

User Manual

Node: Smart Barrier Node

Model: Version 2.0

Manual Revision: 1.0



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1 Introduction

1.1 Warning

This guide intends to assist in the preferred mounting, operation, and usage of Viotel's Smart Barrier Node.

Please read and completely understand this user guide in order to make sure the safe and correct use of the system as well as maintain the longevity of the device.

Protection provided by the equipment may be impaired if used in a manner contrary to this user manual.

Changes or modifications not expressly approved by Viotel Limited could void the user's authority to operate the equipment.

This product must not be disposed of in the normal waste stream. It contains a battery pack and electronic components and should be recycled appropriately.

1.2 Theory of Operation

The device monitors barrier vibration in real-time, and regularly monitors tension of two wires of the flexible rope barrier. This information is transmitted using the mobile phone network (the Cat-M1 mode of modern LTE networks).

The Smart Barrier nodes connects to the LTE network and uploads data:

- regularly – even when the data is normal, as a 'heart beat'. If there is a normal amount of solar energy received by the integrated solar panel, the device uploads vibration and strain data every hour. For lesser amounts of received solar energy, this regular reporting period reduces to every 6 hours, or every 24 hours or even every 72 hours.

- and –

- whenever a potential impact is detected – the device is continuously monitoring vibrations during normal operation.

1.3 Parts List

The Smart Barrier Node is available as 3 main components:

- 1) Smart Barrier Node with integrated solar panel, internal rechargeable battery and magnet
- 2) Detachable strain band with cable and connector
- 3) Stainless steel cross piece for mounting

1.3.1 Smart Barrier Node

ITEM	QTY	DESCRIPTION
1	1	Smart Barrier Node
2	1	Integrated Solar panel
3	1	Cap for 7-pin connector
4	1	Single "STATUS" LED
5	1	Magnet



Table 1 Parts List

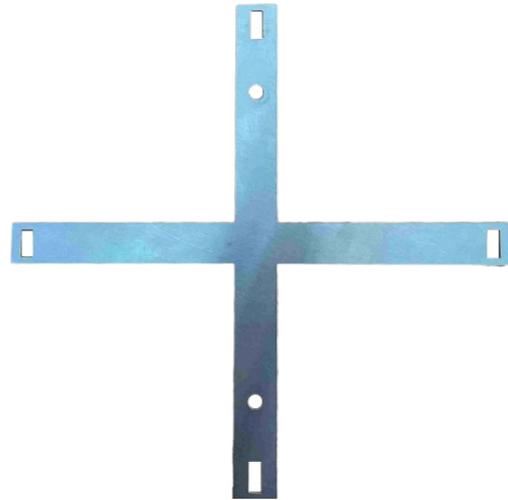
1.3.2 Detachable Strain Band

- Stainless steel band with strain gauge installed on one side and holes for adjustable length on the other
- UV resistant cable with 7-pin connector
- Nut and bolt are 7mm hex, stainless steel
- Stainless steel washer



13.3 Cross-piece

- Stainless steel cross-piece
- Two M5 holes for connecting to node backing plate with stainless steel M5 screws and nyloc nuts (supplied)
- Four slots for stainless steel cable ties (not supplied). Each slot is 4mm x 10mm.



1.4 Dimensions



Figure 1 Dimensions in mm

2 Usage

2.1 Indicated Magnet Location

A magnet is used to interact with the Smart Barrier node. The switch that the magnet (Part 5) operates on the Smart Barrier Node is located in the position as shown below.

Wherever instructed to tap the node using the magnet, do so at the spot indicated by the purple circle (this is where the magnetic sensor is location). A tap means swiping the magnet past the magnetic sensor or holding the magnet at the sensor for <1 second. Double taps must be performed within 3 seconds.



Figure 5: Photo highlighting location of the magnet for Smart Barrier Node

2.2 Required Tools

Hand tools specific to your crash barrier are to be selected by the installation technician. Viotel recommends the following tools and consumables for installation of the Smart Barrier Node with strain band on to a wire rope barrier.

