



Flamonitec KLC 10 UV Flame Detector Instruction Manual

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Flamonitec KLC 10 UV Flame Detector



General aspects

Introduction

This operating manual is a helpful guide for ensuring the successful and safe operation of the UV flame detector KLC 10. 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.

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.
- 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.

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.

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.

Warranty

Read these operating manual carefully and in full before operating the UV flame detector KLC 10!

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 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.

- 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.
- This warranty does not cover damage in transit, lens glass breakage (UV tube) or other damage caused by unqualified handling, incorrect adjustment or inadequate maintenance.

Obligation of the operating company

The UV flame detector KLC 10 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.

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. 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.

Declaration of conformity

		
EC Declaration of Conformity		
Product	Flame detector KLC1x with or without RMF1	
Type	KLC10, KLC11, KLC1000, KLC1001 with or without RMF1	
<p><i>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></p>		
Regulations	EU/2016/426 2014/35/EU 2014/30/EU	Gas appliances regulation Low voltage directive EMC directive
Notified body	DVGW Cert GmbH 0085	
CE certificate from	19.02.2018 CE-0085BS0448	Type examination certificate
Valid until	19.02.2028	
Test basis	EU/2016/426 A III B (09.03.2016) EN 298:2012, EN13611:2015+AC:2016	
Issued by	BST Solutions GmbH	
Legally binding signature		
	Name	Function
	Eberhard Röllecke	General Manager
	Place, Date	Heiligenhaus, den 31.05.2021
<p>BST Solutions GmbH Ruegenstrasse 7 . 42579 Heiligenhaus Germany T +49 2056 989 47-0 info@flamnitec-bst.com www.flamnitec.com MEMBER OF MINDERMANN GROUP</p> <p>Managing Director: Dipl.-Wirt.-Ing. Eberhard Roellecke Ust.-IdNr.: DE 234 744 993 . Amtsgericht Wuppertal HRB 28842 Commerzbank . IBAN: DE51 3008 0000 0561 9749 00 . BIC: DRESDEFF300 Deutsche Bank . IBAN: DE75 3007 0010 0477 8049 00 . BIC: DEUTDE3304</p>		

Address of the manufacturer

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- T: +49 2056 989 47-0
- E-Mail: info@flamnitec-bst.com
- www.flamnitec-bst.com

Safety

Intended use

The UV flame detector KLC 10 is designed in accordance with EN298:2012-11 for burner control that check whether a flame signal is still present after the control switch-off, whereby the UV flame detector is permanently connected to the power supply. The UV flame detector operates in intermittent mode and must be disconnected from the mains and restarted at least once every 24 hours.

With the KLC 10 model, it is mandatory that the burner control box or burner management system performs a check for a flame signal after the fuel valves have been switched off (postflare check). This checks the UV tube for proper operation by the function of the burner control. If the function of the post-flare check is not guaranteed, use model KLC 11.

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.

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 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.

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 authorised specialist staff to carry out set-up and/or maintenance work.
- Replace worn or defective parts.
- Use suitable maintenance tools only.
- After repair work, refit all safety devices and carry out electrical and mechanical checks.
- Check the operating manual for details of displays as well as switch-on and switchoff 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.

Safety devices

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 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 have to be observed. Damaged or illegible signs have to be replaced immediately.

Safety devices on the UV flame detector

The UV flame detector KLC 10 has been fitted with the following safety devices:

- Housing (protection against accidental contact)

Safety maintenance and troubleshooting

Safety instructions in case of maintenance and troubleshooting

Fundamental aspects

- Deadlines set or indicated in the operating manual 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 authorized 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.
- Ensure safe and environmentally friendly disposal of replacement parts!
- Spare parts supplied by BST Solutions or approved of by BST Solutions only may be used.

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 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 deenergized, 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!

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 carried out 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 BST Solutions.

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

Technical data

General characteristic features

- UV-Tube
- Fully electronic construction
- Intermittend operation
- CE0085BS0448

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	230/240 V AC 50 – 60 Hz
consumption	max. 5.5 mA
Operating temperature	-20°C to +60°C (temperatures above > 50°C reduces lifetime)
Humidity	max. 95% r.H., non-condensing
Operating position	any position
Protection class	IP 41
Protection level	II
Switch-On delay after flame on	typically 0.5 s
Switch-Off delay after flame off	< 0.6 s
Output	Potential-free, Semi conductor relay 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.

