DATASHEET

Trimble S9 and S9 HP Total Station

Key Features

Available **0.5" or 1"** angle accuracy

Trimble **DR Plus or HP EDM** for optimal speed, accuracy and reliability

Optional **Trimble VISION and SureScan technology**

Locate2Protect **real-time equipment management**

Intuitive **Trimble Access Field Software**

Trimble Business Center Office Software for **quick data processing**

Trimble 4D Control for **monitoring management**

PERFORMANCE AND PRECISION

The Trimble® S9 total stations integrate the best field technologies plus our highest level of accuracy and specialized engineering features for the ultimate in performance and precision. You can combine scanning, imaging and surveying into one solution, or focus on the highest level of accuracy with options such as LongRange FineLock™ and our Trimble DR High Precision (HP) EDM for applications where precision is priority. Back in the office, trust our powerful Trimble Business Center and Trimble 4D office software to help you process and analyze your data.

Specialized for Engineering Applications

The Trimble S9 total station is built for specialized applications such as monitoring and tunneling, where you need a solution with optimal speed, accuracy and reliability. Combine the Trimble DR HP EDM in the S9 HP with your choice of 1" or 0.5" angular accuracies and Long Range FineLock and you have the flexibility to tackle the most demanding projects.

Trimble DR Plus and DR HP EDM

Trimble DR Plus range measurement technology provides extended range of Direct Reflex measurement without a prism to exceptionally long distances, while the DR HP EDM in the S9 HP offers higher accuracy when measuring to prisms. Trimble's high performance EDMs, combined with the smooth and frictionless drive capabilities of MagDrive™ servo technology, creates unmatched capability for quick measurements, without compromising on accuracy.

Stay on Point

Reduce aiming error, avoid costly re-measurement and be confident in your results with Trimble SurePoint™. The Trimble S9 total stations aim and stay on target through wind, handling, and sinkage, actively correcting for unwanted movement ensuring accurate pointing and measurement every time. With exclusive MultiTrack™ technology and Target ID capabilities, surveyors can choose the type of target, passive or active, that best suits the job site conditions and be confident that they will find and lock to the correct target.

Advanced Engineering Features

Additional engineering-specific features in the Trimble S9 total stations include Trimble Finelock technology and the 3R laser pointer. Trimble Finelock detects targets without interference from surrounding prisms for high precision applications in close quarters. The Trimble LongRange FineLock option extends this functionality. With the Class 3R laser pointer in the Trimble S9 HP, you can visually mark points at greater range in tunnels or underground mines.

Manage Your Assets 24/7

Know where your total stations are 24 hours a day with Trimble Locate2Protect technology. See where your equipment is at any given time and get alerts if your instrument leaves a job site or experiences unexpected equipment shock or abuse.

Our Trimble InSphere Equipment Manager system lets you view usage and keep up-to-date on firmware, software and maintenance requirements. With Trimble Locate2Protect and InSphere Equipment Manager, you can rest assured knowing your equipment is up-to-date and where it should be.

Trimble VISION and SureScan Technology

The Trimble S9 comes with optional Trimble VISION™ and SureScan technology. The improved Trimble VISION gives you the power direct your survey with live video images on the controller as well as create a wide variety of deliverables from collected imagery. Trimble SureScan in the S9 total station provides the flexibility to perform feature-rich scans every day, without the complexity of setting up a separate scanning system or switching to specialized field software. SureScan ensures that you have even coverage and get the most efficiency from your scanning.

Powerful Field and Office Software

Trimble controllers and our specialized modules in Trimble Access™ field software such as Tunnels, Monitoring, Pipelines and Mines provide dedicated workflows to help you get the job done faster. Trimble Access workflows can also be customized to fit your needs.

In the office, use Trimble Business Center to help you check, process and adjust your data in one software solution. Trimble 4D Control™ office software provides a comprehensive solution for the management of monitoring projects—both real time and post-processed—to rapidly detect critical structural movements.