- 2x 7mm spanners
- 1x 8mm spanner
- 1x 3mm Allen key
- 1x coil spring compressor clamp
- Zip ties (plastic & stainless steel)

Contact Viotel for any support required.

3 Physical Installation

3.1 Recommended Mounting Procedure

It is recommended that the Viotel SMART Barrier Node be installed on the last full barrier section before the anchor block downstream of the flow of traffic. The device can efficiently detect strain and crashes along the entire length of the barrier from this position.

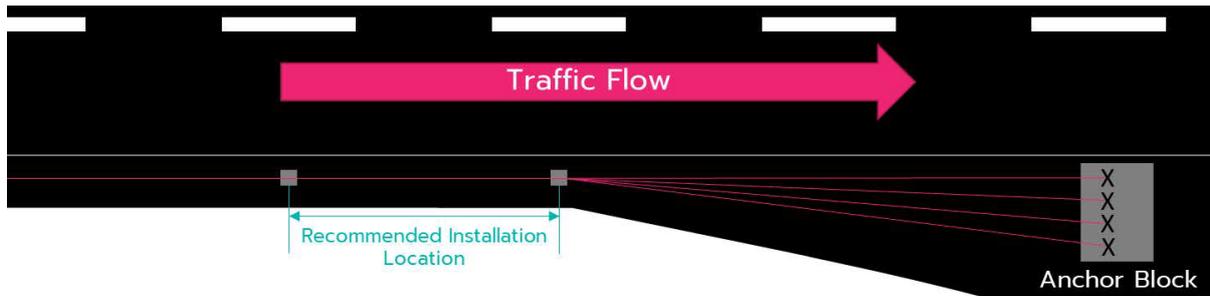


Figure 2 Install wire rope node close to (but not at) the end of barrier

3.2 Recommended Mounting Orientation

It is important to position the solar panel side of the Smart Barrier node on the side of the flexible barrier that has maximum sun exposure. **In the southern hemisphere** this means that the unit should be mounted ideally facing north, or else east or west – **not facing south**. In the northern hemisphere, the unit should be mounted so that it faces south (ideally) or else east or west – not to the north. Consideration should be given to position of overhead structures and trees that throw shade during the date (particularly if the installation occurs at night).



Figure 3 Required orientation of the solar-powered node

3.3 Mount Bracket to Device

STEP	DESCRIPTION
1	<p>Use supplied two screws and nuts to attach the cross-piece to the black backing plate of the node. Put the screw through from the cross-piece side, such that the nut is on the node side.</p> <p>The back of the cross-piece will be flush against one of the wire ropes of the flexible barrier, so this side should be as flat as possible.</p>

3.4 Standard Wire Rope Installation

The strain band for measuring tension is connected between two wires of the flexible barrier.

3.4.1 Which two wires should be used to attached the strain band?

The strain band has 4 holes marked A, B, C and D. These holes are 40mm apart. When fitted to 2 wire ropes of 19mm diameter, the wires can be held with centres that are 160mm apart (hole A), 180mm apart (hole B), 200mm apart (hole C) or 220mm apart (hole D). The two wires should be deflected about 60mm towards each other from their original positions. So you should find a pair wires on the barrier that are between 220mm and 280mm apart, and use the strain band to hold these two wires 60mm closer to each other.

