

SIMPLY PRECISE



PMS Series

Bridge-Type 3D Multisensor Measuring Machines

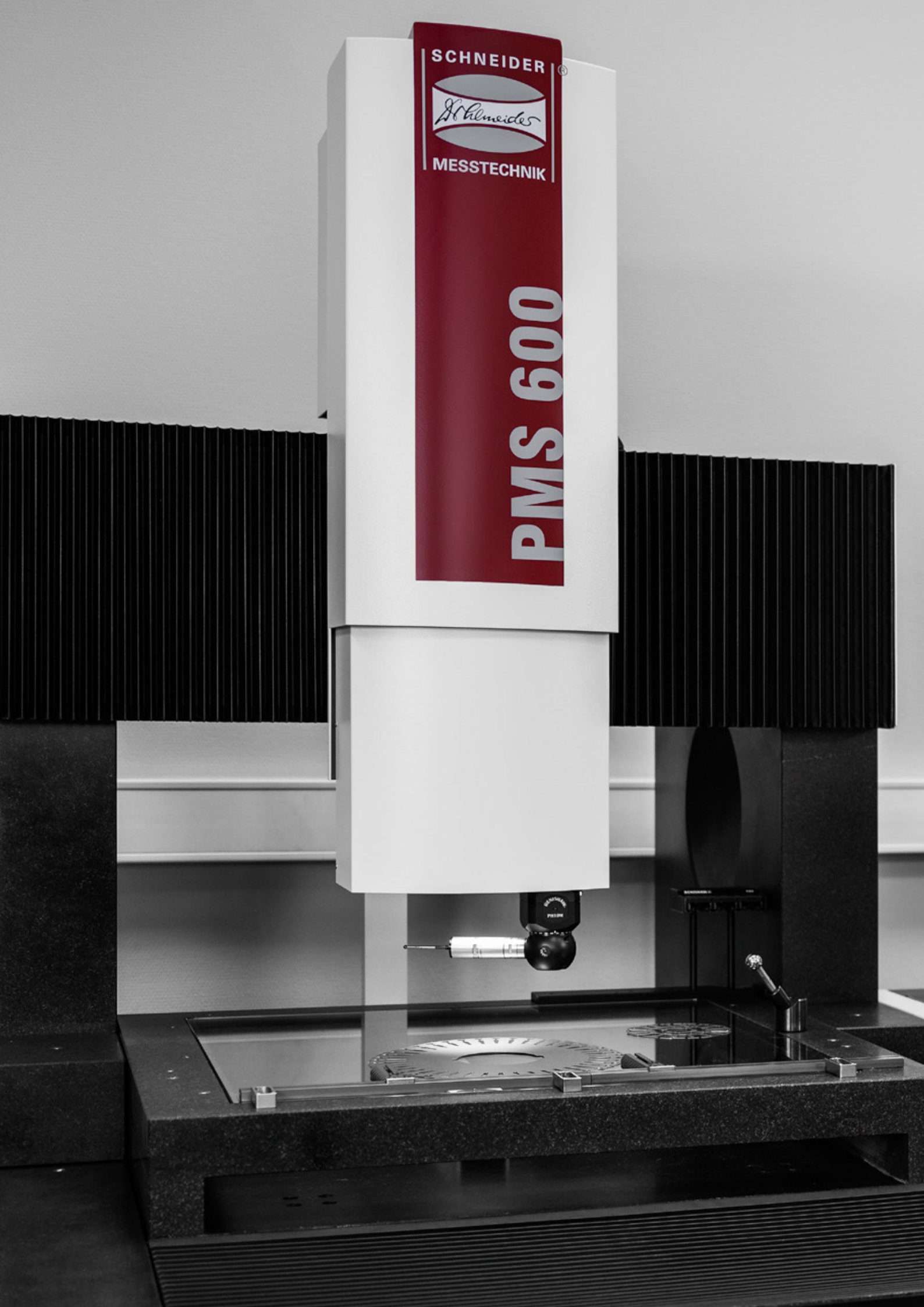


SCHNEIDER®

Schneider

MESSTECHNIK

PMS 600



Translate sober requirements into smart ideas, transfer smart ideas into accurate solutions, transform accurate solutions into measurable results – ambitious goals can only be achieved if everyone pulls in the same direction. We call this **SIMPLY PRECISE**





The PMS series – a technological front runner

The epitome of accuracy and versatility – future-proof by design

3D multisensor portal measuring machines from Schneider's PMS series are at work throughout the world in renowned companies and sophisticated industries. Top-notch organisations engaged in highly sensitive and safety-relevant arenas, such as the automotive and aerospace industries or medical and dental engineering, rely on Schneider's unique expertise because measuring machines in these areas are required to meet exceptionally stringent standards and specifications. Featuring a high-end modular design, Schneider's proven all-round performers provide just the right high-quality solution whatever the challenge may be. And this why:

+ **Uncompromising precision**

The machines in the PMS and PMS-LL series deliver the most accurate measurement results obtainable at today's state of the art. They work with impeccable long-term reliability even in production environments.

+ **Top speed**

Despite their high level of precision, all PMS machines feature remarkable measurement speed, thus providing significant cost benefits.

+ **Multisensor technology honed to perfection**

Schneider's comprehensive portfolio of high-performance optical and tactile 3D measuring systems

enables professionals to tackle any task with confidence and ease.

Thanks to the combination of different sensors, the time required for measurement is considerably reduced, thus enabling new options to be explored and even measurement tasks to be accomplished that were formerly considered incompatible.

+ **One machine for all your measurement needs**

As all PMS machines feature a modular design, they can be individually configured to suit specific needs. Regardless of the machine series and size* you opt for, you will benefit from an unparalleled flexibility of use.

* Please also refer to the summary table on the last double page of this brochure.

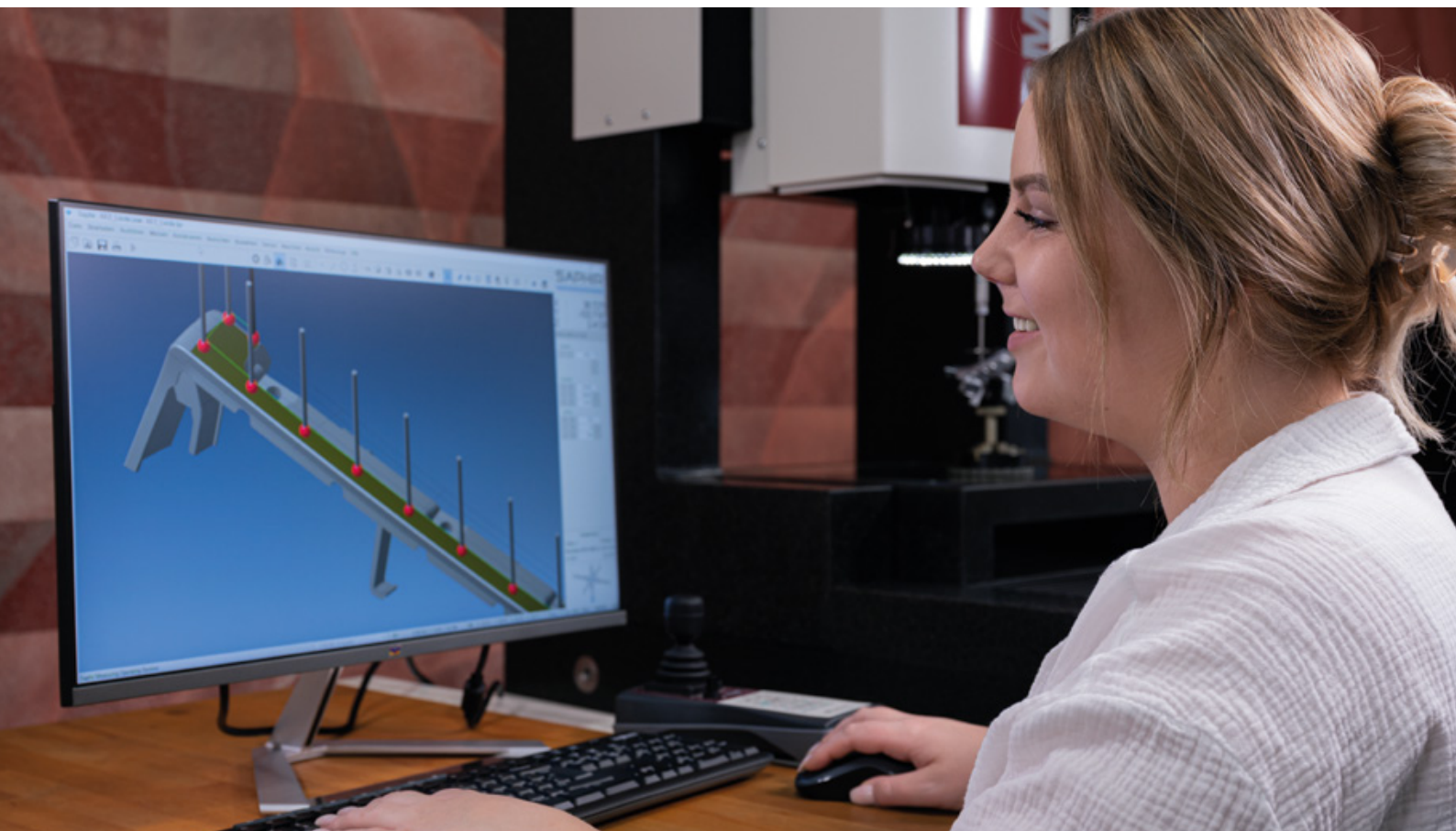
Whether it's simple forms, complex geometries, deep bores or even shafts or reflective glass objects: Your PMS machine will attend to them all with the same accuracy and precision. A variety of useful equipment options, including a modular rotation axis, different clamping tools and a range of stylus change racks, to name but a few, further boost the machines' versatility.

