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Level Measurement based on Archimedes' Principle

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BA

Installation and Operating Instructions



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## Introduction

These Installation and Operating Instructions serve as a tool for the correct installation, operation and maintenance of the device. They are a supplement to the BA Device Description. Read the manual carefully before the device is installed and put into use. It does not include special versions or applications.

All devices are thoroughly checked for order compliance and operability before delivery. Upon receipt, please conduct a visual inspection of possible damage that may be identified as having occurred during shipment. If you discover any defect, please contact our head office in Cologne or the local sales office responsible for your area (see the telephone directory at the end of this manual or on our Web site). Apart from a description of the error, we will need the equipment type and serial number of the delivery.

Heinrichs Messtechnik shall not furnish guarantee for any repair work done without prior notice. Unless otherwise agreed on, the rejected parts must be made available to us in case a claim is made.

## 1 Identification

### 1.1 Supplier/manufacturer

Heinrichs Messtechnik GmbH  
 Robert-Perthel-Str. 9 · D-50739 Köln  
 Phone +49 (221) 49708 - 0  
 Fax +49 (221) 49708 - 178  
 Internet: <http://www.heinrichs-mt.com/>  
 E-mail: <mailto:info@heinrichs-mt.com>

### 1.2 Product type

Level meter based on Archimedes' principle with magnetic measured-value transmission and local level display.

### 1.3 Product name

BA

### 1.4 Issue date

09/03/2007

### 1.5 Version no.

6.0  
 File: BA\_BA\_06\_eng

## 2 Applications

The BA-type level indicator is suitable for level measurement of liquid products in open containers and in containers under pressure. The device is based on Archimedes' principle. The length of the displacer rod corresponds to the measuring range.

## 3 Operational mode and system design

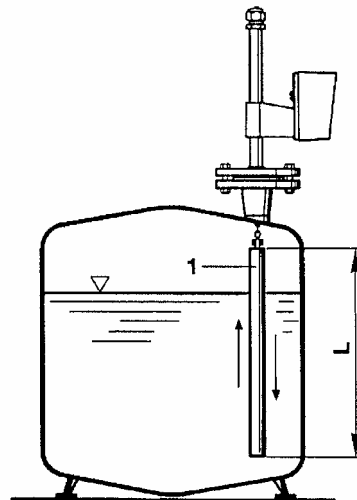
The displacer rod, which is attached to a measuring spring using a chain, immerses into the liquid and is subject to a buoyant force proportional to the mass of the displaced liquid.

Every change in the weight of the rod corresponds to a change in the length of the spring and is therefore a measure of the liquid level. The longitudinal expansion of the spring, i.e. the travel of the rod, will be transmitted from the measuring space to the indicator unit by means of a magnetic coupling. The basic version of the indicator unit

consists of a scale with a pointer for displaying the liquid level. As an option, the indicator unit may be equipped with electrical transmitters for remote display or with limit transducers.

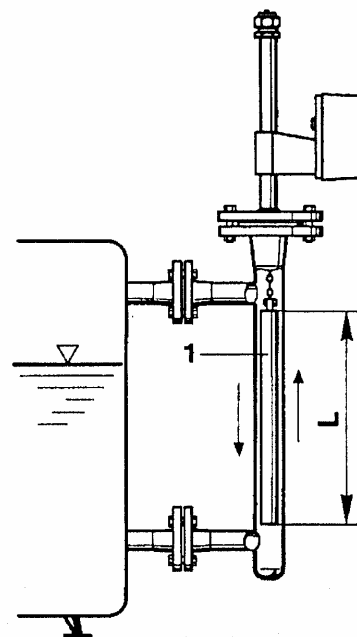
If the device cannot be installed from above, because, for example, a stirrer is mounted in the container, a special displacement vessel is available for lateral installation. Since the buoyancy of the displacer rod depends on the density of the measured medium, it must have been designed for the specific liquid to be measured. The difference in density between the tank atmosphere and the liquid to be measured should be at least 100 g/l. The pressure and the temperature of the atmosphere must be known.

### 3.1 Level measurement in the container



1 = Displacer rod  
 L = Length of displacer rod

### 3.2 Level measurement in the displacement vessel



## 4 Input

### 4.1 Measured variable

Level or separation layer measurement of liquids within a density range of 400 g/l to 2000 g/l

### 4.2 Measuring range (lower-range and upper-range value)

Level: 0–100% (0–XXX cm)  
Separation layer indicator: e.g. 800–1100 g/l

## 5 Output

The indicator unit contains a scale with a 90° reading angle. Various electrical contact makers or transmitters may be installed in the indicator unit.

### 5.1 Binary output

Using the segments of the slot-type initiators or the eccentric discs of the microswitches, any switching point between 10% and 90% of the level can be set.

#### 5.1.1 KEI 1 or KEI 2 limit transducers

1 or 2 limit transducers,  
type SJ 3,5N, make Pepperl+Fuchs  
(special switch possible, e.g. SN version)  
Safety class: PTB Nr. 99 ATEX 2219 X  
PTB Nr. 00 ATEX 2048 X

#### 5.1.2 KEM 1 or KEM 2 limit transducers (special version)

Double-throw microswitches whose switching point is activated by a cam plate.

KEM 1 = 1 Double-throw microswitch  
KEM 2 = 2 Double-throw microswitches

Maximum make-break capacity:  
230 VAC 50/60Hz 6 A  
24 VDC 0.5 A  
110 VDC 0.2 A

### 5.2 Analog output with the ES magneto-electric transmitter

The magneto-electric transmitter is factory-calibrated to the scale values upon shipment. The signal output is supplied exclusively in a two-wire connection at 4-20 mA. Normally, the 4-20 mA signal has the HART® protocol; alternatively it can have PROFIBUS PA.

**Additional options:** 2 limit values, alternatively 1 limit value and 1 pulse output

The signal output and the limit values can be configured using a HART® modem operating on the following configuration programs: SensorPort from Bopp & Reuther, PDM from Siemens or AMS from Rosemount. Furthermore, a HART® hand-held terminal (with DD software) can also be used. For more information about configuration, please refer to the separate Operating Instructions for the ES.

The ES transmitter is available in the PROFIBUS PA version under the **ES-PPA** type designation.

**For operation details, see the separate ES-PPA Operating Instructions.**

**Safety class:** DMT 00 ATEX 075 / II2G EEx ia IIC T6

### 5.3 Analog output with the KINAX 3W2 angle-of-rotation transmitter

The signal output of the angle-of-rotation transmitter is factory-calibrated to the scale values. The signal output is 4-20 mA in 2-wire connection; or alternatively 0-20 mA in 4- or 3-wire connection. The signal output of 4 mA corresponds to the level scale value of 0 (0 mA for the 0-20 mA version). 5.6 mA corresponds to 10% of the level scale value (2 mA). 20 mA corresponds to 100% of the level scale value.

#### Safety class:

The angle-of-rotation transmitter is a component approved for hazardous areas. When used in hazardous areas, all the values and instructions indicated in the certificate of approval must be observed. Auxiliary power is fed through an approved intrinsically safe circuit of 12-30 V. To prove intrinsic safety, only authorized electrical equipment may be interconnected. Please take note of the maximum permissible ambient temperature of 60°C/75°C for the transmitter and the process temperature.

#### Safety class:

PTB 97 ATEX 2271 / II 2G EEx ia IIC T6

**When installing electrical equipment in hazardous areas, the conditions and provisions specified in the approval documents must be followed.**

## 6 Characteristic values

### 6.1 Accuracy

#### 6.1.1 Measured error

+/- 5 mm from the actual value

#### 6.1.2 Repeatability

+/- 2 mm from the actual value

### 6.2 Influence of ambient temperature

- Without electrical equipment and with limit transducer without influence
- With KINAX transmitter:  
+/- 0.5 % / 10 K
- With ES transmitter:  
+/- 0.2 % / 10 K

### 6.3 Influence of fluid temperature

Deviations in fluid temperature from the temperature observed during calibration can result in a proportional display fault because of the corresponding change in density.

## 7 Conditions of use

### 7.1 Mounting requirements

The mounting location must be suitable for vertical installation from above. The connection size of the meter and that of the flange of the container or the displacement vessel must be identical. The pressure stages of the flanges must coincide. The surface roughness of the flange sealing surface must be suitable for the prescribed gaskets. The gaskets must be suitable for the pressure, the temperature and the corrosion of measured medium.

If the container is empty, the distance between the displacer rod and the container bottom should be **20 mm**. If the device is used as a separation layer indicator, the arrangement should be such that the displacer rod will be immersed into the liquid at any time. The limit values for

temperature and air humidity at the mounting location must be maintained and corrosive atmospheres must be avoided.

In order to avoid a negative impact on magnetic measure-value transmission, make sure that there is adequate clearance from parts that might cause magnetic interferences such as solenoid valves and ferromagnetic components such as steel brackets/supports. The minimum lateral clearance for interfering steel parts should be **200 mm**.

Select the mounting location so as to enable a reliable reading of the scale values. Please take note of the space requirements for any possible disassembly of the device as well. The length of the displacer rod must also be considered.

The device should not be installed close to filling tubes and stirrers.

### 7.1.1 Device settings

The measuring equipment is delivered ready for operation according to your order specifications. **The limit transducers** are set to the desired values. If you have submitted no requirements, the basic setting for

1 contact device: - Minimum contact switching point at 10% of falling level (damped/closed-circuit principle).

2 contact devices: Minimum contact switching point at 10% of descending level and maximum contact switching point at 90% of rising level.

### 7.1.2 Adjusting the limit transducers

#### 7.1.2.1 KEI

The contacts are adjustable through the contact position indicators located on the scale. Dismantle the indicator cover, unfasten the contact position indicators, set to the desired value and reattach them.

#### 7.1.2.2 KEM

The switching point can only be changed by adjusting the cam plate.

