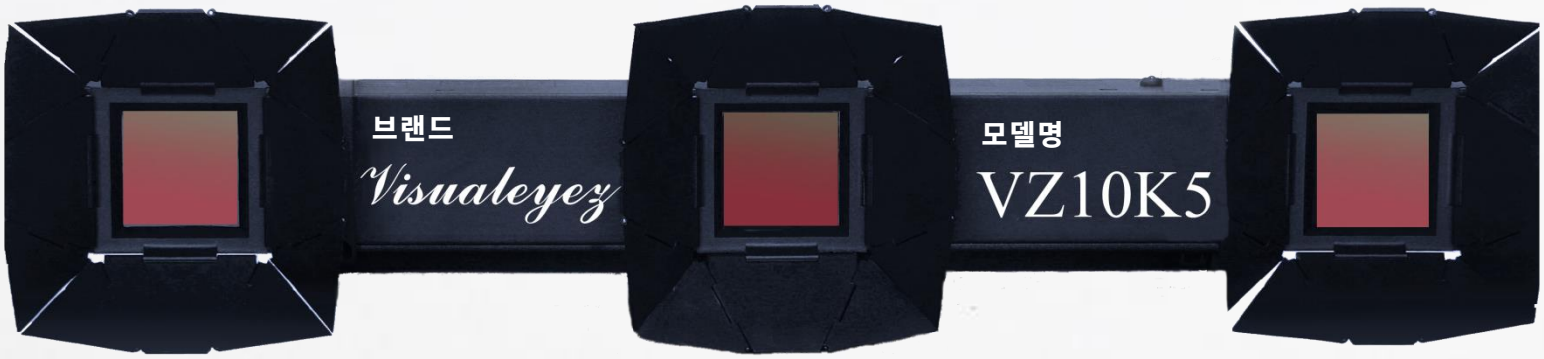
10,000Hz 3D Motion Capture

Phoenix Technologies Inc

20 Years of Motion Capture Innovation

Fastest of All



Power Performance Speed For Research

Treat yourself to the fastest 3D Motion Capture System with the new ***Visualeyez III*** trackers.

Multiple onboard processors and 15µm sensing technology for real-time 3D computations and 512 target ID tracking.

Power without compromise.

PTI 모캡시스템 특장점요약

Automatic Calibration	10,000 Hz Sampling	No Marker Errors	0.1mm Accuracy
15 µm Resolution	100° Square FOV	0.3ms Latency	512 Unique Target IDs

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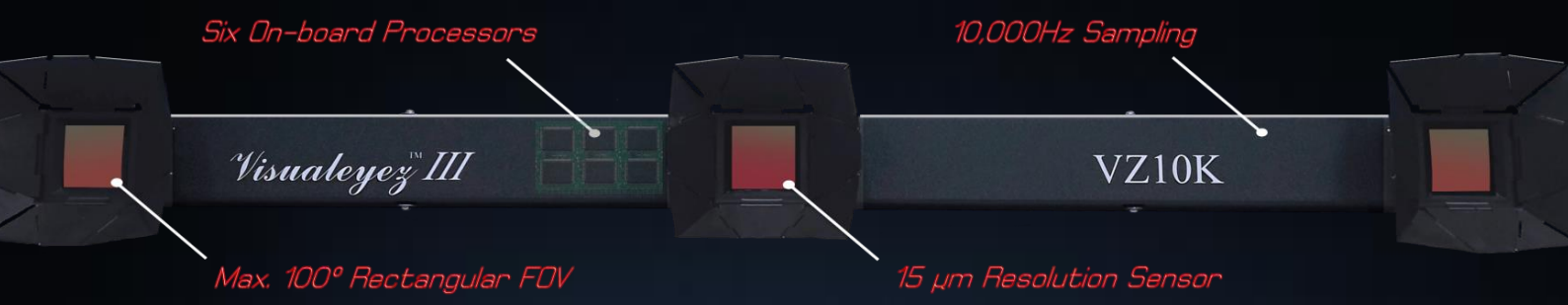

Move your tracker *during* capture. Re-arrange tracker(s) arbitrarily.
No need to register markers or patterns, unlike camera-based systems.
No manual calibration required ever! …even for a multi-tracker system.

