



**SA100 'R'**

**Switchgear Analyser  
Breaker Testing**

# Switchgear Analyser

## Introduction

Weis is a specialist company with over 20 years of experience in the commissioning, testing & maintenance of switchgear and power network fault monitoring within the Power Utility Industry.

Based on its successful SA100 Switchgear Analyser, Weis has developed a Reduced version (SA100 'R') with fewer channels providing a lower cost robust switchgear test set for performance analysis on high, medium and low voltage circuit breakers.

In addition, Dynamic Timing of up to 1 break per phase is made available (external battery required per phase to provide constant current source).

### OPTIONAL ITEMS

**Cable Sets** - A range of standard cable sets & special made cable sets are available on request.

**Transducers** - A full range of transducers and universal mounting arms are available on request.

**Transportation Cases** - Robust purpose made transportation cases are available for the complete range of products.

Possible test results which can be computed per phase for each breaker operation include:-

Peak Coil Current, Current Pulse Length, Operate Times (Main / Resistive), Operate Time Spread (Main / Resistive), On Time, Dead Time, Contact Separation, Datum Velocity, Velocity at Contact Touch, Stroke, Contact Length (Main / Resistive), Spring Compression on Vacuum Contacts, Travel Overshoot, Rebound, Bounce Time, Mechanism Times (Pre Latch / Latch Period), Acceleration and Fingerprint Comparison on all channels (Grey Zone Checking).

### Features

- ◆ ROBUST SWITCHGEAR TEST AND ANALYSIS SYSTEM FOR PORTABLE OR FACTORY USE
- ◆ COMPUTED RESULTS WITH CUSTOM REPORT FORMAT FEATURE, REDUCING TEST TIME
- ◆ CREATE A ELECTRONIC LIBRARY OF BREAKER TEST SETTINGS AND SIGNATURES
- ◆ REVISED CONFIGURATION / RECALCULATION ON PREVIOUS TESTS CAPABILITY
- ◆ SUBSTATION ENVIRONMENT PROVEN WITH A 12.1" HIGH-BRIGHT SUNLIGHT READABLE COLOUR TFT DISPLAY
- ◆ INDEPENDENT CONTROL OF TRIP AND CLOSE AC OR DC COILS
- ◆ 6 ANALOGUE INPUT FOR: 1 x DUAL RANGE (5 / 30A) TRIP AND CLOSE COIL CURRENT, 1 x TRAVEL, 3 x USER CONFIGURABLE
- ◆ 10 DIGITAL INPUTS FOR: TIMING OF UP TO 4 MAIN AND 4 RESISTIVE CONTACTS, 2 x TIMING CONTACTS (24-250V DC or 0V)
- ◆ CALCULATED INPUTS FOR: VELOCITY AND ACCELERATION FROM TRAVEL INPUT
- ◆ SA100 'R' CAN DYNAMICALLY TEST ONE BREAK PER PHASE (EXTERNAL BATTERY SOURCE(S) REQUIRED)
- ◆ ANALOGUE CALCULATIONS PERFORMED ACROSS ALL THREE PHASES AGAINST SINGLE POLE MOTION / TRAVEL SENSING

## Data Management

Breaker Test & Analysis software is an essential 32-bit Windows™ database program that provides an easy to use operator interface for configuring & displaying the SA100 'R' test results in graphical and text report formats.

