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Weight		1,5 KG	
Ver.	Date	Name	MODIFICATION
2	07-10-11	G.Tomé	Indication of connectors GPRS, GPS
3	11-04-12	G.Tomé	Cable and adapter is added
4	17-07-12	G.Tomé	Version in the document name
5	11-12-12	G.Tomé	Mounting instructions updated

SCALE		1/1	
Drawn	20-09-11	Name	G.Tomé
Approved	20-09-11	Name	G.Tomé

Reference


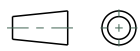
Designation

Pos.	Description	Traintic Code	Manufacturer Part	Notes	Quant.
	Antena 3G+GPS			Drawing number 050037-00	
				Version 05.00	

MOUNTING INSTRUCTIONS

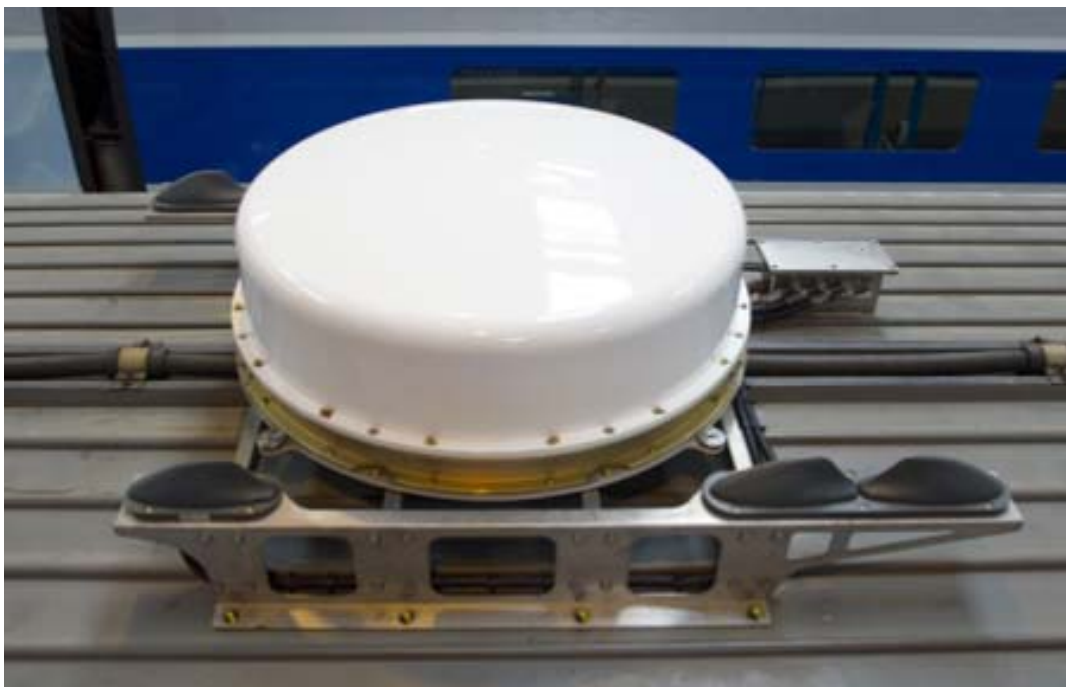
1. Mounting hole for the connector: $\varnothing 38 \dots \varnothing 56$
2. The area of the roof where the antenna is mounted has to be planar and stable.
3. Clear the area where the antenna is mounted from paint, corrosion or any anodized layer.
Clear this area from any dust, brake dust, cutting chip, oil or fat.
4. Use a cap nut plus the enclosed sealing washer. Cap nut M8 DIN 1587 torque 15Nm - 20 Nm
5. All screws and nuts: Stainless steel.
6. No obstacles within a radius of approximately 1 m or more.
7. As a rule over the thumb antennas should face no obstacles within a radius of approximately 1 m or more.
8. It is mandatory not to elevate antennas against the trains roof with high flanges or other challenging constructions.
9. After screwing, the four screw enclosures must be sealed with silicone
It is optional to seal the perimeter of antenna with silicone

