

# Flame Detector **FLUS 06/ FLS 09**

## Technical Documentation

### Instructions of

- Assembly
- Commissioning
- Operation
- Trouble- and fault diagnosis
- Maintenance
- Repairs



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DIN-DVGW: NG2530BL0056

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First-rate engineering and continuous optimization of products and systems, supported by extensive in-house research and development, ensure fulfilment of all specific operational requirements and sustain great flexibility.

Power of innovation, technical perfection and reliability of all products account for SAACKE's technological leadership. Competent project management, comprehensive operational advice, and a worldwide service network stand for customer proximity and partnership with a guaranteed future within the industrial thermal market



Combustion and Energy Systems



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## 1 Safety

This technical document will help you to become familiar with the flame detector and to use it in an optimal way for the purpose for which it is intended.

The flame detector is designed and constructed in accordance with all approved technical rules, applicable labour laws and safety regulations. The result is a plant which provides a maximum of personal safety to the operator.

This technical document includes instructions to help you operate the flame detector safely and properly. It will help you to prevent hazardous situations from arising, to minimise repair costs and reduce failure times and therefore make it possible to increase the reliability and durability of the flame detector.

Usually it is necessary to supplement this technical document with prevailing national laws and regulations e.g. for accident prevention or environmental protection.

This technical document must always be kept available for reference in the installation area of the units.

We shall use the following warning signs in documents to draw your attention to peculiarities or potential hazards:



This sign will be used if failure to comply strictly with operating instructions, working instructions or working procedures etc. could result in ***injuries or fatal accidents***.



This sign will be used if failure to comply strictly with operating instructions, working instructions or working procedures etc. could lead to ***damage to the flame detector***.



This sign will be used to draw your attention to a ***special feature***.



## 1.1 General Safety Information

**To guarantee safety at work and the safety of personnel and plant, the following safety information has to be observed:**

The flame detector must only be used for the specific purpose for which it is intended. Any other or deviating use of the plant is not covered by its specification. We shall not be liable for any damages which may arise from failure to fulfil the foregoing.

The flame detector shall not be misused nor shall its functions be changed or altered.

Prior to each start-up, all technical requirements for safety have to be fulfilled. This is the fundamental precondition for perfect and safe operation of the plant.

Protective installations shall be removed only when the drives have come to a dead standstill and when the plant is safe to work upon.

Maintenance work and inspection on the flame detector are only allowed after the plant has been shut-down and all drives have come to a dead standstill. Measures must be taken, before maintenance work or inspection begins, to prevent the plant being unintentionally restarted.

Operating personnel must inform the responsible manager or supervisor immediately of defects or malfunctions which occur during operation of the plant.

All modifications to control, switching and safety equipment are forbidden.

Only original spare parts from SAACKE GmbH & Co. KG may be used.

SAACKE GmbH & Co. KG reserve the right to implement technical modifications which become necessary to improve the flame detector.

The owners, supervisors and operating personnel must follow the above mentioned regulations to guarantee safe operation of the plant.



Specialists or trained personnel must be familiar with the peculiarities, installation and operation of the flame detector. In addition the operating personnel must be:

- Qualified, trained or authorised to disconnect / disconnect, ground and mark electric circuits, devices or other systems according to the to the current safety engineering standards.
- Qualified or trained according to the current safety engineering standards on application and maintenance of adequate safety systems.
- Trained first aid.

## 1.2 Electrical Connection



- Parts of this flame detector are under high voltage. Warning information is , therefore, to be seriously taken into account as otherwise electrical hazards or heavy body injuries can occur.
- A safe and trouble-free operation of this flame detector depends on the appropriate transport, careful storage, assembly and operation. It is not allowed to connect the flame detector if it presents outer damages.
- During the electric installation, the „Assembly regulations of power installations with nominal voltage below 1000 V" (VDE 0100) must be followed!
- We shall not be liable for any plant damages or malfunctions which may arise from failure to fulfil with this documentation!

### 1.2.1 Protective Conductor Connection

The protective conductor connection is performed via a special PE-connection (terminal 13) of the FLUS 06 flame detector.



When the controller is under an operating voltage, each disconnection of the protective conductor inside or outside the controller can lead to an electric shock. Interruption of the protective conductor is not allowed.

### 1.2.2 Power supply

Connection to power supply (230 VAC) is performed with the terminals 14 (N) and 15 (L) of the FLUS 06 flame detector.

Before the connection is carried out it is important to always check whether the connecting device is suitable for the supply voltage.



The power supply must be carried out by using fuses; Limit the power (Fire protection EN 61010-1) to 150 VA!



### 1.3 Free spaces

In order to properly fit the FLUS 06 flame detector in a switchboard or control box it is important to consider suitable free spaces so that an undisturbed cooling air flow can be ensured in the energised areas. Therefore, appropriate minimum distances shall be kept from equipment with high waste heat!

### 1.4 Cooling

The FLUS 06 flame detector and the FLS 09 flame scanner shall only operate within the allowed temperature ranges (see chapter 3).

In case the ambient temperature within the switchboard or control box increases to levels above the allowed operating values of the FLUS 06 flame monitoring unit (see chapt. 3), corresponding cooling measures (fan, etc.) are provided.

If the temperatures within the FLS 09 flame scanner (at the burner) exceed the allowed operating values, the FLS 09 flame scanner must be cooled during burner operation with the corresponding cooling air.