10,000 Hz Sampling

Each VZ10K/10K5 tracker can reach sampling speed up of 10,000 Hz to capture faster motions and more markers. Unchallenged in 3D capture!

100° FOV

Up to 100 -degree field of view with a rectangular capture space. Largest viewing angle in the market. Every tracker can capture 3D coordinates **over a 9x7x7m space,** all the way to the right-angle corners.

0.1mm Accuracy

Highest RMS accuracy (1D, standard calibration range).
Each 3D tracker's accuracy is verified with a 0.045mm certified 3D coordinate measurement machine complying standards ISO 9001, ISO 10012-1, MIL-STD-45662A (artifacts traceable to the National Institute of Standards and Technology).

0.3ms Latency

Built for true real-time applications from the start. All computations are done internally by **multiple dedicated processors** within each tracker and data are sent to the user instantly. No extra hardware or protocol stands in the way.

**Matlab / Labview / ROS /
Visual 3D Plug-ins,
SDK, Low-level control APIs.**

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The only technology to offer **INSTANT CALIBRATION** for even a **multi-tracker** system. **Move your tracker DURING capture** without any need to stop recording, and with no data errors!

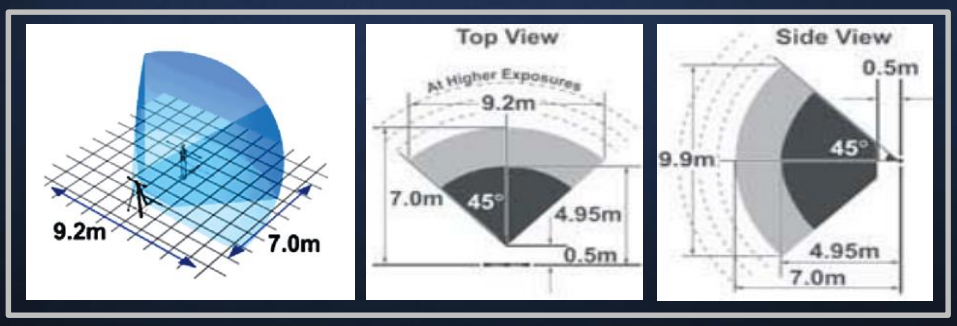
Automatic Calibration

Each active LED marker has **one unique ID** and is tracked flawlessly by the system, always. No marker/pattern registration required, ever.
Up to 512 unique IDs. NO MARKER SWAPPING/ identification errors.

No Marker Errors

Revolutionary tactile feedback function lets you send stimuli to any specific part of a subject, **prompt motions on demand**, **alert your subject(s) of motion deviation, provide virtual touch feedback …**

Tactile Feedback



TECHNICAL SPECIFICATIONS

Sensing Volume:	**~190 m³ of capture space, over 7m distance nominal**
Minimum Sensing Distance:	**0.5m (VZ10K), 0.25m (VZ10K5)**
Position Resolution:	**0.015mm at 1.2m distance (smallest detectable position change)**
Number of Markers:	**512 active LED markers with unique IDs**
Accuracy :	**Up to 0.10mm (RMS, 1D, nominal), 0.25mm (RMS, 3D-combined, nominal) for standard calibration range (VZ10K)**
Data Latency:	**<0.3 ms (at fastest sampling rate)**
Sampling Speed:	**10,000 3D data points per second**
Calibration Range:	**Standard range: 0.6~2.5m distance Extended range: 0.6~4m+ distance +/-40° yaw, +/-30° pitch Custom range possible (please inquire)**

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Capture Range:	7M (standard exposure), 9M and longer (extended exposure)
3D Data Processing:	Real-time. Done by tracker's processing units (no additional hardware or computer required)
Data Format Output:	3D positional data : Text, C3D
Single-Tracker Calibration:	Done in factory, no manual calibration required
Multi-Tracker Calibration:	Automatic and continuous, no manual action required
Field of View:	Up to 100°, both horizontally and vertically
Port:	High-speed RS422 real-time data interface
Supported OS:	Windows 7/8/10, Linux
Marker Type:	Six-Chip LED with >170° emission angle
Minimum System Setup:	One single 3D tracker