+ **An investment for life**

The multisensor capability of all PMS machines is an invaluable asset in that it ensures universal usefulness and top-notch precision. Add to this the machines' process-oriented software, their robust granite structure as well as the many options for cost-effective modular retrofitting and upgrading, and you will have found the perfect pick for a worthwhile investment that will help your business "measure up" – for years and decades to come.

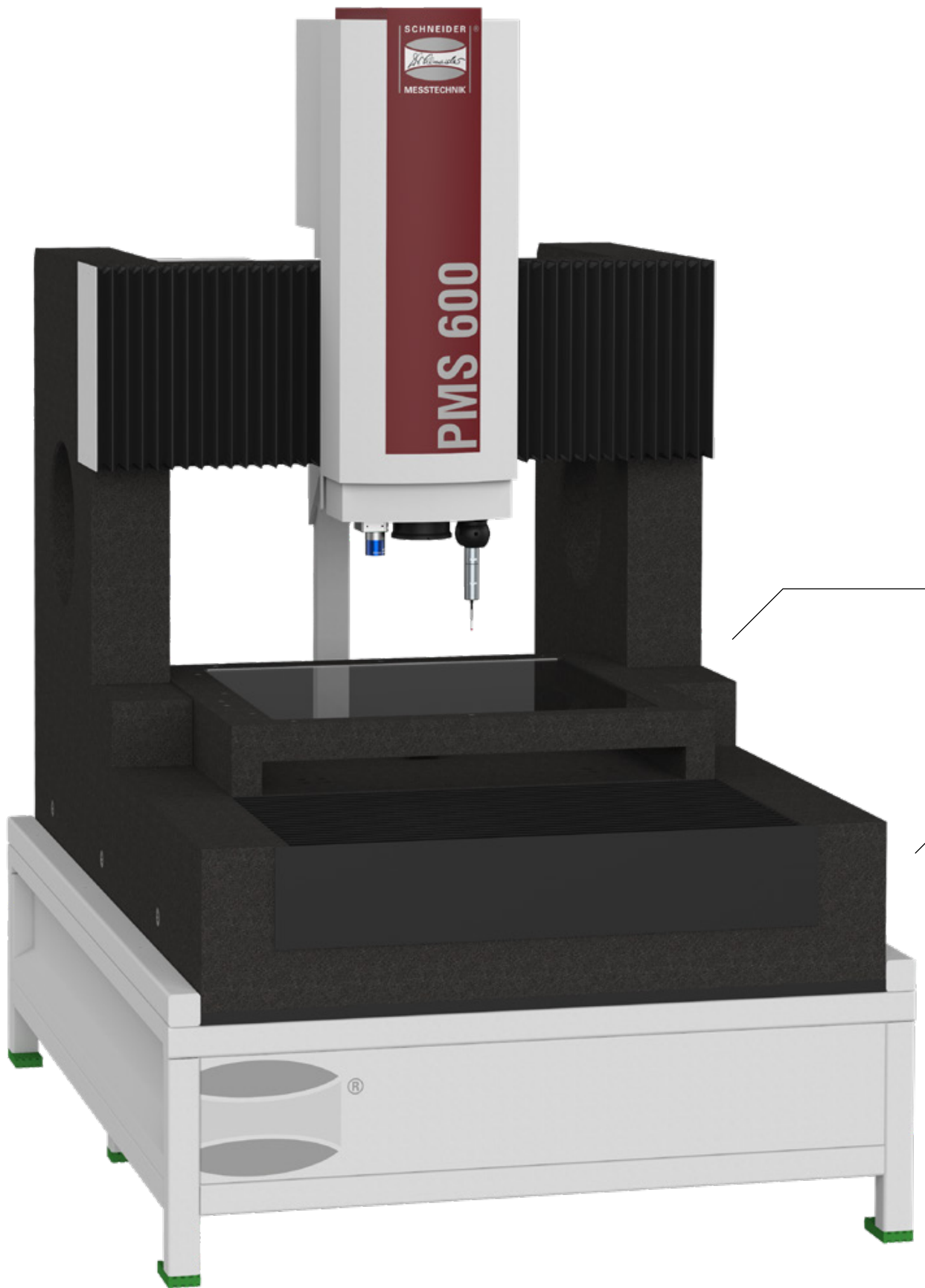
SAPHIR – user-friendly, to the point & efficient

All in one, one for all: The SAPHIR software is Schneider's technological gem because it supports all sensors and measurement tasks! With its practice-oriented, intuitive and workflow-optimising design, 3D measurement and analysis software SAPHIR will shine as the hub of your quality assurance system. Excellent analysis, evaluation and documentation functions provide maximum overview and control and will help you put your measuring machine to the best and most cost-effective use. Check out the SAPHIR brochure to learn more!



Boundless options

Whether it's freeform shapes, chamfer depth, parallelism or perpendicularity of planes, axial run-out, bore hole size and depth, shafts, impeller blades or reflective glass objects: PMS will help you accomplish all measurement tasks with just one machine and one single measurement and analysis software.



- Ultrafast measurement thanks to triggered image acquisition by means of a high-resolution high-speed camera
- LED transmitted and incident light illumination with 16 separately switchable segments
- Motorised zoom objective lens with coaxial incident light illumination*
- Tactile probe TP200*
- Scanning probe SP25*
- Motorised indexing (rotary/swivel) head PH10*
- Chromatic-confocal white-light sensor*
- Triangulation laser for height/contour measurement*
- Modular, mathematically fully integrated rotation axis for measurement of rotationally symmetric workpieces
- 3D measurement and analysis software SAPHIR
- Digitising and BestFit (2D and 3D)*
- Time- and cost-saving measurement of lengths and diameters, radii, angles, chamfers as well as dimensional and geometric tolerances in just one operation



