Products Catalog

BFI Automation

Flame Monitoring & Evaluation Systems

The Company

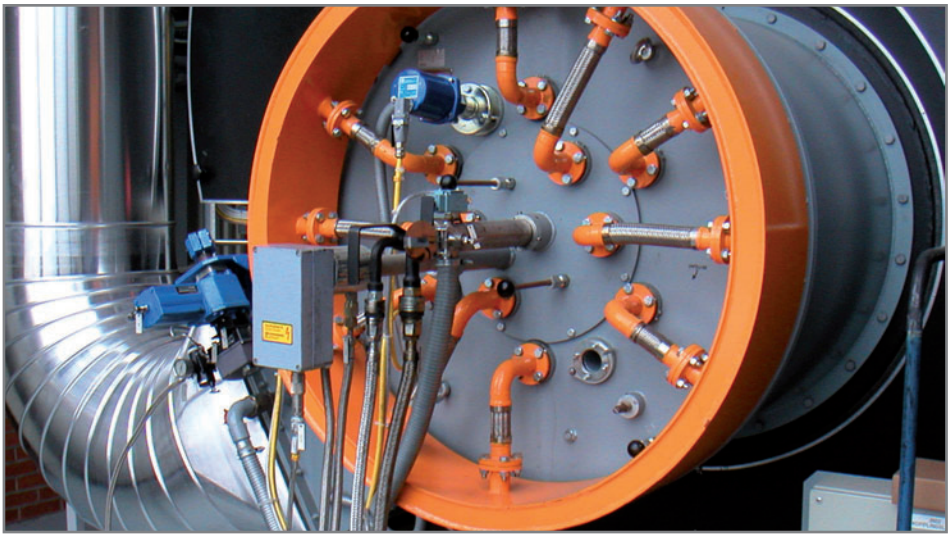
The name BFI Automation stands for innovative, tr endsetting and future-oriented technology.

The BFI Automation, Dipl.-Ing. Kurt-Henry Mindermann GmbH, provides solutions for industrial flame monitoring. The owner operated company was founded in Ratingen, close to Dusseldorf International Airport, in 1973. Research & development, manufacturing and final testing of the entire BFI-product range takes place in the main plant in Ratingen.

Meanwhile BFI is represented by sales of fices and service partners in more than 20 countries. TUV-approved flame monitoring and evaluation systems lead our wide range of outstanding products. BFI Automation projects include plant-related flame monitoring, in addition to safe boiler and burner controls for new and existing steam generators in power plants and refineries. The application diversity and functionality of this equipment is based on many years of experience and close cooperation with well-known energy providers, design/construct companies and the petrochemical industry.

All products were customized to provide an optimal solution of each customer. Qualified engineers can be called on site for combustion process analysis, start-up and maintenance. For BFI Automation it is granted, that the service is as important as safety and quality.

Content



Flame Scanners - System 3000/4000

Features

- Fail safe design and self checking
- Qualified for single and multiburner applications
- Certified for continuous, intermittent and 72h operation
- Available with different spectral sensitivity ranges from UV up to IR and also in combination
- Non-wearing due to fully electronic design
- Mounting and connecting compatible with all BFI flame scanners of series 3000/4000
- SIL 2
- SIL 3 (depending on system)

Applications

- Power plants
- Gas turbines
- H_2S-plants (Claus units)
- Duct burners
- Rotary kiln plants
- Fluidized bed firings
- Cracker
- High pressure combustions
- Waste incinerating plants/grid firings
- Residuals combustion
- Low NO_x-applications

Standard Housing

Ex-Housing

OE-Converter-Housing for FOC

All flame scanners are building a complete flame monitoring system in combination with a flame amplifier of the series 3000/4000 (pages 6/7).

The flame monitoring and evaluation system 3000/4000 was developed with due consideration of safety and optimal availability of customer plants. Our goal is the safe and reliable monitoring of fuel burning systems, provision of criteria to optimize the combustion process, and to reduce emission and pollution. The system is able to discriminate flames from different burners and to monitor these flames selectively.

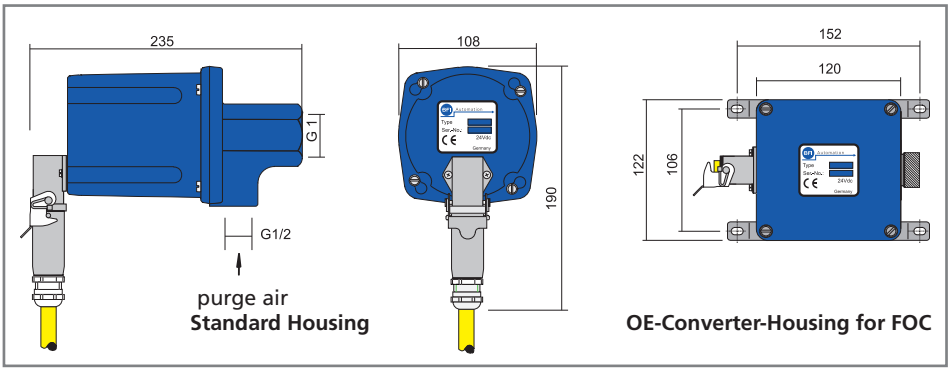
Technical Data	
Self checking	fully electronic, once per second
Spectral sensitivity	190 to 7000 nm
Sight opening angle	2,7 degrees
Operating temperature range	-20 degrees C to +70 degrees C
High temperature application	up to 600 degrees C with fiber optic technology (see page 24)
Power supply	24V DC
Current consumption	approx. 200 mA
Adjustment	multiple sensitivity chanels, partially seperate adjustable senstitivity ranges for UV and IR
Electrical connection	dustproof plug-connector with standard housing and OE-converter, all Ex-housings with wiring chamber
Type of protection	IP65 (IP66 for Ex-housings)
Cable lenght	500 m, up to 1000 m with special specification
Sight connection	G 1“ female thread ISO 228
Purge air connection	G ½“ female thread ISO 228 with standard housing
Required purge air quantity	10 m³/h
Weight	approx. 1,5 kg (approx. 4 to 13 kg with Ex-housings)
Certificates	TUV, ATEX, DVGW, CSA/UL, EN230, EN298, GOST, SIL 2, SIL 3 for 2.0 combined with 3001/3001S or 3001D