CONECT. ANTENA	CONECTORES N - HEMBRA PANEL
	50 Ohms

01	GPRS ANTENA ANTENA GPRS		1	CAF P&A 050037		1.000		
MARCA	DESCRIPCIÓN DESCRIZIONE		CANT. QUANT.	CÓDIGO O NORMA CODICE O NORMA	MATERIAL O REFERENCIA MATERIALE O REFERENZA	PESO PESO (Kg)	DIMENSIONES DIMENSIONES (mm)	
LOCOMOTIVA E401					1.000	A1	BEASAIN	OT
A Modificar cajetín		2016-07-04 96411	ISO 2768-cK DIN ISO 13920-BF		 Power & Automation			
B ACTUALIZAR		2016-12-23 14518						
Ed.	Descripción	Date	Nome					
	X:X Disegnato	01/07/2015	10221	GPRS ANTENA ANTENA GPRS				
	Comprovato	02/07/2015	14044					
	Verificato	02/07/2015	14422					
		Date	Nome					
		es/it						
CAF CONSTRUCCIONES Y AUXILIAR DE FERROCARRILES, S.A. BEASAIN (GIPUZKOA)				B.20.88.342		B		1/9

**ANTENNAS FOR
RAILWAY, LIGHT RAIL, METRO
AND TROLLEY-BUS APPLICATIONS**

INSTALLATION MANUAL





1 INTRODUCTION

This document is a guideline for the installation of the Sencity®Rail or Sencity® Avant antennas on a vehicle roof. It gives additional information to the mounting instruction. For defining the right installation of the antenna, the information on the mounting instruction must be respected.

1.1 Installation

The following chapters provide further details about correct installation such as the correct preparation of the roof and the roof's mechanical stability as well as installation requirements to ensure security in case of accidents.

1.2 Mechanical dimensions

There are minor differences between the different Sencity®Rail and Sencity®Avant antennas. The specific information can be found on the datasheet and the mounting instruction.

1.2.1.Preparation of the roof

To comply with all security requirements, the area of the roof where the antenna is mounted, must be free of paint and contaminants like paint, non-conductive surface treatment, dirt, corrosion, brake dust, oil or fat. In case of an aluminium roof, the aluminium in direct contact with the antenna must not be anodised.



If this requirement is not respected during installation the risk of death when an accident occurs is dramatically increased.

1.2.2.Type of roof of the vehicle

Depending of the roof additional precautions have to be made. In case of doubts, the installation has to be discussed with the train builder.

1.2.2.1 Stabile metal roof

Three issues in regards to the metal roof need to be considered before installation:

1. Conductivity of the roof

After the preparation of the roof, its conductivity on the contact area with the antenna must be checked using a proper ohmmeter.



If this requirement is not respected during installation the risk of death when an accident occurs is dramatically increased.

2. Planarity of the roof

The planarity of the train's roof must be checked before the installation of any antennas. Exact information about planarity can be found in the mounting instruction which is delivered with each antennas.



If this requirement is not respected during installation the risk of death when an accident occurs is dramatically increased.

3. Installation using welded bolts for Sencity® Rail antenna.

To avoid planarity problems, an additional mounting plate can be welded to the train's roof. Blind threads or bolts can be directly welded to the plate and the installed antenna using a special adapter plate (contact HUBER+SUHNER for information about adapter plates). This solution will avoid the risk of leakage.

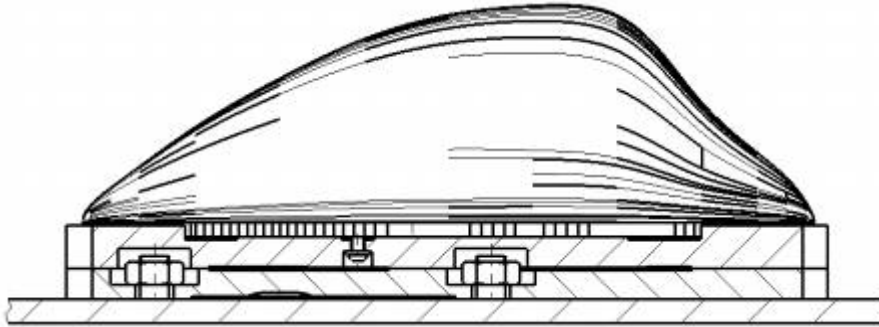


Figure 1

1.2.2.2 Thin metal roof

Three issues in regards to the metal roof need to be considered before installation and are described below. The main problem existing with thin metal roof is ensuring a sufficient contact between the antenna and the vehicle, if this is not achieved it will result in a non-compliance to UIC 533 standard and the risk of death in case of accident. Careful analysis with FMEA needs to be undertaken.

