TRI7 10-15-20

Triband antenna

WEB MANUAL

Momobeam
C.da Berbarello 508 - IT-91025 Marsala Italy
P.Iva IT-02439250818 Tel. +39 393 9906980
www.momobeam.com – info@momobeam.com

ITALIANO
I manuali utente dei prodotti Momobeam sono disponibili in lingua Italiana, Inglese e Spagnola. Per ottenere il manuale nella tua lingua preferita puoi registrarti sul sito www.momobeam.com, eseguire il login, andare alla pagina del prodotto desiderato e scaricare il manuale. Nel caso in cui non fosse ancora disponibile sul sito web, contattaci e, se disponibile, ti invieremo il manuale per email.

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Please, carefully read this user manual before starting to assembly the antenna.

Thank you for purchasing a Momobeam antenna! This manual will guide you to the correct assembling and mounting of your new and powerful antenna. We design and optimize our antennas thru computerized simulations and on field tests. Momobeam antennas are very easy to assemble thanks to the subdivision and labeling of components. Please do not pollute the environment and, if you can, recycle the packaging following the instructions of the responsible authorities. Follow all local codes and ordinances when installing this antenna.

Momobeam Limited Warranty and Liability
Momobeam warrants to the original purchaser that this product will be free from defects in material and workmanship for a period of two (2) years from the date of purchase. Momobeam solely will determine whether a part will be covered by this limited warranty and whether a part will be repaired or replaced. Such determination will be made following the evaluation of alleged defect. Momobeam will evaluate if misuse, abuse, unauthorized modifications, extreme weather conditions or improper installation occurred. This warranty does not cover delivery, transportation, installation or any other cost that may be incurred from any defect. Shipping costs for any repairs, replacements or returns will be paid by the buyer and must be prepaid. Before proceeding with the evaluation, Momobeam will have to receive appropriate documentation that allows to identify any defect found. The purchaser, final customer, installer and user of Momobeam products acknowledge that these products can cause injury or death and accept full responsibility and liability for any and all damage to persons ad to propery (direct, indirect and punitive) caused during installation and subsequent use.

Warning
Do not install this antenna where there is any possibility that the antenna or any part of the supporting structure could come in contact with power lines or any electric circuit. If the antenna comes in contact with electric circuits, this could result in electric shock or loss of life. Also ensure that no people or pets can come in any contact with the antenna after it is installed. Dangerous voltages can exist on the antenna when it is in operation and no part of the system is insulated to prevent electric shock. Momobeam antennas are not designed to be used as support structures. Persons or objects should never be supported by or suspended from the antenna structure. It must be taken into account that falling parts may cause a hazard to people, animals and property on the ground below.

In case of strong winds, please place the antenna so that the boom faces the wind. This way you will avoid excessive stress on the elements.

Disputes For any dispute, only the Marsala - Italy forum is competent
Momobeam antennas are designed and manufactured in Italy

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C.da Berbarello 508 - IT-91025 Marsala Italy
P.Iva IT-02439250818 Tel. +39 393 9906980
www.momobeam.com – info@momobeam.com

Contact If you have any questions regarding the assembly or operation of this antenna, please contact Momobeam:
Momobeam di Giuseppe Spanò
C.da Berbarello 508 - IT - 91025 Marsala Italy
P.IVA IT-02439250818 www.momobeam.com – info@momobeam.com

Assembly advices
Momobeam antennas is made of aluminum tubes, aluminum straps for phase lines, stainless steel hardware (bolts, nuts, washers, U-bolts, saddle clamps), POM-C UV-Resistant driver insulators and polypropylene clamps. Stainless steel is very sturdy, but sometimes you might experience seizure when you tighten or loose some stainless steel parts. The seizure is mainly due to the chemical nature of the material that undergoes a sudden heating of surfaces due to friction during assembly. If this happens, a nut can become seized and it becomes necessary to force the tightening until the bolt breaks and then proceed with its replacement.

It is strongly recommended that you lubricate stainless steel hardware before tightening it to prevent seazure.

If you are removing a stainless steel nut that has been installed, it can help to apply a lubricant before removing it to prevent seizure. If during the removal or tightening of a nut you feel a lot of resistance, stop immediately and apply a lubricant. After that, work the nut in the opposite direction to allow the lubricant to work. We recommend tightening the hardware by hand.

Please, do not over-tight. Extreme force is not required! Once hardware begins to seat firmly, it only takes a few more turns to properly secure parts.
Self-locking nuts provided will prevent unscrew due to the vibrations.

Pay attenction when securing clamps and U-Bolts. Make sure you apply even torque between the bolts.

