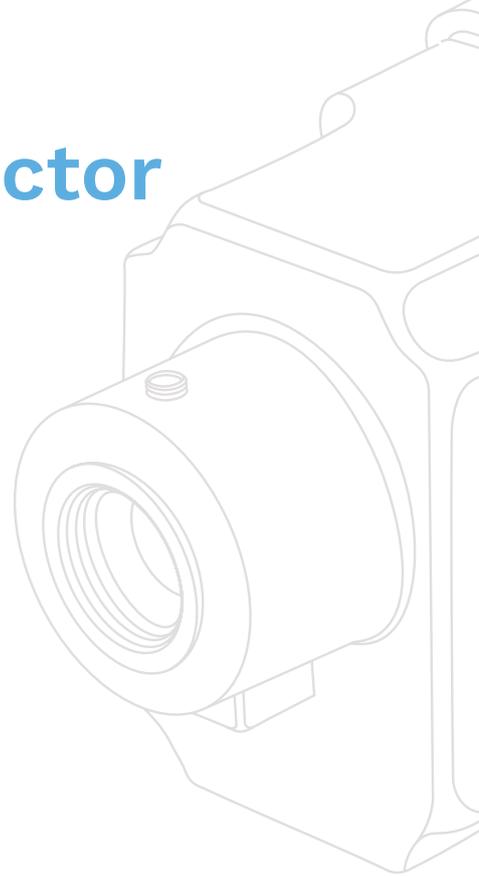


Operating manual (US)

UV Compact Flame Detector

IFC 11



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1 | General aspects

1.1 Introduction

These operating instructions are a helpful guide for ensuring the successful and safe operation of the compact flame detector IFC 11. 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.

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

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 accordance 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 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 11!

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 approved by BFI Automation
- non-performance of specified maintenance work

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.

NOTICE

The UV tube is a wearing part whose service life depends on various factors that BFI Automation cannot influence. Therefore, BFI Automation GmbH does not provide any warranty on the service life of UV tubes.

NOTICE

This warranty does not apply to shipping damage, broken glass of the lens (photocell / UV tube) or any other damage caused by unskilled handling, improper or inadequate maintenance setting.

1.6 Obligation of the operating company

The compact flame detector 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 BST 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

In addition to the operating manual, observe and instruct generally applicable legal and other binding regulations for accident prevention and environmental protection.

1.7 Liability disclaimer

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 detector 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 Address of the manufacturer

BFI Automation GmbH

Ruegenstr. 7 . 42579 Heiligenhaus . Germany

T +49 2056 989 46-0 . E-Mail: info@bfi-automation.de

www.bfi-automation.de

2 | Safety

2.1 Intended use

The IFC 11 is a compact UV flame detector, which is specially designed for severe conditions often experienced in industrial applications for single flame combustion. The IFC 11 can be connected directly to the ionisation or LDR input of the control box. The UV sensor ensures that the flame detector does not react to background radiation from hot refractory or from any other infrared light source.

The IFC 11 is a compact UV flame detector specially designed for use in industrial combustion systems. The flame detector can be connected directly to a tuned ionisation or LDR input of the burner control box. The IFC 11 flame detector is designed in accordance with UL 372-2, CSA C22.2 and EN 298 for burner control boxes that do not check whether a flame signal is still present after a control shutdown. The internal increase of the UV tube voltage immediately after the supply voltage is applied ensures the safety requirement according to UL 372-2, CSA C22.2 and EN 298 for checking the UV tube for ignition for intermittent burner operation within the pre-purge phase.

In case of a fault, the burner control recognises this condition as extraneous light.

With the Dioptric holder, which serves also as a connection interface of the flame detector to the combustion chamber, the IFC 11 can be fitted with different glasses and lenses to special requirements. The flame detector is equipped with an optical interface which visibly indicates the flame signal intensity. A simple diagnosis of the flame intensity is directly on the furnace or boiler possible.

CAUTION

The flame detector must be de-energised for at least 5 s between burner shutdown and restart.

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

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 11.

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 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

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 11 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.

2.4.2 Safety devices on the compact flame detector IFC 11

The compact flame detector IFC 11 has been fitted with the following safety devices:

- Housing (protection against accidental contact)
- Earth connection on housing

2.5 Safety instructions in case of maintenance and troubleshooting

2.5.1 Fundamental aspects

- 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 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 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 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 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!

2.5.3 Inspection in accordance with the Ordinance on Industrial Safety and Health

In the event of the combination or installation of units from different manufacturers or suppliers, a precise test must be done by the operator before commissioning in accordance with the applicable industrial safety regulations and the applicable electrical engineering rules.

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

2.5.4 Safety test

WARNING

To ensure proper operation, the UV flame detector must be tested several times in all applications by starting the burner several times. IFC 11 must be tested several times by starting and stopping the burner several times. and stopped several times. The flame relay must switch off reliably in all cases if there is no flame.

This test should be carried out in different operating situations (see technical data sheet). This is an indispensable prerequisite for safe and proper operation of the unit!

3 | Technical data

3.1 General characteristic features

- UV-Tube
- Intermittent operation
- Spectral analyzing process
- MH47747

3.2 Electrical system, optical system, mechanical system

Optical features	185 to 265 nm, tolerated flame signal fades approx. 200 ms
Orientation	axial
Lifetime of the tube	approx. 10,000 h
Distance to flame	< 80 in
Input	230 V AC 120 V AC (optional) Nominal frequency 50-60 Hz
Prefuse	max. 1 A , slow
Consumption	max. 5.5 mA
Operating temperature	0 °F to 140 °F (temperatures higher than 125 °F reduces life of the UV tube)
Operating position	any position
Kind of protection	IP 65
Protection class	I
Humidity	max. 95 % r. H., non-condensing
Restart time	> 5s between controlled shutdown and renewed heat request
Output data	Flame on reaction time typically 0.5 s Log off time < 0.5 s
Signal output	Open collector output max. switching current 15 mA max. switching power 0.3 W max. switching voltage 280 V AC / 400 V DC

NOTICE

Applies for the maximum length of cable:
 By an appropriate size depending on the length of cable is to ensure the compliance with the data in the controller specified switching voltages / currents

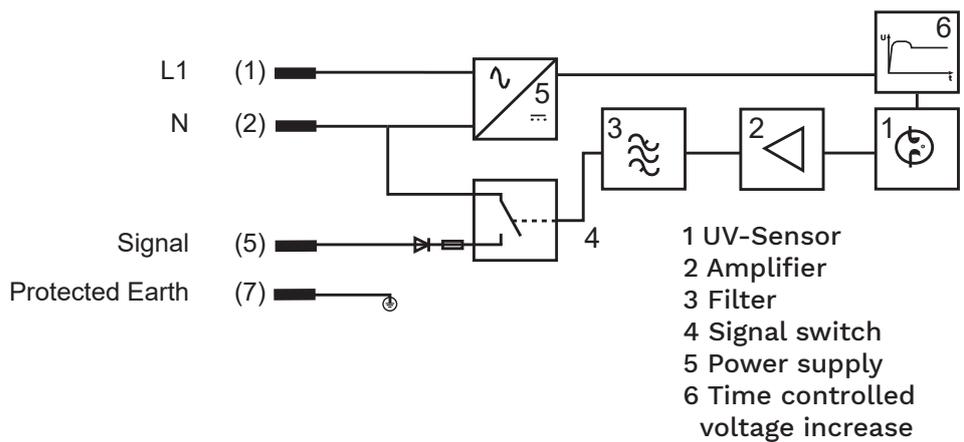
3.3 Weight

Weight approx. 1.15 lb

3.4 Dimensions

Length (without plug or gland) 4.0 in
 Width 2.6 in
 Height 3.6 in
 Dimensions see under item 4.4

3.5 Block diagram IFC 11



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 11
- Operating instructions (optional, customer dependend)
- Connection cable (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 11 is shipped in different packaging materials. The most frequently used packaging materials are cardboard and plastics (foils, foamed material).

