Hand in hand for tomorrow

SCHUNK

Toolholding and workholding

Product overview

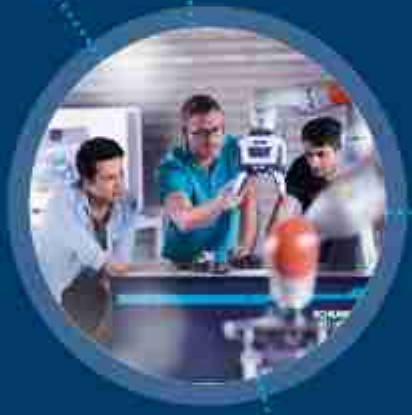
More than **11.000**
Standard Components

Digital Services

60 Apprentices & Students per Year

95% Retention rate

CoLab
Planning and implementation of industrial automation and robotics applications



3.500
Employees

9 Plants

34 Subsidiaries worldwide

Represented in **50** Countries

Awards

1945
Founded by Friedrich Schunk in a garage

Visionary Leader

Hand in hand for tomorrow

SCHUNK, the family-owned company, is a worldwide leader for equipping modern manufacturing and robot systems. More than 3,500 employees in 9 plants and 34 directly owned subsidiaries ensure an intensive market presence. With more than 11,000 standard components SCHUNK offers the world's largest assortment of gripping systems and clamping technology from one source. Due to the digitalization of the portfolio, users can plan their processes efficiently, transparently, and economically. In addition, they benefit from the comprehensive application knowledge surrounding tomorrow's innovative manufacturing.

Cordially yours, the Schunk family

Cooperation Partner

Sustainability

Your workpieces, precisely clamped

High-quality workpiece clamping technology for any field of application

Secure hold for your tools

Best tool clamping technology for highly productive processes

Workpiece clamping technology

Product overview

The right solution for any clamping task

Chuck jaws are the only interface between workpiece and lathe chuck, making them a critical component for increased productivity.
Use of the correct chuck jaw ensures not only perfect power transmission but also reliable workpiece clamping and optimal utilization of machine and tool potentials.

With the extensive range of SCHUNK standard chuck jaws, you will find the perfect clamping solution for your application. Simply determine the relevant parameters based on the workpiece, the machining task and the workpiece clamping in order to select the optimal chuck jaw. SCHUNK chuck jaws are available for most toolholder manufacturers and interfaces, including 1.5 x 60, 1/16 x 90, 3/32 x 90 and metric tongue and groove.

Engineered
Customized

Customized chuck jaws. For complex machining tasks, our experts develop tailor-made clamping solutions for you.
- Suitable for all lathe chuck manufacturers
- Maximum performance
- Ensuring the right clamping

Tech Line
Problem solver

Tech jaws. Claw jaws with active pull-down function, standardized pendulum jaws and QUENTES fiberglass jaws from SCHUNK enable gentle and secure clamping of thin-walled workpieces that are at risk of deformation.
- For special clamping tasks
- Standardized problem solver

Flexible
Jaw quick-change systems

Quick-change systems. SCHUNK jaw quick-change systems convince with their easy handling and reduce set-up times by jaw change within seconds.
- Simple setup
- Jaw change in a matter of seconds
- Suitable for automated solutions

Aggressive grip
Raw part machining

Raw part clamping. SCHUNK provides a wide range of hard chuck jaws for machining raw material in the initial set-up.
- Maximum holding force
- Available for I.D., O.D. and bar clamping
- Increased productivity

Soft grip
Finished part machining

Finished part clamping. Chuck jaws made of a resistant material with ground serration ensure a long service life and high accuracy of the chuck jaws.
- High-quality steel and aluminum
- Hardenable steel
- Ground serration
- High-precision interfaces

Hydraulic compensation jaw

QUENTES

Pendulum Jaws

Pull-down jaws

Jaw quick-change system RAPIDO, manual

Jaw quick-change system RAPIDO, automatic

Base jaws

Special base jaws

Claw jaws for O.D. clamping

Claw jaws for I.D. clamping

Claw jaws for bar clamping

Hard stepped jaws

Soft top jaws and jaw blanks

Soft full grip jaw

Serrated bars

Soft monoblock jaw

Chuck jaws

	Chuck jaws		Fields of application: Raw part clamping	Finished part clamping	I.D. clamping	O.D. clamping	Compensation of shape tolerances	Clamping diameter can be adjusted by turning	Low-deformation clamping of rings and fitting disks	Jaw quick-change
Tech Line (problem solved)	Pendulum jaws		●	●		●	●	●	●	◑
	QUENTES fiberglass jaws			●	●	●		●	●	◑
Flexible (jaw quick-change systems)	Base jaws									●
	Jaw quick-change system RAPIDO		●	●	●	●		●		●
Automotive grip (raw part machining)	Claw jaws		●		●	●				◑
	Stepped top jaws		●		●	●				◑
	Stepped block jaws		●		●	●				●
Soft grip (finished parts machining)	Serrated bars			●	●	●		●		
	Soft top jaws			●	●	●		●		◑
	Jaw blanks			●	●	●		●		
	Full grip top jaws			●	●	●		●	●	◑
	Monoblock jaws			●	●	●		●		●

● Most suitable ◑ Suitable

Characteristics			
Configurable easyJAW	Jaw interfaceldesign (as standard)	Available for lathe chuck sizes (as standard)	Material
	Fine serration 90° Fine serration 60° straight and diagonal Wedge-bar serration	200 – 500 mm	Case-hardened steel
	Fine serration 90° Fine serration 60° Tongue and groove	160 – 315 mm	Glass-fiber-reinforced plastic
	Straight and diagonal Wedge-bar serration	125 – 1000 mm	Hardened and precision ground steel
●	Fine serration 90° Fine serration 60°	160 – 400 mm	Case-hardened steel
●	Fine serration 90° Fine serration 60° Tongue and groove Module 2	140 – 1000 mm	16MnCr5 steel, case-hardened
	Fine serration 90° Fine serration 60° Tongue and groove Module 2	110 – 1200 mm	16MnCr5 steel, case-hardened
	Straight and diagonal wedge-bar serration	160 – 630 mm	16MnCr5 steel suitable for case hardening or 16MnCr5SK steel
	Fine serration 90° Fine serration 60°	125 – 800 mm	Steel or aluminum
●	Fine serration 90° Fine serration 60° Tongue and groove Module 2	80 – 1200 mm	16MnCr5 steel suitable for case hardening or high-tensile aluminum
●	Fine serration 90° Fine serration 60° Module 2	160 – 800 mm	16MnCr5 steel suitable for case hardening
●	Fine serration 90° Fine serration 60° Tongue and groove	80 – 630 mm	16MnCr5 steel suitable for case hardening or high-tensile aluminum
●	Straight and diagonal wedge-bar serration	140 – 800 mm	C45, tempered, inductive hardenable

More than 40,000 sold lathe chucks

From the universal manual lathe chuck to lathe chucks with jaw quick-change systems and maximum clamping forces, SCHUNK offers the right lathe chucks for any application. With over 40 years experience in development and production at SCHUNK, their lathe chucks meet the requirements of state-of-the-art machining and highly demanding machining tasks in internationally known top quality.

Steady rests, quick-change systems, chuck jaws and clamping cylinders complete the product range, which meets the high requirements of modern machining. Through continuous further development of technology and products, as well as consistent compliance with the quality management system DIN EN ISO 9001:2015, SCHUNK is your competent partner for high-quality lathe chucks. SCHUNK provides complete solutions and ensures maximum flexibility for your clamping task.

Engineered
Customized

SCHUNK offers complete solutions from the toolholder to the lathe chuck to the drive for your application.

ROTA NCM1 ▲ ■

ROTA NCM ◆ ● ■

Tech Line
Specialized

Lathe chucks for industry-specific requirements and applications.

ROTA NCA ◆

ROTA NCE ◆

ROTA NCR-A ◆

ROTA NCS 3 | ROTA NCS 6 ◆

Flexible
Quick-change systems

Selected lathe chucks that are characterized by high flexibility for small batch sizes.

ROTA-S plus 2.0 ▲

ROTA-S flex ▲

Conventional
Universally

Selected lathe chucks developed to meet the high demands of modern machines for various applications.

ROTA-G ▲

ROTA NC plus 2 ◆

ROTA HSA ◆

ROTA DFF ◆

ROTA BEV ◆

ROTA HSH ◆

ROTA NC plus 2 ◆

ROTA NC plus 2 ◆

ROTA NCF plus 2 ◆

ROTA NCO ◆

ROTA 2B ◆

ROTA-M flex 2+2 ▲

ROTA TB2 | ROTA TB2-LH ●

ZENTRICO THL-A plus ◆ ●

ZENTRICO THL-S plus ◆

PROTACT

ROTA THW3 ◆

ROTA THW plus ◆

ROTA THW vario ◆

ROTA FSW ▲

Rapido ◆

ROTA TP ●

ZENTRICO THL plus ◆ ●

◆ Hydraulic ● Pneumatic ▲ Manual ■ Magnetic

Tech Line lathe chuck

Tech Line (specialized)

Type		Description
ROTA-M flex 2+2 ROTA-ML flex 2+2		Extremely flexible 4-jaw manual lathe chuck with patented drive concept. Due to the large compensation stroke, round, cubic and geometrically unshaped workpieces can be clamped without any problems.
ROTA NCA		Sealed precision power lathe chucks with large dimensioned through-hole. A sophisticated sealing system with permanent grease lubrication ensures constant clamping forces, minimal maintenance costs and an even wider range of applications.
ROTA NCE		Extremely weight-optimized power lathe chuck with through-hole and up to 40% reduced moment of inertia compared to conventional lathe chucks. Shortened cycle times and energy-efficient machining, especially in the area of high-volume production.
ROTA NCF plus 2 ROTA NCF		Power lathe chuck with through-hole and integrated centrifugal force compensation for reducing the loss of clamping force under speed of rotation.
ROTA NCG		Power lathe chuck without through-hole with the longest jaw stroke at the highest jaw clamping force.
ROTA NCG2		Power lathe chucks without through-hole especially for vertical lathes. Optionally available with centrifugal force compensation or individual jaw adjustment.
ROTA 2B		2-jaw power lathe chuck without through-hole with large stroke and maximum clamping force at the same time.
ROTA NCR		6-jaw compensation chuck for deformation-sensitive clamping of thin-walled workpieces.
ROTA NCR-A		Sealed 6-jaw compensation chuck for deformation-sensitive clamping of thin-walled workpieces. The sealing system ensures constant clamping forces, minimal maintenance costs and an even wider range of applications.
ROTA NCS		Hermetically sealed power lathe chuck for series production in 3- and 6-jaw designs. An active pull-down function ensures the highest machining results with regard to plane parallelism.
ROTA TB2 ROTA TB2-LH		Power lathe chuck with integrated pneumatic cylinder and very large chuck bore especially for machining large tubes. Power lathe chuck with integrated pneumatic cylinder and very large chuck bore especially for machining large tubes. A rapid stroke and clamping stroke enable collision-free loading of pipes with large interfering contours.

