Strain Gauge Simulator

Model 9405

Code:	76-9405 E
Manufacturer:	burster
Delivery:	ex stock/4-6 weeks
Warranty:	24 months

With DKD Calibration Certificate or Manufacturer Calibration Certificate possible

76-9405-E

- **Simulator for pressure, load and torque sensors based on strain gauge design**
- **Several ranges selectable**
- **Easy operation**
- **Sturdy and economical**

Application

The strain gauge (SG) simulators models 9405 allow rapid and easy calibration of measuring chains consisting of, for example, a load sensor, a connecting lead and a supply and amplification unit with a display.

All measuring amplifiers and displays suitable for SG sensors can be connected, checked and calibrated. The supply voltage source is loaded realistically by the simulator. Deviations from the rated supply voltage as well as the influence of the connected lead are taken into account during calibration. Particularly in the case of long leads, this has a decisive influence on the accuracy which can be achieved with the entire measuring chain.

Description

The most accurate method of calibrating a measuring chain involves comparison with a high-precision reference. This also applies to SG sensors. A mechanical variable, whose exact value is known, loads the sensor. It leads, via a detuning in the bridge circuit, to a corresponding output signal. By these means, the measuring chain can be adjusted. This method is often unfeasible (for example, due to very large measuring ranges of several hundred tons or several hundred bars) or too complicated. In such cases, the measurement variable must be simulated electrically. This can be done with ease and high precision using a simulator model 9405. Instead of the sensor, the simulator is connected to the measuring chain. It loads and thus tests the supply voltage source, and simulates the zero signal and the signal for a load, corresponding to the sensitivity of the sensor. As in the case of the SG sensor, this is achieved by a change in resistance.

It must be ensured that the bridge resistance and sensitivity of the simulator are identical to those of the sensor. The sensitivity of sensors is often also stated as a k factor or rated characteristic value. Measuring chains with sensors, whose actual (not rated) sensitivity is slightly lower than that of the simulator, can also be adjusted by means of a simple ratio calculation.

The internal circuit is not in accordance with a wheatstone bridge. This is the reason why shunt calibration is not possible.

Technical Data

Bridge resistance:	350 Ω, ± 1 %
Calibration steps:	(±) 0; 0.5; 1; 1.5; 2; 3 mV/V
Temperature error of the sensitivity (%/10 K):	typ. 0.01/max. 0.03
Max. zero error:	2 µV (plus any thermal e.m.f`s. in the measuring circuit)
Max. sensitivity error (%):	typ. 0.1/max. 0.2
Permissible supply voltage:	max. 20 V
Operation temperature range:	+ 5 ... + 23 ... 40 °C
Weight:	approx. 0.5 kg
Dimensions (W x H x D):	150 x 70 x 105 [mm]
Electrical connection:	4 pole terminals for 4 mm laboratory plug connection, 12 pin connector male

Accessories

Mating cable connection to burster units SEMMEG® 9000 or other SG interfaces like models DIGIFORCE® 9306, 9714, 9162-V2XXX, 9180-V3XXX or 4 banana plug.
laboratory plug 4 mm

length 0.7 m	**Model 9923**
length 3 m	**Model 9913**
Mating connector 12 pin generally	**Model 9940**
Leather bag	**Model 4592**

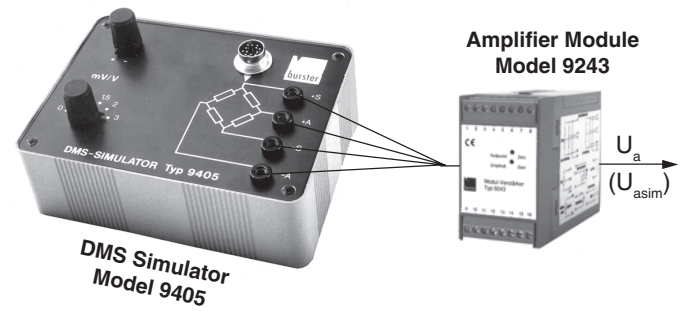
Order Information

Strain gauge simulator	**Model 9405**
Manufacturer Calibration Certificate	**Model 94WKS-9405**
DKD Calibration Certificate (German Calibration Service -DKD-)	**Model 94DKD-9405**

Calibration certificate for the strain gauge simulator

A test certificate is always part of the delivery. By this we confirm that the selecable nominal values (±0 / ±0.5 / ±1 / ±1.5 / ±2 / ± 3 mV/V) reside within the given tolerance range of < 0.2 %. Furthermore it is guaranteed that the values do not exceed the given tolerance range within one year.
The traceability of the used secondary standards is guaranteed by our certified calibration laboratory (DKD-K-02101).
If further data are required you can obtain works or DKD calibration. This calibration confirms the currently measured values and accuracies.

Example of calibrating a measuring amplifier by means of a strain gauge simulator



Where strain gauge sensors cannot be loaded purposefully, because for example no suitable weight is present, the appropriate measuring signal must be reproduced with a strain gauge simulator. Since strain gauge sensors often possess „bent" characteristic values (that means nominal characteristic values) usually those cannot be adjusted accurately by a simulator. The simulator is then set to the next lower characteristic value. The appropriate amplifier output voltage computes itself after the following example:

Given:	SG sensor load cell range 100 kN connected to an amplifier, Analog output is used 0-10V, Sensitivity of the sensor (accord. to calibration certificate) 1.678 mV/V
Problem:	Calibrate the analog output with the SG simulator
1_{st} Step:	The simulator is set to the next lower characteristic value, in this case 1.5 mV/V
2_{nd} Step:	The amplifier's output voltage which can be adjusted is calculated. Instead of 1.678 mV/V by the sensor only 1.5 mV/V are fed by the simulator.
Please note:	The 1.678 mV/V of the sensor is to produce 10 V at the analog output.

$$U_{outsim}\,[V] = \frac{U_{out} \times K_{sim}}{K_{sens}} = \frac{10\ V \times 1.5\ mV/V}{1.678\ mV/V} = 8.939\ V$$

U_{outsim} = *output voltage if the simulator is connected*
U_{out} = *desired amplifier's output voltage with nominal load of the sensor*
K_{sim} = *adjusted characteristic value at the strain gauge simulator*
K_{sens} = *characteristic value of the sensor which can be simulated*

8.939 V are to be set at the analog output with the attached strain gauge simulator and an adjusted characteristic value of 1.5 mV/V.

Functions and Connection Settings