

Smart LNB

IST- Interactive Satellite Terminal

Emulsion Terminal

Installation Manual

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Installation Manual

Interactive Satellite Terminal.

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Index

INTERACTIVE SATELLITE TERMINAL. SMART LNB.

1.	FCC COMPLIANCE	4
2.	TECHNICAL FEATURES.....	5
3.	GENERAL DESCRIPTION.....	6
4.	ELEMENTS CONTAINED IN THE PACKAGE.....	7
5.	INSTALLATION OVERVIEW.	7
6.	ANTENNA SYSTEM.	8
	6.1. Technical features.	8
	6.2. Setting up the antenna.....	9
7.	OUTDOOR UNIT. ODU.....	20
8.	INDOOR UNIT. IDU.....	21
9.	INTERCONNECTION.....	22
10.	ANNEX	25
	10.1. Ku / ku dish.....	25
	10.2. Radiation pattern	26
	10.3. Detailed diagram of the components supplied with the antenna. ..	35

INTERACTIVE SATELLITE TERMINAL. SMART LNB.

1. FCC COMPLIANCE

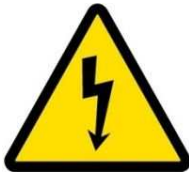
The Smart LNB complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

This device works in combination with an off-set horn-fed dish antenna with a maximum gain of 39.4 dB

This device has been granted with the following **FCC ID: 2AGKM820003-02**



Danger: FCC Radio Frequency Exposure Information

In order to comply with the FCC RF exposure requirements, it is required to maintain a separation distance between the user and the antenna of 11.76m (antenna main beam) and 27cm (horizontal: -10 degrees off-axis).

NOTE: This equipment has been tested and found to comply with the limits for class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. 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.

2. TECHNICAL FEATURES

General

Composition.....	Antenna, Outdoor Unit, Indoor Unit.
Antenna.....	Satellite dish. Diameter 75 cm.
ODU Dimensions (without LNB).....	127 x 144 x 77 mm. (L x W x D)
IDU Dimensions.....	30 x 150 x 110 mm. (L x W x D)

Outdoor Unit. ODU

Connectors	F (F), 75 Ω : External LNB Connection F (F), 75 Ω : IDU Connection
Control and Management.....	Web GUI. (Via IDU).

Reception

Frequency band.....	Ku Band. Low Band: 10,7 – 11,7 GHz High Band: 11,7 - 12,75 GHz.
Standard.....	DVB-S/S2. (EN 302 307)

Transmission

Frequency band.....	Ku Band. 13,75 GHz - 14,50 GHz.
Standard	F-SIM.
Maximum output Power.....	31,5 dBm.

Indoor Unit. IDU

Connectors.....	F (F), 75 Ω : ODU Connection. F (F), 75 Ω : STB Connection. RJ45: Ethernet. LAN Connection. DC IN. (+30Vdc).
Control and Management.....	Web GUI.

3. GENERAL DESCRIPTION.

The **Smart LNB** is an electronic device that opens the door to a new wide range of satellite services.

It features the most advanced technology in satellite transmission and it makes use of a high spectrum efficiency modulation for the uplink.

This technology allows satellite operators to offer their services in either unconnected or connected areas, at a low cost at the equipment and service level.

- Its objective is to provide high added value services to traditional satellite broadcasting.
- Interactive services: HbbTV, VoD, FB, Twitter, telemetry
- High added-value M2M services/ domotics: Home control automation, e-health, connected TV...)

The Smart LNB is based on the following devices:

- | **Antenna System.** Satellite dish and other devices needed for its attachment.
- | **ODU:** Outdoor unit. Installed at the antenna's arm.
- | **IDU:** Indoor unit. Located inside the building.

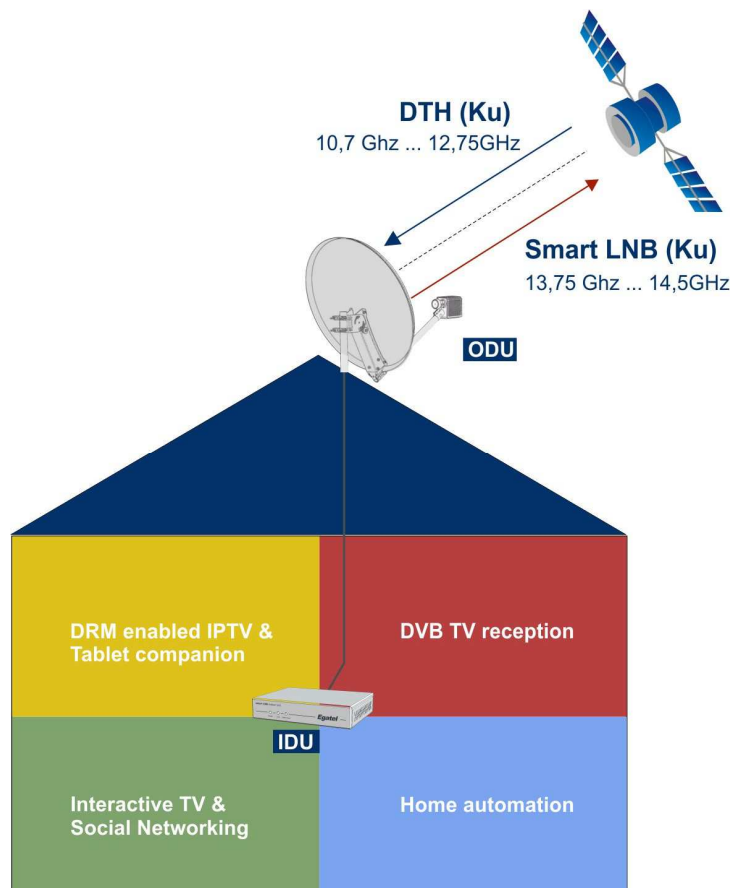


Fig.1. General Scheme.

4. ELEMENTS CONTAINED IN THE PACKAGE.

The package contains:

- | Antenna dish.
- | Feed arm and fasteners.
- | Indoor unit and Power Converter.
- | Outdoor unit (with LNB).

5. INSTALLATION OVERVIEW.

The image below shows the results of a typical installation as described in the following pages. Please read these pages carefully to perform the installation.

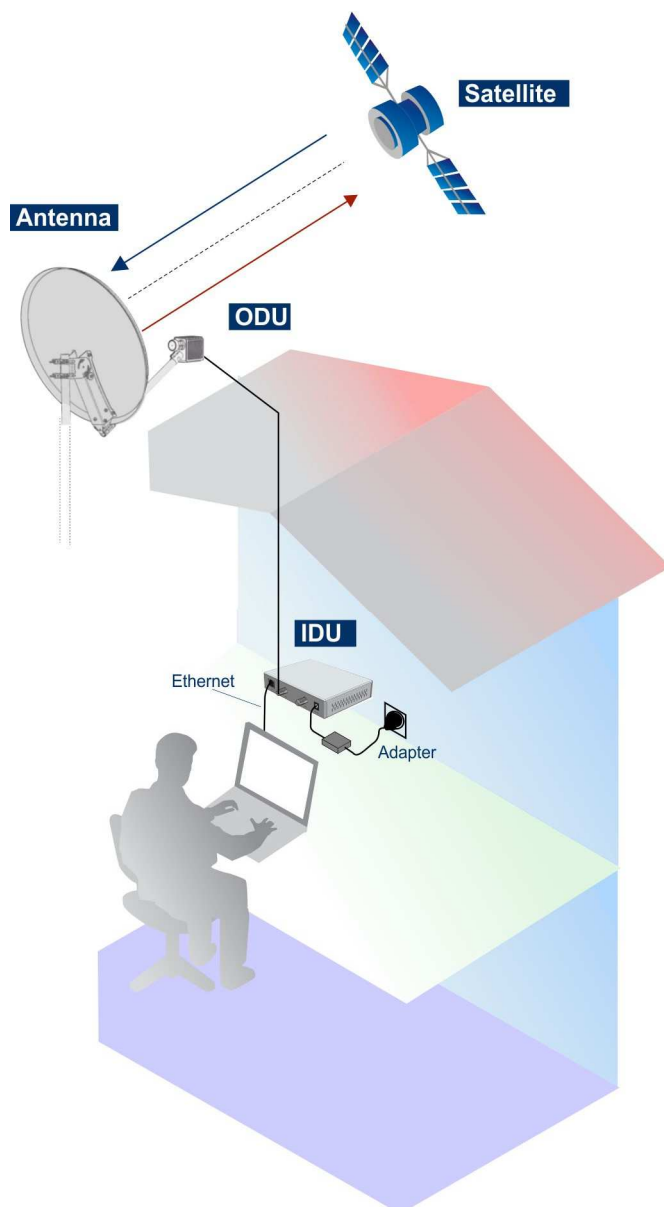


Fig.2. Installation Overview.

6. ANTENNA SYSTEM.

The transmission and reception system comprises the following elements:

- | Satellite antenna. Reflected dish with a diameter of 75cm.
- | Masthead and anchorages.

6.1. Technical features.

DOWNLINK	
Satellite Reception	Interactive Services Broadcast Services
Standard	DVB-S/S2
Ku Band	Low Band: 10,7 Ghz ... 11,70 GHz High Band: 11,7 Ghz ... 12,75 GHz
UPLINK	
Satellite Transmission	IP Data for interactive applications.
Standard	F-SIM
Ku Band	13,75 Ghz ... 14,5 GHz.
Maximum output Power	31,5 dBm
GENERAL	
Athimut Angle Range	360°
Elevation Angle Range	10 to 90
Feed Interface Diameter	23 mm adapter
Mast Pipe interface	32mm – 60 mm
ENVIRONMENTAL REQUIREMENTS	
Operational Wind loading	77 Km / h
Survival windload	144 Km / h
Destructive Windload	216 Km / h

6.2. Setting up the antenna.

Installig the antenna includes the following steps:

- **Step 1:** Choosing a suitable location.
- **Step 2:** Mounting the antenna pole.
- **Step 3:** Mounting the antenna.
- **Step 4:** Pointing the antenna.

Do not stand in front of the LNB or the antenna dish during pointing. Keep the space between the LNB and the antenna dish clear.

6.2.1. Step 1: Choosing a suitable location.

- When setting up the antenna base, take account of the orientation the antenna must have.
- The antenna needs a clear view towards the satellite (without any buildings, trees... that may hinder the signal).



Fig.3. Antenna system.

The antenna must have **clear line of sight** and no obstruction blocking the path between the antenna and the satellite.

6.2.2. Step 2: Mounting the antenna pole.

- When fixing the antenna pole on the base, use a spirit level to make sure the antenna pole stands upright.
- The antenna pole must be made of galvanized steel.
- Mast pipe interface: 32 mm ... 60 mm. (Antenna's pole diameter).

