

Switch Analyzer SA10 & DCM – Dynamic Contact Measuring



Switch Analyzer SA10

SA10

The SA10 unit is designed to be used together with a notebook computer even if some fundamental test can be done stand-alone.

Advantages with the notebook solution are many, versatility, customisability and simplicity. Just carry the notebook computer to your office and set up tests, analyse test results, print test reports etc.

Together with the BTS11 software, a notebook computer and a printer this is the most reliable, capable, accurate and easy to use circuit breaker field test equipment available on the market.

Experienced engineers and service personnel have used the SA10 for many years in some of the worlds toughest environments and it is well established on the world market.

SOME SA10 FEATURES

- » Fully compatible with our factory line test equipment
- » No panel switches, just two push buttons Open and Close
- » Supports both digital and analogue transducers
- » The only field test equipment with a built-in micro ohm measuring function. 200A!
- » Possibility to use the "first trip" analysing method
- » Weighs only 11,6 kg/26 lb
- » Automatic measurement of coil and motor current/voltage

To make sure that flight transport regulations are met, the fuse for the batteries is removed and placed in the accessory box.

Contact inputs

One input measures both the main contact and the preinsertion resistors simultaneously.

Coil inputs

Automatic measurement of coil voltage and coil currents.

Motor and auxiliary inputs

Automatic measurement of motor voltage and motor currents.

Display

Shows contact timing, Coil and Motor voltage/current and Static Resistance values.

Operation buttons

Used to perform tests in stand-alone mode.

Inputs for micro Ohm meter

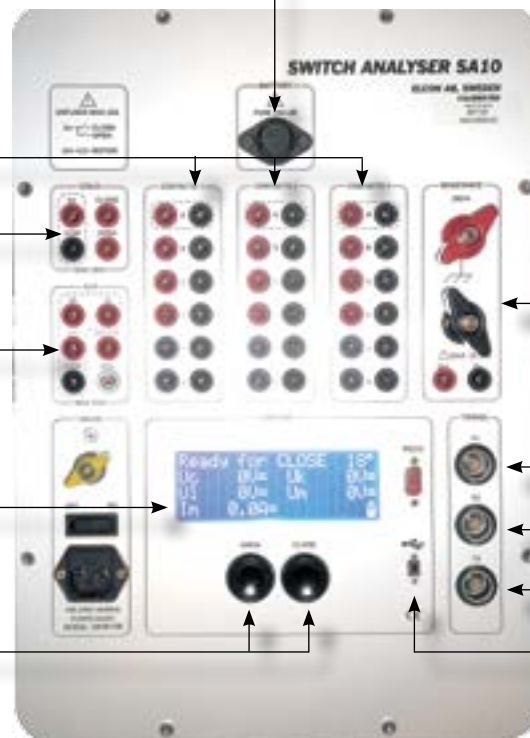
Easy connections using pole screws for this very compact and light micro Ohm meter.

Transducer inputs

Used for analogue and/or digital transducers. Also used for online testing.

PC Communication

Standard serial RS232 and USB communication. Bluetooth option also available.



Plug and play

The panel and the functions of the SA10 are circuit breaker function oriented specially adapted to easily perform your tests on the circuit breaker.



Both side grounded

To ensure the highest possible level of personal safety during testing it is recommended to have the circuit breaker grounded on both sides.

With the accessory DCM it is easy to do all the necessary tests and have the circuit breaker grounded both sides for all tests. Only limitation is for measuring preinsertion contacts, here only one side can be grounded.

Contact Timing

The contact input modules of SA10 supplies 120 VDC at open contacts and 100 mA at closed. The evaluation logic also distinguishes between a possible preinsertion and the main contact in the same operation. It is also possible to measure the value of the preinsertion resistor with a reference shunt. Timing for both the preinsertion and the main contact is guaranteed in any switchyard and at any system voltage.

Each of the 12 channels can measure both the timing of the main and parallel preinsertion resistor contact.

Number of auxiliary contact channels: 6.

(The aux inputs can in environments with low induction also be used as main contact inputs).

Coils and Motor

Automatic measuring of circuit breaker coil and motor current/voltage. Together with an adjustable power unit it is very easy to perform minimum function voltage test on the coils.

The SA10 uses 1 analogue channel to measure coil voltage and current and 1 channel to measure motor voltage and current.