1. Conductivity of the roof

After the preparation of the roof, its conductivity on the contact area with the antenna must be checked using a proper ohmmeter.



If this requirement is not respected during installation the risk of death when an accident occurs is dramatically increased.

2. Stability of the roof

The stability of the roof must be checked before the installation of any antennas. Washers which have a sufficient diameter need to be utilised (see figure below). HUBER+SUHNER recommends the utilisation of washers according to the ISO 7093 standard (stainless steel A2, 140 HV, d2=24, d1=8.4). This recommendation will ensure sufficient contact between the antenna and the roof of the vehicle but does NOT help to reinforce the roof. The stability of the roof needs to be analyzed taking in account the wind load of the antenna (depending on the speed of the vehicle), the weight of the antenna, a possible shock scenarios caused by objects (i.e. birds) and the position on the roof. If in doubts, FEM (Finite Element Method) simulations need to be undertaken before installing any antennas.



If this requirement is not respected during installation the risk of death when an accident occurs is dramatically increased.

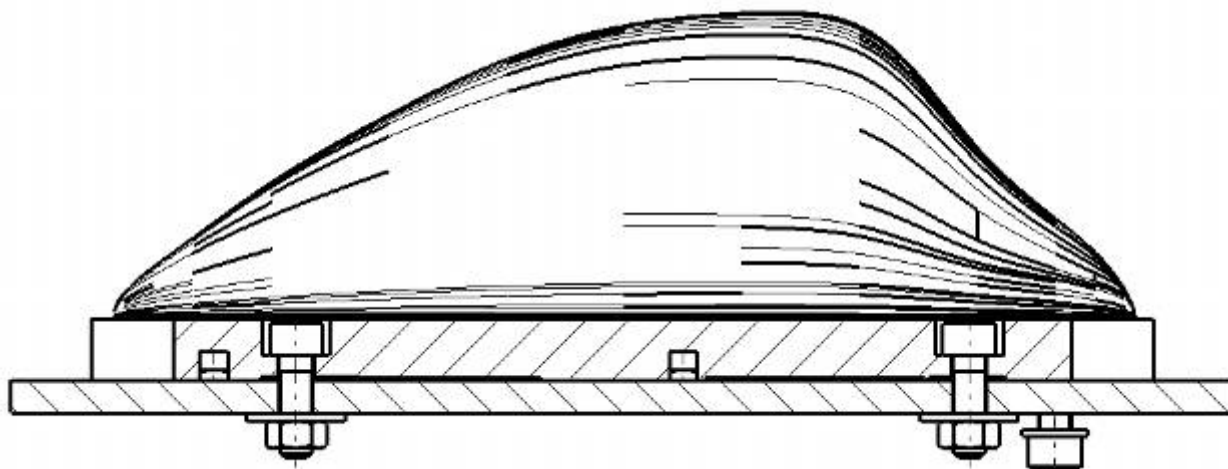


Figure 2

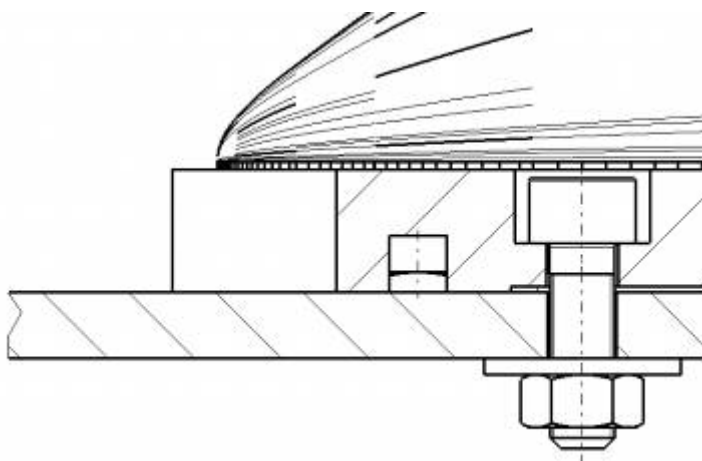


Figure 3

3. Planarity of the roof

The planarity of the train's roof must be checked before the installation of any antennas. Stability problems or uneven parts of the roof will have the same result as the previous case (see above: stability of the roof).