3.4.2 Installation Procedure

STEP	DESCRIPTION
1	Using a standard wire rope tension gauge (not supplied), take tension measurements of all wire ropes in this barrier. Confirm they are at the tension specified by the barrier system manufacturer for that air temperature. Adjust the wire rope tension if necessary.
2	<p>Using a tool (e.g. coil spring compressor) compress both the top and bottom wire ropes of the selected pair about 70-80mm towards each other, at a point roughly halfway between the posts on either side.</p> <p>If mounting on non-parallel wire ropes, it is recommended that hose clamps be installed to support the strain band. Follow steps listed in the 3.5 Anchor Block Wire Rope Installation (Not Recommended) section before proceeding to Step 2.</p>



3	<p>Wrap the strain band around the compressed wires, roughly halfway between posts on either side. Use the nut and bolt to fix the strain band in place. The wires can now be slowly released by the tool so that the strain band is the only thing holding them in place. If attached to non-parallel wires: ensure the strain band is prevented from slipping by hose clamps on the wire rope (see the 3.5 Anchor Block Wire Rope Installation (Not Recommended) section for details).</p>
4	<p>Using stainless steel zip ties, attach the smart barrier node to the wire rope barrier ensuring at least three points of contact. Using steel or plastic zip-ties, fasten the strain band cable along the lower wire rope.</p>  <p>It is recommended the node is mounted onto the wire rope. However it can be attached to posts instead if needed.</p>
5	<p>Activate the Smart Barrier node – see <i>Section 4 Operation</i>.</p>

3.5 Anchor Block Wire Rope Installation

STEP	DESCRIPTION
1	Using a standard wire rope tension gauge (not supplied), take tension measurements of all wire ropes in this barrier. Confirm they are at the tension specified by the barrier system manufacturer for that air temperature. Adjust the wire rope tension if necessary.
2	<p>Identify a suitable pair of wires about halfway between the anchor block and the post. It will probably not be possible to deflect these wires towards each other by 60mm, but 30-40mm will be fine. Thus the pair of wires should be between 190mm and 260mm apart before installing the strain band. Using a suitable tool (e.g. coil spring compressor) pull both wire ropes towards each other.</p> 
3	<p>Install hose clamps on the side of the strain band closest to the anchor block, to prevent strain band (gauge band) slipping down the wire ropes over time.</p> 
4	Proceed to steps 3 to 5 listed in the 3.4 Standard Wire Rope Installation section.

4 Operation

By default, your Viotel Smart Barrier Node will be set to Sleep – there should be no activity on the Status light for at least 40 seconds. To confirm Sleep mode, a single tap of the magnet will result in a blue Status light for 3 seconds. During Sleep mode, the node wakes up briefly every 7 days to check with the myViotel platform. Health data (e.g. battery voltage) is uploaded at this time, and any waiting instructions downloaded; the node may be remotely woken up in this manner if necessary.

To wake the Smart Barrier node up, take the magnet and double tap it over the magnetic sensor. You should see a double green flash followed 5-30 seconds later by a solid blue for 1 sec, and then gap of about 60-180 seconds while the node connects to the LTE network. After that, there should be a double green flash every 30 seconds to indicate normal operation - the node is now Awake.

In the normal operating mode, the Smart Barrier device is constantly monitoring vibrations. A quick shake of the unit will trigger it – the Status light will turn solid blue for 2 seconds. If the shake is prolonged past 2 seconds, the unit will decide the barrier is still shaking and reverberating, and so this was probably a significant impact. In this case, the trigger will be validated (red Status light for 1 second) and the device will connect to the LTE network to upload data. This connection-and-upload process will take about 30-60 seconds, after which normal operation is resumed.

There is no light activity during a LTE connection-and-upload.

While the node is awake, it can be placed into Test Shots mode. In this mode, the node will connect and upload data (incl tension data) every 5 minutes, for 10 cycles. After that, it will automatically go back into the normal Awake mode. To enter Test Shots mode, first make sure the node is Awake – there should be a double green flash every 30 seconds. Then tap the magnet once on the magnetic sensor location. Status will light up – solid green for 2 seconds, followed by a quick yellow flash. The node is now in Test Shots mode, indicated by the double purple flashes every 30 seconds. Test Shots mode takes about 30 minutes to complete.

