BFI Automation

User manual
SOFTWARE CFC COM X000

BFI Automation

Content

1 | General aspects

1.1 Introduction

This manual is an essential aid for the successful and safe use of the software CFC COM x000 in combination with a Compact Flame Controller CFC x000. They contain important information on how to operate the system safely, correctly and efficiently. Observing the operating instructions will help to prevent hazards, reduce costs of repair and downtimes and increase the reliability and lifetime of the device.

All illustrations and drawings in these user manual are for general illustration purposes and do not contain details for design.

The operating instructions always have to be accessible at the device. They have to be read and applied by each person who is required to work with/on the device.
This work may involve, for example:

- operation
- troubleshooting during operation
- servicing
- maintenance (upkeep, inspection, repair) and/or
- transport

This should be confirmed by the operating company in writing.

⚠ DANGER

Any modification to the CFC x000 parameters may only be made after the operating instructions of the Compact Flame Controller have been read carefully. This manual does not contain the original operating instructions and only explains the possibilities of parameterization with the CFC COM x000 software.

1.2 Warning notes

The following warning notes are used in this manual:

⚠ DANGER

This warning level indicates an imminent hazardous situation.
If the hazardous situation is not prevented, this will result in death or severe injury.
Follow the instructions that accompany this warning to prevent the risk of death and severe personal injury.

⚠ WARNING

This warning level indicates a potentially hazardous situation.
If the hazardous situation is not prevented, this may result in death or severe injury.
Follow the instructions that accompany this warning to prevent the potential risk of death and severe personal injury.

⚠ CAUTION

This warning level indicates a potentially hazardous situation.
If the hazardous situation is not prevented, this may result in slight or moderate injuries.
Follow the instructions that accompany this warning to prevent the injury of persons.

⚠ CAUTION

This warning level indicates potential damage to property.
If this situation is not prevented, it may result in damage to property.
Follow the instructions that accompany this warning to prevent damage to property.

NOTICE

A notice indicates additional information that will make the handling of the device easier.

1.3 Copyright protection

This manual have to be treated as confidential. It may only be used by authorised staff. Access by third parties may only be granted upon written agreement of BFI Automation.

All documents are protected in keeping with the German copyright law. The disclosure and reproduction of documentation, in whole or in part, as well as the exploitation and communication of its content shall not be permitted unless expressly stated otherwise. Violations are punishable and require compensation.

We reserve all rights to exercise industrial property rights.

1.4 Warranty

Read this manual carefully before using the software!

The manufacturer is not liable for damage or operating malfunctions that result from the manual not being observed.

The operating company has to supplement the manual with operating instructions on the basis of national regulations on accident prevention and environmental protection, including information on supervision and notification requirements with respect to special operating circumstances, e.g. regarding organisation of work, working processes and staff deployed.

The recognised technical rules for safe and professional working also have to be observed in addition to the operating instructions and the regulations on accident prevention applicable to the country and place of use.

The warranty shall become void, for example, in the event of:

- inappropriate use
- use of impermissible equipment
- incorrect connection
- prior works that are not part of the supplied product or service
- non-use of original spares and accessories
- conversion, if this has not been harmonised with BFI Automation
- non-performance of specified maintenance work

NOTICE

It is recommended that the operator of the device concludes a service contract with BFI Automation. This guarantees that the device is regularly checked by our service staff and ensures that any required wearing and spare parts are available without long delivery periods.

1.5 Obligation of the operating company

Incorrect use of this software can be dangerous.

The operating company is under the obligation to operate the Compact Flame Controller CFC x000 in proper state only. The operating company has to secure hazardous areas that exist between BFI devices and the customer's own equipment.

The operating company has to appoint and instruct responsible staff:

- Only deploy trained or instructed staff.
- Clearly set out the responsibilities of the staff with regard to operation, set-up, maintenance and repair.
- Regularly check that staff are safety conscious and aware of hazards and are observing the operating instructions.
- Before starting to work, staff who are assigned to work with/ on the device have to read and understood the operating instructions, in particular the chapter on "Safety", as well as the relevant regulations.
- The operating instructions and relevant regulations have to be stored in such a way that they are accessible to operating and maintenance staff.
- Set out who will have responsibility for device operation and ensure that this person has the authority to overrule any unsafe instructions of third parties.

NOTICE

Generally valid legal and other binding regulations on accident prevention and environmental protection have to be observed and instructed, in addition to the manual and the operating instructions.

1.6 Liability disclaimer

All technical information, data and guidance on device operation that are contained within this manual are, to the best of our knowledge, correct at the time of printing, taking into account our present understanding and experience.

We reserve the right to make technical changes with respect to the further development of the software covered in this manual. No claims can be made based on the specifications, illustrations and descriptions of this manual.

We shall not be liable for damage or operating malfunctions that result from operating errors, inappropriate repairs or the non-observance of the manual. We expressly state that only original spare parts and accessories approved by us may be used. We expressly point out that only software and accessories approved by us may be used.

The installation or use of non-approved spare and accessory parts and any unauthorized retrofits and modifications are not permitted for safety reasons and exclude any liability by BFI Automation for consequential damages.

BFI Automation is liable for possible errors or omissions with the exclusion of additional claims entered into in the framework of the warranty obligations conceded to in the contract. Claims for damages, on whatever legal basis they may be, shall be excluded.

Translations into foreign languages are carried out in good faith. We cannot accept any liability for translation errors, this also applies where the translation has been carried out or has been commissioned by us. The original text alone shall be binding.

Descriptions and illustrations do not necessarily depict the delivered product or a possible spare parts order. Drawings and graphics are not to scale.

1.7 Address of the manufacturer

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42579 Heiligenhaus, Germany

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Fax: +49 2056 98946-42

E-Mail: info@bfi-automation.de
Internet: www.bfi-automation.de

2 | Installation

2.1 System requirements

The minimum and recommended hard- and software requirements can be obtained from the following table.

CPU	1,8 GHz Multicore
RAM	4 GByte
Screen resolution	Full HD
Interface	USB2.0 (Min.)
Operating system	Min. Windows10

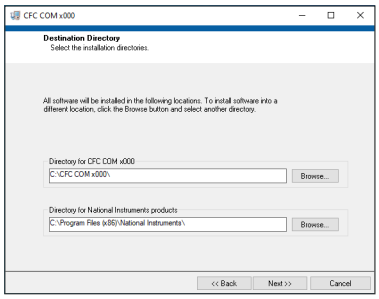
2.2 Run setup

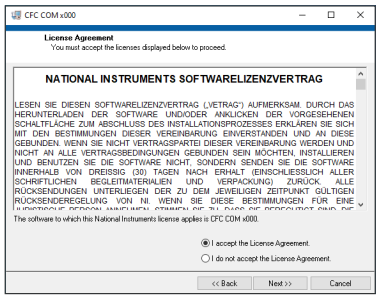
After receiving the installation file either by USB flash drive or via download, you have the following options for installing the software:

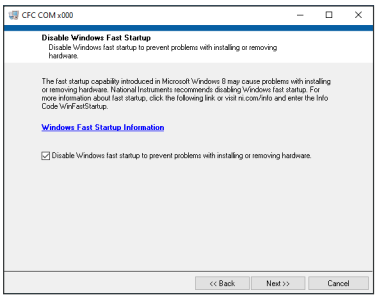
- Installation of the software and the driver with the file Setup. exe, which is located in the directory - CFC COM x000 Ver1.xxx Installer\Volume.