Video: PMS

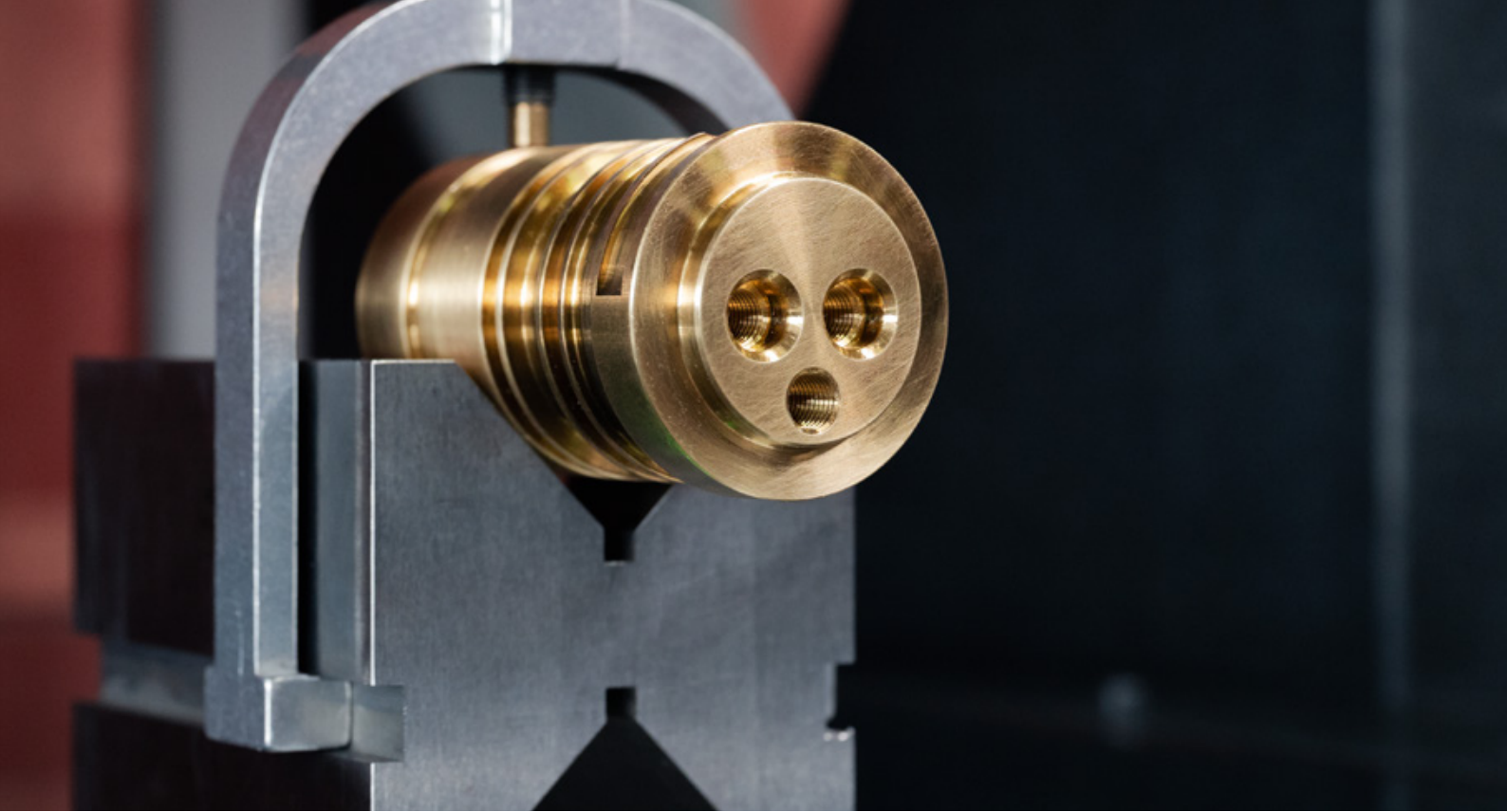
- Robust, highly rigid granite structure
- Dust-protected precision guides
- Temperature compensation for the workpiece and the machine axes*
- Active vibration damping* for excellent stability of measurement in any environment
- As all-round as it gets: designed for objects of any kind

▼ Workstation 130 / 75 / Desk

Regardless of whether you prefer to carry out measurement tasks standing up or sitting down, we can offer the right workstation for any preference – ergonomical, functional, robust.



* optional



Camera & objective lens – the perfect match for true-to-detail high-speed measurement

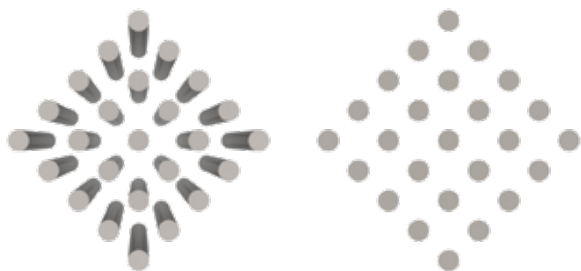
High-speed camera

Ultrafast, ultra-accurate, ultra-precise and ultra-efficient: These are the key strengths of optical PMS measurement. They are afforded by a high-resolution CCD matrix camera that trigger-captures measurement values in the live image in black & white. B/w imaging is indispensable because optical measurement is based on identifying inter-pixel brightness variations. Long-term measurement reliability matters, so we only use carefully selected and expertly manufactured top components in the manufacture of our high-speed camera.

Reliable measurement thanks to telecentricity

The choice of the right objective lens also plays a key role: Ordinary, entocentric lenses tend to produce a distorted image of the measurement object and/or will change the degree of magnification. Therefore, Schneider uses telecentric objective lenses: Since the optical rays passing through the telecentric lens are strictly parallel to the lenses' optical axis, the objects to be measured are captured without the least perspectival distortion and in their original magnification. This ensures consistent accuracy and precision in the measurement of every single workpiece.

Left: 25 cylindrical objects, viewed from above through a standard entocentric objective lens (with a focal length of 50 mm). The image is distorted and thus unsuitable for measurement purposes.



Right: The same objects, viewed through the high-quality telecentric objective lens of a PMS machine. The image is clear and free from perspectival distortion, thus enhancing the quality of measurement results and facilitating the detection of non-conformities.

Precise edge detection in transmitted and incident light

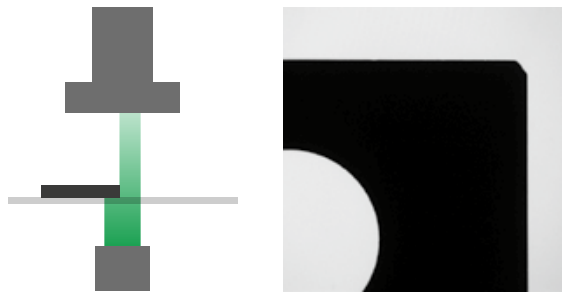
Nothing goes without the right objective lens ... and without the right image-capturing device: Therefore, all PMS and PMS LL models feature a 5-megapixel black-and-white matrix camera that is ideally suited for measurements in both transmitted and incident light:

1. The camera captures even the minutest details of the workpiece's contour in the field of view.
2. The measuring software detects edges and contours based on the brightness information associated with every single image point. Black-and-white images usually provide best results for this purpose. Depending on the measurement task to be performed, your machine can, of course, also be equipped with a colour camera.
3. In transmitted light measurement, the light passes through the glass plate from below, past the object to be measured, then enters the objective lens and strikes the camera chip. This method ensures excellent contrast and sharp edge imaging.
4. Conversely, when it comes to measuring contours and features on the top side of a workpiece, measurement in incident light is the method of choice; contrast resolution in this case depends on surface material, texture and colour.

All PMS machines are thus perfectly equipped to ensure excellent measurement accuracy and clear-cut edge detection.

Details that make a world of a difference: LED 16-segment ring light for incident illumination

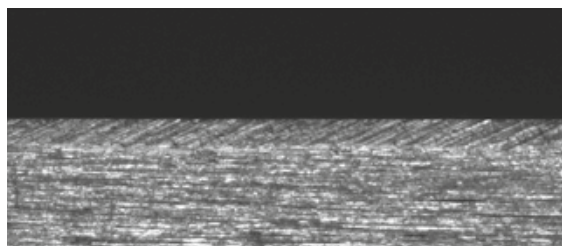
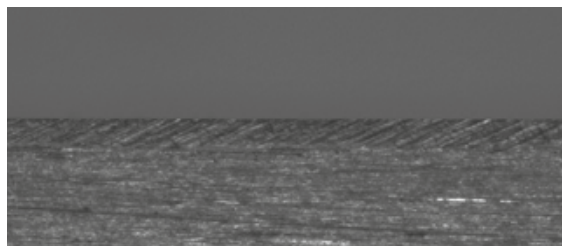
Shed the right light on your workpiece! Workpieces differ in many ways, also in terms of shape-specific lighting needs which even the best camera cannot meet or make up for. Each of your workpieces deserves dedicated lighting, so we have divided the incident light source into 16 segments. All segments can be switched on and off either separately or combined as needed, thus allowing each workpiece feature to be viewed in optimum lighting conditions.



- ▲ Principle of transmitted light measurement: The object is imaged with high contrast and crisp edges.



- ▲ Principle of incident light measurement: The resulting image additionally shows detailed surface features – such as the chamfer of the bore hole shown in the picture.



- ▲ Same workpiece feature – different lighting principle: The upper image shows a workpiece illuminated with standard LED incident light. The image below shows the same workpiece under partial illumination with LED segments and longer exposure time. The edge in the image is displayed with significantly higher contrast.



