

Interference hunting made easy – with the R&S®HE 400 handheld directional antenna



Fig. 1: Five plug-in modules are currently available for the R&S®HE 400. Shown here is the R&S®HE 400 VHF module with the R&S®PR100 portable receiver.

The R&S®HE400 handheld directional antenna replaces its highly acclaimed predecessor, the R&S®HE300, whose various models served the market well for almost 10 years. Used together with the R&S®PR100 portable receiver or the R&S®FSH and R&S®FPH handheld spectrum analyzers, the antenna can precisely locate transmitters and interference sources.

Many different user groups appreciate portable radiomonitoring equipment that can also be used to (manually) take bearings. Users range from mobile network operators and regulatory authorities to facility security companies, armed forces and intelligence services. Depending on the actual application, either the receiver or one of the spectrum analyzers is used – the new R&S®HE400 antenna is compatible with all of them.

Lightweight, compact and intuitive to use

The R&S®HE400 comes with a handle, a receiver-specific cable set and one of five currently available plug-in modules that together cover the frequency range from 8.3 kHz to 8 GHz (Fig. 1). The handle and antenna modules are made of PC/ABS plastic or aluminum for low weight (approx. 1 kg) combined with high impact resistance. The antenna is supplied from the receiver or spectrum analyzer, which further reduces the weight since batteries are not required in the antenna.

The ergonomic handle rests comfortably in your hand and the two controls (trigger button and toggle button) are easy to reach with thumb and index finger. For prolonged work periods, the armrest included with the antenna should be used; it simply attaches to the handle (Fig. 2). The toggle button activates the low-noise amplifier (LNA) integrated into the handle. The handle also includes an electronic compass and a dual

GPS/GLONASS receiver. Positions and bearings obtained in this manner are transmitted to the connected receiver, which also automatically recognizes the type of antenna module that is plugged and the status of the LNA. Field strength values are therefore always displayed correctly – without requiring any user settings (Fig. 3).

To start a measurement or action that was predefined in the receiver, the user simply presses the trigger button on the handle. The position of the transmitter can be calculated using triangulation and displayed on a map.

Modules and cables

Fig. 4 shows the available antenna modules. In addition to the familiar loop modules for HF and VHF that were also available for the R&S®HE300 and a broadband log-periodic module for UHF and SHF, there are two new modules.

The R&S®HE400UWB ultrawideband module covers the extremely wide frequency range from 30 MHz to 6 GHz. In many applications, this module greatly simplifies antenna handling since it eliminates the need to exchange modules. The R&S®HE400UWB combines two separate antennas in a single radome. The antennas are interconnected via a diplexer.

Fig. 2: The attachable armrest allows fatigue-free operation over long periods of time.



Fig. 3: R&S®PR100 display showing the field strength, compass and GPS data.



Plug-in modules for the R&S®HE400

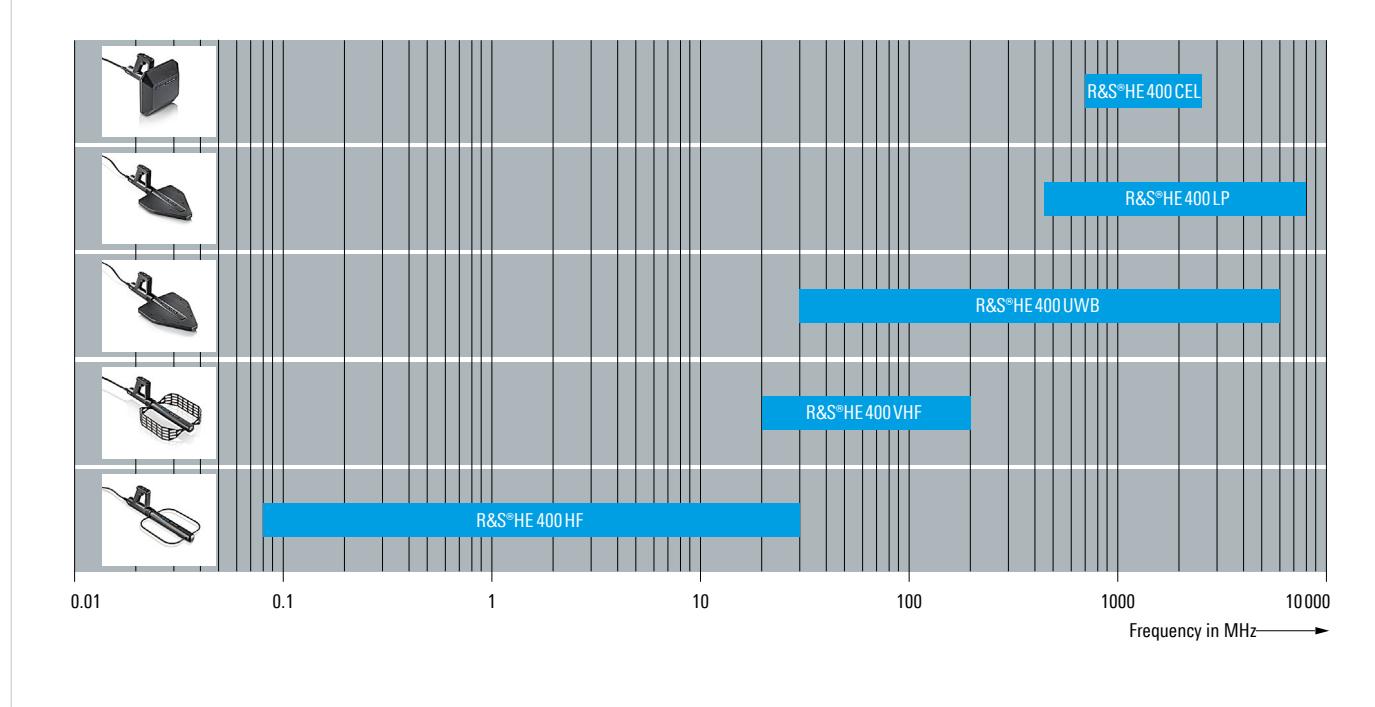


Fig. 4: Available antenna modules by frequency range.

The R&S®HE400CEL cellular module is designed specifically for the cellular bands from 700 MHz to 2.5 GHz. This module uses a special, more precise direction finding method than, for example, log-periodic or loop antennas. At the press of a button on the handle, the broadband dipoles that are next to each other can be switched between normal mode and delta mode. In normal mode, the dipoles work in-phase, producing a relatively broad radiation pattern to the front. In delta mode, the two dipoles are excited out-of-phase, producing a radiation pattern with a steep notch in the line-of-sight direction.(Fig. 5).

In practice, normal mode is used to determine the general direction. The user then switches to delta mode and moves the antenna only in the angular range of the previously determined maximum. Thanks to the very narrow notch in the radiation pattern, minimum-signal direction finding can be used to precisely determine the direction.

Configuration and accessories

The R&S®HE400 can be configured to meet customer-specific requirements. The antenna modules listed in Fig. 4 are simple to plug in and secure with a locking nut. Receiver-specific cable sets are available to connect to one of the three

currently supported receiver devices. These cable sets can be quickly assembled by the user and are also easy to exchange during servicing.

Radiation patterns of the R&S®HE400CEL module

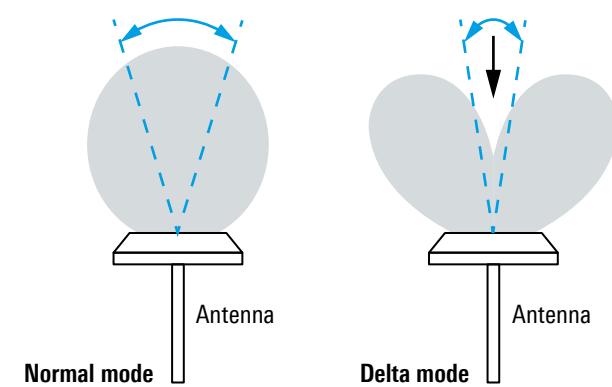


Fig. 5: Delta mode precisely determines the direction of a transmitter based on a minimum signal.



Fig. 6: Everything within reach. The transport case has room for all of the antenna modules and the receiver.

Available accessories include a rugged transport case with room for the antenna handle, all antenna modules and the R&S®PR100 monitoring receiver (Fig. 6). Two compact transport bags for transporting two or four modules are also available. The handle has a threaded socket that is used to mount the antenna on a tripod such as the lightweight R&S®HE400Z4 with spherical head.

Maik Reckeweg

R&S®HE400 – key features

Wide frequency range

- | 8.3 kHz to 8 GHz via five exchangeable antenna modules
- | Ultrawideband module from 30 MHz to 6 GHz

Very comfortable to use

- | Ergonomic shape combined with low weight
- | Attachable armrest
- | Easy-to-access controls

Extensive integrated functionality

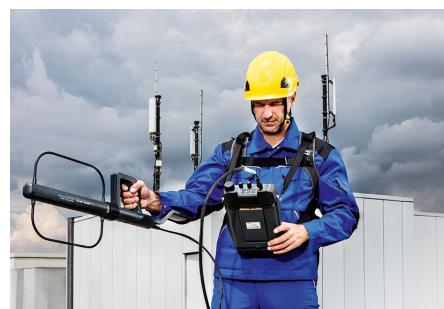
- | Sensitive preamplifier (LNA)
- | GPS/GLONASS receiver
- | Electronic compass
- | Polarization and module recognition

Extremely precise direction finding

- | Distinctive, forward-directed radiation patterns
- | Exact minimum-signal direction finding with the R&S®HE400CEL module's special delta mode

Accessories

- | Transport case and various transport bags
- | Lightweight tripod with spherical head
- | Receiver-specific cable sets



Application examples

Left: R&S®HE400CEL for measurements in the cellular bands. The removable armrest prevents fatigue while working with the antenna.

Top right: R&S®HE400UWB ultrawideband module during bug hunting.

Bottom right: R&S®HE400HF during interference hunting in the cellular range.