SCOPE

HISAC Ultima

Circuit Breaker Dynamic Test Set

Ultimate solution for testing circuit breakers of all types has arrived...

The Product

HISAC Ultima – new generation Circuit Breaker Dynamic Test Set from SCOPE .... the ultimate solution for testing Circuit Breakers of all types. HIASC Ultima is the most complete analyser for checking the dynamic performance of CBs in live EHV switchyards upto 765kV.

The portable analyzer is based on DIN standard modular and up-gradable 19"configuration having intelligent measuring modules controlled by an external laptop through an Ethernet link.

The Ultima can carry out Dynamic Contact Resistance Measurement on SIX breaks of THREE poles in one operation thereby significantly reducing stress on CB & testing downtime.

It offers flexibility to create pre-programmed Test Plans including all test settings for all types of circuit breakers available in a switchyard, that can simply be recalled at the time of actual testing. This saves you from doing all settings in switchyards.

The Analysis software offers a range of utilities which enables effective Condition Monitoring of CB by comparing present test data with previous signatures and predicting future performance.

HISAC Ultima actually gives you the power to design your own condition based maintenance strategy and obtain optimum breaker performance with minimum maintenance shutdowns

The Measurement

- TESTS all types of CBs - LV, HV, EHV & UHV for all critical performance parameters of all the poles / breaks in a single shot - saves downtime & number of operations during testing.
- MEASURES Main / PIR contact timings, bounce, non-simultaneity of contacts and auxiliary contact timings.
- ANLYSES contact travel characteristics for speed, insertion, contact gap, over-travel and rebound with suitable transducer and mounting fixture.
- RECORDS trip and close coil current characteristics.
- REGISTERS the signature of Dynamic Contact Resistance of main and arcing contacts, of all the 6 breaks simultaneously - helps assessing condition of the contacts without opening the interrupter.
- DISPLAYS settings, graphical and tabulated test results.
- PRINTS test repot in graphical format with test header and calculation footer, on external printer.
- INCORPORATES a powerful and practical Windows™ based Test Manager software to control & operate instrument; view, analyse and handle graphical test data on a laptop at high resolution.
- SELECTS pre-programmed setup parameters and pass/fail limits through software.
- CONNECTS to CB with wear resistant test leads of sufficient length, having quick-fit connectors, suitable for EHV CBs.
- MOVES easily within switchyard as the set can be mounted on a specially designed Trolley having large wheels & mains supply distribution board.
- TRANSPORTS over long distance in rugged industrial aluminium cases.
- OFFERS additional options to measure PIR value and configurable analog channels that can be used for monitoring Station DC, Motor current or other static parameters for enhanced performance assessment of CB.

HISAC Ultima with 6 Channel DCRM mounted on Trolley

Dynamic Contact Resistance Measurement ... DCRM signature

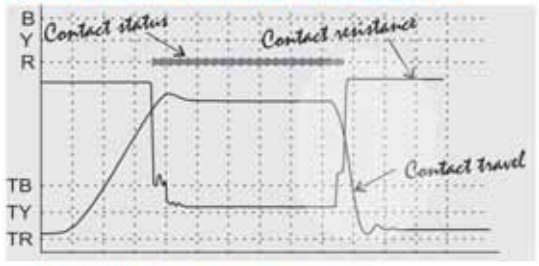
Advent of DCRM had given condition monitoring of CBs a new dimension. It enables user to see what was not visible before.... Condition of main & arcing contacts, without opening the interrupter for physical inspection!

Change in micro-ohm values during C-O operation, as first the arcing & then the main contacts of moving and fixed contacts engage and disengage is plotted against time and a graphical record is obtained. For this DCRM injects 100A DC through contact assembly, reads the voltage drop at high sampling speed during this short time span & relays it to Analyser, which calculates dynamic resistance by doing high speed V/I measurement.

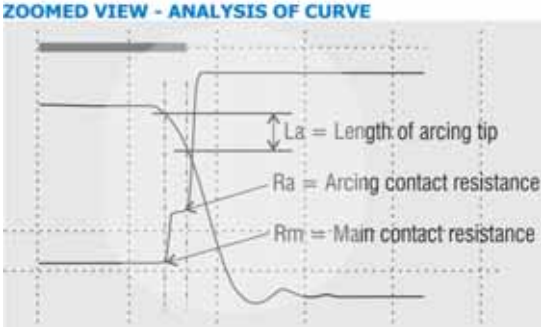
This dynamic micro-ohm signature of the circuit breaker can be used as a periodic inspection parameter for condition monitoring of contacts. Any abnormal jitters or deviation from the standard signature is helpful in identifying between good contact and worn out contact. Any change in the dynamic / frictional characteristics of the whole system, immediately reflects as a change in the dynamic resistance signature. When co-related with travel curve the DCRM curve helps in estimating the wipe of arcing contacts.