### 7.1.3 Use in hazardous areas

#### 7.1.3.1 Without electrical equipment

The basic version of the flowmeter is a *non-electrical device* without its own ignition sources and meets DIN EN 13463-1 requirements. It can be used in hazardous areas that require Category 2 equipment.

Marking:  II 2GD c  
Tech. File Ref. 03-02 X

Since the device does not have its own power sources that would result in a temperature increase, the fluid temperature is decisive for the maximum surface temperature.

When used in potentially explosive dust atmospheres, the device must be cleaned regularly in order to avoid deposits exceeding 5 mm.

#### 7.1.3.2 With built-in electrical limit transducers

When the limit transducers are installed, the device becomes an electrical assembly and receives a marking in accordance with DIN EN 50014 from the entire device with the built-in electrical limit transducers. It can be used in hazardous areas that require Category 2 equipment.

The electrical and thermal data and the special conditions of the EC Type Examination Certificate of the built-in limit transducers must be observed.

The following tables show the interdependencies between the temperature class, the admissible ambient temperature (Ta) and the admissible fluid temperature (Tm).

Standard version		
Temperature class	Ta	Tm
T6	-40°C to 64°C	-40°C to 80°C
T5	-40°C to 62°C	-40°C to 95°C
T4...T1	-40°C to 60°C	-40°C to 110°C

Indicator unit raised 100 mm		
Temperature class	Ta	Tm
T3	-40°C to 60°C	-40°C to 150°C

Indicator unit raised 100 mm and pulled forward 100 mm		
Temperature class	Ta	Tm
T2	-40°C to 60°C	-40°C to 250°C

#### 7.1.3.2.1 Marking for the device when the SJ 3,5...N... limit transducer is built in



PTB 99 ATEX 2219 X  
II 2G EEx ia IIC T6-T4

#### 7.1.3.2.2 Marking for the device when the ES magneto-electric transmitter is built in



DMT 00 ATEX 075  
II 2G EEx ia IIC T6

#### 7.1.3.2.3 Marking for the device when the KINAX 3W2 angle-of-rotation transmitter is built in



PTB 97 ATEX 2271  
II 2G EEx ia IIC T6

**7.1.3.3 Operation in Zone 0 hazardous areas**

The float and its guiding system may be installed in areas that require Category 1 equipment (Zone 0). Only devices that are marked accordingly on the type plate may be operated in these areas.

The conditions of use stated in the TÜV 02 ATEX 1926 X EC Type Examination Certificate must be observed. In addition, the conditions and requirements of the EC Type Examination Certificate for the respective built-in components such as ES, KINAX or limit transducers must be followed.

Marking:



TÜV 02 ATEX 1926 X  
II 1/2 G EEx ia IIC T6...T1

**7.1.3.3.1 Assembly on a tank**

When the device is mounted on a tank, the displacer rod must be protected against inadmissible mechanical strength influence, which may result during filling or emptying events or using an agitator. The displacer rod has to be protected by a splash proof tube.

**7.2 Ambient conditions****7.2.1 Ambient temperature ranges**

Without electrical accessories:

-40°C to +80°C

With limit transducer:

-40 °C to +65°C

With KINAX signal output:

-40°C to +60°C

With ES signal output:

-40°C to +70°C

For the hazardous area version, take note of the maximum ambient temperatures depending on the temperature class as specified in the Type Examination Certificate.

**7.2.2 Storage temperature**

The storage temperatures are identical to the ambient temperature ranges.

**7.2.3 Climatic category**

Weather-protected and/or unheated locations, class C according to IEC 654 Part 1

**7.2.4 Degree of protection**

IP 65

**7.2.5 Shock resistance/vibration resistance**

The meter should be protected from extreme shocks and vibrations, which could cause damage.

**7.2.6 Electromagnetic compatibility**

EN 61000-6-2:1999 Immunity industrial environment

EN 50081-1 Emitted interference residential environment

EN 55011:1998+A1:1999 Group 1, Class B

NAMUR recommendation NE 21

**7.3 Fluid conditions**

The fluid surface should be as calm as possible. The fluid should not bond and tend to settle. In the case of an aggressive evaporation of the fluid, the durability of the material should be clarified. In addition, the fluid should be free of turbulence that may influence the displacer.

**7.4 Fluid temperature limit**

The maximum permissible fluid temperature is stated on the type plate. The indicator unit must not be enclosed in a thermal covering. It should project from that covering at least 100 mm.

**7.4.1 Installation on a container**

Version	Fluid temperature
Standard fitting and standard indicator unit	-40°C to 100°C
Raised 100 mm and standard indicator unit	-40°C to 150°C
Raised 100 mm and indicator unit pulled forward 100 mm	-40°C to 250°C

**7.4.2 Installation on a displacement vessel**

Version	Fluid temperature
Standard fitting and standard indicator unit	-40°C to 150°C
Standard fitting and standard indicator unit pulled forward 100 mm	-40°C to 250°C

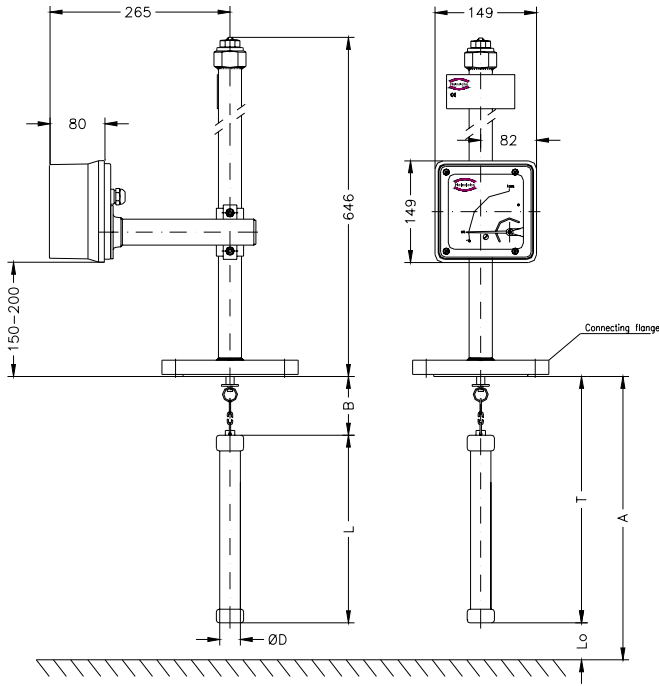
## 8 Construction details

### 8.1 Type of construction/dimensions

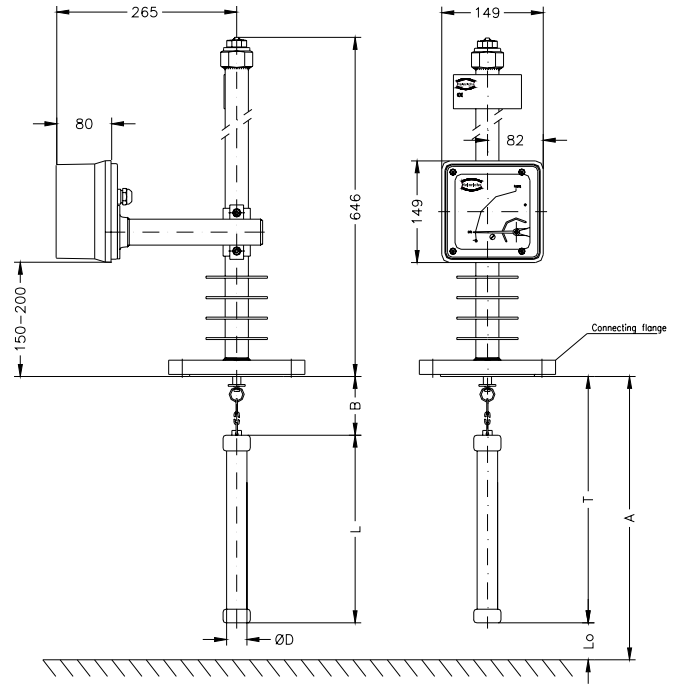
#### 8.1.1 Aluminum indicator housing

Raised up 100 mm and pulled forward from the side 100 mm

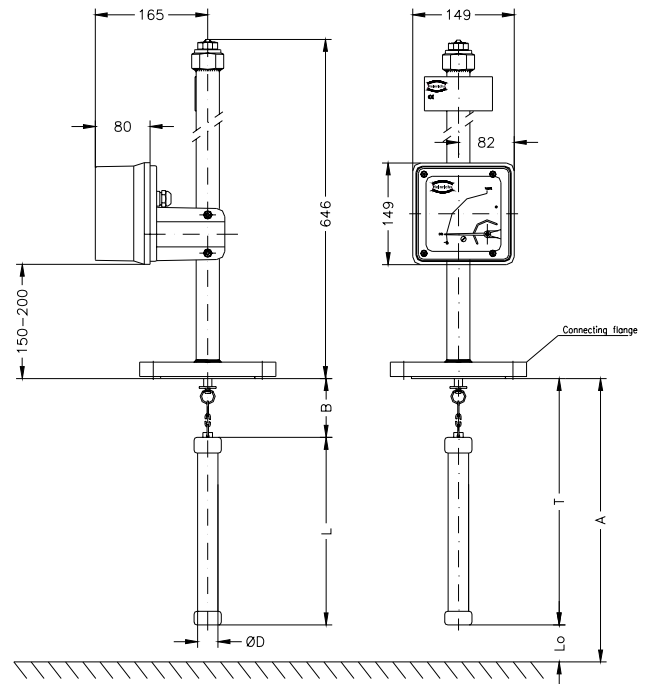
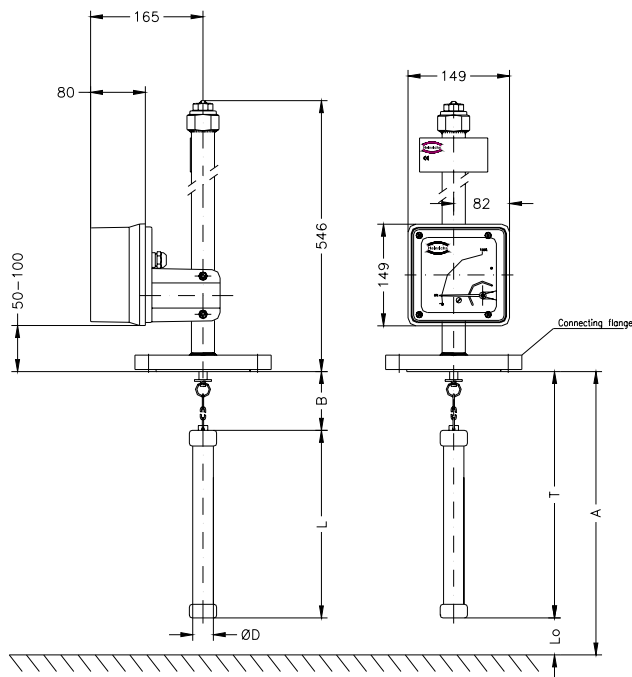
Raised up 100 mm and pulled forward from the side 100 mm with cooling ribs



