

# Instruction Manual

## DA03 || 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

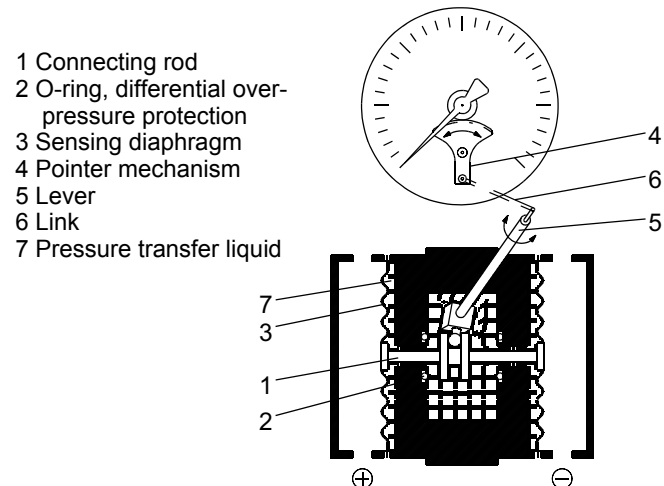
The product must be used only for applications and under conditions specified by the manufacturer.

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 contacts. When the given limit is exceeded output circuits are opened or closed.

## 3. Product Description and Functions

### 3.1. Schematic Diagram



### 3.2. Principles of Operation

The pressures to be compared act on flexible stainless steel diaphragms on either side of the sensing capsule. The two diaphragms are mechanically linked by a rigid connecting rod. To compensate high static pressures, the cavity between the two diaphragms is filled with hydraulic fluid. When pressures are equal on both diaphragms, they are at zero position. When there is a difference in pressures acting on the two diaphragms, they are deflected away from the high pressure side, towards the lower pressure side, causing a displacement of the connecting rod. A precision mechanism translates the linear displacement of the diaphragm connecting rod to angular movement of the gauge's dial pointer. The pointer's displacement range of 270° corresponds to the full scale differential pressure. The connecting rod has intermediate flanges on either side, which protects the diaphragms against excess differential pressure. When differential pressure exceeds the specified limit, the flange towards the lower pressure side is pressed against the sealing O-ring on the inside of the sensing capsule. This action isolates the fluid adjacent to the diaphragm exposed to lower pressure, from the fluid at higher pressure on the other side. This limits the pressure differential across the lower pressure diaphragm, and equalizes the pressure across the higher pressure diaphragm. Thus both diaphragms are protected against excess deflection and risks of rupturing.

## 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.  $\pm 10^\circ$ ) 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.

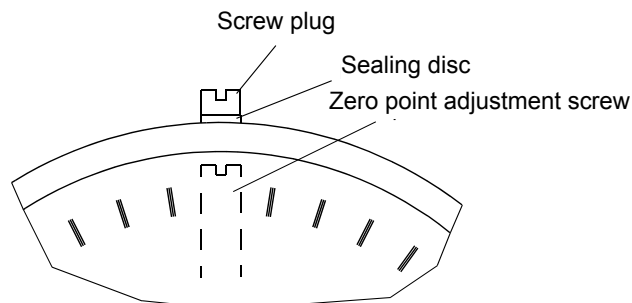
#### 5.2. Zero Point Adjustment

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.

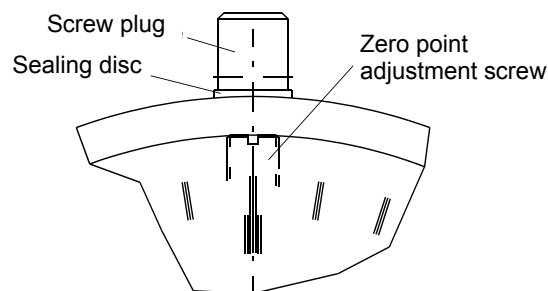
##### 5.2.1. Zero Point Adjustment Screw Position



##### 5.2.2. Zero Point Adjustment Screw Position (Filled Models)



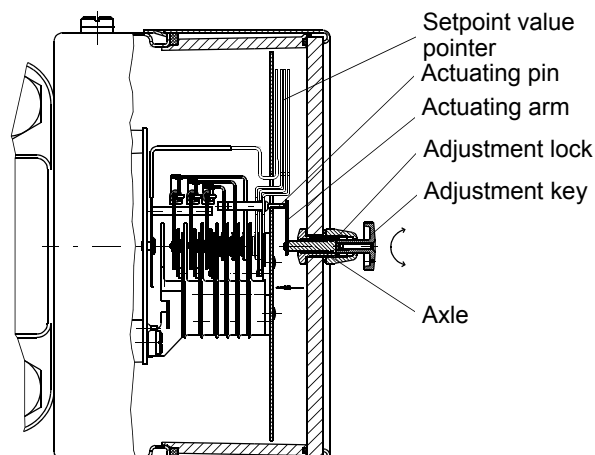
**Filled Models need to be vented before commissioning by opening the air valve on the upper side of instrument!**