For the coil 35 A AC/DC is possible for continuous measurement, and for the motor 50A AC/DC. However if necessary higher currents will pass for shorter periods.

Switch sync breakers

Upon switching for example capacitor banks and shunt reactors it is common to use a switch-sync relay for the cb. The SA10 allows for full analysis of the point-on-wave switching technology.

Communication

Standard RS232 and USB communication is default. However, in order to comply with safety regulations a bluetooth communication kit is available which allows the user to take his laptop computer and move up to 100 m (328ft) away from the test-object.

Static and dynamic resistance

As the only field test equipment on the market with a built in micro ohm meter it is a complete and versatile unit. It generates 200 ADC and the value is automatically recorded into the system together with your other measurements. In order to view the breaker pole's exact behaviour during an operation the dynamic resistance measurement function offers great diagnostic possibilities.

Motion Measurements

The SA10 supports both analogue and digital transducers. A wide range of transducer fastenings can also be supplied. Elcon International is the official world wide supplier of transducer fastenings for ABB-Breakers.

Number of travel transducer inputs; 3 digital or 3 analogue.

Analog inputs

All in all the SA10 has 11 analog inputs, however since our intention is to provide you with a test equipment that is user friendly and circuit breaker oriented they have been preset to handle specific relevant functions such as coil and motor voltages, currents, analog motion transducers etc.

It is of course possible to set most of the inputs to handle other types of related input signals, such as pressure sensors or temperature sensors or any other type of analogue signal that may be relevant.

First trip or online analysis

In order to fully evaluate the condition of the circuit breaker mechanism, the SA10 provides inputs to test the breaker during an online operation. By doing that you can capture the "First Trip" of a breaker that has been stationary for a long time and by that display how the breaker would perform in an actual fault situation. Both trip and close operations are possible online.

Order information



All kits come complete with system software BTS11 with free upgrades, manuals, main cable, ground cable, communication cable, connection accessories, soft cable bag and free support.

SA10 Kit 1 Advanced D

S002

This SA10 kit includes everything you need to perform standard testing on a circuit breaker including motion with digital transducer.

S001	SA10 unit and Software, Connection accessories kit, Mains cable, Communication cable, Soft cable bag
S108-B	Rotary digital transducer RSI503 2500ppr
S205	Cable for digital transducer
S208-A (x3)	Contact timing cables (T-cables)
S203	Cable for measuring of motor voltage and motor current
S204 (x2)	Cable for measuring of coil voltage and coil current
S207	Static/Dynamic resistance cables
S113	Transporting case

SA10 Unit & Kits

SA10 unit and Software, Connection accessories kit, Mains cable, Communication cable, Earthing cable, USB cable

Includes



Art. no.
S001

SA10 Kit 1 Advanced D, SA10 analyzer built direct in to the transportcase. Includes Software, connection accessories kit, cables.

S113, S203, S204 (x2), S205, S207, S208-A(x3), S108-B



S009

Accessories

FSU 30 Switch Sync analysis and First Trip Kit



S155

Transporting case with wheels



S113

Bluetooth communication

The bluetooth communication kit allows the user to move up 100 meters(328ft) away from the test object and execute operations comfortable and safe



S122

Transducers and fastenings

Digital rotary transducer

This rotary digital transducer allows for very accurate motion testing.
Type RSI503 2500ppr.



Art. no.
S108-B

Analogue linear transducer

TLH225 mm



S110

Fastening kit for AHMA

Use this universal kit to fasten your linear transducer to the breaker.
Comes with a practical carrying case.



S119-17

HPL A/B (ABB)

A variety of designated transducer fastenings for the rotary transducer S108-B can be provided for specific breaker types. This bracket is for HPL A/B.



S119-1

BLG 102, 352 (ABB)

A variety of designated transducer fastenings for the rotary transducer S108-B can be provided for specific breaker types. This bracket is for a BLG 102 or 356 mechanism.



S119-6

Universal transducer fastening kit

Use this universal kit to fasten your linear or rotary transducer to the breaker. Can also be used for other various type of breakers. Comes with a practical carrying case.



S120

POB 35 AD

Power supply for coils and motor. Generates up to 30A. Weights only 8 kg.



S131

DCR30 DC Reducer

Voltage reducer is used to perform minimum DC voltage test of the close and trip coils for the mechanism of the Circuit breakers.



