

Installation Manual

Lightning Protection Rod

for

Precision Direction Finders

RHO
Elektronik GmbH **THETA**

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WARNING

This lightning protection rod is an electrical conductor. Contact with power lines can result in death or serious injury. Special care must be taken during installation and service that there is no possibility of contact with high voltage or arc-over from power cables or service drops to buildings. Beside radio technical requirements, safety requires that the lightning protection rod is installed in a position where it will never touch, neither in operation, nor during service nor in case of failure, any power line.

Lightning protection rods are used to safe your installation and life in case of lightning strokes. Carefully fulfil your national lightning protection regulations in order to maintain security and your insurance protection.

Installation shall be done by or carried out under control of an instructed lightning protection specialist.

RHOTHETA Elektronik GmbH is not liable for damages resulting from malicious installation, installation in contradiction to national regulations or handling errors during installation, operation or service.

NOTE

The manufacturer reserves the right on making modifications at any time and without previous information of the product described herein.

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Thank you very much for buying this lightning protection rod of the company RHOTHETA Elektronik GmbH. We kindly ask you now to carefully read this installation manual completely and very carefully in order to avoid possible damages caused by incorrect installation and integration into your lightning protection system.

1 General Information

All information given in this document shall be considered as installation aid in order to install the Lightning Protection Rod in a correct way which

- (1) Allows obtaining useable direction finder output.
- (2) Allows obtaining an installation which is compatible to requirements as given by, for example, EN 62305-3 for lightning protection systems.

1.1 Intended Purpose of the Lightning Protection Rod (LPR)

The Lightning Protection Rod for precision direction finders is designed to protect direction finders from RHOTHETA against the effects of direct lightning strokes into a direction finder system.

Normal lightning protection rods are simple metallic structures which have a large influence on the direction finding accuracy of a direction finder due to reflecting radio waves, so as any other metallic structure in proximity of the direction finder. Please refer to your direction finder's manual for details on best location of installation. The practical limits are in contradiction to the requirements of an efficient lightning protection system.

The RHOTHETA Lightning Protection Rod uses special technologies to reduce those reflections. This reduces the effects of the protection rod to an acceptable level, but will not completely avoid any influence.

1.2 Scope of Delivery

The scope of delivery of the Lightning Protection Rod consists of:

Pos.	Amount	Designation
1	1	Installation Manual
2	1	Lightning Protection Rod
3	2	Lightning Protection Connector DIN EN 50164-1

Table 1: Scope of delivery

1.3 Overview

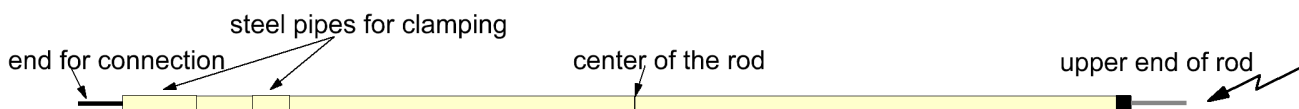


Figure 1: Lightning Protection Rod for precision direction finders

2 Installation

Important note:

Installation shall be carried out by or under control of an instructed lightning protection specialist. The installation described in this chapter is an example of how to install the lightning protection rod may be integrated into a lightning protection system according to EN 62305-3. National requirements may differ and require different installation procedures.

2.1 Positioning of a Lightning Protection Rod

The general position of the direction finder must be selected according to the recommendations given in your direction finder's manual. In addition, the position of the Lightning Protection Rod relative to the position of the direction finder is crucial for the achieved level of protection as well as for the achieved bearing accuracy.

Wrong installation of the Lightning Protection Rod will lead to excessive bearing errors or to limited or non-existing protection against lightning strokes.

Correct selection of the installation position of the Lightning Protection Rod relative to the direction finder must ensure that

- (1) the direction finder is within the protection angle of the protection rod
- (2) Parts of the protection rod not neutralized for RF effects are as far away from the direction finder antenna as possible.

The position of the Lightning Protection Rod relative to the antenna and in conjunction with the on-site lightning protection system should be calculated by an instructed lightning protection specialist.