A typical 2 tracker set-up capture area


A typical 4 tracker set-up capture area

Multi-Sampling Rate:	Yes (Capture different markers at different frequencies at the same time with same spatial resolution)
Tactile Feedback:	Yes, with haptic markers
Maximum Capture Range:	15m with hi-power LED markers
SDK:	C++, with low-level control options
Plug-ins:	Matlab, Labview, ROS, VRPN…
External Start/Stop:	Yes. Via manual switch, computer port, or 3rd party equipment
Synchronization with other equipment:	Yes
Size and Weight:	VZ10K: 112x5x5cm, 2.8kg / VZ10K5: 61.7x5x5cm, 1.2kg

Single 3D Tracker Capture Space Simulation
(for information purpose only, real space may differ)

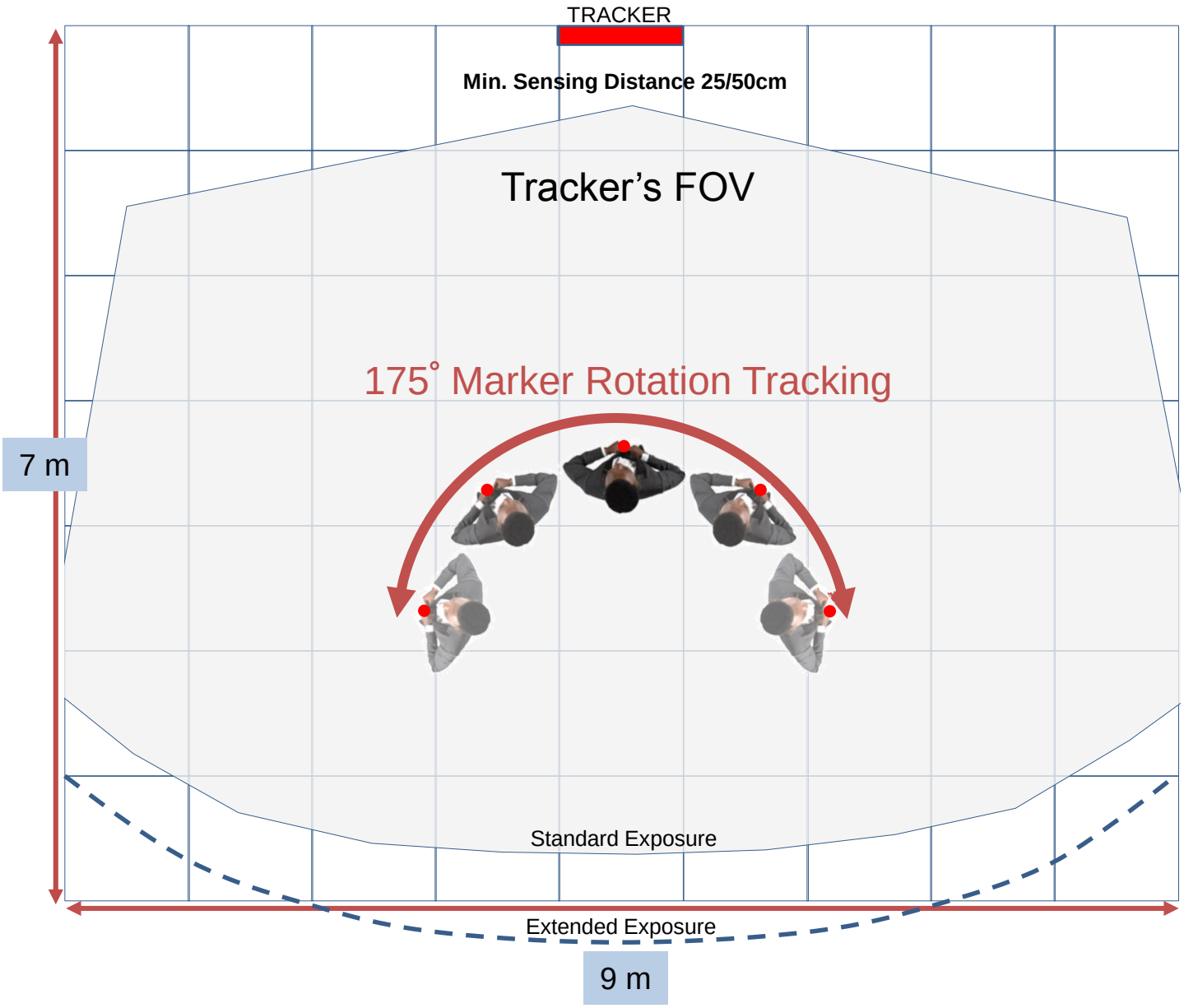
1x1m

3D Tracker

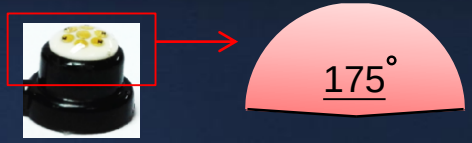
