SG accessories ...bonding material

The most common way in which strain gages are attached to the test object is by bonding. It is prerequisite to use application-specific adhesives that meet the following requirements:

- transmission (as much as possible without loss) of the deformations of the test object to the strain gages
- stable behavior across a temperature and strain range which is as wide as possible
- strain gage and test object must not be chemically attacked

All adhesive packages from HBM include the adhesive and the accessories (such as Teflon foil) required for bonding and, in addition, a safety data sheet. Your criteria for adhesive selection should be:

- application temperature
- material of the measuring body and recommendations for the relevant strain gage
- requirements for long-term stability and reproducibility
- surface roughness

o

Hot curing adhesives

Hot curing adhesives can be used where the test object can be brought up to the curing temperature. This is generally possible in the manufacture of transducers, but also where installations can be made before machine assembly or where the machine can be disassembled. Hot curing adhesives meet higher quality demands and can be used within a greater temperature range than cold curing adhesives.

Z 70

BCY 01

X 60

X 280

EP 310 S

EP 250

Adhesive	Description	Suitable SG	Pot life at room temperature (RT)
cold curing Z 70 Order no.: 1-Z 70 for optional use with Z 70 BCY 01	single component adhesive Cyanoacrylate thin liquid accelerator for Z 70	optimum: Y, C, LD, LE, V residual stress strain gages good: K, G	—
X 60 Order no.: 1-X 60	two component adhesive Polymethyl Methacrylate pasty, even on absorbent or uneven surfaces	optimum: Y, C, LD, DA, V residual stress strain gages good: K, G, LS	5 minutes
X 280 Order no.: 1-X 280	two component epoxy resin adhesive	optimum: Y, C, LD, LE, V good: G, K for smooth and absorbent surfaces	30 minutes
hot curing EP 310 S Order no.: 1-EP 310 S	two component epoxy resin adhesive thin liquid	optimum: Y, C, K, G, LD, LE good: residual stress SG	1 month (at RT) 6 months (at + 2°C) 12 months (at – 32°C)
EP 250 Order no.: 1-EP 250	two component epoxy resin adhesive pasty, even on absorbent surfaces	optimum: Y, C, K, G, LD, LE good: residual stress SG	24 h

SG accessories ...bonding material

Cold curing adhesives

Cold curing adhesives are easy to use and can be processed at minimum cost and effort since they harden under normal ambient conditions. If they feature short curing times they are also called “superglue”. The preferred field of application is in experimental stress analysis. However, if the temperature around the measuring point is higher than about 80° C, we recommend to use a hot curing adhesive or a heat resistant, cold curing epoxy resin adhesive (X280).

Spot weld joints

Spot weld joints are only possible with the special strain gage of type LS 31, and if the test object is of a weldable material. This method is particularly suitable for applications where the cleanliness required for bonding cannot be guaranteed. Hardly any preparations are necessary and the installer needs very little previous experience. However, it is essential to follow the process instructions supplied with the strain gages.

Storage time	Curing temperature	Curing period[3]	Contact pressure (N/mm²)	Temperature limits lower	Temperature limits upper absolute[1]	Temperature limits upper relative[2]	Delivery quantity
6 months at – 15°C: almost unlimited	5°C [3] 20°C 30°C	10 minutes 1 minute 0.5 minutes	thumb pressure	– 55°C (temporarily - 70°C)	+ 100°C	+120°C	10 ml
> 1 year	0°C 20°C 35°C	60 minutes 10 minutes 2 minutes	thumb pressure	– 200°C	+ 60°C	+ 80°C	component A= 0.1 kg B = 80 ml other quantities see price list
1 year at + 4°C	RT . . . 95°C	8 h . . . 1 h	0.05 . . . 2.0	– 70°C	+ 200°C	+ 280°C	6 double pouches à 10 g = 60 g
6 months	95 . . . 205°C	5 h . . . 0.5 h	0.1 . . . 0.5	-270°C	+ 260°C	+ 310°C	component A = 60 ml B = 30 ml
1 year	95 . . . 200°C	16 h . . . 0.5 h	0.1 . . . 1.5	– 240°C	+ 250°C	+ 315°C	5 double pouches à 10.5 g = 52.5 g

[1] zero-point related measurement [2] non zero-point related measurement [3] curing conditions: relative humidily between 30-80%

SG accessories ... strain gage covering agents

The quality of a measuring point with strain gages is not only dependent on the strain gage itself but mainly on the type of installation and its implementation. A perfectly functioning measuring point requires a thorough preparation of the installation surface, careful bonding, correct connection, and a protective covering. It is therefore important to provide the user with all necessary aids. With its strain gage accessories, the HBM product range offers everything necessary for a good strain gage installation.