To prevent loosing parts after accidentally dropping them, we recommend to assembly Momobeam antennas on a large flat area.

Installation requires at least 2 people.

When you are working on the top of a pole or tower, please be careful and use appropriate harness. It is recommended that this operation is done by a professional installer.

To make the antenna assembly operations easier, equip yourself with two saw horses.

Each element is labelled and its parts are bundled together and/or telescoped.
Hardware is packed in labelled bags.
Some parts (like driver elements) comes subassemblied.
This makes the assemble of Momobeam antennas very easy and intuitive.

Momobeam antennas are built using strict quality control. Each batch of production is verified by instrumental and on-air testing by assembling a randomly selected piece.

The driver is a balanced element while the coaxial cable is not, that is why you will need a 1:1 balun.
We recommend to use a Momobeam balun that is available in more versions. Alternatively, you can use a balun of your choice or make a coax cable RF choke (see instructions at the end of the manual). If you will make yourself an RF choke or if you do not use a Momobeam balun, make sure that the wires that connect to the antenna are not longer than 5cm.

Thank you for purchasing a Momobeam antenna, this user manual will guide you towards the correct assembly and mounting of your new and high-performance directive antenna.

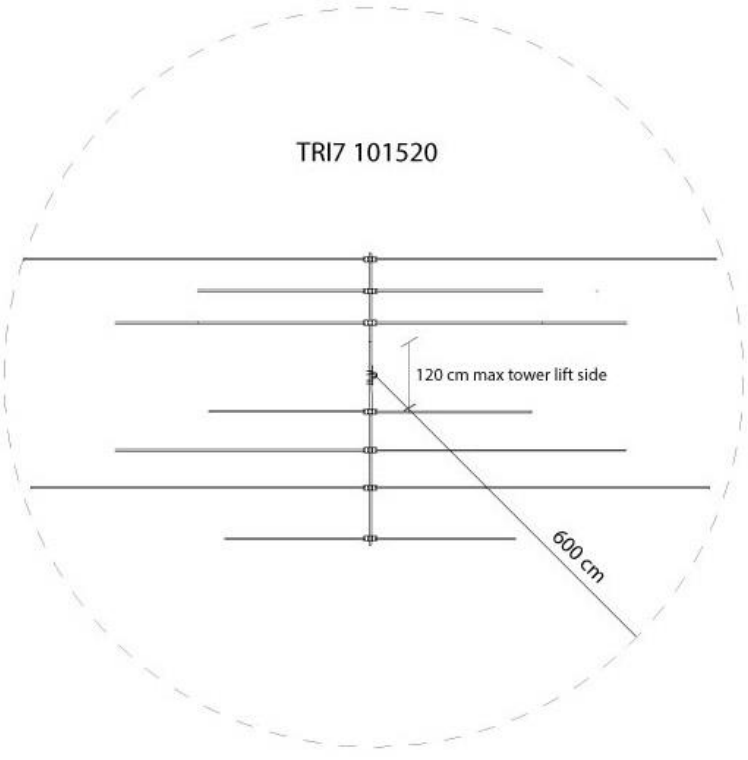
TRI7 10 15 20 (TRI7) is a full-sized Yagi antenna for amateur radio operators that three HF amateur radio bands (14/21/28 MHz) and it is designed for maximum performance. It uses 7 elements on a 4,35 m boom with:
2 elements, reflector and driver on 20 meter band
2 elements, reflector and driver on 15 meter band
3 elements, reflector, driver and director, on 10 meter band

No traps or adaptation system have been used, providing the maximum performance. The antenna is a direct 50 Ohm feed through a single coaxial cable connected to a 1:1 balun (recommended) or a RF choke

Momobeam antennas do not need any type of adaptation system such as hairpins or gamma matches. They are designed to work on a large bandwidth for each band.
You do not need to do any adjustment to the antenna if the assembly is made following all instructions, if spacing are all respected and if you install this antenna at an height not less than 10m.

Materials used for construction
Tubes and plates: Aluminum alloy 6060 T6
Hardware: stainless steel
Driver insulators: POM-C UV-Resistant
Clamps: Polypropylene

Required tools
Key 7 - 10 - 13; hexagonal keys; Protective gloves; Flexometer; anti-seize compound.
NOTE: It is normal to have extra hardware when you have properly completed the assembly.
We put some extra spare parts in a separate bag



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SPECIFICATIONS

BAND	**10 meters (28 MHz)**	**15 meters (21 MHz)**	**20 meters (14 MHz)**		
Gain dBi*	13,8	12,0	11,5		
Gain in free space dBd	6,1	4,3	4,2		
Front/back	18	15	15		
Elements	3	2	2		
SWR	800 KHz	450 KHz	350 KHz		