NOTICE

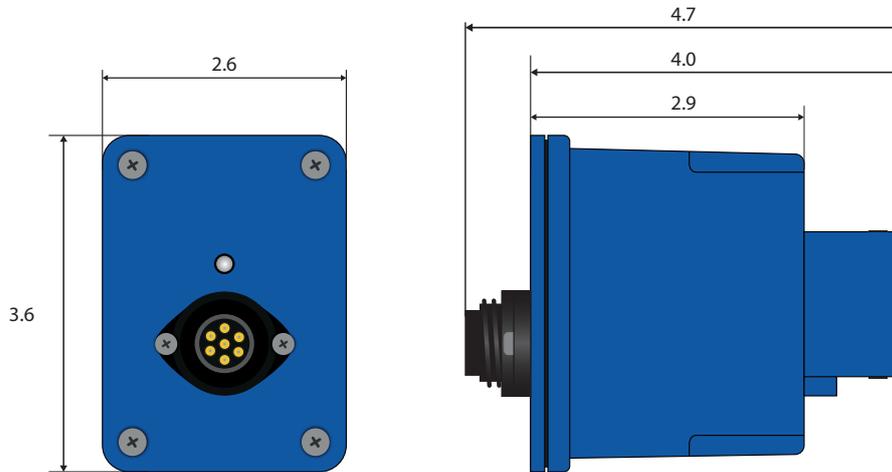
Packaging has to be disposed of in an environmentally friendly way and in accordance with the relevant provisions on disposal.

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 11



All dimensions in inch

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 11 should be mounted close to the flame with straight alignment. The compact flame detector should be mounted with the diopter. The diopter guarantees a quick mounting and demounting of the compact flame controller. A diameter of 1" is recommended for viewing tube that is cut down on the port side of the rear sight to ½". The sight pipe must be adequately dimensioned.

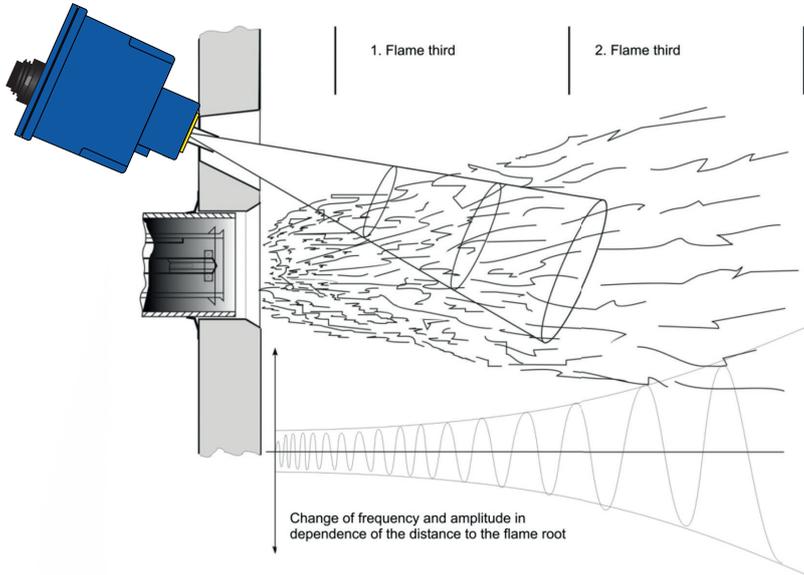
The alignment is to concentrate on the primary zone of the flame (flame root). The distance from the flame should be less than 80 in. Upon completion of the assembly work the screws of the rear sight to the flame menwächters are to be tightened down. At high temperature on the sight glass, which could heat the UV tube to about 140 °F, an air connection is to be provided. To avoid interference, the direct view is to avoid a spark.

