

Original Operating Instructions

Compact UV Flame Detector IFR 11

Type: IFR 11
Document: BA IFR 11 EN Rev1



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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 UV flame detector IFR 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 BST Solutions.

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 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 UV flame detector IFR 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 BST Solutions
- non-performance of specified maintenance work

NOTICE

It is recommended that the operator of the device concludes a service contract with BST Solutions or by BST Solutions authorized companies. 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

When the UV tube is a consumable item, whose life is dependent on various factors that can affect not BST Solutions.

Therefore accepts BST Solutions no warranty on the life of UV tubes.

NOTICE

This warranty does not apply to transportation damages, glass breakage of the lens, (photo element / UV-tube) or other damages due to unqualified handling, incorrect adjustment, or insufficient maintenance.

1.6 Obligation of the operating company

The compact UV 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

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

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 BST Solutions for consequential damages.

BST Solutions 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



BST Solutions GmbH
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EU Konformitätserklärung EC Declaration of Conformity

Produkt **Flammenwächter IFCx , IFRx**
Product *Flame detector IFCx, IFRx*
Typ **IFC10, IFC11, IFC50, IFR10, IFR11, IFR50**
Type *IFC10, IFC11, IFC50, IFR10, IFR11, IFR50*

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> <i>Regulations</i>	EU/2016/426		Gasgeräteverordnung <i>Gas appliances regulation</i>
	2014/35/EU		Niederspannungsrichtlinie <i>Low voltage directive</i>
	2014/30/EU		EMV Richtlinie <i>EMC directive</i>
<i>Benannte Stelle</i> <i>Notified body</i>	DVGW Cert GmbH	0085	
<i>CE-Zertifikat vom</i> <i>CE certificate from</i>	19.02.2018	CE-0085CN0133	Baumusterprüfbescheinigung <i>Type examination certificate</i>
<i>Gültig bis</i> <i>Valid until</i>	19.02.2028		
<i>Normen</i> <i>Standards</i>	EN 298:2012; EN 13611:2019 EN 60730-1:2016		
<i>Ausgestellt durch</i> <i>Issued by</i>	BST Solutions GmbH		

Rechtsverbindliche
Unterschrift
Legally binding signature



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Ort, Datum
Heiligenhaus, den 16.12.2019

1.9 Address of the manufacturer

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2 Safety

2.1 Intended use

The IFR 11 is a compact UV flame detector, which has been developed for single flame combustion which produces little light or radiation in the visible spectrum and has very low flame modulation/flicker frequency. The design of the UV sensor ensures that the flame detector does not react to background radiation from hot refractory or from any other infra-red light source.

The UV flame detector is equipped with an optical interface which visibly indicates the flame signal intensity. The IFR 11 can be connected directly to the ionisation or LDR input of the control box. It is compatible in its physical dimensions and connection capability to other series IFR flame detectors. All IFR accessories are identical and therefore this reduces the variety of components used in production and makes it simpler for field application and service.

The UV flame detector IFR 11 has been developed to meet the requirements of UL 372-2, CSA C22.2 and EN 298:2012. The internal increase of the UV tube voltage immediately after apply supply voltage ensures the safety requirements for the examination of the UV tube to through-ignition. A simple change from ionisation flame control to the IFR 11 is permissible therefore also with control boxes without own UV tube input.

CAUTION

The UV flame detector IFR 11 has to be switched off for more than 5 seconds before burner operation can be started again.

⚠ DANGER

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 UV flame detector IFR 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 UV flame detector IFR 11 is responsible for the proper operation of the device.

2.4.2 Safety devices on the compact UV flame detector IFR 11

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

- Housing (protection against accidental contact)

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 BST Solutions, 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 BST Solutions or approved of by BST Solutions 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 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 !

2.5.3 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 BST Solutions.

2.5.4 Safety test

⚠ WARNING

In order to ensure correct operation, the compact UV flame detector IFR 11 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. Carry out this test whilst several neighbouring burners are started and stopped and different boiler outputs are used. This is an indispensable pre-requisite for a safe and correct operation of the device !

