



Leica TDR6000
Product Brochure
Version 01/2009

Leica
Geosystems

www.leica-geosystems.com/metrology



 **HEXAGON**
METROLOGY



The Laser Station Leica TDRA6000

The Leica TDRA6000 Laser Station is a portable inspection system designed for precision measurements on extremely large structures. It has an operational volume of 600 meters measuring 3d coordinates both with standard reflectors, and non-contact (reflectorless). The Leica TDRA6000 sets a new standard for ultra large scale metrology.

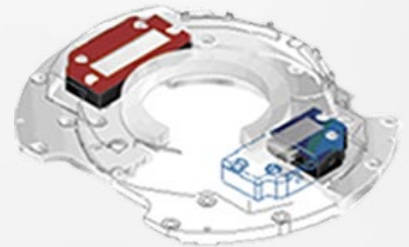
Leica Geosystems introduced the world to Industrial Total Stations in 1983 with the legendary TC2002. In 1995 we introduced the TPS5000 series as the world's first fully automated tracking Industrial Total Station. For decades, Leica Geosystems has supplied thousands of Industrial Theodolites and Total Stations worldwide – many in the toughest industrial environments imaginable, indoors and outdoors. Their ease of use and one-man operation capability make them the obvious choice for a large variety of metrology tasks in aerospace and shipbuilding as well as general precision applications. We have spent the last 25 years perfecting the Total Station for use in industrial environments, and the latest Leica Geosystems Laser Station incorporates everything that we have learned along the way.



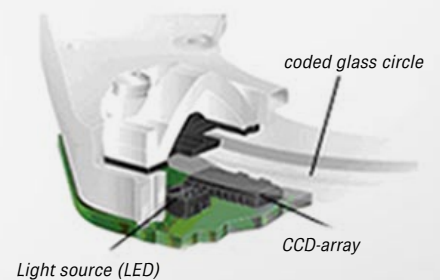
A new level of speed and performance



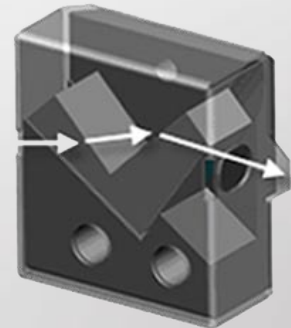
The all new Leica Geosystems proprietary direct drive technology has been designed from the ground up for this sensor. Based on piezo technology, these new direct drives enable high speed motorization and acceleration, at up to 4x our previous generation, but still allow sub micron level fine positioning. This revolutionary piezo technology has very low power consumption and because there are no gears, the drives require almost no maintenance, and are near silent.



A new high speed absolute angle encoder paired with our 4th generation Automatic Target Recognition (ATR) technology give the TDRA6000 Laser Station the best tracking performance in its class. This new quadruple angle detection system is accurate to 0.5 Arc Seconds (1σ) and is capable of 5000 measurements per second. The ATR and encoder feedback loop has been optimized for use with 1.5" corner cube reflectors and is specially tuned for use in a 600m volume.



The PinPoint Reflectorless Distance Meter allows non-contact measurements within the full 600m volume, and has a very small visible beam that allows precision measurements on difficult surfaces. This new EDM is based on our proven System Analyzer technology that takes advantage of both phase and time-of-flight information. The System Analyzer accuracy is further enhanced (specifically on corner cube reflectors) by passing the laser beam through a new anamorphic lens. This lens reshapes the beam with an optimized profile and footprint allowing the inhomogeneous peripheral light to be cut off from the laser beam completely.



Industrial grade measurements

With a typical 3D point uncertainty of 0.25 mm in a 30 meter volume, the new Laser Station TDRA6000 is the most accurate Total Station ever designed for industrial use. Automatic Target Recognition allows the sensor to perform automated deformation studies, as well as track a reflector for single man operations. While the PowerSearch module makes re-locking on to an interrupted reflector as easy as standing still.

Ship Building

With a measurement volume of up to 600m with a noncontact distance meter, the Laser Station TDRA6000 is positioned for any challenge, even the gigantic ship building industry. When paired with metrology focused software solutions designed to maximize the measurement throughput, no other sensor can compare to the Leica Laser Station's range or accuracy.

Machinery and Roller Alignment

Leica Industrial Total Stations have been used for decades for accurate positioning and inspection of industrial machinery like tire building machines, and process assembly machines. Our sensors have also been the cornerstone of precision roller alignment applications for equally as long. Whether you are inspecting or aligning steel mills or paper mills the Laser Station TDRA600 is the sensor for you.



Railway Manufacturing

The process of manufacturing and routine inspection for today's modern trains is not as simple as it used to be. The railway industry has tighter tolerances and higher throughput than ever before. With functions like non-contact measurements (reflectorless) and the highest speed automation on the market, there is no better railway performer than the Laser Station TDRA6000.

Aerospace and Accelerator Alignment

The tightest tolerances require the most precise sensors, and the Laser Station TDRA6000 is the most accurate of its kind. This is not just a surveying Total Station used for metrology applications, it is an Industrial Laser Station designed for the most demanding and highest accuracy jobs.

Power Generation

Wind, Solar and Nuclear power all rely on high accuracy large volume measurements to make sure that the equipment performs at its maximum potential. Whether you are erecting towers or inspecting blades for wind turbines, laying out solar mirror fields, or inspecting Nuclear reactor retrofits, the precision and flexibility of the Laser Station will be welcome changes to your daily work.



