NOKIA

Outdoor Unit Installation

C33513.85--H0

Contents

Summary of changes

Document	Date	Comment
C33513008SE_00	5 Mar 1999	
C33513008SE_A0	11 Jun 1999	Instructions updated
C33513008SE_B0	25 Oct 1999	Snap-on mounting for large antennas, waveguide adapter for separate antennas
DN99590352 Issue 1-0 en	29 Dec 1999	New document numbering scheme adopted
DN99590352 Issue 2-0 en	14 Jan 2000	1-antenna HSB
DN99590352 Issue 5-0 en	16 Jun 2000	20 cm antenna
DN99590352 Issue 6-0 en	31 May 2001	Updated, mounting adapter plate added
DN99590352 Issue 7-0 en	30 Apr 2002	7 and 8 GHz added
DN99590352 Issue 8-0 en	31 Jan 2003	Added information about dual polarised antennas Added Appendix A: information about roof and wall mounting kits

1 About this document

This document describes the installation of the Nokia FlexiHopper microwave radio outdoor unit (OU).

The document covers the following topics:

- precautions when installing the Nokia FlexiHopper OU
- tools and work order of the installation
- installing the outdoor unit, antenna, and alignment unit
- installing the equipment for 1-antenna hot standby
- connecting interfaces
- aligning the antenna.

The Nokia FlexiHopper outdoor unit can be used with different indoor units. The instructions in this document apply irrespective of the indoor unit used.

Refer to the *Installation Overview* part of this manual for general work order and precautions when installing Nokia microwave radios. Refer to the model-specific *Indoor Unit Installation* part when installing microwave radio indoor units.

2 Precautions

This chapter describes the issues you must take into account before installing the outdoor unit. Familiarise yourself thoroughly with the installation instructions before starting the installation.

2.1 Warnings and cautions

Microwave radiation

The radiation emitted by the antenna is low-power radiation and does not exceed the safety regulations. If the radio is operated without the antenna, the safety limit is exceeded near the waveguide openings.

WARNING

Do not look into an open waveguide while the equipment is operating, as damage to the eye may result. The safety distance is 25 cm (0.1 mW/cm^2).

Electrical safety

Caution

Never connect or disconnect the Flexbus cable when the power is on. Damage to the equipment may result.

2.2 Precautions

Before starting the installation, verify that you have the correct equipment (correct outdoor unit frequency and subband, correct antenna) and that the equipment has not been damaged during transport.

Note also the following prerequisites for installation:

- Transmission and installation have been planned.
- The far-end radio is installed or the installation space for the far-end radio has been planned.
- If it is likely that moisture will condense in the outdoor unit, do not leave it outdoors without power.

2.3 Installation restrictions

The following restrictions must be considered before installing the outdoor unit:

- The maximum and minimum temperatures at the installation location must remain in the range given in the technical specifications.
- The integrated antenna can be aligned ±45° in a vertical direction and ±360° in a horizontal direction (fine adjustment ±15°).
- The mounting pole structure must be stable enough to keep the antenna within its 3 dB beamwidth in all foreseeable wind conditions.
- Do not install the outdoor unit at a location where an unauthorised person can have access to the antenna radiation region (which may result in traffic interrupts) or to the equipment itself to vandalise it.
- When the outdoor unit is installed in regions where the temperature falls below zero during the winter, ice can accumulate on installation tower structures. Take precautions to avoid the breakage of antennas due to falling ice. Suitable protection can be accomplished, for example, by installing a metal grating above the antenna.

3 Work order

This chapter lists the required parts and tools and gives the suggested work order for the installation of the Nokia FlexiHopper outdoor unit.

3.1 Parts

The following parts are needed in the normal installation of the Nokia FlexiHopper outdoor unit:

- outdoor unit
- antenna
- alignment unit
- Flexbus cable (RG-223 or RG-214) with a TNC connector (waterproof) and cable ties
- grounding wire.

If Nokia FlexiHopper is installed with a 20 cm square radome antenna, instead of the alignment unit, the following parts can be used:

- alignment bracket with fastener
- mounting adapter plate (in case installing the 20 cm square radome antenna to a pole with a diameter of 120-300 mm).

If Nokia FlexiHopper is installed with a 120 or 180 cm antenna, the antenna has its own alignment unit. In addition, a snap-on mounting is needed.

If Nokia FlexiHopper is installed with a separate antenna, the following additional parts are needed:

- mounting unit
- waveguide adapter
- waveguide.

Parts which are needed in the installation of the directional coupler for 1-antenna HSB protection are listed in Chapter 5.

The installation accessories for the outdoor unit are selected according to the installation method (roof, wall, or tower):

- Roof-mounting kit: a part list and installation instructions are delivered with the mounting kit.
- Wall-mounting kit: a part list and installation instructions are delivered with the mounting kit.
- Tower installation: because the structure of a tower determines the composition of any installation kit, the outdoor unit has no specific accessories for tower installation. If a vertical installation pole is used, it must have a diameter of:
  - 50 - 125 mm (20, 30, or 60 cm antenna)
  - 115 mm (120 or 180 cm antenna)
  - 30 - 120 mm (38 GHz 20 cm antenna with alignment bracket).

  The installation poles for roof- or wall-mounting can be used in some cases.

3.2 Tools

The following tools and equipment are recommended to be at hand when installing the outdoor unit:

- two 13 mm fork or ring spanners (Two spanners are needed for locking the horizontal adjustment. In other tasks one spanner is enough.)
- 6 mm Allen key; for installing the integrated antenna, alignment bracket, snap-on mounting, or waveguide adapter
- 2, 4, or 5 mm Allen key; for changing the polarisation of the antenna, fixing the fastener to the alignment bracket (5 mm)
- torque spanner (*optional*)
- documents on installation planning: installation height, direction, vertical adjustment, and polarisation of the antenna
- compass, binoculars, map; to aid in antenna alignment, if there is no direct visual contact with the station at the other end of the hop
- DC voltage meter and cables with a BNC connector (male); for antenna alignment monitoring (AGC)

- rope, pulley and/or other hoisting equipment; for lifting the OU onto the mast
- protective clothing, helmet.

If the alignment bracket for a 20 cm square radome antenna is used, two 10 mm fork spanners are needed in the alignment.

If a separate antenna is used, the following tools are needed:

- 17, 19, 24, and/or 30 mm fork or ring spanner; for installing 120 and 180 cm antenna
- 2.5 or 3 mm Allen key; for fixing the waveguide.

3.3 Task list

Plan the work in advance.

The following order is recommended for the installation of the Nokia FlexiHopper outdoor unit (see Figure 1):

1. Install the vertical installation pole (*if applicable*).
2. Install the alignment unit, antenna, and outdoor unit.
3. Pre-align the antenna.
4. Connect the grounding wire to the outdoor unit.
5. Connect the Flexbus cable to the outdoor unit.

Prepare the cabling beforehand so that the cables can be connected to the outdoor unit immediately after it has been installed.

The installation of the alignment unit, antenna, and outdoor unit can be performed in several ways:

- Option a.
  - The antenna is mounted on the alignment unit and this combination is mounted on the installation pole.
  - The outdoor unit is mounted on the alignment unit.

- Option b.
  - The alignment unit is mounted on the installation pole.
  - The antenna is mounted on the alignment unit.
  - The outdoor unit is mounted on the alignment unit.
- Option c.
  - The antenna is mounted on the alignment unit.
  - The outdoor unit is mounted on the alignment unit.
  - The alignment unit (with the antenna and the outdoor unit) is mounted on the installation pole.

These instructions detail option b). Other options may be carried out using similar procedures. The best option depends on the size of the antenna. When using the integrated 30 cm antenna, it is advisable to follow the order in option c). When using the 60 cm antenna, the order in option b) is usually the most suitable.

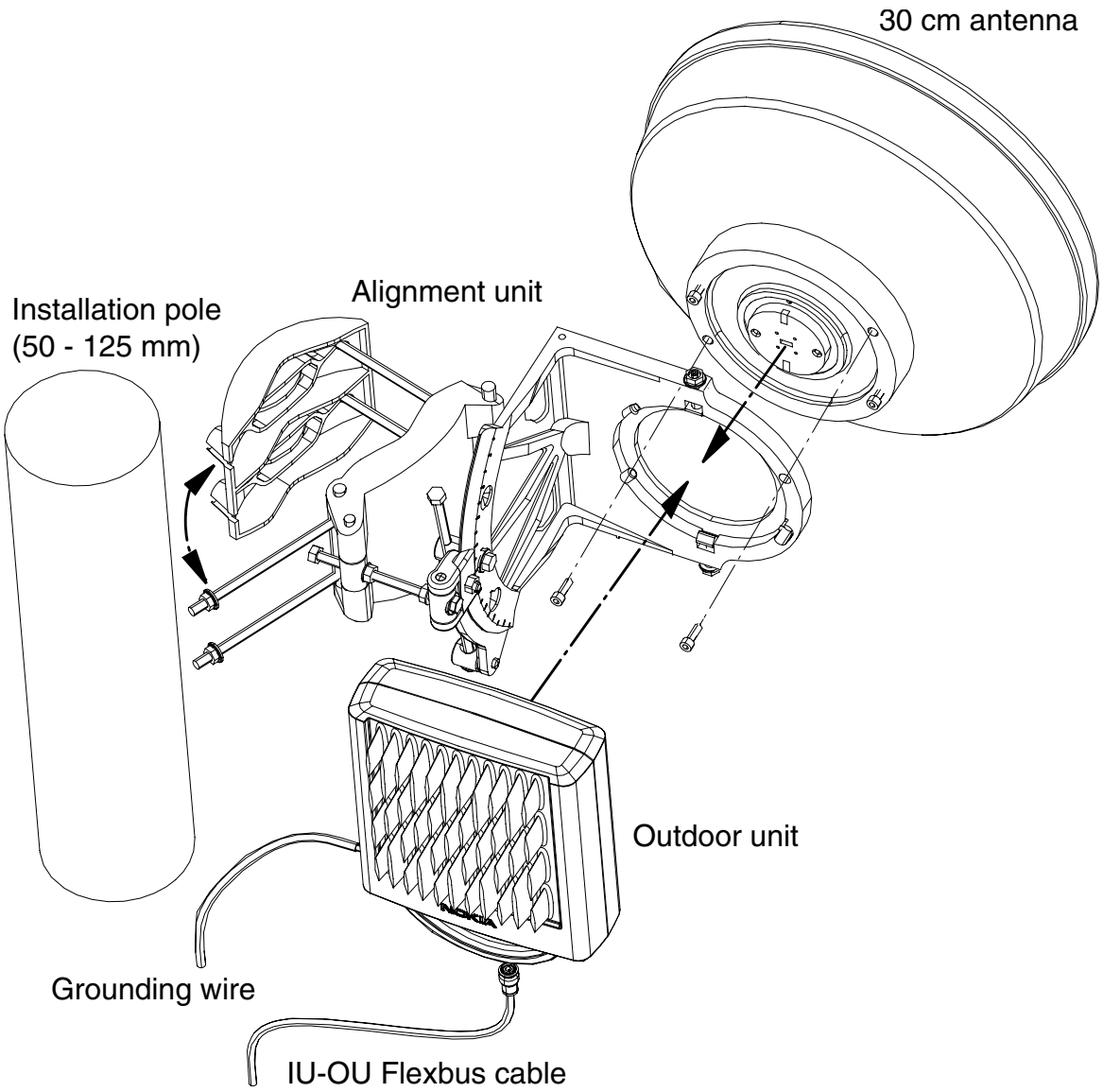

Figure 1. Installing the outdoor unit with the integrated alignment unit

4 Installing the outdoor unit and antenna

This chapter describes how to install and uninstall the Nokia FlexiHopper outdoor unit and antenna. The chapter covers the installation of:

- the integrated alignment unit
- the integrated 20, 30, or 60 cm antenna
- the outdoor unit
- the alignment bracket for the 20 cm square radome antenna
- a 120 or 180 cm antenna
- a separate antenna

and the removal of the outdoor unit or antenna.

