

# **SWITCH ANALYZER SA10**



**[www.elcon.se](http://www.elcon.se)**

# 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:

- Built in a small metal carrying case.
- 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.

### 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.

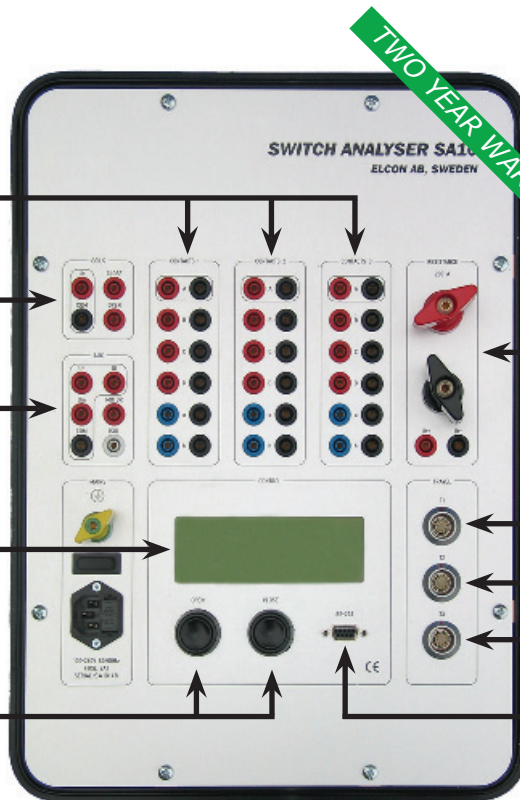
Automatic measurement of motor voltage and motor currents.

### 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 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.

### 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.

Number of main contact timing channels: **12(x2)**

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, shunt reactors and power transformers 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.

Standards RS232 communication is default. However, in order to comply with safety regulations a blue-tooth communication kit is available which allows the user to take his laptop computer and move up to 100m(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 behavior 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 digital transducer inputs: **3**

Number of analogue transducer inputs: **3**

### 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



## SA10 Kit 1 Advanced D.




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-A** Rotary digital transducer RSI503 2500ppr.
- S205** Cable for digital transducer.
- S208(x4)** Contact timing cables.
- S203** Cable for measuring of motor voltage and motor current.
- S204** Cable for measuring of coil voltage and coil current.
- S207** Static/Dynamic resistance cables.
- S113** Transporting case.

## S002

SA10 Unit & Kits	Includes	Art No.
SA10 unit		<b>S001</b>
		
SA10 Kit 1 Advanced D	S113, S203, S204, S205, S207, S208(x4), S108-A.	<b>S002</b>
SA10 Kit 1 Advanced A	S113, S203, S204, S206, S207, S208(x4), S	<b>S003</b>
		

All kits come complete with System software BTS11 with free upgrades, Manuals, Mains cable, Ground cable, communication cable, connection accessories, Soft cable bag and free support.

Accessories.		
Accessories kit	S102(x4), S104(x4)	<b>S107</b>
		
Jumper cable		<b>S104</b>
		
Connection clips		<b>S102</b>
		

Visit our webpage [www.elcon.se](http://www.elcon.se) for complete product range, or contact your local reseller:

"I enjoy working with the SA10 and matched up with any previous test equipment that I have used, this is by far the best I've used and I was fortunate to work with it."  
 (Gunnar Klinga, Chief engineer. HICO America(Hoysung Corp).

"Personally, having a background with the SA10, I have requested that our company purchase several units. This is due to the fact that I have never operated any other unit with the precision & versatility that the SA10 has."  
 (Dean Richards, Protection and Control manager. Tenix Alliance, Australia)

### Accessories.

**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



**Art No.**

**S122**

**Thermal printer.**  
 Used to print out test results without PC.

**S121**

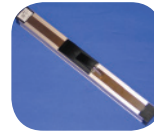
### Transducers and fastenings.

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



**S108-A**

**Analogue linear transducer.**  
 TLH225 mm



**S110**

**Universal fastening kit.**  
 Use this universal kit to fasten your linear or rotary transducer to the breaker. Comes with a practical carrying case.



**S118**

**HPL/LTB Kit.**  
 Complete your transducer fastening kit with this specially developed set for all HPL and LTB breakers. Can also be used for other various type of breakers.



**S118-D**

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



**S119-1**

### Cables.

**Mains cable.**  
**Communication cable (RS232).**  
**Cable for motor supply and measurement.**  
**Cable for trip and close coils.**  
**Grounding cable**

**Art No.**

**S201**  
**S202**  
**S203**  
**S204**  
**S210**

### Cables.

**Cable for digital transducer.**  
**Cable for Analogue transd.**  
**Cable for Static/dynamic resistance measurement.**  
**Contact timing cable**

**Art No.**

**S205**  
**S206**  
**S207**  
**S208**

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# 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 Elcon 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.

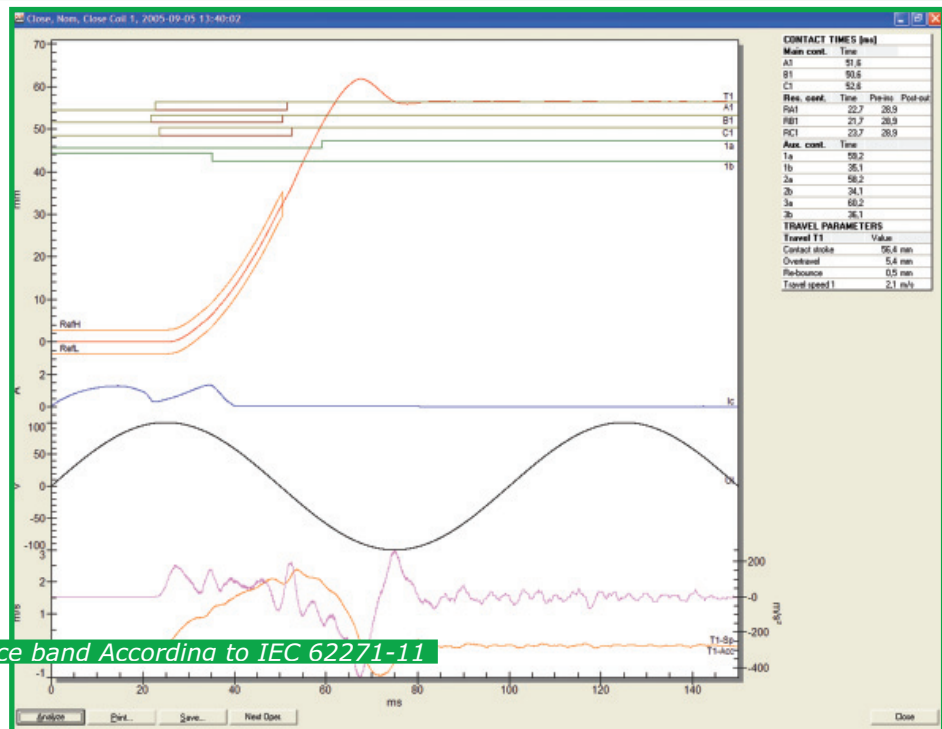
One of the main intensions with our software is to allow any level of user to be able to test the circuit breaker. This is done by creating a database of your breaker types and allowing the user to just choose his breaker from that database and by doing that everything(test plan, test reports, parameters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

