

## Installation Instruction

**The Remote Unit, Extension Unit or Master Unit has to be mounted by professional / special trained installer.**

### 1.1. MECHANICAL INSTALLATION

#### 1.1.1. Health and Safety for mechanical installation

Read and observe the notices in chapter 1.3 Health and Safety.

-  1. **Caution:** Risk of injury by the considerable weight of the unit falling. Ensure there is adequate manpower to handle the weight of the system.
-  2. **Caution:** Risk of serious personal injury by equipment falling due to improper installation. The installer must verify that the supporting surface will safely support the combined load of the electronic equipment and all attached hardware and components. Only use sufficiently dimensioned screws for mounting and make sure the mounting material is adequate for the mounting surface.

#### 1.1.2. Property Damage Warnings for Mechanical Installation

- 1. **Attention:** Do not install the unit in a way or at a place where the specifications outlined in the Environmental and Safety Specifications leaflet of the supplier are not met.
- 2. **Notice:** Due to power dissipation, the unit may reach a very high temperature. Ensure sufficient airflow for ventilation. When mounting the Node AM4 into a train, a temperature test in maximum configuration (i.e. 4 RF cards) must essentially be made. A minimum air flow of 50 m<sup>3</sup>/h is required where the maximum air flow of the Node AM4 is 220 m<sup>3</sup>/h which will be reached at an environmental temperature of around 45°C and above. We suggest to supply the repeater at the air inlet with fresh air and to conduct warm air at the air outlet off the Node AM4 without feedback in order to avoid a 'thermal short-circuit'.
- 3. **Notice:** It is recommended only to use the mounting hardware delivered by the manufacturer. If any different or additional mounting material is used, ensure that the mounting remains as safe as the mounting designed by the manufacturer. 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 unit. The specifications for stationary use of the unit must not be exceeded.  
 Note: Exceeding the specified load limits may cause the loss of warranty.
- 4. **Notice:** Only use sufficiently dimensioned screws for mounting and make sure the mounting material is adequate for the mounting surface.
- 5. **Notice:** Observe that for M12 connectors the nominal torque is 1.0 N-m.
- 6. **Notice:** When connecting and mounting the cables (RF, mains, ...) ensure no water can penetrate into the unit through these cables.



- 7. Notice:** Do not operate the repeater without terminating the antenna connectors. The antenna connectors may be terminated by connecting them to their respective antennas or to a dummy load.

Unless otherwise agreed to in writing by CommScope, CommScope's general limited product warranty (<http://www.commscope.com/Resources/Warranties/>) shall be the warranty governing the Node AMs, including the installation, maintenance, usage and operation of the Node AMs.

## 1.2. ELECTRICAL INSTALLATION

### 1.2.1. Health and Safety for electrical installation

Read and observe the notices in chapter 1.3 Health and Safety.



**Danger: Electrical hazard. Danger of death or fatal injury from electrical current. 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.**

### 1.2.2. Property Damage Warnings for Electrical Installation

1. **Attention:** It is compulsory to ground (earth) the unit before connecting the power supply. Grounding bolts are provided on the cabinet to connect the ground-bonding cable.
2. **Attention:** If the mains connector of the unit is not easily accessible, a disconnect device in the mains power circuit must be provided within easy reach.
3. **Attention:** A connection of the mains supply to a power socket requires the power socket to be nearby the unit.
4. **Attention:** Before connecting or disconnecting the mains connector at the unit, ensure that mains power supply is disconnected.
5. **Attention:** Make sure that an appropriate circuit breaker acting as a disconnect device (as required by IEC/EN60950-1) and an overcurrent limiting device are connected between mains power and the unit.
6. **Attention:** Incorrectly wired connections can destroy electrical and electronic components.
7. **Notice:** To avoid corrosion at the connectors caused by electrochemical processes, the material of the cable connectors must not cause a higher potential difference than 0.6 V (see electrochemical contact series).
8. **Notice:** Use an appropriate torque wrench for the coupling torques:
  - for N-type connectors (2 N-m / 20 in lb) with 13/16 in opening, e. g. item no. 244379 available from the CommScope e-catalog
  - for 7/16 DIN-type (25 N-m / 19 ft lb) with 1 ¼ in opening, e. g. item no. 244377 available from the CommScope e-catalogSMA connectors have a specified torque of 60 N-cm.  
Do NOT use your hands or any other tool (e.g. a pair of pliers). This might cause damage to the connector and lead to a malfunction of the unit.
9. **Notice:** For unstabilized electric networks, which frequently generate spikes, the use of a voltage limiting device is advised.
10. **Notice:** Observe the labels on the front panels before connecting or disconnecting any cables.
11. **Notice:** Unused connectors must be closed with their protective covers to ensure watertightness.

## 1.3. HEALTH AND SAFETY

-  1. **Danger: Electrical hazard. Danger of death or fatal injury from electrical current. 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.**
-  2. **Danger: Electrical hazard. Danger of death or fatal injury from electrical current inside the unit in operation. Before opening the unit, disconnect mains power.**
-  3. **Caution:** High frequency radiation in operation. Risk of health hazards associated with radiation from the unit's inner conductor of the antenna port(s). Disconnect mains before connecting or replacing antenna cables.
-  4. **Caution:** High frequency radiation in operation. Risk of health hazards associated with radiation from the antenna(s) connected to the unit. Implement prevention measures to avoid the possibility of close proximity to the antenna(s) while in operation.

