

# REMBE®

## Operating Instructions



**REMBE®, INC.**

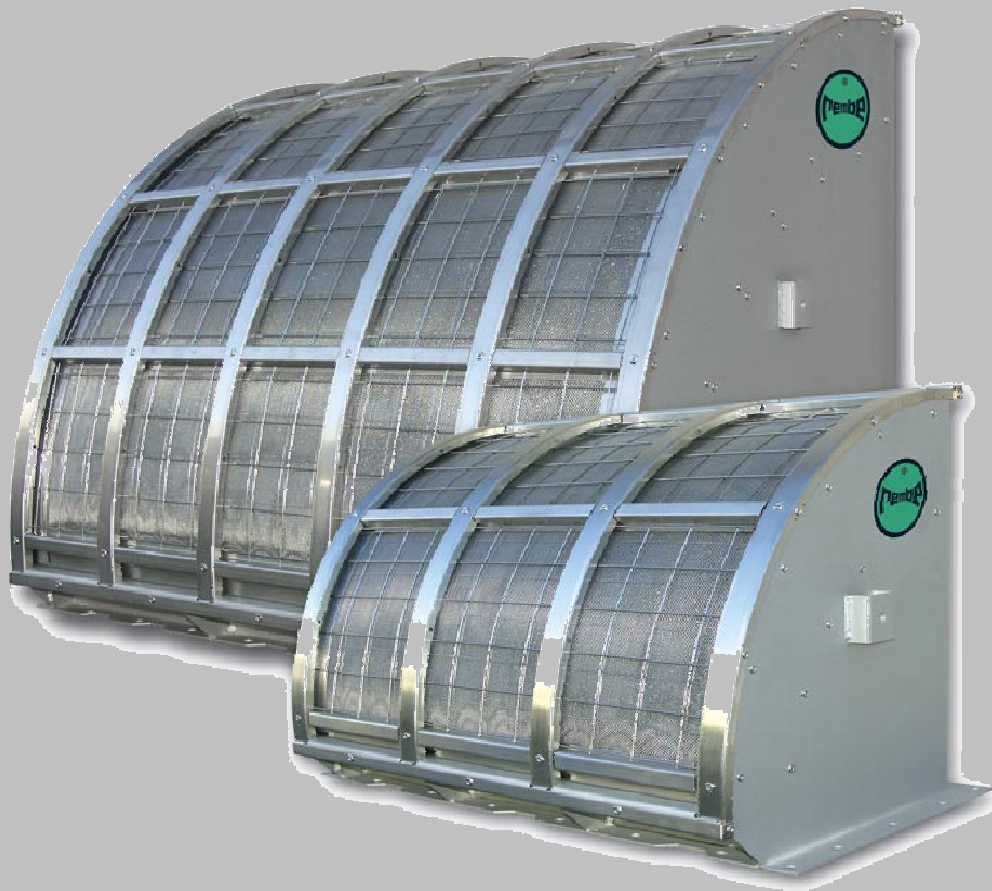
[astgroup.ca](http://astgroup.ca)



905-821-8860



# Q-Box II





### Table of Contents

Congratulations for your purchase of the **REMBE® Q-Box II**. You have a superb product which incorporates the latest technology and which is approved by different authorities.

Before commencing the installation, please read this instructions carefully.

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- 1.2 Installation of the **Q-Box II**
- 1.3 Transformer Isolated Barrier with output: Relay
- 1.4 Marking

#### enclosure

- dimension sheets
- wiring instructions Transformer Isolated Barrier



#### Attention!

**It is essential that all instructions in this manual must be understood and followed precisely to ensure proper operation of the equipment. In case of any questions (e.g. on individual installation situation) please contact REMBE®.**

### 1.1 Safety instructions



#### Attention:

The **Q-Box II** is a high capacity system which decreases the immense energy during a dust explosion.

Any kind of product damage can lead to a malfunction. The result is a dust explosion in the environment of the protected vessel or in the production room.

Due to this safety function, the following restrictions are mandatory for safe use.

