RUSSENBERGER PRÜFMASCHINEN AG

RUMUL FRACTOMAT and KRAK GAGES

A crack length measuring system for tests in fatigue and fracture mechanics

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General

Measuring the crack length is in a large number of tests in fatigue or in fracture mechanics a very important procedure.
The test configuration requires a high accuracy to receive exact results.
The crack length measuring system FRACTOMAT in combination with the KRAK GAGES offers all this, providing a simple and accurate method.
The KRAK GAGES are bonded to the specimen in a similar manner like bonding strain.
The high signal voltages guarantee a trouble free and stable system.
Analog and digital outputs enable setups with any testing machines to control the propagation of the crack.

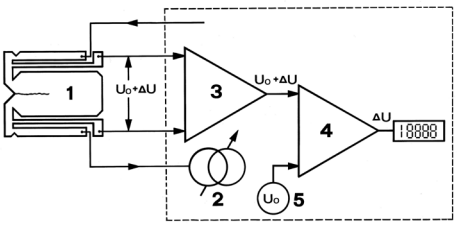
Significant features

- Independent of size, shape and materials characteristics of specimen or component
- No need of electrically insulated grips
- High value of potential difference (approx. 100 mV on KRAK GAGE) and a minor value of the constant current which is being supplied into the KRAK GAGE (approx. 100 mA).
- Linear reference between crack length and potential difference
- Same calibration curve for all sizes of KRAK GAGES
- Continuous measuring and control signal
- Suitable in corrosive medium
- Working range from –50° C up to +150° C
- Analog output for registration or external converters
- Data exchange via localhost to other software applications
- Bonding of KRAK GAGES same as strain gages
- Setup by software for all KRAK GAGES and combination

Functional description

The crack length measuring system works on the basis of the indirect potential drop method and indicates the measuring value continuously.
The KRAK GAGES are supplied with constant current form the FRACTOMAT which is adjusting automatically.
The settings are done by Software via USB Connection. If there is a signal for the load cycle available the FRACTOMAT Software can also count cycles and calculate the crack growth rate da/dN.
KRAK GAGES are measuring transducers, which are consisting of a very thin layer metal foil and an electrically insulating layer.
The KRAK GAGES are being bonded to the surface of the specimen and connected to the FRACTOMAT current source and to the preamplifier.
Size and shape of the KRAK GAGE guarantees a synchronous propagation of the crack in the gage as well as in the specimen, therefore the FRACTOMAT delivers a steady output signal proportional to the crack.

The KRAK GAGE is supplied with a constant current. Depending on the crack length, a potential difference of Uo + ΔU is being generated. Due to a suited geometry of the gage the relationship between crack length and potential is strongly linear, independent of size, shape and conductivity of the specimen. For the nominal crack length of the KRAK GAGE, the gage output is 100 mV. This value is at least in the order of 100 times higher than the conventional direct potential drop method, in which an enormous current conducts through the specimen.



Elementary diagram
1 KRAK GAGE
2 Source of constant current
3 Differential amplifier
4 Compensating amplifier
5 Compensating voltage