All flame scanners are also available with fiber optic technology and/or with Ex-proof housings.

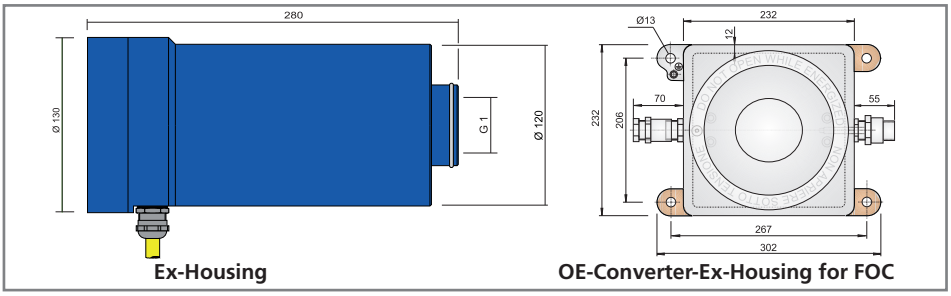
Applications					
Flame Scanner	**Spectral Range**	**Gas**	**Oil**	**Coal**	**H_2S**
Type 2.0	UV/IR	X	X	(X)	
Type 2.0 GT (SIL 3)	UV/IR	X	X	(X)	
Type 3.31	UV	X	X		
Type 3.32	UV	X	X		
Type 3.40	VIS-IR		X	(X)	
Type 4.0	VIS-IR		X	(X)	
Type 4.1	VIS-IR		X	X	
Type 4.2	VIS-IR		X	X	
Type 7.0	IR	X	(X)	(X)	X
Type 7.0/2	IR	X	(X)	(X)	X
Type 7.1	IR	X	(X)	(X)	X

X = especially qualified (X) = qualified

Dimensions



IP65, ATEX Zone 2 II 3G Ex nA II T4, similar to NEMA4/Class 1 Div 2



IP66, ATEX Zone 1 II 2G Ex de IIC T6, similar to NEMA4/Class 1 Div 1

Ordering Matrix				
Flame Scanner	**Base-No.**	**Housing type**		**Heating**
Type 2.0	S 507.0	Standard	-	H
Type 2.0 GT*	S 507H	Ex-housing	EXG	
Type 3.31	S 506.2	OE-converter	L[1)]	
Type 3.32	S 506.3	Ex-OE-converter GUB02	L-EX[1)]	
Type 3.40	S 506.5	2 OE-converter in Ex-housing GUB03	L-EX2[1)]	
Type 4.0	S 508.0	3 OE-converter in Ex-housing GUB03	L-EX3[1)]	
Type 4.1	S 508.1			
Type 4.2	S 508.2			
Type 7.0	S 510.0			
Type 7.0/2	S 510.4			
Type 7.1	S 510.1			
OE-converter 2.0**	S 507.L			

Example: Scanner 2.0 with Ex-housing without Heating = S 507.0EXG

[1)] Not for Type 7.x

*** only standard housing**
**** Exception of the matrix**

Fuels

- Oil (LDO & HFO)
- Natural gas, blast furnace gas and coke oven gas
- Biomass/biogas
- Powdered coal (brown and hard)
- Sulfur
- Naphtha
- H_2S
- H_2

Accessories

- Swivel mount
- Ball valve
- Heating insulator
- Pressure barrier
- Measuring adapter
- Signal generator
- Special cable
- Alignment tool
- Heating
- Tropicalization

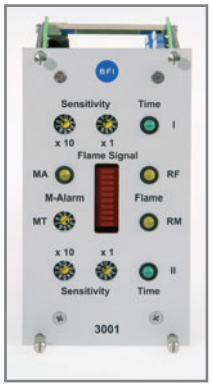
Flame Amplifiers - System 3000/4000

Features

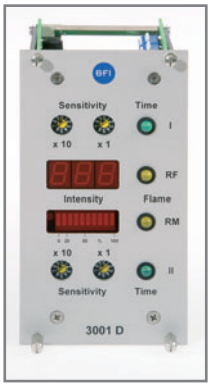
- Fail safe design and self checking
- Selective monitoring of different flames
- Certified for continuous, intermittent and 72 h operation
- Optimization of combustion process
- Multiple sensitivity ranges and switch-off times, selectable by remote signal
- Parallel connection of two/three flame scanners (scanner redundancy)
- 19“-unit design in accordance with DIN 41494
- SIL 2
- SIL 3 (depending on system)