If the parameters given are continuously exceeded, damage of the units will result!

### 1.5 Maintenance and Repairs

All maintenance and repair work shall be performed only by specialists or trained personnel.

Before starting work on electrical equipment like e.g. inspection or cleaning, the plant must be brought to a standstill and kept at a standstill until the work is finished.

After repairing electrical equipment, all the provided safety protective measures have to be tested.



- During all maintenance and repair work measures must be taken to prevent unintentional switching on of the plant power supply. Otherwise you risk electrical hazards or fatal injuries when the plant is set unintentionally in motion!
- All areas cordoned off with safety protection covers or fences shall only be entered for maintenance or repairs of the FLUS 06 flame detector or FLS 09 flame scanner during plant standstill and by the respective authorised and qualified personnel.



## **2 Design and Function**

### **2.1 Preface**

The FLUS 06 Flame monitoring unit combined with the corresponding FLS 09 flame scanner (referred to below as the flame detector) is a safety device for monitoring of flames (e.g. pilot, ignition, booster and main-burner flames) on the basis of optical flame detecting.

In firing systems, the flame detector has the function of registering the burner flame without being influenced by conditions in the combustion chamber (e.g. incandescent wall linings, for instance). In case of flame detachment (flame failure), a fail-safe configuration is generated for the absence of the flame, resulting in shut-off of the fuel supply to the malfunctioning burner.

The flame detector has the following characteristics:

Digital signal processing;

Dynamic self-monitoring

Appropriate range of control and monitoring elements.

The above characteristics enable the flame detector to achieve a high safety level, high availability and high ease of maintenance in functional terms.

The additional requirements made in DIN VDE 0116 and TRD 604 for 72 hour operation with respect to safety devices are fulfilled.

A positive operation potential-free switching contact and a non-positive operation signalling contact are provided at the flame detector's output.

### **2.2 Intended use of the units**

The flame detector is a safety device and conforms with DIN EN 298 and DIN EN 230 standards as well as with the rules specified in the Pressure Equipment Directive 97/23/EC.

It is used primarily in SAACKE firing plants for power and heat generating systems that are operated with oil-, gas- or dual fuel burners.

In firing systems, the flame detector has the function of registering the burner flame without being influenced by conditions in the combustion chamber (e.g. incandescent wall linings, for instance). In case of flame detachment (flame failure), a fail-safe configuration is generated for the absence of the flame, resulting in shut-off of the fuel supply to the malfunctioning burner.



## 2.3 Design

### 2.3.1 FLS 09 Optical Flame scanner

The components of the sensor circuitry are installed on a PCB in a cylindrical housing.

The housing is equipped with an optical receiving port protected against spray water on the side and is intended for installation in a corresponding feed tube at the burner.

The flame scanner fulfils the requirements of Degree of Protection IP 65.

### 2.3.2 FLUS 06 Flame monitoring unit

The components of the functional modules are installed on a PCB. This is located in a housing for installation on DIN (top-hat) section rails (housing type HE) or a base plate (housing type ME).

The design is, for instance, suitable for installation in electrical control cabinets. The instrument is connected at the bottom on its front panel, at an angle of 90°, by means of screw terminals.

## 2.4 Description of Function

### 2.4.1 FLS 09 Optical Flame scanner

Optical flame scanners convert the pulsing radiation parameters of the burner flame into an electrical signal variable. The analogue signals then available are applied to an electronic converter, which multiplexes the signal alternately to the inputs of the two separately structured processing channels.

In the processing channel, the signals are digitised, thus producing conversion of the original signal variables to the evaluation criterion of "pulse duration" (information carrier: Flame radiation frequency).

The cable connection to the flame monitoring unit takes the form of a 5-pole statically shielded cable.

The pulse voltages transmitted from the FLS 09 Optical Flame scanner are regenerated in the corresponding input stages of the FLUS 06 and further processed in the following functional units.

Reliable monitoring of non-equivalent switching conditions and of response and switching-off delay before the output relays at the end of each signal-processing channel are activated, is implemented at the output from the signal-processing channels. Non-equivalence troubles and deviations in time delays beyond the permissible limits result in immediate tripping of the "Flame out" signal.

The switching states of the signal-processing channels and output relays are indicated on the front panel of the instrument by means of a red and a green LED.

The following connections are also provided:

Auxiliary-energy feed;

Functional earthing (grounding) connection for shielding purposes;

Flame scanner connections

Connection of external circuits to a positive operation switching contact for the "Flame out" or "Flame existing" switching states;

Connection of external circuits to a non-positive operation switching contact for the "Flame out" or "Flame present" switching states;

Connection of external measuring instruments to a measuring output of 0 – 20 mA, for remote display of flame intensity.

For the parameter adaptation between the firing plant and the flame monitoring unit, in an IR-flame scanner FLS 09 at a potentiometer in the FLUS 06 different flame intensity stages can be adjusted. In case of an UV flame scanners FLS 09 UV, a FLUS 06 UV will be used. In this case it is not necessary to set different intensities and, therefore, an adjustment device is not provided.

A two-step green LED display is provided for signalling the flame intensity (0 ... 100 %/>100 %).

The transmission range for digital frequency evaluation permits a signal cycle between 10 and 300 Hz; mains frequency signals of 50/60 Hz and their harmonic multiples are suppressed.

