



SMARSHIFT®

Electromagnetic Direct Drives

SMARSHIFT® – Precision Motion for High Speed Automation and Additive Manufacturing

In the era of increasing miniaturization and automation, precision motion control is more critical than ever. **SMARSHIFT** products set new benchmarks in high-dynamic positioning, delivering unmatched speed, precision, and reliability for automation, additive manufacturing, and other demanding applications.

From semiconductor production and photonics to the most complex microassembly processes, **SMARSHIFT** electromagnetic direct drives enable smooth, high-speed motion with nanometer precision. Their exceptional acceleration and short cycle times maximize throughput, while the wear-free design ensures long-term reliability and minimal downtime – even in continuous operation.

Designed for seamless integration, **SMARSHIFT** actuators feature a compact footprint and work effortlessly with modular control systems, ensuring maximum flexibility and efficiency in automated workflows. Whether you need high-throughput production or ultra-precise part handling, **SMARSHIFT** technology provides the foundation for the next generation of intelligent manufacturing solutions.

Discover **SMARSHIFT** – redefining precision motion in industrial automation and beyond.



Application Note: SMARSHIFT® Enables High-Speed and Precise Alignment in Interferometer Assembly

Producing high-precision optical components requires both accuracy and efficiency. At SmarAct Metrology, an assembly line incorporating SMARSHIFT actuators is currently being evaluated for assembling PICO SCALE interferometer sensor heads.

In this process, SMARSHIFT actuators are used for the gantry system and all motion axes that require frequent, high-speed movements. Their exceptional acceleration and precise positioning capabilities

ensure rapid and repeatable alignment, minimizing cycle times while maintaining sub-micrometer precision. By integrating SMARSHIFT technology, SmarAct Metrology aims to optimize throughput without compromising the precision needed for high-performance optical metrology.

With SMARSHIFT-driven automation, the assembly process has the potential to become scalable, stable, and highly efficient - ensuring consistent quality in every PICO SCALE sensor head.

MLL – Linear Positioner with Large Travel.

	MLL-82200	MLL-82300	MLL-82400	MLL-82500
Dimensions [mm]	82 x 250 ... 550 x 30			
Travel [mm]	105	205	305	405
Sensor Resolution [nm]	1			
Speed* [mm/s]	1100	1600	1900	2000
Weight [g]	1800	2300	2800	3300
Max. Normal Force [N]	50			
Force [N] (cont. / peak)	5 / 15			
Customization	Available - Contact SmarAct			

*maximum speed on 50% of full travel



Application Note: SMARSHIFT® Drives High – Precision and High-Performance 2PP 3D Printing at UpNano

The Vienna-based company UpNano has developed the NanoPro VT, a cutting-edge 3D printer based on two-photon polymerization (2PP) for its high-precision industrial-scale printing service. By combining top-notch optics with high-end **SMARSHIFT** positioning technology, the system achieves both exceptional precision and maximum reliability – crucial for producing complex microstructures on a wafer scale up to 8" in diameter.

A standout feature of the NanoPro VT printer is its ability to switch between objective lenses, allowing seamless transitions between ultra-high-resolution printing and rapid large-area fabrication. **SMARSHIFT**

actuators provide the fast, precise positioning required for this flexibility, minimizing cycle times while maintaining sub-micrometer resolution. This combination of speed and precision has significantly boosted productivity, enabling UpNano to meet increasing customer demand.

Additionally, the integration of **SMARSHIFT** technology allows for precise tilt adjustments of the print bed, enabling compensation for even the smallest surface irregularities. This ensures optimal focus and uniform layer formation, further enhancing print quality and reproducibility.

TRIPOD – 400 Versatile Kinematic Robot.



	3-DoF	4-DoF	5-DoF	6-DoF
Dimensions [mm]	400 x 400 x 105 ... 175			
Travel X / Y [mm]	--		up to 300 x 300	
Travel Z [mm]	12			
Travel Rx / Ry / Rz [°]	5 / 5 / --	5 / 5 / ∞	5 / 5 / --	5 / 5 / ∞
Sensor Resolution [nm]	1			
Weight [g]				
Max. Normal Force [N]	50	50	50	50
Customization	Available - Contact SmarAct			
Aperture	100 mm / No			

Application Note: SmarAct MLS Stages Enable High-Precision Tissue Sectioning for Molecular Analysis

Understanding the role of mechanosensitive ion channels like PIEZO1 requires highly precise and stable imaging techniques. In a recent study, researchers developed a HaloTag-based imaging platform to visualize PIEZO1 localization and activity in hiPSC-derived cells and organoids. To achieve the necessary sub-micrometer accuracy and repeatability, the team integrated the SmarAct MLS-3252 linear stage as the Z-axis control in their advanced imaging system.

during long-term imaging. Its compact design and stability made it an ideal solution for integrating high-resolution microscopy with automated motion control. By leveraging the precision of SmarAct technology, the researchers successfully tracked PIEZO1 dynamics in living cells and 3D organoids, gaining new insights into mechanotransduction and its role in human physiology.

