

Operating instructions

## FLAME SCANNER

# COMPACT VERSION 2000X

2000 (UV/UV1/UVA/UVB/UVF/UVSI/UVSIC/IR/IR1/IR1 HE/IR2/IR3/IR4)

(L/EX/LEX)





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# 1 | General aspects

## 1.1 Introduction

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These operating instructions are a helpful guide for ensuring the successful and safe operation of the Flame Scanner. They contain important information on how to operate the system safely, correctly and efficiently. Observing the operating instructions will help to prevent hazards, reduce costs of repair and downtimes and increase the reliability and life of the device.

All illustrations and drawings in these operating instructions are shown for illustration purposes and do not contain details for design.

The operating instructions always have to be accessible at the device. They have to be read and applied by each person who is required to work with/on the device:

- operation
- troubleshooting during operation
- servicing
- maintenance (upkeep, inspection, repair) and/or
- transport

This should be confirmed by the operating company in writing.

## 1.2 Warning notes

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The following warning notes are used in these operating instructions:

### **DANGER**

*This warning level indicates an imminent hazardous situation. If the hazardous situation is not prevented, this will result in death or severe injury. Follow the instructions that accompany this warning to prevent the risk of death and severe personal injury.*

### **WARNING**

*This warning level indicates a potentially hazardous situation. If the hazardous situation is not prevented, this may result in death or severe injury. Follow the instructions that accompany this warning to prevent the potential risk of death and severe personal injury.*

### **CAUTION**

*This warning level indicates a potentially hazardous situation. If the hazardous situation is not prevented, this may result in slight or moderate injuries. Follow the instructions that accompany this warning to prevent the injury of persons.*

### **CAUTION**

*This warning level indicates potential damage to property. If this situation is not prevented, it may result in damage to property. Follow the instructions that accompany this warning to prevent damage to property.*

### **NOTICE**

*A notice indicates additional information that will make the handling of the device easier.*

### 1.3 Copyright protection

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These operating instructions have to be treated as confidential. They may only be used by authorised staff. Access by third parties may only be granted upon written agreement of BFI Automation.

All documents are protected in keeping with the German copyright law.

The disclosure and reproduction of documentation, in whole or in part, as well as the exploitation and communication of its content shall not be permitted unless expressly stated otherwise. Offenders are liable for prosecution and the payment of damages.

We reserve all rights to exercise industrial property rights.

### 1.4 Disposal information

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The Flame Scanner is equipped with electrical and electronic components and must be disposed separate from household waste. Follow the local and actual regulations for waste disposal.



## 1.5 Warranty

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### **Read these operating instructions carefully and in full before operating the Flame Scanner!**

The manufacturer is not liable for damage or operating malfunctions that result from the operating instructions not being observed.

The operating company has to supplement the operating instructions with operating instructions on the basis of national regulations on accident prevention and environmental protection, including information on supervision and notification requirements with respect to special operating circumstances, e.g. regarding organisation of work, working processes and staff deployed.

The recognised technical rules for safe and professional working also have to be observed in addition to the operating instructions and the regulations on accident prevention applicable to the country and place of use.

The warranty shall become void, for example, in the event of:

- inappropriate use
- use of impermissible equipment
- incorrect connection
- prior works that are not part of the supplied product or service
- non-use of original spares and accessories
- conversion, if this has not been harmonised with BFI Automation
- non-performance of specified maintenance work
- Repair work on the device that is not carried out by BFI employees

#### **NOTICE**

*It is recommended that the operator of the device concludes a service contract with BFI Automation. This guarantees that the device is regularly checked by our service staff and ensures that any required wearing and spare parts are available without long delivery periods.*

## 1.6 Obligation of the operating company

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The Flame Scanner may cause hazards if it is operated inappropriately or in an improper condition.

The operating company is under the obligation to operate the machine in proper state only. The operating company has to secure hazardous areas that exist between BFI devices and the customer's own equipment.

The operating company has to appoint and instruct responsible staff:

- Only deploy trained or instructed staff.
- Clearly set out the responsibilities of the staff with regard to operation, set-up, maintenance and repair.
- Regularly check that staff are safety conscious and aware of hazards and are observing the operating instructions.
- Before starting work, staff who are assigned to work with/on the device have to have read and understood the operating instructions, in particular the chapter on "Safety", as well as the relevant regulations.
- The operating instructions and relevant regulations have to be stored in such a way that they are accessible to operating and maintenance staff.
- Set out who will have responsibility for device operation and ensure that this person has the authority to overrule any unsafe instructions of third parties.

### NOTICE

*Generally valid legal and other binding regulations on accident prevention and environmental protection have to be observed and instructed, in addition to the operating instructions.*

## 1.7 Liability disclaimer

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All technical information, data and guidance on device operation that are contained within these operating instructions are, to the best of our knowledge, correct at the time of printing, taking into account our present understanding and experience.

We reserve the right to make technical changes with respect to the further development of the flame amplifier outlined in these operating instructions. No claims can be made based on the specifications, illustrations and descriptions of these operating instructions.

We shall not be liable for damage or operating malfunctions that result from operating errors, inappropriate repairs or the non-observance of the operating instructions. We expressly state that only original spare parts and accessories approved by us may be used. This also applies to the components of other manufacturers that have been used.

The installation or use of non-approved spare and accessory parts and any unauthorized retrofits and modifications are not permitted for safety reasons and exclude any liability by BFI Automation for consequential damages.

BFI Automation is liable for possible errors or omissions with the exclusion of additional claims entered into in the framework of the warranty obligations conceded to in the contract. Claims for damages, on whatever legal basis they may be, shall be excluded.

Translations into foreign languages are carried out in good faith. We cannot accept any liability for translation errors; this also applies where the translation has been carried out or has been commissioned by us. The original text alone shall be binding.

Descriptions and illustrations do not necessarily depict the delivered product or a possible spare parts order. Drawings and graphics are not to scale.

**1.8 Declaration of conformity**



**BFI Automation**

### EU Konformitätserklärung EC Declaration of Conformity

|                |                                 |  |  |
|----------------|---------------------------------|--|--|
| <b>Produkt</b> | <b>Kompaktflammenwächter</b>    |  |  |
| <i>Product</i> | <i>Compact Flame Controller</i> |  |  |
| <b>Typ</b>     | <b>CFCx000, 6012</b>            |  |  |
| <i>Type</i>    | <i>CFCx000, 6012</i>            |  |  |

Hiermit erklären wir, dass die bezeichneten Kompaktflammenwächter, in ihrer Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung, den grundlegenden Sicherheitsanforderungen folgender EU-Verordnungen und -Richtlinien entsprechen:

We hereby declare that the designated Compact Flame Controllers, in their design and construction as well as in the version that we place on the market, comply with the essential safety requirements of the following EU regulations and directives:

|     |  |   |                              |   |
|-----|--|---|------------------------------|---|
| ... | <b>Anwendungsbereich</b><br><i>Field of application</i>  | EU/2016/426   |                              | EU-Gasgeräteverordnung<br><i>EU Gas Appliances Regulation</i>   |
|     | <b>Richtlinien</b><br><i>Directives</i>  | 2014/35/EU  |                              | Niederspannungsrichtlinie<br><i>Low voltage directive</i>   |
|     |  | 2014/34/EU  |                              | Explosionsschutzrichtlinie<br><i>Explosion protection directive</i>   |
|     |  | 2014/30/EU  |                              | EMV Richtlinie<br><i>EMC directive</i>  |
|     |  | 2011/65/EU  |                              | RoHS Richtlinie<br><i>RoHS directive</i>  |
|     | <b>Benannte Stelle</b><br><i>Notified body</i>   | Kiwa Nederland B.V.   | 0063                         |   |
|     | <b>CE-Zerifikat vom</b><br><i>CE certificate from</i>  | 05.11.2024  | CE0063DN3204                 | Baumusterprüfbescheinigung<br><i>Type examination certificate</i>   |
|     | <b>Gültig bis</b><br><i>Valid until</i>  | 05.11.2034  |                              |   |
|     | <b>Normen</b><br><i>Standards</i>  | EN 298:2022; EN 60730-1:2016<br>EN IEC 60079-0:2018; EN 60079-7:2015/ISH1:2016;<br>EN IEC 60079-15:2019; EN 60079-31:2014; EN IEC 63000:2018  |                              |   |
|     | <b>Kennzeichnung ATEX</b><br><i>Identification ATEX</i>  | ATEX Zone 1   |                              | Konformitätserklärung des<br>Gehäuseherstellers<br><i>Declaration of conformity of housing manufacturer</i> |
|     |  | ATEX Zone 2   | TÜV 15 ATEX 7682 X           | ⊕ II 3G Ex ec nC IIC T4 Gc  |
|     |  | ATEX Zone 22  |                              | ⊕ II 3D Ex tc IIIC T100°C Dc  |
|     | <b>Ausgestellt durch</b><br><i>Issued by</i>   | BFI Automation GmbH   |                              |   |
|     | <b>Rechtsverbindliche</b><br><b>Unterschrift</b><br><i>Legally binding signature</i>   | <br>BFI Automation GmbH<br>Ruegenstrasse 7 · 42579 Heiligenhaus · Germany<br>+49 2056 989 46-0 · info@bfi-automation.de<br>www.bfi-automation.de  |                              |   |
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## 1.9 Address of the manufacturer

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## 2 | Safety

### 2.1 Intended use

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The Flame Scanner Compact Version is intended exclusively for the monitoring of flames. The fields of application of this Compact Flame Controller are flame detections for selective and continuous burner monitoring in industrial steam generators, single and multi-burner furnaces.

 **WARNING**

*Danger when improperly used !*

*The device may cause hazards if it is not used as intended and/or for any other purposes.*

*The device has to be used only for the purposes for which it is intended.*

*The procedures described in the operating instructions have to be observed.*

The manufacturer/supplier shall not be liable for damage resulting from use for non-intended purposes. The user/operating company alone shall bear the risk.

## 2.2 Requirements on persons

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### NOTICE

*Work on/with the device may only be performed by persons authorized to do so based on their training and qualification. Furthermore, such persons have to have been commissioned by the operating company.*

Do not allow any persons who are being apprenticed, educated, instructed or on a general training programme to work on the device without the constant supervision of an experienced person.

Persons who are under the influence of drugs, alcohol or medication that affects reactivity shall not be permitted to carry out work on the device.

Connection, set-up, maintenance and repair work may only be carried out by qualified specialist staff.

This device may cause hazards if it is operated inappropriately by untrained staff or if it is not used for its intended purpose.

Generally valid legal and other binding regulations on accident prevention and environmental protection in addition to basic health and safety requirements have to be observed. The operating company has to instruct its staff accordingly.

## 2.3 Safety instructions

---

The following instructions on accident prevention have to be observed when operating the Flame Scanner Compact Version:

### NOTICE

*Only operate the device if it is in a proper state!*

- Do not remove or disable safety devices.
- Check for externally noticeable damage and defects prior to using the device! Immediately notify the appropriate authority/person of any changes that occur (including changes in operating performance). If necessary, stop and secure the device immediately.
- Allow only authorised specialist staff to carry out set-up and/or maintenance work.
- Replace worn or defective parts.
- Use suitable maintenance tools only.
- After repair work, refit all safety devices and carry out electrical and mechanical checks.
- Check the operating instructions for details of displays as well as switch-on and switch-off procedures.
- Prior to switching on the device, make sure that no-one can be endangered by the device!
- The operating company is responsible for ensuring that the device is only operated in a proper state and that account is taken of all the appropriate safety requirements and provisions.
- The operating instructions always have to be kept close to the device and be readily at hand.
- Any non-compliance with the safety instructions outlined in these operating instructions may lead to damage to property, personal injury or even death.

## 2.4 Safety devices

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Check the safety equipment and locking devices on the device for safe operational condition.

