

Narda DF Antennas - Datasheet

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To cover a wide frequency range with high sensitivity, Narda offers several directional antennas. Each antenna is optimized for their particular frequency range with regard to sensitivity and directivity, resulting in excellent bearing accuracy. The fact that their frequency ranges overlap each other by about 20% is of great tactical value.

Two Automatic DF Antennas (ADFA) in combination with the Narda Real-Time Handheld Analyzer SignalShark[®] support full automatic direction finding.

- › 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
- › Automatic DF-Antenna 1
200 MHz to 2.7 GHz
- › Automatic DF-Antenna 2
10 MHz to 8 GHz



Manual DF

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 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 factor is applied automatically when used in conjunction with a basic unit.

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 built in to the handle so it shows no deviation due to the handle. If required, you can numerically enter the local declination (angle between geographic and magnetic North) into the basic unit.

3D position detection

Furthermore, the handle contains position sensors that measure the elevation and roll (polarization) angles of the antenna. The elevation and polarization are important factors in determining the direction of a signal source when taking manual bearings. In contrast, the roll and elevation angles should be kept constant while turning the antenna for a Horizontal Scan.

Start/Stop button

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

Manual DF Antennas

Loop Antenna – 9kHz to 30 MHz

This antenna is very helpful for interference finding in the area of power line communication and interference due to defective capacitors within power supplies.

Antenna 1 – 20 MHz to 250 MHz

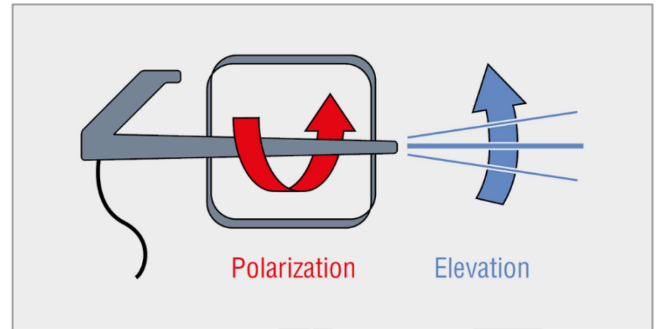
Starting in the region of the ISM frequency of 27 MHz, it is also particularly suitable for interference and impairment searches in the UHF broadcast radio band and also includes the lower end of the VHF TV band including DAB.

Antenna 2 – 200 MHz to 500 MHz

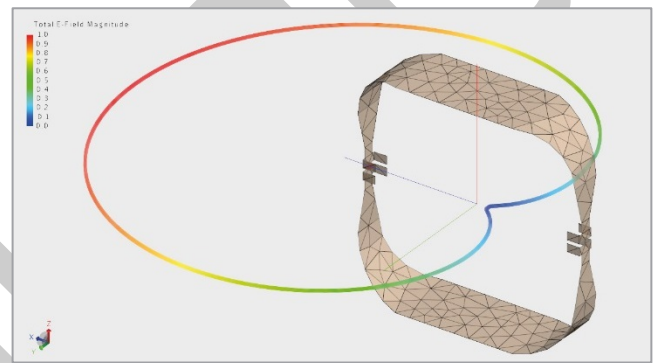
Ideal for interference and impairment searches on all the communications services located in that band. It also covers the ISM frequency at 433 MHz.

Antenna 3 – 400 MHz to 8 GHz

It covers the entire range of mobile -communications services including LTE and WiFi. It also captures L-, S-, and C-band radar.



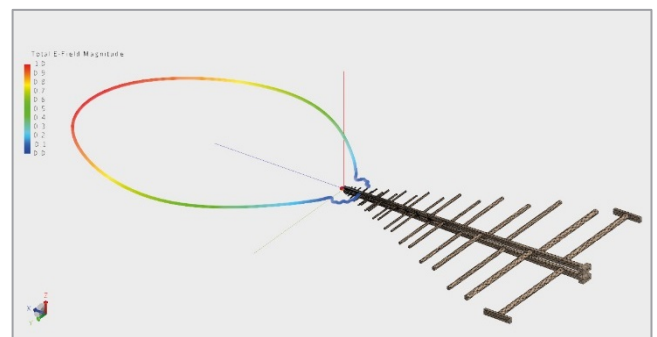
DF Antenna Handle: Position sensors in the handle measure the roll (polarization) and elevation angles of the antenna.



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



Antenna 2: Typical horizontal characteristic for the directional dipole antenna, computed for the far field.



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

Specifications of manual DF Antennas

The following accessories can be used with SignalShark and IDA.

General Specifications – Antenna Handle and Directional Antennas			
Environmental	Operating temperature	- 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	European Union	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 tested 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	
Dimensions (L × W × H), Weight (size without cable)		Handle:	165 mm × 165 mm × 43 mm (6.5" × 6.5" × 1.7"), 470 g / 1.04 lbs
		Dir. Antenna 1:	325 mm × 255 mm × 80 mm (12.8" × 10.0" × 3.1"), 400 g / 0.88 lbs
		Dir. Antenna 2:	285 mm × 410 mm × 43 mm (11.2" × 16.1" × 1.7"), 300 g / 0.66 lbs
		Dir. Antenna 3:	478 mm × 332 mm × 50 mm (18.8" × 13.1" × 2.0"), 350 g / 0.77 lbs
		Loop antenna 3100/14:	430 mm × 370 mm × 42 mm (16.9" × 14.6" × 1.7"), 380 g / 0.84 lbs
Country of origin		Germany	
Automatic frequency response correction		Typical antenna factor correction is applied automatically when used in conjunction with the SignalShark 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° Pitch and roll uncertainty < 3° RMS in the range of +/- 30° (RMS means the standard deviation of the specified error)
Connection cable to SignalShark 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	Connecting thread at the underside of 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)

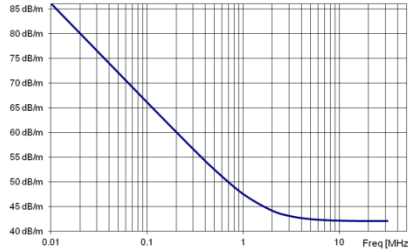
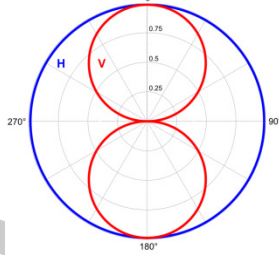
Frequency range	200 MHz to 500 MHz
Antenna type	Directional dipole antenna
Antenna factor	21 dB (1/m) typical @ 350 MHz (passive mode)

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	<div><p>Antenna (Loop) 9 kHz to 30 MHz</p><p>Radiation pattern (typ.) for a horizontal scan and vertical polarization (V) or horizontal polarization (H)</p></div> <p>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</p>

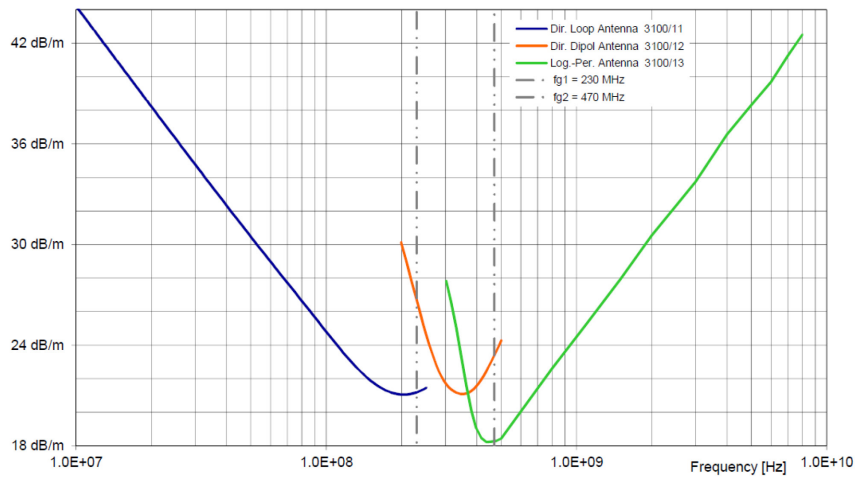
Antenna Adapter, N Male (3100/15)



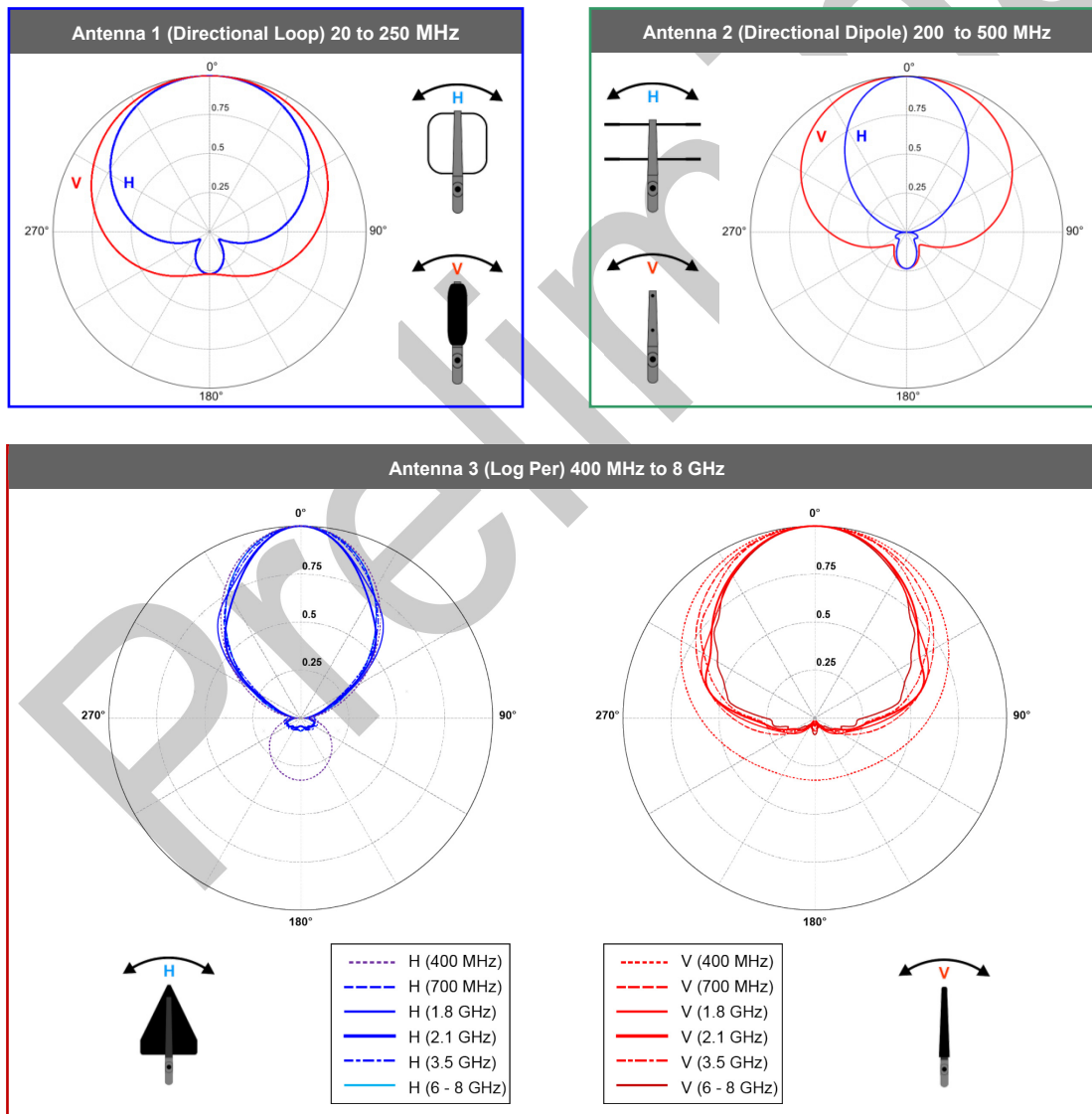
Description	With an adapter the internal 3D compass, built-in switchable preamplifier, and automatic polarization detection can be used with third-party antennas.
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Directional Antennas and Characteristics

Antenna Factors (typical)



Radiation Pattern (typical)



Full automatic DF System

SignalShark supports automatic DF antennas from Narda. An automatic DF Antenna translates signals from several antenna elements into a single channel DF signal. The antenna is controlled by SignalShark, which automatically calculates bearings, based on the single channel DF signals. Measurement results can be bearings, as well as omnidirectional level and spectrum values. Additionally SignalShark calculates the statistical distribution of bearing lines and provides transmitter localization visualized as a heat map.

The antenna can be used with a tripod, can be mounted to an antenna mast or can be attached to the rooftop of a vehicle via a magnetic mount adapter.

Fast automatic direction finding

In an automatic DF Antenna, there are 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 also the omnidirectional channel power and the spectrum is measured.

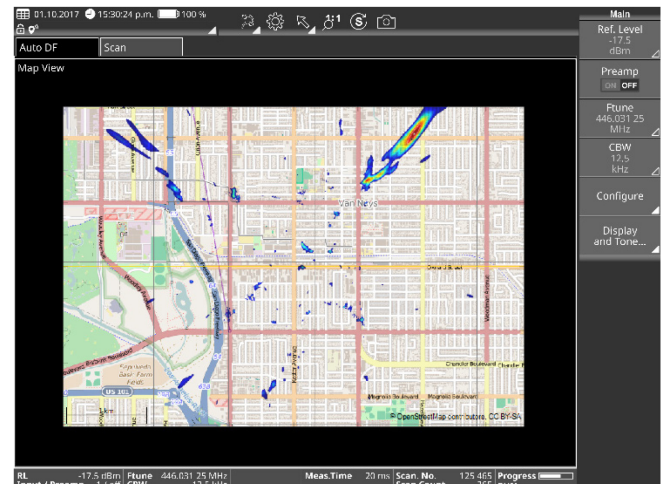
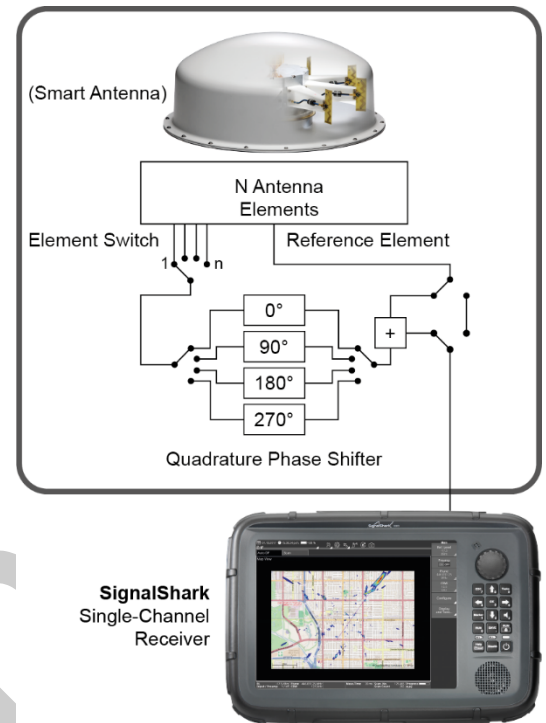
This makes it possible to monitor changes in the signal level or spectrum concurrently with the bearings.

The antenna arrays of the automatic DF Antenna depend on the frequency range. At low frequencies, just a pair of crossed coils are used in combination with the Watson-Watt DF-method. At medium and high frequencies, a 9-element circular array is used for the correlative interferometer DF-method.

Build-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.

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 automatic DF Antenna. 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 automatic DF Antenna can be attached to the rooftop of a vehicle to take random bearings in the estimated area.



Specifications of automatic DF Antennas

The automatic DF antennas can be used with SignalShark.

General Specifications – Automatic DF-Antennas

Temperature	Storage	- 40 °C to + 85 °C
	Operating	- 40 °C to + 55 °C
Humidity	< 29 g/m ³ (< 93 % RH at +30°C), non-condensing	
Permissible wind speed	Max. 130 km/h	
Ingress Protection	IP 55	

Automatic DF-Antenna 1 (3360/01) ^a



Frequency range	200 MHz to 2.7 GHz
Antenna type	Single channel, automatic direction finding antenna.
DF method	Correlative interferometer
Compass	Embedded electronic compass
GNSS	Embedded receiver and antenna
DF accuracy	1° RMS (typ.) ^b
Automatic frequency response correction	Typical antenna factor correction is applied automatically when used in conjunction with the SignalShark basic unit.
VSWR	t.b.d.
Polarization	Vertical
Installation	on mast, tripod, magnet mount
Dimensions (Height × Diameter)	219 mm x 480 mm (8.62" x 18.9")
Weight	5.6 kg (12.3 lbs)
Country of origin	Germany

^a Available from October 2018

^b Measurement in reflection-free environment. RMS error is calculated from the bearings of uniformdistributed samples versus azimuth and frequency.

Automatic DF-Antenna 2



Frequency range	10 MHz to 8 GHz
Antenna type	Single channel, automatic direction finding antenna.
DF method	Watson-Watt, correlative interferometer
Compass	Embedded electronic compass
GNSS	Embedded receiver and antenna
DF accuracy	1° RMS (typ.) ^b
Automatic frequency response correction	Typical antenna factor correction is applied automatically when used in conjunction with the SignalShark basic unit.
VSWR	t.b.d.
Polarization	Vertical
Installation	on mast, tripod, magnet mount
Dimensions (Height × Diameter)	219 mm x 480 mm (8.62" x 18.9")
Weight	t.b.d.
Country of origin	Germany

Ordering Information

Your local Narda representative will inform you of all possible accessories and will be pleased to provide you with advice.

Accessories for SignalShark and IDA

Accessory Description	Part number
Directional Antenna 1, 20 MHz - 250 MHz	3100/11
Directional Antenna 2, 200 MHz - 500 MHz	3100/12
Directional Antenna 3, 400 MHz - 8 GHz	3100/13
Loop Antenna, H-Field, 9kHz-30MHz	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, 9kHz - 8GHz	3300/10

Accessories for SignalShark only

Accessory Description	Part number
Additional GNSS Antenna, external, active	3300/90.05
RF Adapter, N Male to SMA Female, 50 Ohm	3300/90.13
Automatic DF-Antenna 1, 200 MHz - 2.7 GHz	3360/01 ^c
RF-Cable, 9kHz-8GHz, N to SMA, 50 Ohm, 5 m	3603/02 ^c
RF-Cable, 9kHz-8GHz, N to SMA, 50 Ohm, 15 m	3603/03 ^c

Recommended Analyzers

SignalShark Basic Set 3310/101



www.narda-sts.com/signalshark

IDA-3106 Basic Unit set 3106/204



<http://www.narda-ida.com>

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^c Available from October 2018