Great perspectives – the zoom objective lens

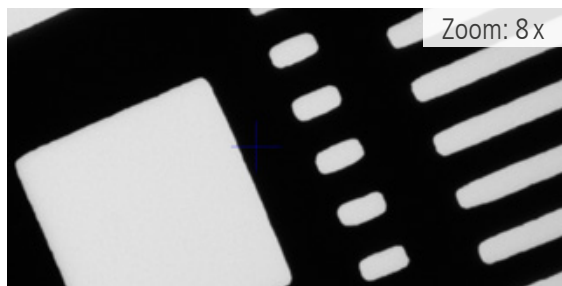
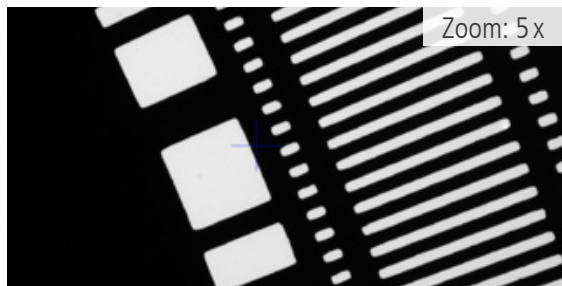
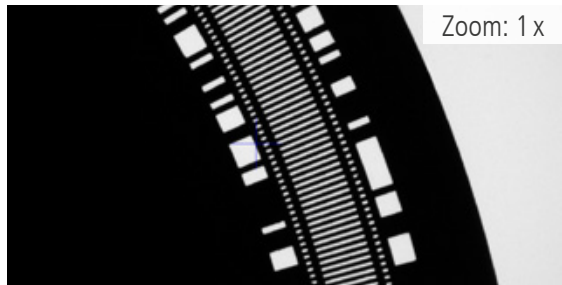
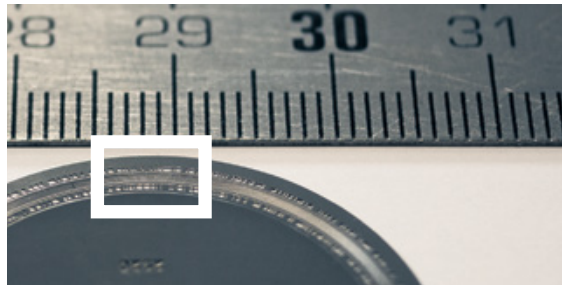
A clear plus: The right magnification for each application

Do you wish to measure both small- and large-sized workpieces? If so, the motorised zoom objective lens will be a time-saving option for you! All you have to do is select the appropriate level of magnification, and thus the optimum degree of accuracy, for each object or detail you wish to view. The lens features eight calibrated zoom levels that provide outstanding insights with excellent quality. And there is even a positive side effect: As depth of field depends on the zoom factor, edges can be rendered either in-focus (sharp) or out-of-focus (blurred) especially in incident light measurement so that they can be clearly delineated from one another.

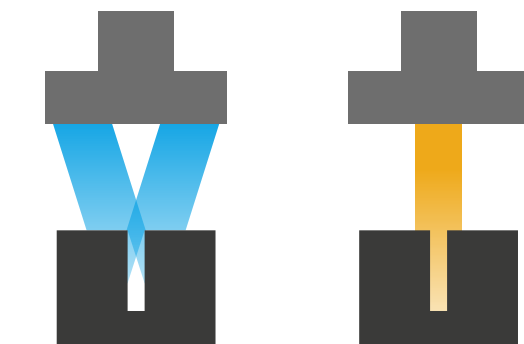
Brilliant performance: Minimised reflection thanks to coaxial incident light illumination

The motorised 8-level zoom objective lens comes with coaxial incident light illumination. This is an extremely useful lighting option because it minimises lateral reflections on reflective surfaces.

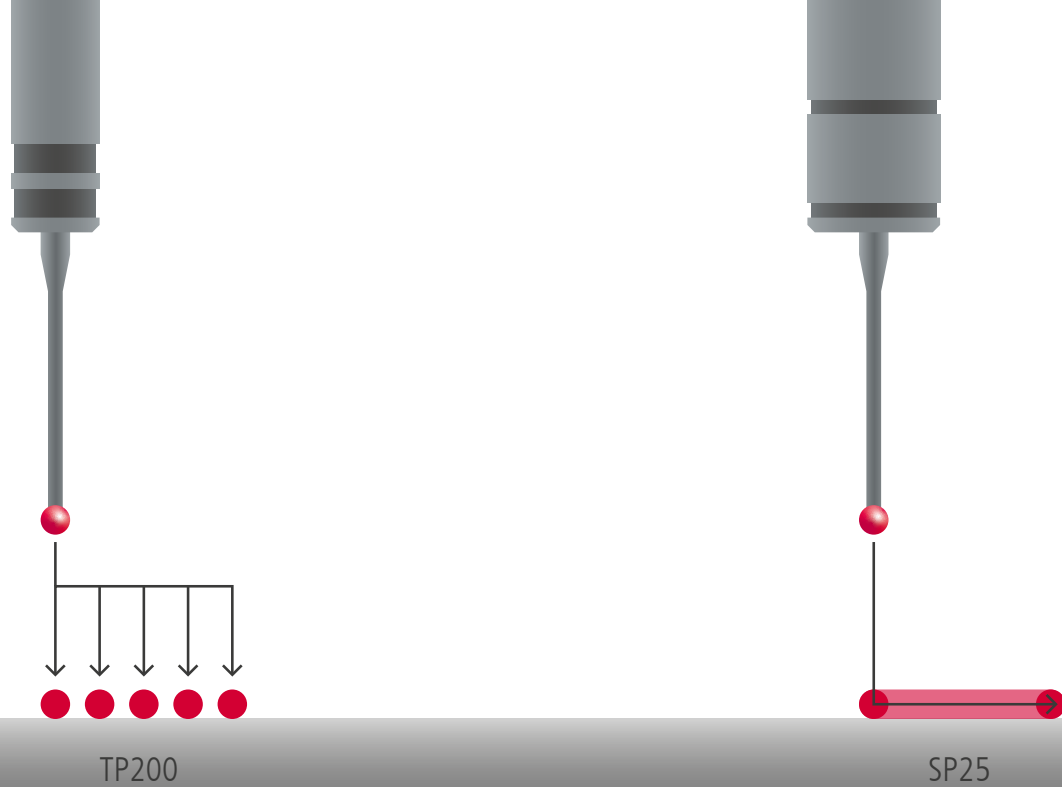
Coaxial incident light illumination offers yet another benefit: Since the light is directed in parallel to the optical beam path, it will dive deep into otherwise difficult-to-measure corners, angles and bore holes.



- ▲ Coaxial incident light illumination: A beam splitter directs the light in parallel to the optical beam path through the objective lens to the workpiece right “into the deep”, i.e. down to the minutest details.



- ▲ Illumination of a deep bore hole in standard incident light (left) and in coaxial incident light (right). The coaxial incident light illuminates the workpiece straight down to the bottom of the bore.



Well-versed “contact management”

Tactile measurement probes: sensitive, point-focussed and efficient

The PMS machines not only support optical measurement methods, but they can also be equipped with tactile probes so that only one machine is needed to help you reap the benefits of the whole range of sensor technologies.

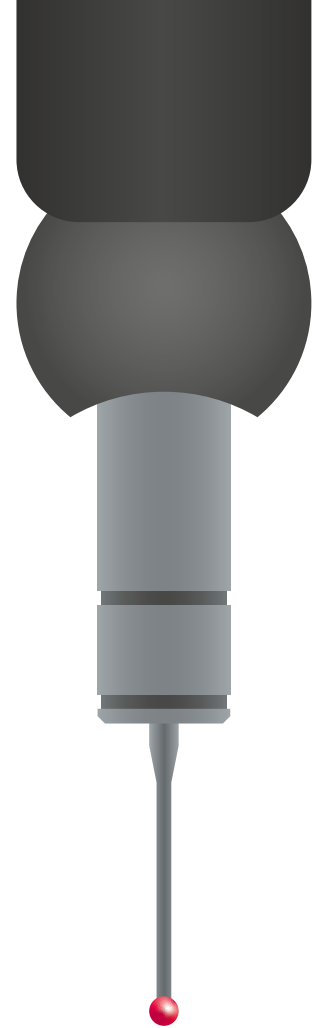
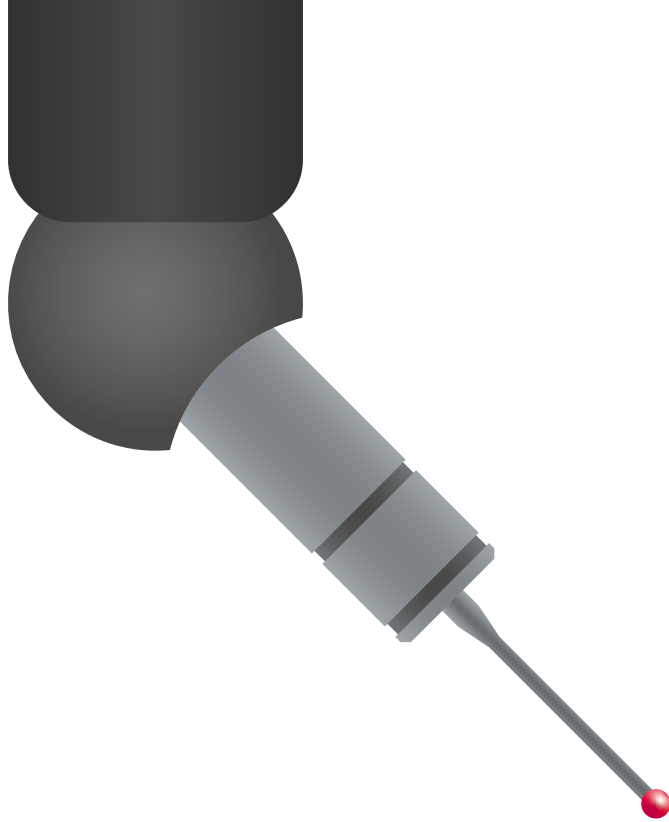
Thanks to their excellent sensitivity, all tactile probes boast exceptional absolute accuracy and also deliver high data density. They even reliably measure features that cannot be sufficiently captured by optical means. Regardless of whether a touch-trigger probe or a scanning probe is used, workpieces of any kind will be measured all the way down to the narrowest angle and in all directions. Probing thus also includes free-form shapes, chamfer depth, parallelism and rectangularity of planes, bore hole size and depth, axial run-out and many more features.