DOI: 10.1101/2023.12.22.573117 (preprint)

The MLS-3252 enabled smooth, nanometer-precise axial positioning, ensuring sharp and well-aligned image stacks while minimizing mechanical drift

MLS Series – Compact, Fast and Reliable



	MLS-3252	MLS-5282	MLS-92122
Dimensions [mm]	52 x 32 x 15	82 x 52 x 14	92 x 122 x 17
Travel [mm]	25	38	65
Sensor Resolution [nm]	1		
Speed* [mm/s]	350	750	900
Weight [g]	80	200	640
Max. Normal Force [N]	10	20	50
Force [N] (cont. / peak)	1 / 2.5	2 / 5	7.5 / 22
Customization	Available – Contact SmarAct		

*maximum speed at 50% of travel range

Application Note: Automated Laser Assembly with the MR-30028

In high-energy laser applications, precision and safety are essential. To minimize manual intervention and ensure consistent quality, the SmarAct MR-30028 rotary stage enhances the level of automation in the assembly of laser components.

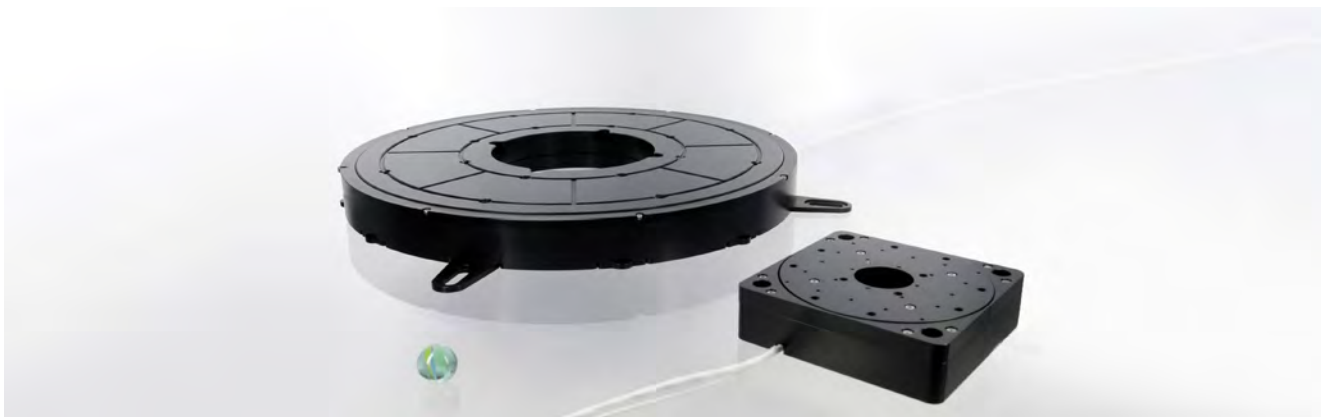
As an indexing table, the MR-30028 moves components precisely between different processing stations. Its high positioning accuracy, speed, and load capacity allow both rapid indexing and fine angular adjustments—crucial for the precise alignment of optical elements at the sub-micron level.

For this application, the MR-30028 has been customized to provide space for necessary cabling

beneath the base plate. It also features end stops for defined motion limits. A cross table mounted on top adds further adjustment flexibility, ensuring adaptability for future product modifications. The system is delivered with a dedicated controller that includes redundant safety relays, enabling safe and straightforward integration of Safe Torque Off (STO).

By integrating the MR-30028, manufacturers benefit from enhanced process stability, precision, and flexibility, making it a safe solution for assembly in hazardous environments.

MR Series – Precise and Fast Rotation



	MR-9224	MR-30028
Dimensions [mm]	92 x 92 x 24	Ø300 x 28
Sensor Resolution [μ°]	5	2
Speed* [$^\circ/s$]	3000	500
Weight [g]	650	5000
Max. Normal Force [N]	50	1000
Torque [Ncm] (cont. / peak)	10 / 30	300 / 500
Customization	Available - Contact SmarAct	