Longest element: 1120cm

Boom lenght: 435cm

Max tower lift side: 120cm

Turning radius: 600cm

Feed: 50 Ohm balanced – single coaxial cable

Mast diameter: 40 to 60mm (upper on request)

Wind area: 0,68 m²

Wind survival:** 130 Km/h

Wind load 130Km/h: 558 N

Balun: optional – to be purchased separately

Weight (excluding packaging): 25kg

* gain at 20m height on real ground

** maximum wind speed at which there is no permanent deformation of the antenna

STEP1 - BOOM ASSEMBLY

TRI7 boom is made of 3 parts that comes bundled together. The central part is a square tube 50x50x2mm, 155cm long; the terminal parts are square tubes 45x45x2mm, 155cm long.
The boom is telescopic so the terminal parts fit in the central part.
The central part has 4 holes, two on each side. The terminal parts have 2 holes, only on one side. Boom parts are joined together with four bolts, four nuts and eight washers in total. You can find hardware in the **"Boom junction" bag**. Please note the labels on each part.

Please note the labels on each part.
1- Align all parts matching the labels on each boom section.
2- Take one of the terminal parts and fit it into the central part, until holes align.
3- Take two bolts 6x70mm and insert one washer per bolt.
4- Lubricate stainless steel bolts before tightening it to prevent seazure.
5- Insert bolts+washers into holes and secure both parts with one washer and one nut per bolt.
6- Repeat the same on the other terminal part of the boom.

Please, do not over-tight. Extreme force is not required! Once hardware begins to seat firmly, it only takes a few more turns to properly secure parts.

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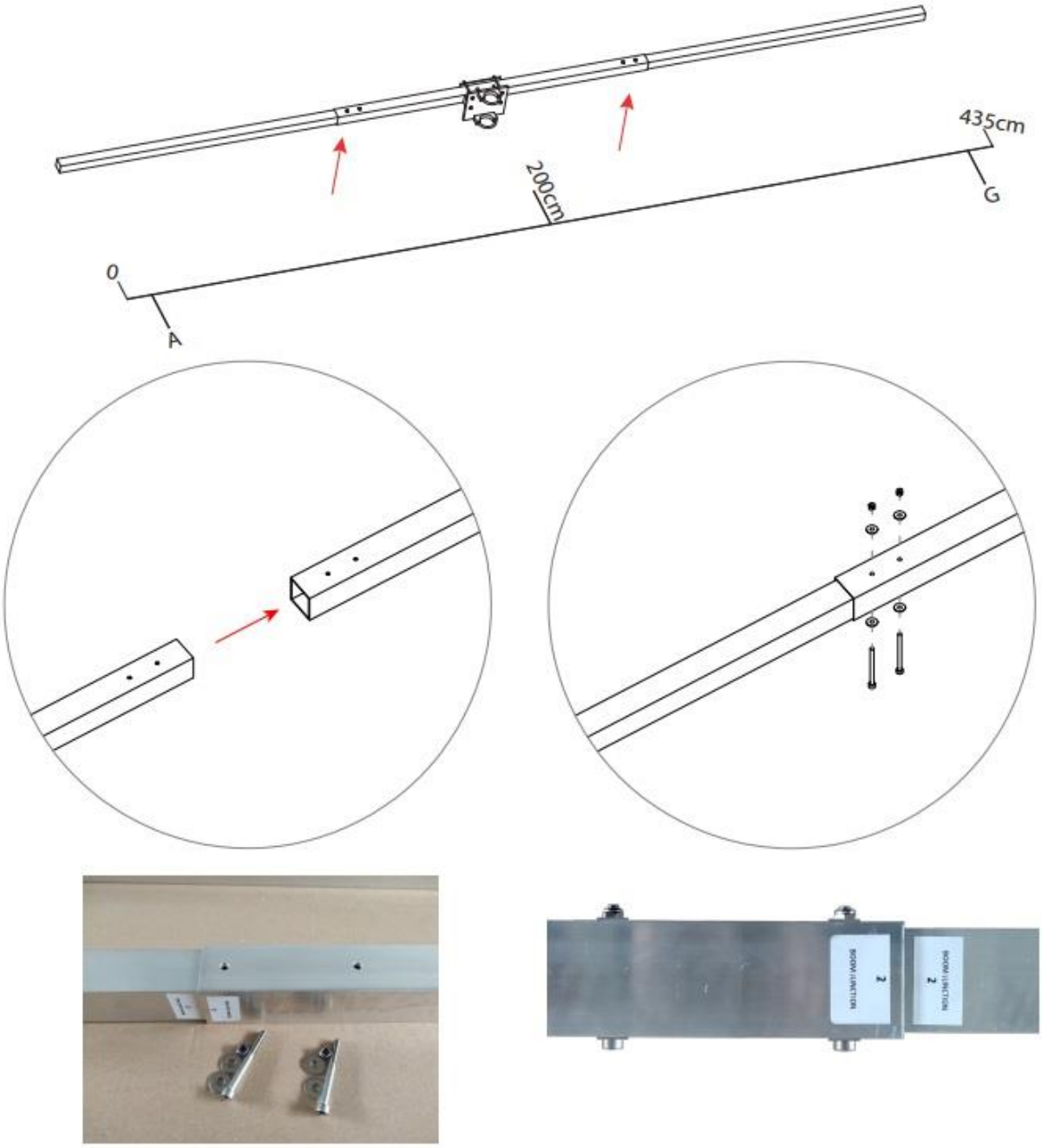

