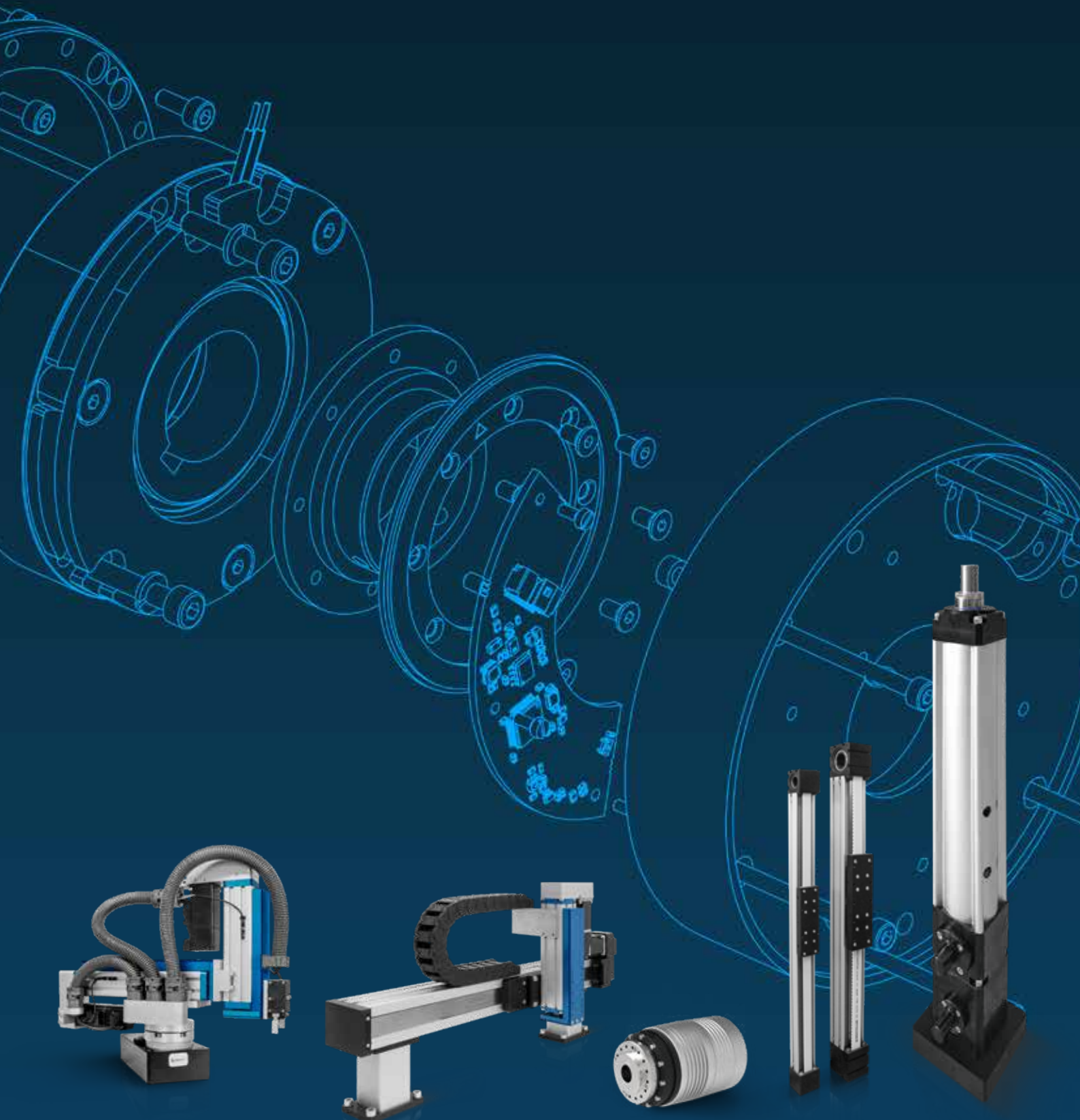




One step ahead on the future

Short Catalog 2019



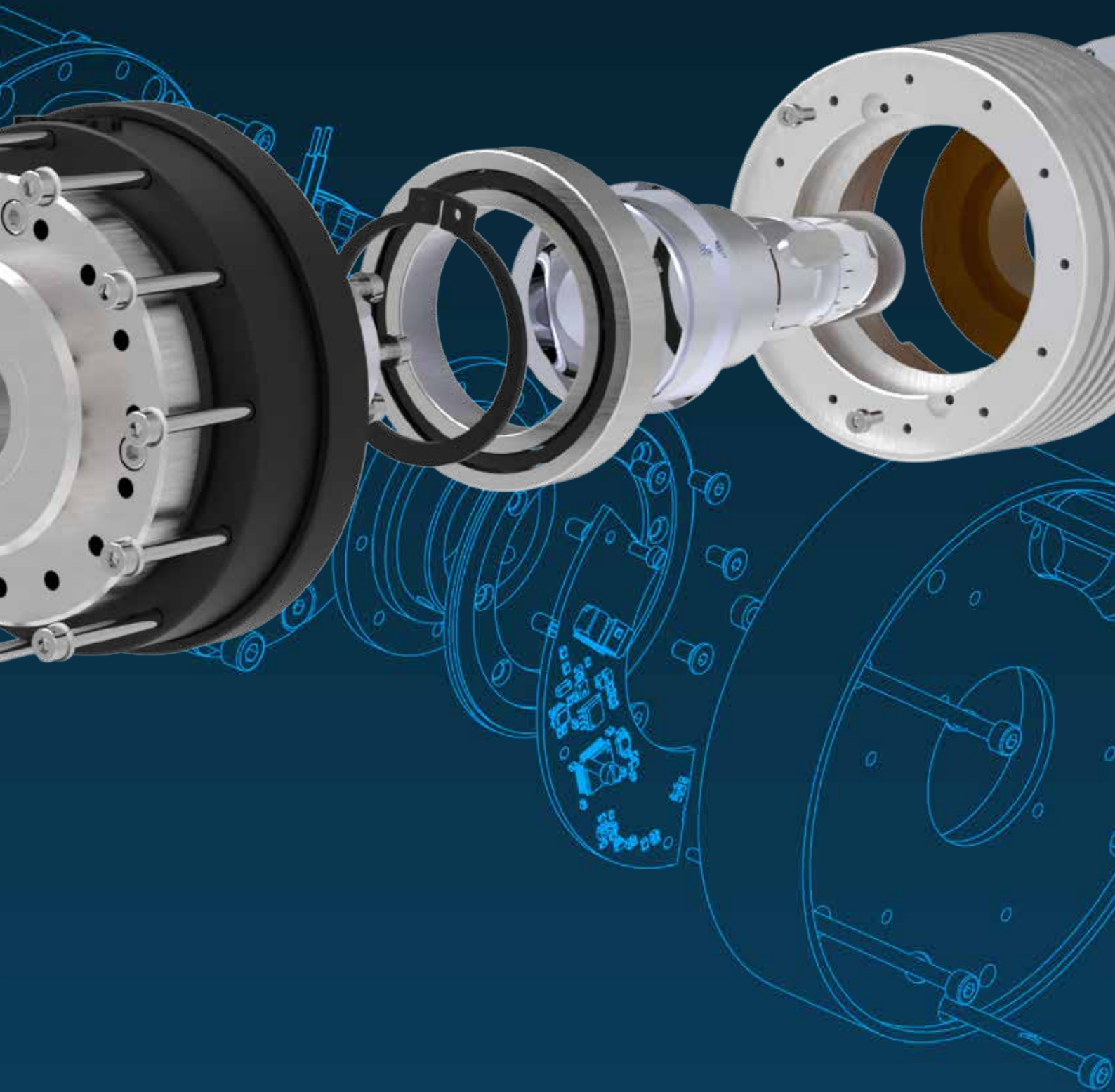
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## AutomationWare Prodotti









## Our Mission

**is to provide high-tech solutions tailored to the applications, built with **quality** and **respecting the environment**. Our solutions accelerate innovation on your products or manufacturing process.**

AutomationWare  
Headquarter is based in Venice (Italy)

# AutomationWare

Was born as a producer of fully electrical actuators. Our electric solutions have always been a suitable alternative to hydraulic and pneumatic systems to offer energy saving, cleanliness, precision, reliability and safety of the working environment.

Since then the commitment, determination and a constant research activity have led the company to establish itself as a worldwide leader in electrical actuation.

We believe in talent. This is why we strive to ensure our employees a constant growth.

Competence, passion, collaboration, motivation guide us daily in our work.



We research and innovate. We are constantly informed on latest technologies and market trends to offer our customers a full range of mechatronic and robotic solutions, widely used in several industrial sectors.


We develop **ROS** (*Robot Operating System*) based solutions and control diagnostics to prevent standstills in production (**AwareVu™**).



**Cast your product  
or process  
into the future!**

Join our community!

**AutomationWare**  
One step ahead on the future



# The new headquarter 5000 m<sup>2</sup> to innovate

## Research & Development

The **R&D** department, enhanced in staff and technologies, uses innovative tools to develop current and future product families:

**ROS** platform (*Robot Operating System*) we develop our robotic system on **ROS** basis. Next generation robotics will be integrated and evolved on open source platforms to grant state-of-the-art complex kinematics or advanced motion planning.

Robotic coordination will be a key issue in the coming years.

**CAD SolidWorks** for a quick and accurate design even of complex systems. The opportunity to carry out virtual tests (*FEM analysis*) guarantees constant quality improvement of the project. We use **CAD** to build motion platforms for **ROS**, applications, streamlining the configuration and potentially engineering customized robots.

## Quality first

Testing systems to give the highest quality to our customers

---

Qualified components

---

We always keep up to date on the latest technological innovations

---

We strive for continuous improvement to offer quality to our customers

---

We produce according to **Lean** manufacturing method and use **Toyota Like** processes

---

Our company has adopted a **lean manufacturing programme**, following the philosophy "*the complete elimination of all waste*" for a real efficiency and a daily improvement of every working aspect.

**Automationware** employs consolidated and great design quality platforms and technologically advanced components to produce customized solutions for every application.

Some of our products are labelled **NSK Inside**.



AutomationWare



AutomationWare  
Headquarter is based in Venice (Italy)

# Our production plant

The new **Ind. 4.0** factory is a centre of excellence for mechatronic and robotics.

All production cycles are networked thanks to a last generation fiber optic connectivity.  
State-of-the-art **Solidworks** technologies integrate the **CAD/CAM** technology in the process guaranteeing executive quality in the evolution of the project. Our **CNC** technology is based on last generation equipment to produce high quality and precision on semi-finished products.  
(machining centres **5-Axes Mazak**)

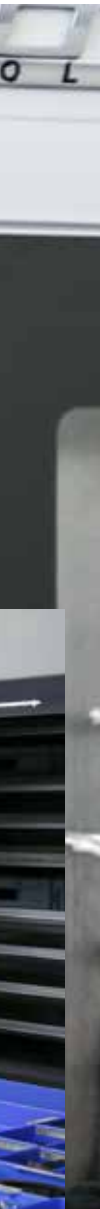
Modern **automatic warehouses** ensure an efficient items storage and protection, in order to maintain the components integrity and accelerate delivery times; the last step in a production process so designed to drastically lower time to market (***just in time system***).

**A live demo area** enables our customers to find the best solution for their production needs.

## Plan to visit our factory, meet our designers to define your next Robotic solutions







Icam Silo2 left page,  
CNC Mazak right page

## Several reasons to accelerate innovation from pneumatic or hydraulic technology to Ind 4.0 E-actuation

	E-Actuators	Pneumatic solutions	Hydraulic solutions
<b>Thrust force</b>	Good	Mediocre	Excellent
<b>Accuracy</b>	Excellent	Good	Good
<b>Control</b>	Excellent	Good	Good
<b>Maintenance</b>	Low	High	High
<b>Repeatability</b>	Excellent	Mediocre	Mediocre
<b>Safety</b>	Excellent	Good	Mediocre
<b>Cleanliness</b>	Excellent	Mediocre	Poor
<b>Initial cost</b>	High	Low	High
<b>Operational cost</b>	Low	High	High
<b>Ind 4.0</b>	Excellent	Good	Mediocre

## The ideal solution for an efficient and safe production

- **High repeatability:**

electrical actuators are accurate, reliable, do not pollute, reduce power consumption and are reprogrammable.

Pneumatic systems need constant maintenance, have a low repeatability over time and require compressed air that could lead to pollution.

- **Initial cost or Return on Investment?:**

Large Corporation are very careful in choosing future solutions for their production process. They normally opt for low environmental impact and limited power consumption systems.

The answer is in electrical actuation: accurate and energy efficient (*up to 90% energy saving*).

Production with hydraulic systems or polluted air (*banned in Pharma and Food & Beverage Industry*) will be a key issue in the coming years.

- **Low noise:**

only electronically controlled electrical systems can ensure compliance with safety directives in the work place requiring less than 85dbA@1m noisiness.

- **Productivity and Ind. 4.0 controllability:**

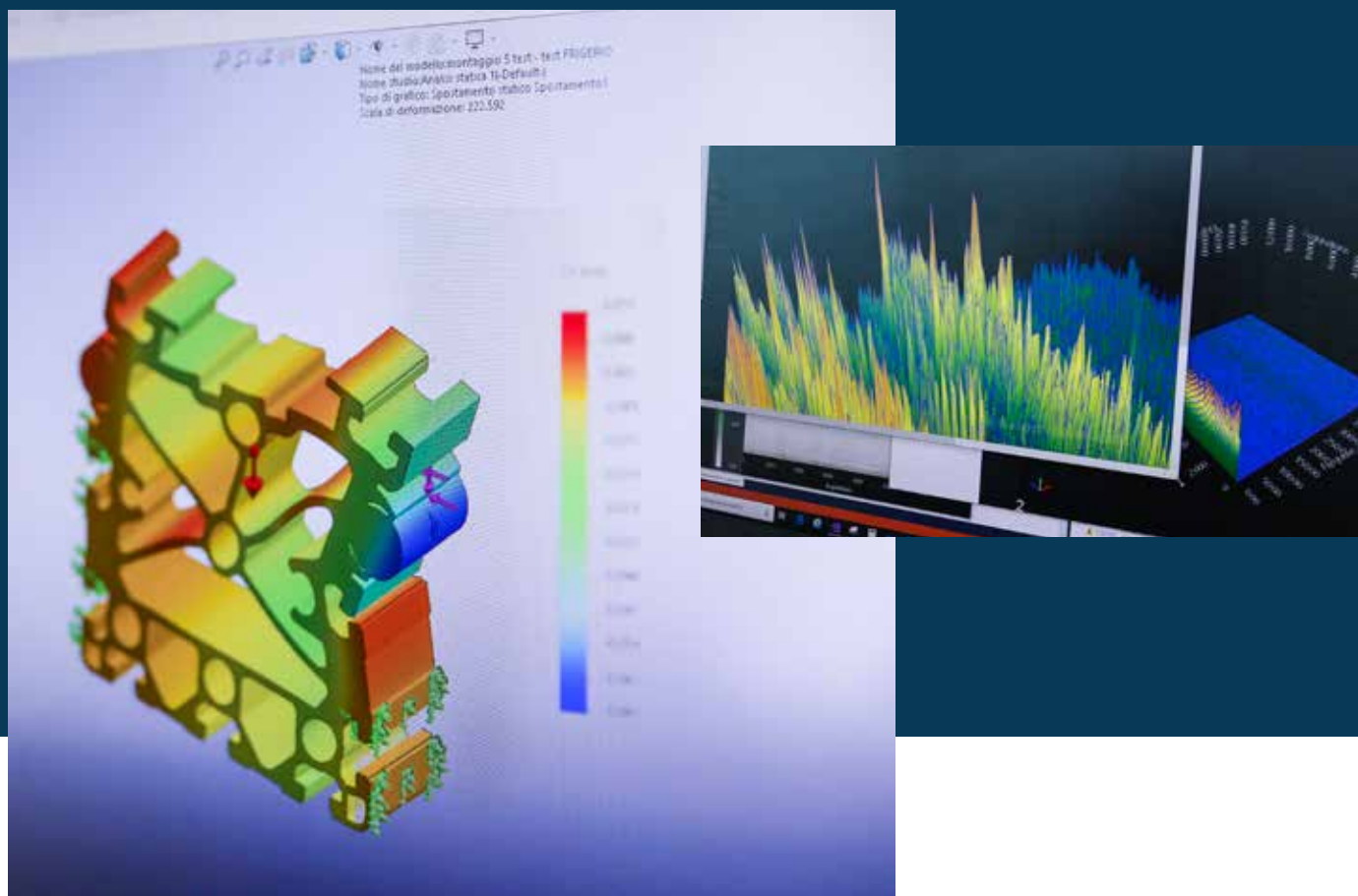
all electrical actuators parameters can be measured and monitored in real time.

**AutomationWare** offers Ind 4.0 solutions with vibration and temperature control system (**AwareVu™**), for predictive maintenance.

Many multinational companies of different industries such as Automotive, Food&Beverage, Pharma have moved to electric and require Ind 4.0 electrical actuators for their new projects.

## Looking forward to expand your business? **Choose electric solutions.**

**Design and develop your products with us. Take advantage of our competence to evolve your product or process towards Ind 4.0**



AutomationWare  
Development of J-Actuators



# A tailor-made service for our customers

## Customers satisfaction comes first to us.

**We listen to your needs. Our know-how is at your complete disposal to make your requests come true.**

### **Experience and passion:**

experience and passion: the expertise achieved in years of field work and a young and dynamic team are our milestone to offer innovative turnkey solutions.

### **Partnership is key for best ideas:**

Each component we produce, is tailored on your needs, guiding your R&D, in choosing the best solution for your industry. We cooperate with you from the planning stage to aftersales and assistance.

Many companies from all over the world have already adopted AW products for their machines.

### **Flexible solutions:**

a wide range of customized solutions to upgrade, integrate and revamp your project. Chance of complete solutions easy to set up, also with hardware and firmware. Let's find out the best solution together!




### **Direct relation with end users**

### **Quick service**

### **360 degrees worldwide assistance**



# A choice for the future

	Actuators	L-Actuators	E-Actuators	X-Actuators
	Robotics	J-Actuators	SM-Actuators	T-Actuators
	Programming & Diagnostic	AwareVu™	SafeVu™	RoboVu™

Models	Description	Technology	Limits specs	Sizes	Accuracy	Repeatability
L-Actuators	ML Linear axis	Belt, Ball Screw, Roller, Rack	up to 5 m/s	45-60-80-90-120-135-160	± 0,01(S) - 0,05 mm (B)	± 0,01 mm
E-Actuators	Mech Value	Ball Screw	up to 1,5 m/s - up to 1700 N	16-25-32	± 0,02 mm	± 0,01 mm
E-Actuators	Mech Line	Ball Screw	up to 1,5 m/s - up to 2900 N	32-50-63	± 0,02 mm	± 0,01 mm
E-Actuators	Mech Force	HT Ball Screw	up to 1,5 m/s - up to 190 kN	50-63-80-100-125-150	± 0,02 mm	± 0,01 mm
E-Actuators	Mech Plus	HT compact Ball Screw	up to 1,5 m/s - up to 213 kN	50-63-80-100-125-160	± 0,01 mm	± 0,01 mm
X-Actuators	Mech Extreme	NSK Ball Screw caged	up to 1,5 m/s - up to 700 kN		± 0,01 mm	± 0,01 mm
J-Actuators	Robotic Joint	EtherCAT Planetary torque system	torque up to 300 Nm	14-17-20-25-32	± 0,05 °	± 0,01 °
SM-Actutors	SM-Series	Electrical sliders systems	up to 2 m/s (3G) - up to 1 kN	25-32-50	± 0,01 mm	± 0,01 mm
T-Actuators	Robotic Joint	EtherCAT Magnetic torque system	torque up to 50 Nm	14-17-20-25-32	± 0,025 °	± 0,01 °
T-Actuators	Rotac Plus	Rotary tables	torque up to 10 Nm	48-65-85-100-130-200	±0,012 °	±0,06 °

Models	Description	Technology	Limits specs	Sizes	Accuracy	Repeatability
AwareVu™	Vibration Diagnostic	Real time FFT probe	Wifi - USB	All products or Systems	up to 1 m range	available
SafeVu™	Radar Diagnostic	scanning of operating area	EtherCAT	Axis and Robot	up to 5 m range	2020
RoboVu™	ROS controller	Robot operating system	EtherCAT	EtherCAT J-T-L-Actuators	Moveit ROS	2020

# Disruptive innovation

## A key factor to define organic growth

Our 20 years history attests a constant growth of company, products and technologies, often disruptive in the mechatronic market. We are forerunners in using **ROS** (*Robotic Operating System*) and patent technologies that change factories for the better (*AwareVU™ for process control*).

**We constantly invest in R&D to obtain technologically advanced and disruptive solutions.**

All our devices are high-quality, made to provide high performance and last over time.

Some of our products are labelled “**NSK inside**”.

Key features:

- Programmability and control of parameters such as acceleration, speed, repeatability
- Easy to maintain
- Real time control of the work cycle thanks to our diagnostic solutions

Innovation is the basis of our daily business, we create mechatronic and robotic solutions that address and anticipate market demands.

AutomationWare Headquarter  
Production J-Actuators



ROS

The use of **ROS** platforms and motion robotics tools, will permit a simplified integration into factories already prepared for these new technologies.

Thanks to the modularity approach of AutomationWare, our future cobots may be used in the most varied industrial activities, from small to heavy payloads in variety of areas of work. (*ex: Large operating area for small payloads*)

**Not only innovative products, but future oriented solutions.**





AutomationWare Headquarter  
Research & Development

AutomationWare Headquarter  
Design and test of PCB J-Actuators



AutomationWare Headquarter  
3D modeling

# Actuators: 4.0 technology for top performances

## L-Actuators

Actuators or linear axes of different sizes  
and for different loads

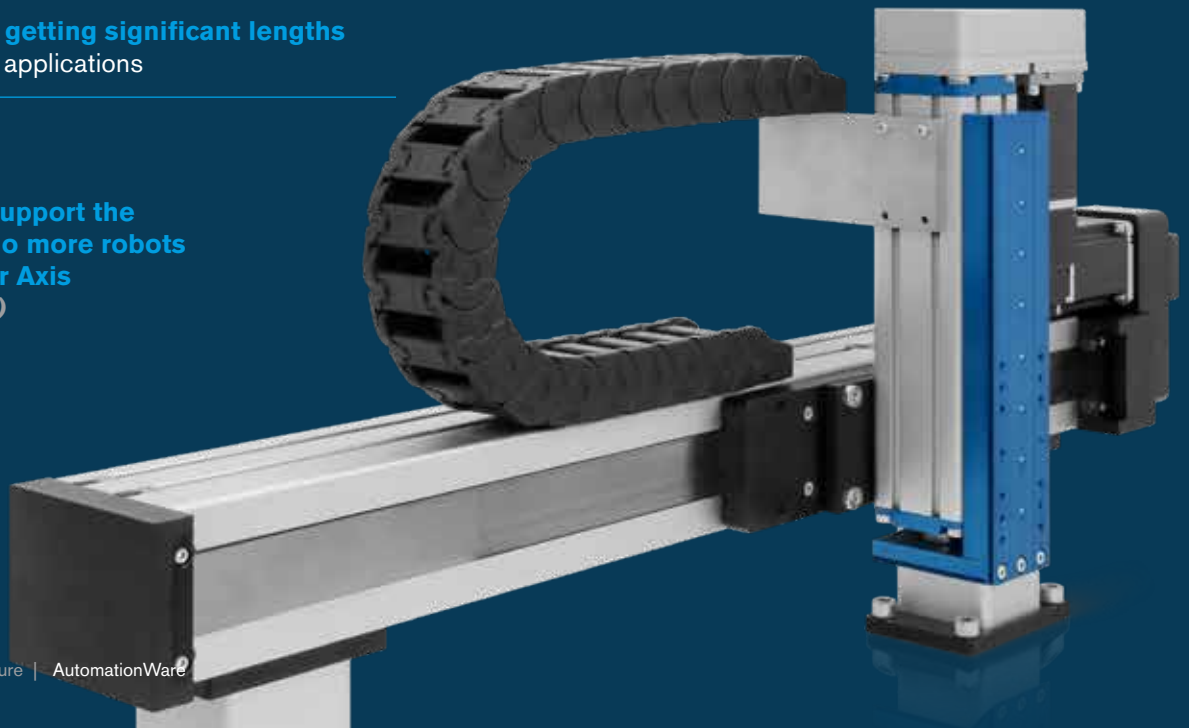
- **Sizes** from 45 mm up to 160 mm
- Translation: **screw** axes, with ball screws, caged for fast applications, performing maximum speed and acceleration. **Belt** axes with mobile or fixed belt used as a rack.
- **Linear guide rails or rollers** for high payloads
- **Speed:** 2mt/sec (*screw*), 5m/s (*belt*)
- **Positioning accuracy:**  $\pm 0,05\text{mm}$  (*belt*),  $\pm 0,01\text{ mm}$  (*screw*)
- **Opportunity of getting significant lengths axes** for logistic applications

L-Actuators, may support the  
integration of one or more robots  
on the same Linear Axis  
(*Robo-Line series*)

## The right solution? Let's find it together!

It is possible to put more axes together or combine them with other **AutomationWare** products, such as SM Actuators. The maximum flexibility to give you several configuration options, from XYZ Cartesian systems, for light or high payloads to solutions, for a fast and accurate Pick&Place solution. (*linear axes + SM-actuators*).

A wide range of accessories enables the creation of single or multi axes solutions for a customized engineering.



# X-Actuators

## Force and technology without compromises

New **Extreme** version for dynamic loads up to **700kN**.

The ideal answer to extreme applications, where high thrust and/or long term activities are required (e.g. *press type operations or plastic blowing*).

The thrust technology is made with in cage **NSK** recirculating ball screws, to withstand the toughest working conditions. ([www.nsk.com](http://www.nsk.com))



# E-Actuators

## The best portfolio of fully electric cylinders

Sizes from 16 mm up to 200 mm and different load capacities for tailored solutions according to the application:

- **Mech Value**  
16,25 or 32 mm. Loads up to 1700 N
- **Mech Line**  
32, 50 or 63 mm. Loads up to 2900 N
- **Mech Force**  
50, 63, 80, 100, 125 or 150 mm. Loads up to 190 kN
- **Mech Plus**  
compact version for loads up to 213 kN
- All **E-Actuators** are **ISO 15552** compatible



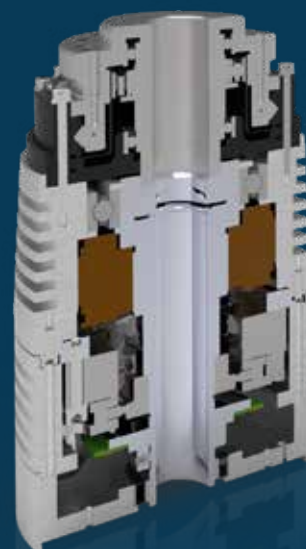
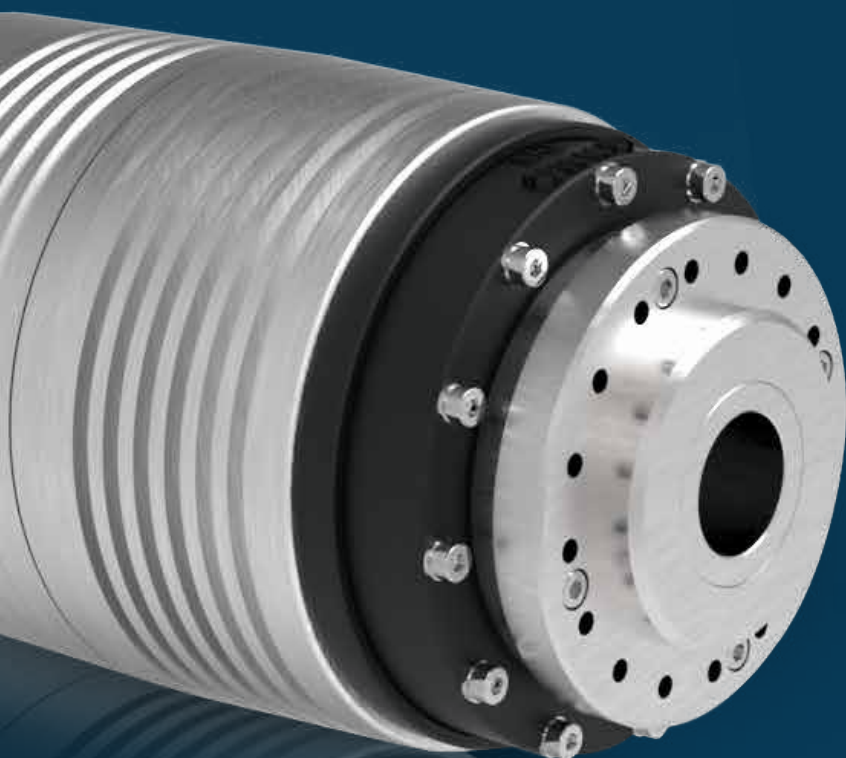


# New robotic solutions:

## Modularity and Technology at the customer's service

### J-Actuators

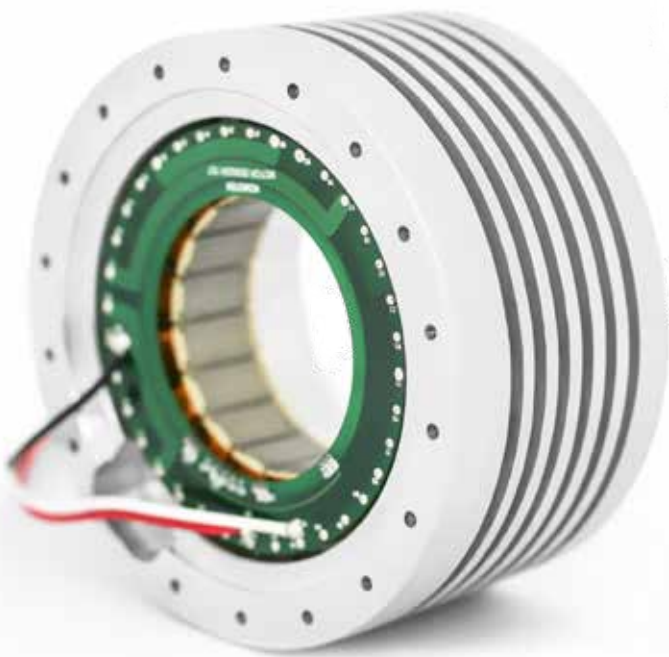
- **5 robot joints** of different sizes according to the output exerted torque (*14-17-20-25 or 32*). Maximum torque up to 500 Nm
- Possibility of **controlling torque variations** for possible impact **up to single Nm** (*Cobotic Applications*)
- **Embedded 3D accelerometer** to detect anomalous vibrations
- Availability of sensors **for many applications** (*Atex, CO<sub>2</sub>,...*)
- **High efficiency Torque Motor** axially connected with a **0 backlash gearbox**. Variable reduction ratio (*up to 1/125*)
- **Breaking system and double encoder** for an accurate position readout
- **EtherCAT-based management of sensors and motor**, with drivers that can be controlled directly even on the ROS platform (*Robot Operating System*).



