

Installation and Operating Manual for Components

HSC[®]

Safety edge
(ex-relevant aspects)



Read the operating manual before beginning any work!

HAAKE[®]



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1 Preface

This installation and operating manual does only refer to those aspects relevant to explosion protection. In order to ensure both the functionality of the device and your own safety you are requested to carefully study the instruction manual enclosed before you start installing the device. This manual is only valid together with the original instruction manual.

If you have any questions which are not answered in this manual, please get in touch with your regional customer service center or else make direct contact with

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The equipment was assessed as based on the following editions of the applicable standards:

- DIN EN 60079-0:2012 + A11:2013 Explosive atmospheres - Part 0:
Equipment – General requirements
- DIN EN 60079-11:2012 Explosive atmospheres – Part 11: Equipment protection by intrinsic safety “i”

2 General information on explosion protection

The safety edges of series HSC xx-yy-zz www y/l are used to protect against risks at shearing and crushing edges. Examples of their use are: automated guided vehicles (AGV), machine hoods, theatre stages, lifting tables, hangar doors, automatic door and gate systems, etc.

The safety edges have a hollow-chamber profile made of elastomer. Only those elastomers supplied by Haake are electrostatically harmless.

Please bear in mind – with regard to your intended area of use – that the safety edge may be corroded by aggressive media. In such cases additional precautions have to be taken by the user. Those additional precautions have to be inspected for their effectiveness at regular intervals.

The safety edges can be used in the following zones:

- a) In Zone 2 (Gas-Ex, category 3G, EPL Gc) in the explosion groups IIA, IIB and IIC
- b) In Zone 22 (Dust-Ex, category 3D, EPL Dc) in the explosion groups IIIA, IIIB and IIIC
- c) In Zone 1 (Gas-Ex, category 2G, EPL Gb) in the explosion groups IIA, IIB and IIC
if power to the safety edge is supplied by means of an intrinsically safe switch amplifier (considering the specified parameters). The safety edge meets the requirements on a simple intrinsically safe apparatus according to clause 12 of EN 60079-14 and clause 5.7 of EN 60079-11.
- d) In Zone 21 (Dust-Ex, category 2D, EPL Db) in the explosion groups IIIA, IIIB and IIIC
if power to the safety edge is supplied by means of an intrinsically safe switch amplifier (considering the specified parameters – here in particular $P_i < 700 \text{ mW}$). The safety edge meets the requirements on a simple intrinsically safe apparatus according to clause 12 of EN 60079-14 and clause 5.7 of EN 60079-11

The qualification with regard to the surface temperature is T4. For all gases, vapours, and mists with an ignition temperature of $> 135 \text{ °C}$ the equipment is no ignition source.

In Dust-Ex-area 125 °C is the reference temperature for further considerations in regard to a safe distance from the smouldering temperature.

The permitted ambient temperature range lies between $-20 \text{ °C} \leq T_a \leq 50 \text{ °C}$.

2.1 Type coding

The type code of the ATEX variant of the safety edge is structured as follows:

HSC xx-yy-zz wwww y/l

xx	=	height in mm (15 to 150 mm)
yy	=	width in mm (10 to 80 mm)
zz	=	variant of profile 01 to 04
wwww	=	material of signal transmitter as follows: TIIA = TPE (SEBS) TIIB = TPE (PP/EPDM) NIIC = NBR EIIC = EPDM
y	=	marking of possible conductor monitoring blank = no resistors mounted W = 2-Watt resistors mounted for conductor monitoring, standard 1k5/10k
l	=	length 150 to 6,000 mm

2.2 Marking (type label)

HAAKE Technik GmbH with address	
Type: HSC xx-yy-zz wwww y/l	
[serial number]	[year of construction]
ExGuide 03 ATEX 0045 X	
CE	Ex II 3G Ex ic IIA/IIB/IIC T4 Gc
	Ex II 3D Ex ic IIIC T125 °C Dc
-20 °C ≤ Ta ≤ 50 °C	