Targets and Accessories

With a collection of different metrology grade reflectors, adapters and accessories, the Laser Station TDRA6000 can be equipped to measure almost anything.

Tripods and Stands

Whether you work indoors or out, the stability of your setup is paramount. Therefore Leica Geosystems has a selection of tripods to make sure that your specific job needs can be fulfilled.



Leica TDRA6000 Laser Station Accuracies

All measurements are performed under stable indoor environmental conditions with the target squarely aligned. Distance measurements are verified against a laser interferometer over 120 m. Unless stated otherwise, all accuracies are Maximum Permissible Error ($\approx \pm 3 \sigma$), with typical accuracies being $\frac{1}{2}$ MPE (or approximately $\pm 1.5 \sigma$).

3D Point Accuracy

The measurement uncertainty of a coordinate " U_{xyz} " is defined as the deviation between a measured coordinate and the nominal coordinate of that point. This measurement uncertainty is specified as a function of the distance between the Laser Station and the measured point. The accuracy specified below is achieved with Leica Geosystems 1.5" Red Ring reflectors and the "Precise" measurement mode. Specifications are stated in Maximum Permissible Error (MPE). Typical results are $\frac{1}{2}$ MPE.

$U_{xyz} \leq 30$ m volume	$U_{xyz} > 30$ m volume
± 0.5 mm	± 0.3 mm + $13 \mu\text{m/m}$

Power Search Performance

Power Search Performance	1.5" RRR & BRR
Max Volume	100 m
Min Distance	2.0 m
Rotation Speed	200 gon/sec
Positioning time ¹	< 5 seconds

¹ 200 gon to full ATR Lock

General Information

Telescope Magnification	30 x
Focusing range	1.7 m to infinity
Keyboard and Display	Display: $\frac{1}{4}$ VGA, color, touch, both faces Keyboard: 34 keys, illuminated
Data storage	Internal memory: 256 MB Memory card: CompactFlash card 256 MB or 1 GB
Interfaces	RS232, Bluetooth® Wireless
Operation	Three endless drives for one or two hand operation Precision trigger key for manual measurements
Power Management	Internal: lithium-ion battery External: AC power supply
Weight Laser Station incl. battery	7.6 kg

Environmental specifications

Operating temperature	-20° C to +50° C
Dust/water	(IEC 60529) IP54
Humidity	95%, non-condensing

3D Point Reproducibility

The 3D Point Reproducibility " P_{RE} " is defined as the standard deviation between multiple measurements of a 3D point and is specified as a function of the distance between the LaserStation and the measured point. The accuracy specified below is achieved with Leica Geosystems 0.5" TBR and/or RFI reflectors using the "Precise" measurement mode.

$P_{RE} \leq 30$ m volume	± 0.2 mm
---------------------------	--------------

EDM Performance

EDM Performance	1.5" RRR & BRR ²	0.5" TBR & RFI ²	Reflective Tape ³	Non Contact (RL) ⁴
Max Volume	600 m	600 m	600 m	600 m
Min Distance	2.0 m	2.0 m	5.0 m	2.0 m
Accuracy (MPE) ¹	0.5 mm	0.5 mm	1.0 mm	2.0 mm

¹ Accuracy shown is Maximum Permissible Error (MPE). Typical results are 1/2 MPE.

² The 1.5" RRR is measured on the laser rail as standard.

³ 20 mm x 20 mm target from 5 m to 60 m and 60 mm x 60 mm target from 61 m to 120 m

⁴ RL measurements are done against the laser rail from 2 to 60 m

ATR & Lock Performance

ATR & Lock Performance	1.5" RRR & BRR	0.5" TBR & RFI ²	Reflective Tape ³
Max Volume	600 m	400 m	40 m
Min Distance	2.0 m	2.0 m	5.0 m
Accuracy (MPE) ¹	± 0.3 mm + $13 \mu\text{m/m}$	N/A	± 2.0 mm
Lock (Tracking) speed @ 20m	9 m/s Tangential	N/A	N/A

¹ Accuracy shown is Maximum Permissible Error (MPE). Typical results are 1/2 MPE.

² TBR & RFI reflectors can be used for point reproducibility (i.e. deformation studies).

³ 20 mm x 20 mm target from 5 m to 60 m and 60 mm x 60 mm target from 61 m to 120 m





Whether building the fastest car, the biggest plane, or the most precise tooling, you need exact measurements to improve quality and productivity. So when it has to be right, professionals trust Leica Geosystems Metrology to help collect, analyze, and present 3-dimensional (3D) data for industrial measurement.

Leica Geosystems Metrology is best known for its broad array of control and industrial measurement products including laser trackers, Local Positioning Technology (LPT) based systems, hand-held scanners, 3D software and high-precision total stations. Those who use Leica Metrology products every day trust them for their dependability, the value they deliver, and the world-class service & support that's second to none.

Precision, reliability and service from Leica Geosystems Metrology.

Leica Geosystems

Metrology Products
Moenchmattweg 5
CH-5035 Unterentfelden
Switzerland
Phone +41 62 737 67 67
Fax +41 62 737 68 68

www.leica-geosystems.com/metrology

www.hexagonmetrology.com

© 2009 Hexagon AB
All rights reserved.

Due to continuing product development, Hexagon Metrology reserves the right to change product specifications without prior notice.
Printed in Switzerland. July 2009

774870