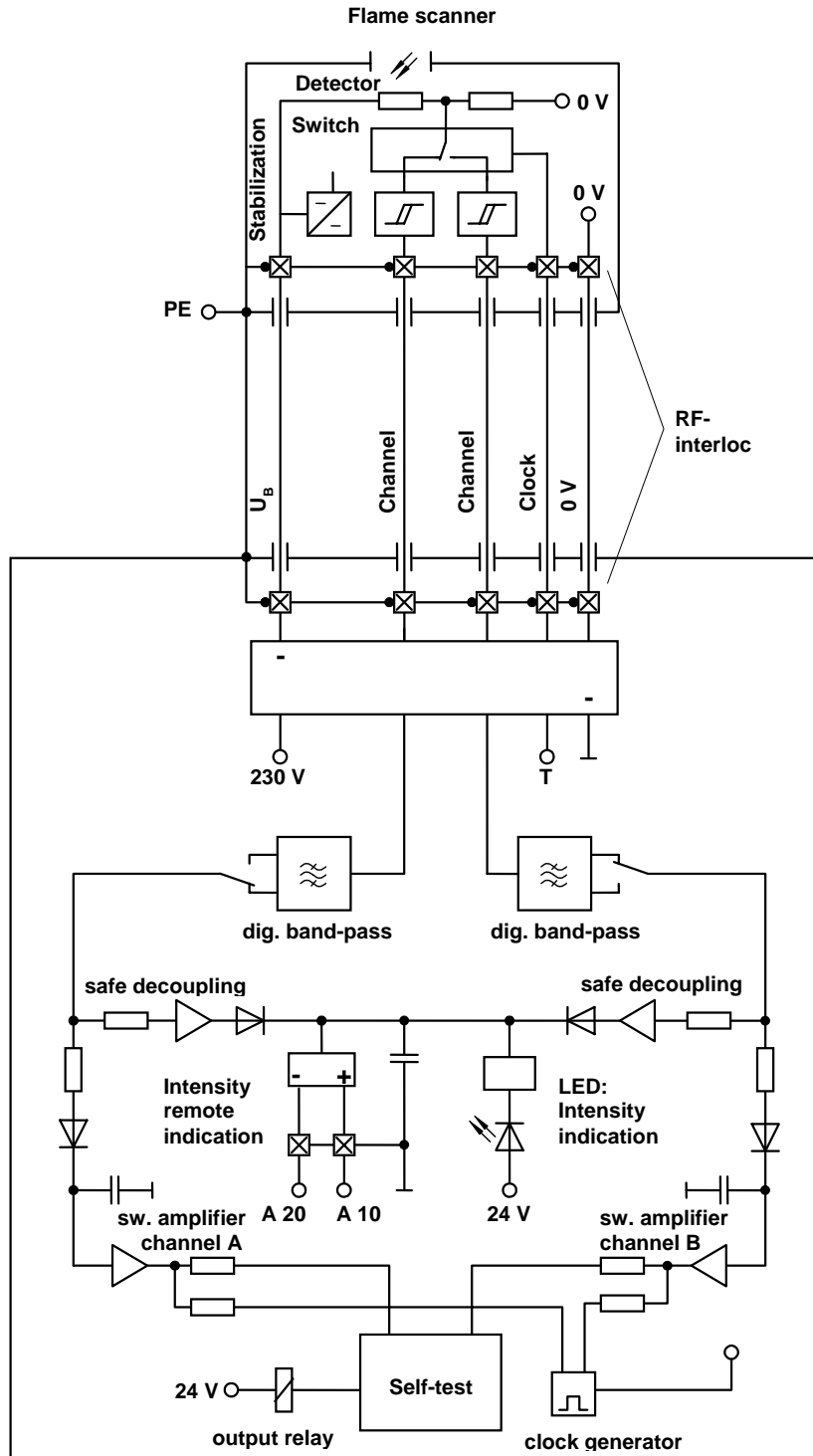
The flame detector is fitted with a self-monitoring circuit. The working principle of this circuit consists of two fundamental parameters:

Signal processing via two separately structured and mutually activated transmission channels

Continuous monitoring of output level for non-equivalence.

