

# COMPACT FLAME CONTROLLER CFC 2000

# TECHNICAL DESCRIPTION

EDITION: TB\_CFC2000\_EN\_REV09\_20150408

#### **Important:**

Please note, that all mounting and wiring as well as all changing or adjustment at the flame monitoring and evaluation equipment should only be carried out by fully trained and authorized personnel.

BFI Automation is pleased to support you if you do not have any experience with the equipment. Our service personnel is carrying out world wide installations, supervision and commissioning and is available upon request.

For the stage of planning you can ask our sales and project engineers for any support you may need.

BFI Automation is providing any kind of training for your engineers.

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## Compact Flame Controller CFC 2000 UV, UV1, IR, IR1, IR2

- Flame scanner with integrated flame amplifier and flame relay.

- TÜV approved, DIN-DVGW, SIL3 certified

- For intermitted, continuous operation

- Type UV, UV: For natural Gas-, Oil- and dual fuel operation

Type IR (VIS-IR): For monitoring of oil and coal dust flames on diffusion burners
 Type IR1 (IR): For monitoring of natural gas flame, fuel gas and H₂S duct burners
 Type IR2 (IR): For monitoring of gas- and oil flames with two colour sensor (UV + IR)

- Dual channel flame monitoring and evaluation system.

- Adjustable sensitivity for both channels separate by software.

- Analogue output 0(4) - 20mA Intensity

- Possible flame evaluation by software

- Status indication of flame relay and intensity indication by LED

- Class of protection IP 65.



# WARNING: IMPROPER INSTALLATION OF THESE PRODUCTS MAY BE HAZARDOUS TO LIFE AND PROPERTY

#### **Function**



For the flame radiation analysis, a well approved integral procedure in the respective spectrum is carried out with the compact flame controller.

After a pre-amplification, the unwanted CW light component is withdrawn from the output signal of the wear-resistant detector. The subsequent sensitiveness attitude allows an attenuation of the signal for adaptation to the combustion process. The post-connected band pass filter caused,

that only the typical modulation of the flame radiation of the primary combustion zone is valued and so extraneous light signals by neighbour burners can be distinguished from the own flame.

Further functional groups include signal conditioning and other for the so-called dynamic monitoring channel which checks the fail safe function of the device continuously.

A component or component defect leads to an immediate disconnection of the flame relay, which one is available as a floating change-over contact for use with the burner management system.

The switching condition is announced additionally by a yellow LED on the reverse side of the device behind the Perspex pane.

For the optimal adjustment of the compact flame controller the flame strength can be read off directly on the device by means of a pulsating green LED. For the visualization or remote indication, a current output is available at 0 or 4-20 mA.

The safety switched-off time which depends on the combustibles to be checked is set ex-works to a second. Longer switched-off times are optionally available upon request.





WARNING: The functioning of the compact flame controller depends both on the burner configuration and from the air flow as well as the spectral pattern of the flames (wavelength). We will advise you gladly in this regard on request.

#### Selection of the current output 0 or 4 to 20mA

The switch over of the current output of the compact flame controller CFC 2000 will be car-

ried out by the special software which is available from BFI Automation.

#### Selection of the right modulation filter

For furnaces with very high power density, it can become necessary to activate another modulation filter besides.

The compact flame controller should not be adjusted to maximum signal level "Flame ON" but as with the flame scanners also, to the highest "Flame ON" / "Flame OFF" relation. Through the numerous adjusting options of the compact flame controller the system itself could be easily adjusted to all boiler geometries and any

combustible throughput for getting an optimal availability.

The adjustment of the modulation filter occurs via DIP switches which are arranged on the main board (red 4-part switches). A change of adjustment to the DIP switches should only occur if an adjustment of the compact flame controller is no more possible with the aid of software.

#### **Mounting**

For guarantee of an optimal flame safeguard control, the correct and oscillation poor positioning of the sight tube to the flame is an essential assumption. For the selective burner control, the mounting has to occur in such a way that the primary combustion zone will be in all load ranges at the viewing angle of the device. The prolongation of the viewpoint axis must not cut the first half of other flames.

Length and diameter of the viewpoint tube have a direct influence on the valuable flame radiation since the viewing angle of the compact flame controller CFC 2000 is defined. The maximum length of the used sight tube should not exceed the maximum length 'L' on a given diameter 'd' that no influence on the field of view will occur.

