

F200K Compact Flame Scanner



Hardware version 2.0 until 2.3

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1 General Information

These instructions must be read carefully and completely before commencing with any work. The basic prerequisite for working safely is compliance with all the specified safety instructions.

1.1 Validity of these Instructions

This document is valid for the F200K Compact Flame Scanner with hardware version 2.0 until 2.3.

For special characteristics of the HW 2.3, see also chapter 6.2 *Commissioning* General information.

The devices correspond to the following directives and standards::

European Directives:

- 2014/30/EU (EMC Directive)
- 2014/35/EU (Low Voltage Directive)
- (EU) 2016/426 Gas Appliance Directive (GAR)
- 2014/68/EU (Pressure Equipment Directive)
- 2011/65/EU (RoHS2)
- 2015/863/EU (RoHS2)

Harmonised European Standards:

- DIN EN 298:2012-11
- DIN EN 60730-2-5: 2015-10
- DIN EN 746-2: 2011
- DIN EN 61508: 2011 part 2 (requirements SIL 3)
- DIN EN ISO 9001:2015 Quality Management Systems
- ISO/IEC 80079-34:2018 Potentially explosive areas - Quality Management System (QAR)

USA and Canada:

- UL 372 – UL Listed

Product-Identification-Number: CE-0085 BO 0005

NOTICE

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1 General Information

1.2 Purpose

In single-burner and multiple-burner furnaces, the flame scanner performs a high-safety monitoring of the burner flame. When the flame goes out, the safe control state 'Flame' is reached.

It is mainly used in large-scale power plants, thermal power stations and chemical plants as well as for monitoring furnaces which are operated from.

- oil
- gas
- bio-mass
- dust coal
- chemicals and other waste products

1.3 Target Group

NOTICE

- ▶ All assembly, commissioning, troubleshooting and maintenance work may only be carried out by authorised and trained personnel.
 - ▶ The device may be operated and maintained only by those who are capable of doing so in terms of their level of knowledge and training.
 - ▶ For F200K, the covers must be removed for commissioning, but then only by authorised personnel. Any further opening or disassembly is not permitted.
The open flame scanner must be protected from ingress of dust and moisture.
Contact with the electronics is only permitted if ESD measures are observed.
 - ▶ Opening the devices is not permitted under any circumstances except for commissioning (F200K).
 - ▶ For safety reasons, access to parameterisation must be restricted to authorised personnel.
-

1.4 Safekeeping of the Manual

Store the manual and all related documents in a safe place.

The manual is part of the product and must be kept safe and be accessible to personnel at all times.

In addition, the following is important:

- The manual is available when required.
- The manual is kept for the entire service life of the device.
- The manual is available to the subsequent operator.

2 Safety

2.1 For Your Safety

The following symbols are used in this document to draw the user's attention to important safety information. They are located at points where the information is required. It is essential that the safety information is observed and followed, and that applies particularly to the warnings.



DANGER!

This draws the user's attention to imminent danger. If it is not avoided, it will result in death or very serious injury. The plant including its surroundings could be damaged.



WARNING!

This draws the user's attention to the possibility of imminent danger. If it is not avoided, it may result in death or very serious injury. The plant including its surroundings could be damaged.



CAUTION!

This draws the user's attention to the possibility of imminent danger. If it is not avoided, it may result in minor injuries. The plant including its surroundings could be damaged.

NOTICE

This draws the user's attention to important additional information about the system or system components and offers further tips.

The safety information is incorporated into the instructions.

Thus, the operator is requested to:

- 1 Comply with the accident prevention regulations whenever work is being carried out.
- 2 Do everything possible within his control to prevent personal injury and damage to property.

2.2 How to Use the Information

The necessary data for correct mounting, wiring, installation, operation and maintenance of the device are to be taken from the relevant instructions for the burner or combustion in the official language of the country.

2 Safety

2.3 Product Safety

NOTICE

This product is state-of-the-art technology and complies with the generally accepted safety-related rules and regulations. Every device is tested before delivery to ensure that it is working properly and safely.

- ▶ Only use this product when it is in perfect condition and in accordance with the manual, the prevailing regulations and guidelines and the applicable safety and accident prevention regulations.

NOTICE

The risk of fire, traffic, wind, tidal waves and earthquakes depends on the installation situation on site and must be evaluated separately.

2.4 Product-specific Dangers



DANGER!

The F200K is not designed to switch off the **fuel valves**.

- ▶ The subsequent signal processing must be carried out in the control system, which is adapted to suit the combustion plant.



WARNING!

The F200K is a safety device. Only specialist staff of the manufacturer or people approved by the manufacturer may intervene. No interventions by anyone else are permissible. This applies, in particular, in the event of a defective fuse.



WARNING!

Radio interference suppression of the output contacts

In the interests of safety, ensure when installing the output contacts that:

- ▶ the user carries out any necessary radio interference suppression circuitry in such a way that the contacts of the safe output (flame signal - flame present) cannot be short-circuited by defective components of the suppression unit.



WARNING!

The power supply of the flame scanner and the user interface with 24 VDC must be ensured by an external power supply unit, which supplies SELV or PELV.

3 Functional Description

3.1 Design

The compact flame scanner is composed of a cylindrical casing comprising an axial light incidence aperture, a processing status indicator at the rear of the unit and operational controls which can be accessed by removing the cover.

When closed the compact flame scanner complies with the requirements of IP66/67 (F200K) or IP66 (F200K..EX) protection degree.

The compact flame scanner is installed at the burner by optionally using the FH30, FV30, FH40, FV40 brackets or with an air-cooled housing of types FS50, FS51 or FS56.

The compact flame scanner consists of the following functional units:

- sensor unit providing for digitalisation of the flame signal
- digital frequency evaluation
- self-monitoring
- switching amplifier

The device is connected through an integrated standard plug and using the a connection cable required for this (8 pins, static shielded) with coupler.

The cable provides for the following connections:

- Infeed of power supply
- connection of the operational earthing FPE
- connection of external power circuits to a failsafe change-over contact to control the control states 'Flame out' and 'Flame in'
- connection of the intensity measurement output
- connection for an external sensitivity change-over, only for F200K2
- connection of the screen via the connector housing

The layout of the operational controls is represented in chapter *8.1 Layout of the Operational Controls*.

3 Functional Description

3.2 Rating Plate

Rating plate F200K (Example):

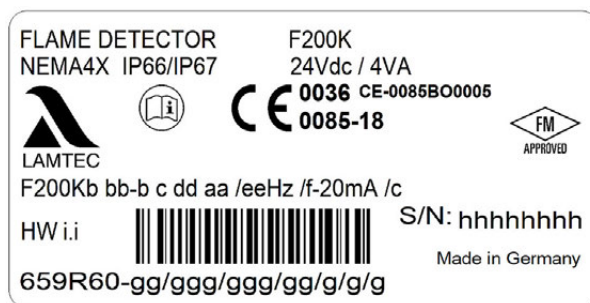


Fig. 3-1 Example rating plate F200K

Information on variants:

- a Housing type:
Ex= zone1, EXII=zone2,
empty/0 = Standard,
FO= Fiber optic,
V= screwed
- b Electronic type
- c Electronic type
- d FFTD: 1 ... 4
- e Mains frequency: 50, 60
- f Output current min.: 0, 4
- g ERP number
- h Serial number
- i Hardware version

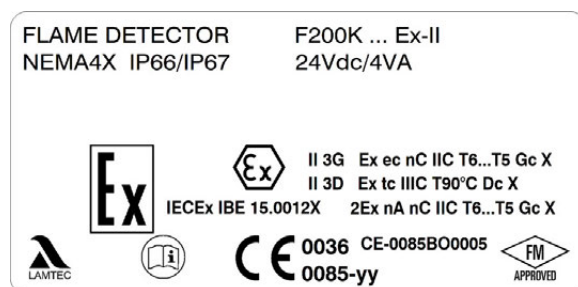


Fig. 3-2 Example rating plate F200K

3 Functional Description

3.3 Mode of operation

The compact flame scanner converts the flame radiation pulsing of the burner flame into electrical signals. These signals are routed to an electronic changeover switch, which alternately applies them to one of the independently working processing channels, where the signals are digitised. This reduces the initial signal quantity to the information 'pulse period' (information carrier: pulse frequency of the flame radiation).

The digitised signals are compared with the related reference signals by means of a digital frequency evaluation unit. This ensures that only those flame signals that are within the pre-selected frequency transmission range will be included in a continued processing, irrespective of their original amplitude. A control switch (for the F200K2 only) located below the removable cover allows the operator to change the lower frequency limit if required. After evaluation, the flame signal is routed to the switching amplifier, which also controls the related shut-down time.

A safe monitoring of the antivalent control states as well as the response and shut-down periods is performed at the output of the signal processing channels, before an activation of the output relays at the end of each signal processing channel is carried out. Antivalence faults and deviation in time delays going beyond the admissible limit values result in the control state 'Flame out'.

The control states 'Flame out' and 'Flame in' are indicated on the rear side of the device by means of a red and/or green LED. The change-over between the two signal processing channels is indicated by pulsing of the green LED during the 'Flame in' control state.

Additionally one or two six-step control switches provide for a sensitivity adjustment to adapt the system to the flames to be monitored, this being indicated by means of a six-step chain of green LEDs designed to be the device's flame intensity indicator.

Miscellaneous

Self-monitoring principle

Signal processing is carried out by means of two transmission channels working independently of each other and alternately triggered. The output levels are permanently checked for antivalence within a given time grid.

Parameter adjustment, combustion system type → monitoring equipment

Using the control rotary switch on the F200K/F200K2 compact flame scanners enables between 6 and 12 sensitivity levels to be set. The F200K2 version allows an increased sensitivity in range II to be set. A six-step green LED indicator indicates the evaluated flame intensity on the rear side of the device. The transmission range of the digital flame frequency evaluation allows for signal passage between 10 ... 190 Hz (F200K1) and/or 10 / 20 / 30 ... 190 Hz (F200K2).

3 Functional Description

3.4 Basic circuit diagram

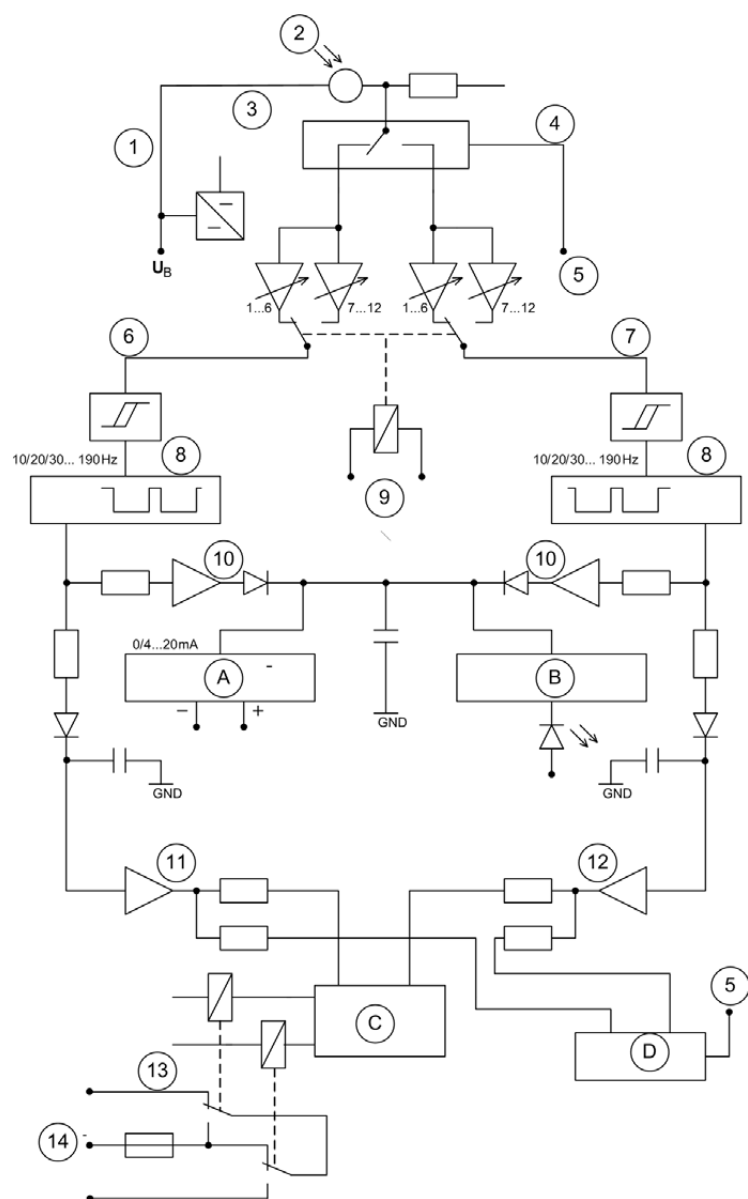


Fig. 3-3 Basic circuit diagram

A	Intensity remote indicator	C	Self-monitoring
B	Visual intensity indicator	D	Monitoring cycle
1	Stabilisation	8	Digital band pass
2	Flame sensor	9	Sensitivity selector switch
3	Detector	10	Safe de-coupling
4	Switch-over contact	11	Switching amplifier channel A
5	Cycle	12	Switching amplifier channel B
6	Channel A	13	Output relay
7	Channel B	14	Output contacts

4 Technical Data

4.1 Characteristics

The compact flame scanner is available in 2 basic versions, as well as an ex-proof enclosure type with several spectral varieties (IR/UV).

Design type	F200K1	F200K2
Sensitivity range	1 sensitivity range 6 levels	2 sensitivity range increased sensitivity in range II, can externally be switched over, 6 levels each
Frequency range	10 ... 190 Hz*	10/20/30 ... 190 Hz* can be adjusted on the device

* Special versions with regard to the lower limit frequencies are available on request

NOTICE

Signals lying in the mains frequency range or its multiples are suppressed for 50 Hz mains generally. For 60 Hz application, please indicate separately in your order form. The related stop ranges are changed in factory.

LAMTEC offers a version without mains frequency suppression for special applications.

This design requires additional measures during installation. Please contact LAMTEC Support for further information. The compact flame scanner is accordingly marked by a rating plate.

Overlapping of the sensitivity ranges

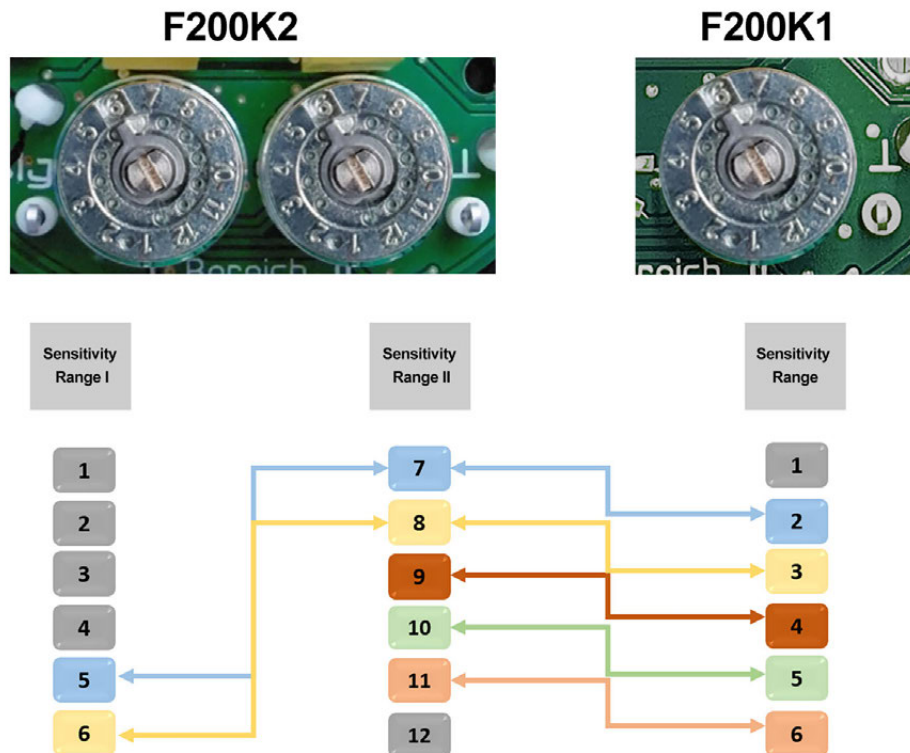


Fig. 4-1 Overlapping of the sensitivity ranges

4 Technical Data

4.2 Spectral Regions

Typ	Hazardous Area		Fiber-optic	Sensitivity	Spectralrange [nm]	Application - Fuel type
	Ex-II	Ex				
F200K1 UV-2				+	210 ... 380	Oil, gas (special gasses such as refinery and blast furnace gases) and highly selective monitoring
F200K2 UV-2	X	X	X	++		
F200K2 UV-6	X	X	X	+++		
F200K1 IR-2				+	850 ... 1100	Monitoring of combustion chambers and combustion edges (coal, wood)
F200K2 IR-2				++		
F200K1 IR-1				+	1100 ... 2800	Oil, gas, wood, coal, furnaces with heavy flue gas recirculation, waste gases with yellowish colour without UV radiation and/or screening of the UV portions by vapour, dust etc.
F200K2 IR-1	X	X	**	++		

+++ very high ** in preparation

++ high

+ middle

○ low

- very low

4 Technical Data

4.3 Operating conditions

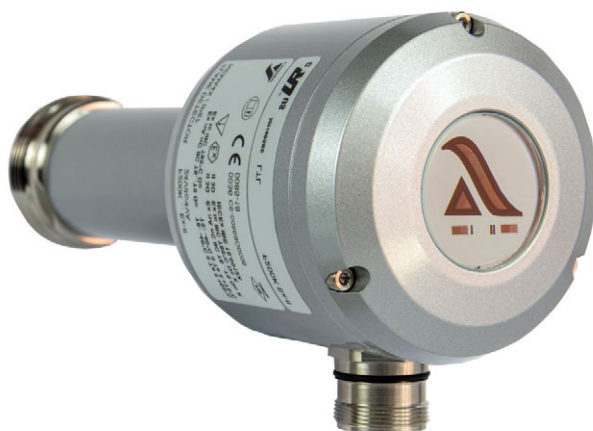


Fig. 4-2 Compact flame scanner F200K V, F200K Ex-II V

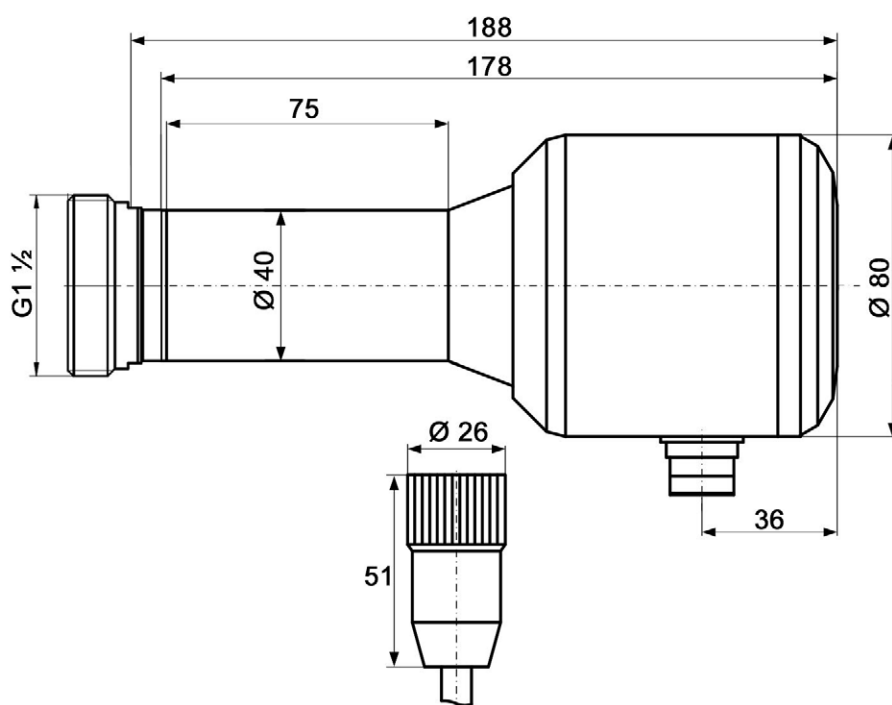


Fig. 4-3 Dimensional drawing compact flame scanner F200K V, F200K Ex-II V

NOTICE

Delivery without connecting cable!

Connection cable must be ordered separately, see order details.



Fig. 4-4 Compact flame scanner F200K, F200K Ex-II

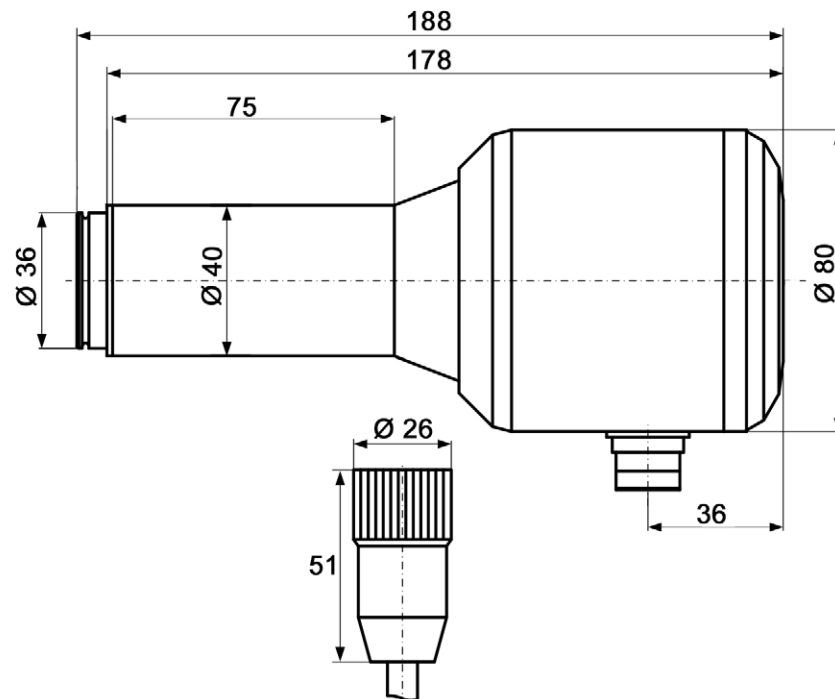


Fig. 4-5 Dimensional drawing compact flame scanner F200K, F200K Ex-II

NOTICE

Delivery without connecting cable!

Connection cable must be ordered separately, see order details.



Fig. 4-6 Compact flame scanner F200K Ex (for Ex zone 1, 21)

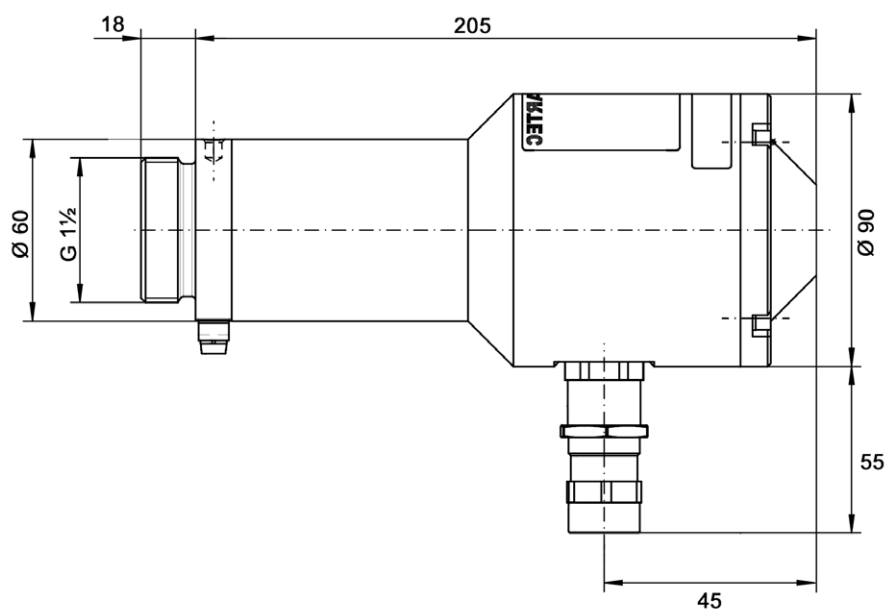


Fig. 4-7 Dimensional drawing compact flame scanner F200K Ex (for Ex zone 1, 21)

NOTICE

Delivery with connecting cable!

