MICROCORD
CARB Series

Non-contact/contact horizontal-arm type CNC Coordinate Measuring Machines for the car body industry

Mitutoyo

Horizontal-type CMM for large work piece

A Coordinate Measuring Machine (CMM) is required at many stages in the process of work piece development, such as for CAD data creation, mold building, jig making, prototype evaluation, welding, and inspection on a mass-production line. Furthermore, a high-precision CNC CMM is required for prototype inspection, analysis and mass production in manufacturing large work pieces for the automotive, aerospace, defense, heavy machinery, railway, and ship industries to name only a few.
The automation of 3D coordinate measurement by introducing a CARB series system can allow simplification of conventional inspection/fixing jigs or even the elimination of inspection jigs, and can achieve major cost reductions in addition to improving accuracy in parts and assembly.
The CARB series, with capacity up to 8 meters (26 feet), can cope with even large-sized workpieces such as large aircraft parts and spacecraft components, as well as car bodies. Since this series can operate while automatically interchanging contact and non-contact probes, tens of millions of measurement points can be collected in a short time.
With the aid of an optional software program this series can be used not only for quality control purposes but also for reverse engineering, thus drastically reducing the time required for development and prototyping. The CARB series combines horizontal-type CMM with high accuracy and maximum flexibility.

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CARBstrato 601524
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High Speed, High Stability, and Environmentally Robust

High Speed, High Stability and Environmentally Robust

On car body production lines, managing the assembly accuracy of individual parts comprising a car body is paramount. With statistical quality control requirements for molded and pressed parts in the final finishing process may require inspection of subassembly parts on a 100-percent basis. A CMM to meet these needs must have the durability to withstand around-the-clock operation while still delivering high speed and high accuracy.

CARBstrato is the horizontal arm CMM that satisfies these requirements with its fully-covered main unit, automatic temperature compensation function and dual-arm operation. This CMM can perform high-speed quality evaluation not only on parts with contoured surface profiles, including car bodies and aircraft parts, but also those using many common geometric elements, allowing application to the measurement of large marine parts, and heavy equipment components.

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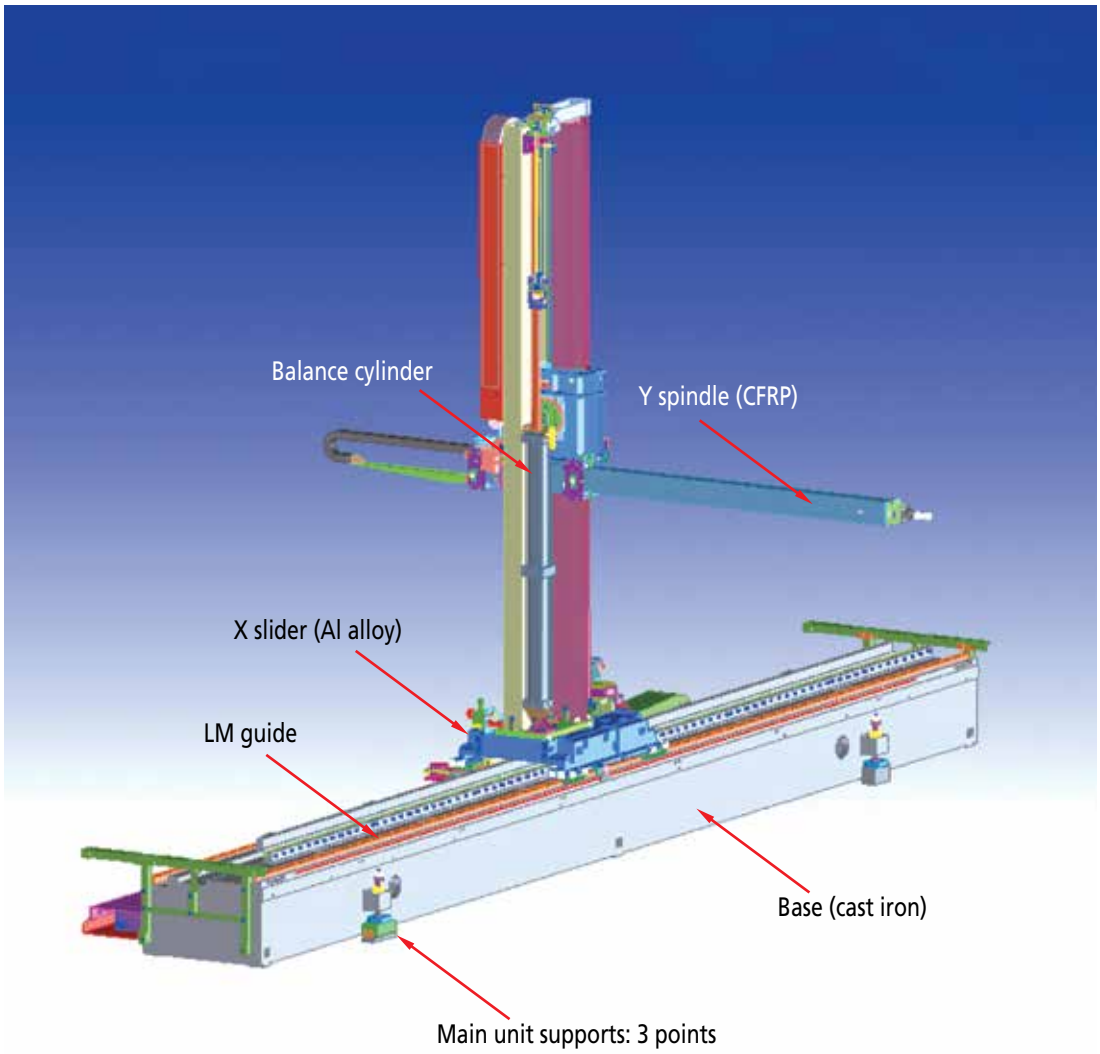
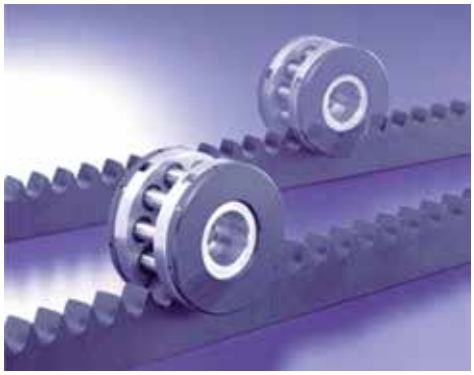
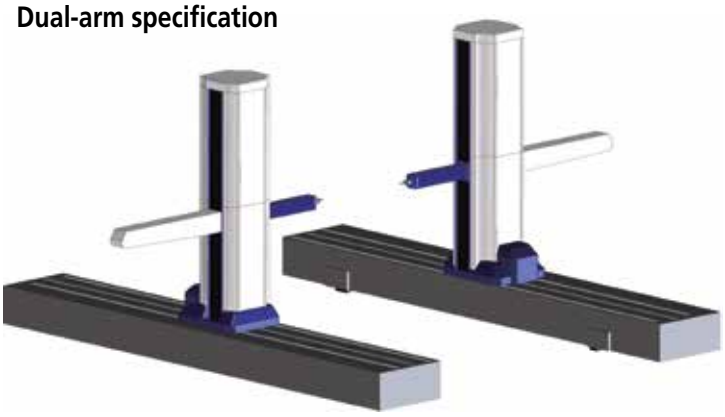


