



## ***Motion capture for advanced underwater measurements***

Qualisys provides motion capture cameras suitable for all possible environments, including indoor, outdoor and even underwater captures. Our underwater cameras are the world's only commercially available optical motion capture cameras for underwater use and are designed for mobility, robustness and trouble-free operation.

Qualisys underwater cameras are enclosed in waterproof housing and equipped with a strobe built specifically for underwater use. Each camera is pressure tested to 5bar (40m depth).

The system can be synchronized with external hardware just like any other Qualisys motion capture system. Naturally, Qualisys Track Manager takes full advantage of the all the features of the cameras and allows streaming and exporting of 3D and 6DOF data to 3rd-party applications in real-time.

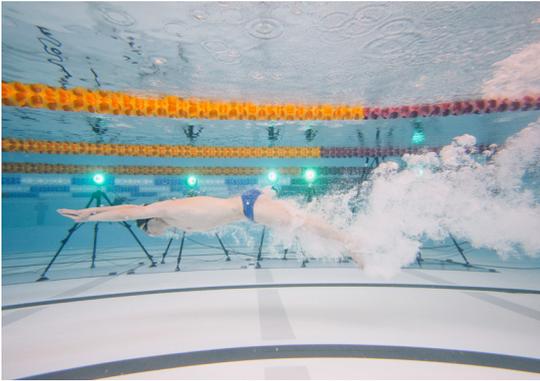
### FEATURES

- High-speed underwater motion capture
- Underwater video with full HD @ 85 fps
- Resolution: 2, 4, and 12 MP
- Low latency for real-time applications
- IP68 housing pressure tested to 40m depth
- Integrated high-power LED strobe
- Combined gigabit Ethernet and power cable
- Aluminum or stainless steel and acrylic underwater housing
- Up to 30 meters range

<sup>1</sup> Optional accessory/feature, not available for all camera models.

# Applications

## UNDERWATER BIOMECHANICS



Analyze all phases of the lap, including start, on-block, flight, the underwater phase, and all the way to the 15m point. using a Qualisys system.

Qualisys underwater cameras has many use cases within underwater biomechanics. Examples of such are lower body gait analysis for in-water rehabilitation using underwater treadmills.

Another example is studying kinematics of swimmers where data collected by the underwater motion capture system is used by researchers and coaches to analyze dive, stroke, and turn of the athlete. it is also possible to combine Qualisys underwater cameras with the skeleton solver functionality in QTM, to capture underwater motions performed by actors, to be used in games and film.

## MARINE



7+u can be used for large volume marine measurements, such as large Ocean basins and towing tanks.

An underwater motion capture system is an essential tool in the development and testing of underwater vehicles and equipment. Examples of use include the tracking of free-running AUVs, underwater objects towed in a towing tank, mooring lines, fish net trawl doors and oil pipeline motions, just to mention a few.

The 7+u is well-suited to track motions in large areas with it measurement range of up to 30 meters. With its wide field of view, the smaller Miquis Underwater is the better choice in spaces like narrow tanks or small pools.

## CAMERA SELECTION GUIDE FOR UNDERWATER MEASUREMENTS

Requirement	Miquis M3u	Miquis M5u	7+u	Miquis Video u
3D tracking capabilities	✓	✓	✓	✗
Synchronized color video	✗	✗	✗	✓
Distances longer than 15 m	✗	✓	✓	✗
Fast movement, high frame rate	✓	✓	✓	✓
Wide FOV for narrow underwater spaces	✓	✓	✗	✓

Recommended ✓

Possible ✓

Not recommended ✗

# Products

## 7+ UNDERWATER

The 7+u camera is a robust, high resolution camera for long-range measurements. The camera's strobe consists of 12 high power deep blue LEDs that can illuminate markers at more than 30m distance. The custom-designed housing is made of hard anodized aluminum and pressure tested to 40m depth. The powerful LEDs are thermally connected to the housing to get the most efficient cooling for best performance.

## MIQUS UNDERWATER

The smaller, nimbler Miquis camera opens up new possibilities for underwater measurement in confined spaces. At just over 2kg, the Miquis is almost four times lighter and four times smaller than the 7+u, and its widest field-of-view is 45% wider, making it easier to deploy in small tanks or pools with short distance to the subject.