Only operate the device if all safety devices are present and enabled. The operating company or operator of the Flame Scanner Compact Version is responsible for the proper operation of the device.

### NOTICE

*The device has been fitted with warning and danger signs for the protection of operating staff. These signs have to be observed. Damaged or illegible signs have to be replaced immediately.*

### 2.4.1 Safety devices

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The Flame Scanner Compact Version has been fitted with the following safety devices:

- Housing (protection against accidental contact)
- Flame-proof housing (optional)
- Earth connection of device (optional)
- Explosion protection barriers (optional)
- Pressure barrier (optional)
- Locking device (optional)
- Purge air connection
- Heating insulator (optional)
- Self-test function

## 2.5 Safety instructions in case of maintenance and troubleshooting

---

- Deadlines set or indicated in the operating instructions for repetitive checks / inspections shall have to be observed!
- Appropriate workshop equipment is essential for performing maintenance work.
- In conformity with the electrical regulations, work on the electrical equipment of the system may only be carried out by an electrical specialist or by trained staff under the direction and supervision of an electrical specialist.
- The adjustment, maintenance and inspection activities and deadlines stipulated by BFI Automation, including information on the replacement of parts / assemblies, have to be observed! These tasks may only be carried out by authorised specialist staff.
- Operating staff have to be informed before maintenance or other special work is carried out. A supervisor has to be appointed.
- When working on the plug, the cable must be disconnected from the power supply.
- Screw connections which have been loosened during maintenance and servicing work, have to be tightened.
- If maintenance and repairs require safety devices to be dismantled, these devices have to be remounted and checked as soon as the maintenance and repair work has been completed.
- Operating and auxiliary materials as well as exchanged parts have to be disposed of in a safe and eco-friendly way.
- Spare parts supplied by BFI Automation or approved of by BFI Automation only may be used.

## 2.5.1 Electrical / electronic devices

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**⚠ DANGER**

*Danger to life caused by electrical current!  
Contact with live wires or components presents a danger to life!  
Prior to any work on the electrical equipment, disconnect the flame amplifying system from the power supply network!*

**NOTICE**

*In keeping with the electrical regulations, work on electrical / electronic parts / components may only be carried out by electrical specialists.*

**Important rules of conduct:**

- Check the device in regular intervals. Any defects or faults ascertained have to be corrected immediately. Switch off the device until the defects have been corrected.
- Equipment parts undergoing inspection, maintenance or repair work have to be made de-energised, if required. First check that the disconnected parts are no longer live, then short to earth. Also isolate neighbouring live parts
- If work is required on live parts, a second person has to be assigned who can disconnect the power supply in case of an emergency. Only use insulated tools!
- Fuses must not be repaired or bridged. Only use original fuses with the specified current!

## 2.5.2 Testing in keeping with the German Workplace Safety Ordinance

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In case of the coupling or installation of devices from various manufacturers or suppliers, the operating company has to carry out a precise test, prior to start-up, in keeping with the German Workplace Safety Ordinance (BetrSichV) in force and the applicable electrical regulations.

In case of queries, please get in touch with BFI Automation.

## 2.5.3 Safety test

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 **WARNING**

*Danger of injury and material damage if improperly used!*

*Improper use of the Flame Scanner Compact Version can lead to injury or even death and to material damage!*

*In order to ensure correct operation, the Flame Scanner Compact Version must be tested several times for all applications by starting and stopping the burner several times. In all cases the flame relay must switch off reliably in case if the flame is not detected. Carry out these tests whilst several neighbouring burners are started and stopped and different boiler outputs are used. This is an indispensable prerequisite for a safe and correct operation of the device!*

## 2.5.4 Specific conditions of use (IECEx)

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 **WARNING**

- The insulation of conductors must match with temperature requirements.
- The housing, especially the Harting plug and connector have to be installed impact-protected.
- The installation must be in accordance with IEC 60079-14.
- The equipment shall only be used in an area of at least pollution degree 2, as defined in IEC 60664-1.
- Transient protection shall be provided that is set at a level not exceeding 140 % of the peak rated voltage value at the supply terminals to the equipment.



## 3 | Technical data

### 3.1 General characteristic features

- Flame Scanner with integrated Amplifier and flame relay
- Tested by the German Technical Inspection Association TÜV, approved by IECEx
- For continuous, intermittent and 72-hours operation
- Typ UV, UV1: For monitoring gas and oil-fired burners in the UV range
- Typ IR / IR4: For monitoring oil, coal and mixedfuel burners
- Typ IR1, IR1 hE: For flames of all kinds (also residues, H2S and special gases) (not for FOC)
- Typ IR2: For monitoring gas and oil-fired burners in the UV range
- Typ IR3: For flames of all kinds (also residues, H2S and special gases)
- Two-channel flame monitoring system
- Sensitivity adjustable separately for both channels by software
- Analog output flame intensity 0(4) to 20 mA
- Flame analysis possibility by software
- LED status display for flame relay and flame intensity
- No additional wiring to external Flame Amplifiers
- Type of protection IP 65 / IP 66
- SIL3

### 3.2 Electrical system, optical system, mechanical system

|   |                     |
|---|---------------------|
| Spectral sensitivity                        |                     |
| UV  | 280 nm to 420 nm    |
| UV1   | 190 nm to 550 nm    |
| IR / IR4                                    | 300 nm to 1050 nm   |
| IR1 / IR1 hE / IR3                          | 1050 nm to 2700 nm  |
| IR2   | 300 nm to 2700 nm   |
| Angle of view                               |                     |
| Standard/Ex-d-housing                       | 1°, 2° or 2,7°      |
| OE-Converter housing/<br>Ex-d-housing (GUB) | 2,7° by sensor head |

### 3.2 Electrical system, optical system, mechanical system

|   |   |
|---|---|
| Self checking   | fully electronic, once per second   |
| Power supply  | 24 V DC SELV  |
| Current consumption<br>Including heating  | max. 200 mA<br>max. 700 mA  |
| Prefuse   | max. 1 A, slow  |
| Design  | in accord. with protection class III SELV   |
| Current output  | 0/4...20 mA, $R_a < 250 \Omega$<br>current window variable by software  |
| Fault output  | 24 V DC, short circuit-proof  |
| Range changeover  | external selection via 24 V DC signal   |
| Flame relay   | 1 changeover contact, potential-free<br>wire breakage detection optional<br>VDE 0110, Class A<br>max. 48 V switching voltage<br>max. 1 A switching current<br>(fused with 0,5 A)<br>max. 30 W switching power |
| Ready for operation (optional)<br>Flame relay   | 1 NO contact, potential-free<br>max. 48 V switching voltage<br>max. 1 A switching current<br>(fused with 0,5 A)<br>max. 30 W switching power  |
| Ready for operation relay   | 1 NO contact, potential-free<br>max. 48 V switching voltage<br>max. 1 A switching current<br>max. 30 W switching power  |
| Switching thresholds  | programmable by software  |
| Safety switch-off time  | 0,4 ... 5 s, set at factory to 1 s  |
| Ambient temperature<br>OE-housing (IECEX) (IR, IR2, IR3, UV, UV1)<br>Ex-d-housing (incl. heating, IECEX)<br>Ex-d-housing (GUB)<br>Standard-housing (IR, IR1, IR1 hE, IR2, IR3)<br>Standard-housing (UV, UV1)<br>OE-housing (EAC) (UV, UV1)<br>OE-housing (EAC) (IR, IR2, IR3) | -20 °C to +70 °C<br>-20 °C to +70 °C<br>-20 °C to +70 °C<br>-40 °C to +85 °C<br>-55 °C to +85 °C<br>-55 °C to +75 °C<br>-20 °C to +70 °C  |
| Electrical connection<br>Standard/OE-Converter housing<br>Ex-d-housing<br>Ex-d-housing (GUB)  | dustproof plug-type connector<br>permanently connected cable<br>terminal blocks   |

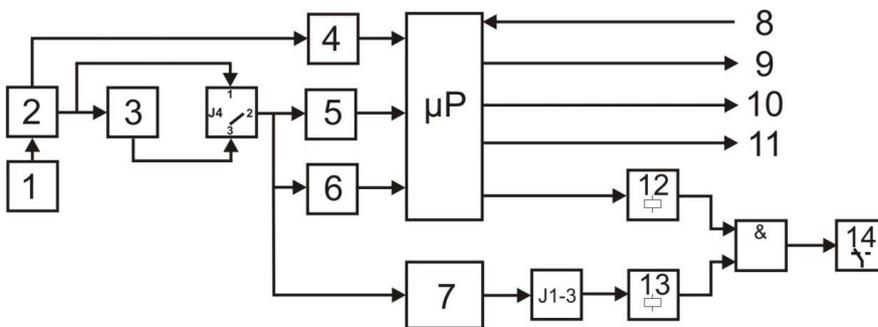
### 3.2 Electrical system, optical system, mechanical system

|  |   |
|--|---|
| Type of protection<br>OE-Converter-/Ex-d-housing/<br>Ex-d-housing (GUB)<br>Standard housing                            | IP 66<br><br>IP 65  |
| Sight port connection<br>Standard/Ex-d-housing<br>OE-Converter-/Ex-d-housing (GUB)                                     | 1" female thread<br>depending on SKL  |
| Purge air<br>Connection<br>Volume<br>Pressure  | ½" female thread<br>10 m³/h<br>0,02 bar over combustion chamber internal pressure   |
| CE   | CE0063  |
| CSA  | 2171345   |
| CSA Class I, Div 2   | 2357645   |
| IECEX<br>Zone 1<br>Ex-d-housing<br>Ex-d-housing (GUB)<br>Zone 2<br>Standard/OE-housing                                 | IECEX EPS 14.0042X<br>IECEX INE 13.0069X<br><br>IECEX TUR 15.0029X  |
| ATEX<br>Zone 1<br>Ex-d-housing<br>Ex-d-housing (GUB)<br>Zone 2<br>Standard/OE-housing                                  | EPS 14 ATEX 1 696 X<br>INERIS 13ATEX0021X<br><br>TÜV 15 ATEX 7682 X   |
| EAC<br>Zone 1<br>Ex-d-housing<br>Ex-d-housing (GUB)<br>Zone 2<br>Standard/OE-housing EAC<br>Standard/OE-housing EAC Ex | EAЭC RU-DE.BH02.B.00177/19<br>TC RU C-IT.BH02.B.00689/18<br><br>EAЭC N RU Д-DE.PA03.B.02640/22<br>RU C-DE.АД07.B.04547/22 |
| AGA  | 8058  |
| SIL 3  | 968/EL 566.04/21  |

### 3.3 Weight

|                           |                |
|---------------------------|----------------|
| Standard housing          | approx. 1.5 kg |
| OE-Converter housing      | approx. 1.5 kg |
| OE-Converter housing WH   | approx. 2.1 kg |
| Ex-d-housing              | approx. 3.5 kg |
| Ex-d-housing (GUB01)      | approx. 5 kg   |
| Ex-d-housing (GUB03 FEAM) | approx. 15 kg  |

### 3.4 Device design - block diagram



- |                                       |                                 |
|---------------------------------------|---------------------------------|
| 1. Sensor                             | 10. Operational readiness       |
| 2. Pre-amplifier                      | 11. Data output RS232           |
| 3. Band-pass filter                   | 12. Flame relay                 |
| 4. DC voltage part                    | 13. Monitor relay*              |
| 5. Frequency part fuse F3             | 14. Relay contact* with fuse F3 |
| 6. Modulation part switch-off time    | J1-3 Monitor channel            |
| 7. Monitor channel*                   | J4 Frequency tap selection      |
| 8. Switchover to channel 2 (external) | μP Microprocessor               |
| 9. Analog output 0(4) to 20 mA        | & AND logic                     |

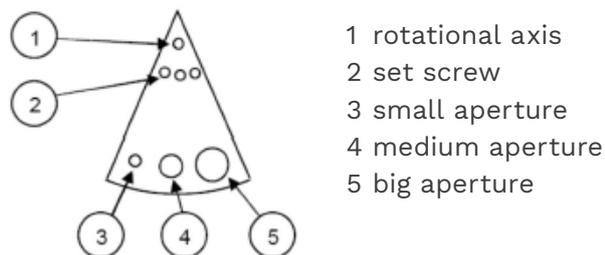
\* safety-related

### 3.5 Optical aperture

With the CFC 2000 of the IR series, the radiation on the sensor element can be reduced with an optical diaphragm. The aperture permits a control of the radiation energy, which is picked up as flame signal by the semi-conductor sensor. It is used to fade out excessive radiation emitted by heavy oil flames, for example, by optical means. An overexcitation of the scanner electronics or a thermal overload of the scanners can be prevented.

