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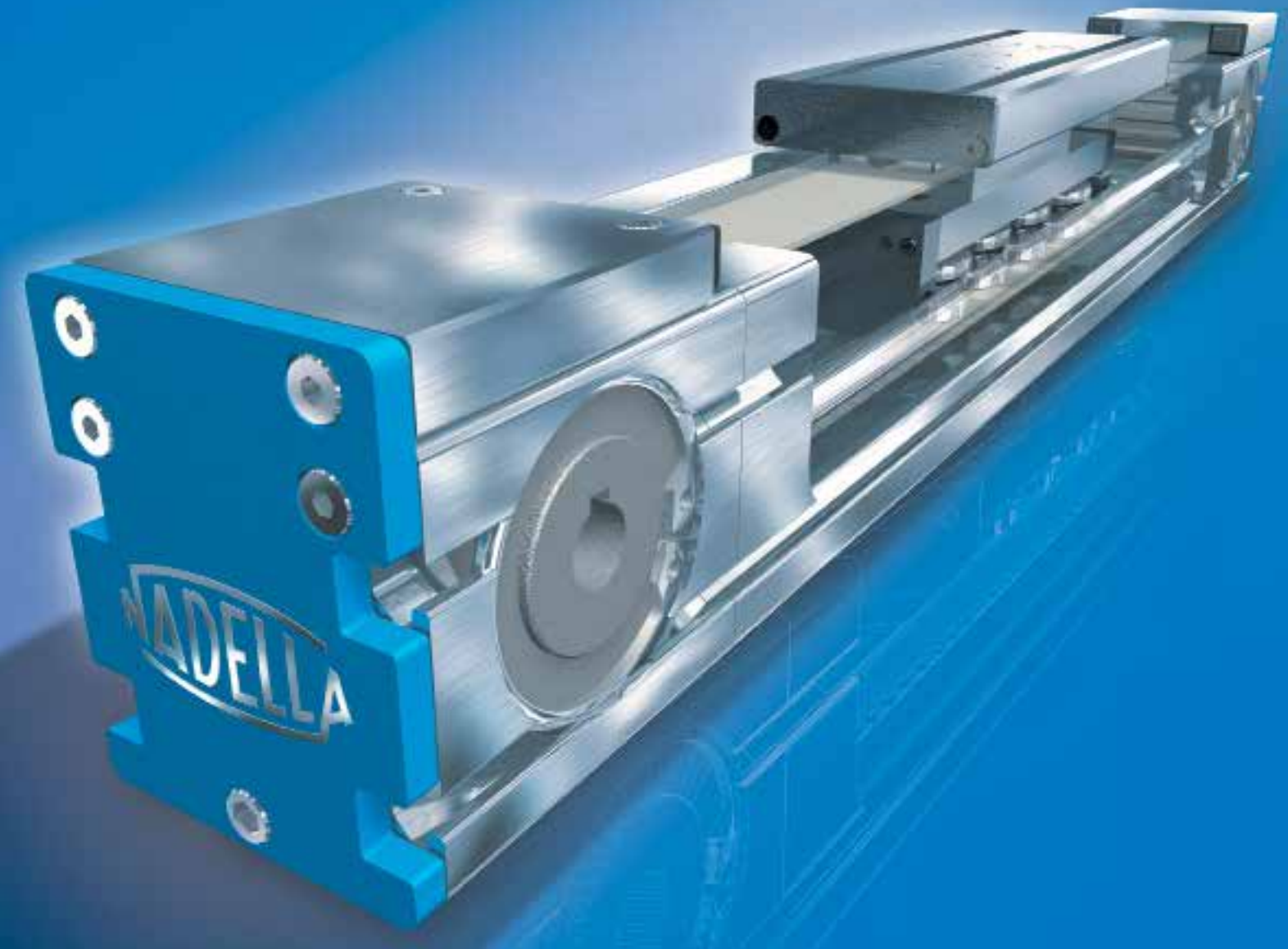
NADELLA
Linear and Motion Solutions

Linear Modules



AXN 2014 E

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Product overview

page

Product description 1-1
Setting, performances, characteristics, application and combination examples

AXN 45-Z 1-2
Linear module with toothed drive belt
- roller guide
- single, double or long carriage

AXN 65-Z 1-4
Linear module with toothed drive belt
- roller guide
- single, double or long carriage

AXN 80-Z 1-6
Linear module with toothed drive belt
- roller guide
- single, double or long carriage

AXN 100-Z 1-8
Linear module with toothed drive belt
- roller guide or recirculating ball guides
- single, double or long carriage

AXNP 45-Z 2-2
Linear module with toothed drive belt with or without cover band
- roller guide or recirculating ball guide
- single, double or long carriage

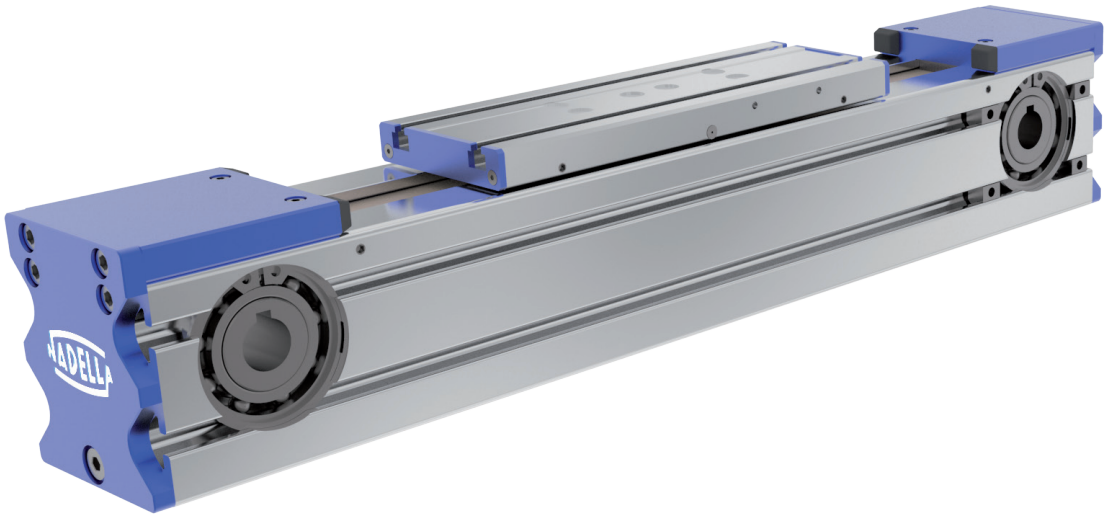
AXNP 65-Z 2-4
Linear module with toothed drive belt with or without cover band
- roller guide or recirculating ball guide
- single, double or long carriage

AXNP 80-Z 2-6
Linear module with toothed drive belt with or without cover band
- roller guide or recirculating ball guide
- single, double or long carriage

Product overview

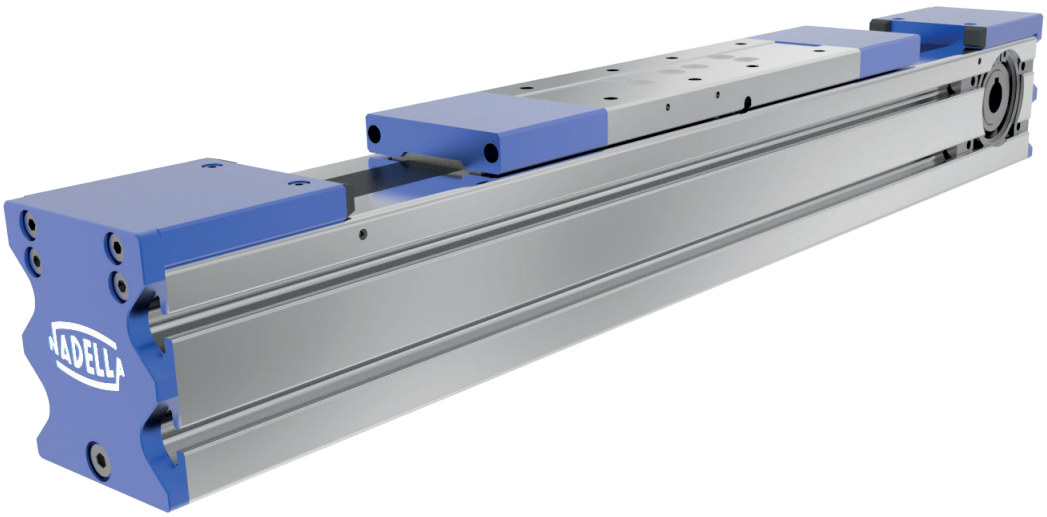
	Basic-Line AXN			
	AXN 45-Z	AXN 65-Z	AXN 80-Z	AXN 100-Z
Profile cross section w x h (mm)	45x48	65x68,5	80x84	100x100
Drive	Toothed belt	Toothed belt	Toothed belt	Toothed belt
Feed rate (mm/U)	100	150	180	230
Max. dynamic working load (N)	325	650	1450	2500
Repeat accuracy (mm)	±0,05	±0,05	±0,05	±0,05
Max. speed (m/s)	6	10	10	10
Guide system	LR24	LR35	LR42	LR52 B
Max. total length overall (m) [1]	6	6	6 (8)	6 (8)
P_R (N) [2]	570	995	1735	6000
P_L (N) [2]	570	995	1735	6000
P_T (N) [2]	1030	1940	2950	6000
M_x (Nm) [2]	8	20	36	75
M_y (Nm) [2]	16	30	83	500
M_z (Nm) [2]	30	70	146	500

[1] *in one part - longer version of 8 m upon request*
[2] *Max. loads and dynamic working loads dependent on guide system*



Product overview

Basic-Line AXNP plus		
AXNP 45-Z	AXNP 65-Z	AXNP 80-Z
45x48	65x68,5	80x84
Toothed belt	Toothed belt	Toothed belt
100	150	180
325	650	1450
±0,05	±0,05	±0,05
6	10	10
LR24 B	LR35 B	LR42 B
6	6	6
660	2750	4300
660	2750	4300
660	2750	4300
8	19	43
16	95	205
30	95	205



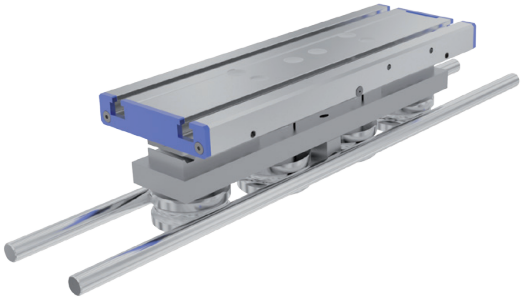
Basic-Line AXN

Product description

High performance and low costs are the outstanding features of this model range. If individual module or multi system: Depending on customers‘ requirements various combinations are possible.

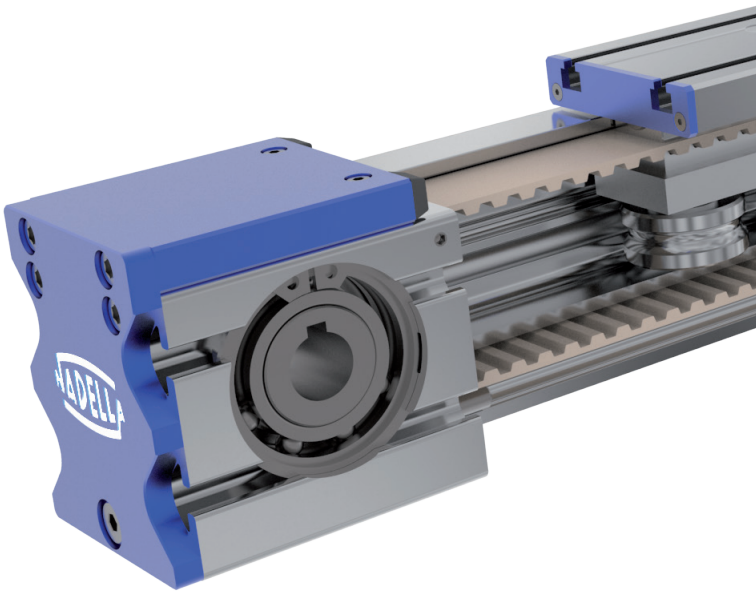
Toothed belt

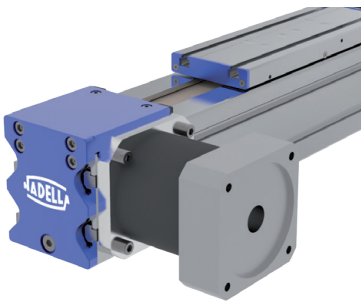
For space and cost reasons the modules are equipped with toothed belt tension located below the table plate. By positive belt retainer the toothed belt is getting tension and laterally security.

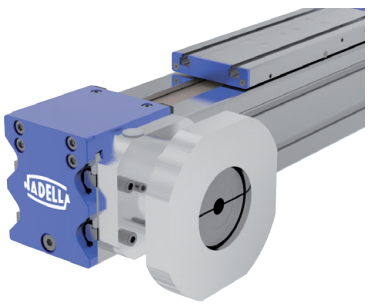


Roller guide

The characteristic features of the roller guide are cost-saving, nearly maintenance-free concomitant with high-performance. Resistance to soiling and smooth running is achieved by rollers of large dimensions.







Universal motor connection

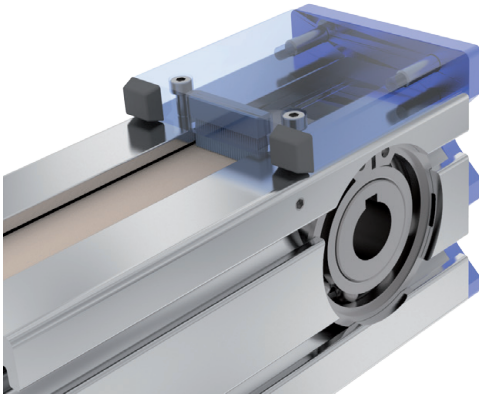
Economic and space-saving solution by direct gearbox connection. Drive end of the gear is equipped with hollow-shaft connection. Alternatively, almost all common flange motors can be connected by metal bellow or elastomer claw couplings with the corresponding motor adapters.

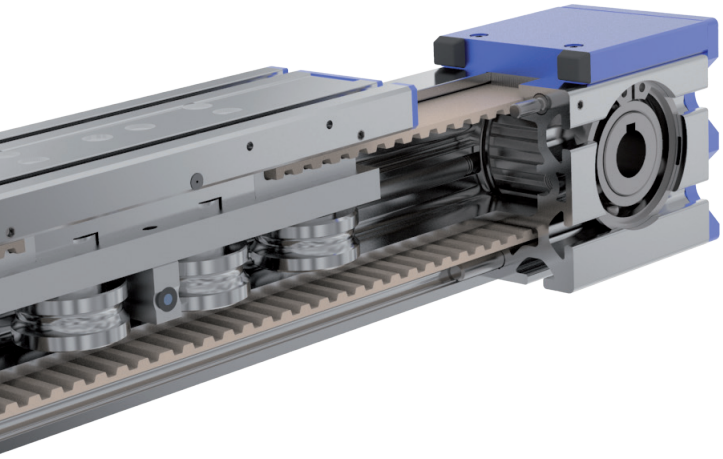
Basic-Line AXN

Product description

Integrated wiper brushes

The actuator profile of the basic line modules is covered on the upper side by the circular toothed belt. Wiper brushes integrated in the head covers prevent effectively lager dirt particles from penetrating into the profilee.



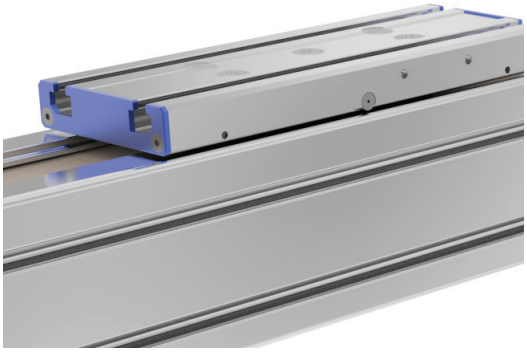


Assembly and fixation of the actuator

Two longitudinal T-slots in the table plates (thread at AXN 45) make it easily possible to install the moving parts. By end-to-end T-slots at the bottom and on either side of the actuator a universal installation of the module is possible. In this application adequate swivelling sliding blocks with spring element can be supplied (for AXN 80 and AXN 100 also DIN slot nuts).

