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AIR CPE INSTALLATION GUIDE

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PREFACE

AIR CPE installation guide covers the AIR CPE unit, how to mount the unit, cable it and make a connection to the BS.

Attention and Warning Symbols

You must be aware of safety when you install and use this system. This guide provides various procedures. If you do some of these procedures carelessly, you could injure or kill yourself or damage equipment or property. Some other procedures require special attention.

Important Safety Instructions

You must keep safety in mind when you install and use AIR CPE unit. Refer to safety instructions in the installation instructions that came with your system. In this guide, the following notes tell you when you need to pay special attention:

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.

Keep the following in mind when you install AIR CPE unit:

- Before you drill any holes in your building, make sure there are no wires or pipes near the holes.
- Install the equipment in accordance with the local building and electrical codes. If you aren't sure, call a licensed building inspector.
- Never install the satellite dish near power lines.
- Don't install the satellite dish on composite materials such as strand, chip, fiber, or particle board unles the fastener attaches securely to a wall stud, rafter, or the foundation material beneath surface.
- Perform as many functions as possible on the ground.
- Do not install the antenna on a rainy, snowy or windy day.

Attention!
These installation instructions are intended for use by qualified professional technicians due to the complexity of the installation and compliance to national/local building and electrical codes.

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1 AIR CPE system overview

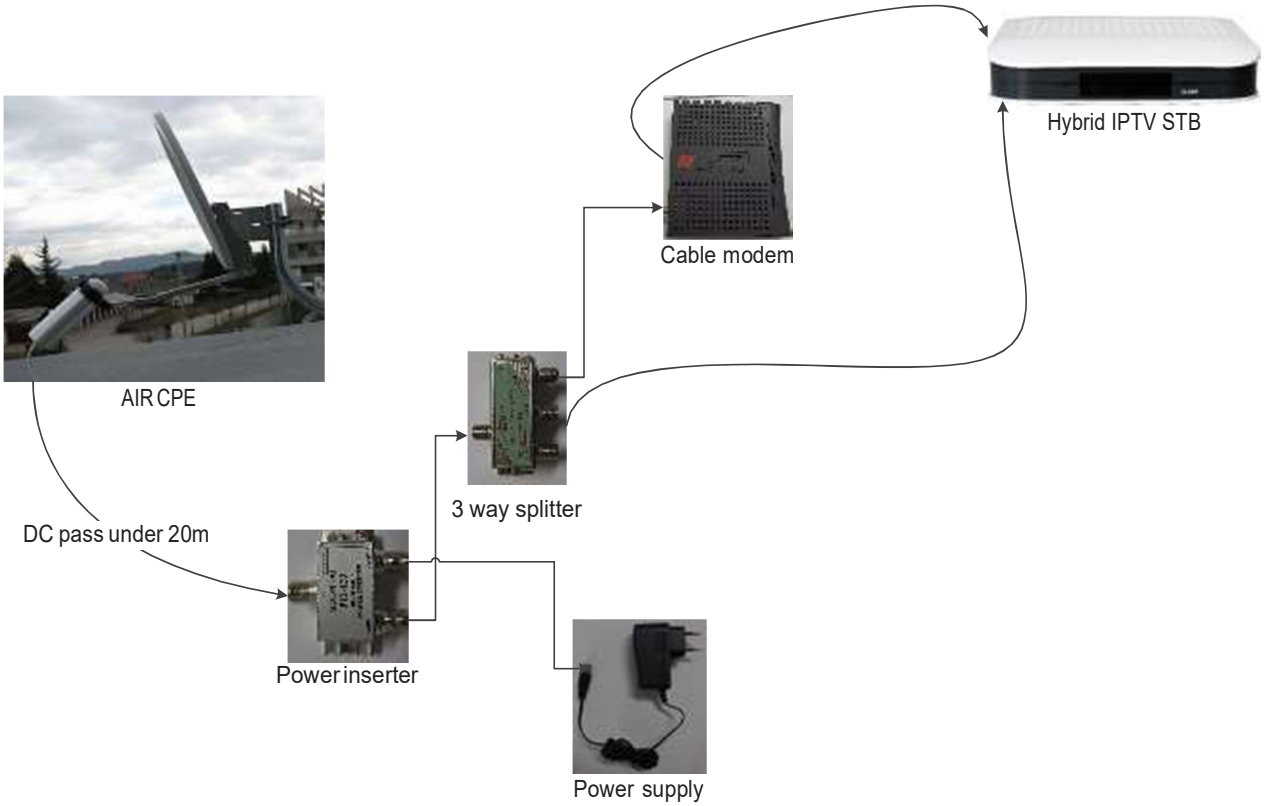


Figure 1: AIR CPE connections

End-user equipment:

