User's Manual

for

Optical Remote Unit MMR8/19 (ID No 159207)

Mikom GmbH An Andrew Company, 21-August-2003

TABLE OF CONTENTS

FIGURES AND TABLES

For your notes

1. GENERAL

1.1. USED ABBREVIATIONS

ALC	Automatic Level Control
AMPS	American Mobile Phone System or Advanced Mobile Phone System
APAC	Automatic Power Adjustment Circuit
BCCH	Broadcast Control Channel
BITE	Built In Test Equipment
BTS	Base Transceiver Station
CDMA	Code Division Multiple Access
CEPT	Conférénce Européenne des Postes et Télécommunications
CF	Center Frequency
CFO	Center Frequency Offset
DL	Downlink
EDGE	Enhanced Data Rates for GSM Evolution
ESD	Electrostatic Discharge
ETACS	Enhanced TACS
ETS	European Telecommunication Standard
ETSI	European Telecommunication Standards Institute
FSK	Frequency Shift Keying
GSM	Global System for Mobile Communication
I^2C-Bus	Inter Integrated Circuit Bus (Philips)
ID No	Identification Number
IF	Intermediate Frequency
LMT	Local Maintenance Terminal
MOR	Mikom Optical Remote unit
MS	Mobile Station
OMC	Operation and Maintenance Center
PCMCIA	Personal Computer Modem Communication International Association
PCS	Personal Communication System
PSTN	Public Switched Telephone Network
Rev	Revision
RF	Radio Frequency
RLP	Radio Link Protocol
RSSI	Receive Signal Strength Indication
RTC	Real Time Clock
RX	Receiver
SCL	Serial Clock
SDA	Serial Data
TACS	Total Access Communication System
TCH	Traffic Channel
TDMA	Time Division Multiple Access
TX	Transmitter
UL	Uplink
UMTS	Universal Mobile Telecommunication System
UPS	Uninterruptable Power Supply
VSWR	Voltage Standing Wave Ratio

1.2. HEALTH AND SAFETY WARNINGS

1. Only suitably qualified personnel is allowed to work on this unit and only after becoming familiar with all safety notices, installation, operation and maintenance procedures contained in this manual.

2. Read and obey all the warning labels attached to the unit. Make sure that the warning labels are kept in a legible condition and replace any missing or damaged labels.

3. Obey all general and regional installation and safety regulations relating to work on high voltage installations, as well as regulations covering correct use of tools and personal protective equipment.

4. Keep operating instructions within easy reach and make them available to all users.

5. It is the responsibility of the network provider to implement prevention measures to avoid health hazards which may be associated to radiation from the antenna(s) connected to the unit.

6. Make sure, access is restricted to qualified personnel.

7. Use this equipment only for the purpose specified by the manufacturer. Do not carry out any modifications or fit any spare parts which are not sold or recommended by the manufacturer. This could cause fires, electric shock or other injuries.

8. Due to power dissipation, the remote unit may reach a very high temperature.

9. Before opening the unit or (dis-)connecting the mains connector at the remote unit, ensure that mains supply is disconnected.

10. ESD precautions must be observed! Before commencing maintenance work, use the available grounding system to connect ESD protection measures.

11. This unit complies with European standard EN60950.

12. Make sure the system settings are according to the intended use (see also product information of manufacturer) and regulatory requirements are met.

13. Although the remote unit is internally protected against overvoltage, it is strongly recommended to earth the antenna cables close to the remote unit's antenna connectors for protection against atmospheric discharge.

14. Laser radiation – Class 1! Do not stare into the beam, do not view it directly or with optical instruments.

1.3. PREAMBLE

Mikom An Andrew Company is a leading manufacturer of coverage equipment for mobile radio networks, specializing in low cost, high performance, RF and optical repeaters. Our optical distributed networks and RF repeater systems provide coverage for every application: outdoor use, indoor installations, tunnels, subways and many more.

Mikom has engineering and manufacturing facilities in Germany, Italy and the USA. In addition, it maintains many field engineering offices throughout the world.

Mikom GmbH operates a quality management system which complies with the requirements of ISO 9001. All equipment is manufactured using only highly reliable materials. In order to ensure constant first-rate quality of the products, a comprehensive quality assurance has been conducted at all fabrication stages. Every component leaves the factory only after a thorough final acceptance test, accompanied by a test certificate guaranteeing optimal function.

The declaration of conformity for the product is available on request via the local offices or from Mikom directly.

Any intervention must be carried out by authorized persons only. If technical assistance for the product is required, please contact the local office or Mikom directly at one of the following addresses:

Mikom GmbH An Andrew Company
Industriering 10
86675 Buchdorf
Germany
Phone: +49 (0) 9099 69 0
Fax: +49 (0) 9099 69 930
email: WIsupport.germany@andrew.com

for The Americas:

Mikom US An Andrew Company
Phone: +1 (919) 771-2570
email: WIsupport.us@andrew.com

When set-up is performed according to this manual, the system will operate without complications for a significant length of time.

1.4. INTERNATIONAL CONTACT ADDRESSES

in Australia 6 Stuart Street Padstow NSW 2211 Australia Phone: +61 (2) 9774-4200 Fax: +61 (2) 9774-4500 email: WIsupport.australia@andrew.com	**in France** Z.I. des Ebisoires 78370 Plaisir France Phone: +33 (1)30-79-15-36 Fax: +33 (1) 30-55-55-37 email: WIsupport.france@andrew.com	**in the USA** 108 Rand Park Drive Garner NC 27529 USA Phone: +1 (919) 771-2570 Fax: + 1 (919) 771- email: WIsupport.us@andrew.com
in the UK Guildgate House Pelican Lane Newbury RG14 1NX, Berkshire, U.K. Phone: +44 (1635) 569-695 Fax: +44 (1635) 569-463 email: WIsupport.uk@andrew.com	**in China** Ground Floor, Unit F, Tower 2 The Astoria 198 Argle Street, Mau Tau Wai, Kowloon Hongkong Phone: +852 2778 3187 Fax: +852 2778 3187 email: WIsupport.china@andrew.com	**in Canada** 1815 Ironstone Manor, # 12 Pickering, Ontario L1W 3W9 Canada Phone: +1 (905) 839-3474 Fax: +1 (905) 839-4663 email: WIsupport.canada@andrew.com
in Switzerland Tiergartenweg 1 4710 Balsthal Switzerland Phone: +41 (6238) 61260 Fax: +41 (6238) 61261 email: WIsupport.switzerland@andrew.com	**in Italy** Via De Crescenzi 40 48018 Faenza Italy Phone: +39 0546 697111 Fax: +39 0546 682768 email: WIsupport.italia@andrew.com	**in Austria** Weglgasse 10 2320 Schwechat Austria Phone: +43 (1) 706 – 3999 Fax: +43 (1) 706 – 39999 email: WIsupport.austria@andrew.com
in Czech Republic U Morusi 888 530 06 Pardubice-Svitkov Czech. Republic Phone: +42 (0406) 301280 Fax: +42 (0406) 301298 email: WIsupport.czechrep@andrew.com		

table 1-1 List of international contact addresses

2. INTRODUCTION

2.1. PURPOSE

Cellular telephone systems transmit signals in two directions between base transceiver station (BTS) and mobile stations (MS) within the signal coverage area.

If weak signal transmissions occur within the coverage area because of indoor applications, topological conditions or distance from the transmitter, extension of the transmission range can be achieved by means of an optical distribution system.

Such a system contains an optical master unit and several remote units. The number of the remote units depends on the hardware and software configuration. The remote units are connected to the master unit with optical links. The optical loss must be less than 10 dB inclusive optical couplers or splitters.

The master unit is the connection to the BTS. The configuration of a master unit depends on the number of the remote units and the frequency range.

The optical transmission uses WDM-systems with a wavelength of 1550 nm in the uplink and 1310 nm in the downlink.

2.2. THE MMR8/19

The fibre optic distribution system is designed for AMPS/PCS or iDEN/PCS services. Up to two bands can be transmitted. In future applications each fibre will be able to serve up to four remote units and to operate up to four providers. One master unit can operate up to 124 remote units.

An auto-levelling function for compensating different fibre losses and a comprehensive supervision concept are implemented.

The remote unit MMR8/19 is connected to a central master unit through optical fibre lines. Specific customer designs for lamp pole or wall mounting are available. Thus, the system provides many advantages in view of easy site acquisition.

For your notes

3. FUNCTIONAL DESCRIPTION

3.1. GENERAL

The following figure shows the configuration of a MMR8/19 remote unit.

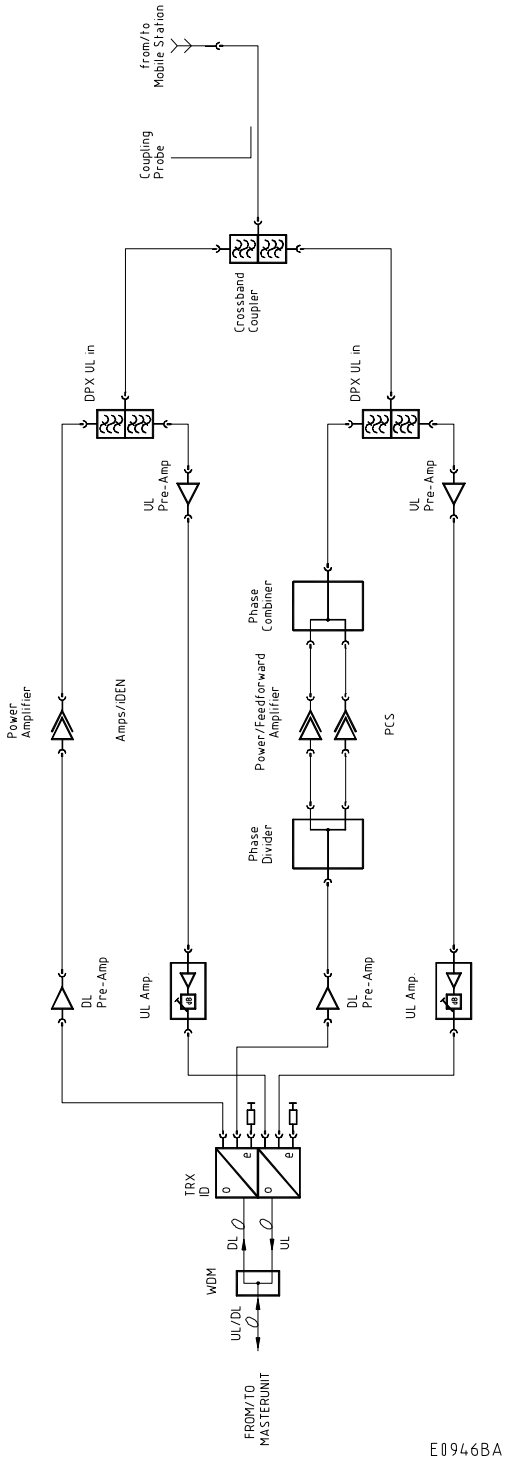


figure 3-1 Configuration of a MMR8/19 remote unit

3.2. COMPONENTS OF THE MMR8/19 REMOTE UNIT

The actual configuration of the remote unit can be seen at the configuration list which is part of the delivery.