Cast iron is used for the base to ensure high stability for all axes. The Z-axis slider is provided with high acceleration by the integration of an air-operated balancing mechanism, and aluminum alloy guide with a large cross-section in accordance with Mitutoyo's unique design technology. Carbon fiber is used for the Y-axis arm(s) to minimize cross section and to prevent interference while still maintaining high stiffness.
Each axis is provided with a temperature sensor near the scale to provide automatic compensation for the difference in linear thermal expansion coefficient of the different materials involved. This allows the CMM to be operated over a wide temperature range without loss of accuracy.
A backlash free, minimum-vibration mechanism has been adopted for the X-axis drive. Air bearings and a frictiondrive system on the Y- and Z-axes minimizes vibrations during movement. Stable measurement results are achieved wit continuous scanning probes (contact or noncontact type).



Low hysteresis Rack and pinion

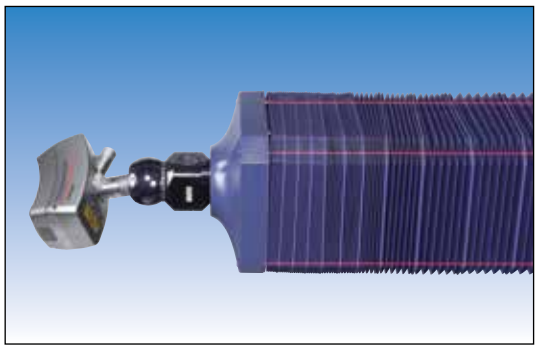
Dual-arm specification



Single-arm specification

In the CARBstrato series, a single-arm system with one main unit and a dual-arm system with two main units installed are available. A four-arm system can also be made as an option. If a single item part is to be measured at high speed, the single-arm machine is optimal. If a body shell or a large part is to be measured at high speed, the dual-arm specification is optimal. In the dual-arm machine, both arms can share one workpiece coordinate system while the software performs an automatic interference check to prevent one arm colliding with the other. A dual-arm machine can be separated so as to operate independently as two single-arm machines if required.

The top of the base that houses the X-axis is completely protected with diamond steel plating for operator safety and accessibility to the parts being measured.
Foreign matter is prevented from reaching the axis guides by shielding all openings with belt-shaped covers. If the system is installed in a pit, so that the top of the base is level with the floor, the operator can freely walk around the measurement space, assuring high operability and safety.



A light-sensitive safety device installed in the Y-axis-arm bellows stops all axial movement immediately when the arm comes into contact with a workpiece, clamp or anything else during measurement. Movement also stops, in all axes, if an excessive twisting load is exerted on the rotary head. Predetermined operations, performed after safety verification, restore the system to an operational state.
This safety device functions in the same manner when using a contact or non-contact probe and, particularly when measuring the inside of a car body or a component fixed with many clamps, greatly increases safety for the operator and machine.

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3-point Support Method

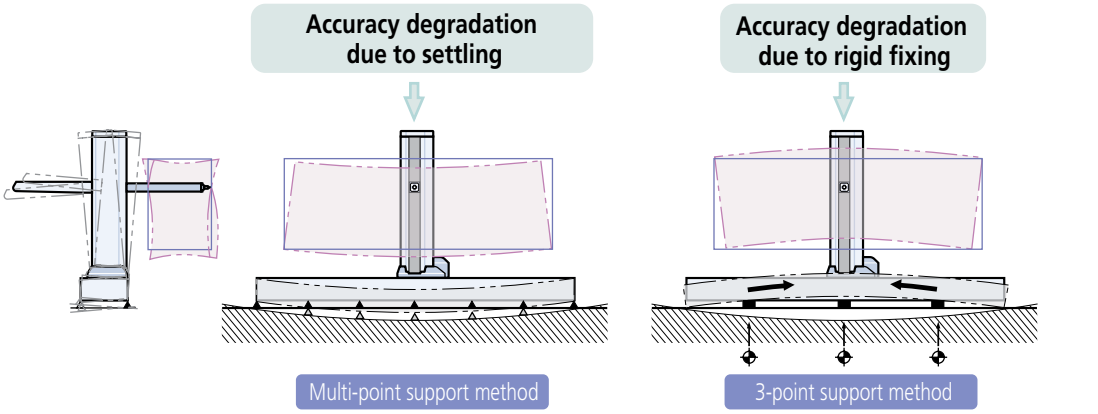
CMM accuracy is degraded by settling of the concrete foundations, so a machine using the multi-point support method needs periodical leveling adjustment to maintain the installed accuracy specification. However, the 3-point support method can maintain measurement-space accuracy irrespective of such unavoidable deformation. This simplest of all support methods requires leveling adjustment only at 2 points and so makes for rapid, easy maintenance.
(The 3-point support method is provided with up to 6m machine.)

Combating Foundation Deformation

• The secular deformation of foundation concrete after construction cannot be avoided. A periodical leveling adjustment of supports is required because of the effect on accuracy due to this deformation.
• The adoption of the 3-point support method maintains long-term accuracy independently of foundation deformation.

Combating Differential Expansion

If the cast-iron base were rigidly fixed to the concrete foundations then any difference in temperature between the two would allow differential thermal expansion, an unavoidable effect, to generate forces which would distort the base and degrade accuracy.
To overcome the consequences of this effect the adopted method is to fix the base to the foundations at one support point only. One of the other support points is then allowed to slide in a straight line away from the fixed point and the remaining point is free to slide in any direction in the horizontal plane. Therefore the base and the foundations can expand and contract independently without any distorting force arising between them.



Low-cost, high performance

The bellows shown in the photo are optional.

Some large work piece manufacturing does not require the CMM to possess the high speed and ruggedness that is needed on a production line. For example, the design, preproduction and subcontract sections all fall into this category. Also, activities such as sampling inspection or reverse engineering do not require a high-speed machine. For these groups and applications the CARBapex is offered as a lower-cost version of CARBstrato to provide the same versatility at a lower operating speed and with less environmental protections, but still with the automatic temperature compensation function and dual-arm operation of CARBstrato.

The operator control (joystick box), software and operating procedures of CARBapex are 100% identical to those of CARBstrato and part programs are also compatible. Owing to the open, horizontal-type design of this cost-effective CMM it is highly suitable for quality improvement measurement applications for products across a wide range of fields including plastic parts, glass parts, reinforcing parts, drive-train parts, clay models, inspection jigs as well as car bodies and pressed parts. Higher environmental protections can be achieved if required the addition of main unit optional bellow covers.

The CARBapex system can be equipped with a light-sensitive safety device but only if the optional bellows are fitted. The safety device operates by detecting interference between the bellows on the Y-axis arm and any obstruction to immediately stop the machine. It is recommended that bellows be fitted when operating in a dust-laden environment. However, note that bellows reduce the stroke of the Y and Z axes.