Trimble

Trimble S9 and S9 HP Configurations

	EDM	Accuracy	Servo	Trimble VISION	Sure Scan	FineLock	Long Range FineLock	3R Laser Pointer	Tracklight	ActiveTrack 360 Prism
S9	DR Plus	0.5"	Robotic	Yes	Yes	Yes	No	No	No	Yes
	DR Plus	0.5"	Robotic	No	No	Yes	Yes	No	No	Yes
	DR Plus	1"	Robotic or Autolock	No	No	Yes	Yes	No	No	Yes
S9 HP	DR HP	0.5"	Robotic	No	No	Yes	Yes	No	No	Yes
	DR HP	0.5"	Robotic or Autolock®	No	No	Yes	No	No	Yes	Yes
	DR HP	0.5"	Robotic	Yes	No	Yes	No	No	No	Yes
	DR HP	1"	Robotic or Autolock	Yes	No	Yes	No	No	No	Yes
	DR HP	1"	Robotic or Autolock	No	No	Yes	No	No	Yes	Yes
	DR HP	1"	Robotic or Autolock	No	No	Yes	Yes	No	No	Yes
	DR HP	1"	Robotic	No	No	Yes	No	Yes	No	Yes

PERFORMANCE (DR PLUS)

Angle measurement

Sensor type . . . . . Absolute encoder with diametrical reading
Accuracy (Standard deviation based on DIN 18723). . . . . 0.5″ (0.15 mgon) or 1″ (0.3 mgon)
Display (least count) . . . . . 0.1″ (0.01 mgon)
Automatic level compensator
  Type . . . . . Centered dual-axis
  Accuracy . . . . . 0.5″ (0.15 mgon)
  Range. . . . . ±5.4′ (±100 mgon)

Distance measurement

Accuracy (ISO)
  Prism mode
    Standard[1] . . . . . 1 mm + 2 ppm (0.003 ft + 2 ppm)
Accuracy (RMSE)
  Prism mode
    Standard . . . . . 2 mm + 2 ppm (0.0065 ft + 2 ppm)
    Tracking . . . . . 4 mm + 2 ppm (0.013 ft + 2 ppm)
  DR mode
    Standard . . . . . 2 mm + 2 ppm (0.0065 ft + 2 ppm)
    Tracking . . . . . 4 mm + 2 ppm (0.013 ft + 2 ppm)
  Extended Range . . . . . 10 mm + 2 ppm (0.033 ft + 2 ppm)

Measuring time

  Prism mode
    Standard . . . . . 1.2 s
    Tracking . . . . . 0.4 s
  DR mode
    Standard . . . . . 1–5 s
    Tracking . . . . . 0.4 s

Measurement Range

  Prism mode (under standard clear conditions[2,3])
    1 prism . . . . . 2,500 m (8,202 ft)
    1 prism Long Range mode. . . . . 5,500 m (18,044 ft) (max. range)
    Shortest range . . . . . 0.2 m (0.65 ft)

  DR mode

	Good (Good visibility, low ambient light)	Normal (Normal visibility, moderate sunlight, some heat shimmer)	Difficult (Haze, object in direct sunlight, turbulence)
White card (90% reflective)[4]	1,300 m (4,265 ft)	1,300 m (4,265 ft)	1,200 m (3,937 ft)
Gray card (18% reflective)[4]	600 m (1,969 ft)	600 m (1,969 ft)	550 m (1,804 ft)

    Reflective foil 20 mm . . . . . 1000 m (3280 ft)
    Shortest possible range . . . . . 1 m (3.28 ft)
  DR Extended Range Mode
    White Card (90% reflective)[4] . . . . . 2200 m

Scanning
Range[2,3] . . . . . from 1 m up to 250 m (3.28 ft–820 ft)
Speed[4] . . . . . up to 15 points/sec
Minimum point spacing . . . . . 10 mm (0.032 ft)
Standard deviation . . . . . 1.5 mm @ ≤50 m (0.0049 ft @ ≤164 ft)
Single 3D point accuracy . . . . . 10 mm @ ≤150 m (0.032 ft @ ≤492 ft)