To put the device back into Sleep mode, double tap the magnet on the magnetic sensor location. On the first tap, the Status light will light up green. On the second tap, the Status light will turn solid blue for 1 second. The device connects to the network and uploads any outstanding data and logging data. This takes about 30-60 seconds. After that, the Status lights up blue for 10 seconds, and then the unit goes to Sleep. No further activity on the Status light.

To confirm Sleep mode, a single tap of the magnet will elicit a solid blue light for 3 seconds.

After the physical installation is complete (Section 2), **the procedure for last step of typical installation is simply:**

- 1) Is the device sleeping? Watch it for 60 seconds: if no double green flashes are observed, the device is probably sleeping. Confirm this by a single magnet tap: the Status light should be solid blue for 3 seconds and if so, the device is in Sleep mode. You can also confirm this by checking the [myViotel](#) app – last data seen from the node should be quite old.
- 2) To wake device up, double tap of the magnet. After a minute or so, you should see double green flashes every 30 seconds – the device is now Awake. Check your myViotel app – last data seen from this device should be very recent.

4.1 Adding to myViotel

Navigate to <https://my.Viotel.co> to associate the device with your myViotel account and access device management and dashboard display. The myViotel dashboard is accessible from any web browser on your computer, phone or tablet.

Detailed user guide for myViotel is found on our [website](#) with device specific instructions for Smart Barrier Node Device Settings and Alert Setup:

myViotel User Guide: <https://www.viotel.co/myviotel-user-guide>

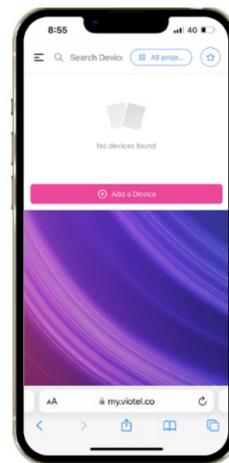
Step 1: Login to myViotel

Login at <https://my.viotel.co>



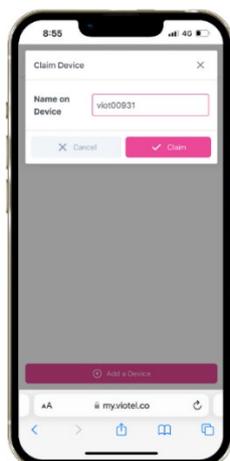
Step 2: Add a Device

In the *home* or *devices* tab, click **Add a Device**.



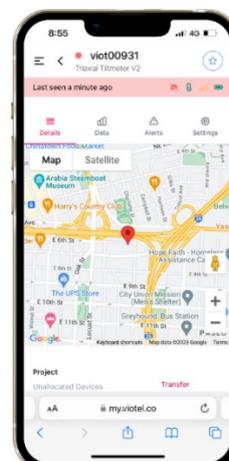
Step 3: Enter serial number

Type in your Viotel node **serial number** in the field provided and **claim** your device. Follow the on screen prompt. Associating the device will complete on successful communication.



Step 4: Set up your device

Navigate the individual device tabs to view device **details**, **data**, **alarms** and **settings**.



5 Maintenance

The product should not require any maintenance after installation.

Only service personnel authorised by the manufacturer may open the inner enclosure. No user serviceable parts are located inside.

5.1 Cleaning

If the need to clean the product should arise, use only a damp cloth and mild detergent. Do not use any solvents as this may damage the enclosure.

5.2 Downloading Data

The only way to upload data is over the cellular communications network. This can be activated on demand using the magnet.

If the signal is weak and the device is unable to upload data at that moment, the device is programmed to keep trying in decreasing increments (to conserve battery). If after 4 days of failing to upload, it will reboot.

Uploaded data can be viewed and downloaded from the [myViotel](#) platform.

Data is stored in non-volatile memory and survives reboots and power loss.

Data is deleted from the device once uploaded.

5.3 Further Support

The myViotel User Guide is found at: <https://www.viotel.co/myviotel-user-guide>

For further support, please email our friendly staff at support@viotel.co with your name and number and we will get back to you.



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