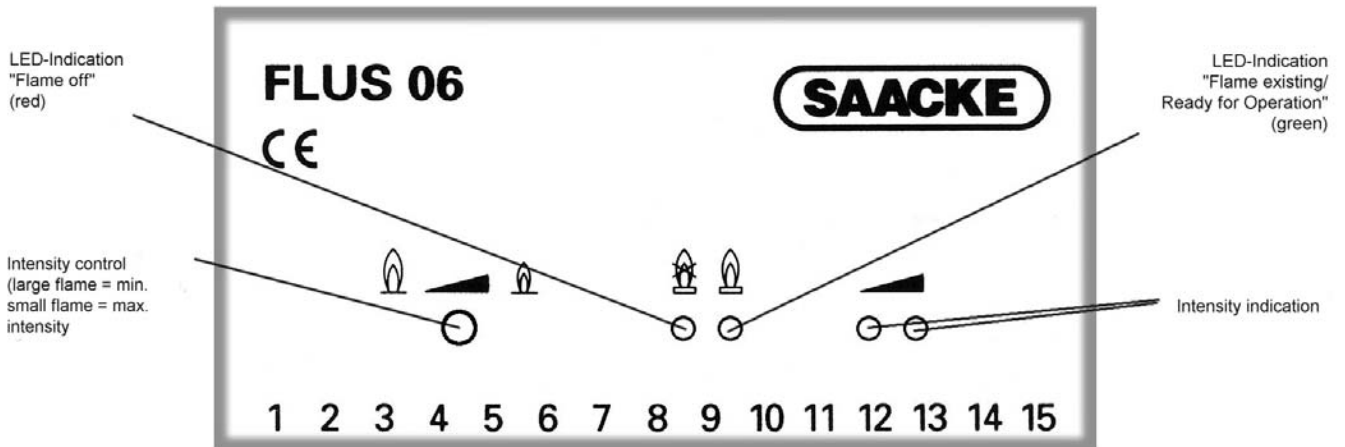


### 2.4.2 FLUS 06 Flame monitoring unit



### 3 Operation

#### 3.1 Display and Operating Elements FLUS 06 IR



The flame detector is operated using the display and operating elements found on its front side.

The flame detector is ready for operation, approximately 10 s after activation of the energy supply.

The following displays must appear:

Display "Flame out" (red LED) lights up

The following changes in the display must occur after burner ignition and when the flame is burning correctly:

Display "Flame out" (red LED) goes out

- Display "Flame existing" (green LED) lights up and flickers in the cycle rhythm of the self-monitoring.

Both green LEDs serve as indication of flame intensity. Depending on the flame intensity, either both LEDs light up or only one lights up:

Low flame intensity: only the front LED lights up

High flame intensity: both LEDs light up

With the intensity potentiometer, the intensity indication is matched to the flame intensity of each burner.

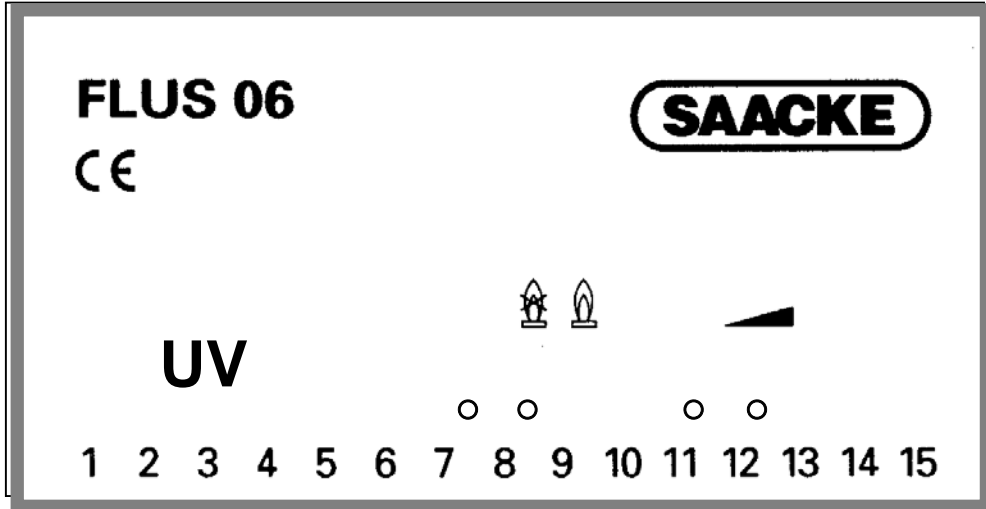
Left-hand position: Large flame = Low amplification

Right-hand position: Small flame = High amplification

If the FLUS 06 is used with a FLS 09 UV, the intensity potentiometer must be in the right-hand position in order to assure a safe and stable flame detection.



### 3.2 Display and Operating Elements FLUS 06 UV



The flame detector is operated using the display and operating elements found on its front side.

The flame detector is ready for operation, approximately 10 s after activation of the energy supply.

The following displays must appear:

Display "Flame out" (red LED) lights up

The following changes in the display must occur after burner ignition and when the flame is burning correctly:

Display "Flame out" (red LED) goes out

Display "Flame existing" (green LED) lights up and flickers in the cycle rhythm of the self-monitoring.

Both green LEDs serve as indication of flame intensity. Depending on the flame intensity, either both LEDs light up or only one lights up:

Low flame intensity: only the front LED lights up

High flame intensity: both LEDs light up

With the intensity potentiometer, the intensity indication is matched to the flame intensity of each burner.

Left-hand position:

Large flame = Low amplification

Right-hand position:

Small flame = High amplification

A flame intensity matching to the individual burner by means of an intensity thermometer as in the FLUS 06 is not required and, therefore, not provided.

Proper adaptation is assured by an optimum alignment of the flame scanner FLS 09 UV in direction of the flame.

## 4 Specification

### 4.1 FLS 09 Flame scanner

<b>General Data</b>	
<b>Environment / Installation</b>	
Ambient temperature	-10 – +60 °C, max. atmospheric humidity = 80% at 35 °C
When transporting and storing	-20 °C - +70 °C, max. atmospheric humidity = 80% at 35 °C
Type of mounting	In the tube of the burner (Tube inner Ø = 24 mm)
Mounting position	Any
Sight angle	abt. ±40° to the optical axis
Dimensions Ø x D	22 x 135 mm (FLS 09,...-S); 22 x 200 (FLS 09-L)
Weight	400 g
Colour	-/-
Housing material	Brass, nickel-plated
Resistance to disturbance	According to PrEN 298 (1998/1999), IEC 1000-4-2 - 6
CE marking	Certification CE-0085BL0172
<b>System of protection / Climate classification</b>	
Degree of protection	IP65
<b>Input variables</b>	
Spectral radiation range	900 – 2800 nm
<b>Inputs</b>	
Power supply to the flame scanner	Voltage: $U_{H1max}$ 42 VDC
	$U_{H1min}$ 22 VDC
	Current: $I_{H1max}$ 10 mA
<b>Outputs</b>	
Flame detection signal	Pulse frequency:        10 – 300 Hz
	Pulse amplitude:        ≥ 15 mV