#### Adjustment of the aperture

The unit has to be opened for the adjustment of the aperture. The aperture is located between the lens and the detector holding block. In order to be able to change the aperture setting, the rotational axis screw (1) has to be loosened first of all. Then loosen the set screw (2) until the aperture can be moved. Set the requested aperture (3-5) and lock the position with the set screw (2). Subsequently tighten the rotational axis screw (1) and close the device.



#### NOTICE

*Flame Scanners Compact Version in OE-Converter housings and Ex-d-housings (GUB) are not equipped with an optical aperture.*



## 4 | Installation and connection

### 4.1 Scope of delivery

---

- Flame Scanner Compact Version 2000X
- Operating instructions
- Connection cable (optional)
- Harting cable box (optional)
- Power supply unit (optional)
- Swivel Mount (optional)
- 3-way-ball-valve (optional)
- Heating insulator (optional)
- Ex-housing (optional)
- Optical alignment device (optional)
- Fibre optic cable (optional)
- Sensor Head (optional)
- Double Nipple (optional)
- Software (optional)
- Software manual (optional)

Refer to the order papers for the exact scope of delivery and compare with the delivery note.

#### **Checking for completeness**

Check the entire delivery for completeness against the accompanying delivery note. Please refer to our terms of sale and delivery otherwise.

#### **Report any damage**

After arrival of the device and accessories, notify the shipping agent, the insurance company and BFI Automation immediately in case of any damage caused by transport or inadequate packaging. Take steps to minimise and prevent further damage.

Report the insurance case to the insurance company without delay and transmit the full claim documents at once in order to expedite the claims settlement (at the latest in sufficient time before the expiry of any periods of preclusion and/or limitation relating to the compensation claims against third parties).

#### **NOTICE**

*All installation and connection work may be carried out by qualified and approved specialist staff only!*

*Observe the legal stipulations and adjustment instructions of the plant operator!*

## 4.2 Packaging

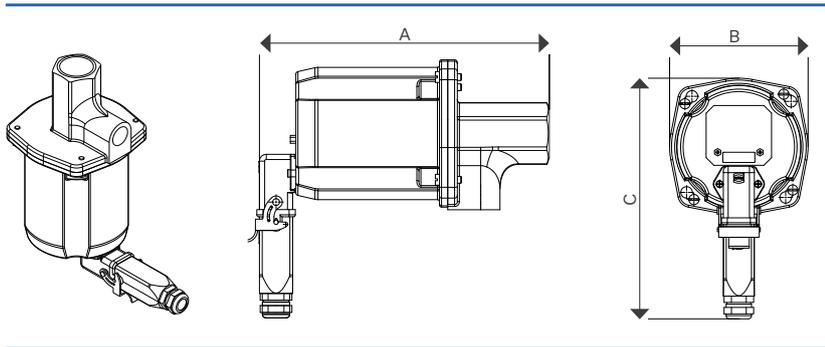
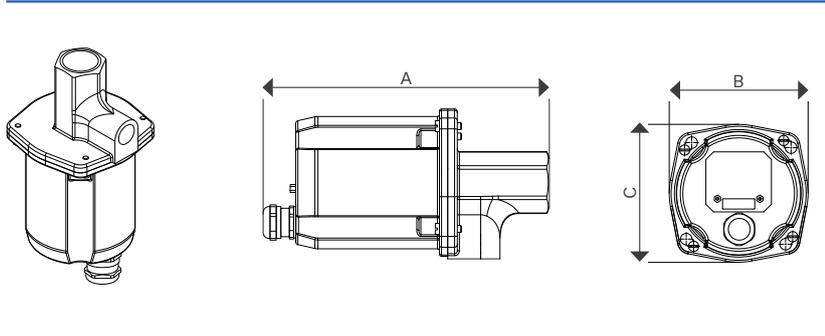
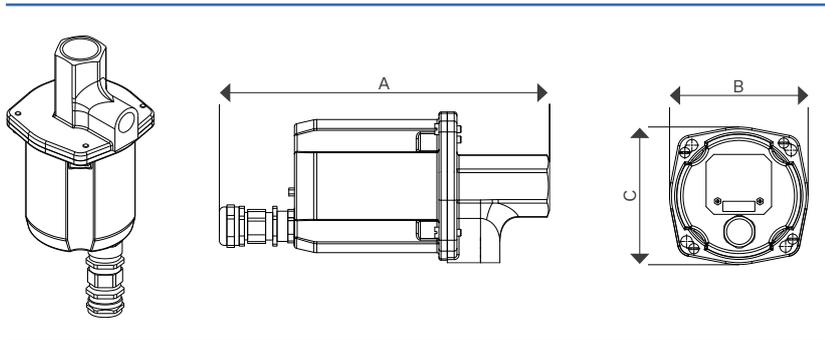
The Flame Scanner Compact Version is shipped in different packaging materials.

The most frequently used packaging materials are cardboard and plastics (foils, foamed material).

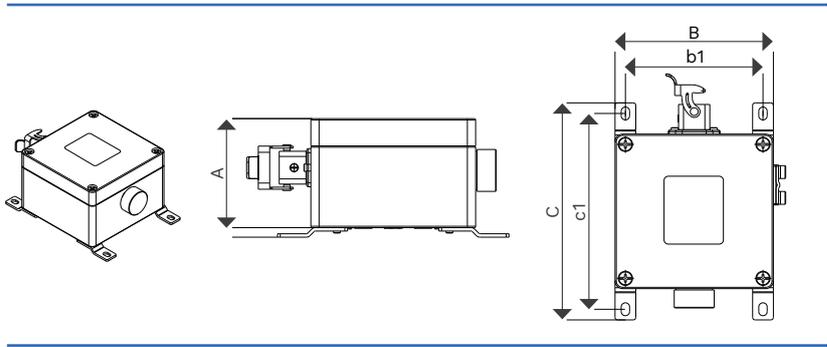
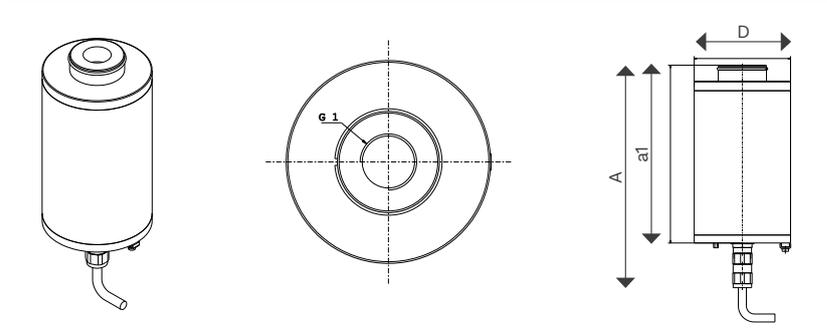
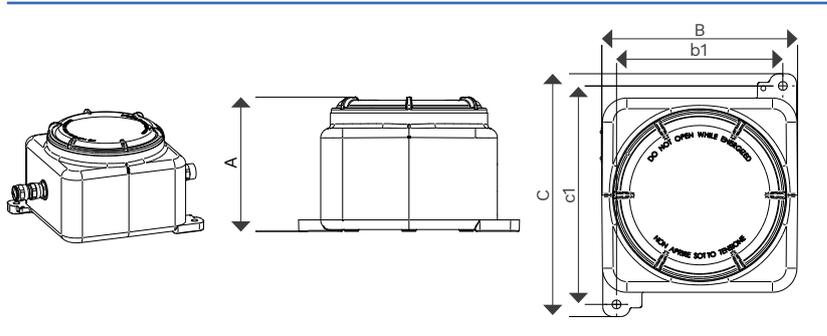
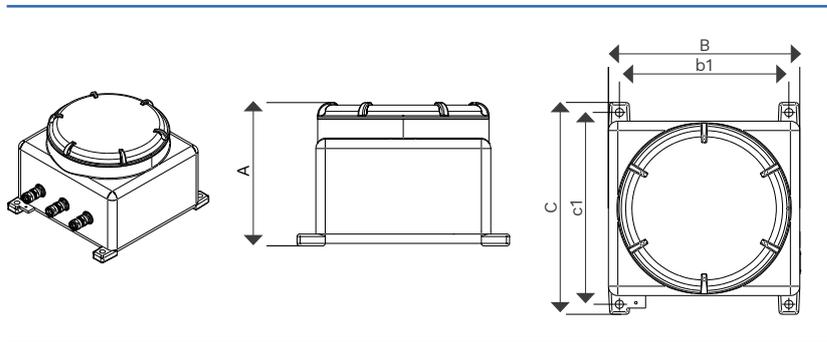
### NOTICE

*Packaging has to be disposed of in an environmentally friendly way and in accordance with the relevant provisions on disposal.*

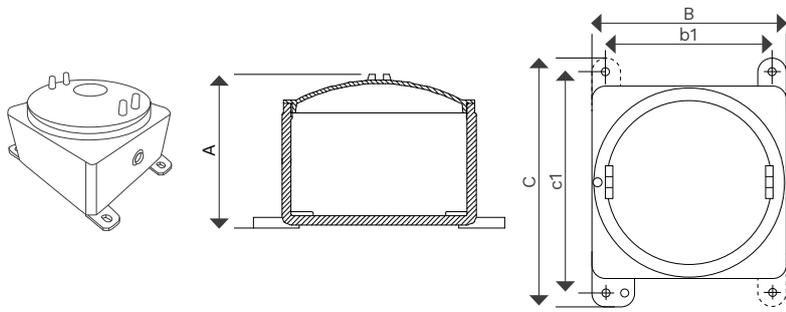
## 4.3 Space requirement - Housings

|   | <table border="1"> <thead> <tr> <th colspan="2"><b>ATEX Zone 2</b></th> </tr> <tr> <th colspan="2"><b>Standard housing</b></th> </tr> </thead> <tbody> <tr> <td>Length A:</td> <td>235 mm</td> </tr> <tr> <td>Width B:</td> <td>108 mm</td> </tr> <tr> <td>Height C:</td> <td>190 mm</td> </tr> <tr> <td>Weight:</td> <td>1.5 kg</td> </tr> <tr> <td>Type:</td> <td>2000X</td> </tr> </tbody> </table> | <b>ATEX Zone 2</b>                         |  | <b>Standard housing</b> |            | Length A: | 235 mm | Width B:  | 108 mm | Height C: | 190 mm | Weight: | 1.5 kg | Type: | 2000X |
|---|--|--|--|-------------------------|------------|-----------|--------|-----------|--------|-----------|--------|---------|--------|-------|-------|
| <b>ATEX Zone 2</b>  |  |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| <b>Standard housing</b>   |  |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Length A:   | 235 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Width B:  | 108 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Height C:   | 190 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Weight:   | 1.5 kg   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Type:   | 2000X  |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
|  | <table border="1"> <thead> <tr> <th colspan="2"><b>Standard housing with Cable gland</b></th> </tr> </thead> <tbody> <tr> <td>Length A:</td> <td>ca. 210 mm</td> </tr> <tr> <td>Width B:</td> <td>108 mm</td> </tr> <tr> <td>Height C:</td> <td>108 mm</td> </tr> <tr> <td>Weight:</td> <td>1.5 kg</td> </tr> <tr> <td>Type:</td> <td>2000X</td> </tr> </tbody> </table>                               | <b>Standard housing with Cable gland</b>   |  | Length A:               | ca. 210 mm | Width B:  | 108 mm | Height C: | 108 mm | Weight:   | 1.5 kg | Type:   | 2000X  |       |       |
| <b>Standard housing with Cable gland</b>  |  |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Length A:   | ca. 210 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Width B:  | 108 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Height C:   | 108 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Weight:   | 1.5 kg   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Type:   | 2000X  |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
|  | <table border="1"> <thead> <tr> <th colspan="2"><b>Standard housing with Conduit gland</b></th> </tr> </thead> <tbody> <tr> <td>Length A:</td> <td>247 mm</td> </tr> <tr> <td>Width B:</td> <td>108 mm</td> </tr> <tr> <td>Height C:</td> <td>108 mm</td> </tr> <tr> <td>Weight:</td> <td>1.5 kg</td> </tr> <tr> <td>Type:</td> <td>2000X</td> </tr> </tbody> </table>                                 | <b>Standard housing with Conduit gland</b> |  | Length A:               | 247 mm     | Width B:  | 108 mm | Height C: | 108 mm | Weight:   | 1.5 kg | Type:   | 2000X  |       |       |
| <b>Standard housing with Conduit gland</b>  |  |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Length A:   | 247 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Width B:  | 108 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Height C:   | 108 mm   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Weight:   | 1.5 kg   |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |
| Type:   | 2000X  |  |  |                         |            |           |        |           |        |           |        |         |        |       |       |

