BFI Automation
technology for your future

COMPACT FLAME CONTROLLER
CFC 2000

TECHNICAL DESCRIPTION

EDITION: TB CFC2000-JMM REV.1

Important:	This data sheet is intended for authorized service personnel and engineers of combustion engineering who have sufficient experience with the installation and the use of flame monitoring devices. We gladly help you if you still have no experience with flame monitoring devices of BFI Automation. Please contact BFI Automation if you have questions or if you require any support. Read this technical description carefully it contains all technical references!

BFI – Automation Dipl.-Ing. K.-H. Mindermann GmbH, Eggerscheidter Str. 57, D-40883 Ratingen
Phone. +49 (0) 2102 96 82 – 0, Fax +49 (0) 2102 9682 – 42
E-Mail: info@bfi-automation.de

BFI Automation
technology for your future

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

- Flame scanner with integrated flame amplifier and flame relay.
- TÜV approved, DIN-DVGW, DIN-CERTCO certified
- For intermitted, continuous operation and 72-hours operation
- Type UV, UV1 : For natural Gas-, Oil- and dual fuel operation
- Type IR (VIS-IR): For monitoring of oil flames on diffusion burners
- Type IR1 (IR): For monitoring of natural gas flame in duct burners
- Type IR2 (IR): in preparation
- 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
- No additional wiring to separate flame scanners.
- Class of protection IP 65.

WARNING

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After a pre-amplification, the unwanted CW light component is withdrawn from the output signal of the wear-resistant detector.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

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 carried 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.