# T-Actuators

New range of joint actuators for a **direct drive** high speed and precision robotics.

- Sizes: 14-17-20-25-32
- Through hole
- Controllable via bus EtherCAT
- Collaborative Diagnostic sensors
- Ideal for high productivity light weight robotic configurations



**Choose  
AW robotic solutions**

**for minimum response  
times, lower programming  
need, more safety.**



# SM-Actuators

Sliders and rotary tables for fast **Pick&Place** applications, with a high operational reliability over time. Ideal for high intensity work cycles and for small works.

**The right solution?  
Let's find it together!**

- **SCARA** configuration for high positioning accuracy
- In combination with other **AW** products (e.g. axes or rotary actuators) for vertical and horizontal **Pick&Place** cartesian configurations (see general catalogue for more info)
- Availability of accessories such as cameras, grippers, ...

# SOFTWARE AND DIAGNOSTIC

AwareVu™

SafeVu™

RoboVu™

## AwareVu™

Ind 4.0 real time diagnostic system to detect vibration and temperature of each **AW** component installed in the system or in the production line.



Using an FFT algorithm, **AwareVu™** analyses the vibration profile in normal operation and warns the controller of possible deviations or malfunction due to internal (*Actuator*) and external events. (*Machines*)

The **AwareVu™** box can be connected via Wi-Fi or USB. Parametric data transfer, also in the cloud, enables to analyse trends over time.

**A sophisticated yet easy to use analysis platform**

**essential to  
avoid production standstills**



# 2020: AutomationWare Diagnostic for collaborative robotics

## SafeVu™

New **AutomationWare** radar-based technology for dangerous contacts prevention (*available from 2020*). The on axial carriage a new radar technology will be installed (*ML 135 RoboLine*), this technology enables to detect people or things in the robots operational area, in order to avoid dangerous impacts.

The real time scanning of working area, compare the static profile zone, with the dynamic situation in operation. If the sensor detects people or things beyond of the programmed safe threshold, **SafeVu™** slows down and/or stops the working axis to avoid accidents.

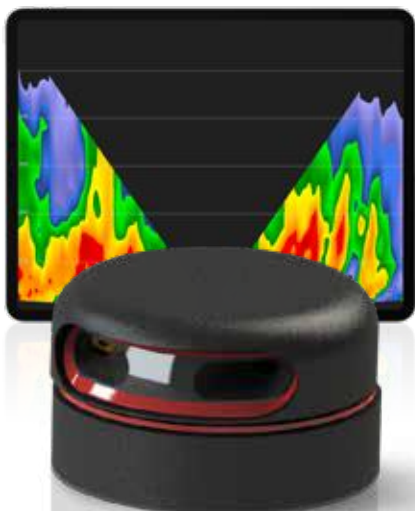
**The ideal solution for collaborative robots on carriage, e.g. in automatic warehouses.**

## RoboVu™

ROS

It is a software application based on **ROS** platform (*Robot Operating System*), to control 6 or more **J-Actuators** joints on a modular cobot configuration.

**RoboVu™** forecasts the kinematics of modular and collaborative **AutomationWare** robotics configuration, drives electronics and safety devices to specifics tasks. (*Available from 2020*)





AutomationWare Headquarter  
*J-Actuators Production*

# Our Partner



**A widespread sales and distribution network enables us to support our customers all over the world.**

We work with our business partners to offer increasingly innovative and high performance solutions, to best meet our customers' need.

- **A.T.P. s.r.l.**

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Sede Operativa: Via S. Felice, 15 – 10092 Beinasco (TO)  
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Web-site [www.casadelcuscinetto.it](http://www.casadelcuscinetto.it)  
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Email [info@sitautomation.it](mailto:info@sitautomation.it)

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Web-site [www.verzolla.com](http://www.verzolla.com)  
Email [commerciale@verzolla.com](mailto:commerciale@verzolla.com)

# AW Linear Axes System Automationware

## Automationware

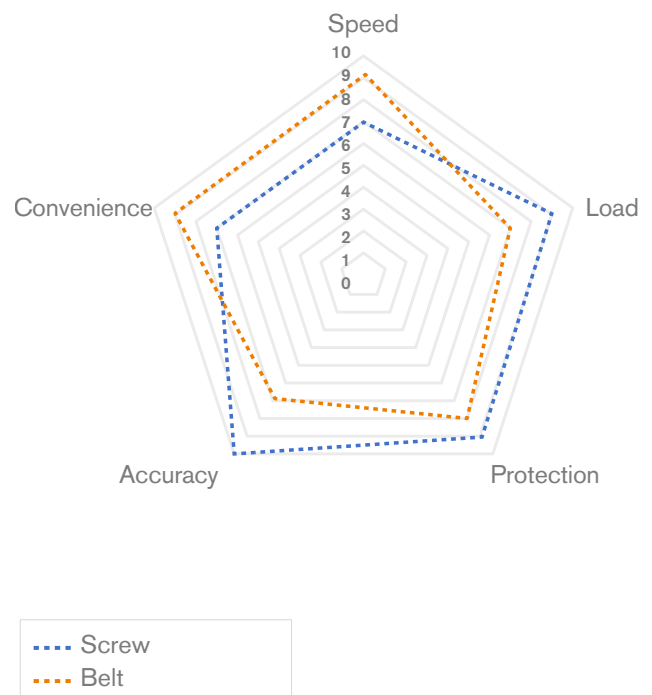
is always mindful  
to hear and help the customer  
to give the best solution for each  
application.

This guide helps the designer to choose the best linear solution on the basis of the **speed, load (load moment), accuracy, protection level and convenience**, to be always in line with the performance requirements and with the application budget.

Our production is characterised by linear Axes with belt drive or screw drive with recirculating ball. Of course, there are for both solutions slide guides with different configuration possibilities.

Furthermore our portal configurations have optional diagnostic systems to check the production efficiency cycle, preventing possible production black outs (*AwareVu*).

Difference between Belt Axis and Screw Axis



## Selection criteria: Belt or Screw?

The choice of technology depends on the required application.

In this diagram we have highlighted 5 basic parameters for the choice of the ideal solution.

### Speed

Speed can be a crucial factor in the choice of the technology, in this case the belt solution can be extremely useful to reach a sup to 5 m/s.

Of course the quality of the slide and of the belt are very important for the required performance limits, maintaining performance over time and maximum reliability.

### Load (*Pro and Plus series*)

The needs to move high loads frequently requires the use of linear Axes with double guide, with recirculating ball screw; there are also axes with unbalanced load on one side, to give solidity and reliability to the system.



## Protection (HP series)

Frequently the linear solutions have to be used in industrial environments with processing residues or dust.

AW has designed a protective system for belt Axes and screw Axes to avoid any contact with the external environment.

## Accuracy

AW has gained considerable experience in matters concerning accuracy and positioning repeatability, thanks to the developed solutions, such as our precision linear actuators (**Serie SM and Mech**). Our linear Axes are particularly known for their accuracy and positioning repeatability skills (*up to +/- 0,01 mm*).

## Convenience

Of course price and performance are basic parameters to choose the right motion technology.

Belt Axes are relatively inexpensive and often simplify the modular design, accelerating the time to market of the project.

The price can vary in relation to the used technologies, therefore Axes with cutting screw and single guide or double guide impact on the cost of the manufacture and price.

# Diagram to help the choice of the right product

**Automationware** doesn't only manufacture standard linear Axes, but also a series of solutions to give to the customer a right answer, based on the particular characteristics of the application; as already explained above, we created a diagram (*page 4*) with the different models and choice parameters, according to the application, to help the customer and choose the right product.

The diagram is divided into **Belt** models and **Screw** models for all possible available configurations:

### ML series (Belt)

Linear belt units with sizes from **45, 60, 80, 90 and 120**, with guides. with slide guides.

A version with Cantilever-fixed-carriage and mobile profile, very useful for vertical applications or if the arm has to be removed during the process, is available.

There is also another version with fixed-carriage and mobile profile on double orthogonal guide; in case of unbalanced loads. (*very useful for vertical applications or if the arm has to be removed during the process*).

The translation is carried out with ball recirculating guides, fixed on the profile.

Guide and profile together provide high mechanical rigidity and low friction.

As already explained above, the carriage of the unit is mounted on one or more sliding blocks with ball recirculation, with anti-scraping protection against dust and other impurities.

The transmission is provided by polyurethane toothed belts, with steel inserts with AT5 or AT10 pitch, the tooth has also a cover, to reduce friction and noise at high speeds.

The used belts have a good loading capacity, high flexibility and low expansion to ensure a positioning repeatability of  $\pm 0,05\text{mm}$ .

The units are made on anodized aluminium profiles of own design.

The Axes has fixing channels for the fixing of the structure and side channels to insert the sensors, or for the passage of cables.

The profile ensures a very good mechanical rigidity, thanks to the innovative design.

The transmission system provides for the calibration of the belt (*power, direction and frequency*) to ensure stability at high speeds with low friction and limited noises.

### HPC or HPV series (Belt or Screw)

Realized for the applications that need protection for mechanical interior components against dust or processing residues.

Also in this case, the linear units are realized in six sizes: **45, 60, 80, 90, 120 and 160** with motion transmission via belt or screw, according to the application.

In both versions, the translation is on sliding blocks with ball recirculation with consequent high mechanical rigidity and low friction, suitable for the combination with new modular systems for the Pick & Place applications (**SM Series**).

# AW Linear Axes System

## Automationware

### HPCC series (Only Belt)

The MotionLine HPCC series has two moving carriages with opposed motion to satisfy the applications in case of alignment during the production or for taking the component during the processing.

The units are realized in two sizes: **80, 120**, both with belt transmittion.

The translation is carried out with sliding blocks with ball recirculation, with consequent mechanical rigidity and low friction.

The carriages are mounted on one or more sliding blocks with ball recirculation (*according to the version*); they are realized in two parts to allow the passage inside the protection lamina.

### ProC and ProV Series

Essentially based on the **HP** series, but with additional double guide for more rigidity, useful for example for an eventual portal configuration.

In both versions the translation is on guide, the carriage is mounted on two or four slides with protection.

### PlusC and PlusV Series

Linear systems designed for relatives high loads; structured with translation with double guide inside the profile.

Belt drive or screw drive, based on the required speed and accuracy.

Very useful in case of high load motion, vertical loads, with possibility of concertina shroud to protect the mechanics.

Belt	Speed	Load	Protection	Accuracy	Convenience	Size 30	Size 45	Size 60	Size 80	Size 90	Size 120	Size 160	Size 160X75	Notes
ML							Y	Y	Y		Y			Option double carriage
HPC						Y	Y	Y	Y		Y			Protection lamina
HPCC									Y		Y			Opposed carriage
PROC										Y	Y	Y		Double guide
PLUSC													Y	Optional concertina shroud

Screw	Speed	Load	Protection	Accuracy	Convenience	Size 30	Size 45	Size 60	Size 80	Size 90	Size 120	Size 160	Size 160X75	Notes
HPV						Y	Y	Y	Y		Y			Screw ISO 7 Option ISO 5
PROV										Y	Y	Y		Screw ISO 7 Option ISO 5
PLUSV													Y	Screw ISO 7 Option ISO 5 Optional concertina shroud

- **Linear Axes** for the best combination of speed, power, accuracy and productivity
- **Sliding Box** with caged ball recirculation for maximum speed and acceleration
- **Maximum speed** up to 5 m/s (*Belt*), 2m/s (*Screw*) with sliding box with caged ball recirculation
- **Accurate positioning** Belt ( $\pm 0,05\text{ mm}$ ), Screw ( $\pm 0,01\text{ mm}$ )
- **Systems with sliding blocks with ball recirculation**, for a good rigidity
- **Perfect alternative** to hydraulic systems, better accuracy, applicable load and reliability over the years
- **Completely electronically controllable** speed and positioning repeatability **programmable** during acceleration
- Motors with servo **Stepper** or **Brushless**
- **Control up to 64 positions** thanks to the **Automationware Easy soft application**
- **Extremely easy to maintain**, long duration, also with high productivity

## Benefits

- Big variety of Linear **Custom solutions**, ad hoc planning
- No recurring calibration
- **Monitoring of operating cycle** with **Easy software** possible (*Ind. 4.0*)
- **Low speed-dependency** comparing to the load, best precision in all work conditions
- Configurable with other **AW-solutions**, such as **SM Series** for Handling systems
- Use in hostile environments, in case of dust or water sprays (**IP65**)
- **Fast and reconfigurable** for size-changes, electronic control of acceleration



# AW Linear Axes System

## Automationware

### Belt Axes

The used belt is made of polyurethane with steel inserts, the tooth has a cover, to reduce friction and noise at high speeds.

The belt slides inside the profile-channels, that protect the internal mechanical against dust or processing residues.

A steel-lamina slides inside the carriage, for a better protection of the unit (**Versioni High Protection**).

The belt-maintenance operations are very easy.

The replacement and the tensioning of the belt can be made without needing to disassemble the application unit.

Motion can be directly transmitted fixing the drive shaft with a shrink disk, or clamping bushes, or with Solid shaft and coupling parts.

Planetary gearboxes available, with high efficiency and precision to optimise the motor's performance on the basis of the load to move.

Wide availability of accessories to realize single or multi-Axes control solutions.

Wide choice of high-performance gearboxes, **Servo Stepper** or **Brushless** motors, variety of cams, with the appropriate interface plates.

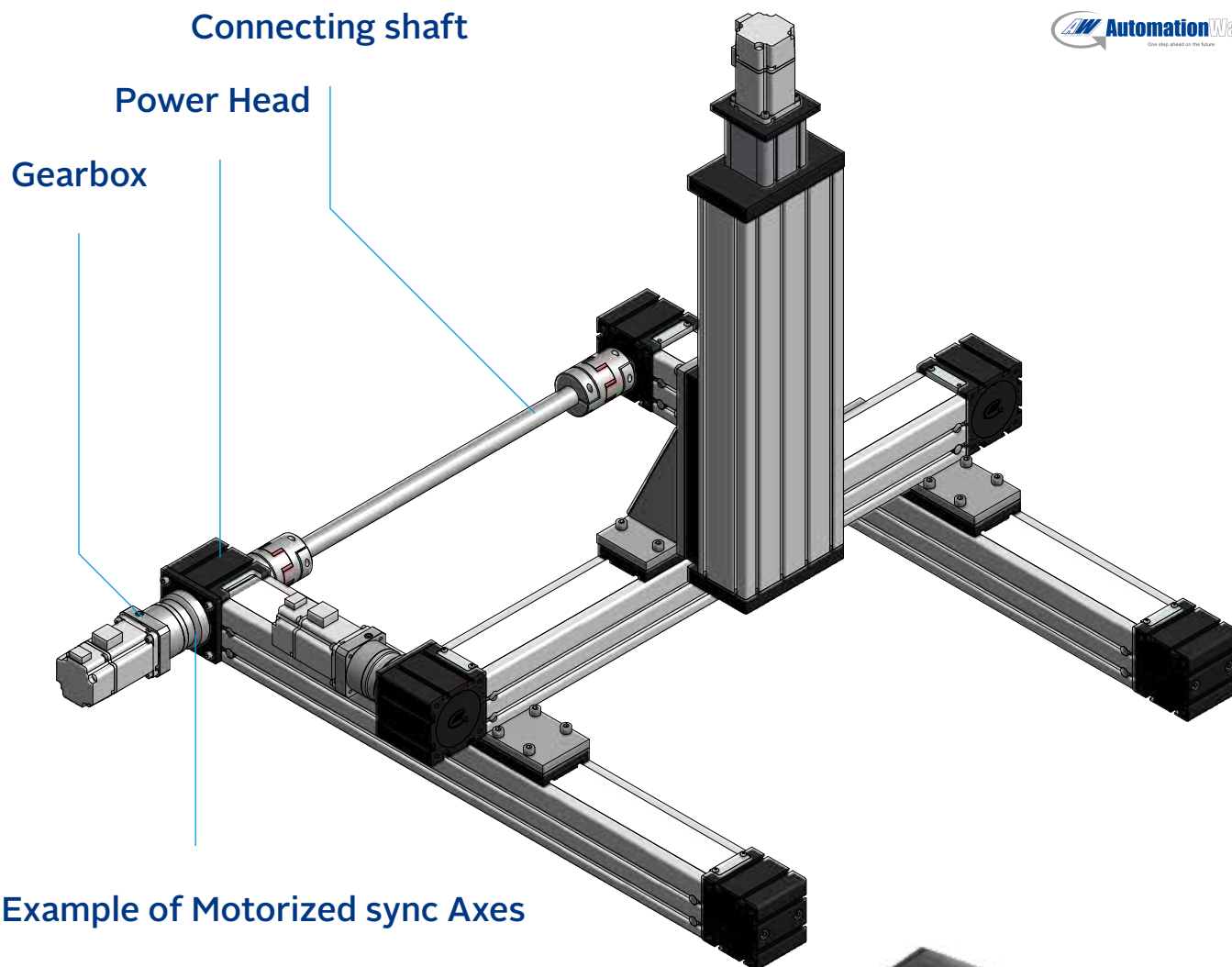
Furthermore, there is a good accessibility for the periodic lubrication.

The deflecting head has a tensioning system.

An eventual regulation is also possible without needing to disassemble the carriage load.







## Example of Motorized sync Axes

The power head has a **pulley with zero backlash**, with bore for the shrink disk or clamping bushes.

The direct fixing of the traction shaft with gearboxes and motors, through opportune flanges, ensures a good rigidity and allows high dynamics.

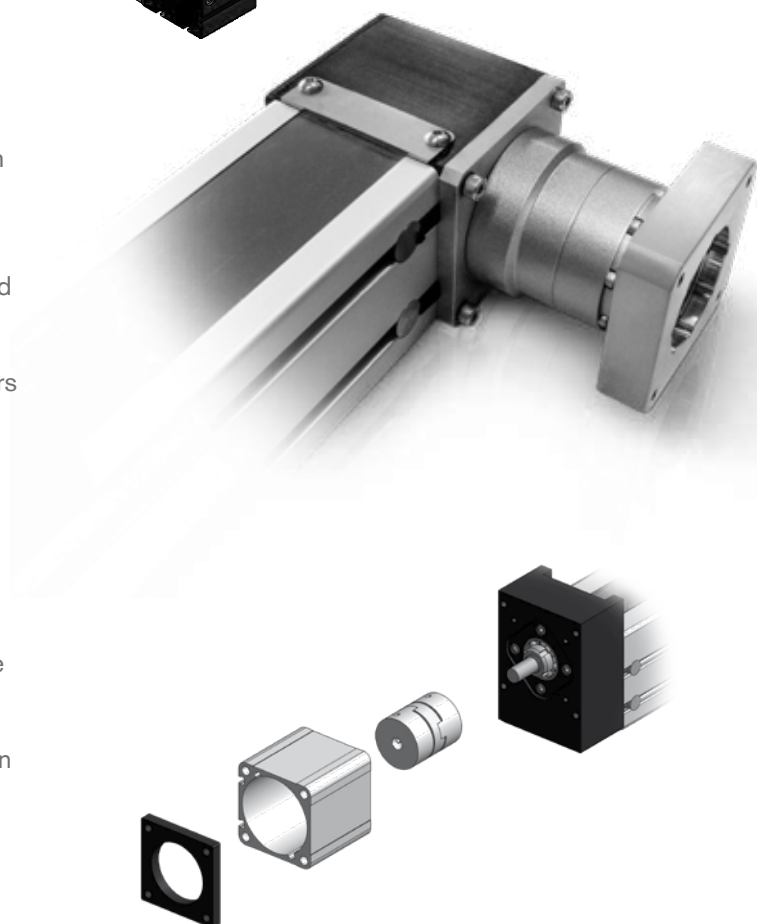
The supply of units with planetary gearboxes and motors is also possible.

In the screw-version the nut is fixed inside the carriage.

The protection of the screw is ensured through the steel lamina sliding inside the carriage.

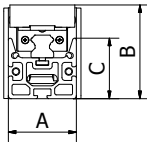
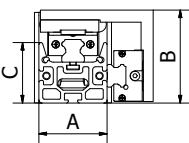
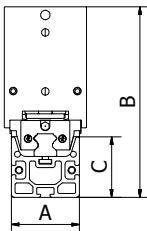
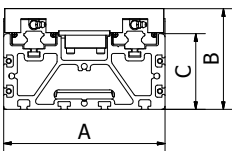
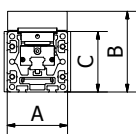
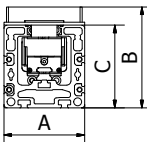
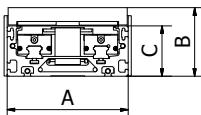
The power head has fixing bores for the connection bell or belt transmission.

The supply of units with bell, connector and interface-flange for the necessary motor is also possible.



# AW Linear Axes System

## Automationware

Reference		Stroke/Round	Guide section		Traction	Protection	Size	Dimension mm			
Family	Model	mm/rev	N.of Guides	Ball Blocks	Belt			A	B	C	
AW MLC							na	45	45	62	40
	ML 45C-11	110	1 x LM15	1	16 AT5						
	ML 45C-12	110	1 x LM15	2	25 AT5						
	ML 60C-11	120	1 x LM15	1							
	ML 60C-12	120	1 x LM15	2	32 AT10						
	ML 80C-11	200	1 x LM25	1							
	ML 80C-12	200	1 x LM25	2							
	ML120C-11	200	1 x LM30	1	50 AT10						
	ML120C-12	200	1 x LM30	2							
AW MLC -2 Guide 90°							na	45	45	61,5	40
	ML 45C-22	110	2 x LM15	2	16 AT5						
	ML 45C-24	110	2 x LM15	4	25 AT5						
	ML 60C-22	120	2 x LM15	2							
	ML 60C-24	120	2 x LM15	4	32 AT10						
	ML 80C-22	180	2 x LM25	2							
	ML 80C-24	180	2 x LM25	4							
	ML120C-22	200	2 x LM30	2	50 AT10						
	ML120C-24	200	2 x LM30	4							
AW MLC V -Cantilever							na	45	45	126	40
	ML 45C-12V	110	1 x LM15	2	25 AT5						
	ML 60C-12V	120	1 x LM15	2	25 AT5						
	ML 80C-12V	180	1 x LM25	2	50 AT5						
	ML 80C-12VL	180	1 x LM25	2	50 AT5						
	ML 120C-12V	200	1 x LM30	2	50 AT10						
AW ML160PlusC							Bellow Optional	160	160	100	75
	ML160PlusC-22	200	2 x LM20	2	50 AT10						
	ML160PlusC-24	200	2 x LM20	4	50 AT10						
AW MLHpCC							Inox Protection	45	45	66	48
	MLHPC- 45-11	110	1 x LM12	1	12 AT5						
	MLHPC- 60-11	120	1 x LM15	1	25 AT5						
	MLHPC- 60-12		1 x LM15	2							
	MLHPC- 80-11	200	1 x LM20	1	32 AT10						
	MLHPC- 80-12		1 x LM20	2							
	MLHPC-120-11	200	1 x LM25	1	50 AT10						
	MLHPC-120-12		1 x LM25	2							
	AW MLHpCC							Inox Protection	80	80	100
	MLHPCC-80-12	120	1 x LM15	1+1	16 AT5						
	MLHPCC-80-14		1 x LM15	2+2							
	MLHPCC-120-12	200	1 x LM20	1+1	32 AT10						
	MLHPCC-120-14		1 x LM20	2+2							
	AW MLProC							Inox Protection	90	90	50
	MLProC- 90-22	90	2 x LM12	2	25 AT5						
	MLProC- 90-24	90	2 x LM12	4							
	MLProC-120-22	110	2 x LM15	2	32 AT5						
	MLProC-120-24	110	2 x LM15	4							
	MLProC-160-22	200	2 x LM20	2	50 AT10						
	MLProC-160-24	200	2 x LM20	4							

# Belt Axes

Max Payload (N)			Max M. Carriage (Nm)			Max Speed	Max. Acc..	Ripetibility	Max Stroke
Fx	Fy	Fz	Mx	My	Mz	(m/s)	(m/s²)	(mm)	(mm)
1015	1138	2276	27	22	22	5	50	+/-0.05	5800
	1844	3687	43	206	103	5	50	+/-0.05	5750
1715	1138	2276	27	22	22	5	50	+/-0.05	5800
	1844	3687	43	246	123	5	50	+/-0.05	5730
4510	3275	6550	124	126	126	5	50	+/-0.05	5730
	4290	8580	165	779	390	5	50	+/-0.05	5650
7670	4727	9545	200	210	210	5	50	+/-0.05	5650
	7658	15315	325	1914	957	5	50	+/-0.05	5550
1015	3414	3414	163	45	45	5	50	+/-0.05	5800
	5531	5531	265	277	277	5	50	+/-0.05	5750
1715	3414	3414	178	45	45	5	50	+/-0.05	5800
	5531	5531	288	335	335	5	50	+/-0.05	5730
4510	9825	9825	582	252	252	5	50	+/-0.05	5730
	12869	12869	943	835	835	5	50	+/-0.05	5650
7670	14181	14181	1146	419	419	5	50	+/-0.05	5650
	22973	22973	1856	2553	2553	5	50	+/-0.05	5550
1715	1821	3642	43	243	121	5	30	+/-0.05	1000
1715	1821	3642	43	243	121	5	30	+/-0.05	1500
3560	2603	5206	102	516	258	5	30	+/-0.05	2000
	2603	5206		868	434	5	30	+/-0.05	2000
7670	6198	12397	261	2066	1033	5	30	+/-0.05	2500
7670	8472	8472	424	138	138	5	50	+/-0.05	5730
7670	13724	13724	900	1053	1053	5	50	+/-0.05	5650
635	461	922	12	6	6	2	20	+/-0.05	4000
1715	783	1566	21	16	16	3	50	+/-0.05	5800
	1566	3132	42	169	85	3	50	+/-0.05	5850
4510	2118	4236	69	69	69	4	50	+/-0.05	5850
	4236	8472	138	915	457	4	50	+/-0.05	5750
7670	3275	6550	124	126	126	4	50	+/-0.05	5750
	6550	13100	247	1680	840	4	50	+/-0.05	5650
1015	2118	4236	69	69	69	4	30	+/-0.05	5850
1015	4236	8472	138	915	457	4	30	+/-0.05	5750
4510	3275	6550	124	126	126	4	30	+/-0.05	5750
4510	6550	13100	247	1680	840	4	30	+/-0.05	5650
800	1136	1136	31	7	7	3	50	+/-0.05	2000
	1840	1840	62	76	76	3	50	+/-0.05	2000
2160	3132	3132	103	32	32	5	50	+/-0.05	4000
	5074	5074	209	245	245	5	50	+/-0.05	4000
7670	8472	8472	398	138	138	5	50	+/-0.05	5750
	13725	13725	783	1098	1098	5	50	+/-0.05	5650

# AW Linear Axes System

## Automationware

### Screw Axes

The used technology is based on ISO7-screws  
(Optional ISO 5).

The positioning accuracy is ensured through an high-resolution encoder.

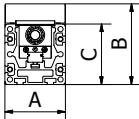
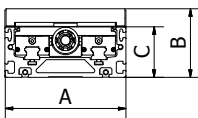
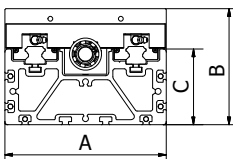
A lamina-protection or a concertina shroud prevents the access to the internal components of dust or other foreign objects (**Versioni High Protection**).

High-efficiency and precision planetary gearboxes available, to optimize the motor performance, in base of the load to move.

A wide availability of accessories enables the creation of single or multi-Axes solutions.

Good choice of high-performance gearboxes, **Servo-Stepper** motors or **Brushless** motors, variety of cams, and the opportune interface plates.

Very good accessibility for the periodic lubrication.

Reference		Stroke/Round	Guide section		Traction	Protection	Size	Dimension mm			
Family	Model		mm/rev	N.of Guides	Ball Blocks			Belt	A	B	C
AW MLHpV											
	ML45V-11	3-10	1 x LM12	1	V10 P3-10	Inox Protection	45	45	66	48	
	ML 60V-12	5-10-16	1 x LM15	2	V16 P5-10-16		60	60	80	60	
	ML 80V-12	5-20	1 x LM20	2	V20 P5-10-20		80	80	100	82	
	ML120V-12	5-10-25	1 x LM25	2	V25 P5-10-25		120	120	115	90	
AW MProV											
	ML 90V-22	5-10	2 x LM12	2	V12 P5-10	Inox Protection	90	90	50	38	
	ML 90V-24		2 x LM12	4							
	ML120V-22	5-10-16	2 x LM15	2	V16 P5-10-16		120	120	68	50	
	ML120V-24		2 x LM15	4							
	ML160V-22	5-10-20	2 x LM20	2	V20 P5-10-20		160	160	100	80	
	ML160V-24		2 x LM20	4							
AW ML160PlusV											
	ML160PlusV-22	5-10-20	2 x LM20	2	V20 P5	Bellow Optional	160	160	100	75	
	ML160PlusV-24	5-10-20	2 x LM20	4	V20 P5		160	160	100	75	





Max Payload (N)			Max M. Carriage (Nm)			Max Speed	Max. Acc..	Ripetibility	Max Stroke
Fx	Fy	Fz	Mx	My	Mz	(m/s)	(m/s <sup>2</sup> )	(mm)	(mm)
2800 - 2500	922	1844	25	6	6	0,75	20	+/-0,01	1200
10490 - 11810 - 8330	1274	2548	34	189	95	1,20	20	+/-0,01	2000
8940 - 12000	4236	8472	138	915	457	1,50	20	+/-0,01	2500
15800 - 17500 - 21000	6550	13100	247	1680	840	1,88	20	+/-0,01	3000
5140 - 3900	1136	1136	31	7	7	0,75	20	+/-0,01	1000
	1840	1840	62	76	76	0,75	20	+/-0,01	1000
10490 - 11810 - 8330	3132	3132	103	32	32	1,20	20	+/-0,01	1500
	5074	5074	209	245	245	1,20	20	+/-0,01	1500
8940 - 16210 - 12000	8472	8472	398	138	138	1,50	20	+/-0,01	2500
	13724	13724	783	1098	1098	1,50	20	+/-0,01	2500
12000	8472	8472	424	138	138	1,5	20	+/-0,01	3000
12000	13724	13724	900	1053	1053	1,5	20	+/-0,01	3000

# Applications

Nowadays our linear systems are applied in many industrial situations for the materials handling, eventually personalised to satisfy the most various needs.