Available lengths 3/5/10 m | 9.84/16.40/32.81 ft, see order details.

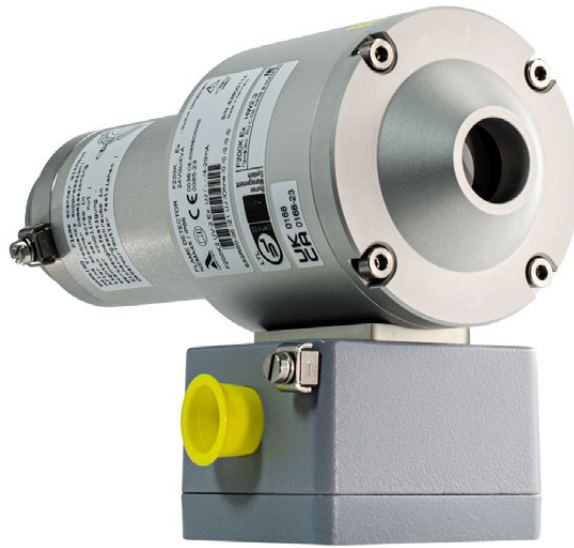


Fig. 4-8 Compact flame scanner F200K Ex (for Ex-Zone 1, 21), with connection area

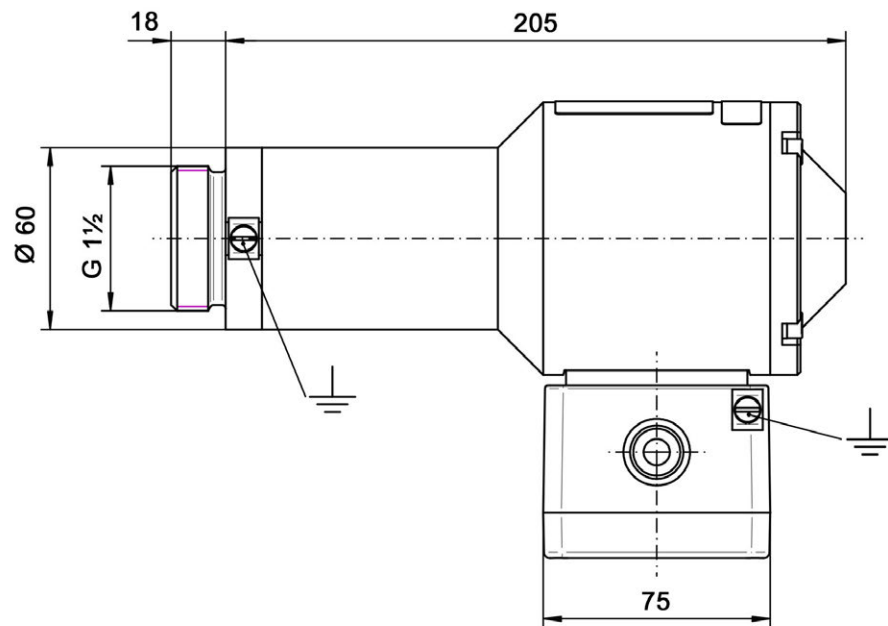


Fig. 4-9 Dimensional drawing compact flame scanner F200K Ex (for Ex zone 1, 21), with connection area

NOTICE

Delivery without connecting cable and without screwed cable gland!

The cable and screwed cable gland must be ordered separately.

4 Technical Data

F200K ... , F200K2 ..., Ex-II (for Ex zone 2, 22)

Dimensions Safe Area and Ex-II

Material	Corrosion-resistant aluminium EN AW 6082 (seawater 2*; atmospheric condition 1*), nickel plated, varnished (F200K Ex-II)
Dimension Version V + S	Total length: 180 mm 7.09" in; Diameter: 40/80 mm 1.57/3.15" in with male thread G 1 ½, length 10 mm 0.4" in / S (Ø 36)
Weight	0,60 kg 1.32 lb
Tightening torque for brackets FV...	Hand-tight approx. 5 Nm

* Comparative evaluation from 1 (very good) to 6 (unsuitable)

F200K, F200K2 Ex (for Ex zone 1, 21)

Dimension

Material	Corrosion-resistant aluminium EN AW 6082 (seawater 2*; atmospheric condition 1*), anodised
Dimension	Total length: 216 mm 8.5" in Diameter: 60/90 mm 2.36"/3.54" in
Weight	2 kg 4.4 lb
Tightening torque for brackets FV...	Hand-tight approx. 5 Nm

* Comparative evaluation from 1 (very good) to 6 (unsuitable)

4 Technical Data

General technical data F200K for all variants/versions

Input parameters	
Auxiliary power	
Power supply voltage ¹	24 VDC $\pm$ 20 %, protection class III
Power consumption	$\leq 4 \text{ W} \leq 380 \text{ mA}$ (100 ms peak)
Switch ON current	28,8 V $\leq 750 \text{ mA}$ (100 ms peak)

¹ The product must not be transported, stored or operated outside the specified range. All promises regarding safety-relevant functions otherwise lose their validity.

Output Data	
Output contact flame signal	change-over contact (floating)
Permissible switching voltage ¹	max. 50 VDC, protection class II (250 VAC by main supply FN 20) min. 6 VAC/DC
Permissible switching current	max. 0,5 A at $< 60^\circ\text{C}$ $+140^\circ\text{F}^2$ 0,4 A at $< 75^\circ\text{C}$ $+167^\circ\text{F}^2$ min. 1 mA ²
Switching capacity	min. 0,1 W max. 30 W
Internal fuses	2,5 A slow IEC or 3,5 A slow UL
Safety time 'FFDT'	$t_{\text{Voff}} \leq 1 \text{ s}$ or $\leq 2 \dots 4 \text{ s}$, (5 s on request) factory setting
Start-up delay	$t_{\text{Von}} \approx \text{FFDT}$ as of HW 2.3 applies to FFDT 3 s $t_{\text{Von}} \approx 2 \text{ s}$
Measuring output for intensity	
Output continuous current	4 (0) ... 20 mA, there is no insulation of potential towards the supply voltage
Maximum working resistance	200 Ω
Floating DC voltage	6,6 V
Basic error	$\pm 2 \%$

¹ The product must not be transported, stored or operated outside the specified range. If it is, any guarantees with regard to safety-related functions lose their validity.

² Please note: Gold-plated relay contacts
The maximum load for inductive/capacitive loads (recurring current peaks during switching) is 100 mA. If this is exceeded, even briefly (current peaks), the specified minimum value of 10 mA can no longer be guaranteed. Provide external spark suppression.

Spectral radiation range and sight angle	
- F200K1 UV-2 and F200K2 UV-2(Ex)	210 ... 380 nm ca. 8°
- F200K2 UV-6 (Ex-II)	215 ... 360 nm ca. 10°
- F200K1 IR-2 and F200K2 IR-2(Ex)	850 ... 1200 nm ca. 50°
- F200K1 IR-1 and F200K2 IR-1(Ex)	1200 ... 2800 nm ca. 60°

NOTICE

Range remote switch-over (F200K2 only) floating-contact, can be controlled by means of the supply voltage.

4 Technical Data

Cable length

Maximum extension via the connection cable 3 m 9,84 ft addition, at a supply voltage 20,5 V	Wire 0.5 mm ² 20 AWG → length: 50 m 164 ft Wire 1.0 mm ² 18 AWG → length: 100 m 328 ft Wire 2.5 mm ² 14 AWG → length: 250 m 820 ft
Deviating cable lengths p. ex. (main criteria is the compliance to limitations of the supply voltage the compact flame scanner and thus the loss of voltage on the supply line)	Length: 150 m 492 ft Wire: 0,5 mm ² 20 AWG 150 : 0.5 x 0.0131 + 19.2 = 23,13 V The supply voltage must be > 23,13 V.

NOTICE

Only a cross-section of 0.5 mm² | 20 AWG is possible for the **F200K Ex**.

Technical load capacity

Operating mode	DB – continuous operation Intermittent operation 72 h Operation according to TRD604
Creepage distances and clearances	IEC 60730-1, ÜK III, VG 2
Interference susceptibility	IEC 60730-1, EN 61000-4
Emitted interference	DIN EN 55011/A1, Klasse B

Climatical conditions

Operating class temperature F200K

Sensor	IR-1	IR-2	UV-6, UV-2
-40 °C -40 °F */**	x	x	x
-20 °C -4 °F	x	x	x
+60 °C +140 °F	x	x	x
+75 °C +167 °F*		x	x

* for F200K ... Ex ... (see Ex approval)

** not valid for FFDT > 3 s

Operating Condition

Relative humidity	0 ... 95 % non-condensing
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Environmental Conditions

Operation	permissible temperature range	- 40 ... +75 °C -40 °F ... +167 °F
Transport	permissible temperature range	- 40 ... +75 °C -40 °F ... +167 °F (type IR-1 +65 °C +149 °F) (storage in closed cargo holds)
Storage	permissible temperature range	- 40 ... +75 °C -40 °F ... +167 °F (type IR-1 +65 °C +149 °F) (storage in closed spaces)
Degree of protection	DIN EN 60529:2000	IP66/67, IP66 (at F200K Ex), NEMA 4X in closed condition

4 Technical Data

Application in hazardous areas Ex zone 2, 22		F200K Ex-II
Device group/category of hazardous area		[Ex] II 3G, Zone 2, [Ex] II 3D, Zone 22
Certificate		IECEX IBE 15.0012X Class I Division 2 File-No. E488138
Marking		Ex ec nC IIC T6...T5 Gc X Ex tc IIIC T90°C Dc X CI I Div2 Gr A T5
Standards		IEC 60079-0, EN 60079-0 ANSI/ISA-12.12.01, CAN/CSA C22.2 No. 213
Operating temperature range		
Ambient temperature		explosive gas atmospheres T5 -40°C -40 °F ... Ta ... +75°C +157 °F T6 -40°C -40 °F ... Ta ... +65°C +149 °F explosive dust atmospheres T90°C 194 °F -40°C -40 °F ... Ta ... +75°C +157 °F
Additional Information		Follow the section "Special Points to Note When Using the Device in Explosion-proof Areas".
Application in hazardous areas Ex Zone 1, 21		F200K Ex
Device group/category of hazardous area		[Ex] II 2G, zone 1, [Ex] II 2D, zone 21
Certificate		IECEX EPS 14.0042X, EPS 14 ATEX 1 696 X
Marking		Ex db IIC T6...T5 Gb Ex tb IIIC T80°C, T95°C Db
Standards		IEC 60079-0 , EN 60079-0
Operating Temperature range		
Ambient temperature		T5 -40 °C -40 °F ... Ta ... +75 °C +157 °F (UV version) T6 -40 °C -40 °F ... Ta ... +65 °C +149 °F (UV version) T6 -40 °C -40 °F ... Ta ... +60 °C +140 °F (IR Version)
Additional information		Follow the section 'Special Points to note when using the device in explosion-proof areas'.

4.4 Life Cycle

F200K has a designed life time of 250,000 burner start-up cycles.
This corresponds to a life time of approx. 10 years for typical applications.
Other values may result from the operating conditions of the respective plant.

The basis for this is formed by the stress tests specified in the EN 298 standard and referenced standards.

The design lifetime applies when using the base system according to the specifications given in the documentation. Further information on the lifetime can be found in the safety manual Safety-Manual.

Storage of a F200K component within the storage conditions specified for storage does not shorten the lifetime.

5 Information for Mounting and Installation

5 Information for Mounting and Installation

5.1 Mounting-Basic Instructions

5.1.1 Safety



WARNING!

For the F200K version without mains frequency suppression, it is mandatory to mount it with its viewing opening on the burner in such a way that it is protected against the detection of mains frequency light.

This mounting must meet the requirements of a tool mounting.
The LAMTEC mounting brackets FV30 and FV40 meet this requirement.

After attaching the union nut to the F200K /V, tighten the set screws located in this union nut with an Allen key. This prevents unintentional disconnection of the connection.

Mounting in a cooler housing of the FS50, FS51 series also ensures tool mounting.

Advice on this is available from LAMTEC support.

Warning notice

The flame monitor without mains frequency suppression is provided with a warning: e. g.



WARNING!

After scanner commissioning tighten set screw in scanner coupling nut!
Flame monitor without mains frequency suppression!



WARNING!

The fiber optic compact flame scanner versions F200K.. IR-.. FO with IR sensors may only be used with the LAMTEC IR Fiber optic FOR...-IR or FOF...-IR.

5.1.2 UL Listed

NOTICE

For applications within the scope of the UL Listed certification procedure, it must be ensured that the components used are Listed suitable. That is, in addition to the flame scanner used must also be the connection cable and if used the power supply Listed suitable and certified. The applicable installation rules according to NFPA70 (NEC) must be observed.

5 Information for Mounting and Installation

5.1.3 Basic mounting instructions

NOTICE

The cables are designed for a special temperature range (see chapter 4 *Technical Data*). Do not open the devices in temperatures below -20 °C/-4 °F.

NOTICE

For the installation of an extension cable on site, make sure to use a **separate, shielded extensionable**. Moreover, provide for good continuity of the shield and make sure that the shield and functional earthing (FPE) are connected properly.

In order to reduce the risk of electromagnetic interference it is recommended that the supply cable and extension cable, if used, are installed in separate containment away from any main wiring (e.g. ignition lines, electrical motors, contactors, frequency inverters). Parallel cable routing with mains cables should be strictly avoided.

NOTICE

Very high levels of electromagnetic radiated noise may result in sporadic problems in flame detection, or may even avoid proper detection at all.

NOTICE

The radiation emitted by a flame contains an element of flicker (pulsating). This characteristic is a result of the processes that occur during combustion. This oscillation (flame frequency) is used for flame monitoring. The compact flame scanner should be installed at the burner viewing port using a suitable mounting device to ensure that the burner flame remains perfectly visible throughout the full modulating/operating range of the furnace. To install a selective monitoring device the viewing port should be located such that the flame sensor can be aligned to detect the base of the flame adjacent to the burner mouth (perhaps 'head' might be better). The compact flame scanner should be aligned so that it cannot 'look' directly into adjacent flames or flames located on the opposite side of the furnace. Consideration should also be given to ensure that background flames, such as coal, wood and waste, cannot be detected.

5 Information for Mounting and Installation

The compact flame scanner:

- is to be aligned in such a way as to cover the first third of the flame for single monitoring.
- has to cover the flame root area for a simple selection during the 'Flame in' control state (area of high flame frequencies), and during the 'Flame out' state to only detect the residual radiation caused by the 'offshoots' of the other flames in the combustion chamber (area of low flame frequencies) or by reflection.
- If possible avoid aligning the compact flame scanner **parallel with the flame axis**, since in this position, a loss of flame can hardly be detected.

In order to reach a high availability and a high selection quality, it is very important to place the compact flame scanner at the appropriate location.

Make sure in every case that the aperture angle for the UV solutions is only about 8°. For this reason we recommend to use the FH40, FV40, FS 51 and/or FS 56 adjustable holding device (ball-and-socket joint), unless already in place. **Correct alignment is of paramount importance** in particular in such cases where there is an additional viewing tube inside the burner or where the visibility of the flame is considerably restricted. With increasing length of the sighting tube is a correspondingly larger cross-section advantageous.

NOTICE

The installation should take place with the **holding device provided by LAMTEC**. Otherwise pay attention to an isolated mounting to avoid any interference from compensating currents provoke over the cable shield.

The installation site must be easily accessible to allow a perfect observation of the visual operational controls even during operation of the furnace. When replacing the compact flame scanner, make sure to install a device having the same identification marking.

Make sure that the **maximum admissible ambient temperature** is not exceeded at the installation site. This applies in particular to radiant heat.

5 Information for Mounting and Installation

5.2 Installation

5.2.1 External Installation

EMC emission

Compliance with the requirements with respect to the EMC emissions are proven for the device as part of the type test.

Output contacts

The flame scanner ready for operation delivers the 'Flame ON' or 'Flame OFF' status message to a floating output contact. Further signal processing has to be carried out by the controller adapted to the related furnace.

To ensure safety, when installation the **output contacts**, it must be ensured that the user carries out any necessary radio interference suppression in such a way that the contacts of the safe output (flame signal - flame present) cannot be short-circuited by defective components of the suppression unit.

Power supply, Output contacts



WARNING!

For the power supply of the flame scanner and for potential separation of the flame scanner contact use the FN20 power supply. Instead of FN20 a safety power supply must be used to generate the power supply of the flame scanner (eg. According to EN61558-2-6 or EN 60950-1).



DANGER!

The output contacts of the Flame scanner are approved for use with SELV or PELV only.

Remote switch-over of sensitivity



WARNING!

Use a floating contact which is feeded by the flame scanner's 24 V supply for the remote switching of the F200K2's range. Or use a SELV or PELV power supply according to 60730-1 or EN 60950-1 (i.e. a safety power supply).

Intensity remote display (4/0 ... 20 mA current loop)



WARNING!

The current loop for remote indication of the flame intensity must be connected to devices which have a safe isolation of the measuring circuit to dangerous active parts in accordance with EN 61140 (e.g. by double or reinforced isolation in accordance with EN 61010-1). This can be, for example, passive instruments or isolating transformers with galvanic 3-way isolation.

NOTICE

If the connection cable LiYCY ... is subjected to particular stress caused by UV radiation, the connection cable protective tubes provided for this purpose must be used.
Order no. 659N990/0/1/2 available in 3/5 and 10 m lengths

5 Information for Mounting and Installation

5.2.2 Device Connection

Refer to connection diagram chapter *8.3 Circuit Diagrams* and *8.4 Examples of Application*.

6 Instructions on Commissioning and Maintenance

6.1 Display and Operational Controls

Represented in chapter 6.1 *Display and Operational Controls*.

NOTICE

The cables are designed for a special temperature range (see chapter 4 *Technical Data*).
Do not open the devices in temperatures below -20 °C/-4 °F.

6.1.1 Intensity Indicator Including the 'Adjust' Function

The flame intensity is represented by a six dot indicator. The indication is delayed in accordance with switch-off time (1s and/or 3s) and fulfils 2 functions.

- 1 Display of the **evaluated intensity** / basic setting
With the Adjust switch set in the OFF position the flame intensity, after internal analysis of amplitude and frequency, is displayed. For a well-established flame signal the state will display the maximum intensity i.e. the uppermost green LED. In normal operation the signal indication may vary/fluctuate for a short period of time depending on the behaviour of the flame being monitored. However, if variance/fluctuation occurs too frequently this might result in a switch-off during prolonged operation.
- 2 Display of the **unevaluated intensity** (direct signal at the sensor element)
With the Adjust switch set to the ON position the flame intensity is displayed as detected at the sensor element without internal flame frequency analysis processing. This function allows the compact flame scanner to be aligned to detect the maximum flame radiation value using the ball-and-socket joint adapter (refer to chapter 6.2.4 *Settings*). Note that with the Adjust switch set to ON the Serv. switch becomes inactive.
Normally, the display should be in the green LED row. If the flame is stable, a reliable operation may be possible in this function even if the two upper yellow LEDs light up. In this mode the flame signal indication should only be used to optimise the alignment of the flame scanner and not as an exact indication of flame measurement

6.1.2 Operating State-Indication

This display type only exists in the F200K2 execution type. The display shows the sensitivity ranges I or II activated by external selection. The range I (normal sensitivity) is mainly used for high flame intensities, whilst range II (higher sensitivity) is used for weaker flame intensities.

6.1.3 Operating Mode-Display

The red LED shows the 'Flame OUT' operating state. Whilst indicating 'Flame IN' the green LED pulses in intensity to indicate the self-monitoring operation of the system. The pulse frequency is the same as the self-monitoring cycle time (1.5 or 3.0 seconds). If the green LED does not pulse then this could be symptomatic of electromagnetic interference (EMC) or a defect of the compact flame scanner. (refer to chapters from 6.2.6 *Fault on Flame Detection* to chapter 6.2.8 *Faults During Operation* and chapter 6.3 *Troubleshooting*).

6 Instructions on Commissioning and Maintenance

6.1.4 Sensitivity-Switch

Depending on the model (F200K1 or F200K2), there are 1 or 2 sensitivity selector switches. The sensitivity selector switches can be set in 6 steps. The switches are used to adapt the device to the existing flame intensity. (refer to 6.2.4 *Settings*).



CAUTION!

The settings of the sensor sensitivity of the model F200K2 must be carried out so that the sensitivity in region II is higher than in the region I. Switch position I-5, I-6 overlaps with II-7, II-8.

6.1.5 Frequency-Switch

The frequency switches are only included in the F200K2 solution.

They are used to set the lower frequency limits of the digital filters. This allows to **improve the selectivity** in flame detection. In the F200K1 solution, only the lower frequency limit of 10 Hz is factory-set principally. (refer to chapter 6.2.4 *Settings*).



CAUTION!

In connection with the frequency setting is important to note that both channels (A and B) ON and/or OFF mode switched on same position.

(refer to chapter 8.1.2 *F200K2... (Ex-proof), in the State as Delivered*)

6.1.6 Service-Switch Serv.

The **Serv.** service switch is issued to suppress the indication during start-up and starting time of the flame scanner. The flame scanner is supplied with the Serv. switch in the ON position as default. This function does not display any short flame signals of other radiation sources (e.g. adjacent burners or background fire), which are not to result in a switch-on of the flame scanner.

For commissioning it is recommendable to set the **Serv.** switch to **OFF**. Short flame signal of other sources are thus indicated even during the start-up phase. This information is important for a probably required change of the **start-up suppression setting** (refer to chapter 6.2.4 *Settings*).

6.1.7 Adjust-Switch

The **Adjust** switch is issued to feed in the **unevaluated flame intensity** (i.e. the direct signal at the sensor element) to the intensity display of the compact flame scanner. The **activation** of the **Adjust** switch (**ON** position) suppresses the function of the **Serv.** switch (refer to 6.2.4 *Settings*).

6.1.8 Start-up Suppression-Potentiometer

The potentiometer is issued to vary the **setting** of the start-up (switch-on) behaviour of the flame scanner. This setting has an influence on the switch-on behaviour of the flame scanner with regard to the flame to be monitored (refer to chapter 6.2.4 *Settings*).

6 Instructions on Commissioning and Maintenance

6.1.9 Measuring Points

These measuring points are used to directly measure the flame signals at the sensor element and can be used to determine the optimum alignment, apart from intensity indication (refer to chapter 6.2.4 *Settings*).

6.2 Commissioning

6.2.1 General Information

Check the compact flame scanner for correct positioning on the burner. Before switching on the supply voltage, check the connections on the basis of the pin configuration as specified here in. Refer to chapter 8.4 *Examples of Application*.

