Flamonitec®
BFI AUTOMATION

Operating Manual (US)

UV Flame Detector KLC 11

Flamonitec®
BFI AUTOMATION

Content

1 | General aspects

1.1 Introduction

This operating manual is a helpful guide for ensuring the successful and safe operation of the UV flame detector KLC 11. It contains important information on how to operate the system safely, correctly and efficiently. Observing the operating manual 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 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. 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 autorized staff. Access by third parties may only be granted upon written agreement of BFI Automation.

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 manual carefully and in full before operating the UV flame detector KLC 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, i.e. regarding organization of work, working processes and staff deployed.

The recognized 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 or by BFI Automation 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

The UV tube is a consumable item, the service life of which is dependent on various factors outside the control of BFI Automation. Therefore BFI Automation provides no warranty on the life of UV tubes.

NOTICE

Warranty of this device does not cover damage in transit, lens glass breakage (UV tube) or other damage caused by unqualified handling, incorrect adjustment or inadequate maintenance.

1.6 Obligation of the operating company

The UV flame detector KLC 11 may cause hazards if it is operated inappropriately or in an improper condition.
The operating company is under the obligation to operate the device properly. 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, aware of hazards, and are observing the operating instructions.
- Before starting work, staff who are assigned to work with/on the device must 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 must be stored in such a way that they are accessible to operating and maintenance staff.
- Appoint 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 must 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 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 UV flame detector outlined in these operating instructions. No claims can be made based on the specifications, illustrations and descriptions of this operating manual.

BFI Automation shall not be liable for damage or operating malfunctions that result from operating errors, inappropriate repairs, or non-observance of the operating instructions. We expressly state that only original spare parts and accessories approved by us shall 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 done in good faith. We cannot accept any liability for translation errors; this also applies where the translation has been done 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

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Ruegenstr. 7 . 42579 Heiligenhaus . Germany
T +49 2056 989 46-0 . E-Mail: info@flamonitec-bfi.com
www.flamonitec.com

2 | Safety

2.1 Intended use

The UV flame detector KLC 11 has been developed to meet the requirements of UL 372-2, CSA C22.2 and EN 298. 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 KLC 11 is permissible therefore also with control boxes without own UV tube input.

For safety reasons and technical regulations, a restart controlled by the system of at least once per 24 h operating hours must be guaranteed.

CAUTION

The UV flame detector KLC 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 manual 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 program 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 done 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

Before working at the UV flame detector switch off the power supply. Before first commissioning or replacement of the device check external wiring!

The following instructions on accident prevention have to be observed when operating the flame detector:

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 autorized 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 manual always has to be kept close to the device and be readily at hand.
- 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 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 UV flame detector 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 must be observed. Damaged or illegible signs must be replaced immediately.

2.4.2 Safety devices on the UV flame detector

The UV flame detector KLC 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 manual for repetitive checks / inspections shall be observed!
- Appropriate workshop equipment is essential for performing maintenance work.
- In conformance with electrical regulations, work on electrical equipment of the system may only be done 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, must be observed! These tasks may only be done by authorized specialist staff.
- Operating staff have to be informed before maintenance or other special work is done. A supervisor must be appointed.
- Screw connections which have been loosened during maintenance and servicing work, must 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.
- Ensure safe and environmentally friendly disposal of replacement parts!
- 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 detector from the power supply network!