Engineering Services – Customized Precision Solutions by SmarAct

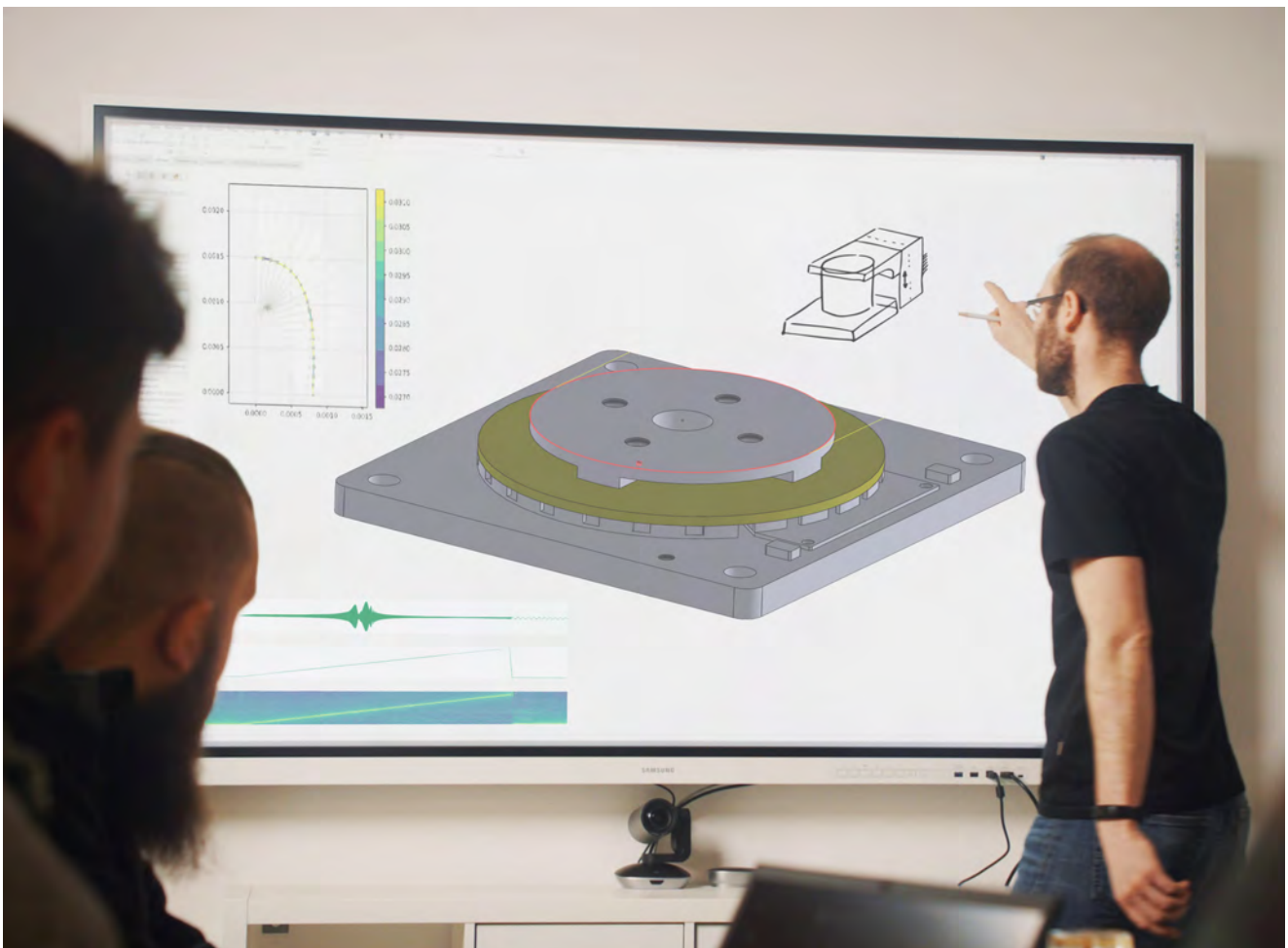
Every application has unique challenges —SmarAct Engineering Services ensure you get a tailor-made solution that meets your exact requirements. Whether it's modifying existing products or developing entirely new systems, our team of experts supports you from concept to final implementation.

With deep expertise in precision positioning, automation, and metrology, we offer custom mechanical designs, specialized control solutions, and complete system integrations. Our in-house

production capabilities allow for rapid prototyping and agile development, ensuring that even the most complex projects can be realized efficiently and with the highest quality standards.

From research laboratories to high-tech manufacturing, SmarAct Engineering Services help push the boundaries of what's possible — bringing your innovations to life with unmatched precision and reliability.

SmarAct – Your Partner for Cutting-Edge Engineering Solutions.



With the development and production of market-leading solutions in the field of high-precision positioning, automation and metrology, the SmarAct Group reliably accompanies their customers in achieving their goals. The broad product portfolio – from single positioning stages to complex parallel kinematics, miniaturized robots, control systems and measurement technology – is complemented by automated microassembly solutions. Even the most challenging customer requirements can be met by maximum adaptability and complete in-house production.

Since its founding in 2005, SmarAct has steadily grown from a small team of engineers to a group of companies with three independent business units and over 270 highly skilled members. Today, SmarAct relies on years of experience and, above all, on a very passionate team with unconditional customer focus.

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