Standard version



Indicator unit raised up 100 mm

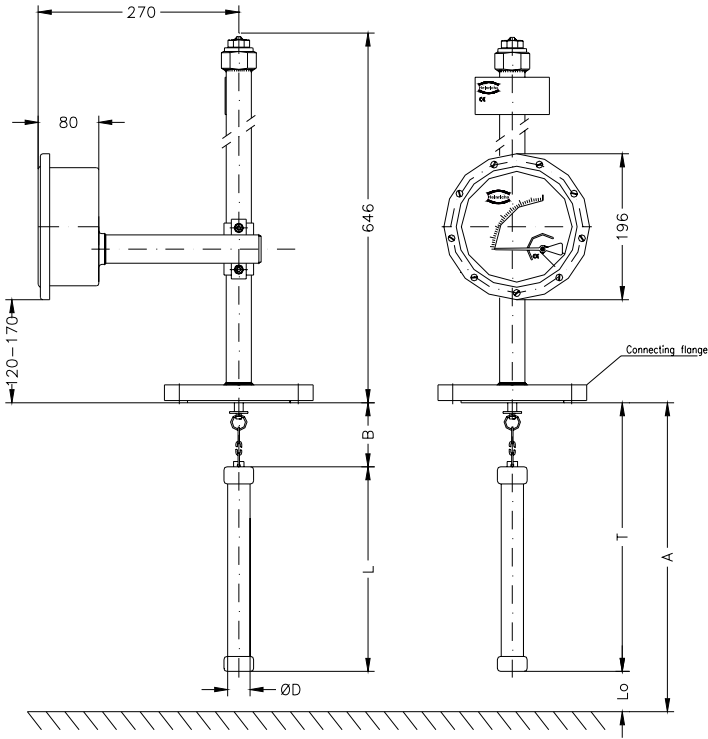




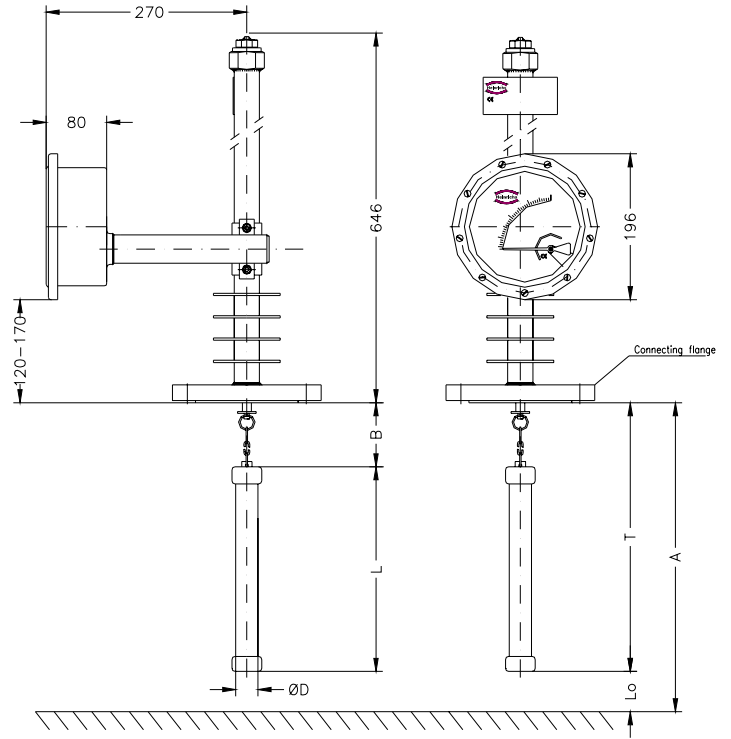
8.1.2 Indicator housing made of stainless steel

Raised up 100 mm and pulled forward from the side 100 mm

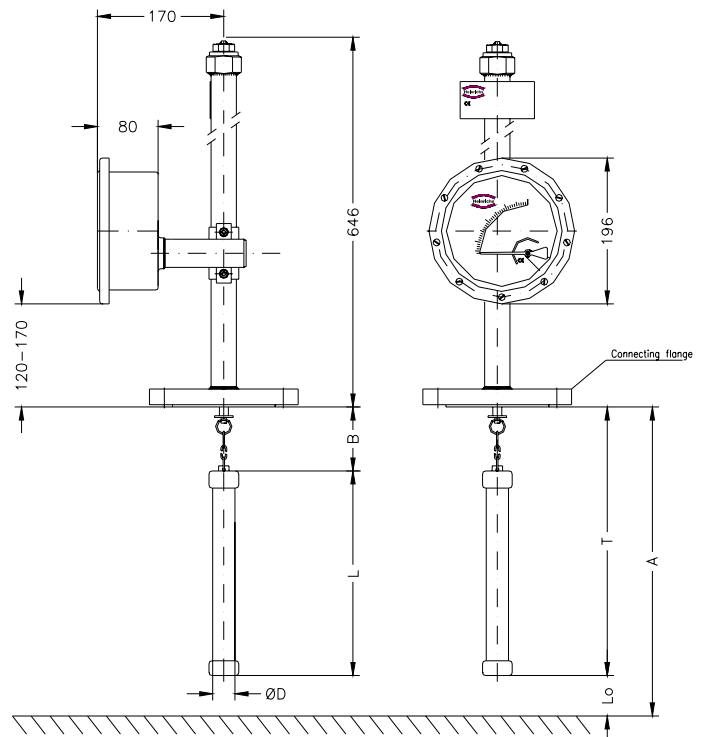
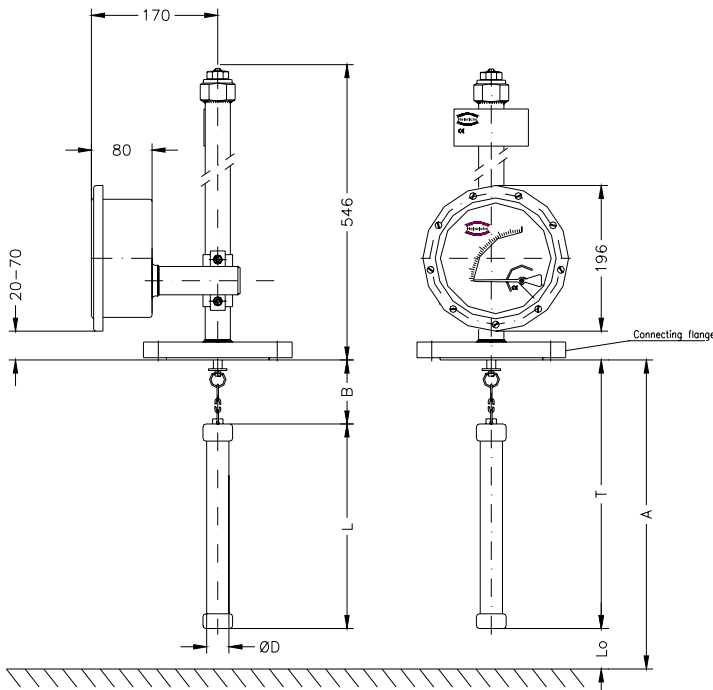
Raised up 100 mm and pulled forward from the side 100 mm with cooling ribs



Standard version



Indicator unit raised up 100 mm



## 8.2 Weight

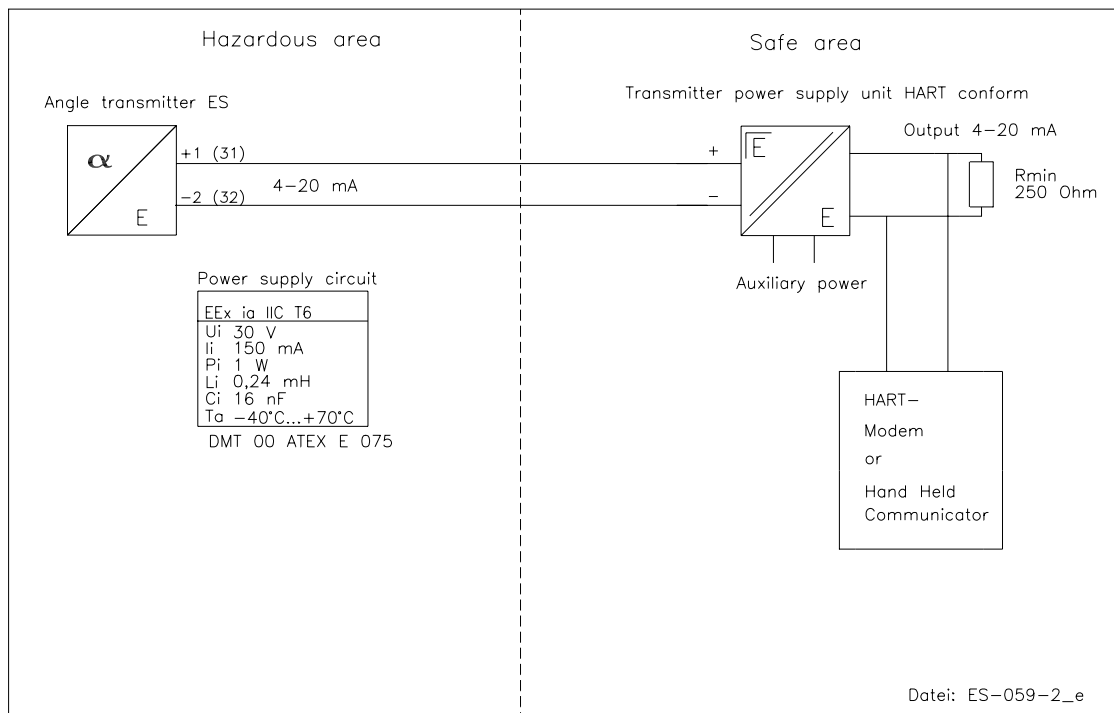
Part	Weight [kg]
Indicator unit with ES	2
Standard fitting	5.5
Fitting raised 100 mm	6.5
Displacer rod for level measurement	3
Displacer rod for separation layer measurement	3-8