## SYNCHRONIZED UNDERWATER VIDEO

Miquis Underwater video can be synchronized and calibrated together with the motion capture cameras to enable 3D video overlay. It can be used as a standalone video solution, bridging the gap between small, hand-held consumer devices and more expensive cameras that are typically used in industrial settings. The Miquis Underwater video camera streams MJPEG compressed, full HD video in 85 fps over standard gigabit Ethernet.

## COMBINING ABOVE AND UNDERWATER

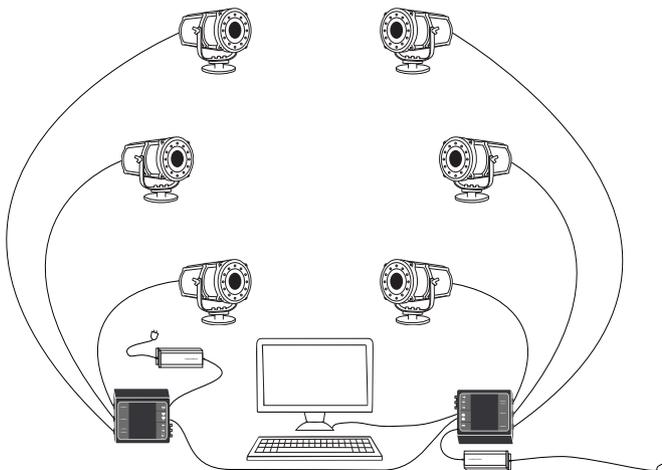
By combining Qualisys groundbreaking underwater cameras with an above water camera system, in what is known as a 'Twin system' setup, above- and underwater movement can be merged together into a single capture.



*7+ Underwater is a robust, high resolution camera primarily suited for medium to long-range measurements, from 7-25m (25 - 75ft).*



*Miquis Underwater cameras are ideal to use in small to medium sized volumes, up to 15m (45ft) range.*



## SYSTEM CONNECTION

Each camera has a high-quality underwater connector, which connects to a water-protected connection unit placed on land. This cable carries both power, data and control signals.

A connection unit drives up to three underwater cameras from one power supply and several connection units can be connected, either daisy-chained or in a star configuration.

# Technical specifications

## QUALISYS UNDERWATER VIDEO

		Video Monochrome	Video Color
Resolution		2.0 MP / 1920 x 1088	2.0 MP / 1920 x 1088
Frame rates	Full HD 1080p	85	85
	HD 720p	180	180
	0.5Mp	330	330
	VGA	550	550
Underwater FOV		60° x 40°	60° x 40°
Color		No	Yes
Auto exposure		Yes <sup>1</sup>	Yes <sup>1</sup>
White balance		N/A	Auto
Max calibration distance		15	10



## QUALISYS UNDERWATER MOCAP

	Miqus M3u	Miqus M5u	7+u	
Pixels	2 MP	4 MP	12 MP	
	Resolution	1824 x 1088	2048 x 2048	4096 x 3072
	Frame rate	340 fps	180 fps	300 fps
Underwater FOV	58° x 40°	51° x 51°	40° x 31°	
Measurement distances with 19 mm markers <sup>2</sup>	12 m	17 m	27 m	
Underwater housing	Stainless steel and acrylic	Stainless steel and acrylic	Hard anodized aluminum	
Length	250 mm / 9.8 in	250 mm / 9.8 in	223 mm / 8.8 in	
Diameter	110 mm / 4.3 in	110 mm / 4.3 in	220 mm / 8.6 in	
Weight	2.5 kg / 5.5 lbs	2.5 kg / 5.5 lbs	8.4 kg / 18.5 lbs	
Buoyancy	Neutral	Neutral	Neutral	
Operating temperature range	0-35°C (32-95°F)	0-35°C (32-95°F)	0-30°C (32-86°F)	
Operating voltage	24 VDC	24 VDC	48 VDC	

<sup>1</sup> possible to switch to manual

<sup>2</sup> dependent on capture volume