narda Safety Test Solutions

Datasheet | Narda DF Antennas

SignalShark IDA 2

Fully Automatic and Manual DF Solutions

Narda Direction Finding (DF) Antennas in combination with the Real-Time Handheld Analyzer SignalShark® cover a wide frequency range with highest sensitivity.

Each antenna is optimized for sensitivity and directivity in its particular frequency range, which results in excellent bearing accuracy.

The manual antenna frequency ranges overlap by about 20%, which can be very useful in practical situations.

- Automatic DF-Antennas
  - 200 MHz to 2.7 GHz / 10 MHz to 8 GHz
  - High DF accuracy
  - High immunity to reflections
  - Fast bearings possible on signals of as low as 2.5 ms duration, which corresponds to two bearing cycles
  - Built-in omnidirectional reference antenna
- Manual DF Antennas from 9 kHz up to 8 GHz
- Active Antenna Handle with built-in Electronic Compass and Preamplifier
  - Automatic antenna recognition
  - Automatic polarization detection
  - Automatic frequency response correction

Narda Automatic DF Antennas

Applications

It is often necessary to locate the position of a signal transmitter once the signals have been detected and analyzed. SignalShark supports the new Automatic Direction Finding Antennas (ADFAs) from Narda, allowing quick and reliable RF signal localization.

The SignalShark combined with an ADFA is a high-performance and cost-effective solution for many applications such as:

- PMR and mobile network maintenance through fast, reliable localization of transmitters and interferers
- Frequency band management
- Monitoring communications at borders
- Protecting areas and signal reconnaissance

Situational Awareness of the RF Spectrum during DF

A central monopole is used as a reference element for DF and as an omnidirectional monitoring antenna. This allows the signals around the signal of interest to be monitored during direction finding by using a Spectrum View.

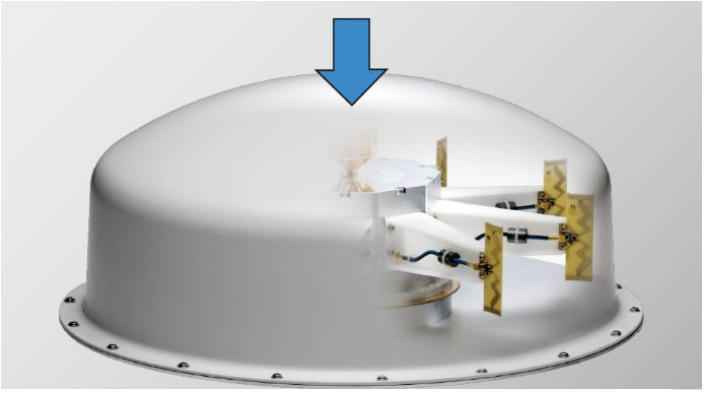


Fig. 1. Omnidirectional antenna element - RF monitoring during DF

Azimuth and Elevation Data for High-end DF Performance

The bearing results of the ADFA contains azimuth and elevation information. This greatly improves the localization of transmitters that are not in the same plane as the antenna itself. For more information, see the Technical Note “Elevation measurement” at www.narda-sts.com.

Bearing of Very Short Duration Signals

The ADFA works very quickly, taking as little as 1.2 ms for one bearing. This ensures reliable results, even for very short duration or pulsed signals such as push-to-talk (PTT), telemetry and hopping signals.

High Quality, Reliable Localization Even in Urban Areas with Reflections

Due to the large antenna aperture and the nine dipole elements of each interferometer antenna array, the ADFA has a high DF accuracy. This, together with the heatmap localization algorithm that runs directly on the SignalShark, means that the localization results are very reliable, even in urban areas with lots of reflections.

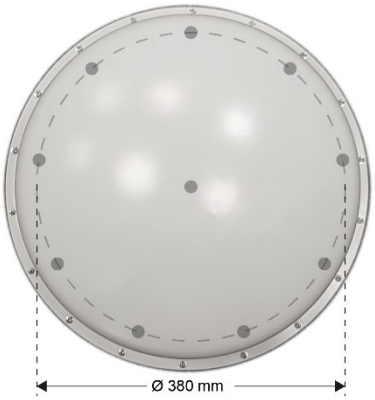


Fig. 2. Large aperture - High DF quality due to nine dipole elements

Integrated Electronic Compass and GNSS Receiver

The ADFA is provided with an electronic compass and a GNSS receiver module for quick and easy alignment.

Fast and Easy Setup

No additional laptop needed

Simply connect the ADFA to the SignalShark and start taking bearings. The ADFA is controlled and powered from the SignalShark, which also has an integrated localization algorithm together with Open Street Map based heatmap visualization.

Magnetic mount adapter for vehicle use

The optional magnetic mount adapter allows the ADFA to be quickly mounted on the steel roof of a vehicle without the need for tools or fixings.

Fig. 3. Magnetic mount - Non-destructive, fast mounting on a vehicle roof

Fig. 4. Tripod – Short-term local DF operation, quick and easy to install

Tripod for short-term local bearing

The tripod with its quick-release coupling and level indicators allows short-term local DF measurements to be set up very quickly.

Fully Automatic DF System

The SignalShark supports Narda ADFAs (automatic DF antennas). The ADFA translates signals from several antenna elements into a single-channel DF signal. The ADFA is controlled by the SignalShark, which determines the bearings automatically, based on the single-channel DF signals. The measurement results are bearings, as well as omnidirectional level and spectrum values. The SignalShark additionally calculates the statistical distribution of the bearing lines, with live visualization of the transmitter location in the form of a heatmap.

The ADFA can be used with a tripod or fitted on an antenna mast, or it can be attached to the roof of a vehicle using a magnetic mount adapter.

Fast Automatic Direction Finding

In an ADFA, there are several elements of antenna arrays, an omnidirectional reference antenna, four phase shifters, a summing stage and a switch matrix. The SignalShark controls and synchronizes the switch matrix with its extremely fast internal measurement unit. A complete bearing cycle can be as short as 1.2 ms. During each bearing cycle the omnidirectional channel power and the spectrum are measured. This makes it possible to monitor changes in the signal level or spectrum concurrently with the bearings. Thus, you can optimize your bearing settings to the signal of interest and monitor the adjacent channels.

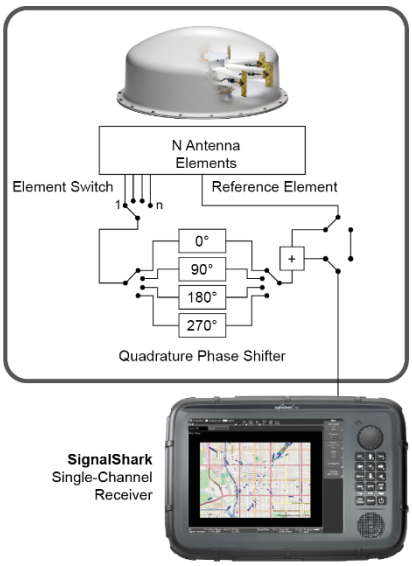


Fig. 5. Direction finding principle

Built-In Transmitter Localization

The SignalShark simplifies localization of transmitters by autonomously evaluating all the available bearing results and plotting them on a map. It uses a statistical distribution of bearing lines that represents the uncertainty in the bearing. The result is a map on which the possible locations of the transmitter are plotted and color-coded according to their probability. Red corresponds to a very likely and blue to a very unlikely transmitter position. The SignalShark also draws an ellipse, which marks the area where the transmitter has a 95 % probability of being located, and its center is the estimated position of the transmitter.

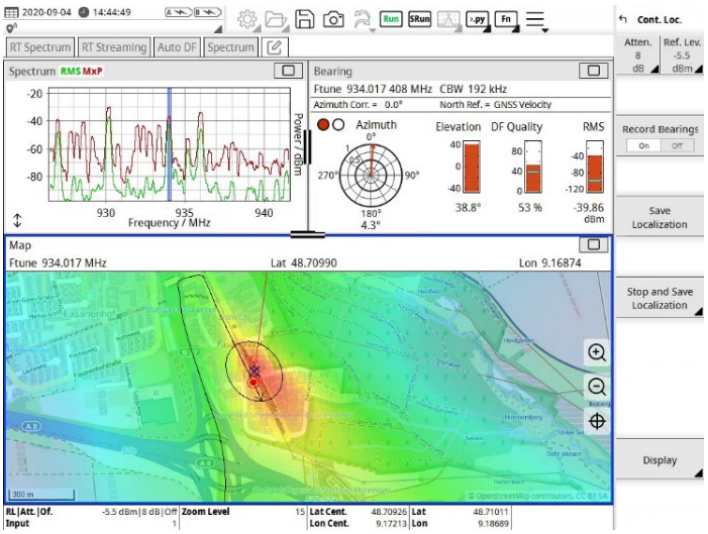


Fig. 6. Map View with heatmap localization

When bearings are taken under non-ideal conditions, such as in an urban environment, the uncertainty in the bearings is much more dependent on the environment than on the ADFA. Nevertheless, if enough bearings are taken from enough locations, the localization algorithm of the SignalShark will generally result in a convergence on the actual location of the transmitter, even in urban surroundings. To speed up and optimize the localization process, an ADFA can be attached to the roof of a vehicle to take bearings from random positions in the suspected area. This allows fast and reliable localizations even in challenging environments.

Fig. 7. Automatic DF antenna on moving vehicle in an urban area.

Narda Manual DF Antennas [a]

DF Antenna Handle

Powered from basic unit

There is no need for additional batteries to power the active antenna handle. The handle simply draws its power from the basic unit (i.e. SignalShark/IDA) through the control cable. This makes the handle even lighter and there is no danger of losing power in the middle of a long-term measurement.

Automatic antenna and polarization detection

The basic unit automatically recognizes the antenna type and direction of polarization via the control cable. The typical antenna correction factors are applied automatically.

Electronic Compass

There is a precision position-compensated electronic compass in the handle. Data from the compass is also transferred to the basic unit via the control cable. The compass is adjusted during production after it has been fitted in the handle, so that no deviation due to the handle is shown. If required, the local declination (angle between geographic and magnetic north) can be entered numerically into the basic unit.

3D position detection

The handle also contains position sensors that measure the elevation and polarization (roll) angles of the antenna. Elevation and polarization are important factors for determining the direction of a signal source when taking manual bearings. In contrast, the polarization and elevation angles should be kept constant when panning the antenna for a horizontal scan.

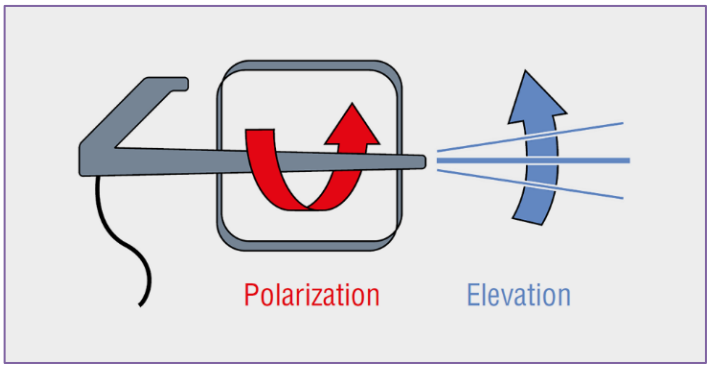


Fig. 8. DF Antenna Handle - Position sensors in the handle measure the roll (polarization) and elevation angles of the antenna.

Start/Stop button

The Start/Stop button on the antenna handle makes it easy to start, stop, or correct a measurement with a thumb press.

Manual DF Antennas

Loop Antenna – 9 kHz to 30 MHz

This antenna is very useful for locating interference in the field of power line communication and detecting interference due to defective capacitors within power supplies.

Antenna 1 – 20 MHz to 250 MHz

Starting in the region of the ISM frequency of 27 MHz, this antenna is also particularly suitable for interference and impairment searches in the UHF broadcast radio band and also includes the lower end of the VHF TV band including DAB.

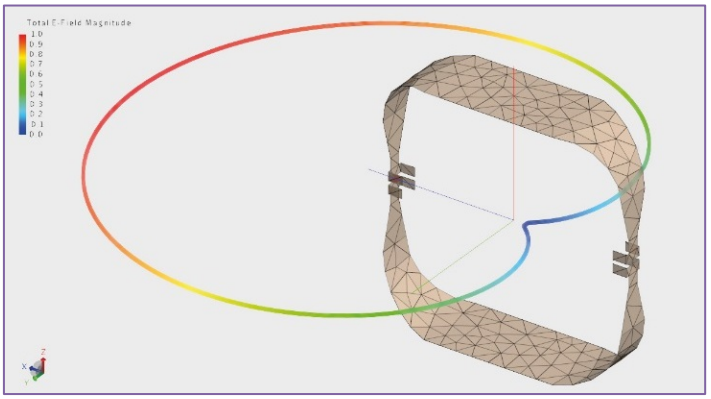


Fig. 9. Antenna 1 - Typical horizontal characteristic of the directional loop antenna, computed for the far field.

[a] *Works in combination with SignalShark as well as IDA Basic Units*

Antenna 2 – 200 MHz to 500 MHz

Ideal for interference and impairment searches on all the communications services located in that band. It also covers the ISM frequency at 433 MHz.

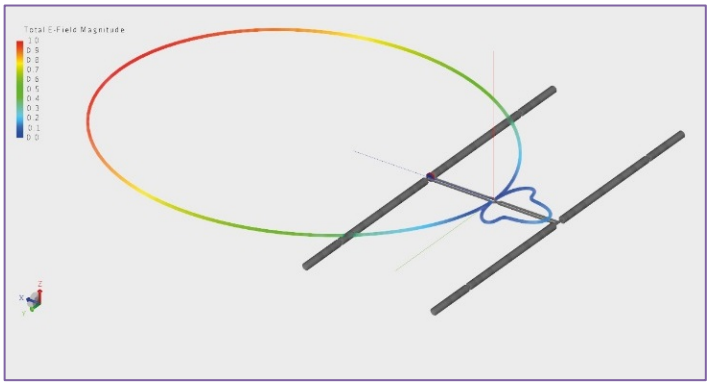


Fig. 10. Antenna 2 - Typical horizontal characteristic of the directional dipole antenna, computed for the far field.

Antenna 3 – 400 MHz to 8 GHz

This antenna covers the range of mobile communications services including LTE, 5G FR1 and WiFi. It also captures L-, S-, and C-band radar.

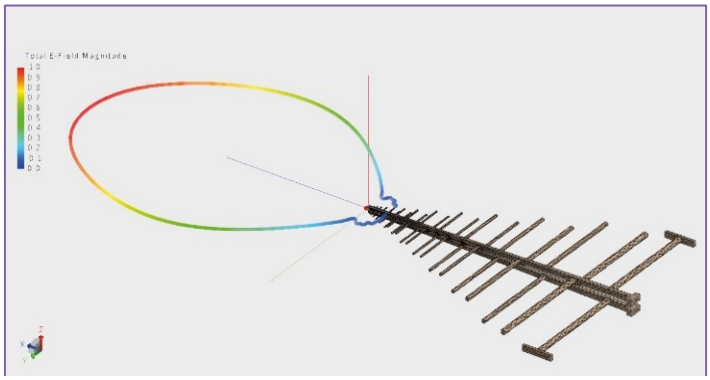


Fig. 11. Antenna 3 - Typical horizontal characteristic of the log-periodic antenna: A narrow lobe. The vertical characteristic is a somewhat wider cardioid.

Definitions and Conditions

Conditions

Unless otherwise noted, specifications apply after 30 minutes warm-up time within the specified environmental conditions. The product is within the recommended calibration cycle.

Specifications with limits

These describe product performance for the given parameter covered by warranty. Specifications with limits (shown as <, ≤, >, ≥, ±, max., min.) apply under the given conditions for the product and are tested during production, considering measurement uncertainty.

Specifications without limits

These describe product performance for the given parameter covered by warranty. Specifications without limits represent values with negligible deviations, which are ensured by design (e.g. dimensions or resolution of a setting parameter).

Typical values (typ.)

These characterize product performance for the given parameter that is not covered by warranty. When stated as a range or as a limit (shown as <, ≤, >, ≥, ±, max., min.), they represent the performance met by approximately 80% of the instruments. Otherwise, they represent the mean value. The measurement uncertainty is not taken into account.

Nominal values (nom.)

These characterize expected product performance for the given parameter that is not covered by warranty. Nominal values are verified during product development but are not tested during production.

Uncertainties

These characterize the dispersion of the values attributed to the measurands with an estimated confidence level of approximately 95%. Uncertainty is stated as the standard uncertainty multiplied by the coverage factor k=2 based on the normal distribution. The evaluation has been carried out in accordance with the rules of the “Guide to the Expression of Uncertainty in Measurement” (GUM).

Specifications of Automatic DF Antennas

The automatic DF antennas require a SignalShark basic unit for operation.

General Specifications – Automatic DF Antenna 1 (3360/01)				
Environmental	Temperature		Storage:	- 40 °C to + 85 °C
			Operating:	- 40 °C to + 65 °C acc. to EN60068-2-1, EN60068-2-2 acc. to MIL-PRF-28800F, Class 2
	Relative Humidity		< 93 % at +30°C (non-condensing acc. to EN 60068-2-30)	
	Ingress Protection		IP 55 (acc. to EN 60529)	
	Vibration		sinusoidal	5 Hz to 55 Hz, 0.15 mm amplitude constant, 55 Hz to 150 Hz, 0.5 g const., acc. to EN 60068-2-6
			random	10 Hz to 300 Hz: 0.01 g2/Hz, 300 Hz to 500 Hz: 0.003 g2/Hz, acc. to EN 60068-2-64
			mobile application: vehicles,	3 Hz to 500 Hz, 0.00047/0.295/0.00082 g2/Hz (approx. 1.76 g RMS)
	Shock resistance		spectrum	45 Hz to 2000 Hz, max. 40 g
Maximal permissible wind speed			DF antenna mounted on vehicle roof with 3300/90.04	without ice deposit 130 km/h with 30 mm radial ice deposit 130 km/h
			DF antenna mounted with ADFA Antenna Mast Mounting Kit 3300/90.03	without ice deposit 275 km/h with 30 mm radial ice deposit 180 km/h
Compliance	EMC	EU	Complies with EMC Directive 2014/30/EU and IEC/EN 61326 -1: 2013	
		Immunity	IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11 Complete set is designed up to 100 V/m (limited by the max. permissible field for the antennas)	
		Emissions	IEC/EN: 61000-3-2, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B	
	Safety		Complies with European Low Voltage Directive 2014/35/EU and IEC/EN 61010-1:2010	
	Material		Complies with European RoHS Directive 2011/65/EU	

Note:

Please see the Automatic DF-antenna product page at www.narda-sts.com for important notes on how to set up the measurement system.

Automatic DF-Antenna 1 (3360/01)	
	
Antenna type	Single channel, automatic direction finding antenna with omnidirectional reference antenna element in the center.
Polarization (E-field)	vertical
Frequency range	Direction Finding: 200 MHz to 2.7 GHz Spectrum: 10 MHz to 2.7 GHz
DF method	Correlative interferometer, 9-element circular arrays
Antenna aperture	380 mm diameter
DF accuracy	1° RMS (typ.) [b]
DF sensitivity	900 MHz to 1.8 GHz: 2.5 µV/m (typ.) see Fig. 12
Linearity IP3	+20 dBm (typ.)
Antenna factor (automatically applied)	see Fig. 13
Azimuth pattern (ripple) of omnidirectional reference antenna element	f ≤ 1.2GHz: <1dB(typ.) f > 1.2GHz: <3dB (typ.)
Nominal impedance	50 Ω
Output return loss VSWR	10 dB (typ.) 2.0 (typ.)
Compass	Embedded electronic compass Azimuth uncertainty < 1.5° RMS (typ.)
GNSS	Embedded receiver and antenna
Power supply	Powered by the SignalShark
Interfaces	RF SMA (female) Control 12-pin (female)
Installation	On mast, tripod (3/8”-16 UNC) or magnetic mount
Dimensions (Height × Diameter)	219 mm x 480 mm (8.62" x 18.9")
Weight	without ice accretion 5.6 kg (12.3 lbs) with 30 mm radial ice accretion 15.6 kg (34.4 lbs)
Country of origin	Germany

[b] *Measurement in an environment free of multipath signals. The DF accuracy is calculated from the bearing results of uniformly distributed samples with azimuth and frequency according to ITU-R SM.2060-0.*

Automatic DF-Antenna 1 (3360/01) - DF Sensitivity (typical)

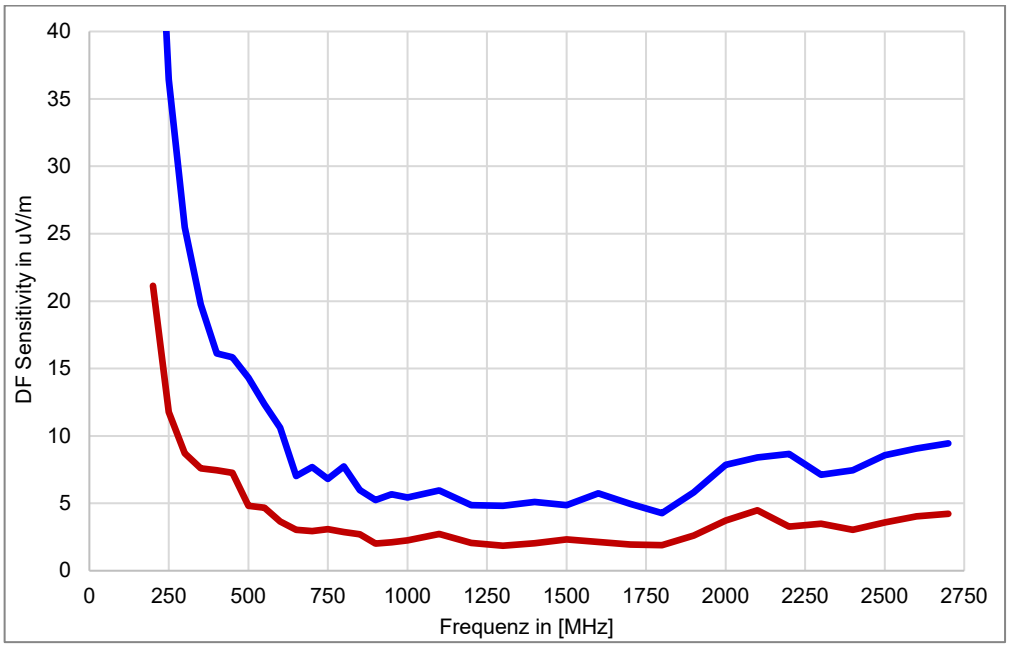


Fig. 12. DF sensitivity for 3° RMS bearing fluctuation according to ITU-R SM.2096-0
Blue curve: CBW 2.5 kHz, Avg. Time 1 s;
Red curve: CBW 600 Hz, Avg. Time 5 s

Automatic DF-Antenna 1 (3360/01) - Antenna Factor (typical)

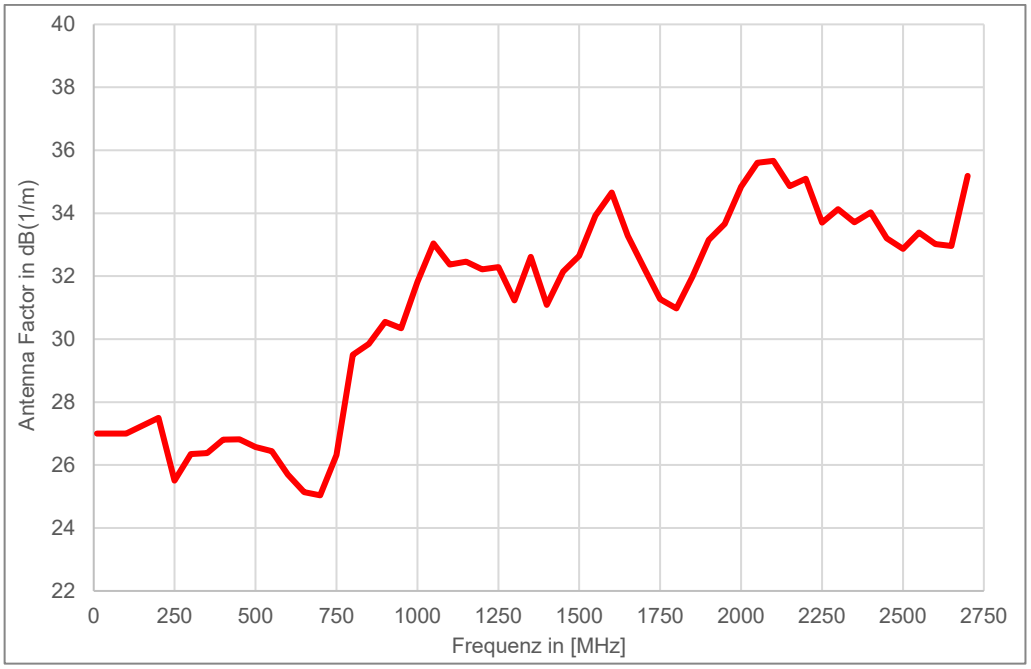


Fig. 13. Antenna Factor, RT Spectrum mode (omnidirectional)

General Specifications – Automatic DF Antenna 2 (3361/01)				
Environmental	Temperature		Storage:	- 40 °C to + 85 °C
			Operating:	- 40 °C to + 65 °C
	Relative Humidity		< 93 % at +30°C (non-condensing acc. to EN 60068-2-30)	
	Ingress Protection		IP 55 (acc. to EN 60529)	
Maximal permissible wind speed			DF antenna mounted on vehicle roof with 3300/90.04	without ice deposit 130 km/h with 30 mm radial ice deposit 130 km/h
			DF antenna mounted with ADFA Antenna Mast Mounting Kit 3300/90.03	without ice deposit 275 km/h with 30 mm radial ice deposit 180 km/h
Compliance	EMC	EU	Complies with EMC Directive 2014/30/EU and IEC/EN 61326 -1: 2013	
		Immunity	IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11 Complete set is designed up to 100 V/m (limited by the max. permissible field for the antennas)	
		Emissions	IEC/EN: 61000-3-2, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B	
	Safety		Complies with European Low Voltage Directive 2014/35/EU and IEC/EN 61010-1:2010	
	Material		Complies with European RoHS Directive 2011/65/EU	

Automatic DF-Antenna 2 (3361/01)		
		
Antenna type	Single channel, automatic direction finding antenna with omnidirectional reference antenna element in the center.	
Polarization (E-field)	vertical	
Frequency range	Direction Finding: Spectrum:	10 MHz to 8 GHz 100 kHz to 8 GHz
DF method	10 MHz to 200 MHz 200 MHz to 8 GHz	Watson-Watt, two orthogonal crossed loops Correlative interferometer, two stacked 9-element circular arrays
Antenna aperture	200 MHz to 2.7 GHz 2.7 GHz to 8 GHz	380 mm diameter 128 mm diameter
DF accuracy [c]	f ≤ 200 MHz f > 200 MHz	1.5° RMS (typ.) 1° RMS (typ.)
DF sensitivity	900 MHz to 1.8 GHz: see Fig. 14 and Fig. 15	1 to 2 µV/m (typ.)
Linearity IP3	200 MHz to 2.7 GHz 2.7 GHz to 8 GHz	+20 dBm (typ.) +17 dBm (typ.)
Antenna factor (automatically applied)	see Fig. 16	
Azimuth pattern (ripple) of omnidirectional reference antenna element	100 MHz f ≤ 1.2GHz 1.8 GHz f ≤ 3 GHz	< 0.3 dB (typ.) < 1dB(typ.) < 2dB (typ.) < 3dB (typ.)
Nominal impedance	50 Ω	
Output return loss VSWR	10 dB (typ.) 2.0 (typ.)	
Compass	Embedded electronic compass Azimuth uncertainty	 < 1.5° RMS (typ.)
GNSS	Embedded receiver and antenna	
Power supply	Powered by the SignalShark	
Interfaces	RF Control	SMA (female) 12-pin (female)
Installation	On mast, tripod (3/8”-16 UNC) or magnetic mount	
Dimensions (Height × Diameter)	219 mm x 480 mm (8.62" x 18.9")	
Weight	without ice accretion with 30 mm radial ice accretion	6.5 kg (14.3 lbs) 16.5 kg (36.4 lbs)
Country of origin	Germany	

[c] *Measurement in an environment free of multipath signals. The DF accuracy is calculated from the bearing results of uniformly distributed samples with azimuth and frequency according to ITU-R SM.2060-0.*
Notes to operational accuracy in an realistic signal environment:
For fixed installation is a non-metallic mast adapter, P/N 3300/90.23, available. However, the system is showing an impact due to the mast mechanical construction. The Watson-Watt principle with crossed loops reacts on unduly large phase differences between E-field and H-field caused by the self–resonance of the mast. Slim masts higher than about 20 % of the shortest operating wavelength may cause unambiguous bearing results with a phase offset by 180°. This kind of influence is of a systematic nature and can be corrected.

Automatic DF-Antenna 2 (3361/01) - DF Sensitivity (typical)

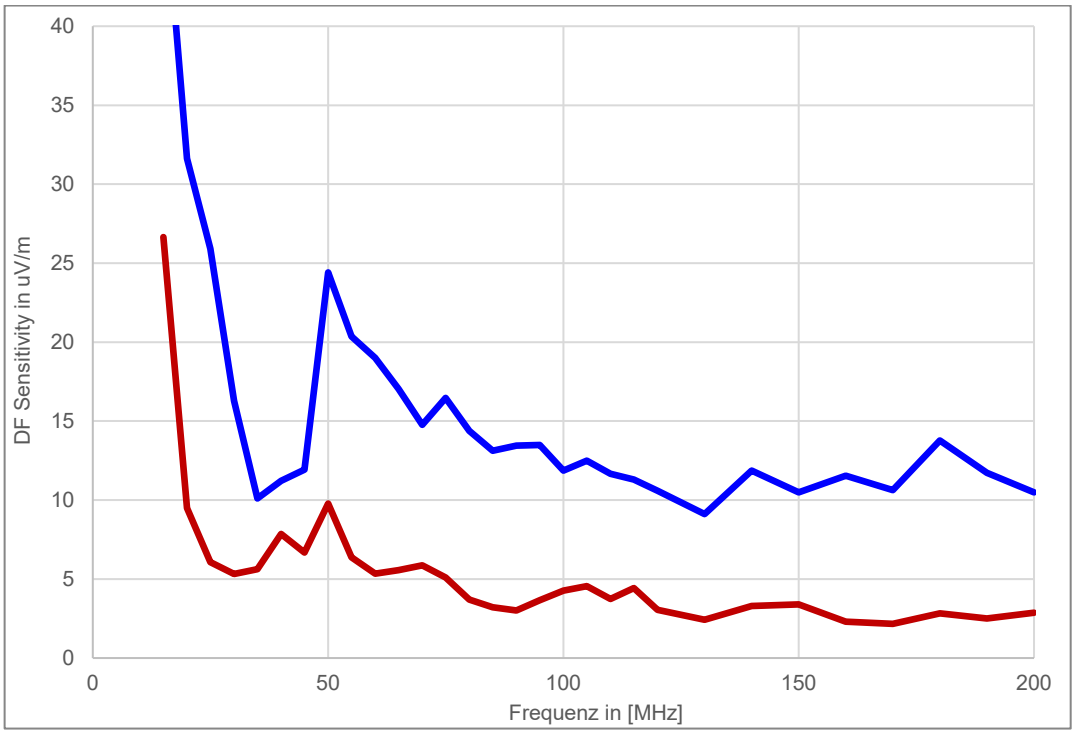


Fig. 14. DF sensitivity for 3° RMS bearing fluctuation according to ITU-R SM.2096-0
Blue curve: CBW 1 kHz, Avg. Time 1 s;
Red curve: CBW 600 Hz, Avg. Time 5 s

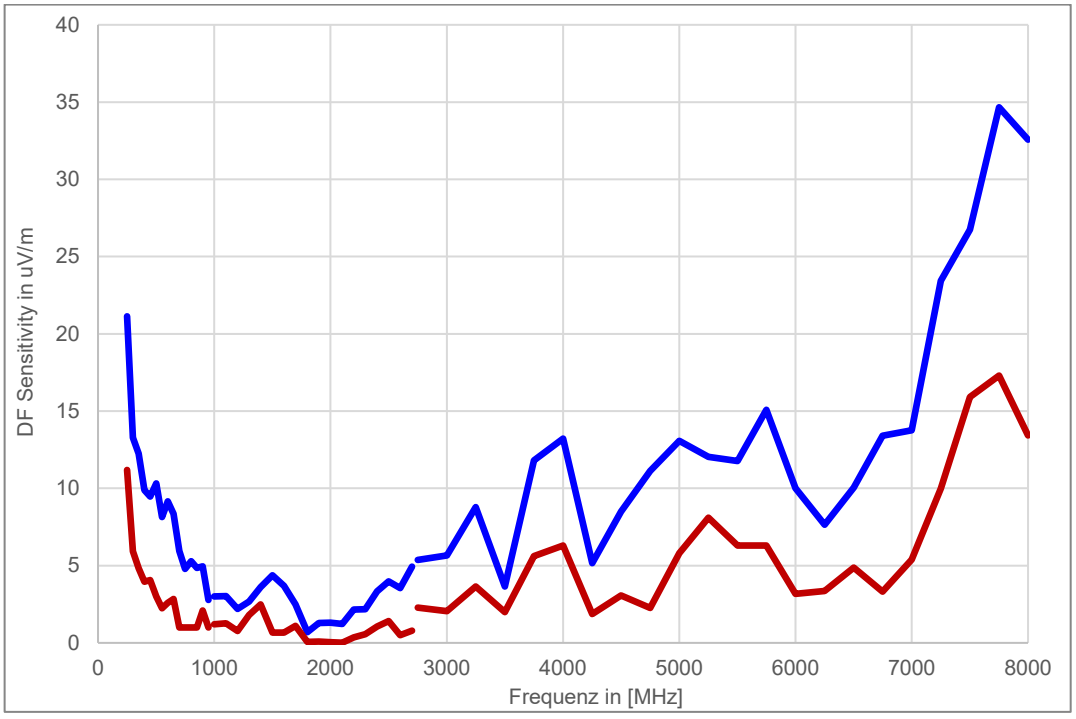


Fig. 15. DF sensitivity for 3° RMS bearing fluctuation according to ITU-R SM.2096-0 (full DF antenna frequency range)
Blue curve: CBW 2.5 kHz, Avg. Time 1 s;
Red curve: CBW 600 Hz, Avg. Time 5

Automatic DF-Antenna 2 (3361/01) - Antenna Factor (typical)

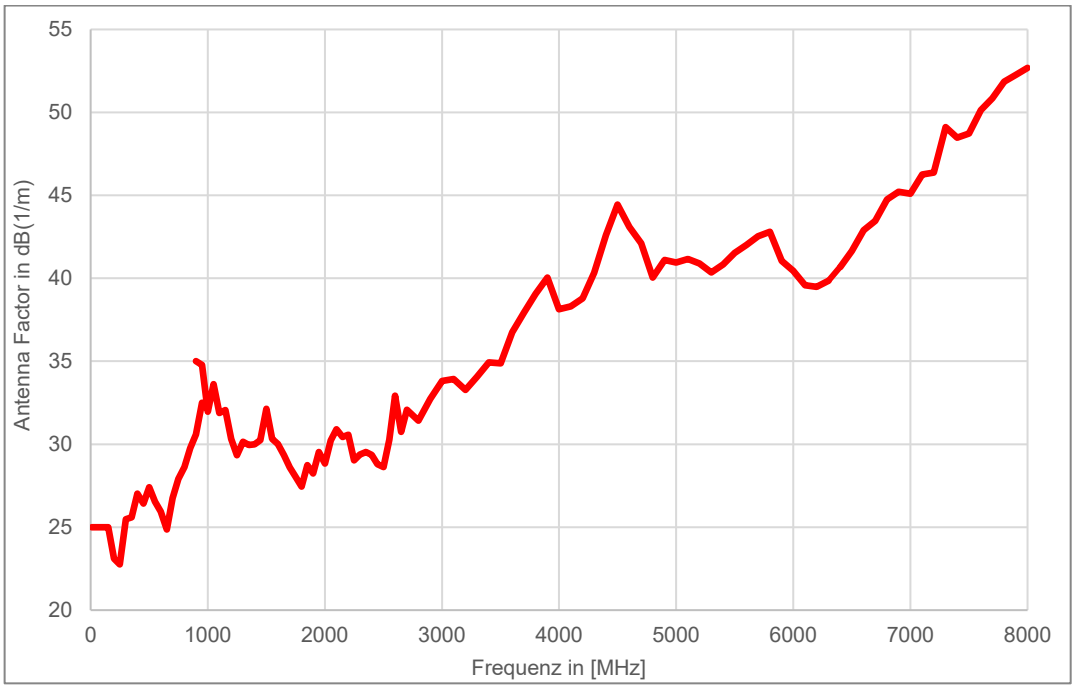


Fig. 16. Antenna Factor, RT Spectrum mode (omnidirectional)

Specifcations of Manual DF Antennas

The manual DF antennas can be used with SignalShark and IDA.

General Specifications – Antenna Handle and Directional Antennas				
Environmental	Temperature		Operating:	- 10 °C to + 55 °C
	Humidity		< 29 g/m³ (< 93 % RH at + 30 °C), non-condensing	
Compliance	Climatic		Storage	1K3 (IEC 60721-3) extended to - 20 °C to + 70 °C
			Transport	2K4 (IEC 60721-3) extended to - 20 °C to + 70 °C
			Operating	7K2 (IEC 60721-3) extended to - 10 °C to + 55 °C
	Mechanical		Storage	1M3 (IEC 60721-3)
			Transport	2M3 (IEC 60721-3)
			Operating	7M3 (IEC 60721-3)
	EMC	EU	Complies with EMC Directive 2014/30/EU and IEC/EN 61326 -1: 2013	
		Immunity	IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-11 Complete set is designed up to 100 V/m (limited by the max. permissible field for the antennas)	
		Emissions	IEC/EN: 61000-3-2, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B	
	Safety		Complies with European Low Voltage Directive 2014/35/EU and IEC/EN 61010-1:2010	
	Material		Complies with European RoHS Directive 2011/65/EU	
Dimensions (L × W × H), Weight (size without cable)			Handle: Dir. Antenna 1: Dir. Antenna 2: Dir. Antenna 3: Loop antenna 3100/14	165 mm × 165 mm × 43 mm (6.5" × 6.5" × 1.7"), 325 mm × 255 mm × 80 mm (12.8" × 10.0" × 3.1"), 285 mm × 410 mm × 43 mm (11.2" × 16.1" × 1.7"), 478 mm × 332 mm × 50 mm (18.8" × 13.1" × 2.0"), 430 mm × 370 mm × 42 mm (16.9" × 14.6" × 1.7"),
				470 g / 1.04 lbs 400 g / 0.88 lbs 300 g / 0.66 lbs 350 g / 0.77 lbs 380 g / 0.84 lbs
Country of origin			Germany	
Automatic frequency response correction			Typical antenna factor corrections are applied automatically when used in conjunction with a Narda Basic Unit and Narda Active Antenna Handle	

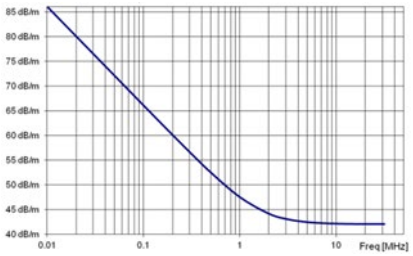
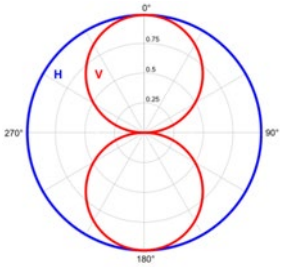
Active Antenna Handle (3300/10) - with Electronic Compass and Preamplifier	
	
Frequency range	9 kHz to 8 GHz Automatic frequency response correction
Preamplifier	Built-in, can be switched off Amplification typ. 16 dB, noise figure < 6 dB
Compass	Embedded electronic compass
Compass uncertainty (typ.)	Azimuth uncertainty < 1.5° RMS for tilt < 15° Elevation and polarization uncertainty < 3° RMS in the range of +/- 30° (RMS means the standard deviation of the specified error)
Connection cable to basic unit	RF cable and control cable combined in a flexible tube, length 1 m
RF connector to basic unit	SMA-connector, male, 50 Ω (N-connector adapter included)
RF connector to Narda directional antennas	BMA 50 Ω (female on handle side)
Antenna connectivity	Horizontal or vertical polarization, type and polarization detected automatically
Power supply	From basic unit
Mounting	Threaded bush underneath the handle for tripod mounting

Directional Antenna 1 (3100/11)	
	
Frequency range	20 MHz to 250 MHz
Antenna type	Directional loop antenna
Antenna factor	21 dB(1/m) typical @ 200 MHz (passive mode)

Directional Antenna 2 (3100/12)	
	
Frequency range	200 MHz to 500 MHz
Antenna type	Directional dipole antenna
Antenna factor	21 dB(1/m) typical @ 350 MHz (passive mode)

Directional Antenna 3 (3100/13)	
	
Frequency range	400 MHz to 8 GHz
Antenna type	Log-periodic antenna
Antenna factor	18.5 dB(1/m) typical @ 500 MHz (passive mode)

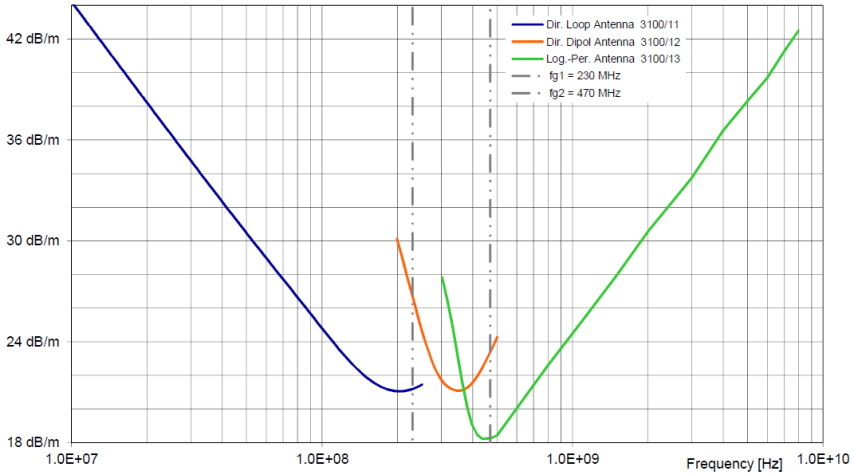
Loop Antenna, H-Field (3100/14)

Frequency range	9 kHz to 30 MHz
Antenna type	Shielded loop antenna
Antenna factor / Radiation pattern	 Passive mode (preamp. off): 66.0 dB(1/m) typical @ 100 kHz 47.5 dB(1/m) typical @ 1 MHz 42.0 dB(1/m) typical @ f > 10 MHz Antenna (Loop) 9 kHz to 30 MHz  Radiation pattern (typ.) for a horizontal scan and vertical polarization (V) or horizontal polarization (H)

Antenna Adapter, N Male (3100/15)

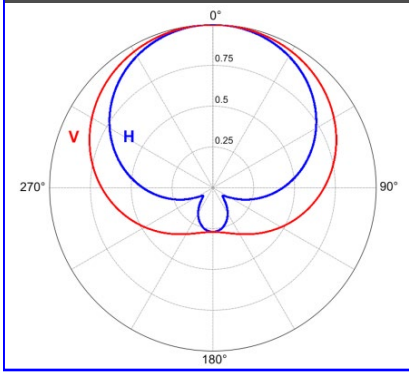
Description	The adapter allows the internal 3D compass, built-in switchable preamplifier and automatic polarization detection to be used with third-party antennas.

Antenna Factors (typical)

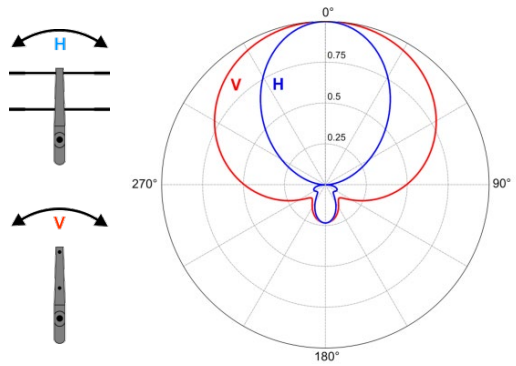


Radiation Patterns (typical)

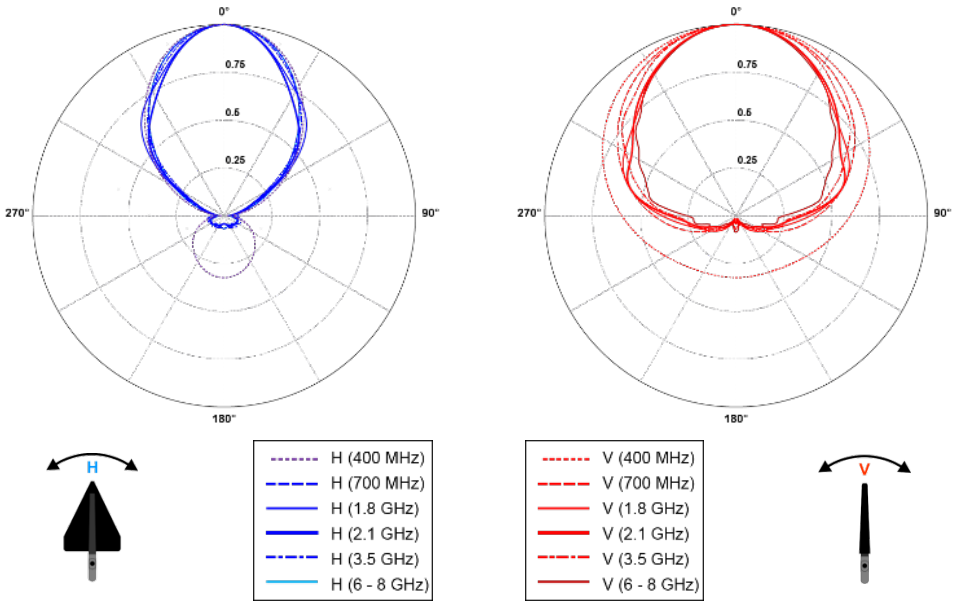
Antenna 1 (Directional Loop) 20 to 250 MHz



Antenna 2 (Directional Dipole) 200 to 500 MHz



Antenna 3 (Log Per) 400 MHz to 8 GHz



Ordering Information

Antennas, Accessories and Options for SignalShark

Description	Part number
Automatic DF-Antenna 1 Basic Set, 200 MHz to 2.7 GHz [d]	**3360/101**
Automatic DF-Antenna 2 Basic Set, 10 MHz to 8 GHz [d]	**3361/101**
RF and Control-Cable for Automatic DF-antennas, DC to 8 GHz, N to SMA, 50 Ohm, 5 m	**3603/02**
RF and Control-Cable for Automatic DF-antennas, DC to 8 GHz, N to SMA, 50 Ohm, 15 m	**3603/03**
ADFA Vehicle Mounting Kit for Autom. DF Antenna	**3300/90.04**
GNSS Antenna, external, active (additional)	**3300/90.05**
RF Adapter, N Male to SMA Female, 50 Ohm	**3300/90.13**
Tripod, Non-Conductive, 1.65m, reinforced, 3/8”-16 UNC [e]	**3300/90.16**
Tripod Quick-Release Coupling, 3/8”-16 UNC	**3300/90.17**
Hardcase for Automatic DF Antenna	**3360/90.01**
Option for SignalShark, Automatic DF Antenna Control, Bearing View	**3310/95.005**
Option for SignalShark, Mapping and Localization for Open Street Map based map visualization and Heatmap localization.	**3310/95.006**

[d] *Requires Option 3310/95.005 “Option, Automatic DF Antenna Control, Bearing View” and RF-Cable 3603/xx.*

[e] *The tripod 3300/90.16 is intended for short-term use only, which means the tripod with antenna should be disassembled directly after a measurement has been completed.*

Application Packages for SignalShark

The application packages are tailor-made solutions that allow you to adapt the SignalShark to your requirements. Each package typically consists of application-dependent hardware accessories and/or firmware options, and costs less than purchasing the items individually. Additional packages can be purchased as and when required. Your local Narda sales representative will be happy to assist you in the selection of the right packages for your applications.

App. Package, Direction Finding Basic	Part number
This Application Package provides comprehensive functions to support hunting of interference signals and hidden transmitters. The device based GPS and the antenna handle with built-in electronic compass makes it possible to conveniently take bearings on a transmitter from various locations. **Includes:** › Option, Horizontal Scan (3310/95.011) › Option, Mapping and Localization (SCPI currently not supported) (3310/95.006) › Active Antenna Handle 9 kHz - 8 GHz (3300/10) › Arm Support for Active Antenna Handle (3100/90.10)	**3310/94.02**

App. Package, Automatic DF 1, 200 MHz to 2.7 GHz*	Part number
This application package provides basic equipment and options for vehicle based, automatic direction finding (bearing). *Additional option 3310/95.006 “Mapping and Localization” is recommended for Open Street Map based map visualization and heatmap localization. **Includes:** › Automatic DF-Antenna 1 (3360/01) › Allen Wrench (3300/90.19) › Option, Automatic DF Antenna Control, Bearing View (3310/95.005) › ADFA Vehicle Mounting Kit for autom. DF Antenna (3300/90.04) › RF-Cable, DC to 8 GHz, N to SMA, 50 Ohm, 5 m (3603/02) › Automatic DF-Antenna Handling and Safety Instructions multilingual (3360/98.12)	**3310/94.05**

App. Package, Automatic DF 2, 10 MHz to 8 GHz*	Part number
This application package provides basic equipment and options for vehicle based, automatic direction finding (bearing). *Additional option 3310/95.006 “Mapping and Localization” is recommended for Open Street Map based map visualization and heatmap localization. **Includes:** › Automatic DF-Antenna 2 (3361/01) › Allen Wrench (3300/90.19) › Option, Automatic DF Antenna Control, Bearing View (3310/95.005) › ADFA Vehicle Mounting Kit for autom. DF Antenna (3300/90.04) › RF-Cable, DC to 8 GHz, N to SMA, 50 Ohm, 5 m (3603/02) › Automatic DF-Antenna Handling and Safety Instructions multilingual (3360/98.12)	**3310/94.06**

App. Package, Automatic DF 1, Hardcase, 200 MHz to 2.7 GHz*	Part number
This application package provides basic equipment and options for vehicle based, automatic direction finding (bearing). *Additional option 3310/95.006 “Mapping and Localization” is recommended for Open Street Map based map visualization and heatmap localization. **Includes:** › Automatic DF-Antenna 1 (3360/01) › Allen Wrench (3300/90.19) › Option, Automatic DF Antenna Control, Bearing View (3310/95.005) › ADFA Vehicle Mounting Kit for autom. DF Antenna (3300/90.04) › RF-Cable, DC to 8 GHz, N to SMA, 50 Ohm, 5 m (3603/02) › Automatic DF-Antenna Handling and Safety Instructions multilingual (3360/98.12) › Hardcase for Automatic DF Antenna (3360/90.01)	**3310/94.11**

App. Package, Automatic DF 2, Hardcase, 10 MHz to 8 GHz*	Part number
This application package provides basic equipment and options for vehicle based, automatic direction finding (bearing). *Additional option 3310/95.006 “Mapping and Localization” is recommended for Open Street Map based map visualization and heatmap localization. **Includes:** › Automatic DF-Antenna 2 (3361/01) › Allen Wrench (3300/90.19) › Option, Automatic DF Antenna Control, Bearing View (3310/95.005) › ADFA Vehicle Mounting Kit for autom. DF Antenna (3300/90.04) › RF-Cable, DC to 8 GHz, N to SMA, 50 Ohm, 5 m (3603/02) › Automatic DF-Antenna Handling and Safety Instructions multilingual (3360/98.12) › Hardcase for Automatic DF Antenna (3360/90.01)	**3310/94.12**

Antennas and Accessories for SignalShark and IDA

Description	Part number
Directional Antenna 1, 20 MHz to 250 MHz	**3100/11**
Directional Antenna 2, 200 MHz to 500 MHz	**3100/12**
Directional Antenna 3, 400 MHz to 8 GHz	**3100/13**
Loop Antenna, H-Field, 9 kHz to 30 MHz	**3100/14**
Antenna Adapter, N Male for Handle 3100/10 and 3300/10	**3100/15**
Arm Support for Active Antenna Handle	**3100/90.10**
Active Antenna Handle for IDA and SignalShark, 9 kHz to 8 GHz	**3300/10**

Application Packages for SignalShark and IDA

The application packages are tailor-made solutions allowing you to adapt SignalShark and IDA to your needs. A package typically consists of application dependent hardware accessories and/or firmware options and has a discount compared to an individual purchase. If needed, additional packages can be purchased also at a later time. Your local Narda representative will be happy to help you selecting the right application packages for your application

App. Package, Antenna Basic Kit (Mobile Operators)	Part number
This Application Package provides you with a lightweight yet robust directional antenna for the frequency range from 400 MHz to 8 GHz and covers cellular communication as well as other service bands. The Package also includes an antenna adapter that allows you to use your own antennas together with the Antenna Handle. This enables you to benefit from the integrated compass, low noise amplifier, and automatic polarization detector in the handle when using your own antennas. **Includes:** › Directional Antenna 3, 400 MHz to 8 GHz (3100/13) › Antenna Adapter, N Male for Handle (3100/10)	**3106/92.03**

App. Package, Antenna Extension Kit	Part number
This Application Package complements and completes the Antenna Basic Kit Application Package so that you can make the best use of the entire frequency range from 9 kHz to 8 GHz. **Includes:** › Directional Antenna 1, 20 MHz to 250 MHz (3100/11) › Directional Antenna 2, 200 MHz to 500 MHz (3100/12) › Loop Antenna, H-Field, 9 kHz to 30 MHz (3100/14)	**3106/92.04**

Application Packages for IDA

Direction Finding	Part number
This Application Package provides comprehensive functions to support hunting of interference signals and hidden transmitters. The device based GPS and the antenna handle with built-in electronic compass makes it possible to conveniently take bearings on a transmitter from various locations. Also included, the mode “Direction Finding” and the option ”Mapping” provides automatic computation of several bearings to give a transmitter location, which is then displayed on a map. **Includes:** › Option Direction Finding, including Horiz. Scan, Tone Search, Localization (3100/95.09) › Option Mapping (3100/95.01) › Active Antenna Handle (3100/10) › Arm Support (3100/90.10)	**3106/92.02**

Your local Narda sales representative can provide information about all the possible accessories and will be pleased to offer advice.

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