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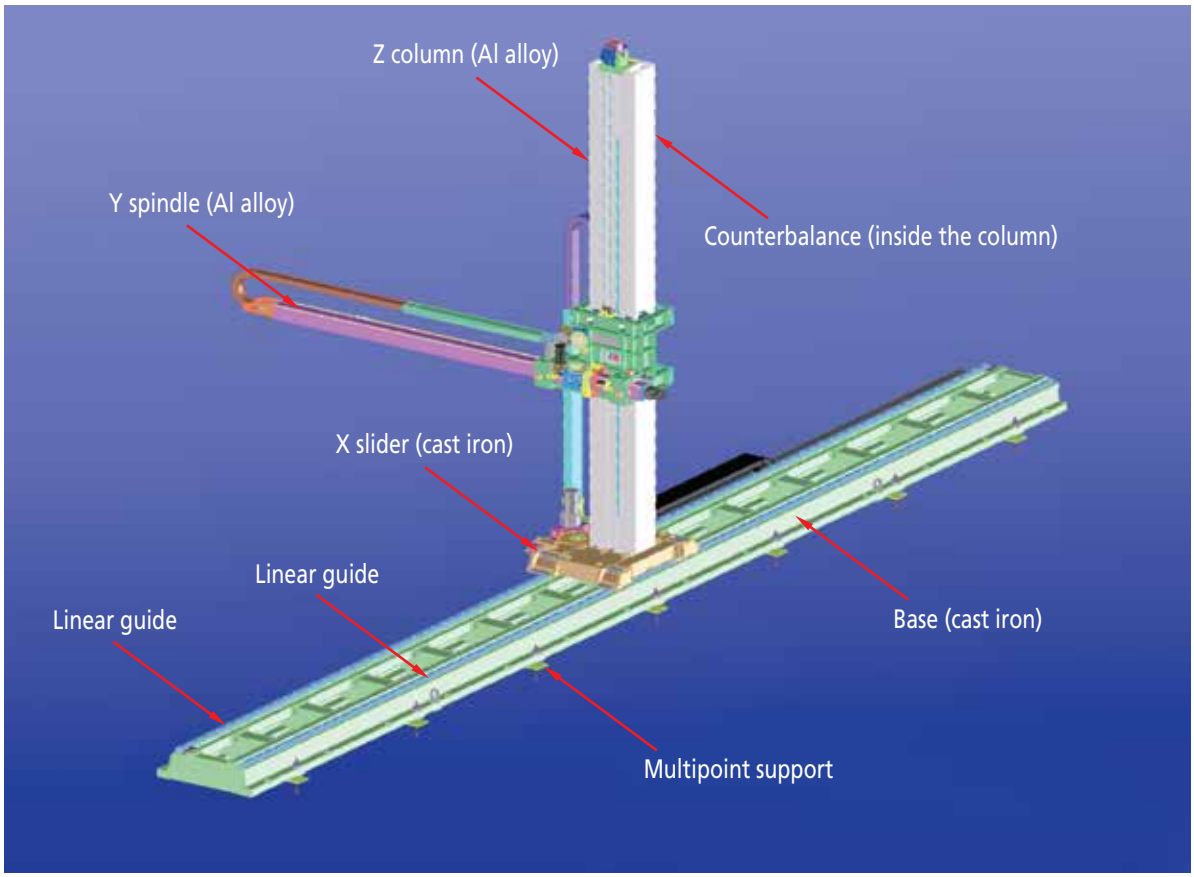
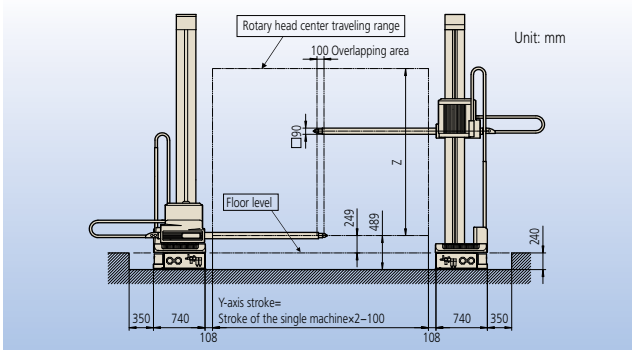
CARBapex



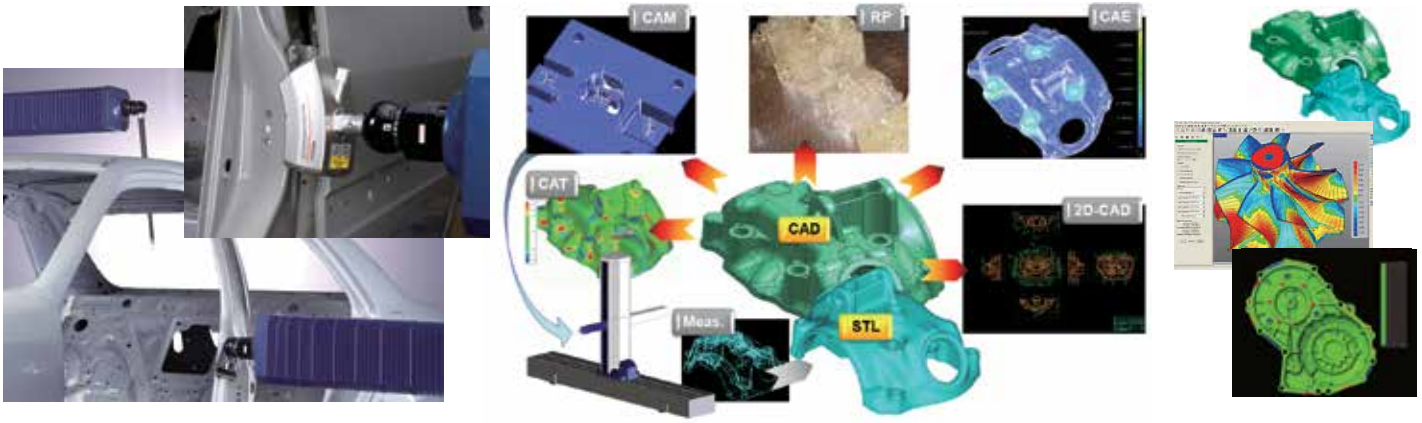
Cast iron is used for the CARBapex base structure to give rigidity and stability, and ball-circulation type high-rigidity linear guides form the X-axis. The Z- and Y-axis arms are manufactured from extruded aluminum alloy to minimize overall mass and to utilize air bearings for frictionless movement. Owing to the use of air bearings, abrasions do not occur on any part of the Y-axis arm, therefore maintaining high accuracy. In addition, all connecting cables are contained in a caterpillar-type cable guide, cables cannot interfere with objects placed on the site floor. The top of the base that houses the X-axis is completely protected with diamond steel plating, the same as CARBstrato, for operator safety and accessibility to the parts being measured.
The use of air bearings for the Y-axis arm distinguishes it from the typical layout machine and this is an extremely important factor for maintaining the straightness of the arm between annual verification tests. Also, the large square cross-section of the Z-axis column minimizes deformation due to expansion/contraction of the arm. Moreover, Mitutoyo's unique friction drive system on all axes minimizes vibration during travel, unlike the conventional rack and pinion arrangement. A drive system that generates no vibration is especially important because it has the effect of causing no noise in the measurement results of a scanning probe.