6.2.3. Step 3: Mounting the antenna.

- Antenna arm comprises two parts, Part1 and Part2. One of them holds the Outdoor unit, and the other one is screwed to the antenna dish. These two parts are joined through a junction.
- Rotate and screw the piece with the elevation scale. (1, B, E).
Tightening: E - 2 Nm.

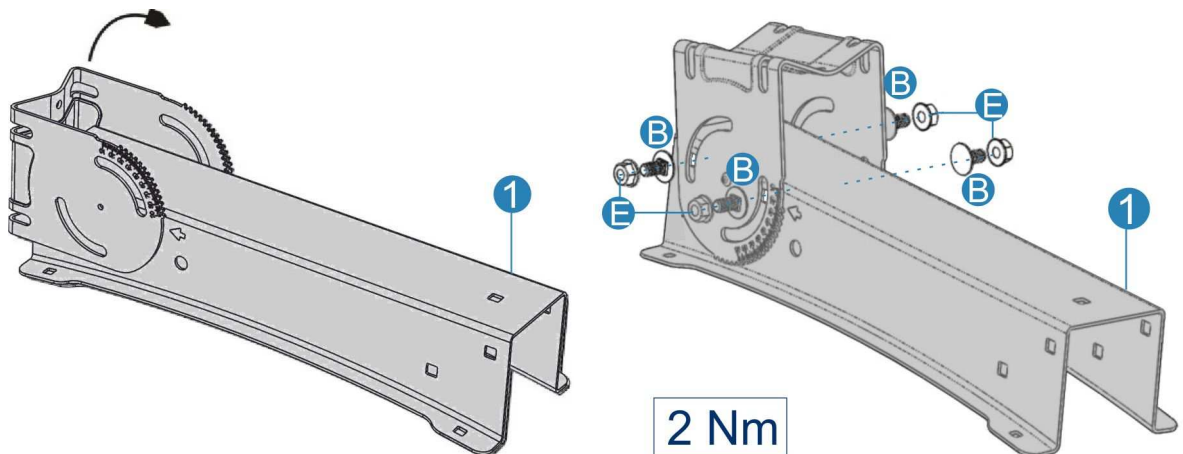
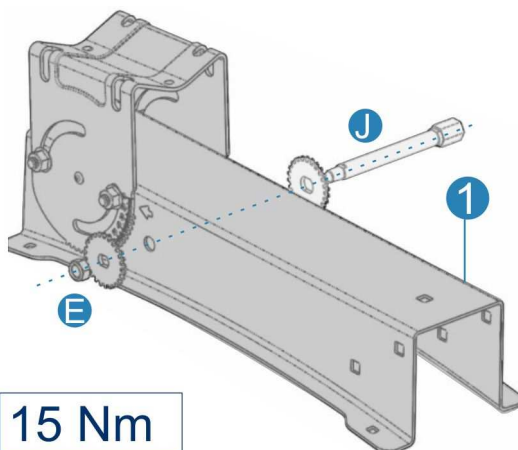


Fig.4. Antenna arm.

Identification	Description	Units
1	Arm (Part 1)	1
B	M8 x 16 mm oval head, short neck	4
E	M8 Nut .	4

- Place the fine elevation bolt as shown below (1, E, J).
The elevation bolt includes: Two toothed discs and a pole.
Tightening: E - 15 Nm.

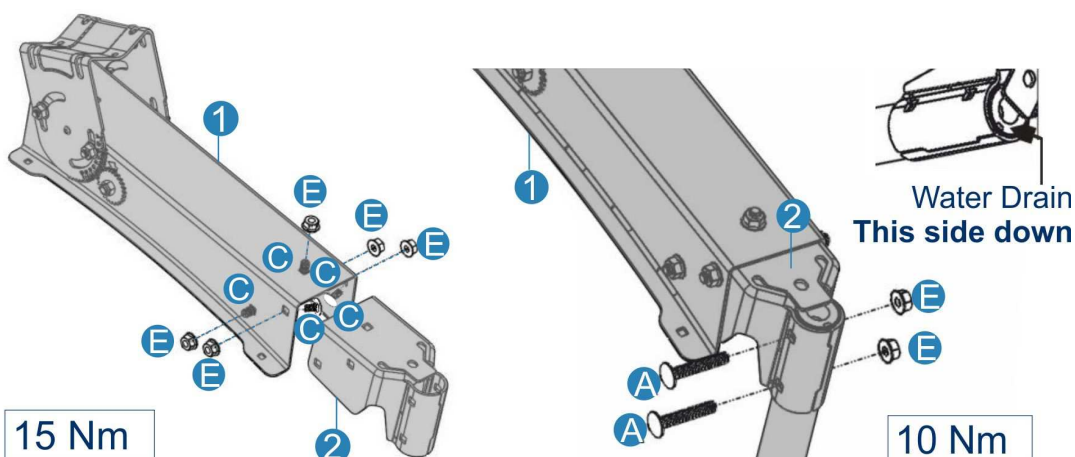


15 Nm

Fig.5. Elevation bolt.

Identification	Description	Units
1	Arm (Part 1)	1
E	M8 Nut .	1
J	Elevation bolt (2 discs and a pole)	1

- Screw the junction of the arm as shown below. (1, 2, C, E).
Tightening: A – 10 Nm. C - 15 Nm.
- Screw the part of the arm (3) that holds the Outdoor unit. (1, 2, 3, A, E).
Tightening: B - 10 Nm.



15 Nm

10 Nm

Fig.6. Arm pieces.

Identification	Description	Units
1	Arm (Part 1).	1
2	Arm junction	1
3	Arm (Part 2).	1
A	M8 x 45 oval head, short neck	2
C	M8 x 16 mm oval head, long neck	5
E	M8 Nut	7

- Insert two squares U-bolt in the masthead (4).
Use the Pole Clamps (H) and washers (E) to attach antenna to the antenna pole (4).
Tightening: E - 2 Nm.

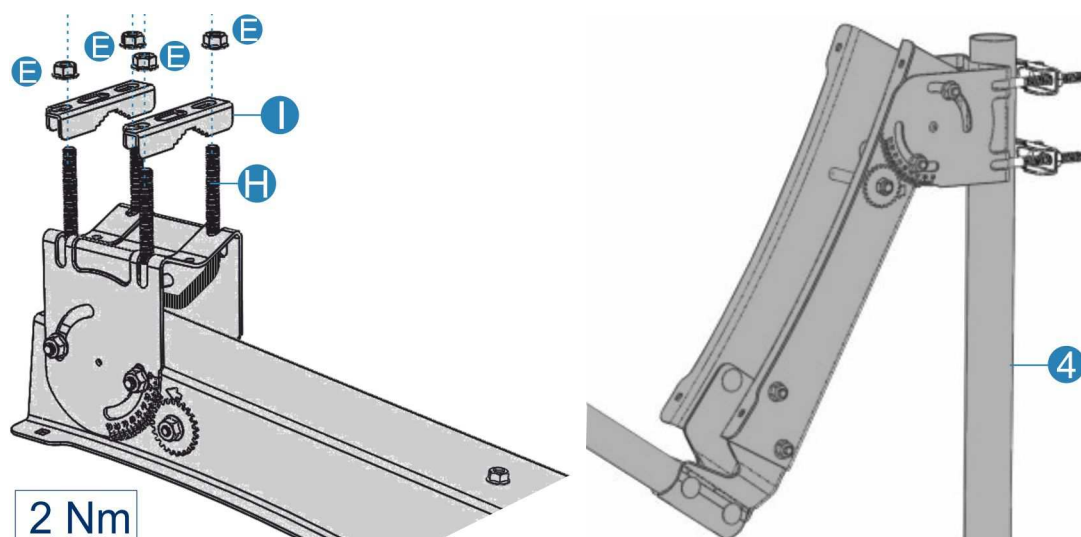


Fig.7. Pieces to attach the antenna to the masthead.

Identification	Description	Units
H	Square U-bolt. M8 x 240	2
I	Pole Clamp	2
4	Antenna pole	1
E	M8 Nut	4

- Attach the LNB holder to the antenna's arm. (3, 5, A, D, E, G).

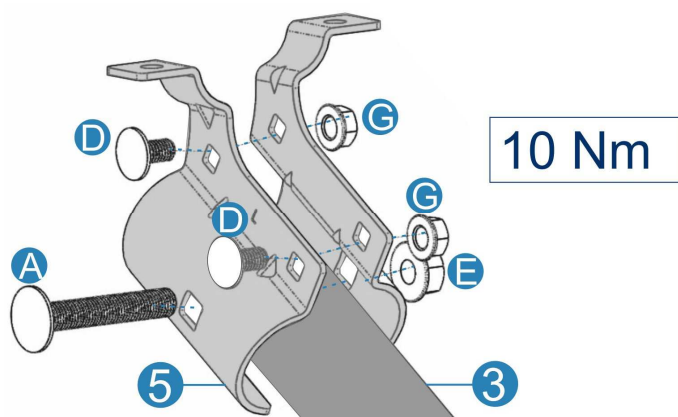


Fig.8. LNB and Outdoor Unit holder.

Identification	Description	Units
3	Arm (Part 2).	1
5	LNB clamp (2 pieces)	1
A	M8 x 45 mm oval head, short neck	1
D	M 6 x 12 total	2
E	M8 nut	1
G	M6 nut	2

- Attach the dish to the masthead with the appropriate screws and nuts. (6, D, F).
Tightening: F - 15 Nm.

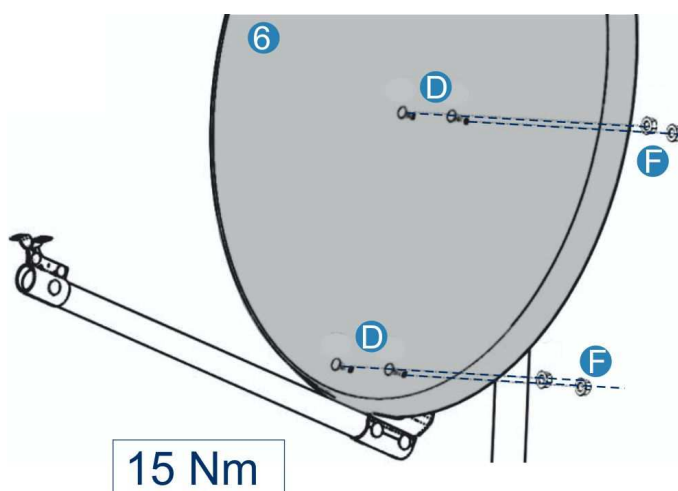


Fig.9. Antenna's dish.

Identification	Description	Units
6	Antenna's dish. Diameter: 75 cm	1
D	M 6 x 12 total	4
F	M8rM6 nut	4

- Attach the Outdoor Unit to the LNB. (7, 8, 9, J, K).