3.2.1. Components Inside the Unit

The following figures show exemplary views of an MMR8/19 remote unit – except for the fan housing without cover – to illustrate the individual components.

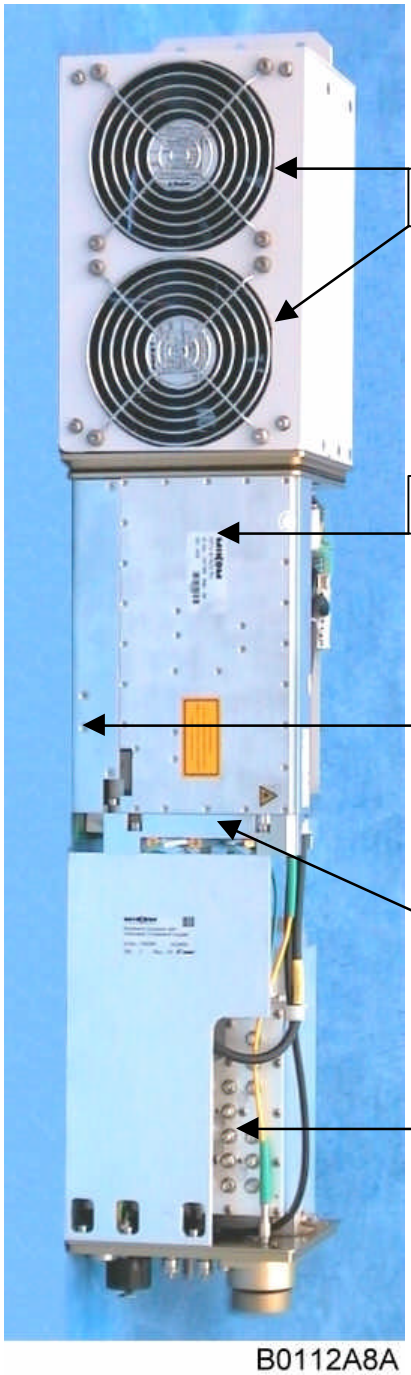


figure 3-2 Remote unit, front view

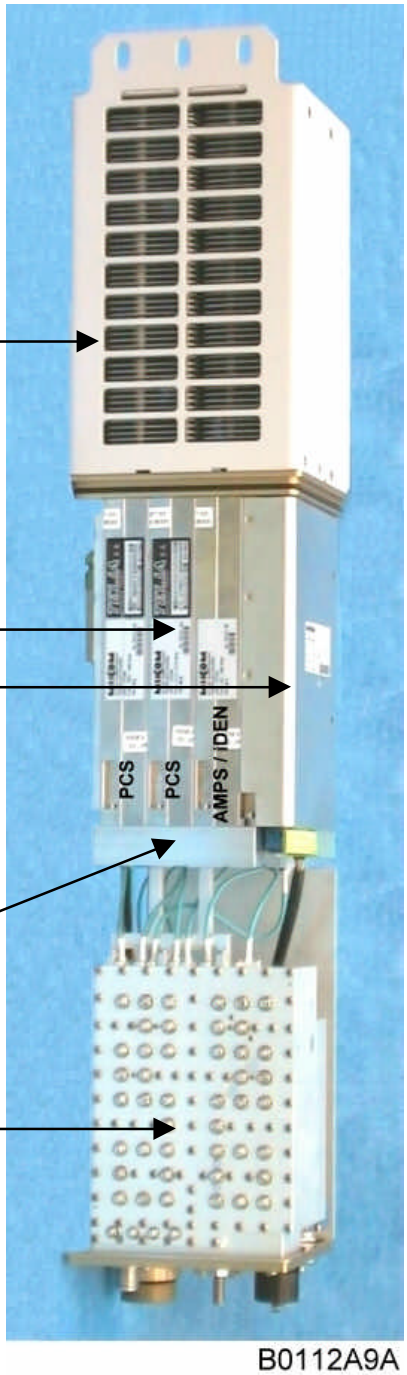


figure 3-3 Remote unit, backside

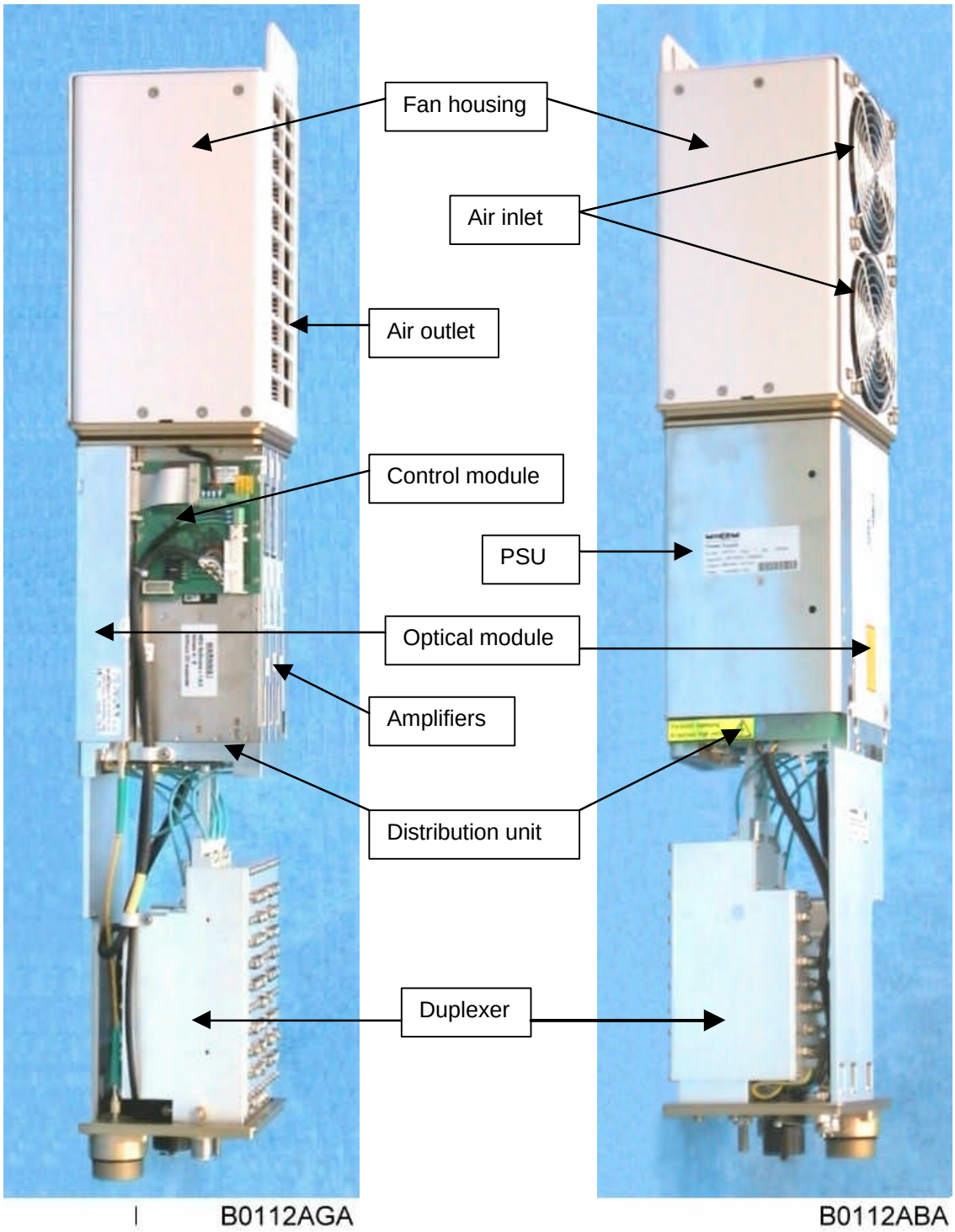


figure 3-4 Remote unit, left side

figure 3-5 Remote unit, right side

3.2.2. Fan Protection Kit

In order to protect the fan unit (e.g. against rain), a protective cover to be mounted over the air inlet is delivered for standalone pole or wall mounted units. For inside pole mounting this equipment is not required.

For more details see chapter *4.1.4 Mounting of Fan Protection*.

3.2.3. Accessories

For the accessories available for the MMR remote unit, e.g. overcoat housing, connecting box or iso-trafo kit, a separate manual is available.

4. INSTALLATION

4.1. MECHANICAL INSTALLATION

4.1.1. General

Read the health and safety warnings in chapter *1.2 Health and Safety Warnings*.

1. **Do not install the unit in a way or at a place where the specifications outlined in the Environmental and Safety Specifications leaflet of Mikom are not met.**

2. **It is strongly recommended to install the unit vertically with the fan unit at the top. If a different installation of the remote unit is required, please contact customer service for further information.**

3. **It is recommended only to use the mounting hardware delivered by Mikom. If different mounting hardware is used, the specifications for stationary use of the remote unit must not be exceeded.**

☞ **Note: Exceeding the specified load limits may cause the loss of warranty!**

4.  **The unit is considerably heavy. Make sure that a suitable mounting surface is used. Ensure there is adequate manpower to handle the weight of the system.**

5. **Due to power dissipation, the remote unit may reach a very high temperature. Ensure sufficient airflow for ventilation as specified in the individual mounting procedures.**

If any different or additional mounting material is used, ensure that the mounting remains as safe as the mounting designed by Mikom. Ensure that the static and dynamic strengths are adequate for the environmental conditions of the site. The mounting itself must not vibrate, swing or move in any way that might cause damage to the remote unit.

Specified torques have to be observed for certain mounting procedures according to the following table:

Type	Tallow-drop screws	Hex nuts	Spacing bolts		PG (plastic)	PG (aluminium)
Thread	M 4	M 8	M 4	M 8	PG 13,5	PG 29
Specified torques	3.3 Nm	27 Nm	2.3 Nm	27 Nm	3.75 Nm	10 Nm

table 4-1 Specified torques

☞ **Note: To avoid damage when mounting the unit, always make sure that the M8 washers (DIN9021 or DIN125 depending on the mounting kit) are placed behind and in front of the unit's mounting drillings.**

For the installation of the protective tube that is delivered with the MMR remote unit for the protection of the fibre-optic cables, observe that a section of at least 250 mm at the tube end has to point downwards as illustrated below.

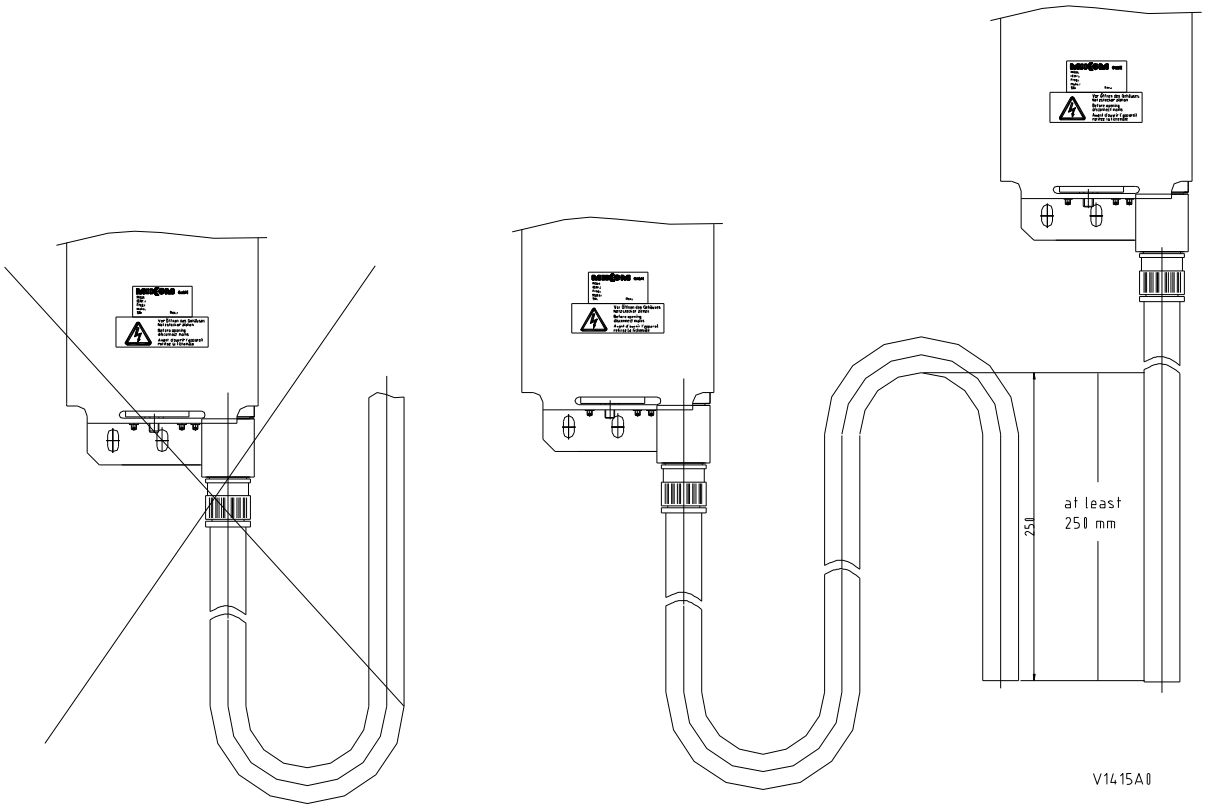


figure 4-1 Tube installation

The mounting procedures for a stand alone remote unit without optional accessories are described and illustrated in the following sections. For further information regarding special mounting procedures including mounting of accessory equipment, please see separate manual.

4.1.2. Wall Mounting Procedure

- Check the suitability of the wall mounting kit and the wall.

☞ **Note: To ensure sufficient airflow when mounting the unit in enclosed spaces, two lid openings (one for the air inlet and the other for the air outlet) have to be provided. The size of each opening must equal at least 12x12 cm (144 cm^2). Also, make sure there is no thermal short circuit between the air inlet and air outlet.**

- Mark the position of the drilling holes (for measurements refer to *figure 4-2 Wall mounting)*. Drill four holes at the marked positions and insert dowels*.
- Use a cap nut or locknut to screw the four dowel screws into the dowels and put the distance tubes over the screws.
- Hang the mounting brackets of the remote unit into the screws, and fasten them immediately using the washers and nuts.
- Ensure that there is free access to the electrical connections as well as to the cabinet. The approved bending radius of the connected cables must not be exceeded.

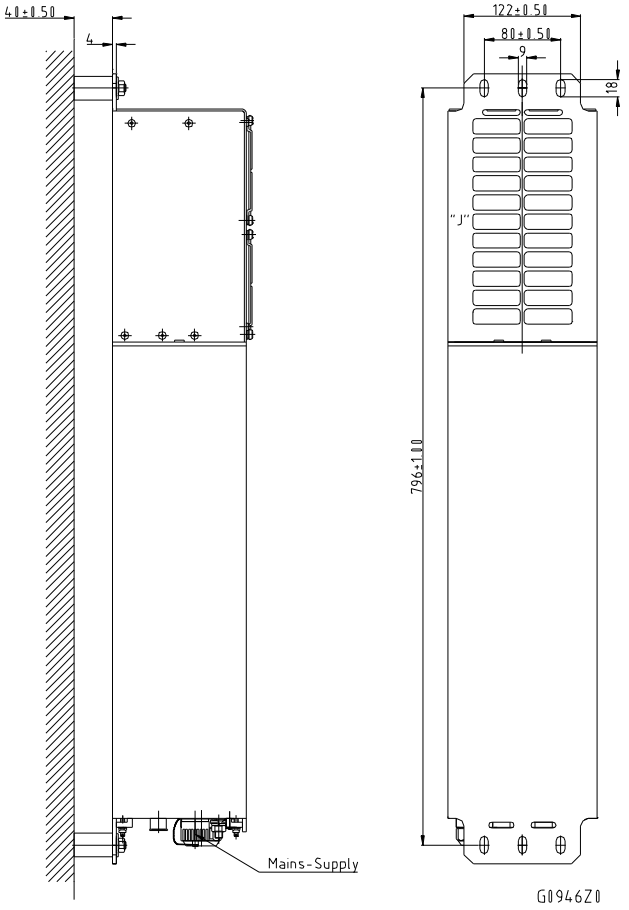


figure 4-2 Wall mounting

* The dowels are not part of the delivery since the suitable type depends on the on-site conditions (material of wall). Therefore, use dowels that are appropriate for the mounting surface.

4.1.3. Outside Pole Mounting Procedure

Standard mounting hardware can not be used to mount the remote unit to a pole, a column or other similar structures. Additional hardware must be used for this type of installation. Such a pole mounting kit could include two threaded rods M8, two U-beams and mounting material like bolts and nuts.

☞ **Note: To ensure sufficient airflow a distance of at least 50mm has to be observed. Do not block the airflow by installing other devices at a nearer distance to the unit.**

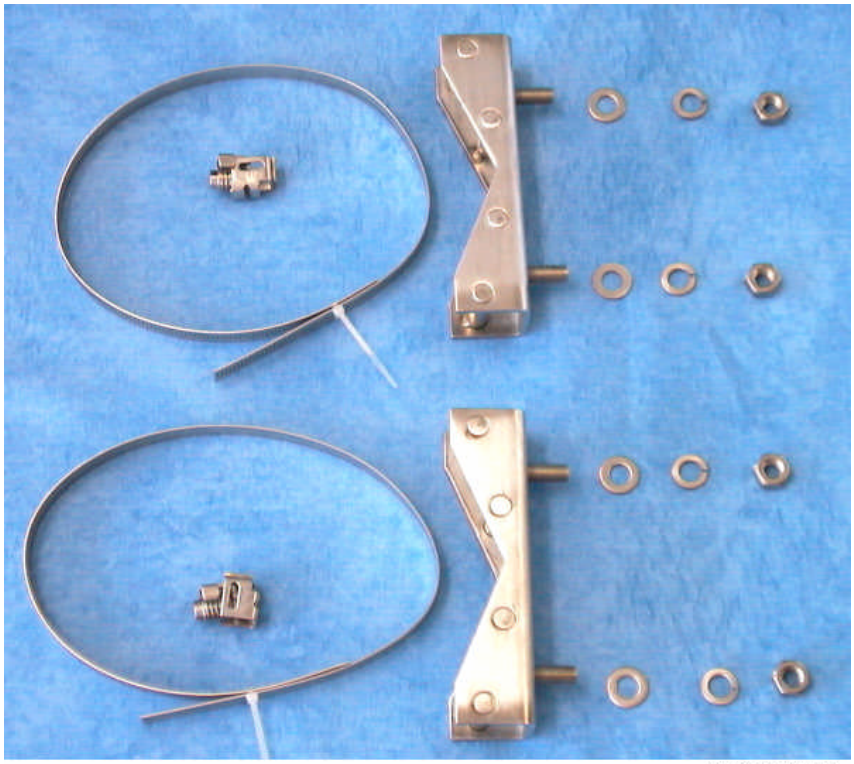


figure 4-3 Pole mounting kit

- Use the screw bands to fasten the two U-beams to the pole as illustrated in *figure 4-4 Pole mounting.*