If this requirement is not respected during installation the risk of death when an accident occurs is dramatically increased.

1.2.2.3 Thin polymer roof

As the roof of the vehicle is made of polymer (typically a mix of epoxy and fibre glass) the roof does not need to be grounded such as seen in the UIC 533 standard. In case of contact between the power line and the roof a short circuit will then only appear when the overhead line is in physically contact with the antenna. A short circuit is possible due to the fact that each antenna is connected to the train equipment through the coaxial cable which travels somewhere with inside the



vehicle. Depending on the application, the coaxial cable will be located close to passengers or to the driver resulting in risk of death when an accident occurs.

In this case the roof of the vehicle will need to be reinforced by making a large cut in the polymer and integrating a large thick metal plate (for the characteristics of this metal plate refer to the chapter 1.2.2.1). For better passenger protection during an accident, a proper grounding cable or copper busbar should be utilised whereby one side of the grounding cable needs to be connected to the metal plate and the other side either connected to earth or to the train itself. The antenna is mounted on the metal plate. Figure 9 shows a sketch of the mounted antenna on the introduced metal plate.



If this requirement is not respected during installation the risk of death when an accident occurs is dramatically increased.

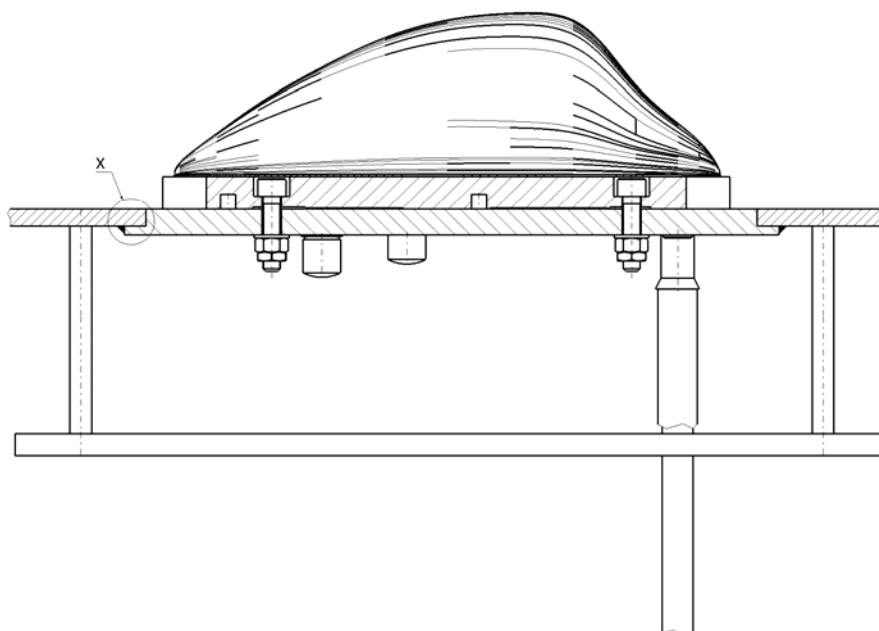


Figure 4

1.2.2.4 Special installation on the side of a train's roof

When the height of the antenna exceeds the maximal height allowance for installing equipment on train rooftops, such as in the case of gauge oversized, the antenna will need to be installed on the side of the roof

As the antenna must be installed horizontally, a special bracket is required for mounting the antenna to the side of the train's roof. HUBER+SUHNER have made several customised brackets for these types of applications, an example of which can be seen below. For more information in regards to customised brackets please contact HUBER+SUHNER.

