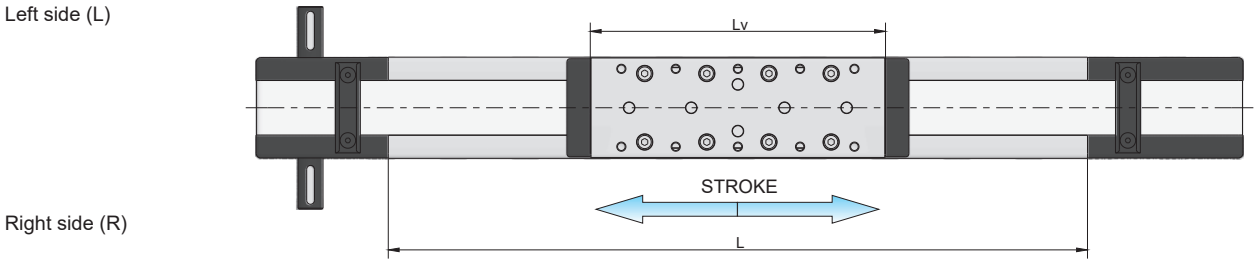
Defining of the linear module length

L = Effective stroke + 2 × Safety stroke + Lv + 42 mm

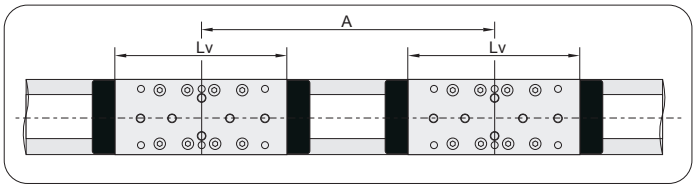
Ltotal = L + 215 mm

Lv - Long carriage = 260 mm

Lv - Short carriage = 170 mm



Double-Carriage



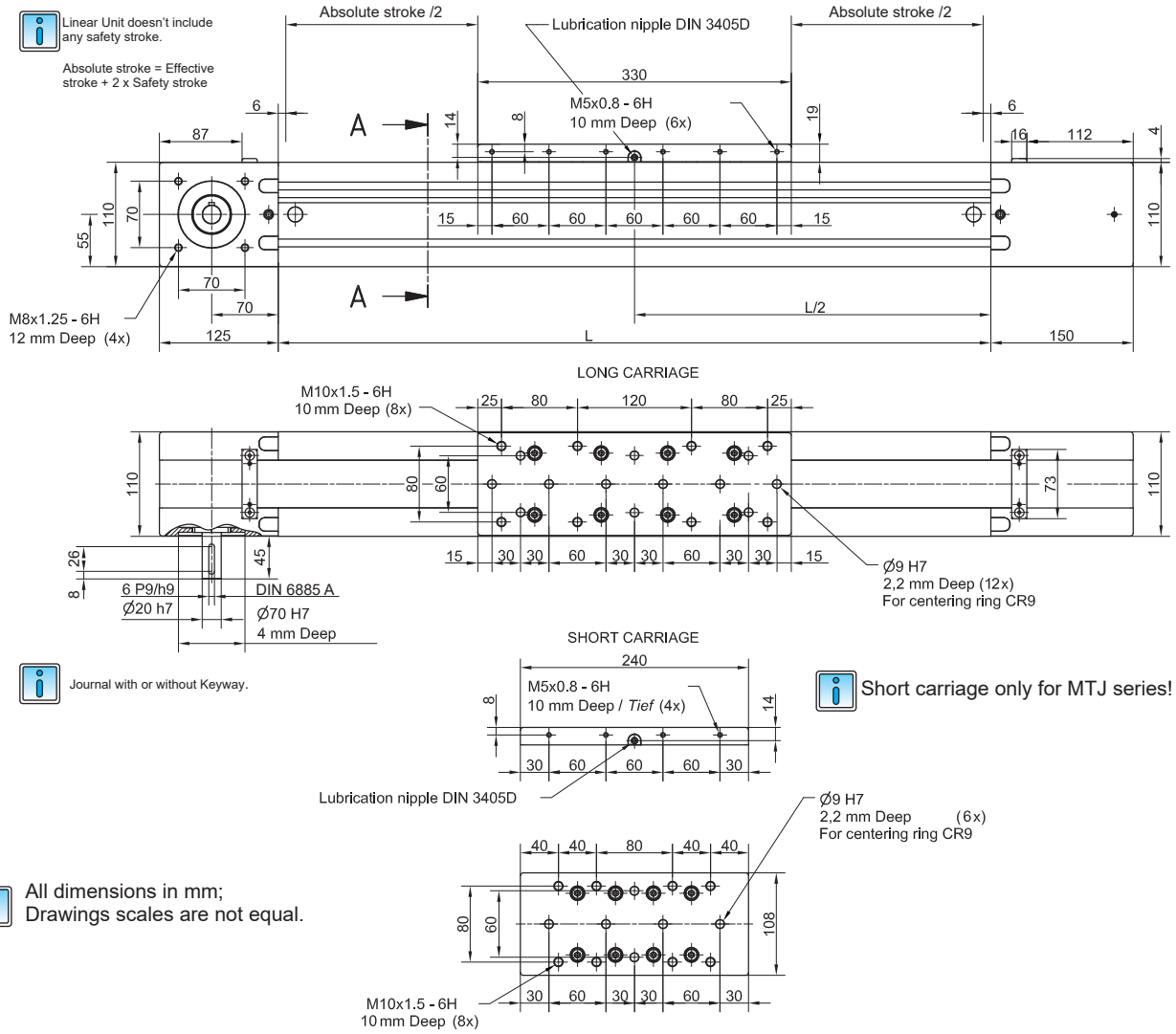
For ordering code please contact us.

L = Effective stroke + 2 × Safety stroke + Lv + A + 42 mm

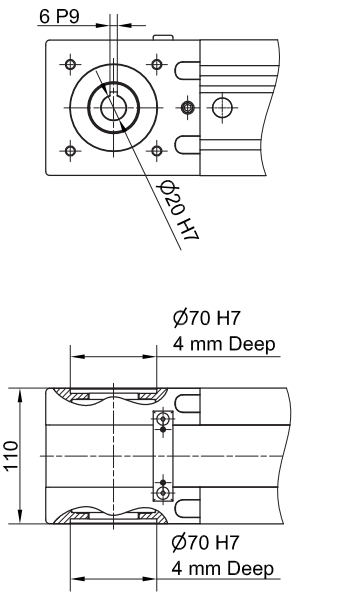
Ltotal = L + 215 mm

A ≥ Lv + 30 mm

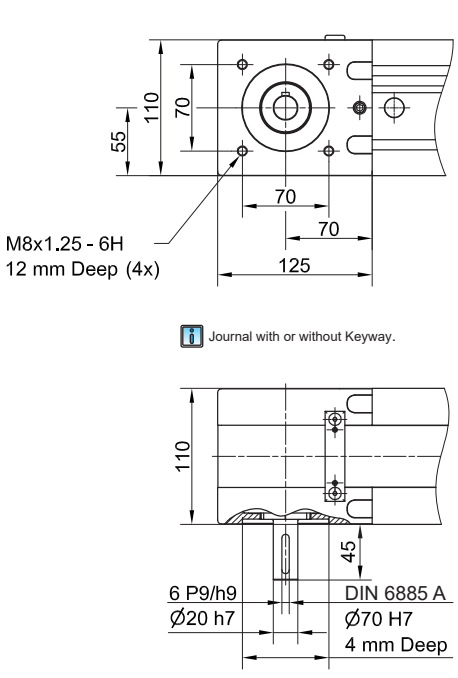
MTJ & MRJ 110
Belt Driven Actuators – Dimensions



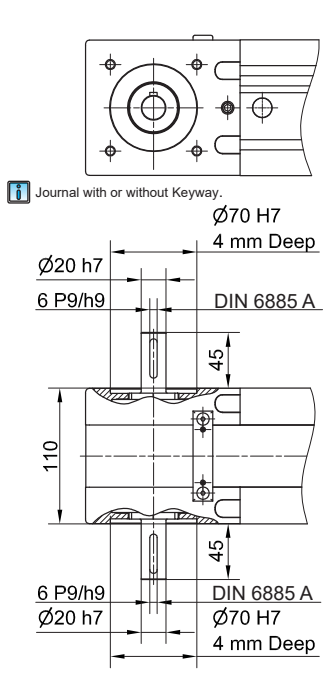
TYPE 0



TYPE 1 L and 1 R



TYPE 2



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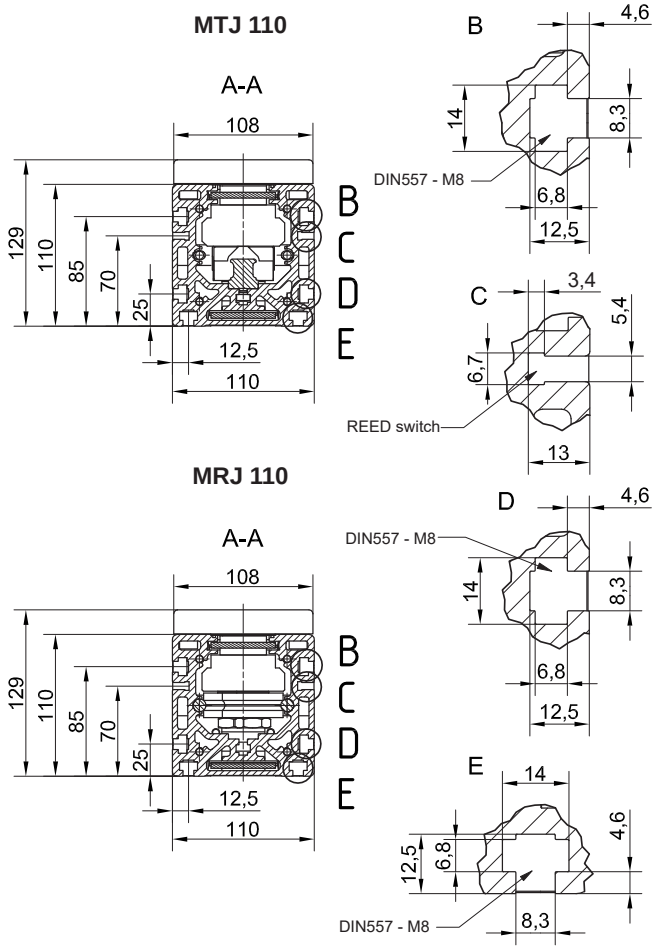
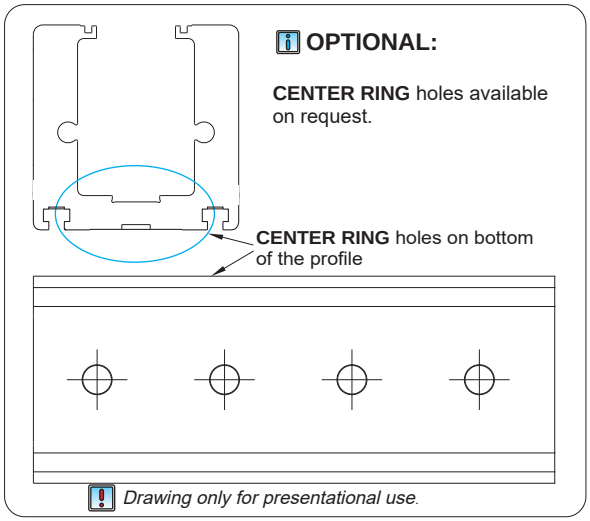
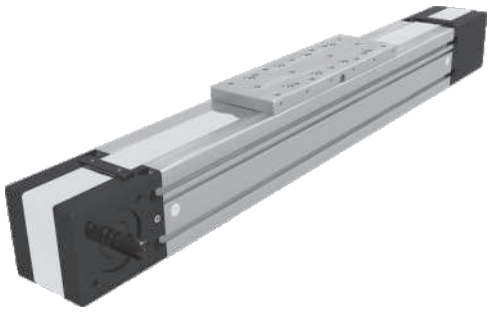
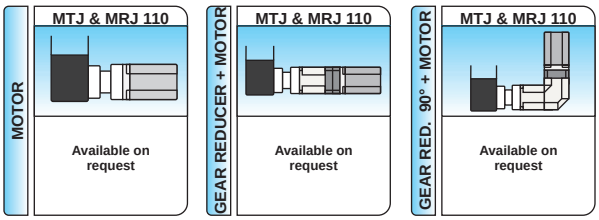
MTJ & MRJ 110
Belt Driven Actuators – Dimensions



All dimensions in mm; Drawings scales are not equal.







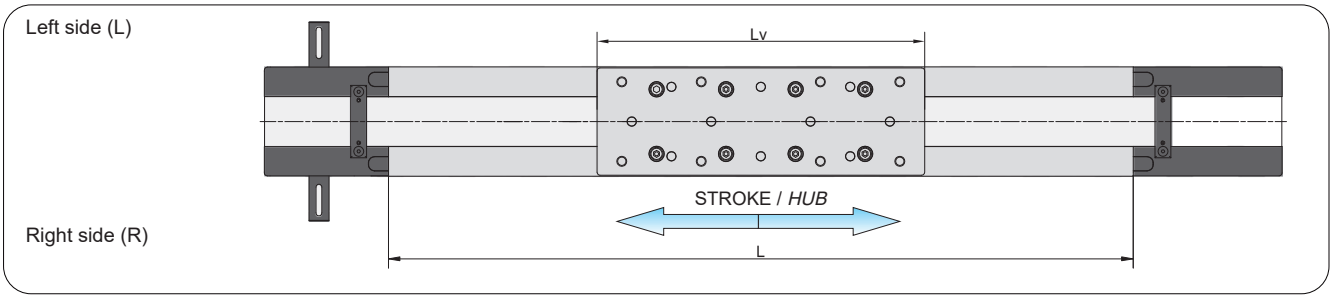
Defining of the linear module length

L = Effective stroke + 2 × Safety stroke + Lv + 12 mm

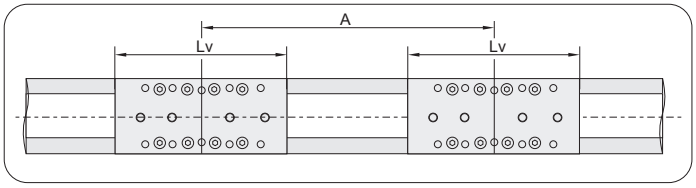
Ltotal = L + 275 mm

Lv - Long carriage = 330 mm

Lv - Short carriage = 240 mm



Double Carriage



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L = Effective stroke + 2 × Safety stroke + Lv + A + 12 mm

Ltotal = L + 275 mm

A ≥ Lv

Notes

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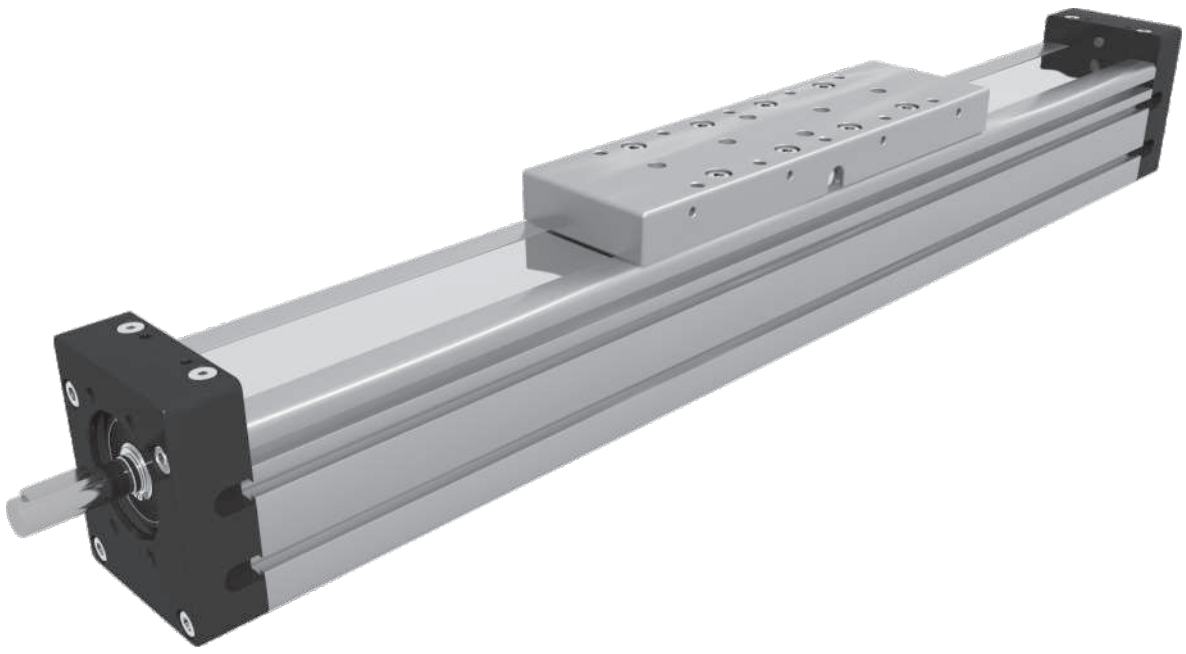
MTV Series
Standard Ball Screw Driven Actuators

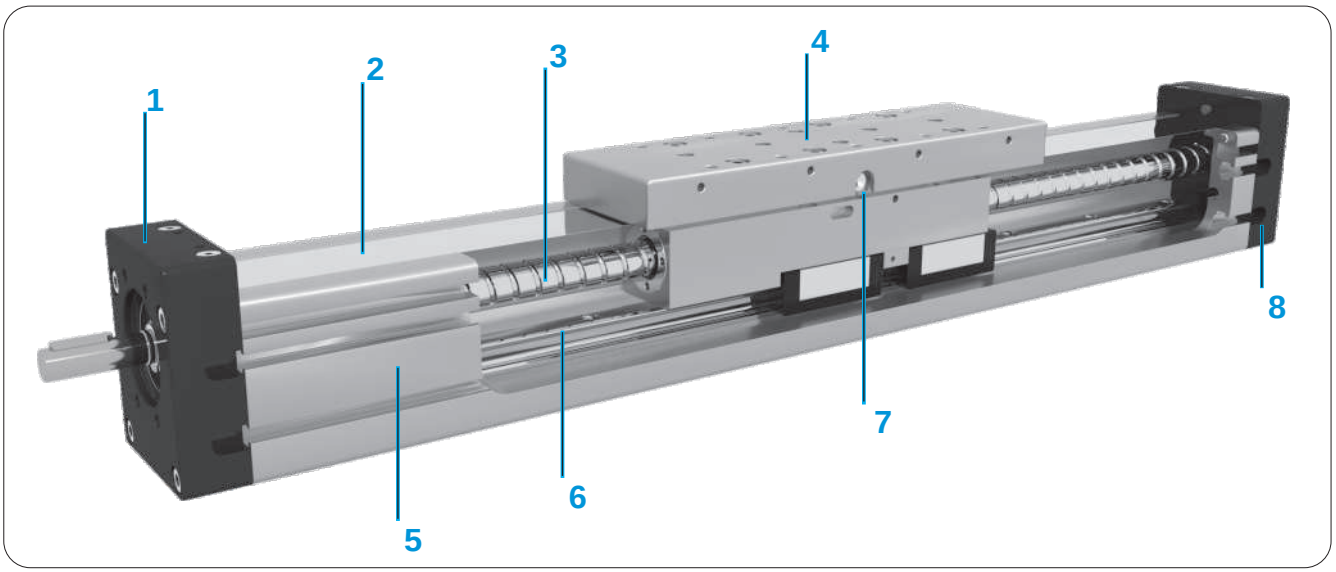
*The **MTV** series describes Linear Units with precision ball screw drive, integrated guide rail and compact dimensions. They provide high performances features, such as high speeds, good accuracy and repeatability.*
They can easily be combined to multi-axis systems.
Excellent price-/performance ratio and quick delivery time are ensured.
The compact, precision-extruded aluminum Profile from 6063 AL with integrated Zero-backlash Ball rail guide system, allows high load capacities and optimal cycles for the movement of larger masses at high speed.
In the Linear Units MTV a precision ball screw, with tolerance class ISO7 (ISO5 on request), with reduced backlash of the ball nut is used.
A corrosion-resistant protection strip, protects all the parts in the profile from dust and other contaminants.
The aluminum profile includes T-slots for fixing the Linear Unit and for attaching sensors and switches. Also, a Reed switch can be used here.
The carriage, with central lubrication port, allows easy central re-lubrication of ball screw and Ball rail guide and provides the possibility to attach additional accessories on the side.
For the Linear Units MTV various adaptation options, for attaching (or redirecting), for Motors or Gearboxes are available.



The aluminium profiles are manufactured according to the medium EN 12020-2 standard

Straightness = 0,35 mm/m; Max. torsion = 0,35 mm/m; Angular torsion = 0,2 mm/40 mm; Parallelism = 0,2 mm

MTV Series
Ball Screw Actuators – Order Codes



1 - Drive block with floating bearing (MTV 110 - fixed bearing)
2 - Corrosion-resistant protection strip
3 - Ball screw tolerance ISO7 (ISO5 available on request)
4 - Carriage; with built in Magnets
5 - Aluminium profile-Hard anodized
6 - Integrated Linear Ball Guideway
7 - Central lubrication port; both sides
8 - End block with fixed bearing (MTV 110 - floating bearing)

HOW TO ORDER

MTV - 65 - 1610 - ISO7 - 1 - 1000 - 2SA

Series :

MTV

Size :

65

80

110

Ball screw :

MTV 65: Ø16×5, Ø16×10, Ø16×16

MTV 80: Ø20×5, Ø20×10, Ø20×20, Ø20×50

MTV 110: Ø32×5, Ø32×10, Ø32×20, Ø32×32

Ball screw tolerance :

ISO7 (Standard)

ISO5

Ball screw journal :

0 : Without keyway

1 : With keyway

Absolute stroke (mm) :
(Absolute stroke = Effective stroke + 2 x Safety stroke)

Number of screw supports n_{SA} :
(only even integer number - 2, 4, 6, 8, 10SA) - for MTV 65 max. 4SA is available

Leave blank : Without SA

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MTV Series
Ball Screw Actuators – Performance

General technical data for MTV series

Linear Unit	Carriage length	Load capacity		Dynamic moment			Moved mass	* Maximum length	Planar moment of inertia	
	Lv [mm]	Dynamic C [N]	Static C0 [N]	Mx [Nm]	My [Nm]	Mz [Nm]	[kg]	Lmax [mm]	Iy [cm^4]	Iz [cm^4]
MTV 65	220	19800	35000	158	700	700	1,5	2900	71,3	89,4
MTV 80	290	34200	60000	370	1470	1470	3,0	5480	144,1	192,3
MTV 110	330	49600	85000	630	2650	2650	4,9	5850	562,0	669,0

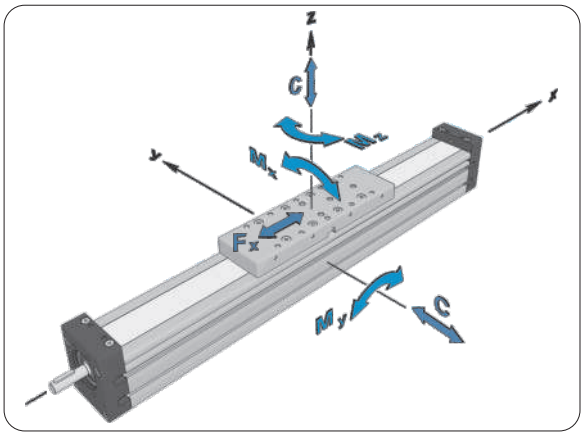
*For lengths over the stated value in the table above, please contact us

Recommended values of loads:

All the data of static and dynamic moments and load capacities stated in the upper table are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety. We recommend a minimum safety factor (fs =5.0)

Modulus of elasticity

E = 70000 N / mm^2



Ball Screw Drive data

Liner unit	1 Maximal travel speed [m / s]		2 No load torque [Nm]	Lead constant [mm / rev]	Ball screw [d × l]	3 Max. Repeatability precision [mm] STANDARD ISO7	ISO5	Dynamic load capacity BS Ca [N]	Max. axial load Fx [N]	Maximal drive torque Ma [Nm]
MTV 65	$34{,}2 \cdot 10^3 \cdot I / L^2$ [mm]	≤ 0,35	0,11	5	16 × 5	± 0,02	± 0,01	13150	8700	7,7
		≤ 0,70	0,12	10	16 × 10	± 0,02	± 0,01	11550	6730	11,9
		≤ 1,12	0,13	16	16 × 16	± 0,02	± 0,01	8170	4200	11,9
MTV 80	$64{,}2 \cdot 10^3 \cdot I / L^2$ [mm]	≤ 0,28	0,16	5	20 × 5	± 0,02	± 0,01	14800	14800	13,0
		≤ 0,55	0,17	10	20 × 10	± 0,02	± 0,01	15900	13850	24,5
		≤ 1,13	0,18	20	20 × 20	± 0,02	± 0,01	16250	6930	24,5
		≤ 2,50	0,28	50	20 × 50	± 0,02	± 0,01	13000	2770	24,5
MTV 110	$108 \cdot 10^3 \cdot I / L^2$ [mm]	≤ 0,18	045	5	32 × 5	± 0,02	± 0,01	18850	18850	16,7
	$99{,}0 \cdot 10^3 \cdot I / L^2$ [mm]	≤ 0,50	0,50	10	32 × 10	± 0,02	± 0,01	33400	29600	52,3
	$105 \cdot 10^3 \cdot I / L^2$ [mm]	≤ 1,00	0,55	20	32 × 20	± 0,02	± 0,01	29700	14800	52,3
	$103 \cdot 10^3 \cdot I / L^2$ [mm]	≤ 1,60	0,60	32	32 × 32	± 0,02	± 0,01	35150	9240	52,3

For travel speed over the stated value in the table above please contact us.

[2]The stated values are for strokes up to 500mm. No Load Torque value increases with stroke elongation

[3]For the ball nut with the preload of 2%, please contact us.

Reduced effective diameter at journal with keyway decreases values of max. drive torque.

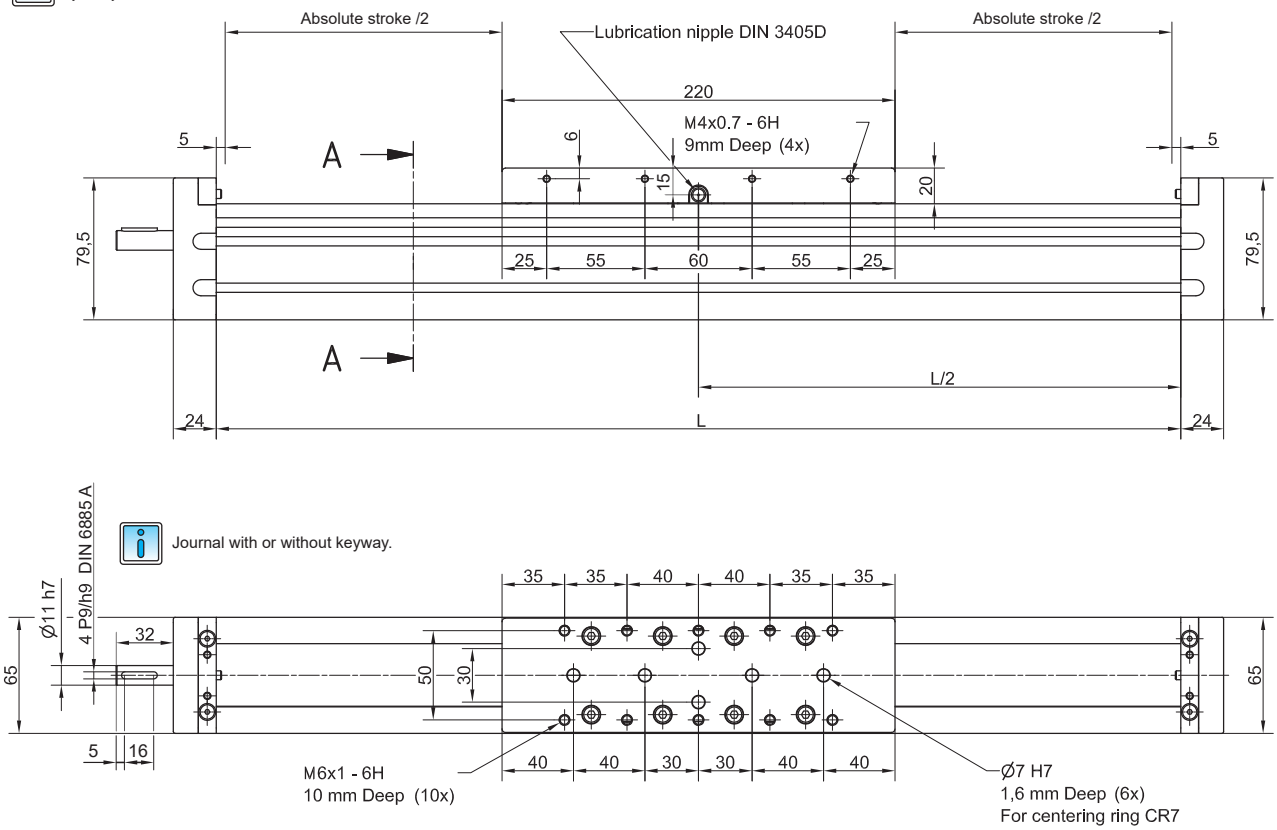
Linear Unit	Max. permissible drive torque Ma [Nm]
MTV 65	5,5
MTV 80	11,9
MTV 110	27,3

Mass and mass moment of inertia

Linear Unit	Carriage length Lv [mm]	Mass of linear unit [kg]	Mass moment of inertia [10^{-5} kg·m^2]
MTV 65	220	4 + 0,0073 * Stroke [mm]	2,5 + 0,0051 * Stroke [mm]
MTV 80	290	8,2 + 0,0114 * Stroke [mm]	8,5 + 0,0127 * Stroke [mm]
MTV 110	330	17,3 + 0,0216 * Stroke [mm]	47,0 + 0,0690 * Stroke [mm]

Mass calculation doesn´t include mass of motor, reduction gear, switches and clamps.

MTV 065
Ball Screw Actuators – Dimensions



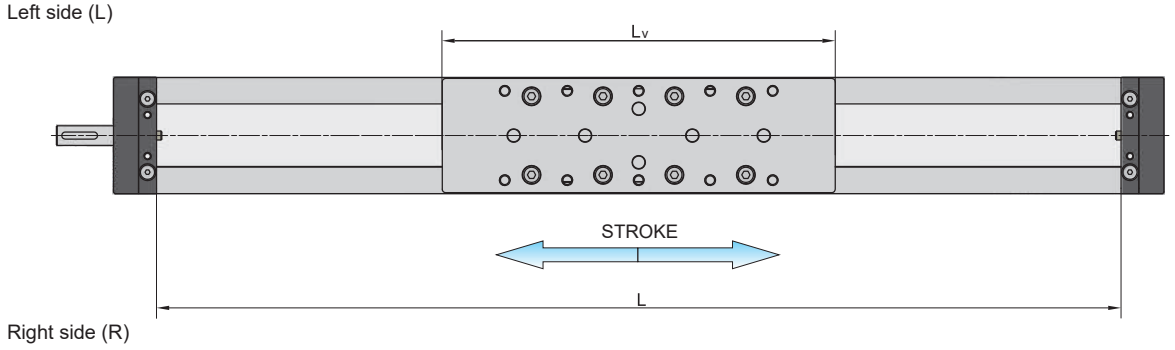
All dimensions in mm;
Drawings scales are not equal.

Defining of the linear module length

L* =Effective stroke + 2 × Safety stroke *+ Lv + 10 mm

Lv = 220 mm

L total = L + 48 mm



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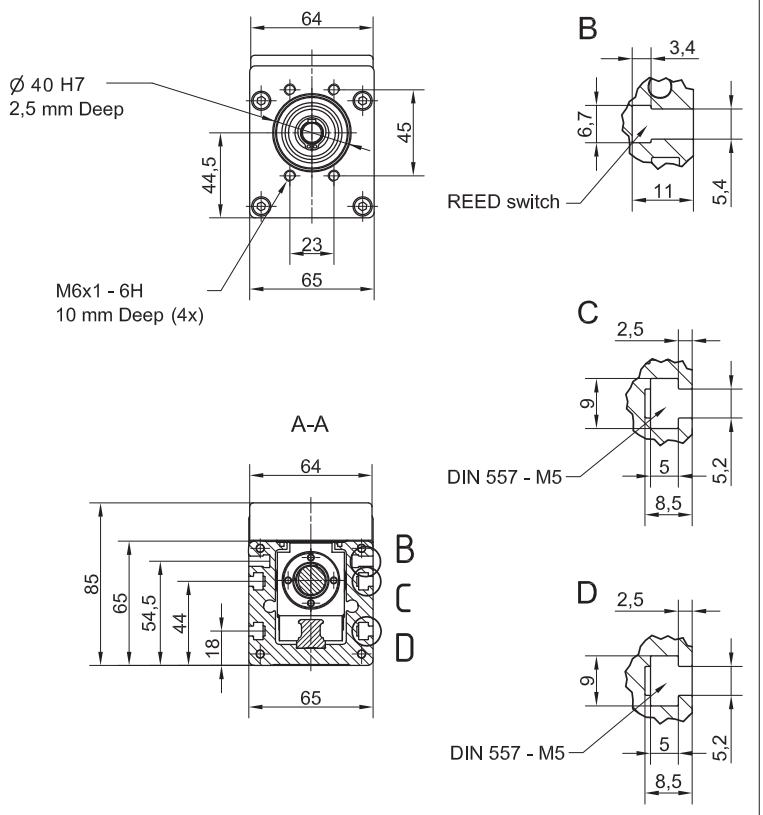
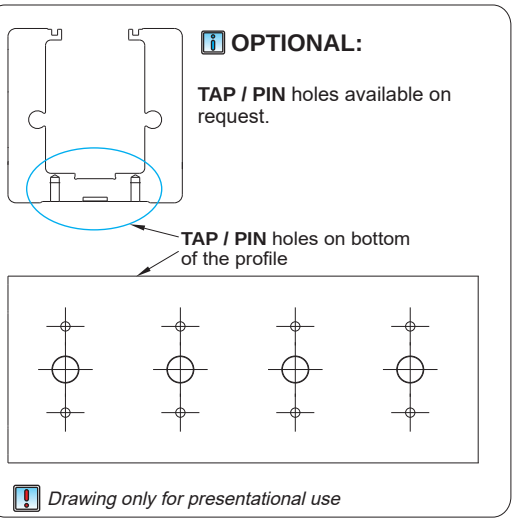
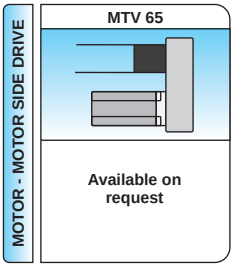
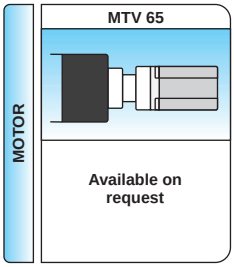
MTV 065
Ball Screw Actuators – Dimensions

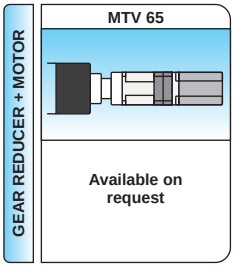


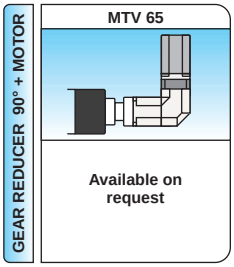
All dimensions in mm;
Drawings scales are not equal.

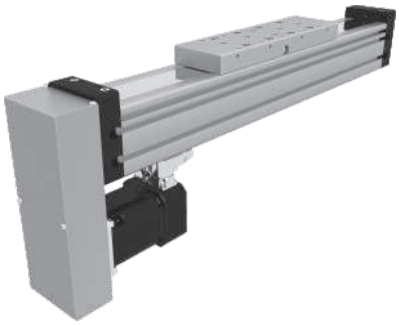










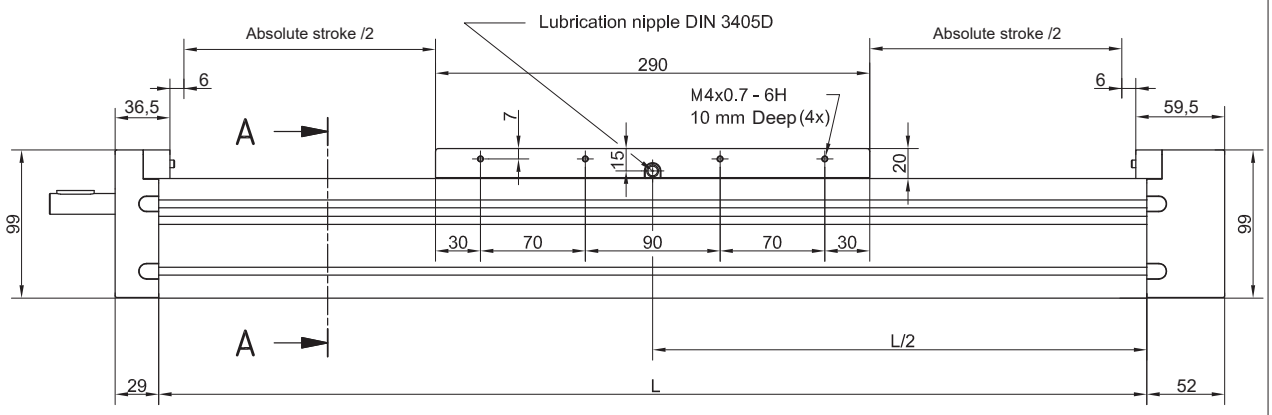


For more information on motor side drive (MSD) please see page 70

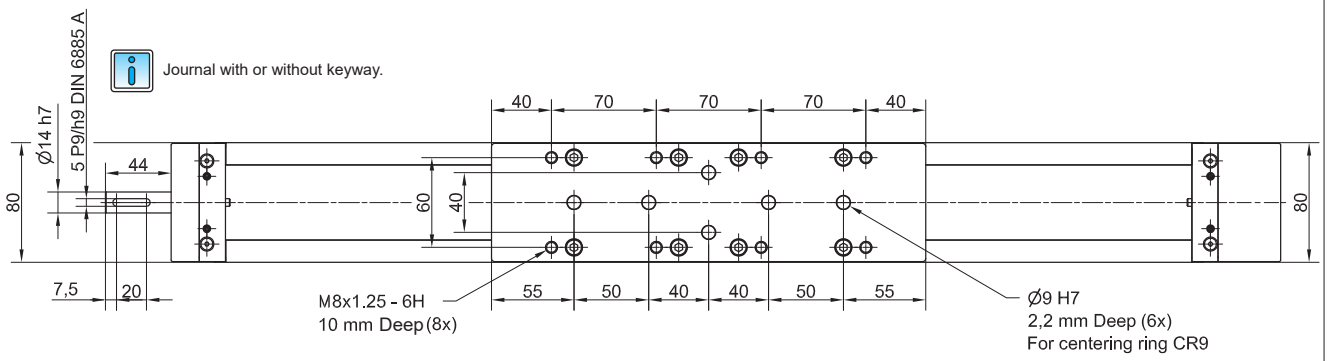
MTV 080
Ball Screw Actuators – Dimensions

Linear Unit doesn't include any safety stroke.

Absolute stroke = Effective stroke + 2 x Safety stroke



Journal with or without keyway.



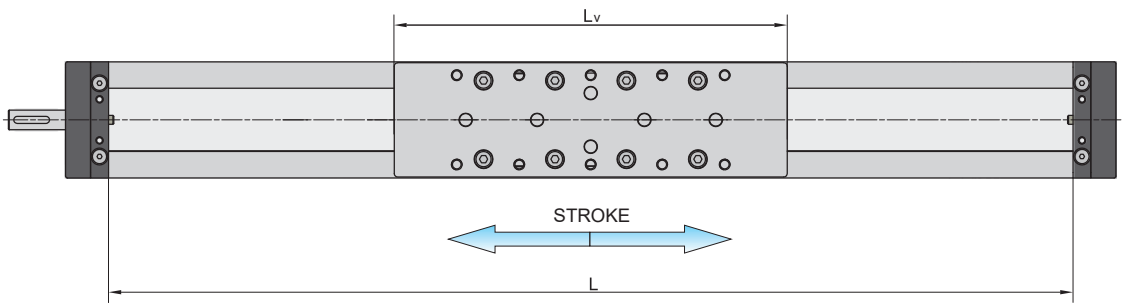
All dimensions in mm.;
Drawings scales are not equal.

Defining of the linear module length

L* = Effective stroke + 2 × Safety stroke + *Lv* + *27 mm

Lv* = *290 mm

L total* = *L* + *81 mm



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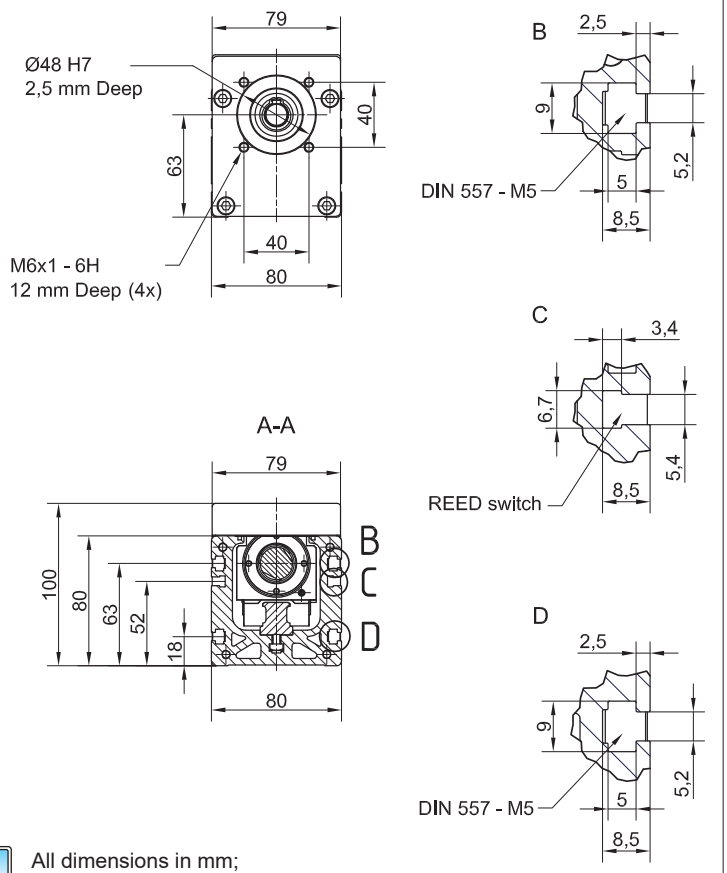
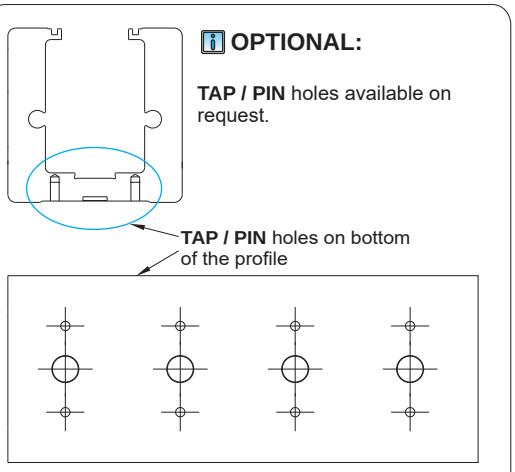
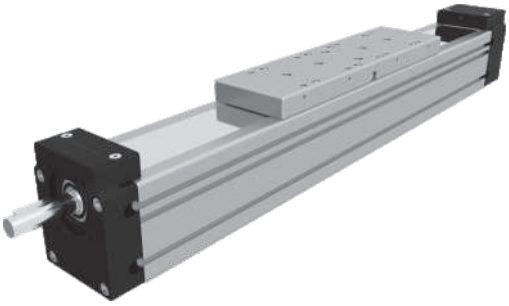
MTV 080
Ball Screw Actuators – Dimensions

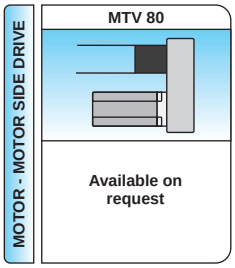


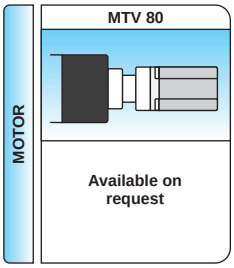
All dimensions in mm;
Drawings scales are not equal.

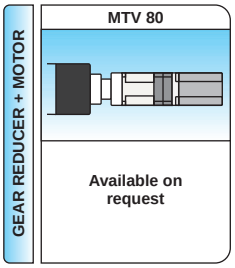


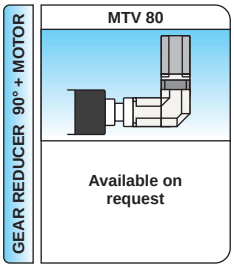
Drawing only for presentational use.

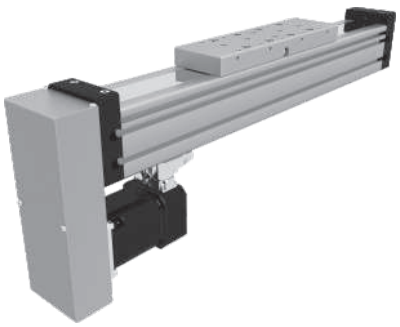










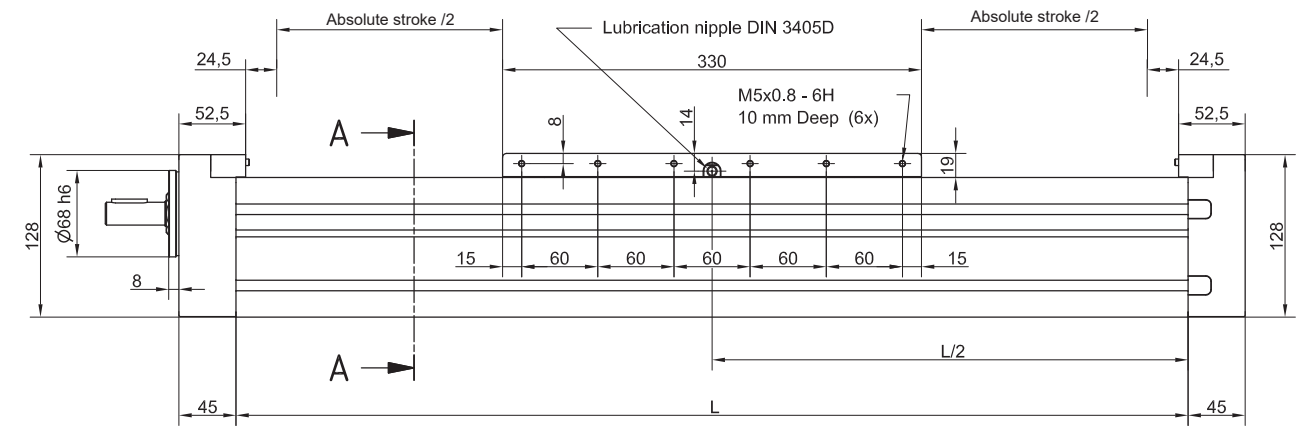


For more information on motor side drive (MSD) please see page 70

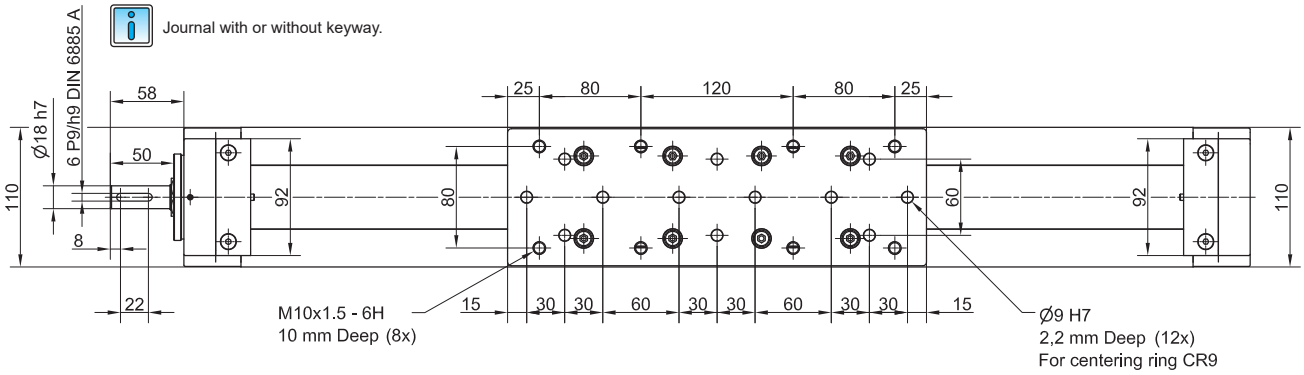
MTV 110
Ball Screw Actuators – Dimensions

Linear Unit doesn't include any safety stroke.

Absolute stroke = Effective stroke + 2 x Safety stroke



Journal with or without keyway.



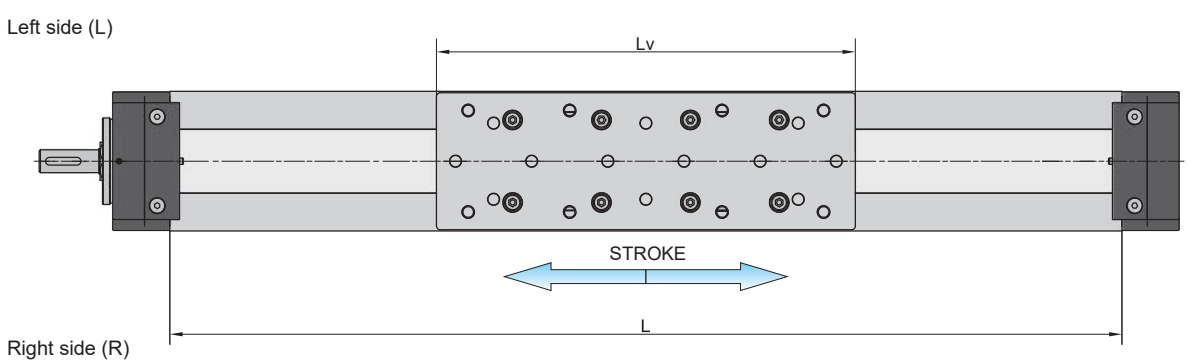
All dimensions in mm.;
Drawings scales are not equal.

Defining of the linear module length

L* =Effective stroke + 2 × Safety stroke *+ Lv + 64 mm

Lv = 330 mm

L total = L + 90 mm



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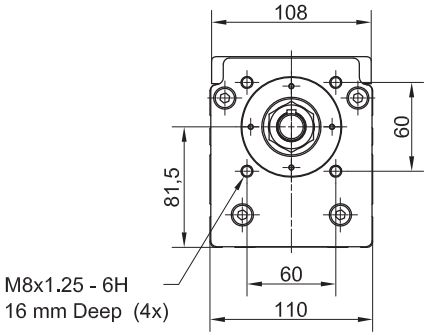
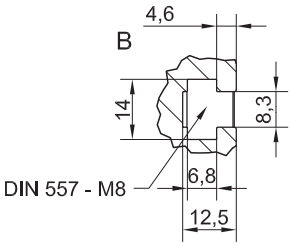
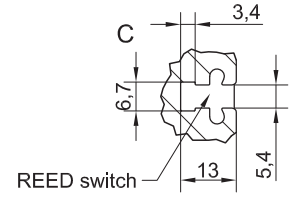
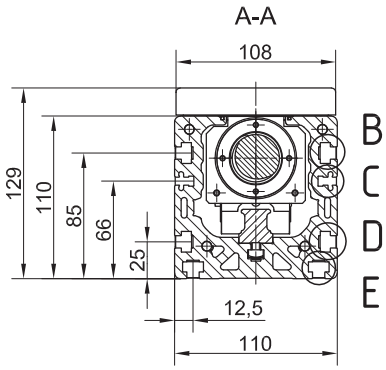
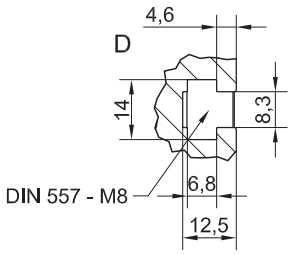
MTV 110
Ball Screw Actuators – Dimensions

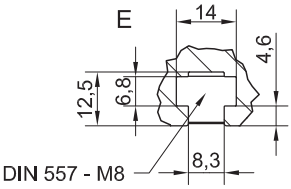




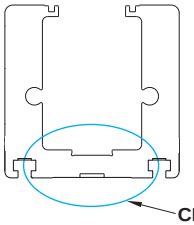








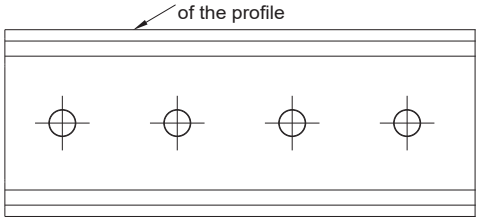
All dimensions in mm;
Drawings scales are not equal.



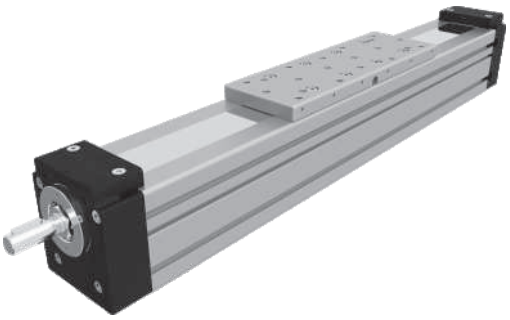
OPTIONAL:

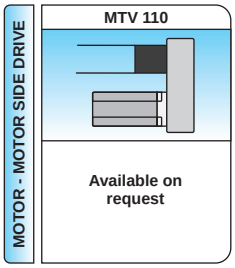
CENTER RING holes available on request.

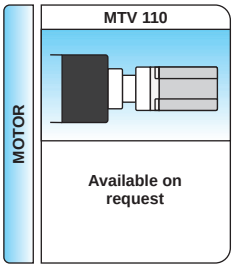
CENTER RING holes on bottom of the profile

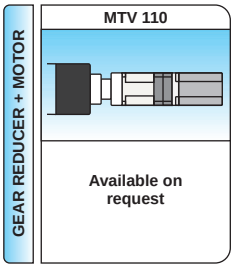


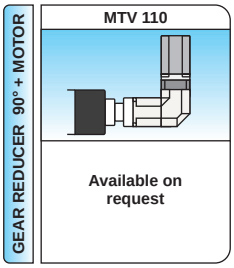
Drawing only for presentational use.

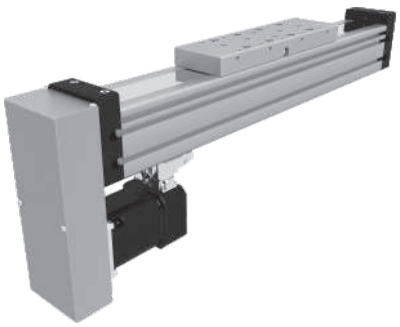












For more information on motor side drive (MSD) please see page 70

Notes

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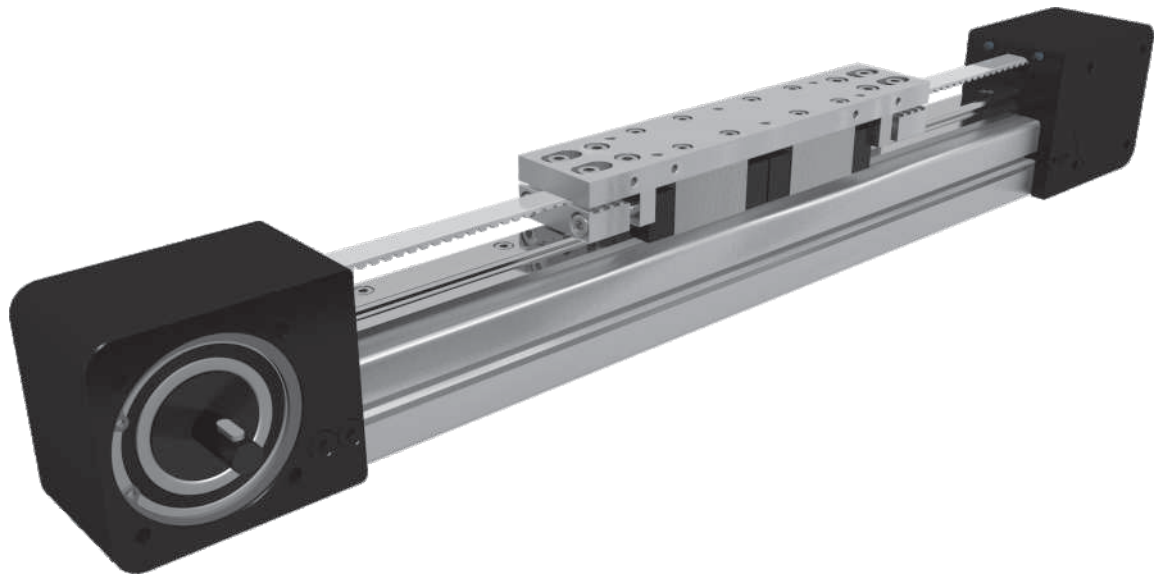
MTJ ECO Series
Economy Belt Driven Actuators

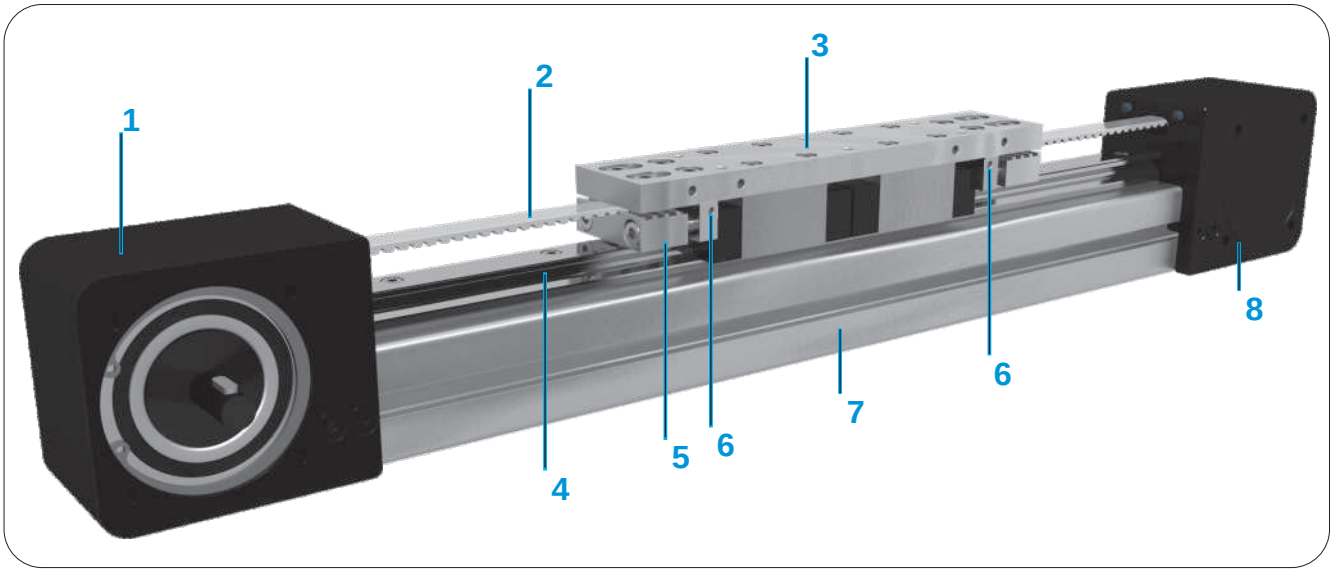
*The **MTJ ECO** series Linear Unit is a powerful and cost-effective Linear Unit with toothed belt drive and a Zero-backlash Ball rail guide system for easy and accurate linear movements.*
It can easily be combined to multi-axis systems.
Excellent price-/performance ratio and quick delivery time are ensured.
An extruded aluminum Profile from 6063 AL with on it mounted Zero-backlash Ball rail guide system, allows high load capacities and optimal cycles for the movement of larger masses at high speed.
The linear unit MTJ ECO uses a pre-tensioned steel reinforced AT polyurethane timing toothed belt. In conjunction with a Zero-backlash drive pulley high moments with alternating loads with good positioning accuracy, low wear and low noise can be realized.
The aluminum Profile includes T-slots for fixing the Linear Unit and for attaching sensors and switches .
Different carriage lengths of the Linear Unit allow the possibility to attach additional accessories on the side.
Lubrication holes on the carriage allow easy re-lubrication of the Ball rail guide .
For the linear unit MTJ ECO various adaptation options, for attaching (or redirecting), for Motors or Gearboxes are available.



The aluminium profiles are manufactured according to the medium EN 12020-2 standard

Straightness = 0,35 mm/m; Max. torsion = 0,35 mm/m; Angular torsion = 0,2 mm/40 mm; Parallelism = 0,2 mm

MTJ ECO Series
Economy Belt Actuators – Order Codes



1 - Drive block with pulley
2 - AT polyurethane toothed belt with steel tension cords
3 - Carriage
4 - Linear Ball Guideway
5 - Belt Tensioning system
6 - Lubrication port
7 - Aluminium profile-Hard anodized
8 - End block

HOW TO ORDER

MTJ - 40 - ECO - 1000 - L - 1 - R

Series :

MTJ

Size :

40

Type :

ECO

Absolute stroke (mm) :

(Absolute stroke = Effective stroke + 2 x Safety stroke)

Carriage Version :

S : Short

L : Long

Type of drive pulley :

0 : Pulley with through hole

1 : Pulley with journal

10 : Pulley with journal (without Keyway)

2 : Pulley with journal on both sides

20 : Pulley with journal on both sides (without Keyway)

3 : Without drive unit

Drive journal position :

L : Journal on left side

R : Journal on right side

Leave blank : For type of drive pulley 0, 2, 20 and 3

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MTJ ECO Series
Economy Belt Actuators – Performance

General technical data for MTJ ECO series

Linear Unit	Carriage length	Load capacity		Dynamic moment			Moved mass	Maximum Repeatability	*Maximum length	Planar moment of inertia	
	Lv [mm]	Dynamic C [N]	Static C0 [N]	Mx [Nm]	My [Nm]	Mz [Nm]	[kg]	[mm]	Lmax [mm]	Iy [cm⁴]	Iz [cm⁴]
MTJ 40 ECO S	132	9900	17500	79	59	59	0,45	± 0,1	5960	9,53	9,21
MTJ 40 ECO L	200	19800	35000	158	660	660	0,72	± 0,1			

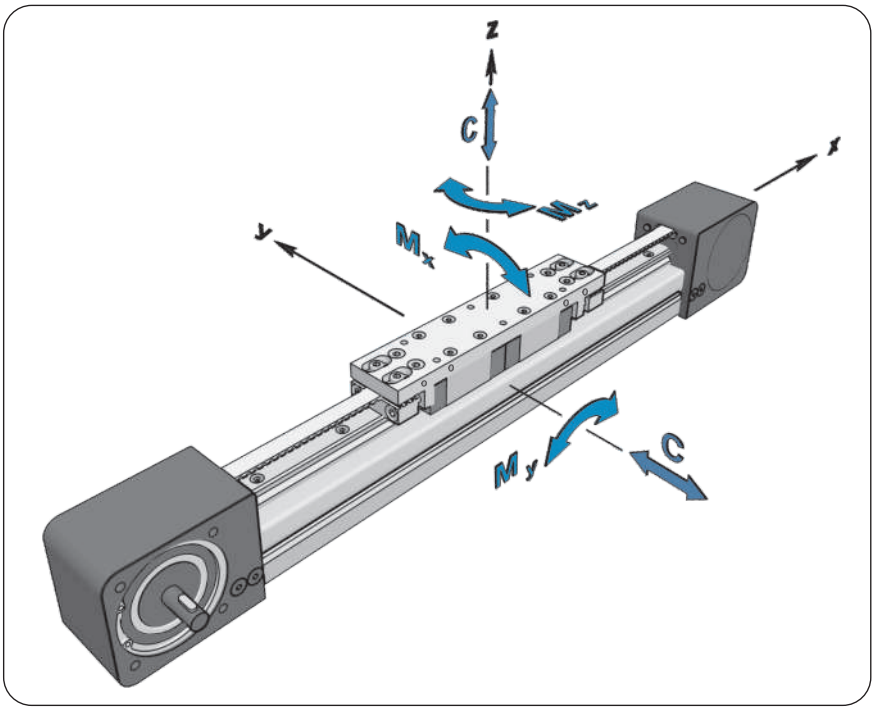
*For lengths over the stated value in the table above, please contact us.

Recommended values of loads

All the data of static and dynamic moments and load capacities stated in the upper table are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety. We recommend a minimum safety factor (fs =5.0)

Modulus of elasticity

E = 70000 N / mm^2



Drive and belt data

Linear Unit	Maximal travel speed	Maximum drive torque	*No load torque	Puley drive ratio	Pulley diameter	Belt type	Belt width	Max. force transmited by belt	Specific spring constant Cspec
	[m / s]	[Nm]	[Nm]	[mm / rev]	[mm]		[mm]	[N]	[N]
MTJ 40 ECO S	3	7,5	0,8	180	57,31	AT5	12	262	235000
MTJ 40 ECO L			0,9						

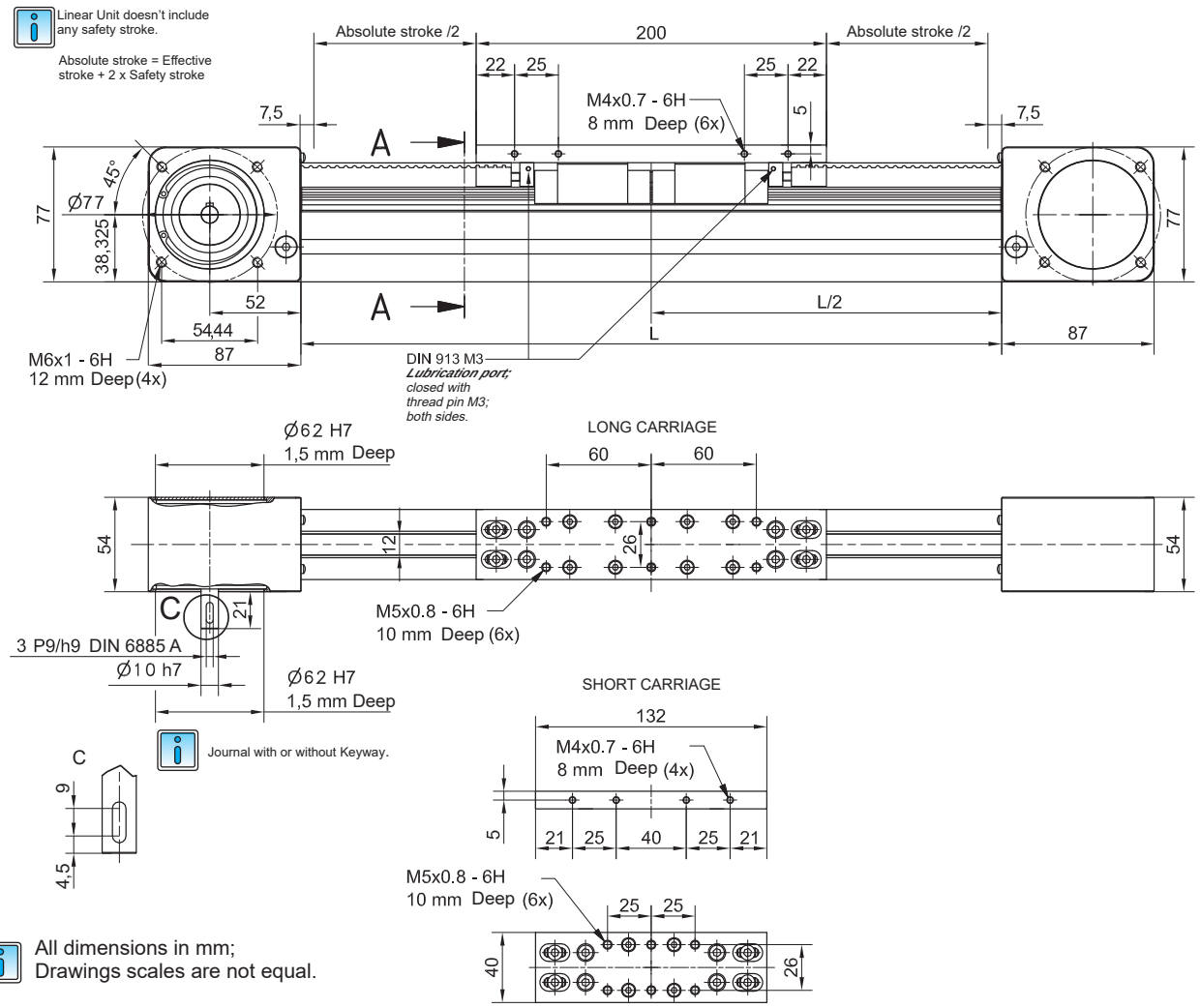
*The stated values are for strokes up to 500mm. No Load Torque value increases with stroke elongation

Mass and mass moment of inertia

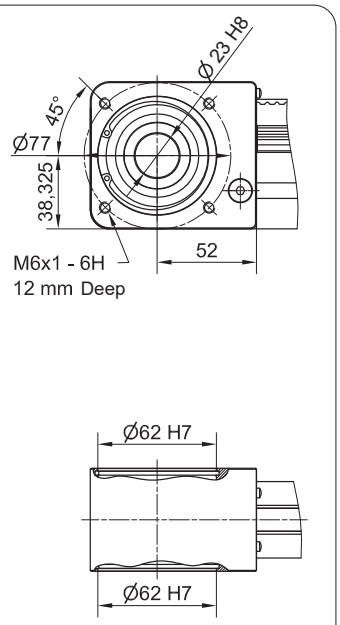
Linear Unit	Carriage length Lv [mm]	Mass of linear unit [kg]	Mass moment of inertia [10^{-5} kg·m^2]
MTJ 40 ECO S	132	3,1 + 0,003 * Stroke [mm]	70,1 + 0,007 * Stroke [mm]
MTJ 40 ECO L	200	3,55 + 0,003 * Stroke [mm]	92,3 + 0,007 * Stroke [mm]

Mass calculation doesn´t include mass of motor, reduction gear, switches and clamps.

