RADIAN 3D Laser Tracker Systems

A FOCUS ON AUTOMATION

The API industrial laser tracker legacy continues with the latest RADIAN™ tracker series offering the smallest, lightest and most accurate portable trackers on the market allowing both faster and easier measurements.

API's compact and rigid UNIBODY tracker design allows for shaft mounted laser, motors, and encoders. The UNIBODY shaft-mounted laser innovation minimizes Abbe offset errors, while also housing laser source, optics, camera and major head electronics in the center of the tracker body. The UNIBODY, and the centering of all heat sources, allows rapid distribution of heat throughout the body during warm-up or drastic ambient temperature variations' ensuring the tracker body maintains constant heat equilibrium throughout its operation, resulting in a shorter warm-up time and superior measurement stability.

FOR MORE THAN 30 YEARS API HAS PIONEERED LASER BASED EQUIPMENT FOR MEASUREMENT AND CALIBRATION

The rigid UNIBODY instrument casting offers innovative "air-over cooling" minimizing thermal effects, which provides increased temperature stability, faster start-up times, and further reducing instrument error enhancing overall measuring performance. Competitive trackers, with side-mounted lasers, create unbalanced heat sources requiring complex and lengthy warm-up routines involving extended thermal stabilization periods before accurate measurements can be performed.

API's integrated controller offers cable-less and hazard-free tracker operation in confined spaces. Onboard Wi-Fi reduces system setup and provides for seamless operation.

API's wide-angle iVision™ fast autolock allows rapid recapture of lost laser beam providing effortless usability for difficult to access and interrupted line of sight measurements. Hot swappable batteries provide 10 hours operation.

A PASSION FOR PRECISION

RADIAN Core, Plus and Pro models provide a solution to match every customer application and budget for trusted large-scale portable coordinate metrology solutions. An extended range of hand-held tactile and laser scanning probes compliment the RADIAN's measurement and reverse engineering capabilities further extending the RADIAN tracker measurement reach.

RADIAN 6D trackers can be enhanced with calibration tools to perform dynamic calibration and tracking of industrial robots and machine tools providing enhanced performance of manufacturing processes by reducing process variation.

LASER TRACKING SYSTEM
1988

TRACKER 2
1999

TRACKER 2 PLUS
2002

TRACKER 3
2005

RADIAN
CURRENT

Dr. Kam Lau
API CEO

A VISION FOR INNOVATION

For more than 30 years API have pioneered laser based equipment for measurement and calibration. API founder and CEO, Dr. Kam Lau, invented the laser tracker while working at USA's National Institute of Standards and Technology (NIST) to allow industrial robot accuracies to be determined. API shipped the world's 1st Industrial laser tracker to Boeing in 1988 and subsequently delivered the world's 1st 6D industrial laser tracker in 1989. API licensed its 3D laser tracker technology under a commercial agreement with Wild/Kern (now Leica) in 1989 allowing API to concentrate efforts on 5/6D laser tracker solutions for industrial manufacturing applications.

Today API is a global company with its laser trackers continuing to be the benchmark for metrology Automation, Precision and Innovation. API measurement and calibration products are at the heart of manufacturing organizations world-wide ensuring product quality and performance.

RADIAN

	CORE	PLUS	PRO
Laser Technology - ADM/IFM	ADM - 3D	ADM - 3D/6D	ADM/IFM - 3D/6D
Maximum Distance Range (Diameter)	50m / 80m*	50m / 80m*	20m* / 50m / 80m*
Wireless Operation	✓	✓	Ethernet
Hand-Held Probing (vProbe)		✓	✓
Hand-Held Scanning (iScan)		✓	✓
Live Camera View			✓
Integrated Controller	✓	✓	
Vertical, Horizontal, Inverted Operation	✓	✓	✓
Wide Angle iVision Fast Autolock	✓	✓	✓
Battery Operation	10 Hours	10 Hours	
Warranty	2 Years	2 Years	2 Years

*Optional

RADIAN LASER TRACKER TECHNICAL FEATURES

RADIAN MEASUREMENT AND ACCESSORIES

SMR MEASUREMENT

API break resistant Spherically Mounted Retroreflectors (SMR) are constructed with a one piece optic eliminating risks associated with glass panels shifting, separating or fracturing and can track over 80m with optical centering accuracy down to ± 2.5 microns offering high accuracy line of sight measurement.

HANDHELD PROBING

The API vProbe™, a hand-held, light-weight, wireless tactile probe with easy-hold grip which allows the laser tracker to perform extended coordinate measurement functions by measuring intricate features or part characteristics outside the line of site of the tracker set-up, providing fast and accurate measurements. The vProbe offers more versatility than a portable arm CMM and inherently more suitable for larger parts. A stylus toggle switch for dual locations with LED indication makes measurement quick and convenient whether inside, behind, or underneath a part. Dynamic tactile scanning capability provides instant coordinate feedback with integrated battery for 6 hours of measurement activity. Styli lengths up to 500mm can be accommodated.

iProbe comes standard with the RADIAN Plus tracker.