STEP 2 - BOOM TO MAST PLATE ASSEMBLY

You will find the **TRI7** boom to mast plate inside a bag that contains: one 180x180x10mm plate with 8 holes, one 180x80x5mm counterplate with 4 holes, one "Boom to mast plate" hardware bag, one "u bolt" hardware bag.
The centre of the boom to mast plate must be positioned at **200cm** from the boom start.
This measurement must be taken from the A element side (marked on boom). The position is also marked on the boom (see Boom to mast plate position picture).

Note: the boom to mast plate must be mounted perpendicular to the ground.

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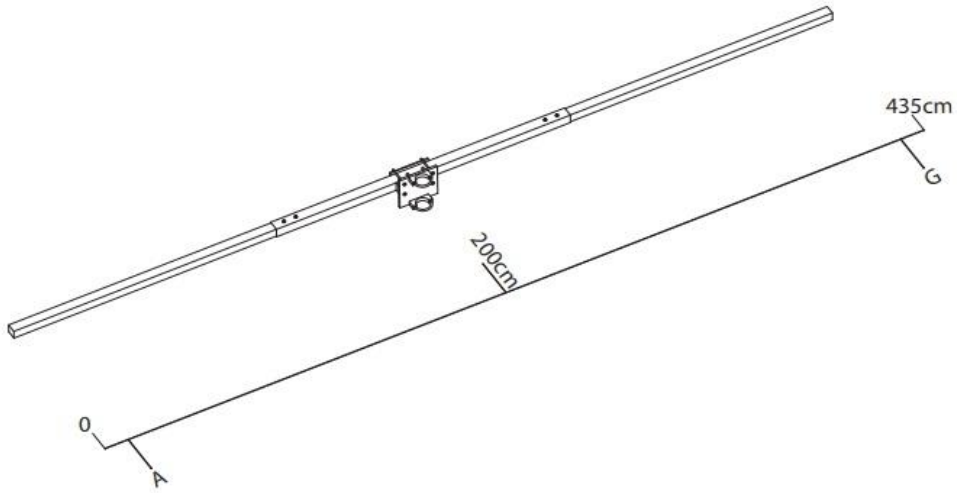

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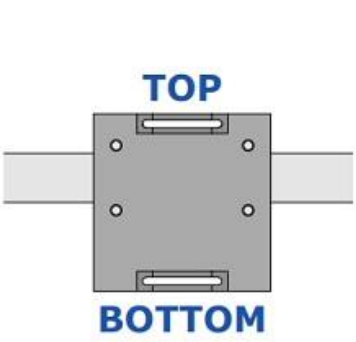

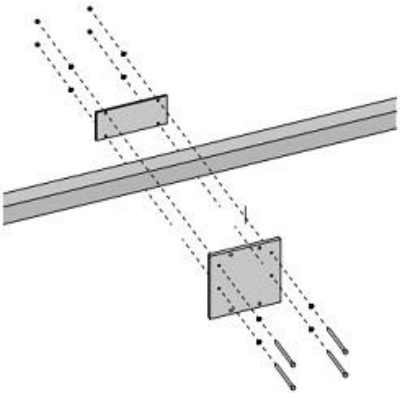

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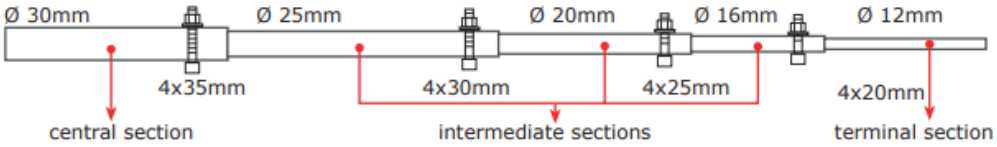
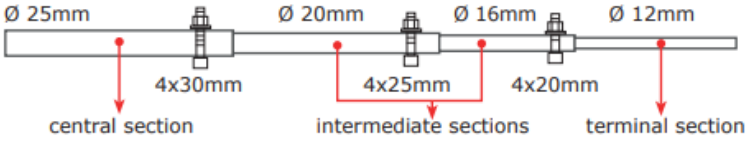
STEP 3 - ELEMENTS ASSEMBLY