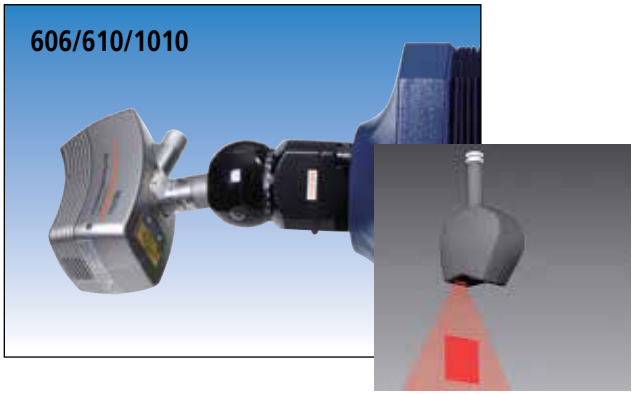
The X-axis base of CARBapex is designed to the minimum for a horizontal-type coordinate measuring machine. Therefore, if this system is installed on the floor the top of the base is low and provides the operator with safer operation. Also, if this system is installed under the floor, the cost of the foundations can be reduced because of the shallower excavation required.
Since the Y-axis spindle is located at the lower end of the Z-axis slider, the spindle can be lowered close to a measuring plane. This allows the height of fixtures to be lower so that the operator can work safely even when measuring the top of a large part.

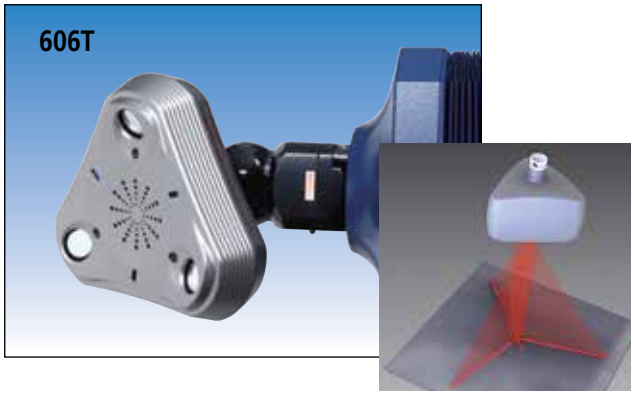
Non-contact Line Laser Measuring Systems

The combination of form and function in current large work piece designs increasingly requires complicated combinations of contoured surfaces. The ideal tool for inspecting these complex surfaces is the non-contact line laser probe. This powerful probe system can acquire a huge amount of measurement data at high speed enabling detailed 3D analysis.



Line Laser Probes Appropriate for Large Work Piece Measurement





Item \ Model		SurfaceMeasure 606	SurfaceMeasure 610	SurfaceMeasure 1010	SurfaceMeasure 606T
Laser irradiation method		Line Laser (single)			Line Laser (cross)
Max. scan width		60mm	60mm	100mm	3×65mm
Max. scan depth		60mm	100mm	100mm	65mm
Working distance		93mm	115mm	115mm	174mm
Scanning error *		12µm	15µm	18µm	17µm
Acquisition rate		75,000points/sec			3×25,000/sec
Mass		430g	400g	400g	480g
Laser Class	EN/IEC	Class2 [EN/IEC 60825-1(2007)]			
	JIS	Class2 [JIS C 6802 : 2011]			
	Laser type	Red semiconductor			
Line Laser	Wavelength	660nm			
	Output	4mW			
Point Laser	Wavelength	635nm			—
	Output	1mW			—

*	Accuracy inspection environment	Temperature: 20°C±1°C / Humidity: 50%±10%
	Target workpiece	Specified master ball for inspection (Diameter 30mm)
	Inspection method	According to Mitutoyo's acceptance procedure. (1σ / sphere measurement, probe alone)

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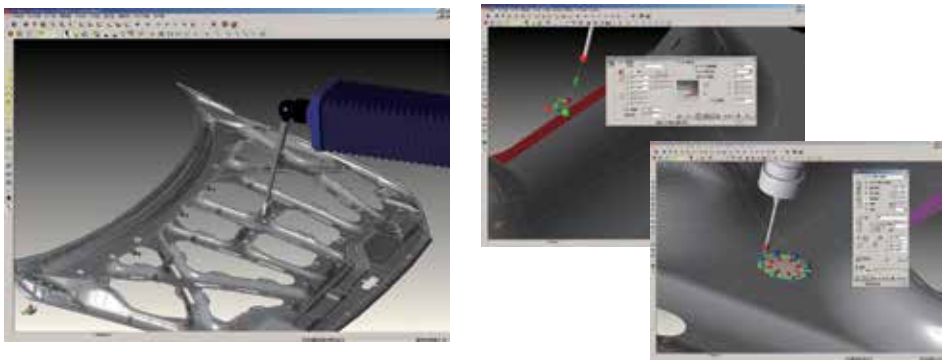
CAT1000 3D Teaching Programs

MiCAT
Mitutoyo Intelligent Computer Aided Technology
the standard in world metrology software
CMM

● CAT1000P implements a 3D measurement point search function and an edge measuring function essential for complex curved surface measurement as a 3D-CAD model standard.
CAT1000P can create a high-quality part program either offline or online, dramatically improving the availability of a measuring system.

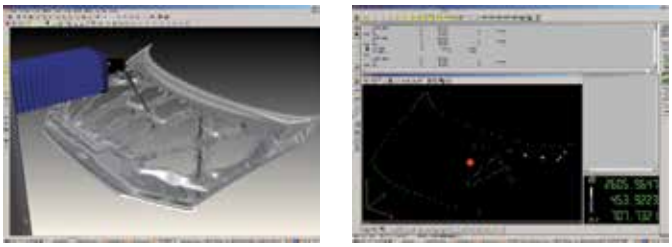
• Offline Teaching
This teaching program can create a CNC part program even without a real workpiece and thus provide tuition in advance of receiving the workpiece.



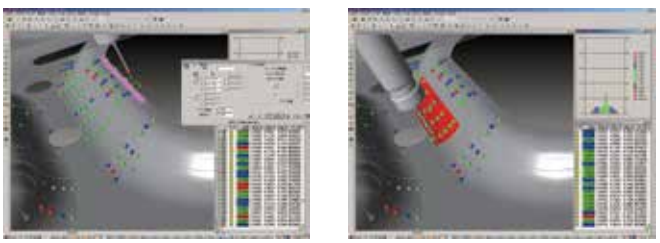
• Online Teaching
With CAT1000P active on the CNC CMM, the CMM main unit moves according to the instructions issued by the CAT1000P. This teaching program can teach the measurement of fine parts and specify of measuring directions more easily than operating the joystick.