☞ **Note: When fastening the U-beams make sure that they are installed congruently and not at an angle to each other. To determine the distance between the beams refer to *figure 4-2 Wall mounting* for measurements.**

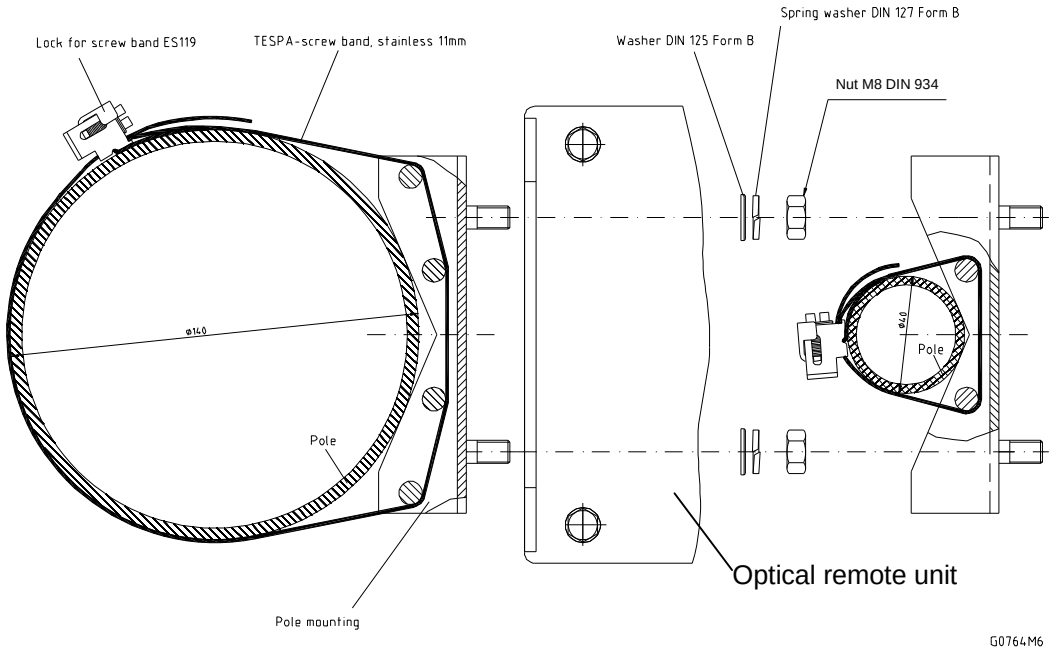


figure 4-4 Pole mounting.

- Hang the mounting brackets of the remote unit into the threaded bolts of the U-beam, and fasten them immediately using the washers and nuts.

Ensure that there is free access to the electrical connections as well as to the cabinet. The approved bending radius of the connected cables must not be exceeded.

4.1.4. Mounting of Fan Protection

Since the fan protection is required for the outdoor usage of a stand alone remote unit, the mounting of this optional equipment is also described in this manual.

- To install the protective cover of the fan protection kit, first unscrew the four screws with the respective lock washers from the cover of the remote unit's air inlet, and instead, screw in the four spacing bolts M4.0x30 with the four lock washers M4.0 DIN125 that are part of the fan protection kit.

- Place the protective cover into the right position by fitting its four bore holes over the spacing bolts and fasten it using the original lock washers and screws of the remote unit. (These lock washers and screws are also part of the fan protection kit and can be used as spare parts in case of loss.)

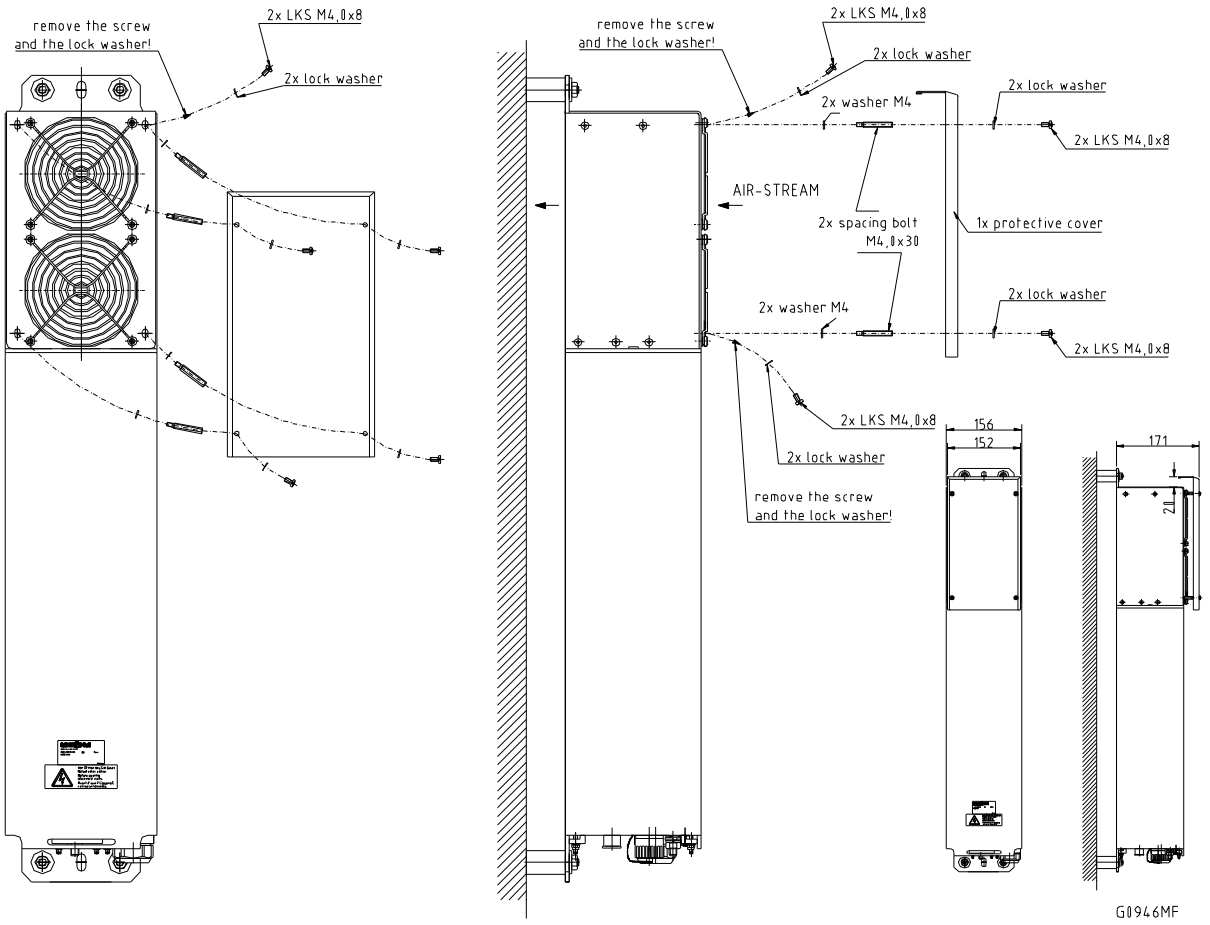


figure 4-5 Mounting procedure for fan protection

4.1.5. Suggestion for an Inside Pole Mounting Procedure

For inside pole mounting a mounting aid is provided as support. Additionally to the material delivered by Mikom, eight M8 washers DIN9021 are required to be put onto the spacing bolts inside the pole behind and in front of the unit's mounting drillings.

To mount the unit inside a pole, proceed as follows:

- Fix the strap with the ratchet around the pole so that the ratchet is located above the opening into which the unit is to be installed and fasten the strap tight.

- The backside of the unit is provided on top and bottom with drillings for mounting. Use the drillings on top to hang the remote unit into the mounting studs of the ratchet.

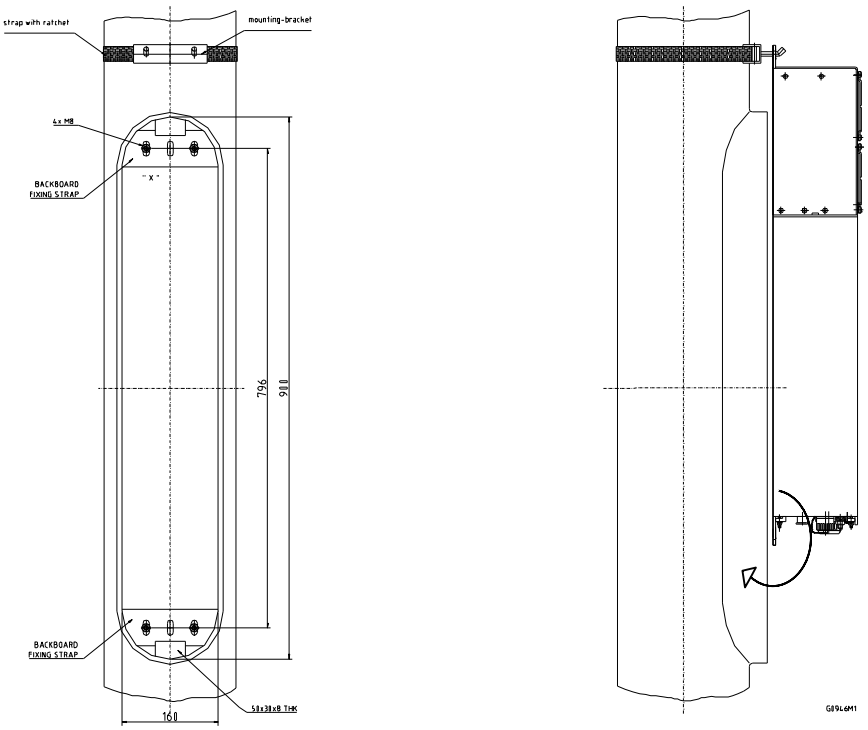


figure 4-6 Mounting aid brackets

- Carry out all connection procedures at the connector flange described in chapter *4.2 Electrical Installation*.

