Safety Instruction

UNIQ **04 Impedance probe with field device

Type: AME-I (COM-, HMI-Unit) ExD
1-channel field device for connection to impedance probes.

Additional technical documentation

Please observe applicable laws, standards, and guidelines to ensure appropriate use at the place of use. Additional documents include the operating instructions, Ex specifications, EMC specifications, and technical data.

Target audience, use

The plant operator is responsible for planning, installation, commissioning, operation, maintenance, and dismantling. The proper installation, commissioning, operation, maintenance, and dismantling of the unit must be performed exclusively by qualified personnel. Please read the detailed operating instructions.

Application

Approved for appropriate and authorized use in accordance with manufacturer's instructions. Warranty claims and manufacturer's liability are void in the event of improper handling. The device is used in measurement and control technology for monitoring, e.g., in tanks or separators. Impedance pipe/bar probes can be operated with a field device mounted or detached.

Operating and environmental conditions must be observed. The probe circuit is intrinsically safe. Terminal X11 can be operated in Ex ia mode.

Prohibited use

If used improperly, the safety of personnel and equipment cannot be guaranteed.

Assembly / installation

Do not install damaged or contaminated devices. Only install devices in perfect condition. In potentially explosive atmospheres, the ExD connection side of the connection head may only be opened when power is off. When opening the connection head, the installation must be protected from the elements. Avoid direct sunlight when operating outdoors. Protect the field device from heat sources. The AME-COM and AME-I_HMI field devices are designed to meet protection class IP50 according to IEC/EN 60529. Installation is intended exclusively in the dual-chamber ExD enclosure.

All electrical circuits connected to the device must comply with surge category II (or higher) as specified in IEC/EN 60664-1. Follow installation instructions in IEC/EN 60079-14. Installation and operation in potentially explosive atmospheres are permitted only if they comply with the requirements of IEC/EN 60079-0.

Requirements; cables and connecting wires

When installing cables and connecting wires, keep the following points in mind:

- Permissible conductor cross-sectional area for the terminal blocks
- Insulation on the conductors must extend all the way to the terminal. Stranded wires can be used without ferrule caps
- Only shielded cables may be used
- Installation must be performed while disconnected from power
- Connect the external ground terminal first

Setting and parametrization

Standard device configuration and other setting options can be found in the detailed operating instructions specific to the probe.

Commissioning of the device

Before commissioning, the probe must be installed and connected using a suitable control cable. In addition, ensure that the wiring is correct in accordance with the operating instructions.

Operation, maintenance, repairs

The device status is shown during operation on the display; further details are explained in the operating instructions. A defective device may only be repaired by Aquasant Messtechnik. Disassembly must be done with power disconnected. Instructions for removing the field device electronics from the ExD enclosure are provided in the operating instructions.

Preventive maintenance, cleaning

The system must be inspected and tested for proper functionality by Aquasant Messtechnik or the MSR department in accordance with SEV regulations, etc. Be sure to read the operating instructions. The device must be cleaned while disconnected from power. It is not permitted under any circumstances to insert objects into the device or to open the electronics housing. The housing can be cleaned with low-pressure compressed air (< 2 bar) or with a damp cotton cloth (do not use solvents).

Delivery, transportation, disposal

Check packaging and content for damage. Check scope of delivery for completeness and accuracy. Use the original packaging for storage (in a dry, clean place) or transport. Follow national laws and regulations regarding the disposal of defective devices and packaging.

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Technical data AME-I

Power supply	24 VDC ±10% U_m = 30.0 VDC
Power consumption	≤ 1.2 VA
Inrush current	ca. 600 mA / 1ms
Max. operating current	90 mA
Cable-type	min. 2x2x0.75 mm² /shielded
Switching function	Parameterized threshold value
Monitoring	Self-monitoring measurement system: Measured value: Below threshold / Above threshold, Technical malfunction
Analog output	**passive** 4–20 mA output, Ex ia, with galvanic isolation, Technical malfunction <3.5 mA

Relay circuit	200 VDC/AC max 0.5 A
Switching capacity	10 W
Switch-on delay	< 1 sec.
Response delay	0 – 30 min. adjustable
Weight	300 g
Protection class	IP50
Storage & Operation ambient temperature	-20 … +60 °C
Relative humidity	80 %, non-condensing
Dimension Housing AME-Module	L x ø 128 x 61 mm H x ø 100 x 60 x 160 mm

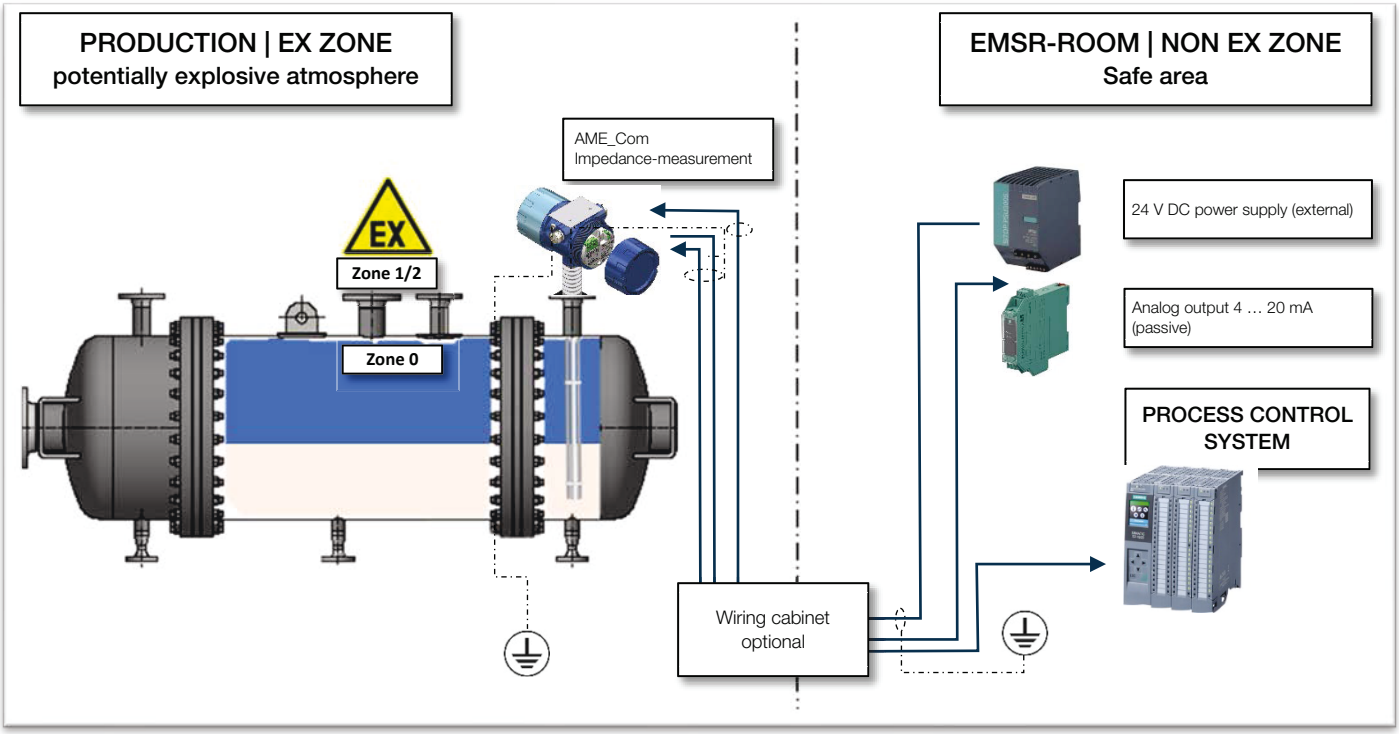
Overvoltage Category (OVC): I

The field device is designed for connection to overvoltage category I. In hazardous areas, it may only be connected to circuits that are powered by a safe isolation (SELV/PELV power supply in accordance with surge category III) to ensure that the maximum voltage Um = 30 VDC is not exceeded at any time.

Ex – Rating data

Max. operating voltage: **U_m = 30 V**
Ignition protection type: **ExD / intrinsic safety [Ex ia]**
Parameters of the certified intrinsically safe circuit:
U_0 = 7.875 VDC I_0 = 9.03 mA P_0 = 71.11 mW C_0 ≤ 8 µF L_0 ≤ 100 mH

Example application: Interface separation



Intrinsic safety

- The AME-I_HMI field device (display), meaning the Ex ia side of the dual-chamber enclosure, may be opened
- The 4-20mA current output on the AME-Com connection board can be powered by an Ex-rated isolation transformer

Special conditions X

The EU type-examination certificate must be observed. It is particularly important to comply with the “Special Conditions” contained therein.

No.:	Special conditions X
1	The probes must only be fitted or removed in accordance with the type code when the tank is empty and vented, the field instrument’s measurement electronics are de-energized, and the probe is grounded.
2	Warning!! Electrostatic discharge. Applicable for all probes made of an electrically insulating material (e.g. PTFE). Since these materials are insulators, the main risk during cleaning is electrostatic charging (sparking due to friction). **Clean probes only with a damp cloth!!** Permitted: Cleaning exclusively with a damp antistatic cloth (damp, with a mild antistatic cleaner if necessary) or by rinsing/washing with liquids. Alternative: Cleaning may only be performed when there is no explosive atmosphere present (system shut down, cleared of explosive gases, and ventilated or inerted).
3	Since the probe circuit is operationally grounded, there must be a common equipotential bond along the entire length of the wiring for the probe circuit and the power and signal circuits (both inside and outside the hazardous area).
4	**IMPORTANT NOTE:** The device must be connected to a permanent Ex-i equipotential bonding system via the external grounding screw. According to EN 60079-14, the grounding resistance from the housing to the system’s central grounding electrode must not exceed 1 Ω. Operation without a connected equipotential bonding system will result in the revocation of the Ex certification. Do not loosen the ground screw until the probe has been removed and the electrical conductor disconnected.
5	Operation of the probe outside the specified nominal pressure range of the entire system is prohibited. The operator must take process engineering measures to ensure that no impermissible adiabatic pressure surges occur in the vessel. Follow the instructions on the device label!
6	The operator must verify for the process that the selected probe materials are chemically resistant to the specific process medium. If the products tend to cake or dust is present in Zone 20, the probe must be cleaned of product buildup at regular maintenance intervals.
7	Pipe Probes: Installation instructions are found in the manual: The operator is required to electrically connect the pipe flanges upstream and downstream of the probe on-site using low-resistance grounding strips.

8	The probes, with either integrated or separate field-mounted measurement electronics (see the manufacturer's separate document for the type code), are classified as Group II, Category 2G equipment in accordance with Directive 2014/34/EU (ATEX 114). In accordance with Directive 1999/92/EC (ATEX 137), these may be used in Zones 1 and 2, as well as in gas groups IIA, IIB and IIC, where there is a risk of explosion due to flammable substances within temperature classes T1–T4.When using and installing this equipment, the requirements set out in EN 60079-14 and the operating instructions must be strictly complied with.
9	The probes, with either integrated or separate mounted field measurement electronics (see the manufacturer's separate document for the type code), are classified as Group III, Category 2D equipment in accordance with Directive 2014/34/EU (ATEX 114). According to Directive 1999/92/EC (ATEX 137), these may be used in Zones 21 and 22 where combustible dusts are present. When using and installing these devices, the requirements set out in EN 60079-14 and the operating instructions must be strictly complied with.
10	Only the part of the probe that comes into contact with the medium, as specified in the type designation, is classified under Directive 2014/34/EU (ATEX 114) as an apparatus in Group II/III, Category 1G or Category 1D respectively, which may be used in Zone 0 or Zone 20 respectively in accordance with Directive 1999/92/EC (ATEX 137).
11	The parts of the probe that come into contact with the medium, as specified in the type designation and coated with an insulating material (e.g. PTFE), may be used as following: In accordance with EN 60079-0, Section 7.4.2 'Prevention of the build-up of electrostatic charges in Group I or Group II' and EN 60079-32-1, the following applies in agitated vessels or pipework where non-conductive media are flowing past (electrical conductivity < 10^{-9} S/m): 1) Zone 0, Gas Groups IIA / IIB: no restrictions for coatings where s = < 2 mm or compliance with Table 7 'Surface Limits' (EN 60079-0), taking into account 7.4.2 b). 2) Zone 0, gas groups IIA / IIB and IIC: no restrictions for coatings where s ≤ 0.2 mm or comply with Table 7 Surface Limits (EN 60079-0), taking into account 7.4.2 b). 3) Zone 0, gas groups IIA / IIB / IIC: no restrictions if the system is inerted. 4) Zone 0, gas groups IIA / IIB / IIC: no restrictions with, for example: PTFE-el (modified PTFE (e.g. PTFE-el or antistatic)); discharge resistance <10^{9} Ω/cm, or other materials in accordance with 7.4.2(a) of (EN 60079-0) . 5) If the liquids have an electrical conductivity of >10^{-9} S/m, there are no restrictions for Zone 0 (EN 60079-32-1), even if electrostatic charging of the PTFE coating is not possible, even in rare fault conditions. NOTE: It is generally accepted that glass and ceramic surfaces are not susceptible to electrostatic charging. Consequently, they are suitable for use in Zone 0, Gas Group IIC. Observe the information on the type plate!

12	Only the part of the bar probe that comes into contact with the medium, including the connection to the inactive electrode section as specified in the type designation, may be used in Category 1 of Zone 20 if one of the following conditions is met: 1) Where a plastic or elastomer is used to cover a conductive material, this is only permitted if the surface area is less than 500 mm^2. 2) If the thickness of the outer insulation on metal parts is >= 8 mm. 3) If the material meets the requirements of EN 60079-0, Section 7.4.3 (a) or (b), relating to the limit of surface resistance or breakdown voltage. 4) In Zone 20, the probe must not be used in processes that generate significant static charge (e.g. pneumatic dust transport, direct jet filling onto the sensor). 5) If the system is inerted.
13	The handheld probe's models specified in the type code may only be used in Zone 1 in gas groups IIA and IIB. Please observe the information on the type plate!
14	The clamp-on probes specified in the type designation may only be used in Zone 1 in gas groups IIA, IIB and IIC. Please observe the information on the type plate!
15	The version of the leakage probe specified by the type code must only be used in Zone 1 with gas groups IIA / IIB. Please observe the information on the type plate!
16	The permissible ambient temperature range for the field device electronics to be connected to the probes is -20°C to +60°C; as specified in the type code.

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The permissible medium temperature for the probe mounting section, with either integrated or separate AME-I field-mounted measurement electronics as specified in the type code, must be defined for the selected design (with or without temperature decoupling (heat sink), dimensions, etc.) in such a way that the requirements are met. This verification or the information required for determining compliance must be included in the operating instructions for each variant.

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The temperature-dependent classification of the probe range (Zone 0 / EPL Ga) applies to all probe types used in gases and vapors:

The probes are designed as devices with zone separation. The maximum permissible surface temperature of the process-side probe area (EPL Ga) is primarily determined during operation by the temperature of the surrounding process medium. Self-heating caused by the intrinsically safe measuring circuit (Ex ia IIC) and mechanical frictional heat (due to static, fixed installation) are negligible.
To ensure effective prevention of ignition sources with regard to hot surfaces in accordance with EN 1127-1, the operator must strictly limit the permissible gas temperature classes based on the actual process temperature.
Depending on the maximum process temperature T_{medium}, the following mandatory temperature class classification applies to the sensor area:

Max. Process Temperature (Medium in Tank)	Max. Surface Temperature of Probe in Zone 0	Required Minimum Ignition Temperature of Gases	Permissible Gas Temperature Classes	Permissible Gases (Practical Examples)	Temperature Class of Overall Device (Enclosure)
<= 80 °C	max. 80 °C	> 85 °C	T6, T5, T4, T3, T2, T1	Carbon disulfide, Ethylene, Benzene, Gasoline, Methane, Hydrogen	T4
<= 110 °C	max. 110 °C	> 135 °C	T4, T3, T2, T1	Ethylene, Benzene, Gasoline, Methane, Hydrogen	T4
> 110 °C to <= 170 °C	max. 170 °C	> 200 °C	T3, T2, T1	Motor fuels (Gasoline), Diesel, Heating oil, Jet fuel, Methane, Hydrogen	T4 (through the heat sink)

WARNING:
Risk of explosion due to hot surfaces! If the device is operated at process temperatures above 80 °C, the surrounding gas-air mixture (Zone 0) must NOT comply with temperature class T6. Failure to comply may result in spontaneous combustion of the medium on the probe surface.

2) Responsibilities of the operator (system installer):
At any time the operator must ensure, through process engineering or control system measures (e.g., component-tested temperature monitoring in accordance with IEC 60079-14), that the maximum medium temperature does not exceed the permissible limit value for the respective gas atmosphere—as defined by the operating ranges specified above—at any time.

3) Thermal decoupling of the electronics (Zone 1 / EPL Gb):
The electronics enclosure (type of protection Ex db IIC T4 Gb) remains permanently within temperature class T4 (maximum surface temperature 135°C), provided that the permissible ambient temperature at the enclosure of -20°C to +60°C is maintained by the structural thermal decoupling (heat sink/spacer).

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The following applies to all probes used in dusty environments (Zone 20 / EPL Da):

1) Special conditions for safe operation in dusty atmospheres (Zone 20).
The probe bar extends directly into Zone 20 (Da) and measures the actual process temperature of the medium (up to 170 °C). To prevent the formation of effective hot surfaces in Zone 20 in accordance with EN 1127-1, the plant operator must ensure that the flammable dusts present in the tank do not fall below the following minimum thermal values. The layer thickness safety margin (75 K): According to IEC 60079-14, for dust deposits up to 5 mm thick, the rule applies that the surface temperature of the device must be at least 75 Kelvin below the dust's ignition temperature. These limit values are calculated directly for each level and included in the table (e.g., for the 170 °C level, the dust must have a glow temperature of at least 170 + 75 = 245 °C).

Max. Process Temperature (Medium in Tank)	Max. Surface Temperature of Probe in Zone 20 (EPL Da)	Permissible Dust Group	Limit Values for Dust Layers / Marking	Temperature of Electronics in Zone 21 (EPL Db)
≤ 80 °C	max. 80 °C	IIIC, IIIB, IIIA (conductive & non-conductive dusts, loose fibers)	T85°C (Suitable for dusts with smoldering temp. > 160 °C at 5 mm layer thickness)	T135°C (Enclosure protected by Ex tb)
≤ 110 °C	max. 110 °C	IIIC, IIIB, IIIA (conductive & non-conductive dusts, loose fibers)	T110°C (Suitable for dusts with smoldering temp. > 185 °C at 5 mm layer thickness)	T135°C (Enclosure protected by Ex tb)
> 110 °C to ≤ 170 °C	max. 170 °C	IIIC, IIIB, IIIA (conductive & non-conductive dusts, loose fibers)	T170°C (Suitable for dusts with smoldering temp. > 245 °C at 5 mm layer thickness)	T135°C (Enclosure decoupled thanks to cooling body)

Proof of conformity for the plant operator: The marking T85°C...T170°C fully specifies the temperature-dependent load on the probe in the process. In accordance with the installation regulations (IEC 60079-14), the operator is required to ensure compliance with the necessary safety distances relative to the minimum ignition temperature of the dust cloud (T_{cl}) and the glow temperature of the dust layer (T=5 mm) minus 75 K, depending on the respective process conditions.

2) Safety note for the plant operator: If the dust deposit on the bar probe in the tank could reach a layer thickness of more than 5 mm, the permissible glow temperatures must be increased accordingly per EN ISO/IEC 80079-20-2, or the maximum process temperature must be reduced.

3) Note on fault safety: Unacceptable self-heating of the bar probe caused by the electronics in the event of a fault is ruled out, as power is supplied via a certified, intrinsically safe circuit with the Ex ia ignition protection type. The maximum electrical fault voltage/power is well below the thermal ignition limits of industrial dusts. Surface temperatures higher than 170 °C are not permitted.

20	Pipe probes: Thermal derating of the outer housing at T4 135°C for Gases, Vapors, and Dusts. Due to the high thermal conductivity of the aluminum/steel base body, the outer housing reaches significant temperatures under steady-state conditions when the medium temperature is high. To comply with temperature class T4 (gas, Zone 1) or T135°C (dust, Zone 21), the operator must strictly adhere to the following requirements: 1) Zone 1 gases and vapors: The following applies to the outer wall of the pipe in accordance with IEC 60079-14: - For processes ≤110°C, the exterior is classified as T4 - For processes ranging from >110°C to 170 °C, the exterior surface of the equipment is classified as T3, or insulation must be installed locally, whose exterior surface can be verified as complying with the requirements of temperature class T4 ≤ 135 °C." 2) Zone 21 dusts The following applies to the outer wall of the pipe according to IEC 60079-14: - For processes ranging from >110°C to 170 °C, thermal insulation must be installed on the piping by the customer. - The operator must ensure, through the design of the insulation—either by measurement or calculation—that the freely accessible outer surface of this insulation does not exceed the requirements of gas temperature class T4 ≤ 135 °C or the maximum dust surface temperature of T135 °C at any time. - In the presence of combustible dusts (Zone 21), the operator must additionally verify whether the residual surface temperature of the insulation (<=135°C) complies with the required safety distance from the substance-specific minimum ignition and glow temperatures (75-K rule according to IEC 60079-14) for dusts. Note for the installer: The integrated stainless steel temperature decoupling ensures that the electronics housing located at the top (Ex-d and Ex-ia chambers) always complies with the requirements of temperature class T4, provided that the maximum permissible ambient temperature does not exceed.
21	FXS* flex/rope probes: Guidelines for floor mounting: In the case of turbulent media, flex/rope probes must be secured or anchored to the tank bottom or wall (e.g., via an insulated eyelet on the tank bottom) so that the weight can no longer swing. Weight Sheathing: Ideally, the end weight should be completely coated in PTFE plastic so that any impact against the wall is absorbed without generating sparks. The use of flex/rope probes inside the tank is strictly limited to gas groups IIA and IIB. Processes that generate high levels of static charge (e.g., direct jet filling onto the cable) are not permitted. (Inerted systems are exempt from this restriction.)
22	PLS* leakage probes: Electrostatic Certification (Zone 0): Due to the design-related surface limitations of the PTFE components in contact with the medium, these probes are approved for use in a tank (Zone 0) for atmospheres classified as Gas Groups IIA and IIB.

23	STM* / SPAMd1* handheld Probes: Explosion-proof zone certification: The probes are certified for use in Zone 1 explosive atmospheres (Gas Groups IIA and IIB).
24	COS* clamp-on probes: The clamp-on probes are approved for use in Zone 1 explosive gas atmospheres (equipment protection level EPL Gb) for substance groups IIA, IIB, and IIC. Requirements for local lines: Since the probe is clamped from the outside onto local pipe or glass tube, the operator is responsible for the electrostatic evaluation of these lines. The tube or glass fittings used must be approved for the flow velocities and charge characteristics of the specific medium in accordance with EN 60079-14 and EN 60079-32-1 for the respective explosion group (IIA/IIB/IIC).
25	Probe materials made of zirconium or titanium: The use of these probes within Zone 0/1 is permitted exclusively in inerted vessels and piping.
26	When connecting the field device's measurement electronics to the probes using an RF cable, the following must be observed: 1) The RF cable must be a shielded cable with a conductive/grounded outer jacket; 2) or the cable must be routed in such a way that electrostatic charging is proactively prevented.
27	Lightning Protection: Integration into the external lightning protection system and equipotential bonding. The operator must integrate the tubular or rod probe into the lightning protection system of the entire facility in accordance with EN 62305.

Related documentation

This document is an integral part of the following user manuals. Refer to the user manual provided with the device, which corresponds to the device type. For additional operating information, please refer to the application-specific user manual.
https://doc.aquasant.com/manuals/

Supplementary documentation

Explosion protection brochure: https://doc.aquasant.com/certificate/Ab2026
Certificate_Safety-Instructions_UNIQ_impedance_SEV26.pdf

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Operating instructions for bar / pipe probes brochure:
https://doc.aquasant.com/Manuals/Ab2026
[ZDE IMP 2606] Pipe-probe-UNIQ-T804_Comissioning-Manual.pdf
[ZDE IMP 2606] Bare-probe-UNIQ-I804_Comissioning-Manual.pdf

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▽pipe probe ▽bar probe

Identification

For an explanation of the labeling and type of protection, please refer to the explosion protection brochure.

Identification in accordance with the directive:

Device designation:	UNIQ T804 / UNIQ I804
Field device	AME-I
Type:	F100-1
EU Type Examination Certificate:	SEV 26 ATEX 0xxx / IECEx SEV xxxxxxx
ATEX:	2014/34/EU
RoHS:	RL 2011/65/EU EN 63000:2018
ATEX-Approval: 	II 1/2G Ex ia IIC T6…T3 Ga / Ex db IIC T4 Gb
IECEx	Ex II ia IIC T6…T3 GA / Ex db IIC T4 Gb
CE 2813	

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Dok: VEB-AMEI-UNIQ_Safety-Instruction-SEV26 Version: 261029/1