● CAT1000S is a curved surface profile evaluation program that can graphically display a toleranced result while making comparisons between a free-form surface profile (3D CAD model) and a measurement point group. CAT1000S easily performs Pass/Fail judgment on the measured/analyzed comparison results with user defined color tolerance parameters.

• Real-time reporting GEOPAK
This evaluation program allows measurement in conjunction with GEOPAK under the condition of 'GEOPAK setup coordinate system = CAD model coordinate system'.



• Boundary Evaluation with Changed Evaluation Method
In addition to curved surface evaluations, CAT1000S can also determine the difference between side face measurement data projected on a curved surface model and the edge of a workpiece. This program is effective at evaluating the circumference of a comparatively thin workpiece such as sheet metal.



CARBstrato Specifications

Item		Single Arm System	Dual Arm System
Guide method		X: Linear guide, Y, Z: Air bearings	
Drive speed	CNC mode	Moving speed of each axis 8 to 500mm/s (0.31 to 19.7″/s) (Maximum speed 866mm/s (34.1″/s))	
		Measuring speed: 1 to 10mm/s (0.04 to 0.4″/s)	
	J/S mode	Moving speed: 0 to 80mm/s (0 to 3.15″/s)	
		Measuring speed: 0 to 3mm/s (0 to 0.12″/s)	
		Feed speed: 0.05mm/s (0.002″/s)	
Driving acceleration		1176mm/s^2 (46.3″/s^2) for each axis (Maximum composite acceleration 2037mm/s^2 (80.2″/s^2))	
Resolution		0.0001mm (0.000004″)	
Measuring system		Linear encoder	
Temperature conditions within which accuracy is guaranteed	Range	16°C to 26°C	
	Rate of change	1.0 K/hour	
		5.0 K/24 hours	
	Gradient	Vertical 1.0 K/min	
		Horizontal 1.0 K/min	
Temperature range within which operation is guaranteed		10°C to 35°C	
Recommended humidity		55% to 65%	
Vibration		10 Hz or less Amplitude of 2μm p-p or less 10 Hz to 50 Hz Acceleration of 0.004m/s^2 or less	
Power supply	Rated voltage	Single phase: 100/115/220/240 V ±10% (50/60 Hz)	
	Max. current	15A (100 V)	2 x 15A (100 V)
Machine air requirements	Pressure	0.5 Mpa	
	Consumption	During Z-axis motion: Up to 500 l/min When Z axis is stopped: 70 l/min	During Z-axis motion: Up to 1000 l/min When Z axis is stopped: 140 l/min
Air supply capability	Pressure	0.6 MPa or more	
	Flow rate	At least 500 l/min	At least 1000 l/min

Note: This machine incorporates a main unit Startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating this machine after initial installation.

Mitutoyo

Accuracy of Main Unit

The accuracy of the CARBstrato Series with specified probes is shown below.

Displacement accuracy ISO10360-2 (JIS B 7440-2)

CARBstrato Single Arm

Model	TP2/20	SP25M
CARBstrato 401420	MPE_E: 18+20L/1000≤70	MPE_E:15+20L/1000≤70
CARBstrato 401424	MPE_E: 18+20L/1000≤70	MPE_E:15+20L/1000≤70
CARBstrato 401620	MPE_E: 18+20L/1000≤70	MPE_E:15+20L/1000≤70
CARBstrato 401624	MPE_E: 18+20L/1000≤70	MPE_E:15+20L/1000≤70
CARBstrato 601620	MPE_E: 18+20L/1000≤70	MPE_E:15+20L/1000≤70
CARBstrato 601624	MPE_E: 18+20L/1000≤70	MPE_E:15+20L/1000≤70
CARBstrato 601626	MPE_E: 20+20L/1000≤90	MPE_E:18+20L/1000≤90
CARBstrato 801620	MPE_E: 18+20L/1000≤90	MPE_E:15+20L/1000≤90
CARBstrato 801624	MPE_E: 18+20L/1000≤90	MPE_E:15+20L/1000≤90
CARBstrato 801626	MPE_E: 20+20L/1000≤110	MPE_E:18+20L/1000≤110

CARBstrato Dual Arm

Model	TP2/20	SP25M
CARBstrato 601420D	MPE_E: 38+30L/1000≤90	MPE_E: 35+30L/1000≤90
CARBstrato 601424D	MPE_E: 38+30L/1000≤90	MPE_E: 35+30L/1000≤90
CARBstrato 601426D	MPE_E: 40+30L/1000≤110	MPE_E: 38+30L/1000≤110
CARBstrato 601430D	MPE_E: 40+30L/1000≤110	MPE_E: 38+30L/1000≤110
CARBstrato 601620D	MPE_E: 38+30L/1000≤90	MPE_E: 35+30L/1000≤90
CARBstrato 601624D	MPE_E: 38+30L/1000≤90	MPE_E: 35+30L/1000≤90
CARBstrato 601626D	MPE_E: 40+30L/1000≤110	MPE_E: 38+30L/1000≤110
CARBstrato 601630D	MPE_E: 40+30L/1000≤110	MPE_E: 38+30L/1000≤110
CARBstrato 801620D	MPE_E: 38+30L/1000≤110	MPE_E: 35+30L/1000≤110
CARBstrato 801624D	MPE_E: 38+30L/1000≤110	MPE_E: 35+30L/1000≤110
CARBstrato 801626D	MPE_E: 40+30L/1000≤130	MPE_E: 38+30L/1000≤130
CARBstrato 801630D	MPE_E: 40+30L/1000≤130	MPE_E: 38+30L/1000≤130

L = Measured length (mm)

Probing error ISO 10360-2 (JIS B 7440-4)

Probe Model	Maximum Permissible Probing Error (MPEp)
TP2/20	20μm
SP25M	15μm

- Accuracy determined with Standard Stylus
  ø3 x 10mm / ø0.12 x 0.39″ for TP2/20
  ø4 x 50mm / ø0.16 x 1.97″ for SP25M
- The accuracy values quoted above are guaranteed at any position within the measurement volume.
- Other accuracy information is described in the Mitutoyo inspection certificate

CARBapex Specifications

Item		Single Arm System	Dual Arm System
Guide method		X: Linear guide, Y, Z: Air bearings	
Drive speed	CNC mode	Moving speed of each axis 8 to 300mm/s (0.31 to 11.8″/s) (Maximum speed 519mm/s (20.43″/s))	
		Measuring speed: 1 to 5mm/s (0.04 to 0.2″/s)	
	J/S mode	Moving speed: 0 to 80mm/s (0 to 3.15″/s)	
		Measuring speed: 0 to 3mm/s (0 to 0.12″/s)	
		Feed speed: 0.05mm/s (0.002″/s)	
Driving acceleration		588mm/s^2 (23.15″/s^2) for each axis (Maximum composite acceleration 980mm/s^2 (38.58″/s^2))	
Resolution		0.0001mm (0.000004″)	
Measuring system		Linear encoder	
Temperature conditions within which accuracy is guaranteed	Range	16°C to 26°C	
	Rate of change	1.0 K/hour	
		5.0 K/24 hours	
	Gradient	Vertical 1.0 K/min	
		Horizontal 1.0 K/min	
Temperature range within which operation is guaranteed		10°C to 35°C	
Recommended humidity		55% to 65%	
Vibration		10 Hz or less Amplitude of 2µm p-p or less 10 Hz to 50 Hz Acceleration of 0.004m/s^2 or less	
Power supply	Rated voltage	Single phase: 100/115/220/240 V ±10% (50/60 Hz)	
	Max. current	15A (100 V)	2 x 15A (100 V)
Machine air requirements	Pressure	0.5 Mpa	
	Consumption	Maximum: 70 l/min	Maximum: 140 l/min
Air supply capability	Pressure	0.6 MPa or more	
	Flow rate	At least 100 l/min	At least 200 l/min

Note: This machine incorporates a main unit Startup system (relocation detection system), which disables operation when an unexpected vibration is applied or the machine is relocated. Be sure to contact your nearest Mitutoyo Sales Office prior to relocating this machine after initial installation.