Lifetime lubrication

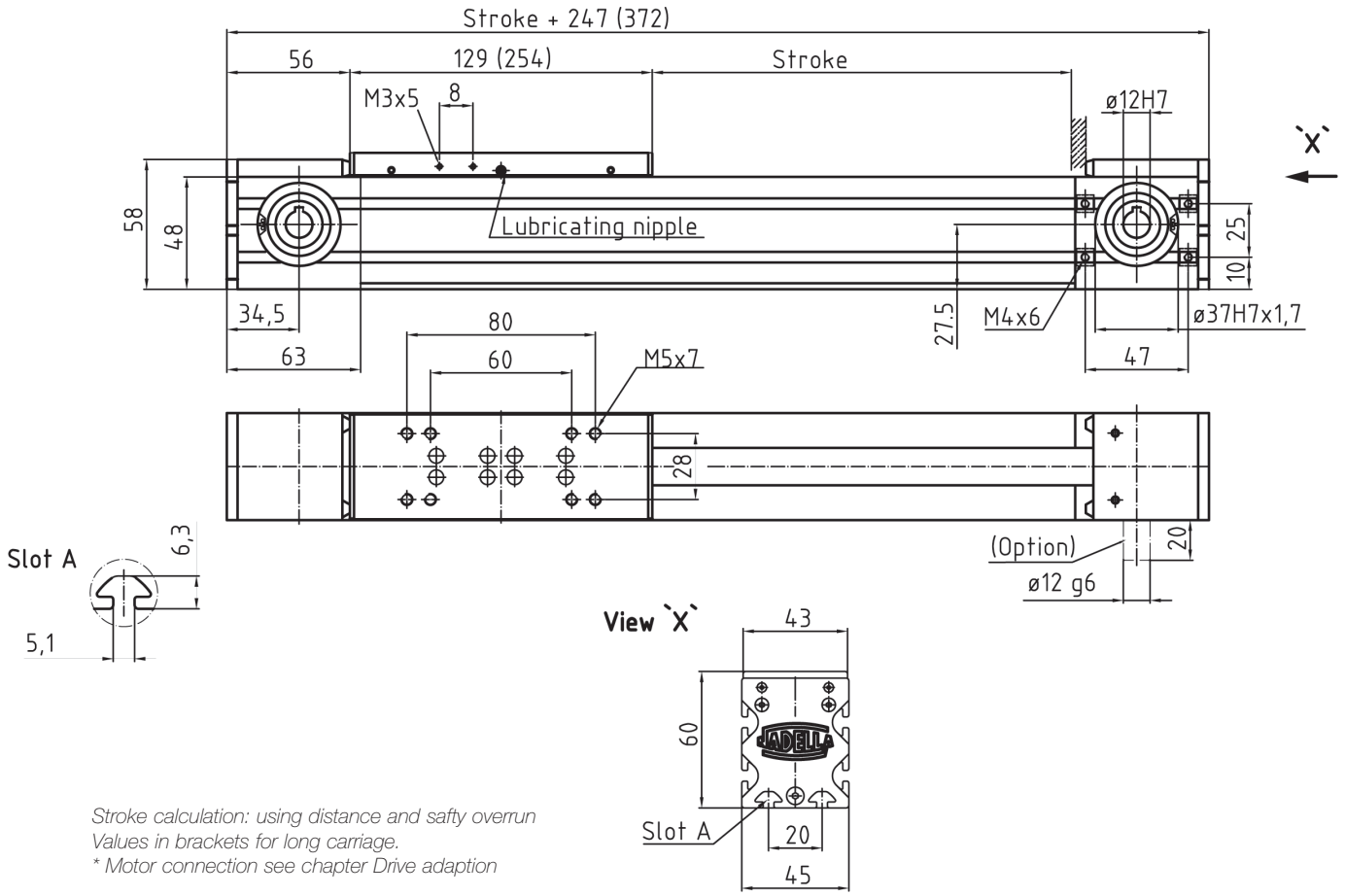
The bearings of the rollers and the belt pinions are lubricated for life. At any movement the steel shafts or the roller guides are coated by a thin lubricant film, coming from an integrated system. For short-stroke use, strokes ≤ ½ length of carriage, please contact our Technical support. In case of high travel mileage and/or acceleration values it is possible to refill this system through lubricating nipples in the table plate.
Recommended lubricant: Klüber Lamora D220)



Basic-Line AXN

AXN 45-Z

Actuator with toothed belt and roller guide



Stroke calculation: using distance and safty overrun
Values in brackets for long carriage.
** Motor connection see chapter Drive adaption*

Basic-Line AXN

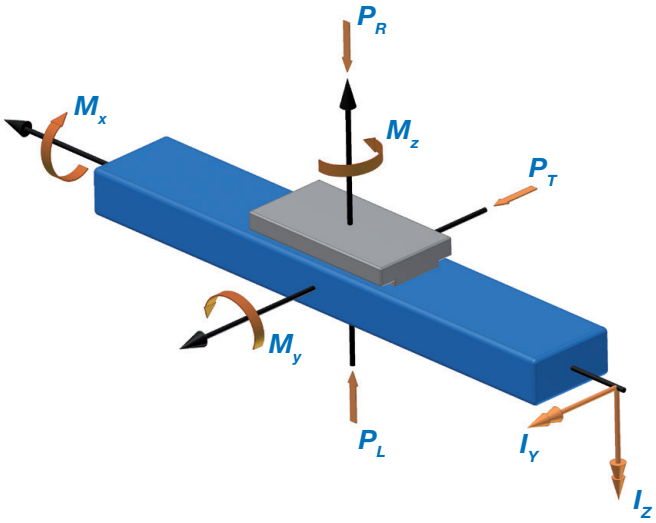
AXN 45-Z

Loads and load moments*

	Roller guide 24.06	
Loads (N)	dyn.	stat.
P_R	570 (950)	1040 (2000)
P_L	570 (950)	1040 (2000)
P_T	1030 (1710)	1810 (3500)
Load moments (Nm)		
M_x	8 (14)	15 (30)
M_y	16 (45)	27 (90)
M_z	30 (80)	54 (170)

** The dynamic load of the guide system is based on a nominal liftetime of 54.000 km.*

Values in brackets for execution with long carriage (254 mm)



Technical data

Max. speed	max. 6 m/s
Repeating accuracy	± 0,05 mm/m
Actuation	Toothed belt 16 AT5
Max. dynamic working load	325 N
Feed rate per rotation	100 mm
Idle-running torque	0,2-0,3 Nm
Moment of inertia	0,383 kgcm^2
Max. length overall	6 m
Geometrical moment of inertia I_Y	21,7 cm^4
Geometrical moment of inertia I_Z	22,5 cm^4

Mass

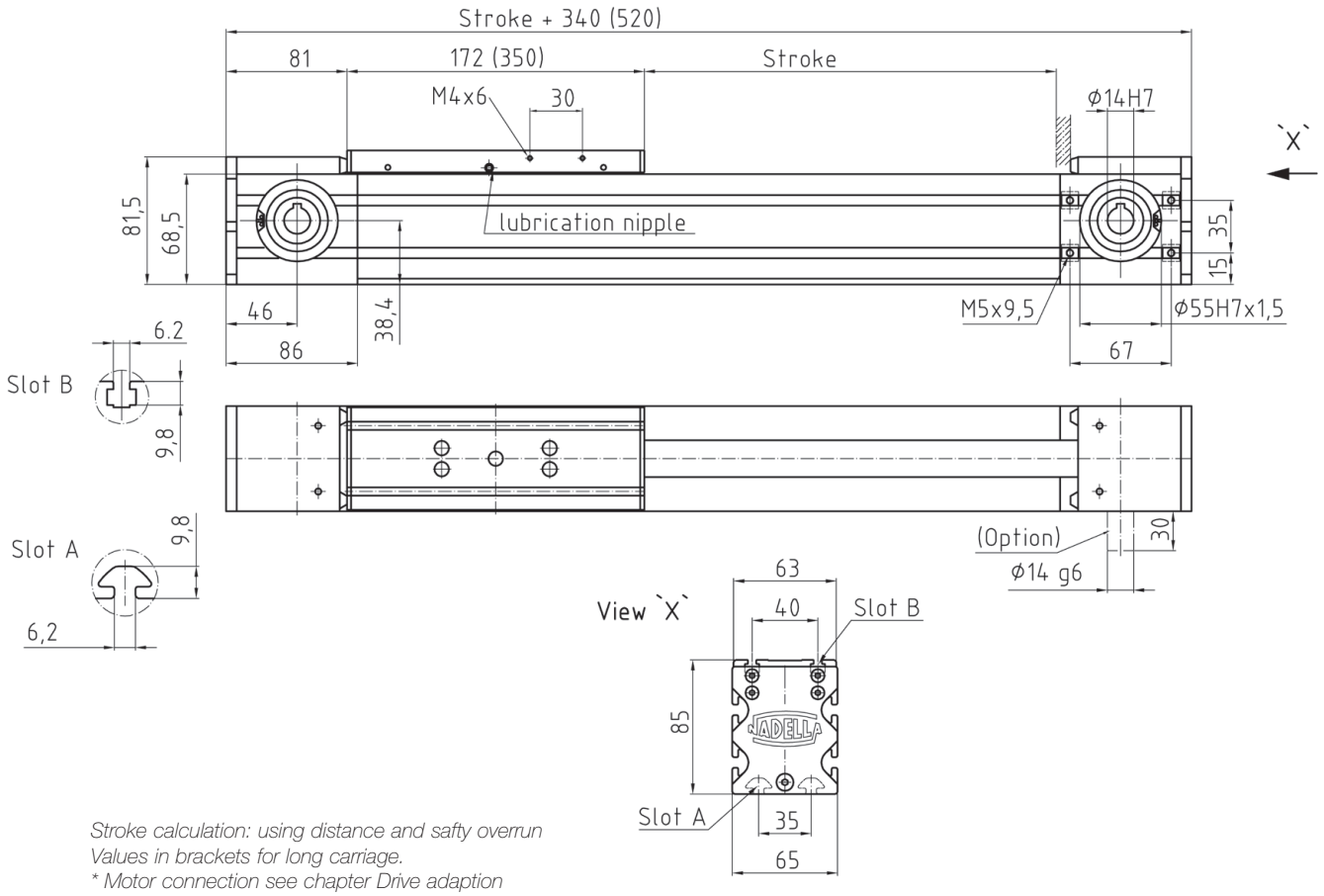
	roller guide 24.06
Basic mass	1,8 kg
Mass per 100 mm stroke	0,3 kg
Slide mass	0,5 kg (1,0 kg)

NX Rust-resistant version available.

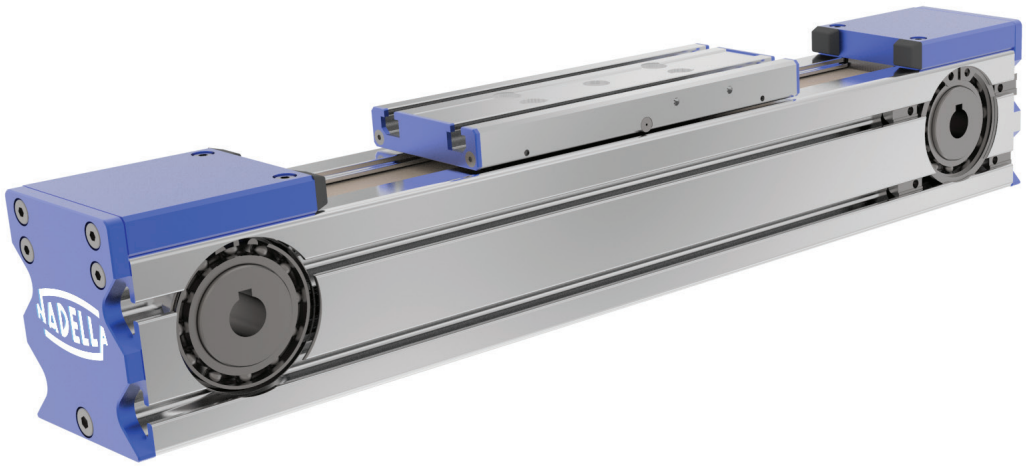
Basic-Line AXN

AXN 65-Z

Actuator with toothed belt and roller guide



Stroke calculation: using distance and safty overrun
Values in brackets for long carriage.
** Motor connection see chapter Drive adaption*



Basic-Line AXN

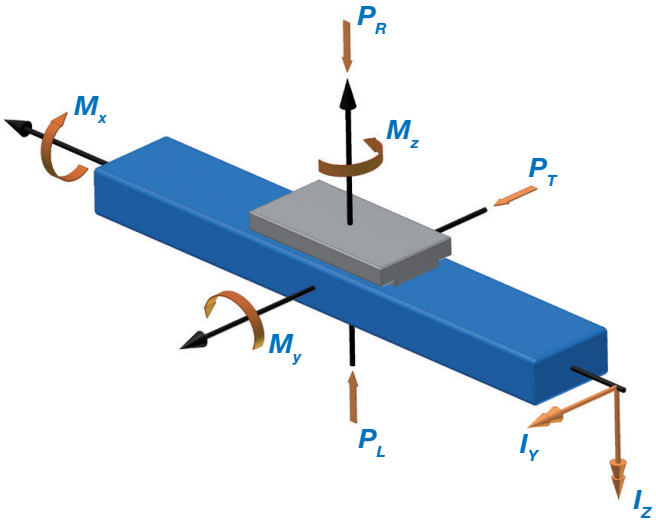
AXN 65-Z

Loads and load moments*

	Roller guide 35.10	
Loads (N)	dyn.	stat.
P_R	995 (1700)	2400 (4500)
P_L	995 (1700)	2400 (4500)
P_T	1940 (3500)	3200 (6500)
Load moments (Nm)		
M_x	20 (40)	40 (80)
M_y	30 (112)	75 (250)
M_z	70 (220)	120 (400)

** The dynamic load of the guide system is based on a nominal liftetime of 54.000 km.*

Values in brackets for execution with long carriage (350 mm)



Technical data

Max. speed	max. 10 m/s
Repeating accuracy	± 0,05 mm/m
Actuation	Toothed belt 32 AT5
Max. dynamic working load	650 N
Feed rate per rotation	150 mm
Idle-running torque	0,8-1,0 Nm
Moment of inertia	2,994 kgcm^2
Max. length overall [1)]	6 m (one-piece)[1)]
Geometrical moment of inertia I_Y	80,2 cm^4
Geometrical moment of inertia I_Z	89,2 cm^4

1) major length upon request

Mass

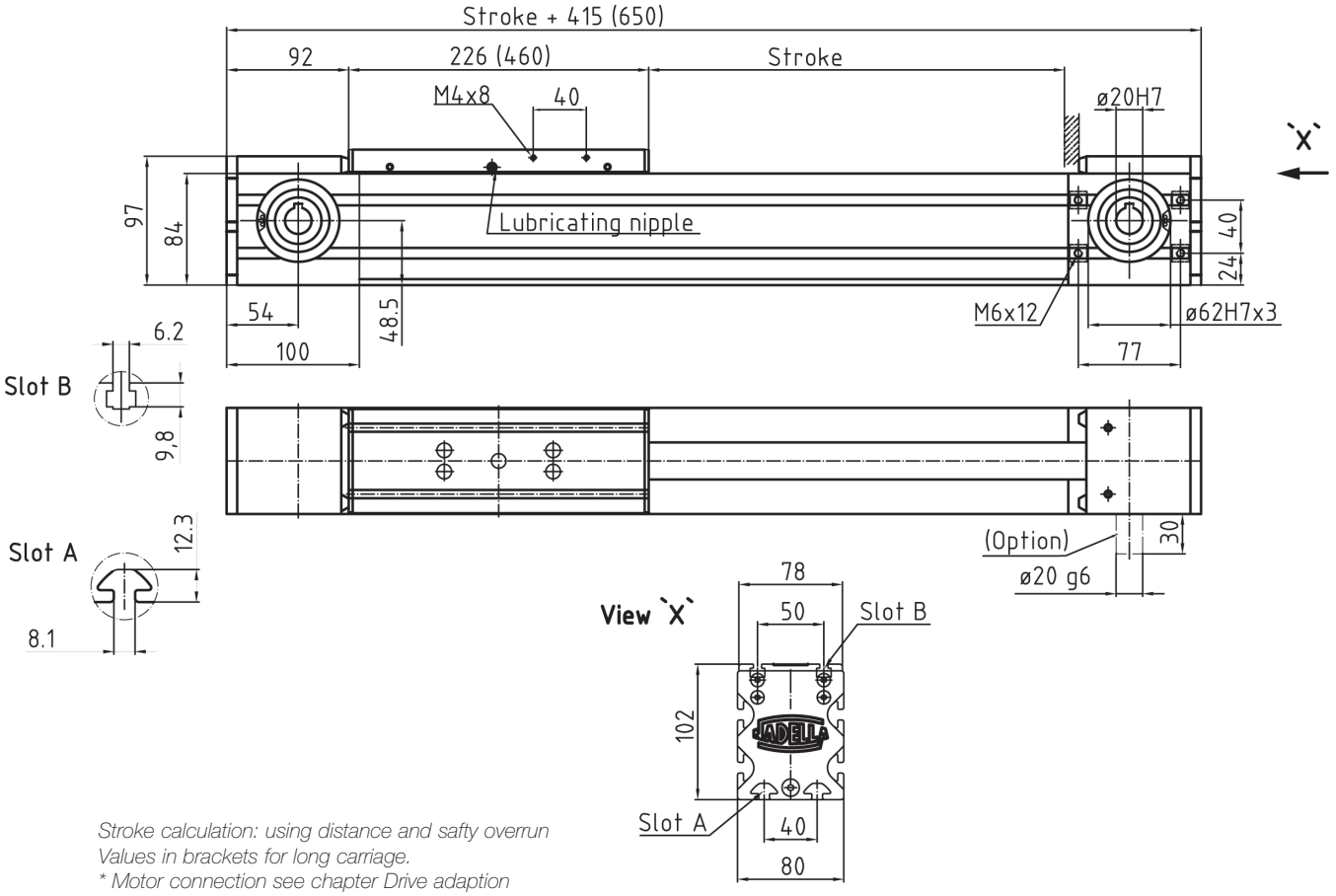
	Roller guide 35.10
Basic mass	4,8 kg
Mass per 10 mm stroke	0,6 kg
Slide mass	1,5 kg (3 kg)

NX Rust-resistant version available.