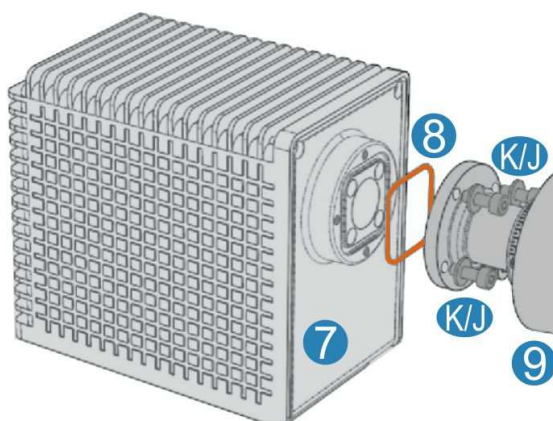


Fig.10. Outdoor Unit & LNB.

Identification	Description	Units
7	Outdoor Unit. ODU	1
8	O-ring (MU1551)	1
9	LNB. [F/D = 0.78].	1
J	M4x10 screw	4
K	M4 nut.	4

- Attach the Outdoor Unit and the LNB to the antenna's arm. (7, D, G).

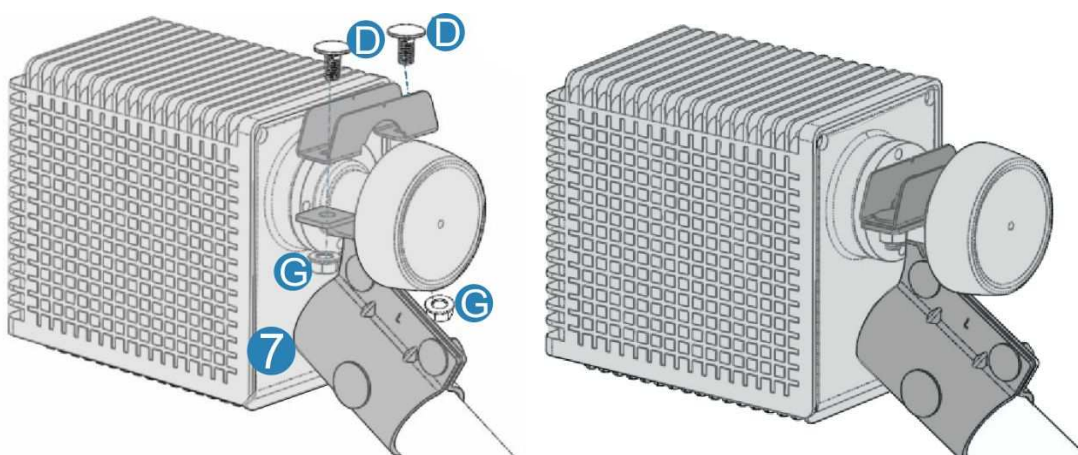


Fig.11. Outdoor Unit & LNB.

Identification	Description	Units
7	Outdoor Unit. ODU	1
D	M 6 x 12 total	2
G	M6 nut	2

At this point, the antenna is mounted.



Fig.12. Antenna, ODU and LNB.

- Roof Mount / Wall Mount. [Optional.](#)

This antenna can be placed on the roof or on a wall. The best place will be selected in each location. The following accessories would be supplied.

Identification	Description	Units
A	M8 x 70	2
B	M8 nut	2
C	Cover	1

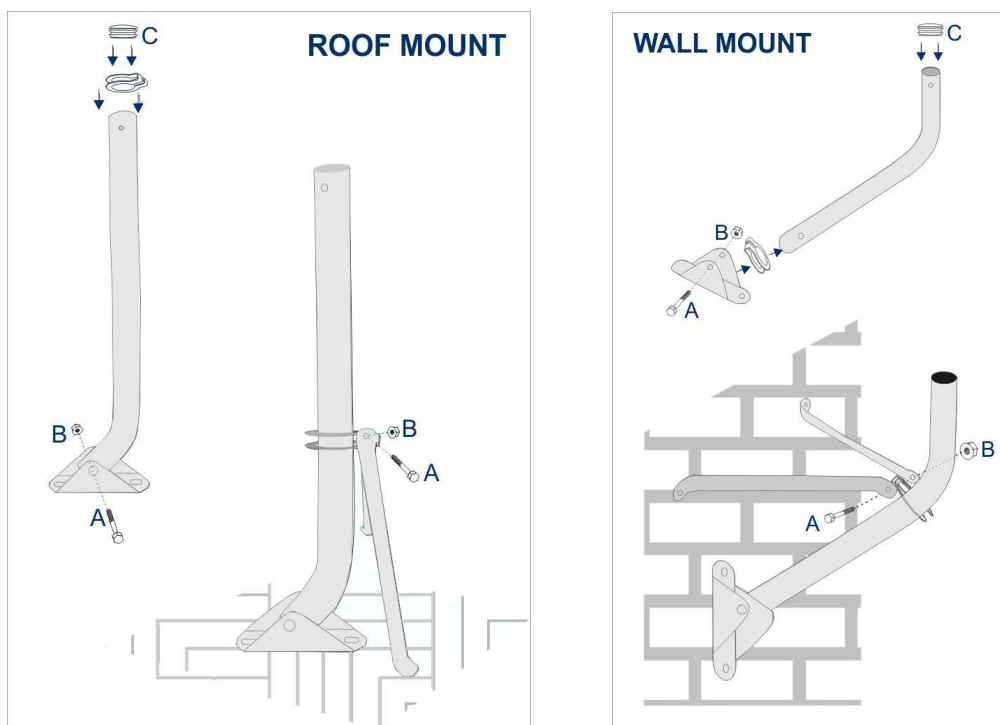


Fig.13. Antenna assembly

- External LNB. [Optional.](#)

The outdoor unit can be connected to an external LNB placed at the antenna's arm.



Fig.14. External LNB.

6.2.4. Step 4: Pointing the antenna

The parameters needed to pointing the antenna are:

- Azimuth
- Elevation and
- Polarization at the antenna's location.

Antenna's orientation is specific to each location. Look up the value that applies to your position.

Eutelsat has an app to point antennas: [Eutelsat Satellite Finder](#).

It is an easy-to-use tool to point satellite antennas. It provides basic parameters for exact antenna pointing, from elevation and azimuth angles to line-of-sight and optimal polarization angles. Download free-of-charge from iTunes and Google Play.

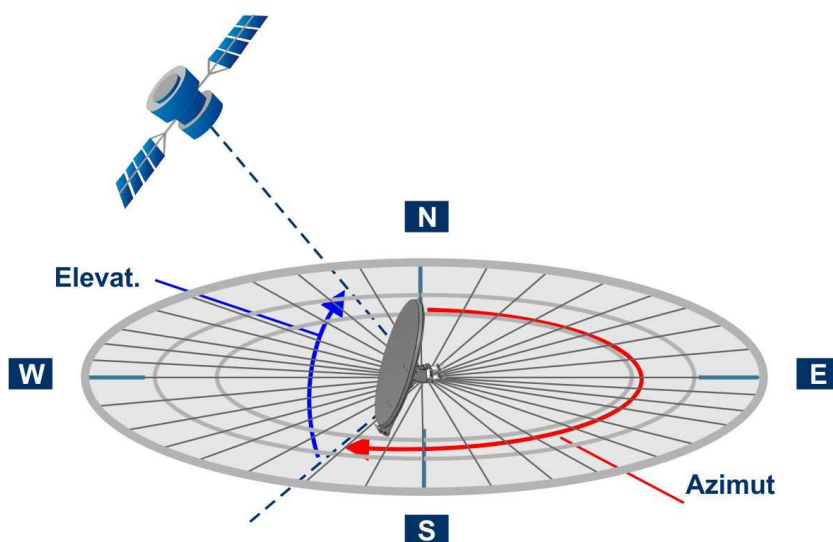


Fig.15. Pointing the antenna.



Example. Eutelsat app.

- o The procedures relating to horizontal and vertical pointing are described below in a sequential way. In reality, you will have to perform these two procedures simultaneously.
- o Whenever the procedure tells you to loosen a securing bolt or nut, slacken it just enough to allow the corresponding element to move freely.
- o While performing this vertical rough pointing, you will need to hold the antenna to prevent it from inadvertently losing its position.

Elevation. (Vertical)

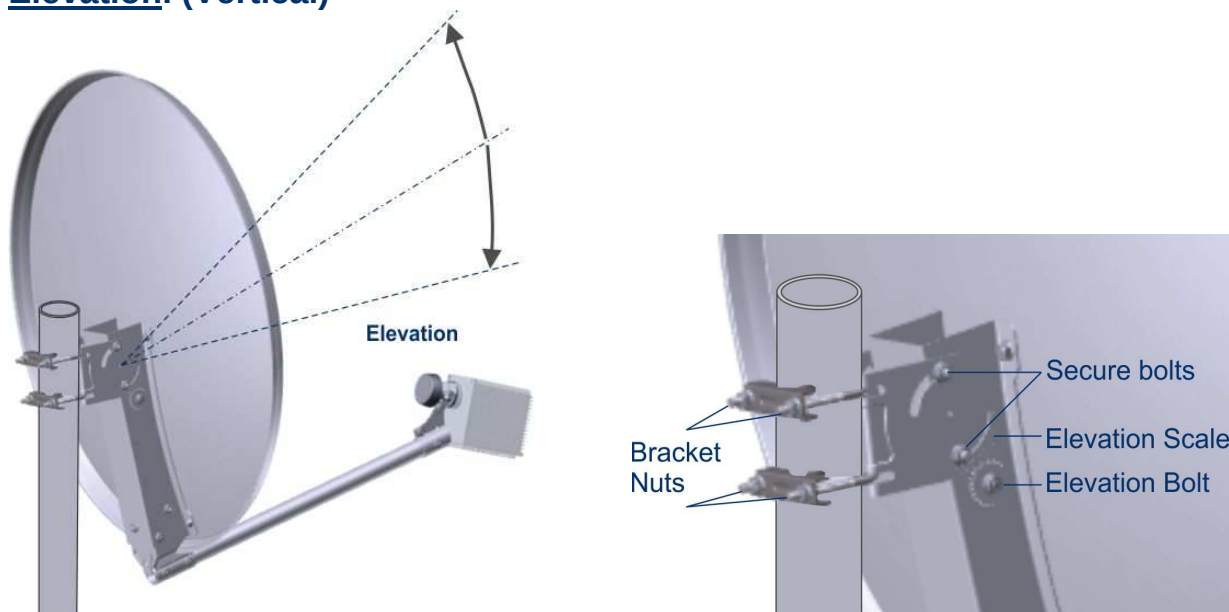


Fig.16. Pointing the antenna. Elevation.

- | Loosen securing bolts.
- | Rotate the elevation bolt to move the antenna to the required elevation. See the elevation scale drawn in the antenna to fix the desired elevation. (Up - Down).
- | Tighten securing bolts. **Tightening: 15 Nm.**

Azimuth. (Horizontal).