S149-DCR

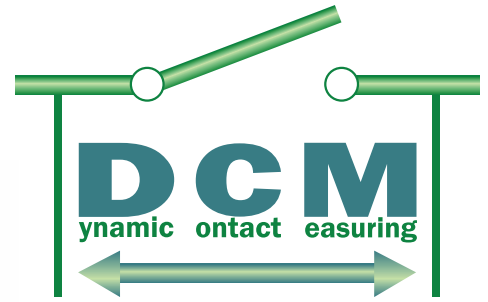
PIR 470

For measurement of the value of the preinsertion resistors.



S128

Order information



All kits come complete with system software BTS11 with free upgrades, manuals, main cable, communication cable, connection accessories, soft cable bag and free support.

DCM

S160

Weight 32 Kg / 70.5 lb

S161		Dynamic Contact Monitoring DCM-CU
S162	3 pcs	DCM Measuring unit DCM2
S163	5 pcs	Communication cable for DCM 10m
S113		Transporting Case with wheels
S170	3 pcs	- Current sense cable for DCM 0,5m
S171	6 pcs	+Current sense cable for DCM 3m
S172	3 pcs	Hanging bag for DCM2
S201		Mains cable 2m
S202		RS232 Communication Cable
S202-F		Bluetooth 2.1 USB Adapt
S114		Soft Cable Bag

System software BTS11

Test program BTS11

For complete testing of the circuit breakers, the analyzing software BTS11 is used. The software is free and delivered together with the SA10. This software is used for Elcons field test equipments as well as factory end test equipments. Data between the two different systems can easily be imported/exported. All updates are free and are distributed from our webpage.

To test circuit breakers in general, is to operate the breaker and check the contact timing. However in factory testing and at field service some other tests are necessary. For field testing these other tests can also be very useful in diagnostics purpose.

Common operation tests, can be done, with result timing diagrams for up to three phases each with one travel curve, up to twelve contact curves and a common coil current curve. All common tests are performed and evaluated according to established industrial standard. A new test, mainly for field diagnostic, is to take dynamic resistance test curves of an operating main contact. A spring tension motor test, with current timing diagram is also included.

One of the main intentions with our software is to allow any level of user to be able to test the circuit breaker. This is done by creating a database of your breaker types and allowing the user to just choose his breaker from that database and by doing that everything (test plan, test reports, parameters etc.) is automatically adjusted to comply with that test. Let's keep it simple.

SOME BTS11 FEATURES

- » Simple operating control function for all possible tests
- » Quick test. No settings needed.
- » Possibility to perform automatic test sequences
- » Test guides for new tests and test objects
- » Curve analyzing window with many possibilities and tools
- » Data analyzing function with limit supervision and possibilities to do comparison with a previous test. (Reference characteristics IEC62271-100).
- » Possibility to customize any operation in order to adapt the software to any type of breaker
- » Statistics analyzing
- » SQL or Access database with several users and user-levels
- » Import and export test data
- » Automatic unit conversion, (ex: kg to lb or mm to inches)
- » Test against function values (measurement limits)
- » Easily set up your own test profile
- » Attach pictures or reference documents to assist the user

ECC - Elcon Competence Center

ECC offers different levels of software and hardware training. We believe in true hands-on experience, much better than any manuals. Students perform actual testing under instructor supervision. Choose between different levels, Basic or Advanced. ECC offers the training in our facility in Sweden. Customer can also choose ECC FLEX, means that we send our instructor to you; also the program can be more adapted to your special testing needs. Please contact us for more information and a quote.

