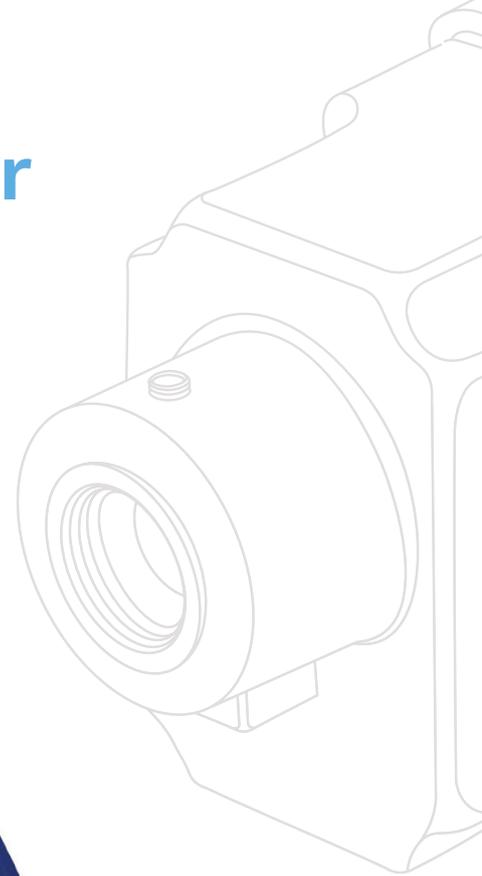


Operating Manual  
**Compact Flame Detector**  
**IFC 400**



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# 1 | General aspects

## 1.1 Introduction

This operating manual is a helpful guide for ensuring the successful and safe operation of the compact flame detector IFC 400. It contains important information on how to operate the system safely, correctly and efficiently. Observing the operating manual will help to prevent hazards, reduce cost of repairs and downtime and increase the reliability and life of the device.

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

The operating manual always has to be accessible at the device. It must be read and applied by each person who is required to work with/on the device.

### This work may involve, for example:

- 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

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

This operating manual has to be treated as confidential. It 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



The following warning notes are used in these operating instructions: The flame detector 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

**Read these operating instructions carefully and in full before operating the compact flame detector IFC 400!**

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

The operating company has to supplement the operating manual 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 manual 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
- use of non-original spares and accessories
- conversion, if this has not been approved by BFI Automation
- non-performance of specified maintenance work

### 1.6 Obligation of the operating company

The compact flame detector IFC 400 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 its intended state only. The operating company must secure hazardous areas that exist between BFI devices and the customer's own equipment.

**The operating company must 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 manual.
- Before starting work, staff who are assigned to work with/on the device have to have read and understood the operating manual, in particular the chapter on „Safety“, as well as the relevant regulations.
- The operating manual 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 manual.

## 1.7 Liability disclaimer

All technical information, data and guidance on device operation that are contained within this operating manual 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 compact flame detector outlined in this operating manual. No claims can be made based on the specifications, illustrations and descriptions of this operating manual.

We shall not be liable for damage or operating malfunctions that result from operating errors, inappropriate repairs or the non-observance of the operating manual. 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



**Flamnitec®**  
BFI AUTOMATION

## EU Konformitätserklärung EC Declaration of Conformity

|                |                                       |  |  |
|----------------|---------------------------------------|--|--|
| <b>Produkt</b> | <b>Flammenwächter IFCx, IFRx</b>      |  |  |
| <i>Product</i> | <i>Flame detector IFCx, IFRx</i>      |  |  |
| <b>Typ</b>     | <b>IFC201, IFC400, IFR201, IFR400</b> |  |  |
| <i>Type</i>    | <i>IFC201, IFC400, IFR201, IFR400</i> |  |  |

.....

