

MS05AX / MS1AX

**MS**  
MEASURING  
STATION



**Ultra-high Precision  
Auto-tracking Total Station**

- 0.5" / 1" Angle Accuracy
- Automated Matrix Detection
- High-Performance, versatile EDM
- 0.5 mm Distance Accuracy
- Laser Option for Tunneling

**It's time.**

## **Topcon 'Measuring Station' Opens New Era in Ultra-Precision 3D Measurement.**

Featuring a wide array of innovative technologies, MS05AX and MS1AX offer superior performance in angle and distance measurement as well as reliable robotic functionality. The 'Measuring Station' ensures dramatic enhancement in precision and productivity in all applications such as surveying, engineering, construction, monitoring and 3D industrial measurement.

# **MS05AX**

### **Ultra-Precision Measuring Station**

#### **● 0.5" Angle Accuracy**

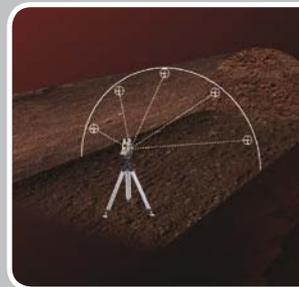
The MS05AX employs innovative Independent Angle Calibration System (IACS) technology for unparalleled measurement reliability. Combined with market-proven absolute encoders that incorporate advanced coding and digital-processing technologies, the MS05AX provides the industry's highest 0.5" (0.15 mgon) angle measurement precision.

#### **● The Sub-millimetre EDM opens the door to unprecedented precision**

Cutting-edge distance measurement technology ensures unparalleled comprehensive performance. Using reflective sheet targets, the MS05AX provides sub-millimetre accuracy in a range of up to 200 m. With its 3.5 km long-range capability and fast measurement speed, the MS05AX also satisfies every requirement for the reference EDM that is employed for precise baseline calibration.

- Sub-millimetre 0.5 mm + 1 ppm accuracy using reflective sheets within the range of 200 m.
- Measures prisms with 0.8 mm + 1 ppm precision up to 3,500 m.
- Reflectorless measurement can be performed with 1 mm + 1 ppm up to 100 m in range.

## **MEASURING STATIONS**



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## MS05AX AND MS1AX



ADVANCED TECHNOLOGY  
ULTRA PRECISION  
3D MEASUREMENT

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The new MS Series combines advanced technology and modern design innovations.

## MS1AX

Long-range and versatile Measuring Station

● **1" - 1 mm Accuracy**

The MS1AX is primarily designed for precise construction applications providing 1" (0.3 mgon) angle accuracy and 1 mm + 1 ppm distance measurement precision.

● **Wide Measurement Range**

- A 400 m reflectorless measurement capability gives MS1AX further versatility for applications where reflectors cannot be placed.
- Measures up to 300 m with 50 x 50 mm reflective sheet targets.
- Long-range capability reduces the need for changing instrument positions, resulting in higher work efficiency.

● **Angle & Distance Measurement Performance**

Model	MS05AX	MS1AX
<b>ANGLE MEASUREMENT</b>		
Accuracy	0.5" / 0.15 mgon	1" / 0.3 mgon
Minimum display	0.1" / 0.02 mgon / 0.0005 mil	
IACS	Provided (Independent Angle Calibration System)	
<b>DISTANCE MEASUREMENT</b>		
Accuracy		
Reflective sheet	(0.5 + 1 ppm x D) mm	(1 + 1 ppm x D) mm
Prism	(0.8 + 1 ppm x D) mm	(1 + 1 ppm x D) mm
Reflectorless	(1 + 1 ppm x D) mm	(3 + 1 ppm x D) mm
Minimum display	0.01 mm	0.1 mm
Measuring range		
Reflective sheet	200 m	300 m
One prism	3,500 m	3,500 m
Mini prism	800 m	1,000 m
Reflectorless	100 m	400 m
Measuring time	Fine: 2.4 s, Rapid: 2.0 s	

It's time.