The linear units are planned for an easy installation, also in combination with other Automationware products, for example the handling systems (**SM Serie**).

Our Axes can be also used in dusty environments or with processing residues, thanks to the protection/ isolation system of the moving parts.

Our linear solutions prevent the contamination and can be also properly used in humid environments or for food processing (**Axes and actuators are IP65**).

## Packaging and/or Material motion

These linear systems are very useful for packaging applications in different configurations (**XYZ**) with different combinations thanks their modularity and compatibility with our fast handling slides (**Serie SM**).

The **Plus series** can be used for heavy factory applications, where the materials motion needs a rugged mechanical structure with a very high precision and long lifespan (*Welding, Automotive, Cutting ...*).

## Factory automation

Essential for palletisation systems, very good for industrial production chains, to find a rapid solution for eventual complexities of the production line.

They can be used for storage applications also for lengths of over 10 m.

## Machine tools

Useful for the motion of manufacturing component of machine tools for the plastic or metallic material motion, also in combination with electric cylinders, for high speed and precision.





## Inspections and quality control

When motion may be combined with optical scan systems to improve quality and boost precision, without movement ringing.

## Laser / Camera Scanning

To place laser-systems or video-scanning systems to display objects or decode barcodes.

*(Application barcode system in production systems or automatic storage systems).*

## Production

Filing systems in production, for the motion modulation of containers with liquids, and if there is the need to accelerate or decelerate with predetermined curves. Impossible with unscalable systems in acceleration *(es. Pneumatic systems).*

## Medical and pharmaceutical

Perfect to combine with handling systems with critical applications, such as production and filling of pharmaceutical products, for diagnostic tests or for quality controls.

Also available on request the telescopic Axes extension *(Please call AW directly).*

The hygienic integrity is guaranteed through the isolation (**HP** and **PRO** series), that allows the operation also in environments with hygienic protection.

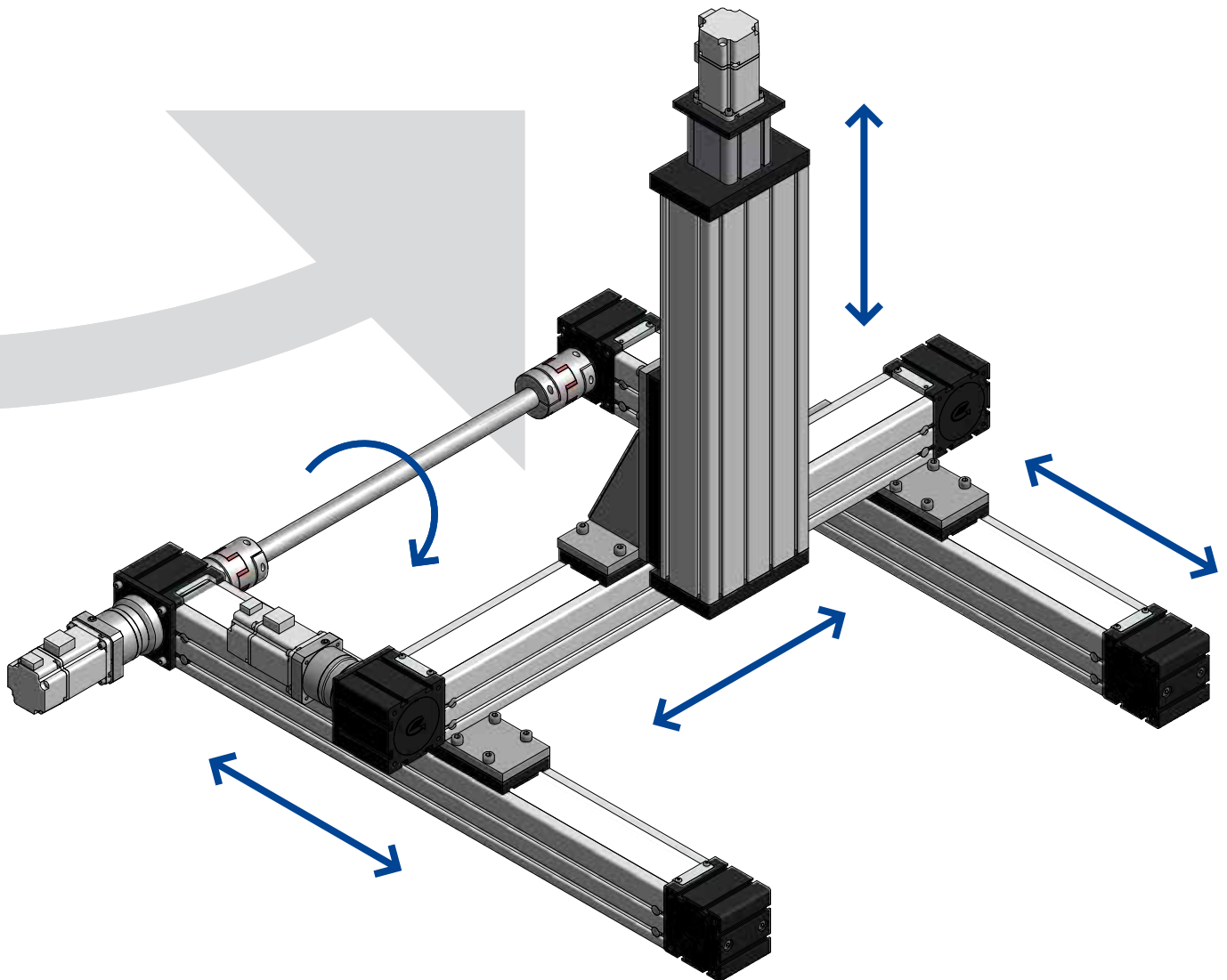
Optional the eventual Axes pressurization.



# AW Linear Axes System

## Automationware

### Configuration examples



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**Example of Belt Cartesian Axes (XYZ).** Parallel Axes system based on belts connected with shaft and gearbox.

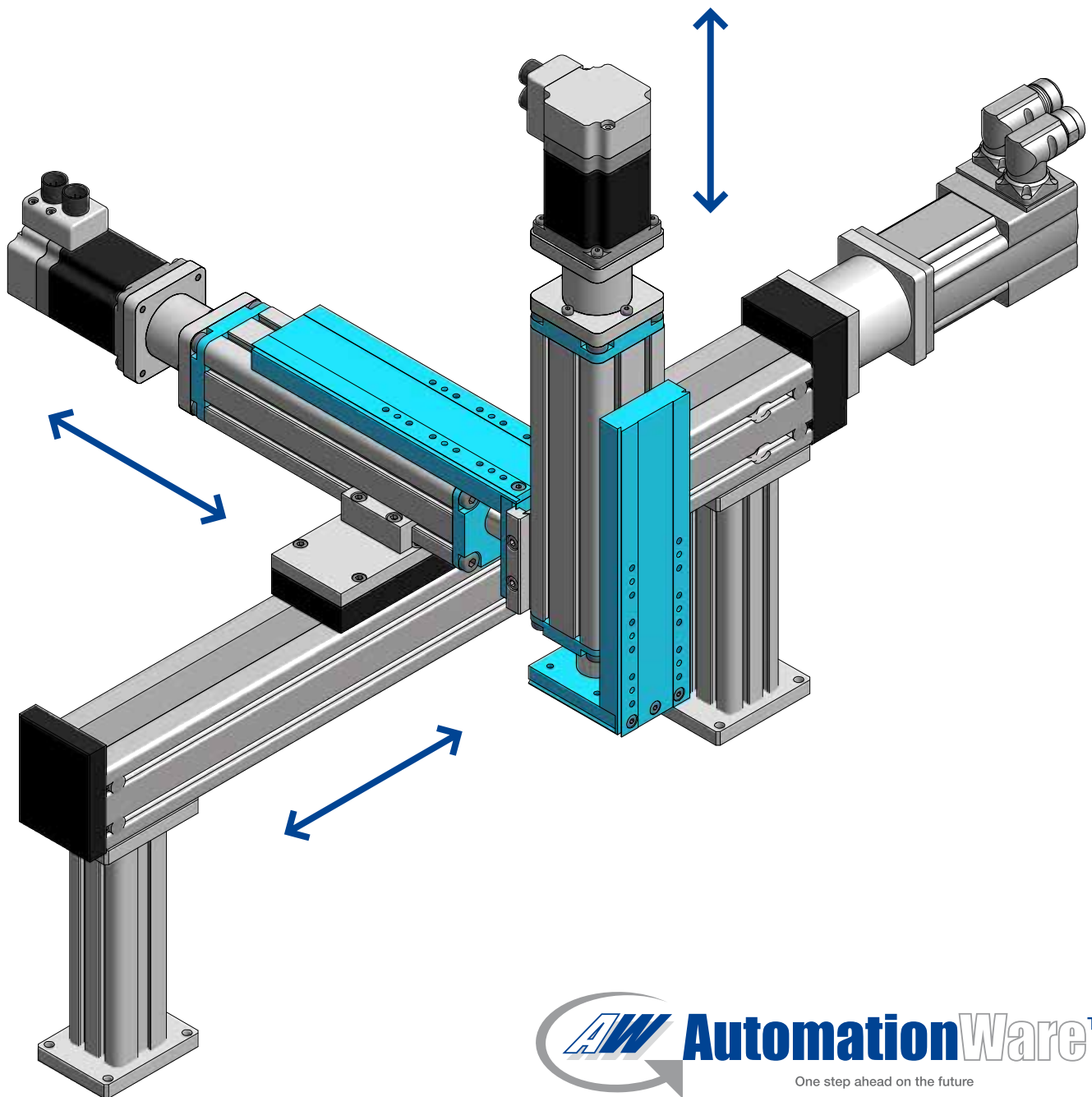
Vertical line based on screw transmission adapted for heavy loads.



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## Cartesian Solution (XYZ).

With fast linear screw Axes,  
combined with a **Pick and Place**  
**SM-slide-system** for the best  
productivity.



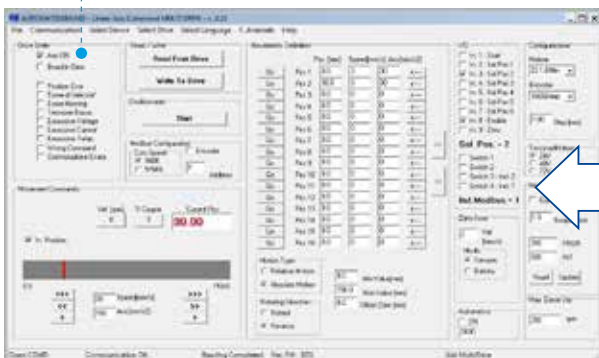
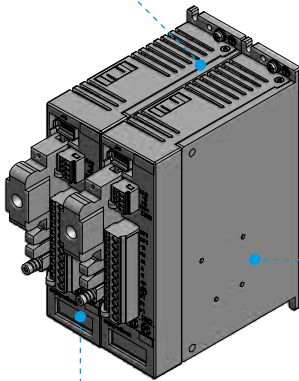
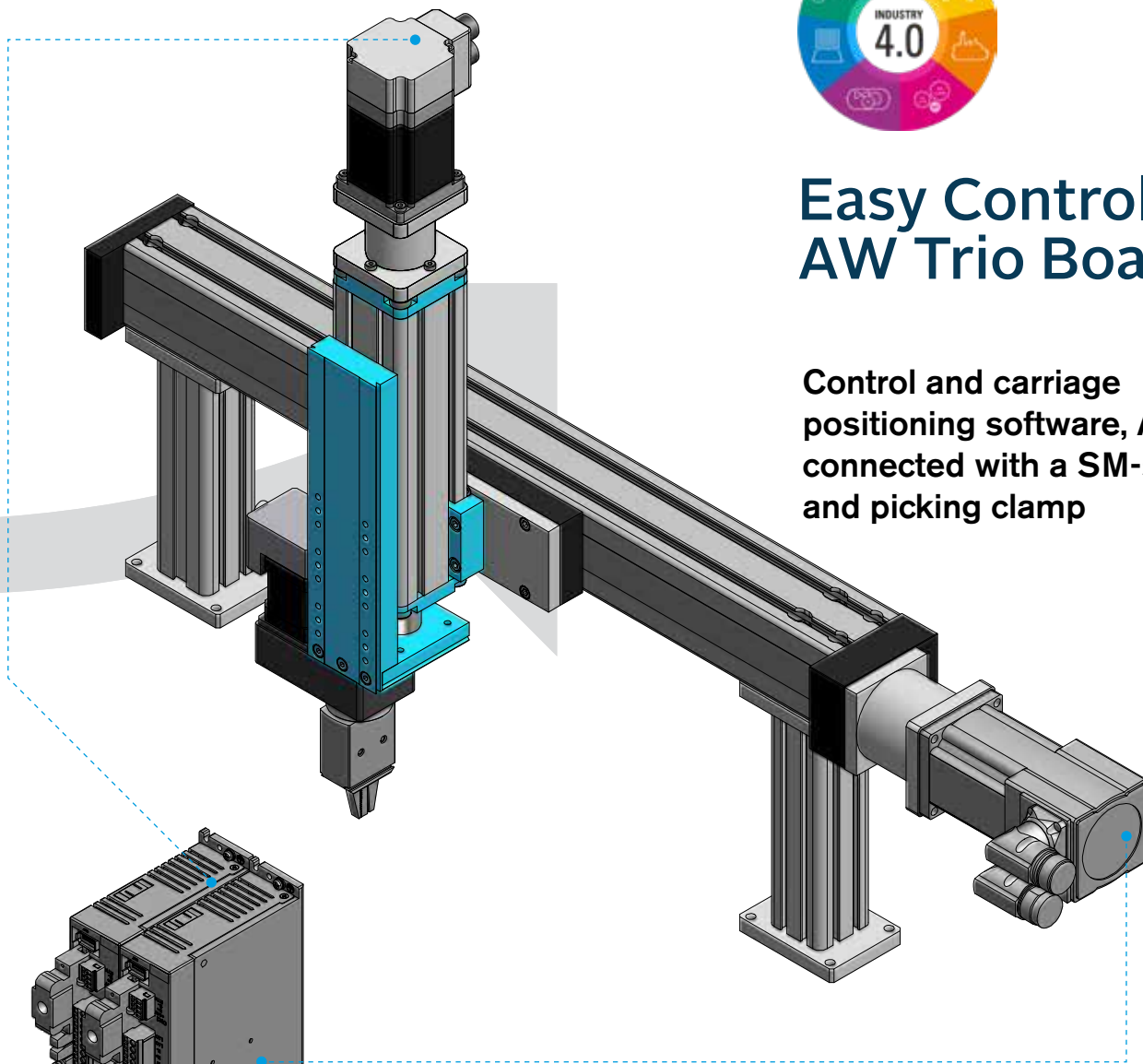
# AW Linear Axes System

## Automationware



### Easy Control™ & AW Trio Board

Control and carriage positioning software, Axes connected with a SM-slide and picking clamp



# System Drivers, motor control and diagnostic

## Automationware

uses first-level components to operate its technological innovative linear units or actuators, motors and electronic servo drivers with very good performances.

For the carrying out of the lift movements there is the **Easy-Application**, that allows the fast and easy control of the drive through digital I/O, after the PC-configuration.

Alternatively it is possible to use the standard communication protocols, such as **CANopen** or **EtherCAT**, that allow an easy integration into the entire machine-system.

The drives have the function electronic cams and a vibration suppression system for solid and stable **XYZ** portal configurations, also with high operating regime.

Our motors have an encoder up to 17 bit, for an high positioning accuracy.

The motion management on more Axes, combined with fast slides, can be programmed with an intelligent **AW Trio** control module, to optimize the modulation and the Axes synchronisation for high-productivity cycles, determining acceleration and appropriate motions of the application.

## Configuration through the EASY™ software



## AwareVu™

**Automationware** considers the new **market trends ind. 4.0**, develops a new control platform called **AwareVu**.

The new product can be applied on portal or on a singular **Automationware** component to control the vibration profile of the system during the processing cycle, activating an alarm in case of malfunction.

The alarm can be visible through a local LED light or recognised via Wi-Fi in the machine computer on the **AW application**.

# AW Linear Axes System

## Automationware

# Configuration through the EASY™ software



It is possible to set up a maximum of 64 positions, each characterised by programmable speed and acceleration.

The position data are absolutely or relatively definable respect to the current position.

The selection of the controls for the different positions (*in succession or random*) allows the automatic functional simulation of the linear Axes.

This control moves the actuator to the indicated position, and gives a graphical indication of the reached position.

An alternative method to define the position to reach is the interactive motion of the carriage, and associate the speed and acceleration to each motion.

The set up position can be saved in one of the 64 positions of the cabinet.

A third method to define the positions is possible, if these are increasing remote each other.

In this case with only one control on the cabinet **“default settings”**, all useful motions for the application can be set up, also combining the different positions **XYZ**, in case of more motors.

When the configuration has been made, the different positions can be recalled through the available digital I/O from the drive.

There is also the optional possibility to create a database for the function trends, activating diagnostic methods on the time power profile to avoid malfunctions of the operations.





## AW Linear Axes System

The Motion Line-Axes series has an adequate accessory range to support every application:

- **Compact high efficiency-planetary gearboxes** with a small backlash
- **Flanges and shrink disks or clamping bushes** for a perfect compatibility with motors and gearboxes
- **Cams**, according to the used motors
- **Different kinds of motors and drivers** to complete the portal
- **Sensors** for mobile and/or fixed carriage units and for mobile profile
- **Additional carriages** for a good load distribution
- **Different sensors such as Hall-effect**, induction or electromagnetic with Bracket profile fixing
- **Connecting brackets and connecting system** for XYZ configurations or adaptors for **SM-series** connection

## Consult the detailed technical guide

Linear Axes ML series and accessories on our web site:  
[www.automationware.it](http://www.automationware.it)



# AW Linear Axes System

## Automationware

### Order Code

Below the identifying table to determine model and dimensional specifications of the Axes to order.  
(For 2D or 3D configurations please visit our website [www.automationware.it](http://www.automationware.it) or send your request to [info@automationware.it](mailto:info@automationware.it))

#### Order example

##### ML-45-12-1200-FC-22

ML45 Mono Guide Unit with long carriage, 1200mm stroke, traction shaft with bore for 22mm - shrink disk.

##### ML-80-11-500-BC-A

ML80 Mono Guide Unit with short carriage, 500mm stroke, traction shaft for clamping bushes on the "A" side.

ML	45	12	1200	FC	F	A	A	12																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

# AW Linear Axes System

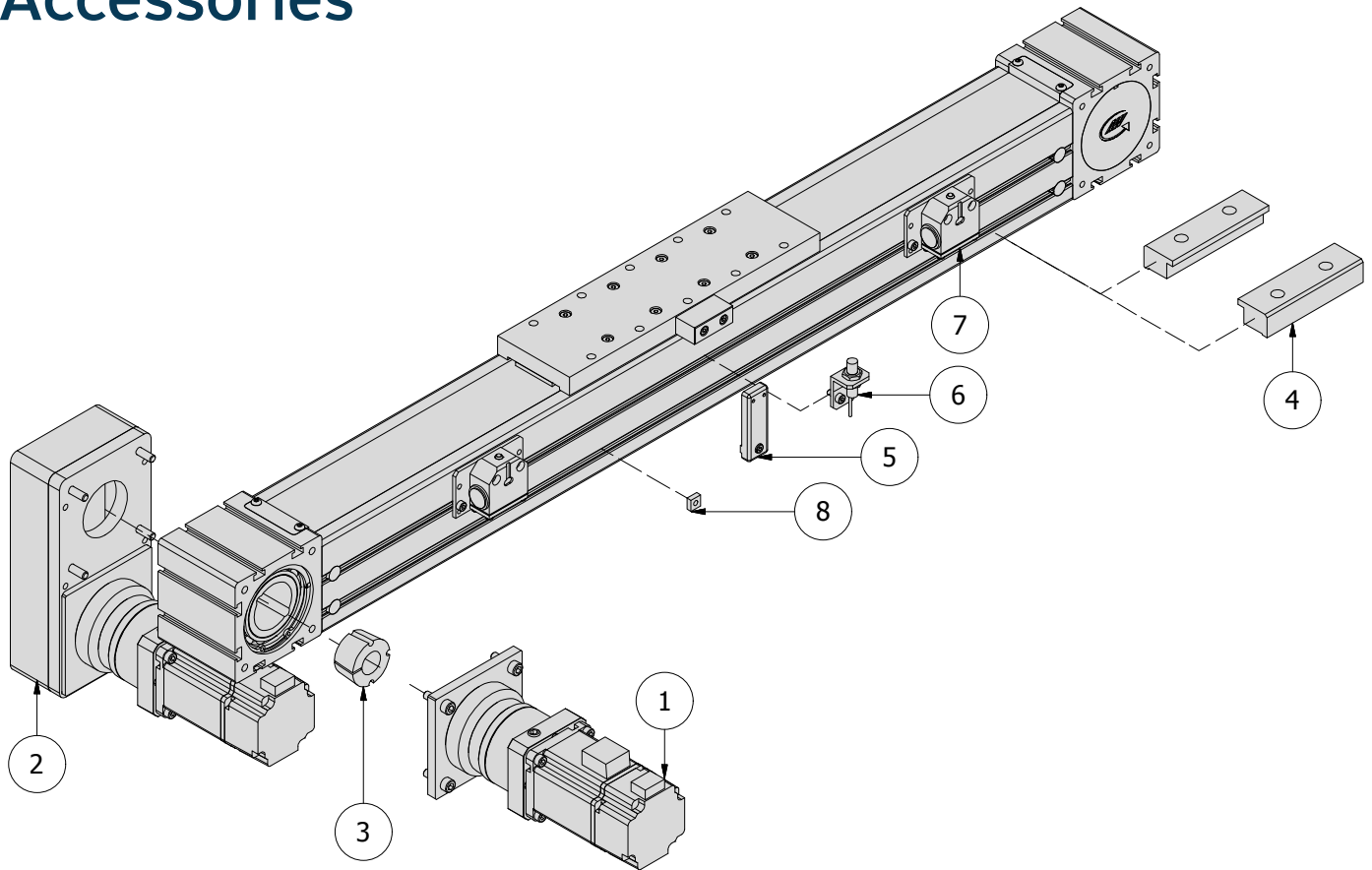
## Automationware

## Notes

# AW Linear Axes System

## Automationware

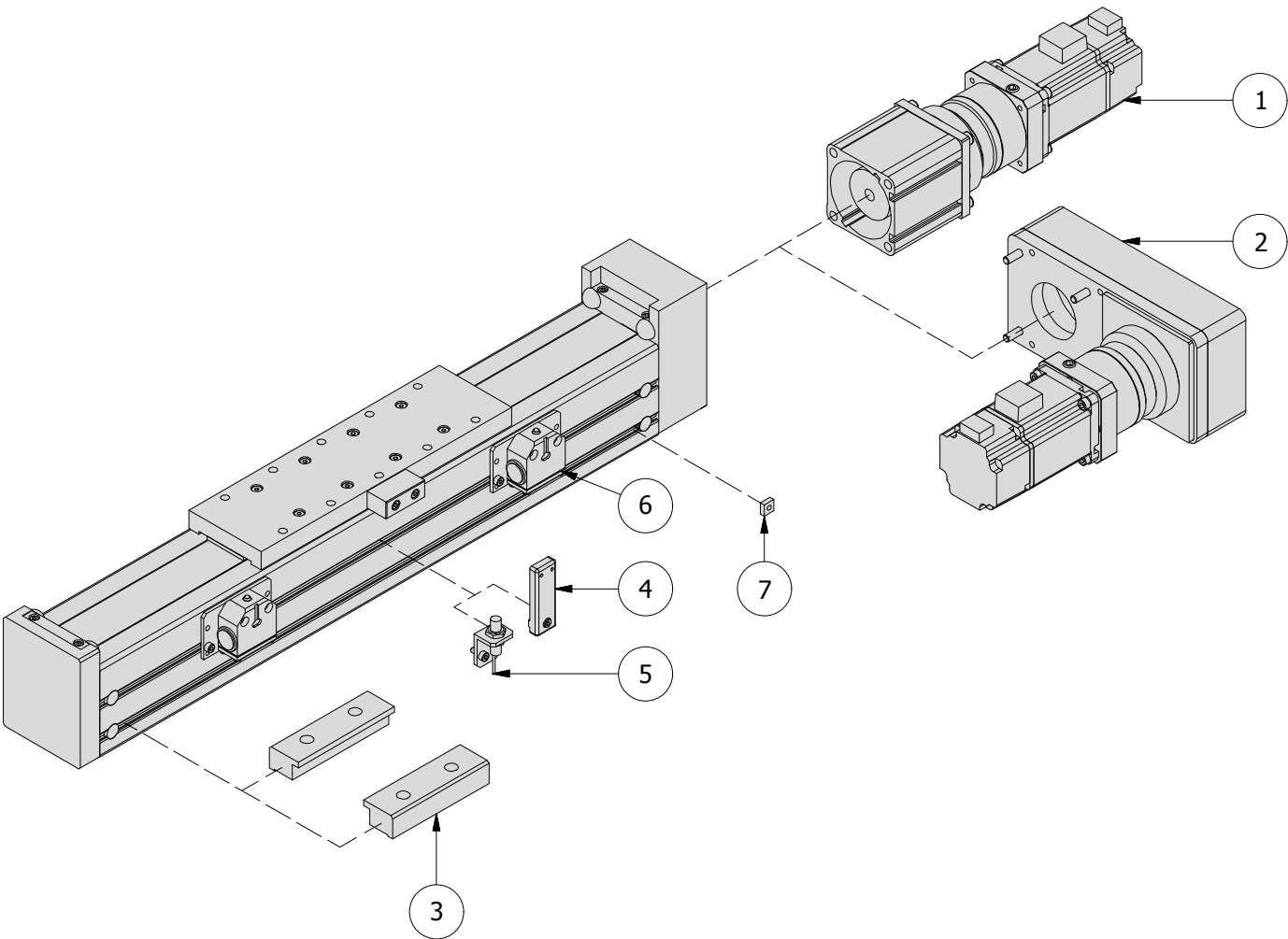
### Accessories



#### ACCESSORIES BELT AXES

POSITION	DESCRIPTION
1	Direct transmission mounting kit
2	Parallel Transmission mounting kit
3	Clamping bushes / Shrink disk
4	Fixing bracket clamps Kit
5	Hall-effect sensor
6	Inductive sensor
7	Mechanic sensor
8	Channel fixing bolts





ACCESSORIES SCREW AXES

POSITION	DESCRIPTION
1	Direct transmission mounting kit
2	Geared transmission mounting kit
3	Fixing bracket clamps Kit
4	Hall-effect sensor
5	Inductive sensor
6	Mechanic sensor
7	Channel fixing bolts

# Mech Series

## Automationware

Series: **Value** – **Line** – **Force** – **Plus** & **Extreme**

## Mech Value Series

Small-sized electric cylinders, for high performance in terms of speed and resistance, based on a sphere recirculation screw technology, available in a normal or parallel version to optimize spaces.

They are equipped with innovative high-speed Stepper motors with encoder or in the Sensorless version, a new technology making use of motor control parameters to detect correct position without installing an encoder, thus reducing costs and sizes.

The cylinder profiles are also designed to include the **AwareVu** technology for detecting vibrations in the installation area. (Ind. 4.0)

Available sizes **16** - **25** - **32**, with direct or delayed Stepper motor for easier adjustability.



Features/Model		UM	Mech Value 16	Mech Value 25	Mech Value 32
Flange Size	mm		30 mm	32 mm	42 mm
Diameter / Step Screw	mm		8/-2-8	10/-3-10	12/-5-10
Accuracy	mm		±0.02	±0.02	±0.02
Maximum axial force	N		325-50	833-105	1700-250
Maximum Motor Speed (Stepper)	rpm		3000	3000	3000
Maximum screw speed	rpm		3000	3000	3000
Maximum axial speed	mm/s		100-400	150-500	250-500
Useful Ride* (Non standard available under request)	mm		50-300	50-400	50-500

# Mech Series

## Automationware

**Series: Value – Line – Force – Plus & Extreme**

## Serie Mech Line

Highly reliable and widespread cylinders, a consolidated product with an excellent price-performance ratio.

They are available on four sizes, **25 - 32 - 50 - 63**, using sphere recirculation screw movement, and are equipped with an anti-rotation device.

They are ISO 15552 compatible.

They can be powered using Stepper or Brushless motors, also with closed-ring control.

Motor power may be direct or delayed.



Features/Model Line		UM	Mech Line 25	Mech Line 32	Mech Line 50	Mech Line 63
Flange Size	mm		32 mm	47 mm	65 mm	75 mm
Diameter / Step Screw	mm		10/3-10	12/5-10	16/5-10-16	20/5-10-20
Dynamic load	kN		2,8-2,5	5,14-3,90	10,49-11,81-8,33	14,6-11,0-13,4
Axial force 2000km	kN		0,32-0,43	0,69-0,67	1,42-2,02-1,67	1,98-1,88-2,89
Maximum screw speed	rpm		4500	4500	4500	4500
Maximum axial speed	mm/s		750	750	1200	1500
Useful Ride* (Non standard available under request)	mm		50-300	50-400	50-500	50-500

# Mech Series

## Automationware

Series: **Value** – **Line** – **Force** – **Plus** & **Extreme**

## Mech Force Series

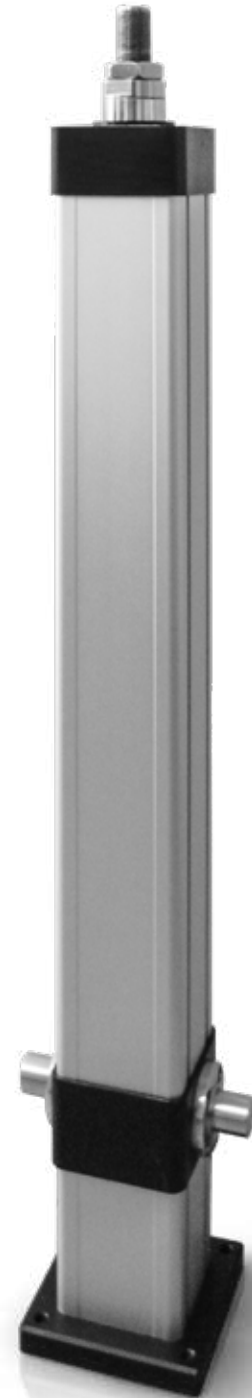
The **Mech Force series** is suitable for the most extreme workloads or in situations where heavy-duty operation is required with a high dynamic load over time.

