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Sensors for Potentially Explosive Atmospheres



for

Plastics

Foil, Paper

Textile Industries

Strip Processing

Lines

Rolling Mills



www.haehee.com

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Symbols of this Manual



Sections with this indication are to be obeyed absolutely. The neglect of these references can lead to the endangerment of health and life of persons



Is shown before passages in the text, which supply additional information

Obligations of the Operator



The user of this products must ensure that only authorized personnel mount these products and operate them who

- know the rules of on-the-job-safety and accident prevention
- have been instructed in the operation of these products
- have read and understood this Operator Manual

Personnel that mount these products, commission, maintain and operate them are obligated

- to obey all rules of on-the-job-safety and accident prevention
- to read the Operator Manual completely and follow all instructions and advice notices
- confirm the above with their signature

For the purpose of the Manual authorized personnel for the installation (mounting), inspection, maintenance and commissioning are considered to be personnel with a professional education, technical experience as well as knowledge of the applicable standards and directives and in addition are in a position of access the work situation and recognize potential hazards ahead of time.

Register please here:

Type of Sensor / Designation

Serial No. of Sensor

I confirm with my signature that I have read and understood this Operator Manual.

City/Place

Date

Signature

**Explosion**

An explosion is an oxidation or a decomposition reaction with a sudden rise of temperature and pressure. Thereby generating sudden increase in volume and release of energy in a violent manner in confined spaces e.g. through potentially explosive atmospheres and compressed gases.

Precondition for an explosion

An explosion can result only if three factors are present:

**Potential ignition source**

The presence of a potential ignition source is a determining element for the categorization of equipment according the Directive 2014/34/EC (previously 94/9/EC).

Types of ignition sources according to EN 1127-1 are:

- hot surfaces
- flames, hot gases and particles
- mechanical generate sparks
- electrical equipment
- electrical equalizing current, cathodic corrosion protection
- static electricity, thunder bolt, switching operations
- electromagnetic fields/ IR radiation, visible light
- ionizing radiation, UV radiation
- ultrasound
- adiabatic compression and shock waves
- chemical and biological reactions

Endangered areas

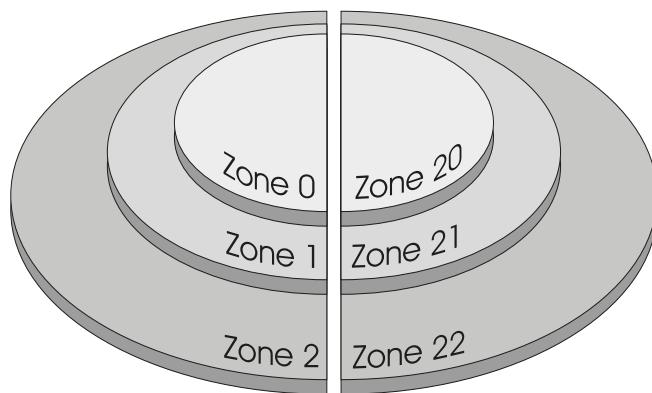
Typical danger zones are in refineries, refuel and loading equipment for combustible gases, liquids and matter, chemical, plants, paint shops, e. g. coaters.

Danger Zones

The user of the equipment has to determine the danger zone according to Directive 99/92/EC. The user of the equipment has the responsibility for determination the endangerment, the risks evaluation and the documentation of the relevant safety measures. The user must establish an explosion prevention document defining the following points:

- Categorization of zones corresponding to endangerment potential
- Determination of the temperature classes and the explosion groups
- Determination of the present ambient temperatures

Such an explosion prevention document is the basis for the supplier for the recommendation and the delivery of suitable products and components (Industrial Safety Directive)

Principle of Explosion Protection**Classification in Zones**

Explosion hazard zones are classified depending on the frequency and duration of the potentially explosive atmosphere.

Hazard by Gas, Vapor, Mist		
Zone 0 (category 1G): A place in which an explosive atmosphere consisting of a mixture of air with flammable substances in the form of gas, vapor or mist is continuously present or for long periods of time.	Zone 1 (category 2G): A place in which an explosive atmosphere consisting of a mixture of air with flammable substances in the form of gas, vapor or mist occasionally can occur in normal operation.	Zone 2 (category 3G): A place in which an explosive atmosphere consisting of a mixture of air with flammable substances in the form of gas, vapor or mist can occur in normal operation but, if it does occur, will persist for a short period only.
Hazard by Dust		
Zone 20 (category 1D): A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods of time.	Zone 21 (category 2D): A place in which an explosive atmosphere in the form of a cloud of combustible dust in air occasionally can occur in normal operation.	Zone 22 (category 3D): A place in which an explosive atmosphere in the form of a cloud of combustible dust in air can occur in normal operation but, if it does occur, will persist for a short period only.
Equipment Categories		
Equipment category 1G/1D: This equipment is designed in such a way that it can be used in accordance with the specification provided by the Manufacturer resulting in very high degree of safety. Equipment of this category must provide the required degree of safety even in very seldom occurring malfunctions of the equipment. They contain explosion prevention measures that provide safety even in the event of a failure of one technical prevention measure because a second independently technical prevention measure. This applies also to two independently occurring failures.	Equipment category 2G/2D: This equipment is designed in such a way that it can be used in accordance with the specification provided by the Manufacturer resulting in high degree of safety. The technical explosion prevention measures provide the necessary measure of safety even in frequent equipment malfunctions and failures, which can commonly be expected, the necessary degree of safety.	Equipment category 3G/3D: This equipment is designed in such a way that it can be used in accordance with the specification provided by the Manufacturer resulting in a normal degree of safety. Equipment in this category provides the necessary measure safety under normal operating conditions.

Principle of Explosion Protection**Meaning of Designation**

CE 0123 Notified body, which supervises the production facility

Ex II 2 G Ex ia IIC T6...T1 Gb Explosion protection marking for gases

Ex II 2 G Ex ia IIC T135°C Db Explosion protection marking for dusts

BVS 05 ATEX E 091 X Examination certificate number

Meaning of designation		
	Explosion Protection Symbol	
II	Equipment Group II	Use of the device in dust or gas hazardous areas, however not underground (mining industry)
2	Category 2 (High level of security)	Occasional / rare occurrence of explosive atmospheres
G	Atmosphere G=Gas →	Zones 1 and 2
D	Atmosphere D=Dust →	Zones 21 and 22
Ex ia	Intrinsically Safe Equipment	Equipment may be operated only with intrinsically save electric circuits → use of safety barriers is necessary
IIC	Explosion Group	The explosion group describes the danger of the gases. It increases from the explosion group IIA to IIC, The devices with the explosion group IIC are certified also for IIA and IIB.
IIIC	Explosion Group	The explosion group describes the danger of the dusts. It increases from the explosion group IIIA (combustible lint) to IIIC (conductive dusts), The devices with the explosion group IIIC are certified also for IIIA and IIIB.
T6 - T1	Temperature Class	Equipment is approved for these temperature classes, if the max. Surface temperature of each corresponding class is not exceeded. The temperature classes range from T1 to T6, whereby materials which fall into the temperature class T6, represent the highest danger. However there is only one gaseous material in the classes to T6/T5.
T135°C		Maximum permissible surface temperature of the device
Gb / Db	Equipment Protection Level (EPL)	Device with "high" level of protection for use in gas or dust explosive areas. There is no danger of ignition in normal operation or when a predictable error / malfunction.



Are suitable for the use in potentially explosive atmospheres within areas of the zones 1 and 2 or zone 21 and 22

The sensors of the HAEHNE GmbH for potentially explosive atmospheres are designed for the measurement of forces acting on mechanical sensors. Strain gauges applied to these sensors generate a voltage in the measuring bridge which is proportional to the forces acting on the sensors.

Instruction



For the safe operation of the sensors of the group II, category 2 within gas and dust potentially explosive atmospheres it is necessary to ensure through the use of installation and protection devices that normal operating conditions do not damage or overload the equipment.

HAEHNE - sensors are supplied as complete measuring system consisting of the following components: sensors, J-Box, safety barrier and the associated measuring amplifier with option F or Option Fxx-yyzzz. The safety barriers in the combination E (SIBA-E) are to be used for the application area Gb and with safety barriers in the combination D (SIBA-D) for the application area Db. Each measuring system consists of firmly assigned components.

The J-Box contains the resistances for the adjustment of zero point and nominal rating and is considered as a simple electrical equipment.

In the case of orders containing more than one measuring system, it is prohibited to exchange individual components among themselves.

The manufacturer cannot be held responsible for damage, which is caused by disregarding the safety instructions and warnings.

Attention!



Operating electrical equipment in adverse circumstances and in proper handling in potentially explosive atmospheres can endanger the health and safety of people and in certain circumstances animals as well as operating machinery and equipment.

HAEHNE - sensors for potentially explosive atmospheres can be used only in accordance with the specific operating instructions.

Substantial damage to people and property can be caused by inappropriate installation, employment in areas not intended for, incorrect operating procedures, ignoring safety notes, inadmissible removal of parts of the equipment or protective covers as well as structural changes to the sensors.

The operating conditions must be strictly observed during installation and suitable measures must be undertaken to ensure their permanent effectiveness.

Installation, Start-Up

In general the information contained in the individual product descriptions, technical data sheets and operating instruction manuals apply. In order to correspond, however, to the requirements of EN 60079-0 and EN 60079-11, the following conditions must be strictly observed:

- The sensors must be connected with safety barriers and the J-Box of the associated measuring amplifier. It is absolutely necessary to ensure that the amplifier/J-Box/safety barrier - combinations are not within an area with the potentially explosive atmosphere. In addition, the device combination as on the pages "Wiring SIBA E" and "Wiring SIBA D" can be interconnected.



- If the amplifiers and safety barriers are not supplied by *HAEHNE*, care must be taken to ensure that the maximum values of the intrinsically safe circuits are not exceeded and that the connection diagrams are strictly adhered to.
- The connecting cables must have strain relief devices to guard against excessive cable pull or pressure.
- If the factory attached explosion proof sensor cables need to be extended, it is necessary to ensure that given restrictions (capacitance, inductance) are strictly observed. The use of explosion proof of cables with **same parameters** is absolutely necessary.
- The safety barriers provided by *HAEHNE* are suitable for a temperature range of - 20° C to + 60° C. In case of the use of other safety barriers it is necessary to ascertain their suitability.
- In addition, it is necessary to ensure that the valid regulations and operating instructions of the final user are strictly observed.
- For applications in Group III

The intrinsically safe circuit is not reliably separated from the ground. Along the intrinsic circuit, potential equalization is absolutely necessary. The sensors must be constructed in such a way that intensive electrostatic charging processes can be excluded.

Repairs



- Repairs to the sensors can be made only by qualified technical personnel authorized by the manufacturer with original spare parts.
- Inappropriate repairs represent substantial danger to the user.
- The unauthorized opening of the sensor results in the loss of explosion proof protection warranty.
- Defective devices must be disconnected from the power supply and replaced immediately.

Maintenance

- Under no circumstances are changes allowed to the *HAEHNE* sensors classified for potentially explosive atmospheres.
- Periodic maintenance of *HAEHNE* sensors for explosive atmospheres is not necessary.
- Recalibration should be made according to predetermined fixed periods/intervals.

Employment of the sensors in measuring rolls



If *HAEHNE* explosion protection sensors are used in a measuring roll, then the employment in the environments of category IIC Gb and IIIC Db is permitted if, in addition to the points covered in the manual of explosion protection and related to the sensor mounted in the roll, the following additional points are considered:

- The circumferential speed of the measuring roll should not exceed a value of 1 meter/second
- The measuring roll should not scratch at other objects.
- Plastic parts may not exceed a total area of 20 cm².
- The ball bearings of the measuring roll must be replaced after 90 % of the nominal life span of the bearing. Even if the nominal life goes far beyond this period, the replacement of the ball bearings must be carried out from the manufacturer of the measuring roller due to the aging process of the lubrication. To reduce the risk of a defective bearing due to a production error, the bearings must be checked regularly for running noise and smooth running.



Force sensor

Typ *** * * * ***F
 Typ *** * * * ***Fxx-yyzzz
 Typ *** * * * ***F***
 Typ *** * * * ***Fxx-yyzzz***

In the complete type denomination, the wild cards are replaced by letters or numbers to indicate the different sensor variations.

Typ *** * * * ***F***

Optional: non ex-relevant characteristics for special dimensions
 Non ex-relevant characteristics like force measuring range, type of building, size, sensor designation

Typ *** * * * ***Fxx-yyzzz***

Optional: non ex-relevant characteristics for special dimensions
 Permissible ambient temperature range
 $-yy \text{ } ^\circ\text{C} \leq T_a \leq zzz \text{ } ^\circ\text{C}$
 (determined by the permissible operation temperatures of the used materials)
 Resistance of the DMS
 35 für (350 Ω)-DMS
 70 für (700 Ω)-DMS
 10 für (1000 Ω)-DMS
 Non ex-relevant characteristics like force measuring range, type of building, size, sensor designation

Example:

The force sensor type *** * * * ***F70-20120 has (700 Ω)-DMS and is suitable for use in a temperature range between -20 °C and +120°C

A change in the ignition behavior of the observed gases at ambient temperatures outside the atmospheric range (outside -20 °C ... +60 °C) has not been studied in the context of authorization and must be assessed separately by the operator.

For dust-applications, the sensors are marked as T135°C.

EC - Type Examination:

BVS 05 ATEX E 091 X

Group, Category, Ignition protection:

Ex II 2 G Ex ia IIC T4 Gb für Typ *** * * * ***F

Ex II 2 G Ex ia IIC T4 Gb für Typ *** * * * ***F***

Ex II 2 G Ex ia IIC T6...T1 Gb für Typ *** * * * ***Fxx-yyzzz

Ex II 2 G Ex ia IIC T6...T1 Gb für Typ *** * * * ***Fxx-yyzzz***

Ex II 2 D Ex ia IIIC T135°C Db (for all types)

is suitable for hazardous areas of zones 1 and 2 or 21 and 22



Guide Line Conformity	Norms	Quality assurance production
Directive 2014/34/ EC (previously 94/9 EC)	EN IEC 60079-0:2018 EN 60079-11:2012	CE 0123

General Parameters

Electrical characteristics

Maximum input voltage	U_i DC = 17 V
Maximum input current	I_i
- for applications Gb	500 mA
- for applications Db	250 mA
Maximum input power	P_i
- for applications Gb	2 W
- for applications Db	550 mW

The force sensors contain concentrated capacitors or inductors

Parameters for Type * * * * F****Parameters for Type *** * * * F*****

The internal capacitance and internal inductance resulting only from line capacitance and line inductance of the connected connecting line (max. 20 m length).

Maximum internal capacitance	C_i 3,2 nF
Maximum internal inductance	L_i 14 µH
Ambient temperature range	T_a -20 °C...+60 °C

Parameters for Type * * * * Fxx-yyzzz****Parameters for Type *** * * * Fxx-yyzzz*****

Variants with device socket (without connecting cable)

Maximum internal capacitance	C_i negligible
Maximum internal inductance	L_i negligible

Variants with connecting cable

Maximum internal capacitance	C_i
and maximum internal inductance	L_i

resulting only from line capacitance and line inductance of the connected connecting line:

Capacity coating	160 nF/km
Inductance coating	0,68 µH/m

Ambient temperature range T_a

Minimum ambient temperature $T_{a,min}$

depending on the type characteristic „yy“: -yy °C

Maximum ambient temperature $T_{a,max}$

depending on the type characteristic „xx“ and „zzz“ and the desired temperature class



For Sensors with classification	Type characteristic xx = 35	Type characteristic xx = 70	Type characteristic xx = 10
$T_{a,max}$ = smaller value of			
T1	(380 °C, zzz °C)	(415 °C, zzz °C)	(405 °C, zzz °C)
T2	(230 °C, zzz °C)	(265 °C, zzz °C)	(255 °C, zzz °C)
T3	(135 °C, zzz °C)	(170 °C, zzz °C)	(160 °C, zzz °C)
T4	(70 °C, zzz °C)	(105 °C, zzz °C)	(95 °C, zzz °C)
T5	(35 °C, zzz °C)	(70 °C, zzz °C)	(60 °C, zzz °C)
T6	(20 °C, zzz °C)	(55 °C, zzz °C)	(45 °C, zzz °C)
T135°C	(100°C, zzz °C)	(100°C, (zzz -10) °C)	(100°C, zzz °C)

Example:

The materials of the force sensor type *** * * * F70-20120 are suitable for use at -20° C up to 120 C°. For the classification of the sensor into the individual temperature classes, the upper limit of the permissible ambient temperature is calculated from the maximum temperature of the temperature class reduced by the heating of the DMS and the permissible temperature of the used materials:

The force sensor is suitable for T6 in ambient temperatures -20 °C up to 55 °C. It is suitable for T5 in ambient temperatures -20 °C up to 70 °C, for T4 in ambient temperatures -20 °C up to 120 °C and for T3 in ambient temperatures -20 °C up to 120 °C. For temperatures -20 °C up to 100 °C, the sensor can be used in dust-explosive areas.



The combination of the **HAEHNE** products: amplifier - force sensor - J-Box - safety barrier modules make the electrical circuits within a hazardous area intrinsically safe. This intrinsically safety depends on the existing external capacitance C_o and the external inductance L_o .

Safety barriers Combination E (SIBA-E) are used for the explosion-proof gas IIC Gb.

When using safety barriers from **HAEHNE**, the following maximum values must be observed:

Explosion Group	External Capacitance (C_o)	External Inductance (L_o)
IIB	1 μF	0,5 mH
IIC	375 nF	30 μH

The measuring sensor can be taken as free of inductance and capacitance. The sensor connection cable supplied as standard with the force sensor has a capacitance from 160 nF per km and an inductance from 0,68 μH per meter of length. This results in the maximum deliverable cable length of 44 m.

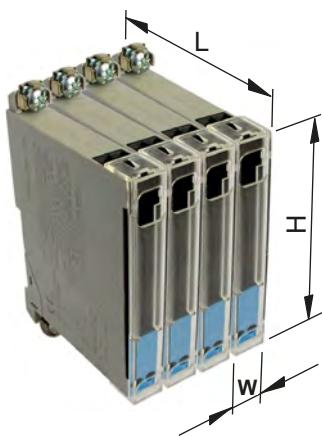
Together with possible additional customer cable installation the values for external capacitance and inductance should not be exceeded.

Attention!

The sensors, the connection cables and the additional energy limiting devices should be operated within a single system of potential equalization.

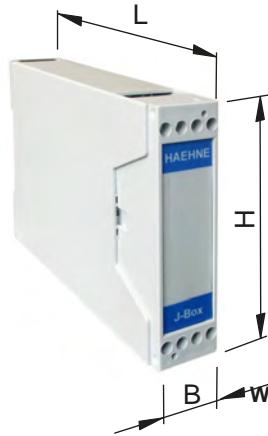


Safety Barriers



Dimensions in mm:
12 x 70 x 83 (W x L x H)

Adaption Modul J-Box



Dimensions in mm:
22,5 x 110 x 75 (W x L x H)

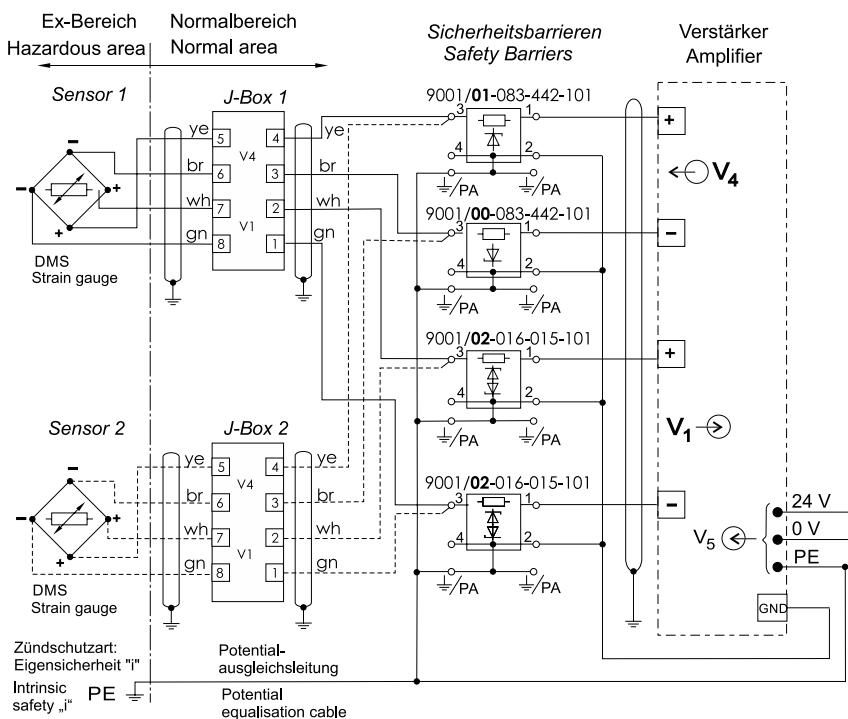
Note



The technical information, pictures and dimensions provided here are non-committal.
Claims cannot be based on this information. We reserve the right to make improvements and changes without altering the manual.



for HAEHNE 1-channel Amplifier
AMA, AME, DMA, DA-PN, DA-PB, DA-EN, DA-EC and MAC

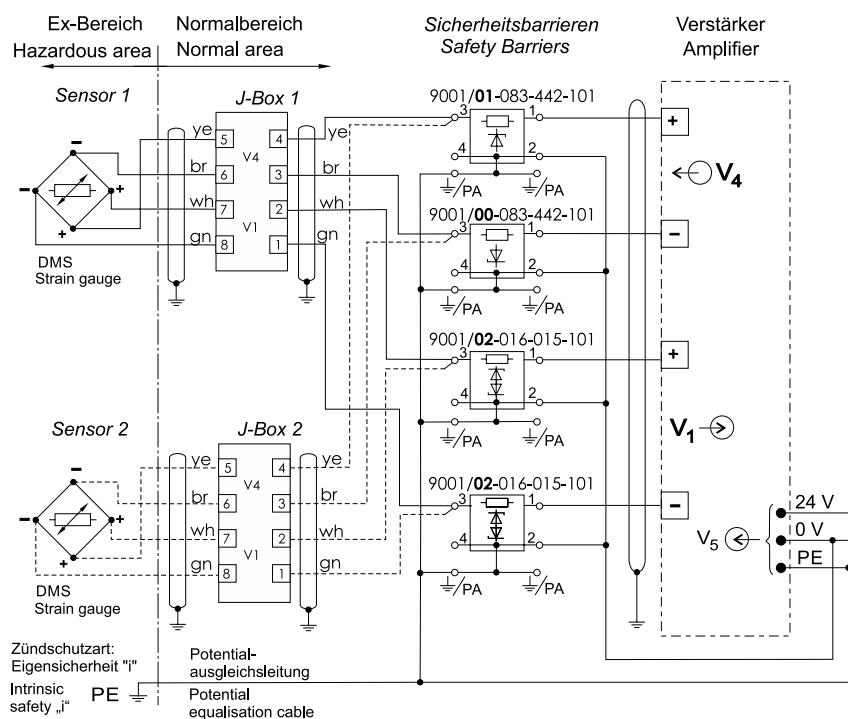


In the control cabinet cables under 5 m of length do not have to be shielded.

The "Technical Information" of the amplifiers show the labeling of the terminals

V_1	Output signal of full bridge strain gauge
V_2	Direct voltage output
V_3	Filtered voltage output
V_4	Excitation voltage to the full bridge strain gauge in the sensors
V_5	Supply voltage 24 V DC
I_1	Current output (option C and N)

for HAEHNE Amplifier Busbox-PS 2



Note



The pin assignment of deviating core colors can be found on the respective product description of the sensor

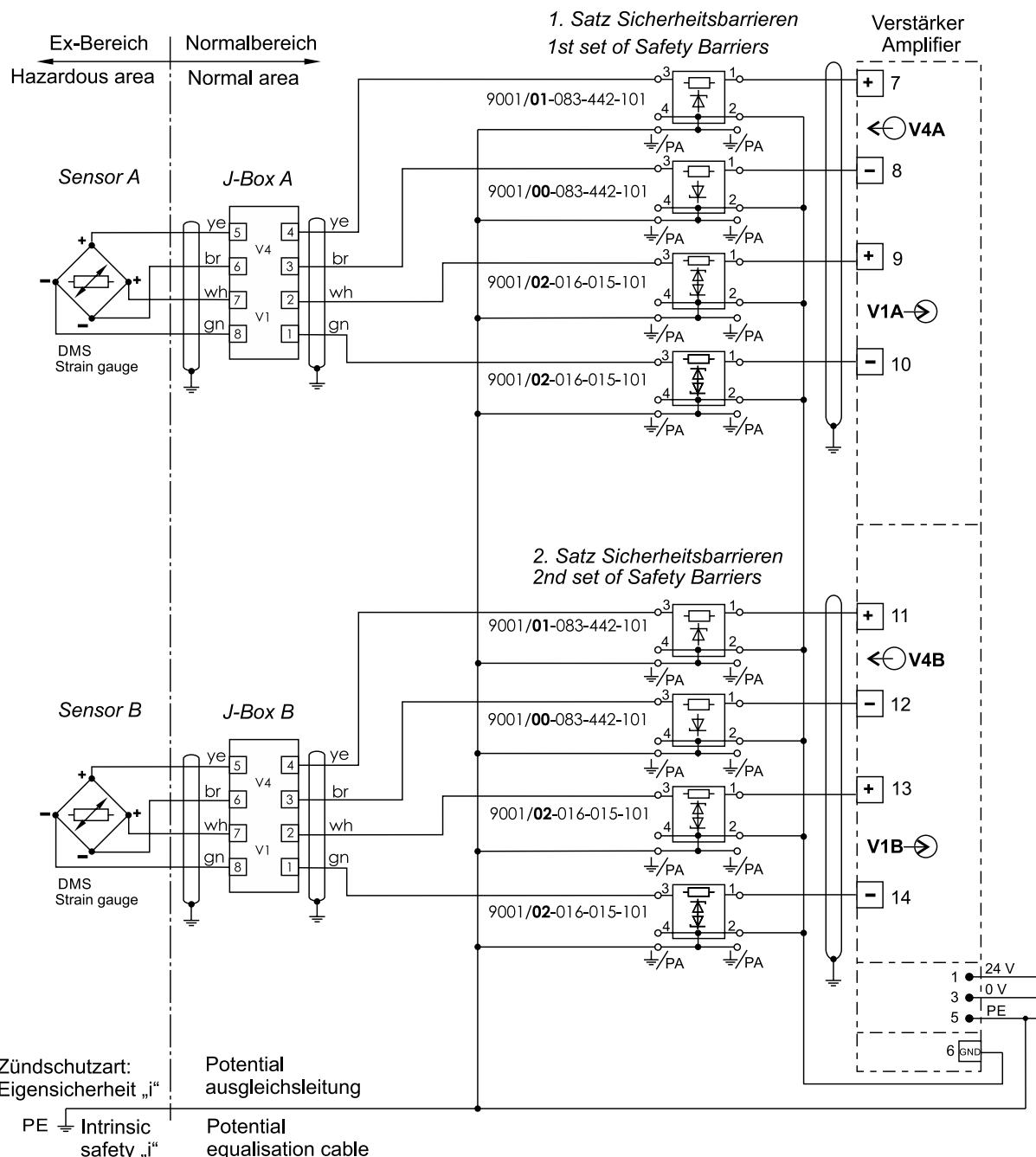
Attention!



The calibration resistors in the J-Box are specified for the corresponding sensor only and can only be connected to this sensor. Therefore, the sensor and the J-Box carry the identical measurement location designation. For example sensor 04711-5 must be connected to the J-Box 04711-5.



for HAEHNE Amplifiers DA-2PN, DA-2PB, DA-2EN and DA-2EC

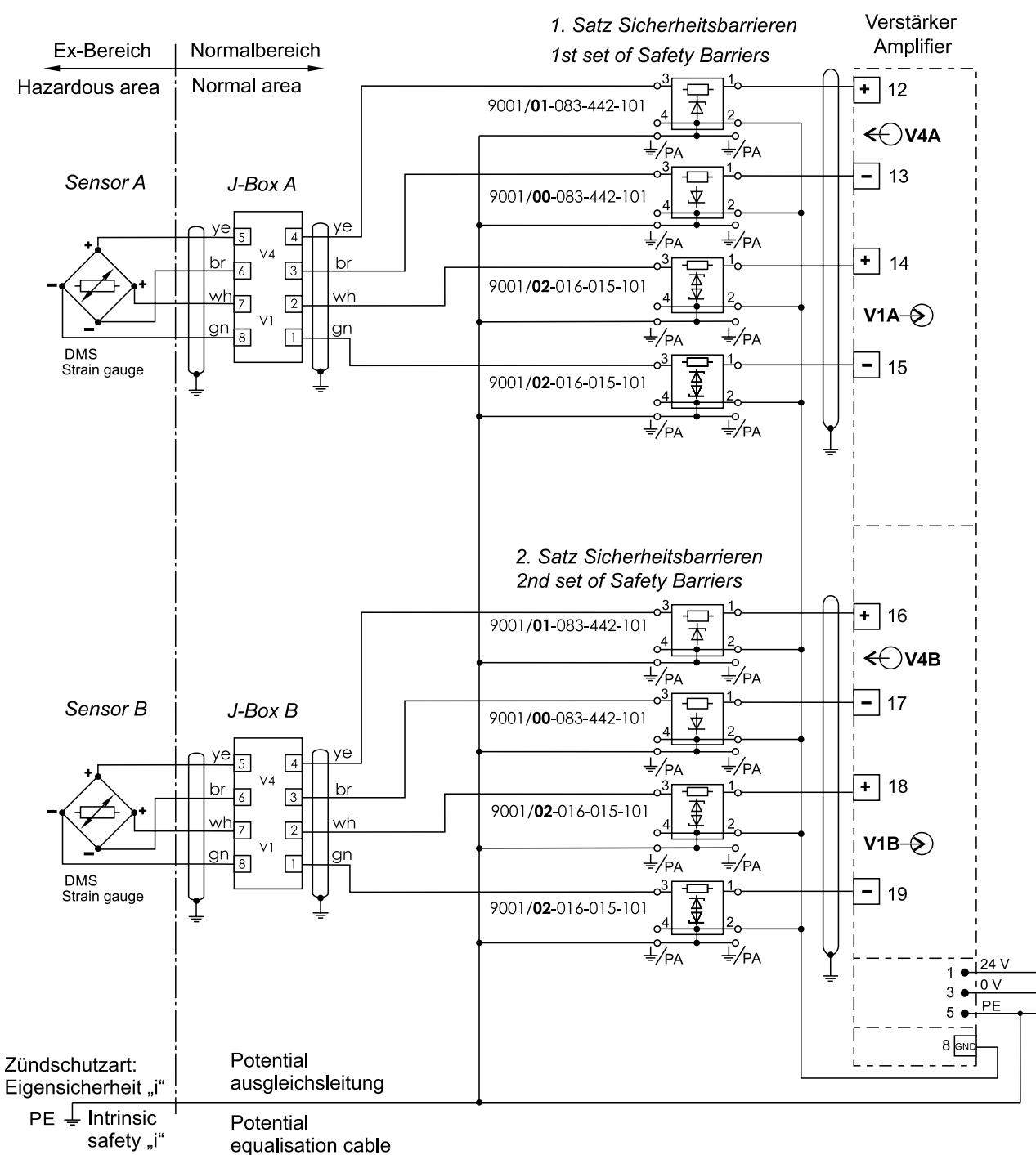


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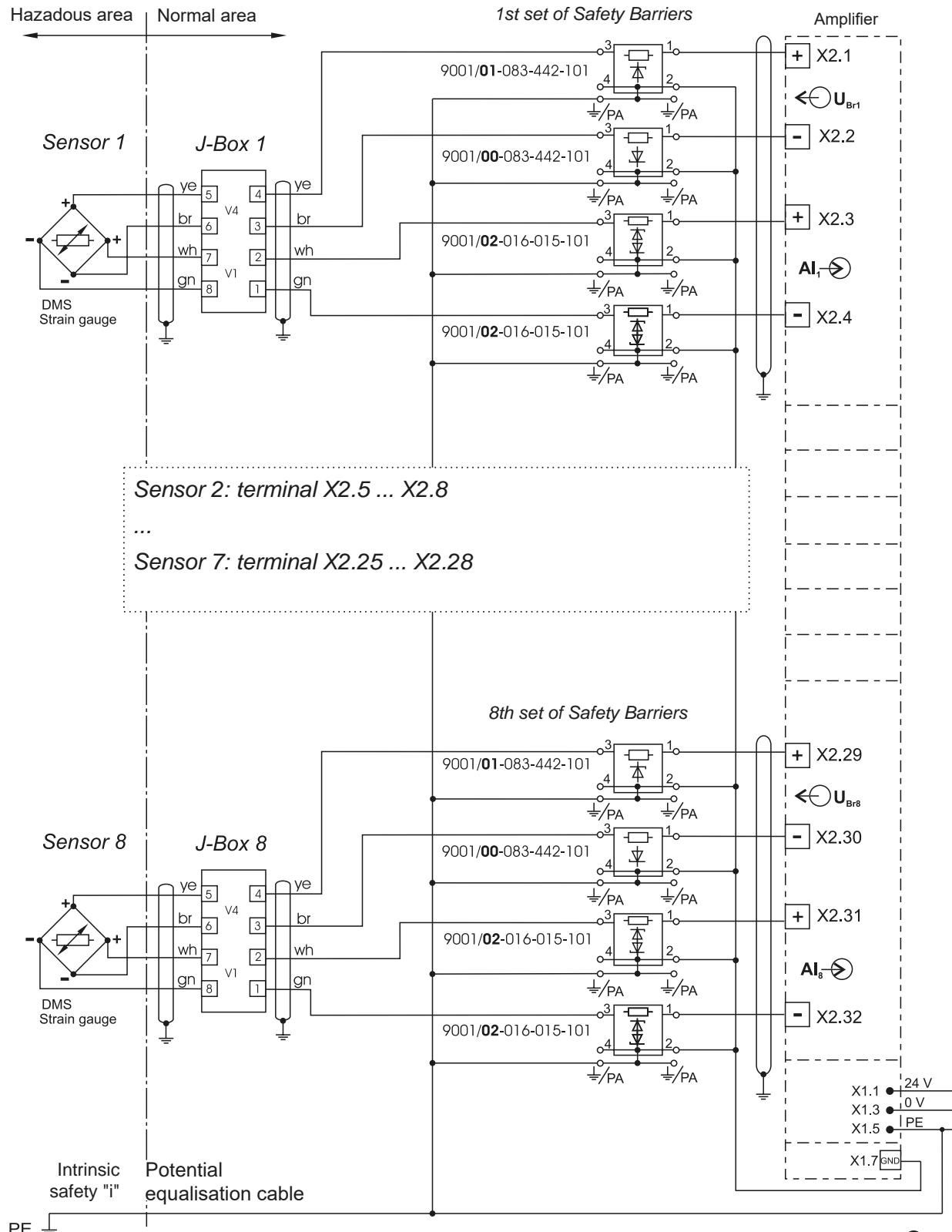
for HAEHNE Amplifier DCM

**Note**

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for HAEHNE Amplifier DCX

**Note**

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The combination of the *HAEHNE* products: amplifier - force sensor - J-Box - safety barrier modules make the electrical circuits within a hazardous area intrinsically safe. This intrinsically safety depends on the existing external capacitance C_o and the external inductance L_o .

Safety barriers Combination D (SIBA-D) are used for the explosion-proof dust IIIC Db.

When using safety barriers from *HAEHNE*, the following maximum values must be observed:

Explosion Group	External Capacitance (C_o)	External Inductance (L_o)
IIIB / IIIC	1 μF	2 mH

The measuring sensor can be taken as free of inductance and capacitance.

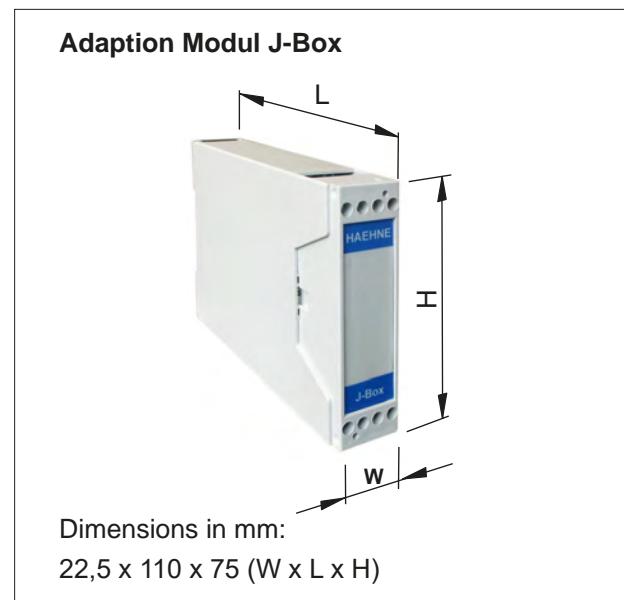
The approval of the sensors applies to dust and gas hazardous areas; the maximum cable length available is 44 m (see page 12).

Together with possible additional customer cable installation the values for external capacitance and inductance should not be exceeded.

Attention!



The sensors, the connection cables and the additional energy limiting devices should be operated within a single system of potential equalization.



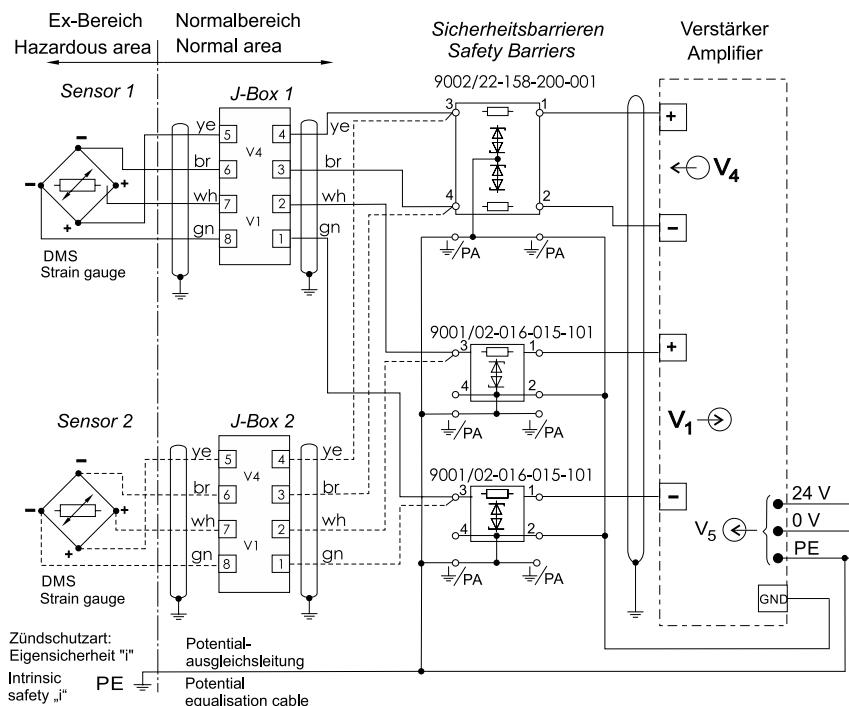
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for HAEHNE 1-channel Amplifier
AMA, AME, DA-PB, DA-PN, DA-EC, DA-EN, DMA and MAC

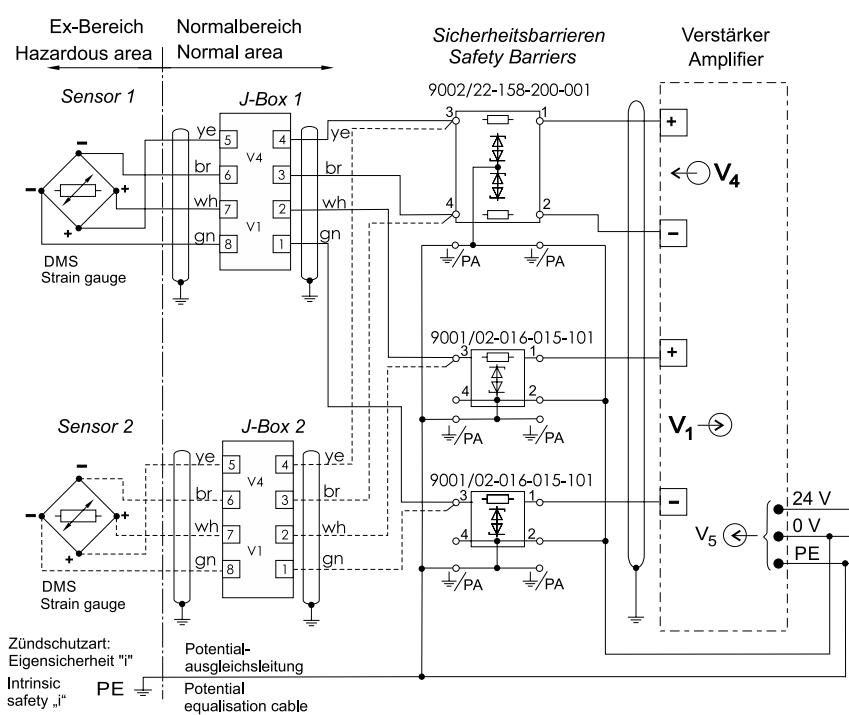


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I_1	Current output (option C and N)

for HAEHNE Amplifier Busbox-PS 2



Note

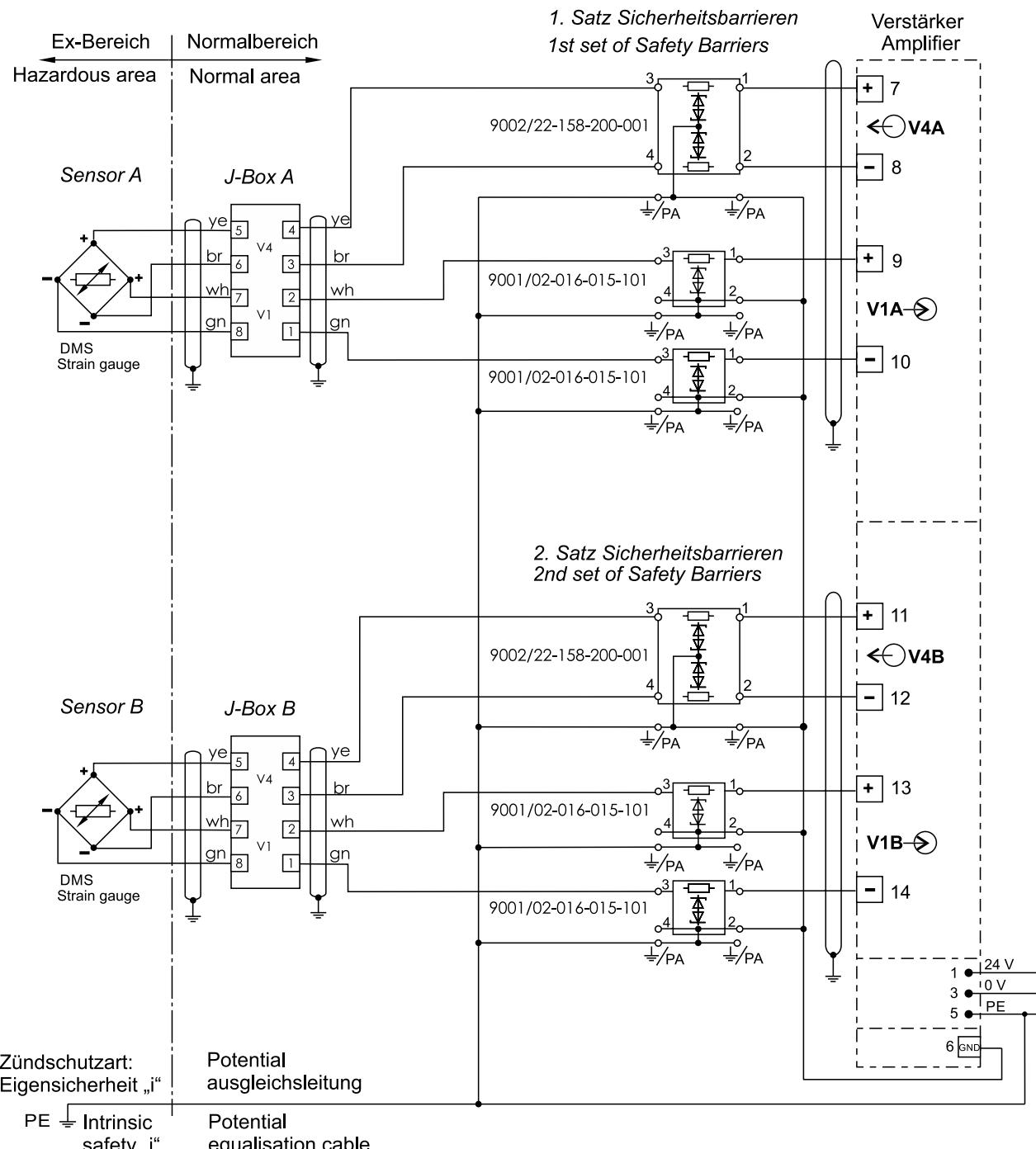
The pin assignment of deviating core colors can be found on the respective product description of the sensor

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The calibration resistors in the J-Box are specified for the corresponding sensor only and can only be connected to this sensor. Therefore, the sensor and the J-Box carry the identical measurement location designation. For example sensor 04711-5 must be connected to the J-Box 04711-5.

for HAEHNE Amplifiers DA-2PN, DA-2PB, DA-2EN and DA-2EC

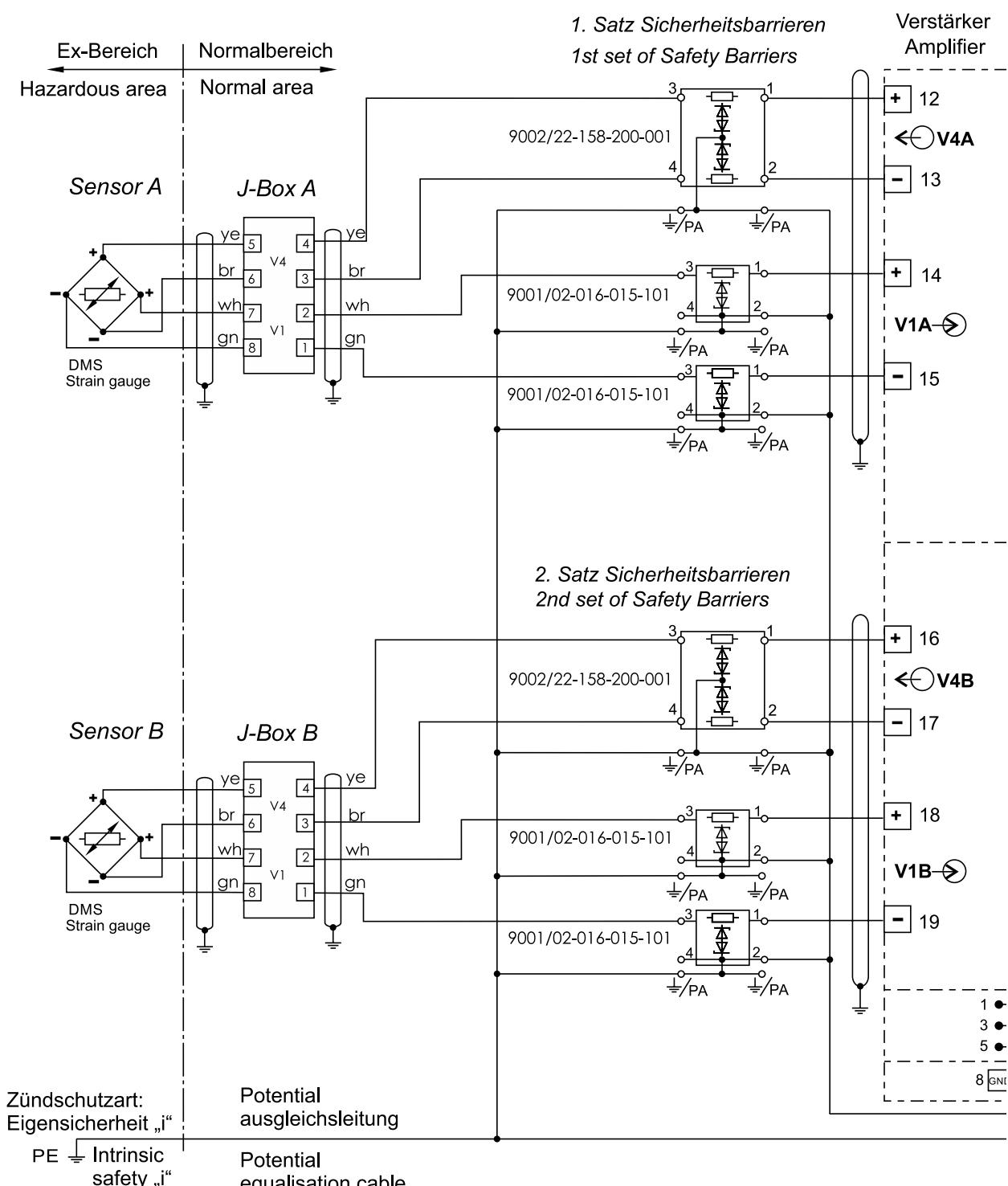
**Note**

The pin assignment of deviating core colors can be found on the respective product description of the sensor