Hiermit erklären wir, dass der nachstehend bezeichnete Flammenwächter in seiner Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheitsanforderungen folgender EU-Richtlinien entspricht

*This is to confirm that the below described system in its design and type of construction complies with the provisions of the Directive of the Council of the European Communities on the approximation of the laws of the member states relating to*

|                     |             |  |                                  |
|---------------------|-------------|--|----------------------------------|
| <i>Verordnungen</i> | EU/2016/426 |  | Gasgeräteverordnung              |
| <i>Regulations</i>  | 2014/35/EU  |  | <i>Gas appliances regulation</i> |
|                     | 2014/30/EU  |  | Niederspannungsrichtlinie        |
|                     |             |  | <i>Low voltage directive</i>     |
|                     |             |  | EMV Richtlinie                   |
|                     |             |  | <i>EMC directive</i>             |

|                            |                                   |               |                                     |
|----------------------------|-----------------------------------|---------------|-------------------------------------|
| <b>Benannte Stelle</b>     | Kiwa Nederland B.V.               | 0063          |                                     |
| <i>Notified body</i>       |                                   |               |                                     |
| <b>CE-Zertifikat vom</b>   | 03.04.2019                        | CE-0085CU0083 | Baumusterprüfbescheinigung          |
| <i>CE certificate from</i> |                                   |               | <i>Type examination certificate</i> |
| <b>Gültig bis</b>          | 03.04.2029                        |               |                                     |
| <i>Valid until</i>         |                                   |               |                                     |
| <b>Prüfgrundlagen</b>      | EN 298:2012, EN13611:2015+AC:2016 |               |                                     |
| <i>Test basis</i>          |                                   |               |                                     |

Ausgestellt durch **BFI Automation Mindermann GmbH**

*Issued by*

Rechtsverbindliche Unterschrift

*Legally binding signature*



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|                                  |                              |
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| <i>Name</i>                      | <i>Place, Date</i>           |
| Eberhard Röllecke                | Heiligenhaus, den 19.02.2024 |
| Prokurist                        |                              |
| <i>Authorised representative</i> |                              |

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|--|---|

### 1.9 Address of the manufacturer

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www.bfi-automation.de

## 2 | Safety

### 2.1 Intended use

The IFC 400 is a compact flame detector that has been specially designed for industrial combustion furnaces for continuous operation. It provides a galvanically isolated change-over contact as safety-related output.

As a safety-relevant criterion for flame detection, the flickering of the flame is used. Switching thresholds, switching times and filter characteristics can only be set by the manufacturer.

The flame detection is signaled via a LED and data is transmitted for evaluation.

#### DANGER

The Compact Flame Detector IFC 400 may only be operated with a burner control or a DCS. It is **not** approved for direct control of the fuel valve!

#### WARNING

Danger due to improper use!  
The device may be dangerous if used improperly and / or otherwise.  
Only use the device as intended.  
Follow the procedures described in this operating manual.  
The manufacturer / supplier is not liable for damage resulting from improper use. The risk is borne solely by the user / operator.

### 2.2 Requirements on persons

#### 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 compact flame detector IFC 400.

### 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 manual 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 instructions always have to be kept close to the device and be readily accessible.
- Any non-compliance with the safety instructions outlined in this operating manual may lead to damage to property, personal injury or even death.

## 2.4 Safety devices

### 2.4.1 Fundamental aspects

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 compact flame detector IFC 400 is responsible for the proper operation of the device.

### NOTICE

To protect the operating personnel, warning / danger signs are attached to the device. Note these signs.  
Replace damaged or illegible warning / danger signs immediately.

#### 2.4.2 Safety devices on the compact industrial flame controller IFC 400

The industrial flame controller IFC 400 has been fitted with the following safety devices:

- Housing (protection against accidental contact)
- IP 65
- Internally protected by fuse (not changeable)

### 2.5 Safety instructions in case of maintenance and troubleshooting

#### 2.5.1 Fundamental aspects

- Deadlines set or indicated in the operating manual for repetitive checks / inspections must be observed!
- Appropriate workshop equipment is essential for performing maintenance work.
- In conformance 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.
- 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.

