

CRYSTA-APEX C



The modular system for 3D CNC coordinate measurement in the production environment. Quick, versatile and high performing.

Future-proofed high performance.

CRYSTA-APEX C is more than just a powerful measuring machine. When you invest in this flexible and economical modular system for your production operations today, you'll also be taking care of the measuring tasks of tomorrow. With it, you'll be fully equipped to face the future. When change arrives, as it will, you won't have to replace all your instruments at once. You'll have the capability to meet the quality standards of tomorrow without incurring additional costs today.

Intelligence

Modular. The modularity of the system means that CRYSTA-APEX C can be easily converted and upgraded, adapting to changing requirements as they arise, such as new customer specifications, new measuring tasks or new production conditions without replacement of the measuring machine itself being necessary. You can react with flexibility, intelligence and economy – without forever having to invest in completely new systems.

Multiple sensors. With CRYSTA-APEX C you have a multisensor-capable 3D coordinate measuring machine. This means that you can, without great expense, alternate between contact, optical (image processing) and laser systems. You can even use probe and sensor systems from other major manufacturers. This opens up the entire breadth of modern measuring techniques – all rolled into one intelligent system concept.

Integrated. With its fully automatic measuring cycles, CRYSTA-APEX C can be perfectly integrated into the production process itself. Networking between production machines and a feedback system causes no difficulty either. CRYSTA-APEX C, as a measuring island in production or in the test laboratory, will ensure absolute precision. Wherever and however you use this intelligent system, all you need is the appropriately configured software, and not, as has otherwise been the rule, a completely new measuring instrument for each application.

Mitutoyo

CRYSTA-APEX C



Experience and innovation
all rolled into one advanced system.

Production-oriented and integrated 3D CNC measurement requires tight performance specifications, outstanding robustness and absolute reliability. CRYSTA-APEX C gets full marks with clear advantages in terms of performance, stability and economic efficiency – another product of Mitutoyo's competence and experience.

Competence

Specially developed and equipped for demanding conditions, CRYSTA-APEX C opens up new dimensions in reliable quality control. With a total of 13 variants in four series, there's a full range of perfect solutions whatever your requirements. There is also a very wide range of accessories from specially designed sensors through to a versatile clamping system.

CRYSTA-APEX C comes with the high-end MCOSMOS package from Mitutoyo's MiCAT software platform as standard, the user-friendly command centre for professional measuring and evaluation. With powerful, optional, application-specific modules available, MCOSMOS rises with ease to any challenge, however demanding the application.

Hardware or software, hard-and-fast specifications or more flexible requirements, CRYSTA APEX C always gives you the innovative lead you expect from Mitutoyo – and a view to the future too.