## 9 Electrical connection

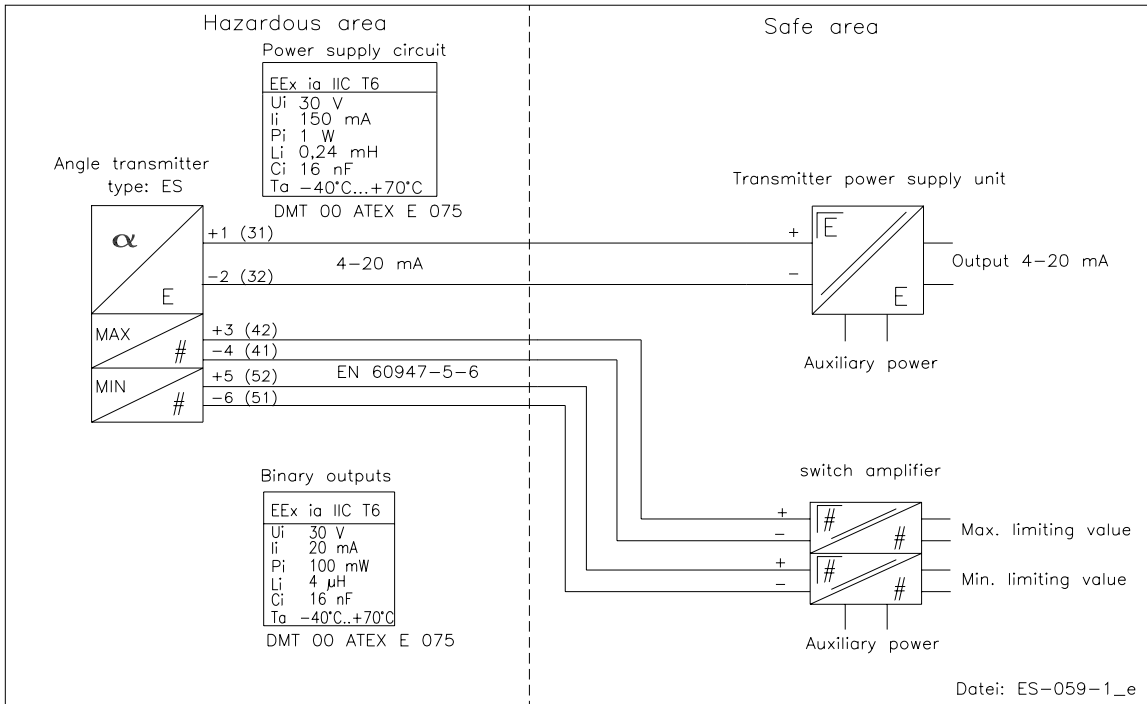
### Wiring

To connect the auxiliary power, remove the indicator cover, insert the connector cable into the cable gland and attach it to the terminals according to terminal diagram. Tighten the cable gland securely, remount the indicator cover and close it tightly.

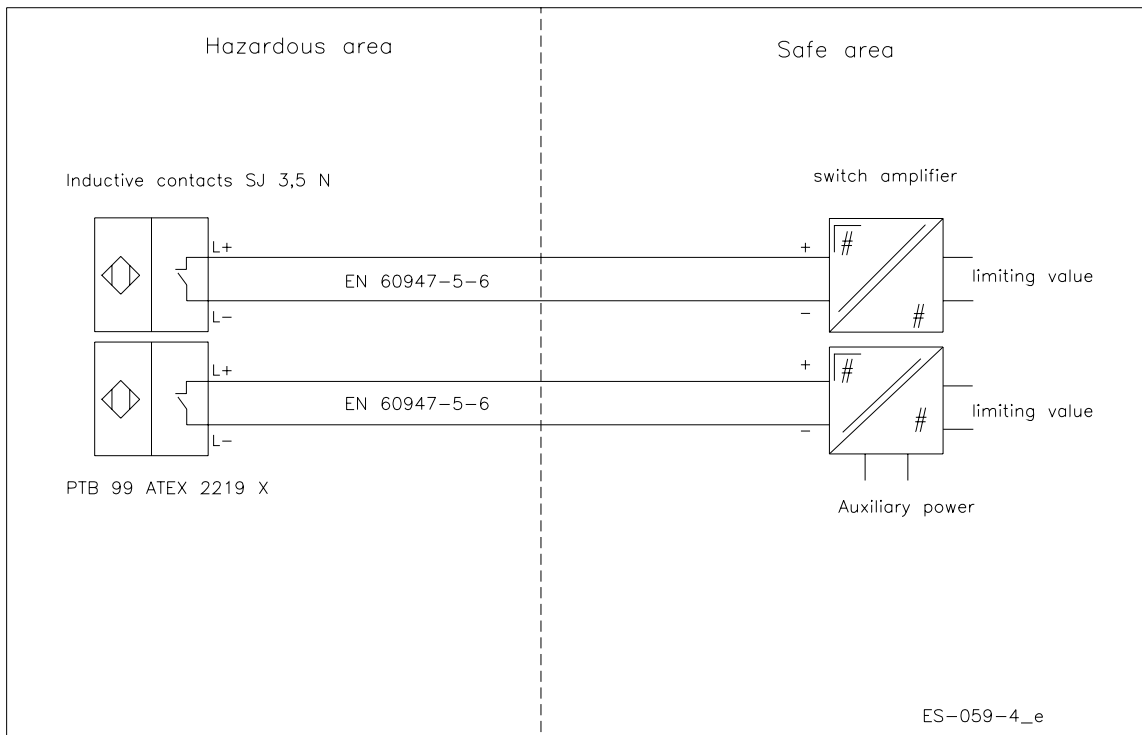
### 9.1 Wiring diagram for ES transmitter



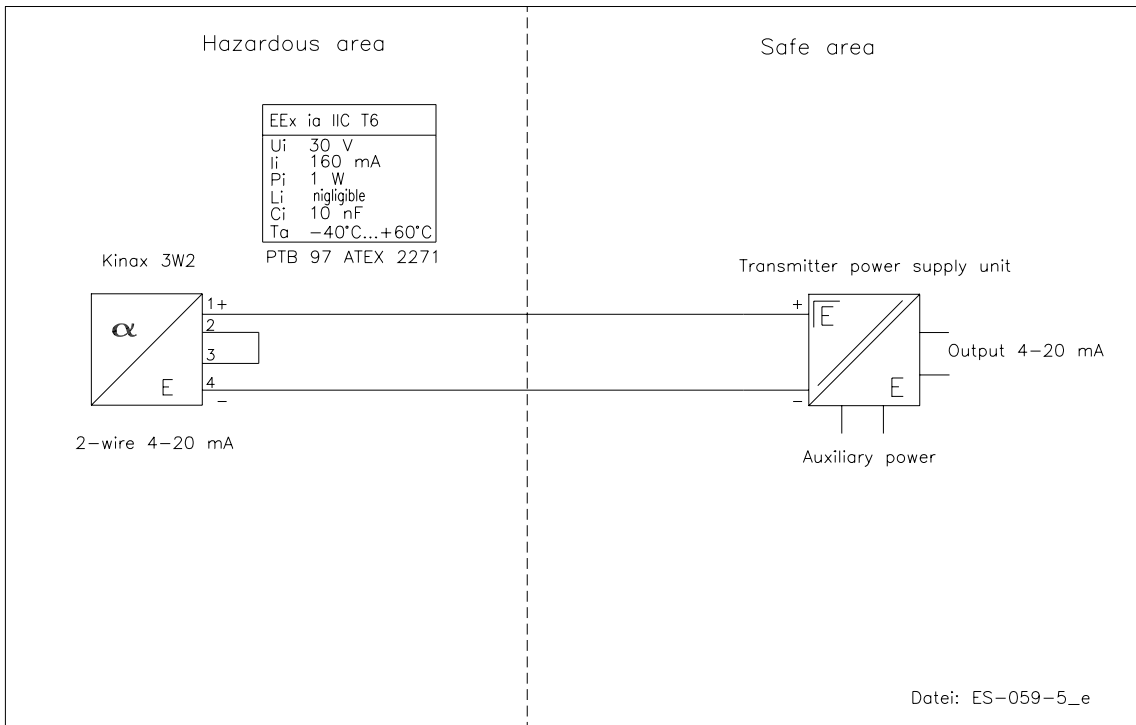
9.2 Wiring diagram for ES transmitter with 4-20 mA output and 2 limit transducers