The switches of the compact flame scanner **as delivered** are set according to chapter 8.1 *Layout of the Operational Controls*, unless otherwise agreed. The potentiometer for start-up suppression is set to 50 %.

NOTICE

As of HW 2.3, the units with an FFDT of 3 s are generally equipped with a switch-on time that is shortened from 3 s to approx. 2 s.

For all other FFDTs, the following still applies: The switch-on time corresponds approximately to the FFDT.

The shortened switch-on time is an advantage for the availability during the start-up process for monitoring poorly burning flames in single burner applications.

When replacing a unit with FFDT 3 s and HW < 2.3 with a unit with HW 2.3, the following must be taken into account, especially for firing systems with background radiation which is difficult to suppress. This increases the sensitivity to parasitic light of the installed flame monitoring system.

This can lead to parasitic light faults during the start-up process of the burner control unit. An adjustment of the settings and the alignment of the flame monitor may be necessary.

6.2.1.1 'Flame Out' State

After switching on the power supply, the flame scanner is ready for operation after approximately 5 seconds. The following display has to be shown:

- | | |
|-----------------------------|--|
| - Display 'Flame out' | 'Red' LED lights up |
| - Sensitivity range I or II | 'Yellow' LED lights depending on external pre-selection f. range I or II (for F200K2 only) |

6.2.1.2 'Flame In' State

To check the monitoring parameters, install the compact flame scanner in the specified mounting place before starting the operation of the furnace. If the flame burns naturally, the display should change as follows:

- | | |
|-------------|---|
| 'Red' LED | Goes out |
| 'Green' LED | Lights up, changing its radiation intensity antivalently to the cycle rhythm of the self-monitoring system.
Intensity indicator (lighting point) should reach 100 %. |

6 Instructions on Commissioning and Maintenance

6.2.1.3 Operating mode switchover

Two preselectable operating modes

The compact flame scanner F200K offers users two operating modes for selection. This makes it possible to select two different settings in the range of gain levels. The individual operating modes can be switched during operation.

6.2.2 Special Points to Note When Using the Device in Explosion-proof Areas



WARNING!

The following applies when using the F200K Ex-II, F200K Ex in explosion-proof areas:

- For use only in approved explosion protection zones.
- When using the device in the ambient temperature range, you must keep the temperature in accordance with the temperature class: See Ex marking on the device and chapter 4 *Technical Data* in this document.
- Protection against high mechanical energy:
 - The flame scanner must be mounted on a burner or boiler using a LAMTEC FV30, FH30 or FS50 bracket to protect the light inlet opening. These guards (bracket) must be removable only by the use of a tool.
 - The glass for observing the internal display must be protected against high mechanical energy by installation.
 - The electrical connector must be protected by assembling from high mechanical energy.
 - The mechanical strength of the connection cable is given in principle by the shielded design. The requirements of DIN EN IEC 60079-14 for the protection of the cable are decisive and situation-related for system installers. This may result in higher protection requirements for the cable.
- Replace units that no longer meet the IP64 protection class due to damage such as defective or damaged sight glasses and connection cables with plugs.
Defective or damaged connection cables with connector must be replaced completely. Repair of the connection cable may only be carried out by the manufacturer.
- Only disconnect connectors or any other cable connections when it is de-energised.
See the warning on the device: WARNING – DO NOT DISCONNECT WHEN ENERGISED.
- In particular, separation has to be only permitted after clearance measurement by personnel in charge of the explosion protection of the operating company.
DIN EN IEC 60079-14 'Annex: Instructions for procedures to work safely in an explosive gas atmosphere'.
- Protect the plug of the connection cable of the flame Scanner against self-loosening by mounting it correctly on the flame scanner. The plug has a metric ISO thread and is therefore self-locking.
- Note, in particular, the information on setup in DIN EN IEC 60079-14, section 12.2 (cables and earthing).
- The electrical connection of the connection cable shall be carried out outside of the explosion hazardous area or by means of a connecting box acc. to EPL Gc. E.g. the LAMTEC terminal housing FG24 Ex.
- The screen of connection cable shall be earthed and a continuous equipotential bonding has to be maintained after installation.

6 Instructions on Commissioning and Maintenance

- Cable glands that can be mounted on the flame scanner housing must meet the requirements of the Ex zone and the degree of protection of the flame scanner and must have an EMC design that matches the cable.

The assembly specifications for the the cable gland must be observed.

- Check cable glands and other components with seals for tightness.
Should there be a need to loosen the cable gland, it is to be ensured that the cables do not turn while loosening and tightening the cable connection. Strong turning of the cable can destroy the Ex properties of the cable gland.
- A transformer/transducer for generating the supply voltage must be carried out in according to IEC 61558-2-6/-2-16 requirements.
- The rated voltage (supply voltage) must be limited in the associated power supply.
- The device shall not be exposed to high charging processes when coated.
- Avoid dust deposits. If necessary, clean regularly in an explosion-proof way.
- Opening the device may be required during commissioning and maintenance purposes!
Clean in particular the Flame sensor housing before opening. Should there be any risk of Ex danger to the surroundings in an opened device, a clearance measurement should be done before the opening. (see above „Separation of an electrical connection").
Avoid during disassembly and disassembled that contamination can get into the interior of the housing

Devices for Zone 1/21:

- Mount the device only with dirt-free Ex-gap. Use to facilitate, if necessary, an anti-corrosive grease or mineral oil thickened for assembly.
Any damage to the ex-gap is equated with the loss of the protective properties of the housing.

Special instructions for use in Hazardous Area Class I Division 2 (valid for F200K Ex-II)

- During installation, the regulations of the NEC (National Electrical Code) must be observed.

6 Instructions on Commissioning and Maintenance

Marking information on the device: Example

F200K Ex + Rating Plate BARTEC

FLAME DETECTOR F200K ... Ex - built-in component -
NEMA4X 24Vdc / 4VA

CE 0036 CE-0085BO0005
0085-18

F200Kb bb-b c dd Ex aa /eeHz /f-20mA /c

HW i.i  S/N: hhhhhhhh

659R60-gg/ggg/ggg/gg/g/g/g Made in Germany

F200K Ex-II

FLAME DETECTOR F200K ... Ex-II
NEMA4X IP66/IP67 24Vdc/4VA

   II 3G Ex ec nC IIC T6...T5 Gc X
II 3D Ex tc IIIC T90°C Dc X
IECEx IBE 15.0012X 2Ex nA nC IIC T6...T5 Gc X

CE 0036 CE-0085BO0005
0085-yy 

LTL  **CERTIFIED** SAFETY US-CA SECURITE US-CA MH48669 Burner Management System

F200K Ex **ERC**
ПрофЭкс RU C-DE.АЖ58.В.00434/20

LTL  **CERTIFIED** SAFETY US-CA SECURITE US-CA MH48669 Burner Management System

F200K ... Ex-II **ERC**
ПрофЭкс RU C-DE.АЖ58.В.00434/20
CI I Div2 Gr A,B,C,D T5 **E488138**
PRIMARY SAFETY CONTROL FOR HAZ. LOC 

BARTEC
97980 Bad Mergentheim Germany

CE 0044
Typ 07-6142-9021 IP66

 II 2G Ex db IIC T6, T5 Gb
II 2D Ex tb IIIC T80°C, T95°C Db
EPS 14 ATEX 1 696 X
Ex db IIC T6, T5 Gb
Ex tb IIIC T80°C, T95°C Db
IECEx EPS 14.0042X
-40°C ≤ Ta ≤ +65°C (T6, T80°C)
-40°C ≤ Ta ≤ +75°C (T5, T95°C)
Fert. Nr. *****/**

Flammenwächter / Flame Detector (UV)
(siehe Zusatzschild Einbau) /
(built-in components see additional label)

U = 24 V DC
P = < 4 W

BARTEC
97980 Bad Mergentheim Germany

CE 0044
Typ 07-6142-9022 IP66

 II 2G Ex db IIC T6, T5 Gb
II 2D Ex tb IIIC T80°C, T95°C Db
EPS 14 ATEX 1 696 X
Ex db IIC T6, T5 Gb
Ex tb IIIC T80°C, T95°C Db
IECEx EPS 14.0042X
-40°C ≤ Ta ≤ +65°C (T6, T80°C)
-40°C ≤ Ta ≤ +75°C (T5, T95°C)
Fert. Nr. *****/**

Flammenwächter / Flame Detector (IR)
(siehe Zusatzschild Einbau) /
(built-in components see additional label)

U = 24 V DC
P = < 4 W

WARNUNG - NICHT UNTER SPANNUNG ÖFFNEN
DO NOT OPEN WHEN ENERGIZED

Warning: e.g.

 **ATENÇÃO / ATTENTION / WARNING / WARNING**
NÃO ABRA / SEPARER QUANDO ENERGIZADO
NE PAS OUVRIR / DÉCONNECTER SOUS TENSION
DO NOT OPEN / SEPARATE WHEN ENERGIZED
NICHT UNTER SPANNUNG ÖFFNEN / TRENNEN
ПРЕДОСТЕРЕЖЕНИЕ - РАЗЪЕДИНЯТЬ ТОЛЬКО В БЕЗОПАСНОЙ ЗОНЕ

F200Kb bb-b c dd Ex-II aa /eeHz /f-20mA /c

HW ii.ii  S/N: hhhhhhhh

659R60-gg/ggg/ggg/gg/g/g/g Made in Germany

6 Instructions on Commissioning and Maintenance

6.2.3 Preparations

6.2.3.1 Checking the Compact Flame Scanner

The flame scanner can be checked for proper functionality without a flame being present.

- 1 Carry out the complete electrical installation of the flame scanner and connect it to the supply voltage.
A LAMTEC test emitter of the FFP30 type (IR + UV) can be used as an auxiliary means for flame simulation.
- 2 Simulation of flame radiation in front of the flame scanner's viewing port. This can be achieved using a lighter or any other type of a modulated-light source (do not use the mains frequency) having a sufficiently high intensity. For example the light from a lamp can be modulated by moving splayed fingers to and fro in front of the bulb. However, start-up suppression requires a stable signal to do this. If necessary and if the signal is not sufficient, the **SERV.** switch (see chapter 8.1 *Layout of the Operational Controls*) should be set to **OFF** in order to make the reaction to the simulated flame signal visible.

The flame scanner will switch on its output contacts if the flame signal is simulated for a sufficient period of time. This is indicated by the extinction of the red LED and the pulsating light of the green LED. The 6-level intensity indicator illuminates.

If no flame signal is indicated despite apparent correct functionality then check the output contact (refer to chapter 6.3 *Troubleshooting*).

6.2.3.2 Alignment

The following information applies analogous to the process optics of Fiber optic.

IR-flame scanners should be installed/aligned in such a way that possible reflections from the combustion chamber are already largely suppressed by constructive measures. A ball-and-socket joint for the alignment of the sensor to the flame is normally not required, since the optics of the flame scanner is characterised by a wide viewing angle.

UV-flame scanners should generally be used with a ball-and-socket joint only, since the optics of the flame scanner has a narrow viewing angle. For this reason an optimum alignment towards the flame is of utmost importance.

6.2.3.3 Optics

There are no special requirements for locking discs or similar components when using **IR-flame scanners**. Small accumulations of dirt due to dust and similar materials are generally not critical for flame detection.

In **UV- flame scanners**, the requirements for locking discs are more critical. Ensure that materials, such as quartz, that allow UV light to pass through freely are used. These materials are used in the LAMTEC UV adjustable holding devices (FH30, FV30, FH40 and FV40) Small accumulations of dust, water and other contaminants are much more likely to affect the performance of flame detection than when using an IR scanner.



WARNING!

When using an F200K without mains frequency suppression, it must be ensured that it is protected against the detection of mains frequency light. The mounting of the sight opening on the burner must meet the requirements of a tool mounting. Unintentional loosening of the F200K must be prevented.

Advice on this is available from LAMTEC support.

6 Instructions on Commissioning and Maintenance

6.2.4 Settings

6.2.4.1 Opening the cover of the F200K Ex

To adjust flame detection sensitivity settings, the front cover, below which the adjustment switches are located, must be removed.



WARNING!

Loss of explosion protection due to crushing and shearing off an incorrectly positioned cover sealing.

- ▶ When closing, make sure that the seal is correctly fitted in the cover.
- ▶ The Ex-gap must not be damaged during any of the following work steps!

Procedure:

Disassemble the cover and reposition the seal, which may be stuck to the housing, correctly on the cover.

1. Loosen the 4 allen screws in the front cover.



2. Pull the cover evenly out of the housing without tilting it. Carefully pull off any seal that may have stuck to the housing without stretching it.



3. Next, position the gasket in the lid groove without forming loops.

6 Instructions on Commissioning and Maintenance



4. Finally, push the cover carefully back into the housing and tighten the Allen screws crosswise.



6.2.4.2 Sensitivity

If for the first burner start there is no flame detection then the sensitivity switch (**flame amplitude**) can be set towards the right-hand stop position to allow a stable flame detection. The positions 1 - 6 and/or 7 - 12 are allocated to the internal amplification of the flame signal. Position 1 and/or 7 means lowest amplification / sensitivity as well as 6 and/or 12 highest amplification / sensitivity in the related sensitivity range.

NOTICE

Ensure that the flame scanner is configured such that the device successfully reacts by indicating 'Flame Out' should the flame be either not burning correctly or be extinguished.

After having carried out a correct burner adjustment, reduce the sensitivity again to such an extent as to allow for a stable and safe operation. The measurable signals should have at least **2 to 3 times the switching threshold value of 25 mV AC** to allow a **reliable recognition**

6 Instructions on Commissioning and Maintenance

6.2.4.3 Alignment with Adjustment Function

To allow an optimum alignment of the compact flame scanner towards the flame (maximum flame amplitude), the intensity indicator of the device can be used by activating the '**Adjust**' function switch. The activation of the '**Adjust**' switch (**ON** position) suppresses the function of the **Serv.** switch. The intensity indicator now represents flame amplitude detected.

If the intensity has already been set to maximum in this function, reduce the sensitivity of the active sensitivity switch to such a level that a reaction of the intensity indicator can be noticed, in order to find the best possible view to the flame by alignment.

After having completed the adjustment work and/or before optimisation set the **Adjust** switch back to **OFF**.

The values can slightly tolerate depending on the application			
Flame amplitude	Measurement points	LED lights	20 mA Current loop
Flame off	< ca. 25 mVAC	none	< ca. 5 %
2 times threshold response	50 mVAC	ca. 2. (yellow)	ca. 25 %
3 times threshold response	75 mVAC	ca. 4. (green)	ca. 50 %
4 times threshold response	100 mVAC	ca. 5. (green)	ca. 85 %

6.2.4.4 Measuring Points

Apart from the Adjust function, the measuring points (refer to chapter 6.1 *Display and Operational Controls*) of the device can be used. This allows to continuously measure the unevaluated intensity. The measured resistance should be > 5 MOhm.

WARNING!

Connect only potential free measuring equipment/devices to the testing terminals. The measuring equipment/devices must provide a reliable separation of the measuring circuit to hazardous active parts, according to EN 61140 e.g. by double or reinforced insulation according to EN 61010-1 (e.g. a standard handheld multi meter).

The trigger threshold for the F200K is at = 25 mV AC, while the measured signal voltage can amount to maximally 3 V AC.

To allow an **optimum suppression** of reflections, the measured values should be clearly below the specified value of 25 mV AC of the response threshold after burner switch-off.

See also table in chapter 7.2.3.2 *Alignment with Adjustment Function*.

6.2.4.5 Frequency Settings

An adaptation to the burner flame can additionally be configured in the F200K2 (ex-proof) as to the lower frequency limit (chapter 8.1.2 *F200K2... (Ex-proof), in the State as Delivered*). This frequency allows no remote switch-over. Generally, a low frequency limit means a higher availability, a reduction of the selectivity. 3 levels are provided for (10, 20 and 30 Hz).

CAUTION!

The **setting** (changeover to another frequency range) has always to be carried out for both processing channels **A and B in an identical way**. Always ensure that **only one** frequency range (Channel A + B) is in the **ON** position is selected each time.

6 Instructions on Commissioning and Maintenance

6.2.4.6 Start-up Suppression

If during the burner start there are short pulses within the detection range, due to background radiation or adjacent burners, the start-up suppression function can be used to eliminate detection.

The start-up suppression function allows suppression short pulse rates, which may occur on burner start in connection with the fan operation (pre-ventilation) and background fire. The values can be set between 0 and 100 % at a continuous start-up delay of 1s, i.e short pulse rates, which may cause 'parasitic light detection' but no permanent flame signal during the burner start phase, are ignored (suppressed) with different weighting. When 0% has been set, the flame scanner is activated even on inadequate flame signals, at a setting of 100% however, an activation requires very proper and stable flame signals.

In case of inadequate starting flames, an excessive start-up suppression impedes a timely recognition of the flame.

The devices are delivered with start-up suppression factory set to 50 % and the **Serv.** switch preset to the **ON** position (deactivated).

Carry out resetting according to the requirements as follows:

(see the representation of the operational controls in section 8.1 *Layout of the Operational Controls*)

- Set the **Serv.** switch to the **OFF** position, this allows pulses to be made visible during the start-up time via the devices' intensity indicator
- Set the start-up suppression (see chapter 8.1 *Layout of the Operational Controls*) according to the amplitude of the pulse rates between 0 and 100 %

After completion of the settings and/or optimisation, reset the **Serv.** switch to the **ON** position.



CAUTION!

This setting operation should only be used if the alignment of the flame sensor, as well as sensitivity and frequency settings as to reliability have fully been used.

NOTICE

As of HW 2.3, the units with an FFDT of 3 s are generally equipped with a switch-on time that is shortened from 3 s to approx. 2 s.

For all other FFDTs, the following still applies: The switch-on time corresponds approximately to the FFDT.

The shortened switch-on time is an advantage for the availability during the start-up process for monitoring poorly burning flames in single burner applications.

When replacing a unit with FFDT 3 s and HW < 2.3 with a unit with HW 2.3, the following must be taken into account, especially for firing systems with background radiation which is difficult to suppress. This increases the sensitivity to parasitic light of the installed flame monitoring system.

This can lead to parasitic light faults during the start-up process of the burner control unit.

An adjustment of the settings and the alignment of the flame monitor may be necessary.

6 Instructions on Commissioning and Maintenance

6.2.5 Switch-off test - check the correct setting



WARNING!

Simulate a flame rupture or flame extinction by shunting off the fuel supply to the burner to be monitored by the flame scanner. Check that the signal for shutting-off the safety valve is triggered off within the period of $T_S < 1$ s (on safety period 'Operation' at $t_{VOff} = 1$ s) after extinction of the flame.

'Red' LED	lights
'Green' LED	dark



WARNING!

For the IR compact flame scanners of the F200K1(2) IR-1 and/or F200K1(2) IR-2 types, take into account the radiation effects characteristic of the combustion chamber. Consequently, switch-off tests should be carried out when the boiler has reached operating temperature. In particular, make sure that the sensitivity of the compact flame scanner is increased only to such a value required to safely and reliably monitor the flame throughout the operating range of the burner.

6.2.6 Fault on Flame Detection

Check this function according to chapter 6.2.3 *Preparations* -6.2.3.1 *Checking the Compact Flame Scanner*.

6.2.6.1 1. Interference

Generally, interference becomes apparent by the fact that the intensity indicator of the device may indicate 100 %, but the green LED ('Flame in') does not light up. Or, the green LED lights up for a moment, but then it does not change its intensity according to the cycle rhythm and goes out again. This is a cycle synchronisation fault (signal in both evaluation channel present at the same time). This may chiefly be due to the interference emission of the ignition transformer during ignition.

- Check the shielding and FPE for proper connection to the F200K.
- Carry out a proper grounding of the ignition transformer.
- Check the cables for laying and if required untangle/separate them spatially.

6.2.6.2 2. Exceeding the permissible ambient temperature

Make sure that the maximum allowable ambient temperature of 60 °C/140 °F is not exceeded at the installation site. In case where the temperature is expected to exceed the limit, take appropriate cooling measures (e.g. cooling air enclosure FS 50, FS 51 or FS 56) refer to chapter 9.3.6 *Cooling Air Housing with Ball-and-Socket Joint FS51* and chapter 9.3.7 *FS56 (Adjustable, Demountable, with Cooling Air Housing)*. Make sure that the flame scanner casing does not heat up beyond this temperature value due to the impact of the heat radiated by the boiler. Overheating will result in a sensitivity loss in the first line, or will cause damage to the sensor elements and with it may result in a total failure of the system.

6 Instructions on Commissioning and Maintenance

6.2.7 Faults During Ignition

Faults occurring during ignition may have 4 causes.

- 1 In case of additionally monitoring the pilot flame, the pilot flame may not sufficiently be detected.
 - Check the pilot flame for stable operation
 - Check that the pilot flame is sufficiently visible within the viewing scope of the compact flame scanner, and change pilot burner adjustment if required.
 - Realign the flame scanner and check for cleanness of the viewing port
 - Measure the flame radiation captured by the compact flame scanner (chapter 6.2.4 *Settings*), and optimise alignment if required.
 - Increase sensitivity if required.
- 2 Interference
Refer to chapter 6.2.6 *Fault on Flame Detection*
- 3 If the flame has trouble to start-up, a timely recognition of the flame may be hampered by an excessive start-up suppression.
- 4 Defect in the device.

6.2.8 Faults During Operation

Faults occurring during operation may have 3 causes.

- 1 The main flame may not sufficiently be detected.
 - Check the main flame for stable operation - provide for visibility throughout the operating range.
 - Check the compact flame scanner for proper alignment and make sure that the viewing port.
 - Measure the flame radiation detected by the compact flame scanner (chapter 6.2.4 *Settings*), optimise alignment if required.
 - Increase the sensibility if required.
- 2 Interference
Refer to chapter 6.2.6 *Fault on Flame Detection*.
- 3 Defect in the device.

6.3 Troubleshooting

on apparently immaculate functioning according to the indicator elements

- 1 Check the output contact fuse and the contact.
 - Disconnect the compact flame scanner from the supply voltage.
 - Check the normally closed output contact at the 1st clamping point behind the compact flame scanner between the brown (BR) and the white (WH) connection wire (avoid low resistance continuity check - fuse 500 mA).
 - Connect the compact flame scanner to the supply voltage.
 - Check with simulated flame between the brown (BR) and the green (GN) connection wire.
- 2 Check the supply voltage.
 - Connect the compact flame scanner to the supply voltage.
 - Check the supply voltage at the 1st clamping point behind the compact flame scanner between the red and the blue connection wire for compliance with the voltage limits (in particular the lower limit).
 - Repeat test with simulated flame.
 - If the supply voltage is too low, this may be due to excessive lengths of the supply lines which core sections are too small, apart from other faults.

6 Instructions on Commissioning and Maintenance

6.4 Commissioning Flow Chart

Simple and fast process for commissioning the F200K.

NOTICE

The following steps require that all work in the previously described chapters on installation and mounting has been carried out correctly and checked again.

- 1 Set all frequency DIP switches (1) to default as shown in the drawing.
- 2 Set rotary switch (8) to position 6.
- 3 Connect the multimeter to the measuring points (9) and (6) (the multimeter setting is "AC voltage"), for good flame detection a minimum voltage of ≥ 50 mV AC* required.
- 4 Start the burner in the lowest firing-rate.
- 5 If the voltage is higher than 100 mV, the rotary switch (8) must be reduced step by step.
- 6 If the voltage is less than 50 mV, it is necessary to switch to range II (switchover by connecting the yellow and red wires of the connecting cable) then increase the settings of the rotary switch (7), (Default is 11, start with 8 here).

