

**SOKKIA**

# Series 10

SET210 · SET310 · SET510 · SET610

**Total Stations**  
*with enhanced EDM*



*Photo:  
SET310 with optional  
memory card unit*

**FASTER, EASIER, WITH INCREASED FUNCTIONALITY  
– THE NEW GENERATION STANDARD TOTAL STATIONS.**



# Series 10

SET210 · SET310 · SET510 · SET610

The Series 10 total stations come loaded with Sokkia's original absolute encoders. A wireless keyboard\* is also available for faster, easier operation. Retaining the same superior environment-proof construction as featured on previous models, the Series 10 models are the new generation of our standard total stations.

\* Optionally available for use with the SET210, SET310 and SET510 models.

## ■ Sokkia's original absolute encoder

The Series 10 total stations are loaded with absolute encoders that employ the RAB code (RANdom Bi-directional code) which was originally developed for the digital level SDL30. Through the use of advanced signal processing, stable and reliable angle measurement data can be obtained. As there is no need to reset the total station for 0 indexing at the start of surveying, measurement can be started as soon as the power is turned on.

## ■ Water and dust resistant

With advanced protection against water and dust infiltration, the Series10 operates dependably in sudden showers or drizzling rain, or in humid or dusty construction environments (Complies with IP66 of international standard IEC60529).

## ■ SF14 Wireless Keyboard (Optional)



The IR wireless keyboard is available as an optional accessory for use with the SET210/SET310/510 models. The keyboard features 37 keys, including alphanumeric keys for letter and number input, softkeys, measurement keys and more. The keyboard allows quick input of point names and coordinate



values. The small, lightweight body has been designed with an easy to grip shape that allows convenient one-hand operation.

Attaching a strap to the keyboard allows it to be hung around the neck, eliminating the chance of dropping and damaging it. Highly dust and water resistant, the keyboard operates dependably in the harsh environment of dusty construction sites. Power is supplied by two AAA/R03 dry cell batteries.



## ■ FOF sensor

Sokkia's originally designed, extremely compact FOF (Fiber made of Optical Filter material) sensors are located on both sides of the SET210/310/510 for communication with the SF14 wireless keyboard. To prevent them from being easily scratched or dirtied, the sensors have been positioned on the unit at the same height as the instrument height mark. Because the guide fiber that guides the infrared beam into the inside of the instrument uses the same material as that used in infrared filters, the unit is not easily influenced by outside light. The sensor's wide signal reception range allows you to operate the keyboard while standing in a normal position.

## ■ Extra-large memory capacity

Whether storing point data from large sites, downloading data from a PC for setting out or applying feature codes, Series10's large memory capacity supports all your surveying needs. Series10 stores up to 10,000 points. Because data can be recorded in 10 different job files, job data from different work sites can be handled at the same time. Additionally, scale factor compensation can be configured for each job file.

## ■ CompactFlash Card Unit (Factory option)

A card unit for commercially available CompactFlash memory cards can be added as an option to the SET210/310/510. 72,000 points (eighteen 4,000-point files) can be stored with an 8MB memory card, while a 16MB memory card provides 144,000 points of data storage (thirty-six 4,000-point files).

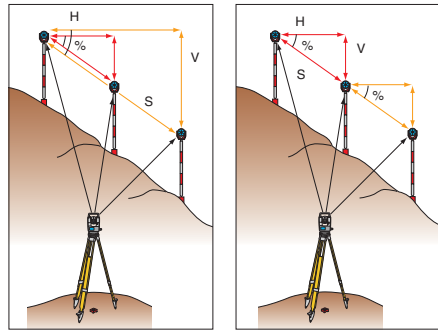


- Memory card not included.
- Memory cards of up to 64MB can be used.
- Some CompactFlash cards may not be compatible.