3 Technical data

3.1 General characteristic features

- UV-Tube
- Fully electronic construction
- Intermittend operation
- CE 0085CN0133

3.2 Electrical system, optical system, mechanical system

Optical features	185 to 265 nm
Tolerated flame signal fades	approx. 200 ms
Orientation	radial
Lifetime of the tube	approx. 10000 h
Distance to flame	< 72 inch
Input	120 V AC Nominal frequency 50-60 Hz
Prefuse	max. 1 A , slow
consumption	max. 10 mA
Operating temperature	0 to +140°F (temperatures higher than 120°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
Electrical connenction for stand-ard	Amphenol eco mate plug C016 Other connectors on request
Restart time	>5s between controlled shut-down and renewed heat request

Output data	Flame on reaction time typically 0.5s Log off time <0.5s
Switching output	FET 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. 1.13 lbs

3.4 Dimensions

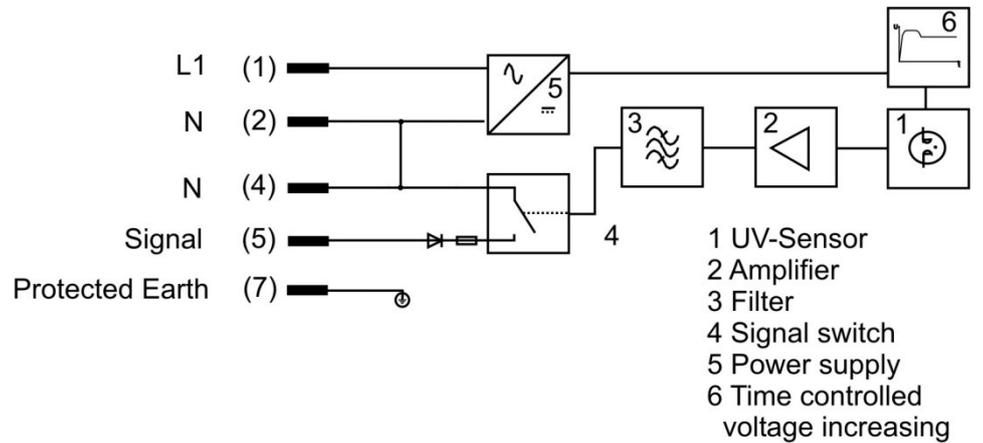
Length (without plug or gland) 7.98 inch

Width 2.6 inch

Height 3.62 inch

Dimensions see under item 4.4

3.5 Block diagram IFR 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 UV flame detector IFR 11
- Operating instructions BA IFR 11 EN (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 BST Solutions 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 UV flame detector IFR 11 is shipped in different packaging materials. The most frequently used packaging materials are cardboard and plastics (foils, foamed material).