Max. speed of rotation [mm]	Max. clamping force [kN]	Stroke/jaw [mm]	Compensation stroke/ jaw [mm]	Number of jaws	Sizes
1100 – 2700	100 – 180	9.5 – 17.8	5.1 – 10	4	260 – 500
600 – 900	150 – 180	14.5 – 17.8	7.9 – 10	4	630 – 1200
3500 – 5500	45 – 160	4 – 5.3		3	160 – 330
3500 – 7500	45 – 155	3.2 – 5.8		3	130 – 315
4000 – 6000	72 – 160	5.3		3	185 – 315
1800 – 3300	187 – 300	8 – 11		3	400 – 630
1600 – 6000	72 – 330	6.4 – 15		3	165 – 630
500 – 900	330	23		3	800 – 1400
2000 – 5300	26 – 85	10 – 18		2	125 – 400
3500 – 4000	36 – 50	6	±1	6	165 – 200
600 – 4000	36 – 300	6 – 25	±1 – ±6	6	190 – 1000
1400 – 5000	44 – 150	5.8 – 8.2	±2 – ±3 (6-jaws)	3/6	175 – 500
500 – 1700	115 – 240	7 – 12.8		3	470 – 1000
500 – 1300	115 – 240	20 – 38.5		3	470 – 1000

Flexible/conventional

	Type		Description
Flexible (quick-change system)	ROTA-S plus 2.0		Manual lathe chuck with jaw quick-change system with diagonally serrated base jaw interface. Can be used even more flexibly in combination with center sleeves or expansion arbors. Also available as a 2-jaw chuck.
	ROTA-S plus		Manual lathe chuck with jaw quick-change system with diagonally serrated base jaw interface.
	ROTA-S flex		Extremely weight-reduced manual lathe chuck for mill/turn centers. Very fast conversions from small to large workpiece diameters due to jaw quick-change system.
	ROTA THW3		Sealed power lathe chuck with jaw quick-change system with straight serrated base jaw interface. A patented sealing system with permanent grease lubrication ensures constant clamping forces, minimal maintenance costs and an even wider range of applications.
	ROTA THW plus		Power lathe chuck with jaw quick-change system with straight serrated base jaw interface.
	ROTA THW vario		Sealed power lathe chuck with jaw quick-change system with straight serrated base jaw interface. As an additional feature, it can be converted to an arbor or a collet chuck.
Conventional (universal)	ROTA NC plus 2		Power lathe chuck with through-hole in 2-, 3- and 4-jaw design for universal use. This wide range means virtually all customer requirements can be catered for.
	ROTA NC		Power lathe chuck with through-hole in 3-jaw design for universal use.
	ROTA TP		Power lathe chuck with integrated pneumatic cylinder as an alternative if no hydraulics are available on the lathe.
	ROTA SPK		Dirt-resistant jaw boxes for individual clamping solutions on face plates with T-slots running in parallel.

ZENTRICO Steady rests

The distinctive, slim design combines a high degree of functionality with an attractive appearance. The shape clearly signals long lifetime, accuracy, functional safety and a high performance level. The overall design is a fusion of a variety of technical shape elements that underlines the high quality of the product.

	Max. speed of rotation [mm]	Max. clamping force [kN]	Stroke/jaw [mm]	Number of jaws	Sizes
	3400 – 5400	40 – 180	6.5 – 9.9	2/3	160 – 315
	900 – 2200	230 – 270	12 – 15	3	400 – 1000
	400 – 1000	100 – 270	7 – 15	3	550 – 1400
	1700 – 6000	64 – 240	6.7 – 10.5	3	200 – 630
	3600 – 6000	45 – 160	5.9 – 8.6	3	165 – 315
	5400	82	7.4	3 Expansion arbor collet	215
	2000 – 500	48 – 160	5.3	2/3/4	185 – 315
	700 – 2500	187 – 410	8 – 16	3	400 – 630
	2200 – 4000	22 – 90	3 – 15	3	125 – 350
		55 – 75	75 – 100	1	180 – 260

Our performance promise. Your benefits.

- High centering and repeat accuracy due to optimized lever kinematics
- Suitable for almost any machine due to simple attachment
- Process-reliable operation and longer maintenance intervals
- Much lower dirt levels, less chip formation
- Existing steady rests can be replaced easily, no special parts required

Modular system for individuals

Positioning and clamping in one single operation – SCHUNK VERO-S gets to the heart of rationalization and flexibility in workpiece machining. SCHUNK VERO-S, with its standardized modular system for clamping systems, offers an enormous variety of highly precise and versatile clamping modules, especially for small batches starting with batch size 1 as well as with a large variety of workpiece variants.

In the key position: VERO-S – the modular quick-change pallet system. VERO-S clamps workpieces, pallets, modules for stationary use, and tombstones using one or more clamping pins. The uniform clamping pin size ensures the user maximum flexibility and universally fits all quick-change pallet modules.

VERO-S

The quick-change pallet system

allows for **very fast and extremely precise conversion** of workpieces or clamping devices on modern 3-, 4- or 5-axis machining centers and ensures optimal use of the machine capacity.

KSC3

KSC3 + SRQ

KSC-D

PAL ROTA-S plus 2.0

PAL S 399 x 159

2-way clamping station
NSL3 200

KSC3

KSC mini

KSP3

KSG

PAL S 399 x 399

4-way clamping station
NSL3 400

KSC3

KSM2

KSP3

PAL MFR-A1

PAL S 599 x 159

6-way clamping station
NSL3 600

Classic quick-change pallet modules

Pneumatic

Type		Description
NSE mikro – innovative technology in the smallest spaces with the smallest quick-change pallet modules		
NSE mikro 49		Mikro clamping module for universal applications in micro-cutting. Quick-change pallet module with drive via drive ring and three flat clamping slides with additional patented dual stroke system.
NSE mikro 49-13		Mikro clamping module for universal applications in micro-cutting with significantly increased pull-down force for more power. Quick-change pallet module with drive via axial pistons and two round clamping slides with additional patented fast and clamping strokes.
NSE mini – powerful modules for the smallest variable pitches		
NSE mini 90		Miniature clamping module for applications with light force application such as machining aluminum or plastic or for use on measuring devices. Quick-change pallet module with drive via drive ring and three flat clamping slides with additional patented dual stroke system.
NSE mini 90-25		Miniature clamping module with significantly higher pull-down force for light milling machining. Quick-change pallet module with drive via axial pistons and two round clamping slides with additional patented fast and clamping strokes.
NSE-HT mini 88-20		Miniature clamping module specially designed for high-temperature applications up to 200 °C. Material, drive concept and seals are specially adapted to these temperatures.
NSE3 – the high-performance quick-change pallet system for universal milling machining		
NSE3 99		Powerful clamping module with high pull-down forces for small pitches.
NSE3 138		The most powerful quick-change pallet module par excellence. This premium module serve as the basis for the VERO-S modular system and can be expanded by a unique variety of different equipment. Optionally available with cone seal.
NSE3-T3 138		Powerful quick-change pallet module in tombstone design. Its slim design is particularly suitable for applications with tombstone and swiveling table. Optionally available with cone seal.
NSE3 138-P		Powerful quick-change pallet module with integrated media transfer units. These media transfer units make it possible to transfer pneumatics or hydraulics directly through the module to the clamping device with a max. transfer pressure of 300 bar. Optionally available with cone seal.

	Pull-down force [kN]	Pull-down force with turbo [kN]	Module height [mm]	Weight [kg]	Clamping pin type/ clamping ring type	Automated machine loading	Manual machine loading
	0.15	0.4	12	0.2	SPx mikro 10	Yes	Yes
	0.5	1.5	13	0.2	SPx mikro 10	Yes	Yes
	0.5	1.5	20	1	SPx mini 20	Yes	Yes
	1.5	6.0	25	1.3	SPx mini 20	Yes	Yes
	0.5	2.5	20	1	SPx mini 20	Yes	Yes
	5	18	56	2.4	SPx 40	Yes	Yes
	8	28	39	4.4	SPx 40	Yes	Yes
	7	24	11	3.5	SPx 40	Yes	Yes
	8	28	39	4.4	SPx 40	Yes	Yes

VERO-S automation

	Type		Description
Pneumatic	NSE-A3		Fully equipped automation module for automated machine tool loading as well as for applications in handling, assembly and automation technology.
	NSA plus		Extremely flat automation module for high-end palletizing. A pallet lift-off function ensures maximum process reliability in interaction with robots.
	NSR		Extremely slim robot coupling for high-end pallet handling with high pull-down forces.

