Switch Analyzer SA10

ELCON INTERNATIONAL

No. 1 in testing your breakers

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 enginneers 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 analougue transducers
- The only field test equipment with a built-in micro ohm measuring function. 200A!
- Possibillity to use the “first trip” analysing method
- Weighs only 11,6 kg/26 lb
- Automatic measurement of coil and motor current/ voltage

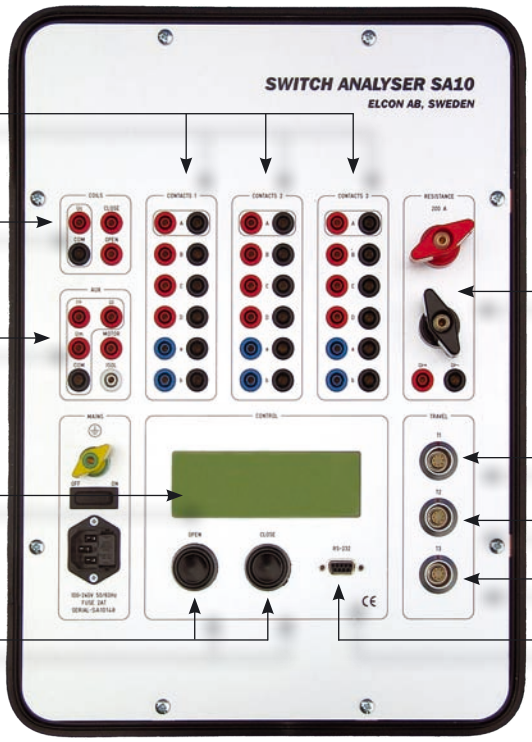
Contact inputs
One input measures both the main contact and the preinsertion resistors simultaneously.

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.

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

Standars RS232 comunication is default. However, in order to comply with safety regulations a bluetooth comunication 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 autmatically recorded into the system together with your other measurents. 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 digital transducer inputs: 3.
Number of analogue transducer inputs: 3.

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 guarantied 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 enviroments 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 continous measurement, and for the motor 50A AC/DC. However if necessary higher currents will pass for shorter periods.

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 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
S210	Earthing cable

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 Unit & Kits	Includes		Art. no.
SA10 unit and Software, Connection accessories kit, Mains cable, Communication cable			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, S210		S009

Accessories

FSU 30 Switch Sync Analysis Switch Syncronisation kit		S155
Transporting case with wheels		S113
Bluetooth communication The bluetooth comunication kit allows the user to move up 100 meters(328ft) away from the test object and excecute operations comfortable and safe		S122

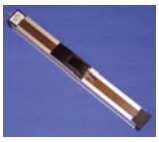
Transducers and fastenings

Art. no.

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

S108-B

Analogue linear transducer
TLH225 mm



S110

Universal transducer fastening kit
Use this universalkit 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.

S118

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

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

S141

VR10
Voltage reducer is used to perform minimum DC voltage test of the close and trip coils for the mechanism of the Circuit breakers.

S149

PIR 470
For measurement of the value of the preinsertion resistors.