# A wide variety of functions provide increased operation efficiency

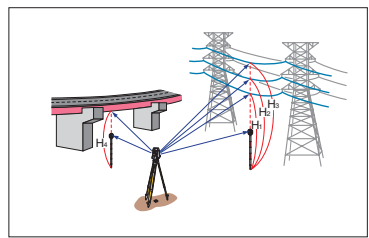


## Missing Line Measurement (MLM)



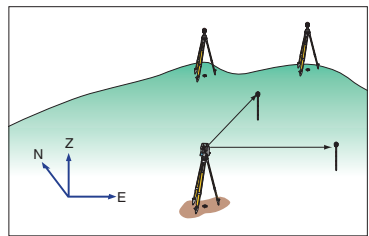
At the touch of a key, the Series 10 measures horizontal distance, slope distance, height difference and percentage of slope between two prisms.

## Remote Elevation Measurement (REM)



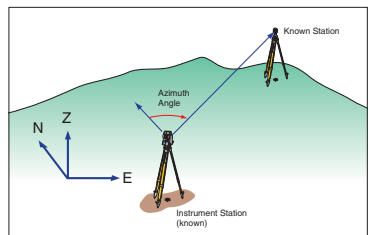
The Series 10 easily determines the height of a point where a prism cannot be placed. Sight a prism either directly above or directly below the target point, and then sight the target point.

## 3-D Coordinate Measurement



The Series 10 calculates 3-D coordinate values of measuring points and displays them either as N,E,Z or E,N,Z.

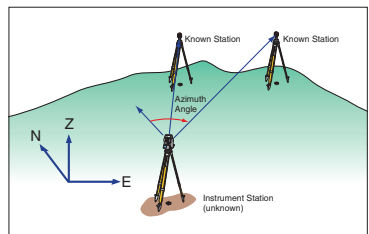
## Automatic Azimuth Angle Setting



The Series 10 can automatically set the horizontal angle to the azimuth of a back sight by using the coordinates of the instrument station and the back sight point.

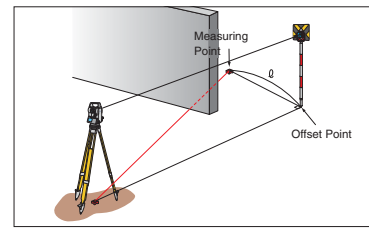
## Resection

The Series 10 can determine the azimuth and coordinates of an unknown instrument station with 2 to 10 known points. When using two points, measure both angles and distances.



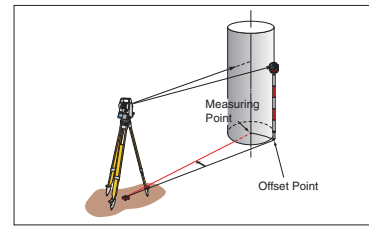
When using three or more points, the distance is not required. Station elevation from known reference points (up to 10 points) can also be calculated and each deviation of multiple reference points is displayed. If a bad point is selected it can be recalculated, re-observed or replaced with a new point.

## Offset/Distance



The Series 10 calculates the angles and distance, or the coordinates of the measuring point by inputting the distance and direction between the measuring point and the offset prism.

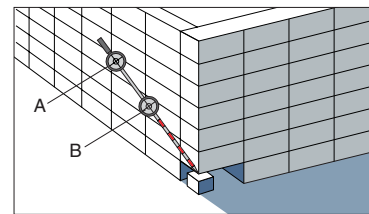
## Offset/Angle



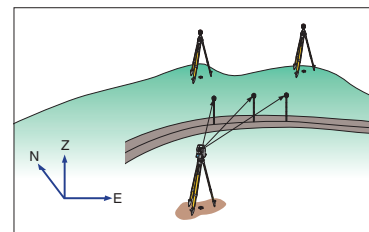
The Series 10 automatically calculates the position of measuring points. First, set the prism on either side of the measuring point at the same distance from the Series 10 instrument. Measure the prism, then sight the measuring point.

## Two-Distance Offset

With the use of a 2RT500-K 2-point target, the Series 10 can measure hidden points easily and efficiently. Set the two-point target on the measuring point (the target does not have to be perpendicular), measure targets A and B, and input the length between target B and the measuring point. The Series 10 calculates the position of the measuring point in angles and distance, or in coordinate values.