- Put four of the M8 washers DIN9021 over the spacing bolts inside the pole.

- Lead the unit inside the opening of the pole by pulling the ratchet downwards and detach the unit from the mounting studs of the ratchet to insert it completely into the pole fitting the mounting drillings on top and bottom onto the four spacing bolts (M8 thread) inside the pole.

- Push the unit in completely till it hits the backstop. Since the drillings are somewhat higher than the spacing bolts the vertical position of the unit is slightly adjustable. Then, put the remaining M8 washers DIN9021 over the spacing bolts.

- Fasten the unit with the washers to the spacing bolts using appropriate tools and material.

☞ **Note: To ensure sufficient airflow, two lid openings (one for the air inlet and the other for the air outlet) with a size of at least 144 cm² have to be provided. Also, make sure there is no thermal short circuit between the air inlet and air outlet.**

4.2. ELECTRICAL INSTALLATION

4.2.1. General

Read the health and safety warnings in chapter *1.2 Health and Safety Warnings*.

1. This unit contains dangerous voltages. Loss of life, severe personal injury or property damage can be the result if the instructions contained in this manual are not followed.

2. It is compulsory to ground the unit before connecting power supply. A grounding bolt is provided on the cabinet to connect the ground bonding cable.

3. Although the remote unit is internally protected against overvoltage, it is strongly recommended to earth the antenna cables close to the remote unit's antenna connectors for protection against atmospheric discharge. In areas with strong lightning it is strongly recommended to insert additional lightning protection.

4. If the mains connector of the remote unit is not easily accessible, a separation device in the mains circuit must be provided within easy reach.

5. Before connecting or disconnecting the mains connector at the remote unit, ensure that mains supply is disconnected.

6. Make sure that an appropriate circuit breaker and an overcurrent limiting device are connected between mains and remote unit.

7. A connection of mains supply to a power socket requires the power socket to be nearby the remote unit.

8. The remote unit might be supplied from IT mains. (The maximum nominal line to line voltage must not exceed 400VAC).

9. Incorrectly wired connections can destroy electrical and electronic components.

10. To avoid corrosion at the connectors caused by electrochemical processes, the material of the cable connectors must not cause a higher potential difference than 0.6V (see electrochemical contact series).

11. It is sufficient to tighten the N antenna connector hand-screwed. Any use of a tool (e.g. pair of pliers) might cause damage to the connector and thus lead to malfunctioning of the remote unit.

12. For unstabilized electric networks which frequently generate spikes, it is advised to use a voltage limiting device.

13. Observe the labels on the front panels before connecting or disconnecting any cables.

4.2.2. Connections

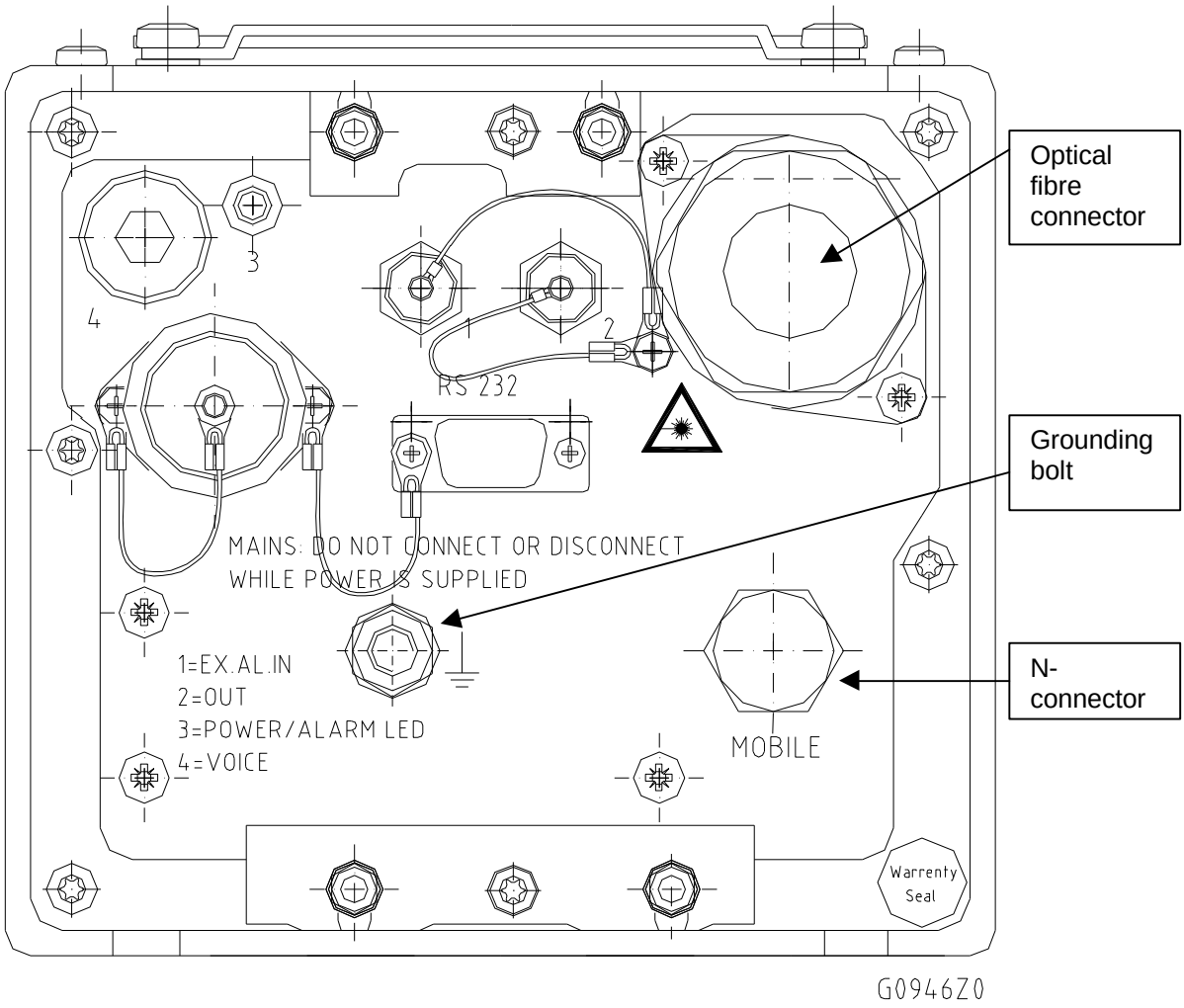


figure 4-7 Connector flange

4.2.3. Grounding

Grounding must be carried out. Connect an earth bonding cable to the grounding connection provided at the outside of the remote unit (see *figure 4-7 Connector flange*). Do not use the grounding connection to connect external devices.

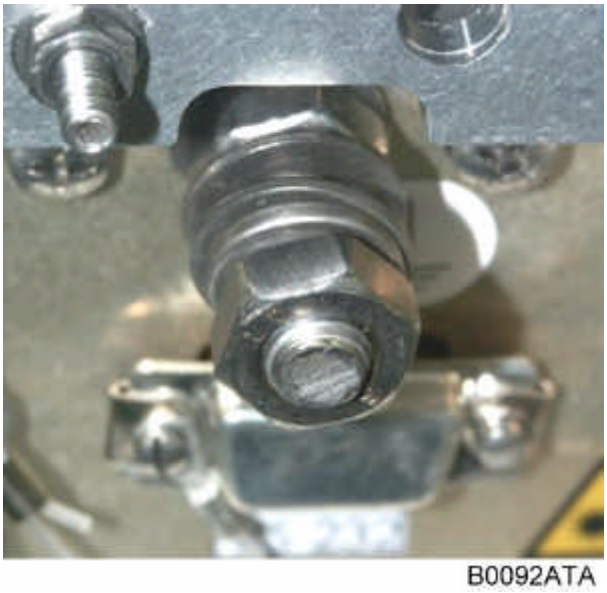


figure 4-8 Grounding bolt with loosened hex nut

After loosening the hex nut, connect the earth bonding cable between the two washers as illustrated in the figures above and below. Then, fasten all parts again with the hex nut.

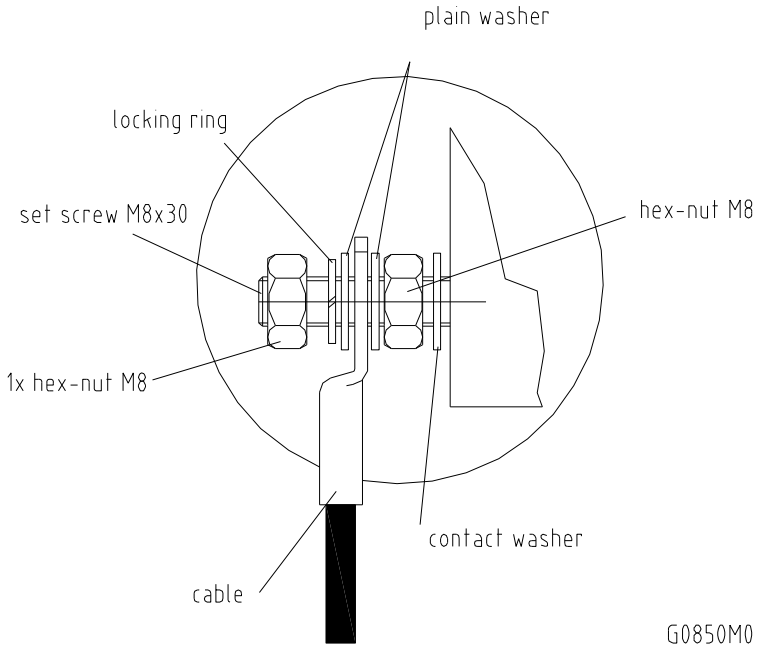


figure 4-9 Grounding bolt, schematic view

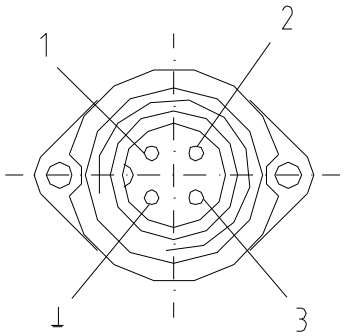
4.2.4. Power Connection

☞ **Note:** **Do not connect the power cord at the mains connector (see *figure 4-7 Connector flange*) while power is applied, i. e. interrupt mains supply before connecting the power cord at the remote unit. Then, engage mains again.**

Before connecting electrical power to the remote unit, the remote unit must be grounded.