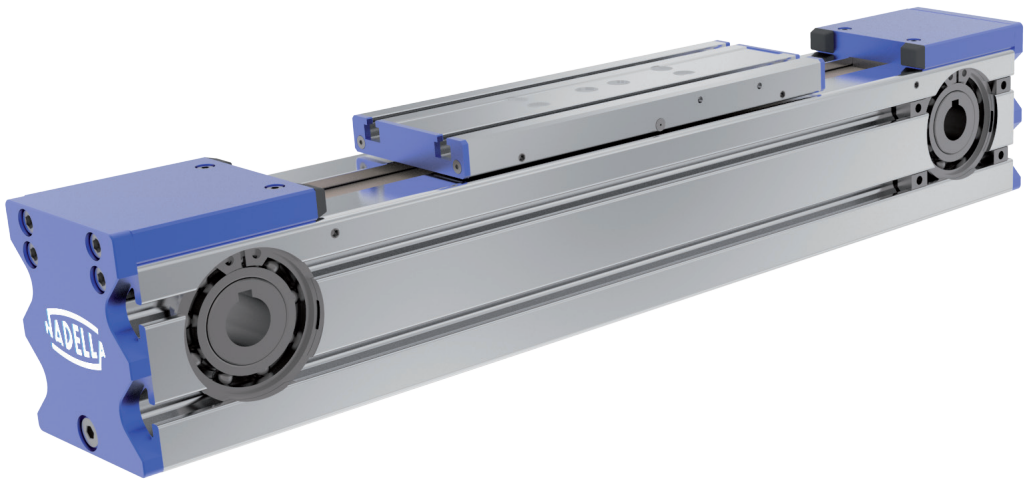
Basic-Line AXN

AXN 80-Z

Actuator with toothed belt and roller guide



Stroke calculation: using distance and safty overrun
Values in brackets for long carriage.
** Motor connection see chapter Drive adaption*



Basic-Line AXN

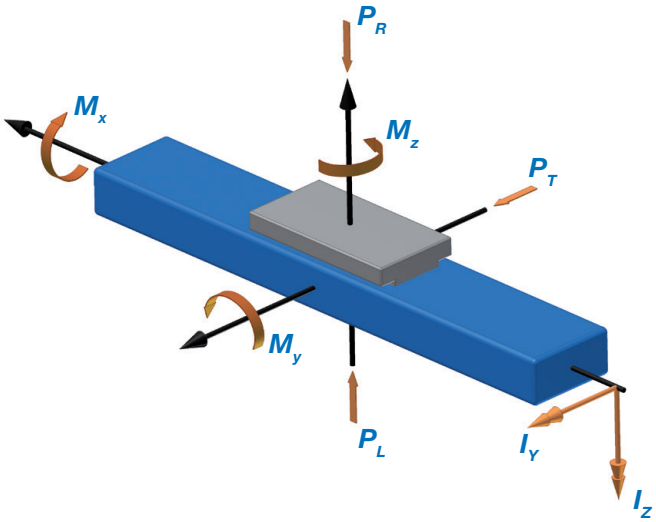
AXN 80-Z

Loads and load moments*

	Roller guide 42.10	
Loads(N)	dyn.	stat.
P_R	1735 (2950)	3000 (5100)
P_L	1735 (2950)	3000 (5100)
P_T	2950 (5000)	5250 (8900)
Load moments (Nm)		
M_x	36 (60)	62 (100)
M_y	83 (245)	143 (425)
M_z	146 (365)	260 (635)

** The dynamic load of the guide system is based on a nominal liftetime of 54.000 km.*

Values in brackets for execution with long carriage (460 mm)



Technical data

Max. speed	max. 10 m/s
Repeating accuracy	± 0,05 mm/m
Actuation	Toothed belt 32 AT10
Max. dynamic working load	1450 N
Feed rate per rotaion	180 mm
Idle-running torque	1,0-1,2 Nm
Moment of inertia	5,237 kgcm^2
Max. length overall [1)]	6 m (one-piece)[1)]
Geometrical moment of inertia I_Y	198,5 cm^4
Geometrical moment of inertia I_Z	207,4 cm^4

1) major length upon request

Mass

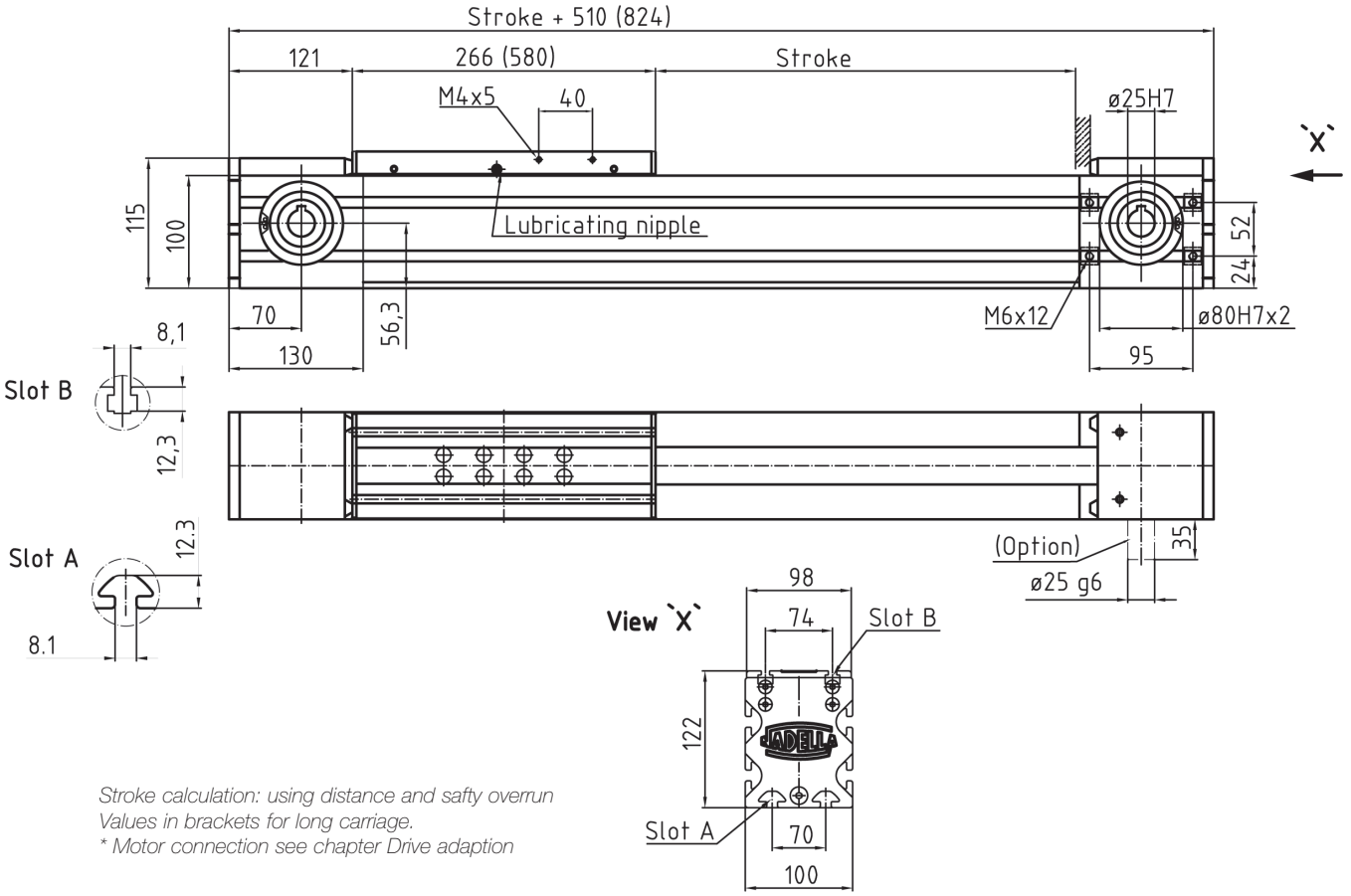
	Roller guide 42.10
Basic mass	8,5 kg
Mass per 100 mm stroke	0,9 kg
Slide mass	2,3 (4,6) kg

NX Rust-resistant version available.

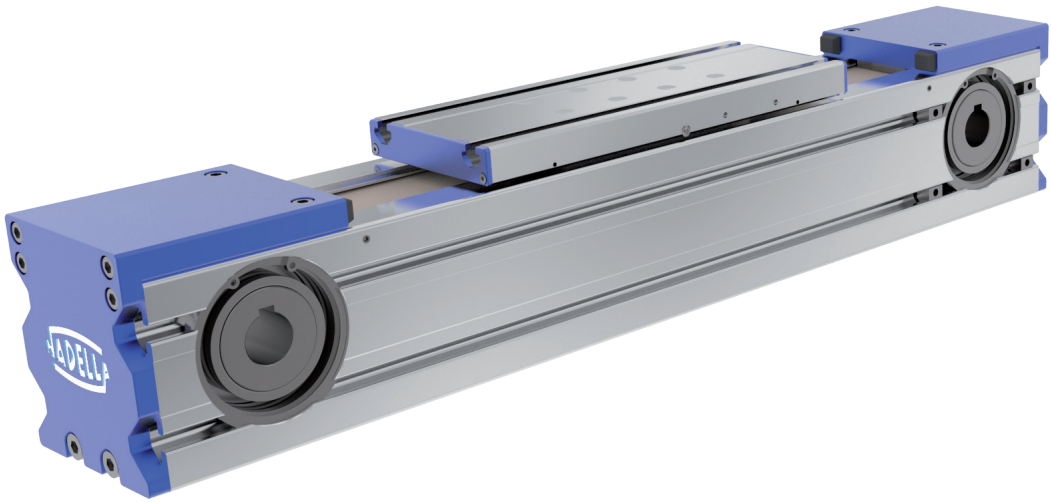
Basic-Line AXN

AXN 100-Z

Actuator with toothed belt and roller guide



Stroke calculation: using distance and safty overrun
Values in brackets for long carriage.
** Motor connection see chapter Drive adaption*



Basic-Line AXN

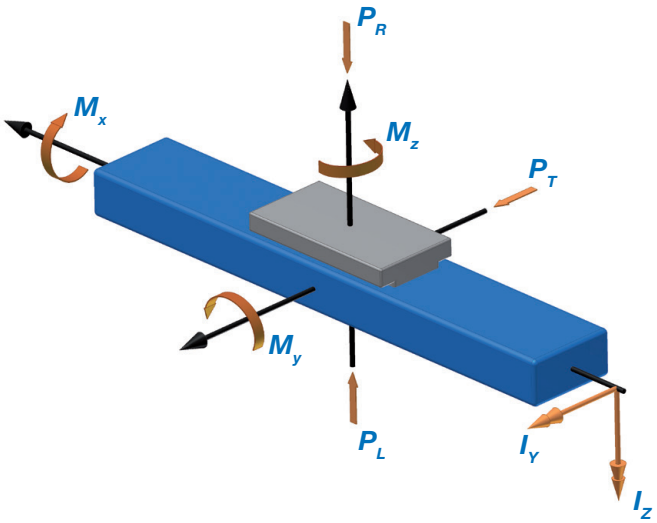
AXN 100-Z

Load and load moments*

	Roller guide 52.16		Rail guide B	
Load s(N)	dyn.	stat.	dyn.	stat.
P_R	2150 (3500)	3200 (7500)	6000 (8000)	20000 (30000)
P_L	2150 (3500)	3200 (7500)	6000 (8000)	20000 (30000)
P_T	4500 (7800)	7000 (13000)	6000 (8000)	20000 (30000)
Lastmomente (Nm)				
M_x	75 (125)	110 (340)	75 (90)	225 (300)
M_y	125 (425)	170 (850)	500 (600)	1650 (2300)
M_z	330 (430)	400 (1900)	500 (600)	1650 (2300)

** The dynamic load of the guide system is based on a nominal liftetime of 54.000 km.*

Values in brackets for execution with long carriage (580 mm)



Technical datal

Max. speedt	max. 10 m/s
Repeating accuracy	± 0,05 mm/m
Actuation	Toothed belt 50 AT10
Max. dynamic working load	2500 N
Feed rate per rotation	230 mm
Idle-running torque	3 Nm
Moment of inertia	14 kgcm^2
Max. length overall [1)]	6 m (8m)[1)]
Geometrical moment of inertia I_Y	343 cm^4
Geometrical moment of inertia I_Z	465 cm^4

[1)] *8m in one piece dependent on availability*

Mass

	Roller guide 52.16	Rail guide B
Basic mass	16 kg	15,4 kg
Mass per 100 mm stroke	1,4 kg	1,4 kg
Slide mass	4,4 kg (6,4 kg)	3,8 kg (5,8 kg)

NX Rust-resistant version available.

Basic-Line AXNPlus

Product description

The new range of AXNP modules is a further development our our successful AXN modules with toothed drive belt. These units have been developed especially for quick handling and positioning functions. If individual or multi system – depending on customers' requirements various combinations are possible, even a combination with the AXN module range is possible.

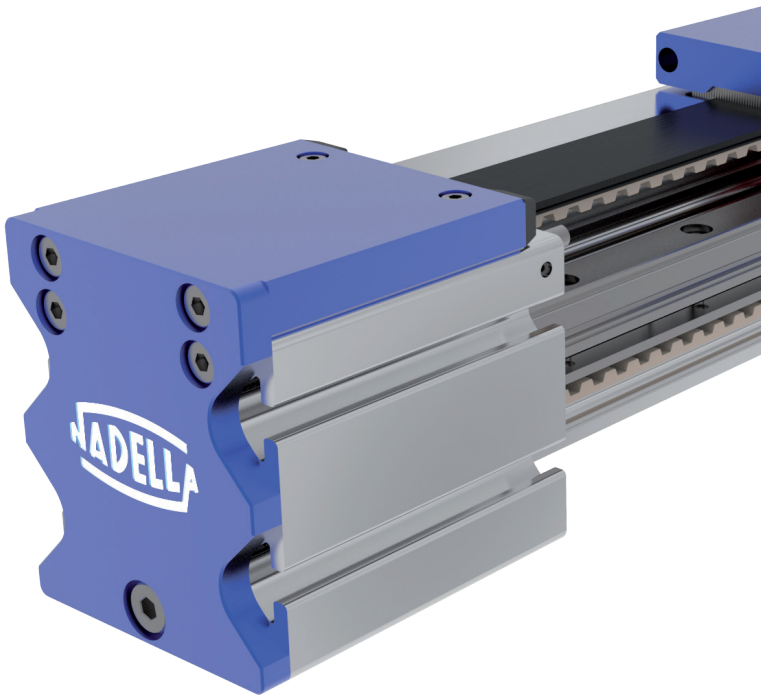
Toothed drive belt

AT-type belt, reinforced with steel cords, allows transfer of large drag forces and guarantees a long liftime. The belt tension is located in the crosshead.

Roller guide / Rail guide

The characteristic features of the roller guide are cost-saving, nearly maintenance-free concomitant with high-performance. Resistance to soiling and smooth running is achieved by rollers of large dimensions. The use of two eccentric bearings guarantees that the guides can optimal be pre-loaded and mounted completeley free of clearance. The dynamic working load is based on a nominal lifetime of 54.000 km.

As an alternative, these actuators can also be equipped with recirculating ball guides or guides in caged-ball technology. The advantages of these rail guides are long lifetime, low noise, high accuracy and high loads. For a statically cycling of the guide systems the dynamic loads are relevant.



Universal motor connection

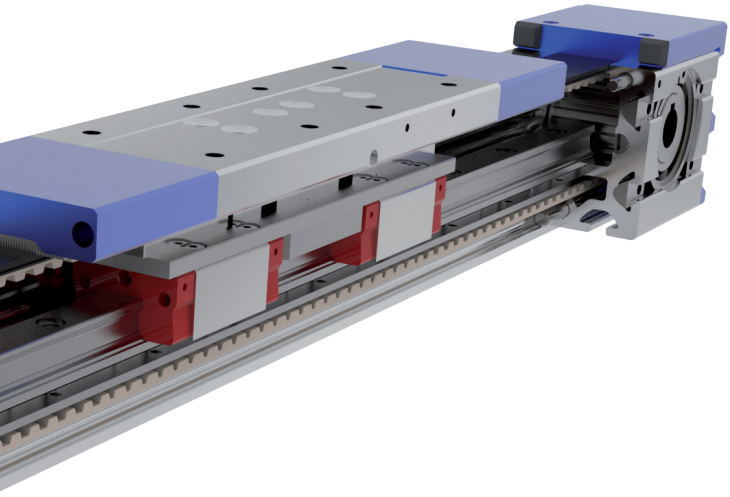
Economic and space-saving solution by direct gearbox connection. Drive end of the gear is equipped with hollow-shaft connection. Alternatively, almost all common flange motors can be connected by metal bellow or elastomer claw couplings with the corresponding motor adapters.

Basic-Line AXNPlus

Product description

Dirt protection

The actuator profile of the basic line modules AXNP contains a cover band which covers the profile completely on the upper side. Therefore, dirt particles can not enter into the actuator. In additon, wiper brushes integrated in the head covers prevent effectively larger dirt particles from penetrating into the profile. Of course all actuators can also be delivered without cover band.



Assembly and fixation of the actuator

By roll-in T-slots, fastening shoulder and connection plates a universal installation of the module is possible. In this application adequate spring sliding blocks with spring element can be supplied.