## 1.4. PROPERTY DAMAGE WARNINGS

1. **Attention:** Due to power dissipation, the unit may reach a very high temperature. Do not operate this equipment on or close to flammable materials. Use caution when servicing the unit.
2. **Attention:** Only authorized and trained personnel are allowed to open the unit and get access to the inside.
3. **Notice:** Although the unit is internally protected against overvoltage, it is strongly recommended to ground (earth) the antenna cables close to the antenna connectors of the unit for protection against atmospheric discharge. In areas with strong lightning, it is strongly recommended to install additional lightning protection.
-  4. **Notice:** ESD precautions must be observed. Before commencing maintenance work, use the available grounding (earthing) system to connect ESD protection measures.
5. **Notice:** Only suitably qualified personnel are allowed to work on this unit and only after becoming familiar with all safety notices, installation, operation and maintenance procedures contained in this manual.
6. **Notice:** Keep operating instructions within easy reach and make them available to all users.
7. **Notice:** Read and obey all the warning labels attached to the unit. Make sure that all warning labels are kept in a legible condition. Replace any missing or damaged labels.

8. **Notice:** Only license holders for the respective frequency range are allowed to operate this unit.
9. **Notice:** Make sure the repeater settings are correct for the intended use (refer to the manufacturer product information) and regulatory requirements are met. Do not carry out any modifications or fit any spare parts, which are not sold or recommended by the manufacturer.

## 1.5. COMPLIANCE

1. **Attention:** In order to meet the Conducted Emissions requirement according to EN 61000-6-3, the following conditions must be fulfilled for units with PSU DC 680 W or PSU DC 780 W:
  - a) The connecting cable to the DC voltage source must be less than 30 m long.
  - b) For connecting cables >30m, special material requirements must be observed, e.g. a shielded two-wire line must be used as the input lead or a metal cable channel/installation conduit must be used for installing the input lead.
2. **Notice:** For installations, which have to comply with FCC RF exposure requirements, the antenna selection and installation must be completed in a way to ensure compliance with those FCC requirements. Depending on the RF frequency, rated output power, antenna gain, and the loss between the unit and antenna, the minimum distance D to be maintained between the antenna location and human beings is calculated according to this formula:

$$D_{[cm]} = \sqrt{\frac{P_{[mW]}}{4 * \pi * PD_{[mW/cm^2]}}}$$

where

- P (mW) is the radiated power at the antenna, i.e. the max. rated unit output power in addition to the antenna gain minus the loss between the unit and the antenna.
- PD (mW/cm<sup>2</sup>) is the allowed Power Density limit acc. to 47 CFR 1.1310 (B) for general population / uncontrolled exposures which is
  - F (MHz) / 1500 for frequencies from 300MHz to 1500MHz
  - 1 for frequencies from 1500MHz to 100,000MHz

RF exposure compliance may need to be addressed at the time of licensing, as required by the responsible FCC Bureau(s), including antenna co-location requirements of 1.1307(b)(3).

For FCC compliance and meeting the UL requirement of 1 watt EIRP max. for the AWS uplink band, the type of donor antenna must be selected in way not to exceed the 1 watt EIRP. Selection of antenna type and execution of installation has to be done in accordance to relevant FCC part and is in responsibility of the installer.

**3. Notice:** For installations which have to comply with European EN50385 exposure compliance requirements, the following Power Density limits/guidelines (mW/cm<sup>2</sup>) according to ICNIRP are valid:

- 0.2 for frequencies from 10 MHz to 400 MHz
- $F \text{ (MHz)} / 2000$  for frequencies from 400 MHz to 2 GHz
- 1 for frequencies from 2 GHz to 300 GHz

**4. Notice:** For installations which have to comply with FCC/ISED requirements:

**English:**

This device complies with FCC Part 15. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

This device complies with Health Canada's Safety Code. The installer of this device should ensure that RF radiation is not emitted in excess of the Health Canada's requirement. Information can be obtained at [http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio\\_guide-lignes\\_direct-eng.php](http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct-eng.php).

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Antenna Stmt for ISED:**

This device has been designated to operate with the antennas having a maximum gain of 9 dBi. Antennas having a gain greater than 9 dBi are prohibited for use with this device without consent by ISED regulators. The required antenna impedance is 50 ohms.

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 100 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. Users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

**French:**

Cet appareil est conforme à FCC Partie 15. Son utilisation est soumise à Les deux conditions suivantes: (1) cet appareil ne peut pas provoquer d'interférences et (2) cet appareil doit accepter Toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement du dispositif.