2.3 Technical data

Types	HSC xx-yy-zz wwww y/l
IP degrees	Standard IP 54 / 65
Type of protection	Intrinsic Safety Ex i
Rated voltage	< 45 Volt AC/DC
Rated current	< 0,15 A AC/DC
Nominal values IIA/IIB (gas)	UiIIB = 45 V AC/DC, IiIIB = 150 mA, Pi = 1,2 W
Nominal values IIC (gas)	UiIIC = 30 V AC/DC, IiIIC = 150 mA, Pi = 1,2 W
Nominal values IIIB (dust)	Ui = 45 V AC/DC, Ii = 150 mA, Pi = 700 mW
Internal inductance	Li = negligible up to 5 m length, then 1µH/m
Internal capacitance	Ci = negligible
Connecting cable	Doubly insulated, highly flexible single-wire cables; other cables can be used in agreement with the manufacturer.

3 General requirements

3.1 Appropriate and intended use

The safety edge is designed for use in industrial applications. Any use outside such applications is regarded as inappropriate.

In order to ensure a safe operation the safety edge is only to be used according to the details stated in the assembly instructions. Additionally, the legal and safety regulations that apply to the specific case of application have to be taken into account when using the equipment. Correspondingly, this condition also applies to the use of auxiliary equipment.

The safety edge is no safety element in the meaning of the intended use. The electronic control unit has to be designed in such a manner that no subsequent damage will occur in case the safety edge fails.

3.2 General risks if safety instructions are not observed

The safety edge is a device made according to state-of-the-art technology and is safe to be operated. However, the safety edges provide some residual risks if they are inappropriately used and operated by untrained staff.

Each person assigned with the task to erect, put into service, maintain or repair the safety edge must have read and understood the safety-related instructions.

- a) Any selection and operation of the device must be done observing the acknowledged technical rules.
- b) The requirements on simple electrical apparatus used in Gas-Ex atmospheres of Zone 1 as defined in EN 60079-11 are met.
- c) The requirements on simple electrical apparatus used in Dust-Ex atmospheres of Zone 21 as defined in EN 60079-11 are met. Here, the power P_i has to be limited to 700 mW (750 mW if the ambient temperature is 40 °C).
- d) Suitable precautions have to be taken to prevent any inappropriate impairment of the device.
- e) It has to be ensured that only such equipment is installed that complies with the types of protection relevant to the applicable zones!
- f) All connected electrical equipment has to be suitable for the respective intended use.
- g) The operator has to ensure protection against lightning in compliance with the locally applicable regulations.
- h) The hazard of any objects falling onto the safety edge has to be prevented. In conjunction with rust, light metal and kinetic energy an exothermic reaction may be initiated.
- i) The safety edge shall not be shortened!
If there are operational reasons to shorten a safety edge, this shall only be done by the manufacturer.
- j) All cable ends – after they have been shortened to the necessary length – have to be provided with cable end sleeves.
- k) The base to which the safety edge is fastened has to be clean and even.
- l) The safety edge (surface) and the connecting cable shall not be damaged.
- m) All cables have to be installed in such a manner that they are protected against mechanical outside impact.
- n) The deformation path (referring to the over-travel of the machine part that needs to be secured) has to be sufficient.
- o) The supply circuit of the safety edge has to be either protected by a fuse (max. 0.5 A nominal value) or supplied by an electric switch amplifier with intrinsically safe outputs.
- p) The electric connections have to be properly connected. If after the assembly of the safety edge a closed current runs (to be tested e.g. by a continuity tester), the assembly has been done correctly.

- q) Plugs shall only be installed by a person qualified in electrical matters and have to meet the requirements of the pertinent standards (e.g. EN 60079-11)
 - a) They shall NOT fit other plug connections provided!

4 Commissioning, installation

The safety edge is to be mounted in a major system. Depending on the degrees of ingress protection, an interval for cleaning the equipment (dust deposits) has to be defined. Strict care has to be taken that only such equipment is installed that complies with the types of protection relevant to the applicable zones and categories. When installing the equipment, the locally applicable rules on erection, e.g. EN 60079-14, have to be observed.