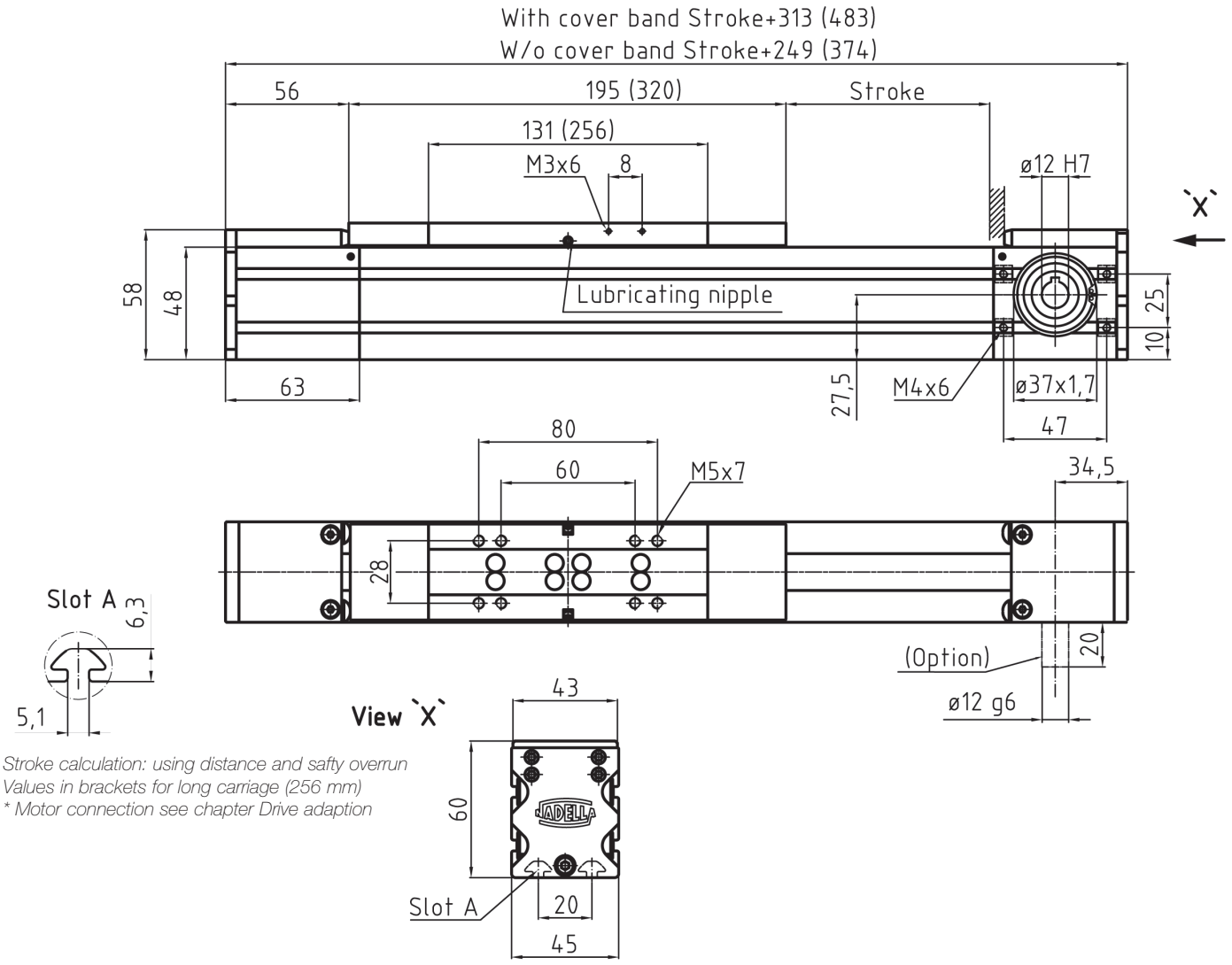
Lifetime lubrication

The bearings of the rollers and the belt pinions are lubricated for life. At any movement the steel shafts or the roller guides are coated by a thin lubricant film, coming from an integrated system.
For short-stroke use, strokes ≤ ½ length of carriage, please contact our Technical support. In case of high travel mileage and/or acceleration values it is possible to refill this system through lubricating nipples in the table plate.
Recommended lubricant:
Klüber Lamora D220 (guide rollers)
Klüber Microlube GL261 (guide rails)

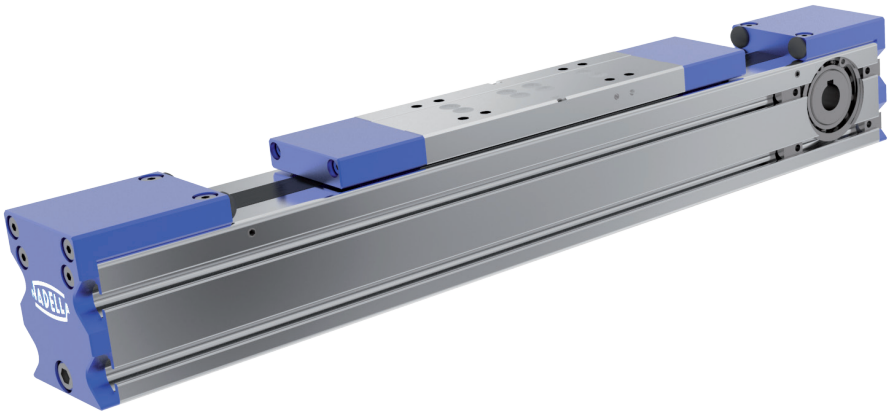
Basic-Line AXNPlus

AXNP 45-Z

Actuator with toothed belt and roller or rail guide



Stroke calculation: using distance and safty overrun
Values in brackets for long carriage (256 mm)
** Motor connection see chapter Drive adaption*



Basic-Line AXNPlus

AXNP 45-Z

Loads and load moments*

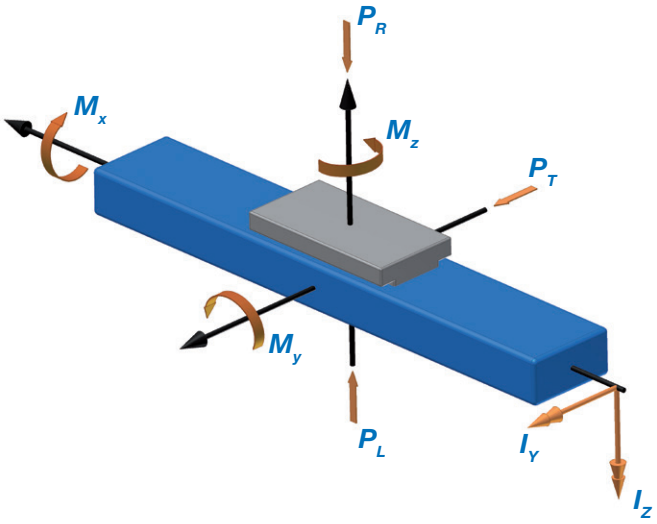
	Roller guide 24.06		Rail guide B	
Loads (N)	dyn.	stat.	dyn.	stat.
P_R	570 (950)	1040 (2000)	660	910
P_L	570 (950)	1040 (2000)	660	910
P_T	1030 (1710)	1810 (3500)	660	910
Load moments (Nm)				
M_x	8 (14)	15 (30)	4,5	6
M_y	16 (45)	27 (90)	18	25
M_z	30 (80)	54 (170)	18	25

** The dynamic load of the guide system is based on a nominal liftetime of 54.000 km.*

Values in brackets for execution with long carriage (256 mm). Long carriage with rail guide upon request.

Technical data

Max. speed	max. 6 m/s
Repeating accuracy	± 0,05 mm/m
Actuation	Toothed belt 16 AT5
Max. dynamic working load	325 N
Feed rate per rotation	100 mm
Idle-running torque	0,2-0,3 Nm
Moment of inertia	0,383 kgcm^2
Max. length overvall	6 m
Geometrical moment of inertia I_Y	21,7 cm^4
Geometrical moment of intertia I_Z	22,5 cm^4



Mass

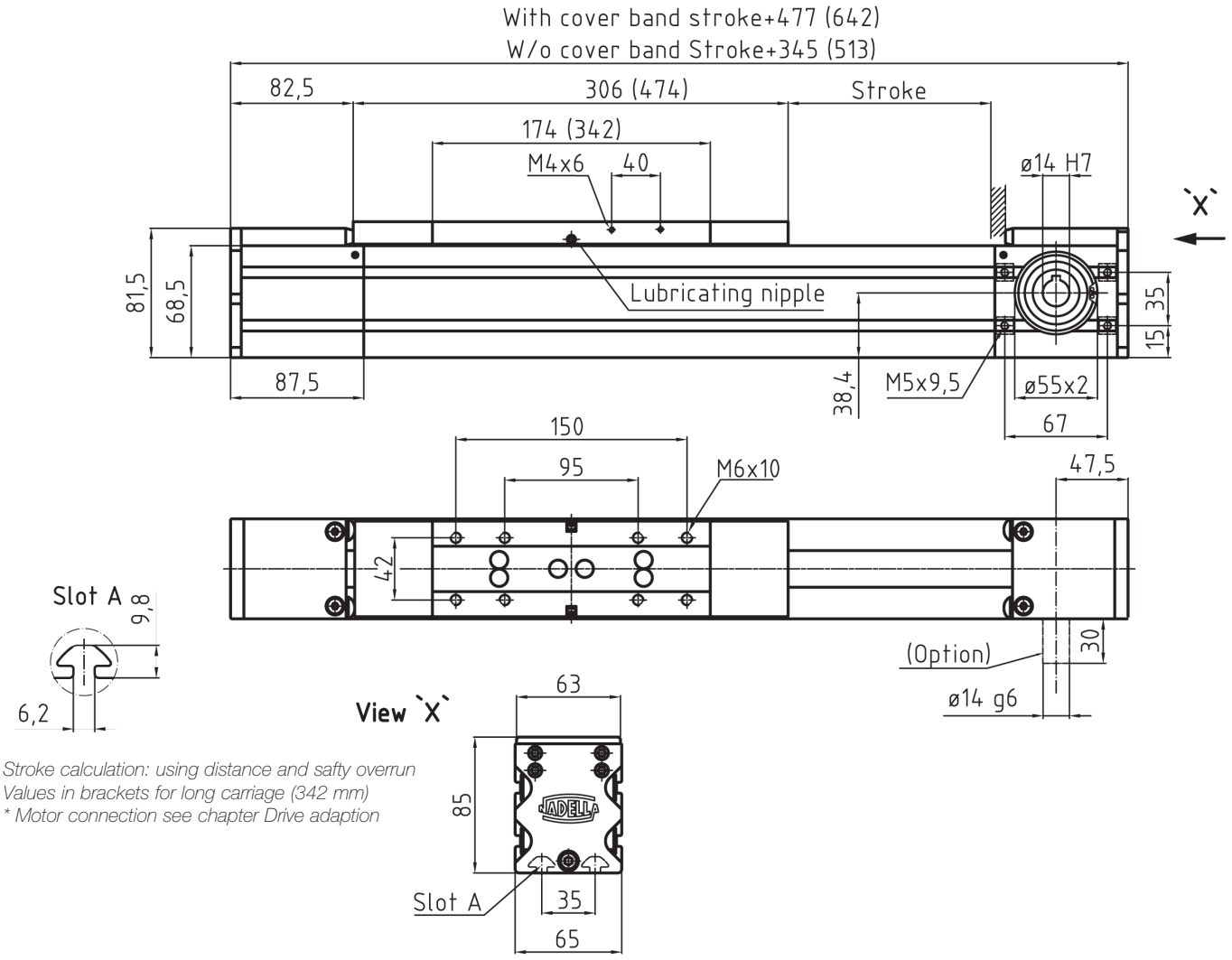
	Roller guide 24.06	Rail guide B
Basic mass	1,8 kg	1,8 kg
Mass per 100 mm stroke	0,3 kg	0,35 kg
Slide mass with cover band	0,55 kg (1,05 kg)	0,55 kg
Slide mass w/o cover band	0,5 kg (1,0 kg)	0,5 kg

NX Rust-resistant version available.

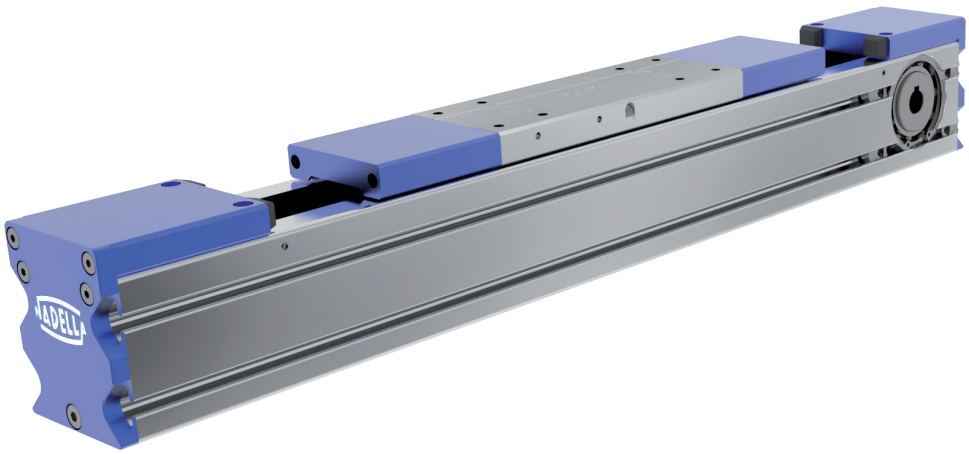
Basic-Line AXNPlus

AXNP 65-Z

Actuator with toothed belt and roller or rail guide



Stroke calculation: using distance and safty overrun
Values in brackets for long carriage (342 mm)
** Motor connection see chapter Drive adaption*



Basic-Line AXNPlus

AXNP 65-Z

Loads and load moments*

	Roller guide 35.10		Rail guide B	
Loads (N)	dyn.	stat.	dyn.	stat.
P_R	995 (1700)	2400 (4500)	2750	9650
P_L	995 (1700)	2400 (4500)	2750	9650
P_T	1940 (3500)	3200 (6500)	2750	9650
Load moments (Nm)				
M_x	20 (40)	40 (80)	19	69
M_y	30 (112)	75 (250)	95	345
M_z	70 (220)	120 (400)	95	345

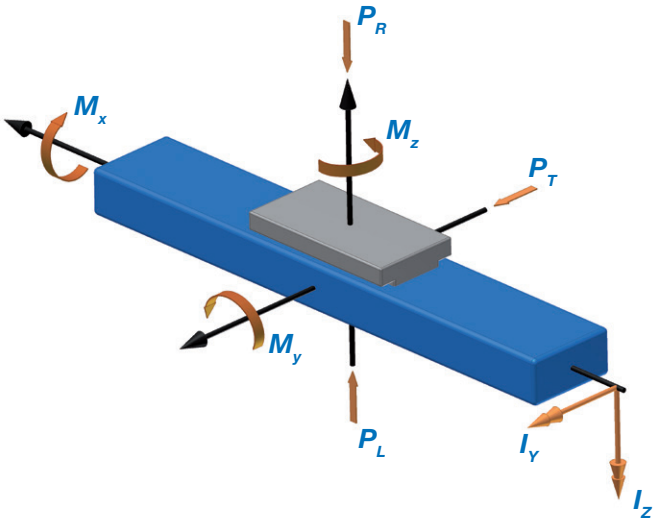
** The dynamic load of the guide system is based on a nominal liftetime of 54.000 km.*

Values in brackets for execution with long carriage (342 mm). Long carriage with rail guide upon request.

Technical data

Max. speed	max. 10 m/s
Repeating accuracy	± 0,05 mm/m
Actuation	Toothed belt 32 AT5
Max. dynamic working load	650 N
Feed rate per rotation	150 mm
Idle-running torque	0,8-1,0 Nm
Moment of inertia	2,994 kgcm^2
Max. length overall	6 m (one-piece)[1)]
Geometrical moment of inertia I_Y	80,2 cm^4
Geometrical moment of inertia I_Z	89,2 cm^4

1) major length upon request



Mass

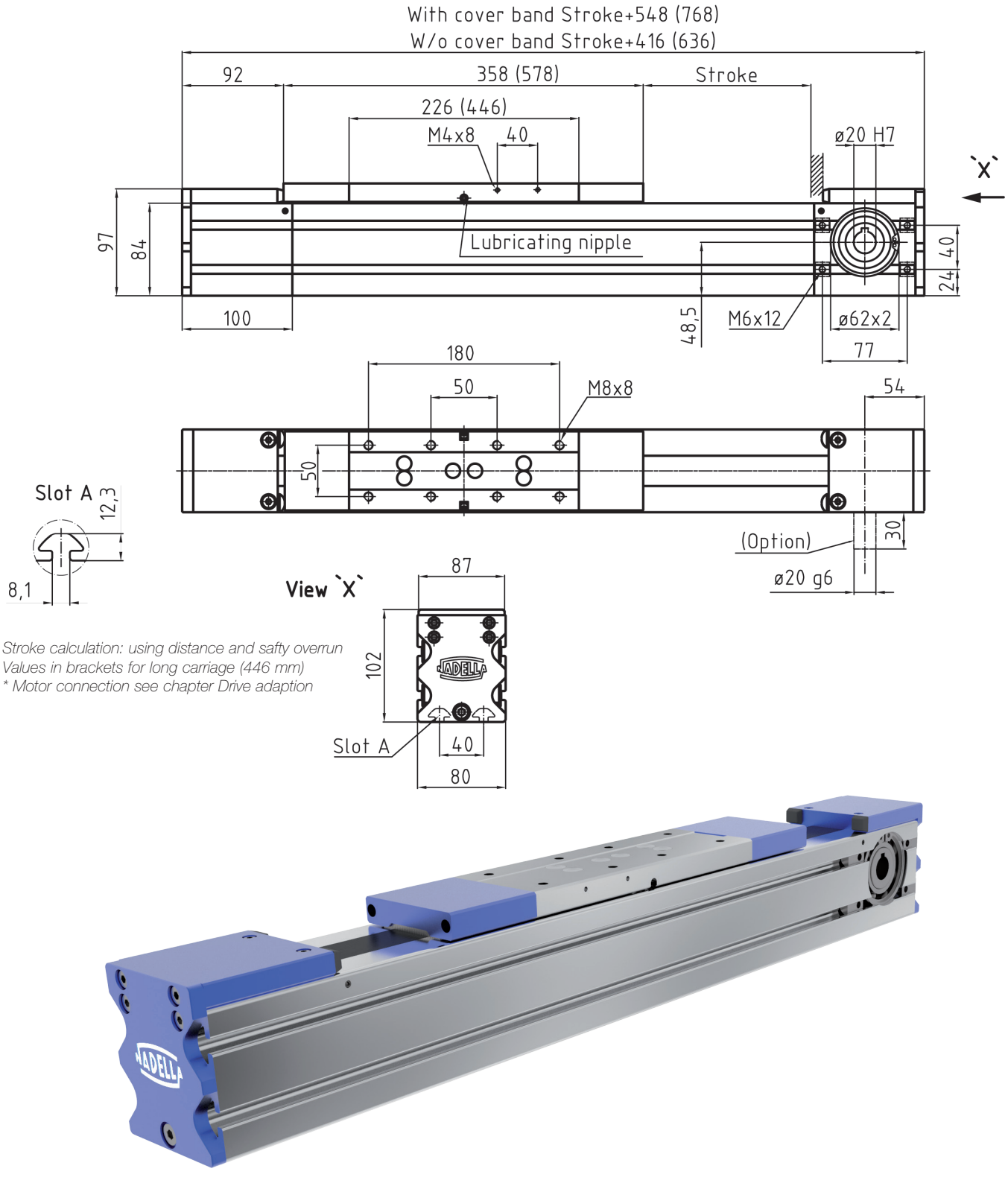
	Roller guide 35.10	Rail guide B
Basic mass	4,8 kg	4,8 kg
Mass per 100 mm stroke	0,6 kg	0,7 kg
Slide mass with cover band	1,6 kg (3,2 kg)	1,7 kg
Slide mass w/o cover band	0,5 kg (1,0 kg)	1,5 kg

NX Rust-resistant version available.