Intelligent quick-change pallet modules

Electric	NSE-E mini 90		Electromechanically actuated quick-change pallet module with integrated electronics. Drive via a 4-PIN connection on the side. Monitoring the clamping slide positions via two external inductive proximity switches.
	NSE-E mini 90-2S-IOL		Electromechanically actuated quick-change pallet module with integrated electronics. Drive and integrated monitoring of clamping slide positions and pallet presence via IO-Link interface.
Sensory	NSE-S mini 90-2S-IOL		Pneumatically controlled quick-change pallet module on NSE mini basis with additional integrated electronics. Integrated monitoring of clamping slide positions and pallet presence via IO-Link interface.
	NSE-S3 138-IOL		Pneumatically controlled quick-change pallet module on NSE mini basis with additional integrated electronics. Integrated monitoring of clamping slide positions and pallet presence via IO-Link interface.
Piezo-hydraulic	NSE-PH 138-IOL		Piezo-hydraulic quick-change pallet module with the same performance values in the same installation space as the current NSE3. Drive and data transfer via IO-Link interface.

	Pull-down force [kN]	Pull-down force with turbo [kN]	Module height (above the machine table) [mm]	Weight [kg]	Clamping pin type/ clamping ring type	Automated machine loading	Manual machine loading
	8	28	39	4.4	SPx 40	Yes	Yes
	3	9	2.5	2.5	SRx 120	Yes	Yes
	5	15	40	5.8	SRx 160		
	0.5	1.5	29	0.15	SPA mikro 10	Yes	Yes
	1	4	39.5	0.4	SPA mini 20		
	4	15	60	1.6	SPA 40		
	12	50	21	176	SPA 80		
	1.5		20	1.7	SPx mini 20	Yes	Yes
	6		25	1	SPx mini 20	Yes	Yes
	1.5	6	25	1	SPx mini 20	Yes	Yes
	8	28	39	4.5	SPx 40	Yes	Yes
	28		39	4.5	SPx 40	Yes	Yes

Direct workpiece clamping systems

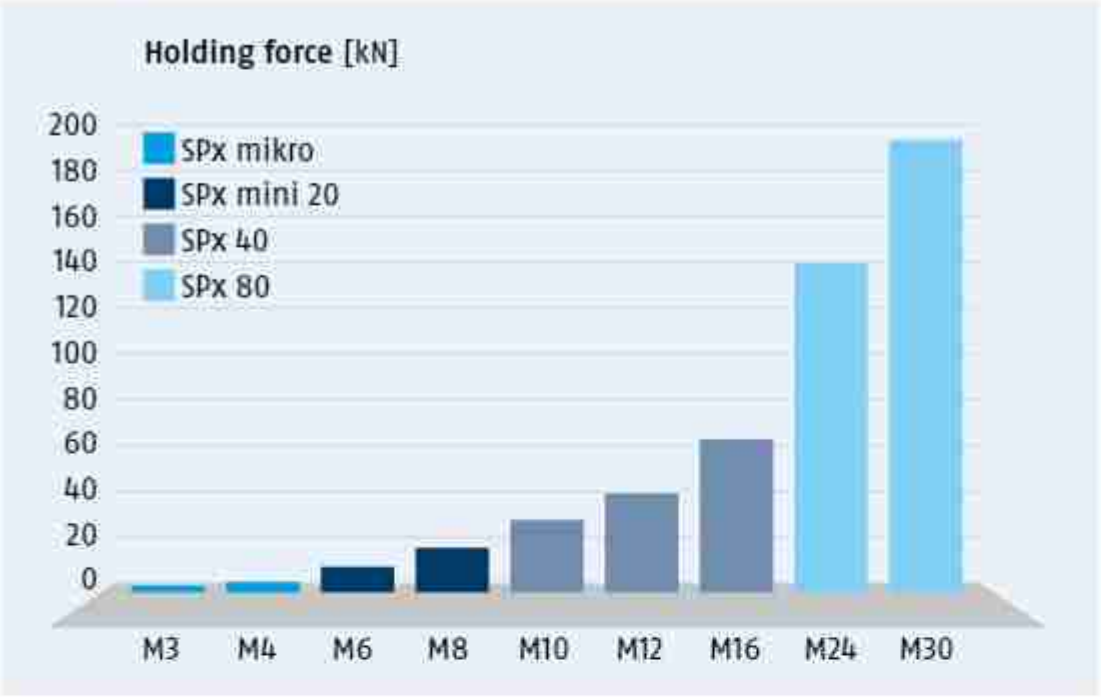
	Module type		Description
Pneumatic workpiece direct clamping system WDP-SX	Basic modules		Basic modules serve as the basis of the clamping pillars. Depending on the machine table interface, there are different basic modules available.
	Stacking modules		Stacking modules are used to preset the height of the clamping pillars. The modules are available in five standardized heights.
	Clamping modules		Clamping modules serve as an interface to the workpiece in combination with VERO-S clamping pins. They are available in pneumatic or manual versions.
	Compensation modules		In combination with compensation bolts, compensation modules can continuously compensate for height differences of up to 11 mm. They are available in pneumatic or manual versions.
Manual workpiece direct clamping system WDM-SX	Basic modules		Basic modules serve as the basis of the clamping pillars. Depending on the machine table, there are different basic modules available.
	DUO basic modules		Robust module with three VERO-S interfaces for superstructures of heavy workpieces and fixtures with wide lateral support.
	VARIO basic modules		Versatile clamping modules with two clamping areas for mounting a VERO-S clamping pin from above and below.
	Assembly clamp modules		Assembly clamp modules are used to preset the height of the clamping pillars. The modules are available in three standardized heights.

	Pull-down force/ holding force [kN]	Pull-down force/ holding force with turbo [kN]	Module diameter [mm]	Module height [mm]	Height compensation [mm]	Repeat accuracy module interface [mm]
	10 – 25		Ø 99	60		< 0.005
	10 – 25		Ø 99	30 – 160		< 0.005
	4 – 15	15	Ø 99	70		< 0.005
	0.8	4	Ø 99	70	11	< 0.005
	15		Ø 80	75 – 175		< 0.005
	15		Ø 80	75 – 150		< 0.005
	15		Ø 80	100 – 125		< 0.005
	15		Ø 80	125 – 175		< 0.005

VERO-S clamping pins

	Type		Description	Version	Suitable for
SPx mikro 10	SPA mikro 10 SPB mikro 10 SPC mikro 10		**Standard clamping pin** Standard clamping pins for form-fit connection of workpieces or devices with clamping modules.	Centering pin Positioning pin Holding pin	NSE mikro NSR mikro
SPx mini 20	SPA mini 20 SPB mini 20 SPC mini 20		**Standard clamping pin** Standard clamping pins for form-fit connection of workpieces or devices with clamping modules.	Centering pin Positioning pin Holding pin	NSE mini NSR mini
SPx 40	SPA 40 SPB 40 SPC 40		**Standard clamping pin** Standard clamping pins for form-fit connection of workpieces or devices with clamping modules.	Centering pin Positioning pin Holding pin	NSE3 NSE-A3 NSR 138 NSR 160
	SPA-X 40 SPA-XY 40		**Compensation pin** Clamping pin for compensating fluctuations of the bore hole gauges. SPA-X 40 = compensation in one direction of ±1 mm. SPA-XY 40 = compensation in all directions of ±1 mm.	Compensation pin Compensation pin	NSE3 NSE-A3
	SPG 40		**Accuracy pin** Clamping pins with patented flex taper with a repeat accuracy < 0.002 mm	Centering pin	NSE3 NSE-A3
	SPA-S 40 SPB-S 40 SPC-S 40		**Dove tail pin** Clamping pins with a mounting depth of 3.5 mm.	Centering pin Positioning pin Holding pin	NSE3 NSE-A3
	SPA-OB 40 SPB-OB 40 SPC-OB 40		**Clamping pin without centering collar** The clamping pin is screwed into the workpiece using a fitting screw. Fitting screw with fitting diameter ⌀ 8 mm = ID 0471634. Fitting screw with fitting diameter ⌀ 10 mm = ID 0471635.	Centering pin Positioning pin Holding pin	NSE3 NSE-A3
	SPA-F 40 SPC-F 40		**Heavy duty pin** Clamping pins with a holding force of 75 kN.	Centering pin Holding pin	NSE3 NSE-A3
SPx 80	SPA 80-30		**Clamping pins for NSR maxi** Clamping pins for form-fit connections of the NSR maxi robot coupling to the associated pallet coupling.	Centering pin	NSR maxi

