

# SOKKIA

# NET05 NET1

## AUTOMATED 3-D STATION



**Precision &  
Reliability**

# A Giant Leap in the precision measurement of Mammoth structures

Since its groundbreaking debut in 1990, SOKKIA's NET series 3-D Stations have been evolving in precision, functionality and versatility to meet the changing needs of precision measurement applications. Featuring the latest technological breakthroughs, NET05 and NET1 offer unprecedented precision as well as the automated capability to satisfy the most demanding measurement tasks.

## NET05

### An Ultra-Precision 3-D Station

#### 0.5" Angle accuracy

NET05 employs SOKKIA's unique Independent Angle Calibration System (IACS) technology for unparalleled measurement reliability. Combined with enhanced absolute encoders utilizing SOKKIA's market proven RAB code (RANdom Bidirectional code) technology, NET05 provides the industry's highest 0.5" (0.15mgon) angle measurement precision.

#### Super Laser Distance Meter opens the door to unprecedented precision

SOKKIA's breakthrough distance measurement technology ensures the industry's highest comprehensive performance.

- NET05 measures prisms with the industry's highest typical accuracy\*<sup>1</sup> (0.8mm + 1ppm) up to an astonishing 3,500m.
- Sub-millimeter (0.5mm + 1ppm)\*<sup>2</sup> typical accuracy using reflective sheets.
- Reflectorless measurement can be performed with (1mm + 1ppm) typical precision.
- The measurement speed has been dramatically quickened to 2.4 seconds or less in fine measurement mode.

\*<sup>1</sup> Compared to existing Total Stations using normal surveying prisms, as of December 1, 2007.

\*<sup>2</sup> The highest accuracy among NET series 3D Stations and other Sokkia Total Stations.





## NET 1

### A Long-range and Versatile 3-D Station

#### 1" - 1mm Accuracy

NET1 measures angles with 1" (0.3mgon) typical accuracy and distances with (1mm + 1ppm) using reflective sheet targets. This level of precision meets the needs of various applications with an affordable cost.

#### Wide measurement range

A 200m reflectorless measurement range gives NET1 further versatility for applications where reflectors cannot be placed. NET1 measures up to 300m with 50 x 50mm reflective sheet targets.

### Automated 3-D Station

Sokkia's High-Precision 3-D station is now automated. Another Sokkia industrial measuring solution goes into action. Construction management and maintenance for: Shipbuilding, Rail

Vehicles, Automobiles, Bridges, Wind Turbine Generators, Plant Facilities and more. Automatic deformation monitoring in: Tunnels, Subways, Dams, Slopes and Heavy Construction Sites. The NET1 is an auto-pointing, auto-tracking 3-D station that combines rugged reliability with the precision you need to measure large objects and monitor the displacement of large structures. The NET1 features a high performance EDM, a dedicated auto-pointing algorithm and high-precision motor drive mechanism to accurately sight targets and track

moving prisms. The NET1 incorporates the upgradeable Windows® CE based OS and has an easy-to-use touch screen. It is also equipped with Bluetooth® wireless technology for cable-free connections to controllers PCs and other peripherals.

#### Automatic measurement function

The NET1 can perform auto-pointing using both prisms and reflective sheet targets for automatic deformation monitoring. Auto-tracking of moving prisms further broadens measurement possibilities. A dedicated auto-pointing algorithm allows the NET1 to sight the target closest to the center of the telescope even if multiple reflective objects are present in the field of view.



## Applications

# Automated measurement capability expands application possibilities

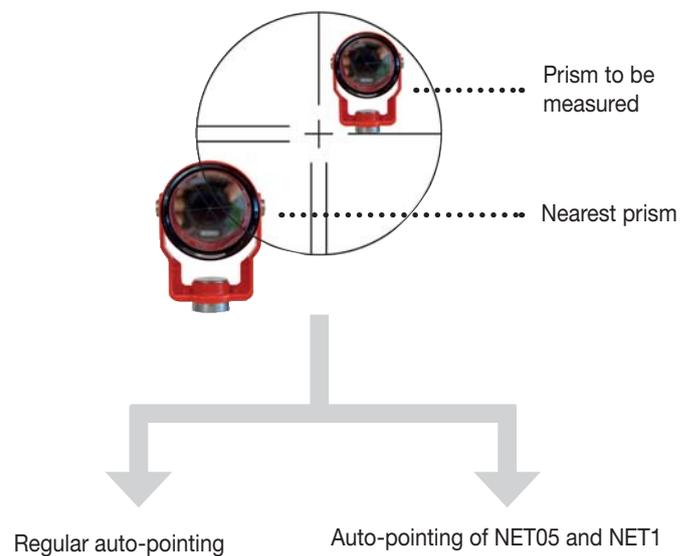


## Monitoring

Effectively perform displacement and deformation monitoring using the state-of-the-art automated measurement functionality.

- Bridges, buildings, dams, mining sites, tunnels, railroads and other large structures, both existing and under construction, can be automatically monitored even without an operator.
- NET05 and NET1 implement an exclusive autopoiting algorithm\* for monitoring applications. The NET 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. This function remarkably enhances the reliability of periodic monitoring with predetermined prisms.

\* With a regular auto-pointing algorithm, the instrument sights the nearest target with the strongest reflection.

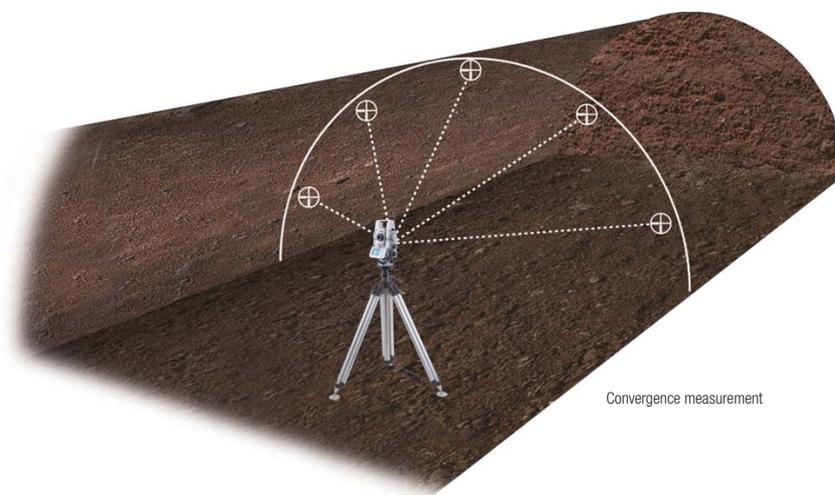




## Tunnels

Measure tunnel convergence and deformation more efficiently than ever.

- Quickly and accurately measure the convergence of tunnel supports, crowns and walls, especially in sites using NATM.
- Rapidly measure tunnel cross-section profiles using the combination of reflectorless EDM and motor drive functionality. The long reflectorless range of NET1 makes it an ideal solution.
- The auto-tracking function of NET05/NET1 allows it to precisely control the position and attitude of tunnel shield machinery.
- NET05/NET1 can be employed for automatic or unmanned monitoring of tunnels, either existing or under construction, to ensure safety and save labor.



Convergence measurement



## Ship building

Effectively perform displacement and deformation monitoring using the state-of-the-art automated measurement functionality.

- NET05/NET1 dramatically increases construction efficiency and accuracy with its superior measurement capability in combination with unique target systems.
- Precise geometry measurement enables accurate manufacture of ship blocks, resulting in smoother assembly minimizing on-site trimming.
- Accurate positioning of each block results in improved overall ship quality.