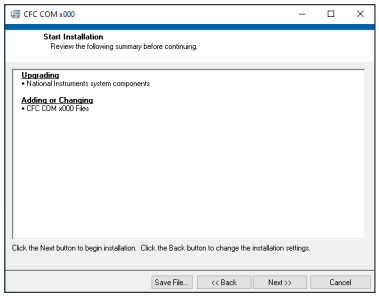
Once the installation has been successfully completed, the following installation folders are suggested. By clicking on "Browse", you can assign your own directory and a different file name. Clicking "Next" will open the licence agreement, which must be accepted in order to proceed with the installation of CFC COM x000.

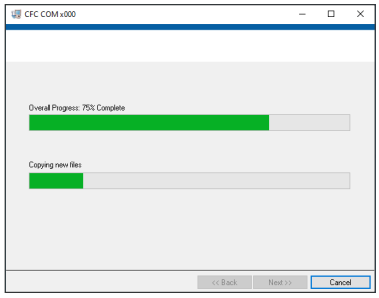
A check is carried out for existing software components. Then, it proceeds to install the files in the specified directory using the "Next" command. Finally, the installation program confirms that the installation is complete.

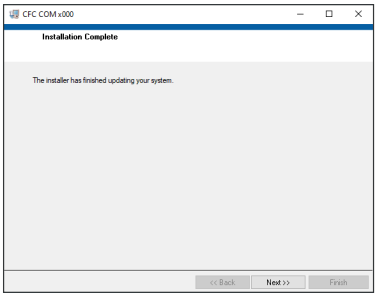










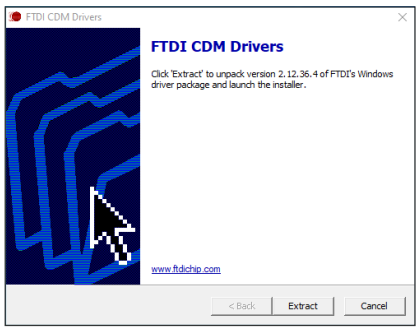


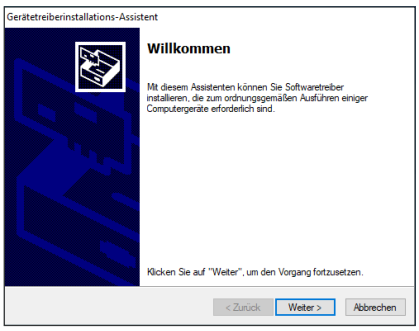
2.2 Run setup

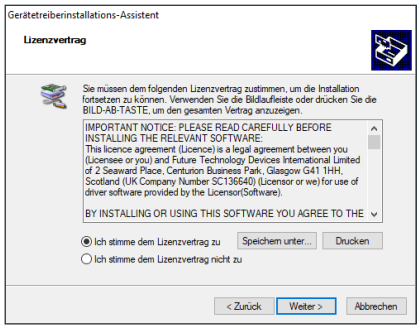
Immediately after installing the software, you will be prompted to install the driver. The displayed version of the driver is unpacked with the "Extract" command. Click "Next" to continue the process. The licence agreement must be accepted in order to continue the installation. Finally, the installation programme reports that the installation is complete. This must be confirmed by clicking "Finish".

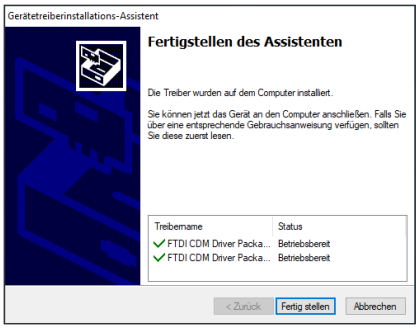
NOTICE

The data received by the Compact Flame Controller can only be processed after the driver has been fully installed.









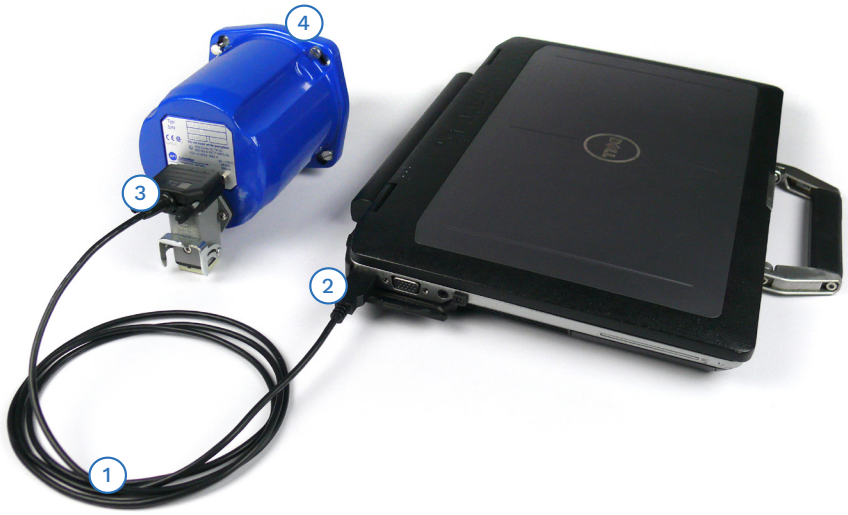
2.3 Connecting to the computer

Connect the Compact Flame Controller to the computer by using the BFI data interface cable ①. The data cable has an USB plug ② for the connection to the computer and an IR interface in a SUB-D housing ③ for the connection to the Compact Flame Controller ④.

NOTICE

The Compact Flame Controller must be connected to the power supply (24 V DC).

After connecting the Compact Flame Controller to the computer and installing the software and driver, the program can be started.



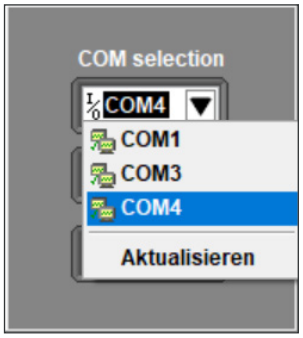
2.4 Start the software

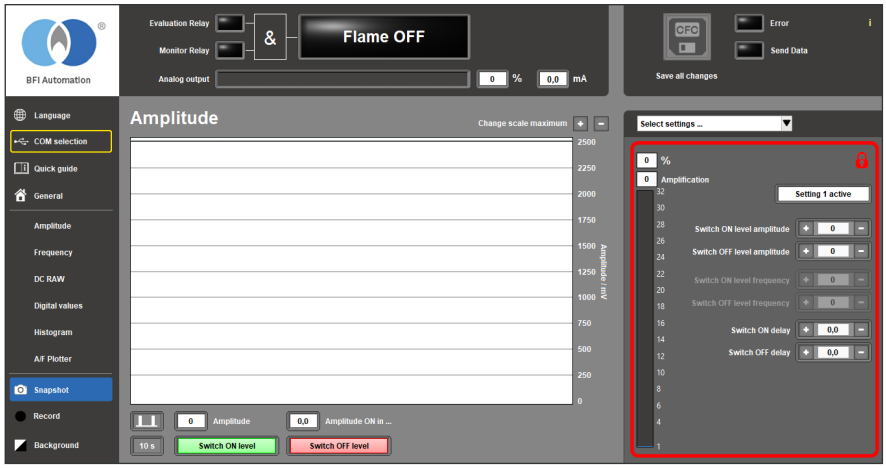
Start the program by double-clicking the CFC COM x000 icon. The illustrated CFC COM x000 interface is displayed. The resolution cannot be changed.