For power supply connection a minimum cross section of 1.5 mm² for each wire has to be observed as well as the applicable national regulations regarding loop impedance, voltage drop and methods of installation. Ensure to connect to the right voltage.

The correct wiring of the power supply plug is as follows:



Flangeconnector 380V/16Af.
Pin 1= Phase 1 (brown)
Pin 2= Neutral (blue)
Pin 3= n.c.
⊥ = PE (green/yellow)
G0946Z0

4.2.5. Connection of the Antenna Cables

The remote unit has a N-type antenna connector. For its location please refer to *figure* 4-7 Connector flange. For mounting the cable connectors, it is recommended to refer to the corresponding documentation of the connector manufacturer. The bending radius of the antenna cables must remain within the given specifications.

For the selection of cable and antenna it should be considered that a cable with higher loss is less expensive but on the other hand it impairs performance.

It is sufficient to tighten the N connectors hand-tight. The use of a tool (like pliers) may cause damage to the connector and therefore, lead to a malfunctioning of the remote unit.

4.2.6. Optical Fibre Cable Connection

Optical signals are transmitted by use of an optical fibre for each remote unit.

☞ **Note:** **Care should be taken when connecting and disconnecting fibre optic cables. Scratches and dust significantly affect system performance and may permanently damage the connector. Always use protective caps on fibre optic connectors not in use.**

In general optical fibres do not need special protective measures. However, protection against environmental influences e.g. rodents and humidity must be considered.

The optical fibre is a single mode fibre. Type is E9/125µm with the following minimum requirements.

Attenuation:	<0.36 dB/km @ 1310 nm	/	<0.26 dB/km @ 1550 nm
Dispersion:	<3.5 ps/nm km @ 1310 nm	/	<18.0 ps/nm km @ 1550 nm

The specified bending radius of the optical fibres must not be exceeded. The pigtails for the connection between master unit and remote unit must have a sufficient length. A protection for the feeding into units must be given. The system attenuation of the optical fibres, including the connectors, must not exceed 10 dB.

System attenuation and attenuation of optical components must be determined. This can be achieved by measuring attenuation and reflection with an appropriate measuring instrument. For pigtails, a total value of < 0.4 dB (measured to a reference plug) can be assumed due to the dead zone of the reflectometer. These measurements must be made with a sufficient length of optical fibre, at the In- and Output of the device which has to be measured.

Fibre cable connectors have to be of the same type (E2000/APC8°) as the connectors used for the unit. The fibre optic cables are connected to the optical transceiver.

☞ **Note:** **Angled connectors are not compatible with straight optical connectors; non-compatibility of connectors will result in permanent damage to both connectors.**

Before connecting the fibre cables, follow the procedure below to ensure optimized performance. It is important that these procedures are carried out with care:

- Remove fibre optic protective caps.
- Do not bend the fibre optic cable in a tight radius (< 4 cm) as this may cause cable damage and interrupt transmission.

- Using high-grade alcohol and lint-free cotton cleaning swabs, clean the end of the fibre optic cable that will be inserted in the optical connectors on the donor interface box.
- Blow out the laser receptacle with clean and dry compressed air to remove any particulate matter.
- Connect the fibre optic cables by inserting the cable end into the laser receptacle and aligning the key (on the cable end) with the keyed slot.
- Do not use any index matching gels or fluids of any kind in these connectors. Gels are intended for laboratory use and attract dirt in the field.

☞ **Note: If the unit is mounted inside a pole (see separate description) the following procedure has to be strictly observed:**

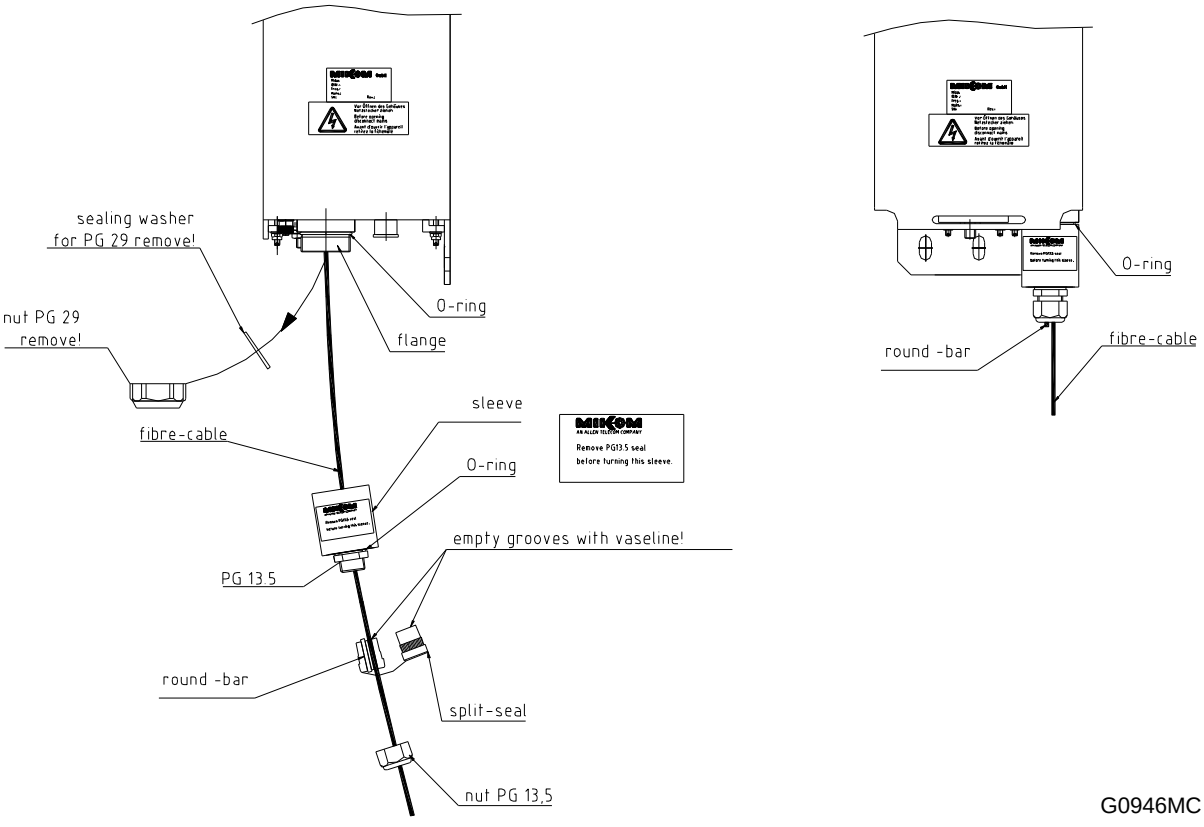


figure 4-10 Tight kit

1. Remove the PG29 nut and the sealing washer.

2. Connect the optical fibre cable.

3. Screw the sleeve onto the flange.

4. Lay the fibre cable into the groove beside the round bar in one half of the split-seal. → Ensure that in both halves the grooves for the fibre cable are filled with vaseline.

5. Press the seal into the PG sleeve while holding the optical fibre straight.

6. Screw the PG13.5 nut tightly onto the PG13.5.

5. COMMISSIONING

5.1. GENERAL

Read the health and safety warnings in chapter *1.2 Health and Safety Warnings* as well as the description carefully to avoid mistakes and proceed step by step as described!

- Do not operate the remote unit without termination of the antenna connections! The termination can be achieved by connecting the antennas, a dummy load or the 50-Ohm-terminated connection of a measuring instrument.

- To ensure safety, the electrical and subsequent installations, commissioning and maintenance activities that require the unit to be under power while open, must only be carried out by suitably qualified personnel.

- When opening the remote unit, do not damage the seals on the devices inside the remote unit. Warranty void if the seals are broken!

- To query the status, the remote unit can be accessed remotely via a master unit.

- Since the system provides an auto-levelling and auto-setup function, no further settings are necessary at the remote unit itself. All other settings are required at the master unit and are explained in the corresponding documentation.

5.2. AUTO-LEVELLING

In order for the auto-levelling function to operate properly, a defined level has to be set at the optical interface (DL) of the master unit. For details refer to the description of the master unit.

5.3. REMOTE OPERATION

For details refer to the descriptions of the master unit and corresponding software.

For your notes

6. ALARMS

6.1. BITE AND ALARMS

The Built-In Test concept comprises the monitoring of the power supplies, the power amplifiers and the optical interface.

All occurring alarms can be checked via software at the master unit.

6.2. HANDLING OF ALARMS

As soon as the software acknowledges a valid alarm, a message is transmitted to the master unit.

If the reason for the alarm has been cleared or if the alarm should continue, a new alarm message will not be repeated. If there was an interruption of at least one second after acknowledgement, a new alarm message will be generated.

6.3. STATUS REPORT

For details refer to the corresponding software documentation, which is part of the "System Description for the MMR Optical Master Unit".

6.4. LED ALARMS

The LED on the connector flange of the remote unit indicates the following alarms:

LED Indication	***Alarms***
Green	No alarm → Status ok
Orange	*Alarms not related to RU:* • External alarms • Optical alarm Rx • all ALC alarms
Red	*Alarms related to RU:* • Power 28V • Power 12V • Temperature • Fan • I^2C • Optical alarm Tx • Amplifier "Power Down"
LED off	No power

table 6-1 LED alarms

For the position of the LED see *figure 4-7 Connector flange*.

6.5. ALARM LIST

The status of the remote unit can be checked via software commands.