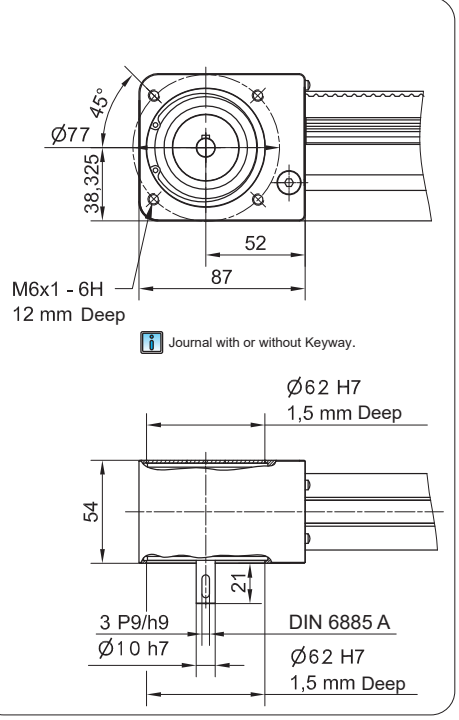
MTJ ECO 040
Economy Belt Actuators – Dimensions



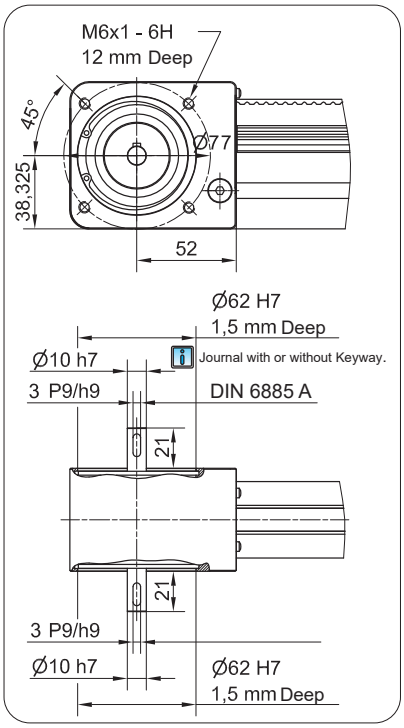
TYPE 0



TYPE 1 L and 1 R



TYPE 2



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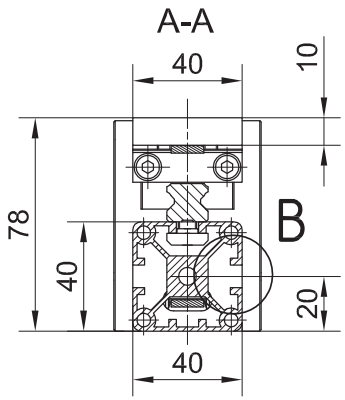
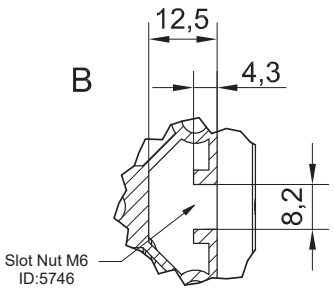
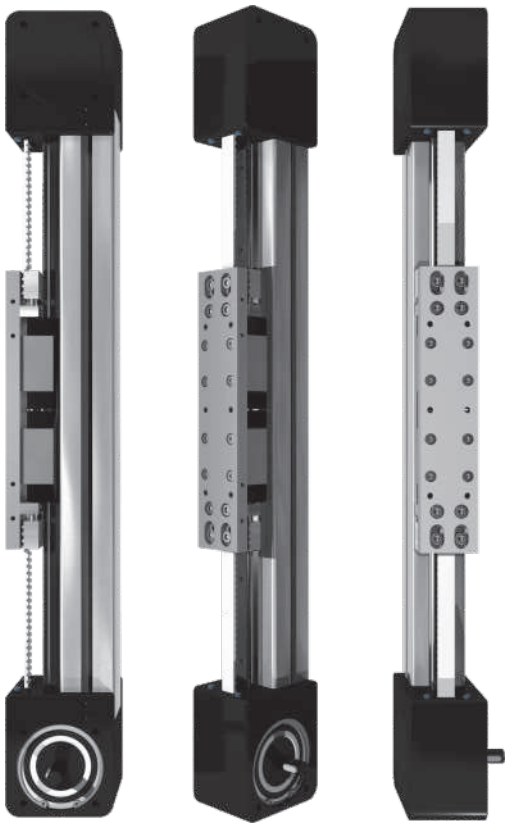
MTJ ECO 040
Economy Belt Actuators – Dimensions







All dimensions in mm;
Drawings scales are not equal.

MOTOR	GEAR REDUCER + MOTOR	GEAR REDUC. 90° + MOTOR
MTJ 40 ECO	MTJ 40 ECO	MTJ 40 ECO
Available on request	Available on request	Available on request

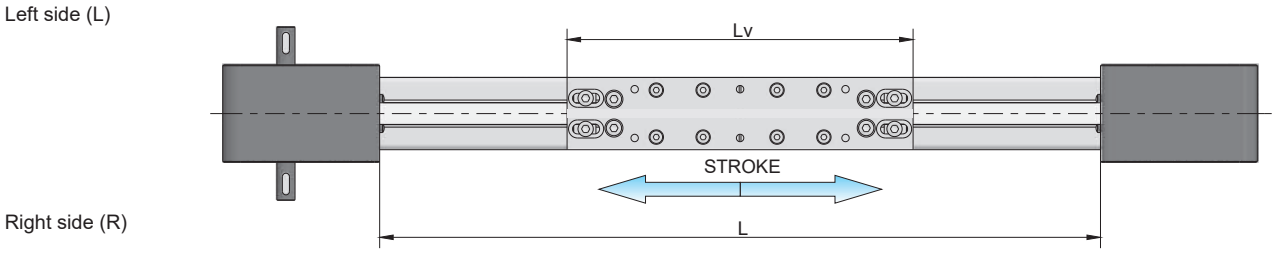
Defining of the linear module length

L* =Effective stroke + 2 × Safety stroke *+ Lv + 15 mm

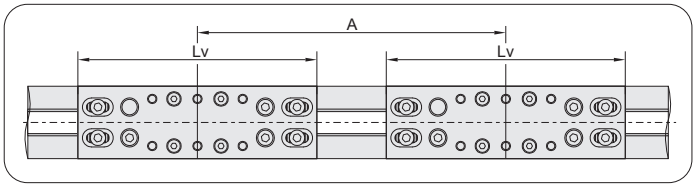
Ltotal = L + 174 mm

Lv - Long carriage = 200 mm

Lv - Short carriage = 132 mm



Double Carriage



For ordering code please contact us.

L = Effective stroke + 2 × Safety stroke + Lv + A + 15 mm

Ltotal = L + 174 mm

A ≥ Lv

Notes

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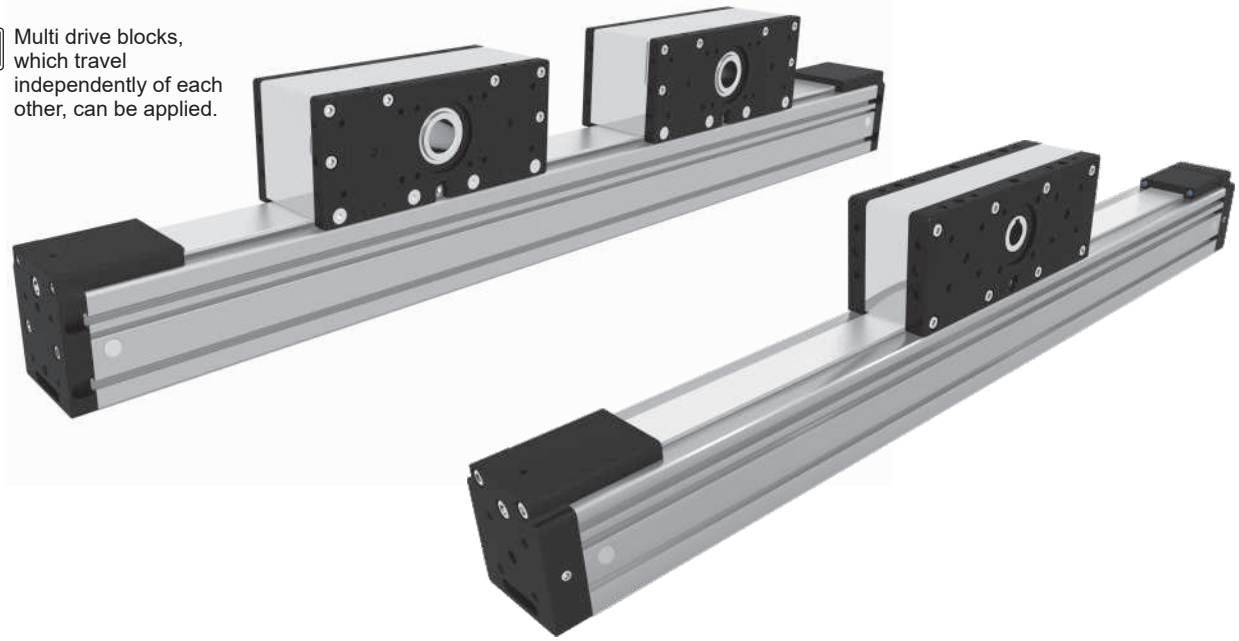
MTJZ Series
Z-Axis Belt Driven Actuators

*The **MTJZ** series contains Z-axis Linear Units with toothed belt drive , integrated Ball rail system and compact dimensions. This Linear Units provide high performance features such as, high speed, good accuracy and repeatability by vertical applications.*
They can easily be combined to multi-axis systems.
Excellent price-/performance ratio and quick delivery time are ensured.
The compact, precision-extruded aluminum Profile from 6063 AL with integrated Zero-backlash Ball rail guide system, allows high load capacities and optimal cycles for the movement of larger masses at high speed.
In the linear units MTJZ is used a pre-tensioned steel reinforced AT polyurethane timing toothed belt. In conjunction with a Zero-backlash drive pulley high moments with alternating loads with good positioning accuracy, low wear and low noise can be realized.
The in the Profile slot driving Polyurethane timing belt protects all the parts in the Profile from dust and other contaminations
The aluminum Profile includes T-slots for attaching sensors and switches. Also, a Reed switch can be used here.
The drive block provides the possibility to attach a Motor or Gearbox housing and additional accessories on it.
Central lubrication port on the drive block allows easy re-lubrication of the Ball rail guide.
For the linear units MTJZ various adaptation options, for attaching (or redirecting), for Motors or Gearboxes are available.

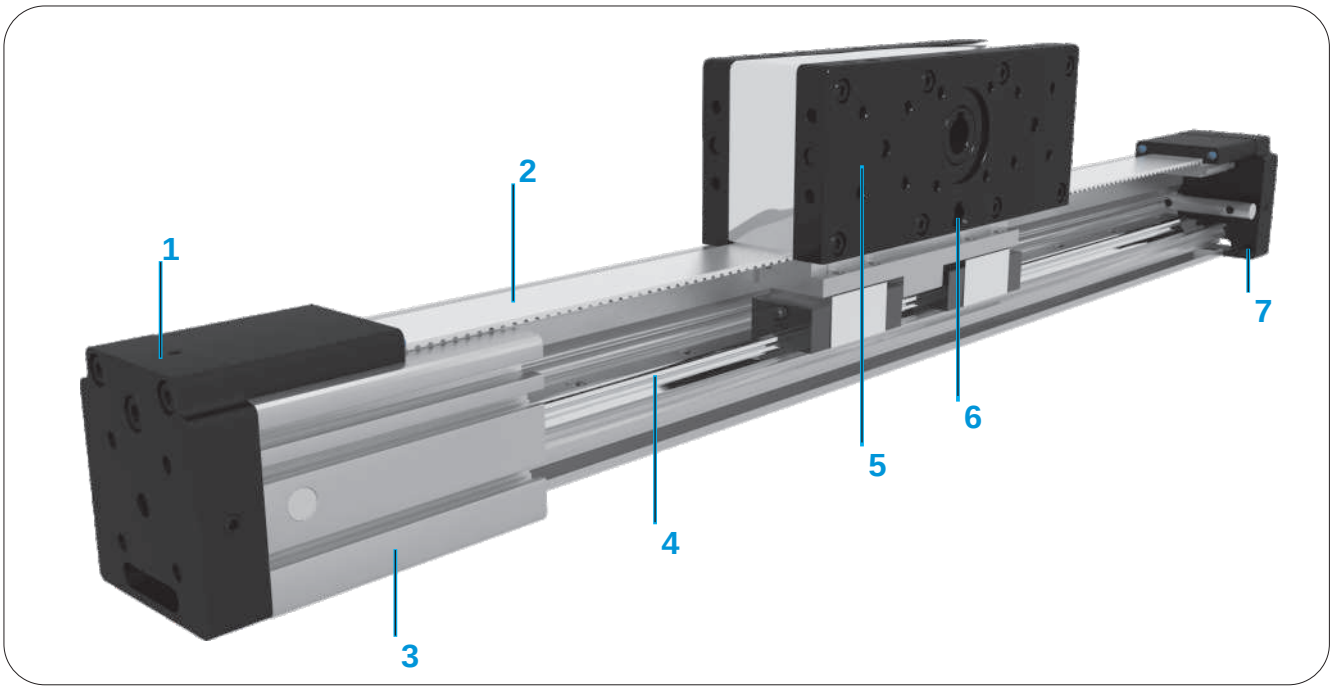
Multi drive blocks, which travel independently of each other, can be applied.



The aluminium profiles are manufactured according to the medium EN 12020-2 standard

Straightness = 0,35 mm/m; Max. torsion = 0,35 mm/m; Angular torsion = 0,2 mm/40 mm; Parallelism = 0,2 mm

MTJZ Series
Z-Axis Belt Actuators – Order Codes



1 - Tension End with integrated belt tensionin system
2 - AT polyurethane toothed belt with steel tension cords.
3 - Aluminium profile-Hard anodized
4 - Linear Ball Guideway
5 - Drive block with pulley, Motor flange; with built in Magnets
6 - Central lubrication port; both sides
7 - Tension End with integrated belt tensioning system

HOW TO ORDER

MTJZ - 65 - 1000 - 1 - 0 - 1

Series :

MTJZ

Size :

40

65

80

110

Absolute Stroke (mm) :
(Absolute stroke = Effective stroke + 2 x Safety stroke)

Type of drive pulley :

0 : Pulley with through hole

1 : Pulley with journal

10 : Pulley with journal (without Keyway)

2 : Pulley with journal on both sides

20 : Pulley with journal on both sides (without Keyway)

MTJZ 110 only available with drive pulley with through hole

Clamping element :

0 : Without

1 : With (available only for MTJZ 110)

Number of drive blocks :

The stated number specifies the number of drive blocks on one Linear unit

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MTJZ Series
Z-Axis Belt Actuators – Performance

General technical data for MTJZ series

Linear Unit	Drive block length	Load capacity		Dynamic moment			Mass of drive block	Maximum Repeatability	* Maximum length **(Version 1)	* Maximum length **(Version 2)	Planar moment of inertia	
	Lv [mm]	Dynamic C [N]	Static C0 [N]	Mx [Nm]	My [Nm]	Mz [Nm]	[kg]	[mm]	Lmax [mm]	Lmax [mm]	Iy [cm⁴]	Iz [cm⁴]
MTJZ 40	120	4610	6930	28	120	120	0,95	± 0,08	1000	3000	9,8	11,6
MTJZ 65	200	19800	35000	158	1025	1025	3,2	± 0,08	1200	6000	59,7	74,4
MTJZ 80	250	34200	60000	370	2565	2565	4,9	± 0,08	1500	6000	129,1	173,4
MTJZ 110	300	49600	85000	630	3470	3470	11,3	± 0,08	1800	6000	513,0	620,0

*For lengths over the stated value in the table above please contact us.

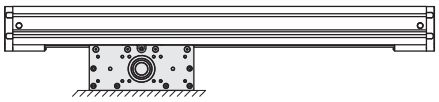
Recommended values of loads

All the data of static and dynamic moments and load capacities stated in the upper table are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety. We recommend a minimum safety factor (fs =5.0)

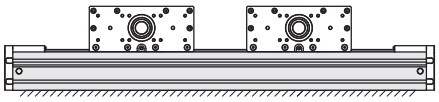
Modulus of elasticity: E = 70000 N / mm²

** Mounting versions

Version 1: Mounting by the drive block, profile travels

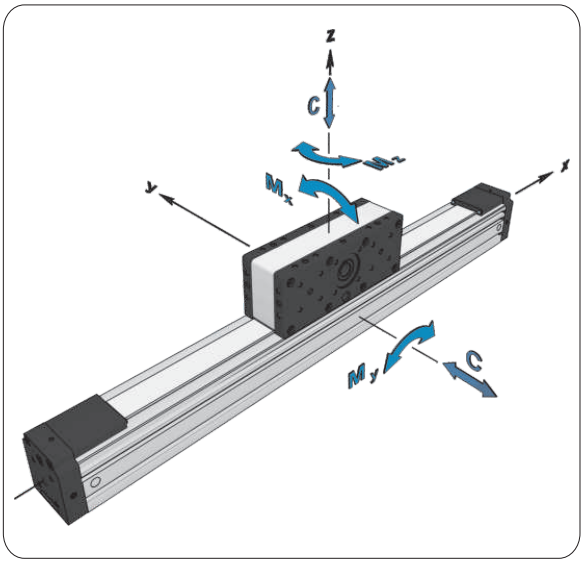


Version 2: Mounting by the profile, drive block travels



Multi drive blocks, which travel independently of each other, can be applied.

On request!



Drive and belt data

Linear Unit	Maximum travel speed	Maximum drive torque	Puley drive ratio	Pulley diameter	Belt type	Belt width	Max. force transmited by belt	Specific spring constant Cspec
	[m / s]	[Nm]	[mm / rev]	[mm]		[mm]	[N]	[N]
MTJZ 40	5	3,6	99	31,51	AT3	20	230	225000
MTJZ 65	5	13,1	165	52,52	AT5	32	500	600000
MTJZ 80	5	29,4	210	66,84	AT5	50	880	960000
MTJZ 110	5	110,0	300	95,49	AT10	70	2300	2450000

Mass and mass moment of inertia

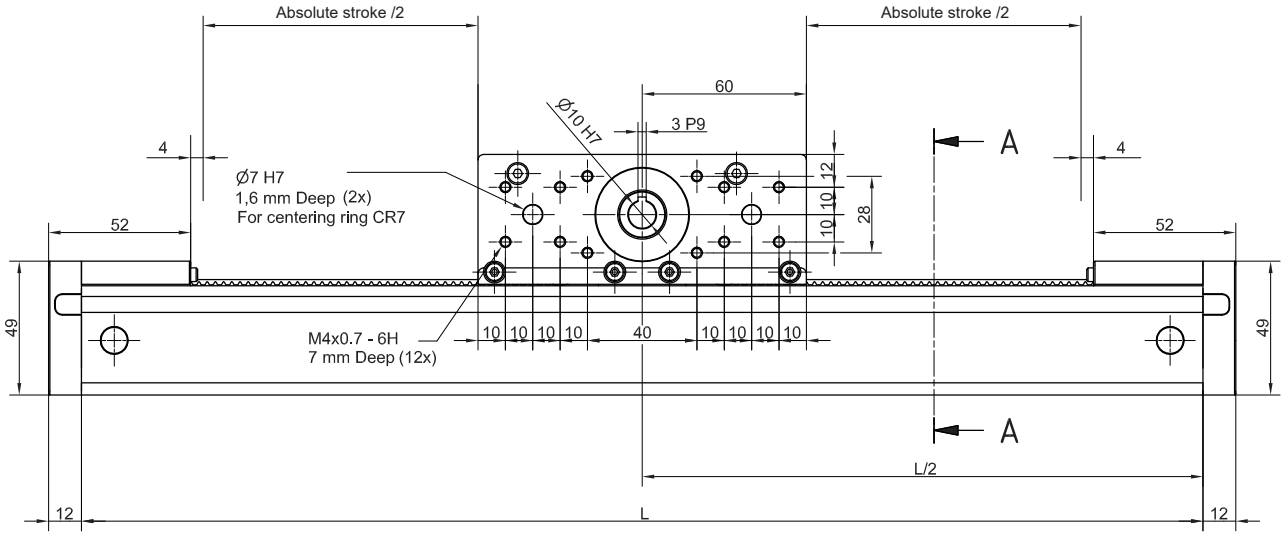
Linear Unit	Mass of linear unit	Mass moment of inertia of drive block
	[kg]	[10^{-4} kg·m²]
MTJZ 40	1,7 + 0,0023 * Stroke [mm]	2,3 + 0,0058 * Stroke [mm]
MTJZ 65	5,7 + 0,0054 * Stroke [mm]	18,9 + 0,0374 * Stroke [mm]
MTJZ 80	9,7 + 0,0083 * Stroke [mm]	60,5 + 0,0922 * Stroke [mm]
MTJZ 110	21,7 + 0,0147 * Stroke [mm]	273,0 + 0,3358 * Stroke [mm]

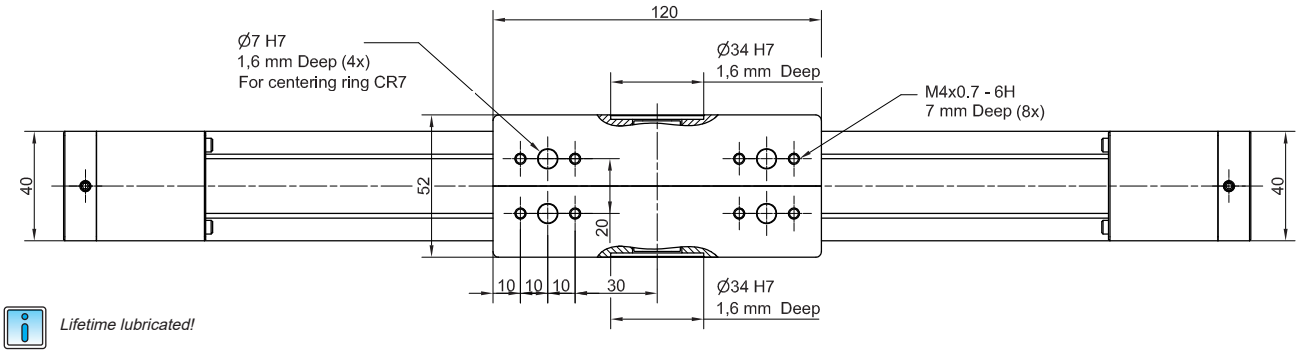
Mass calculation doesn´t include mass of motor, reduction gear, switches and clamps.

MTJZ 040
Z-Axis Belt Actuators – Dimensions

Linear Unit doesn't include any safety stroke.

Absolute stroke = Effective stroke + 2 x Safety stroke

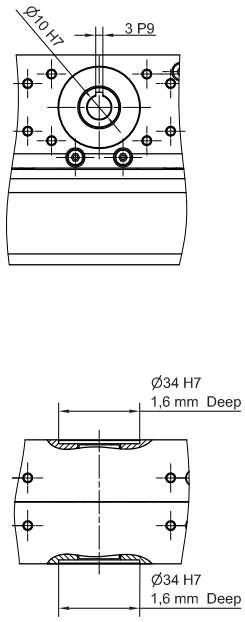




Lifetime lubricated!

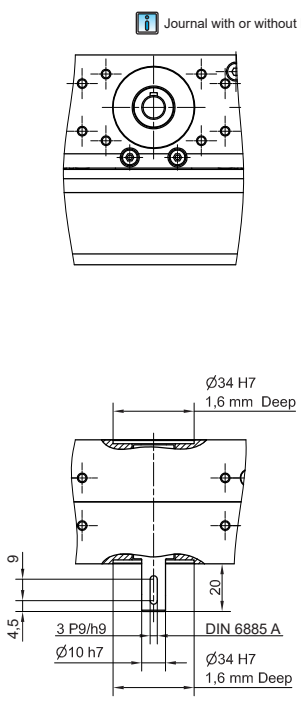
All dimensions in mm; Drawings scales are not equal.

TYPE 0



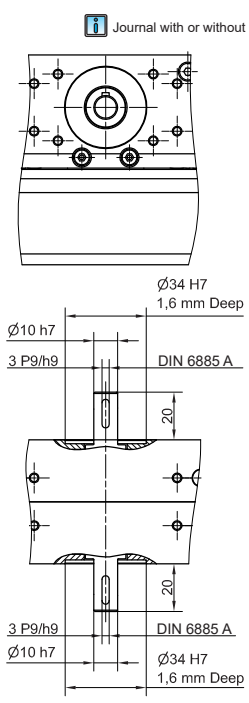
TYPE 1

Journal with or without Keyway.



TYPE 2

Journal with or without Keyway.



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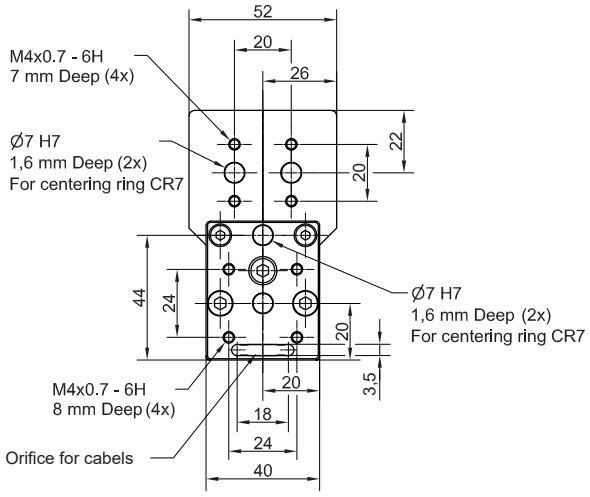
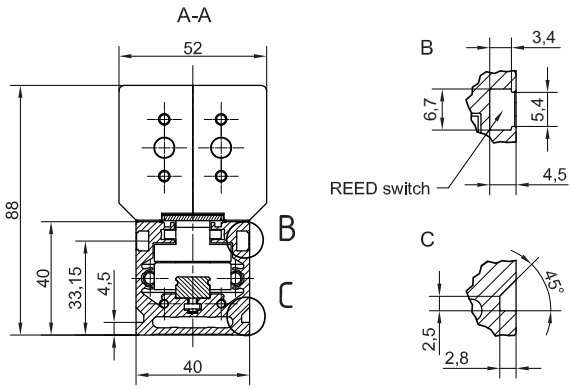
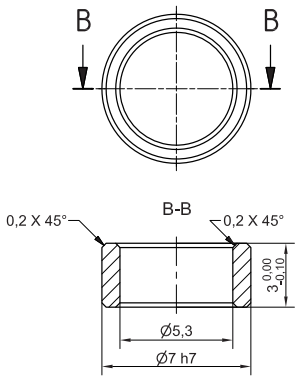
MTJZ 040
Z-Axis Belt Actuators – Dimensions

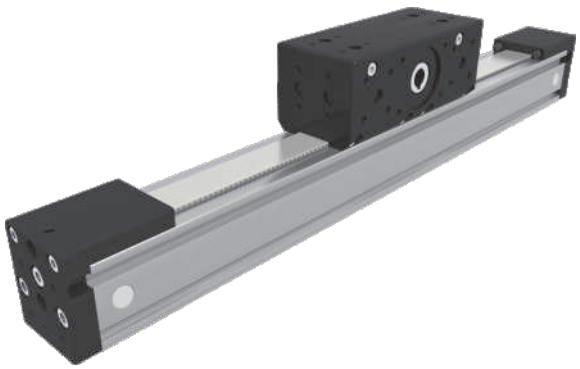




All dimensions in mm; Drawings scales are not equal.

CENTERING RING CR7
Material: 1.4305 (AISI303)

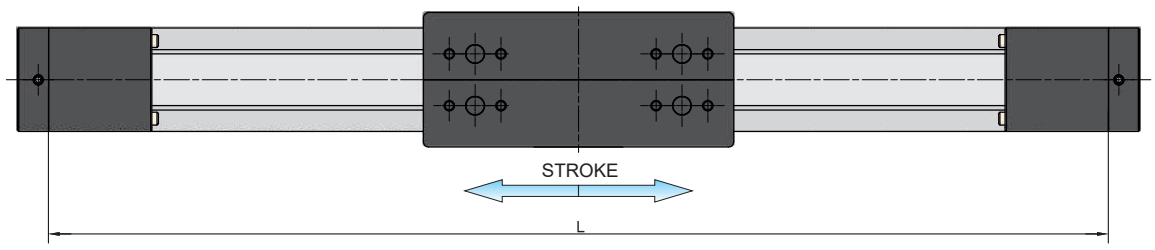


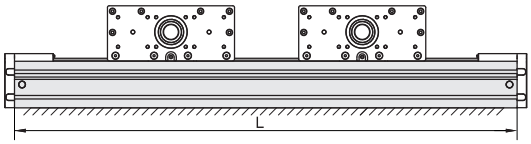


Defining of the linear module length

L = Effective stroke + 2 × Safety stroke + 208 mm

Ltotal = L + 24 mm





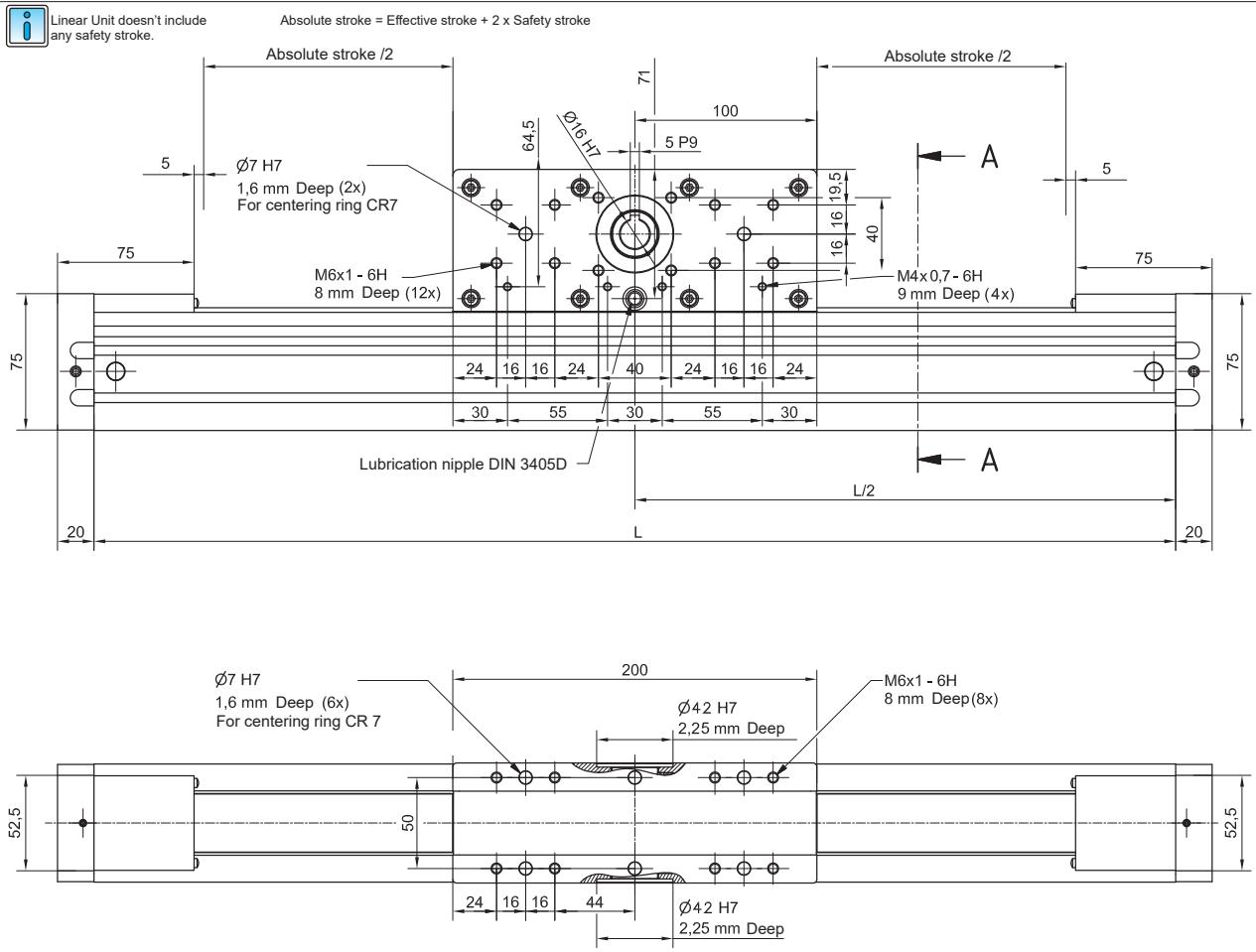
Multi drive block

L = Effective stroke + 2 × Safety stroke + 120 × n_b + 88 mm

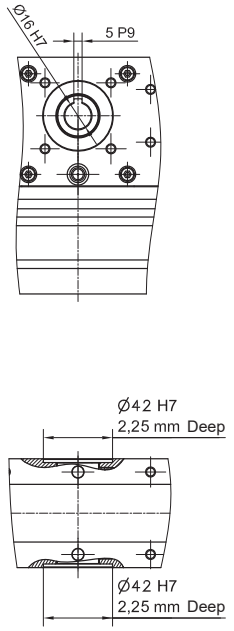
n_b - number of drive blocks

Ltotal = L + 24 mm

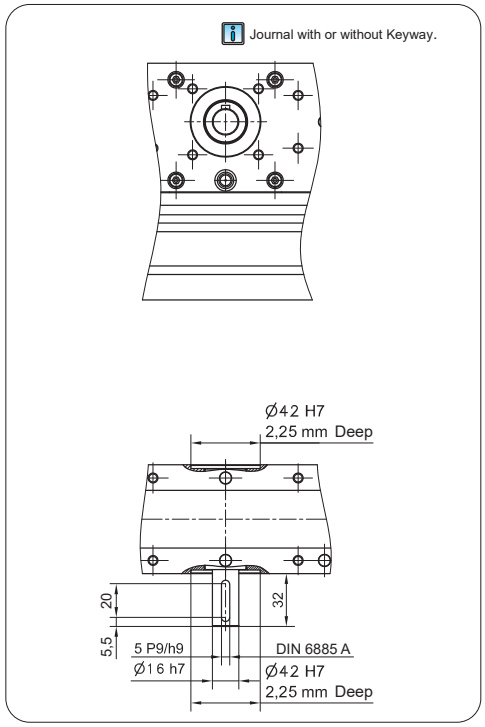
MTJZ 065
Z-Axis Belt Actuators – Dimensions



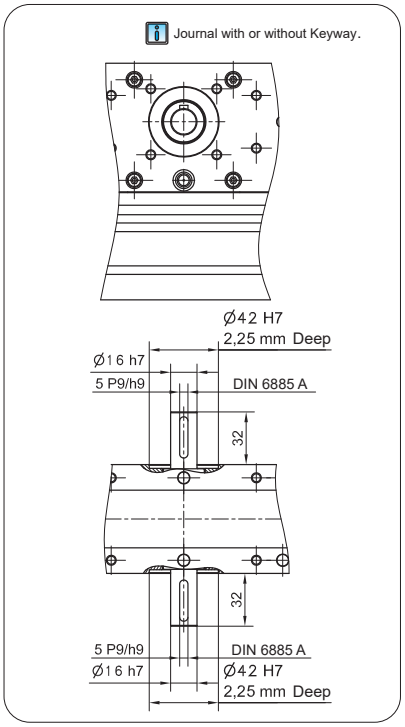
TYPE 0



TYPE 1



TYPE 2



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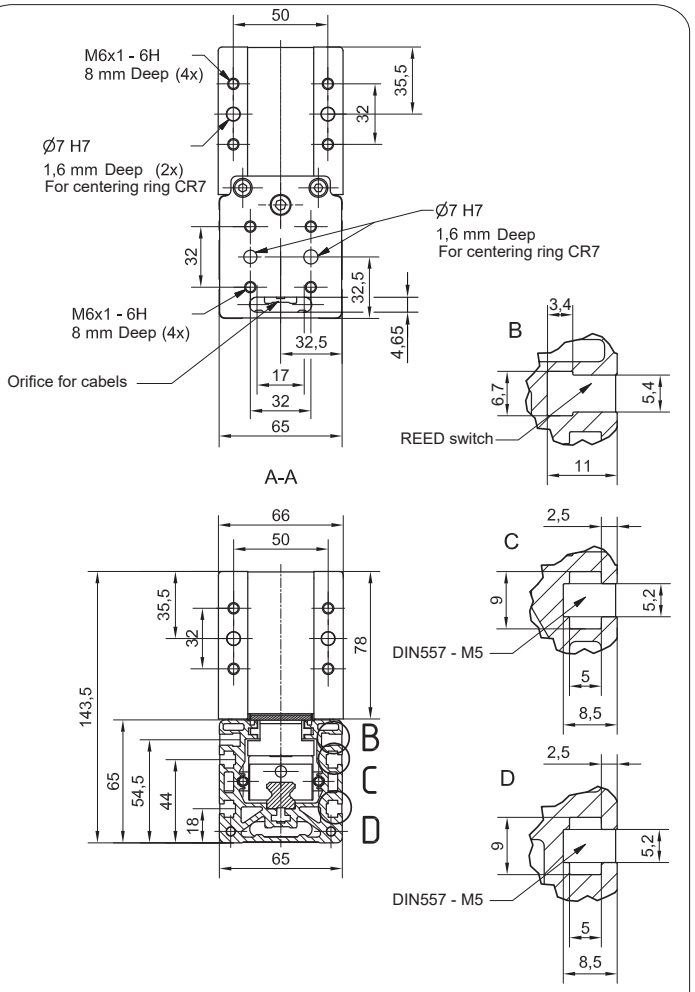
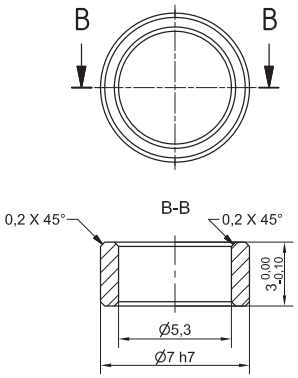
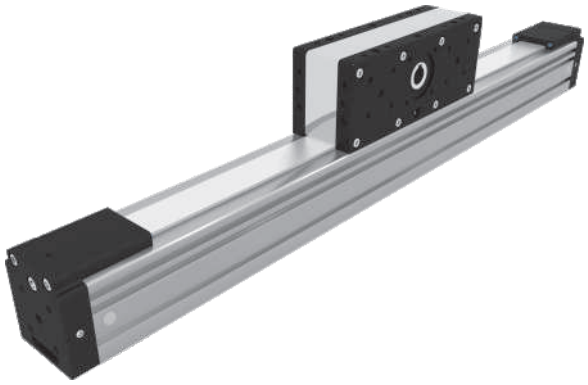
MTJZ 065
Z-Axis Belt Actuators – Dimensions



All dimensions in mm; Drawings scales are not equal.

CENTERING RING CR7
Material: 1.4305 (AISI303)

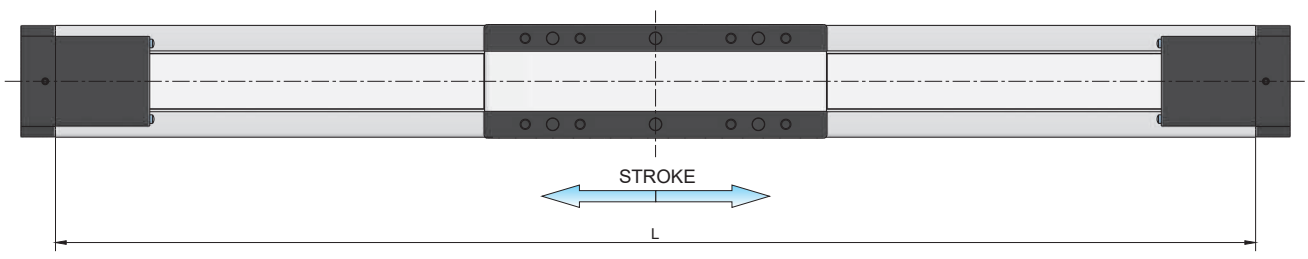




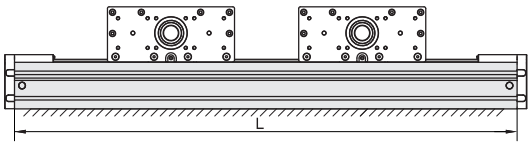
Defining of the linear module length

L = Effective stroke + 2 × Safety stroke + 320 mm

Ltotal = L + 40 mm



Multi drive block

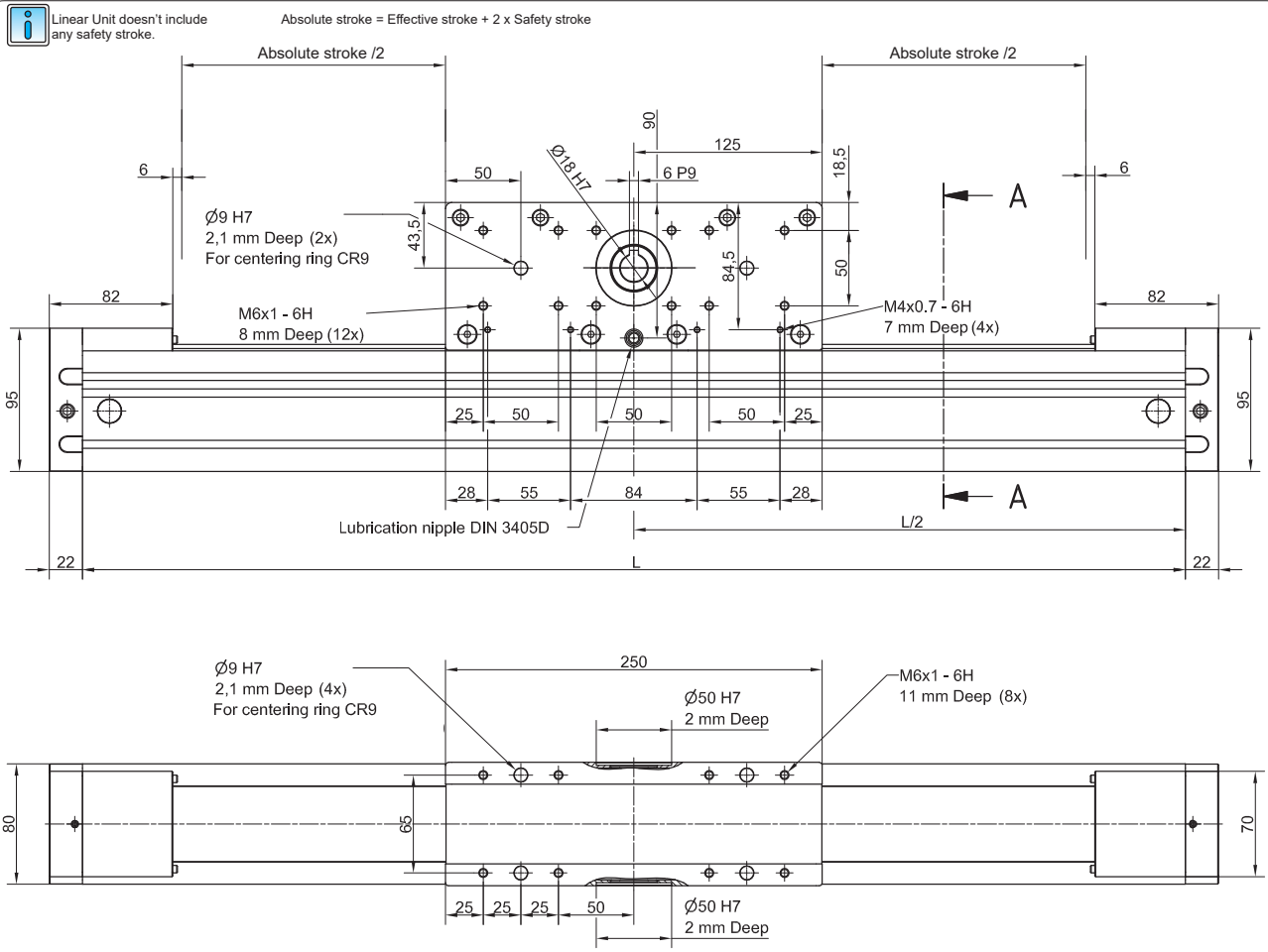


L = Effective stroke + 2 × Safety stroke + 200 × n_b + 120 mm

n_b - number of drive blocks

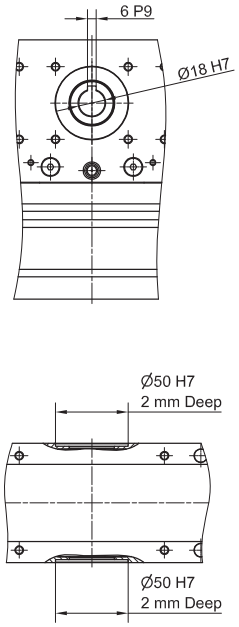
Ltotal = L + 40 mm

MTJZ 080
Z-Axis Belt Actuators – Dimensions

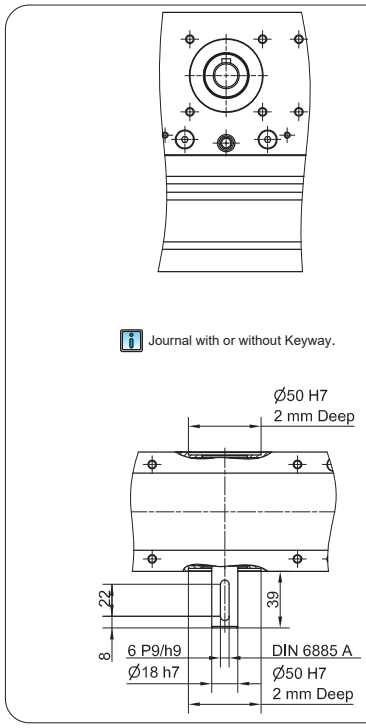


All dimensions in mm; Drawings scales are not equal.

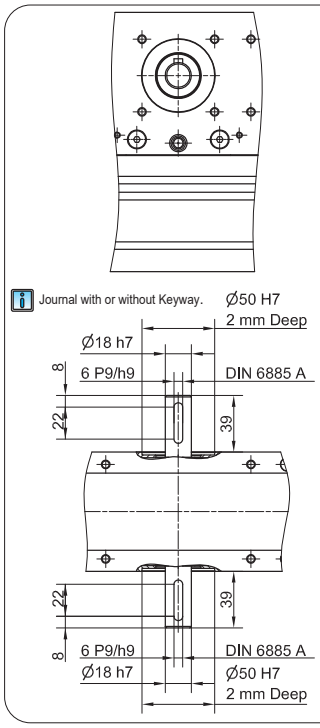
TYPE 0



TYPE 1



TYPE 2



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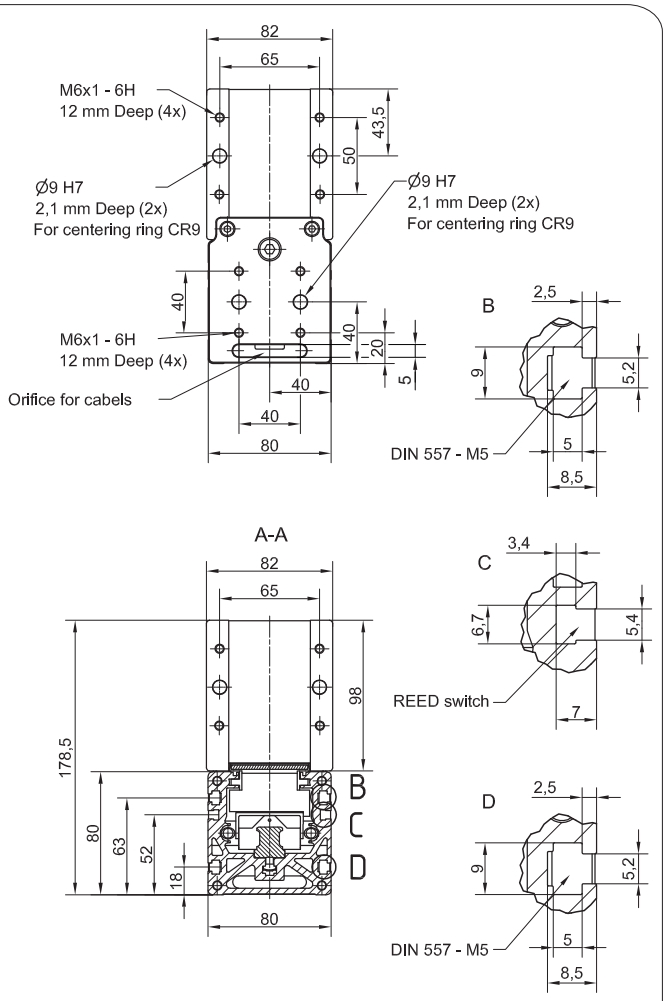
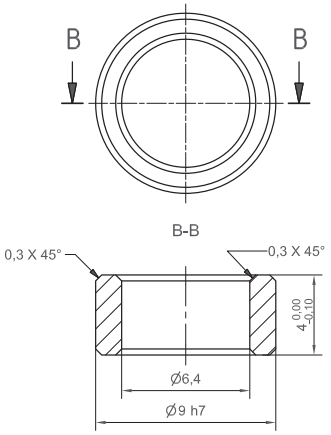
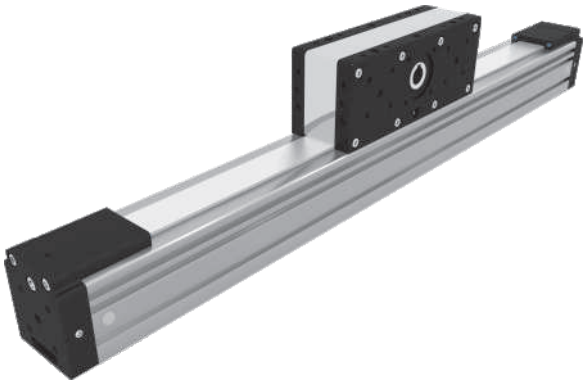
MTJZ 080
Z-Axis Belt Actuators – Dimensions



All dimensions in mm; Drawings scales are not equal.

CENTERING RING CR9
Material: 1.4305 (AISI303)

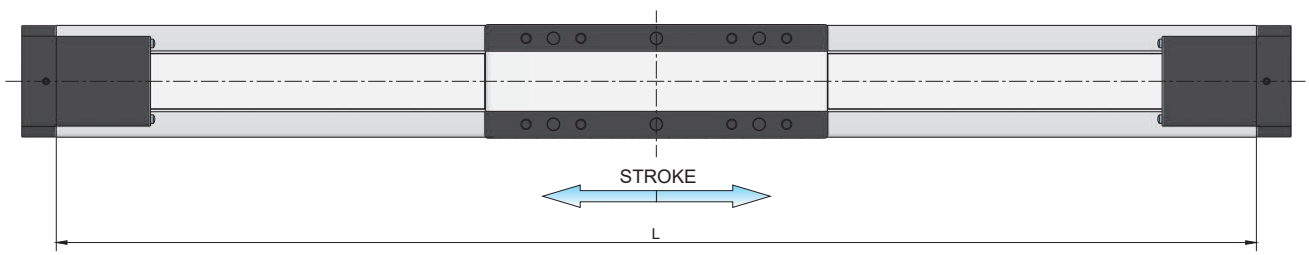




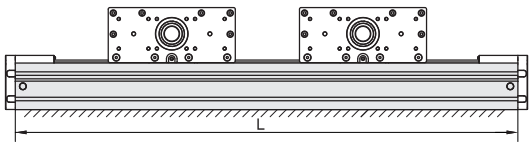
Defining of the linear module length

L = Effective stroke + 2 × Safety stroke + 382 mm

Ltotal = L + 44 mm



Multi drive block

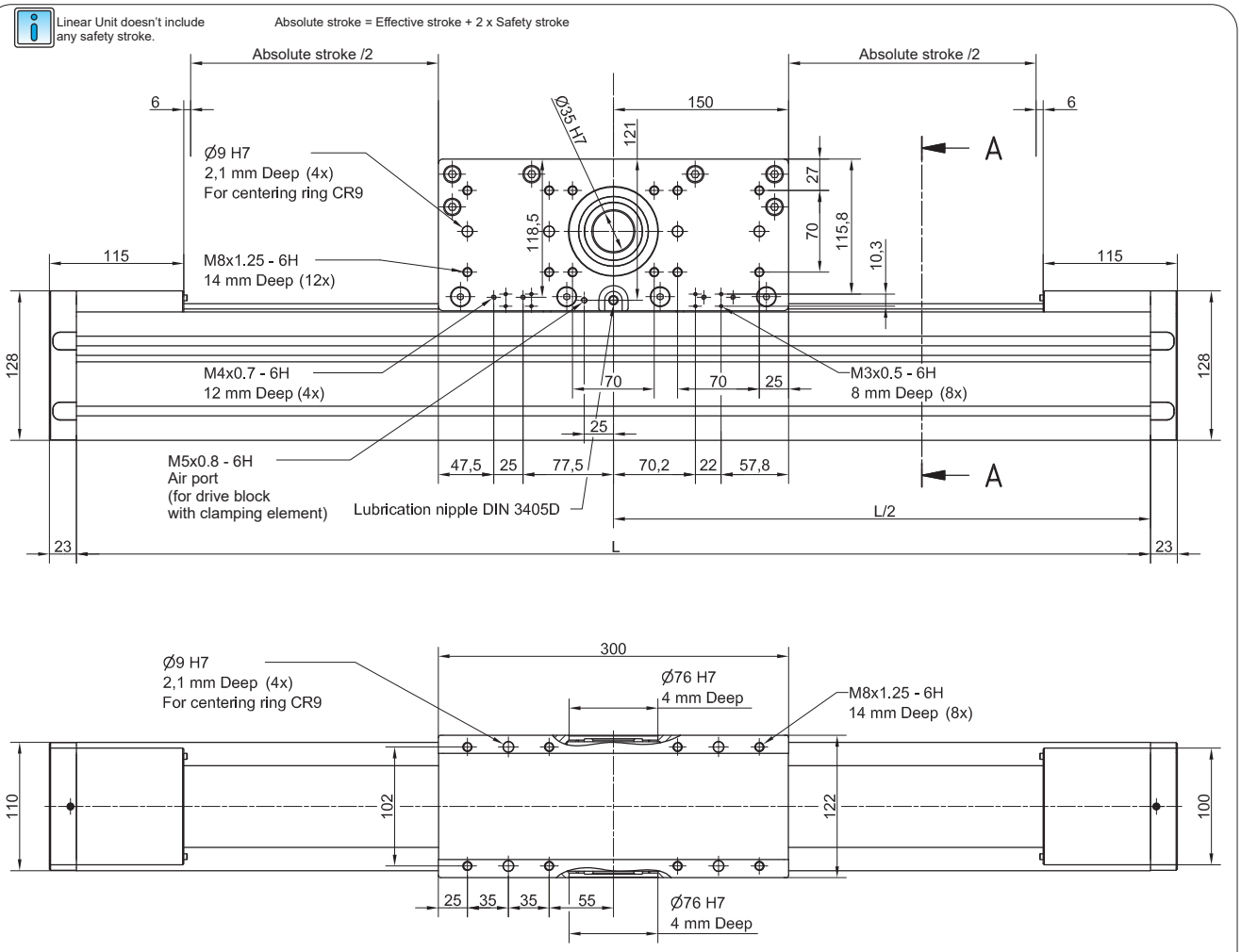


L = Effective stroke + 2 × Safety stroke + 250 × n_b + 132 mm

n_b - number of drive blocks

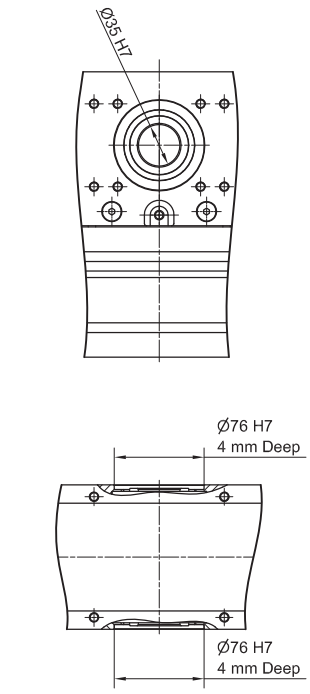
Ltotal = L + 44 mm

MTJZ 110
Z-Axis Belt Actuators – Dimensions



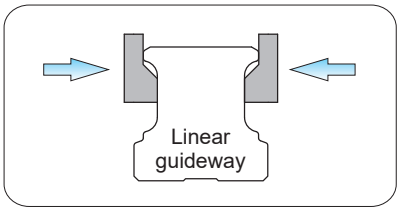
All dimensions in mm; Drawings scales are not equal.

TYPE 0



Drive block with clamping element

Clamping by spring-loaded energy

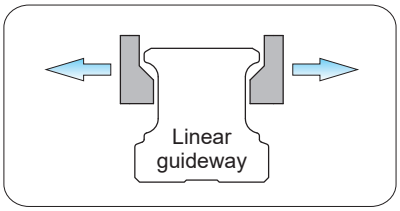


Air pressure = 0 bar

Holding force = 1400 N

Holding force is tested on clamping element using a slightly lubricated rail (ISO VG 68).

Opened by air pressure



Opening air pressure = 5,5 - 8 bar

The air pressure opens clamping pistons. Free movement is allowed.

Purified and oiled air shall be used (according to ISO 8573-1 Class 4). Recommended filter size is 25 µm.

Linear Unit	Mass of drive block [kg]	Mass of linear unit [kg]
MTJZ 110	12,9	23,3 + 0,0147 * Stroke [mm]

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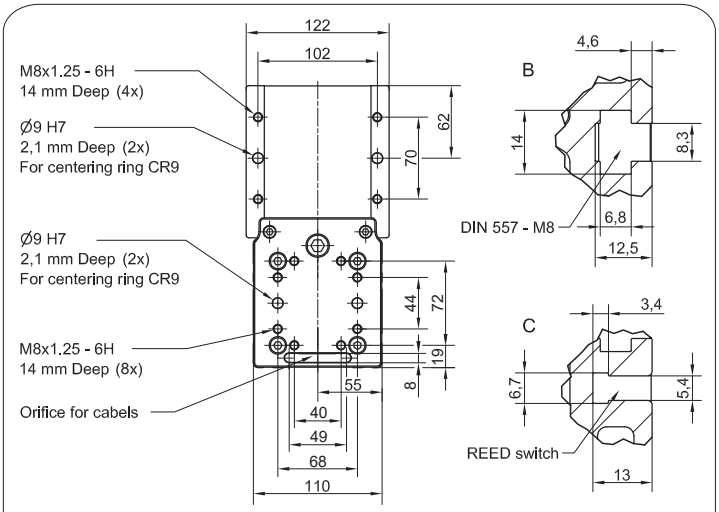
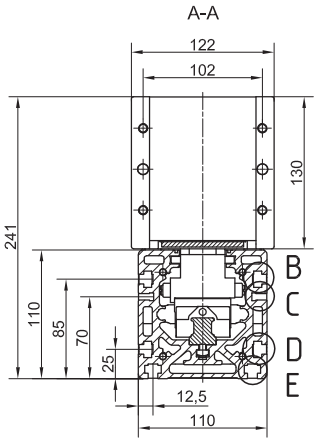
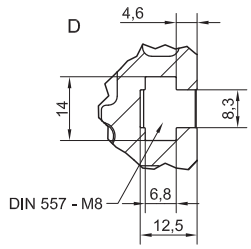
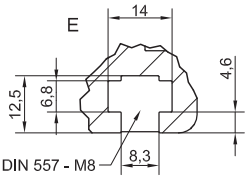
MTJZ 110
Z-Axis Belt Actuators – Dimensions



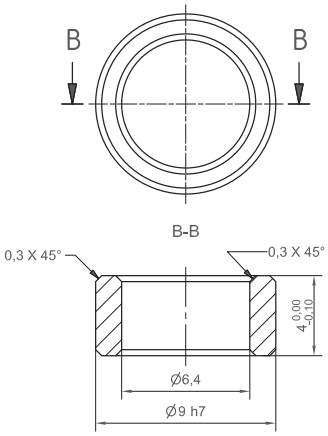


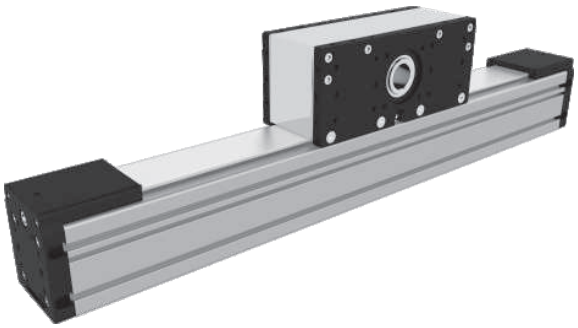




All dimensions in mm; Drawings scales are not equal.

CENTERING RING CR9
Material: 1.4305 (AISI303)

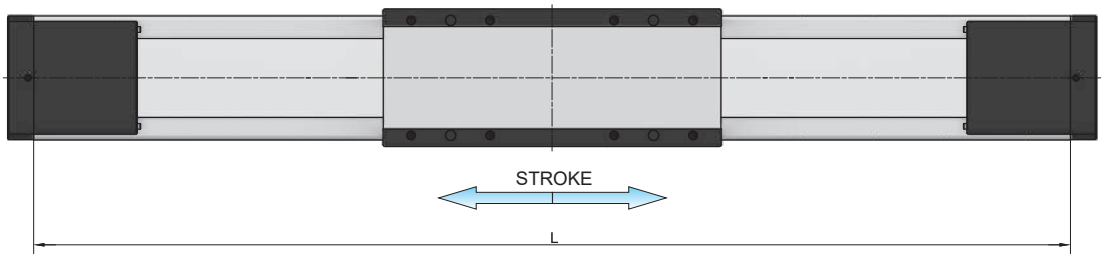




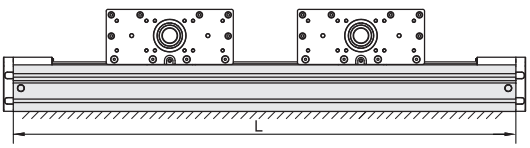
Defining of the linear module length

L = Effective stroke + 2 × Safety stroke + 496 mm

Ltotal = L + 46 mm



Multi drive block



L = Effective stroke + 2 × Safety stroke + 300 × n_b + 196 mm

n_b - number of drive blocks

Ltotal = L + 46 mm

Notes

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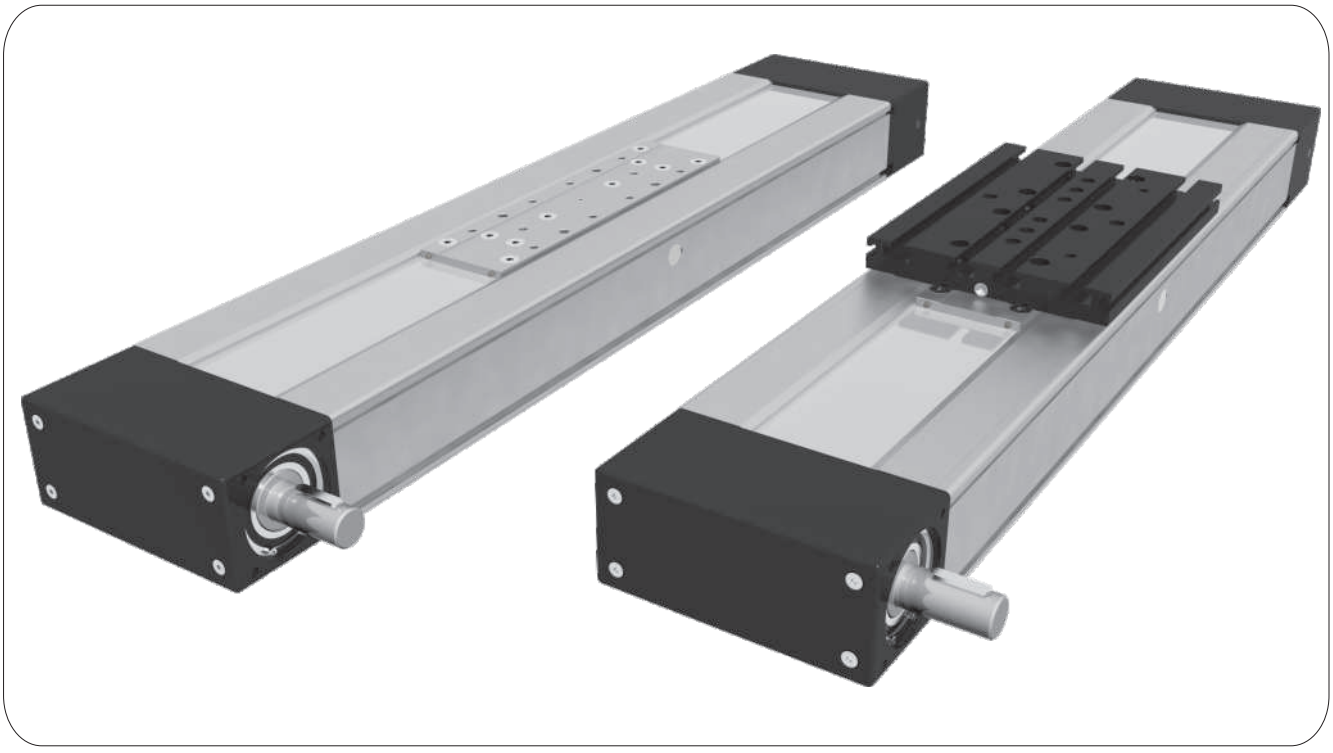
CTJ Series
Two-Row Belt Driven Actuators

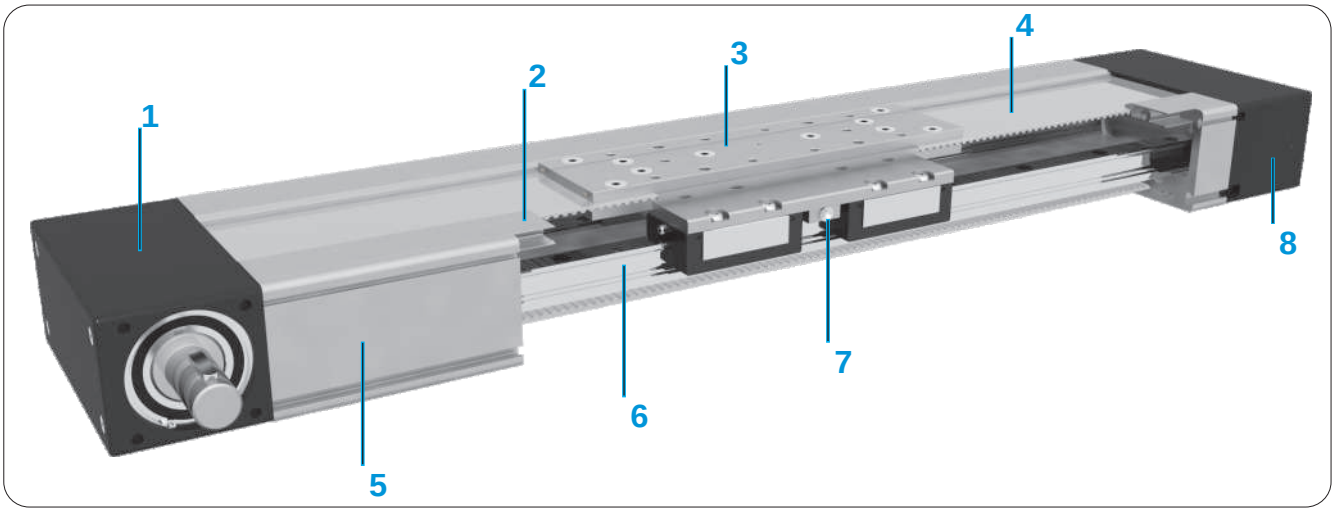
*The **CTJ** series includes Linear Units with a toothed belt drive and two parallel, integrated, Zero-backlash rail guides. Compact dimensions allow high performance features such as, high speed and repeatability. They can easily be combined to multi-axis systems.*
Excellent price-/performance ratio and quick delivery time are ensured.
A compact , precision-extruded aluminum Profile from AL 6063, with two parallel, integrated Zero-backlash rail guide systems, allows high load capacities and an optimal sequence for the movement of larger masses at high speed.
In the linear units CTJ is used a pre-tensioned steel reinforced AT polyurethane timing toothed belt. In conjunction with a Zero-backlash drive pulley high moments with alternating loads with good positioning accuracy, low wear and low noise can be realized.
The in the Profile slot driving Polyurethane timing belt, protects all the parts in the Profile from dust and other contaminations.
Different carriage lengths with lubrication port allows for easy re-lubrication of the Ball rail guide system and allows the possibility to attach additional accessories. The re-lubrication can also be done through maintenance holes on the side of the Profile.
The aluminum profile includes T-slots for fixing the Linear Unit and for attaching sensors and switches. Also, a Reed switch can be used here.
For the linear units CTJ various adaptation options, for attaching (or redirecting), for Motors or Gearboxes are available.