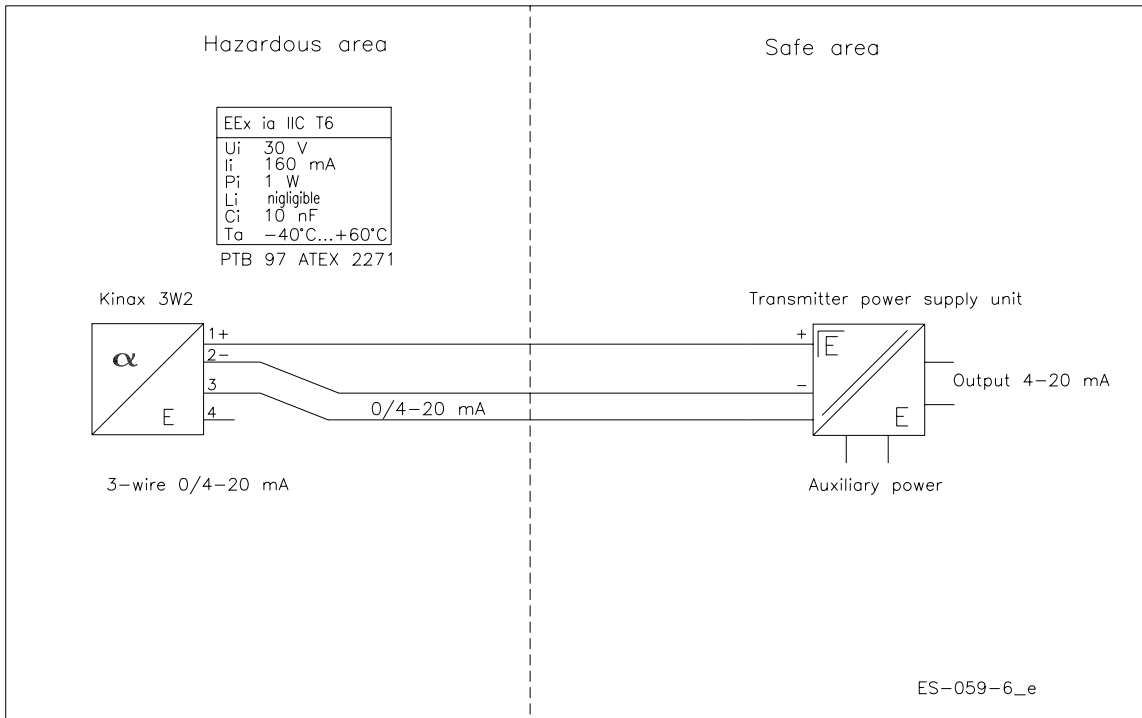
9.3 Wiring diagram for inductive limit transducers



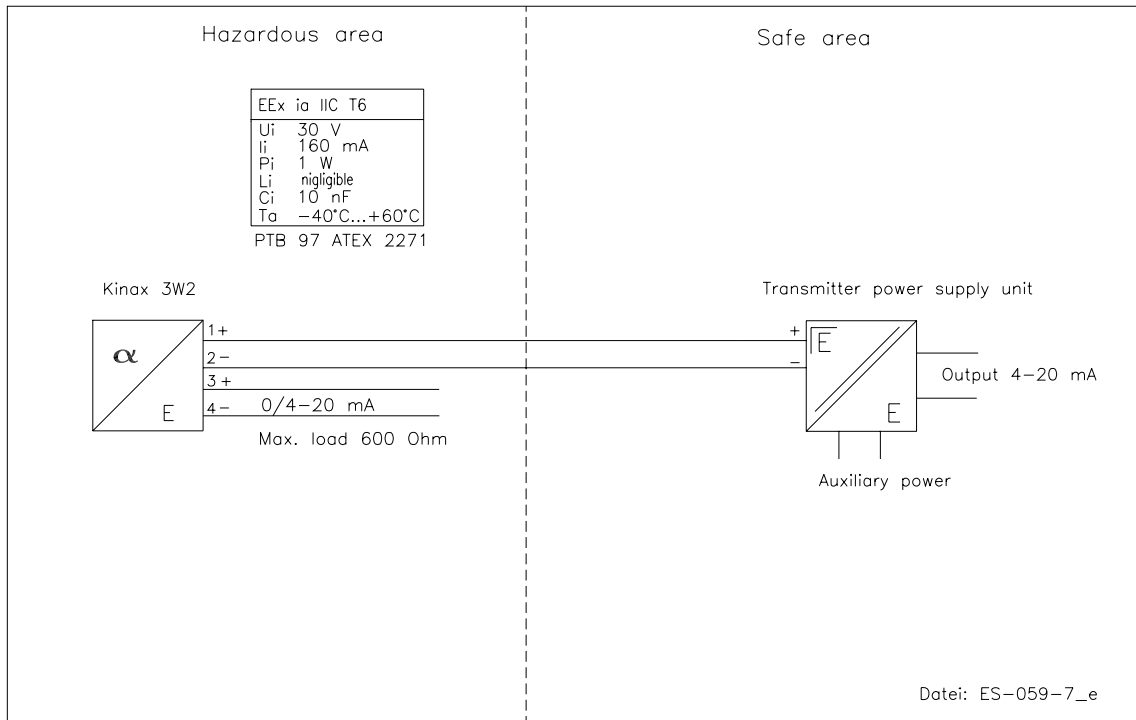
9.4 Wiring diagram for KINAX 3W2 transmitter with 4-20 mA output, 2 wires



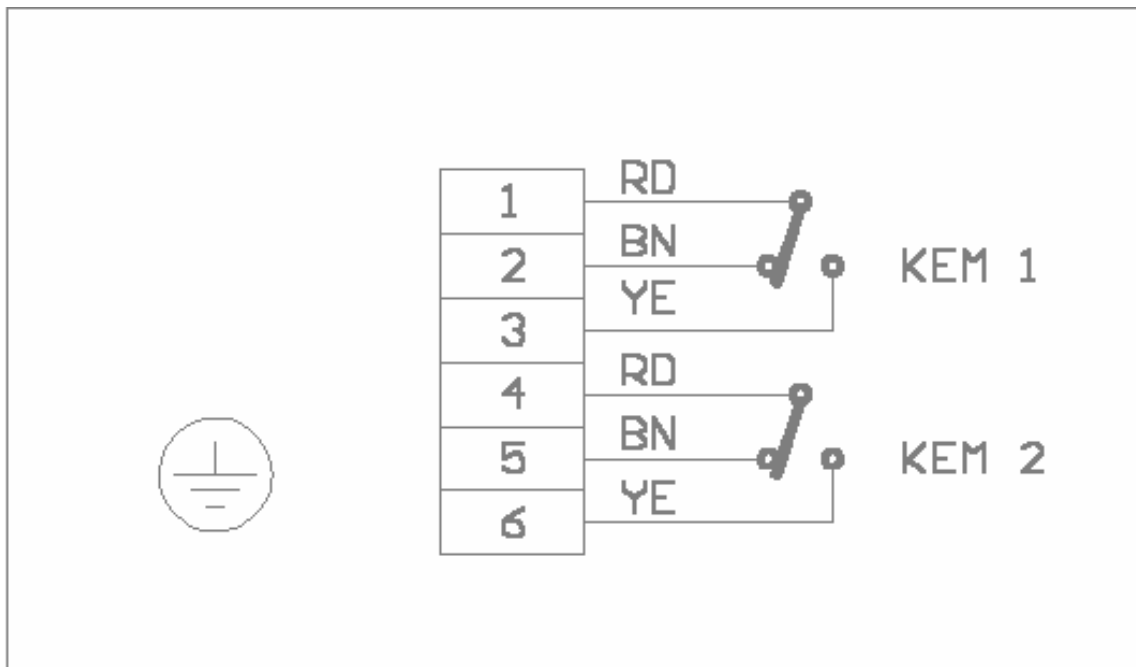
9.5 Wiring diagram for KINAX 3W2 transmitter with 4-20 mA output, 3 wires



9.6 Wiring diagram for KINAX 3W2 transmitter with 4-20 mA output, 4 wires



9.7 Wiring diagram for KEM 1 and KEM 2 double-throw microswitches



## 10 Indicator unit

- Analog indicator approx. 90° with pointer
- Customized product scale
- ES transmitter with freely programmable user interface
- Parameters may be changed based on the ES Operating Instructions.

## 11 Auxiliary power

see Electrical connection

## 12 CE mark

The measuring system meets the statutory requirements of the following EU directives: Directive 94/9/EC (Equipment and Protective Systems for Use in Potentially Explosive Atmospheres), the Electromagnetic Compatibility (EMC) Directive 89/336/EEC and the Pressure Equipment Directive 97/23/EC.

Heinrichs Messtechnik confirms compliance with the directives by attaching the CE mark.

## 13 Order information

Please include the following information in your order:

- With or without displacement vessel
- Connection size
- Pressure stage
- Flange sealing strip
- Material
- Installation from above: distance from the sealing strip of the flange to the bottom of the container
- Lateral installation: flange distance to displacement vessel
- Length of chain (standard version: 150 mm)
- Medium
- Density
- Operating temperature
- Operating pressure
- Indicator unit: standard version in "cm" (special scale available)

Additional equipment:

- Signal output 4-20 mA with HART® with or without limit transducer
- Limit transducer: 1 or 2 switching points
- Heating jacket with connection .....
- High-temperature version: raised indicator unit
- High-temperature version: lateral indicator unit
- Special indicator unit made of stainless steel
- Drain, vent, plug, flange, valve (only for displacement vessel)
- Separation layer version
- Certificates

## 14 Standards and directives, certificates and approvals

- Certified to DIN-EN 9001
- Production in accordance with AD guidelines and HPO approval (TRB200/TRD201)
- TÜV approval for welding requirements in accordance with DIN-EN 729-2
- Measuring range rated and converted to other products according to VDE/VDI guidelines 3513
- Directive 94/9/EC (Equipment and Protective Systems for Use in Potentially Explosive Atmospheres)
- EN 50014:1997+A1-A2 - General requirements
- EN 50020:1994 - Intrinsic safety "i"
- Directive 89/336/EEC (EMC Directive)
- EN 61000-6-2:1999 – Immunity industrial environment
- EN 50 081-1 – Emitted interference residential environment
- EN 55011:1998+A1:1999 – Group 1, Class B
- NAMUR recommendation NE 21
- EN 60529 – Degrees of protection through housing (IP code)
- EN 61010 – Safety requirements for electrical measuring, control and laboratory devices
- EN 60947-5-6:2000 – Switchgear and controlgear
- Directive 97/23/EC (Pressure Equipment Directive)

## 15 Safety instructions

### 15.1 Intended use

The BA level meter may be used only for measurements of fluid media. The manufacturer shall not be liable for damages that result from unintended or inappropriate use. When dealing with an aggressive medium, clarify the material durability of all wetted parts. When using the device in hazardous areas, follow the EC Type Examination Certificate and the applicable national installation rules.