## Setting Out



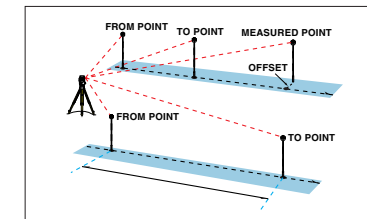
The Series 10 performs three-dimensional setting out with N, E and Z or E, N and Z coordinates. Directions and distances to the setting out position are indicated on the screen.

## Set-out Line

The Set-out line program is used for setting out and checking alignment of curb lines, construction boards and grades of pipes. A baseline or an offset from baseline can be defined. When calculating the measuring point, it's possible to calculate and use the scaled down coefficient of the distance and surveyed value that was calculated using the known coordinate values of 2 points.

## Point Projection

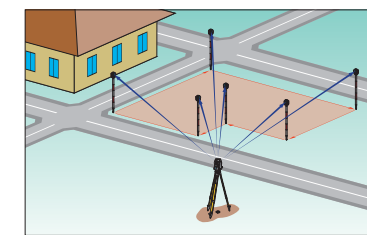
This program projects a point onto a line. It calculates the distance and offset of the point relative to the specified baseline, and it computes the coordinates of the intersection point, which can then be directly set out. Elevations are interpolated where possible.



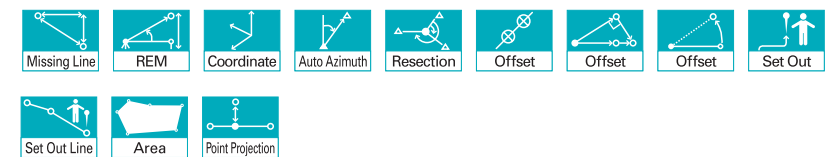
When calculating the measuring point, it's possible to calculate and use the scaled down coefficient of the distance and surveyed value that was calculated using the known coordinate values of 2 points.

Illustration of Set-out Line and Point Projection.

## Area Calculation



The Series 10 can use measured points or stored data to calculate an area.



## SDR Series Data Collectors (Optional)

Sokkia's extremely popular SDR series data collectors can be fully utilized through the 2-way communication capability of the Series 10 instruments. Highly sophisticated programs such as Topography, Traverse Adjustment, Building Face Survey, various types of Setting Out measurement, Road measurement and more are available through combined use of the Series 10 and SDR data collectors.

## Standard Accessories

BDC46A rechargeable battery (SET210/310/510: 2 pcs, SET610: 1pc.), CDC61/62/64/68 quick charger, CP7 tubular compass, lens hood, lens cap, plumb bob, tool kit, operator's manual, carrying case and shoulder strap.

## Optional Accessories

SF14 wireless keyboard\*, CF card unit\* (factory option), BDC12 Ni-Cd large external battery, EDC3 power cable for BDC12 (2m), EDC7 power cable for BDC12 (0.5m), CDC14 battery charger for BDC12, DOC26 25-pin interface cable, DOC46 printer cable (for connection to a Centronics compatible printer that supports ESC/PTM), DE25 diagonal eyepiece, EL7 40x eyepiece, EL6 30x eyepiece (for SET610), OF3A solar filter, SC189 backpack. For more information, please consult your local dealer.

\* SET210/310/510 only

## Shifting Tribrach Models (Optional)

The SET310S, SET510S, SET610S are available with shifting tribrach.

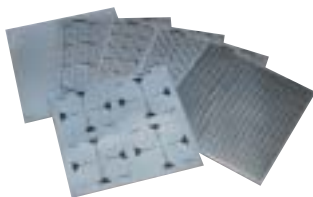
## Low Temperature Model (Factory option)

The SET510 Low Temperature Model is optionally available. It features Sokkia's new LCD and lubricant technology to ensure extremely smooth operation in climates as cold as -30°C (22°F), without compromising performance in high temperatures.



### ■ Fast and reliable EDM

Series 10 total stations measure the distance every 1.6 seconds through use of the fine-continuous measurement mode. With glass prisms, a high accuracy of  $\pm(2 + 2 \text{ ppm} \times D)$  mm is achieved. With the rapid measurement mode, distance is measured every 0.8 seconds, and the tracking mode updates the distance data every 0.3 seconds.