#### Restrictions:

Kst-Value:	$\leq 200 \text{ bar} \times \text{m} / \text{s}$
P <sub>max</sub> :	$\leq 9 \text{ bar}$
min. ignition energy:	$\geq 3 \text{ mJ}$
min. ignition temperature:	$\geq +698 \text{ °F} (+370 \text{ °C})$
static activation pressure:	$0.1 \text{ bar} \pm 20\%$
P <sub>red. max</sub> :	$\leq 0,5 \text{ bar}$
ambient temperature:	$-58 \text{ °F} - +248 \text{ °F} (-50 \text{ °C} \text{ to } +120 \text{ °C})$
process temperature:	up to $+356 \text{ °F} (+180 \text{ °C})$ - dep. on gasket material
eff. venting area:	s. EC-Type Examination Certificate

The bursting disc, gasket and transformer isolated barrier are integral elements of the **Q-Box II** system. The documents accompanying the **Q-Box II**, as delivered, provide the specifications for set-up and start-up of the **Q-Box II**. Take care that the dimensions of the necessary venting area are according to the following guidelines and standards respectively:



VDI-guideline 3673 - Pressure venting of dust explosions  
VDI-guideline 2263 Bl. 3 - Pressure shock resistant vessels and apparatus  
prEN 14491 - Dust explosion venting protective systems  
NFPA 68 - Guide for Venting and Deflagrations

For sizing and positioning of the Q-Box II on the equipment, we recommend you consult with REMBE®, INC.

If REMBE®, INC. has not checked the sizing and positioning of the Q-Box II, the customer and /or installing contractor has to ensure correct and sufficient design and installation.

Venting into explosion hazard area is not allowed.

The ratio of the room volume where the vented vessel is located to the vented vessel volume has to be at least 15:1

The installation of a **Q-Box II** shall be in such a way that no dust deposits in front of the bursting panel will occur. Vertical or upward installations are preferred.

The **Q-Box II** is suitable for organic and non toxic dusts.

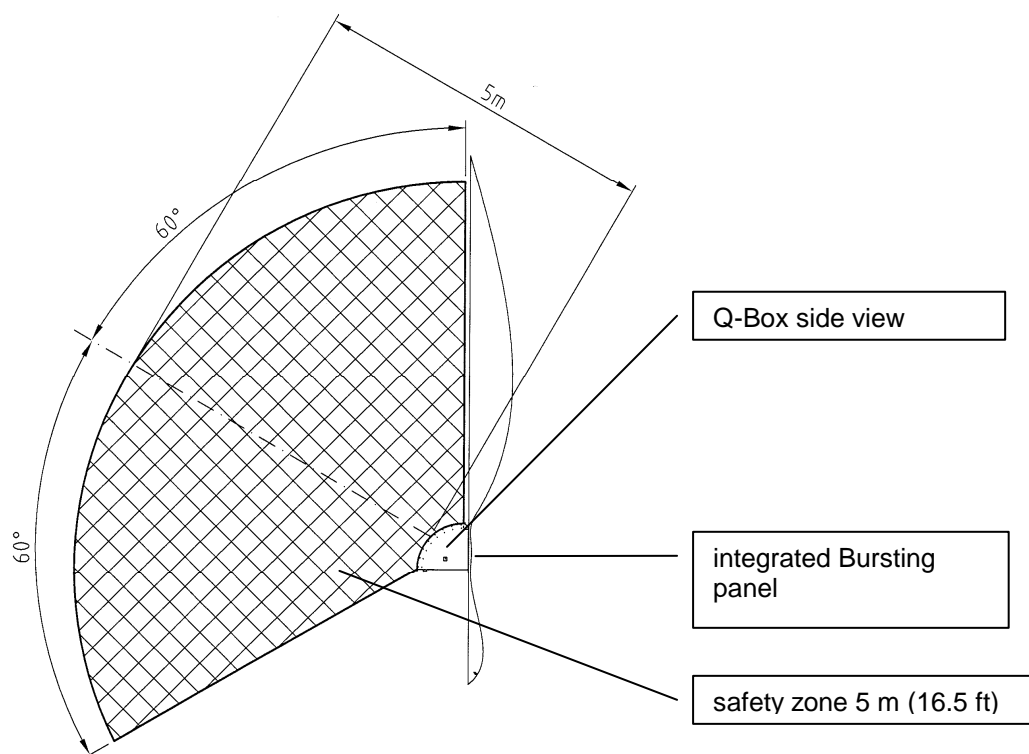
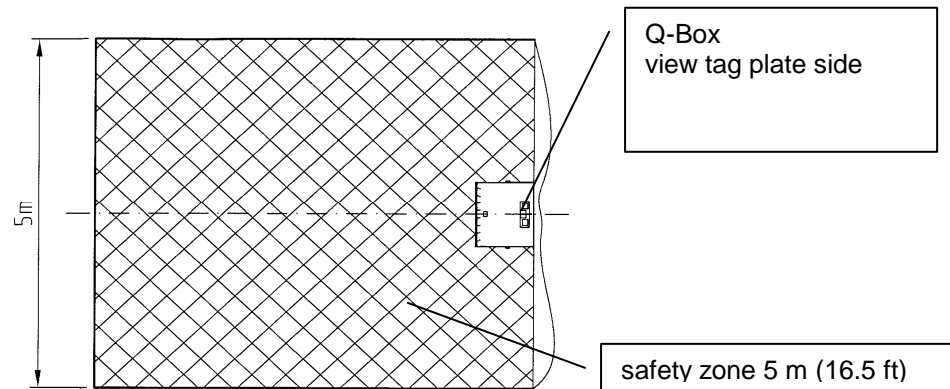
The **Q-Box II** safety zone of 5 m (16.5 ft) must be marked in the venting direction. This zone shall not be entered during operation of the system. The safety zone can be reduced to 0.5 m (1.65 ft) on the sides and by protection shields or similar means.