4.1 Alignment unit

The integrated alignment unit is designed for parabolic antennas of 30 and 60 cm and square radome antennas of 20 cm. It can be installed onto poles of 50 - 125 mm diameter.

The alignment unit can be installed onto either side of the pole simply by turning the alignment unit around; no change of parts is needed. In normal use there is no need to handle loose parts that might drop during the installation process.

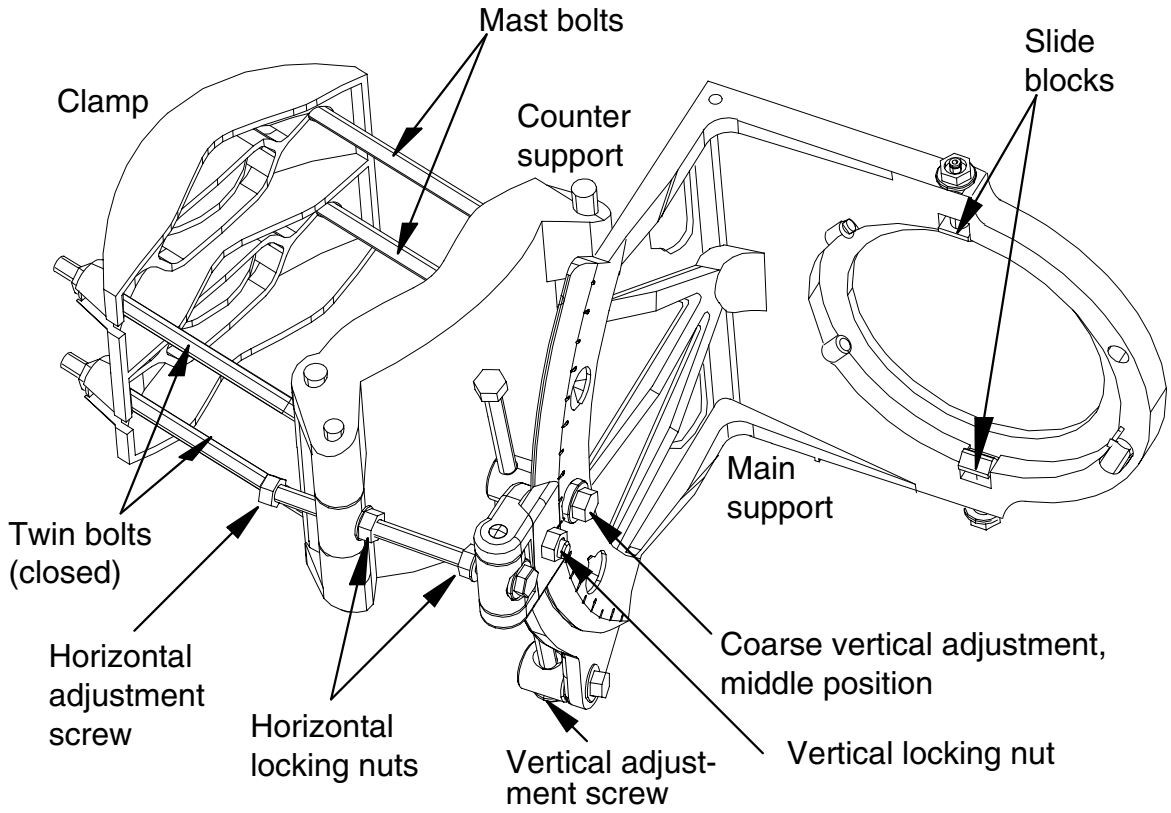

Figure 2. Nokia FlexiHopper integrated alignment unit

Mounting the alignment unit on a pole

To mount the alignment unit on a pole:

1. Turn the horizontal adjustment screw clockwise, so that the installation pole fits behind the clamp.
2. Open the M8 nuts of the mast bolts and swing open the twin bolts (see Figure 3).
3. Push the alignment unit into its place, so that the installation pole settles between the clamp and the counter support.
4. Close the twin bolts and tighten the nuts using a 13 mm spanner.

Before the final tightening, turn the horizontal adjustment screw to the centre position and turn the whole alignment unit towards the far-end station. Aim along the side surface of the main support, for example. Tighten the nuts to a torque of 25 Nm.

5. If the vertical deviation to the far-end station is more than 20°, change the position of the coarse vertical adjustment bolt of the main support to the upper or lower position, depending on the direction of the deviation. Do this already before installing the alignment unit, if the deviation is known.

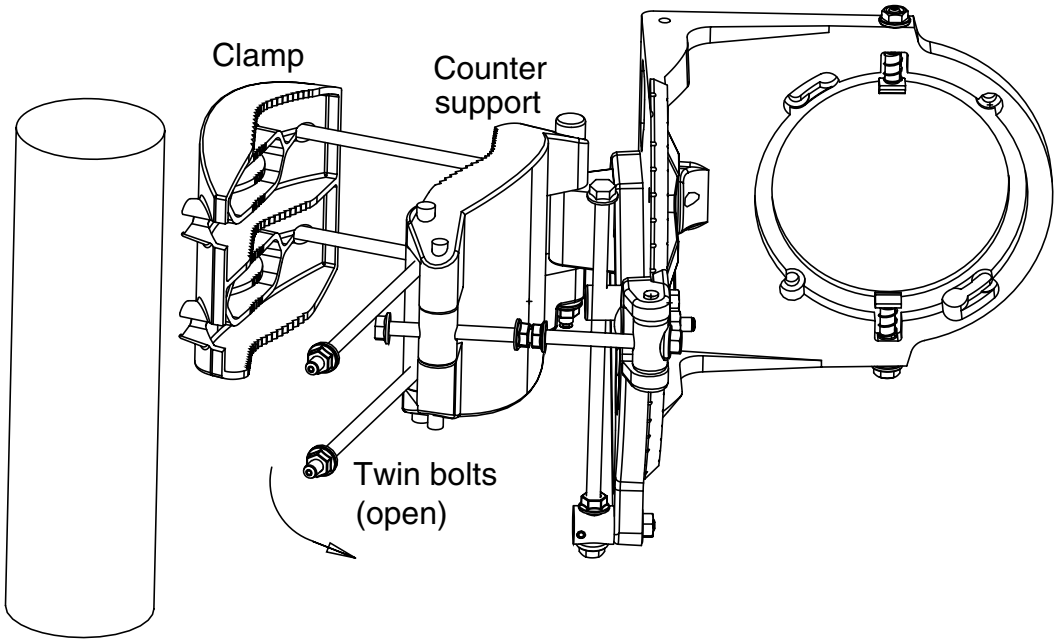

Figure 3. Mounting the alignment unit on a pole

4.2 Antenna

Note

The antenna is installed with the water holes facing down (possible plug must be removed).

Changing antenna polarisation

Choose the right polarisation by turning the antenna feeder (see Figures 4 and 5). The feeder is fixed with four screws. The screw type depends on the antenna manufacturer:

- 20 cm Precision antenna: Take off the screws using a 2 mm Allen key. Turn the feeder plate 90°. Put the screws back and tighten them.
- 30, 60, 120, and 180 cm Precision antenna: Take off the screws using a 5 mm Allen key. Turn the feeder plate 90°. Put the screws back and tighten them.
- 30, 60, 120, and 180 cm 13-38 GHz Andrew antenna: Loosen the screws slightly using a 4 mm Allen key. Turn the feeder plate 90°. Tighten the screws.
- 60, 120, and 180 cm 7-8 GHz Andrew antenna: Loosen the four screws with 5 mm Allen key. Take off the hub. Loosen the three screws slightly with a 3 mm Allen key. Turn the feeder 90°. Tighten the screws and replace the hub. Note the guide hole direction.

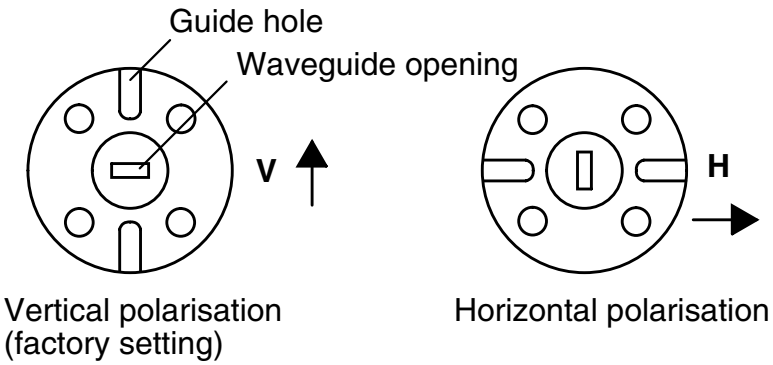

Figure 4. Antenna feeder in vertical and horizontal polarisation

Mounting the antenna on the alignment unit

To mount the integrated antenna on the alignment unit:

1. Put two M8 Allen screws (out of the total of four) into the holes on the antenna flange (upper left and lower right holes); turn only a few turns.
2. Lift the antenna into place; with the screws through the widened holes in the alignment unit (see Figure 5). Turn the antenna counter-clockwise. The waveguide has to be vertical or horizontal and the antenna water hole has to face down.
3. Add the two remaining M8 screws and tighten all four screws with a 6 mm Allen key. The torque is 8 Nm.

4. If the antenna feeder is protected with a cover or tape, remove the cover or tape.

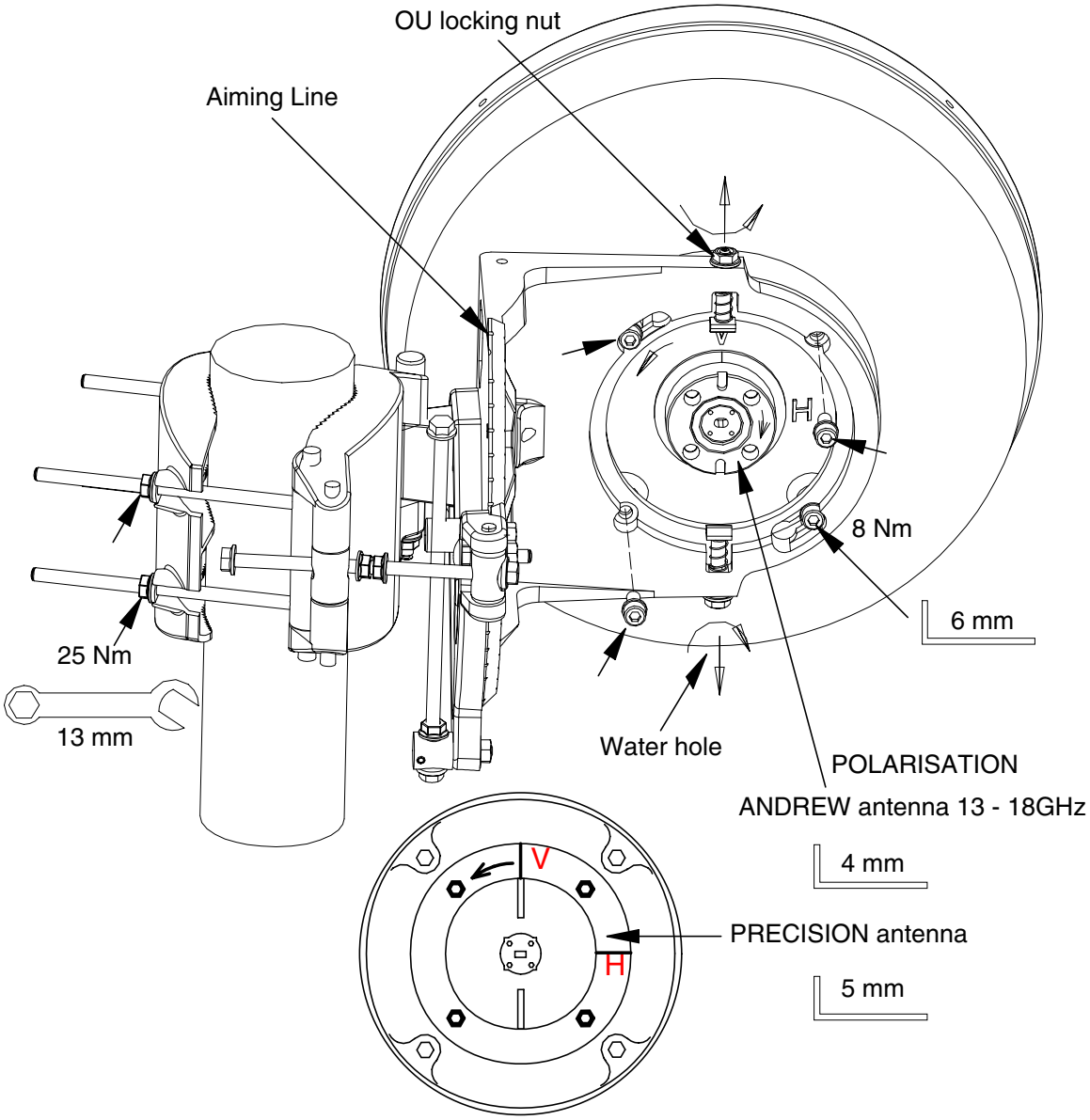

Figure 5. Installing the antenna

4.3 Outdoor unit

Mounting the outdoor unit

To mount the outdoor unit on the alignment unit:

1. Remove the protective rubber cap from the waveguide flange of the outdoor unit. Put the cap away onto the circular ledge beside the flange. Do not peel off or damage the foil covering the waveguide opening.

   Check and clean, if necessary, the outdoor unit and the mounting ring of the alignment unit.

2. Unscrew the outdoor unit locking nuts (M8) out of the threads, so that the slide blocks can be drawn free from the screws (see Figure 5).

3. Push the lower edge of the V ring of the outdoor unit behind the slide block and push the upper edge so that it clicks behind the other slide block. Check that the (rectangular) outdoor unit guide pin fits into the corresponding antenna guide hole.

   - In vertical polarisation the handle and the connectors face down.
   - In horizontal polarisation the handle and the connectors face sideward, away from the installation pole.

4. Tighten both the OU locking nuts, first manually and then with a spanner (see Figure 6). The torque is 4 Nm.

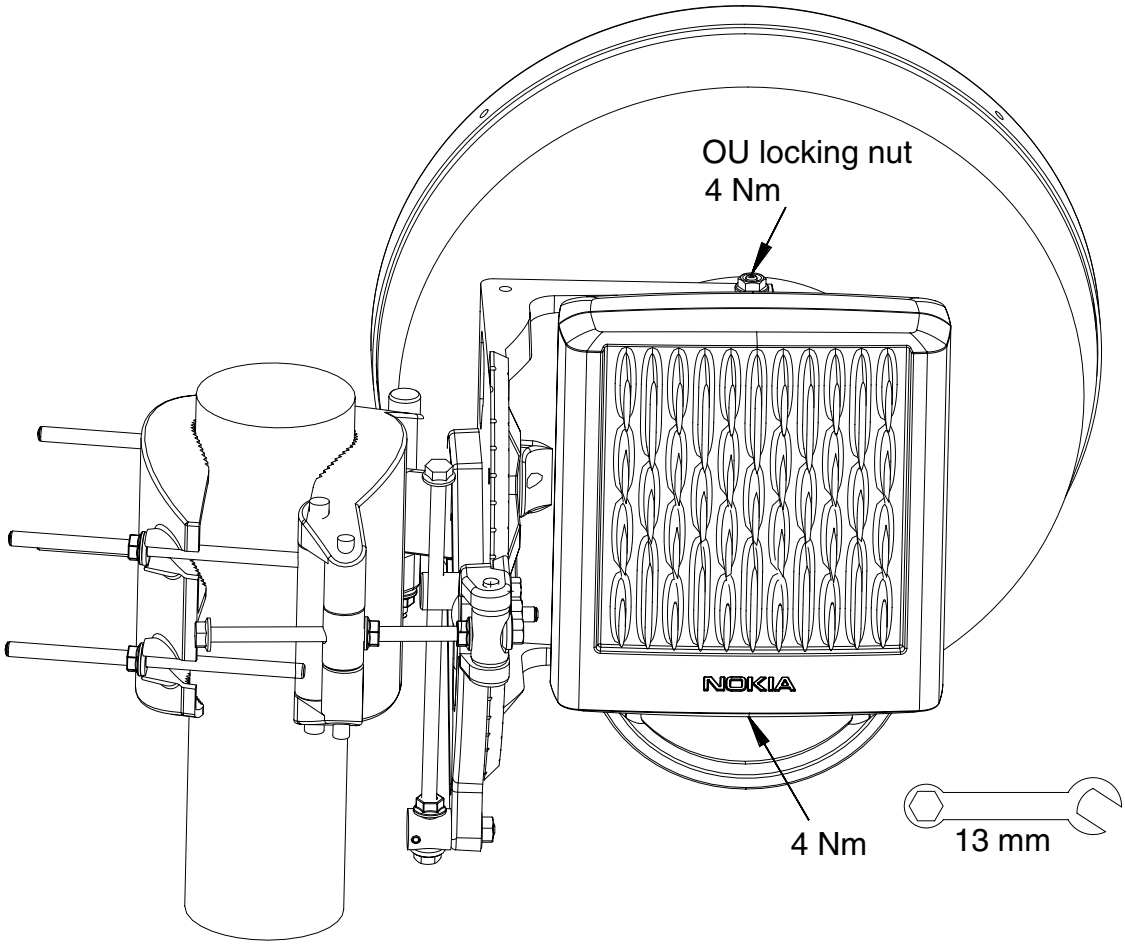

Figure 6. Mounting the outdoor unit on the alignment unit (vertical polarisation)

4.4 Alignment bracket for the 23 – 38 GHz 20 cm antenna

The 20 cm square radome antenna can be installed on the same alignment bracket that is used with Nokia MetroHopper. An additional fastener is used in this installation. The alignment bracket can be installed onto poles of 30 - 120 mm diameter and with a mounting adapter plate onto poles of 120 - 300 mm diameter.

Mounting the alignment bracket on a pole (with a diameter of 30 – 120 mm)

To mount the alignment bracket on a pole (see Figure 7):

1. Place the bracket and the clamp around the pole.
2. Turn the bracket roughly towards the far-end station. Note that there must be enough room for installing the fastener and the outdoor unit.
3. Tighten the mounting bolts with a 6 mm Allen key. The torque is 20 Nm.

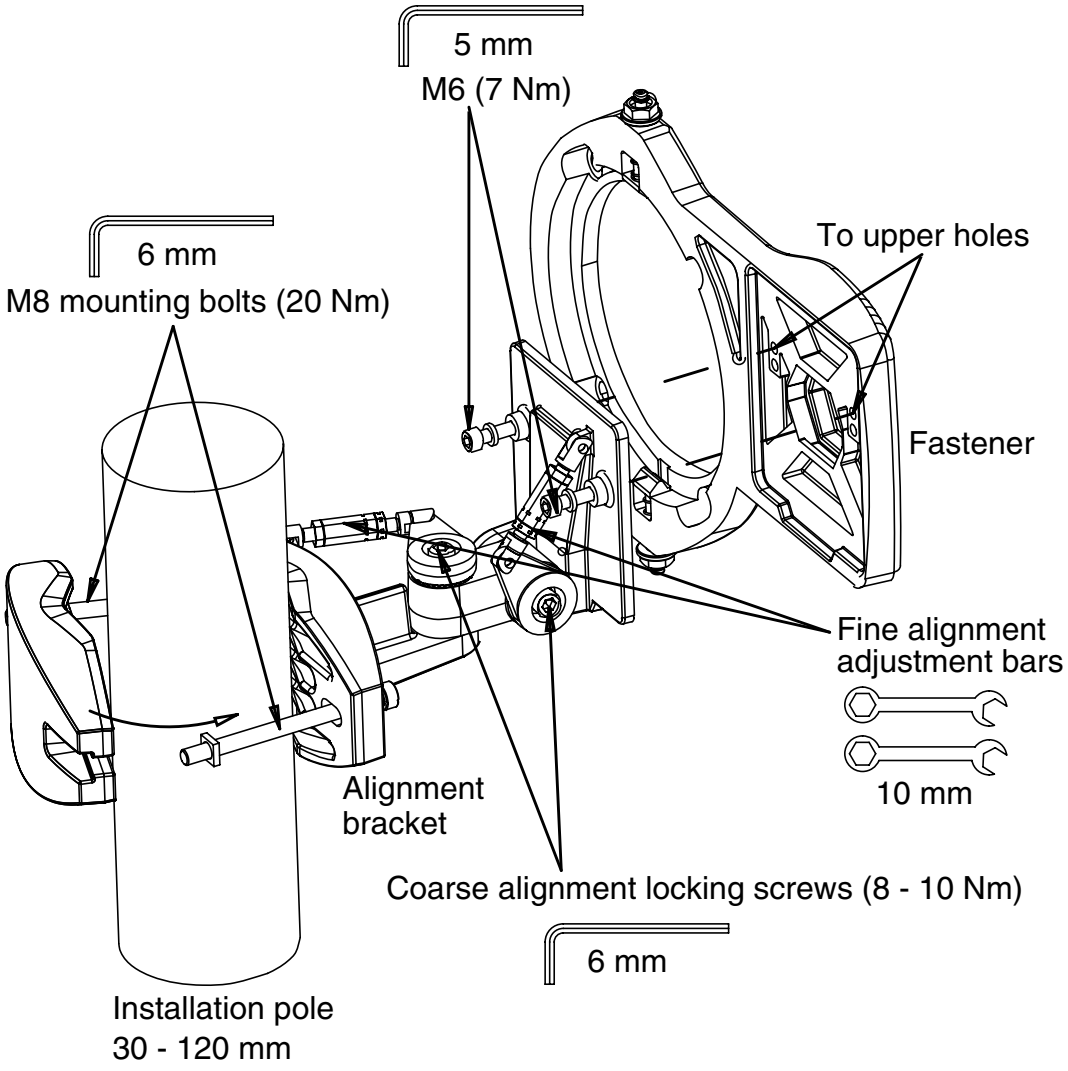

Figure 7. Installing the alignment bracket and the fastener

Fixing the fastener to the alignment bracket

The fastener can be mounted on either side of the pole. Install the alignment bracket accordingly (see Figures 7 and 8).