175˚ LED Marker

Tracker's FOV

Single 3D Tracker
Field Of View at
20˚ Tilt,
2.5m Height



7mm Active NIR 6-Chip
LED Marker with unique ID



Ultra-Wide 175˚
Emission Angle

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Stream your real-time motion capture data to:

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Open Source Robotics Foundation

MATLAB

NATIONAL INSTRUMENTS LabVIEW

The Motion Monitor

...The Total Solution in Motion Capture ®

Visual3D v5™ Professional

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OPEN VR

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And more!

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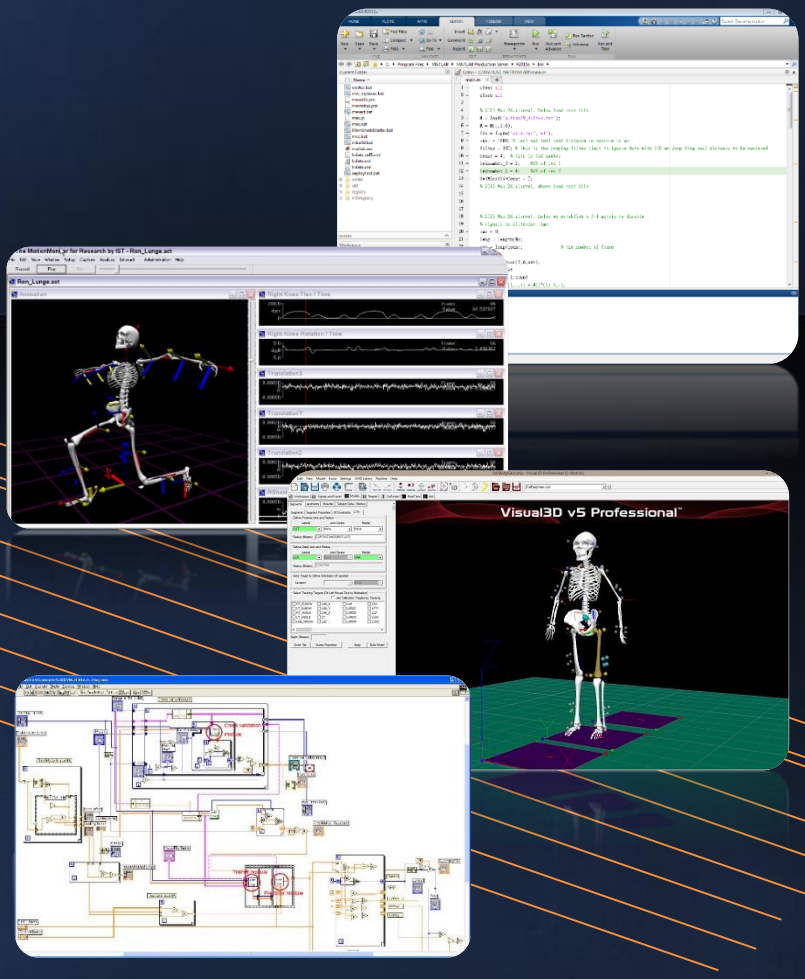
For different plug ins