The distance of the **Q-Box II** to walls or nearby equipment must be a minimum of 0.5 m (1.65 ft) to guarantee the total venting and the function of the **Q-Box II**. Do not install flammable or temperature sensitive equipment in this area.

Safety zone should be like sketch below.

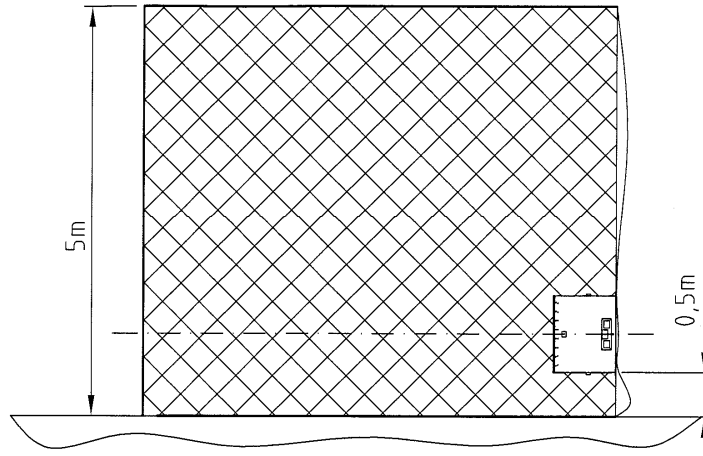
The venting process can be influenced by units inside the zone (e.g. beam of the building, baffle plates). In order to determine the influence of these units on the venting process, please contact experts.

Beyond the safety zone, a small release of dust during the venting process is possible. In some cases, depending on the product, harmful combustion by-products may occur. If there are any questions please contact REMBE® for assistance. A general statement is impossible.





Safety zone in case of installation close to the ground



The **Q-Box II** system works maintenance-free. The outside of the filter system must be free of dust deposits. Any dust accumulation has to be removed during standstill of the system with a soft brush and / or by a vacuum cleaner. Inspection intervals are heavily dependent on the specific area conditions. After starting up, inspections should be conducted monthly. If there are no dust deposits or effects, inspection intervals can be increased step by step, but have to be conducted at a minimum of once a year.

### **Wet cleaning of the installation place is not allowed.**

A clean cover is available to avoid dust deposits on the filter system. In the event of activation, the clean cover opens on its own. From time to time, the clean cover must be cleaned (washed) or replaced by an original REMBE® spare part.

An activation of the **Q-Box II** must immediately shut down the plant by the integrated signaling unit and transformer isolated barrier. An optical and acoustical alarm shall force personnel to leave the building for safety reasons.

### **Procedure after activation**

The person responsible for safety must be informed immediately. When the situation is under control and the danger of burns or secondary explosions can safely be excluded, contact REMBE® INC. (provide the serial/batch-no. of the Q-Box II system) for further advice. The replacement Bursting Panel for the Q-Box II system must be an Original REMBE® Bursting Panel.



### **Attention!**

Make sure that the hinged side of the bursting panel fits to the closed side of the Q-Box II (with cable glands) to ensure proper venting through the flame filter.

A manual for refurbishment is available on request.

Essential safety instructions for fire and explosion hazards have to be observed.



### 1.2 Installation of the Q-Box II

During transportation and installation, suspending of the **Q-Box II** is only allowed by using the attached eyes.