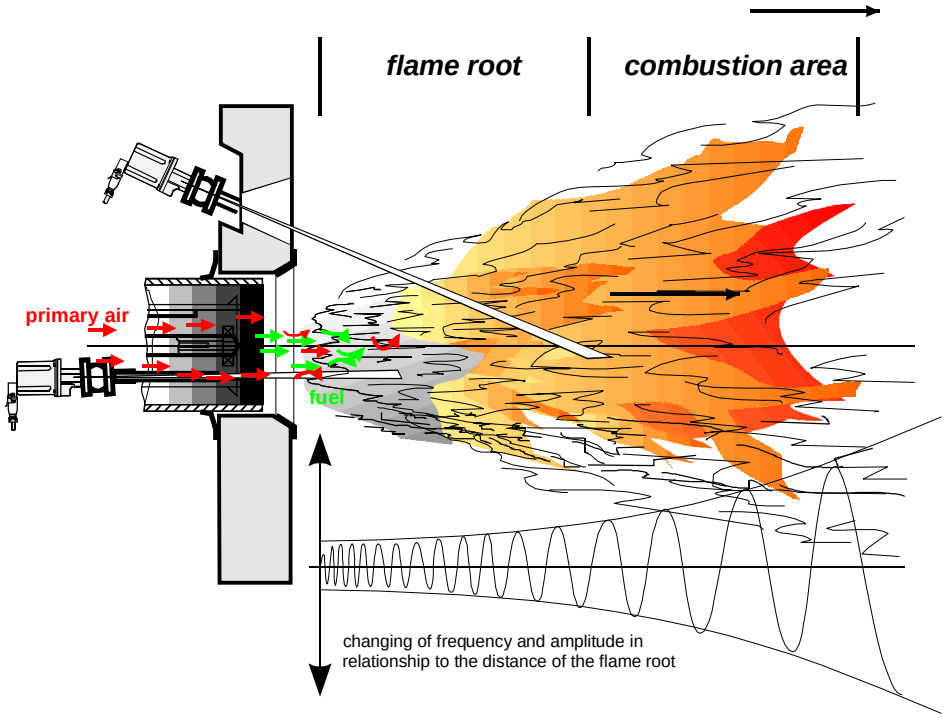
Mounting

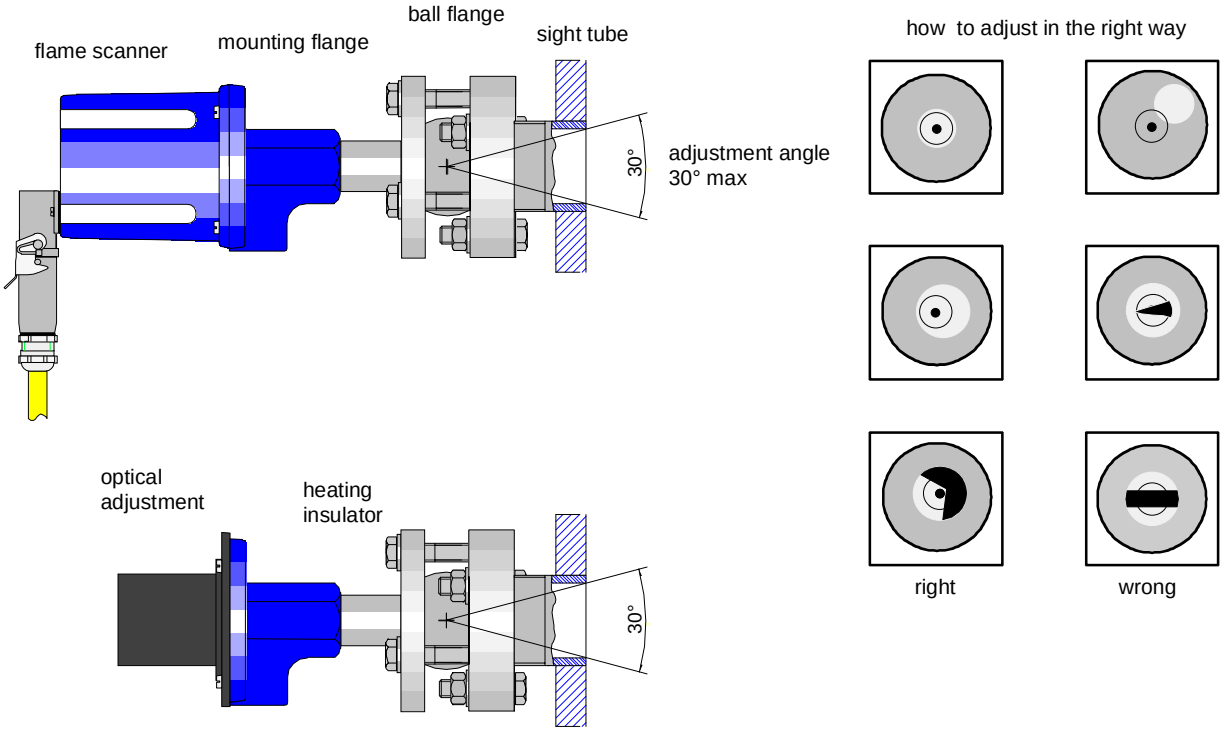
For guarantee of an optimal flame safeguard control, the correct and oscillation poor positioning of the sight tube to the flame is an essential assumption. For the selective burner control, the mounting has to occur in such a way that the primary combustion zone will be in all load ranges at the viewing 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 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

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

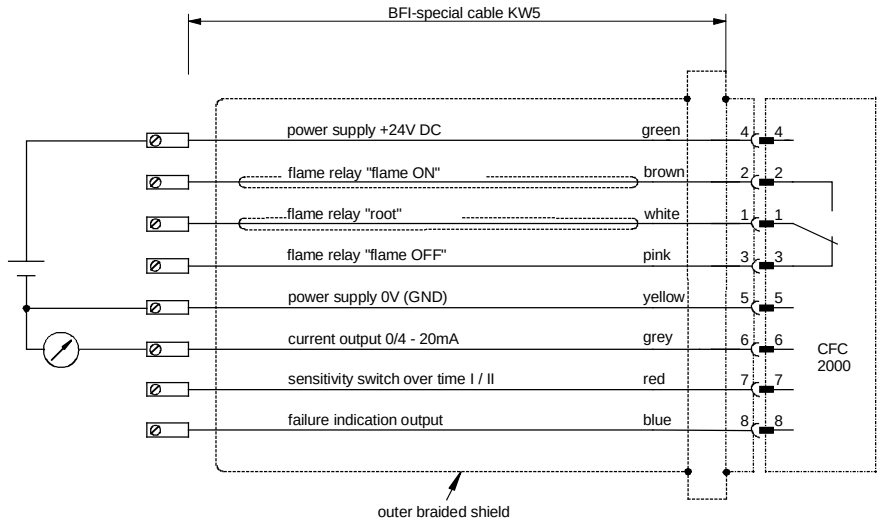
The pin assignment of the connector is shown in the wiring diagram.