Strain gage covering agents

In general, it is recommended that strain gages be protected against external effects such as humidity or mechanical damage since even small fluctuations in the atmospheric humidity affect the measured signal of a strain gage.
Suitable covering agents should have only minimum effects on the measuring point. Strain gage and test object must not be affected at all. Criteria for selecting the appropriate covering agent should be:

- application temperature,
- media surrounding the measuring point.

The following table will help in the selection of a suitable means of measuring point protection, which for special requirements can also be carried out in several layers. For instance, it would make sense to apply AK22, with - in extremely humid environments - additional sealing by ABM 75. Caution: NG150 cannot be combined with PU120. Please ensure, in the case of multi-layer covering, that the second layer may only be applied after full curing of the first layer and that it should overlap on all sides. All HBM covering agents are supplied with a safety data sheet.

SG accessories ... strain gage covering agents


ABM 75


AK 22


PU 120


SG 250


NG 150


SL 450

Strain gage covering agent	Temperature range of resistance in air in °C	Package contents	One package suffices for approx.	Application method	Curing conditions	Storage capability at room temperature	Components
AK 22 viscous putty Order no.: 1-AK 22	– 50 . . . + 170	1 kg	30 strain gages	kneading on by hand	–	unlimited	viscous, kneadable sticky putty
ABM 75 aluminum foil c/w knead. compound Order no.: 1-ABM 75	– 196 . . . + 75	11 pcs. 205 mm x 100 mm	200 strain gages	pressing on by hand	–	unlimited	0.05 mm thick aluminum foil, coated with 3 mm thick kneading compound
NG 150 [1)] nitrile rubber Order no.: 1-NG 150	– 269 . . . + 150	3 bottles c/w approx. 25 cm^3 each	35 strain gages	brush application	air drying at room temperature	max. 1 year	one-component solvent containing nitrile rubber
SG 250 transparent silicone rubber Order no.: 1-SG 250	– 70 . . . + 250	tube with approx. 85 g	20 strain gages	tube application	air drying at room temperature	6 months	transparent one-component solvent free silicone rubber
PU 120 [1)] polyurethane paint Order no.: 1-PU 120	– 40 . . . + 120	3 bottles c/w approx. 30 ml each	250 strain gages	brush application	room temperature . . . + 100°C	1 year	one-component solvent containing polyurethane paint
SL 450 transparent silicone resin Order no.: 1-SL 450	– 50 . . . + 450	3 bottles c/w approx. 25 g each	90 strain gages	brush application	in temperature steps from 95°C ... 315°C	6 months	transparent solvent containing silicone resin

1) Caution: PU120 cannot be combined with NG 150

SG accessories ... strain gage covering agents

Chemical resistance of HBM covering agents

Chemical substance	AK 22	ABM 75	NG 150	SG 250	PU 120	SL 450
Exposure	yes	yes	yes	yes	yes	yes
Water:	yes	yes	yes	yes	yes	yes
water under pressure (400 bar)	yes	–	–	–	–	–
condensation	–	–	–	–	yes	–
tropical climate	–	–	–	–	yes	–
vapour	no	–	–	–	–	–
Oils:	no	no	yes	yes	yes	–
engine oil (RT/70°C)	–	–	yes	–	–	–
mineral oil (RT/70°C)	–	–	yes	–	–	–
hydraulic oil (RT/70°C)	–	–	yes	–	–	–
Fats	–	–	–	–	yes	–
Solvents general	no	conditional	conditional	no	conditional	conditional
Fuels:	no	no	yes	no	–	–
petrol	no	no	yes	no	–	–
kerosene	–	–	yes	–	–	–
Aromatic substances/aliphatic mixtures	–	–	conditional	–	–	–
Aromatic substances:	no	no	conditional	no	conditional	no
benzene	–	–	no	–	–	–
toluene	no	no	conditional	no	yes	no
xylene	no	no	conditional	no	conditional	no
Chlorinated solvents:	no	no	no	no	no	no
dichloromethane	no	no	no	no	no	no
carbon tetrachloride	–	–	no	–	–	–
perchloroethylene	–	–	no	–	–	–
1.2-dichloroethane	–	–	no	–	–	–
o-dichlorobenzene	–	–	no	–	–	–
Alcohols:	conditional	yes	conditional	conditional	conditional[1)]	yes
ethyl alcohol	conditional	yes	conditional	conditional	conditional	yes
methyl glycole	–	–	no	–	conditional	–
butyl alcohol	–	–	conditional	–	conditional	–
iso-propyl alcohol	–	–	conditional	–	conditional	–
ethylene glycole	–	–	yes	–	–	–
Ketone:	conditional	conditional	no	no	no	conditional
acetone	conditional	conditional	no	no	no	yes
methyl ethyl ketone (MEK)	no	no	no	no	no	conditional
Terpene:	–	–	conditional	–	–	–
dipenten	–	–	conditional	–	–	–
turpentine	–	–	yes	–	–	–
Acids:	no	conditional[2)]	conditional	yes	no	yes
hydrochloric conc.	no	–	conditional	yes	no	yes
sulphuric acid 50 %	no	–	yes	yes	no	yes
acetic acid 50 %	no	–	no	yes	no	conditional
nitric acid 50 %	no	–	no	yes	no	yes
oleic acid conc.	–	–	yes	–	–	–
lactic acid conc.	–	–	conditional	–	–	–
air which contains acid	–	–	–	–	yes	–
Lyes:	conditional	conditional[2)]	conditional	no	conditional	yes
sodium hydroxide 10 %	conditional	–	no	no	no	yes
potassium hydroxide 10 %	–	–	no	–	–	–
ammonia 28 %	–	–	conditional	–	–	–
air which contains alkaline	–	–	–	–	yes	–
Liquified gases (except oxygen)	–	–	yes	–	–	–
UV resistance	yes	yes	yes	yes	yes	–