MiCAT

Mitutoyo Intelligent Computer Aided Technology

the standard in world
metrology software

cmm

Mitutoyo



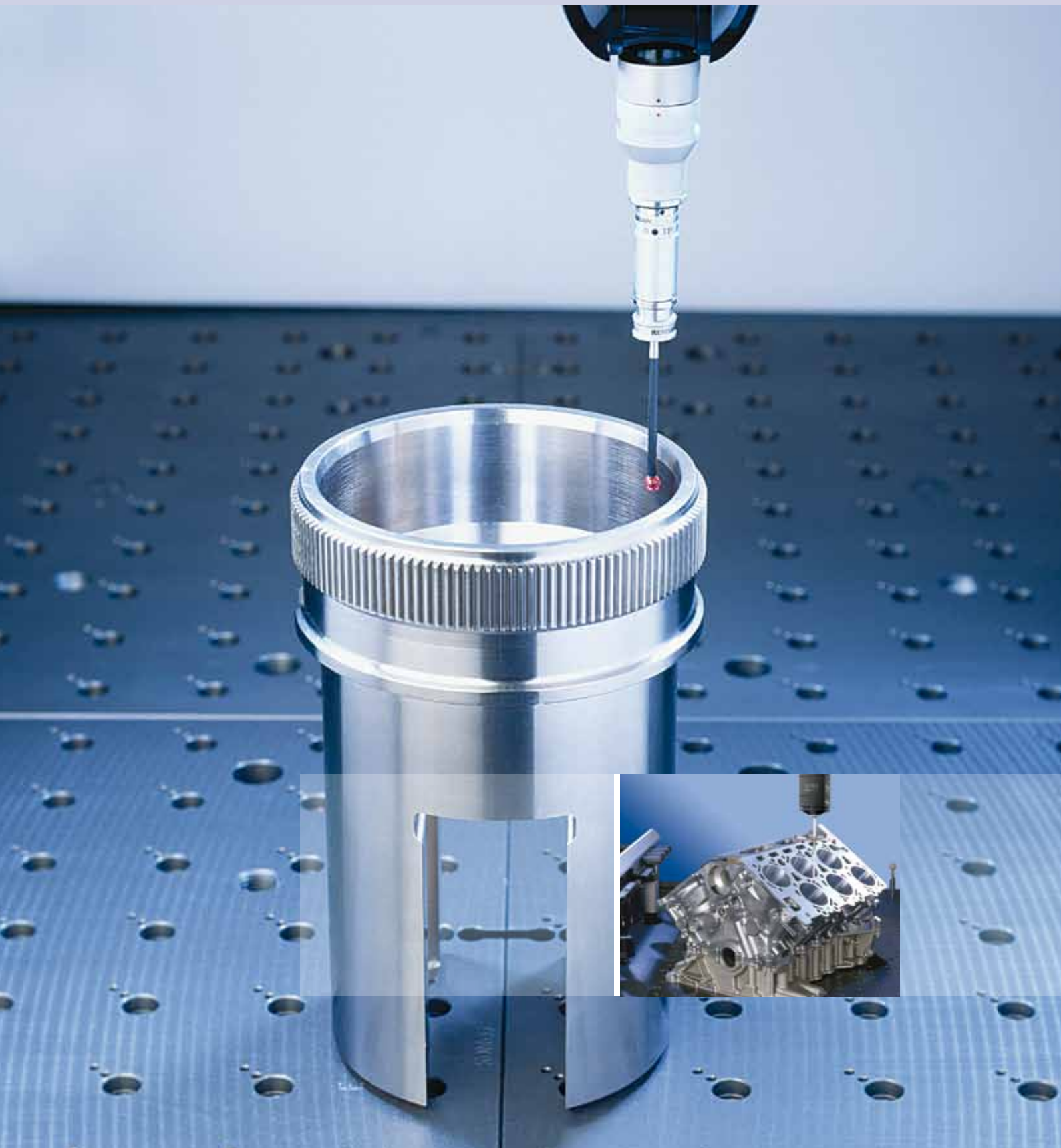
Competence



Mitutoyo offers a comprehensive range of clamping systems, loading equipment and thermo cabinets.



CRYSTA-APEX C:
Higher quality, point for point.



Performance

- Maximum drive speed 520 mm/s
- Measuring accuracy 1.7 μm^*
- Maximum acceleration 0.23 g
- Integrated thermal-effect compensation for instrument and workpiece in the temperature range 16 to 26 $^{\circ}\text{C}$
- High precision (resolution 0.1 μm), dustproof glass scales on all axes
- Self-adjusting air bearings on all axes
- Fully-digitised servo control for low-vibration movements
- FEM-aided design ensures geometric accuracy and vibration resistance
- High-end software as standard
- Configurable to requirements: compatible with probe systems and sensors by other major manufacturers
- A perfect match provided by 13 variants in four series
- Space saving and light, compact design built with high quality materials
- Outstanding price/performance ratio

Performance



* For models with 500, 700 or 900 mm X-axis travel:

$\text{MPE}_E = (1.7+0.3L/100) \mu\text{m}$ in the temperature range 18 to 22 $^{\circ}\text{C}$ with MPP-100 or SP25M probes