Elements are telescopic, which means there is a section with diameter bigger than the oth ers. This section is the central one and it must be mounted to the boom plate and secured thru the polypropylene clamps. Each element is tapered and the taper runs smaller towards the tip. Each section slides into another.

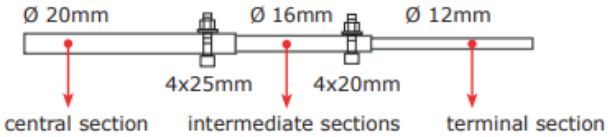
14 MHz



21 MHz



28 MHz

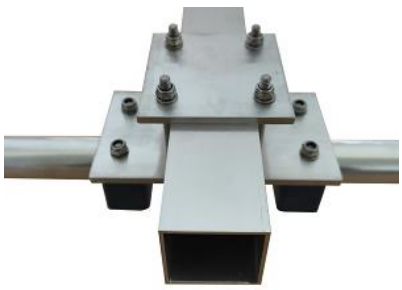


Elements are labelled. Parts of the same element are bundled together for easy and intuitive assembly.

You will find the following bundles:

Element A Reflector 20m
Element B Reflector 10m
Element C Reflector 15m
Element D Driver 10m
Element E Driver 15m
Element F Driver 20m
Element G Director 10m

Elements D, E, F are driver elements. Their central section is divided in the middle through a POM-C UV-Resistant insulator (preassembled with insulator, 2 bolts, 2 washers and 2 nuts).



Top view

Bottom viev

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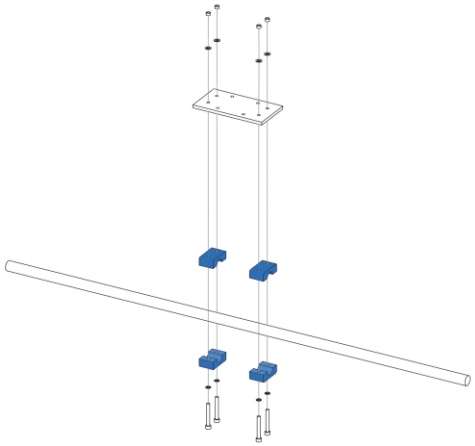
In order to be assembled on the boom, each element central part needs:
1 plate, 1 counterplate, 4 M6X70 bolts, 8 washers M6, 4 self lockin g nuts M6
2 polypropylene clamps, 4 M6X50 bolts, 8 washers M6, 4 self locking nuts M6

Plate kit

STEP 3.1 - ELEMENT PLATES ASSEMBLY

1- For each element locate the correspondant clamps and plate following the labels. Assembly elements central parts on the plates placing the two halves of insulating clamps on the external holes.
2- Place the element central section in the clamps saddles. Important: the label (for elements A, B, C, G, H, I, L) or the POM-C UV-Resistant insulator (for D, E, F elements) must be centred between clamps.
Place the tube so that larger holes face the ground. Bolts in the middle of driver elements must point the opposite direction of the plate.
3- Place the second half of the clamps and secure them using 2 bolts M6X50, 2 nuts and 4 washers for each clamp. You will find hardware in "clamps hardware" bag.
Tighten bolts firmly. Make sure clamps are tighten evenly alternating between the bolts.



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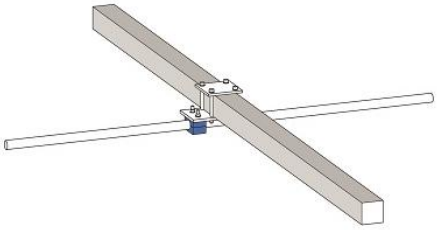
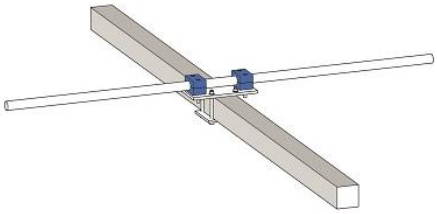
STEP 3.2 - ELEMENT PLATES ASSEMBLY TO THE BOOM

After you assembly all plates with central elements section, mount them to the boom using the counterplate, four bolts M6X70, eight washers M6 and four self locking nuts M6. You will find hardware in "**Element plate to boom hardware**" bag.
The elements plates and the elements themselves must be mounted on the underside of the boom, while the counterplate must be placed on top. Plates positions are marked on the boom. Place the plates + central element part in the marked position on the boom.
Important: for driver elements (D / E / F) loosely tighten counterplate bolts as you might need to slightly adjust the position when assembling phase lines.