The following window opens:

2.4.1 COM selection

No interface is activated by default. This setting can be changed by clicking on the "COM selection" menu. All active COM interfaces are displayed.





2.4.2 Data transfer

Data transfer starts immediately after selecting the correct interface.

NOTICE

During data transfer, the software automatically detects which CFC type is connected. CFCs of series 1000 has a reduced user interface (see illustration).

Display for CFC of the 1000 series:

In the case of the CFC1000, only amplitude evaluation is displayed and only one parameter level is available. These differences in display result from the different range of functions of the devices.

⚠ CAUTION

After starting, it is initially only possible to receive data. Settings or parameters can only be changed after entering the corresponding serial number and may only be performed by appropriately qualified and trained specialist staff!
Click on "General" in the menu to obtain the version of the software. Click the "OK" button to close the window.

3 | Visualisation

3.1 User interface

The CFC COM x000 software is divided into four sections:

① Menu
② Status display
③ Signal window
④ Settings

① General software settings are located at the top of the menu section. The middle area contains the selection of the signal windows. The bottom three points are used to record and display the received signals.

NOTICE

The BFI logo also serves as a button, that leads to the company contact details.

② The Compact Flame Controller CFC is equipped with two relays which are controlled by different channels. The flame signal is ON, when the LED of the evaluation relay & monitor relay light up at the same time. The flame status is indicated by the large "Flame ON" LED. The analogue output shows the current output of the CFC as a bar graph, percentage display and in mA.

3.1 User interface

③ The current flame signals with corresponding additional information (e.g. switching thresholds) are displayed in the signal window. The following signal windows are available in the menu:

- Amplitude
- Frequency
- DC RAW
- Digital values
- Histogram
- A/F Plotter

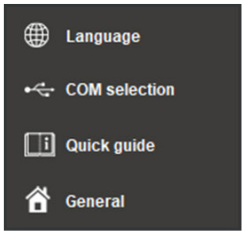
The buttons underneath the graph vary depending on the display and are explained via mouse over text.

NOTICE

The black characteristic line indicates the current value. Green indicates the set switch-on threshold and red indicates the switch-off threshold.

④ To change the settings, click on the area marked in red and confirm the CFC serial number by entering it.

3.2 General settings



"Language"
The display language of the software is selected in the Language menu item.

If a language is not listed, it is possible to create it yourself by translating it in the "Language" file. The text as shown in the software are defined in the "Language" file. The square brackets indicates the start of a new language (see notice). The area highlighted in yellow in language [6] is intended for the userdefined translation.

```
[6]
;User
User defined = "User defined"
Language = "Language"
Flame Relay = "Flame Relay"
....
Setting 1 = "Setting 1"
Setting 2 = "Setting 2"
```

```
[6]
;User
User defined = "Svenska"
Language = "Språk"
Flame Relay = "Flamrelä"
....
Setting 1 = "Attityd 1"
Setting 2 = "Attityd 2"
```

Translation example Swedish

NOTICE

[0] = English; [1] = Español; [2] = Française; [3] = Deutsch; [4] = Italiano; [5] = Polski; [6] = User;

"COM selection"
All available COM interfaces are listed here.

"Quick Guide"
This menu item opens a quick guide in the selected language.

3.2 General settings

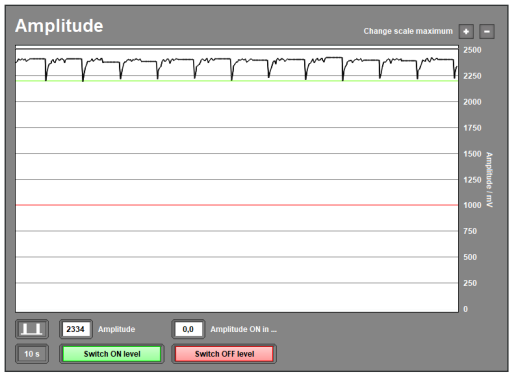
"**General**"
Information about the CFC:

- CFC Serial number (showing the last two digits, 5 corresponds to 05)
- CFC Firmware Version
- Date, when button "Save all changes" was used last time
- Operating hours of the CFC
- Failure memory FIFO (First In First Out). The last four failures will be shown in case any occured.

3.3 Signal window - Amplitude

This window is showing the Amplitudes of flame modulation, which is finally an information about the radiation difference between bright and dark areas in the flame. The output voltage of the semi-conductor sensor will be converted from AC-voltage to DC-voltage.

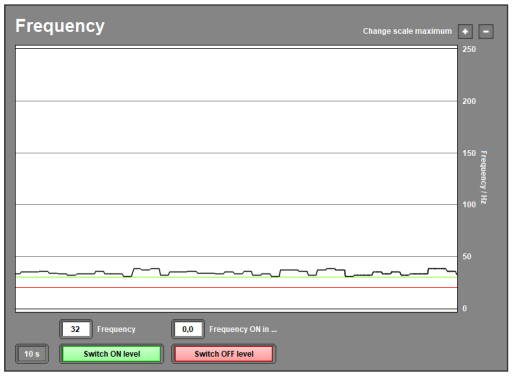
High differences between bright and dark flame areas =
High Modulation Amplitudes = High Analogue Evaluation Signal.



3.4 Signal window - Frequency

This window is showing the Flicker Frequency of flame modulation, which is finally an information about the speed of changes between bright and dark areas due to the mixing process of air and fuel. The diagram is showing the main frequency of the combustion process.

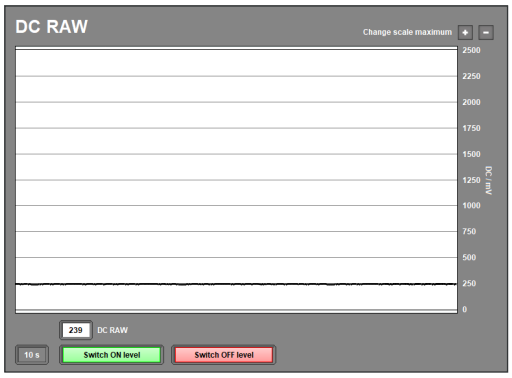
High Frequency Signal = High speed of mixing process.



3.5 Signal window - DC RAW

This window is showing the DC content of flame radiation (see diagram), which is finally an information about the intensity of flame radiation. The flame modulation is set on top of this offset voltage (DC). This signal is used only on CFC-IR Series. The thresholds are currently without function.

High DC RAW Signal = High radiation level. An abnormal low DC signal may indicate e.g. dirty lens.



3.6 Signal window - Digital values

In this window, amplitude, frequency and DC RAW signals are shown as digital values. The current signal as well as the Min., Max. and average values (Avg.) over the time period set below are shown. The bar graph shows the fill level of the FIFO buffer (First In First Out). When the FIFO buffer is full, the above digital values are updated accordingly, i.e. if a time period of e.g. 5 minutes is set, the values displayed above correspond to those of the last 5 minutes.

The FIFO buffer can be cleared at any time by pressing the "Reset" button.

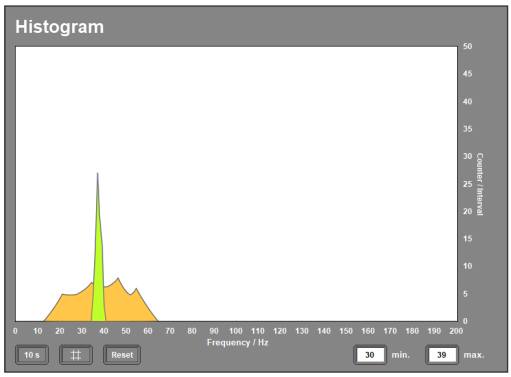
Once the time has been set, the flame signals are recorded for a limited time by pressing the "Record" button.

