



# Qband+ Qsmart BLE Base Station Product Manual

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# 1 Introduction

## 1.1 General Information

accesso are providing 100% Virtual Queuing System (VQS) allowing guests to be able to make registrations for rides without the need to wait physically at the ride itself.

The BLE Base Station is a fixed mains powered device that is connected to a wired Ethernet network. It transmits and receives Bluetooth Low Energy data packets to and from the Qband+ wristbands which are worn by guests in public attractions such as theme parks and water parks. It also contains a GPS receiver to enable very accurate time synchronisation.

There are two separate units that make up the complete BLE Base Station device, the Feeder unit which contains the power supply and Ethernet Interface, and the Head unit which contains the wireless transceiver. Splitting the complete design into two separate units enables the head unit to be placed high up on buildings and towers, while the feeder unit can be mounted near ground level allowing easy access for maintenance.

## 1.2 Facilities

### 1.2.1 Head Unit

- 2.4GHz RF sub-system
- Supports Bluetooth Low Energy standard
- Supports GPS receiver for very accurate timing
- Supports RS422/RS485 for extended distances up to 1Km
- Simple 10 – 30V DC power requirement (nominal 24V DC)
- Weatherproof IP65 enclosure

### 1.2.2 Feeder Unit

- Integrated power supply for Head Unit
- Integrated Lightning Protection
- Ethernet to RS422/RS485 converter
- Supports RS422/RS485 for extended distances up to 1Km
- Weatherproof IP65 enclosure

## 1.3 Applications

The Bluetooth base stations track the movement of guests around the park, and provide the facility to locate Qbands+ at the park exit for the purposes deactivating the band, and for application of simple detection of theft prevention.

## 2 Installation

### 1.1 Location

There are two separate units that make up the complete BLE Base Station device, the Feeder unit and the Head unit.

The Head unit has been designed to be as small as possible to allow the unit to be mounted high up on buildings yet remaining unobtrusive. In normal operation the BLE antennas are connected via good quality low loss coax. However depending on the antenna type it is possible to mount the antenna directly to the reverse TNC connector on the case. The connection to the Feeder unit is normally made via standard shielded CAT 5 cable that carries both the 24V DC power and RS485 data signals.

**\* Please ensure that the correct type of cable is used and that it meets the relevant Fire & Safety requirements. This is particularly relevant for internal wiring where special flame retardant cable types should be used.**

The Feeder unit is normally mounted near ground level to allow for easy access for mains and network connections. It also provides a port for locally configuring and programming the Head unit.

### 2.1 Wiring

#### 2.1.1 Feeder Unit

##### 2.1.1.1 Mains Connection

The feeder unit requires connection to a mains power supply (110-240V AC) rated at 3 amps minimum. The wiring must adhere to the relevant country safety standards.

##### 2.1.1.2 Network Connection

The Feeder requires connection to the Qsmart network via an Ethernet connection. This connection is made via a punch down block as shown in the picture below.

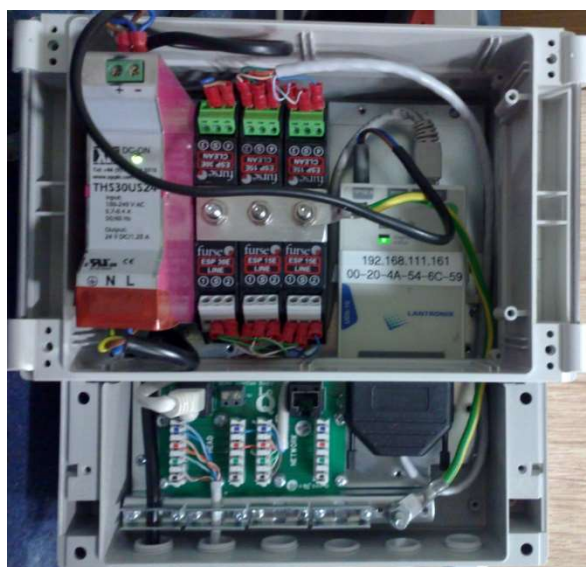


Figure 1 Feeder Unit

### 2.1.1.3 Head unit Connection

The connection from the Feeder unit to the Head unit is made via a single 8-way screened CAT5 cable. This cable carries both the 24V DC power and the RS485 data signals that are used for a BLE Base Station installation.