During installation of the **Q-Box II**, pay attention to the following items:

#### Connection flange


Compare the dimensions of the existing flange with the **Q-Box II** connection dimensions in the drawing on page 7.

Clean the sealing surfaces at the mounting location and the gasket of the **Q-Box II** carefully. After positioning the **Q-Box II**, tighten all studs and nuts cross-like. The housing of the **Q-Box II** has to be grounded.

### 1.3 Transformer Isolated Barrier with output: Relay

A transformer isolated barrier is included as part of the **Q-Box II** system. This electronic device must be installed in the main control room or at installation place in a separate box (min. degree of protection IP 54). The signaling unit (blue cable) of the integrated bursting panel is wired in the junction box of the **Q-Box II**. This wire must be connected to specified terminals of the transformer isolated barrier. (see page 9, diagram KFD2-SR2-Ex1.W). The relay contact must lead to a shut down of the plant to avoid transport of glowing or burning material into other parts of plant.

### 1.4 Marking

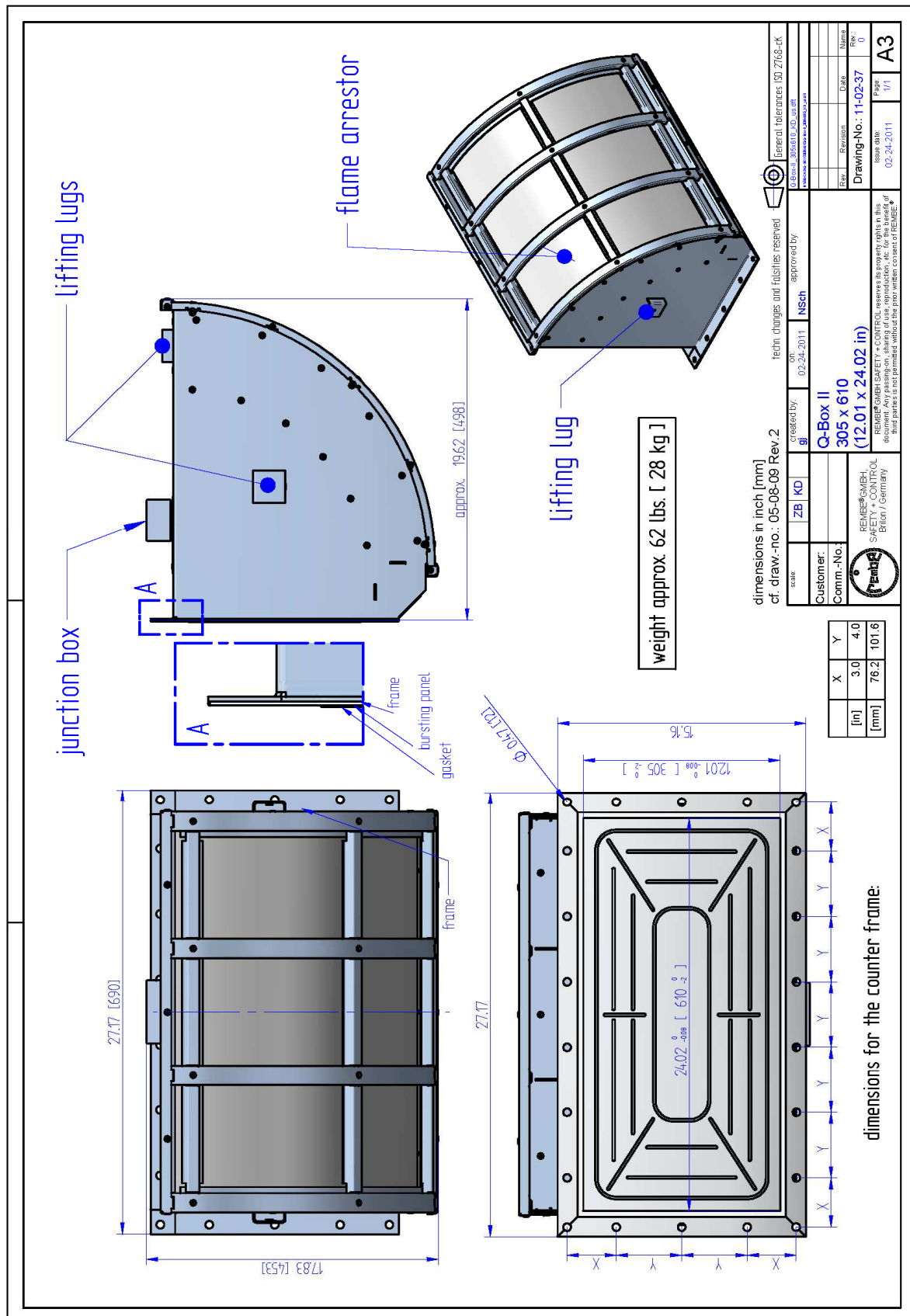
<b>REMBE® GmbH</b>					
SAFETY + CONTROL				www.rembe.com	
DN / Size	586 x 920	eff. Entlastungsfläche / eff. vent area: _____			
Type	QB 586 x 920	Mat.:	steel		
Serie / Batch	QB _____	max. Temp.:	453 K		
<b>Abblaseseite / Ventside</b>					
Berstüberdruck / Burstoverpressure in					bar ue
bei/at	295 K	→	0,100	min.: 0,080	max.: 0,120
bei/at	_____	→	_____	min.: _____	max.: _____
Berstscheiben-Type: SKEX-GO-VENT				Ser.-Nr Berstscheibe: _____	
Bursting panel type: SKEX-GO-VENT				Ser.-No Bursting panel: _____	
Identifikation: BVS 06 ATEX yyyy X					
Identification: BVS 06 ATEX yyyy X					
ECK-04				Made in Germany	