$\text{MPE}_E = (1.9+0.4L/100) \mu\text{m}$ in the temperature range 16 to 26 $^{\circ}\text{C}$ with TP200 probe

For models with 1200 mm X-axis travel:

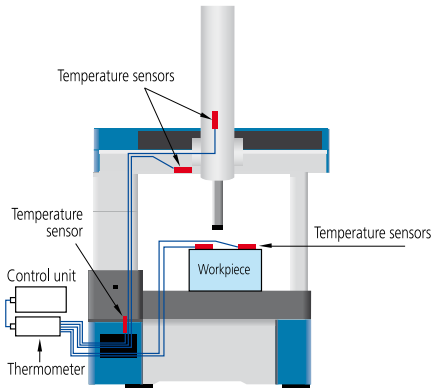
$\text{MPE}_E = (2.3+0.3L/100) \mu\text{m}$ in the temperature range 18 to 22 $^{\circ}\text{C}$ with MPP100 or SP25M probes

$\text{MPE}_E = (2.5+0.4L/100) \mu\text{m}$ in the temperature range 16 to 26 $^{\circ}\text{C}$ with TP200 probe

CRYSTA-APEX C: Top-class technology and perfection as standard.

Measuring results are stable even when the temperature fluctuates

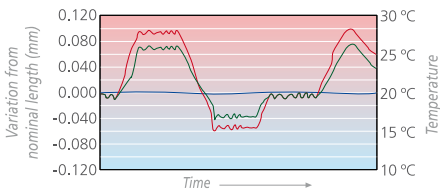
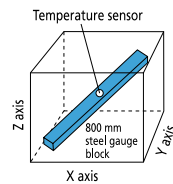
Even with the machine's environment and the workpiece temperature fluctuating between 16 and 26 °C, CRYSTA-APEX C measures as if thermal conditions were stable. Sensors on the CRYSTA-APEX C and workpiece record temperature variations and feed the information to the automatic thermal-effect compensation system, which then corrects all measurements back to 20 °C in real time. This results in shop floor measurements being made to a level of accuracy only possible otherwise in thermally stable measurement laboratories.