To fix the fastener to the alignment bracket:

1. Place the fastener on the alignment bracket.

2. Tighten the M6 screws with a 5 mm Allen key. The torque is 7 Nm.

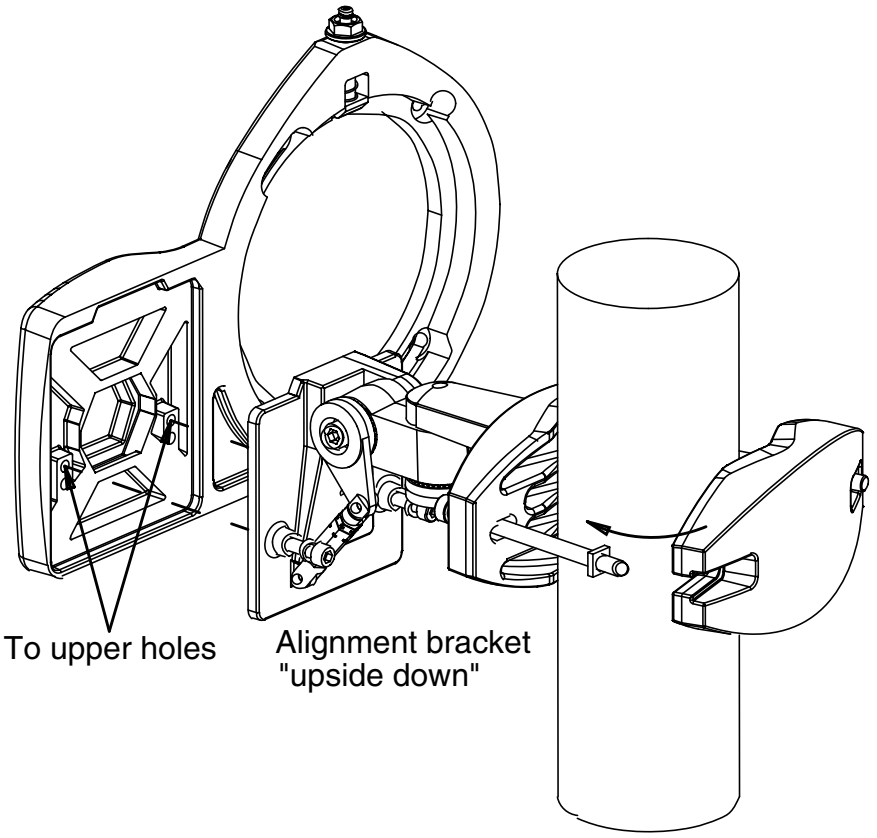

Figure 8. Mounting the alignment bracket and the fastener on the other side of the pole

Mounting the antenna on the fastener

The antenna is mounted on the fastener the same way as it is mounted on the alignment unit (see Section 4.2). Polarisation can be changed by turning the antenna feeder plate (see Section 4.2). The mounting of the 20 cm antenna on the fastener is shown in Figure 9.

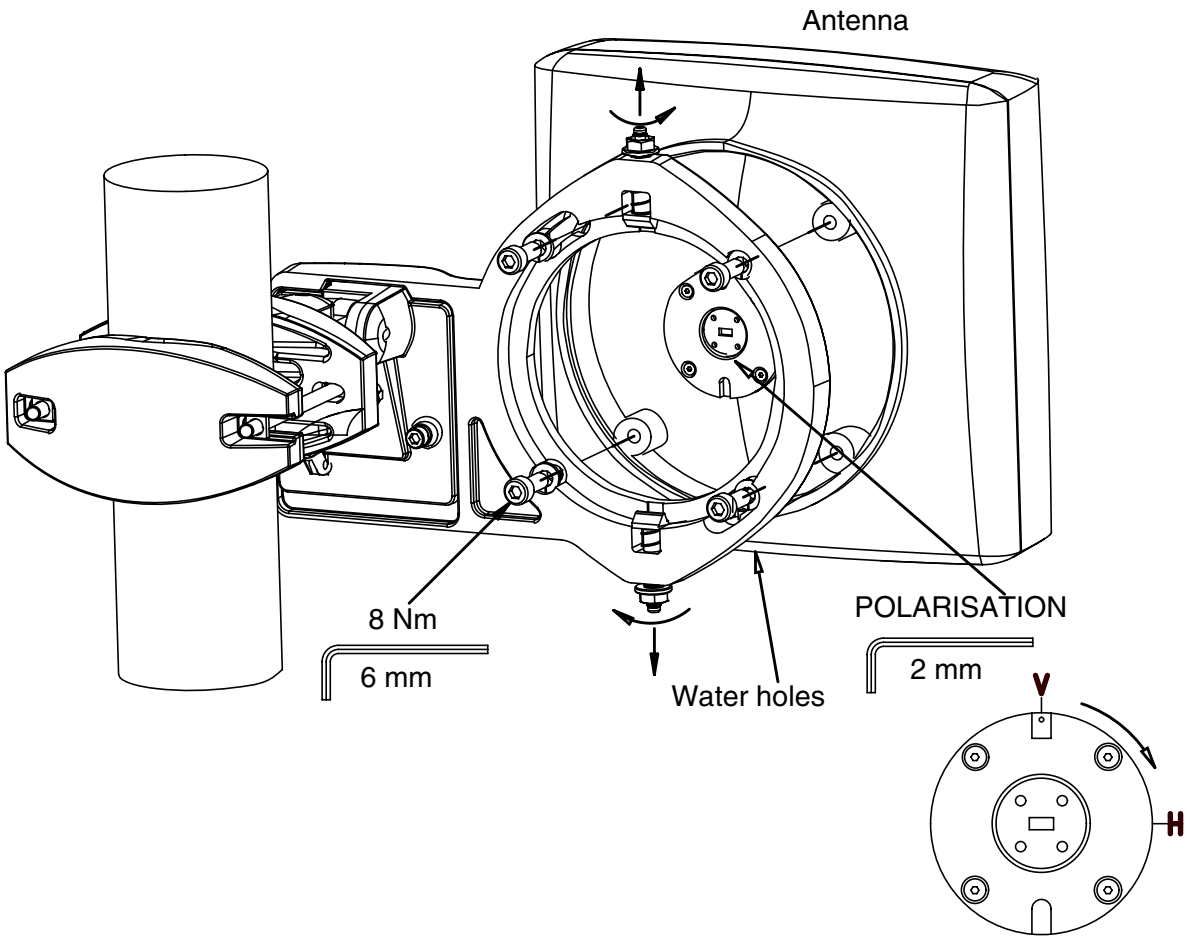

Figure 9. Mounting the 20 cm antenna on the fastener

Mounting the outdoor unit on the fastener

The outdoor unit is mounted on the fastener in the same way as it is mounted on the alignment unit (see Section 4.3). The mounting is shown in Figure 10.

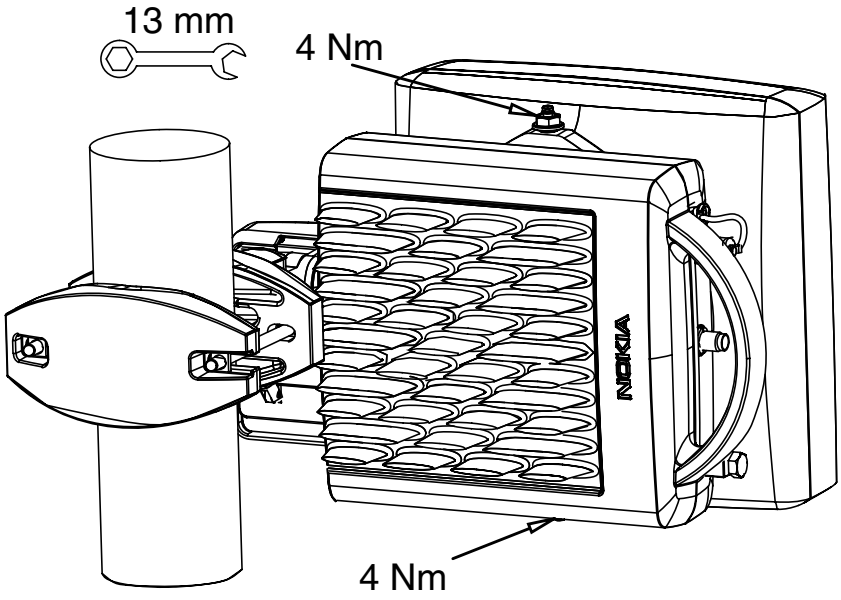

Figure 10. Mounting the outdoor unit on the fastener (horizontal polarisation)

4.5 120 cm and 180 cm antennas

Large antennas are mounted on the antenna manufacturers' own alignment units. The outdoor unit can be fitted to these antennas without a flexible waveguide using a snap-on mounting.

Note

The antenna is installed with the water holes facing down (possible plugs must be removed).

Changing antenna polarisation

The polarisation of the 120 and 180 cm antennas is changed in the same way as the polarisation of the 30 cm and 60 cm antennas (see Section 4.2).

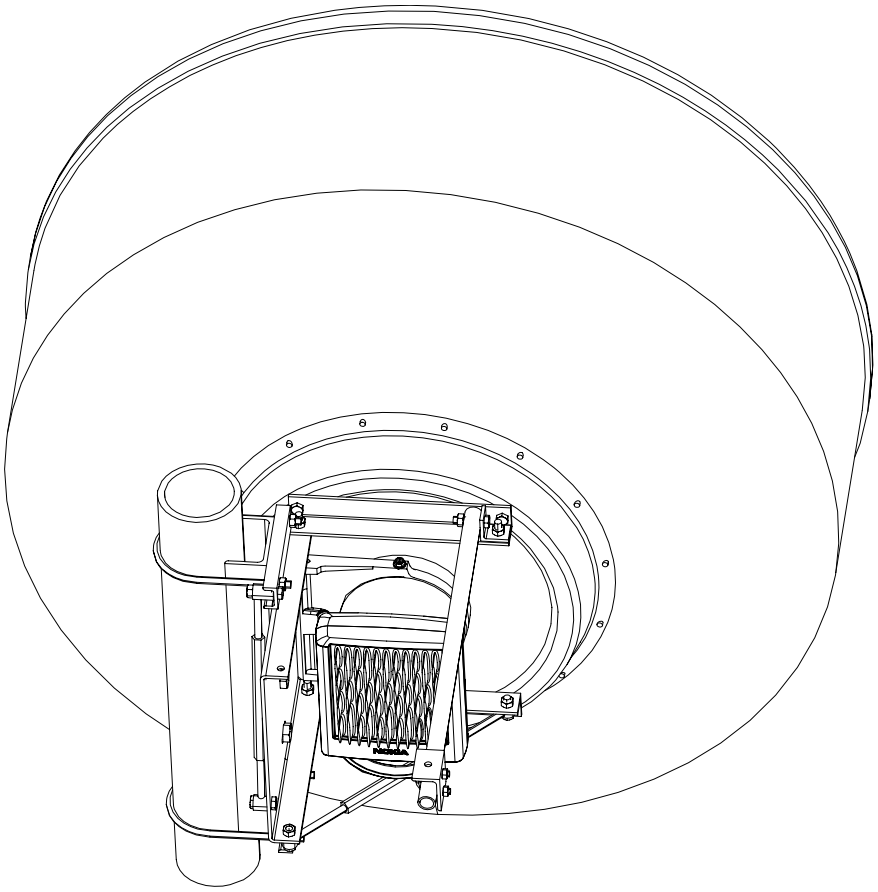

Figure 11. Nokia FlexiHopper 7, 8, 13 or 15 with a 120 cm antenna

Fixing the snap-on mounting to the antenna

To fix the snap-on mounting to a large antenna (see Figure 12):

1. Put two M8 Allen screws (out of the total of four) into holes on the antenna flange (upper left and lower right holes); turn only a few turns.

2. Put the snap-on mounting into place; with the screws through the widened holes in the mounting. Turn the mounting clockwise.

