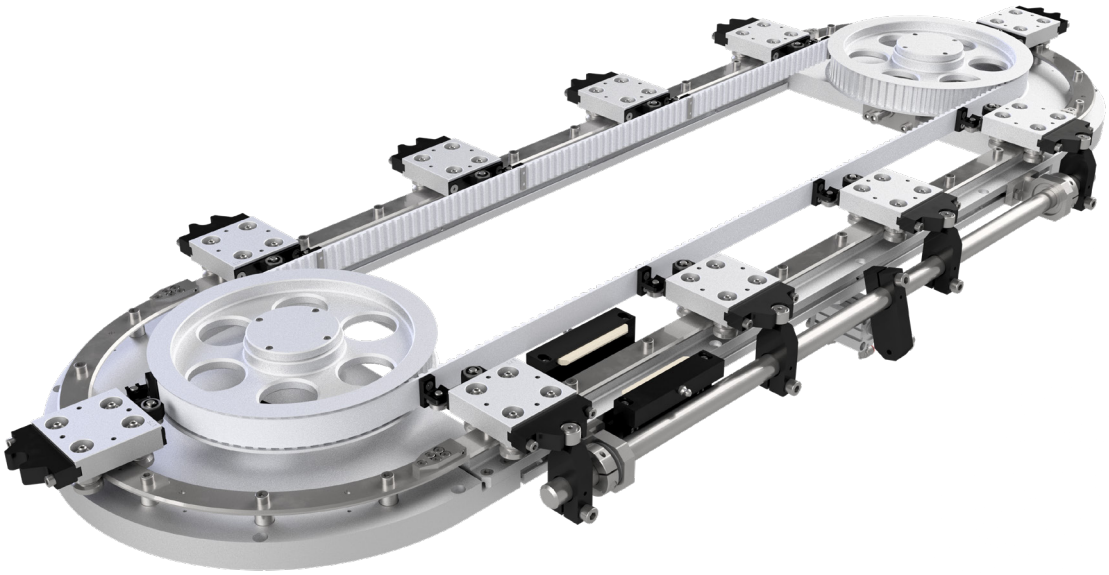
NADELLA ROLLON BY TIMKEN

AXNR

Data sheet - rev. 1.1



ACTUATORS AND SYSTEMS

myRollon

myRollon is Rollon's **digital working platform** designed to simplify the selection and configuration of linear and rotary motion solutions. It enables users to identify the most suitable motion system based on their specific application requirements, enhancing design precision and efficiency.

By centralizing essential tools and resources in a unified environment, myRollon empowers users to access all necessary services and information — saving time and boosting productivity in search of high-performance motion solutions.

SCAN ME!

Index

Ordering key 4
Features and advantages 5
Components and dimensions 6
Accessories 10
Use and maintenance 12

ORDERING KEY

▪ **AXNR track system**

AXNR	**O** **Q**	**175**	**8**	**A** **B** **S**	**22**	**1502**	**00**

Options - 00 = no options, 11 = carriage positioning system, 12 = angle gear box, 13 = short removable guide rail section, 14 = with transverse reinforcements, 70 = anticorrosion version, 99 = according to drawing

Module dimensions [mm] - Length X for AXNRO, Length and width X x Y for AXNRQ

Guide roller diameter - 22, 32, 40

Connector type - A = rod end, B = stright, S = special

Number of carriages

Radius - 75, 125, 175, 225, 300, 400, 500

Track type - O = oval, Q = ring

Series

Ordering example: **AXNRQ 175 6 A 32 1503x800 12**

▪ **Carriage**

T4R	**75**	**FR22EU** **FR32EU** **FR40EU**	**A** **B** **S**	**00**

Options - 00 = No options, 11 = With carriage position cam, 70 = Anticorrosion version, 99 = According to drawing

Connector type - A = rod end, B = direct, S = special

Guide roller type

Radius - 75, 125, 175, 225, 300, 400, 500

Series

Ordering example: **T4R 225 FR32EU A 70**

FEATURES AND ADVANTAGES

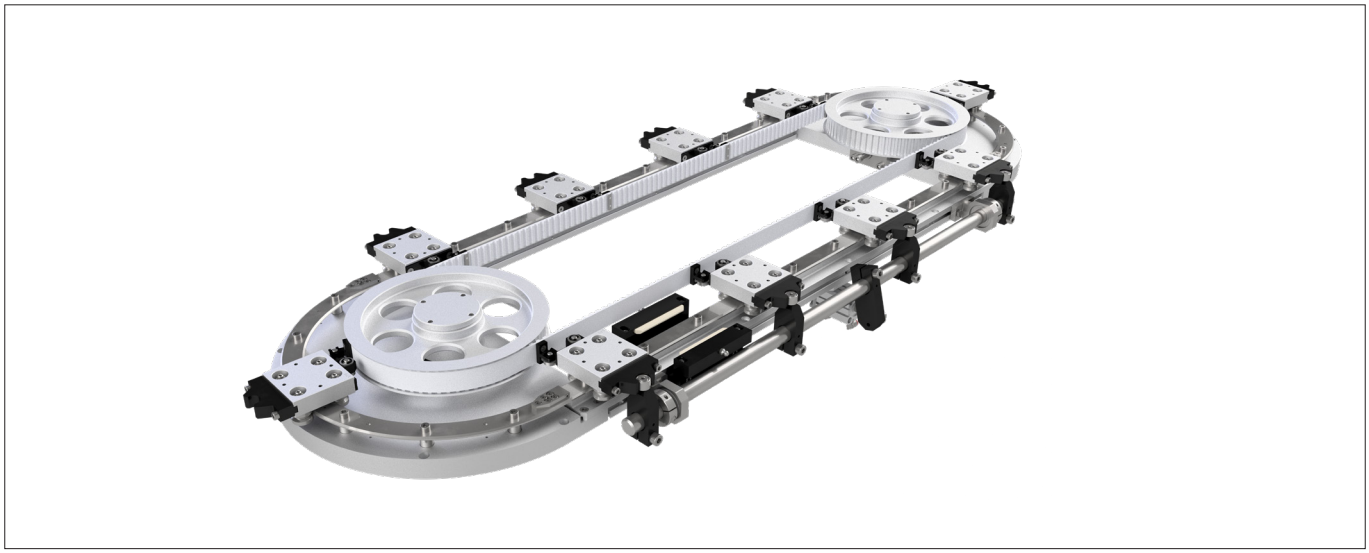


Fig.1

The modular circular system

AXNR is a reliable solution based on the combination of standard components to allow product definition and availability in short time. Thanks to its flexible configuration, AXNR can also be modified to meet specific requirements.