Applications

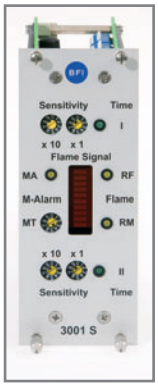
- Power plants
- Gas turbines
- H_2S-plants (Claus units)
- Duct burners
- Rotary kiln plants
- Fluidized bed firings
- Cracker
- High pressure combustions
- Waste incinerating plants/grid firings
- Residuals combustion
- Low NO_x-applications



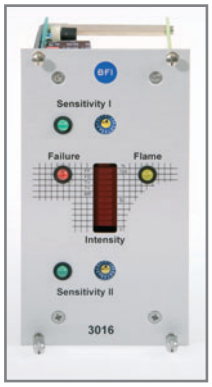
Type 3001



Type 3001D



Type 3001S



Type 3016

Type 4001

All flame amplifiers are building a complete flame monitoring system in combination with a flame scanner of series 3000/4000 (pages 4/5).

The Flame monitoring and evaluation system 3000/4000 is based on different flame amplifier modules, manufactured as 19“-slide-in modules. They contain all control logics and provide the signals for external processing.

The flame monitoring and evaluation system 3000/4000 was developed with due consideration of safety and optimal availability of customer plant. The goal is the safe and reliable monitoring of fuel burning systems, provision of criteria to optimize the combustion process, and to reduce emission of pollution. The system is able to discriminate flames from different burners and to monitor these flames selectively.

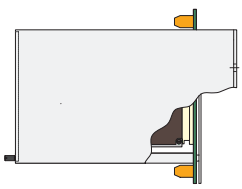
Technical Data	
Self checking	fully electronic, once per second
Flame intensity output	0/4 to 20 mA
Relay output	1 safety change-over-contact, internally fused 1A 1 auxiliary change-over-contact (3001/3001S/3001D/3016) 1 failure alarm (3016)
Power supply	24V DC
Current consumption	approx. 300 mA (3001,3001D,3016), 250 mA (4001)
Operating temperature range	-20 degrees C to +70 degrees C (3001,3001D, 3001S, 4001) 0 degrees C to +60 degrees C (3016)
Cable lenght	500 m, up to 1000 m with special specification
Safety	fail safe design, self checking
Mode of operation	continuous
Weight	see „Technical features“ on next page
Type of protection	IP00
Safety switch OFF time	selectable, 1 to 6 s , 200 to 650 ms with 3016
Certificates	TUV, DVGW, CSA, UL, EN230, EN298, GOST, SIL 2, SIL 3 for 3001/3001S/3001D combined with 2.0

All flame amplifiers are also available in Ex-housings. See chapter „Housings“ on pages 26/27.

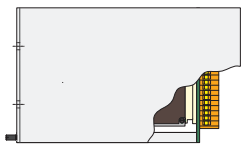
Technical features						
Type	**3001**	**3001D**	**3001DF**	**3001S**	**3016**	**4001**
Amount of channels	2	2	2	2	2	1
Amount of sensitivity channels	2	2	2	2	2	1
Switch OFF times	1-6 s	1-6 s	1-6 s	1-6 s	200-650 ms	1-6 s
Intensity bargraph	Yes	Yes	Yes	Yes	Yes	No
Intensity indication, digital	No	Yes	Yes	No	No	No
Impulse divider	No	1:1,1:2,1:4	No	No	No	No
Additional fuel discrimination	No	No	Yes	No	No	No
Pre-alarm	adjustable	50% fix	50% fix	adjustable	adjustable	No
Dimensions in 19"-units	14TE/3HE	14TE/3HE	14TE/3HE	10TE/3HE	14TE/3HE	7TE/3HE
Weight	700 g	700 g	700 g	500 g	500 g	200 g
SIL	SIL 2	SIL 3	SIL2	SIL 2	SIL 2	SIL 2

Overview Material Numbers	
Type	**Material-No.:**
Flame amplifier 3001	G 601
Flame amplifier 3001D	G 601.D
Flame amplifier 3001S	G 601.S
Flame amplifier 3001DF	G 601.DF
Flame amplifier 3016	G 616
Flame amplifier 4001	G 607

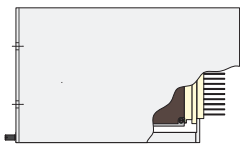
Overview about possible cable connections for 19" racks, built-on and built-in housings. (dimensions see chapter „Housings" on pages 26/27)



Back Panel F



Back Panel R



Multipoint connector

Description	Backpanel 3001F	Backpanel 3001R	Backpanel 3001RTA	Multipoint connector with flat pins	Multipoint connector with Wire-Wrap
Material-No.:	E 301.0	E 301.1	E 301.2	on request	on request

Housing Variants

- 19"-rack
- 19"-built-in housing
- 19"-built-on housing
- Wall mounting housing IP66
- Ex-wall mounting housing for ATEX Zone 1

Accessories

- Multipoint connector
- Back panel R, F or RTA
- Signal generators
- Power supply modules
- Selector units
- Flame evaluation unit
- Signal evaluator unit
- Special cable
- Heating
- Tropicalization

Back panels and Connectors

Our backpanels providing screw terminals for easy wiring, accessible from rear side (R) and front side (F). The back panel 3001RTA offers an additional failure output. Alternatively we provide female multipoint connectors with flat pins (Wire-Wrap or Maxi TERMI-POINT on request).

