

# Probes for Coordinate Measuring Machines

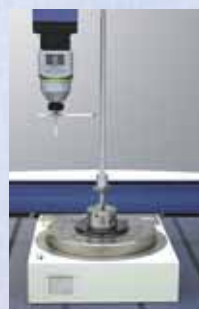
CATALOG No. E4292



**Mitutoyo**

# MPP-300Q/MPP-300

## Ultra High-Accuracy Scanning



### • Fast scanning

The MPP-300Q/300 is a multi-functional probe designed for CNC coordinate measuring machines. It can not only perform a continuous path contact-type scanning measurement [a measurement method that implements a collection of a large amount of coordinate data while traveling along the path in contact with the workpiece] at  $V2 \leq 0.3 \mu\text{m}$  (reference value when the LEGEX series is installed), but also high-accuracy point measurement ( $\sigma \leq 0.1 \mu\text{m}$ : when the LEGEX series is installed, and data collection from a centering point measurement (shown below).

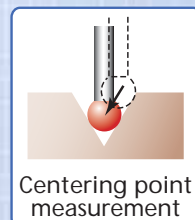
### • Omni-directional scanning

The MPP-300Q/300 has internally incorporated high-accuracy scales with a minimum resolution of  $0.01 \mu\text{m}$  for each direction (X, Y, and Z axes), which makes it possible to read the stylus displacement in any direction.

The air bearing employed in the sliding section of each axis helps enable this probe with minimum directionality.

### • Low measuring force

The ordinary touch trigger probe, even if it has only a small force to generate a trigger signal the moment the stylus actually comes into contact with the workpiece, may be subject to several tens to several hundred grams of force at the press-in that immediately follows contact. In addition, some of the scanning probes from other manufacturers employ such a structure that the motor drive mechanism forcibly specifies the probing position in order to permit the use of a longer stylus, necessitating the probe to actually have a greater measuring force.



In contrast, the MPP-300Q/300 can reduce its measuring force to a minimum of  $0.03\text{N}$  so that it can even measure elastic workpieces such as resins, etc., without damaging them at all.

### • Fast scanning

For a scanning measurement, either of the following scanning methods can be selected: one in which scanning progresses while automatically following an unknown geometry (unknown geometry scanning), or one in which scanning progresses based on the locus of the probe tip given beforehand (known geometry scanning). With known geometry scanning it is possible to perform fast scanning at  $120 \text{ mm/s}$ .

Conventionally, it is normal to evaluate geometries such as a line or a circle through point measurement. However, for evaluating the flatness or roundness of an extra precision-machined workpiece, it is better to improve the reliability of the measurement result by evaluating the object at more measurement points.

Unfortunately, it takes an extended amount of time for a touch-trigger probe to measure an object point by point. The MPP-300Q/300 can, for example, complete its measurement in several seconds even if it is required to measure inside diameters of  $\phi 100 \text{ mm}$  at 1000 measurement points. In addition, measurement can be pursued effectively while changing the scanning speed, depending on the measurement accuracy required.

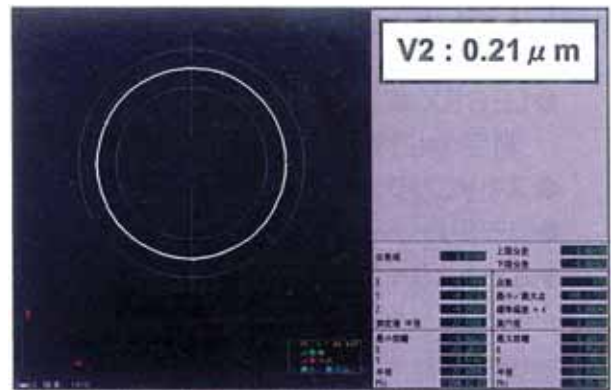
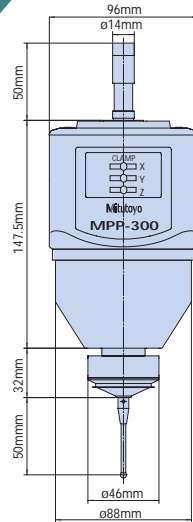
### • Optional units

A wide variety of optional units, including rotary table MRT320 for synchronized scanning and the automatic stylus change system, are provided.

## MPP-300Q/MPP-300 Specifications

MPP-300Q/ MPP-300	Measurement range	$\pm 1 \text{ mm}$
	Resolution	$0.01 \mu\text{m}$
	Max. permissible probing error	$\text{MPE}_P \leq 0.45 \mu\text{m}$ (LEGEX500/700/900: When the $\phi 4 \times 18 \text{ mm}$ stylus is used.)
	Max. permissible probing error during scanning	$\text{MPE}_{\text{THP}} \leq 1.4 \mu\text{m}$ (LEGEX500/700/900: When the $\phi 4 \times 18 \text{ mm}$ stylus is used.)
	Spring rate	$0.2 \text{ N/mm}$
	Max. stylus length	200mm for both vertical and horizontal
	Max. stylus mass	75g
	Stylus mount	M4 screw
	Max. tracing speed	$120 \text{ mm/s}$ [at a known geometry scanning]
	Air flow rate	$30 \text{ NL/min}$
	Probe head	N/A
	Applicable models	CNC CMM (LEGEX500/700/900/1200 series)
Automatic stylus change system (optional)	No. of mountable stylus modules	- 4 standard units [Port 1 is dedicated for the standard stylus (for calibration purpose)]
		- Expandable to max. 10 ports. Note, all styli should be arranged on the same axis.

## Dimensions

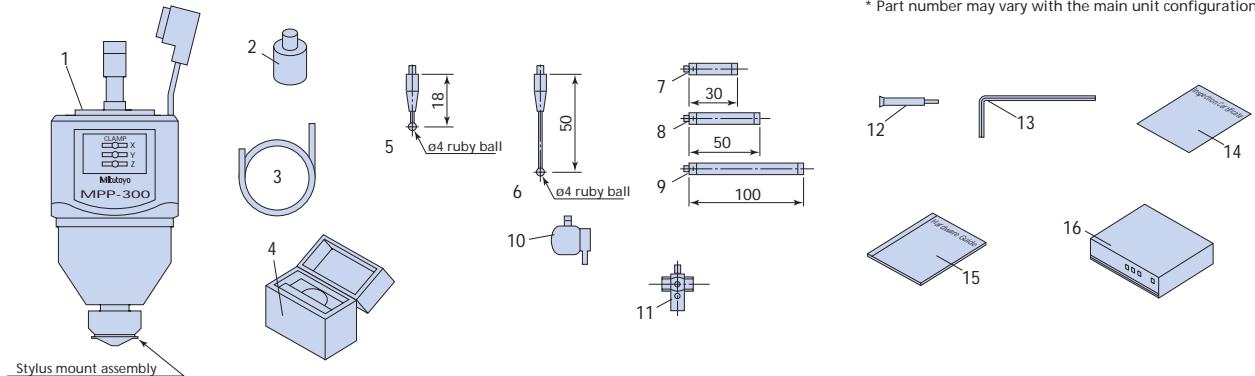


An example scanning measurement of a ring gage with the LEGEX series and MPP-300

## Set configuration

Unit	Ref. No.	Description	Part No.	Qty	Mass (kg)	Remark
Configuration of the MPP-300 main unit No. 02AQD310	1	MPP-300 probe main unit	02AQD330	1	1.5	Including one stylus mount assembly. Silicon oil (2000CS) Air hose for MPP-CMM Wooden box for storing MPP-300 Standard stylus
	2	Damping oil	02AQD090	1	0.017	
	3	Connection air hose	970117	1	0.05	
	4	Storage box	02AQD480	1	1.5	
	5	ø4X18mm stylus	—	1	0.002	
MPP-300 probe set Order No. 06ABJ729	6	ø4X50mm stylus	—	5	0.005	3.3 M4-M4 ceramics M4-M4 ceramics M4-M4 ceramics  For attaching/detaching M4 stylus Nominal diameter: 1.5 Hardware-only Operation Manual
	7	Extension L=30 mm	181280	2	0.005	
	8	Extension L=50 mm	181281	1	0.007	
	9	Extension L=100 mm	06AAD458	1	0.01	
	10	MS4-stylus knuckle	06AAD460	1	0.015	
	11	MS4-stylus center	06ACH817	1	0.04	
	12	Stylus tool	181279	2	0.001	
	13	Allen wrench	538411H	1	0.001	
	14	Inspection certificate	—	1	0.002	
	15	MPP-300 Hardware Guide	99MCA242	1	0.15	
Clamp unit	16	MPP-300 clamp unit configuration (of rack-mount specification)	02AQD500A	1	1.8	

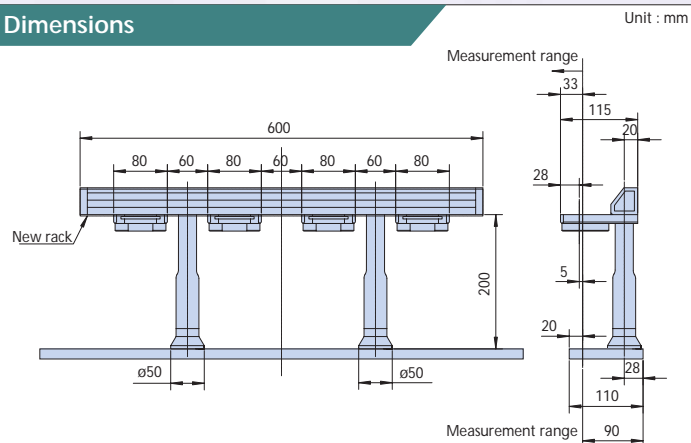
\* Part number may vary with the main unit configuration.



## Optional units

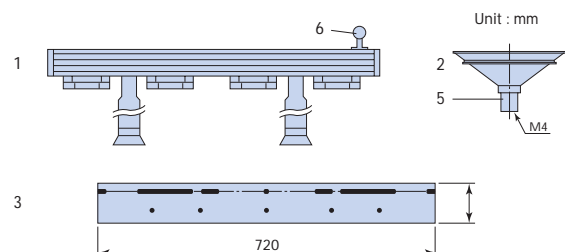
## Automatic Stylus Changer

## Dimensions



## Detail

Unit	Ref. No.	Description	Part No.	Qty	Mass (kg)	Remark
Automatic stylus change system Set Order No. 06ABG596	1	Auto-stylus change rack	06ABG597	1	5	Supplied with 4 ports for replacement. Used for installing a rack on the CMM base.
	2	Stylus mount assembly	02AQD042	3	0.04	
	3	Auxiliary plate	06ABG598	1	8	
	4	ø4X18mm stylus	—	3	0.005	For re-calibration
	5	MS4-stylus center	06ABH817	3	0.012	
	6	Reference sphere	06ABH818	1	0.04	





# SP80

## High-accuracy scanning probe adaptive to long-type stylus

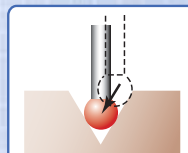


### • High-accuracy scanning probe adaptive to long-type stylus

The SP80 scanning probe is designed to employ a long stylus that has high measurement accuracy and a maximum length of 500 mm (measured in both the horizontal and vertical directions). It is a multi-function probe for CNC coordinate measuring machines that undertakes not only scanning measurement (a measurement method that collects a large amount of coordinate data while traveling along the path in contact with the workpiece) but also high-accuracy point measurement as well as data collection from a centering point measurement (shown below).

### • Fast scanning

For scanning measurement, either of the following scanning methods can be selected: one in which scanning progresses while automatically following an unknown geometry (unknown geometry scanning), or one in which scanning progresses based on the locus of the probe tip given beforehand (known geometry scanning). With known geometry scanning it is possible to perform fast scanning at 120 mm/s. Conventionally, it is normal to evaluate geometries such as a line or circle through point measurement. However, for evaluating the flatness or roundness of an extra precision-machined workpiece, it is better to improve the reliability of the measurement result by evaluating the object at more measurement points. Unfortunately, extended time is required for a touch-trigger probe to measure an object point by point. The MPP-300Q/300 can, for example, complete its

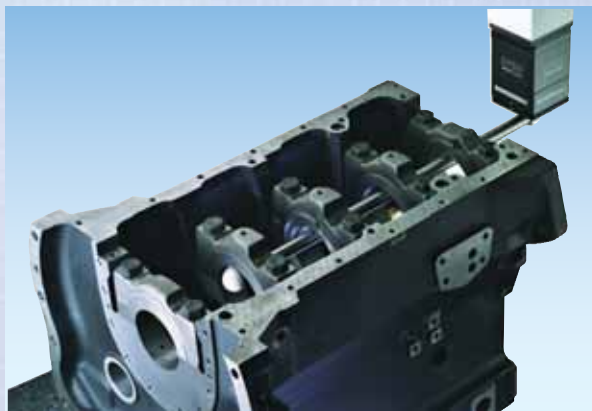


Centering point measurement

measurement in several seconds, even if it is required to measure inside diameters of  $\phi 100$  mm at 1000 measurement points. In addition, any measurement can be pursued effectively while changing the scanning speed, depending on the measurement accuracy required.

### • Optional units

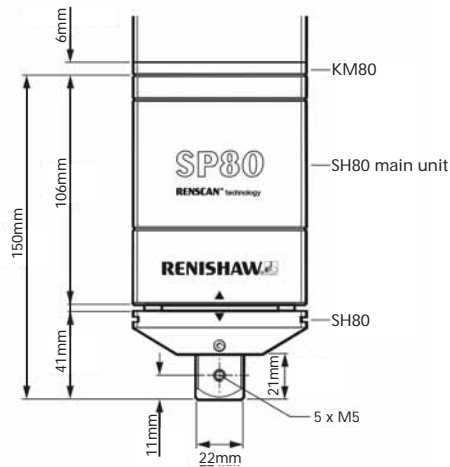
A wide variety of optional units, including rotary table MRT320 for synchronized scanning and the automatic stylus change system, are provided.



### SP80 Specifications

SP80	Measurement range	$\pm 2.5$ mm
	Max. permissible probing error during scanning	$MPE_{THP} \leq 2.0 \mu m$ (Crysta-Apex C700/900: If the $\phi 8 \times 60$ mm stylus is used.)
	Spring rate	1.8N/mm
	Max. stylus length	500mm
	Max. stylus mass	500g
	Stylus mount	M5
	Max. scanning speed	120mm/s [at a known geometry scanning]
	Probe head	N/A
	Applicable models	CNC coordinate measuring machines

## Dimensions



## Set configuration

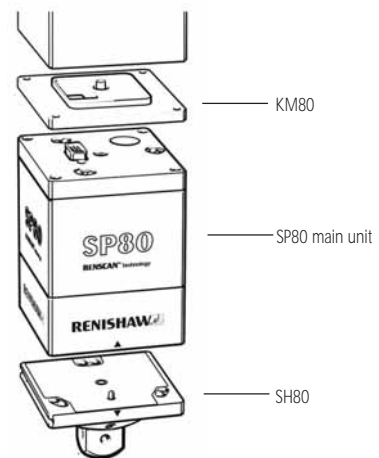
## SP80 main unit

Description	Part No.	Mass (kg)	Remark
SP80 basic set	06ABT513	2.6	One SP80 main unit, SH80, KM80, and ø8X60mm stylus

## Parts for SP80

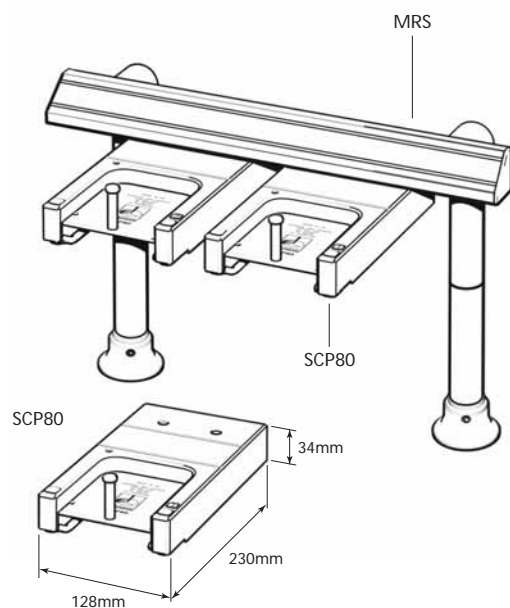
Description	Part No.	Mass (kg)	Qty
SP80 adapter	06ABT587	0.3	1
SP80 Probe cable	06ABT588	0.1	1
SP80 EXT cable	06ABT590	0.2	1
IU 80	06ABT525	0.51	1
SP80 Power Supply BOX	06ABT591	1	1
OPT200S-MPP2	06ABN865	0.2	1
OPT200 attachment	06AAS741	0.4	1
Control ROM (MAIN)	06ZAA058	0.01	1
Control ROM (OPT)	06ZAA059	0.01	1
Mass (kg)			3.73

\* Part number may vary with the main unit configuration.



## Optional units

## Automatic Stylus Changer



## SP80 stylus change set 1 (600mm-rail specifications) / Oder No. 06ABT766

Description	Part No.	Unit	Mass (kg)
MRS kit#2	06ABT529	1	3.5
SH80	06ABT523	1	0.24
SCP80	06ABT524	2	2.1
Rack plate (auxiliary plate)	06ABG598	1	8
ACR3 attachment	06ABP467	1	0.05
Mass (kg)			13.89

## SP80 stylus change set 2 (1000mm-rail specifications) / Oder No. 06ABT767

Description	Part No.	Unit	Mass (kg)
MRS kit#3	06ABT530	1	3.7
SH80	06ABT523	3	0.48
SCP80	06ABT524	4	4.2
Rack plate (auxiliary plate)	06ABG598	1	8
ACR3 attachment	06ABP467	1	0.05
Mass (kg)			16.43

# SP25M

## Compact High-accuracy Scanning Probe



### • Compact high-accuracy scanning probes

The SP25 is a compact high-accuracy scanning probe with an outside diameter of  $\varnothing 25$  mm. This multi-functional probe is suitable for a CNC coordinate measuring machine that performs not only scanning measurement (measurement method that collects a large amount of coordinate data while traveling along the path in contact with the workpiece), but also high-accuracy point measurement, as well as data collection from a centering point measurement (shown below).

### • Fast scanning

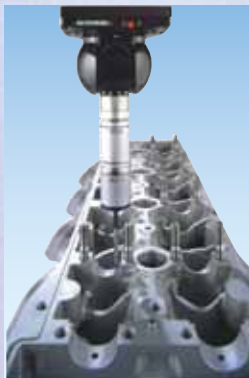
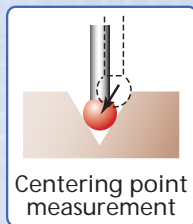
For a scanning measurement either of the following scanning methods can be selected: one in which the scanning progresses while automatically following an unknown geometry (unknown geometry scanning), and one in which scanning progresses based on the locus of the probe tip given beforehand (known geometry scanning). With known geometry scanning it is possible to perform fast scanning at a maximum of 120 mm/s. Conventionally, it is normal to evaluate geometries such as a line or a circle through point measurement. However, for evaluating the flatness or roundness of an extra precision-machined workpiece, it is better to improve the reliability of a measurement result by evaluating the object at more measurement points. Unfortunately, an extended of time is required for a touch-trigger probe to measure such an object point by point. The SP-25 can, for example, complete its measurement in several seconds even if it is required to measure inside diameters of  $\varnothing 100$  mm at 1000 measurement points. In addition, it can pursue any measurement effectively while changing the scanning speed, depending on the measurement accuracy required.

### • Enhancing the setup and measurement efficiency through automatic change of probe orientations

Since the SP25 can be mounted on a probe head such as the PH10M/PH10MQ that automatically changes the probe orientation, it can greatly reduce the preparation time for measurement and for actual measurement in comparison to a conventional-type scanning probe whose position is fixed downward. In addition, the use of other probes, as advantaged by the probe change system, makes it possible to realize full automation in measuring various forms of machined parts.

### • Optional units

A wide variety of optional units, including rotary table MRT320 for synchronized scanning and the automatic stylus change system, are provided.

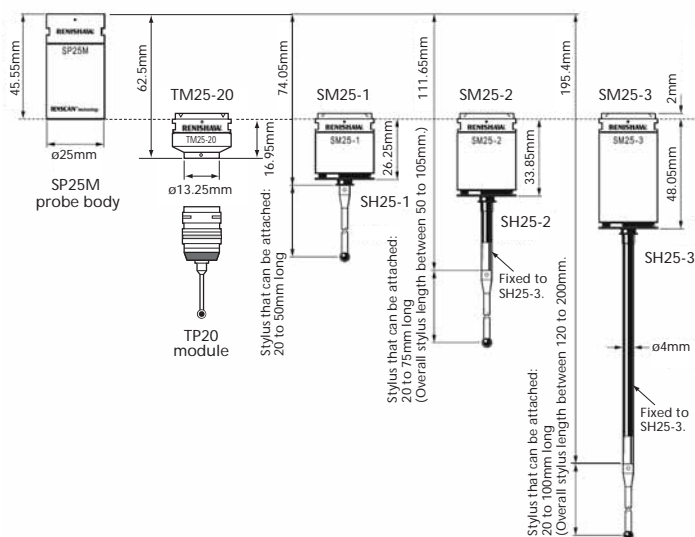


### SP25M Specifications

SP25M	Measurement range	$\pm 0.5$ mm
	Max. permissible probing error during scanning	$MPE_{THP} \leq 2.3 \mu m$ (Crysta-Apex C700/900: If the $\varnothing 4 \times 50$ mm stylus is used.)
	Spring rate	0.4N/mm
	Amount of over travel	$\pm 2.0$ mm (XY) $\pm 1.7$ mm (Z)
	Max. stylus length	200mm (When SM25-3 or SH25-3 is used.)
	Stylus mount	M3
	Max. scanning speed	120mm/s [at a known geometry scanning]
	Probe head	Essential: PH10M/PH10MQ
	Applicable models	CNC coordinate measuring machines



## Dimensions



## Configuration

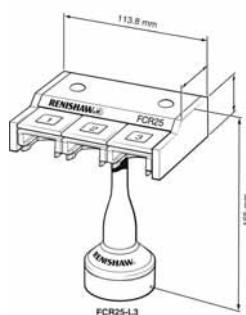
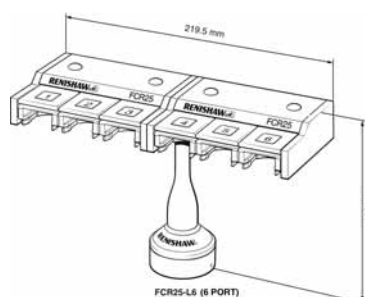
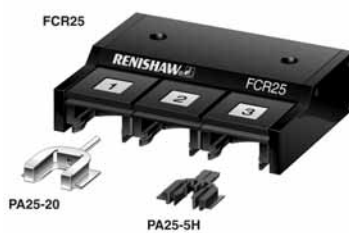
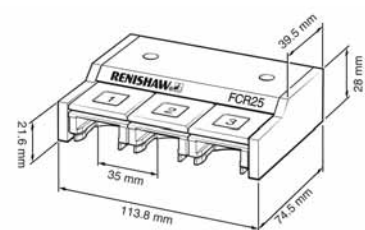


Description	Part No.	Remark
SP25M full combination kit	06ABS969	A complete set of SP25M, SM25-1/2/3, SH25-1/2/3, and TM25-20
SP25M scanning kit #1	06ABS970	A complete set of SP25M, SM25-1, and SH25-1
SP25M scanning kit #2	06ABS971	A complete set of SP25M, SM25-2, and SH25-2
SP25M scanning kit #3	06ABS972	A complete set of SP25M, SM25-3, and SH25-3
Scanning module SM25-1 kit	06ABS452	A complete set of SM25-1 and SH25-1
Scanning module SM25-2 kit	06ABS453	A complete set of SM25-2 and SH25-2
Scanning module SM25-3 kit	06ABS454	A complete set of SM25-3 and SH25-3
Stylus holder SH25-1	06ABS455	
Stylus holder SH25-2	06ABS456	
Stylus holder SH25-3	06ABS457	
TM25-20TTP module adapter kit #1	06ABS475	A set of TP20 standard force module and TM25-20
TTP module adapter kit TM25-20	06ABS473	

\* TTP module (TM25-20, TP20 module) will be supported for MCOSMOS V2.4 or later releases.

## Optional units

## Automatic Scanning Module Changer/Automatic Stylus Changer



\* SP25M internally uses the high-power LED light source. Exercise caution when handling, in accordance with the Operation Manual.

\* Can be mounted on the MRS rack.

# MPP-100

## High-Accuracy Scanning Probe



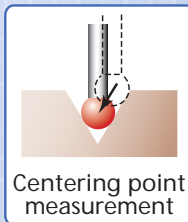
### • Low-cost scanning probes

The MPP-100 is a low-price and high-accuracy scanning probe. It is a multi-function probe for CNC coordinate measuring machines that performs not only a scanning measurement (a measurement method that collects a large amount of coordinate data while traveling along the path in contact with the workpiece) but also a high-accuracy point measurement, as well as data collection from centering point measurement (shown below).