Alarm message	***Failure***
Opt. Rx alarm Opt. Tx alarm	Opt. Rx failure (no input) Opt. Tx failure
Autolevelling	Optical loss has changed
Amplifier current DL1 Amplifier current DL2 Amplifier current DL3	Amplifier current too high or too low
ALC alarm DL ALC alarm UL	Output power too high Input power too high
Temperature alarm	Temperature out of range
I2C bus failure	Internal communication bus failure
PSU 12 V PSU 28 V PSU mains	Power supply 12V failure Power supply 28V failure Power supply mains failure
FAN	FAN out of order
External alarm 1 External alarm 2 External alarm 3 External alarm 4	Option for supervision of external components

7. MAINTENANCE

7.1. GENERAL

Read the health and safety warnings in chapter *1.2 Health and Safety Warnings*.

☞ **Note: The remote unit does not require preventative maintenance measures.**

☞ **Note: To prevent malfunctions of the cooling system due to dirt or pollution, it is recommended to clean the heat sink at regular intervals. These cleaning intervals depend mainly on the location of the remote unit and the corresponding degree of pollution.**

Maintenance on the remote unit shall be performed by replacing only components that are contained in this chapter. In order to maintain warranty, take care not to damage unintentionally the seals on the modules.

The spare parts list, consequently, contains only units which can be replaced without tuning or soldering work. Those units are all Mikom parts as well as internal and external cables.

☞ **Note: Defect parts should only be replaced by original parts from Mikom. All interventions inside the housing are at one's own risk.**

☞ **Note: During maintenance ensure that the remote unit has been disconnected from mains.**

☞ **Note: Before disconnecting any cables, label any unlabeled cables to ensure correct connection.**

For most maintenance procedures appropriate tools are required to ensure correct handling. All these tools can be ordered from Mikom. For screwing procedures observe that all our screws have a right-hand thread, i. e. for fastening the screws turn the tool clockwise and for unscrewing them turn it counter-clockwise.

Due to the design of the remote unit the only component recommended to be replaced is the fan unit. For replacing any other component please contact Mikom.

7.2. REPLACING THE FAN UNIT

Replacement of the fan unit is not required as a preventative measure. Only if an alarm indicates a malfunctioning of a fan, the unit has to be exchanged.

☞ **Note: Please observe that the fan unit can only be replaced as a whole. Do not remove the fans separately.**

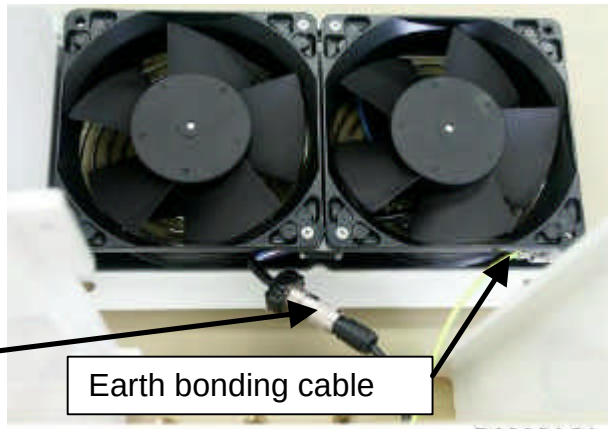
Read the health and safety warnings in chapter *1.2 Health and Safety Warnings* as well as the instructions in chapter *7.1 General* before starting with the replacement procedure. Then, proceed as follows:

1. Loosen the four tallow-drop screws M4x8 by which the fan plate is screwed to the cabinet. Remove the four screws and the corresponding washers.


B0092ALA

2. Remove the fan plate with the fan unit – by putting slight pressure on the fan plate cover – to a position that allows access to the fan connector and the earth bonding cable.

3. Unscrew the fan connector and disconnect the earth bonding cable.



B0092A5A

☞ **Note: To observe the specified torque of 650 Ncm for an M5 thread, use an appropriate tool for the following screwing procedures.**

4. To remove the fan plate, loosen the M5 nut (as shown in *figure 7-1 Fan unit assembly*) as well as the corresponding contact washers and flat-plug. Then, loosen the eight tallow-drop screws by which the fan unit is screwed to the fan plate (seven screws M5x14 and one M5x20).

☞ **Note: Do not unscrew the screws completely. Only loosen them till the fan unit can be taken off.**

5. To mount the new fan unit, position it correctly and screw it to the fan plate with the seven tallow-drop screws M5x14 and the one tallow-drop screw M5x20. Fasten this screw again with the M5 nut.

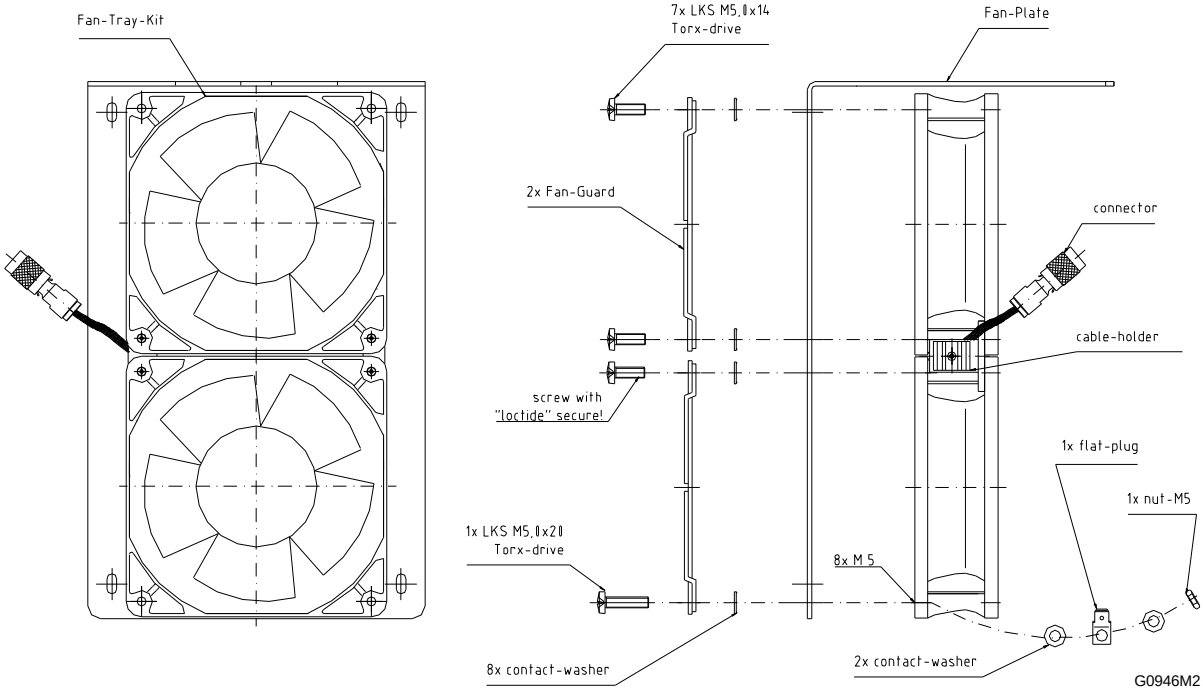


figure 7-1 Fan unit assembly

6. Reconnect the earth bonding cable and the fan connector (see *step 3*). Then, place the fan plate back into its original position and fix it tight as shown below.

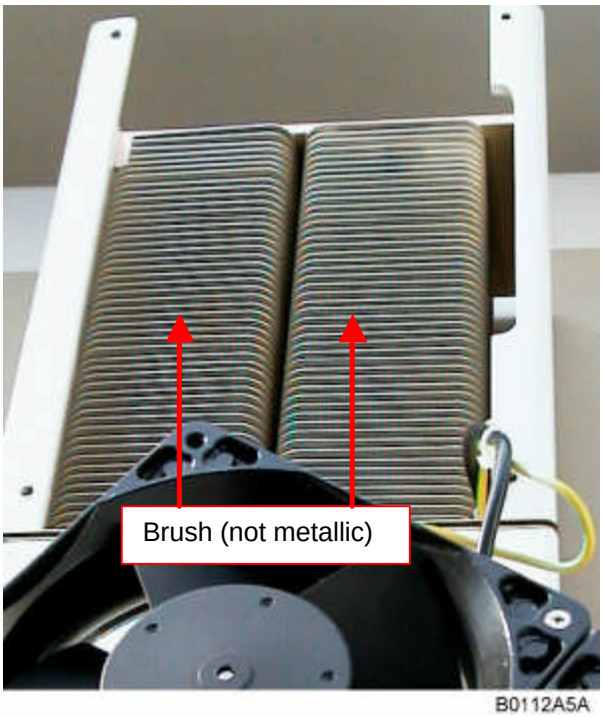
7. Screw the whole fan unit to the cabinet with the four tallow-drop screws M4x8 (see *step 1*). In order not to exceed the specified torque of 330 Ncm use an appropriate tool.

7.3. CLEANING THE HEAT SINK

☞ **Note:** **Read the health and safety warnings in chapter *1.2 Health and Safety Warnings* as well as the instructions in chapter *7.1 General* before starting with the replacement procedure. Then, proceed as follows:**

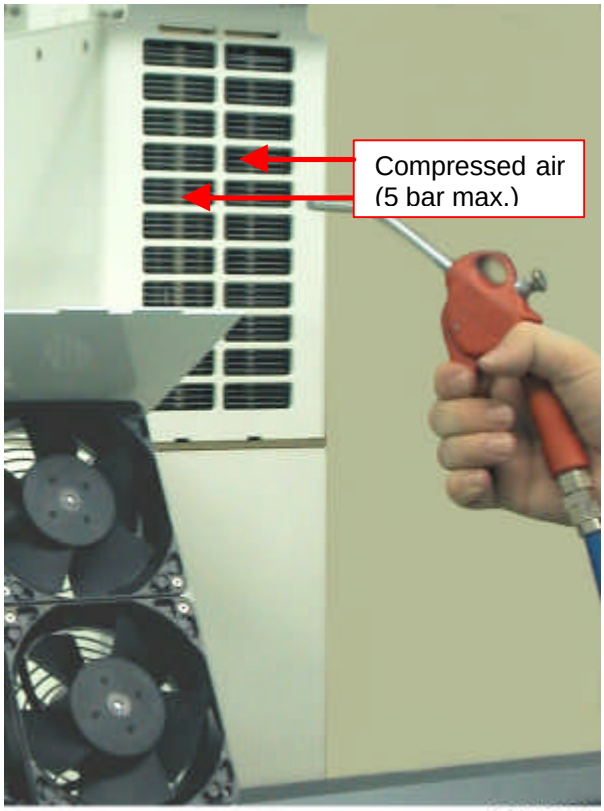
1. Switch off the remote unit. Make sure that mains is disconnected for the following procedure.