## Bridges

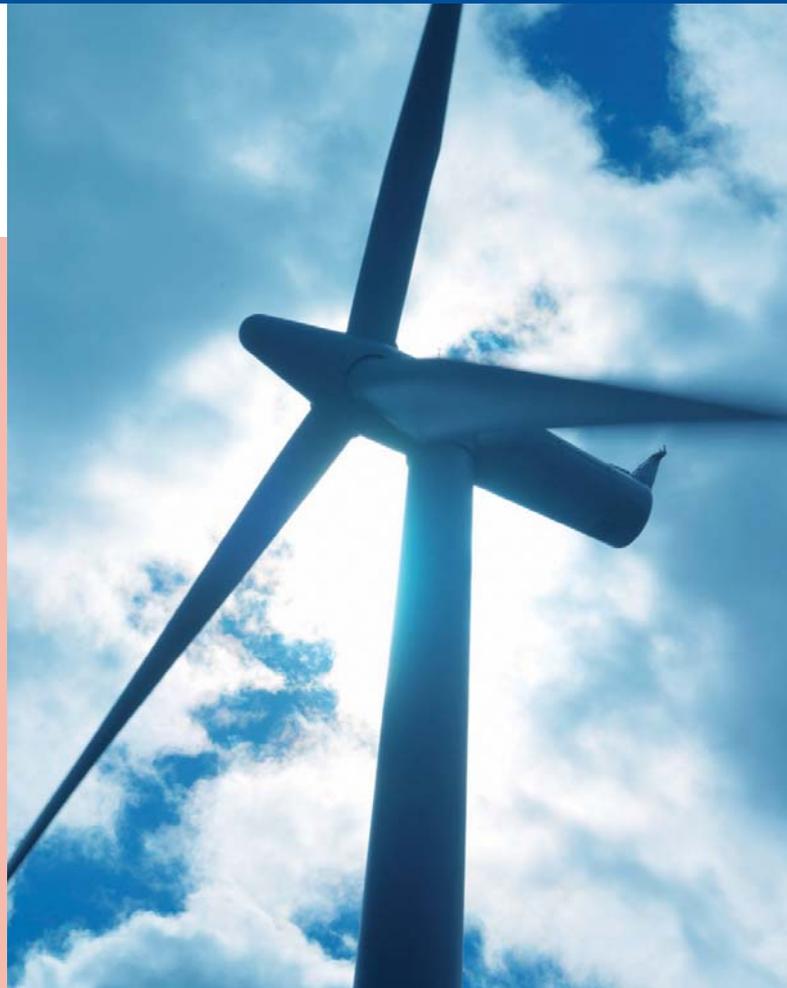
Perform precision measurement easily using reflective sheet targets and compact prisms to enable high quality bridge construction with less lead time

- In-process measurement of framework members ensures accurate manufacture resulting in shorter on-site assembly times.
- Automatically monitor displacement and deformation of existing bridges for maintenance and safety purposes.

## Plants

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.



## Vehicles and Aircraft

NET05 provides a flexible solution for the precise measurement of dimensions and geometry of various vehicles and aircraft during manufacturing, service and maintenance.

- NET05 measures points with submillimeter accuracy using reflective sheet targets that can be directly applied to the measuring points.
- The easy-to-locate mobile system is convenient for 3D measurement from multiple positions.



Software

# GLM, Sokkia's industrial business partner

GLM, our Germany based official worldwide industrial partner is specialized in complete tailor-made systems to meet the requirements of the customer, offering both complete optical 3-D solutions and software. Being active for over a decade GLM has gained experience in many industrial applications. Sokkia's superior accuracy measurement 3-D stations in combination with GLM's 3-DIM software and range of reflective targets offer a solution for almost every industrial measuring job.

## 3-DIM Software

Graphical software for industrial surveying applications

The easy-to-use 3-DIM software range is especially developed for industrial surveying applications. For shipbuilders, railway engineers, bridge builders and many others, 3-DIM is an essential tool for preparation and documentation of dimensional control tasks.

