FISCHER MESS- UND REGELTECHNIK

Instruction Manual

DA09 || Differential Pressure Gauge

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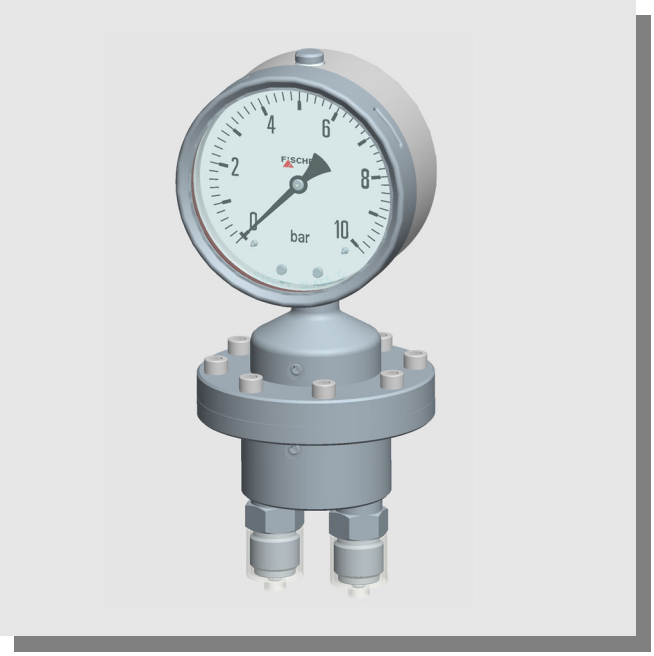


1. Safety Instructions

1.1. General

This manual contains detailed information about the product, and instructions for its installation, operation and maintenance. Operators and other technical personnel responsible for the equipment must read this thoroughly before attempting to install or operate this equipment. A copy of this manual must always be kept accessible at the place of work for reference by concerned personnel.

Chapter 1 (sections 1.2 through 1.7) contains general as well as specific safety instructions. Chapters 2 through 10, covering topics ranging from intended purpose of the equipment to its final disposal, also include important points relating to safety. Overlooking or ignoring any of these safety points can endanger humans and animals, and possibly cause damage to other equipment.

1.2. Personnel Qualification

Personnel responsible for installation, operation, maintenance and inspection of this product must have the qualifications, training and experience necessary to carry out such work on this type of equipment.

1.3. Risks of Disregarding Safety Instructions

Disregarding safety instructions, use of this product for purposes for which it is not intended, and/or operation of this product outside the limits specified for any of its technical parameters, can result in harm to persons, the environment, or the plant on which it is installed. Fischer Mess- und Regeltechnik GmbH will not be responsible for consequences in such circumstances.

1.4. Safety Instructions for Operators

Safety instructions for the proper use of this product must be followed. This information must be available at all times to by personnel responsible for installation, operation, maintenance and inspection of this product. Adequate steps must be taken to prevent the occurrence of hazardous conditions that can be caused by electric energy and the convertible energy of the process media. Such conditions can, for example, be the result of improper electrical or process connections. Detailed information is available in relevant published norms (DIN EN, UVW in Germany; and equivalents in other countries), industrial standards such as DVWG, Ex-, GL-, VDE guidelines, as well as regulations of the local authorities (e.g., EVUs in Germany).

1.5. Modifications Forbidden

Modification or other technical alteration of the product is not permissible. This also applies to the use of unauthorized spare parts for repair / maintenance of the product. Any modifications to this product, if and as necessary, should be done only by Fischer Mess- und Regeltechnik GmbH.

1.6. Operational Restrictions

The operational reliability of the product is guaranteed only when used for intended purposes. The product must be selected and configured for use specifically with defined process media. The limiting values of operating parameters, as given in the product specification sheet, must never be crossed.

1.7. Safety Considerations during Installation and Maintenance

The safety instructions given in this manual, existing national regulations relating to accident prevention, and the internal safety rules and procedures of the user organization regarding safety during installation, operation and servicing must all be followed meticulously.

It is the responsibility of the users to ensure that only suitably qualified and experienced technical personnel are used for installation, operation and servicing of this equipment.