AXNR combines an aluminium structure, curved guides and carriages of the Multi-Motion line, transmission via gearbox and toothed belt, lubrication unit and carriage indexing system, the latter being extremely suitable when the carriage positioning error needs to be minimised.

AXNR can be designed according to specific requirements achieving oval or rectangular geometries. It is always pre-tested before shipment. The system can also be equipped with specific sensors, which can be integrated with the 4.0 systems already in place, to detect belt tensioning in real time and, consequently, perform predictive maintenance and check for possible drifts.

Preferred areas of application

Some of the most common sectors in which AXNR finds greater application include, for example, test line, bottling line, high speed conveyor, packaging, medical, or multi-station assembly lines.

Performance characteristics

- Available sizes: 22, 35, 47
- Max. operating speed: 2 m/s
- Max. acceleration: 25 m/s²
- Temperature range: -10 °C to +70 °C
- Repeatability: ±0.05 mm
- Profile material: Aluminium
- Drive: Toothed belt

Rails

- Material: Hardened carbon steel, stainless steel (upon request)
- Available straight rail lengths: up to 4020 mm in single element, longer rails by joints

Carriages

- Material: Anodized aluminium
- Surface treatment: stainless steel and anticorrosion coating (upon request)
- Rollers material: Steel
- Rollers are lubricated for life
- Roller seal/shield: 2RS (splash-proof)

MAIN ADVANTAGES

Floating connection

Toothed belt and carriages are linked by a floating connection to provide reliable movement the compensation of distance between carriage on round path.

Dynamic system

The drive pulley is directly mounted on the gear box output shaft for maximum integration.

Low maintenance

The foam releases lubrication oil directly to the guide rollers, reducing oil consumption and minimizing maintenance.

Uniquely quiet

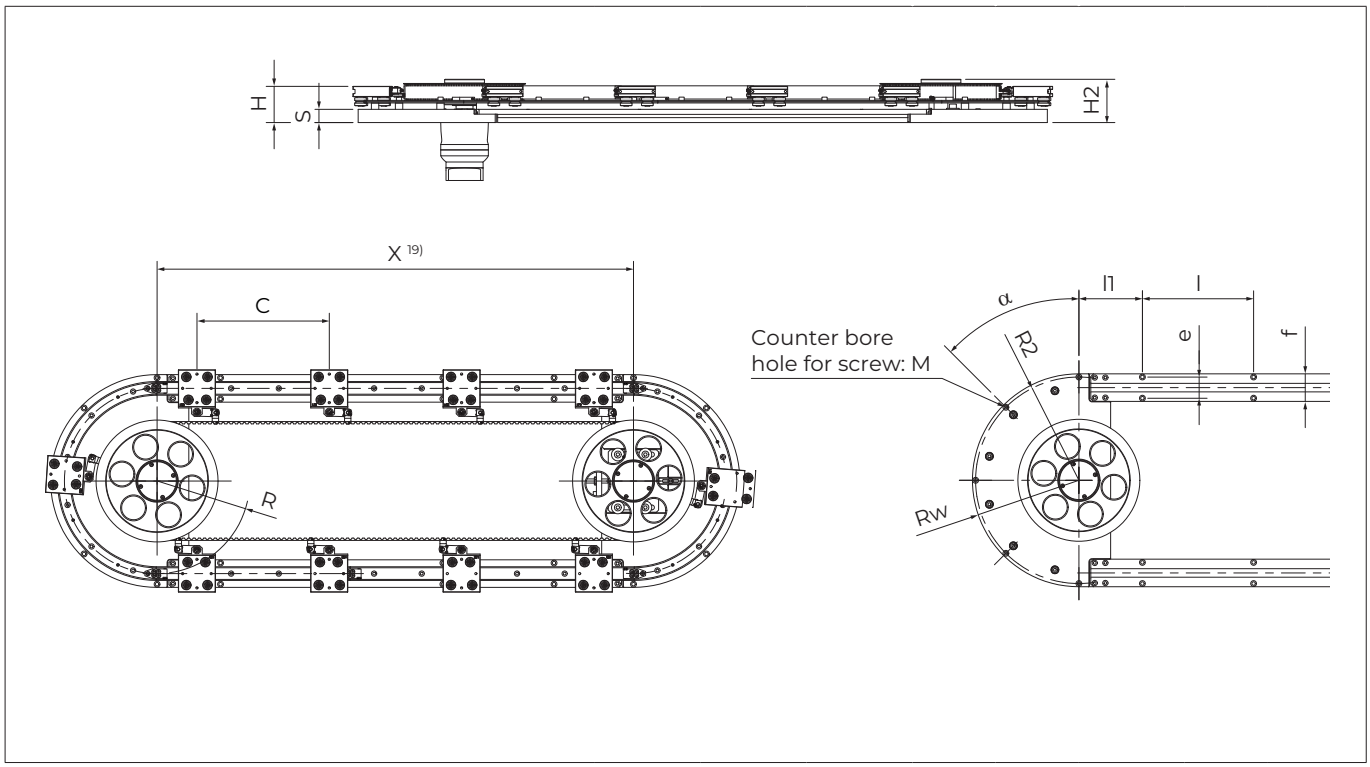
Ground raceways help to ensure low friction and low noise.