- AIR CPE – AIR transceiver (LNB)
- Satellite dish antenna with mast
- Power inserter
- Splitter (optional), if you have more than 1 device behind LNB
- Power supply 12V,1A
- Cable modem
- STB (optional)

2 How to install the AIR CPE unit at customer side

In the following pages, you will find step-by-step instructions for:

- Determining Base Station direction for aiming antenna
- Finding suitable antenna site
- Installing mast
- Assembling Antenna on ground
- Attaching antenna to mast
- Routing RG6 cable
- Attaching Transceiver(LNB) to antenna
- Aiming and fine-tuning antenna

- **Step 1: Determining Base station direction for aiming antenna**

Caution

First of all you must find an appropriate position on the building with **CLEAR LINE OF SIGHT** to the AIR base station .In front of the antenna there should not be any obstacles that could hinder the signal and the Fresnel zones. On figures bellow see diference between good and bad line of sight.

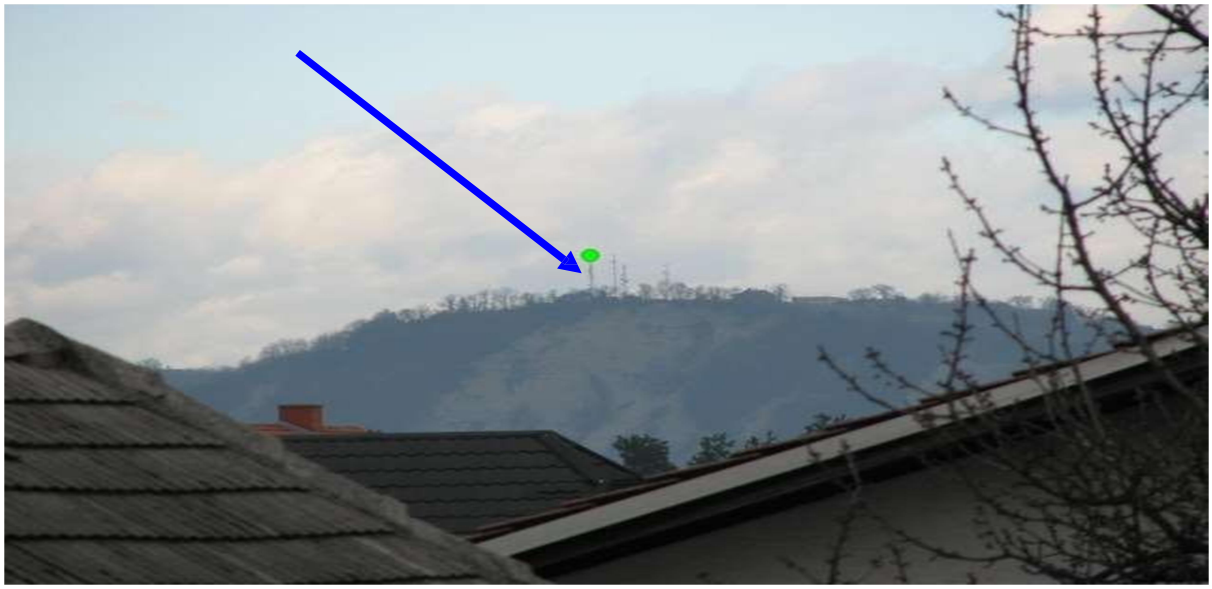


Figure 2: Clear line of sight

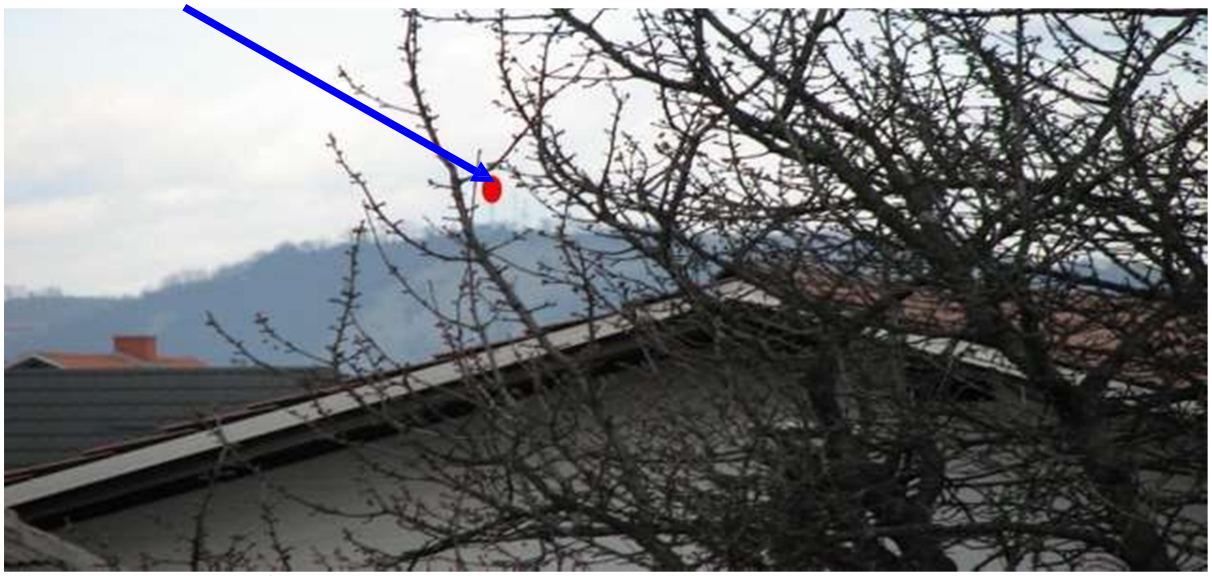


Figure 3: Bad line of sight

- **Step 2: Finding suitable antenna site**

A suitable antenna site requires an unobstructed view to the AIR base station, a stable antenna mounting surface, a distance for power supply max 20m of coax cable. Examples are shown on figures below.

Caution