3. Add the two remaining M8 screws and tighten all four screws with a 6 mm Allen key. The torque is 8 Nm.

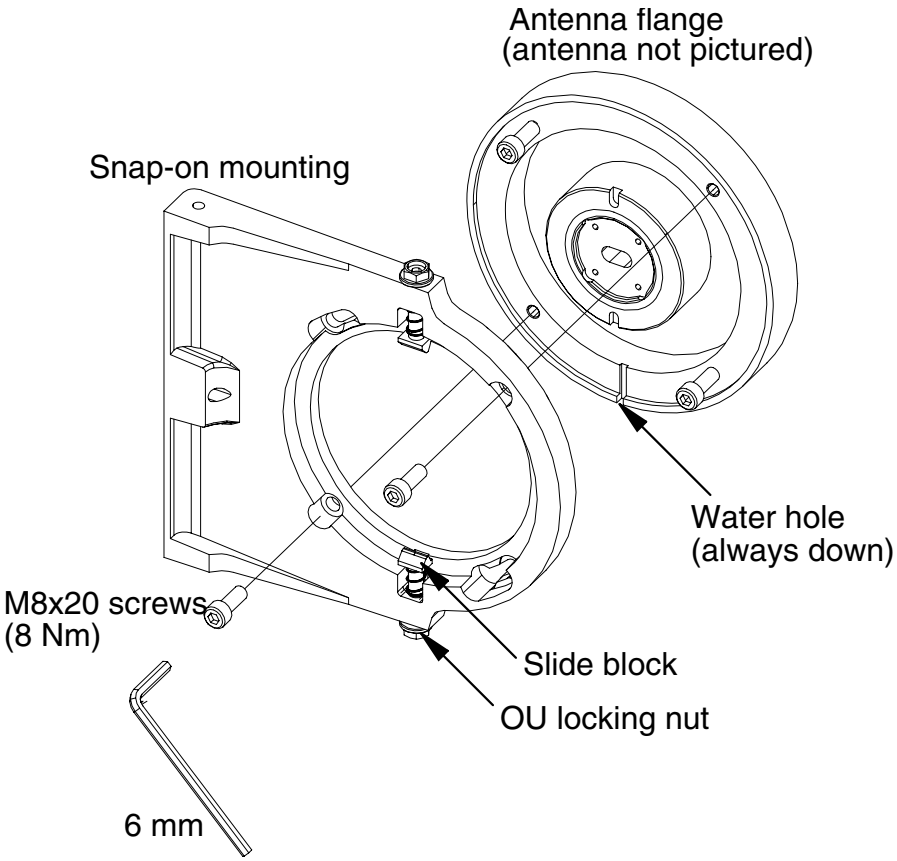

Figure 12. Fixing the snap-on mounting to a large antenna

Mounting the outdoor unit

The outdoor unit is mounted on the snap-on mounting in the same way as it is mounted on the alignment unit (see Section 4.3).

4.6 Separate antennas

It is also possible to use an antenna that is separate from the outdoor unit. The outdoor unit and the antenna are connected by a flexible waveguide or an elliptical waveguide.

Large antennas (larger than 60cm) are mounted on the antenna manufacturer's own alignment units. Small antennas (20, 30 and 60 cm) are mounted on the Nokia FlexiHopper alignment unit.

The outdoor unit is mounted on its own mounting unit (or alignment unit) and the waveguide is connected to it with an adapter. The mounting unit is a simplified version of the Nokia FlexiHopper alignment unit.

The antenna feeder has threaded holes for the installation of the waveguide with screws.

When used with a separate antenna, the Nokia FlexiHopper outdoor unit is always installed with the handle facing down.

Note

The waveguide adapter is always installed with the guide hole facing up and the water hole facing down.

Polarisation can be changed by turning the antenna feeder (see Section 4.2).

Dual polarised antennas

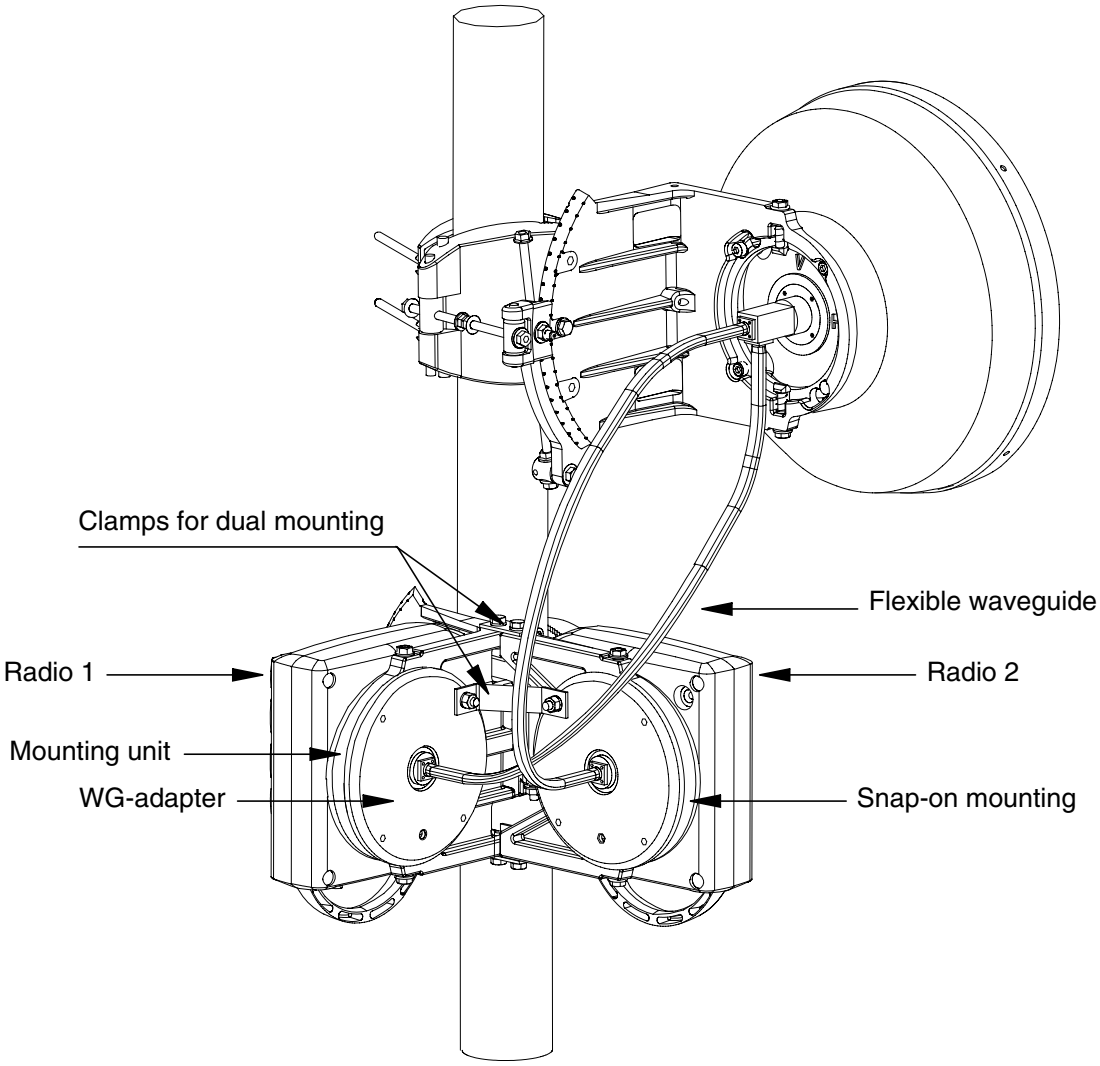

Figure 13. Dual polarised antennas

Dual polarised antenna has two waveguide flanges, one for vertical and one for horizontal polarisation.

Radios cannot be integrated directly on dual polarized antenna.

Both radios are connected with flexible waveguides to the antenna. Small dual polarised antennas (30/60cm) are installed on alignment unit in the same way as a single polarised antenna.

Both radios may have their own mounting units. With clamps for dual mounting,a snap-on-adapter can be installed on mounting unit and then only one mounting unit is needed for pole installation.

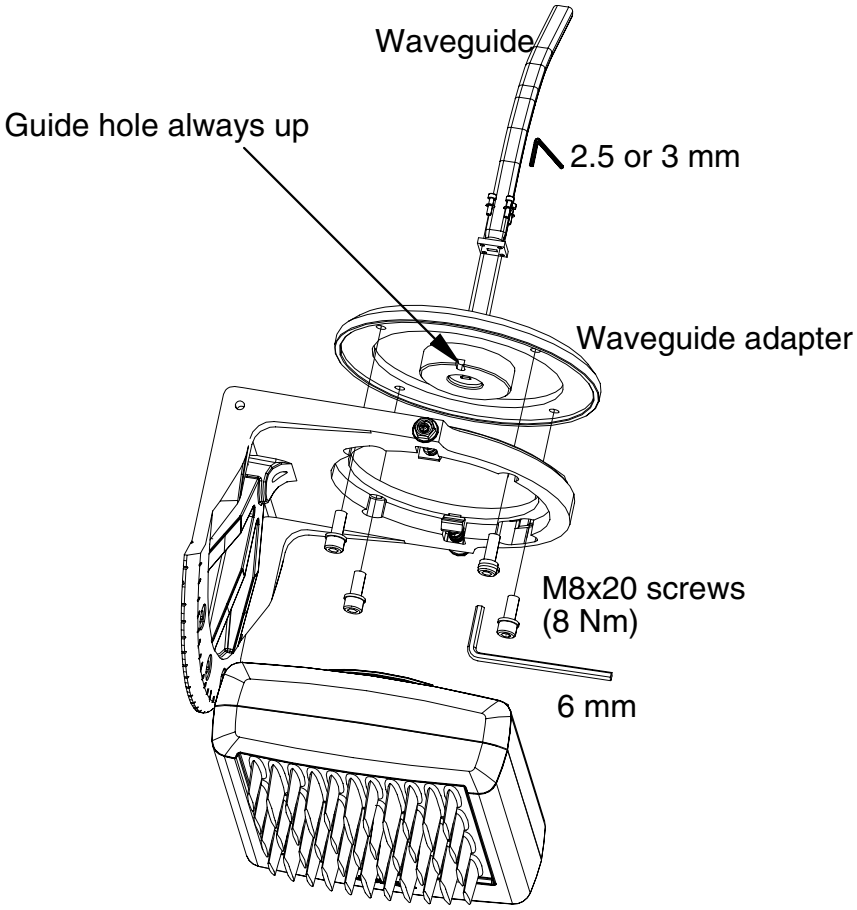

Figure 14. Installing the waveguide adapter

Fixing the waveguide adapter

To fix the waveguide adapter to the mounting unit (see Figure 14):

1. Put two M8 Allen screws (out of the total of four) into holes on the waveguide adapter (upper left and lower right holes); turn only a few turns.

2. Lift the waveguide adapter into place; with the screws through the widened holes in the mounting unit. Turn the adapter counter-clockwise.

3. Add the two remaining M8 screws and tighten all four screws with a 6 mm Allen key. The torque is 8 Nm.

Fixing the waveguide

Fix the waveguide to the adapter using four screws.

- On the 7 to 15 GHz waveguides, these screws are M4x16. Tighten the screws with a 3 mm Allen key. The torque is 2 Nm.
- On the 18 to 38 GHz waveguides, the screws are M3x12. Tighten the screws with a 2.5 mm Allen key. The torque is 1 Nm.

Fix the other end of the waveguide to the antenna in the same way.

4.7 Removing the outdoor unit and antenna

Follow these instructions if the outdoor unit or the antenna is to be removed or replaced.

Caution

Switch the OU power supply off (with the node manager) before removing the outdoor unit.

Removing the outdoor unit

To remove the outdoor unit:

1. Disconnect the Flexbus cable (see Figure 19).
2. Disconnect the grounding connector (see Figure 19).
3. Open the locking nuts of the outdoor unit (see Figure 5).
4. Lift the upper slide block, twist the outdoor unit backwards and detach it from the alignment unit.

5. Put the protective rubber cap back on the waveguide flange of the outdoor unit.

Note

The outdoor unit must be removed before the antenna can be removed.

Removing the 20, 30, or 60 cm antenna

To remove the integrated antenna (see Figure 5):

1. Unscrew and remove the two antenna mounting screws (upper right and lower left).
2. Unscrew the two remaining screws in the grooves a couple of turns.
3. Turn the antenna around its axis slightly so that the heads of the screws fit into the openings in the grooves.
4. Pull the antenna free of the alignment unit (or the fastener).
5. Protect the antenna feeder with a cover or tape to prevent dirt from getting in the waveguide.

