




Leica Absolute Tracker AT401  
Absolutely portable

*Leica*  
Geosystems

 **HEXAGON**  
METROLOGY

# Leica Absolute Tracker AT401

## Absolutely portable



The Leica Absolute Tracker AT401 is a portable coordinate measuring machine (CMM) that allows extreme precision over ultra large distances. It is able to be powered by its own internal battery and is able to work in the most demanding environment, yet maintains the highest level of precision and the largest ever work envelope. The Leica Absolute Tracker AT401

has a unique "All in One" system design that incorporates such needed accessories as built in live video, level to gravity, environmental monitoring and even an integrated IR remote control. By utilizing the integrated Wireless LAN communication the sensor can be used completely wirelessly making this the most portable Absolute Tracker ever.



Absolute Tracker

Leica

SWISS Technology  
by Leica Geosystems



Measure where no other  
CMM can go





Especially large structures require highly accurate, flexible and portable metrology equipment. This surrounding is right for the Leica Absolute Tracker AT401. It redefines large scale portable measurement and opens the door for unprecedented metrology applications.



**A new level of portability & durability**

The complete measurement system weighs less than 15 kg including the case and in a minimum configuration it will fit into the overhead compartment of most commercial airliners. This is truly the world's most portable CMM





# Mastering any industry condition



## Ready for any environment

Utilizing a completely sealed design that is independently IP54 (IEC 60529) certified means this sensor can be installed in the most unforgiving environments. Spraying

coolant, dust, weld splash, nothing is too harsh for this sensor. The Leica Absolute Tracker AT401 is the first laser tracker certified for outdoor use, even in the rain.







# PowerLock



## **PowerLock**

Leica Geosystems introduced the world to PowerLock in 2009. This vision technology detects a reflector and automatically locks the laser beam onto it, even when the target is moving. The laser beam moves to the user, not the other way around. In the past operating a laser tracker was almost a "black art". It took time and experience for an operator to learn how to efficiently use the sensor without breaking the beam. PowerLock changed this completely and makes the handling of a laser tracker much easier.











# A wireless all-in-one laser tracker



## Cable-less operation

With two identical batteries – one in the sensor, one in the controller- the Leica Absolute Tracker AT401 can run for a work day. When power approaches a critical level, the batteries can be either replaced or hot swapped. The laser tracker continues running as if nothing had happened. With the built in WiFi connection the Leica Absolute Tracker AT401 becomes a completely wireless portable CMM free from any external data or power cable requirements.

Optionally the Leica Absolute Tracker AT401 is ready for Power over Ethernet. With this technology, a regular LAN cable supplies the sensor with both data and power.



## Ultra Large Volume Measurements

With endless telescope rotation the sensor can measure a full 360° horizon and a 290° vertical dome. Pair this with a typical radial volume of 320 meters and you have the worlds largest volume precision CMM.



## Complete system integration

The Leica Absolute Tracker AT401 is ready for any measurement task that comes its way. All accessories such as remote control, environmental monitor or level sensor are already built in.



# Boundaries are there to cross

## **Aerospace**

The Leica Absolute Tracker AT401's portability and capability for one man operation make many challenging aerospace applications such as tool building and inspection, geometry check, part alignment, metrology assisted assembly or antenna construction much easier.

## **Off highway and heavy vehicles**

Manufacturing vehicles of any type requires metrology equipment which helps to ensure top quality. Tool repeatability, vehicle inspection, line installation or line maintenance are just a few examples where the Leica Absolute Tracker AT401 excels. With an ultra large volume measurement and wireless operation these tasks can be completed easier than ever before.

## **Power Generation**

Turbines and generators for use in wind or water power must withstand extreme conditions. For checking strict tolerances, ultra high accuracy is essential. The Leica Absolute Tracker AT401's portability and flexibility make large-volume shaft or machine alignment, machine inspection or blade measurement easy.

## **Research and science**

When large structures and distances are the object of scientific activities, the Leica Absolute Tracker AT401 with a typical radial volume of 320 m is the right metrology tool. Ring survey or part inspections on an accelerator are just two examples.

## **Shipbuilding**

Due to its infinite rotation and extreme measurement range, the Leica Absolute Tracker AT401 can handle even the ship building industry's gigantic dimensions when it comes to surveying, aligning engines and shafts or installing equipment.









# Expertise in quality

It all started with a theodolite. When Jakob Kern first constructed precision instruments in Switzerland of the 1830s, industry was in its early stages. But there is one lasting legacy – the commitment to absolute quality. Many Leica Geosystems instruments are still in daily use after several decades, as for example the first ever built Leica Geosystems laser trackers from 1990. Today, the Leica Geosystems metrology branch is a part of the global Hexagon Metrology network.