#### 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 returned 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 DZ36-00 LV 0300
- Switching panel mounting kit (only for bar ranges, code "T")
- Switching panel mounting kit with customer prepared supporting construction (code "G")

## 10. Disposal



*Protect your environment!*

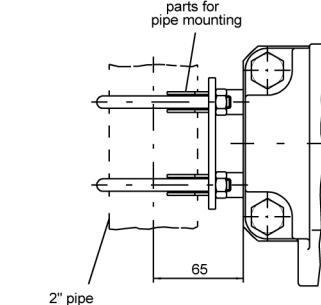
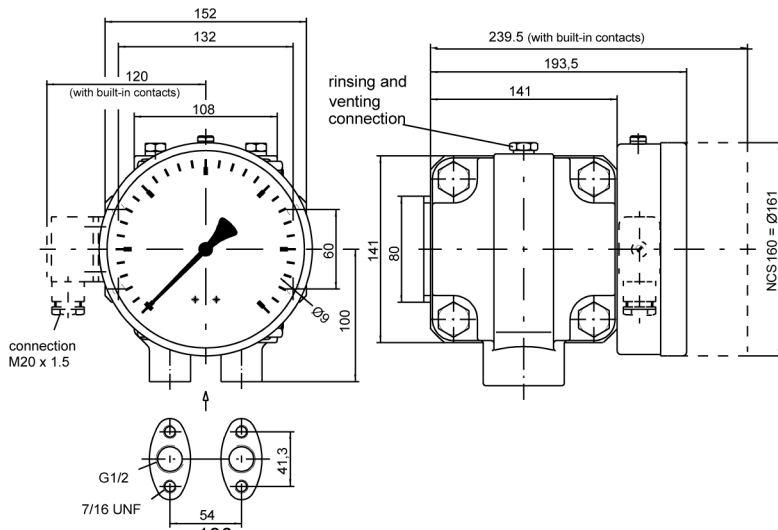
Use the product in accordance with relevant regulations. Please be aware of environmental consequences of disposal at the end of the product's life, and take care accordingly.

## 11. Specifications

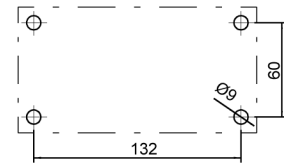
<b>General</b>	Measuring ranges	0...40 mbar to 0...25 bar (see Ordering Code)
	Nominal pressure rating	40 bar or 100 bar (max. static pressure)
	Accuracy	± 1.6% of span
	Max. differential overpressure	Safe up to max. static pressure; pressure differential in either direction
	Indicator	Circular dial type, 100 mm or 160 mm diameter
	Operating temperature	Ambient: -20°C to +80°C Media: +100°C, maximum
	Temperature coefficient	Approx. 0.3% / 10°C
	Zero adjustment	Screw through hole on top of dial housing. ±25% FS.
	Protection class	IP 54, per DIN EN 60529
	Pressure chambers	Smooth internal surfaces without recesses; flush sensing diaphragms; easy to clean
Pressure connections	DIN EN 61518 connecting flanges with 2x G½ (F) threaded sockets. Various bite type ferrule connectors (see Ordering Code)	
Purge ports	2x G 1/8 (F) threaded sockets, in flanged pressure chamber casing; screw plugs fitted	
<b>Materials</b>	<i>Type „R“</i>	
	Pressure chamber (wetted part)	Stainless steel 1.4404 (AISI 316L)
	Diaphragm (wetted part)	dP ≤ 400 mbar: stainless steel 1.4571 dP ≥ 0.6 bar: DURATHERM® (stainless steel)
	<i>Type „H“ (1)</i>	
	Pressure chamber (wetted part)	Hastelloy® C4
	Diaphragm (wetted part)	dP ≤ 2.5 bar: Hastelloy® C 276 dP ≥ 4 bar: Standard diaphragm with separating foil made from Hastelloy® C 276 <b>NB: Models with separating foil not useable for vacuum application.</b>
	Intermediate plate	Aluminium alloy (AlMgSiPb); hard coated
Dial mechanism, gauge housing	Stainless steel 1.4301	
Dial window	Laminated safety glass	
Dial scale and pointer	Aluminium	
O-ring gasket	Viton® (FKM, fluoroelastomere)	
<b>Options and Accessories</b>	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.
	Liquid filling	For operating conditions involving vibration, pressure fluctuations, and/or moisture condensation inside, the gauge can be supplied with glycerine filling.
	Reference pointer	Adjustable pointer for visual marking of limit / reference value.
	Peak registering pointer	Separate pointer without spring, friction holding: dragged by the measuring pointer as the measured value increases. Stays put when the measuring pointer recedes, thereby registering peak value. Manual re-setting.
	Options (on special order)	Special materials: PTFE coated or Hastelloy-C diaphragm and pressure chamber casing Special dial scales
	Accessories	Pipe mounting kit (Model DZ 10) for 2" pipe Direct fitting 3-spindle blocking/equalizing valves unit. Installs directly on the gauge flanges. Rating PN 100; size DN 5; stainless steel 1.4571 (Model DZ 36-00LV0300)
Pressure connections	Process pipe connection to be erected by using bite type ferrule connectors or direct fitting of pipe into G½ F thread. Make sure that the connection is firmly sealed.	
<b>Mounting</b>	Wall mounting (Type „W“)	With mounting plate on back of instrument
	Pipe mounting (Type „R“)	With mounting parts for vertical or horizontal mounting on 2" pipes
	Panel mounting (2)	Due to the instruments heavy weight the small measuring cell only is suitable for direct panel mounting: measuring ranges ≥ 0.6 bar, dial NCS100 and NCS160, without contacts or transmitters. The instrument factory prepared for panel mounting and the necessary mounting parts may be ordered with code „T“.
Panel mounting with front cover ring and support (3)	All models may be fitted with a customer made support construction and the front cover ring to be used for panel mounting (Ordering Code „G“).	