Compact Flame Controller - CFC x000

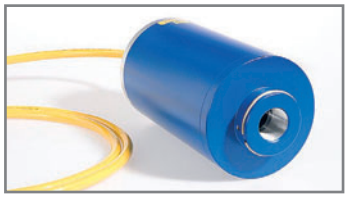
Features

- Fail safe design and self checking
- Qualified for single and multi burner applications
- Available with different spectral sensitivity ranges from UV up to IR and also in combination
- Certified for continuous, intermittent and 72 h operation
- Non-wearing due to fully electronic design
- Programmable via software
- Flame analysis via software
- Bus-ready in combination with converter 5012/6012
- Robust housing
- SIL 3

Applications

- Power plants
- Gas turbines
- H_2S-plants (Claus units)
- Duct burners
- Rotary kiln plants
- Fluidized bed firings
- Cracker
- High pressure combustions
- Waste incinerating plants/grid firings
- Residuals combustion
- Low NO_x-applications

Standard Housing



Ex-Housing

OE-Converter-Housing for FOC

The compact flame controller CFC combines flame scanner and flame amplifier module built as an all-in-one system.

The compact flame controller CFC x000 series has been developed for applications on large steam generators and industrial boilers. The goal is safe and reliable monitoring of fuel burning systems, provision of data to optimize the combustion process, and to reduce the emission of pollutants. The system is able to discriminate flames from different burners and to monitor these flames selectively. All parameters can be optimized for any combustion via the corresponding software.

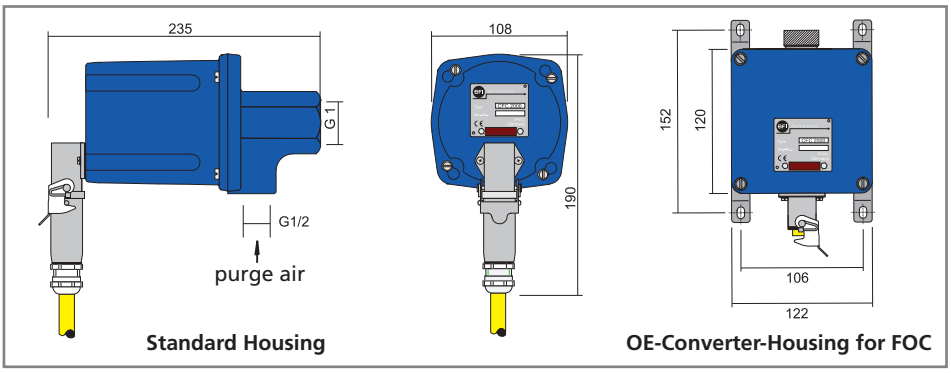
Technical Data	
Self checking	fully electronic, once per 800 ms
Spectral sensitivity	190 to 7000 nm
Sight opening angle	2,7 degrees
Operating temperature range	-20 degrees C to +70 degrees C (+85 degrees C)
High temperature application	up to 600 degrees C with fiber optic technology (see page 24)
Flame relay	1 switch over contact (potential free)
Safety switch OFF time	1 to 5 seconds
Flame intensity output	0/4 to 20 mA
Power supply	24V DC
Current consumption	approx. 100 mA
Adjustment	multiple parameter chanels, partially seperate adjustable sensitivity ranges for UV and IR
Electrical connection	dustproof plug-connector with standard housing and OE converter, fixed cable (3m) with EXG, all other with wiring chamber
Type of protection	IP65 (IP66 with Ex-housing)
Sight connection	G 1“ female thread ISO 228
Purge air connection	G ½“ female thread ISO 228 with standard housing
Required purge air quantity	10 m³/h
Weight	approx. 1,5 kg (approx. 4-13 kg with Ex-housings)
Certificates	TUV, ATEX, DVGW, CSA, UL, EN230, EN298, GOST, SIL 3
Interface	infrared (for BFI software) RS 232 (visualization to control room)

All flame scanners are also available with fiber optic technology and/or with Ex-proof housings.

Applications							
Compact Flame Controller	**Spectral Range**	**Gas**	**Oil**	**Coal**	**H_2S**	**Bio**	**H_2**
CFC x000UV	280 to 420 nm	X	X			X	
CFC x000UV1	190 to 550 nm	X	X			X	X
CFC x000IR	300 to 1050 nm		X	X		X	
CFC x000IR1*	1050 to 2700nm (7000nm)	X	X	(X)	X	(X)	X
CFC x000IR2	300 to 2700 nm	X	X	(X)		(X)	X
CFC 1000IR3	1050 to 2700 nm				X	(X)	X