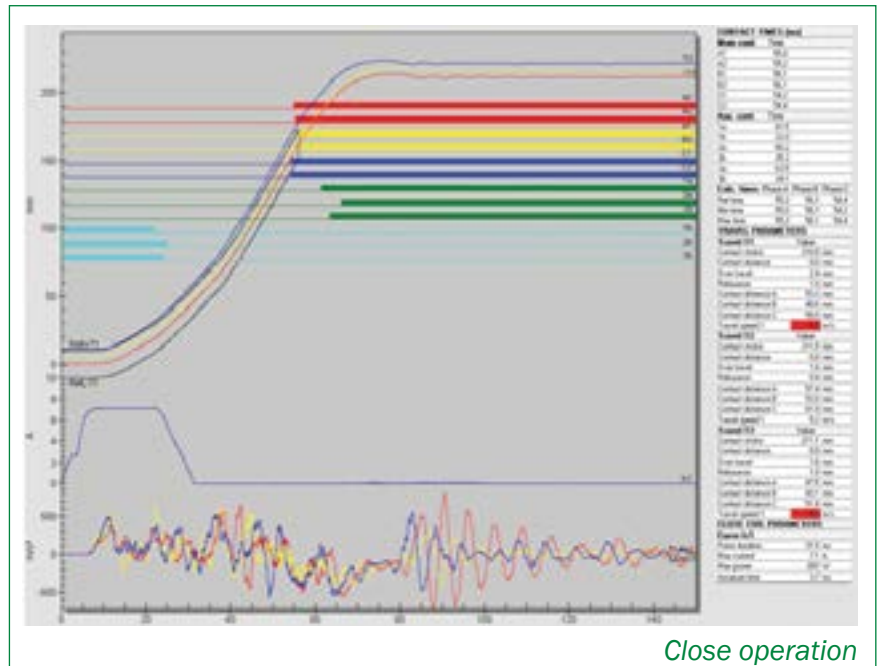
“Who stops to learn stops to live”

Henry Ford



Example of operations

- » Close
- » Open
- » O-C, C-O, O-C-O
- » Any combination of O and C
- » Min function coil voltage
- » Spring charge(motor current)
- » Slip coupling
- » Damping curve
- » Static resistance
- » Dynamic resistance
- » Test of Disconnectors
- » Pre-insertion resistors
- » User customized operations (ex: for long mid-voltage CB sequences)

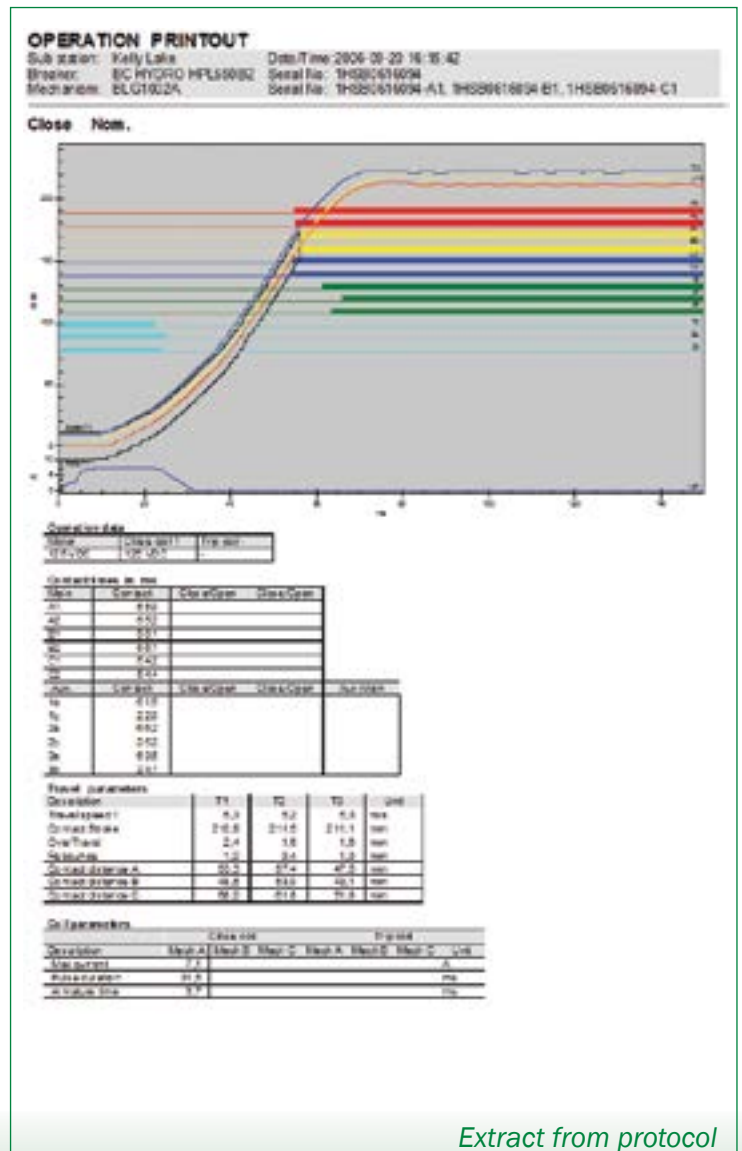


Other testing possibilities and features

- » Up to three mechanisms with up to 12 contact elements per phase
- » Set up your own test sequence
- » Define the trig conditions. Contact, coil, travel or analogue trig
- » Choose sampling rate. Up to 50 kHz
- » Up to three analogue and/or digital transducers used simultaneously
- » Complete curve customizability. Colour, visibility, filled or regular, scale etc
- » Easy functions/guides for calibration
- » Speed and acceleration curves
- » Define any number of Speed, Distance or Time measurements
- » First trip analysis
- » Switch sync relay testing