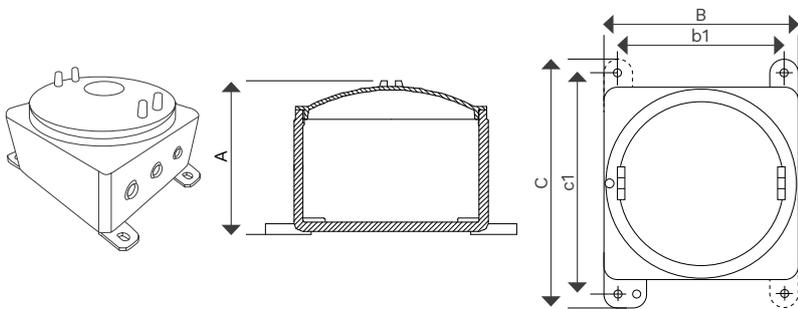
**4.3 Space requirement - Housings**

|    | <table border="1"> <thead> <tr> <th colspan="2"><b>ATEX Zone 2</b></th> </tr> <tr> <th colspan="2"><b>OE-Converter housing</b></th> </tr> </thead> <tbody> <tr> <td>Length A:</td> <td>80 mm</td> </tr> <tr> <td>Width B/b1:</td> <td>122/106 mm</td> </tr> <tr> <td>Height C/c1:</td> <td>168.5/152mm</td> </tr> <tr> <td>Weight:</td> <td>1.5 kg</td> </tr> <tr> <td>Type:</td> <td>2000X(L)</td> </tr> </tbody> </table>  | <b>ATEX Zone 2</b> |  | <b>OE-Converter housing</b> |  | Length A:    | 80 mm     | Width B/b1: | 122/106 mm | Height C/c1: | 168.5/152mm | Weight: | 1.5 kg    | Type: | 2000X(L)   |
|--|--|--------------------|--|-----------------------------|--|--------------|-----------|-------------|------------|--------------|-------------|---------|-----------|-------|------------|
| <b>ATEX Zone 2</b>   |  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| <b>OE-Converter housing</b>  |  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Length A:  | 80 mm  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Width B/b1:  | 122/106 mm   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Height C/c1:   | 168.5/152mm  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Weight:  | 1.5 kg   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Type:  | 2000X(L)   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
|   | <table border="1"> <thead> <tr> <th colspan="2"><b>ATEX Zone 1</b></th> </tr> <tr> <th colspan="2"><b>Ex-d-housing</b></th> </tr> </thead> <tbody> <tr> <td>Length A/a1:</td> <td>286/223mm</td> </tr> <tr> <td>Ø D:</td> <td>120 mm</td> </tr> <tr> <td>Weight:</td> <td>3.5 kg</td> </tr> <tr> <td>Type:</td> <td>2000X(EX)</td> </tr> </tbody> </table>   | <b>ATEX Zone 1</b> |  | <b>Ex-d-housing</b>         |  | Length A/a1: | 286/223mm | Ø D:        | 120 mm     | Weight:      | 3.5 kg      | Type:   | 2000X(EX) |       |            |
| <b>ATEX Zone 1</b>   |  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| <b>Ex-d-housing</b>  |  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Length A/a1:   | 286/223mm  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Ø D:   | 120 mm   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Weight:  | 3.5 kg   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Type:  | 2000X(EX)  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
|  | <table border="1"> <thead> <tr> <th colspan="2"><b>ATEX Zone 1</b></th> </tr> <tr> <th colspan="2"><b>Ex-d-housing (GUB01)</b></th> </tr> </thead> <tbody> <tr> <td>Length A:</td> <td>153 mm</td> </tr> <tr> <td>Width B/b1:</td> <td>200/170 mm</td> </tr> <tr> <td>Height C/c1:</td> <td>250/225 mm</td> </tr> <tr> <td>Weight:</td> <td>5 kg</td> </tr> <tr> <td>Type:</td> <td>2000X(LEX)</td> </tr> </tbody> </table>  | <b>ATEX Zone 1</b> |  | <b>Ex-d-housing (GUB01)</b> |  | Length A:    | 153 mm    | Width B/b1: | 200/170 mm | Height C/c1: | 250/225 mm  | Weight: | 5 kg      | Type: | 2000X(LEX) |
| <b>ATEX Zone 1</b>   |  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| <b>Ex-d-housing (GUB01)</b>  |  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Length A:  | 153 mm   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Width B/b1:  | 200/170 mm   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Height C/c1:   | 250/225 mm   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Weight:  | 5 kg   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Type:  | 2000X(LEX)   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
|  | <table border="1"> <thead> <tr> <th colspan="2"><b>ATEX Zone 1</b></th> </tr> <tr> <th colspan="2"><b>Ex-d-housing (GUB03)</b></th> </tr> </thead> <tbody> <tr> <td>Length A:</td> <td>231 mm</td> </tr> <tr> <td>Width B/b1:</td> <td>305/270 mm</td> </tr> <tr> <td>Height C/c1:</td> <td>336/308 mm</td> </tr> <tr> <td>Weight:</td> <td>15 kg</td> </tr> <tr> <td>Type:</td> <td>2000X(LEX)</td> </tr> </tbody> </table> | <b>ATEX Zone 1</b> |  | <b>Ex-d-housing (GUB03)</b> |  | Length A:    | 231 mm    | Width B/b1: | 305/270 mm | Height C/c1: | 336/308 mm  | Weight: | 15 kg     | Type: | 2000X(LEX) |
| <b>ATEX Zone 1</b>   |  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| <b>Ex-d-housing (GUB03)</b>  |  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Length A:  | 231 mm   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Width B/b1:  | 305/270 mm   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Height C/c1:   | 336/308 mm   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Weight:  | 15 kg  |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |
| Type:  | 2000X(LEX)   |                    |  |                             |  |              |           |             |            |              |             |         |           |       |            |

**4.3.1 Space requirement - Discontinued housings**



|                             |            |
|-----------------------------|------------|
| <b>ATEX Zone 1</b>          |            |
| <b>Ex-d-housing (GUB02)</b> |            |
| Length A:                   | 218 mm     |
| Width B/b1:                 | 232/196 mm |
| Height C/c1:                | 304/262 mm |
| Weight:                     | 7.4 kg     |
| Type:                       | 2000X(LEX) |



|                             |            |
|-----------------------------|------------|
| <b>ATEX Zone 1</b>          |            |
| <b>Ex-d-housing (GUB03)</b> |            |
| Length A:                   | 218 mm     |
| Width B/b1:                 | 276/236 mm |
| Height C/c1:                | 356/318 mm |
| Weight:                     | 10.4 kg    |
| Type:                       | 2000X(LEX) |

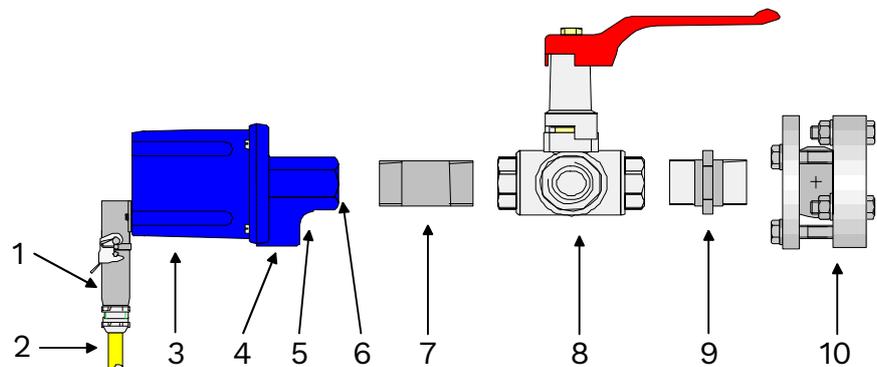
#### 4.4.1 Installation - Standard housing

**NOTICE**

*At a diameter of 1", the sighting tube should not be any longer than 50 cm. When doubling the length, double the diameter to 2"!*

By using a ball-flange, the adjustment can be carried out easily ensuring that the ideal sighting point is set mechanically. The Flame Scanner Compact Version is supplied complete with a rapid-installation flange. This flange ensures the unproblematic disassembly of the flame scanner. It has a purge air connection, the construction of which prevents the soiling of the lens system without the dust-laden purge air damaging the lens. If temperatures of over 50 degrees Celsius occur at the flame scanner despite the inflow of cooling air caused by the heat dissipation of the sighting tube, heating insulator has to be used. In case of pressurised combustion, an additional 3-way-ball-valve has to be fitted for protection. The exit of hot gas after removal of the scanner is prevented, ensuring further cooling and purging of the arrangement.

The entire mechanical peripheral system can be supplied by BFI Automation.