*(2 to 3 times the switching threshold value of 25 mV)

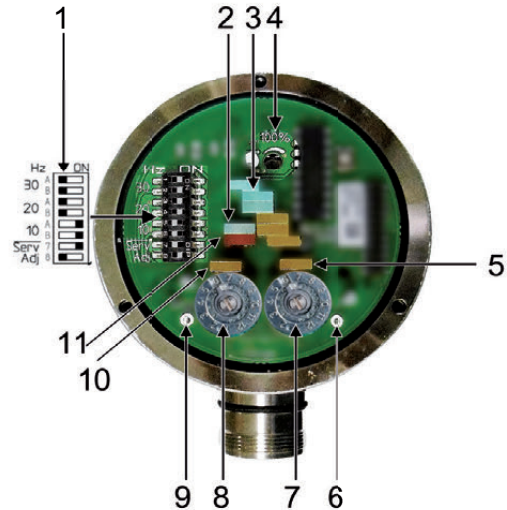


Fig. 6-1 Control and operating elements F200K

The frequency DIP switches (1) are required for existing background radiation with low frequencies. The low frequencies (below 10/20/30Hz) are faded out depending on the setting.

NOTICE

The frequency DIP switches (1) A and B must always be adjusted together. (two-channel system), only one frequency range may be selected, the other two must be set to "Off".

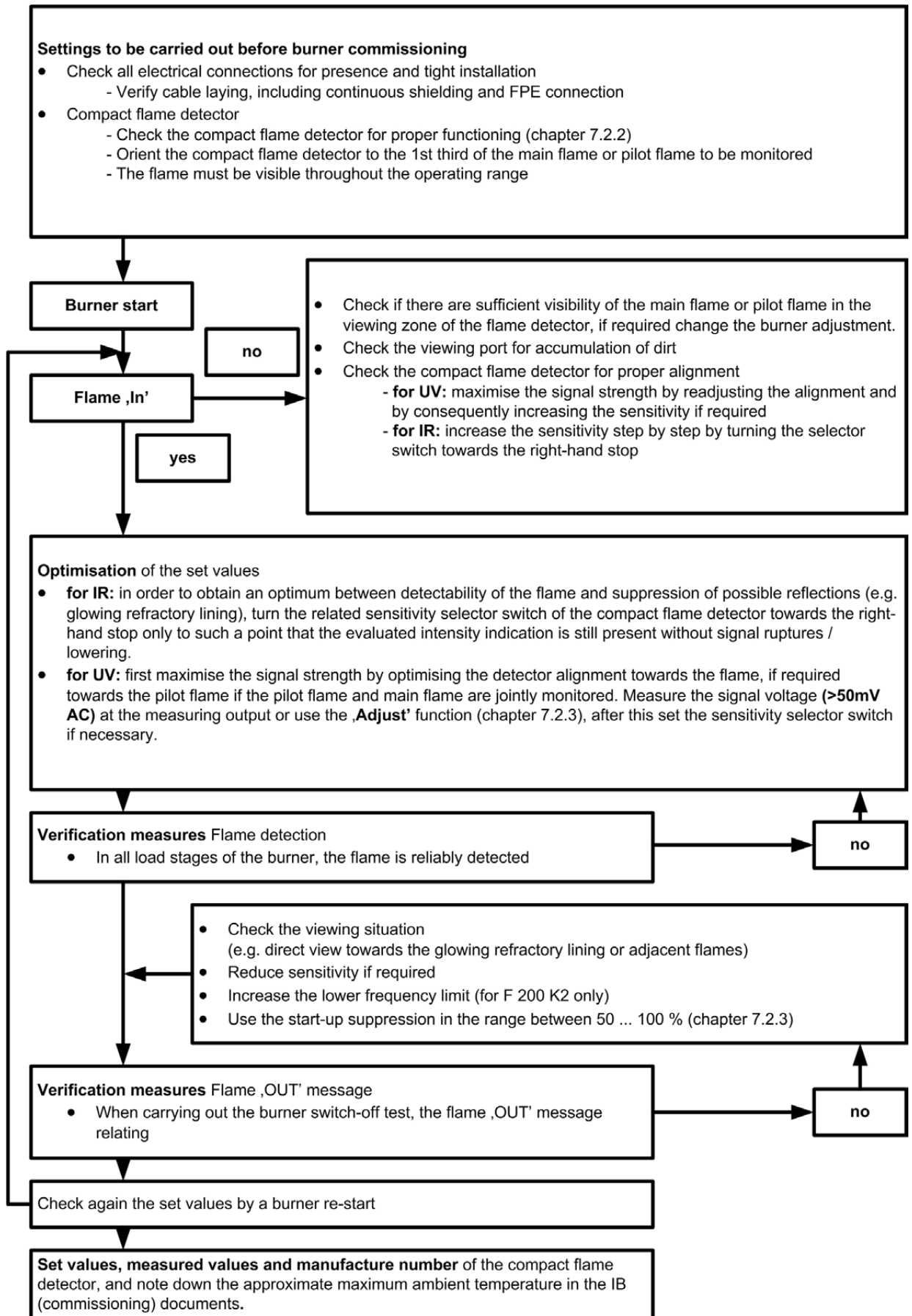
The **Serv.** switch is issued to suppress the indication during start-up and starting time of the compact flame scanner. The compact flame scanner is supplied with the Serv. switch in the ON position as default. For commissioning it is recommendable to set the Serv. switch to OFF.

The **Adj** switch is for commissioning. In the "ON" position, the sensor signal is displayed with the intensity display (3) in the range 0... 150 mV

The **start-up suppression function** (4) (rotary potentiometer 0 ... 100 %) allows suppression short pulse rates, which may occur on burner start in connection with the fan operation (pre-ventilation) and background fire.

See Chapter 6.2.4.6 *Start-up Suppression*

6 Instructions on Commissioning and Maintenance



6 Instructions on Commissioning and Maintenance

6.5 Maintenance

6.5.1 General Information

Provisions shall be made to ensure that the light entry port of the flame sensor and the viewing port on the furnace, where the sensor is fitted, are regularly cleaned, i.e. at regular intervals, which depend on the operating conditions of the furnace. The compact flame scanner needs no maintenance. The operation of the flame scanner by physically shutting off the flame should be incorporated into the maintenance cycle for the device.

NOTICE

If it is necessary to clean the optics of fiber optic flame scanners, special care should be taken to clean the fiber optic surface. Damage to the surface can result in significant signal loss.

6.5.2 Instructions on Troubleshooting



DANGER!

The flame scanner is a safety device.

Any repair work or other changes to the device shall only be carried out by the manufacturer's specialist staff or by some other persons appointed by the manufacturer.

Any other person are not allowed to operate on parts inside the device.

In particular, this concerns the unauthorized exchange of the flame contact fuse.

6 Instructions on Commissioning and Maintenance

6.5.3 Flame Scanner Testing Device replace Battery

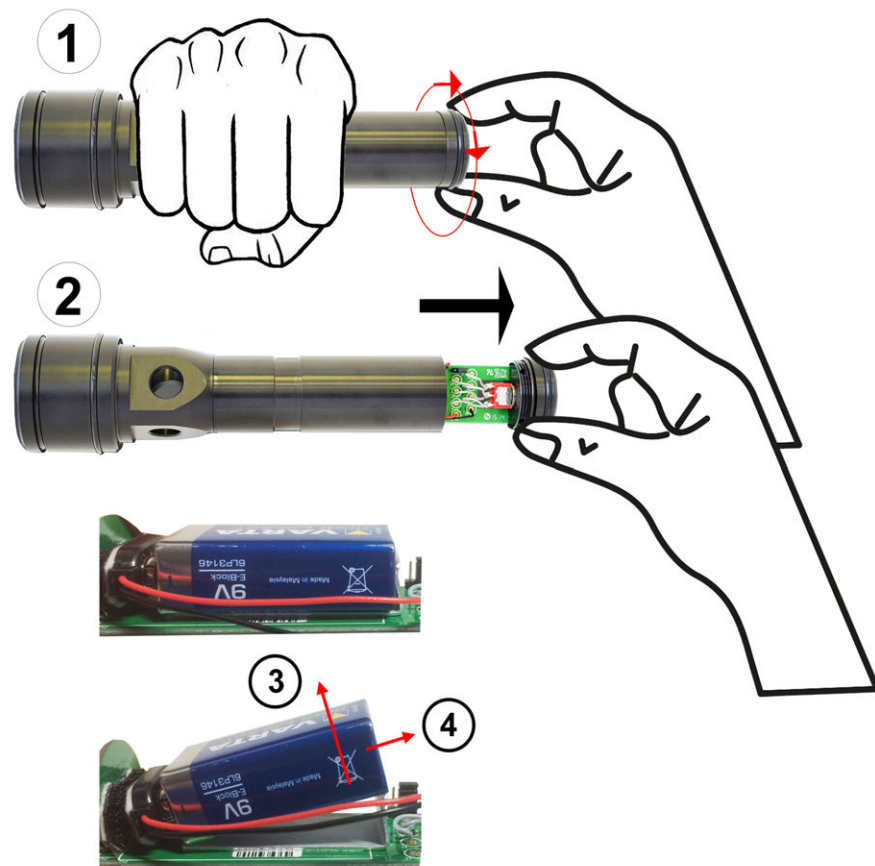


Fig. 6-2 Flame Scanner Testing Device FFP30 replace battery

Battery type: 9-Volt-Block 6LR61

The assembly is carried out in the reverse order

7 Warranty and Delivery Terms

The manufacturer's terms and conditions of guarantee shall apply. Any modifications or changes carried out to the device by authorised personnel shall render all warranties and guarantees void. Inappropriate or use outside the recommended guidelines set out in this manual shall also render the warranties and guarantees void.

Delivery will comply with ordering details. The terms of deliveries and services of LAMTEC, and the general terms of delivery for products and services made or rendered by companies of the electrical industry, shall apply.

8 Appendix

8.1 Layout of the Operational Controls

8.1.1 F200K1 ... in the State as Delivered

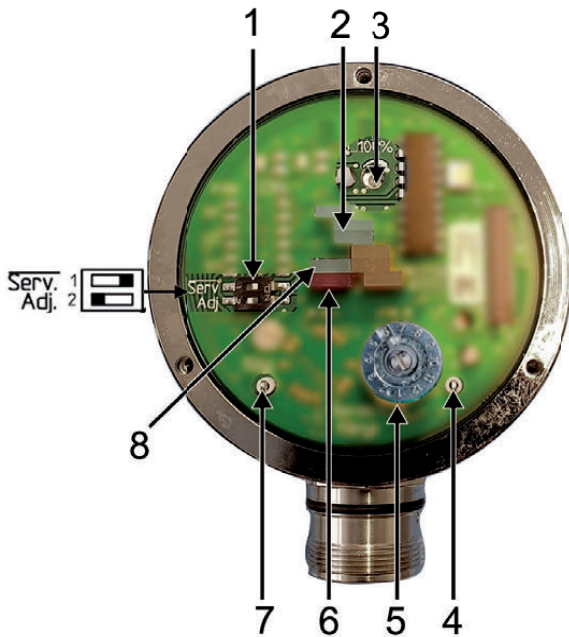


Fig. 8-1 Control and operating elements F200K1



Fig. 8-2 Housing cover F200K

- 1 **Serv.** Service switch, according to chapter 6.1.6 *Service-Switch Serv.Adj.*- Adjust, according to chapter 6.2.4.3 *Alignment with Adjustment Function* and chapter 6.2.4 *Settings*
- 2 **Intensity indicator** for flame signal in the range of 0 ... 100 %
- 3 **Start-up suppression**, according to chapter 6.2.4 *Settings*
- 4/7 **Measuring points** to measure the flame radiation received by the F200K according to chapter 6.2.4 *Settings*
- 5 **Sensitivity switch** for gradual increase and/or decrease of sensitivity (amplification) of the compact flame scanner in 6 level, according to chapter 6.2.4 *Settings*
- 6 **LED (red)**: Indication 'Flame Out' state
- 8 **LED (green)**: Indication 'Flame In' state

8 Appendix

8.1.2 F200K2... (Ex-proof), in the State as Delivered

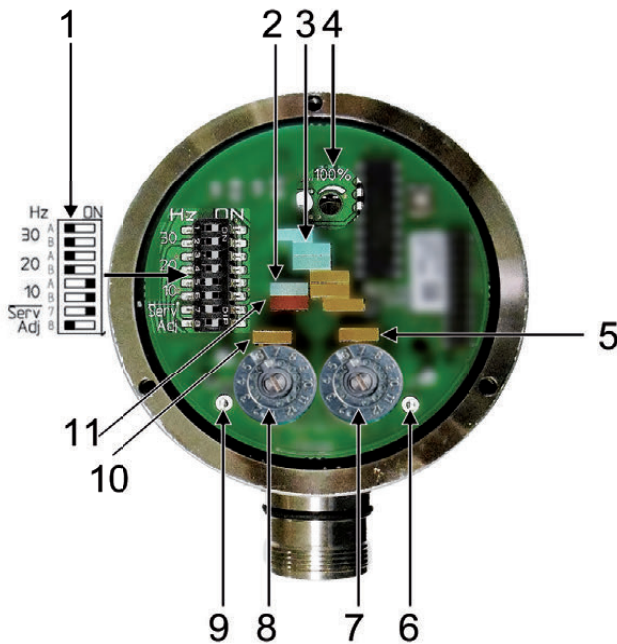


Fig. 8-3 Control and operating elements F200K2



Fig. 8-4 Housing cover F200K, F200K EX-II

- 1 **Serv.** Service switch, according to chapter 6.1.6 *Service-Switch Serv.*
Adj.- Adjust, according to section chapter 6.1.1 *Intensity Indicator Including the 'Adjust' Function* and chapter 6.2.4 *Settings* **Frequency switch** according to chapter 6.2.4 *Settings*.
Note:
When changing the frequency both switch (A + B) of the respective Range ON or OFF switching and always one Frequency enable.
- 2 **LED (green):** Indication, 'Flame in' state
- 3 **Intensity indicator** for flame signal in the range 0 ... 100 %
- 4 **Start-up suppression**, according to chapter 6.2.4 *Settings*.
- 5/ **LED (yellow)**, only for F200K2, lights for active range,
- 10 Pre-selection according to chapter 8.3.3 *Circuit Diagram F200K2 ... EX* or chapter 8.4.1 *Interfacing with ETAMATIC* (pin configuration) and chapter 6.2.4 *Settings*.
- 6/9 **Measuring points** to measure the flame radiation received by the F200K, according to chapter 6.2.4 *Settings*.
- 7 **Sensitivity switch for range II** (range of higher sensitivity), for gradual increase and/or decrease of sensitivity (amplification) of the compact flame scanner in 6 levels, overlapping switching position 5 = 7.6 = 8, s., see Chapter 6.2.4 *Settings*.
- 8 **Sensitivity switch for range I** (range of normal sensitivity), for gradual increase and/or decrease of sensitivity (amplification) of the compact flame scanner in 6 levels.
- 11 **LED (red):** Indication, "Flame out" state

8.2 Dimensions

8.2.1 F200K and F200K Ex-II (Hazardous Area 2.22) Compact Flame Scanner

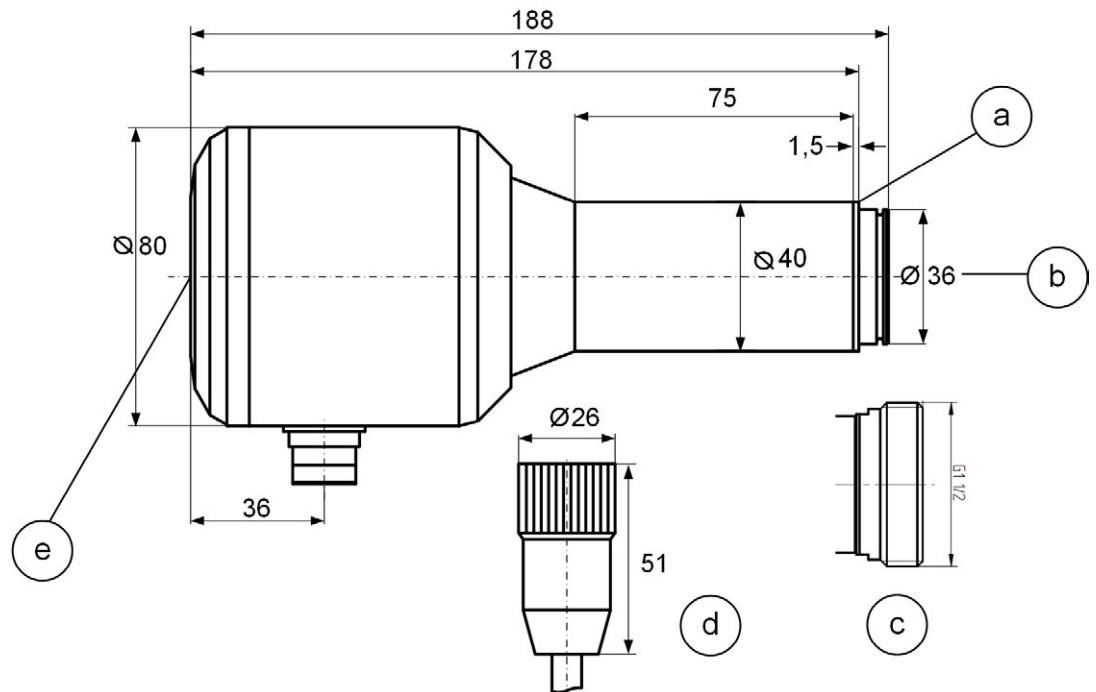


Fig. 8-5 Compact flame scanner F200K/F200K Z2, IP67

- a Permanent joint
- b Light entry port
- c Variant/V
- d Coupler for connecting cable
- e Indication of the operating state

Material: Corrosion-resistant aluminium EN AW 6082 (seawater 2*; atmospheric condition 1*)

Weight: approx. 0.6 kg/1,32 lb

* Comparative evaluation from 1 (very good) to 6 (unsuitable)

8.2.2 F200K2 ... Ex Compact Flame Scanner (Hazardous Area 1, 21)

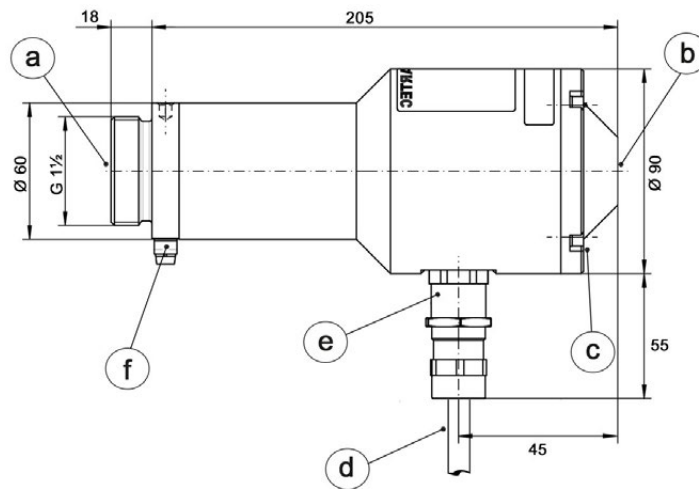


Fig. 8-6 Compact flame scanner F200K2 Ex, IP66

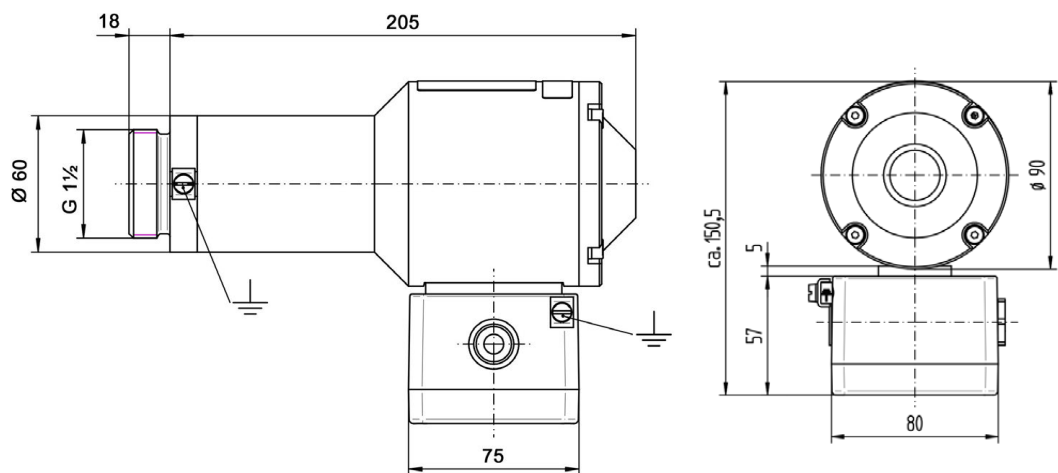


Fig. 8-7 Compact flame scanner F200K Ex with terminal space, IP66

- a Light entry port
Coupling fixation: Cylindrical pipe Thread DIN ISO 228/1
- b Indication of operating state
- c 4x cylindrical bolts M5 - ISO 4762 (DIN 912) Allen key width 4 ISK
- d Connection cable 3 m long/9,84 ft, Assignment same as F200K
- e Cable entry (not detachable!), with or without conduit connection 1/2" BSPP
- f Cylindrical bolt DIN 84, cable cross section 2.5 ... 6 mm²/14 AWG ... 11 AWG

Material: Corrosion-resistant aluminium EN AW 6082 (seawater 2*; atmospheric condition 1*), anodised or stainless steel

weight approx. 1,8 kg/3,96 lb

* Comparative evaluation from 1 (very good) to 6 (unsuitable)

8.2.3 Connection Housing FG 24 Ex

Ex e IIC T6 Gb , Ex tb IIIC T85°C Db (Sira 99ATEX3173)

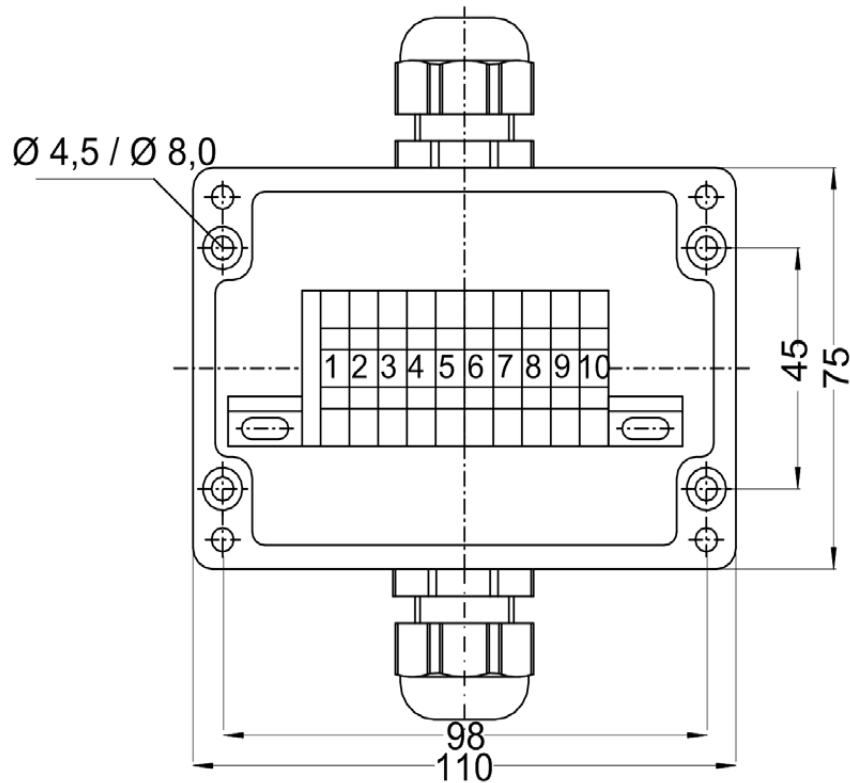


Fig. 8-8 Connection housing FG 24 Ex

Purchase order numbers FG 24 Ex:	659R0111
Classification:	II 2 G Ex e II T6 Gb II 2 D Ex IIIC T85°C Db
Protection class:	IP66
Cable gland:	e.g. 50.620 PASW/EX< 5,5...13,0 M 20x1,5
Type of terminal:	Spring-type terminal
Clamping range:	0.5 mm ² ... 2.5 mm ² /21 AWG ... 14 AWG
Stripping range:	8 mm ... 9 mm/0.31 in ... 0,35 in

8.3 Circuit Diagrams



DANGER!