The profile has a reinforced structure and the driving technology consists in customized sphere recirculation screws, to achieve high dynamic loads offering optimal speed performances thanks to the various step options.

They are ISO 15552 compatible, can be powered by Brushless or Stepper motors, which can also be coupled to gearboxes in order to take up less space and provide a comprehensive solution.

They can include the **AwareVu** device which gives continuous feedback on operation under standard conditions, warning in advance about any maintenance needs.

The **Mech Force 150** version has a Steel structure.



Features/Model Line	UM	Mech Force 50	Mech Force 63	Mech Force 80	Mech Force 100	Mech Force 125	Mech Force 150
Flange Size	mm	65 mm	75 mm	95 mm	115 mm	135 mm	165 mm
Diameter / Step Screw	mm	20/5-10-20	25/5-10-25	32/5-10-32	40/5-10-40	50/10	63/10-16-20
Dynamic load	kN	14,6-11-13,4	19,8-16-15,1	25,9-29,8-22,7	23,9-60,4-44,4	76,9	87,9-190-141,9
Axial force 2000km	kN	1,98-1,88-2,89	2,69-2,74-3,50	3,52-5,1-5,72	3,24-10,33-12,0	13,15	15-38-30,57
Maximum screw speed	rpm	4500	4500	4062	3250	2600	2063
Maximum axial speed	mm/s	1500	1875	2166	2167	433	688
Useful Ride* (Non standard available under request)	mm	50-500	50-600	50-800	50-800	50-1000	50-500



# Mech Series

## Automationware

**Series: Value – Line – Force – Plus & Extreme**

## Mech Plus & Extreme Series

The **Mech Plus series** is suitable for the most extreme loads and adds very compact cylinder features.

In addition, the series has a graft for greasing the screw, in cases of heavy duty where an automatic lubrication is required. In the parallel version, it has a high resistance transmission belt and no backlash (*clearance 0*).

The profile has a reinforced structure and the pushing technology is built with ball screws with high dynamic loads combined with a structure of very compact snail, to always offer maximum performance.

There is a version called **Mech Extreme** with a dynamic load of over 750,000 Newton for high-load applications with extreme durability, based on an ISO 5 rectified screw system, designed to the **Automationware** specification.

This cylinder can be used for continuous loads of years to over 70000 Newton, ideal for extreme applications. (*Reinforced in steel*).

The whole series is ISO 15552 compatible, they can be motorized with Brushless or Stepper devices also coupled to reducers to keep the overall dimensions limited and offer a compact solution.

They can contain the **AwareVu** device to give a continuous feedback on the functioning in normal conditions, warning in advance about any unusual vibrations.



**New**

Features/Model Line	UM	Mech Plus 50	Mech Plus 63	Mech Plus 80	Mech Plus 100	Mech Plus 125	Mech Plus 160	Mech Plus Extreme
Flange Size	mm	65mm	75 mm	100mm	120mm	140mm	180mm	180mm
Diameter / Step Screw	mm	25P10	32P10	40P10	50P10	63P10	80P10 -20	50P40 ISO 5
Dynamic load	kN	19,9	33,8	78,6	97,8	109,7	121,9 - 213,7	414 - 752
Axial force 2000km	kN	3,4	5,78	13,44	16,72	18,76	20,84 - 46	92 - 184
Maximum screw speed	rpm	4500	4375	3500	2800	2222	1750	1500
Maximum axial speed	mm/s	750	729	583	467	370	292 - 583	1000
Useful Ride* (Non standard available under request)	mm	50-600	50-800	50-900	50-1100	50-1300	50-1500	50-1000

# Mech Series

## Automationware

## Benefits and Selection Criteria

Characteristic	Mech Value (New)	Mech Line	Mech Force	Mech Plus
Size	16-25-32	25-32-50-63	50-63-80-100-150	50-63-80-100-150
Max Axial Force	1700 N	2400 N	190000 N	213000 N
Accuracy	0,02 +/-	0,02 +/-	0,01 +/-	0,01 +/-
Max Speed	0,5 m/s	1,5 m/s	2 m/s	0,75 m/s
Lubrication	manual	manual	manual (automatic on 150)	automatic (optional on 50)
Parallel drive	Y	Y	Y	Y
Gearbox	N	optional	optional	optional
Anti-rotation	Y	Y	Y	Y
Diagnostic Ind. 4.0	AwareVu™ (optional)	AwareVu™ (optional)	AwareVu™ (optional)	AwareVu™ (optional)
Motor	Stepper	Stepper & Brushless	Stepper & Brushless	Brushless

## Applications

### Mech Value Series: A revolution on small-sized cylinders

Ideal cylinders for small-scale applications, to replace pneumatic systems and achieve precise and rapid speed modulation, with intermediate positions and adjustable acceleration.

Available with the new Stepper motor, which allows for cost saving and size reduction, **always with a view to precise positioning control.**

### Mech Line Series: Ideal for medium-scale industrial applications

Ideal electric cylinders for industrial applications with medium applicable strength, an excellent alternative to pneumatic or hydraulic cylinders with remarkably low operating costs.

They are designed for long life without maintenance, and include a set of accessories suitable for any configuration.

### Mech Force & Mech Plus Series: Ind. 4.0 Resistance and Technology, uncompromising

Excellent cylinders for the most extreme applications, where high drive and/or long operation are required.

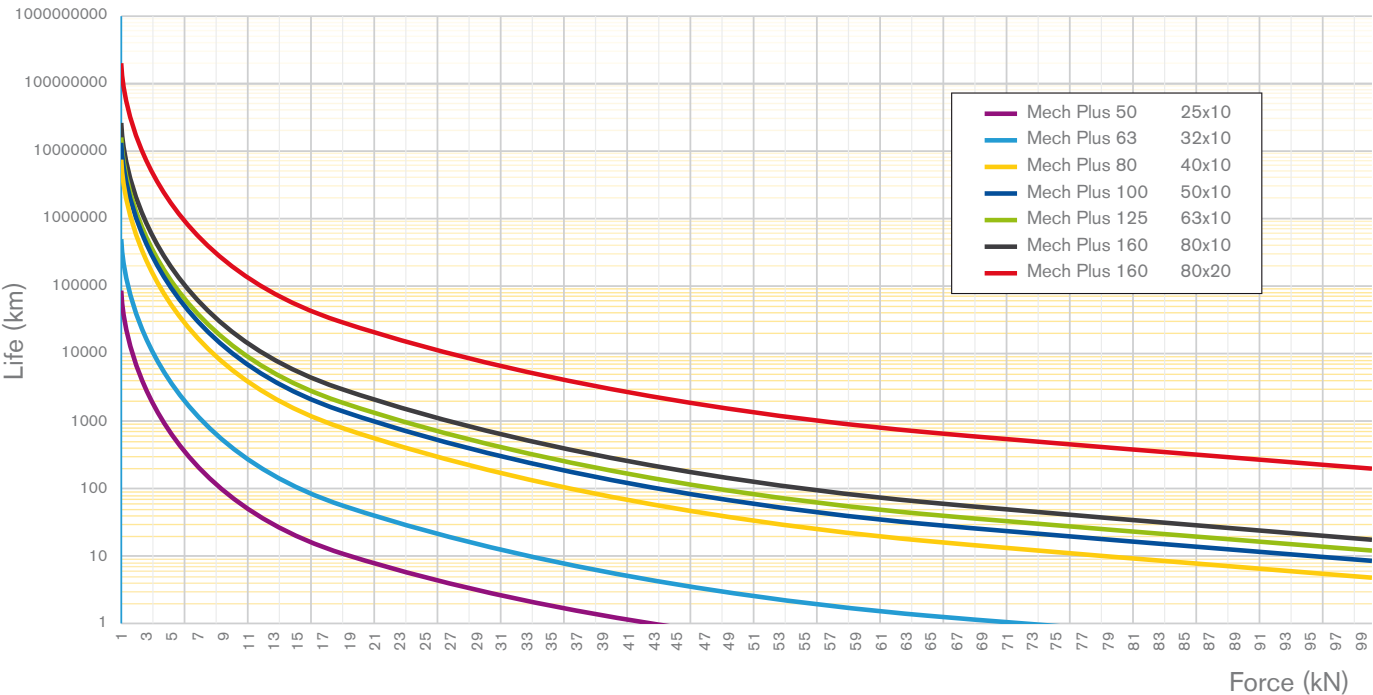
The dynamic loads of the sphere recirculation screws are among the highest on the market, ensuring top quality as well as cutting-edge drive performance levels.

The Plus Series adds Ind. 4.0 technology and compactness as standard.

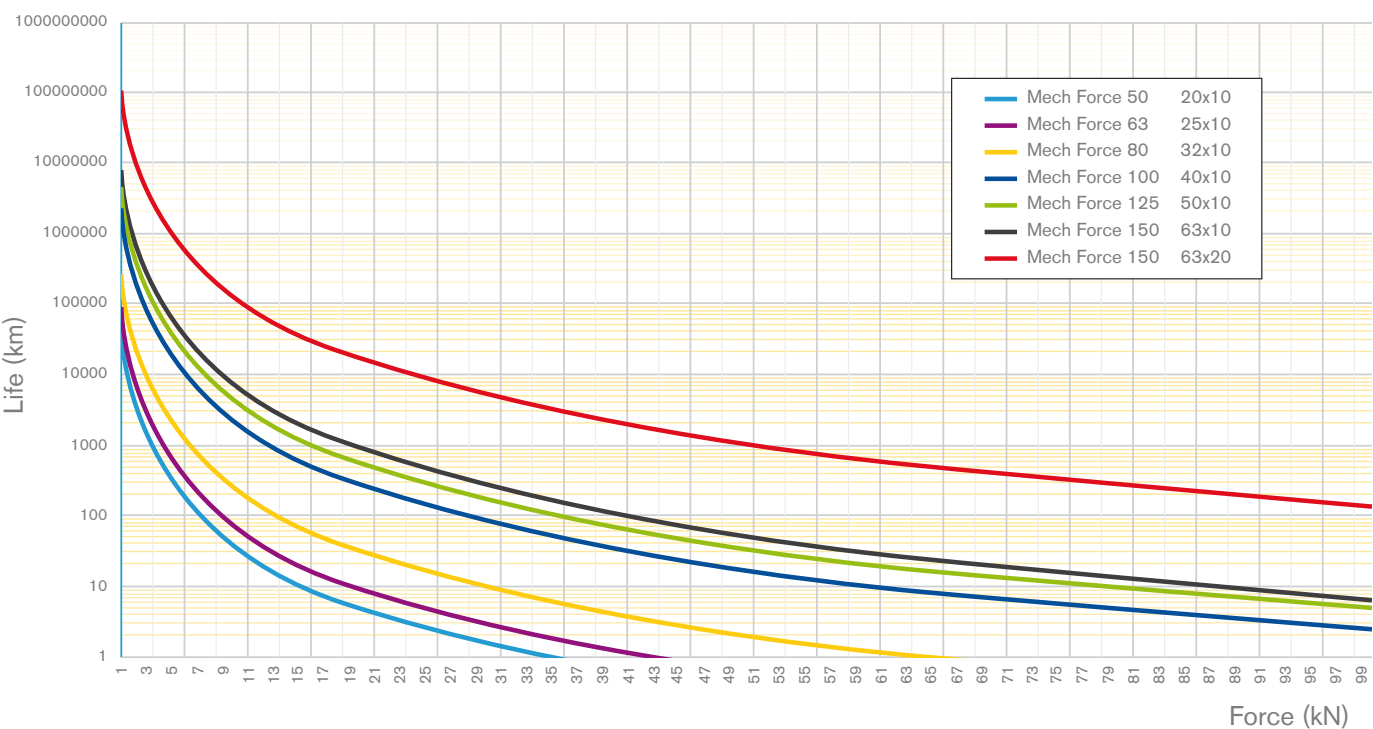
*(Automationware AwareVu patent which prevents three-dimensional vibrations using an electronic system in the base of the cylinder, which can also be controlled via Wi-Fi to check any malfunctioning in the system.)*

Performance tables for the **Mech Plus** and **Mech Force** series  
(Duration as a function of the load)

Mech Plus - Force Vs. Life expressed in km (based at 500 rpm)



Mech Force - Force Vs. Life expressed in km (based at 500 rpm)



The tables in figure show the operational performance levels in km as a function of the loads applied in kNewton (at a speed of 500 rpm).

The tables are merely indicative: we always recommend sizing depending on the work cycle, speed and load applied.

# Applications

## **Automotive and heavy load moving**

The automotive industry sector often requires the use of hydraulic cylinders for the production chain and for the components-assembly phase (*Use of the cylinders as press.*)

The easy installation and the easy programming, makes them very useful to avoid complex pneumatic or hydraulic installations.

## **Diagnostic and Healthcare**

The electric cylinder can be very useful for micrometric movements on scanning devices and TAC. The system also maintains the position, even without power supply. In absence of the hydraulic, it is the ideal solution to simplify the design of the compact and transportable medical diagnostic systems.

It allows the accurate positioning of persons and objects for the electronically programmable diagnostics. For the pharmacological production cycles, the electric cylinders prevent each contamination, allow the product packaging in aseptic rooms with precision and minimal maintenance.

AutomationWare provides also linear axes, combinable with other Pick & Place solutions for the packaging of pharmacological products for automated diagnostic.



## **Packaging and/or material motion**

Very useful for packaging systems, ideal solution for industrial applications, such as the logistics, if the material movement needs high forces, modulate movements, also with high speed.

## **Aerospace & Defence**

Many defence applications need industrial actuators to moderate the investment, maintaining an excellent level of quality and easy use in normal application situations.

Our cylinders offer a very good applicability for different configurations, such as navigation simulators (*also militar*). Very useful also for the logistic applications, if the IP65 protection can be appropriate.



## Factory automation

Essential in modern palletising systems, excellent in industrial production chains to find a rapid solution to eventual line problems. Very useful for the warehouses, as extending and upgrading of existing facilities.

## Energy

Widely used for the flow control of the hydroelectric turbines, for easy installation and regulability. Widely used also for wind-power applications, for the variation of the incidence angle of the blades.

Very useful also for fuel extraction or fuel production installations, thanks to its easy maintenance and management, also by remote control.

## Machine tools

Used as substitutes for hydraulic systems of machines for metal sheets bending.

The easy use and the simplification of systems make them very popular in the applications that need the “press” type operation. They can also be used in very vertical applications, such as tyre-inserting machines, simplifying the hydraulic inserting systems. Machine tools for the production of springs or for the mechanical component insertion, such as bearings, bushings, ringnuts, reducing the complexity of the systems, modulating the pressure with programmed motion.



# Mech Plus Automationware

Designed to offer  
the best combination of force performance  
with a compact and solid form factor

## Gearbox

With very high efficiency using  
a best performance helicoidal  
planetary system for long life and  
low noise level (Backlash  $\leq 5$ )

## Permanent Magnetic

system included on the roller screw  
ball system for accurate positioning  
optimization

## Magnetic detectors

Inserted on chassis (no external wires)

## Head bearing

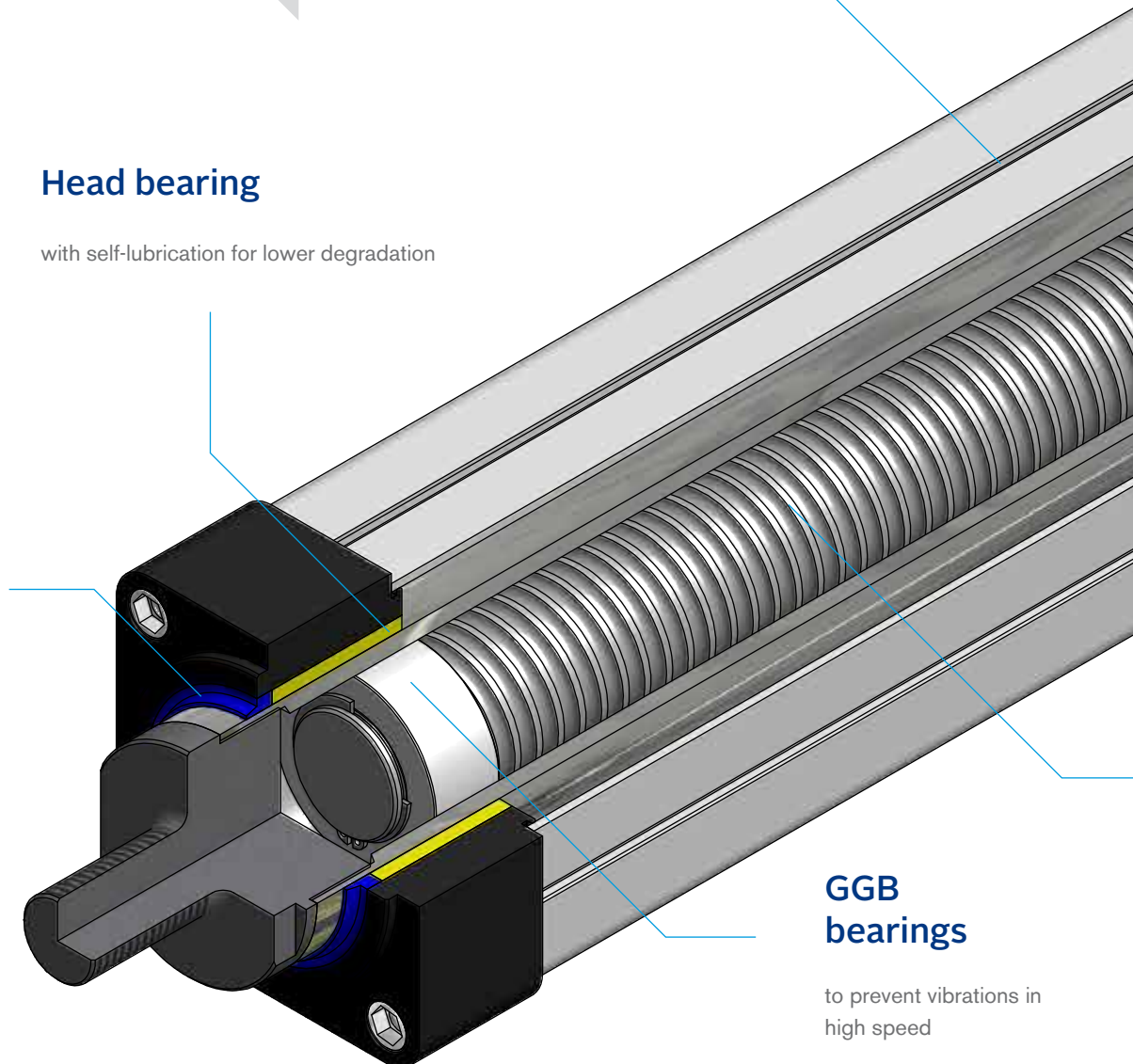
with self-lubrication for lower degradation

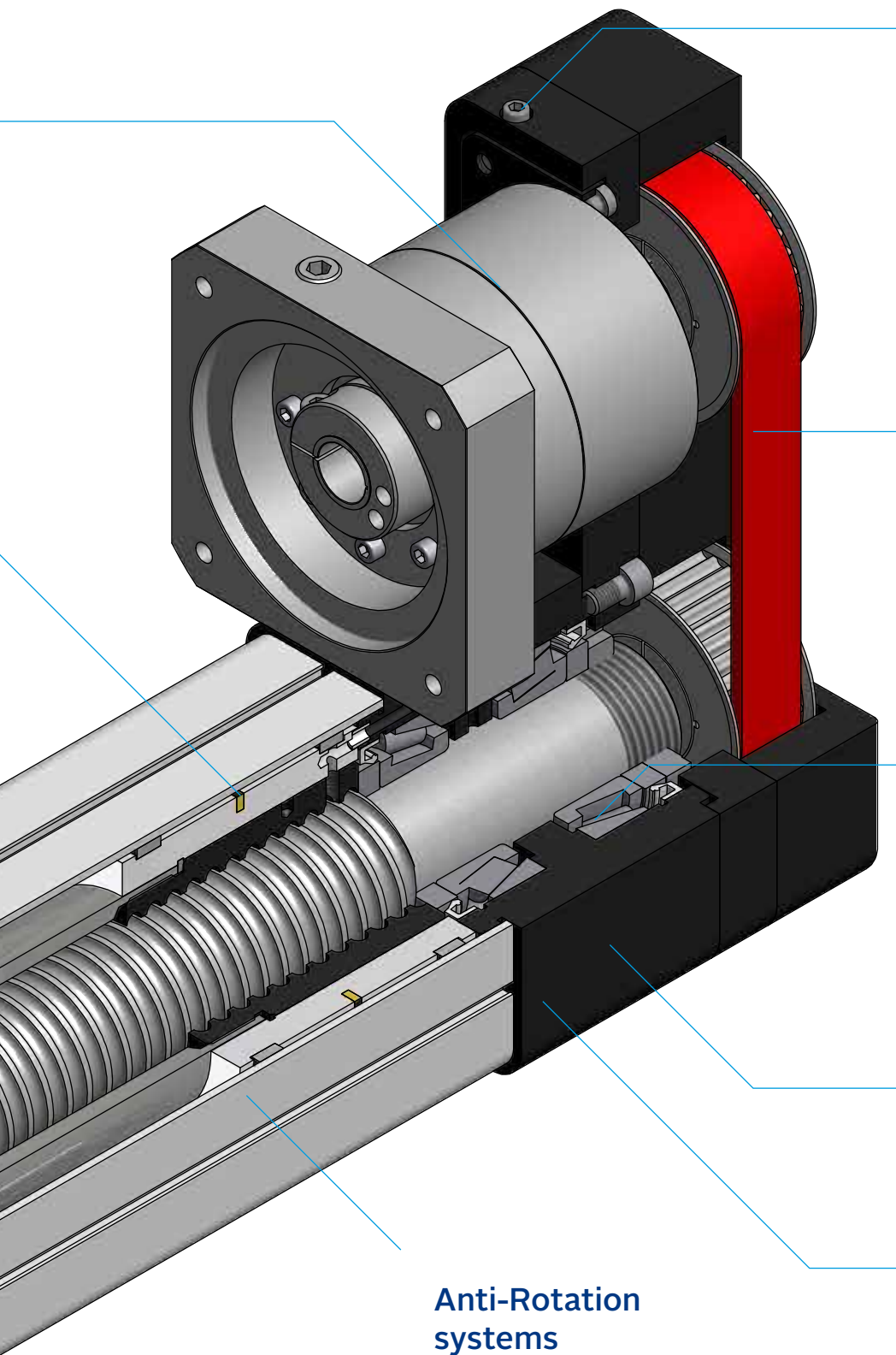
## Dust scraper

Seal to avoid  
contamination from  
external and selected  
for severe temperature  
variation (degree of  
protection IP 65) –  
Double protection for  
hostile situation

## GGB bearings

to prevent vibrations in  
high speed





## Micrometric Belt tension system

With factory pre-setup for best efficiency and accuracy

## High performance Kevlar

belt for high durability stiffness

## Lubrication system

Tapered roller bearings, with high capacity torque and pin for centralized lubrication system

## Lateral pins

Optional lateral pins for heavy loads operations

## Anti-Rotation systems

Cylinder with **anti-rotation** systems included

## Roller balls screw ISO 7

(ISO 5 optional), for long life span and heavy load



**AwareVu™**

Vibration and Temperature  
Control for Ind. 4.0  
Diagnostics



# Mech Series

## Automationware

### Drives and Diagnostics Ind. 4.0

Motors and Drives	I/O	CANopen	Ethercat	Profinet	Mech Value (New)	Mech Line	Mech Force	Mech Plus
Drive AW EZI	X	na	optional	na	Stepper (Nema xx)	Stepper (Nema xx)	na	na
Drive AW ECMA	X	X	X	na	na	Brushless	Brushless	na
Drive AW ServoOne	X	X	X	X	na	na	Brushless High Torque	Brushless High Torque
Encoder	Incremental				Sensorless / Optional	Required / Sensorless	Required	Required
Easy Software	Move Modelling				Option	Option	Option	Option
AwareVu	3D vibration Diagnostic Ind. 4.0				Optional	Optional	Optional	Included

### Market Ahead solutions to achieve Ind. 4.0 movement, control and diagnostics on your mechatronic components

All cylinders in the Mech series can be fitted with **Stepper** or **Brushless** motors.

The **Stepper** power system includes the possibility of encoder or **sensorless** control, in order to make the cylinder more compact and economical, always guaranteeing precise positioning thanks to a technology which detects position based on electric operation parameters.

With **Brushless** motors very high axial speeds can be achieved, always with the utmost precision, thanks to a wide range of available encoders.

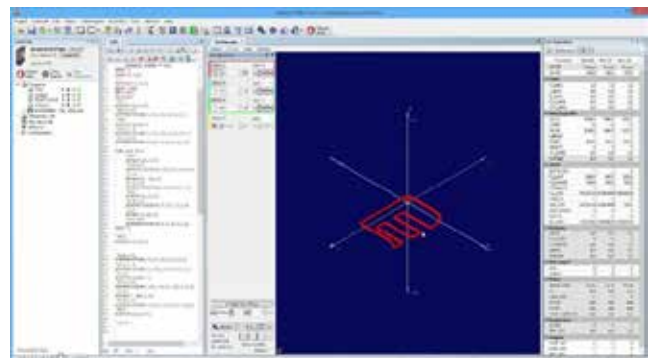
It is based on a full-closed loop control system, with **auto notch filter** which prevents vibrations also at high productivity levels to reduce noise during operation.

The 17-bit encoder guarantees high positioning precision, allowing for a 0.01 mm precision.

If the cylinders need to be used in coordination on several axes (*for example in TRIPOD- Simulator systems*), as an option, we offer a **four-axis** driver with **TRIO software**, in order to allow for advanced motion interpolation.

This axial system control may include our EZI – ECMA -ServoOne drivers, which can all be integrated in a single chassis.

The integrated **E-Cam** connection allows for easy synchronization of motion and positioning with cameras.





For basic applications, **Automationware** has a control software system called **Easy** which can be installed on a standard PC or Tablet and connected via a USB or Serial interface to the control electronics.

The following figure illustrates the main menu of the **Easy** software.

It is possible to set as many as 64 positions, each of them characterized by adjustable speed and acceleration.

Positioning data can be defined in an absolute or relative way with regard to the current location.

The command selection for the various positions (*in succession or random*) makes it possible to simulate automated operation of the actuator.

If this command is entered, the actuator moves to the required position and a graphical indication is given of the position reached.



## Sistema AwareVu™, for Ind. 4.0 diagnostics



### Electronic control installed on the base of the electric cylinder (as standard on Mech Plus)

AW has developed a new diagnostic system called **AwareVu™** (Patent Pending).

It allows for actuator monitoring through temperature and vibration checks, in order to identify any faults during operation phases also due to factors external to the cylinder.

The system is designed to trigger a local warning (*Light Alarm*), as well as being collected via WIFI or via USB to the network, which makes it possible to save production parameter data, in the central computer or in cloud.

The system also includes Mobile Phone or Tablet applications, in order to warn maintenance operators about possible malfunctioning, with the possibility of displaying data, parameters or alarms on screen.

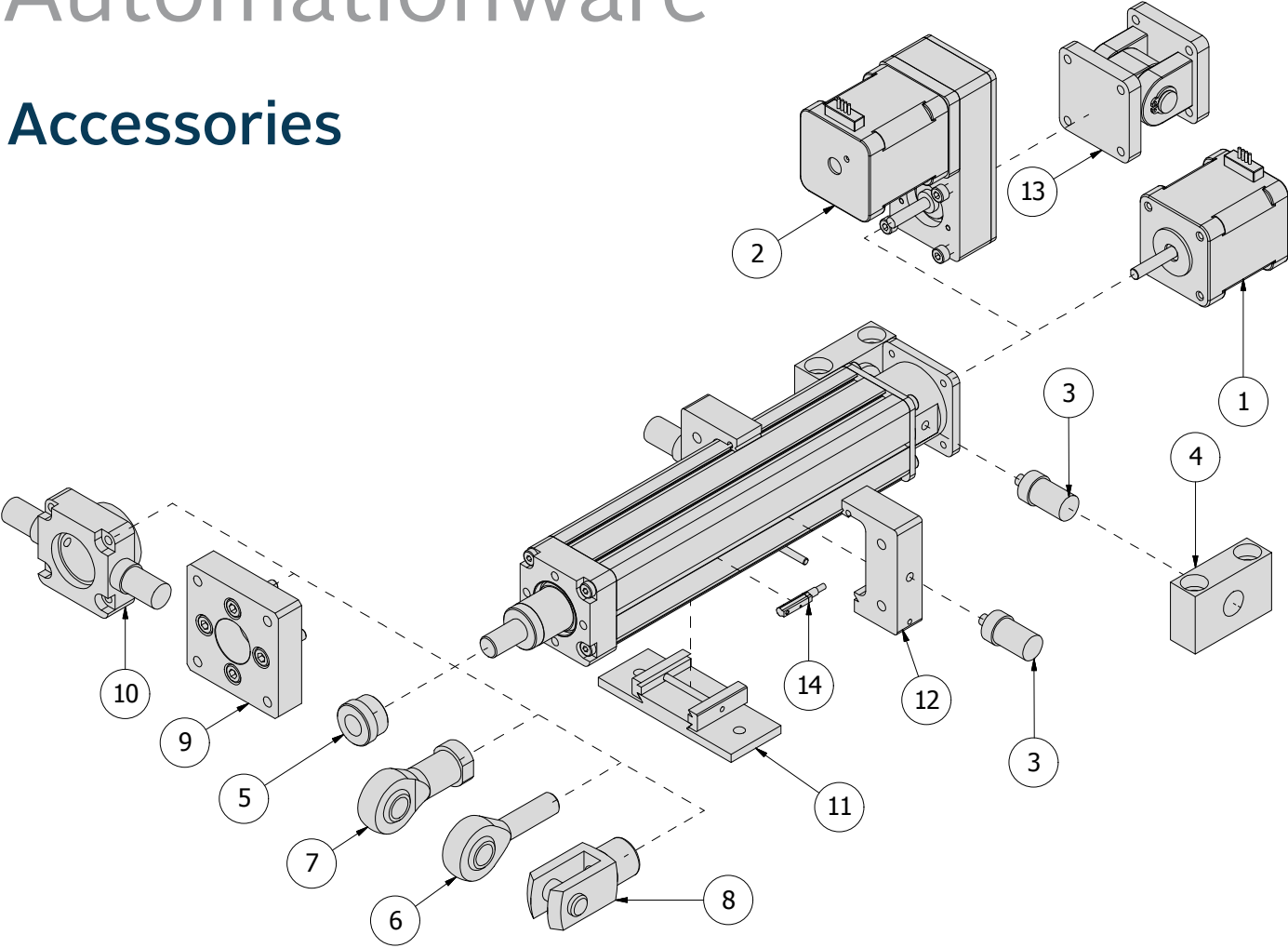
The system stores and processes signals from vibration and temperature sensors; this produces a frequency profile diagram (*Fourier series*), which allows the client to set threshold values, to be warned in the event of unusual vibrations or excessive temperature variations (*also on an individual system component*).