Other important facts to be observed:

- a) The ATEX safety edge shall be put into service – while considering the electrical parameters – by expert personnel qualified similar according to BetrSichV (German Ordinance on Industrial Safety) as follows:
 - a) in Zone 2 as intrinsically safe (IS) equipment of the type of protection Ex ic IIB/IIC T4 Gc
 - b) in Zone 22 as intrinsically safe (IS) equipment of the type of protection Ex ic IIIC T125 °C Dc
 - c) in Zone 1 as simple electrical apparatus for I.S. circuits
 - d) and in Zone 21 as simple electrical apparatus for I.S. circuits

The details stated on the type label have to be adhered to. The conditions described in this instruction manual, and the conditions of use and permissible data which are stated on the prints/type labels of the respective equipment have to be observed, too.
- b) The use of the safety edge in an intrinsically safe circuit requires a control drawing (interconnection of IS-devices), to be issued by the erector/operator.
- c) Only such equipment is to be connected to the circuits in Zone 2 that is suitable for the use in this zone and for which the appropriate documents have been provided.
- d) The explosion limit curves specified in EN 60079-11 have to be considered in Zones 2/22 without a safety factor and to be observed when installing the equipment.
- e) At cables longer than 5 m the capacity of the cables must be considered when calculating the evidence of intrinsic safety. If no other values are provided, the standard values according to clause 12.2.2.2 of EN 60079-14 can be used: (a) $L_i = 1 \mu\text{H/m}$; (b) $C_i = 0.2 \text{ nF/m}$.
- f) The safety edge has to be properly protected if operated in adverse environmental conditions.
- g) Equipotential bonding has to be provided in accordance with the conditions of erection in the country where the equipment is used (VDE 0100 Part 540, IEC 364-5-54).
- h) Electrostatic charges have to be prevented. In order to ensure the proper dissipation of electrostatic charges the respective national requirements have to be taken into account. Principally, there are several possibilities which are to be used additively:
 - a) Mounting the safety edge onto an electrostatically discharging surface (e.g. steel frame connected to the system PE)
 - b) Supplying the safety edge with a PE cable (marked green/yellow) which then has to be properly connected to the PE of the system or building.
 - c) Equipping the safety edge with a PE connection at the assembly surface (marked with the PE logo). This is the spot where the PE of the system or building has to be connected.
- i) Dust deposits shall not be thicker than 2 mm.
- j) Metallic parts of the safety edge have to be integrated into the equipotential bonding in accordance with the relevant national rules.
- k) Any parts of the equipment which got stuck (e. g. by frost or corrosion) may not be removed by force if potentially explosive atmosphere is present.
- l) The safety edge is only to be operated if fully mounted and intact; if the enclosure is damaged, the operation is not permitted.
- m) Avoid any contact of the safety edge with corrosive media.

- n) The safety edge is not to be used in systems where cathodic systems for corrosion protection are in place. Although special precautions may make that possible, the manufacturer has to be consulted in each case. Parasitic currents are not to be led via the construction.
- o) The formation of ice on the equipment has to be prevented.
- p) Only such auxiliary components may be used in potentially explosive atmospheres which meet all requirements of relevant European and national directives and legislation.
 Inside the potentially explosive atmospheres assembly shall only be performed taking the locally applicable rules of erection into account. The following conditions have to be observed (incomplete):
 - a) Assembly and maintenance to be done only if atmosphere is Ex-free and while observing the instructions valid in the operator's country!
 - b) Additional precautions have to be taken if the presence of hydro-sulphide, ethylene oxide and/or carbon monoxide is to be expected: those substances are of a very low ignition energy!
 - c) Where these substances are present and where any substance of explosion group IIC is present, and where yet a potentially explosive atmosphere is expected to be present, only non-sparking tools shall be used!