HANDHELD SCANNING

Integrated with an API 6DOF laser tracker, the innovative API iScan™ wireless hand held blue laser line scanner offers a fast, accurate and more productive solution to generate component point-clouds. Digitizing rates of up to 200,000 points/second and capable of scanning both reflective and dark surfaces, iScan features 360° yaw and roll to achieve infinite sensor positioning. Simple one-button operation provides effortless scanning functionality and also offers tactile probing providing even greater tracker measuring flexibility.

RADIAN ACCESSORIES

	CORE	PLUS	PRO
SMR Measurement	✓	✓	✓
vProbe Hand-Held Probing		✓	✓
iScan Hand-Held Laser Scanner		✓	✓
Active Target		✓	✓
Smart Track		✓	✓

All accessories have a measuring range up to the maximum tracking distance of the respective laser tracker. Built-in 6DoF sensor allows tracker accuracy to be maintained throughout its entire operating distance.

2 YEAR WARRANTY

API 2 Year Warranty - API offers the industry benchmark warranty on its RADIAN laser trackers and accessories for a period of 24 months on parts and labor. Full terms and conditions available upon request.

RADIAN AUTOMATION AND CALIBRATION

Integrated API 6DoF laser tracker within robotic machining, inspection, and guidance cells provide real-time adaptive control offering improved metrological performance and improved quality of manufacturing processes.

Active Target™

Active Target™ is a battery-powered self-orientating motorized 360° rotation SMR that locks onto the laser tracker and automatically orientates to the laser beam allowing for automated tracking and measurements of machine tools, industrial robots, or automation where a standard SMR cannot perform.

CALIBRATION: API 6DoF laser trackers combined with unique API calibration tools provide dynamic calibration and tracking of industrial robots and machine tools providing enhanced performance of manufacturing processes by reducing process variation.

SmartTrack™

SmartTrack™ provides automatic 6DoF measurement for dynamic accuracy applications by determining the position (x, y, z) and angular orientation (pitch, yaw, roll) of a tracked point in real-time revealing the true position and orientation of a moving target such as a robotic end-effecter. Applications include machine tool and robot calibration and dynamic robot accuracy enhancement.

LASER TRACKER APPLICATIONS

Each manufacturing industry sector has unique metrology requirements. The API RADIAN laser tracker range and measurement accessories offer a highly flexible, portable coordinate measuring solution with applications across all industries. API has customers globally in all sectors and has accumulated a wealth of application experience in aerospace, automotive, energy, heavy machinery, agricultural equipment, military & defense, machine tools, automation and tooling.

RADIAN excels at high-definition surface scanning with feature extraction to automation and machine control; from hidden-point probing to traditional dynamic 3D reflector measurement: the Radian is the first-choice of laser tracker system in a wide range of industries.

- Alignment & Calibration
- Part Measurement
- Jigs, Fixture & Tooling Inspection
- Reverse Engineering
- Adaptive Control
- Robot Tracking

LASER TRACKER SUSTAINABILITY

Manufactured in the USA, all RADIAN laser trackers are supplied with the industry's most comprehensive 2 year parts and labor warranty. API offers all-inclusive tracker calibration and maintenance contracts that can also include our loaner tracker program and advance reservation calibration program.

Supported globally through subsidiary offices in Europe, China, India, and master reseller partnerships, API offers the level of support demanded by our sophisticated international customers. We are where you are.