The output contacts of the Flame scanner are approved for use with SELV or PELV only.

8.3.1 Circuit Diagram F200K1 ...

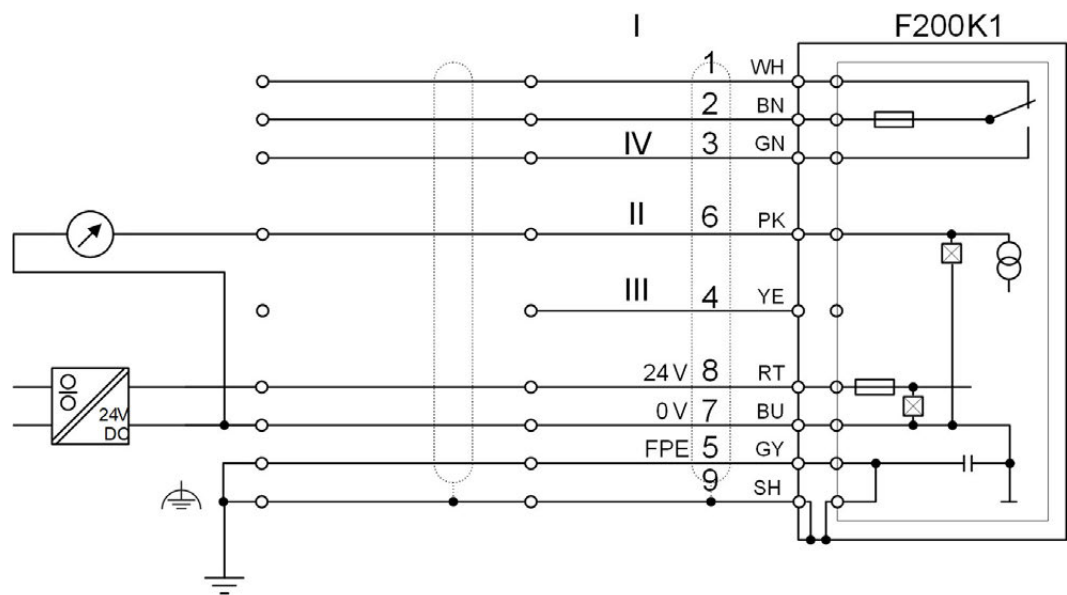


Fig. 8-9 Connection diagram F200K1...

- | | | | | | | | |
|------------|--|-----------|---------|-----------|----------|-----------|----------|
| I | - Connection cable | WH | - white | PK | - pink | BU | - blue |
| II | - 0/4 ... 20 mA | BN | - brown | YE | - yellow | GY | - grey |
| III | - Range without any function (F200K1 only) | GN | - green | RT | - red | SH | - shield |
| IV | - Flame signal | | | | | | |

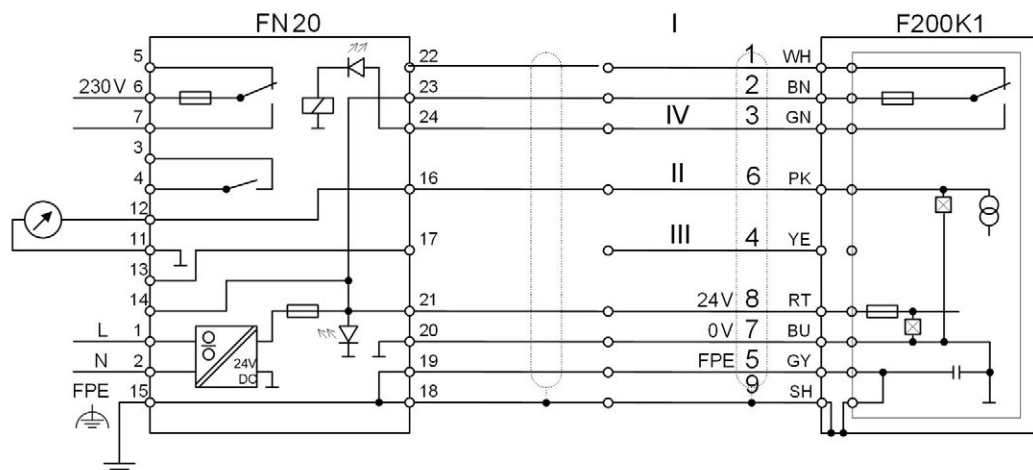


Fig. 8-10 Connection diagram F200K1... with power pack FN 20

8.3.2 F200K Terminal Assignment with FN 20 Power Supply special Application with Ionisation Terminal

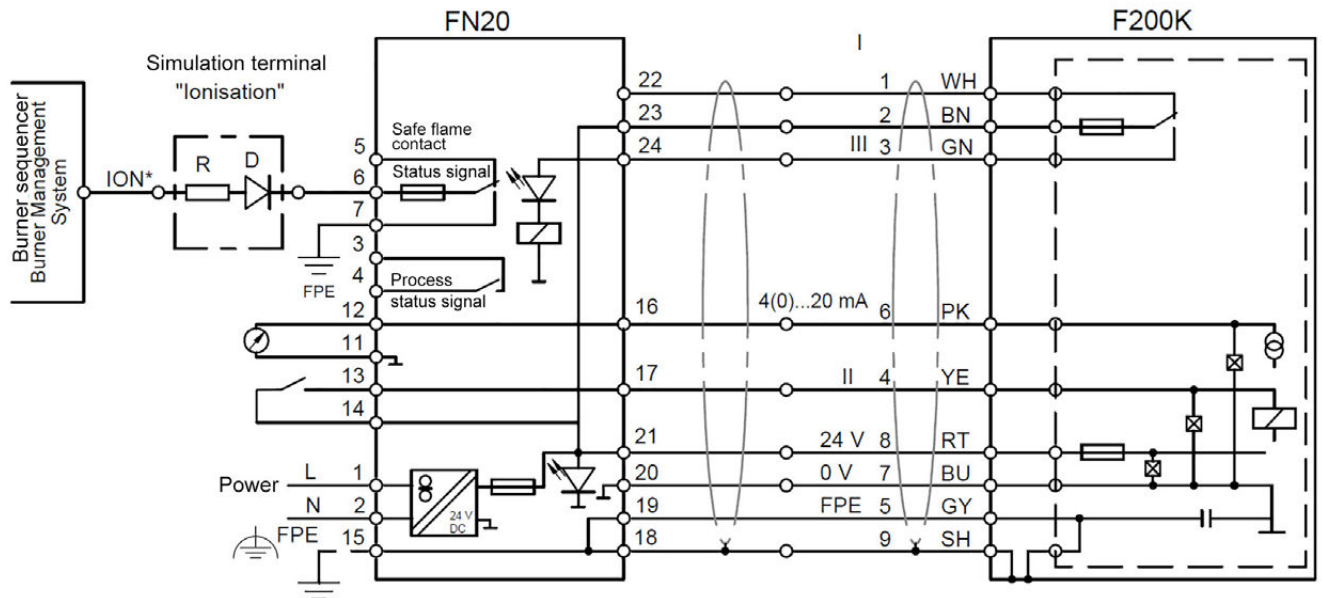


Fig. 8-11 F200K terminal assignment with FN 20 power supply special application with ionisation terminal

BK = black

RD = red

PK = pink

GN = green

WH = white

BU = blue

YE = yellow

Ionisation terminal

For transmission of the digital signal FLAME OFF/ON into an ionisation current.

No ionisation current = FLAME OFF

Ionisation current active = FLAME ON

NOTICE

The switch off time (FFDT) consists of the response time of the flame scanner and the response time of the burner sequencer. In total, this must not exceed the maximum permissible time in the respective use case.

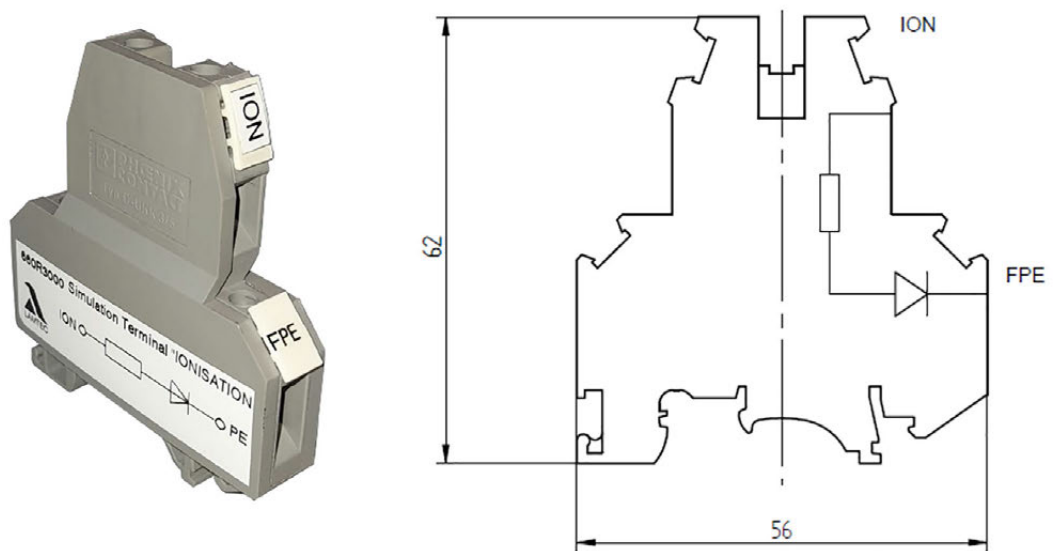


Fig. 8-12 2-level terminal ionisation block, Illustration, dimensions and technical data

Clamping range	0,2 mm ² ... 4 mm ² / 24 ... 11 AWG
Type of terminal	Screw terminal
Wide	6,2 mm / 0,24 in
Type of mounting	Mounting rail 35 / 7,5
Insulating material	PA
Flammability class	according to UL94: VO
Order No.	660R3000

The F200K flame monitoring system issues the Flame ON or OFF signal to the burner control system via a failsafe floating contact. The named systems have been inspected and certified in accordance with the standards named in the manuals. With the wiring for ionisation current (type 660R3000), coupling to the failsafe floating output of the flame monitoring systems also outputs a failsafe ionisation current. This requires the suitability of the burner control units. Check if the generated ionisation current is within the operating range of the burner control units. In addition, the wiring must be installed in accordance with the description in the manuals.

8 Appendix

8.3.3 Circuit Diagram F200K2 ... EX

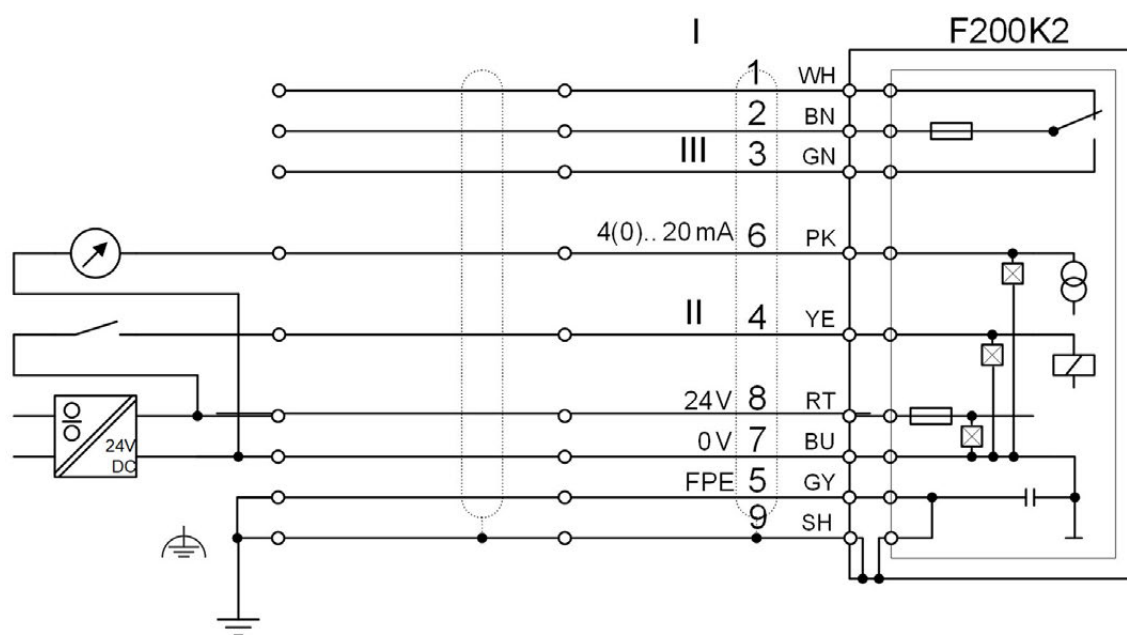


Fig. 8-13 Circuit diagram F200K2... (Ex)

I	- Connection cable	WH	- white	PK	- pink	BU	- blue
II	- Range	BN	- brown	YE	- yellow	GY	- grey
III	- Flame signal	GN	- green	RT	- red	Sch	- shield

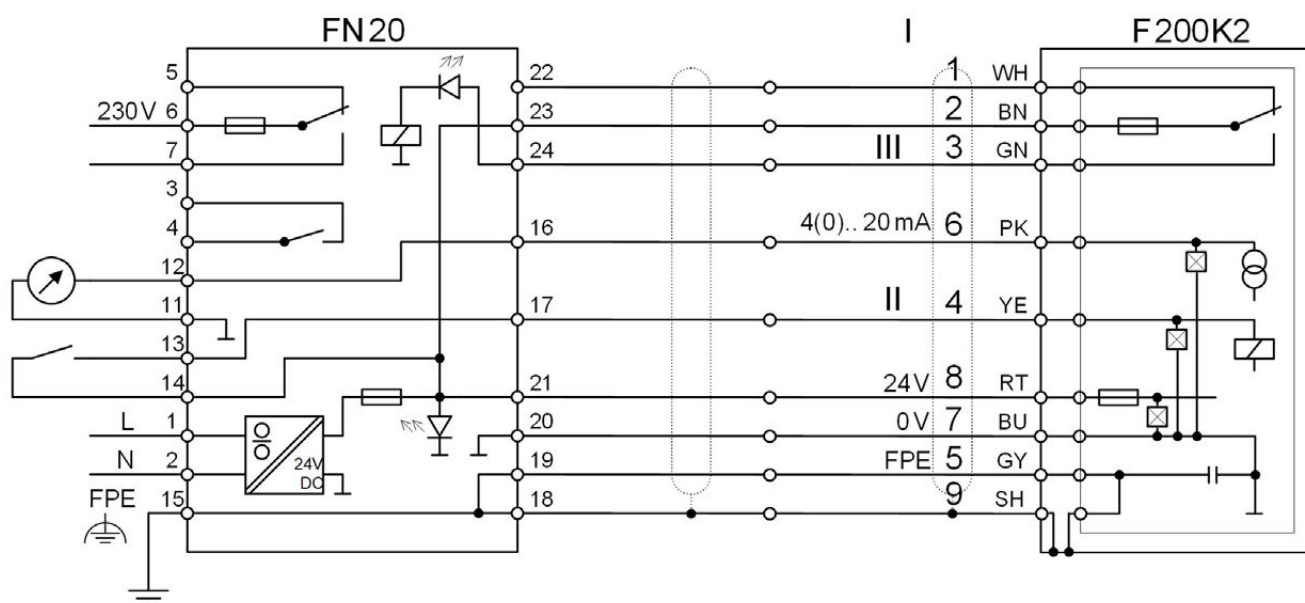


Fig. 8-14 Circuit diagram F200K2... (Ex) with power pack FN20

8.4 Examples of Application

8.4.1 Interfacing with ETAMATIC

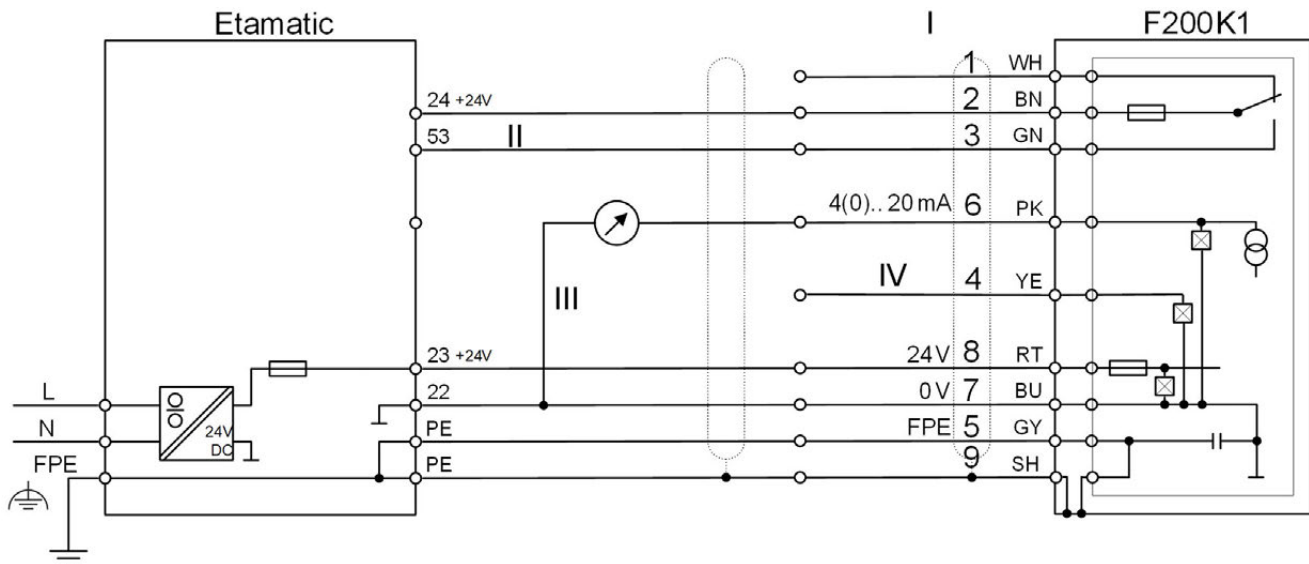


Fig. 8-15 Interconnection F200K1 with ETAMATIC

I	– Connection cable	WH	- white	PK	- pink	BU	- blue
II	– Flame signal	BN	- brown	YE	- yellow	GY	- grey
III	– Flame intensity	GN	- green	RT	- red	Sch	- shield
IV	– Range without any function (F200K1)						

NOTICE

If a F200K is connected to a FMS or ETAMATIC no other device may be connected to the 24 V power supply of the FMS or ETAMATIC.

If the F200K shall be connected while power is supplied a RESET of the controls (FMS or ETAMATIC) may occur.

8.4.2 Interfacing with FMS

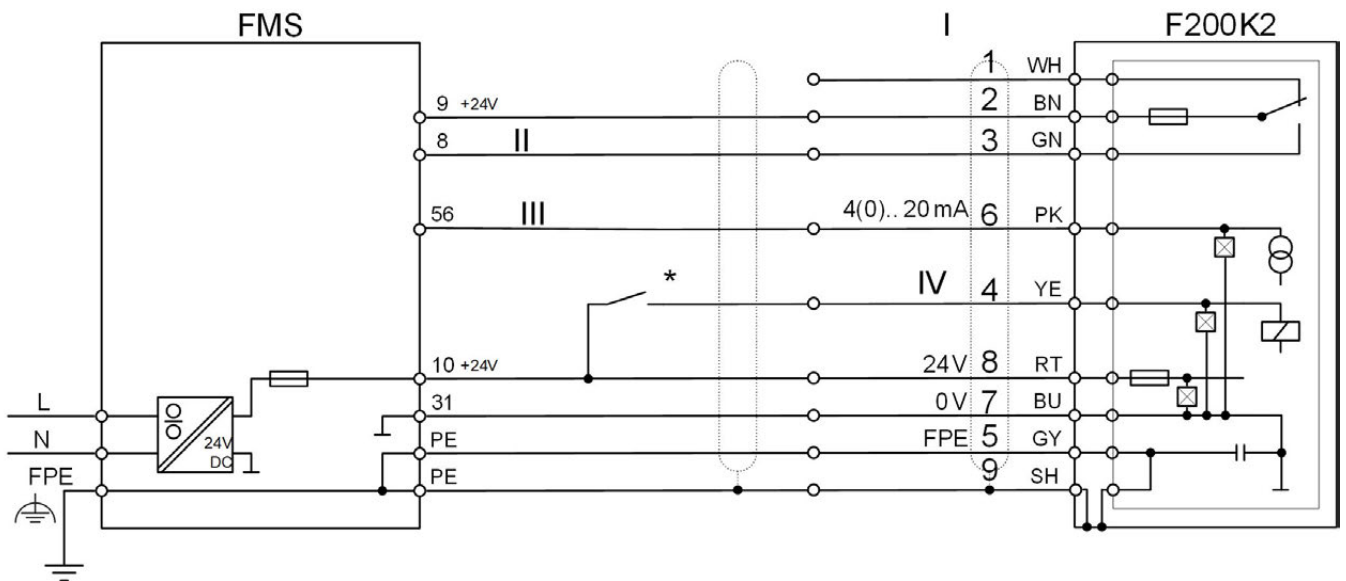


Fig. 8-16 Interconnection F200K2 with FMS

I	- Connection cable	WH	- white	PK	- pink	BU	- blue
II	- Flame signal	BN	- brown	YE	- yellow	GY	- grey
III	- Flame intensity	GN	- green	RT	- red	Sch	- shield
IV	- Range						

*Use application-related

9 Accessories

9.1 FN20, FN30-20 Power Supply

9.1.1 Purpose

The FN20 mains supply unit is used to connect the F200K to a mains A.C. It has been designed for top hat rail installation (as an option, it is also available for plate mounting). Additionally the unit has the related safely operating output relays for mains A.C. to couple the relays of the F200K.

Ensure that the FN20 is installed to a protection degree of **at least IP40**. As an option, the FN20 mains supply unit is available in an **IP65** housing.

NOTICE

The FN20 (115 V) is UL Listed approved.


WARNING!

Installation!
The wires must be installed/attached in such a way that, if a wire is unintentionally loosened, a sufficient distance is still maintained between SELV/PELV and the other voltages.

9.1.2 Technical Data

Mains voltage		230 VAC (+10 %/-15 %)
optional		115 VAC (+15 %/-15 %)

NOTICE

When ordering the FN20 for 115 VAC, it will be delivered with the related identification marking on the mains unit. The setting for the mains supply voltage can only be changed in the factory.