Additionally, for optimum performance, we recommend that, in cases where the direction finder must not cover all directions (e.g. land side in case of VTS applications), the Lightning Protection Rod should be installed in a direction from which no signals are expected:

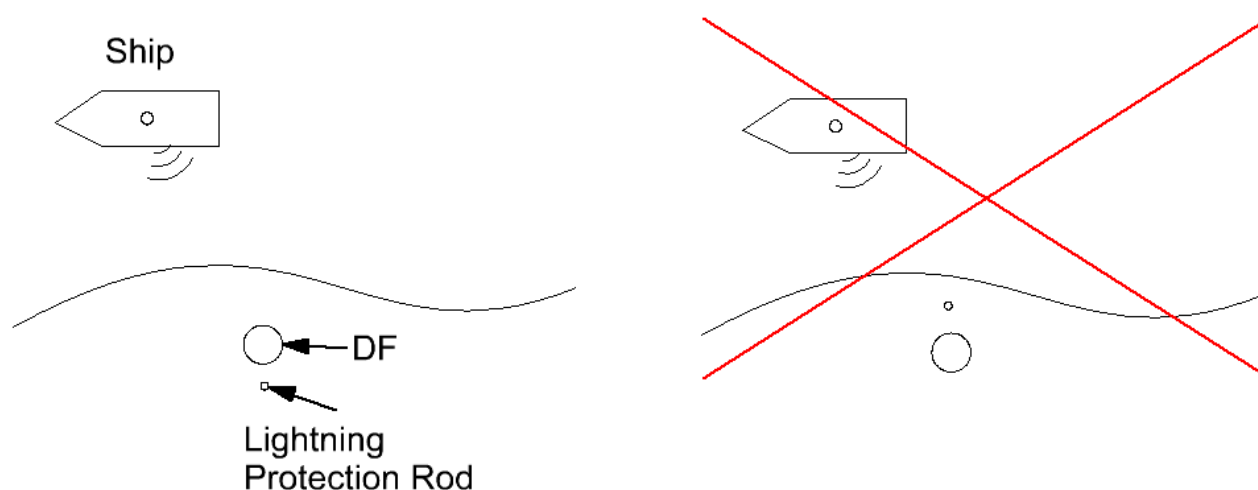


Figure 2: Installation position for best performance

The drawing below shows limiting values of how the Lightning Protection Rod may be installed relative to the direction finder antenna (in this example: RT-500-M) and how the whole system might be installed to a antenna tower or atop a building.

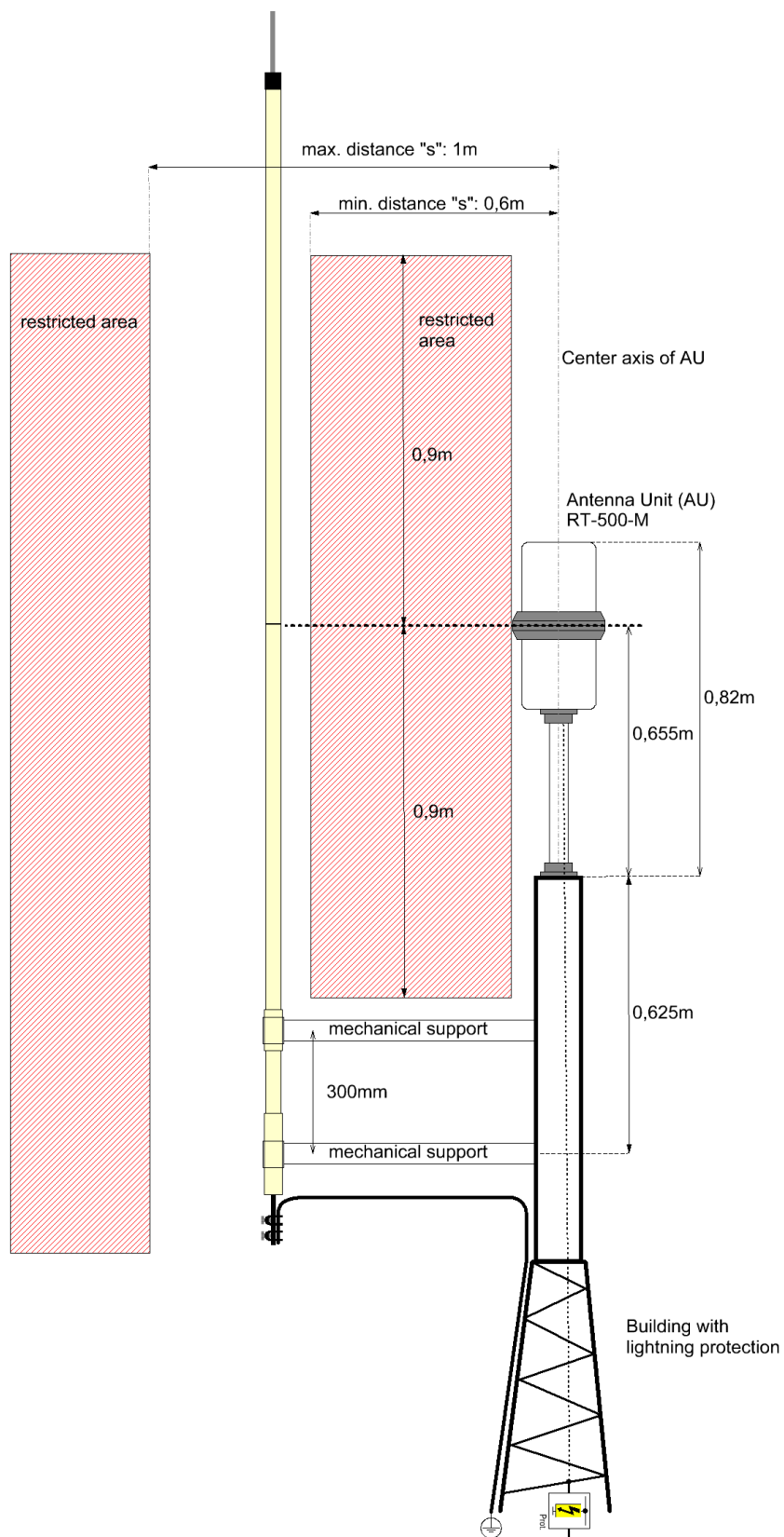


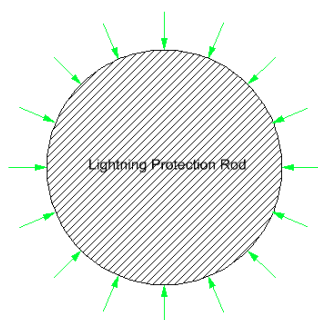
Figure 3: Installation constraints

2.2 Connection to existing Lightning Protection Systems

Conduct the seven steps below to integrate the Lightning Protection Rod into your lightning protection system:

- (1) Define an installation location of the whole direction finder system according to the information given in your direction finder's manual.
- (2) Define the detailed installation position of the Lightning Protection Rod based on the information given in chapter 2.1 and your national lightning protection regulations.
- (3) Connect two mechanical supports to the two steel pipes on the bottom part of the Lightning Protection Rod. Make sure that the pressure of the claws is equally distributed over the surface of the pipe. The distance between the Lightning Protection Rod and the direction finder antenna must be at least 50 cm (60 cm off the centre axis of an RT-500-M, for example).

Correct distribution of pressure:



Incorrect distribution of pressure:

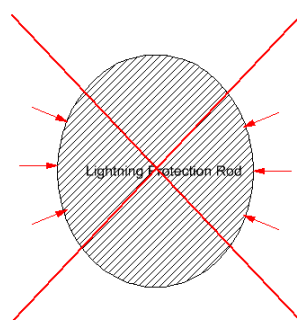


Figure 4: Correct and incorrect pressure distribution of mounting claws

Important note: Never install the claws on the fibre glass part of the Lightning Protection Rod. Fibre glass will not withstand the clamping force. Always clamp to the steel pipes.