See the picture above for the colour code punch down sequence.

### 2.1.1.4 Earth Connection

All variants of the feeder unit **must be** earthed correctly to ensure protection of the equipment against lightning strikes.

The lightning protection barriers fitted in the feeder unit are rated at 90 Amps so any run of earth cable must be a very low impedance path. It is recommended that 16mm<sup>2</sup> cable with a minimum rating of 90Amps be used with a maximum length of 3 metres before it is terminated at the main protective earth point (earth rod etc.).

## 2.1.2 Head Unit

### 2.1.2.1 Feeder unit Connection

The connection from the Feeder unit to the Head unit is made via a single 8-way screened CAT5 cable. This cable carries both the 24V DC power and the RS485 data signals that are used for a BLE Base Station installation.

The Head unit also allows for direct connection to a 24V DC power supply via a terminal block without the need for connection to a feeder unit. This should only be used if no lightning protection is required.

See the picture below for the colour code punch down sequence.



Figure 2 Head Unit

## 2.2 Configuration

Configuration of the unit can only be carried out by trained personnel with the correct equipment, there are no user configurable options in the BLE Head unit.

## 3 Operation

### 3.1 Switching On

Before switching on check all connections are correct and that the Feeder unit is suitably earthed.

With the Head unit power switch in the off position apply power to the Feeder unit and check that the power LED D4 next to the power switch illuminates indicating a good 24V signal. The power switch the Head unit can then be turned on, the unit should initialize and the LED D5 should illuminate indicating a good 3V signal.

In normal operation the dipswitches should be all set to 'OFF'.

### 3.2 Normal Operation

The easiest way to determine correct operation of the BLE Base Station is to observe the LEDs on the Head unit BLE board. The +3V LED illuminates to indicate a good power supply and the other three LEDs toggle to indicate data transfer.

## 4 Specifications

### 4.1 Feeder Unit

#### 4.1.1 Mechanical

Width:	-	226.5 mm
Height:	-	236.7 mm
Depth:	-	134.5 mm
Weight:	-	3.1 Kilograms
Case Material	-	ABS (to UL 94)
Sealing	-	IP65

#### 4.1.2 Controls and Indicators

None

#### 4.1.3 Power Requirements

Supply	-	110 – 240V AC 50 – 60Hz at 1A
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#### 4.1.4 Connections

Network	-	Ethernet via 8 way punch down
Head unit	-	RS422/RS485 via 8 way punch down
Earth	-	Protective Earth via M6 stud

### 4.2 Head Unit

#### 4.2.1 Mechanical

Width:	-	100 mm
Height:	-	160 mm
Depth:	-	61 mm
Weight:	-	925 grams
Case Material	-	Aluminium Al Si 12
Sealing	-	IP66

#### 4.2.2 Controls and Indicators

##### RS485 Interface Board

SW2	-	Power switch
Dipswitch	-	not used
LED D4	-	24V DC



LED D5	-	3V DC
<u>BLE board</u>		
Switch "Reset"	-	Reset
Switch "User"	-	not used
+3V	-	3V DC power supply
Master	-	data
Slave 1	-	data
Slave 2	-	data

#### 4.2.3 Power Requirements

Supply	-	10 – 30 VDC at 100mA
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#### 4.2.4 Connections

Feeder unit	-	RS422/RS485 via 8 way punch down
3 x BLE antenna-		TNC 50 ohm
GPS antenna	-	Reverse TNC 50 ohm

#### 4.2.5 RF Characteristics

Transceiver:	-	2.4GHz Blue Tooth Low Energy compliant
Channels:	-	CH0 – CH36 for data CH37, CH38, CH39 for advertisements
RF characteristics	-	2402 – 2480MHz
Bandwidth	-	1MHz
Spacing	-	2MHz
Output power:	-	Maximum 2.51mW (+4dBm)
Antenna Type:	-	External Reverse TNC connector
Data rate:	-	250 Kbps (effective)