### ■ Large variety of reflective sheet targets for more versatility in the field



Sokkia offers a large lineup of reflective sheet targets including; adhesive sheet type targets, rotating type targets with pin-poles, rotating type targets for tribrachs, 2-point targets for hidden points and reflective staves for cross-sectional surveying.



These innovative targets extend the boundaries of your survey tasks while lowering costs.

### ■ Triple-axis compensation for dependable angle measurement

The dual-axis compensator monitors instrument tilt in two directions and corrects both vertical and horizontal angle values. The collimation function corrects the deviations of the telescope's mechanical axis. These monitoring systems automatically provide the maximum angle measurement accuracy.

### ■ Easy-to-use keyboard

Enjoy an efficient workflow and greater productivity thanks to Series 10's ergonomic keyboard. Customizable softkeys enable reconfiguration of desired functions to any key position.

### ■ Extra-wide screen

Never lose sight of your project. Series 10's high-density screen (192 x 80 pixels) provides optimum data visibility in a variety of temperatures.



### ■ Compact Lithium Ion battery

Take 7.5 hours of continuous angle and distance measurements with Series 10's rechargeable Lithium Ion battery. Unlike Ni-Cd cells, Series 10's Li-Ion batteries can be fully recharged at anytime, without diminishing the batteries' energy



capacity. BDC46A/BDC46 batteries are commonly used for Sokkia's digital levels, etc.



### ■ Enhanced security

A password-protection function is included for security purposes. You can assign your own password to the instrument to prevent unauthorized use.



\* SET210 • SET310 • SET510 (Optional)  
 \*\* SET210 • SET310 • SET510 (Factory option)