TECHNICAL SPECIFICATIONS

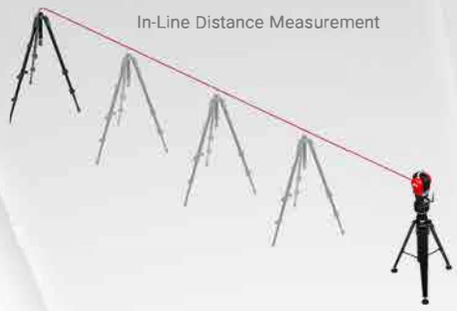
	CORE	PLUS	PRO
Working Range	ADM - 3D	ADM - 3D/6D	ADM/IFM - 3D/6D
Rotational Envelope	50m / 80m	50m / 80m	20m / 50m / 80m
Horizontal (Infinite)	±320° (640°)	±320° (640°)	±320° (640°)
Vertical (Infinite)	-59° - +79° (138°)	-59° - +79° (138°)	-59° - +79° (138°)
Data Output Rate	1000 points/sec.	1000 points/sec.	1000 points/sec.
Distance Measurement Performance			
Resolution	0.5 µm	0.5 µm	0.5 µm
Accuracy (MPE)	15µm or 0.7µm/m*	15µm or 0.7µm/m*	15µm or 0.7µm/m*
IFM Accuracy	not applicable	not applicable	0.5µm/m
Angular Measurement Performance			
Volumetric Accuracy (MPE)	15µm + 5µm/m	15µm + 5µm/m	10µm + 5µm/m
Precision Level Accuracy	±2 arc seconds	±2 arc seconds	±2 arc seconds
Maximum Radial Velocity	180°/sec	180°/sec	180°/sec
Maximum Radial Acceleration	180°/sec²	180°/sec²	180°/sec²
Autolock Performance			
iVision Field of View	30° (diagonal)	30° (diagonal)	30° (diagonal)
Acquisition Range	2m – 40m	2m – 40m	2m – 40m
Accuracy	10µ or 0.7µm/m*	10µ or 0.7µm/m*	10µ or 0.7µm/m*
Attributes			
Tracker Size	198mm² x 430mm	198mm² x 430mm	177mm² x 355mm
Tracker Weight	10.9 Kg	10.9 Kg	9.0 Kg
Controller Size	Integrated	Integrated	110 x 177 x 355mm
Controller Weight	Integrated	Integrated	12.2 Kg
Combined Weight	10.9 Kg	10.9 Kg	21.2 Kg
Transport Case	559x406x254mm	559x406x254mm	610x508x290mm
Total Transport Weight	22.7Kg	22.7Kg	28.2Kg
WiFi	✓	✓	
Ethernet			✓
Laser Emission	Class II IEC60825-1	Class II IEC60825-1	Class II IEC60825-1
Warm-up Time	15 minutes	15 minutes	15 minutes
Power Specifications			
Power Supply Voltage	110/230V ±10%	110/230V ±10%	110/230V ±10%
Power Consumption	60W	60W	100W
Continuous Operation Battery Life	10 hours**	10 hours**	-
Environmental			
Operating Temperature	-10°C to 45°C	-10°C to 45°C	-10°C to 45°C
Relative Humidity	10–95%***	10–95%***	10–95%***
Altitude	-700m to 3000m	-700m to 3000m	-700m to 3000m
Protection Level	IP52	IP52	IP52

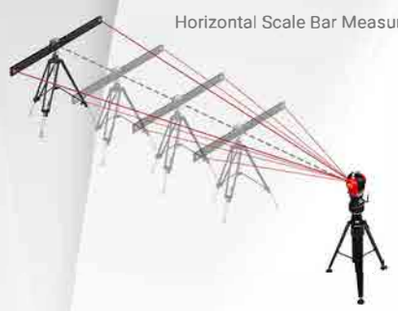
*Whichever is greater **Hot swappable ***Non-condensating

TECHNICAL PERFORMANCE

All specifications are calculated per the ASME B89.4.19 standard. Variation in air temperature is not included. Quoted values represent Maximum Permissible Error (MPE).

The typical accuracy values represent expected measuring performance.





In-Line Distance Measurement

	CORE		PLUS		PRO			
Range	MPE	Typical	MPE	Typical	MPE (ADM)	Typical	MPE (IFM)	Typical
2-5m	15µm	8µm	15µm	8µm	10µm	5µm	2.5µm	1.5µm
2-10m	15µm	8µm	15µm	8µm	10µm	5µm	5µm	3µm
2-20m	15µm	8µm	15µm	8µm	14µm	7µm	10µm	5µm
2-25m	18µm	9µm	18µm	9µm	18µm	9µm	12.5µm	7µm
2-30m	21µm	11µm	21µm	11µm	21µm	11µm	15µm	8µm
2-35m	25µm	13µm	25µm	13µm	25µm	13µm	17.5µm	9µm
2-40m	28µm	14µm	28µm	14µm	28µm	14µm	20µm	10µm
2-50m	35µm	18µm	35µm	18µm	35µm	18µm	25µm	13µm
*2-60m	42µm	21µm	42µm	21µm	42µm	21µm	30µm	15µm
*2-80m	55µm	28µm	55µm	28µm	55µm	28µm	40µm	20µm

Horizontal Scale Bar Accuracy**

	CORE		PLUS		PRO			
Range	MPE	Typical	MPE	Typical	MPE (ADM)	Typical	MPE (IFM)	Typical
2m	35µm	18µm	35µm	18µm	28µm	14µm	28µm	14µm
5m	57µm	29µm	57µm	29µm	49µm	25µm	49µm	25µm
10m	92µm	46µm	92µm	46µm	85µm	43µm	85µm	43µm
20m	163µm	29µm	163µm	29µm	156µm	78µm	156µm	78µm
25m	198µm	99µm	198µm	99µm	191µm	96µm	191µm	96µm
30m	233µm	117µm	233µm	117µm	226µm	113µm	226µm	113µm
35m	269µm	135µm	269µm	135µm	262µm	131µm	262µm	131µm
40m	304µm	152µm	304µm	152µm	297µm	149µm	297µm	149µm
50m	375µm	188µm	375µm	188µm	368µm	184µm	368µm	184µm
*60m	445µm	223µm	445µm	223µm	438µm	219µm	438µm	219µm
*80m	587µm	294µm	587µm	294µm	580µm	290µm	580µm	290µm

*Requires 80m range option **2.3m Scale Bar Length