## Automated Measurement Capability Expands Applications.

### ● MONITORING

Effectively performs displacement and deformation monitoring using the state-of-the-art automated measurement capability.

Featuring Matrix Detection technology, the MS AX range is able to automatically detect, measure and record all prisms that are to be used within a monitoring object, for instance the face of a dam, or length of railway line.

Additionally, Rapid 2D Monitoring is available to dramatically speed up the monitoring process. For use when distance measurements are not necessary on monitoring projects to save time!

- Bridges, buildings, dams, mining sites, tunnels, railroads and other large structures, both existing and under construction, can be automatically monitored using remote control techniques.
- MS05AX and MS1AX implement an advanced auto-pointing algorithm optimized for monitoring applications. The MS AX automatically sights the prism closest to the telescope center regardless of the distance from the instrument even if multiple prisms or other reflective objects are in the field of view. The MS AX series comes as standard with an incredible 1" auto-pointing accuracy as defined by ISO17123-3.



### ● TUNNELS

Measures tunnel convergence and deformation more efficiently than ever.

- Quickly and accurately measures the convergence of tunnel supports, crowns and walls. Ideal for the sites using NATM.
- Rapidly measure tunnel cross-section profiles using the combination of reflectorless EDM and motor drive functionality. The incredible 400 m reflectorless range of MS1AX makes it an ideal solution.
- The auto-tracking function of MS05AX/MS1AX allows it to precisely control the position and attitude of a tunnel shield machine.
- The optional LSP1 Laser Guide emits a visible laser beam for profile contour projection on tunnel faces.
- MS05AX/MS1AX can be employed for automatic or unmanned monitoring of tunnels, either existing or under construction, to ensure safety and save labor.

### ● CIVIL ENGINEERING

Major Civil engineering tasks demand the highest accuracy and reliability possible. The MS05AX/MS1AX dramatically increases construction efficiency and accuracy with its superior measurement capability in combination with unique target systems.

## APPLICATIONS



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## APPLICATIONS



### ● BRIDGES

Precise measurements using reflective sheet targets and compact prisms enable high-quality bridge construction with short lead times.

- In-process measurement of framework members ensures the accurate manufacture of each part, increasing productivity in on-site assembly.
- Automatically monitor displacement and deformation of existing bridges for maintenance and safety purposes.



### ● PLANT AND PROCESS ENGINEERING

Position, geometry and dimensions of complex members of various plants can be measured with sub-millimeter to millimeter accuracy.

- For as-built measurement where real precision is required.
- For precise positioning, leveling, vertical and in-line alignment of pipes, machineries, wind power generators and other components.



### ● NUCLEAR

When absolute accuracy is required and no compromise is allowed, the MS05AX provides a flexible solution for the precise measurement of dimensional stability and geometry of important structures.

- MS05AX measures points with sub-millimeter accuracy using reflective sheet targets that can be directly applied to the measuring points.
- The easy-to-setup mobile system provides maximum convenience in 3D measurement from multiple positions.

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**It's time.**

## Fully equipped with advanced features to enhance measurement efficiency.

### ● Auto-Pointing

The auto-pointing function using reflective prisms or sheet targets realises automatic measurement for applications such as unmanned deformation monitoring.

- 1,000 m Auto-Pointing range using one standard prism.
- An advanced Auto-Pointing algorithm ensures reliable measurement to the predetermined prisms in periodic monitoring applications.

### ● Auto-Tracking

The MS05AX/MS1AX constantly tracks a moving prism up to 90 km/h at a distance of 100 m, or 18 km/h at 20 m.

- For continuous measurement of moving objects.
- For precise position and attitude control of tunnel shield machines.
- For high-precision setting-out tasks.

### ● Perfectly Aligned Laser Pointer

- The red laser pointer utilises the EDM measuring beam, and is therefore perfectly aligned with the EDM and telescope axes.

### ● Multiple Data Storages

- Over 1 MB of internal data memory.
  - CF card Type II, SD card\* and USB memory are supported.
- \* CF type adapter required.