S128

System software BTS11

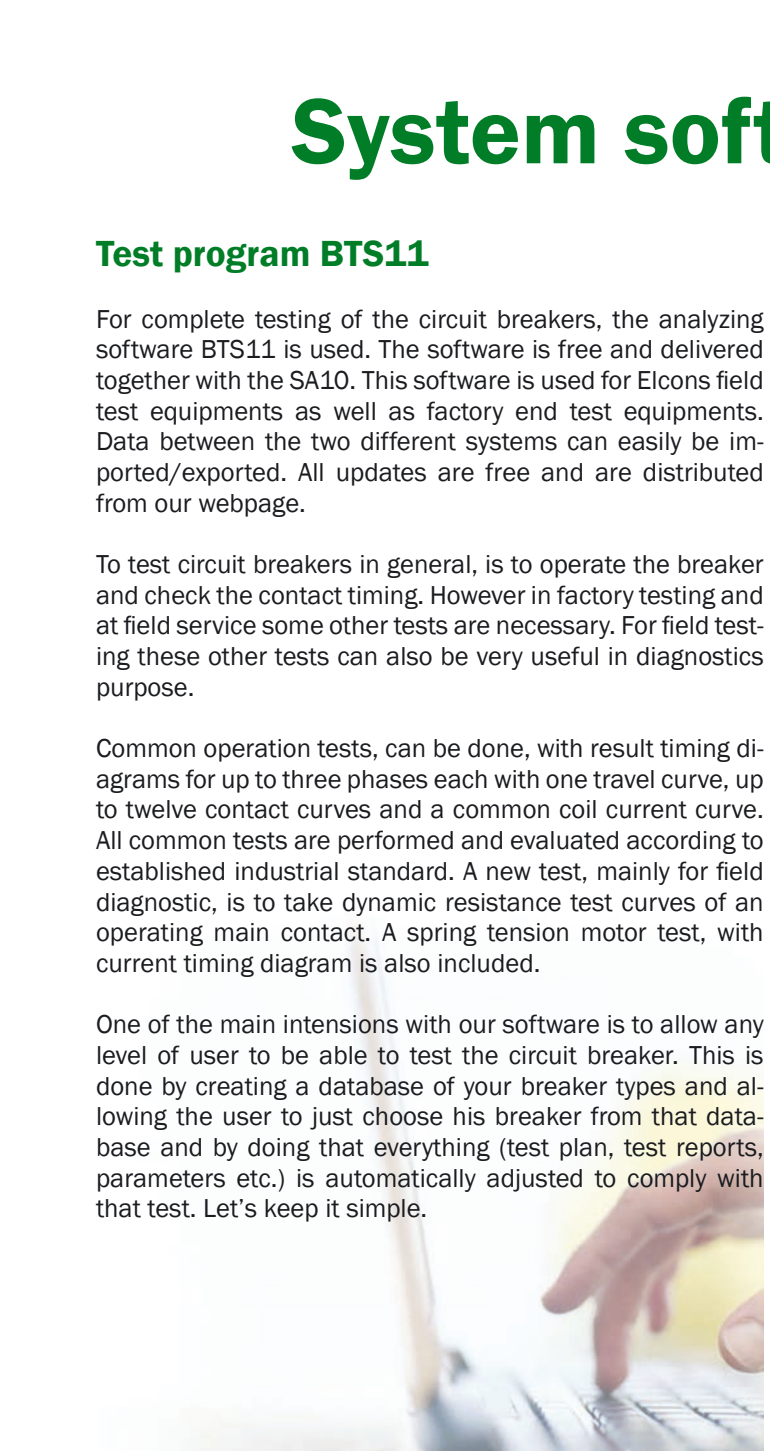
Test program BTS11

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 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

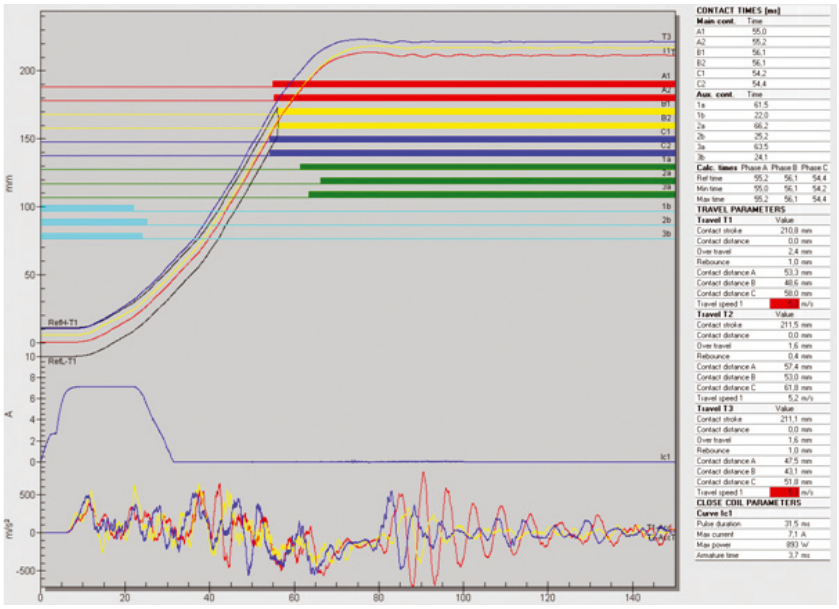
ECC - Elcon Competence Center

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 curent)
- Slip coupling
- Damping curve
- Static resistance
- Dynamic resistance
- Test of Disconnectors
- Pre-insertion resistors
- User customized operations *(ex: for long mid-voltage CB sequences)*