It is important to estimate the cable length at this point.

Maximum distance for power supply is not more than 20m of coax cable. In case of more cable mount a separate power inserter and power supply unit on the coax cable in the distance of 20m or less to the transceiver.

The max distance of the coax cable, without the usage of a house amplifier, from the Cable modem to the Power inserter can be calculated with this formula:

Signal level received at the Power inserter – loss of the splitter (if applicable) – cable and connector loss from Power inserter to Modem >-81dBm

Example:
-67 - 6,2 - 7,2(30mcable) = -80,4dBm in this case there should be theoretically enough signal without the usage of a home amplifier

Caution
Minimum receive level from the AIR CPE for QAM64 is -81dBm
A typical power inserter has an attenuation under 1 dB.

Figure 4. CASE1: suitable antenna site installation

Figure 5: CASE2: suitable antenna site installation

Figure 6: CASE3: unsuitable antenna site installation

The concrete railing (“wall”) in front of the antenna as seen in this picture can pose a degradation of signal because of possible blocking of Fresnel zones.

- **Step 3: Installing mast**

Below are potential mounting sites:

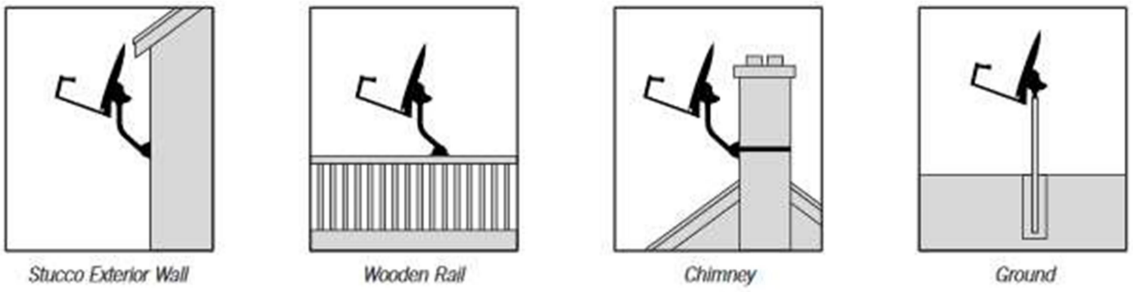


Figure 7: Mounting sites

Be sure you have the necessary mounting hardware before you begin.