#### 4.2.6 BLE Antenna Specification

Frequency Range	-	2.40GHz – 2.50GHz
Impedance	-	50R
Gain	-	9dBi maximum
Polarisation	-	Linear Vertical
Beam width	-	Horizontal > 60 degrees, Vertical >76 degrees

## 5 Environmental Conditions

### 5.1 Operating temperature

Long Term Storage: - -20 to + 50 °C

Operation: - 0 to +50 °C

### 5.2 Relative Humidity

Long Term Storage: - <50%

Operation: - up to 99% Non-condensing

### 5.3 Other restrictions

Avoid long-term exposure to direct sunlight.

Avoid exposure to corrosive environments, e.g. salt water.

## 6 Warranty Statement

accesso warrants for a period of 1 year from the date for shipment that each device supplied shall be free from defects in material and workmanship. During this period, if the customer experiences any difficulties with the product and is unable to resolve by phone or e-mail with accesso Technical Support, a Return Material Authorization (RMA) number will be issued. Following receipt of a RMA the customer is responsible for returning the product to accesso, freight pre-paid. accesso upon verification of a valid warranty will, at its option, repair or replace the product in question, and return it to the customer freight pre-paid. No services are provided at the customer's site under this warranty.

accesso warrants the Firmware within the device for a period of ninety (90) days from the date of shipment, that each Firmware package shall be free from defects and operate according to the accesso specifications. Any Firmware revisions required hereunder cover supply of distribution media only and do not cover, or include any installation or upgrade of the product.

accesso shall have no obligation to make repairs or to effect replacement required through normal wear and tear arising in whole or in part by catastrophe, fault or negligence of the user, improper or unauthorized use of the product, or use of the product in such a manner for which it was not designed, or causes external to the product.

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Warranty claims must be received by accesso within the applicable warranty period. A replaced product, or part thereof, shall become the property of accesso and shall be returned to accesso at the purchaser's expense. A Return Material Authorization number assigned by accesso must accompany all returned product.

## 7 Approvals

### 7.1 Declaration of Conformity

Accesso Technology Group PLC

Unit 5, The Pavilions

Ruscombe Business Park

Twyford

Berkshire

RG10 9NN

**Hereby declares that the following product:**

Product Name: BLE Base Station

Model Number: P2400-485

**Conforms to the following standards:**

#### **EMC**

FCC 47CFR 15.107 & 15.109

ISED ICES-003 Issue 6

#### **Radio**

FCC47CFR 15.249 & IC RSS-210

#### **Safety**

IEC 60950-1:2005/A2:2013

IECEE CB

#### **Radio Intermodulation**

FCC KDB article 708832 & OET Release 09/10/2007 & ISED

#### **Safety RF Exposure**

FCC 447498 D01 & IC RSS-102 Issue 5

### 7.2 USA Conformity Statement

FCC ID: 2AKCM-P2400-485

FCC warning statement:

- This device complies with Part 15 of the FCC Rules.  
Operation is subject to the following two conditions:  
This device may not cause harmful interference, and

This device must accept any interference received, including interference that may cause undesired operation.

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To satisfy FCC RF exposure requirements the device must be installed in such a way as to ensure a minimum separation of 20 cm between the user/public and the antennas.

- This device must not be co-located or operated in conjunction with any other antenna or transmitter.
- Any changes or modifications not expressly approved within this manual could violate FCC regulations and void your warranty for this equipment. Use only the supplied antennas or alternatives of the same specification (see section 4.2.6). Use of unauthorised antennas (or modifications to the antennas) could violate FCC regulations and void your warranty for this equipment.

### 7.3 Canada Conformity Statement

IC ID: 21963-P2400485

#### ISED Warning Statement

##### English

"Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication."

"This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device."

## French

"Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante."

"Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement