ZERØKEY

SPATIAL INTELLIGENCE

QTM-EAP10/QTM-EAP11 Device Manual v1.0.8

Quantum RTLS POE Anchor

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Revision Tracking

Rev	EC	Author	Reviewer	Approver	Change Notes	Date
V1.0.0	N/A				Released to Baseline	**2021/10/25**
V1.0.1	N/A	K. Fulton			Update to Regulatory Statements Add revision history table Add system diagram	**2021/12/10**
V1.0.2	N/A	K. Fulton			Add power supply usage statement Add references to QTM-EAP10 and QTM-EAP11 Changed daisy chain units (10 for QTM-EAP10, 12 for QTM-EAP11)	**2022/01/27**
V1.0.3	N/A	J. Wolf			Update compliance for 'Class A' device Updated System Diagram	**2022/08/04**
V1.0.4	N/A	J. Wolf			Updated model naming format Added class A warning statement Updated certification wording Updated USB port wording	**2022/08/16**
V1.0.5	N/A	J.Wolf			Updated DC Power Supply wording.	**2022/09/16**
V1.0.6	N/A	J. Wolf			-Updated regulatory statement wording	**2022/10/21**
V1.0.7	N/A	J. Wolf			-Added product name to title page - Added FCC Part 18 statement	**2022/11/01**
V1.0.8	N/A	J. Wolf			-Updated FCC and ISED distance statements	**2022/12/07**

Certification and Compliance

The radio used in this device has been certified for use according to Federal Communications Commission (FCC), Industry Canada (IC) and Conformitè Europëenne (CE) rules and regulations.

FCC Regulatory Statement

Model: QTM-EAP10, FCC ID: 2AX6LQTMEAP10
Model: QTM-EAP11, FCC ID: 2AX6LQTMEAP11

Caution: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Warning: Operation of this equipment in a residential environment could cause radio interference.

Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment must be installed and operated with a minimum distance 20 centimeters between the radiator and user's body. This equipment has been evaluated to meet general RF exposure requirement at 20 centimeters distance.

This device complies with Part 18 of the FCC Rules.

ISED Regulatory Statement

Model: QTM-EAP10, IC: 26679-QTMEAP10
Model: QTM-EAP11, IC: 26679-QTMEAP11

CAN ICES-003(A)/NMB-003(A)
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1) This device may not cause interference.
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Warning: Operation of this equipment in a residential environment could cause radio interference.

CAN ICES-003(A)/NMB-003(A)
Le présent appareil est conforme aux CNR Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) il ne doit pas produire de brouillage et (2) l' utilisateur du dispositif doit étre prêt à accepter tout brouillage radioélectrique reçu, même si ce brouillage est susceptible de compromettre le fomctionnement du dispositif.

The device meets the exemption from the routine evaluation limits in section 2.5 of RSS 102 and compliance with RSS-102 RF exposure, users can obtain Canadian information on RF exposure and compliance.
Le dispositif rencontre l'exemption des limites courantes d'évaluation dans la section 2.5 de RSS 102 et la conformité à l'exposition de RSS-102 rf, utilisateurs peut obtenir l'information canadienne sur l'exposition et la conformité de rf.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This equipment must be installed and operated with a minimum distance of 20 centimeters between the radiator and your body.
Cet émetteur ne doit pas être Co-placé ou ne fonctionnant en même temps qu'aucune autre antenne ou émetteur. Cet équipement devrait être installé et actionné avec une distance minimum de 20 centimètres entre le radiateur et votre corps.

CONTENTS

PREFACE

ABOUT THIS GUIDE

This guide contains the information you will need to operate a QTM-EAP10/QTM-EAP11 with the Quantum RTLS system.

WHERE TO FIND MORE INFORMATION

Refer to the following sources for additional information and for product and software updates.

- **QTM-EAP10/QTM-EAP11 Resources**
  For more information and the most up to date user manual please visit our website (https://zerokey.com) which contains additional product specifications, user documentation, and notices.

- **Included product documentation**
  Your product package includes documentation detailing the setup, configuration, and operation of the Quantum RTLS system.

CONVENTIONS USED IN THIS GUIDE

Take note of these symbols which indicate important information within this manual.

CAUTION: Important instructions to prevent damage or improper operation of the Smart Space system.

NOTE: Key information and helpful tips that

CONFIG: Critical setup information that MUST be followed prior to operation of the system.

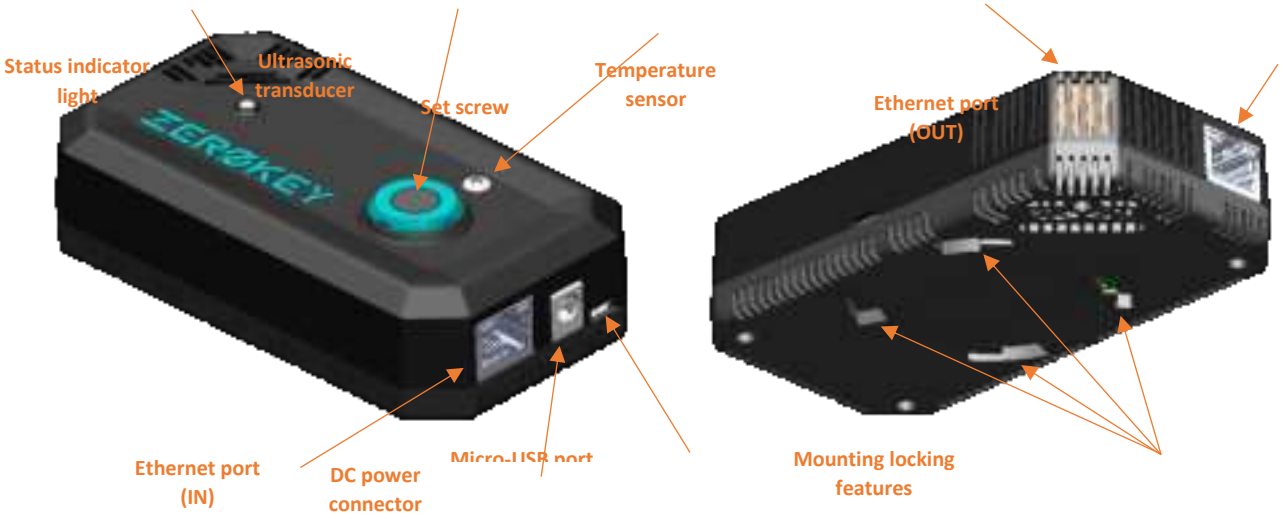
TYPOGRAPHY

Bold text	Indicates the name of a menu item, field, or important variable.
Italics	Emphasizes a word or a phrase.

2 PRODUCT OVERVIEW

The QTM-EAP10/QTM-EAP11 is an Anchor node for the Quantum RTLS system. Anchors are the reference nodes of the tracking system. This Anchor node is the stationary, tracking reference node that should not be moved after system calibration.

2.1 DEVICE COMPONENTS



2.2 PHYSICAL CHARACTERISTICS

2.2.1 SIZE

Without mount: 32 mm tall, 119 mm wide and 66 mm deep.

2.2.2 WEIGHT

Without mount: 106 grams.

2.2.3 Communication / Power Connectors

The unit requires active connection to power for operation and can be powered over ethernet or DC power.

The anchor unit is connected to a power via. Ethernet or DC power supply. When disconnected from power the unit will not remain powered on. There is no user-facing method to power off the unit, as it is intended to be always-on.

POE

The QTM-EAP10/QTM-EAP11 features ethernet ports to allow for Power over Ethernet (PoE) on permanent installations of the units. There are two ethernet ports available to allow for daisy chaining of devices. The port on the same side as the other connectors is used for power input, while the other ethernet port is used for power output to the next device in the chain.

It recommended to use a PoE-specific cable if using this method to power the device. For best outcomes, use a PoE-specific cable with 24 AWG conductor.

This device conforms to 802.3at Type 2 “PoE+” (30.0W).

The QTM-EAP10/QTM-EAP11 unit features two ethernet ports to support daisy chaining to power multiple devices in sequence. See section 3.3 for more information on daisy chain connections.

CAUTION: Use only an UL 60950-1 and IEC 62368-1: 2014 listed 802.3at Type 2 “PoE+” (30.0W) PoE capable power port.

DC POWER CONNECTOR

A DC power connector is available for permanent installations where PoE is not available.

CAUTION: Use only an UL 60950-1 and IEC 62368-1: 2014 listed 56V, 0.5A power supply. (Phihong Technology Co., Ltd. Type: PSAC30U-560L6 or equivalent)

USB

A micro-USB type connector is for factory testing purposes only.

CAUTION: Do not establish a connection between the device and a PC unless directed by a ZeroKey support member.

2.3 ALERTS, WARNINGS, AND INDICATORS

2.3.1 LIGHT ALERT

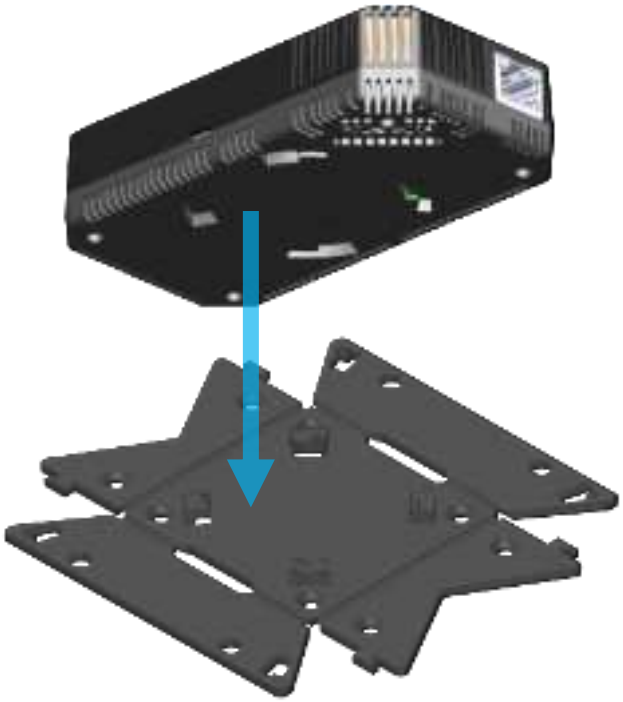
Upon boot-up, the QTM-EAP10/QTM-EAP11 LED will turn solid white for 1 second, then turn solid red for 1 second before entering idle state.

COLOUR & PATTERN	MEANING
Solid green	On, idle – not positioning
Blinking green	On, normal operation - positioning
All LED’s (RGB)	DFU mode - receiving firmware update

3 INSTALLATION

3.1 MOUNTING THE QTM-EAP10/QTM-EAP11

3.1.1 UNIVERSAL MOUNT



To use the universal mount:

- Line up the notches on the mount with the mounting holes on the bottom of the device
- Twist the mount in a clockwise direction 15 degrees until it clicks into place

- Adjust the universal mount to fit the installation location. For additional fitment options, the mount can be left flat, the sides can be removed using snips or side cutters, or the sides can be folded along the edge. If all edges are folded in, they can interlock with one another at the corners to assemble a universal shape. The “V” shaped groove on the short edge allows for mounting on round surfaces such as poles. There are holes on the sides and along the edges so that the unit can be secured with materials such as cable ties, Velcro, or wire.

- Mount the anchor so that the transducer is approximately pointed towards the area of interest. Transducer can be adjusted afterwards.

NOTE: For more information on anchor network and placement requirements, see ZeroKey Support Materials at zerokey.com.

3.2 ADJUSTING THE TRANSDUCER

The transducer on the QTM-EAP10/QTM-EAP11 can be adjusted to allow for more flexible coverage of the tracked space. To adjust the transducer:

1. Loosen the set screw next to the transducer
2. Rotate the transducer to the desired orientation
3. Tighten the set screw next to the transducer

NOTE: Avoid over-tightening the set screw, as it could cause damage to the transducer.

3.3 CONNECTING

The QTM-EAP10/QTM-EAP11 features two ethernet ports to allow for PoE via. daisy chain. Although not the only option for powering QTM-EAP10/QTM-EAP11 units, daisy chaining is the preferred method when deploying a permanent installation. The port on the same side as the other connectors is used for power input, while the other ethernet port is used for power output to the next device in the chain. For best outcomes, consider the following recommendations:

- The maximum number of units in one chain should not exceed 12 for the QTM-EAP11 and 10 for the QTM-EAP10
- Cable length should not exceed 100 m
- The ZeroKey pinout standard for pinout termination is 568A
- The devices must be powered via 802.3at Type 2, “PoE+” (25.52W) in order to reach maximum number daisy chained units.
- Connect all devices before powering on the system

Refer to Section 2.2.3 for input voltage requirements.