The aluminium profiles are manufactured according to the medium EN 12020-2 standard

Straightness = 0,35 mm/m; Max. torsion = 0,35 mm/m; Angular torsion = 0,2 mm/40 mm; Parallelism = 0,2 mm

CTJ Series
Two-Row Belt Actuators – Order Codes



1 - Drive block with pulley
2 - Aluminum cover
3 - Carriage; with built in Magnets
4 - AT polyurethane toothed belt with steel tension cords
5 - Aluminium profile-Hard anodized
6 - Two integrated Linear Ball Guideways
7 - Central lubrication port; both sides
8 - Tension End with integrated belt tensioning system

HOW TO ORDER

CTJ - 145 - 1000 - L - 1 - R - 1

Series :
CTJ

Size :
90
110
145
200

Absolute stroke (mm) :
(Absolute stroke = Effective stroke + 2 x Safety stroke)

Carriage Version :
S : Short
L : Long

Type of drive pulley :
1 : Pulley with journal
10 : Pulley with journal (without Keyway)
2 : Pulley with journal on both sides
20 : Pulley with journal on both sides (without Keyway)
3 : Without drive unit

By CTJ 200 with drive pulley 2 or 20, the drive journal position left - **L** or right - **R** side must be also specified - motor/gearbox attachment side.

Drive journal position :
L : Journal on left side
R : Journal on right side
Leave blank : For type of drive pulley 2, 20 and 3

Connection plate :
0: Without
1: With

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CTJ Series
Two-Row Belt Actuators – Performance

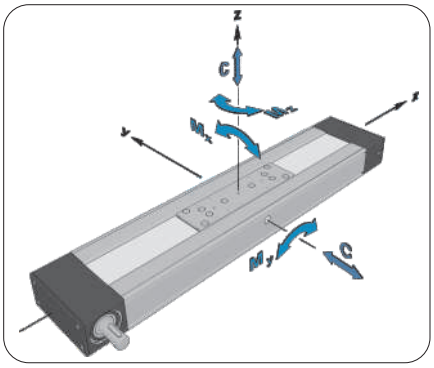
General technical data for CTJ series

Linear Unit	Carriage length	Load capacity		Dynamic moment			Moved mass	Maximum Repeatability	* Maximum length	Planar moment of inertia	
	Lv [mm]	Dynamic C [N]	Static C0 [N]	Mx [Nm]	My [Nm]	Mz [Nm]	[kg]	[mm]	Lmax [mm]	Iy [cm^4]	Iz [cm^4]
CTJ 90 S	102	4620	6930	125	17	34	0,20	± 0,08	6000	13,4	107,0
CTJ 90 L	156	9240	13860	250	290	290	0,35	± 0,08			
CTJ 110 S	170	19800	35000	610	118	235	0,64	± 0,08	6000	31,1	217,2
CTJ 110 L	215	39600	70000	1225	1680	1680	0,98	± 0,08			
CTJ 145 S	180	34200	60000	1500	260	520	1,35	± 0,08	6000	78,9	707,6
CTJ 145 L	240	68400	120000	3005	3420	3420	2,25	± 0,08			
CTJ 200 S	265	49600	85000	3235	450	900	3,05	± 0,08	6000	376,4	2744,6
CTJ 200 L	405	99200	170000	6470	8680	8680	5,70	± 0,08			

*For lengths over the stated value in the table above please contact us

Recommended values of loads

All the data of static and dynamic moments and load capacities stated in the upper table are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety. We recommend a minimum safety factor (fs =5.0)



Modulus of elasticity

E = 70000 N / mm^2

Drive and belt data for CTJ series

Linear Unit	Maximum travel speed	Maximum drive torque	* No load torque	Puley drive ratio	Pulley diameter	Belt type	Belt width	Max. force transmited by belt	Specific spring constant C_{spec}
	[m / s]	[Nm]	[Nm]	[mm / rev]	[mm]		[mm]	[N]	[N]
CTJ 90 S	5	7,5	0,40	90	28,65	AT 3	35	520	402500
CTJ 90 L			0,42						
CTJ 110 S	6	15,7	0,98	120	38,20	AT 5	50	820	960000
CTJ 110 L			1						
CTJ 145 S	6	33,6	1,48	165	52,52	AT 5	70	1280	1360000
CTJ 145 L			1,5						
CTJ 200 S	6	102 with keyway	2,3	250	79,58	AT 10	100	3250	4350000
CTJ 200 L		129 without keyway	2,8						

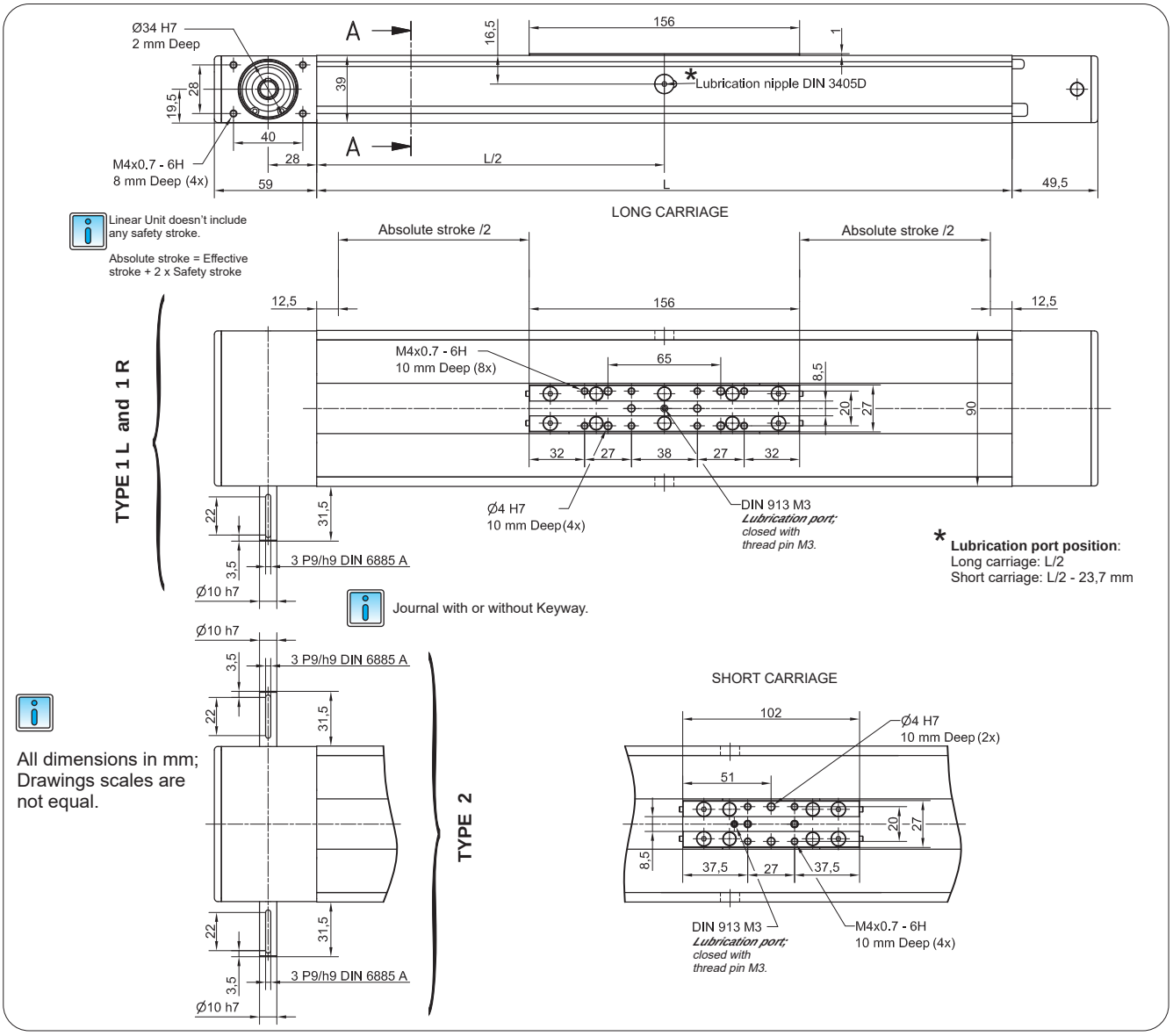
* The stated values are for strokes up to 500mm. No Load Torque value increases with stroke elongation

Mass and mass moment of inertia

Linear Unit	Carriage length Lv [mm]	Mass of linear unit [kg]	Mass moment of inertia [10^{-5} kg·m^2]
CTJ 90 S	102	1,7 + 0,0048 * Stroke [mm]	7 + 0,0031 * Stroke [mm]
CTJ 90 L	156	2,1 + 0,0048 * Stroke [mm]	11 + 0,0031 * Stroke [mm]
CTJ 110 S	170	3,6 + 0,0072 * Stroke [mm]	36 + 0,0125 * Stroke [mm]
CTJ 110 L	215	4,2 + 0,0072 * Stroke [mm]	49 + 0,0125 * Stroke [mm]
CTJ 145 S	180	7,2 + 0,0127 * Stroke [mm]	145 + 0,0330 * Stroke [mm]
CTJ 145 L	240	8,8 + 0,0127 * Stroke [mm]	208 + 0,0330 * Stroke [mm]
CTJ 200 S	265	20,2 + 0,0245 * Stroke [mm]	778 + 0,1868 * Stroke [mm]
CTJ 200 L	405	26,2 + 0,0245 * Stroke [mm]	1210 + 0,1868 * Stroke [mm]

Mass calculation doesn´t include mass of motor, reduction gear, switches and clamps.

CTJ 090
Two-Row Belt Actuators – Dimensions

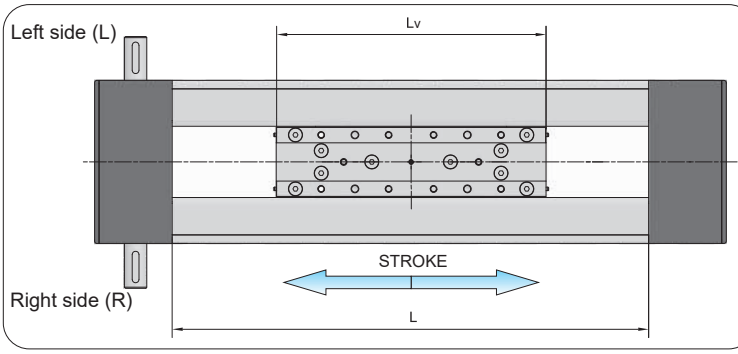


Defining of the linear module length

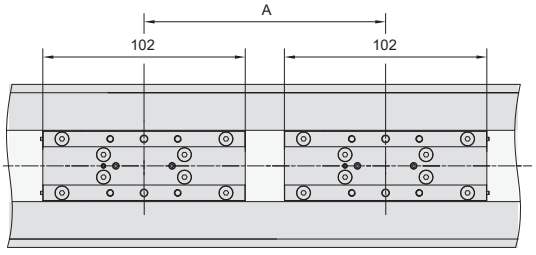
L = Effective stroke + 2 × Safety stroke + Lv + 25 mm

Ltotal= L + 108,5 mm

Lv - Long carriage = 156 mm
Lv - Short carriage = 102 mm



Double-Carriage



Only with **short** carriage version.

L = Effective stroke + 2 × Safety stroke + A + 127 mm

Ltotal = L + 108,5 mm

A ≥ 102 mm

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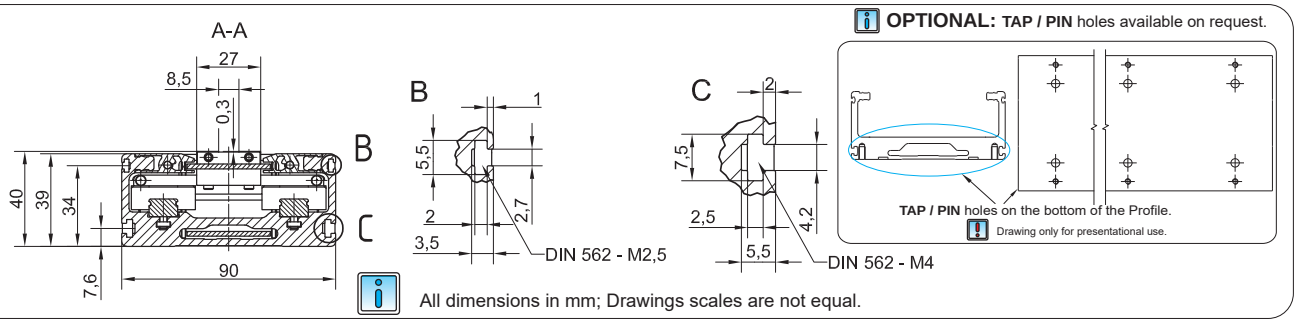
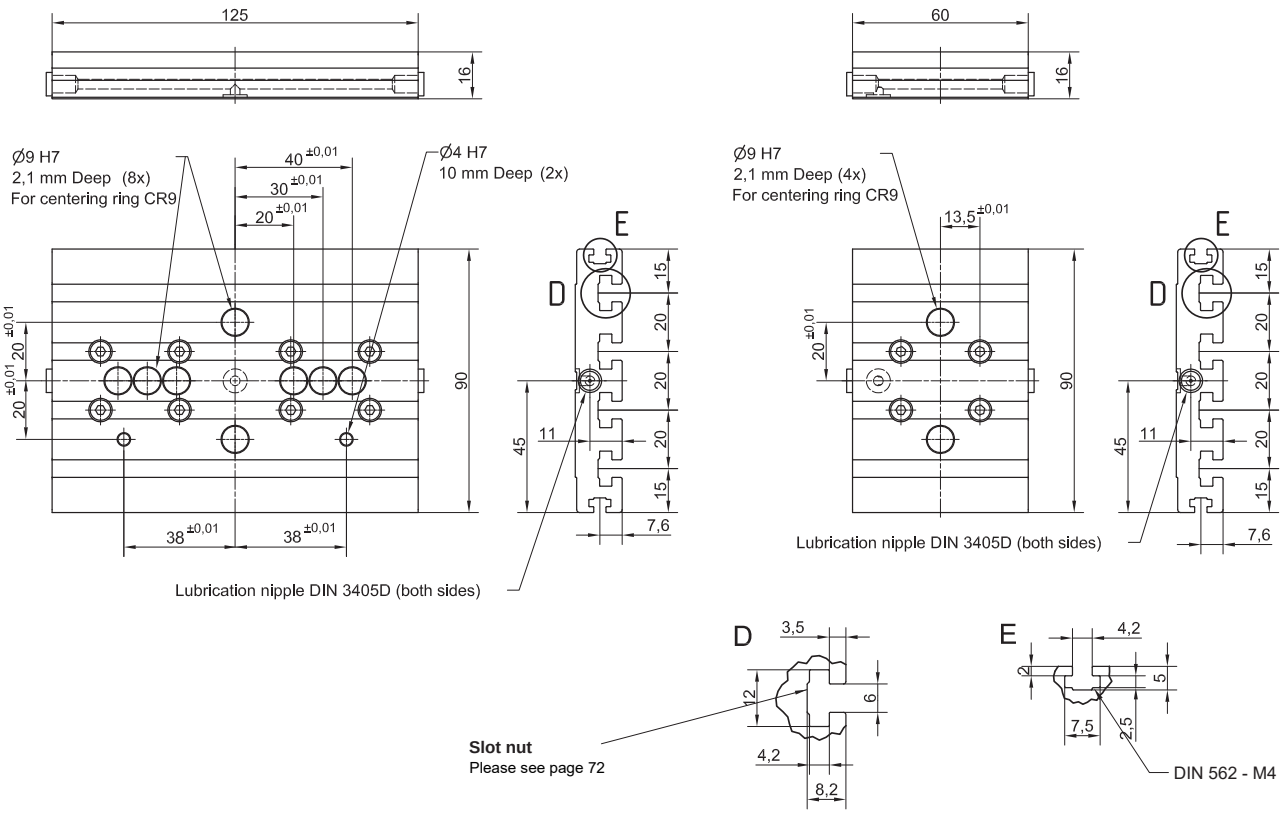
CTJ 090
Two-Row Belt Actuators – Dimensions



CONNECTION PLATE

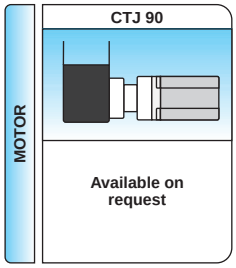
CTJ 90 L

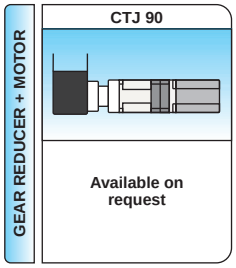


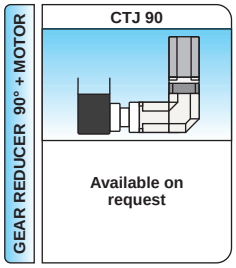
CTJ 90 S

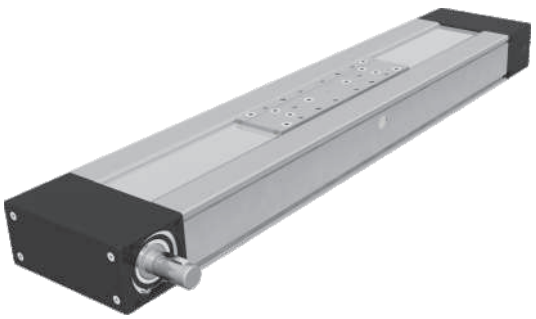
Linear Unit	Plate length [mm]	Weight [kg]	Code
CTJ 90 S	60	0,2	48853
CTJ 90 L	125	0,4	48854

Mounting elements for mounting the connection plate on the Linear unit are inlcuded.

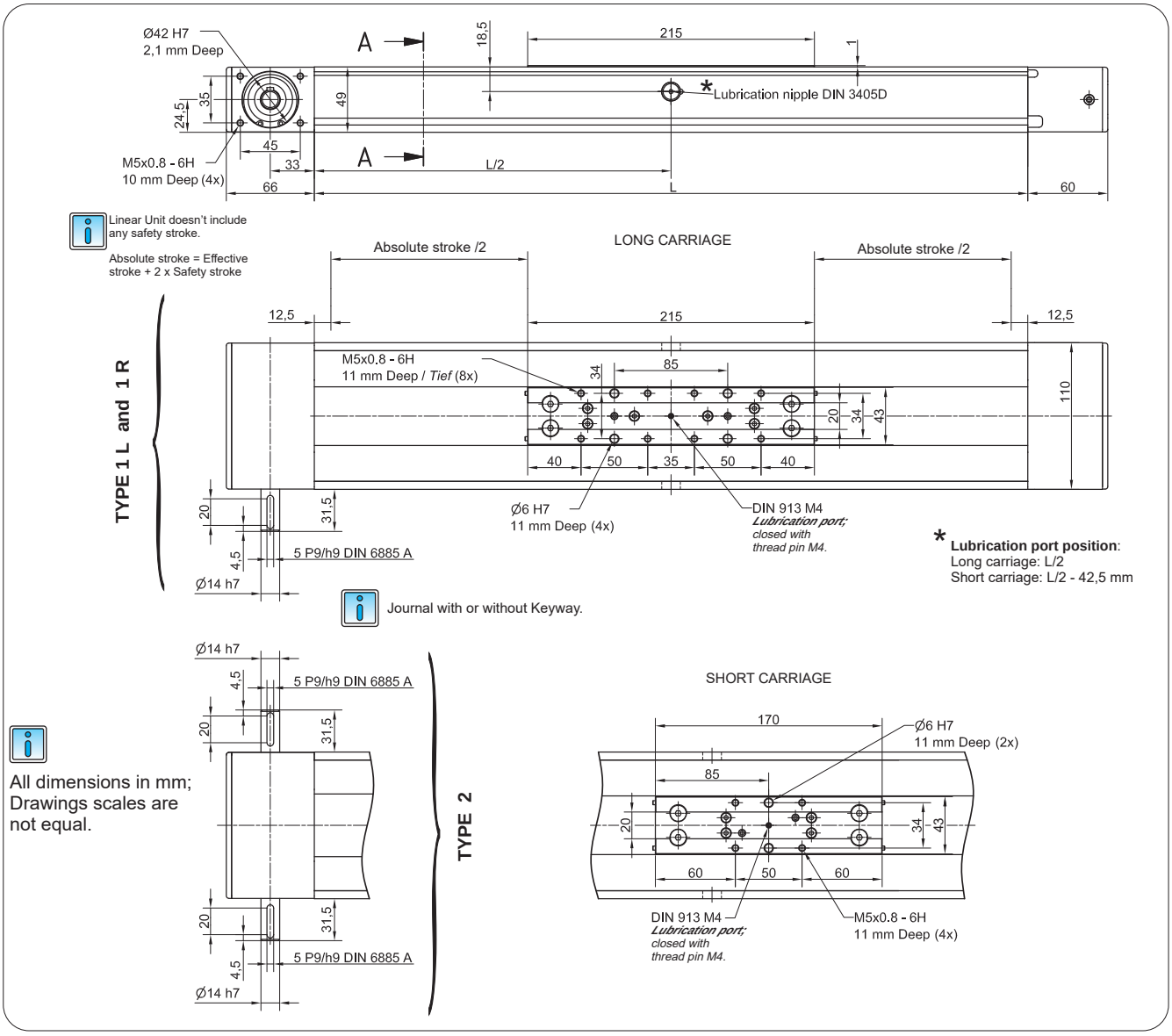








CTJ 110
Two-Row Belt Actuators – Dimensions

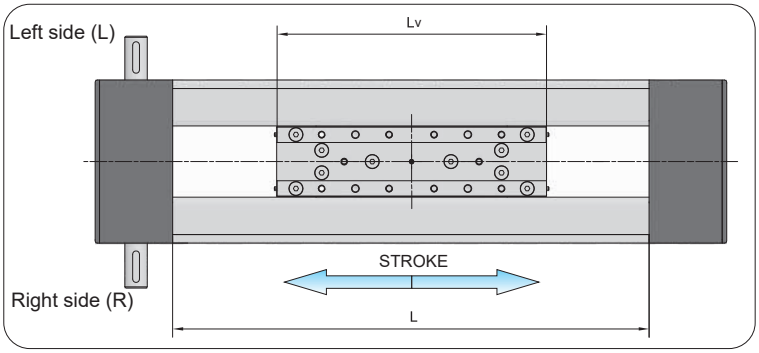


Defining of the linear module length

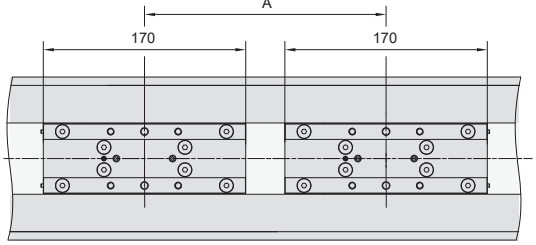
L = Effective stroke + 2 × Safety stroke + Lv + 25 mm

Ltotal = L + 126 mm

Lv - Long carriage = 215 mm
Lv - Short carriage = 170 mm



Double-Carriage



Only with **short** carriage version.

L = Effective stroke + 2 × Safety stroke + A + 195 mm

Ltotal = L + 126 mm

A ≥ 170 mm

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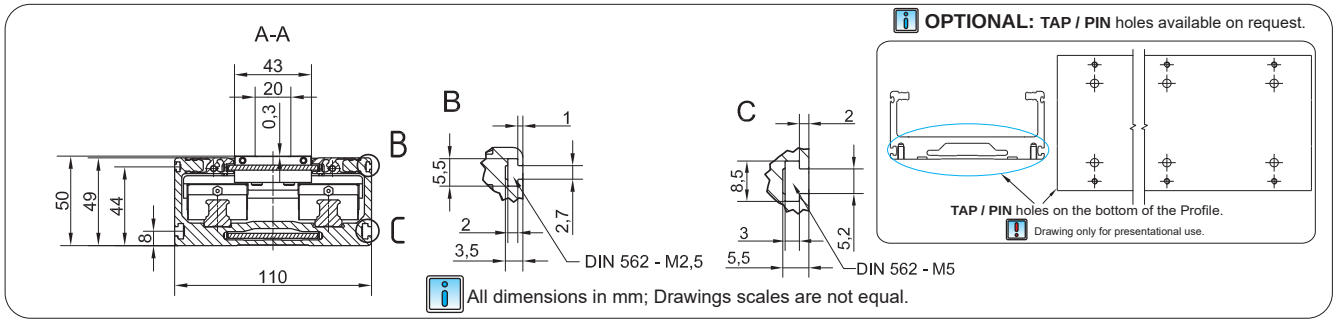
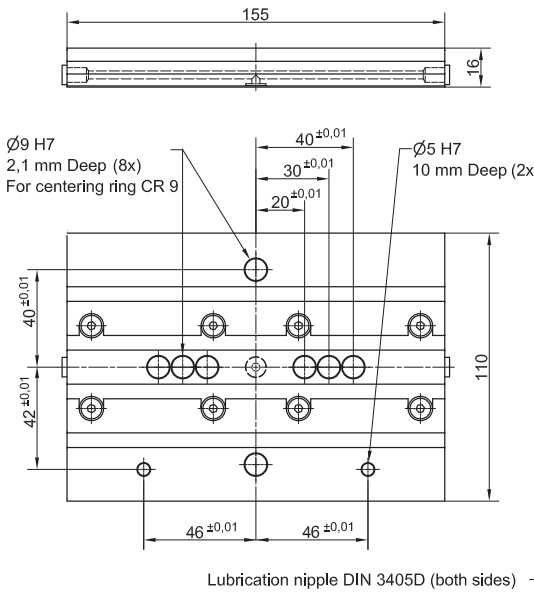
CTJ 110
Two-Row Belt Actuators – Dimensions

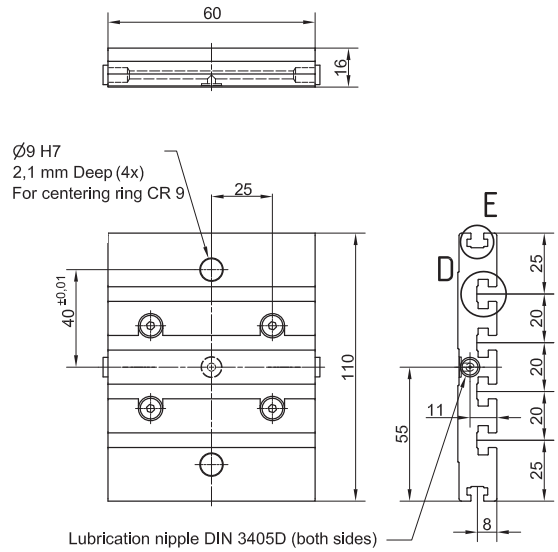


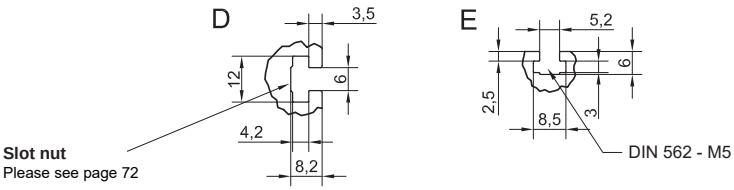
CONNECTION PLATE

CTJ 110 L



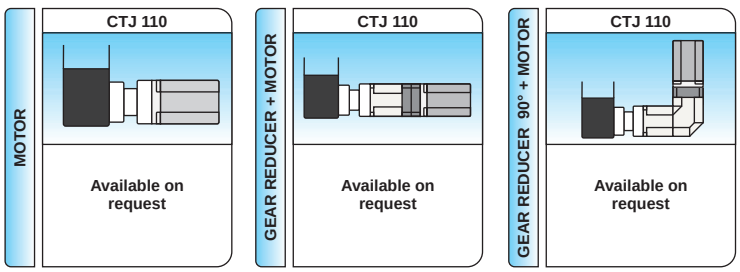
CTJ 110 S

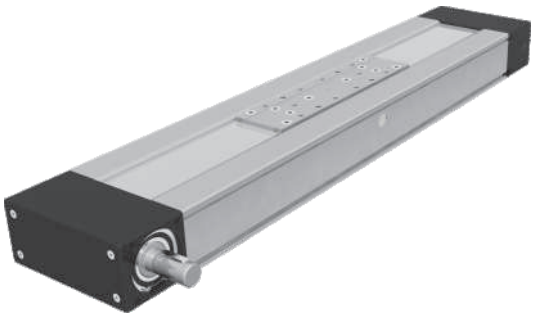




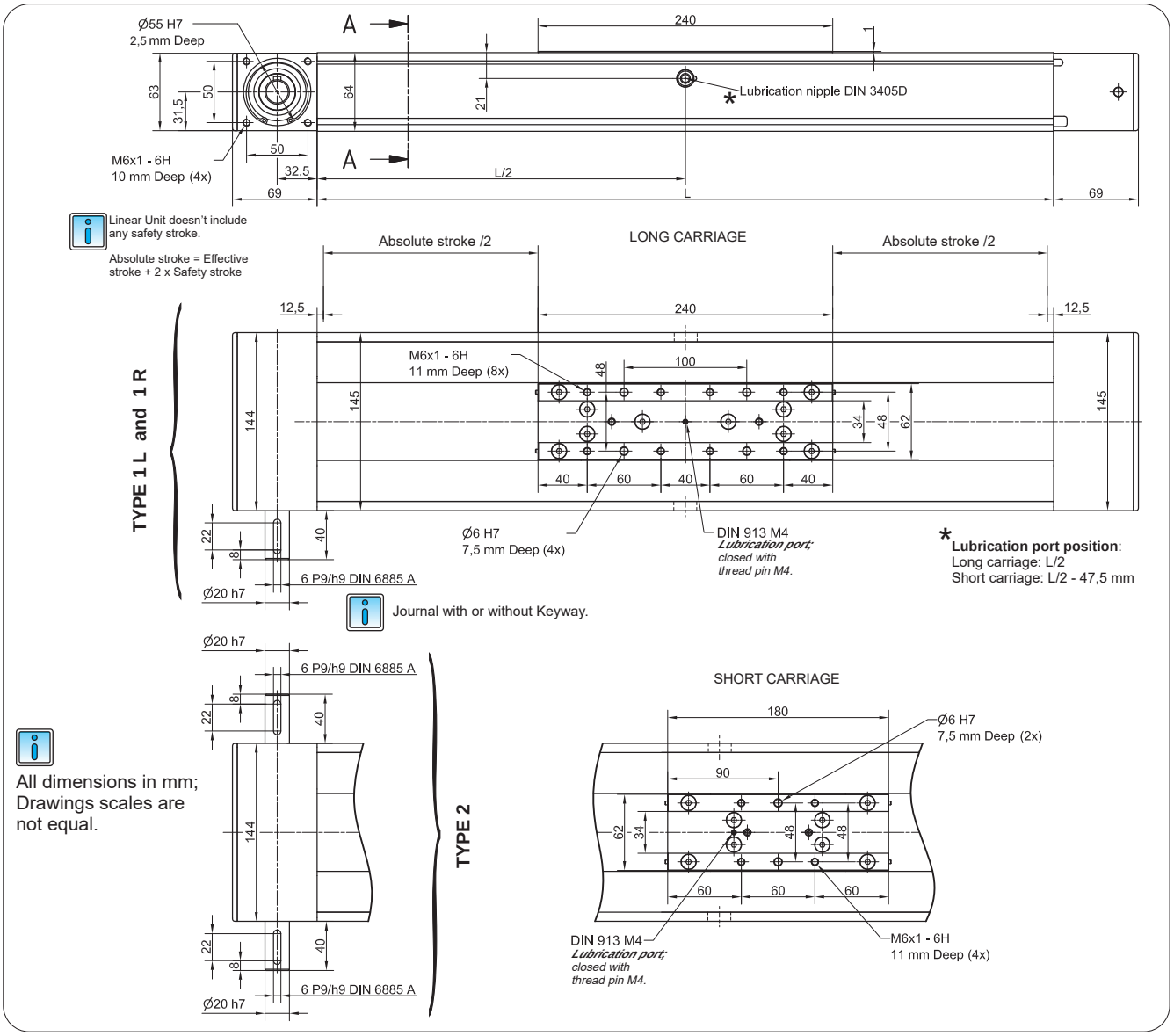
Linear Unit	Plate length [mm]	Weight [kg]	Code
CTJ 110 S	60	0,35	48525
CTJ 110 L	155	0,60	48480

Mounting elements for mounting the connection plate on the Linear unit are inlcuded.





CTJ 145
Two-Row Belt Actuators – Dimensions



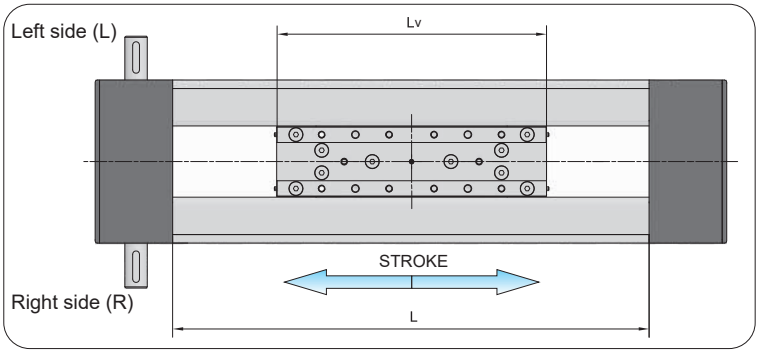
All dimensions in mm; Drawings scales are not equal.

Defining of the linear module length

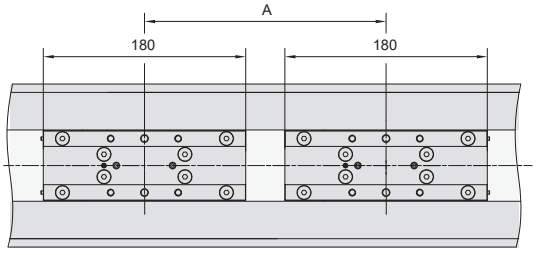
Lv - Long carriage = 240 mm
Lv - Short carriage = 180 mm

L = Effective stroke + 2 × Safety stroke + Lv + 25 mm

Ltotal = L + 138 mm



Double-Carriage



Only with **short** carriage version.

L = Effective stroke + 2 × Safety stroke + A + 205 mm

Ltotal = L + 138 mm

A ≥ 180 mm

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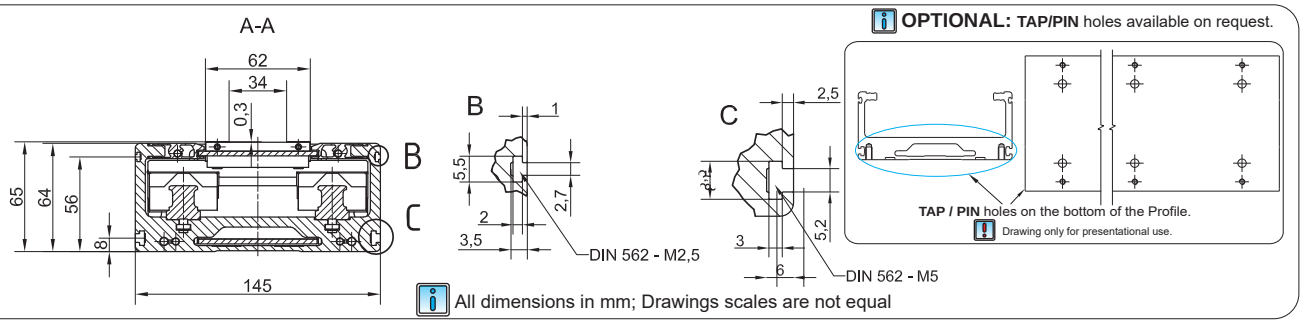
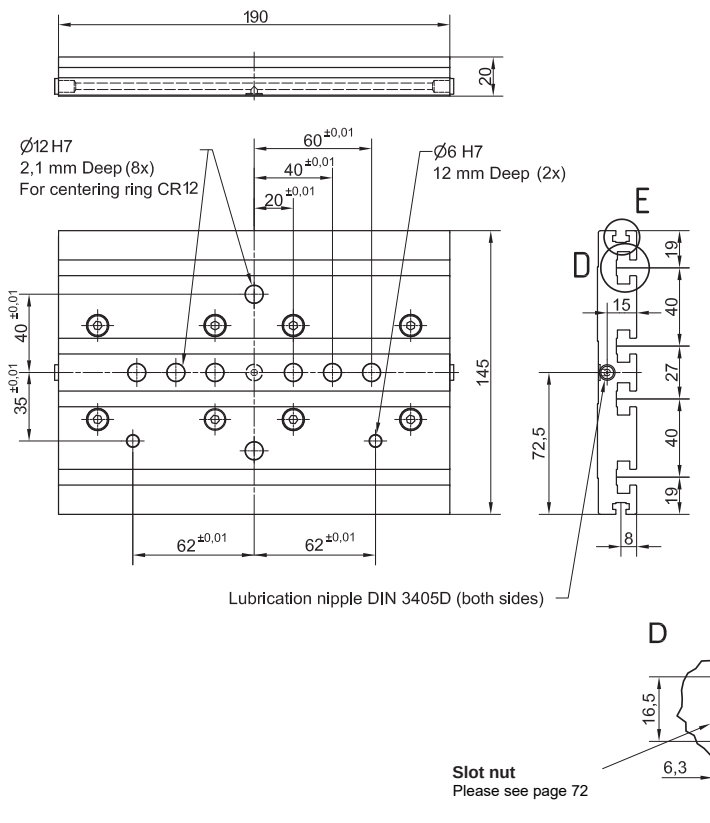
CTJ 145
Two-Row Belt Actuators – Dimensions

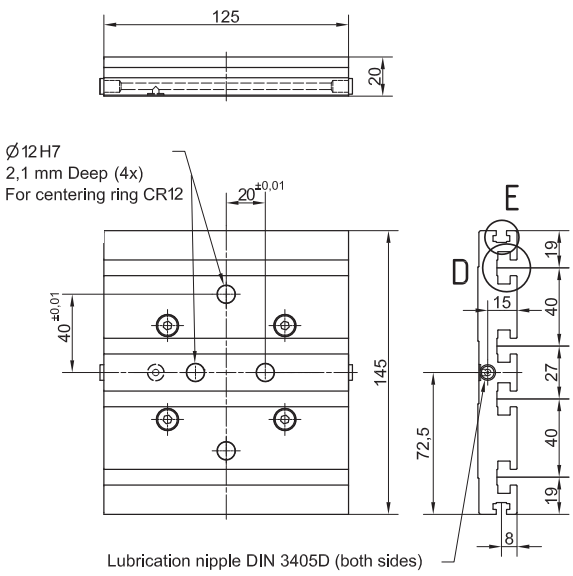


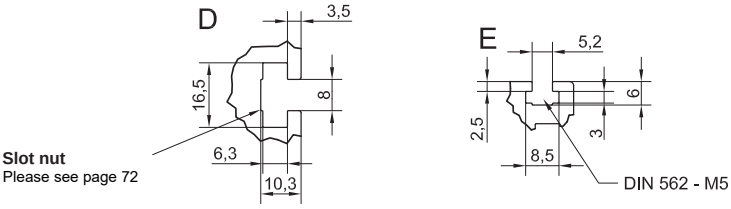
CONNECTION PLATE

CTJ 145 L



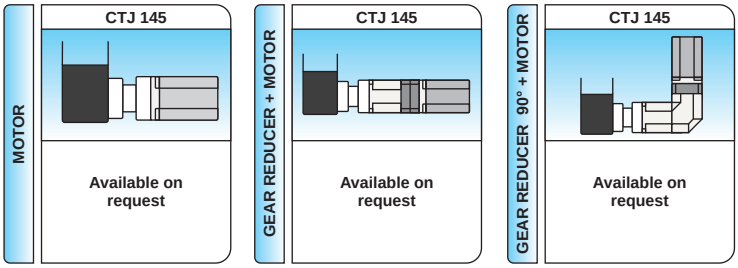
CTJ 145 S

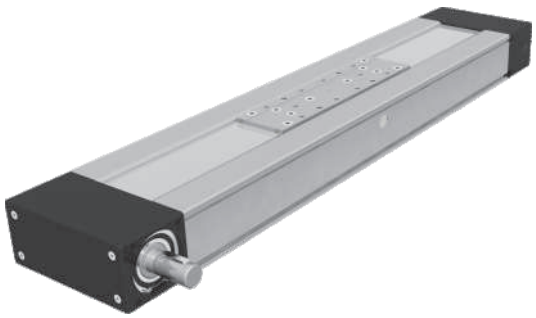




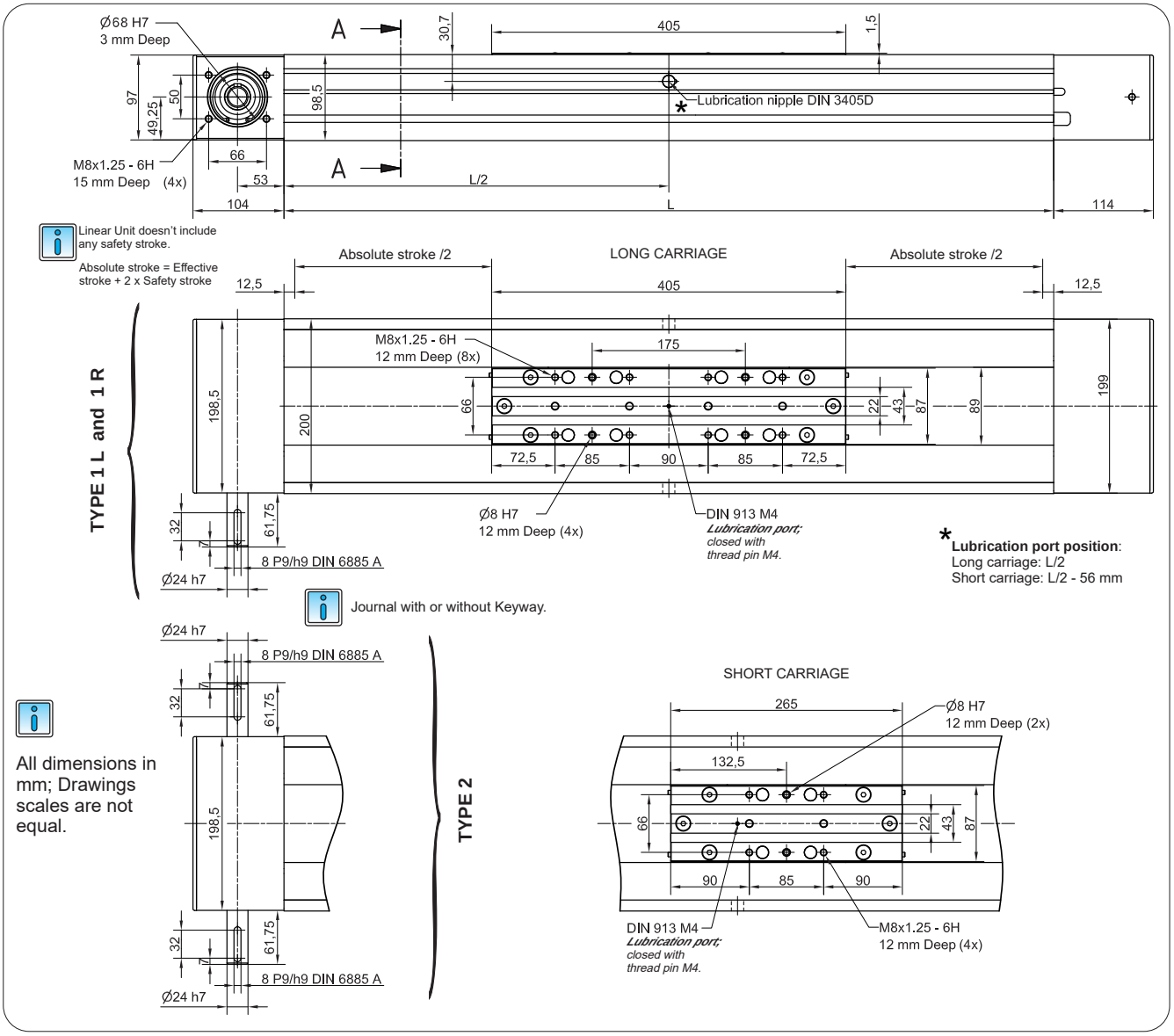
Linear Unit	Plate length [mm]	Weight [kg]	Code
CTJ 145 S	125	0,8	46776
CTJ 145 L	190	1,3	46775

Mounting elements for mounting the connection plate on the Linear unit are inlcuded.





CTJ 200
Two-Row Belt Actuators – Dimensions

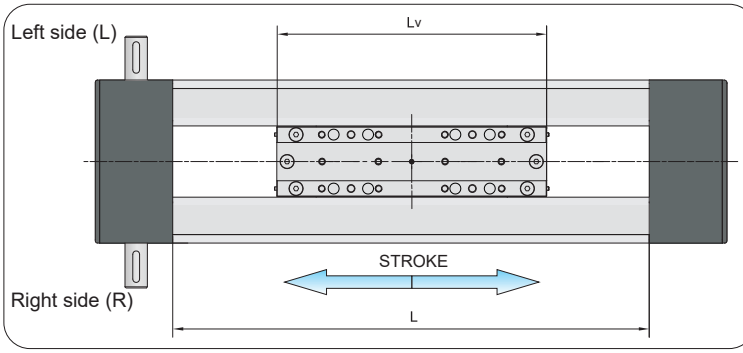


Defining of the linear module length

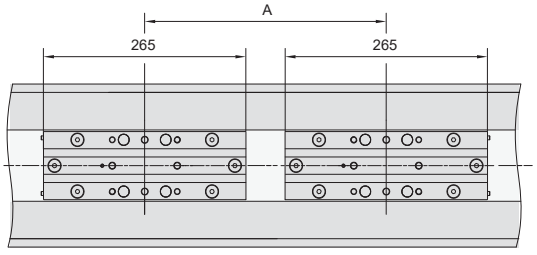
L = Effective stroke + 2 × Safety stroke + Lv + 25 mm

Ltotal= L + 218 mm

Lv - Long carriage = 405 mm
Lv - Short carriage = 265 mm



Double-Carriage



Only with **short** carriage version.

L = Effective stroke + 2 × Safety stroke + A + 290 mm

Ltotal = L + 218 mm

A ≥ 265 mm

For ordering code please contact us

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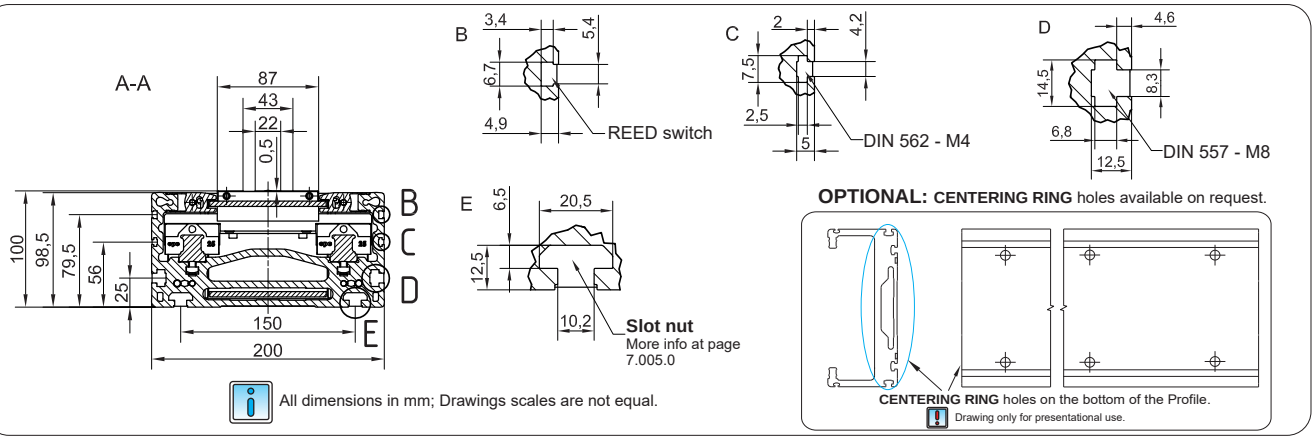
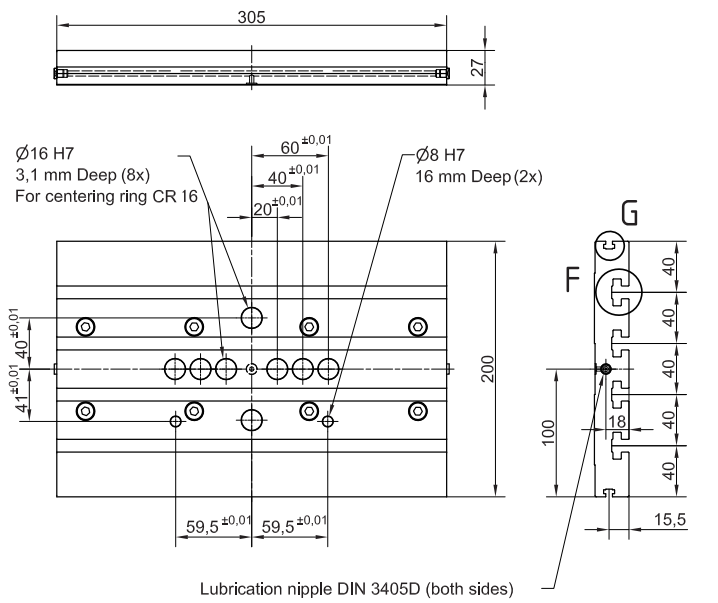
CTJ 200
Two-Row Belt Actuators – Dimensions

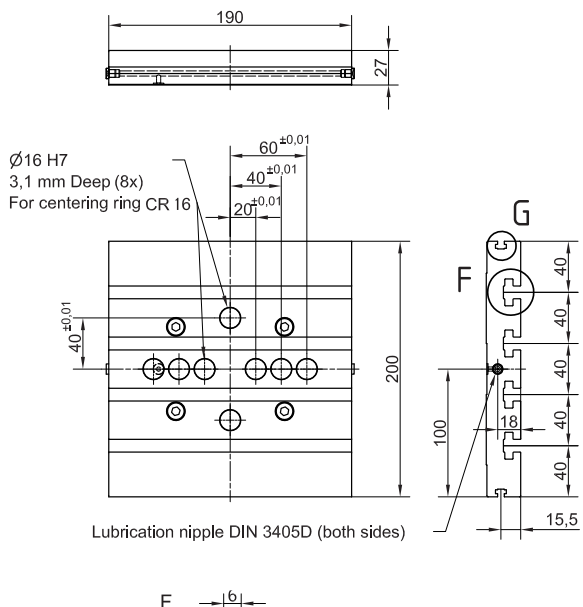


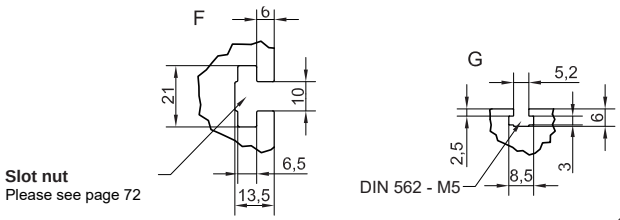
CONNECTION PLATE

CTJ 200 L



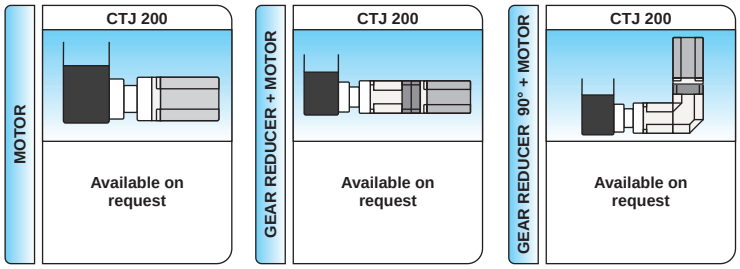
CTJ 200 S





Linear Unit	Plate length [mm]	Weight [kg]	Code
CTJ 200 S	190	2,3	52483
CTJ 200 L	305	3,7	52482

Mounting elements for mounting the connection plate on the Linear unit are inlcuded.



Notes

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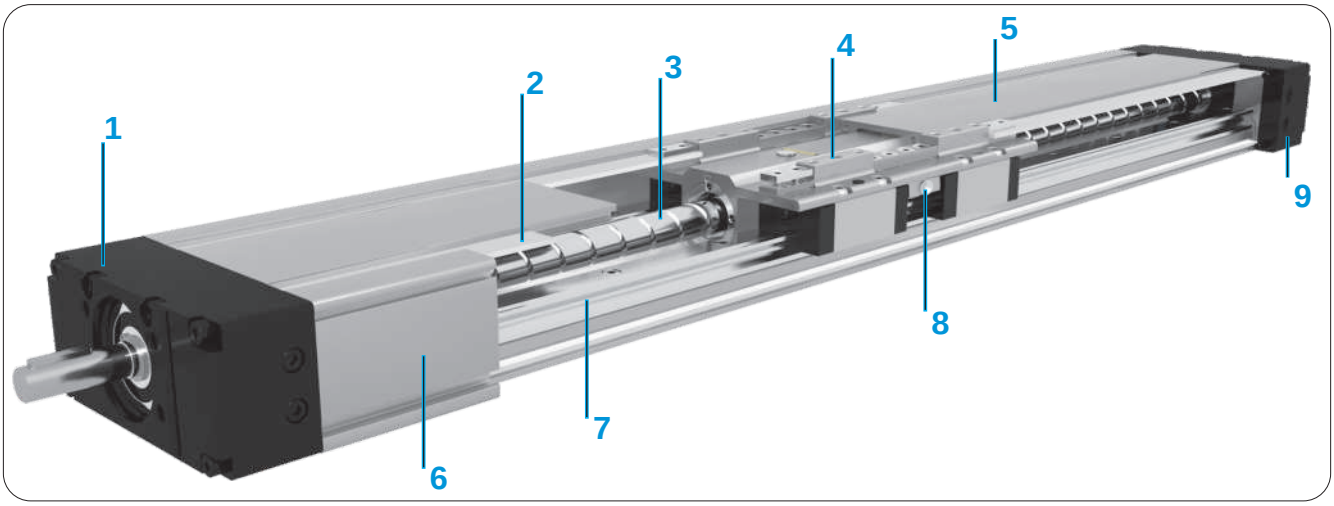
CTV Series
Two-Row Ball Screw Driven Actuators

*The **CTV** series describes Linear Units with a precision ball screw drive and two parallel, integrated, Zero-backlash rail guides. Compact dimensions allow high performance features such as, high speeds, good accuracy and repeatability.*
They can easily be combined to multi-axis systems.
Excellent price-/performance ratio and quick delivery time are ensured.
The compact, precision-extruded aluminum Profile from AL 6063, with two parallel, integrated, Zero-backlash rail guide systems, allows high load capacities and optimal cycles for the movement of larger masses at high speed.
In the Linear Units CTV a precision ball screw, with tolerance class ISO7 (ISO5 on request), with reduced backlash of the ball nut is used.
Two parallel circulating antistatic polyurethane sealing strips and an aluminum cover are ensuring to protect all the parts in the profile from dust and other contaminantions.
Different carriage lengths with lubrication port allows for easy re-lubrication of the ball screw and Ball rail guide system and allows the possibility to attach additional accessories. The re-lubrication can also be done through maintenance holes on the side of the Profile.
The aluminum profile includes T-slots for fixing the Linear Unit and for attaching sensors and switches. Also, a Reed switch can be used here.
For the linear units CTV various adaptation options, for attaching (or redirecting), for Motors or Gearboxes are available.

The aluminium profiles are manufactured according to the medium EN 12020-2 standard

Straightness = 0,35 mm/m; Max. torsion = 0,35 mm/m; Angular torsion = 0,2 mm/40 mm; Parallelism = 0,2 mm

CTV Series
Two-Row Ball Screw Actuators – Order Codes



1 - Drive block with floating bearing
2 - Gap-type seal of antistatic PU strip (recirculating)
3 - Ball screw tolerance ISO7 (ISO5 available on request)
4 - Carriage; with built in Magnets
5 - Aluminum cover
6 - Aluminium profile-Hard anodized
7 - Two integrated Linear Ball Guideways
8 - Central lubrication port; both sides
9 - End block with fixed bearing

HOW TO ORDER

CTV - 110 - 1610 - ISO7 - 1 - 1000 - L - 1 - 1

Series:
CTV

Size:
90
110
145
200

Ball screw :
CTV 90: Ø12×5, Ø12×10
CTV 110: Ø16×5, Ø16×10, Ø16×16
CTV 145: Ø20×5, Ø20×10, Ø20×20, Ø20×50
CTV 200: Ø32×5, Ø32×10, Ø32×20, Ø32×32

Ball screw tolerance :
ISO7 (Standard)
ISO5

Ball screw journal :
0 : Without keyway
1 : With keyway
CTV 90 only available without keyway - **0**

Absolute stroke (mm) :
(Absolute stroke = Effective stroke + 2 x Safety stroke)

Carriage Version :
S : Short
L : Long

Connection plate :
0 : Without
1 : With

Protection cover :
0 : Without antistatic PU Gap-type seal strip
1 : With antistatic PU Gap-type seal strip (Standard)
2 : With Corrosion-resistant protection strip

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CTV Series
Two-Row Ball Screw Actuators – Performance

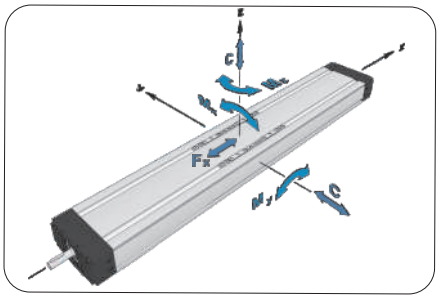
General technical data for CTV series

Linear Unit	Carriage length	Load capacity		Dynamic moment			Moved mass	*Maximum length	Planar moment of inertia	
		Dynamic	Static							
	Lv [mm]	C [N]	C0 [N]	Mx [Nm]	My [Nm]	Mz [Nm]	[kg]	Lmax [mm]	Iy [cm^4]	Iz [cm^4]
CTV 90 S	35	4620	6930	125	17	34	0,3	750	13,6	102,6
CTV 90 L	100	9240	13860	250	300	300	0,5			
CTV 110 S	39	19800	35000	650	118	235	0,63	1500	29,1	196,0
CTV 110 L	124	39600	70000	1305	1680	1680	1,36			
CTV 145 S	49	34200	60000	1500	260	520	1,19	1800	85,3	682,3
CTV 145 L	149	68400	120000	3005	3420	3420	2,61			
CTV 200 S	80	49600	85000	3220	450	900	3,11	2200	417,4	3007,3
CTV 200 L	255	99200	170000	6445	8680	8680	6,21			

*For lengths over the stated value in the table above please contact us.

Recommended values of loads:

All the data of static and dynamic moments and load capacities stated in the upper table are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety. We recommend a minimum safety factor (fs =5.0)



Modulus of elasticity

E = 70000 N / mm^2

Ball Screw Drive data

Linear Unit	1 Maximal travel speed		2 No load torque		Lead constant	Ball screw	3 Max. repeteability precision [mm] STANDARD		Dynamic load capacity BS	Maximum Axial load	Maximal drive torque without Keyway
			Carriage: S	Carriage: L							
	[m / s]		[Nm]	[Nm]	[mm / rev]	[d × l]	ISO7	ISO5	Ca [N]	Fx [N]	Ma [Nm]
CTV 90	$38{,}7 \cdot 10^{3} \cdot I / L^{2}$ [mm]	≤ 0,49	0,07	0,09	5	12 × 5	± 0,02	± 0,01	5000	5000	4,4
		≤ 0,97	0,06	0,08	10	12 × 10	± 0,02	± 0,01	3800	2540	4,5
CTV 110	$49{,}6 \cdot 10^{3} \cdot I / L^{2}$ [mm]	≤ 0,35	0,11	0,13	5	16 × 5	± 0,02	± 0,01	13150	8700	7,7
		≤ 0,70	0,12	0,16	10	16 × 10	± 0,02	± 0,01	11550	6730	11,9
		≤ 1,12	0,14	0,18	16	16 × 16	± 0,02	± 0,01	8170	4200	11,9
CTV 145	$64{,}2 \cdot 10^{3} \cdot I / L^{2}$ [mm]	≤ 0,28	0,28	0,3	5	20 × 5	± 0,02	± 0,01	14800	14800	13,0
		≤ 0,55	0,26	0,28	10	20 × 10	± 0,02	± 0,01	15900	13850	24,5
		≤ 1,13	0,24	0,28	20	20 × 20	± 0,02	± 0,01	16250	6930	24,5
		≤ 2,50	0,34	0,38	50	20 × 50	± 0,02	± 0,01	13000	2770	24,5
CTV 200	$108 \cdot 10^{3} \cdot I / L^{2}$ [mm]	≤ 0,18	0,45	0,55	5	32 × 5	± 0,02	± 0,01	18850	18850	16,7
	$99{,}0 \cdot 10^{3} \cdot I / L^{2}$ [mm]	≤ 0,50	0,50	0,60	10	32 × 10	± 0,02	± 0,01	33400	29600	52,3
	$105 \cdot 10^{3} \cdot I / L^{2}$ [mm]	≤ 1,00	0,55	0,65	20	32 × 20	± 0,02	± 0,01	29700	14800	52,3
	$103 \cdot 10^{3} \cdot I / L^{2}$ [mm]	≤ 1,60	0,60	0,70	32	32 × 32	± 0,02	± 0,01	35150	9240	52,3

1 For travel speed over the stated value in the table above please contact us
2 The stated values are for strokes up to 500mm. No Load Torque value increases with stroke elongation
3 For the ball nut with the preload of 2% please contact us

Linear Unit	Permissible drive torque (with Keyway) Ma [Nm]
CTV 90	-
CTV 110	5,5
CTV 145	11,9
CTV 200	27,3

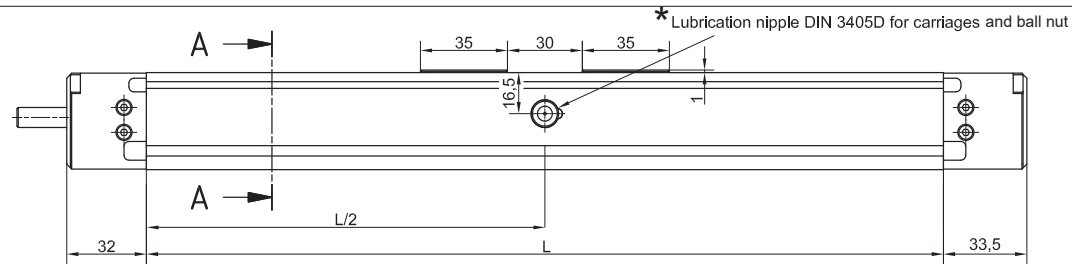
Reduced effective diameter at journal with keyway decreases values of max. drive torque.

Mass calculation doesn´t include mass of motor, reduction gear, switches and clamps.