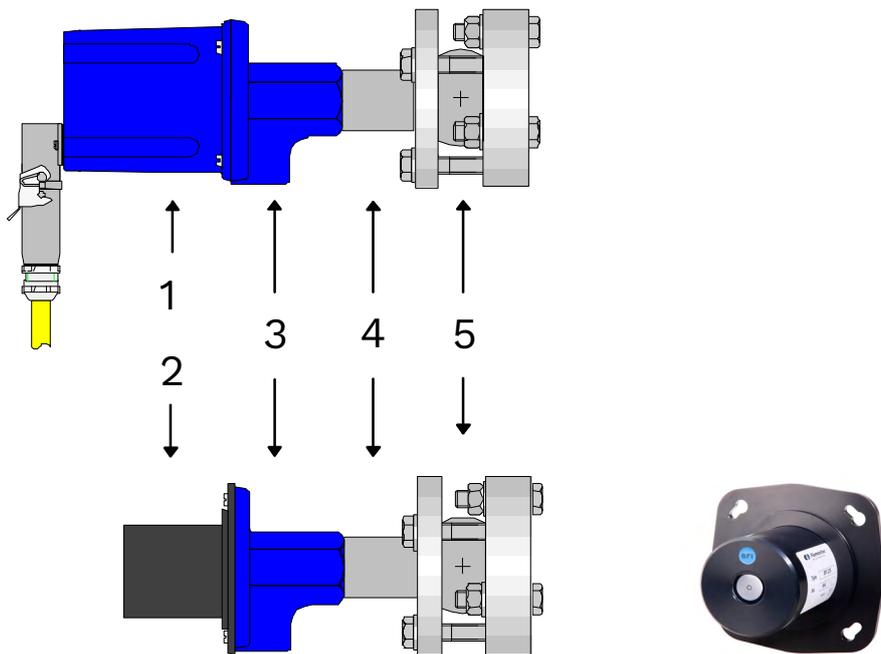


- |                                  |                      |
|----------------------------------|----------------------|
| 1. Harting plug                  | 7. Heating insulator |
| 2. Special cable KW5             | 8. 3-way-ball-valve  |
| 3. Flame Scanner Compact Version | 9. Double nipple     |
| 4. Purge air connection          | 10. Swivel mount     |
| 5. Purge air flange              |                      |
| 6. Sighting tube connection      |                      |

### 4.4.1 Installation - Standard housing

**NOTICE**

*All installation and connection work may be carried out by qualified and approved specialist staff only! The legal regulations as well as adjustment instructions of the plant operator have to be observed!*



- |                                 |                     |
|---------------------------------|---------------------|
| 1 Flame Scanner Compact Version | 4 Heating insulator |
| 2 Optical alignment device      | 5 Swivel mount      |
| 3 Purge air flange              |                     |

The Flame Scanner Compact Version has been provided with oblong holes for easy installation on the purge air flange. The sighting tube connection has been provided with a G1" internal thread. In order to ensure perfect flame amplifying, the correct and low-vibration position of the sighting tube relative to the flame is essential. The Flame Scanner Compact Version has to be aligned in such a way that a perfect visual image is set. For this purpose use the optical adjusting device (available as an accessory) as shown in chapter 4.4.5. The best setting results when a large visual field is achieved.

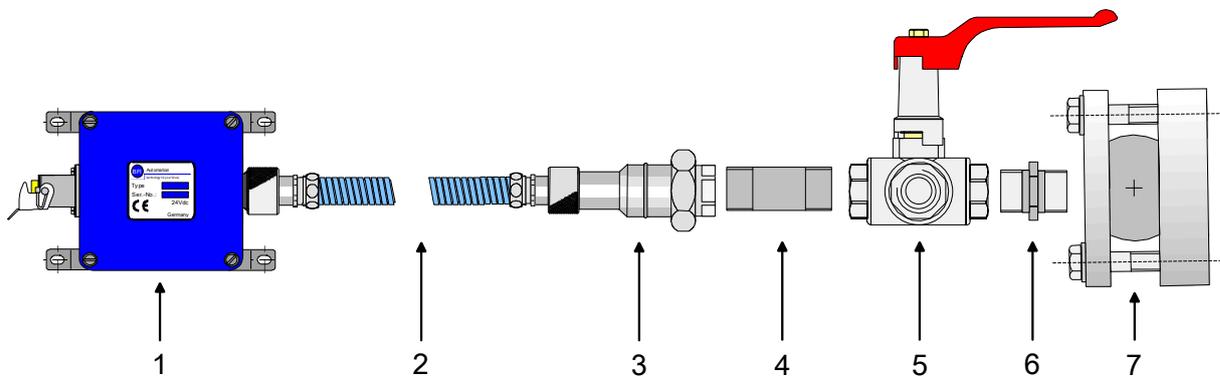
### 4.4.2 Installation - OE-Converter housing

**NOTICE**

*At a diameter of 1", the sighting tube should not be any longer than 50 cm. When doubling the length, double the diameter to 2"!*

By using a Swivel Mount, the adjustment can be carried out easily ensuring that the ideal sighting point is set mechanically. Connection of the fibre optic cable by using the swivel nuts at both ends. If temperature of over 200 degrees Celsius occur at the Flame Scanner Compact Version despite the inflow of cooling air caused by the heat dissipation of the sighting tube, heating insulator has to be used. In case of pressurised combustion, an additional 3-way-ball-valve has to be fitted for protection. The exit of hot gas after removal of the Sensor Head SKL is prevented, ensuring further cooling and purging of the arrangement.

The entire mechanical peripheral system can be supplied by BFI Automation.



- |                                  |                     |
|----------------------------------|---------------------|
| 1. Flame Scanner Compact Version | 5. 3-way-ball-valve |
| 2. Fibre Optic Cable             | 6. Double Nipple    |
| 3. Sensor Head SKL               | 7. Swivel Mount     |
| 4. Heating Insulator             |                     |

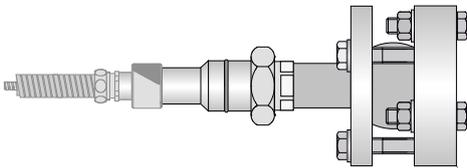
### 4.4.2 Installation - OE-converter housing

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The sight port connection of the Sensor Head SKL is G 1" female thread.

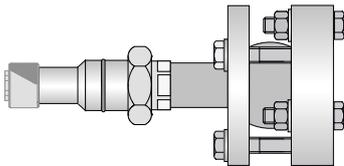
In order to ensure perfect flame amplifying, the correct and low-vibration position of the sighting tube relative to the flame is essential. The Sensor Head SKL has to be aligned in such a way that a perfect visual image is set. For this purpose use the Optical Alignment Device (available as an accessory) as shown in chapter 4.4.5.

#### Fibre Optic Cable



Remove the Fiber Optic Cable from the Scanner Head SKL, replace it with the optical alignment device and fix it with the hand nut.

#### Optical Alignment Device



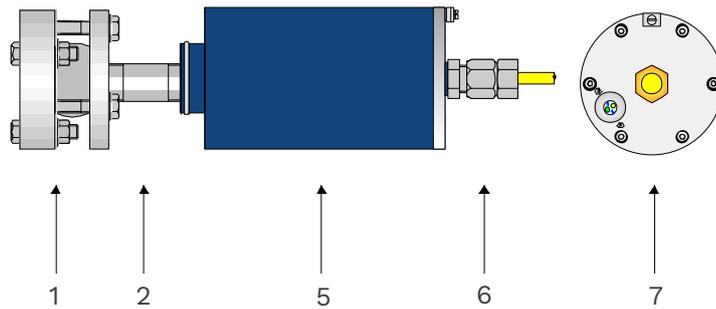
**NOTICE**

*The enclosure may only be opened by a person authorised to do so when it is de-energised!*

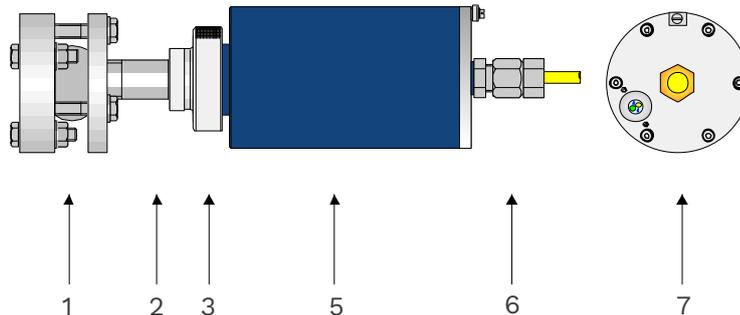
### 4.4.3 Installation - Ex-d-housing

The assembly of the Ex-proof housing can be performed in three different ways:

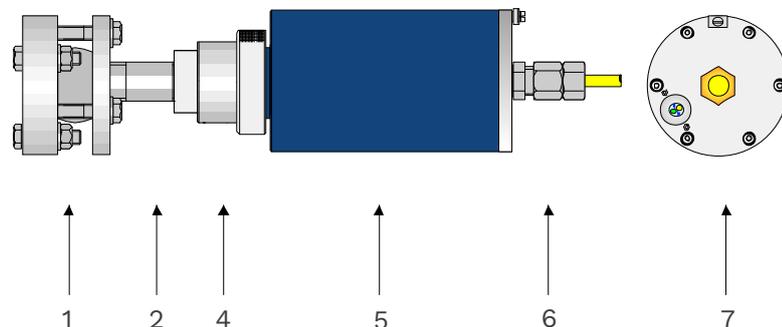
1. Standard



2. With quick release lock



3. With quick release lock and purge air connector



- |  |                     |
|--|---------------------|
| 1. Swivel mount                                | 5. EX-proof housing |
| 2. Heating insulator                           | 6. Cable coupling   |
| 3. Quick release lock                          | 7. Back view        |
| 4. Quick release lock with purge air connector |                     |

### 4.4.3 Installation - Ex-d-housing

---

For alignment of the visual axis of the Flame Scanner Compact Version.

The circle insight the visor represents the detecting area of the sensor (see chapter 4.4.5).

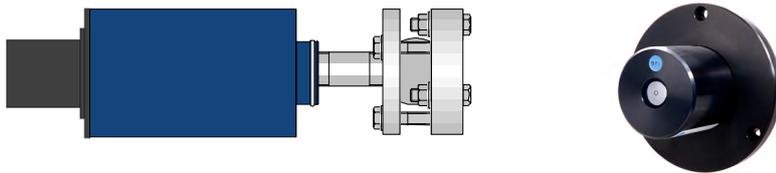
With a swivel mount the visual axis can be aligned as shown below. The images in the upper line show a correct alignment. The images in the lower line show a misalignment of the visual axis of the Flame Scanner or a negative influence by burner internals.

#### Ex-housing



Remove the cover with electronics, replace it with the optical alignment device and fix it with the screws.

#### Optical Alignment Device



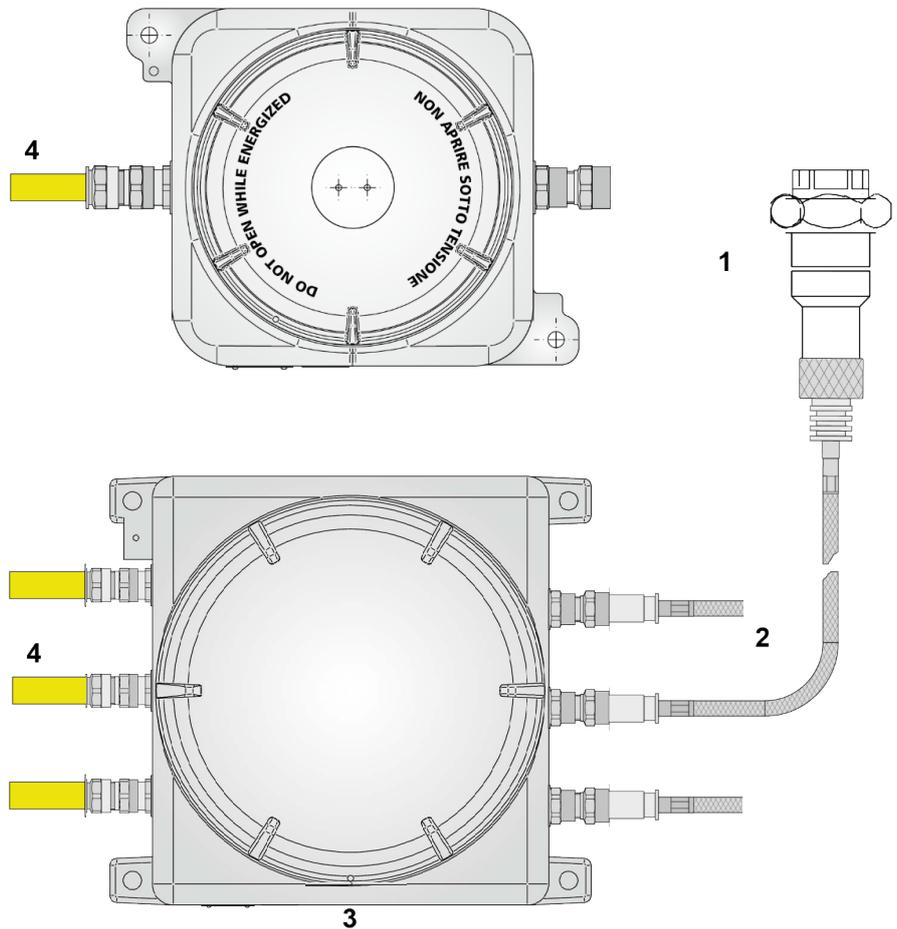
#### NOTICE

*The enclosure may only be opened by a person authorised to do so when it is de-energised!*

#### 4.4.4 Installation - Ex-d-housing (GUB)

The sighting tube connection has been provided with a G1" internal thread. In order to ensure perfect flame amplifying, the correct and low-vibration position of the sighting tube relative to the flame is essential.