### 15.2 Installation, start-up and operating personnel

Only trained specialists authorized by the system operator may carry out the installation, electrical installations, start-up, maintenance and operation. They must read and understand the operating manual and follow its instructions.

The required mounting, electrical installation, start-up and maintenance work may only be carried out by expert and authorized persons designated by the plant operator.

Basically, follow the conditions and provisions applicable in your country.

## 16 Packaging, mounting and shipment

Carefully unpack the device to avoid damaging it. Storage and installation must be done in a clean and dry room so that contamination – especially of the interior of the fitting – is avoided. Follow the limit values for ambient temperature. Carefully hang the displacer rod in its support.

When transporting the device to a remote mounting location, we recommend that you reuse the factory-issued packaging and the transport protection.

## 17 Maintenance

The device requires no maintenance if used according to its intended purpose. However, if cleaning is necessary to remove dirt from the measuring ring or the float, take note of the following aspects:

- Please take note that, with devices with built-in electrical equipment, removing the indicator cover restricts the EMC protection.
- Before removing a device, make sure that the pipeline is free from the product, is depressurized and has cooled down.
- Dirty displacer rods may be carefully cleaned after removal with a brush and the appropriate cleansing agent. Please make sure that the passage to the device head is free of sediments.
- The switching points of the limit transducers are adjustable. To do this, remove the indicator cover, unfasten the contact point indicator located on the scale and readjust it. After the adjustment, reattach the bolts of the contact point indicator. Reinstall and tighten the indicator cover.
- The calibration of the KINAX signal output is firmly set and not adjustable. Do not adjust the potentiometer of the transmitter.
- The parameterization of the ES is possible and is done via HART®. Please refer to the separate Operating Instructions for the ES.
- The gas and viscous damping cylinders can be checked for dirt (see Installing/removing the damping sets).

## 18 Trouble shooting

- **Indicator window clouds over:** Water in the indicator unit.
- **Indicator cover is not tight enough:** Adjust the cover seal, tighten the cover.
- **Window is opaque:** Corrosive atmosphere, ventilate.
- **Window ices over due to cold and damp atmosphere:** The device can be equipped at the factory with an air/nitrogen flush.
- **Window ices over due to very cold medium and damp atmosphere:** The device can be equipped at the factory with a pulled-forward indicator unit.
- **Device shows incorrect values:** Compare the process data density and temperature with the values on the scale.
- **Pointer does not react in spite of varying level:** The pointer may have gotten stuck; remove the cover and move the pointer; if the pointer can be moved easily, the displacer rod cannot move. If the pointer is unable to move further, send the device to the head office for servicing.
- **The displacer rod is stuck at one place due to dirt:** Disassemble the device. If necessary, dismantle and clean the displacer rod.
- **Scale pointer pulsates:** Turbulence in the fluid or agitated fluid surface. The problem can be solved by installing a splash proof tube for the displacer rod.
- **Electrical equipment are not functioning:** Check the auxiliary power. Are suitable power supply equipment connected, have the terminals been selected correctly, has the parameterization carried out correctly?

## 19 Returning devices for repair and service

**Note:** In accordance with the applicable German waste disposal legislation, the owner/client is responsible for the disposal of special waste and hazardous materials. Consequently, all devices sent to us for repair must be free of any hazardous materials. This also applies to possible hollow spaces and fissures in the devices. If repair is necessary, confirm the above-mentioned item in writing (**please use the form in the Appendix**).

If hazardous materials remain in or on the device after it has been returned, Heinrichs Messtechnik shall be authorized to remove them at the client's expense without further inquiry.

## 20 Replacement parts

The following parts can be ordered as replacement parts:

- 1) Indicator cover with window/gasket/screws
- 2) Scale with standard scaling
- 3) Pointer
- 4) Magnetic transmission sleeve with pointer axis
- 5) Float/displacer rod
- 6) Limit transducer
- 7) ES transmitter

## 21 Exploded views

### 21.1 Aluminum indicator unit

Name	Part no.
Mounting plate with 1 thread M 20 x 1.5	10
Mounting plate with 2 threads M 20 x 1.5	11
Bearing unit	20
Fixing screws for bearing unit	30
Dummy plug M 20 x 1.5	40
Cable gland	41
Cable gland	42
Scale, blank	50
Scale, product scale according to original shipment (order no. necessary)	51
Screw for fixing the scale	60
Zero-point screw with nut	70
Indicator cover with glass window, gasket, screws	80
Scale pointer with hub	90
Scale pointer with hub and 2 switching dials	91
Scale pointer with hub and linearization disc	92
Scale pointer with hub and linearization disc/switching dial	93
Scale pointer with hub and 2 switching dials and ES position magnet	94
1. SJ 3,5 N limit transducer with limit value indicator	110
1. SJ 3,5 SN limit transducer with limit value indicator	111
2. SJ 3,5 N limit transducer with limit value indicator	120
2. SJ 3,5 SN limit transducer with limit value indicator	121
Connection plate for 1 limit transducer with mounting parts	130
Connection plate for 2 limit transducers with mounting parts	131
Installation set for transmitter type KINAX 3W2 Ex with lever arm and mounting parts	132
Installation set transmitter type KINAX 3W2 Ex with lever arm and mounting parts and connection for a limit transducer	133
Installation set transmitter ES Ex Hart	140
Installation set transmitter ES Ex with switch (min-max)	141
Installation set transmitter ES Ex with Profibus	142