5 Installing the equipment for 1-antenna HSB

This chapter describes how to install the directional coupler for hot standby (HSB) protection with one antenna. Each frequency band has its own coupler, but some couplers share similar construction. There are two installation procedures, one for the 7, 8, 13, and 15 GHz couplers and one for the 18 - 38 GHz couplers.

5.1 Installing 1-antenna HSB for the 7-15 GHz radios

5.1.1 Parts

In addition to two Nokia FlexiHopper radios and their cabling, the following parts are needed in this installation:

- coupler (including mounting unit)
- waveguide (flexible or elliptical)
- antenna
- alignment unit.

  If a 20, 30 or 60 cm antenna is used, the antenna is mounted on the Nokia FlexiHopper alignment unit 30/60. If a 120 or 180 cm antenna is used, the antenna is mounted on the antenna manufacturer's own alignment unit.

5.1.2 Installation

The coupler assembly is installed on a pole. The antenna is mounted on a separate alignment unit and the coupler is connected to the antenna with a waveguide. The outdoor units are mounted on the coupler.

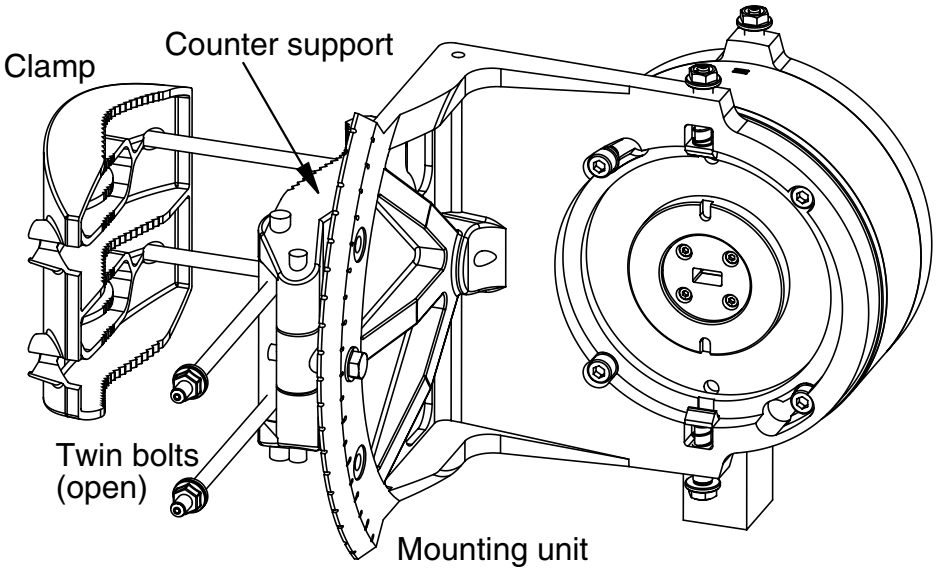

Figure 15. Coupler for the 7-15 GHz radio

Installing the coupler

To install the coupler assembly for the 7-15 GHz radios on a pole (see Figures 15 and 16):

1. Open the M8 nuts of the mast bolts and swing open the twin bolts.

2. Push the mounting unit into place, so that the installation pole settles between the clamp and the counter support.

3. Close the twin bolts and tighten the nuts using a 13 mm spanner. The torque is 20 Nm.

Installing the antenna

If a 20, 30 or 60 cm antenna is used, install the antenna and the alignment unit as described in Sections 4.1 and 4.2. If a 120 or 180 cm antenna is used, follow the instructions that come with the antenna package. Polarisation can be changed by turning the antenna feeder (see Section 4.2).

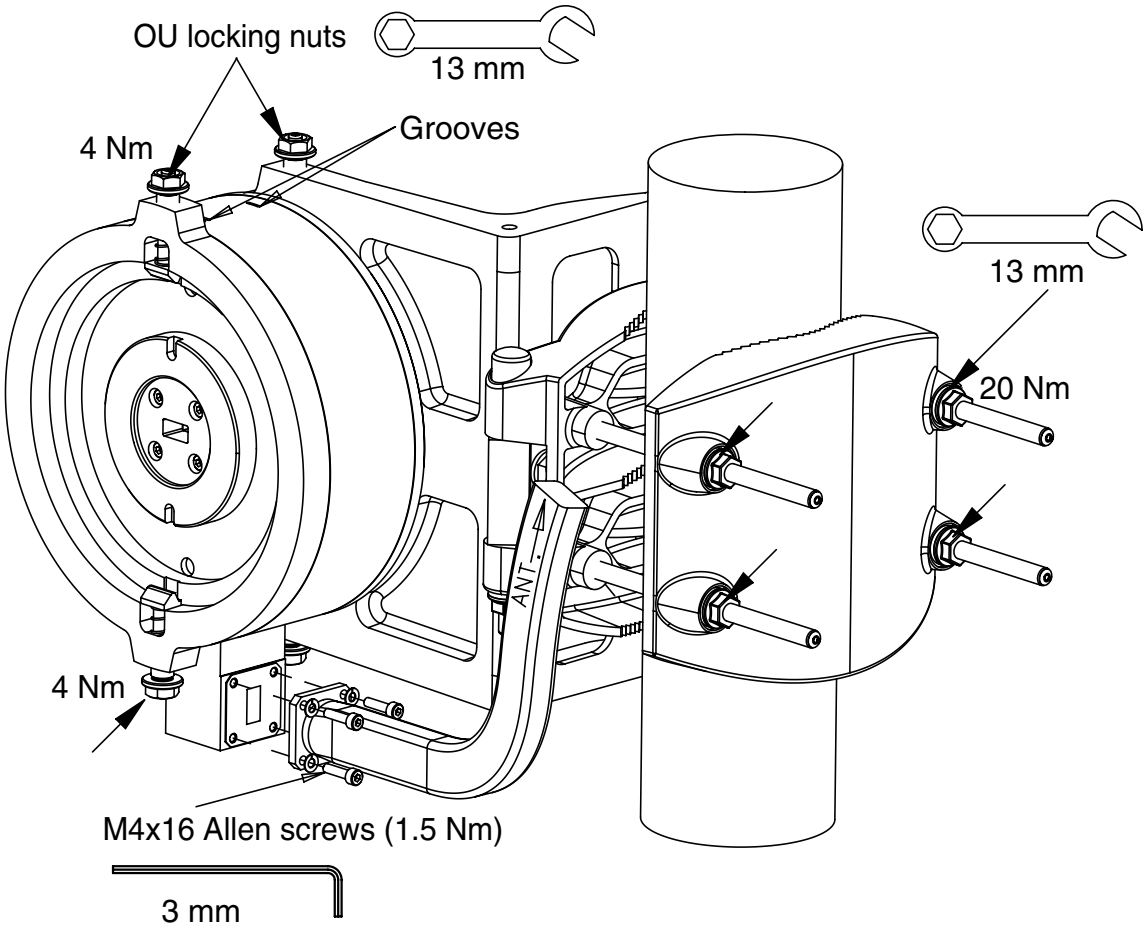

Figure 16. Installing the 7-15 GHz coupler

Fixing the waveguide

Remove the protective tapes from the waveguide flanges of the coupler. Do not peel off or damage the foil covering the waveguide opening. Fix the waveguide to the coupler with four M4x16 Allen screws (see Figure 16). Tighten the screws with a 3 mm Allen key. The torque is 1.5 Nm.

Fix the other end of the waveguide to the antenna in the same way. Use a gasket between the flanges.

Mounting the outdoor units on the coupler

Mount the outdoor units on the coupler in the same way as they are mounted on the alignment unit (see Section 4.3). In this case, the handles always face down.

The coupler input with the lower insertion loss from the radio to the antenna is marked with one groove (I) on the top of the coupler (the side closer to the pole, see Figure 16). The coupler input with the higher insertion loss is marked with two grooves (II) on the top of the coupler. See *Product Description* for the values of the insertion loss.

Note

Configure the radio connected to the coupler input with lower insertion loss (I) as the primary transmitter. See *Commissioning and Maintenance*.

5.2 Installing 1-antenna HSB for the 18 - 38 GHz radios

The mechanical structure of the coupler for the 18 - 26 GHz bands is shown in Figure 17. The coupler for the 38 GHz band has shorter side plates and a shorter flexible waveguide, but otherwise its mechanical structure is the same.

5.2.1 Parts

Two Nokia FlexiHopper radios and their cabling are always needed in this installation. The need for other parts depends on the antenna setup used.

If a 20, 30, or 60 cm antenna is used, the following parts are needed:

- coupler
- antenna
- alignment unit (T55050.01 is used in this case also for 20 cm square radome antenna).

If a 120 or 180 cm antenna is used, the following parts are needed:

- coupler
- snap-on mounting
- antenna (with its own alignment unit).

If a separate antenna is used, the following parts are needed:

- coupler
- mounting unit or alignment unit (for the coupler and the radios)
- antenna and alignment unit

- waveguide adapter
- waveguide (flexible or elliptical).

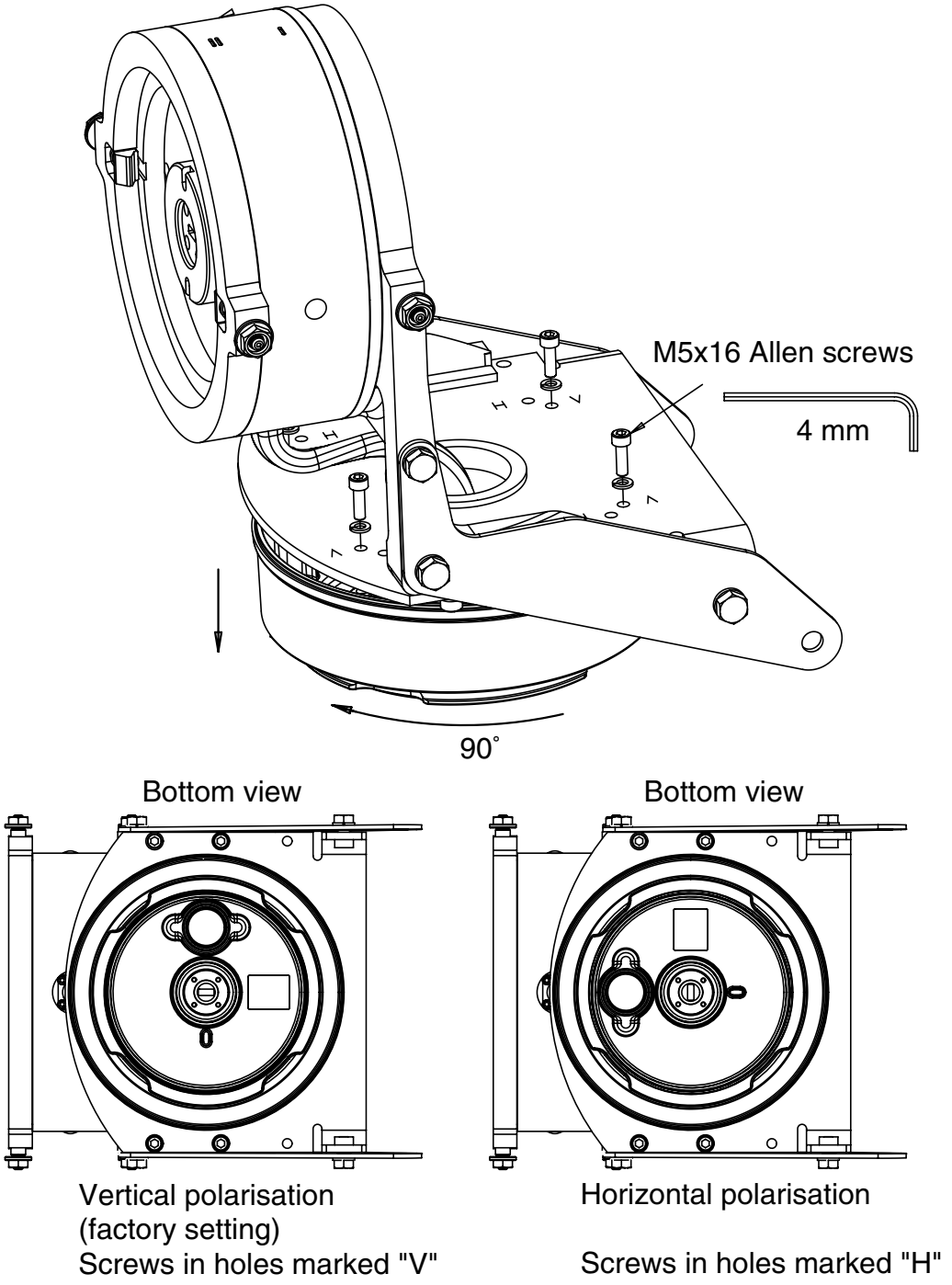

Figure 17. Changing the polarisation on the 18 - 38 GHz coupler

5.2.2 Installation

If a 20, 30 or 60 cm antenna is used, the alignment unit and the antenna are installed normally. The coupler is mounted on the alignment unit. The outdoor units are mounted on the coupler.