Basic-Line AXNPlus

AXNP 80-Z

Actuator with toothed belt and roller or rail guide



Stroke calculation: using distance and safty overrun
Values in brackets for long carriage (446 mm)
** Motor connection see chapter Drive adaption*

Basic-Line AXNPlus

AXNP 80-Z

Loads and load moments*

	Roller guide 42.10		Rail guide B	
Loads (N)	dyn.	stat.	dyn.	stat.
P_R	1735 (2950)	3000 (5100)	4300	15000
P_L	1735 (2950)	3000 (5100)	4300	15000
P_T	2950 (5000)	5250 (8900)	4300	15000
Load moments (Nm)				
M_x	36 (60)	62 (100)	43	150
M_y	83 (245)	143 (425)	205	730
M_z	146 (365)	260 (635)	205	730

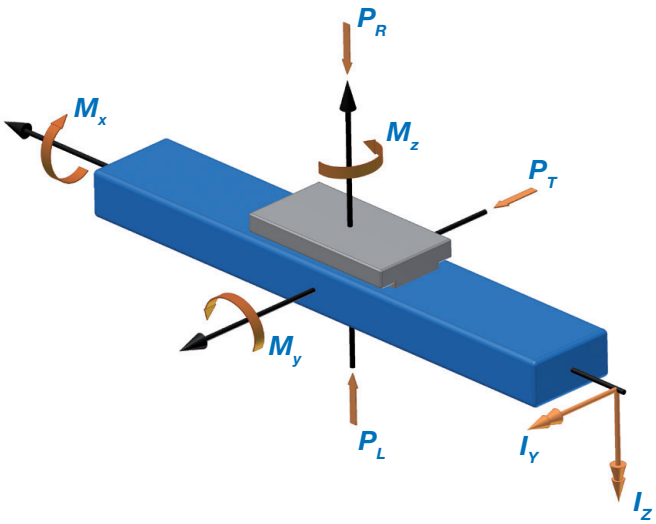
** The dynamic load of the guide system is based on a nominal liftetime of 54.000 km.*

Values in brackets for execution with long carriage (446 mm). Long carriage with rail guide upon request.

Technical data

Max. speed	max. 10 m/s
Repeating accuracy	± 0,05 mm/m
Actuation	Toothed belt 32 AT10
Max. dynamic working load	1450 N
Feed rate per rotaion	180 mm
Idle-running torque	1,0-1,2 Nm
Moment of inertia	5,237 kgcm^2
Max. length overall	6 m (one-piece)[1)]
Geometrical moment of inertia I_Y	198,5 cm^4
Geometrical moment of inertia I_Z	207,4 cm^4

1) major length upon request

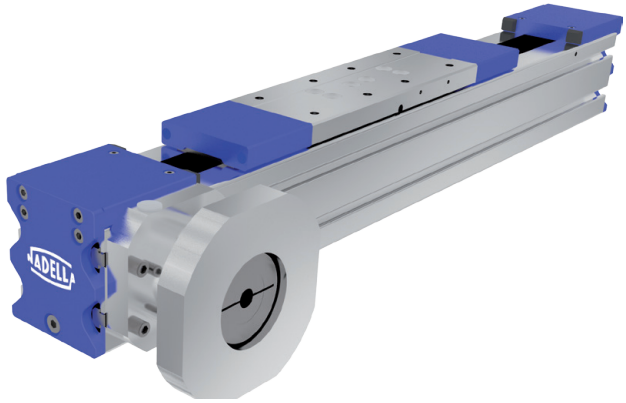


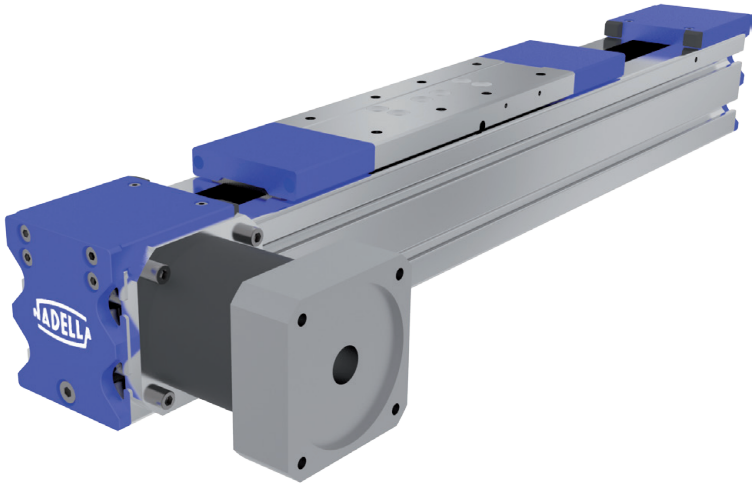
Mass

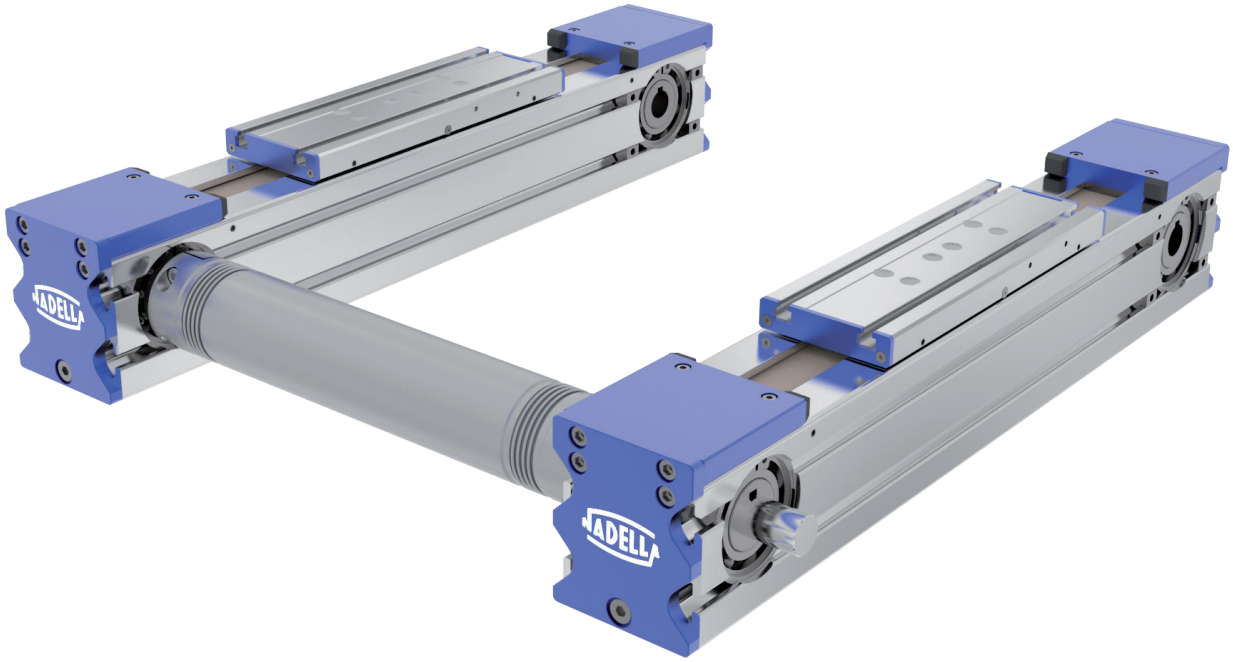
	Roller guide 42.10	Rail guide B
Basic mass	8,5 kg	8,5 kg
Mass per 100 mm stroke	1,0kg	1,1 kg
Slide mass with cover band	3,2 kg (6,4 kg)	3,1 kg
Slide mass w/o cover band	2,7 kg (3,1 kg)	2,7 kg

NX Rust-resistant version available.

Drive adaption/ Reference switch







Drive adaption/ Reference switch

page

Free shaft extension — 3–2

Direct gearbox connection — 3-3

Coupling box / motor flange — 3-4

Drive connecting shaft VBW/VBR — 3-5

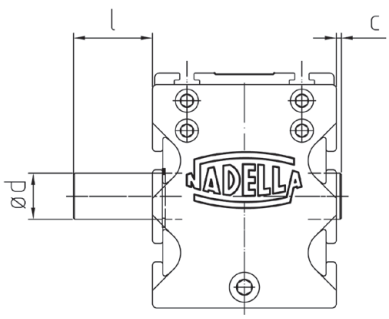
Inductive end-/reference switch — 3-6

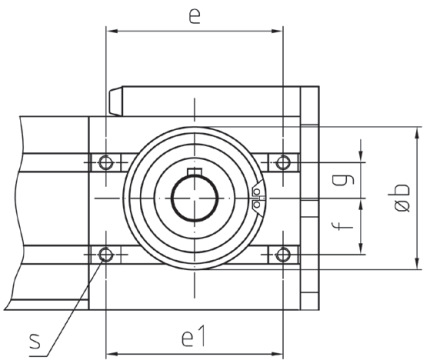
3

Drive adaption/ Reference switch

Free shaft extension

Optional drive shafts on one or both sides for drive connection e.g. with gearbox.





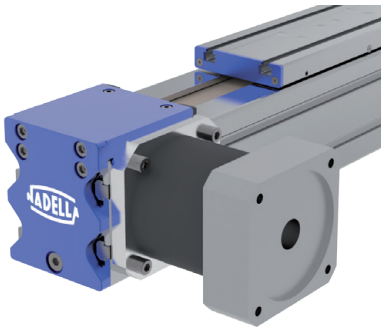
Type	a	b H7	c[1)]	d h6	e1[2)] min.	e	f	g	l	s
AXN(P) 45-Z	28,5	37 x 1,7	0	12	37	47	17,5	7,5	20	M4 x 6
AXN(P) 65-Z	40,0	55 x 1,5	0	14	56	67	23,4	11,6	30	M5 x 9,5
AXN(P) 80-Z	46,0	62 x 3	0	20	68	77	24,5	15,5	30	M6 x 12
AXN 100-Z	60,0	80 x 2	0	25	95	80	32,3	19,7	35	M6 x 12

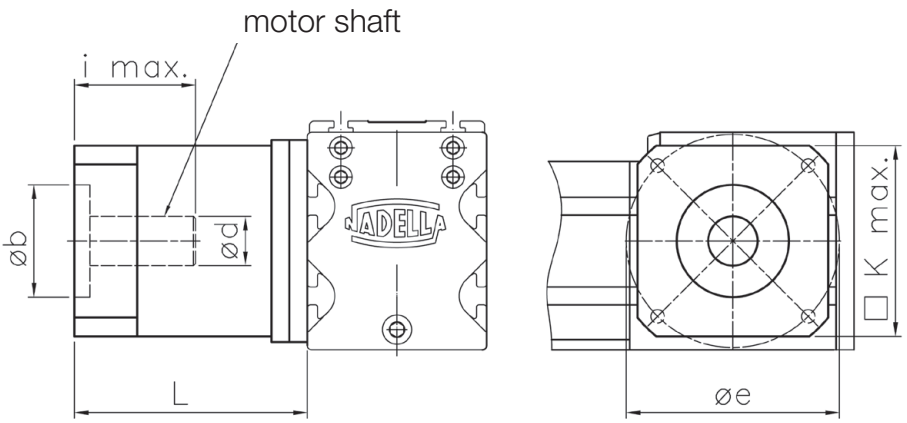
[1)] „0" = shaft snag on the opposite side is almost flush with outer edge of profile
[2)] only lower profile nut "with type AXN(P)

Drive adaption/ Reference switch

Direct gearbox connection

Space-saving drive connection with adapter plate and standard gear. Advantages are improvement of space and cost reduction due to removal of clutch and clutch bell. The drive is connected with the actuator via adapter plate. Power transmission to be effected by fitted key.





Gear data

Actuator type	AXN45-Z	AXN65-Z	AXN80-Z	AXN100-Z
gear type	PLE 40	PLE 60	PLE 80	PLE 120
gear ratio [1]	3,4,5,8			
max. ooutput torque (Nm)	5	15	40	90
max. medium rotary speed at 50% T min^{-1}	5000	4500	4000	3350
circumferential backlash (arcmin)[2]	< 15	< 12	< 8	< 8
moment of inertia ($kgcm^2$)[3]	0,031-0,017	0,135-0,065	0,77-0,39	2,63-1,32
weight (kg)	0,35	0,9	2,1	6,0

[1] *other gear ratio upon request.*
[2] *restricted circumferential backlash.*
[3] *depending on gear ratio*

Dimensions

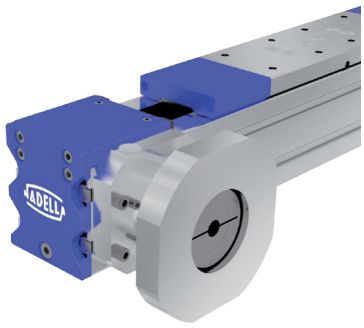
Actuator type	gear type	e[4] (mm)	motor type	b[4] (mm)	max. weight of motor (kg)	d	i max. (mm)	K max. [5] (mm)	L[6] (mm)
AXN(P)45-Z	PLE 40	any	B5 / B14	any	2	4/5/6/6,35/8/9/11	25	40x40	74
AXN(P)65-Z	PLE 60	any	B5 / B14	any	3,5	6/6,35/8/9/9,525/ 10/11/12/14/16/19	23	60x60	77,5
AXN(P)80-Z	PLE 80	any	B5 / B14	any	9	9,525/10/11/12 12,7/14/16/19/22/24	30	90x90	106
AXN100-Z	PLE 120	any	B5 / B14	any	16,5	11/12,7/14/15,87/ 16/19/22/24/28/32/35	40	115x115	134,5

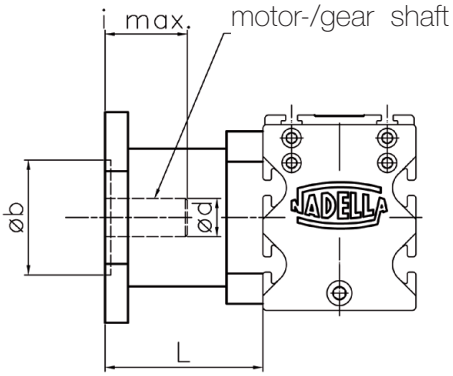
[4] *within flange dimensions*
[5] *max. dimenison, next higher ones on request (e.g.: PLE 40 with flange dimensions 60x60 mm).*
[6] *length of motor flange included*

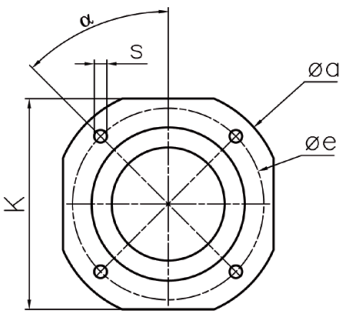
Drive adaption/ Reference switch

Coupling box / motor flange

The coupling and flanges will be adapted according to standard mounting combinations by clutch, clutch bell and adapter flange.





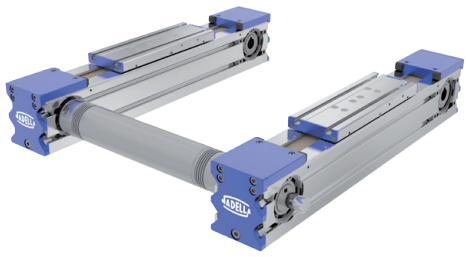


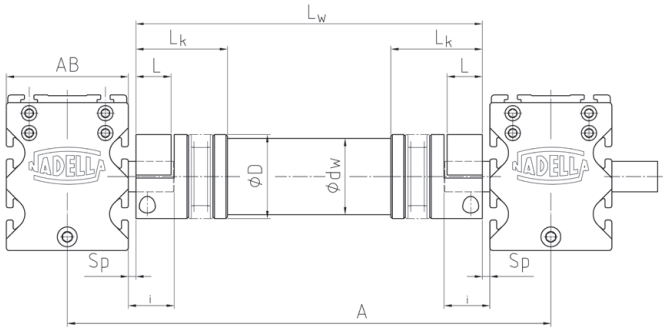
Actuator	code	design	e	α	s	b	d	i	k	a	L
			min.-max.			min.-max.		max.	max.		
AXN(P) 45	I	B5	45-65	0°	4x M5 x15	36-55	6 - 16	35	75	100	57
	II	B5	45-90	45°	4x M5 x15	36-70	6 - 16	35	75	100	57
	III	B14	50-63	0°	4x Ø 5,5	36-55	6 - 16	35	75	100	57
	IV	B14	50-86	45°	4x Ø 5,5	36-72	6 - 16	35	75	100	57
AXN(P) 65	I	B5	65-110	0°	4x M5 x18	52-100	8 - 28	40	90	120	72,5
	II	B5	65-110	45°	4x M5 x18	52-100	8 - 28	40	90	120	72,5
	III	B14	68-110	0°	4x Ø 5,5	52-100	8 - 28	40	90	120	72,5
	IV	B14	68-110	45°	4x Ø 5,5	52-100	8 - 28	40	90	120	72,5
AXN(P) 80	I	B5	75-110	0°	4x M6 x 12	60-95	12 - 32	45	120	130	77
	II	B5	75-120	45°	4x M6 x 12	60-105	12 - 32	45	120	130	77
	III	B14	80-105	0°	4x Ø 6,6	60-95	12 - 32	45	120	130	77
	IV	B14	80-115	45°	4x Ø 6,6	60-105	12 - 32	45	120	130	77
AXN 100	I	B5	75-108	0°	4x M6 x 16	60-96	12 - 32	45	120	150	98,5
	II	B5	75-138	45°	4x M6 x 16	60-115	12 - 32	45	120	150	98,5
	III	B14	82-110	0°	4x Ø 6,6	60-100	12 - 32	45	120	150	98,5
	IV	B14	82-140	45°	4x Ø 6,6	60-115	12 - 32	45	120	150	98,5

Drive adaption/ Reference switch

Drive conneting shaft VBW

The actuators can be parallely connected. Power transmission by special connecting shaft with integrated metal bellows clutch.