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ACTIVE LED MARKERS

Automatic Unique IDs

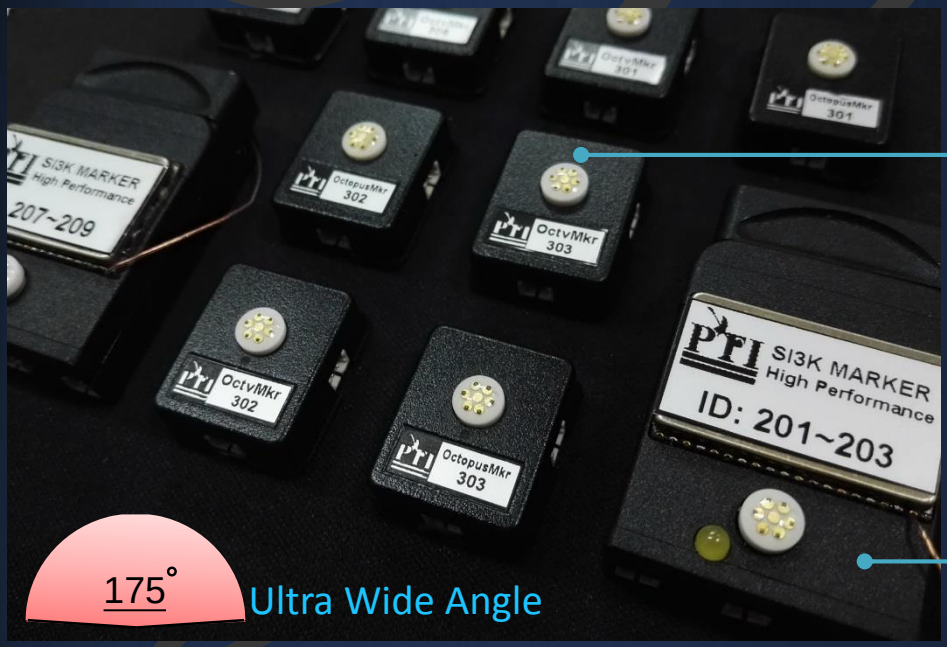
175° Emission Angle LED

Tiny 7mm Diameter

Each LED marker comes with one unique ID and self-registers with the system automatically, even after occlusions.

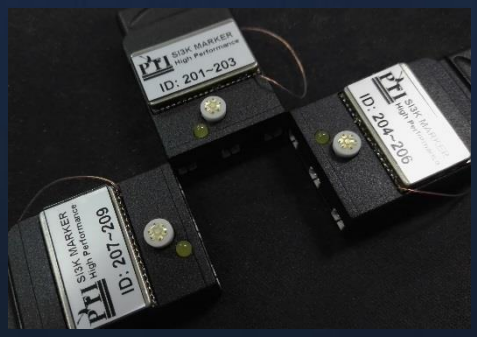
A proprietary 6-chip LED equips all PTI markers and provides the largest light emission angle on the market to capture wide rotations with one single 3D tracker.

[Uncanny precision and flexibility: PTI markers are packaged in different ways for application conveniences]



Octopus Markers

SI3K Markers



- ☑ No Marker Registration Needed
- ☑ Automatic ID labelling
- ☑ No Marker Swapping Errors
- ☑ Automatic Occlusion Recovery

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ACTIVE LED MARKERS

Octopus Markers

This intelligent marker system will **reduce up to 90% of the wiring** requirement compared to a Standard LED marker system.

Each marker comes with a distinct built-in ID for flawless marker identification and can be quickly interconnected with other Octopus Markers to build a **flexible layout**.

Light and compact, the Octopus marker is the prime choice for full-body motion capture and any application that requires quick and flexible marker layout.