2. Intended Applications

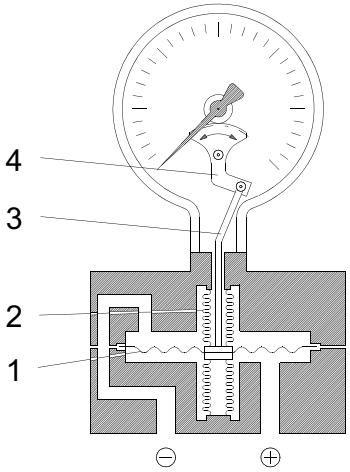
The product must be used only for applications and under conditions specified by the manufacturer.

The instrument is intended as indicator and switch for gaseous and liquid media.

The inbuilt switching elements are adjustable slot-type initiators or delayed action or magnetic snap action limit contatcs. When the given limit is exceeded output circuits are opened or closed.

3. Product Description and Functions

3.1. Schematic Diagram



1 Sensing diaphragm
2 Sealing / spring bellows
3 Connecting rod
4 Pointer mechanism

3.2. Principles of Operation

The pressures to be compared are connected to adjacent pressure chambers separated by a flexible metal diaphragm. The diaphragm is loaded by a pair of opposing coaxial bellows springs, one on each side of the diaphragm.

The bellows on one side also serves to isolate the surrounding pressure chamber from the gauge mechanism, thus protecting the mechanism from the media. A connecting rod links the diaphragm through the isolating spring bellows to the dial mechanism.

When pressures on both sides of the diaphragm are equal, the diaphragm is at zero deflection. When there is a pressure difference between the two chambers, the diaphragm is deflected away from the higher pressure chamber, towards the lower pressure chamber. The resulting linear displacement of the connecting rod is translated into angular movement of the gauge's dial pointer, through a precision mechanism. The angular movement of the pointer is proportional to the pressure difference across the diaphragm.

4. Installation

Types with inbuilt limit switches need matching connection to fixed cable connection to guarantee protection class IP65. Its outer diameter needs to be between 7 and 13 mm.

The instrument can be mounted on walls, mounting plates, tubes, in panels or on boards by adapted accessories (see. 11. Specifications and 12. Dimensions for details).

The instrument is intended and factory adjusted for vertical mounting, pressure ports downward. When mounted in other orientation (max. ± 10°) the pointers' zero position needs to be adjusted (see 5.2).

4.1. Process Connections

- Only qualified technicians authorized for this type of work should undertake installation.
- Ensure that process equipment and pressure lines are at atmospheric pressure before making pressure connections.
- The instrument should be provided with suitable protection against pressure surges (e.g., snubber or pulsation damper).
- Ensure that the mechanical configuration and materials of construction of the instrument are compatible with the process media.
- Ensure that process pressure is always less than the specified safe pressure rating.

4.2. Electrical Connections

- Only qualified technicians authorized for this type of work should undertake installation.
- Electrical connections must comply with relevant international, national and local regulations and norms relating to electrical and instrumentation installations.
- Switch off electrical power to the plant before attempting electrical installation work of any kind.
- Make electrical connections to the instrument through a suitable energy-limiting safety device (isolation or zener barrier).

5. Commissioning

- Power supply and signal cabling to the instrument must be correctly selected to meet operational requirements, and installed in a way that does not cause physical stress to the instrument.
- Pressure lines must have a downward gradient throughout from the pressure instrument to the process vessel / pipe. This is to prevent formation of air / gas pockets (for liquid applications) and liquid plugs (for air / gas applications). If this continuous downward gradient cannot be provided for any reason, then suitable water and / or air separation devices must be inserted into the pressure lines.
- Pressure lines must be kept as short as possible and must not have short bends to avoid measurement errors induced by pressure line delays.
- When used with liquid media the pressure lines must be vented, for different heights in head of liquid in lines cause measuring errors. The instrument and lines must be protected against frost when used with water.
- Carefully check the tightness of all pressure connections before start-up.

5.1. Pressure Connections

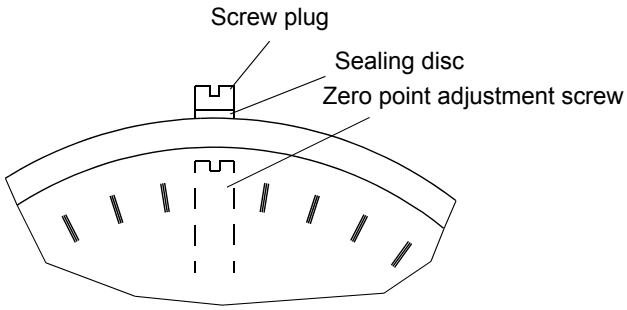
The instruments pressure ports are marked by "+" and "-" symbols. For differential pressure applications the "+" port must be connected to the higher pressure and the "-" port should be connected to the lower pressure.