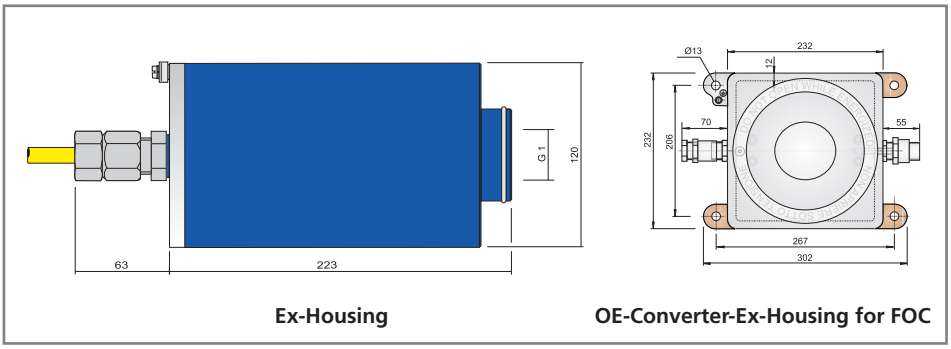
***not available for CFC 1000** **X = especially qualified (X) = qualified**

Dimensions:



Standard Housing **OE-Converter-Housing for FOC**

IP65, ATEX Zone 2 II 3G Ex nA II T4, similar to NEMA4/Class 1 Div 2



Ex-Housing **OE-Converter-Ex-Housing for FOC**

IP66, ATEX Zone 1 II 2G Ex d IIC T6, similar to NEMA4/Class 1 Div 1

CFC-Configuration				
Function	**CFC 1000**	**CFC 2000**	**CFC 3000**	**CFC 4000**
Second parameter channel, externally selectable		X	X	X
Frequency analysis via software		X	X	X
DC-rough signal evaluation via software		X	X	X
RS 232 interface, network ready with converter 5012 (read only)			X	
RS 232 interface, network ready with converter 6012				X
Failure output	X	X		

X = Function available

Fuels

- Oil (LDO & HFO)
- Natural gas, blast furnace gas and coke oven gas
- Biomass/biogas
- Powdered coal (brown and hard)
- Sulfur
- Naphta
- H_2S
- H_2

Accessories

- Swivel mount
- Ball valve
- Heating insulator
- Pressure barrier
- Signal generator
- Special cable
- Alignment tool
- Heating
- Tropicalization
- Power supply
- Adapter unit
- Converter
- Software
- Communication cable

Communication - Accessories

BFI provide a wide range of accessories to complete the compact flame controller for installation, commissioning and analysis.

- Adapter Units
- Converter
- Software

Converter 5012/6012

A wide range power supply unit and a relay for higher contact ratings are integrated. In combination with a CFC 3000/4000 it provides up to 3 analog output signals for different flame characteristic information, which supports your DCS to optimize the combustion process.

In addition to this, a network of up to 64 CFC 3000/4000 can be established by connecting the converters on a RS485 bus.

The converter 6012 provides a SD-Card slot for data recording. Remote parameter settings with USB-security key.

Ordering Matrix

Type	Base-No.	Spectral Response		Housing type		Heating
CFC1000	S 518	UV	.3	Standard	-	H
CFC2000	S 520	UV1	.0	Ex-housing	EXG	
CFC3000	S 521	IR	.4	OE converter	L[1)]	
CFC4000	S 522	IR1[2)]	.7	1 x OE converter in Ex-housing GUB02	L-EX[1)]	
		IR2	.6	2 x OE converter in Ex-housing GUB03	L-EX2[1)]	
		IR3[3)]	.8	2 x OE converter in Ex-housing GUB03	L-EX3[1)]	

Example: CFC2000 with UV-sensor prepared for mounting in Ex-Housing Material-No.: S 520.3EX
[1)] not for IR1 and IR3 [2)] not for CFC1000 [3)] only CFC1000

Accessories	Material-No.:
Adapter unit 3200, without mA-indicator, 3HE, 14TE	G 663.02
Adapter unit 3201, with one mA-bargraph indicator, 3HE, 14TE	G 663.1
Adapter unit 3202, with two mA-bargraph indicators, 3HE, 14TE	G 663.2
RS 485 Converter 5012, DIN rail mounting	G 657
RS 485 Converter 5012, integrated in a wall mounting housing IP66	G 657.1
RS 485 Converter 6012, DIN rail mounting	G 677
RS 485 Converter 6012, integrated in a wall mounting housing IP66	G 677.1
IR/USB data interface cable	6040-4810-00
Converter cable USB/RS232	6040-4820-00
Communication and software package CFC-COM1	6040-4901-00
Communication software CFC COM1	6040-4901-02
Communication software CFC NET	6040-4901-03