NOTICE

In keeping with the electrical regulations, work on electrical, electronic parts, components may only be done 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-energized, if required. First check that the disconnected parts are no longer live, then short to earth (ground). Also isolate neighboring 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 and stopping the burner several times. The ionization current simulation must switch off reliably in all cases when there is no flame. This test should be done 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
- Fully electronic construction
- Intermittend operation
- MH47747

3.2 Electrical system, optical system, mechanical system

Optical features	185 to 260 nm
tolerated flame signal fades	approx. 200 ms
Orientation to flame	radial, left (optional axial -> thereby reduced sensitivity approx. 40 %)
Lifetime of the UV-tube	> 10,000 h
Operating voltage	120 V AC 50 to 60 Hz
consumption	max. 5.5 mA
Operating temperature	0 °F to 140 °F (temperatures above > 125 °F reduces lifetime)
Humidity	max. 95 % r.H., non-condensing
Operating position	any position
Protection class	IP 21
Protection level	II
Switch-On delay after flame on	typically 0.5 s
Switch-Off delay after flame off	< 0.6 s
Deenergizing time before restart	> 5 s
Output	max. switched current 15 mA max. switched power 0.3 W max. switched 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

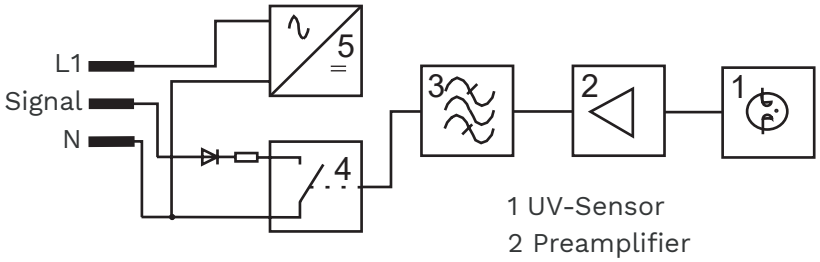
Weight approx. 1.02 oz

3.4 Dimensions

Length (incl. plug)	4.53 in
Width	1.18 in
Height	0.87 in

Drawing see item 4.4

3.5 Block diagram KLC 11



1 UV-Sensor
2 Preamplifier
3 Filter
4 Signalswitch
5 Power supply

4 | Transport, installation and connection

NOTICE

All installation and connection work must only be done by qualified and approved specialist staff! Observe the legal stipulations and adjustment instructions of the plant operator!

4.1 Scope of delivery

- UV flame detector KLC 11
- Operating manual (optional, customer-dependent)
- Connection cable (optional)
- Mounting flange (optional)
- Adapter ADP (optional)
- Angle adapter KLC (optional)
- Diagnostic tool KLC-com (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 or carrier, and BFI Automation immediately in case of any damage caused by transport or inadequate packaging.

Take steps to minimize and prevent further damage.

Take measures to minimize and prevent further damage. Report the case of damage to the distributor immediately.

4.2 Packaging

The UV flame detector KLC 11 is shipped in different packaging materials. The most frequently used packaging materials are cardbard 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.

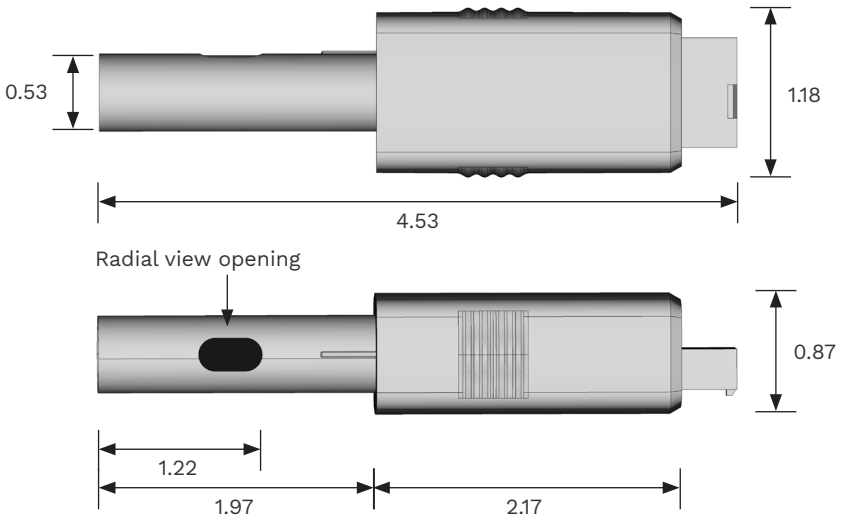
4.3 Shipping instructions

NOTICE

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

4.4 Dimensions

see the following illustration:



All dimensions in inch

4.5 Installation

NOTICE

All installation and connection must only be done by qualified and approved specialist staff! The legal regulations as well as adjustment instructions of the plant operator have to be observed!