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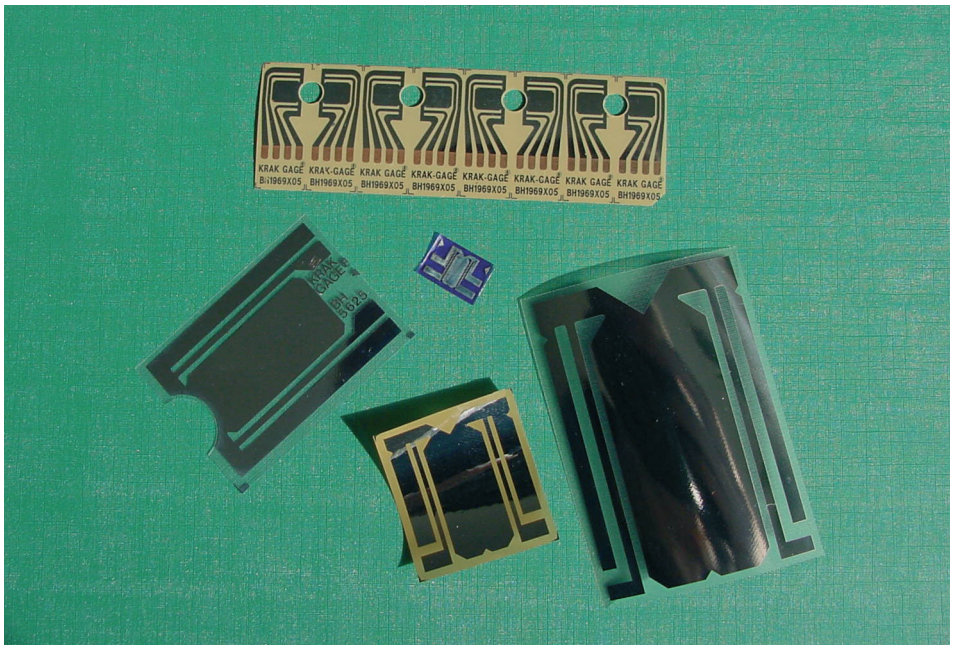
Specifications

Number of channels: 2
Analog output for nominal crack length: 10 VDC
Constant current: 0.5 – 195 mA
Accuracy better than: +/–1%
Resolution of KRAK GAGES: infinite
Resolution of AD Converter: 16 bit
Counter resolution: 32 bit
USB connection to PC
Bonding: same as strain gages
Limit detectors: 2, for selectable measured values
Dimensions (L/H/D): 260 x 160 x 260 mm
Power supply: 100 – 250 V, 50/60 Hz
Maximum power: 60 W
Weight: 4.2 kg

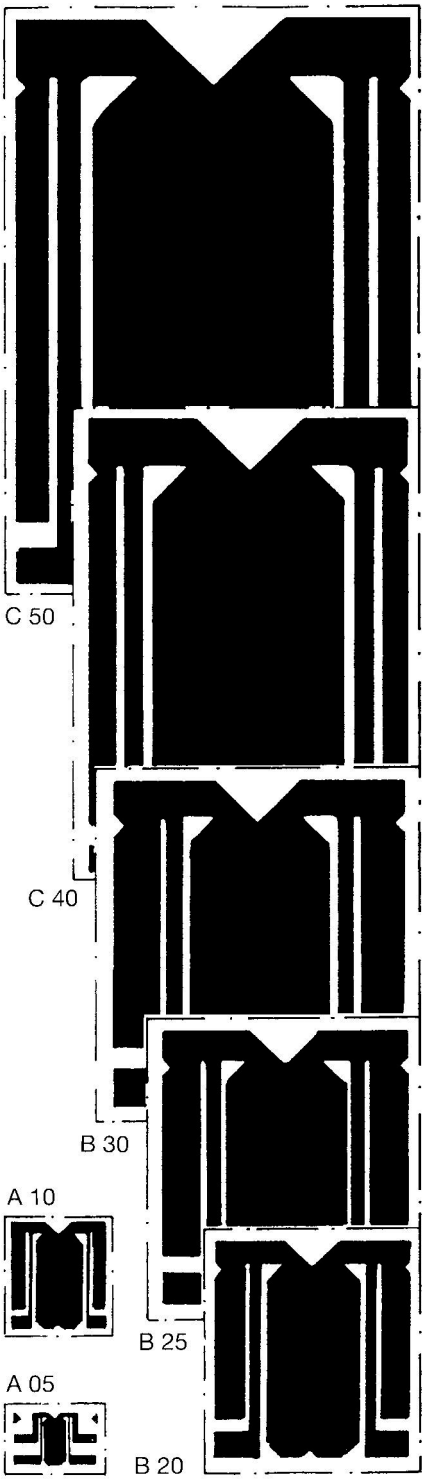
Application on RUMUL resonant testing machines

Applications on RUMUL resonant testing machines enable direct recording of the crack length or controlling of the load conditions according to the cyclic stress intensity continuously calculated from the crack length.