Intelligent

Effective compensation

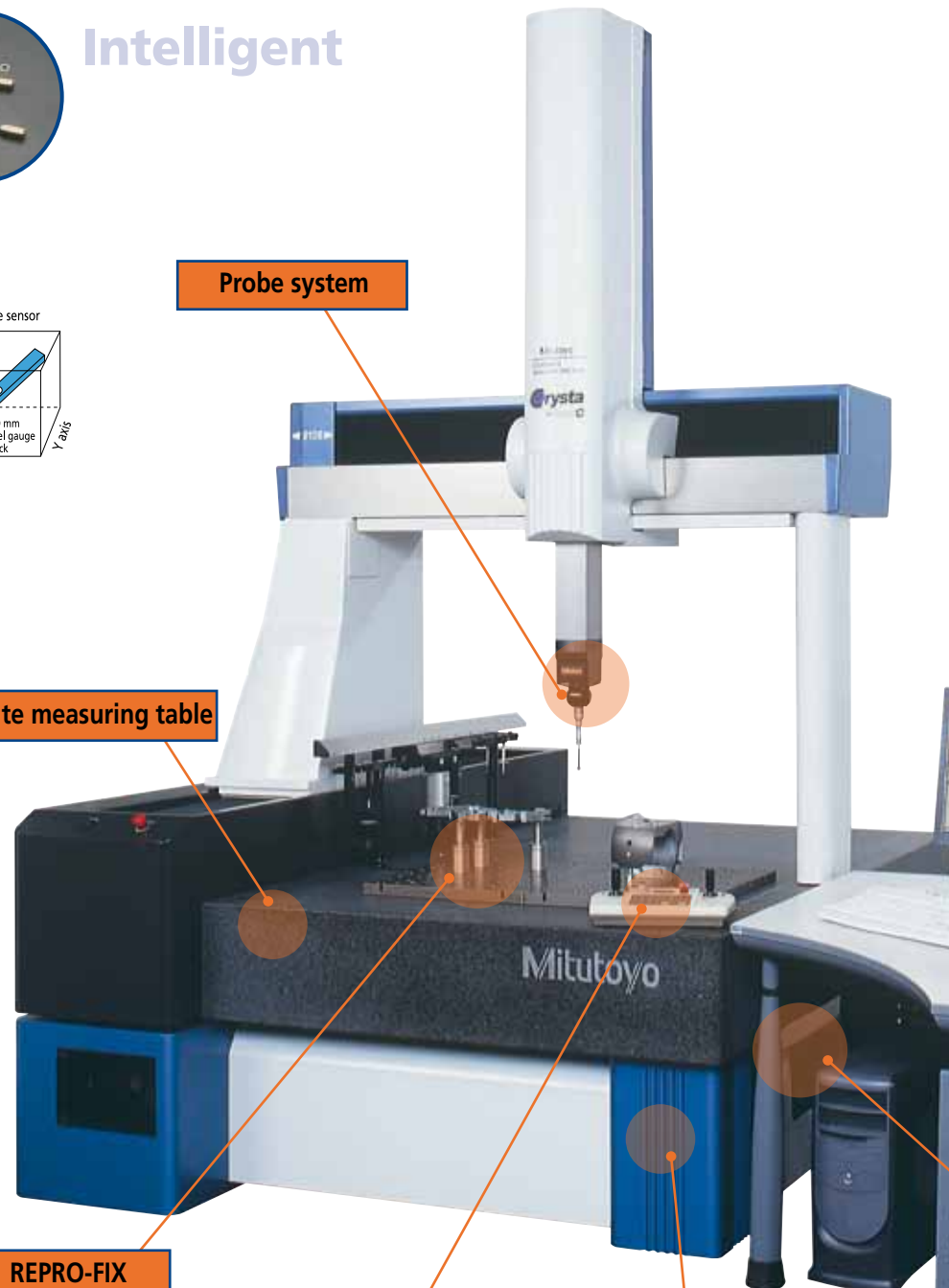
Thermal-effect compensation using an 800 mm steel gauge block mounted diagonally on the CMM table as an example – measured with a fluctuating environmental temperature.



- Temperature variation of the block
- Expansion of the gauge block due to temperature variation
- Compensated length of the gauge block

Probe system

Granite measuring table



A perfect match

13 variants in four series

With a total of 13 variants in four series with bridge (X axis) travel between 500 and 1200 mm, the CRYSTA-APEX C series opens up an outstandingly wide choice of applications. Even users with highly specific measuring requirements will surely find a configuration to match their needs.



REPRO-FIX
clamping system

Joystick

Supporting table

Perfection



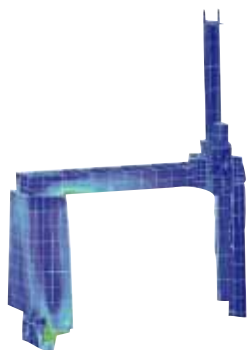
Dustproof glass scales

CRYSTA-APEX C has high-precision dustproof glass scales with a resolution of 0.1 μm . Sensors on the scales provide temperature compensation, a feature that makes CRYSTA-APEX C particularly suitable for use in a harsh production environment.

Precise

Modern technology for accurate guidance

Finite element method (FEM) analysis was used to achieve a highly rigid bridge structure design that ensures exceptional guideway straightness and good suppression of vibrations. The high thermal conductivity of the aluminium guideways helps prevent deflection and twisting due to thermal-gradient effects.



Stable

Perfection

Compact

Space saving and light

CRYSTA-APEX C does not require any special structural prerequisites at the installation site. Thanks to particularly high-quality lightweight materials and space-saving dimensions, a hard and stable mounting surface with normal machine-standard foundations is quite sufficient.