Mass and mass moment of inertia

Linear unit	Carriage Length Lv [mm]	Mass of Linear unit [kg]	Mass moment of inertia [10^{-5} kg·m^2]
CTV 90 S	35	1,6 + 0,006 * Stroke [mm]	0,4 + 0,002 * Stroke [mm]
CTV 90 L	100	2,2 + 0,006 * Stroke [mm]	0,5 + 0,002 * Stroke [mm]
CTV 110 S	39	3,3 + 0,008 * Stroke [mm]	1,1 + 0,005 * Stroke [mm]
CTV 110 L	124	4,6 + 0,008 * Stroke [mm]	2,0 + 0,005 * Stroke [mm]
CTV 145 S	49	5,7 + 0,015 * Stroke [mm]	4,2 + 0,013 * Stroke [mm]
CTV 145 L	149	8,4 + 0,015 * Stroke [mm]	6,9 + 0,013 * Stroke [mm]
CTV 200 S	80	15,4 + 0,031 * Stroke [mm]	29,0 + 0,069 * Stroke [mm]
CTV 200 L	255	23,8 + 0,031 * Stroke [mm]	49,1 + 0,069 * Stroke [mm]

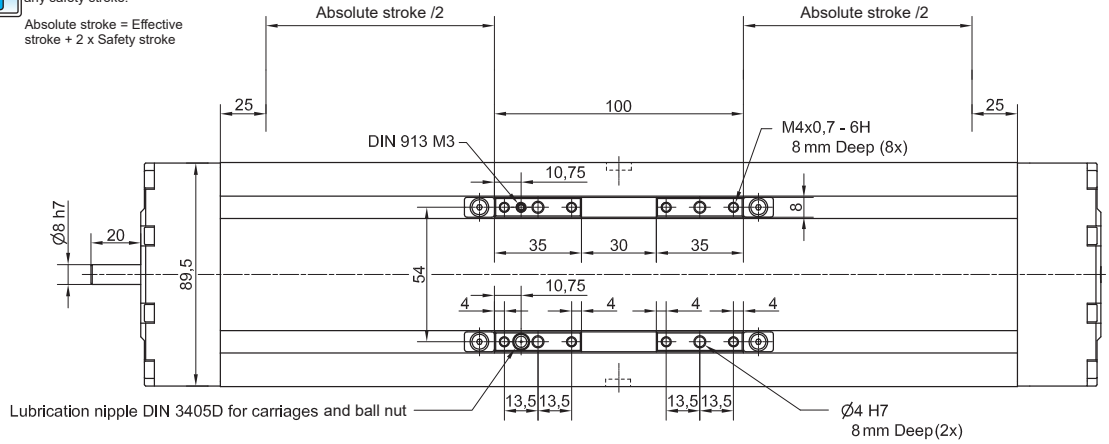
CTV 090
Two-Row Ball Screw Actuators – Dimensions



Linear Unit doesn't include any safety stroke.

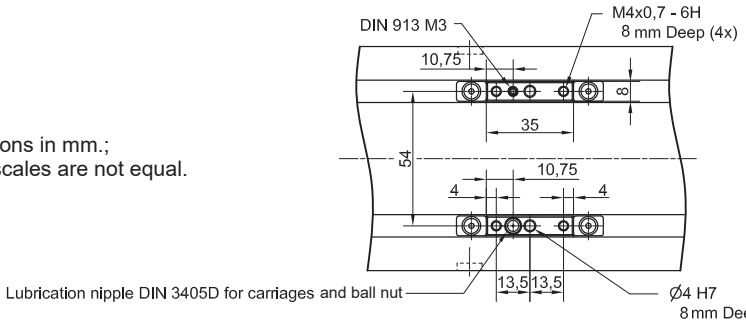
Absolute stroke = Effective stroke + 2 x Safety stroke

LONG CARRIAGE



* **Lubrication port position**:
Long carriage: L/2
Short carriage: L/2 - 24,2 mm

SHORT CARRIAGE



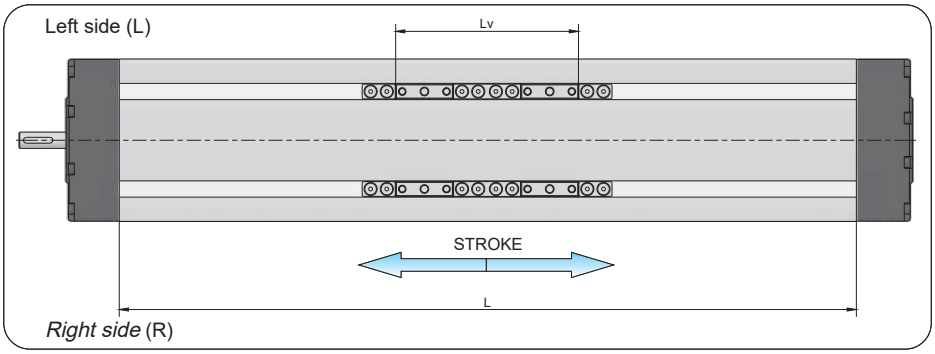
All dimensions in mm.;
Drawings scales are not equal.

Defining of the linear module length

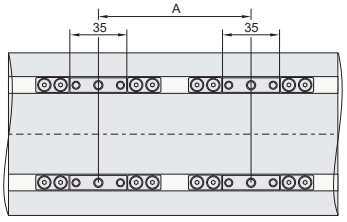
Lv - Long carriage = 100 mm
Lv - Short carriage = 35 mm

L = Effective stroke + 2 × Safety stroke + Lv + 50 mm

Ltotal = L + 65,5 mm



Double-Carriage



Only with **short** carriage version.

L = Effective stroke + 2 × Safety stroke + A + 85 mm

Ltotal = L + 65,5mm

} **A** ≥ 65 mm

For ordering code please contact us.

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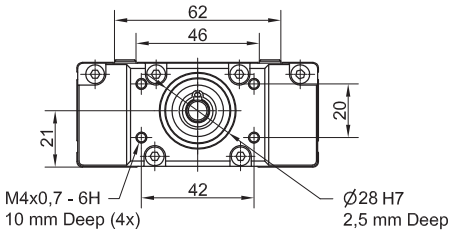
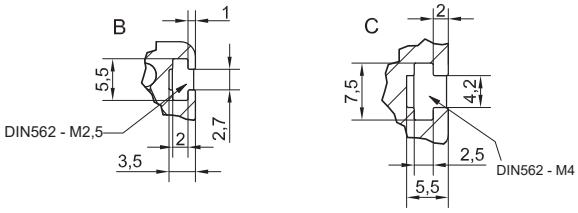
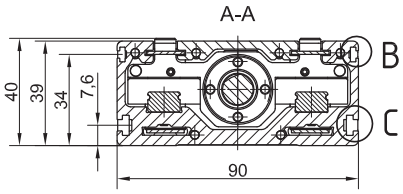
CTV 090
Two-Row Ball Screw Actuators – Dimensions

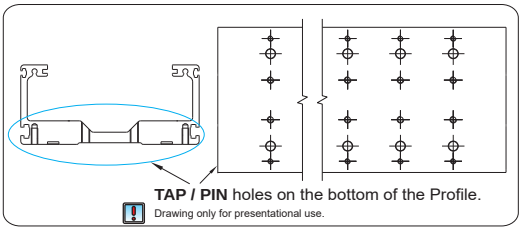




OPTIONAL: **TAP / PIN** holes available on request.



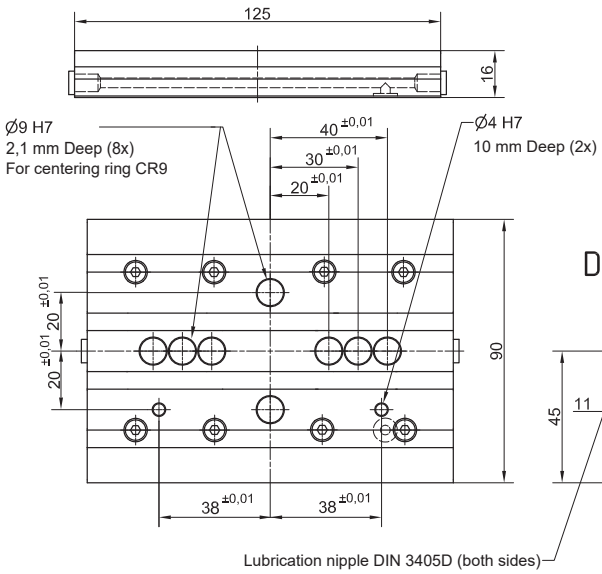
All dimensions in mm; Drawings scales are not equal.

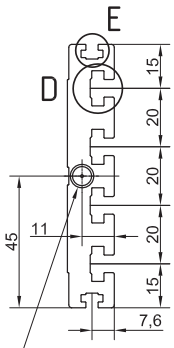


TAP / PIN holes on the bottom of the Profile.
Drawing only for presentational use.

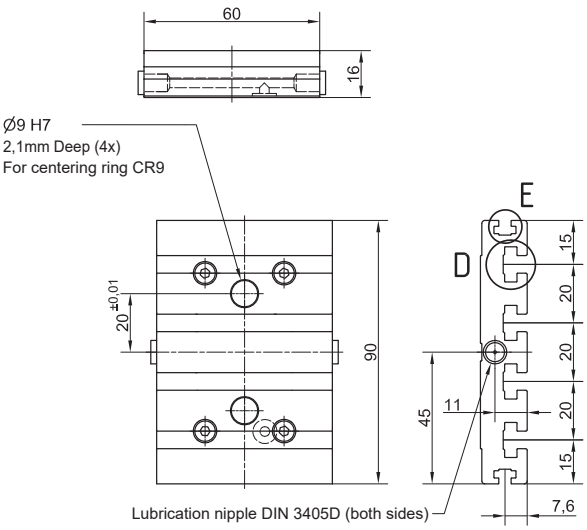
CONNECTION PLATE

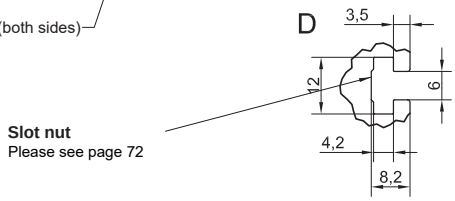
CTV 90 L



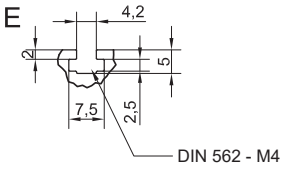


CTV 90 S





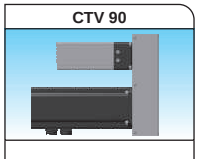
Slot nut
Please see page 72



Linear Unit	Plate length [mm]	Weight [kg]	Code
CTV 90 S	60	0,21	46906
CTV 90 L	125	0,44	46907

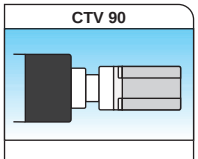
Mounting elements for mounting the connection plate on the Linear unit are inlcuded.

MOTOR - MOTOR SIDE DRIVE



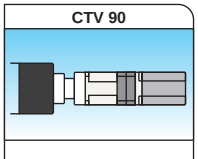
Available on request

MOTOR



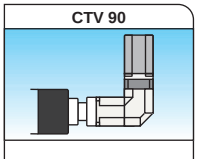
Available on request

GEAR REDUCER + MOTOR



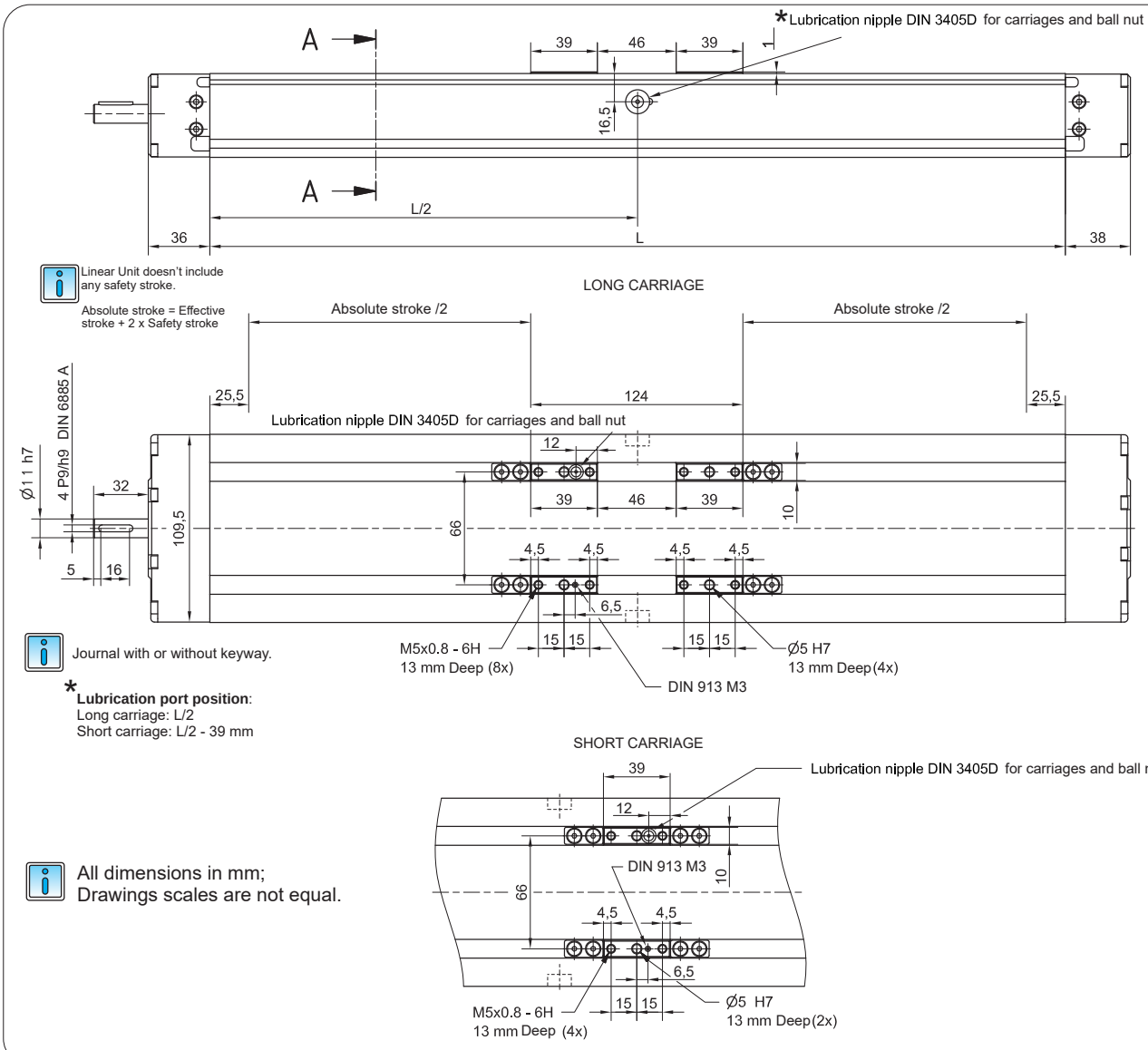
Available on request

GEAR REDUCER 90° + MOTOR



Available on request

CTV 110
Two-Row Ball Screw Actuators – Dimensions

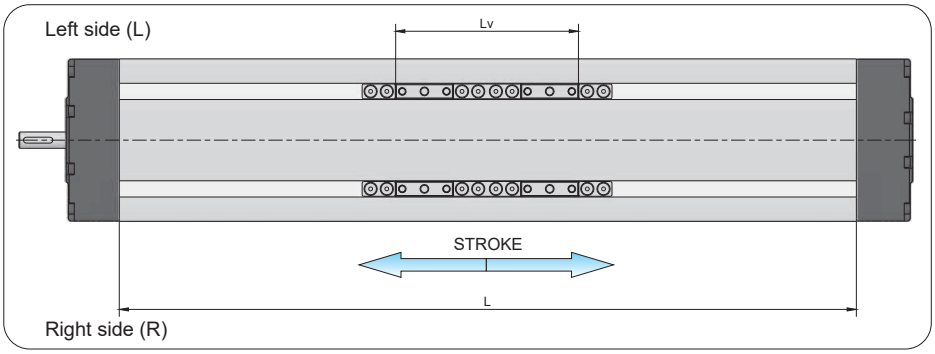


Defining of the linear module length

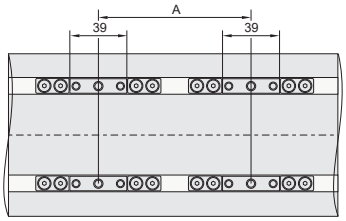
L = Effective stroke + 2 × Safety stroke + Lv + 51 mm

Ltotal = L + 74 mm

Lv - Long carriage = 124 mm
Lv - Short carriage = 39 mm



Double-Carriage



Only with **short** carriage version.

L = Effective stroke + 2 × Safety stroke + A + 90 mm

Ltotal = L + 74 mm

A ≥ 85 mm

For ordering code please contact us

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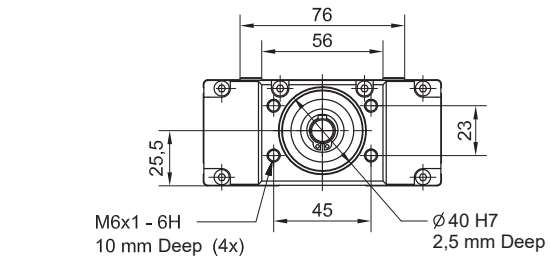
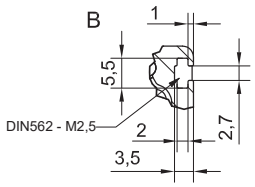
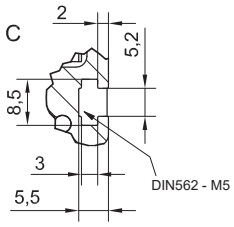
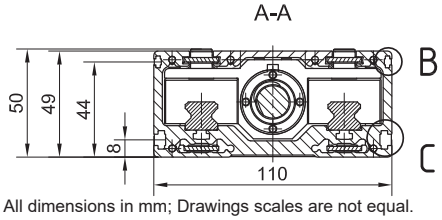
CTV 110
Two-Row Ball Screw Actuators – Dimensions



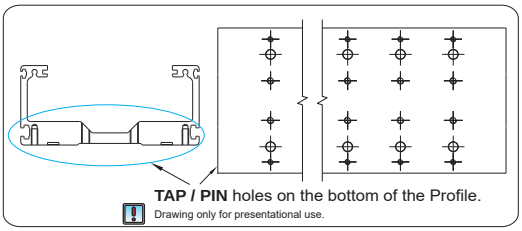






All dimensions in mm; Drawings scales are not equal.

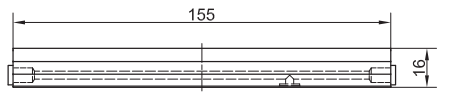
OPTIONAL: **TAP / PIN** holes available on request.

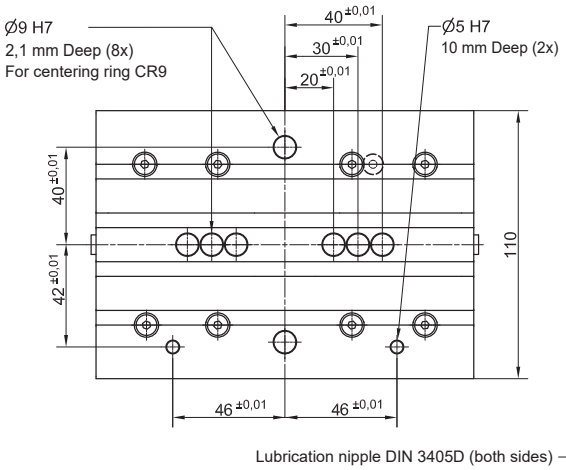


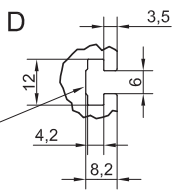
TAP / PIN holes on the bottom of the Profile.
Drawing only for presentational use.

CONNECTION PLATE

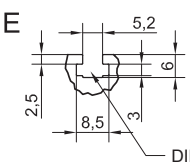
CTV 110 L



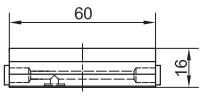


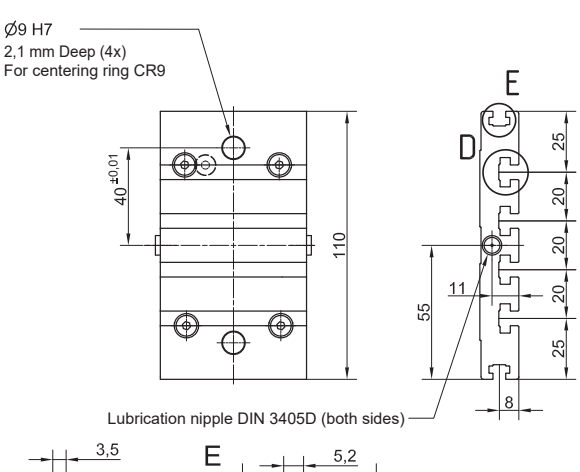


Slot nut
Please see page 72



CTV 110 S

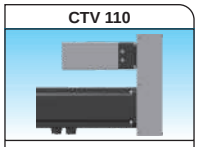




Linear Unit	Plate length [mm]	Weight [kg]	Code
CTV 110 S	60	0,37	48348
CTV 110 L	155	0,74	48349

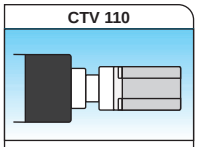
Mounting elements for mounting the connection plate on the Linear unit are inlcuded.

MOTOR - MOTOR SIDE DRIVE



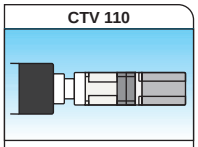
Available on request

MOTOR



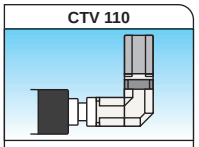
Available on request

GEAR REDUCER + MOTOR



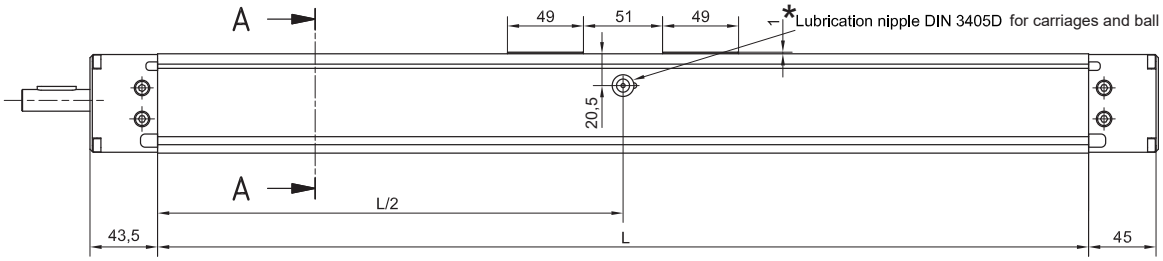
Available on request

GEAR REDUCER 90° + MOTOR



Available on request

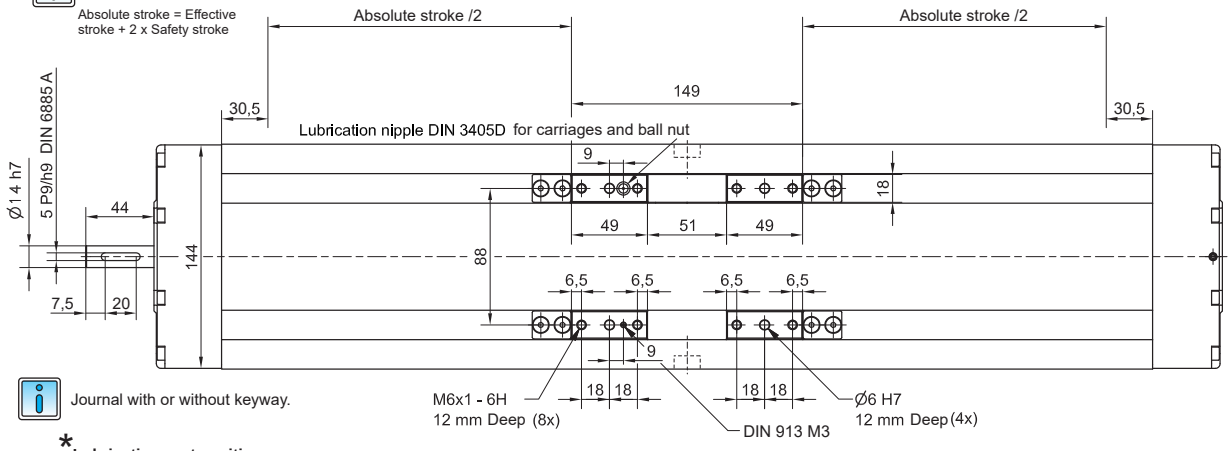
CTV 145
Two-Row Ball Screw Actuators – Dimensions



Linear Unit doesn't include any safety stroke.

Absolute stroke = Effective stroke + 2 x Safety stroke

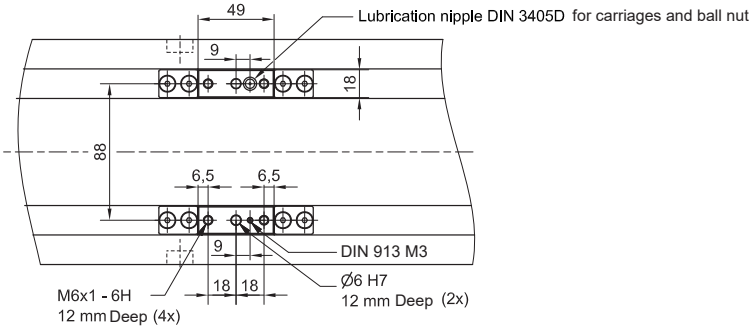
LONG CARRIAGE



Journal with or without keyway.

* **Lubrication port position**:
Long carriage: L/2
Short carriage: L/2 - 46 mm

SHORT CARRIAGE



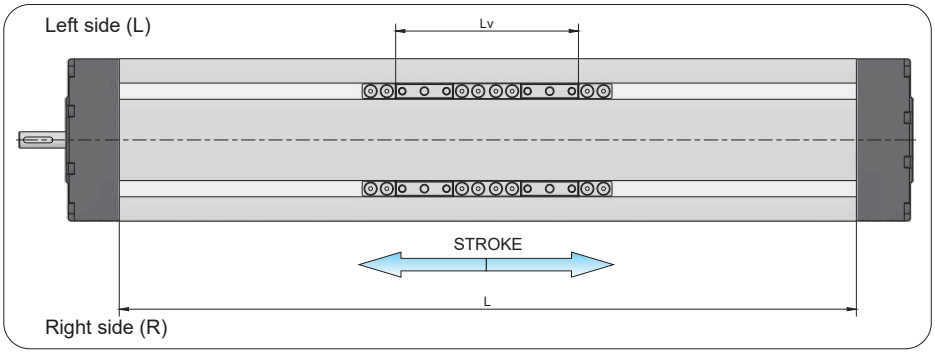
All dimensions in mm;
Drawings scales are not equal.

Defining of the linear module length

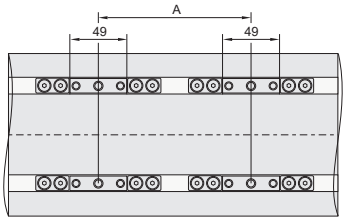
Lv - Long carriage = 149 mm
Lv - Short carriage = 49 mm

L = Effective stroke + 2 × Safety stroke + Lv + 61 mm

Ltotal = L + 88,5 mm



Double-Carriage



Only with **short** carriage version.

L = Effective stroke + 2 × Safety stroke + A + 110 mm

Ltotal = L + 88,5 mm

A ≥ 100 mm

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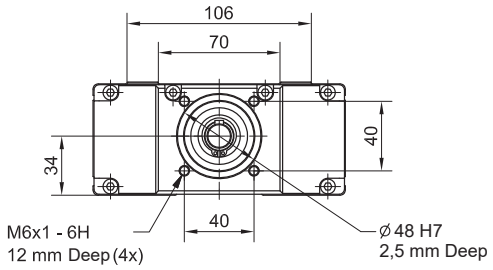
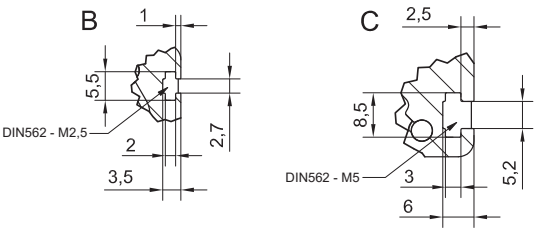
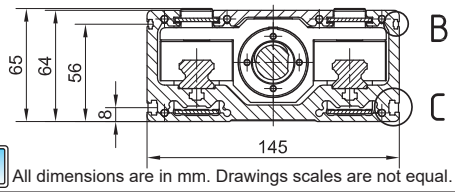
CTV 145
Two-Row Ball Screw Actuators – Dimensions

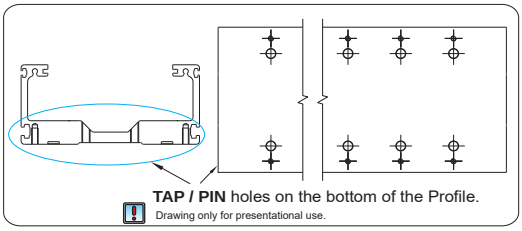




OPTIONAL: **TAP / PIN** holes available on request.



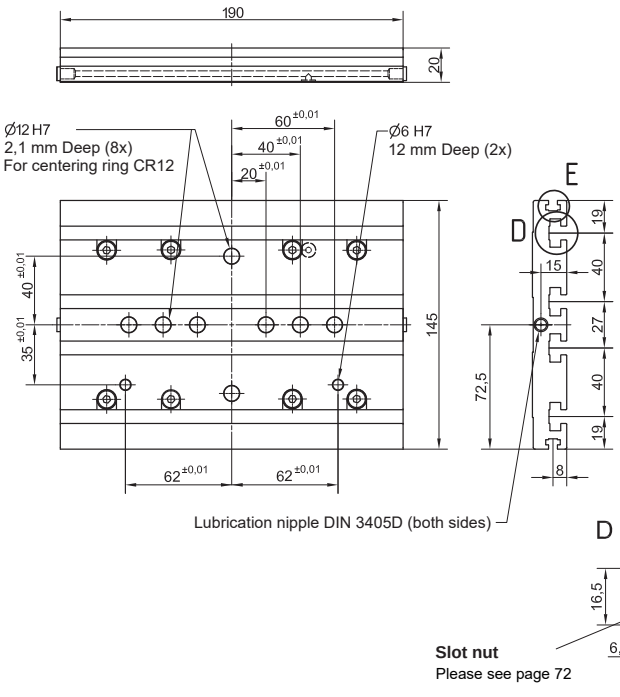
All dimensions are in mm. Drawings scales are not equal.

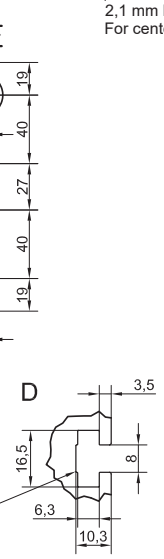


TAP / PIN holes on the bottom of the Profile.
Drawing only for presentational use.

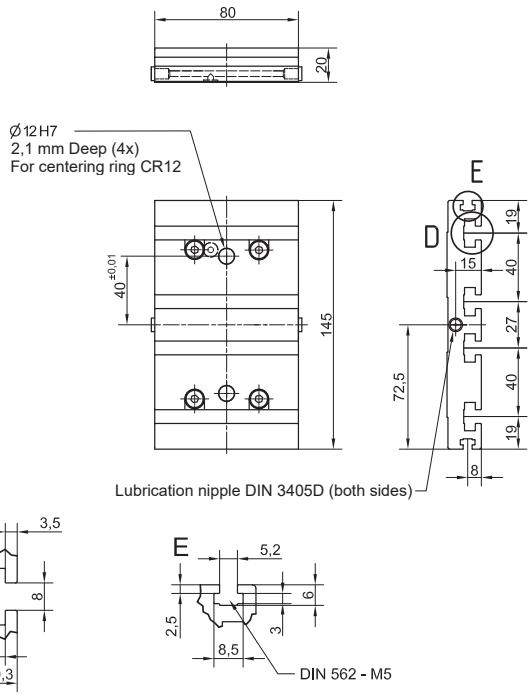
CONNECTION PLATE

CTV 145 L





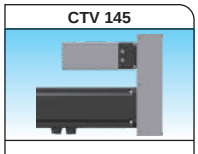
CTV 145 S



Linear Unit	Plate length [mm]	Weight [kg]	Code
CTV 145 S	80	0,78	48351
CTV 145 L	190	1,54	48350

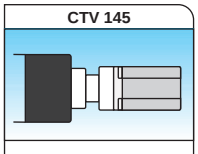
Mounting elements for mounting the connection plate on the Linear unit are inlcuded.

MOTOR - MOTOR SIDE DRIVE



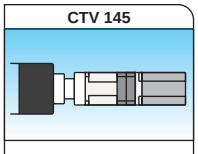
Available on request

MOTOR



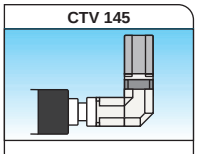
Available on request

GEAR REDUCER + MOTOR



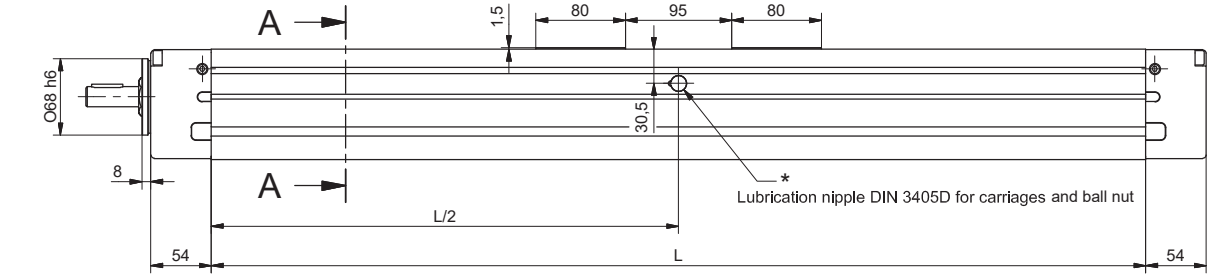
Available on request

GEAR REDUCER 90° + MOTOR



Available on request

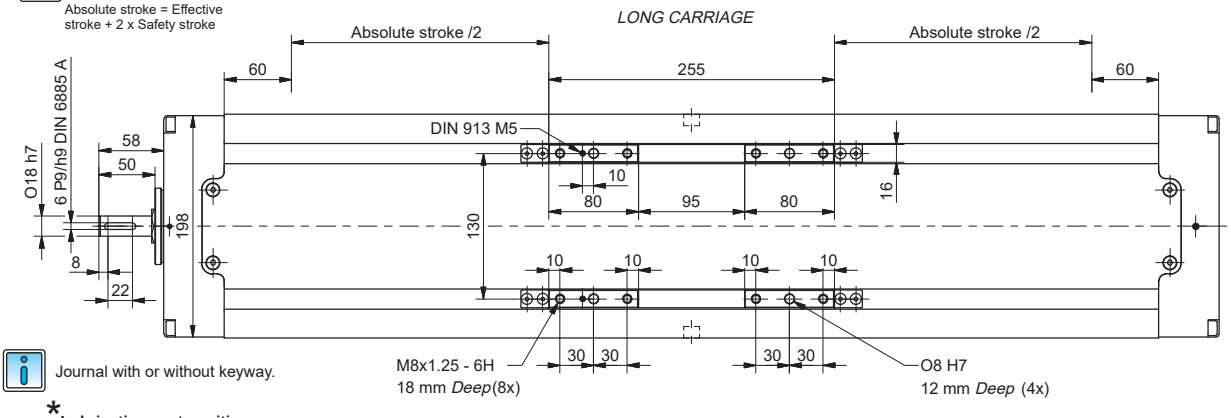
CTV 200
Two-Row Ball Screw Actuators – Dimensions



Linear Unit doesn't include any safety stroke.

Absolute stroke = Effective stroke + 2 x Safety stroke

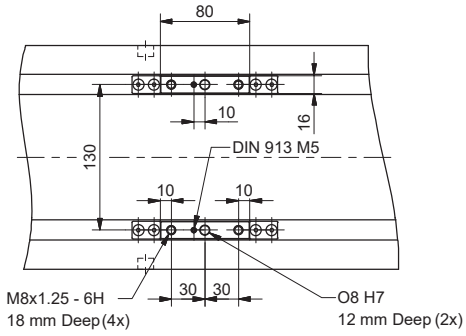
LONG CARRIAGE



Journal with or without keyway.

* **Lubrication port position**:
Long carriage: L/2
Short carriage: L/2 - 53 mm

SHORT CARRIAGE



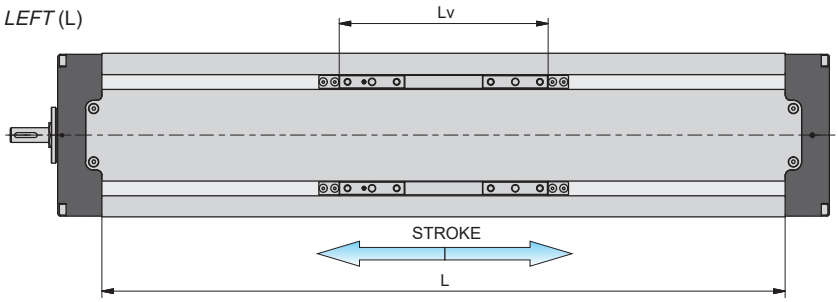
All dimensions in mm;
Drawings scales are not equal.

Defining of the linear module length

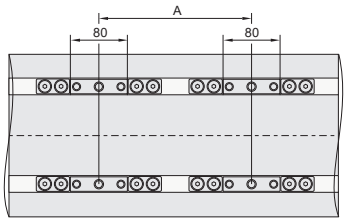
Lv - Long carriage = 255 mm
Lv - Short carriage = 80 mm

L = Effective stroke + 2 × Safety stroke + Lv + 120 mm

Ltotal = L + 108 mm



Double-Carriage



Only with **short** carriage version.

L = Effective stroke + 2 × Safety stroke + A + 200 mm
Ltotal = L + 108 mm

A ≥ 130 mm

For ordering code please contact us

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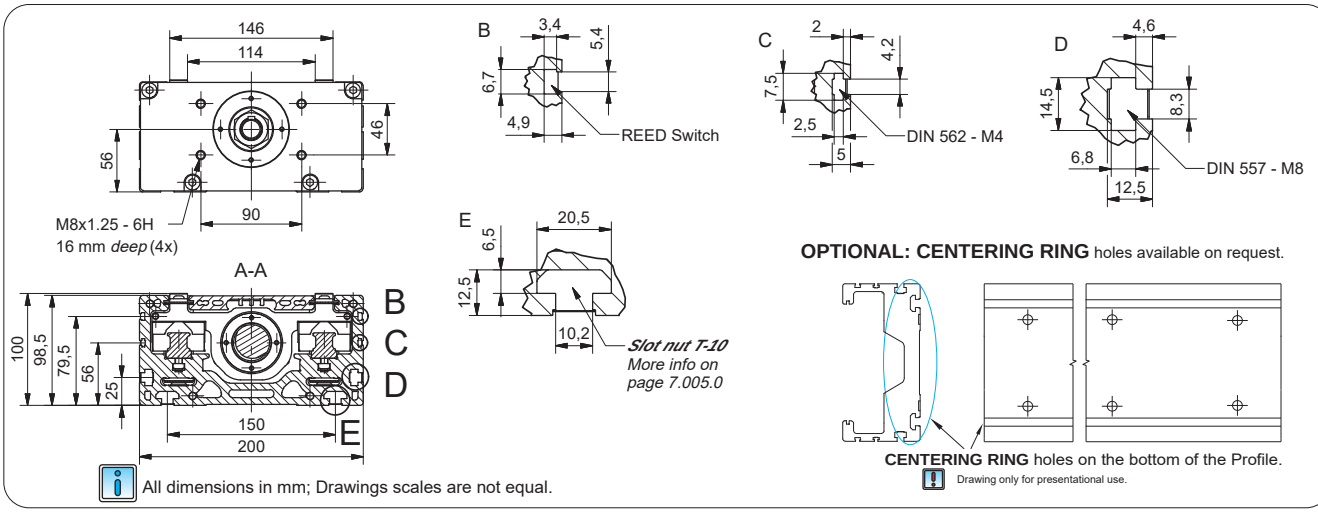
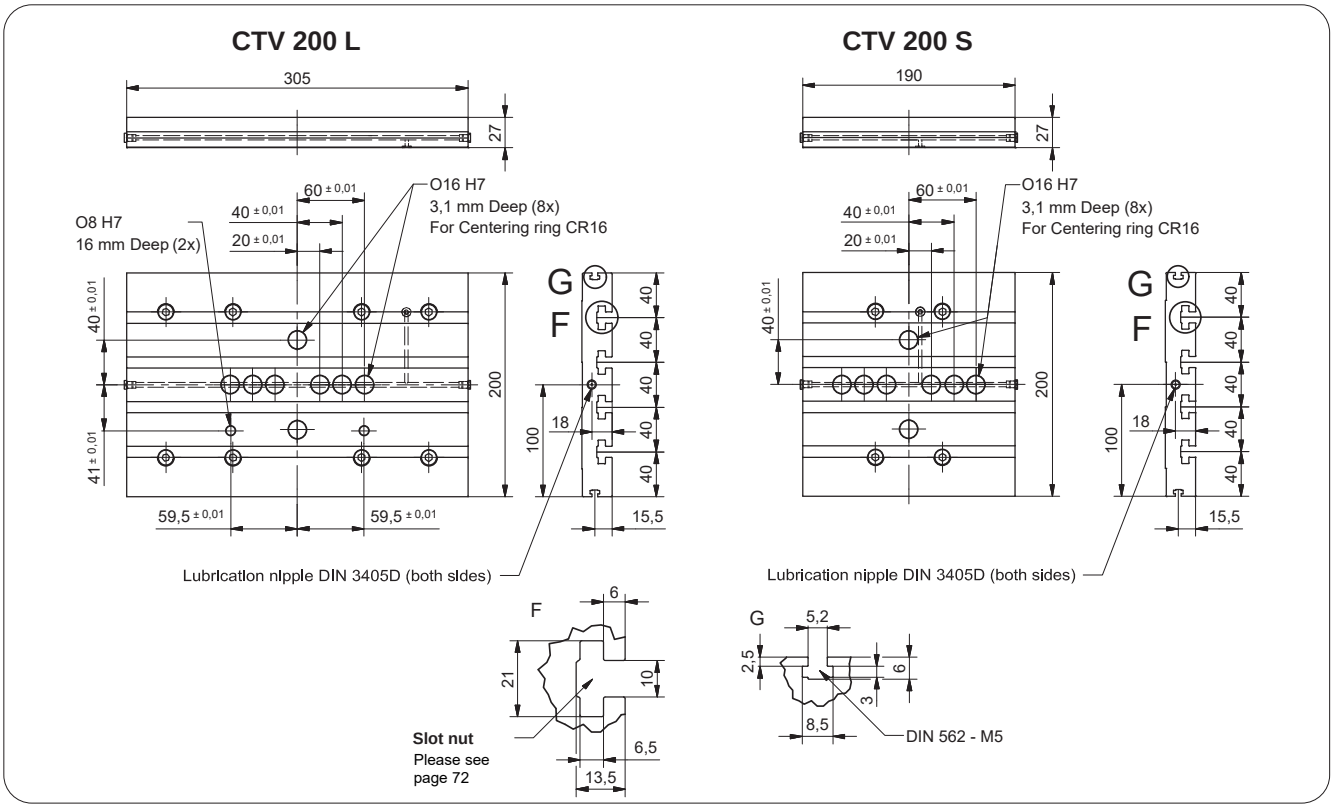
CTV 200
Two-Row Ball Screw Actuators – Dimensions



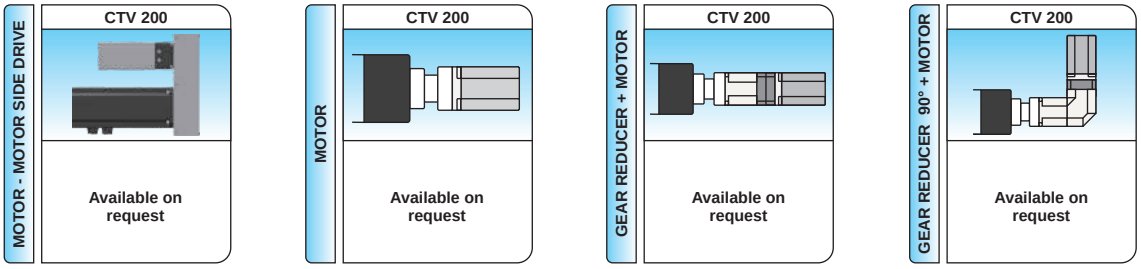
CONNECTION PLATE



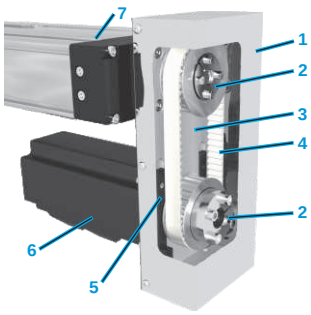
Linear unit	Plate length [mm]	Weight [kg]	Code
CTV 200 S	190	2,32	66669
CTV 200 L	305	3,75	66657

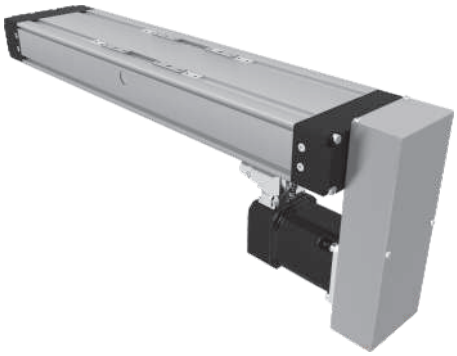
Mounting elements for mounting the connection plate on the Linear unit are inlcuded.

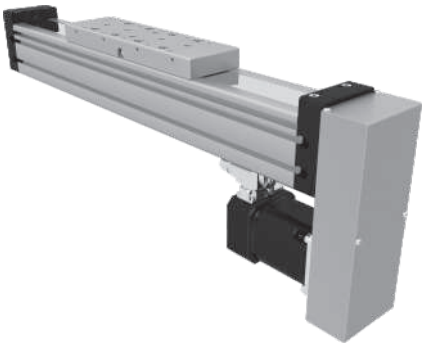
Please consider our advice in our Maintenance- and assembly instructions



CTV & MTV MSD
Motor Side Drive – Ball Screw Actuators



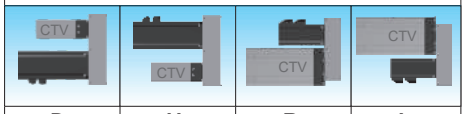




1 - Cover
2 - Attachment of pulley with clamping set
3 - Anodized aluminium housing
4- Toothed belt
5- Belt tensioning system (elongation and frequency of belt span provided with delivery of unit)
6 - Motor
7 - Linear unit - CTV / MTV

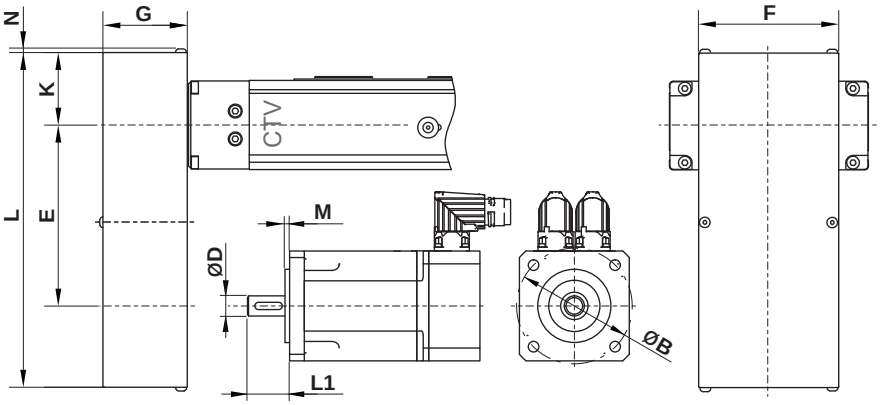
The linear unit must be executed with drive journal without keyway, so that the MSD belt drive can be mounted on it.

Possible installation positions of MSD

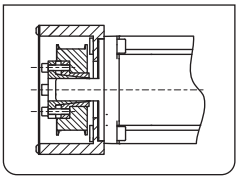


D	U	R	L
Down	Up	Right	Left

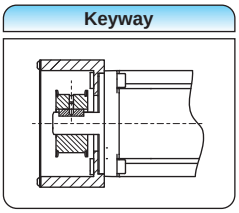
DIMENSIONS AND TECHNICAL DATA



Clamping set



Keyway



Linear Unit	Type	Gear ratio	Max. drive torque [Nm]	Mass moment of inertia [10^{-6} kg·m^2]	Mass [kg]	Motor size limits [mm] ØB max	M max	L1 min Clamping set	L1 min Keyway	L1 max	ØD max Clamping set	ØD max Keyway	Dimensions [mm] E	F	G	K	L	N
CTV 90	T1	i=1	4	79	0,88	70	4*	22	25	39	14	22	100	70	41	31	179	2
		i=1,5	4	48	0,74			/			/	14	102					
CTV 110 / MTV 65	T1	i=1	4	72	0,90	70	4*	22	25	39	14	22	100	70	41	31	179	2
		i=1,5	4	41	0,80			/			/	14	112				190	
CTV 110 / MTV 65	T2	i=1	9	206	1,51	100	4*	24	30	49	18	30	145	90	51	43	250	2
		i=1,5	9	335	1,53			25			14		139					
CTV 145 / MTV 80	T1	i=1	9	207	1,52	100	4*	24	30	49	18	30	145	90	51	43	250	2
		i=1,5	9	335	1,64			25			14		180				282	
CTV 145 / MTV 80	T2	i=1	12	551	3,30	120	4*	30	35	59	22	40	160	120	61	56	297	2,5
		i=2	12	860	2,93						14	32	158					
CTV 200 / MTV 110	ON REQUEST																	

*For a bigger value an additonal adapter plate is used

(max. drive speed: 3000 1/min; No load torque: approx. 0,5 Nm)

MSD - CTV 110 - T2 - 1,5 - MSM040B

- **Motor Side Drive:** MSD
- **Linear Unit series :** CTV 110 — CTV / MTV
- **Type :** T2
- **Gear ratio :** 1,5
- **Motor type :** MSM040B — According to customer's drawing

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FAX: 01827 253390
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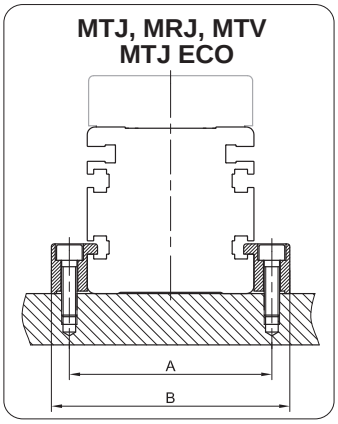
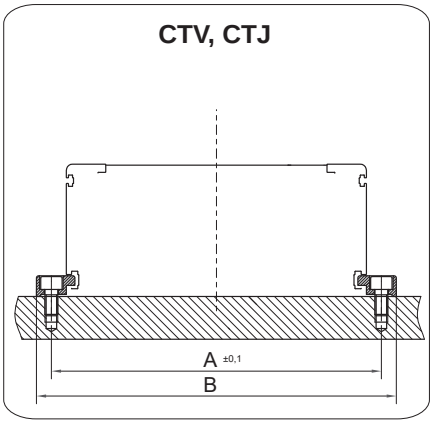
Profile Clamps

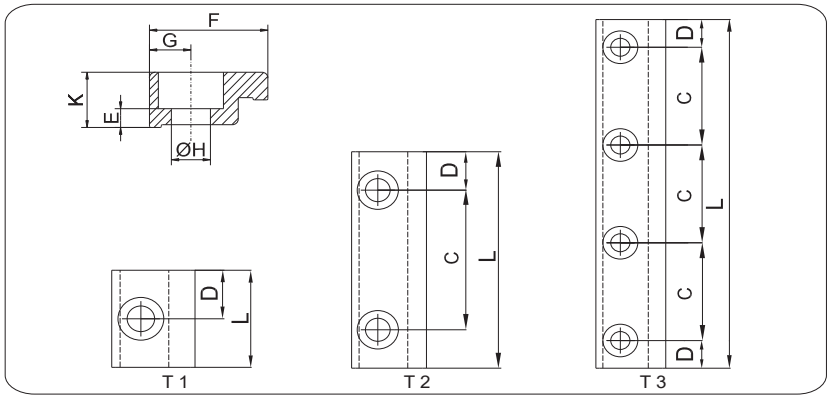




General

The modules are mounted by using fixtures which are placed in the slot on the side of the profile.

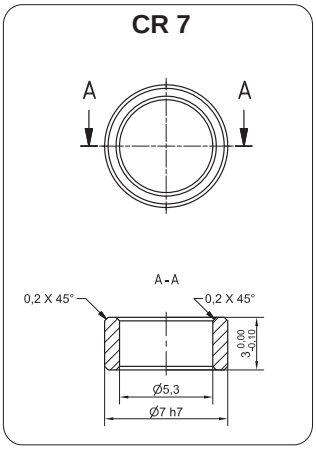
Linear Unit must be mounted by the aluminium profile!

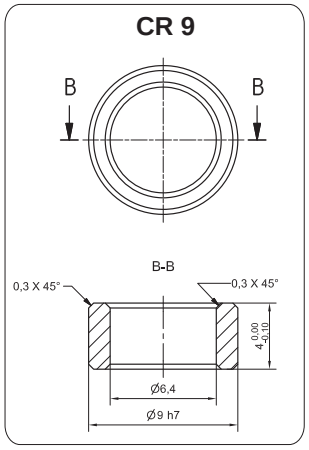


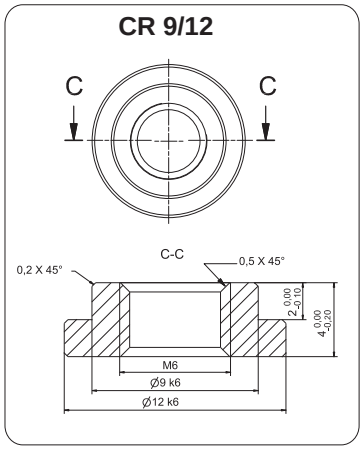
Linear Unit	Type	Dimensions [mm]										Screw	Countersink for	Weight [kg]	Code
		A	B	C	D	L	E	F	G	ØH	K				
MTJ, MRJ 40	T 2	50	64,4	40	7,5	55	2,5	15	7,2	5,5	8	M5	DIN 912	0,014	37139
MTJ, MRJ, MTV 65	T 2	78	93	40	10	60	11,5	20	7,5	6,5	20	M6	DIN 912	0,054	37129
MTJ, MRJ, MTV 80	T 2	93	108	40	10	60	11,5	20	7,5	6,5	20	M6	DIN 912	0,054	37129
MTJ, MRJ, MTV 110	T 2	130	150	40	10	60	18	30	10	8,5	27	M8	DIN 912	0,082	44375
MTJ ECO 40	T 2	52	66	40	7,5	55	14,5	20	7	5,5	20	M5	DIN 912	0,035	40728
CTV, CTJ 90	T 1	102	112	/	12,5	25	4,5	15	5	4,5	9	M4	DIN 912	0,01	46994
CTV, CTJ 90	T 2	102	112	40	11	62	4,5	15	5	4,5	9	M4	DIN 912	0,02	48636
CTV, CTJ 90	T 3	102	112	20	8,5	77	4,5	15	5	4,5	9	M4	DIN 912	0,025	47163
CTV, CTJ 90	T 3	102	112	25	6	87	4,5	15	5	4,5	9	M4	DIN912	0,028	55261
CTV, CTJ 90	T 3	102	112	30	8,5	107	4,5	15	5	4,5	9	M4	DIN912	0,031	55638
CTV, CTJ 110	T 1	126	140	/	12,5	25	3,4	20	7	6,6	10	M6	DIN 912	0,01	48642
CTV, CTJ 110	T 2	126	140	40	11	62	3,4	20	7	6,6	10	M6	DIN 912	0,03	48643
CTV, CTJ 110	T 3	126	140	20	8,5	77	4,5	20	7	5,5	10	M5	DIN 912	0,03	48640
CTV, CTJ 110	T 3	126	140	30	8,5	107	4,5	20	7	5,5	10	M5	DIN 912	0,045	46995
CTV, CTJ 110	T 3	126	140	40	11	142	3,4	20	7	6,6	10	M6	DIN912	0,056	55260
CTV, CTJ 145	T 1	161	175	/	12,5	25	4,5	20	7	6,5	10	M6	DIN 912	0,01	48642
CTV, CTJ 145	T 2	161	175	40	11	62	4,5	20	7	6,5	10	M6	DIN 912	0,03	48643
CTV, CTJ 145	T 3	161	175	20	8,5	77	4,5	20	7	5,5	10	M5	DIN 912	0,03	48640
CTV, CTJ 145	T 3	161	175	30	8,5	107	4,5	20	7	5,5	10	M5	DIN 912	0,045	46995
CTV, CTJ 145	T 3	126	140	40	11	142	3,4	20	7	6,6	10	M6	DIN 912	0,056	55260
CTV, CTJ 200	T 2	222	240	40	19	78	14,8	29	9	8,5	27,5	M8	DIN 912	0,110	53049
CTV, CTJ 200	T 2	222	240	50	19	88	14,8	29	9	8,5	27,5	M8	DIN 912	0,120	53050
CTV, CTJ 200	T 2	222	240	70	19	108	16,3	29	9	8,5	27,5	M8	DIN 912	0,160	53051

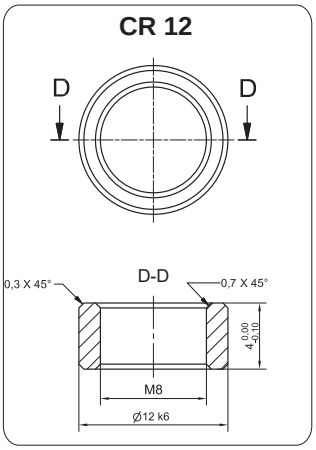
Recommended number of clamping fixtures: For T1 is recommended 6 pcs. per meter on each side, for T2 is recommended 3 pcs. per meter on each side and for T3 is recommended 3 pcs. per meter on each side.

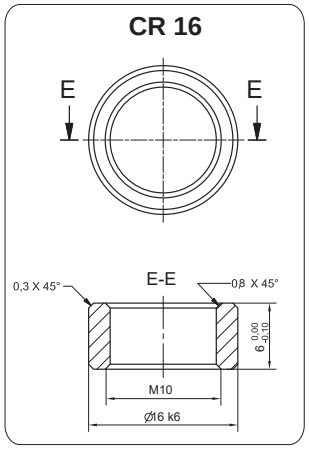
Centering Rings & Slot Nuts











Type	Compatible with	Code
CR 7	MTJ/MRJ/MTJZ/MTV: 40, 65	23332
CR 9	MTJ/MRJ /MTV/MTJZ: 80,110 CTV/CTJ: 90, 110	23331
CR 9/12	MTJ/MRJ /MTV/MTJZ: 80,110 CTV/CTJ: 90, 110, 145	48885
CR 12	CTV/CTJ: 145	49049
CR 16	CTV/CTJ: 200	53023

SLOT NUTS

DIN562

DIN557

Slot Nut

LINEAR UNITS - PROFILE

*** - deviating CODE**

CODE	NUT TYPE	MTJ/MRJ 40	MTJ/MRJ/ MTV/MTJZ 65	MTJ/MRJ/ MTV/MTJZ 80	MTJ/MRJ/ MTV /MTJZ 110	MTJ 40 ECO	CTV 90 CTJ 90	CTV 110 CTJ 110	CTV 145 CTJ 145	CTV 200 CTJ 200
41609	DIN562 - M2,5						X	X	X	
40682	DIN562 - M4	X - *57017	X	X			X			X
40768	DIN562 - M5							X	X	
40769	DIN557 - M5		X	X						
44451	DIN557 - M8				X					X
5746	Slot Nut M6					X				
5551	Slot Nut T-10-M8									X
5552	Slot Nut T-10-M6									X
5553	Slot Nut T-10-M5									X
5570	Slot Nut T-10-M8 L=90									X

LINEAR UNITS - CONNECTION PLATES

CODE	NUT TYPE	CTV 200 CTJ 200
5551	Slot Nut T-10-M8	X
5552	Slot Nut T-10-M6	X
5553	Slot Nut T-10-M5	X
5570	Slot Nut T-10-M8 L=90	X

CODE	NUT TYPE	CTV 145 CTJ 145
5704	Slot Nut 8LM4	X
5703	Slot Nut 8LM5	X
5702	Slot Nut 8LM6	X
5701	Slot Nut 8LM8	X

IDENT	NUT TYPE	CTV 110 CTJ 110	CTV 90 CTJ 90
48887	Slot Nut 6LM4	X	X
48888	Slot Nut 6LM5	X	X

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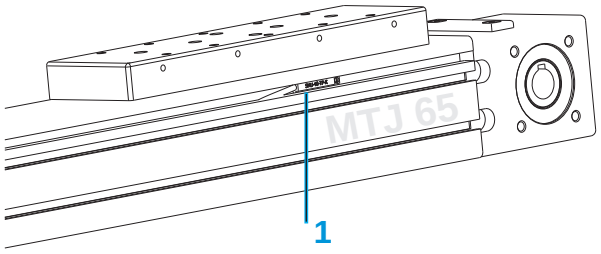
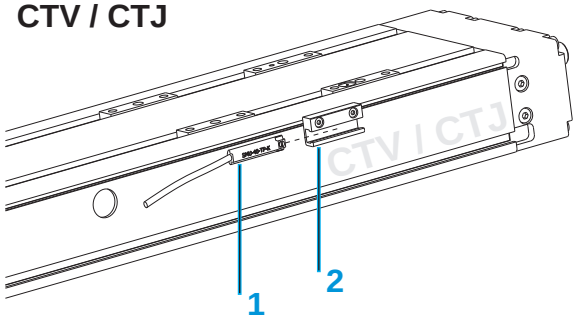
Magnetic Field Sensors

MTJ / MRJ / MTV



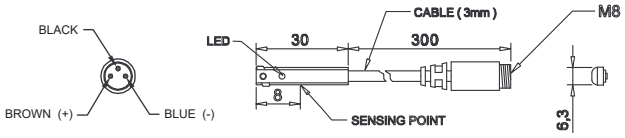
CTV / CTJ



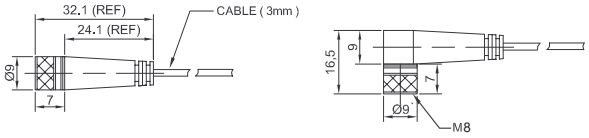
1 - Magnetic field sensor
2 - Sensor holder

Mounting of Magnetic field sensor on **CTV** and **CTJ** series requires a HOM sensor holder. For CTV/CTJ 200 a HOM sensor holder is not needed.

SMU-40TP-K *PNP NO*

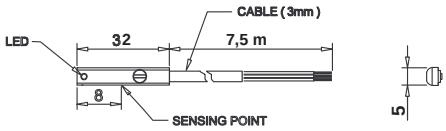


Extension cable with connector



Code	Type	Compatibility	
43851	HOM sensor holder	CTV90, CTV110, CTV145, CTJ90, CTJ110, CTJ145	
40679	SMU-40TP-K	MTJ/MRJ/MTV/MTJZ:40,65,80,110 CTV/CTJ: 200	
45869	SMU-40TP-K + HOM	CTV90, CTV110, CTV145 CTJ90, CTJ110, CTJ145	
8146	Extension Cable length 2m - Straight connector		
8147	Extension Cable length 5m - Straight connector		
9017	Extension Cable length 2m - Angeled connector		
9019	Extension Cable length 5m - Angeled connector		

SME-8M-DO *PNP NC*

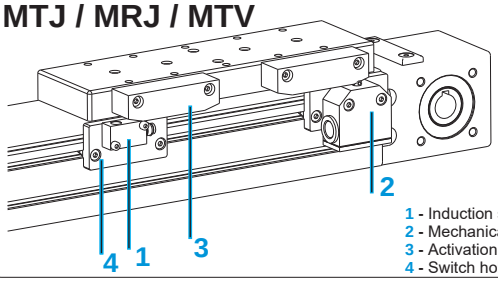


Code	Type	Compatibility	
43851	HOM sensor holder	CTV90, CTV110, CTV145 CTJ90, CTJ110, CTJ145	
43310	SME-8M-DO	MTJ/MRJ/MTV/MTJZ:40,65,80,110 CTV/CTJ: 200	
45870	SME-8M-DO + HOM	CTV90, CTV110, CTV145 CTJ90, CTJ110, CTJ145	

TECHNICAL DATA	SMU-40TP-K *PNP NO*	SME-8M *PNP NC*
Sensor Type	PNP	Contacting, Bipolar
Switching function	NO	NC
Operating voltage	10 ~ 30 V DC	5 ~ 30 V DC
Switching Current	100 mA max.	80 mA max.
Switching capacity	6 W max.	2,4 W max.
Voltage Drop	1,5 V max.	3,5 V max.
Current Consumption	20 mA / 24 V DC max.	20 mA / 24 V DC max.
Switching Frequency	1000 Hz	/
Ambient temperature	-10 do +70°C	-10 do +70°C
Shock/Vibration	50 G / 9 G	50 G / 9 G
Protection class	IP 67	IP 65, IP 67
LED indicator	Yellow	Yellow
Electrical connection	M8, 3-pin	Open end
Cable material-length	PU - 0,3 m	PU- 7,5 m
	/	Energy chain compliant-bending radius 75 mm
Extension cable	Energy chain compliant	/

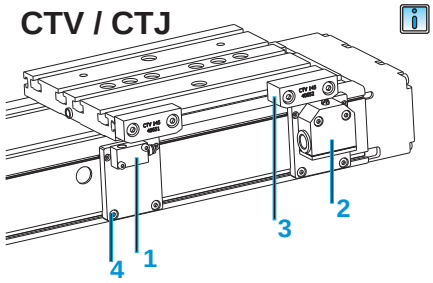
Limit Switches

MTJ / MRJ / MTV



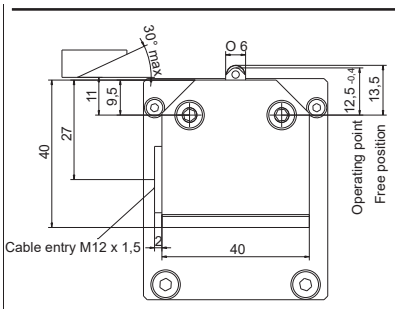
1 - Induction switch
2 - Mechanical switch
3 - Activation block
4 - Switch holder

CTV / CTJ



Mounting and using the Induction and Mechanical switch, can be done only if the CTV and CTJ series Linear Units are delivered with Connection plates.