### • Fast scanning

For scanning measurement, either of the following scanning methods can be selected: one in which scanning progresses while automatically following an unknown geometry (unknown geometry scanning), and one in which scanning progresses based on the locus of the probe tip given beforehand (known geometry scanning). With known geometry scanning it is possible to perform fast scanning at 120 mm/s. Conventionally, it is normal to evaluate geometries such as a line or circle through point measurement. However, for evaluating the flatness or roundness of an extra precision-machined workpiece, it is better to improve the reliability of a measurement result by evaluating the object at more measurement points. Unfortunately, an extended amount of time is required for a touch-trigger probe to measure such the object point by point. The MPP-100 can, for example, complete its measurement in several seconds, even if it is required to measure inside

diameters of  $\varnothing 100$  mm at 1000 measurement points. In addition, it can pursue any measurement effectively while changing the scanning speed, depending on the measurement accuracy required.



### • Omni-directional scanning

The MPP-100 has internally incorporated high-accuracy scales with a minimum resolution of  $0.01\mu\text{m}$  for each direction (X, Y and Z axes), which makes it possible to read the stylus displacement in any direction.



### MPP-100 Specifications

MPP-100	Measurement range	$\pm 1\text{mm}$
	Resolution	$0.1\mu\text{m}$
	Max. permissible probing error during scanning	$\text{MPE}_{\text{THP}} \leq 3.0\mu\text{m}$ (Crysta-Apex C series: if the $\varnothing 4 \times 18\text{mm}$ stylus is used.)
	Spring rate	$0.75\text{N/mm}$
	Max. stylus length	200mm for both vertical and horizontal
	Max. stylus mass	75g
	Stylus mount	M4 screw
	Max. scanning speed	120mm/s
	Air flow rate	30NL/min
	Probe head	N/A
	Applicable models	CNC CMM (Crysta-Apex C series, Bright-STRATO series)
Automatic stylus change system (optional)	No. of mountable stylus modules	<ul style="list-style-type: none"> <li>- 4 standard units [Port 1 is dedicated to the standard stylus (for calibration purposes)]</li> <li>- Expandable to a maximum 10 ports. However, all styli should be arranged on the same axis.</li> </ul>



Technical drawing of the MPP-100 probe. The drawing shows a vertical probe with a blue body. The top section has a diameter of 90mm and a height of 50mm. Below this is a section with a diameter of 14mm and a height of 141.5mm. The main body has a diameter of 92mm and a height of 50mm. The bottom section has a diameter of 46mm and a height of 32mm. The probe is labeled 'Mitutoyo MPP-100' and has three buttons labeled 'CLAMP', 'X', 'Y', and 'Z'.

Unit	Ref. No.	Description	Part No.	Qty	Mass (kg)	Remark	
MPP-100 main unit configuration No. 02AQD010	1	MPP-100 probe main unit	02AQD030	1	1.5	3.3	Including one stylus mount assembly.
	2	Damping oil	02AQD090	1	0.017		Silicon oil (2000CS)
	3	Connection air hose	970117	1	0.05		Air hose for MPP-CMM
	4	Storage box	02AQD020	1	1.5		Wooden box for storing MPP-100
MPP-100 probe set Order No. 06ABG594	5	ø4X18mm stylus	–	1	0.002		Standard stylus
	6	ø4X50mm stylus	–	5	0.005		
	7	Extension L=30mm	181280	2	0.005		M4-M4 ceramics
	8	Extension L=50mm	181281	1	0.007		M4-M4 ceramics
	9	Extension L=100mm	06AAD458	1	0.01		M4-M4 ceramics
	10	MS4-stylus knuckle	06AAD460	1	0.015		
	11	MS4-stylus center	06ABH817	1	0.04		
	12	Stylus tool	181279	2	0.001		
	13	Allen wrench	538411H	1	0.001		For attaching/detaching M4 stylus
	14	Inspection certificate	–	1	0.002		Nominal diameter: 1.5
	15	MPP-100 Hardware Guide	99MCA231	1	0.15		Hardware-only Operation Manual
Clamp unit	16	MPP-100 clamp unit configuration (desktop specification)	02AQD100A	1	1.8		

Technical drawing of a new rack and pinion assembly. The drawing includes a side view and a front view.

**Side View Dimensions:**

- Total length: 600 mm
- Segment lengths: 80, 60, 80, 60, 80, 60, 80 mm
- Base diameter: Ø50 mm
- Height: 200 mm

**Front View Dimensions:**

- Top flange: 33 mm
- Height: 115 mm
- Top edge: 20 mm
- Side flange: 28 mm
- Base: 5 mm
- Height: 20 mm
- Base: 28 mm
- Width: 110 mm
- Measurement range: 90 mm

A label "New rack" points to the rack assembly.

Unit	Ref. No.	Description	Part No.	Qty	Mass (kg)	Remark
Automatic stylus change system Set No. 06AG596	1	Auto-stylus change rack	06AB597	1	5	Supplied with 4 ports for replacement.
	2	Stylus mount assembly	02AQD042	3	0.04	
	3	Auxiliary plate	06AB598	1	8	Used for installing a rack on the CMM base.
	4	øX18mm stylus	916491	3	0.005	
	5	M54-stylus center	06AB817	3	0.012	
	6	Reference sphere	06AR818	1	0.04	For re-calibration

# MPP-10

## Effective Screw Depth Measurement Probe

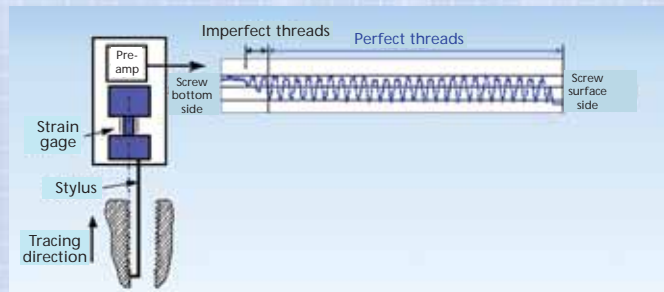


### • Special unique model for measuring effective screw depth

Screw holes, or female screws, may not function well on fastening if the depth is insufficient, or extended machining time may be required, or the strength of the target workpiece may be affected if the depth is excessive. Therefore, it is very important to ensure that each hole is of an appropriate effective depth. Today's general method of measuring the effective depth of a female screw is for the operator to manually drive-in a dedicated tool called a "screw gage" in the target hole to identify the depth. However, since some automobile engine parts have more than 100 female screws, screw gage can consume a significant amount of time, contributing to excessive overhead. The MPP-10 is only one probe model that has enabled automatic measurement of female screw depths using a CNC coordinate measuring machine.

### • Enhancing the setup and measurement efficiency through the automatic change of probe orientations

Since the MPP-10 can be mounted on a probe head, such as the PH10M/PH10MQ, that automatically changes the probe orientation, it is capable of automatically measuring workpieces in which many female screws have been machined in various directions. In addition, the use of other probes, as advantaged by the probe change system, makes it possible to realize full automation in measuring various forms of machined parts.

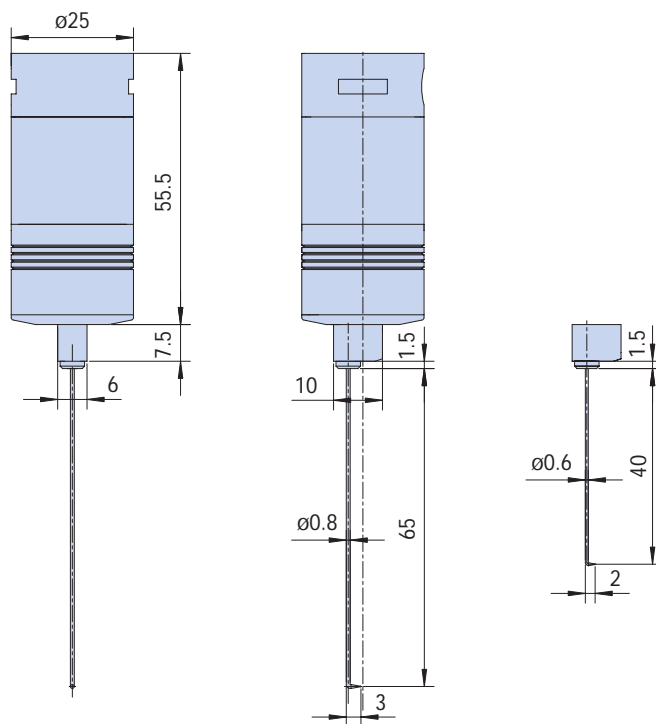


### MPP-10 Specifications

Female screws that can be measured	M4 - M20	
Maximum measurement depth	M4-M8 screw	30mm
	M4-M20 screw	60mm
Maximum measuring speed	M4-M10 screw	10mm/sec
	M12-M20 screw	30mm/sec
Probe outside diameter	ø25mm	

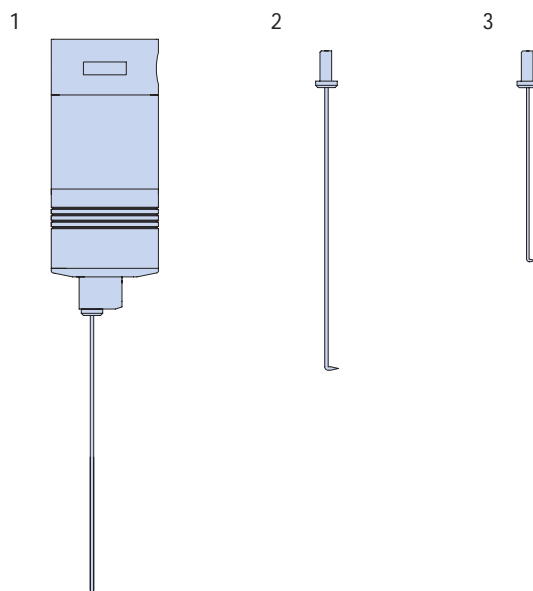
## Dimensions

Unit : mm



## Set configuration

	Ref. No.	Description	Part No.	Qty.
MPP-10 main unit configuration Order No. 02AQD210	1	MPP-10 main unit	02AQD220	1
	2	Stylus (L65x3)	02AQD250	1
	3	Stylus (L40x2)	02AQD260	1
	4	Stylus mounting tool	02AQD211	1
	5	Storage box	02AQD270	1





# LC50/LC100

## Line Laser Probe



### • Ultra-fast data collection

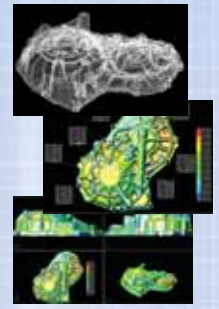
The LC50/100 probe is designed to collect coordinate values on the workpiece surface while it is irradiating the workpiece with a line-formed laser beam as it travels over the workpiece. Since it can collect data at the ultra high speed of 19,200 points/sec., the LC50/100 is able to complete a form measurement of, for example, an automobile body part, which would take several hours to several tens of hours to measure even with a non-contact type scanning probe, within only several minutes.

### • Advantages due non-contact measurement

Since this probe is a non-contact type, it can measure even elastic bodies such as resins and thin machined parts that can be easily deformed by contact-type measurement.

### • Wide uses included for CAD

The collected set of point data can be utilized for various purposes by editing, generating a plane, comparison with CAD data, and conversion into CAD data, which can be performed by the rich selection of optional software titles supported.



## LC50/LC100 Specifications

LC50	Accuracy	$\sigma \leq 15\mu\text{m}$
	Working distance (Dimension a in Figure 1)	100mm
	Measurement range (Dimension b in Figure 1)	50mm (50mm in positive direction from working distance)
	Laser width (Dimension c in Figure 1)	50mm
	Data input speed	19200point/sec
	Laser standard	Class II
LC100	Accuracy	$\sigma \leq 20\mu\text{m}$
	Working distance (Dimension a in Figure 1)	100mm
	Measurement range (Dimension b in Figure 1)	100mm (100mm in positive direction from working distance)
	Laser width (Dimension c in Figure 1)	50mm
	Data input speed	19200point/sec
	Laser standard	Class II

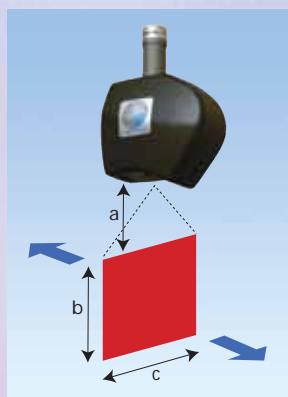
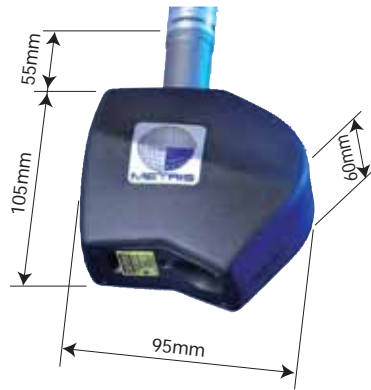


Figure 1: Measurable area with LC50/100



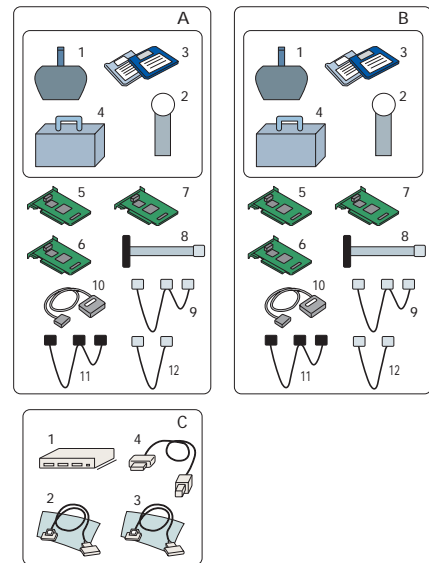
\* The high-accuracy model, LC15, and the XC50 model, which allows faster data collection due to the three-line laser beam, are also provided.

## Dimensions



## Set Configuration

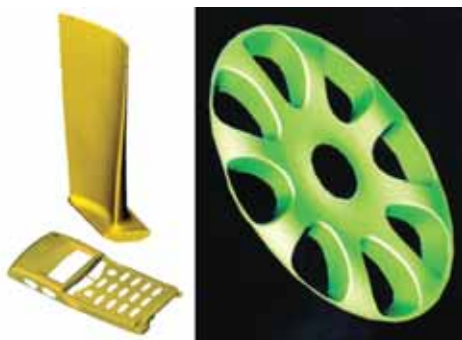
No.	Group	Description		Part No.	Qty	Mass (g)	Remark
1	A	Metris LC-100 Probe [06ABP455]	Metris probe (LC-100)	06ABP443	1	300	LC-100 probe
2			Master ball	06ABP445	1	750	
3			Calibration Disk	06ABP446	1	30	
4			Case	06ABP447	1	200	
5		MPI add-in card		06ABP448	1	200	
6		Frame grabber add-in card		06ABP449	1	400	
7		Encoder add-in card		06ABP450	1	700	
8		MPI-ENC cable		06ABP451	1	20	Flat cable
9		Control cable		06ABP452	1	250	15-15-9 pin connector cable
10		Video cable		06ABP453	1	100	Coaxial-15 pin cable
11		Metris PICS cable		06ABP474	1	100	
12		Multiwire Extension Harness		06ABL115B	1	400	15-15pin Cable
1	B	Metris LC-50 Probe [06ABP499]	Metris probe (LC-50)	06ABP444	1	300	LC-50 probe
2			Master ball	06ABP445	1	750	
3			Calibration Disk	06ABP446	1	30	
4			Case	06ABP447	1	200	
5		MPI add-in card		06ABP448	1	200	
6		Frame grabber add-in card		06ABP449	1	400	
7		Encoder add-in card		06ABP450	1	700	
8		MPI-ENC cable		06ABP451	1	20	Flat cable
9		Control cable		06ABP452	1	250	15-15-9 pin connector cable
10		Video cable		06ABP453	1	100	Coaxial-15 pin cable
11		Metris PICS cable		06ABP474	1	100	
12		Multiwire Extension Harness		06ABL115B	1	400	15-15pin Cable
1	C	PICS JCBOX Set [06ABP472]	PICS JCBox	06ABN603	1	800	
2			PICS cable	06AAJ456B	1	300	5m
3			PICS cable	916624	1	200	1.5m
4			USB cable	06ABP473	1	350	5m



## Optional software

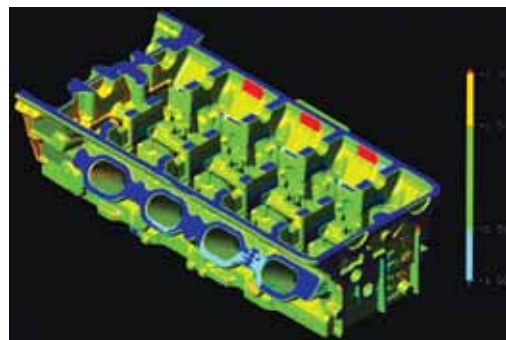
### Surface

Generates a plane from pointclouds, which are randomly corrected by the laser probe, etc.



### CADCompare

Compares the measurement data and existing CAD data.



# WIZprobe

## Point Laser Probe



### • High-accuracy laser probe

The WIZprobe affords two kinds of measurement: one in which point measurement using single-point measurement is performed by the point laser, with a spot diameter of 30 $\mu$ m, is irradiated into a workpiece, and the other in which scanning measurement is performed by collecting a workpiece profile as point-group data.

### • Automatic form tracing

If the probe makes a scanning measurement along the profile of an unknown geometry, it continues measurement while automatically following the geometry. In this case, measurement can be commenced by simply supplying the start position, measuring direction, and finish position.

### • Enhancing the setup and measurement efficiency through the automatic change of probe orientations

Since WIZprobe can be mounted on a probe head, such as the PH10M/PH10MQ, that automatically changes the probe orientation, it can be used for full-automated measurement on a surface including the top and bottom of, for example, the cross section of a turbine blade that is typically found in aircraft engines.

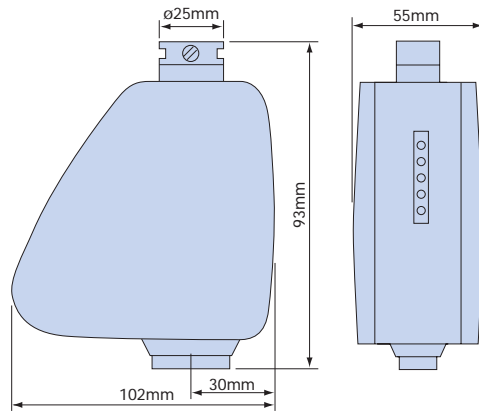


## WIZprobe Specifications

WIZprobe	Working distance	50mm
	Measurement range	$\pm 5$ mm ( $\pm 5$ mm from the working distance)
	Point-by-point measurement repeatability	$\sigma \leq 6\mu$ m
	Data input speed	50point/sec
	Laser spot diameter	30 $\mu$ m
	Laser standard	Class II
	Applicable data processing unit	MCOSMOS

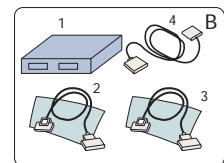
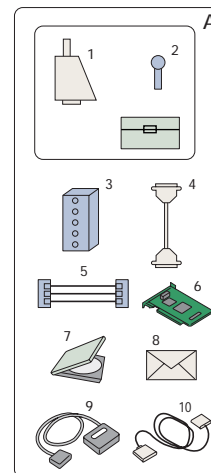


## Dimensions



## Set Configuration

No.	Group	Description	Part No.	Qty	Mass (g)	Remark
1	A	WIZprobe SET1 (include case) [06ABP461]	06ABP332	1	1600	PK-07-PR-00-000-0
2		WIZprobe Sensor Calibration Sphere Rod	06ABP336	1		PK-05-ME-00-200-0
3		User Interface Box	06ABP334	1		PK-70-IB-00-400-0
4		WIZcard Extension Cable	06ABP335	1		PK-05-00-CB-062-0
5		12Volts cable	06ABP338	1		
6		WIZcard PC add-in card	06ABP333	1		PK-07-WC-00-000-0
7		Software CD-ROM	06ABP339	1		Includes manual
8		WIZprobe-Acceptance test report	06ABP346	1		
9		WIZpobe Cable	06ABP343	1		Renishaw multi-wire standard A-1016-7617
10		PC Serial Communication Cable	06ABP344	1		PH-10 Autojoint cable
1	B	SY-TR I/F BOX Set [06ABP424]	06ABH630	1	400	PK-05-00-00-031-0
2		SYTR-I/F Box	916624	1	200	1.5m
3		PICS cable	06ABH627	1	300	
4		RS232C cable	06ABN299	1	300	s-s cross cable (9pin)





### • Provides image measuring capability for coordinate measuring machines

The QVP probe performs form measurement by image processing micro geometry that cannot be measured by a contact type probe, or elastic bodies that are easily deformed by slight measuring forces.

Although the method of microscopic measurement with the centering microscope mounted on the coordinate measuring machine has been used since coordinate measuring machines came into use in the industry, they have an inherent disadvantage in that the operation of identifying positions is dependent on the operator's eye, resulting in possible measurement errors. Even with a CNC coordinate measuring machine manual measurement must be performed sometimes, such as with an installed centering microscope. The QVP probe is an vision probe dedicated for coordinate measuring machines and was developed based on Mitutoyo's state-of-the-art technology, in order to enable full automation of image measurement with a CNC coordinate measuring machine. This technology was originally developed for Mitutoyo vision measuring machines.

### • Automatic detection of workpiece edge

The QVP-captured image will have various automatic edge detections performed by the dedicated software, Visionpak, and then various calculation processes (calculation of dimensions and geometrical deviations) will be performed by the general-purpose measurement program, Geopak.

### • Standard provision of white LED illumination

Since the QVP is equipped with the standard co-axial light running through the lens system as well as white-light LED ring illumination, which is bright and has a long service life, no auxiliary illumination is required. The light volume can be set to between 0 and 100% at 1% increments.

### • Mounting onto the Automatic Probe Changer

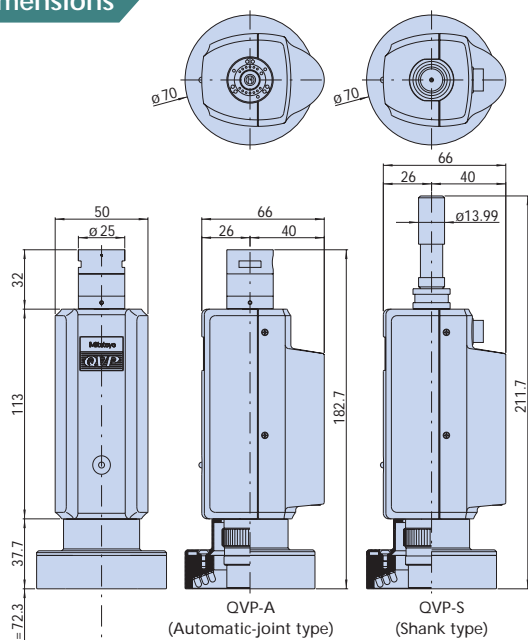
The QVP can also be mounted onto an automatic probe changer, allowing full-automatic measurement including both the contact and non-contact types in combination with the contact-type probes.



## QVP Specifications

QVP main unit	CCD size		1/2 inch (B/W)			
	Optical tube magnification		0.5X			
	Illuminating function	Co-axial	White light LED source (built-in): Power dissipation 5W or less			
		Ring	White light LED source: Power dissipation 10W or less			
	Mass		Automatic-joint type: 310g, shank type: 385g			
	Optical magnification		0.5X	1.5X	2.5X	5X
	Observation range (mm)		9.6X12.8	3.2X4.3	1.9X2.6	1X1.3
	Working distance (mm)		59	72.3	59.5	44
Objective	Magnification		1X	3X	5X	10X
			Optional	Standard	Optional	Optional
	Numerical Aperture (N.A.)		0.03	0.07	0.11	0.18
	Depth of focus (μm)		306	56	23	8
	Mass		70g	47g	59g	75g
QVP I/F BOX	Supply voltage		AC100 to 240V			
	Frequency		50/60Hz			
	Power capacity		45W			
	Mass		3800g			

## Dimensions



Unit : mm

## Optional accessories



Objective ML1X (375-036)  
Objective ML5X (375-034)  
Objective ML10X (375-035)



Calibration gage  
(02AQC310)  
- Gage for sharing the  
coordinates between the QVP  
and contact-type probe

Calibration chart  
(958448)  
- Gage for calibrating  
a single QVP unit



## Data processing unit

### ● Dedicated data processing software VISIONPAK

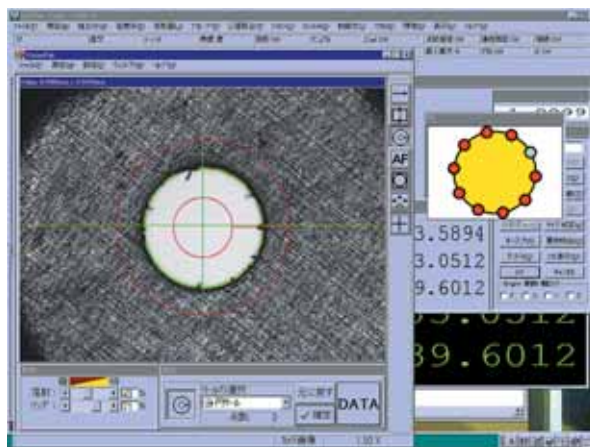
VISIONPAK operates under the Microsoft Windows operating system and is a general-purpose measurement program for coordinate measuring machines. It displays the image window when it detects a workpiece edge. After detecting an edge, it undertakes various calculations with the regular general-purpose measurement programs.