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

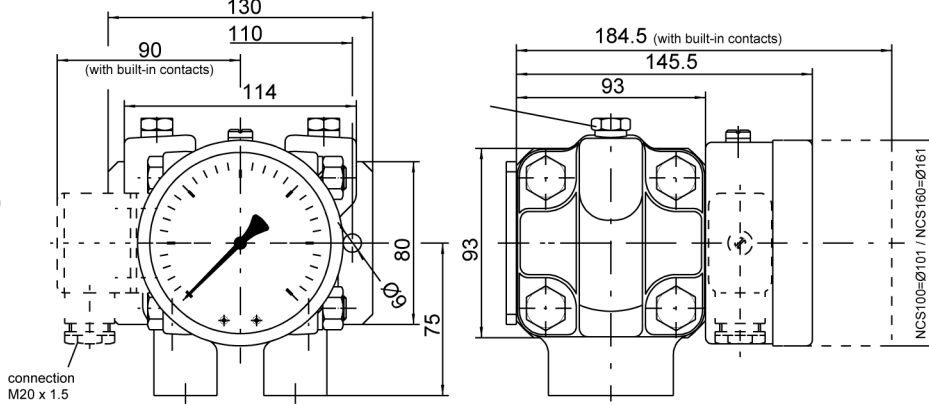
for ranges 40...400 mbar



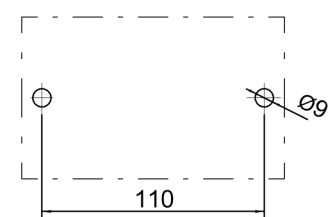
Drilling plan for mounting plate



for ranges 0.6...25 bar

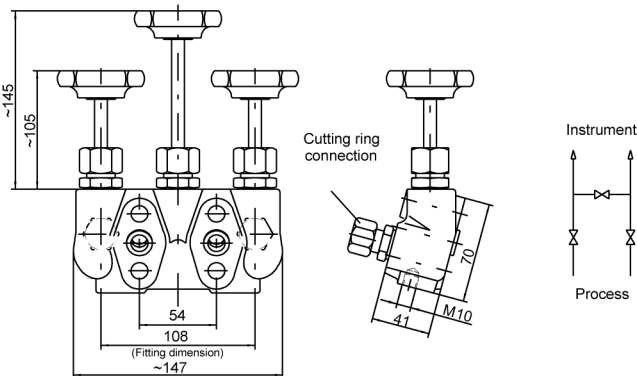


Drilling plan for mounting plate



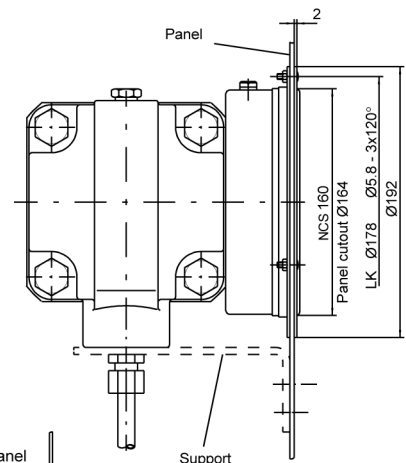
**Three spindle blocking / equalising valves unit DZ 36-00 LV 0300**