EDM SPECIFICATIONS
Light source . . . . . Pulsed laserdiode 905 nm, Laser class 1
Beam divergence Prism mode
Horizontal . . . . . 4 cm/100 m (0.13 ft/328 ft)
Vertical . . . . . 8 cm/100 m (0.26 ft/328 ft)
Beam divergence DR mode
Horizontal . . . . . 4 cm/100 m (0.13 ft/328 ft)
Vertical . . . . . 8 cm/100 m (0.26 ft/328 ft)
Atmospheric correction . . . . . –130 ppm to 160 ppm continuously

PERFORMANCE (DR HP)
Angle measurement
Angle accuracy (Standard deviation based on DIN 18723) . . . . . 0.5″ (0.15 mgon) or 1″ (0.3 mgon)
Angle display (least count) . . . . . 0.1″ (0.01 mgon)

Distance measurement
Accuracy (ISO)
Prism mode
Standard[1] . . . . . 0.8 mm + 1 ppm (0.0026 ft +1 ppm)
Accuracy (RMSE)
Prism mode
Standard . . . . . 1 mm + 1 ppm (0.003 ft +1 ppm)
Tracking . . . . . 5 mm + 2 ppm (0.016 ft + 2 ppm)
DR mode
Standard . . . . . 3 mm + 2 ppm (0.01 ft + 2 ppm)
Tracking . . . . . 10 mm + 2 ppm (0.032 ft + 2 ppm)

Measuring time
Prism mode
Standard . . . . . 2.5 s
Tracking . . . . . 0.4 s
DR mode
Standard . . . . . 3–15 s
Tracking . . . . . 0.4 s

Range
Prism mode (under standard clear conditions[2,3])
1 prism . . . . . 3,000 m (9,800 ft)
1 prism Long Range mode . . . . . 5,000 m (16,400 ft)
3 prism Long Range mode . . . . . 7,000 m (23,000 ft)
Shortest range . . . . . 1.5 m (4.9 ft)
DR mode

	Good (Good visibility, low ambient light)	**Normal** (Normal visibility, moderate sunlight, some heat shimmer)	**Difficult** (Haze, object in direct sunlight, turbulence)
White card (90% reflective)[4]	>150 m (492 ft)	150 m (492 ft)	70 m (229 ft)
Gray card (18% reflective)[4]	>120 m (394 ft)	120 m (394 ft)	50 m (164 ft)

Shortest range . . . . . 1.5 m (4.9 ft)

EDM SPECIFICATIONS (DR HP)
Light source . . . . . Laserdiode 660 nm; Laser class 1 in Prism mode, Laser class 2 in DR mode
Beam divergence
Horizontal . . . . . 4 cm/100 m (0.13 ft/328 ft)
Vertical . . . . . 4 cm/100 m (0.13 ft/328 ft)

Trimble

Trimble S9 and S9 HP Total Station

SYSTEM SPECIFICATIONS

Leveling

Circular level in tribrach	8′/2 mm (8′/0.007 ft)
Electronic 2-axis level in the LC-display with a resolution of	0.3″ (0.1 mgon)

Servo system

MagDrive servo technology	integrated servo/angle sensor electromagnetic direct drive
Rotation speed	115 degrees/sec (128 gon/sec)
Rotation time Face 1 to Face 2	2.6 sec
Positioning speed 180 degrees (200 gon)	2.6 sec
Clamps and slow motions	Servo-driven, endless fine adjustment

Centering

Centering system	Trimble 3-pin
Optical plummet	Built-in optical plummet
Magnification focusing distance	2.3×/0.5 m–infinity (1.6 ft–infinity)

Telescope

Magnification	30×
Aperture	40 mm (1.57 in)
Field of view at 100 m (328 ft)	2.6 m at 100 m (8.5 ft at 328 ft)
Focusing distance	1.5 m (4.92 ft)–infinity
Illuminated crosshair	Variable (10 steps)
Autofocus	Standard

Camera (also available as an option in the DR High Precision version)