Holding forces in comparison



VERO-S clamping pin size comparison

SPA mikro 10

SPA mini 20

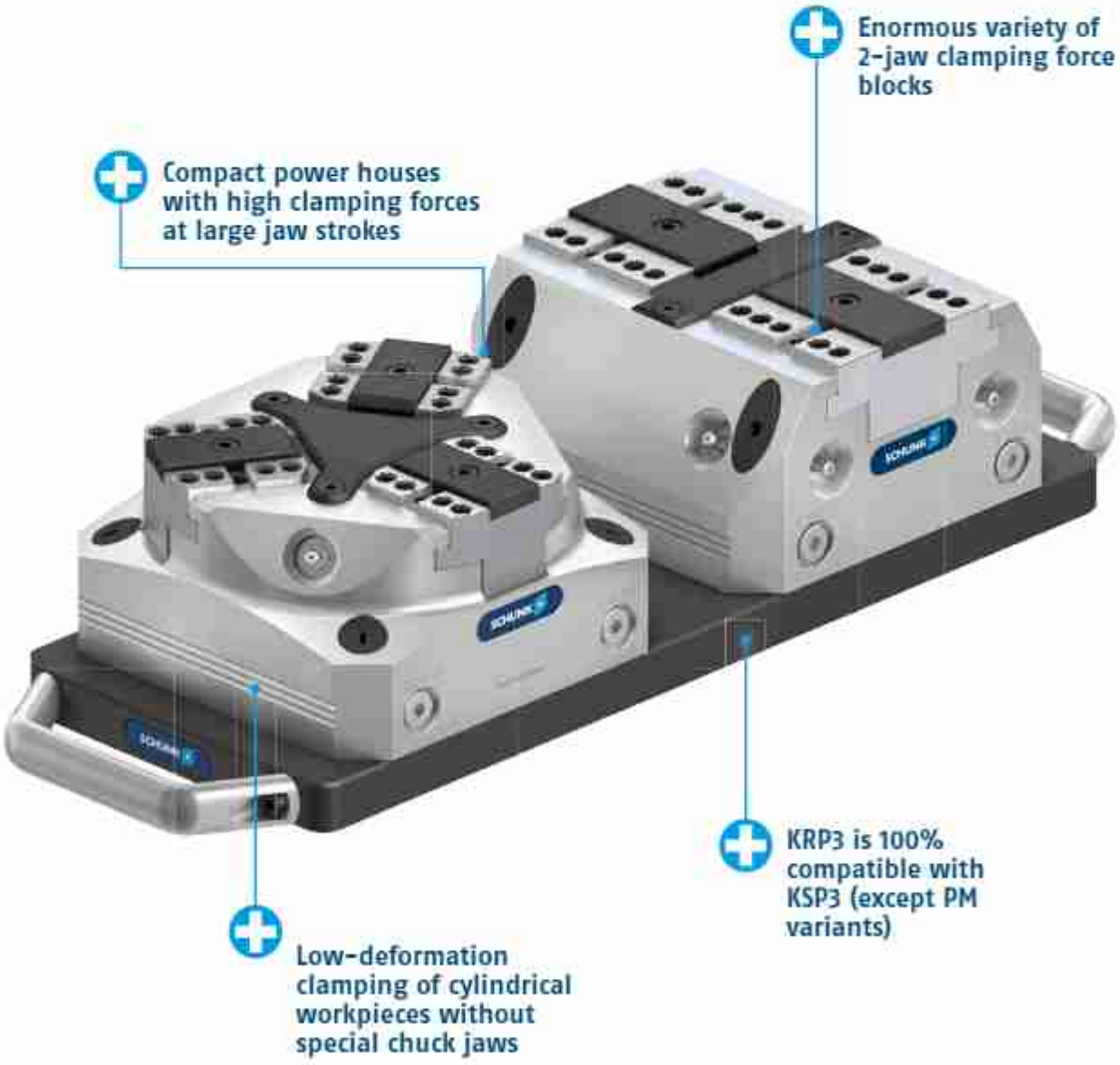
SPA 40

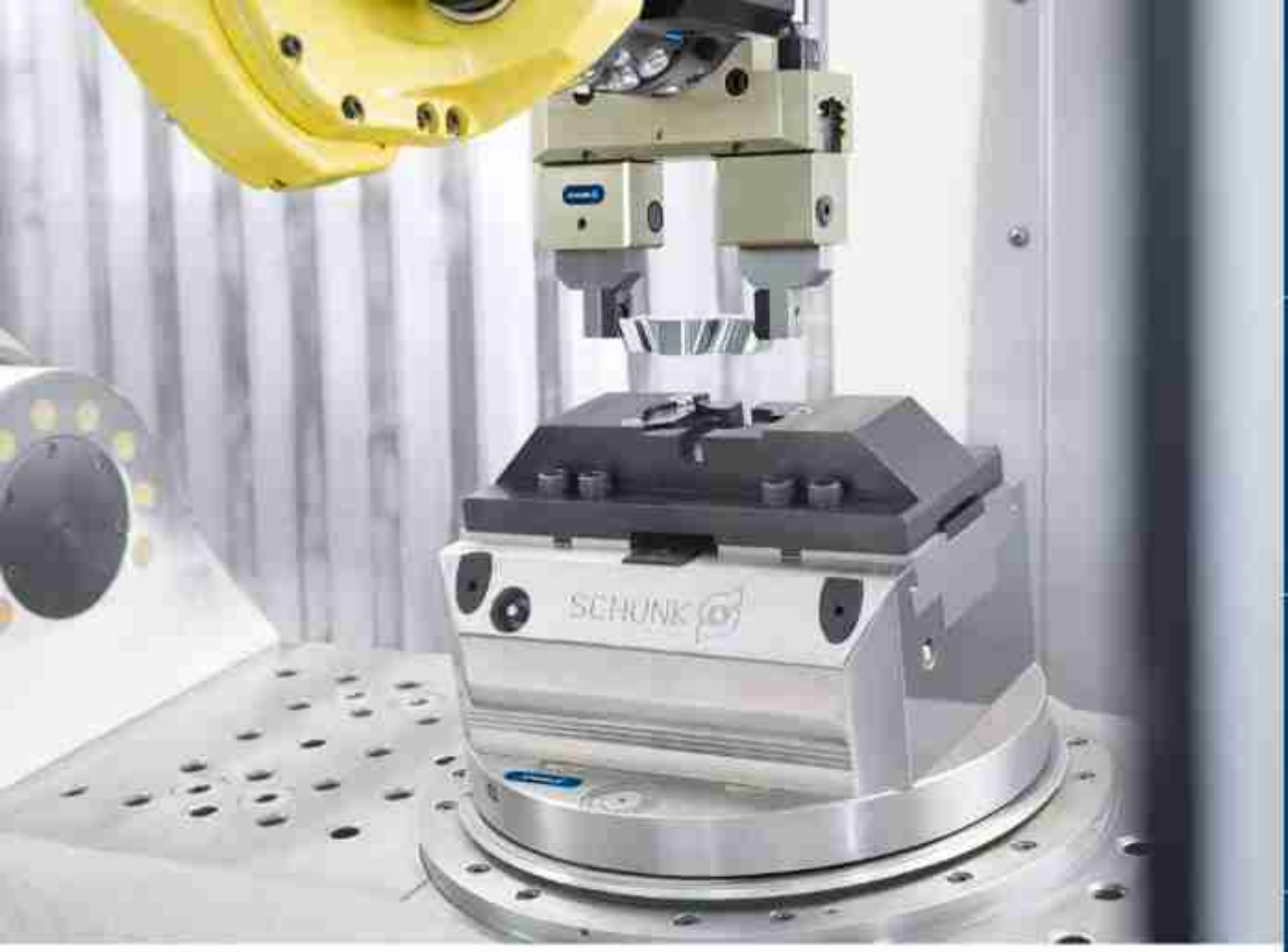
SPA 80

TANDEM3: No one offers more solutions and higher performance for standard versions.

TANDEM3, the new modular system from the pioneer for clamping force blocks. The new series replaces the existing TANDEM plus modular system, but also adds numerous new sizes and variants to the portfolio, as well as supplementing the modular system with the 3-jaw clamping force blocks. This means that SCHUNK is able to offer more solutions and services for workpiece clamping in its standard range than any other company, paving the way for use in automated machine loading.

The clamping force blocks of the new generation are 100% compatible with the TANDEM plus vises, so that they can be replaced 1:1. The entire program is supplemented with a variety of system jaws and top jaws, as well as base plates and adapter plates for direct mounting of the clamping force blocks on the VERO-S quick-change pallet system or the machine table. Benefit here from SCHUNK's decades of know-how in the development of clamping force blocks.





Compact. Intelligent. It's all inside. – The art of engineering from SCHUNK.

"When breaking new ground, it is important to be brave enough to try out something new."

Philipp Schräder, Head of Development Toolholding and Workholding

2-jaw clamping force blocks

Pneumatic KSP3

Type		Axes 3	4	5	Description
Standard stroke					
KSP3		x	x	x	Pneumatically actuated clamping force blocks with standard stroke for any type of clamping task – whenever pneumatics are available on the machine. Advantage of standard stroke: High clamping forces due to the small wedge angle.
Long stroke					
KSP3-LH		x	x	x	Pneumatically actuated clamping force blocks with long stroke for any type of clamping task – whenever pneumatics are available on the machine. Advantage of long stroke: Long jaw stroke for collision-free loading of workpieces with large interfering contours.
With fixed jaw					
KSP3-F		x	x	x	Pneumatically actuated clamping force blocks with fixed stroke for any type of clamping task – whenever pneumatics are available on the machine. Advantage of fixed jaw: Fixed zero point and therefore no offset of the reference point.

Hydraulic KSH3

Type		Axes 3	4	5	Description
Standard stroke					
KSH3		x	x	x	Hydraulically actuated clamping force blocks with standard stroke especially in the field of series production – whenever hydraulics are available on the machine. Advantage of standard stroke: High clamping forces due to the small wedge angle.
Long stroke					
KSH3-LH		x	x	x	Hydraulically actuated clamping force blocks with long stroke especially in the field of series production – whenever hydraulics are available on the machine. Advantage of long stroke: Long jaw stroke for collision-free loading of workpieces with large interfering contours.
With fixed jaw					
KSH3-F		x	x	x	Hydraulically actuated clamping force blocks with fixed stroke especially in the field of series production – whenever hydraulics are available on the machine. Advantage of fixed jaw: Fixed zero point and therefore no offset of the reference point.