# Series 10 SET210 · SET310 · SET510 · SET610

## SPECIFICATIONS

### Total Stations

		SET210	SET310	SET510	SET610
Telescope		Fully transiting, coaxial sighting and distance measuring optics.			
Length		170mm (6.7in.)			
Objective aperture		45 mm (1.8 in.) [EDM: 48 mm (1.9 in.)]			
Magnification		30 x			26 x
Image		Erect			
Resolving power		3"			3.5"
Field of view		1°30' (26 m/1,000 m)			
Minimum focus		1.0m (3.3 ft.)			
Reticle illumination		Built-in. 5 brightness levels			
Angle measurement		Photoelectrical absolute rotary encoder scanning. Both circles adopt diametrical detection.			
Unit		Degree / Gon / Mil, selectable			
Display resolutions		H&V 1" / 5", 0.2mgon / 1mgon, 0.005 mil / 0.02 mil, selectable			
Accuracy (ISO17123-3:2001)		H&V 2" (0.6mgon) (0.01mil) 3" (1 mgon) (0.015mil)		5" (1.5 mgon) (0.02mil) 6" (1.9 mgon) (0.025mil)	
Measuring time		Less than 0.5 sec., continuous			
Measurement mode		H Clockwise / Counterclockwise, selectable ; 0 set, Hold, angle setting, repetition, available V Zenith 0°, Horizontal 0°, Horizontal 0° ±90°, slope in % , selectable			
Automatic dual-axis compensator		ON (V&H, V only) / OFF selectable			
Type		Dual-axis liquid tilt sensor			
Range		±3" (±55 mgon), * out-of-range * warning display provided			
Display resolution		According to display resolution			
Collimation program		ON / OFF selectable			
Fine motion screws		Fine/Coarse two-speed motion   One-speed motion			
Distance measurement		Modulated near infrared light (IEC Class 1 LED)			
Measuring range (slope distance)		A: Average conditions: slight haze, visibility about 20 km (12 miles), sunny periods, weak scintillation. G: Good conditions: no haze, visibility about 40 km (25 miles), overcast, no scintillation.			
With RS90N-K reflective sheet target		A	2m to 120m (390ft.)		
With CP01 compact prism		A	1m to 800m (2,620ft.)		
With one AP01 prism		A	1m to 2,400m (7,870ft.)		
		G	1m to 2,700m (8,850ft.)		
With three AP01 prisms		A	1m to 3,100m (10,160ft.)		
		G	1m to 3,500m (11,480ft.)		
Accuracy (D=measuring distance; unit: mm)		With prism		Fine meas. ± (2 + 2ppm x D) mm Rapid meas. ± (5 + 5ppm x D) mm	
		With reflective sheet target*1		Fine meas. ± (4 + 3ppm x D) mm Rapid meas. ± (5 + 5ppm x D) mm	
Unit		Meters / Feet / Inch, selectable			
Display resolution		Fine meas. 0.001 m (0.01 ft. / 1/8 inch) Rapid meas. 0.001 m (0.01 ft. / 1/8 inch) Tracking meas. 0.01 m (0.1 ft. / 1/2 inch)			
Measuring time		Fine meas. Every 1.6 sec. (initial meas. 2.8 sec.) Rapid meas. Every 0.8 sec. (initial meas. 2.3 sec.) Tracking meas. Every 0.3 sec. (initial meas. 1.8 sec.)			
Measurement mode		Fine meas. (single/repeat/average) / Rapid meas. (single/repeat) / Tracking, selectable			
Atmospheric correction		(1) Temperature / pressure input, (2) ppm input, (3) w/o compensation, selectable			
Prism constant correction		-99 mm to +99 mm (1 mm steps)			
Refraction & earth-curvature correction		ON (K=0.142 / K=0.20) / OFF, selectable			
Data storage and transfer					
Data storage Internal memory		About 10,000 points			
CompactFlash card unit *2		Optional			n/a
Scale factor setting		0.5 to 2.0			
Interface		Asynchronous serial, RS-232C compatible, baud rate : 1,200 to 38,400 bps			
Printer output		Centronics compatible (w/optional DOC46 printer cable)			
General					
Display		Alphanumeric/graphic dot matrix LCD (192 x 80 dots) w/backlight, on both faces			Alphanumeric/graphic dot matrix LCD (192 x 80 dots) w/backlight, on one face
Keyboard		4 softkeys and 11 keys on both faces			
Wireless keyboard		Optional			
Sensitivity of levels Plate level		20" / 2 mm		30" / 2 mm	
Circular level ( in tribrach )		10" / 2 mm			
Graphic LCD level		3" / outer circle			
Optical plummet		Image: Erect, Magnification: 3x, Minimum focus: 0.3 m (0.99 ft.)			
Water and dust resistance		Conformity to class IP66 (IEC60529)			
Operating temperature*3		-20° C to +50° C (-4° F to +122° F)			
Tilting / Trunnion axis height		236mm (9.3in.) from tribrach bottom, 193mm (7.6in.) from tribrach dish.			
Size with handle and battery		W 165 x D 170 x H 341 mm (W 6.5 x D 6.7 x H 13.5 in.)			
Weight with handle and battery		5.2 kg (11.4 lb.)			5.0 kg (11.1 lb.)
Power supply		Operating voltage : 6.7V ~ 8.0V DC			
BDC46A Li-Ion detachable battery		Angle & distance continuous use*4: About 7.5 hours (About 900 points), Angle measurement only: About 10 hours Recharging time with standard quick charger: Less than 2 hours			
BDC12 external Ni-Cd battery (optional)		Angle & distance continuous use*4: About 28.5 hours, Angle measurement only: About 37.5 hours			
Battery level display		4 steps with warning message.			
Automatic power cut-off		30 / 15 / 10 / 5 minutes after operation / OFF, selectable			
Resume function		ON / OFF selectable (backed up for about 1 week)			

\*1 When the beam's incident angle is within ±30° up and down / right and left in relation to the surface of the target.

\*2 Flash memory card not included. The 8MB CompactFlash memory card provides approximately 72,000 points of data storage.

\*3 SET510 Low Temperature Model operates under -30°C to +50°C (-22°F to +122°F).

\*4 Fine & single measurement with 30 sec. measurement intervals at 25°C (77°F).

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