



HF Dipole HX002M1

Naval Antenna System

- No skip zone
- Reduced outline
- Compact design yet high efficiency
- No ground plane required
- No separate control cable required
- Integrated tuning unit



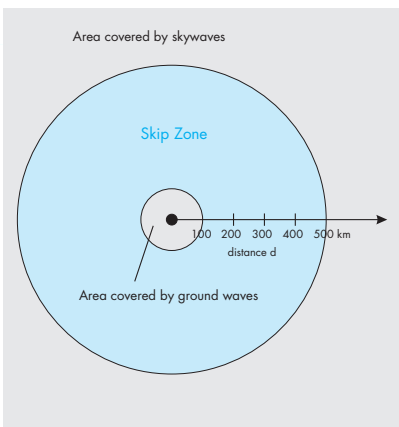
ROHDE & SCHWARZ

Optimum omnidirectional coverage / No skip zone

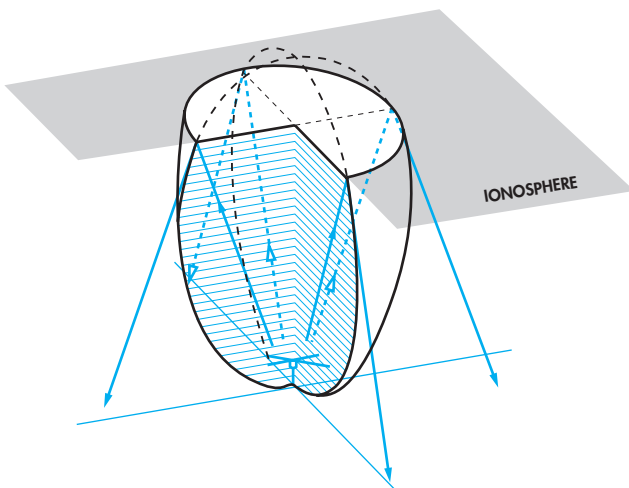
HF Dipole HX002M1 enables optimum coverage over all distance ranges.

It is particularly advantageous for radiocommunication over short and medium ranges, since at distances below 1000 km rod antennas cannot guarantee sufficient transmission reliability due to their skip zone.

Shortwave transmission with a vertical antenna always results in incomplete coverage. A limited area around the transmitting site is covered by ground waves; the depressed vertical pattern enables long distances to be covered well. In between, there is a skip zone



Skip zone at HF produced by vertically polarized antenna



Full coverage using high-angle radiation antenna (NVIS) with three-dimensional radiation pattern



HF Dipole HX002M1 for shipboard communication

usually several hundred kilometers wide. HX002M1 enables high-angle radiation (NVIS: near-vertical incident skywave) to ensure omnidirectional coverage at suitable frequencies, ie between 2 MHz and 8 MHz. Below 2 MHz the antenna operates as a top-fed monopole, thus ensuring omnidirectional coverage with ground waves in the frequency range suitable for this purpose. The fully automatic tuning unit, which is integrated in the antenna head, ensures continuous matching to the transmitting system with an SWR of less than 1.5. No control cable is required from the transmitter for tuning, so the antenna can be used in existing systems without any modifications.

Conventional antennas: the problems

Conventional antennas for shipboard operation such as rod antennas and loop antennas often cause communication problems and are incompatible with systems on the ship.

- Rod antennas: unfavourable radiation pattern over short and medium distances (skip zone); poor electromagnetic compatibility with other systems on board, since for rod antennas the ship's structure acts as a ground plane
- Loop antennas: poor efficiency and therefore low transmission reliability and limited operating bandwidths

HX002M1: the solution

The 150 W HF Dipole HX002M1 solves such problems since the reactive power has been minimized in the antenna feed system.

Although *only 5.2 m long*, the self-tuning dipole antenna guarantees optimum radiocommunication over any distance in the frequency range 1.5 MHz to 30 MHz.

Features of HX002M1:

- compact design, only 5.2 m long
- high efficiency
- no ground plane required, so ensuring good EMC - even on GRP vessels

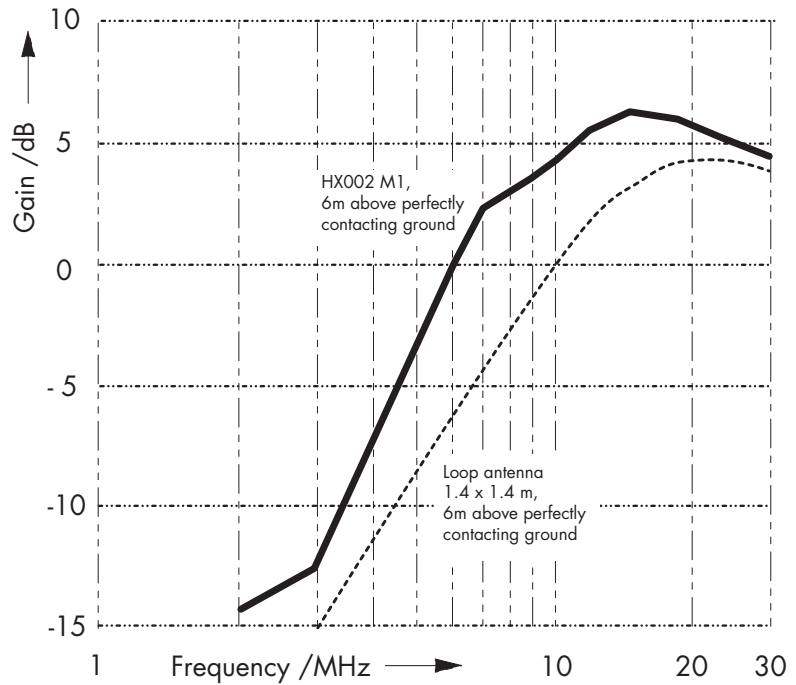
Radiation characteristics

The excellent radiation characteristics of the HX002M1 are the result of the radiator shape, the integrated low-loss tuning network and the high-grade balun.

Design and functioning

High antenna gain is achieved by placing the matching network near the feedpoint of the dipole. Therefore all modules such as radiators, antenna tuning unit and balun are accommodated in the antenna head.

The RF section of the ATU - the matching network - is of unbalanced design with discrete, binary-stepped inductors and capacitors. The balanced current distribution on the radiators is achieved by using an eddy-current choke suppresser configured as a balun.



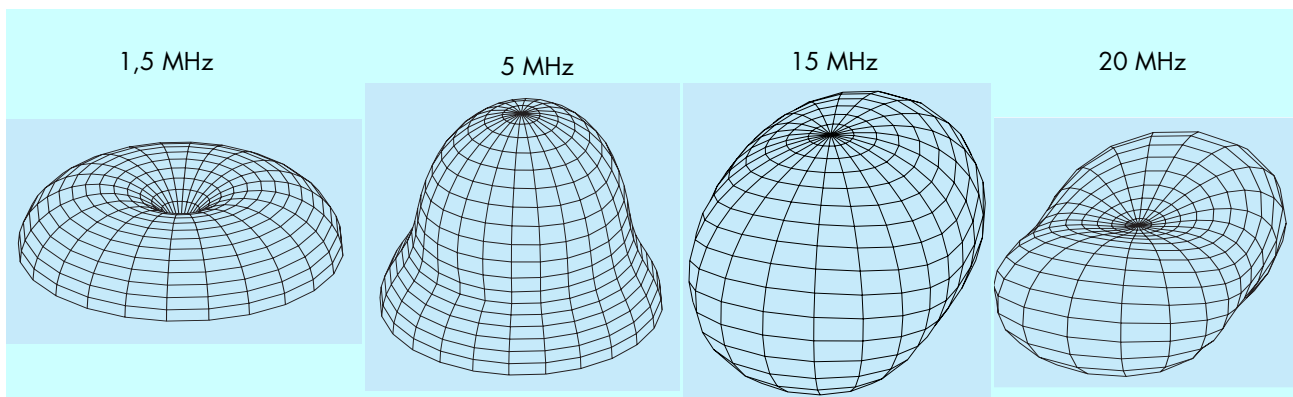
Gain of 150 W HF Dipole HX002M1 compared to loop antenna

The mechanical design meets all requirements on heavy-duty upper-deck equipment: Housing and antenna rods are made from strong and non-corrosive glassfiber-reinforced polyester; all metallic parts are made from stainless steel or seawater-resistant aluminium alloys.

As the smooth antenna surface prevents the deposition of salt and soil, maintenance and cleaning work are reduced to a minimum.

The requirements made on state-of-the-art transmission systems, such as fast frequency change and continuous matching also with varying conditions in the near field of the antenna, are met by the adaptive behaviour of the HX002M1. The non-volatile memory completely covering the 1.5 MHz to 30 MHz frequency range is updated following each tuning correction, so the tuning time of the antenna is continuously and automatically minimized.

Radiation patterns of 150 W HF Dipole HX002M1 over perfectly conducting ground (dipole axis x-orientated)



Lightning and NEMP protection

Lightning and NEMP protection has been provided for the radiator connectors, the balun (spark gaps) and the output of the control unit.

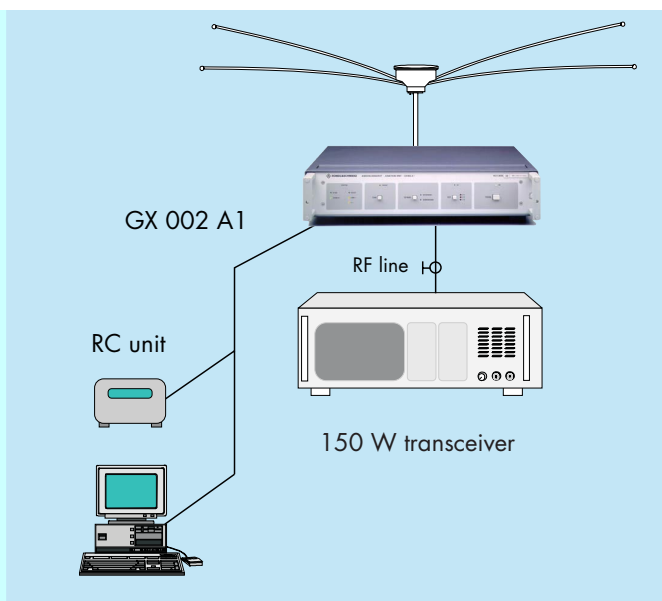
Simple integration

HF Dipole HX002M1 can be directly connected to the HF Transceivers XK 2100 from Rohde & Schwarz. To connect other transceivers, Junction Unit GX 002 A1 is available to provide power supply and tuning control.

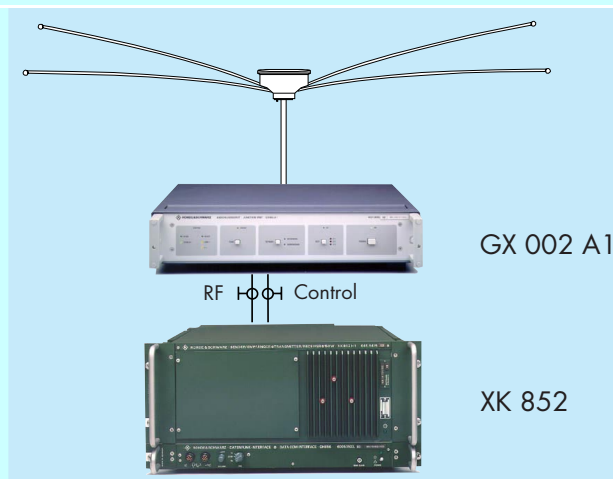
To connect transmitters of the XK 852 family or transmitters from other manufacturers, Junction Unit GX 002 A1 is provided featuring the following functions:

- power supply
- generating serial control information for the antenna
- feeding data signals and DC supply voltage into the RF line
- status display
- providing a parallel interface for XK 852 equipment as well as an RS-232-C interface for computer control and diagnosis.

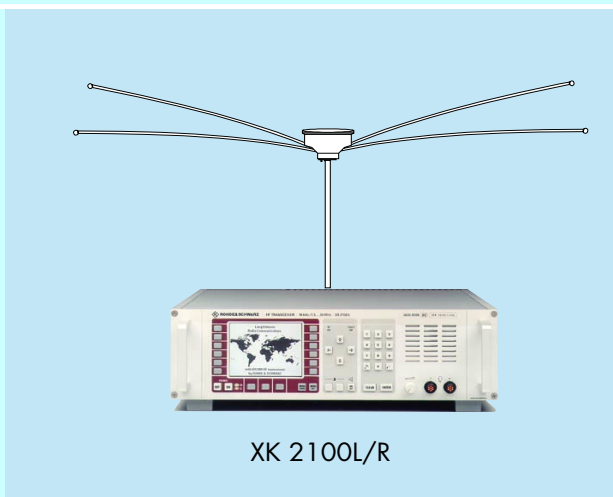
All the control signals and the supply for the ATU are taken via the inner conductor of the antenna RF cable so that no separate control cable is required. No additional units are required to connect transmitters of the XK 2100 family.



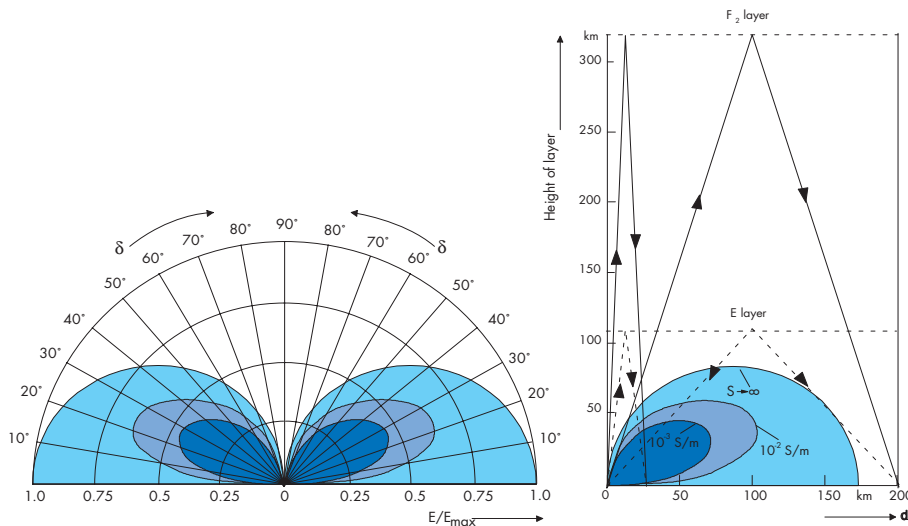
Application with any HF transceiver and Junction Unit GX 002 A1.
Control is possible via serial RS-232 interface or via parallel-connected remote control



Application with HF Transceiver XK 852 and Junction Unit GX 002 A1



HX002M1 together with HF Transceiver XK 2100.
No additional components are needed, control and power supply of the antenna are performed via RF cable



Vertical radiation pattern of $\lambda/4$ vertical antenna and transmission path for high-angle radiation

Specifications

Electrical data

| | |
|-------------------------------------|-----------------------|
| Frequency range | 1.5 MHz to 30 MHz |
| Max. permissible transmitting power | 150 W PEP 100 W CW |
| Nominal input impedance | 50 * |
| SWR | typ. <1.3, max. 1.5 |
| Gain | see Fig. 3 |
| Radiation pattern | see Fig. 4 |

Tuning time

| | |
|----------------|---|
| Initial tuning | typ. 3 s, max. 6 s |
| Re-tuning | typ. <0.2 s |
| Silent tuning | <30 ms |
| Tuning power | 30 W to 50 W 50 W to 100 W with GX 002 A1 |
| RF connector | N female |
| Power supply | from XK 2100 or via GX 002 A1 |
| AC supply | 100/120/220/230 x (1 * 10%) V 47 Hz to 63 Hz (100 VA) |
| Battery | 22 V to 32 V, approx. 2.5 A at 24 V 23 V to 32 V when a 60 m cable RG 213/U is used |

Mechanical data, environmental conditions

| | |
|---|---|
| Dimensions | dipole length 5.2 m |
| Connection to mast | bolt, 40 mm dia/100 mm length |
| Weight | approx. 34 kg |
| Dimensions of junction unit GX002A1 (W x H x D) | 483 mm x 133 mm x 390 mm |
| Permissible wind speed without ice accretion | 200 km/h |
| with radial ice accretion | 120 km/h |
| Operating temperature range | -30 °C to 55 °C acc. to MIL-STD-810E Meth. 501.3 and 502.3 |
| Storage temperature range | -40 °C to 85 °C acc. to MIL-STD-810E Meth. 501.3 and 502.3 |
| Relative humidity | 95 % at 25 °C to 55 °C acc. to MIL-STD-810E Meth. 507.3 |
| Resistance to vibration | to MIL-STD-810E Meth. 514.4 random 80 Hz to 350 Hz 0.04g ² /Hz 20 Hz to 80 Hz, 3 dB/octave 350 Hz to 2000 Hz, -6 dB/octave |
| Resistance to shock | 40g, spectrum 45 Hz to 2000 Hz acc. to MIL-STD-810E Meth. 516.4 |
| Resistance to salt fog sand and dust | to MIL-STD-810E to MIL-STD-810E |
| EMP protection | integrated lightning and NEMP protection |
| EMC | to MIL-STD-461B |

Certified Quality System
ISO 9001
DQS REG. NO 1954-04

Fax Reply (HF Dipole HX002M1)

- Please send me an offer**
- I would like a demo**
- Please call me**
- I would like to receive your free-of-charge CD-ROM catalog**
(including Test&Measurement Products + Sound and TV
Broadcasting)

Others: _____

Name: _____
Company/Department: _____
Position: _____
Address: _____

Country: _____
Telephone: _____
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