Data sheet

# Antenna Tuning Unit R&S®FK2900M

For matching of HF transceivers to antennas used in stationary and shipboard applications

- Tuning range 1.5 MHz to 30 MHz
- Fully automatic tuning
- 1000 W CW and PEP at 100 % duty cycle
- Tuning of all rod antennas from 10.5 m to 12 m
- Tuning of all long-wire antennas >15 m
- Low probability of intercept (LPI)
- Silent tuning over the entire frequency range from 1.5 MHz to 30 MHz
- Maintenance-free
- MTBF 12 000 h
- Continuous monitoring of operational status
- Rugged design

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## Brief description

The Antenna Tuning Unit R&S®FK 2900M is a member of the HF Transceiver Family R&S®XK 2000. The R&S®FK 2900M matches the R&S®XK 2500 and R&S®XK 2900 transceivers to rod and wire antennas. It is designed for stationary or shipboard applications. It can handle power up to 1000 W CW and PEP at a 100 % duty cycle. The R&S®FK 2900M operates in the frequency range from 1.5 MHz to 30 MHz where it performs an antenna impedance transformation into 50 Ω in both the receive and transmit mode. Additionally, it provides preselection in the receive mode.

Owing to the silent tuning feature of the Transceiver R&S®XK 2900L, low probability of intercept (LPI) is enhanced.

## Tuning functionality

**Silent tuning over the entire frequency range from 1.5 MHz to 30 MHz**
Before the ATU can be used for an application, it must be connected to an antenna to "learn" its characteristic. Learning takes place in a user-defined frequency range in the HF band (1.5 MHz to 30 MHz).

The ATU "learns" the antenna characteristic by receiving tuning data for a maximum of 1500 predefined frequencies. Once the tuning data for these frequencies is known and stored, the typical ATU setting time is less than 30 ms.

The advantage for the user is the low probability of intercept (LPI), since ATU frequency setting takes place very quickly and without any emission of RF power.

**Repeated tuning**
A change in environmental conditions may slightly alter the actual antenna tuning data as compared to the stored data.

The quality of antenna matching is therefore checked during operation by means of an integrated VSWR measuring device. If the required VSWR (<1.5:1) is not attained, the ATU can be retuned in less than 200 ms.

## Design

The rugged, waterproof and dustproof construction of the R&S®FK 2900M allows its use in stationary, landmobile and shipboard applications, even in harsh environments and continuous 24-hour operation.

**BITE**
The antenna tuner is included in the continuous monitoring of the system BITE so that status reports are displayed at the control unit of the transceiver system.

**ECM and overvoltage protection**
All boards have ECM filters. For protection against overvoltage as produced by lightning strokes to the antenna, the R&S®FK 2900M output is provided with lightning protection.

# Specifications

| | |
|---|---|
| Frequency range | 1.5 MHz to 30 MHz |
| RF input power | 1000 W + 0.5 dB PEP<br>1000 W + 0.5 dB CW |
| Duty cycle | continuous |
| RF tuning power | 40 W ±1 dB, max. VSWR 3:1 |
| Tuning accuracy | automatic tuning to 50 Ω to within a VSWR of 1.5:1 (typ. 1.3:1) |
| **Suitable antennas** | |
| Rod antennas | length 10.5 m to 12 m |
| Long-wire antennas | length >15 m |
| First-time tuning | typ. 1 s |
| Repeated tuning | typ. <0.2 s |
| Silent tuning | <30 ms |
| Silent tuning (memory size) | 1500 predefined frequencies for learning antenna characteristic |
| **Connections** | |
| RF input | built-in connector, N female |
| Antenna | insulator (ceramics), screw terminal |
| Grounding | by means of screw terminal |
| **Permissible distances** | |
| Antenna feeder – R&S®FK 2900M | ≤30 cm |
| R&S®XK 2900 – R&S®FK 2900M | ≤50 m |
| **Note:** For cable lengths >50 m, a special cable or an external power supply is required. | |

## General data

| | |
|---|---|
| Power supply | 21 V to 31 V DC, approx. 1.2 A, supplied via ATU control cable or external power supply |
| Dimensions (with insulator) (W × H × D) | 432 mm × 435 mm × 631 mm |
| Weight | 43 kg |
| Material of case | aluminum |
| Installation position | all positions allowed |
| Color | RAL 7001, navy grey |
| MTTR | 30 minutes, without sealing finish |
| MTBF | 12000 h in line with MIL-HDBK-217E |

## Environmental data

| | |
|---|---|
| Temperature range | |
| Operating temperature range | –40 °C to + 55 °C in line with MIL-STD-810E meth. 501.3 and 502.3, cat. A2 and C2 |
| Storage temperature range | –40 °C to + 85 °C in line with MIL-STD-810E meth. 501.3 and 502.3 |
| Maximum altitude | 3000 m above sea level, $T_{amb}$ < 35 °C in line with MIL-STD-810E meth. 500.3, proc. I + II |
| Humidity | |
| Operation | in line with MIL-STD-810E meth. 507.3, 26 °C/41 °C, 95 % RH, duration of test 5 days |
| Storage | in line with MIL-STD-810E meth. 507.3, 26 °C/41 °C, 95 % RH, duration of test 5 days |
| Vibration (without shockmount) | in line with MIL-STD-810E meth. 514.4, cat. 9 |
| Random | 4 Hz to 50 Hz, 0.01 $g^2$/Hz, 2 h per axis |
| Vibration (with shockmount) | in line with MIL-STD-810E meth. 514.4, cat. 9 |
| Random | 4 Hz to 50 Hz, 0.02 $g^2$/Hz, 2 h per axis |
| Shock (without shockmount) | max. 40 g, 45 Hz to 2000 Hz spectrum, in line with MIL-STD-810E meth. 516.4 |
| Shock (with shockmount) | 50 g, 11 ms, half sine |
| Class of protection | IP 66 in line with DIN IEC 40050, water-proof |
| Solar radiation | in line with MIL-STD-810E meth. 505.3, proc. II, basic hot |
| Salt fog | in line with MIL-STD-810E meth. 509.3 |
| Sand and dust | in line with MIL-STD-810E meth. 510.3, proc. I and II |
| Icing/Freezing rain | in line with MIL-STD-810E meth 521.1 |
| Safety features | built-in lightning overvoltage and over-current protection, protection against overtemperature and static charges on antenna |
| Electromagnetic compatibility | in line with MIL-STD-461E, CE102, CS101, CS114, RE101, RE102, RS101, RS103, EN 55022, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-6 |

## Ordering information

| Order designation | Type | Order No. |
|---|---|---|
| Antenna Tuning Unit | R&S®FK 2900M | 6097.1005.02 |
| Antenna Tuning Unit (masts >12 m) | R&S®FK 2900M | 6097.1005.05 |
| **Recommended extras** | | |
| Shockmount, horizontal mounting | R&S®KS 2900M | 6116.2507.03 |
| Shockmount, vertical mounting | R&S®KS 2900M | 6116.2507.02 |
| **Cables and connectors** | | |
| ATU Control Cable (between R&S®XK 2500/2900 and R&S®FK 2900M) | R&S®GK 2903M | 6117.9757.xx[1)] |
| Mating Connector Set | R&S®ZF 4105 | 6120.5407.02 |
| **Documentation** | | |
| User manual R&S®FK 2900M | | 6076.0780.12 |

[1)] Order number depending on cable length.
10 10 m length
20 20 m length
30 30 m length
40 40 m length
50 50 m length

Certified Quality System ISO 9001 DQS REG. NO 1954 QM

Certified Environmental System ISO 14001 DQS REG. NO 1954 UM

Certified Quality System AS 9100 DQS REG. NO 1954 AS

Certified Quality System AQAP-110 Audit report GP Q2 - NO 96.07

More information at
www.rohde-schwarz.com
(search term: FK2900M)

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