5.2. Zero Point Adjustment

The differential pressure gauge is factory adjusted therefore in normal case adjustment during installation is not necessary.

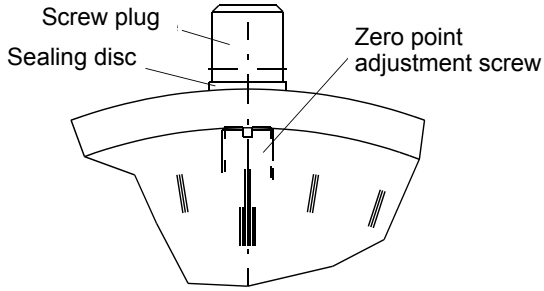
- Equalize pressure in both chambers.
- Unmount screw plug.
- Use zero point adjustment screw to set the pointer to zero.
- Mount screw plug.

5.2.1. Zero Point Adjustment Screw Position



5.2.2. Zero Point Adjustment Screw Position (Filled Models)

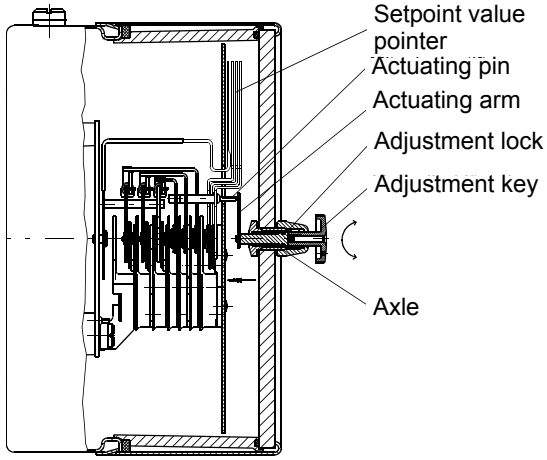
Filled Models need to be vented before commissioning by opening the air valve on the upper side of instrument!



5.3. Setting of Switching Points

An adjustment lock is located in the instruments sight glass. The switching contacts located on the setpoint value indicators can be adjusted to any point of scale by the removable adjustment key.

For reasons of switching accuracy and products life span switching points should be within range of 10% to 90% of scale.



Adjustment Sequence:

- Attach adjustment key on axle of adjustment lock.
- Press axle inwards until the actuating arm interlocks with the actuating pins.
- Turn adjustment key until setpoint value pointer reaches the desired switching point.
- Release axle and remove adjustment key.

5.4. Connection Scheme / Contact Function

See connection scheme on instrument and datasheet Limit Transducer KE... .

Contact Function:

Function 1: Contact closes when the pointer increments clockwise.

Function 2: Contact opens when the pointer increments clockwise.

Contact Assignment:

Contact 1 - setpoint value pointer on the left

Contact 2 - setpoint value pointer in the middle

Contact 3 - setpoint value pointer on the right

6. Maintenance

The instrument is inherently maintenance-free.

However, to ensure reliable operation and maximize the operating life of the instrument, it is recommended that the instrument, its external electrical and process connections, and external connected devices be regularly inspected, e.g.:

- Check the display.
- Check the switching function in connection with external devices.
- Check all pressure connections for leak-tightness.
- Check the integrity of all electrical connections of the instruments.

Inspection and test schedules depend on operating and site conditions. The operating manuals of other equipment to which the instrument is connected must be read thoroughly to ensure that all of them work correctly when connected together.

7. Transport

The product must be protected against shock and vibration during transport. It must therefore be properly packed, preferably in the original factory packaging, whenever it is to be transported.

8. Service

Any defective devices or devices with missing parts should be retourned to Fischer Mess- und Regeltechnik GmbH. For quick service contact our service department.

Remaining medium in and on dismantled measuring instruments may cause danger to persons, environment and equipment. Take reasonable precautions! Clean the instrument thoroughly if necessary.

9. Accessories

- Three-spindle blocking and equalizing valve DZ93...
- Four-spindle blocking, equalizing and venting valve DZ94...