# Mech Value

## Automationware

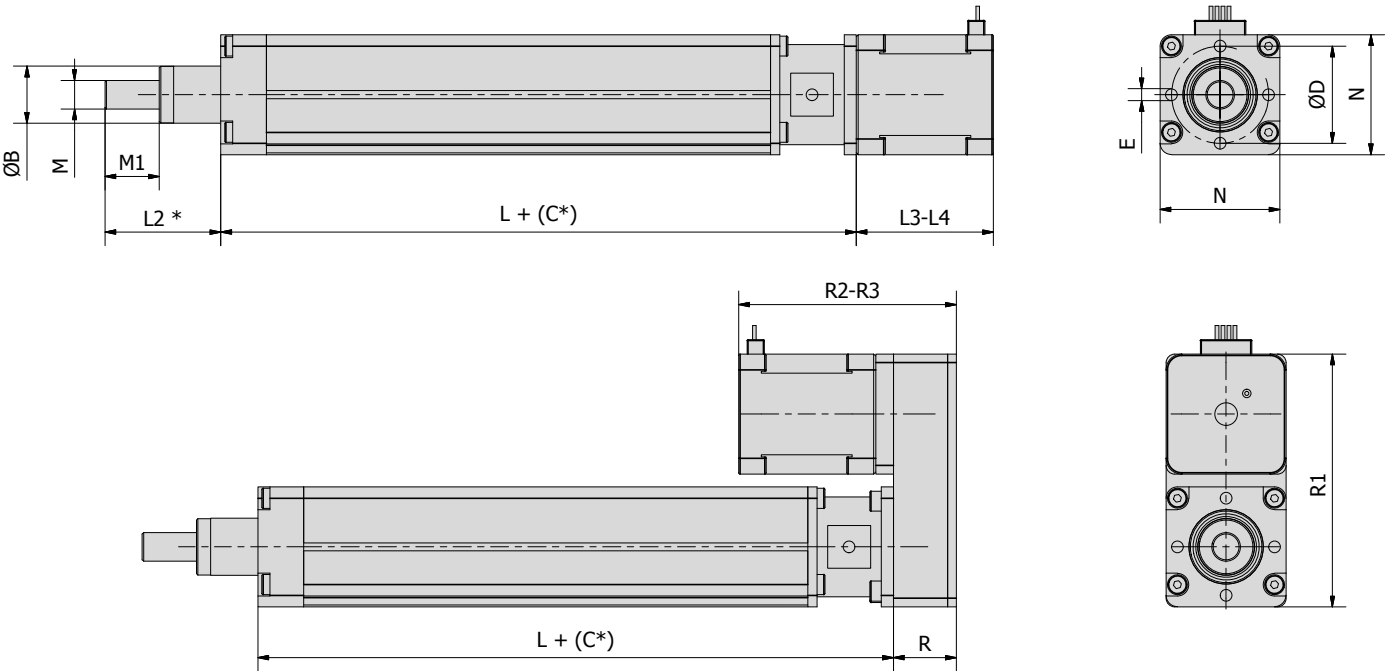
### Accessories



#### MECH VALUE ACCESSORIES

POSITION	DESCRIPTIONS
1	Direct drive Kit
2	Parallel Drive Kit
3	Lateral PIN kit
4	Adjustable intermediate zipper kit
5	Kit pins on poster head
6	Support kit for pins
7	Fixing kit on top
8	Front spherical joint
9	Threaded anterior spherical joint
10	Front fork joint
11	Pierced nipple
12	Backward joint swinging kit
13	Front interface plate kit
14	effect hall sensor

# Dimensions and Components



DIMENSION: Base Version, Direct drive Parallel Drive

Actuator Size	UM	Mech Value 16	Mech Value 25	Mech Value 32
Lead screw	mm	8x3-8	10x3-10	12x5-10
$\varnothing B$	mm	16	18	20
$\varnothing D$	mm	25	28	34
E	mm	M4x8	M3x8	M6x12
L	mm	88,5	105,5	122,5
L2*	mm	28	34	40,5
L3	mm	45	38	48
L4	mm	50	53	60
M	mm	M6	M8	M10x1,25
M1	mm	12	16	19
N	mm	30	32	42
R	mm	17	17	22
R1	mm	60,5	75,5	88,5
R2	mm	69,7	62,7	76,2
R3	mm	74,7	77,7	88,2

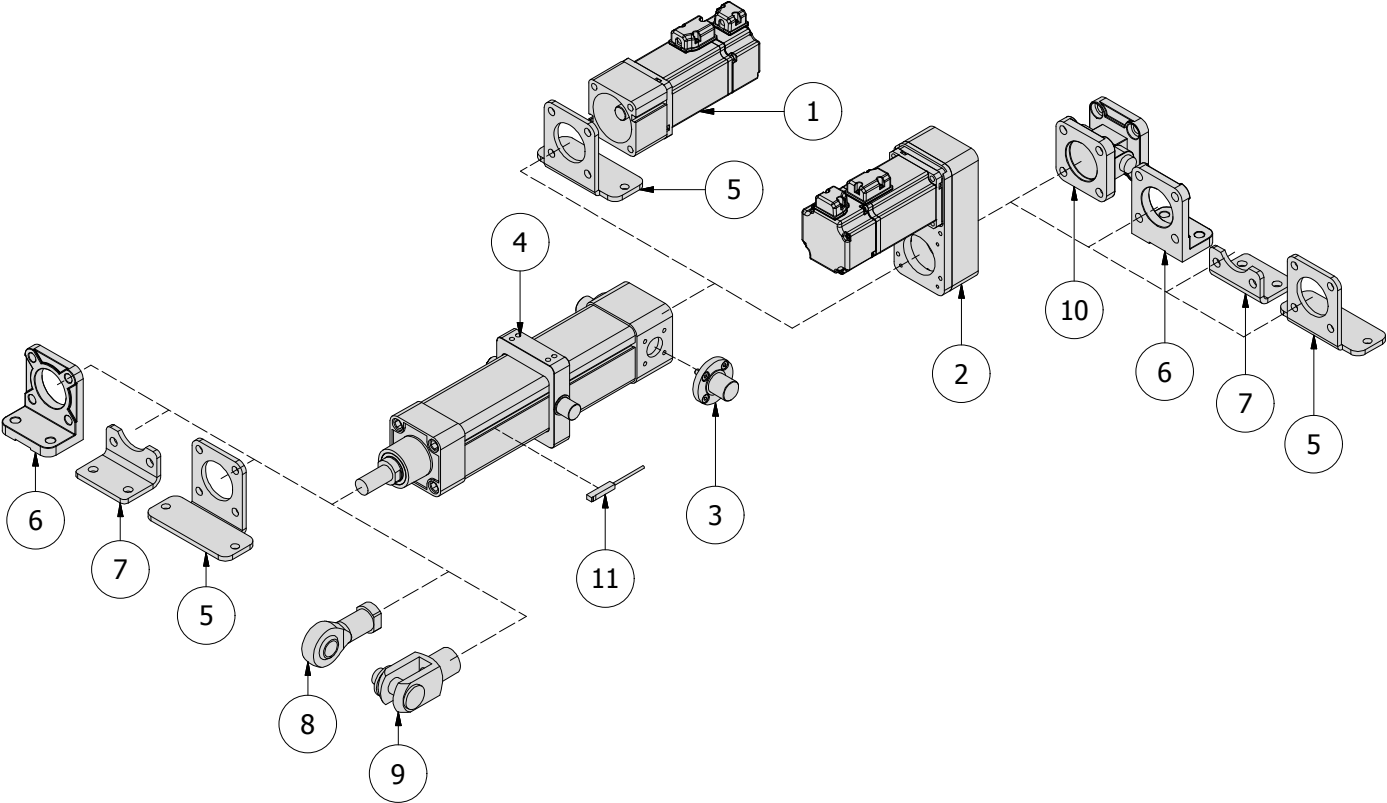
L2\*= QUOTA TO BE MODIFIED IN CASE OF INTERFACE FLANGE ADDITION:

Mech 16 = 12 mm      Mech 25 = 44 mm      Mech 32 = 54,5 mm

L3 = short motor	R2 = short motor
L4 = long motor	R3 = long motor

# Mech Line/Force Automationware

## Accessories

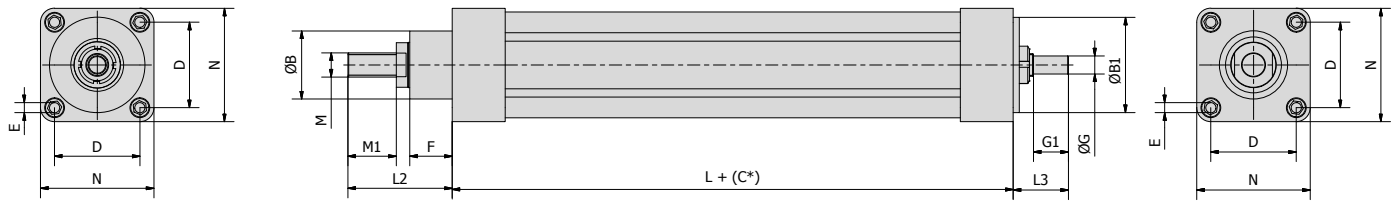


MECH LINE/FORCE ACCESSORIES

POSITION	DESCRIPTIONS
1	Direct drive Kit
2	Parallel Drive Kit
3	Lateral PIN kit
4	Lateral flange support for lateral Kit
5	wider Lateral flange support Kit
6	flange support Kit
7	Lower flange support Kit
8	Clevis rod end
9	Fork rod end
10	Backword joint swinging kit
11	effect hall sensor
Available Gearbox 3-4-5-7-10-16-20	



# Dimensions and Components



DIMENSION: Base Version, Direct drive Parallel Drive

Actuator Size	UM	Mech Line 25	Mech Line 32	Mech Line 50	Mech Line 63
Lead screw	mm	12x5-10	12x5-10	16x5-10-16	20x5-10-20
ØB	mm	-	30	40	45
ØB1	mm	22	32	50	63
D	mm	Ø26	32,5	46,5	56,5
E	mm	N°4 M3x5	N°4 M6x18	N°4 M8x15	N°4 M8x15
ØG	mm	-	20	28	28
L	mm	Ø6 h8	Ø8 h8	Ø10 h8	Ø12 h8
L2	mm	12,5	16,5	16	23,1
L3	mm	97,3	129	134	171
M	mm	24	48	41	41
M1	mm	20	25,5	27,5	36,5
N	mm	M8	M10x1,25	M16x1,5	M16x1,5
M1	mm	20	20	32	32
N	mm	32	47	65	75

\*C = Corsa

DIMENSION: Base Version, Direct drive Parallel Drive

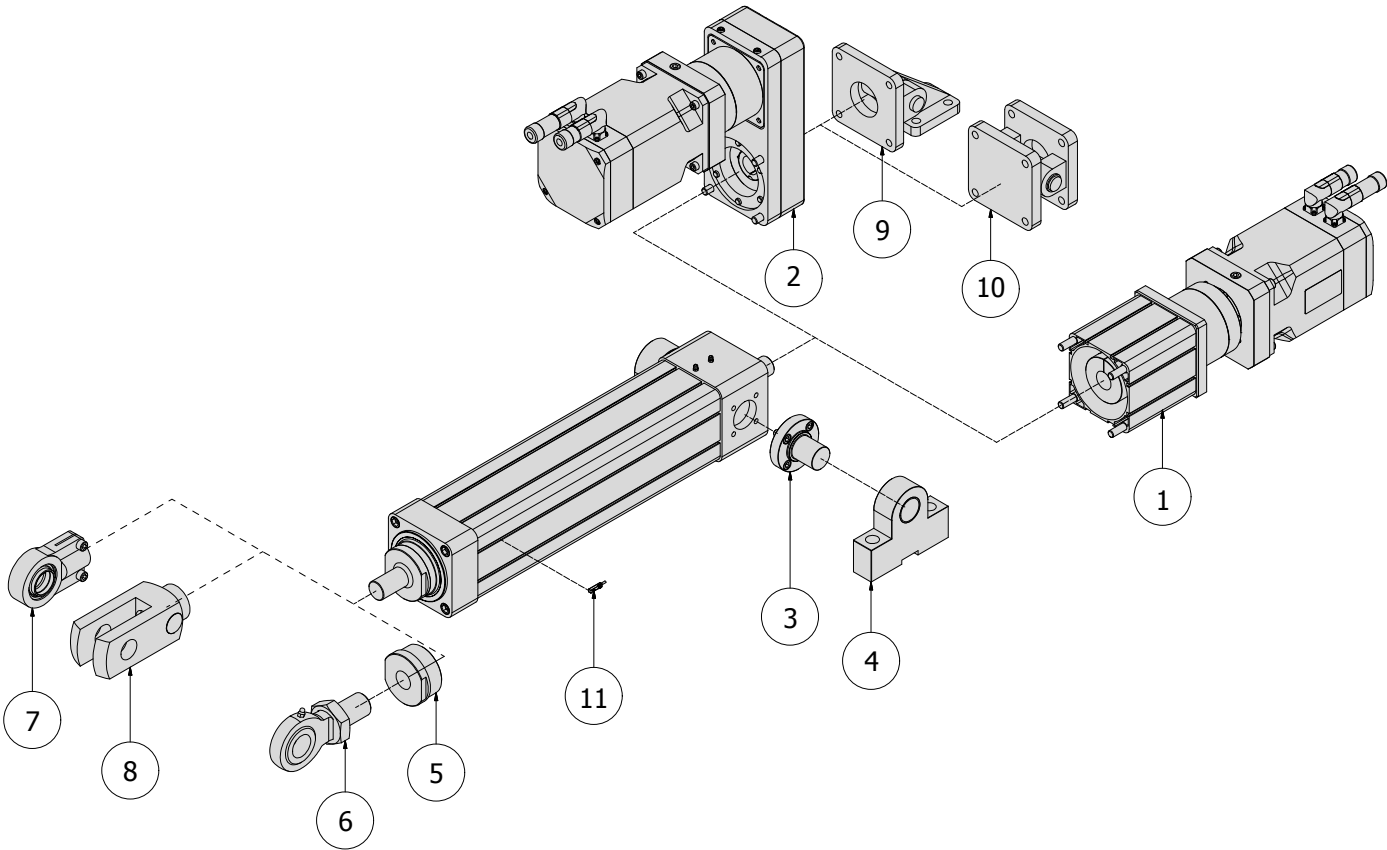
Actuator Size	UM	Mech Force 50	Mech Force 63	Mech Force 80	Mech Force 100	Mech Force 125	Mech Force 150
Lead screw	mm	20x5-10-20	25x5-10-25	32x5-10-20-32	40x5-10-20-40	50x5-10-40	63x10-16-20
ØB	mm	40	45	55	70	90	90
ØB1	mm	50	63	80	100	125	150
D	mm	46,5	56,5	72	89	Ø130	Ø130
E	mm	N°4 M8x18	N°4 M8x18	N°4 M10x20	N°4 M10x20	N°8 M10x25	N°8 M16x30
ØG	mm	3	3	3	3	3	3
L	mm	Ø12 h8	Ø14 h8	Ø17 h8	Ø24 h8	Ø32 h8	Ø32 h8
L2	mm	24,5	27	31	40,5	48	50
L3	mm	173	182	228	285	300	438
M	mm	45	55	60	70	105	95
M1	mm	34	36,4	40	52,6	61	64
N	mm	M16x1,5	M20x1,5	M20x1,5	M27x2	M30x2	M36x3
M1	mm	32	40	40	50	60	60
N	mm	65	75	95	115	135	165

\*C = Corsa

# Mech Plus

## Automationware

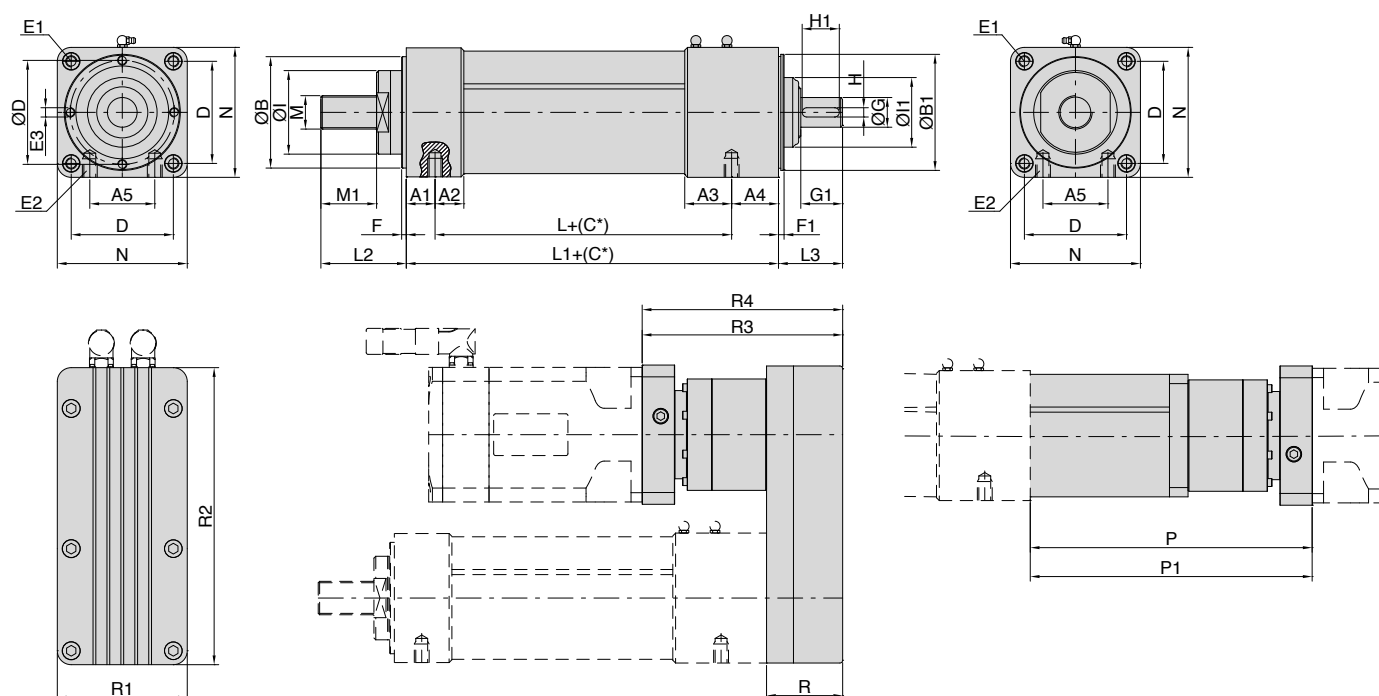
### Accessories



ACCESSORIES MECH PLUS

POSITION	DESCRIPTION
1	Direct Drive Kit
2	Parallel Drive Kit
3	Lateral Pins Kit
4	Lateral Flange Support For Pins Kit
5	Female Threaded
6	Spherical Rod End
7	Clevis Rod End
8	Fork Rod End
9	90°Backward Joint Swinging Kit
10	Backward Joint Swinging Kit
11	Hall Sensor

# Components



SUMMARY OF DIMENSION: for basic in line and parallel version

Cylinder size	UM	PLUS 050	PLUS 063	PLUS 080	PLUS 100	PLUS 125	PLUS 160	
Screw lead	mm	P10	P10	P10	P10	P10	P10	P20
A1		17	20	23	28,5	30,5	45	45
A2		17	20	23	28,5	30,5	45	45
A3		27	30	41	55,5	50,5	60	60
A4		27	30	39	47,5	50,5	60	60
A5		24	34	40	50	70	80	80
ØB		50 g6	70 g6	80 g6	100 g6	120 g6	160g6	160g6
ØB1		50 g6	63 g6	80 g6	100 g6	125 g6	160g6	160g6
D		46,5	56,5	72	89	110	140	140
ØD		45	58	71	88,8	112	140	140
E1		M8x18	M8x18	M10x20	M10x20	M12x20	M16x30	M16x30
E2		M8x10	M8x10	M12x12	M16x20	M16x20	M20x30	M20x30
E3		N°6 M4x12	N°8 M4x12	N°8 M4x12	N°8 M5x12	N°4 M10x20	N°8 M10x20	N°8 M10x20
F		3	3	5	6	6	10	10
F1		3	6	6	6	6	13	13
ØG		14 h7	16 h7	22 h7	25 h7	32 h7	35 h7	35 h7
G1		22	25	28	38	45	46	46
H		5	5	6	8	10	10	10
H1		16	20	20	36	40	40	40
ØI		40	55	65	80	90	120	120
ØI1		28	38	44	56	75	85	85
L		132	137	178	216	219,5	270	325
L1		176	187	240	292	300,5	375	430
L2		56	60	70	76	90	118	118
L3		36,5	46,5	49	63	69	80	80
M		M20x1,5	M20x1,5	M27x2	M27x2	M33x2	M42X2	M42X2
M1		35	40	45	45	60	80	80
N		65	75	100	120	140	180	180
P		157	204,5	243	283,7	302	356	363,5
P1		189	225,5	231	311,5	239,5	390,5	398
R		43	58	58	70	78	107	107
R1		65	75	100	120	139	180	180
R2		150	190	227	305	320	415	415
R3		110	152	177	211	212	264	264
R4		142	168	165	238,5	328,5	298,5	298,5

C\*= Cylinder Stroke

# Rotac Plus

## Automationware

48 65 85  
100 130 200

**Precision, structural solidity and  
positioning repeatability  
wide range of engineered solutions**

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## Supported by continuous innovation

A new range of Rotary Actuators is the complement to the range of **Automationware** products.

Renewed range on the basis of our experience in the design of custom products, allowing the adaptability for a wide range of Rotation Motion applications, also with high stiffness and high load capacity.

Various introduced novelties, such as the double bearings with shafts, the long lasting, high performance belt-drive transmission system, coupled with Pulley with 0 Backlash, micrometre regulation of the tensioning system.

The new **Rotac Plus** can be motorized by the customer, leaving the characteristics of the precision repeatability unchanged, thanks to the stability of the mechanical transmission solution.

Available in 6 sizes: **48, 65, 85, 100, 130, and 200**, they are structured in aluminium with precision processing on all surfaces, anodized and with Holes for the easy placement on all sides.





- Very good positioning repeatability
- High performance belt transmission in Kevlar Aramid with mechanic for the micrometre regulation
- Inextensible to the nominal torque also with bi-directional movement
- Precision in the positioning system coupled with Pulley with 0 Backlash
- Can be used in hostile environments (*Belt specification -30° + 100° C*)
- Wide holes for cables and connections
- Mandrel with different connection-layouts and pin references
- Optional, direct stepper or brushless motorization, or with planetary high efficiency gearbox
- Incremental encoder up to 10000 Pulse/Round. Absolute encoder (*Optional*)
- Option available on request, HPR with high resolution Encoder
- Planetary gearbox 4-6-8, or on Application-specific, available.

The use of innovative transmission techniques invalidates the expansionary and the contractive effects of the belt, giving the possibility of micrometre calibration for a very accurate and stable positioning.

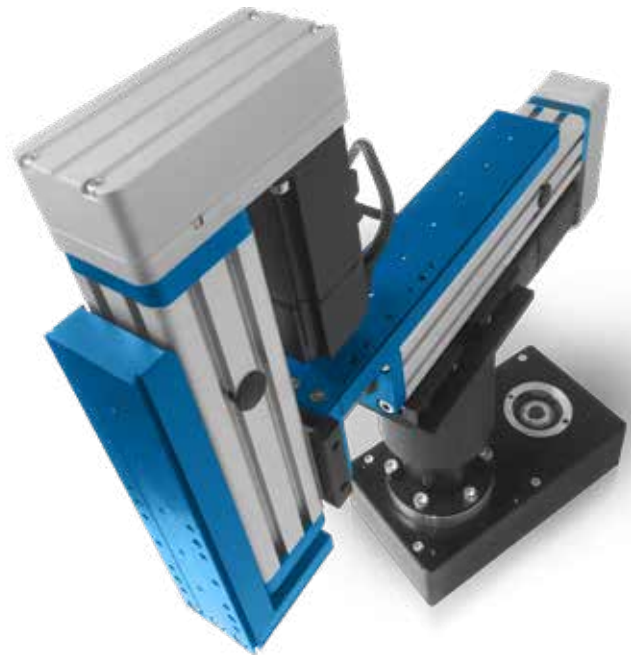
The mechanical layout ensures also with motorisations chosen by the customer a very good positioning repeatability and gives a good alternative to the complete embedded solutions.

The available motorisations are Brushless or Stepper with incremental encoder control or absolute encoder (*optional*).

The Package control Software is also available, with the possibility to program up to 64 positions (**Rotac EASY™**): Rotac can also accommodate the new **AwareVu** to control the system vibrations. (*Page 8*)

## Benefits

- **Excellent price-to-performance ratio**, alternative solution, low maintenance
- **Applicability** in situations with essential speed and accuracy
- **Versatility**. Supporting base for the **AW Mini-SCARA** configuration
- Use in hostile environments (*thermal excursions of the belt -30° a +100° C*)
- Motorisation chosen by the customer, **Brushless or Stepper AW motor** solutions with drivers and high precision encoder
- **Easy coupling** with gearboxes, motor an both surfaces
- **Configurable** with other **Automationware** products (*Linear axes or SM-series slide*)
- Control Software for the easy system programming



# Application

## Electronics production

Very useful for the positioning of the electronic components or silicon wafers. They can be coupled to Pick and Place systems, for the high precision and high speed rotation. The HPR option (*High Precision Rotac*) allows a very high positioning repeatability.

## Diagnostic and quality control

If the rotating movement can be combined with scanning systems for the quality control requiring the accurate positioning without fluctuations (*ringing*) or anomalous vibrations

## Laser Scanning

Ideal system for the installation of a laser for 2-3D applications for geographic, archaeological scanning and for reverse engineering. Possibilities for Bar code systems applications of the production or storage systems.

## Production and filling

Very useful in the production, to modulate the movement of the containers with liquid, and it is necessary to accelerate or decelerate with pre-established curves; impossible with pneumatic actuators.



## Packaging and/or Material Motion

Extremely useful for the packaging, also combined with the Automationware SM series (*high speed electric slides*), if scalable torque, high precision and positioning reliability are necessary.

## Aerospace and Defense

For the applications of "Digital Sentinel" with installation of fast cameras or laser systems to identify territory violations. They can be also used on board of aircrafts for territorial scan applications.

## Factory automation

Excellent for the industrial production chains, to find a rapid solution for eventual line problems (*glass insertion for the manufacturing application in the automotive sector*).

## Machine tools

Useful to move elements of the machine tools as support of automation systems, thanks to the high speed and precision (*manufacturing and processing machines for the production of small mechanical components such as keys and automotive components*).