Mains frequency		45...65 Hz
Power consumption		≤ 5,4 VA
Related fuse inside the device, secondary		315 mA slow blow
Output DC voltage		Protection class III
Output no-firing-rate voltage		< 33 V
Max. current input		0.2 A avg
Operating mode		DB
Creepage distances and clearances		DIN EN 60730 part 1

Output contact, safe	Changeover switch (floating)
Maximum switching voltage	max. 250 VAC, 50 VDC Protection II min. 6 VAC/DC
Maximum switching current	max. 0.5 A min. 10 mA, at a limit firing-rate of 50 mA
Switching capacity on DC voltage on AC voltage	min. 0,1 W max. 30 W max. 120 W
internal fuse	500 mA slow IEC

Signalling contact	Normally open contact (floating)
Maximum switching voltage	max. 250 VAC, 30 VDC Protection class II min. 6 VAC/DC
Maximum switching current	max. 0,5 A min. 10 mA, at a limit firing-rate of 50 mA
Switching capacity on DC voltage on AC voltage	min. 0,1 W max. 30 W max 120 W
External fuse	≤ 500 mA slow IEC, ≤ 750 mA slow UL



DANGER!

Output contact, safe versus signalling contact

Electrical insulation is affected through base insulation, i.e. it is not allowed to simultaneously apply SELV (safety extra low voltage) and mains voltage to the two contacts.

Connection core section	
– Flexible	0,5 ... 2,5 mm ² /20 AWG... 14 AWG
– Rapid	0,5 ... 4,0 mm ² /20 AWG... 12 AWG
Technical Stressability	
Operating mode	Continuous operation Intermittent operation 72 h operation according to TRD 604
Creepage distances	IEC 60730-1:2010, ÜK III, VG 2

Radio Interference Suppression



WARNING!

The output contacts of the flame scanner have no radio interference suppression. The user is required to take the appropriate radio interference suppression measures on the basis of the overall installation design. In order to ensure the required safety, carry out the installation circuitry in such a way as to avoid shorting-out of the safe output (flame signal - flame present) by defective components of the interference suppression unit.

Climatic conditions	
Installation category	Temp. min. - 20 °C/-4 °F max. + 60 °C/+140 °F, rel. air humidity 80% at 35 °C/+95 °F
Degree of protection	IP20; without further enclosure IP65; built-in in IP65 enclosure
Storage conditions (in original packing)	
Storage location	closed premises
Air temperature	- 40 ... + 70 °C/-40 °F ... +158 °F
Air humidity	max. 80 % at 35 °C/95 °F
Transport conditions (in original packing)	
Type of transport	in cargo holds
Air temperature	- 40 ... + 70 °C/-40 °F ... +158 °F
Temperature-humidity-coupling	max. 80 % at 35 °C/+95 °F

9 Accessories

9.1.3 Pin Assignment

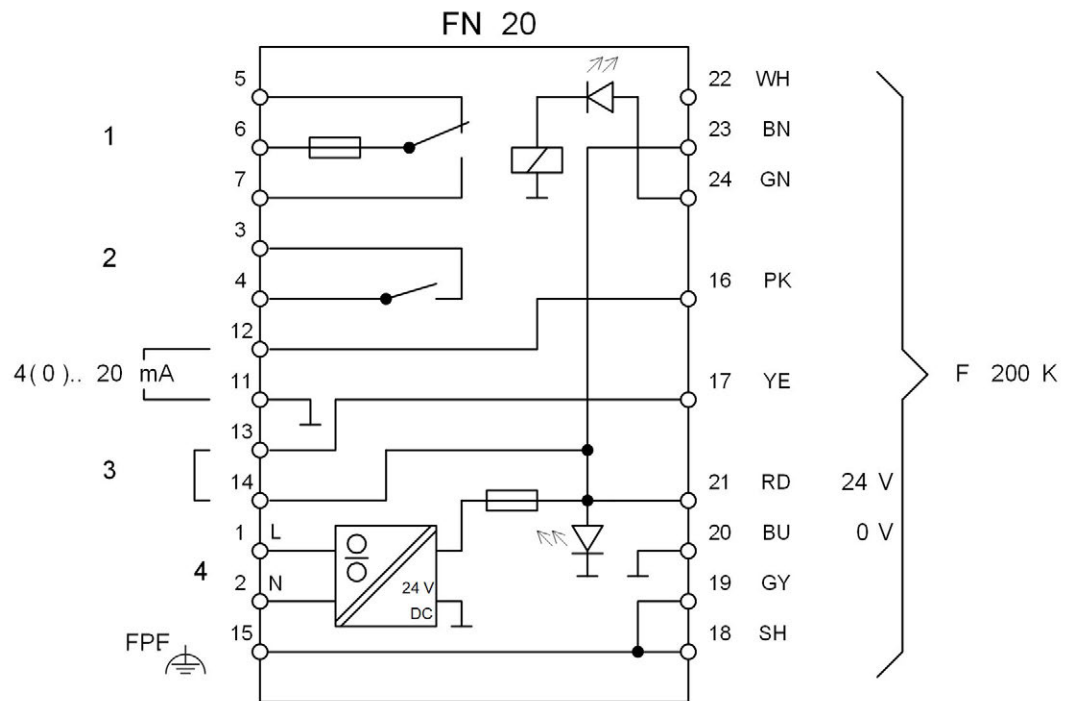
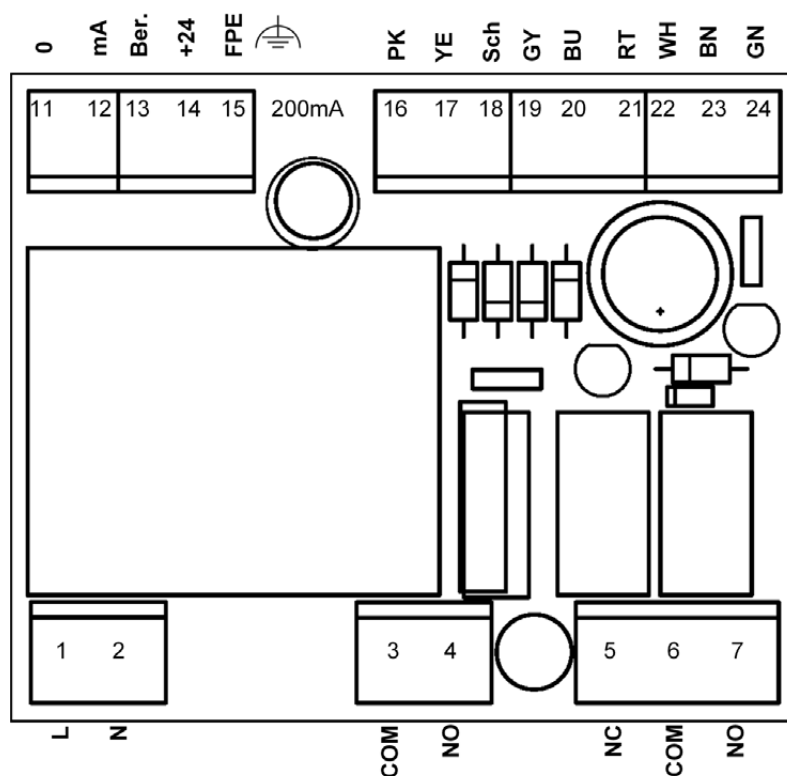


Fig. 9-1 Pin configuration FN20

1	- Flame contact	WH	- white	PK	- pink	BU	- blue
2	- Signalling contact	BN	- brown	YE	- yellow	GY	- grey
3	- Sensitivity selector	GN	- green	RT	- red	Sch	- shield
4	- Mains/FPE						

9 Accessories

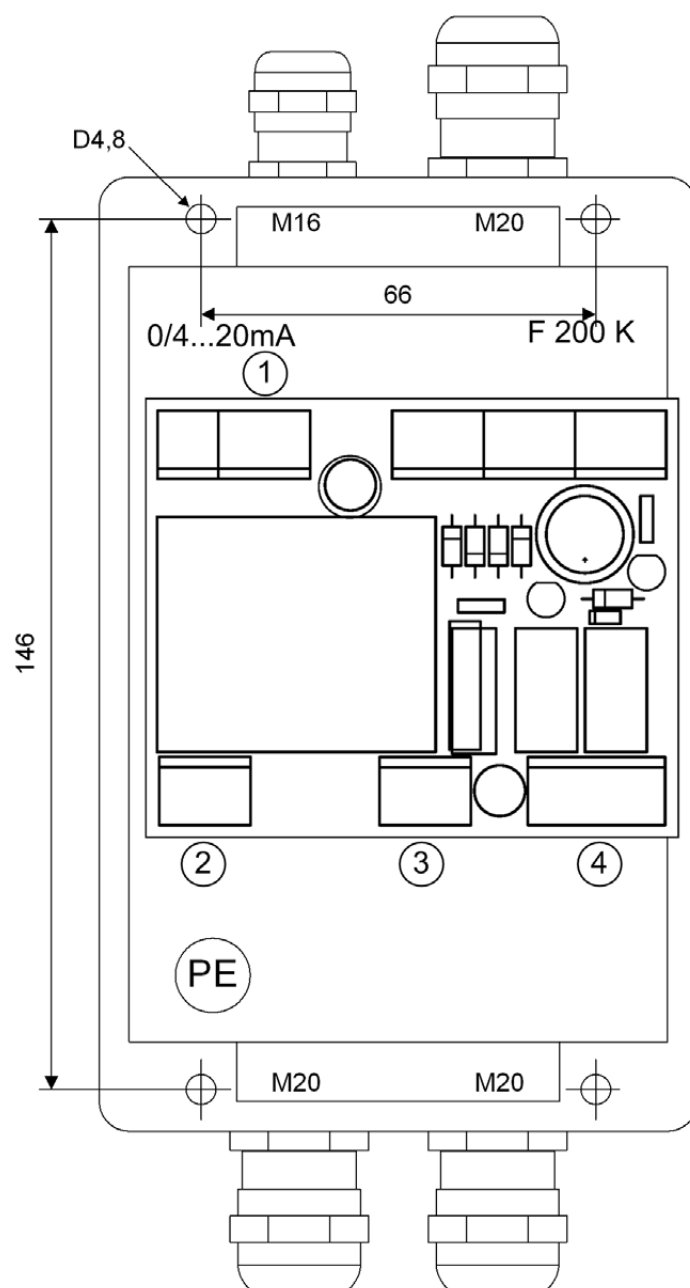


Width 77 mm/3.03 in
 Length 90 mm/3.54 in
 Height 46 mm/1.81 in
 from upper edge for hat top rail
 Weight 0,35 kg/0,77 lb

Fig. 9-2 Dimensional drawing IP20 - housing Type 659R6010, FN20

- 1/2 L1/N Mains voltage (230/110 VAC) input
- 3/4 Second contact for flame indication not fail-safe (3 COM 4 NO)
- 5/6/7 Flame signal(5 NC 6 COM 7 NO)
- 11/14 -/+ 24 VDC Power Output
- 15 Shielding
- 20/21 -/+ 24 VDC Power Supply

9 Accessories



Width 100 mm/3,93 in
 Length 160 mm/6,29 in
 Height 80 mm/3,15 in
 Weight 1,15 kg/2,54 lb

1 Remote switch-over
 2 Mains
 3 Signal contact
 4 Safe contact

Fig. 9-3 Dimensional drawing IP65 - housing Type 659R6010/G FN30-20

9.2 Weather Shield

The weather shield is intended to protect the electronic parts in outdoor installations. Should the cover be removed for the purposes of commissioning or service in inclement weather conditions, precautions should be taken to provide additional protection from the elements to ensure personal and equipment safety are maintained. The weather shield also provides sun shade protection and improves the visibility of the indicators.

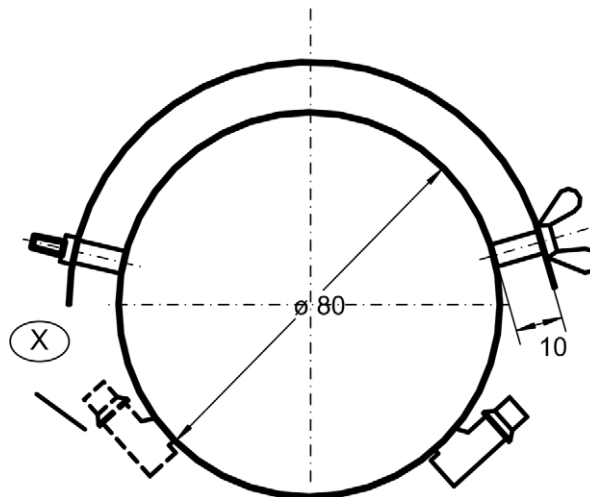


Fig. 9-4 Mounting of weather shield type 659R6030 (rear view)
X - reverse installation in F200K possible

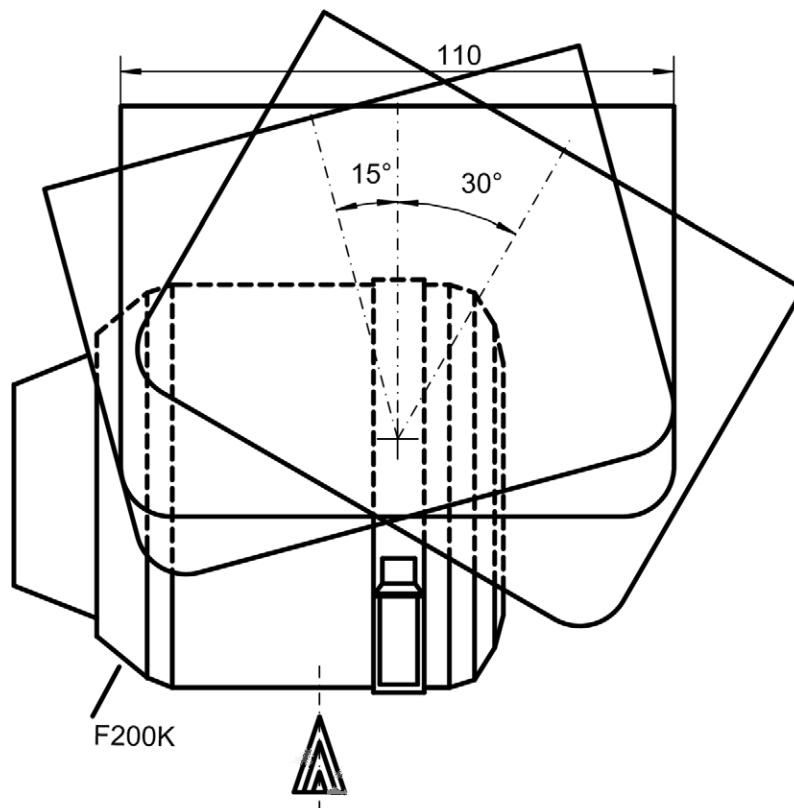


Fig. 9-5 Mounting variation of weather shields type 659R6030 (side view)

9.3 Adjustable Holding Devices

9.3.1 FH30-10 (for IR and UV, without Ball-and-socket-joint with Purge Air Connection)

Special attention when mounting the F200K with the holder FH30....

In order to avoid soiling of the view opening during operation, the assembly steps shown in the following illustration must be carefully observed.

NOTICE

In particular, it is important to ensure that the flame scanner F200K snaps tightly into the plastic sleeve of the holder before the clamping devices are tightened.

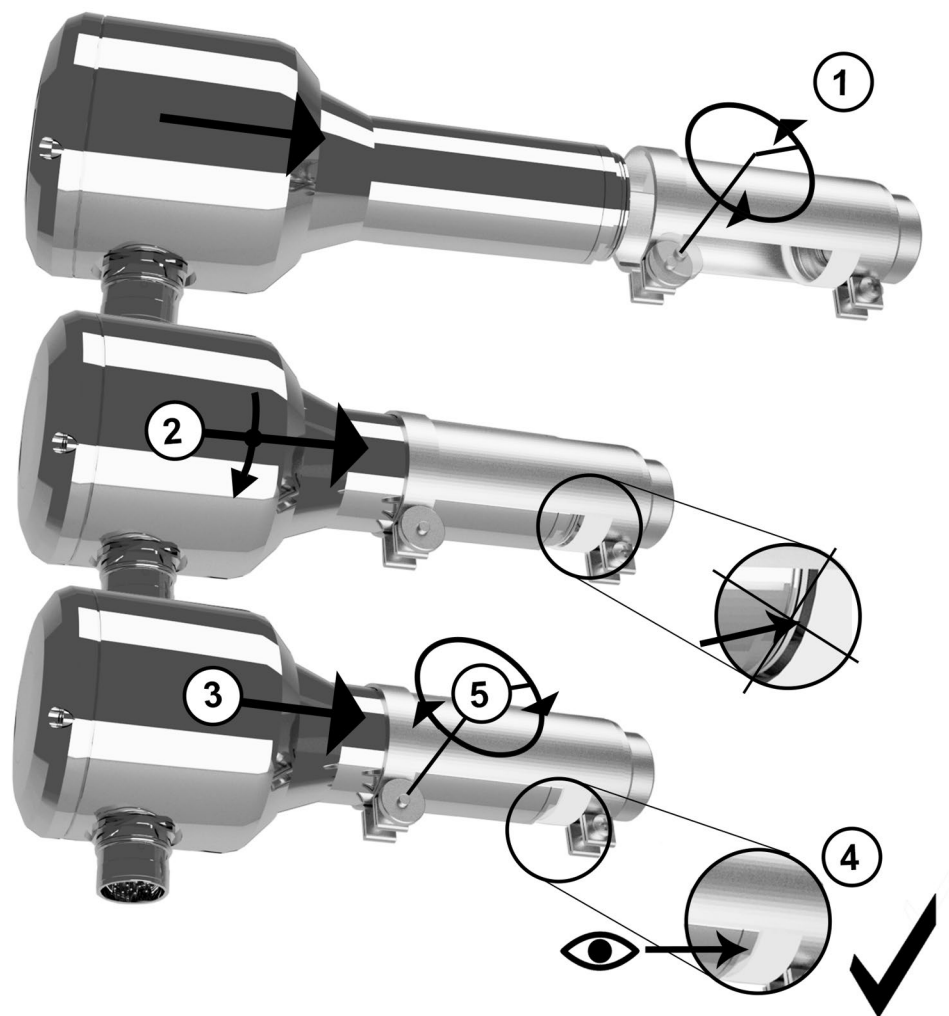


Fig. 9-6 Mounting F200K to FH30-00

9 Accessories

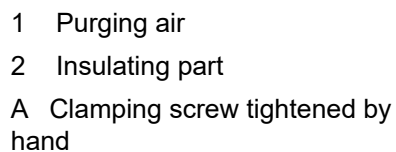


Fig. 9-7 Dimensional drawing FH30-10 type 659S1500 with flame scanner F200K

9.3.2 FH40-10 (for IR and UV, with Ball-and-socket-joint and Purge Air Connection)

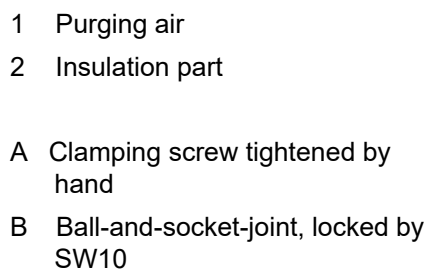
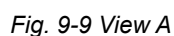


Fig. 9-8 Drawing dimension FH40-10 Type 659S1600 with flame scanner F200K

Instructions for purge/sealing air

- Free of dirt and oil
(may be with oil separators, particulate filters)
- > 20 mbar above the current pressure prevailing
- $\geq 5 \text{ m}^3/\text{h}/22.01 \text{ gpm}$ for cooling
- < 50 °C/+122 °F at the purge air inlet



9 Accessories

9.3.3 FV30-10 (for IR and UV, without Ball-and-socket-joint with Purge Air Connection)

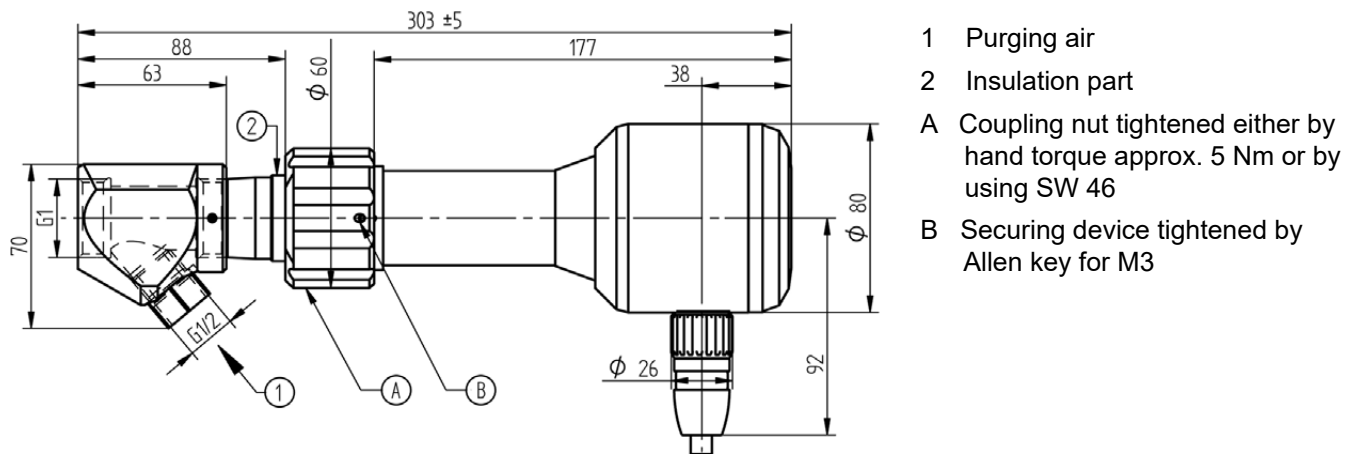


Fig. 9-10 Dimensional drawing FV30-10 Type 659S1200 with flame scanner F200K

9.3.4 FV40-10 (for IR and UV, with Ball-and-socket-joint and Purge Air Connection)

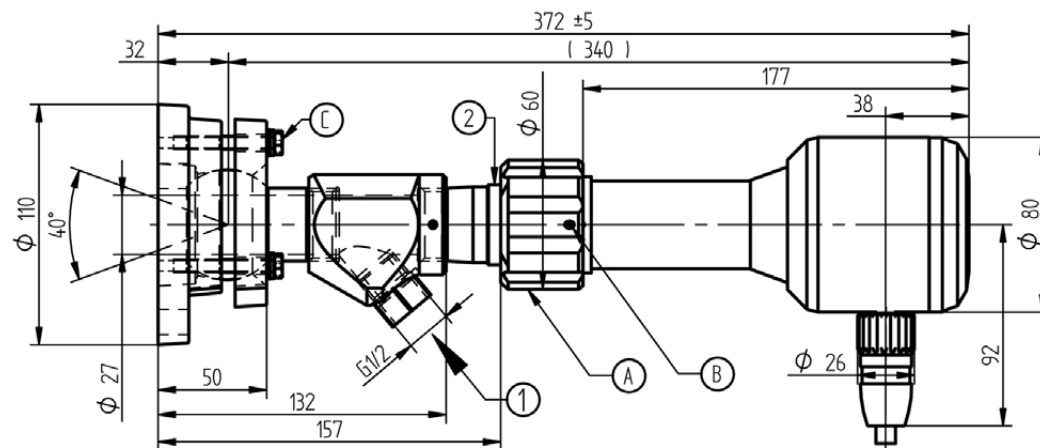


Fig. 9-11 Dimensional drawing FV40-10 type 659S1300 with compact flame scanner F200K

