Perception HPHV automated analysis
Specifications

PERCEPTION HPHV AUTOMATED ANALYSIS

Overview

The testing of HV and MV switchgear devices requires advanced and automated analysis capabilities to generate reproducible and accurate test results. The operator's interaction at this stage of the signal evaluation should be minimal. Real world signals may be distorted, carry noise or spikes, but they still have to be evaluated appropriately and in an automated manner.

SW Conformity

The "PERCEPTION HPHV automated analysis" (High Power/High Voltage) uses the Perception STL Analysis option, which's calculations are designed and implemented according to the STL technical report **"Harmonisation of data processing methods for High Power Laboratories, September 2004"**.

Implementation

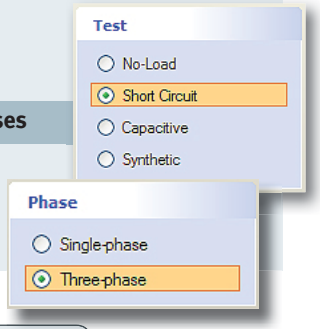
The "PERCEPTION HPHV automated analysis" combines the STL algorithms with built-in intelligence to take decisions which results in an automated signal evaluation. Internally taken decisions are reported to the operator in a status output. The user has control over the type of test and the number of phases. The required input signals are requested depending on the operator's choice and the assigned channels are remembered going forward.

Available tests

- No-Load
- Short circuit
- Capacitive
- Synthetic

Number of phases

- Single-phase
- Three-phase



Test and Phase selections.

Automatically detected type of test (event sequences)

- O (Open)
- C (Close)
- OC (Open-Close)
- CO (Close-Open)
- O-CO (Open-Close-Open)

The search will be performed in the whole recording, so all event sequences will automatically be detected, independent of the timing (for example: O-CO with 0.3s as well as with 15s delay).
The detection algorithm is designed to work on recordings with:

- a single sweep or multiple sweeps
- a single time base or SLOW-FAST sweeps

Required input signals

A number of input signals are required for each type of test:

- Travel (mechanical position of circuit breaker contact)
- ItrOpen (digital Open command or current in tripping coil)
- ItrClose (digital Close command or current in tripping coil)

All other input signals depend on the test duty and the number of phases selected.

No-Load:

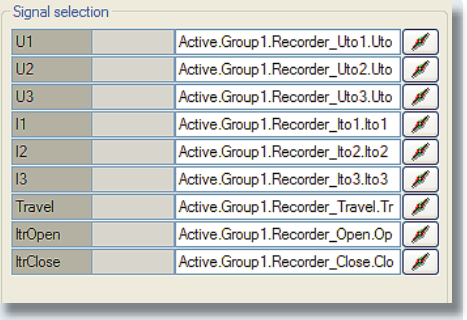
- U_{CS} (voltage of the contact separation)

The voltage of the contact separation is defined as "high" for closed and "low" for open, means it has to be measured as voltage drop over a shunt.
If the voltage of the contact separation is measured as direct voltage across the contacts of the test object, then the signal has to be inverted in the formula database.

Short-Circuit:

- U (voltage across the contacts of the circuit breaker; this includes the sine wave signal at mains frequency plus the TRV signal)
- I (current through the contacts of the circuit breaker)

There is no extra channel required for the TRV signal (transient recovery voltage). The TRV contains much higher frequency components than the mains signal. Perception and GEN DAQ products can either be configured to run the whole test at higher sampling speed with a single time base or with a time base switch based on a trigger (A-B-A time base). The PERCEPTION HPHV automated analysis performs evaluations on both of them without operators interaction required.



Input signal selection short circuit 3 phase.

Capacitive:

- U_{SS} (voltage on the source side)
- U_{ls} (voltage on the load side)
- U_{to} (voltage across the test object)
- I (current through the contacts of the circuit breaker)

Synthetic:

- U_{SS} (voltage on the source side)
- I_{inj} (injected current)
- U (voltage across the contacts of the circuit breaker)
- I (current through the contacts of the circuit breaker)

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Major output results

The major output results are shown on the HPHV sheet for quick overview.