Specially engineered test lead set having special Ck clamps ensure correct implementation of classical four wire measurement method and excellent accuracy and repeatability of results.

TYPICAL DYNAMIC RESISTANCE CURVE OF EHV CB

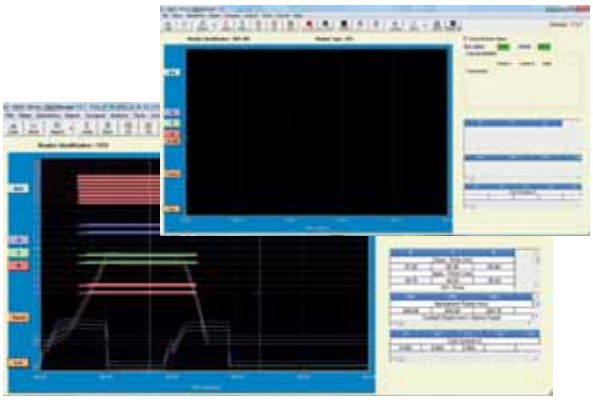


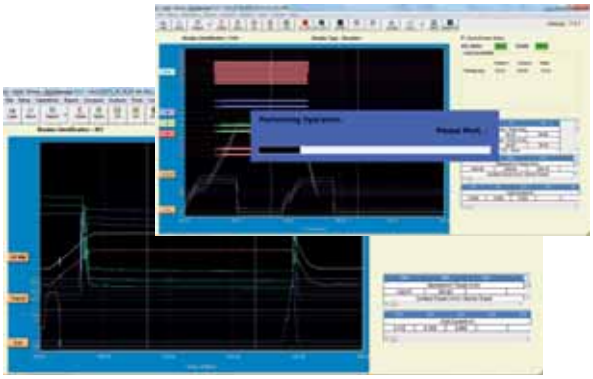
ZOOMED VIEW - ANALYSIS OF CURVE



HISAC Ultima Test Manager Software

- ❑ Controls the operation of HISAC Ultima through laptop
- ❑ Pre-programmable Test Plans facilitate creation of Test Setup library which is very easy to use & time saving during testing.
- ❑ User defined, structured storage of test data for easy future retrieval. Dynamic calculations on graphical information with cursor movement facilitating easy on-screen analysis.
- ❑ Comparison of test results with Manufacturer's test certificate using programmable limit checks.
- ❑ Assessment of present condition & prediction of future performance by multiple signature comparison and Trend Analysis.
- ❑ Comprehensive report generation including graphs and numerical results for all important parameters.
- ❑ Back up & restoration of test data
- ❑ Save graphs as bitmap images for incorporating in user reports
- ❑ Facility to export test report to pdf & excel format.
- ❑ This powerful test manager software really makes condition monitoring & condition based preventive maintenance feasible for the Power Utilities !



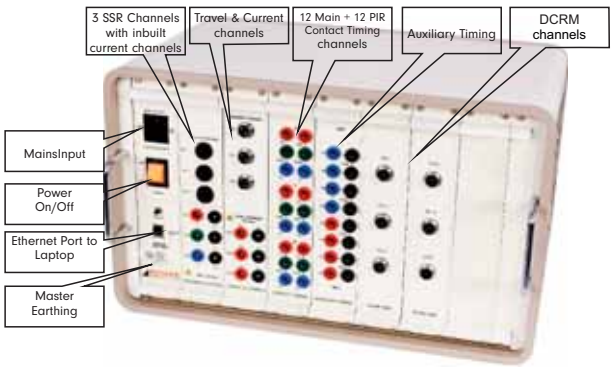


Software Screen short

Standard Configuration of HISAC Ultima Analyser rack consists of following modules

- Base CPU module with Ethernet connection for laptop
- Breaker Control module for Close, Trip1 & Trip2
- Travel & Current module for 3 Travel & 3 Coil Current channels.
- Contact Timing module for Main & PIR contacts – 12 Main + 12 PIR.
- Auxiliary Timing module for 4 dry & 4 wet auxiliary contacts.
- DCRM Link module as per DCRM modules selected (1 for 3 DCRM modules, 2 for 6 DCRM modules).