Peak-loads management

Design to reduce the belt-to-carriage distance to minimize peak load on the carriage connection during high-speed transitions from curved to straight paths.

COMPONENTS AND DIMENSIONS

▪ AXNRO



Available in EVO version

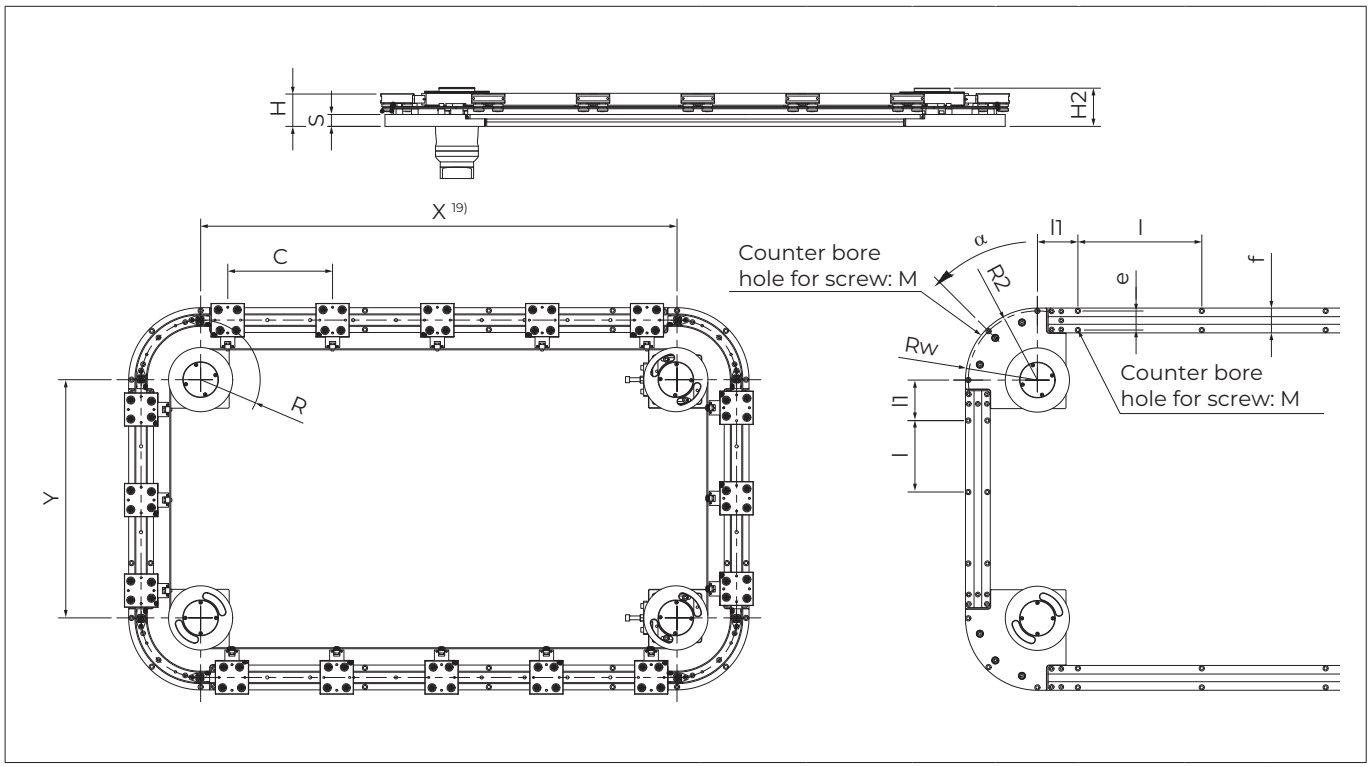
Fig.2

Type	Size	R [1] [mm]	R_W [2] [mm]	GRS [3]	BT [4]	Z [5]	H [6] [mm]	H_2 [7] [mm]	S [mm]	R_2 [8] [mm]	α [9] °	f [10]	l_1 [11] [mm]	l [12] [mm]	d [13] [mm]	D [14] [mm]	h [15] [mm]	e [16] [mm]	WxL [17] [kg]	WxAL [18] [kg]
AXNRO	22	75	101	FS22M	AT10-25	17	68.5	80	25	95	60x3	52	120	200	6.6	11	4	40	14.3	6.6
AXNRO	22	125	151	FS22M	AT10-25	40	68.5	82	25	145	45x4	52	120	200	6.6	11	4	40	19.7	6.6
AXNRO	22	175	201	FS22M	AT10-25	70	68.5	82	25	195	45x4	52	120	200	6.6	11	4	40	27.4	6.6
AXNRO	35	225	265	FS35M	AT10-32/AT20-32	85/42	83	95	25	256	45x4	80	140	200	9	15	8/21	62	54.4	13
AXNRO	35	300	340	FS35M	AT10-32/AT20-32	130/64	83	95	25	331	45x4	80	140	200	9	15	8/21	62	73.0	13
AXNRO	47	400	460	FS47M	AT20-50	90	102	125	30	450	22.5x8	120	180	200	11	18	10/26	100	186	24.5
AXNRO	47	500	560	FS47M	AT20-50	120	102	125	30	550	22.5x8	120	180	200	11	18	10/26	100	245	24.5

Tab.1

1) Circular guide radius
2) Aluminum base radius
3) Guide rail size
4) Belt Type
5) Number of teeth in pulley Z
6) See the technical drawing at page 22 for details
7) Distance between module mounting surface and upper surface of belt wheel
8) Distribution radius of mounting hole
9) Distribution angle of mounting hole
10) Aluminum beam width
11) Hole spacing at the beginning of line segment
12) Hole spacing of straight line
13) Counterbore hole perforation diameter
14) Counterbore hole diameter
15) Counterbore hole depth
16) Hole spacing
17) Approximate weight for module length X = 1 m (without carriages)
18) Weight for additional length
19) Length of module in X direction. Length is the distance between the rail centres, see page 30 for details and calculation method.