#### 2.5.2 Electrical / electronic devices

##### **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 at regular intervals. Any defects or faults ascertained have to be corrected immediately. Switch off the device until the defects have been corrected.
- Equipment undergoing inspection, maintenance or repair work must be deenergised, 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 must be present to 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!
- Before opening the housing, the device must be deenergized.

**2.5.3 Testing per German Workplace Safety Ordinance (BetrSichV)**

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 accordance 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.

**2.5.4 Safety test**** WARNING**

In order to ensure correct operation, the compact flame detector IFC 400 of all applications have to be tested several times by starting and stopping the burner several times. In all cases the flame relay has to be switched off reliably in case of an absent flame. The test should be performed in different operating situations. This is an indispensable pre-requisite for a safe and correct operation of the device!

## 3 | Technical data

### 3.1 General characteristic features

- Semiconductor sensor
- Fully electronic construction
- Galvanically isolated change-over contact
- Continuous operation
- CE0085CU0083

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

|   |  |
|---|--|
| Optical features  | 350 to 1100 nm   |
| Orientation   | axial  |
| Input   | 230 V AC / 50-60 Hz<br>120 V AC (optional)   |
| Prefuse   | max. 1 A, slow   |
| consumption   | max. 50 mA   |
| Operating temperature                                     | -20 to +70°C   |
| Operating position  | any position   |
| Kind of protection  | IP 65  |
| Protection class  | I  |
| Humidity  | max. 95% r.H., non-condensing  |
| Electrical connenction                                    | Fixed cable connection, 1.5m   |
| Restart time  | Standard 5s<br>Other times on request  |
| <b>Reaction time</b><br>Switch-on time<br>Switch-off time | < 1s<br>< 1s   |
| For the switch-off time applies:                          | For installations in accordance with DIN / EN 267 or<br>DIN / EN 676 at the moment of self-checking < 2s   |
| <b>Thresholds</b><br>Amplitude<br>Pressure<br>Frequency   | <b>Off / On / Max.</b><br>50 / 100 / 1023<br>150 / 200 / 900<br>15 / 20 / 400  |
| Relay output  | <b>Floating, potential-free change-over contact</b><br>max. switching current 0.5 A<br>max. switching power 125 W<br>max. switching voltage 250 V AC |