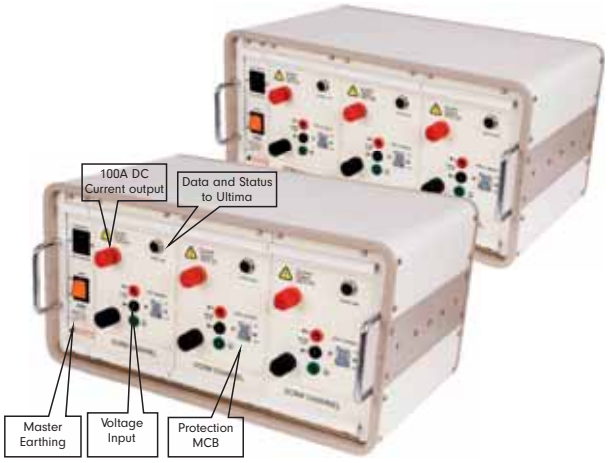
Analyser Rack



Optional Accessories extend the capabilities of the basic instrument making it complete test equipment for testing circuit breakers.

DCRM Modules (Optional)

It captures dynamic variation in contact resistance of main & arcing contacts during breaker operation, as DCRM signature of 3 or 6 breaks simultaneously. Each DCRM rack houses 3 DCRM modules. Each module has in-built, independent, isolated, re-chargeable battery based 100 A DC source. Yet it is highly portable. One DCRM rack having 3 DCRM modules is sufficient for CBs having single break per pole whereas two DCRM racks (having 6 DCRM modules in total) will be needed for CBs having two breaks per pole. Each DCRM modules communicates with DCRM Link module in Analyser rack and passes on data O/S test current, dynamic resistance, battery status etc.It incorporates MCB protection to save battery from accidental short circuits.



3 Channel DCRM Racks

Additional Measurement Modules (Optional)

- Additional optional modules are available to measure PIR value and for monitoring Station DC (Coil voltage), Motor current or other static parameters through configurable Analog channels.
- The Standard configuration of Travel & Current module having 3 Travel & 3 Coil Current channels can be further expanded to have additional 3 Travel & 3 Coil Current channels.
- The Standard configuration of Auxiliary Timing module having 4 dry & 4 wet auxiliary contacts Timing channels can be further expanded to have additional 2 dry & 2 wet auxiliary contact channels.
- The combination of these optional modules should be confirmed with SCOPE before ordering.

Travel Transducers with Mounting Fixtures (Optional)

For evaluating travel characteristics of operating mechanisms, SCOPE offers rotary and linear resistive travel transducers with universal / specially designed fixtures to suit variety of CBs available. More details are given on subsequent pages.

Trolley (Optional)

For easy movement within the substation, safe storage & transportation. Can accommodate one Analyser rack & two DCRM racks.

Travel Transducer with Mounting Fixture (Optional)

In order to evaluate the travel mechanism / contact behavior of circuit breakers, it is necessary to mount the travel transducers at the appropriate point on the operating mechanism of CB. Depending on type of motion to be tapped either a rotary or a linear travel transducer having correct length as dictated by the stroke of circuit breaker is required. To hold this travel transducer rigidly on breaker mechanism suitable mounting fixture is required. This fixture is generally common (universal) for rotary transducers, however it may be custom built for different make / type & travel stroke of breaker mechanisms.

HISAC Ultima with such suitable travel transducer with mounting fixture can record travel graph & measure various travel related parameters like Total Travel, Default & Datum Velocities, Default Travel (Contact Gap / Contact Insertion), Over- travel & Rebound etc. For meaningful analysis of DCRM signature, it is recommended to have travel curve of circuit breaker along with DCRM curve.

SCOPE has rich experience in designing and providing solutions for travel measurement. It offers following options for facilitating this:

Standard Travel Transducer

SCOPE offers linear and rotary transducers manufactured by specialist manufacturers. These are rugged, reliable and suited for recording of circuit breaker travel characteristics. Detailed specifications of these transducers are available on request. Standard transducers are available from 25 to 600 mm linear stroke lengths and 360 degrees rotation, with a conductive plastic resistive element.