### Features:-

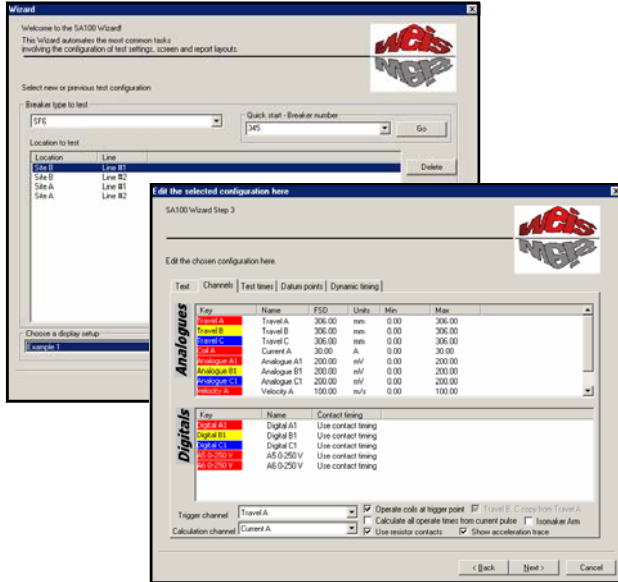
- ◆ Operator interface for Regular (via Wizard) or Advanced users
- ◆ Results automatically computed with feature to recalculate on configuration change of any existing test record
- ◆ Graphical display of captured waveforms with measurement cursors
- ◆ Standard or user defined report format
- ◆ Archiving of all tests and configurations
- ◆ Fingerprint comparison on all channels (grey zone checking)

BTA software runs on a standard IBM compatible PC with a 32-bit Windows™ operating system. This permits the transportation of test records to a regular office based or portable computer.

The display and printing of a report can be fully customised to include logo's, in-house styles, text phrases and results format, thus eliminated the need to manually complete a written form in most cases.

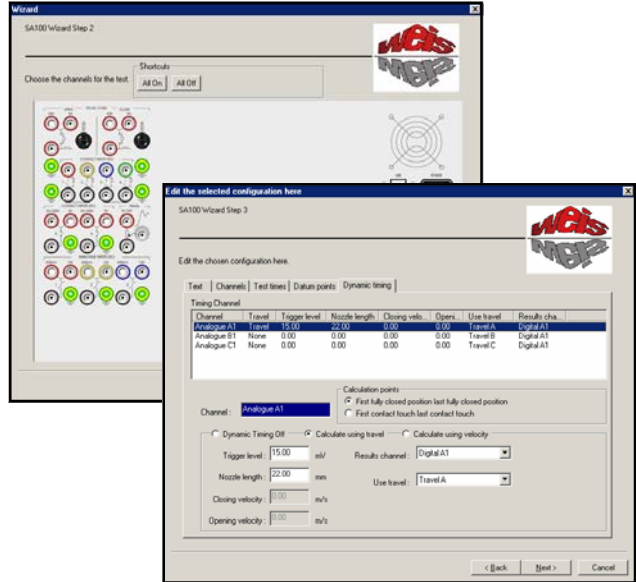
# SA100 'R'

Wizard - Start New or Select Existing Test Configuration



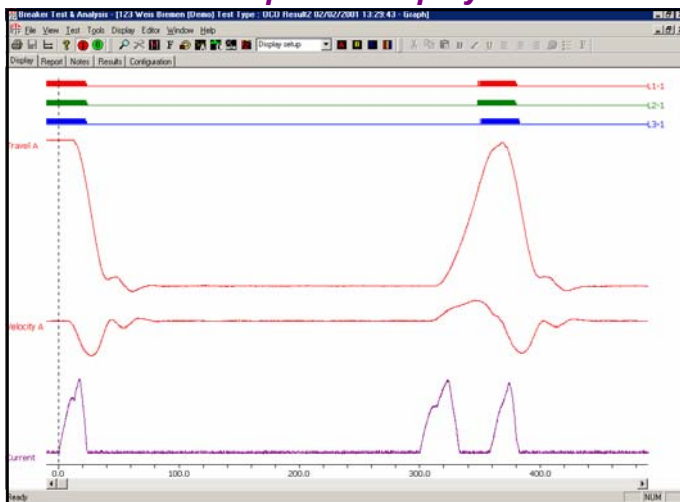
Wizard (Step 3) - Channel Settings

Wizard (Step 2) - Breaker Test Connections



Wizard (Step 3) - Dynamic Test Settings

## Graphical Display



### Graphical Features

- Zoom - Time Base
- Zoom - Amplitude
- Cursors - Measured Value & Time
- Colours - Traces & Background
- Font - Text Style & Size
- Print - Screen as Displayed
- Add Calculated Channels
- Combine Test Records - Overlay Traces
- Select Pre-defined Display Setups