10. Disposal

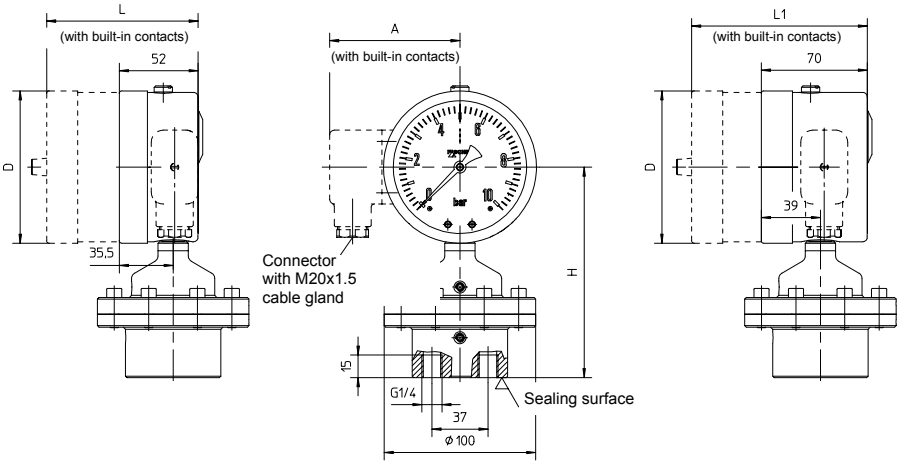
Protect your environment!
Use the product in accordance with relevant regulations. Please be aware of environmental consequences of disposal at the end of the product's life, and take care accordingly.

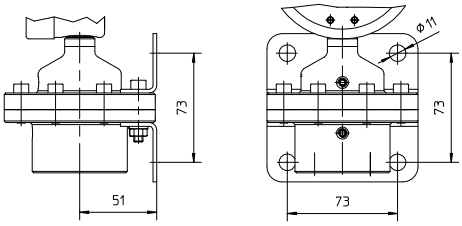
11. Specifications

General	Ranges / max. statc pressure	0...25 mbar to 0...250 mbar / 10 bar 400 mbar to 0...25 bar / 25 bar
	Accuracy	± 2.5% FS
	Max. differential overpressure	Either side: 10 x FS
	Indicator	Circular dial type, 100mm or 160mm diameter, safety housing DIN EN 837 NG 100 o. NG 160
	Operating temperature	Ambient: -20°C to +80°C Medium: +100°C, maximum
	Temperature coefficient	Approx. 0.3% / 10K
	Zero adjustment	By screw on top of gauge housing, ±25% FS
	Protection class	IP 54, per DIN EN 60529
	Pressure connections	Threaded sockets 2x G¼ (F); plus other optional types (see Ordering Code)
Materials	Pressure chambers (media contact)	Stainless steel 1.4404 (AISI 316L)
	Diaphragm (media contact)	Ranges ≤ 400mbar: stainless steel 1.4571 (AISI 316Ti) Ranges ≥ 0.6 bar: DURATHERM® (stainless steel)
	Bellows (media contact)	Stainless steel 1.4571
	Pointer mechanism	Stainless steel 1.4301
	Dial housing	Stainless steel 1.4301
	Dial window	Laminated safety glass
	Dial scale and pointer	Aluminium
	O-ring seals	FPM (fluorocarbon elastomer)
Options and Accessories	Electrical accessories	Limit signalling contacts: delayed action / magnet actuated switch type / non-contact proximity type limit detector. Pointer rotation transducer: capacitance type, with output signal proportional to the pointer position (uses deeper gauge housing: see Dimensions) For details of electrical accessories, see Data Sheet KE. Accessories applicable on ranges ≥ 100 mbar
	Liquid filling	For operating conditions involving vibration, pressure fluctuations, and/or moisture condensation inside, the gauge can be supplied with glycerine filling. Instruments with build-in contacts will be filled with NAPVIS for better electrical isolation. In case of inductive contacts silicon oil will be used.
	Reference pointer	Adjustable pointer for visual marking of limit / reference values
	Peak registering pointer	Separate pointer without spring, friction holding: dragged by the measuring pointer as the measured value increases. Stays put when the measuring value recedes, thereby registering peak value. Manual re-setting (Range ≥ 60 mbar).
	O2 - applications „degreased“	According to German „BG-Chemie“ regulations all wetted parts will be degreased. (See ordering code 3 at item „Dial liquid filling“)
	Options (on request)	Special dial scales, housing material: stainless steel 1.4571
	Accessories	Blocking / equalising valves unit, models DZ 93/94: Three and four spindle types. For zero calibration, static pressure testing, and sealing pressure source when removing gauge for servicing. The fourth spindle in the model DZ 94 can be used to vent the pressure source.
Mounting	pipe fitting	On pressure connections
	wall mounting	With mounting plate
	pipe mounting	With mounting plate and fastening bow
		Pressure connection by means of threaded cutting ring connectors or direct fitted pressure lines should be carried out with appropriate jointing compound.