If a 120 or 180 cm antenna is used, the antenna is installed normally. The snap-on mounting is installed on the antenna. The coupler is mounted on the snap-on mounting. The outdoor units are mounted on the coupler.

Installing the 20, 30 or 60 cm antenna

Install the alignment unit and the antenna as described in Sections 4.1 and 4.2.

Changing the polarisation on the coupler

To change the polarisation on the coupler from vertical (factory setting) to horizontal (see Figure 17):

1. Take off the M5x16 screws (form the holes marked “V”) using a 4 mm Allen key.
2. Turn the collar 90° counter-clockwise.
3. Put the screws back (in the holes marked “H”) and tighten them.
4. Make sure that the polarisation of the antenna is changed correspondingly (see Section 4.2).

Mounting the coupler on the alignment unit

The coupler is mounted on the alignment unit in a similar way to the outdoor unit. Two additional M8x16 screws are used to secure the mounting.

The coupler can be installed on the alignment unit whether the alignment unit is on the right or the left side of the pole. Remove the water plug from the *lower* end of the coupler bushing.

To mount the coupler on the alignment unit (see Figure 18):

1. Remove the protective rubber cap from the waveguide flange of the coupler. Put the cap away onto the circular ledge beside the flange. Do not peel off or damage the foil covering the waveguide opening.

2. Unscrew the locking nuts (M8) on the alignment unit or the snap-on mounting out of the threads, so that the slide blocks can be drawn free from the screws.

3. Push the lower edge of the V ring of the coupler behind the slide block and push the upper edge so that it clicks behind the other slide block. Check that the (rectangular) guide pin fits into the corresponding antenna guide hole.

4. Tighten both locking nuts, first manually and then with a spanner. The torque is 4 Nm.

5. Fix the M8x16 screws, so that they go through the holes in the side plates of the coupler. Tighten the screws with a 13 mm spanner. The torque is 18 Nm.

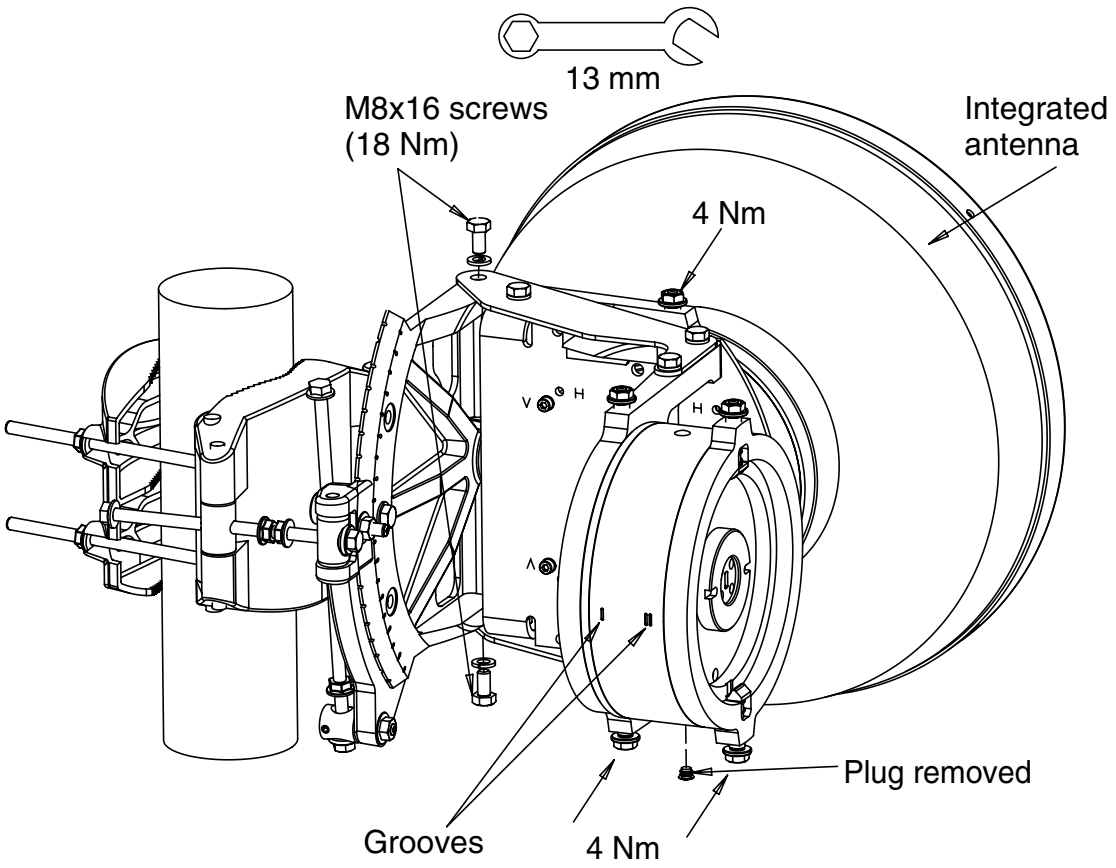

Figure 18. Mounting the 18 - 38 GHz coupler on the alignment unit

Mounting the outdoor units on the coupler

Mount the outdoor units on the coupler in the same way as they are mounted on the alignment unit (see Section 4.3). In this case, the handles always face backwards, in the opposite direction to the hop.

The coupler input with the lower insertion loss from the radio to the antenna is marked with one groove (I) on the coupler (the side closer to the pole, see Figure 18). The coupler input with the higher insertion loss is marked with two grooves (II) on the coupler. See *Product Description* for the values of the insertion loss.

Note

Configure the radio connected to the coupler input with lower insertion loss (I) as the primary transmitter. See *Commissioning and Maintenance*.

Mounting the coupler when a separate antenna is used

To mount the coupler when a separate antenna is used (refer to Section 4.6):

1. Mount the coupler on the mounting unit (or alignment unit) as described above.
2. Fix the waveguide adapter to the mounting unit (or alignment unit).
3. Fix the waveguide to the adapter and to the antenna.

6 Connecting interfaces

Two cables need to be connected to the Nokia FlexiHopper outdoor unit:

- a grounding wire
- the IU-OU Flexbus cable.

The AGC connector is used in antenna alignment (see Chapter 7).

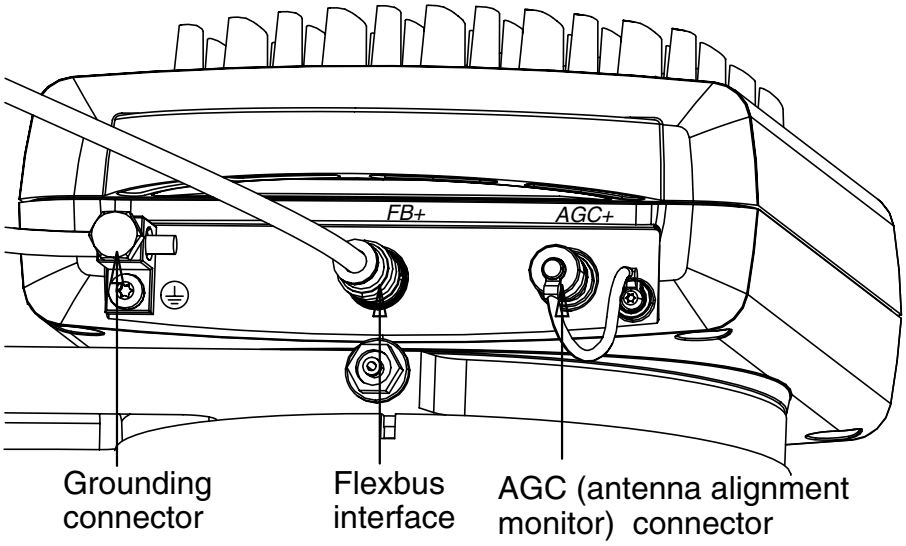

Figure 19. Connector panel of the Nokia FlexiHopper OU

6.1 Grounding

Grounding the outdoor unit

A 16 mm^2 grounding wire is used in grounding the outdoor unit.

To ground the outdoor unit:

1. Peel the tip of the grounding wire 15 mm.
2. Connect the grounding wire to the grounding clamp of the outdoor unit and tighten with a 13 mm spanner (4 Nm).

   If the grounding wire is furnished with a lug (hole greater than 6 mm), it can be mounted under the bolt head of the grounding connector. With a little more force the bolt can be taken off.
3. Connect the other end of the wire to the general grounding wire of the tower.

Caution

Make sure that general grounding of the tower is performed according to regulations issued by local authorities.

6.2 Flexbus cable

Caution

If the Flexbus cable is already connected to the indoor unit, make sure the Flexbus OU power supply is switched off before connecting the cable to the outdoor unit. The power can be switched off using the manager software.

Connecting the IU-OU Flexbus cable

The outdoor unit fits a clamp-type (water-tight) straight TNC connector, fitted into an RG-214 cable, for example. Cables and connector kits are available from Nokia.

To connect the Flexbus cable to the outdoor unit:

1. Connect the TNC connector (of the IU-OU Flexbus cable) to the outdoor unit. Tighten the connector manually (0.5 Nm).

2. Tie the cable to the installation pole with cable ties or with special holders (FIMO, for example).

   Leave enough slack to the cable so that the outdoor unit can be turned during the alignment.

Ground the sheath of the Flexbus cable between the indoor unit and the outdoor unit at approximately 50 m intervals. Ground the sheath also at the inlet to the equipment space. National regulations may require grounding every 20 m. Grounding kits are available from Nokia.

Note

When several Nokia FlexiHopper outdoor units are installed in the same pole (in a protected configuration, for example), we recommend that you label the IU-OU Flexbus cables to ensure that the cables are connected to the correct units.

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7 Aligning the antenna

This chapter describes the alignment of the 30 or 60 cm antenna with the integrated alignment unit and the alignment of the 20 cm square radome antenna with the alignment bracket. The antenna is pre-aligned during the installation and fine-aligned during the commissioning when both ends of the hop are transmitting.

7.1 Coarse alignment

Coarse alignment (pre-alignment) can be done already before the installation of the outdoor unit. Horizontal adjustment is carried out by turning the alignment unit around the pole. In case of 20 cm square radome antenna and alignment bracket, horizontal adjustment can also be done by adjusting the bracket. It is useful to know the deviation up or down from the horizontal level, so that the vertical adjustment of the alignment unit can be performed beforehand.

Integrated alignment unit

On the integrated alignment unit, vertical adjustment is set at the factory to the middle position. To set the vertical adjustment to +25° or -25°, loosen the vertical adjustment nuts (*V*) and take off the coarse vertical adjustment bolt (*V adj. bolt*). Turn the mounting plate +25° or -25° and reinstall the bolt (see Figure 20).