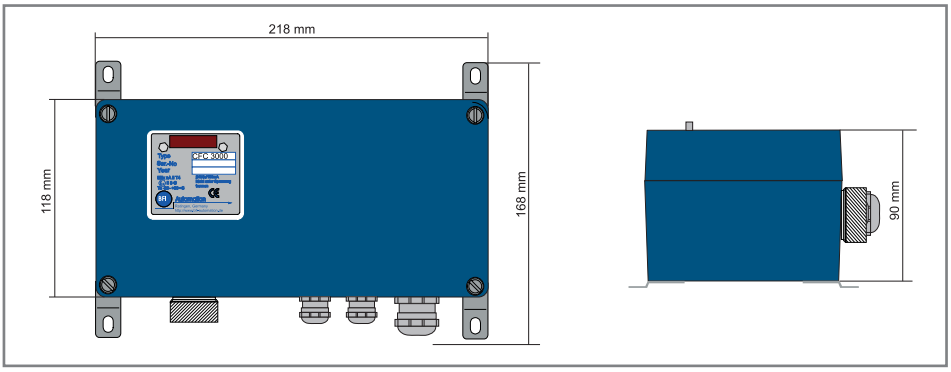
Converter 5012

Converter 6012

Technical Data	5012	6012
Power supply input	24 V DC or 100 to 240 V AC	24 V DC or 100 to 240 V AC
Current consumption	approx. 125 mA	approx. 125 mA
Power supply output	24 V DC	24 V DC
Output current	approx. 150 mA	approx. 150 mA
Flame relay	1 change-over-contact 250 V/1 A	1 change-over-contact 250 V/1 A
Analogue output	0/4 to 20 mA	0/4 to 20 mA
Datalogger	No	SD-Card (max. 32 GB)
Data output	RS485 with 64 selectable addresses	RS485 with 64 selectable addresses
Operating temperature range	-20 degrees C to +60 degrees C	-20 degrees C to +60 degrees C
Dimensions (W x H x D) mm	99,7 x 75 x 115	99,7 x 75 x 115
Type of mounting	DIN rail mounting (35mm) or built-on	DIN rail mounting (35mm) or built-on
Type of protection	IP50	IP50
Weight	approx. 450 g	approx. 450 g

Functional upgrade of CFC x000

Dimensions:



Type	Base-No.	Sensor type	Gland	Function	Commu-nication
CFC2000	S 540.	0 = UV1 3 = UV 4 = IR 6 = IR2	U = Conduit E = Gland	M = Multi-output R = Fault relay	-
CFC3000	S 541.	0 = UV1 3 = UV 4 = IR 6 = IR2	U = Conduit E = Gland	M = Multi-output R = Fault relay	com (optional)
				D = Fuel-discrimination relay	com
CFC4000	S 542.	0 = UV1 3 = UV 4 = IR 6 = IR2	U = Conduit E = Gland	M = Multi-output R = Fault relay	com (optional)
				D = Fuel-discrimination relay	com

Example: CFC 3000 UV1 with gland, multi output and network capability
Material-No.: S 541.0EMcom

Upgrades for CFC x000

To increase the capabilities of the CFC, upgrade modules can be integrated into the housing.

This includes the following functions:

- Selectable, fail-safe multi-output
  - Relay output
  - Pulse output
  - Current output
- Alarm relay
- Fuel-discrimination relay
- RS 485 interface:
  - Unidirectional with CFC 3000
  - Bidirectional with CFC 4000
- Optional cable glands or conduit

Applications:

- Retrofit of gas turbines
- Flame detector of large steam generators, with centralized management of signals and parameters (boiler overview, remote configuration etc.)

Communication Software

CFC COM 1

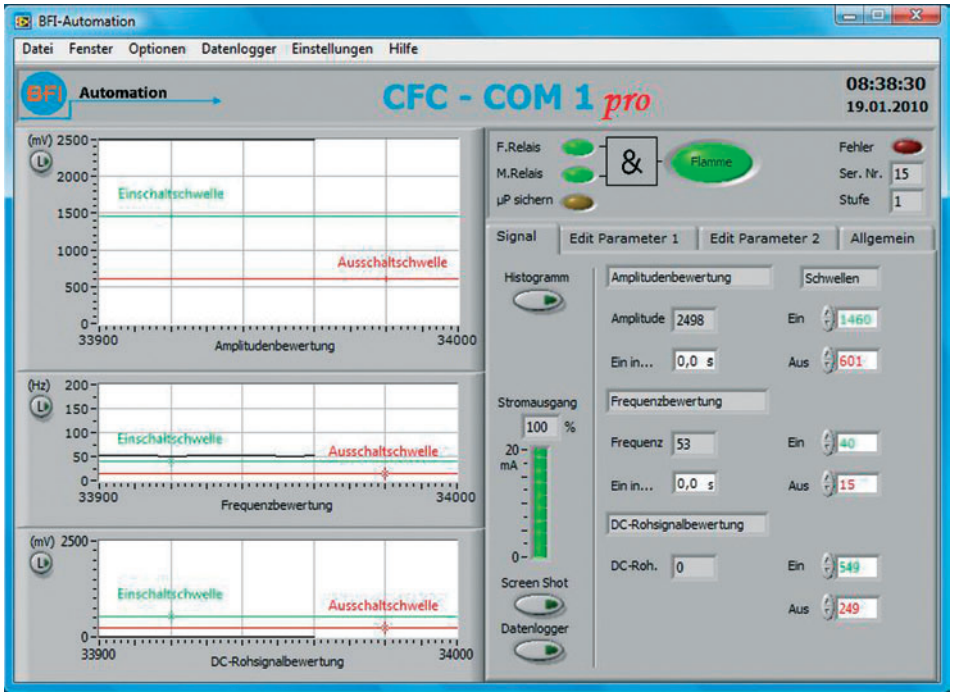
Our software CFC COM 1 enables flame analysis and programming of any compact flame controller type CFC x000.

