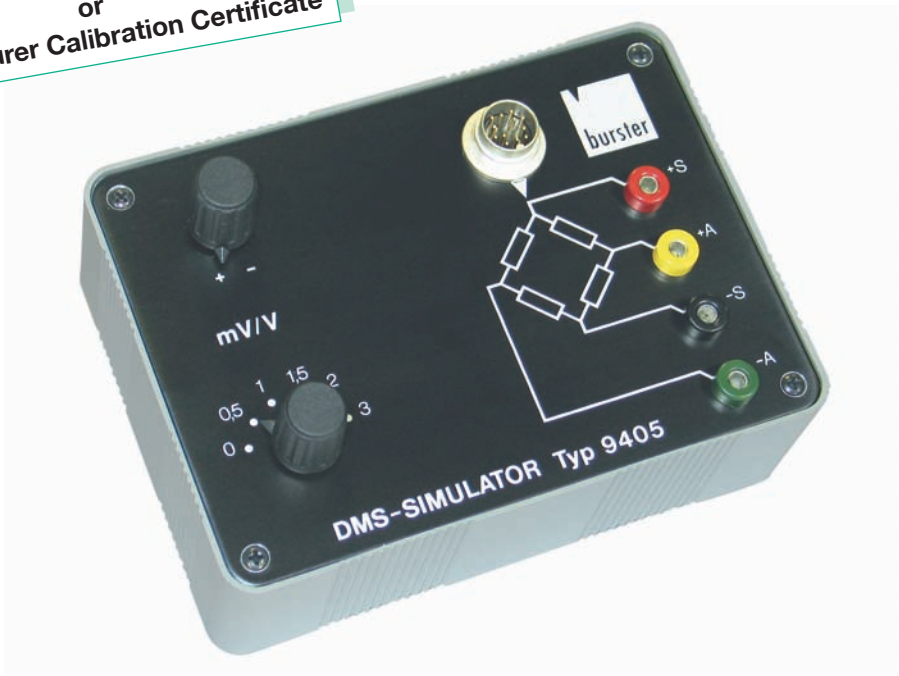
Strain Gauge Simulator

Model 9405

Code:	76-9405 EN
Delivery:	ex stock/4-6 weeks
Warranty:	24 months

With DKD Calibration Certificate
or
Manufacturer Calibration Certificate



76-9405 EN

- **Simulator for pressure, load and torque sensors based on strain gauge principle**
- **Five characteristics selectable**
- **Reversible polarity of measurement signal**
- **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 indicator.

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 connection leads 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.

Because of the reversible polarity the SG simulator allows the examination of measuring chains, for tension and compression measurement or differential pressure.

Description

The most accurate method of calibrating a measuring chain is the comparison with a high-precision reference. This also applies to SG sensors. A mechanical variable, whose value is exactly known, loads the sensor. It yields, 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 very easy and with 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.

Measuring chains with sensors, whose actual (not rated) sensitivity is slightly different than the simulator´s signal, 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. But in most cases it is not required.

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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)
Sensitivity error (%):	typ. 0.1/max. 0.2
Permissible supply voltage:	max. 20 V
Operating 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 mm laboratory plug connection, 12 pin connector male

Order Information

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

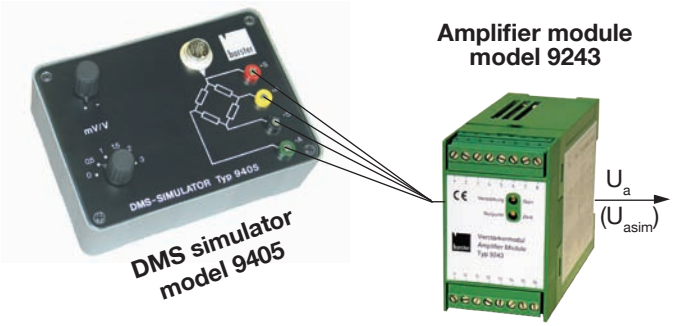
Accessories

Mating cable connection to burster units (12 pin sensor input socket) and 4 mm plugs

length 0.7 m	**Model 9923**
length 3.0 m	**Model 9913**
Mating connector 12 pin	**Model 9940**
Adequate leather bag including strap used for protection and transport	**Model 4592**

Calibration certificate for the strain gauge simulator (refer to order code)
A test certificate is always part of the delivery. By this we confirm that the selectable 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 manufacturer 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 exists, 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 model 8438-100 kN. Sensitivity of the sensor (acc. to calibration certificate) 1.678 mV/V. Amplifier output signal at nominal load 100 kN: U_a = 10 V.
Problem:	Amplifier output voltage U_{asim} which must be adjusted with amplifier connected.
1st Step:	The simulator is set to the next lower characteristic value, in this case 1.5 mV/V
2st Step:	The amplifiers 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 U_a=10 V at the amplifier output.

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

U_{asim} = Output voltage if the simulator is connected
U_a = Desired amplifiers 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 Setting