Size [mm]	Clamping force at max. operating pressure [kN]	Additional clamping force resulting from spring assembly [kN]	Stroke per jaw [mm]	Max. jaw height [mm]	Repeat accuracy [mm]	Closing/opening time [s]	Operating pressure [bar]
64	4.5	0.5 – 1.5	2	60	0.01	0.1	2 – 9
100	18	2.5 – 6.5	2	60	0.01	0.2	2 – 9
140	30	4.5 – 9	3	60	0.01	0.3	2 – 9
160	45	5.5 – 11	3	60	0.01	0.4	2 – 9
200	55	8.5 – 16	4	100	0.02	0.6	2 – 9
250	55	10.5 – 20	5	150	0.02	1.6	2 – 6
315	100	16.5 – 32.5	6.5	200	0.02	2	2 – 6
64	2.3	0.4 – 0.8	4	120	0.01	0.1	2 – 9
100	8	1 – 2.5	6	150	0.01	0.2	2 – 9
140	15	2 – 4	7	120	0.01	0.3	2 – 9
160	20	2 – 4.5	8	200	0.01	0.4	2 – 9
200	25	3.5 – 7	10	200	0.02	0.6	2 – 9
250	20	3.5 – 7	15	500	0.02	1.6	2 – 6
315	40	6.5 – 12.5	18	500	0.02	2	2 – 6
64	4.5	0.5 – 1.5	4	60	0.01	0.1	2 – 9
100	18	2.5 – 6.5	4	60	0.01	0.2	2 – 9
140	30	4.5 – 9	6	60	0.01	0.3	2 – 9
160	45	5.5 – 11	6	60	0.01	0.4	2 – 9
200	55	8.5 – 16	8	100	0.01	0.6	2 – 9
250	55	10.5 – 20	10	150	0.01	1.6	2 – 6
315	100	16.5 – 32.5	13	200	0.01	2	2 – 6

Size [mm]	Clamping force at max. operating pressure	Stroke per jaw [mm]	Max. jaw height [mm]	Repeat accuracy [mm]	Closing/opening time [s]	Operating pressure [kN]
64	4.5	2	60	0.01	0.5	10 – 60
100	18	2	60	0.01	1	10 – 60
140	30	3	60	0.01	1	10 – 60
160	45	3	60	0.01	1.5	10 – 60
200	60	4	100	0.02	1.8	10 – 60
64	4.5	4	60	0.01	0.1	10 – 120
100	16	6	60	0.01	1	10 – 120
140	30	7	60	0.01	1	10 – 120
160	40	8	60	0.01	1.5	10 – 120
200	53	10	200	0.02	1.8	10 – 120
250	50	15	150	0.02	2.5	10 – 60
315	95	18	200	0.02	3.5	10 – 120
64	4	4	60	0.01	0.1	10 – 60
100	18	4	60	0.01	1	10 – 60
140	30	6	60	0.01	1	10 – 60
160	45	6	60	0.01	1.5	10 – 60
200	60	8	100	0.01	1.8	10 – 60

2-jaw clamping force blocks

Spring-loaded KSF3

Type		Axes			Description
		3	4	5	
Standard stroke					
KSF3		x	x	x	Spring-loaded clamping force blocks with standard stroke especially for tombstone and storage solutions. Clamping force is fully maintained even after compressed air is removed. Advantage of standard stroke: High clamping forces due to the small wedge angle.
Long stroke					
KSF3-LH		x	x	x	Spring-loaded clamping force blocks with long stroke especially for tombstone and storage solutions. Clamping force is fully maintained even after compressed air is removed. Advantage of long stroke: Long jaw stroke for collision-free loading of workpieces with large interfering contours.
With fixed jaw					
KSF3-F		x	x	x	Spring-loaded clamping force blocks with fixed stroke especially for tombstone and storage solutions. Clamping force is fully maintained even after compressed air is removed. Advantage of fixed jaw: Fixed zero point and therefore no offset of the reference point.

Pneumatic PGS3

Type		Axes			Description
		3	4	5	
Standard stroke					
PGS3		x	x	x	Pneumatically actuated clamping force blocks with standard stroke for automated machining of small workpieces. Advantage of standard stroke: High clamping forces due to the small wedge angle.
Long stroke					
PGS3-LH		x	x	x	Pneumatically actuated clamping force blocks with long stroke for automated machining of small workpieces. Advantage of long stroke: Long jaw stroke for collision-free loading of workpieces with large interfering contours.

Size [mm]	Clamping force range [kN]	Clamping force range with turbo [kN]	Stroke per jaw [mm]	Max. jaw height [mm]	Repeat accuracy [mm]	Closing/ opening time [s]	Opening pressure [bar]	Max. turbo pressure [bar]
100	7 – 12		2	60	0.01	0.2	6 – 9	
160	20 – 30		3	60	0.01	0.8	6 – 9	
250	37 – 50		5	150	0.02	1.5	6 – 9	
100	3 – 5	9 – 11	6	150	0.01	0.2	6 – 9	6
160	10 – 15	29 – 34	8	200	0.01	0.4	6 – 9	6
250	15 – 21	40 – 46	15	500	0.02	1.5	6 – 9	6
100	7 – 12		4	60	0.01	0.2	6 – 9	
160	20 – 30		6	60	0.01	0.4	6 – 9	
250	37 – 50		10	150	0.01	1.5	6 – 9	

Size [mm]	Clamping force at max. operating pressure [kN]	Stroke per jaw [mm]	Max. jaw height [mm]	Repeat accuracy [mm]	Closing/ opening time [s]	Operating pressure [kN]
100	10	2	30	0.02	0.2	2 – 6
140	17	3	30	0.02	0.3	2 – 6
100	4.5	6	45	0.02	0.2	2 – 6
140	8.5	7	45	0.03	0.3	2 – 6

3-jaw clamping force blocks

Pneumatic KRP3

Type		Axes 3	4	5	Description
Standard stroke					
KRP3		x	x	x	Pneumatically actuated clamping force blocks with standard stroke for any type of clamping task – whenever pneumatics are available on the machine. Advantage of standard stroke: High clamping forces due to the small wedge angle.
Long stroke					
KRP3-LH		x	x	x	Pneumatically actuated clamping force blocks with long stroke for any type of clamping task – whenever pneumatics are available on the machine. Advantage of long stroke: Long jaw stroke for collision-free loading of workpieces with large interfering contours.

Hydraulic KRH3

Type		Axes 3	4	5	Description
Standard stroke					
KRH3		x	x	x	Hydraulically actuated clamping force blocks with standard stroke especially in the field of series production – whenever hydraulics are available on the machine. Advantage of standard stroke: High clamping forces due to the small wedge angle.
Long stroke					
KRH3-LH		x	x	x	Hydraulically actuated clamping force blocks with long stroke especially in the field of series production – whenever hydraulics are available on the machine. Advantage of long stroke: Long jaw stroke for collision-free loading of workpieces with large interfering contours.

Spring force KRF3

Type		Axes 3	4	5	Description
Standard stroke					
KRF3		x	x	x	Spring-loaded clamping force blocks with standard stroke for tombstone and storage solutions. Due to the clamping via spring force, the clamping force is fully maintained even after compressed air is removed. Advantage of standard stroke: High clamping forces due to the small wedge angle.
Long stroke					
KRF3-LH		x	x	x	Spring-loaded clamping force blocks with long stroke for tombstone and storage solutions. Due to the clamping via spring force, the clamping force is fully maintained even after compressed air is removed. Advantage of standard stroke: High clamping forces due to the small wedge angle.

Size [mm]	Clamping force at max. operating pressure [kN]	Additional clamping force resulting from spring assembly [kN]	Stroke per jaw [mm]	Max. jaw height [mm]	Repeat accuracy [mm]	Closing/opening time [s]	Operating pressure [bar]
100	18	2 – 5	2	60	0.01	0.2	2 – 9
160	45	4 – 8	3	60	0.01	0.4	2 – 9
200	55	6.5 – 12	4	100	0.02	1	2 – 9
250	55	9 – 15	5	150	0.02	1.6	2 – 6
100	8	0.75 – 2	6	150	0.01	0.2	2 – 9
160	20	2 – 3.5	8	200	0.01	0.4	2 – 9
200	25	3 – 5.5	10	200	0.02	1	2 – 9
250	20	3 – 5.5	15	500	0.02	1.6	2 – 6

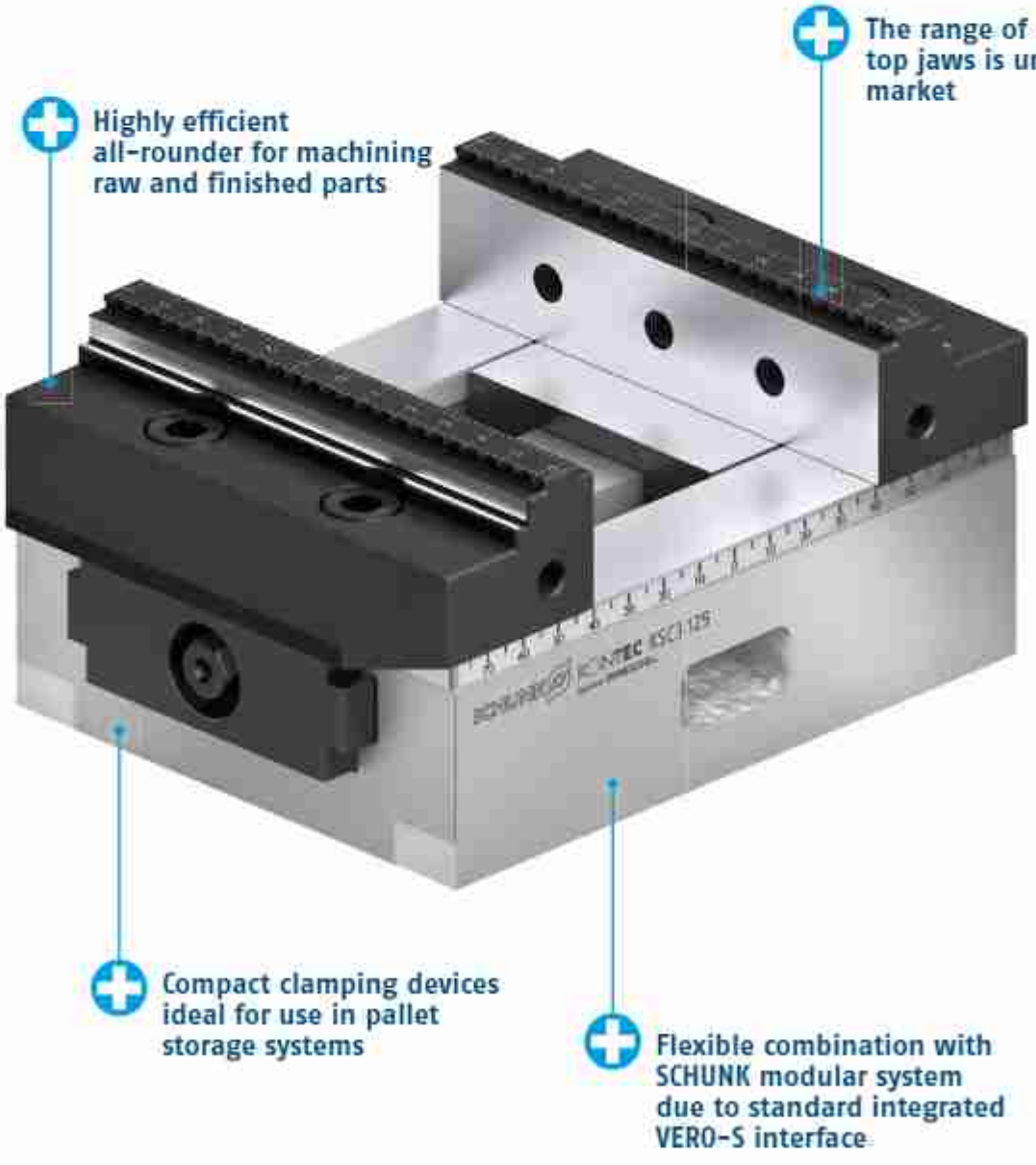
Size [mm]	Clamping force at max. operating pressure [kN]	Stroke per jaw [mm]	Max. jaw height [mm]	Repeat accuracy [mm]	Closing/opening time [s]	Operating pressure [bar]
100	18	2	60	0.01	1	10 – 60
160	45	3	60	0.01	1.5	10 – 60
200	60	4	100	0.02	1.8	10 – 60
100	16	6	60	0.01	1	10 – 120
160	40	8	60	0.01	1.5	10 – 120
200	53	10	100	0.02	1.8	10 – 120
250	50	15	150	0.02	2.5	10 – 60