▪ AXNRQ



Available in EVO version

Fig.3

Type	Size	R [1] [mm]	R_W [2] [mm]	GRS [3]	BT [4]	Z [5]	H [6] [mm]	H_2 [7] [mm]	S [mm]	R_2 [8] [mm]	α [9] °	f [10]	l_1 [11] [mm]	l [12] [mm]	d [13] [mm]	D [14] [mm]	h [15] [mm]	e [16] [mm]	WxL [17] [kg]	WxAL [18] [kg]
AXNRQ	22	75	101	FS22M	AT10-25	17	68.5	80	25	95	45x2	52	120	200	6.6	11	6	40	23.4	6.6
AXNRQ	22	125	151	FS22M	AT10-25	40	68.5	82	25	145	45x2	52	120	200	6.5	11	6	40	32.9	6.6
AXNRQ	22	175	201	FS22M	AT10-25	70	68.5	82	25	195	45x2	52	120	200	6.6	11	6	40	43.5	6.6
AXNRQ	35	225	265	FS35M	AT10-32/AT20-32	85/42	83	95	25	256	45x2	80	140	200	9	15	8/21	62	76.9	13
AXNRQ	35	300	340	FS35M	AT10-32/AT20-32	130/64	83	95	25	331	45x2	80	140	200	9	15	8/21	62	106	13
AXNRQ	47	400	460	FS47M	AT20-50	90	102	125	30	450	22.5x4	120	180	200	11	18	10/26	100	276	24.5
AXNRQ	47	500	560	FS47M	AT20-50	120	102	125	30	550	22.5x4	120	180	200	11	18	10/26	100	370	24.5

Tab.2

1) Circular guide radius
2) Aluminum base radius
3) Guide rail size
4) Belt Type
5) Number of teeth in pulley Z
6) See the technical drawing at page 22 for details
7) Distance between module mounting surface and upper surface of belt wheel
8) Distribution radius of mounting hole
9) Distribution angle of mounting hole
10) Aluminum beam width
11) Hole spacing at the beginning of line segment
12) Hole spacing of straight line
13) Countersunk hole perforation diameter
14) Countersunk hole diameter
15) Countersunk hole depth
16) Hole spacing
17) Approximate weight for module length X = 1 m (without carriages)
18) Weight for additional length
19) Length of module in X direction. Length is the distance between the rail centres, see page 30 for details and calculation method

▪ Carriage

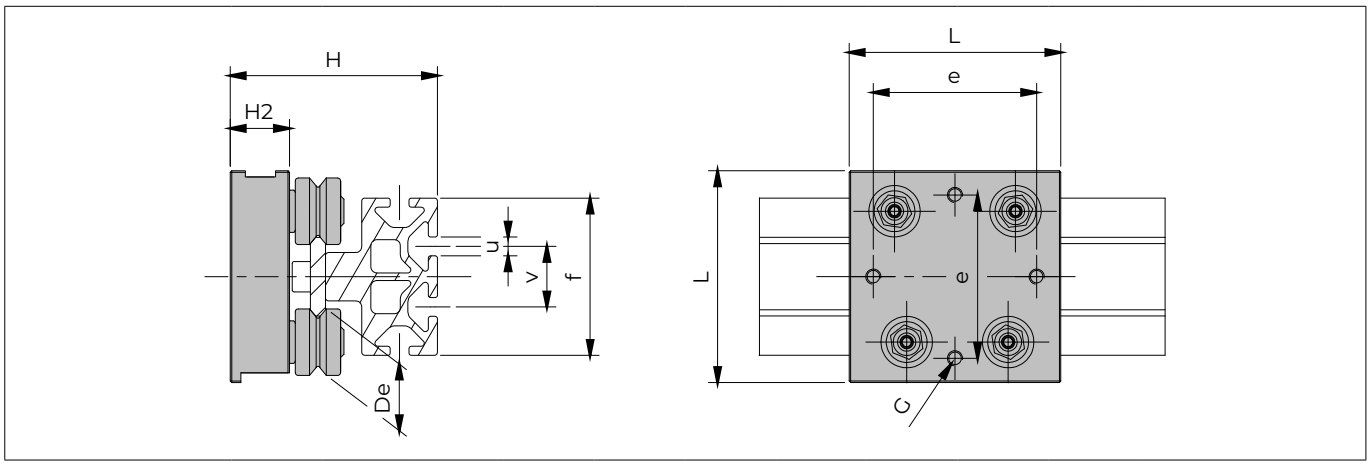


Fig.4

Type	L [mm]	De [mm]	e [mm]	G	H [mm]	H2 [mm]	U [mm]	V [mm]	f [mm]	Weight* [kg]	Combinations
T4R 75 FR22EU-...	70	22	54	M5	68.5	19.6	6.2	20	52	0.40	AXNR 75
T4R 125 FR22EU-...	70	22	54	M5	68.5	19.6	6.2	20	52	0.40	AXNR 125
T4R 175 FR22EU-...	70	22	54	M5	68.5	19.6	6.2	20	52	0.40	AXNR 175
T4R 225 FR32EU-...	110	32	90	M8	83	27.4	6.2	40	80	1.22	AXNR 225
T4R 300 FR32EU-...	110	32	90	M8	83	27.4	6.2	40	80	1.22	AXNR 300
T4R 400 FR40EU-...	150	40	126	M10	102	29.5	6.2	2x30	120	2.50	AXNR 400
T4R 500 FR40EU-...	150	40	126	M10	102	29.5	6.2	2x30	120	2.50	AXNR 500

*Weight without locating CAM

Tab.3

▪ Connectors

Connector type A with Durbal tie rod is available for AXNR radius 125 175 225 300 mm. Connector type B is available for all dimensions.