Mitutoyo

Accuracy of Main Unit

The accuracy of the CARBapex Series with specified probes is shown below.

Displacement accuracy ISO10360-2 (JIS B 7440-2)

CARBapex Single Arm

Model	TP2/20	SP25M
CARBapex 401420/401218B	MPE_E: 25+28L/1000≤95	MPE_E: 20+28L/1000≤95
CARBapex 401424/401222B	MPE_E: 25+28L/1000≤95	MPE_E: 20+28L/1000≤95
CARBapex 401620/401418B	MPE_E: 25+28L/1000≤95	MPE_E: 20+28L/1000≤95
CARBapex 401624/401422B	MPE_E: 25+28L/1000≤95	MPE_E: 20+28L/1000≤95
CARBapex 601620/601418B	MPE_E: 25+28L/1000≤95	MPE_E: 20+28L/1000≤95
CARBapex 601624/601422B	MPE_E: 25+28L/1000≤95	MPE_E: 20+28L/1000≤95
CARBapex 601626/601424B	MPE_E: 30+28L/1000≤110	MPE_E: 25+28L/1000≤110
CARBapex 801620/801418B	MPE_E: 25+28L/1000≤110	MPE_E: 20+28L/1000≤110
CARBapex 801624/801422B	MPE_E: 25+28L/1000≤110	MPE_E: 20+28L/1000≤110
CARBapex 801626/801424B	MPE_E: 30+28L/1000≤120	MPE_E: 25+28L/1000≤120

CARBapex Dual Arm

Model	TP2/20	SP25M
CARBapex 601420D/601218BD	MPE_E: 50+35L/1000≤120	MPE_E: 45+35L/1000≤120
CARBapex 601424D/601222BD	MPE_E: 50+35L/1000≤120	MPE_E: 45+35L/1000≤120
CARBapex 601426D/601224BD	MPE_E: 55+35L/1000≤130	MPE_E: 50+35L/1000≤130
CARBapex 601430D/601228BD	MPE_E: 55+35L/1000≤130	MPE_E: 50+35L/1000≤130
CARBapex 601620D/601418BD	MPE_E: 50+35L/1000≤120	MPE_E: 45+35L/1000≤120
CARBapex 601624D/601422BD	MPE_E: 50+35L/1000≤120	MPE_E: 45+35L/1000≤120
CARBapex 601626D/601424BD	MPE_E: 55+35L/1000≤130	MPE_E: 50+35L/1000≤130
CARBapex 601630D/601428BD	MPE_E: 55+35L/1000≤130	MPE_E: 50+35L/1000≤130
CARBapex 801620D/801418BD	MPE_E: 50+35L/1000≤130	MPE_E: 45+35L/1000≤130
CARBapex 801624D/801422BD	MPE_E: 50+35L/1000≤130	MPE_E: 45+35L/1000≤130
CARBapex 801626D/801424BD	MPE_E: 55+35L/1000≤140	MPE_E: 50+35L/1000≤140
CARBapex 801630D/801428BD	MPE_E: 55+35L/1000≤140	MPE_E: 50+35L/1000≤140

L = Measured length (mm)

Probing error ISO 10360-2 (JIS B 7440-4)

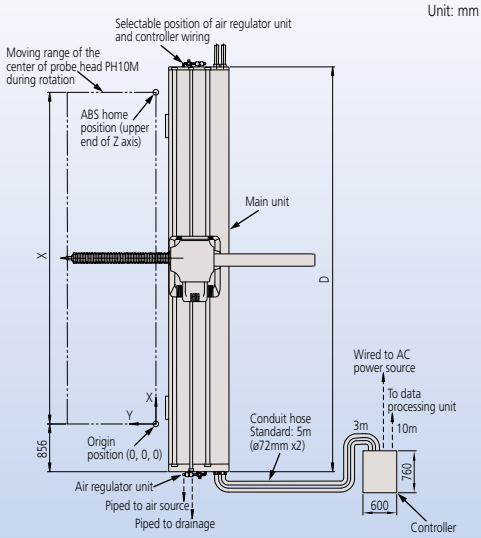
Probe Model	Maximum Permissible Probing Error (MPEp)
TP2/20	Z : 2000/2400mm 20µm
	Z : 2600/3000mm 25µm
SP25M	Z : 2000/2400mm 15µm
	Z : 2600/3000mm 20µm

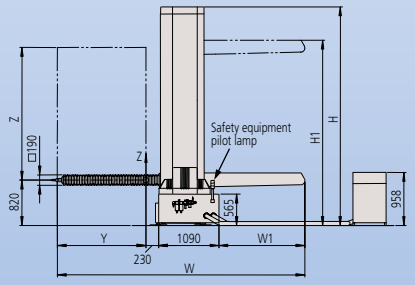
- Accuracy determined with Standard Stylus
  ø3 x 10mm / ø0.12 x 0.39″ for TP2/20
  ø4 x 50mm / ø0.16 x 1.97″ for SP25M
- The accuracy values quoted above are guaranteed at any position within the measurement volume.
- Other accuracy information is described in the Mitutoyo inspection certificate

Single Arm System External Dimensions

CARBstrato

Unit: mm

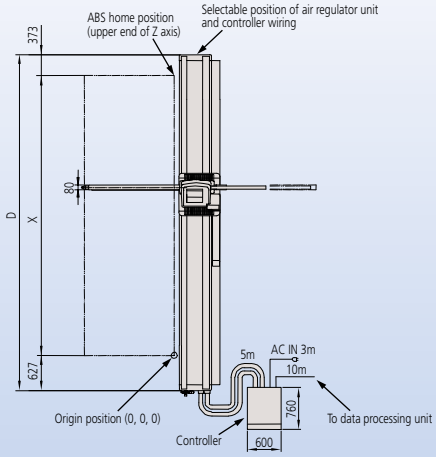


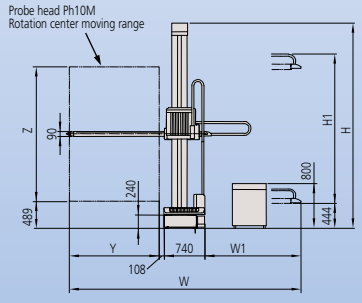


- If the ABS/Home position (origin return direction) or controller position is to be changed owing to the workpiece carry-in direction and the operational circumstances, optional works are required. For details, consult your local Mitutoyo Support Staff.
- Mitutoyo provides a Reference Foundation Drawing detailing the foundation structure necessary to maintain the accuracy of measuring machines. A construction contractor will be required to prepare a site-specific foundation drawing and execute the work required.
- Information on the base plate, welding work and anchor work for fixing a CARB machine to the base floor is described in the Reference Foundation Drawing. These works must be arranged by the customer.
- Ancillary works for the cast surface plate, pit cover, workpiece support stand, etc. must be executed by the customer.

