

R&S® DDF255

Digital Direction Finder

Accurate direction finding with measurement and analysis capabilities in a single unit



75 Years of
Driving
Innovation


ROHDE & SCHWARZ

R&S® DDF255 Digital Direction Finder

At a glance

The R&S® DDF255 combines the new and extremely powerful R&S® ESMD wideband monitoring receiver with the highly accurate correlative interferometer DF method. This combination results in a high-precision wideband direction finder featuring extensive measurement and analysis functions. With its high integration density and optional DC power supply, the R&S® DDF255 is optimally prepared for mobile applications.

Main features

Due to the use of wide-aperture DF antennas and a very large number of antenna elements, the patented DF method offers a high degree of accuracy and outstanding immunity to reflections at an excellent price/performance ratio.

Added to that is a wide scope of measurement and analysis capabilities such as the optional measurement of radio signals in line with ITU recommendations.

Key facts

- Tried-and-tested DF method used by 23 regulatory authorities worldwide
- Reliable DF results even in difficult environments (e.g. urban areas with up to 50% reflection)
- High-precision DF method at an excellent price/performance ratio (patented method)
- Determination of signal bearings in the frequency range up to 6 GHz
- Detection even of extremely short emissions at unknown frequencies due to high-speed panorama scan (optional)
- Measurement methods in line with ITU recommendations (optional)

R&S® DDF255 front view



Key features and benefits

Versatile applications

- ▮ Extremely fast spectrum monitoring with scan speeds of up to 100 GHz/s in the 20 MHz to 3.6 GHz frequency range (optional 9 kHz to 26.5 GHz)
- ▮ Wideband direction finding with realtime bandwidth of up to 20 MHz and selectable channel resolution
- ▮ Display and demodulation of signals with extremely large bandwidth of up to 20 MHz
- ▮ Highly accurate direction finding in line with ITU recommendations in the 20 MHz to 3 GHz (optional 300 kHz to 6 GHz) range including map display (optional)
- ▮ Signal analysis including the classification, demodulation and decoding of important communications systems (optional)

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Performance and measurement methods in line with ITU recommendations

- ▮ As an option, the R&S®DDF255 can be furnished with comprehensive, ITU-compliant measurement methods
- ▮ These include, for example, the measurement of frequency and frequency offset, field strength, modulation, spectrum occupancy and bandwidth

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Wideband direction finding with realtime bandwidth of up to 20 MHz

- ▮ All channels in the aeronautical or maritime frequency bands can be simultaneously displayed and their bearings taken
- ▮ All FM broadcast channels can be simultaneously displayed and their bearings taken
- ▮ Frequency-dependent bearing fluctuations are reduced through high channel resolution and result averaging by means of a histogram
- ▮ The bearings of frequency-agile transmitters (frequency-hopping and chirp transmitters) with up to 100 hops/s are reliably determined

▷ [Page 6](#)

Fast and reliable radiolocation due to high DF accuracy

- ▮ In the VHF/UHF/SHF range, the R&S®DDF255 uses the highly accurate correlative interferometer DF method
- ▮ Compared to most other products on the market, the R&S®DDF255 offers higher immunity to reflection as it uses DF antennas with a very large number of antenna elements (VHF/UHF/SHF)

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Direction finding up to 6 GHz

- ▮ As an option, the R&S®DDF255 offers high-precision direction finding up to 6 GHz
- ▮ Bearings of signals such as WLAN and WiMAX and of microwave systems can be taken

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Versatile applications

Due to the extensive functionality of the R&S®ESMD digital wideband receiver, the R&S®DDF255 offers more standard features than a conventional direction finder. With the appropriate options, the R&S®DDF255 transforms into a complete, integrated solution for radiomonitoring and radiolocation. When controlled through a PC or laptop, the R&S®DDF255 offers the following capabilities, for example:

- Extremely fast spectrum monitoring with scan speeds of up to 100 GHz/s in the 20 MHz to 3.6 GHz frequency range (optional 9 kHz to 26.5 GHz)
- Wideband direction finding with a realtime bandwidth of up to 20 MHz and selectable channel resolution, e.g. for simultaneously taking the bearings of all broadcast, aeronautical or maritime radio signals
- Display and demodulation of signals with very large bandwidth of up to 20 MHz
- Highly accurate direction finding in line with ITU recommendations in the 20 MHz to 3 GHz (optional 300 kHz to 6 GHz) range including map display (optional)
- Signal analysis including the classification, demodulation and decoding of important communications standards (optional)

To enable more in-depth analysis of the signal spectrum and the signal environment, the R&S®DDF255 features an IF panorama. The current receive frequency is positioned in the center of the spectrum display. The display width can be set between 1 kHz and 20 MHz for optimal adaptation to the task at hand. MinHold, MaxHold and Average displays are also possible, allowing an even broader scope of applications.

The instrument comes standard with 128 Mbyte of RAM and 2 Gbyte compact flash card memory for the display of data. Using the high-speed USB 2.0 interface, external hard disks with a large memory depth can also be connected.

The R&S®DDF255 can be fully remote-controlled via the LAN interface. To ensure reliable high-speed data transmission (baseband data, scan data), as well as the reliable transmission of control commands the receiver is equipped with two 1 Gbit LAN interfaces. The protocol on the LAN interface is compliant with the standard commands for programmable instruments (SCPI) syntax.

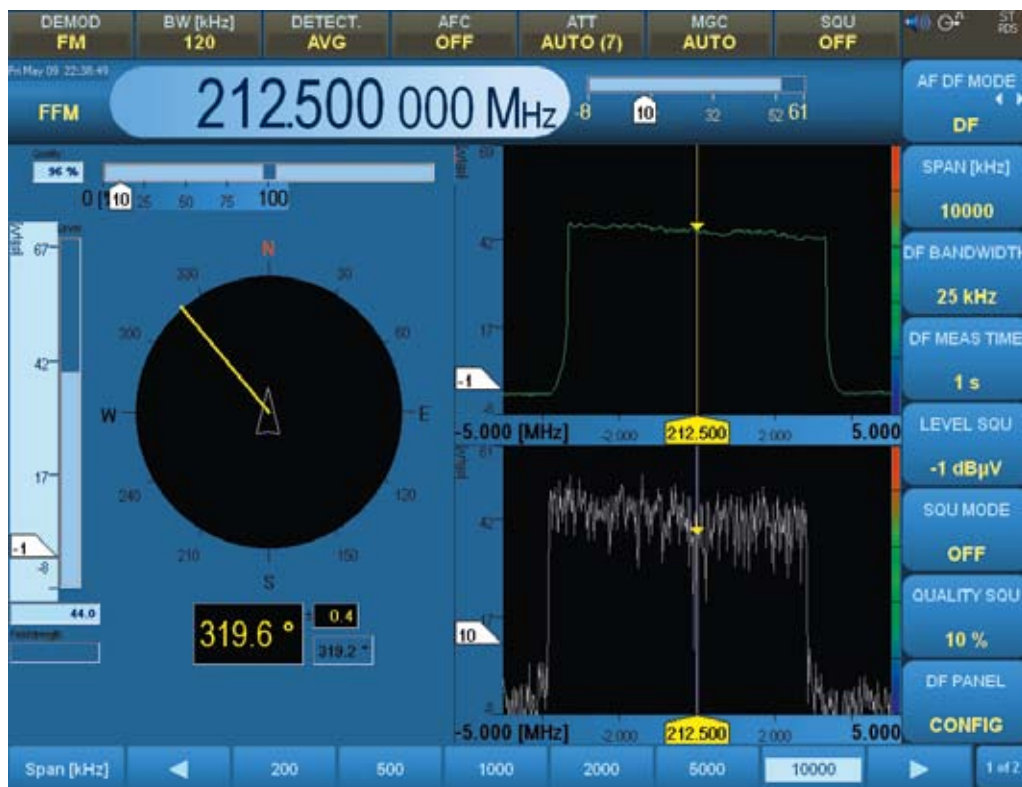
Performance and measurement methods in line with ITU recommendations

The R&S®DDF255 meets, and in many cases clearly surpasses, the ITU recommendations for monitoring direction finders and receivers. For example, the R&S®DDF255 receiver offers large-signal immunity clearly superior to the minimum values recommended by the ITU (higher intercept points, lower phase noise).

As an option, the R&S®DDF255 can be furnished with comprehensive, ITU-compliant measurement methods.

These include:

- ▮ Frequency and frequency offset in line with ITU-R SM.377
- ▮ Field strength in line with ITU-R SM.378
- ▮ Modulation in line with ITU-R SM.328
- ▮ Spectrum occupancy in line with ITU-R SM.182/SM.328 (on control PC)
- ▮ Bandwidth in line with ITU-R SM.443
- ▮ Recognition of mono and stereo transmissions from FM broadcast transmitters



R&S®DDF255 graphical user interface

Wideband direction finding with realtime bandwidth of up to 20 MHz

By using high-speed signal processing, the R&S®DDF255 can take the bearings of all signals in a wide frequency range of up to 20 MHz with selectable resolution and in realtime. For all signals above the level threshold, bearings are calculated in parallel and displayed.

Wideband direction finding offers a variety of applications and benefits:

- All channels in the aeronautical or maritime frequency bands can be displayed and their bearings taken in realtime (800 aeronautical channels or 88 maritime channels)
- All FM broadcast channels can be displayed and their bearings taken in realtime
- The bearings of signals with large bandwidths such as DAB and DVB-T can be taken with high channel resolution. The bearing is then an average value (histogram) calculated from many individual bearings. This compensates for frequency-dependent bearing fluctuations
- The bearings of frequency-agile transmitters (frequency-hopping and chirp transmitters) with up to 100 hops/s are reliably determined

Fast and reliable radiolocation due to high DF accuracy

In the VHF/UHF/SHF range the R&S®DDF255 uses the correlative interferometer DF method.

(See section on technical background.)

In contrast to simple amplitude comparison methods, the R&S®DDF255 therefore offers significantly higher, class A DF accuracy in line with ITU recommendations.

This high DF accuracy relies on the precise measurement of the phase angles between the reference antenna element and the other elements. Measuring the phase difference between two signals normally requires two coherent receive paths. For this reason, most interferometer direction finders on the market use at least two receivers. With the R&S®DDF255, the two receive paths are coherently linked in the DF antenna using a patented method from Rohde&Schwarz.

In the HF range the Watson-Watt DF method is used. The special advantage of this method is that small DF antennas can be deployed. This makes the R&S®DDF255 also suitable for mobile direction finding in this frequency range.

Direction finding up to 6 GHz

Together with the new R&S®DDF255-SHF option and the R&S®ADD075 DF antenna, the R&S®DDF255 delivers precise DF results up to 6 GHz.

New communications systems in the frequency range above 3 GHz require direction finders that are able to measure signals up to 6 GHz such as:

- WLAN (wireless local area network)
- WiMAX (worldwide interoperability for microwave access)
- Microwave systems

The R&S®DDF255 therefore also effectively detects interference in the corresponding frequency bands.

Locating the target transmitter previously required the use of rotatable directional antennas, which have disadvantages regarding manageability and measurement speed.

The R&S®DDF255 immediately displays the bearing and significantly simplifies direction finding while driving. The high DF accuracy and reflection immunity available in the VHF/UHF range are also achieved in the SHF range.

R&S®DDF255 rear view



Technical background

Single-channel interferometer DF method

The correlative interferometer DF method is based on measuring the phase differences between several antenna elements of a DF antenna. To measure the phase angle φ between the signals of two antenna elements by means of a single receiver, a patented Rohde&Schwarz method is used.

With this method, the phase of one of the signals is shifted in four steps ($0^\circ/90^\circ/180^\circ/270^\circ$) in the quadrature multiplexer, and the resulting signal is added to the second signal in each case (see diagram on page 9, bottom).

The receiver measures the amplitude of the sum signal after each phase shift. Placing the four amplitude values ($A_1/A_2/A_3/A_4$) thus obtained in the formula in the diagram yields the phase angle between the two signals. This measurement is performed for each antenna element.

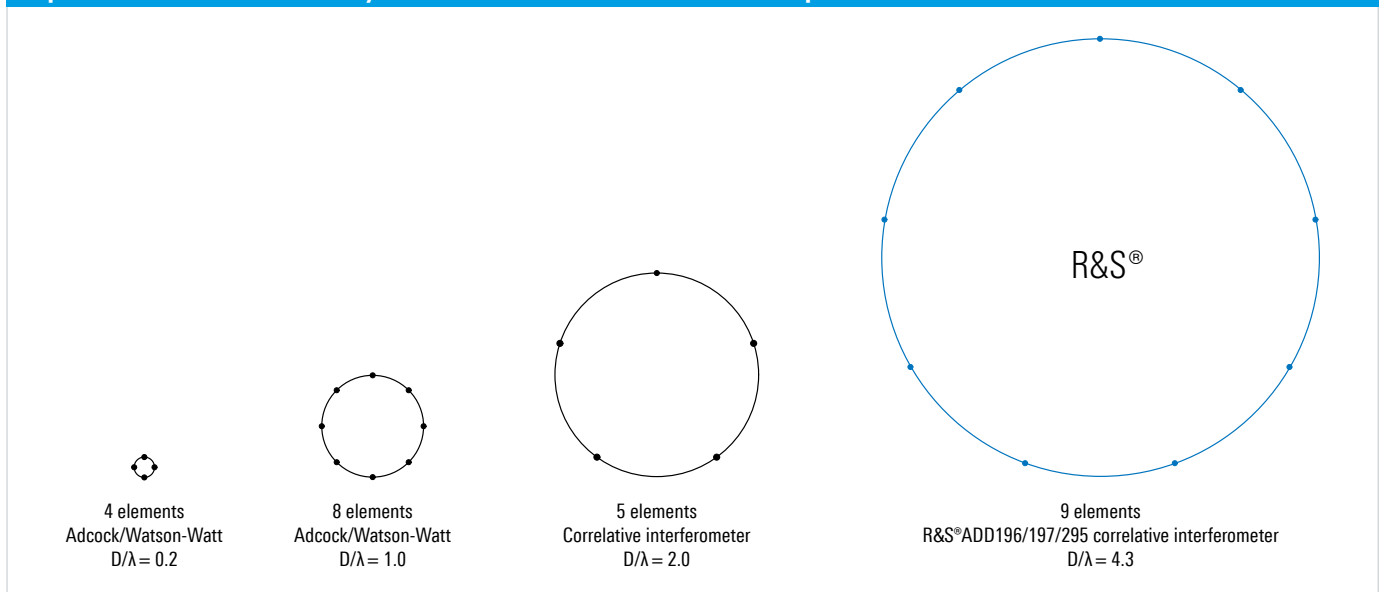
Multi-element DF antennas

It is generally known that a direction finder's accuracy and sensitivity in a real environment increases with the diameter of the DF antenna. This advantage comes to light only in an actual operational environment that includes reflections and weak signals. This is not apparent in the specifications, since the instrument and system accuracy specified there are valid for ideal, reflection-free DF antenna environments and strong signals for the purpose of comparison.

The figure below shows that the R&S®DDF255, featuring a nine-element VHF/UHF antenna and the correlative interferometer DF method, offers by far the largest DF antenna and thus higher accuracy and sensitivity.

Maximum permissible diameter of the DF antenna relative to the wavelength for unambiguous DF results for up to 50% of environmental reflections

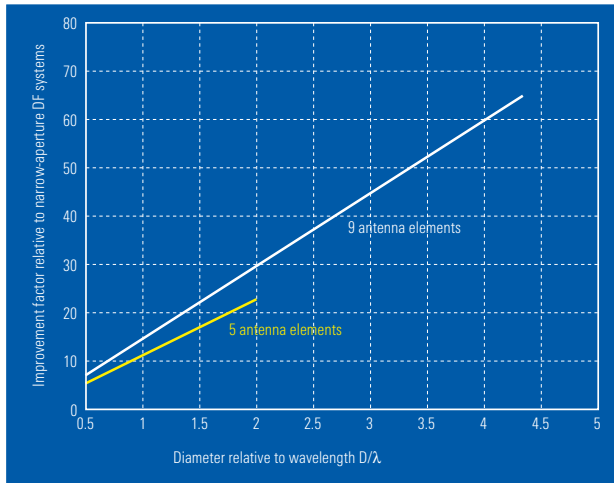
Improvement of DF accuracy as a function of the DF antenna aperture



Comparison of DF accuracy with 50% reflections and identical antenna diameter

Frequency	Accuracy of the R&S®DDF255	Accuracy of five-element direction finder
160 MHz	20°	21°
300 MHz	12°	12°
460 MHz	8°	100°
900 MHz	4°	150°
1.5 GHz	6°	110°
3.0 GHz	9°	160°

Improvement factor for the correlative interferometer



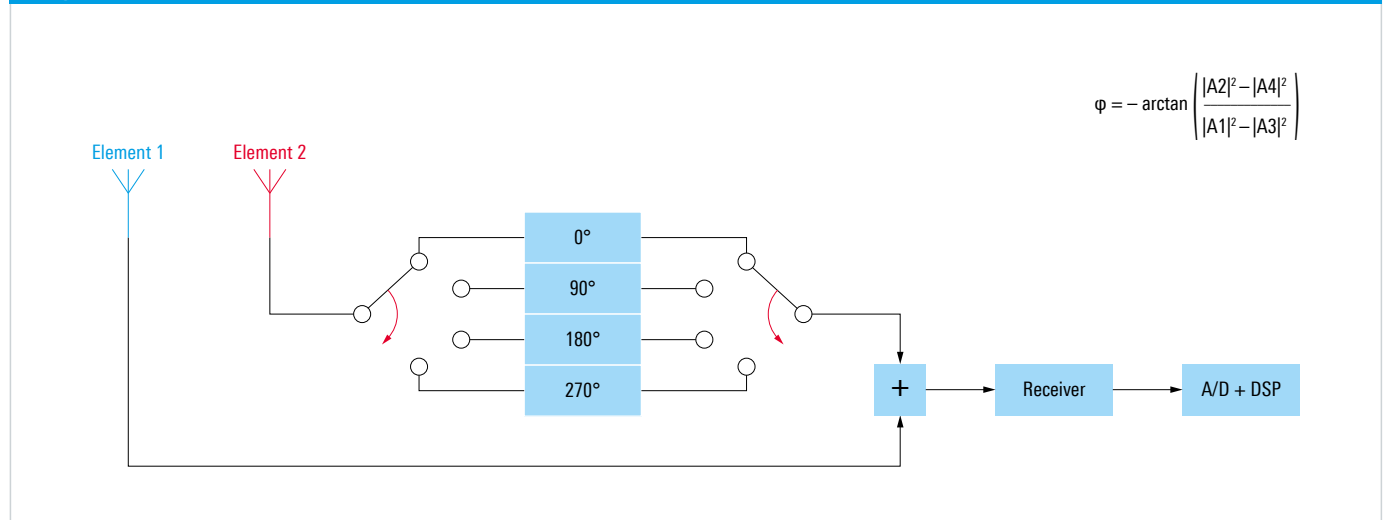
Improvement factor as a function of the DF antenna aperture for the correlative interferometer

Reflections can impair DF accuracy. Depending on their design, some DF antennas can handle reflections better than others.

The R&S®DDF255 was designed to provide accurate bearings even with a 50% share of incoming signal reflections.

This high immunity to reflections is an advantage that is due to the use of many antenna elements. If only five antenna elements are used for instance, a 50% share of reflections can produce DF errors in the order of 100° (see table above). The direction finder is pointing in the totally wrong direction.

Single-channel interferometer DF method



System configuration

DF antenna for the HF range

R&S®ADD119

The R&S®ADD119 is a compact HF DF antenna based on the Watson-Watt DF method. It consists of a crossed loop and a reference antenna accommodated in a radome of approx. 1 meter in diameter. By using the R&S®AP502Z1 vehicle adapter, the R&S®ADD119 can be mounted on a vehicle roof or alternatively on an R&S®ADD1XTP tripod (see upper left picture).

Mobile DF antenna for the entire VHF/UHF range

R&S®ADD295

The R&S®ADD295 is a VHF/UHF DF antenna optimized for mobile applications. It covers the entire 20 MHz to 3 GHz frequency range in a compact radome. This is possible through the use of two concentric circles of dipoles. The R&S®ADD295 can be mounted on a vehicle roof by using the R&S®AP502Z1 vehicle adapter. For installation on a mast, the R&S®ADD150A mast adapter is recommended.

Horizontal and vertical polarization in a single DF antenna

R&S®ADD197

Rohde&Schwarz is the world's first manufacturer to develop a DF antenna with compact dimensions that contains both vertically and horizontally polarized antenna elements.

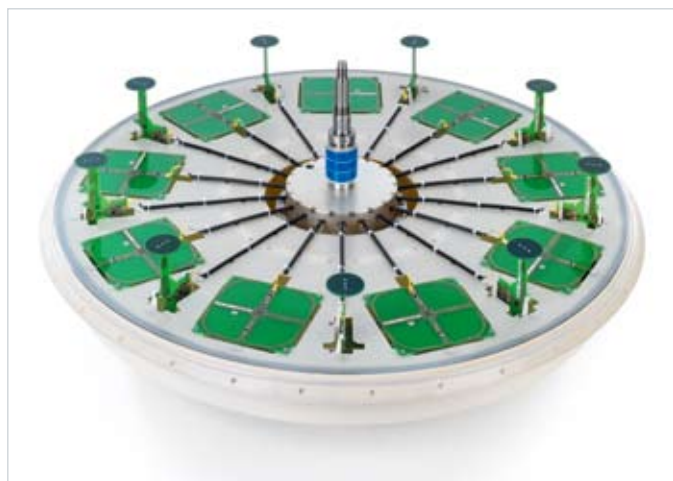
In the free space between the nine vertically polarized dipole antenna elements, an additional nine horizontally polarized loop antennas have been inserted, which are selected with switches. These loop antennas are significantly more complex than simple wire loops and have been extensively optimized. In conjunction with the tried-and-tested correlative interferometer DF method, a performance is achieved that exceeds all expectations and is nearly identical for both types of polarization.

The R&S®ADD197 is suitable for both stationary and mobile applications and covers the 20 MHz to 1.3 GHz frequency range (horizontal polarization: 40 MHz to 1.3 GHz).

The R&S®ADD197 can be mounted on a vehicle roof by using the R&S®AP502Z1 vehicle adapter. For installation on a mast, the R&S®ADD150A mast adapter is recommended.

For installation heights of more than 30 meters above ground (masts higher than 30 meters, high buildings, mountain tops, etc.), the R&S®ADD-LP supplemental lightning protection is recommended.

R&S®ADD119



R&S®ADD197

R&S®ADD196 mounted above an
R&S®ADD071



VHF/UHF DF antenna

R&S®ADD196

The R&S®ADD196 is suitable for both stationary and mobile applications. It covers the 20 MHz to 1.3 GHz frequency range.

The R&S®ADD196 can be mounted on a vehicle roof by using the R&S®AP502Z1 vehicle adapter. To achieve maximum DF accuracy and sensitivity, the antenna should be mounted on a mast, e.g. above the UHF DF antenna.

For installation on a mast, the R&S®ADD150A mast adapter and the R&S®ADD071Z antenna adapter are recommended. The upper left picture shows the R&S®ADD196 mounted above the R&S®ADD071.

For installation heights of more than 30 meters above ground (masts higher than 30 meters, high buildings, mountain tops, etc.), the R&S®ADD-LP supplemental lightning protection is recommended.

DF antenna for the UHF/SHF range

R&S®ADD075:

first SHF DF antenna from Rohde & Schwarz

With the R&S®ADD075, Rohde & Schwarz offers its first DF antenna for the SHF range. With two circular antenna arrays arranged on top of each other, the R&S®ADD075 covers the 1.3 GHz to 6 GHz frequency range.

For mobile applications, the antenna can be flat-mounted on a vehicle roof. Because of its compact dimensions, it can even be camouflaged under an elevated plastic roof.

For stationary applications, the R&S®ADD075 can be used in conjunction with the R&S®ADD196 DF antenna, which is mounted above it. This yields a DF antenna system that covers the 20 MHz to 6 GHz frequency range.

R&S®ADD071:

stationary and semi-mobile UHF DF antenna

The R&S®ADD071 covers the 1.3 GHz to 3 GHz frequency range and is suitable for stationary as well as semi-mobile applications, preferably mounted on a mast. An R&S®ADD197 or R&S®ADD196 antenna can be mounted above the R&S®ADD071 due to its robust design.

This type of DF antenna system then covers the entire 20 MHz to 3 GHz frequency range. The lower left picture shows how the R&S®ADD071 and R&S®ADD196 can be combined to create a DF antenna system for semi-mobile applications.

Combination of R&S®ADD071 and R&S®ADD196
for semi-mobile applications

Supplemental lightning protection

R&S®ADD-LP

All Rohde&Schwarz DF antennas that are subject to an increased risk of damage by lightning after installation are delivered with a lightning rod as standard. This rod safely diverts lightning strikes and in most cases prevents damage to the DF antenna.

However, the higher a DF antenna is installed above ground, the higher the likelihood that the lightning will not strike the rod, but the side of the DF antenna, thus causing severe damage.

For this reason, the R&S®ADD-LP supplemental lightning protection is recommended for installation heights of more than 30 meters above ground (masts higher than 30 meters, high buildings, mountain tops, etc.). The crossed lightning rods prevent lateral impacts in almost all cases since the rods project beyond the DF antenna.

Antenna cables

R&S®DDF1C-x

To connect the DF antennas to the R&S®DDF255 direction finder, a number of R&S®DDF1C-x cable sets are available in different lengths for different the frequency ranges. The cable sets usually consist of one coaxial RF cable and one control cable for each DF antenna.

Special lengths are available on request.

System software

R&S®ARGUS and R&S®RAMON

In addition to front panel control, the R&S®DDF255 can also be controlled via the R&S®ARGUS or R&S®RAMON system software. This permits integration of the R&S®DDF255 into larger systems.

The control interface is accessible to users, which allows control of the R&S®DDF255 by means customer-specific software.

System requirements

If the R&S®DDF255 is ordered without front panel control, a standard PC is required to control the direction finder.

R&S®ADD-LP supplemental lightning protection
(mounted on an R&S®ADD197)



Application examples

Mobile radiomonitoring and radiolocation

The R&S®DDF255 is optimally prepared for integration in vehicles:

- High integration density: Occupying only four height units with a 19-inch width, the enclosure is very compact
- Flexible power supply: The R&S®DDF255 can be optionally equipped with a DC power supply
- Front panel control: The R&S®DDF255 can alternatively be controlled from the front panel without using a PC
- Multiple antenna inputs: Several DF and/or monitoring antennas can be connected to the R&S®DDF255 without additional switches

The DF and monitoring antennas connected to the R&S®DDF255 have a decisive impact on performance. In this area, Rohde&Schwarz offers solutions that meet the specific requirements of mobile radiomonitoring and radiolocation in line with ITU recommendations.

R&S®ADD295 mobile DF antenna

Previously, two DF antennas were required to cover the entire VHF/UHF range. This caused additional reflection, particularly with systems mounted on vehicle roofs. The new R&S®ADD295 solves this problem and in addition requires only half the space on the vehicle roof because it covers the entire VHF/UHF frequency range with its two concentric circles or dipoles.

R&S®ADD295 mounted on a vehicle roof



Stationary radiomonitoring and radiolocation up to 6 GHz

The R&S®DDF255, together with the R&S®ADD197 and R&S®ADD075 DF antennas, provides an extremely powerful stationary system for radiomonitoring and radiolocation up to 6 GHz. It meets, and in many cases clearly surpasses, ITU recommendations.

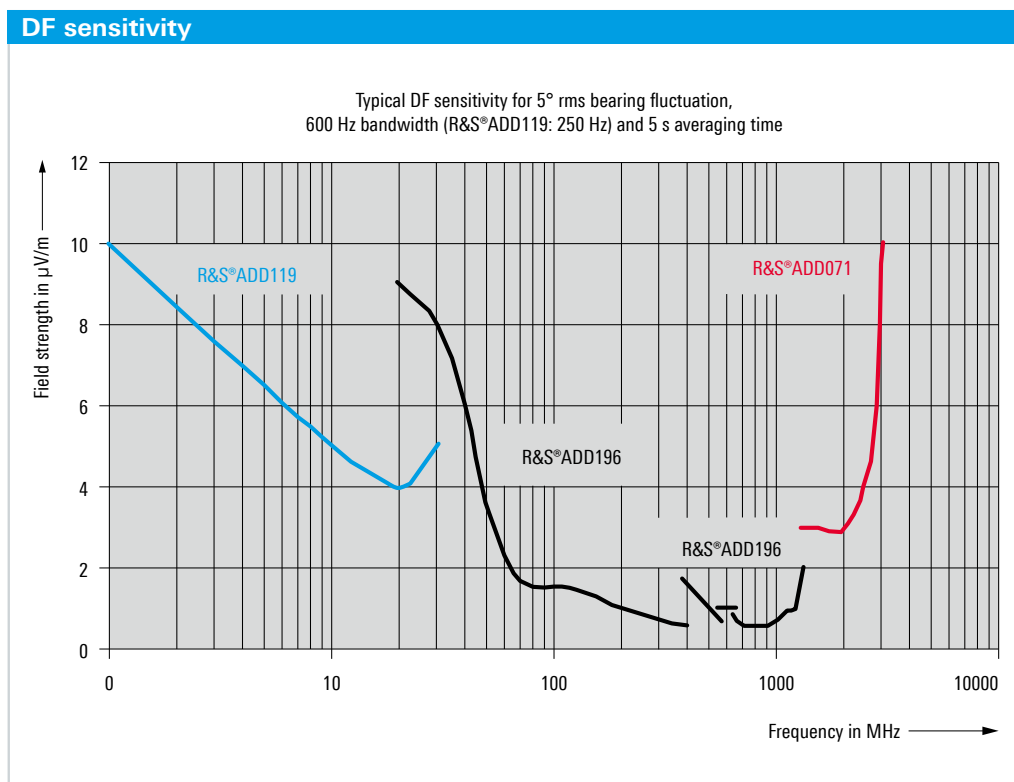
With the R&S®ADD197 DF antenna for the VHF/UHF range, accurate bearings can now also be obtained for all horizontally polarized transmitters. This solves a number of problems, and at the same time opens up completely new applications:

- Illegal TV and sound broadcast transmitters equipped with horizontally polarized antennas on masts are in operation in some countries. Locating these types of transmitters using vertically polarized DF antennas and triangulation is not possible
- Defective transmitting and receiving systems with horizontally polarized antennas can be located with significantly higher reliability
- Public TV and sound broadcast transmitters can be used to align the direction finder to north and check its functionality. These transmitters are ideally suited for this purpose as they permanently broadcast a powerful and undisturbed signal from a known location. The DF accuracy and north alignment can thus be conveniently checked

Additional monitoring antennas can be directly connected to the R&S®DDF255. The recommendations of the ITU can thus be met without using external antenna switches. Together with the R&S®DDF255-ITU option, this yields a radiomonitoring and radiolocation system that delivers reproducible and reliable results in line with ITU recommendations.

Specifications in brief

Frequency range		
Frequency range, receive mode	base unit	20 MHz to 3.6 GHz
	with R&S®DDF255-SHF option	20 MHz to 26.5 GHz
	with R&S®DDF255-HF option	9 kHz to 3.6 GHz
Frequency range, DF mode	base unit	20 MHz to 3 GHz
	with R&S®DDF255-SHF option	20 MHz to 6 GHz
	with R&S®DDF255-HF option	300 kHz to 3 GHz
DF mode		
DF method	VHF/UHF/SHF range	correlative interferometer
	HF range	Watson-Watt
DF accuracy	frequency range 1 MHz to 30 MHz	2° rms
	frequency range 30 MHz to 80 MHz	≤2° rms, typ. 1° rms
	frequency range 80 MHz to 1.3 GHz	1° rms
	frequency range 1.3 GHz to 3 GHz	≤2° rms, typ. 1° rms
Realtime bandwidth for wideband direction finding		up to 20 MHz
DF sensitivity	frequency-dependent	see diagram
Receive mode		
Realtime bandwidth for analysis/demodulation		up to 20 MHz
Scan speed	with R&S®DDF255-PS option	up to 100 GHz/s



Options

R&S®DDF255-DC DC/DC converter

The R&S®DDF255 can be alternatively equipped with a DC power supply. This option provides a wide voltage range to cover nearly any type of application. For instance, the R&S®DDF255 can be directly connected to a vehicle's power supply system when equipped with the R&S®DDF255-DC option.

R&S®DDF255-SHF option

The R&S®DDF255-SHF option extends the frequency range of the R&S®DDF255 upward. The upper frequency limit depends on the operating mode:

- DF mode: 6 GHz
- Receive mode: 26.5 GHz

To use this option, DF and/or receiving antennas for this frequency range are required in addition.

R&S®DDF255-HF option

The R&S®DDF255-HF option extends the frequency range of the R&S®DDF255 downward. The lower frequency limit depends on the operating mode:

- DF mode: 300 kHz
- Receive mode: 9 kHz

To use this option, DF and/or receiving antennas for this frequency range are required in addition.

R&S®DDF255-IM ITU measurement software

The R&S®DDF255-IM option expands the R&S®DDF255 to offer a comprehensive range of ITU-compliant measurement methods. These include:

- Frequency and frequency offset in line with ITU-R SM.377
- Field strength in line with ITU-R SM.378
- Modulation in line with ITU-R SM.328
- Spectrum occupancy in line with ITU-R SM.182/SM.328 (on control PC)
- Bandwidth in line with ITU-R SM.443
- Recognition of mono and stereo transmissions from FM broadcast transmitters

To use this option in line with ITU recommendations, it is advisable to provide suitable receiving antennas.

R&S®DDF255-SL selective call/pager decoder

The R&S®DDF255-SL option allows the decoding of diverse selective call methods and the demodulation of pagers.

The following selective call methods are supported:
CCIR1, CCIR7, CCITT, EEA, EIA, EURO, DCS, DTMF,
CTCSS, NATEL, VDEW, ZVEI1, ZVEI2.
Other methods are available on request.

Results are shown on the display of the direction finder or on the external control PC.

R&S®DDF255-PS panorama scan

When equipped with the R&S®DDF255-PS option, the R&S®DDF255 traverses a user-defined frequency range at maximum speed (without direction finding). This provides a quick overview of the spectrum occupancy. Any changes caused by illegal radio services, interference sources, temporary emissions, etc., can thus be recognized immediately. The marker function can be used to take a bearing of, demodulate and analyze the target signal.

The resolution for the FFT computation can be set to match the channel spacing used by various radio services. This FFT scan provides fast scan rates at narrow resolution bandwidths and thus high sensitivity.

R&S®DDF255-COR DF error correction

The R&S®DDF255-COR option enables the R&S®DDF255 to correct errors through the use of comparison tables.

Especially in mobile DF applications, DF accuracy is often degraded due to vehicle reflections. By applying appropriate error correction, the DF accuracy can be significantly improved. For this purpose, the DF vehicle is exposed to test signals applied in 10° steps from all directions across the entire frequency range. As a result of these measurements, correction tables for each frequency are created and stored in the R&S®DDF255 memory. These tables contain the correct DF value for each measured DF value. By using this approach, many errors are rectified.

Ordering information

Base unit and options

Designation	Type	Order No.	Availability
Base unit (including supplied accessories such as power cable, manual, etc.)			
Digital Direction Finder, without front panel control	R&S®DDF255	4067.9240.02	available
Digital Direction Finder, with front panel control	R&S®DDF255	4067.9240.03	available
Hardware options			
DC/DC Converter	R&S®DDF255-DC	4066.4000.03	3rd quarter 2008
SHF Option	R&S®DDF255-SHF	4066.4200.03	4th quarter 2008
HF Option	R&S®DDF255-HF	4066.4100.03	3rd quarter 2008
Software options			
ITU Measurement Software	R&S®DDF255-IM	4066.4400.03	3rd quarter 2008
Panorama Scan	R&S®DDF255-PS	4066.4500.03	3rd quarter 2008
Selective Call/Pager Decoder	R&S®DDF255-SL	4066.4600.03	3rd quarter 2008
DF Error Correction	R&S®DDF255-COR	4068.0201.02	on request

System components

Designation	Type	Order No.	Availability
HF DF Antenna	R&S®ADD119	4053.6509.02	available
VHF/UHF DF Antenna	R&S®ADD196	4077.3000.02	3rd quarter 2008
Dual Polarized DF Antenna	R&S®ADD197	4068.1450.02	available
VHF/UHF Wideband DF Antenna	R&S®ADD295	4070.9002.02	1st quarter 2009
UHF DF Antenna	R&S®ADD071	4043.6006.02	available
UHF/SHF DF Antenna	R&S®ADD075	4069.6603.02	4th quarter 2008
DF Antenna Cable Set for single-channel direction finders, frequency range 0.3 MHz to 1.3 GHz	R&S®DDF®1C-1	4077.6009.xx	3rd quarter 2008
DF Antenna Cable Set for single-channel direction finders, frequency range 0.3 MHz to 3 GHz	R&S®DDF®1C-5	4077.7005.xx	3rd quarter 2008
DF Antenna Cable Set for single-channel direction finders, frequency range 0.3 MHz to 6 GHz	R&S®DDF®1C-7	4077.8001.xx	3rd quarter 2008
Lightning Protection	R&S®ADD-LP	4069.6010.02	available
Mast Adapter	R&S®ADD150A	4041.2655.02	available
Antenna Adapter, with cable outlet	R&S®ADD071Z	4043.7002.02	available
Antenna Adapter	R&S®ADD071Z	4043.7002.03	available
Tripod with Adapter	R&S®ADD1XTP	4063.4409.02	available
Vehicle Adapter	R&S®AP502Z1	4041.2655.02	available
Electronic Compass	R&S®GH150	4041.8501.02	available
GPS Navigator/GPS Receiver with integrated inertial navigation (including GPS antenna)	R&S®GINA	4055.6906.04	available

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About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

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Certified Quality System
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DQS REG. NO 1954 QM

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For data sheet, see
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Data without tolerance limits is not binding | Subject to change

*0.14 €/min within German wireline network; rates may vary in other networks (wireline and mobile) and countries.