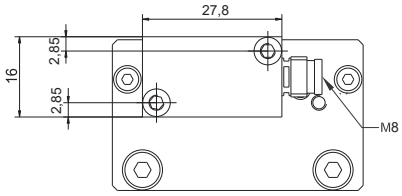
MS- Mechanical switch



Protection class IEC 60529	IP 67
Ambient temperature	-5°C ...+80°C
Operating point accuracy	± 0.05 mm
Approach speed max.	45 m/min
Approach speed min.	0,01 m/min
Switching contact	1 changeover
Switching principle	Snap-action
Rated voltage	250 V AC
Switching current, min. at	10 mA
Switching voltage	24 V DC
Cable entry	M12 x 1,5

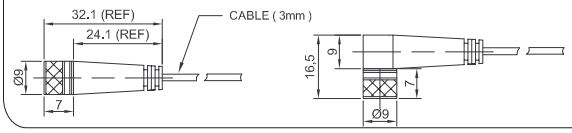
ORDERING CODES		*MTJ/MRJ 40*	*MTJZ 40*	*MTJ/MRJ/MTV 65 MTJZ 65/80*	*MTJ/MRJ/ MTV 80*	*MTJ/MRJ/ MTV 110*	*MTJZ 110*	*MTJ ECO 40*	*CTV/CTJ 90*	*CTV/CTJ 110*	*CTV/CTJ 145*	*CTV/CTJ 200*
+ 2×	Activation block with fixing screws	43243	52022	43247	43256	47827	63702	49030	49032	49031	40652	40652
	Mechanical switch only					47921						
2× + + 2× +	Mechanical switch with mounting elements	40683		40687	40689	47826	63703	49035	49034	49033	47939	53055

IS- Inductive switch



Sensor Type	PNP
Switching function	NC / NO
Rated voltage	10 ~ 30 V DC
Switching Current	150 mA max.
Ambient temperature	-25°C ...+70°C
Switching Frequency	800 Hz max.
Voltage Drop	3,5 V
Protection class	IP 67
Electrical connection	M8, 3-pin

Extension cable with connector



Extension cable	Energy chain compliant - bending radius 75 mm
Cable material-length	PU
Cable length	2m / 5m
Cable length	*M8, 3-pin Straight or Angeled connector*

ORDERING CODES		*MTJ/MRJ 40*	*MTJZ 40*	*MTJ/MRJ/MTV 65 MTJZ 65/80*	*MTJ/MRJ/ MTV 80*	*MTJ/MRJ/ MTV 110*	*MTJZ 110*	*MTJ ECO 40*	*CTV/CTJ 90*	*CTV/CTJ 110*	*CTV/CTJ 145*	*CTV/CTJ 200*
+ 2×	Activation block with fixing screws	43243	52022	43247	43256	47827	63702	49030	49032	49031	40652	40652
	PNP NO Inductive switch only					40671						
2× + + 2× +	**PNP NO** Ind. switch with mounting elements	40680		48026	43233	48047	63705	45105	49039	49038	48058	53054
	PNP NC Inductive switch only					43570						
2× + + 2× +	**PNP NC** Ind. switch with mounting elements	48851		40685	47848	47989	63704	45103	49037	49036	47850	53052

	Extension Cable length 2m - Straight connector	8146
	Extension Cable length 5m - Straight connector	8147
	Extension Cable length 2m - Angeled connector	9017
	Extension Cable length 5m - Angeled connector	9019

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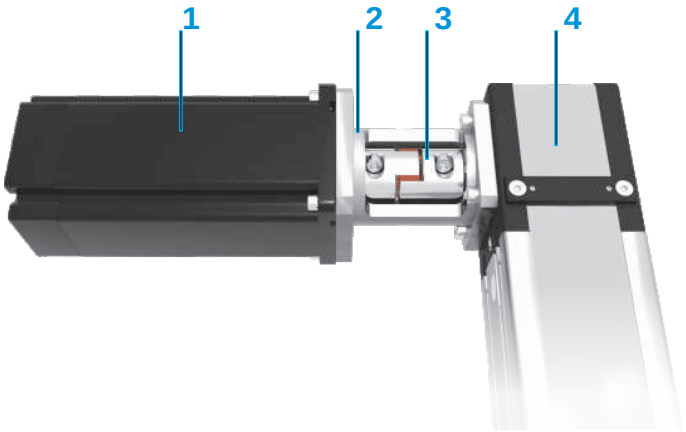
Motor Adapters & Couplings



1 - Motor
2 - Motor adapter
3 - Coupling
4 - Linear Unit

VK - CTV110 - SMB60 - GESM14

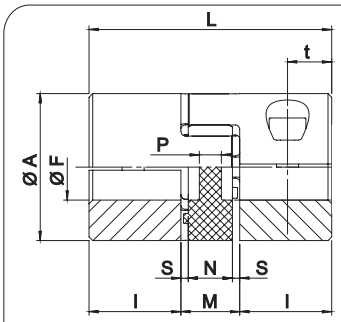
Motor adapter :
Linear Unit :
Motor type :
According to customer's specification
Coupling type :

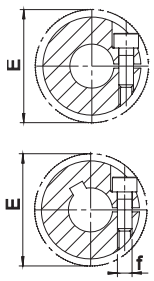
COUPLINGS

COUPLING - GESM14 - F8C - F14C

Coupling:
Coupling type / size:
7, 9, 14, 19/24, 24/28, 28/38, 38/45

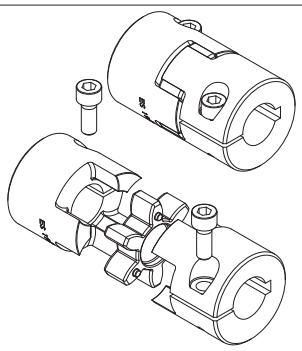
Option:
C: with keyway
Leave blank: without keyway
Hole diameter





without Keyway

with Keyway



The maximum transmittable torque of the clamping hub depends on the bore diameter

Please see page 76

Size	* T_{KN} Nominal (Nm)	*T_{Kmax} (Nm)	Ms (Nm)	Hub W (Kg)	Hub J (Kgm^2)	n_{max} (min^{-1})	A (mm)	F (mm) [min]	F (mm) [max]	f (mm)	L (mm)	l (mm)	M (mm)	N (mm)	S (mm)	P (mm)	t (mm)	E (mm)
7	2	4	0,35	0,003	$0,085 \times 10^{-6}$	40.000	14	3	7	M2	22	7	8	6	1,0	6	4	15,0
9	5	10	0,75	0,007	$0,42 \times 10^{-6}$	28.000	20	4	9	M2,5	30	10	10	8	1,0	2	5	23,4
14	12,5	25	1,4	0,018	$2,6 \times 10^{-6}$	19.000	30	6	15	M3	35	11	13	10	1,5	2	5,5	32,2
19/24	17	34	11	0,071	$18,1 \times 10^{-6}$	14.000	40	10	20	M6	66	25	16	12	2,0	3,5	12	45,7
24/28	60	120	11	0,156	$74,9 \times 10^{-6}$	10.600	55	10	28	M6	78	30	18	14	2,0	4	12	56,4
28/38	160	320	25	0,240	$163,9 \times 10^{-6}$	8.500	65	14	35	M8	90	35	20	15	2,5	5,2	13,5	72,6
38/45	325	650	25	0,440	$465,5 \times 10^{-6}$	7.100	80	19	45	M8	114	45	24	18	3,0	5,6	16	83,3

***The values of nominal T_{KN}** and max. T_{Kmax}** transmissible torque in the upper table are valid for coupling with Keyway!**

OSL Cardan Shafts

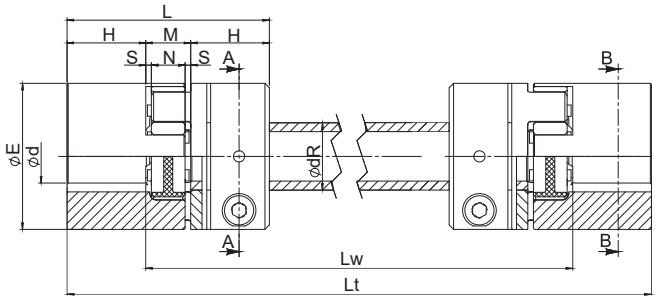
Size	Recommended coupling bore diam. and Transmissible Torque (Nm) - valid for shaft tolerances k6 without Keyway																								
	ø4	ø5	ø6	ø7	ø8	ø9	ø10	ø11	ø12	ø14	ø15	ø16	ø19	ø20	ø22	ø24	ø25	ø28	ø30	ø32	ø35	ø38	ø40	ø42	ø45
7	0,7	0,8	1	1,1																					
9	1,1	1,4	1,7	1,9	2,2	2,5	2,8	3																	
14			2,5	2,9	3,3	3,7	4,1	4,6	5	5,8	6,2	6,6													
19/24							23	25	27	32	34	36	43	45											
24/28							23	25	27	32	34	36	43	45	50	54	57	63							
28/38										58	62	66	79	83	91	100	104	116	124	133	145				
38/45											62	66	79	83	91	100	104	116	124	133	145	158	166	174	187

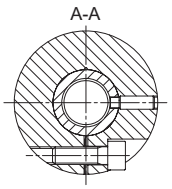
Ms	Screw tightening torque	Nm
W	Weight	Kg
J	Coupling moment of inertia	kgm^2
n_{max}	Maximum rpm	min^{-1}
T_{KN}	Coupling nominal torque	Nm
T_{kmax}	Coupling maximum torque	Nm

The operating temperature range for the coupling is between -30 and +90°C

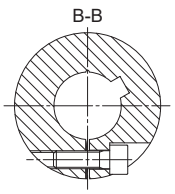
SYNCHRONISATION SHAFT OSL

The maximum transmittable torque of the clamping hub depends on the bore diameter



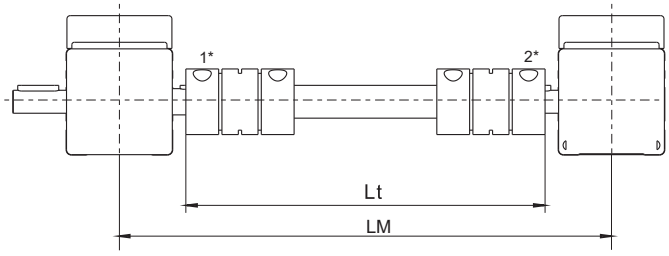


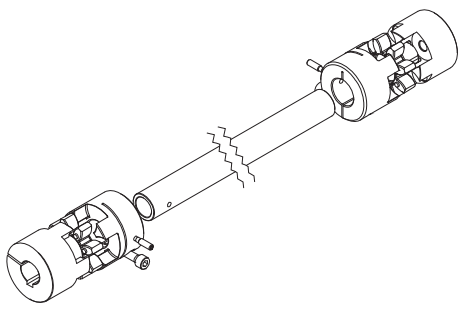
Internal Hub



Size	Internal hub		C_T (Nm/rad)	E (mm)	H (mm)	ød min (mm)	ød max (mm)	M (mm)	N (mm)	S (mm)	L (mm)	Lw min (mm)	Lt (mm)	dR x thickness (mm)	Weight (kg)	Moment of inertia (10^{-6}kg·m^2)
	Ms (Nm)	M_T (Nm)														
14	1,34	6	59	30	11	4	16	13	10	1,5	35	48		14 x 2,0	0,072 + 0,00021·Lw	10,4 + 0,0076·Lw
19/24	10	34	314	40	25	6	24	16	12	2	66	82	on request	20 x 3,0	0,284 + 0,00044·Lw	72,4 + 0,0324·Lw
24/28	10	45	596	55	30	8	28	18	14	2	78	96		25 x 2,5	0,624 + 0,00048·Lw	300 + 0,0614·Lw
28/38	25	105	2868	65	35	10	38	20	15	2,5	90	110		35 x 5,0	0,960 + 0,00128·Lw	656 + 0,2954·Lw
38/45	25	123	4521	80	45	12	45	24	18	3	114	138		40 x 5,0	1,760 + 0,00149·Lw	1862 + 0,4656·Lw

Ms	Screw tightening torque	Nm
M_T	Maximum transmissible torque	Nm
C_T	Torsional rigidity per meter	Nm/rad





For longer distances Bearing Supports needed. Please contact us.

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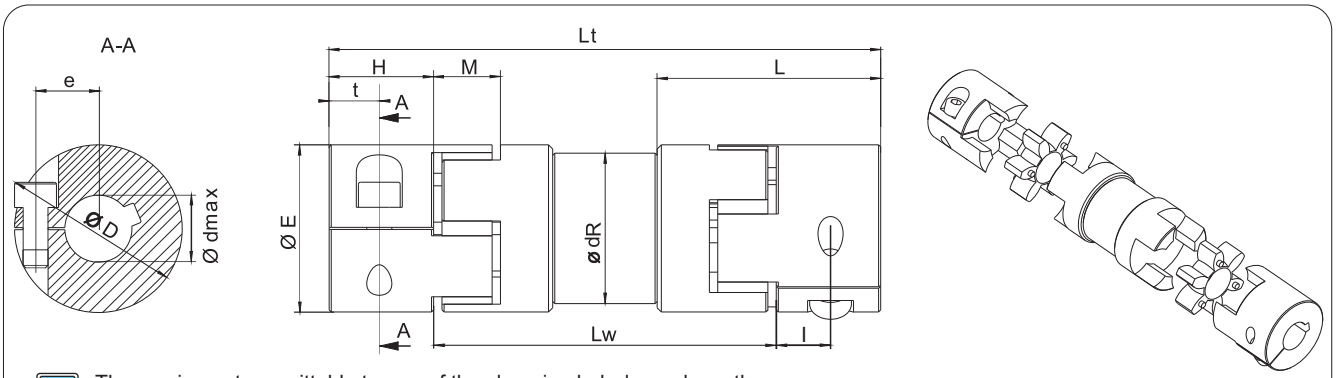
OSR Cardan Shafts

SYNCHRONISATION SHAFT OSR



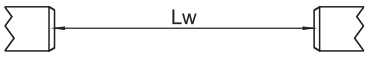
The maximum transmittable torque of the clamping hub depends on the bore diameter

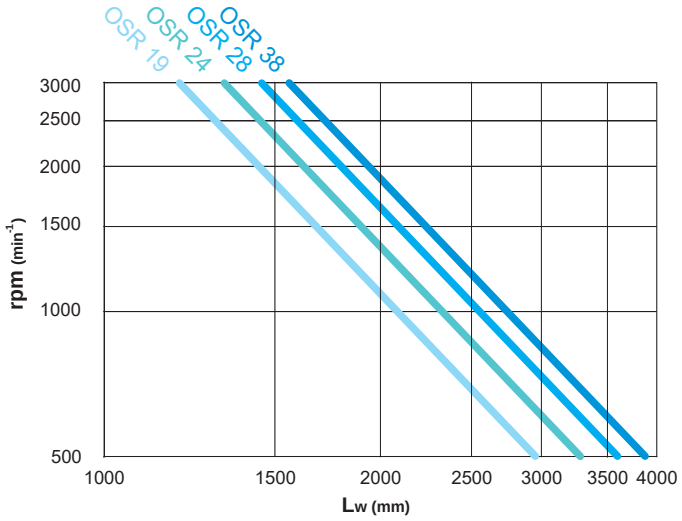
Size	d min (mm)	d max (mm)	Ms (Nm)	MT (Nm)	CT (Nm/rad)	E (mm)	H (mm)	I (mm)	L (mm)	M (mm)	Lw min (mm)	Lt (mm)	D (mm)	t (mm)	e (mm)	dR (mm)	Weight (kg)	Moment of inertia (10^{-6}kg·m^2)
19	10	20	10	39	1630	40	25	13	53,5	16	82	on request	47	12	15	36	0,30 + 0,00058·Lw	66,0 + 0,1679·Lw
24	10	28	10	53	3980	55	30	16	63	18	96		57	14	20,8	45	0,62 + 0,00091·Lw	242 + 0,4099·Lw
28	14	35	25	137	7494	65	35	20	67	20	110		73	15	25	55	0,98 + 0,00112·Lw	572 + 0,7717·Lw
38	15	45	25	180	14540	80	45	25	83,5	24	138		84	20	30	68	1,75 + 0,00140·Lw	1522 + 1,4975·Lw

Ms	Screw tightening torque	Nm
MT	Maximum transmissible torque	Nm
CT	Torsional rigidity per meter	Nm/rad

INSTALLATION

The overall length Lt is best determined as the distance between shaft ends - length Lw plus 2x dimension H.





SELECTION DIAGRAM

Ideal execution for long distance shat connections.
Torque transmission is zero backlash. Designed for lengths up to 4m without bearing support (depending on rotation speed).

Standard lenghts available till 3m, for longer lengths please contact us.

OSR - 19 - MTJ65 - LM - 890 - F16C - F16C

Type:
OSL
OSR

Size:
OSL: 14, 19/24, 24/28, 28/38, 38/45
OSR: 19, 24, 28, 38

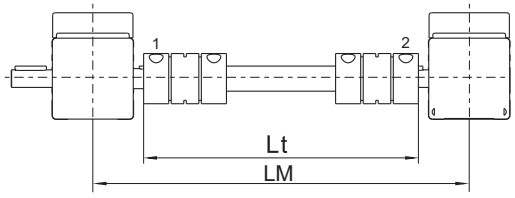
Linear unit series:
MTJ/MRJ/MTJ ECO: 40, 65, 80, 110
CTJ: 90, 110, 145, 200
Leave blank : not for linear unit

Length type:
LM (Middle distance of the linear units)
Lt (Production length of the sync. shaft)

Option:
C: with keyway
Leave blank: w/o keyway

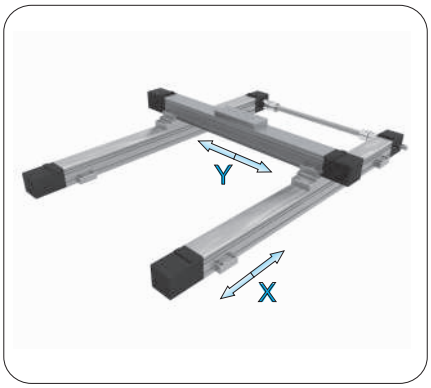
Hole diameter:
— one side end hub
--- other side end hub

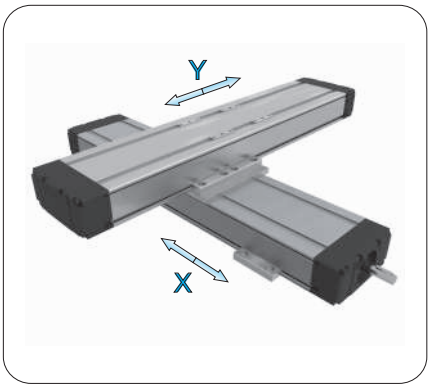
Length [mm]

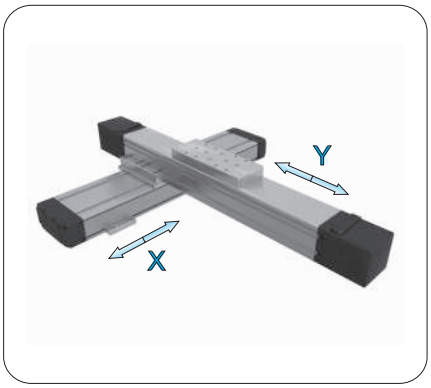


X-Y Connecting Plates

X- Axis MTJ, MRJ, MTV, MTJ ECO, CTV = 0° → Y Axis = 0°

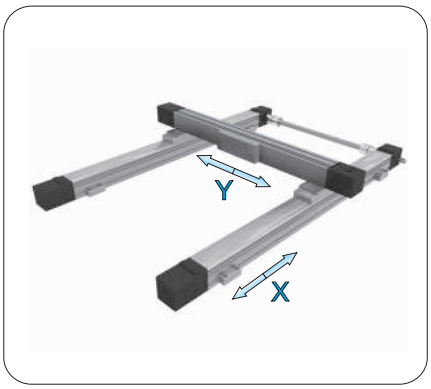


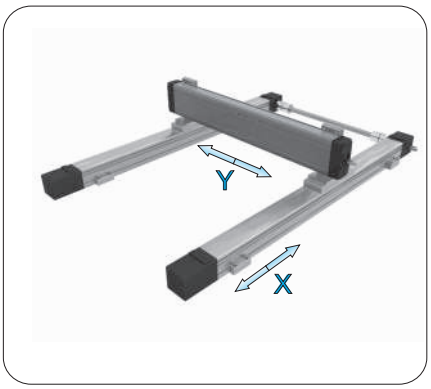


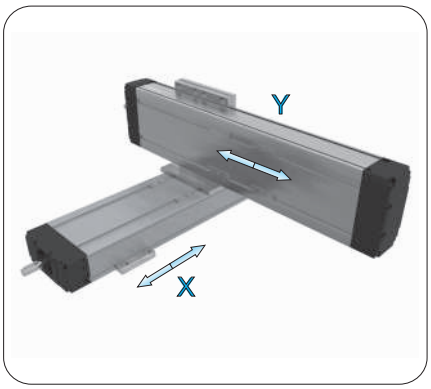


X-Axis	Y-Axis								
	MTJ, MRJ 40	MTJ, MRJ, MTV 65	MTJ, MRJ, MTV 80	MTJ, MRJ, MTV 110	MTJ 40 ECO	CTV, CTJ 90	CTV, CTJ 110	CTV, CTJ 145	CTV, CTJ 200
MTJ, MRJ 40	CP M40 0 M40 0	CP M40 0 M65 0			CP M40 0 E40 0	CP M40 0 C90 0			
MTJ, MRJ, MTV 65	CP M65 0 M40 0	CP M65 0 M65 0	CP M65 0 M80 0		CP M65 0 E40 0	CP M65 0 C90 0	CP M65 0 C110 0		
MTJ, MRJ, MTV 80		CP M80 0 M65 0	CP M80 0 M80 0	CP M80 0 M110 0		CP M80 0 C90 0	CP M80 0 C110 0	CP M80 0 C145 0	
MTJ, MRJ, MTV 110		CP M110 0 M65 0	CP M110 0 M80 0	CP M110 0 M110 0			CP M110 0 C110 0	CP M110 0 C145 0	CP M110 0 C200 0
MTJ 40 ECO	CP E40 0 M40 0	CP E40 0 M65 0	CP E40 0 M80 0		CP E40 0 E40 0	CP E40 0 C90 0	CP E40 0 C110 0		
CTV, CTJ 90	CP C90 0 M40 0	CP C90 0 M65 0				CP C90 0 C90 0	CP C90 0 C110 0		
CTV, CTJ 110	CP C110 0 M40 0	CP C110 0 M65 0	CP C110 0 M80 0			CP C110 0 C90 0	CP C110 0 C110 0	CP C110 0 C145 0	
CTV, CTJ 145		CP C145 0 M65 0	CP C145 0 M80 0	CP C145 0 M110 0		CP C145 0 C90 0	CP C145 0 C110 0	CP C145 0 C145 0	
CTV, CTJ 200			CP C200 0 M80 0	CP C200 0 M110 0			CP C200 0 C110 0	CP C200 0 C145 0	CP C200 0 C200 0

X- Axis MTJ, MRJ, MTV, MTJ ECO, CTV = 0° → Y Axis = 90°







X-Axis	Y-Axis								
	MTJ, MRJ 40	MTJ, MRJ, MTV 65	MTJ, MRJ, MTV 80	MTJ, MRJ, MTV 110	MTJ 40 ECO	CTV, CTJ 90	CTV, CTJ 110	CTV, CTJ 145	CTV, CTJ 200
MTJ, MRJ 40	CP M40 0 M40 90	CP M40 0 M65 90			CP M40 0 E40 90	CP M40 0 C90 90			
MTJ, MRJ, MTV 65	CP M65 0 M40 90	CP M65 0 M65 90	CP M65 0 M80 90			CP M65 0 C90 90	CP M65 0 C110 90		
MTJ, MRJ, MTV 80		CP M80 0 M65 90	CP M80 0 M80 90	CP M80 0 M110 90		CP M80 0 C90 90	CP M80 0 C110 90	CP M80 0 C145 90	
MTJ, MRJ, MTV 110		CP M110 0 M65 90	CP M110 0 M80 90	CP M110 0 M110 90			CP M110 0 C110 90	CP M110 0 C145 90	CP M110 0 C200 90
MTJ 40 ECO	CP E40 0 M40 90	CP E40 0 M65 90	CP E40 0 M80 90		CP E40 0 E40 90	CP E40 0 C90 90	CP E40 0 C110 90		
CTV, CTJ 90	CP C90 0 M40 90	CP C90 0 M65 90				CP C90 0 C90 90			
CTV, CTJ 110	CP C110 0 M40 90	CP C110 0 M65 90	CP C110 0 M80 90			CP C110 0 C90 90	CP C110 0 C110 90		
CTV, CTJ 145		CP C145 0 M65 90	CP C145 0 M80 90	CP C145 0 M110 90		CP C145 0 C90 90	CP C145 0 C110 90	CP C145 0 C145 90	
CTV, CTJ 200			CP C200 0 M80 90	CP C200 0 M110 90			CP C200 0 C110 90	CP C200 0 C145 90	CP C200 0 C200 90

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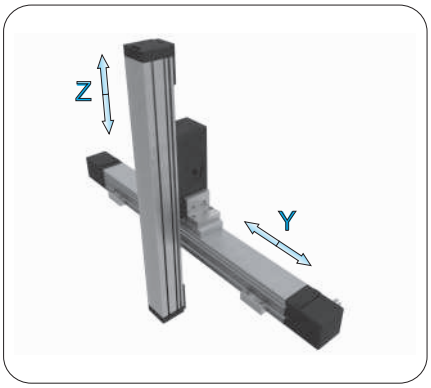
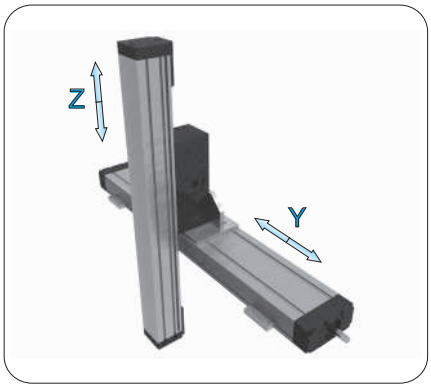
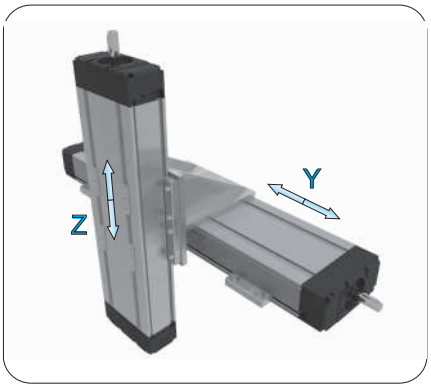
Y-Z Connecting Plates

Y- Axis MTJ, MRJ, MTV, MTJ ECO, CTV = 0° → Z-Axis = 90°

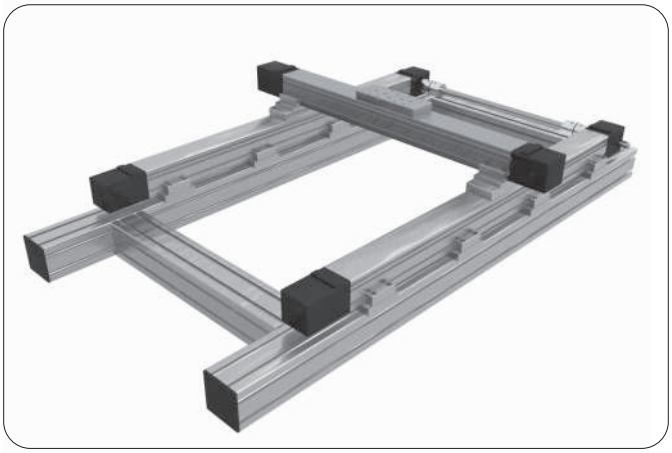


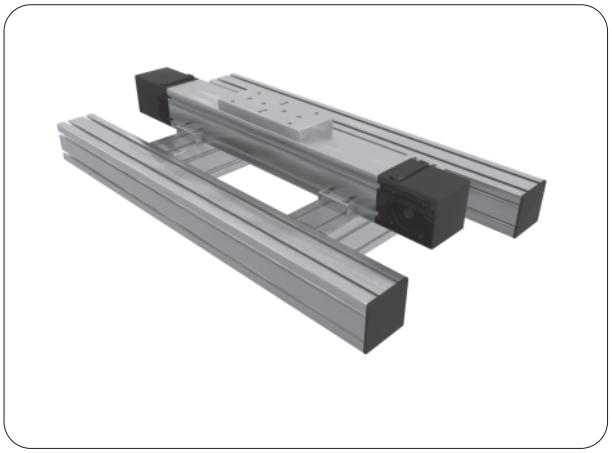




Y-Axis	Z-Axis									
	MTJZ 40	MTJZ 65	MTJZ 80	MTJZ 110	MTV 65	MTV 80	MTV 110	CTV 90	CTV 110	CTV 145
MTJ, MRJ 40	CP M40 0 Z40									
MTJ, MRJ, MTV 65	CP M65 0 Z40	CP M65 0 Z65			CP M65 0 ZM65					
MTJ, MRJ, MTV 80	CP M80 0 Z40	CP M80 0 Z65	CP M80 0 Z80		CP M80 0 ZM65	CP M80 0 ZM80				
MTJ, MRJ, MTV 110		CP M110 0 Z65	CP M110 0 Z80	CP M110 0 Z80	CP M110 0 ZM65	CP M110 0 ZM80	CP M110 0 ZM110			
MTJ 40 ECO	CP E40 0 Z40									
CTV, CTJ 90	CP C90 0 Z40	CP C90 0 Z65						CP C90 0 ZC90		
CTV, CTJ 110	CP C110 0 Z40	CP C110 0 Z65	CP C110 0 Z80		CP C110 0 ZM65	CP C110 0 ZM80		CP C110 0 ZC90	CP C110 0 ZC110	
CTV, CTJ 145	CP C145 0 Z40	CP C145 0 Z65	CP C145 0 Z80	CP C145 0 Z110	CP C145 0 ZM65	CP C145 0 ZM80	CP C145 0 ZM110	CP C145 0 ZC90	CP C145 0 ZC110	CP C145 0 ZC145
CTV, CTJ 200			CP C200 0 Z80	CP C200 0 Z110		CP C200 0 ZM80	CP C200 0 ZM110		CP C200 0 ZC110	CP C200 0 ZC145

CONNECTION ELEMENTS FOR CUNSTRICTIONS WITH ALU PROFILES



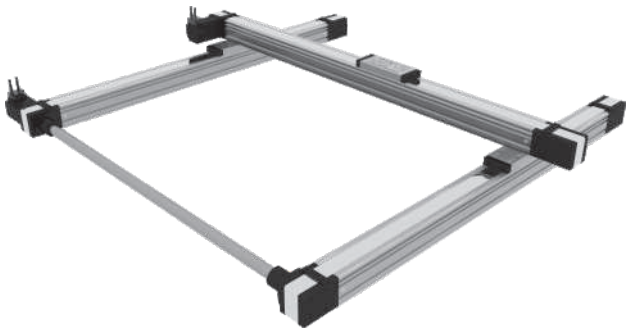


Linear Unit must be mounted by the aluminium profile and not at the end blocks!

Multi-Axis Systems

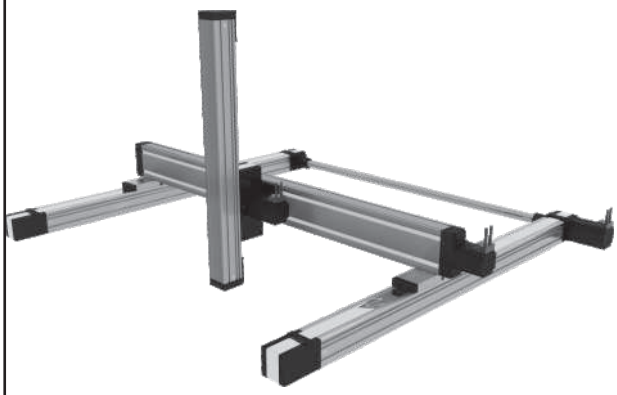
We offer all neccessary fittings including brackets, clamping fixtures and adapter plates in order to build multi-axis systems. Beside standard elements we supply also custom fixing and connection elements manufactured in our workshop.

1



2

3



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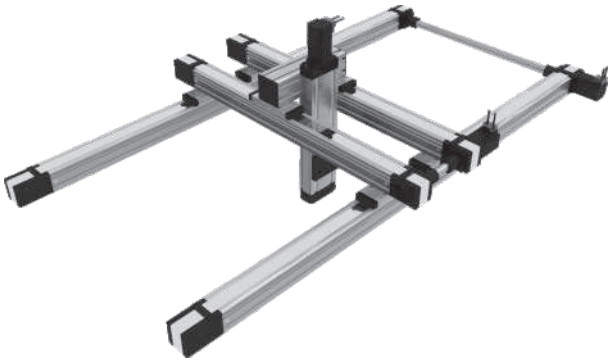

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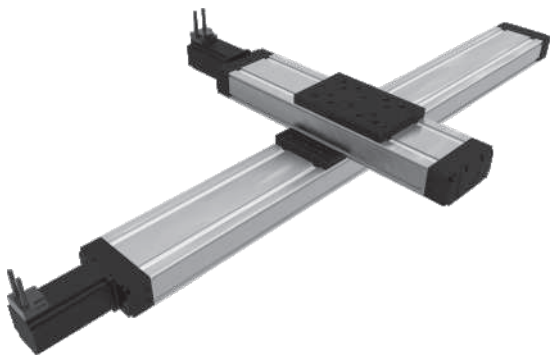

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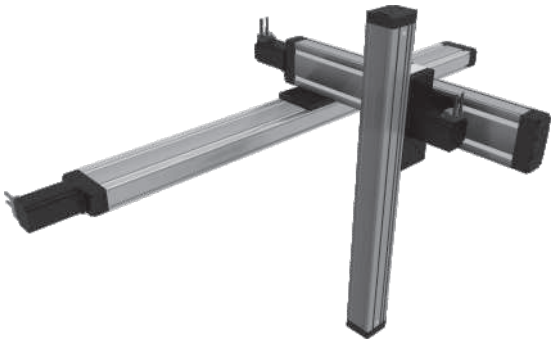

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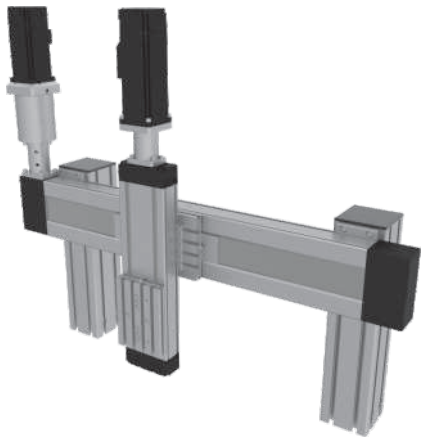
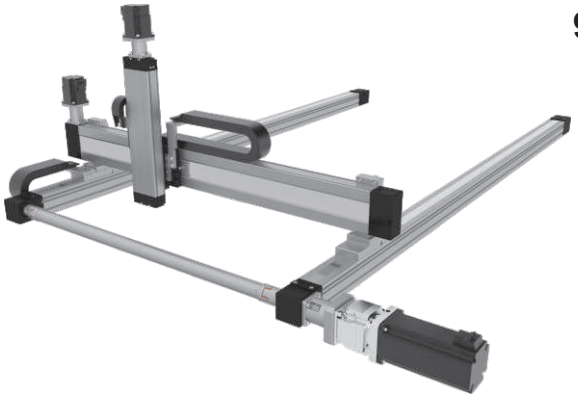
Multi-Axis Systems

7

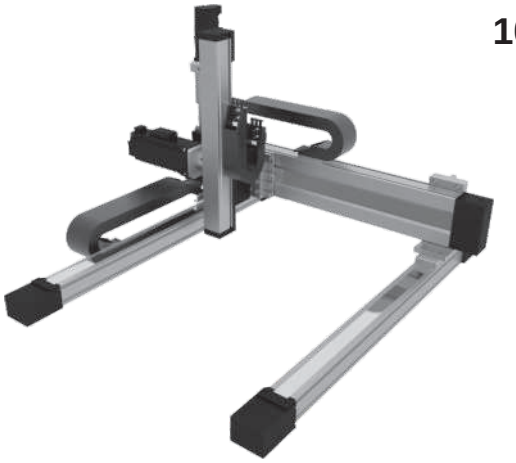


8

9

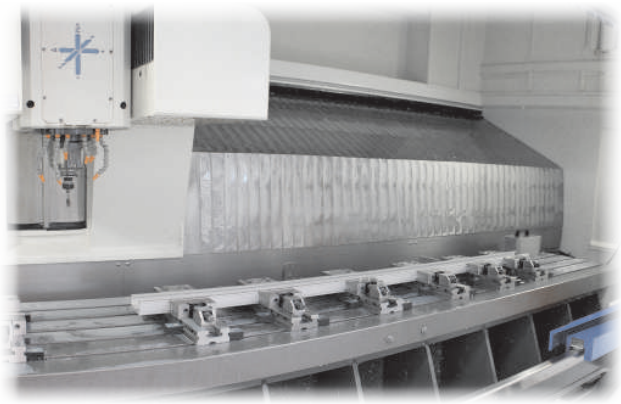


10



Technology

The calculation program “LINEAR UNITS SELECTION” enables fast and simple selection of a suitable linear axis based on your application data. As a result of the interpretation of this data, the program provides you with diverse information, e.g. driving torque, rotation speed, maximal process speed, durability and other information about a particular product.
So contact us!



Our modern machinery, for example, comprises several CNC automatic lathes with power tools, a 4-axis machining centre with a highly modern, fully automated pallet changing system and a CNC machining centre with a travel distance of 3.5m, where our linear-axis profiles are machined.

Wenzel's 6m-long measuring machine enables precise control of straightness, parallelism, angle tolerance and other dimensional tolerances of linear axis profiles, before and after processing, as well as the creation of measurement protocols. Our diverse manufactured components can also be measured here.

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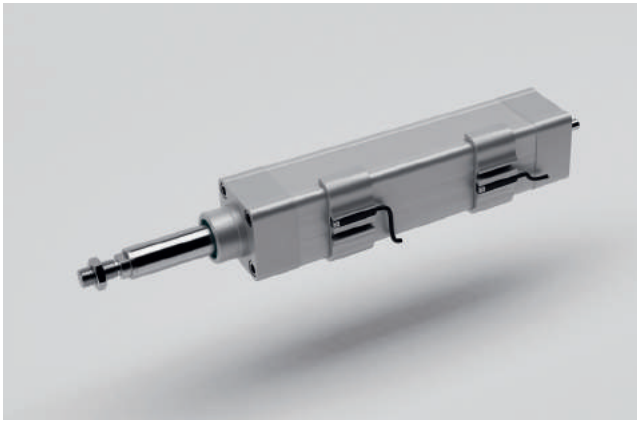
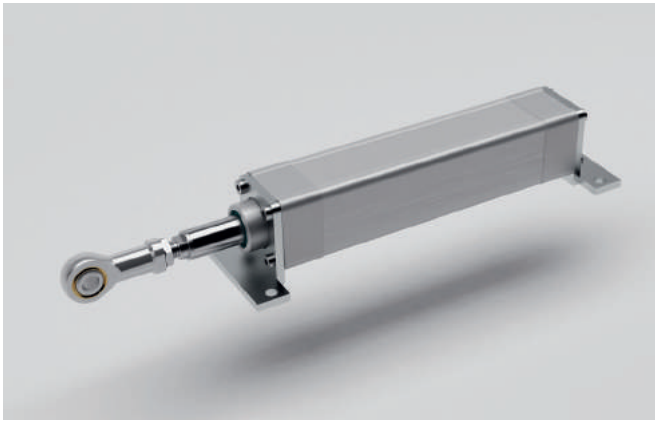
PNCE Series
Ball Screw Driven Electric Cylinders

The PNCE are electric cylinders with a precision ball screw drive. The electric cylinder is based on the standard ISO 15552. Its outer design and dimensions are very similar to pneumatic cylinders. High performance features such as, high speeds, good positioning accuracy and high repeatability are ensured through a precision ball screw with reduced backlash (preload on request) of the ball nut and non-rotating piston rod. For a long service life the re-lubrication can be done through a lubrication nipple.
The design with its smooth surfaces enables easy cleaning of the cylinder. In combination with a lubricant class H1 it is also suitable for food & beverage applications. It can be additionaly equipped with switches and ISO standard accessories.

The excellent sealing of the components in the cylinder ensures an IP65 protection class and protects the interior of the cylinder from dust, water and other contaminants. Version IP65CR also offers a high corrosion resistance in harsh environments.

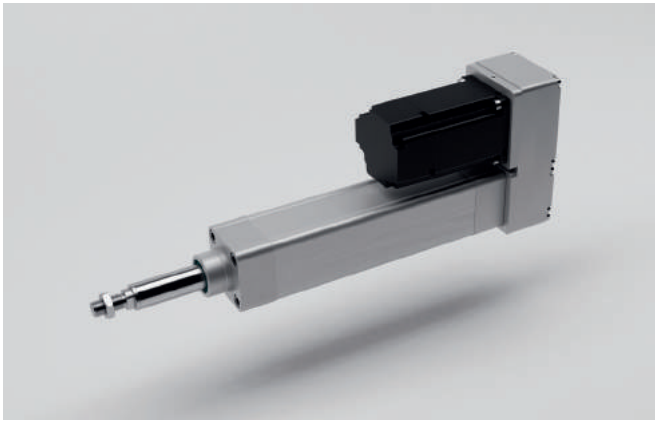


Sensor holder



ISO standard accessories

Motor adapter with coupling (IP65)

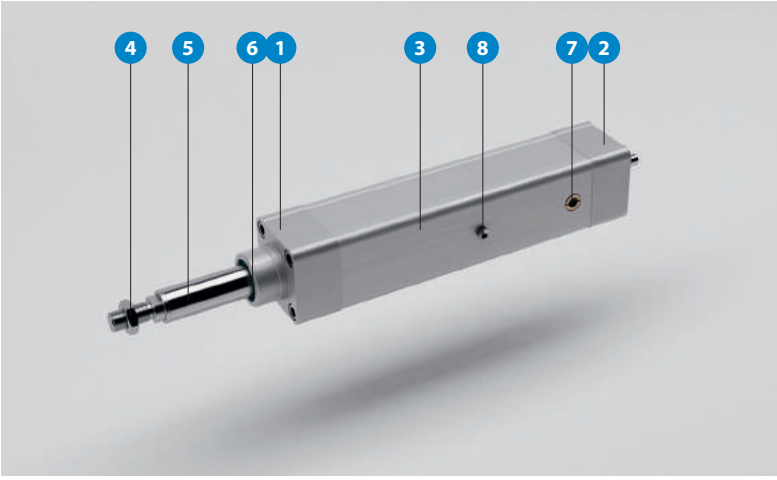


Motor side drive (IP65)

The aluminium profiles are manufactured according to the medium EN 12020-2 standard

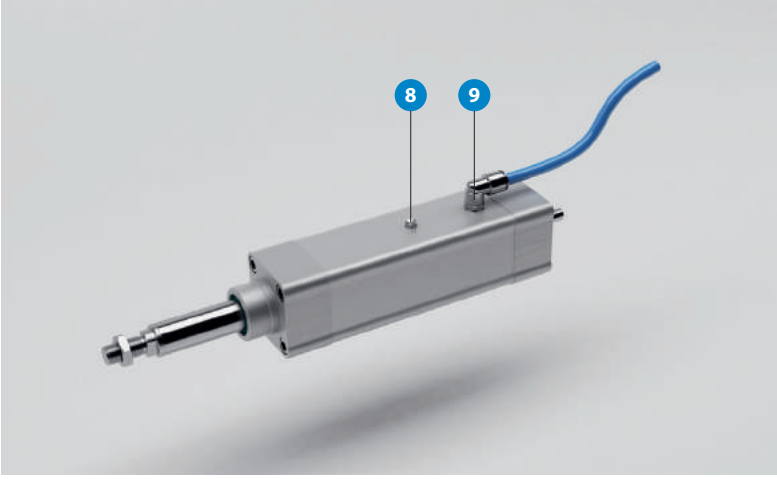
PNCE Series
Electric Cylinders – Structure

• Standard version (S)*



1 – Front cap
2 – Drive cap
3 – Smooth cylinder profile
4 – Hex nut
5 – Piston rod (stainless steel) with an anti-rotation device
6 – Piston rod seal
7 – Pressure compensation
8 – Lubrication nipple

* IP40 protection class



8 – Lubrication nipple
9 – Connection for pressure compensation

• IP65 protection class (IP65)

The appropriate sealing of the external parts ensures the electric cylinder the IP65 protection class. The IP65 protection class of the electric cylinder fulfils the specifications to IEC 60 529. The connection for pressure compensation in the cylinder profile ensures the exchange of air between the interior of the cylinder and the environment. This prevents the occurence of excess pressure or negative pressure inside the electric cylinder. It also protects the interior of the cylinder from the external media like dust and water.

• IP65 protection class with high corrosion resistance (IP65CR)

It offers high corrosion resistance in harsh environments.The version IP65CR includes all the features of the electric cylinder version IP65. In addition to ensuring high corrosion resistance all the external parts are corrosion resistant (e.g. the connection for pressure compensation, lubrication nipple, and the connection elements are made of stainless steel). More information about materials is available upon request in the extended material information list.

• For applications in the food industry (FI)

The version FI includes all the features of the electric cylinder version IP65CR. It is upgraded by materials suitable for some applications in the food industry. The cylinder is greased with a lubricant class NSF H1. The design with the smooth surfaces of the aluminium profile enables its quick and effective cleaning. During the cleaning the sealing air can be applied to the connection for pressure compensation. The use for the food & beverage industry is limited by the materials of the electric cylinder. More information about materials is available upon request in the extended material information list.

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PNCE Series
Electric Cylinders – Order Codes

Series:
PNCE

Size:
- 32
- 40
- 50
- 63

Screw type:
- BS: ball screw

Ball screw:
- PNCE 32: Ø12x5, Ø12x10
- PNCE 40: Ø16x5, Ø16x10, Ø16x16
- PNCE 50: Ø20x5, Ø20x10, Ø20x20, Ø20x50
- PNCE 63: Ø25x5, Ø25x10, Ø25x25

Absolute stroke [mm]:
Absolute stroke = Effective stroke + 2 × Safety stroke

Versions:
- S: Standard version
- IP65: IP65 protection class
- IP65CR: IP65 protection class with high corrosion resistance
- FI: For applications in the food industry (check the material information)

Option 1:
- Leave blank: standard
- F: female thread on the piston rod

Option 2:
- Extended piston rod E [mm]

PNCE Series
Electric Cylinders – Technical Data

General technical data for the PNCE series

PNCE	Ball screw	Dynamic * load capacity	Maximum axial load **	Maximum drive torque	Maximum travel speed ***	Max. rotational speed	No load torque	Minimum stroke	Maximum stroke	Axial backlash	Maximum acceleration
	d×l [mm]	C [N]	F_{max} [N]	M_p [Nm]	v_{max} [m/s]	n_{max} [min^{-1}]	M_0 [Nm]	s_{min} [mm]	s_{max} [mm]	[mm]	[m/s^2]
32	12×5	5000	2540	2,2	0,48	5800	0,10	30	800	< 0,02	20
	12×10	3800	1270		0,97		0,15	30			
40	16×5	13150	6020	5,3	0,35	4200	0,15	40	900	< 0,02	20
	16×10	11550	3010		0,70		0,20	35			
	16×16	8170	1880		1,12		0,25	35			
50	20×5	14800	14600	12,9	0,28	3300	0,30	50	1000	< 0,02	20
	20×10	15900	7830	13,9	0,55		0,35	55			
	20×20	16250	3900		1,10		0,40	50			
	20×50	13000	1560		2,5	3000	0,50	30			
63	25×5	16700	16500	14,6	0,23	2700	0,50	40	1200	< 0,02	20
	25×10	15800	15800	28,0	0,45		0,55	40			
	25×25	13400	7940	35,1	1,13		0,65	30			

* Dynamic load capacity of ball screw drive. This value is the basis for calculating the service life.
** When considering service life, see page 92. This value needs to be considered when using the piston rod or mounting attachments' accessories.
*** Maximum travel speed depends of the absolute stroke of the PNCE, see diagrams on page 89

Operating conditions

Operating temperature	0°C ~ +60°C
Protection class	IP40, IP65
Duty cycle	100 %

Recommended values of loads:

All the data of the dynamic load capacities (ball screw drive) stated in the upper table are theoretical without considering any safety factor. The safety factor depends on the application and its requested safety and service life.
We recommend a minimum safety factor $f_s = 5,0$, where f_s is defined as $f_s = C / F_m$.
See page 10 for information on how the applied mean axial load F_m affects the service life.

Mass and mass moment of inertia

PNCE	Ball screw	Moved mass **	Mass of the electric cylinder	Mass moment of inertia
	d×l [mm]	m_m [kg]	m_{PNCE} [kg]	J_{PNCE} [10^{-6} kg m^2]
32	12×5	0,32 + 0,0010 × (Absolute stroke + E)	1,10 + 0,0043 × Absolute stroke + 0,0010 × E	2,15 + 0,0128 × Absolute stroke + 0,0006 × E + 0,6333 × m_{load}
	12×10			2,75 + 0,0147 × Absolute stroke + 0,0025 × E + 2,5331 × m_{load}
40	16×5	0,44 + 0,0007 × (Absolute stroke + E)	1,45 + 0,0051 × Absolute stroke + 0,0007 × E	4,50 + 0,0395 × Absolute stroke + 0,0004 × E + 0,6333 × m_{load}
	16×10			5,35 + 0,0408 × Absolute stroke + 0,0018 × E + 2,5331 × m_{load}
	16×16			7,10 + 0,0436 × Absolute stroke + 0,0046 × E + 6,4846 × m_{load}
50	20×5	0,95 + 0,0012 × (Absolute stroke + E)	2,50+0,0073 × Absolute stroke + 0,0012 × E	17,75 + 0,0817 × Absolute stroke + 0,0007 × E + 0,6333 × m_{load}
	20×10			19,55 + 0,0839 × Absolute stroke + 0,0030 × E + 2,5331 × m_{load}
	20×20			26,75 + 0,0928 × Absolute stroke + 0,0118 × E + 10,1322 × m_{load}
	20×50	0,88 + 0,0012 × (Absolute stroke + E)	2,43 + 0,0073 × Absolute stroke + 0,0012 × E	73,80 + 0,1549 × Absolute stroke + 0,0740 × E + 63,3258 × m_{load}
63	25×5	1,00 + 0,0011 × (Absolute stroke + E)	3,05 + 0,0097 × Absolute stroke + 0,0011 × E	32,55 + 0,2358 × Absolute stroke + 0,0007 × E + 0,6333 × m_{load}
	25×10			34,45 + 0,2378 × Absolute stroke + 0,0028 × E + 2,5331 × m_{load}
	25×25	0,98 + 0,0011 × (Absolute stroke + E)	3,03 + 0,0097 × Absolute stroke + 0,0011 × E	47,30 + 0,2523 × Absolute stroke + 0,0172 × E + 15,8315 × m_{load}

** The moved mass is already considered in the equation for calculating the mass of the electirc cylinder m_{PNCE} and the mass moment of inertia J_{PNCE}. The moved mass includes the mass of the piston rod with the internal anti-rotation device and ball nut.

m_{load}	Applied mass to be moved	[kg]
E	Extended piston rod	[mm]
Absolute stroke		[mm]

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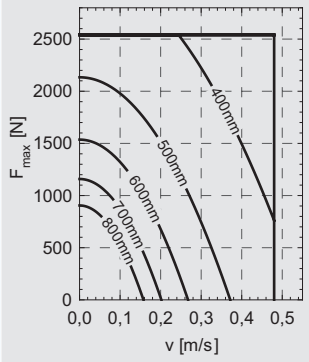
PNCE Series
Electric Cylinders – Load vs Speed

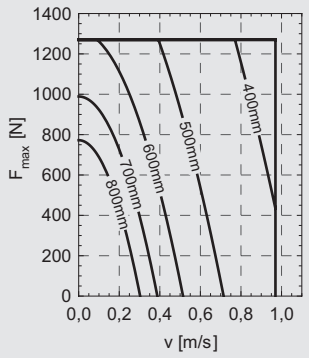
Maximum axial loading as a function of the travel speed for different values of absolute stroke (F_{max} - v curves)

PNCE 32

12×5

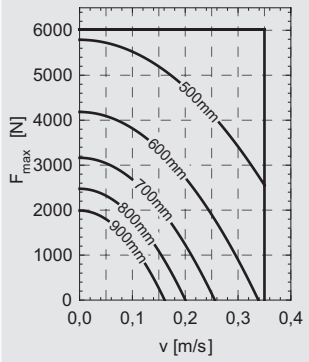


12×10

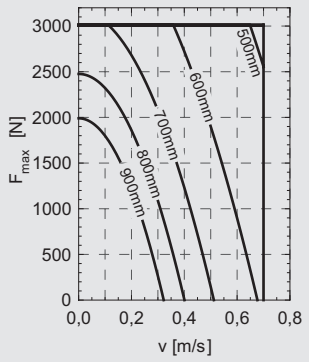


PNCE 40

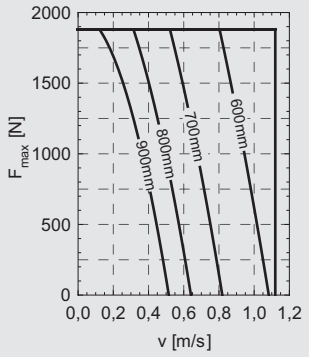
16×5



16×10

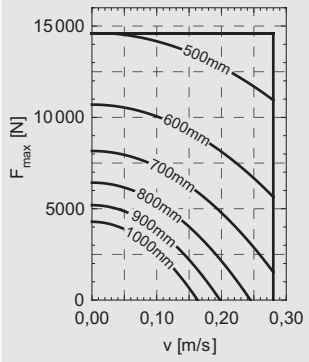


16×16

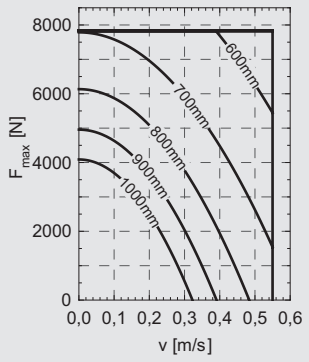


PNCE 50

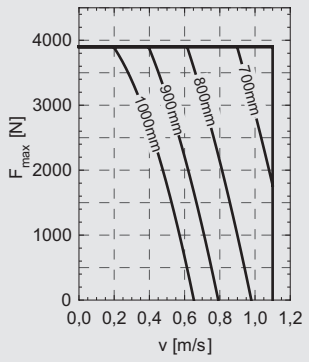
20×5



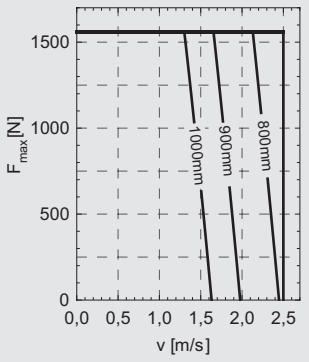
20×10



20×20

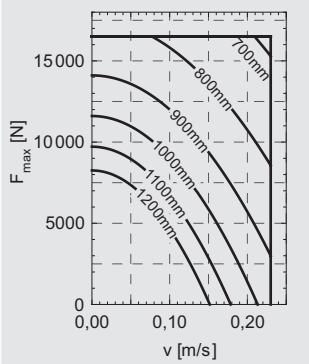


20×50



PNCE 63

25×5



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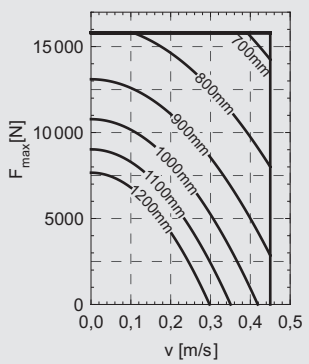
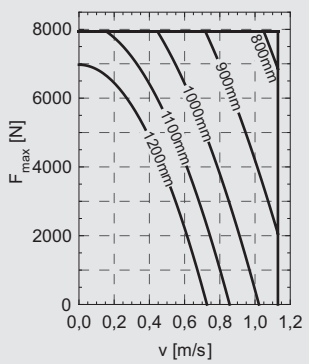
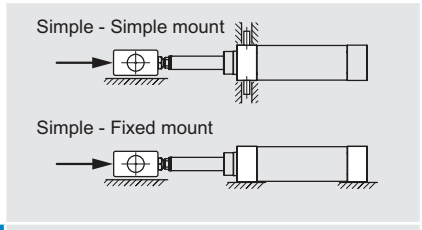


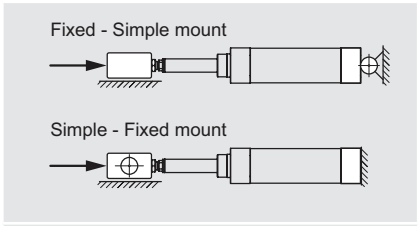
25×25

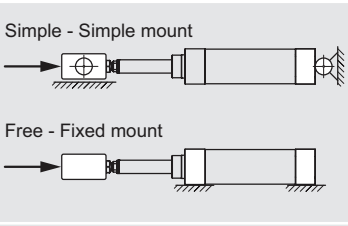


PNCE Series
Electric Cylinders – Load vs Stroke

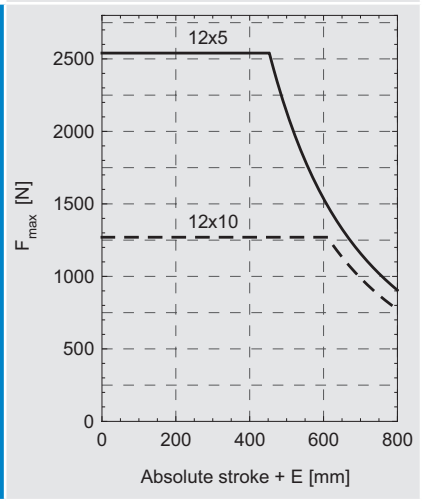
Maximum axial loading as a function of the absolute stroke (F_{max} - absolute stroke curves)

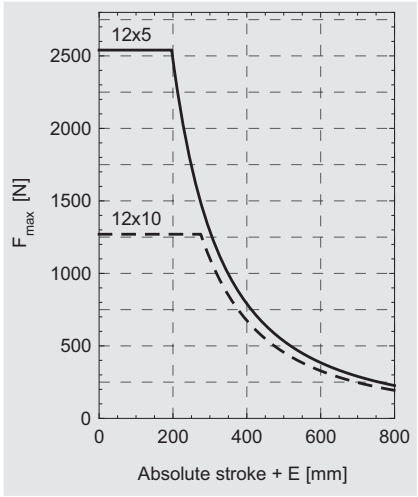


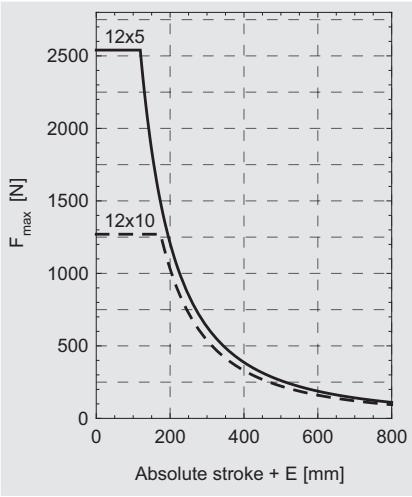




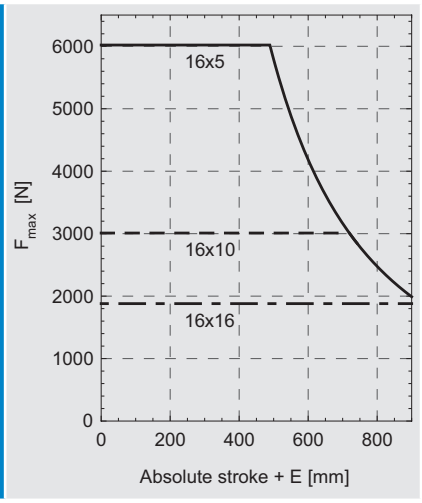
PNCE 32

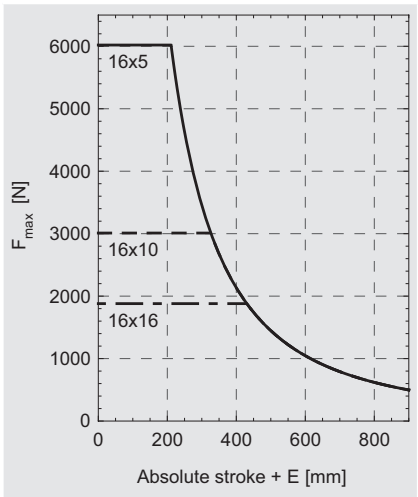


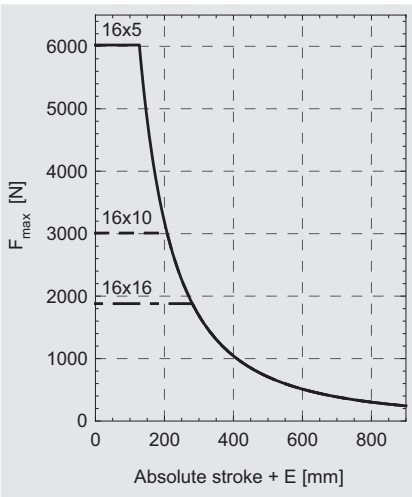




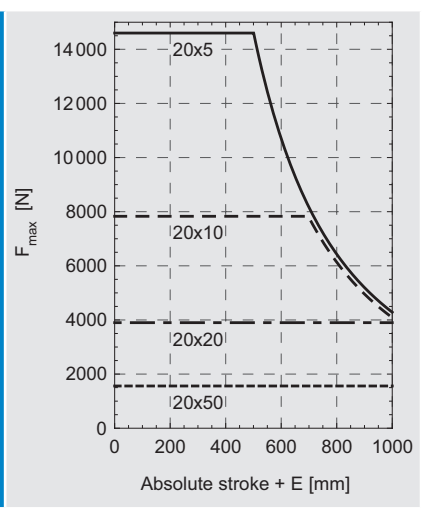
PNCE 40

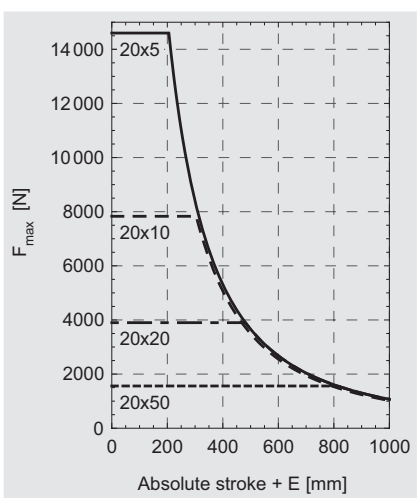


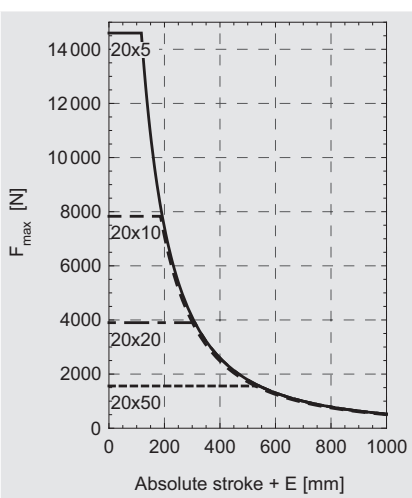




PNCE 50







E	Extended piston rod	[mm]

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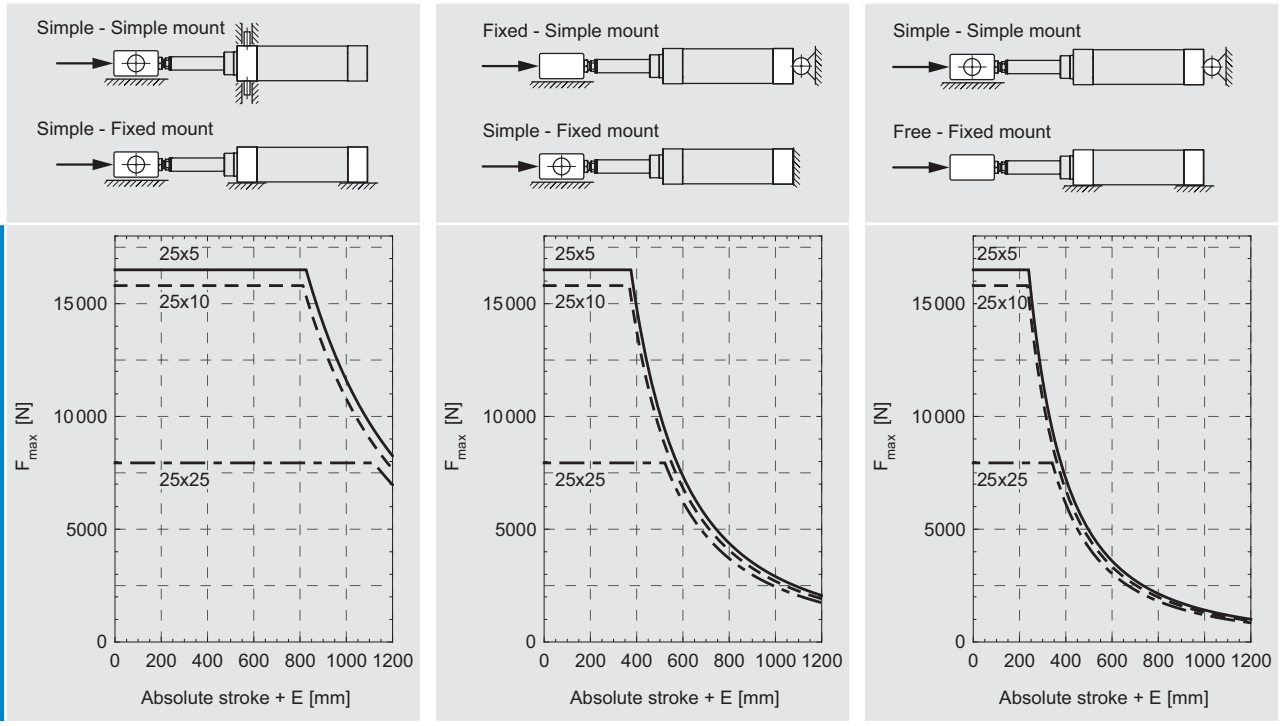
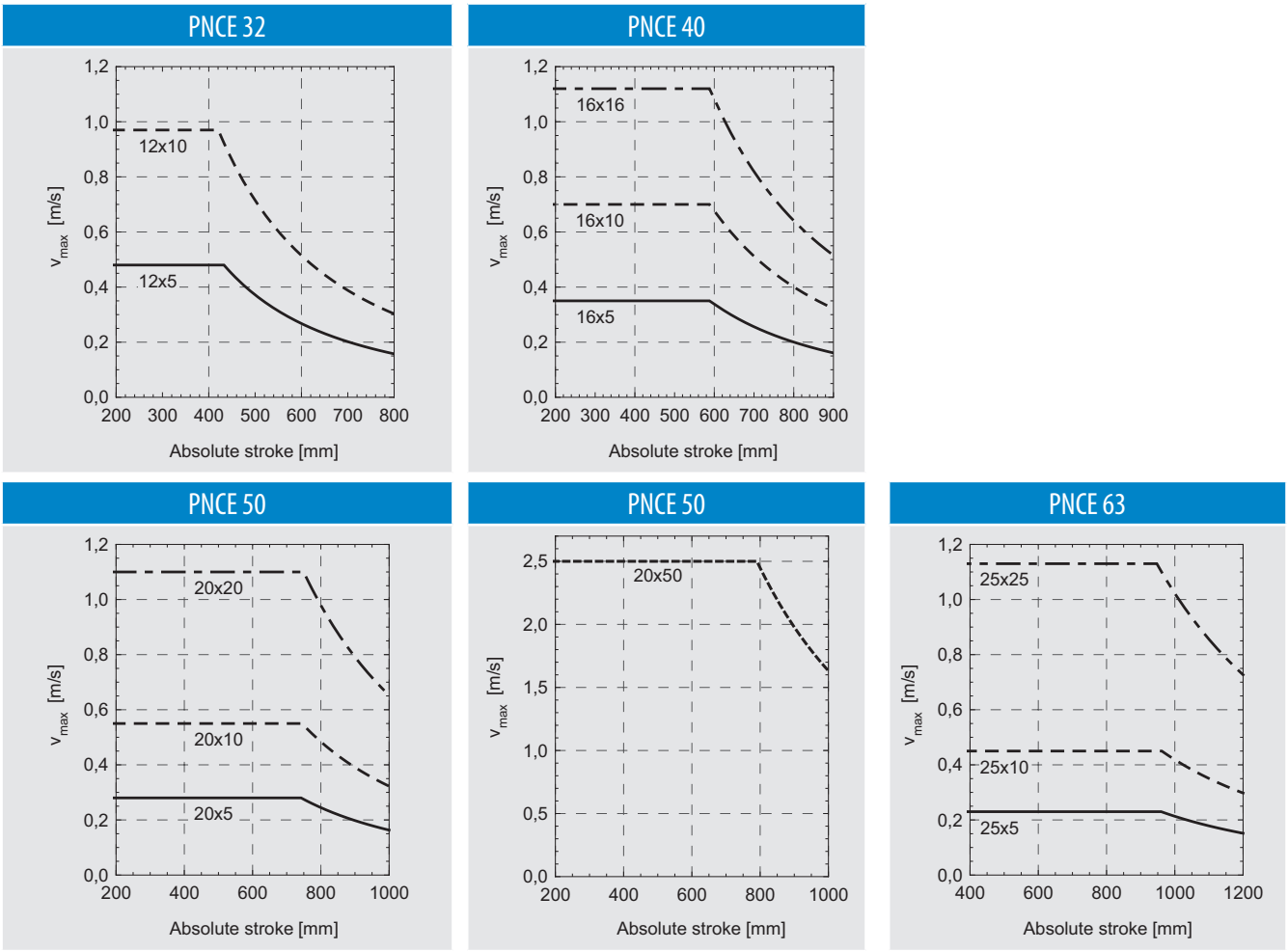
PNCE Series
Electric Cylinders – Speed vs Stroke