Size [mm]	Clamping force range [kN]	Clamping force range with turbo [kN]	Stroke per jaw [mm]	Max. jaw height [mm]	Repeat accuracy [mm]	Closing/ opening time [s]	Opening pressure [bar]	Max. turbo pressure [bar]
100	7 – 12		2	60	0.01	0.2	6 – 9	
160	20 – 30		3	60	0.01	0.8	6 – 9	
200	26 – 35		4	100	0.02	1.2	6 – 9	
250	37 – 50		5	150	0.02	1.8	6 – 9	
100	3 – 5	9 – 11	6	150	0.01	0.2	6 – 9	6
160	10 – 15	29 – 34	8	200	0.01	0.8	6 – 9	6
200	11.5 – 15.5	28 – 32	10	200	0.02	1.2	6 – 9	6
250	15 – 21	40 – 46	15	500	0.02	1.6	6 – 9	6

KONTEC: Manually clamped – powerful and precise holding.

KONTEC manual clamping systems make production on semi/fully automated universal milling machines and machining centers even more efficient. Whether power-amplified single-acting vise, single-acting vise, centric clamping vise or multi clamping vise – you will be absolutely impressed!

A range of system and top jaws that is unique on the market means that the clamping devices can be adapted to individual customer requirements. The clamping by tension in combination with the integrated VERO-S interface allows the vises to be changed quickly and easily on the SCHUNK quick-change pallet system – with the maximum level of repeat accuracy.



NEW

The new clamping force tester IFT SST for universal use is suitable for measuring 2-jaw clamping force blocks or vises, regardless of the manufacturer. The clamping distance for the measuring head is 55 mm. Data evaluation is carried out wirelessly via an app on an industrial tablet computer or via the subsequent export to other end devices. The measured values can be stored and displayed in relation to the clamping device.

Manual clamping system

		Type		Axes			Description
				3	4	5	
Single clamping systems	with force amplification	The machine vise					
		KSG		x	x	x	Modular machine vice with continuously adjustable clamping force and quick clamping lever.
		The 5-axis vise					
		KSX 125		x	x	x	5-axis vise with continuously adjustable clamping force and quick clamping lever. Due to the high design, very good accessibility of the machine spindle to the workpiece is ensured.
	without force amplification	The 5-axis vise for 6-sided machining					
		KSX-C2		x	x	x	5-axis vise with jaw quick-change system and adjustable clamping center. A standard integrated pull-down function enables complete and precise machining of the sixth side.
		The single-acting vise					
		KSC-F		x	x	x	Extremely flat single-acting vise with quick adjustment of the clamping range and low weight. Ideally suited for use in palette storage units.
Centric clamping systems	without force amplification	The centric clamping vise					
		KSC3		x	x	x	Extremely flat centric clamping vise with high clamping forces and a program of system and top jaws that is unique on the market for a flexible range of applications. A nickel-plated base body to protect against corrosion broadens the range of applications significantly.
		The centric vise for small components					
		KSC mini		x	x	x	Centric clamping vise with jaw quick-change system and high clamping forces with compact dimensions.
Multiple clamping system	without force amplification	The double vise					
		KSC-D		x	x	x	Extremely flat double vise with nickel-plated base body and convenient third-hand function – also available as single-acting vise. The third-hand function can be used to insert two workpieces one after the other, and then to fix and securely clamp them.
		The flexible multiple clamping system					
		KSM2		x	x	x	Clamping rails with innovative jaw quick-change system for clamping a large part density on only one clamping device.

Width of the clamping vise [mm]	Base body length [mm]	Max. clamping range [mm]	Cubic workpieces	Bulky workpieces	Round workpieces	Max. clamping force
100	305	245				30
125	390	343	x	x	x	40
160	530	506				40
125	265	212				40
125	300	249	x	x	x	40
125	815	749				40
125	330	217				40
125	430	317				40
125	500	387	x	x	x	40
125	630	517				40
125	800	687				40
80	214	192				25
125	362	308	x	x	x	40
125	740	682				40
160	480	434				50
80	130	121				25
80	190	185				25
125	160	163				40
125	235	226	x	x	x	40
125	300	303				40
160	280	251				50
160	480	465				50
70	80	57	x	x	x	16
70	100	77				16
80	300	122				25
125	320	114				40
125	390	149				40
125	460	184	x	x	x	40
125	530	219				40
125	600	254				40
125	670	289				40
125	740	324				40
90	260	134				30
90	400	274				30
90	500	374	x	x	x	30
90	600	474				30
90	650	524				30

Tombstones

Horizontal machining centers do not achieve optimum performance unless combined with the suitable tombstones in combination with the right clamping devices. Due to the enormous range of clamping options and loading densities the machine running times are increased significantly. SCHUNK tombstones also offers optimum accessibility and machining of your workpieces.

The tombstones are available in four different tombstone designs with a total of over 50 standard versions.
The stable hollow body design provides for high rigidity as well as good vibration damping. The base plates with the dimensions 400 x 400 mm and 500 x 500 mm are suitable for standard machine pallets type DIN 55201 and JIS 6337–1980.

Tombstones with an extremely compact design

Optimal machine spindle accessibility

For pallets 400 x 400 mm and 500 x 500 mm

Universal application possibilities

Six series:

1. VERO-S tombstones
2. Double angle tombstones
3. Triangle tombstones
4. Octangle tombstones
5. Cube tombstones
6. Tombstones with clamping vises

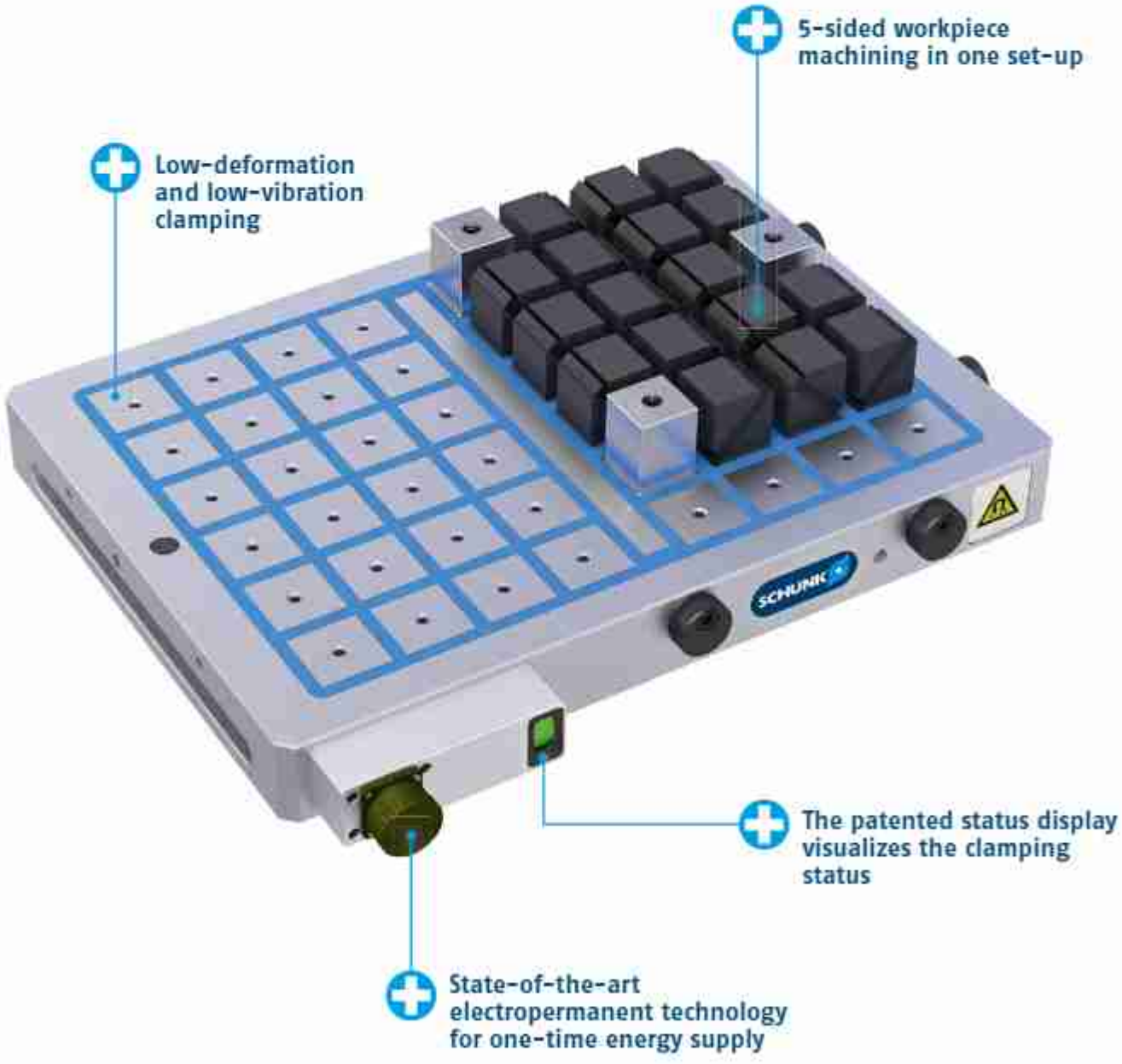
Design

- Very finely milled with through-hole grid 50 mm
- Very finely milled, with reduced drilling grid, specially for SCHUNK clamping devices
- Rough clamping surfaces without bore holes for finishing by customer

Magnetic clamping technology

Modern machine tools and machining centers are designed for complex machining operations carried out during a single set-up. As the workpieces can be placed flat onto the MAGNOS magnetic chucks, all sides of the workpiece can be easily accessed. The permanent magnetic clamping force is uniformly applied across the entire workpiece, thereby effectively minimizing vibrations.