[1)] low alcohol
[2)] up to 5 % (destruction of aluminum foil)
conditional = conditionally resistant
(minimum 10 days at RT)

Chemical resistance:
Unless identified specifically, the resistance refers to room temperature. No information can be provided on long term effects. The data is based on our own experience or was taken from literature. Since the specific conditions vary with each user, it is recommended individual users carry out their own tests on resistance. Some covering agents become milky when in contact with some chemicals.

SG accessories ... cleaning agents, aids for bonding and soldering

Cleaning agent RMS 1

Satisfactory bonding joints are only achieved if the adhesive covers the bonded surfaces well. Therefore, the application surfaces must be cleaned prior to bonding with a chemically pure solvent and a clean cleaning pad. RMS 1 is an environmentally friendly mixture of Isopropanol and Acetone which dissolves all normal contamination.
One packing unit contains 1 l cleaning agent and 500 cleaning pads.
Order no.: 1-RMS 1

Teflon foil

33 m Teflon foil on reel, suitable for cold curing and hot curing strain gage bonding. The Teflon foil prevents other material except the strain gage from bonding to the component.
Thickness: 0.05 mm, width: 60 mm
Order no.: 1-Teflon

Flux pen

Soldering aid in felt pen format helps to achieve perfect small soldering connections. Suitable for solders with melting points up to 350°C. The flux pen contains non-corrosive flux without chloride.
Package contents: 5 pcs.
Order no.: 1-FS 01

Flux pen

Polyimide tape

33 m heat resistant tape, 19 mm in width. Suitable for all standard strain gage installation procedures to ensure safe positioning of the strain gage on the workpiece.
Temperature resistant up to 270°C
Order no.: 1-Klebeband

Cleaning pads

Cellulose for cleaning of test objects prior to strain gage installation.
Format 5 cm x 5 cm.
Package contents: 500 pcs.
Order no.: 1-8402.0026

Cleaning agent dispenser

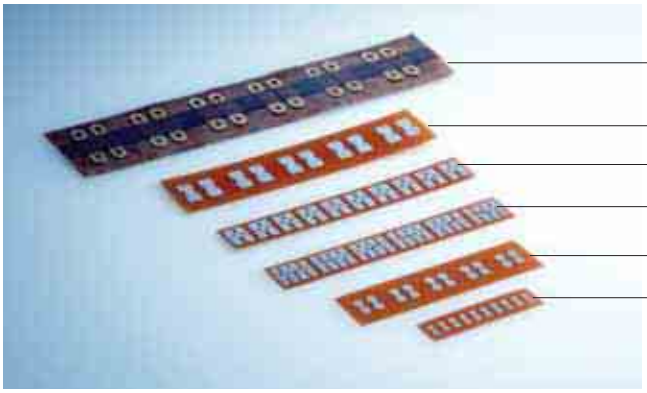
In order to avoid contamination of the solvent in the course of time, we recommend to use the RSP 120 cleaning agent dispenser.
Order no.: 1-RSP 120

Cleaning agent dispenser

Resin cored solder

Resin cored solder as used in strain gage applications. Soldering wire Ø 0.5 mm consisting of solder S-SN60Pb38Cu2 with resin core, type F-SW32. The flux is non-corrosive. Conversion to lead-free solder is scheduled for 2006.
Melting range: 183 to 190 C.
Delivery form: 1 kg on reel
Order no.: 1-Lot

SG accessories ... solder terminals

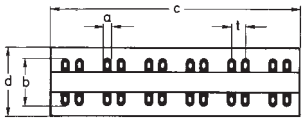


For strain gages with leads or wires, solder terminals should be installed between the connecting cables and the strain gage itself. This facilitates the perfect soldering joint and provides strain relief of the strain gage connections. The solder terminals are installed in the same manner as the strain gages onto the test object. HBM offers solder terminals in different designs and dimensions.