## 4.2 Flame scanner FLS 09 UV

General Data	
<b>Environment / Installation</b>	
Ambient temperature	-10 – +60 °C, max. atmospheric humidity = 80% bei 35 °C
When transporting and storing	-20 °C - +70 °C, max. atmospheric humidity = 80% bei 35 °C
Type of mounting	In the tube of the burner (Tube inner Ø = 24 mm)
Mounting position	Any
Sight angle	ca. ±5° to the optical axis
Dimensions Ø x D	22 x 135 mm (FLS 09 UV); 22 x 200 (FLS 09 UV –L)
Weight	400 g
Colour	-/-
Housing material	Brass, nickel-plated
Resistance to disturbance	According to PrEN 298 (1998/1999), IEC 1000-4-2 - 6
CE- marking	Certification CE-0085BL0172
<b>System of protection / Climate classification</b>	
Degree of protection	IP65
<b>Input variables</b>	
Power supply to the flame scanner	260 – 400 nm
<b>Inputs</b>	
Flame scanner power supply	Voltage: $U_{H1max}$ 42 VDC $U_{H1min}$ 25 VDC Current $I_{H1max}$ 15 mA
<b>Outputs</b>	
Flame detection signal	Pulse frequency: 10 – 200 Hz Pulse amplitude: $\geq 25$ m V



### 4.3 FLUS 06 Flame monitoring unit, FLUS 06 UV

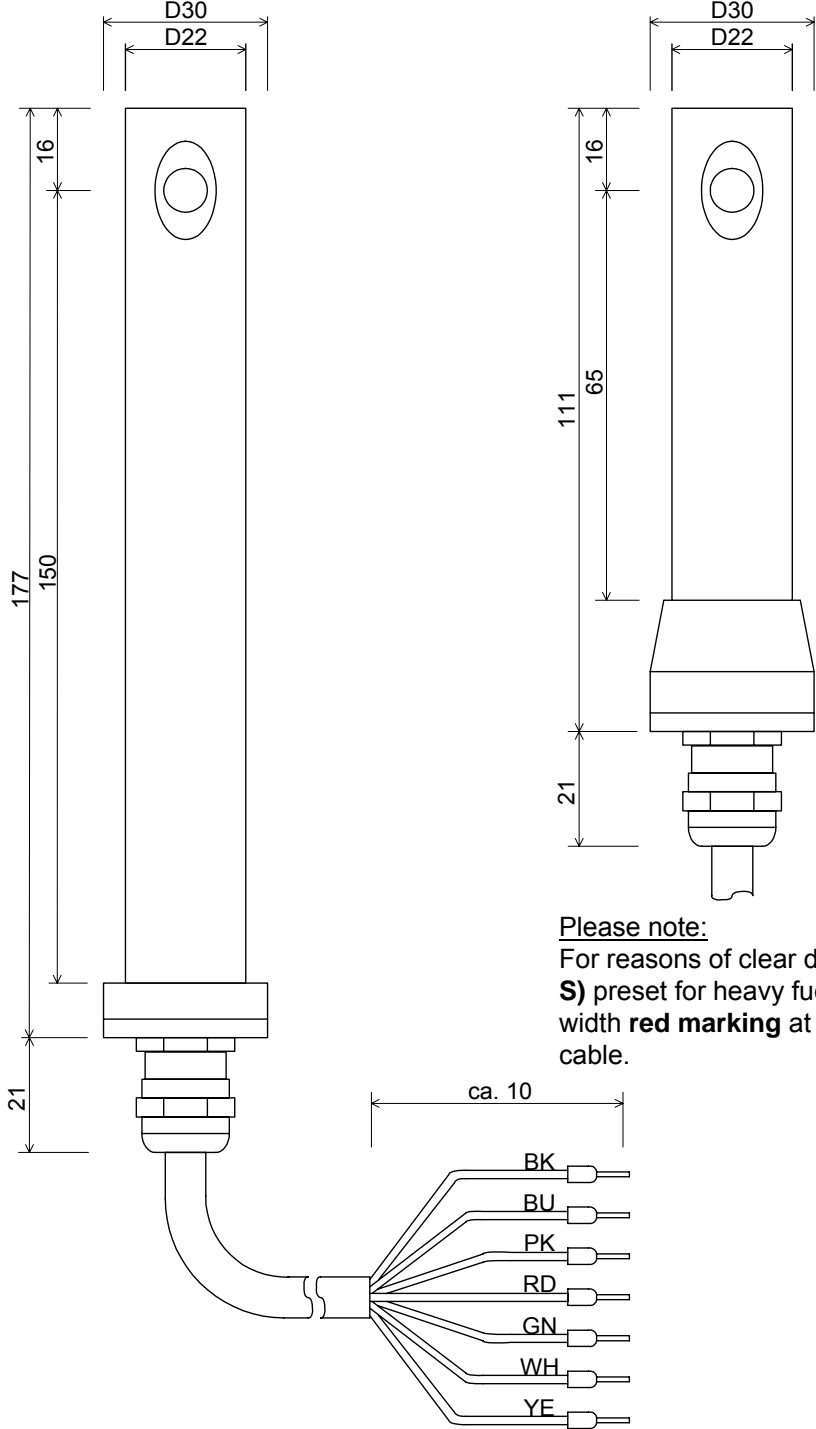
<b>General Data</b>	
<b>Device's front side</b>	
Material of the front panel	Aluminium
LED-display	2 LEDs for status: "Flame out" "Flame present"  2 LEDs for intensity indication
<b>Environment / Installation</b>	
Ambient temperature	-10 – +60 °C, max. atmospheric humidity = 80% at 35 °C
When transporting and storing	-20 °C - +70 °C, max. atmospheric humidity = 80% at 35 °C
Type of mounting	Mounting plate fastening
Mounting position	Any
Dimensions W x H x D	100 x 75 x 110 mm
Weight	500 g
Colour	Front panel: Aluminium Housing: grey / black
Housing material	Polycarbonate
Resistance to disturbance	According to PrEN 298 (1998/1999), IEC 1000-4-2 - 6
CE marking	Certification CE-0085BL0172
<b>System of protection / Climate classification</b>	
Degree of protection	IP20
Connections (when plugged in)	IP 20
<b>Dynamic characteristics</b>	
Self-monitoring cycle $t_{CYCLE}$	Approx. 1.5 s for safety time margin $t_{V OFF} \leq 1$ s