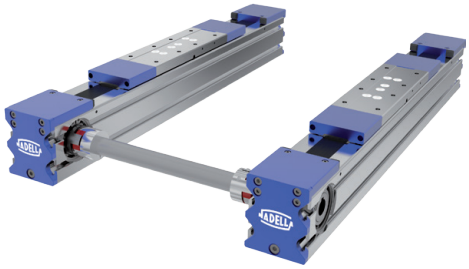


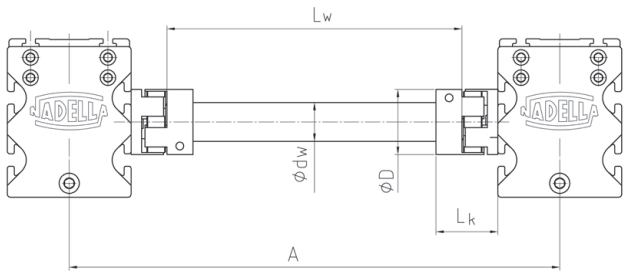


	T_{KN} (Nm)	A min [1]	L	Sp.[1]	Sp min [2]	i	L_W [3]	D	d_W	L_K	A_B
AXN(P) 45-VBW	10	162	20	8,5	1,0	10	A-62	40	35	39,5	45
AXN(P) 65-VBW	10	202	30	18,5	1,5	10	A-102	40	35	39,5	65
	30	221	30	13,0	2,0	15	A-91	55	50	52,0	65
AXN(P) 80-VBW	30	236	30	13,0	2,0	15	A-106	55	50	52,0	80
	60	258	30	9,0	2,5	19	A-98	66	60	64,0	80
AXN 100-VBW	60	288	35	14,0	2,5	19	A-128	66	60	64,0	100
	75	283	35	4,0	2,5	31	A-108	57	50	63,0	100

[1] *can be removed without dismantling the actuator*
[2] *dismantling of the shaft only when dismantling at least one actoator*
[3] *calculation L_W=A-(2* AB/2)-(2*Sp)*

Drive connection with partially integrated coupling VBR (direct connection for gearbox)





					clutch partially integradted	
	T_{KN} (Nm)	A min[1]	Lw[1]	dw	D	Lk
AXN(P) 45	9	105	A - 67	12 x 2	25,2	19
AXN(P) 65	17	173	A - 107	22 x 2	42	38
AXN(P) 80	17	181	A - 114	25 x 3	42	34,5
AXN100	75	219	A - 143	30 x 4	56	41,5

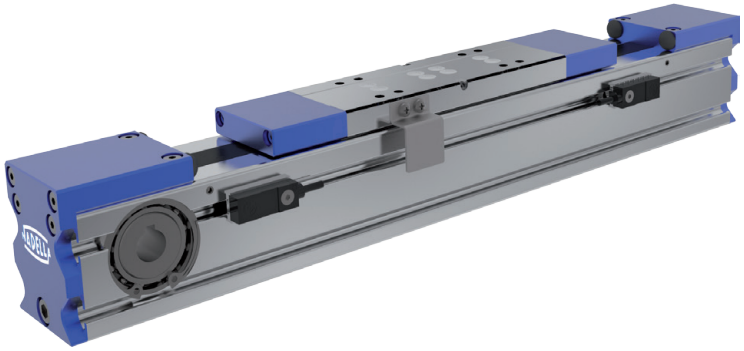
[1] *can be removed without dismantling the actutor*

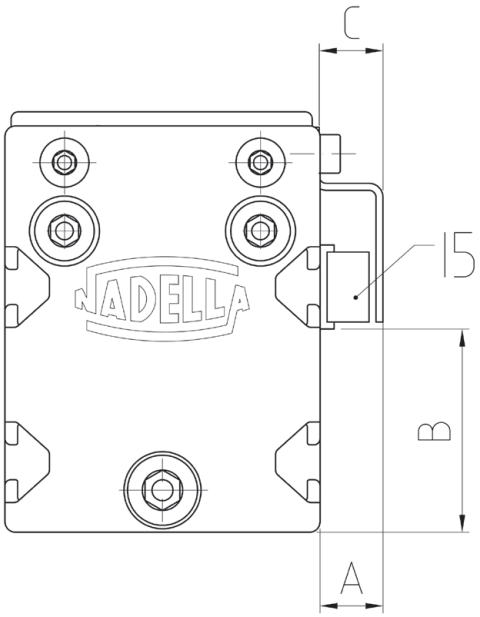
Drive adaption/ Reference switch

Inductive switches

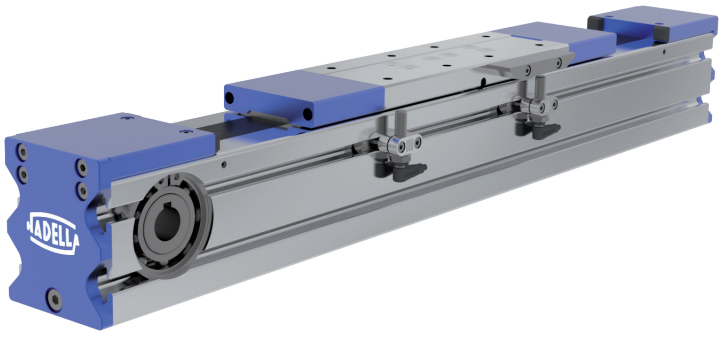
For more safeness it is recommended to install limit switches for linear modules driven by electric motors. Positions can be controlled or signals can be derivated by inductive switches. Switches are available in a set which consists of two switches, cams and fixing elements or as single switch.

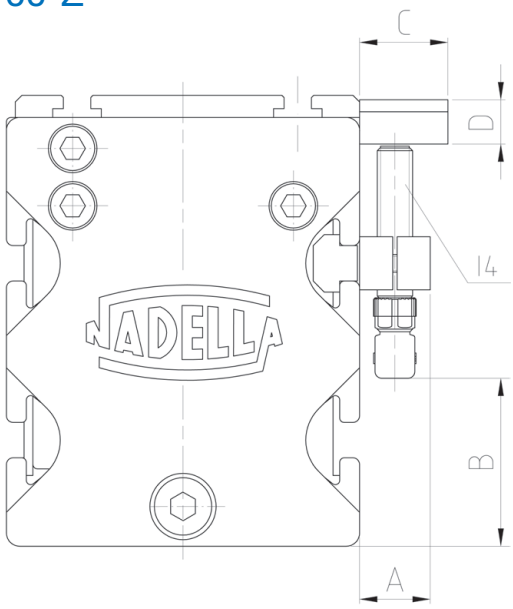
Inductive proximity switch AXN(P) 45-Z





Inductive proximity switch AXN(P) 65/80-Z AXN 100-Z





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Drive adaption/ Reference switch

Inductive switches

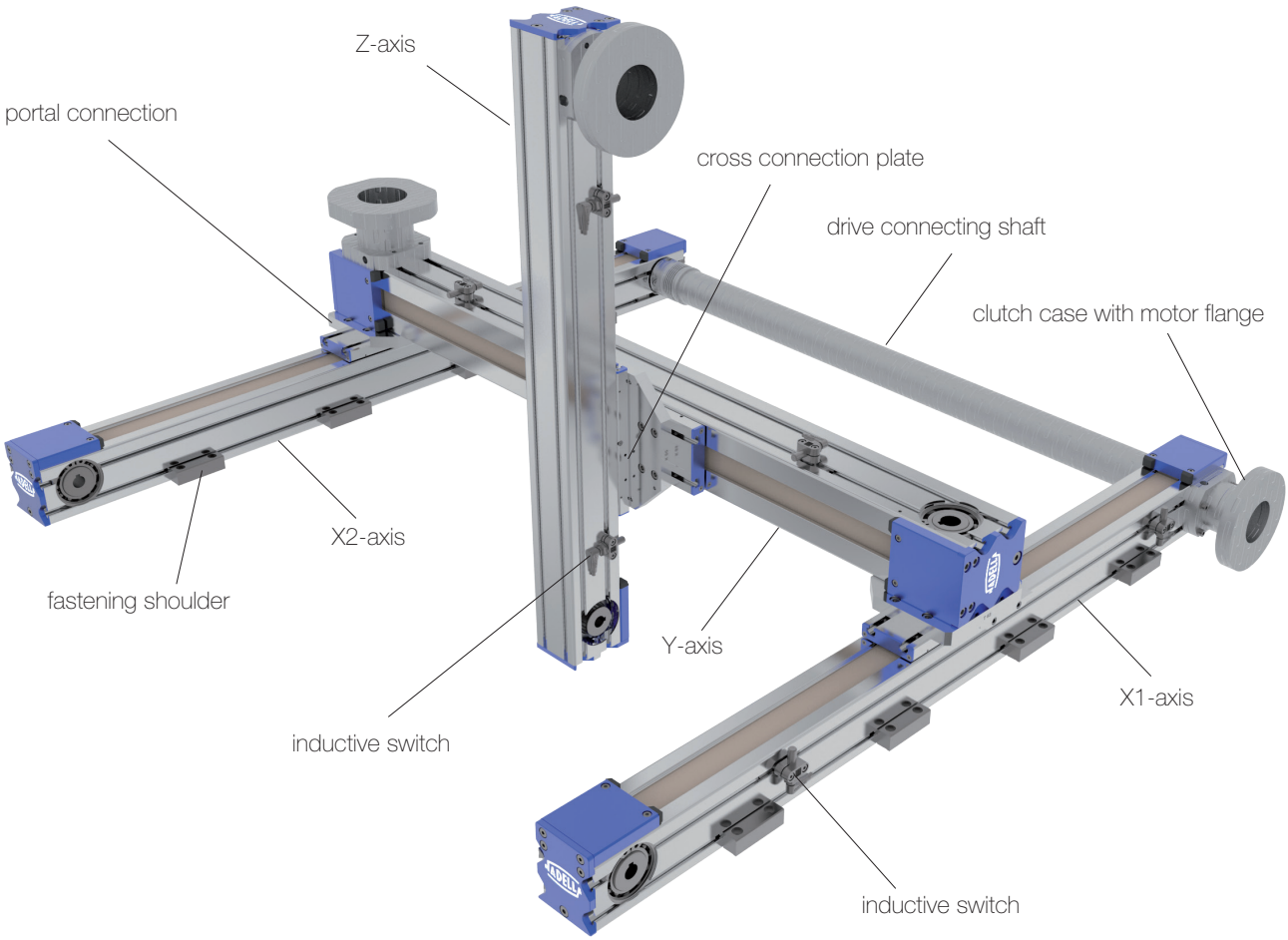
switch		mounting dimensions			
	Typ	A	B[1)]	C	D
AXN(P) 45-Z	I5	9	29	9	-
AXN(P) 65-Z	I4	16	27	19	11
AXN(P) 80-Z	I4	16	44	19	11
AXN 100-Z	I4	16	64	19	11

[1)] *ca. values depending on switch position wihout cable connection.*

Technical data

	Connected voltage	max. load current	switching precision	cable length[2)]	protection class
Switch I4 PNP opening/closing contact AXN(P) 65-Z / AXN(P) 80-Z / AXN 100-Z	10…30 V DC	200 mA	≤10% des Schalt-abstandes	5 m	IP 67
Schwitch I5 PNP opening/closing contact AXN(P) 45-Z	10…30 V DC	100 mA	≤10% des Schalt-abstandes	3 m	IP 67

[2)] *Bigger cable lenth on request (please indicate desired cable length in the order)*


Z-axis
portal connection
cross connection plate
drive connecting shaft
clutch case with motor flange
X2-axis
fastening shoulder
Y-axis
X1-axis
inductive switch
inductive switch

Fastening and joining elements

ab Seite

Slot nuts — 4-2

Fastening shoulder — 4-3

Direct connection — 4-4

Cross connection — 4-5

Portal connection — 4-6

Slot covers — 4-7

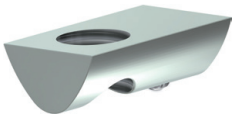
Assembly examples — 4-9

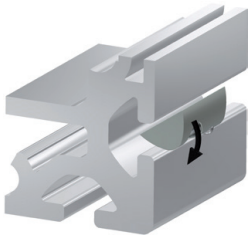
4

Fastening and joining elements

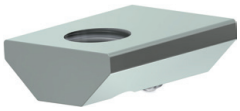
Slot nuts

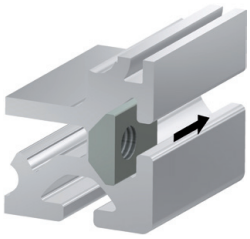
Type E (swivel-mounted)
- standard slot nut
- can be swivelled in any position
- fixed by spring ball
- steel zinc coated



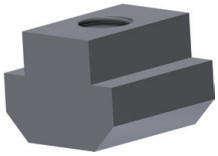


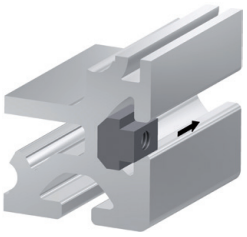
Type S
- slot nut for heavy loads
- slide-in at end of profile
- fixation with elastic balls (up to nut slot 8,2)
- steel zinc coated

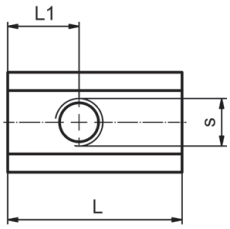




Type T (DIN slot nut)
- slot nut for heavy loads
- installed on demand
- steel black finished
- without fixation







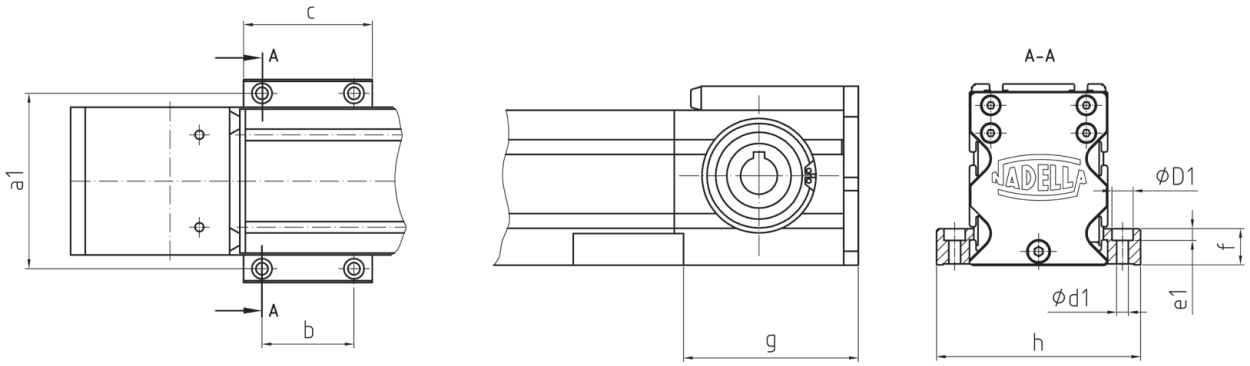
Actuator	Type [1] Nut slot-	s	Design	L	L_1 [2]	TA (Nm)	max. tensile force
AXN(P) 45-Z	5 St-	M3	E	12	3	1,5	500
AXN(P) 65-Z AXN 80-table	6 St-	M4 M5	E	17	5	4,0 8,0[3]	1750
AXN(P) 80-profile AXN 100-Z	8 St-	M5 M6	E	22	9	8,0[3] 14,0[3]	2500 3500
AXN(P) 80-Z AXN 100	DIN 508	M6	T	13	6,5		

[1] all combinations of actuators and not slots are possible - e.g. AXC 60 not slot 5St-M3 Design E
[2] max. values, different dimensions possible
[3] strength category 10.9 is necessary by using the max. clamping torque

Fastening and joining elements

Fastening shoulder

Easy fixation of actuator by top-side screw connection.
For combinations with fastening shoulder please see chapter „direct connection“.