Order no.	Dimensions (mm)					Contents per package
	Soldering tag		Carrier		Distance	
	a	b	c	d	t	
1-LS 2	2,5	14	72	20	4	36 pairs

LS2

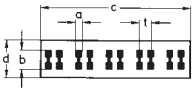
bronze soldering tag on teflon carrier suitable for dynamic loads
attachement to test object: bonding
usable up to 180°C, for short periods up to 260°C



Order no.	Dimensions (mm)					Contents per package
	Soldering tag		Carrier		Distance	
	a	b	c	d	t	
1-LS 7	1	3	20	6	2	125 pairs
1-LS 5	1.5	4.5	35	10	2.5	125 pairs
1-LS 4	2.5	6.5	50	13	4	125 pairs

LS7/5/4

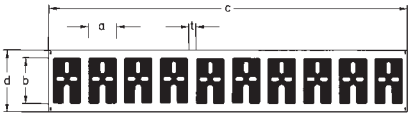
copper, nickel-plated, on polyimide
attachment to test object: bonding
usable up to 180°C, for short periods up to 260°C



Order no.	Dimensions (mm)					Contents per package
	Soldering tag		Carrier		Distance	
	a	b	c	d	t	
1-LS 212	3.7	6	47.5	8	1	125 pairs

LS212

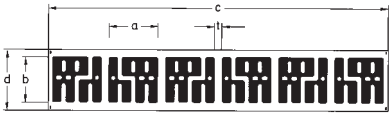
copper nickel-plated on polyimide
attachement to test object: bonding
usable up to 180°C, for short periods up to 260°C



Order no.	Dimensions (mm)					Contents per package
	Soldering tag		Carrier		Distance	
	a	b	c	d	t	
1-LS 224	6.5	6	45	8	1	75 pairs

LS224

copper nickel-plated on polyimide
attachement to test object: bonding
usable up to 180°C, for short periods up to 260°C



SG accessories ... cables and stranded wires

PVC ribbon cable

PVC insulated ribbon cable consisting of six leads each with a cross section of 0.14 mm², 50 m per reel, resistance 0.131 Ω/m.
Order no.: 1-3133.0034

Paint insulated copper wire

Polyurethane-insulated copper wire with a cross section of 0.04 mm², 25 m in length.
Order no.: 1-CULD01

Jumper wire

Teflon insulated jumper wire with a cross section of 0.05 mm², yellow, 100 m per reel, resistance 0.34 Ω/m.
Order no.: 1-3130.0239-G

Very flexible stranded wire

For internal, exposed wiring of transducers; cross section of 0.04 mm² (multi-wire) and 0.6 mm outer diameter, resistance 0.417 Ω/m, permissible temperature +70°C, 25 m per reel, PVC insulation.
Order no. 1-SLI 01

Flexible stranded wire

Teflon-insulated flexible stranded wire with a cross section of 0.24 mm² (multi-wire) and an outside diameter of 0.9 mm, 100 m per reel, resistance 0.0741 Ω/m.

blue Order no.: 1-3301.0092-B
green Order no.: 1-3301.0091-Gr
white Order no.: 1-3301.0094-W
black Order no.: 1-3301.0088-S
red Order no.: 1-3301.0089-R

Designation	Insulation	Thermal resistance	Chemical resistance	Typical application
Flexible stranded wire 1-3301.0088-S 1-3301.0089-R 1-3301.0091-Gr 1-3301.0092-B 1-3301.0094-W	Teflon	– 200 . . . + 260 °C	resistant against nearly all chemicals. except: elementary fluoride, chlorine trifluoride, molten alkali metals	for internal connection of strain gage bridges or for contacting from strain gage through to solder terminal
Jumper wire 1-3130.0239-G	Teflon	– 200 . . . + 260 °C	see flexible stranded wire	see flexible stranded wire
Very flexible stranded wire 1-SLI 01	PVC	short period 105 °C permanent ...70 °C	non resistant against: ester, chlorinated hydrocarbons, ketone, aromatic hydrocarbons, benzene, liquid halogens, nitric acid conc., depending on the softener used, also aqueous solutions	for internal connection of the strain gages in the transducer
PVC ribbon cable 1-3133.0034	PVC	short period 105 °C permanent ...90 °C	see very flexible stranded wire	see very flexible stranded wire
Paint insulated copper wire 1-CULD 01	Polyurethane	short period 120 °C permanent -40...80 °C	non resistant against: strong acids, strong lyes, alcohols, aromatic hydrocarbons, saturated vapor, hot water	for internal connection of the strain gages in the transducer

SG accessories ... cable and stranded wire

Shielded

Type	Kab4.1/00-3	Kab5/00-4	Kab8/00-4	Kab7/00-4	Kab9/00-4
Notes	Inexpensive cable for connection of 1/4 bridges in three-wire circuit (CF 600 Hz < 50 m; CF 4.8 kHz <20 m)	Low-capacitance, therefore also suitable for CF amplifiers and longer distances. Very thin, predestined for geometrically critical circumstances	Very low-capacitance cable with low line resistances, therefore suitable for long distances	Wide temperature range and good chemical resistance. If CF amplifiers are used, the usable cable length is reduced (CF 600 Hz < 50 m; CF 4.8 kHz <20 m)	See KAB7/00-4, however, with lower line resistance, therefore, wider range if low-frequency CF amplifiers or DC amplifiers are used
Sheath color	gray	gray	gray	gray	gray
No. of cores	3	4	4	4	4
Outside diameter [mm]	4.1	5	8	6.5	8.8
Core cross section [mm]	0.14	0.17	0.26	0.5	1.25
Insulation material (core)	PVC	PE	PE	Teflon	Teflon
Sheath material	PVC	PVC	PVC	silicone	silicone
Resistance [Ω/m]	0.130	0.106	0.075	0.040	0.014
Insulation resistance (core-core) [Ω/m]	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}
Capacitance (core-core) [pF/m]	110	80	67	140	140
Capacitance (core-shield) [pF/m]	110	80	67	140	140
Temperature range [°C]	-20....80	-35....80	-35....80	-50...180	-50...180
1/4-bridges in 3-wire circuit, half bridges without sensing lead connected	x	x	x	x	x
1/4-bridges in 4-wire circuit, full bridges without sensing lead connected	x	x	x	x	x
Half bridges; full bridges with sensing lead connected					
Order no.	4-3131.0017	4-3133.0002	4-3133.0023	4-3131.0048	4-3131.0012

Minimum order quantity: 10 m

For more information please refer to our Price List (load cells, transducers, amplifiers, data acquisition and software)

SG accessories ... cable and stranded wire

cable

	Kab5.4/00-6	Kab6.5/00-6-TPE	Kab6.5/00-6-SIL	Kab4.2/00-6-PUR	Kab8/00-2/2/2	Kab8/00-2/2/2 SIC
	Inexpensive 6-wire cable for uncritical applications (CF 600 Hz < 50 m; CF 4.8 kHz <20 m)	See Kab5.4/00-6, however, with extended temperature range	Chemically resistant cable with extended temperature range. Reduced capacitance and low resistance, therefore, suitable for longer distances	Special cable for use in the soil (CF 600 Hz < 50 m; CF 4.8 kHz <20 m)	Quad-shielded cable twisted in pairs, also suitable for longer distances and higher-frequency CF amplifiers	See Kab8/00-2/2/2, however, better chemical resistance
	gray	gray	gray	black	gray	gray
	6	6	6	6	6	6
	5.4	6.5	6.5	4.2	7.5	7.5
	0.14	0.25	0.25	0.15	0.14	0.14
	PE	TPE	Teflon	TPE	PE	PE
	PVC	TPE	silicone	PUR	PVC	silicone
	130	77	80	ca. 120	138	138
	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}	10^{12}
	82	100	100	95	75	75
	82	100	100	140	130	130
	-30...85	-50....120	-50....180	-50....125	-30....70	-30.....70
	x	x	x	x	x	x
	4-3131.0071	4-3301.0115	4-3301.0108	4-3301.0151	4-3301.0071	4-3301.0169

SG accessories ... bridge completion, resistance meter

Bridge completions

Bridge completion resistors are connected to the strain gages of a measuring point to form the Wheatstone bridge circuit. In accordance with the nominal strain gage resistances, HBM offers different resistance values.
2 x 120 Ω, Order no.: 3-3054.0334
2 x 350 Ω, Order no.: 3-3054.0282

TO 3 resistance meter

The TO 3 is an electronic measuring unit (ohmmeter and megohmmeter) for determining resistances within the range of 0 to 50 G Ω. This pocket megohmmeter has been designed, and is particularly suitable, for fast checking of the insulation resistance of strain gage installations and strain gage resistances in the field and in service.
It features a total of 16 measuring ranges for insulation resistance and throughput measurements. Four self-adjusting measuring voltages (50 V, 25 V, 10 V, and 2.5 V) enable adaptation to the measuring task in hand and prevent any possible destruction of a specimen by a test voltage which is too high. The megohmmeter is accommodated in a solid plastic housing complete with carrying handle, and it is supplied with a protective bag and two measuring cables.
Order no.: 1-TO3

Specifications		TO 3 resistance meter
measuring range	MΩ	0 – 50,000
number of measuring ranges		16
minimum resistance that can be read off	Ω	20
measuring voltages	V	2.5; 10; 25 and 50, dep. on measuring range
open circuit voltage		1.1 x UN max.
display		analog display with mirror scale, scale length 110 mm
application position		horizontal
accuracy class		2.5 (IEC publication 51)
adjustment time, max.	s	4
operating temperature range	°C	0...+40 (30% up to 60% rel. humidity)
temperature error	%/10K	±1.5
batteries		6 pcs. 1.5 V, rod batteries (type IEC LR 14)
number of measurements		approx. 2,000 with a single battery set
protection class per EN 60529 (IEC 529)		IP 50 (measuring mechanism), IP 20 (other parts)
safety		EN 61010-1 class 2, (tested at 1 kV AC / 1 min.)
conformity (CE mark)		EN 45014, EN 50081-1, EN 50082-1, EN 61010-1, IEC 51, IEC 529, VDE 0410
housing		plastic, impact resistant, with carrier strap
dimensions	mm	205 x 128 x 100
weight, approx.	kg	1

SG accessories ... installation case

DAK 1 strain gage starter kit

The DAK1 starter kit is convenient to use, contains the equipment needed for installing strain gages for the first time and provides an easy introduction to strain gage technology. The specialized book by Karl Hoffmann, an experienced specialist in strain gage technology, provides comprehensive know-how both on the installation and wiring of strain gages and on the evaluation of measured values.
For the first pratical steps it includes:

- strain gages,
- solder terminals,
- cleaning agents and cleaning pads,
- emery cloth,
- the cold curing adhesives X60 and Z70,
- stranded connection wires,
- 2 agents for measuring point protection: AK22 and ABM75

Because DAK1 has been used in company-internal strain gage and instrumentation seminars for many years, the contents of this kit has been constantly optimized.
Order no.: 1-DAK1

Contents of DAK 1

10	LY11-6/120A SG
1	Z 70
1	X 60
1	AK 22
1	ABM 75
	Solder terminals
	Stranded connection wire
	Emery cloth
	RMS 1
	Cleaning pads
	Solder
1	Specialized book „An Introduction to Measurements using Strain Gages“
1	Petri dish

DAK 2 strain gage installation case

The DAK 2 strain gage installation case contains all tools and aids required for strain gage installations. It is portable and lockable. In the bottom part of the DAK 2 there is empty space for various adhesives and other uses, below the removable insert.
Dimensions: 470 x 170 x 360 mm
Weight: approx. 6 kg
(incl. standard scope of delivery)
Order no.: 1-DAK 2

Contents of DAK 2

1	Ersa soldering iron (16 W)
1	flat brush
1	folding magnifying glass (6 times)
1	graduated ruler, 150 mm
1	glass fiber erasing brush, plus 1 spare brush
1	pair of scissors, toothed
1	pair of pointed scissors
1	wide pair of tweezers
1	pointed pair of tweezers
1	flexible ruler, 300 mm
1	dental probe with bent tip
1	cement spatula
1	cutting pliers with wire strippers
1	Petri dish 60/15
1	scalpel holder, plus 6 blades
10 m	ribbon cable 6 x 0.14 mm², multi-colored
25 g	solder diameter Ø 1 mm
1	lux pen
1	roll of Scotch tape
1	rubber
1	HBM pen
1 each	sheet of corundum cloth grain size 180/220/360
100 cm³	cleaning agent RMS 1
200	cleaning pads 50 x 50 mm

HBM-software ... for stress analysis

With its catman family HBM provides the complete measurement chain – the complete solution from strain gages right through to the software.

The amplifier is set up by simply assigning the strain gage or sensor from the sensor database.

Already during the measurement, the comprehensive mathematics library enables strain gage rosettes to be analyzed online.

catman®Easy

Easy data acquisition software

- Quick results thanks to modern and intuitive user interface
- Library for experimental stress analysis
- Graphical data analysis with optional export of curves (e.g. Word)
- Data export in commonly used formats (Excel, ASCII, DIAdem)

catman®Professional

The complete solution for measurement, visualization, analysis and documentation

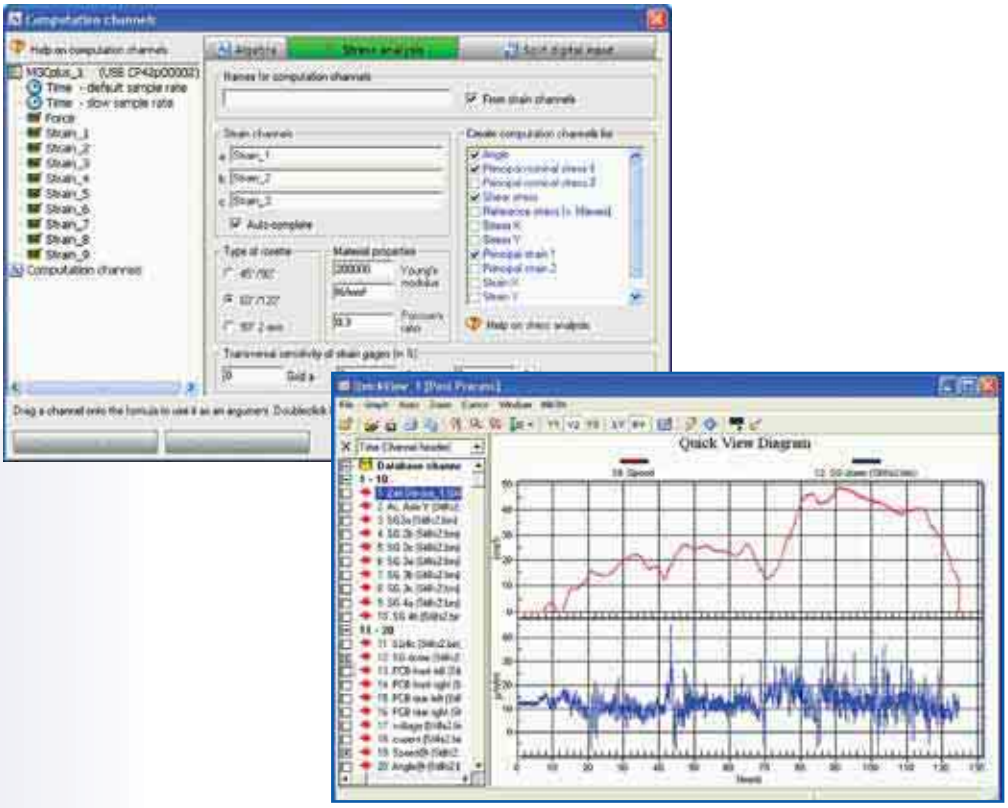
- Free definition of individual interfaces for visualization and reports
- Mathematical analysis (signal analysis, statistics, etc.)
- Automation of individual measurement sequences
- Development of your own applications using catman Script
- Open ActiveX interface