3.7 Signal window - Histogram

The Histogram provides an alternative frequency analysis. It shows the frequency range over a period of time. Use the "Reset" button to reset the display.

Short-term freqeuncy changes are not displayed for long-term analysis. The frequency evaluation period can be changed by using the button at the bottom left.

Stable flames are represented by a small frequency range (green histogram), unstable flames by a larger frequency range (orange histogram).

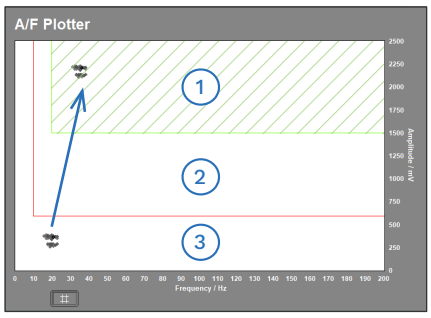


3.8 Signal window - A/F Plotter

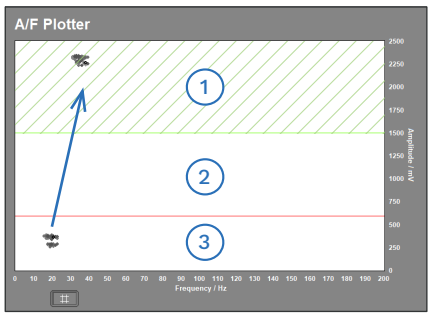
Switching on the flame relay

The green marked area ① is defined by the switch-on thresholds amplitude and, if active, frequency. To switch on the flame relay, the flame signal must change from the areas ② or ③ to the area ①. This means that the flame signal has exceeded the switch-on thresholds for amplitude **and** frequency, if activated.

With activated Frequency evaluation



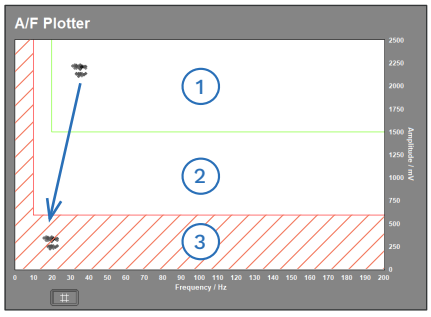
With deactivated Frequency evaluation



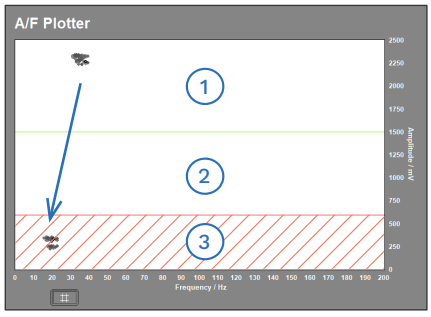
Switching off the flame relay

The red marked area ③ is defined by the switch-off thresholds amplitude and, if active, frequency. To switch off the flame relay, the flame signal must change from the areas ① or ② to the area ③. This means that the flame signal has fallen below the amplitude **or** frequency switch-off thresholds, if activated.

With activated Frequency evaluation



With deactivated Frequency evaluation



3.9 Display of the mA signal

The 0/4 to 20 mA current output signal of the CFC is displayed as a bar graph, percentage value and in mA in the upper area of the software.

3.10 Changing the scaling for the y-axis

The scaling of the y-axis of the two diagrams for the amplitude signal and the frequency signal can be freely selected. This is very helpful particularly when setting the sensitivities and the threshold values and for stretching and compressing the time axis.

The scale end value can be changed using the + and - buttons. This axis is then automatically adjusted.

The standard values are 2500 mV for the amplitude evaluation and DC RAW signal evaluation as well as 200 Hz for the frequency evaluation. Changing the scaling to higher values is only possible for the frequency evaluation to a maximum of 900 Hz.

3.11 Recording and visualisation

Take a **Snapshot** by pressing the "Snapshot" button.

Start recording
By pressing the "Record" button, the software immediately records the flame signals including all software settings. An active recording session is indicated by a red flashing LED. Press the button again to stop recording.

NOTICE

A white field for entering notes appears underneath this.

Change background colour
By pressing the "Background" button, the background colour of the signal window can be changed between black and white.

3.12 Signal analysis

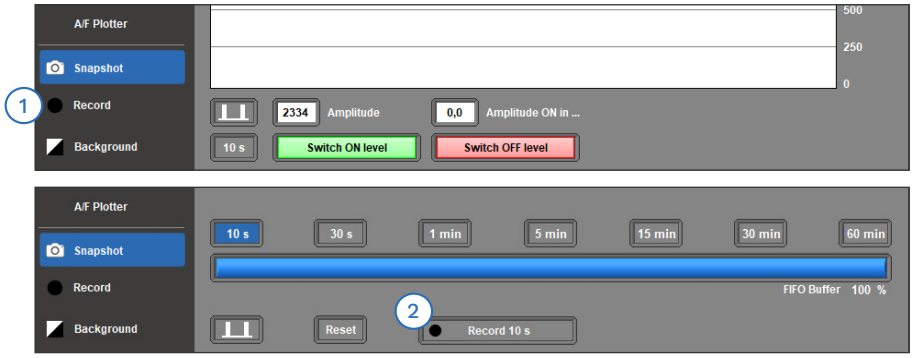
The flame raw signal can be recorded and used for post analysis. The data is saved in space-saving text format and requires approx. 3 MB of memory per hour. Every second, 20 to 25 data records are transferred to the computer. The software offers two ways to start recording:

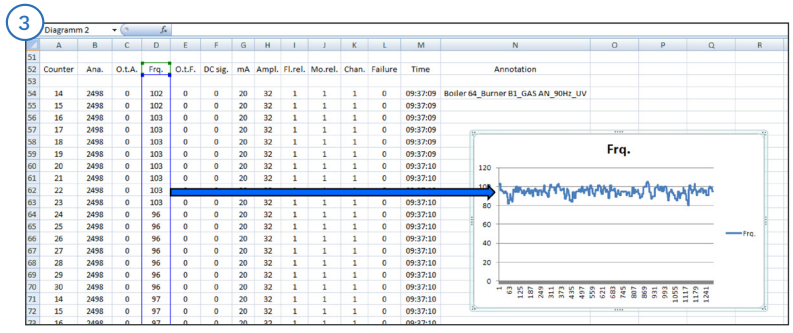
1. The "Record" button ① in the menu (unlimited in time).
2. The "Record [time]" button ② in the Digital values signal window. The recording time is preset above the bar display of the FIFO buffer.

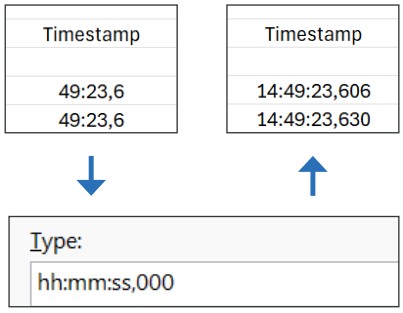
The log files can be opened and processed using spreadsheet software (e.g. Excel) ③.

NOTICE

*To fully display the time information, after importing the log file into Excel, format the timestamp column by **right clicking > Format cells > Custom > Type: > hh:mm:ss,000***







3.13 Switch-on delay

The lower value with the designation ... ON in ... below the graphs shows the quantisation or switch-on delay time. As long as the flame signal has not exceeded the switch-on thresholds, this field shows the preset delay value in seconds.

If the flame signal exceeds the switch-on thresholds, the time counts down to zero and then the flame relay is activated. Should the flame signal drop below the starting thresholds again before expiry of the set time, the time is reset again to the default value. The switch-on delay can be set to a value between 0.4 and 6 seconds.

3.14 Display of parameters

The associated switch-on and switch-off thresholds as well as switch-on and switch-off delay be read in the "Setting 1 and 2" tab.

3.15 Display of relay status

The status of the evaluation and monitor relay is visualised by the LEDs arranged in the "status window" on the left. The flame relay in ON when the "Flame ON" LED lights up.

The flame signal is evaluated in two separate channels. The monitor channel monitors the safety-related function of hardware and software and controls the monitor relay. The evaluation channel process of the flame signal is subject to the software parameters and controls the evaluation relay. Both channels must switched on simultaneously to activate the binary output signal (Flame ON).

NOTICE

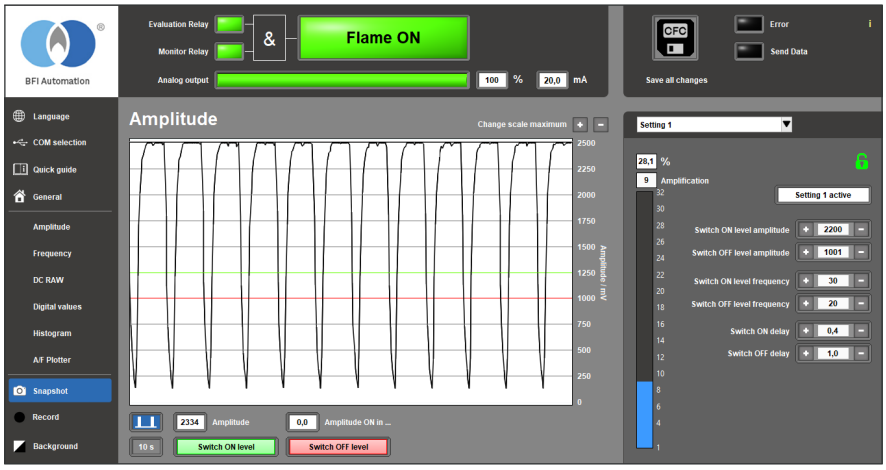
*The **Flame ON** binary signal is set when both relays are activated. The series connection of both relay contacts conforms to the SIL 3 requirements.*

3.16 Self-test visualisation

When displaying the amplitude signal, the self-test signal drop is faded out for 160 ms to draw attention to the flame signal. To observe the self-test, press the button ① available in the Amplitude and Digital values signal windows to fade it in. Press the button again to cancel this function.

NOTICE

During the self-test phase, the sensor of the Compact Flame Controller is switched off, whereby the signal evaluation is suspended for 160 ms.



4 | Edit or input section

4.1 Activating the edit section

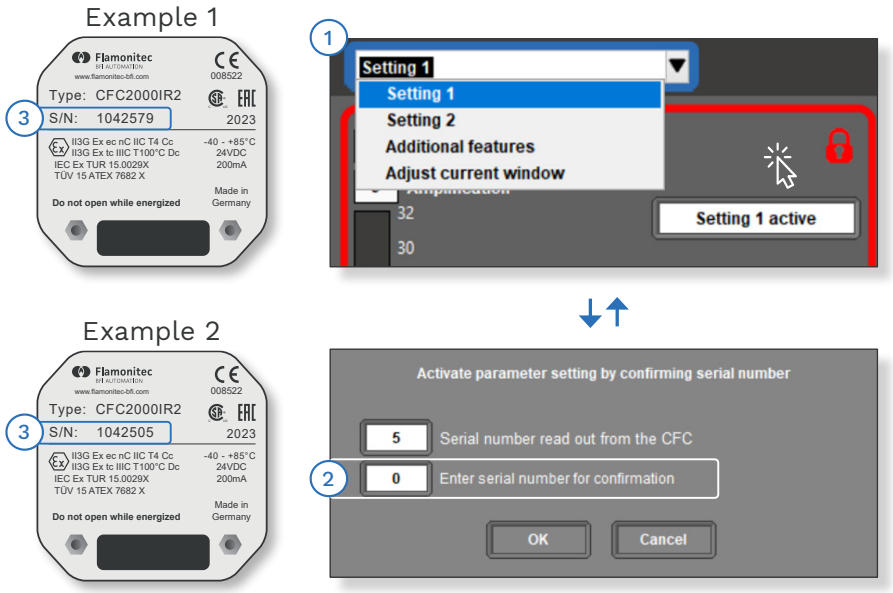
The edit or input section is used to adjust the Compact Flame Controller to the requirements of the combustion process. It consists of buttons and inputs fields, in which parameters can be set or corresponding numerical values can be entered.

4.2 Changing the settings

To enable the SETTING 1, SETTING 2, ADDITIONAL FEATURES or ADJUST CURRENT WINDOW setting levels, the last two digits of the serial number of the connected Compact Flame Controller must be confirmed. To confirm the serial number, click on the area marked in red.

To change any setting ①, the last two digits of the CFC serial number must be entered in the input field ② . The digits to be entered are displayed directly above the input field or can alternatively also be read off the name plate ③.

Possible entry of digits:
- Example 1 - 79
- Example 2 - 05 or 5



4.3 Setting 1 and 2

NOTICE

To change the settings, the serial number must be confirmed first (chapter 4.2).

Amplification ① adjusts the sensitivity of the CFC, which affects the amplitude signal. The switching thresholds for flame ON and OFF are available for amplitude- ③ and frequency evaluation ④. The frequency switching thresholds are only taken into account if frequency evaluation is activated in "Additional features" menue ⑤. The switching thresholds are also shown in the corresponding signal windows.

Value entry options:

- Enter value directly into the white window
- Increasing/decreasing the switching thresholds by using the +/- buttons
- Adjust the amplification by clicking on the bar graph

If the field ② flashes red, the current input is done on the currently inactive channel. The new settings become effective, when the related parameter level is being selected.

Save changes permanently by pressing the button >

4.4 Setting - Additional features

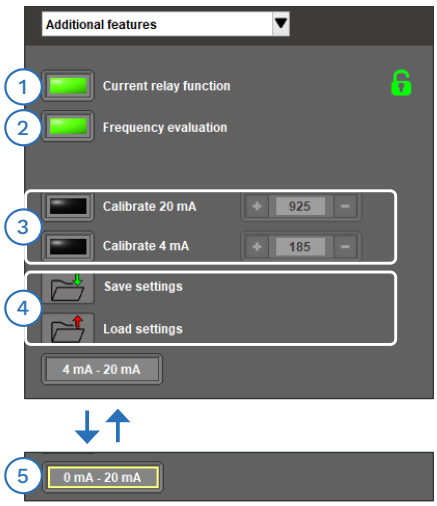
When the current relay function ① is activated, the CFC outputs the analogue signal only if flame relay is switched on. When flame relay is switched off, CFC provides current start value (0/4 mA).

When frequency evaluation ② is activated, the switching thresholds of amplitude and frequncy are used to evaluate the flame status.

When the calibration function is activated, the CFC outputs the selected current value. The current value can be adjusted by using the +/- buttons ③ (chapter 4.12).

Transferring parameter files between CFC and computer (chapter 5) ④.

Change the required current start value between dead-zero (0 mA - 20 mA) and live-zero (4 mA - 20 mA) by pressing the button ⑤.