<b>Inputs</b>													
Operating voltage	230 VAC (+10% – -15%), 50 – 60 Hz, approx. 5 VA												
Flame scanner	Pulse frequency: 10 – 300 Hz Pulse amplitude: $\geq 10$ mV												
<b>Outputs</b>													
Output contact (safety function)	<b>1 Piece</b> Type N.O. contact Permissible turn-on voltage max. 250 V AC / 30 V DC min. 6 V AC/DC Permissible switching current max. 0,5 A min. 1 mA (for 50 mA critical contact load) Switching rating: max. 15 W DC; max. 125 VA AC (cos. $\varphi = 0,4$ ) Fusible cut-out element: 0,5 A (TR 5-T/Wickmann)												
Operation signalling contact	<b>1 Piece</b> Type N.O. contact Permissible turn-on voltage max. 250 V AC / 30 V DC min. 6 V AC/DC Permissible switching current max. 0,5 A min. 40 mA												
Power supply to the flame scanner	<b>1 Piece</b> <table style="margin-left: 20px;"> <thead> <tr> <th></th> <th><b>FLS 09</b></th> <th><b>FLS 09 UV</b></th> </tr> </thead> <tbody> <tr> <td>Voltage:</td> <td><math>U_{H1max}</math> 37 VDC</td> <td>37 VDC</td> </tr> <tr> <td></td> <td><math>U_{H1min}</math> 22 VDC</td> <td>30 VDC</td> </tr> <tr> <td>Short circuit current:</td> <td><math>I_k</math> 40 mA (max. 1 min)</td> <td></td> </tr> </tbody> </table>		<b>FLS 09</b>	<b>FLS 09 UV</b>	Voltage:	$U_{H1max}$ 37 VDC	37 VDC		$U_{H1min}$ 22 VDC	30 VDC	Short circuit current:	$I_k$ 40 mA (max. 1 min)	
	<b>FLS 09</b>	<b>FLS 09 UV</b>											
Voltage:	$U_{H1max}$ 37 VDC	37 VDC											
	$U_{H1min}$ 22 VDC	30 VDC											
Short circuit current:	$I_k$ 40 mA (max. 1 min)												
<b>Interfaces</b>													
Measuring output for flame intensity	<b>1 Piece</b> Output current: 0 – 20 mA max. burden: 500 $\Omega$ Floating voltage: 22 – 26 V Intrinsic error: $\pm 2\%$												

4.4 Dimension sheets

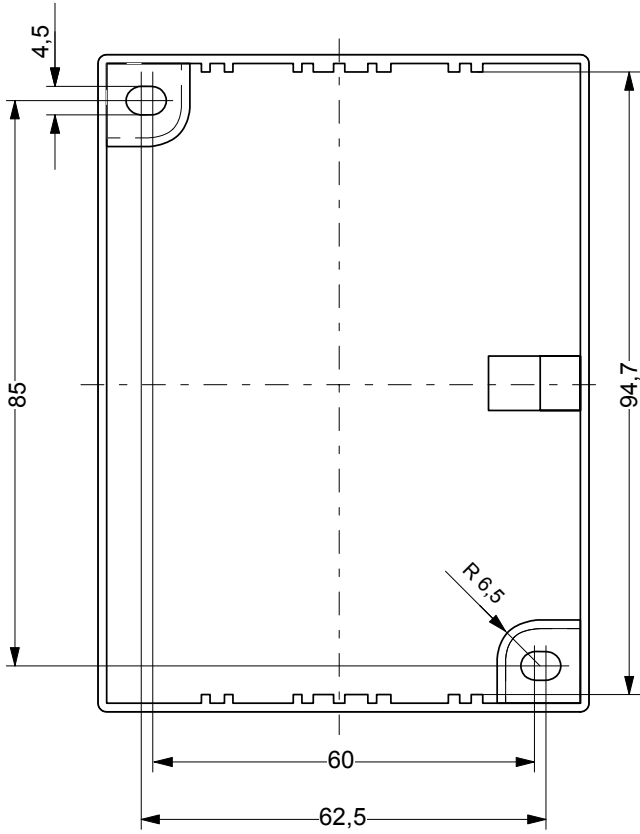
4.4.1 FLS 09 Flame scanner



**Please note:**  
For reasons of clear distinction, the scanner **FLS 09 (-S)** preset for heavy fuel oil operation has an abt. 2 cm width **red marking** at the stuffing box union around the cable.