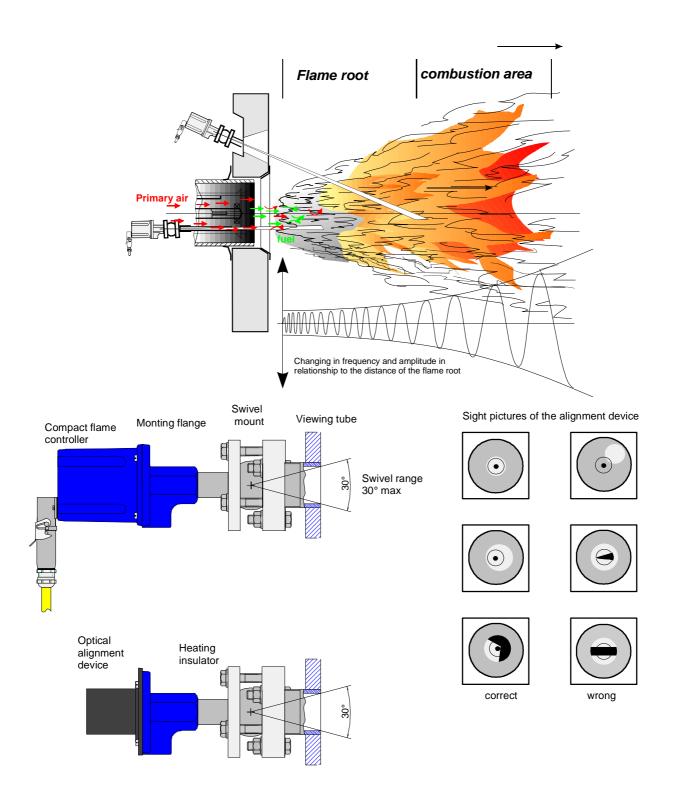
d 1" 1,5" 2" L 0,5m 0,8m 1,1m However the sight tube should always be kept as short as possible. A diameter of 2"is recommended. The correct direction is represented in the subsequent drawing. The optical alignment system BFI 235 (part-no: P106) can be supplied by BFI ex stock.

The compact flame controller CFC 1000 / 2000 is supplied completely with a quick release flange. This flange assures possible assembly and dismantling of the device on site which could be done as quickly as possible. The flange has a purge air connection which special construction prevents the lens of contamination or damaging by dust polluted air.

The optimal alignment system consists of heat insulator, stop valve and ball flange.

This mechanical periphery can be supplied upon request.







CAUTION: All alignments and or adjustments must always be applied if new repair parts were installed, the flame scanner was moved or the flame picture was modified (e.g. through additional combustibles, new torches, changes to the torches / air registers), as well as all initial installations.



#### Installation

The pin assignment of the connector is shown in the wiring diagram.

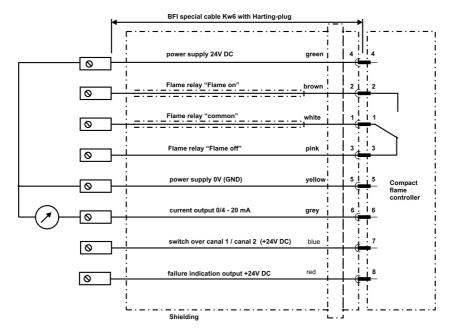
The output signal 0(4)-20mA for flame intensity is not separated by the supply voltage, so the signal refers to the operating voltage measures. If this should lead to problems, a corresponding

isolating transformer can be provided upon request. The burden of 250 ohms should always not be exceeded.

The device is immediately ready for operation after switch-on of the supply voltage.

#### **Wiring Diagram**

Pin/Terminal	Description	colour code BFI special cable KW6
1	Flame relay: Root	white
2	Flame relay: Contact flame ON	brown
3	Flame relay: Contact flame OFF	pink
4	power supply: +24 V DC	green
5	power supply: 0V (GND)	yellow
6	current output 0(4)-20 mA	grey
7	switch over canal 1 / canal 2 (+24V DC)	blue
8	failure indication output +24V DC	red

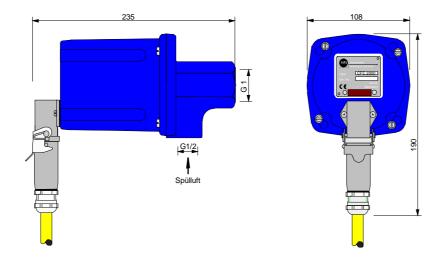




CAUTION: In order to guarantee a proper operation the compact flame controller must be tested several times at all conditions. The burner has to be started and stopped several times (the flame relay must always interrupt reliably with no flame on). Carry out these tests while different neighbour burners are started and stopped as well as on different boiler loads. This is a vital assumption for a proper and reliable operation.