The patented status display for the operating condition of square pole plates allows users to see at a glance whether the MAGNOS magnetic chucks are active or not. This allows accidents to be avoided. The continuous display of the magnetizing state enables reliable clamping and does not depend on the power supply.



Try out the new MAGNOS app. Available for iOS, Android or as a web-based version.

The app makes everyday work with MAGNOS magnetic chucks easier with the simple calculation of holding forces – try it now for 6 months free of charge.

Our performance promise. Your benefits.

- Simple calculation of the holding forces on the PC (web-based version) or via the app
- Optimization of the manufacturing process through prior estimation of the machining data
- For SCHUNK MFPS, MFRS, MGT and MTR magnetic chucks

Magnetic clamping technology

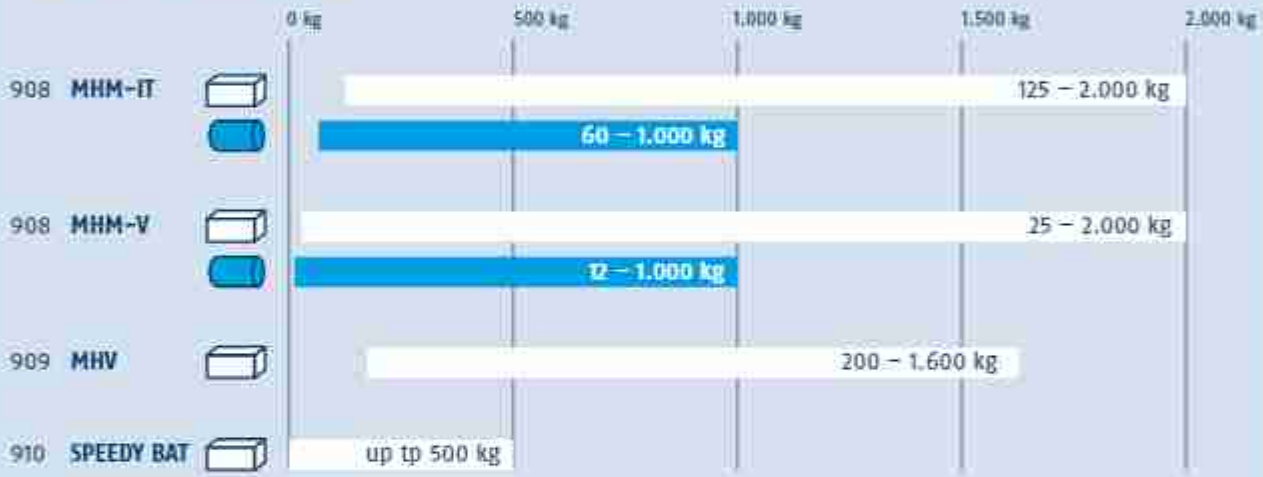
	Type		Description
Milling applications	MFRS		Electropermanent magnetic chucks with square poles for general milling applications.
	MFPS		Electropermanent magnetic chucks with parallel poles for thin and narrow workpieces.
Turning applications	MGT		Electropermanent magnetic chucks for finishing, precision turning and grinding of rings and washers.
Grinding applications	MSC-PM60D		Electropermanent magnetic chucks with parallel poles and large pole pitches for medium and large workpieces.
	MSC-PM62F		Electropermanent magnetic chucks with parallel poles and fine pole pitches for small and thin workpieces.
	MSC-PM15		Manual magnetic chucks with parallel poles and fine pole pitches for small and thin workpieces.
	MSC-PM35		Manual magnetic chucks for machining rings and washers.
EDM applications	MEF-F-A1		Electropermanent magnetic modules

Pole size/pole pitch [mm]	Mains voltage [V]	Max. clamping force [kN/* N/cm²]	Min. material thickness [mm]	Min. workpiece size [mm]	Connection
50 x 50/70 x 70	400/460	39 – 1162	8 – 20	230 x 170	Fast connection
30 + 10	400/460	160*	7	230 x 170	Fast connection
	400/460	160*	8	Ø 150 – Ø 610	Fast connection
3 + 5	400/460	75*	4	40 x 40	Fixed cable connection
3 + 0.8	400/460	75*	2	40 x 40	Fixed cable connection
1.5 x 0.8		75*	1.5	20 x 20	Hexagon
		80*		Ø 24 – Ø 58	Hexagon
	200/220	75*		20 x 20	Fast connection

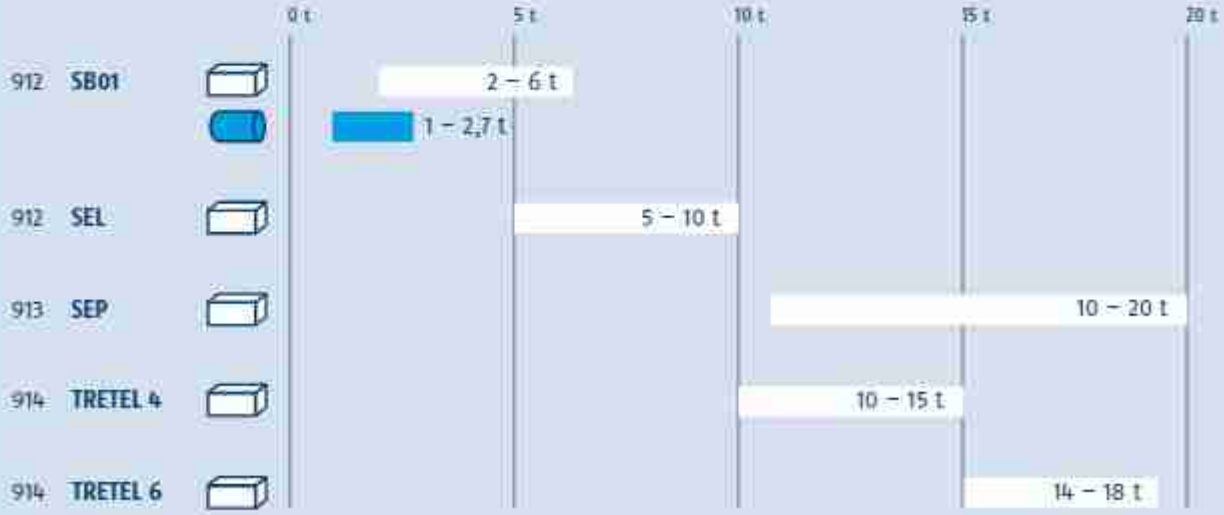
Magnetic lifting technology – versatile, strong and reliable.

MAGNOS magnetic lifting technology from SCHUNK is the perfect option for high lifting and safe holding capacity without the need of external energy supply. With a wide range of simple lifting magnets up to high-performance, electropermanent lifting devices, MAGNOS provides for easy handling of ferromagnetic workpieces up to 20 tons.
Reliably and deformation-free in no time at all.

Magnets for easy lifting



Magnets for heavy lifting



Electropermanent magnetic lifting technology

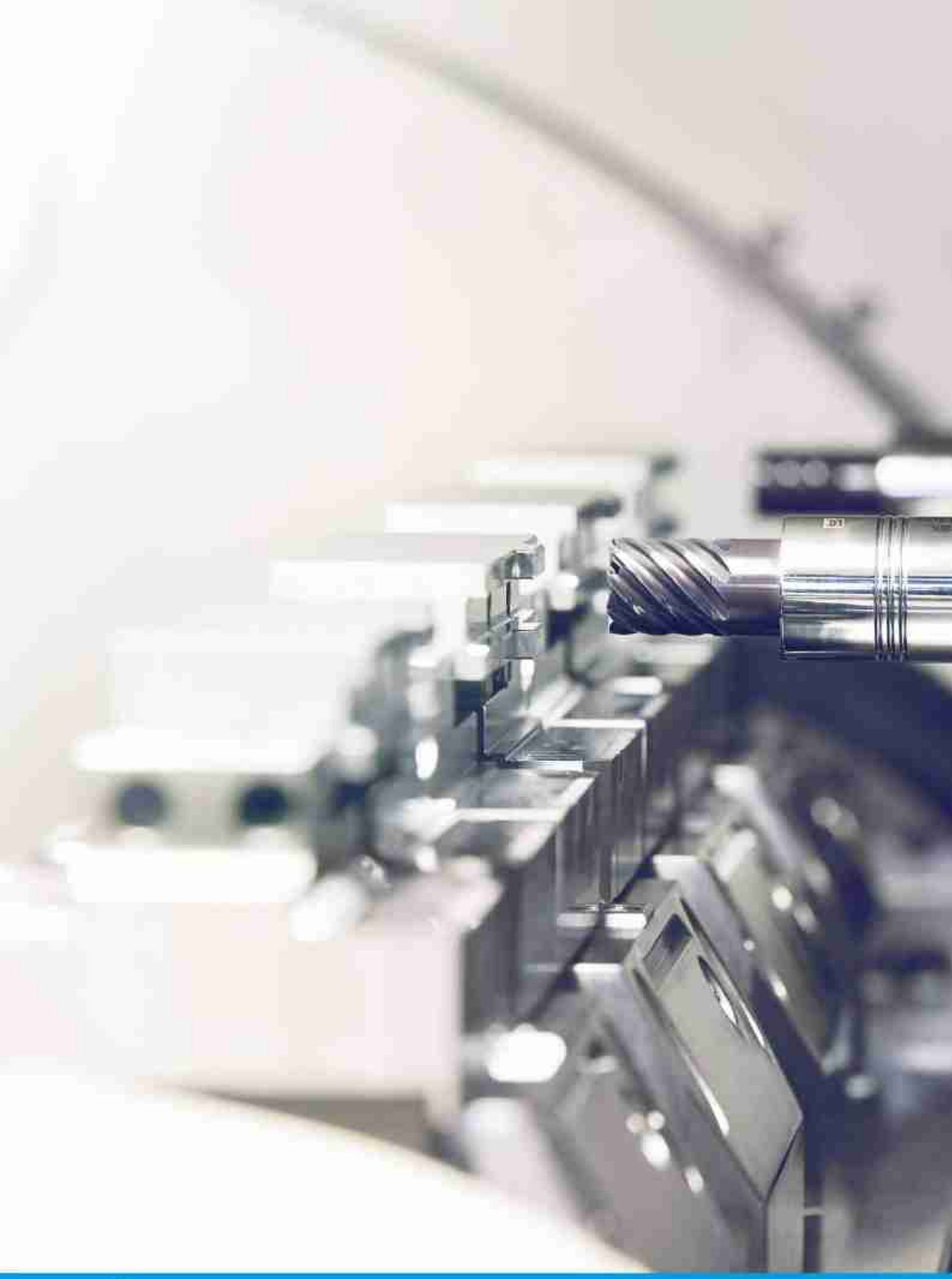
The electropermanent magnetic lifter ensures absolute process reliability even in the event of a power failure. No additional buffer batteries are required. The load remains on the magnetic lifter indefinitely without changing the clamping force. This system is saves energy, as it only requires the power supply only during the MAG and DEMAG cycles.