E	Extended piston rod	[mm]

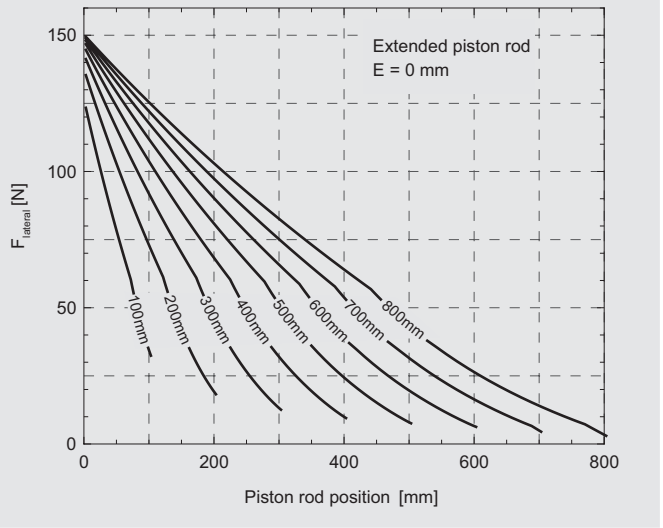
Maximum travel speed as a function of the absolute stroke (v_{max} - absolute stroke curves)

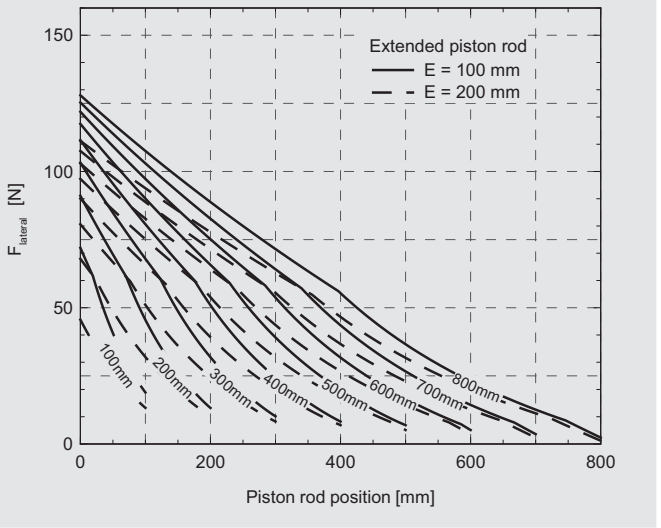


PNCE Series
Electric Cylinders – Lateral Loading

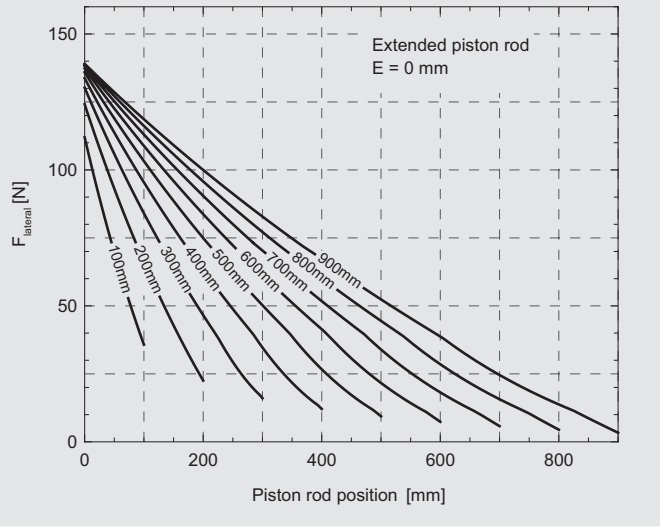
Maximum lateral loading as a function of the piston rod position for different values of the absolute stroke ($F_{lateral}$ - piston rod position curves)

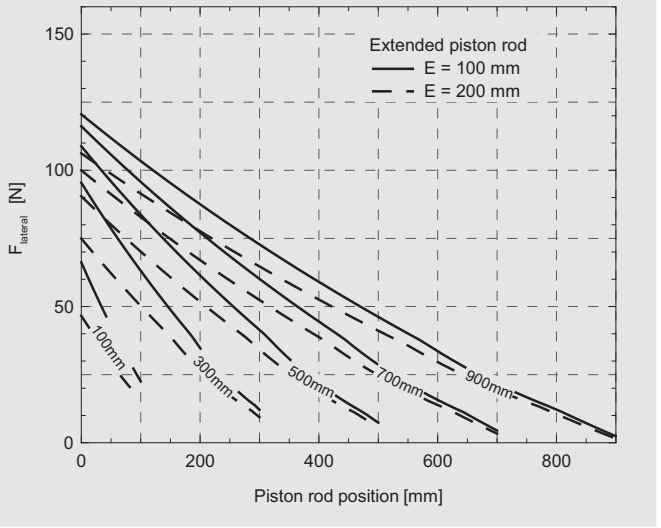
PNCE 32





PNCE 40





Values on the curves represent the absolute stroke

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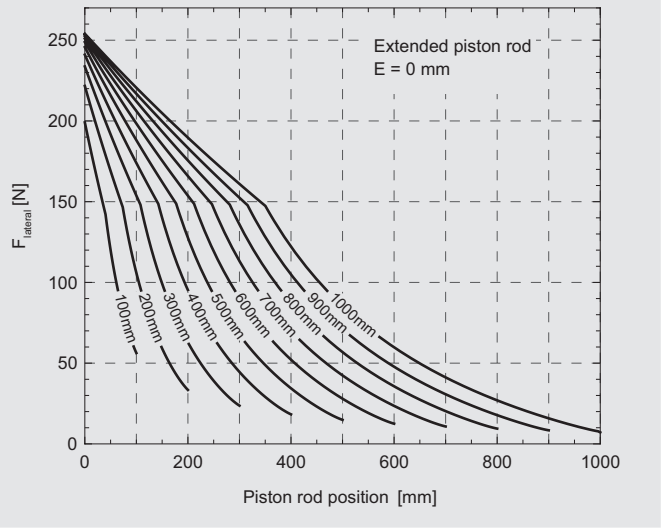
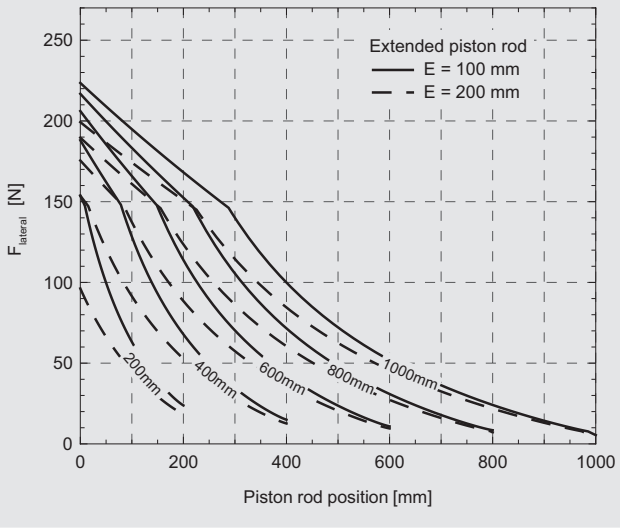
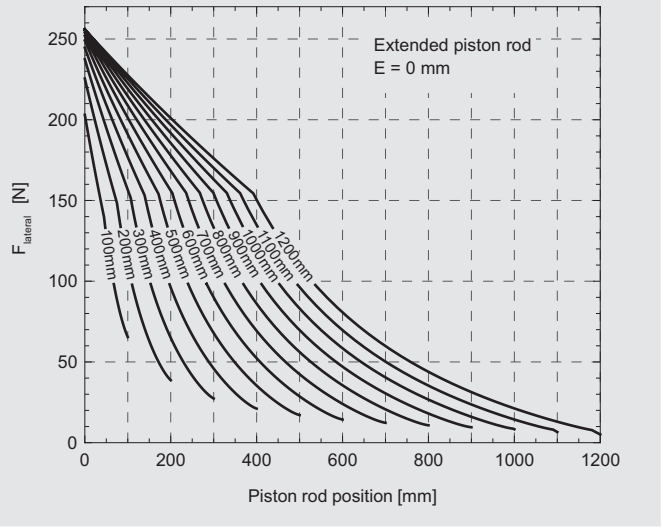
PNCE Series
Electric Cylinders – Lateral Loading

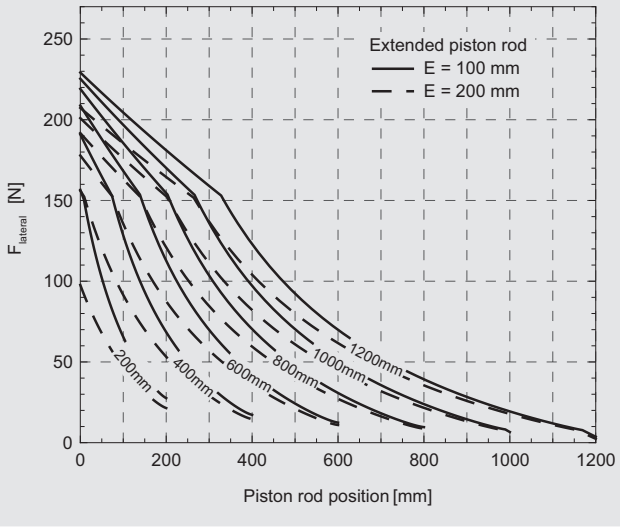
PNCE 50



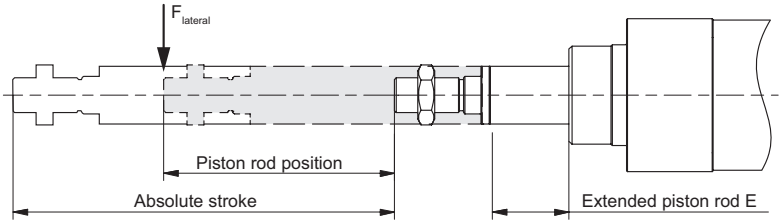


PNCE 63





Values on the curves represent the absolute stroke

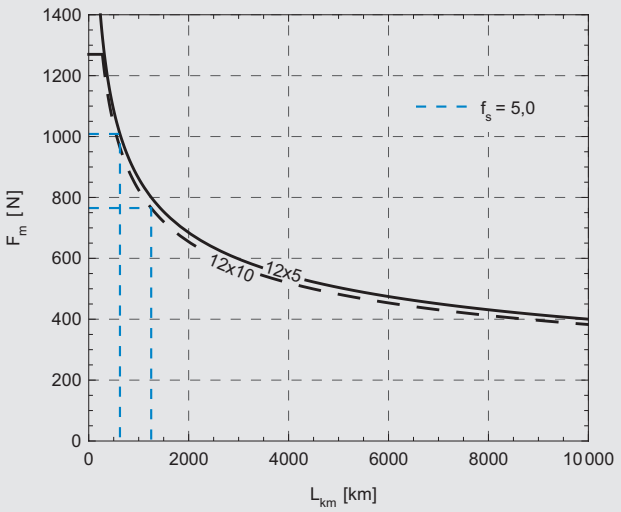


Diagrams taking into consideration
a travel speed of 0,5 m/s and an axial load of $F_{max}/4$

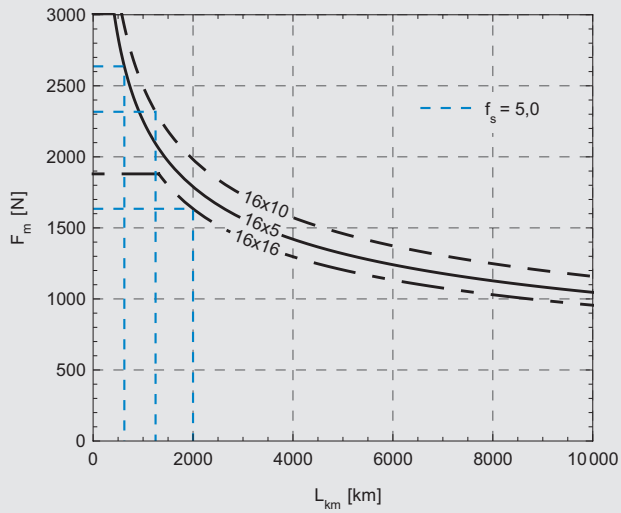
PNCE Series
Electric Cylinders – Service Life

Service life - applied mean axial load F_m as a function of the service life L_{km}

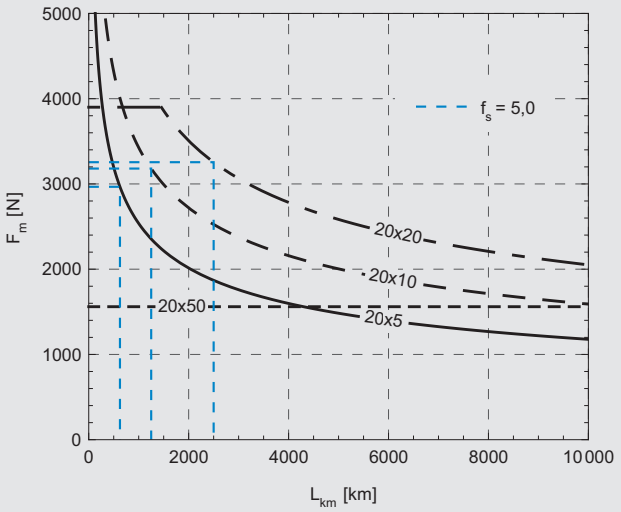
PNCE 32



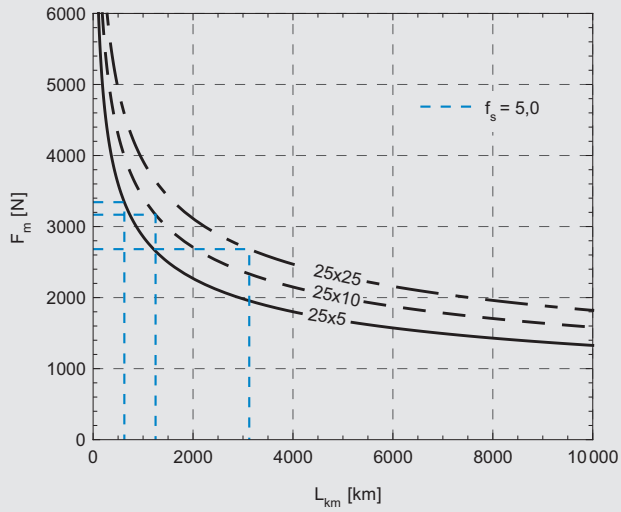
PNCE 40



PNCE 50

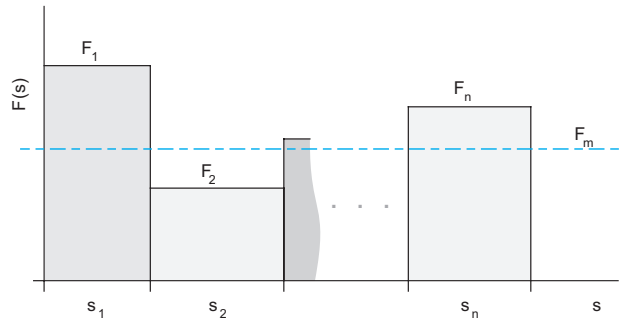


PNCE 63



Mean axial load F_m calculation

$$F_m = \sqrt[3]{\frac{|F_1|^3 \times s_1 + |F_2|^3 \times s_2 + \ldots + |F_n|^3 \times s_n}{s_1 + s_2 + \ldots + s_n}}$$



F_m	mean axial load
F_i	i-th axial load of a given loading regime F (s), i∈{1,2,...,n}
s_i	i-th travel path of a given loading regime F (s), i∈{1,2,...,n}

Diagrams presented above are showing the theoretically determined service life of the ball screw drive when the mean axial load F_m at room temperature is taken into consideration.

It should be noted that application conditions may have a significant effect on the service life.

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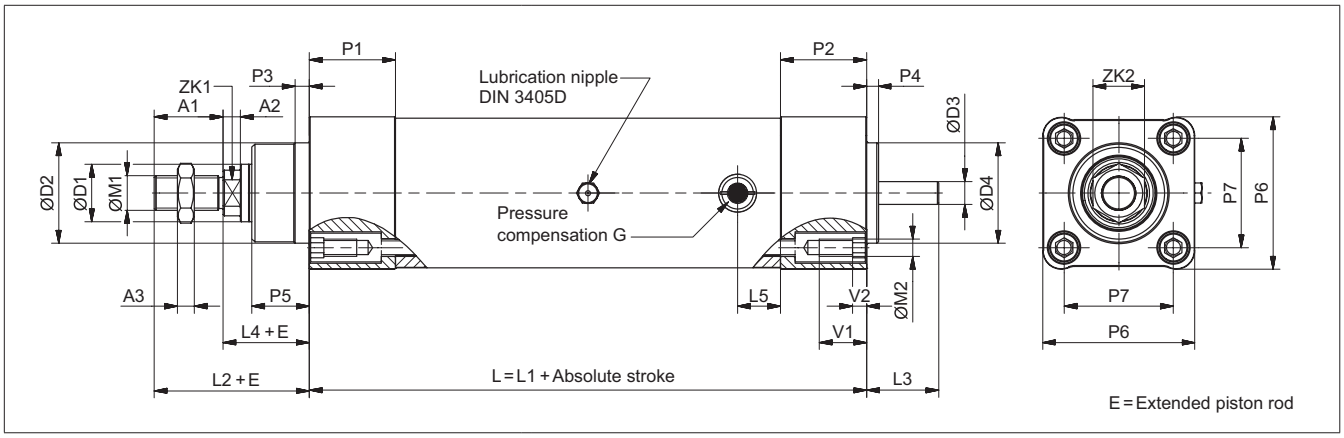
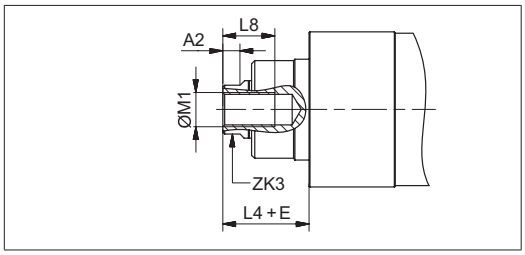
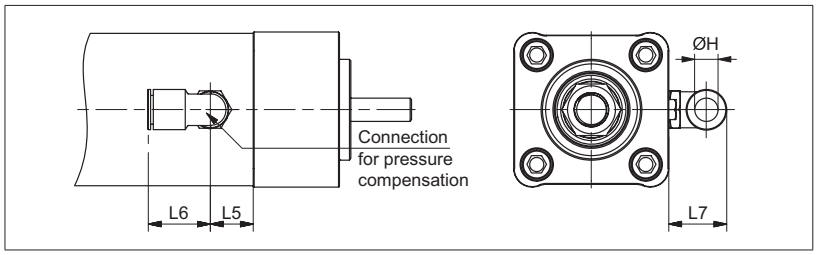
PNCE Series
Electric Cylinders – Dimensions



Female thread



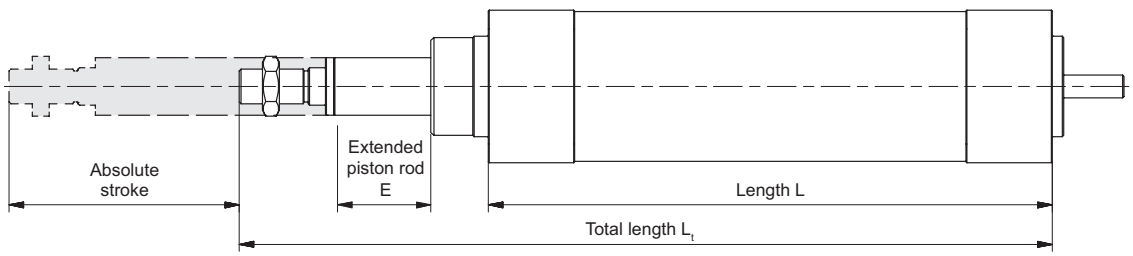
IP65, IP65CR, FI



PNCE	L1 (+0,2 / -1,4)	L2	L3	L4 (+1,9 / -0,8)	L5	L6	L7	L8	P1	P2	P3	P4 (±0,1)	P5 (±0,1)	P6	P7	G
Size	[mm]															
32	136	48	21	26	15	22,5	20,0	15	30	30	5	4	18	47	32,5	G 1/8
40	144	54	25	30	15	22,5	20,0	18	30	30	5	4	20	54	38	G 1/8
50	180	69	32	37	15	22,5	20,0	25	36	37	5	4	25	65	46,5	G 1/8
63	171	69	38	37	15	22,5	20,0	25	38	38	5	4	25	75	56,5	G 1/8

PNCE	ØD1 (f8)	ØD2 (d11)	ØD3 (h7)	ØD4 (g7)	ØM1	ØM2	ØH	A1	A2	A3	ZK1	ZK2	ZK3	V1	V2
Size	[mm]														
32	18	30	6	30	M10×1,25	M6	8	22	5	5	10	17	16	16	4,5
40	20	35	8	35	M12×1,25	M6	8	24	6	6	13	19	17	16	4,5
50	25	40	11	40	M16×1,5	M8	8	32	8	8	17	24	22	18	4,5
63	30	45	15	45	M16×1,5	M8	8	32	8	8	17	24	27	18	4,5

Absolute stroke and length of the PNCE definition



Absolute stroke = Effective stroke + 2 × Safety stroke

L = L1 + Absolute stroke

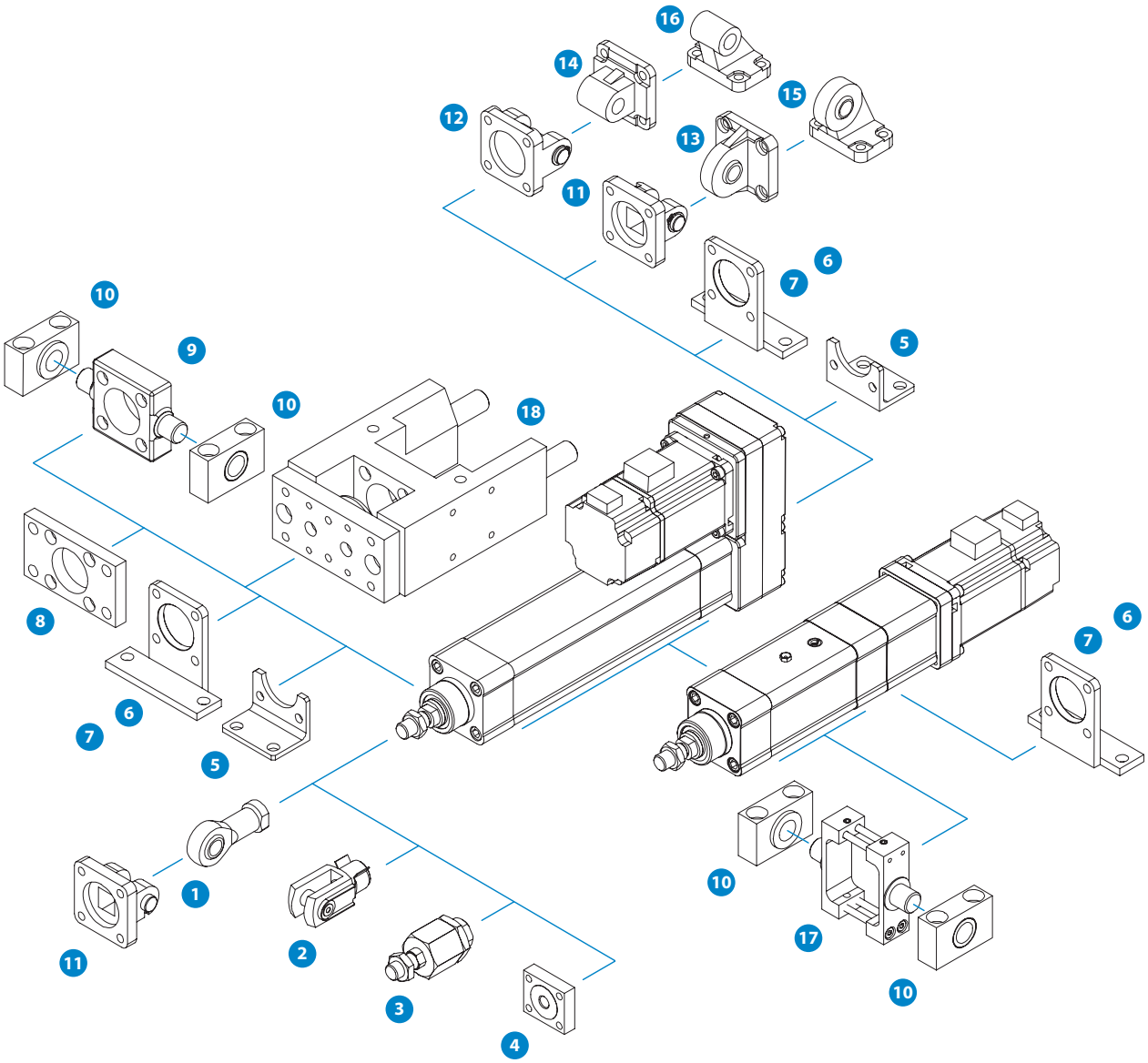
L_t = L + L2 + E **E_{max} = 200 mm**

Female thread:
L_t = L + L4 + E **E_{max} = 200 mm**

The electric cylinder doesn't include any safety stroke.

E	Extended piston rod	[mm]

PNCE Series
Electric Cylinders – Accessories



Page	95			96			97			98			99			100		101
Piston rod accessories	1	2	3	4														
Mounting attachment accessories					5	6	7	8	9	10	11	12	13	14	15	16	17	
Guiding unit																		18

CR This sign applies to corrosion resistant products

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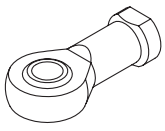
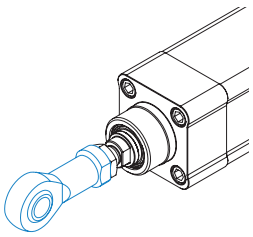
Piston rod accessories

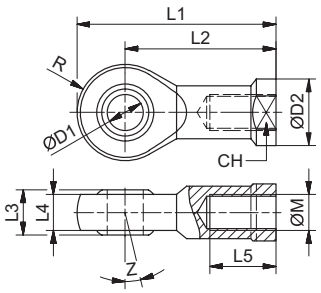
SGS (Material: galvanized steel, CR - stainless steel AISI 304)

1 CR



SIMPLE SUPPORT

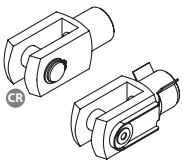


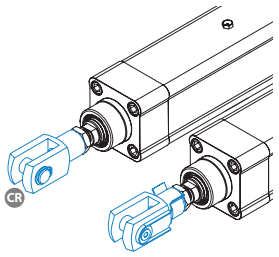


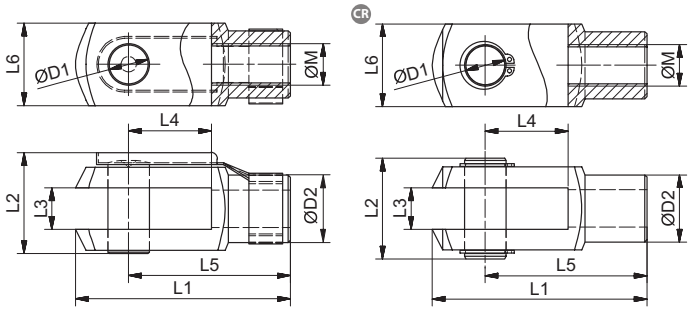
SGS			ØM	L1	L2	L3	L4	L5	ØD1 (H7)	ØD2	R	CH	Z	m	F_{max}
Size	Code	Code CR	[mm]										[°]	[kg]	[N]
32	9206	69550	M10×1,25	57	43	14	10,5	20	10	19	14	17	13	0,08	F_{PNCE}
40	9208	69551	M12×1,25	66	50	16	12	22	12	22	16	19	13	0,11	F_{PNCE}
50	9210	50691	M16×1,5	85	64	21	15	28	16	27	21	22	15	0,22	F_{PNCE}
63	9210	50691	M16×1,5	85	64	21	15	28	16	27	21	22	15	0,22	F_{PNCE}

SG (Material: galvanized steel, CR - stainless steel AISI 304)

2 CR





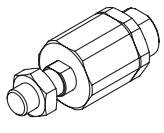


SG			ØM	L1 (±0,5)	L2	L3 (B13)	L4 (±0,5)	L5	L6	ØD1 (h11)	ØD2	m	F_{max}
Size	Code	Code CR	[mm]									[kg]	[N]
32	9186	69547	M10×1,25	52	26 [25]	10	20	40	20	10	18	0,09	F_{PNCE}
40	9189	69548	M12×1,25	62	32 [30]	12	24	48	24	12	20	0,15	F_{PNCE}
50	9191	69549	M16×1,5	83	40 [39]	16	32	64	32	16	26	0,33	F_{PNCE}
63	9191	69549	M16×1,5	83	40 [39]	16	32	64	32	16	26	0,33	F_{PNCE}

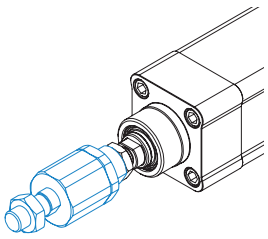
Bracketed values for type CR

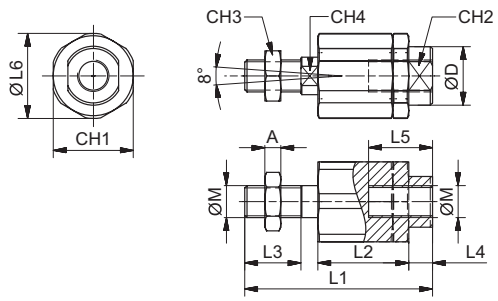
FK (Material: galvanized steel)

3



SIMPLE SUPPORT



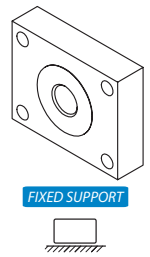


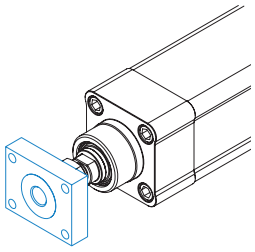
FK		ØM	L1	L2	L3	L4	L5	ØL6	A	ØD	CH1	CH2	CH3	CH4	m	F_{max}
Size	Code	[mm]													[kg]	[N]
32	5466	M10×1,25	71	35	20	11	23	32	6	22	30	19	17	12	0,22	F_{PNCE}
40	5468	M12×1,25	75	35	24	11	23	32	7	22	30	19	19	12	0,23	5000
50	5470	M16×1,5	103	54	32	9	32	45	8	32	41	27	24	20	0,66	10000
63	5470	M16×1,5	103	54	32	9	32	45	8	32	41	27	24	20	0,66	10000

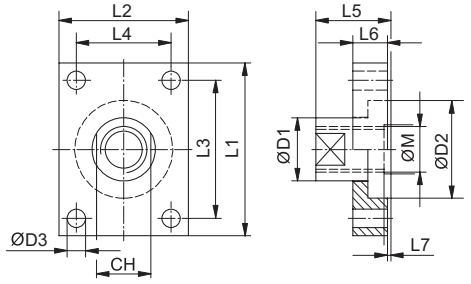
PNCE Series
Electric Cylinders – Accessories

KSZ (Material: galvanized steel)

4





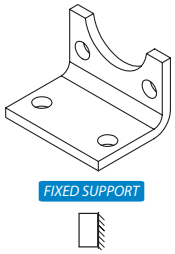


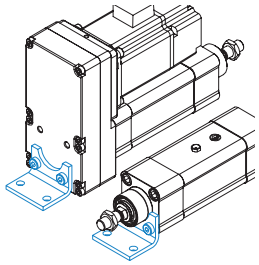
KSZ		ØM	L1	L2	L3	L4	L5	L6	L7	ØD1 (-0,2)	ØD2	ØD3 (H13)	CH	m	F_{max}
Size	Code						[mm]							[kg]	[N]
32	**5229**	**M10×1,25**	40	35	30	25	20	10	0,1	17	26	5,5	15	0,11	F_{PNCE}
40	**5230**	**M12×1,25**	50	40	40	30	22	12	0,1	17	26	5,5	15	0,18	F_{PNCE}
50	**5231**	**M16×1,5**	60	45	48	33	25	12	0,1	22	34	6,6	19	0,25	F_{PNCE}
63	**5231**	**M16×1,5**	60	45	48	33	25	12	0,1	22	34	6,6	19	0,25	F_{PNCE}

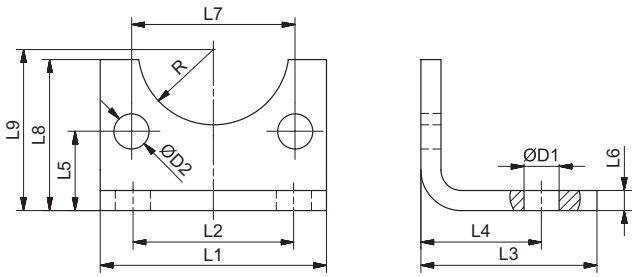
Mounting attachments' accessories

HG (Material: galvanized steel, CR - stainless steel AISI 304)

5 CR



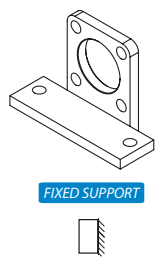


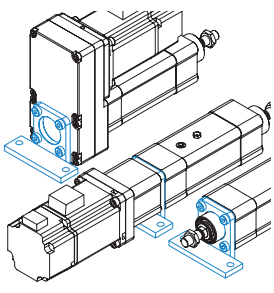


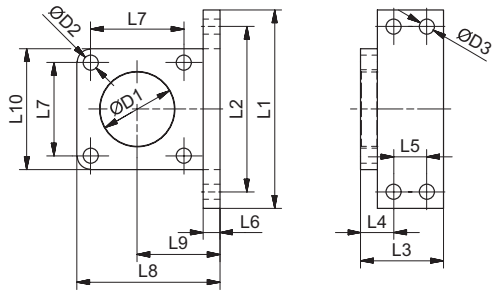
HG					L1	L2	L3	L4	L5	L6	L7	L8	L9	ØD1	ØD2	R	m	F_{max}
Size	Code[1]	Code CR[1]	Code MSD type T1[2]	Code MSD CR type T1[2]	[mm]												[kg]	[N]
32	**69601**	**69605**	**69597**	**69609**	45	32	35	24	15,75	4	32,5	30	32	7	7	15	0,09	F_{PNCE}
40	**69602**	**69606**	**69598**	**69610**	52	36	36	28	17	4	38	30	36	9	7	17,5	0,10	3500
50	**69603**	**69607**	**69599**	**69611**	65	45	47	32	21,75	5	46,5	36	45	9	9	20	0,20	5400
63	**69604**	**69608**	**69600**	**69612**	75	50	45	32	21,75	5	56,5	35	50	9	9	22,5	0,22	6200

HGL (Material: galvanized steel)

6







HGL			L1	L2	L3	L4	L5	L6 (±0,5)	L7	L8	L9 (±0,1)	L10	ØD1 (H11)	ØD2 (H13)	ØD3 (H13)	m	F_{max}
Size	Code[1,3]	Code MSD type T1[2]	[mm]													[kg]	[N]
32	**69162**	**69613**	79	65	30	16	-	6	32,5	54,5	32	45	30	7	7	0,19	F_{PNCE}
40	**69163**	**69614**	90	75	30	16	-	6	38	62	36	52	35	7	9	0,23	5100
50	**69164**	**69615**	110	90	35	19	-	10	46,5	76,5	45	63	40	9	9	0,54	11100
63	**69165**	**69616**	120	100	50	20	20	10	56,5	86,5	50	73	45	9	9	0,79	11100

[1] Front cap mounting
[2] Motor side drive type T1 mounting
[3] Motor adapter mounting

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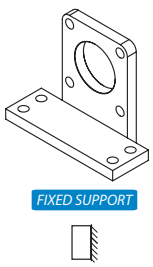
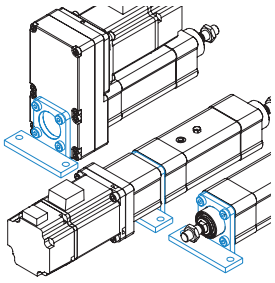
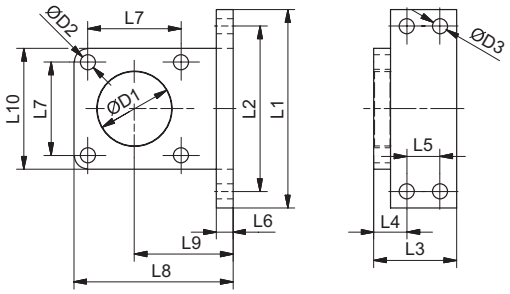
PNCE Series
Electric Cylinders – Accessories

HGLL (Material: galvanized steel)

7





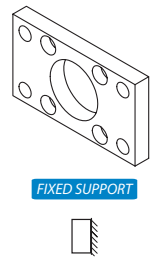


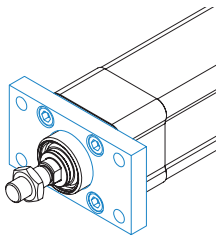
HGLL			L1	L2	L3	L4	L5	L6 (±0,5)	L7	L8	L9 (±0,1)	L10	ØD1 (H11)	ØD2 (H13)	ØD3 (H13)	m	F_{max}
Size	Code[1,3]	Code MSD type T2[2]	[mm]													[kg]	[N]
32	**69429**	**69617**	79	65	30	16	-	6	32,5	57,5	35	45	30	7	7	0,20	F_{PNCE}
40	**69166**	**69618**	90	75	30	16	-	6	38	71	45	52	35	7	9	0,25	2800
50	**69167**	**69619**	110	90	35	19	-	10	46,5	91,5	60	63	40	9	9	0,62	7100
63	**69168**	**69620**	120	100	50	20	20	10	56,5	96,5	60	73	45	9	9	0,85	10100

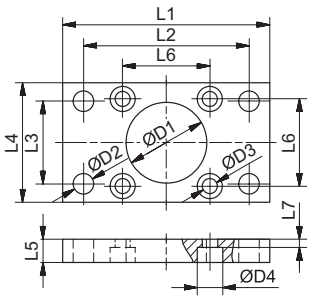
[1] Front cap mounting
[2] Motor side drive type T2 mounting
[3] Motor adapter mounting

FG (Material: galvanized steel, CR - stainless steel AISI 304)

8 CR



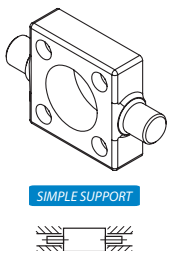


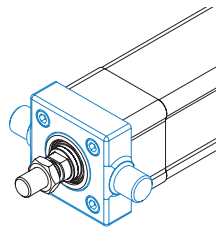


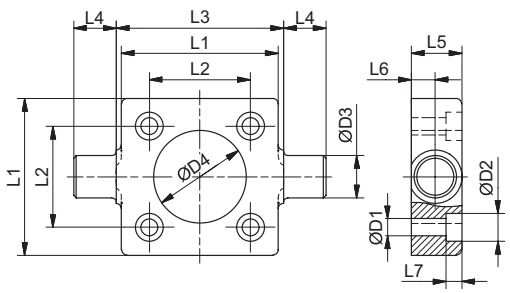
FG			L1	L2	L3	L4	L5	L6	L7	ØD1 (H11)	ØD2 (H13)	ØD3	ØD4	m	F_{max}
Size	Code	Code CR	[mm]											[kg]	[N]
32	**5485**	**69495**	80	64	32	45	10	32,5	5	30	7	6,5	10,5	0,22	F_{PNCE}
40	**5487**	**69497**	90	72	36	52	10	38	5	35	9	6,5	10,5	0,28	F_{PNCE}
50	**5489**	**69498**	110	90	45	65	12	46,5	6,5	40	9	8,5	13,5	0,53	F_{PNCE}
63	**5491**	**69499**	120	100	50	75	12	56,5	6,5	45	9	8,5	13,5	0,68	F_{PNCE}

ZK (Material: galvanized steel)

9







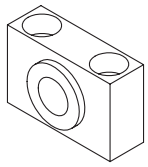
ZK		L1	L2	L3 (h14)	L4 (h14)	L5	L6 (+0,2 / 0)	L7 (+0,5 / 0)	ØD1	ØD2	ØD3 (e9)	ØD4 (H11)	m	F_{max}
Size	Code	[mm]											[kg]	[N]
32	**69075**	46	32.5	50	12	14	6,5	6	6,6	11	12	30	0,17	F_{PNCE}
40	**69083**	59	38	63	16	19	9	6	6,6	11	16	35	0,43	F_{PNCE}
50	**69084**	69	46.5	75	16	19	9	8	9	15	16	40	0,58	F_{PNCE}
63	**69085**	84	56.5	90	20	24	11,5	8	9	15	20	45	1,12	F_{PNCE}

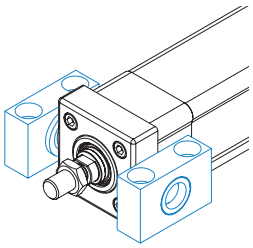
PNCE Series
Electric Cylinders – Accessories

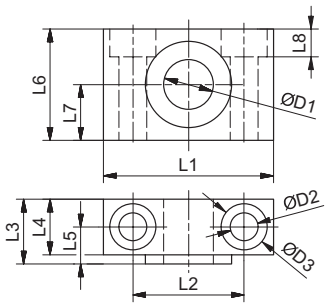
LZ (Material: galvanized steel)

set contains 2 pcs

10



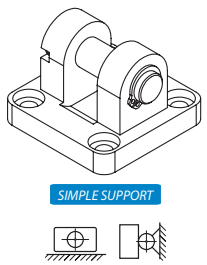


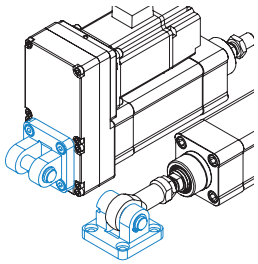


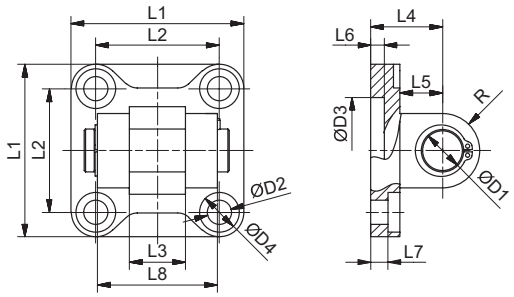
LZ		L1	L2 (±0,2)	L3	L4	L5	L6	L7 (±0,1)	L8 (±0,5)	ØD1 (F7)	ØD2 (H13)	ØD3 (H13)	m	F_{max}
Size	Code	[mm]											[kg]	[N]
32	**8139**	46	32	18	15	10,5	30	15	7	12	6,6	11	0,10	F_{PNCE}
40	**8141**	55	36	21	18	12	36	18	9	16	9	15	0,15	F_{PNCE}
50	**8141**	55	36	21	18	12	36	18	9	16	9	15	0,15	9200
63	**8143**	65	42	23	20	13	40	20	11	20	11	18	0,23	12800

SGN (Material: aluminium, CR - stainless steel AISI 316)

11 CR





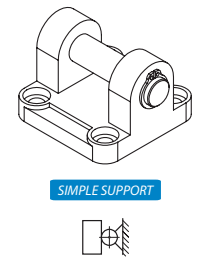


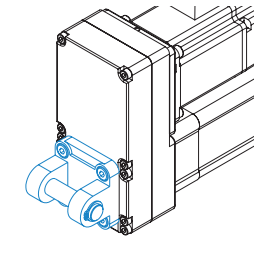
SGN					L1 (±0,5)	L2	L3	L4 (±0,2)	L5	L6	L7	L8	ØD1 (f7)	ØD2 (H13)	ØD3 (H11)	ØD4 (H13)	R	m	F_{max}
Size	Code[1]	Code CR[1]	Code MSD[2]	Code MSD CR[2]	[mm]													[kg]	[N]
32	**9200**	**69538**	**69621**	**69625**	45	32,5	14	22	13 [12]	5	5,5	34	10	6,6	30	11	10	0,10 [0,20]	F_{PNCE}
40	**9201**	**69539**	**69622**	**69626**	52 [55]	38	16	25	16 [15]	5	5,5	40	12	6,6	35	11	12	0,14 [0,30]	5700
50	**9202**	**69540**	**69623**	**69627**	65	46,5	21	27	16 [17]	5	6,5	45	16	9	40	15	12	0,26 [0,48]	7600
63	**9203**	**69541**	**69624**	**69628**	75	56,5	21	32	21 [20]	5	6,5	51	16	9	45	15	16	0,35 [0,70]	9600

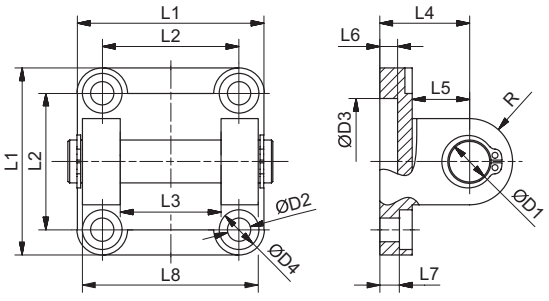
Bracketed values for type CR

SBG (Material: aluminium, CR - stainless steel AISI 304)

12 CR







SBG			L1	L2	L3	L4 (±0,2)	L5	L6	L7	L8	ØD1 (e8)	ØD2 (H13)	ØD3 (H11)	ØD4 (H13)	R	m	F_{max}
Size	Code MSD[2]	Code MSD CR[2]	[mm]													[kg]	[N]
32	**69629**	**69633**	45	32,5	26	22	13	5	5,5	45	10	6,6	30	11	10	0,11 [0,20]	F_{PNCE}
40	**69630**	**69634**	52	38	28	25	16	5	5,5	52	12	6,6	35	11	12	0,18 [0,31]	F_{PNCE}
50	**69631**	**69635**	65	46,5	32	27	16	5	6,5	60	12	9	40	15	12	0,23 [0,45]	8000
63	**69632**	**69636**	75	56,5	40	32	21	5	6,5	70	16	9	45	15	16	0,36 [0,70]	11000

Bracketed values for type CR

[1] Front cap mounting
[2] Motor side drive mounting

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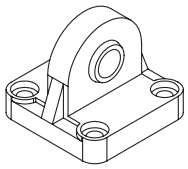
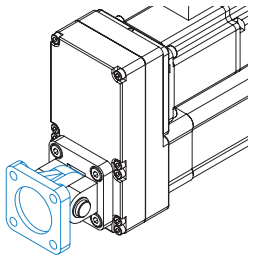
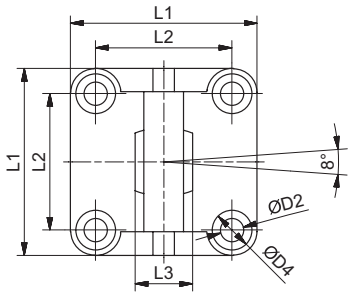
PNCE Series
Electric Cylinders – Accessories

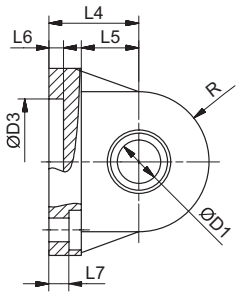
SSG (Material: aluminium, CR - stainless steel AISI 316)

13 CR







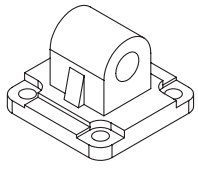


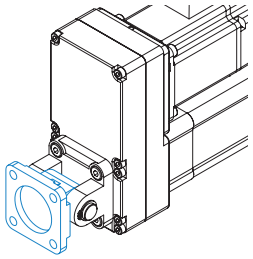
SSG			L1	L2	L3	L4 (JS 15)	L5	L6	L7 (±0,5)	ØD1 (H7)	ØD2 (H13)	ØD3 (H11)	ØD4 (H13)	R	m	F_{max}
Size	Code	Code CR	[mm]												[kg]	[N]
32	**9292**	**69542**	45	32,5	14	22	12	5	5,5	10	6,6	30	11	16 [15]	0,09 [0,18]	F_{PNCE}
40	**9294**	**69544**	52 [55]	38	16	25	15	5	5,5	12	6,6	35	11	18	0,13 [0,29]	F_{PNCE}
50	**9296**	**50709**	65	46,5	21	27	15 [17]	5	6,5	16	9	40	15	21	0,24 [0,42]	14400
63	**9298**	**69546**	75	56,5	21	32	20	5	6,5	16	9	45	15	23	0,30 [0,66]	14400

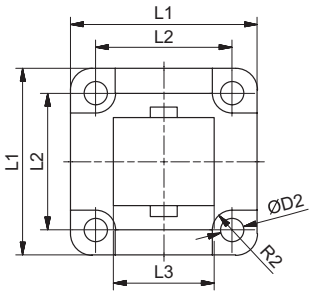
Bracketed values for type CR

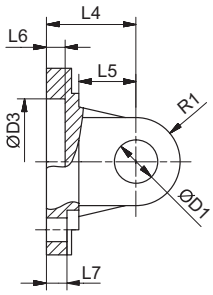
SGL (Material: aluminium, CR - stainless steel AISI 304)

14 CR







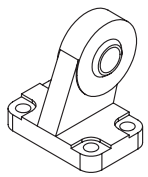


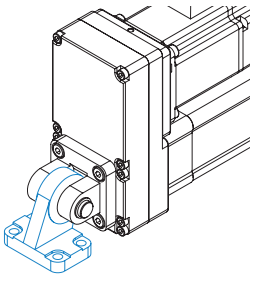
SGL			L1	L2	L3	L4 (±0,2)	L5	L6	L7	ØD1 (H9)	ØD2 (H13)	ØD3 (H11)	R1	R2	m	F_{max}
Size	Code	Code CR	[mm]												[kg]	[N]
32	**9176**	**69500**	45	32,5	26	22	13	5	5,5	10	6,6	30	10	5,5	0,08 [0,21]	F_{PNCE}
40	**9178**	**69501**	52	38	28	25	16	5	5,5	12	6,6	35	12	5,5	0,11 [0,30]	F_{PNCE}
50	**9180**	**69502**	65	46,5	32	27	16	5	6,5	12	9	40	12	7,5	0,18 [0,43]	9200
63	**9182**	**69503**	75	56,5	40	32	21	5	6,5	16	9	45	16	7,5	0,27 [0,74]	14300

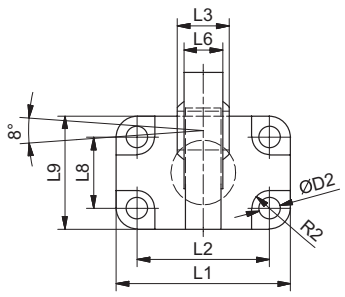
Bracketed values for type CR

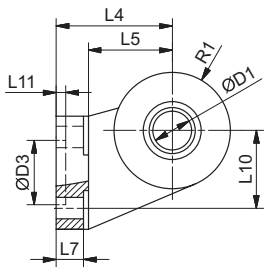
LSG (Material: size 32...50 - galvanized steel, size 63 - graphite cast iron, CR - stainless steel AISI 316)

15 CR







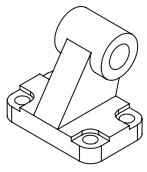


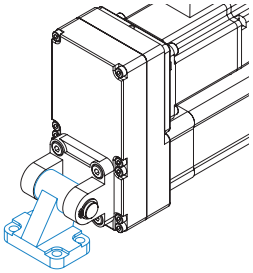
LSG			L1	L2	L3	L4 (JS 15)	L5	L6	L7	L8	L9	L10 (JS 15)	L11	ØD1 (H7)	ØD2 (H13)	ØD3 (H13)	R1	R2 (H13)	m	F_{max}
Size	Code	Code CR	[mm]																[kg]	[N]
32	**8129**	**69071**	51	38	14	32	22	10,5	8,5	18	31	21	3	10	6,6	20	15	5,5	0,18	F_{PNCE}
40	**8130**	**69072**	54	41	16	36	26	12	8,5	22	35	24	3	12	6,6	20	18	5,5	0,27	F_{PNCE}
50	**8131**	**69073**	65	50	21	45	33	15	10,5	30	45	33	3	16	9	20	20	7,5	0,46	F_{PNCE}
63	**8132**	**69069**	67	52	21	50	38	15	10,5	35	50	37	3	16	9	20	23	7,5	0,55	F_{PNCE}

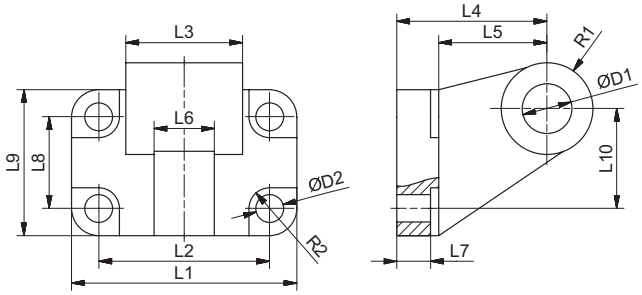
PNCE Series
Electric Cylinders – Accessories

LG (Material: aluminium, CR - stainless steel AISI 304)

16 CR





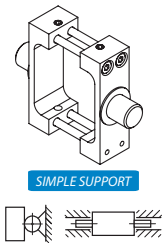


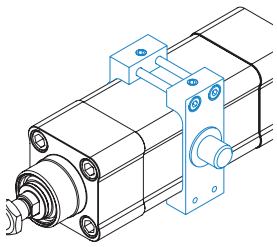
LG			L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	ØD1 (H9)	ØD2 (H13)	R1	R2	m	F_{max}
Size	Code	Code CR	[mm]														[kg]	[N]
32	**8119**	**69505**	51	38	26	32	24	10	6,4	18	31	21	10	6,6	10	5,5	0,06 [0,16]	F_{PNCE}
40	**8120**	**69506**	54	41	28	36	26	15	8,4	22	35	24	12	6,6	11	5,5	0,14 [0,24]	F_{PNCE}
50	**8121**	**69507**	65	50	32	45	33	16	10,4	30	45	33	12	9	13	7,5	0,14 [0,42]	9200
63	**8122**	**69508**	67	52	40	50	36	16	12,4	35	50	37	16	9	15	7,5	0,20 [0,53]	15300

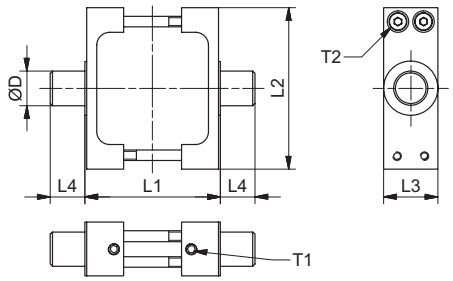
Bracketed values for type CR

ZKCE (Material: galvanized steel)

17







ZKCE		L1	L2	L3	L4	ØD	T1	T2	m	F_{max}
Size	Code	[mm]					[Nm]		[kg]	[N]
32	**69148**	50	65	25	12	12	5	3	0,15	F_{PNCE}
40	**69149**	63	75	25	16	16	7	5	0,30	F_{PNCE}
50	**69150**	75	95	30	16	16	7	5	0,52	8500
63	**69151**	90	105	30	20	20	7	5	0,64	8500

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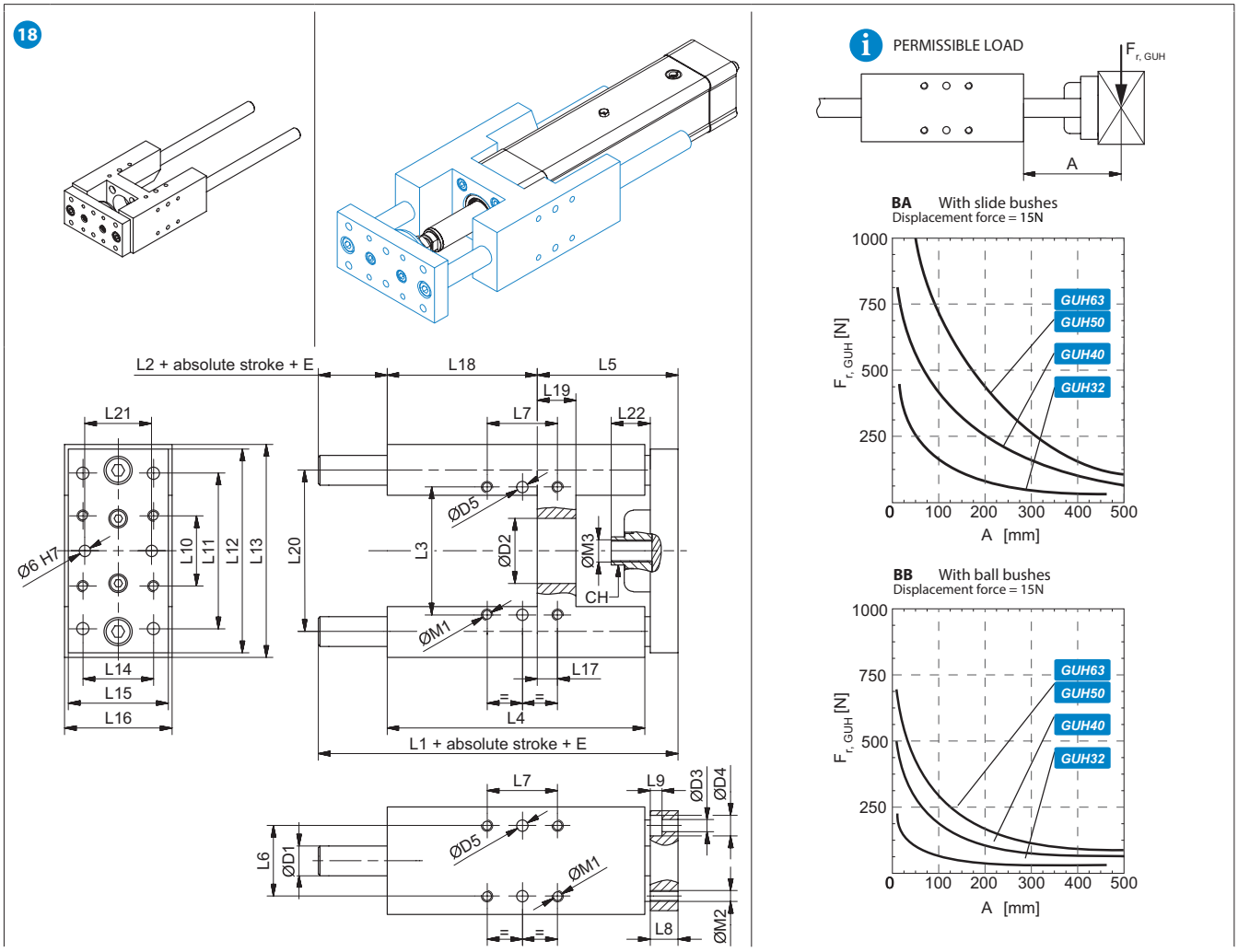
PNCE Series
Electric Cylinders – Guiding Unit

GUH (Material: body - aluminium, guides - steel)



HOW TO ORDER

GUH - 40 - 200 - BB

Guiding unit

Size:
• 32 • 40 • 50 • 63

Absolute stroke + Extended piston rod E [mm]

Option: • BA: with slide bushes
• BB: with ball bushes

Absolute stroke + extended piston rod E = max. 500mm

E	Extended piston rod	[mm]

PNCE	Mass of GUH	Moved mass of GUH*
	m_{GUH} [kg]	$M_{m,GUH}$ [kg]
32	1,57 + 0,0017 × (Abs. stroke + E)	0,86 + 0,0017 × (Abs. stroke + E)
40	2,48 + 0,0031 × (Abs. stroke + E)	1,32 + 0,0031 × (Abs. stroke + E)
50	4,18 + 0,0047 × (Abs. stroke + E)	2,47 + 0,0047 × (Abs. stroke + E)
63	5,54 + 0,0047 × (Abs. stroke + E)	2,90 + 0,0047 × (Abs. stroke + E)

* The moved mass of GUH is already considered in the equation for calculating the mass of GUH m_{GUH}

PNCE	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16
Size	[mm]															
32	177	37	61	125	64	32,5	32,5	12	6,5	32,5	78	90	97	32,5	45	49
40	192	37	69	139	74	38	38	15	6,5	38	84	110	115	38	54	58
50	205	38	85	148	89	46,5	46,5	15	8,5	46,5	100	130	137	46,5	63	69
63	237	38	100	182	88	56,5	56,5	15	8,5	56,5	105	145	152	56,5	79	85

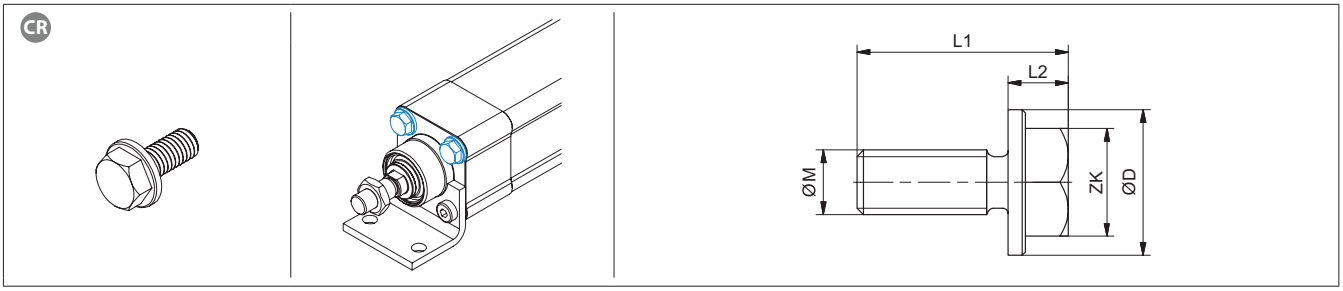
PNCE	L17	L18	L19	L20	L21	L22	ØD1	ØD2	ØD3	ØD4	ØD5 × l (H7)	ØM1	ØM2	ØM3	CH
Size															
32	4,3	76	17	74	31	18	12	30	6,5	10,5	6×6	M6×12	M6	M10×1,25	15
40	11	81	21	87	36	21	16	35	6,5	10,5	6×10	M6×12	M6	M12×1,25	15
50	18,5	78	26	104	45	24	20	40	8,5	13,5	6×10	M8×16	M8	M16×1,5	22
63	15,3	111	26	119	45	24	20	45	8,5	13,5	6×10	M8×16	M8	M16×1,5	22

PNCE Series
Electric Cylinders – Motor Adapters

Blanking screws (Material: stainless steel AISI 304)

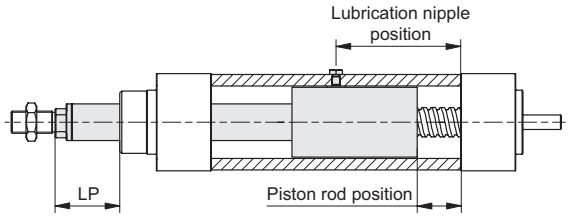
set contains 4 pcs

CR



Blanking screw		ØM	L1	L2	ØD	ZK
Tip / Type	Code	[mm]				
M6	**69156**	M6	19,5	5,5	12,8	10
M8	**69157**	M8	24	8	17	13

LUBRICATION POSITION

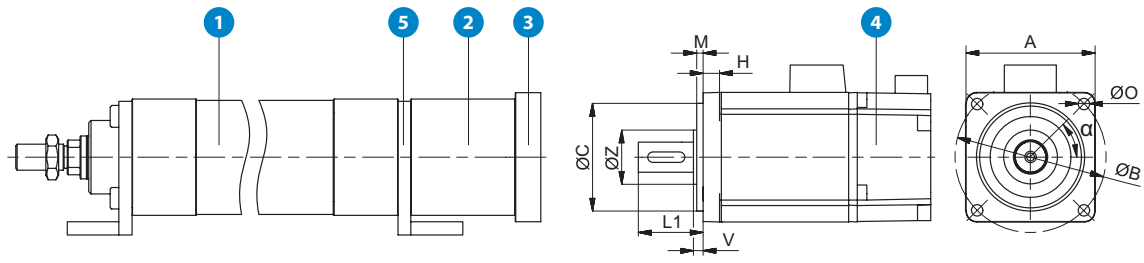


E	Extended piston rod	[mm]

PNCE	Ball screw	Lubrication nipple position	Piston rod position	LP
	d×l [mm]	[mm]	[mm]	[mm]
32	12×5, 12×0	Abs. stroke / 2 + 38,0	Abs. stroke / 2 - 9,0	Abs. stroke / 2 + E - 1,0
40	16×5, 16×10, 16×16	Abs. stroke / 2 + 42,0	Abs. stroke / 2 - 10,5	Abs. stroke / 2 + E - 0,5
50	20×5, 20×10, 20×20	Abs. stroke / 2 + 53,5	Abs. stroke / 2 - 22,0	Abs. stroke / 2 + E - 10,0
	20×50		Abs. stroke / 2 - 5,0	Abs. stroke / 2 + E + 7,0
63	25×5, 25×10	Abs. stroke / 2 + 47,5	Abs. stroke / 2 - 13,5	Abs. stroke / 2 + E - 1,5
	25×25		Abs. stroke / 2 - 4,0	Abs. stroke / 2 + E + 8,0

The lubrication nipple on the aluminum profile of the electric cylinder allows easy re-lubrication of the ball screw.
To achieve the lubricationing position the piston rod must be moved from the end position into position (Piston rod position) shown in the table above. The same position is achieved when the distance LP is obtained.

MOTOR ADAPTER WITH COUPLING



1 - PNCE
2 - Motor adapter housing
3 - Motor flange
4 - Motor
5 - Mounting attachment HGL/HGLL

HOW TO ORDER

VK	-	PNCE40	-	EKL10	-	1	-	S	-	60	-	70	-	50	-	3	-	30	-	7,5	-	5,5	-	4,6	-	29	-	45
										A		ØB		ØC		M		L1		H		ØO		V		ØZ		α

Motor adapter

PNCE series

Coupling type
According to the customers's specification (page 22)

Mounting attachment HGL/HGLL:
- 0: without
- 1: with

Versions:
- S: Standard
- IP65CR: IP65CR protection

(IP65CR version is also suitable for some applications in the food industry. More information on request.)