4.5 Setting - Adjust current window

The current window defines the range of the amplitude signal, in which the Compact Flame Controller will output 0/4 mA to 20 mA ①. The analogue output depends on the amplitude signal.

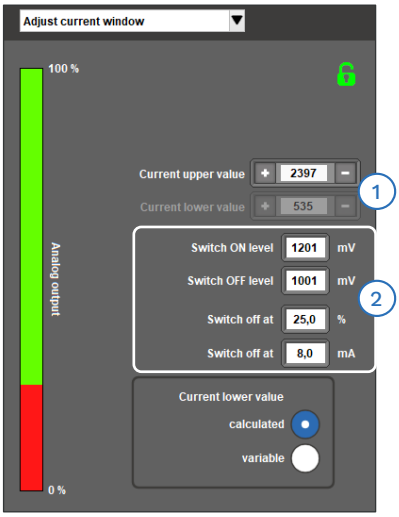
The relevant amplitude switching thresholds and the analogue value, at which the flame relay switches off via the amplitude evaluation, are specified in section ②.

After starting the burner, the flame signal (black line) must cross the green switch-on threshold upwards. The flame relay is activated after the switch-on delay time has elapsed. This process must take place within the ignition safety time set at the burner control system. The switch-on and switch-off threshold can be modified within certain limits.

The switch-on threshold must be set above the extraneous light signal and lower than that of the own burner. If the burner is shut down or fails, the flame signal must drop clearly below the switch-off threshold.

NOTICE

The "Current lower value" is greyed out, if the lower amplitude value of the current window has been set as dependent (calculated) ③.



4.5.1 Setting - Adjust current window (0/4 mA)

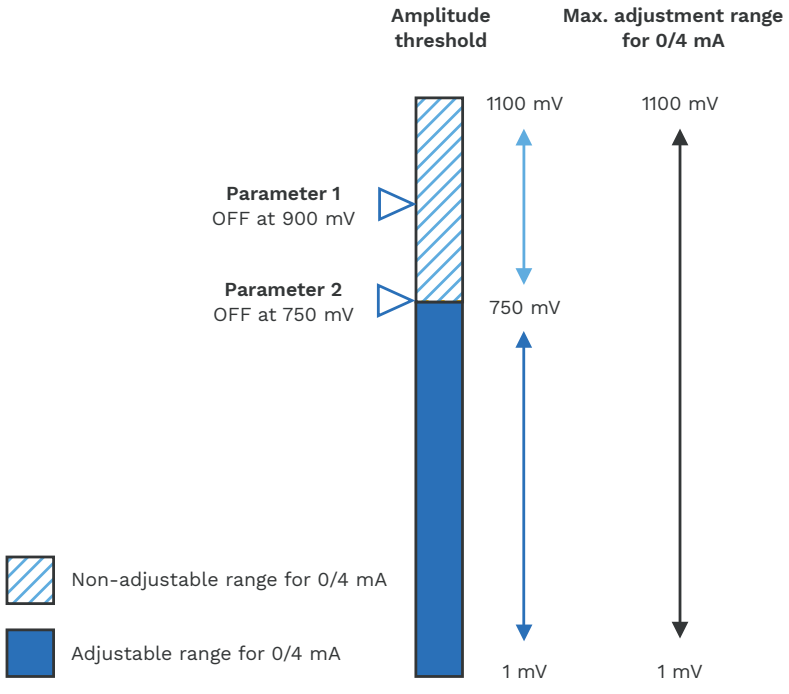
The **lower amplitude value of the current window** is either dependent (calculated) or independent (variable) of the switch-off threshold of the amplitude signal.

If "**calculated**" is selected, the lower value of the current window is calculated, so that the switch-off takes place via the amplitude evaluation at 25% analogue output. With this function, the system operator can assess the flame signal without knowing the switch-off thresholds of the amplitude signal.

If "**variable**" is selected, any value between 1 mV and 1100 mV can be choosen.

The following conditions can restrict the above setting ranges:

- The lower amplitude value of the current window must be lower than the amplitude switch-off threshold.
- The settings of the current window is taking the switch-off thresholds of both parameter levels into account (see diagram).
- If the amplitude switching thresholds are adjusted, the settings of the current window are automatically checked for the above conditions and adjusted if necessary. The automatic adjustment is indicated by a message in the Amplitude evaluation window.

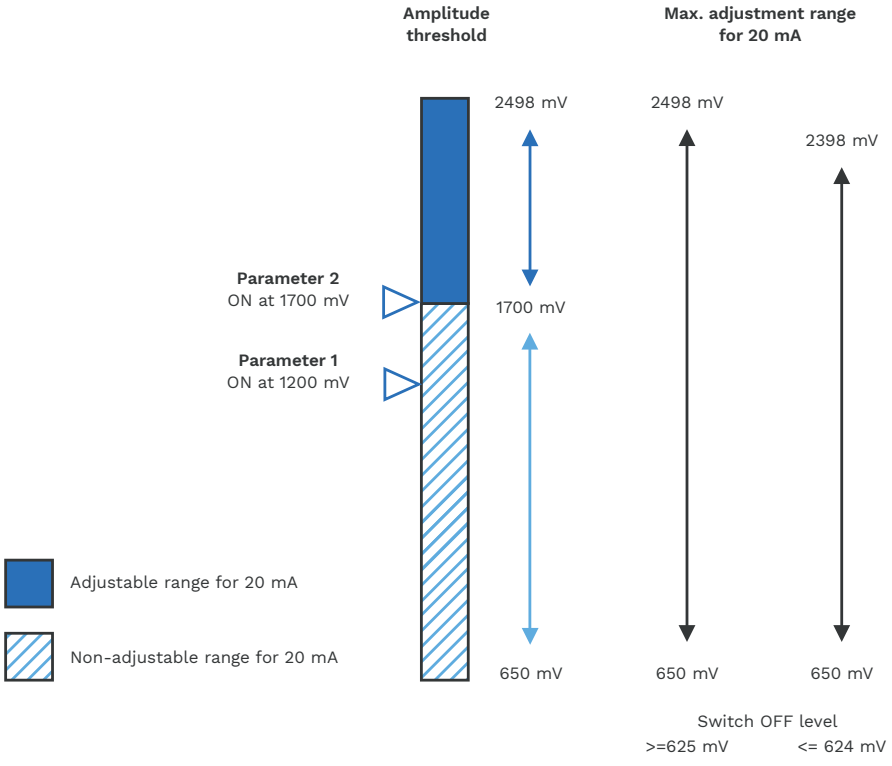


4.5.2 Setting - Adjust current window (20 mA)

The **upper amplitude value of the current window** (20 mA) can be set between 650 mV and 2498 mV.

The following conditions can restrict the above setting ranges:

- The upper amplitude value of the current window must be at least equal to or above the amplitude switch-on threshold.
- The settings of the current window is taking the switch-on thresholds of both parameter levels into account (see diagram).
- From an amplitude switch-off threshold of less than 625 mV, the upper value of the current window is reduced from a maximum of 2498 mV to a maximum of 2398 mV. This prevents the lower value of the current window from becoming negative.



4.6 Saving data on the microprocessor

If settings are changed, the parameters are saved directly to the Random Access Memory (RAM).

The Compact Flame Controller immediately operates with the new parameters which, are not yet permanently saved. Changed settings are initially buffered in the RAM of the Compact Flame Controller and must be permanently saved to the EEPROM by clicking the "Save all changes" button!

NOTICE

If the parameters have not been saved permanently, the settings are loaded from the EEPROM and used after the next power supply interruption (last edit date).