NOTICE

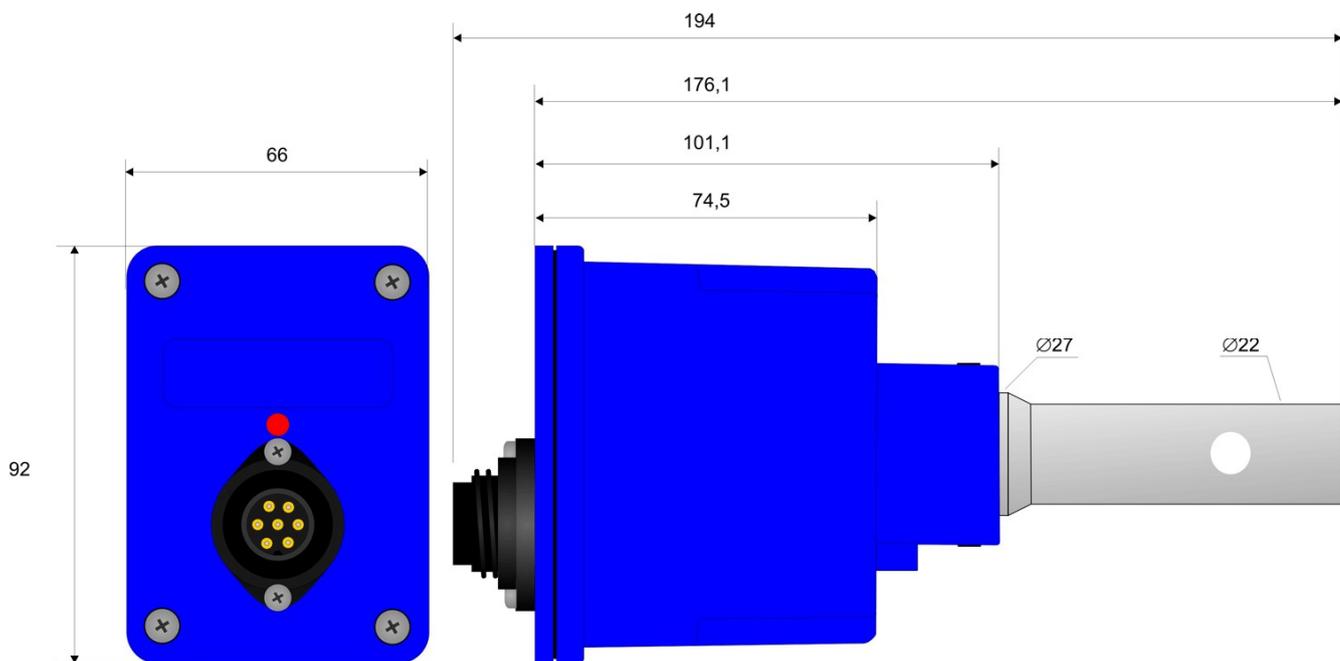
Packaging has to be disposed of in an environmentally friendly way and in accordance with the relevant provisions on disposal.

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 IFR 11



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 IFR 11 should be mounted close to the flame with straight alignment. The compact UV flame detector should be mounted with its mounting flange. The mounting flange guarantees a quick mounting and demounting of the compact UV flame controller. The sight pipe must be adequately dimensioned.

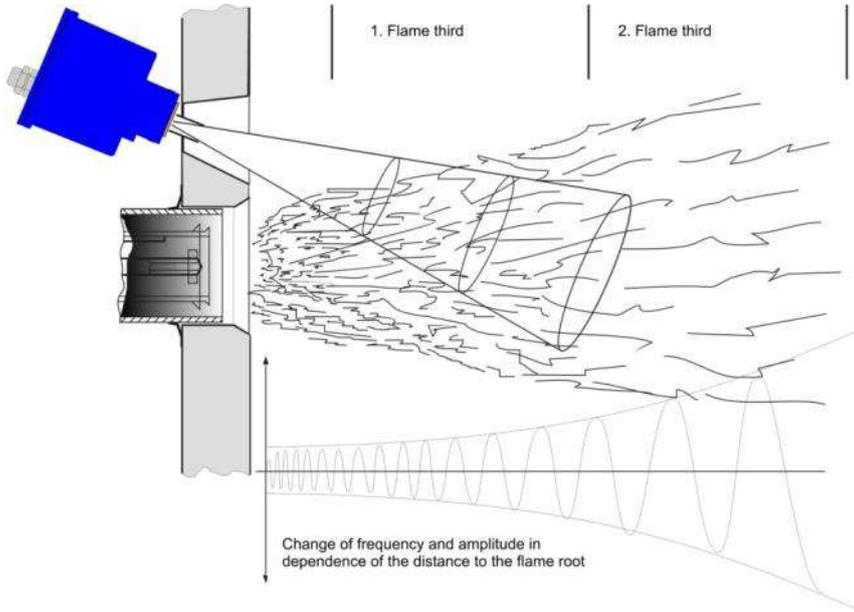
The alignment is to concentrate on the primary zone of the flame (flame root). The distance from the flame should be less than 78". Upon completion of the assembly work the screws of the rear sight to the flame detector are to be tightened down. At high temperature on the sight glass, which could heat 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 and technical regulations a controlled burner shut down of at least once per 24 hours must be guaranteed. The IFR 11 carries out a UV-tube checkup by increasing the voltage during the start-up phase. After a heat requirement the IFR 11 has to be non-energized for more than 5 seconds. The voltage should be switched on only before a heat requirement and absolutely before extraneous light-check.