#### 21.1.1 Complete indicator unit, local with scale

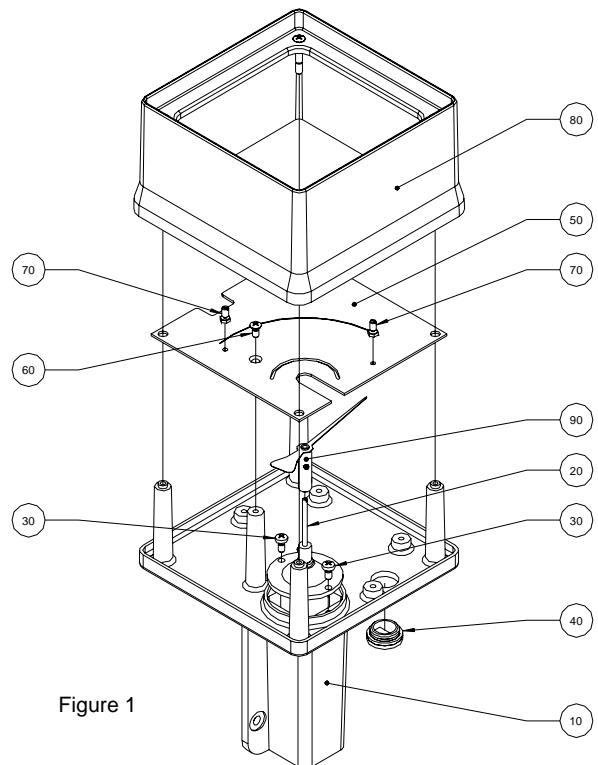


Figure 1

#### 21.1.2 Complete indicator unit with 1 SJ 3,5 N limit transducer

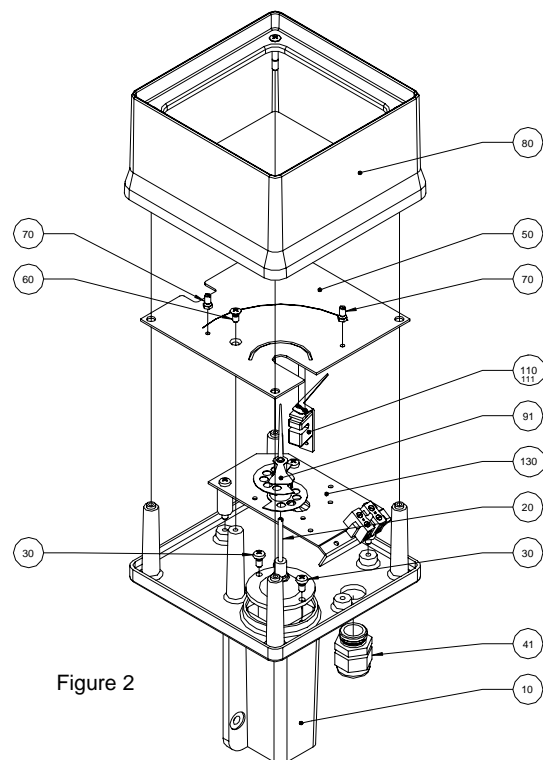


Figure 2



**21.1.3 Complete indicator unit with 2 SJ 3,5 N limit transducers**

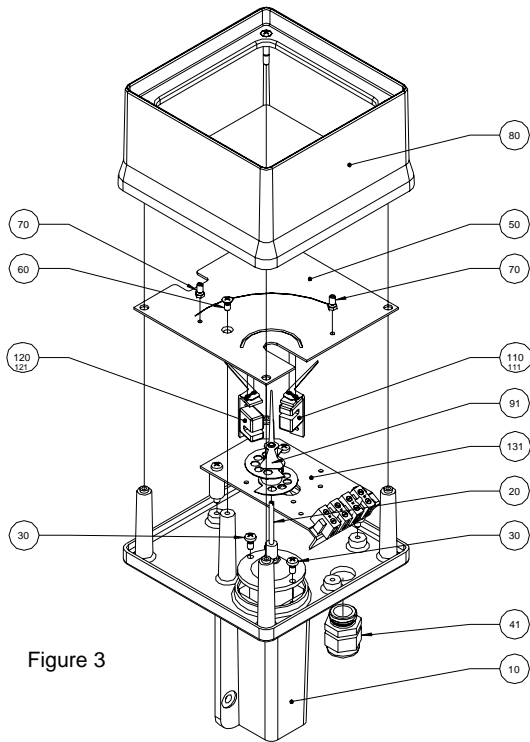


Figure 3

**21.1.5 Complete indicator unit with E2 KINAX Ex transmitter and 1 SJ 3,5 N limit transducer**

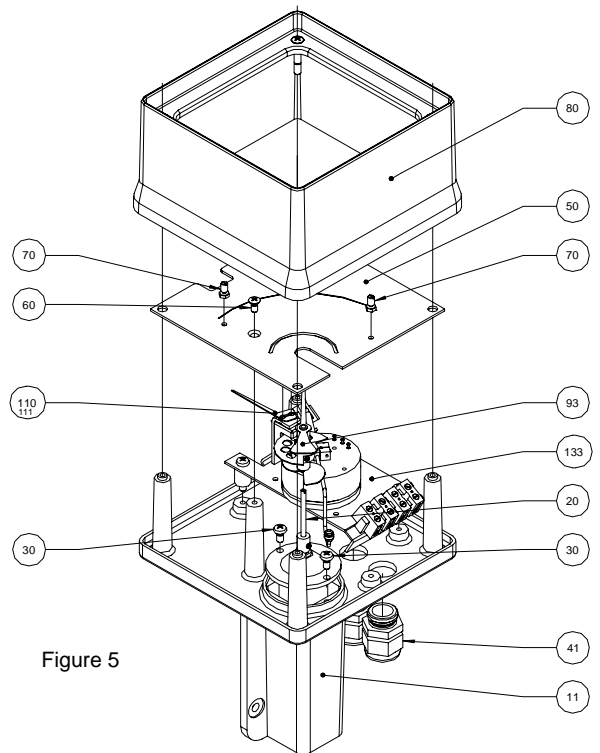


Figure 5

**21.1.4 Complete indicator unit with E2 KINAX Ex transmitter**

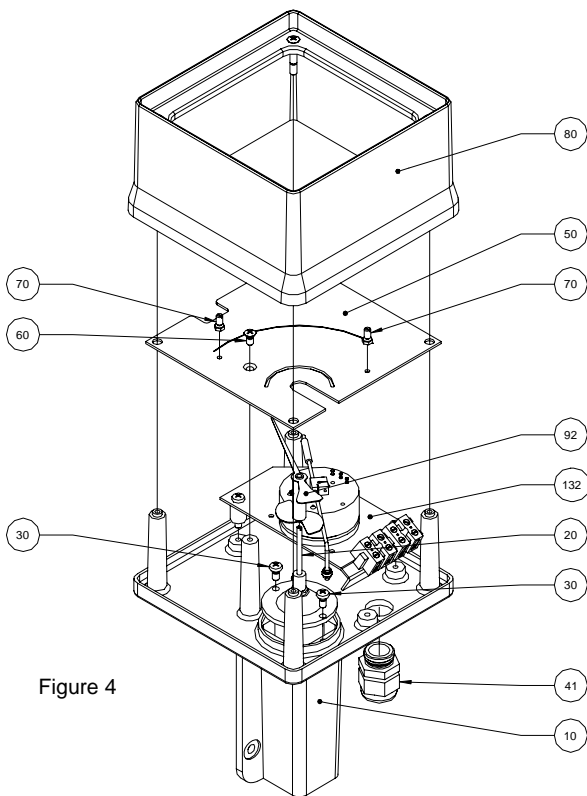


Figure 4

**21.1.6 Indicator unit with transmitter type ES Ex HART®**

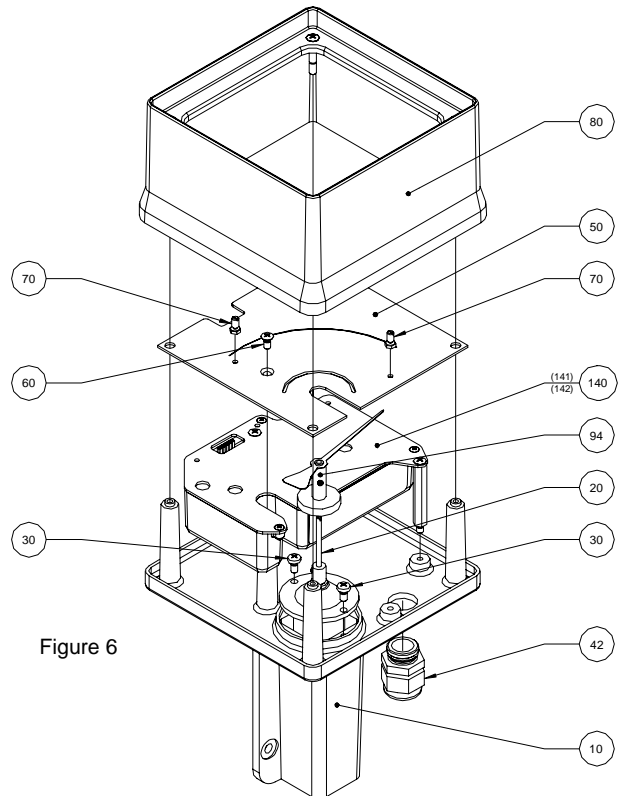


Figure 6

**22 Decontamination certificate for device cleaning**

Company: .....

City: .....

Department: .....

Name: .....

Tel. No.: .....

This level meter

type BA-.....

was operated using the measured medium.....

Since this measured medium is dangerous in water/poisonous/corrosive/flammable,  
we have

- checked that all hollow spaces of the device are free of these materials\*
- neutralized and flushed all hollow spaces of the device\*

\*cross out what is not applicable.


We hereby confirm that in resending the device no danger to persons or the environment is posed by the residual measured substance.

Date: .....

Signature: .....

Stamp

23 EC Type Examination Certificate



**Translation**

**EC-TYPE EXAMINATION CERTIFICATE**

(1) **Equipment:** Level meter type BA

(2) **Equipment or protective system intended for use in potentially explosive atmospheres - Directive 94/9/EC**

(3) **EC-Type Examination Certificate Number**  
**TÜV 02 ATEX 1926 X**

(4) **Manufacturer:** Heinrichs Messtechnik GmbH  
Robert Perthel Strasse 9  
D-50739 Köln

(5) **Equipment:** Level meter type BA

(6) **Manufacturer:** Heinrichs Messtechnik GmbH  
Robert Perthel Strasse 9  
D-50739 Köln

(7) This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

(8) The TÜV NORD CERT GmbH & Co. KG, TÜV CERT-Certification Body, notified body number N° 0032 in accordance with Article 9 of the Council Directive of the EC of March 23 1994 (94/9/EC), certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

(9) The examination and test results are recorded in the confidential report N° 02 YEX 185906. Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

**EN 50 014: 1997**      **EN 50 020: 1994**      **EN 50 284: 1999**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type examination certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.


(12) The marking of the equipment or protective system must include the following:  
**Ex II 1/2 G EEx ia IIC T6...T1**

TÜV NORD CERT GmbH & Co. KG  
TÜV CERT-Certification Body  
Am TÜV 1  
D-30619 Hannover  
Tel.: 0511 966-1470  
Fax: 0511 966-2555

*Perthel*  
Head of the Certification Body


TÜV CERT (A 072) 10.00.14

Hanover, 2002-10-15



This certificate may only be reproduced without any change or details included. Examples or changes shall be allowed by the TÜV NORD CERT GmbH & Co. KG.

page 1/4



**SCHEDULE**

(13) **EC-TYPE EXAMINATION CERTIFICATE N° TÜV 02 ATEX 1926 X**

(14) **Description of equipment**  
The level meter type BA is intended for the measurement of filling levels in resp. at tanks. The device uses the archimedes buoyancy principle. The float and its mechanical guidance may be erected in areas that require apparatus of category 1.  
The connection between the temperature class, the permissible ambient temperature (T<sub>a</sub>), the media temperatur (T<sub>m</sub>) and the utilised intrinsically safe evaluation circuits has to be taken from the following tables.

**Electrical Data**  
**Device with measuring transmitter**  
**type ES resp. ES-PPA**  
Supply- and signal circuit ..... in type of protection „Intrinsic Safety“ EEx ia IIC / IIB resp. EEx ib IIC / IIB  
Electrical data and terminal assignment see DMT 00 ATEX E 075

**Hazardous explosive areas that require apparatus of category 1:**

Temperature class	T <sub>a</sub>	T <sub>m</sub>
T6...T1	-20 °C to 66 °C	-20 °C to 60 °C

**Hazardous explosive areas that require apparatus of category 2:**

Temperature class	T <sub>a</sub>	T <sub>m</sub>
T6	-40 °C to 64 °C	-40 °C to 80 °C
T5	-40 °C to 62 °C	-40 °C to 95 °C
T4...T1	-40 °C to 60°C	-40 °C to 110 °C

**Device with angular position transmitter**  
**type KINAX 3W2 Typ ...**  
Supply- and signal circuit ..... in type of protection „Intrinsic Safety“ EEx ia IIC / IIB resp. EEx ib IIC / IIB  
Electrical data and terminal assignment see PTB 99 ATEX 2271

**Hazardous explosive areas that require apparatus of category 1:**

Temperature class	T <sub>a</sub>	T <sub>m</sub>
T6	-20 °C to 57 °C	-20 °C to 60 °C
T5...T1	-20 °C to 72 °C	-20 °C to 72 °C

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Schedule EC-Type Examination Certificate N° TÜV 02 ATEX 1926 X

Hazardous explosive areas that require apparatus of category 2:

Temperature class	T <sub>a</sub>	T <sub>m</sub>
T6	-40 °C to 54 °C	-40 °C to 80 °C
T5	-40 °C to 70 °C	-40 °C to 95 °C
T4...T1	-40 °C to 68 °C	-40 °C to 110 °C