Chip	Color Digital Image Sensor
Resolution	2048 x 1536 pixels
Focal length	23 mm (0.09 ft)
Depth of field	3 m to infinity (9.84 ft to infinity)
Field of view	16.5° x 12.3° (18.3 gon x 13.7 gon)
Digital zoom	4-step (1x, 2x, 4x, 8x)
Exposure	Spot, HDR, Automatic
Brightness	User-definable
Image storage	Up to 2048 x 1536 pixels
File format	JPEG

Power supply

Internal battery	Rechargeable Li-Ion battery 11.1 V, 5.0 Ah
External power supply	12 V only external
Operating time[5]	
One internal battery	Approx. 6.5 hours
Three internal batteries in multi-battery adapter	Approx. 18 hours
Robotic holder with one internal battery	13.5 hours
Operating time for video robotic[7]	
One battery	5.5 hours
Three batteries in multi-battery adapter	17 hours

Weight and Dimensions

Instrument (Autolock)	5.4 kg (11.35 lb)
Instrument (Robotic)	5.5 kg (11.57 lb)
Trimble CU controller	0.4 kg (0.88 lb)
Tribrach	0.7 kg (1.54 lb)
Internal battery	0.35 kg (0.77 lb)
Trunnion axis height	196 mm (7.71 in)

AUTOLOCK AND ROBOTIC SURVEYING

Passive prisms	500 m–700 m (1,640–2,297 ft)
Trimble MultiTrack Target	800 m (2,625 ft)
Trimble ActiveTrack 360 Target (DR Plus EDM)	500 m (1,640 Ft)
Trimble ActiveTrack 360 Target (DR HP EDM)	200 m (656 ft)
Autolock pointing precision at 200 m (656 ft) (Standard deviation)[3]	
Passive prisms	<2 mm (0.007 ft)
Trimble MultiTrack Target	<2 mm (0.007 ft)
Trimble ActiveTrack 360 Target	<2 mm (0.007 ft)
Shortest search distance	0.2 m (0.65 ft)
Type of radio internal/external	2.4 GHz frequency-hopping, spread-sprectrum radios
Search time (typical)[7]	2–10 sec

FINELOCK

Finelock pointing precision at 300 m (980 ft) (standard deviation)[3]	<1 mm (0.003 ft)
Range to passive prisms (min–max)[3]	20 m–700 m (64 ft–2,297 ft)
Minimum spacing between prisms at 200 m (656 ft)	0.8 m (2.625 ft)
Long Range Finelock (not available in all models)	
Pointing precision at 2,500 m (8,200 ft) (standard deviation)[3]	<10 mm (0.039 ft)
Range to passive prisms (min.–max.)[3,8]	250 m–2,500 m (64 ft–8,200 ft)
Minimum spacing between prisms at 2,500 m (8,200 ft)	<10.0 m (32.808 ft)

GPS SEARCH/GEOLOCK

GPS Search/GeoLock	360 degrees (400 gon) or defined horizontal and vertical search window
Solution acquisition time[9]	15–30 sec
Target re-acquisition time	<3 sec
Range	Autolock & Robotic range limits

OTHER SPECIFICATIONS

Laser pointer coaxial (standard)	Laser class 2
Laser pointer non-coaxial (not available in all models)	Laser class 3R
Tracklight built in	Not available in all models
Operating temperature	–20° C to +50° C (–4° F to +122° F)
Dust and water proofing	IP65
Humidity	100% condensing
Communication	USB, Serial, Bluetooth®[6]
Security	Dual-layer password protection, Locate2Protect[10]
Tracking rate	10 Hz

1 Standard deviation according to ISO17123-4.
2 Standard clear: No haze. Overcast or moderate sunlight with very light heat shimmer.
3 Range and accuracy depend on atmospheric conditions, size of prisms and background radiation.
4 Kodak Gray Card, Catalog number E1527795.
5 The capacity in –20 °C (–5 °F) is 75% of the capacity at +20 °C (68 °F).
6 Bluetooth type approvals are country specific. Contact your local Trimble Authorized Distribution Partner for more information.
7 Dependent on selected size of search window.
8 Long Range FineLock can be used with standard FineLock from 20 m.
9 Solution acquisition time is dependent upon solution geometry and GPS position quality.
10 Functionality and availability dependent on region.

Specifications subject to change without notice.

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