#### Attention!

The Warranty is completely voided if these instructions or parts of them are not observed. The user is responsible for proper use and durability of the above-described product.



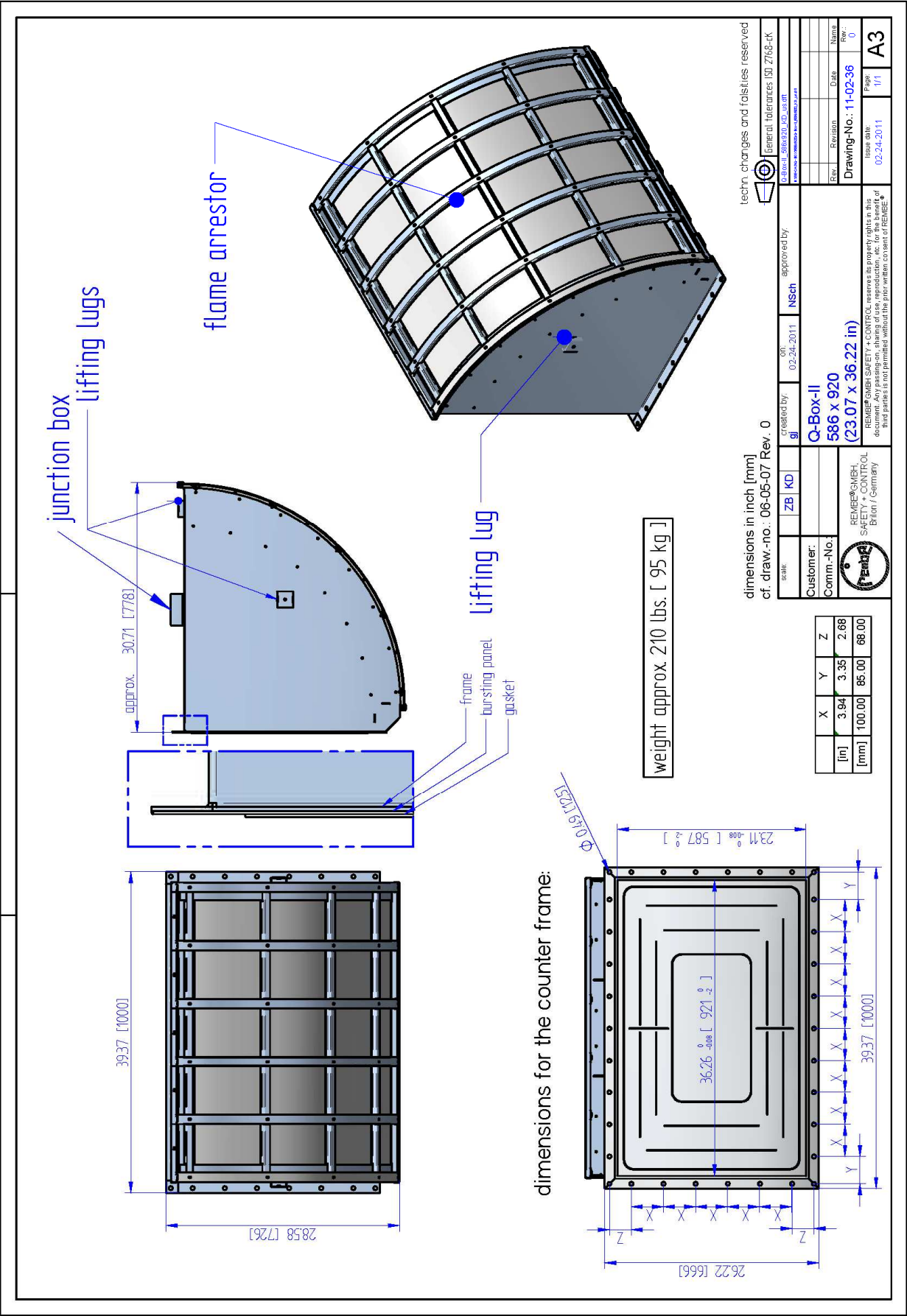


# REMBE®

## Operating Instructions



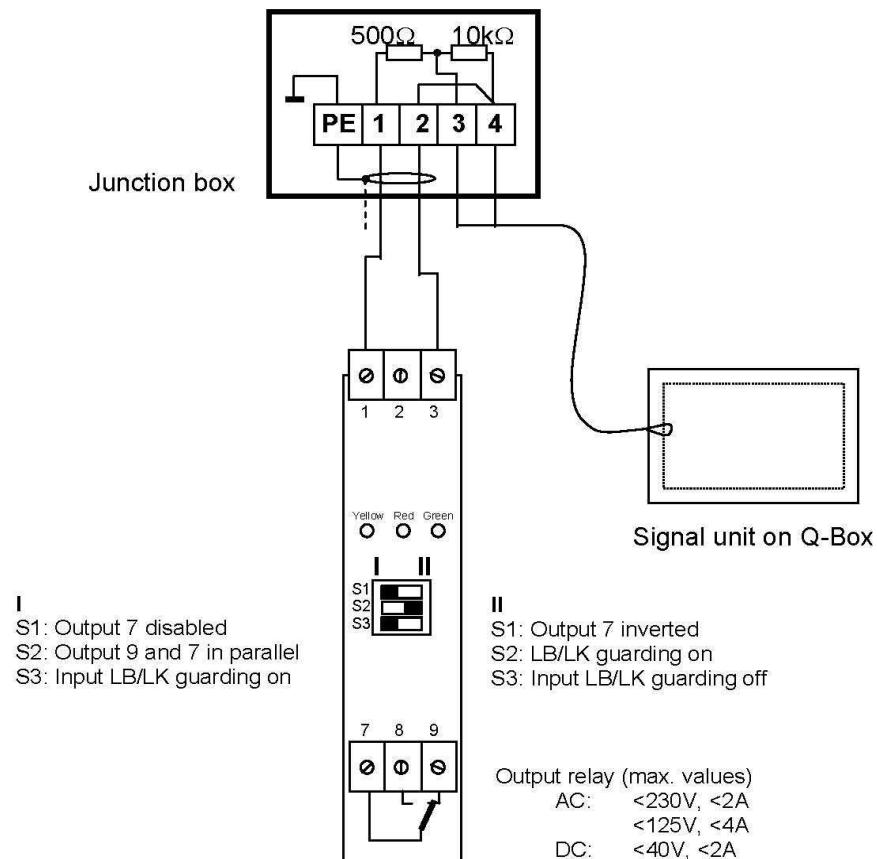
REMBE®, INC.







### Connection diagram safety relay für KFD2-SR2-Ex1.W



# REMBE®

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REMBE®, INC.

