

Installation

History

Date	Version	Author	Details
22/05/2000	Draft	NT Thomas	Complete User Manual
13/10/2000	Draft	TN Walsh	Added RFE to com m est
10/12/2001	Draft	Int'l EPA	Added custom support com m est
29/01/2001	Draft	Int'l EPA	Updated elem a com m est and view by H air
02/02/2001	Draft	Int'l EPA	Revised details observed by H air
28/02/2001	Issue 1	HS ear	Initial version com m est and changes
18/07/2001	Issue 2 Draft	Tom D um ic	Added U ST y pe A provision
20/09/2001	Issue 2	Tom D um ic	Revised P col v 1
06/09/2001	Issue 2 Draft	Tom D um ic	Draft P col v 2

1

About this document

This document provides comprehensive details for installing the System. These include procedures to verify that the Nokia Inlite is installed correctly and is functional.

The information in the document has been arranged in a manner that the installation of a Nokia Inlite System is carried out with optimum efficiency. Actions requiring specific attention have been suitably highlighted.

The document content is organised as follows:

- Contents of delivery in Chapter 2
- Work order in Chapter 3
- Unpacking in Chapter 4
- Installation procedures in Chapter 5

Throughout the document, warnings, cautions and notes are given where appropriate. However, it is most important that before starting the installation, the Warnings and Cautions and Product Description associated with the system are carefully read.

2

Contents of delivery

The Nokia InLite System is delivered in a number of packages. The number of packages is determined by the number of Local Units and Remote Units needed to ensure optimum cellular capacity within the building.

The packages are:

- MU package and accompanying smaller package
- Remote Unit package (comprising two boxes)
- Local Unit package (comprising two boxes)
- Package containing optional items.

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The Remote Unit and Local Unit packages are usually delivered in pallets containing five unit packages.

2.1 Main Unit

2.1.1 Main Unit package

The contents of the MU package is:

Item description	Quantity
Housing	1
Cover	1
Backplate	1
Splice box (containing cable)	1
Cable cover	1
Cable support	1
Fixed power supply cable with 2m plug	1

Item description	Quantity
Screw for cable support	1
Switch	1
Cable	1
Power supply	2
Mounting pin:	1
• T shaped mounting pin	1
• Screw M 4x 20mm for mounting unit	2
• 1/2" offset screw M 6x 25mm for mounting UL - beam	2
• Screw M 6x 40mm for mounting unit frame	4
• Locking key for U cover	1
Pin mounting accessories:	
• Front lock	2
• Back lock	2
• Screw M 6x 20mm for mounting unit frame into back	4
• M 8x 12mm front back lock	4
• Washer	4
• Square 20x 20x 4mm metal	4
• Metal band 1010mm long	2
• Locking device (used in ps)	2

Table 2.1.1.2 Main Unit Package

2.1.2 Main Unit smaller package

The contents of the MU smaller package is:

Item description	Quantity
CD ROM : Infrared sensor	1

Item description	Quantity
CD ROM: Introduction to the product	1
Calibration kit	
R F J um peral R G 222m cing, g langed N (type connected end)	8
L M P cal, m cing	1
Adm cal, m cing, (type) p e p s connect fix ed end	1
Adm connect (type) ID (type) p e p s	1
Adm connect (type) ID (type) p e p s	1

Table 2 Contents of the Local Unit package

2.2 Local Unit

2.2.1 Local Unit package

The contents of the Local Unit package is:

Contents	Quantity
Local Unit package (US) - 180 pages	1
Four pieces of the Local Unit package (US) - 180 pages Note: - The package is not to be used for the purpose of the product. - The package is not to be used for the purpose of the product.	4

Table 3 Contents of the Local Unit package (US)

2.2.2 Local Unit package (US)

The contents of the Local Unit package (US) is:

Table 5. Contents of Remote Unit package

2.3.2 Remote Unit package (US)

The contents of the Remote Unit package (US) is:

Item description	Quantity
Remote Unit A1900CD M A2, xS CAP Cfm 11020VAC 48V D C	2
500 hnm rch (type)	2
Power supply connect • IE C320-pm hnm rch 48V AC • Bay type 48V D C	2
Flange pin 6 CAP Cfm 11020VAC 48V D C Note: • The power supply should be connected to the power supply terminal. • The power supply should be connected to the power supply terminal. • The power supply should be connected to the power supply terminal.	1

Table 6. Contents of Remote Unit package (US)

2.3.3 Remote Unit Installation Kit

The contents of the Remote Unit Installation Kit package is:

Item description	Quantity
Mounting bracket	1
Spacer (for mounting bracket)	1
Spacer	1
M 3x10mm screws (for spacer)	2
M 3x20mm screws (for spacer)	2
M 6x40mm mounting screws	4

Item description	Quantity
M 3x8mm screw on dished end during ack	5
Cable cover	1
M 3x20mm screw for cable cover	4
Cable 5x2mm	2
Cable 100x25mm	3

Total Cost Rem dUlink i

Net
Usually F0 jumpers/pigtails used with LU and RU connections are to
separate packages.

2.4 Optional items package

This package contains optional items ordered from Nokia such as in
antennas.

3

Work order

The installation of a Nokia InLite System is described in detail in the chapters which are presented in a sequence deemed for optimum completion of installation, the Nokia Inlite System is configured to meet the requirements.

Note

The work must be planned in advance.

Note

Prior to installation, it is most important that the installers familiarise themselves with the installation instructions and cautions.

Note

Prior to installation, ensure that the site is fully prepared. prepare the site is provided in Nokia InLite: Requirements for Operation and Installation



Installing the Nokia Inlite System



WARNING

All fibre optic related work activities must only be performed by qualified and approved personnel.

1. Unpack the delivery close to the point of installation and against the checklist included in each package.
2. Inspect the contents of the packages visually.
3. Ensure that all the tools needed for installation are present (laptop PC with Nokia Supervisor Software Version 1.0.0 or higher) .
4. Install fibre optic cables between the MU and RU locations

5. Install the MU in its allocated location.
6. Install the LUs into the MU.
7. Check the MU power supply.
8. Identify the RU locations and drill the holes for the RU mount screws.
9. Arrange the power supply at the RU locations.
10. Install the antennas.
11. Arrange/splice the F0 pigtails 4 m long to the F0 cables between RUs at the LU end.
12. Arrange/splice the F0 pigtails 2 m long to the F0 cables between RUs at the RU end.
13. Test the F0 cables.
14. Label the F0 cables at the RU and LU ends.
15. Mount the RU mounting racks to the supports and mount the RUs.
16. Connect the F0 cables to the LUs and RUs.
17. Connect RF antenna cables between the antennas and the RUs.
18. Connect the RF jumper cables to the MU.
19. Connect power supply to the RUs.
20. Switch on the mains power to the MU.
21. Connect the LMP cable between MU and the local management laptop and start the Nokia Inlite System Supervisor Software.
22. Complete the MU and RU placing tables in the Nokia Supervisor Software.
23. Start the commissioning process as described in the Commissioning document.
24. Fit the cable cover and the MU cover.

Not

Splicing is not required if used jumpers.

4

Unpacking

Prior to unpacking the transportation packages, move them close to the installation area to avoid any unnecessary activity.



WARNING

Ensure that all safety precautions are observed when moving the transportation packages and lifting items of equipment.



Caution

Take care when removing items from their transportation packages to avoid damaging them or sustaining personal injury.



Caution

Lift the MU by the backplate. Do not lift the MU by the splice carrier to avoid damaging the open door switch.

Note

Ensure that the delivered packages are in accordance with the



Unpacking the transportation packages:

1. Carefully remove the plastic wrapping from around the package.
2. Ensure that the package is correctly orientated for removal.
3. Open the package and carefully remove the contents of the package. Do not touch the items on the plastic wrapping to avoid scratching them.

Note

Do not remove the LUs from their anti-static packaging until you install them in the MU. This reduces the risk of ESD damage.

-
4. Using the checklist contained in the package, ensure that all present.
 5. Carefully inspect each item for signs of damage.
 6. If there are signs of damage or an item(s) is missing, immediately report these findings to your local Nokia representative.
 7. Repeat steps 1 to 6 inclusive for all other packages as and when required.

5

Installation

This chapter details the installation of the MU and Remote Unit. Figure 5-1 shows the block diagram of the InLite system.

The conversion factors used in this document are:

1 mm = 0.03937 inch; 1 inch = 25.4 mm

1 Nm = 0.7376 lbf ft; 1 lbf ft = 1.356 Nm



Caution

Care must be taken when installing the Nokia Inlite System. Components can be damaged and cause damage if not handled with care. Observe the instructions which items are installed.

Notes

Installation of the Nokia InLite System must be carried out by personnel who have completed the Nokia training course on Nokia InLite installation or have an equivalent understanding of the system.



- The common (and recommended) method is to run the F0 cable connectors and splice short pre-connectorised pigtails onto avoid damaging connectors in the cable-running process. That adequate length is available at each end for correct relief.
- Optical connectors cannot be fitted in the field due to the process required. There is no significant loss in performance of using fusion splices.
- The optical cable must not be stressed, as this can cause loss and could create internal micro fractures.
- It is important not to squeeze the cable by, for example, cable ties.

5.2 Installing the Main Unit

The installation location and position is predefined.



Caution

Always use the antistatic wrist strap when handling plug-in units.

5.2.1 Removal of the plastic cover and associated parts

Prior to removal of the plastic cover of the MU, move the assembly to the installation location for installation.

Figure 5-1 shows the MU chassis assembly, cover and cable cover.

Note

The MU is delivered with the Switch Matrix/Dual Band RF module, and Power Supply Units already installed. Figure 5-1 does not show these units.

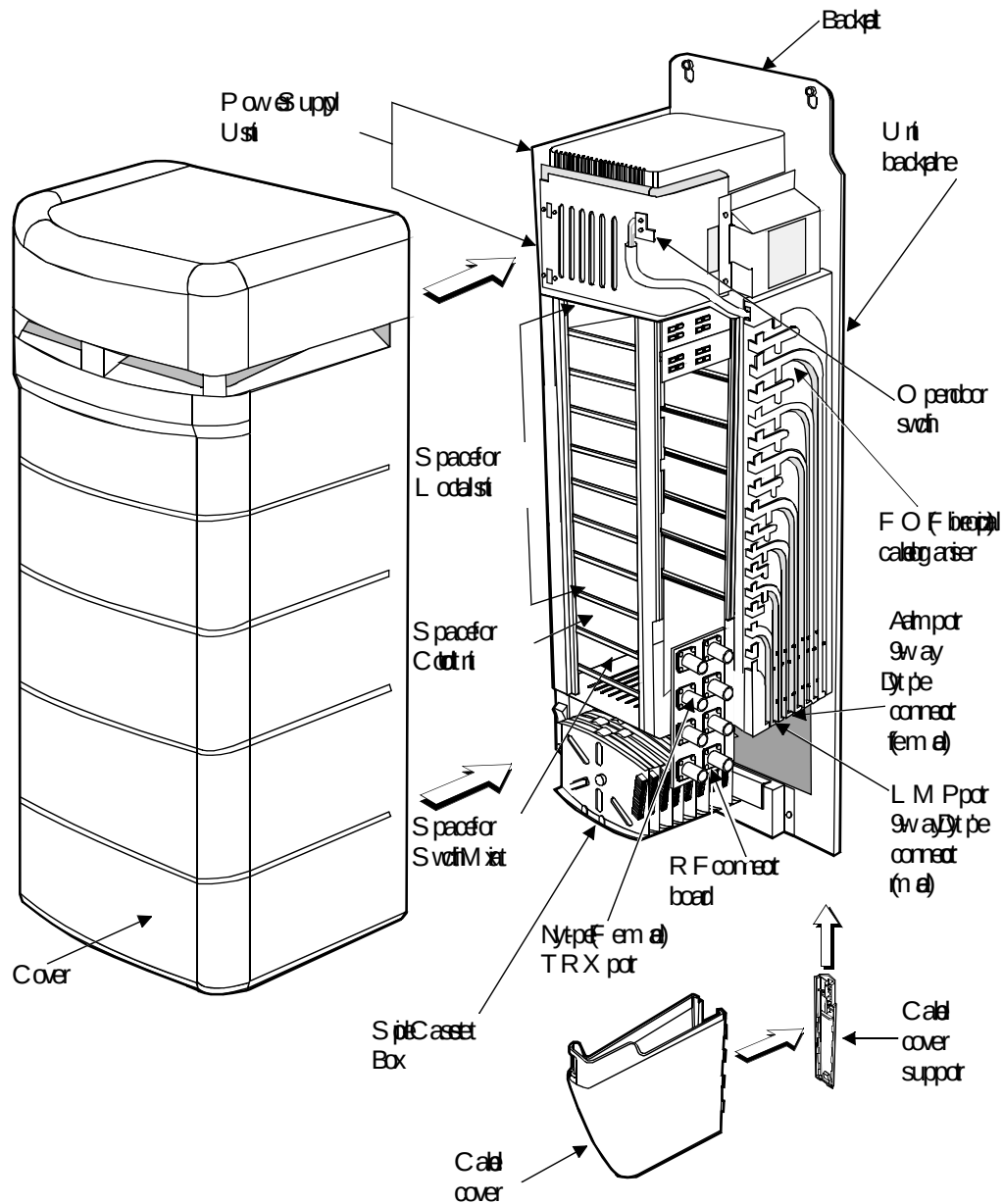


Figure 2 Multi-slot assembly cover and cable cover



To remove the plastic and cable covers

1. Unlock the plastic cover using the key provided.

2. Holding the cover firmly and against the chassis assembly, upwards until the cover locking guides are free of the backplate.
3. Carefully pull the cover off the chassis assembly and store until required again.
4. Remove the cable cover by carefully lifting until the lock is clear of the retention recesses on the cable cover support. Store in a safe place.
5. Pull the plastic cable cover support downwards to disengage from the backplate.
6. Remove the cable cover support and store it in a safe place.

5.2.2 Main Unit mounting frame

The mounting frame is used in both wall and pole installations as the base for the MU assembly.

Screw holes and dimensions of the mounting frame are presented in Figure 5-2. Screw holes R1, R2, R3 and R4 are intended for fixing the mounting frame to a wall or onto a pole bracket. The upper MU fixing screws are in holes B1 and B2.