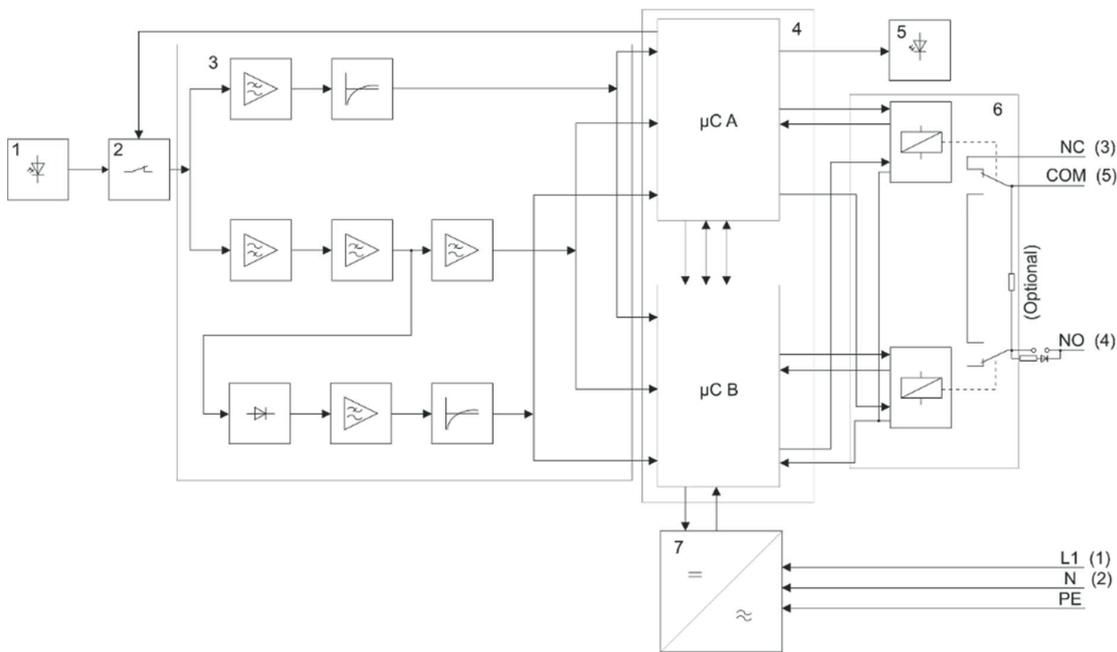
### 3.3 Weight

Weight approx. 0.700 kg

### 3.4 Dimensions

Length (without plug or gland) 142 mm  
 Width 66 mm  
 Height 92 mm  
 Dimensions see under item 4.4

### 3.5 Block diagram IFC 400



| Item | Designation       |
|------|-------------------|
| 1    | Sensor            |
| 2    | Shutter           |
| 3    | Preamplifier      |
| 4    | Signal evaluation |
| 5    | Optical output    |
| 6    | Relay             |
| 7    | Power supply      |

## 4 | Transport, installation and connection

### 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!

### 4.1 Scope of delivery

- Compact flame detector IFC 400
- Operating instructions (optional, customer dependend)
- Connection cable in other length (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).

### 4.2 Packaging

The compact flame detector IFC 400 is shipped in different packaging materials. The most frequently used packaging materials are cardboard and plastics (foils, foamed material).

### NOTICE

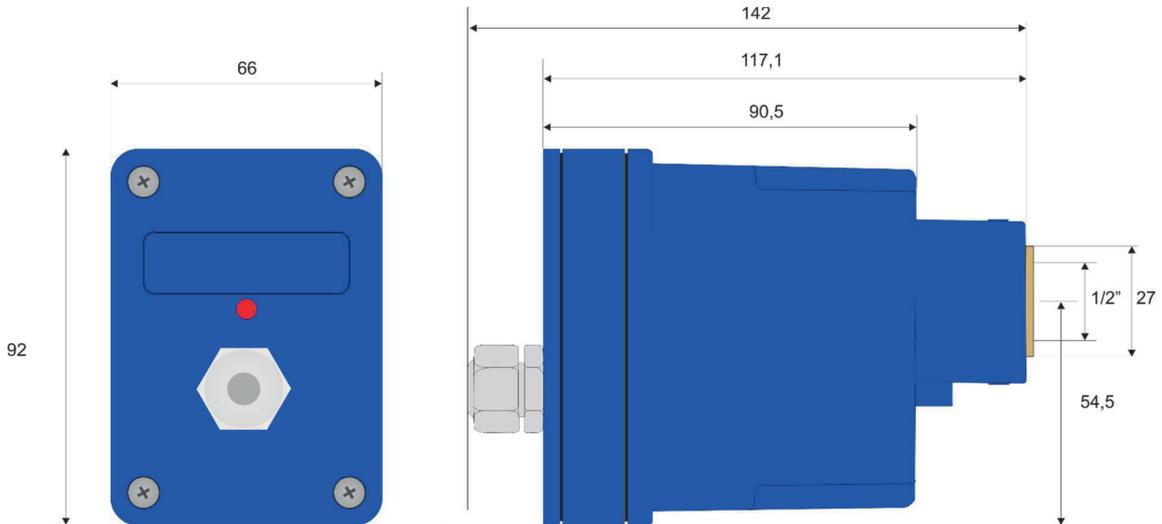
Packaging has to be disposed of in an environmentally friendly way and in accordance with the relevant provisions on disposal.