Self-supporting

Electropermanent lifting magnets from SCHUNK are self-supporting, i.e. they only require a short electrical pulse for the MAG/DEMAG process.

Reliable

The magnet still holds the workpiece reliably even in the event of an interrupted power connection.



Tool clamping technology

Product overview

SCHUNK toolholders –
The complete range for all applications from the technology leader

Each specific application has different requirements. Particularly when it comes to precision, there can be no compromise. This is where SCHUNK, as a technology leader, comes in with its total tooling complete range. The innovative and highly precise toolholding systems cover a unique range in proven SCHUNK quality.

We focus on your particular application case and will always find the optimal toolholding system for your task. Discover the SCHUNK technology diversity from mechanical toolholders, heat shrink toolholders, low-vibration precision toolholders in SCHUNK polygon clamping technology and SCHUNK hydraulic expansion technology to the ultimate for Industry 4.0 applications – the first intelligent toolholder iTENDO.

Intelligence

Intelligence For safe workpiece machining in the unmanned, automated production process, the "closest-to-the-part" components need to have the necessary intelligence. The answer from SCHUNK: the new SCHUNK iTENDO – the first intelligent toolholder on the market.

Premium
TENDO Platinum
TENDO Slim 4ax

Tech
TENDO LSS/ES, KSR, ZERO
SINO-R
TRIBOS S
TRIBOS Mini/RM
TENDO Engineered

Premium. DIN inside: the SCHUNK TENDO Platinum is DIN-compliant in 29 interfaces and over 1,000 variants. The SCHUNK TENDO Slim 4ax is the world's first hydraulic expansion toolholder in DIN standardized heat shrink contour.

Tech. Whether short or long, powerful, slim and optimized for interfering contours – the SCHUNK range problem solvers are specialized for the most demanding tasks, whatever the machining process.

TENDO Platinum

TENDO Slim 4ax

Economy
TENDO E compact

Economy. SCHUNK TENDO E compact is impressive when it comes to volume machining, drilling, reaming and threading. And all that with up to 300% longer tool service lives. The universal hydraulic expansion toolholder meets the increasing requirements in volume machining at a price that makes it easy to switch from mechanical and thermal chucks to the much more precise TENDO quality.

TENDO E compact

Basic
Mechanical toolholders CELSIO

Basic. SCHUNK CELSIO heat shrink toolholders and extensions, together with the extensive range of mechanical toolholders, form the basis of the SCHUNK Total Tooling complete range.

Mechanical toolholders

Precision collet chucks

Extensive toolholder portfolio
for equipping your machine tool completely

100% availability
online via the SCHUNK shop

Over 35 years of experience
in the field of toolholders

Always the right toolholder
for any application, for any cutting edge

The most extensive technology range of toolholders made in Germany.

See this unique range from one source for yourself as part of our total tooling promotion.

Due to real-time data communication, process monitoring in real time, and hence production is ensured with optimal parameters. For more information, please contact us directly at: iTENDO@de.schunk.com

iTENDO³

TENDO LSS

TENDO ES

TENDO KSR

TENDO Zero

SINO-R

TRIBOS-S

TRIBOS Mini

TRIBOS RM

TENDO Engineered

ER collet chucks

WELDON end mill holders

Face mill arbors

Combination shell end mill adapters

CNC short drill chuck

CELSIO

Intelligent toolholder iTENDO²

With our new iTENDO² we have taken the idea of intelligent toolholders to the next level. Speeds of rotation up to 30,000 RPM and an interfering contour that corresponds 1:1 to that of a SCHUNK standard toolholder make it destined for use in a wide range of tasks without any of the time-consuming adjustment work. This also makes it a straightforward option for monitoring machining processes in real time.

Three service packages offer an intelligent solution for any challenge. From process optimization using a tablet, to playing out data for process monitoring and also to completely integrating the system into existing machine controls.

iTENDO² pad – the new iTENDO² with its own tablet PC

- Direct connection to the tablet PC without machine connection
- Display of chatter index (10 Hz data)
- Alarm and trend evaluation on the tablet PC
- Available for various machine connections

100% compatibility

simple 1:1 exchange with SCHUNK standard toolholders without time-consuming reprogramming of your system

Tool clamping technology

Comparison tables

Toolholder Intelligence/Premium/Tech

	Type		General milling machining	Drilling/ chamfering	Reaming	Thread cutting	Roughing
Intelligence	iTENDO²		◑	●	◑	◑	
Premium	TENDO Platinum		◑	●	◑	◑	
	TENDO Slim 4ax		◑	●	◑	◑	
	TENDO Slim 4ax Cool Flow		◑	●	◑	◑	
	TENDO Engineered		◑	●	◑	◑	
Tech	TENDO Zero		◑	●	●	◑	
	TENDO ES		◑	●	◑	◑	
	TENDO LSS		○	●	◑		

● Most suitable ◑ Suitable ○ Suitable

	Finishing	Run-out accuracy	Damping	Radial rigidity	Torque	Repeat accuracy	Flexibility & variability ø	Handling & set-up time optimization	Machining with optimized interfering contours
		3 µm	●	●		3 µm		●	○
	●	3 µm	●	◑	◑	3 µm	●	●	◑
	●	3 µm	●	○	◑	3 µm	●	●	●
	●	6 µm	●	○	◑	6 µm	●	●	●
	●	3 µm	●	◑	◑	3 µm	●	●	◑
		0 µm	●	◑	◑		●	●	◑
	●	6 µm	●	●	◑	6 µm	●	●	●
	◑	6 µm	●	○	◑	6 µm	●	●	●

Tool clamping technology

Comparison tables

Toolholder Tech/Economy

	Type		General milling machining	Drilling/ chamfering	Reaming	Thread cutting	Roughing
Tech	TENDO RLA		◑	●	◑	◑	
	TRIBOS-RM		●	●	◑	◑	
	TRIBOS-S		◑	●	◑	◑	○
	TRIBOS-Mini			●	◑		
	TRIBOS-R		●	●	◑	◑	●
	SINO-R		◑	◑		●	●
Economy	TENDO E compact		●	●	◑	●	●

● Most suitable ◑ Suitable ○ Suitable

	Finishing	Run-out accuracy	Damping	Radial rigidity	Torque	Repeat accuracy	Flexibility & variability ø	Handling & set-up time optimization	Machining with optimized interfering contours
	●	3 µm	●	◑	◑	3 µm	●	●	◑
	●	3 µm	●	○	◑	3 µm	○	◑	◑
	●	3 µm	●	○	◑	3 µm	●	◑	●
	◑	3 µm	◑	○	◑	3 µm		◑	●
	◑	3 µm	●	●	◑	3 µm	●	◑	○
		5 µm	●	●	◑		●	○	○
	●	3 µm	●	●	●	3 µm	●	●	○

Tool clamping technology

Comparison tables

Basic

	Type		General milling machining	Drilling/ chamfering	Reaming	Thread cutting	Roughing
Basic	CELSIO		◑	●	◑	○	◑
	ER collet chucks		◑	○	○	◑	
	ER precision collet chucks		◑	●	◑	◑	○
	WELDON end mill holders		◑			○	◑
	Whistle-Notch mounting		◑			○	◑
	Face mill arbor		◑				●
	Combination shell and end mill adapter		◑				●
	CNC short drill chuck			◑			
	Screw-in milling cutter mounting		◑				◑
	Morse taper mounting		○	○	○	○	○

● Most suitable ◑ Suitable ○ Suitable

	Finishing	Run-out accuracy	Damping	Radial rigidity	Torque	Repeat accuracy	Flexibility & variability ø	Handling & set-up time optimization	Machining with optimized interfering contours
	◑	3 µm	○	◑	●	3 µm		○	●
	○	8 µm	◑	◑			●	○	◑
	◑	3 µm	◑	●	●		●	○	○
		3 µm	○	●	●	3 µm		○	○
		3 µm	○	◑	●				○
	○	6 µm		●		6 µm		○	
	○	6 µm		●				○	
		N/A	○		○		●	◑	○
		5 µm		◑				○	◑
		8 µm	○		○		○	◑	○

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