# Rotac Plus

## Automationware

High Performance Rotary actuator based on a solid monolithic system, providing precise accurate and repeatable positioning.  
(Up to 70 Nm)

Micrometric  
Calibration System

### Solid Double Bearings

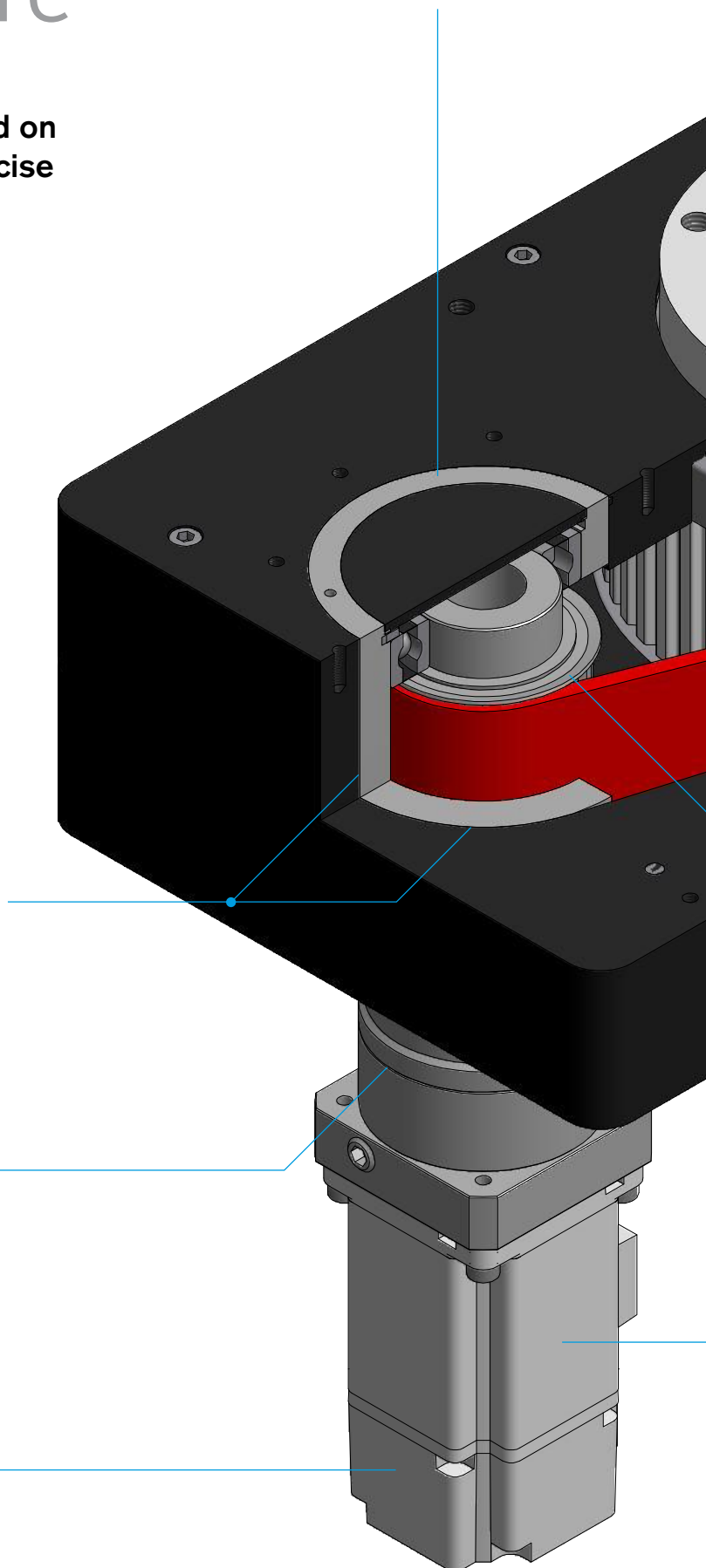
System with lubrications free  
Isolated IP65

### Planetary

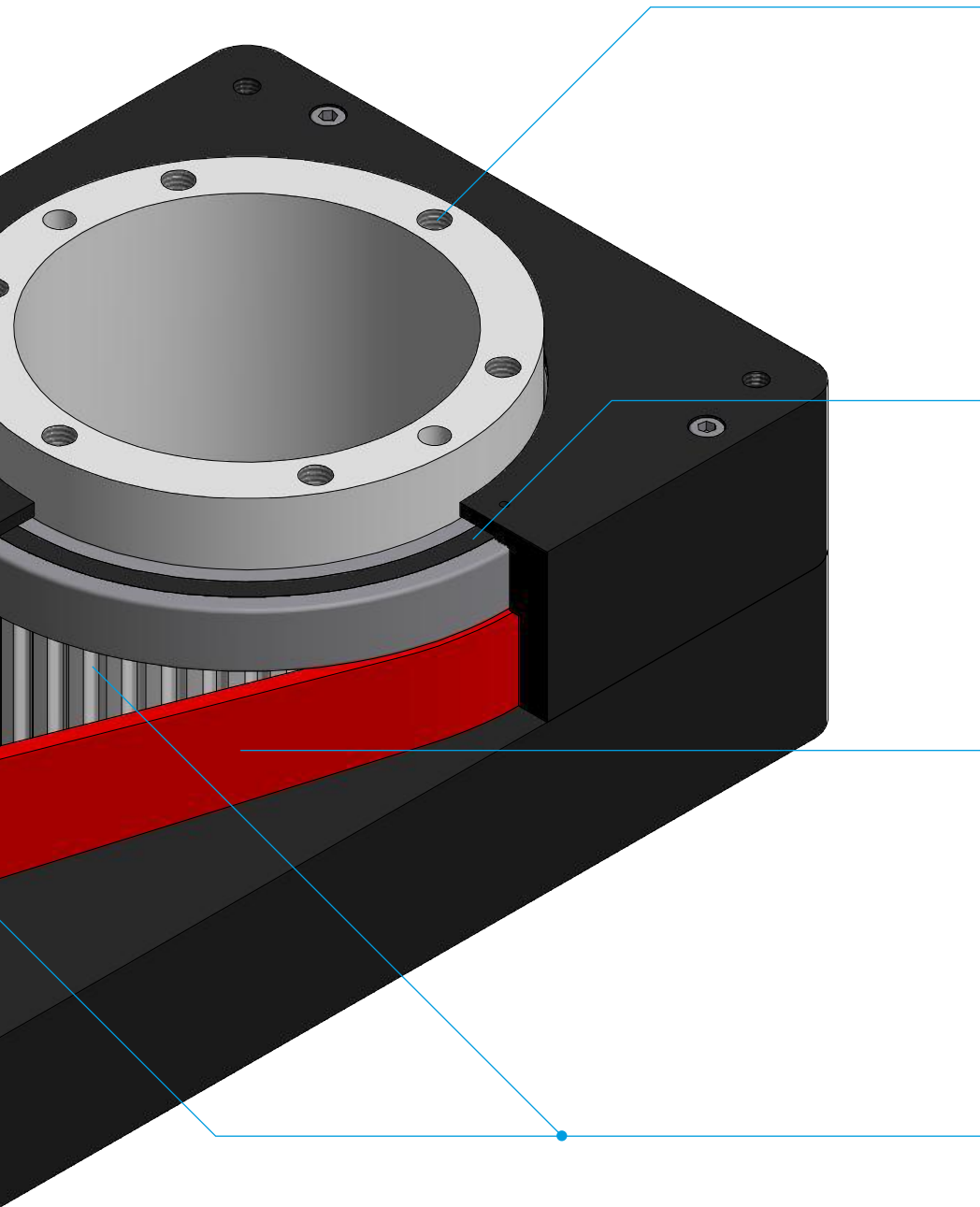
High efficiency gearbox

### Encoder

High resolution encoder for precise and accurate positioning **Option HPR** (*High Position Repeatability up to 0,002°*)







## Mandrel

with pin references and several holes for an easy connectivity to tables or accessories

## Solide Double Bearing

System with high possibility of heavy radial payload, lubrications free  
Isolated IP65

## High performance Aramid of Kevlar Belting

system, offering high level protection for Hostile environment  
(-30° + 100° C.)

## Pulley with Backlash 0

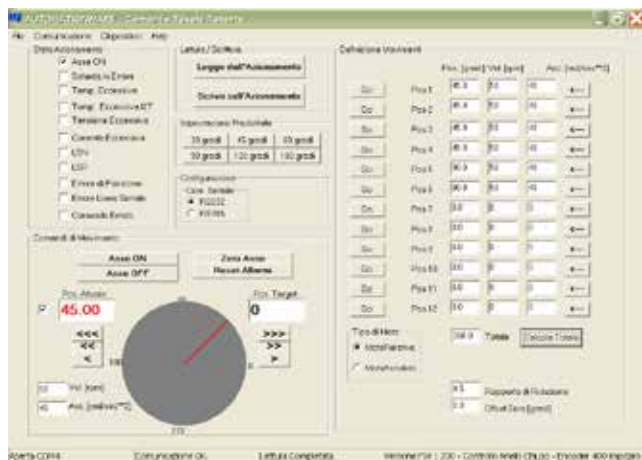
Stepper or Brushless motor driver

# Rotac Plus Automationware

## Configuration of the Rotary Actuator with the ROTAC EASY software

The control software Easy Motion can be installed on a normal PC or on a tablet, it can be connected through a normal USB interface or serial interface to the control electronics.

The main window of the Easy program is displayed in the figure above.



The control software **Easy Motion** can be installed on a normal PC or on a tablet, it can be connected through a normal USB interface or serial interface to the control electronics.

It is possible to set up 64 different positions, each one characterized by speed and acceleration.

The position data can be defined absolutely or relatively, in relation to the current position.

The selection of the controls for the different positions (*in succession or random*) allows the automatic functional simulation of the actuator.

In the figure is displayed the main window of the easy system.

This control moves the actuator to the indicated position, and gives a graphical indication of the reached position, a second method to define the position to reach, is the interactive motion of the table, the table can be moved with a clockwise or counterclockwise movement.

For each movement it is possible to set up the corresponding speed and acceleration.

The chosen position can be saved in one of the 64 positions in the cabinet.

A third method to define the positions is possible, if these are increasing remote each other; in this case with only one control on the cabinet “**default settings**”, all movements for a 360°-rotation of the actuator can be set up. (*Ex. selecting 45° it is possible to select 45° from Pos. 1 to Pos. 8*).

When the configuration has been made, the different positions can be recalled and controlled through the available digital I/O from the drive.



## AwareVu™

**Automationware** considers the new **market trends ind. 4.0**, develops a new control platform called **AwareVu**.

The new product can be applied on each Rotac or combined with other **Automationware** components to control the vibration profile of the system during the processing cycle, activating an alarm in case of malfunction.

The alarm can be visible through a local LED light or recognised via Wi-Fi in the machine computer on the **AW application**.

# Models and Specifications

## Stepper : ROTAC PLUS - Hollow Rotary Actuator

Description	Nm	1,2	3	3,6	9	22	40
Maximun Torque	Nm	1,2	3	3,6	9	22	40
Belt Ratio	ic	3	3	2,5	3	3	3
Motor Type/Model STEPPER (450rpm)	Nm	0,4 -Nema 17	1,0-Nema 23	1,8-Nema 23	3,0-Nema 24	7,0-Nema 34	12,8-Nema 34
Encoder Resolution	Pulses/Round	10000	10000	10000	10000	10000	10000
Motor Inertia	kgcm2	0,05	0,48	0,48	0,84	2,00	2,90
Max Output speed	rpm	150	150	180	150	150	150
Max load inertia	kgcm2	4,86	43,2	30	75,6	180	261
Permissive Thrust Load	N	860	880	1360	2560	4000	7800
Position repeatability	°	0,012	0,012	0,012	0,012	0,012	0,012
Position repeatability (Option HRP-S)	°	0,006	0,006	0,006	0,006	0,006	0,006
Hall Home Sensor	-	PNP	PNP	PNP	PNP	PNP	PNP
Driver Control Model	-	AW DPC 48	AW DPC 48	AW DPC 48	AW DPC 48	AW RS	AW RS
Software & Network	-	Easy Rot	Easy Rot	Easy Rot	Easy Rot	Easy Rot	Easy Rot

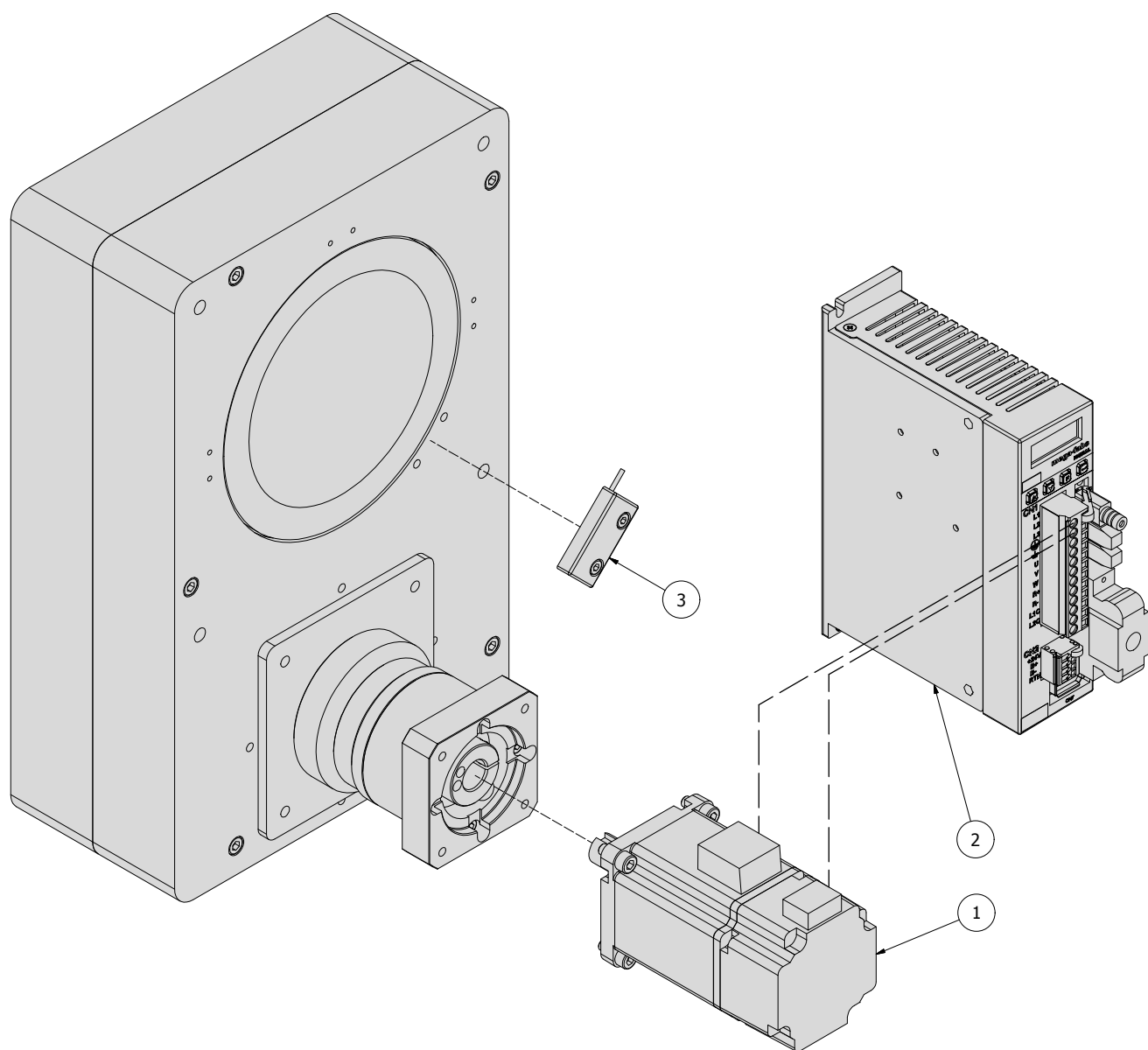
## Brushless : ROTAC PLUS - Hollow Rotary Actuator

Description	MU	Rotac 48	Rotac 65	Rotac 85	Rotac 100	Rotac 130	Rotac 200
Maximun Torque	Nm	1,2	3	3,6	9	22	70
Belt Ratio	ic	3	3	2,5	3	3	3
Planetary Gearbox	-	/	/	AWRL50	AWRL50	AWRL70	AWRL90
Gear Ratio	ig	/	/	4-6-8	4-6-8	4-6-8	4-6-8
Motore Type/Model Brushless (1000rpm)	W	200	400	400	400	750	1000
Max Torque vs ratio factor	Nm	0,47	1,18	0,42-0,28-0,21	0,88-0,58-0,44	2,1-1,4-1,1	6,9-4,6-3,4
Motor Inertia	kgcm2	0,177	0,277	0,277	0,277	1,13	8,41
Max Output speed	rpm	1000	1000	300-200-150	250-165-125	250-165-125	250-165-125
Max load inertia	kgm2	0,0016	0,0025	0,028-0,062-0,11	0,04-0,09-0,16	0,163-0,366-0,65	1,21-2,72-4,84
Position repeatability (res. 2000 i/g)	°	0,06	0,06	0,018-0,012-0,009	0,015-0,01-0,008	0,015-0,01-0,008	0,015-0,01-0,008
Position repeatability (Option HRP-B)	°	0,012	0,012	0,004-0,002-0,002	0,003-0,002-0,002	0,003-0,002-0,002	0,003-0,002-0,002
Backlash	°	0	0	0,008-0,006-0,004	0,007-0,005-0,003	0,007-0,005-0,003	0,007-0,005-0,003
Permissive Trust Load	N	860	880	1360	2560	4000	7800
Hall Home Sensor	-	PNP	PNP	PNP	PNP	PNP	PNP
Control Driver	-	AW RB	AW RB	AW RB	AW RB	AW RB	AW RB
Software & Network	-	Easy Rot	Easy Rot	Easy Rot	Easy Rot	Easy Rot	Easy Rot

# Rotac Plus

## Automationware

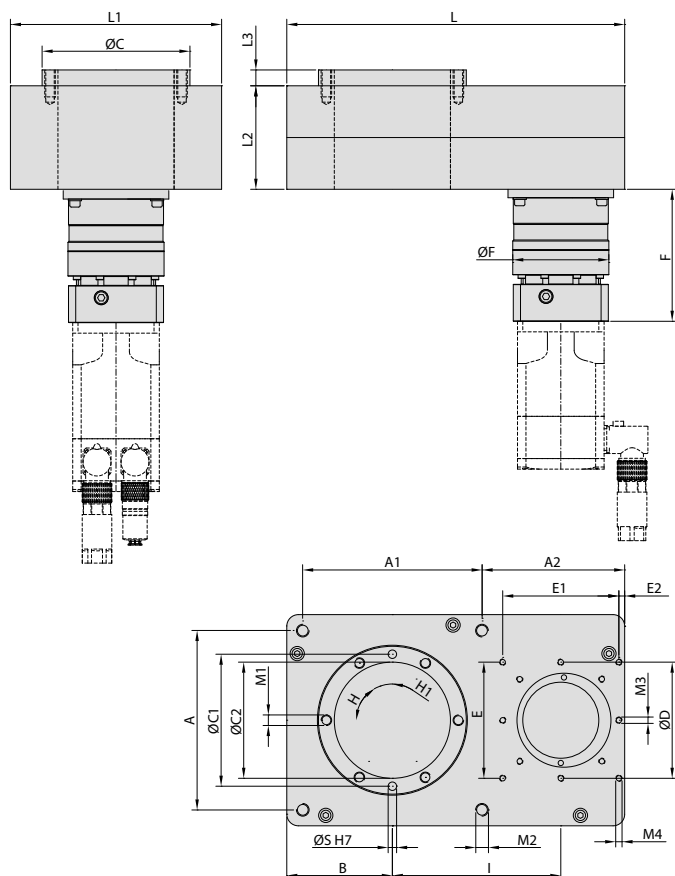
### System Accessories



AVAILABLE OPTIONS ROTAC PLUS

POSITION	DESCRIPTION
1	Motor and Encoder (Stepper or Brushless)
2	Electronics Control
3	Hall Effect Sensor

# Components



DIMENSIONS: Rotac Plus Series

Rotac Plus	MU	Rotac 48	Rotac 65	Rotac 85	Rotac 100	Rotac 130	Rotac 200
INPUT SHAFT	mm	5	8	12	12	16	22
A	mm	40	50	70	80	110	170
A1	mm	40	50	70	80	110	170
A2	mm	45,5	70	52,5	95	93	135
B	mm	24,5	35	42,5	50	67	100
ØC	mm	40	58	70	75	100	140
ØC1	mm	32	50	62,5	65	90	125
ØC2	mm	16	25	30	55	80	110
ØD	mm	-	-	-	-	79	110
E	mm	-	-	45	50	70	-
E1	mm	-	-	40	50	70	-
E2	mm	-	-	7,5	17	13	-
F	mm	*F	*F	*F	*F	*F	*F
ØF	mm	-	-	50	50	70	90
H	mm	60°	60°	60°	60°	60°	60°
H1	mm	30°	30°	30°	30°	30°	30°
I	mm	42	62,7	60	94	100	159,5
L	mm	90	130	130	185	215	320
L1	mm	48	65	85	100	130	200
L2	mm	28	28	30	48	63	78
L3	mm	10	12	13	12	10	15
M1	mm	N°6 M4x8	N°6 M5x10	N°6 M4x10	N°6 M6x12	N°6 M8x16	N°6 M10x25
M2	mm	N°4 M4x12	N°4 M5x12	N°4 M6x12	N°4 M6x12	N°4 M8x16	N°4 M12x25
M3	mm	-	-	-	-	N°4 M5x10	N°8 M6x12
M4	mm	-	-	N°4 M4x12	N°4 M4x12	N°4 M5x10	-
ØS H7	mm	N°2 4x5	N°2 4x5	N°2 4x10	N°2 5x12	N°2 6x12	N°2 8x12

\*F = Force according with GearBox reduction



# AW Solution System

## Automationware

25 32 50 63

**Innovative and modular solution for a modern handling or Pick & Place engineering.**

**It provides AwareVu™ Ind. 4.0 diagnostic.**

---

## Customer talk we listen ....

We always listen and anticipate customer needs, to solve definitely a wide variety of high-output application, to help advanced Mechatronic Systems designers find innovative solutions on the market.

The SM series enhances the **Automationware** product families (*axes, cylinders, electric rotary tables*) and integrates technologically giving a series of solutions on the market for highly efficient handling or pick and place.

Nowadays many customers use for such application mixed systems, electric and pneumatic, fitting them with electronic regulating and control devices to improve the movement and the control (*Ind. 4.0*).

Notwithstanding these efforts, manoeuvrability and accuracy are often limited.

In addition, the monitoring of the reproductive cycle doesn't have the **Ind. 4.0** feedback for the forecasting of eventual malfunctions.

The manoeuvrability or the regulation is extremely expensive, complex and inadequate for eventual, requested shape variations.

Some manufacturers have changed their pneumatic systems, providing them with linear motors, improving some of these technological limitations; but running into other contraindications, such as high costs or the impossibility of operating at extremely high loads or in environments with high concentrations of dust or processing residues.

**Automationware**, leader of Mechatronic-based components, designs a series of products for a definitive, reliable, precise and economic solution on the market; for the construction of high-performance Cartesian systems.

Furthermore many improvements have been made; the complete control possibility of the manufacturing process (*force, temperature and vibrations*) for high tech Real-Time Diagnostic. (**AwareVu™ Patent pending**).

The SM series is composed of modular linear sliders, controlled by very high performance brushless motors.

The SM slides are available in 4 versions (25-32-50-63) for variable loads, stroke and speeds, also with high payloads.

The movement and the positioning are completely electronically controlled and ensure accuracies up to 0,01mm, with the complete control and modelling of the motion cycle.

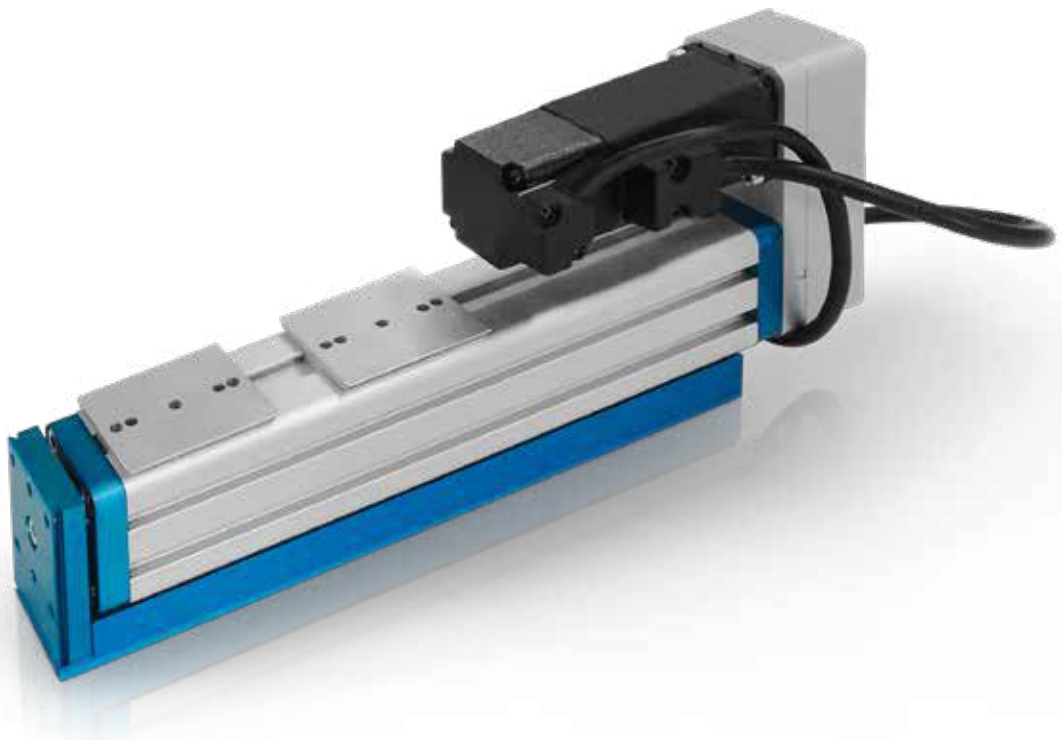
The used first class mechanic technologies derive from the extensive experience of **AW** uniting mechanic and advanced electronic, to reach speed and high load movement, impossible for pneumatic systems and very critical for linear motor systems.

The system is completed by **Ind. 4.0** diagnostic, called **AwareVu** for the manufacturing cycle monitoring, highlighting real-time the anomalous vibrations of the manufacturing cycle, alerting the local monitoring and transmitting the functioning and frequency parametric trends to the control system (*Cloud*).

- **4 formats, 25-32-50-63**, completely motorized with high performance Brushless
- **Stroke up to 420 mm**, adaptable speed to the requested load
- **Speed up to 2 m/sec, acceleration up to 3g**, highest applicable force 3kN
- **Accuracy up to 0,01 mm**, positioning repeatability irrelevant to the load
- Movement mechanic (*slides, guides and screws*) studied for high acceleration (*3g*)
- Motion planning by software. **TRIO option** for complex trajectories
- Reduced maintenance, real-time diagnostic systems (**AwareVu**)
- **Various configurations**, MiniScara solution, adaptability with AW screw-axes or belt axes
- **Grippers or vacuum accessories** to complete the application.

## Benefits

- Valid alternative to pneumatic systems, **simplifying project cycles**
- Valid alternative to linear motor systems, **cost reduction and performance improvement**
- **Limited dependence on applied load, positioning accuracy and adaptability** in dusty environments with industrial manufacturing
- **Programmable motion curves** (*highly useful for liquids and/or delicate materials*)
- **Complete cycle control**, format change, reconfigurations
- **Minimal normal maintenance**, no calibration
- **High productivity**, more than 100 cycles in a minute



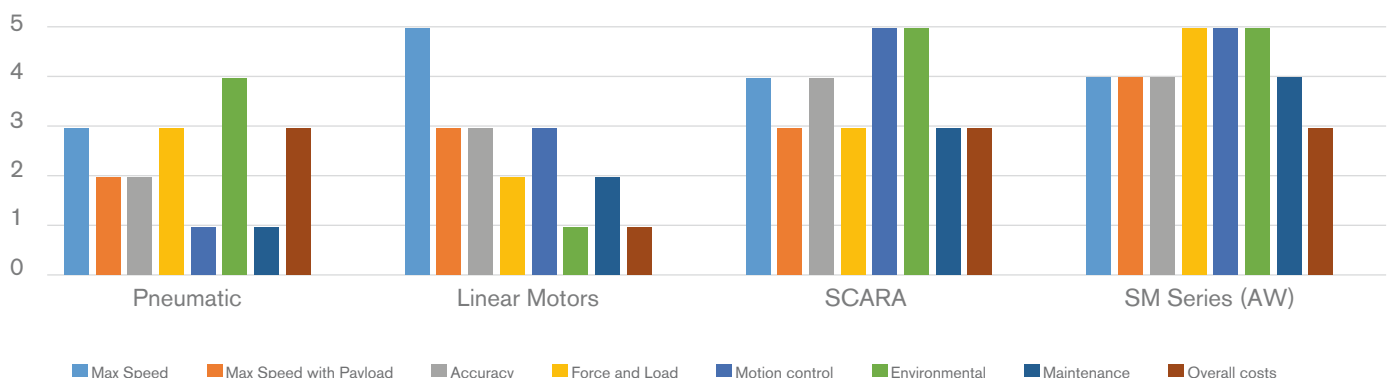
# AW Solution System

## Automationware

### Criteria for Technological Choice

Pneumatic...  
Linear Motor... SCARA...  
or SM Automationware?

Comparison bewteen Fast Handling Systems



	Pneumatic	Linear Motors	SCARA	SM Series (AW)
Max Speed	3	5	4	4
Max Speed with Payload	2	3	3	4
Accuracy	2	3	4	4
Force and Load	3	2	3	5
Motion control	1	3	5	5
Environmental	4	1	5	5
Maintenance	1	2	4	4
Overall costs	3	1	3	3
Total Evaluation	19	20	31	34

5 Max Value - 1 Min Value

In the table above, we have indicated some essential characteristics for our customers (*Voice of Customers*), to choose the right technology for their new **Handling** or **Pick&Place** projects.

For **AW** is the voice of customer essential for our internal engineering ideas, so we project to give a solution for customer questions.

In this table we meticulously compared the different available technologies, to better represent the differences between the different solutions.

(5 for the maximum performance and 1 for the minimum performance).

**Maximum unloaded speed:** this parameter indicates the maximum speed capability.

As shown in the graph below, the linear motors allow superior speed and acceleration to each available system.

**Maximum loaded speed:** in case of operating cycle, the systems with linear motor decrease the general productivity depending on the payload.

The load inertia causes unwanted oscillations while positioning, with consequent impact on productivity.

The pneumatic systems rarely exceed 75 cycles per minute and are very vulnerable to compressor pressure variations.

The performance of **SCARA** is very good, but limited according to the applicable max. load (*small systems*).

**The SM series** is not influenced by the load, the motorized mechanical movement allows, at maximum speed, thrust up to 3kN.

**Accuracy:** extreme vulnerability of the pneumatic systems, they need a considerable accessory planning to give precision and repeatability guarantees.

The systems with linear motors react to ringing positioning in case of operating loads, oscillating at the destination.

**SCARA** and **SM** offer an excellent position reliability in all conditions.

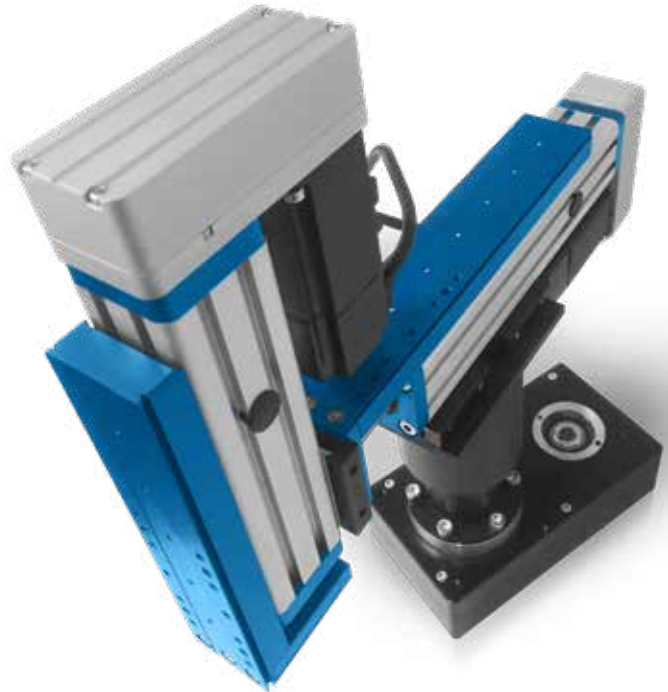
**Loading force:** the **SM** series derives from the consolidated experience of Automationware in designing and building high-performance actuators (*up to 190kN*); so in the case of the sliders this technology is used to give the best performance on the market.