### 4.3 Shipping instructions

### NOTICE

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

#### 4.4 Dimensions IFC 400



All dimensions in mm

#### 4.5 Installation

##### 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!

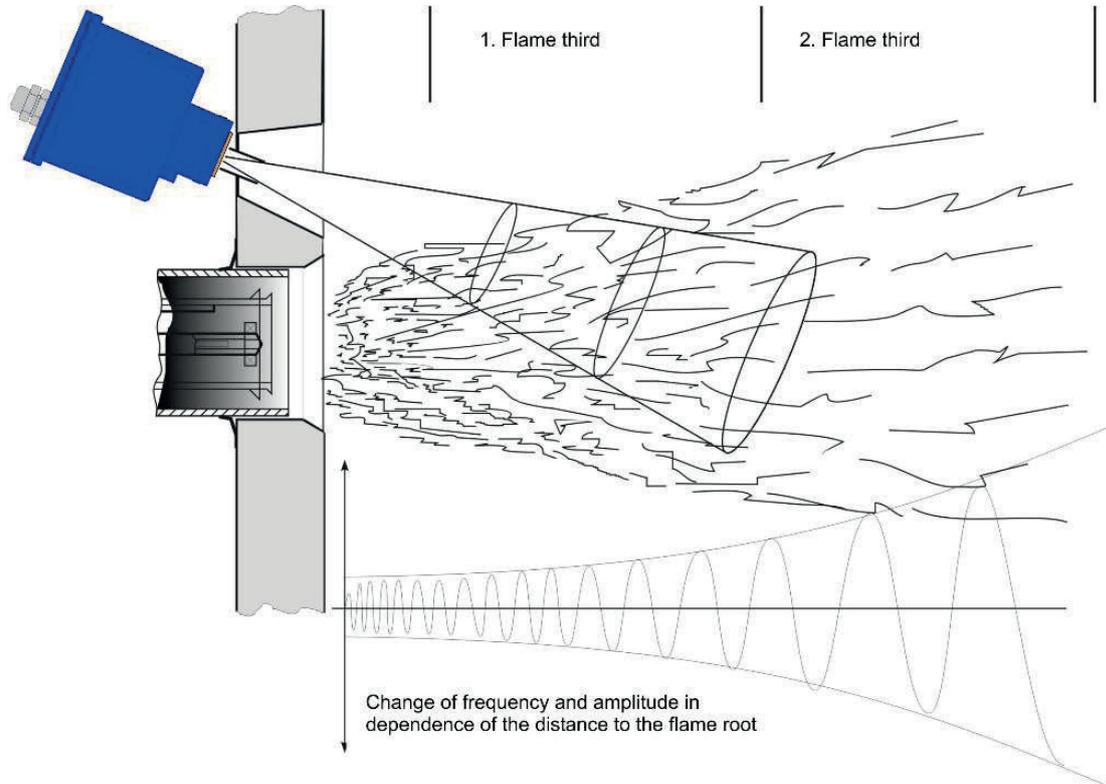
The IFC 400 should be installed as close as possible to the flame with low vibration. The alignment is to concentrate on the primary zone of the flame (flame root). The compact flame detector should be mounted with the adapter. In order to prevent interference, the direct view of a spark is to be avoided.

The connecting cable is to run separately from the high-energy ignition and power lines over long distances and not parallel to avoid interference.

##### NOTICE

The cable length when using the ionization circuit depends on the used burner control. For connection length > 1.5 m, the wires of the relay contacts in the connection cable must be shielded.

#### 4.5.1 Alignment of IFC 400



#### 4.5.2 Usage of glasses and lenses

Depending on the distance and viewing angle to the flame, the adapter lens to be used when needed. If pressure is prevailing in the combustion chamber, an adapter with quartz glass is recommended.