Test reports

- » Create your own test report templates using the dynamics that MS word provides. Multi lingual
- » Extensive protocol functions to meet any customers demands
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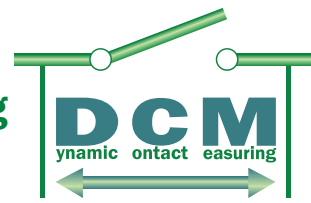
HARDWARE SPECIFICATION SA10 UNIT

Number of main contact timing channels:	12 + 12 preinsertion resistor	Number transducer inputs:	6
Closed contact current with internal source:	100 mA	Digital input receiver type:	RS422
Preinsertion resistance range (standard version):	50 – 5000 ohm	Analogue input measuring range:	0 – 5 V
Current disturbance immunity (standard version):	±10 mApk	Analogue input impedance:	200 kohm 30pF
Number of auxiliary contact timing channels:	6	Analogue transducer minimum resistance:	100 ohm
Closed aux. contact current with internal source:	1 mA	Power supply, both:	5 V, 100 mA
External source contact voltage:	+15 - +400 VDC	Input connectors, transducer channels:	LEMO Series 2K, 8 p
Reaction time, any timing channel:	< 20 microsek	Protection level any transducer input:	2
Input connectors, any timing channel:	Touch-protected jacks		
Protection level, any timing channel:	3		
		Number of aux inputs (Uk, Ui, Um, COM):	3
Operating coil source inputs (Uc, COM):	1	Input voltage measure range DC:	0 – 300 V ±1% or ±1 V
Source voltage measuring range DC:	0 – 300 V ±1% or ±1 V	Input voltage measure range AC:	0 – 300 V ±2% or ±2 V
Source voltage measuring range AC:	0 – 300 V ±2% or ±2 V	Input impedance:	1 Mohm 30pF
Number of operating coil outputs (OPEN, CLOSE):	2	Number of outputs (MOTOR supplied from Um):	1
Coil current measure range DC:	0 – 30 A ±1% or ±0,1 A	Motor current measure range DC:	0 – 50 A ±1% or ±0,1 A
Coil current measure range AC:	0 – 30 A ±2% or ±0,2 A	Motor current measure range AC:	0 – 50 A ±2% or ±0,2 A
Coil trig reaction time:	< 20 micsek	Input conns, coil and auxiliary inputs/outputs:	Touch-protected jacks
Internal current limit:	35 A	Prot level coil and auxiliary inputs/outputs:	3
		Serial communication interface type:	RS232 and USB connection
		Serial communication baud rate:	115 kbps
Number of contact resistance meas inputs:	1	Serial communication connector type:	9 pole female D-sub
Resistance measure range:	0 – 1000 microOhm	Protection level serial communication :	2
Resistance measure accuracy:	± 2 microOhm		
Resistance measure current:	200 A	Power supply input AC voltage:	85 – 265 V, 50 – 60 Hz
Current generator source capacity:	≥ 4 V	Power supply input DC voltage:	100 – 375 V
Resistance measuring input connector:	Touch-protected jacks	Power requirement:	< 50 VA
Current generator output connector:	High current pole terminals	Main fuse:	2 At
Protection level resistance measuring inputs 1):	2	Internal battery (lead accumulator):	12 V, 6 Ah
Protection level current generator outputs:	1	Battery fuse:	25A
		Input connector type:	IEC320
Protection level 1 (external connections and case)		Protection level power input pins:	3
ESD resistance:	IEC 1000-4-2 L4		
Radiated electromagn. field res. (27-1000 MHz):	IEC 1000-4-3 L3	Internal sampling rate(adjustable):	10Hz - 50 kHz
Burst resistance:	IEC 1000-4-4	Max sampling time example 1:	at 100Hz 211Sek
Pulse resistance:	IEC 1000-4-5	Sampling time example 2:	at 50kHz 400ms
		Ambient operating temperature range:	-20° - +50° C
Protection level 2 (full isolation)		Ambient storage temperature range:	-40° - +70° C
Protection according to:	level 1	Ambient relative humidity (non-condensing):	0% - 97%
Allowed between contact point(s) and earth:	≤±400 VDC, 285 VAC		
		Dimensions:	458x331x153 mm (18"x13"x6")
Protection level 3 (full isolation, full protection)		Weight:	11,7 kg
Protection according to:	level 2		
Allowed between any ind. level 3 contact point:	≤ ±400 VDC, 285 VAC		