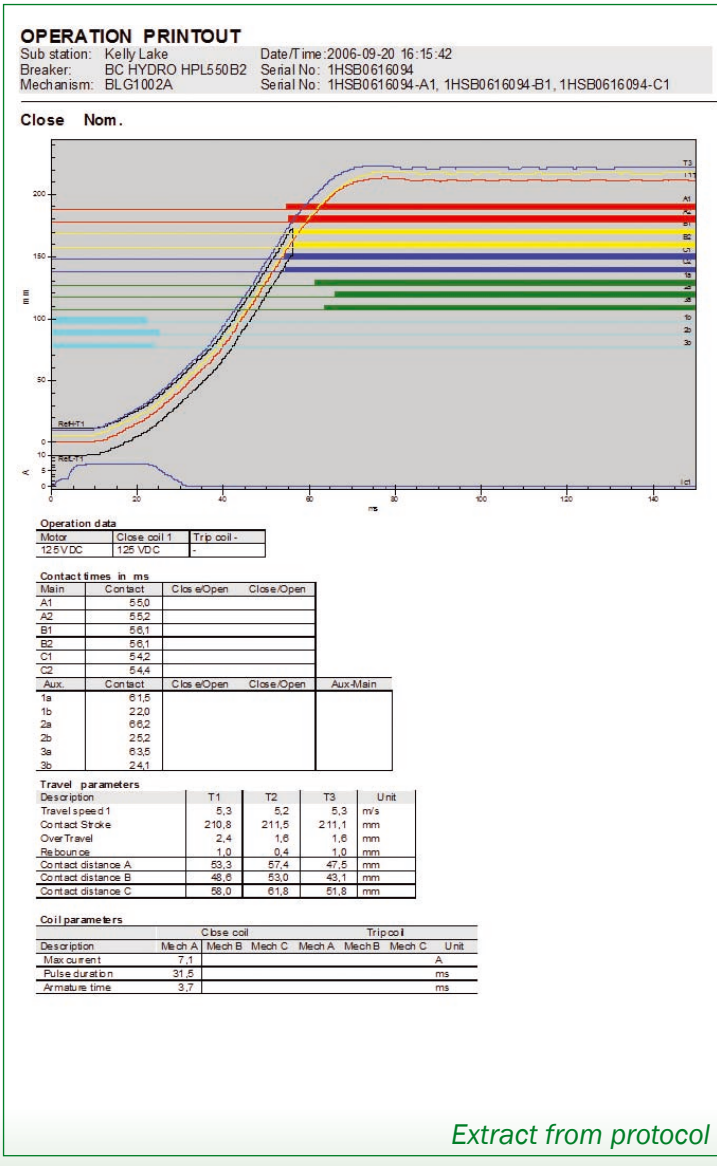
Close operation

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



OPERATION PRINTOUT

Sub station: Kelly Lake — Date/Time: 2006-09-20 16:15:42
Breaker: BC HYDRO HPL550B2 — Serial No: 1HSB0616094
Mechanism: BLG1002A — Serial No: 1HSB0616094-A1, 1HSB0616094-B1, 1HSB0616094-C1

Close Nom.

Operation data

Motor	Close coil 1	Trip coil -
125VDC	125 VDC	-

Contact times in ms

Main	Contact	Close/Open	Close/Open
A1	55,0		
A2	55,2		
B1	56,1		
B2	56,1		
C1	54,2		
C2	54,4		

Aux.	Contact	Close/Open	Close/Open	Aux-Main
1a	61,5			
1b	22,0			
2a	66,2			
2b	25,2			
3a	63,5			
3b	24,1			

Travel parameters

Description	T1	T2	T3	Unit
Travel speed 1	5,3	5,2	5,3	m/s
Contact Stroke	210,8	211,5	211,1	mm
Over Travel	2,4	1,6	1,6	mm
Rebounce	1,0	0,4	1,0	mm
Contact distance A	53,3	57,4	47,5	mm
Contact distance B	48,6	53,0	43,1	mm
Contact distance C	56,0	61,8	51,8	mm