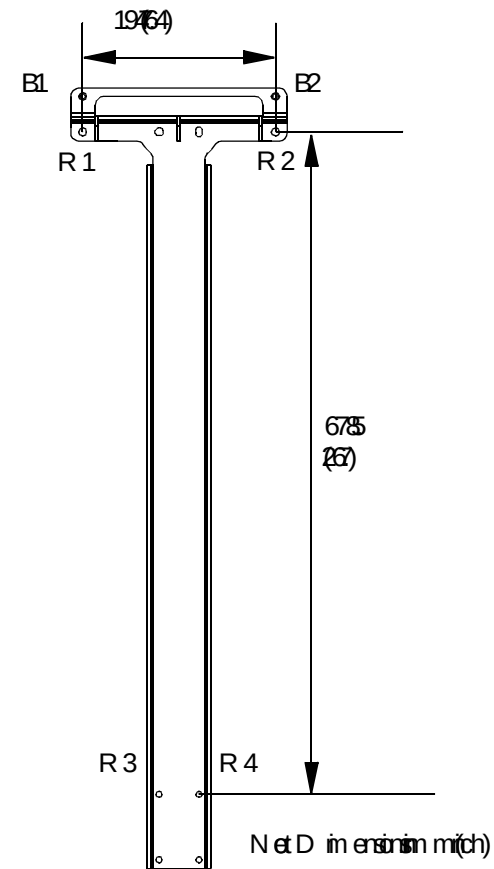


Figure 3 Main unit frame

5.2.3 Wall mounting



Caution

If a ladder is required to attain the height at which the MU is being installed, take great care when using the ladder.



To fix the Main Unit to a wall.

1. Position the mounting frame in the correct location on the wall level to check that the mounting frame is in the straight position.
2. Mark the fixing points on the wall using the anchor screw hole R3 and R4 in Figure 3 on the mounting frame.

3. Drill the holes in the wall and clean them out. Insert anchor screws into the wall, depending on the wall material.
4. Install the mounting frame from the upper anchor screw hole (in Figure 1) onto the wall. Use appropriate anchor screws. the screws (6.3 x 38) supplied by Nokia, use a 6 mm hexagon key to tighten.
5. Position the U-plate (refer to Figure 2) onto the second lower holes (R3 and R4). Make sure the U-plate is in the correct position. The larger holes on the U-plate must be facing downwards as per Figure 2.
6. Screw the anchor screws through the U-plate and anchor screws (R3 and R4) into the wall.
7. Insert the M4 x 20 mm Allen screws into the upper fixing holes of the mounting frame (B1 and B2 in Figure 3).
8. Hang the MU on the upper fixing screws. Do not tighten yet.
9. Position the L-beam on the back of the MU into the U-plate (Figure 4).
10. Tighten the upper MU fixing screws (B1 and B2 in Figure 3).
11. Tighten the two offset screws (B3, B4) M6 x 25mm on the L-beam from the underside. Tighten to 24 Nm. Refer to Figure 5.

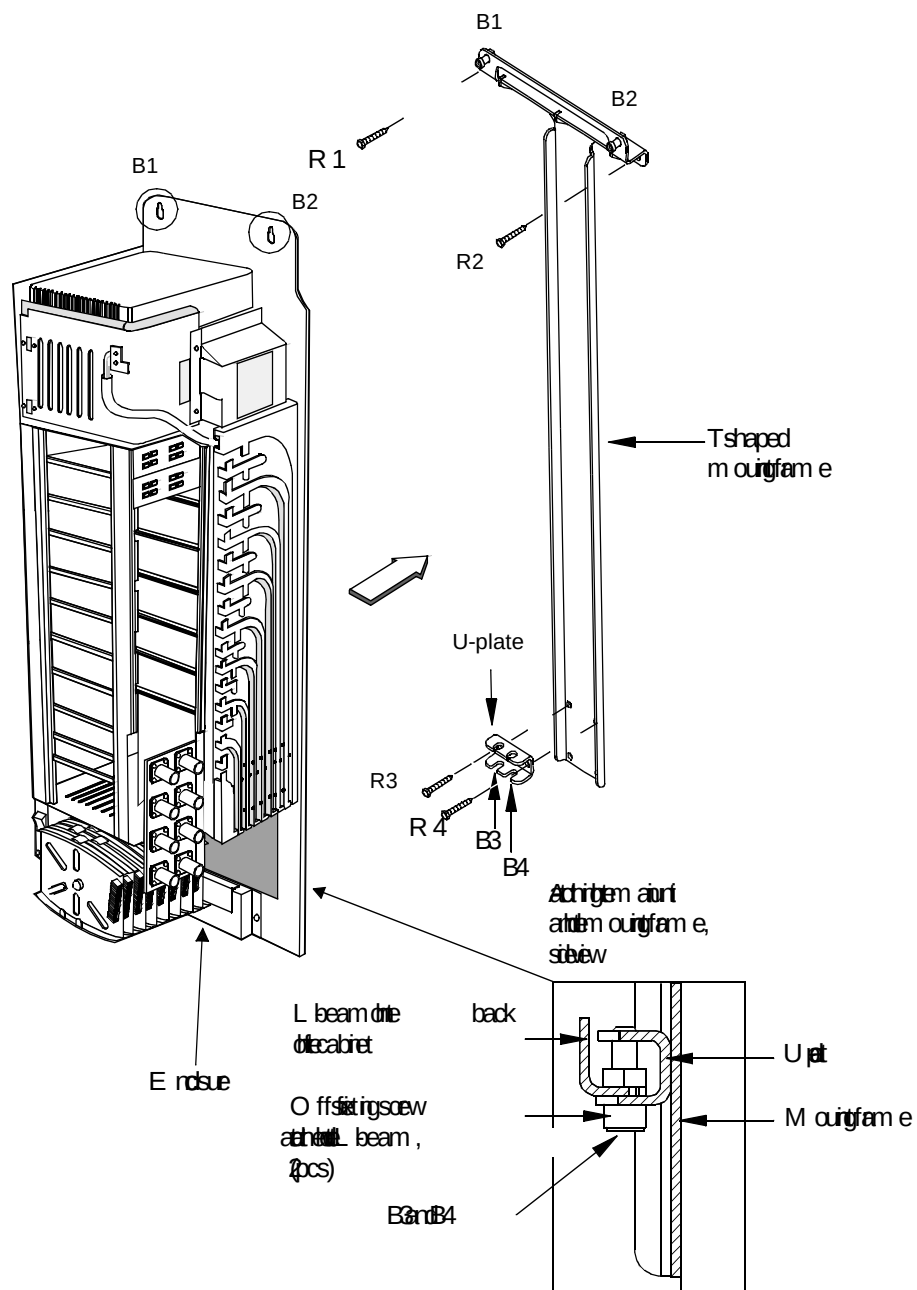


Figure 4. Mounting unit

5.2.4 Pole mounting

The MU can be mounted on a pole in two different ways depending on diameter. If the pole diameter is between 60 - 120 mm (2.4 - 4.7 in)

mounting blocks (front and back) are used exclusively; if the between 120 - 300 mm (4.7 - 11.8 in) adjustable straps are used with the front mounting blocks.

Prior to mounting the MU to a pole it is necessary to prepare brackets.

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Pre-assemble the mounting blocks before taking them up the pole

Pole mounting of the Main Unit on a 60-120 mm diameter pole
Figure shows one set of pole brackets.

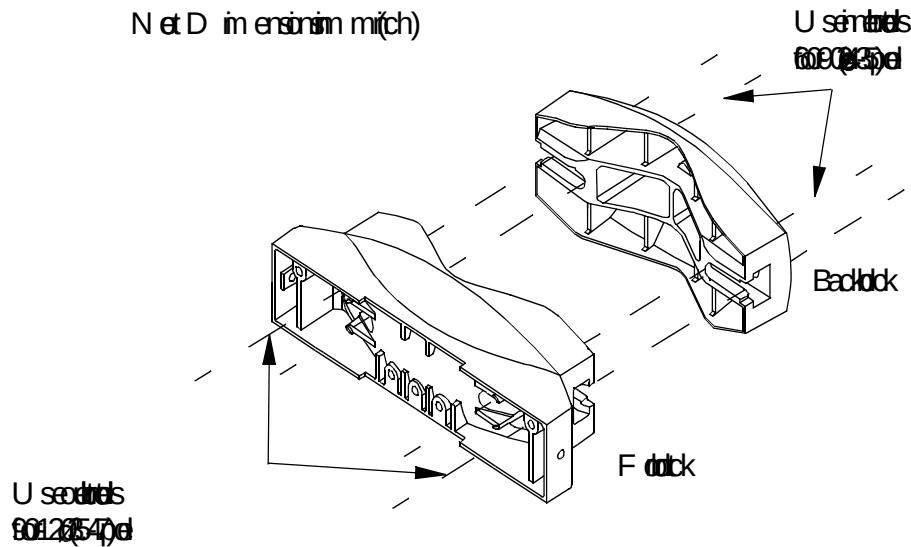


Fig. 5. Front and back pole bracket

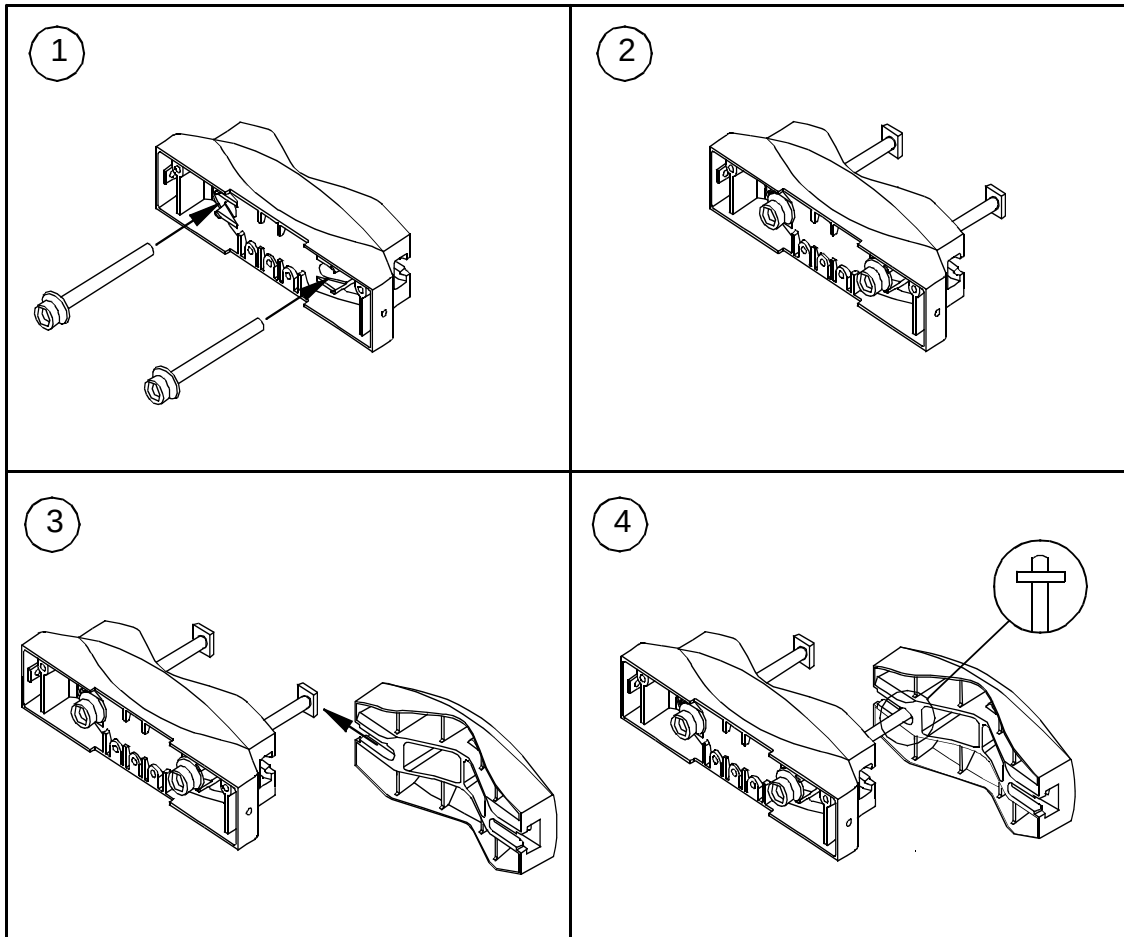
To pre-assemble the pole brackets:

Not

If the diameter of the pole is 60-90 mm (2.4-3.5 in), use the inner pole diameter is 90-120 mm (3.5-4.7 in), use the outer holes.



To pre-assemble the pole brackets:



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Figure 6 Pre-assembly of pole brackets

1. Insert the assembly bolts with washers into the bolt holes blocks. Refer to 1 in Figure .
2. Attach the square nuts to the ends of the bolts. Screw the to prevent them from falling off from the ends of the bolt Figure .
3. Slide one bolt with the square nut to the slot at the side Refer to 3 in Figure .
4. Screw the bolt on enough to prevent the bolt and the nut f from the side of the back block. Refer to 4 in Figure .



To install the pole brackets and the mounting frame onto a

Net

Before taking the mounting frame up the pole, carry out the tas 1 to 3 inclusive.

Figure shows the installation configuration for mounting the mounting frame on a pole.

1. Insert the two M4 x 20 mm fixing screws to the uppermost s the mounting frame (B1 and B2 in Figure). Tighten the scr bear the weight of the MU.
2. Position the U-plate onto the screw holes R3 and R4 on the frame. Refer to Figure .

Net

The larger holes on the U-plate must be facing down. Refer to

3. To fix the U-plate and the lower pole bracket to the mount: the M6 x 20 mm Allen screws through the U-plate and through R3 and R4 into the lower front block. Refer to Figure . Use with a 6 mm Allen bit to tighten securely.
4. Position the pre-assembled upper pole bracket on the pole. the holes for screws R1 and R2 are on the upper edge of th Refer to Figure .
5. Rotate the back block of the upper pole bracket so that th inserted with the square nut into the slot at the side of
6. Tighten the bolts evenly to fix the upper pole bracket to torque socket spanner/wrench with an 8 mm Allen bit to tig (8.85 ft/lb.).
7. Attach the mounting frame to the upper bracket from fixing R2 with M6 x 20 mm Allen screws. Refer to Figure . Use a t with a 6 mm Allen bit to tighten.

-
8. Fix the mounting frame to the pole with the lower bracket. Fix bracket in the same manner as the upper bracket. Tighten to 12 ft/lb.).