Once power has been supplied to the system, refer to section 2.3.1 to verify that all devices are on and on and have entered idle state. Before continuing to system calibration, ensure that the QTM-EAP10/QTM-EAP11 device is detected by the Quantum RTLS Gateway.

3.4 CALIBRATION

Before regular system operation can occur, the network of Anchor nodes must go through a calibration via. the ZeroKey Configuration Tool.

NOTE: For more information on system calibration, see ZeroKey Support Materials at zerokey.com.

4 OPERATION

The QTM-EAP10/QTM-EAP11 is a Quantum RTLS Anchor node. In Quantum RTLS, the anchor unit performs as one of many reference nodes in the RTLS tracking system. In regular operation there is a network of 6 or more anchor nodes that have enough spatial diversity covering the tracked space to provide diverse ranging information to each mobile device to enable accurate positioning. Anchor nodes are mounted in permanent locations and must remain stationary after calibration and during system operation. There is no further need to physically interact with the QTM-EAP10/QTM-EAP11 during regular system operation.

5 PRODUCT CARE

5.1 GENERAL CARE

5.1.1 CLEANING

The device can be cleaned using a moistened soft cloth and nonabrasive hand/dish soap. DO NOT IMMERSE. Wipe dry to prevent any moisture build up.

5.1.2 OPERATING TEMPERATURE

This device is designed to operate from -20°C to +60°C ambient. Do not place the unit in direct sun for extended periods without proper ventilation as the unit may exceed the +60°C temperature.

6 REPAIRS AND DISPOSAL

6.1 FIRMWARE UPDATES

The QTM-EAP10/QTM-EAP11 can be updated with new firmware through our over-the-air reprogramming application to correct, improve, or add new features to enhance the unit's performance. Details on how to perform these updates is included with each update installation package.

6.2 OPERATION LOGS

The QTM-EAP10/QTM-EAP11 updates and maintains information concerning its operation and activities as it is being used around the site. This information is used to the monitor the health of the unit and improve the device performance. The information collected does not contain any personal information from the user.

6.3 REPAIRING DAMAGED DEVICE

Units that have been damaged or have failed to operate in the field can be returned for repair or replacement with a few exceptions. If the unit is intact but has ceased to operate, it can be returned via an RMA request to our repair center. Please contact your plan administrator for more information and an RMA form.

6.4 DISPOSAL OF DEVICE

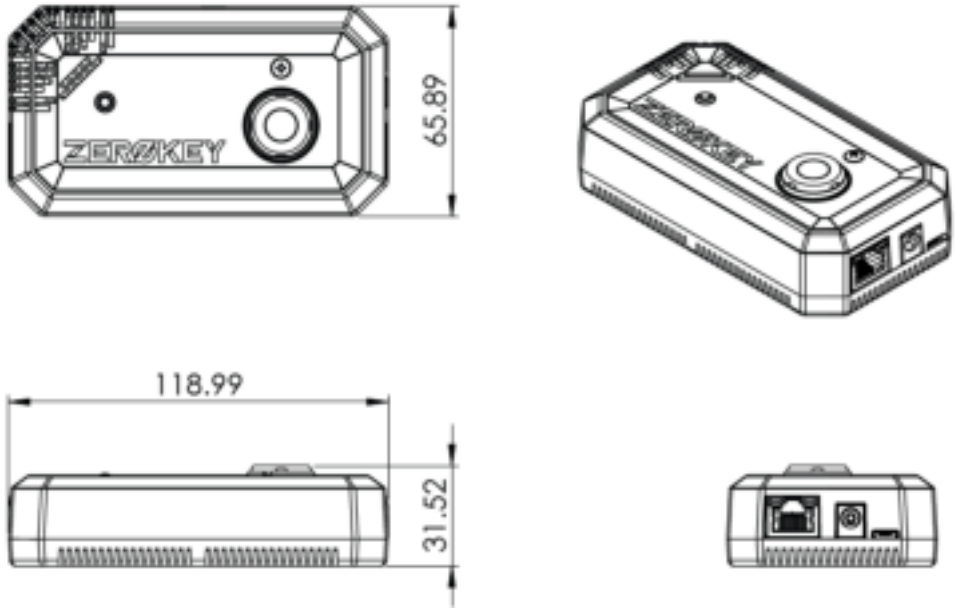
The QTM-EAP10/QTM-EAP11 must be sent to an electronics recycling depot to reclaim the electronics. Please contact your nearest electronics recycling company for details on their collection requirements.