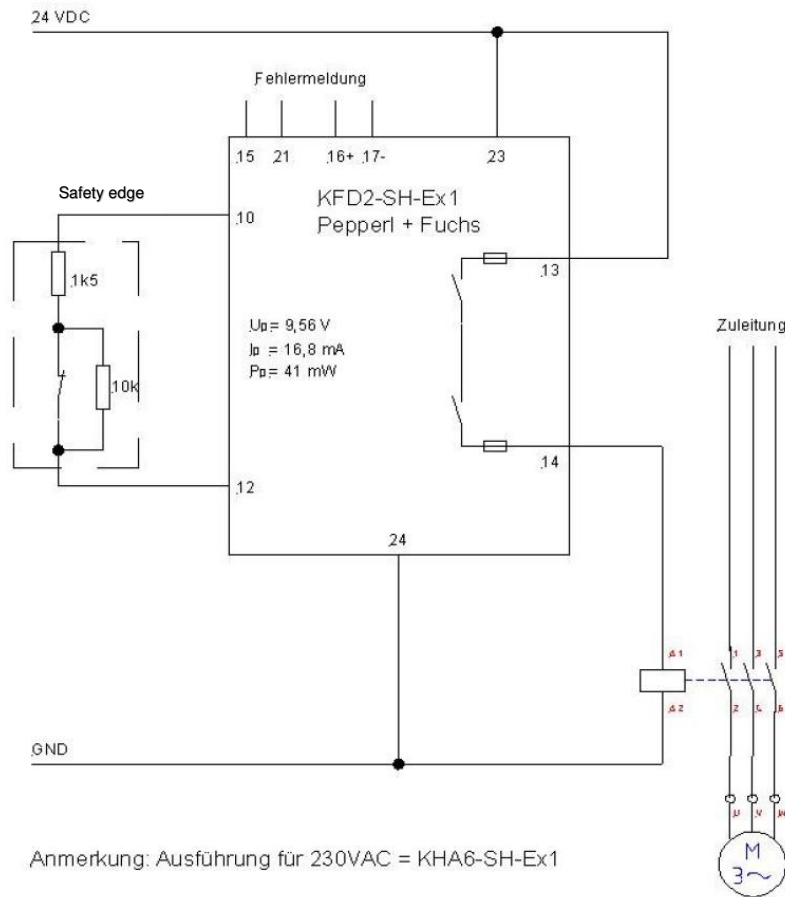
Measures taken when using the equipment in areas of zones 2 / 22			
Designation	www marking	Zone 2	Zone 22
Material TPE (SEBS)	TIIA	IIA ¹	IIIB
Material TPE (PP/EPDM)	TIIB	IIB ²	IIIB
Material NBR	NIIC	IIC	IIIB
Material EPDM	EIIC	IIC	IIIB

¹If warning sign and additional precautions are provided, this material can also be used in IIB and IIC.

²If warning sign and additional precautions are provided, this material can also be used in IIC.

5 Modules and measures

The mounting of a safety edge has to be assessed as an installation in compliance with § 44 of ATEX Directive 2014/34/EU. No new marking has to be put in place for the installation (i.e. the combination of safety edge and control unit).



Example (symbolic representation) of the interconnection with a safety relay: terminals S10 and S12 are intended for IS-equipment; as an alternative, the safety edge can also be supplied with the resistor circuit.

NB: IS-conductors have to be marked and have to be installed separately from non-IS conductors.

6 Maintenance and repair

Definition of terms according to IEC 60079-17:

Maintenance: defines a combination of any actions carried out to retain an item in, or restore it to, conditions in which it is able to meet the requirements of the relevant specification and perform its required functions.

Inspection: defines any action comprising careful scrutiny of an item carried out either without dismantling, or with the addition of partial dismantling as required, supplemented by means such as measurement, in order to arrive at reliable conclusion as to the condition of an item.

Visual inspection: defines an inspection which identifies, without the use of access equipment and tools, those defects, such as missing bolts, which will be apparent to the eye.

Close inspection: defines an inspection which encompasses those aspects covered by a visual inspection and, in addition, identifies those defects, such as loose bolts, which will be apparent only by the use of access equipment, for example steps, where necessary, and tools. For close inspections an enclosure usually does not need to be opened and the equipment does not need to be disconnected.

Detailed inspection: defines an inspection which encompasses those aspects covered by a close inspection and, in addition, identifies those defects, such as loose terminations, which will only be apparent by opening the enclosure, and/or using, where necessary, tools and test equipment.