When the antenna is not installed, the far-end can be aimed along the side surface of the main support.

Alignment bracket

On the alignment bracket, the vertical coarse adjustment range is ±45° (in 10° steps). To set the vertical adjustment, loosen the coarse alignment locking screw with a 6 mm Allen key and turn the bracket. Vertical alignment can be adjusted in a similar way (±90°, in 10° steps, but note that there must be enough room for the fastener and the outdoor unit). Tighten the screws to a torque of 10 Nm before the fine alignment.

7.2 Fine alignment

The antenna is aligned after the transmit frequency has been checked or set (see the *Commissioning and Maintenance* part of this manual). The outdoor unit at the other end of the hop must be pre-aligned to this station and must be sending a signal on the correct frequency.

The antenna is aligned on the basis of the monitoring voltage (AGC), which is inversely proportional to the input level of the signal received from the radio hop and should be depict as Received Signal Strength Indicator (RSSI).

1
2
3

Aligning an antenna mounted on the integrated alignment unit

The fine horizontal adjustment range is ±15°. The fine vertical adjustment ranges are +45° to 0°, ±25°, or 0° to –45°, depending on the coarse vertical adjustment.

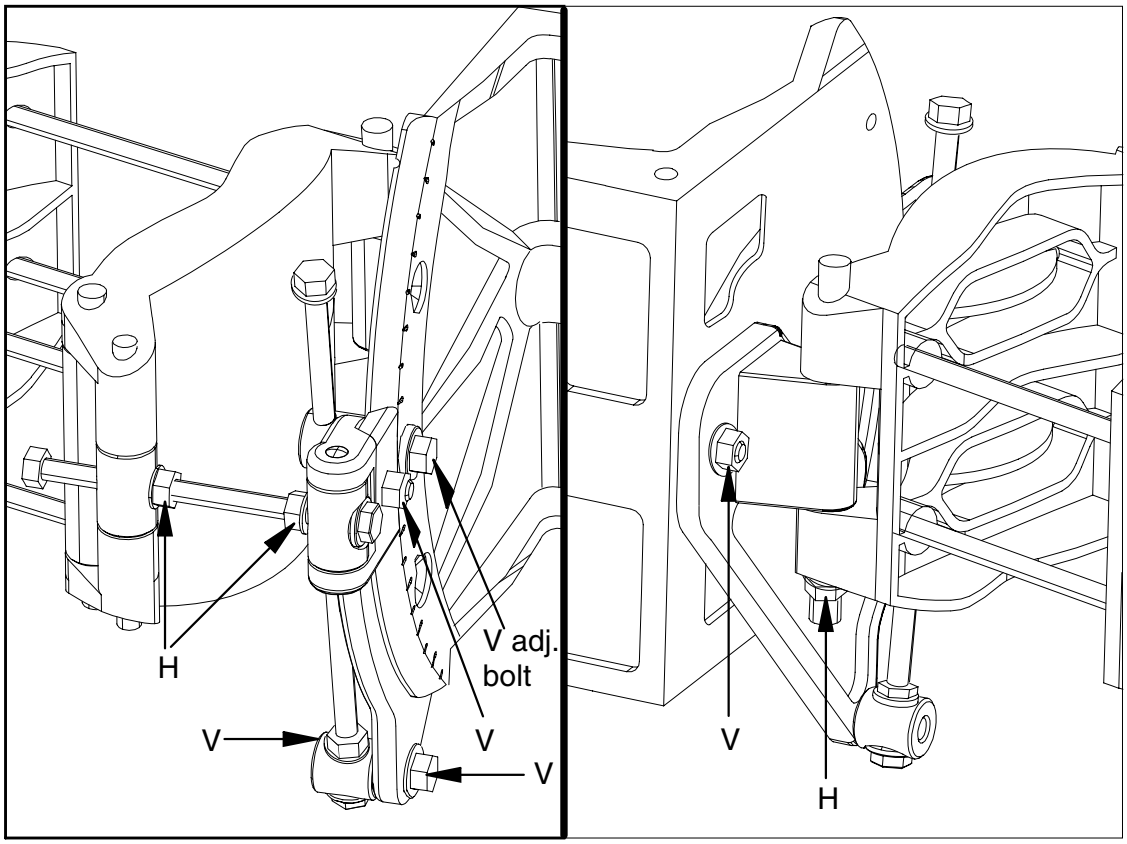

Figure 20. Locking nuts of the alignment unit

To fine align an antenna mounted on the integrated alignment unit:

1. Connect the DC voltage meter to the monitoring connector (AGC) via an adapter or a cable with a BNC connector (male).

2. Turn the vertical and horizontal adjustment screws (M8) with a box or fork spanner (see Figure 2). One full turn equals 0.5°.

3. Find the *minimum* value for the monitoring voltage by vertical and horizontal adjustment of the adjustment screws.

4. When the right alignment has been found, lock the moving parts together and lock the adjustment screws (see Figure 20). The torque is 20 Nm.

   Alignment should not move during locking (check the monitoring meter).

5. Remove the DC voltage meter.

Aligning a 20 cm square radome antenna mounted on the alignment bracket

The fine horizontal and vertical adjustment ranges are ±10°.

To fine align an antenna mounted on the alignment bracket:

1. Connect the DC voltage meter to the monitoring connector (AGC) via an adapter or a cable with a BNC connector (male).

2. Loosen the locking screws to approximately 10 Nm (see Figure 7).

3. Adjust the fine alignment bars with a 10 mm spanner until you find the *minimum* monitoring voltage value. One full turn equals 3°.

4. Lock the fine alignment bars using two 10 mm spanners.

5. Tighten the locking screws to a torque of 20 Nm. Tighten first the joint that is closer to the installation pole.

6. Remove the DC voltage meter.

Appendix A. Mounting Kits

A.1 Mounting kit OU roof

The mounting of the outdoor unit onto a roof is implemented with the Mounting Kit OU Roof (T38085.01). The tube for roof-mounting i.e. T-tube is intended for installations on flat and slanting roofs. Installation of the tube onto a vertical surface is also feasible. The rigidity of the installation can be increased by staying. The T-shaped tube can in some cases be used for installation on a tower. A parts list and installation instructions are delivered with the mounting kit.

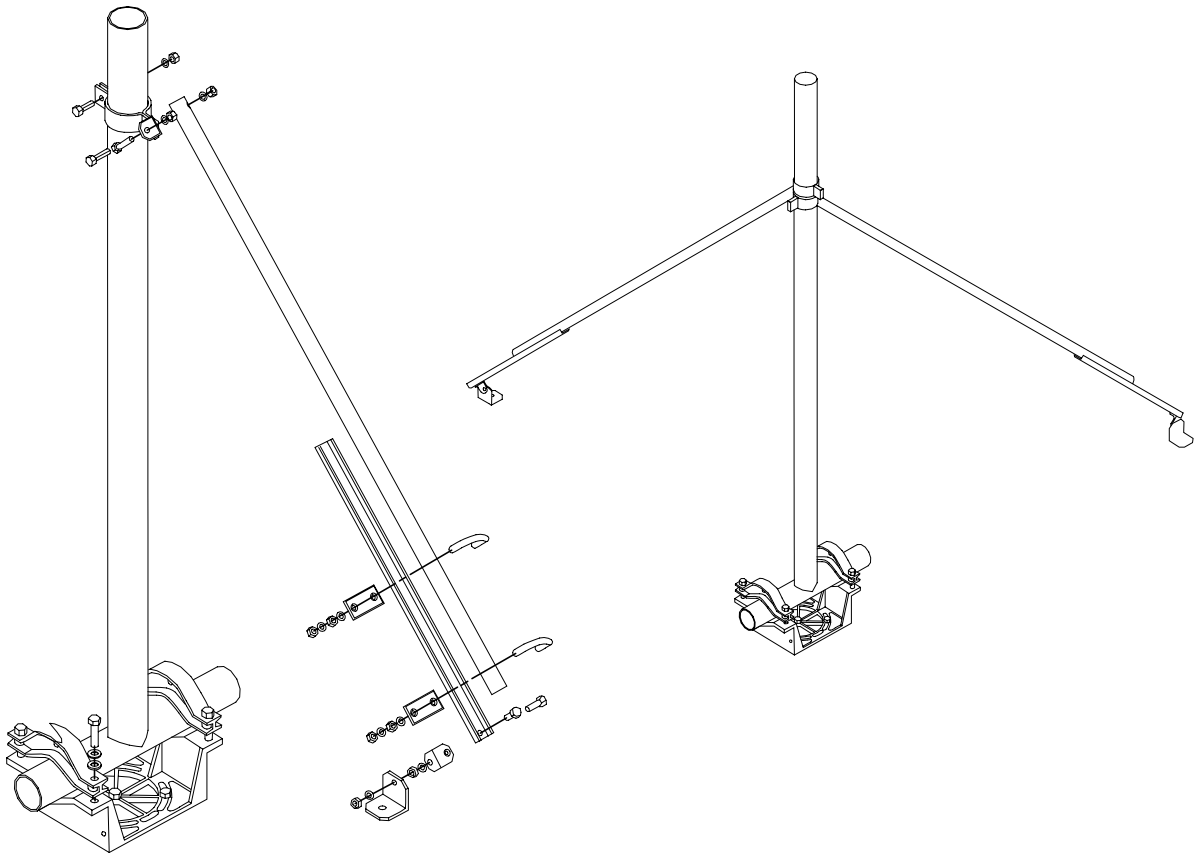

Figure 21. Mounting kit OU roof

A.2 Mounting kit OU wall

The mounting of the outdoor unit on a wall is implemented with the Mounting Kit OU Wall (T38085.02). The tube for wall-mounting, O-tube is intended for vertical installations on walls. In some cases the tube can also be used for low-profile roof installations or even for installations on a tower. The position of the O-tube can be changed according to the location. The rigidity of the installation can be increased with vertical and horizontal tubes functioning as stays. A parts list and installation instructions are delivered with the mounting kit.

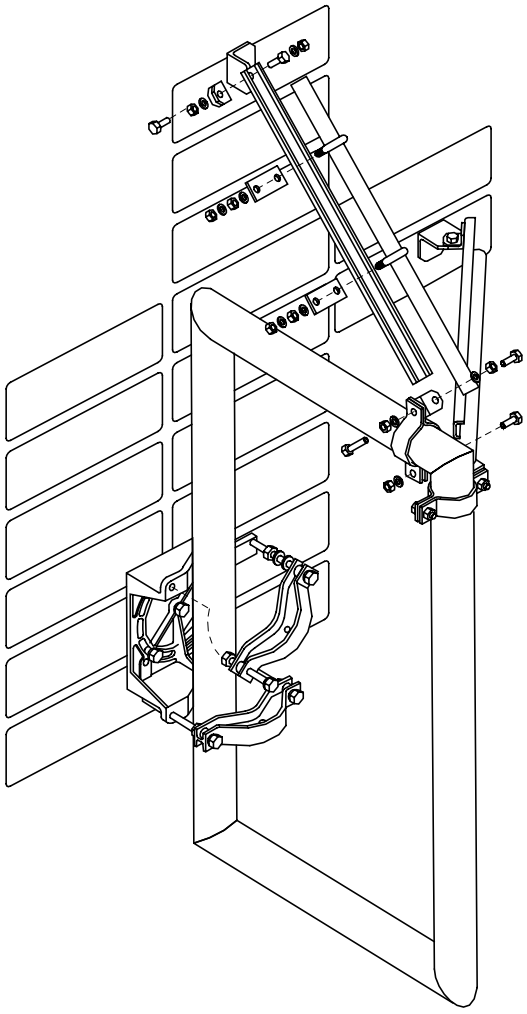

Figure 22. Mounting kit OU wall