Acknowledgements: SA10 fulfils the European conformity requirements in (Electromagnetic Compatibility) EMC Directive 89/336/EEG, 92/31/EEG & the Low Voltage Directive 73/23/EEG and 93/68/EEG including amendments by the CE-marking Directive 93/68/EEG, and is CE-marked. SA10 is today the only field test equipment in the market, that can perform circuit breaker analysis accepted by ABB Switchgear.

Warranty: Two years

The fast and safe way of testing your HV Circuit breakers using



With the new tool for the Elcon products Switch Analyzers SA10 and SA5, the DCM (Dynamic Contact Measurement), will it be possible to do all the tests and analyzes you are used too, but faster and even both side grounded.

The SA10 itself can only measure dynamic contact on one contact a time, but with the new DCM tool it is possible to measure at the same time up to 2 contacts in series for each phase, total 6 contacts at the same time. Or a single phase operated CB with up to six contacts in series.



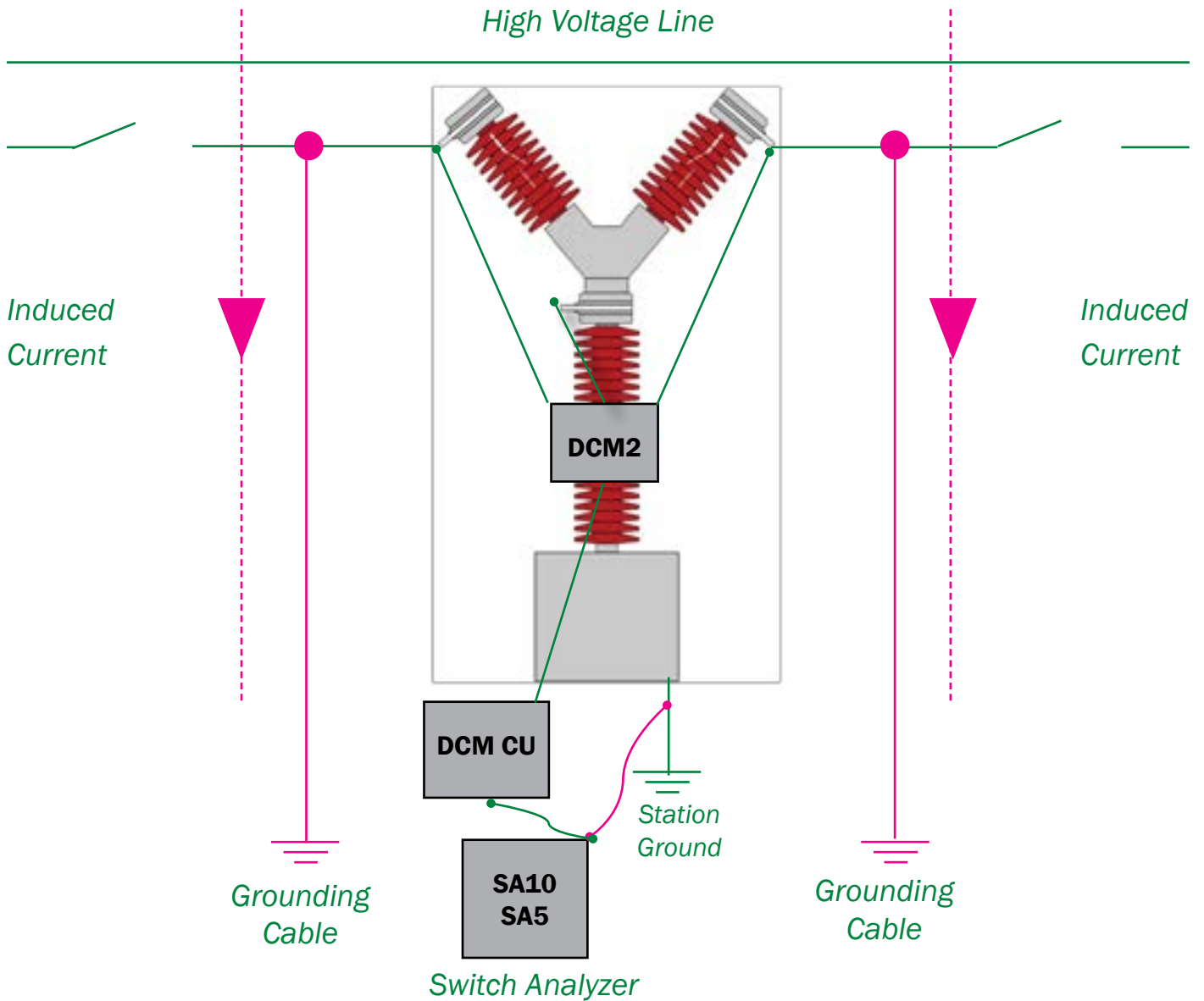
You can perform tests with both sides of the circuit breaker grounded and you don't need to rewire between the single tests. This is a great safety advantage for the maintenance personal, since they do not need to go up and done so many times to do rewiring. The personal will not so often be exposed to danger, like live bus bars or induction.