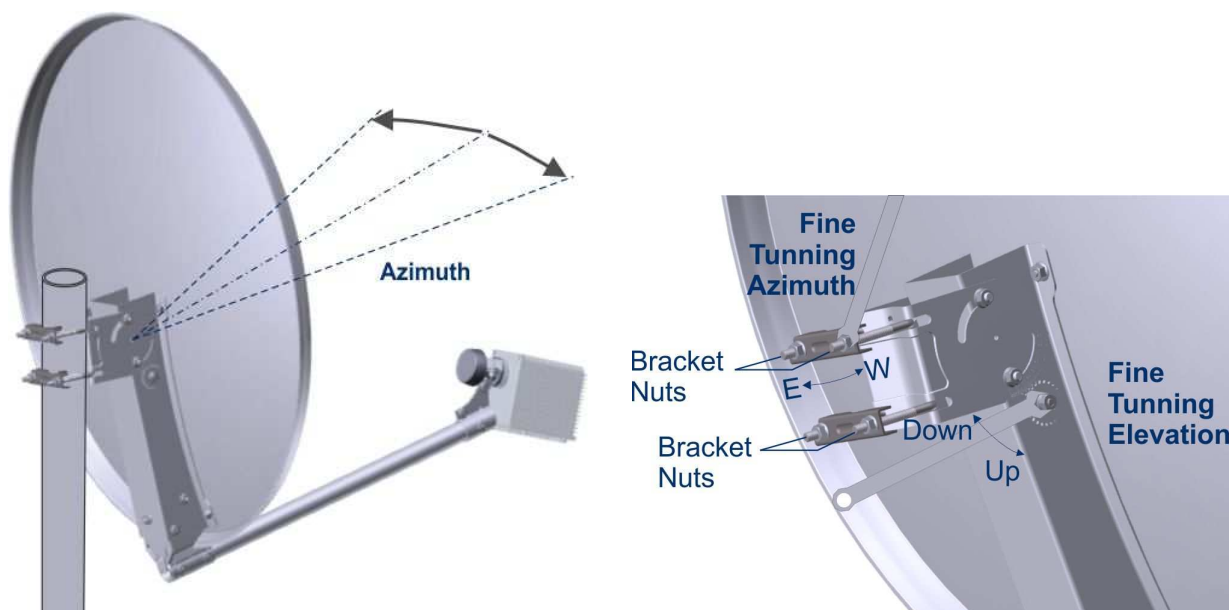


Fig.17. Pointing the antenna. Azimuth.

- | Loosen bracket nuts.
- | Slowly move the dish horizontally (E – W).
- | Secure the bracket nuts. **Tightening: 10 Nm.**

To set the azimuth, a compass or mobile application could be useful.



Fig.18. Mobil application. Compass.

Polarisation.

- | Look up the angle that applies to the position of the antenna.
- | Check the scaling on the Feed horn and set it to the appropriate angle.
- | Lock the LNB in the clamp with the securing bolt.

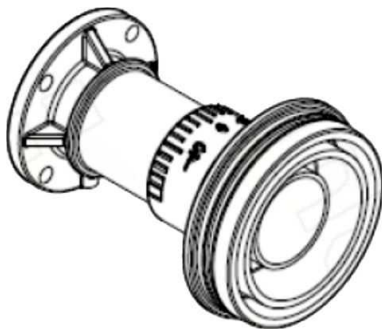


Fig.19. Polarisation.

Beeper

In the future, the ODU will include a **“Beeper”** to help you point the antenna correctly.

During the pointing procedure, the “beeper” can produce various sounds, each having a specific meaning, for example:

- The antenna points to a wrong satellite.
- The antenna points to the correct satellite.
- The antenna does not receive the strongest signal.
- The antenna points to the correct satellite and is receiving the strongest signal.

7. OUTDOOR UNIT. ODU.

The **ODU, Outdoor Unit**, is housed in a waterproof case located at the antenna's arm. It can be connected to an external LNB and it is powered by the IDU.



Fig.20. Outdoor Unit. ODU.

| Interfaces:

- F type connector facing the Indoor Unit.
- F type connector facing the External LNB.



Fig.21. ODU Interfaces.

8. INDOOR UNIT. IDU.

The IDU, Indoor Unit, is located inside the building.

Its design is based on a compact and easy-to-use terminal that features the latest Home Plug-AV (HPAV) technology.



Fig.22. Indoor Unit. IDU.

| Signalling leds:

Led	Colour	Description
Power	Green	Power supply presence.
Link	Green	Communication between IDU & ODU.
Data Coax	Yellow	Data transfer activity between IDU & ODU.

| **Interfaces.** The Indoor Unit has four ports to interface with the external world:

- RJ-45 port to connect the IDU to the user's LAN. (Web GUI).
- F-type connector facing the Outdoor Unit.
- F-type connector facing the user's Set-Top-Box.
- DC port for external 30V power supply. (30V / 2A Desktop AC/DC adapter).



Fig.23. Indoor Unit's rear panel.

9. INTERCONNECTION.

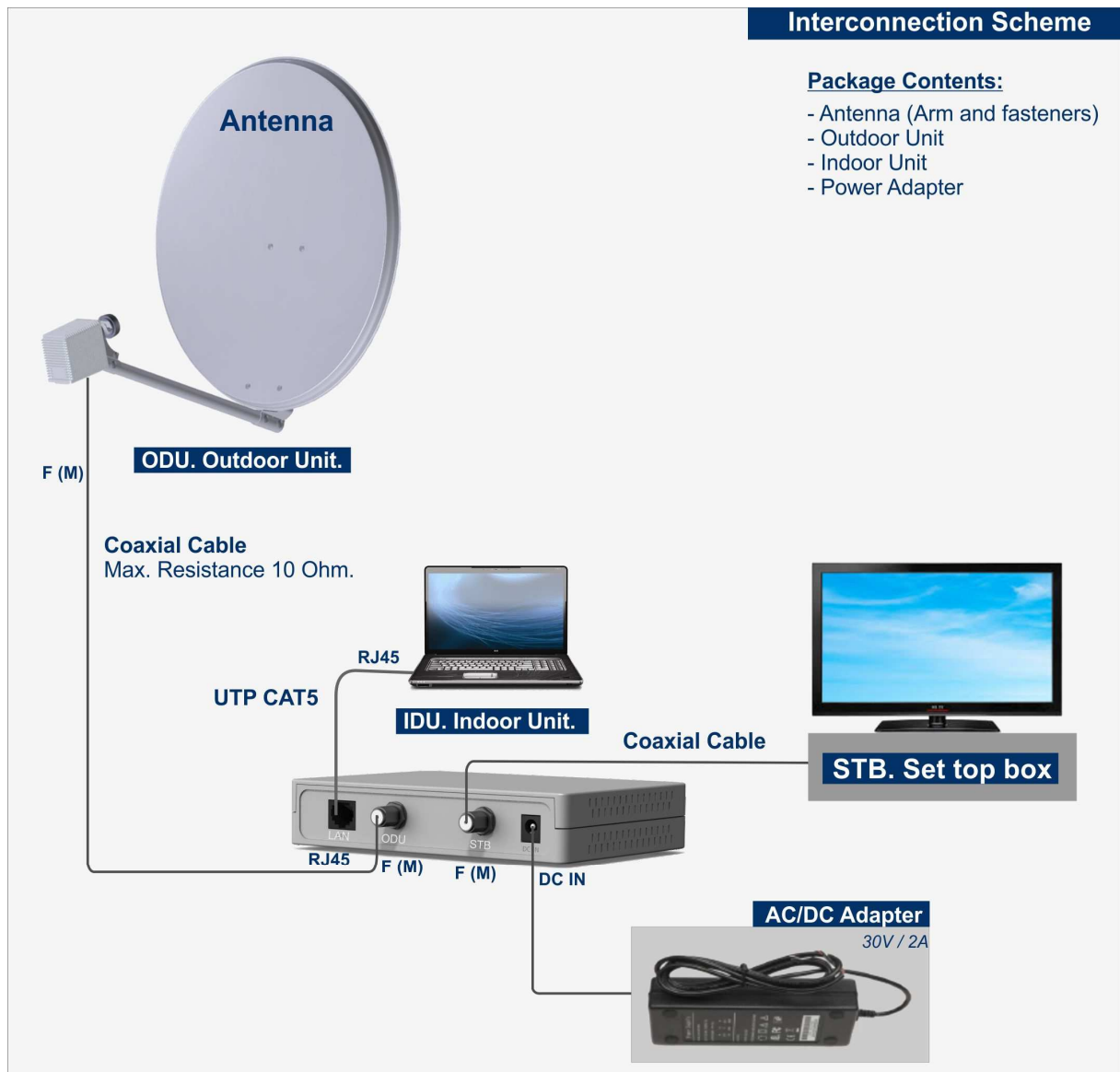


Fig.24. Interconnection general scheme.

* The set top box (STB) is not provided by Egatel.

9.1. ODU – IDU Connection

When pointing is completed, connect the **Tx/Rx** cable between the ODU and the IDU.

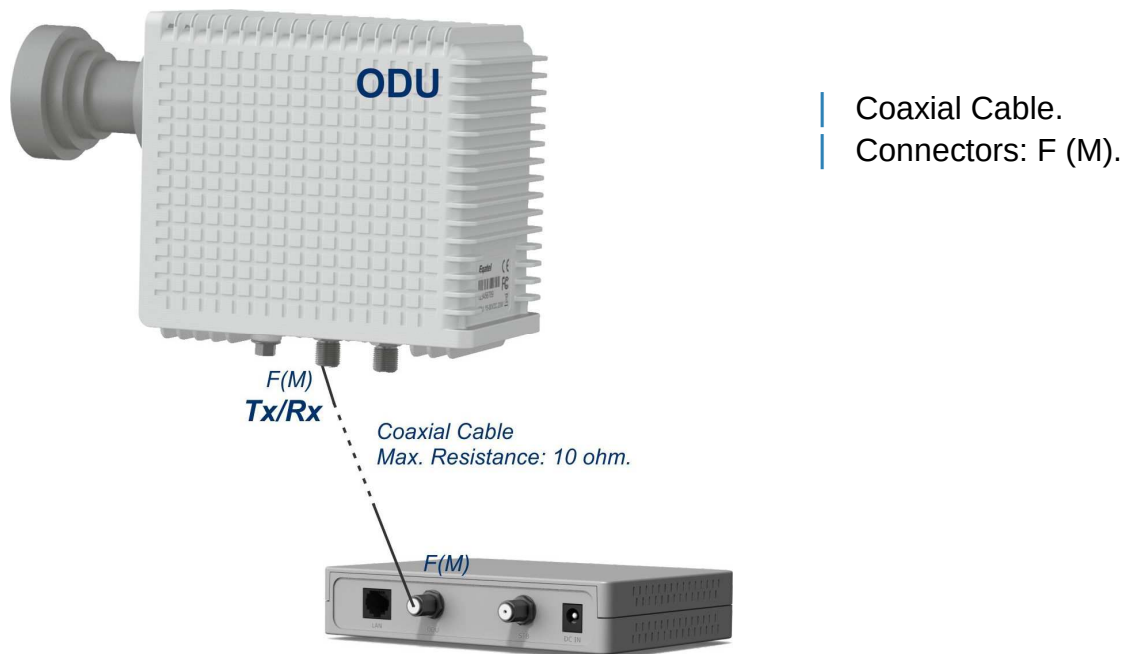


Fig.25. ODU – IDU Interconnection.