AXNR Radius	Belt type	Carriage model	
		Connector type A	Connector type B
75	AT10-25	-	T4R75 FR22EU-B ...
125	AT10-25	T4R125 FR22EU-A ...	T4R125 FR22EU-B ...
175	AT10-25	T4R175 FR22EU-A ...	T4R175 FR22EU-B ...
225	AT10-32	T4R225 FR32EU-A ...	-
	AT20-32	-	T4R225 FR32EU-B ...
300	AT10-32	T4R300 FR32EU-A ...	-
	AT20-32	-	T4R300 FR32EU-B ...
400	AT20-50	-	T4R400 FR40EU-B ...
500	AT20-50	-	T4R500 FR40EU-B ...

Tab.4

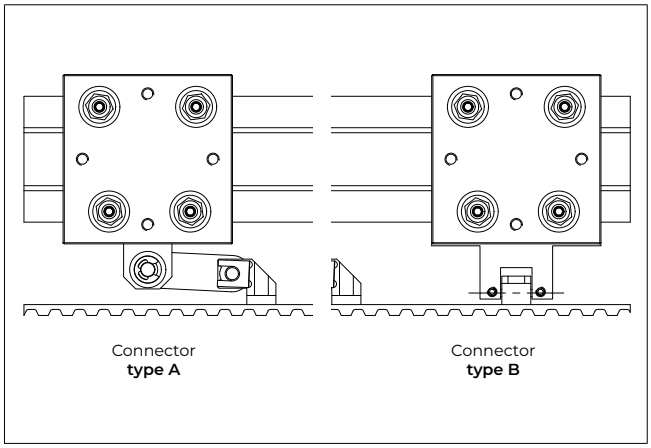


Fig.5

▪ Preload

Normal preload is registered already in the factory for a ready to use product, but on request higher or lower preload can be required.

The preload remains constant on the straight and on the round path, but during the transition, when two rollers are on the round rail and the other two are on the straight rail, the preload is lost and a small play between the rollers and the guide occurs.

▪ Maximum loads on single carriage

The following table shows the maximum loads that can be applied on a single carriage. The maximum loads are based on the stud and bearing strengths. The loads in the table are considered as acting singularly. For applications with many loads acting at the same time the loads must be reduced.

Type	Carriage	Fy [N]	Fz [N]	Mx [Nm]	My [Nm]	Mz [Nm]
AXNR.. 75	T4R75FR22EU-...	2800	1680	18	26	48
AXNR.. 125	T4R125FR22EU-...	2800	1680	18	28	51
AXNR.. 175	T4R175FR22EU-...	2800	1680	18	30	53
AXNR.. 225	T4R225FR32EU-...	4000	3200	63	95	130
AXNR.. 300	T4R300FR32EU-...	4000	3200	63	100	130
AXNR.. 400	T4R400FR40EU-...	7300	5600	190	250	350
AXNR.. 500	T4R500FR40EU-...	7300	5600	190	250	350

Tab5

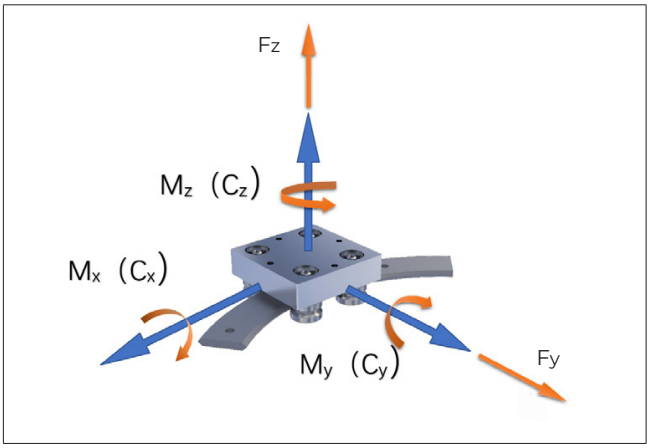


Fig.5

▪ Basic dynamic loads of single carriage

The following table shows the nominal loads that correspond to a nominal life of the bearing at 100 km. The nominal lifetime of the carriage can be estimated from the standard bearing formula:

$$L_{10} = (Ci/Pi)^3 \cdot 100\ km$$

Ci is the basic dynamic load capacity in a specific direction i and Pi is the external load applied in the same specific direction.

Type	Carriage	Fy [N]	Fz [N]	Mx [Nm]	My [Nm]	Mz [Nm]
AXNR.. 75	T4R75FR22EU-...	5800	4000	43	62	100
AXNR.. 125	T4R125FR22EU-...	5800	4000	43	67	105
AXNR.. 175	T4R175FR22EU-...	5800	4000	43	72	110
AXNR.. 225	T4R225FR32EU-...	11600	8500	165	250	375
AXNR.. 300	T4R300FR32EU-...	11600	8500	165	260	375
AXNR.. 400	T4R400FR40EU-...	17000	12000	400	550	800
AXNR.. 500	T4R500FR40EU-...	17000	12000	400	550	800

Tab.6

▪ Example

- Carriage loaded with an external load F
- Carriage T4R225 FR32EU-A-00
- F = 2000 N
- The external load F acts in the z-axis direction:
  Pz = F = 2000

In the tab.5 you find that the load capacity Fz for carriage T4R225 FR32EU is equal to 3200, so the system is validated against breakage. To estimate the system lifetime we proceed as follows: from the table of the "basic dynamic loads" we see that Cz, for the carriage T4R225 FR32EU, is equal to 8500. The nominal lifetime will be:

$$L_{10} = (8500/2000) \cdot 100 = 7676\ Km$$

The admissible load on the system depends on guide rollers load capacity and on the retention force of the connector between carriage and belt. The tables in this page allow the selection of AXNR module size, based on guide roller load capacity, speed and accelerations involved. The belt transmission, in fact, is subject to inertia forces due to the duty cycle and due to the centrifugal acceleration between the straight and curved path. This second acceleration becomes consistent when increasing the velocity and usually defines the max admissible speed of the carriage. For a system mounted in horizontal plane and with the payload mass centred on the carriage with connector B type the graph here below allows a preliminary evaluation. Moreover, mass position on the carriage and module orientation strongly affect the load on the belt.

