

High-Precision Resistance Transfer Standard



Author Dipl.-Ing. Guido Weckwerth, CEO, wekomm engineering GmbH

wekomm engineering pairs the Vishay Foil Resistors (VFR) VHA518-7 Bulk Metal® Foil resistor with carefully selected components to create a transfer standard product that meets metrology-grade specifications even outside a calibration laboratory.

Industry/Application Area: Electronics development and production

Products Used: VHA518-7 series of hermetically sealed, high-precision Bulk Metal® Foil 4-terminal resistors

The Challenge

To provide the best possible accuracy and reliability for a resistance standard, wekomm engineering required a resistance cell. As the standard would be operating in a wide range of temperatures outside controlled lab conditions, the resistor needed to provide the lowest possible TCR and high immunity to mechanical stresses.

The Solution

Using the Vishay Foil Resistors (VFR) VHA518-7 proved to be the best starting point in developing resistance standards to suit modern industrial needs, where the demand for high accuracy is increasing but the quality of the environmental conditions in which they are taken is not. wekomm engineering paired the VHA518-7 resistor with carefully selected components to form a transfer standard product, which is able to meet metrology-grade specifications even outside a calibration laboratory.



The resistance standard is built completely neutral towards thermal voltages, which is made possible by an intelligent combination of connection methods and materials. Outside the casing, wekomm engineering uses very solid and well-engineered connection posts to make the occurrence of thermal voltages as unlikely as possible. When used with matching low-thermal connection spade lugs, thermal issues are eliminated completely. The standard's massive aluminum case provides guarding and shielding, and is sealed in accordance with IP66 requirements. Powered by VFR and made in Germany, wekomm engineering's resistance standard is the preferred product when reliability, precision, and ruggedness are paramount.

The User Explains

The list of challenges for any standard resistor is short. It needs to maintain its value for a long period — at least a couple of years — and must offer temperature stability so that the resistance value will only change a minimal amount with fluctuations in ambient temperature. The absolute value is not overly critical, as all resistors will be exactly measured and documented with the measured value before shipment

With the VFR team, we were able to define and have manufactured a resistance cell that combines those two requirements. The long-term stability is given through the resistor's very rigid oil-filled case, along with its unique and proven Bulk Metal Foil technology. For achieving the minimum TCR, we use a combination of different foil types in one resistor. As those foils are hand-selected in terms of temperature drift, it is possible to find a combination of foils where the different TCRs will add up to the most minimal amount. In this way, a TCR can be achieved that is well below even the best standard resistors.

Measurements

Our measurements proved that the promised long-term stability of 1 ppm / year can easily be surpassed.



Figure 1: wekomm engineering's 10 Ω and 10 kΩ precision resistance standards pair the VFR VHA518-7 Bulk Metal Foil resistor with carefully selected components to form a transfer standard product housed in a protective aluminum case.



“The VHA518-7 series proved to be the very best foundation for our resistance transfer standards. Together with a carefully crafted case and connections, they helped form a reliable, precise, and cost-effective product made in Germany.”

Acknowledgement:

wekomm engineering GmbH served the electronic development and production market for about 10 years. To strive for quality is an intrinsic goal in the company's daily work, which brings together highly experienced and skilled engineers. Expanding wekomm engineering's product range into the field of metrology is a logical next step in the company's history - www.wekomm.de.

Contact Information

Dipl.-Ing. Guido Weckwerth
CEO, wekomm engineering GmbH
Noackstrasse 1d
82152 Planegg, Germany
Email: info@wekomm.de
URL: www.wekomm.de
Phone: +49 180 5060570

Vishay Precision Group, Inc. (VPG)
Vishay Foil Resistors
foil@vpgsensors.com

[Click here for your regional VFR contact.](#)