Motor dimensions [mm]

[°]

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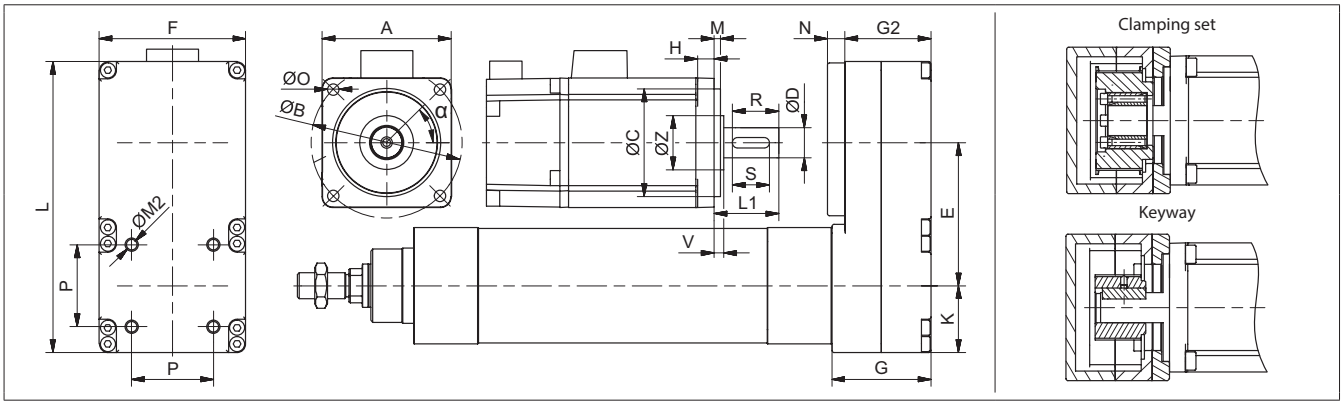
PNCE MSD
Motor Side Drive – Electric Cylinders

MOTOR SIDE DRIVE WITH A TIMING BELT



HOW TO ORDER

MSD	PNCE40	T1	1	S	60	70	50	3	30	14	7,5	5,5	20	20	4,6	29	45
Motor side drive	PNCE series	Type	Gear ratio	Versions: • S: Standard • IP65CR: IP65CR protection	A	ØB	ØC	M	L1	ØD	H	ØO	R	S	V	ØZ	α
					Motor dimensions [mm]												[°]

Technical data

PNCE	Type	Gear ratio	Max. drive torque	Maximum radial load on shaft *	No load torque	Mass moment of inertia	Mass	Motor size limits [mm]							
								A	ØB	L1			ØC	ØD	
		i	$M_{p,MSD}$ [Nm]	$F_{r,MSD}$ [N]	$M_{0,MSD}$ [Nm]	J_{MSD} [10^{-6} kg m²]	m_{MSD} [kg]	max	max	min		max	max	max	
										Clamping set	Keyway			Clamping set	Keyway
32	T1	1	1,4	40	0,10	65	0,85	81	80	**	25	38	50	16	-
		1,5	0,9	40	0,07	34	0,72	80						9	14
40	T1	1	3	80	0,10	82	0,92	74	80		25	42	50	16	-
		1,5	2	80	0,07	46	0,79	73						9	14
	T2	1	4	80	0,27	281	1,66	109	110		30	52	75	28	-
		1,5	2,6	80	0,18	195	1,39	107						16	24
50	T1	1	9	170	0,27	356	1,76	98	110		30	52	75	28	-
		1,5	6	170	0,18	240	1,48	96						16	24
	T2	1	9	205	0,30	1002	3,63	173	140		35	62	100	35	-
		2	4,5	205	0,15	574	3,06	184					95	15	22
63	T1	1	21	500	0,34	1115	3,72	163	140		35	62	100	35	-
		2	8,9	400	0,17	631	3,10	174					95	15	22

* This is the load which is linearly dependent on the maximum drive torque $M_{p,MSD}$ and is generated by the correct pretension of the belt. This load needs to be reduced in accordance with the capabilities of the motor.
** Minimum dimension L1 depends on the size of particular clamping set. Values can be found on the upper table on page 104

Dimensions

PNCE	Type	Gear ratio	E	F	G	G2	N ***	K	L	P	ØM2
		i	[mm]								
32	T1	1	65	68	42	36	8	31	135	32,5	M6×8,5
		1,5	64,5								
40	T1	1	65	68	46	40	8	31	135	38	M6×8,5
		1,5	64,5								
	T2	1	82,5	89	57	51	8	42	174	46,5	M6×9
		1,5	81,7								
50	T1	1	82,5	89	57	51	8	42	174	46,5	M8×9
		1,5	81,7								
	T2	1	120	116	66	60	10	49,5	239	56,5	M8×10
		2	125,8								
63	T1	1	120	116	66	60	10	49,5	239	56,5	M8×10
		2	125,8								

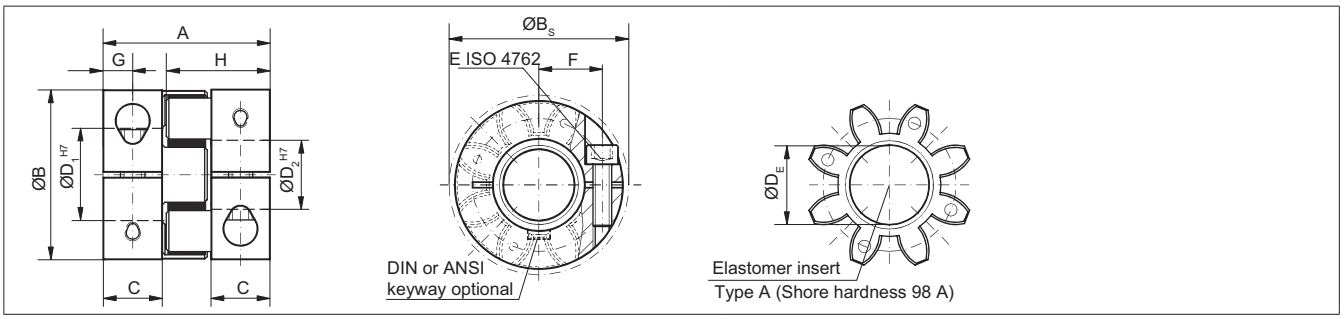
*** This is a standard value. It could differ depending to the motor dimensions M and L1.

PNCE Series
Electric Cylinders – Couplings

Minimum dimension L1 [mm] depends on the motor shafts diameter ØD

PNCE	Type	Gear ratio	ØD [mm]																						
		i	6	6,35	7	8	9	9,53	10	11	12	14	15	16	17	18	19	20	22	24	25	25,4	28	30	32	35
32	T1	1	18	18	18	18	20	20	20	23	23	27	27	27	-	-	-	-	-	-	-	-	-	-	-	-
		1,5	18	18	18	18	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	T1	1	18	18	18	18	20	20	20	23	23	27	27	27	-	-	-	-	-	-	-	-	-	-	-	-
		1,5	18	18	18	18	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	T2	1	18	18	18	18	20	20	20	23	23	27	27	27	31	31	31	31	31	36	36	36	36	-	-	-
		1,5	18	18	18	18	20	20	20	23	23	27	27	27	-	-	-	-	-	-	-	-	-	-	-	-
50	T1	1	-	-	-	18	20	20	20	23	23	27	27	27	31	31	31	31	31	36	36	36	36	-	-	-
		1,5	-	-	18	18	20	20	20	23	23	27	27	27	-	-	-	-	-	-	-	-	-	-	-	-
50	T2	1	-	-	-	23	25	25	25	25	25	29	29	29	33	33	33	33	33	38	38	38	38	38	38	41
		2	23	23	23	23	25	25	25	25	25	29	29	-	-	-	-	-	-	-	-	-	-	-	-	-
63	T1	1	-	-	-	-	-	-	-	-	-	29	29	29	33	33	33	33	33	38	38	38	38	38	38	41
		2	-	-	-	23	25	25	25	25	25	29	29	-	-	-	-	-	-	-	-	-	-	-	-	-

COUPLINGS



EKL			5	10	20	60
Rated torque	[Nm]	T_{KN}	9	12.5	17	60
Max. torque*	[Nm]	T_{MAX}	18	25	34	120
Overall length	[mm]	A	26	32	50	58
Outside diameter	[mm]	B	25	32	42	56
Outside diameter with screw head	[mm]	B_S	25	32	44,5	57
Mounting length	[mm]	C	8	10,3	17	20
Inside diameter range H7	[mm]	$D_{1/2}$	4-12,7	4-16	8-25	12-32
Inside diameter of the elastomer	[mm]	D_E	10,2	14,2	19,2	26,2
Clamping screw (ISO 4752)		E	M3	M4	M5	M6
Tightening torque of the clamping screw	[Nm]		2	4	8	15
Distance between the centres	[mm]	F	8	10,5	15,5	21
Distance	[mm]	G	4	5	8,5	10
Hub length	[mm]	H	16,7	20,7	31	36
Moment of inertia per hub	[10^{-3}kgm^2]	$J_{1/2}$	0,002	0,003	0,01	0,04
Approximate weight	[kg]		0,02	0,05	0,12	0,3
Speed standard	[min^{-1}]		15000	13000	12500	11000

* The maximum transmittable torque of the clamping hub depends on the bore diameter and is limited to the size of the PNCE.

Maximum transmittable and drive torque $M_{p,C}$ [Nm] depends on the bore diameter

EKL	Ø4	Ø5	Ø8	Ø16	Ø19	Ø25	Ø30	Ø32
5	1,5	2	8	-	-	-	-	-
10	-	4	12	32	-	-	-	-
20	-	-	20	35	45	60	-	-
60	-	-	-	50	80	100	110	120

Maximum transmittable and drive torque $M_{p,C}$ [Nm] limited to the size of the PNCE

EKL	PNCE 32	PNCE 40	PNCE 50	PNCE 63
5	2,2	-	-	-
10	2,2	5,3	13,9	-
20	-	-	13,9	17
60	-	-	-	35,1

HOW TO ORDER

COUPLING - EKL10 - A - F8 - F14PFN

Coupling

Coupling type/size:
• 5 • 10 • 20 • 60

Elastomer insert type:
• A

Hole diameter

Option:
• PFN: with keyway
• Leave blank: without keyway

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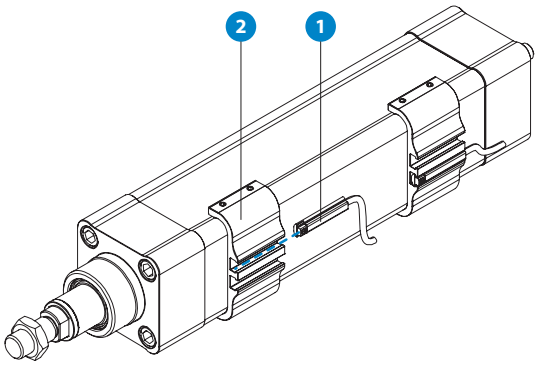
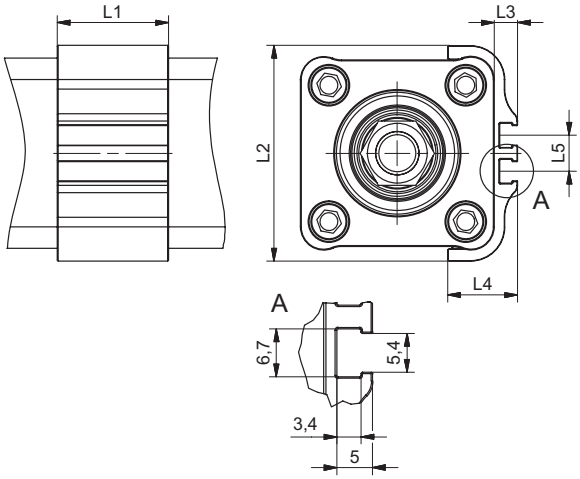
WMH Transmissions Limited

PNCE Series
Electric Cylinders – Magnetic Sensors



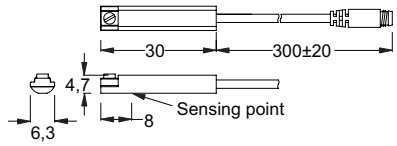
1 - Magnetic field sensor
2 - Sensor holder

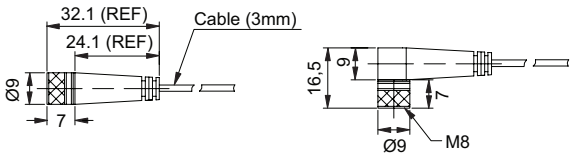
Mounting of the Magnetic field sensor on PNCE requires a HPNCE sensor holder.

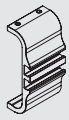


PNCE	L1	L2	L3	L4	L5
	[mm]				
32	30	53	6,5	19,5	10
40	30	60	6,5	19,5	10
50	30	71	6,5	22,5	10
63	30	81	6,5	22,5	10

SMU-40TP-K PNP NO / PNP NC





Code	Type	Compatibility	
68997	HPNCE sensor holder	PNCE 32	
68998		PNCE 40	
68999		PNCE 50	
69000		PNCE 63	
57815	SMU-40TP-K PNP NC	PNCE series	
40679	SMU-40TP-K PNP NO	PNCE series	
8146	Extension cable length 2m - Straight connector		
8147	Extension cable length 5m - Straight connector		
9017	Extension cable length 2m - Angled connector		
9019	Extension cable length 5m - Angled connector		

TECHNICAL DATA	SMU-40TP-K PNP NC	SMU-40TP-K PNP NO
Sensor Type	GMR sensor	GMR sensor
Switching function	NC	NO
Output	PNP	PNP
Operating voltage	10 ~ 30 V DC	10 ~ 30 V DC
Switching Current	200 mA max.	100 mA max.
Power rating	6,0 W max.	6,0 W max.
Voltage Drop	1,5 V / 100mA max.	1,5 V / 100mA max.
Current Consumption	20mA / 24 V max.	20mA / 24 V max.
Switching Frequency	1000 Hz	1000 Hz
Ambient temperature	-10 ~ +70°C	-10 ~ +70°C
Shock/Vibration	50 G / 9 G	50 G / 9 G
Protection class	IP67	IP67
LED indicator	Yellow	Yellow
Electrical connection	M8, 3-pin	M8, 3-pin
Cable material length	PU - 0,3m	PU - 0,3m
Extension cable	Energy chain compliant	Energy chain compliant

LOAD TORQUE CALCULATION AND DETERMINATION OF MAXIMUM AXIAL LOAD ON THE PNCE CYLINDER

Load torque

The load torque is a function of an applied axial load on the PNCE and can be calculated as follows:

$$M_{load} = \frac{F_{axial} \times l}{2000 \times \pi \times \eta}$$

When the motor side drive (MSD) is taken into consideration:

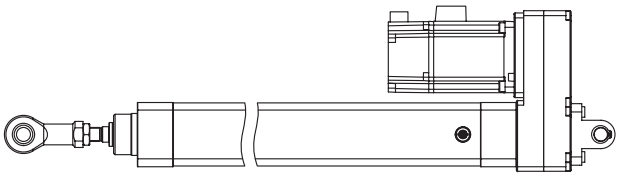
$$M_{load} = \frac{F_{axial} \times l}{2000 \times \pi \times \eta \times i}$$

M_{load}	Load torque	[Nm]
F_{axial}	Applied axial load on the PNCE	[N]
l	Ball screw lead	[mm]
η	Mechanical efficiency ≈ 0,9	[-]
i	Gear ratio	[-]

It should be noted that the load torque M_{load} must never exceed the maximum drive torque M_p.

Maximum axial load on the PNCE

Application conditions example:
- PNCE 40 with ball screw 16×5
- Absolute stroke = 500 mm
- Extended piston rod E = 0 mm
- Travel speed v_{max} = 0,2 m/s
- Using motor side drive type T1 with a gear ratio i = 1,5
- Mounting: simple – simple mount with SGS and SBG attachment



Using the diagram of the maximum axial loading as a function of the absolute stroke, the maximum axial load depending on the given mounting case can be obtained as F_{max} = 700 N.
Using the diagram of the maximum axial loading as a function of the travel speed, the maximum axial load depending on the ball screw lead and absolute stroke can be obtained as F_{max} = 4700 N.

For a selected motor side drive, the maximum drive torque $M_{p, MSD}$ = 2 Nm can be found (technical data table). Using the equation for the load torque calculation when the motor side drive is taken into consideration, the maximum axial load F_{max} = 3392 N can be calculated.

For selected mounting attachments, the maximum axial load is limited to the maximum axial load of the PNCE, i.e. F_{max} = 6020 N.

Finally, for this application example, the maximum axial load on the PNCE can be determined, i.e. F_{max} = 700 N. This is the smallest value of all the values obtained in the previous steps.

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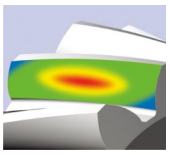
WMH Transmissions Limited

Planetary Reduction Gearboxes

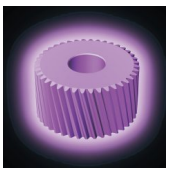
WMH offers a range of compact planetary gearboxes suitable for use with industry standard motors. The internal gearing reduces the high speed of the motor down to a more suitable speed required to drive our range of linear actuators. As a result of this speed reduction, the output torque is increased proportionally allowing the use of smaller, more compact and more cost effective motors and drives packages to achieve the performance from the linear actuators.

WMH offers both a high precision range of stainless steel gearheads in the AE series and a more economic, lightweight range of aluminium gearheads in the second generation PE series. Both ranges are fully interchangeable featuring the same mounting dimensions and output shaft sizes. Standard adapter flanges and couplings are also available to allow the combination of motor, gearbox and linear unit into one, compact linear motion solution.

Equipped with ***solid uncaged needle roller bearings,*** provides maximum contact points to increase stiffness and generates high output torque.



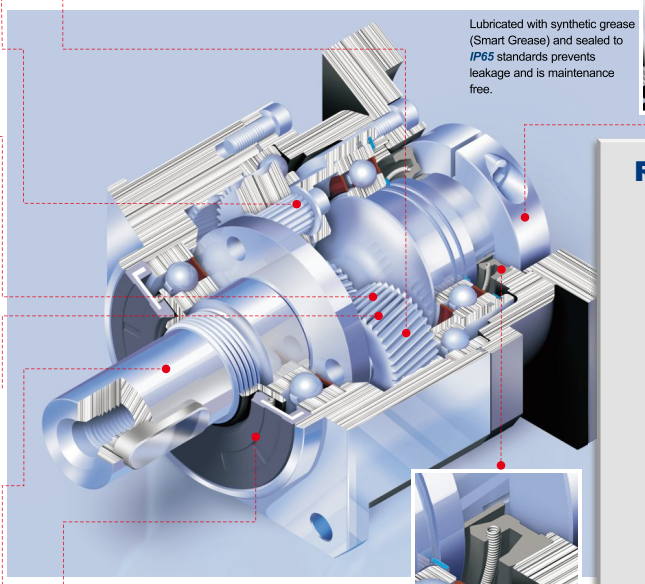
A high setting gear performance is achieved by using our ***HeliTopo technology.*** This ***eases off the tooth profile*** and ***crowns the lead of each tooth.*** This optimizes the gear mesh alignment and overlap to achieve maximum tooth surface contact.



Our in house plasma nitriding heat treatment process maintains the tooth surface hardness at ***900Hv*** for superior wear-resistance and a core hardness at ***30 HRc*** for toughness.

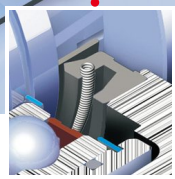
One piece planet carrier with extended bearing design provides maximum radial load capacity and increases system reliability and stiffness.

True Helical Gear Design Precision helical gearing increases tooth to tooth contact ratio by over 33% vs spur gearing. The helix angle produces smooth and quiet operation with decreased backlash (less than 1 arc-minutes and ≤ 56dB).

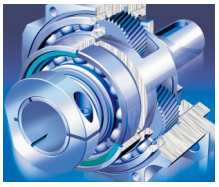


Lubricated with synthetic grease (Smart Grease) and sealed to ***IP65*** standards prevents leakage and is maintenance free.

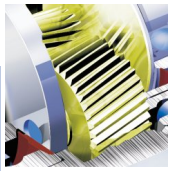
NEW - Patented output sealing systems design eliminates friction and heat generation which is accomplished by applying our hi-tech coating to all output contact surfaces. This coating reaches a hardness of ***3700Hv*** and is ground to R_a 0.2 μm finish to ensure sealing.



NEW - Patented input sealing system design eliminates break away torque and decreases friction/heat. The hi-tech coating bushing (***3700 Hv***, R_a 0.2 μm finish) interfaces with our proprietary seal which decreases wear and erosion of both sealing surfaces. This new patent prevents leakage and has a service life of over 20,000 hours.

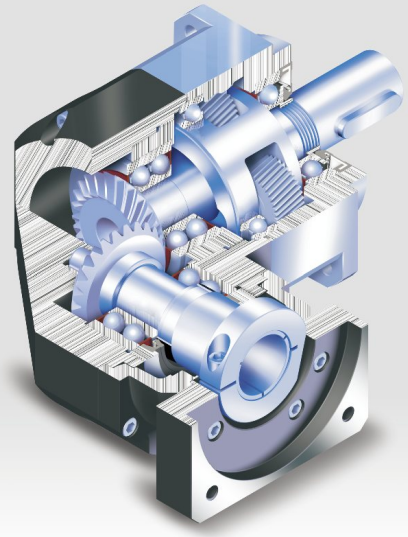


Patented planet carrier design puts the sun gear bearing directly into the planet carrier. It minimizes gear misalignment to gain higher accuracy.



Triple split collet with dynamic balanced set collar clamping system provides backlash free power transmission and eliminates slippage. 100% concentricity allows for smooth rotation and higher input speed capability.

Right Angle



R version with 90° input via helical bevel gear. Featuring an extremely short, light yet rigid housing and full compatibility with standard motor adapters.

AE Series – Precision Gearboxes

7 frame sizes from 050 up to 235

26 reduction ratios from 3:1 up to 200:1

Nominal output torque up to 2000 Nm

Operating noise levels as low as 56 dB

PE Series – Economy Gearboxes

5 frame sizes from 050 up to 155

17 reduction ratios from 3:1 up to 100:1

Nominal output torque up to 450 Nm

Operating noise levels as low as 60 dB

Planetary Gearboxes
Reduction Gearboxes – Performance

Parameter	Unit	Stage	Ratio	AE 050	AER050	AE 070	AER070	AE 090	AER090	AE 120	AER120	AE 155	AER155	AE 205	AER205	AE 235	AER235
Nominal Output Torque *(Maximum Acceleration Torque is 1.8 times more than nominal capacity)*	Nm	1	3:1	20	9	55	36	130	90	208	195	342	342	588	588	1140	1140
			4:1	19	12	50	48	140	120	290	260	542	520	1050	1040	1700	1680
			5:1	22	15	60	60	160	150	330	325	650	650	1200	1200	2000	2000
			6:1	20	18	55	55	150	150	310	310	600	600	1100	1100	1900	1900
			7:1	19	19	50	50	140	140	300	300	550	550	1100	1100	1800	1800
			8:1	17	17	45	45	120	120	260	260	500	500	1000	1000	1600	1600
			9:1	14	14	40	40	100	100	230	230	450	450	900	900	1500	1500
			10:1	14	14	40	40	100	100	230	230	450	450	900	900	1500	1500
			14:1	-	-	-	42	-	140	-	300	-	550	-	1100	-	1800
			20:1	-	-	-	40	-	100	-	230	-	450	-	900	-	1500
		2	15:1	20	14	55	-	130	-	208	-	342	-	588	-	1140	-
			20:1	19	14	50	-	140	-	290	-	542	-	1050	-	1700	-
			25:1	22	15	60	60	160	150	330	325	650	650	1200	1200	2000	2000
			30:1	20	20	55	55	150	150	310	310	600	600	1100	1100	1900	1900
			35:1	19	19	50	50	140	140	300	300	550	550	1100	1100	1800	1800
			40:1	17	17	45	45	120	120	260	260	500	500	1000	1000	1600	1600
			45:1	14	14	40	40	100	100	230	230	450	450	900	900	1500	1500
			50:1	22	22	60	60	160	100	330	230	650	650	1200	1200	2000	2000
			60:1	20	20	55	55	150	150	310	310	600	600	1100	1100	1900	1900
			70:1	19	19	50	50	140	140	300	300	550	550	1100	1100	1800	1800
			80:1	17	17	45	45	120	120	260	260	500	500	1000	1000	1600	1600
			90:1	14	14	40	40	100	100	230	230	450	450	900	900	1500	1500
			100:1	14	14	40	40	100	100	230	230	450	450	900	900	1500	1500
			120:1	-	-	-	-	-	150	-	310	-	600	-	1100	-	1900
			140:1	-	-	-	-	-	140	-	300	-	550	-	1100	-	1800
			160:1	-	-	-	-	-	120	-	260	-	550	-	1000	-	1600
			180:1	-	-	-	-	-	100	-	230	-	450	-	900	-	1500
			200:1	-	-	-	-	-	100	-	230	-	450	-	900	-	1500
Nom Input Speed	rpm	1 / 2	3 ~ 200	5000		5000		4000		4000		3000		3000		2000	
Max Input Speed	rpm	1 / 2	3 ~ 200	10000		10000		8000		8000		6000		6000		4000	
Backlash *	Arcmin	1	3 ~ 20	≤ 8	≤ 10	≤ 8	≤ 10	≤ 8	≤ 10	≤ 8	≤ 10	≤ 8	≤ 10	≤ 8	≤ 10	≤ 8	≤ 10
		2	25 ~ 200	≤ 12	≤ 14	≤ 12	≤ 14	≤ 12	≤ 14	≤ 12	≤ 14	≤ 12	≤ 14	≤ 12	≤ 14	≤ 12	≤ 14
Max Radial** Load Output	N	1 / 2	3 ~ 200	702		1377		2985		6100		8460		13050		8700	
Max Axial** Load Output	N	1 / 2	3 ~ 200	390		765		1625		3350		4700		7250		18000	
Operating Temperature	°C	1 / 2	3 ~ 200	-10 ~ +90													
Noise ***	dB (A)	1 / 2	3 ~ 200	≤ 56	≤ 61	≤ 58	≤ 63	≤ 60	≤ 65	≤ 63	≤ 68	≤ 65	≤ 70	≤ 67	≤ 72	≤ 70	≤ 74

Parameter	Unit	Stage	Ratio	PEII 050	PEIIR 050	PEII 070	PEIIR 070	PEII 090	PEIIR 090	PEII 120	PEIIR 120	PEII 155	PEIIR 155
Nominal Output Torque *(Maximum Acceleration Torque is 1.8 times more than nominal capacity)*	Nm	1	3:1	16		42		110		217		430	
			4:1	16		42		113		223		440	
			5:1	15		40		118		220		435	
			7:1	12		35		96		198		366	
			10:1	10		27		68		155		295	
		2	15:1	15		40		109		213		424	
			16:1	16		42		116		228		452	
			20:1	16		42		116		230		454	
			25:1	15		40		123		228		450	
			30:1	15		40		108		212		422	
			35:1	12		35		100		206		382	
			40:1	16		43		117		232		459	
			50:1	15		40		123		228		450	
			70:1	12		35		100		206		382	
			100:1	10		27		70		162		308	
Nom Input Speed	rpm	1 / 2	3 ~ 100	4500		4000		3600		3600		2500	
Max Input Speed	rpm	1 / 2	3 ~ 100	8000		6000		6000		4800		3600	
Backlash *	Arcmin	1	3 ~ 10	≤ 8	≤ 12	≤ 7	≤ 11	≤ 6	≤ 10	≤ 6	≤ 10	≤ 6	≤ 10
		2	15 ~ 100	≤ 10	≤ 14	≤ 9	≤ 13	≤ 8	≤ 12	≤ 8	≤ 12	≤ 8	≤ 12
Max Radial** Load Output	N	1 / 2	3 ~ 100	810		1150		1530		3260		4550	
Max Axial** Load Output	N	1 / 2	3 ~ 100	405		575		765		1630		2275	
Operating Temperature	°C	1 / 2	3 ~ 100	0 ~ +90									
Noise ***	dB (A)	1 / 2	3 ~ 100	≤ 60	≤ 70	≤ 62	≤ 72	≤ 64	≤ 74	≤ 66	≤ 75	≤ 68	≤ 77

* Backlash is measured @ 2% nominal output torque

** Applied at centre of output shaft (Length/2)
For more information, see pages 125 & 139

*** Based on 10:1 ratio @ 3000 rpm without load

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AE – Planetary Series
Precision Range – Stainless Steel

Unique stainless steel gearheads

- Stainless steel housings with chemically blacked aluminium adapters
- Round B14 style output flange
- 7 frame sizes from 050 up to 235
- 26 reduction ratios from 3:1 up to 200:1
- Nominal output torque up to 2000 Nm
- Backlash from as low as ≤ 8 arcmin
- Efficiency of up to ≥ 97 %
- Operating noise levels as low as 56 dB

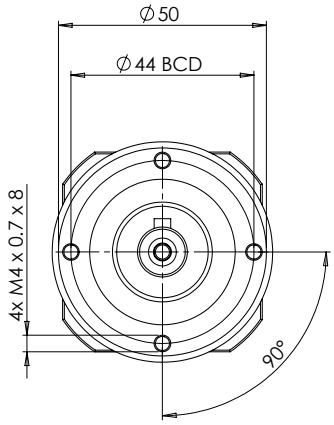
WMH is proud to offer the unique range of Apex Dynamics AE series precision planetary gearboxes. Stainless steel housings and output shafts combined with a durable, compact design, the AE series provide quality and performance at affordable prices.

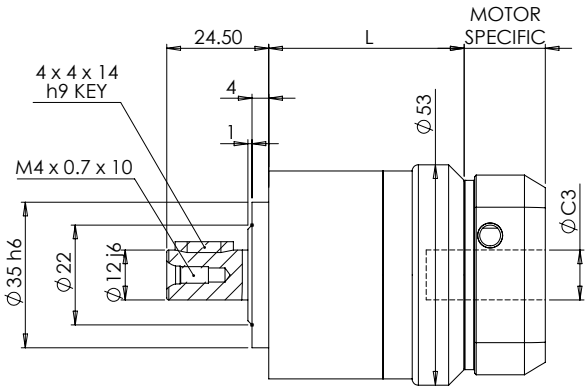
High precision, high torque and quiet operation are provided by optimised helical internal gearing. Straddle mounted high precision ball bearings allow for high radial and axial loads.

The AER series has a 90° input via helical bevel gearing. Featuring an extremely short, light yet rigid housing and full compatibility with the same standard motor adapters as the AE inline gearboxes.

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

AE050 – In-Line
Precision Range – Stainless Steel





For economy steel dimensional equivalent see **PEII050**

DIM L Single Stage = 47.0 mm
DIM L Double Stage = 74.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	20	36.0	60	0.03
4:1	19	34.2	57	0.03
5:1	22	39.6	66	0.03
6:1	20	36.0	60	0.03
7:1	19	34.2	57	0.03
8:1	17	30.6	51	0.03
9:1	14	25.2	42	0.03
10:1	14	25.2	42	0.03
~ DOUBLE STAGE ~				
15:1	20	36.0	60	0.03
20:1	19	34.2	57	0.03
25:1	22	39.6	66	0.03
30:1	20	36.0	60	0.03
35:1	19	34.2	57	0.03
40:1	17	30.6	51	0.03
45:1	14	25.2	42	0.03
50:1	22	39.6	66	0.03
60:1	20	36.0	60	0.03
70:1	19	34.2	57	0.03
80:1	17	30.6	51	0.03
90:1	14	25.2	42	0.03
100:1	14	25.2	42	0.03

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	5000
Max. Input Speed (rpm)	10000
Torsional Rigidity (Nm/arcmin)	3
Max. Radial Load on Output (N)*	702
Max. Axial Load on Output (N)*	390
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	0.6 / 0.9
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 56

* Applied at centre of output shaft (Length/2). For more information, see page 125

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

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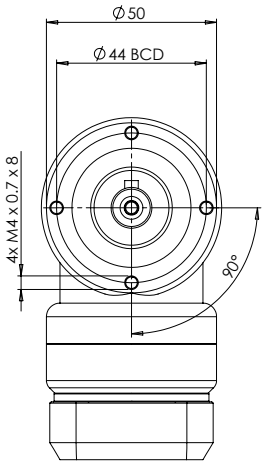
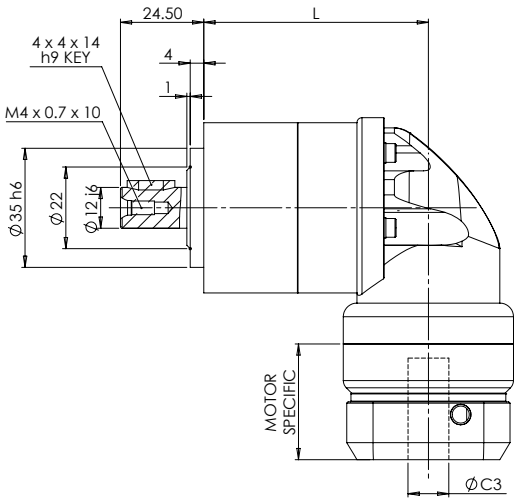
AER050 – Right Angle
Precision Range – Stainless Steel





For economy steel dimensional equivalent see **PEIIR050**

DIM L Single Stage = 66.0 mm
DIM L Double Stage = 93.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	9	16.2	27	0.09
4:1	12	21.6	36	0.09
5:1	15	27.0	45	0.09
6:1	18	32.4	54	0.09
7:1	19	34.2	57	0.09
8:1	17	30.6	51	0.09
9:1	14	25.2	42	0.09
10:1	14	25.2	42	0.09
~ DOUBLE STAGE ~				
15:1	14	25.2	42	0.09
20:1	14	25.2	42	0.09
25:1	15	27.0	45	0.09
30:1	20	36.0	60	0.09
35:1	19	34.2	57	0.09
40:1	17	30.6	51	0.09
45:1	14	25.2	42	0.09
50:1	14	25.2	42	0.09
60:1	20	36.0	60	0.09
70:1	19	34.2	57	0.09
80:1	17	30.6	51	0.09
90:1	14	25.2	42	0.09
100:1	14	25.2	42	0.09

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	5000
Max. Input Speed (rpm)	10000
Torsional Rigidity (Nm/arcmin)	3
Max. Radial Load on Output (N)*	702
Max. Axial Load on Output (N)*	390
Efficiency (1 STG / 2 STG) (%)	≥ 95 / ≥ 92
Unit weight (1 STG / 2 STG) (kg)	1.0 / 1.3
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 61

* Applied at centre of output shaft (Length/2). For more information, see page 125

** Based on 10:1 ratio @ 3000 rpm without load

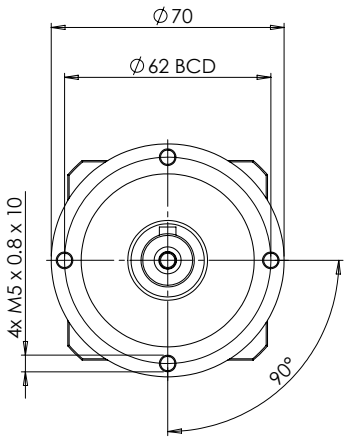
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

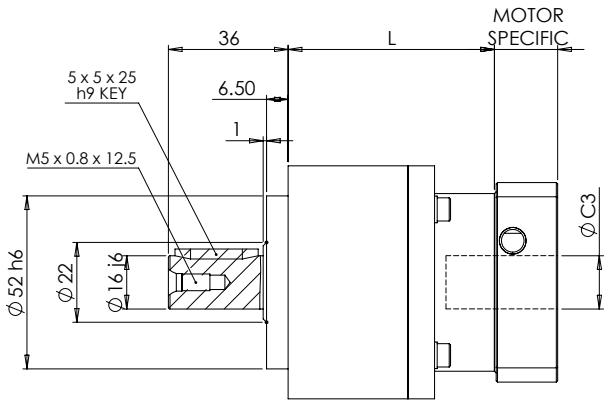
Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

AE070 – In-Line
Precision Range – Stainless Steel





For economy steel dimensional equivalent see **PEII070**

DIM L Single Stage = 62.0 mm
DIM L Double Stage = 87.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	55	99.0	165	0.16
4:1	50	90.0	150	0.14
5:1	60	108.0	180	0.13
6:1	55	99.0	165	0.13
7:1	50	90.0	150	0.13
8:1	45	81.0	135	0.13
9:1	40	72.0	120	0.13
10:1	40	72.0	120	0.13
~ DOUBLE STAGE ~				
15:1	55	99.0	165	0.03
20:1	50	90.0	150	0.03
25:1	60	108.0	180	0.03
30:1	55	99.0	165	0.03
35:1	50	90.0	150	0.03
40:1	45	81.0	135	0.03
45:1	40	72.0	120	0.03
50:1	60	108.0	180	0.03
60:1	55	99.0	165	0.03
70:1	50	90.0	150	0.03
80:1	45	81.0	135	0.03
90:1	40	72.0	120	0.03
100:1	40	72.0	120	0.03

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	5000
Max. Input Speed (rpm)	10000
Torsional Rigidity (Nm/arcmin)	7
Max. Radial Load on Output (N)*	1377
Max. Axial Load on Output (N)*	765
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	1.4 / 1.6
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 58

* Applied at centre of output shaft (Length/2). For more information, see page 125

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

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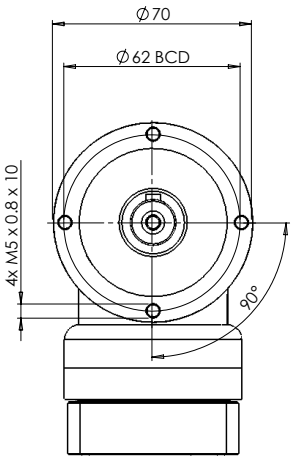
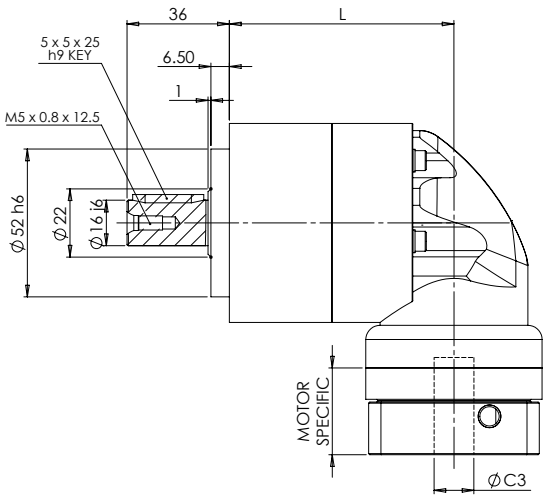
AER070 – Right Angle
Precision Range – Stainless Steel





For economy steel dimensional equivalent see **PEIIR070**

DIM L Single Stage = 76.0 mm
DIM L Double Stage = 106.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	36	64.8	108	0.35
4:1	48	86.4	144	0.35
5:1	60	108.0	180	0.35
6:1	55	99.0	165	0.35
7:1	50	90.0	150	0.35
8:1	45	81.0	135	0.35
9:1	40	72.0	120	0.35
10:1	40	72.0	120	0.35
14:1	42	75.6	126	0.07
20:1	40	72.0	120	0.07
~ DOUBLE STAGE ~				
25:1	60	108.0	180	0.09
30:1	55	99.0	165	0.09
35:1	50	90.0	150	0.09
40:1	45	81.0	135	0.09
45:1	40	72.0	120	0.09
50:1	60	108.0	180	0.09
60:1	55	99.0	165	0.09
70:1	50	90.0	150	0.09
80:1	45	81.0	135	0.09
90:1	40	72.0	120	0.09
100:1	40	72.0	120	0.09

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	5000
Max. Input Speed (rpm)	10000
Torsional Rigidity (Nm/arcmin)	7
Max. Radial Load on Output (N)*	1377
Max. Axial Load on Output (N)*	765
Efficiency (1 STG / 2 STG) (%)	≥ 95 / ≥ 92
Unit weight (1 STG / 2 STG) (kg)	2.1 / 2.0
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 63

* Applied at centre of output shaft (Length/2). For more information, see page 125

** Based on 10:1 ratio @ 3000 rpm without load

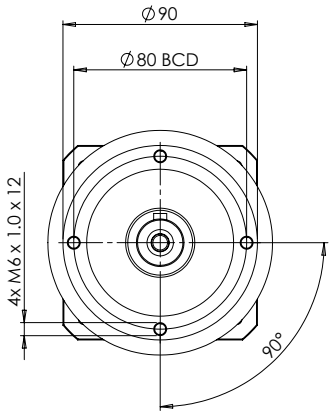
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

Output Shaft Option
Keyed Shaft

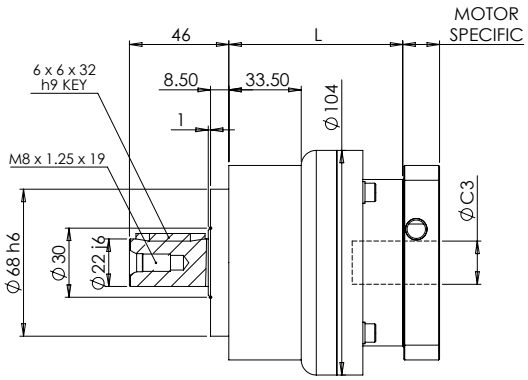
Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

AE090 – In-Line
Precision Range – Stainless Steel



For economy steel dimensional equivalent see **PEII090**



DIM L Single Stage = 80.5 mm
DIM L Double Stage = 113.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	130	234.0	390	0.61
4:1	140	252.0	420	0.48
5:1	160	288.0	460	0.47
6:1	150	270.0	450	0.45
7:1	140	252.0	420	0.45
8:1	120	216.0	360	0.44
9:1	100	180.0	300	0.44
10:1	100	180.0	300	0.44
~ DOUBLE STAGE ~				
15:1	130	234.0	390	0.13
20:1	140	252.0	420	0.13
25:1	160	288.0	480	0.13
30:1	150	270.0	450	0.13
35:1	140	252.0	420	0.13
40:1	120	216.0	360	0.13
45:1	100	180.0	300	0.13
50:1	160	288.0	480	0.13
60:1	150	270.0	450	0.13
70:1	140	252.0	420	0.13
80:1	120	216.0	360	0.13
90:1	100	180.0	300	0.13
100:1	100	180.0	300	0.13

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	4000
Max. Input Speed (rpm)	8000
Torsional Rigidity (Nm/arcmin)	14
Max. Radial Load on Output (N)*	2985
Max. Axial Load on Output (N)*	1625
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	3.3 / 4.7
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 60

* Applied at centre of output shaft (Length/2). For more information, see page 125
** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

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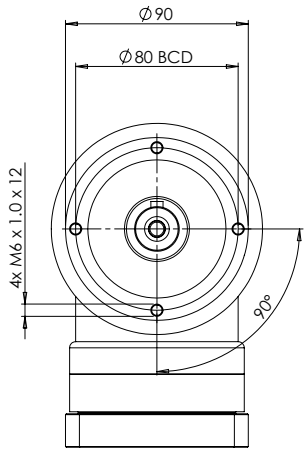
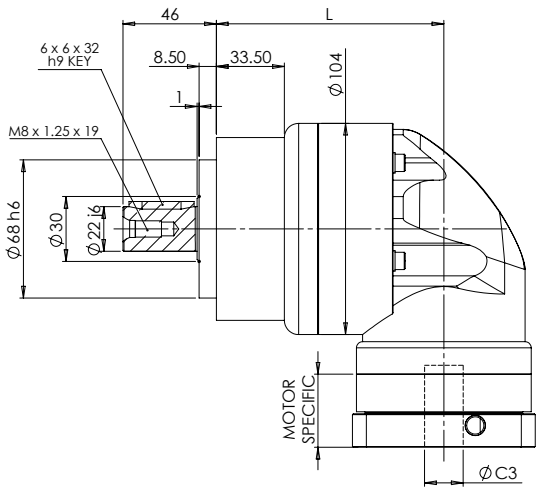
AER090 – Right Angle
Precision Range – Stainless Steel





For economy steel dimensional equivalent see **PEIIR090**

DIM L Single Stage = 112.0 mm
DIM L Double Stage = 130.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	90	162.0	270	2.25
4:1	120	216.0	360	2.25
5:1	150	270.0	450	2.25
6:1	150	270.0	450	2.25
7:1	140	252.0	420	2.25
8:1	120	216.0	360	2.25
9:1	100	180.0	300	2.25
10:1	100	180.0	300	2.25
14:1	140	252.0	420	1.87
20:1	100	180.0	300	1.87
~ DOUBLE STAGE ~				
25:1	150	270.0	450	0.35
30:1	150	270.0	450	0.35
35:1	140	252.0	420	0.35
40:1	120	216.0	360	0.35
45:1	100	180.0	300	0.35
50:1	100	180.0	300	0.35
60:1	150	270.0	450	0.35
70:1	140	252.0	420	0.35
80:1	120	216.0	360	0.35
90:1	100	180.0	300	0.31
100:1	100	180.0	300	0.31
120:1	150	270.0	450	0.31
140:1	140	252.0	420	0.31
160:1	120	216.0	360	0.31
180:1	100	180.0	300	0.31
200:1	100	180.0	300	0.31

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	4000
Max. Input Speed (rpm)	8000
Torsional Rigidity (Nm/arcmin)	14
Max. Radial Load on Output (N)*	2985
Max. Axial Load on Output (N)*	1625
Efficiency (1 STG / 2 STG) (%)	≥ 95 / ≥ 92
Unit weight (1 STG / 2 STG) (kg)	5.8 / 4.6
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 65

* Applied at centre of output shaft (Length/2). For more information, see page 125
** Based on 10:1 ratio @ 3000 rpm without load

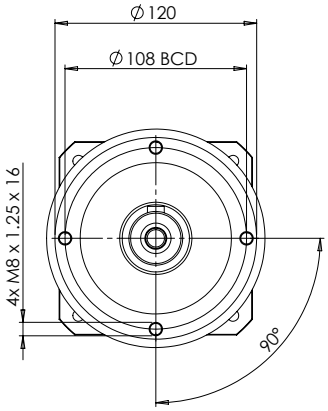
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

Output Shaft Option
Keyed Shaft

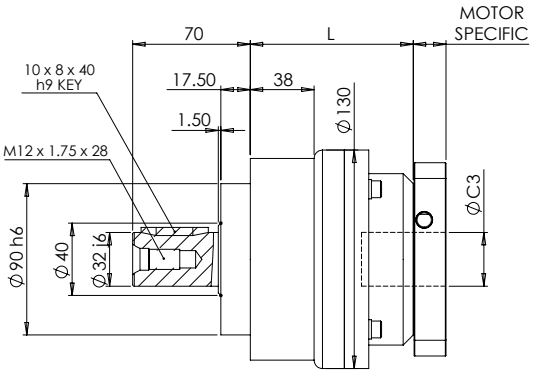
Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

AE120 – In-Line
Precision Range – Stainless Steel



For economy steel dimensional equivalent see **PEII120**



DIM L Single Stage = 97.0 mm
DIM L Double Stage = 138.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	208	374.4	624	3.25
4:1	290	522.0	870	2.74
5:1	330	594.0	990	2.71
6:1	310	558.0	930	2.65
7:1	300	540.0	900	2.62
8:1	260	468.0	780	2.58
9:1	230	414.0	690	2.57
10:1	230	414.0	690	2.57
~ DOUBLE STAGE ~				
15:1	208	374.4	624	0.47
20:1	290	522.0	870	0.47
25:1	330	594.0	990	0.47
30:1	310	558.0	930	0.47
35:1	300	540.0	900	0.47
40:1	260	468.0	780	0.47
45:1	230	414.0	690	0.47
50:1	330	594.0	990	0.44
60:1	310	558.0	930	0.44
70:1	300	540.0	900	0.44
80:1	260	468.0	780	0.44
90:1	230	414.0	690	0.44
100:1	230	414.0	690	0.44

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	4000
Max. Input Speed (rpm)	8000
Torsional Rigidity (Nm/arcmin)	25
Max. Radial Load on Output (N)*	6100
Max. Axial Load on Output (N)*	3350
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	6.9 / 8.7
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 63

* Applied at centre of output shaft (Length/2). For more information, see page 125

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

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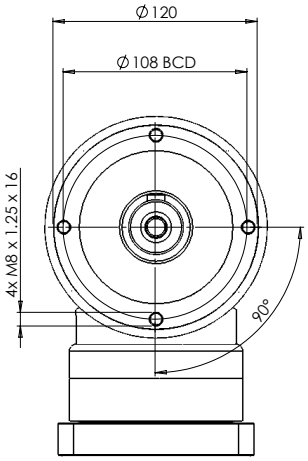
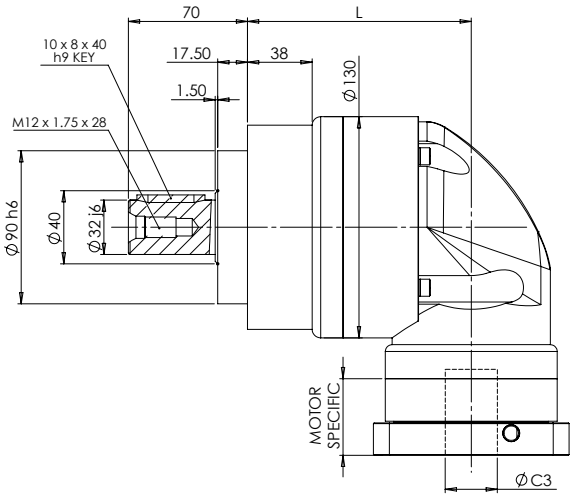
AER120 – Right Angle
Precision Range – Stainless Steel





For economy steel dimensional equivalent see **PEIIR120**

DIM L Single Stage = 131.5 mm
DIM L Double Stage = 170.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	195	351.0	585	6.84
4:1	260	468.0	780	6.84
5:1	325	585.0	975	6.84
6:1	310	558.0	930	6.84
7:1	300	540.0	900	6.84
8:1	260	468.0	780	6.84
9:1	230	414.0	690	6.84
10:1	230	414.0	690	6.84
14:1	300	540.0	900	6.25
20:1	230	414.0	690	6.25
~ DOUBLE STAGE ~				
25:1	325	585.0	975	2.25
30:1	310	558.0	930	2.25
35:1	300	540.0	900	2.25
40:1	260	468.0	780	2.25
45:1	230	414.0	690	2.25
50:1	230	414.0	690	2.25
60:1	310	558.0	930	2.25
70:1	300	540.0	900	2.25
80:1	260	468.0	780	2.25
90:1	230	414.0	690	2.25
100:1	230	414.0	690	2.25
120:1	310	558.0	930	1.87
140:1	300	540.0	900	1.87
160:1	260	468.0	780	1.87
180:1	230	414.0	690	1.87
200:1	230	414.0	690	1.87

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	4000
Max. Input Speed (rpm)	8000
Torsional Rigidity (Nm/arcmin)	25
Max. Radial Load on Output (N)*	6100
Max. Axial Load on Output (N)*	3350
Efficiency (1 STG / 2 STG) (%)	≥ 95 / ≥ 92
Unit weight (1 STG / 2 STG) (kg)	11.2 / 11.1
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 68

* Applied at centre of output shaft (Length/2). For more information, see page 125
** Based on 10:1 ratio @ 3000 rpm without load

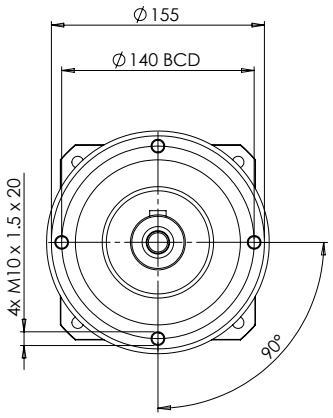
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

Output Shaft Option
Keyed Shaft

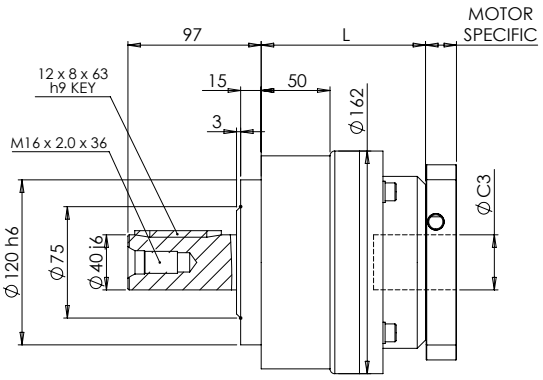
Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

AE155 – In-Line
Precision Range – Stainless Steel



For economy steel dimensional equivalent see **PEII155**



DIM L Single Stage = 119.5 mm
DIM L Double Stage = 176.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	342	615.6	1026	9.21
4:1	542	975.6	1626	7.54
5:1	650	1170.0	1950	7.42
6:1	600	1080.0	1800	7.25
7:1	550	990.0	1650	7.14
8:1	500	900.0	1500	7.07
9:1	450	810.0	1350	7.04
10:1	450	810.0	1350	7.03
~ DOUBLE STAGE ~				
15:1	342	615.6	1026	2.71
20:1	542	975.6	1626	2.71
25:1	650	1170.0	1950	2.71
30:1	600	1080.0	1800	2.71
35:1	550	990.0	1650	2.71
40:1	500	900.0	1500	2.71
45:1	450	810.0	1350	2.71
50:1	650	1170.0	1950	2.57
60:1	600	1080.0	1800	2.57
70:1	550	990.0	1650	2.57
80:1	500	900.0	1500	2.57
90:1	450	810.0	1350	2.57
100:1	450	810.0	1350	2.57

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	3000
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	50
Max. Radial Load on Output (N)*	8460
Max. Axial Load on Output (N)*	4700
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	13.0 / 17.0
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 65

* Applied at centre of output shaft (Length/2). For more information, see page 125
** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

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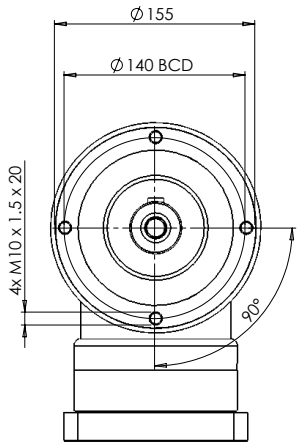
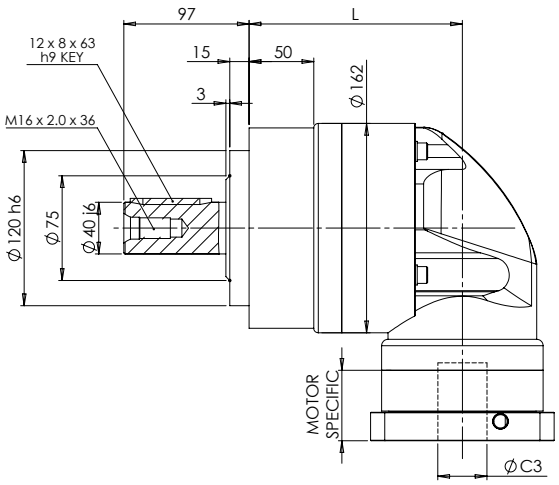
AER155 – Right Angle
Precision Range – Stainless Steel





For economy steel dimensional equivalent see **PEIIR155**

DIM L Single Stage = 165.0 mm
DIM L Double Stage = 210.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	342	615.6	1026	23.4
4:1	520	936.0	1560	23.4
5:1	650	1170.0	1950	23.4
6:1	600	1080.0	1800	23.4
7:1	550	990.0	1650	23.4
8:1	500	900.0	1500	23.4
9:1	450	810.0	1350	23.4
10:1	450	810.0	1350	23.4
14:1	550	990.0	1650	21.8
20:1	450	810.0	1350	21.8
~ DOUBLE STAGE ~				
25:1	650	1170.0	1950	6.84
30:1	600	1080.0	1800	6.84
35:1	550	990.0	1650	6.84
40:1	500	900.0	1500	6.84
45:1	450	810.0	1350	6.84
50:1	650	1170.0	1950	6.84
60:1	600	1080.0	1800	6.84
70:1	550	990.0	1650	6.84
80:1	500	900.0	1500	6.84
90:1	450	810.0	1350	6.84
100:1	450	810.0	1350	6.84
120:1	600	1080.0	1800	6.25
140:1	550	990.0	1650	6.25
160:1	550	990.0	1650	6.25
180:1	450	810.0	1350	6.25
200:1	450	810.0	1350	6.25

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	3000
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	50
Max. Radial Load on Output (N)*	8460
Max. Axial Load on Output (N)*	4700
Efficiency (1 STG / 2 STG) (%)	≥ 95 / ≥ 92
Unit weight (1 STG / 2 STG) (kg)	22.4 / 21.8
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 70

* Applied at centre of output shaft (Length/2). For more information, see page 125
** Based on 10:1 ratio @ 3000 rpm without load

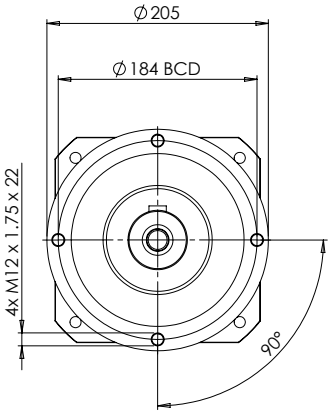
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

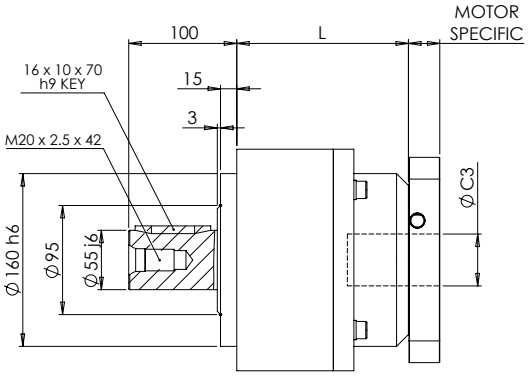
Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

AE205 – In-Line
Precision Range – Stainless Steel





DIM L Single Stage = 159.0 mm
DIM L Double Stage = 214.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	588	1058.4	1764	28.98
4:1	1050	1890.0	3150	23.67
5:1	1200	2160.0	3600	23.29
6:1	1100	1980.0	3300	22.75
7:1	1100	1980.0	3300	22.48
8:1	1000	1800.0	3000	22.59
9:1	900	1620.0	2700	22.53
10:1	900	1620.0	2700	22.51
~ DOUBLE STAGE ~				
15:1	588	1058.4	1764	7.42
20:1	1050	1890.0	3150	7.42
25:1	1200	2160.0	3600	7.42
30:1	1100	1980.0	3300	7.42
35:1	1100	1980.0	3300	7.42
40:1	1000	1800.0	3000	7.42
45:1	900	1620.0	2700	7.42
50:1	1200	2160.0	3600	7.03
60:1	1100	1980.0	3300	7.03
70:1	1100	1980.0	3300	7.03
80:1	1000	1800.0	3000	7.03
90:1	900	1620.0	2700	7.03
100:1	900	1620.0	2700	7.03

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	3000
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	145
Max. Radial Load on Output (N)*	13050
Max. Axial Load on Output (N)*	7250
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	31.0 / 35.0
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 67

* Applied at centre of output shaft (Length/2). For more information, see page 125
** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

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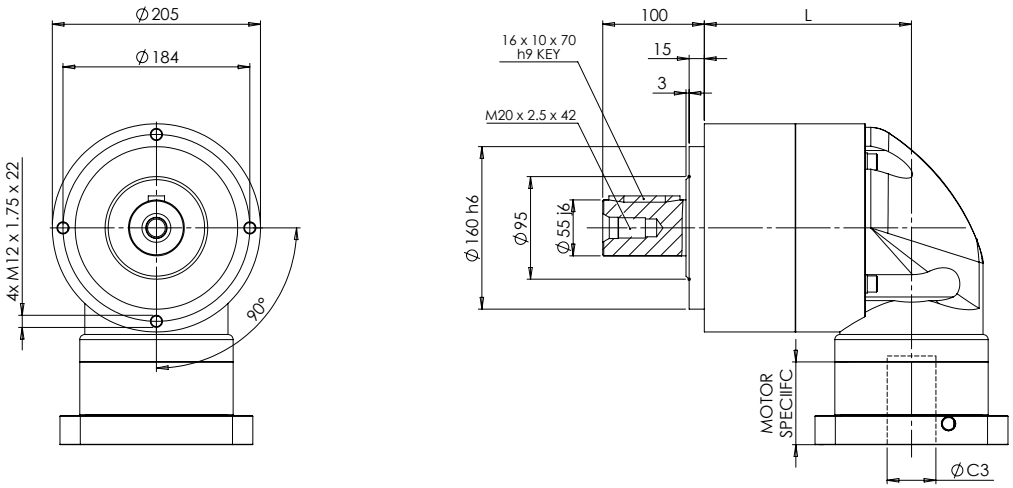
AER205 – Right Angle
Precision Range – Stainless Steel



DIM L Single Stage = 204.0 mm
DIM L Double Stage = 260.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	588	1058.4	1764	68.9
4:1	1040	1872.0	3120	68.9
5:1	1200	2160.0	3600	68.9
6:1	1100	1980.0	3300	68.9
7:1	1100	1980.0	3300	68.9
8:1	1000	1800.0	3000	68.9
9:1	900	1620.0	2700	68.9
10:1	900	1620.0	2700	68.9
14:1	1100	1980.0	3300	65.6
20:1	900	1620.0	2700	65.6
~ DOUBLE STAGE ~				
25:1	1200	2160.0	3600	23.4
30:1	1100	1980.0	3300	23.4
35:1	1100	1980.0	3300	23.4
40:1	1000	1800.0	3000	23.4
45:1	900	1620.0	2700	23.4
50:1	1200	2160.0	3600	23.4
60:1	1100	1980.0	3300	23.4
70:1	1100	1980.0	3300	23.4
80:1	1000	1800.0	3000	23.4
90:1	900	1620.0	2700	23.4
100:1	900	1620.0	2700	23.4
120:1	1100	1980.0	3300	21.8
140:1	1100	1980.0	3300	21.8
160:1	1000	1800.0	3000	21.8
180:1	900	1620.0	2700	21.8
200:1	900	1620.0	2700	21.8

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	3000
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	145
Max. Radial Load on Output (N)*	13050
Max. Axial Load on Output (N)*	7250
Efficiency (1 STG / 2 STG) (%)	≥ 95 / ≥ 92
Unit weight (1 STG / 2 STG) (kg)	46.8 / 43.7
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 72

* Applied at centre of output shaft (Length/2). For more information, see page 125
** Based on 10:1 ratio @ 3000 rpm without load

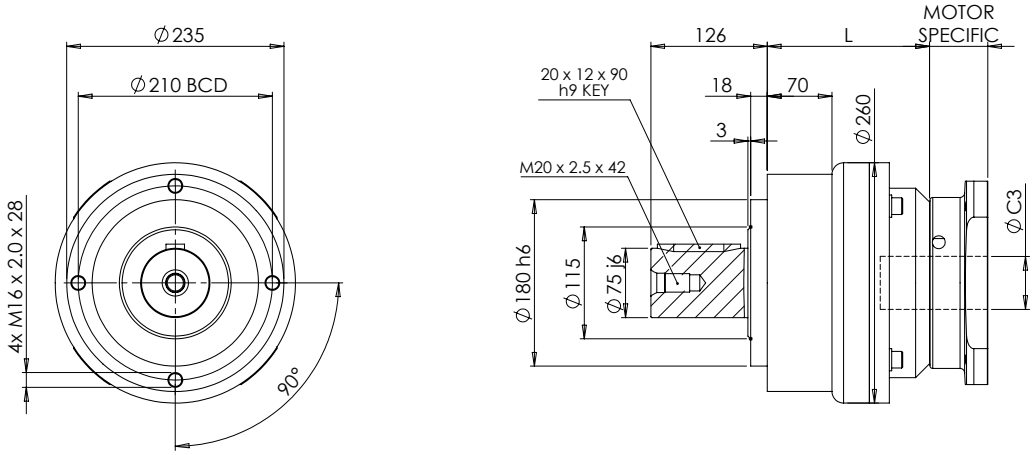
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

AE235 – In-Line
Precision Range – Stainless Steel



DIM L Single Stage = 175.5 mm
DIM L Double Stage = 260.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	1140	2052.0	3420	69.61
4:1	1700	3060.0	5100	54.37
5:1	2000	3600.0	6000	53.27
6:1	1900	3420.0	5700	51.72
7:1	1800	3240.0	5400	50.97
8:1	1600	2880.0	4800	50.84
9:1	1500	2700.0	4500	50.63
10:1	1500	2700.0	4500	50.56
~ DOUBLE STAGE ~				
15:1	1140	2052.0	3420	23.29
20:1	1700	3060.0	5100	23.29
25:1	2000	3600.0	6000	23.29
30:1	1900	3420.0	5700	23.29
35:1	1800	3240.0	5400	23.29
40:1	1600	2880.0	4800	23.29
45:1	1500	2700.0	4500	23.29
50:1	2000	3600.0	6000	23.29
60:1	1900	3420.0	5700	23.29
70:1	1800	3240.0	5400	23.29
80:1	1600	2880.0	4800	23.29
90:1	1500	2700.0	4500	23.29
100:1	1500	2700.0	4500	23.29

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	4000
Torsional Rigidity (Nm/arcmin)	225
Max. Radial Load on Output (N)*	8700
Max. Axial Load on Output (N)*	18000
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	53.0 / 66.0
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 70

* Applied at centre of output shaft (Length/2). For more information, see page 125
** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

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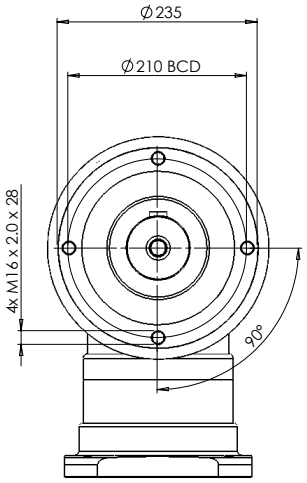
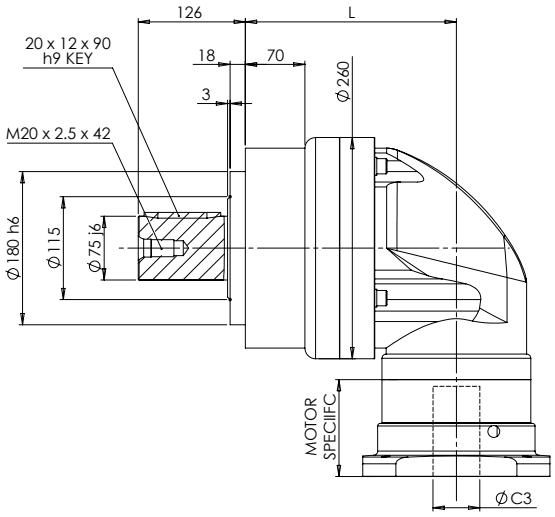
AER235 – Right Angle
Precision Range – Stainless Steel





DIM L Single Stage = 248.0 mm
DIM L Double Stage = 305.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)	Mass Moment of Inertia (kg/cm²)
~ SINGLE STAGE ~				
3:1	1140	2052.0	3420	135.4
4:1	1680	3024.0	5040	135.4
5:1	2000	3600.0	6000	135.4
6:1	1900	3420.0	5700	135.4
7:1	1800	3240.0	5400	135.4
8:1	1600	2880.0	4800	135.4
9:1	1500	2700.0	4500	135.4
10:1	1500	2700.0	4500	135.4
14:1	1800	3240.0	5400	119.8
20:1	1500	2700.0	4500	119.8
~ DOUBLE STAGE ~				
25:1	2000	3600.0	6000	68.9
30:1	1900	3420.0	5700	68.9
35:1	1800	3240.0	5400	68.9
40:1	1600	2880.0	4800	68.9
45:1	1500	2700.0	4500	68.9
50:1	2000	3600.0	6000	68.9
60:1	1900	3420.0	5700	68.9
70:1	1800	3240.0	5400	68.9
80:1	1600	2880.0	4800	68.9
90:1	1500	2700.0	4500	68.9
100:1	1500	2700.0	4500	68.9
120:1	1900	3420.0	5700	65.6
140:1	1800	3240.0	5400	65.6
160:1	1600	2880.0	4800	65.6
180:1	1500	2700.0	4500	65.6
200:1	1500	2700.0	4500	65.6

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see page 126
Nom. Input Speed (rpm)	2000
Max. Input Speed (rpm)	4000
Torsional Rigidity (Nm/arcmin)	225
Max. Radial Load on Output (N)*	8700
Max. Axial Load on Output (N)*	18000
Efficiency (1 STG / 2 STG) (%)	≥ 95 / ≥ 92
Unit weight (1 STG / 2 STG) (kg)	78.0 / 81.9
Min. Operating Temperature (°C)	- 10
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 74

* Applied at centre of output shaft (Length/2). For more information, see page 125

** Based on 10:1 ratio @ 3000 rpm without load

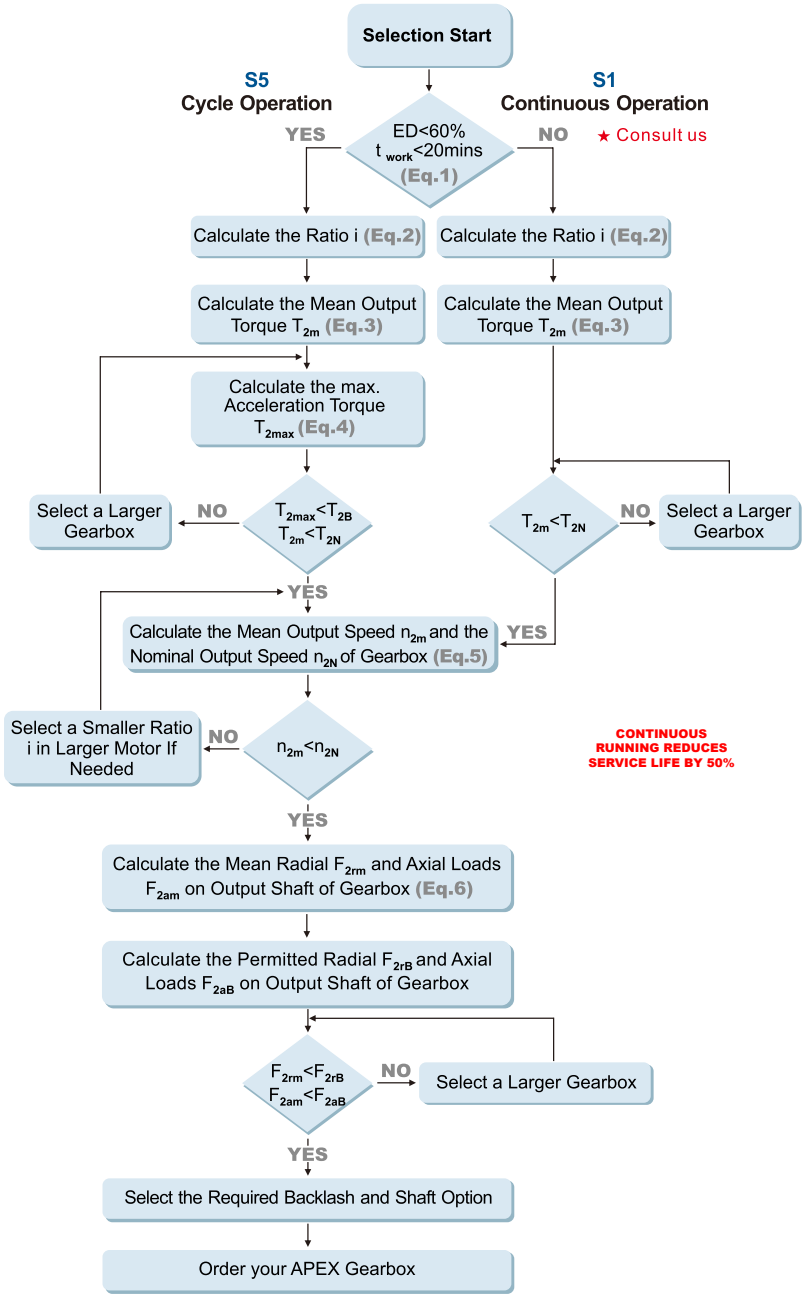
Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

Output Shaft Option
Keyed Shaft

Other Options Available	Order Code
Food Grade Grease	on request
High or Low Temperature Grease	on request
Full Stainless Steel Construction	on request
Vacuum Sealed	on request
IP67 Sealed (wash-down suitable)	on request

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

Selection of the Optimum Gearbox



Recommended (for S5 Cycle Operation)

The general design is given for

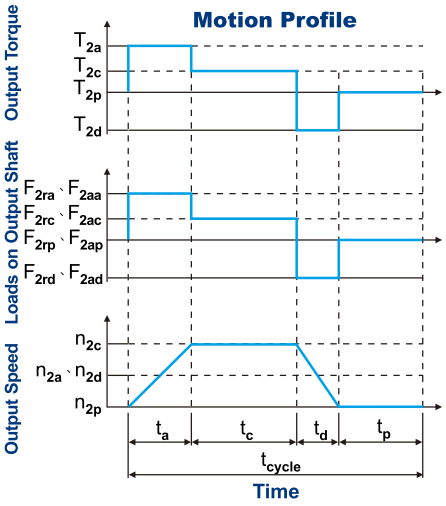
$$\frac{J_L}{i^2} \leq 4 \times J_m$$

The optimal design is given for

$$\frac{J_L}{i^2} \cong J_m$$

J_L Load Inertia

J_m Motor Inertia



1. $ED = \frac{t_a + t_c + t_d}{t_{cycle}} \times 100\%$, $t_{work} = t_a + t_c + t_d$

Index : a. Acceleration, c. Constant, d. Deceleration, p. Pause **(Eq.1)**

2. $i \cong \frac{n_m}{n_{work}}$

n_m Output Speed of the Motor

n_{work} Working Speed **(Eq.2)**

3. $$T_{2m} = \sqrt[3]{\frac{n_{2a} \times t_a \times T_{2a}^{\ 3} + n_{2c} \times t_c \times T_{2c}^{\ 3} + n_{2d} \times t_d \times T_{2d}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

(Eq.3)

4. $T_{2max} = T_{mB} \times i \times k_s \times \eta$

where K_s is

K_s	No. of Cycles / hr
1.0	0 ~ 1,000
1.1	1,000 ~ 1,500
1.3	1,500 ~ 2,000
1.6	2,000 ~ 3,000
1.8	3,000 ~ 5,000

T_{mB} Max. Output Torque of the Motor

η Efficiency of the Gearbox **(Eq.4)**

5. $n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$

$$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$$

$$n_{2N} = \frac{n_{1N}}{i}$$

(Eq.5)

6. $$F_{2rm} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2ra}^{\ 3} + n_{2c} \times t_c \times F_{2rc}^{\ 3} + n_{2d} \times t_d \times F_{2rd}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

$$F_{2am} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2aa}^{\ 3} + n_{2c} \times t_c \times F_{2ac}^{\ 3} + n_{2d} \times t_d \times F_{2ad}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

(Eq.6)

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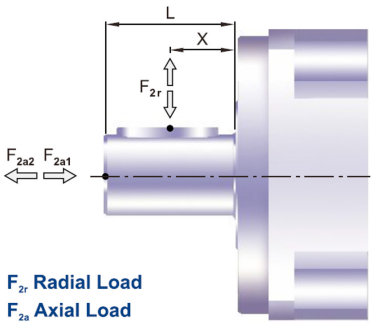
AE Output Loads

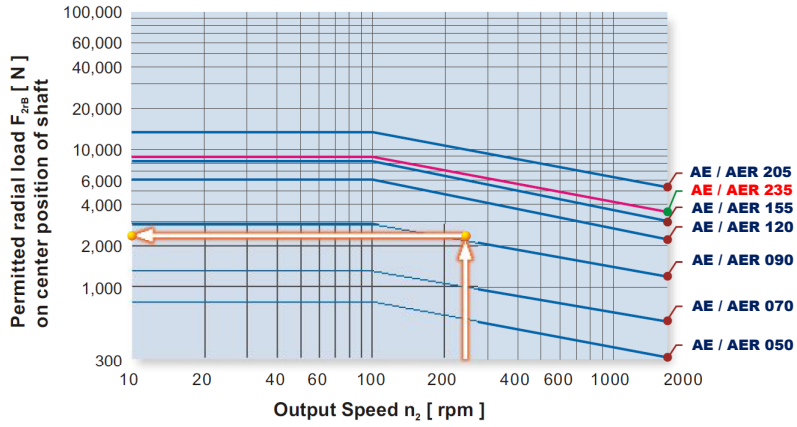


F_{2r} Radial Load
F_{2a} Axial Load

The permitted radial and axial loads on the output shaft of the gearbox are dependant on the design of the output bearing arrangement.