Weight

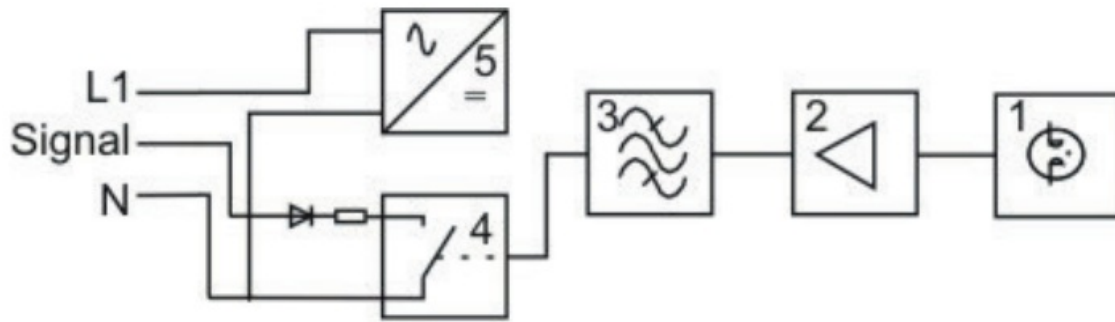
- **Weight:** approx. 0.029 kg

Dimensions

- **Length:** (with plug) 115 mm
- **Width:** 30 mm
- **Height:** 22 mm

Drawing see item 4.4

Block diagram KLC 10



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

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!

Scope of delivery

- UV flame detector KLC 10
- Operating manual (optional, customer-dependent)
- Connection cable (optional)
- Mounting flange (optional)
- Adapter ADP (optional)
- Angle adapter KLC (optional)
- Diagnostic tool KLCcom (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).

Packaging

- The UV flame detector KLC 10 is shipped in different packaging materials. The most frequently used packaging materials are cardboard and plastics (foils, foamed material).

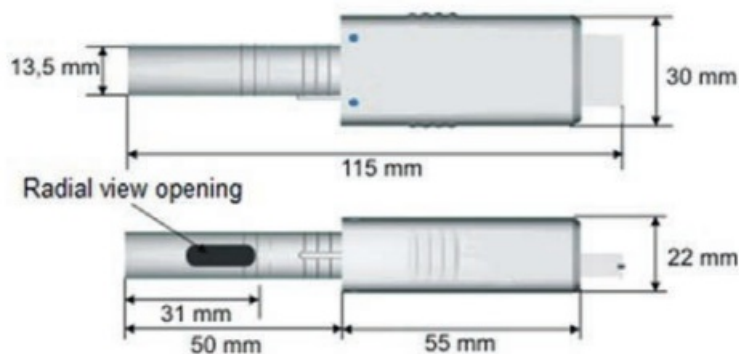
NOTICE: Packaging has to be disposed of in an environmentally friendly way and in accordance with the relevant provisions on disposal.

Shipping instructions

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

Dimensions

see the following illustration:



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!

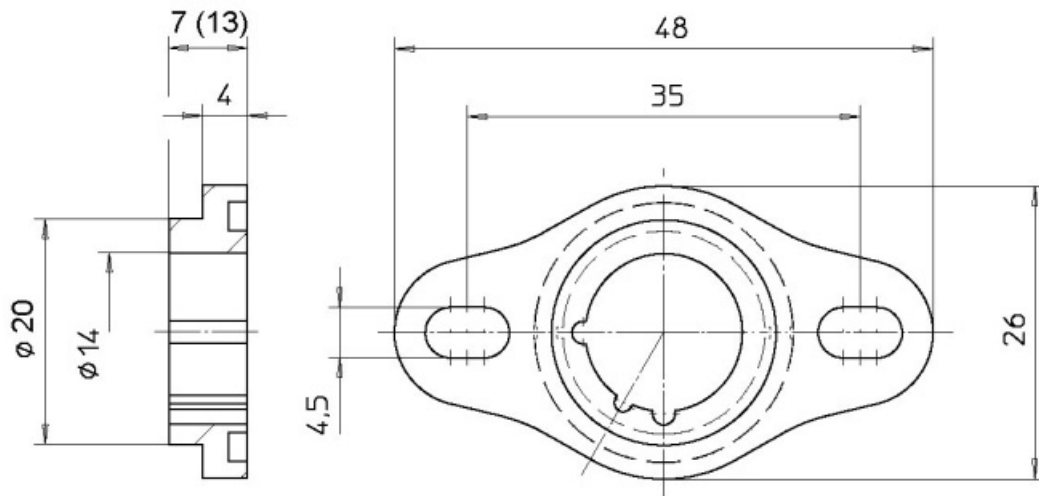
The KLC 10 should be mounted close to the flame with straight alignment. The flame detector should be mounted with the mounting flange KLC or another suitable holder with $\varnothing 14$ mm opening. Fix the UV flame detector with the holder. The angle of view, especially with sight tubes, must be of 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 and technical regulations a controlled burner shut down of at least once per 24 hours must be guaranteed. By the KLC 10 implementation the BMS has to check the UV tube after every normal

shut-down the UV flame detector for the availability of a flame signal there. Otherwise the KLC 11 has to be used.