Since the first release 3-DIM has continuously improved, considering new requirements of customers and supported by the experience of GLM's industrial surveying engineers. The software runs on different platforms such as controllers and PC's.

## 3-DIM Observer Motorized

Tracking, Scanning and Monitoring GLM data logger for motorized Sokkia 3-D Stations

Especially designed for motorized Sokkia 3-D stations, 3-DIM Observer Motorized software makes it possible to automatically create design coordinates with maximum tolerances. After scanning,

3-DIM Observer Motorized shows the deviation between the measurement and the design coordinate. Points which are out of tolerance will be marked immediately. In addition 3-DIM motorized offers a lot of other functions for intelligent measuring like: Monitoring, Scanning, Tracking, Iterative Stake-out.

One system for every job!!!

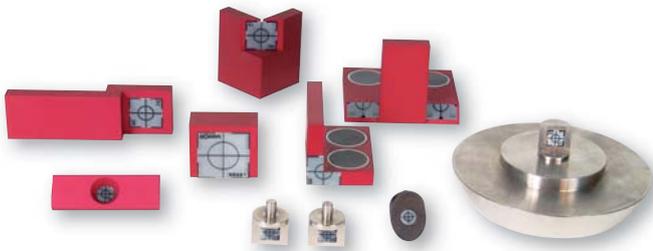


**3-DIM**  
OBSERVER

**3-DIM**  
OBSERVER  
MOTORIZED

## A complete range of reflective target adapters

To make the measuring with Sokkia's MONMOS systems easier and more accurate GLM developed a complete range of reflective target adapters. This range of adapters is very economic in comparison to the use of prisms; prisms break more easily and are much more expensive. The range includes side wall target adapters, paired



target adapters, adapters with pin, spherical adapters, target adapters for edges, target adapters for front or rear faces and shipbuilder's target adapters for molding edges. Of course any other adapter can be designed whenever needed because they are developed and manufactured on request.

## DKD- and PTB- Calibration laboratory for the measurement categories longitude and angle

All Sokkia industrial instruments and GLM targets adapters are calibrated and certificated by the DKD-Calibration laboratory (Germany) before delivery. This to guarantee our customers a high accuracy.

All check-ups, calibrations and certifications are done in compliance with EN-standards. Our membership

in the German calibration service (DKD), which is controlled by the German federal physical and technical agency (PTB), guarantees compliance of longitude and angle with national norms and regulations. Results of the calibration are listed in a special certificate, the DKD-calibration license. This certificate conforms to all requirements of the DIN ISO series of standards for control of inspection, measuring and test equipment.



## Product Features

# Auto Pointing Auto Tracking Motor Drive Remote Control

Fully equipped with advanced features to enhance measurement efficiency.

### Auto-Pointing

The auto-pointing function uses both reflective prisms and sheet targets\* to realize automatic measurement such as unmanned monitoring systems.

- 1,000m auto-pointing range using one AP prism.
- An exclusive auto-pointing algorithm ensures reliable measurement to the predetermined prisms in periodic monitoring applications.

\* Excluding "Half Type Targets".

### Target Illumination

- Prisms or sheet targets can be located easily in dim lighting conditions using the high-intensity white LED built into the telescope.
- Brightness and illumination patterns can be selected according to the environment.

### Auto-Tracking

NET05/NET1 constantly tracks a moving prism up to 90kmph at a distance of 100m, or 18kmph at 20m.