The SKL-probe has to be aligned in such a way that a perfect visual image is set. For this purpose use the optical adjusting device as shown in chapter 4.4.5.



- |                      |                  |
|----------------------|------------------|
| 1. Sensor Head SKL   | 3. Flame Scanner |
| 2. Fibre Optic Cable | 4. Special Cable |

#### 4.4.4 Installation - Ex-d-housing (GUB)

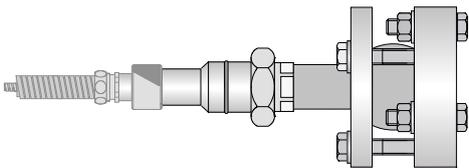
---

For alignment of the visual axis of the Flame Scanner Compact Version.

The circle insight the visor represents the detecting area of the sensor (see chapter 4.4.5).

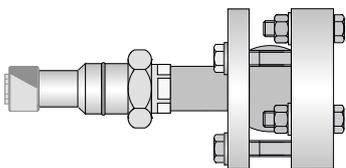
With a swivel mount the visual axis can be aligned as shown below. The images in the upper line show a correct alignment. The images in the lower line show a misalignment of the visual axis of the Flame Scanner Compact Version or a negative influence by burner internals.

##### Fibre Optic Cable



Remove the cover with electronics, replace it with the optical alignment device and fix it with the screws.

##### Optical Alignment Device



**NOTICE**

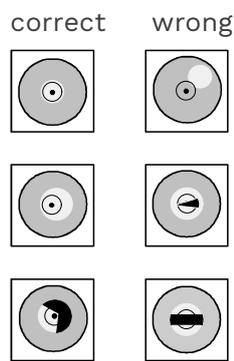
*The enclosure may only be opened by a person authorised to do so when it is de-energised!*

### 4.4.5 Vision images of the optical adjustment device

**CAUTION**

*Danger of injuring the eyes by infrared and ultraviolet radiation and penetrating gases when checking the flame visually!  
Wear filtering protective glasses!*

**Vision images of the optical adjustment device**



**NOTICE**

*The images appear mirror inverted in horizontal and vertical direction!*

The length and the diameter of the sighting tube have a direct influence on the usable flame radiation as the visual angle of the lens system is defined. Without restriction of the visual range, the maximum length L of a sighting tube for conventional tube diameters D is as follows:

|    |       |       |       |
|----|-------|-------|-------|
| D: | 1"    | 1.5"  | 2"    |
| L: | 0.5 m | 0.8 m | 1.1 m |

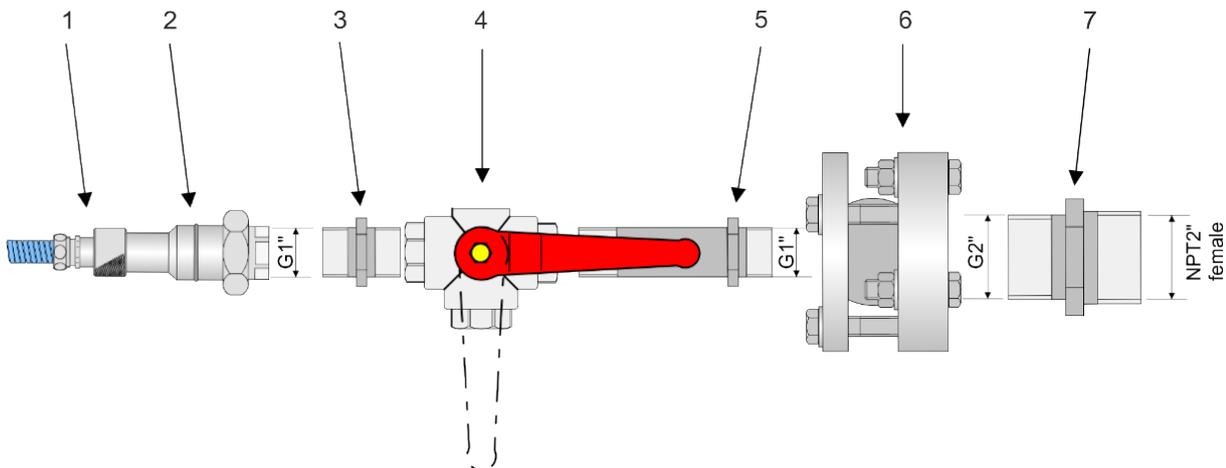
For this reason, the sighting tube should always be as short as possible. A diameter of 2" is recommended.

**NOTICE**

*At a diameter of 1", the sighting tube should not be any longer than 50 cm. When doubling the length, double the diameter to 2"!*

#### 4.4.6 Mounting variant using accessories

By using a ball-flange, the adjustment can be carried out easily ensuring that the ideal sighting point is set mechanically. Connection of the fibre optic cable by using the swivel nuts at both ends. If temperature of over 100 degrees Celsius occur at the Flame Scanner despite the inflow of cooling air caused by the heat dissipation of the sighting tube, heating insulator has to be used. In case of pressurised combustion, an additional 3-way-ball-valve has to be fitted for protection. The exit of hot gas after removal of the SKL-probe is prevented, ensuring further cooling and purging of the arrangement. The entire mechanical peripheral system can be supplied by BFI Automation.



- |                      |                  |
|----------------------|------------------|
| 1. Fibre Optic Cable | 5. Double Nipple |
| 2. Sensor Head SKL   | 6. Swivel Mount  |
| 3. Double Nipple     | 7. Double Nipple |
| 4. 3-way-ball-valve  |                  |

#### 4.4.7 Works setting of the compact flame controller

---

 **DANGER**

*Danger to life caused by combustion or explosion!*

*In case of incorrect installation or adjustment, uncontrolled combustion or explosions may be caused!*

*Observe the adjustment instructions of the plant operator!*

*Adjustment work may be carried out only by qualified and approved specialist staff!*

Flame Scanner Compact Version with variable sensitivity settings are set to the highest value at the manufacturer's works.

Flame Scanner Compact Version with variable frequency filters have a high signal sensitivity on account of the preset low-frequency harmonisation. Flame Scanner Compact Version with a variable shutter are set at the manufacturer's works to Shutter open which ensures maximum radiation sensitivity.

Devices with an additional changeover system must be actively controlled by means of an external 24 V DC signal.

#### 4.4.8 Adaption of the Flame Scanner Compact Version to the firing

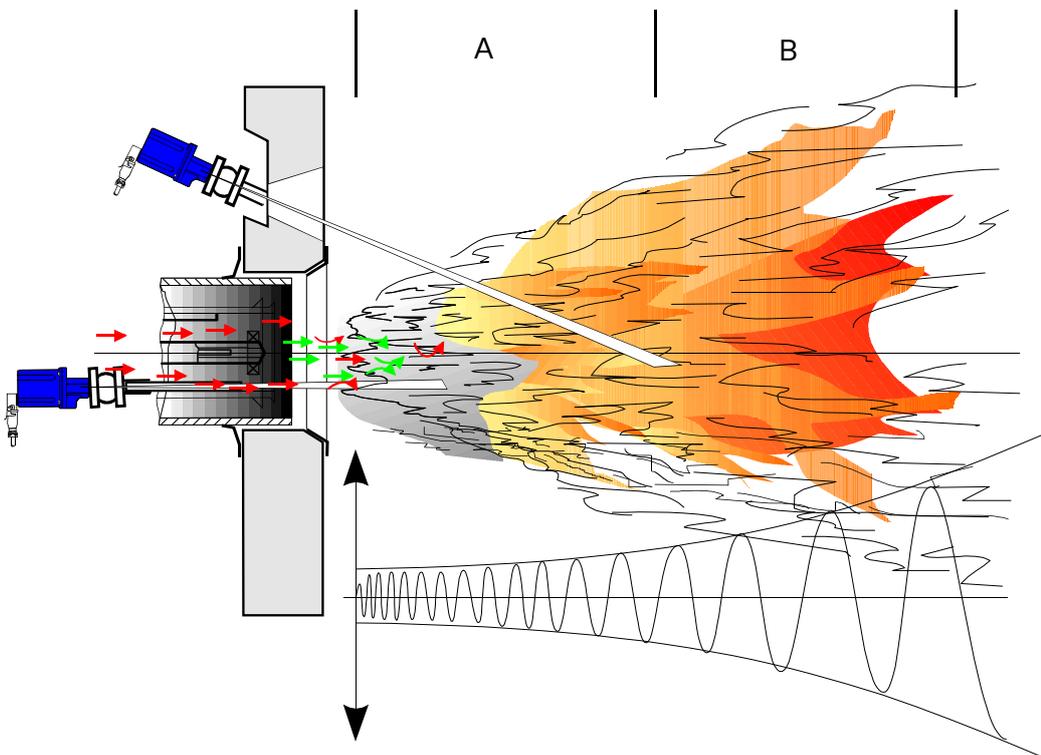
**⚠ DANGER**

*Danger to life caused by combustion or explosion!  
In case of incorrect installation or adjustment, uncontrolled combustion or explosions may be caused!  
Observe the adjustment instructions of the plant operator!  
Adjustment work may be carried out only by qualified and approved specialist staff!*

**NOTICE**

*All alignments and settings have to be carried out, when new spare parts have been fitted, the Flame Scanner Compact Version has been moved or the flame image has been changed (by additional fuel, new burner, change in the burner / air register, for example) as well as during all first installations!*

For selective burner amplifying, the device has to be installed in such a way that the primary combustion zone in all load ranges is inside the visual angle of the Flame Scanner Compact Version. The sight axle has to cut through the first third of the flame (A) of the own burner if possible. The extension of the sight axle must not cut through the first third of the flame of other burners.



## 4.5 Connection

---

 **DANGER**

*Danger to life caused by electrical current!*

*The safety instructions and local safety regulations have to be observed during connection!*

*The safety instructions and local safety regulations have to be observed during connection!*

*Have electrical connections made only by authorised specialist personnel!*

For connection data, please refer to the chapter Technical data and to the following terminal diagram.

Ensure that the available supply voltage complies with the voltage indicated on the type plate.

Prior to connection, check the device and the connecting cables for visible damage.

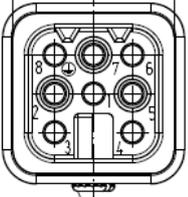
For the contact assignment of the plug connector, refer to the following terminal diagram.

The output signal 0(4) to 20 mA for the flame intensity is not separate from the supply voltage so that the signal refers to the operating voltage ground. Should this result in problems, a corresponding isolating transformer can be supplied on request. The load of 250 ohm must on not account be exceeded.

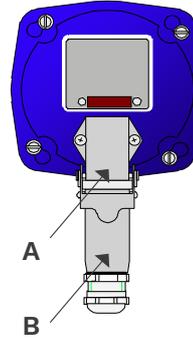
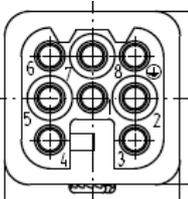
After switching on the supply voltage, the device is immediately ready for operation.