#### 4.5.3 Purge air connection

If the sensor temperature may rise due to high combustion chamber temperatures above 60°C, a purge air connection in order to limit the temperature sensor to provide a maximum of 60°C is essential. The dimensioning of the scavenging air is dependent on the parameters of the furnace back pressure, and the pending purge air pressure and temperatures. Purge air connections are available as the diameters ¼" and ½" optionally. The air connection is combined with the adapter. Depending on the application again lenses and glasses are available. This eliminates the normal adapter.

## 4.6 Connection

### 4.6.1 Electrical connection

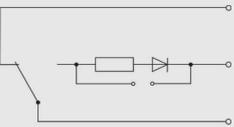
**⚠ DANGER**

Danger to life caused by electrical current!  
The safety instructions and local safety regulations have to be observed during connection!

For connection data, please refer to the chapter titled „Technical data“ as well as 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.

### 4.6.2 Connection diagram IFC 400

| Internal connection diagram AC/DC   | Cable No. | Connection |
|---|-----------|------------|
| L   | 1         | L          |
| N   | 2         | N          |
|  | 3         | NC         |
|   | 4         | NO         |
|   | 5         | Com        |
| PE  | PE        | PE         |

Version i Ionization output  
Com (5) Ionization output automatic burner control  
NO (4) Earth connection

## 4.7 Storage

Do not unpack any packed compact flame detector IFC 400 and accessories.

**The following conditions apply to storage:**

- Store in a dry place. Maximum relative humidity 95 %. Non condensing.
- In addition, ensure that the floor in the storage area will remain dry throughout the storage period.
- Protect from direct sunlight. Storage temperature 0 to +25°C.
  - Store in a dust-free location.
  - Avoid mechanical vibrations and damage.

## 5 | Description

### 5.1 Functional description IFC 400

The IFC 400 is a compact flame detector, that has been specially designed for use in industrial continuous-combustion furnaces. It provides a galvanically isolated changer as an output. As a safety-relevant criterion for flame detection, the flickering of the flame is used. Switching thresholds, switching times and filter characteristics can only be set by the manufacturer.

The flame detection is signalled via an LED and data is transmitted for evaluation.

 **DANGER**

The compact flame detector IFC 400 may only be operated with a burner control or DCS. It is **not** approved for direct control of the fuel valve!

## 6 | Operation of the flame detector IFC 400

### 6.1 Test of the flame detector

To ensure the proper operation, the flame detector must be tested several times by starting and stopping the burner. As long as there is no flame in all cases the flame relays has to be switched off solid. The test should be repeated for different operation situations ( see also datasheet ). This is an essential condition for safe and proper operation of the device.

### 6.2 Operating indicator LED

Via the built-in LED the flame detector is indicating the following operating conditions:

| LED  | Meaning                                   |
|--|---|
| off  | IFC 400 is without potential or defective |
| Flashing with short interruptions<br>flashes with long interruptions | Flame is off<br>Flame is on               |
| on   | IFC 400 is defective                      |

## 7 | Maintenance and servicing

### 7.1 Cleaning

For cleaning, use a moist cloth to wipe the housing from the outside only. For maintenance of the sight glass, please use a clean and lint free cloth. Do not use any kind of cleaning sprays or liquids.

**NOTICE**

Do not scratch the glass!

## 8 | Troubleshooting

| Error description          | Cause                               | Remedy  |
|----------------------------|-------------------------------------|---|
| No flame signal            | connecting error or no active power | Please check the plugs an the connections of the burner controller box  |
|                            | Glass dirty                         | Power off the IFC and take it out of the flange. Now clean the glass carefully with a clean and lint-free cloth |
|                            | IFC 400 malfunction                 | Replace IFC   |
|                            | Alignment wrong                     | Correct alignment   |
| Ambient light interference | View of sparks or artificial light  | Change view or shield against artificial light  |