### ● Wide variety of image processing functions

With the powerful image processing functions (tools) it can detect various forms of edges at high speed. It can measure in the height direction by means of its auto-focus function, and save the captured image as the image data (bitmap format) as well.

### ● Outlier removal function

In ordinary micro-form measurement it is often difficult to remove burrs and dusts from the objective workpiece, resulting in an inevitable measurement error. In contrast, VISIONPAK can recognize, for example, the obstruction as an "outlier" and bypass it during measurement.



## VISIONPAK Image Processing Tool



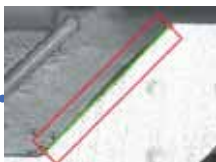
## Simple tool

Used for detecting a single point on the edge pointed to by the arrow.



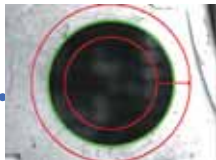
## Box tool

Used for multiple-point line measurement of an edge caught in the box



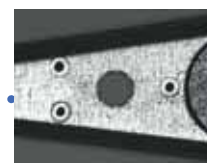
## Circle tool

Used for multiple-point measurement of a circle for the objective circular edge. As with the box tool, it can collect data that is free from the effect of burrs and dust.



## Manual tool

Used for detecting an optional position pointed to (clicked on) by the mouse.



## Centroid tool

Used for detecting the center of gravity of an optional form.



## Edge self-tracing tool

By simply specifying the start point and measurement interval, the objective edge can be detected while automatically tracing an unknown geometry.





# CF20

## Centering Microscope for Coordinate Measuring Machines



### • Use the coordinate measuring machine as a large microscope

The CF20 is a centering microscope that enables measurement of small holes and elastic bodies which are difficult for a touch trigger probe to measure. With the CF20 the coordinate measuring machine can be used as a large microscope.

### • Optional accessories to implement various evaluations

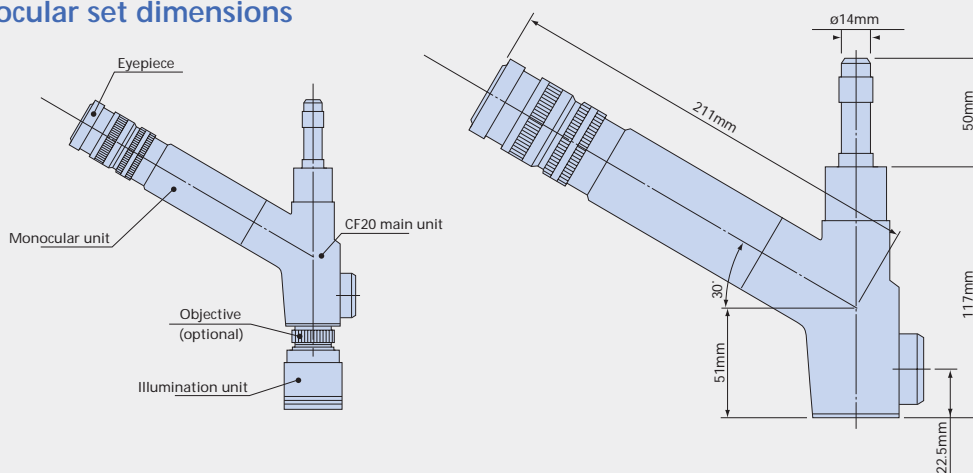
To cope with the size and form of a workpiece to be observed and measured, lenses of various magnifications and reticles for form comparison are provided.

### • CCTV monitor system

The dedicated CCD camera can be mounted on the back of the CF20 main unit. Video signals from the camera can be displayed as an image on the external monitor. This is a great aid in relieving eye stress, especially if several hours of work must be done.



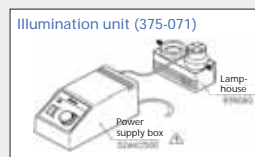
### CF20 monocular set dimensions



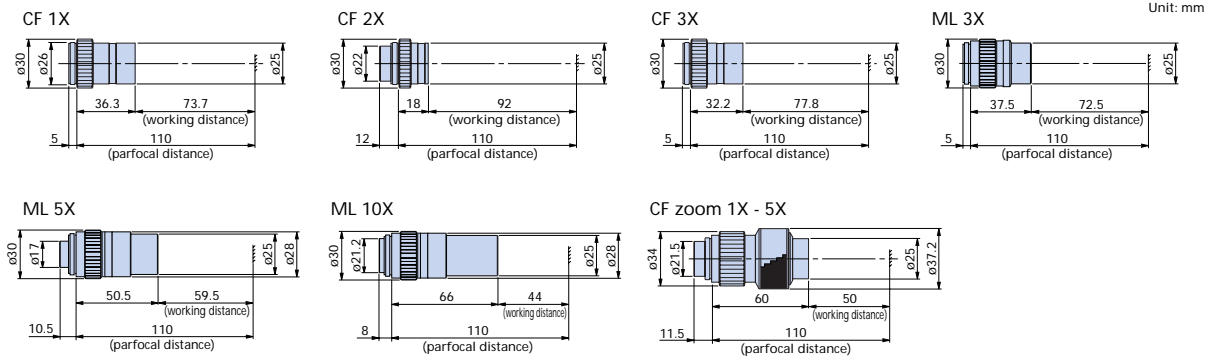
<b>CF20 monocular set (375-201)</b> 	<b>CF20 binocular set (375-202)</b> 	<b>CF20 protractor eyepiece set (375-203)</b> 	<b>CF20 double image set (375-204)</b> 	<b>CF20 disc plate set (375-205)</b> 
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### Specifications

Description	Specification	Accessory
CF20 monocular set (375-201)	CF10X eyepiece, field number 22 Cross hair and concentric circle reticle	1. Illumination unit (375-071) 2. Spare lamp (162151) 3. Lens cap 4. Tools 5. Power cable 6. Operation Manual 7. Storage box
CF20 binocular set (375-202)	CF10X eyepiece, field number 22 Cross hair and concentric circle reticle (right) Pupil distance adjustment: 51 - 76mm	
CF20 protractor eyepiece set (375-203)	CF10X eyepiece, field number 21 Measurement range: 360°, Angle index: 1° Minimum reading: 5' (vernier scale)	
CF20 double image set (375-204)	CF10X eyepiece, field number 22	
CF20 disc plate set (375-205)	CF10X eyepiece, field number 22 ISO metric/unify screws Cross hair and concentric circle reticle/ dotted line cross scale, ML 3X objective	



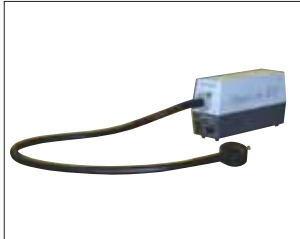
## Objectives (optional)



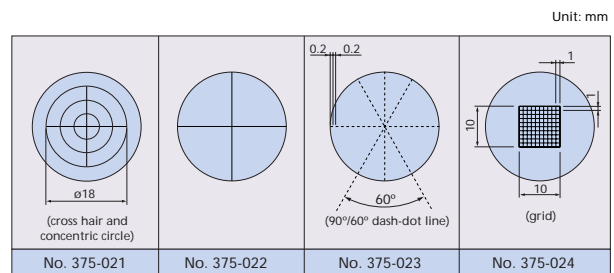
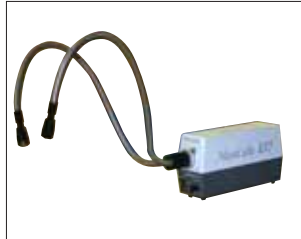
Order No.	Description	Numerical Aperture (N.A.)	Working distance W.D. (mm)	Resolution R ( $\mu\text{m}$ )	Depth of focus of single objective lens $\pm$ D.F. ( $\mu\text{m}$ )	Mass (g)
375-031	CF 1X	0.03	73.7	9.2	306	45
375-032	CF 2X	0.06	92	4.6	76	35
375-033	CF 3X	0.07	77.8	3.9	56	35
375-037	ML 3X	0.07	72.5	3.9	56	45
375-034	ML 5X	0.11	59.5	2.5	23	80
375-035	ML 10X	0.18	44.0	1.5	8	100
375-038	CF zoom 1X - 5X	1X 0.04	50	6.9	171	200
		3X 0.1		2.75	27	
		5X 0.1		2.75	27	

- Values for resolution and depth of focus of a single objective lens are calculated based on the reference wavelength ( $\Delta=0.55\mu\text{m}$ ).
- The real field of view (mm) can be obtained from Field number/Objective magnification.

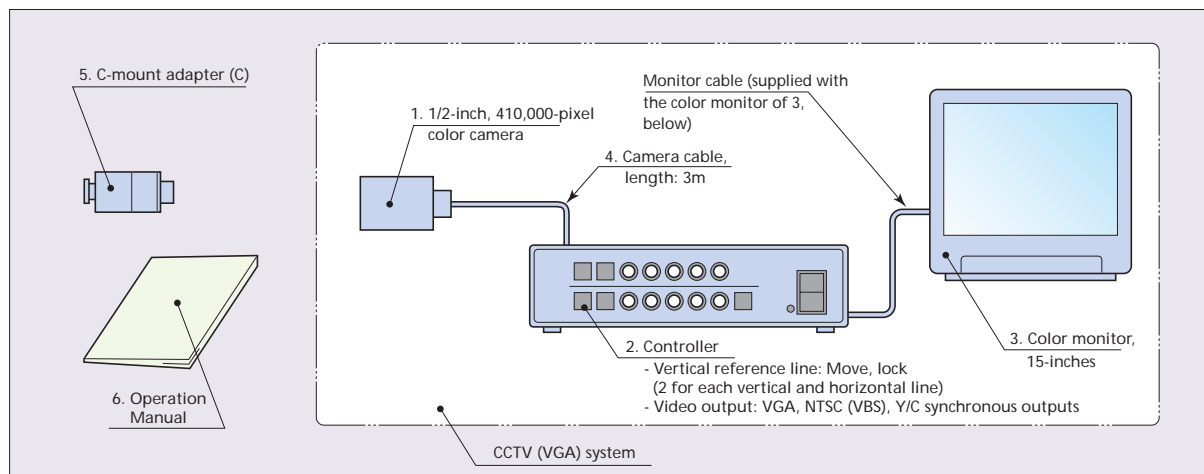
Fiber optic circular illumination unit (176-366)



Twin-fiber optic illumination unit (176-344)



## CCTV Monitor System for CMM with CF20 [Order No. 320-053]



Ref. No.	Part No.	Description	Qty	Remark	
1	06AAV876	1/2-inch color camera	1	CCD	Color TV (VGA) System No. 06AAV874, which includes the accessory set of Ref. Nos. 1 to 4 (common to the order No. 176-372 CCD Color TV System)
2	06AAV875	Controller	1		
3	06AAV877	Color monitor unit	1	Manufactured by SONY	
4	06AAV878	Camera cable	1	Length: 3m	
5	972031	C-mount adapter (C)	1		
6		User's Manual	1	Common to 176-372	

- Real field of view (mm) on the monitor can be obtained from CCD camera's imaging device pixels (VxH)/Objective magnification.

# MTP2000

## Ultra High-Accuracy Touch Signal Probe



### • Ultra high-accuracy touch trigger probes

Provides a very high repeatability ( $2\sigma \leq 0.15\mu\text{m}$ ). In addition, the Mitutoyo original structure guarantees high-accuracy roundness and sphericity measurements as aided through probing with minimum directionality.

### • Enhancing the setup and measurement efficiency through automatic change of probe orientations

Since the MTP2000 can be mounted on a probe head, such as the PH10M/PH10MQ, that automatically changes the probe orientation, it can greatly reduce the preparation time for measurement and for actual measurement in comparison to a conventional-type scanning probe which has a downward fixed position. In addition, the use of other probes, as advantaged by the probe change system, makes it possible to realize full automation in measuring various forms of machined parts.



### MTP2000 Specifications

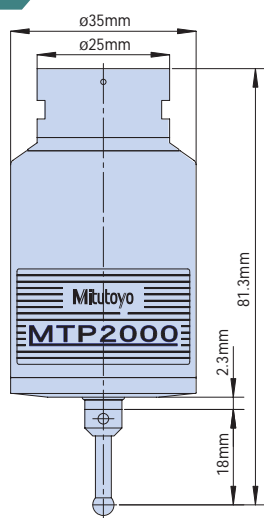
MTP2000	Measuring direction	$\pm X, \pm Y, +Z$
	Standard stylus	$\varnothing 4 \times 20\text{mm}$ high-accuracy specifications
	Repeatability ( $2\sigma$ )	$0.15\mu\text{m}$ or less ( $\varnothing 4 \times 18\text{mm}$ stylus, at a measuring speed of $3\text{mm/s}$ )
	Directionality (XYZ: 3D)	$\pm 0.5\mu\text{m}$ or less ( $\varnothing 4 \times 18\text{mm}$ stylus, at a measuring speed of $3\text{mm/s}$ )
	Required force to generate trigger signal	XY $0.006\text{N}$ (When the $\varnothing 4 \times 20\text{mm}$ stylus is used.)
		Z $0.1\text{N}$ (When the $\varnothing 4 \times 20\text{mm}$ stylus is used.)
	Amount of over-travel	XY $\pm 5$ to $6^\circ$
		Z $+1.5\text{mm}$
	Required force to achieve over-travel	XY $1.15\text{N}$
		Z $2.94\text{N}$
	Max. stylus length	100mm in the vertical direction, and 51mm in the horizontal direction
	Stylus mounting method	M4 screw
	Mass of a single unit	95g
	Durability	1,000,000 times
	Probe head	Essential: PH10M/PH10MQ
	Applicable models	CNC coordinate measuring machines (LEGEX series)

### Notes:

- Where the 5-directions stylus knuckle is attached, it is not possible to insert an intermediate extension.
- Where the 5-directions stylus knuckle is attached, it is possible to insert an extension of up to 500mm.
- Where more than one styli are mounted, the sum of the moments of all styli should be  $10\text{N}\cdot\text{m}$  or less.  
Moment of each stylus ( $\text{N}\cdot\text{m}$ ) =  $M(\text{g}) \times (L+20) \times 9.8/1000$   
Where  $M(\text{g})$  is the stylus mass, and  $L(\text{mm})$  is the distance from the stylus' momentplane of the stylus holder to the center of the stylus.
- Any ball stylus with its diameter less than  $\varnothing 1\text{mm}$  cannot be used.
- Use a measuring speed of  $3\text{mm/s}$  or more.
- Input error may result, if the environment includes radio frequency source greater than  $5\text{Hz}$  or noise source greater than  $70\text{dB}$ .
- Soft workpieces or those which are soiled with oils, etc., may not be measured.



## Dimensions



## Set configuration [Order No. 06ABK839]

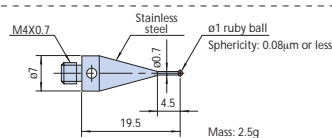
No.	Description	Part No.	Qty	Remark
1	MTP2000 main unit configuration	06ABK840	1	
1-1	MTP2000 main unit	Set No. 02AQC670	1	
1-2	Stylus mounting fixture	02AQC660	1	
	Storage box	02AQC940	1	
1-3	MS4-stylus tool	181279	1	For attaching/detaching M4 stylus
1-4	High-accuracy stylus $\phi 4 \times 18 \text{mm}$	06ABK810	1	
2	MTP2000 I/F BOX configuration	02AQC700B	1	
2-1	MTP2000 I/F BOX	02AQC710	1	
2-2	Probe ID cable	02AQC800	1	
3	Hardware Guide	99MCA173J	1	

## Option accessories

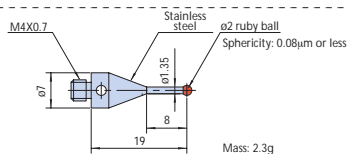
## High-accuracy styli

Unit : mm

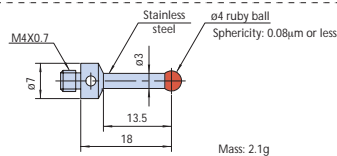
Order No. : 06ABT109  
Description : MS4-1R4.5-S



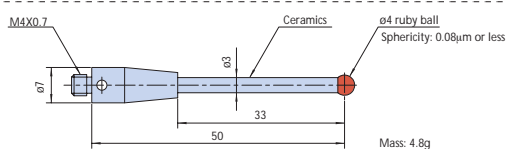
Order No. : 06ABK815  
Description : MS4-2R8-S



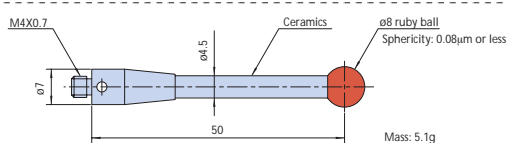
Order No. : 06ABK816  
Description : MS4-4R13.5-S



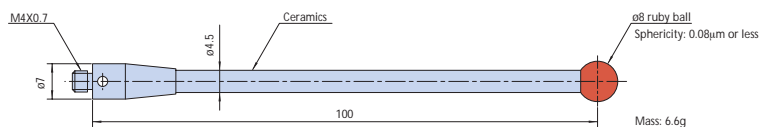
Order No. : 06ABT110  
Description : MS4-4R33C-S



Order No. : 06ABT111  
Description : MS4-8R50C-S



Order No. : 06ABT112  
Description : MS4-8R100C-S



## High-accuracy stylus set [Order No. 06ABT114]

Description	Mass (g)	Qty	Remark
MS4-1R4.5-S	2.5	2	High-accuracy stylus (Sphericity: 0.08μm or less)
MS4-2R8-S	2.3	2	
MS4-4R13.5-S	2.1	2	
MS4-4R33-S	4.8	1	
MS4-8R50C-S	5.1	1	
MS4-8R100C-S	6.6	1	30mm ceramic extension (M4)
MS3-30C	18	1	
MS4-EXT50C	6.7	2	
MS4-EXT30C	5.1	1	
MS4-M3EXT20	3.2	1	20mm extension (M4 male - M3 female)

Description	Mass (g)	Qty	Remark
MS4-M3EXT75C	5.2	1	20mm extension (M4 male - M3 female)
MS4-stylus center	12.1	1	
MS3-stylus center	2.4	1	
MS2-stylus center	0.8	1	
MS4-stylus tool	3.5	2	
MS2-stylus tool	0.7	2	
MS4-M3 femal-adapter	1.4	2	M4 male - M3 female
MS3-M2 femal-adapter	0.6	5	M3 male - M2 female
Storage box	700	1	

# TP7M (high-accuracy)

## High-Accuracy Touch Trigger Probe



### • High-accuracy touch trigger probes

This is a high-accuracy touch trigger probe with a maximum repeatability of  $2\sigma \leq 0.25\mu\text{m}$ .

### • Enhancing the setup and measurement efficiency through automatic change of probe orientations

Since the TP7M can be mounted on a probe head, such as the PH10M/PH10MQ that automatically changes the probe orientation, it can greatly reduce the preparation time for measurement and for actual measurement in comparison to a conventional-type scanning probe with a position that is fixed downward. In addition, the use of other probes, as advantaged by the probe change system, makes it possible to realize full automation in measuring various forms of machined parts.

### • Adaptive to long-type stylus

The TP7M can mount a long stylus up to 180 mm long\*. In combination with the longest extension of 200 mm equipped for the PH10M/PH10MQ, it can reach a position at a maximum distance of 380 mm.

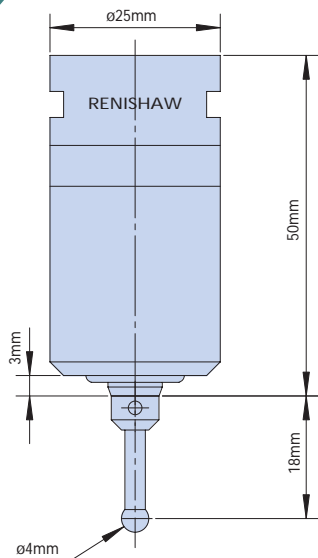
\* This maximum length may vary with the coordinate measuring machine main unit being used and/or the material/diameter of the stylus itself.



### TP7M Specifications

TP7M	Measuring direction	$\pm X, \pm Y, +Z$	
	Standard stylus	$\varnothing 4 \times 18\text{mm}$	
	Repeatability ( $2\sigma$ )	$0.25\mu\text{m}$ or less (When the standard stylus is used.)	
	Directionality (XY: 2D)	$\pm 0.25\mu\text{m}$ or less	
	Required force to generate trigger signal	XY	0.02N (When the 50mm stylus is used.)
		Z	0.15N (When the 50mm stylus is used.)
	Amount of over-travel	XY	$\pm 16^\circ$
		Z	$\pm 5\text{mm}$
	Required force to achieve over-travel	XY	0.49N (When the 50mm stylus is used.)
		Z	2.94N (When the 50mm stylus is used.)
	Maximum stylus length	150mm	
	Stylus mounting method	M4 screw	
	Mass of a single unit	85g	
	Durability	10,000,000 times	
	Probe head	Essential: PH10M/PH10MQ	
	Applicable models	CNC coordinate measuring machines	

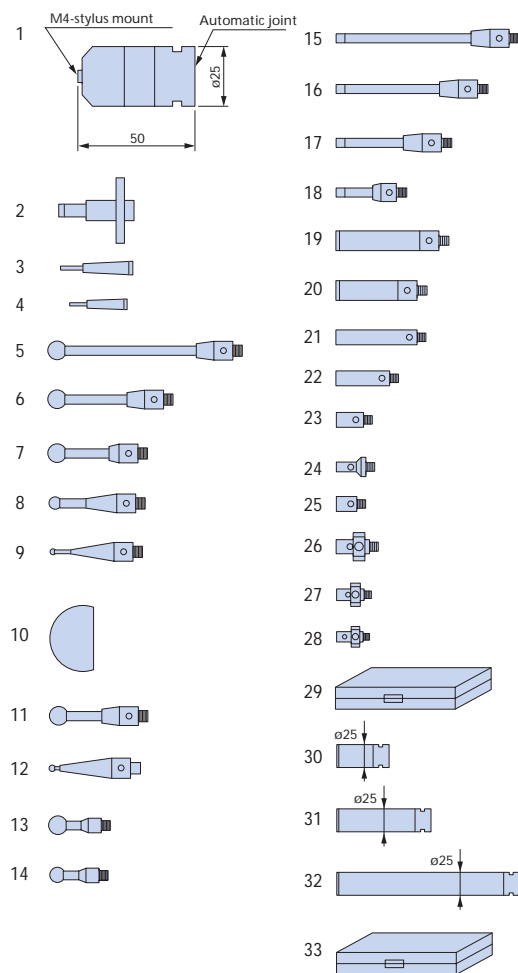
## Dimensions



## Set configuration [Order No. 916483]

Unit : mm

Unit	Ref. No.	Description	Part No.	Mass(g)	Qty	Remark
TP7M probe stylus set No. 916484	1	Touch trigger probe TP7M	916486	85	1	
	2	Joint key S10	174748	24	1	
	3	M4-stylus tool	181279	3.5	2	For attaching/detaching the stylus
	4	M2-stylus tool	153140	0.7	2	
	5	Stylus $\phi 8 \times 100$ (M4)	916488	6.8	1	
	6	Stylus $\phi 8 \times 50$ (M4)	916487	5.3	1	
	7	Stylus $\phi 4 \times 18$ (M4)	916491	2.2	1	Standard stylus
	8	Stylus $\phi 2 \times 19$ (M4)	916490	2.2	4	
	9	Stylus $\phi 1 \times 19.5$ (M4)	916489	2.5	1	
	10	Stylus $\phi 30$ ceramic (M3)	916492	15.3	1	
	11	Stylus $\phi 5 \times 21$ (M3)	163873	1.5	1	
	12	Stylus $\phi 0.5 \times 20$ (M3)	163871	1.0	2	
	13	Stylus $\phi 6 \times 10$ (M2)	160219	0.9	1	
	14	Stylus $\phi 3 \times 10$ (M2)	153136	0.4	5	
	15	Extension L100	181285	6.3	1	M4 male - M3 female
	16	Extension L75	181284	5.3	1	M4 male - M3 female
	17	Extension L50	181283	4.6	1	M4 male - M3 female
	18	Extension L20	181282	3.2	1	M4 male - M3 female
	19	Extension L50	181281	6.8	1	M4
	20	Extension L30	181280	5.1	1	M4
	21	Extension L30	160229	1.4	1	M2
	22	Extension L20	160228	0.9	1	M2
	23	Extension L10	160227	0.4	1	M2
	24	Adapter L9	181286	1.3	2	M4 male - M3 female
	25	Adapter L5	160231	0.6	5	M4 male - M3 female
	26	MS4-stylus center	916493	12	1	M4
	27	MS3-stylus center	168677	3.3	1	M3
	28	MS2-stylus center	160230	1.0	1	M2
	29	Wooden box	916494	700	1	
Extension set No. 916485	30	Probe extension PEM1	916495	65	1	L50
	31	Probe extension PEM2	916496	90	1	L100
	32	Probe extension PEM3	916497	150	1	L200
	33	Wooden box	916498	600	1	
	34	User's Manual	916499	100	1	





# TP200

## High-Accuracy Touch Trigger Probe



### • Compact high-accuracy touch trigger probes

This touch trigger probe has an outside diameter as small as  $\phi 13.5$  mm, which greatly contributes to probing complex portions of a workpiece. With the combined use of an appropriate probe extension it can probe even deeper locations.