#### 4.4.2 Flame Monitoring Unit FLUS 06



## 5 Mounting and Commissioning

### 5.1 Rules for mounting

#### 5.1.1 FLS 09 Flame scanner

The processes occurring in combustion also generate a pulsing radiant fraction of the flame (flame flicker), the oscillation cycle (flame frequency) of which is relatively fast at the flame root (i.e., in the vicinity of the burner muzzle) and becomes slower toward the tip of the flame.

The flame scanner should

be aligned for individual monitoring in such a way that the first third of the flame is observed and

register in the "Flame out" state only the residual radiation caused, for instance, by reflected radiation.

The flame monitoring unit installed down-circuit the flame scanner is then able to differentiate between the "Flame present" and "Flame out" states.

Correct positioning of the flame scanner is therefore a decisive precondition for a high level of availability.



The sensor cable must be installed spatially separate from the mains and control lines and from high-energy heavy-current transmission lines and equipment (e.g. ignition lines, ignition transformers, electric motors, power relays, etc.). Installation of these lines parallel to mains lines in cable ducts is not permissible. Too high disturbance radiation can lead to sporadic problems with the flame detection and even prevent it.

Optical flame scanners are supplied with a connecting cable of approx. 3 m length. Extension of the supply cable up to 100 m between the flame scanner and the flame monitoring unit is permissible. When creating this extension on site, it is absolutely necessary to use a separate, five-core shielded extension line, and to make sure that the shielding is continuous and that the shield is connected correctly to the FLUS 06 flame detection mechanism. We recommend for this purpose the use of a separate screened five-core extension cable suitable for connection to the sensor connecting line using suitable connecting elements.

The sensors must be installed on the viewing port in such a way that the burner flame is easily visible throughout the entire operating range of the firing system. It should be noted that the area of the burner flame registered by the sensor becomes smaller as the length of the feed tube increases. For orientation when aligning the scanner with the flame, a mark has been made in the form of a counterbore in the casing on the side turned away from the flame detector window on the flange with cable union.



### 5.1.2 FLUS 06 Flame monitoring unit

The installation position of the flame monitoring unit must be easily accessible in order that it is possible without difficulty to observe the optical control elements even during operation of the firing system. A unit with the same markings must be installed as a replacement when the flame monitoring unit is changed.



It must be noted that a maximum ambient temperature of 60° C must not be exceeded at the installation location.

## 5.2 Installation

### 5.2.1 External Installation

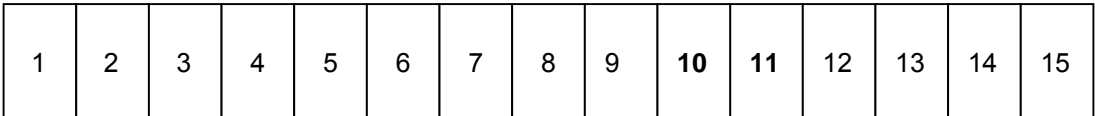
The flame detector in operating condition supplies the "Flame present" or "Flame out" status signal to two potential-free contact outputs. Further signal processing must be performed in the control system adapted to the individual firing system.

The non-positive operation output contact should be protected externally against overcurrent. This can be accomplished not only by using a fuse but also by means of other elements, such as relay coils, etc.

In order to ensure safety, a check for correct installation should be made during wiring of the output contacts by the user.

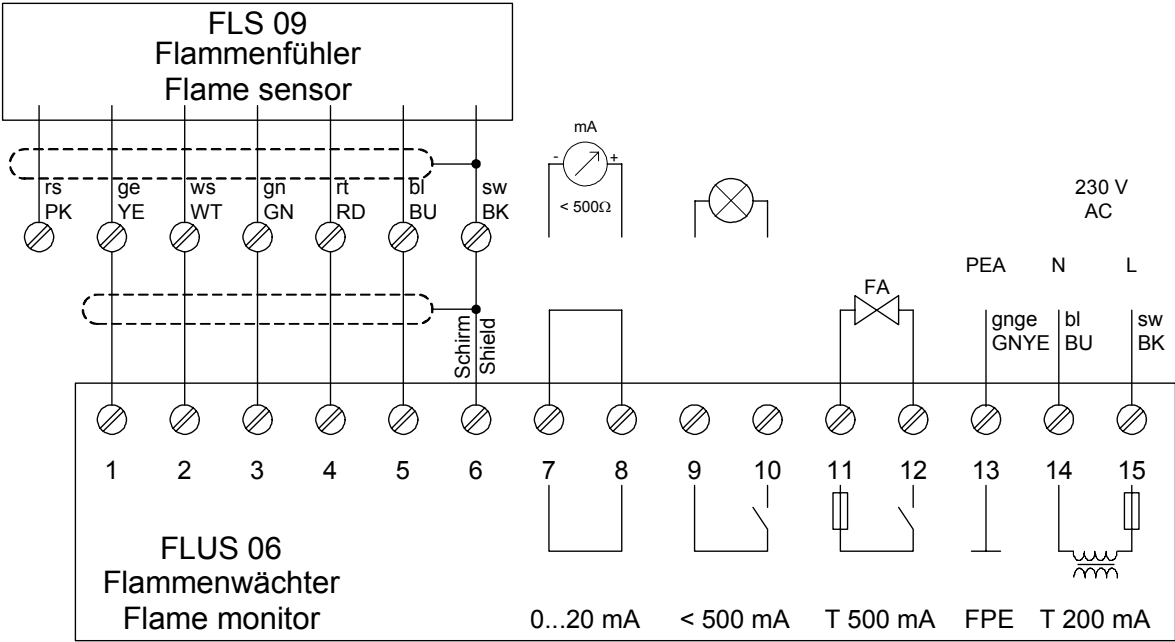
## 5.2.2 Connecting the Instrument Connections