Note: The length and type of coaxial cable connecting ODU and IDU must guarantee a resistance lower than 10 ohm. (Inner + outer). Example RG6U.

9.2. External LNB Connection

If the system includes an external LNB, plug the coaxial cable as shown below.



Fig.26. External LNB connection.

9.3. IDU Connection

As it has been explained before, the Indoor Unit has four ports to interface with the external world.

- | F type connector facing the Outdoor Unit. (See *ODU – IDU connection*).

- | RJ-45 port to connect the IDU to the user's LAN. (Web GUI).

Plug a network cable in the Indoor unit and the computer's Ethernet port.

- Ethernet Cable: UTP Cat5.

- Connectors: RJ-45.

- | DC port for external power supply.

Connect the Indoor Unit to a wall outlet through the Power Adapter provided: AC/DC Adapter, +30V / 2A.

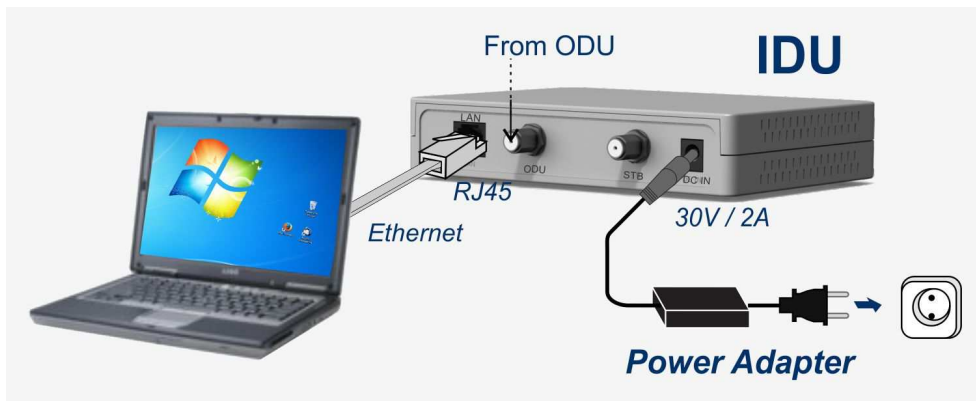


Fig.27. LAN and Power supply connection.

10. ANNEX

10.1. Ku / Ku Dish.

The following table gathers the major antenna Ku/Ku parameters.

Antenna Parameters	
Type	Offset
Offset	20,8°
Reflector Diameter	750 x 802 mm
Focal Distance	585 mm
F/D Ratio	0,78
Frequency Range (GHz)	RX: 10,7 - 12,75 GHz TX: 13,75 – 14,5 GHz
Reflector material	Galvanized Steel
Reflector Thickness	0,65 mm
Polarization	Linear/Circular
Gain @ 14,50 GHz	39,4 dBi
Elevation Adjustment Range	10° to 90°
Azimuth Adjustment Range	360°
Mast Pipe Interface	40 – 60 mm
Feed Interface Diameter	23 mm adapter
77 (IEC1114-2 Standard)	77 (IEC1114-2 Standard)
Survival Windload	144 km/h (IEC1114-2 Standard)
Destructive Windload	216 Km/h (IEC1114-2 Standard)

10.2. Radiation pattern

10.2.1. Relevant values extracted from the diagrams

Horizontal polarization

Plane $\varphi=0^\circ$

LF 3dB (°)	LF 10dB (°)	Isolation (dB)	1 st Null Level (dB)	1 st Null Position (°)	1 st L.S. Level (dB)	1 st L.S. Position (°)
2	4	>30	-23,4	-3	-17,4	-3,5

Plane $\varphi=90^\circ$

LF 3dB (°)	LF 10dB (°)	Isolation (dB)	1 st Null Level (dB)	1 st Null Position (°)	1 st L.S. Level (dB)	1 st L.S. Position (°)
1,5	3	>23	-27,4	2,5	-18,1	3,5

Vertical polarization

Plane $\varphi=0^\circ$

LF 3dB (°)	LF 10dB (°)	Isolation (dB)	1 st Null Level (dB)	1 st Null Position (°)	1 st L.S. Level (dB)	1 st L.S. Position (°)
2	4	>29,2	-21,4	-3,5	-20,4	-4

Plane $\varphi=90^\circ$

LF 3dB (°)	LF 10dB (°)	Isolation (dB)	1 st Null Level (dB)	1 st Null Position (°)	1 st L.S. Level (dB)	1 st L.S. Position (°)
2	4	>22,8	-21,5	3,5	-20,4	3

Radiation patterns of two orthogonal planes ($\varphi = 0^\circ$ and 90°) to the plate of the parabola. ECP – direct polarization; ECX – cross polarization.

By default, the system always measures and displays in the graphics, cross-polarization in red.

10.2.2. Horizontal Polarization: Rectangular coordinates Radiation pattern.

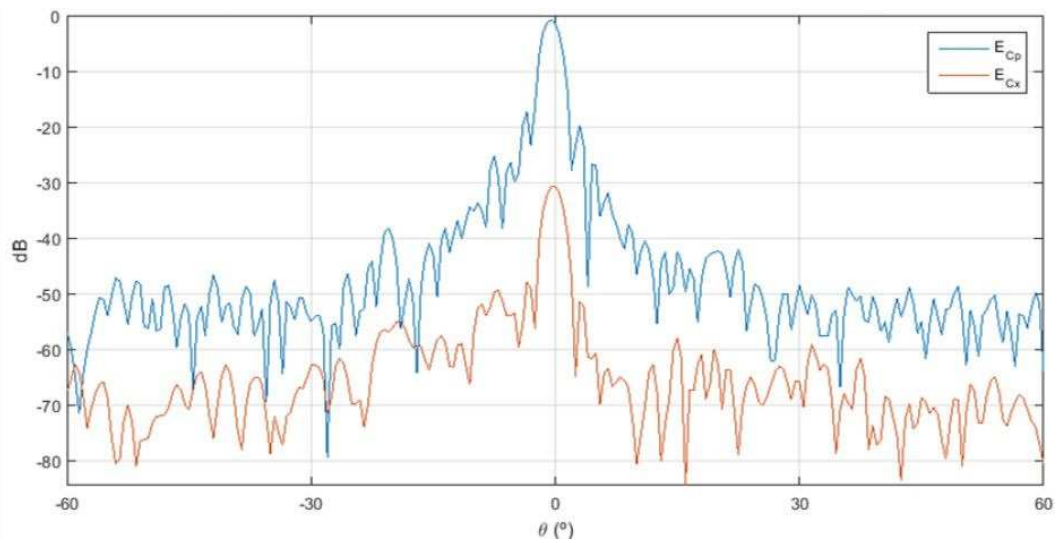


Fig.28. Radiation pattern. Copolar and crosspolar. Plane: $\phi=0^\circ$.

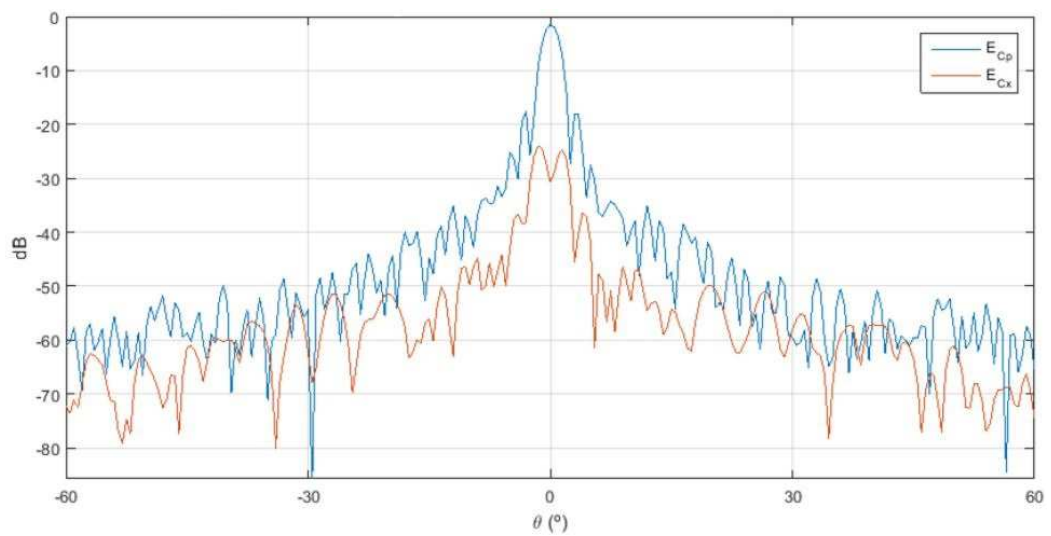


Fig.29. Radiation pattern. Copolar and crosspolar. Plane. Plane: $\phi=90^\circ$.

10.2.3. Horizontal Polarization: Radiation pattern “With markes”.

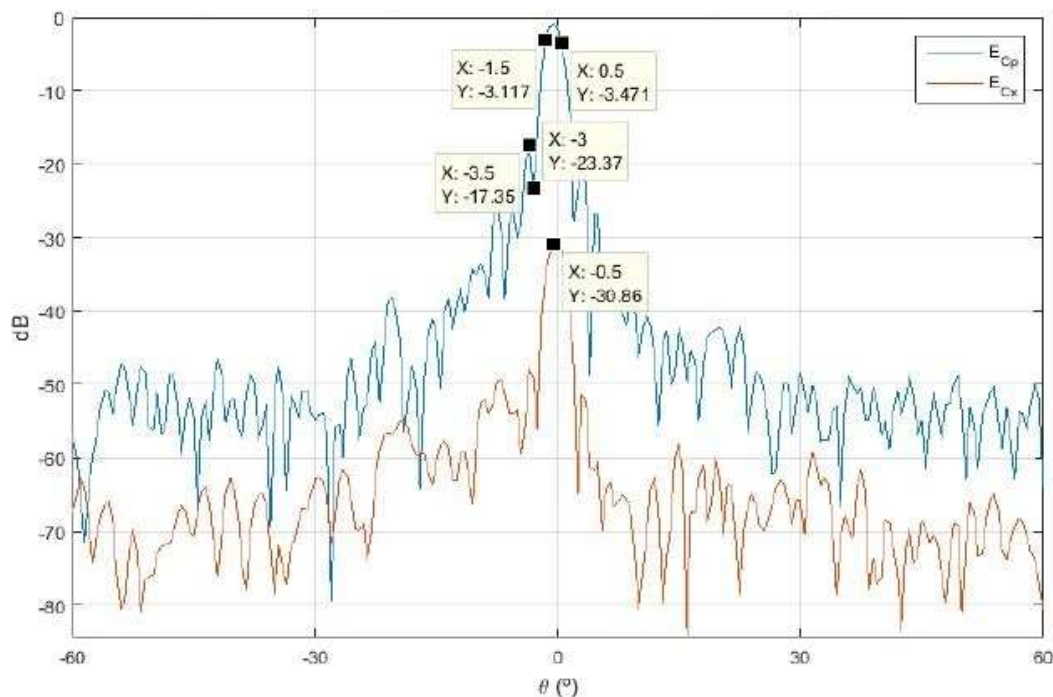


Fig.30. Radiation pattern. Copolar and crosspolar. Plane. Plane: $\phi=0^\circ$.