- a) Maintenance or replacement works are to be carried out by qualified personnel only, i.e. personnel qualified according to TRBS 1203 or similar.
- b) Only such auxiliary components may be used in potentially explosive atmospheres which meet all requirements of relevant European and national directives and legislation.
- c) Components may only be replaced by original spare parts which are also approved for the use in Ex-atmospheres.
- d) Inside the Ex-atmosphere the equipment has to be cleaned regularly. The intervals are to be defined by the operator in compliance with the environmental rules valid at the place of operation.
- e) After maintenance and/ or repair works have been performed, all barriers and notes removed for that purpose have to be put back in their original place.
- f) In case faults of the equipment are noticed, remove the equipment. The inner parts cannot be maintained by the customer. Instead, send the equipment to the manufacturer for inspection.

	Activity	Visual inspection monthly	Close inspection every 6 months	Detailed inspection every 12 months
1	Visual inspection of safety edge, removing dust deposits	•		
2	Check of safety edge for proper fastening and cracks		•	
3	Check of electrical system for intactness			•
4	Check of entire system	Operator's responsibility		

7 Special precautions:

The instruction manuals of the supplied assemblies have to be observed and the conditions of the manufacturer have to be fulfilled.

Any equipment that is operated in conjunction with potentially explosive atmospheres must not be modified. Repair works on the equipment are only to be carried out by authorized expert personnel especially inducted for this task.

8 Fault elimination

No changes or modifications may be performed on equipment that is operated in conjunction with explosive atmospheres. Such equipment shall only be repaired by expert personnel trained and authorized to do so.

9 Disposal

Packaging material and worn components shall be disposed of according to the regulations applicable in the country of installation.

10 EU-Declaration of conformity

EU-KONFORMITÄTSERKLÄRUNG zur Bestätigung der Übereinstimmung einer Baugruppe mit der Richtlinie 2014/34/EU

EU DECLARATION OF CONFORMITY to confirm the conformance of a device with the Directive 2014/34/EU

Der Hersteller

The manufacturer

HAAKE Technik GmbH, Master Esch 72, DE 48691 Vreden

erklärt hiermit in alleiniger Verantwortung, dass die nachfolgende Maschine oder Baugruppe

hereby declares under sole responsibility, that the machinery or subassembly equipment described below

Bezeichnung

Description

Schaltleisten HSC xx-yy-zz www y/l

Safety edges HSC xx-yy-zz www y/l

Kennzeichnung: mechanische Ausrüstung

Marking: mechanical equipment

CE II 3G Ex ic IIA/IIB/IIC T4 Gc or

CE II 3D Ex ic IIIC T125°C Dc

Fertigungs-Nr. lt. Lieferpapieren und Typenschild

Serial no. see shipping documents and type label

mit den Bestimmungen folgender harmonisierter Normen der Europäischen Union, in der zum Unterschriftsdatum gültigen Fassung, übereinstimmt:

conforms with the provisions of the following harmonized standards in the version of the European Union, valid at signature date

EN 60079-0:2012 + A11:2013 Explosionsgefährdete Bereiche - Teil 0: Betriebsmittel - Allgemeine Anforderungen

EN 60079-0:2012 + A11:2013 Explosive atmospheres – Part 0: General Requirements

EN 60079-11:2012 Explosionsgefährdete Bereiche – Teil 11: Geräteschutz durch Eigensicherheit "i"

EN 60079-11:2012 Explosive atmospheres – Part 11: Equipment protection by intrinsic safety "i"

Ebenfalls mit folgenden Europäischen und nationalen Normen und technischen Vorschriften, in der zum Unterschriftsdatum gültigen Fassung, übereinstimmt:

Also conforms with the following European and National Standards and technical provisions in the version, valid at signature date:

Technische Regeln für Gefahrstoffe (TRGS) 727, Vermeidung von Zündgefahren infolge elektrostatischer Aufladungen

Technical rules for hazardous substances (TRGS) 727, Avoidance of ignition hazards as consequence of electrostatic charging

Ausgefertigt in Vreden am 31. Dezember 2016

done at Vreden on Decembre, 31st 2016

Name des Unterzeichners

Name of signatory

Lars Deibel

Unterzeichnet für und im Namen der / Signed for and on behalf of Haake Technik GmbH



Unterschrift / signatur

EU-Konformitätserklärung HSC, 2018-11-27



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