The KLC 11 should be mounted close to the flame with straight alignment. The flame detector should be mounted with the mounting flange KLC or another suitable holder with 0.55 inch opening. Mount the UV flame detector with the holder. The angle of view, especially with sight tubes, must be of appropriate dimensions to avoid any reduction of flame radiation. Protect the sensor against other light sources.

To prevent faults, the direct view of an ignition spark must be avoided. Faults in the pre-purge phase can be caused by this. The maximum cable length of the connection cable must be observed. The connection cable must be kept separate from high-energy ignition and mains cables and must not be laid parallel to them over long distances.

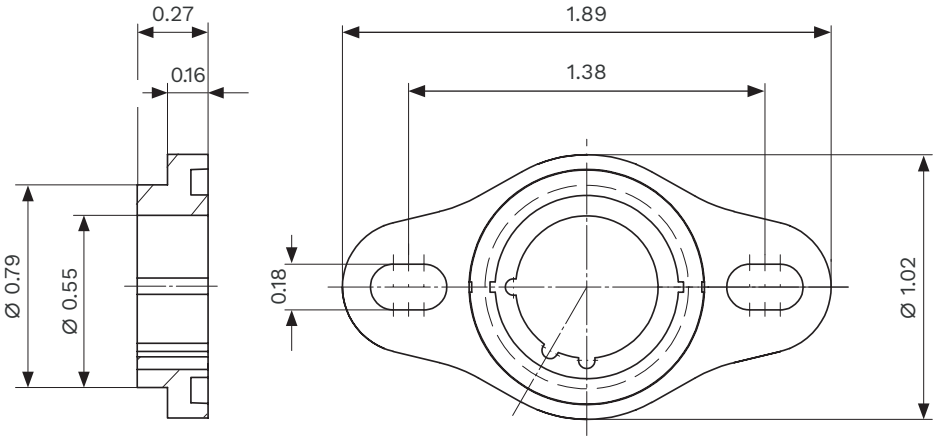
⚠ DANGER

For safety reasons, there must be at least one control shutdown per 24 hours. During start-up, the KLC 11 independently carries out an internal voltage increase to test the UV tube. After the end of the heat requirement, the KLC 11 must be de-energized for > 5 s by means of suitable connection wiring. The voltage should only be switched on at the time of the heat requirement and absolutely before the external light check. If the KLC 11 is permanently live, an burner control must be used to check to determine whether a flame signal is present after a control shutdown.

For the mounting BFI Automation offers different accessories:

4.5.1 Mounting flange KLC

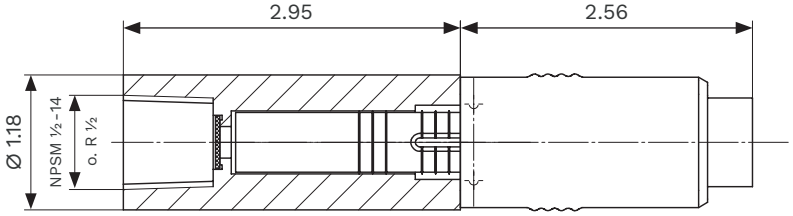
The mounting flange holds the detector in a suitable position to view the flame. Two overall heights of 0.28 in and 0.52 in are available. An O-ring seal is available which will give the mounting flange an air tight seal to the burner housing if required.