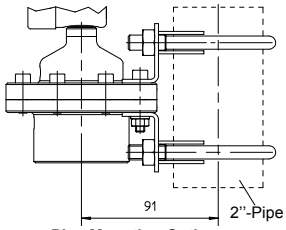
12. Dimensions (all units in mm unless stated otherwise)

for ranges 0.4...25 bar





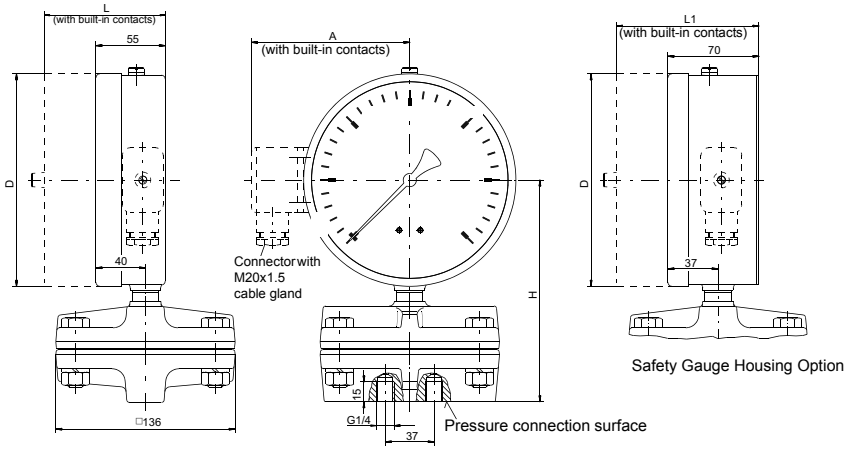
Wall Mounting Option

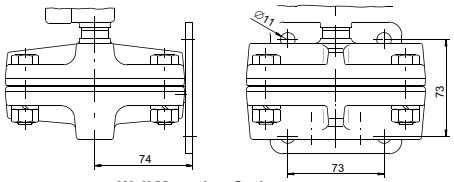


Pipe Mounting Option

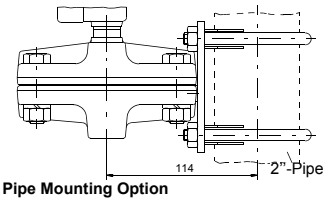
Dial size	D	H	A	L	L1
NG100	∅101	140	86	100	116
NG160	∅161	170	120	102	118

for ranges 25...250 mbar





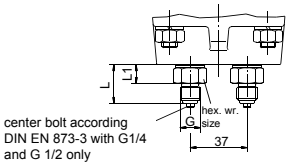
Wall Mounting Option



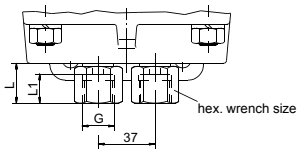
Pipe Mounting Option

Dial size	D	H	A	L	L1
NG100	∅101	140	86	100	116
NG160	∅161	170	120	102	118

Connections



center bolt according DIN EN 873-3 with G1/4 and G 1/2 only



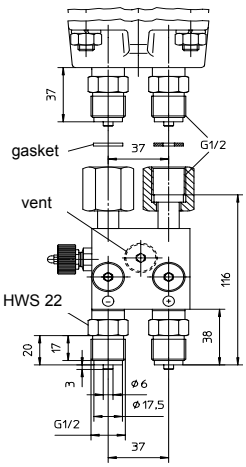
outside threading G	L	L1	SW
G 1/4	25	12	19
G 1/2	34	17	22
1/4-18 NPT	30	12	19
1/2-14 NPT	37	13	22