CARBapex

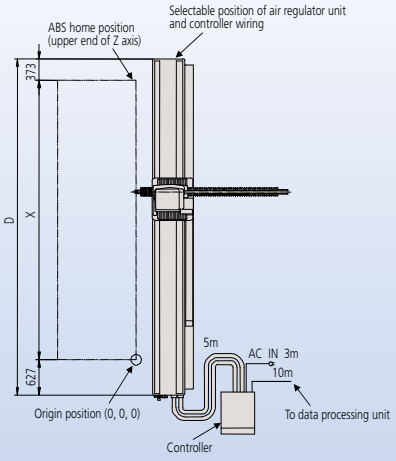
Unit: mm

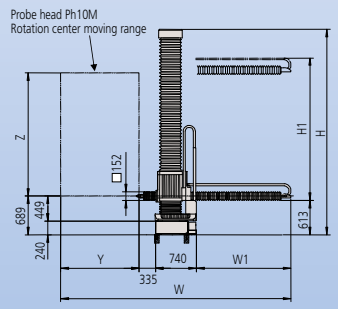




CARBapex (When equipped with optional bellows cover)

Unit: mm





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CARBstrato

Model	X	Y	Z	W	W1	D	H	H1	Mass
CARBstrato 401420	4000mm	1400mm	2000mm	4073mm	1353mm	5324mm	3553mm	2995mm	4835kg
CARBstrato 401424			2400mm				3953mm	3395mm	4875kg
CARBstrato 401620		1600mm	2000mm	4473mm	1553mm		3553mm	2995mm	4840kg
CARBstrato 401624			2400mm				3953mm	3395mm	4880kg
CARBstrato 601620	6000mm		2000mm			7324mm	3553mm	2995mm	6240kg
CARBstrato 601624			2400mm				3953mm	3395mm	6280kg
CARBstrato 601626			2600mm				4153mm	3595mm	6300kg
CARBstrato 801620	8000mm		2000mm			9324mm	3553mm	2995mm	7640kg
CARBstrato 801624			2400mm				3953mm	3395mm	7680kg
CARBstrato 801626			2600mm				4153mm	3595mm	7700kg

CARBapex

Model	X	Y	Z	W	W1	D	H	H1	Mass
CARBapex 401420	4000mm	1400mm	2000mm	3830mm	1582mm	5000mm	3266mm	2266mm	1700kg
CARBapex 401424			2400mm				3666mm	2666mm	1720kg
CARBapex 401620		1600mm	2000mm	4230mm	1782mm		3266mm	2266mm	1710kg
CARBapex 401624			2400mm				3666mm	2666mm	1730kg
CARBapex 601620	6000mm		2000mm			7000mm	3266mm	2266mm	2250kg
CARBapex 601624			2400mm				3666mm	2666mm	2260kg
CARBapex 601626			2600mm				3866mm	2866mm	2270kg
CARBapex 801620	8000mm		2000mm			9000mm	3266mm	2266mm	2870kg
CARBapex 801624			2400mm				3666mm	2666mm	2880kg
CARBapex 801626			2600mm				3866mm	2866mm	2890kg

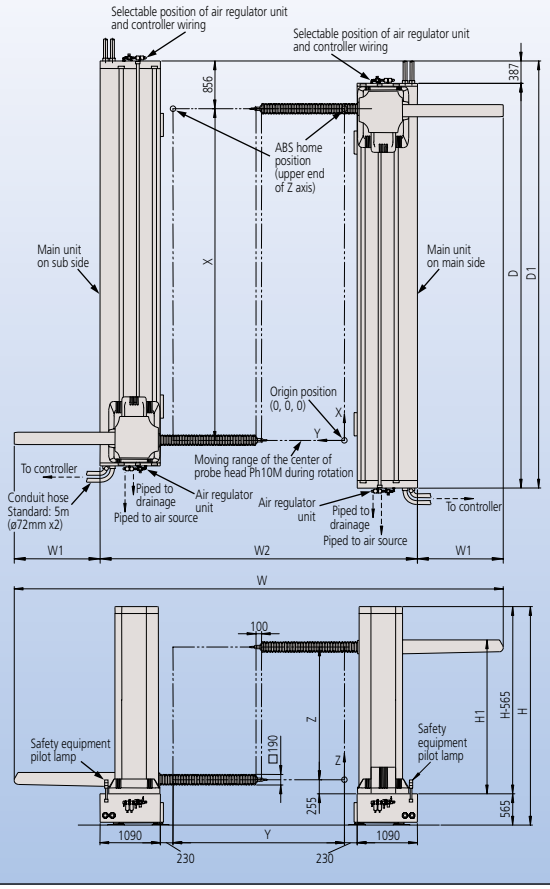
CARBapex (When equipped with optional bellows cover)

Model	X	Y	Z	W	W1	D	H	H1	Mass
CARBapex 401218B	4000mm	1200mm	1800mm	3857mm	1582mm	5000mm	3266mm	2147mm	1700kg
CARBapex 401222B			2200mm				3666mm	2547mm	1720kg
CARBapex 401418B		1400mm	1800mm	4257mm	1782mm		3266mm	2147mm	1710kg
CARBapex 401422B			2200mm				3666mm	2547mm	1730kg
CARBapex 601418B	6000mm		1800mm			7000mm	3266mm	2147mm	2250kg
CARBapex 601422B			2200mm				3666mm	2547mm	2260kg
CARBapex 601424B			2400mm				3866mm	2747mm	2270kg
CARBapex 801418B	8000mm		1800mm			9000mm	3266mm	2147mm	2870kg
CARBapex 801422B			2200mm				3666mm	2547mm	2880kg
CARBapex 801424B			2400mm				3866mm	2747mm	2890kg