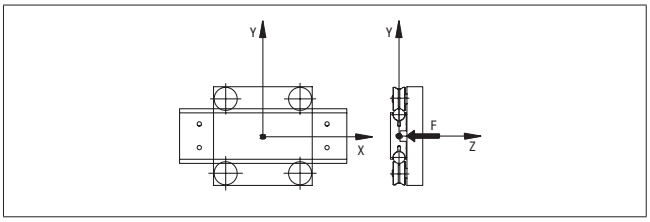


Fig.6

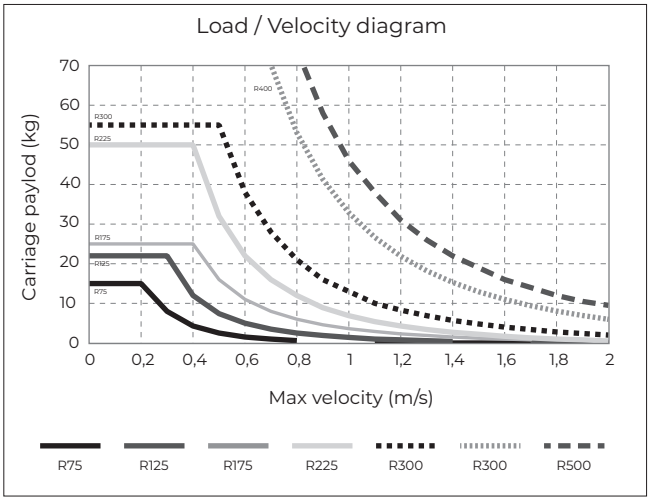


Fig.7

Contact our Technical Service to better evaluate your load conditions. See page 13 and Application Form for the data to be used for the dimensional verifying.

ACCESSORIES

▪ Positioning system

AXNR positioning system has been developed especially for precise circular applications. The system is driven by an air cylinder located below the straight module beam. The cylinder rotates the indexer shaft equipped with cam followers that engage in the locating cam fixed on the carriages. The system allows repeatability in the carriage location of +/- 0.05 mm. One or several positioning systems can be mounted on the module to index all carriages or some carriages only.

BEFORE

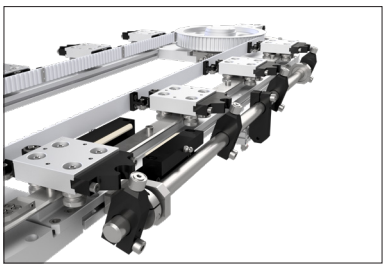


Fig.8
Avoid the moving carriage

AFTER

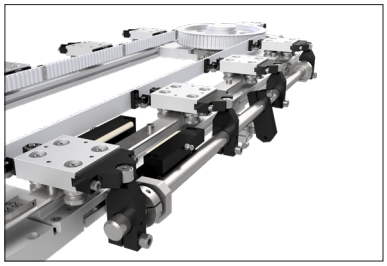


Fig.9
Automatic positioning system

When the positioning system is used carriages are equipped with locating cam.

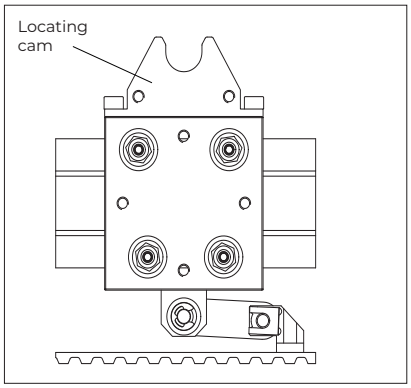


Fig.10

Positioning system is driven by pneumatic cylinder. Consider there is a space below the system and beside the carriages required for the air cylinder.

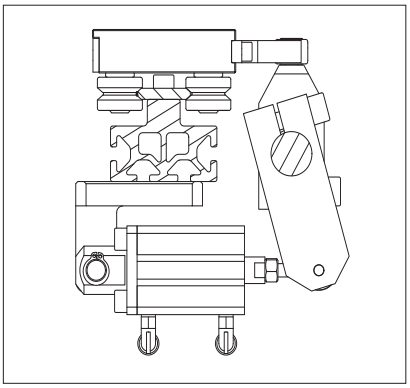


Fig.11

One cylinder is used to activate several positiong cam follower. Normal maximum lenght for a single unit up to 2000 mm.

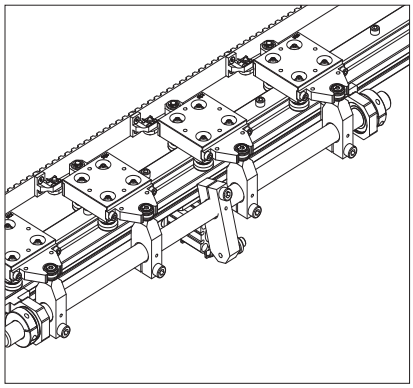


Fig.12

▪ Transverse reinforcement

In case of long or heavy modules these can be provided with transversal supports (Option 14). The supports are linked to the structure with angular connectors equipped with threaded holes to accommodate eyebolts.