Coil parameters

	Close coil			Trip coil			
Description	Mech A	Mech B	Mech C	Mech A	Mech B	Mech C	Unit
Max current	7,1						A
Pulse duration	31,5						ms
Armature time	3,7						ms

Extract from protocol

HARDWARE SPECIFICATION SA10 UNIT

Number of main contact timing channels:	12(x2)
Closed contact current with internal source:	100 mA
Preinserton resistance range (standard version):	50 – 5000 ohm
Current disturbance immunity (standard version):	±10 mApk
Number of auxiliary contact timing channels:	6
Closed aux. contact current with internal source:	1 mA
External source contact voltage:	+15 - +400 VDC
Reaction time, any timing channel:	< 20 microsek
Input connectors, any timing channel:	Touch-protected jacks
Protection level, any timing channel:	3
Operating coil source inputs (Uc, COM):	1
Source voltage measuring range DC:	0 – 300 V ±1% or ±1 V
Source voltage measuring range AC:	0 – 300 V ±2% or ±2 V
Number of operating coil outputs (OPEN, CLOSE):	2
Coil current measure range DC:	0 – 30 A ±1% or ±0,1 A
Coil current measure range AC:	0 – 30 A ±2% or ±0,2A
Coil trig reaction time:	< 20 micrsek
Internal current limit:	35 A
Number of contact resistance meas inputs:	1
Resistance measure range:	0 – 1000 microOhm
Resistance measure accuracy:	± 2 microOhm
Resistance measure current:	200 A
Current generator source capacity:	≥ 4 V
Resistance measuring input connector:	Touch-protected jacks
Current generator output connector:	High current pole terminals
Protection level resistance measuring inputs 1):	2
Protection level current generator outputs:	1
Protection level 1 (external connections and case)	
ESD resistance:	IEC 1000-4-2 L4
Radiated electromagn. field res. (27-1000 MHz):	IEC 1000-4-3 L3
Burst resistance:	IEC 1000-4-4
Pulse resistance:	IEC 1000-4-5
Protection level 2 (full isolation)	
Protection according to:	level 1
Allowed between contact point(s) and earth:	≤±400 VDC, 285 VAC
Protection level 3 (full isolation, full protection)	
Protection according to:	level 2
Allowed between any ind. level 3 contact point:	≤ ±400 VDC, 285 VAC

Number transducer inputs:	6
Digital input receiver type:	RS422
Analogue input measuring range:	0 – 5 V
Analogue input impedance:	200 kohm 30pF
Analogue transducer minimum resistance:	100 ohm
Power supply, both:	5 V, 100 mA
Input connectors, transducer channels:	LEMO Series 2K, 8 p
Protection level any transducer input:	2
Number of aux inputs (Uk, Ul, Um, COM):	3
Input voltage measure range DC:	0 – 300 V ±1% or ±1 V
Input voltage measure range AC:	0 – 300 V ±2% or ±2 V
Input impedance:	1 Mohm 30pF
Number of outputs (MOTOR supplied from Um):	1
Motor current measure range DC:	0 – 50 A ±1% or ±0,1 A
Motor current measure range AC:	0 – 50 A ±2% or ±0,2 A
Input conns, coil and auxiliary inputs/outputs:	Touch-protected jacks
Prot level coil and auxiliary inputs/outputs:	3
Serial communication interface type:	RS232
Serial communication baud rate:	115 kbps
Serial communication connector type:	9 pole female D-sub
Protection level serial communication :	2
Power supply input AC voltage:	85 – 265 V, 50 – 60 Hz
Power supply input DC voltage:	100 – 375 V
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
Internal sampling rate(adjustable):	10Hz - 50 kHz
Max sampling time example 1:	at 100Hz 211Sek
Sampling time example 2:	at 50kHz 400ms
Ambient operating temperature range:	-20° - +50° C
Ambient storage temperature range:	-40° - +70° C
Ambient relative humidity (non-condensing):	0% - 97%
Dimensions:	458x331x153 mm (18”x13”x6”)
Weight:	11,7 kg

Acknowledgements: SA10 fulfils the European conformity requirements in (Electromagnetic Compatibility) EMC Directive89/336/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

Contact

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