fits directly onto the DIN 19209 flanges

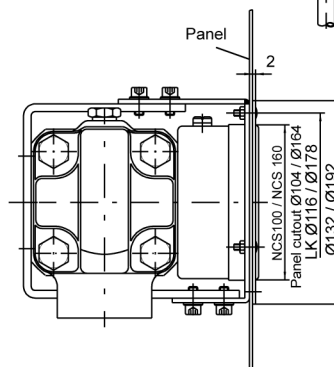
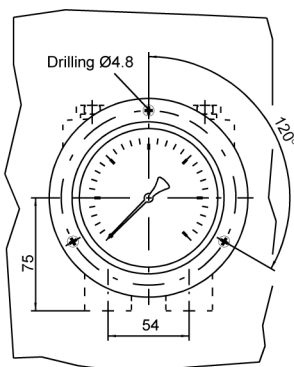


**Panel mounting with customer prepared support**

(Ordering Code „G“)



**Panel mounting accessories only for bar ranges (Ordering code „T“)**





14. CE-Certificate

					
					
<p><b>EG-Konformitätserklärung</b></p> <p>Wir erklären in alleiniger Verantwortung, dass nachstehend genannte Produkte</p>	<p><b>EC Declaration of Conformity</b></p> <p>We declare under our sole responsibility that the products mentioned below</p>				
<p><b>Differenzdruck-Messgerät / Differential Pressure Gauge mit eingebauten Kontakten KE / with inbuilt contacts KE</b></p> <p><b>DA03 # # # # # # # # # # 0</b></p>					
<p>gemäß gültigem Datenblatt übereinstimmen mit der</p> <p><b>EG-Richtlinie</b></p> <p>2006/95/EG (NSR)</p>	<p>specified by the actual data sheet complies with the</p> <p><b>EC Directive</b></p> <p>2006/95/EC (LVD)</p>				
<p>Die Produkte wurden entsprechend der folgenden Norm geprüft:</p> <p>DIN EN 61010-1:2002-08</p>	<p>The instruments have been tested in compliance with the norm</p> <p>DIN EN 61010-1:2002-08</p>				
<p>Die Geräte werden gekennzeichnet mit:</p>	<p>The gauges are marked with:</p>				
<p><b>CE</b></p>					
<p>Bad Salzuffen, 18.01.08 (Ort, Datum / place, date)</p>	<p>(rechtsverb. Unterschrift / authorized signature)</p>				
<table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Fischer Mess- &amp; Regeltechnik GmbH Bielefelder Strasse 37a D-32107 Bad Salzuffen USt-IdNr.: DE124602839 Steuer-Nr.: 313/5729/0559</td> <td style="width: 25%;">Fon: +49 (0) 52 22-9740 Fax: +49 (0) 52 22-71 70 Web: www.fischermesstechnik.de Mail: info@fischermesstechnik.de</td> <td style="width: 25%;">Sparkasse Lemgo BLZ 482 501 10 Konto-Nr.: 11 841 BIC: WELADED1LEM IBAN: DE90482501100000011841</td> <td style="width: 25%;">Postbank Hannover BLZ 250 100 30 Konto-Nr.: 0201 830 307 BIC: PBNKDEFF IBAN: DE 98 2501 0030 0201 8303 07</td> </tr> </table>		Fischer Mess- & Regeltechnik GmbH Bielefelder Strasse 37a D-32107 Bad Salzuffen USt-IdNr.: DE124602839 Steuer-Nr.: 313/5729/0559	Fon: +49 (0) 52 22-9740 Fax: +49 (0) 52 22-71 70 Web: www.fischermesstechnik.de Mail: info@fischermesstechnik.de	Sparkasse Lemgo BLZ 482 501 10 Konto-Nr.: 11 841 BIC: WELADED1LEM IBAN: DE90482501100000011841	Postbank Hannover BLZ 250 100 30 Konto-Nr.: 0201 830 307 BIC: PBNKDEFF IBAN: DE 98 2501 0030 0201 8303 07
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<p>Sitz/reg. office: Bad Salzuffen Amtsgericht Lemgo HRB 226 Geschäftsführer/ Manag. Dir.: Günter B. Gödde</p>					

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