### 4.5.1 Electrical connection

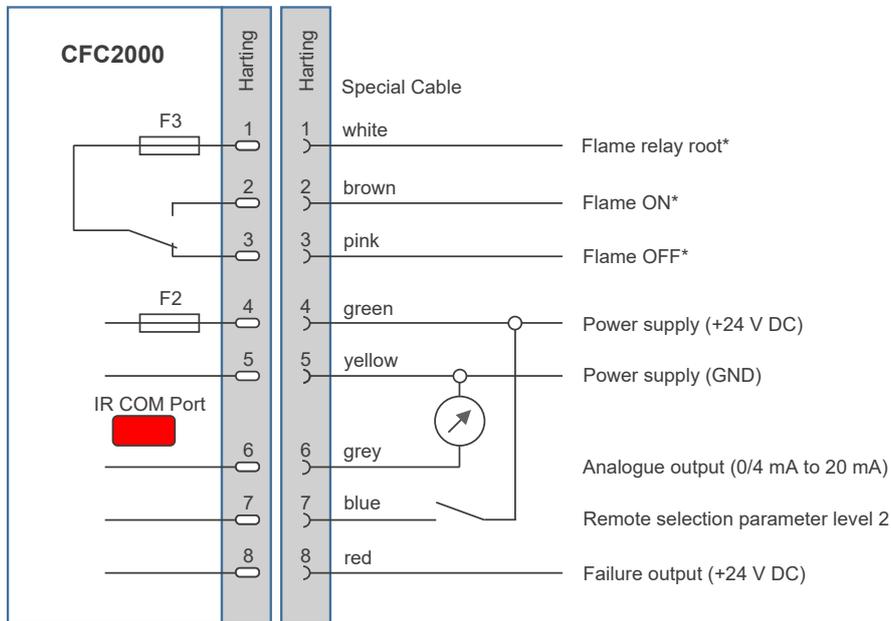
#### A - Harting device plug (pin contacts)



#### B - Harting cable connection box (socket contacts)



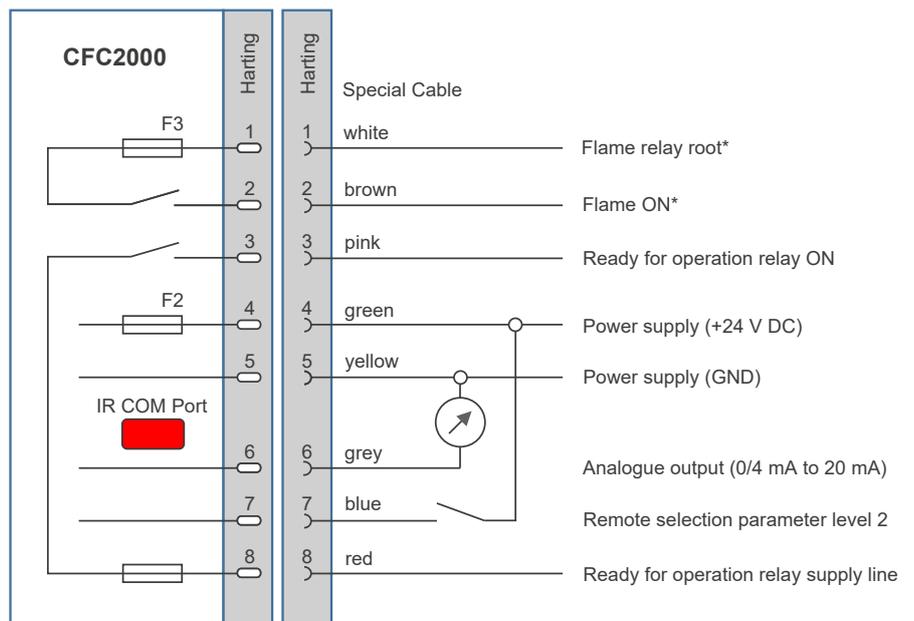
#### Connection of CFC without special configuration:



\* safety-related

### 4.5.1 Electrical connection

**Connection of CFC with ready for operation contact:**



\* safety-related

### 4.5.2 Laying the special cable

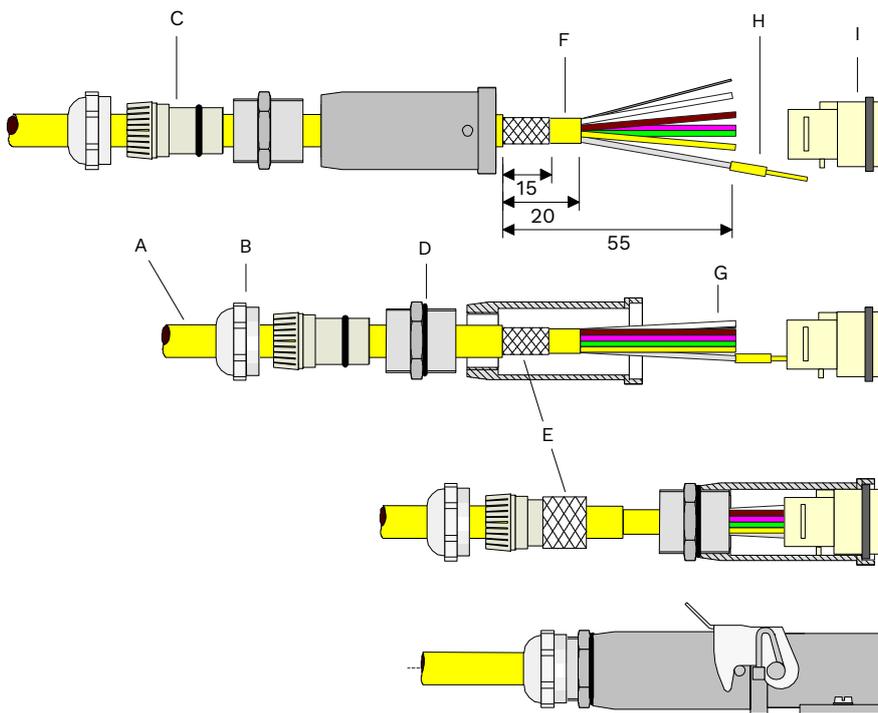
**NOTICE**

No contact chamber may remain bare!  
 All contact chambers in the contact insert have to be fitted with crimp contacts!  
 For this purpose use a suitable crimp tool!

**HINWEIS**

The union joint should be tightened with a tightening torque of 10 Nm.

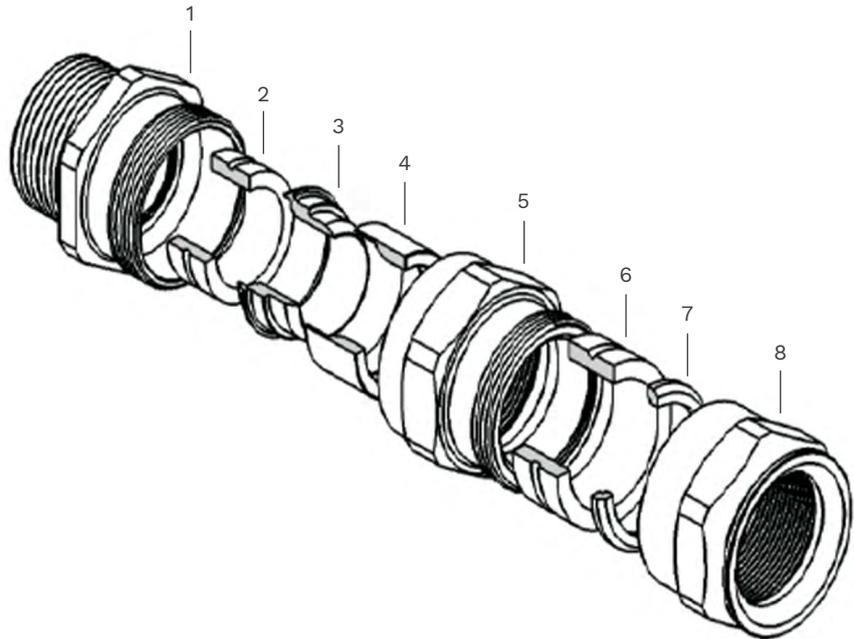
On the flame scanner side the external shielding is connected to the housing mass by means of a clamp connection located between the plastic insert the threaded part in the cable gland (not available in KW3 cable). The internal shielding is cut on the flame scanner side and is connected to the flame amplifier side along with the signal GND (see terminal diagram).



- |                          |                          |
|--------------------------|--------------------------|
| A external PUR shielding | F internal PUR shielding |
| B union joint            | G individual wires       |
| C plastic insert         | H crimp contact          |
| D threaded part          | I female contact         |
| E external shield        |                          |

### 4.5.3 Mounting of the gland ADE4F (Type5) for Special Cable

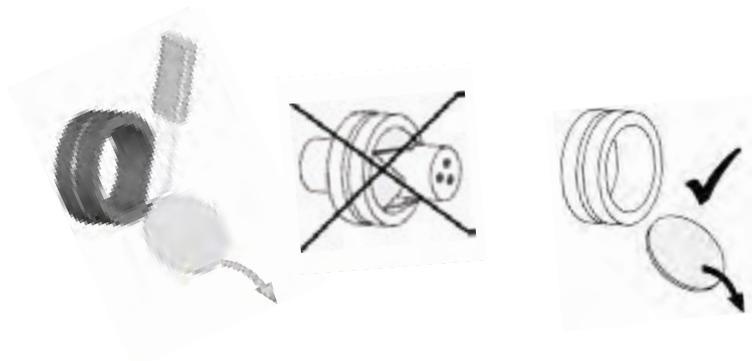
The base nut is already bonded and mounted to the Ex-d-housing (GUB).



- |                         |                               |
|-------------------------|-------------------------------|
| 1. Base nut             | 5. Middle nut                 |
| 2. Sealing              | 6. Sealing                    |
| 3. Shielding clamp base | 7. Pressure distribution ring |
| 4. Shielding clamp      | 8. Top nut                    |

#### NOTICE

Both sealings (2 and 6) are closed and should be opened before mounting.

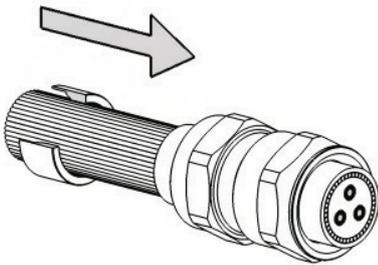


### 4.5.3 Mounting of the gland ADE4F (Type5) for Special Cable

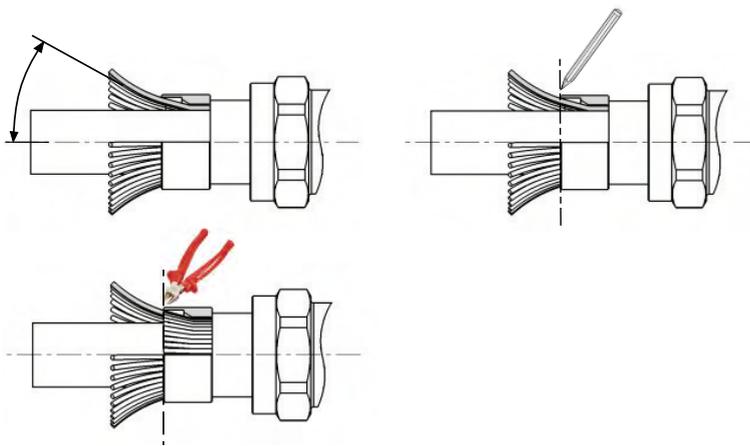
---

Put on part numbers 5 – 8 to the cable. Then shorten the cable to the needed length and cut off the outer sheath.

Now put on the shielding clamp (4) to the cable and shorten the shielding, but leave some 2 cm of the shielding.

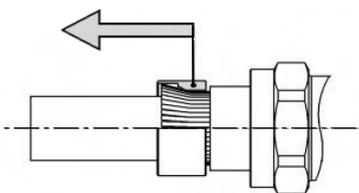


Fan out and cut the shielding in the shown way.