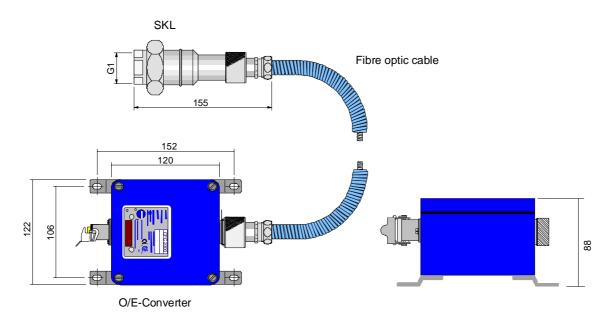
### **Standard Housing**



Suitable for use in hazardous areas Zone 2



#### **OE-Converter housing**



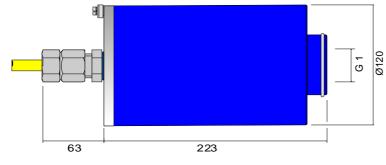
Suitable for use in hazardous areas Zone 2



6



#### **Explosion Proof Housing**





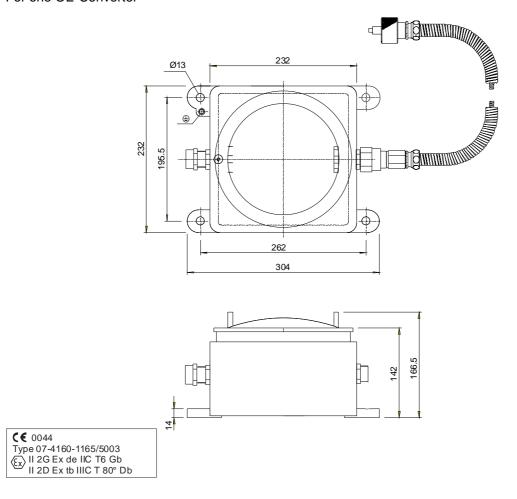
Type 07-6152-9024

(Ex) | I 2G Ex d | IC T6
| II 2D Ex tD A21 | IP 66 T 80°C

For us in hazardous areas classified as Zone 1 PTB 03 ATEX 1051

#### **EXPLOSION PROOF HOUSING FOR OE-CONVERTER**

For one OE-Converter



For us in hazardous areas classified as Zone 1 KEMA 08 ATEX 0123



#### **Accessories**

Power supply 230/115V AC Ball flange 1" with 2" flange plate Heating insulator 1" 3-way-ball-valve 1" 5bar pressure barrier 1" Optical adjustment device

#### **Accessories for OE-Converter**

Probe SKL for IR or UV Fibre optic cable Y-fibre optic cable Fibre optic lance

#### **Technical Data Sheet**

Spectral Sensitivity

UV 280 to 420 nm UV1 190 to 550 nm IR 300 to 1050 nm IR1\* 1050 to 2700 nm IR2 300 to 2700 nm

\*not for OE-Converter

Viewing angle 2.7°

Power supply 24 V DC

Current consumption approx. 100 mA, for triple Ex-OE-Converter approx. 300 mA

Construction protection class III SELV

Ambient temperature range -20°C...+70°C

Current output 0(4)...20 mA (Ra < 250 Ohm)

Current window possible adjustment by software

Failure output 24 V DC, short circuit protected

Application programming interface IRDA/USB

Sensitivity switch over Selection of the sensitivity switch over 24 V DC

Flame relay 1 change over contact, floating

VDE 0110, class A

max. 48 V switching voltage

max. 1 A switching current (fused with 0.5 A)

max. 30 W switching power

Switching thresholds programmable by software

Safety switch off time factory adjusted to 1s

Sight tube connection

1" inside screw ISO 228

Purge air connection

1/2" inside screw ISO 228

Value of purge air

10 m³/h at standard conditions



Electrical connection

Standard Harting connector HAN8 90 degrees

Explosion proof housing 3m special cable

OE-Converter housing Harting connector HAN8 90 degrees

Ex-OE-Converter housing M20-screw joint and terminal clamps inside

Dimension

Standard with flange 235 x 108 mm (Length x Diameter) Flame proof housing 223 x 120 mm (Length x Diameter)\*

OE-Converter housing 120 x 122 x80 mm (Length x Width x Height)\*

\*without connectors and mounting bracket

Class of protection Standard housing and OE-Converter housing IP 65, similar to

NEMA 4/Class 1 Div 2

ATEX Zone 2



Ex- housing IP 66, similar to NEMA 4/Class 1 Div 1 ATEX Zone 1 PTB 03 ATEX 1051

€ 0044 Type 07-6152-9024 €x II 2G Ex d IIC T6 II 2D Ex tD A21 IP 66 T 80°C

Ex-OE-Converter housing ATEX Zone 1

**KEMA 08 ATEX 0123** 

(€ 0044 Type 07-4160-1165/5003 (Ex) II 2G Ex de IIC T6 Gb II 2D Ex tb IIIC T 80° Db

#### Weight

Standard 1.5 kg
Flame proof housing 4.0 kg
OE-Converter housing 1.5 kg
Ex-OE-Converter housing 7.0 kg

Full electronically self-check function for the guarantee of the faultless function of the device after VDE 0116, EN298:2012, it correspond the guidelines TRD 411 to 414. DIN DVGW approved, CSA and UL listed and CE conform.

#### Right of technical changes reserved!

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