The maximum cable length of the cable is to be noted (see „Technical data). The connecting cable is to run separately from the high-energy ignition and power lines over long distances and not parallel to transfer it to.

DANGER

For safety reasons, there must be at least one control shutdown per 24 hours. With the IFC 11, to check the UV tube in accordance with UL 372-2, CSA C22.2 and EN 298, the burner control to be used must during the restart check the flame detector for the presence of an extraneous light signal. Between the control shutdown and the restart, the UV flame detector must be de-energised for at least 5 sec. between control shutdown and restart.

4.5.1 Alignment of IFC 11



4.5.2 Usage of glasses and lenses

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

4.5.3 Purge air connection

If the sensor temperature may rise due to high combustion chamber temperatures above 140 °F, a purge air connection in order to limit the temperature sensor to provide a maximum of 140 °F 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

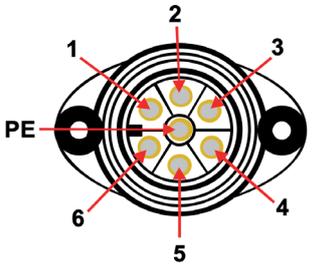
Danger to life caused by electrical current!
The safety instructions and local safety regulations have to be observed during connection!

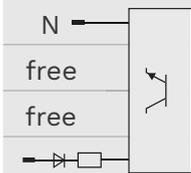
For connection data, please refer to the chapter titled „Technical data“ as well as to the following terminal diagram.

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 11

Occupancy male and female plug



PIN	Internal connection AC/DC	Cable number 3 + PE	Colour	Connection for ionization output / LDR
1	L	1	Brown	L
2	N	2	Grey	N
3	free	-	-	-
4	free	-	-	-
5		3	Black	ION / LDR
6	free	-	-	-
PE	PE	Green / yellow	-	PE

4.7 Storage

Do not unpack any packed compact flame detector IFC 11 and accessories.

The following conditions apply to storage:

- Store in a dry place. Maximum relative humidity 95 %. Non condensing. In addition, it has to be assured that the floor in the storage area will remain dry throughout the storage period.
- Protect from direct sunlight. Storage temperature: 40 °F to 100 °F.
- Store in a dustfree location.
- Avoid mechanical vibrations and damage.

5 | Description

5.1 Functional description IFC 11

The IFC 11 is a compact UV flame detector specially designed for use in industrial combustion systems. The flame detector can be connected directly to a tuned ionisation or LDR input of the burner control box. The IFC 11 flame detector is designed in accordance with UL 372-2, CSA C22.2 and EN 298 for burner control boxes that do not check whether a flame signal is still present after a control shutdown. The internal increase of the UV tube voltage immediately after the supply voltage is applied ensures the safety requirement according to UL 372-2, CSA C22.2 and EN 298 for checking the UV tube for ignition for intermittent burner operation within the pre-purge phase. In case of a fault, the burner control recognises this condition as extraneous light. The flame detector must be de-energised for at least 5 s between burner shutdown and restart.

With the Dioptic holder, which serves also as a connection interface of the flame detector to the combustion chamber, the IFC 11 can be fitted with different glasses and lenses to special requirements. The flame detector is equipped with an optical interface which visibly indicates the flame signal intensity. A simple diagnosis of the flame intensity is directly on the furnace boiler possible.