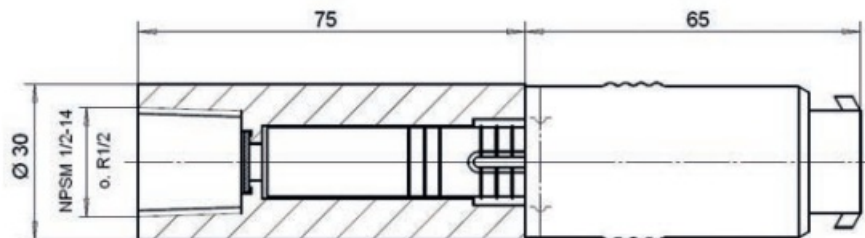
For the mounting BST solutions offers different accessories:

Mounting flange KLC



- The mounting flange KLC serves for to the admission, attachment and adjustment of the UV flame detector.
- Two overall heights with 7 and 13 mm are available. By means of an O-ring the mounting flange KLC can be simply sealed to the burner housing.

Adapter ADP



The ADP adapter makes it possible to mount the UV flame detectors KLC 10 with additional axial alignment directly on a combustion chamber opening. 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.

Connection

Electrical connection

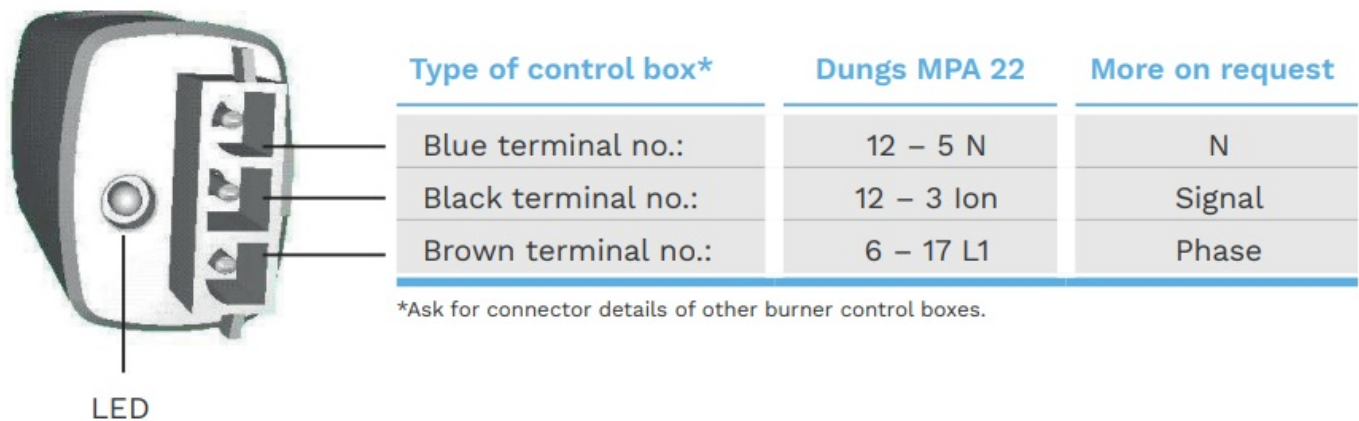
DANGER: Danger to life caused by electrical current!

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.

Connector diagram



Storage

- Do not unpack any packed UV flame detector KLC 10 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:** -20 °C to +60 °C
- Store dust-free.
- Avoid mechanical shocks and damage.

Description

Functional description KLC 10

The KLC 10 is a UV flame detector specially designed for single burner applications that produce almost no radiation in the visible light spectrum or operate with very low flame modulation. The design of the UV sensor ensures that the flame detector does not react to background radiation from hot refractory or from any other infrared light source. Adjustments during commissioning and maintenance are not necessary! The flame signal intensity can be easily recognised via an LED as an optical display. The UVTCom readout tool with the BST-Com PC software enables the flame signals to be displayed and logged. The UV flame detector provides the burner control with the safety-related and switched ionization current simulation signal.