## 9 | Order data

The compact flame detector IFC 400 is available from BFI Automation GmbH under the following order data:

| Type   | Description | Part-No.     |
|--|-------------|--------------|
| Compact Flame Detector IFC 400/230, sensitive*, Relay output, fixed connection cable 1.5 m | 230 V AC    | 6015-0050-01 |
| Compact Flame Detector IFC 400/230i, sensitive*, Ionization, fixed connection cable 1.5 m  | 230 V AC    | 6015-0050-04 |
| Compact Flame Detector IFC 400/120i, sensitive*, Ionization, fixed connection cable 1.5 m  | 120 V AC    | 6015-0070-80 |

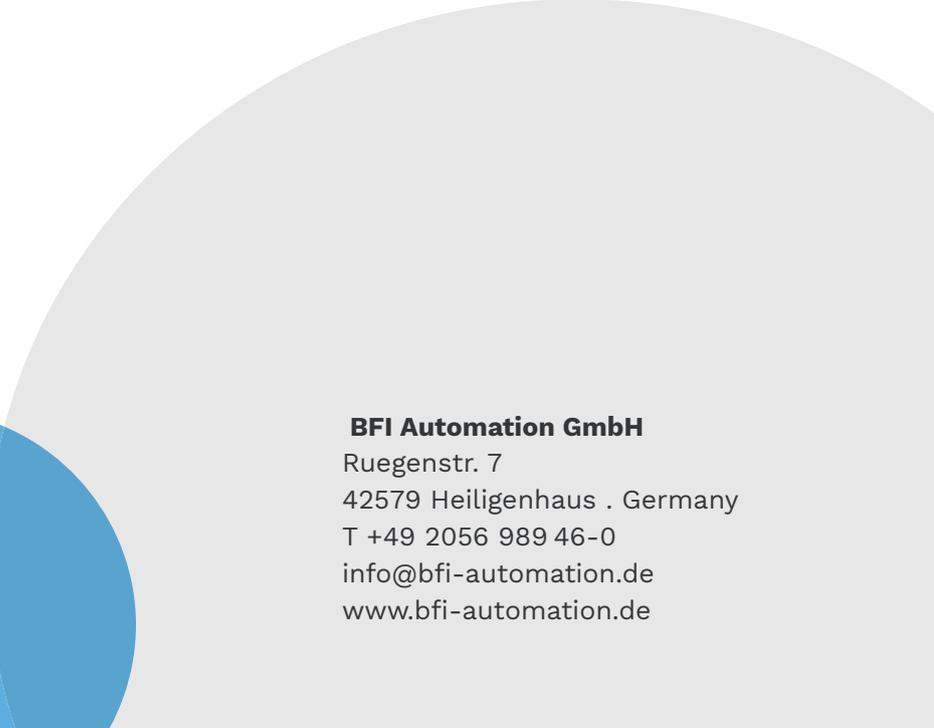
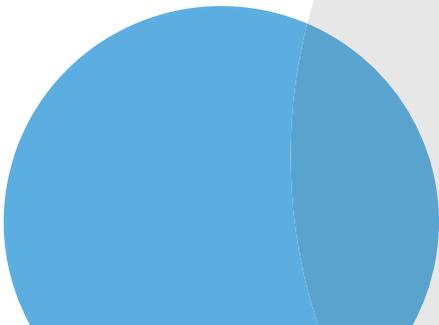
\* For installations according to DIN / EN 267 or DIN / EN 676, the switch-off time at the moment of the self-check < 2 s.

## 10 | Accessories

Following accessories are offered by BFI Automation:

| Type   | Part-No.     |
|--|--------------|
| Adapter ½“ with nut and gasket                         | 1830-0160-00 |
| Adapter ½“ with UV-quartz glass lense*, nut and gasket | 6595-8980-10 |
| Adapter 1“ with purge air connector ¼“, nut and gasket | 6595-8981-04 |
| Communication set and software for IFx, 1.5 m          | 6040-4933-00 |
| Communication set and software for IFx, 3 m            | 6040-4933-03 |

\* If there is no continuous negative pressure in the combustion chamber, a lens or pane must also be ordered as a pressure barrier.



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