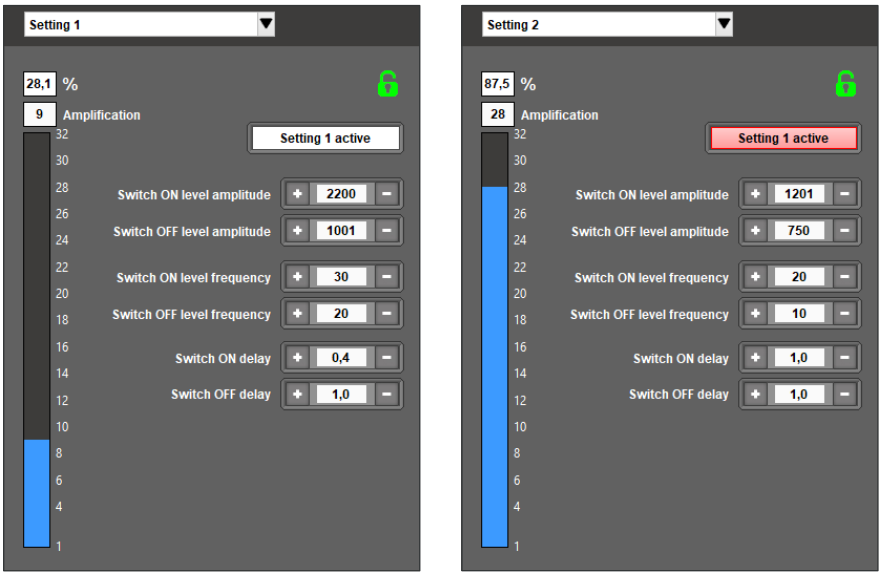
Deleting the parameters if the EEPROM has not been backed up is helpful when carrying out tests. Various different settings can be tested without the need to change the parameters saved in the EEPROM. If the Compact Flame Controller is de-energised after tests, the settings that were last saved in the EEPROM will be applied again the next time it is started up.

4.7 Amplification setting

A change of the amplification (sensitivity setting) affects the amplitude signal. The Compact Flame Controller is factory set to maximum gain of 32 (highest sensitivity). The amplification can be read from the numerical value and at the slide controller.

There are two ways of changing the amplification:

- Direct input of a value into the input field
- By moving the mouse pointer over the slider and press the left mouse key. Hold the mouse key pressed and move the bar up or down. The exact settings of the slider are also visualised by the numerical value.



4.8 Frequency evaluation

In addition to the amplitude evaluation, the Compact Flame Controller from the CFC 2000 series offer the option of performing frequency evaluation of the flame. The frequency evaluation is subject to the modulation rate (flicker frequency) and was developed to eliminate the extraneous light in multi-burner systems. The flame signal of the flame to be monitored differs characteristically from other signal
sources (extraneous light) by a higher flicker frequency.

The integration of the frequency evaluation into the flame monitoring is carried out via the setting "Additional features".

NOTICE

When the frequency evaluation is activated, the flame signal must exceed the switch-on threshold of the amplitude evaluation and the switch-on threshold of the frequency evaluation. Activation of the flame relay (Flame ON) takes place after the set switch-on delay. The flame relay remains active until one of both switch-off thresholds drops below for the duration of the safety time.

4.9 Setting the switching thresholds

The green value stands for the switch-on threshold, the red value for the switch-off threshold and the black value is the current value.

The switch-on threshold must be set above the extraneous light and lower than that of the useful light. If the burner is shut down or fails, the frequency signal must drop clearly below the switch-off threshold.

To set the switching thresholds, see chapter 4.3.

4.10 Safety times for operation

Switch-off delay (switch-off time)

NOTICE

The set safety time for operation applies to both sensitivity levels!

The safety time can be adjusted to the safety specifications of the combustion process. Activate the corresponding field for the switch-off time by double clicking with the mouse and enter the new value via the keypad. Alternatively use +/- buttons.

NOTICE

The safety time for operation can be set between 0.4 – 6 seconds. The safety time for operation (switch-off time) is also subject to the hardware settings (refer to operating instructions BA CFC x000 EN).

Switch-on delay (switch-on time)

The flame signal must exceed to the switch-on thresholds for the set switch-on time in order to activate the flame relay. The switch-on time can be selected between 0.4 and 6 seconds. The delay enables the Compact Flame Controller to be optimally adjusted to the combustion process.

To do this, set the switch-on delay in the settings level by entering it directly in the white field. The +/- buttons are available as well.

4.11 Calibrating the current output

To calibrate the current output, go to the setting "Additional features". This function is used when the expected output current is not correct.

When the calibration function is activated, the CFC outputs the selected current value, which can be measured with a suitable measurement device. If the actual current output differs from the value displayed in the software, use the +/- buttons to calibrate it. After completing the calibration, press the green LED again to end the process.

Save changes permanently by pressing the button >

NOTICE

During the calibration process, the Compact Flame Controller continuously outputs a simulated current value. No other settings can be adjusted simultaneously.

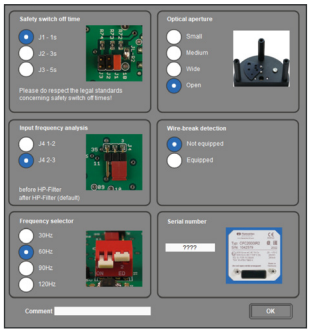
If communication is interrupted during the calibration process (by disconnecting the IR data cable or closing the software), the Compact Flame Controller will remain in calibration mode and continue to output the simulated current value, which does not correspond to the current flame status. To ensure accurate calibration, re-establish the connection and complete the calibration process.

4.12 Current relay function

By default, the current output depends on the amplitude evaluation and the set current window. The switching thresholds have no influence on the current output.

The current relay function offers the possibility of activating the current output only when the flame relay has switched on. Select current relay function in settings "Additional features". The green LED serves as a button and as a status indicator.

4.13 Saving hardware settings



After finishing the recording and when saving the settings, the software opens this window to record the hardware settings.

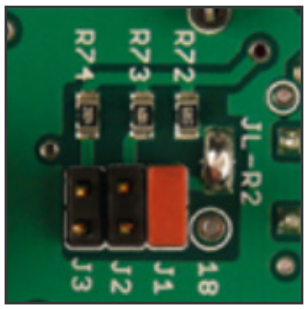
No settings are changed by the entries in this window, they are merely added to the header of the log- or parameter file. This information is important for post analysing of recorded flame information.

The CFC housing must be opened for the hardware settings. The settings marked in blue in the graphic correspond to the default settings (factory settings).

NOTICE

Space for Comments/Annotations referring to the recorded data.

4.13.1 Safety switch-off time for operation

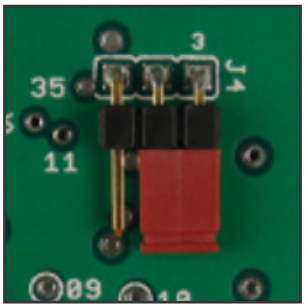


The monitor relay is controlled by the monitor channel. The safety switch-off time of the monitor channel is set by jumpers J1-J3 on the CFC main PCB. The switch-off time of the evaluation channel is set via the software and controls the evaluation relay. Monitor channel and evaluation channel are logically AND
linked. The shorter switch-off time determines the CFC safety switch-off time for operation.