One close and open operation will give you all the information you need to do the analyze in the BTS11 software, such as;

- » Operation time
- » Coil current
- » Coil voltage
- » Travel
- » Speed
- » Damping
- » Static and Dynamic resistance
- » And much more.....

**Upgrade your existing SA10
or SA5 to the future of circuit
breaker testing!**





DCM Analyze Both side grounded and isolated



Connection example

The DCM Kit consists of one DCM-CU-unit and, three DCM-2-units, and all necessary cables and connector's in a transport case.

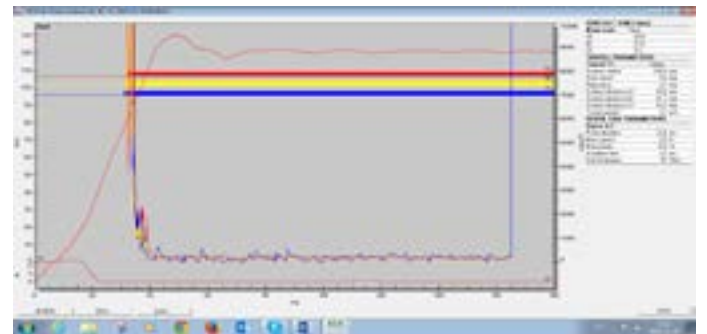
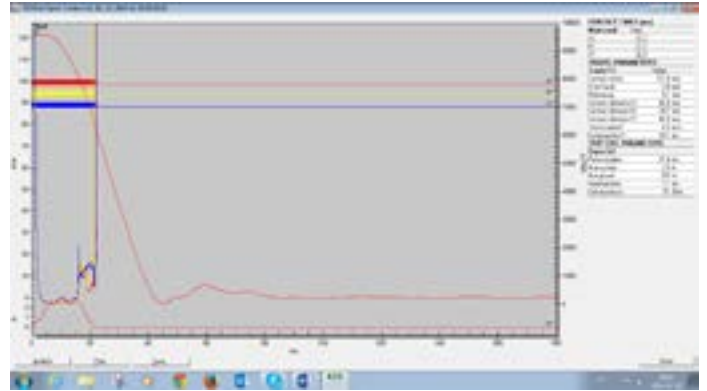
DCM-CU-unit is connected to the SA10 or SA5 wireless or

with a communication cable.

DCM-2-units are hooked up at each phase close to the contact chambers, and the measuring cables from the DCM-2-units are connected to the CB.