Top view



Bottom view

BOTTOM VIEW

BOTTOM VIEW

TOP VIEW

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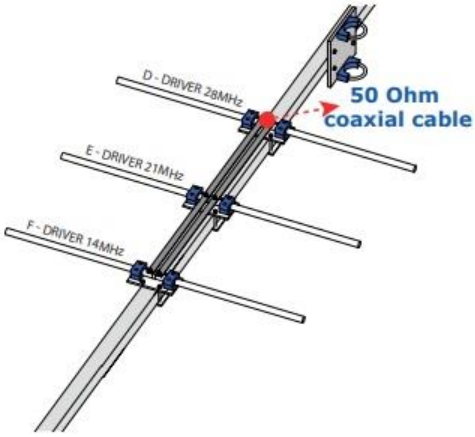
STEP 3.3 - PHASE LINES ASSEMBLY

Now insert the "phase line" so that they all fit the "driver" elements bolts that are preassembled and comes out from the middle part of the element central section (elements D / E / F). Please note the labels on the phase lines.
1- Unscrew the nuts that comes out from the bolts in drivers middle part.
2- Remove the washer and insert the phase line in the bolt.
3- Insert the washer and secure with the nut. It might be necessary to slightly adjust elements distance adapting it to the holes in the phase lines or slightly rotating the driver element in order to insert the phase lines correctly.

Once you assembled both phase lines and all plates with all elements central parts, check all spacings between the elements and then firmly tighten all bolts



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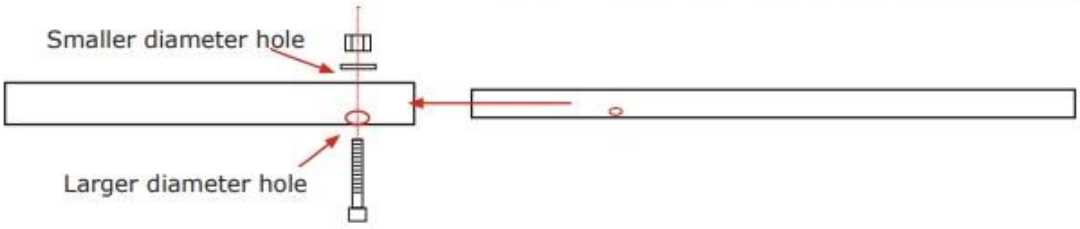
STEP 3.4 - ELEMENTS SECTIONS ASSEMBLY

Now you can easily assemble the rest of the element sections. You only need to slide each part and secure junctions with one bolt, one washer and one nut to assemble the element.
The hardware of the elements is divided by element. You will find a 14 MHz bag for A / F elements, one for 21 MHz C / E elements, one for 28 MHz B / D / G elements.

Please note that the holes on elements parts have two different sizes.
The head of the bolt must be inserted into the larger diameter hole, thru the smaller diameter tube and it must exit thru the small hole in the bigger diameter tube on the opposide side. This creates a mechanical and electrical strong junction.
All bigger diameter holes must face the ground.



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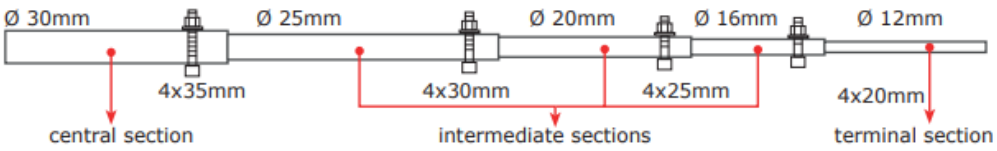
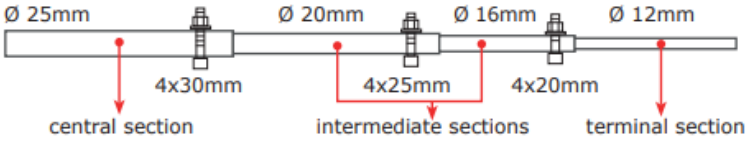
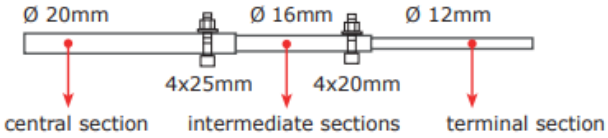
14 MHz