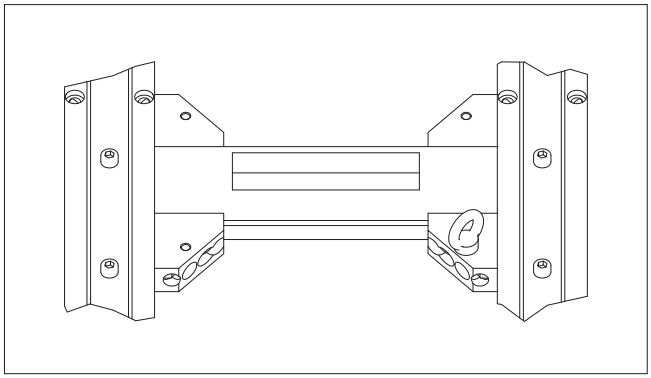


Fig.13

▪ Sensors

In case a reference point is required, inductive proximity sensors can be used. The sensor can be easily fixed on the aluminium profile and reads a ferromagnetic target positioned on the carriage cam.

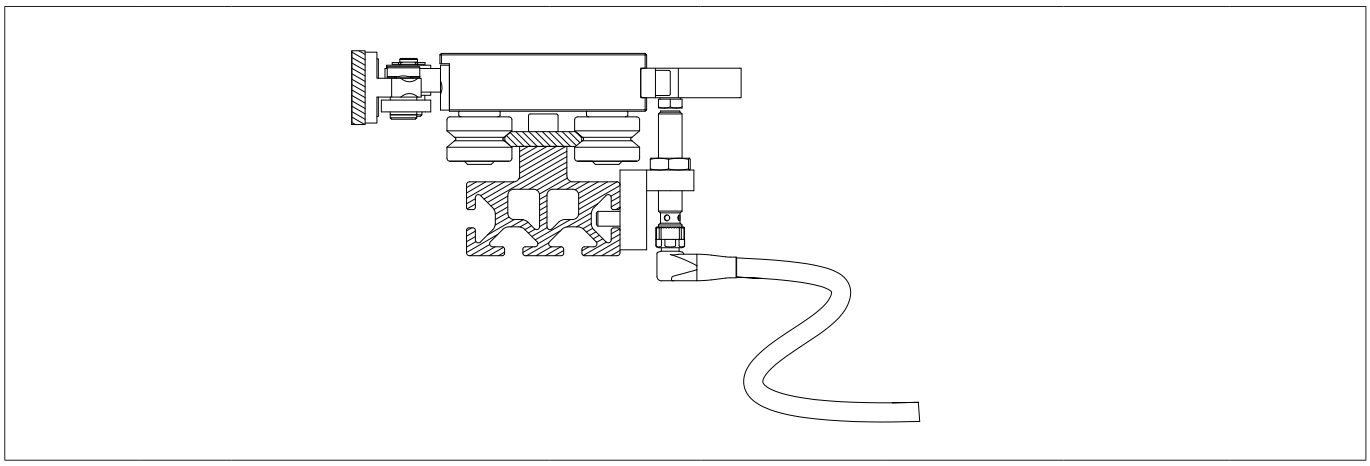


Fig.14

Code	AXNR size	Sensor	Connected voltage	Max load current [mA]	Switching precision	Cable length [m]	Protection class
20.036.610	22	Switch i4 PNP-NO (Normally Open)	10 ... 30 V DC	200	≤ 10% of sensing distance	5	IP 67
20.036.620	22	Switch i4 PNP-NC (Normally Close)					
20.055.610	35	Switch i4 PNP-NO (Normally Open)					
20.055.620	35	Switch i4 PNP-NC (Normally Close)					

Each kit is composed by one sensor, with its cable and its holder and one ferromagnetic target.

Tab.7

USE AND MAINTENANCE

▪ Direct gearbox connection

The gearbox is directly connected to the aluminium alloy base of AXNR Circular System.

Planetary gearbox with reinforced bearings are used to support the belt tension and to allow precise movement.

Depending on the available space it is possible to select the axial gearbox or the 90° angle gearbox. Gearbox is complete of flange and finished accordingly with the motor type used by the customer. In most cases a two stages gearbox is selected to achieve the right balancing between speed and torque.

The table here below shows approximate dimensions and available ratios for the two stages gearbox.

Precise dimension can be defined with the specific motor flange type identification.