9 Accessories

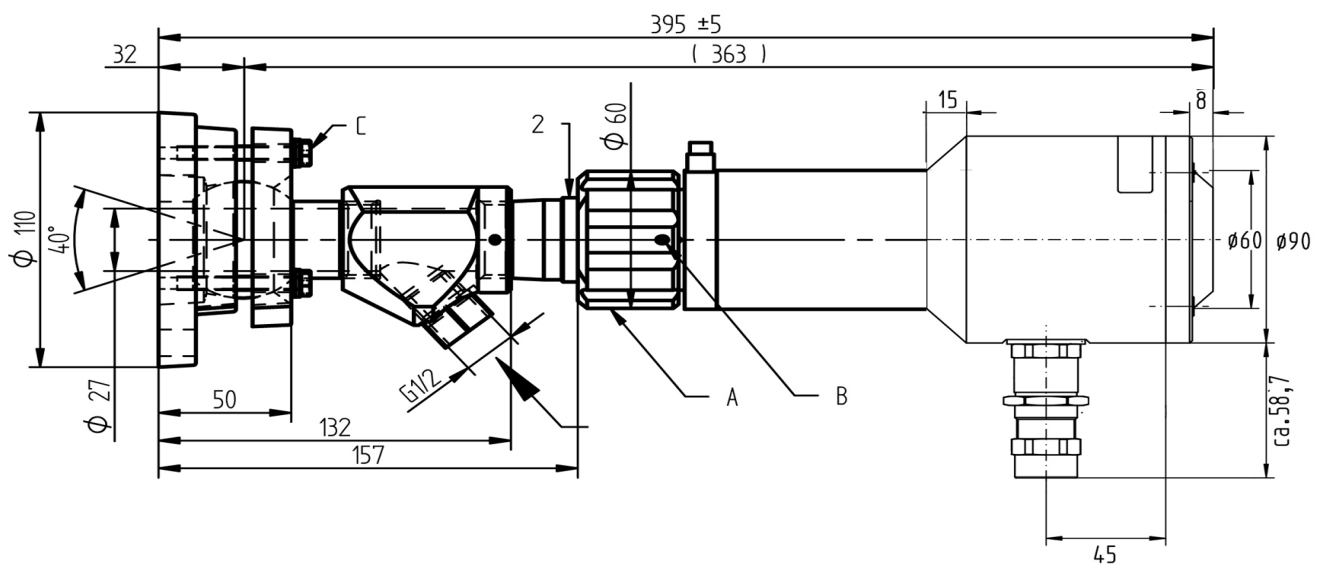


Fig. 9-12 Dimensional drawing with bracket FV40-10 with F200K Ex type 659S1300

- 1 Purging air
- 2 Insulation part
- A Coupling nut tightened either by hand torque approx. 5 Nm or by using SW 46
- B Securing device tightened by allen key for M3
- C Clamping of the ball-and-socket joint by using SW 10

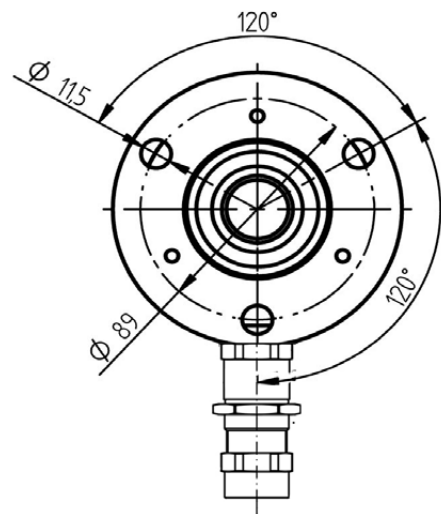


Fig. 9-13 View A

9 Accessories

9.3.5 Cooling Air Housing FS50

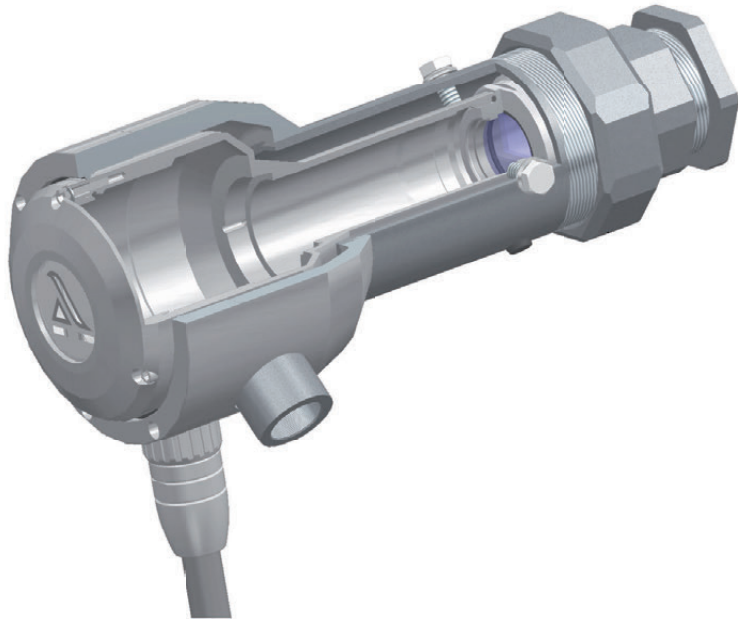
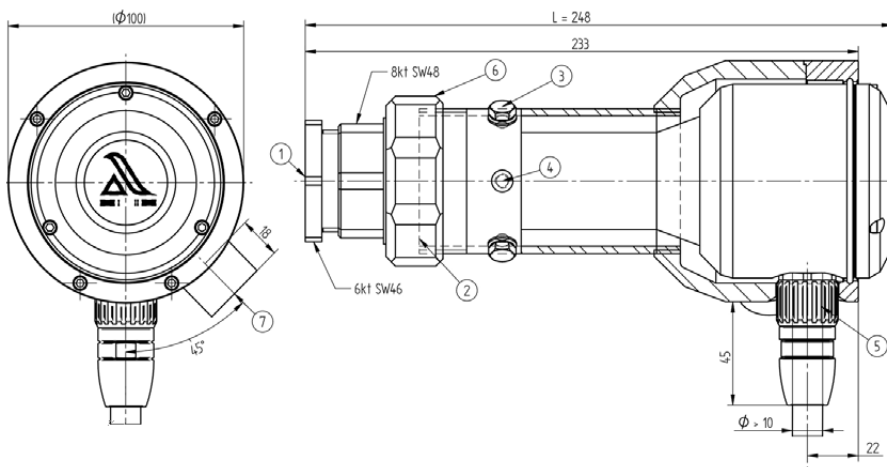


Fig. 9-14 Cooling air housing FS50



- 1 Pipe connector (boiler) Rp1"
- 2 Sealing ring 56x42x2
- 3 3x setting screws M6 - nylon
- 4 3x removable rubber buffers (discharge of cooling air)
- 5 Cable connector with screwed connection
- 6 Detachable connection 8 Kt SW 66 (lens cleaning)
- 7 Cooling air connection Rp1/2"

Fig. 9-15 Cooling air housing FS50 dimension drawing

9 Accessories

Cooling air housing FS50-2 with cooling air connection NPT

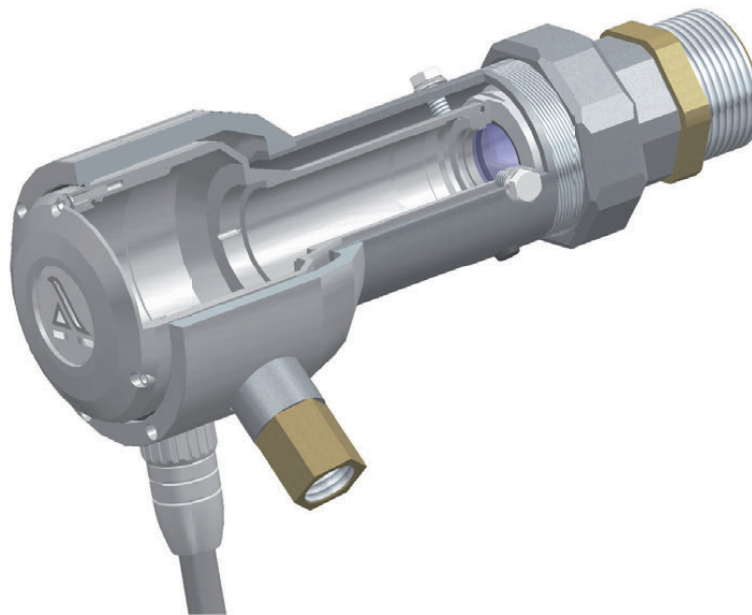


Fig. 9-16 Cooling air housing FS50-2

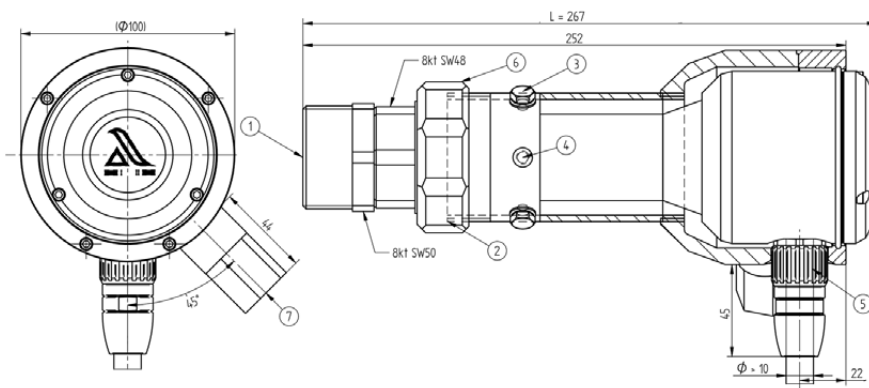


Fig. 9-17 Cooling air housing FS50-2 dimension drawing

- 1 Pipe connector (boiler) Rp1 1/2 "
- 2 Sealing ring 56x42x2
- 3 3x setting screws M6 - nylon
- 4 3x removable rubber buffers (discharge of cooling air)
- 5 Cable connector with screwed connection
- 6 Detachable connection 8 Kt SW 66 (lens cleaning)
- 7 Cooling air connection Rp 1/2" NPT

9 Accessories

9.3.6 Cooling Air Housing with Ball-and-Socket Joint FS51

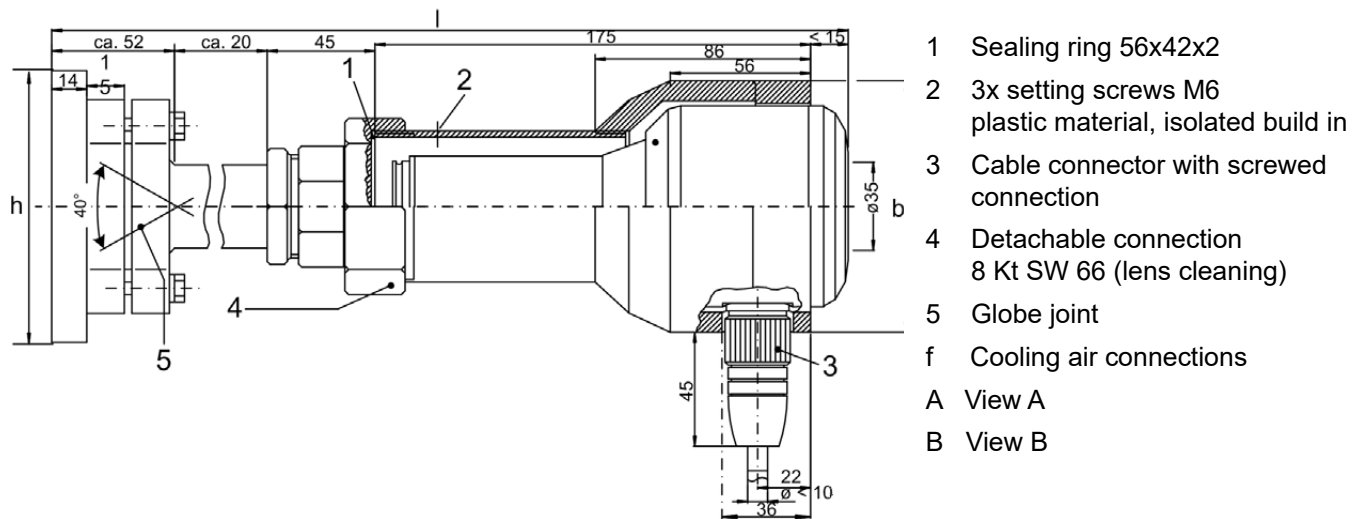


Fig. 9-18 Adjustable holding device FS 51 type 659R6107

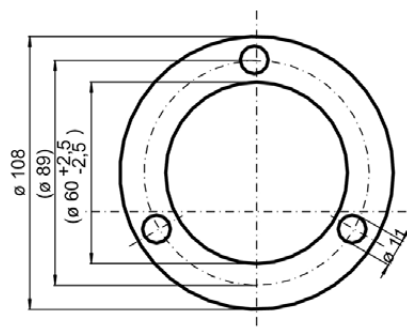


Fig. 9-19 FS 51 View A

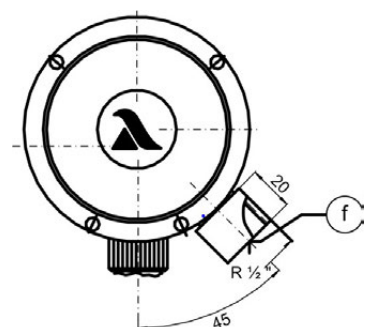
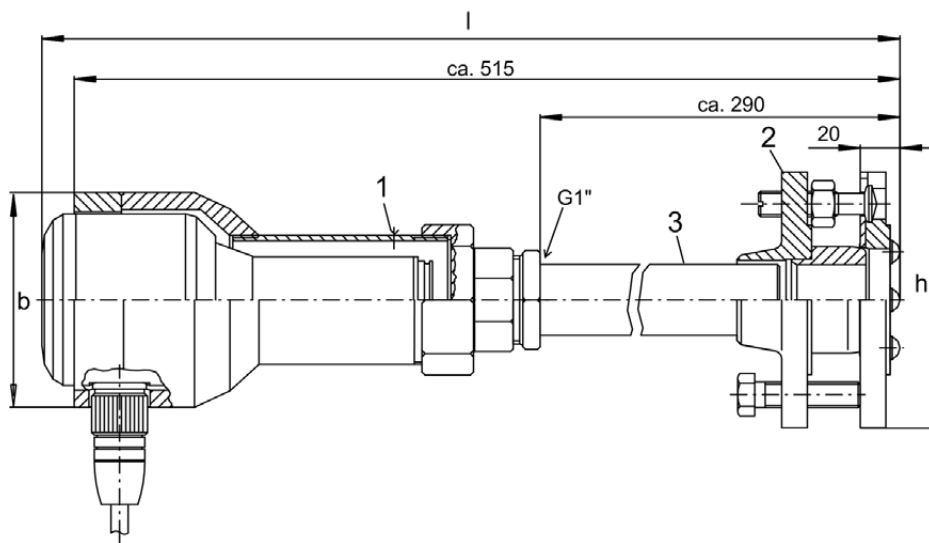


Fig. 9-20 FS 51 View B

9.3.7 FS56 (Adjustable, Demountable, with Cooling Air Housing)

9 Accessories



- 1 3x Retaining screw M6 - Nylon
- 2 Distance sleeve
- 3 Flange demountable and adjustable

4 Cooling air connection

Fig. 9-21 Adjustable holding device FS56 with cooling air housing F200K

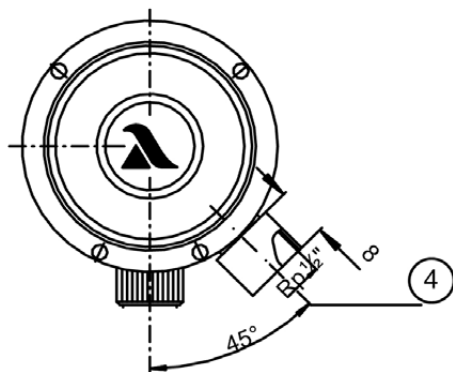


Fig. 9-22 View B

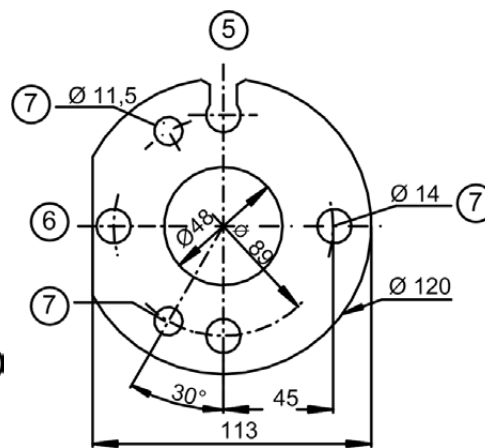


Fig. 9-23 View A

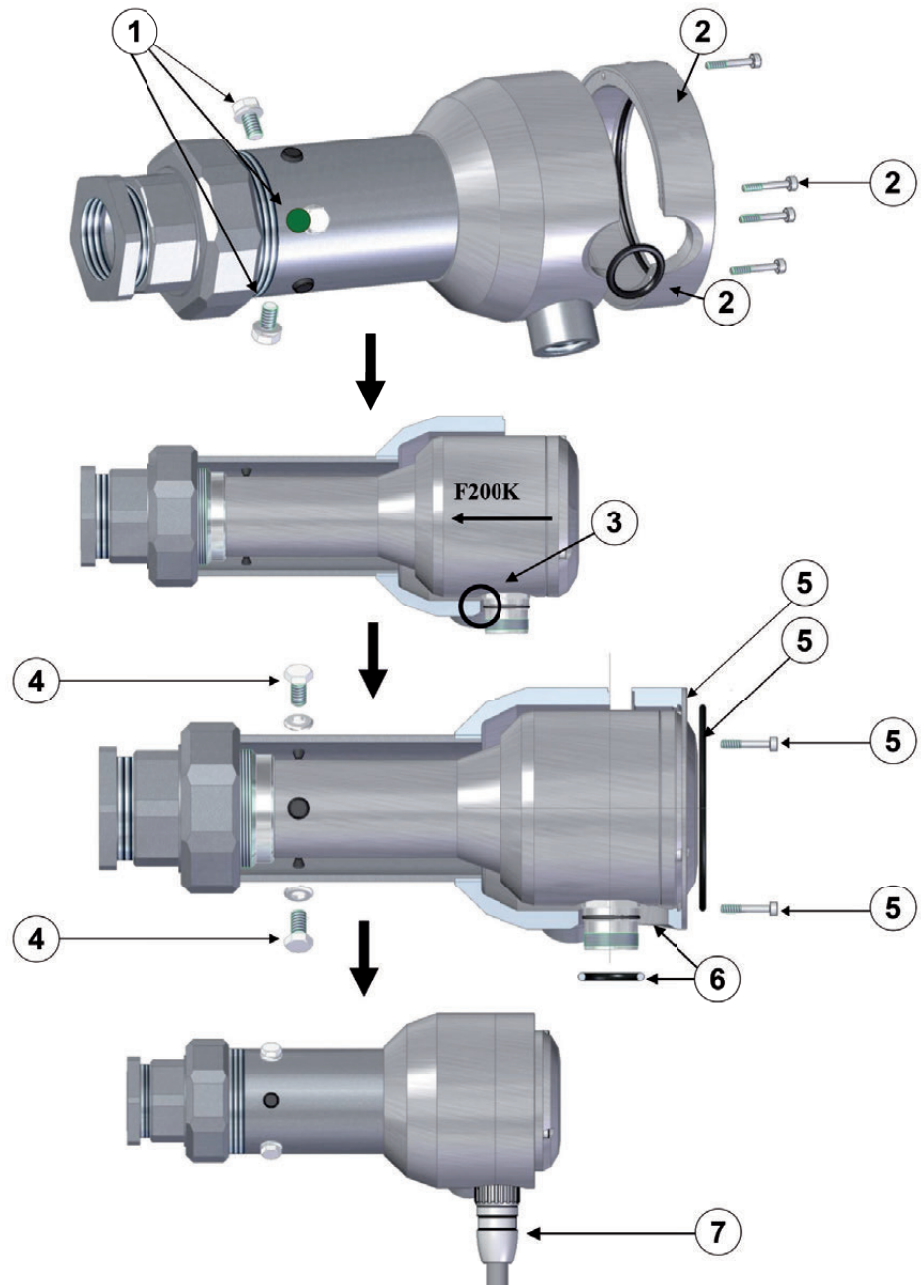
- 5 Top
- 6 Flange outlines and bore sketch fixing X
2 x Ø 11,5;
1 x Ø 14
- 7 Mounting bores

A View A

B View B

9.4 Installation in the Cooling Air Housing

Installation steps 1 to 7



- | | | |
|---|---|---|
| 1 Loosen 2 x (without green screw paint) secured M6x12 screws + spring washer | 2 Remove 4 x hexagonal head screws + rear housing section Caution: Do not lose O-ring 22 x 3! | 3 Slide the F200K into the front housing section (up to the position on the plug connector) |
| 4 Adjustment of the F200K in the FS50 pipe by screwing in 3 x PA screw M6x12 | 5 Insert the O-ring into the sealing groove and screw housing part 2 with 4 x M3x16 screws + washers. | 6 Insert the O-ring, insert the plug connector until it is positioned exactly in the housing. |
| 7 Connecting the connection cable | | |

9 Accessories

9.5 Flame Scanner Testing Device



Fig. 9-24 Flame Scanner Testing Device FFP30

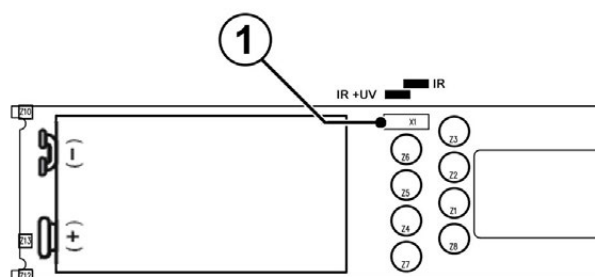


Fig. 9-25 1. (1) Positions of the internal jumper IR + UV

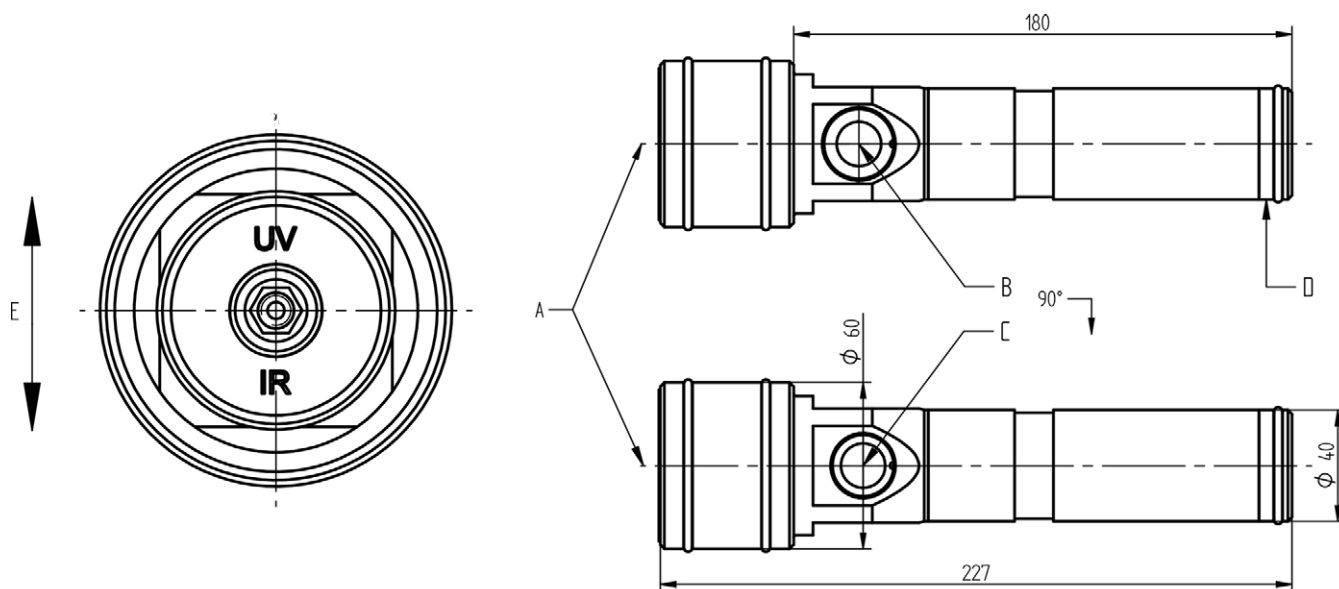


Fig. 9-26 Dimensional drawing FFP30

- A Threaded receptacle for F200K, F300K
- B Plug-in receptacle for FFS30, FFS08
- C Plug-in receptacle for FFS30, FFS07
- D Changing battery (9 V, 500 mA - turn left to open housing)
- E Toggle switch

9 Accessories

Design	
Area of application	IR- and UV flame sensor Switching by means of toggle switch
Frequency range	Flame simulation by 4 frequency ranges
Power supply	alkaline battery 9 V, 500 mAh automatic switch-off by approx 5 min Battery life approx. 3 years
Housing	
Design	cylindrical aluminium housing
Montage	direct connection to: Threaded receptacle for F200K, F300K Plug-in receptacle for FFS30, FFS07, FFS08, F200K
Environmental conditions	
Degree of protection	IP54
Level of protection	III
Weight	0.52 kg/1.15 lb

9 Accessories

9.6 Connection Cable AK01

9.6.1 Purpose



DANGER!