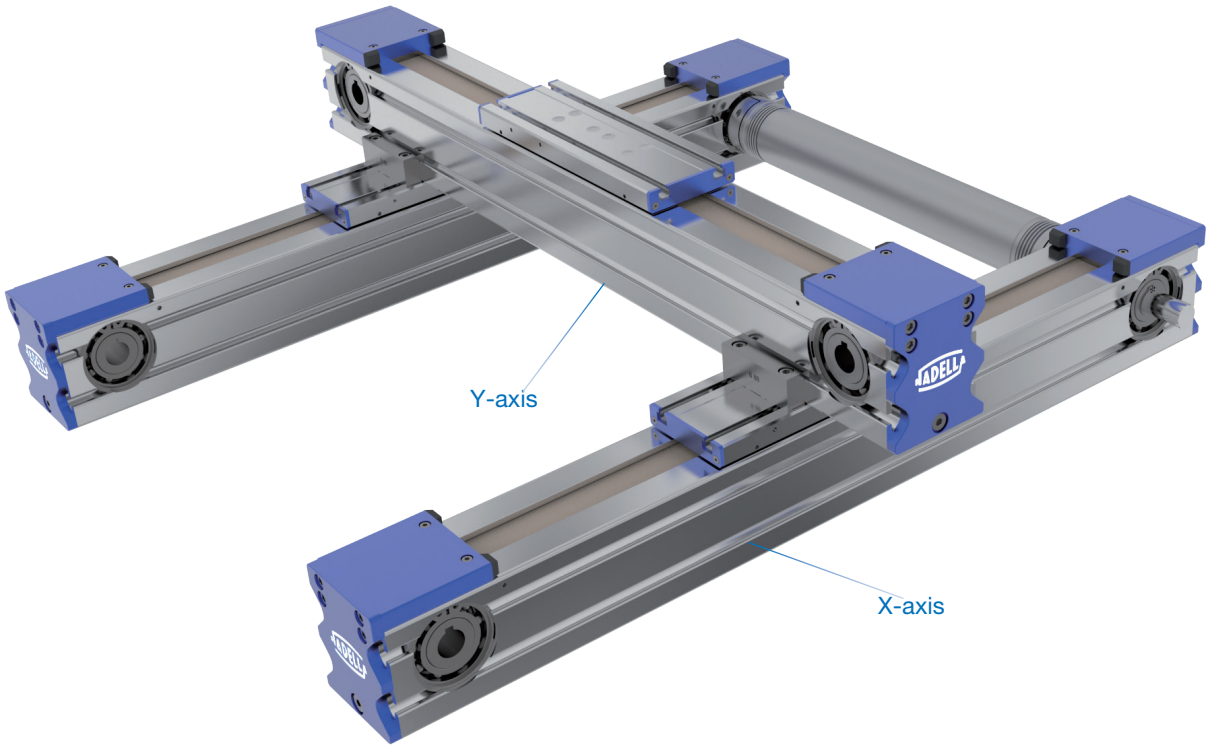
Type[1]										
Actuator		a1	b	c	d1	D1	e1	f	g[2]	h
AXN(P) 45-Z	Bfl. Bk4[3]	60	-	20	5,5	10	5,5	11	68	74
	Bfl. B44		28	41						
AXN(P) 65-Z	Bfl. B64	80	28	41	5,5	10	11,5	17	95	97
	Bfl. Bk6[3]		-	20						
	Bfl. B66		40	60						
AXN(P) 80-Z	Bfl. B86	95	40	60	6,6	11	18,5	25	105	111
	Bfl. Bk8[3]		-	25						
	Bfl. B88		50	70						
AXN 100-Z	Bfl. B1010	114	74	95	6,6	11	18	25	110	130

[1] Type = actuator and type of fastenign shoulder e.g. AXN 65-Bfl. B64
[2] for drive belt actuators also depending on drive adapter
[3] short execution with countersink

Fastening and joining elements

Direct connection AXN / AXNP

Cost-efficient solution for simple standard connections.
A direct connecting set including 2 fastening shoulders and corresponding fastening screws is needed for each connection of X- and Y-axis.

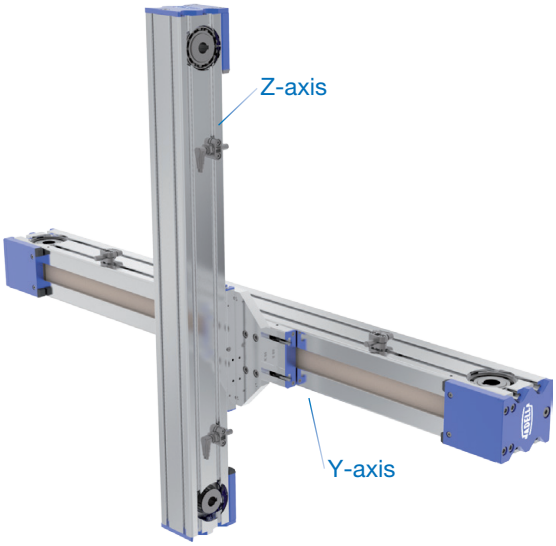


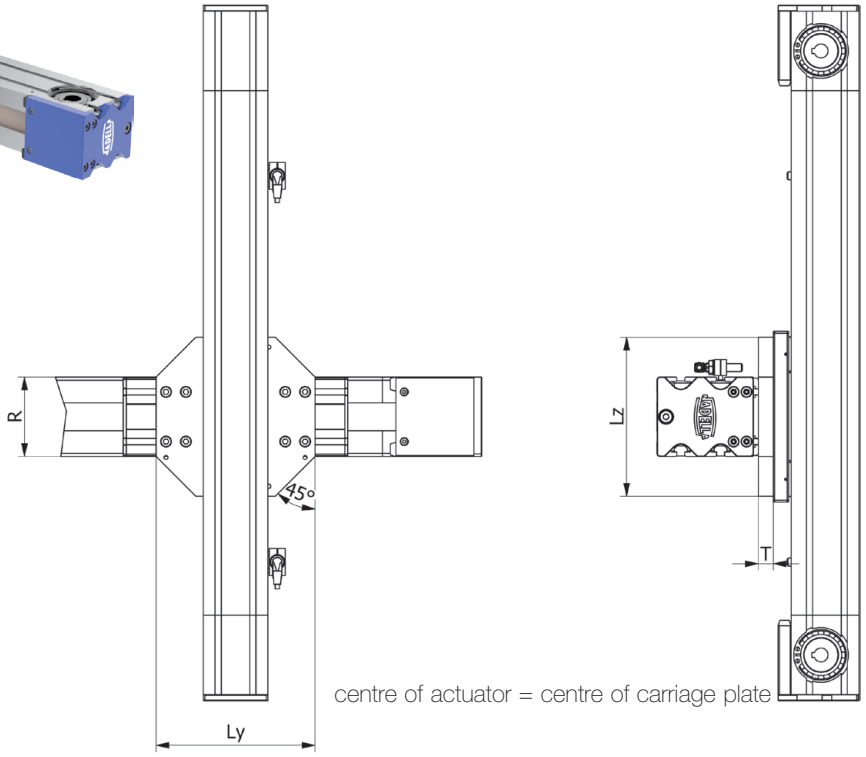
Y-axis	AXN(P) 45-Z	AXN(P) 65-Z	AXN(P) 80-Z	AXN 100-Z
X-axis	connection set			
AXN(P) 45-Z	D(P) 44	D(P) 46		
AXN(P) 65-Z		D(P) 66	D(P) 68	
AXN(P) 80-Z			D(P) 88	D(P) 810
AXN 100-Z				D(P) 1010

Fastening and joining elements

Cross connection AXN / AXNP

Cross connections by standardized adapter plates for Y-Z axis connections.
Carriage of Z-axis will be connected to the carriage of Y-axis via adapter plate.
Advantage: the complete Z-axis profile can be moved



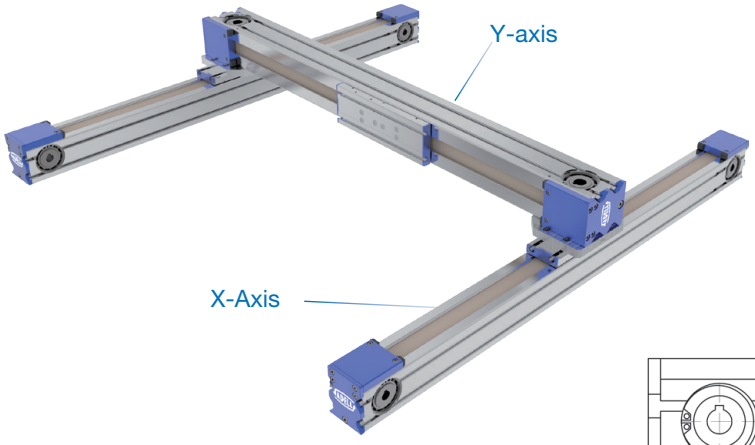


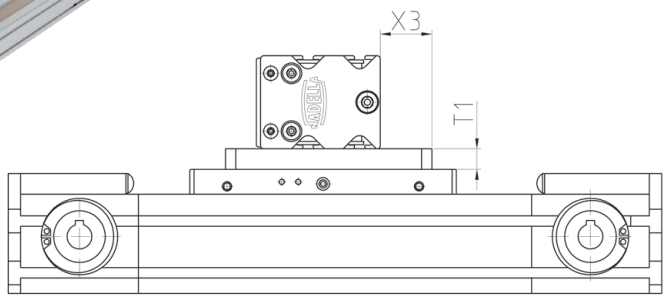
Y-axis	Z-axis	Ly	Lz	R	T	Type cross connection
AXN(P) 45-Z	AXN(P) 45-Z	100	100	65	10	AXN(P)-K44
AXN(P) 65-Z	AXN(P) 45-Z	100	100	65	10	AXN(P)-K64
AXN(P) 65-Z	AXN(P) 65-Z	140	140	65	12	AXN(P)-K66
AXN(P) 80-Z	AXN(P) 65-Z	160	160	80	15	AXN(P)-K86
AXN(P) 80-Z	AXN(P) 80-Z	160	220	80	15	AXN(P)-K88
AXN 100-Z	AXN(P) 80-Z	220	220	110	15	AXN(P)-K108
AXN 100-Z	AXN 100-Z	230	230	100	15	AXN-K1010

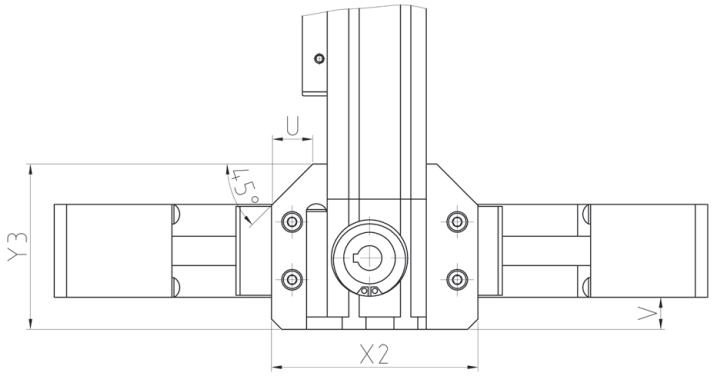
Fastening and joining elements

Portal connection AXN / AXNP

Connection plate for „table-profile-connections“.
With our portal connection plates, workable and cost saving portals can be realized.
Especially for use with big cross hub or bigger mass, very stiff constructions are possible.







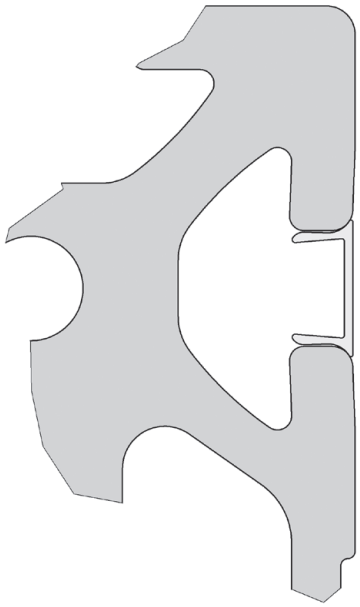
X-axis	Y-axis	T1	U	V	X2	X3	Y3	Portal connection
AXN(P) 45-Z	AXN(P) 45-Z	10	27	15,5	100	27,5	80	AXN(P) 45-T44
AXN 45-Z	AXN(P) 65-Z	12	20	23,5	100	17,5	104	AXN(P) 45-T46
AXN(P) 65-Z	AXN(P) 65-Z	12	25	13,5	130	32,5	104	AXN(P) 65-T66
AXN(P) 65-Z	AXN(P) 80-Z	15	24	21,5	120	16	117	AXN(P) 65-T68
AXN(P) 80-Z	AXN(P) 80-Z	15	24	14	140	26	117	AXN(P) 80-T88
AXN(P) 80-Z	AXN 100-Z	15	45	25	180	40	155	AXN(P) 80-T810
AXN 100-Z	AXN 100-Z	15	45	20	190	45	160	AXN 100-T1010

[1] position on X-axis fixed with cylinder pins
[2] For table length of 600 mm

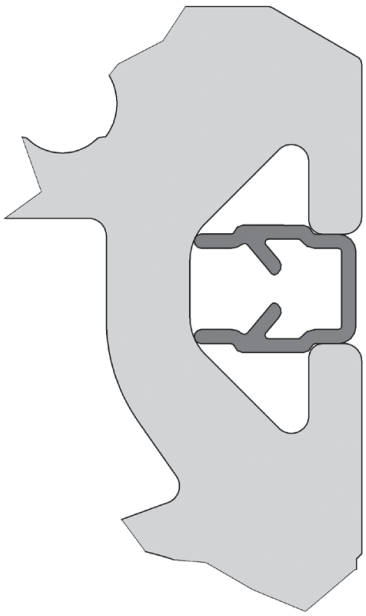
Fastening and joining elements

Cover for profile slots AXN / AXNP

For any application used in visual range or with increasing dirt, the profile slots can be covered by corresponding covers in aluminium or plastic material. Therefore no dirt particles can enter the t-slots which guarantees good dirt protection for the actuator.



Cover profile AL
Colour: silver-coloured



Cover profile PP
Colour: black

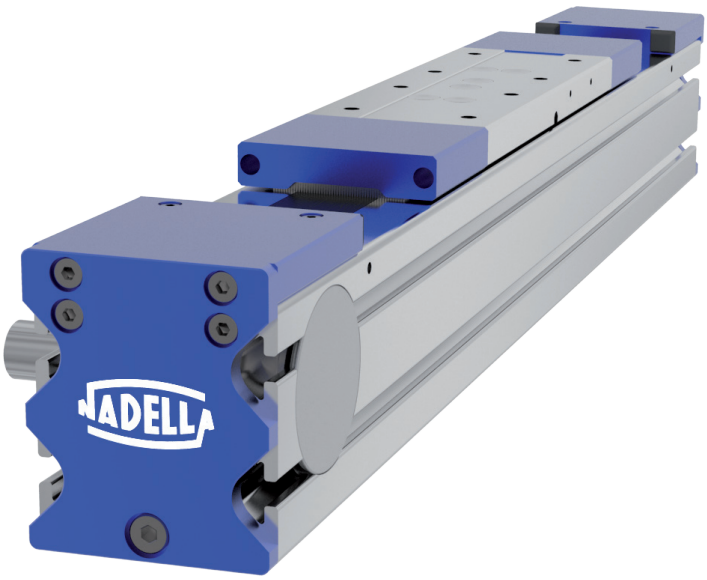
Axis	Size	Designation	Material
AXN(P) 45-Z	Nut 5	Cover profile 5 PP	polypropylene black
AXN(P) 65-Z	Nut 6	Cover profile 6 Al	aluminium ecru
		Cover profile 6 PP	polypropylene black
AXN(P) 80-Z / AXN 100-Z	Nut 8	Cover profile 8 Al	aluminium ecru
		Cover profile 8 PP	polypropylene black

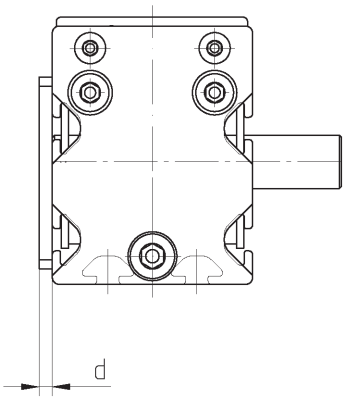
[1] *only for T-nuts at the ground area of the actuator*

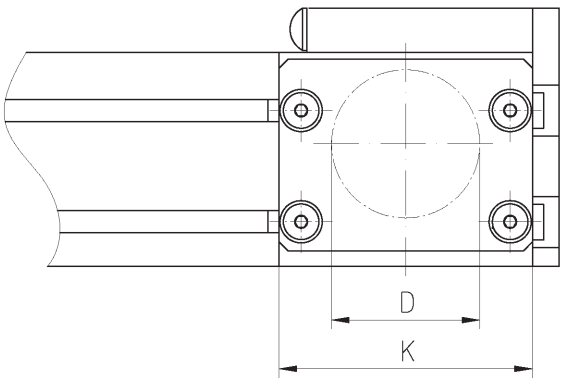
Fastening and joining elements

Plates for AXN / AXNP

Special plates for the free driving sides protect bearings and bevels against penetrating dirt and prevent potential risk of accident.