The KLC 10 can be connected directly to the ionisation or LDR input of the burner control. It is compatible with other devices of the KLC series in its dimensions, connection dimensions and pin assignment. All accessories are therefore identical and reduce the variety of parts in production and service. According to EN298:2012-11, it is mandatory for the burner control box of the KLC 10 model to carry out a flame test after the control shutdown (post-flare control). The flame detector must be checked at least once every 24 hours. This checks both the burner for possible afterburning and the UV tube itself for integrity. Otherwise, use the KLC 11 model.

Optionally function blocks for KLC 10

Relay module for flame detectors RMF 1

The UV flame detector KLC 10 is a low power signal out-put 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 the operating manual of the RMF1 in its current version.

Operation of the UV flame detector

Test of the UV flame detector

To ensure the 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 ionization current simulation 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.

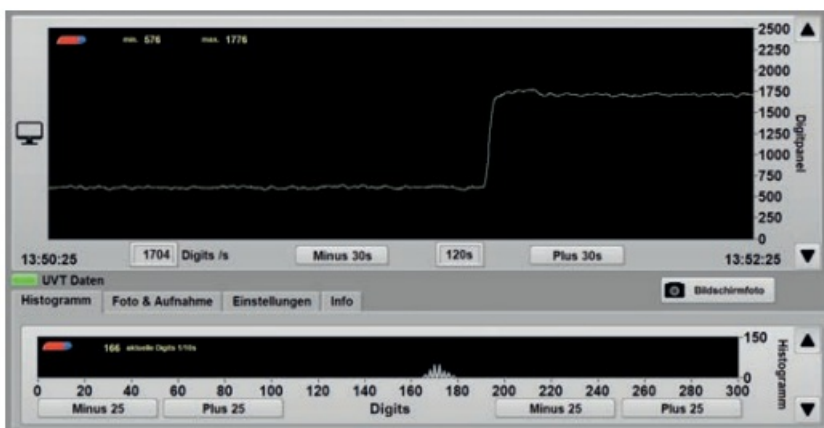
Operating indicator LED

Via the built-in LED the UV flame detector KLC 10 is indicating 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.

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 KLC 10:

- 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 BSTCom operating instructions.

Maintenance and servicing

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!

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 50°C, the intervals are shortened.

Safety-related check

Due to the natural aging of the UV-tube (10,000 h by ambient temperature less than 50°C), a safety-related check has to be done during every commissioning and maintenance. The following steps should be checked:

- 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 a new start-up or directly after darkening the flame detector.

Behavior in case of error

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

Troubleshooting

Description / Reason / Remedy

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

Order data

The UV flame detector KLC 10 is available from BST Solutions under the following order data:

Part /Version /Article No.

UV flame detector KLC 10 / 230 R	Optical direction radial	611145021000
UV flame detector KLC 10 / 230 RS		611145021160
UV flame detector KLC 10 / 230 RA	Optical direction radial and axial* Optical direction radial and axial*	611145061000
UV flame detector KLC 10 / 230 RAS		611145061160

*axial alignment reduces sensitivity by about 40%.

In accordance with the safety requirements of EN298:2012-11, only the UV flame detector type KLC 11 is permitted for burner control that are not connected to a permanent power supply and whose flame amplifiers do not check for the presence of a flame after the control shutdown.

Accessories

Following accessories are offered by BST Solutions:

Part /Version /Part number

Mounting flange KLC	overall height 7 mm	665001010000
Mounting flange KLC		665002010000
Angle adapter KLC*, standard mirror	overall height 13 mm	615001020000
Angle adapter KLC*, stainless steel mirror	Accessory for radial mounting applications	615001020000
ADP 10 – UV*		575010512110
Relay Module Flame detector RMF1/230	Accessory for radial mounting applications	640480002000
Read out unit UVT-Com	Adapter KLC , heat insulating up to 180°C, R ½“, quartz glass	731000081081
Connection cable KLC, 600 m m long	230 V version	661060040100
Connection cable KLC, 1000 m m long		661100040100
Connection cable KLC, 2000 m m long	Opto-adapter, USB interface, Software BST-Com via download	661200040100
Connection cable KLC	600 mm long	On request
	1000 mm long	
	2000 mm long Different length	

*only to use with KLC 10 axial and radial


Contact

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Subject to technical changes | © BST Solutions 2021

Documents / Resources

 <p>Flamnitec BST SOLUTIONS</p> <p>Operating Manual UV Flame Detector KLC 10</p>	<p>Flamnitec KLC 10 UV Flame Detector [pdf] Instruction Manual KLC 10 UV Flame Detector, KLC 10, UV Flame Detector, Flame Detector, Detector</p>
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References

- [Sell.com : Buy. Sell. Trade.](#)
- [Kundenspezifische Flammenüberwachung | BST Solutions](#)

Manuals+.