Cet appareil est conforme avec Santé Canada Code de sécurité 6. Le programme d'installation de cet appareil doit s'assurer que les rayonnements RF n'est pas émis au-delà de l'exigence de Santé Canada. Les informations peuvent être obtenues: [http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio\\_guide-lignes\\_direct-fra.php](http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/radio_guide-lignes_direct-fra.php)

Les changements ou modifications non expressément approuvés par la partie responsable de la conformité pourraient annuler l'autorité de l'utilisateur à utiliser cet équipement.

**Antenne Stmt pour ISDE:**

Ce dispositif a été désigné pour fonctionner avec les antennes ayant un gain maximal de 9 dBi. Antennes ayant un gain plus grand que 9 dBi sont interdites pour une utilisation avec cet appareil sans le consentement des organismes de réglementation d'ISDE. L'impédance d'antenne requise est 50 ohms.

L'antenne (s) utilisé pour cet émetteur doit être installé pour fournir une distance de séparation d'au moins 100 cm de toutes les personnes et ne doit pas être co-localisées ou opérant en conjonction avec une autre antenne ou émetteur. Les utilisateurs et les installateurs doivent être fournis avec des instructions d'installation de l'antenne et des conditions de fonctionnement de l'émetteur pour satisfaire la conformité aux expositions RF.

5. **Notice:** Installation of this equipment is in full responsibility of the installer, who has also the responsibility, that cables and couplers are calculated into the maximum gain of the antennas, so that this value, which is filed in the FCC Grant and can be requested from the FCC data base, is not exceeded. The industrial boosters are shipped only as a naked booster without any installation devices or antennas as it needs for professional installation.
6. **Notice:** Corresponding local particularities and regulations must be observed. For national deviations, please refer to the respective documents included in the manual CD that is delivered with the unit.
7. **Notice:** The unit complies with Overvoltage Category II. It also complies with the surge requirement according to EN 61000-4-5 (fine protection); however, installation of an additional medium (via local supply connection) and/or coarse protection (external surge protection) is recommended depending on the individual application in order to avoid damage caused by overcurrent.

For Canada and US, components used to reduce the Overvoltage Category shall comply with the requirements of IEC 61643-series. As an alternative, components used to reduce the Overvoltage Category may comply with ANSI/IEEE C62.11, CSA Certification Notice No. 516, CSA C22.2 No. 1, or UL 1449. Suitability of the component for the application shall be determined for the intended installation.

8. **Note:** For a Class A digital device or peripheral:  
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
9. **Note:** For a Class B digital device or peripheral:  
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference.
10. **Note:** This unit complies with European standard EN60950-1 / EN62368-1.
11. **Note:** This unit must be installed in areas with restricted access for skilled employees only.

## Equipment Symbols Used / Compliance

Please observe the meanings of the following symbols used in our equipment and the compliance warnings:

Symbol	Compliance	Meaning / Warning
---	FCC	For industrial (Part 20) signal booster: WARNING: This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.
		For (Part 90) signal booster: WARNING: This is NOT a CONSUMER device. It is designed for installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC Licensee to operate this device. You MUST register Class B signal boosters (as defined in 47 CFR 90.219) online at <a href="http://www.fcc.gov/signal-boosters/registration">www.fcc.gov/signal-boosters/registration</a> . Unauthorized use may result in significant forfeiture penalties, including penalties in excess of \$100,000 for each continuing violation.
		For AWS-3: To fulfill the FCC the UL requirement of 1 Watt EIRP max. for the AWS uplink band, the type of donor antenna must be selected in a way not to exceed the 1 Watt EIRP. Antenna type selection and execution of installation, i.e. the maximum antenna height of 10m must not be exceeded, has to be done in accordance to the relevant FCC part and is in responsibility of the installer. For stationary application, an operation in the UL band 1755 to 1780 MHz is strictly prohibited by FCC.
---	ISED	WARNING: This is NOT a CONSUMER device. It is designed for installation by an installer approved by an ISED licensee. You MUST have an ISED LICENCE or the express consent of an ISED licensee to operate this device. AVERTISSEMENT: Ce produit N'EST PAS un appareil de CONSOMMATION. Il est conçu pour être installé par un installateur approuvé par un titulaire de licence d'ISDE. Pour utiliser cet appareil, vous DEVEZ détenir une LICENCE d'ISDE ou avoir obtenu le consentement exprès d'un titulaire de licence autorisé par ISDE.
CE	CE	To be sold exclusively to mobile operators or authorized installers – no harmonized frequency bands, operation requires license. Intended use: EU and EFTA countries
		Indicates conformity with the RED directive 2014/53/EU and/or RoHS directive 2011/65/EU.
CE 0700	CE	Indicates conformity with the RED directive 2014/53/EU and RoHS directive 2011/65/EU certified by the notified body no. 0700.

## **WEEE Recycling**

Country specific information about collection and recycling arrangements per the Waste Electrical and Electronic Equipment (WEEE) Directive and implementing regulations is available on CommScope's website.

<http://www.commscope.com/About-Us/Corporate-Responsibility-and-Sustainability/Environment/#recycling>

## **Required Antenna Distances**

Node AM/A+	Antenna gain without cable loss [dBi]	Maximum Distance			
		FCC		ISED	
		m	inches	m	inches
DCM AF 1727E	9	.251	9.88	.386	15.19