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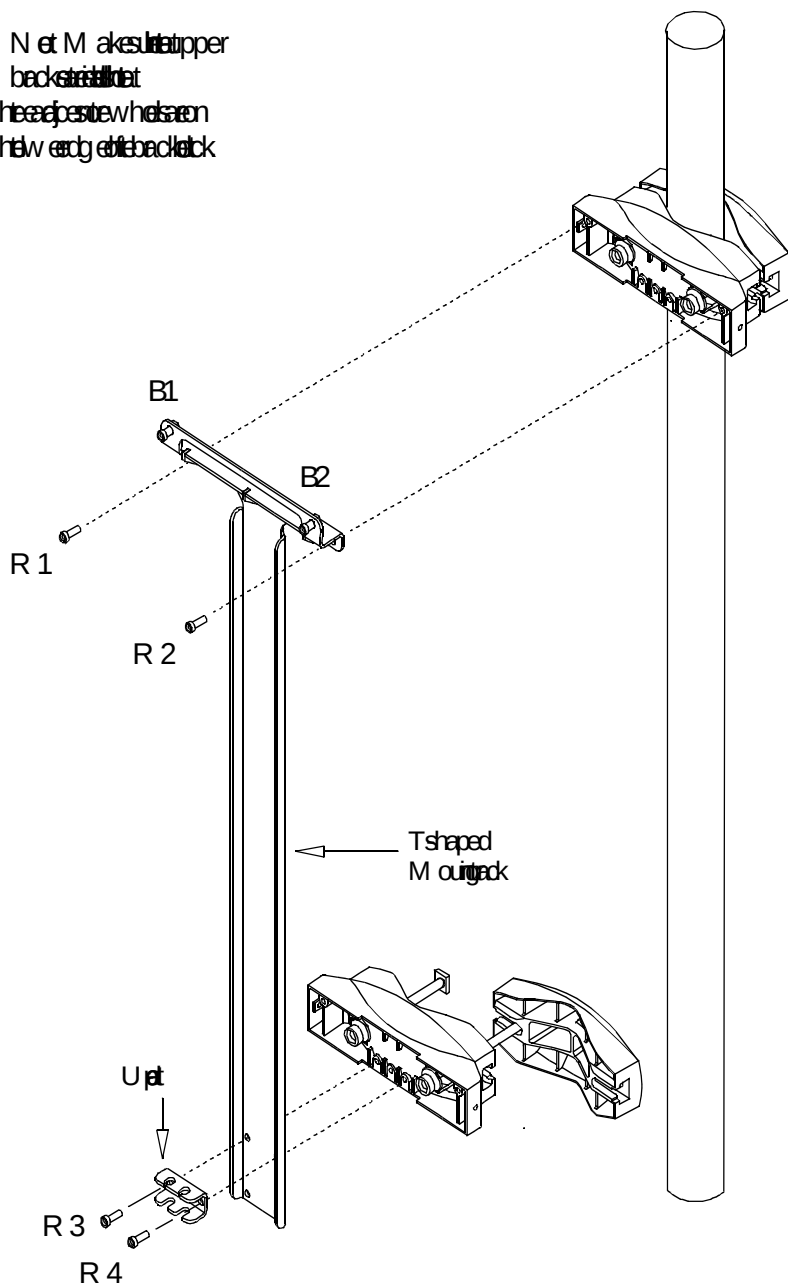


Figure 7. T-shaped mounting bracket



To mount the Main Unit on a 60-120 mm diameter pole:
Figure shows the manner in which a MU is mounted on a pole using

frame.



Caution

If a ladder is required to attain the height at which the MU is being installed, great care must be taken when using the ladder.

1. Bring the MU to the mounting frame and position the L-beam on top of the cabinet into the U-plate.
2. Hang the MU on the two upper MU M4 x 20mm fixing screws (B1 and B2 shown in Figure 1).
3. Tighten the upper fixing screws (B1 and B2 shown in Figure 1) to 12 Nm (8.85 ft/lb).
4. Tighten the two M6 x 25 mm offset screws (B3 and B4 shown in Figure 1) on the L-beam into the U-plate from the underside. Use a torque spanner/wrench with a 6 mm Allen bit and an 80 mm extension to tighten to 12 Nm (8.85 ft/lb).

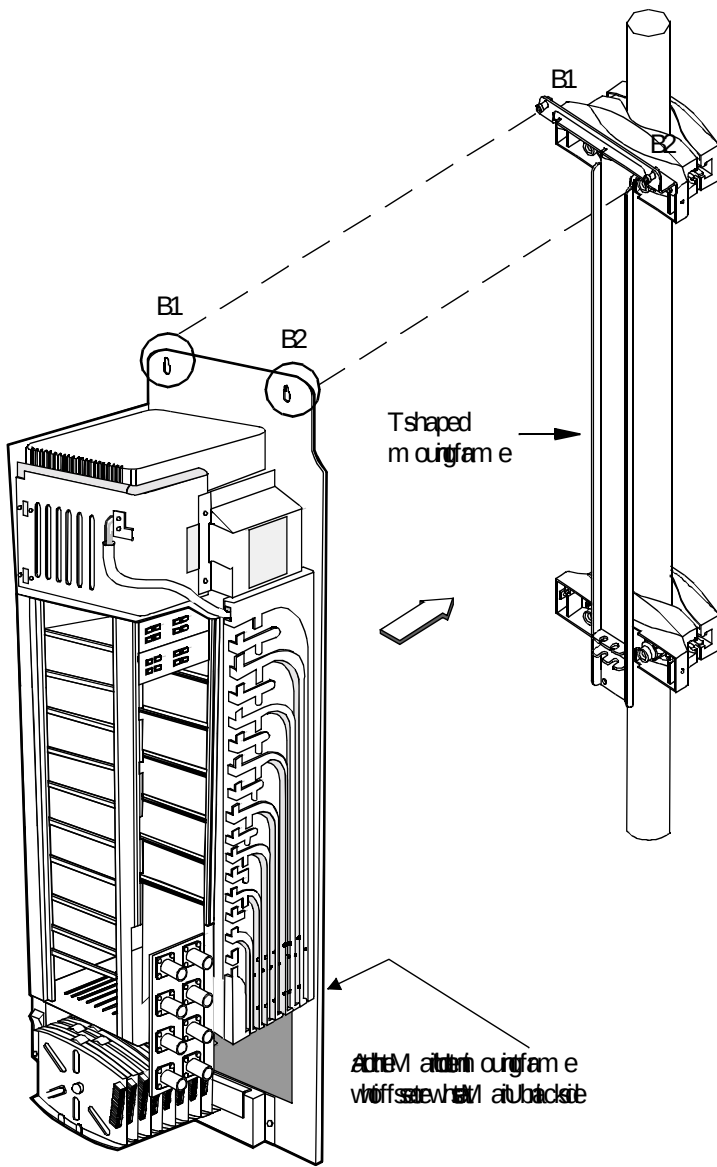


Figure 8 Main unit mounting frame

Pole mounting of a Main Unit on a 120-300 mm diameter pole
 Figure shows the preparation of the bands and Figure shows the MU on a pole.

Not
 Only the front blocks are required for this operation.

Table shows the relationship between the pole diameters and band length

Pole Diameter (mm)	Band Length (mm)
140	580
160	630
180	680
200	740
220	790
240	850
260	900
280	950
300	1010

Table 1. Band lengths



To pre-assemble the pole brackets

1. Assemble the locking device. Insert the end of the rack into the housing just enough to engage the rack. Make sure that the word SIDE UP on the rack can be seen.
2. Cut the metal band to the appropriate length according to the pole diameter. Refer to Table 1 for the different pole diameters / band lengths
3. Route the metal band through the holes in the top front block
4. Bend one end of the metal band about 30 mm (1.2 in) towards the top to form a hook.
5. Insert the hook into the slot at the end of the locking rack.
6. Bend the other end of the metal band about 30 mm (1.2 in) towards the underside to form a hook. Leave it free for now.

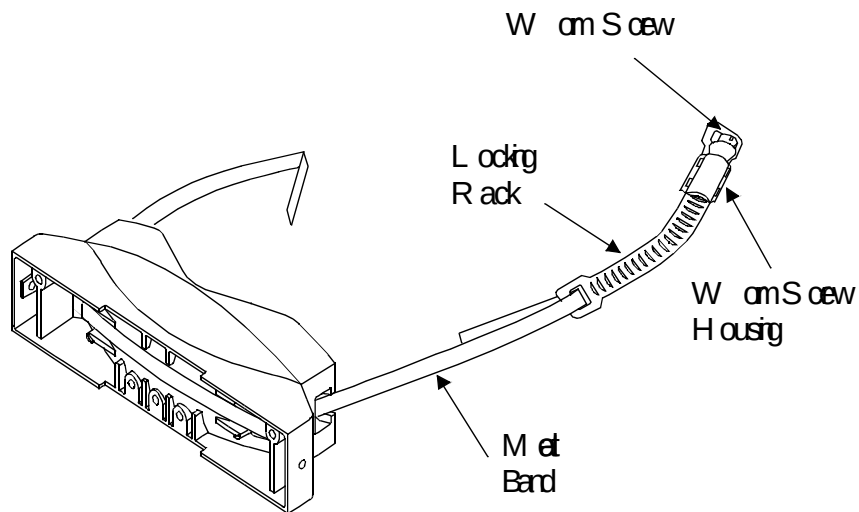


Figure 2 Pole bracket assembly



To install the pole bracket and mounting frame onto a pole Figure shows the manner in which a mounting frame is installed on a 25mm diameter pole.



Caution

If a ladder is required to attain the height at which the MU is installed, great care must be taken when using the ladder.

Note

Before taking the mounting frame up the pole, carry out the tasks 1 to 3 inclusive

1. Insert the two M4 x 20mm MU fixing screws into the uppermost holes on the mounting frame (B1 and B2 shown in Figure). These holes are large enough to bear the weight of the MU.

2. Position the U-plate onto the second lowest screw holes R3 and R4. Refer to Figure 3-10.

Note

The larger holes on the U-plate must be facing downwards.

3. To fix the U-plate and the lower pole bracket to the mounting frame, insert the M6 x 20 mm Allen screws through the U-plate and through screw holes R3 and R4 into the screw holes on the lower bracket. Refer to Figure 3-11. Use a torque driver with a 6 mm Allen bit to tighten securely.
4. Position the pre-assembled upper bracket on the pole. Make sure the screw holes for the screws R1 and R2 are on the upper edge of the frame. Refer to Figure 3-12.
5. Wrap the metal band tightly around the pole.
6. Insert the hook-shaped free end of the band into the band slot on the screw housing.
7. Tighten the worm screw to 10 Nm (7.4 ft-lb) with an 8 mm hexagonal key.
8. Attach the mounting frame to the upper bracket from the fixing plate with M6 x 20 mm Allen screws. Refer to Figure 3-13. Use a torque driver with a 6 mm Allen bit to tighten the screws.
9. Fix the mounting frame to the pole with the lower bracket. Fix the lower bracket in the same manner as the upper bracket.

