

Static Micro-ohm Resistance Readings for Circuit Breaker Main Contacts

There is a common misconception regarding resistance across the main contacts in the primary current path of power circuit breakers and molded case circuit breakers. The belief is that this resistance is an indicator of the general health of the circuit breaker, specifically its ability to reliably carry current without overheating, or avoid nuisance tripping. While in some cases, high contact resistance may be a symptom of a circuit breaker that has worn or damaged main contacts, the resistance value usually measured by many third-party testing companies is irrelevant, and often misleading in new or nearly new circuit breakers.

By design, Siemens low voltage power and molded case circuit breakers have internal main contacts that are self-cleaning when the circuit breaker operates under load. Particularly for new circuit breakers, but applicable for any circuit breaker that has been left open for a period of time, any contaminants are removed during loaded operations. In order to maintain this functionality in power and molded case circuit breakers it is important that the users of such circuit breakers not attempt to adjust, clean, dress, or polish the main contacts.

Siemens Industry (as well as other manufacturers of low-voltage circuit breakers) does not recommend performing milli-ohm or milli-volt drop tests across circuit breaker contacts because it has been shown that such tests are not a reliable or accurate method of determining the suitability of a given circuit breaker for its intended application.

The resistance of the main current path (including the contacts) in a circuit breaker is variable. Contact resistance, and the measurement of contact resistance is affected by:

- Climate
- Number and magnitude of past interruptions
- Foreign material between the contacts
- Oxidation of contact surfaces
- Assembly tolerances
- Where and how the readings are taken

Static micro-ohm or milli-volt drop readings are highly sensitive to all the previously mentioned criteria — a known and acceptable condition to Siemens and other manufacturers of power circuit breakers.

Contact resistance in the order of magnitude that is measured in the field (20 — 200 micro-ohms), aside from being variable, is negligible both in theory and in practice, as are the phase-to-phase differences frequently measured. The NETA document "Acceptance Testing Specifications" makes an arbitrary statement as to the allowable tolerance of this measurement when no tolerances are stated by the manufacturer. As applied to Siemens circuit breakers, this arbitrary pass/fail criterion has no basis in the practical operational environment of the circuit breaker.

For the reasons above, Siemens Industry neither publishes any tolerances for, nor recommends the testing of static micro-ohm or milli-volt drop across the main contacts of any Siemens low voltage power or molded case circuit breakers.

Siemens WL circuit breakers are qualified to UL 1066 and UL 489, as well as conforming to relevant recognized industry performance standards such as ANSI/IEEE C37.13, C37.16, C37.17, C37.20.1, and IEC 60947-2. The WL circuit breakers also meet all recognized industry testing and qualification requirements, such as ANSI C37.50, UL 489, and IEC 60947-2. Siemens molded case circuit breakers, including the 3VA, VL, Sentron, xGB/xGG and BQD/CQD families, are qualified and listed to UL489.

Siemens Industry does not accept the NETA "Acceptance Testing Specifications" as an accurate means of validating the quality or operational performance of its low voltage power or molded case circuit breakers. Any test report or claim stating that a Siemens circuit breaker is not suitable for its intended application or service on the basis of contact resistance or milli-volt drop, will not be considered acceptable evidence of nonconformity for warranty action by Siemens. Any other conformity issues or conditions will be considered under the Siemens Industry Standard Terms and Conditions of Sale.

**Published by
Siemens 2019**

Siemens Industry, Inc.
5400 Triangle Parkway
Norcross, GA 30092

Subject to change without prior notice

All rights reserved

Order No. CBFL-CRPST-0619

Printed in USA-CP

© 2019 Siemens Industry, Inc.

The technical data presented in this document is based on an actual case or on as-designed parameters, and therefore should not be relied upon for any specific application and does not constitute a performance guarantee for any projects. Actual results are dependent on variable conditions.

Accordingly, Siemens does not make representations, warranties, or assurances as to the accuracy, currency or completeness of the content contained herein. If requested, we will provide specific technical data or specifications with respect to any customer's particular applications. Our company is constantly involved in engineering and development. For that reason, we reserve the right to modify, at any time, the technology and product specifications contained herein.