Features

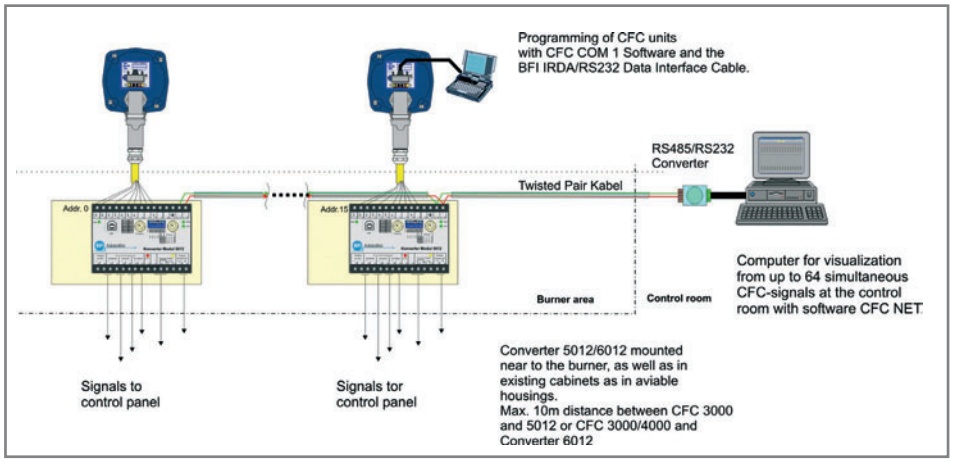
- Pure flame radiation signals in real-time and with analysing diagrams
- Visualization of output signals
- Switch ON/OFF thresholds
- Switch ON/OFF times
- Data logger
- Storage and uploading of CFC settings
- Multilingual
- PRO-/LITE-mode
- Sensitivity setting
- Failure memory

Network

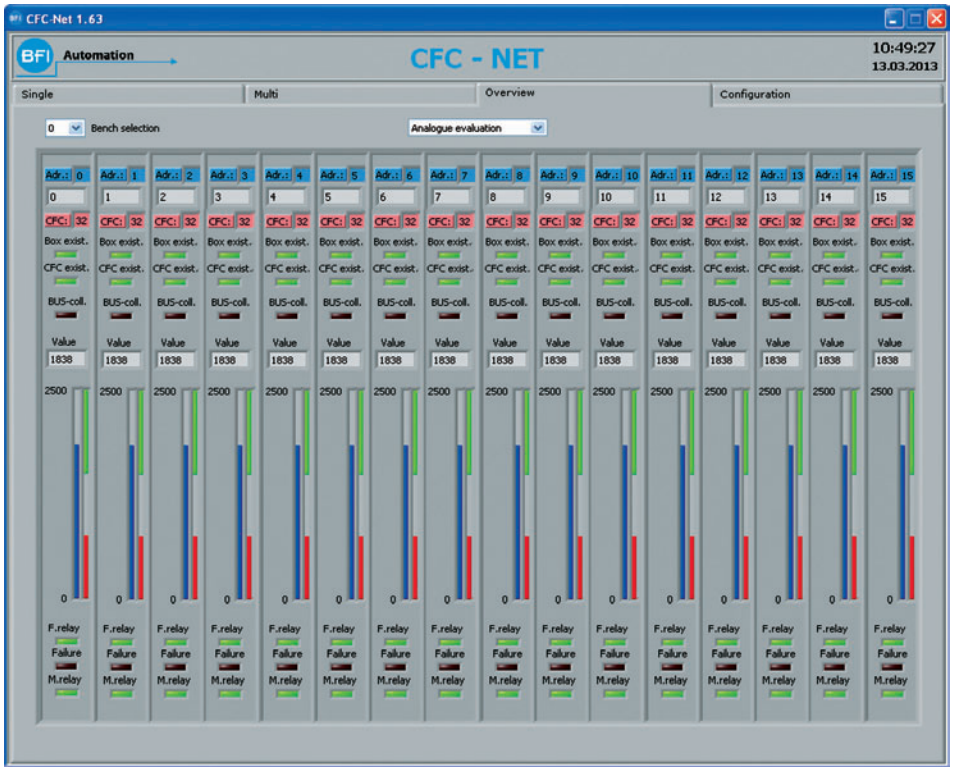
Bus design with up to 64 CFC 3000/4000, each with converter 5012/6012.