### • Enhancing the setup and measurement efficiency through the automatic change of probe orientations

Since the TP200 can be mounted on a probe head, such as the PH10M/PH10MQ that automatically changes the probe orientation, it can drastically reduce the time required to prepare for measurement and for actual measurement in comparison to a conventional-type scanning probe with a position that is fixed downward.

### • Automatic stylus change

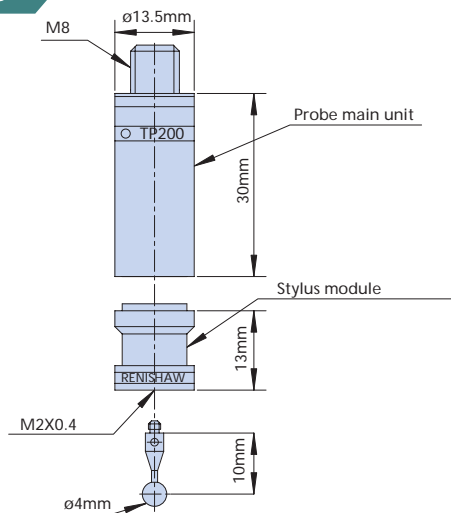
If the measurement cannot be performed by merely changing the probe orientation (such as when it is impossible to measure without replacing the normal stylus with one that has a different diameter or unique form), this automatic stylus change via the stylus change system allows full-automatic measurement to be completed without being interrupted mid-course. In addition, working with other probes, as advantaged by the probe change system, makes it possible to realize full automation in measuring various forms of machined parts.



### TP200 specifications

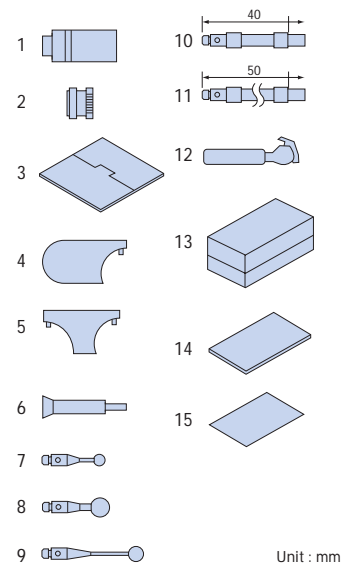
TP200	Measuring direction	$\pm X, \pm Y, \pm Z$	
	Repeatability ( $2\sigma$ )	0.3 $\mu$ m or less (with 10mm stylus), 0.4 $\mu$ m or less (with the 50mm stylus)	
	Directionality (XY: 2D)	$\pm 0.4\mu$ m or less (with 10mm stylus), $\pm 0.8\mu$ m or less (with the 50mm stylus)	
	Directionality (XYZ: 3D)	$\pm 0.65\mu$ m or less (with 10mm stylus), $\pm 1\mu$ m or less (with the 50mm stylus)	
	Required force to generate trigger signal	XY	0.02N (STANDARD/LOW FORCE), where a 50mm stylus is used.
		Z	0.07N (STANDARD/LOW FORCE), where a 50mm stylus is used.
	Amount of over-travel	XY	$XY \pm 14^\circ$
		Z	+4.5mm (with 0.07N), +3mm (with 0.15N)
	Required force to achieve over-travel	XY	0.35N (STANDARD FORCE) 0.1N (LOW FORCE)
		Z	4N (STANDARD FORCE) 1N (LOW FORCE)
	Maximum stylus length	50mm (STANDARD FORCE)	
		30mm (LOW FORCE)	
	Maximum stylus mass	8g (STANDARD FORCE), 3g (LOW FORCE)	
	Stylus mounting method	M2 screw	
	Mass of a single unit	22g	
	Durability	10,000,000 times	
SCR200 (optional)	Probe head	Essential: PH10M/PH10MQ/MIH/PH1	
	Applicable models	CNC coordinate measuring machines	
	Note:	Any stylus less than $\phi 1$ mm should be used with the LOW FORCE module.	
SCR200 (optional)	Stylus module replacement accuracy	Repeated positioning accuracy: 1.0 $\mu$ m or less (through automatic change), when a 50mm stylus is used. *2.0 $\mu$ m or less at a manual replacement: when a 50mm stylus is used.	
	Number of stylus modules that can be mounted	Maximum 6 units	

## Dimensions



## Set configuration [Order No. 06AAL268]

	Ref. No.	Description	Part No.	Qty	Remark
Touch trigger probe TP200 set Order No. 06AAL268	1	TP200 probe	06AAL253	1	
	2	Stylus module (standard)	06AAL254	1	Standard measuring force (at over-travel)
	3	Cleaning tool	06AAL256	1	For cleaning the stylus module
	4	Single-ended wrench	161534	1	For attaching/detaching the probe (S1)
	5	Double-ended wrench	161535	1	For attaching/detaching the probe (S9)
	6	Stylus tool	153140	1	For attaching/detaching the stylus (S7)
	7	Stylus ø3X10 (M2)	153136	1	Standard stylus
	8	Stylus ø6X10 (M2)	160219	1	
	9	Stylus ø4X20 (M2)	160221	1	
	10	Extension 40mm (M2)	06AAL257	1	Carbon fiber
	11	Extension 50mm (M2)	06AAL258	1	Carbon fiber
	12	Carbon extension attachment tool	06AAL264	1	
	13	Wooden box	06AAL265	1	Stylus storage box
	14	User's Manual	06AAL623	1	
	15	Certificate		1	



Unit : mm

## Optional accessories

## Stylus module automatic changer SCR200

## Automatic stylus change system kit (Order No. 06AAL540)

No.	Description	Part No.	Qty	Specification (use)	Mass (kg)
1	Stylus module (low measuring force)	06AAL255	1	For ball stylus less than ø1	0.01
2	Stylus module (standard)	06AAL254	3		0.01
3	SCR200 kit	06AAL267	1	With a rack mount kit	0.93
4	PL63	06AAM887	1	PI200-SCR200 connection cable	0.15



# TP20

## Touch Trigger Probe



### • Compact touch trigger probes

This touch trigger probe has an outside diameter as small as  $\phi 13.2$  mm, which greatly contributes to probing complex portions of a workpiece. With the combined use of an appropriate probe extension it can probe even deeper locations.

### • Enhancing the setup and measurement efficiency through the automatic change of probe orientations

Since the TP20 can be mounted on a probe head such as the PH10M/PH10MQ that automatically changes the probe orientation, it can drastically reduce the time required to prepare for measurement and for actual measurement in comparison to a conventional-type scanning probe that has a position fixed downward (when it is mounted on the CNC coordinate measuring machine).

### • Automatic stylus change

If the measurement cannot be achieved by simply changing the probe orientation (such as when it is not possible to make measurements without replacing the normal stylus with one having a different diameter or unique form), automatic stylus change via the stylus change system allows full-automatic measurement to be completed without mid-course interruption. In addition, the use of other probes as advantaged by the probe change system makes it possible to realize full automation in measuring various forms of machined parts (when it is mounted on the CNC coordinate measuring machine).

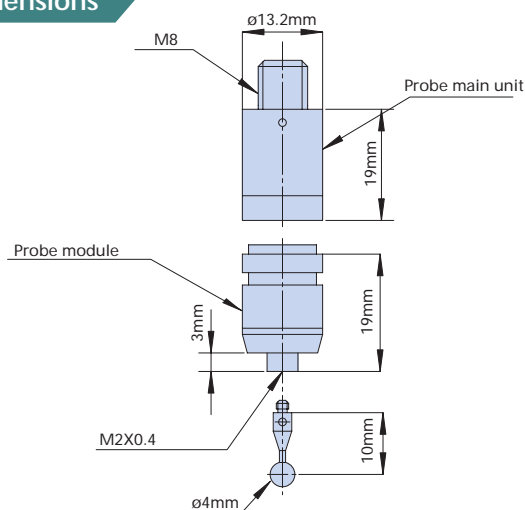


### TP20 Specifications

TP20	Measuring direction	$\pm X, \pm Y, +Z$	
	Repeatability ( $2\sigma$ )	0.35 $\mu$ m or less	
	Directionality (XY: 2D)	$\pm 0.8\mu$ m or less (with the STANDARD FORCE 10mm stylus), $\pm 2.5\mu$ m or less (with the 50mm stylus)	
	Directionality (XYZ: 3D)	$\pm 1\mu$ m or less (with the STANDARD FORCE 10mm stylus), $\pm 4\mu$ m or less (with the 50mm stylus)	
	Required force to generate trigger signal	XY	0.08N (STANDARD FORCE), with 10mm stylus 0.1N (MEDIUM FORCE), with 25mm stylus 0.1N (EXTENDED FORCE), with 50mm stylus
		Z	0.75N (STANDARD FORCE) 1.9N (MEDIUM FORCE) 3.2N (EXTENDED FORCE)
	Amount of over-travel	XY	$\pm 14^\circ$
		Z	+4.0mm (STANDARD FORCE) +3.7mm (MEDIUM FORCE) +2.4mm (EXTENDED FORCE)
	Required force to achieve over-travel	XY	0.2 to 0.3N (STANDARD FORCE) 0.2 to 0.4N (MEDIUM FORCE) 0.2 to 0.5N (EXTENDED FORCE)
		Z	3.5N (STANDARD FORCE) 7N (MEDIUM FORCE) 10 (EXTENDED FORCE)
	Maximum stylus length	50mm (STANDARD FORCE) 60mm (MEDIUM FORCE) 60mm (EXTENDED FORCE)	
	Stylus mounting method	M2 screw	
	Mass of a single unit	22g (probe body: 13g, probe module: 9g)	
	Durability	1,000,000 times	
	Probe head	Essential: PH10M/PH10MQ/MIH/PH1	
	Applicable models	Manual/CNC coordinate measuring machines	
MCR20 (optional)	Probe module replacement accuracy	Repeatability positioning accuracy: 1.0 $\mu$ m or less (through automatic change), when a 10mm stylus is used. *2.0 $\mu$ m or less at a manual replacement: when a 10mm stylus is used.	
	Number of stylus modules that can be mounted	Maximum 6 units	

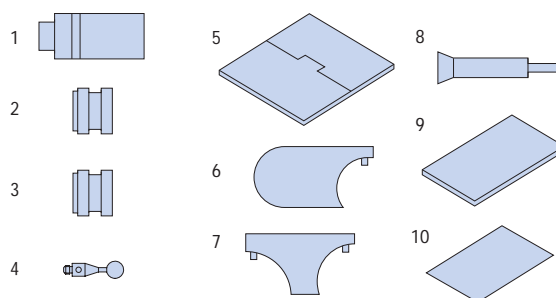


## Dimensions



## Set configuration [Order No. 06AAV547]

Ref. No.	Description	Part No.	Qty	Mass	Specification (use)
1	TP20 probe main unit	06AAV542	1	13g	
2	Probe module [STANDARD]	06AAV543	1	9g	Measuring force (small)
3	Probe module [MEDIUM]	06AAV544	1	9g	Measuring force (medium)
4	ø4X10mm stylus	-	1	0.4g	Standard stylus
5	Cleaning tool	06AAL256	1	54g	For cleaning stylus module
6	Single-ended wrench	161534	1	5g	For attaching/detaching probe
7	Double-ended wrench	161535	2	5g	
8	Stylus tool	153140	1	1g	For attaching/detaching stylus
9	User's Manual	99MCA060	1	100g	
10	Certificate		1	1g	
				450g	Total mass including package



## Optional accessories

## Stylus module

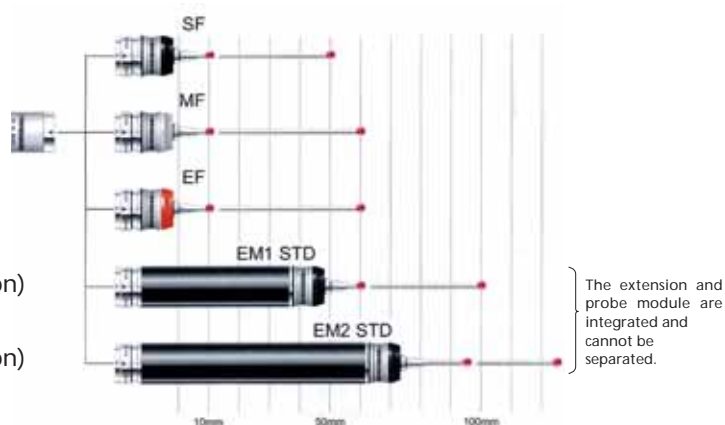
Standard force module

Medium force module

Extended force module

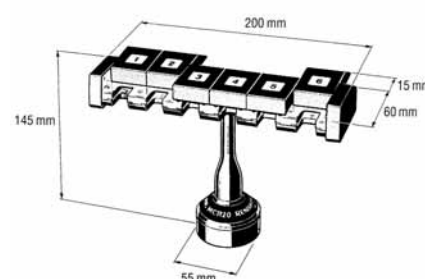
EM1-STD (Standard force module with extension)

EM2-STD (Standard force module with extension)



## Probe module automatic changing system MCR20

MCR20 set	Order No. 06AAV546	1	1.3kg	Accessories • ø2X30mm stylus 1 • Probe module (standard force) 2 • Mounting kit 1
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# TP2-5W

## Compact Touch Trigger Probe

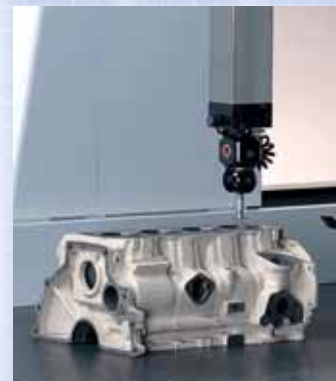


### • Compact touch trigger probes

This touch trigger probe has an outside diameter as small as  $\phi 13$  mm, which greatly contributes to probing complex portions of a workpiece. With the combined use of an appropriate probe extension it can probe even deeper locations.

### • Enhancing the setup and measurement efficiency through the automatic change of probe orientation

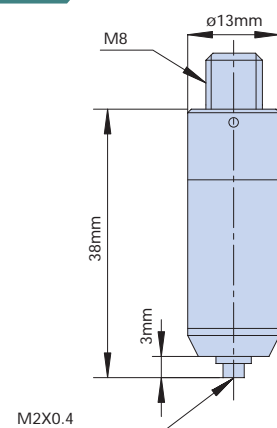
Since the TP2-5W can be mounted on a probe head such as the PH10M/PH10MQ that automatically changes the probe orientation, it can drastically reduce the time required to prepare for measurement and for actual measurement in comparison to a conventional-type scanning probe that has a fixed position downward. With the combined use of an appropriate probe extension it can probe even deeper locations (when it is mounted on the CNC coordinate measuring machine).



### TP2-5W Specifications

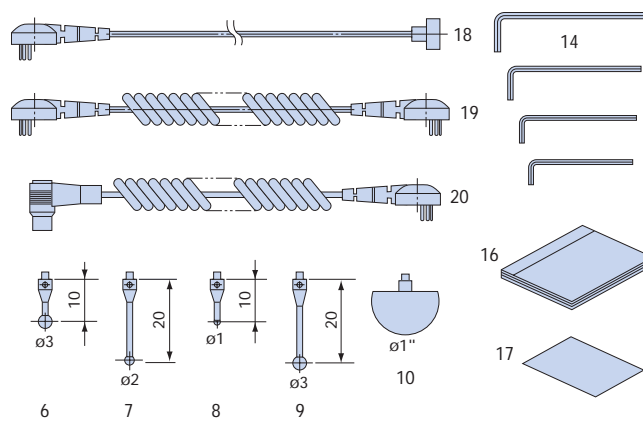
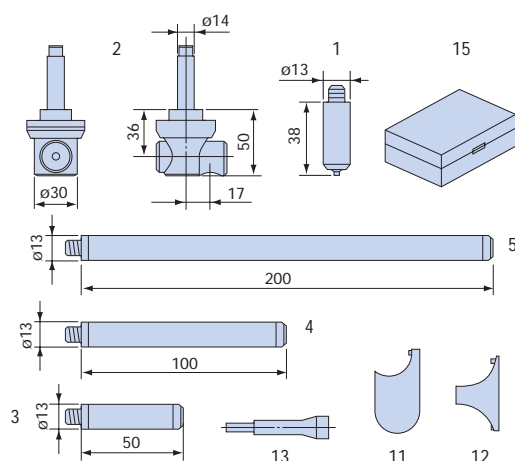
TP2-5W	Measuring direction	$\pm X, \pm Y, +Z$	
	Repeatability ( $2\sigma$ )	0.35 $\mu$ m or less	
	Directionality (XY: 2D)	$\pm 0.8\mu$ m (with 10mm stylus), $\pm 2.5\mu$ m (with the 50mm stylus)	
	Directionality (XYZ: 3D)	$\pm 1\mu$ m (with 10mm stylus), $\pm 4\mu$ m (with the 50mm stylus)	
	Required force to generate trigger signal	XY	0.07 to 0.15N (Variable. Standard: 0.07N)
		Z	0.7N (when the X and Y axis are set to standard)
	Amount of over-travel	XY	XY $\pm 14^\circ$ , Z+4mm (when the required force to generate trigger signal is 0.07N)
		Z	$\pm 4$ mm (when the required force to generate trigger signal is 0.07N), +3mm (at 0.15N)
	Required force to achieve over-travel	XY	0.2 to 0.4N
		Z	4N (when the required force to generate trigger signal is 0.07N)
	Stylus mounting method	M2 screw	
	Mass of single unit	22g	
	Durability	1,000,000 times	
	Probe head	Essential: PH10M/PH10MQ/MIH/PH1	
	Applicable models	Manual/CNC coordinate measuring machines	

## Dimensions



## Set configuration

No.	Description	Part No.	Qty	Mass (kg)	Remark
1	TP2-5W	538414	1	0.022	
2	PH1 (ø14)	932877A	1	0.125	
3	Carbon fiber extension bar	06ABM152	1	0.024	L=50mm
4		06ABM153	1	0.057	L=100mm
5		06ABM154	1	0.086	L=200mm
6	Stylus	—	1	0.0004	ø3X10mm standard stylus
7		—	1	0.0004	ø2x20mm
8		—	1	0.0003	ø1x10mm
9		—	1	0.0005	ø3x20mm
10		135399	1	0.0044	Carbon fiber ball
11	Single-ended wrench	161534	1	0.005	For attaching/detaching the probe
12	Double-ended wrench	161535	1	0.005	For attaching/detaching the probe
13	MS2-stylus tool	153140	1	0.002	For attaching/detaching the stylus
14	Allen keys (4-piece set)	908961	1 for each	0.006	
15	Storage box	06AAN446	1	1.3	
16	User's Manual	154613	1	0.1	
17	Certificate		1	0.01	
18	Signal cable	932878	* See the table below.	0.2	5P-5P straight, 5m
19	Signal cable	935793	* See the table below.	0.05	5P-5P curl code
20	Signal cable	908462	* See the table below.	0.05	5P-12P curl code

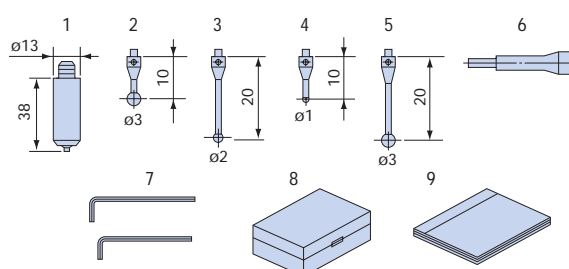


Set order No.	Configuration	Mass (kg)	Remark
06ABM328	No.1 - 18	1.948	With signal cable (5P-5P straight, 5m)
06ABM329	No.1 - 17, 19	1.798	With signal cable (5P-5P curl code)
06ABM330	No.1 - 17, 20	1.798	With signal cable (5P-12P curl code)
06ABM155	No.1 - 17	1.748	Signal cable: None

Unit : mm

## TP2 kit [Order No. 916148]

No.	Description	Part No.	Qty
1	Touch trigger probe TP2-5W	538414	1
2	Stylus ø3X10mm	—	1
3	Stylus ø2X20mm	—	1
4	Stylus ø1X10mm	—	1
5	Stylus ø3X20mm	—	1
6	Stylus tool S7	153140	2
7	Allen keys (2 sizes)	916149	1 for each
8	Storage box	916150	1
9	User's Manual	154613	1



Unit : mm



# MH20i

## Touch Trigger Probe with Manual Probe Head



### • Touch trigger probe with manual probe head

This series of touch trigger probes has a manually operable probe head for coordinate measuring machines. The probe module part has an outside diameter as small as  $\phi 13.2$  mm, which greatly aids in probing complex portions of a workpiece. Other probe modules employing an extension either 50 mm long or 70 mm long are also provided.

### • Capable of positioning its orientation

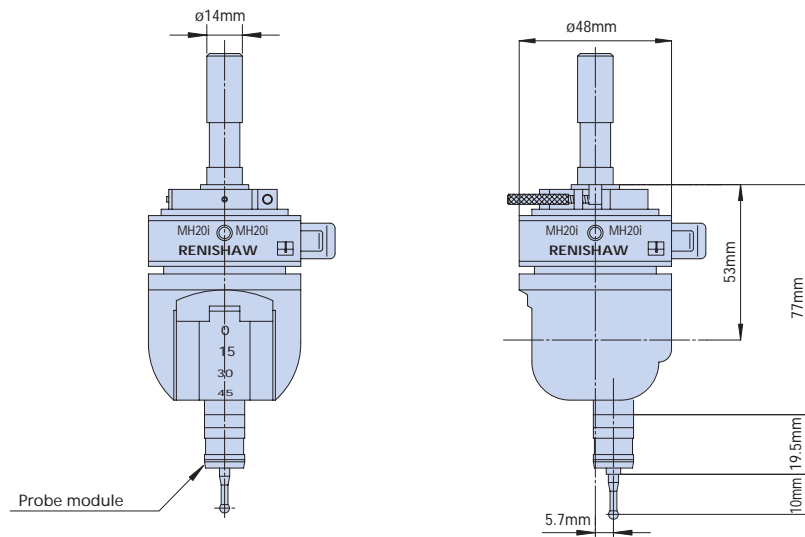
The probe head part of the MH20i has a structure that not only permits its position (probe orientation) to be manually changed but also provides a maximum of 168 orientations (at a positioning repeatability  $\sigma \leq 1.5 \mu\text{m}$ ). Even for measurement of a complex three-dimensional form that requires repeated changes in the probe orientation, preliminary registration of required positions can eliminate re-calibration after each positional change, thereby broadly improving the measurement efficiency.