Main applications: Biomechanics, Rehabilitation, Robotics, Motor Control…

Size & Weight:	**19x16x7mm, 3.9g**
LED Type:	**One 6-chip, 175-degree emission angle LED (one ID)**
Power Source:	**One 7.2V battery (56x30x26mm, 50g) for up to 22 markers**
Alternative Power:	**Possible**
Inter-marker Connection :	**Via one marker-to-marker interconnection wire**
Marker Control:	**Wireless (Single receiver 58x37x13mm, 19g)**

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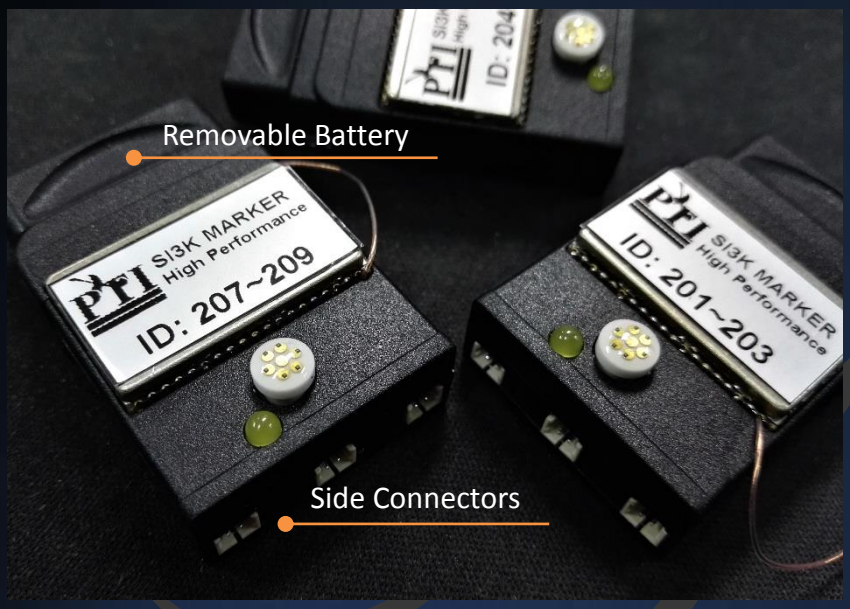
ACTIVE LED MARKERS

SI3K Markers



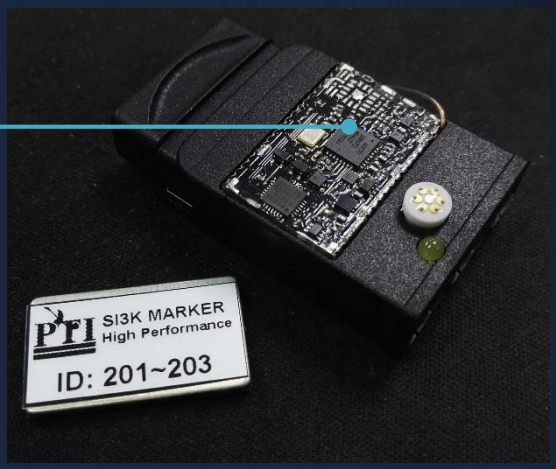
A compact SI3K Marker comes with zero wires and can support up to 3 LEDs through its side connectors.

All three LEDs will have their own distinct marker IDs.

This self-identified marker is self-contained, it comes with its own hot-swappable tiny rechargeable battery (for 90mn or more of continuous capture use).

What is under the hood of a SI3K?

A lot of miniaturization with next-generation electronic components. The SI3K is a one-of-a-kind intelligent (patented) motion capture marker that reflects the advanced manufacturing competence of Phoenix Technologies.



Main applications: Robotics, UAVs, 6DOF, Clinical Trials, Neuroscience…

Size & Weight:	**40x28x9mm (with battery), 9.5g (without battery)**
LED Type:	**6-chip, 175-degree emission angle LEDs**
Power Source:	**One (hot-swappable) rechargeable 3.6V battery (7g)**
Alternative Power:	**Possible without battery**
Number of LEDs:	**1 to 3, with individual IDs, 7mm dia., 0.5g each**
Marker Control:	**Wireless**

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ACTIVE LED MARKERS

Standard Markers

Standard markers are the smallest marker type available: only 7mm in diameter. They come with the exact same 6-chip ultra-wide LED and unique ID system as the other PTI markers.