### ● Unique and Versatile Targets

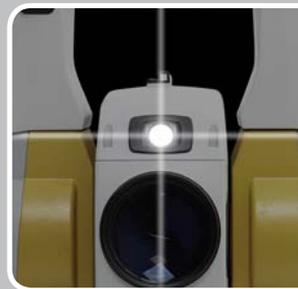
- A full line of prisms and reflective targets are designed to maximize measurement accuracy and efficiency.

### ● Superior Environmental Protection

- Highest in its class IP64 dust-water resistant withstands dusty or wet conditions.
- Weatherproof multi-port maintains IP64 protection even with an RS-232C data cable or an external battery connected.

### ● Fully Illuminated Keyboard

Both the display and full-alphanumeric keyboard on the control panel are adequately illuminated allowing easy operation in tunnels, at night, and in low lighting conditions.



### ● Target Illumination

- Prisms or sheet target can be located easily in dim lighting conditions using the high-intensity white LED built into the telescope.
- Brightness and illumination pattern (blink or on) can be selected according to the environmental conditions.

### ● Maximum Protection from dust and water

MS05AX/MS1AX withstand the finest dust as well as the hardest driving rain and showers. The industry-leading IP64 protection provides unparalleled reliability in the harshest work site conditions. No matter the circumstances on the job site, MS AX series always work without downtime.

### ● Windows CE

- MS05AX/MS1AX incorporate the flexible Windows CE operating system.
- A large TFT color LCD display provides an easy to use intuitive graphic interface and touch screen operation.

## Auto-pointing, Auto-tracking, Motor Drive, and Laser Option.

The Topcon MS AX series measuring stations are the latest, most advanced system on the market today combining a new modern design and advanced technology.

# MS

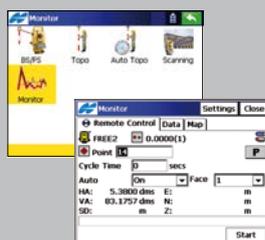
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- |                                  |   |  |                                   |
|----------------------------------|---|--|-----------------------------------|
| <b>1</b> Interchangeable Handles | <b>4</b> Super accurate distance measurement  | <b>7</b> USB, CF, SD & Serial Interfaces     | <b>10</b> Vertical Jog Dial       |
| <b>2</b> Gunsight                | <b>5</b> Swappable Li-Ion Batteries   | <b>8</b> High precision angular measurements | <b>11</b> Measurement Trigger Key |
| <b>3</b> Red Tech EDM Technology | <b>6</b> Windows CE 5.0 with Full Colour 3.7" LCD Touch Screen and integrated brightness sensor | <b>9</b> Bright White LED Lamp               | <b>12</b> Horizontal Jog Dial     |

### ● TopSURV Software

The easy-to-navigate, intuitive user interface of TopSURV software offers all users its full functionality with the shortest learning curve. TopSURV supports all surveying tasks, including topo data collection, as-built survey and stakeout.



### ● Complete System

- MS 0.5" or 1" AX Instrument
- Dual Charging Cradle
- Choice of optional field controllers
- Li-Ion Batteries
- Compact Carry Case
- Optional TopSURV on Board for MS AX
- Compatibility with DC3 remote controlled monitoring system
- Manuals & Utility software

## The Leader in Positioning Technology ...

Topcon offers positioning products that deliver unparalleled site-wide performance and integration. Topcon's history of technological advances and our reputation for superior reliability means there's no other company positioned to provide you with a better "Total Positioning Solution." From survey to inspection Topcon, through our dealer network, provides the innovative technology that gives surveyors, civil engineers, contractors, equipment owners, and operators the competitive edge by addressing such critical issues as increasing profits, quality craftsmanship, improving productivity, lowering operating costs, and enhancing job site safety.

Full positioning integration field-to-finish: That's the goal of Topcon. When it's time for you to step up to the next level,

## The Leader in Customer Satisfaction ...

To ensure that your Topcon instrument maintains peak performance, your local Topcon dealer offers factory trained and certified service technicians. If service isn't available in your area, our European Service Center offers a repair and return policy second to none.

