

Contact Resistance on Air Circuit Breakers – Masterpact NT/NW

Why do we provide the details of contact resistance :

The resistance per pole values which were indicated in the catalogues was provided to help customers determine global power dissipation in switchboards and to assist with the switchboard design.

The values corresponded to measurement tests made on a brand new device straight from the manufacturing plant.

These tests were made in a laboratory under ideal test conditions and with specific manufacturers test methods depending on the nominal rated current of the circuit breaker.

The measured value may in fact increase in time depending on the product storage or operating conditions.

It is commonly known that increased contact resistance is mainly due to contact oxidation.

The oxidation varies in speed depending on the length of the storage time and the climatic conditions and disappears on energising the device without having any adverse effect on the operation or temperature rise.

High pole resistance may also be caused by foreign material between the contacts, eroded contacts, low contact force and loose terminations.

Standard requirements :

There are no specific recommendations or guidelines provided under the standards to make contact resistance measurements.

Note :

The difference between Compact NS/NSX and Masterpact NT/NW is that you can inspect the state of the contacts/arc chutes/chambers during preventive maintenance and make an actual verification of the contact wear. See maintenance guide.

A new circuit breaker :

There **are no** specific recommendations provided by Schneider Electric in the User Manual to make contact resistance measurements on a device during commissioning or prior to energising.

A general check of the circuit breaker takes only a few minutes and avoids any risk of mistakes due to errors or negligence.

A general check must be carried out :

- prior to initial use
- following an extended period during which the circuit breaker is not used.

A circuit breaker in operation :

There **are** specific recommendations provided by Schneider Electric in the Maintenance Guide to make contact resistance measurements on a device during Level IV preventive maintenance.

The Level IV preventative maintenance is recommended every 5 years and is ensured by the Schneider Electric after sales department.

Inspect the circuit breaker following a short-circuit :

There **are no** specific recommendations provided by Schneider Electric in the User Manual to make contact resistance measurements on a device following a short circuit :

- check the arc chutes.
- check the contacts (The contacts and the wear can be checked visually)
- check the tightness of connections.
- check the disconnecting-contact clusters.

Schneider Electric pole resistance measurement procedure for an Air Circuit Breaker :

This specific contact resistance test procedure exists for all Schneider Electric circuit breakers. Using a mohmmeter is not recommended because most of the time the injected current is too small regarding the rating of the circuit breaker.

♦ Purpose :

To assess internal connections and contacts in a circuit breaker. This can be done by conducting a millivolts drop test across the line and load terminal of each pole with the circuit breaker contacts closed.

♦ Equipment :

This test must be conducted using a DC power supply stabilised ($\leq 24\text{DC}$) capable of supplying the rated current of the circuit breaker except for circuit breaker rated higher than 500A, the power supply should be capable of delivering no less than 500A.

♦ Pole resistance measurement :

Manually operate 5 times the circuit breaker to the OFF and then ON position (without current).
Apply test current across one pole for 30min at least.
Record the millivolt drop and calculate the resistance ($R=U / I$).
Three measurements must be carried out per pole.
The circuit breaker must be opened and closed between each measurement.
The average measurement value must be recorded.
Repeat for each pole

♦ Results

The test results will vary according to the breaker frame type, ampere rating.

The resistance value for an air circuit-breaker pole using this method is **purely indicative**.
The low measurement values may result in errors due to the procedure (temperature, contact points, etc.) or other phenomena that are difficult to control (see below).
This method is not a sure indication that the contacts are worn.
A more precise evaluation of the contact wear can be viewed directly by removing the arc chutes.

The reference values are :

<+40%	≥+40%
Contacts are OK.	Major presumption that contacts are not OK. Test check (see comment 1).

Comment 1 : Check for series or parallel connections

Test set-up :