The following probes are available for the machines in the PMS series:

TP200 – tactile touch-trigger probe

TP200 is a 6-way touch-trigger probe designed for continuous high-precision measurement along the three coordinate axes (X/Y/Z) in both directions. Therefore, multiple-height measurement (e.g. of bore holes arranged in different planes) can also be performed with ease. With this measurement technique, the measurement points are individually probed.

Smart & savvy: When it comes to measuring touch-sensitive workpieces, a “low-force module” exerting less stylus pressure is available to complement the “standard-force module”.



SP25 – tactile scanning & self-centring probe

SP25 can be employed as a touch-trigger probe – however, its main function is tactile scanning.

Unlike TP200, SP25 is designed to perform a continuous scan of the workpiece in all spatial directions. Travelling across the workpiece surface, it captures the greatest possible number of measurement points. With this technique, you can not only scan-measure regular geometric shapes (e.g. spheres, cones planes), but also complex free-form shapes. At the same time, the self-centring function enables measurement of teeth, threads and similar objects.

Fast and to the point: The scanning measurement technique helps in saving significant amounts of time – without the least compromise on precision. On the contrary: Scanning probes deliver exceptionally high point density and thus meet requirements that go far beyond the capabilities of other measurement resources.

PH10 – motorised indexing (rotary/swivel) head

Smart indexing head adapter PH10 is usually combined with tactile scanning probe SP25.

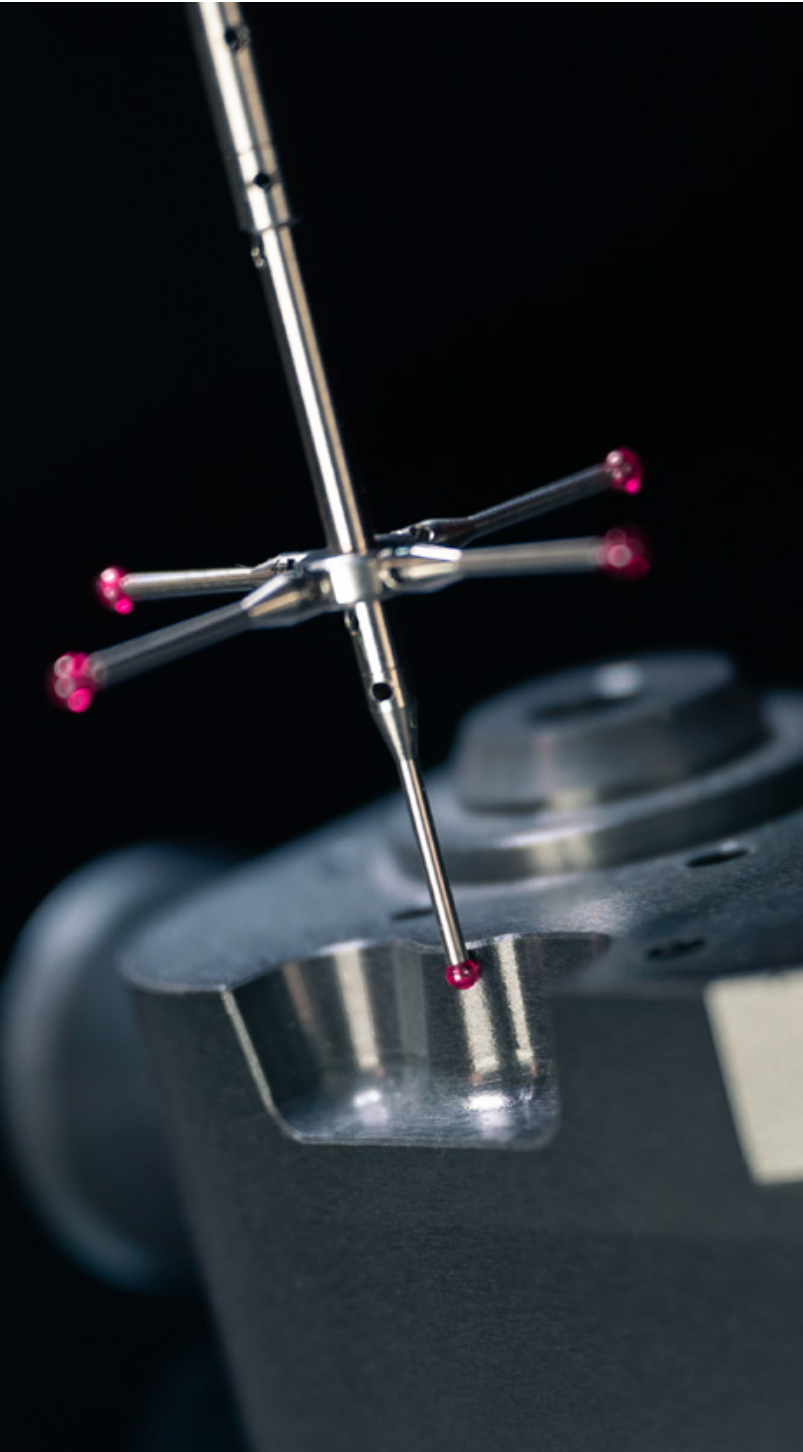
Thanks to the special design of PH10, the probe can be deflected inward or outward, as may be required in the measurement of cross bore holes etc. In fine increments of 7.5°, PH10 will adjust to any angular position of the workpiece.

Productivity booster: Especially when it comes to measuring angled surfaces, probe changing will only seldom be required with PH10. However, if needed, it can be performed in the same way as with all our probes, in a fully automated manner right during programme execution – with repetitive accuracy of probe positioning. This helps in saving much manual effort and time, and it contributes to boosting measurement throughput.

Always on the right path: collision-free probing

Measurement to the power of two with tactile AND optical probes

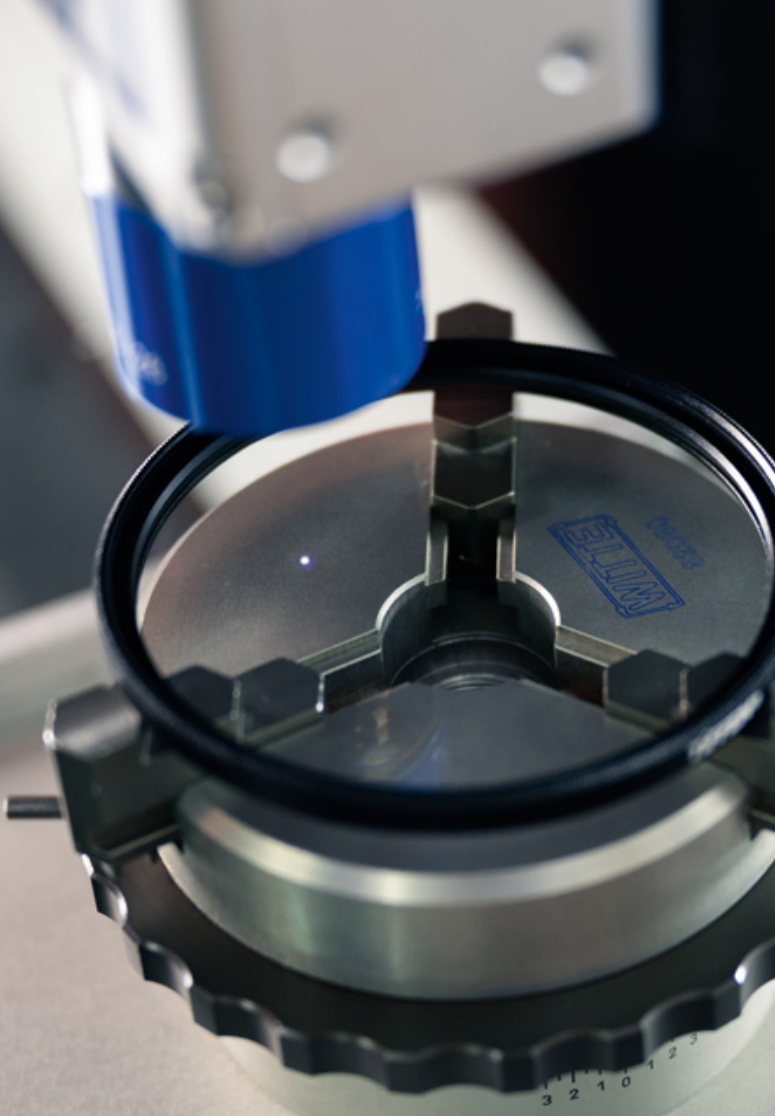
Combining optical with tactile measurement and saving resources, time and cost along the way has never been easier than with a PMS machine! Installation of the probes to a separate feed axis (Z-axis) or to an indexing (rotary/swivel) head reliably prevents the probes from interfering with each other and from getting in the way of optical measurement.



