

R&S® IQW

Wideband I/Q Data Recorder

Bring real RF scenarios to your lab



R&S®IQW Wideband I/Q Data Recorder At a glance

The R&S®IQW wideband I/Q data recorder is a versatile instrument for fast and reliable realtime recording, storage and playback of wideband I/Q data streams. In contrast to field tests, recording of live RF scenarios allows users to perform tests in the lab under real-world conditions reproducibly and at lower cost.

The wide recording bandwidth and high sampling rate and bit depth of the R&S®IQW make the instrument ideal for deployment in areas such as aerospace and defense, and for R&D of wideband communications systems.

In combination with Rohde&Schwarz signal and spectrum analyzers and signal generators, the R&S®IQW can be used in a wide variety of situations for recording, archiving and playback of GNSS, communications and radar signals, as well as complex signal scenarios.

The smart GUI concept makes working with I/Q data quick and easy. Easily removable and lockable SSD memory packs provide the necessary flexibility and security. With its very short boot time, the Linux-based operating system ensures fast availability while reducing vulnerability to external malware attacks.

Along with wide bandwidth and high speed, the R&S®IQW features easy operation and a high level of security.

Key facts

- Realtime recording, storage and playback of digital I/Q data with bandwidths up to 512 MHz
- Accurate data acquisition with a sampling rate up to 640 Msample/s and 16-bit I/Q data (complex)
- Fast data provision and memory expansion with easily removable memory packs (SSD) up to 15 Tbyte
- Easy operation with the 5.7" TFT touchscreen user interface or by remote control with the SCPI command set and web-based responsive GUI
- Linux operating system for fast, stable operation and protection against malware
- Import and export of I/Q data via USB 3.0
- Recording of GPS coordinates
- Graphical display of power spectrum



High-precision data acquisition

Data recording and playback with up to 512 MHz bandwidth and no sample loss

With the R&S®IQW, I/Q data with a bandwidth up to 512 MHz can be recorded, stored and played back without any sample loss. This allows users to capture wideband live RF scenarios. Unlike artificially generated signals, users can employ the signals for lab tests relying on realistic scenarios. These real-world scenarios include effects such as signal reflection, attenuation and scattering, which make it possible to simulate true-to-life test environments in the lab at low cost.

Reflecting the real environment

The resolution of the measured signal depends on the number of bits used for recording and reproduction. In other words, the higher the bit count, the higher the achievable signal integrity. With 16-bit samples (16-bit quantization), live RF signals and scenarios can be reproduced reliably and with higher accuracy. The greater bit depth also provides a larger dynamic range and improves the signal-to-noise ratio.

Precise timestamping

Timestamping at the frame level allows users to precisely evaluate the timing of the recorded I/Q data so that they can determine exactly which data was recorded at what time. This makes it possible to accurately correlate the captured I/Q data to events and ambient conditions during the recording session.

Removable memory packs for more flexibility

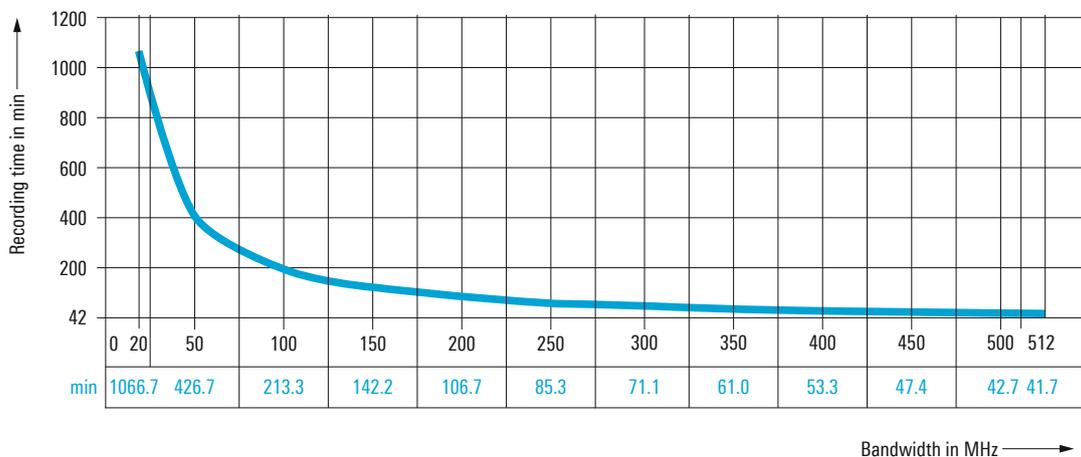
The R&S®IQW has a sturdy stainless steel case, and its 3 HU by 1/2 19" format is very compact, making it suitable for both stationary and mobile use. It contains a removable SSD memory pack that can be released by a lever mechanism. For users, this means fast data provision, allowing data to be exchanged easily and reliably between different users. In addition, memory expansion is possible by choosing a memory pack with a higher capacity.



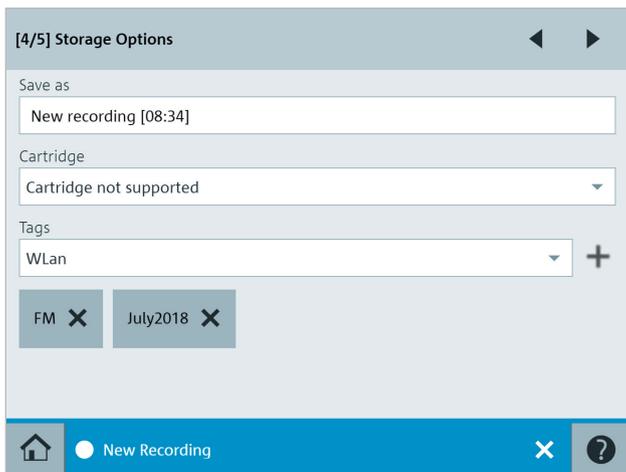
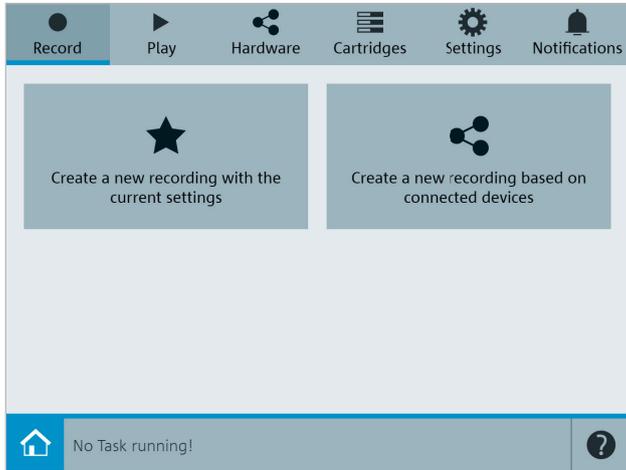
Removable SSD memory pack.

Different memory sizes are available for the R&S®IQW. The R&S®IQW-BD115 option contains a 15 Tbyte SSD memory pack and the R&S®IQW-BD106 option contains a 6.4 Tbyte SSD memory pack for recording bandwidths up to 512 MHz. The R&S®IQW-BD106 allows realtime recording up to 42 minutes. Reducing the bandwidth increases the recording time. The relationship between bandwidth and recording time is shown in the chart below. The

Recording time as a function of bandwidth with R&S®IQW-BD106 6.4 Tbyte SSD



Smart operating concept



R&S®IQW-BC103 option contains a 3.2 Tbyte SSD memory pack for recording bandwidths up to 200 MHz.

Operation of the R&S®IQW is based on a smart, intuitive user interface, allowing users to quickly make the desired settings and start recording.

The recorder can be operated locally or by remote control. Local control is via the touchscreen, with the option of connecting an accessory keyboard and mouse.

Convenient remote control

A web-based user interface enables control of the recorder via a web browser. The responsive GUI automatically adapts to the screen size, so a smartphone can also be used for remote control. This allows one or more users to operate the instrument conveniently via a LAN from their workstation or on the go with a smartphone.

Another option for remote control is using the SCPI command set for automatic operation. Context-sensitive online help provides detailed explanations of all parameters, such as specific default settings or associated SCPI commands.

Simplified data management

The R&S®IQW provides helpful functions to assist users in working with the acquired I/Q data. GPS data can be recorded and displayed as auxiliary information to facilitate geographical correlation of I/Q data for convenient evaluation. Archiving and sorting of recordings is supported by setting tags so that data can later be searched for, filtered and sorted according to user-defined criteria.

Manual/triggered start and stop of recordings

Recordings can be started and stopped manually or by using a trigger signal. The recorder can trigger on either the rising or falling edge of the trigger signal.

I/Q data import and export via USB 3.0

The R&S®IQW-K110 option makes it possible to import and export I/Q data. Files can be saved via USB 3.0 to an external disk drive. This facilitates downstream processing and analysis of exported I/Q data recordings.



Security first

Securing confidential measurement data

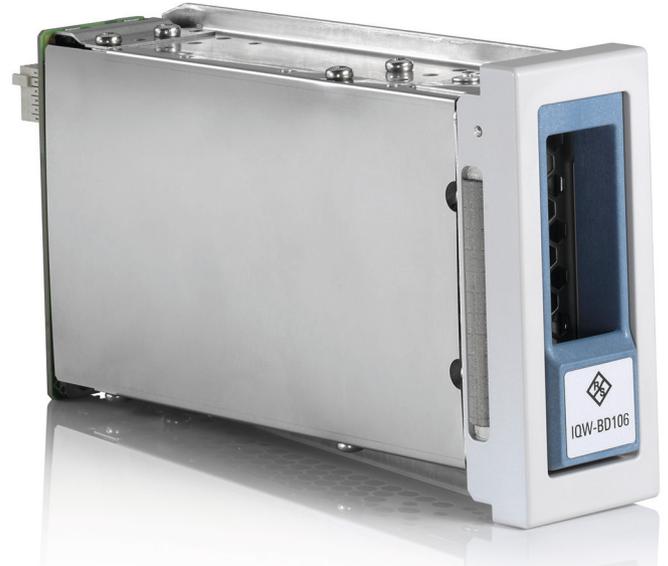
The removable memory pack ensures the confidentiality of user measurements by preventing unauthorized access to the recorded data. Once the memory pack is removed, no measurement data remains in the instrument. The instrument's boot medium, which contains user data such as instrument settings, can also be removed. As a result, the R&S®IQW can be sent in for calibration or handed over to another user without any security concerns, because confidential measurement data and settings always remain with the rightful user. The standardized Kensington lock fitting on the instrument and the memory pack locking mechanism hinder potential data theft.

Protected against external malware

Susceptibility to external attacks is significantly reduced through the use of a Linux-based operating system, delivering higher security. Furthermore, Linux provides high system stability by protecting important system data and preventing it from being modified. Easily and quickly installable firmware updates ensure that the software is always up-to-date and secure, offering the latest functions and improvements.

Always up-to-date with free firmware updates

The firmware of the R&S®IQW can be updated using a USB stick or a LAN-connected PC. Updates are available online free of charge at www.rohde-schwarz.com. Several different firmware versions can be installed concurrently on the R&S®IQW. This allows users to safely evaluate a new firmware version before using it.



The locking mechanism of the memory pack hinders potential data theft.

When speed counts

The R&S®IQW is designed for high data rates. This includes the HS Digital I/Q interface as well as the entire hardware architecture and the data storage media.

HS Digital I/Q interface (Rohde & Schwarz proprietary)

The HS Digital I/Q interface enables fast data recording with a high sampling rate, wide bandwidth and 16 bit memory depth.

Consistent use of PCIe

The consistent use of PCIe is another factor that contributes to the high system speed.

High-quality SSD memory packs

The high-quality SSD memory packs, which are normally used in servers, combine high availability and reliability with short latencies.

Linux-based operating system

The operating system of the R&S®IQW has short boot times, so the recorder is very quickly ready for use at all times.

The system makes the difference

Numerous ports at the front and rear

The R&S®IQW has numerous interfaces for data recording and instrument control. The arrangement of the interface ports ensures easy cabling to keep the workstation uncluttered.

Interfaces for data transfer

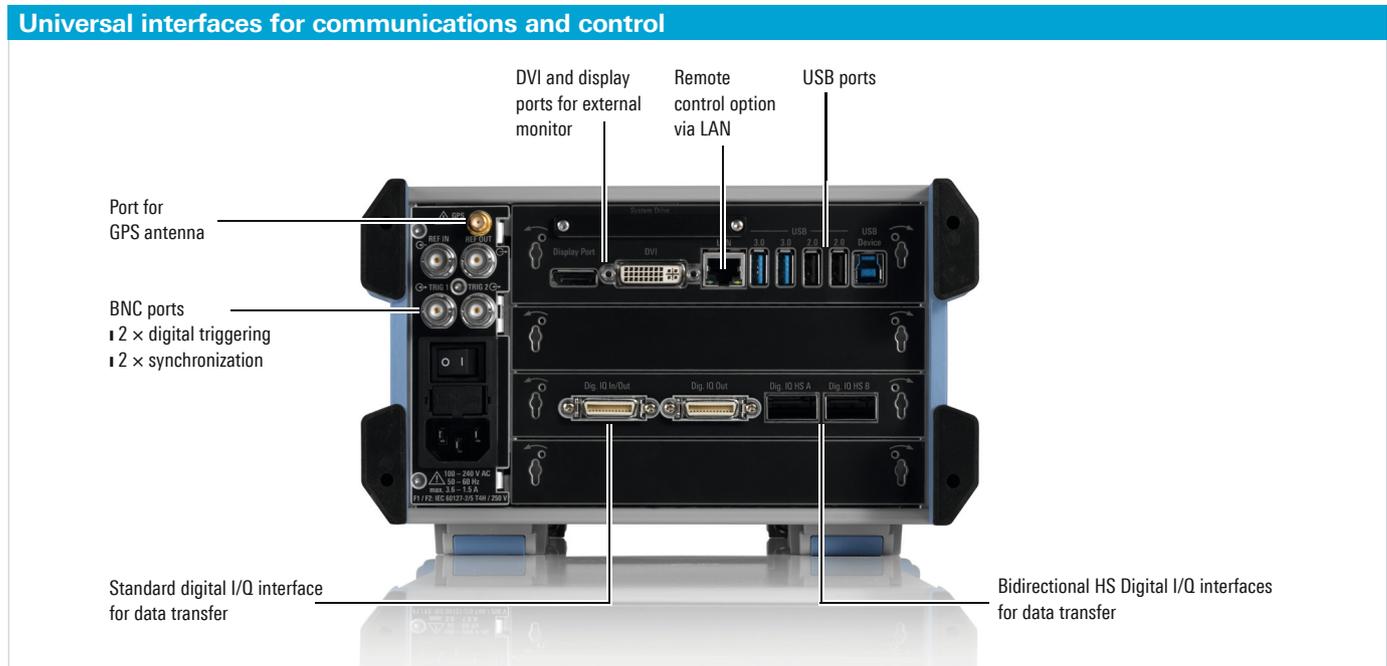
The two HS Digital I/Q ports are the key interfaces of the R&S®IQW for I/Q data recording and playback. These bidirectional interfaces can receive data from or send data to a device. This does away with reconnecting cables when switching between recording and playback of I/Q data. In addition to the HS Digital IQ interfaces, the R&S®IQW comes with a standard digital I/Q interface for lower data rates and a bandwidth up to 160 MHz. The associated BNC ports can be used for digital start/stop triggering of recordings and for the input and output of reference clock signals for instrument and test setup synchronization. Via the GPS port, an antenna can be connected to the integrated GPS module. This makes it possible to record GPS data in order to assign recorded I/Q data to its exact geographical locations.

Universal interfaces for communications and control

The Ethernet interface provides access to the recorder via a web-based GUI or through SCPI commands. The USB 3.0 interface enables import and export of I/Q data files. Input devices such as a mouse and keyboard can be connected via USB to create a convenient workstation.

Test setup with a signal and spectrum analyzer and a signal generator

A signal and spectrum analyzer for receiving live RF signals and a signal generator for reconstructing and emitting RF signals can be connected to the R&S®IQW. The R&S®FSW and the R&S®SMW200A communicate with the R&S®IQW via the HS Digital I/Q interfaces. With this setup, wideband RF scenarios received by the R&S®FSW can be stored in the R&S®IQW. Using the R&S®SMW200A, the recorded RF scenarios can be emitted, for example during lab tests. This allows test runs to be performed more efficiently and with lower resource usage, and therefore at lower cost, than field tests, which must be carried out by experts. Further instruments supported by the R&S®IQW are the R&S®FSV, R&S®SMBV100A and R&S®SGT100A.

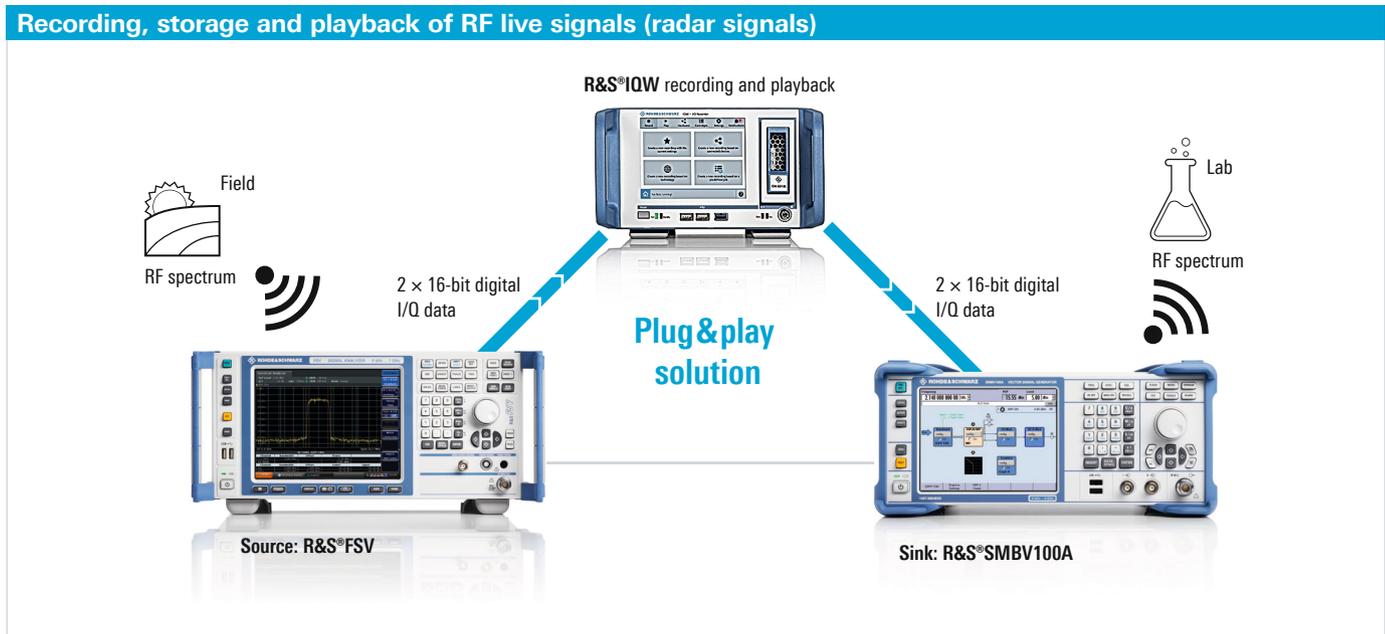
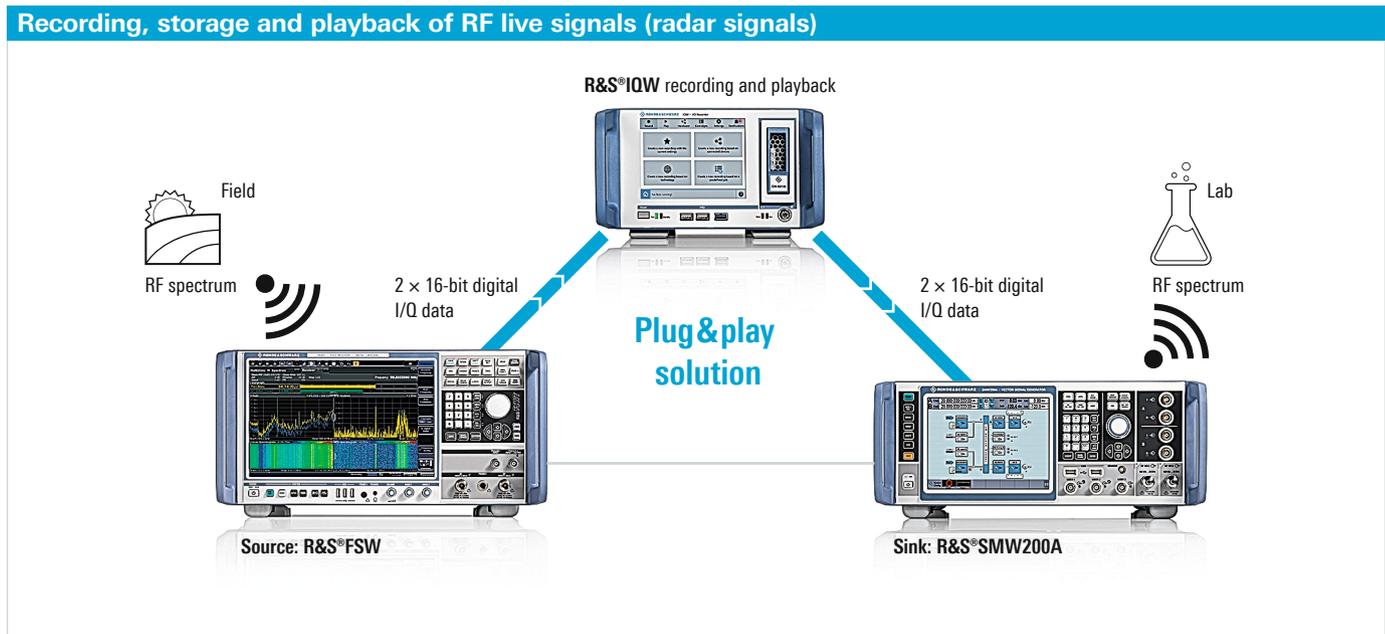


Testing DUTs in the lab with the R&S®FSW and the R&S®SMW200A

With the R&S®FSW, real RF spectra can be captured. The R&S®FSW converts analog signals to digital I/Q data, which is recorded and stored in the R&S®IQW. This recording function enables users to test equipment under real conditions, including with impairments like multipath propagation, signal obstruction, diffraction and interference. The R&S®IQW can record different RF scenarios for lab testing of DUTs, allowing different real-world scenarios to be simulated in the lab to test DUTs under different RF conditions. The R&S®SMW200A reconverts the stored digital I/Q data to an RF signal, which can be replayed. Thus the same device test can be performed repeatedly under identical real-world conditions with minimal effort.

R&S®IQW100 mid-range solution

The R&S®IQW100 provides full I/Q wideband data recorder functionality, with bandwidth up to 200 MHz. This mid-range solution is recommended for use with a spectrum analyzer such as the R&S®FSV and a signal generator such as the R&S®SMBV100A or R&S®SGT100A. Test systems with the R&S®IQW100 mid-range version address applications such as the recording, archiving and playback of R&S®GNSS and communications signals, allowing reproducible testing of DUTs in the lab using the captured signals.



Training course

The R&S®IQW training course combines classroom-based theory lessons with practical exercises. It covers the most important topics that must be understood in order to effectively use the R&S®IQW for recording and playback of I/Q data.

The course provides operators with the necessary knowledge to understand the role and use of the R&S®IQW in a recording and replay system including other instruments for RF signal reception and transmission. The course is instructor-led with an interactive approach. A final exam will be held to ensure effective knowledge transfer.

Training course

Operator training with R&S®IQW, R&S®FSW and R&S®SMW200A

R&S®IQW-T100

3638.8890.02

Specifications in brief

Specifications in brief		
I/Q data transfer		
RF bandwidth		512 MHz
I/Q word size	per I/Q sample	16 bit for I and 16 bit for Q
Sampling rate	R&S®IQW	640 Msample/s
HS Digital I/Q interface		full duplex, QSFP+, 40 Gbit/s
Standard digital I/Q interface		input/output, 26-pin MDR connector
Interfacing instruments	I/Q data source for recording	R&S®FSW, R&S®FSV
	I/Q data sink for playback	R&S®SMW200A, R&S®SMBV100A, R&S®SGT
General data		
Display	with touchscreen	5.7" TFT color display, 640 × 480 pixel, LED backlighting
USB interfaces		4 × USB 2.0, 3 × USB 3.0
LAN interface	remote control	Ethernet 10/100/1000 Mbit/s
Power supply	AC power supply	100 V to 240 V AC (±10%), ≤ 150 VA, 50 Hz to 60 Hz/400 Hz (±5%), 1.5 A to 3.6 A
Overall dimensions	W × H × D	249 mm × 150 mm × 451 mm (9.80 in × 5.90 in × 17.76 in)
	for 19" rack mounting	½ 19", 3 HU
Weight		6.3 kg (25.4 lb)
Environmental conditions	operating temperature range	0°C to +50°C
	storage temperature range	-20°C to +70°C

Ordering information

Designation	Type	Order No.
Base unit (without memory pack)		
I/Q wideband data recorder, mid-range, with touchscreen, optimized for SSD memory packs	R&S®IQW100	1525.7551K02
I/Q wideband data recorder, with touchscreen, optimized for SSD memory packs	R&S®IQW	1525.7551K05
Memory packs		
3.2 Tbyte SSD memory pack, for maximum RF bandwidth of 200 MHz	R&S®IQW-BC103	1525.8293.03
6.4 Tbyte SSD memory pack, for maximum RF bandwidth of 512 MHz	R&S®IQW-BD106	1525.8293.06
15 Tbyte SSD memory pack, for maximum RF bandwidth of 512 MHz	R&S®IQW-BD115	1525.8293.15
Accessories		
Cable for standard I/Q interface, length: 2 m	R&S®SMU-Z6	1415.0201.02
Cable for HS Digital I/Q interface, length: 3 m	R&S®DIGIQ-HS	3641.2948.03
Options		
I/Q data export/import	R&S®IQW-K110	1525.8370.02
Recording of GPS coordinates	R&S®IQW-K112	1525.8393.02
Bandwidth extension up to 200 MHz for R&S®IQW100	R&S®IQW-K200	1525.8429.02
Training course		
Operator training with R&S®FSW and R&S®SMW200A	R&S®IQW-T100	3638.8890.02

Service options		
Extended Warranty, one year	R&S®WE1	Please contact your local Rohde & Schwarz sales office.
Extended Warranty, two years	R&S®WE2	
Extended Warranty, three years	R&S®WE3	
Extended Warranty, four years	R&S®WE4	

Service that adds value

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

Rohde & Schwarz

The Rohde & Schwarz electronics group offers innovative solutions in the following business fields: test and measurement, broadcast and media, secure communications, cybersecurity, monitoring and network testing. Founded more than 80 years ago, the independent company which is headquartered in Munich, Germany, has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

- | Environmental compatibility and eco-footprint
- | Energy efficiency and low emissions
- | Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

Rohde & Schwarz training

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R&S®IQW Wideband I/Q Data Recorder

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