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

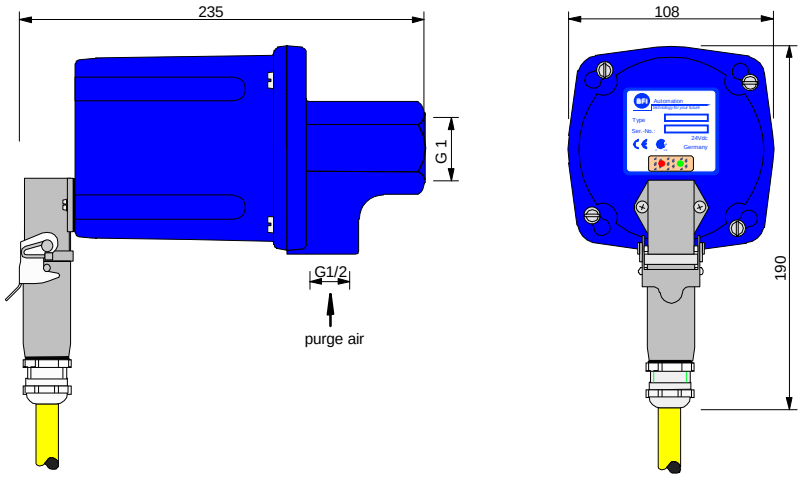
Pin/Terminal	Description	colour code BFI special cable KW6
1	Flame relay: Root	white
2	Flame relay: Contact flame ON	brown
3	Flame relay: Contact flame OFF	pink
4	power supply: +24 V DC	green
5	power supply: 0V (GND)	yellow
6	current output 0(4)-20 mA	grey
7	switch over canal 1 / canal 2 – 24V DC	red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



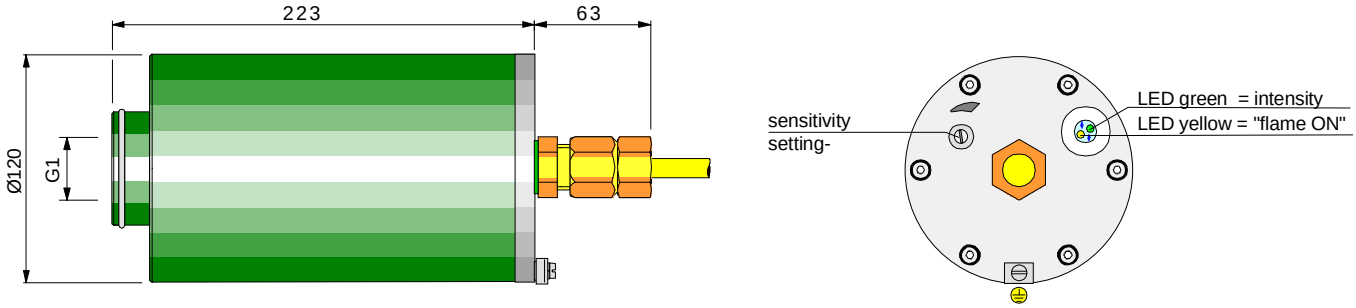
CAUTION

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



Flame Proof Housing



Flame proof protection class: EEx d IIC T 6
for PTB 87/1095

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

BFI Automation
technology for your future

Technical Data Sheet

Spectral Sensitivity	
UV	270 to 420 nm
UV1	190 to 500 nm
IR	300 to 1050 nm
IR1	1050 to 2700 nm
Viewing angle	3°
Power supply	24 V DC +/-15%
Current consumption	ca. 300 mA
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
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 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 Nm^3/h
Electrical connection	
Standard	dust proof Harting connector
Flame proof housing	3m special cable
Dimension	
Standard with flange	235 x 108 mm (Length x Diameter)
Flame proof housing	223 x 120 mm (Length x Diameter)
Class of protection	IP 65, NEMA 4
Weight	
Standard	1,0 kg
Flame proof housing	3,5 kg

Full electronically self-check function for the guarantee of the faultless function of the device after VDE 0116, EN 230, EN 298, it correspond the guidelines TRD 411 to 414 and filled the additional requirements of TRD 604 for the 72- hours operation. DIN DVGW and DIN-CERTCO approved, CE conform.