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

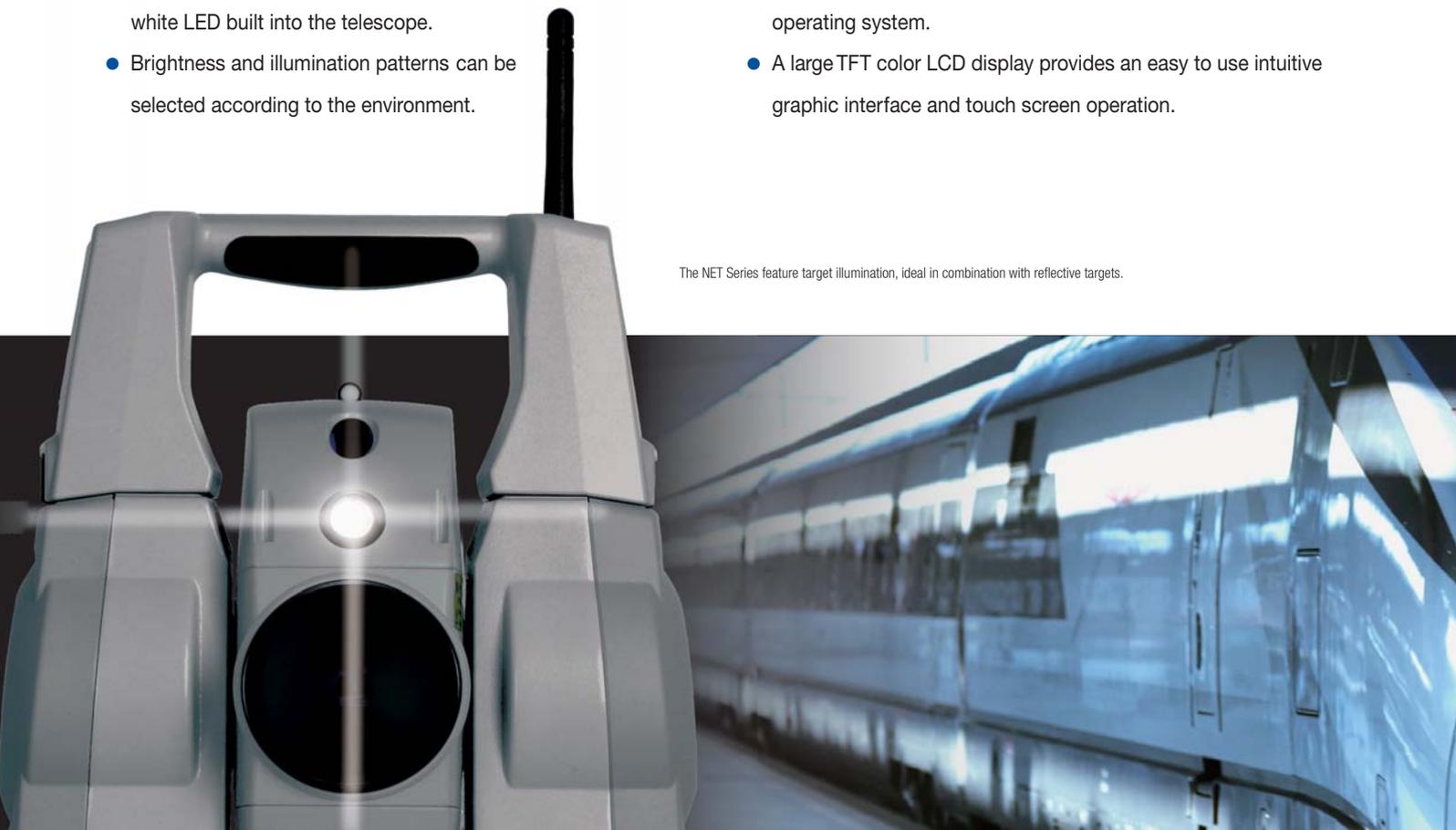
### Perfectly Aligned Laser Pointer

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

### Windows® CE

- NET05/NET1 incorporates the upgradeable Windows® CE operating system.
- A large TFT color LCD display provides an easy to use intuitive graphic interface and touch screen operation.

The NET Series feature target illumination, ideal in combination with reflective targets.





### Multiple Data Storage

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

\* CF type adapter required.

### Highest Environmental Protection

- Highest in its class\* IP64 dust-water resistant body stands up under dusty or wet conditions.
- Waterproof multi-port maintains IP64 protection even with an RS-232C data cable or an external battery connected.