5.2 Optionally function blocks for IFC 11

5.2.1 Relay module for flame detectors RMF 1

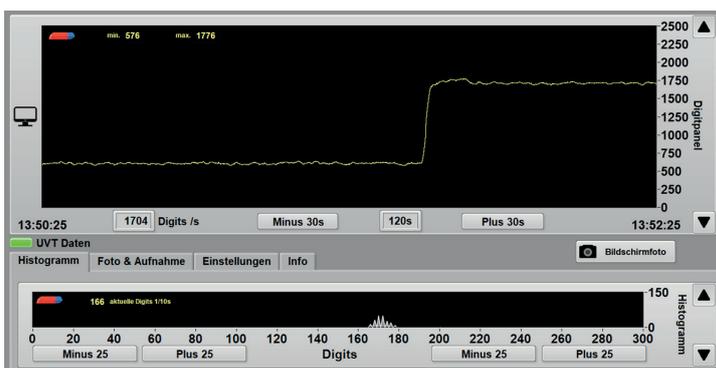
The UV compact flame detector IFC 11 is a low power signal output equipped to simulate ionization or LDR signal. If a relay switch contact is required, the use of RMF 1 is recommended. The RMF 1 has an electrically isolated changeover contact with a maximum switching voltage of 250 V AC, a maximum switching current of 1 A and a maximum rating of 250 VA. More information can be found in BA RMF1 EN in its current version.

5.2.2 Diagnostic with UVT-Com

With the data interface UVT-Com, consisting of optical adapter with cable, USB-Interface and software BST-Com, the following information can be read from the IFC 11:

- present pulses of the UV-tube

For this purpose, the USB-optoadapter UVT-Com must be inserted into the recess of the LED. Via the connection cable and the interface, the data can be read into a laptop or PC using the corresponding BST-Com software. Further information can be found in the BST-Com operating instructions.



6 | Operation of UV compact flame detector

6.1 Test of the UV compact flame detector

To ensure the proper operation, the UV compact flame detector has to 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 a safe and proper operation.

6.2 Operating indicator LED

Via the built-in LED the UV compact flame detector IFC 11 is indicating the following operating conditions:

LED	Meaning
off	IFC 11 is without connection or there is no detected flame
Blinking	Flame is detected The blinking of the LED represents the flame signal intensity Increasing blinking = higher intensity
on	The flame is detected with highest intensity

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!

7.2 Maintenance interval

There is a maintenance interval of less than 10,000 hours of operation are observed. If the UV compact flame detector operated at temperatures > 120 °F, the maintenance interval is shortened considerably.

7.3 Safety check

A safety check of flame monitoring must be carried out during every commissioning and maintenance of the furnace because the UV tube subjects a natural aging and the end of its life causes problems. Here the following steps should be checked:

The following steps should be reviewed:

- The attempt to start the burner flame detector is darken -> after the end of the safety time into lock indicate a fault!
- The attempt to start the burner's flame detector with an external UV radiation, eg lighter or gas flame (ambient lighting is not sufficient) to illuminate - must -> go into lock during the pre purge mode!
- The operation of the burner flame detector is darken -> depending on type of control box-rung must either by executing a restart attempt at the end of the safety time or immediately after darkening the burner indicate a fault!

7.4 Behavior in case of malfunction

In case of malfunctioning of the flame sensor must be replaced, and send back to the manufacturer for check. Precaution after crossing the tube service life of 10,000 h should the UV tube be replaced by the manufacturer or by authorized personnel. IFC 11 is a safety component and may not be opened!

8 | Troubleshooting

Error description	Cause	Remedy
No flame signal	I) Connecting error or no active power	Please check the plugs and the connections of the burner control box
	II) 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
	III) IFC 11 malfunction	Replace IFC
	IV) Tube faulty	Replace tube
Ambient light interference	I) Tube faulty	Replace tube
	II) View to sparks	Change view

9 | Order data

The UV Compact Flame Detector IFC 11 is available from BFI Automation GmbH under the following order data:

Type	Description	Order-No.
Flame detector IFC 11/120	120 V AC	6015-1113-00

10 | Accessories

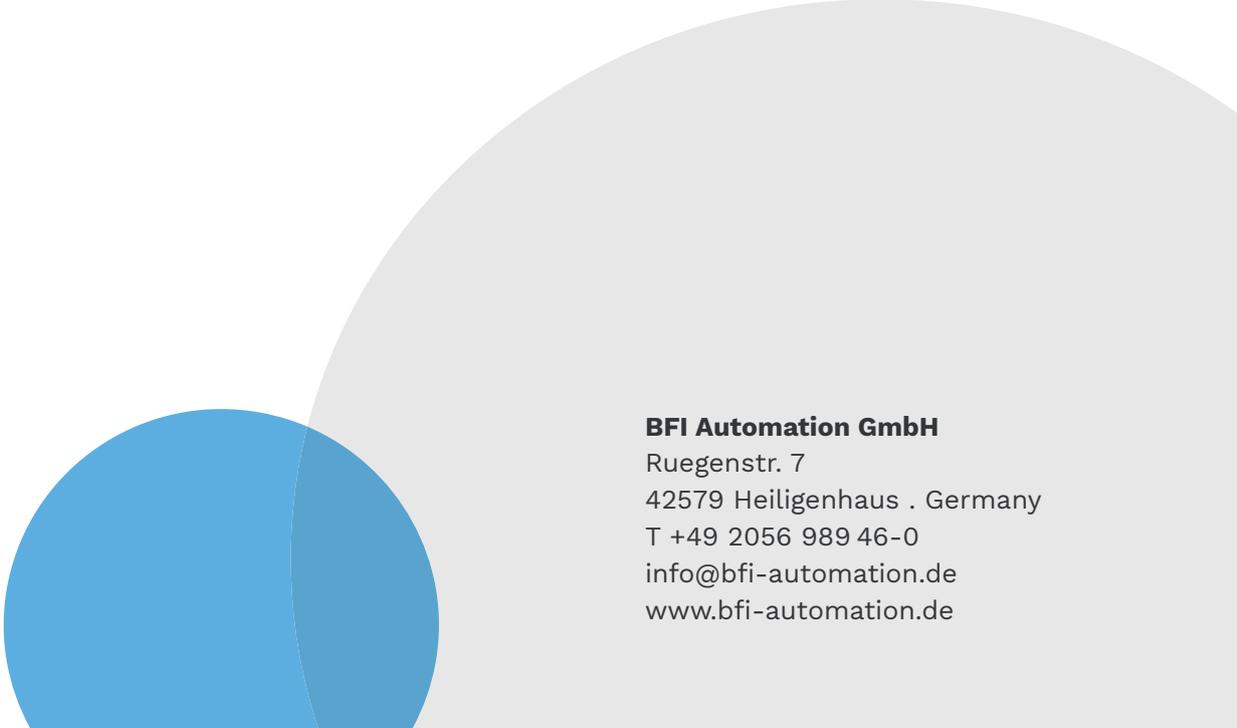
Following accessories are offered by BFI Automation :

Type	Part-No.
UV-tube kit for IFC	5010-0050-12
Adapter ½" with nut and gasket	1830-0160-00
Adapter ½" with UV-quartz glass plate*, nut and gasket	6595-8980-00
Adapter ½" with UV-quartz glass lense*, nut and gasket	6595-8980-10
Adapter 1" with purge air connector ¼", nut and gasket	1830-0161-14
Adapter 1" with purge air connector ¼", UV-quartz glass plate*, nut and gasket	6595-8981-14
Adapter 1" with purge air connector ¼", UV-quartz glass lense*, nut and gasket	6595-8981-04
Relay module for flame detectors RMF 1/120	6040-0001-01
Readout unit UVT-Com Opto-Adapter, USB-Interface	6040-4832-00
Software BST-Com, via download	9030-2000-05
Connection cable with female right-angled plug, length 1.8 m	6060-2233-01
Connection cable with female right-angled plug, length 3.0 m	6060-2233-03

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

NOTICE

Due to the different designs that can be tailored to the particular application involved, the rear sight is one with the appropriate glasses or lenses not included as well as the cable and the required adapter must be ordered separately.



BFI Automation GmbH
Ruegenstr. 7
42579 Heiligenhaus . Germany
T +49 2056 989 46-0
info@bfi-automation.de
www.bfi-automation.de