21 MHz



28 MHz



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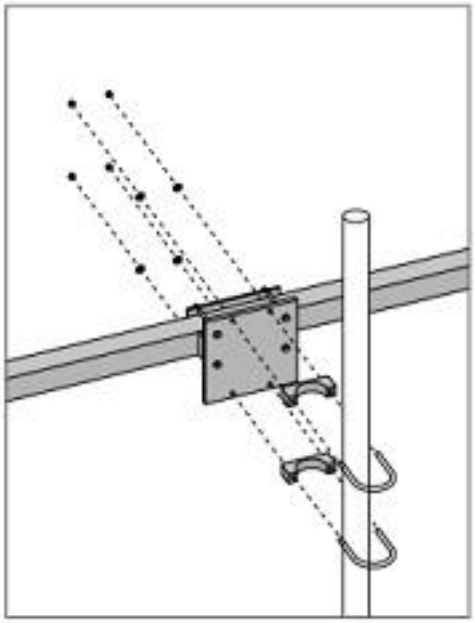
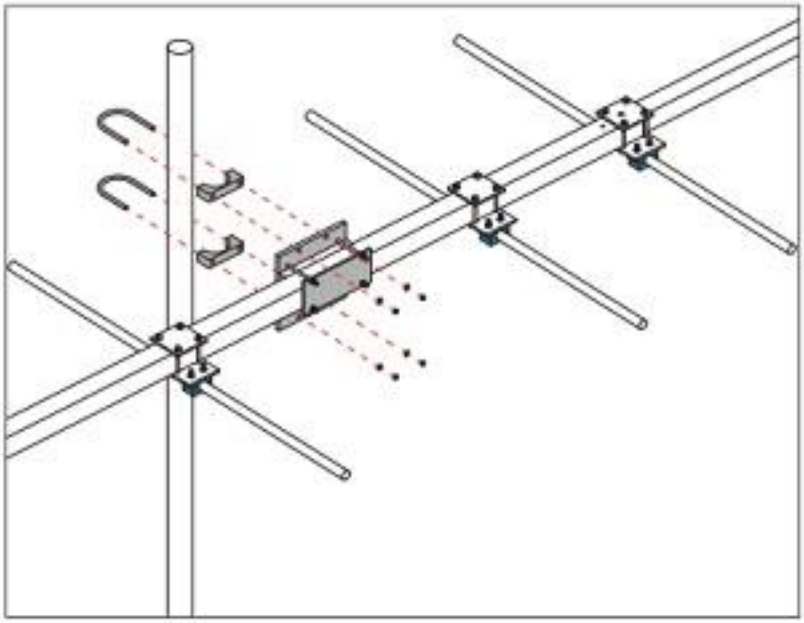
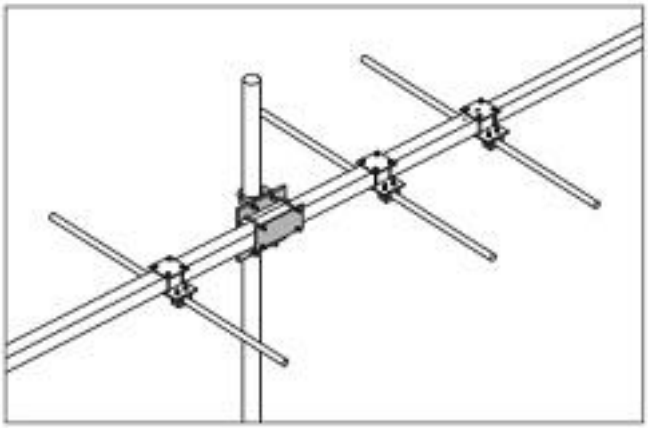
STEP 4 - ASSEMBLING THE ANTENNA ON THE MAST

Once the antenna has been assembled, it must be mounted on a support at a height of not less than 10m. It is recommended that this operation is done by a professional installer. Make sure that the mast on which the antenna will be mounted is of a diameter compatible with that of the Ubolt supplied with the antenna.

Now proceed to fix the antenna to the mast as shown in the figure below. You will need 2 Ubolts, 2 saddle clamps, 8 M6 washers, 8 M6 self locking nuts.
You will find hardware in the "U bolt" hardware bag.