2. Remove the fan plate with the fan unit from the remote unit as described in chapter *7.2 Replacing the Fan Unit,* steps *1* and *2*:



B0112A5A

3. Use compressed air (max. 5 bar) to blow out the heat sink from back to front:



B0112A6A

4. In case the dirt cannot be blown out completely but part of it sticks to the ribs of the heat sink, clean the concerned parts carefully from the front using e.g. a brush. Take care that the material is not scratched or damaged.

5. After cleaning the heat sink mount the fan unit again according to chapter *7.2 Replacing the Fan Unit,* steps *6* and *7*. Then, switch the remote unit back on.

8. APPENDIX

8.1. ILLUSTRATIONS

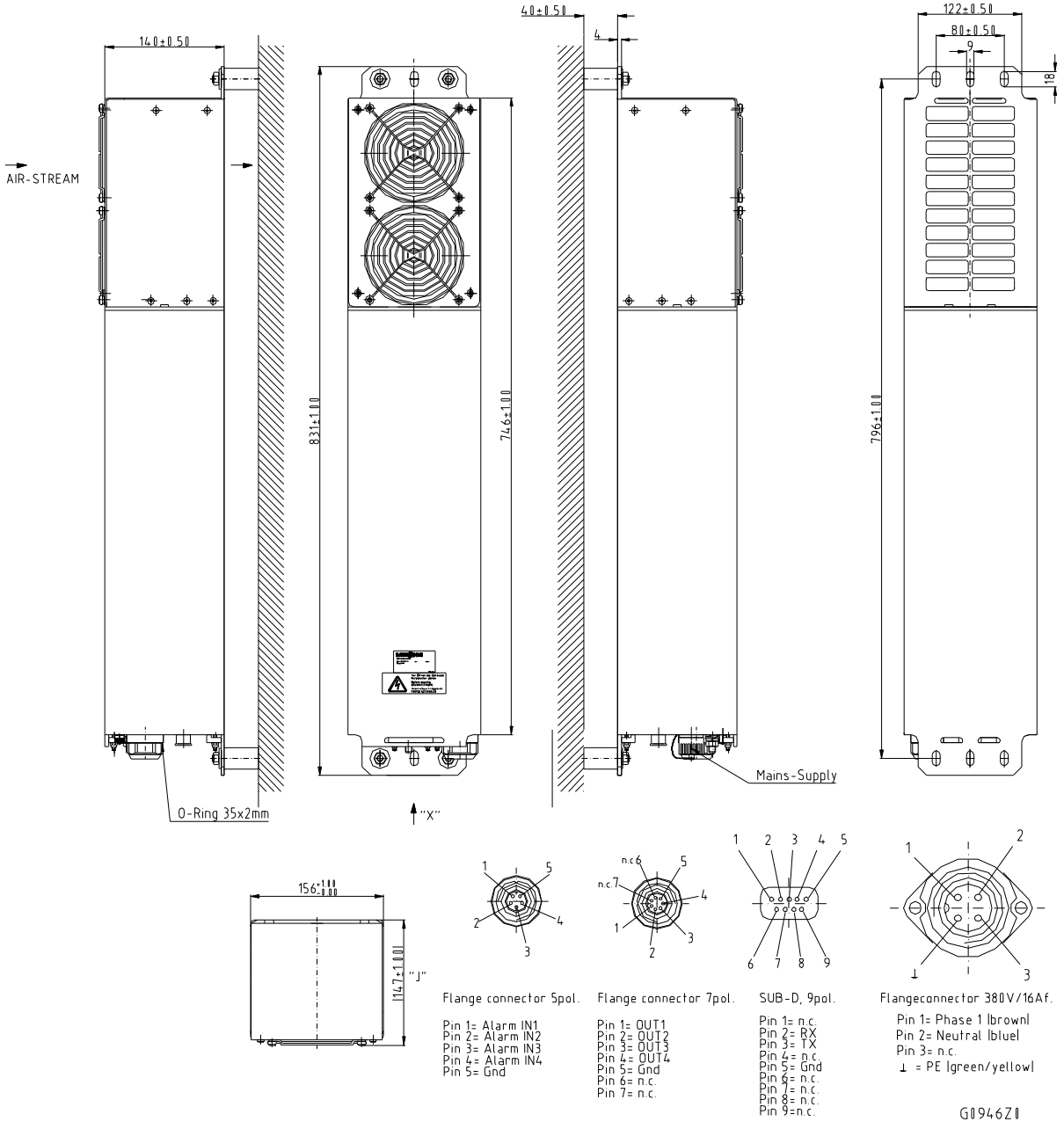


figure 8-1 Installation drawing

8.2. SPECIFICATIONS

8.2.1. Mechanical Specifications

Dimensions *	Height (max.):	32.8" (83.2 cm)
	Width (max.):	6.2" (15.7 cm)
	Depth (max.):	5.8" (14.8 cm)
Weight		~ 40 lbs (20 kg)
Mounting**		⇒ Do not block air in- and outlet! ⇒ Vertical mounting compulsory

* With mounting brackets, without connectors

** To ensure sufficient airflow when mounting the unit in enclosed spaces, two lid openings (one for the air inlet and the other for the air outlet) have to be provided. The size of each opening must equal at least 12x12 cm (144 cm^2). Also, make sure there is no thermal short circuit between the air inlet and air outlet.

All data is subject to change without notice!

8.2.2. Optical and Interface Specifications

BTS interfaces	Number of connectors per band	2 for IDEN/AMPS 4 for PCS
	Input power	+33 dBm typ. (up to +46 dBm with UL performance degradation)
Antenna port	Connector	N female
	Output power	see band specification
	Return loss	15 dB typ. / 12 dB min.
Optical link	Connectors	E2000/APC 8°
	Tx output power (optical)	0 to 7 dBm optical
	Tx input power (RF)	0 dBm max. composite
	Rx input power (optical)	+7 dBm max.
	Optical link budget	0 to 10 dB optical
	Optical return loss	45 dB min.
	Fibre type	Single mode 9/125 µm

All data is subject to change without notice!

8.2.3. Electrical Specifications

MMR8/19*		
AC power	Mains power	115 V AC; 230 V AC or 48 V DC
	Power consumption	400 W

800 MHZ section					
DL	Frequency range	869 - 894 MHz (AMPS) or 851 - 869 MHz (LMR)			
	RF output power (per carrier)	Analogue	TDMA	CDMA	iDEN
	⇒ 2 carriers	+40 dBm	+37 dBm	+34 dBm	+34 dBm
	⇒ 4 carriers	+36 dBm	+32 dBm	+31 dBm	+31 dBm
	⇒ 8 carriers	+32 dBm	+29 dBm	+28 dBm	+28 dBm
	⇒ 16 carriers	+30 dBm	+26 dBm	+25 dBm	+25 dBm
	⇒ 32 carriers (CDMA 20 carriers)	+26 dBm	+23 dBm	+24 dBm	+22 dBm
	Spurious emissions	< -13 dBm			
	DL output tolerance over frequency	±1.0 dB			
	DL output tolerance over temp.	±1.5 dB			
UL	Frequency range	824 - 849 MHz (AMPS) or 806 - 824 MHz (LMR)			
		$IICP_3$ optimized		*NF optimized*	
	Input ICP3	1.5 dBm		-9 dBm	
	Noise figure	13.5 dB		5.5 dB typical	
	Gain	2 dB		16 dB	
1900 MHZ section					
DL	Frequency range	1930 – 1990 MHz			
	RF output power (per carrier)	GSM	TDMA	CDMA	
	⇒ 2 Carriers	+39 dBm	+36 dBm	+33 dBm	
	⇒ 4 Carriers	+35 dBm	+31 dBm	+30 dBm	
	⇒ 8 Carriers	+31 dBm	+28 dBm	+27 dBm	
	⇒ 16 Carriers	+28 dBm	+25 dBm	+24 dBm	
	⇒ 32 Carriers	+25 dBm	+22 dBm	+21 dBm	
	Spurious emissions	< -13 dBm			
	DL output tolerance over frequency	±1.0 dB			
	DL output tolerance over temp:	±1.5 dB			
UL	Frequency range	1850 - 1910 MHz			
		$IICP_3$ optimized		*NF optimized*	
	Input ICP3	1 dBm		-11 dBm	
	Noise figure	14 dB		5.5 dB typical	
	Gain	2 dB		16 dB	

* All data are valid for systems in a thermally steady state; i.e. after approx. 40 min of operation.

All data is subject to change without notice!

8.2.4. Environmental and Safety Specifications

Environmental and safety	For detailed information, refer to the Environmental and Safety Specifications leaflet for Mikom indoor/outdoor cell enhancers, related to ETS 300 019 (European Telecommunication Standard).	
Operating temperature range	-33°C to +40°C (+50°C with degradation)	
Accoustic noise	<49dB(A) (@+30°C) sound pressure level	
Ingress protection	RF part Fan with cover	IP67 IP55

All data is subject to change without notice!

8.3. SPARE PARTS

The following lists contains all parts available for the remote unit. The configuration of the delivered unit meets the requirements of the customer and can differ depending on the state of the delivery.

Spare Parts List for Remote Unit MMR8/19

Designation:	**ID No:**
MMR8/19	***159207***
Connecting Box Kit Pole Mounting	159612
Connecting Box Kit Wall Mounting	159613
Connecting Box Kit w/o Mounting Kit	158313
Fan Tray Kit	157622
Overcoat Housing Kit Pole Mounting	159624
Overcoat Housing Kit Wall Mounting	159625
Overcoat Housing w/o Mounting Kit	158384
User's Manual for Optical Remote Unit MMR8/19	159967

Mikom reserves the right to replace the spare parts listed above by equivalent substitutes!

9. INDEX