- (4) Connect the opposite side of the two mechanical supports to the metal tube on which the direction finder antenna has been installed. The vertical alignment of the lightning protection rod must be so that the centre marker of the rod is in the same height as the centre of your direction finder antenna.
- (5) Install a connection rod to the blank lower end of the Lightning Protection Rod using Lightning Protection Connectors according to DIN EN 50164-1. Use the connectors of the scope of delivery if you use rods up to a diameter of 8 mm, otherwise use specific connectors for larger diameters:

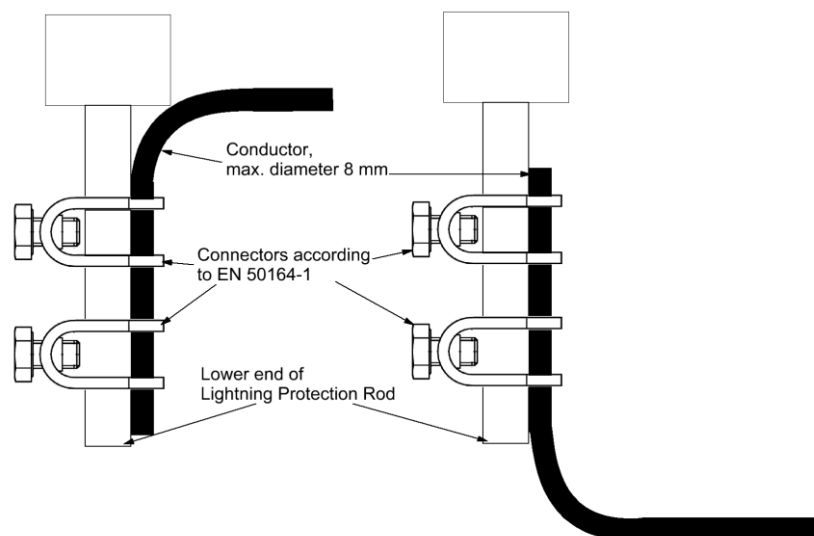


Figure 5: Electrical connection of the connection rod to the Lightning Protection Rod

Important note: Never use the two steel pipes to connect the Lightning Protection Rod to the building's lightning connection system. They have NO electrical connection to the lightning protection rod. They are foreseen for mechanical mounting only.

- (6) Connect the opposite end of the connection rod to your local lightning protection system.
- (7) Test the conductivity of the whole system according to the applicable (national) regulations.

2.3 Protection of the Connection Cable to the Antenna Unit

Protect the interconnection cable to the antenna with lightning surge protective device according to applicable national standards.

Signal voltages depend on the direction finder used in your system. Please refer to the specific documentation of your direction finder.

3 Maintenance

Perform annual visual checks of the systems. Verify that:

- There is no corrosion between interconnected conducting parts.
- The fibre glass tube is not damaged
- All parts are at their original position
- No visible leakage exists, through which water could penetrate into the Lightning Protection Rod.
- No other damages are visible

If any damage is visible, exchange the Lightning Protection Rod.

4 Technical Data

Total weight without installation aids:	8 kg
Length:	3000 mm
Diameter of the fibre glass tube:	40 mm
Upper end of termination rod, material:	AlMgSi with anti-corrosive painting
Blank lower end of termination rod, material:	AlMgSi
Diameter of the blank end of termination rod:	16 mm
Length of the blank upper end of the termination rod:	150 mm
Length of the blank lower end for connection of the lightning protection connector:	120 mm
Length of the upper steel pipe for clamping:	100 mm
Diameter of the upper steel pipe for clamping:	45 mm
Length of the lower steel pipe for clamping:	200 mm
Diameter of the lower steel pipe for clamping:	45 mm
Distance between the steel pipes for clamping:	300 mm
Max. diameter of conductor connected to the rod:	8 mm
Wind load at 160 km/h wind speed	182 N

Table 2: Technical data

5 Abbreviations

AU	Antenna Unit
DF	Direction Finder
h	hours
kg	Kilograms
km	Kilometers
mm	Millimeter
N	Newton
RF	Radio Frequency
VTs	Vessel Traffic Service