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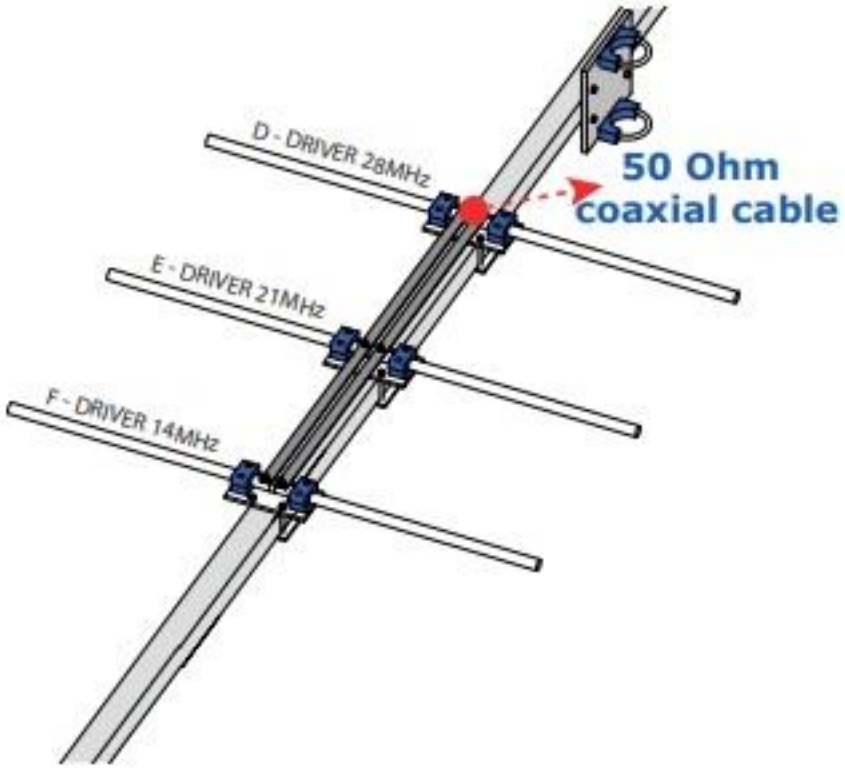
BALUN

TRI7 comes without a balun. We recommend to use a Momobeam balun that is available in three versions: 3kW, 5kW and 10kW.
Alternatively, you can use a 1:1 balun of your choice or make a coax cable RF choke (see instructions at the end of the manual).

A 1:1 balun must be connected to the phase lines (**element "D")** as shown in the picture below. The balun can be fixed to the phase lines with tie wraps paying attenction not to deform the distance between the phase lines.

Remove one nut and one washer. Position ring terminals of the balun and one washer and secure with one nut.



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PROBLEMS AND SOLUTIONS

SWR significantly higher than indicated among "specifics"?

- Check the connections of the coaxial cable (connectors welding and cable continuity);
- Check the operation of the balun if present. Also its wires should not be longer than 5 cm.
- Check all measurements and spacing.

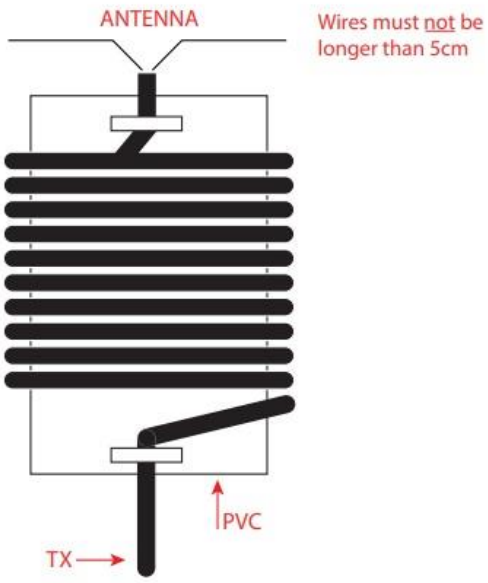
If no errors are found in the measurements, it is likely that your new Momobeam antenna has been mounted at an insufficient height (less than 10 meters) or it is possible that there is an interaction with other antennas or metallic objects (if they are less than 3 meters away).
If it is not possible to increase the distance between the antennas, try to rotate the interfering antenna 90°.

You might experience seizure when you tighten or loose some stainless steel parts. The seizure is mainly due to the chemical nature of the material that undergoes a sudden heating of surfaces due to friction during assembly. If this happens, a nut can become seized. If this happens, it is necessary to force the tightening until the bolt breaks and then proceed with its replacement.
It is strongly recommended that you lubricate stainless steel bolts before tightening it to prevent seazure.

In case of strong winds, please place the antenna so that the boom faces the wind. This way you will avoid excessive stress on the antenna elements.

HOW TO MAKE A RF CHOKE

RF-Choke is made of coaxial cable like the one shown below (10 coils of good quality RG213 cable wound on a 100/120 mm diameter support). The coils must not overlap. If you will make yourself an RF choke, make sure that the wires that connect to the antenna are not longer than 5cm. Less is more



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