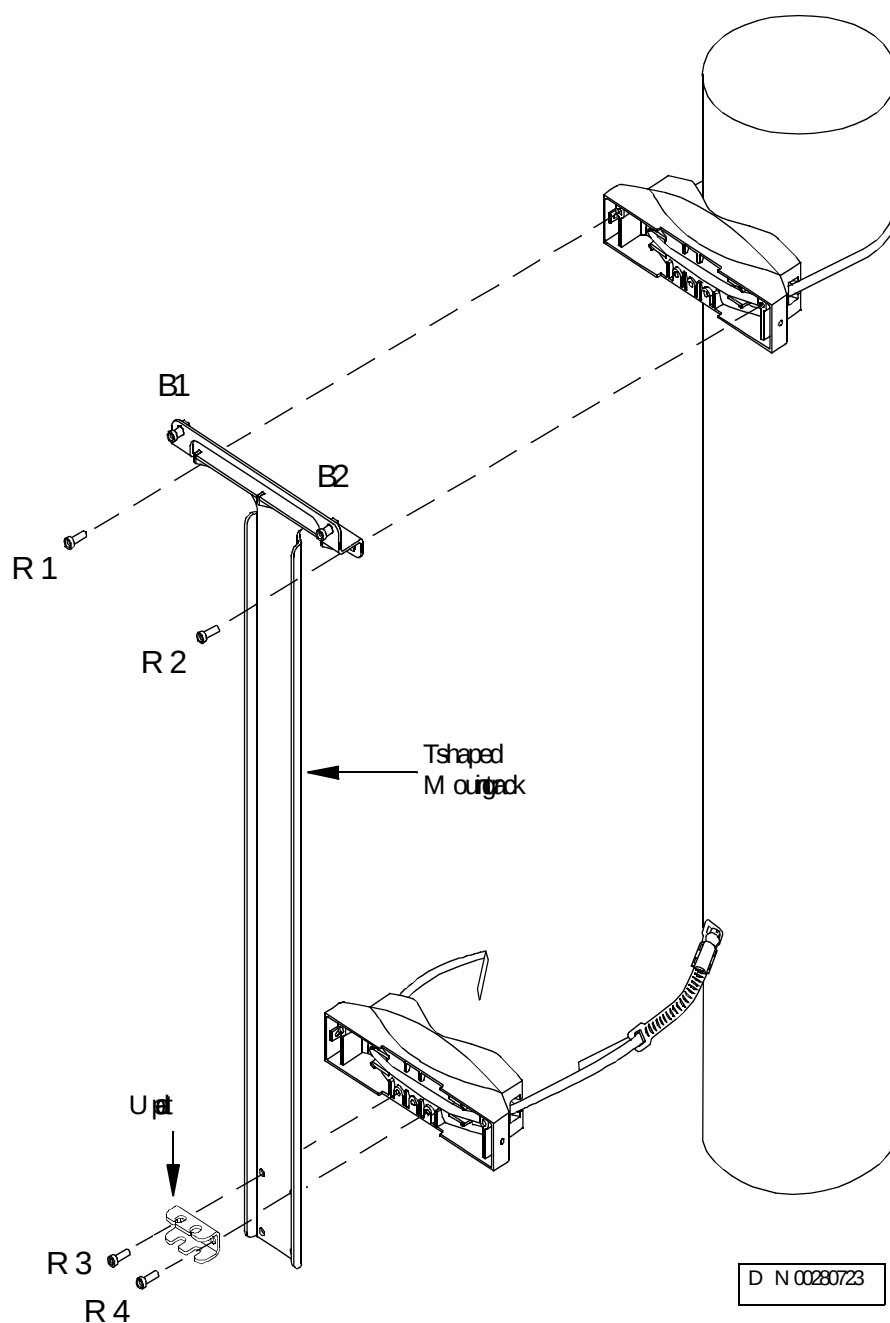


Fig. 10. Main unit and



To install the Main Unit onto the mounting frame

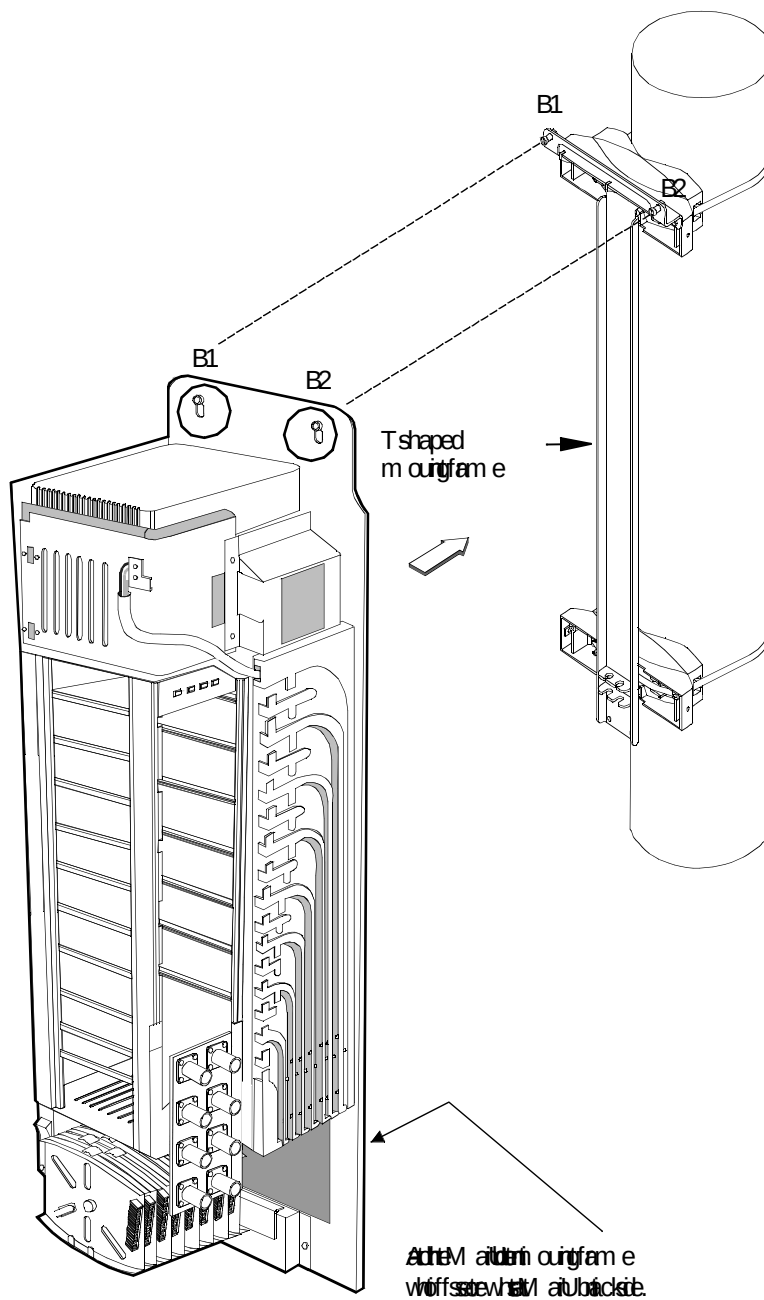


Figure 1. Phone mounting frame assembly

5.3 Installing the Local Units

Check the RF Plan documents to find out how many RUs are to be connected to each LU. This information is needed to set the jumpers in the LUs.

Notes

Before installing the LUs, check that the jumpers are in the correct position.

5.3.1 Configuration of four RUs

When four RUs are to be connected to an LU, there is no need to change jumper settings; just make sure that the jumper settings are correct and insert the LU into its location in the MU.



Figure 12 Installing the LU

5.3.2 Configuration of less than four RUs

When less than four RUs are connected to the same LU, any unused RX and TX must be disconnected. This can be done by changing the position of the appropriate jumper in the LU.



Installing the LUs - configuration less than four RUs

1. Check which RX and TX optical port are not used. For example, if RX1 is not used, the optical connector RX1 corresponds to RX1 switch in Figure 13.

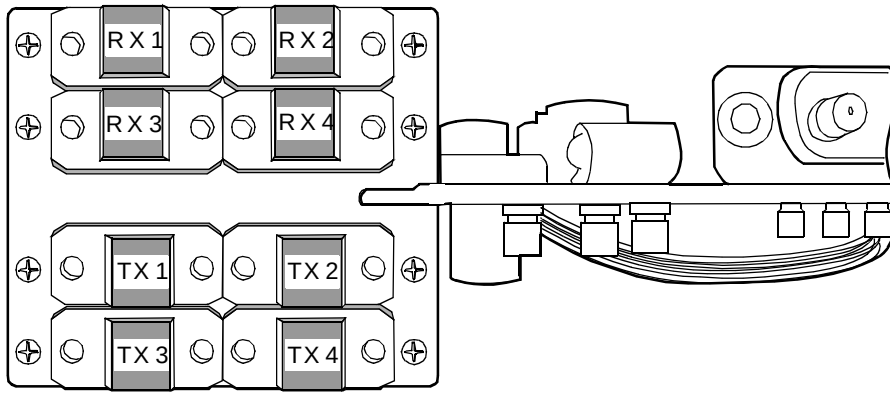


Figure 13. Optical port

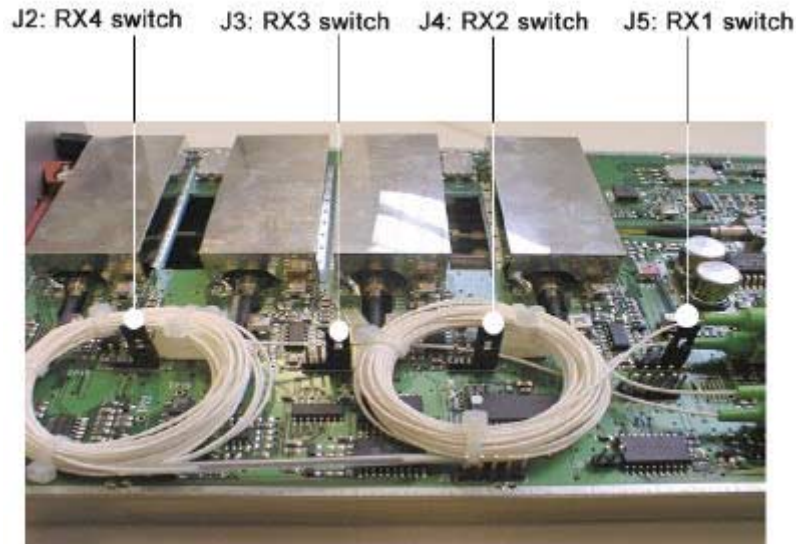


Figure 14. Location of RX switches

2. Move the appropriate jumper to the OFF position by moving it onto the two left-hand pins of the jumper connector (see Figure 15).

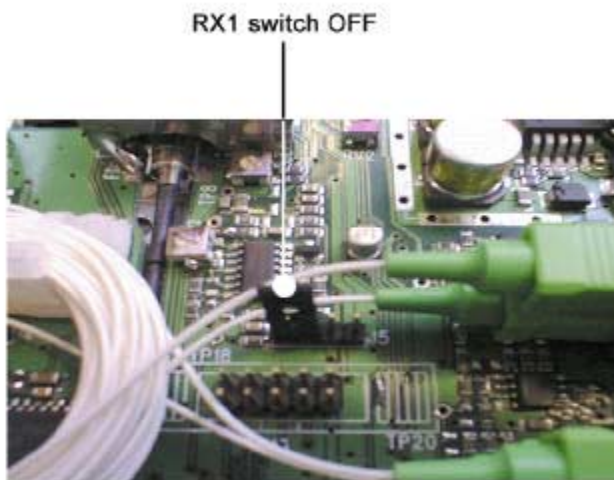


Figure 15. Locating the RX1 switch

3. Go to the Main Unit and Remote Unit placing window of the Supervisor Software. Add a note against each unused RU to indicate that it is unused.

Notes

If the Supervisor software is not running at this time, make a note to remember to record this information at the first available opportunity.



Adding more RUs to an LU

1. Check which Rx and TX optical ports are used.
2. Move the appropriate jumper to the ON position by moving the jumper onto the right-hand two pins of the jumper connector.
3. Go to the Main Unit and Remote Unit placing window of the Supervisor Software. Remove the existing note against the RU which indicates RX was unused.

Notes

If the Supervisor software is not running at this time, make a note to remember to record this information at the first available opportunity.

5.4 Preparing to install the RUs

Drill the holes for the RU mounting rack screws in the allocated to the RF planning document for the site for detailed information of the RUs.

Tip

Do not mount the RU mounting rack at this stage.

5.5 Installing the antennas

Indoor panel or omni antennas can be used with the Nokia InLit

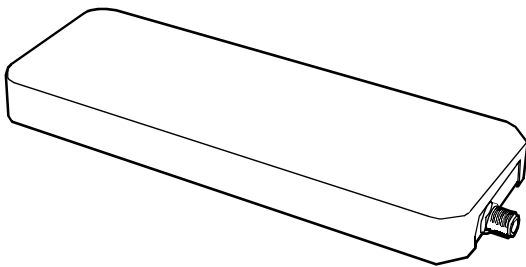


Figure 16. Panel antenna

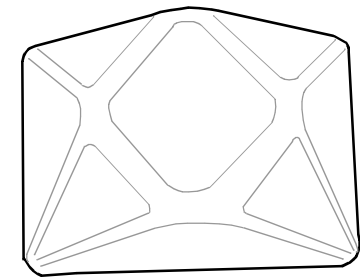


Figure 17. Omni antenna



To install the antennas

1. Install the panel or omni antennas at their allocated location
RF planning document for the site for detailed information on
of the antennas

5.6 Splicing the fibre optic pigtails



WARNING

All fibre optic related work activities must only be performed by s
qualified and approved personnel.

Splicing is normally required at both the MU and RU ends of the FO
A splice is a permanent joint that perfectly aligns two fibre optic
Figure).

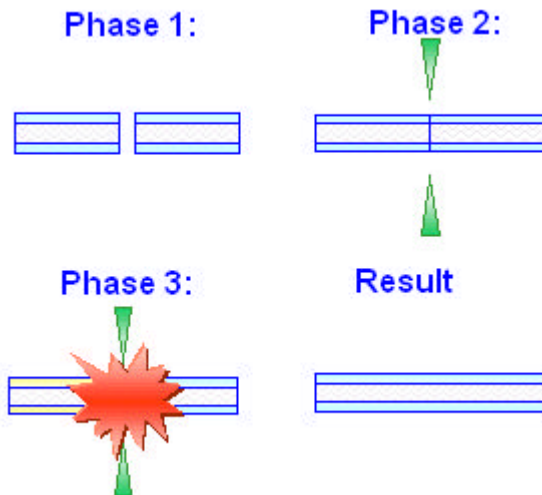


Figure 18 Example of a fibre splice

5.6.1 When splicing is required

Splices are required for the following reasons:

- The cable runs are too long for one straight cable pull
- You need to mix a number of different types of cable
- You need to connect a buried cable.

5.6.2 Types of splicing

Fibre splicing is accomplished by one of the following methods:

- Mechanical
- Fusion

Mechanical splicing

Mechanical splicing employs a splicing machine intended to visually align the two single fibre ends and then mechanically join the two fibre ends. The splice is held in a relatively small enclosure which is typically pre-loaded with index matching gel. The index matching gel is placed in the splice to achieve high optical performance with low loss.

Mechanical splices are best used for multimode fibres.

Fusion splicing

In fusion splicing the ends of the fibres are aligned either manually using manipulators and a microscope system for viewing the splice, or automatically using cameras or by measuring the light transmitted through the splice. The ends of the fibre are then melted together using a gas flame or commonly an electric arc.

There are two types of fusion splicing methods in use throughout the world today:

- Mass fusion
- Single fusion.

Mass fusion splicing is for splicing multiple fibres, such as ribbon fibres, in one operation.

Single fusion splicing joins the fibres one at a time.

Near perfect splices can be obtained with losses as low as 0.02 dB (mechanical splice 0.2 dB).

Fusion splices give very low back reflections and are preferred for high-speed fibres.

Fusion splicing uses expensive equipment and provides cheap splices; mechanical splicing uses less expensive equipment but provides more expensive splices.

5.6.3 Splicing defects

Splicing defects are illustrated in Figure 19.

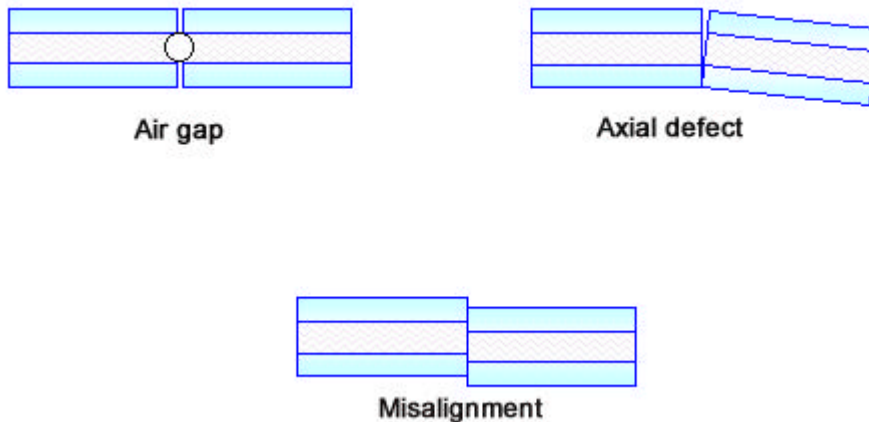


Figure 19. Splicing defects

5.6.4 Testing the fibre optic cables

Using a Power Meter, the power that arrives to the far end of the fibre optic link is measured. This measurement is used to determine the total attenuation of the fibre optic link.

Backscattering is the more complete method for fibre optic traceability diagnostics and for the anomaly entity and position determination. The instrument used is called the OTDR.

A periodic optical pulse sequence is injected into the fibre optic link. The instrument determines the retro-diffuse power percentage.

The instrument is used to:

- Measure the total attenuation
- Verify the attenuation trend along the fibre optic cable and concentrated loss points.
- Show the loss results on the reflectometric diagram as a percentage variation.

If the measured optical connector attenuation is greater than 0.1 dB, the connections should be replaced.

Net

Appendix B provides detailed information on how to test the fibre optic installation.