**SCARA** can handle relatively higher loads, but their cost increases significantly.

The pneumatic is inappropriate for high loads, the linear motors increase considerably their cost changing the operative payload.

**Motion control:** very difficult for pneumatic systems (*also for little modulations they need a very complicated planning*), they are so not to choose for format changes.

The linear motors can have a very good motion control, but limited by modest loads. **SCARA** and **SM** allow an optimal manoeuvrability, the **SM** series has also the suite software for the motion modulation. (**TRIO system**).



**Working environment:** pneumatic systems can be influenced by pressure variations, the initial factory calibration should be adjusted during the installation remote phase. The linear motors are vulnerable to weather changes, they can also begin to seize, if not protected from processing residues (*water, dust, metal powders*). No problem for **SCARA** and **SM sliders**.

**Maintenance:** very important for pneumatic systems that often require frequent calibrations.

The maintenance cost-impact of pneumatic systems is frequently ignored by the manufacturers.

However the advent of **SCARA** and of the electronic controlled movements, such as the **SM series**, offer nowadays a valid alternative.

The **SM** series allows a better integration with axes and electric actuators that can be connected to the application, keeping the total cost of ownership low.

The **AwareVu** diagnostic system makes the installed configurations controllable in real time, thereby avoiding production blackouts.

**Cost:** the total cost of the chosen solution must also be considered with the installation and maintenance costs, that are on average 10 times higher than the configuration costs.

The planning of the **SM** series is designed for the best price/performance combination, without prejudice on productivity or applied load.

# AW Solution System

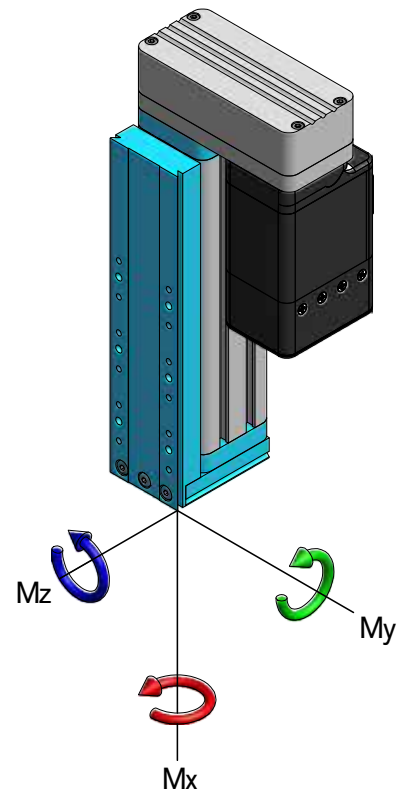
## Automationware

### The SM series

Offers an ideal solution, particularly to give the right price at the best performance.

Optimal for P&P applications thanks to its exceptional speed and acceleration to reach up to 2 m/sec with productivity over 100 cycles/minute.

### Models specification and correspondent Table for applicable loads



**Table :** Specifications of SM Sliders

Actuator	Screw		Stroke	Fx.max.	Fx Nom	Max Speed	Acceleration	Motors Specs	Encoder Res.	Accuracy	Mx	My	Mz	Cdyn
Size	Diam. (mm)	Lead (mm)	mm	N	N	mm/s <sup>2</sup>	m/s <sup>2</sup>	Nm - rpm	Pulse/round	mm	Nm	Nm	Nm	Nm
SM25-BR1	12	5-10	60-120-180	250-125	200-100	375-750	7,5-25	BR1 0,32 Nm-4500rpm	10.000	+/- 0,01	9,5	23,4	23,4	2010
SM32-BR1	12	5-10	60-120-180-240	250-125	200-100	375-750	7,5-25	BR1 0,32 Nm-4500rpm	10.000	+/- 0,01	9,5	23,4	23,4	2010
SM50-BR2	16	5-10-16	120-180-240-300	470-235-145	376-188-116	375-750-1200	7,5-15-25	BR2 0,64Nm-4500rpm	10.000	+/- 0,01	21	46	46	3290
SM63-BR3	20	5-10-20	120-180-240-300-420	1000-500-250	800-400-200	375-750-1500	7,5-15-30	BR3 1,27Nm-4500rpm	10.000	+/- 0,01	44,3	76,7	76,7	5480

#### Moments of Inertia Calculation

		SM25			SM32				SM50				SM63				
Stroke	[mm]	60	120	180	60	120	180	240	120	180	240	300	120	180	240	300	420
Slider Weight	[Kg]	0,6	1	1,2	1,2	1,6	1,94	2,28	2,8	3,35	3,9	4,45	4,1	4,74	5,42	6,11	7,46
In Motion Weight	[Kg]	0,35	0,45	0,55	0,59	0,75	0,9	1,06	1,54	1,8	2,06	2,33	2,32	2,66	3	3,34	4,02
M. Inertia Screw	[Kg mm <sup>2</sup> ]	0,46	0,71	0,96	0,46	0,71	0,96	1,22	4,7	6,3	7,9	9,6	11,4	15,5	19,5	23,5	31,6
Lead	Moments of Inertia @ Payload Ø	Moments of Inertia @ Payload Ø			Moments of Inertia @ Payload Ø				Moments of Inertia @ Payload Ø				Moments of Inertia @ Payload Ø				
[mm]	[Kg mm <sup>2</sup> / Kg]	[Kg mm <sup>2</sup> ]			[Kg mm <sup>2</sup> ]				[Kg mm <sup>2</sup> ]				[Kg mm <sup>2</sup> ]				
5	J=0,63 x Payload(kg)	0,29	0,45	0,61	0,83	1,19	1,53	1,89	5,68	7,44	9,21	11,08	12,87	17,19	21,40	25,62	34,15
10	J=2,53 x Payload(kg)	1,35	1,85	2,35	1,96	2,61	3,24	3,91	8,60	10,86	13,12	15,50	17,28	22,24	27,10	31,96	41,79
16	J=6,47 x Payload(kg)								14,69	17,98	21,26	24,71					
20	J=10,13 x Payload(kg)												34,92	42,46	49,91	57,35	72,35



# Simulation models for operating cycles

The graphs below show the cycle times for different P&P combinations.  
*(Based on the 4 formats 25-32-50-63)*

The productivity estimate in cycles/s are referable to different load examples.

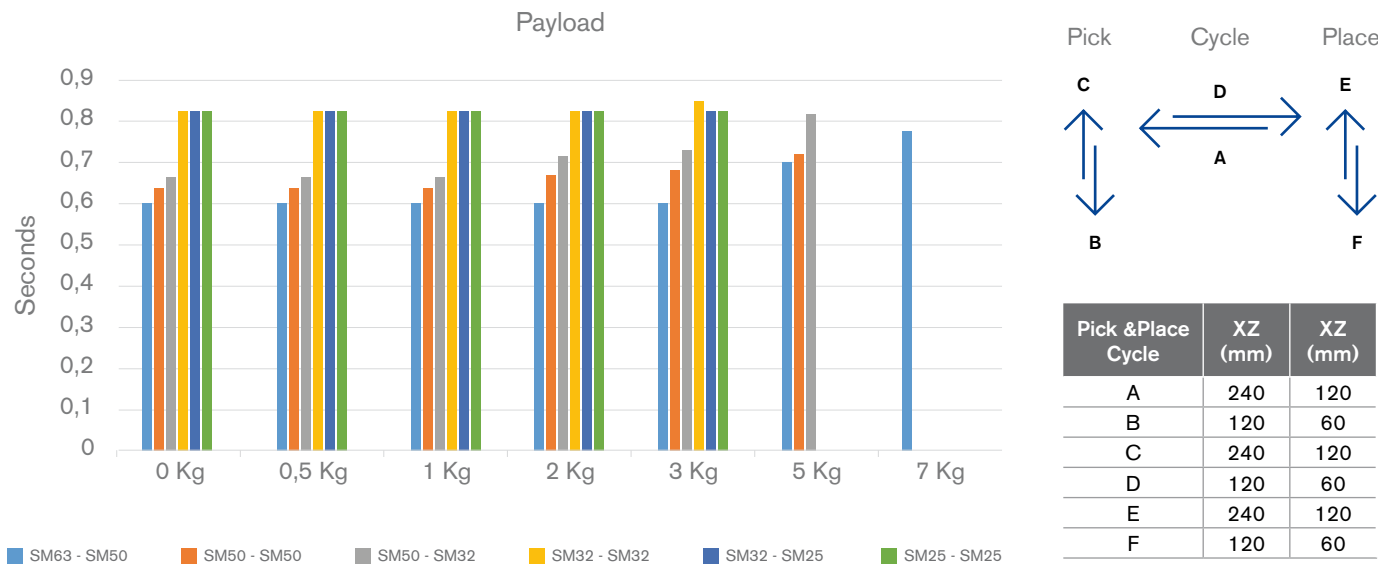
The evaluations are made with X=120 o 240mm and Z=60 o 120mm stroke, (6 phases).

This analysis is recommended in the system planning phase, to define the best possible configuration and optimise productivity and construction costs.

## Examples of P&P cycles based on SM sliders with X=240, Z=120 mm



## Example of P&P cycle based on SM sliders X=120, Z=60 mm



# Applications

## Electronic / Mechanical production

With Pick&Place for mounting mechanical or electronic components, also configurable with linear axes or Rotac Plus rotary actuators.

A wide range of grippers or vacuum accessories is also available for each need.

## Quality control system

For liquid materials or products, with probes positioning for Quality Inspection.

High speed and accuracy in the positioning.



## Manufacturing

*(Food and Beverage)*

Possibility to control, the acceleration and positioning

Very useful to prevent spillage of expensive liquids in high productivity situations *(Pharma)*.

## Packaging and /or material movement

Optimal solution for packaging systems  
Also combined with linear axes for high speed & long-distance movements.



## Printing & Labelling

High speed solution with low construction costs.  
Different accessories for height-adjustable positioning for different applications.

P&P combinable with the rotary actuator *(Miniscara configuration)*.

## Factory automation

The definitive solution for production without the use of pneumatic.

Excellent productivity, low maintenance, integrated diagnostic system to avoid production-blackout.

Simplification of the design, helping the realization with low maintenance costs.

## Medical & Pharmaceutical/ Laboratory Automation

Perfect for probing, to use with delicate applications such as biological tests, diagnostic tests, or pharmaceutical packaging.

The **AW** solution guarantees great reliability and precision,

greater process control with manufacturing-cycles storage, thanks to the **AwareVu** diagnostics.

The hygienic integrity is ensured by the slide insulation, allowing the operating in controlled-contamination environments.



# AW Solution System

## Automationware



## Automation and control of the SM series: AW EASY™ application Trio Motion application

**Market Ahead solutions for  
the movement, control and  
Ind. 4.0 diagnostic of mechatronic  
components**

---

The SM series is with high-performance **Brushless motor** motorized, has controller driver and can be easily programmed **using our Easy™ application**.

We also offer an additional application: **TRIO (Control Hardware and software solutions for movement management)**, for advanced interpolated motion (2 – 128 motion controls available for multi-axes applications).

The motor drivers need the incorporated **E-Cam** connection for the easy movement synchronization.

We also can offer drivers for different standard communication protocols, such as **CANopen**, **DMCNET**, **EtherCAT**, with high performance capabilities, allowing an easy integration in the overall system.

The full-closed loop control system has an **auto notch filter** with vibration suppression also in high productivity conditions, to avoid unnecessary vibrations and make the system more robust and stable.

The 17-bit encoder guarantees high positioning accuracy, maintaining a precision of 0,01 mm.

## Trio application

**AW** has integrated into the **SM** series the possibility to provide a programming kit called **TRIO**, optimal for coordinated motion-programming, also for the **SM** series difficult configurations.

This application allows the easy programming, importing from CAD/CAM planned motions and minimizing realisation time of the desired motion.



### Motion Perfect system

A single programming interface to monitor and co-ordinate up to 128 axes or actuators.

**Motion Perfect** is planned to define the motion profiles and to activate and test the verification systems.

**Motion Perfect** uses an easy Windows-based interface for a simple and fast application development.



## TrioBASIC

The programming language called **TrioBASIC** is simple and intuitive, it is also extremely reliable, thanks to its large-scale on the automation market.

**TrioBASIC** can work with multitasking-applicability, allowing the inserting of subroutines to use for different application configurations.

The readability of programming syntax is very similar to the well-known and used **BASIC**.

## IEC61131-3

In this system is used a logic real time controller **IEC 61131**.

This development environment is very common for the mechatronic applications and it is used in the systems for modern industrial controls.

# Configuration SM slided, using Easy™ software application

The **Easy control software** can be installed on PC or Tablet and can be connected through an USB interface or serial interface to the control electronic.

In the following figure is highlighted the main **Easy-program** menu.

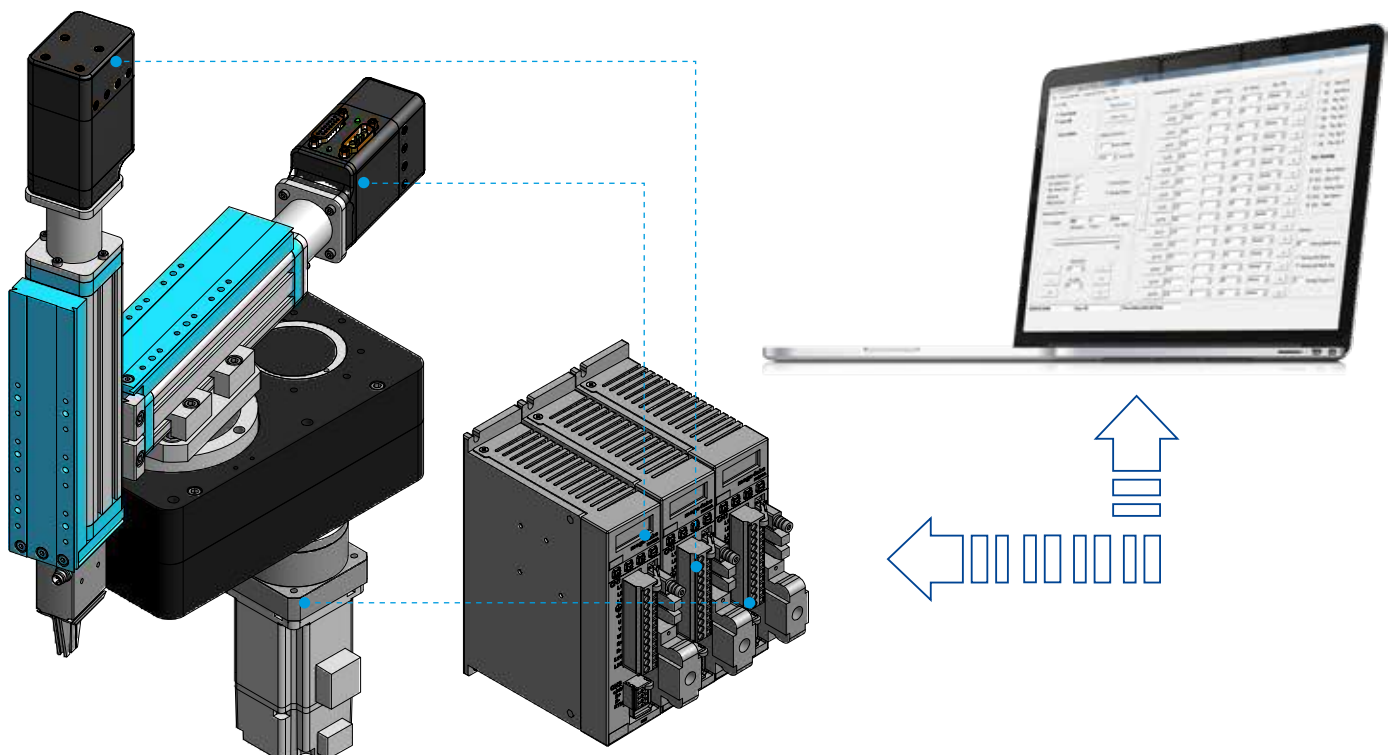
It is possible to set up 64 different positions, each one characterized by programmable speed and acceleration. The position data can be defined absolutely or relatively, in relation to the current position.

The selection of the controls for the different positions (*in succession or random*) allows the automatic functional simulation of the actuator.

This control moves the actuator to the indicated position, and gives a graphical indication of the reached position.

The chosen position can be saved in one of the 64 positions in the cabinet.

Once the configuration is saved, each position may be reached through digital I/O available on the electronic driver and eventually connected with the local PLC or computer.





# AW Solution System

## Automationware

### AwareVu™ system, for Ind. 4.0 diagnostic

A very efficient system  
to detect anomalies during  
the production process.



## AwareVu™

AW developed an innovative diagnostic system called **AwareVu™** (Patent Pending); it allows the complete system monitoring with temperature and vibration control, to identify possible variations of the production cycle and / or possible malfunctions.

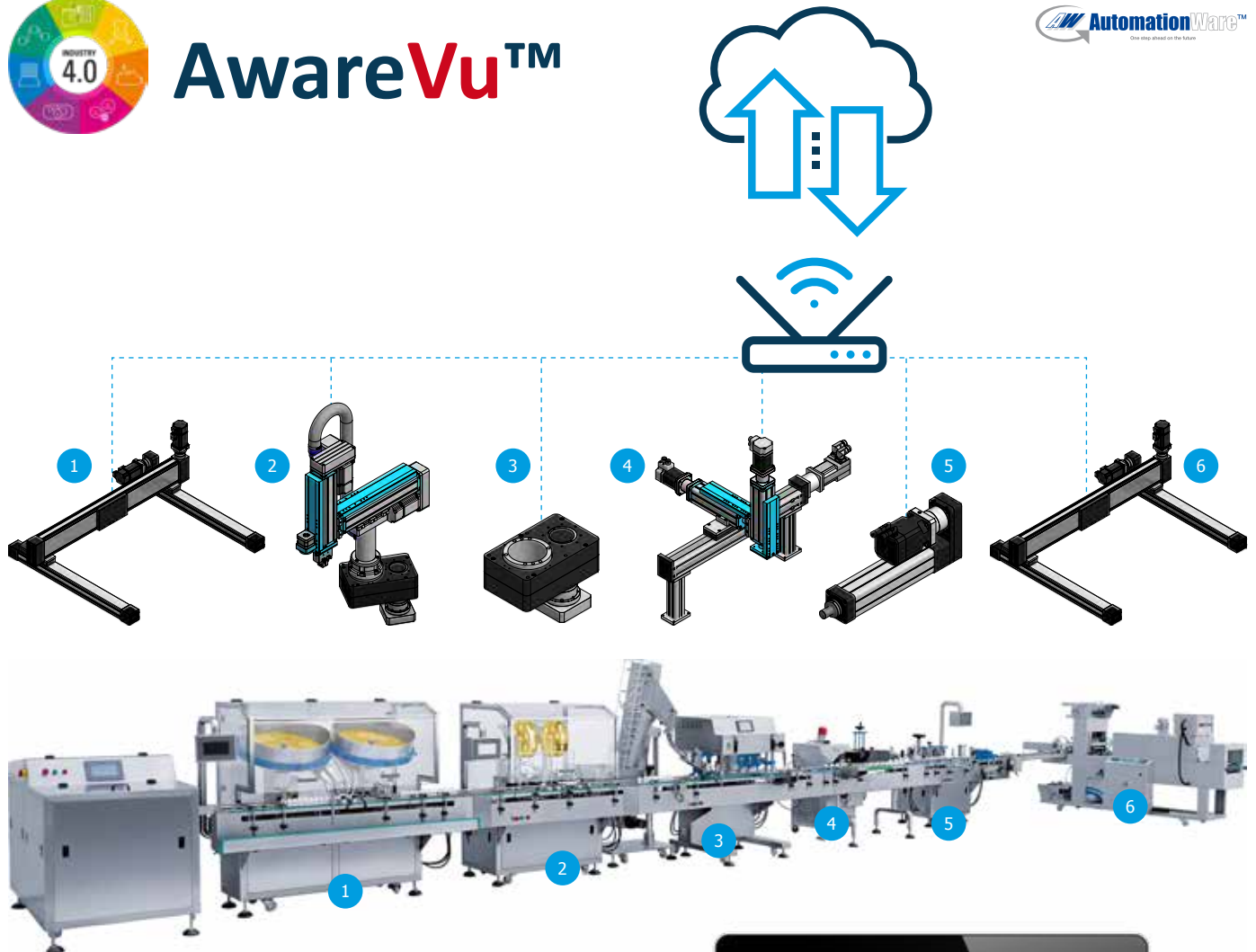
The system is able to determine the local alarm (*lighting alarm*), and it is connected to the net via WIFI or via USB, to allow data recording and storing in the central computer or in cloud.

The system has also applications for Mobile Phones or Tablet, to alert the maintenance operators about eventual malfunctions.

The operator has the possibility to display on a single screen data, parameters and alarms.

The system acquires and processes signals from vibration and temperature sensors, it represents the frequency profile (*Fourier*), determining established thresholds; the customer will be advised about unusual vibrations or high-temperature vibrations (*also for individual system components*).





## Table Configuration Sliders SM

Version : SM 25 | 32 | 50 | 63

	SM-	32-	10-	120-	BR1-	MP-	1
PRODUCT	SM						
SIZE	25-32-50-63						
LEAD mm	SM25 (5-10), SM32 (5-10), SM50 (5-10-16), SM63 (5-10-20)						
STROKE mm	SM25: 60-120-180, SM32: 60-120-180-240, SM50: 120-180-240-300, SM63: 120-180-240-300-420						
MOTOR TYPE	Brushless Only ( - BR0, BR1, BR2, BR3)						
DIRECT - PARALLEL	Without Motor (0) - Direct Drive (MD) - Parallel Drive (MP)						
HOME SENSOR	Type of Hall sensors 1 included - (1 end switch - 2 end switch Optional)						

# SM Series™ Automationware

- Max speed up to 2 m/s
- Accuracy +/- 0,01 mm
- Max Fx Force 3000 N

## Brushless Motor

High Performance Brushless Motor with 17 bit resolution encoder, direct or parallel drive

## Cylinder

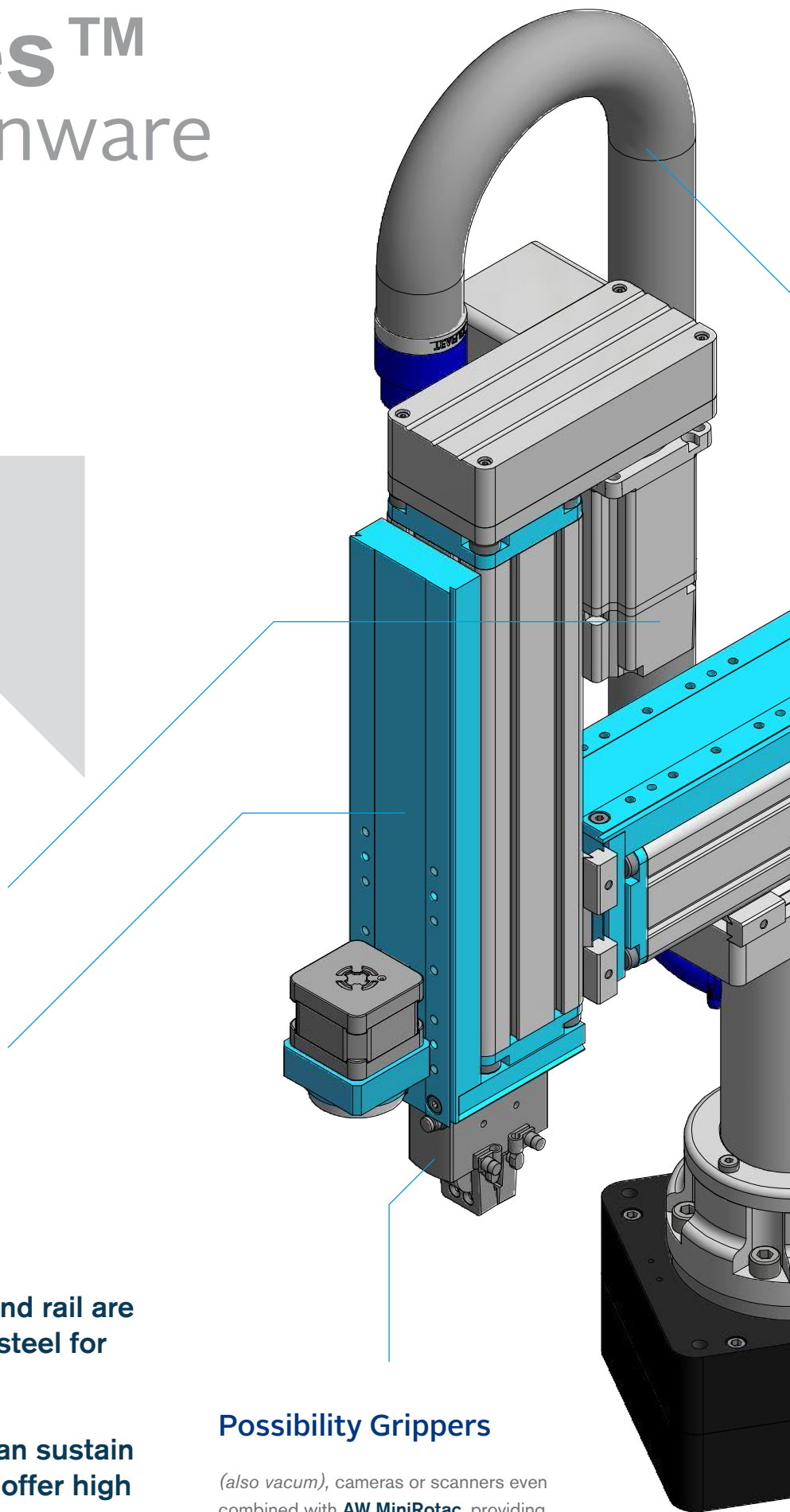
based on high performance ball screw system for extreme accelerations, long life and high loading capability

**Sliders Motion and stability:**  
Tiny and light weight, block and rail are in special grade of stainless steel for anti-corrosion purpose.

**Gothic arch contact design can sustain loads from all directions and offer high rigidity and high accuracy.**

## Possibility Grippers

(also vacuum), cameras or scanners even combined with **AW MiniRotac**, providing a full rotation on picking head





**AwareVu™**

Patent Pending AW monitoring system. This application prevents users of AW products to be exposed to unexpected problems (*Real time FFT*)

## Best cable connectivity and protections

to avoid connectors stress.  
Cables connectivity embedded on the system  
(*Inside of telescopic support*)

## Proximity magnetic

Complementary proximity magnetic detector for additional protection (*Single included and Double optional*)

## Telescopic arm

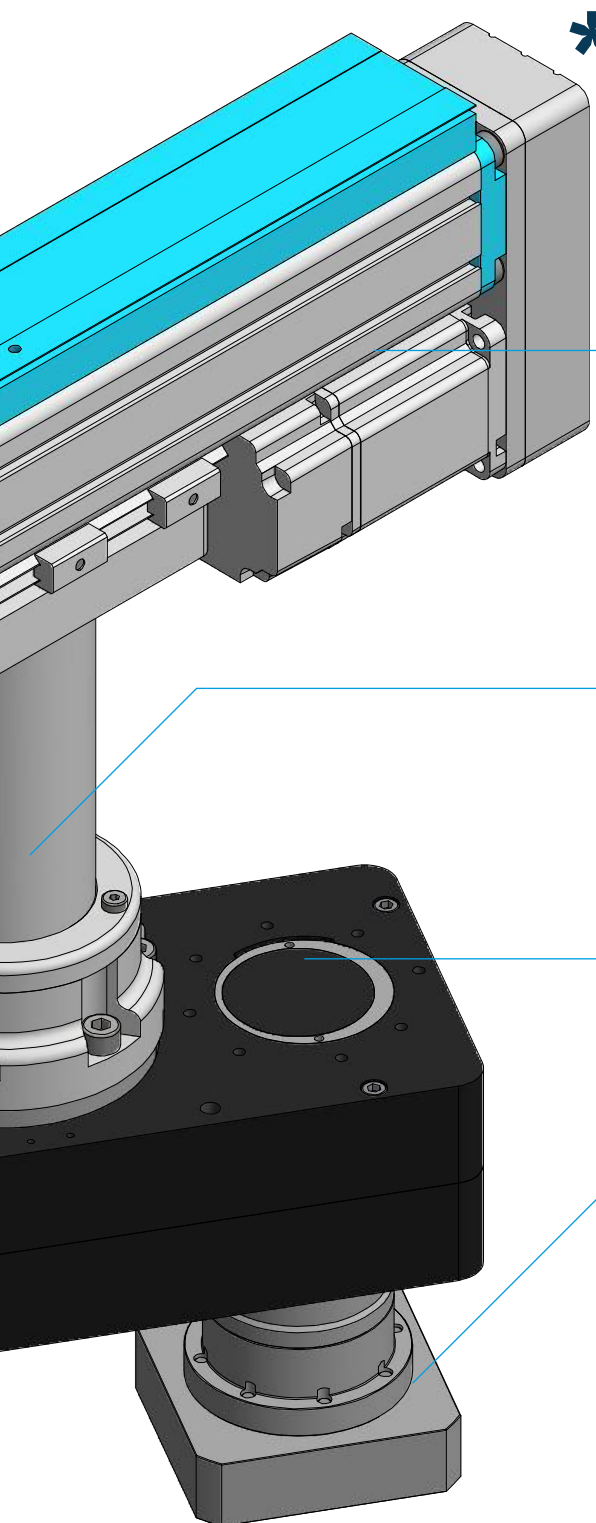
for vertical adjustments

## Combination

Combination with **Rotac Plus** for full rotation capability and high accuracy positioning up to 0,02°

## Possibility

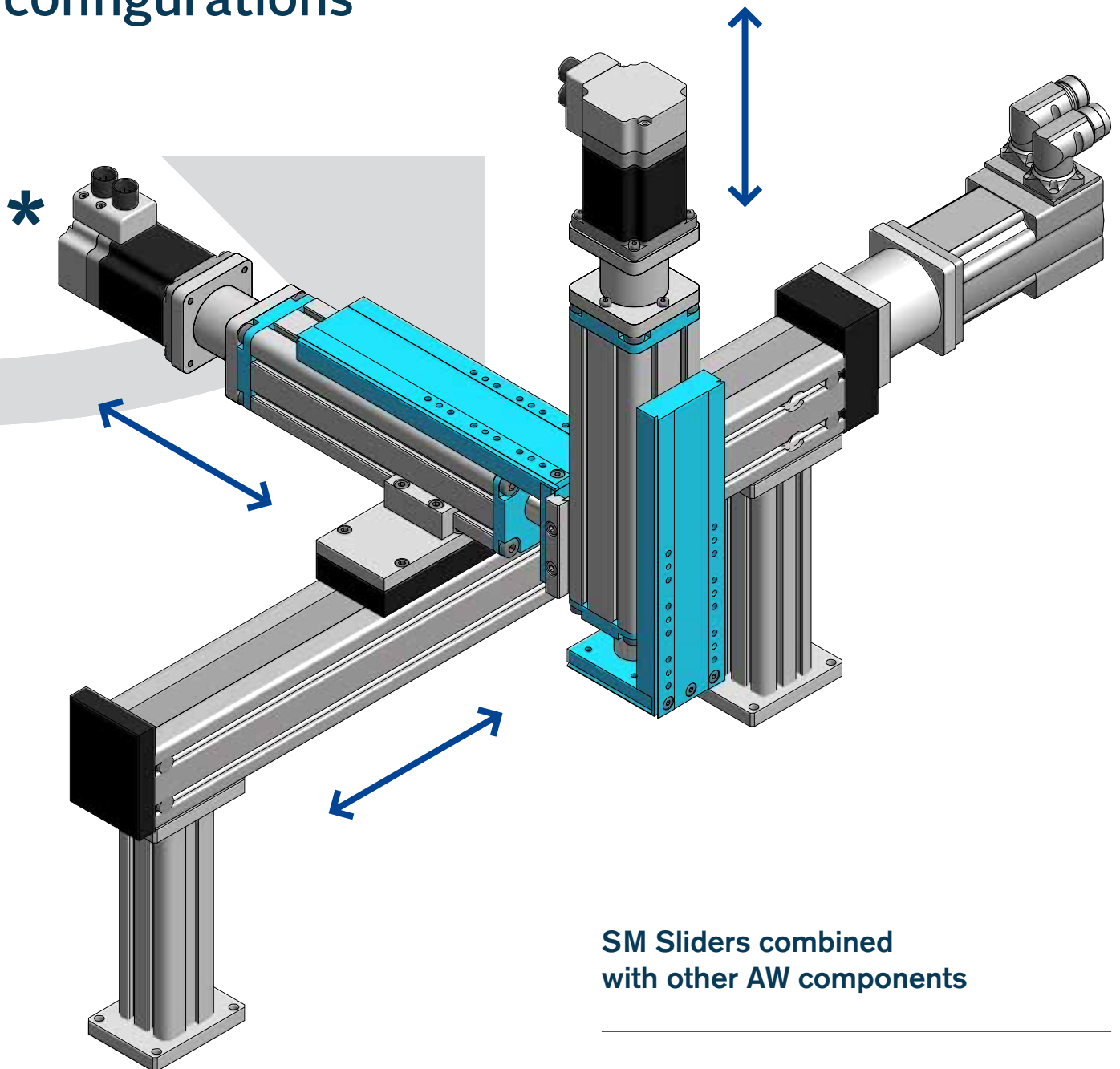
of gearbox with very small backlash



# SM Series™

## Automationware

### Examples of configurations



#### SM Sliders combined with other AW components

**XYZ** Cartesian application based SM series combined with Linear actuators ML series (*belt or screw*).

Possibility of motion control with **Trio** System and diagnostic with **AwareVu** monitoring application.