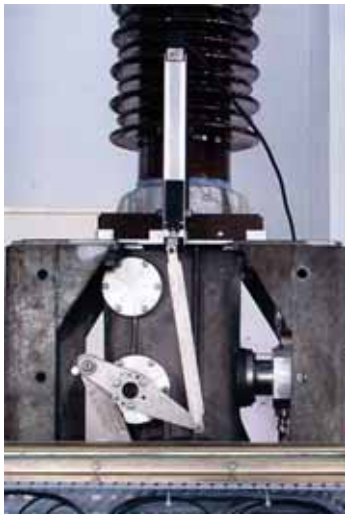
LTF Series Travel Transducer-cum-Fixtures

Sometimes, it is difficult to mount commercially available linear or rotary transducers on the mechanisms of some circuit breakers. This may be due to complicated geometry of the mechanism or due to conditions of special linkages or problems of vibration. SCOPE has studied the construction of some of these and designed and manufactured rugged and reliable transducer-cum-fixtures that make it possible to perform travel measurement on such circuit breakers.

LTH Series Mounting Fixtures for Standard Travel Transducers

SCOPE has designed and standardized fixtures for mounting standard transducers which are commercially available.

SCOPE has capability to design special fixtures for any new CB on request !

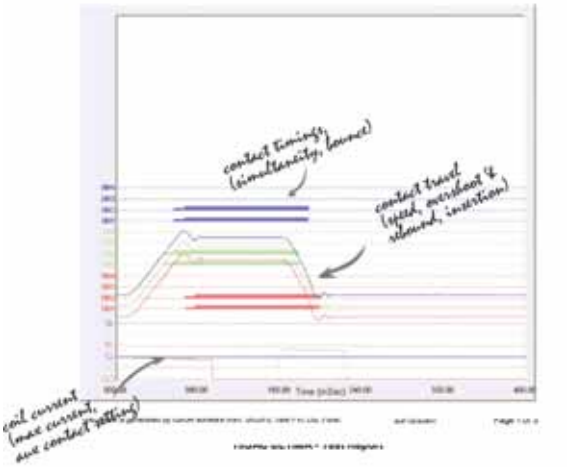


Actual pictures of Transducers mounted with their fixtures

Benefits

Analysis of test results provides inputs to assess and correct:

- settings for contact timings
- closing and opening speeds, over-travel, rebound and contact wipe
- auxiliary contact settings for obtaining specified C-O times
- trip / close release mechanism settings
- DCRM Signature gives information on:
  - Reflects useful information on contact conditions, especially arcing contacts
  - Gives prior indication of deterioration in operating mechanism linkages
  - Certain mechanical weaknesses, undetected by travel measurement, are reflected in DCRM measurement.



SPECIFICATIONS

CHANNELS	CONFIGURATION	RANGE	RESOLUTION	ACCURACY
Contact Timing	24: 4 Main + 4 PIR per pole, on 3 poles simultaneously	Measurement duration 1 mS to 40 Sec at 1 kC, 0.05 mS to 2 Sec at 20 kC	1 mS at 1 kC 0.05 mS at 20 kC	Value ± 0.05% ± 1 digit
Auxiliary Contact Timing	8: 4 dry, 4 wet. Optionally expandable to 12 dry,12 wet	24 to 250 V DC	1 mS at 1 kC 0.05 mS at 20 kC	Value ± 0.05% ± 1 digit
Coil Current	3: Trip / Close Coil current Optionally expandable to 6	1, 2, 5, 10, 25 A DC	0.1% of range at 1 A, 0.004% of range at 25 A	Value ± 0.5% ± 1 digit
Voltage (Travel)	3: Travel characteristics Optionally expandable to 6	0-5 V DC	1.2 mV	Value ± 0.5% ± 1 digit
Optional DCRM	3 or 6: Each for Resistance & Test Current as per configuration ordered	1000, 2000, 4000, 8000 µΩ	0.1 % of selected range	Value ± 2% ± 1 digit
Optional Configurable Analog Inputs	4 or 6: Optional, for conditioned analog signal inputs	0-5V DC	1.2 mV	Value ± 0.5% ± 1 digit
Optional PIR Value	3: Optional, for Pre-Insertion Resistor value measurement	0-5 kΩ	1 Ω	Value ± 5 % ± 1 digit