## Where quality comes together

Every installed system is the result of individual consulting from a Hexagon Metrology sales engineer or a certified dealer. The definition of the metrology challenge is the initial step. Together with the future users, Hexagon Metrology develops the perfect package consisting of a Leica Geosystems sensor, suitable software and optional system extensions. After the purchase, Hexagon Metrology offers customized service and support for the entire instrument life.





## Leica Absolute Tracker AT401 accuracy

All accuracies are specified with Leica Geosystems precision 1.5" Red Ring Reflectors and a measurement mode of 2 seconds per point under stable environmental conditions. Full range is specified as 1.5 to 80 meters away from the laser tracker within a vertical range of +/- 45°.

All accuracies are stated in maximum permissible error (MPE). Typical results are half of MPE.

### $U_{xyz}$ – Full Range

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 tracker and the measured point.

AT401:

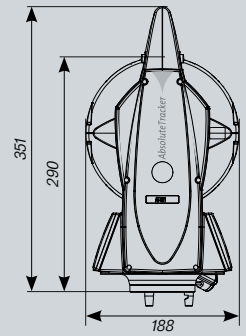
+/- 15  $\mu\text{m}$  + 6  $\mu\text{m}/\text{m}$  (+/- 0.0006" + 0.00007"/ft)



# Specifications

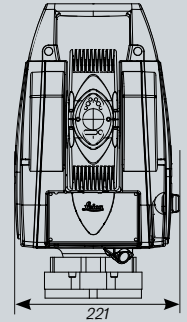
## Dimensions

Sensor Size: 290 x 221 x 188 mm (11.4" x 8.7" x 7.4")  
 Sensor Weight: 7.3 kg (16 lbs)  
 Controller Size: 250 x 112 x 63 mm (9.8" x 4.4" x 2.5")  
 Controller Weight: 0.8 kg (1.75 lbs)



## Range

Infinite Horizontal Rotation: +/- 360°  
 Infinite Vertical Rotation: +/- 145°  
 Typical working Volume: 320 m



## Environmental

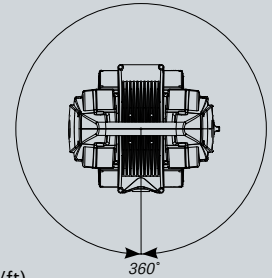
Dust/Water: IP54 (IEC 60529)  
 Operating Temperature: 0°C to +40°C  
 Relative Humidity: Max. 95% (non-condensing)  
 Altitude: -700 to 5500 m (-2,300 to 18,000 ft)

## Motorization

Acceleration: 360°/s<sup>2</sup>  
 Rotation Speed: 180°/s  
 PowerLock: 10° FOV

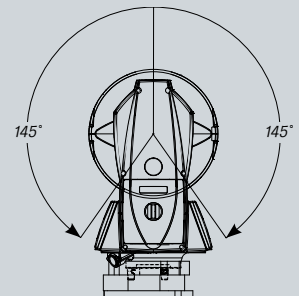
## Absolute Angular Performance

Resolution: 0.07 arc Seconds  
 Accuracy (MPE): +/- 15  $\mu\text{m}$  + 6  $\mu\text{m}/\text{m}$  (+/- 0.0006" + 0.00007"/ft)  
 Repeatability (MPE): +/- 7.5  $\mu\text{m}$  + 3  $\mu\text{m}/\text{m}$  (+/- 0.0003" + 0.00004"/ft)  
 Inclination Setting Accuracy (2 $\sigma$ ): +/- 1 arc second



## Absolute Distance Performance

Resolution: 0.1  $\mu\text{m}$   
 Accuracy (MPE): +/- 10  $\mu\text{m}$  (+/- 0.00039")  
 Repeatability (MPE): +/- 5  $\mu\text{m}$  (+/- 0.0002")



## Laser Emission

Class 2 Laser Product in accordance with the IEC 60825-1 Second Edition (2007-03)

## General Information

|                       |   |
|-----------------------|---|
| Overview Camera (OVC) | 4:3 IR enhanced Image $\approx$ 10° FOV   |
| Environmental Monitor | Internal – Temperature, Pressure and Humidity<br>External – Air Temperature – Object Temperature      |
| Remote Control        | Integrated 4 Button IR  |
| Interfaces            | Cable – TCP/IP (Cat5)<br>Wireless – WLAN (IEEE 802.11g)   |
| Power Management      | Internal – lithium-ion battery<br>External – AC power supply<br>Optional – Power Over Ethernet (PoE+) |



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](http://www.leica-geosystems.com/metrology)**

**[www.hexagonmetrology.com](http://www.hexagonmetrology.com)**

© 2010 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. April 2010.



Class 2 Laser Product in accordance with the IEC 60825-1, Second Edition (2007-03)