Superior

Air bearings on all axes

Self-adjusting air bearings on all axes allow CRYSTA-APEX C to move the probe with outstanding smoothness, speed and precision. They form the basis for absolute measuring accuracy.



Quick

Speed and acceleration

With a maximum acceleration of 0.23 g and a drive speed of up to 520 mm/s, CRYSTA-APEX C sets the standard in its class.



Software

Controller

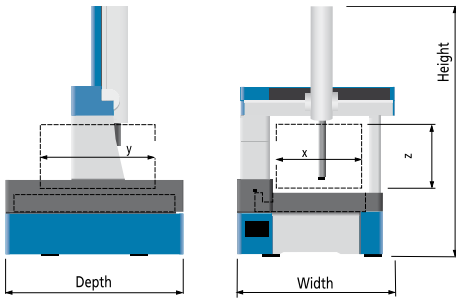


Controlled

Dynamism and flexibility with fully digitised drive control

The CRYSTA-APEX C drive control works with an extremely high-performance Digital Signal Processor. It perfectly controls digital signals of all control circuits, drive movements, positioning and speed to give maximum measuring quality. Control algorithms for accessory devices can also be installed quickly and easily.

Quality with exceptional versatility.



Series 500

Series 700



544

574

776

7106

Measuring range	X axis	
	Y axis	
	Z axis	
Workpiece clamping	No. of M8 threaded holes	
Workpiece	Max. height	
	Max. table loading	
Accuracy	16 – 26 °C	TP200
		SP25M
ISO 10360-2	18 – 22 °C	TP200
		SP25M
Accuracy	ISO 10360-4	MPP-100
		SP25M
		SP80
Resolution		
Guidance		
Drive speed	CNC mode	
	Joystick	
Measuring speed		
Acceleration		
Measuring table	Material	
	Dimensions	
Air supply	Consumption/pressure	
Machine dimensions	Width	
	Depth	
	Height	
Machine mass incl. supporting table and controller		

505 mm	505 mm
405 mm	705 mm
405 mm	405 mm
9	13
545 mm	
180 kgf	
MPE _E =(1.9+0.4L/100) μm	
MPE _E =(1.7+0.4L/100) μm	
MPE _E =(1.9+0.3L/100) μm	
MPE _E =(1.7+0.3L/100) μm	
—	
MPE _{THP} =2.3 μm / MPT _τ =110 s	
—	
0.1 μm	
Air bearings on all axes	
8 to 300 mm/s (max. 520 mm/s)	
Rapid drive mode: max. 80 mm/s	
Slow drive mode: 0.05 mm/s	
1 to 8 mm/s (CNC)	
Per axis 0.13 g (max. 0.23 g)	
Granite	
638 x 860 mm	638 x 1160 mm
Approx. 50 l/min at 0.4 MPa	
1082 mm	
1122 mm	1458 mm
2185 mm	
515 kg	625 kg

705 mm	705 mm
705 mm	1005 mm
605 mm	605 mm
10	13
800 mm	
800 kgf	1000 kgf
MPE _E =(1.9+0.4L/100) μm	
MPE _E =(1.7+0.4L/100) μm	
MPE _E =(1.9+0.3L/100) μm	
MPE _E =(1.7+0.3L/100) μm	
MPE _{THP} =3.0 μm / MPT _τ =110 s	
MPE _{THP} =2.3 μm / MPT _τ =110 s	
MPE _{THP} =2.0 μm / MPT _τ =120 s	
0.1 μm	
Air bearings on all axes	
8 to 300 mm/s (max. 520 mm/s)	
Rapid drive mode: max. 80 mm/s	
Slow drive mode: 0.05 mm/s	
1 to 8 mm/s (CNC)	
Per axis 0.13 g (max. 0.23 g)	
Granite	
880 x 1420 mm	880 x 1720 mm
Approx. 60 l/min at 0.4 MPa	
1470 mm	
1650 mm	1950 mm
2730 mm	
1675 kg	1951 kg