Switch Amplifier

KFD2-SR2-Ex1.W

### Features

- 1-channel isolated barrier
- 24 V DC supply (Power Rail)
- Dry contact or NAMUR inputs
- Relay contact output
- Line fault detection (LFD)
- Reversible mode of operation
- Up to SIL2 acc. to IEC 61508

### Function

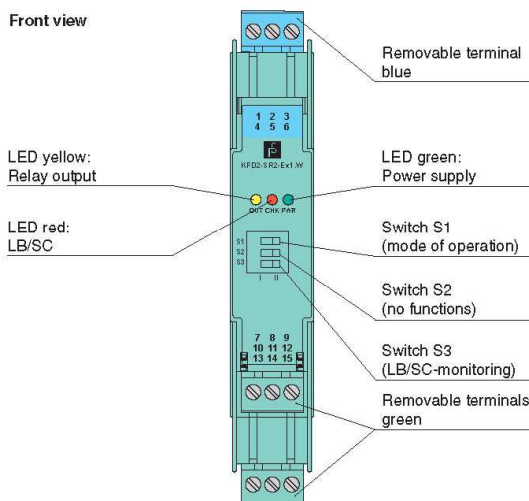
This isolated barrier is used for intrinsic safety applications. It transfers digital signals (NAMUR sensors/mechanical contacts) from a hazardous area to a safe area.