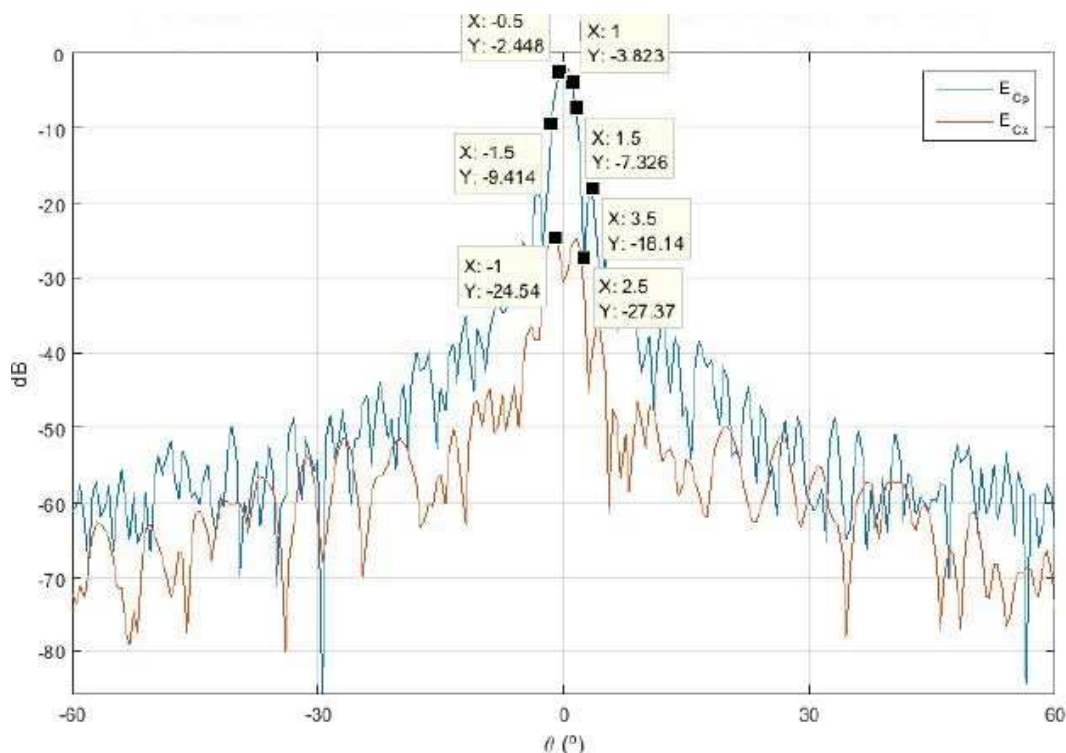


Fig.31. Radiation pattern. Copolar and crosspolar. Plane. Plane: $\phi=90^\circ$.

10.2.4. Horizontal Polarization: Polar coordinates radiation pattern.

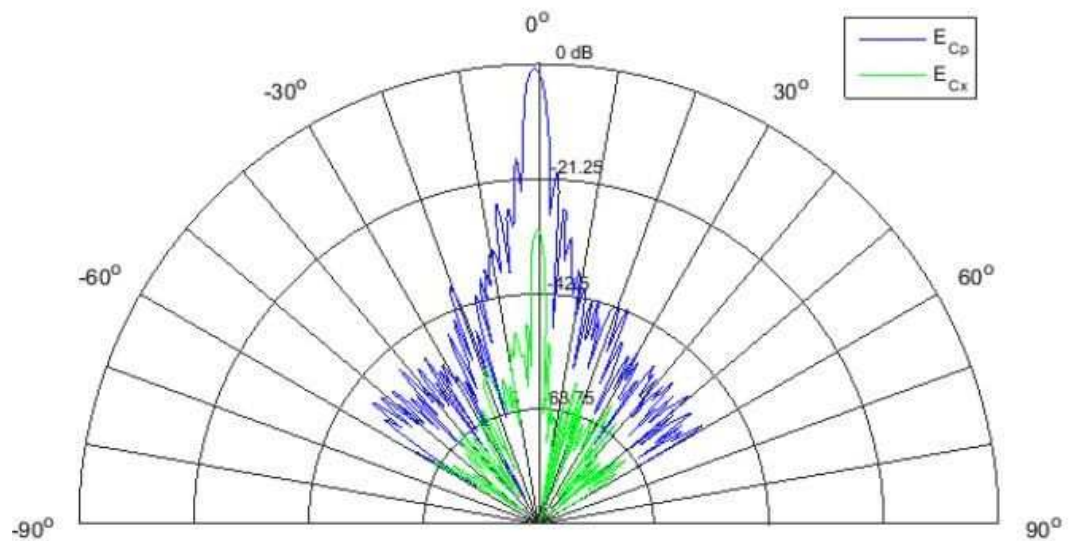


Fig.32. Radiation pattern. Copolar and crosspolar component. Plane: $\phi=0^\circ$.

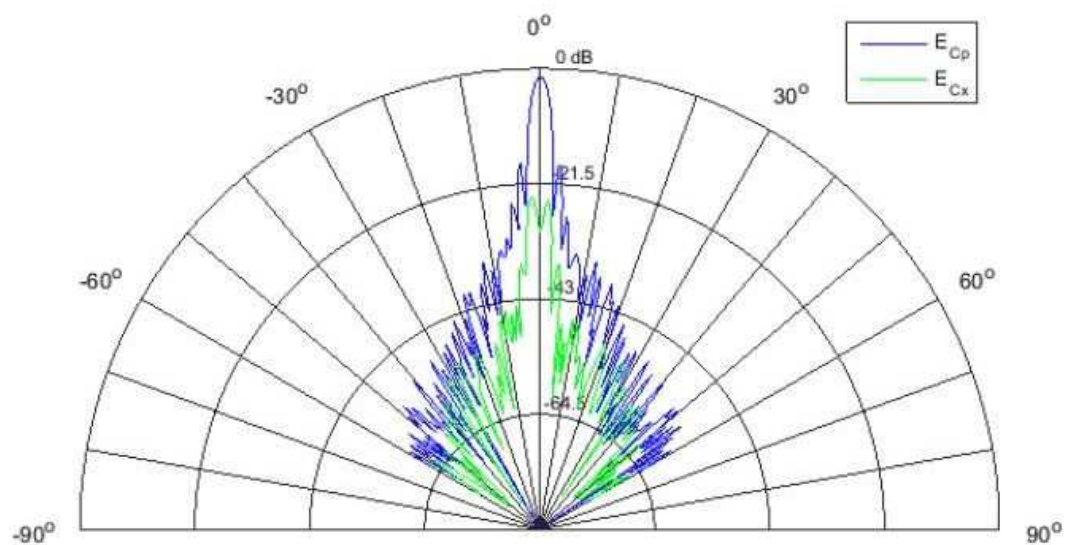


Fig.33. Radiation pattern. Copolar and crosspolar component. Plane: $\phi=90^\circ$.

10.2.5. Horizontal Polarization: 3D Radiation pattern.

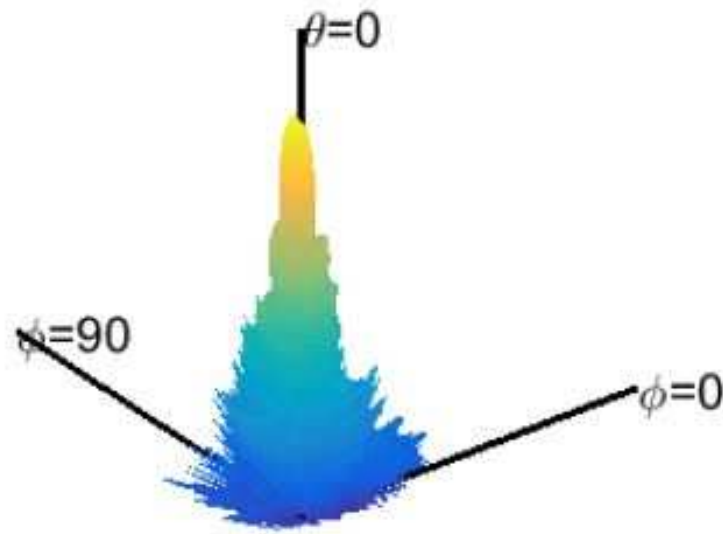


Fig.34. Radiation pattern. Copolar – Polar component.

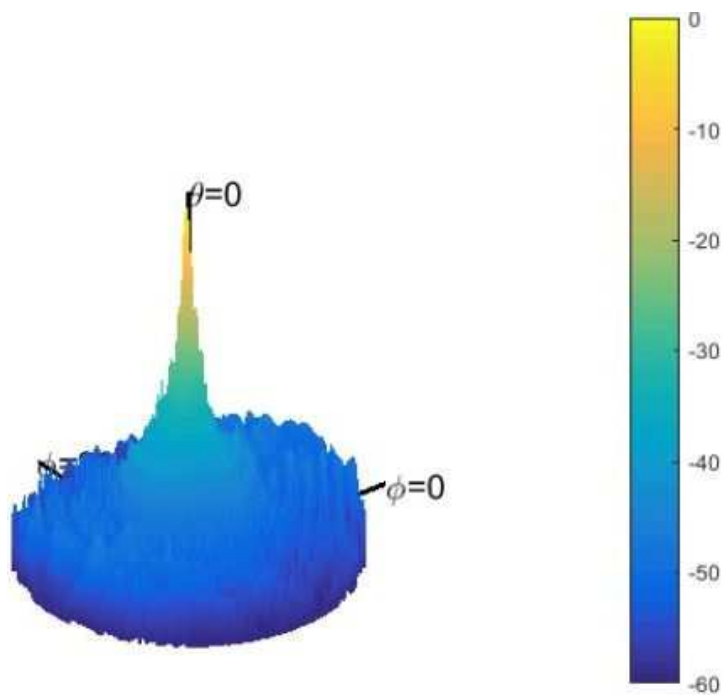


Fig.35. Radiation pattern. Copolar.