4.5.1 Alignment of IFR 11



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 IFR 11

Occupancy male and female plug	PIN	Internal connection AC/DC	Cable number	Connection for ionization output / LDR
	1	L	1	L
	2	N*	2	N
	3	NC	-	-
	4	*	3	-
	5	┌───┐	4	ION/LDR
	6	NC	-	-
	PE	PE	Green / yellow	PE

*Pin 2 and 4 are internal connected

4.7 Storage

Do not unpack any packed compact UV flame detector IFR 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: -20°C to +70°C
- Store in a dust-free location.
- Avoid mechanical vibrations and damage.

5 Description

5.1 Functional description IFR 11

The IFR 11 is a compact UV flame detector, which is specially designed for severe conditions often experienced in industrial applications for single flame combustion. The IFR 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 infra-red light source.

The compact UV flame detector has to be disconnected started up once in a day. For safety reasons and technical regulations a controlled burner shut down at least once per 24 hours must be guaranteed.

The UV flame detector IFR 11 has been developed to meet the requirements of UL 372-2, CSA C22.2 and EN 298. The internal 15 % increase of the UV tube voltage during the start-up phase ensures the safety requirement for the examination of the UV tube to through-ignition. The UV flame detector IFR 11 has to be switched off for more than 5 seconds before burner operation can be started again. A simple change from ionisation flame control to the IFR 11 is permissible therefore also with control boxes without own UV tube input.

The UV 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 IFR 11

5.2.1 Relay module for flame detectors RMF 1

The compact UV flame detector IFR 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 US in its current version.

6 Operation of the UV flame detector IFR 11

6.1 Test of the UV flame detector

To ensure the proper operation, the 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 flame detector is indicating the following operating conditions:

LED	Meaning
off	IFR is not active or without potential
flashing	IFR has detected a flame; the quality of the flame signal is indicated by the intensity of the flashing of the LED – fast flashing indicates a healthy flame signal and vice versa - slow flashing indicates a weak flame signal. intensity of the flashing of the LED – fast flashing indicates a healthy flame signal and vice versa - slow flashing indicates a weak flame signal.
on	IFR has detected the strongest level of flame signal.

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 flame detector operated at temperatures > 120 ° F, the maintenance interval is shortened considerably.

7.3 Safety – related check

Due to the natural aging of the UV-tube (10,000 h by ambient temperature less than 120 ° F), a safety-related check has to be done during every commissioning and maintenance.

The following steps should be check:

- During start-up of the BMS the flame detector should be darkened. After the safety time the BMS should indicate a fault!
- During start-up of the BMS the flame detector should be lighted with an external UV radiation like a gas flame or lighter – the existing ambient light is not enough. The BMS should indicate a fault during the pre-aeration phase!
- During normal operation the flame detector should be darkened. Depending on the BMS a fault has to be indicated after safety time expired during anew start-up or directly after darken the flame detector.

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. IFR 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 II) Glass dirty III) IFR 11 malfunction IV)Tube faulty	Please check the plugs an the con- nections of the burner controller box Power off the IFR and take it out of the flange. Now clean the glass carefully with a clean and fuzz-free cloth Replace IFR Replace tube
Ambient light interference	I) Tube faulty II) View to sparks	Replace tube Change view

9 Order data

The compact UV flame detector IFR 11 is available from BST Solutions GmbH under the following order data:

Type	Description	Order-No.
Flame detector IFR11/230	230 V AC	611193031000
Flame detector IFR11/120	120 V AC	611293031000

10 Accessories

Following accessories are offered by BST Solutions :

Type	Description	Order – No.
Replacement UV-tube kit for IFR		5010-0050-10
Relay module for flame detectors RMF1/230		640480002000
Relay module for flame detectors RMF-R1/230	with additional resistor output (20 kΩ)	640480002001
Relay module for flame detectors RMF1/120		640480002100
Relay module for flame detectors RMF-R1/120	with additional resistor output (20 kΩ)	640480002101
Connecting cable BK03, 1.8 m		561984740094
Connecting cable BK03, 3m		561984740096
female angle jack		165303041000

NOTICE

Cable and the desired jack must be ordered separately.