Device with inductive proximity switches  
(max. 2 pc.; type SJ 3,5 N  
resp. SJ 3,5 SN)

Evaluation and supply circuit..... in type of protection „intrinsic Safety“  
EEx ia IIC / IIB resp. EEx Ib IIC / IIB  
(terminals L+, L-) only for the connection to certified intrinsically safe circuits

Maximum values:

Type 1	Type 2	Type 3	Type 4
U <sub>I</sub> = 16 V	U <sub>I</sub> = 16 V	U <sub>I</sub> = 16 V	U <sub>I</sub> = 16 V
I <sub>I</sub> = 25 mA	I <sub>I</sub> = 25 mA	I <sub>I</sub> = 52 mA	I <sub>I</sub> = 76 mA
P <sub>I</sub> = 34 mW	P <sub>I</sub> = 64 mW	P <sub>I</sub> = 169 mW	P <sub>I</sub> = 242 mW

The connection between the type of the connected circuit, the maximum permissible media-temperature (T<sub>m</sub>) and the ambient temperature (T<sub>a</sub>) in dependence on the category of the application has to be taken from the following tables:

Hazardous explosive areas that require apparatus of category 1:

Temperature class	max. permissible ambient temperature T <sub>a</sub> at the indication box				T <sub>m</sub>
	Type 1	Type 2	Type 3	Type 4	
T6	73 °C	66 °C	43 °C	---	-20 °C to 60 °C
T5	80 °C	80 °C	60 °C	40 °C	
T4...T1	80 °C	80 °C	80 °C	71 °C	
The minimum permissible ambient temperature at the indication box is: -20 °C.					

BA 02 03 02

page 3/4



Schedule EC-Type Examination Certificate N° TÜV 02 ATEX 1926 X

Hazardous explosive areas that require apparatus of category 2:

Temperature class	max. permissible ambient temperature T <sub>a</sub> at the indication box				T <sub>m</sub>
	Type 1	Type 2	Type 3	Type 4	
T6	72 °C	64 °C	40 °C	---	-40 °C to 80 °C
T5	80 °C	80 °C	55 °C	38 °C	
T4...T1	80 °C	80 °C	80 °C	71 °C	
The minimum permissible ambient temperature at the indication box is: -40 °C.					

effective internal capacitance C<sub>i</sub> = 50 nF  
effective internal inductance L<sub>i</sub> = 250 µH

(16) Test documents are listed in the test report No.: 02 YEX 185906.

(17) Special conditions for safe use

The level meter is not marked with the permissible ambient- and media temperature. The connection between the temperature class, the permissible ambient temperature (T<sub>a</sub>) and the permissible media temperature (T<sub>m</sub>) has to taken from the tables above resp. from the operation instruction.

The process pressure and the temperature range of the media has to be between 0,8 bar to 1,1 bar and -20 °C to 60 °C when the application requires category 1 apparatus. When this apparatus is used outside of these atmospheric conditions this certificate for a category 1/2 apparatus can be used as guideline. Additional tests are recommended for the special intended conditions of the application.

(18) Essential Health and Safety Requirements  
no additional ones

BA 02 03 02

page 4/4



Translation



**EC-Type Examination Certificate**

(1) - Directive 94/9/EC -  
 (2) Equipment and protective systems intended for use  
 in potentially explosive atmospheres

(3) **DMT 00 ATEX E 075**

(4) **Equipment:** Electronic transmitter type ES or ES-PPA

(5) **Manufacturer:** Bopp & Reuther Heinrichs Messtechnik  
 Josef Heinrichs GmbH & Co. Messtechnik KG

(6) **Address:** D 50933 Köln

(7) The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

(8) The certification body of Deutsche Montan Technologie GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.  
 The examination and test results are recorded in the test and assessment report BVS PP 00.2071 EG.

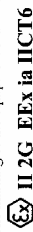
(9) The Essential Health and Safety Requirements are assured by compliance with:

EN 50014:1997+A1-A2 General requirements  
 EN 50020:1994 Intrinsic safety 'i'

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Type Examination Certificate relates only to the design and construction of the specified equipment. Further requirements of Directive 94/9/EC apply to the manufacture and placing on the market of this equipment.

(12) The marking of the equipment shall include the following:



**Deutsche Montan Technologie GmbH**

Essen, dated 31. Oktober 2000

Signed: Joekers

Signed: Dill

DMT-Certification body

Head of special services unit

Page 1 of 3 to DMT 00 ATEX E 075  
 This certificate may only be reproduced in its entirety and without change.  
 Am Technologiepark 1, 45307 Essen, Telefon (0203)172-1416, Telefax (0203)172-1716

(13) Appendix to

**EC-Type Examination Certificate**

**DMT 00 ATEX E 075**

(15) 15.1. Subject and type  
 Electronic transmitter type ES or ES-PPA

15.2. Description  
 The electronic transmitter serves for the recording of the position or angular position of a magnet at rotameters.  
 The completely encapsulated electronic device of the transmitter is mounted in a light alloy housing together with corresponding terminals for the connection of the intrinsically safe circuits. The transmitter is provided to be installed in a housing with a min. degree of protection IP 20.

15.3. Parameters

15.3.1 type ES

15.3.1.1 Input circuit (terminals 1 and 2)

voltage	Ui	DC	30	V
current	Ii		150	mA
power	Pi		1	W
effective internal inductance	Li		0,24	mH
effective internal capacitance	Ci		16	nF

15.3.1.2 Binary outputs 1 and 2; potentially free optocoupler circuits (terminals 3 - 4 and 5 - 6), each

voltage	Ui	DC	30	V
current	Ii		20	mA
power	Pi		100	mW
effective internal inductance	Li		4	µH
effective internal capacitance	Ci		16	nF

15.3.2 type ES-PPA Input circuit (terminals 7 and 8)  
 for connection with a circuit in accordance with FISCO model (PTB report no. PTBW-533)

voltage	Ui	DC	25	V
current	Ii		280	mA
power	Pi		2	W
effective internal inductance	Li		negligible	
effective internal capacitance	Ci		negligible	

15.3.3 ambient temperature range  
 Ta - 40 °C up to + 70 °C

Page 2 of 3 to DMT 00 ATEX E 075  
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(1) **EC-TYPE-EXAMINATION CERTIFICATE**  
 (Translation)



(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - Directive 94/9/EC

(3) EC-type-examination Certificate Number:  
**PTB 97 ATEX 2271**

(4) Equipment: Transmitter for angular position KINAX 3W2 type 708-...  
 ... resp. KINAX WTT07 type 707-...  
 ... resp. KINAX WTT06 type 706-...

(5) Manufacturer: Camille Bauer AG

(6) Address: Aargauerstrasse 7, CH-5610 Wohlen

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

(9) The examination and test results are recorded in the confidential report PTB Ex-97-27381.

(10) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:  
**EN 50014:1997**  
**EN 50020:1994**

(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The marking of the equipment shall include the following:

**II 2 G EEx Ia IIC T6**

Zertifizierungsstelle Explosionschutz  
 By order



Dr.-Ing. U. Johannsmeyer  
 Regierungsdirektor

Braunschweig, 21.01.1998

Sheet 1/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig



(16) Test and assessment report  
 BVS-PP-00-2071 EC as of 31. Oktober 2000

(17) Special conditions for safe use  
 None

We confirm the correctness of the translation from the German original.  
 In the case of arbitration only the German wording shall be valid and binding.

45307 Essen, dated 31.10.2000  
 BVS-Schu/Kn. A. 20000463

Deutsche Montan Technologie GmbH

*[Signature]*  
 DMT-Certification body

*[Signature]*  
 Head of special services unit



**Physikalisch-Technische Bundesanstalt**  
Braunschweig und Berlin

**SCHEDULE**

- (13)
- (14) **EC-TYPE-EXAMINATION CERTIFICATE No. PTB 97 ATEX 2271**

(15) Description of equipment

The angular position transmitter KINAX 3W2 of type 708-... KINAX WT 707 of type WT 707-... and KINAX WT 706 of type WT 706-... convert the angular position of a shaft contactlessly to a proportional electrical output signal.

A variation of the shaft position effects a variation of a capacitance, which is converted to a proportional current alteration by the downstream electronics.

The ranges of the ambient temperature dependent on the temperature class are shown in the following table.

Minimum ambient temperature	Maximum ambient temperature	Temperature class
-40 °C	60 °C	T 6
-40 °C	75 °C	T 5

Electrical data

Supply- and measuring output.....type of protection Intrinsic Safety EEx'ia IIC for connection to a certified intrinsically safe circuit (terminals 1, 2, 3)

Maximum values:  $U_i = 30 \text{ V}$   
 $I_i = 160 \text{ mA}$   
 $P_i = 1 \text{ W}$

Effective internal capacitance:  $C_i \leq 10 \text{ nF}$   
 The effective internal inductance is negligibly small.

The transmitter for angular position KINAX 3W2 of type 708-... must be mounted into a housing which meets the requirement of a degree of protection IP 20 according to IEC 529.

Since the angular position transmitters KINAX WT 707 of type WT 707-... and KINAX WT 706 of type WT 706-... meet the requirements of a degree of protection IP 20 according to IEC 529 mounting of these variants into an additional housing is not necessary.

sheet 2/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig



**Physikalisch-Technische Bundesanstalt**  
Braunschweig und Berlin

**SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 97 ATEX 2271**

- (16) Report PTB Ex 97-27381

- (17) Special conditions for safe use  
not applicable

- (18) Essential health and safety requirements  
met by standards

Braunschweig, 21.01.1998

Zertifizierungsstelle Explosionsschutz

By order



*Dr.-Ing. U. Johannsmeyer*  
 Dr.-Ing. U. Johannsmeyer  
 Regierungsdirektor

Sheet 3/3

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • D-38116 Braunschweig

## 24 Sales representatives

Internet: <http://www.heinrichs-mt.com/>

## 25 Notes

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