The proximity sensor or switch controls a form C changeover relay contact for the safe area load. The barrier output changes state when the input signal changes state. The normal output state can be reversed using switch S1. Switch S3 is used to enable or disable line fault detection of the field circuit.

During an error condition, the relay reverts to its de-energized state and the LEDs indicate the fault according to NAMUR NE44.

A unique collective error messaging feature is available when used with the Power Rail system.

### Assembly

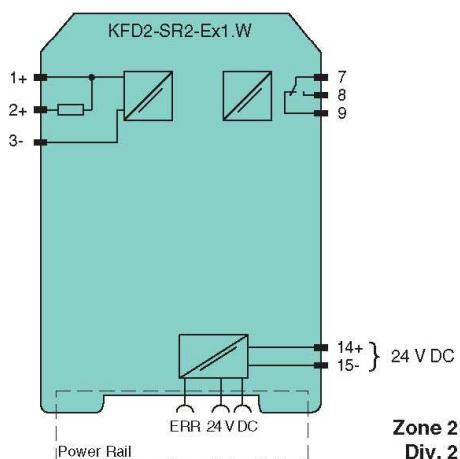
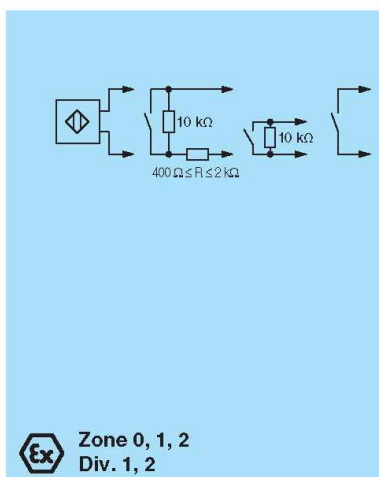


CE



SIL2

### Connection





### Technical data

KFD2-SR2-Ex1.W

<b>General specifications</b>	
Signal type	Digital input
<b>Supply</b>	
Connection	Power Rail or terminals 14+, 15-
Rated voltage	20 ... 30 V DC
Ripple	≤ 10 %
Rated current	≤ 30 mA
Power loss	0.7 W
Power consumption	< 0.9 W
<b>Input</b>	
Connection	terminals 1+, 2+, 3-
Rated values	acc. to EN 60947-5-6 (NAMUR)
Open circuit voltage/short-circuit current	approx. 8 V DC / approx. 8 mA
Switching point/switching hysteresis	1.2 ... 2.1 mA / approx. 0.2 mA
Line fault detection	breakage I ≤ 0.1 mA , short-circuit I > 6 mA
Pulse/Pause ratio	≥ 20 ms / ≥ 20 ms
<b>Output</b>	
Connection	terminals 7, 8, 9
Output	signal ; relay
Contact loading	253 V AC/2 A/cos φ > 0.7; 126.5 V AC/4 A/cos φ > 0.7; 40 V DC/2 A resistive load
Minimum switch current	2 mA / 24 V DC
Energized/De-energized delay	approx. 20 ms / approx. 20 ms
Mechanical life	10 <sup>7</sup> switching cycles
<b>Transfer characteristics</b>	
Switching frequency	< 10 Hz
<b>Electrical isolation</b>	
Output/power supply	reinforced insulation according to IEC 61140, rated insulation voltage 300 V <sub>eff</sub>
<b>Directive conformity</b>	
Electromagnetic compatibility	
Directive 2004/108/EC	EN 61326-1:2006
Low voltage	
Directive 2006/95/EC	EN 50178:1997
<b>Conformity</b>	
Electromagnetic compatibility	NE 21
Protection degree	IEC 60529
Protection against electric shock	IEC 61140
<b>Ambient conditions</b>	
Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
<b>Mechanical specifications</b>	
Protection degree	IP20
Mass	approx. 150 g
Dimensions	20 x 119 x 115 mm (0.8 x 4.7 x 4.5 in) , housing type B2
<b>Data for application in connection with Ex-areas</b>	
EC-Type Examination Certificate	PTB 00 ATEX 2080 , for additional certificates see <a href="http://www.pepperl-fuchs.com">www.pepperl-fuchs.com</a>
Group, category, type of protection	Ⓔ II (1)GD [EEx ia] IIC [circuit(s) in zone 0/1/2]
Input	EEx ia IIC
Voltage U <sub>0</sub>	10.5 V
Current I <sub>0</sub>	13 mA
Power P <sub>0</sub>	34 mW (linear characteristic)
<b>Supply</b>	
Maximum safe voltage U <sub>m</sub>	253 V AC / 125 V DC (Attention! U <sub>m</sub> is no rated voltage.)
<b>Output</b>	
Contact loading	253 V AC/2 A/cos φ > 0.7; 126.5 V AC/4 A/cos φ > 0.7; 40 V DC/2 A resistive load
Maximum safe voltage U <sub>m</sub>	253 V AC (Attention! The rated voltage can be lower.)
<b>Statement of conformity</b>	
Group, category, type of protection	Ⓔ II (3)G [Ex ic] IIC; [Ex nL] IIC
Input	[Ex ic] IIC; [Ex nL] IIC
Voltage U <sub>0</sub>	10.5 V
Current I <sub>0</sub>	13 mA
Power P <sub>0</sub>	34 mW (linear characteristic)
<b>Output</b>	
Contact loading	253 V AC/2 A/cos φ > 0.7; 126.5 V AC/4 A/cos φ > 0.7; 40 V DC/2 A resistive load
Statement of conformity	TÜV 99 ATEX 1493 X , observe statement of conformity