Which probe will fill your bill?

- + Tactile touch-trigger probe TP200 marks the entry level to the world of tactile measurement technology
- + SP25 scans the workpiece and delivers a maximum number of measurement points – for fast workflows and results with even greater precision
- + Indexing (rotary/swivel) head PH 10 also enables measurement at inward- or outward-deflected probe positions.

By the way: If you use different styli, these can be swapped in a fully automated manner by means of change racks – this can even be done while the execution of the measurement programme is in progress.



Non-contact measurement

Special materials, shapes and contours call for special methods! The machines in the PMS series offer professional non-contact solutions for any need:

Chromatic confocal white-light sensor

- + Optical distance sensor designed for measurement of highly reflective, absorbing or transparent surfaces, e.g. glass lenses and glass wall thicknesses, ampoules, mirrors (fig.: high-quality glass filter)
- + Conceived for measurement of free-form surfaces and microstructures that usually defy measurement by camera or tactile probing
- + Non-contact measurement of highly sensitive objects and surfaces

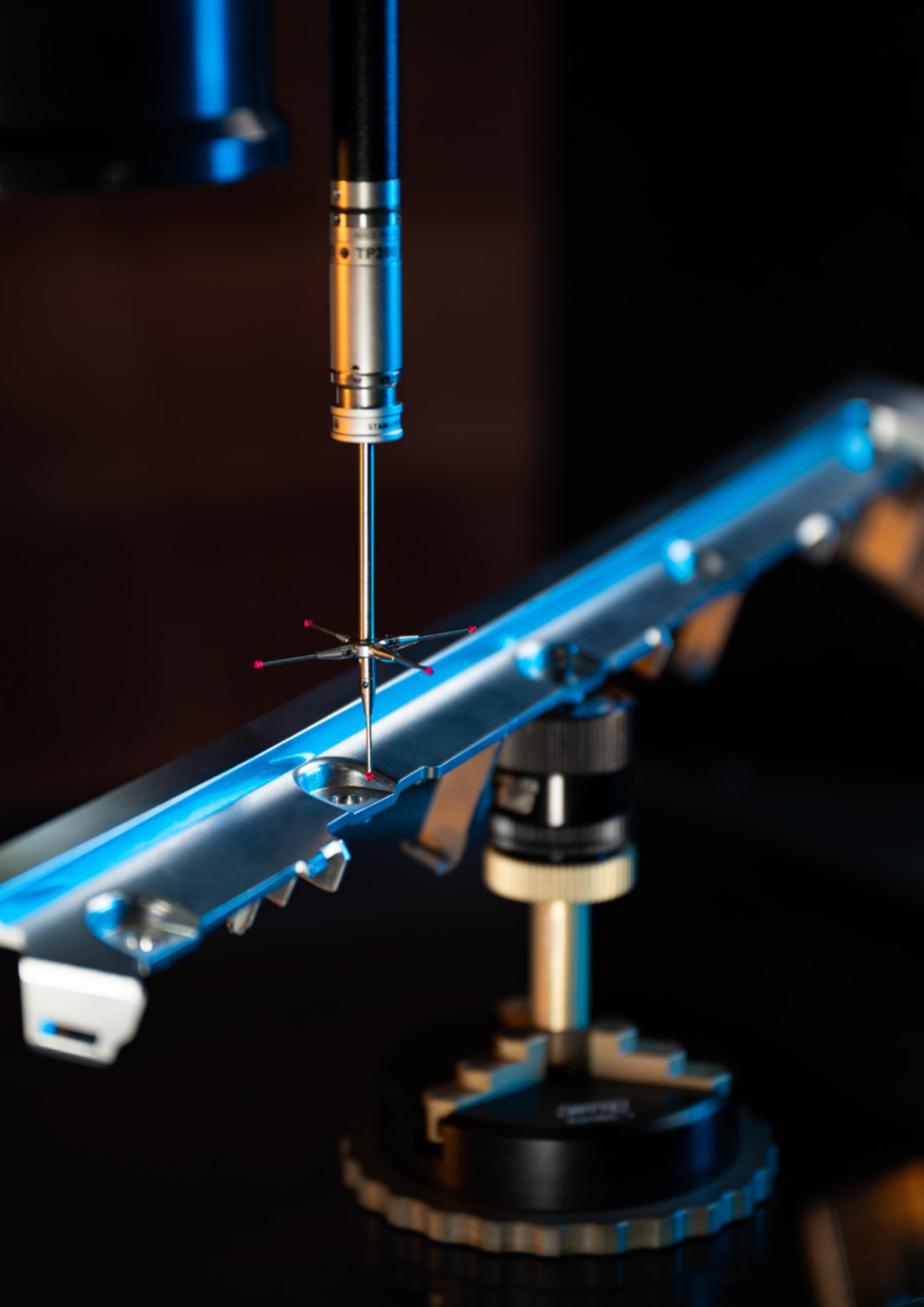
Extremely accurate and precise: The chromatic confocal white-light sensor boasts excellent resolution and a particularly high level of reproducible measurement accuracy.

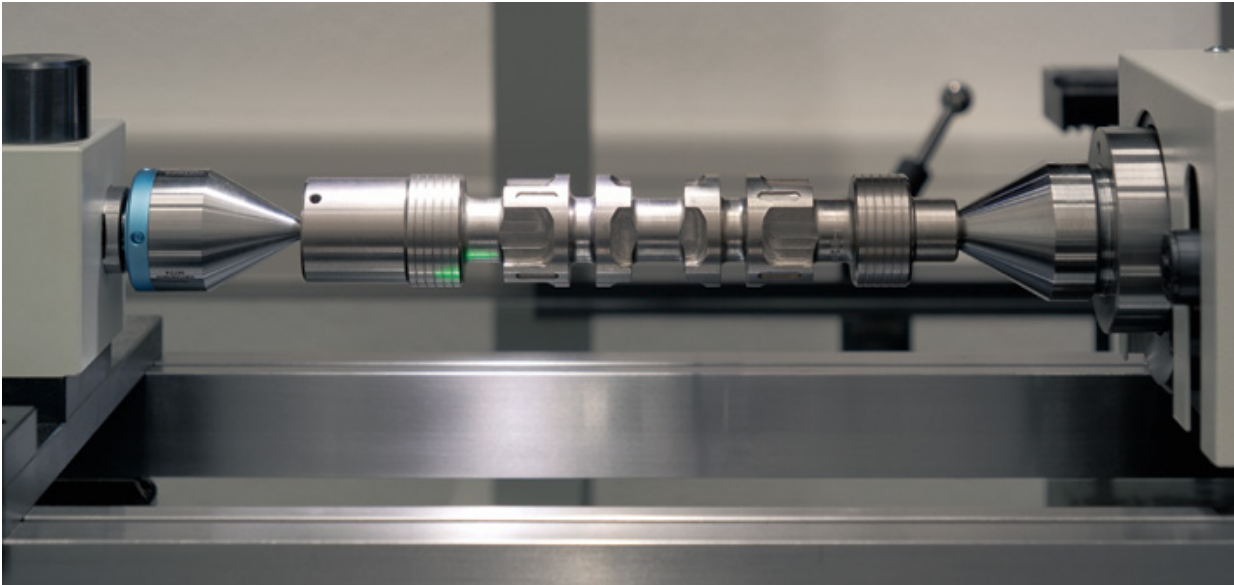


Triangulation laser

- + Ideal for fast, reproducible height and contour measurement
- + Automatic scanning of height contours
- + Collision- and displacement-free measurement of non-clamped workpieces
- + Combinable with tactile probes and/or the coaxial zoom objective lens

Wear-free: The triangulation laser is the solution of choice for touch-sensitive height and contour measurement.





Dynamic measurement in rotation

Rotationally symmetric workpieces – probed to the minutest detail

The machines in the PMS series also play to their strengths when it comes to measuring turned or milled parts: All machines can be modularly complemented with a CNC-controlled, continuously adjustable rotation axis mounted to the sturdy granite plate of the measurement stage so that even complex rotationally symmetric workpieces such as shafts, impeller blades, machining tool cutter edges and other elements can be reliably measured.