Caution
Mount the base securely!!!

The mast base must be sturdy so antenna does not shift under various weather conditions and its own weight. Mounting is preferable on wood or masonry. Unsuitable sites may be handrail, aluminum or vinyl siding, composite paneling and fibre/particle/strand boards.

- **Step 4: Assembling antenna on the ground**

Follow the supplied assembly instructions for satellite antenna. Do not attach the LNB (AIR transceiver) at this time.

Caution
Difference between satellite system and AIR system assembly:

Figure 8: Antenna assembly

Caution
For AIR usage the assembly should be like this to achieve lower BS elevation angles. Rotate antenna back upside down!!!!!

- **Step 5: Attaching antenna to mast**

Slide the antenna on mast. Tighten the azimuths clamp bolts just enough so the antenna has only side-to-side movement for later azimuth alignment.

- **Step 6: Routing RG6 cable(s)**

You will route RG6 cable from AIR transceiver (LNB) to the Power inserter, then from Power inserter to splitter (optional) and then to the cable modem.

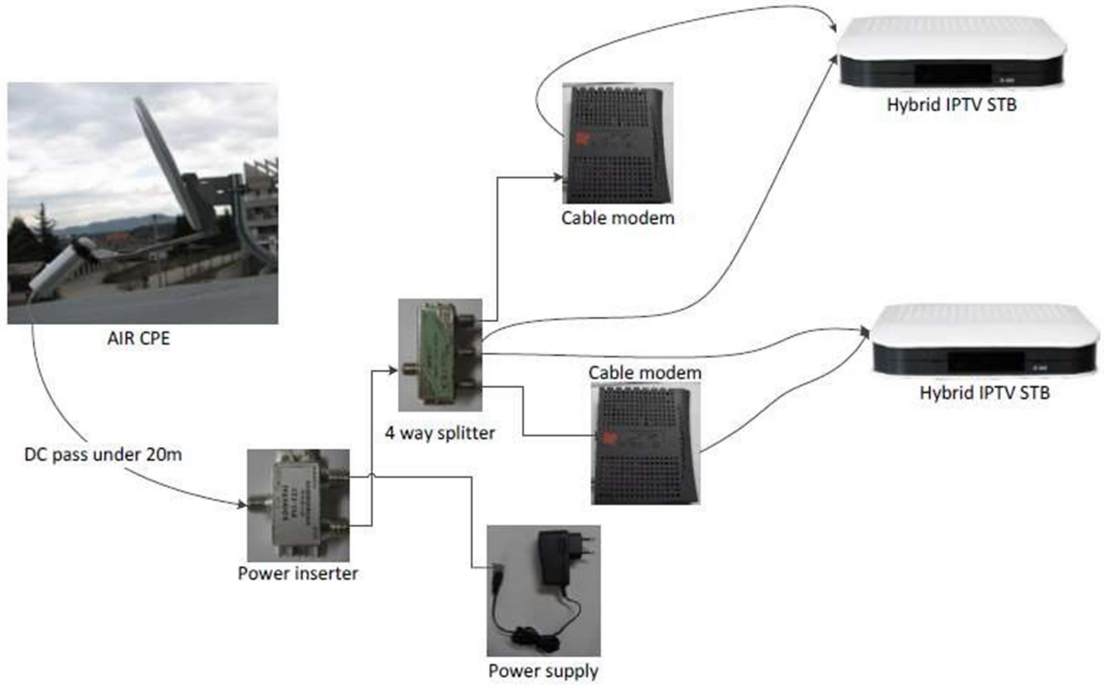


Figure 9: AIR CPE connections 2
For best reception we suggest the usage of a coax cable with this value or similar.

Impedance:	75 ohm
Core line impedance:	<= 61 ohm/km
Attenuation:	at 862MHz <=24 dB/100m
Usage:	outdoor
Connector used:	Cabelcon F56-CX3 5.1

Caution

A typical 3-way splitter has an attenuation of app. 6 dB per port.
If power supply is not near enough the transceiver will show disturbance when modem will transmit data.
Compression connectors are used to achieve better quality of the signal and better water insulation of the cable.