5.6.5 Cleaning the optical cables

Optical connectors are similar to eyeglass lenses and therefore can be degraded by dust particles, finger grease and scratches. The connector ferrule can be inspected by means of a microscope.



To clean the optical cables

1. Open the connectors.

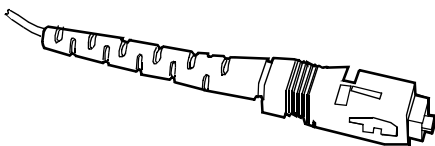


Figure 20. SCAP Connector

2. Apply a drop of cleaning liquid (pure alcohol) to the edge of then clean and dry it with a clean tissue, using a circular movement. Always use a clean tissue for each cleaning activity.
3. Remove any residue particles by using a clean dry air source.
4. Before reinserting the connectors, clean the adapter applying cleaning liquid into its center hole and removing it immediately with a clean dry air supply.
5. Reinsert the connectors into the adapter, avoiding any physical contact with the ferrules with fingers or with any other surface.

5.7 Connecting the cables to the Main Unit

The site will have been configured in accordance with the site requirements. The location of the Remote Units (RUs) within the building complex and the optic cables associated with each RU are identified.

Do not

Do not remove fibre optic cable connector covers until required to do so.

Do not

Do not bend the fibre optic cables beyond the recommended bend angle to ensure that the cables are not stressed or damaged in any way.

Figure 5.7 shows the location of the MU cable connectors and the optical fibre cables.

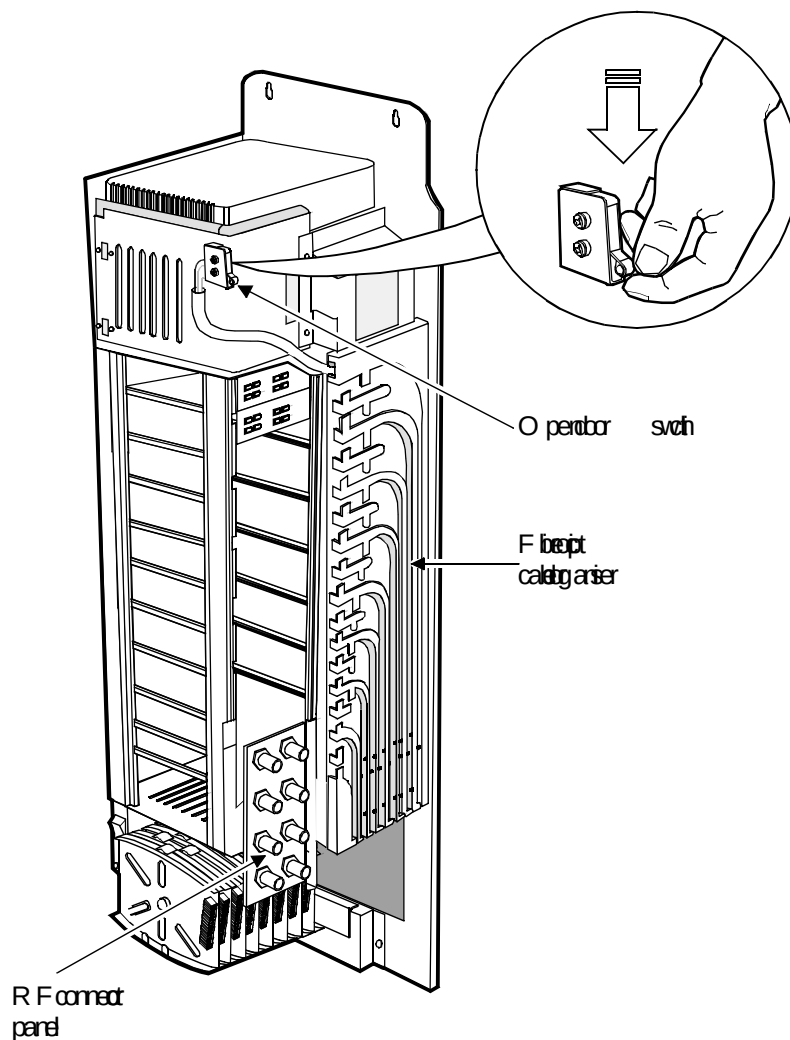


Figure 21 RFP board and optical cable

5.7.1 Connecting the fibre optic cables



WARNING

All fibre optic related work activities must only be performed by qualified and approved personnel.

5.7.1.1 Configurations

Two configurations are possible:

- Point-to-point
- Point-to-multipoint.

Point-to-point mode

The MU is installed in the centre of the building. Twin fibre optic each RU to the MU.

Point-to-multipoint mode

The main fibre optic cable contains up to 64 optical fibres. An RU by separating the fibres from the main cable using a distribution

5.7.1.2 Connecting the fibres between the Local Unit and the Remote Unit



WARNING

All fibre optic related work activities must only be performed by qualified and approved personnel.

Figure shows the MU fibre optic cable channeling.

Note

Pigtails are used between the Local Units (LUs) and the splice cassette. Splices are arranged in the splice cassette box.

In the case of RUs, pigtails are used between the RU and the splice cassette. Splices are arranged inside the splice holder.



To connect the fibre optic cables:

1. Locate the fibre optic cables from the RUs.
Check the following:
 - Each cable has an identifying label.
 - The cables are long enough for the splicing operation.
2. Check that the splicing tools are available and arrange the splicing area.
3. Check that every LU is correctly plugged into the MU.
4. Starting from the LU at the top of the MU (LU 1), select the corresponding labelled pigtail. Remove the connector cap.
5. Clean the optical connector and connect the pigtail to the connector of the LU.

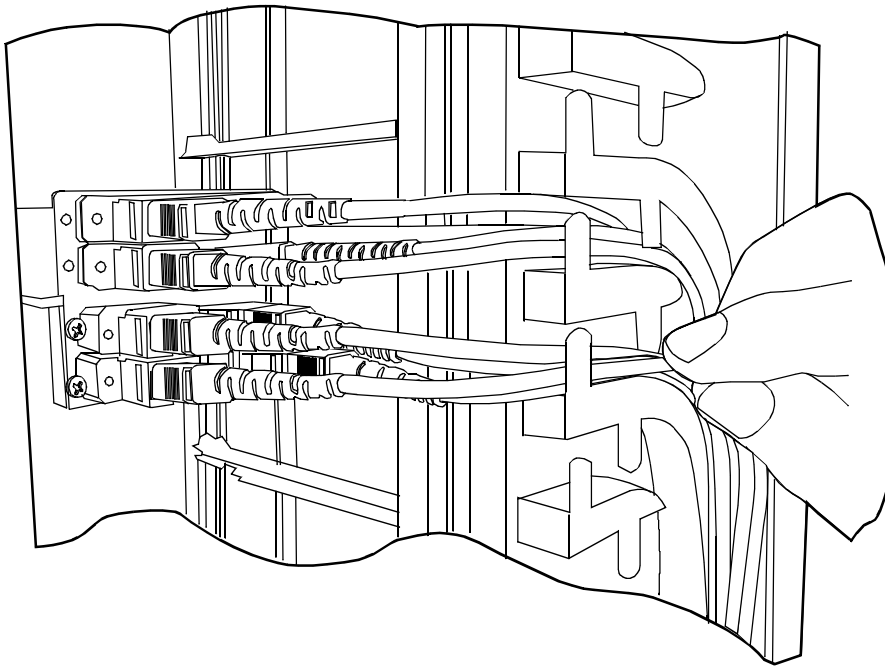


Figure 22 Arranging the pigtail

6. Arrange the pigtail in the correct cable channel in the fibre optic cable management system. If required, cut the pigtail to the correct length.
7. Locate the corresponding fibre from the RU. Splice the fibre to the pigtail.
8. Open the splice cassette box by levering open the plastic cover at the top of the cassettes using a screwdriver. Shown in Figure 23.



Figure 23 Opening splice cassette

Not

The splice cassette box contains eight cassettes. The box can be opened by cassette.

9. Arrange the splice and the loose fibre into the first cassette cassette box. Leave extra fibre, so that the cassette can be e
-

Not

Each cassette holds the splices for one LU. For each LU there are 1 splices.

10. Repeat steps 4 to 9 for the remaining pigtailed and the fibres Figure provides an example of how the fibres are arranged.

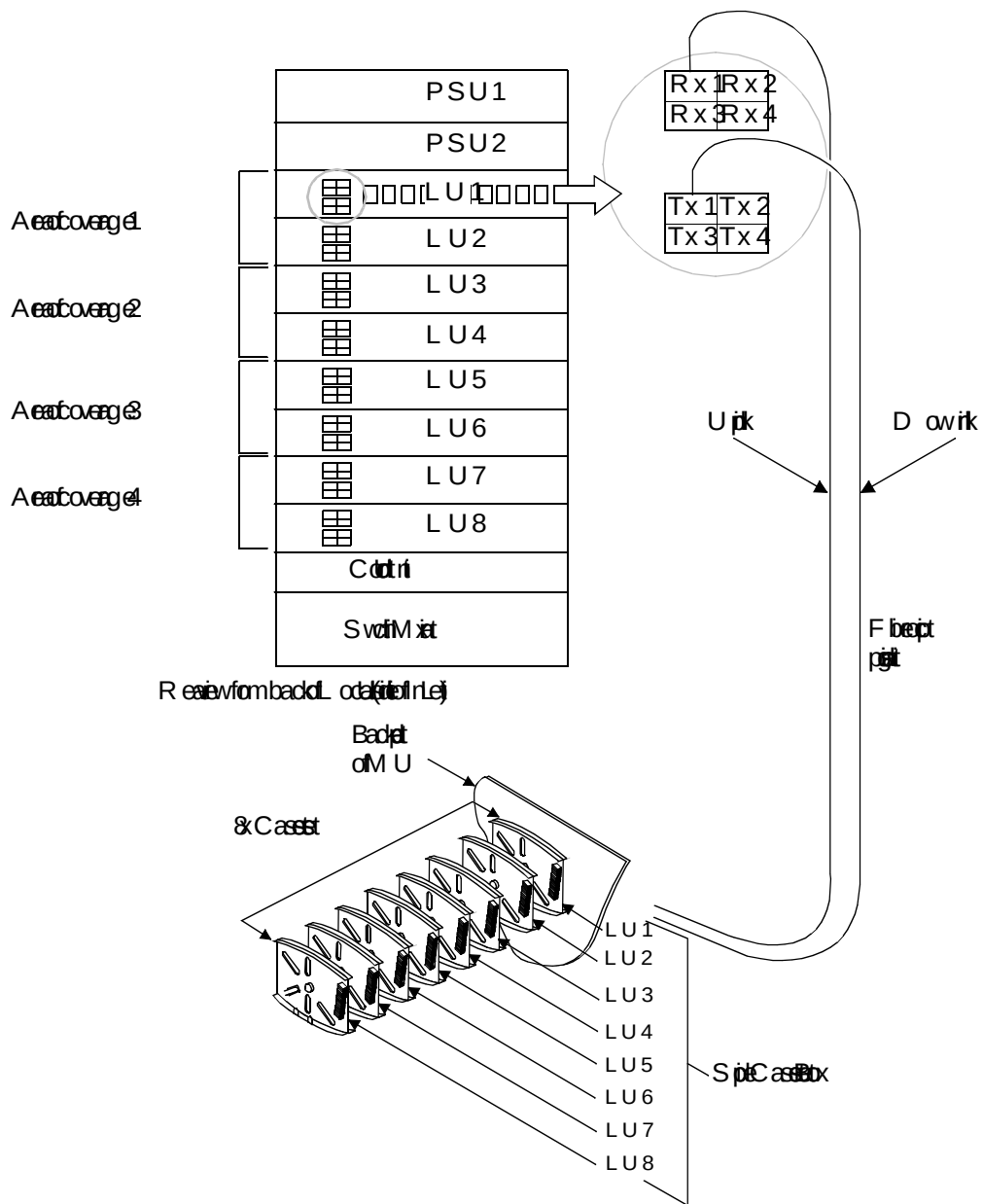


Figure 24. Communication

5.8 Installing the RUs

5.8.1 Pre-installation actions

Prior to installing the RUs, it is important that the site has been sufficiently to accommodate the equipment. Particular attention should be given to the following:

- Fibre optic cable lengths and type. The cables should be of a suitable weight, suitable bend radius and capable of withstanding tensile installation. The length of the cables will be determined by the coverage attainable by the strategic location of the RUs within the complex.
- Fibre optic cable terminations. These can be supplied suitably (cable lengths need to be known in this case) or cables can be terminated and then, by cable splicing, short cables provide connectors can be attached.
- The fibre optic cable connectors used must be angle-polished type connectors. Fusion splices to connect fibres are also suitable.
- RU locations. The most efficient manner for locating RUs is the minimum number of RUs for optimum cell coverage. The position of RUs must ensure the maintenance of their operating temperature.
- Power supply availability.
- All cables must be clearly labelled.
- The system configuration must be adequately documented.

5.8.2 RU IP41 Installation

Figure , shows the external interfaces of the RU.