\* Among the motorized Total Stations as of December 1, 2007.

### Unique and Versatile Targets

- The full line of dedicated NET series targets can be used.

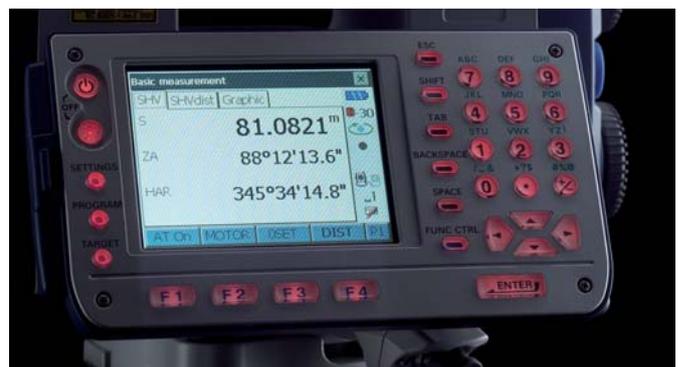
For working in dark environments;  
the good visible display and fully  
illuminated keyboard.

### Bluetooth® Wireless Communication

H-BT1 and RC-TS3 handles include a Class 1 *Bluetooth*® device to allow wireless communication with an external controller or PC up to 300m.

### 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.





## SPECIFICATIONS

		NET05	NET1
<b>Telescope</b>		Fully transiting, Coaxial sighting & distance measuring optics. Magnification 30x Resolving power 2.5" Minimum focus 1.3m	
<b>Angle measurement</b>		Absolute encoder scanning. Both circles adopt diametrical detection.	
<b>Unit</b>		Degree / Gon / Mil, selectable	
<b>Display resolutions (selectable)</b>		0.2" / 0.5", 0.00005 / 0.0001gon, 0.001 / 0.002mil	0.5" / 1", 0.0001 / 0.0002gon, 0.002 / 0.005mil
<b>Accuracy (ISO 17123-3:2001)</b>		0.5", 0.15mgon, 0.0025mil	1", 0.3mgon, 0.0005mil
<b>IACS (Independent Angle Calibration System)</b>		Provided	
<b>Automatic dual-axis compensator</b>		Dual-axis liquid tilt sensor	
<b>Working range</b>		±4' (±74mgon)	
<b>Distance measurement</b>		Modulated laser, Phase comparison method with red laser diode (690nm)	
<b>Laser output<sup>1</sup></b>	Reflectorless mode	Class 2 (max. 0.99mW)	Class 3R (max. 0.99mW)
	Prism/Sheet mode	Class 1 equivalent (max. 0.22mW)	
<b>Measuring range<sup>2</sup></b>	With one AP prism	1.3 to 3,500m	1.3 to 3,500m
	With CP prism	1.3 to 800m	1.3 to 1,000m
	With sheet target (RS50N-R) <sup>3</sup>	1.3 to 200m	1.3 to 300m
	Reflectorless <sup>4</sup>	0.3 to 40m <sup>5</sup>	0.3 to 200m <sup>5</sup>
<b>Unit</b>		Meter / Foot / US Foot / Inch, selectable	
<b>Minimum display resolutions</b>	Fine / Rapid	0.0001m	
	Tracking	0.001m	
<b>Typical Accuracy<sup>2,7</sup> (ISO 17123-4:2001)<sup>8</sup> With AP/CP prism</b>	With sheet target <sup>3</sup>	(0.8 + 1ppm x D)mm	(1.5 + 1ppm x D)mm
	With sheet target <sup>3</sup>	(0.5 + 1ppm x D)mm	(1 + 1ppm x D)mm
	Reflectorless <sup>4</sup>	(1 + 1ppm x D)mm <sup>5</sup>	(3 + 1ppm x D)mm <sup>5</sup>
<b>Measuring time<sup>9</sup></b>	Fine	every 0.9s (initial 2.4s)	
	Rapid	every 0.6s (initial 2.0s)	
	Tracking	every 0.4s (initial 1.3s)	
<b>Auto-pointing &amp; Auto-tracking</b>		Pulse laser transmitter and CCD detector integrated in telescope with co-axial optics	
<b>Auto-pointing range/Auto-tracking range<sup>9</sup></b>			
	With one AP prism	1,000m / 800m	
	With CP prism	700m / 600m	
	With ATP1 360° prism	600m / 500m	
	With sheet target (RS50N-R) <sup>10</sup>	50m / n/a	
<b>OS &amp; Control</b>		Operating system Windows® CE Ver.5.0	
<b>Display</b>		3.5in. Transreflective TFT QVGA color LCD with backlight, Touch Screen, on single face	
<b>General</b>		Dust and water protection IP64 (IEC 60529:2001), (IP64 is maintained while connected with an RS-232C or an external power cable.)	
<b>Operating temperature / Storage temperature</b>		-10 to +50°C / -30 to +70°C	
<b>Size with handle<sup>11</sup> &amp; battery / Instrument height</b>		W201 x D202 x H375mm / 236mm from tribrach bottom	
<b>Weight with handle<sup>11</sup> &amp; battery</b>		7.6kg	
<b>Power supply</b>		7.2V DC	
<b>BDC58 detachable battery</b>		Li-ion rechargeable battery, 7.2V, 4.3Ah, 2 BDC58 are included as standard accessories.	
<b>Standard detachable battery BDC58 (Li-ion, 4.3Ah)</b>		Approx. 3 hours (Continuous use at 20°C) <sup>12</sup>	
<b>External battery BDC61 (Ni-MH, 13Ah)</b>		Approx. 9 hours (Continuous use at 20°C) <sup>12</sup>	