Jumper J1 closed: 1 second (Standard)
Jumper J2 closed: 3 seconds
Jumper J3 closed: 5 seconds

Example 1: required CFC switch-off time = 1s
> J1 closed (1s) & Software switch-off time 1s
Example 2: required CFC switch-off time = 2s
> J2 closed (3s) & Software switch-off time 2s
Example 3: required CFC switch-off time = 5s
> J3 closed (5s) & Software switch-off time 5s

4.13.2 Input frequency analysis



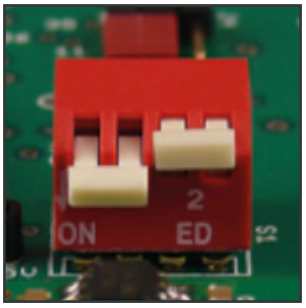
J4 is not equipped (n.e.) on all Compact Flame Controllers CFC!

In this case the collection point is after High-Pass (HP)-Filter. The jumper J4 selects, on which stage the microcontroller collects its flame signal for the frequency analysis. Generally there are two options, before and after HP-Filter.

With terminals 2-3 connected the collection point is after HP-Filter, which means that any change on frequency setting on S1 (30, 60, 90 or 120 Hz) will have an effect on frequency evaluation signal, shown on software diagram.

With terminals 1-2 connected the collection point is before HP-Filter, which means that changes on S1 will not effect the frequency signal on software diagram.

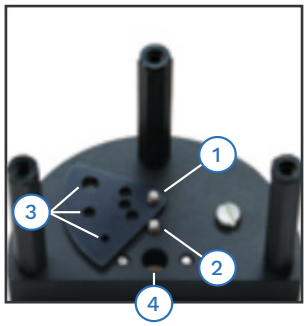
4.13.3 Frequency selector



The "Frequency selector" S1 is located on the CFC main PCB and changes the cutoff frequency of the High-Pass-Filter. A lower frequency setting (min. 30 Hz) will increase the amplitude signal as also lower flicker frequencies can pass this stage to generate flame signal. A higher frequency setting (max. 120 Hz) will reduce the signal especially from unwanted low frequency sources like e.g. fire ball, back ground radiation or even neighbour flames. The frequency signal might be effected as well.

Selectable filter settings are 30 Hz, 60 Hz (Standard), 90 Hz and 120 Hz.

4.13.4 Optical aperture



Available on CFC-IR-Series only.

An optical aperture reduces the flame radiation intake of the semiconductor-sensor ④ on optical way. The triangular aperture plate is located between lens and sensor and comes with three different hole sizes (small, medium and wide). Set as follows:

- open locking screw ①
- unfix axis screw ②
- set aperture ③
- fix axis screw ②
- close locking screw ①

The plate can be also turned away so that the semiconductor-sensor ④ gets the full flame radiation (open).

4.13.5 Wire-break detection & Annotation

The CFC is prepared to be equipped with a "wire-break-detection" feature. The configuration can be carried out according to customer requirements.

Standard configuration: Not equipped

4.13.6 Serial number

The serial number can be found on the CFC name plate.

Press "OK" to acknowledge the hardware settings. Save the log- or parameterfile after then.

5 | Data management

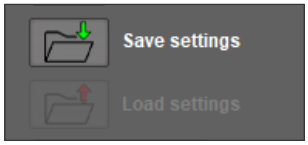
5.1 Save Settings (CFC ▶ Computer)

All parameter changes are saved in the RAM memory (Random Access Memory) as long as the CFC is supplied with power. To save the parameters permanently in the EEPROM, press the "Save all changes" button.

⚠ CAUTION

If the parameters have not been saved permanently, the settings will be loaded from the EEPROM and used after the next power supply interruption (last edit date).

This feature can be used to reset the CFC to the settings last saved in the EEPROM after test settings by disconnecting it from the power supply (min. 5 seconds). Please note that the burner will fail after disconnection from the power supply if it has not already been switched off.



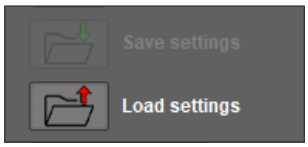
CFC ▶ Computer
To save the current parameters, select "Additional features" - "Save settings" button and enter the hardware settings.

NOTICE

Only the data that has been saved in the EEPROM will be transferred to the connected computer.

5.2 Load Settings (Computer ▶ CFC)

All CFC parameters can be saved on the connected computer. These parameters can be transferred to any CFC of the same series. For security reasons, data can only be loaded in Edit mode. All previously set and saved data will be lost when the new parameters are transferred. To save the parameters permanently in the EEPROM, press the "Save all changes" button.



Computer ▶ CFC
Transfer parameters from computer to CFC via the "Additional features" - "Load settings" button.

NOTICE

After installation on the burner, each new and pre-set Compact Flame Controller must be checked for proper function and security against extraneous light!

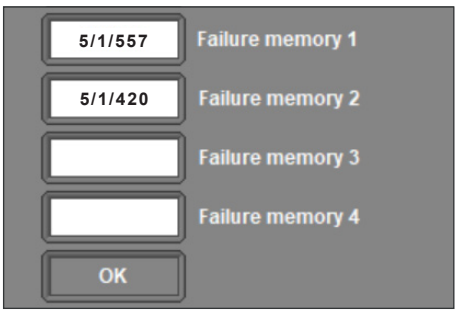
5.3 Failure memory

The CFC x000 has an failure memory that archives failures that have occurred and displays them in the "General" section. The last four failures are displayed according to the FIFO principle (First In First Out).

The following information is revealed by the failure code. For example, the following figure shows a brief loss of voltage (BOT fault) with activated channel 1 at operating hour 320:

5	/	**1**	/	**320**
Failure type		Failure channel		Operating hour

Failure type	Failure description	Channel	Operating hours
1	RAM	y	Zzzz
2	Flame relay failure	1 or 2	0...65535
3	Electric potentiometer failure		
4	Watchdog time failure		
5	BOT failure – Brown Out Detect	1 or 2	0...65535



Example: 5/1/557 (Last recognised failure)
Failure No. 5 (BOT failure = short-term loss of power)
on (activated channel) 1 at (Operating Hour) 557.

5/1/420 (First recognised failure)
Failure No. 5 (BOT failure = short-term loss of power)
on (activated channel) 1 at (Operating Hour) 420.

Failure signaling is indicated via the red LED "Error" in the upper right part of the user interface. In addition, a signal is output to PIN 8 of the plug-in connector. (see CFC operating instructions)

6 | Faults

Problem	Display	Cause	Remedy
Programme does not start communication	Software is not operable	No or the wrong interface selected Connection between CFC and computer interrupted	Select the correct interface Check connection between CFC and computer
Evaluation signals stop	No changes on the screen	Communication between the CFC and the computer interrupted	Check connection, restart programme
Data logger does not start	Error message from the computer	Missing access rights to the drive on which the temporary log file is created	Execute this program as Admin or at least have admin rights assigned to this path
Parameters cannot be changed	Enable field for the serial number marked red	Wrong or no serial number entered	Enter serial number

7 | Order data

7.1 Software

The CFC Com x000 software can be obtained from BFI Automation GmbH using the following order data:

Article	Part number
Communication and software package for CFC1000-4000 incl. IRDA/USB2.0 - Data interface cable lenght 1.5 m	6040-4901-00
Communication and software package for CFC1000-4000 incl. IRDA/USB2.0 - Data interface cable lenght 3 m	6040-4901-03

7.2 Accessories

Article	Part number
IRDA/USB2.0 - Data interface cable lenght 1.5 m	6040-4810-10
IRDA/USB2.0 - Data interface cable lenght 3 m	6040-4810-13

BFI Automation

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