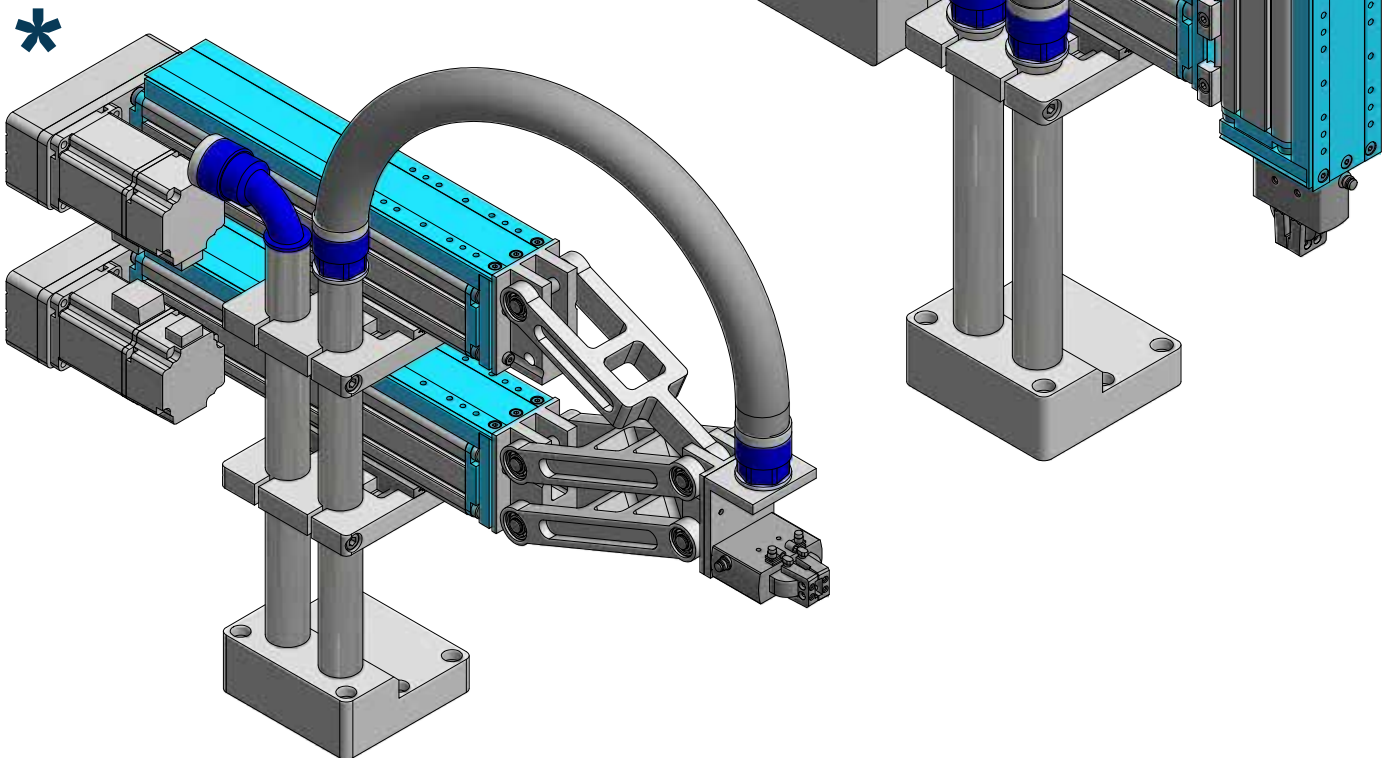


**AwareVu™**



## Vertical P&P configuration

High speed solution, based on 2 sliders working **XZ**, best approach for long strokes and quick changes of formats.



## Horizontal P&P configuration

Very High speed solution, based on 2 sliders working in coordination horizontally, very useful for heavy loads applications and/or extreme cycling Requests.



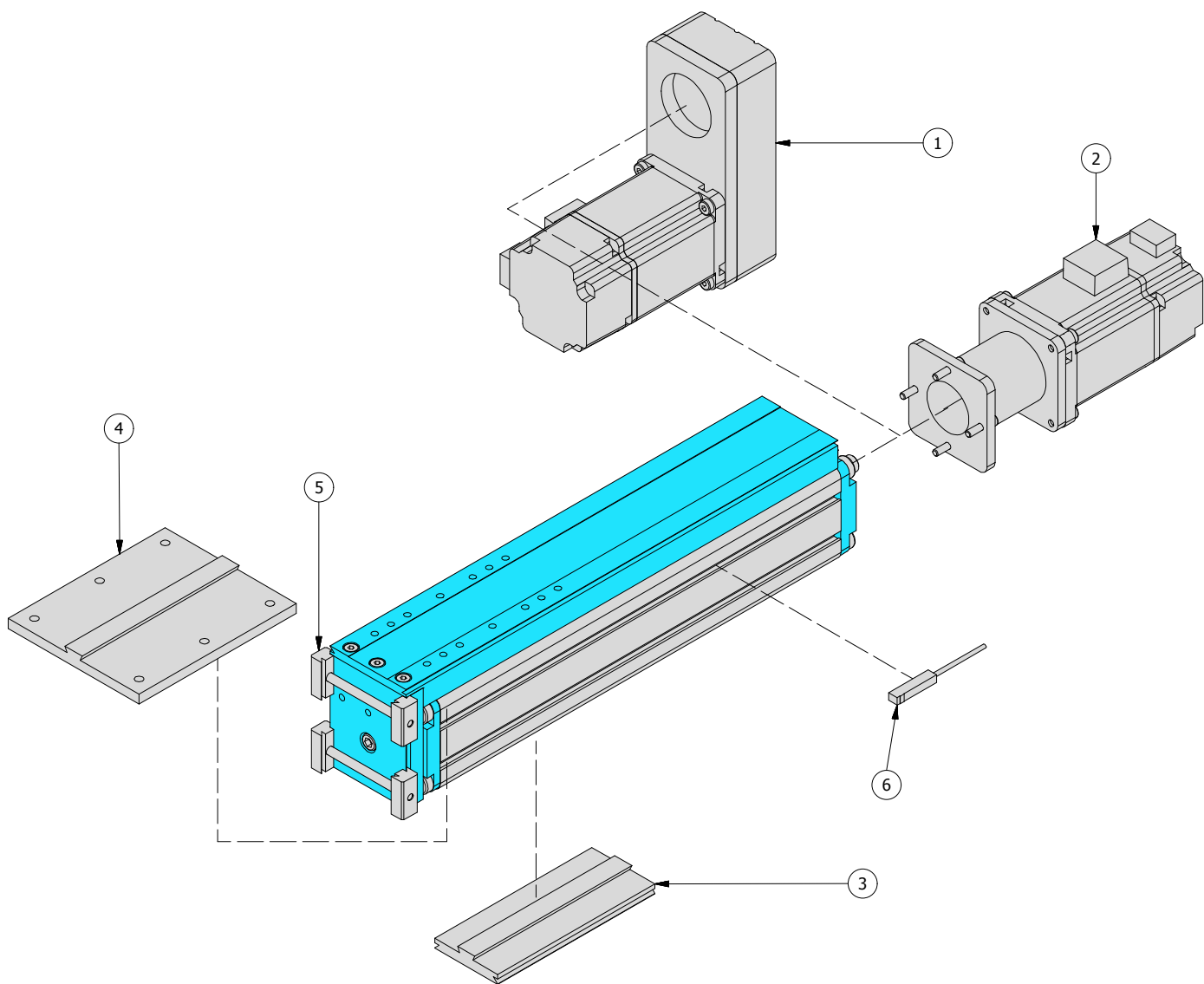
Patent pending monitoring system from **AW**.

Application to store cycle vibrations and alert for any overshoot or instability (*FFT*).

# SM Series™

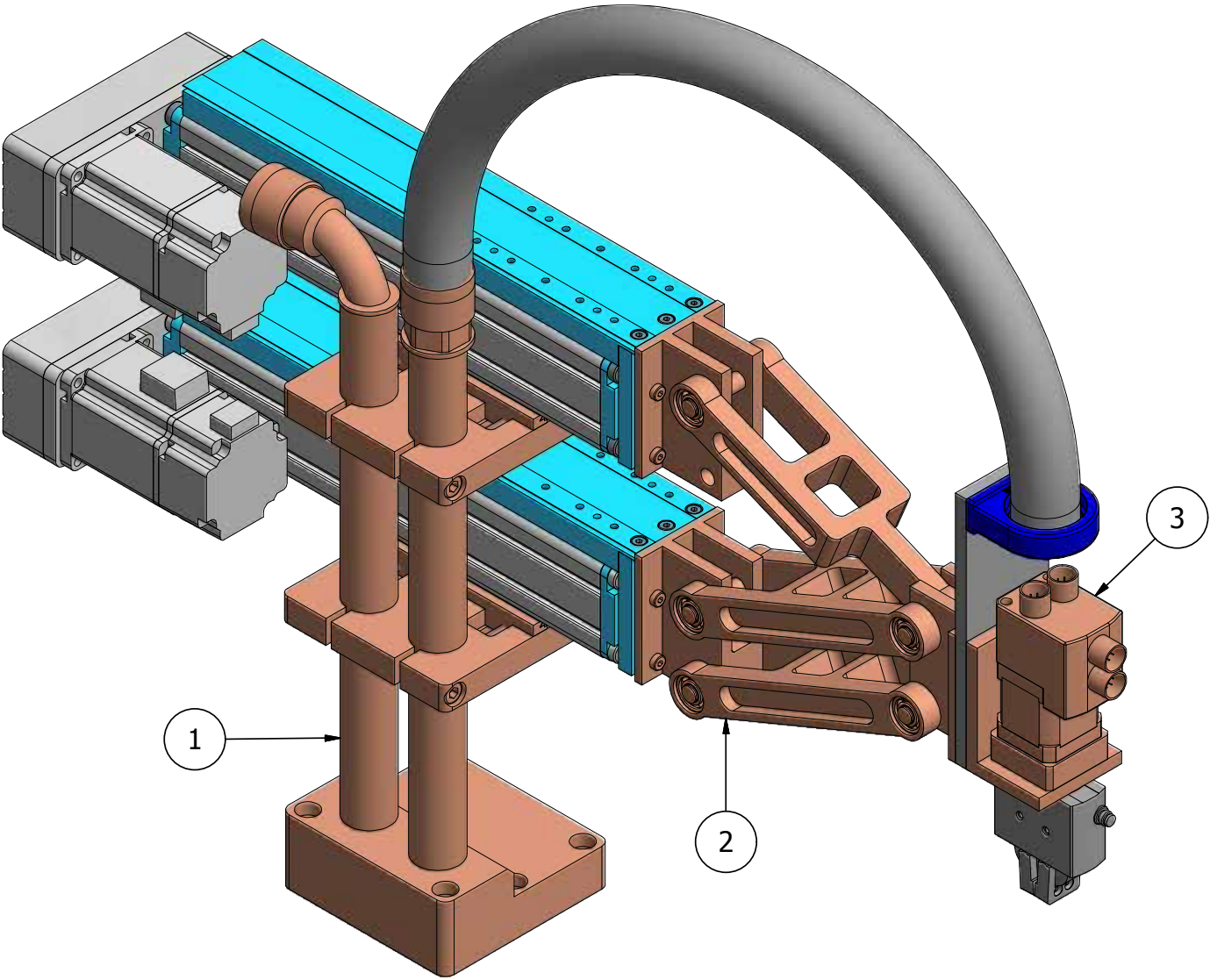
## Automationware

### Accessories



AVAILABLE OPTIONS SLIDES SM

POSITION	DESCRIPTIONS
1	Parallel Drive Mounting Kit
2	Direct Drive Mounting Kit
3	Base interface plate
4	Fixed interface plate
5	Holding Kit
6	Hall sensor



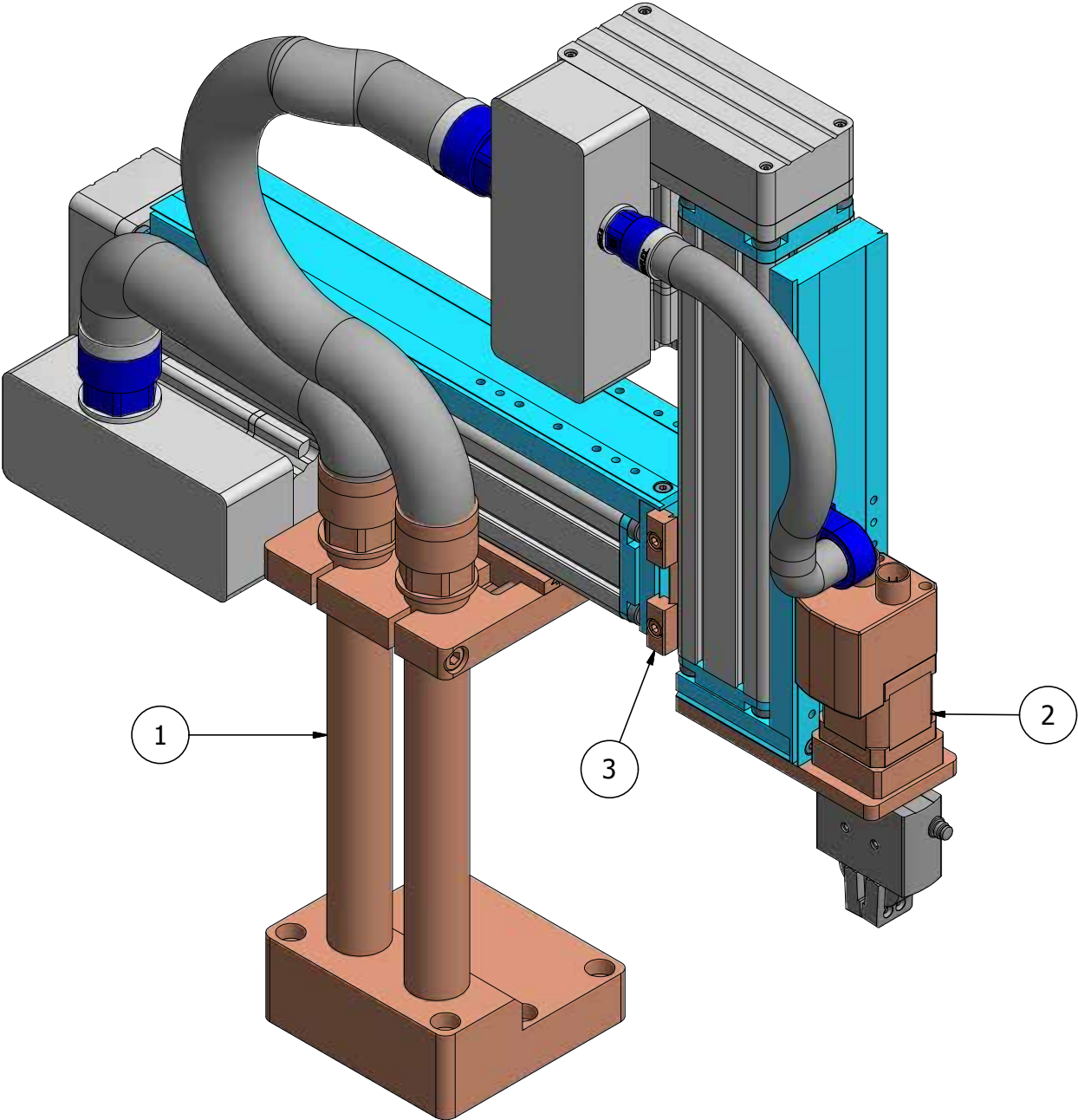
AVAILABLE OPTIONS HORIZONTAL P&P

POSITION	DESCRIPTIONS
1	Support Kit
2	Front trapeze kit
3	Rotary spindle kit

# SM Series™

## Automationware

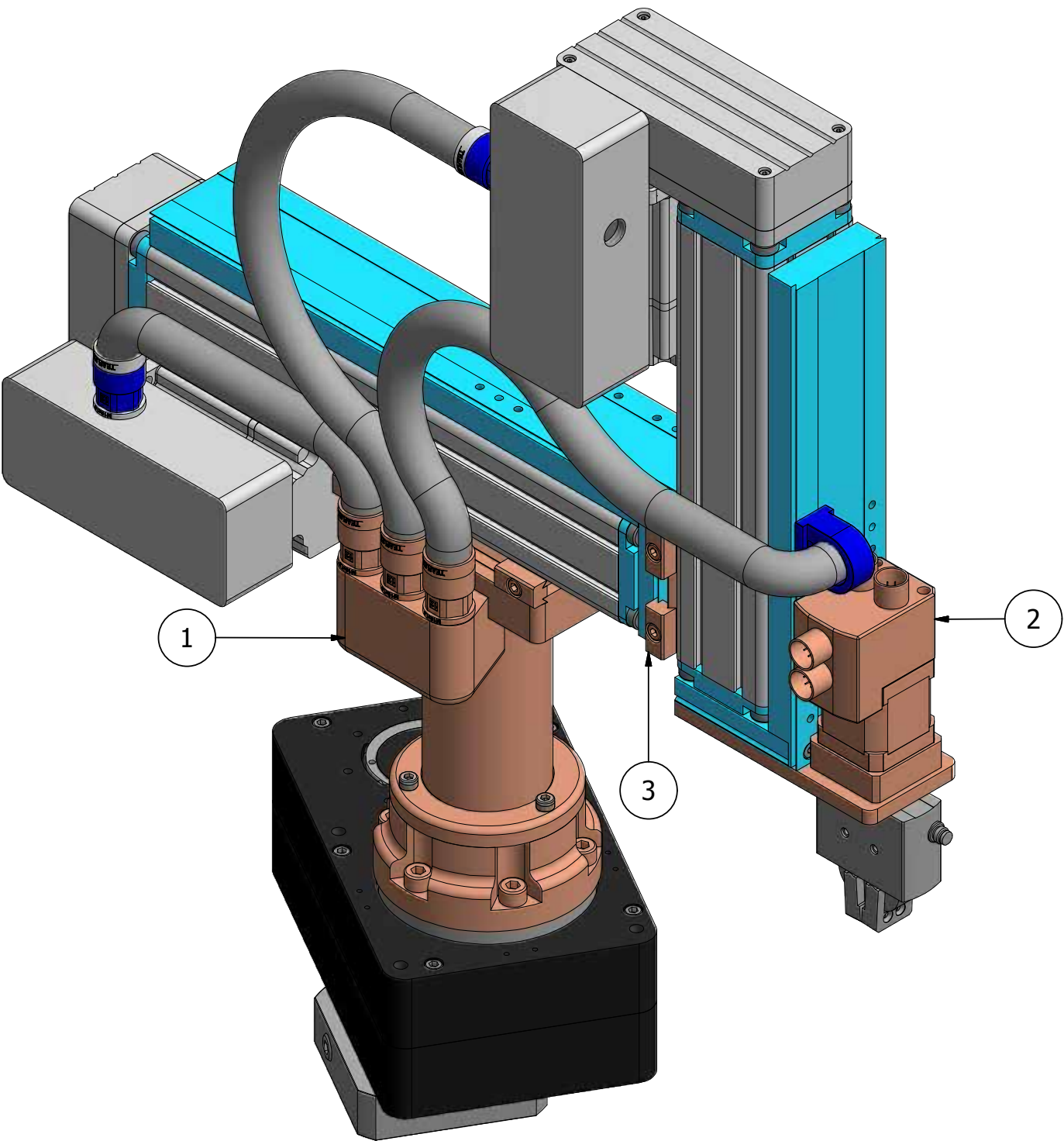
### Accessories



AVAILABLE OPTIONS VERTICAL P&P

POSITION	DESCRIPTIONS
1	Support Kit
2	Rotary spindle kit
3	SM vertical interface kit





AVAILABLE OPTIONS MINI SCARA

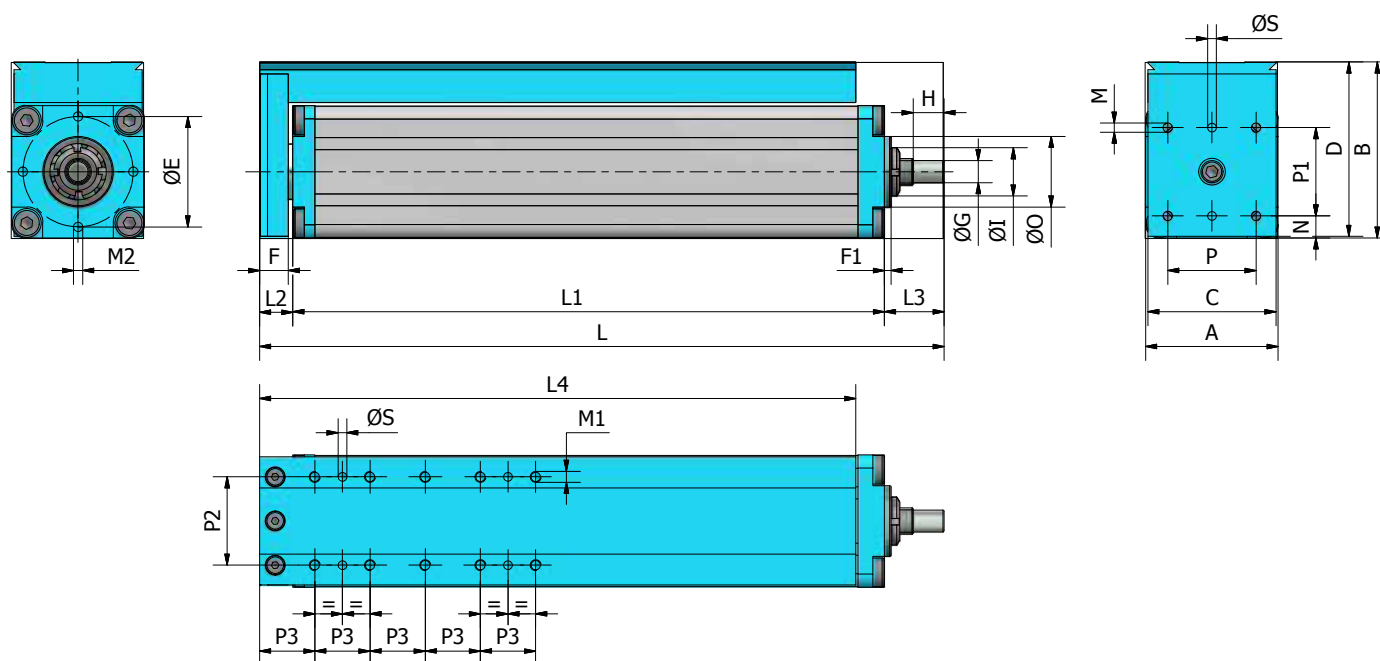
POSITION	DESCRIPTIONS
1	Telescopic support kit
2	Rotary spindle kit
3	SM vertical interface kit



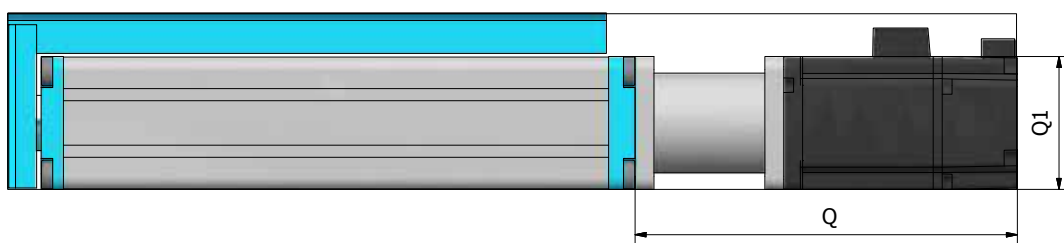
# SM Series™

## Automationware

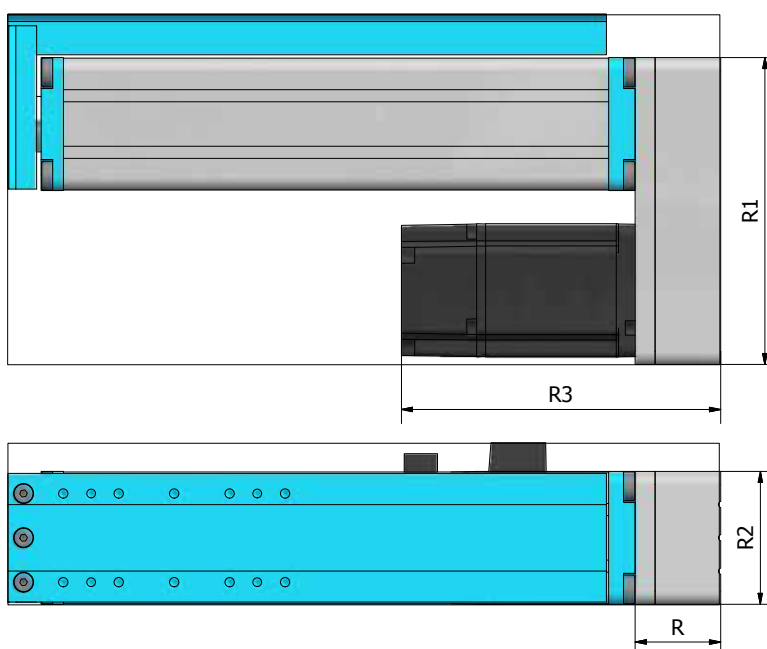
### Components



#### Direct Motorization



#### Motorized Returned



DIMENSIONS: Base Version, Direct Drive, Parallel Drive

Size Slider	UDM	SM 25			SM 32				SM 50				SM 63				
Lead screw	mm	P 5/10			P 5/10				P 5/10/16				P 5/10/20				
Stroke	mm	60	120	180	60	120	180	240	120	180	240	300	120	180	240	300	240
A	mm		32			42				60,6				70			
B	mm		47,5			60				80				94			
C	mm		30			40				58				68			
D	mm		46,5			59				79				93			
ØE	mm		28			39				50				60			
F	mm		7,5			11				13				14			
F1	mm		1			2				3				3			
ØG h7	mm		6			8				10				12			
H	mm		13			14				14				16			
ØI	mm		18			18				21				25			
L	mm	190	240	310	220,5	280,5	340,5	400,5	310	370	430	490	324	384	444	504	624
L1	mm	158,5	218,5	278,5	183,5	243,5	303,5	363,5	268	328	388	448	278,5	338,5	398,5	458,5	578,5
L2	mm		8,5			12				15				16			
L3	mm		23			25				27				29,5			
L4	mm	166,5	226,5	286,5	192	252	312	372	270	330	390	450	280	340	400	460	580
M	mm		N°4 M3X6			N°4 M4X10				N°4 M5x12				N°4 M6x12			
M1	mm		N°4 M3x4			N°4 M4x8				N°10 M5x10				N°10 M6x12			
M2	mm		N°4 M3X5			N°4 M3x10				N°4 M4x10				N°4 M5x10			
N	mm		8,5			6,3				10,3				10			
ØO	mm		22			26				32				35			
P	mm		15			20				40				50			
P1	mm		20			30				40				50			
P2	mm		20			23				40				50			
P3	mm		20			30				25				30			
Q	mm		155,6			55				172,5				200,7			
Q1	mm		40x40			45x45				60x60				70x70			
R	mm		27,5			27,5				38,5				38			
R1	mm		92			107				138				144			
R2	mm		46			45				60				70			
R3	mm		130,2			130,1				144				169,7			
ØS H7	mm		4x3			4x4				4x5				5x5			

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