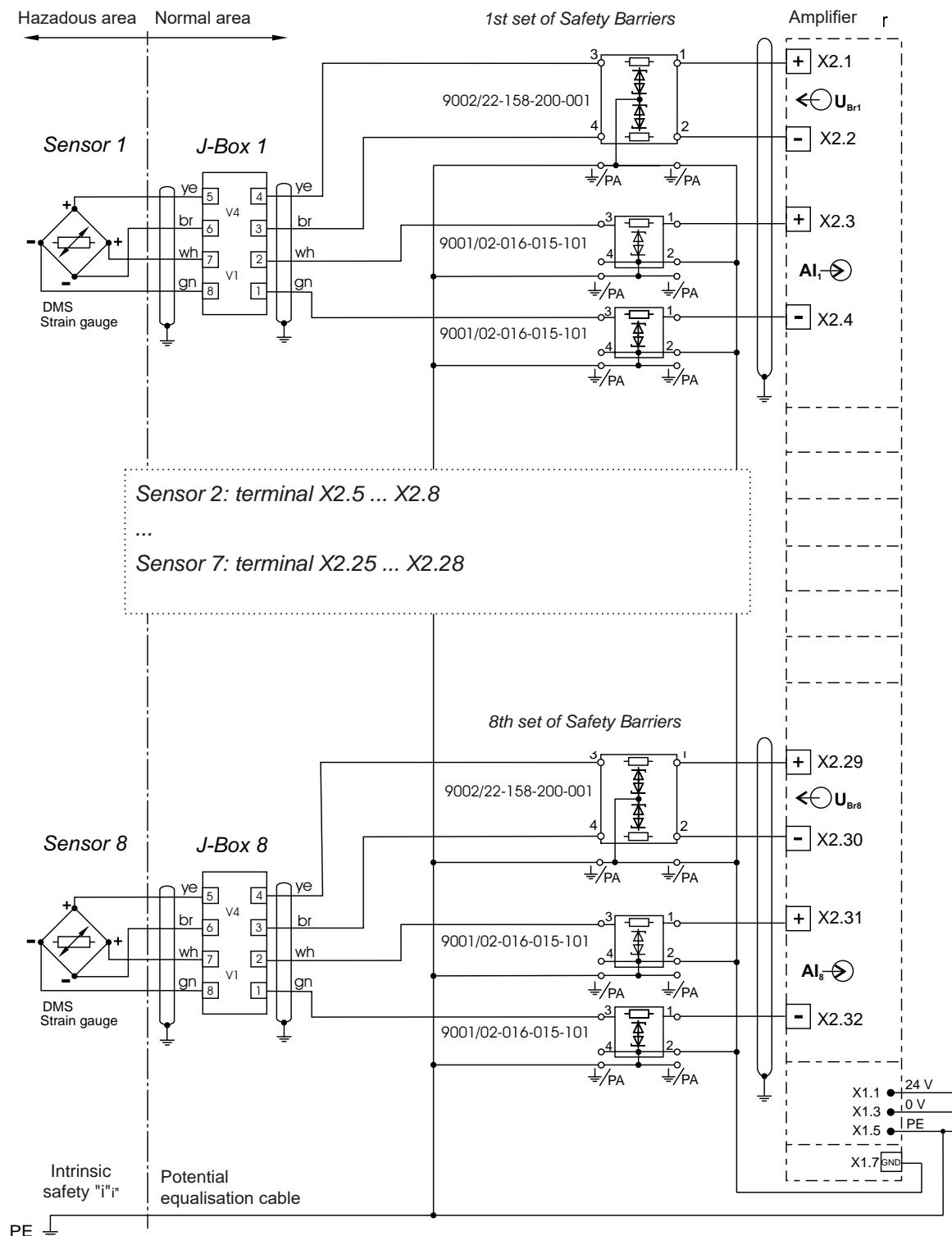
for HAEHNE Amplifier DCM



Note

The pin assignment of deviating core colors can be found on the respective product description of the sensor



**Note**

The pin assignment of deviating core colors can be found on the respective product description of the sensor

Declaration of conformation**HAEHNE Force Sensors**

Geräte und Schutzsysteme zur bestimmungsgemäßigen Verwendung in explosionsgefährdeten Bereichen (Richtlinie 2014/34/EU (vorher 94/9/EG))
Equipment and protective systems intended for appropriate use in potentially explosive atmospheres [directive 2014/34/EC (previously 94/9/EC)]

Die Firma
The Manufacturer

HAEHNE
Elektronische Messgeräte GmbH
Heinrich-Hertz-Str. 29
40699 Erkrath

erklärt hiermit, dass alle Ex-Schutz Kraftmesssensoren mit der
declares hereby, that all force measurement sensors for the use in potentially explosive atmospheres with

Kennzeichnung <i>Designation</i>	CE 0123 II 2G Ex ia IIC T4 Gb	für Typ *** * * * F
	CE 0123 II 2G Ex ia IIC T4 Gb	für Typ *** * * * F***
	CE 0123 II 2G Ex ia IIC T6... T1 Gb	für Typ *** * * * Fxx-yz***
	CE 0123 II 2G Ex ia IIC T6... T1 Gb	für Typ *** * * * Fxx-yz***
	CE 0123 II 2D Ex ia IIIC T135° C Db	(für alle Typen)

entwickelt und gefertigt wurden in Übereinstimmung mit den unten aufgeführten harmonisierten Normen für elektrische Betriebsmittel in explosionsgefährdeten Bereichen.
developed and manufactured in accordance with the harmonized European standards for electrical apparatus for potentially explosive atmospheres:

EN IEC 60079-0:2018

Allgemeine Bestimmungen
General requirements

EN 60079-11:2012

Eigensicherheit "i"
Intrinsic safety "i"

Die bezeichneten Produkte entsprechen dem aktuellen Stand der Technik und den Anforderungen, die in der Richtlinie 2014/34/EU (vorher 94/9/EG) „Geräte und Schutzsysteme zur bestimmungsgemäßigen Verwendung in explosionsgefährdeten Bereichen“ festgelegt sind.

The designated products are in conformity with the requirements of the directive 2014/34/EC (previously 94/9/EC) „Equipment and protective systems intended for use in potentially explosive atmospheres“.

EG-Baumusterprüfungsberechtigung BVS 05 ATEX E 091 X ausgestellt durch:

The EC-type examination certification BVS 05 ATEX E 091 X issued by:
DEKRA EXAM GmbH (NB 0158)
Dinnendahlstr. 9
D-44809 Bochum

Erkrath, den 19.02.2020

Ort, Datum (*Place, Date*)

Dr. F. Goronzy, Geschäftsführer (*General Manager*)

Certificates

Ex

Product quality assurance notification
No. EX3A 052103 0006 Rev. 00

Holder of Certificate: Haehne
HAEHNE
Elektronische Messgeräte GmbH
Heinrich-Hertz-Str. 29
40699 Erkrath
GERMANY

Factory(ies): Haehne Elektronische Messgeräte GmbH
Heinrich-Hertz-Str. 29, 40699 Erkrath, GERMANY

Scope of Certificate: Force Measurement Sensors to be used in Cat. 2G and 2D in Type of Protection "I"

The certification body of TÜV SÜD Product Service GmbH certifies that the certificate holder maintains a quality system which fulfills the requirements of Annex VII of Directive No. 2014/34/EU for Equipment and protective systems intended for use in potentially explosive atmospheres (ATEX). The validity of this Certificate requires periodical surveillance. See also notes overleaf.

Report no.: 713168912
Valid until: 2022-10-31

Date, 2020-02-20
(Norbert Thimm)

Page 1 of 1
TUV SÜD Product Service GmbH is a Notified Body in accordance with Directive 2014/34/EU for equipment and protective systems intended for use in potentially explosive atmospheres with the identification number 0123.
TUV SÜD Product Service GmbH • Certification Body • Ridlerstraße 65 • 80339 Munich • Germany

DEKRA

Translation
EC-Type Examination Certificate

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

(2) **BVS 05 ATEX E 091**

(3) **Equipment:** Force Sensor type **** * F***.F
Manufacturer: HAEHNE GmbH
Address: 40699 Erkrath, Germany

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

(5) The certification body of EXAM BBG Prüf- und Zertifizierer 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 05.2061 EG.

(6) The Essential Health and Safety Requirements are assured by compliance with:
EN 50014-1997 + A1 – A2 General requirements
EN 50020-2002 Intrinsic safety "i"

(7) 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 appendix to this certificate.