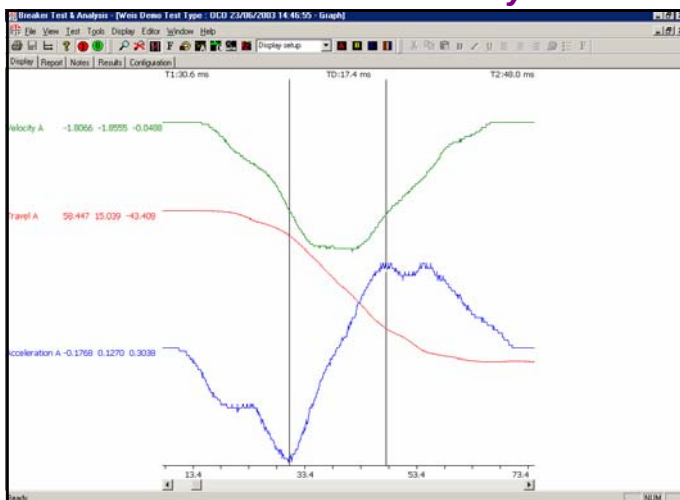
### Advanced Analysis

- Acceleration Trace Computed from Travel
- Velocity Trace computed from Travel
- All Graphical View Features Supported

### Report Features

- Customise which Results are shown
- Edit Headings
- Change Font - Text Style, Size & Colour
- Select Pre-defined Report Setups

## Acceleration & Velocity



## Text Report

Breaker Test & Analysis [123 Wols Bromen (Demo) Test Type : DCU Result/02/02/2001 13:29:43 - Report]

Site Name : Wols Bromen (Demo)  
 Breaker Number: 123  
 Breaker Type : 400kV SF6  
 Line Name : Line #1  
 Operator Name : B. Tester

Test Type : OCCO  
 Test Date : 02/02/2001  
 Test Time : 13:29:43  
 Dead Time : 326.10 324.80 327.20 ms  
 On Time : 31.70 31.60 32.90 ms

Operation 1 Results

	Phase A	Phase B	Phase C	
Current	2.22	A		
Operate Time	22.30	22.90	22.30	ms
Operate Time Spread	0.60	0.00	0.00	ms
Operate Time (res)	23.30	23.90	23.30	ms
Operate Time Spread (res)	0.60	0.00	0.00	ms
Contact Times #1	22.30	22.90	22.30	ms
Contact Times #1 (res)	23.30	23.90	23.30	ms
Overshoot Time	18.70	24.30	23.20	ms
Velocity	5.11	5.19	5.21	m/s
Velocity (2)	5.11	5.19	5.21	m/s
Terminal Velocity	1.22	0.38	0.69	m/s
Stroke	116.12	116.12	116.12	mm
Contact Length	33.57	34.64	34.79	mm
Contact Length (res)	38.76	39.98	40.44	mm
Contact Separation	82.55	82.70	81.18	mm
Contact Separation (res)	77.36	77.36	75.53	mm
Overshoot	4.73	4.73	4.73	mm
Rebound	0.76	0.76	0.76	mm

# Specifications

## INPUTS

<b>Analogue:</b>	1 x Independently controlled trip (open) and close coil current inputs. 1 x Resistive (linear or rotary) travel transducer inputs, will calculate all three phases. 3 x User configurable 0 - 10V DC or 0 - 200mV DC inputs, selected via input sockets.
<b>Analogue Accuracy:</b>	<0.5% of fullscale.
<b>Digital:</b>	8 x Contact status inputs providing timing of up to 4 main contacts and 4 resistive contacts ('dry' contacts). 2 x User configurable inputs for 'wet' or 'dry' contact timing (24 - 250V DC or 0V DC).
<b>Resistive Contact Range:</b>	15 - 10,000 ohms.
<b>Digital Resolution:</b>	100µSec.
<b>Connectors:</b>	4mm safety socket.