Very sturdy, ruggedized, they can be dipped into water/alcohol for easy cleaning.

Even smaller 4mm-version with a single-chip LED available.

Connect to a target control box and a wireless receiver + battery set.

Standard markers can be individually positioned on the capture subject without any consideration for the other markers.

Main applications: Surgical Tools, Spinal Research, Neuroscience, Fingers Capture …

Size & Weight:	**7mm, 0.5g (marker)**
LED Type:	**6-chip, 175-degree emission angle LED**
Power Source:	**One 7.2V battery (56x30x26mm, 50g)**
Alternative Power:	**Possible**
Inter-marker Connection :	**Via Target Control Box (TCM16) 58x37x13mm, 25g**
Marker Control:	**Tetherless (Single Receiver 58x37x13mm, 19g)**

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PTI 3D TRACKERS vs. OTHER SYSTEMS SPECS COMPARISON

Systems: / Features:	PTI VZ10K / VZ10K5 3D Trackers	Passive Camera-based 2D Motion Capture	Other Active 3D Motion Capture
Field of View:	Up to 100° (horizontally and vertically)	60° (*)	35° to 60° (*)
Sampling Speed:	10,000 Hz	1,000 Hz+ (*)	4,500 Hz to 5,000 Hz
Single Tracker Calibration:	Done in factory	Manual (by user) with a wand, before each capture	Done in factory or manual
Multi-Tracker Calibration:	Automatic and Continuous	Manual (by user) with a wand, before each capture	Manual (by user) with a wand, before each capture
3D Accuracy:	Guaranteed and repeatable for single and multi-tracker systems	Cannot be specified due to 2D cameras and manual calibration	Guaranteed only for single tracker systems
Capture Range:	7~8M (Full 90° FOV)	4~5M (more with reduced FOV)	4M (*) (more with narrow FOV)
Marker Type:	Active LED with ID	Reflective markers, no ID	Active LED with ID
Marker LED:	>170° emission angle	N/A	120° emission angle (*)
Marker System:	Wireless (SI3K)	N/A	Semi-Wireless
Marker Layout Patterns:	Not required	Required	Not required
System Layout:	Any, changeable during capture (no blinding problem).	Restricted (blinding problem)	Any, but not changeable during capture
Parabolic Lens Distortion:	None	Definite	Definite

(*) Can vary with systems or models

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PTI 3D TRACKERS vs. OTHER SYSTEMS SPECS COMPARISON

Features: \ Systems:	PTI VZ10K / VZ10K5 3D Trackers	Passive Camera-based 2D Motion Capture	Other Active 3D Motion Capture
Devices Required for 170° Capture:	One tracker	Four cameras	Two trackers
Devices Required for 360° Capture:	Three trackers	Eight cameras (*)	Four trackers
3D Data Computation:	Real-time in tracker	Requires external processing hardware	Requires external processing hardware
Minimum Sensing Distance:	0.25m	2m (*)	2m (*)
Tracker Movement During Capture:	Possible with instant tracker warm-up (even for multi-tracker systems)	Not possible (new manual calibration required each time)	Not possible (new manual calibration required each time)
Marker ID system:	Automatic	No ID system (swapping problems)	Automatic
Data Cleaning Requirement:	No	Yes, to solve marker identification errors	No
Automatic Recovery from Occlusion:	Yes	Not Possible (no marker IDs, swapping problems)	Yes
Marker Registration Prior to Capture:	Automatic	Required (manual)	Not required
Latency:	<0.3ms, uniform	Long, non-uniform	Long, non-uniform
Capture Space for Smallest System:	7x9x9m (standard exposure)	5x5x3m (*)	5x4x2m (*)
Portability:	High (Single tracker 1.4kg, VZ10K5)	Low (multiple cameras, restricted layout, manual calibration, external processing box)	Average (heavyweight, external processing box, manual calibration)

(*) Can vary with systems or models

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