(8) This EC-Type Examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to 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

(9) The marking of the equipment shall include the following:
Ex II 2G EEx ia IIC T4

EXAM BBG Prüf- und Zertifizierer GmbH
Bochum, dated 26. June 2005

Signed: Dr. Jockers	Signed: Dr. Eickhoff
Certification body	Special services unit

Page 1 of 2 BVS 05 ATEX E 091 X
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DEKRA EDQM GmbH, Domänenallee 9, 44809 Bochum, Germany. Phone +49 234 3696-110. Fax +49 234 3696-110. E-mail: excert@dekra.com

DEKRA

Appendix to
EC-Type Examination Certificate
BVS 05 ATEX E 091

(13) **15.1 Subject and type**
Force Sensor type **** * F***.F
In place of *** the complete description characters and numeric are inserted which specify the application:
Type **** * F***.F
not ex-relevant identifications such as force measuring range,
type of building, size, sensor designation

(15.2) **Description**
The force sensor is used for the acquisition of tension and compression forces and the conversion of this signal into a proportional electrical signal.
The sensor consists of strain gauges in a bridge circuit which are glued on a gauging member.
The force sensor is a simple apparatus according to section 5.4 of EN 50020 :2002.
The electrical connection of the sensor to a corresponding control unit is made with a fixed cable with maximum 20 m in lengths.

(15.3) **Parameters**

Voltage	Ui	DC	17	V
Current	Ii		500	mA
Pulse	PI		2	W
Effective internal capacitance	Ci		3.2	nF
Effective internal inductance	Li		14	µH
Ambient temperature range	Ta		-20 °C up to +60 °C	

(16) **Test and assessment report**
BVS PP 05.2061 EG as of 20.06.2005

(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.

44809 Bochum, 26.05.2008
BVS-Schuf/Ar E.0734/08

DEKRA EXAM GmbH



DEKRA Testing and Certification GmbH
Bochum, 2020-05-11

Signed: Jörg-Timm Kliisch

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Certification body, Domänenstr. 9, 44809 Bochum, Germany
Phone +49 234 3696-402. Fax +49 234 3696-401. e-mail: DTS-Certification-body@dekra.com

Certificates



- 13 Appendix
 14 EU-Type Examination Certificate
 BVS 05 ATEX E 091 X
 Supplement 3

15 Product description

15.1 Subject and type

Force Sensors type *** * * * Fxx-yzzz
 type *** * * * Fxx-yzzz ***
 type *** * * * F
 type *** * * * ***

In the complete type denomination, the wildcards are replaced by letters or numbers to indicate the different sensor variations:

Type *** * * * Fxx-yzzz

Permissible ambient temperature range
 -yy °C < T_a ≤ zzz °C
 (determined by the permissible operation temperatures of the used materials)

Resistance of the DMS
 35 for (350 Ω)-DMS
 70 for (700 Ω)-DMS
 10 for (1000 Ω)-DMS

Non ex-relevant characteristics like force measuring range, type of building, size, sensor designation

Type *** * * * Fxx-yzzz ***

Optional: marking for custom dimensions (not ex-relevant)
 Permissible ambient temperature range
 -yy' °C < T_a ≤ zzz' °C
 (determined by the permissible operation temperatures of the used materials)

Resistance of the DMS
 35 for (350 Ω)-DMS
 70 for (700 Ω)-DMS
 10 for (1000 Ω)-DMS

Non ex-relevant characteristics like force measuring range, type of building, size, sensor designation

Type *** * * * F***

Optional: marking for custom dimensions (not ex-relevant)
 Non ex-relevant characteristics like force measuring range, type of building, size, sensor designation

Example:

The force sensor type *** * * * F35-20060 has (350 Ω)-DMS and is suitable for use in a temperature range between -20 °C and +60 °C.

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For variants with permanently connected cable

Maximum internal capacitance and maximum internal inductance are calculated only from the cable capacitance and cable inductance:
 Capacitance per unit length
 Inductance per unit length

$$160 \text{ pF/m}$$

$$0.68 \mu\text{H/m}$$

15.3.1.2 Ambient temperature range

Minimum ambient temperature depending on the type characteristic „yy“:

Maximum ambient temperature depending on the type characteristics „xx“ and „zzz“ and the desired temperature class.

For sensors with (350 Ω)-DMS

Type characteristic xx = 35

For T1-classification

For T2-classification

For T3-classification

For T4-classification

For T5-classification

For T6-classification

For T135 °C-classification

For sensors with (700 Ω)-DMS

Type characteristic xx = 70

For T1-classification

For T2-classification

For T3-classification

For T4-classification

For T5-classification

For T6-classification

For T135 °C-classification

For sensors with (1000 Ω)-DMS

Type characteristic xx = 10

For T1-classification

For T2-classification

For T3-classification

For T4-classification

For T5-classification

For T6-classification

For T135 °C-classification

Example:

The materials of the force sensor type *** * * * F35-20060 are suitable for use at -20 °C up to 60 °C.

For temperatures below -20 °C the permissible ambient temperature is calculated from the maximum temperature of the temperature class reduced by the heating of the DMS and the permissible temperature of the used materials.

The force sensor is suitable for T6 in ambient temperatures -20 °C up to 20 °C. It is suitable for T5 in ambient temperatures -20 °C up to 35 °C and for T4 in ambient temperatures -20 °C up to 60 °C.

For temperatures -20 °C up to 60 °C, it can be used in dust-explosive areas.

A change of the ignition behavior of the regarded gases for ambient temperatures outside atmospheric pressure conditions (-20 °C up to +60 °C) has not been regarded for this certification and has to be assessed by the operator.

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15.2 Description

The force sensors are used for the acquisition of tension and compression forces and the conversion of these forces into a proportional electrical signal.
 The sensors consist of strain gauges in a bridge circuit which are glued on a metallic gauging member. The gauging member is inside a metallic sleeve.

The force sensors are simple apparatus according to clause 5.7 of EN 60079-11/2012. They are intended for use in explosive areas requiring equipment with EPL, Gb resp. Db.

The electrical connection of the sensors type *** * * * F and type *** * * * F*** to a corresponding control unit is made with a fixed cable with max. 20 m length. The new sensor type *** * * * F*** differs from the previously approved sensor type *** * * * F only in the dimensions, there is no Ex-relevant technical difference.

The electrical connection of the sensors type *** * * * Fxx-yzzz and type *** * * * Fxx-yzzz *** is made with a fixed cable with variable cable length or a connection socket. The new sensor type *** * * * Fxx-yzzz *** differs from the previously approved sensor type *** * * * Fxx-yzzz only in the dimensions, there is no ex-relevant technical difference.

Depending on the type key ending "xx-yzzz", the sensors are suitable for different ambient temperature ranges and are classified as T1...T6. For dust-applications, the sensors are marked as T135°C.

Reasons for the supplement

- Update of standard
- Modification of the existing type designation of the force sensor
- Introduction of new force sensor types

15.3 Parameters

15.3.1 For type *** * * * Fxx-yzzz and type *** * * * Fxx-yzzz ***

15.3.1.1 Electrical parameters

	U _i	DC	I _t	V
Maximum input voltage				
Maximum input current				
for Gb-applications	500			mA
for Db-applications	250			mA
Maximum input power				
for Gb-applications	2			W
for Db-applications	550			mW

The force sensors do not include concentrated capacitances or inductances.

For variants with connection socket (no connected cable)

	C	L
Maximum internal capacitance	negligible	
Maximum internal inductance		negligible

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15.3.2 For type *** * * * F and type *** * * * F***

15.3.2.1 Electrical parameters

	U _i	DC	I _t	V
Maximum input voltage				
Maximum input current				
for Gb-applications	500			mA
for Db-applications	250			mA
Maximum input power				
for Gb-applications	2			W
for Db-applications	550			mW

The force sensors do not include concentrated capacitances or inductances.

The internal capacitance and internal inductance are calculated only from the capacitance and inductance of the permanently connected cable (max. length 20 m).

	C	L
Maximum internal capacitance	3.2	nF
Maximum internal inductance	14	µH

15.3.2.2 Ambient temperature range

	T _a
	-20 °C up to +60 °C

16 Report Number

BVS PP 05.2061 EU, as of 2020-05-11

17 Special Conditions for Use

For Use in Group III:
 The intrinsically safe circuit is not safely separated from earth. Along the intrinsically safe circuit, potential equalization must exist.
 The sensors have to be installed in such a way, that intensive electrostatic charging processes are excluded.

18 Essential Health and Safety Requirements

The Essential Health and Safety Requirements are covered by the standards listed under item 9.

19 Drawings and Documents

Drawings and documents are listed in the confidential report.

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.

DEKRA Testing and Certification GmbH
 Bochum, 2020-05-11
 BVS-FraMu A 20190861

Managing Director

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