APPENDIX A – SPECIFICATIONS

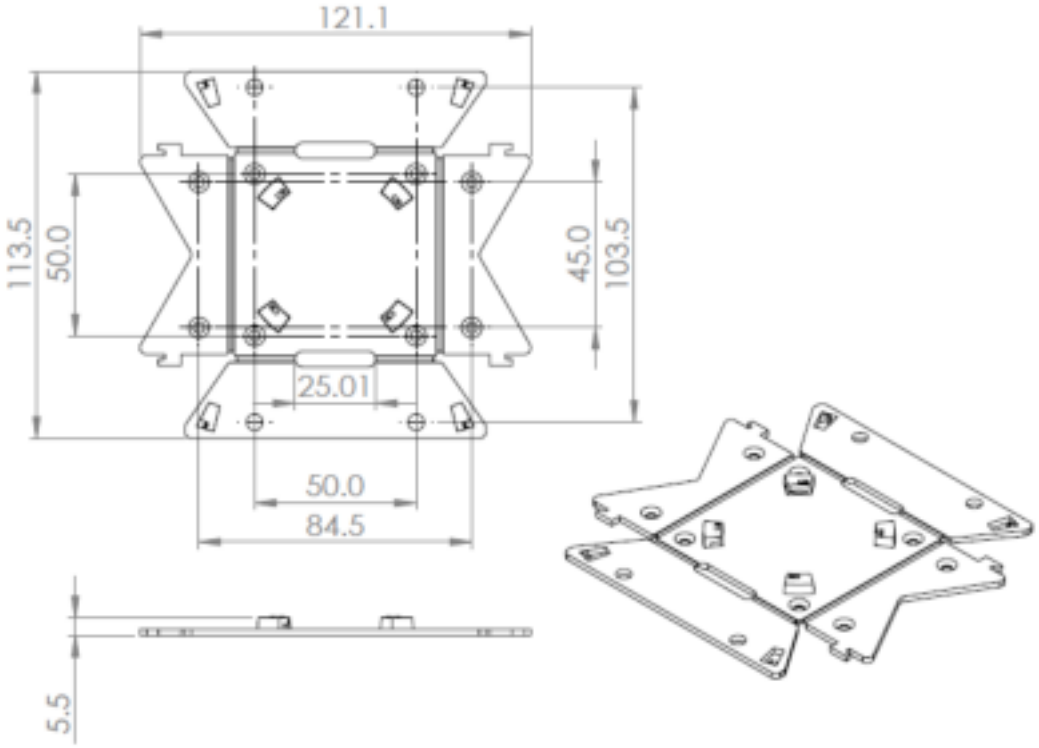
Dimensions	119 x 65.9 x 31.5 mm
Weight	106 g
Input Voltage	48.0-57.0v DC
Input Current	50 mA max (QTM-EAP10), 70mA max (QTM-EAP11)
Output Voltage	44-57v DC
Quiescent Current	0.25 to 0.50 mA
Power-over-Ethernet	802.3at type 2 “PoE+”
Ethernet Speed	10/100 Mbps
Microcontroller	ARM Cortex-M4F @ 64MHz
Ethernet Port	2 x RJ45
USB	USB 2.0 (12Mbs)
DC Power Connector	2.10mm ID 5.5mm OD, centre positive.
Peripherals	Status LED, temperature sensor
Mounting Options	Universal Mounting Plate, 2 sided tape
Operating Temperature	-20 to 60°C
Operating Humidity	5 to 95% Non-Condensing
RF Modulation	GFSK
RF TX Power	0-8 dBm
RF RX Sensitivity	-90 to -97 dBm
Ultrasonic Frequency Band	50.0KHz +/- 0.1KHz
Ultrasonic Output	96 dB SPL (max)
Ultrasonic Duty Cycle	2.8% (min) 3.2% (max)
Certifications	FCC (US) / IC (Can) / CE (EU) / JRL (JP) / KC (KR)

APPENDIX B – MECHANICAL DRAWINGS

QTM-EAP10/QTM-EAP11



UNIVERSAL MOUNT



APPENDIX C – SYSTEM DIAGRAM