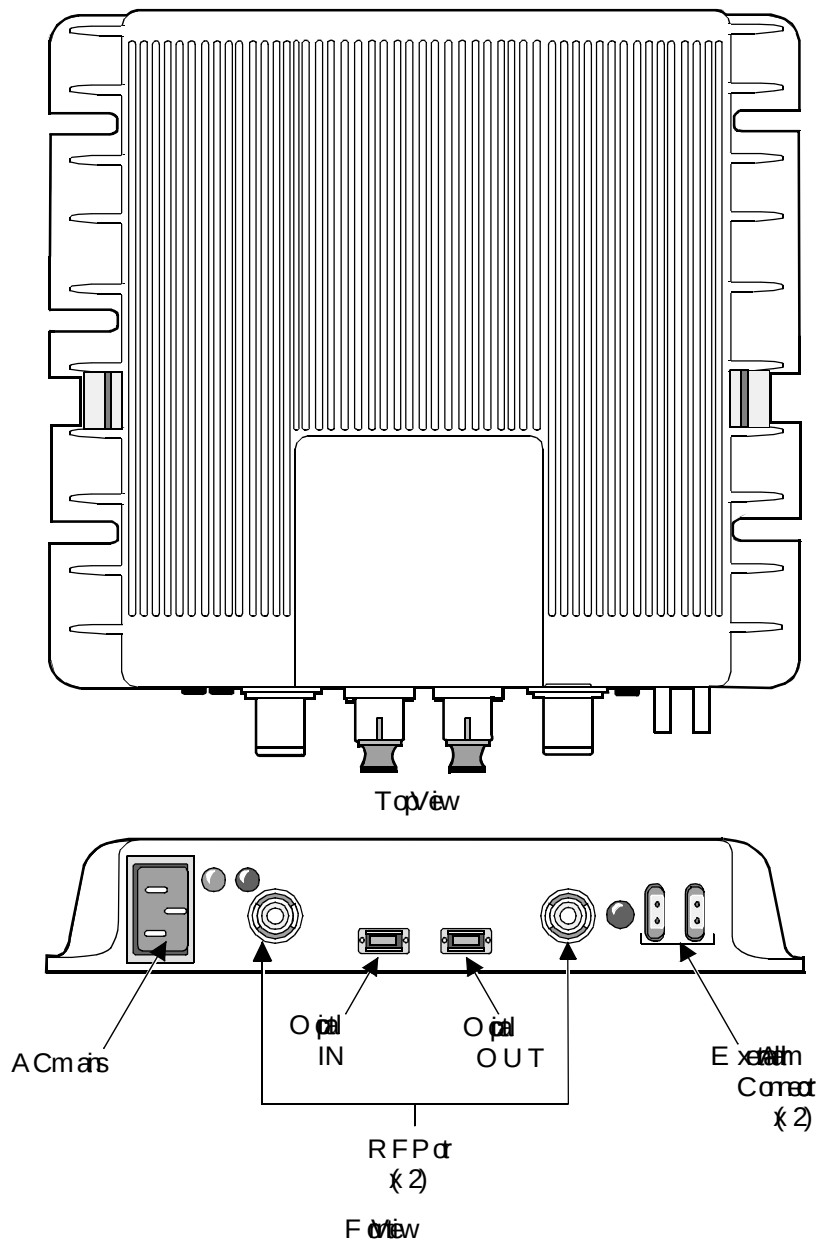


Figure 25. Remote Unit (RU)

Figure 25 shows a typical installation configuration within a building.

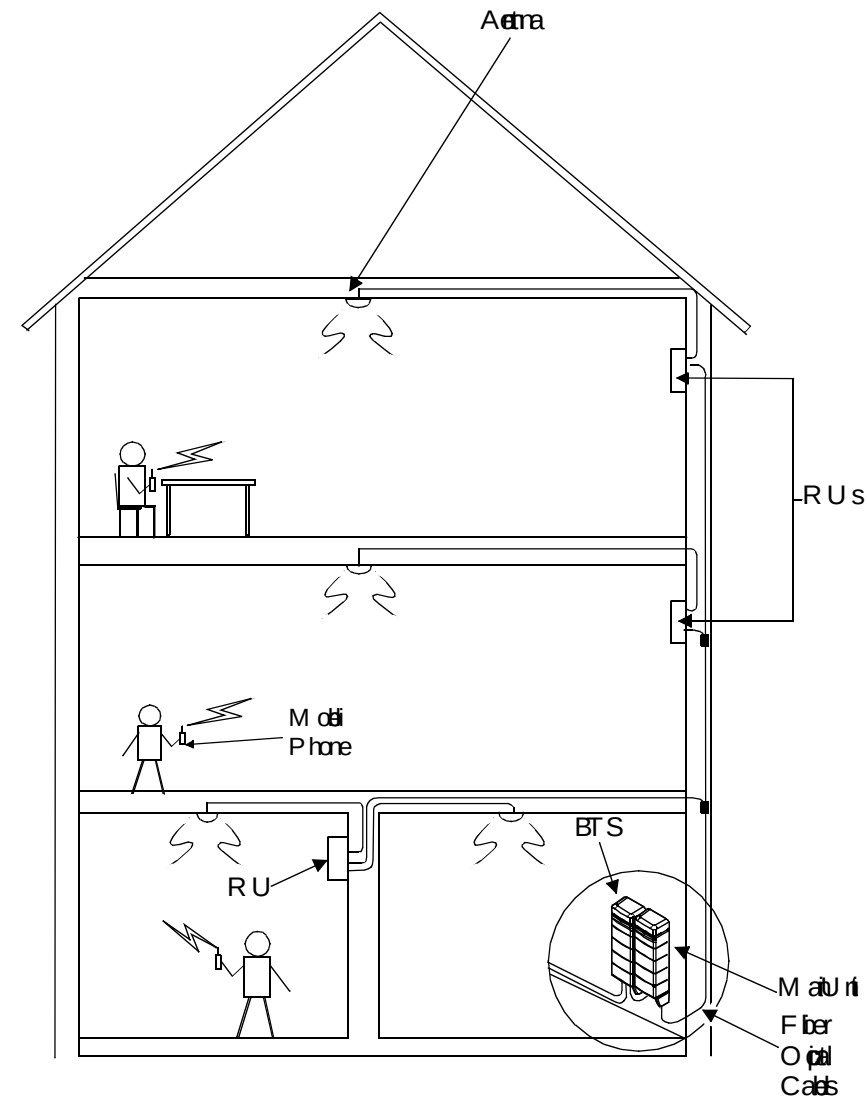


Figure 26. Non-co-located building example (pic)

The MU and the RUs do not have to be co-located in the same building. This diagram shows a typical example of this type of installation configuration.

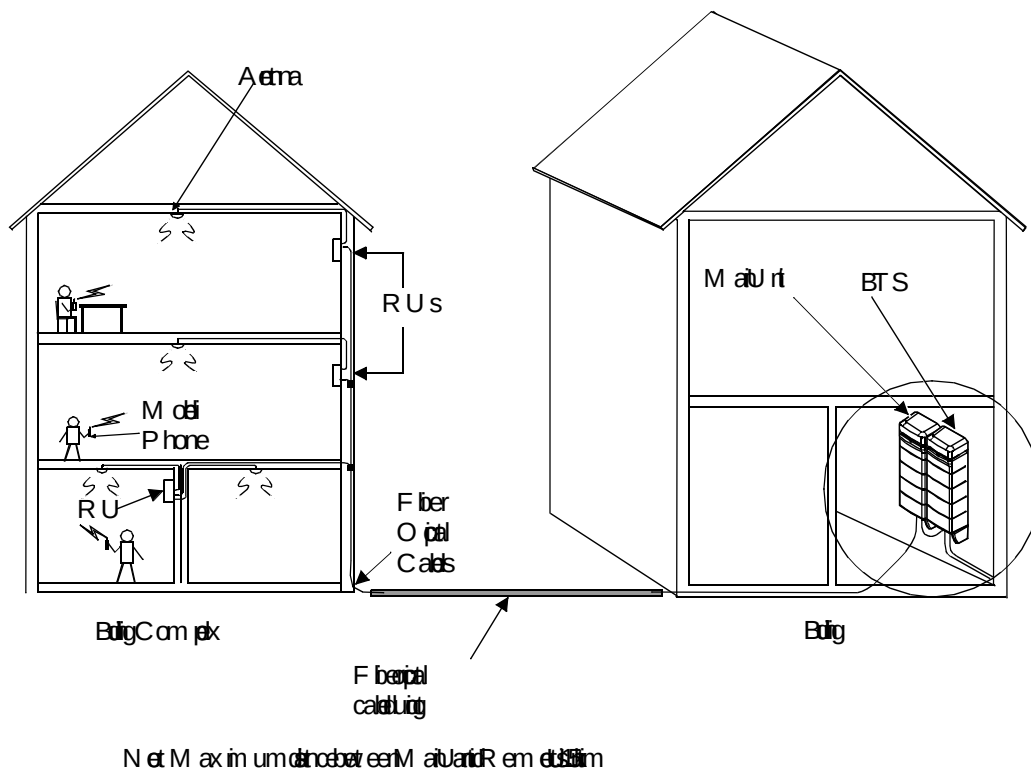


Figure 27. Main and RU subfeedings.



Installing the RU IP41, mounting rack and antennas:

Net

It is most important that the documentation showing the layout cable identification is consulted at all times.

1. Locate the holes drilled for the mounting of the RU or local pole.

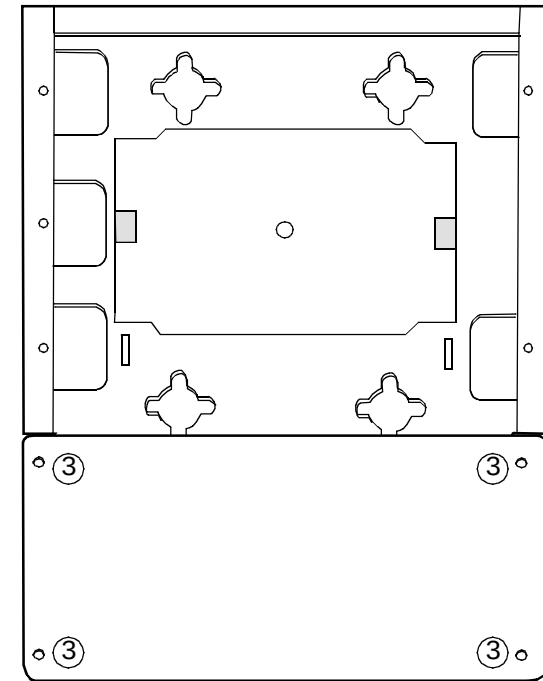


Figure 28. Removing the mounting rack cover

2. Remove the four M3 x 20 mm screws (3) holding the mounting rack cover in place and remove the cable cover.

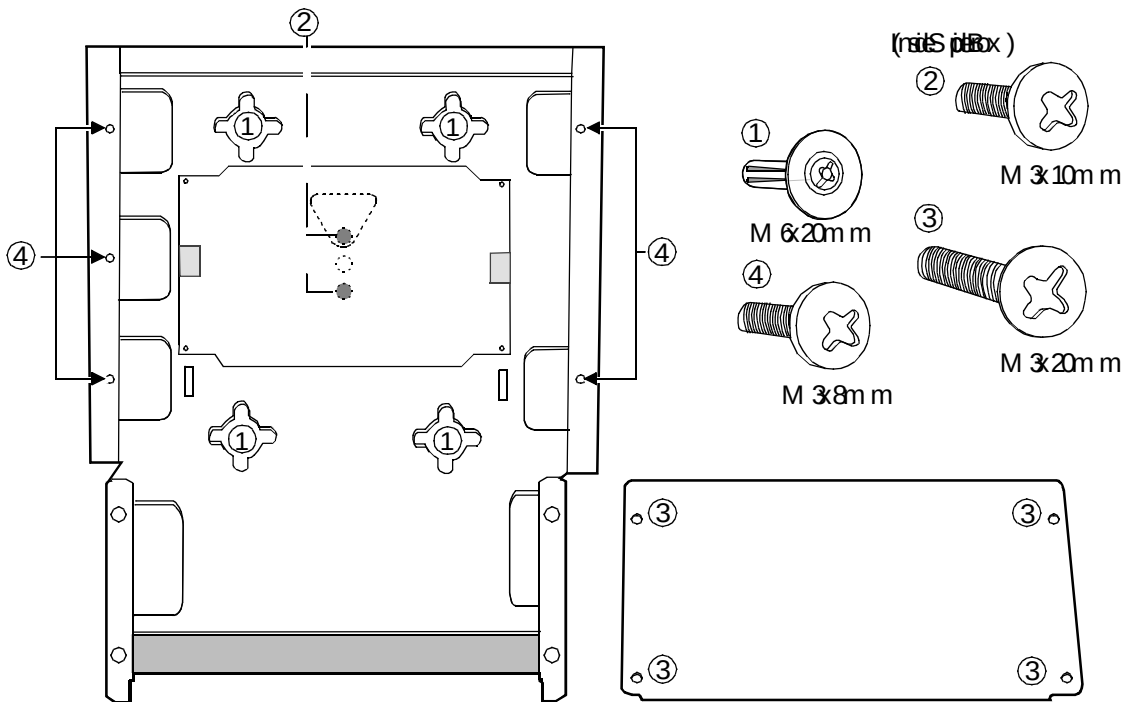


Figure 29. Removing unit and mounting accessories

3. Fix the mounting rack to the wall at the designated position using M6 x 20 mm Fisher screws
4. Open the splice tray cover and fix the splice holder using screws (2).

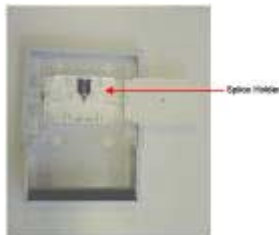


Figure 30. Removing splice holder

5. Arrange the optical splices in the splice holder and close the splice tray cover.

6. Fix the Remote Unit into the mounting rack using the five M3 x screws provided.
7. Connect the antenna cable between the antenna and the RU. Up to 4 antennas can be connected to the RU. Ensure that the antenna cables are neatly routed and secured.

Notes

If only one antenna is connected, use a 50 ohm termination for the unused connector.

Notes

Do not over-tighten the connectors. If N-type connectors are used, torque is sufficient.

8. Connect the F0 cables (uplink and downlink) to the RU.
9. Connect the power cable to the RU.
10. Screw the mounting rack cable cover in place, using the four M3 x screws (3) provided.

5.8.3 RU IP53 Installation



Installing the RU IP53, mounting rack, mounting rack cover and antennas

Notes

It is most important that the documentation showing the layout of the cables and cable identification is consulted at all times.