CRYSTA-APEX C

Series 900



Series 1200



9106/9108

9166/9168

9206/9208

121210

122010

123010

905 mm	905 mm	905 mm
1005 mm	1605 mm	2005 mm
605 mm / 805 mm	605 mm / 805 mm	605 mm / 805 mm
13	18	23
	800 mm / 1000 mm	
1200 kgf	1500 kgf	1800 kgf
	$MPE_E=(1.9+0.4L/100) \mu\text{m}$	
	$MPE_E=(1.7+0.4L/100) \mu\text{m}$	
	$MPE_E=(1.9+0.3L/100) \mu\text{m}$	
	$MPE_E=(1.7+0.3L/100) \mu\text{m}$	
	$MPE_{THP}=3.0 \mu\text{m} / MPT_{\tau}=110 \text{ s}$	
	$MPE_{THP}=2.3 \mu\text{m} / MPT_{\tau}=110 \text{ s}$	
	$MPE_{THP}=2.0 \mu\text{m} / MPT_{\tau}=120 \text{ s}$	
	0.1 μm	
	Air bearings on all axes	
	8 to 300 mm/s (max. 520 mm/s)	
	Rapid drive mode: max. 80 mm/s	
	Slow drive mode: 0.05 mm/s	
	1 to 8 mm/s (CNC) / 1 to 3 mm/s (CNC)	
	Per axis 0.13 g (max. 0.23 g) / Per axis 0.1 g (max. 0.17 g)	
	Granite	
1080 x 1720 mm	1080 x 2320 mm	1080 x 2720 mm
	Approx. 60 l/min at 0.4 MPa	
	1670 mm	
1950 mm	2690 mm	3090 mm
	2730 mm / 3130 mm	
2231 kg / 2261 kg	2868 kg / 2898 kg	3912 kg / 3942 kg

1205 mm	1205 mm	1205 mm
1205 mm	2005 mm	3005 mm
1005 mm	1005 mm	1005 mm
16	24	36
	1200 mm	
2000 kgf	2500 kgf	3000 kgf
	$MPE_E=(2.5+0.4L/100) \mu\text{m}$	
	$MPE_E=(2.3+0.4L/100) \mu\text{m}$	
	$MPE_E=(2.5+0.3L/100) \mu\text{m}$	
	$MPE_E=(2.3+0.3L/100) \mu\text{m}$	
	$MPE_{THP}=3.5 \mu\text{m} / MPT_{\tau}=110 \text{ s}$	
	$MPE_{THP}=2.8 \mu\text{m} / MPT_{\tau}=120 \text{ s}$	
	$MPE_{THP}=2.8 \mu\text{m} / MPT_{\tau}=120 \text{ s}$	
	0.1 μm	
	Air bearings on all axes	
	8 to 300 mm/s (max. 520 mm/s)	
	Rapid drive mode: max. 80 mm/s	
	Slow drive mode: 0.05 mm/s	
	1 to 5 mm/s (CNC)	
	Per axis 0.1 g (max. 0.17 g)	
	Granite	
1400 x 2165 mm	1400 x 2965 mm	1400 x 3965 mm
	Approx. 100 l/min at 0.4 MPa	
	2200 mm	
2420 mm	3220 mm	4220 mm
	3630 mm	
4050 kg	6150 kg	9110 kg

MCOSMOS is part of the MiCAT software platform and supports professional control, measurement and evaluation in coordinate inspection. It is a modular software suite available in three versions to give a range of capability to match the kind of work your company handles and the type of CMM employed.



Professional

Software packages and optional modules to meet every requirement

With this high-end software system developed by Mitutoyo, you have the capabilities of a variety of standard modules and optional modules at your fingertips. Every module is designed to help you make comprehensive measurement evaluations and document and present them effectively. Measurement data is archived into clear, easy-to-use structures. MCOSMOS 1 comes as standard with all CRYSTA-APEX C coordinate measuring machines.