2.6.1 F-Connector installing instruction

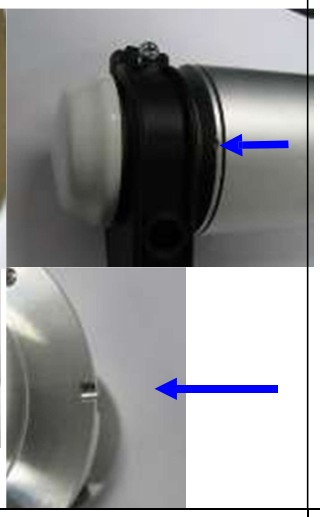
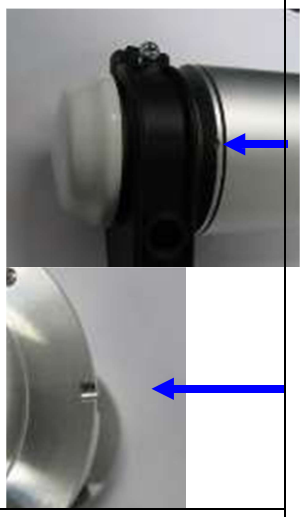
To avoid water intrusion to the AIR transceiver a self-vulcanization tape must be applied to the outdoor connector as shown in the picture below. It is necessary to apply the tape at the base of the trans-connector and move up in at least two wraps at long of the whole trans-connector, connector and 1 to 2 cm over the cable. The tape should be wrapped with a low pulling force. The tape must not be torn in the process of wrapping. If the tape is applied with to high pulling force, the tape can break under environmental influences. On every wrap the tape must cover at least half of the first applied wrap along the whole length of the trans-connector, connector and 1 to 2 cm of cable.

Figure 10: F-connector seal

2.7 Step 7: Attaching Transceiver (LNB) to antenna

The Transceiver has one F-connector. Polarization depends on the sector in which are you doing CPE installation. On the Transceiver (LNB) you define polarization by turning it.

Table 1: CPE polarization

Sector-direction	A	B	C	D
Downstream polarization	Horizontal	Vertical	Horizontal	Vertical
Upstream polarization	Vertical	Horizontal	Vertical	Horizontal
Picture of LNB with marking				
Position of mark on head	VERTICAL	HORIZONTAL	VERTIKAL	HORIZONTAL

Caution

Max angle of the sector is 90 degrees; the user should be within the angle if not the user could have transmitting or receiving problems. If the user is connected in an area where antennas overlap the polarization with better values should be chosen.

2.8 Step 8: Aiming and fine-tuning antenna

Caution
AIR Transceiver must be powered to do fine-tuning antenna.

AIR Transceiver can be powered with spectrum analyzer or through the power inserter with power supply adapter.

Below is AIR transceiver powered with power supply adapter via power inserter:

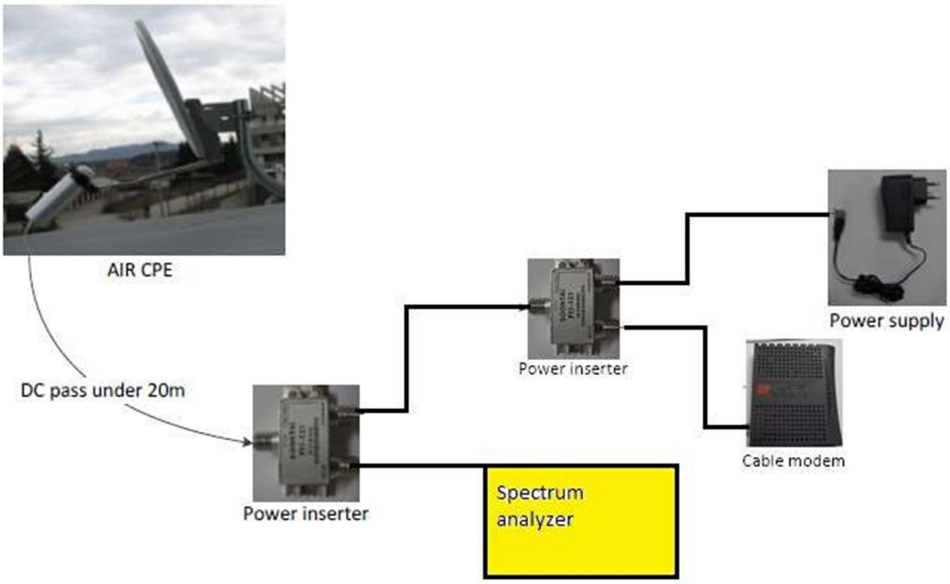


Figure 11: CPE powering 1

Below is AIR Transceiver powered with spectrum analyzer:

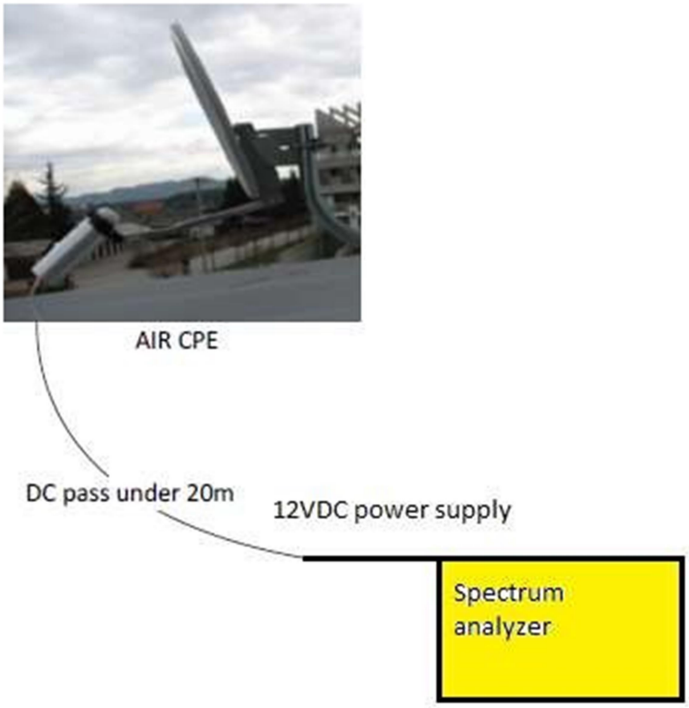


Figure 12: CPE powering 2

With the AIR transceiver mounted you should do the fine tuning of the dish with a spectrum analyser to get the best possible signal.

It is important to obtain the strongest signal possible; the higher the signal strength, the less likely you are to experience signal outages during adverse weather.

To achieve maximum signal strength follow these steps:

- Point the antenna to a generally direction of the AIR base station
- Slowly rotate antenna around the mast a few degrees at a time, pause 3-5 seconds in between for signal strength update on spectrum analyser
- When you get maximum signal strength with azimuth alignment switch to elevation alignment
- Once you get maximum signal strength on elevation alignment tighten the elevation nuts.
- Verify azimuth antenna alignment and tighten azimuth clamp bolts/nuts.

After fine tuning the dish and AIR transceiver or receiver you can connect the STB and cable modem.

Check Signal to Noise Ratio (SNR)

Minimal values for functioning are:
- 24 dB of SNR for QAM64 modulation

Recommended values are:
- >30 dB of SNR

Caution

Values represent the minimum value for functioning of the devices and do not contain any overhead of the SNR.

Recommended spectrum analysers:
- Promax
- Deviser

3 Troubleshooting Check List for Initial Installation

If the signal is not found, be sure the antenna installation manual have been properly followed. Check to:

- Make sure all cable connections are correct and each connection is tightened properly
- Verify the direction of the aiming dish to the AIR base station
- Make sure there are no obstacles (trees, buildings, windows, corner or overhang of your roof, your body..) - the signal does not pass leaves, branches.. etc.
- Make sure you have 12 VDC power supply on AIR transceiver (noise should be visible on spectrum analyzer if you have power supply)
- RG 6 cable with solid copper center conductor is highly recommended because it has much lower DC voltage drop compared to cable with a copper-coated, steel center conductor.
- Check if are you using correct polarization on AIR transceiver

5 APPENDIX A: Transceiver specification

Technical data

- Length: 204,5 mm
- Diameter: 60 mm
- Weight: 800 g
- Power consumption: DC 12V, 0.7A, over RF coax cable
- Connection type: F-male, 75Ω for RX and TX IF
- Mount type: For LNB holder fi 40mm
- Housing: Aluminium with plastic like cover, UV protected, weather protected, outdoor