1. Locate the holes drilled for the mounting of the RU or locate the mounting pole.

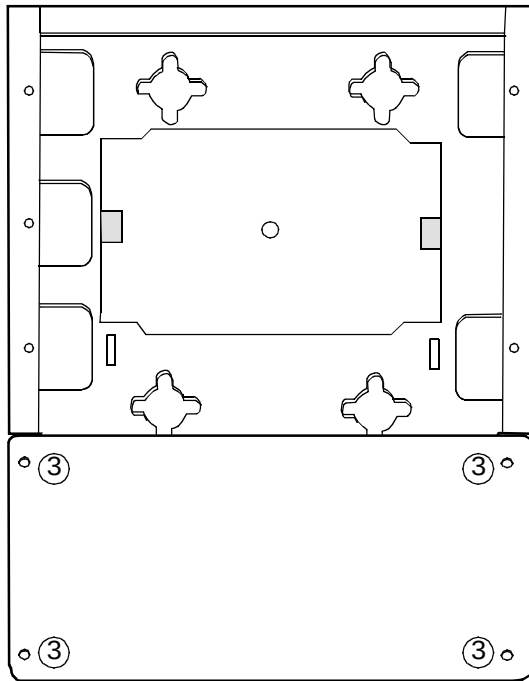


Fig. 81. Remplacement d'une unité

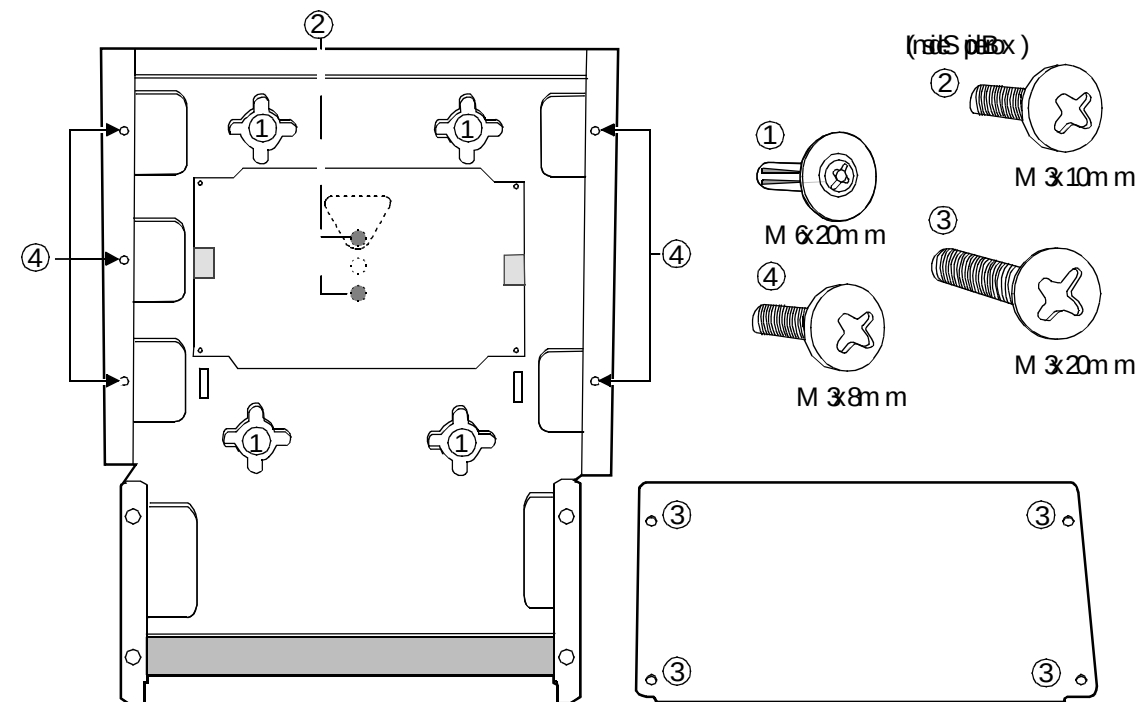


Figure 2 Removal of mounting accessories

2. Remove the cover of the mounting rack.
3. Fix the mounting rack to the wall at designated position using x 40 mm Fisher screws provided.
4. Open the splice tray cover and fix the splice holder.
5. Arrange the optical splices in the splice holder and close the
6. Fix the RU into the mounting rack using the five M3 x 8 mm scr provided.

7. Connect the antenna cable between the antenna and the RU. antennas can be connected to the RU. Ensure that the antenna is neatly routed and secured.

Notes

If only one antenna is connected, use a 50 ohm termination for the connector.

Notes

Do not over-tighten the connectors. If N-type connectors are used, the torque by hand is sufficient.

8. Connect the F0 cables (uplink and downlink) to the RU.
9. Connect the power cable to the RU.
10. Screw the mounting rack in place, using the four M3 x 20 mm screws.
11. Insert the enclosure cover by sliding it downwards from the top of the backplate along the bars on both sides of the backplate.
12. Secure the cover to the wall using one M6 x 40 Fisher screw.

5.8.4 RU IP64 Installation



Installing the RU IP64

Notes

It is most important that the documentation showing the layout of the cables and cable identification is consulted at all times.

1. Locate the holes drilled for the mounting of the RU or local antenna on the wall or pole.
2. Remove the ten M5 x 16 screws from front of the RU cover to detach the cover from the enclosure and open the cover.
3. Fix the enclosure backplate to the wall at designated positions using the four M6 x 40 mm Fisher screws provided.
4. Open the splice tray cover and fix the splice holder.
5. Draw the optic cables very carefully into the enclosure through the cable management tray and devote them to the splice holder.
6. Arrange the optical splices in the splice holder and close the splice tray cover.
7. Connect the F0 cables (uplink and downlink) to the RU.

-
8. Connect the antenna cable between the antenna and the RU. Up to 4 antennas can be connected to the RU. Ensure that the antenna cable is neatly routed and secured.
-

Notes

If only one antenna is connected, use a 50 ohm termination for the unused connector.

Notes

Do not over-tighten the connectors. If N-type connectors are used, a screwdriver is sufficient.

9. Connect the power cable to the RU.
10. Close the enclosure cover and secure it to the backplate using the screws provided.

5.9 Connecting the RF cables



To connect the RF jumper cables

Not

The RF connectors on the MU connector panel are numbered (1-8)

Not

Do not connect the RF jumper cables to the BTSs until required Inlite System commissioning phase. For more information, refer to Inlite Commissioning

1. Obtain the appropriate number of RF jumper cables (eight max per transportation package. The connectors have angled connector type).
2. Connect the RF jumper cable to the MU and connect it to the RF connector on the RF panel. Take care not to over bend or tighten the connector.
3. Repeat steps 2 and 3 for the remaining RF jumper cables.

Figure 33 shows two RF cables connected to the RF panel

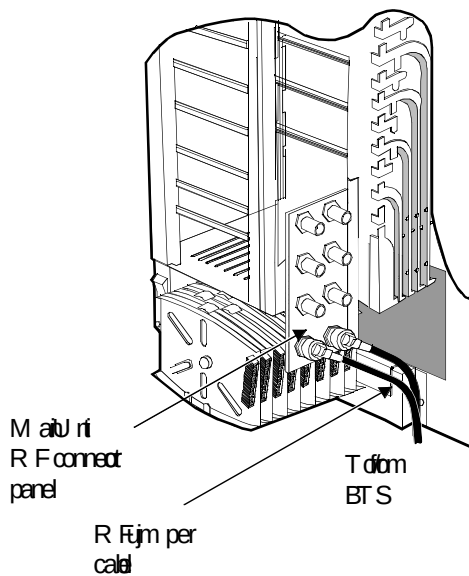


Figure 33. RF jumper cables connected to Main RF connect panel

5.10 Connecting the power

More information on the power connection is provided in Requirements for Installation and Operation information on the power cable requirements, refer to: Product Description

5.10.1 Remote Unit

The RU can be supplied by a central power supply (-48 VDC) or a local (110 VAC or 220 VAC). Connect or switch on the power to the RUs.

5.10.2 Main Unit

The Main Unit has a fixed power cable for 110 VAC or 220 VAC power. The appropriate plug should be connected. For more information about the power supply cable, refer to the Nokia Product Description. Switch the Main Unit power on.

5.11 Connecting the local management PC

5.11.1 Connecting the PC



To connect the PC and start the Supervisor Software

1. Connect the LMP cable to the LMP connector of the Main Unit and laptop PC.
2. Start the PC and the Supervisor Software.

Not

For more information about the Supervisor software, refer to the Nokia Commissioning

5.11.2 Checking the alarm status

If the F0 cable connections between the RU and MU have been made correctly, the only alarm which should be active when the software is started is the door alarm. This alarm can be deactivated by manually operating the alarm switch (see Figure) the alarm should then be cancelled.

If other alarms are active, alarm description

Net

It is possible at powerup, the BkUp alarm will be active. If t
click the BkUp button in the main window of the Supervisor soft
the BkUp window. The alarm should now be cancelled.

5.11.3 Recording RU and MU placing

Record the location of the MU and RUs in the Main Unit and Rem
Placing window of the Supervisor Software.

More information on the software Nokia Inlite is Commissioning

5.12 Labelling the fibre optic cables

Label every FO cable at the RU and LU ends.

The label at each end should provide the following information

- Floor/building where the RU is located
- RU number
- Downlink or uplink.

5.13 Fitting the Main Unit cover

Net

This procedure is carried out after the Nokia Inlite System ha
commissioned.

The assembly comprises:

- Cable cover
- Cable cover support
- MU cover
- Plastic cover lock

The main cover and cable cover are shown in Figure .



To fit the Main Unit cable cover support, cable cover and cover

1. Obtain the cable cover support and secure to the bottom right of the MU backplate using the M4 nut and shakeproof washer provided. The cable cover support is located via a stud on the backplate.
2. Obtain the cable cover and holding the cables such as to allow the cover to pass over them, push the cable cover back then down into position on the cable cover support.
3. Lift the MU plastic cover and carefully slide it over the enclosure. At the same time ensure that the cable cover locking pieces are aligned with the recesses on the backplate.
4. Ensure that no cables are trapped between the unit and the backplate.
5. Press the cover in position onto the MU backplate.
6. Push the cover down from the top and at the same time keeping it firmly pressed against the backplate, make sure that the all cable cover pieces are securely located in the backplate recesses.
7. Insert the locking assembly in position as shown in Figure . Using the key provided, lock the plastic cover in position.

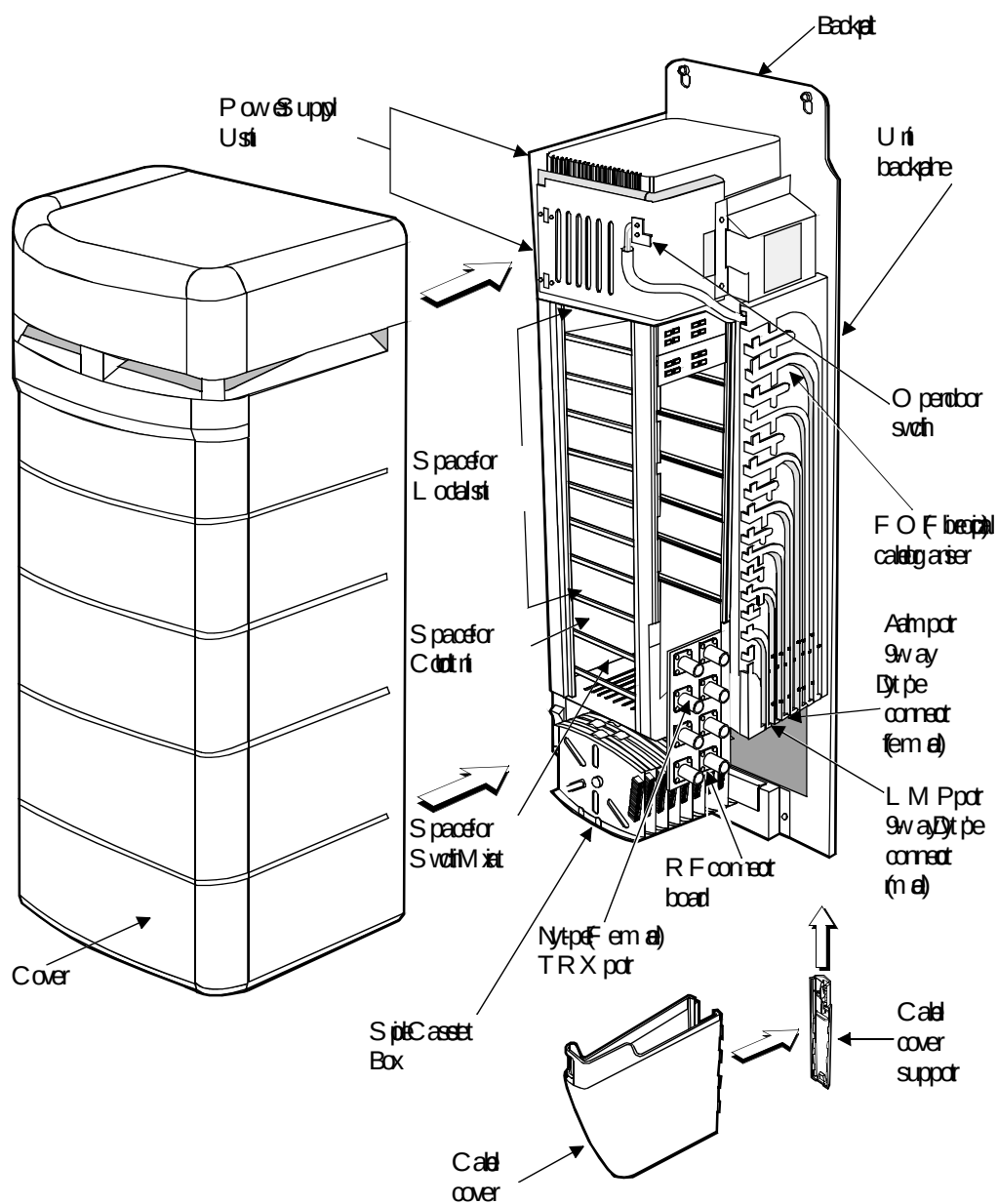
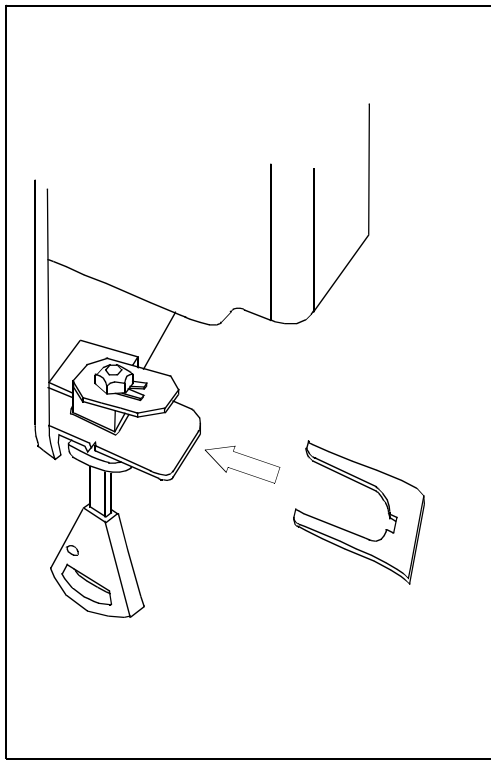
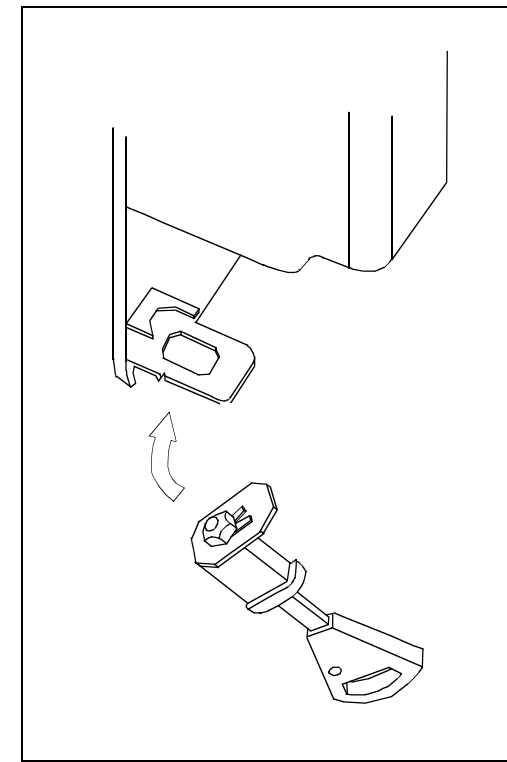


Figure 34. Maltodextrin coverage



D N 00280774

Figure 55 Lock cover

5.14 Installation checks



To check that installation of the Nokia Inlite System has been satisfactorily completed:
Check the following:

1. The RUs were installed in accordance with this document.
2. The MU was installed in accordance with this document.
3. The fibre optic cables have been correctly installed.
4. All FO cables have been tested.
5. There are no alarms in the LU and RU windows of the Supervisor Software.