Flame scanner	Intensity 0 ... 20 mA	Signalling contact	Outlet - contact (safe)	230 V AC
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1)

- 1) Connection 13 must in all cases be grounded; functional grounding for shielding purposes
- 2) If no remote indicator is connected, terminals 7 and 8 must be bridged.





### 5.3 Commissioning

#### 5.3.1 Checking of Emergency Flame Trip

The shut-off tests on the flame detector must be done when the boiler is warm enough to operate.

A simulation of a detached/extinguished flame is needed. This can be done for example by shutting off the fuel supply to the burner monitored by a flame scanner or by blacking out the flame detector window on the flame scanner for a few seconds.

Check to make sure that the signal to shut the safety shut-off/isolating mechanism is tripped within the time  $t_{\text{off}} \leq 1 \text{ sec.}$  after the flame goes out.

the green LED goes out

the red LED lights up

Care must always be taken that the sensitivity of the flame detector is only adjusted as high as necessary for a safe and reliable monitoring of the flame in all load rates of the burner.

#### 5.3.2 Adjusting the basic sensitivity when problems arise

When problems occur with detection of the flame or during the shut-off tests or from trouble with extraneous light, apart from changing the alignment of the flame scanner it is also possible to alter its basic sensitivity, see maintenance instructions.







## 6 Trouble and Fault Diagnosis



**The flame detector is a safety device and conforms with the following standards:**

- Work on or changes to it may therefore be performed only by the manufacturer's specialised staff or by persons appointed for this purpose in co-ordination and agreement with the manufacturer.
- Any work on or changes to the equipment by unauthorised persons impermissible!

## 7 Maintenance

### 7.1 FLS 09 Flame scanner

The optical receiving port of the flame scanner and the appurtenant viewing port on the firing system must be cleaned at certain intervals (these intervals will depend on the operation conditions of the firing system).

Checking of the emergency flame shut-down tripping system must be included in the maintenance activity cycle.

This applies in particular to heavy fuel oil firing plants where there is a risk of coking. Here a check should be done daily if possible, but once a week at the very least.

One way to do this is by shutting down the burner via a separate shut-off mechanism for the fuel supply. Otherwise, the burner should be shut down while the boiler is warm enough to operate and started up again immediately.

In each case, always check that the flame detector shuts off within the prescribed safety time and that no signal for extraneous light is given when the burner is started up again.

### 7.2 FLUS 06 Flame monitoring unit

The FLUS 06 flame monitoring unit is maintenance-free.

If the key pad is dirty, the following measures shall be carried out:

Carefully clean the dirt with a clean cloth and one of the listed detergents

Wipe with a clean cloth

Generally recognised as safe detergents	Do not use!
Methylated spirit	Solvents such as dichloromethane, ether, chloroform
Household detergent	
Isopropanol	Acetone
Glass detergent	Methyl ethyl ketone
	Acids
	Caustic soda (undiluted)



## 8 Repairs

### 8.1 Repair Instructions

In the event of defects, the flame detector or the flame scanner must be replaced.

Only the manufacturer is authorized to do repairs. In case of more complex errors, the flame detector or the flame scanner has to be exchanged.



When replacing the flame scanner or the flame detection mechanism it is necessary to use equipment with the same SAACKE ID number. Also, the adjustments must be transferred to the replacement mechanism and for safety reasons, shut-off tests should be done once again.

### 8.2 Replacement of Spare Parts

To order a spare part, enter the respective SAACKE part number in the appropriate column of the order form.

In addition to the part number, the plant number is also needed so that the correct part can be ordered from SAACKE.

# Flame Detector FLUS 06 / FLS 09

Spare Part	Part Number
FLUS 06 Flame monitoring unit	7-8385-527356
FLS 09 Flame scanner with approx. 3 m connecting cable	7-7955-527357
Flame scanner FLS 09 (-S) with abt. 3 m connecting line (for heavy fuel oil)	7-7955-531730
Flame scanner FLS 09 (-L) with abt. 3 m connecting line (extended length design)	7-7955-530812
Flame monitoring unit FLUS 06 UV	7-8385-602164
Flame scanner FLS 09 UV-5 with abt. 3 m connecting line	7-7955-602167
Flame scanner FLS 09 UV-5L with abt. 3 m connecting line (extended length design)	7-7955-602168
Intensity indication PQ 48 s	7-7374-252162
Mount for FLS	5-6510-603825
Adapter for FLS	5-7834-603827



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