## MH20i Specifications

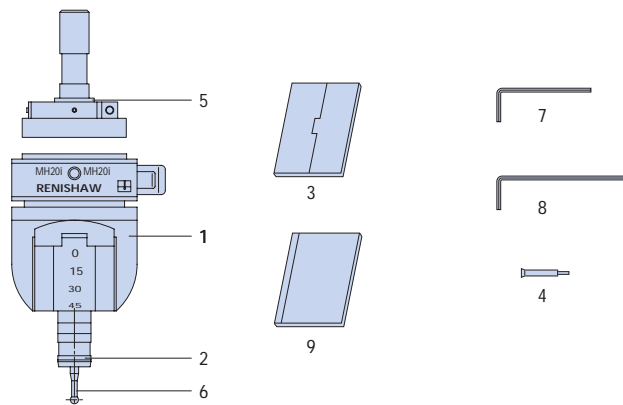
MH20i	Measuring direction	$\pm X, \pm Y, +Z$
	Position change	Manually for A axis (vertical direction): 0 to 90° (at 15° increments), and for B axis (horizontal direction): $\pm 180^\circ$ (at 15° increments)
	Repeated positioning accuracy	$\sigma \leq 1.5 \mu\text{m}$
	Repeatability (2 $\sigma$ )	0.35 $\mu\text{m}$ or less
	Directionality (XY: 2D)	$\pm 0.8 \mu\text{m}$ or less (with the STANDARD FORCE 10mm stylus), $\pm 2.5 \mu\text{m}$ or less (with the 50mm stylus)
	Directionality (XYZ: 3D)	$\pm 1 \mu\text{m}$ or less (with the STANDARD FORCE 10mm stylus), $\pm 4 \mu\text{m}$ or less (with the 50mm stylus)
	Required force to generate trigger signal	XY 0.08N (STANDARD FORCE), with the 10mm stylus 0.1N (MEDIUM FORCE), with the 25mm stylus 0.1N (EXTENDED FORCE), with the 50mm stylus
		Z 0.75N (STANDARD FORCE) 1.9N (MEDIUM FORCE) 3.2N (EXTENDED FORCE)
	Amount of over-travel	XY $\pm 14^\circ$
		Z +4.0mm (STANDARD FORCE) +3.7mm (MEDIUM FORCE) +2.4mm (EXTENDED FORCE)
	Required force to achieve over-travel	XY 0.2 - 0.3N (STANDARD FORCE) 0.2 - 0.4N (MEDIUM FORCE) 0.2 to 0.5N (EXTENDED FORCE)
		Z 3.5N (STANDARD FORCE) 7N (MEDIUM FORCE) 10N (EXTENDED FORCE)
	Maximum stylus length	50mm (STANDARD FORCE) 60mm (MEDIUM FORCE) 60mm (EXTENDED FORCE)
	Stylus mounting method	M2 screw
	Mass of a single probe unit	250g
	Durability	1,000,000 times
	Probe head	Not required
	Applicable models	Manual/CNC coordinate measuring machines

## Dimensions



## Set Configuration

	Ref. No.	Description	Part No.	Qty	Mass (kg)	Remark
MH20i single unit Order No. 06ABN436	1	MH20i	06ABN469	1	0.25	
	2	Probe module	06AAV543	1	0.01	STANDARD TYPE
	3	Cleaning tool	06AAL256	1	0.05	For cleaning the stylus module
	4	MS2-stylus tool	153140	1	0.003	For attaching/detaching the stylus
	5	Positioning shank	160589	1	0.15	
MH20i set Order No. 06ABN470	6	Stylus	—	1	0.001	$\varnothing 4 \times 10$ (standard stylus)
	7	Allen key (2mm)	06AAA943	1	0.001	
	8	Allen key (3mm)	06AAA944	1	0.001	
	9	Operation Manual	99MCA265J	1	0.1	



## Optional accessories

### Stylus module

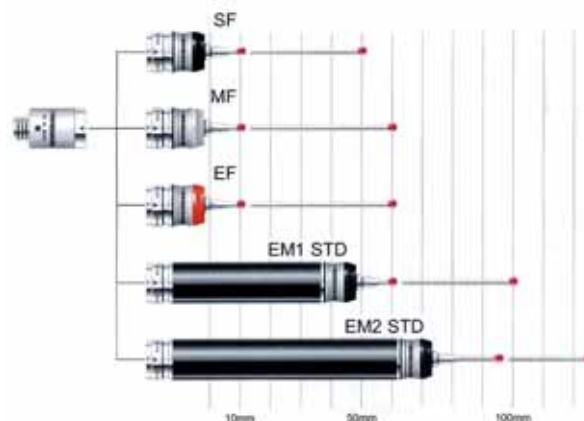
Standard force module

Medium force module

Extended force module

EM1-STD

EM2-STD



# MH20

## Touch Trigger Probe with Manual Probe Head



### • Compact touch trigger probe with manual probe head

This trigger probe has a manually operable probe head for coordinate measuring machines. The probe module part has an outside diameter as small as  $\varnothing 13.2$  mm, which greatly aids in probing complex portions of a workpiece. Other probe modules employing an extension either 50 mm long or 70 mm long are also provided.

### • Easy position change

The operator can change the probe orientation in an optional direction by hand (simply loosen the knob on the right-hand side and change the position, then re-fasten the knob). No Allen key or other tools are required for the positional change.

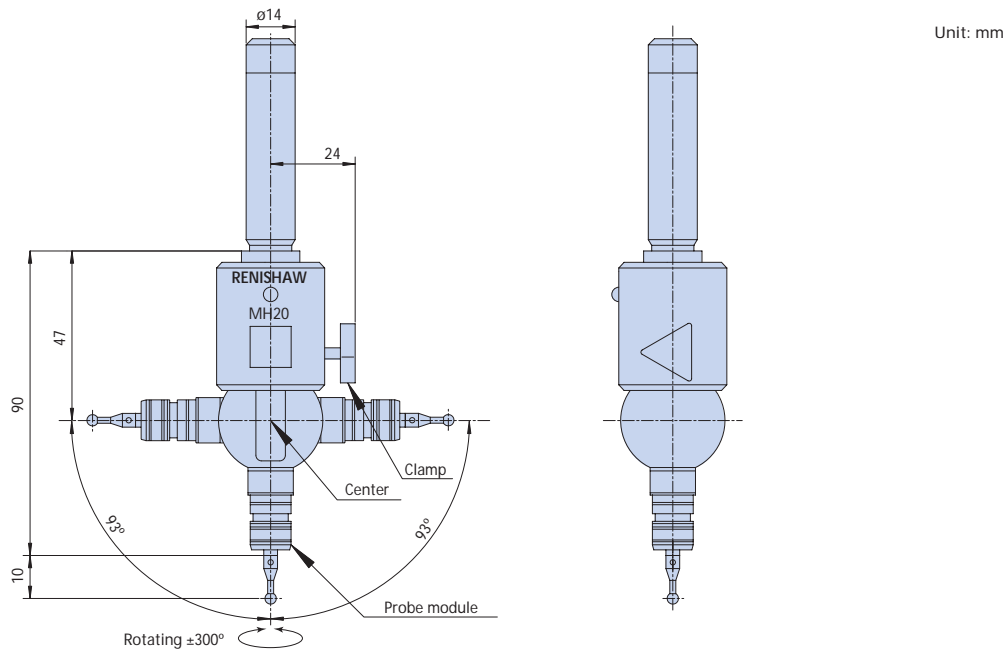


### MH20 Specifications

MH20	Measuring direction	$\pm X, \pm Y, +Z$	
	Position change	Manually for A axis (vertical direction): $\pm 93^\circ$ , and for B axis (horizontal direction): To be fixed to optional direction in range of $\pm 300^\circ$	
	Repeatability ( $2\sigma$ )	0.35 $\mu$ m or less	
	Directionality (XY: 2D)	$\pm 0.8\mu$ m or less (with the STANDARD FORCE 10mm stylus), $\pm 2.5\mu$ m or less (with the 50mm stylus)	
	Directionality (XYZ: 3D)	$\pm 1\mu$ m or less (with the STANDARD FORCE 10mm stylus), $\pm 4\mu$ m or less (with the 50mm stylus)	
	Required force to generate trigger signal	XY	0.08N (STANDARD FORCE), with the 10mm stylus 0.1N (MEDIUM FORCE), with the 25mm stylus 0.1N (EXTENDED FORCE), with the 50mm stylus
		Z	0.75N (STANDARD FORCE) 1.9N (MEDIUM FORCE) 3.2N (EXTENDED FORCE)
	Amount of over-travel	XY	$XY \pm 14^\circ$
		Z	+4.0mm (STANDARD FORCE) +3.7mm (MEDIUM FORCE) +2.4mm (EXTENDED FORCE)
	Required force to achieve over-travel	XY	0.2 to 0.3N (STANDARD FORCE) 0.2 to 0.4N (MEDIUM FORCE) 0.2 to 0.5N (EXTENDED FORCE)
		Z	3.5N (STANDARD FORCE) 7N (MEDIUM FORCE) 10N (EXTENDED FORCE)
	Maximum stylus length	50mm (STANDARD FORCE) 60mm (MEDIUM FORCE) 60mm (EXTENDED FORCE)	
	Stylus mounting method	M2 screw	
	Mass of a single probe unit	22g (Probe body: 13g, Probe module: 9g)	
	Durability	1,000,000 times	
	Probe head	Essential: PH10M/PH10MQ/MIH/PH1	
	Applicable models	Manual/CNC coordinate measuring machines	

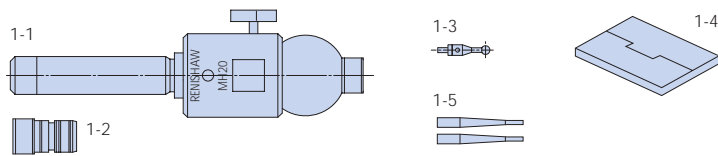


Dimensions



Set Configuration

MH20-set standard configuration  Order No. 06AAZ727	No.	Description		Part No.	Qty	Mass (kg)	Remark	
	1	MH20 kit No. 06AAZ726	1-1	MH20	06AAZ728	1	0.3	Probe head main unit
			1-2	TP20 standard module	06AAV543	1		Measuring force (small)
			1-3	Stylus	160217	1		ø4X10 (standard stylus)
			1-4	Cleaning kit	06AAL256	1		For cleaning the probe module connection
			1-5	MS2-stylus tool	153140	2		Stylus attachment tool
	2	Operation Manual				1	0.1	
3	Certificate				1	0.01		



# PH10M/PH10MQ

## Motorized Probe Head



### • Enhancing the measurement efficiency through automatic position change

This probe head can automatically control the position of a probe attached at the end. (This position change can be performed, during manual operation, by simply specifying the angle through the supplied control box or the dedicated software, or by re-calling the position from memory, if it has stored for automatic position change.)

When a polyhedral object is measured with a probe without the change of position function, the following operation must be conducted: attach a cross-stylus, or multiple styli, on the mount in order to measure the top surface with one facing downward, and measure the side surface with one facing sideways. However, if the workpiece has a complex geometry, probing to the target position may be obstructed because the unused stylus can interfere with the workpiece. Also, the measuring operation in which the stylus needs be attached at the specified angle may become problematic if position change is not possible. Moreover, this automatic position change allows for measurement to be completed in much less time than the automatic stylus change method, reducing the total number of man-hours required to perform measurement with the coordinate measuring machine.

### • High-accuracy positioning with as many as 720 orientations

Since the PH10M/PH10MQ can set its position to a maximum of 720 orientations, even one stylus can function as if 720 styli are attached. In addition, since this probe head has a repeatability to the same position as high as  $2\sigma \leq 0.5\mu\text{m}$ , it does not require re-calibration for measurement in which the same position must be repeatedly called.

### • Possible to mount various kinds of probe

At the end of this head various probes, including but not limited to a touch trigger probe, scanning probe, vision probe, laser probe, and screw depth measuring probe, etc., can be mounted.

Furthermore, these probes can be easily replaced by means of the probe changer (optional), which achieves full-automatic measurement on a wide range of measurement objects.

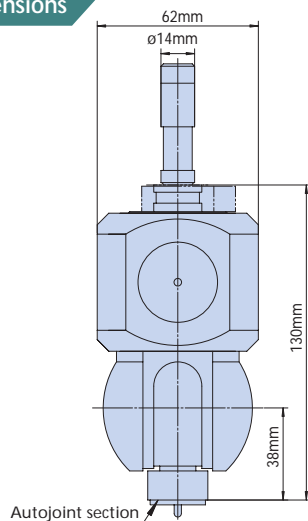
\* Note that some probes is not compatible with this automatic probe change.



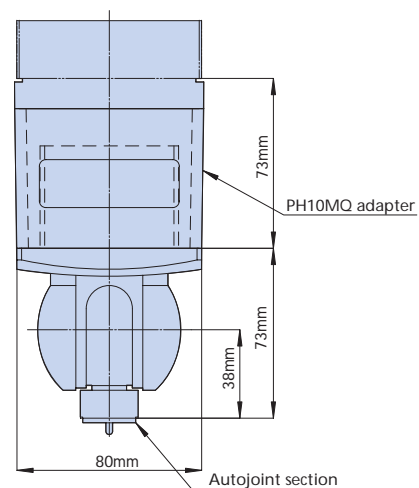
### PH10M/PH10MQ specifications

Position change	Horizontal direction	$\pm 180^\circ$ (at $7.5^\circ$ increments, 48 positions)
	Vertical direction	0 to $105^\circ$ (at $7.5^\circ$ increments, 15 positions)
Repeated positioning accuracy	$2\sigma \leq 0.5\mu\text{m}$	
Mountable probe	MTP2000, TP7M, TP200, TP20, TP2-5W, QVP, SP25, SP600XE, MPP-10 Note that some combinations are prohibited on the same system.	
Extension	PEM1, PEM2, PEM3, PAA1, PAA2, PAA3 More than one extension cannot be joined for use. However, combined use of PAA+PFCF1, PAA1+PFCF2, and PAA1+PFCF3 are permitted. Use on an extension is not permitted for the WIZprobe/LC50/LC100/QVP.	
Applicable models	CNC coordinate measuring machines	





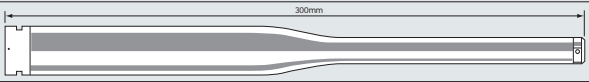
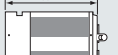
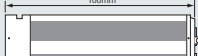

## PH10M dimensions



## PH10MQ dimensions



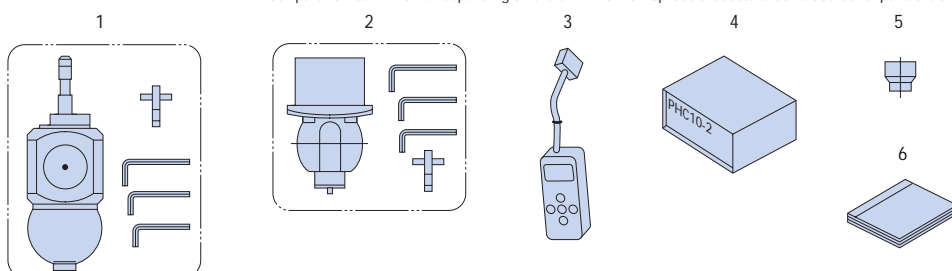
## Extensions

PAA1	
PECF1	
PECF2	
PECF3	
PAA3	
PEM1	
PEM2	
PEM3	

## Set configuration

No.	Description	Part No.	Qty	Remark	Mass (kg)
1	PH10M head set	PH10M head	*		2.0
		Joint key S10	174748		
		Allen key (nominal 1.5)	908756		
		Allen key (nominal 2)	06AAA943		
		Allen key (nominal 2.5)	06AAA944		
2	PH10MQ head set	PH10MQ head	*		2.0
		Joint key S10	174748		
		Allen key (nominal 1.5)	908756		
		Allen key (nominal 2.5)	06AAA944		
3	HCU-1	06AAN820	1	Controller for positioning the probe head	0.8
4	PHC10-2 (RS232C)	06AAR547	1	Interface with the machine-side CPU (for error display)	2.2
5	PAA1	909460	1	Adapter for mounting the TP200 onto the PH10M	0.06
6	User's Manual	99MCA034	1	User's Manual for PH10M head	0.1

\* Each part number will differ depending on the CMM main unit/probe that uses it. Some additional parts are also available.







### • High-accuracy positioning in a maximum of 720 orientations

The MIH has such a capability that permits its position (probe orientation) to be manually changed to maximum 168 kinds of orientations at a positioning repeatability of  $\sigma \leq 1.5 \mu\text{m}$ . For measurement of a complex three-dimensional form that requires repeated changes in the probe orientation, preliminary registration of required positions can eliminate re-calibration after each positional change, therefore improving the measurement efficiency at large. The current position can of course be confirmed on the LCD display of the MIH main unit.

### • Probe extensions up to 300 mm long

The MIH can employ any probe extension that is a maximum of 300 mm long. An example combination of the TP2-5W and a 50 mm stylus can extend the probe's reach to approximately 400 mm.

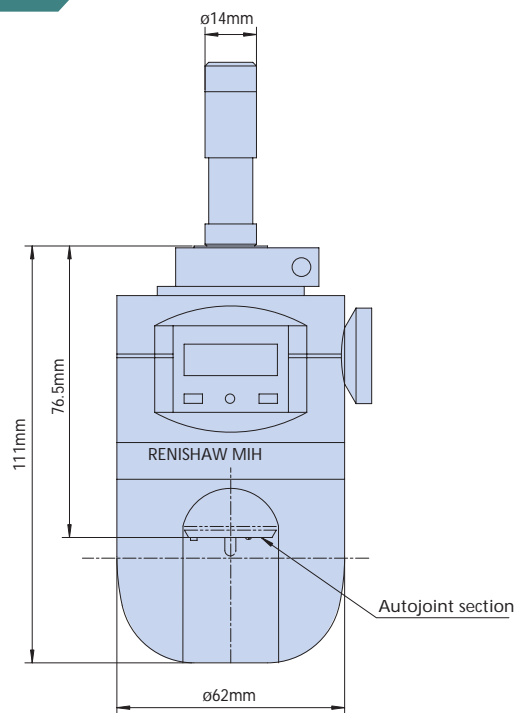


### MIH specifications

MIH	Position change	Horizontal direction	$\pm 180^\circ$ (at 7.5 increments, 48 positions)
		Vertical direction	0 to $105^\circ$ (at 7.5 increments, 15 positions)
	Repeated positioning accuracy	$\sigma \leq 1.5 \mu\text{m}$	
	Mountable probe	TP200, TP20, TP2-5w	
	Extension	PAA1 (PAA1+PECF1, PAA1+PECF2, PAA1+PECF3), PAA2, PAA3	
	Applicable models	Manual coordinate measuring machines	

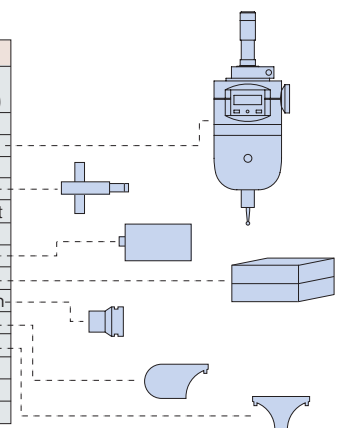


## Dimensions



## Set configuration

No.	Description	Part No.	Mass (kg)	Qty	Remark
1	MIH head kit set Order No. 06AAB126	MIH head	06AAB127	1.5	1
		Joint key S10	174748		1
		Allen key (nominal 2)	06AAA943		1
		Allen key (nominal 2.5)	06AAA944		1
		Battery PX28L	06AAB128		2
		Wooden box for MIH	06AAB129		1
2	PAA1	909460	0.06	1	Adapter for connecting the MIH and probe. Length: 32mm
3	Single-ended wrench	161534	0.01	1	For fastening the TP2 and extension
4	Double-ended wrench	161535	0.005	1	For fastening the TP2 and extension
5	Positioning shank	160589	0.14	1	To be attached on the MIH head (Mitutoyo)
6	Certificate		0.001	1	
7	User's Manual		0.05	1	



## Optional accessories

## Extensions

PECF1	
PECF2	
PECF3	
PEL3	



- **Manual probe head**

Manual probe head for use with the TP200, TP20, and TP2-5W.

- **Easy position change**

The operator can change the probe orientation to an optional direction by hand.

- **Extension**

It is possible to insert a probe extension that is a maximum of 200 mm long.

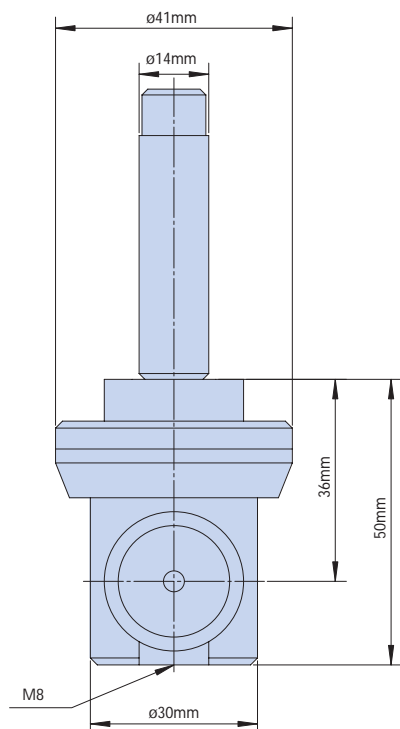


### PH1 specifications

Position change	Horizontal direction	360° (at 15° increments) Possible in a non-stop manner, if the head is rotated along with the $\varnothing 14\text{mm}$ shank unit.
	Vertical direction	$\pm 115^\circ$ (non-step)
Mountable probe	TP200, TP20, TP2-5W	
Extension	PECF1, PECF2, PECF3	
Applicable models	Manual/CNC coordinate measuring machines	

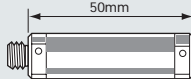
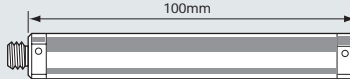



### Dimensions (when mounted on the TP2-5W)



### Optional accessories

#### Extensions

PECF1	
PECF2	
PECF3	



An example connection of PECF3

# ACR-3



Releasing the lock



Engaging the lock

## • Necessity for automatic probe change

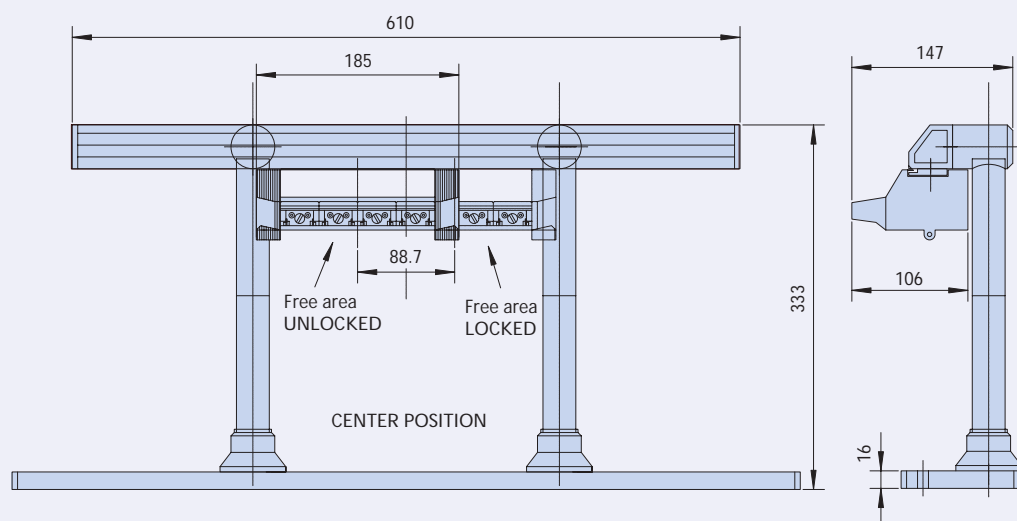
The ACR3 is an automatic probe changer for use with the PH10M/PH10MQ. It is essential for full-automatic measurements where the currently employed probe does not have the capability of automatic stylus change but the stylus diameter or length must be occasionally changed, and where the contact-type probe and non-contact type probe are switched as required.

## • Simplified structure

In comparison to the conventional automatic probe changer, which must have a dedicated motor built in to turn on and off the lock system, is expensive, and has poor durability, the ACR3 has a simplified structure and improved durability because it employs a new mechanism in which the automatic probe change is performed through the CNC coordinate measuring machine's own drive system.