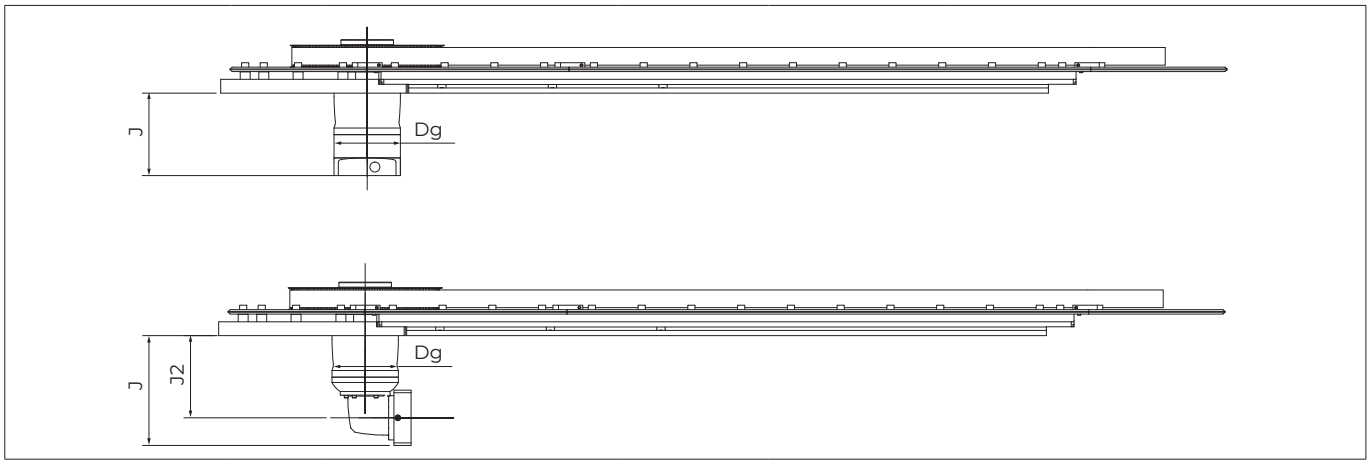


Fig.14

Type	Size	Gear box body size Dg	Axial version J	Angle version J2/J	Available gear box ratio
AXNRO/AXNRQ	75	50	70	57/77	9-12-15-16-20-25-28-30-32-35-40-50-64-70-100
AXNRO/AXNRQ	125	90	111	99/140	9-12-15-16-20-25-28-30-32-35-40-50-64-70-100
AXNRO/AXNRQ	175	90	111	99/140	9-12-15-16-20-25-28-30-32-35-40-50-64-70-100
AXNRO/AXNRQ	225	120	142	139/197	9-12-15-16-20-25-28-30-32-35-40-50-64-70-100
AXNRO/AXNRQ	300	120	142	139/197	9-12-15-16-20-25-28-30-32-35-40-50-64-70-100
AXNRO/AXNRQ	400	155	172	178/253	20-25-32-40-50-60-64-100
AXNRO/AXNRQ	500	155	172	178/253	20-25-32-40-50-60-64-100

Each kit is composed by one sensor, with its cable and its holder and one ferromagnetic target.

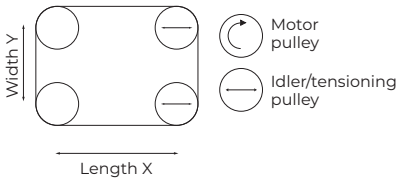
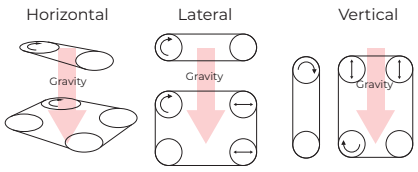
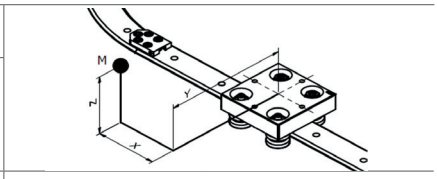
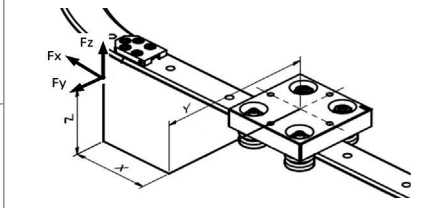
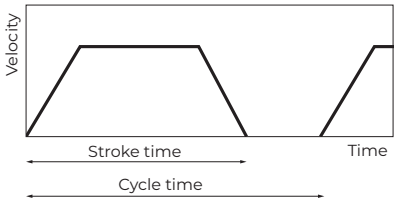
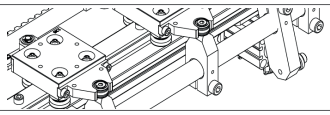
Tab.8

CIRCULAR SYSTEM DEFINITION ELEMENTS

For the definition of the AXNR system proceed as follows:

1. Define the application requirement: weight and dimension of the mass to be handled, additional forces acting on the carriage, expected system life, module orientation in the space, environment condition as cleanness, temperature, cycle details as stroke, acceleration, velocity, cycle time.
2. Select the carriage dimension accordingly with the load and carriage load capability. Data in the tables allow calculation in simple cases, refer to Nadella service for assistance.
3. Decide which configuration is desired (AXNO or AXNRQ) and how many carriages are needed.
4. Estimate the module dimensions as follows. The dimensions depend on the belt length. In most cases the carriages are at constant pitch and the belt length is calculated as the number of carriages by the carriage distance (carriage distance has to be multiple of the belt pitch). From the belt length deduct the length of belt around pulleys (the belt pitch by the number of teeth of the full pulley Z). The result is the length of the belt parallel to the straight path. Divide this value by 2. For AXNRO this result is a first approximation of the module Length X. For AXNRQ decide the desired width dimension Y and deduct it. The X length here calculated is a theoretical length, actual system length X has to be increased of few mm to compensate the elongation of the belt during the assembly (needed elongation is defined by Nadella during the product definition phase).
5. Choose gearbox type, lubricator position, carriage positioning system and other options. For AXNRQ modules define in which corner the drive pulley has to be located.
6. Fill in the application form and submit it to Nadella. It will simplify the technical evaluation and offering process.

APPLICATION FORM

Customer information		
Company		
Contact person		
Phone		
Email		
Date		
Project designation		
Application data		
Equipment type/ Application description		
AXNR type	AXNRO ☐ AXNRQ ☐	
AXNR radius	75 ☐ 125 ☐ 175 ☐ 225 ☐ 300 ☐ 400 ☐ 500 ☐	
AXNRQ Width Y (useless value for AXNRO)		
Mark the drive pulley position		
System orientation	Horizontal ☐ Lateral ☐ Vertical ☐	
Number of carriages		
Distance between carriages [mm]		
Mass M applied on the carriage [kg]		
Mass position [mm]	X = Y = Z =	
Additional force F acting on the carriage	Fx = Fy = Fz =	
Additional force position	X = Y = Z =	
Complete Cycle time [s]		
Stroke time (time to move from one position to the next one) [s]		
Acceleration [m/s²]		
Max velocity [m/s]		
Carriage locating system	Yes ☐ No ☐	
Number of positions with carriage locating system		
Gear box type	Axial ☐ 90° angle ☐	
Gear box ratio 1:...		
Other requirements (corrosion resistance, temperature range, ...)		

NOTE

beyond motion

rollon .com

BIBUS SUPPORTING YOUR SUCCESS
BIBUS SK, s.r.o
Trnavská 31, SK-94 901 Nitra

Tel.: 037/ 7777 911 Email: sale@bibus.sk
Fax.: 037/ 7777 999 http://www.bibus.sk