Various KRAK GAGES

Standard version 1:1
KRAK GAGES



* Standard sizes (ex stock)
The figure in the type designation A05, A10, B20 etc. stands for the nominal crack length (max crack length) of the KRAK GAGES

special versions on request

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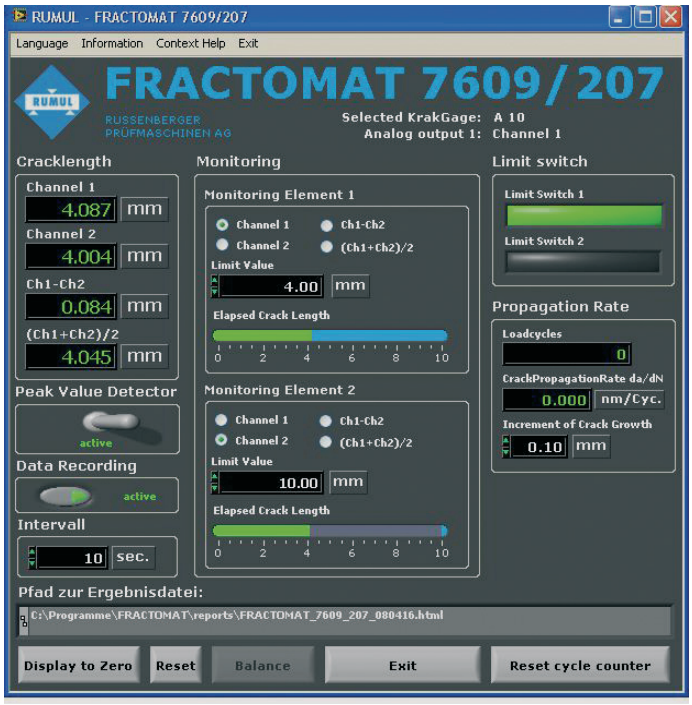
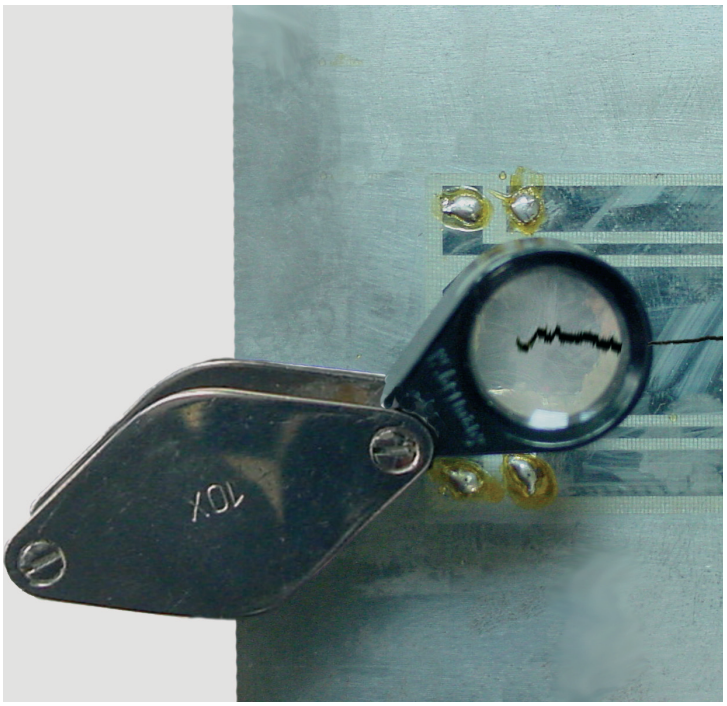
FRACTOMAT software

FRACTOMAT features are operated by the software only. Test results and switching states of the limit value detectors are shown on the user-interface.



Software user-interface



Crack in a specimen

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