## Dimensions

Unit : mm



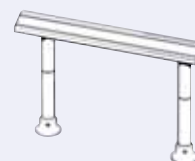
## Set configuration

	No.	Description	Part No.	Qty	Mass (kg)	Remark
4-port system [Order No. 06ABP469]	1	ACR3	06ABN438	1	1.5	4-port rack
	2	MRS KIT2	06ABN607	1	3.5	Rack base
	3	Auxiliary plate	06ABG598	1	8	For fixture
	4	ACR3 attachment	406ABP467	1	0.05	Attachment
	5	User's Manual		1	0.1	
	6	Control ROM		1	0.01	Adaptive to ACR3
8-port system [Order No. 06ABP470]	1	ACR3	06ABN438	2	1.5	4-port rack
	2	MRS KIT2	06ABN607	1	3.5	Rack base
	3	Auxiliary plate	06ABG598	1	8	For fixture
	4	ACR3 attachment	406ABP467	1	0.05	Attachment
	5	User's Manual		1	0.1	
	6	Control ROM		1	0.01	Adaptive to ACR3

1



2



3



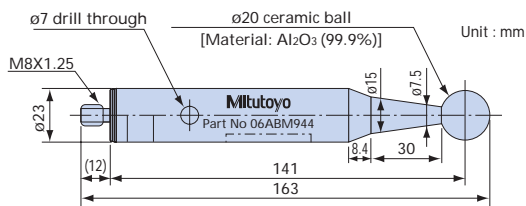
4



## Ceramic Master Ball

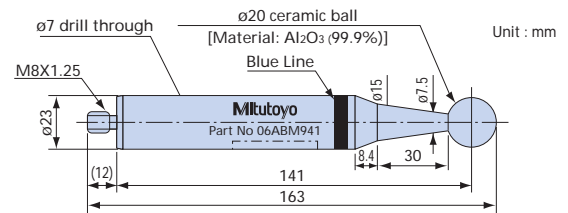
### ● Ceramic master ball (standard type)

- Ball sphericity: 0.13 $\mu$ m or less
- Ball diameter dimensional tolerance:  $S\phi 20 \pm 0.01$ mm



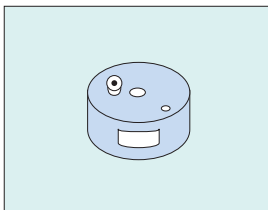
### ● Ceramic master ball (high-accuracy type)

- Ball sphericity: 0.08 $\mu$ m or less
- Ball diameter dimensional tolerance:  $S\phi 20^{+0}_{-0.02}$  mm

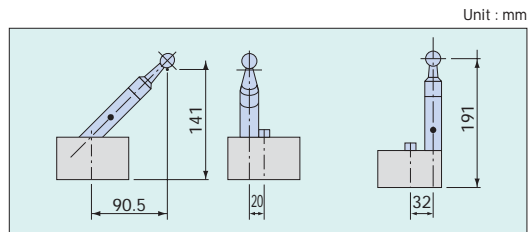


### ● Base

Base for a ceramic master ball



Base appearance



Ceramic ball attachment figure

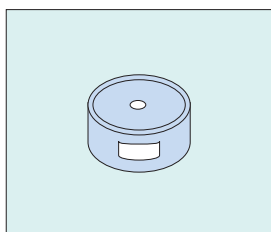
### ● Set break-downs

Set order No.	Set name	Ceramic master ball type	Inspection Certificate	Base	Calibration Certificate	Traceability System Diagram
06ABQ041A	A set	Standard	○	○	—	—
06ABQ041B	A3 set	Standard	○	○	○	○
06ABQ040A	B set	Standard	○	—	—	—
06ABQ040B	B3 set	Standard	○	—	○	○
06ABQ044A	C set	High accuracy	○	○	—	—
06ABQ044B	C3 set	High accuracy	○	○	○	○

## Optional accessory for the Ceramic Master Ball

### ● Spacer

Spacer for the base



Spacer appearance

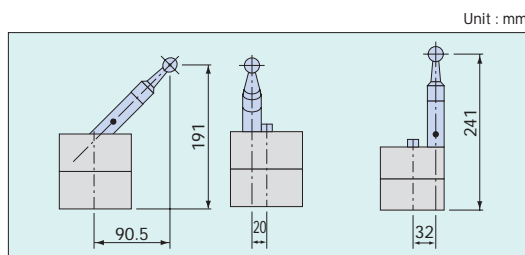


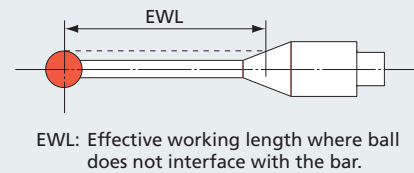
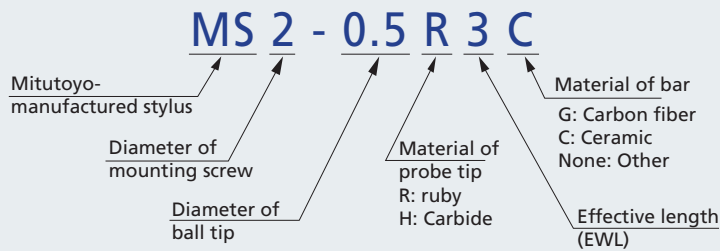
Figure of attaching to Ceramic Master Ball + Base



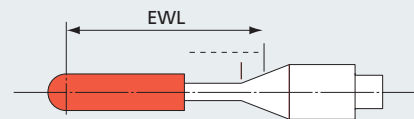
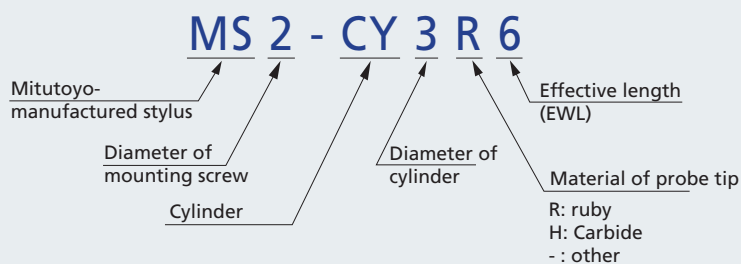
# Product Identification on Styli for Coordinate Measuring Machines

From each Mitutoyo styli the approximate form can be identified (see below).

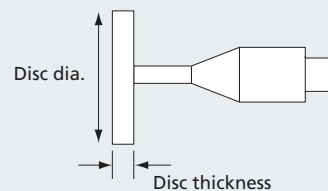
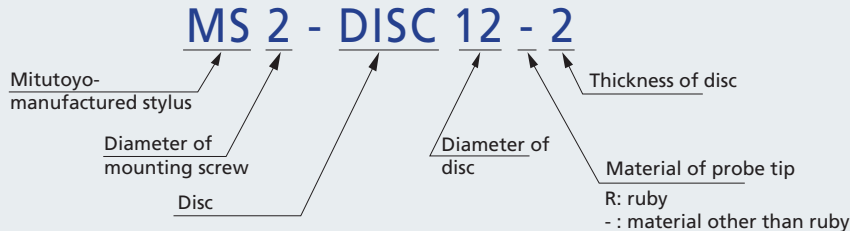
## 1. Case of a ball stylus



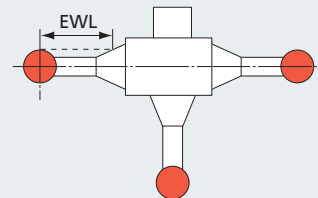
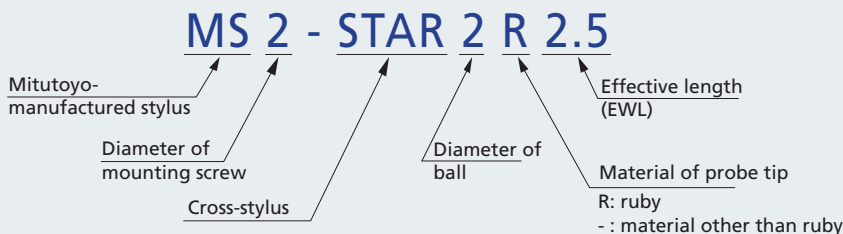
## 2. Case of a cylindrical stylus



## 3. Case of disc stylus



## 4. Case of cross-stylus

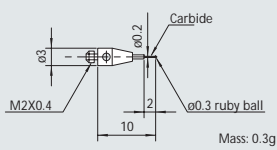


## 5. Case of other materials

1. Point stylus MS2-PO ("H" will be added when the probe tip is carbide.)
2. Extension MS2-EXT10 (the figure at the end represents the length. "G" is appended if the bar is carbon fiber, and "C" is appended if the bar is ceramic.)
3. Stylus knuckle MS2-stylus knuckle (an adapter for turning the stylus to the optional angle.)
4. Stylus center MS-stylus center (an adapter to allow the styli to be mounted so they can be oriented in directions crossing each other.)

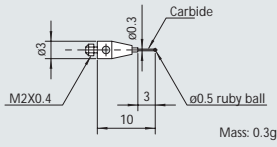
Stylus (Mounting Thread dia: M2)

Order No. : 06ABN751  
Description : MS2-0.3R2

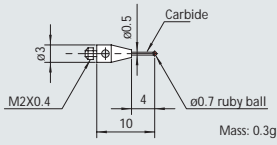


- Use with a measuring force 0.4N or less.
- Cannot be mounted on TP200.

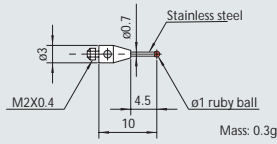
Order No. : 06ABN752  
Description : MS2-0.5R3



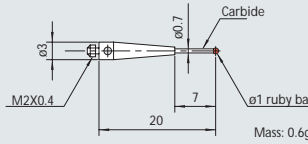
Order No. : 06ABN753  
Description : MS2-0.7R4



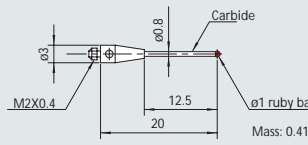
Order No. : 06ABN754  
Description : MS2-1R4.5



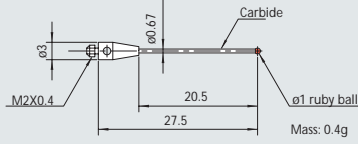
Order No. : 06ABN755  
Description : MS2-1R7



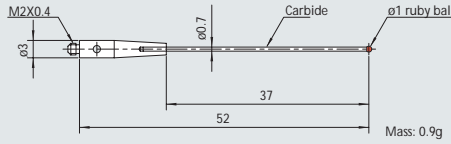
Order No. : 06ABN756  
Description : MS2-1R12.5



Order No. : 06ABN757  
Description : MS2-1R20.5

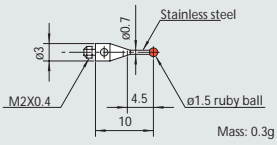


Order No. : 06ABF409  
Description : MS2-1R37

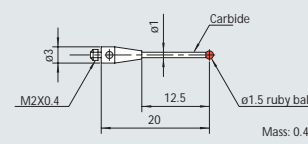


- Cannot be mounted on TP200, otherwise an input error may result.

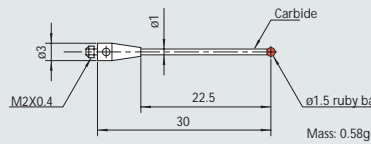
Order No. : 06ABN758  
Description : MS2-1.5R4.5



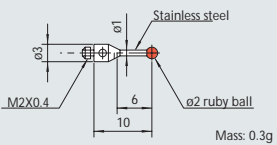
Order No. : 06ABN759  
Description : MS2-1.5R12.5



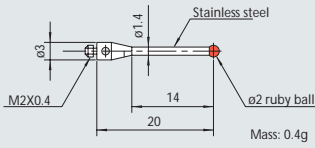
Order No. : 06ABN760  
Description : MS2-1.5R22.5



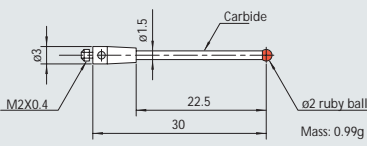
Order No. : 06ABN761  
Description : MS2-2R6



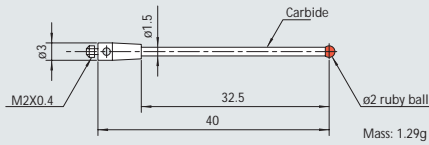
Order No. : 06ABN762  
Description : MS2-2R14



Order No. : 06ABN763  
Description : MS2-2R22.5

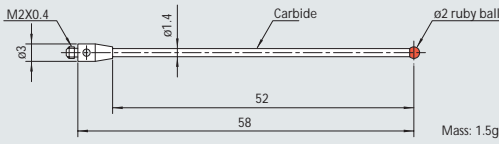


Order No. : 06ABN764  
Description : MS2-2R32.5



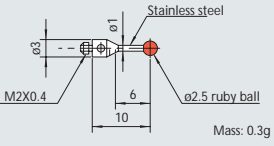
- Cannot be mounted on TP200, otherwise an input error may result.

Order No. : 06ABF406  
Description : MS2-2R52

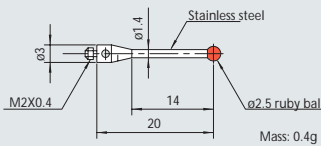


- Cannot be mounted on TP200, otherwise an input error may result.
- For other probes it is recommended to use in the vertical direction, otherwise an input error may result depending on the drive speed or acceleration.

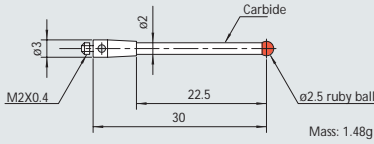
Order No. : 06ABN765  
Description : MS2-2.5R6



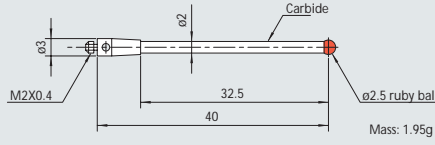
Order No. : 06ABN766  
Description : MS2-2.5R14



Order No. : 06ABN767  
Description : MS2-2.5R22.5

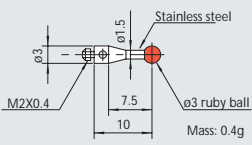


Order No. : 06ABN768  
Description : MS2-2.5R32.5

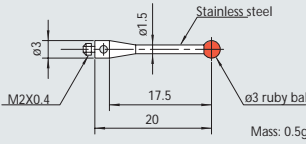


- Cannot be mounted on TP200, otherwise an input error may result.

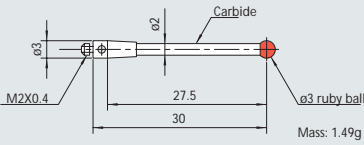
Order No. : 06ABN769  
Description : MS2-3R7.5



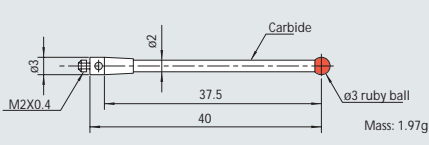
Order No. : 06ABN770  
Description : MS2-3R17.5



Order No. : 06ABN771  
Description : MS2-3R27.5

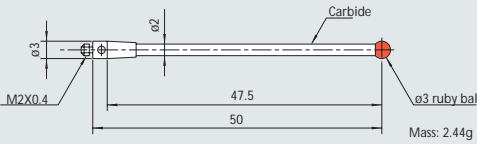


Order No. : 06ABN772  
Description : MS2-3R37.5



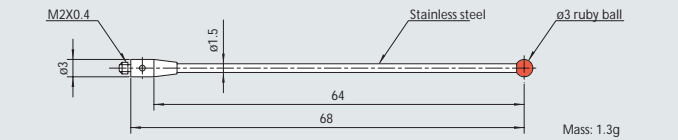
- Cannot be mounted on TP200, otherwise an input error may result.

Order No. : 06ABN773  
Description : MS2-3R47.5



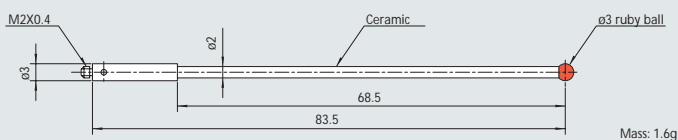
- Cannot be mounted on TP200, otherwise an input error may result.

Order No. : 06ABF402  
Description : MS2-3R64



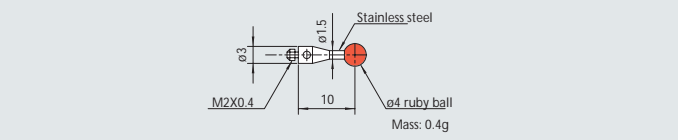
• Cannot be mounted on TP200, otherwise an input error may result.  
• For other probes it is recommended to use in the vertical direction, otherwise an input error may result depending on the drive speed or acceleration.

Order No. : 06ABF405  
Description : MS2-3R68.5C

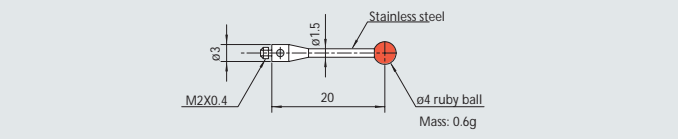


• Cannot be mounted on TP200, otherwise an input error may result.  
• For other probes it is recommended to use in the vertical direction, otherwise an input error may result depending on the drive speed or acceleration.

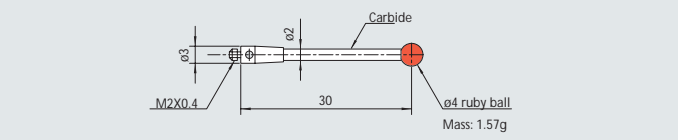
Order No. : 06ABN774  
Description : MS2-4R10



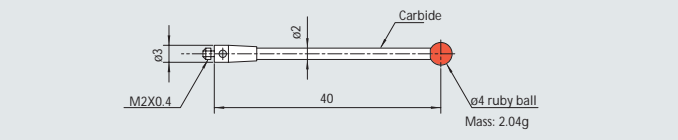
Order No. : 06ABN775  
Description : MS2-4R20



Order No. : 06ABN776  
Description : MS2-4R30

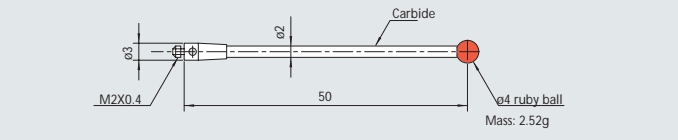


Order No. : 06ABN777  
Description : MS2-4R40



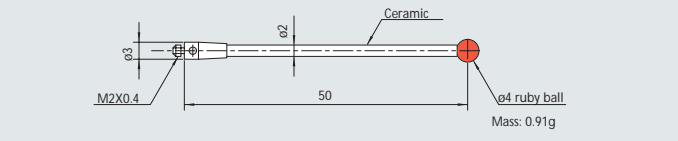
• Cannot be mounted on TP200, otherwise an input error may result.

Order No. : 06ABN778  
Description : MS2-4R50

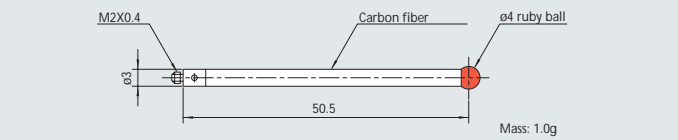


• Cannot be mounted on TP200, otherwise an input error may result.

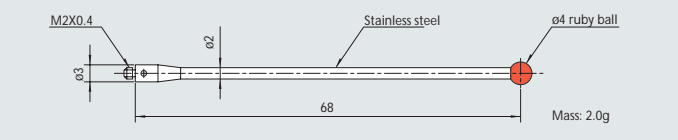
Order No. : 06ABN779  
Description : MS2-4R50C



Order No. : 06ABQ341  
Description : MS2-4R50.5G

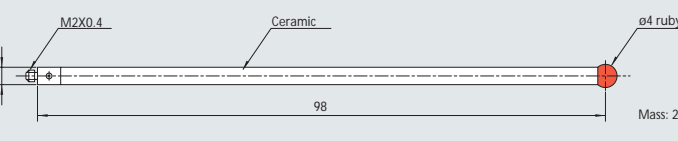


Order No. : 06ABF404  
Description : MS2-4R68



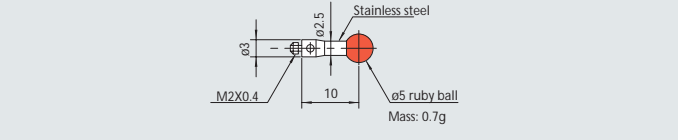
• Cannot be mounted on TP200, otherwise an input error may result.  
• For other probes it is recommended to use in the vertical direction, otherwise an input error may result depending on the drive speed or acceleration.

Order No. : 06ABF410  
Description : MS2-4R98C

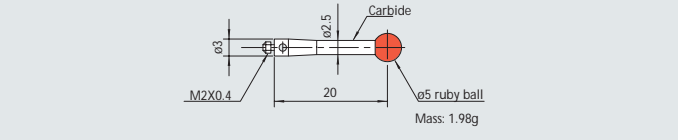


• Cannot be mounted on TP200, otherwise an input error may result.  
• For other probes it is recommended to use in the vertical direction, otherwise an input error may result depending on the drive speed or acceleration.

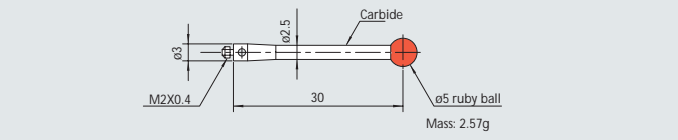
Order No. : 06ABN780  
Description : MS2-5R10



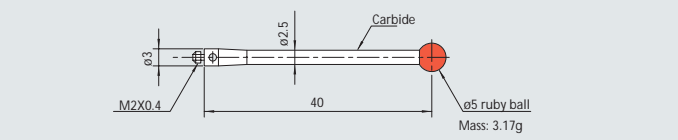
Order No. : 06ABN781  
Description : MS2-5R20



Order No. : 06ABN782  
Description : MS2-5R30

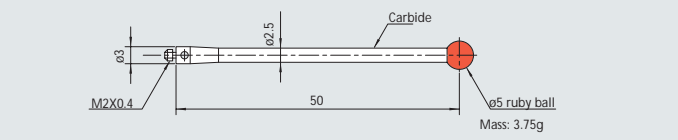


Order No. : 06ABN783  
Description : MS2-5R40



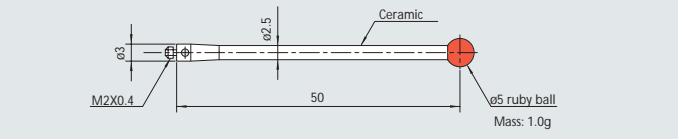
• Cannot be mounted on TP200, otherwise an input error may result.

Order No. : 06ABN784  
Description : MS2-5R50

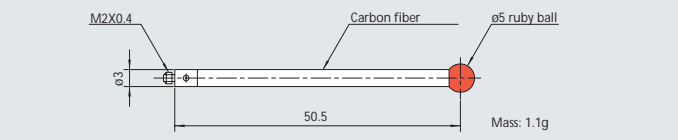


• Cannot be mounted on TP200, otherwise an input error may result.

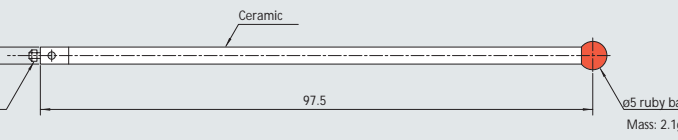
Order No. : 06ABN785  
Description : MS2-5R50C



Order No. : 06ABQ342  
Description : MS2-5R50.5G

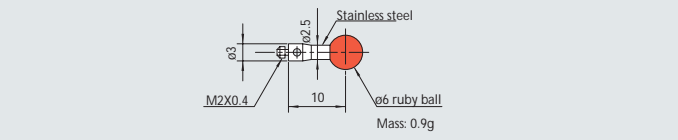


Order No. : 06ABF411  
Description : MS2-5R97.5C

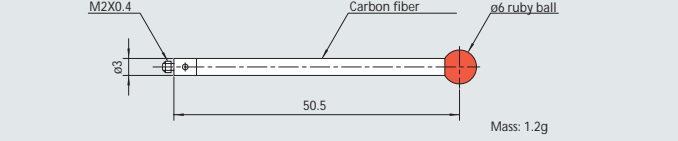


• Cannot be mounted on TP200, otherwise an input error may result.  
• For other probes it is recommended to use in the vertical direction, otherwise an input error may result depending on the drive speed or acceleration.

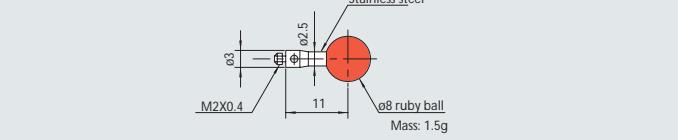
Order No. : 06ABN786  
Description : MS2-6R10



Order No. : 06ABN787  
Description : MS2-6R50.5G



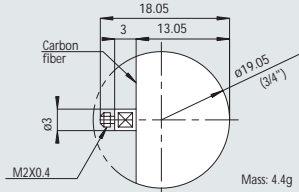
Order No. : 06ABN788  
Description : MS2-8R11



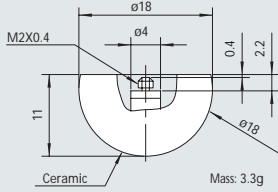


Stylus (Mounting thread dia.: M2)

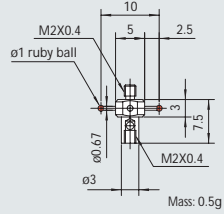
Order No. : 135399  
Description : MS2-19.05C 3/4inch



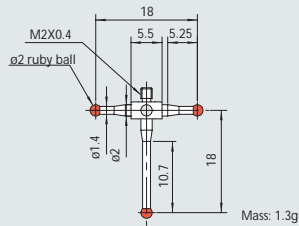
Order No. : 160225  
Description : MS2-18C



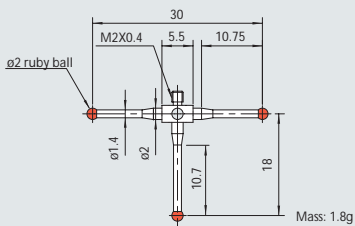
Order No. : 06ABN795  
Description : MS2-STAR1R2.5



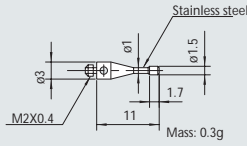
Order No. : 06ABN796  
Description : MS2-STAR2R5.25



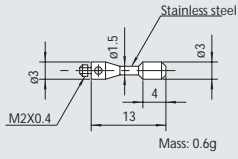
Order No. : 06ABN797  
Description : MS2-STAR2R10.75



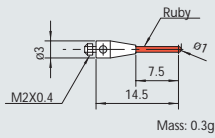
Order No. : 06ABN789  
Description : MS2-CY1.5-1.7



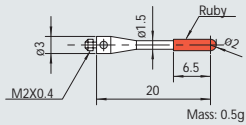
Order No. : 06ABN790  
Description : MS2-CY3-4



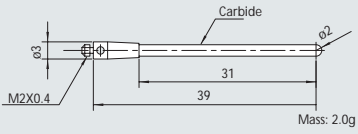
Order No. : 06ABN791  
Description : MS2-CY1R7.5



Order No. : 06ABN792  
Description : MS2-CY2R6.5

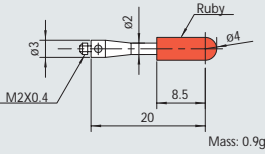


Order No. : 06ABN793  
Description : MS2-CY2H31

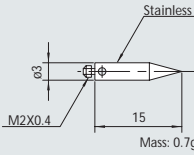


• Cannot be mounted on TP200, otherwise an input error may result.