<sup>1</sup> IEC 60825-1; Amd.2:2001, FDA CDRH21 CFR Part1040.11. <sup>2</sup> Under good conditions: No haze, visibility about 40km, overcast, no scintillation. <sup>3</sup> When squarely aligned with the target. <sup>4</sup> With KODAK Gray Card White Side (90% reflective). Reflectorless range/accuracy may vary according to measuring objects, observation situations and environmental conditions. <sup>5</sup> Measured object brightness: 5.000 lx or less (indoor, underground or dim conditions) <sup>6</sup> Measured object brightness: 30.000 lx or less (cloudy weather, or similar conditions) <sup>7</sup> D=measuring distance in 'mm'. <sup>8</sup> Time of reflectorless measurement may vary according to measuring objects, observation situation and environmental conditions. <sup>9</sup> Under average conditions: Slight haze, visibility about 20km, sunny periods, weak scintillation. <sup>10</sup> When the measuring beam's incidence angle is within ±15° to the target surface, indoor conditions with sufficient contrast between the target and background. <sup>11</sup> Basic handle H-BC1 <sup>12</sup> Auto-pointing with H&V 180° rotation and fine single measurement every 30s.

SOKKIA CO. LTD., founded in 1920 in Japan, is a leading manufacturer in developing complete measurement solutions for surveying, construction and industrial measurement applications. Sokkia's portfolio includes GNSS systems (Global Navigation Satellite Systems), reflectorless and robotic total stations, digital theodolites, automatic/digital levels, rotation/line lasers and software.

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### NET05

**LASER RADIATION**  
AVOID DIRECT EYE EXPOSURE  
MAX 0.99mW LD 690-695nm  
CLASS 2 LASER PRODUCT  
IEC 60825-1 Am2 2001

### NET1

**LASER RADIATION**  
AVOID DIRECT EYE EXPOSURE  
MAX 0.99mW LD 690-695nm  
CLASS 3R LASER PRODUCT  
IEC 60825-1 Am2 2001



Sokkia is a sponsor of the International Federation of Surveyors