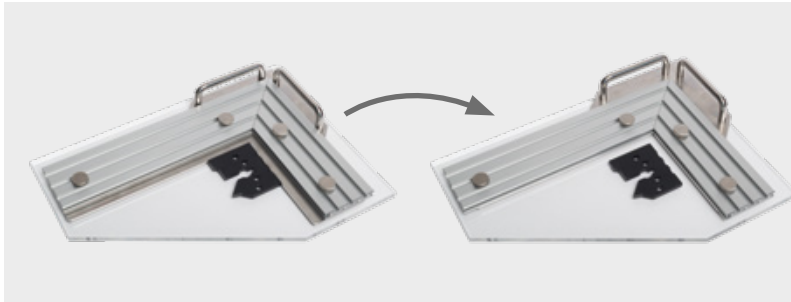
Good to know: The rotation axis will not in any way interfere with other measurement functions. All PMS machines thus ideally combine the world of objects featuring regular geometric or free-form shapes with the world of rotationally symmetric objects and will measure either in consistently high quality.

The PMS rotation axis boasts the following high-end features:

- + **Full mathematical integration**
For three-dimensional optical and tactile measurement
- + **Patented wobble compensation**
Reliably eliminates any wobbling movements (variances), such as almost inevitably tend to occur between the workpiece and the clamping device
- + **Dynamic measurement in rotation**
With high point density and up to 60 images per second
- + **True-to-position measurement and analysis**
Incl. 3D graphical representation of all measurement points with unambiguous point allocation and analysis with different reference elements for unbiased quality evaluation free from external influence
- + **Interface**
Available with all standard or customer-specific holders (e.g. SK 40, SK 50, HSK 63, ...)

Handy high-precision accessories

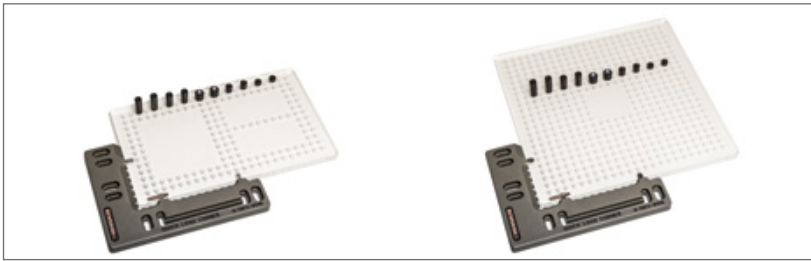
We at Schneider are well conversant with the metrological needs and concerns of industry professionals. Therefore, we have devised an extensive array of premium accessories that can be individually adjusted. Here is a small selection from our range:



Alignment square

The adjustable alignment square enables accurate, detached positioning of measurement objects with unobstructed all-round visibility – ideal for fast optical measurement.

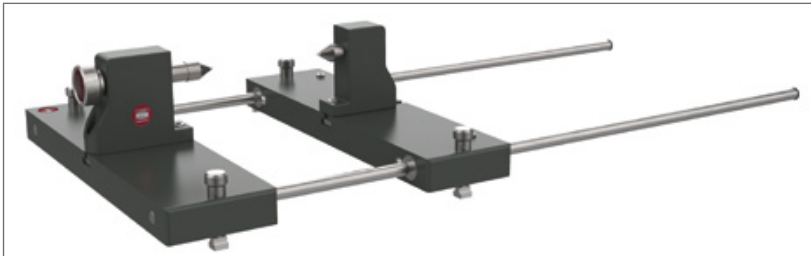
▼ Clamping system with a magnetic holder plate for optical or tactile measurement



▼ Various stylus change racks

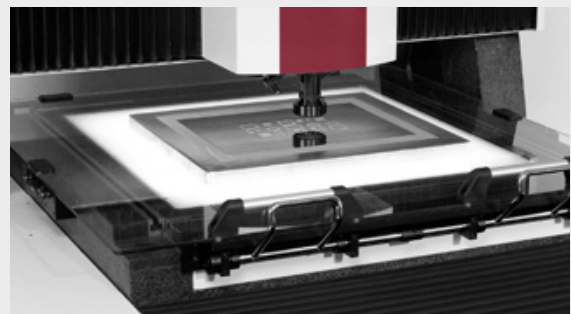



▼ Pair of tailstocks mounted on an adjustable base plate (for shaft measurement)



Pressure plate for thin films and foils

Thin films and foils can be easily positioned and measured on the measurement stage – deformation-free and with reproducible results.





Always by your side

From initial consultation to after-sales support and smart solutions for special measurement tasks: As a Schneider client, you can always count on a personal approach and a dedicated person to get in touch with. Your personal consultant will familiarise himself with your specific needs so that you can rely on him to provide valuable advice and assistance – fast, to the point and with a view to providing the best value for money.

Your consultant will work in close contact with our technology, support and development teams and will coordinate their services in accordance with your requirements and needs. Would you like to see for yourself how we measure up to our high standards? Then please do not hesitate to contact us!

Customising – as you like it!

Freely configurable, retrofittable and upgradable

Out of all Schneider measuring machines, the models in the PMS/PMS LL series provide the widest range of configuration options. Whether it's production-optimised adjustment of clamping concepts and devices, bespoke fixtures for pallet measurement or options for machine interfacing with your robot system – with a PMS machine in your fleet, you will have all it takes to benefit from maximum efficiency, performance and measurement accuracy:

- + Thanks to the machines' high-end modular design, all individual components can be configured to suit your needs right throughout their whole service life
- + Most of the optional features and components can be easily retrofitted or upgraded at a later point in time for integration into your existing concept
- + For any further adjustments, customised solutions or special designs you may need, you can rely on the expertise and experience of our seasoned engineering team

If you opt for a PMS machine, you will be perfectly equipped to meet all measurement challenges that lie ahead and to respond to the waves of change swiftly and efficiently at all times. This agility is a major key to your entrepreneurial freedom because it may open profitable doors to new customer segments and to further promising business areas.

Have you got your own vision of what YOUR perfect bridge-type multisensor machine should look like? Then please do not hesitate to talk to us – we look forward to devising a solution to suit your specific needs.

PMS LL series: Air bearings for even greater precision

Granite & air – never airy-fairy!

All machines in the PMS LL series are a perfect blend of maximum precision, flexibility and top measurement speed. This is hardly surprising because they boast not only the same benefits, performance and equipment features as the machines in the PMS series, but also share their retrofit and upgrade options. So what's the difference then between the two? In a nutshell: It's the even greater – ultra-high ... ultimate – accuracy and precision!

The PMS LL machines owe their outstanding accuracy and precision characteristics to the use of state-of-the-art air-bearing technology, which makes an unbeatable team in combination with the well-engineered granite design:

+ Granite structure

All PMS machines rely on a rigid and thus torsion-resistant granite structure that ensures maximum machine stability and provides the basis for high-precision measurement.

+ Air-bearing axes

PMS LL machines additionally feature air bearings in all axes. The axes thus float on an ultra-thin air cushion for completely frictionless movement. Any mechanical influences that might interfere with measurements in progress are thus gently and reliably eliminated.