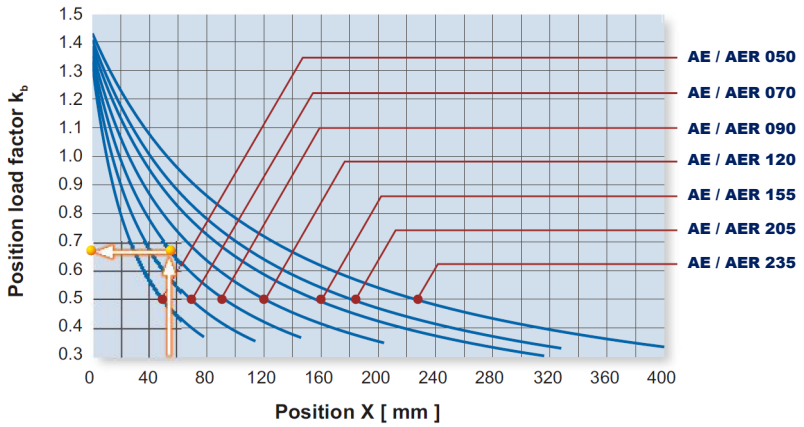
APEX use the extension straddle oversized bearing design thus allowing for heavy loads on both axis.

Permitted radial loads are dependant on the nominal output speed of the gearbox as can be seen on the below graph.



CONTINUOUS RUNNING REDUCES SERVICE LIFE BY 50%

If the radial force is not exerted on the centre of the output shaft (length/2) then the permitted loads can be calculated based on the position load factor as depicted on the below graph.



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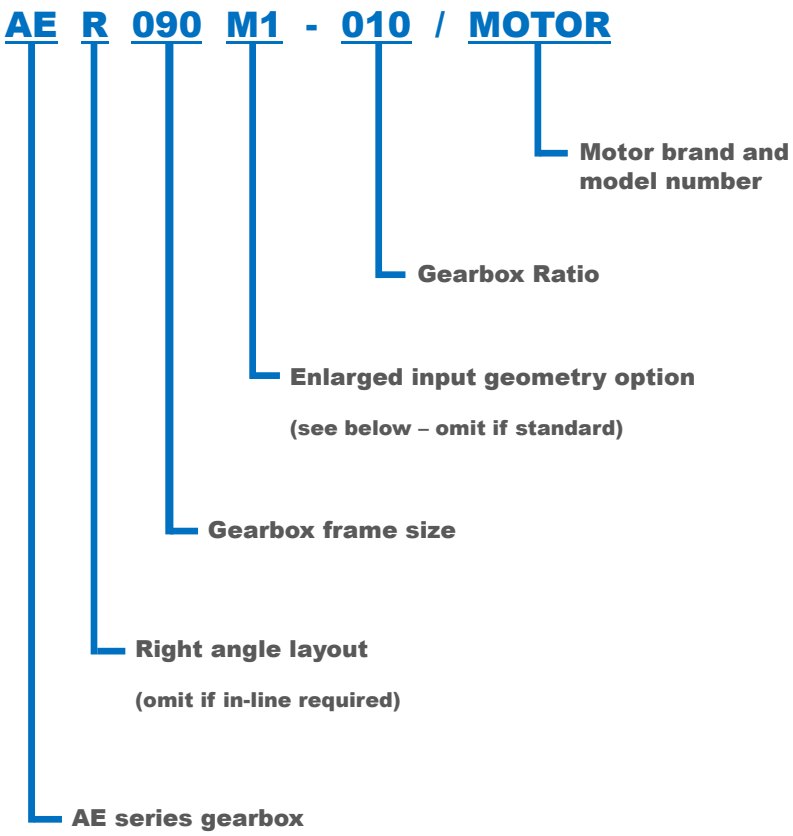
AE Order Codes



Example Order Code: AE120-035 / ALLEN BRADLEY MPL-A230P

AE Max. ØC3	050		070		090		120		155		205		235	
	1 STG	2 STG	1 STG	2 STG	1 STG	2 STG	1 STG	2 STG	1 STG	2 STG	1 STG	2 STG	1 STG	2 STG
Standard	11	11	14	11	19	14	32	19	38	32	48	38	55	48
M1	12	12	16	12	24	16	-	24	-	-	-	-	-	-
M2	-	-	-	-	-	5/8"	-	-	-	-	-	-	-	-

FOR ANY NON STANDARD ENQUIRIES
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WMH Transmissions Limited

PEII – Planetary Series
Economy Range – Steel

Economy steel version of precision AE range

Second generation

- Steel & aluminium construction
- Round B14 style output flange
- 5 frame sizes from 050 up to 155
- 17 reduction ratios from 3:1 up to 100:1
- Nominal output torque up to 450 Nm
- Backlash from as low as ≤ 6 arcmin
- Efficiency of up to ≥ 97 %
- Operating noise levels as low as 60 dB

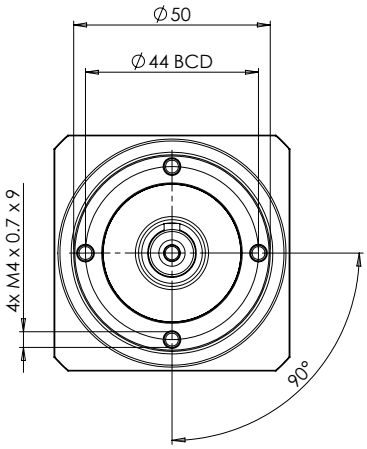
WMH also offers a range of economy planetary reduction gearboxes in the form of the Apex Dynamics PEII series now in their second generation.

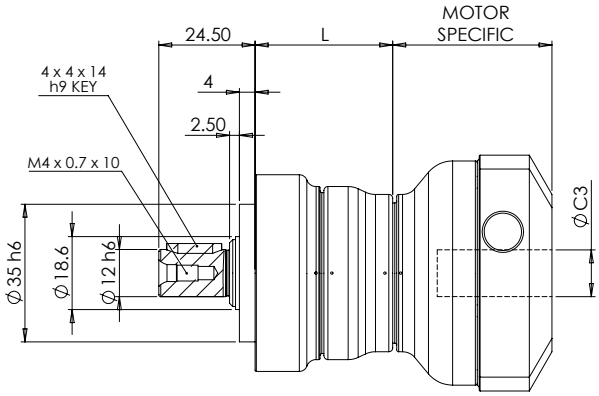
Featuring lower inertia, smaller size and lower weight thanks to their aluminium and steel construction and the same mounting geometry as the AE series, these units provide an economic alternative for less demanding applications.

The PEIIR series has a 90° input via helical bevel gearing. Featuring an extremely short and light bonded housing and full compatibility with the same standard motor adapters as the PEII inline gearboxes.

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PEII050 – In-line
Economy Range – Steel





For precision stainless steel dimensional equivalent see **AE050**

DIM L Single Stage = 35.0 mm
DIM L Double Stage = 50.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	16	28.8	48
4:1	16	28.8	48
5:1	15	27.0	45
7:1	12	21.6	36
10:1	10	18.0	30
~ DOUBLE STAGE ~			
15:1	15	27.0	45
16:1	16	28.8	48
20:1	16	28.8	48
25:1	15	27.0	45
30:1	15	27.0	45
35:1	12	21.6	36
40:1	16	28.8	48
50:1	15	27.0	45
70:1	12	21.6	36
100:1	10	18.0	30

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	4500
Max. Input Speed (rpm)	8000
Torsional Rigidity (Nm/arcmin)	0.9
Max. Radial Load on Output (N)*	810
Max. Axial Load on Output (N)*	405
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	0.6 / 0.9
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 60
No Load Torque (1 / 2 STG) (N)**	0.05 / 0.05

* Applied at centre of output shaft (Length/2). For more information, see page 139

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 8 arcmin
~ DOUBLE STAGE ~
≤ 10 arcmin

Ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
8	0.10	0.10
11	0.16	0.16
14	0.20	0.20

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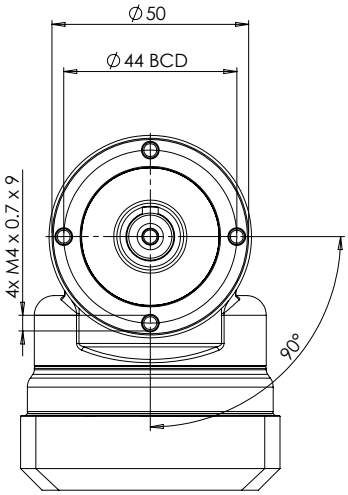
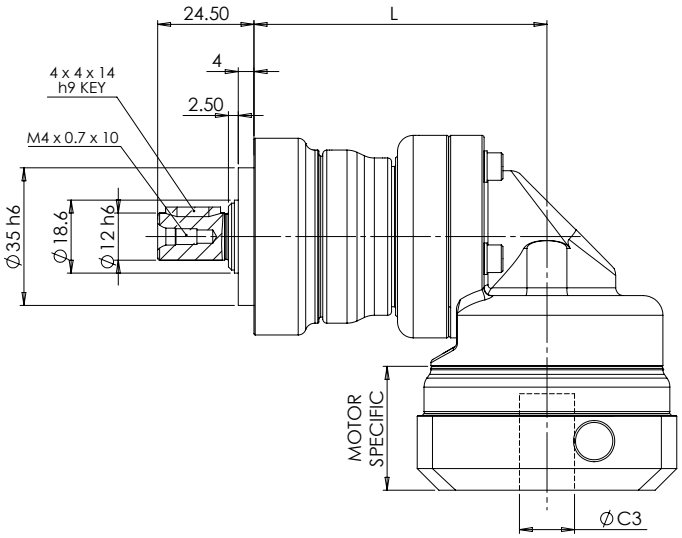
PEIIR050 – Right Angle
Economy Range – Steel





For precision stainless steel dimensional equivalent see **AER050**

DIM L Single Stage = 74.5 mm
DIM L Double Stage = 89.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	16	28.8	48
4:1	16	28.8	48
5:1	15	27.0	45
7:1	12	21.6	36
10:1	10	18.0	30
~ DOUBLE STAGE ~			
15:1	15	27.0	45
16:1	16	28.8	48
20:1	16	28.8	48
25:1	15	27.0	45
30:1	15	27.0	45
35:1	12	21.6	36
40:1	16	28.8	48
50:1	15	27.0	45
70:1	12	21.6	36
100:1	10	18.0	30

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	4500
Max. Input Speed (rpm)	8000
Torsional Rigidity (Nm/arcmin)	0.9
Max. Radial Load on Output (N)*	810
Max. Axial Load on Output (N)*	405
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	1.0 / 1.3
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 70
No Load Torque (1 / 2 STG) (N)**	0.10 / 0.10

* Applied at centre of output shaft (Length/2). For more information, see page 139

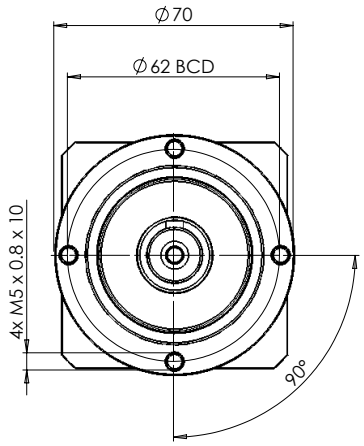
** Based on 10:1 ratio @ 3000 rpm without load

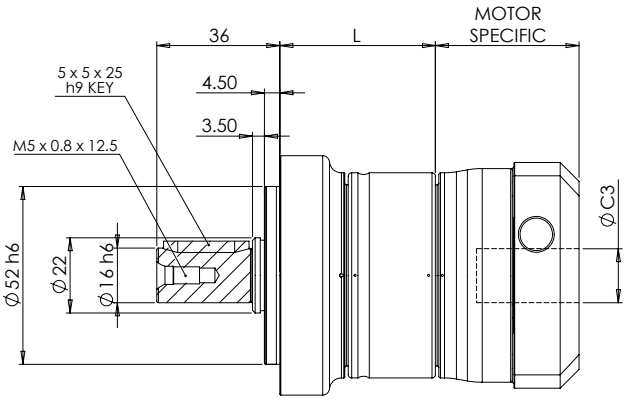
Backlash
~ SINGLE STAGE ~
≤ 12 arcmin
~ DOUBLE STAGE ~
≤ 14 arcmin

Ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
8	0.18	0.18
11	0.20	0.20
14	0.24	0.24

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PEII070 – In-line
Economy Range – Steel





For precision stainless steel dimensional equivalent see **AE070**

DIM L Single Stage = 45.5 mm
DIM L Double Stage = 65.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	42	75.6	126
4:1	42	75.6	126
5:1	40	72.0	120
7:1	35	63.0	105
10:1	27	48.6	81
~ DOUBLE STAGE ~			
15:1	40	72.0	120
16:1	42	75.6	126
20:1	42	75.6	126
25:1	40	72.0	120
30:1	40	72.0	120
35:1	35	63.0	105
40:1	43	77.4	129
50:1	40	72.0	120
70:1	35	63.0	105
100:1	27	48.6	81

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	4000
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	2.2
Max. Radial Load on Output (N)*	1150
Max. Axial Load on Output (N)*	575
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	1.4 / 1.6
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 62
No Load Torque (1 / 2 STG) (N)**	0.10 / 0.10

* Applied at centre of output shaft (Length/2). For more information, see page 139

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 7 arcmin
~ DOUBLE STAGE ~
≤ 9 arcmin

Ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
8	0.12	0.10
11	0.19	0.16
14	0.22	0.20
19	1.53	1.51

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

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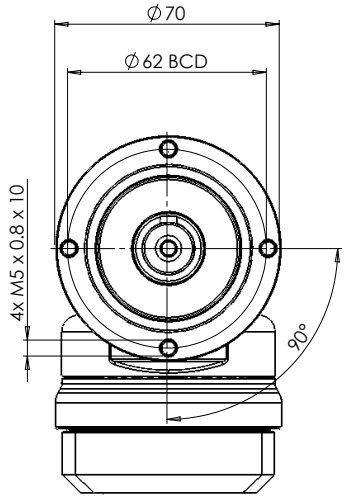
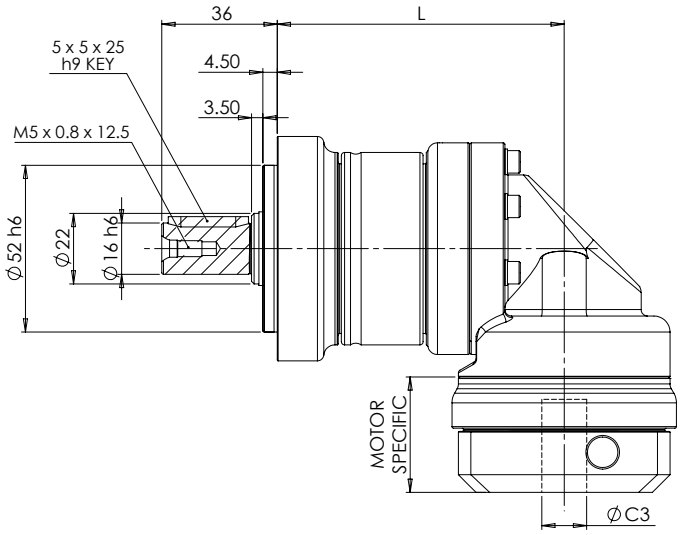
PEIIR070 – Right Angle
Economy Range – Steel





For precision stainless steel dimensional equivalent see **AER070**

DIM L Single Stage = 89.5 mm
DIM L Double Stage = 109.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	42	75.6	126
4:1	42	75.6	126
5:1	40	72.0	120
7:1	35	63.0	105
10:1	27	48.6	81
~ DOUBLE STAGE ~			
15:1	40	72.0	120
16:1	42	75.6	126
20:1	42	75.6	126
25:1	40	72.0	120
30:1	40	72.0	120
35:1	35	63.0	105
40:1	43	77.4	129
50:1	40	72.0	120
70:1	35	63.0	105
100:1	27	48.6	81

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	4000
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	2.2
Max. Radial Load on Output (N)*	1150
Max. Axial Load on Output (N)*	575
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	2.1 / 2.0
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 72
No Load Torque (1 / 2 STG) (N)**	0.15 / 0.15

* Applied at centre of output shaft (Length/2). For more information, see page 139

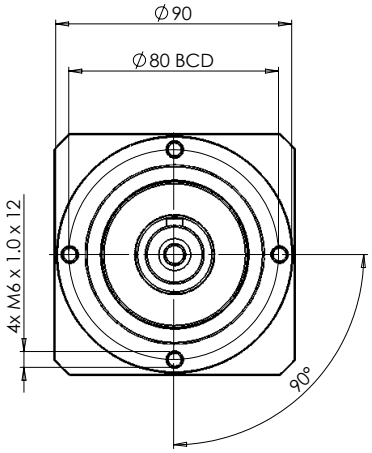
** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 11 arcmin
~ DOUBLE STAGE ~
≤ 13 arcmin

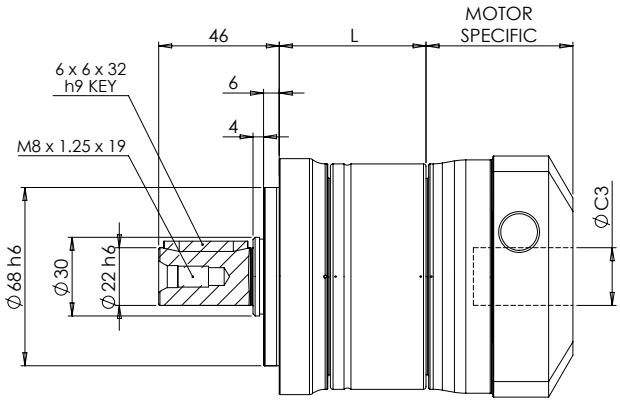
Ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
8	0.36	0.36
11	0.39	0.39
14	0.43	0.43
19	1.24	1.24

ALL APEX GEARBOXES ARE SUPPLIED LUBRICATED FOR LIFE WITH NYE® NYOGEL 792D SYNTHETIC GREASE AND CONFORM WITH ATEX EQUIPMENT-GROUP II CATEGORY 2 AS STANDARD

PEII090 – In-line
Economy Range – Steel



For precision stainless steel dimensional equivalent see **AE090**



DIM L Single Stage = 56.0 mm
DIM L Double Stage = 82.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	110	198.0	330
4:1	113	203.4	339
5:1	118	212.4	354
7:1	96	172.8	288
10:1	68	122.4	204
~ DOUBLE STAGE ~			
15:1	109	196.2	327
16:1	116	208.8	348
20:1	116	208.8	348
25:1	123	221.4	369
30:1	108	194.4	324
35:1	100	180.0	300
40:1	117	210.6	351
50:1	123	221.4	369
70:1	100	180.0	300
100:1	70	126.0	210

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	3600
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	8
Max. Radial Load on Output (N)*	1530
Max. Axial Load on Output (N)*	765
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	3.3 / 4.7
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 64
No Load Torque (1 / 2 STG) (N)**	0.40 / 0.30

* Applied at centre of output shaft (Length/2). For more information, see page 139

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 6 arcmin
~ DOUBLE STAGE ~
≤ 8 arcmin

ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
14	0.36	0.24
19	1.70	1.58
24	2.24	2.12
28	2.68	2.55

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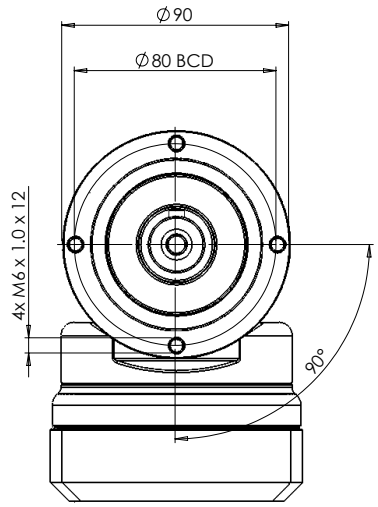
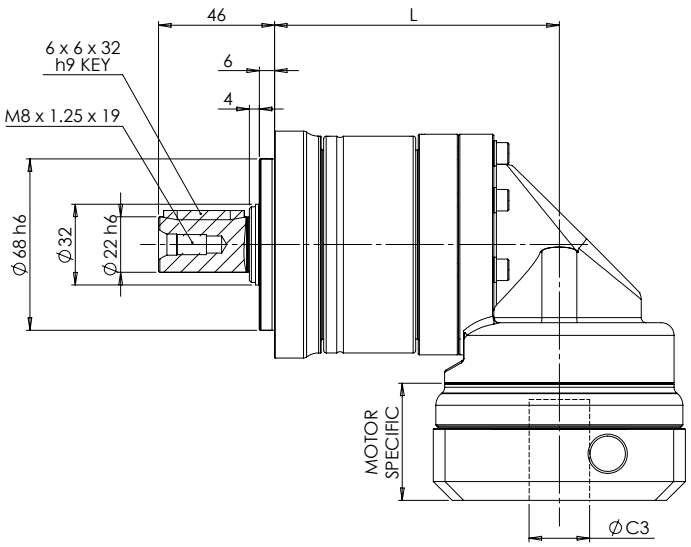
PEIIR090 – Right Angle
Economy Range – Steel





For precision stainless steel dimensional equivalent see **AER090**

DIM L Single Stage = 113.0 mm
DIM L Double Stage = 139.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	110	198.0	330
4:1	113	203.4	339
5:1	118	212.4	354
7:1	96	172.8	288
10:1	68	122.4	204
~ DOUBLE STAGE ~			
15:1	109	196.2	327
16:1	116	208.8	348
20:1	116	208.8	348
25:1	123	221.4	369
30:1	108	194.4	324
35:1	100	180.0	300
40:1	117	210.6	351
50:1	123	221.4	369
70:1	100	180.0	300
100:1	70	126.0	210

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	3600
Max. Input Speed (rpm)	6000
Torsional Rigidity (Nm/arcmin)	8
Max. Radial Load on Output (N)*	1530
Max. Axial Load on Output (N)*	765
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	5.8 / 4.6
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 74
No Load Torque (1 / 2 STG) (N)**	0.45 / 0.35

* Applied at centre of output shaft (Length/2). For more information, see page 139

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

Ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
14	1.87	1.87
19	2.67	2.67
24	2.97	2.97
28	3.47	3.47

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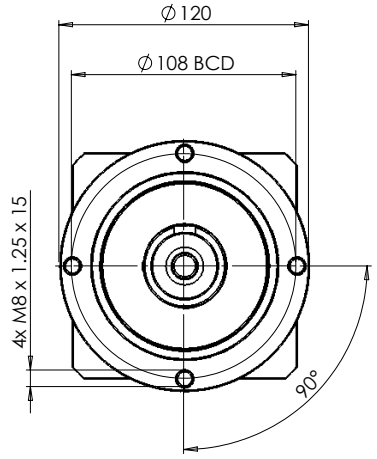
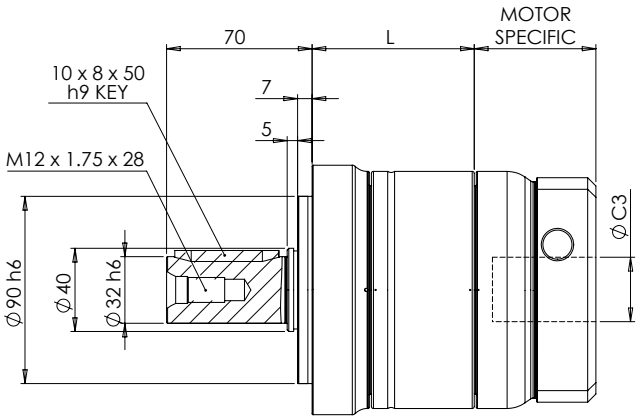
PEII120 – In-line
Economy Range – Steel



For precision stainless steel dimensional equivalent see **AE120**



DIM L Single Stage = 78.0 mm
DIM L Double Stage = 114.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	217	390.6	651
4:1	223	401.4	669
5:1	220	396.0	660
7:1	198	356.4	594
10:1	155	279.0	465
~ DOUBLE STAGE ~			
15:1	213	383.4	639
16:1	228	410.4	684
20:1	230	414.0	690
25:1	228	410.4	684
30:1	212	381.6	636
35:1	206	370.8	618
40:1	232	417.6	696
50:1	228	410.4	684
70:1	206	370.8	618
100:1	162	291.6	486

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	3600
Max. Input Speed (rpm)	4800
Torsional Rigidity (Nm/arcmin)	12
Max. Radial Load on Output (N)*	3260
Max. Axial Load on Output (N)*	1630
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	6.9 / 8.9
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 66
No Load Torque (1 / 2 STG) (N)**	0.80 / 0.40

* Applied at centre of output shaft (Length/2). For more information, see page 139

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 6 arcmin
~ DOUBLE STAGE ~
≤ 8 arcmin

ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
19	2.20	1.73
24	2.74	2.27
28	3.17	2.70
32	7.77	7.30
35	10.80	10.30
38	14.00	13.50

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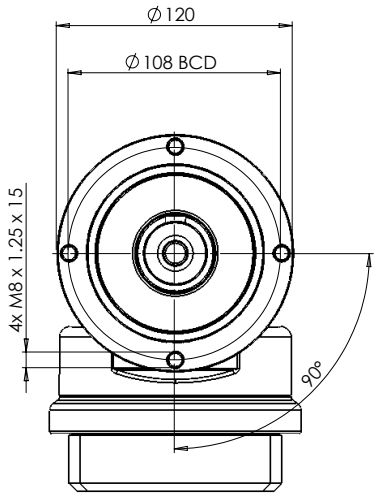
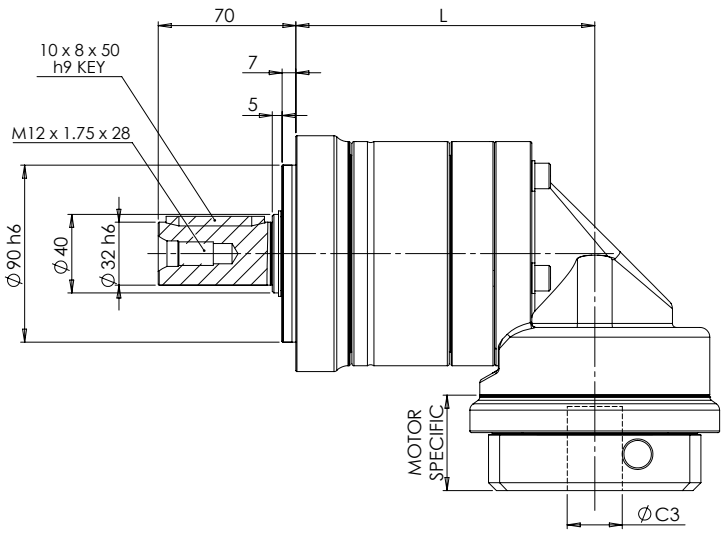
PEIIR120 – Right Angle
Economy Range – Steel





For precision stainless steel dimensional equivalent see **AER120**

DIM L Single Stage = 152.0 mm
DIM L Double Stage = 188.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	217	390.6	651
4:1	223	401.4	669
5:1	220	396.0	660
7:1	198	356.4	594
10:1	155	279.0	465
~ DOUBLE STAGE ~			
15:1	213	383.4	639
16:1	228	410.4	684
20:1	230	414.0	690
25:1	228	410.4	684
30:1	212	381.6	636
35:1	206	370.8	618
40:1	232	417.6	696
50:1	228	410.4	684
70:1	206	370.8	618
100:1	162	291.6	486

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	3600
Max. Input Speed (rpm)	4800
Torsional Rigidity (Nm/arcmin)	12
Max. Radial Load on Output (N)*	3260
Max. Axial Load on Output (N)*	1630
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	11.2 / 11.1
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 75
No Load Torque (1 / 2 STG) (N)**	0.85 / 0.45

* Applied at centre of output shaft (Length/2). For more information, see page 139

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
19	6.80	6.80
24	7.10	7.10
28	7.59	7.59
32	10.56	10.56
35	11.97	11.97
38	13.95	13.95

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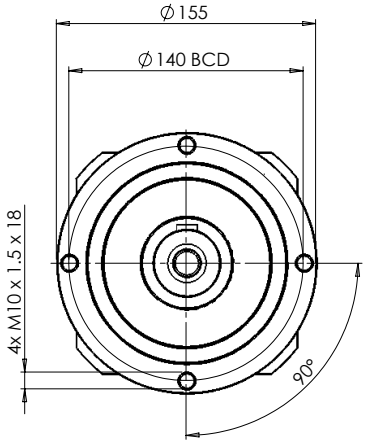
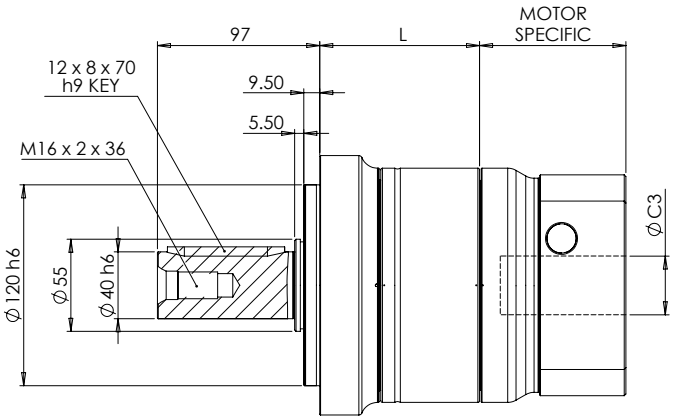
PEII155 – In-line
Economy Range – Steel





For precision stainless steel dimensional equivalent see **AE155**

DIM L Single Stage = 95.5 mm
DIM L Double Stage = 143.0 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	430	774.0	1290
4:1	440	792.0	1320
5:1	435	783.0	1305
7:1	366	658.8	1098
10:1	295	531.0	885
~ DOUBLE STAGE ~			
15:1	424	763.2	1272
16:1	452	813.6	1356
20:1	454	817.2	1362
25:1	450	810.0	1350
30:1	422	759.6	1266
35:1	382	687.6	1146
40:1	459	826.2	1377
50:1	450	810.0	1350
70:1	382	687.6	1146
100:1	308	554.4	924

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	2500
Max. Input Speed (rpm)	3600
Torsional Rigidity (Nm/arcmin)	16
Max. Radial Load on Output (N)*	4550
Max. Axial Load on Output (N)*	2275
Efficiency (1 STG / 2 STG) (%)	≥ 97 / ≥ 94
Unit weight (1 STG / 2 STG) (kg)	13.0 / 17.0
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 68
No Load Torque (1 / 2 STG) (N)**	2.50 / 0.80

* Applied at centre of output shaft (Length/2). For more information, see page 139

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 6 arcmin
~ DOUBLE STAGE ~
≤ 8 arcmin

ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
19	-	2.18
24	4.52	2.73
28	4.94	3.15
32	9.70	7.91
35	12.80	11.00
38	16.00	14.20
42	24.50	-

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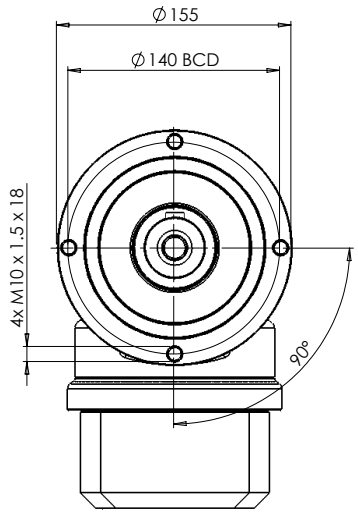
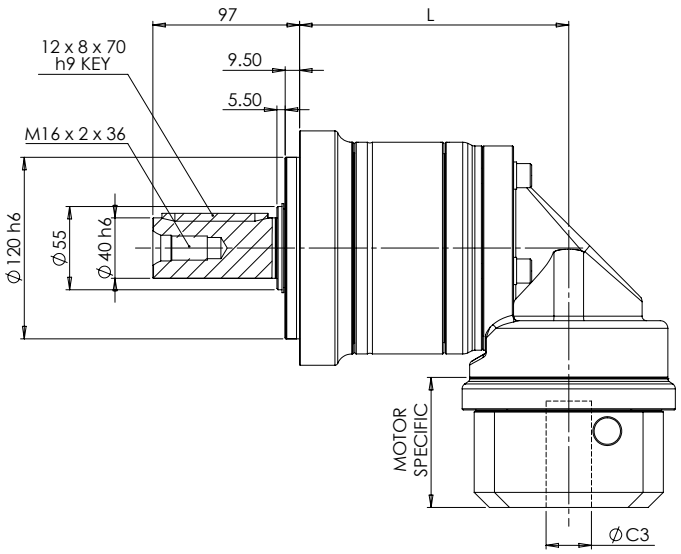
PEIIR155 – Right Angle
Economy Range – Steel





For precision stainless steel dimensional equivalent see **AER155**

DIM L Single Stage = 178.0 mm
DIM L Double Stage = 225.5 mm

Ratio	Nom. Output Torque (Nm)	Max. Acceleration Torque (Nm)	Emergency Stop Torque (Nm)
~ SINGLE STAGE ~			
3:1	430	774.0	1290
4:1	440	792.0	1320
5:1	435	783.0	1305
7:1	366	658.8	1098
10:1	295	531.0	885
~ DOUBLE STAGE ~			
15:1	424	763.2	1272
16:1	452	813.6	1356
20:1	454	817.2	1362
25:1	450	810.0	1350
30:1	422	759.6	1266
35:1	382	687.6	1146
40:1	459	826.2	1377
50:1	450	810.0	1350
70:1	382	687.6	1146
100:1	308	554.4	924

Design Parameter	Value
Max. Motor Shaft Ø (C3) (mm)	see below
Nom. Input Speed (rpm)	2500
Max. Input Speed (rpm)	3600
Torsional Rigidity (Nm/arcmin)	16
Max. Radial Load on Output (N)*	4550
Max. Axial Load on Output (N)*	2275
Efficiency (1 STG / 2 STG) (%)	≥ 93 / ≥ 90
Unit weight (1 STG / 2 STG) (kg)	22.4 / 21.8
Min. Operating Temperature (°C)	+ 0
Max. Operating Temperature (°C)	+ 90
Protection Rating	IP65
Noise (dB)**	≤ 77
No Load Torque (1 / 2 STG) (N)**	2.55 / 0.85

* Applied at centre of output shaft (Length/2). For more information, see page 139

** Based on 10:1 ratio @ 3000 rpm without load

Backlash
~ SINGLE STAGE ~
≤ 10 arcmin
~ DOUBLE STAGE ~
≤ 12 arcmin

ø C3	Mass Moment of Inertia (kg/cm²)	
	Single Stage	Double Stage
19	-	13.57
24	13.87	13.87
28	14.36	14.36
32	17.33	17.33
35	18.74	18.74
38	20.79	20.79
42	26.54	-

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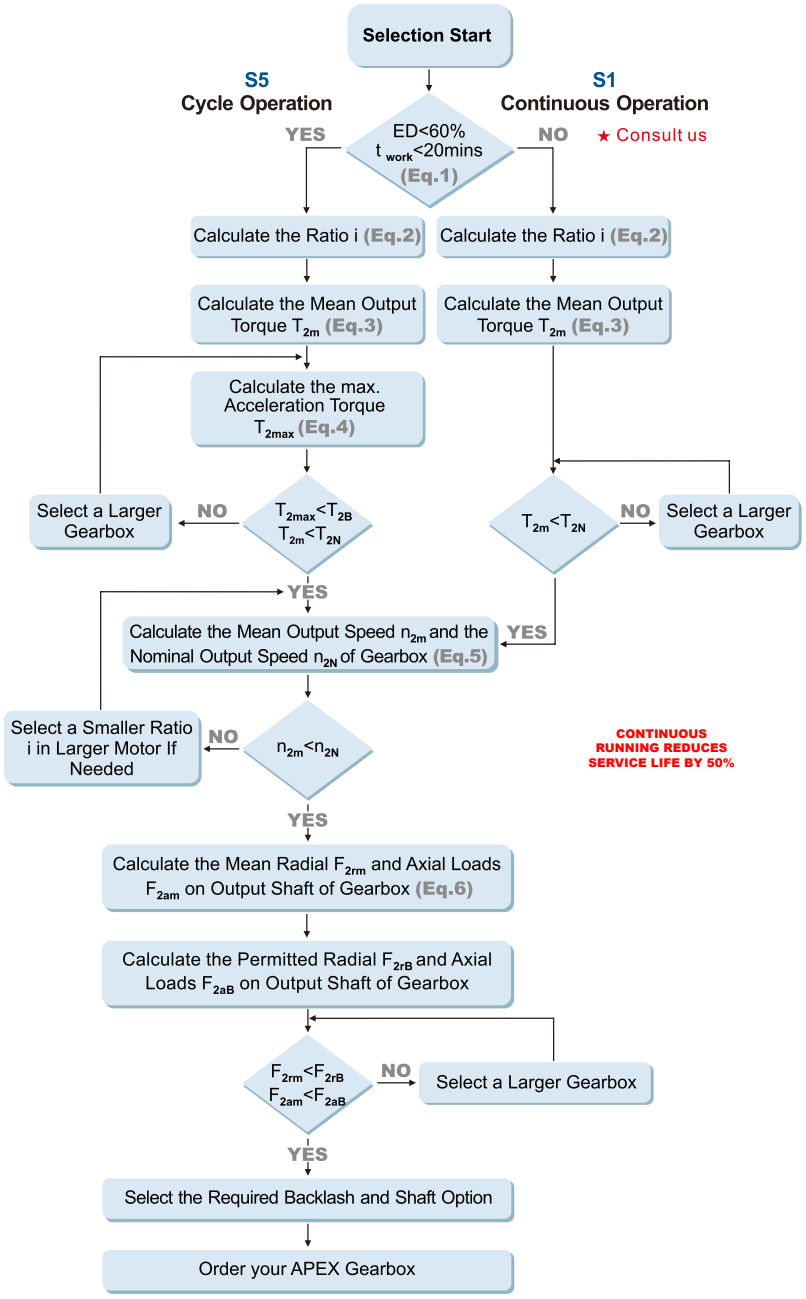
Selection of the Optimum Gearbox



Recommended (for S5 Cycle Operation)

The general design is given for

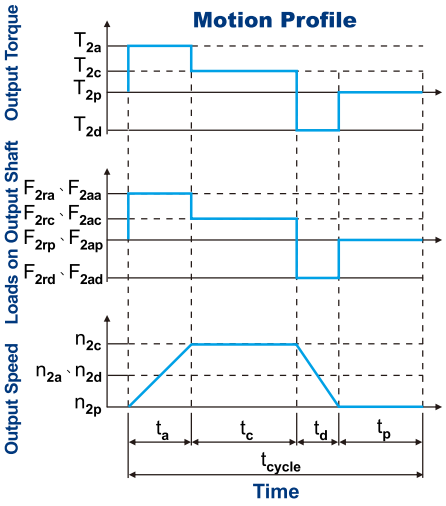
$\frac{J_L}{i^2} \leq 4 \times J_m$

The optimal design is given for

$\frac{J_L}{i^2} \cong J_m$

J_L Load Inertia

J_m Motor Inertia



1. $ED = \frac{t_a + t_c + t_d}{t_{cycle}} \times 100\%$, $t_{work} = t_a + t_c + t_d$

Index : a. Acceleration, c. Constant, d. Deceleration, p. Pause **(Eq.1)**

2. $i \cong \frac{n_m}{n_{work}}$

n_m Output Speed of the Motor

n_{work} Working Speed **(Eq.2)**

3. $T_{2m} = \sqrt[3]{\frac{n_{2a} \times t_a \times T_{2a}^{\ 3} + n_{2c} \times t_c \times T_{2c}^{\ 3} + n_{2d} \times t_d \times T_{2d}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$ **(Eq.3)**

4. $T_{2max} = T_{mB} \times i \times k_s \times \eta$

where K_s is

K_s	No. of Cycles / hr
1.0	0 ~ 1,000
1.1	1,000 ~ 1,500
1.3	1,500 ~ 2,000
1.6	2,000 ~ 3,000
1.8	3,000 ~ 5,000

T_{mB} Max. Output Torque of the Motor

η Efficiency of the Gearbox **(Eq.4)**

5. $n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$

$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$

$n_{2N} = \frac{n_{1N}}{i}$ **(Eq.5)**

6. $F_{2rm} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2ra}^{\ 3} + n_{2c} \times t_c \times F_{2rc}^{\ 3} + n_{2d} \times t_d \times F_{2rd}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$

$F_{2am} = \sqrt[3]{\frac{n_{2a} \times t_a \times F_{2aa}^{\ 3} + n_{2c} \times t_c \times F_{2ac}^{\ 3} + n_{2d} \times t_d \times F_{2ad}^{\ 3}}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$ **(Eq.6)**

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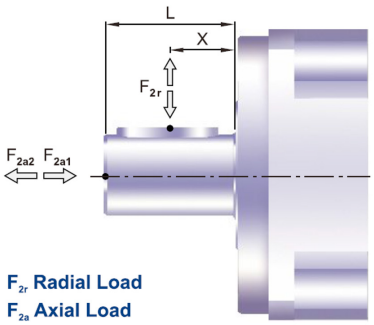
PEII Output Loads

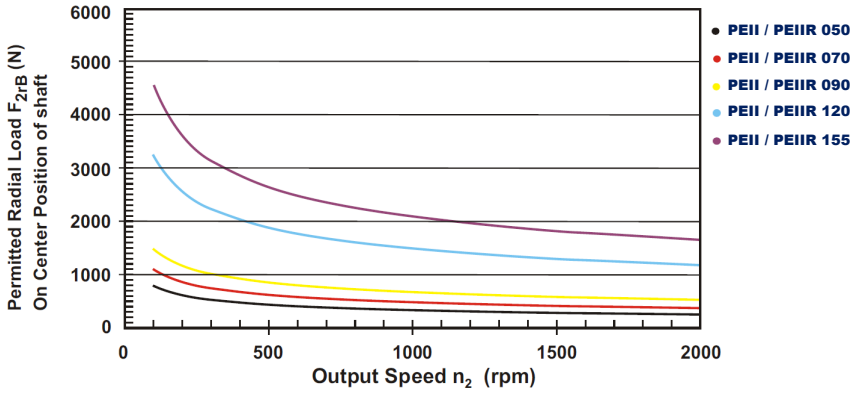


F_{2r} Radial Load
F_{2a} Axial Load

The permitted radial and axial loads on the output shaft of the gearbox are dependant on the design of the output bearing arrangement.

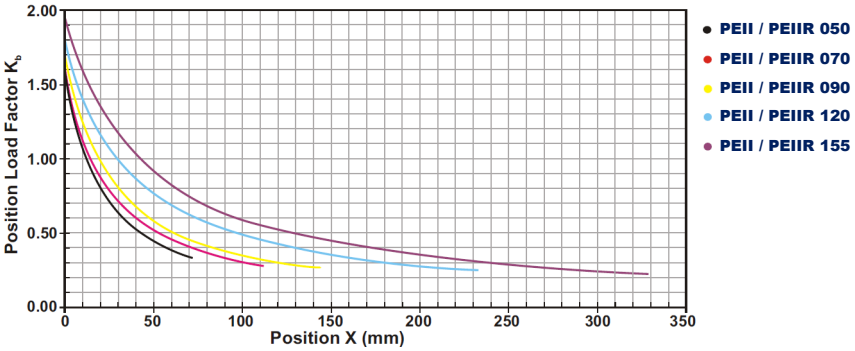
APEX use the extension straddle oversized bearing design thus allowing for heavy loads on both axis.

Permitted radial loads are dependant on the nominal output speed of the gearbox as can be seen on the below graph.



CONTINUOUS RUNNING REDUCES SERVICE LIFE BY 50%

If the radial force is not exerted on the centre of the output shaft (length/2) then the permitted loads can be calculated based on the position load factor as depicted on the below graph.



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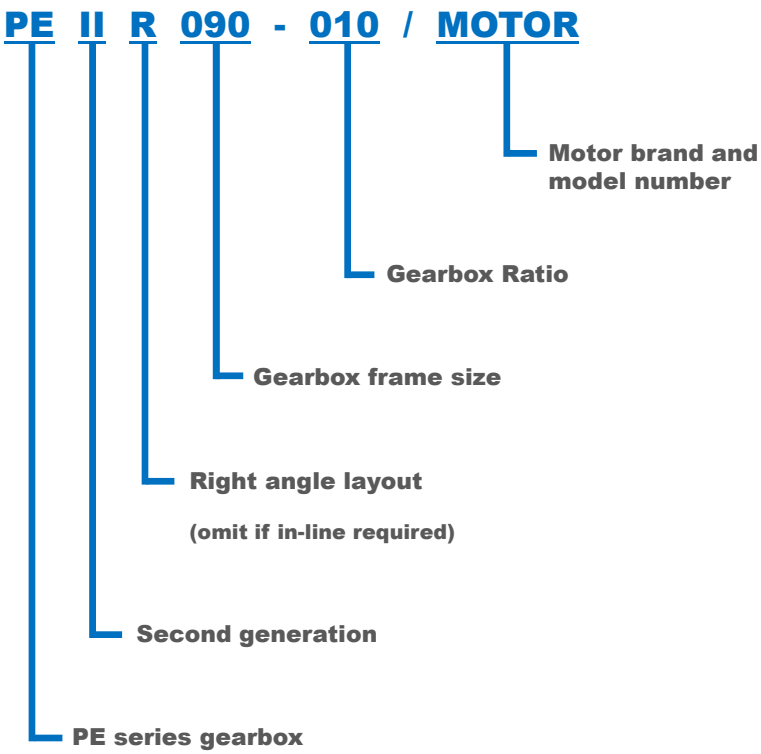
PEII Order Codes



Example Order Code: PEII120-035 / ALLEN BRADLEY MPL-A230P

FOR ANY NON STANDARD ENQUIRIES
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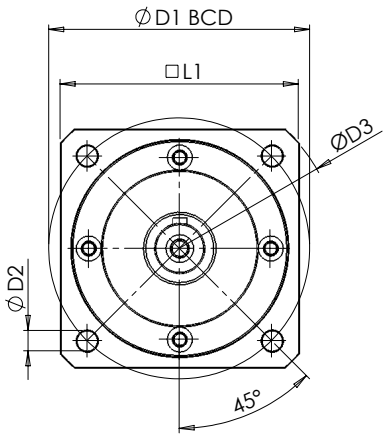
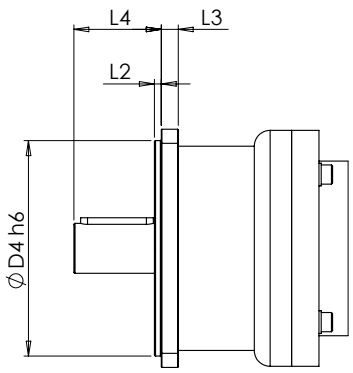
Front Plates & Motor Adapters
For AE / PE Gearheads & Motors

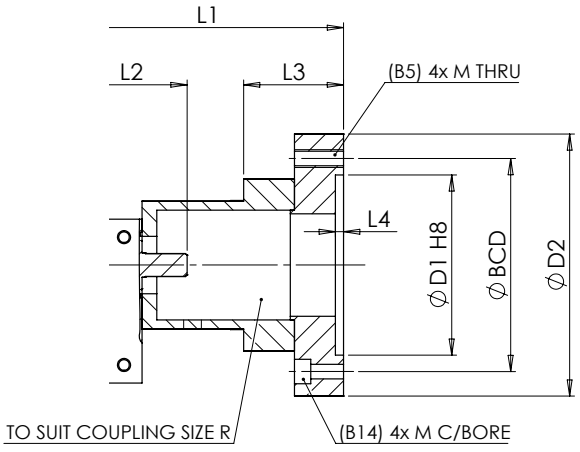




NOTE: Example AE090 gearbox shown with IEC63D5B5 front plate

Design Parameter	Value
Material	AL6061
Hardness (HRB)	55 - 65

Fits	Part Number	D1	D2	D3	D4 h6	L1	L2	L3	L4
AE / PEII 050	AE/R050-NEMA23	66.675	6.0	77	38.1	57.2	2.0	6.0	18.5
	AE/R050-PX60	70	5.6	80.5	50	60	2.5	6.0	18.5
AE / PEII 070	AE/R070-Metric	90	6.6	106	50	80	3.0	8.0	28.0
	AE/R070-NEMA34	98.425	5.6	115	73.08	86	2.5	5.5	30.5
	AE/R070-DT90/PX90	100	6.6	120	80	90	3.0	5.0	31.0
AE / PEII 090	AE/R090-NEMA34	98.425	5.5	122	73.025	92	2.5	10.0	36.0
	AE/R090-DT90/PX90	100	6.5	122	80	92	2.5	10.0	36.0
	AE/R090-IEC63D5B5	115	9.0	140	95	105	3.0	6.5	38.5
	AE/R090-NEMA42	125.73	7.0	144	55.58	107	4.0	10.5	35.5
AE / PEII 120	AE/R120-NEMA42	125.73	7.1	170	55.499	127	1.5	20.0	50.0
	AE/R120-NEMA56	149.225	6.6	170	114.3	127	3.0	14.5	55.5
AE / PEII 155	AE/R155-B5	175	11.0	196	130	160	5.0	15.0	82.0
AE 205	AE/R205-B5	230	13.0	277	180	210	5.0	18.0	82.0
AE 235	AE/R235-B5	275	17.0	317	235	240	5.0	18.0	108.0



WMH offers a range of standard adapter flanges to suit AE & PE gearboxes as well as industrial standard servo motors.

WMH adapter flanges have been designed to suit our range of backlash free couplings. Please advise mating component shaft sizes and we will also supply a suitably machined coupling.

WMH can also produce bespoke adapter flanges in-house in our fully equipped machine shop. Please contact our sales team with your specific requirements.

IN ADDITION TO OUR STANDARD RANGE OF FRONT PLATE ADAPTERS WE CAN ALSO OFFER CUSTOMISED UNITS TO YOUR SPECIFICATION ON REQUEST

Wider Gearbox Range

WMH offers a small selection of gearboxes picked to suit our linear actuators. Although these gearboxes will be adequate for the majority of applications, there are many more gearbox types available from our sister company
APEX DYNAMICS UK LTD

AB

Standard stainless steel type
Frame sizes 042 up to 220
Reduction ratios 3:1 to 200:1
Nominal torque ≤ 2000 Nm
Backlash from ≤ 1 arcmin

AD

Stainless steel rotary output
Frame sizes 047 up to 255
Reduction ratios 4:1 to 200:1
Nominal torque ≤ 2000 Nm
Backlash from ≤ 1 arcmin

AE

Economy stainless steel type
Frame sizes 050 up to 235
Reduction ratios 3:1 to 200:1
Nominal torque ≤ 2000 Nm
Backlash from ≤ 8 arcmin

AF

Heavy duty stainless steel type
Frame sizes 042 up to 220
Reduction ratios 3:1 to 200:1
Nominal torque ≤ 2000 Nm
Backlash from ≤ 1 arcmin

PL

Economy pulley mounting type
Frame sizes 070 up to 120
Reduction ratios 3:1 to 100:1
Nominal torque ≤ 140 Nm
Backlash from ≤ 6 arcmin

PS

Economy alternative output type
Frame sizes A up to E
Reduction ratios 3:1 to 100:1
Nominal torque ≤ 450 Nm
Backlash from ≤ 6 arcmin

KF

Compact hypoid square B5 type
Frame sizes 060 up to 240
Reduction ratios 3:1 to 10:1
Nominal torque ≤ 1600 Nm
Backlash from ≤ 3 arcmin

KH

Compact hypoid rotary output
Frame sizes 064 up to 285
Reduction ratios 3:1 to 10:1
Nominal torque ≤ 1600 Nm
Backlash from ≤ 3 arcmin

PA

Economy steel square B5 type
Frame sizes 042 up to 142
Reduction ratios 3:1 to 100:1
Nominal torque ≤ 450 Nm
Backlash from ≤ 6 arcmin

PD

Economy steel rotary output
Frame sizes 053 up to 110
Reduction ratios 3:1 to 100:1
Nominal torque ≤ 230 Nm
Backlash from ≤ 6 arcmin

PE

Economy steel round B14 type
Frame sizes 050 up to 155
Reduction ratios 3:1 to 100:1
Nominal torque ≤ 450 Nm
Backlash from ≤ 6 arcmin

PG

High reduction economy type
Frame sizes 040 up to 160
Reduction ratios 3:1 to 1000:1
Nominal torque ≤ 450 Nm
Backlash from ≤ 6 arcmin

ATC

Shrink disc output bevel boxes
Frame sizes 065 up to 280
Reduction ratios 1:1 to 500:1
Nominal torque ≤ 3200 Nm
Backlash from ≤ 6 arcmin

ATH

Hollow output bevel boxes
Frame sizes 065 up to 280
Reduction ratios 1:1 to 500:1
Nominal torque ≤ 3200 Nm
Backlash from ≤ 6 arcmin

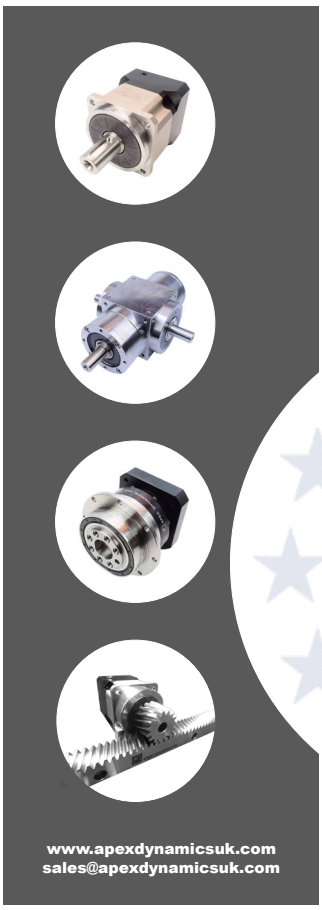
ATL

Solid shaft output bevel boxes
Frame sizes 065 up to 280
Reduction ratios 1:1 to 500:1
Nominal torque ≤ 3200 Nm
Backlash from ≤ 6 arcmin

ATM

Opposite rotation bevel boxes
Frame sizes 065 up to 280
1:1 ratio with up to 3 outputs
Nominal torque ≤ 3200 Nm
Backlash from ≤ 6 arcmin

If our range of gearboxes shown in this catalogue does not meet your needs, please contact our sales team for more information on other gearbox series. We are more than happy to discuss more bespoke applications, arrange joint site visits and / or send out our stock catalogues for your reference.



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" Part of your drive "

PRECISION GEARBOXES
STOCK CATALOGUE
EDITION 01 – 2017

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sales@apexdynamicsuk.com

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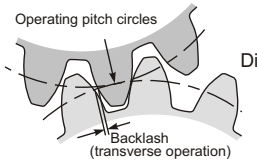
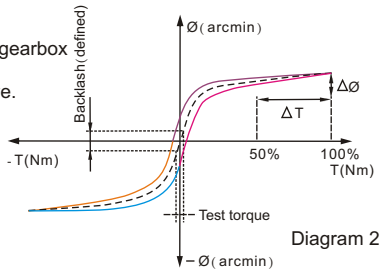
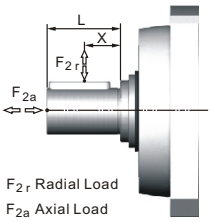
WMH Transmissions Limited

Gearbox Glossary

Emergency Stop Torque T_{2NOT}	Nm	The Emergency Stop Torque is the maximum permitted torque at the output of gearbox. This may happen only occasionally and may not exceed 1,000 times during the whole service life.
Max. Acceleration Torque T_{2B}	Nm	Under the Cyclic Operation (S5), the Max. Acceleration Torque is the maximum torque which can be transmitted only briefly to the output of gearbox up to 1,000 cycles/hr.
No Load Running Torque	Nm	The No Load Running Torque is the min. torque to overcome the internal friction of a gearbox without loading*.
Nominal Input Speed n_{1N}	rpm	The Nominal Input Speed is the permitted input speed of gearbox by the Continuous Operation (S1) while the housing temperature does not exceed 90°C. This value is measured at environment temperature 25°C.
Max. Input Speed n_{1B}	rpm	The Max. Input Speed is the max. permitted input speed of gearbox by the Cyclic operation (S5). This value is measured at environment temperature 25°C and serves as the absolute limit of the gearbox.
Backlash	arcmin	The Backlash is the maximum angular measurement between two teeth of gears when the transverse operation occurs (refer to Diagram 1). The arcmin is the measurement unit for the backlash. One arcmin equals 1/ 60 degree, symbolized as 1'.  Diagram 1
Torsional Rigidity	Nm/arcmin	Torsional Rigidity is the quotient (△T / △Ø) between the applied torque and resulting torsion angle. This value indicates how much torque is needed on the gearbox to rotate the output shaft for 1 arcmin. The Torsional Rigidity can be determined by Hysteresis Curve. Hysteresis Curve When the input shaft is locked, increase torque at the output slowly up to T_{2B} in both directions and then release the torque gradually. According to the measured torque and torsion angle, a closed curve will be acquired as in the Diagram 2.  Diagram 2
Radial Load And Axial Load	N	The permitted radial and axial loads on output shaft of the gearbox depend on the design of the gearbox supporting bearings. 
Efficiency η	%	The transmission efficiency of the gears inside a gearbox (without friction).
Operating Temperature	° C	The Operating Temperature indicates the temperature of gearbox housing.
Degree of Protection		IP code stands for International Protection standard. The IP65 as example: the first IP number stands for protection degree against dust; the second IP number stands for protection against liquid.
Lubrication		APEX uses synthetic lubrication grease. Alternate greases are available,
Running Noise	dB(A)	The Running Noise is measured depends on gearbox size, the ratio and the speed*. Higher speed usually induces higher noise level, while higher ratio induces lower noise level.
Moment of Inertia J_1	$kg.cm^2$	The Moment of Inertia J1 is a measurement of the effort applied to an object to maintain its momentary condition at rest or rotating.
Breakaway Torque	Nm	The Breakaway Torque is the minimum torque to start the rotation from the input side of gearbox. A smaller size or a higher ratio gearbox requests less Breakaway Torque.
Back Driving Torque	Nm	The Back Driving Torque is the minimum torque to start the rotation from the output side of gearbox. A larger size or a higher ratio gearbox requires greater Back Driving Torque.

***THIS VALUE IS MEASURED AT AN ENVIRONMENTAL TEMPERATURE OF 25°C AND INPUT SPEED OF 3000 RPM IF THE NOMINAL SPEED OF THE GEARBOX IS OVER 3000 RPM THEN THIS VALUE IS MEASURED BY THAT SPECIFIC NOMINAL INPUT SPEED**

WMH Transmissions Limited

“ Part of your drive ”

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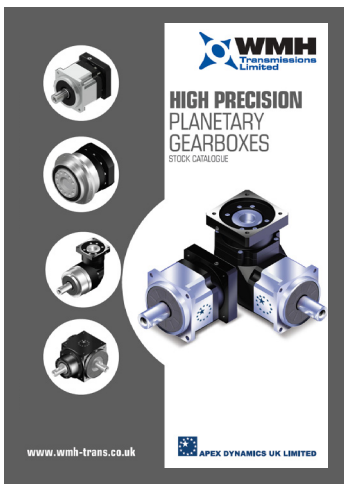
Centurion Park
Tamworth
Staffordshire
B77 5PN

PLEASE SEE OUR OTHER PRODUCT RANGES



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