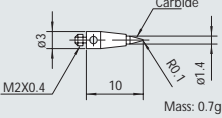
Order No. : 06ABN794  
Description : MS2-CY4R8.5



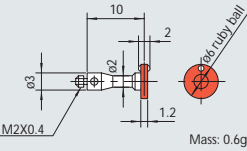
Order No. : 06ABN799  
Description : MS2-PO



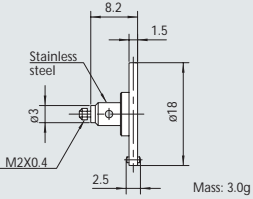
Order No. : 06ABN800  
Description : MS2-PO-H



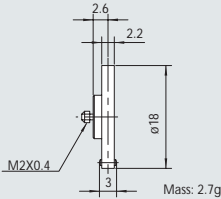
Order No. : 160214  
Description : MS2-DISC6R2



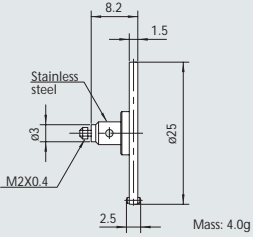
Order No. : 06AAL516  
Description : MS2-DISC18-2.5



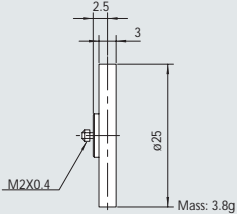
Order No. : 160215  
Description : MS2-DISC18-3



Order No. : 06AAL517  
Description : MS2-DISC25-2.5

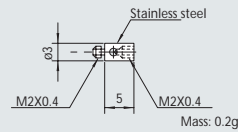


Order No. : 160226  
Description : MS2-DISC25-3

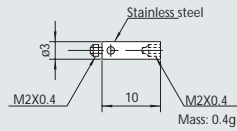


# Stylus (Mounting screw dia.: M2)

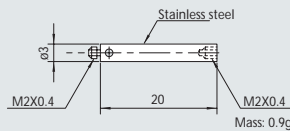
Order No. : 06ABP853  
Description : MS2-EXT5



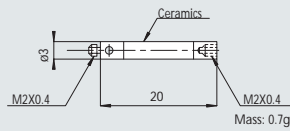
Order No. : 06ABN804  
Description : MS2-EXT10



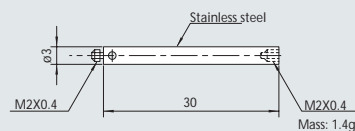
Order No. : 06ABN805  
Description : MS2-EXT20



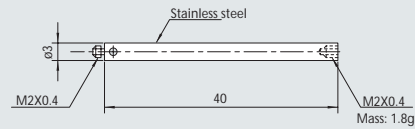
Order No. : 908884  
Description : MS2-EXT20C



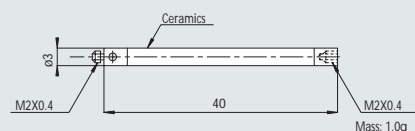
Order No. : 06ABN806  
Description : MS2-EXT30



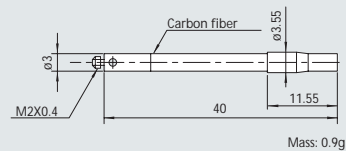
Order No. : 06ABN807  
Description : MS2-EXT40



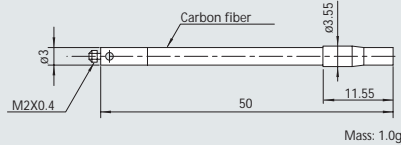
Order No. : 908885  
Description : MS2-EXT40C



Order No. : 06AAL257  
Description : MS2-EXT40G



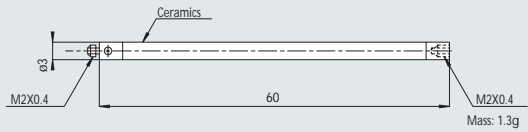
Order No. : 06AAL258  
Description : MS2-EXT50G



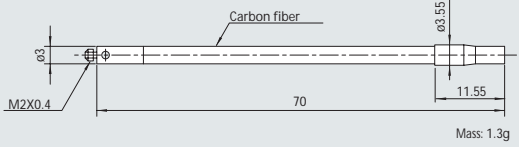
• For TP200

• For TP200

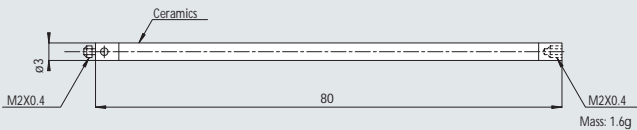
Order No. : 908886  
Description : MS2-EXT60C



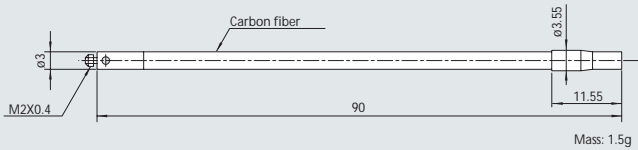
Order No. : 06ABN809  
Description : MS2-EXT70G



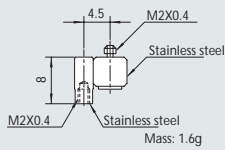
Order No. : 908887  
Description : MS2-EXT80C



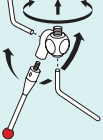
Order No. : 06ABN810  
Description : MS2-EXT90G



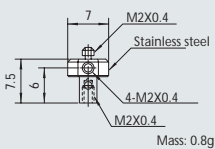
Order No. : 153142  
Description : MS2-stylus knuckle



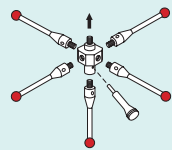
• Adapter for turning the stylus in the optional direction.



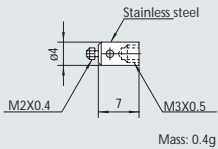
Order No. : 06ABN812  
Description : MS2-stylus center



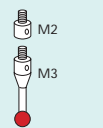
• Adapter for turning the stylus in one of the five directions.



Order No. : 06ABN813  
Description : MS2-M3 female-adaptor

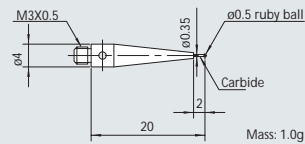


• This is an adapter for a probe, whose stylus attachment section is threaded to M2, to accept M3-screw stylus.



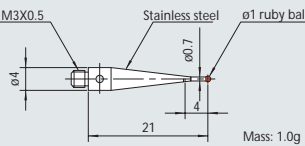
Stylus (Mounting thread dia.: M3)

Order No. : 06ABN816  
Description : MS3-0.5R2

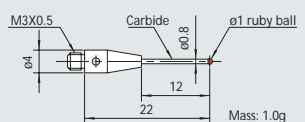


• Use with a measuring force 0.4N or less.

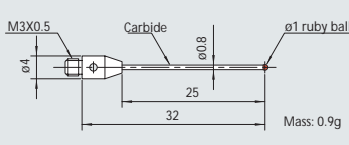
Order No. : 06ABN817  
Description : MS3-1R4



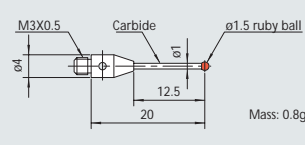
Order No. : 06ABF414  
Description : MS3-1R12



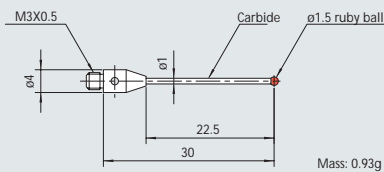
Order No. : 06ABF412  
Description : MS3-1R25



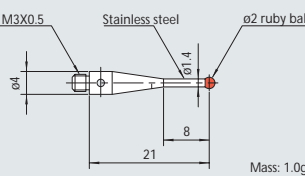
Order No. : 06ABN818  
Description : MS3-1.5R12.5



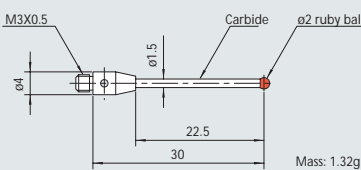
Order No. : 06ABN819  
Description : MS3-1.5R22.5



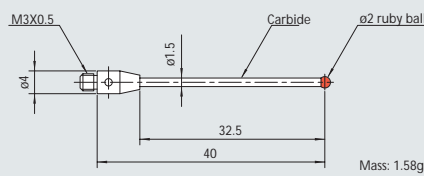
Order No. : 06ABN820  
Description : MS3-2R8



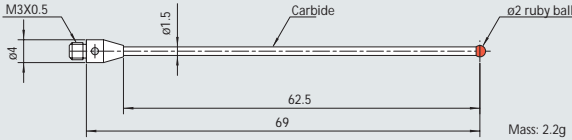
Order No. : 06ABN821  
Description : MS3-2R22.5



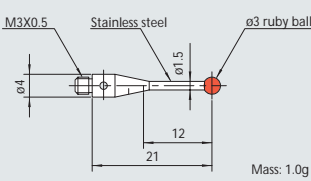
Order No. : 06ABN822  
Description : MS3-2R32.5



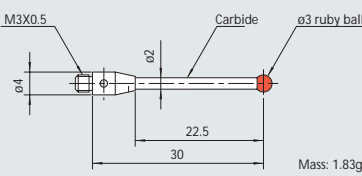
Order No. : 06ABF416  
Description : MS3-2R62.5



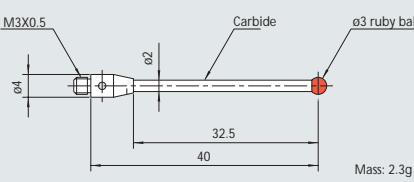
Order No. : 06ABN823  
Description : MS3-3R12



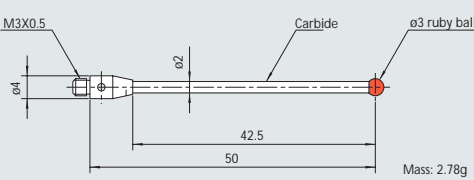
Order No. : 06ABN824  
Description : MS3-3R22.5



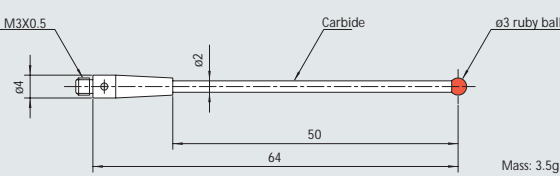
Order No. : 06ABN825  
Description : MS3-3R32.5



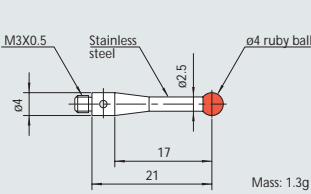
Order No. : 06ABN826  
Description : MS3-3R42.5



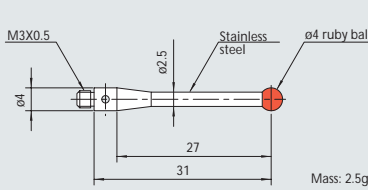
Order No. : 06ABF415  
Description : MS3-3R50



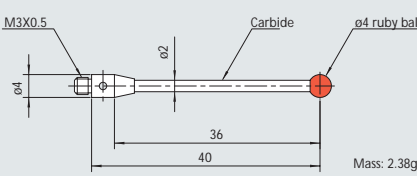
Order No. : 06ABN827  
Description : MS3-4R17



Order No. : 06ABN828  
Description : MS3-4R27

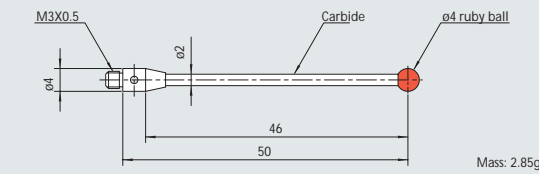


Order No. : 06ABN829  
Description : MS3-4R36

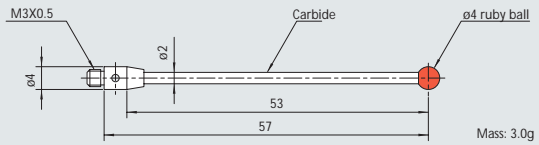




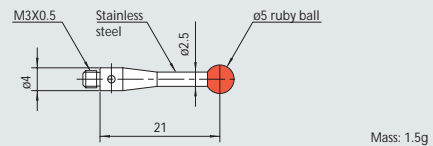
Order No. : 06ABN830  
Description : MS3-4R46



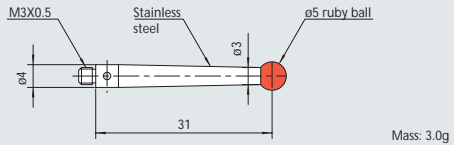
Order No. : 06ABF403  
Description : MS3-4R53



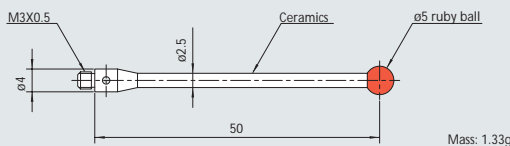
Order No. : 06ABN831  
Description : MS3-5R21



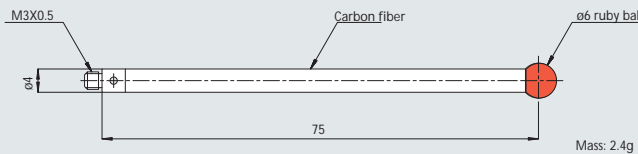
Order No. : 163874  
Description : MS3-5R31



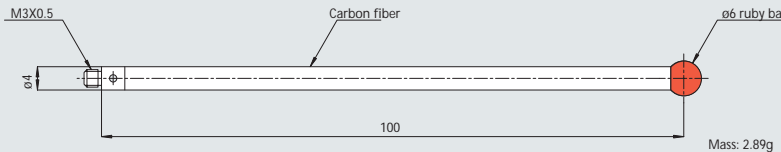
Order No. : 06ABN832  
Description : MS3-5R50C



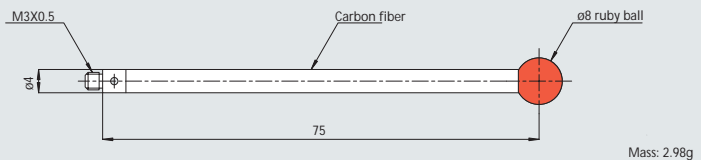
Order No. : 06ABS911  
Description : MS3-6R75G



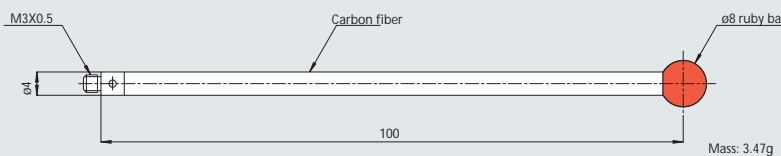
Order No. : 06ABS912  
Description : MS3-6R100G



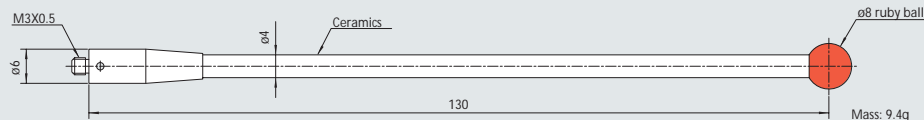
Order No. : 06ABS913  
Description : MS3-8R75G



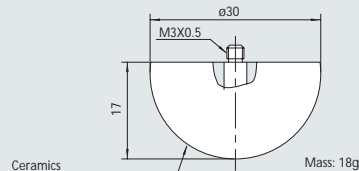
Order No. : 06ABS914  
Description : MS3-8R100G



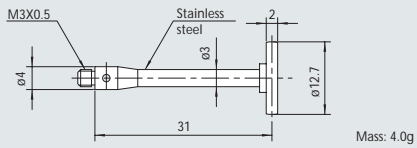
Order No. : 06ABF407 Description : MS3-8R130C



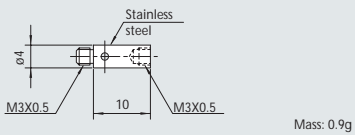
Order No. : 916492  
Description : MS3-30C



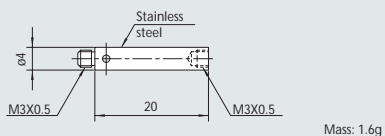
Order No. : 169011  
Description : MS3-DISC12.7-2



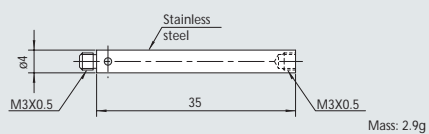
Order No. : 06ABN833  
Description : MS3-EXT10



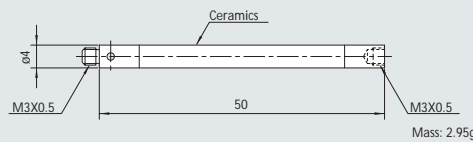
Order No. : 06ABN834  
Description : MS3-EXT20



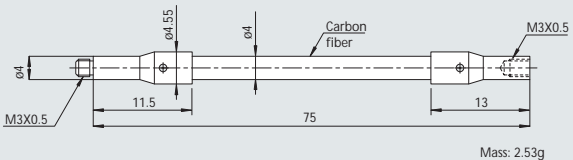
Order No. : 06ABN835  
Description : MS3-EXT35



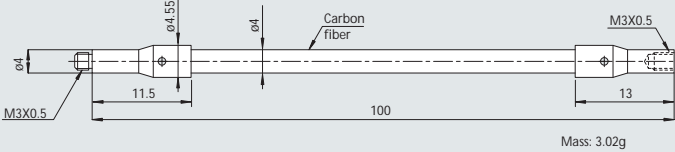
Order No. : 06ABN836  
Description : MS3-EXT50C



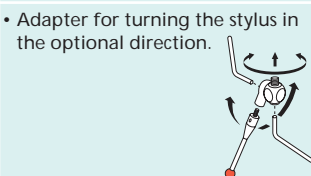
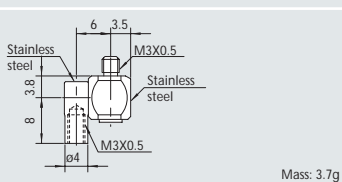
Order No. : 06ABS915  
Description : MS3-EXT75G



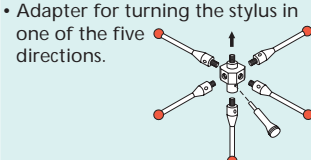
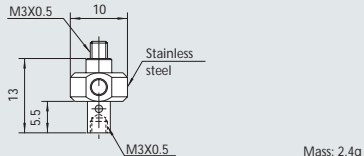
Order No. : 06ABS916  
Description : MS3-EXT100G



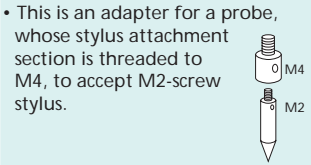
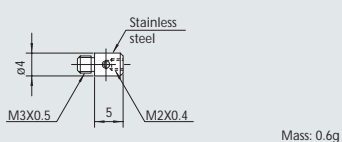
Order No. : 06ABN838  
Description : MS3-stylus knuckle



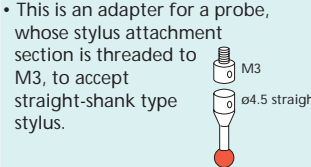
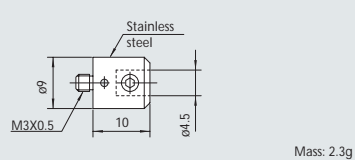
Order No. : 06ABN839  
Description : MS3-stylus center



Order No. : 06ABN837  
Description : MS3-M2 female-adapter

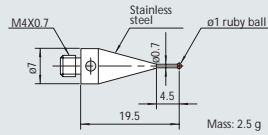


Order No. : 167234  
Description : MS3-ø4.5-adapter

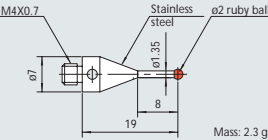


Stylus (Mounting thread dia.: M4)

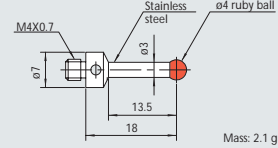
Order No. : 06ABN840  
Description : MS4-1R4.5



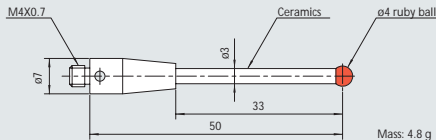
Order No. : 06ABN841  
Description : MS4-2R8



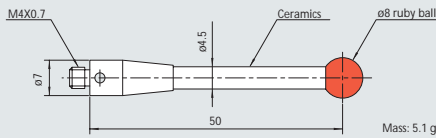
Order No. : 06ABN842  
Description : MS4-4R13.5



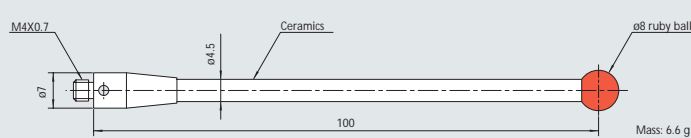
Order No. : 06ABQ149  
Description : MS4-4R33C



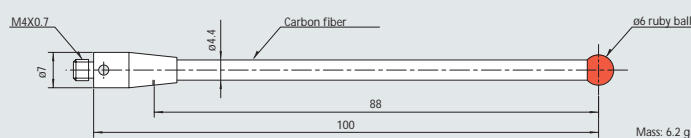
Order No. : 06ABN843  
Description : MS4-8R50C



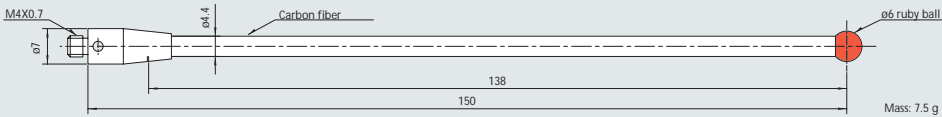
Order No. : 06ABN844  
Description : MS4-8R100C



Order No. : 06ABN845  
Description : MS4-6R88G

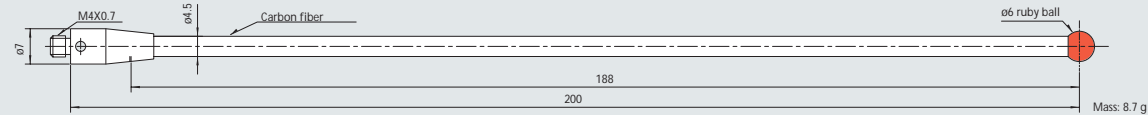


Order No. : 06ABN846 Description: MS4-6R138G



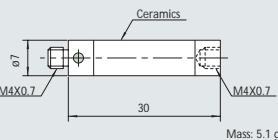
• Cannot be mounted on MTP2000.

Order No. : 06ABN847 Description: MS4-6R188G

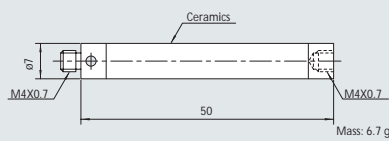


• Cannot be mounted on MTP2000 or TP7M.

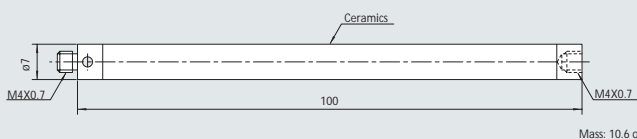
Order No. : 06ABN848  
Description : MS4-EXT30C



Order No. : 06ABN849  
Description : MS4-EXT50C

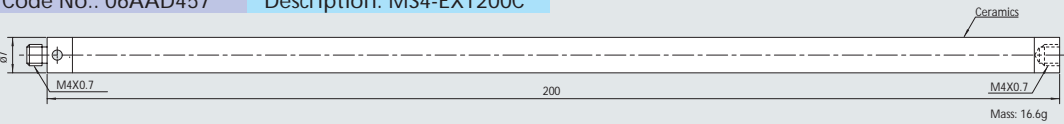


Order No. : 06ABN850  
Description : MS4-EXT100C



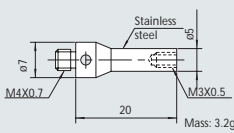
• Cannot be mounted on MTP2000.

Code No.: 06AAD457 Description: MS4-EXT200C

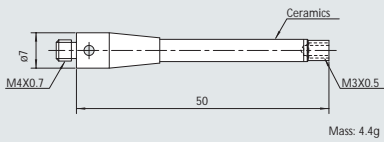


• Dedicated for TP800.