## OUTPUTS

<b>Coil Operation:</b>	Solid state outputs for trip (open) and close.
<b>Coil Peak Current:</b>	5A (accuracy 2.5mA) or 30A (accuracy 15mA) AC/DC measurement ranges selectable via input sockets. Other measurement ranges possible via optional external shunt; for example 50A Peak (up to 75mS duration) or 100A Peak (up to 50mS duration).
<b>Coil Max. Voltage:</b>	400V peak.

## RECORDING

<b>Resolution:</b>	12 bit A/D (1:4096) and 10 kHz sampling rate.
<b>Recording Time:</b>	Selectable up to 100 seconds.
<b>Synchronisation:</b>	All inputs sampled simultaneously.
<b>Start trigger:</b>	Coil current or selectable on any analogue / digital input.

## GENERAL SYSTEM

12.1" TFT SVGA (800x600) "High-Bright Sunlight Readable" colour display (350cd). Removable USB Flash-Disk. 3½" 1.44Mbyte floppy disk drive and EIDE hard disk drive. PS2 sockets for external keyboard with built in trackball. VGA port for external screen. RS232 serial, parallel printer, USB & RJ45 network ports. 256MB RAM. Windows™ Operating System. All standard Windows Centronics or USB printers supported. Safety keyswitch to enable/disable coil operation.

## REAL-TIME CLOCK

<b>Range:</b>	Time, date, leap year and day of the year with internal battery backup. 100mS resolution.
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## PROGRAMMING - SETTABLE PARAMETERS

<b>User strings:</b>	Site name, breaker number, breaker type, line name, operator name and up to 30 user configurable.
<b>Test times:</b>	Close, Open, Trip Free, Close-Open, Open Close, Open-Close-Open.
<b>Coil operate times:</b>	Initial delay, trip coil "on-time", close coil "on-time", delay time between closing and opening, delay time between opening and closing.
<b>Channels:</b>	Analogue - Input name, fullscale value, units. Digital - Input name.
<b>Datum points:</b>	2 sets of velocity calculation points on travel (speed) curve.

## COMPUTED RESULTS

### Up to a sequence of 3 operations detailing 3-phase information:

Peak coil current, operate times and operate time spread (main/resistive), on time, dead time, datum velocity, velocity at contact touch, acceleration, stroke, contact length (main/resistive), contact separation, spring compression on vacuum contacts, travel overshoot, bounce time and rebound.

### Acceleration and velocity:

Graphical trace derived for measured travel input with cursor measurement.

## OPERATING VOLTAGES

<b>Prime Power:</b>	100 to 370V DC, 90 to 264V AC auto-sensing via IEC power connection. Burden <60 VA.
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## ENVIRONMENTAL

<b>Operating Temp.:</b>	-20°C to +70°C (-4°F to +158°F)
<b>Humidity:</b>	0 to 97% RH non-condensing.
<b>Isolation:</b>	2kV rms for 1 minute (channel to channel, channel to earth).
<b>Surge Withstand:</b>	To IEC 801-5. 1.2/50µS.
<b>(Transient)</b>	Common Mode: Severity level class 4. Series Mode: Severity level class 3.
<b>Fast Transient Burst:</b>	To IEC 801-4 level 3.
<b>RFI Immunity:</b>	To IEC801-3 level 3. 10V/m 26-1000MHz.
<b>Emissions:</b>	To EN50081-1: 1992.

## MECHANICAL DETAILS

<b>Enclosure:</b>	6U steel enclosure suitable for Euro 19" wide rack mounting or free standing (tabletop).
<b>Ventilation:</b>	Fan assisted.
<b>Weight:</b>	<9kg.
<b>Optional Carry Case:</b>	Reinforced aluminium with wheels on one end, 710mm(W) x 480mm(H) x 370mm(D).

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