All dimensions in inch

4.5.2 Adapter ADP

Adapter ADP enables installation of the UV flame detector series KLC 11 with optional axial direction directly at a combustion chamber. A quartz glass serves as a pressure barrier and prevents the escape of heating gases from the combustion chamber. For the application of the flame detector KLC at high surface temperatures, the version made of heat-insulating material should be used.



All dimensions in inch

4.6 Connection

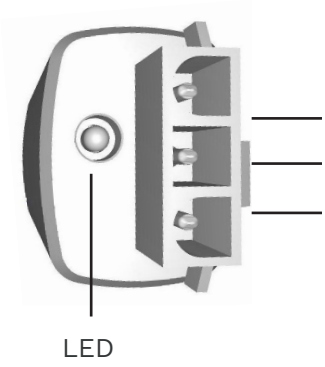
4.6.1 Electrical connection

⚠ DANGER

Danger to life caused by electrical current!
When connecting, observe the safety instructions and the locally applicable safety regulations!

Refer to the Technical Data chapter and the following wiring diagram for connection data.
Check that the mains voltage corresponds to the voltage indicated on the type plate.
Before connecting, check the device and the connecting cables for visible damage.

4.6.2 Connector diagram



Type of control box	Connection for
Red	N
Black	Ion
Brown	L1

Please ask for connection details for all other types/manufacturers burner control boxes.

4.7 Storage

Do not unpack packed UV flame detector and accessories.
The following conditions apply to storage:

- Store in a dry place. Maximum relative humidity: 95 % r. h., non-condensing.
- maximum storage time 3 years
- Ensure that the packages are not stored outdoors.
- In addition, ensure that the floor of the storage room is dry during storage.
- Protect from direct sunlight. Storage temperature: 40 °F to 120 °F
- Store dust-free.
- Avoid mechanical shocks and damage.

5 | Description

5.1 Functional description KLC 11

The KLC 11 is a compact UV flame detector specially designed for single burner furnaces which produce almost no radiation in the visible light spectrum or operate with very low flame modulation. The UV tube used ensures that background radiation, e.g. from glowing brick linings or mixing equipment parts, is not detected.

The flame signal intensity can be easily recognized without any effort by means of an LED as optical indicator. By using the UVTcom readout unit, the flame signal can be read out and logged by the BSTcom software on a PC.

The KLC 11 can be connected directly to the ionization or LDR input of the burner control. It is compatible in its dimensions, connection dimensions and pin assignment with other units from the KLC series. All accessories are therefore identical and reduce the variety of parts in production and service.

The internal boost of the UV tube voltage immediately after applying the supply voltage ensures the safety requirements according to UL 372 for the check of the UV tube for ignition. A simple conversion from ionization monitoring to the KLC 11 is therefore also possible with burner controls without an own UV-cell input.

Since the KLC 11 performs a self-test only at the moment of switch-on, it is approved for intermittent operation. The flame detector must be disconnected from the mains for at least 5 s and restarted at least once every 24 hours.

5.2 Optionally function blocks for KLC 11

5.2.1 Relay module for flame detectors RMF 1

The UV flame detector KLC 11 is a low power signal out-put equipped to simulate ionizati-ontion or LDR signal. If a relay switch contact is required, the use of Relay module for flame detector RMF 1 / 120 is recommended. The RMF 1 / 120 has an electrically potential free switch 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 the operating manual of the RMF 1 / 120 in its current version.

6 | Operation of the UV flame detector

6.1 Test of the UV flame detector

To ensure proper operation, the UV 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 UV flame detector has to be switched off solid. The test should be repeated for different operation situations (see datasheet). This is an essential condition for safe and proper operation.