The Connection Cable are approved for use with SELV or PELV only.

NOTICE

For special requirements it may be necessary to protect cable additionally.
The specific installation rules are to be observed.

NOTICE

Only the connection cable AK01-51 is equipped with UL Listed certified TC-ER cable.
The other connection cables comply with a UL AWM style. The wiring of the devices must be in accordance with the NEC field wiring requirements for the particular site.



Fig. 9-27 F200K Connection cable AK01-51

9.6.2 Technical Data

Plug PIN	Cable - Core - Code				Function	
	Colours			Numbers		
1	WH	ws	white	1 ONE	Contact	switch NC
9		br	brown	2 TWO	Contact	COM-midpoint
8	GN	gn	green	3 THREE	Contact	switch NO
11		ge	yellow	4 FOURE	Area	BI/II-Relay
6	GY	gr	grey	5 FIVE	FPE/Shield	
5	PK	rs	pink	6 SIX	Intensity	0/4 ... 20 mA
4	BU	bl	blue	7 SEVEN	Supply	0
3	RD	rt	red	8 EIGHT	Supply	+
Hous- ing	Shield braiding		black	yellow+ black	Shield	

9 Accessories

Technical Data AK01-51	Used for UL Listed Section and hazardous area Class I Division 2
Protection class	TC-ER (Tray Cable Exposed Run), outdoor
Housing material	Outer sheath of special PVC
Minimum bending radius	Static/Occ. moved: 6/20 x OD (Outer diameter)
Temperature range	Static/Occ. moved: -40/-10 °C ... +90 °C / -40/+14 °F ... +194 °F
Cross-section	8 × 0,9 mm ² / 18 AWG
Shield	copper braiding
Core identification	black cores with continuous white numbering

9.7 Fiber Optic

The LAMTEC Fiber Optic System is available with 2 spectral sensitivities and 2 basic mechanical constructions. The spectral sensitivity is matched to the LAMTEC flame scanner.



WARNING!

F200K IR-x FO

The flame scanner F200K FO in the IR version (IR-1..4) may only be used with the LAMTEC Fiber Optic in the IR version. The Fiber Optic IR version includes the required spectral sensitivity limitation.

Visible is the Fiber Optic IR version on the process optics (see Fig. below).

The viewing port to the flame is not a lens, but covered with a black filter.

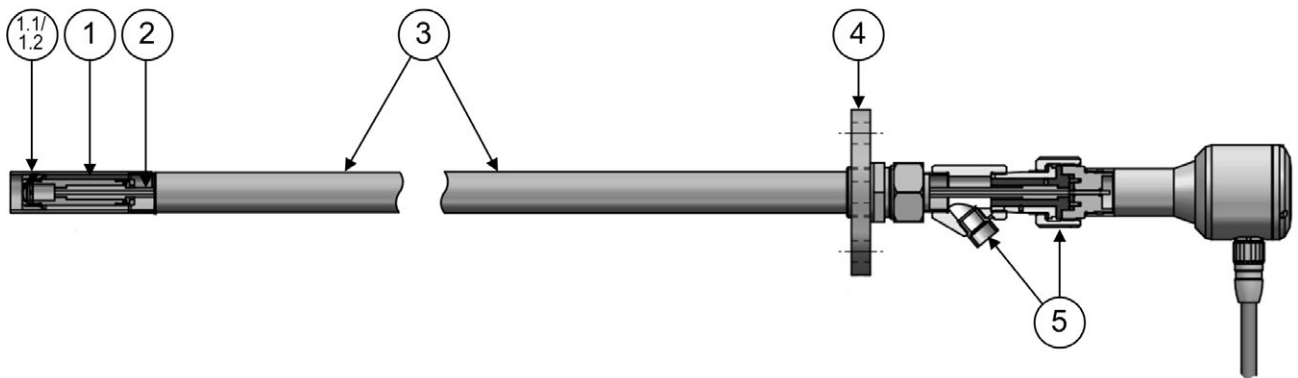


Fig. 9-28 Fiber optic rigid with Flame scanner

- | | |
|---|---|
| 1 Component Group Process Optics | 3 Component Group housing |
| 1.1 Optic UV | 4 Component Group burner mounting assembly |
| 1.2 Optic IR | 5 Component Group Flame scanner holder assembly FV30-FO |
| 2 Fiber bundle (customer-specific length) | |

Fiber Optic with enclosure - **Type key FOabb-cc-dd:**

- a enclosure type: R-rigid, F-flexible
- b enclosure series: e.g. 10
- c length: e.g. 25 - (2,5 m)
- d optic: UV - uv/vis/nir, IR-nir

9 Accessories

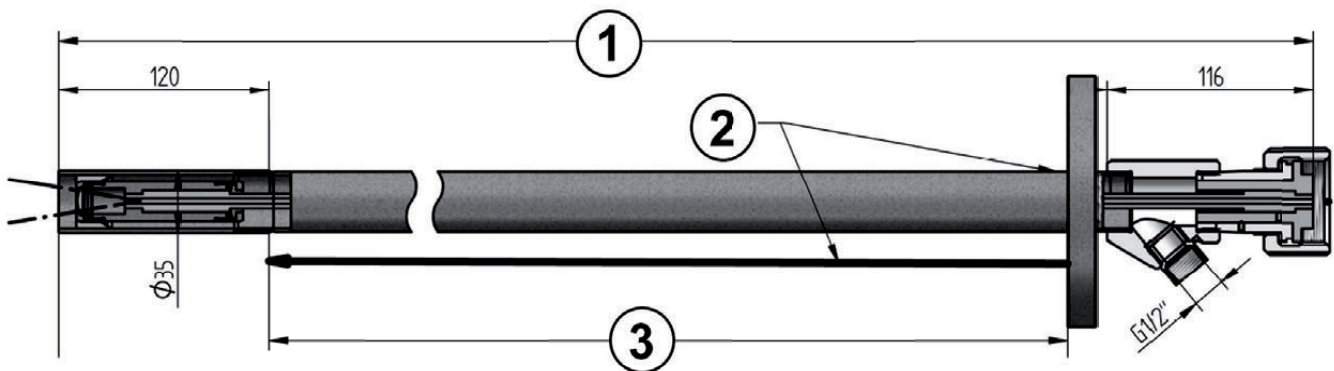


Fig. 9-29 Faser optik system rigid FOR10-XX-XX

1 Minimum total length 1000 mm/3,28 ft

3 Adjustment length 740 mm/2,43 ft

2 Mounting flange positionable

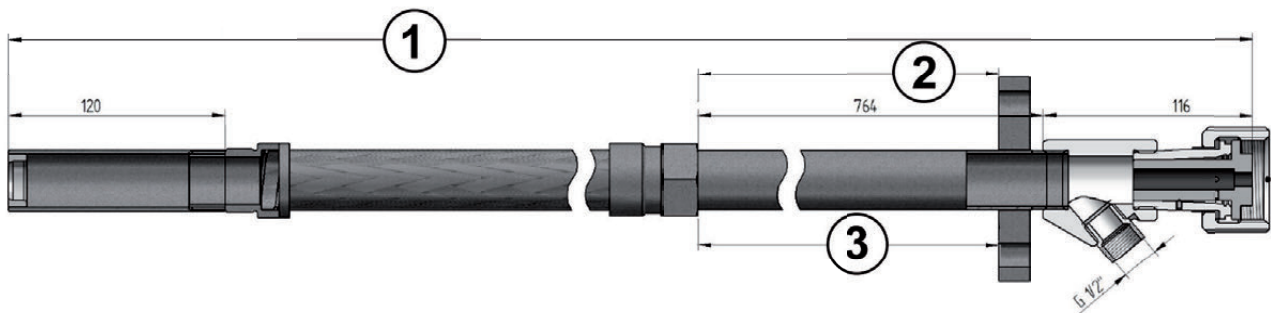


Fig. 9-30 Fiber optic system flexible FOF10-XX-XX

1 Minimum total length 1500 mm/4,92 ft

10 Commissioning Protocol



LAMTEC Leipzig GmbH & Co KG

Installation & Operation Record Compact Flame Detector F 200 K

1. Object:

2. Plant specifications:

Burner-Type: Gas burner ☐ Oil burner ☐ Combi. burner ☐ Waste burner ☐

Fuel: Gas ☐ Oil ☐ Combi. ☐

No. of burner(s): ☐

Burner arrangement: opposite ☐ side by side ☐ one on top ☐

Ignition-Burner monitoring: yes ☐ no ☐

Back ground firing: Coal ☐ Waste ☐

3. Flame Sensor arrangement:

Ball & Socket joint: yes ☐ no ☐

View direction: straight from rear ☐ straight from rear ☐ at the side ☐

Temperature: ca. ° C

Air purge: yes ☐ no ☐

Cable laying (Sensor-/Ignition-Transformer-Cable) seperately ☐ collectively ☐

4. Type of Compact Flame detector: F 200 K

4.1. Adjustment of the Sensitivity

Sensitivity sector I / switching position (1-6)

Sensitivity sector II / switching position (7-12)

4.2. Signal voltage at measuring points in the selected adjustment of the sensibility

Ignition burner 1 + 2 min. max.

Main burner 1 min. max.

Main burner 2 min. max.

4.3. Frequency setting

Frequency 10 ... 190 Hz ☐ 20 ... 190 Hz ☐ 30 ... 190 Hz ☐

4.3. Approach suppression in %:

Special features / remarks:

Date

Signature

11 EU Declaration of Conformity



EU-Konformitätserklärung

EU Declaration of Conformity
Déclaration de Conformité UE

Wir
We / Nous

LAMTEC Leipzig GmbH & Co. KG
Am Obstgut 24
D-04425 Taucha

erklären,
dass das Produkt
declare that product
déclarons que produit

F200K - Unabhängiger Flammenwächter

Zubehör für Gasgeräte/Druckgeräte: Flammenwächter (4131)
Accessories for gas appliances/pressure equipment: Flame supervisor (4131)
Accessoires pour les appareils à gaz/dispositifs de pression: Détecteur de flamme (4131)

bestehend aus
consisting of
composé de

F200K

659R60 – X X X X X X X

in den Varianten
variants
variants

Gehäuse Varianten

F200K... / F200K... Ex-II / F200K... Ex

inklusive
inclusive
y compris

AK01 - Anschlusskabel

659R61XX /XX

Zusatzmodule

additional modules
modules complémentaires

FN20 - Netzteil mit Relaiskoppler
- 230VAC / 115VAC

659R6010 /XX

auf welche sich diese Erklärung bezieht, mit den folgenden Norm(en) übereinstimmt
to which this declaration relates conforms to the following standard(s)
sur laquelle cette déclaration se réfère, et conformément aux dispositions de la norme(s)

DIN EN 298: 2012-11
DIN EN 60730-2-5: 2015-10
DIN EN 60730-1: 2017-05

LAMTEC Leipzig GmbH & Co. KG
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Internet: www.lamtec.de
E-Mail: info@lamtec.de

print 19/12/22



gemäß den einschlägigen Harmonisierungsrechtsvorschriften der Europäischen Union:
in accordance with the relevant harmonization legislation of the European Union:
conformément à la législation d'harmonisation pertinente de l'Union européenne:

Nummer (Number / Numéro)	Text (Text / Texte)
2014/35/EU 2014/35/EU/ 2014/35/UE	Niederspannungsrichtlinie Low Voltage Directive Directive basse tension
2014/30/EU 2014/30/EU 2014/30/UE	EMV-Richtlinie EMC Directive Directive CEM
(EU) 2016/426 (EU) 2016/142 (UE) 2016/142	Gasgeräte Verordnung (GAR) Gas Appliances Regulation Règlement appareils à gaz

Die notifizierte Stelle 0085 für (EU) 2016/426, DVGW CERT GmbH, Josef-Wirmer-Str. 1-3, 53123 Bonn, hat folgende Bescheinigung ausgestellt:

EU-Baumusterprüfbescheinigung CE-0085BO0005 gültig bis 17.04.2028.

The notified body 0085 for (EU) 2016/426, DVGW CERT GmbH, Josef-Wirmer-Str. 1-3, 53123 Bonn, Germany, has issued the following certificate:

EU Type Examination Certificate CE-0085BO0005 valid until 17.04.2028.

L'organisme notifié 0085 pour (UE) 2016/426, DVGW CERT GmbH, Josef-Wirmer-Str. 1-3, 53123 Bonn, Allemagne, a délivré le certificat suivant:
Attestation d'examen de type CE-0085BO0005 valable jusqu'au 17.04.2028.

Das Datenblatt und gegebenenfalls die Basisdokumentation sind zu beachten.

The data sheet and basic documentation, if any, have to be considered.

La consultation de la fiche technique, et éventuellement de la documentation technique de base, est requise.

Hinweise zur Anwendung der Richtlinie 2014/35/EU und 2014/30/EU:

Die Konformität mit (EU) 2016/426 setzt die Übereinstimmung mit 2014/35/EU voraus und beinhaltet diese.

Die Konformität mit 2014/30/EU ist nach Einbau des Bauteils in das Endgerät nachzuweisen und zu erklären.

Remarks regarding the application of directive 2014/35/EU and 2014/30/EU:

Conformity with (EU) 2016/142 presupposes that requirements of 2014/35/EU are fulfilled and includes these.

Conformity with 2014/30/EU has to be proved and declared after installation of the component.

Remarques sur l'application des directives 2014/35/UE et 2014/30/UE:

La conformité avec la (UE) 2016/142 intègre la conformité avec la 2014/35/UE.

La conformité avec la 2014/30/UE après l'installation de l'appareil est à prouver et à déclarer.

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.

The manufacturer is solely responsible for issuing this declaration of conformity.

Seul le fabricant est responsable de la délivrance de cette déclaration de conformité.

Rechtsverbindliche Unterschrift

Authorized signature / Signature autorisée

Taucha, 19.12.2022

Dr. Olaf Winne, Managing Director, Direction

LAMTEC Leipzig GmbH & Co. KG
Am Obstgut 24
D-04425 Taucha

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Internet: www.lamtec.de
E-Mail: info@lamtec.de

print 19/12/22



EU-Konformitätserklärung

EU Declaration of Conformity
Déclaration de Conformité UE

Wir We Nous	LAMTEC Meß- und Regeltechnik für Feuerungen GmbH & Co. KG Josef-Reiert-Straße 26 D-69190 Walldorf (Baden)	
erklären, dass das Produkt declare that product déclarons que produit	F200K - Unabhängiger Flammenwächter Anlagenteil mit Sicherheitsfunktion Equipment part with safety function Partie du système avec fonction de sécurité	
Bestehend aus consisting of composé de	F200K	659R60 – X X X X X X X
in den Varianten variants variants	Gehäuse Varianten F200K... / F200K... Ex-II / F200K... Ex	
inklusive inclusive y compris	AK01 - Anschlusskabel Zusatzmodule additional modules modules complémentaires FN20 - Netzteil mit Relaiskoppler - 230VAC / 115VAC	659R61XX /XX 659R6010 /XX

auf welche sich diese Erklärung bezieht, mit den folgenden Norm(en) übereinstimmt
to which this declaration relates conforms to the following standard(s)
sur laquelle cette déclaration se réfère, et conformément aux dispositions de la norme(s)

DIN EN 298: 2012-11
DIN EN 60730-2-5: 2015-10
DIN EN 60730-1: 2017-05

LAMTEC Meß- und Regeltechnik für Feuerungen
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print 23/05/23

11 EU Declaration of Conformity



gemäß den einschlägigen Harmonisierungsrechtsvorschriften der Europäischen Union:
in accordance with the relevant harmonization legislation of the European Union:
conformément à la législation d'harmonisation pertinente de l'Union européenne:

Nummer (Number / Numéro)	Text (Text / Texte)
2014/68/EU 2014/68/EU 2014/68/UE	Druckgeräterichtlinie Kat.4 Mod. B+D Pressure Equipment Directive Directive équipements sous pression
2011/65/EU 2011/65/EU 2011/65/UE	RoHS RoHS RoHS
2015/863/EU 2015/863/EU 2015/863/UE	RoHS RoHS RoHS

Die notifizierte Stelle 0036 für 2014/68/EU, TÜV SÜD Industrie Service GmbH, Westendstr. 199, 80686 München, hat folgende Bescheinigung ausgestellt:

EU-Baumusterprüfung (Modul B) Z-IS-TAF-MUC-23-05-2652106-09100118 gültig bis 11.05.2033.

The notified body 0036 for 2014/68/EU, TÜV SÜD Industrie Service GmbH, Westendstr. 199, 80686 Munich, Germany, has issued the following certificate:

EU Type Examination (Module B) Z-IS-TAF-MUC-23-05-2652106-09100118 valid until 11.05.2033.

L'organisme notifié 0036 pour 2014/68/UE, TÜV SÜD Industrie Service GmbH, Westendstr. 199, 80686 Munich, Allemagne, a délivré l'attestation suivante:

Examen de type UE (module B) Z-IS-TAF-MUC-23-05-2652106-09100118 valable jusqu'au 11.05.2033.

Das Datenblatt und gegebenenfalls die zugehörige Dokumentation sind zu beachten.

(The data sheet and basic documentation, if any, have to be considered.)

(La consultation de la fiche technique, et éventuellement de la documentation technique de base, est requise.)

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.

The manufacturer is solely responsible for issuing this declaration of conformity.

Seul le fabricant est responsable de la délivrance de cette déclaration de conformité.

Rechtsverbindliche Unterschrift

Authorized signature / Signature autorisée

Walldorf, 15.05.2023

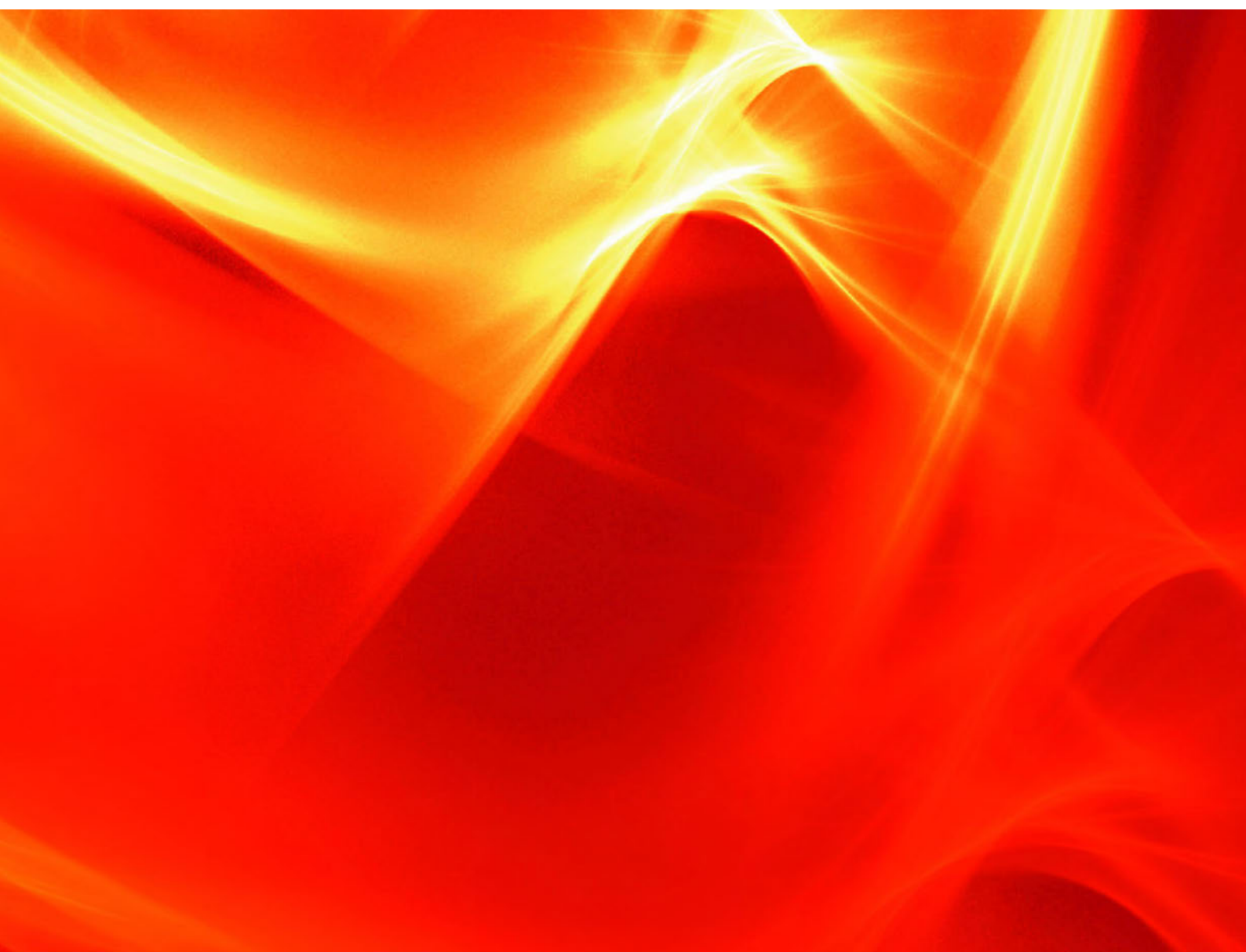
Hans-Jürgen Altendorf, Managing Director, Direction

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