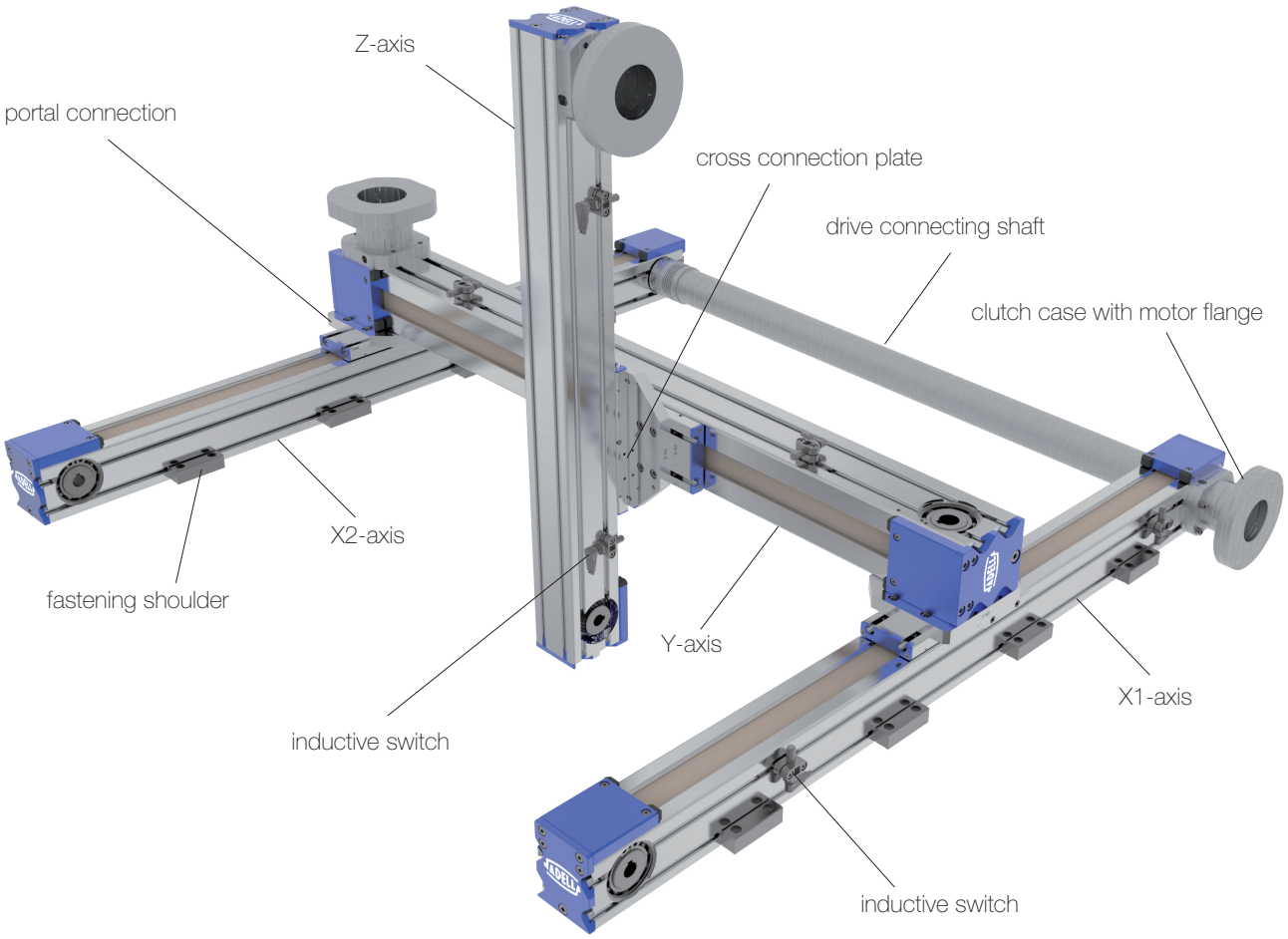


Axis	Ø D (mm)	□ K (mm)	Overlap d(mm)	Type
AXN(P) 45-Z	-	56,5 x 43	3	AXN 45-Plate
AXN(P) 65-Z	-	78 x 58	3	AXN 65-Plate
AXN(P) 80-Z	62	-	0	AXN 80-Plate
AXN 100-Z	-	110 x 85	4	AXN 100-Plate

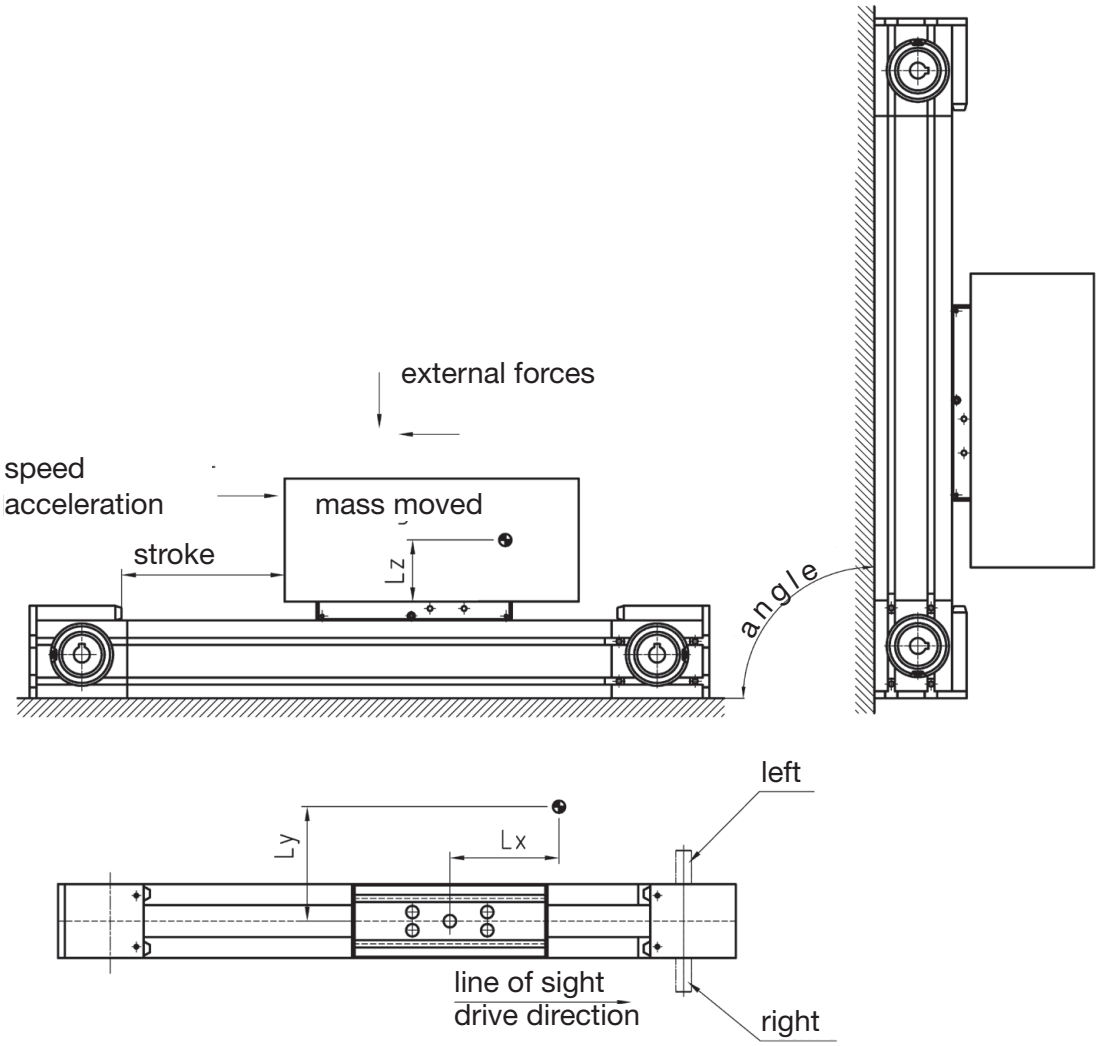
Fastening and joining elements

Combinations with AXN or AXNP

More than only a single acting actuator ! Basic-Line modules are well thouht-out, have high capacity and are a cost saving solution. Single actuators are also availabe as multi actuator systems. Upon customers request, we can provide fastening shoulders, limit switches, coupling housing, planetary gear and drive connecting shaft as a completion to our AXN/AXNP modules.



Technical information



Technical information

pages

Actuator selection — 5-2

Technical information — 5-4

Basics — 5-5

Type designation Basic-Line — 5-6

Application form — 5-7

5

Technical information

Actuator selection

Guide selection – roller guide LR or rail guide B

Application	horizontal	- LR or B
	vertical	- LR or B
Mass	low till medium*	- LR or B
	medium till high*	- B
Substantive		
Transverse moment loading		- B
Dynamic	low till medium*	- LR or B
	medium till high*	- B

Carriage size – single/twin carriage or long carriage

Mass

The mass to be moved should be well fastened on the carriage and not have large overhangs. The centre of gravity of the mass should be approximately in the middle of the carriage mounting surface. Alternatives for longer screw-on surfaces are long standard carriages or double carriages which can also be fitted with larger distances.

Overhanging or wide masses

If the mass to be moved is very wide or has an overhanging centre of gravity it is recommended to use two parallel actuator units (maybe driven by a connecting shaft).

** The specifications short, medium, long or low, medium, high are to be understood in the ratio 1/3, 2/3 and 3/3 of the technical performance data indicated in the catalogue for respective actuator types and sizes.*

Technical information

Selection of linear actuator

Actuator size and type

The actuator size is mainly determined by the mass to be moved (weight and volume). This mass should be easy to mount and therefore should have a certain guide size and carriage mounting surface which also is decisive for the actuator size (see product overview in the catalogue).

The second selection criteria for the actuator is the moving dynamic of the mass. The resulting forces (e.g. driving forces, moments, centrifugal forces, etc.) must be absorbed by the toothed belt and by the guide. Based on the synoptical table in the catalogue possible actuator types and sizes can be specified.
To make the right choice the technical data indicated in the catalogue such as admissible loads and load moments should only be used by one third as the combination of forces and moments can significantly affect the lifetime.

Further selection criteria for the actuator type are space requirements and the travel length of the linear actuator. It may be recommendable to replace larger single actuators by smaller parallel actuators and vice-versa. In case of large effective strokes, it may be necessary to use large actuators also for small loads.

The above are only rough guidelines for the selection of an actuator which can also be completely different depending on the application and the existing realities or on the customers personal wishes. In case of combined actuators such as X-Y systems or X-Y-Z systems a gantry structure with two parallel basic actuators should always be given preference to a boom system with only one basic actuator. For the design of combined systems the actuator on which the mass to be moved will be mounted should always be viewed at first.

We shall be pleased to assist you with the design and selection of the right modules for your application.

Please send us information about your application and technical data.
(See also application form at the end of the catalogue)

Design fundamentals

General
All data refer to the respective standard type of the linear module. A special design or temperatures above 80°C can considerably affect these values.

Technical data, loads and load moments
The values indicated are maximum possible individual sizes. Combined loads (e.g. forces and moments from different directions) reduce these maximum values and can have a negative effect on precision. If linear actuators are not fully supported, in addition a deflection or torsion test may become necessary.

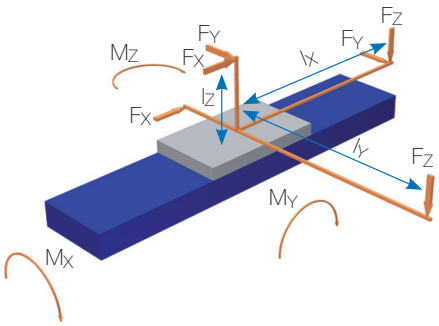
Repeat accuracy
The repeat accuracy defines that under the same conditions within the given tolerances the mechanical linear module will reach again a position already approached before.

Stroke length
The stroke length indicated in the order code corresponds to the maximum possible travel distance. Accelerating and stopping distances or a possible safety overflow must be taken into consideration for design.

Speeds
The theoretical travel speed results from the screw pitch or in case of a toothed belt actuator from the stroke per turn of the pinion, the gear ratio of a possible gear and a motor speed. To determine the actually possible travel speed the specific conditions, the mass to be moved, acceleration, motor output and the admissible drive torque of the selected actuator as well as the efficiency have to be considered.

Operating characteristics and production tolerances
Differences in running performance and noise development with identical units cannot be completely excluded, not even by our high production standard with small production tolerances. Our extruded profiles are manufactured according to DIN EN 12020-2. Especially with reference to straightness and torsion these fixed tolerances mostly are clearly underrun. The exact adjustment of the linear units and/or mounting to precisely machined surfaces increase the guiding accuracy. A possible deflection of partially supported actuators mainly depends on the inherent rigidity, the load, the self-supporting length and the rigidity of the adjacent construction.

Calculation basis



Forces due to a moving mass

$$F_x = m \cdot a$$
$$F_y = m \cdot a$$
$$F_z = m \cdot (g + a)$$

F = load (N)
m = mass (kg)
a = acceleration (m/sec²)
g = acceleration of gravity (9,81 m/sec²)

Additional moment loading with an eccentric centre of gravity or lever arm

$$M_x = F_y \cdot l_z \text{ or } F_z \cdot l_y$$
$$M_y = F_x \cdot l_z \text{ or } F_z \cdot l_x$$
$$M_z = F_x \cdot l_y \text{ or } F_y \cdot l_x$$

l_x, l_y, l_z = distance of force application point in direction x, y, z, indicated in m

In most applications there are force combinations. The resulting total forces always must be smaller than the respective admissible values.

Drive sizing (estimate)

$$M_A = M_{Last} + M_{Leer}$$

M_A = necessary drive torque (Nm)
M_{Last} = load torque (Nm)
M_{Leer} = idle torque (Nm) – see data sheets

$$M_{Last} = \frac{F_x \cdot p}{2 \cdot \pi \cdot 1000}$$

F_x = feed force (N)
p = stroke/revolution (mm) for toothed drive belt
screw pitch (mm) for screw drive
η = for ball screw approx. 0.9

For screw drive::

$$M_{Last} = \frac{F_x \cdot p}{2 \cdot \pi \cdot \eta \cdot 1000}$$

Feed force for horizontal operation

$$F_x = m \cdot g \cdot \mu + m \cdot a$$

μ = friction coefficient for rail guide 0.02
for roller guide 0.05

Feed force for vertical operation

$$F_x = m \cdot (g + a)$$

Admissible drive torques

The maximum acceleration also depends on the maximum admissible drive torque of the respective actuator. Example: calculation for toothed belt actuator AXN80-Z:

$$M_{Azul} = \text{belt traction x pinion radius} = \frac{1450N \cdot 180mm}{2 \cdot \pi \cdot 1000} = 41.5Nm$$

5

Ordering code

Type designation for AXN and AXNP

Ordering example

AXN 65 – Z HW 14 – LR 35 –1000 –1340 – 00

Type designation
AXN...
AXNP...

Drive configuration
Z: belt drive
O: no drive

Drive configuration with belt drive

HW:	hollow shaft
WL (WR):	driveshaft left (right)
WD:	driveshaft both sides
KL (KR):	partially integrated coupling on one side left (right)
PL (PR):	planetary gear left (right)
PLK (PRK):	planetary gear left + coupling right (planetary gear right + coupling left)
MKL (MKR):	motor flange with coupling left (right)

Characteristic of the shaft / coupling with belt drive
- diameter of shaft or hollow shaft (HW, WL, WR, WD)
- diameter of coupling holes (KL,KR, MKL, MKR)
- gear ratio (PL, PR)
- for type PLK or PRK only the gear ratio is indicated

Options
This number will be given by Nadella. It shows special marks or special design which are noted in clear text.
00 without options
10 cover band
12 slot covers
13 cover band
22 twin carriage
23 long carriage
35 with caged ball technology
77 stainless version (NX)
88 profile with junction
99 according to drawing
more than one option possible

Overall length
(Stroke + length surcharge according to data given in this catalogue)

Stroke

Size of guide system
subject to catalog

Reference variable
LR : linear guide system
B : ball circulating guide according to DIN 645

In case any motor adaption is required, please send us the dimension sheets of the corresponding motor/gear for each order.

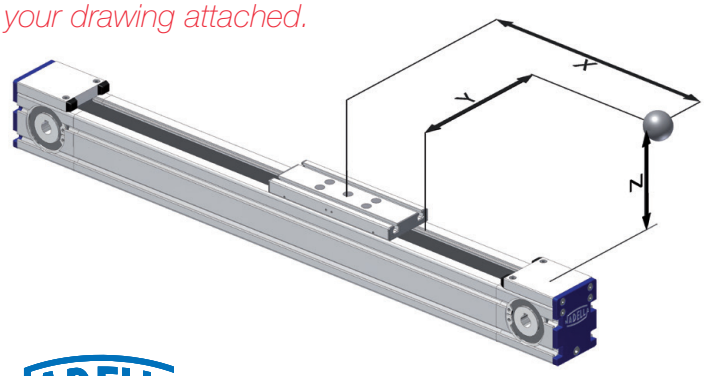
Application form - part 1

	Date
Company	
Address	Street
Contact	
Phone	Fax
eMail	
Project designation	

Application parameter

	single axis	multi axis system	
Ccoordinate	X	Y	Z
Single axis / parallel axis (distance in mm)			
Installation position: horizontal (hor); vertikal (ver) or wall fastening (wa)			
Stroke [mm]			
Effective stroke ≤ ½ carriage length	Yes ☐	No ☐	
Speed v [m/s]			
Acceleration a [m/s²]			
Traverse time [s]			
Cycle time [s]			
Repeat accuracy [± mm]			
Required lifetime [h]			
Actual load [kg]			
External loads [N]			
Center coordinate load X [mm]			
Center coordinate load Y [mm]			
Center coordinate load Z [mm]			
Center coordinate force X [mm]			
Center coordinate force Y [mm]			
Center coordinate force Z [mm]			

For higher loads or charges please send your drawing attached.

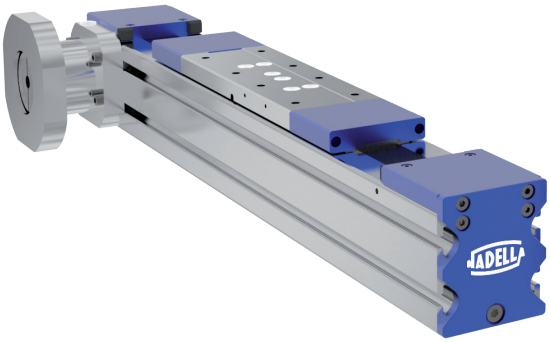


Application form - part 2

Remarks

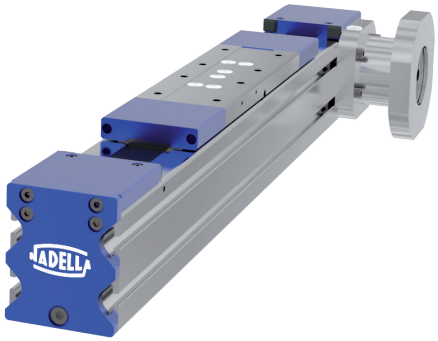
Conditions of use (dust, splash water, abrasive media)
Corrosion resistance
Drive adaption for existing gear

Fittings left



Gear ☐ Switch ☐

Fittings right



Gear ☐ Switch ☐

Attachments

Connecting shaft for distance [mm]	(please indicate distance of actuators)	
Planetary gear (Type: ratio)	(e.g. PLE80:8)	
Inductive switch (opening/closing contact)	Pieces	Type
Slots	Pieces	Type
Fastening shoulder	Pieces	Type
Cover profile (2m length)	Pieces	Type
Cover plate	☐	
Corrosion resistant version	☐	

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