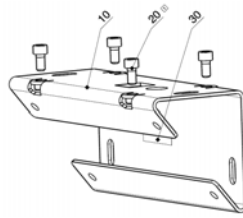


Figure 5

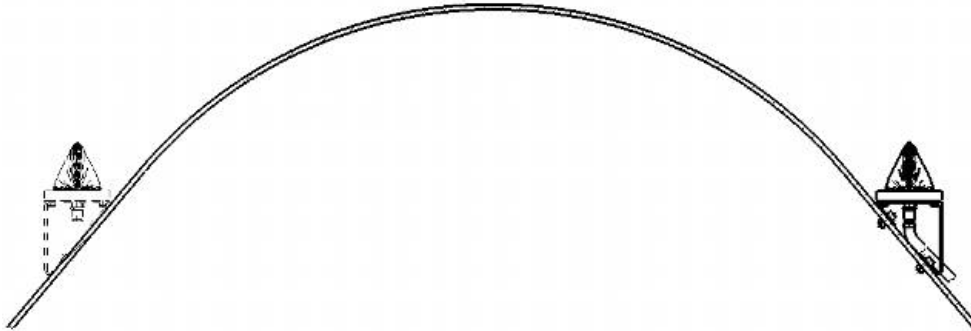


Figure 6

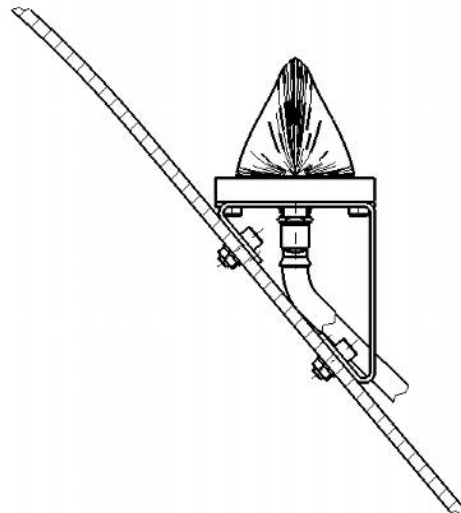


Figure 7

1.2.3. Compliance with sealing requirements

The roof of the vehicle should offer a sufficient mechanical stability to prevent leakage into the vehicle and a good electrical contact between the antenna and the vehicle's roof. The special sealing located under the antenna needs to be sufficiently compressed onto the roof of the train in order to comply with the IP68 rating. A thin metal sheet does not provide a sufficient enough contact therefore, the roof of the train should be reinforced. The Sencity® Rail antennas are mounted with M8 screws allowing the antenna to withstand high speeds and to provide security. The head of the screws should be sealed using an appropriate sealing material.

The antennas have a draining hole besides the connector in order to allow for moisture to exit the antenna. The draining hole links the inner part of the antenna with the inside of the vehicle. In the case of mounting the antenna on a bracket and to still insure an inside environment, the antenna should be mounted on top of a sealed box which will create an inside environment for the connector (figure 14).

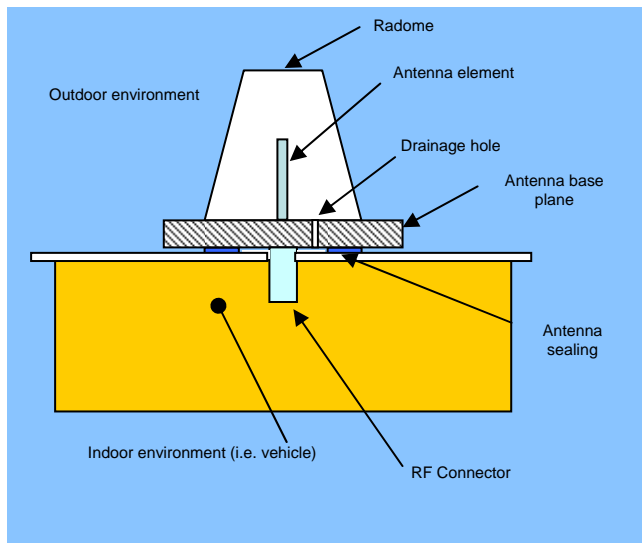


Figure 8
Direct installation on a train's roof (recommended)