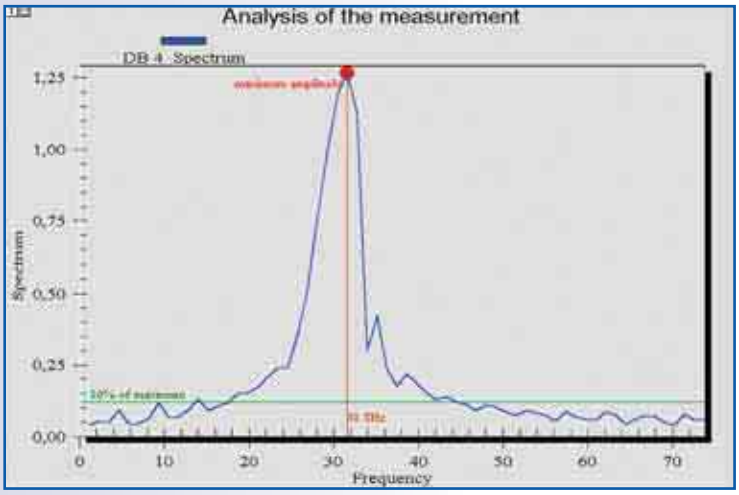
catman®Enterprise

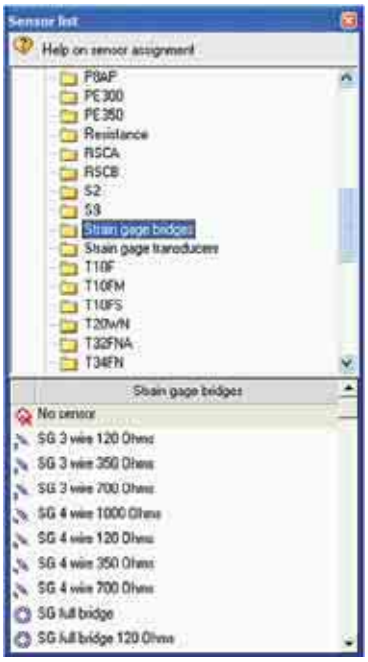
Comfortable configuration of up to 10,000 channels

- Client/server architecture for distributed data access over a network
- Online data distribution to several client PCs
- Comprehensive trigger functions (e.g. reference curve or limit trigger)
- Complete measurement run reported in a log file
- Automatic check of all strain gage measuring points
- Trend analysis

... for stress analysis







QuantumX-family

HBM amplifiers ... used in stress analysis

MGCplus

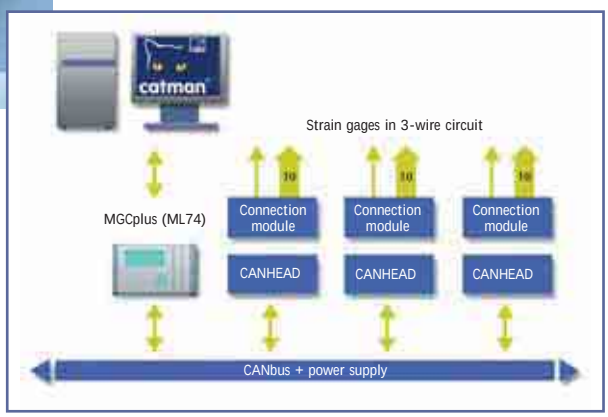
Modular computer-controllable measuring amplifier system for universal applications

- stand-alone amplifier modules for all standard measurement quantities
- different computer interfaces (RS232, Ethernet, USB, CANbus, ProfibusDP)
- parallel synchronous data aquisition of up to 128 channels per device
- sampling rate of up to 19,200 measured values / sec. / channel
- 24 bit resolution
- can be operated manually via operating panel or computer
- stand-alone data acquisition on PC-Card hard disk
- proven HBM technology also with 8-channel modules
- quarter, half- and full bridge connection
- patented transducer identification technology, T-ID and TEDS

MGCplus amplifier system from HBM

CANHEAD

Amplifier module for installation close to the measuring point and for data transfer via standard CANbus system. A maximum of 10 strain gages per CANHEAD amplifier module and up to 12 CANHEADs can be connected to one CANbus line. Installation costs can be reduced by a ratio of 10:1.