10.2.6. Vertical Polarization: Rectangular coordinates Radiation pattern.

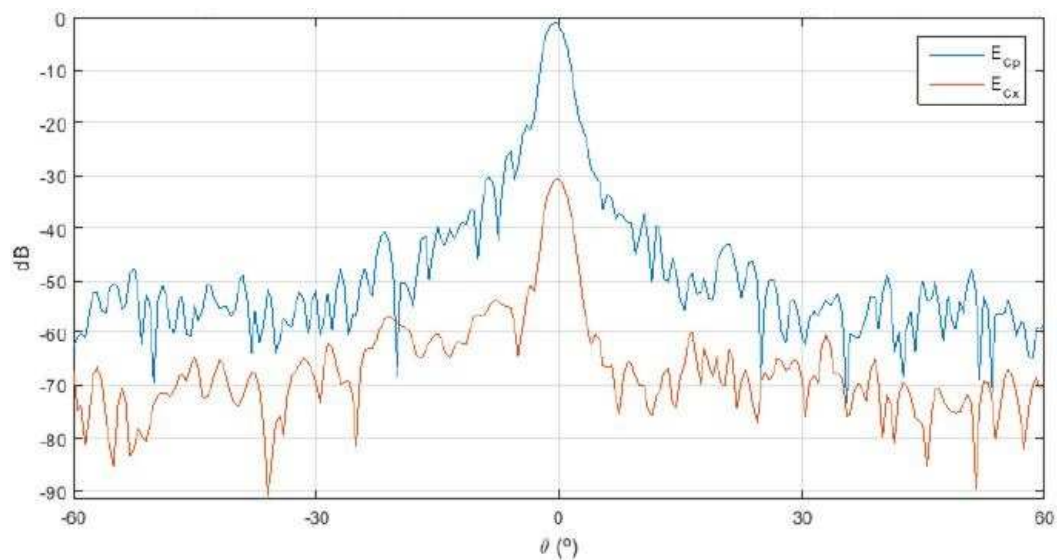


Fig.36. Radiation pattern. Copolar and crosspolar component. Plane: $\phi=0^\circ$.

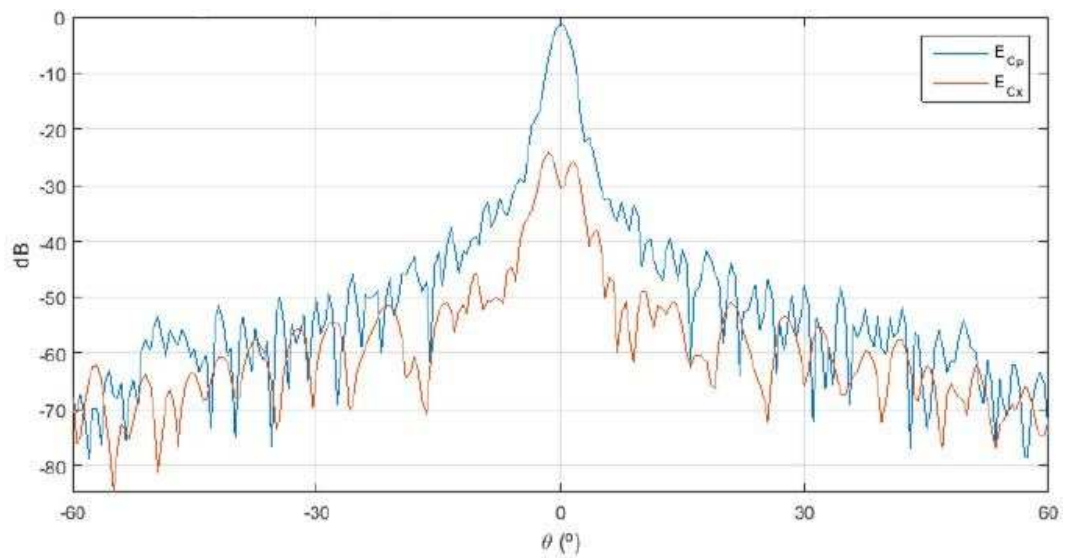


Fig.37. Radiation pattern. Copolar and crosspolar component. Plane: $\phi=90^\circ$.

10.2.7. Vertical Polarization: Radiation pattern "With marks".

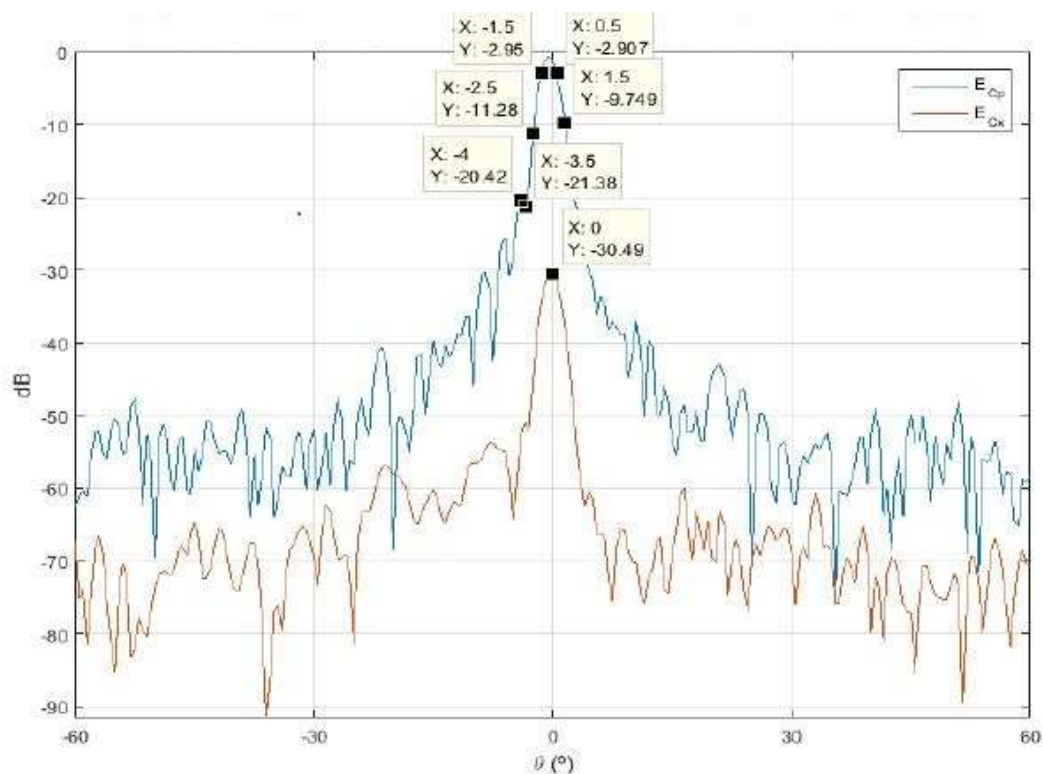


Fig.38. Radiation pattern. Copolar and crosspolar component. Plane: $\phi=0^\circ$.

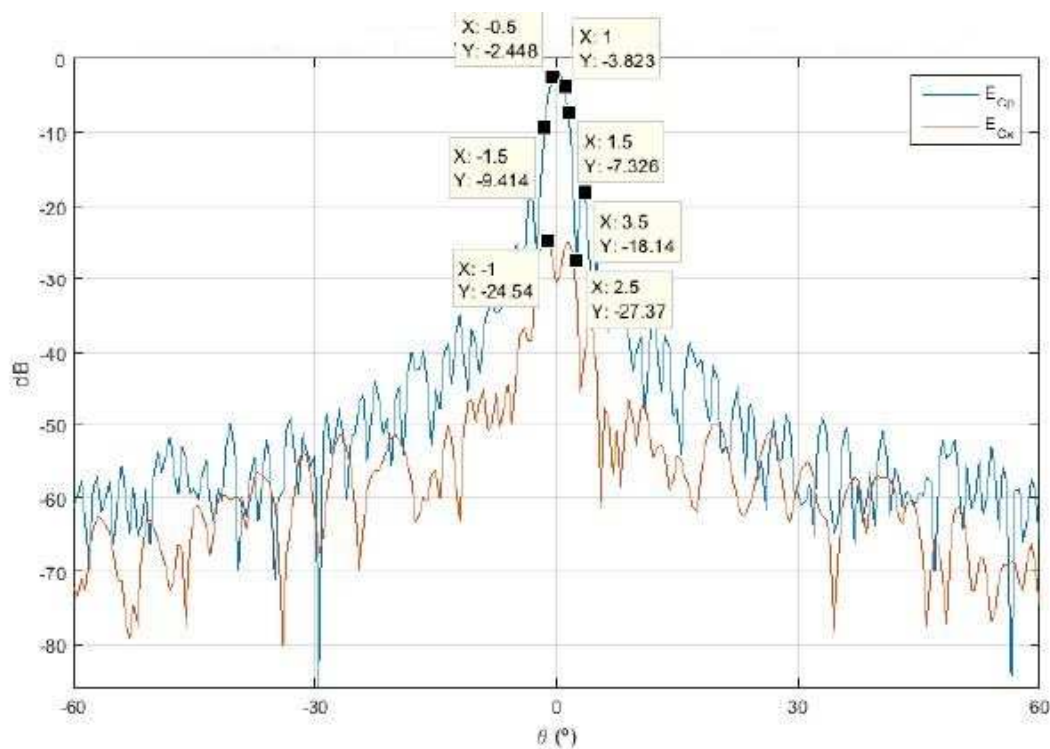


Fig.39. Radiation pattern. Copolar and crosspolar component. Plane: $\phi=90^\circ$.

10.2.8. Vertical Polarization: Polar coordinates radiation pattern.

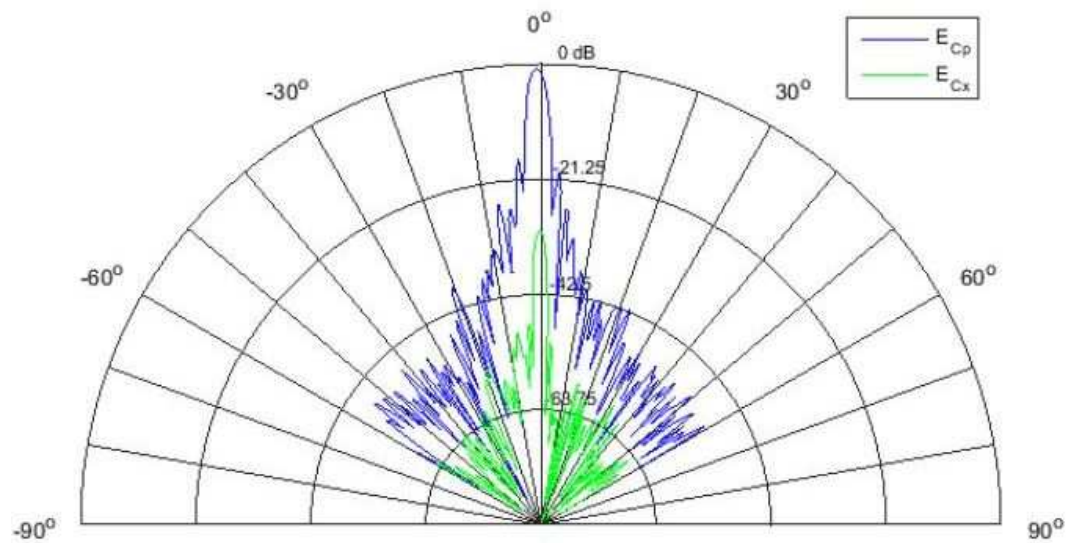


Fig.40. Radiation pattern. Copolar and crosspolar component. Plane: $\phi=0^\circ$.