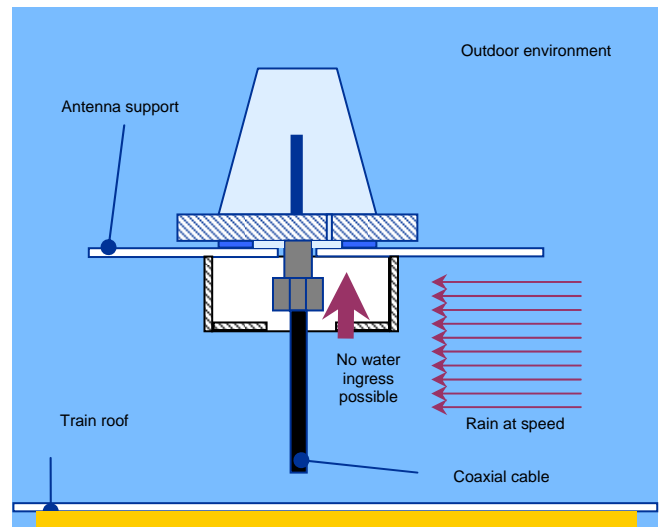


Figure 9
Installation on a metal plate over the roof

1.2.4. Corrosion between Sencity® Rail or Sencity® Avant antennas and the roof

The Sencity® Rail and Sencity® Avant antennas were designed in accordance with the MIL-F-14072D standard which limits the risk of corrosion via a careful selection of metallic components. Due to the diverse roof materials used upon different vehicles, limitation of the risk of corrosion between the antenna and the roof is of major importance.

A **primer** could help to avoid corrosion of the vehicle's roof and the antenna (depending of the roof material). A good solution is to apply a layer of zinc between the antenna and the vehicle's roof (a commercial zinc spray). The ions within the zinc will then migrate to the antenna or to the vehicle's roof slowing down the galvanic corrosion process.

1.2.5. Antennas with passive GPS

For the antennas with passive GPS (ref: 1399.17.0043 and 1399.17.0100), the 5 V DC feeding of the GPS / Galileo receiver needs to be switched off before the cable is connected to the GPS / Galileo port of the antenna. As the GPS / Galileo antenna is DC grounded (compliance to the UIC 533 standards), the induced short-circuit will damage the GPS / Galileo receiver if it is not switched off (see figure 14).

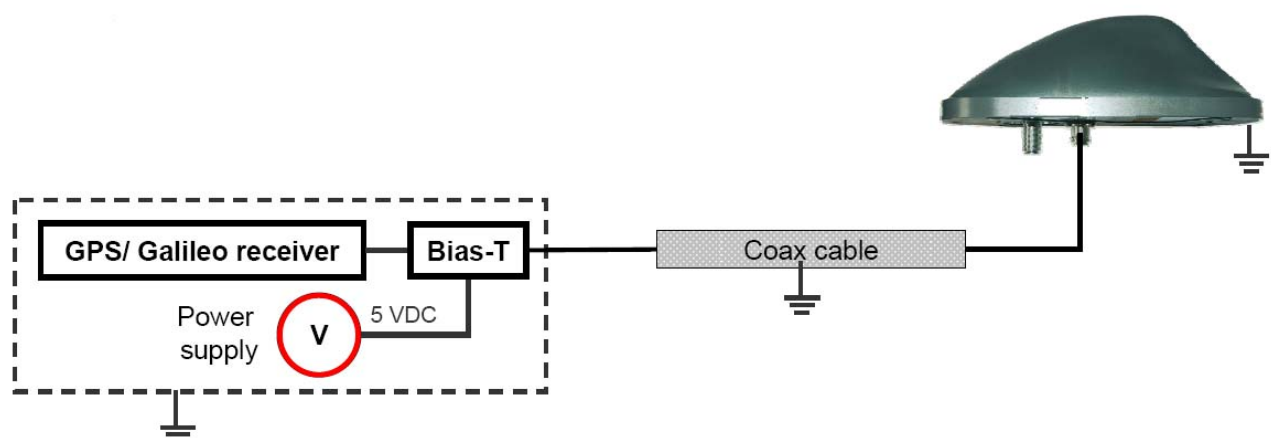


Figure 14



HUBER+SUHNER group is certified according to ISO 9001 and ISO 14001.



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