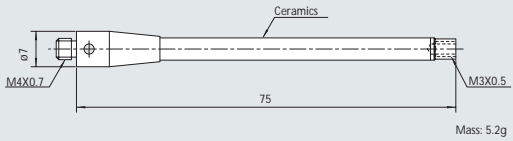
Order No. : 06ABN851  
Description : MS4-M3EXT20



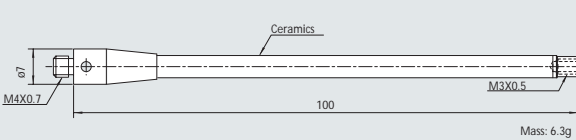
Order No. : 06ABN852  
Description : MS4-M3EXT50C



Order No. : 06ABN853  
Description : MS4-M3EXT75C

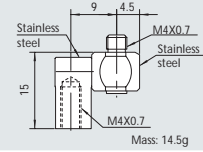


Order No. : 06ABN854  
Description : MS4-M3EXT100C



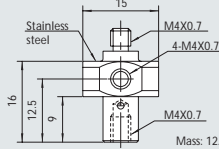
• Cannot be mounted on MTP2000.

Order No. : 06AAD460  
Description : MS4-stylus knuckle



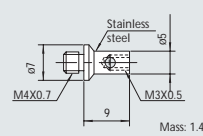
• Adapter for turning the stylus in the optional direction.

Order No. : 06ABN857  
Description : MS4-stylus center



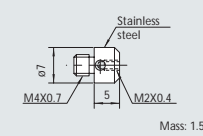
• Adapter for mounting the stylus in the five positions.

Order No. : 06ABN855  
Description : MS4-M3 female-adapter



• This is an adapter for a probe, whose stylus attachment section is threaded to M4, accept M3-screw stylus.

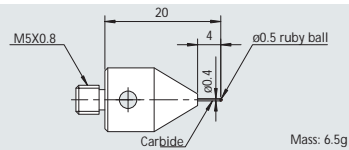
Order No. : 06ABN856  
Description : MS4-M2 female-adapter



• This is an adapter for a probe, whose stylus attachment section is threaded to M4, accept M2-screw stylus.

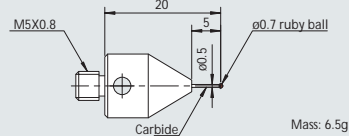
Stylus (Mounting screw dia.: M5)

Order No. : 06ABS917  
Description : MS5-0.5R4



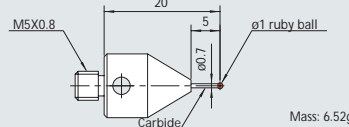
• Dedicated for SP80.

Order No. : 06ABS918  
Description : MS5-0.7R5



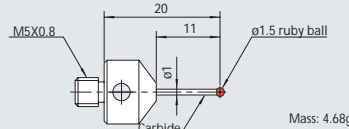
• Dedicated for SP80.

Order No. : 06ABS920  
Description : MS5-1R5



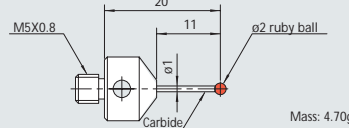
• Dedicated for SP80.

Order No. : 06ABS921  
Description : MS5-1.5R11



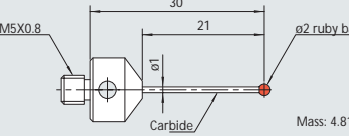
• Dedicated for SP80.

Order No. : 06ABS923  
Description : MS5-2R11



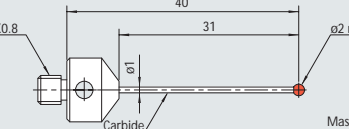
• Dedicated for SP80.

Order No. : 06ABS924  
Description : MS5-2R21



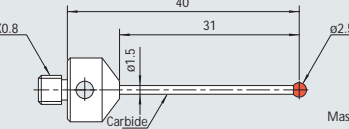
• Dedicated for SP80.

Order No. : 06ABS925  
Description : MS5-2R31



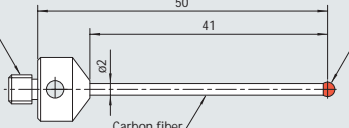
• Dedicated for SP80.

Order No. : 06ABS926  
Description : MS5-2.5R31



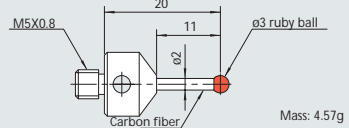
• Dedicated for SP80.

Order No. : 06ABS927  
Description : MS5-2.5R41G



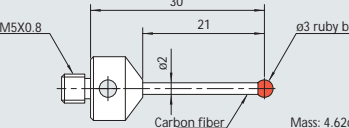
• Dedicated for SP80.

Order No. : 06ABS928  
Description : MS5-3R11G



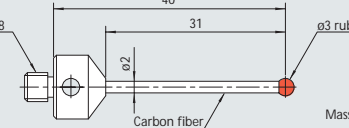
• Dedicated for SP80.

Order No. : 06ABS929  
Description : MS5-3R21G



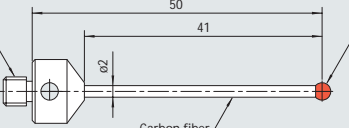
• Dedicated for SP80.

Order No. : 06ABS930  
Description : MS5-3R31G



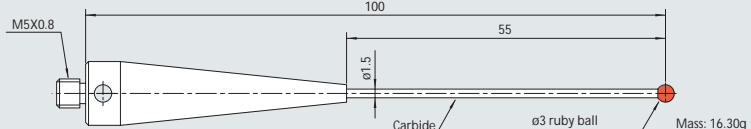
• Dedicated for SP80.

Order No. : 06ABS931  
Description : MS5-3R41G



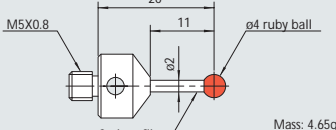
• Dedicated for SP80.

Order No. : 06ABS932  
Description : MS5-3R55



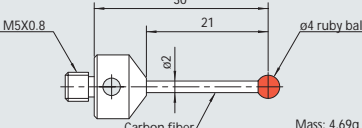
• Dedicated for SP80.

Order No. : 06ABS933  
Description : MS5-4R11G



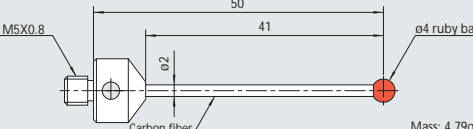
• Dedicated for SP80.

Order No. : 06ABS934  
Description : MS5-4R21G



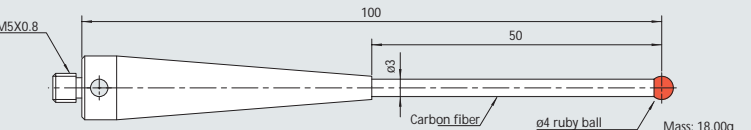
• Dedicated for SP80.

Order No. : 06ABS935  
Description : MS5-4R41G



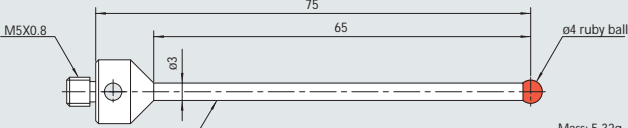
• Dedicated for SP80.

Order No. : 06ABS936  
Description : MS5-4R50G



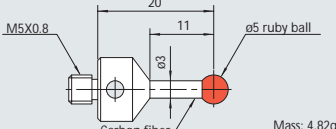
• Dedicated for SP80.

Order No. : 06ABS937  
Description : MS5-4R65G



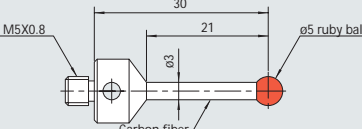
• Dedicated for SP80.

Order No. : 06ABS938  
Description : MS5-5R11G



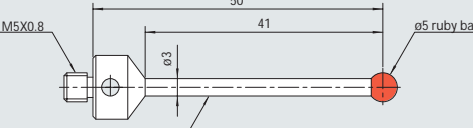
• Dedicated for SP80.

Order No. : 06ABS939  
Description : MS5-5R21G



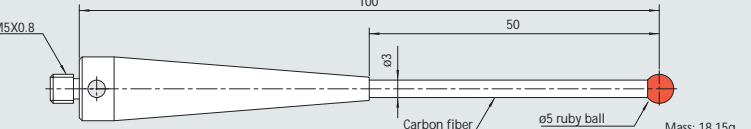
• Dedicated for SP80.

Order No. : 06ABS940  
Description : MS5-5R41G



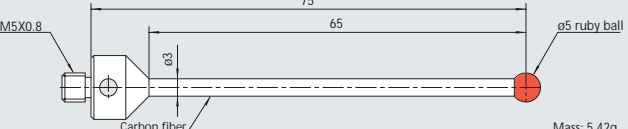
• Dedicated for SP80.

Order No. : 06ABS941  
Description : MS5-5R50G



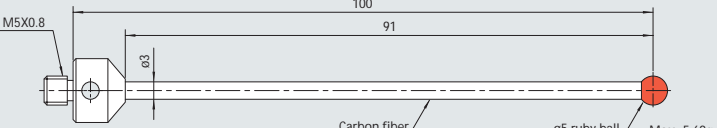
• Dedicated for SP80.

Order No. : 06ABS942  
Description : MS5-5R65G



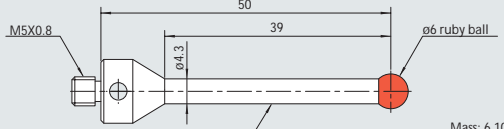
• Dedicated for SP80.

Order No. : 06ABS943  
Description : MS5-5R91G

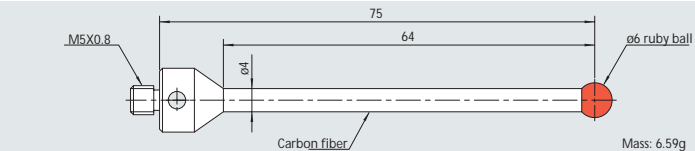
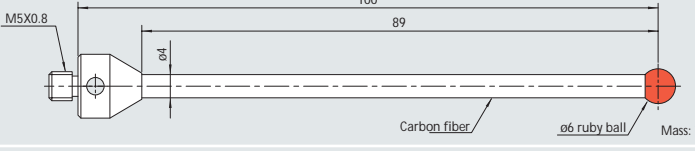
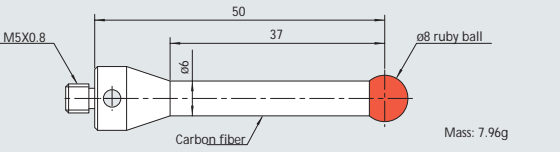
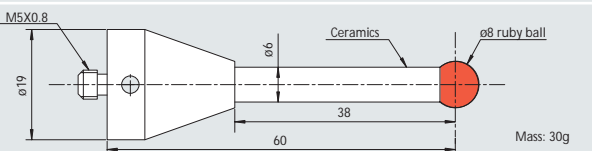
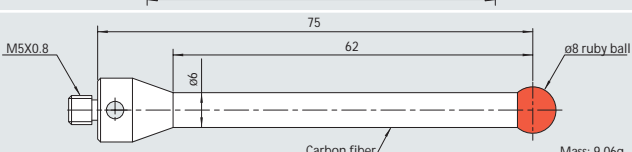
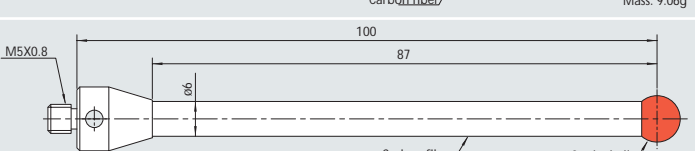
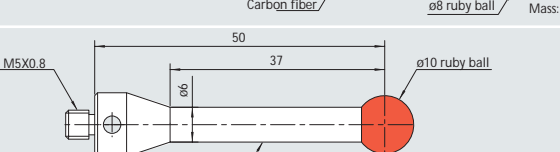
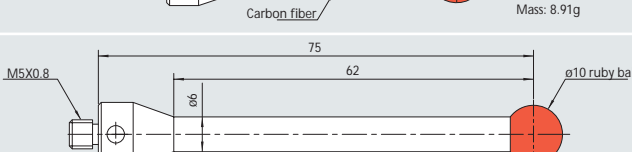
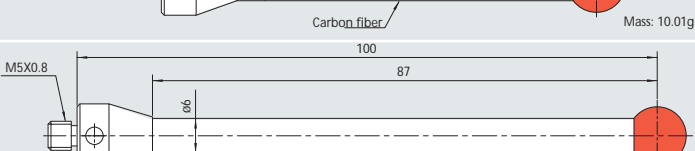
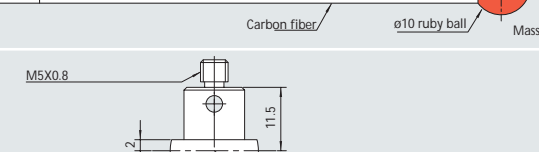
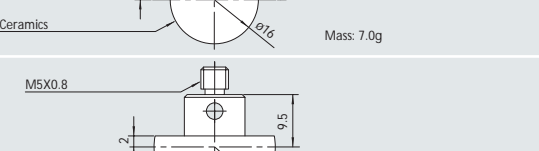
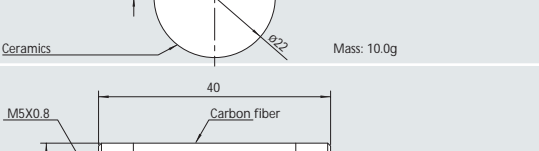
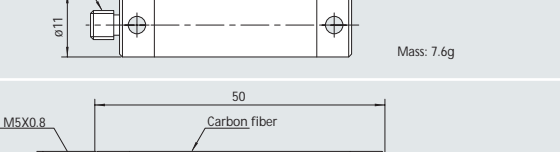


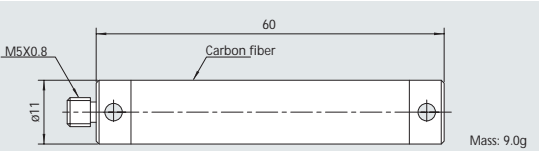
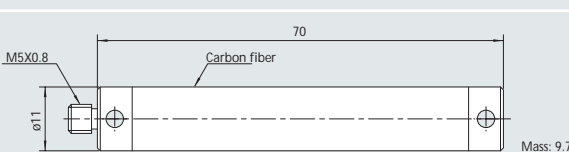
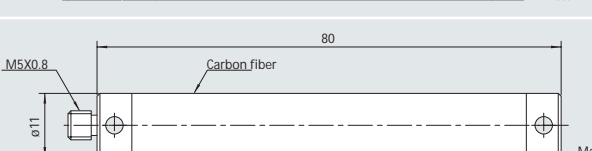
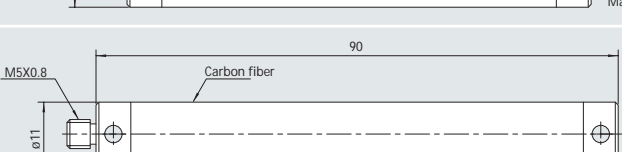
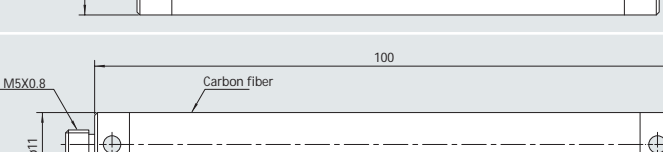
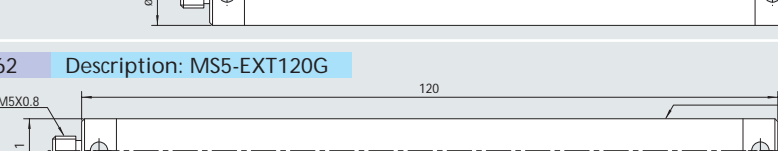
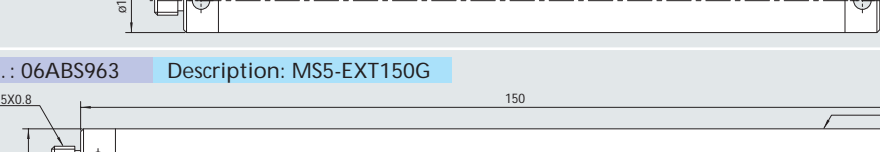
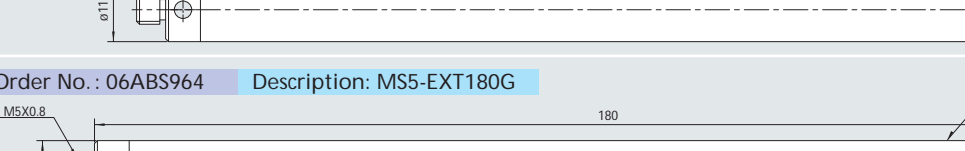
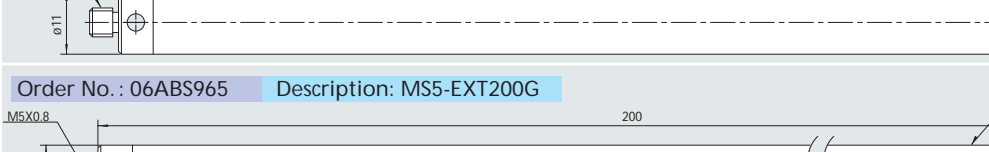
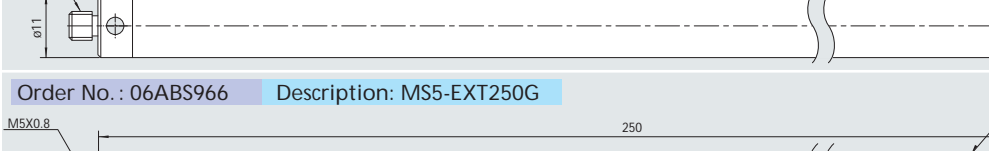
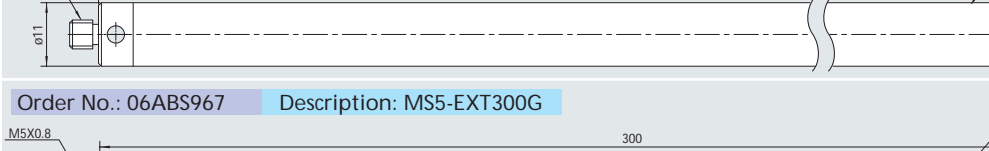
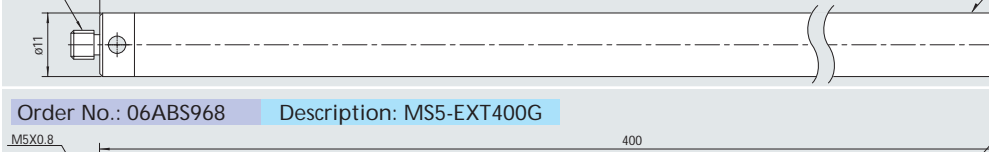
• Dedicated for SP80.

Order No. : 06ABS944  
Description : MS5-6R39G



• Dedicated for SP80.

Order No. : 06ABS945 Description : MS5-6R64G		• Dedicated for SP80.
Order No. : 06ABS946 Description : MS5-6R89G		• Dedicated for SP80.
Order No. : 06ABS947 Description : MS5-8R37G		• Dedicated for SP80.
Order No. : 06ABU673 Description : MS5-8R38C		• Dedicated for SP80.
Order No. : 06ABS948 Description : MS5-8R62G		• Dedicated for SP80.
Order No. : 06ABS949 Description : MS5-8R87G		• Dedicated for SP80.
Order No. : 06ABS950 Description : MS5-10R37G		• Dedicated for SP80.
Order No. : 06ABS951 Description : MS5-10R62G		• Dedicated for SP80.
Order No. : 06ABS952 Description : MS5-10R87G		• Dedicated for SP80.
Order No. : 06ABS953 Description : MS5-16C		• Dedicated for SP80.
Order No. : 06ABS954 Description : MS5-22C		• Dedicated for SP80.
Order No. : 06ABS955 Description : MS5-EXT40G		• Dedicated for SP80.
Order No. : 06ABS956 Description : MS5-EXT50G		• Dedicated for SP80.

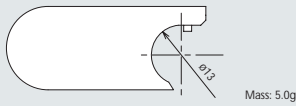
Order No. : 06ABS957 Description : MS5-EXT60G		• Dedicated for SP80.
Order No. : 06ABS958 Description : MS5-EXT70G		• Dedicated for SP80.
Order No. : 06ABS959 Description : MS5-EXT80G		• Dedicated for SP80.
Order No. : 06ABS960 Description : MS5-EXT90G		• Dedicated for SP80.
Order No. : 06ABS961 Description : MS5-EXT100G		• Dedicated for SP80.
Order No. : 06ABS962 Description: MS5-EXT120G		• Dedicated for SP80.
Order No. : 06ABS963 Description: MS5-EXT150G		• Dedicated for SP80.
Order No. : 06ABS964 Description: MS5-EXT180G		• Dedicated for SP80.
Order No. : 06ABS965 Description: MS5-EXT200G		• Dedicated for SP80.
Order No. : 06ABS966 Description: MS5-EXT250G		• Dedicated for SP80.
Order No.: 06ABS967 Description: MS5-EXT300G		• Dedicated for SP80.
Order No.: 06ABS968 Description: MS5-EXT400G		• Dedicated for SP80.



# Attachment Tools

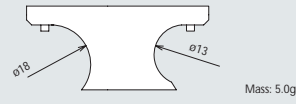
Unit : mm

Order No. : 161534  
Description : Single-ended wrench



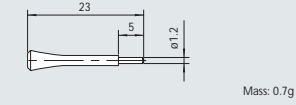
• Attachment tool for probes with the body diameter of 13mm and probe extensions.

Order No. : 161535  
Description : Double-ended wrench



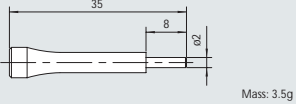
• Attachment tool for probes with the body diameter of 13mm or 18mm and probe extensions.

Order No. : 153140  
Description : M2-stylus tool



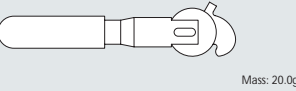
• Stylus attachment/detachment tool for M2 and M3 mounting screws.

Order No. : 181279  
Description : M4-stylus tool



• Stylus attachment/detachment tool for M4 mounting screws.

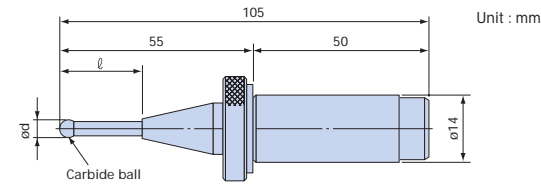
Order No. : 06AAL264  
Description : Attachment tool for carbon-fiber extensions



• Attachment/detachment tool for carbon-fiber extensions whose mounting screw is M2.

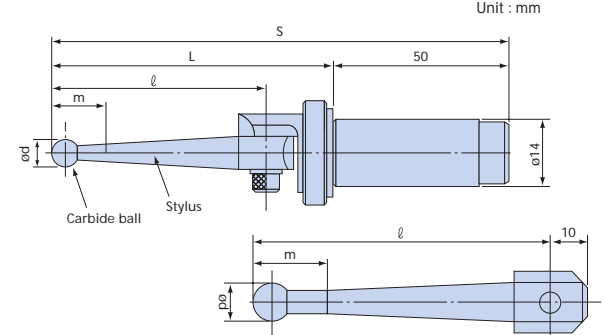
# Probes for Manual Coordinate Measuring Machines

## Ball probe



Order No.	ød	ℓ
932377A	2	6
932378A	3	11.5
932379A	5	22.5
932380A	6	28
532328	10	45

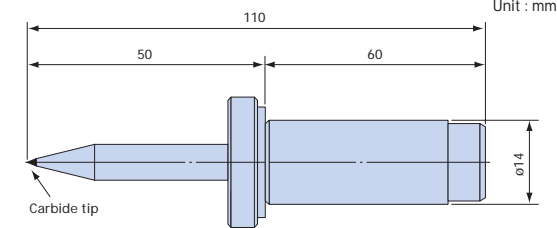
## Universal probe



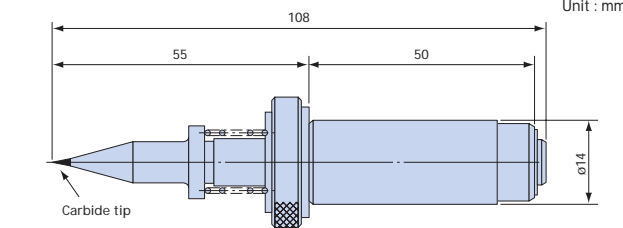
Set Order No.	ød	S	L	ℓ	m
932375A (932363)	2	127	77	53	6
932375B (932364)	3	130.5	80.5	56.5	9.5
932375C (932365)	5	137.5	87.5	63.5	16.5
932375D (932366)	10	154	104	80	20
932375E (932367)	15	211.5	161.5	137.5	27.5

( ) shows the part No. of each single unit of stylus.

## Point probe (Order No. 593467)



## Scriber probe (Order No. 930616)



Coordinate Measuring Machines	
Vision Measuring Systems	
Form Measurement	
Optical Measuring	
Sensor Systems	
Test Equipment and Seismometers	
Digital Scale and DRO Systems	
Small Tool Instruments and Data Management	

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<http://www.mitutoyo.co.jp>

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