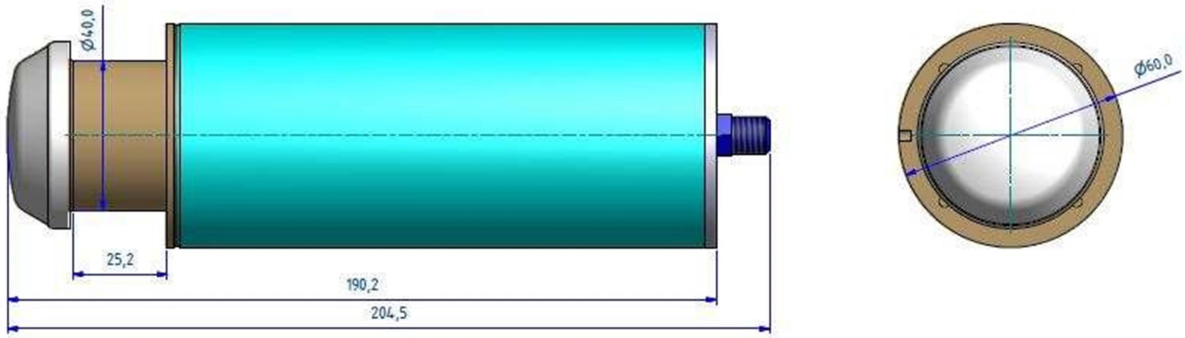


Figure 14: AIR CPE

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Table 2: Transciever specification

SPECIFICATION for TRANSCEIVER:	
Parameter	**Description**
Receiving Section	
RF Output Frequency (B1)	27500-27900 MHz
RF Output Frequency (B2)	27950-28350 MHz
IF Output Frequency	454–854 MHz
LO Frequency	27046 MHz B1 ; 27496 MHz B2
LO Frequency Stability	±30kHz (-30;°C~+60°C)
Gain	35±4dB typ.
	35±5dB (-30°C~+60°C)
Gain Flatness	±5dB (-30°C~+60°C)
Noise Figure	2.5dB typ.
In-Band Spurious	-50dBm Max
Transmitting Section	
IF Input Frequency	35–65 MHz
RF Output Frequency	31075-31255 MHz
LO Frequency Stability	±30kHz (-30°C~+60°C)
Gain	32 ±3dB typ.
	32±4dB (-30°C~+60°C)
Gain Flatness	±4dB (-30°C~+60°C)
Output 1-dB Compression Point	18 dBm typ.
	15 dBm Min(-30°C~+60°C)
Optimum number of transmitting channels	1
Max. allowed number of transmitting channels	2
Output Spurious/Harmonics	-45 dBm max (out of band)
General Specifications	
IF Connector (Rx out/ Tx in)	F-Type, 75Ohm
Output return loss	13dB
Input return loss	12dB
DC Power supply	+11 ~ +15 V
DC Consumption(@+11~+15Vdc)	700mA Max
Operating Temperature	-30°C~+60°C
Weather Proof Housing	100% Water proof

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Compliance with standards:
IEC CISPR22:2008 (Sixth Edition) IEC CISPR24:2010 (Second Edition)
IEC 60950-1:2006 +A1:2010 +A2:2013 +A11:2009 +A12:2011 IEC 60950-1:2005 (Second Edition) + A1:2010 + A2:2013
IEC 60950-22:2005 (First Edition) EN 301 489-1 V1.9.2
EN 301 489-4V 1.4.1 V1.6.1
IEC 60529:1989(2nd Ed.) + A1:1999 + A2:2013 EN 302 326-2
EN 301 390
EN 301 744
EN 301 753

Caution

AIR transceiver only works with connectin to an AIR base station; mounting and handling of the unit can be only done by authorized personel. All other are prohibited to handle with the unit.

This mark guarantees that this apparatus complies with the requirements of the European Directives which cover the EMC and safety and marking aspects.

When this crossed-out bin symbol is attached to a product it means the product is covered by the European Directive 2002/96/EC.
All electrical and electronic products should be disposed of separately from the municipal waste stream via designated collection facilities appointed by the government or the local authorities.
The correct disposal of your old appliance will help prevent potential negative consequences for the environment and human health.
For more detailed information about disposal of your old appliance, please contact your city office, waste disposal service or the shop where you purchased the product.

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.