## **Some BTS11 features:**

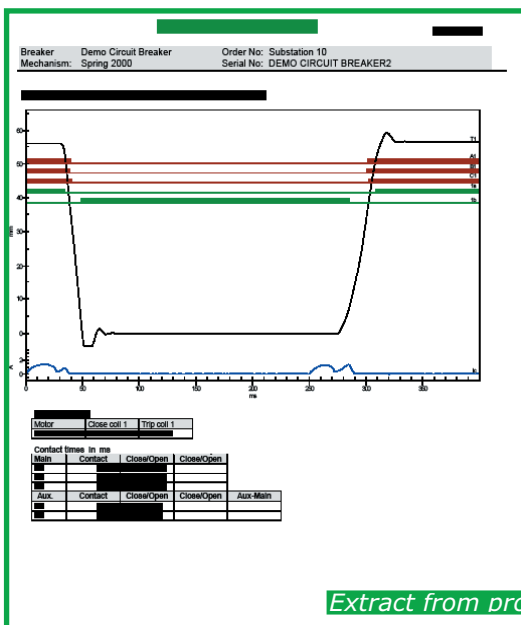
- **Simple operating control function for all possible tests.**
- **Quick test. No settings needed.**
- **Possibility to perform automatic test sequences.**
- **Test guides for new tests and test objects.**  
**Curve analyzing window with many possibilities and tools.**
- **Data analyzing function with 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.**

## 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)



Close Operation ex. with reference band According to IEC 62271-11



Extract from protocol

## 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.
- Digital signing options.
- Automatic compressing and preparing protocols for email or web-publishing.
- Built in pdf support.

# SWITCH ANALYZER SA10

## Hardware specification SA10 unit

Number of main contact timing channels:	12(x2)	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		
Operating coil source inputs (Uc, COM):	1	Number of aux inputs (Uk, Ul, Um, COM):	3
Source voltage measuring range DC:	0 – 300 V ±1% or ±1 V	Input voltage measure range DC:	0 – 300 V ±1% or ±1 V
Source voltage measuring range AC:	0 – 300 V ±2% or ±2 V	Input voltage measure range AC:	0 – 300 V ±2% or ±2 V
Number of operating coil outputs (OPEN, CLOSE):	2	Input impedance:	1 Mohm 30pF
Coil current measure range DC:	0 – 30 A ±1% or ±0,1 A	Number of outputs (MOTOR supplied from Um):	1
Coil current measure range AC:	0 – 30 A ±2% or ±0,2 A	Motor current measure range DC:	0 – 50 A ±1% or ±0,1 A
Coil trig reaction time:	< 20 micrsek	Motor current measure range AC:	0 – 50 A ±2% or ±0,2 A
Internal current limit:	35 A	Input conns, coil and auxiliary inputs/outputs:	Touch-protected jacks
		Prot level coil and auxiliary inputs/outputs:	3
Number of contact resistance meas inputs:	1	Serial communication interface type:	RS232
Resistance measure range:	0 – 1000 microOhm		
Resistance measure accuracy:	± 2 microOhm	Serial communication baud rate:	115 kbps
Resistance measure current:	200 A	Serial communication connector type:	9 pole female D-sub
Current generator source capacity:	≥ 4 V	Protection level serial communication :	2
Resistance measuring input connector:	Touch-protected jacks		
Current generator output connector:	High current pole terminals	Power supply input AC voltage:	85 – 265 V, 50 – 60 Hz
Protection level resistance measuring inputs 1):	2	Power supply input DC voltage:	100 – 375 V
Protection level current generator outputs:	1	Power requirement:	< 50 VA
		Main fuse:	2 At
		Internal battery (lead accumulator):	12 V, 6 Ah
		Input connector type:	IEC320
		Protection level power input pins:	3
Protection level 1 (external connections and case)		Internal sampling rate(adjustable):	10Hz - 50 kHz
ESD resistance:	IEC 1000-4-2 L4	Max sampling time example 1:	at 100Hz 211Sek
Radiated electromagn. field res. (27-1000 MHz):	IEC 1000-4-3 L3	Sampling time example 2:	at 50kHz 400ms
Burst resistance:	IEC 1000-4-4		
Pulse resistance:	IEC 1000-4-5		
		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

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***“Your No.1 Partner in Breaker Test Equipment”***

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