6. The cables between the RUs and LUs of the MU have been corrected according to this document.
7. All fibre optic and RF cables have been correctly labelled.
8. Information for the Main Unit and Remote Unit Placement window recorded and entered.

Appendix A Technical instructions for optic fibre installation testing

A.1 Scope

This Appendix describes the test procedure to be performed after the installation of fibre optic cables.

A.2 Acronyms

Acronym	Meaning
SM	Single Mode
OTDR	Optical Time Domain Reflectometer
TPA	Two Point Attenuation Measurement
MTAV	Maximum Test Attenuation Value
ACR	Attenuation Compliance Requirement
UL	Up-link
DL	Down-link
RL	Return Loss

Table 1. Acronyms

A.3 Test activities definition

Test activities on fibre optic cabling are required in order to verify that the installation procedures and relevant optical material fulfil all the requirements and are compliant with the aims of the optical distribution system for which it is designed.

Installation tests shall check the optical system performances and shall be carried out following these steps:

- Test Measurements
- Compliance Declarations.

Test measurements results are required for fibre optic attenuation evaluation; for any other specification, the Subcontractor has declaration of compliance referring to each technical constraint. Section 5 of this Appendix.

A.4 Installation Test Measurements

This section describes the optical tests to be carried out during installation to verify the compliance of the system with the technical requirements. Section 5 of this Appendix.

The Subcontractor has to perform measurements on 100% of fibre in the system.

The optical signal at 3rd window (1550nm) has to be assumed as reference value for each measurement to be performed:

- Optical Attenuation Evaluation
- Optical Length Evaluation
- Back-reflected Power Diagram.

Section 6 of this Appendix shows a measurement report model for optical attenuation and length evaluation; a copy of back-reflection diagram is included in the installation test documentation.

The technique used is the Two-Point Attenuation measurement (TAP) as illustrated in Figure 1.

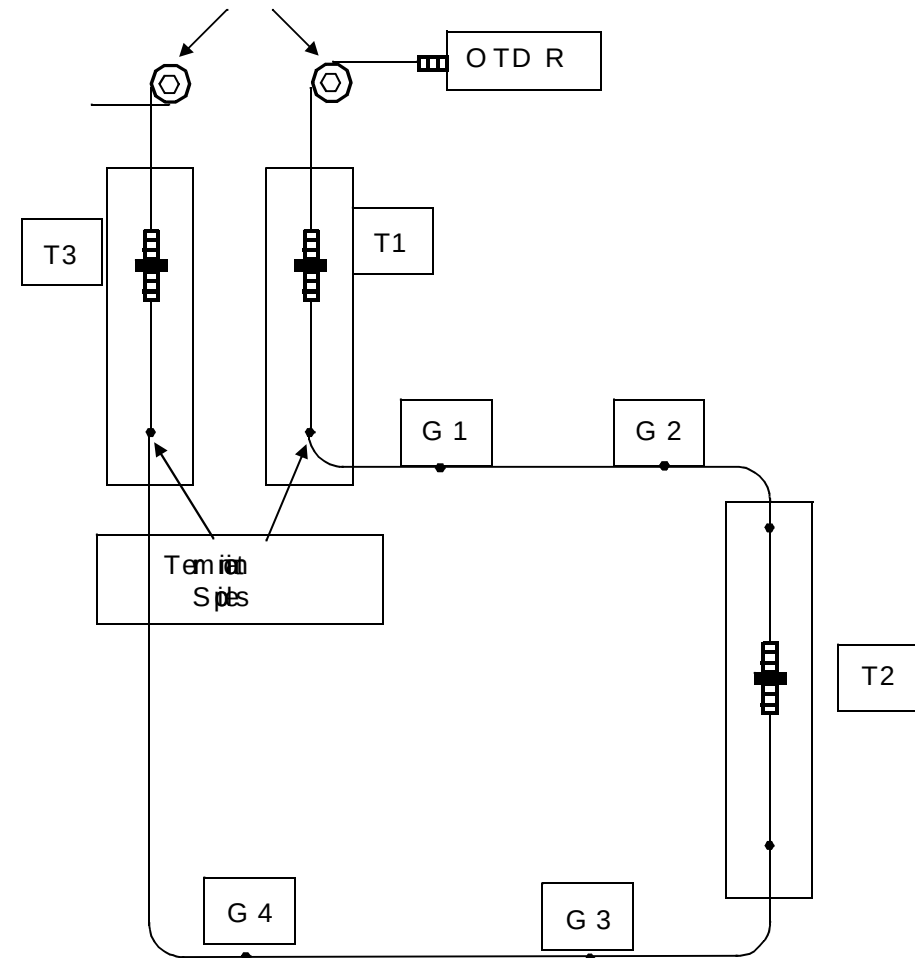


Figure 36. Initial fibre optic network (OTDR R)

A.4.1 Optical Attenuation Measurement

The Subcontractor has to provide a report on optical attenuation measurements in order to guarantee that the attenuation of each fibre optic is not a theoretical value due to theoretical evaluation (MTAV) based on acceptance parameters. Measurements, carried out by means of OTDR using the back-reflection technique, have to be as required for single-mode fibre. Two fibres

at least, called “launching fibres”) must be connected with both ends of the fibre optic cable so that connector attenuation is included in the measurement results.

Net

The measurement must be performed as follows:

1. Connect OTDR to one end of the fibre optic cable and perform a measurement.
2. Connect the OTDR to the other end of the fibre optic cable and perform a measurement.
3. Average the two measurement results to obtain the real optical loss.

The MTAV reference value is determined basing on the following formula:

$$MTAV = \left(\alpha \times L + \sum_{n=1}^N S_n + \sum_{a=1}^A C_a \right) \times 0.001$$

Figure 37. MTAV formula

Where ...	Represents	Value
α	Fibre optic cable loss coefficient (reference value of 0.2 dB/km)	dB/km
L	Length of the fibre optic cable (L = L ₁ + D + L ₂)	Km
S_n	Number of splices	-
S_a	Reference splice loss (provided in the specification)	dB
C_n	Number of connectors	-
C_a	Reference connector loss (provided in the specification)	dB

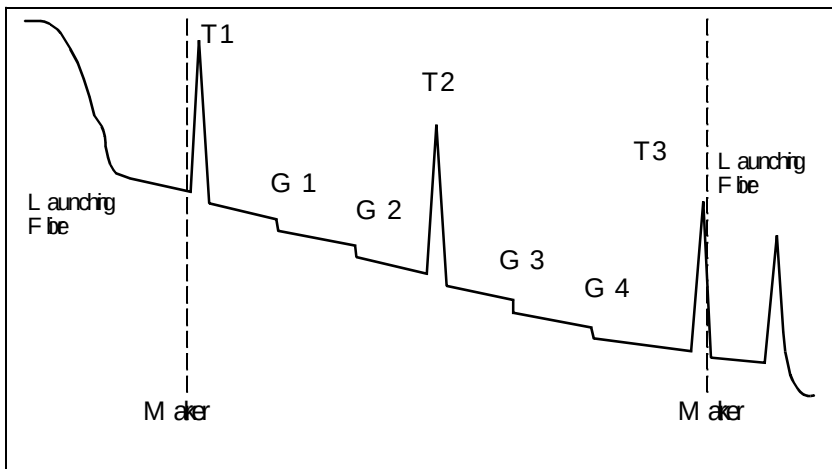


Figure 8. Optical measurement (OTDR Report)

A.4.2 Optical length measurement

Power back-reflection technique has to be assumed as the reference computing the fibre optic length.

The Subcontractor has to carry out an end-to-end measurement report optic length using the model shown in Section 6, which has to be in installation test documentation.

A.4.3 Back reflected power diagram

Fibre optic attenuation has to be uniformly spread without any high per the technical specification described in Section 5. The condition tested and reported by means of the back-reflected power diagram in installation documentation.

A.4.4 Optical link check

In order to verify installation activities and tests not to cause a between uplink and downlink, a link check by means of a visible optical required, even if no test report must be provided by the Subcontractor.

Figure shows how to connect the Optical Source and the Power Meter to perform the link check for uplink and downlink.

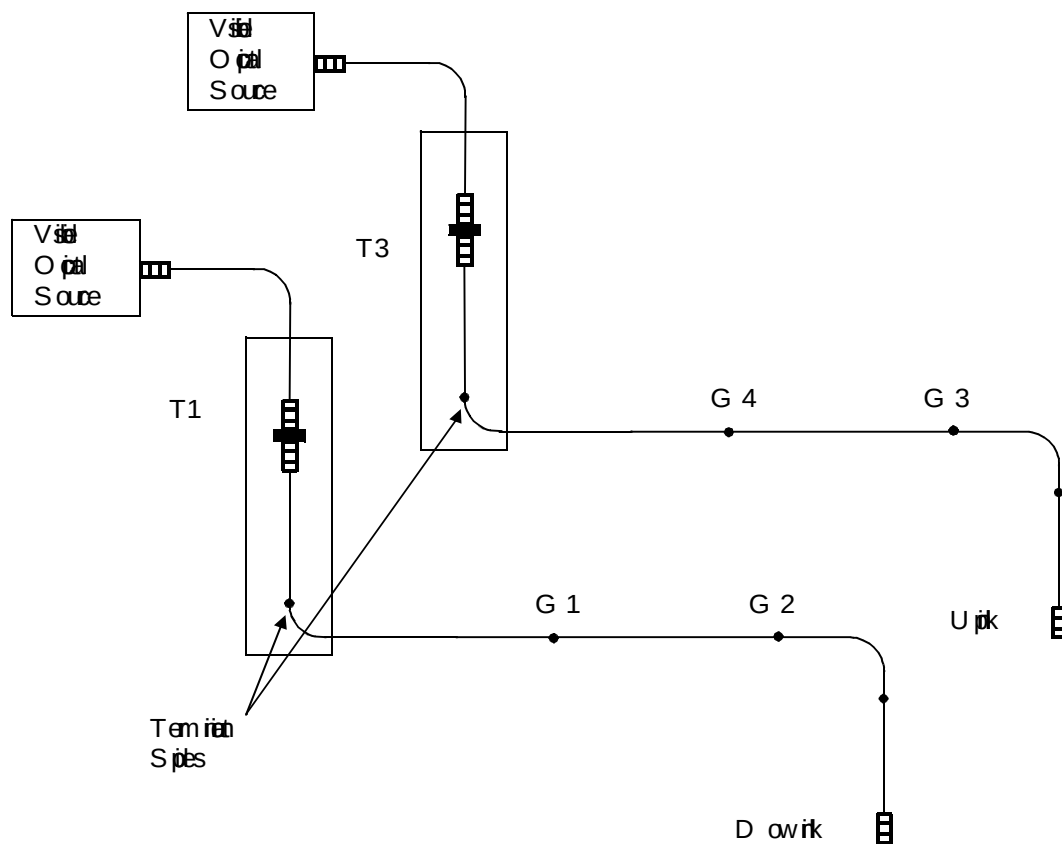


Figure 39. Composite power net

A.5 Compliances

A declaration of compliance is required from the Subcontractor technical specifications included in this chapter.

All the activities are supposed to be compliant with specific Subcontractor is responsible also for all of them, even if no t Splices on fibre optic cables have to be carried out by means semiautomatic devices, so that to provide efficiency of the op per the technical specification included in this appendix.

Installation procedures, materials and equipment must be compl requirement concerning the adoption of the fusion splicing tec However, a preliminary agreement with the Project Manager is r these aspects.

Definition Attenuation Compliance Requirement is the maximum a value due to a single component in the optical connection.

A.5.1 Fibre optic

Specification	Value
Fibre type	SM R (125 μ m)
Wave length (nm)	1550
IL window	1310 $\pm$ 10
IL window	1550 $\pm$ 10
Spectral width (nm)	10
IL window	0.1
IL window	0.2
High loss (dB)	$\leq$ 0.1

Table 1 Fibre optic standards

A.5.2 Splice and connector

Specification	Value
Splice AC R (dB)	$\leq$ 0.2
Connector AC R (dB)	$\leq$ 0.5
Connector L (dB)	$\geq$ 55

Table 2 Splice and connector standards

A.5.3 Measurement parameters

Time-domain impulse to perform back-reflected power technique measurement has to be chosen in connection with the fibre optic length, in order to ensure measurement result reliability (See Table 10).

Specification	Value
Reference	1675
Weight (g)	1550

Table 3. Measurement error specifications

A.6 Installation test document (example)

PAG ____/____

OPTICAL TEST

Project _____
Company _____

☐ Company Test

☐ Verification

MEASUREMENT PARAMETERS

Wavelength λ [nm]: _____

Refractive Index n: _____

TOTAL ATTENUATION AND OPTICAL LENGTH MEASUREMENTS

Theoretic Attenuation = $[(\alpha \cdot L) + (S_a \cdot S_n) + (C_a \cdot C_n)]$ [dB]

Remote Unit Code	Fibre optic	Computed Att. (dB)	Total Att. (dB)	Optical Link Length (m)	Remote Unit Code	Fibre optic	Computed Att. (dB)	Total Att. (dB)	Optical Link Length (m)
	UL					UL			
	DL					DL			
	UL					UL			
	DL					DL			
	UL					UL			
	DL					DL			
	UL					UL			
	DL					DL			
	UL					UL			
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Company Verifier Signature _____
Date ____/____/____

Verifier Signature _____
Date ____/____/____

Figure 10. Open