Dual Arm System External Dimensions

CARBstrato

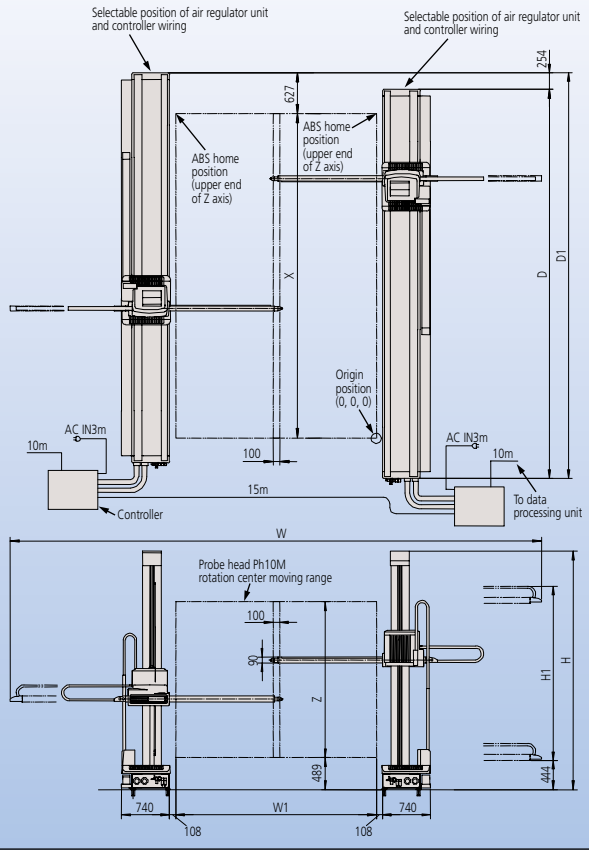
Unit: mm



- If the ABS/Home position (origin return direction) or controller position is to be changed owing to the workpiece carry-in direction and the operational circumstances, optional works are required. For details, consult your local Mitutoyo Support Staff.
- Mitutoyo provides a Reference Foundation Drawing detailing the foundation structure necessary to maintain the accuracy of measuring machines. A construction contractor will be required to prepare a site-specific foundation drawing and execute the work required.
- Information on the base plate, welding work and anchor work for fixing a CARB machine to the base floor is described in the Reference Foundation Drawing. These works must be arranged by the customer.
- Ancillary works for the cast surface plate, pit cover, workpiece support stand, etc. must be executed by the customer.

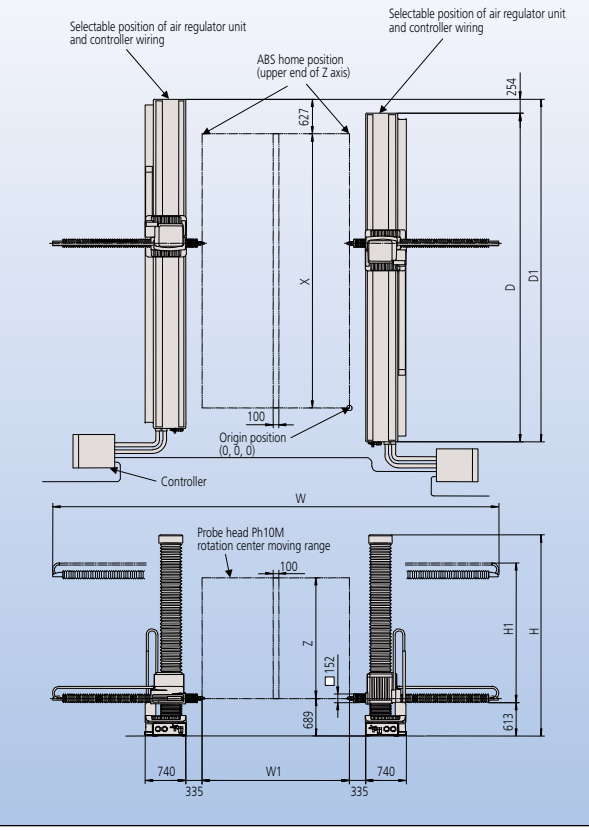
CARBapex

Unit: mm



CARBapex (When equipped with optional bellows cover)

Unit: mm



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CARBstrato-Dual Arm System External Dimensions

Model	X	Y	Z	W	W1	W2	D	D1	H	H1	Mass
CARBstrato 601420D	6000mm	2700mm	2000mm	8046mm	1353mm	5340mm	7324mm	7711mm	3553mm	2995mm	12470kg
CARBstrato 601424D			2400mm						3953mm	3395mm	12550kg
CARBstrato 601426D			2600mm						4153mm	3595mm	12590kg
CARBstrato 601430D			3000mm						4553mm	3995mm	12670kg
CARBstrato 601620D		3100mm	2000mm	8846mm	1553mm	5740mm			3553mm	2995mm	12480kg
CARBstrato 601624D			2400mm						3953mm	3395mm	12560kg
CARBstrato 601626D			2600mm						4153mm	3595mm	12600kg
CARBstrato 601630D			3000mm						4553mm	3995mm	12680kg
CARBstrato 801620D	8000mm		2000mm				9324mm	9728mm	3553mm	2995mm	15280kg
CARBstrato 801624D			2400mm						3953mm	3395mm	15360kg
CARBstrato 801626D			2600mm						4153mm	3595mm	15400kg
CARBstrato 801630D			3000mm						4553mm	3995mm	15480kg

CARBapex-Dual Arm System External Dimensions

Model	X	Y	Z	W	W1	D	D1	H	H1	Mass
CARBapex 601420D	6000mm	2700mm	2000mm	7560mm	2700mm	7000mm	7254mm	3266mm	2266mm	4480kg
CARBapex 601424D			2400mm					3666mm	2666mm	4520kg
CARBapex 601426D			2600mm					3866mm	2866mm	4530kg
CARBapex 601430D			3000mm					4266mm	3266mm	4560kg
CARBapex 601620D		3100mm	2000mm	8360mm	3100mm			3266mm	2266mm	4490kg
CARBapex 601624D			2400mm					3666mm	2666mm	4520kg
CARBapex 601626D			2600mm					3866mm	2866mm	4540kg
CARBapex 601630D			3000mm					4266mm	3266mm	4570kg
CARBapex 801620D	8000mm		2000mm			9000mm	9254mm	3266mm	2266mm	5740kg
CARBapex 801624D			2400mm					3666mm	2666mm	5760kg
CARBapex 801626D			2600mm					3866mm	2866mm	5780kg
CARBapex 801630D			3000mm					4266mm	3266mm	5820kg

CARBapex (When equipped with optional bellows cover)

Model	X	Y	Z	W	W1	D	D1	H	H1	Mass
CARBapex 601218BD	6000mm	2300mm	1800mm	7614mm	2300mm	7000mm	7254mm	3266mm	2147mm	4480kg
CARBapex 601222BD			2200mm					3666mm	2547mm	4520kg
CARBapex 601224BD			2400mm					3866mm	2747mm	4530kg
CARBapex 601228BD			2800mm					4266mm	3147mm	4560kg
CARBapex 601418BD		2700mm	1800mm	8414mm	2700mm			3266mm	2147mm	4490kg
CARBapex 601422BD			2200mm					3666mm	2547mm	4520kg
CARBapex 601424BD			2400mm					3866mm	2747mm	4540kg
CARBapex 601428BD			2800mm					4266mm	3147mm	4570kg
CARBapex 801418BD	8000mm		1800mm			9000mm	9254mm	3266mm	2147mm	5740kg
CARBapex 801422BD			2200mm					3666mm	2547mm	5760kg
CARBapex 801424BD			2400mm					3866mm	2747mm	5780kg
CARBapex 801428BD			2800mm					4266mm	3147mm	5820kg

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