- Breaker Control : Three solid state contacts rated at 35A, 300V AC/DC for breaker operation (Close, Trip1 & Trip2)
- Trigger Options : Open, Close, C-O, O-C, O-C-O, delay between operations configurable. Command duration is also configurable
- Sampling Speed : 20kC, 10kC, 5kC, 1kC, selectable
- Plot Length : 2Sec at 20kC, 4Sec at 10kC, 8Sec at 5kC and 40Sec at 1kC
- Travel Channels : For linear / rotary resistive transducers. 0-5V DC excitation source in-built
- Test Report : Clear graphical result with test header and computation footer
- Control Through : IBM compatible external laptop
- Communication Port : Ethernet port for communication between laptop and instrument
- Test Leads : Suitable to test EHV Circuit breakers. Leads supplied are of suitable length, thickness, insulation quality & mechanical strength. They have colour coded terminators, quick-fit type rugged clamps & identification labels
- Environment : 0 to 50°C, 95% RH (non-condensing). Electrical interference normally found in charged EHV switch yards upto 765 kV
- Power : 230V AC ± 15%, 50Hz ± 10%, 70VA (for Analyser), 55 VA (per DCRM rack)
- Dimensions : HISAC Ultima Analyser Rack: 500 x 270 x 300 mm, HISAC Ultima DCRM Rack: 500 x 270 x 250 mm (3 modules /enclosure)
- Weight : HISAC Ultima : 12 kg, DCRM : 18 kg (3 channels/enclosure); instrument
- Type Testing : As per IEC 60068 / IS 9000 for Supply Voltage Variation, Dry Heat, Damp Heat, Change of Temperature, Bump, Vibration, Mechanical Shock
- As per IEC 61326 for EMI/EMC & As per IEC 61010-1 for Safety

Ordering Information

Description	Quantity
Standard Accessories	
HISAC Ultima Analyser Rack with Standard Configuration is supplied with following Standard Accessories	
Contact Cables for R1R2,R3R4, Y1Y2, Y3Y4 & B1B2,B3B4 of 15m	6 Nos.
Current Cables for CH1, CH2 and CH3 of 7m	3 Nos.
Travel Cables for TR, TY and TB of 7m	3 Nos.
Breaker Control Cable CLS, TRIP1, TRIP2 of 7m	3 Nos.
Auxiliary DRY Cable A1,A2,A3,A4 of 7m	4 Nos.
Auxiliary WET Cable A5,A6,A7,A8 of 7m	4 Nos.
AC Mains Cord of 3m, Master Earthing Cable of 7m & Ethernet Cable of 1.5m	1 No. Each
Spare Fuses	10 Nos.
Aluminium Carrying Case for Instrument	1 No.
Carrying Case for Test Lead Set	1 No.
HISAC Ultima Test Manager Software on CD	1 No.
Instruction Manual & Test & Calibration Report	1 Set Each
Optional Accessories	
HISAC Ultima DCRM Rack - 3 Channel or 6 Channel as per configuration ordered is supplied with following Standard Accessories. The Accessories mentioned are for 3 Channel DCRM Rack. They will get doubled for 6 Channel DCRM (2 DCRM Racks)	
Calibrated Test Cables for C+, C- & V+, V- , 15m with Ck clamp of 75mm opening	3 Sets
DCRM Link Cable of 1m	3 Nos.
AC Mains Cord of 3m & Master Earthing Cable of 7m	1 No. Each
Spare Fuses	10 Nos.
Aluminium Carrying Case for Instrument	1 No.
Carrying Case for Test Lead Set	1 No.
Test & Calibration Report	1 Set

❑ For both Analyser & DCRM, Test Lead Set with 20 m & 35 m (specially designed for 765 kV CBs) lengths are optionally available.

❑ **Travel Transducers & Fixtures for various types of CBs**
• Standard Linear Travel Transducer, Resistive, 25 to 600 mm travel • Standard Rotary Position Transducer, Resistive, 360° rotation • LTF Series Travel Transducers-cum-Fixtures • LTH/NLTH/NRTF Series Fixtures for Standard Linear or Rotary Transducer
❑ **SCOPE has capability to design special Fixtures for any new CB on request.**
❑ **Configurable Analog Inputs Module – 4 or 6 Channels for Station DC, Motor Current etc.**
❑ **Pre-Insertion Resistor (PIR) Value Measurement Module – 3 Channels**
❑ **Trolley – Suitable for carrying one HISAC Ultima Analyser Rack & two DCRM Racks having large wheels & distribution board**
❑ **Laptop for operating HISAC Ultima, with standard configuration available in market**
❑ **Printer with standard configuration available in market**

Simple solutions for difficult measurements®

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