6.2 Operating indicator LED

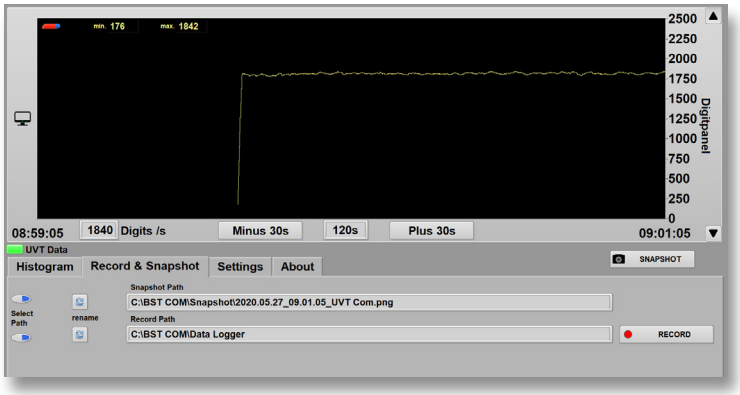
UV flame detector KLC 11 uses a built-in LED to indicate the following operating conditions:

LED	Meaning
off	KLC is not active or without potential.
flashing	KLC 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.
on	KLC has detected the strongest level of flame signal.

6.3 Diagnostic with UVT-Com

The UVT-Com readout unit consists of an optical adapter with cable, USB interface and software BST-Com. It displays current pulses of the KLC 11 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.



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

The UV flame detector should be checked as part of general system maintenance. Replacement of the flame detector is recommended after approximately 10,000 operating hours. At temperatures above 125 °F, the intervals are shortened.

7.3 Safety-related check

Due to the natural aging of the UV-tube (10,000 h by ambient temperature less than 125 °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 burner control the UV flame detector should be darkened. After the safety time the BMS should indicate a fault!
- During start-up of the burner control the UV 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 prepurge phase!
- During normal operation the UV flame detector should be darkened. Depending on the burner control a fault has to be indicated after safety time expired during start-up or directly after darken the flame detector.

7.4 Behavior in case of error

In case of malfunction the UV flame detector has to be replaced. After a operating time of more than 10,000 hours the UV-tube should be changed by manufacturer or authorized personnel. The KLC 11 is a safety component and it is not allowed to open it!

8 | Troubleshooting

Description	Reason	Remedy
Flame relay does not switch	I) connecting error or no active power	Please check the plugs an the connetions of the burner controller box
	II) Glass dirty	Power off the KLC and take it out of the flange. Now clean the glass carefully with a clean and lint-free cloth
	III) KLC malfunction IV) UV tube faulty	Replace the KLC Replace UV tube
Ambient light interference	I) UV tube faulty	Replace UV tube
	II) View to sparks	Change view

9 | Order data

The UV flame detector KLC 11 is available from BFI Automation under the following order data:

Part	Version	Article No.
UV flame detector KLC 11 / 120 R	Optical direction radial, 120 V AC	6011-1320-00
UV flame detector KLC 11 / 120 RA	Optical direction radial and axial*, 120 V AC	6011-1320-01

*axial alignment reduces sensitivity by about 40%.

10 | Accessories

Following accessories are offered by BFI Automation:

Part	Version	Part number
Mounting flange KLC	overall height 0.28 in	1550-4220-07
Mounting flange KLC	overall height 0.55 in	1550-4220-13
Angle adapter KLC*, standard mirror	Accessory for radial mounting applications	1550-4225-10
Angle adapter KLC*, stainless steel mirror	Accessory for radial mounting applications	1550-4225-20
ADP 10 – UV*	heat-insulated up to 180°C, R ½“, quartz glass	6580-2030-00
Relay Module Flame detector RMF1/230	230 V version	6040-0001-00
Connecting cable KLC	length of 23.6 in	6060-2220-06
Connecting cable KLC	length of 39.3 in	6060-2220-10
Connecting cable KLC	length of 78.7 in	6060-2220-20
Connection cable KLC	other length	on request
Read out unit UVT-Com	Opto-adapter, USB interface	6040-4832-00
Software BST-Com	via Download	9030-2000-05

*only to use with KLC 11 axial and radial

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BFI AUTOMATION

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