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REMBE®, INC.

### Technical data

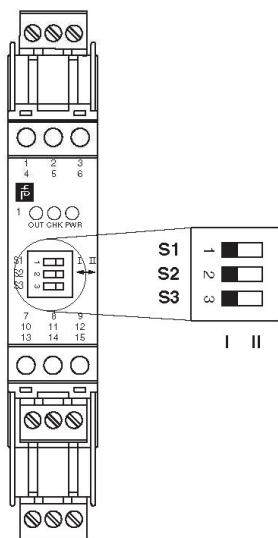
KFD2-SR2-Ex1.W

Group, category, type of protection, temperature classification	Ex II 3G Ex nA nC IIC T4
Output	
Contact loading	50 V AC/4 A/cos $\phi$ > 0.7; 40 V DC/2 A resistive load
Electrical isolation	
Input/Output	safe galvanic isolation acc. to EN 50020, voltage peak value 375 V
Input/power supply	safe galvanic isolation acc. to EN 50020, voltage peak value 375 V
Directive conformity	
Directive 94/9/EC	EN 50014, EN 50020, EN 60079-0:2006, EN 60079-15:2005
International approvals	
FM approval	
Control drawing	116-0035
CSA approval	
Control drawing	116-0047
General information	
Supplementary information	EC-Type Examination Certificate, Statement of Conformity, Declaration of Conformity, Attestation of Conformity and instructions have to be observed where applicable. For information see <a href="http://www.pepperfuchs.com">www.pepperfuchs.com</a> .

### Technical data

KFD2-SR2-Ex1.W

### Configuration



#### Switch position

S	Function	Position
1	Mode of operation Output I (relay) energized	with high input current I
		with low input current II
2	no function	
3	Line fault detection	ON I
		OFF II

#### Operating status

Control circuit	Input signal
Initiator high impedance/ contact opened	low input current
Initiator low impedance/ contact closed	high input current
Lead breakage, lead short-circuit	Line fault

Factory settings: switch 1, 2 and 3 in position I

### Accessories

#### Power feed modules KFD2-EB2...

The power feed module is used to supply the devices with 24 V DC via the Power Rail. The fuse-protected power feed module can supply up to 100 individual devices depending on the power consumption of the devices. A galvanically isolated mechanical contact uses the Power Rail to transmit collective error messages.

#### Power Rail UPR-03

The Power Rail UPR-03 is a complete unit consisting of the electrical inset and an aluminium profile rail 35 mm x 15 mm. To make electrical contact, the devices are simply engaged.

**The Power Rail must not be fed via the device terminals of the individual devices!**