CANHEAD includes two components:

- intelligent base module for strain gage wiring
- amplifier module for the amplifying and processing of measured signals

HBM amplifiers ... used in stress analysis

Spider8 and Spider8-30

PC measurement electronics with 4 carrier frequency amplifiers. Spider8 can be retrofitted with SR55 (4.8 kH) and SR01 (DC module), Spider 8-30 can be retrofitted with SR30 (600 Hz) and SR01 (max. 8 channels per device).

- Voltage supply via power pack or 10 – 16 V/DC
- Sensor supply, signal adaptation, A/D conversion, digital filter and computer interface in EMC tested housing
- High sampling rate at 16 bit resolution
- Parallel and serial interface for parameterization of the device and data acquisition.

Connection, for example, via parallel printer port of the computer; optionally via USB adaptor.

- No PC interference required
- 8 devices can be cascaded via parallel interfaces
- Can be combined with laptop computer for mobile applications

Scout55

Single channel universal amplifier with carrier frequency 4.8 kHz for strain gage half- and full bridges, inductive half- and full bridges, LVDT, piezo-resistive and potentiometric transducers

- Serial interface signal output and full parameterization
- Interactive control via LCD display

T-ID

In experimental stress analysis with large numbers of measuring points, strain gages are identified using T-ID modules. An unambiguous, 64-bit-long identification number written on the T-ID module in a non-erasable format is read off through the same cable connections that are also used for transmission of the analog measurement signals. Thanks to the patented wiring technique, the additional digital information processing does not affect the highly sensitive and precise analog measurement signal.

Similar to the solder terminals, T-ID modules can be located in the direct vicinity of the strain gage. HBM software enables alias names to be assigned to the identification numbers and LEDs on the T-ID modules to be driven which facilitates locating of individual strain gages.

Literature, teaching pack, seminars, CD ROM

Specialized book

„An Introduction to Measurements Using Strain Gages“.
A practical introduction into this specialist area of measurement technology with a focus on how to avoid or correct measuring errors.
Order no. 1-Hoffm. Buch-D (German)
1-Hoffm. Buch-E (English)

Strain gage teaching pack

The strain gage teaching pack provides a multimedia introduction to the installation of strain gages. The film explains the competent installation of strain gages by means of cold curing and hot curing adhesives.
In addition, the tips and tricks shown can be read in the manuscript and in the specialized book „An Introduction to Measurements Using Strain Gages“.
Order no.: 1-DMS-Lernpaket

Seminars

Learning by rote is not our style. HBM offers you practical basic and advanced training in the field of the electrical measurement of mechanical quantities. By means of hands-on lectures, the basics will first be explained and demonstrated, and then used in practice in subsequent training courses. Theory and practice sessions alternate several times during the course of the seminar, in order to discuss and clarify questions - which usually first occur in practical application sessions - in the next theory block.

Our concept offers the right seminar for everybody – ranging from the free one-day lecture through workshops up to 1-week seminars.

seminars, CD ROM

DK

Basics of strain gage bonding and measuring technology
Target group: Specialist personnel, master tradesmen or engineers who want to implement strain gage installations independently and under their own responsibility.

DM

Strain gage measuring technology in the manufacture of transducers and in experimental stress analysis
Target group: Users from all specialist disciplines who want to carry out measurements by means of strain gages.

For more detailed information on our seminars on HBM device technology and software and all seminar dates, please visit our homepage at www.hbm.com. Or request our seminar program from seminare@hbm.com.

It is of course possible to implement all seminars that are offered in our seminar center at Darmstadt directly on your own premises. On request, we will modify our seminars in order to enable us to offer a target-oriented basic and advanced training.

DMSdirekt CD/SGdirect CD

Electronic order catalog and manual for strain gages
The CD-ROM DMSdirekt is to make it as easy as possible for you to apply and order strain gages. The CD-ROM DMSdirekt contains:

- help and assistance with regard to strain gage selection,
- installation notes,
- tips and tricks in strain gage handling,
- the option to generate a legally binding strain gage quotation for yourself as well as to print out the appropriate order
- film “The correct installation of strain gages using our Z70 superglue”.

To request your free DMSdirekt CD/SGdirect CD,
please e-mail to info@hbm.com