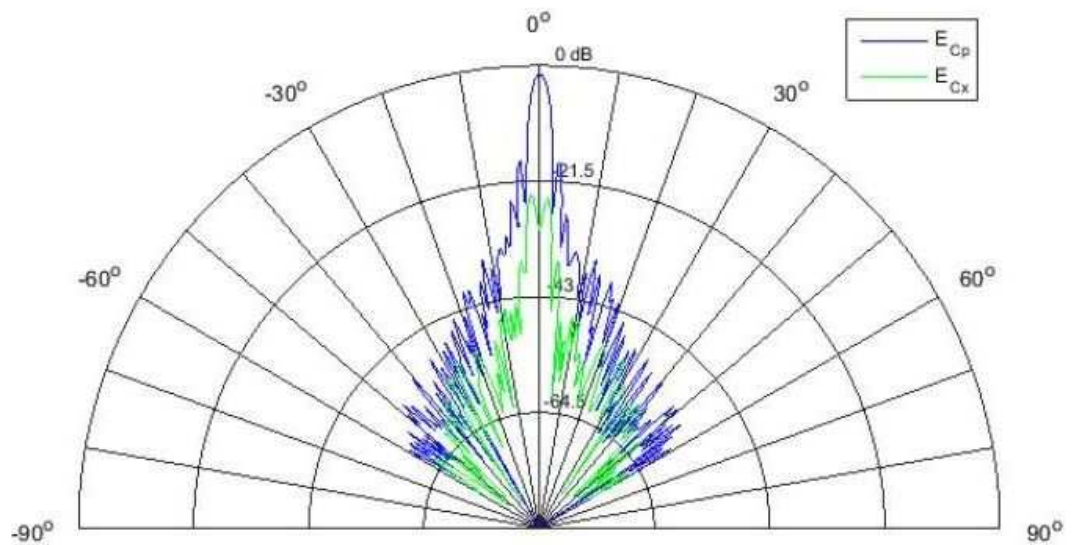


Fig.41. Radiation pattern. Copolar and crosspolar component. Plane: $\phi=90^\circ$.

10.2.9. Vertical Polarization: 3D Radiation pattern.

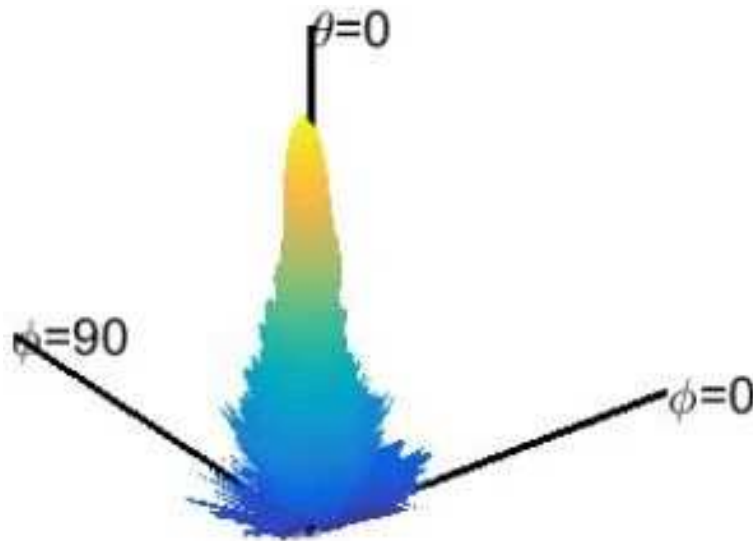


Fig.42. Radiation pattern. Copolar – Polar component.

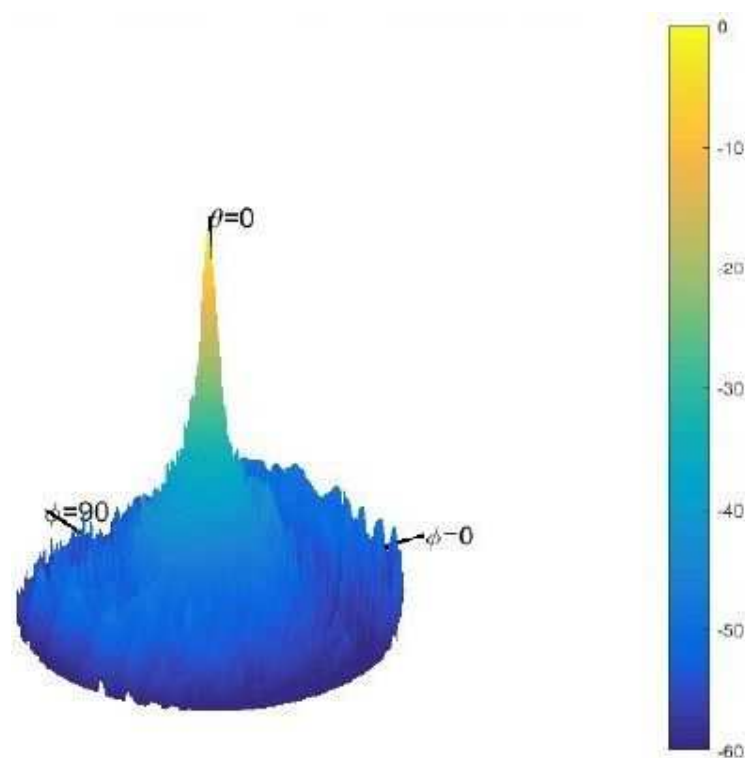


Fig.43. Radiation pattern. Copolar

10.3. Detailed diagram of the components supplied with the antenna.

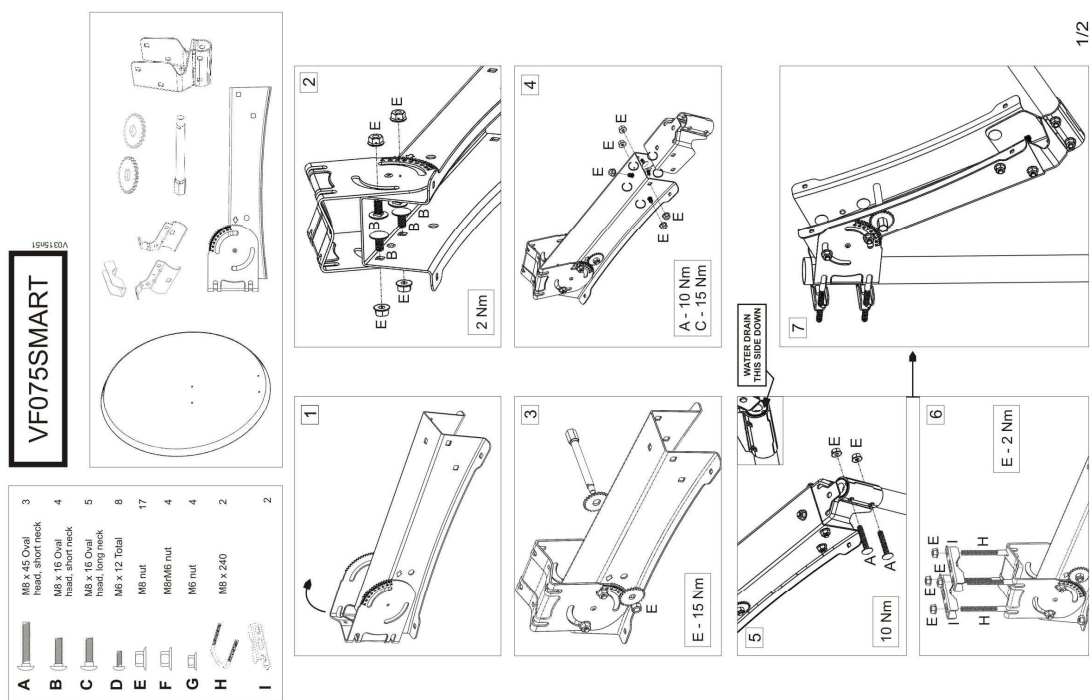
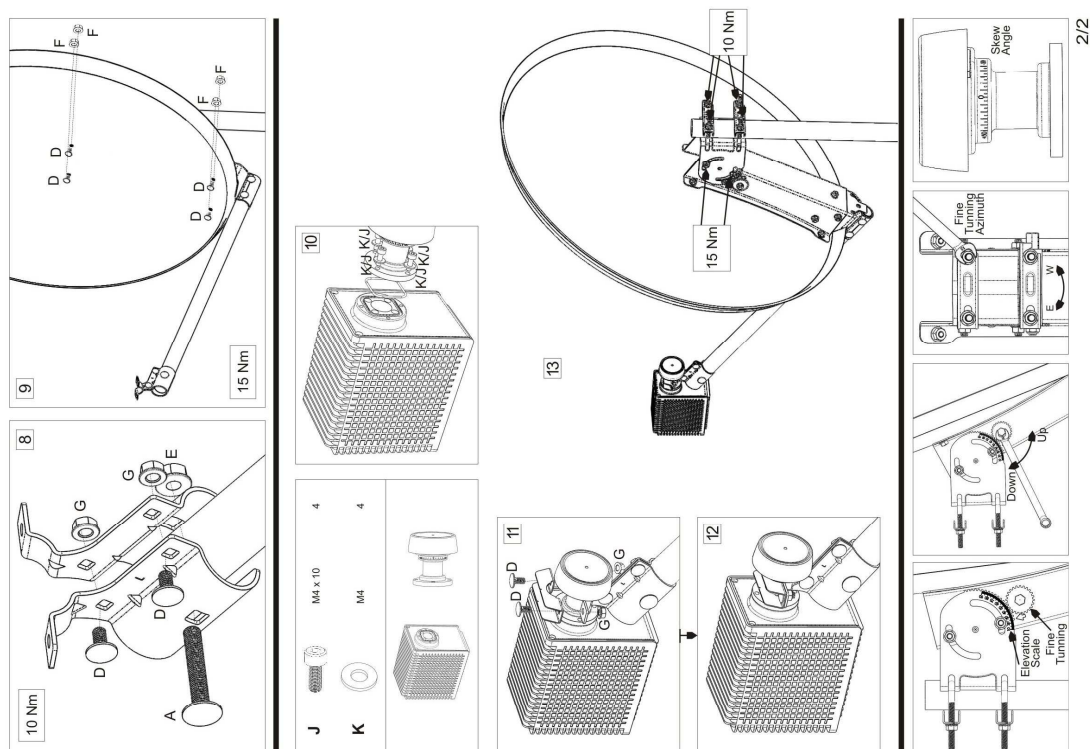


Fig.44. Antenna components.



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