Example of operations done with the DCM tool

- » Close
- » Open
- » C-O
- » Min function coil voltage
- » Spring charge(motor current)
- » Slip coupling
- » Damping curve
- » Static resistance
- » Dynamic resistance



Other testing possibilities and features

- » Define the trig conditions. Contact, coil, travel or analogue trig
- » Choose sampling rate. Up to 50 kHz
- » Up to three analogue and/or digital transducers used simultaneously
- » Complete curve customizability. Colour, visibility, filled or regular, scale etc
- » Easy functions/guides for calibration
- » Speed and acceleration curves
- » Define any number of Speed, Distance or Time measurements



Test reports

- » Create your own test report templates using the dynamics that MS word provides. Multi lingual
- » Extensive protocol functions to meet any customers demands
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DCM CU TECHNICAL SPECIFICATION



Power supply	Quantity	1
	Marked	"Input"
	Connector type	IEC 950 entry module
	Fuses	2*1.5A slow
	Voltage range	100 - 240VAC, 50/60 Hz, Max70W
Control output	Quantity	3
	Marked	"DCM UNIT 1","DCM UNIT 2","DCM UNIT 3"
	Connector type	M12, 8 pole Female
	Standard	IEC 61076-2-101
	Output voltage	18-24VDC
	Max output current	2.5A
	Communication	RS485, baud rate 921.6 K Baud
Trig signal	5-24VDC	
Communication PC	Quantity	1
	Marked	"RS232 TO COMPUTER"
	Connector type	9-pole D-sub, female
	Communication type	RS232, baud rate 115.2 K Baud
Communication SA	Isolation	1000 V DC
	Quantity	1
	Marked	"RS-232 TO SWITCH ANALYZER"
	Connector type:	9-pole D-sub, male
Communication Network	Communication type:	RS232, baud rate 115.2 K Baud
	Isolation:	1000 V DC
	Quantity	1
	Marked	"ETHERNET"
Communication Bluetooth	Connector type:	RJ45
	Communication type:	ETHERNET 100 Mb/s
	Quantity	1
	Marked	"BLUETOOTH"
	Connector type	BLUETOOTH ANTENNA SMA MALE
	Communication type	Serial communication via Bluetooth ® version 2.1
	Communication protocols	Support for version 2.1 + Enhanced Data Rate (EDR)
	Scope	Backward compliant with Bluetooth version 2.0, 1.2, 1.1
	Baud rate	< 100 meters (Line of sight)
	Data size	115.2 K baud
Parity	8-bit	
Stop bits	None	
Flow control	1	
Environment	Dimensions	None
	Weight	165*50*175 (With*Height*Depth)
	Operating temperature	about 1.2 kg
	Storing temperature	-20 - 40 °C
	Relative humidity	-20 - 70 °C
	Altitude operating	20 - 85% non-condensing
	Altitude non-operating	< 2 000 m
		< 12 000 m

DCM 2 TECHNICAL SPECIFICATION

Control input	Quantity Marked Connector type Standard Charge voltage Max charge current: Communication Trig signal:	1 "CONNECT TO CONTROL UNIT" M12, 8 pole Male IEC 61076-2-101 18-24VDC 2.5A RS485, baud rate 921.6 K Baud 5-24VDC
Current output	Quantity Marked Connector type Output Current pulse time: Current limitation:	2 + 1 Return "+ CURRENT 1", "+ CURRENT 2", "- CURRENT 1, 2" High current sockets with locking, nom 100A type: ID/B6AR-N-S (Manufacturer: Multi Contact) 0-1.6VDC, 0-225A (Depends of cable resistance) max 200ms By cable resistance.
Voltage Sense Input	Quantity Marked Connector type Measurement range 1 Analog resolution 1 Measurement range 2 Analog resolution 2	2 + 2 Reference "+ SENSE 1", "+ SENSE 2", "- SENSE 1", "- SENSE 2" Isolated banana socket $\pm 0.15\text{VDC}$ 14 bits Resolution about 0,0000185 V DC / Bit $\pm 1.5\text{VDC}$ 14 bits Resolution about 0,000185 V DC / Bit
Measuring resistance	Range1 Measurement range 1 Measurement range 2 Sample rate	$\leq 750 \mu\Omega \pm 1 \mu\Omega @ 200\text{A}$ $\leq 1.5 \text{ m}\Omega \pm 10 \mu\Omega @ 200\text{A}$ $\leq 5.0 \text{ m}\Omega \pm 10 \mu\Omega @ < 200\text{A}$ 50KHz
Environment	Dimensions Weight Operating temperature Storing temperature Relative humidity Altitude operating Altitude non-operating	165*50*175 (With*Height*Depth) about 1.6 kg -20 - 40 °C -20 - 70 °C 20 - 85% non-condensing < 2 000 m < 12 000 m



Contact

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