## Specification additional

- \*1 IEC 60825-1:Amd.2:2001, FDA CDRH21 CFR Part1040.10 & 1040.11.
- \*2 Under good conditions: No haze, visibility about 40 km, overcast, no scintillation.
- \*3 When squarely aligned with the target.
- \*4 With Kodak Gray Card White Side (90% reflective).  
Reflectorless range/accuracy may vary according to measuring objects, observation situations and environmental conditions.
- \*5 Time of reflectorless measurement may vary according to measuring objects, observation situations and environmental conditions.
- \*6 When the measuring beam's incidence angle is within  $\pm 15^\circ$  to the target surface, indoor conditions with sufficient contrast between the target and background.
- \*7 Auto-pointing with H&V 180° rotation and fine single measurement every 30 s at 20°C.



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## SPECIFICATIONS

	MS05AX	MS1AX
<b>ANGLE MEASUREMENT</b>		
Telescope	Magnification: 30x, Resolving power: 2.5", Minimum focus: 1.3 m	
Angle measurement	Absolute encoder scanning. Both circles adopt diametrical detection.	
Unit	Degree / Gon / Mil, selectable	
Display resolutions (selectable)	0.1" / 0.5", 0.02 / 0.1 mgon, 0.0005 / 0.002 mil	
Accuracy (ISO 17123-3:2001)	0.5", 0.15 mgon, 0.0025 mil	1", 0.3 mgon, 0.005 mil
IACS	Provided (Independent Angle Calibration System)	
Automatic dual-axis compensator	Dual-axis liquid tilt sensor, Working range: $\pm 4'$ ( $\pm 74$ mgon)	
Distance measurement	Modulated laser, Phase comparison method with red laser diode (690 nm)	
Laser output*1 mode	Class 3R Reflectorless / Class 1 Prism/Sheet mode	
Measuring range*2		
With reflective sheet (50 mm)*3	200 m	300 m
One prism / mini prism	3,500 m / 800 m	3,500 m / 1,000 m
Reflectorless*4	100 m	400 m
Minimum display resolutions	0.01 mm / 0.1 mm	0.1 mm / 1 mm
Accuracy*2 (ISO 17123-4:2001)		
With reflective sheet*3	(0.5 + 1 ppm x D) mm	(1 + 1 ppm x D) mm
With prism	(0.8 + 1 ppm x D) mm	(1 + 1 ppm x D) mm
Reflectorless*4	(1 + 1 ppm x D) mm	(3 + 1 ppm x D) mm
Measuring time*5	Fine: 0.9 s (initial 2.4 s), Rapid: 0.6 s (initial 2.0 s), Tracking: 0.4 s (initial 1.3 s)	
Auto-pointing range / tracking range	AP prism 1,000 m / 800 m   mini prism 700 m / 600 m 360° prism 600 m / 500 m   reflective sheet (50 mm)*6 50 m / n/a	
Auto-Collimation Accuracy (ISO 17123-3)	AP Prism 1 mm @ 200 m Reflective sheet 1 mm @ 50 m	
<b>OS &amp; CONTROL</b>		
Operating system	Windows CE Ver.5.0	
Display	3.7 in. TFT QVGA backlit color LCD, Touch Screen on both faces	
<b>GENERAL</b>		
Dust and water protection	IP64 (IEC 60529:2001) - maintained with external connections	
Temperature	-20 to +50°C (operating) / -30 to +70°C (storage)	
Size with handle & battery	W201 x D220 x H375 mm	
Weight	7.7 kg (with handle & battery)	
Power supply	7.2V DC	
BDC58 detachable battery	Li-ion rechargeable battery, 7.2V, 4.3Ah, 2 BDC58 are included as standard	
Operating time at 20°C *7	Standard detachable battery BDC58: Approx. 3 hours External battery BDC61 (Ni-MH, 13Ah): Approx. 9 hours	

Your local authorised Topcon distributor is: