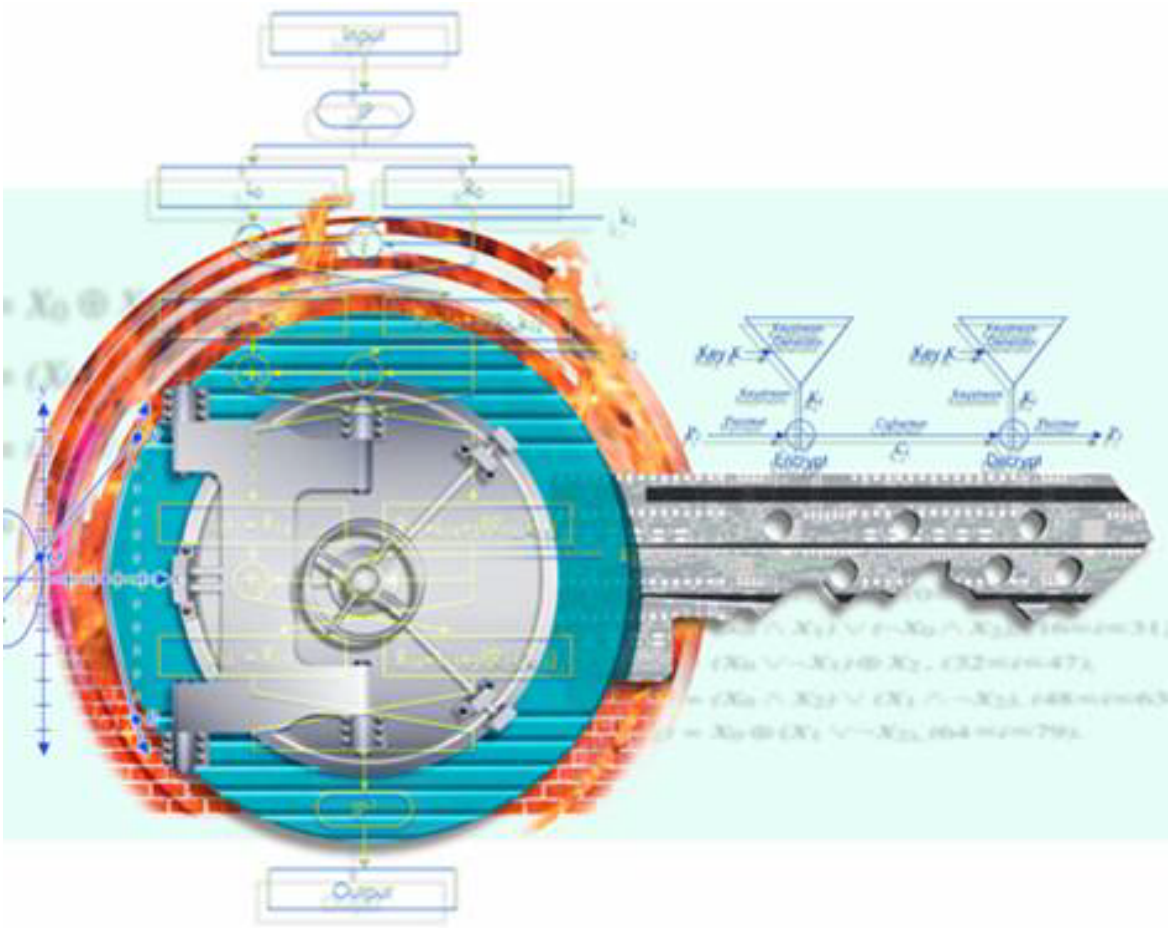

Product: R&S® NRP-Z series Power Sensors

Resolving Security Issues when working with R&S® NRP-Z Power Sensors in Secure Areas

Based upon the user's security requirements, this document describes the Rohde & Schwarz options available to address the user's power sensor needs. It also covers the different memory types and locations where user information can be stored in the R&S® NRP-Z power sensors.

For secure environments, it describes an approach to irretrievably remove user data and any information regarding instrument usage from the power sensor.

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Overview

In many cases it is imperative that the R&S® NRP-Z series Power Sensors can be used in a secured environment. Generally these highly secured environments will not allow any test equipment to leave the area unless it can be proven that no user information will leave with the test equipment. Security concerns can arise when power sensors need to leave a secured area to be calibrated or serviced.

In the following the types of memory and their usage in the R&S® NRP-Z series Power Sensors are described. In general, there is no memory which is accessible directly by the user, unlike the case, for example, with an USB memory stick.

Sensor Models Covered

This document covers all current R&S® NRP-Z series Power Sensors

Model	Part No.
R&S® NRP-Z11	1138.3004.02
R&S® NRP-Z21	1137.6000.02
R&S® NRP-Z22	1137.7506.02
R&S® NRP-Z23	1137.8002.02
R&S® NRP-Z24	1137.8502.02
R&S® NRP-Z27	1169.4102.02
R&S® NRP-Z28	1170.8008.02
R&S® NRP-Z31	1169.2400.02
R&S® NRP-Z37	1169.3206.02
R&S® NRP-Z51	1138.0005.02
R&S® NRP-Z52	1138.0505.02
R&S® NRP-Z55	1138.2008.02
R&S® NRP-Z56	1171.8201.02
R&S® NRP-Z57	1171.8401.02
R&S® NRP-Z81	1137.9009.02
R&S® NRP-Z85	1411.7501.02
R&S® NRP-Z86	1417.0109.02
R&S® NRP-Z91	1168.8004.02
R&S® NRP-Z92	1171.7005.02
R&S® NRP-Z98	1170.8508.02
R&S® FSH-Z1	1155.4505.02
R&S® FSH-Z18	1165.1909.02

Note:
The following information is valid for all models covered. Specific points relating to a particular sensor, are clearly expressed.

Types of Memory in the R&S® NRP-Z Series Power Sensors and its Security Concerns

CMOS-SRAM Memory

There is 1 MByte of CMOS-SRAM memory in all sensors but the R&S® NRP-Z81. The CMOS-SRAM is not backup-powered by a battery. Thus, after switching off power or disconnecting the sensor from the USB no information retains in the memory.

The CMOS-SRAM is not a security concern.

SDRAM Memory

The R&S® NRP-Z81 has 16 Mbyte of SDRAM memory on the digital board. SDRAMs are volatile memories and lose their data when the power is switched off. The SDRAM will be unreadable within one minute after the power is removed from the sensor.

The SDRAM is not a security concern.

EEPROM Memory

The R&S®NRP-Z81 is equipped with two digital potentiometer chips. Every chip provides 26 bytes of EEPROM storage.

Note:
The firmware of the sensor does not use the EEPROM. Also user commands can not address the memory.

The EEPROM is not a security concern.

FLASH Memory

There are FLASH memories in the R&S® NRP-Z series Power Sensors. With the exception of NRPZ81, all sensors contain 2 Mbytes of flash memory. The NRP-Z81 provides 8 megabytes.

The FLASH memory contains different parts of information: the sensor's boot loader, the calibration data, the firmware including FPGA and the S-parameter data. The FLASH memory does not contain any kind of setup information like the recently used RF frequency or other sensor measurement parameters or results.

Boot Loader (no security concern, sanitizable)	Calibration Data (no security concern, sanitizable)	Firmware incl. FPGA (no security concern, sanitizable)	S-parameter Data (security concern, sanitizable)

The boot loader contains a short procedure to load the firmware into the SDRAM and to flash the FPGA.

The boot loader is not a security concern.

The calibration data is essential data to operate a power sensor. These data can only be updated during production or by the R&S® service personnel. User commands cannot access this data.

The calibration data is not a security concern.

The firmware (including FPGA file) contains only code and constant data and is not used to store any configuration or results.

The firmware (incl. FPGA) is not a security concern.

The S-parameter data are a security problem as they contain information about the used frequency ranges. Users can upload S-parameter data into the sensor and download S-parameter data from the sensor. These S-parameter data are considered as confidential user data.

The S-parameter data (part of FLASH memory) may be a security concern.

Information Security in Highly Sensitive Areas

As SRAM and SDRAM are erased when the power is switched off, their data pose no security risk. Moreover, no user data are written into the EEPROM memory; hence, it is assumed that the EEPROM also poses no security risk.

The internal FLASH memory is the only device that does not lose its contents when power is removed and may contain user data in form of S-parameter data.

Notice:

To meet security requirements, the R&S®NRP-Z Series Power Sensors provide a sanitizing procedure that makes sure that user data (or alternatively the complete FLASH memory) will be irretrievably extinguished without removing storage from the instrument. The sanitizing procedure is part of a PC software NRPz-sanitizer, which is available from the R&S® service department.

Performing Service, Calibration and Maintenance on the Power Sensors of the R&S® NRP-Z series

The instrument calibration ensures that measurements are traceable to government standards. Rohde & Schwarz highly recommends that users follow the calibration cycle suggested for their instrument.

Notice:
To keep classified user data in the secure areas while the instrument is in servicing, Rohde & Schwarz recommends sanitizing the internal FLASH memory.

Two levels of sanitization are available:

Level 1: Sanitize the S-paramater data

This procedure will sanitize the S-parameter data set which is essential for power sensors with a built-in attenuator. It can not be recovered by means of firmware update. The sanitizing procedure will save the S-parameter data set to a file on the PC. It is highly recommend that users save this file and restore it after calibration using the R&S® NRP-Toolkit.

Level 2: Sanitize the complete memory of the power sensor

This procedure will sanitize the complete FLASH memory including the parts which are considered as not being a security concern. The power sensor is unusable after this procedure and can only be reactivated by the R&S® service department.

Now the instrument can be taken safely out of the protected area.

Performing Firmware Updates

Rohde & Schwarz highly recommends, but does not require, that the users of its products maintain their products with the latest firmware updates. Updated firmware is provided on the R&S® website.
How does a user perform firmware updates?

The software package R&S® NRP-Toolkit is available which provides driver and libraries for the different sensors on one side, and on the other side the NrpFlashup program which is necessary to transfer new/updated firmware to the sensor.

NrpFlashup processes so called NRP files (*.nrp) which are available from the R&S® website or on the CD.

NrpFlashup makes sure that a firmware, released for another sensor model, is not written on the sensor of the user.

Additional Information

Please contact your Rohde & Schwarz support center for comments and further suggestions, or find the current address on the homepage http://www.customersupport.rohde-schwarz.com.

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