Professional

Modules included as standard

MCOSMOS 1

MCOSMOS 2

MCOSMOS 3

PartManager

The command centre that starts the software package and manages part programs.



Geometry module

For easy part program generation (online/offline) to measure geometrical elements. Extensive and versatile functions for data reporting.



Online/offline programming module

For control geometry and simple part program generation (online/offline) utilising CAD data with collision avoidance control.



3D freeform surface evaluation module

Generates nominal/actual value comparisons from the CAD model and measured points.



2D profile evaluation module

Scans and evaluates workpiece contours.



Support for all available probe systems, rotary/swivel heads as well as probe-change systems comes as standard (see following page)

MCOSMOS optional modules

Statistical evaluation module

2D profile evaluation module

Measuring and evaluation module for involute gear profiles

3D freeform surface evaluation module

Coordinate measuring instruments – standard interface module

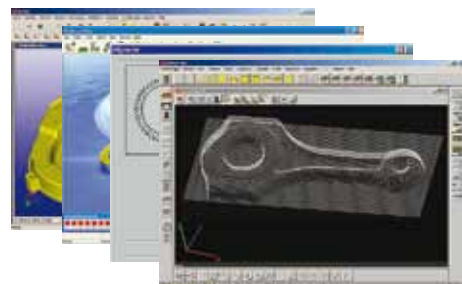
Aerofoil evaluation module

NC compensation value module





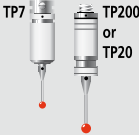



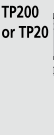





Non contact vision module

Queuing system module

... other modules available – details on request



Quality and versatility in every case: Mitutoyo probe systems.

Contact probe systems				
Touch-trigger probes for single point or multipoint measurements			Scanning probes for single point or multipoint measurements	
Manual, swivelling probe head with separate measuring probe	Fixed measuring head with separate measuring probe	Motorised indexable probe heads		Measuring head with separate measuring probe. Compact measuring system
 	  	    	 	 
SCR200 / MCR20	ACR1 / MRS-ACR3 / SCR200 / MCR20	SCR200		MRS-SCRMPP
			MRS-SCP80	ACR1 / FCR25 / MRS-ACR3
Probe changing systems				

REPRO-FIX clamping system

The REPRO-FIX flexible clamping system saves you time and money and gives even greater measurement precision in the production environment. Perfectly matched to the CRYSTA-PLUS C, REPRO-FIX solves any clamping task, however individual. Through simple-to-handle, modular fixture technology, REPRO-FIX is easily disassembled completely – or in modules, to be assembled again when convenient. With the supplementary QUICK-RAIL kit for positioning the REPRO-FIX elements, this can be done even more quickly and easily.



Versatile

Optical (non-contact) measuring systems

Video measuring head
for single point or multipoint
measurement

Video measuring heads, also in
combination with other measuring
systems

Laser measuring systems
for single point measuring, contour
measuring and digitisation

Laser-scan measuring heads, also in
combination with other measuring
systems



ACR1 / MRS-ACR3

Probe changing systems

Probe changing system overview

ACR1



SCRMP

MRS-
FCR25



MRS-
SCP80

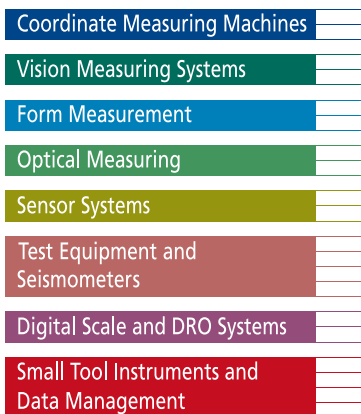
SCR200



MRS-
ACR3



With Mitutoyo's coordinate measuring machines you can be sure of gaining a competitive edge provided by the expertise of the world's leading specialist in production measurement technology. Take advantage of Mitutoyo's decades of experience to help achieve your goals. In Mitutoyo you have a partner who sets the highest standards for quality, performance and progress.



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