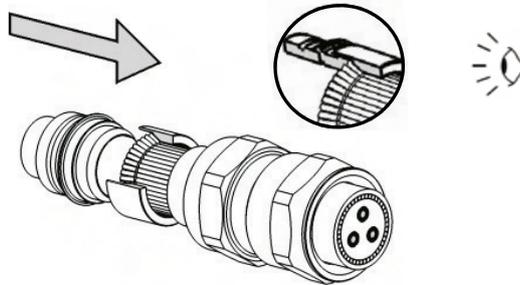
Put on the shielding clamp base and clamp the shielding.

Take care that shielding, shielding clamp base and shielding clamp are mounted like the following picture shows.

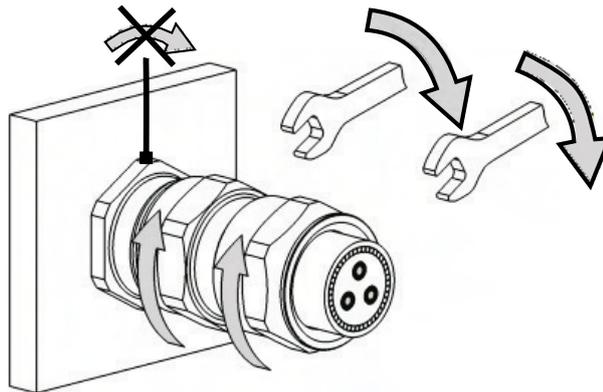


### 4.5.3 Mounting of the gland ADE4F (Type5) for Special Cable

---



Now push the sealing (2) to the cable and put it to the base nut (1). Hand-tighten the middle nut and top nut in first step. At last pull tight first the middle nut with 12.5 Nm and then the top nut with the same torque.

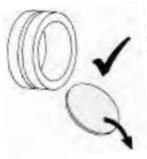


Last but not least you can connect the wires to their terminals.

#### 4.5.4 Mounting of the gland ADCS (Type6) for Fiber Optic Cable

 **CAUTION**

*The Fiber Optic Cable will turn around during the mounting to the Ex-housing. So it is highly recommended not to mount it to the Sensor Head SKL before this mounting has been done.*



Firstly, the screw connection is screwed by hand with the base nut already fitted.

Not too tight because the small side of the Fiber Optic Cable (FOC) must still fit through.

Next step is to insert the small side of the FOC into the gland until the stop (Picture 1 und 2).



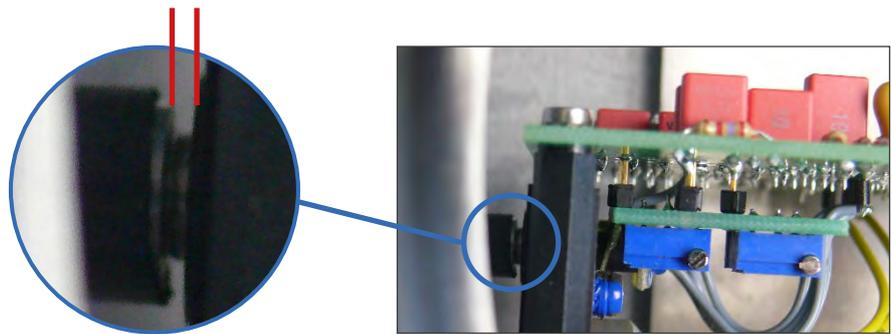
Picture 1



Picture 2

#### 4.5.4 Mounting of the gland ADCS (Type6) for Fiber Optic Cable

Check the distance between the fibre optic cable and the sensor element (Picture 3). There should be a gap left of 2-3 mm.



Picture 3

Now the middle nut is to be tightened with 20 Nm torque. Please hold the top nut and FOC during this mounting. The position of the FOC should not be changed.



Picture 4

The top nut can now be tightened also with 20 Nm torque.

## 4.6 Storage

---

Do not unpack any packed Flame Scanners Compact Version and accessories.

The following conditions apply to storage:

- Store in a dry place. Maximum relative humidity 60 %. In addition, it has to be assured that the floor in the storage area will remain dry through-out the storage period.
- Protect from direct sunlight. Storage temperature: 15 degrees to 25 degrees C (59 degrees to 77 degrees F).
- Store in a dustfree location.
- Avoid mechanical vibrations and damage.

## 5 | Description

### 5.1 Functional description

---

For flame radiation analysis the Flame Scanner Compact Version is using the integral method in the respective spectral range.

After pre-amplification, the undesirable unmodulated light portion is removed from the output signal of the wear-free detector. The subsequent sensitivity setting permits an attenuation of the signal for adaptation to the firing conditions. The downstream bandpass ensures that only the typical flame radiation modulation of the primary combustion zone is evaluated. This allows extraneous light signals from neighbouring burners to be distinguished from the monitored flame. Further function groups include i.a. the signal processing for the dynamic monitor channel that continuously monitors the fault-free state of the device.

A part of component defect results in the immediate switch-OFF of the flame relay that represents a floating changeover contact for processing in the burner controller. The switching status is additionally indicated by a yellow LED on the rear side of the device behind the perspex panel.

For optimum adjustment of the Flame Scanner Compact Version, the flame intensity can be read off directly at the device by means of the pulsating green LED. A current output with 0(4) to 20 mA is available for visualisation or remote display.

The safety switch-OFF time that depends on the fuels to be monitored is set at the manufacturer's works to 1 second. Longer switch-OFF times can be set, if required.

## 5.2 Operational readiness

---

The CFC 2000 operational readiness contact has a relay output to the Harting connector terminals 3 and 8. The NO contact is closed after connecting the CFC 2000. If an internal fault is detected, this contact will be opened again.

## 5.3 Hardware settings

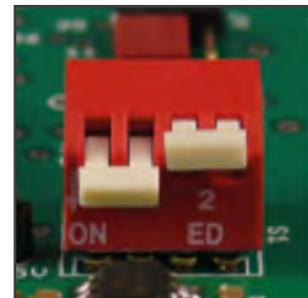
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The safety concept of the Flame Scanner Compact Version is based on two-channel signal processing. The evaluation channel processes the flame signal under processor control so that the settings can be changed by the BFI software. The safety channel is configured with SMD technology. Settings can only be changed on the printed circuit board.

### 5.3.1 Frequency filter

---

The CFC 2000 has a four-step frequency filter in the signal input. The evaluation of the flame signal by the software takes place only downstream of the frequency filter. Part of the extraneous light can therefore be filtered out before the evaluation by the software. The limit frequencies of the high-pass filter can be set as follows:

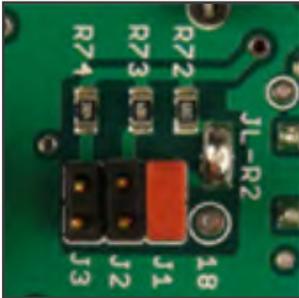


| Filter frequency (Hz) | Switch 1 | Switch 2 |
|-----------------------|----------|----------|
| 30 Hz                 | OFF      | OFF      |
| 60 Hz                 | ON       | OFF      |
| 90 Hz                 | OFF      | ON       |
| 120 Hz                | ON       | ON       |

#### NOTICE

*The setting at the dip switches should only be changed when an adjustment of the Flame Scanner Compact Version is no longer possible by software (see software handbook).*

### 5.3.2 Safety switch-OFF time of the safety channel



The safety switch-OFF time of the safety channel (hardware) is set by means of a jumper. The settings are as follows:

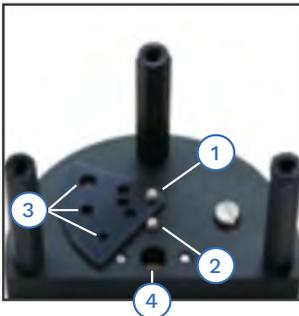
- Jumper 1 bridged: 1 second
- Jumper 2 bridged: 3 seconds
- Jumper 3 bridged: 5 seconds

If a switch-OFF time of 2 seconds is required, the jumper must be inserted in position 2 (3 seconds) and the switch-OFF time of the evaluation channel set by software to 2 seconds (see software handbook). The shorter switch-OFF time of the two channels always takes priority.

#### NOTICE

*The safety switch-OFF time during operation (shut-off time) is also dependent on the software setting (see software handbook)!*

### 5.3.3 Optical aperture



Available on CFC-IR-Series only.

An optical aperture reduces the flame radiation intake of the semiconductor-sensor ④ on optical way. The triangular aperture plate is located between lens and sensor and comes with three different hole sizes (small, medium and wide). Set as follows:

- open locking screw ①
- unfix axis screw ②
- set aperture ③
- fix axis screw ②
- close locking screw ①

The plate can be also turned away so that the semiconductor sensor ④ gets the full flame radiation (open).



## 6 | Operation of the Flame Scanner

---

### **WARNING**

*Danger of injury and material damage if improperly used!  
Improper use of the Flame Scanner Compact Version can lead to injury or even death and to material damage!  
Operation of the Flame Scanner Compact Version only by authorised and qualified special personnel! Observe the operating instructions!*

### **NOTICE**

*The response of the Flame Scanner Compact Version depends on the burner configuration as well as on the air flow and the spectral characteristic (wave length).*

### 6.1 Test of the Flame Scanner

---

In order to ensure correct operation, the Flame Scanner Compact Version must be tested several times for all applications by starting and stopping the burner several times (the flame relay must reliably shut-down in all cases when there is no flame). Carry out these tests whilst several neighbouring burners are started and stopped and different boiler outputs are used. This is an indispensable prerequisite for a safe and correct operation of the device!

### 6.2 Opening/closing the device

---

#### **NOTICE**

*The Flame Scanner Compact Version may only be opened / closed by qualified personnel!*



## 7 | Maintenance, care and transport

---

The Flame Scanner Compact Version requires no maintenance. For cleaning, use a moist cloth to wipe the housing from the outside only and clean the lens in regular intervals.

**NOTICE**

*Do not scratch the lens!*

### 7.1 Forwarding instructions

---

**NOTICE**

*Do not subject the appliance to heavy impacts during transport. Do not subject the appliance to any humidity!*



## 8 | Failures

| Problem  | Display  | Cause  | Remedy   |
|--|--|--|--|
| No flame-ON signal after the burner has been started | No mA output signal<br>Yellow LED OFF<br>Green LED OFF<br>No data communication                  | Flame Scanner Compact Version does not work          | Check voltage supply<br>Replace Flame Scanner Compact Version<br>Check electrical connection   |
|  | Flame signal (software) low<br>Yellow LED OFF  | Flame signal too low or below the starting threshold | Inspect Flame Scanner Compact Version<br>Check flame, alignment, sighting tube and lens<br>Check / set sensitivity and switching thresholds  |
|  | Flame signal (software) above the starting thresholds<br>Yellow LED OFF<br>Red LED ON (software) | Device or self-test fault                            | Check fault memory<br>Possibly remove plug for 5 seconds then start the burner again<br>Replace Flame Scanner Compact Version  |
|  | Flame signal (software) above the starting thresholds<br>Yellow LED ON<br>Green LED ON           | Relay contact or wiring problem                      | Check fuse F3 in relay output circuit<br>Check electrical connection   |
| Burner trips   | Flame signal (software) drops. Below the shut-off threshold, the flame relay switched off.       | No flame, weak flame signal                          | Check flame<br>Check Flame Scanner Compact Version<br>Check Flame Scanner Compact Version alignment, sight tube and lens<br>Increase sensitivity setting<br>Replace Flame Scanner Compact Version<br>Check electrical connection |
|  | Flame signal above shut-off threshold<br>Yellow LED OFF  | Device or self-test fault                            | Check fault memory<br>Possibly remove plug for 5 seconds then start the burner again<br>Replace Flame Scanner Compact Version  |



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