inside threading G	L	L1	SW
G 1/2	26	19	27
1/4-18 NPT	20	-	19
1/2-14 NPT	26	-	27

Option: Three spindle blocking valve DZ 93

or

Four spindle blocking valve DZ 94



13. Ordering Code

Differential Pressure Gauge DA09

												0

Range

0 . . . 25 mbar	5	6
0 . . . 40 mbar	5	7
0 . . . 60 mbar	5	8
0 . . . 100 mbar	5	9
0 . . . 160 mbar	6	0
- 40 . . . 60 mbar	7	0
- 60 . . . 100 mbar	7	2
-100 . . . 150 mbar	7	4
-150 . . . 250 mbar	7	6
0 . . . 250 mbar	8	2
0 . . . 400 mbar	8	3
0 . . . 0.6 bar	0	1
0 . . . 1 bar	0	2
0 . . . 1.6 bar	0	3
0 . . . 2.5 bar	0	4
0 . . . 4 bar	0	5
0 . . . 6 bar	0	6
0 . . . 10 bar	0	7
0 . . . 16 bar	0	8
0 . . . 25 bar	0	9
- 1 . . . 0.6 bar	3	2
- 1 . . . 1.5 bar	3	3
- 1 . . . 3 bar	3	4
- 1 . . . 5 bar	3	5

Nominal Pressure Rating

10 bar (Measuring Range ≤ 250 mbar)	E
25 bar (Measuring Range ≥ 400 mbar)	G

Gasket

EPDM *)	E
FKM	V
FKM FEP coated	U

Pressure connection

Threaded sockets: 2x G1/4 (F)	0	1
Threaded connectors: 2x G1/2 (F)	0	3
Threaded connectors: 2x NPT 1/4 (F)	0	4
Threaded connectors: 2x NPT 1/2 (F)	0	5
Threaded connectors: 2x G1/4 (M)	1	1
Threaded connectors: 2x G1/2 (M)	1	3
Threaded connectors: 2x NPT 1/4 (M)	1	4
Threaded connectors: 2x NPT 1/2 (M)	1	5
Plug connection M20x1.5	S	2

Dial Size

100 mm dia., bayonet type (1.4301)	L
160 mm dia., bayonet type (1.4301)	M
100 mm dia., safety type DIN EN 837 (1.4301)	O
160 mm dia., safety type DIN EN 837 (1.4301)	P

Mounting

Standard	0
Pipe mounting	R
Wall mounting	W

Dial Liquid Filling and Oxygen Compatibility

Without liquid filling	0
Dial with liquid filling: glycerine	1
Dial with liquid filling: Napvis (for built-in contacts)	2
Pressure chambers cleaned for O_2 use	3
Dial with liquid filling: silicone oil (for built-in proximity detector)	4

Additional Pointer

Without additional pointer	0
Adjustable reference pointer	1
Peak registering pointer, resettable (only for ranges ≥ 60 mbar)	2

Signalling Accessories: Contacts / Transmitters

Without contacts / transmitter	0
Build-in contacts, per data sheet KE... (ranges ≥ 100 mbar)	1
Build-in pointer position transducer, per data sheet KE09 (ranges ≥ 100 mbar)	2
Build-in contacts with plug-in connector (power plant type)	5

*) Shaded marks are not indicated in data sheet and only available on request

14. CE-Certificate

FISCHER
MESS- UND REGELTECHNIK

TÜV CERT
DIN EN ISO 9001 : 2000
08 100 561000

EG-Konformitätserklärung

Wir erklären in alleiniger Verantwortung, dass nachstehend genannte Produkte

EC Declaration of Conformity

We declare under our sole responsibility that the products mentioned below

Drucktransmitter / Pressure Transmitter

DA09 ############

mit eingebauten Kontakten KE... / with inbuilt contacts KE...

gemäß gültigem Datenblatt übereinstimmen mit der

EG-Richtlinie

2006/95/EG (NSR)

specified by the actual data sheet complies with the

EC Directive

2006/95/EC (LVD)

Die Produkte wurden entsprechend der folgenden Norm geprüft :

DIN EN 61010-1:2002-08

The instruments have been tested in compliance with the norm

DIN EN 61010-1:2002-08

Die Geräte werden gekennzeichnet mit:

The gauges are marked with:

CE

Bad Salzuflen, 05.12.07
(Ort, Datum / place, date)

(rechtsverb. Unterschrift / authorized signature)

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IBAN: DE98250100300201830307

Sitz: Bad Salzuflen
Amtsgericht Lemgo HRB 226
Geschäftsführer:
Günter B. Gödde