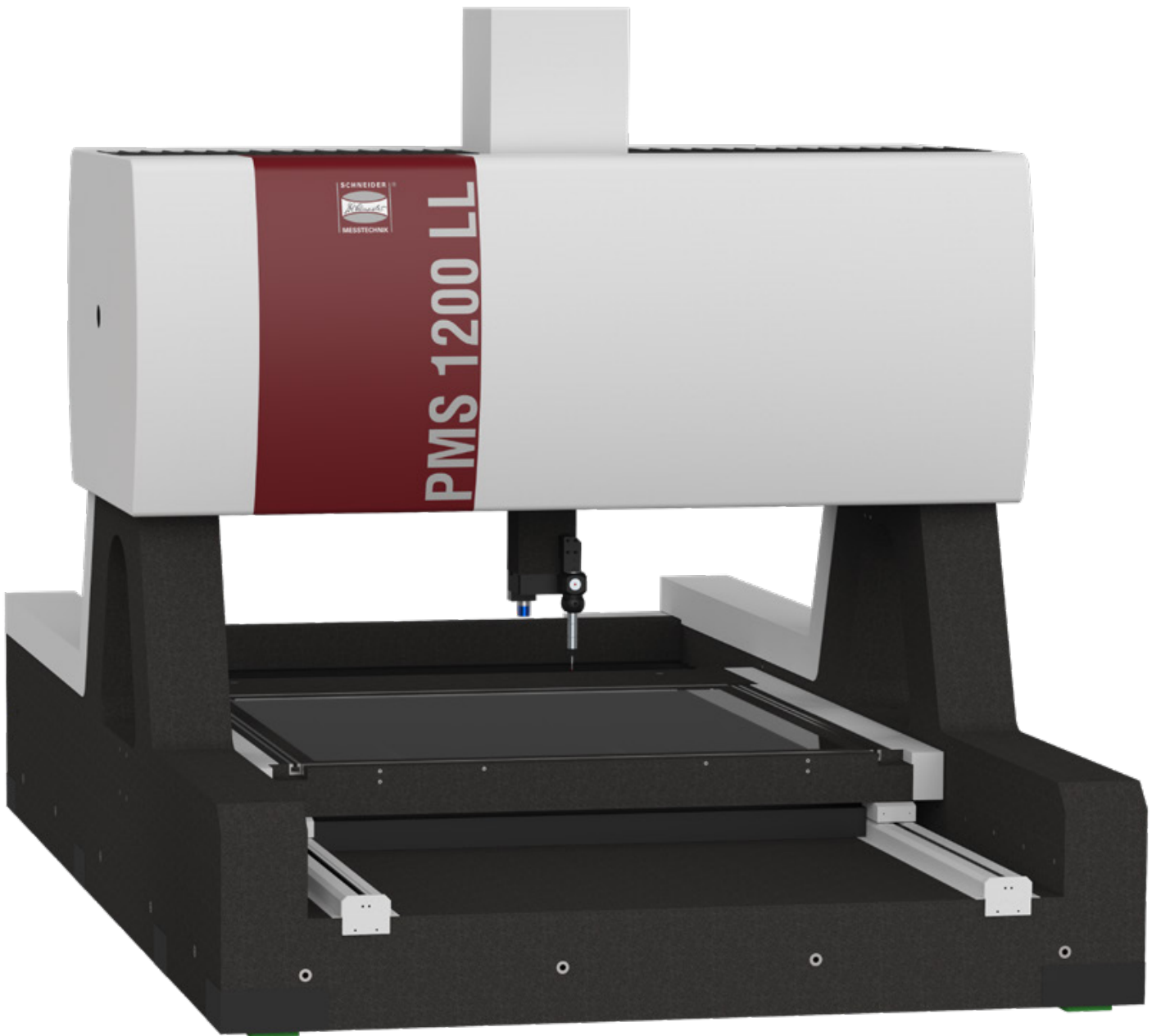
Schneider's PMS machines feature air bearings – however, the measurement results they deliver will never be "up in the air"! In fact, out of all Schneider measuring machines, these models provide the highest achievable level of measurement accuracy, which makes them stand out from comparable systems. Especially for tasks requiring meticulous care and consistent adherence to tight tolerances, PM LL ranks as the number one choice.

On top: Active vibration damping

Ambient interferences such as critical vibrations and oscillations can be reliably counteracted. To this end, all PMS and PMS LL machines can be equipped with an active air damping system. Depending on machine type and size, we offer a variety of options.



- + PMS LL machines include all performance features, benefits and options afforded by the PMS series
- + Exceptional accuracy of measurement thanks to air bearings in all axes
- + Frictionless travel ensures maximum guidance, repeat and positioning accuracy
- + The modular design enables implementation of client-oriented, cost-effective solutions also for PMS LL machines



Large measurement volumes – compact design: PMS 1200 LL with workstation.
For measurement ranges from 1,200 mm in the X and Y axes as well as 600 mm in height (Z).

Technical Data of the PMS Series

Model		PMS 400	PMS 500	PMS 600	PMS 700
Measurement range	XxY mm	400x400	500x500	600x600	700x700
	Z mm	300	300	300	300
Objective lens (fixed focal length)		Other objective lenses available upon request			
Magnification		1,0x	1,5x	3,0x	
Field of view		5,6x4,2	4,0x3,0	2,0x1,5	
Working distance		190	80	80	
Zoom objective lens		Motorised 8-level zoom			
Magnification		0,58x – 7x (8 levels)			
Field of view		11,0x7,1 – 1,1x0,7			
Working distance		86			
Resolution		0,0001			
Travel speed max.		100			
Acceleration max.		400			
Positioning accuracy		0,0005			
Max. workpiece weight					
on glass plate		20			
on granite plate		200			
Length measurement error¹⁾		Measurement length L in mm			
optical (1D), DIN EN ISO 10360-7 ²⁾		$E_{UX, MPE}, E_{UY, MPE} (1,3 + L / 300 \text{ mm}) \mu\text{m}$			
optical (2D), DIN EN ISO 10360-7 ²⁾		$E_{UXY, MPE} (2,0 + L / 300 \text{ mm}) \mu\text{m}$			
tactile (1D), DIN EN ISO 10360-2 ³⁾		$E_{OX, MPE}, E_{OY, MPE} (1,3 + L / 300 \text{ mm}) \mu\text{m}$			
tactile (2D), DIN EN ISO 10360-2 ³⁾		$E_{OXY, MPE} (2,0 + L / 300 \text{ mm}) \mu\text{m}$			
tactile (3D), DIN EN ISO 10360-2 ³⁾		$E_{O, MPE} (2,8 + L / 300 \text{ mm}) \mu\text{m}$			
Dimensions (mm)	Width	950	1.100	1.250	1.350
	Depth	1.200	1.500	1.750	1.950
	Height	1.970	1.970	1.970	2.010
Control cabinet / Workstation 130		800x800 mm / 1.300x900 mm			
Weight	kg	1.100	1.450	1.900	3.000
Electric power supply		220-240VAC, 50-60 Hz, 1 kW			

¹⁾ Permitted ambient conditions: 20 °C ± 1 K, temperature gradient $\Delta t_h = 0,5 \text{ K/h}$, $\Delta t_d = 4,0 \text{ K/d}$, measured with a calibrated standard reference

²⁾ B = Magnification factor = 1,5 \cong objective lens 1,5x

³⁾ If **optionally** equipped with TP200 or SP25, **standard probing system** with a straight probe (stylus ball \varnothing 4 mm, length 50 mm)

Technical Data of the PMS LL Series

Model		PMS 500 LL	PMS 700 LL	PMS 900 LL	PMS 1200 LL
Measurement range	XxY mm	500x500	700x700	900x900	1200x1200
	Z mm	400	400	600	600
Objective lens (fixed focal length)		Other objective lenses available upon request			
Magnification		1,0x			
Field of view		mm			
Working distance		mm			
Resolution		mm			
Travel speed max.		mm/s			
Acceleration max.		mm/s ²			
Positioning accuracy		mm			
Max. workpiece weight					
on glass plate		kg			
on granite plate		kg			
Length measurement error¹⁾		Measurement length L in mm			
optical (1D), DIN EN ISO 10360-7 ²⁾		E _{UX, MPE} , E _{UY, MPE} (0,9 + L/600 mm) μm			
optical (2D), DIN EN ISO 10360-7 ²⁾		E _{UXY, MPE} (1,2 + L/500 mm) μm			
tactile (1D), DIN EN ISO 10360-2 ³⁾		E _{OX, MPE} , E _{OY, MPE} (0,9 + L/600 mm) μm			
tactile (2D), DIN EN ISO 10360-2 ³⁾		E _{OXY, MPE} (1,2 + L/500 mm) μm			
tactile (3D), DIN EN ISO 10360-2 ³⁾		E _{O, MPE} (1,9 + L/400 mm) μm			
Dimensions (mm)					
Width		1.650	1.850	2.050	2.350
Depth		2.600	2.800	3.000	4.000
Height		2.150	2.350	2.350	2.350
Control cabinet / Workstation 130		800x800 mm / 1.300x900 mm			
Weight		kg			
		5.100	6.300	6.900	10.500
Electric power supply		220-240VAC, 50-60 Hz, 1 kW			

¹⁾ Permitted ambient conditions: 20 °C ± 1 K, temperature gradient Δth = 0,5K/h, Δtd = 4,0K/d, measured with a calibrated standard reference

²⁾ B = Magnification factor = 1,0 ≙ objective lens 1,0x

³⁾ If **optionally** equipped with TP200 or SP25, **standard probing system** with a straight probe (stylus ball ø 4mm, length 50mm)

Gerne für Sie da!

Sie benötigen andere Messbereiche, eine individuelle Sonderlösung oder möchten unsere Maschinen einmal in Aktion erleben? Sprechen Sie uns an. Ihr persönlicher Berater steht Ihnen gerne mit Rat, Tat und der nötigen Fachkompetenz zur Seite.

Dr. Schneider

Dr. Heinrich Schneider Messtechnik GmbH | Rotlay-Mühle | 55545 Bad Kreuznach | GERMANY
Tel. +49 671 291 02 | Fax +49 671 291 200 | info@dr-schneider.de | www.dr-schneider.de

Subject to technical modification | 28062021/DHSM