No-Load:

- Type of test (O, C, OC, CO or OCO)
- Opening time, Closing time
- Additional Min. Opening time and Min. Closing time (3 phase)
- Travel (total displacement of contact)
- Overlap (displacement between Action time and contact separation/touch)
- Speed (speed of the contact at contact separation/touch)

The values of the contact separation/touch can manually be stored as a reference and is available for all following other test duties (short circuit, capacitive, synthetic).

Short-Circuit:

- Type of test (O, C, OC, CO or OCO)

For the ***Open event*** are calculated:

- I_{ac} (breaking current, 3 crest RMS before contact separation)
- Additional I_{ac} average (3 phase)
- DC (asymmetry in %)
- U_{rec} (recovery voltage after the TRV, 3 crest RMS)
- Additional U_{rec} average
- Opening time
- Arcing time
- Speed

For the ***Close event*** are calculated:

- I_{mc} (making current, 3 crest RMS after the first absolute peak current)
- U_{app} (applied voltage, 3 crest RMS before contact touch)
- Additional U_{app} average (3 phase)
- Closing time
- Pre Arcing time
- Speed

Capacitive:

- Type of test (O, C, OC, CO or OCO)

For the ***Open event*** are calculated:

- I_{ac} (breaking current, true RMS before contact separation)
- U_{ss} before (true RMS voltage on source side just before contact separation)
- U_{ss} after (true RMS voltage on source side, just after contact separation)
- Opening time
- Arcing time
- Speed

For the ***Close event*** are calculated:

- I_{mc} (making current, true RMS after the contact touch)
- U_{app} (applied voltage, true RMS before contact touch)
- Additional U_{app} average (3 phase)
- Closing time
- Pre Arcing time
- Speed

Synthetic:

- Type of test (O, C, OC, CO or OCO)

For the ***Open event*** are calculated:

- I_{ac} (breaking current, 3 crest RMS before contact separation)
- Additional I_{ac} average (3 phase)
- DC (asymmetry in %)
- U_{rec} (recovery voltage after the TRV, 3 crest RMS)
- Additional U_{rec} average
- Opening time
- Arcing time
- Speed

For the ***Close event*** are calculated:

- I_{mc} (making current, 3 crest RMS after the first absolute peak current)
- U_{app} (applied voltage, 3 crest RMS before contact touch)
- Additional U_{app} average (3 phase)
- Closing time
- Pre Arcing time
- Speed

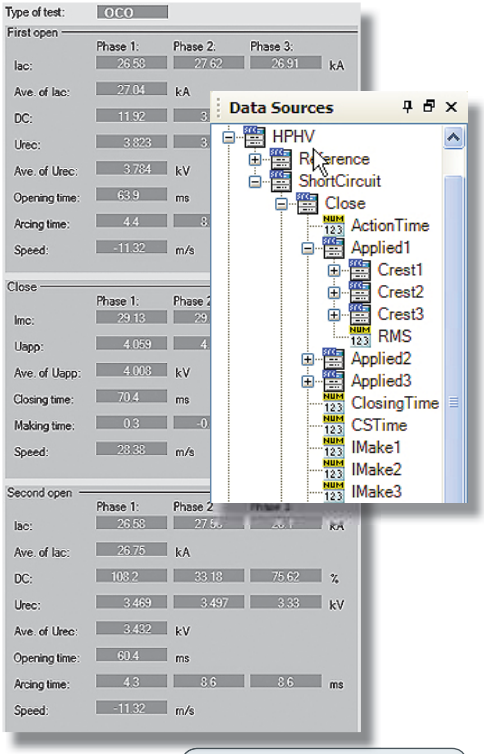
The major output parameters are the same as for short circuit, while internally the injection current is taken into account.

Output results in the Data Sources

The major results are listed in the HPHV sheet for direct users review. All calculated values (displayed major values, internally used parameters as well as optional calculations) are available in the Data Sources of Perception to be reused in the Formula database and the Report generator.

System requirements

The HPHV automated analysis requires Perception 5.0 and the STL option installed.



Major output results of short circuit 3 phase and Output results in the Data Sources.

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HBM Genesis HighSpeed products were previously sold under the Nicolet brand. The **Nicolet** brand is owned by Thermo Fisher Scientific Inc. Corporation.

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