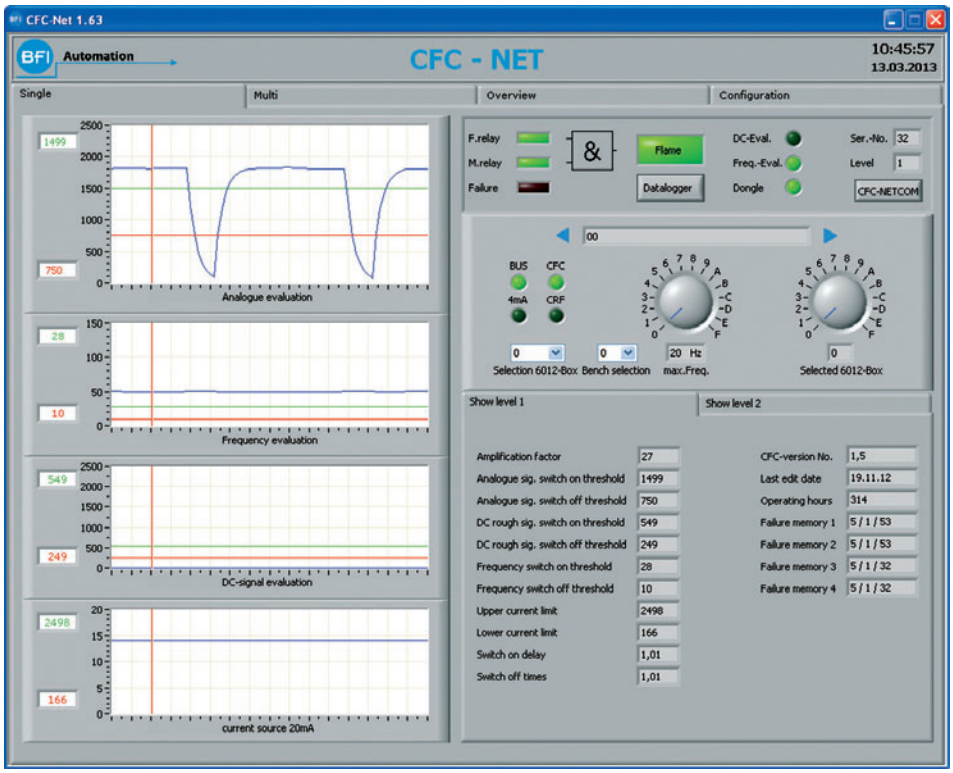


Communication Software and Accessories	Material-No.:
Communication and software package CFC-COM 1	6040-4901-00
Communication software CFC-COM1	6040-4901-02
Communication software CFC-NET	6040-4901-03
IR/USB Data interface cable	6040-4810-00
RS 485 converter 5012, DIN rail mounting	G 657
RS 485 converter 5012, integrated in a wall mounting housing IP66	G 657.1
RS 485 converter 6012, DIN rail mounting	G 677
RS 485 converter 6012, integrated in a wall mounting housing IP66	G 677.1



Network Software





CFC NET

Our software CFC NET enables the operator to get a clear overview about flame radiation information of all connected CFC 3000/4000. The CFC bus capability can be achieved via the converter 5012/6012.

Features

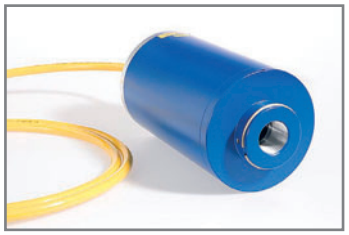
- Analyzing on diagrams in real-time
- Switchover from boiler overview to burner view
- Visualization of output signals
- Switch ON/OFF thresholds
- Sensitivity settings
- Switch ON/OFF times
- Data logger
- Multilingual
- Configuration menu
- Failure memory
- Remote programming of CFC 4000 with converter 6012 from control room via USB safety key

Compact Flame Controller CFC 200
(formerly 8.xx)

Features
- Fail safe design and self checking
- Particularly suitable for single burner applications
- Available with different spectral sensitivity ranges from UV up to IR and also in combination
- Non-wearing due to fully electronic design
- SIL 2
- Cost-efficient

Applications
- Power plants
- Surface burner
- High pressure plants
- Claus plants
- Waste incineration plants/grid firings
- Rotary kiln plants
- Fluidized bed firings
- Cracker furnace
- Residue incineration
- Low NO_x-applications

Standard Housing


Ex-Housing


OE-Converter-Housing for FOC

The compact flame controller unites flame sensor and flame detector in one housing.

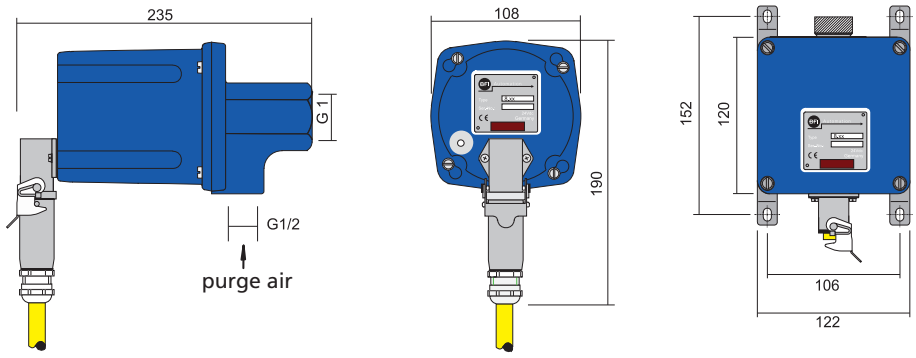
The compact flame controllers of the series CFC 200 are designed for the monitoring of gas- and oil flames on single burner applications.

Technical Data	
Self checking	fully electronic, once per second
Spectral sensitivity	190 to 7000 nm
Sight opening angle	2,7 degrees
Operating temperature range	-20 degrees C to + 70 degrees C
High temperature application	Up to 600 degrees C via FOC (see page 24)
Flame relay	1 change-over contact (potential-free)
Safety switch-off time	1 second , other times on request
Flame intensity	0/4 to 20 mA
Operating voltage	24V DC
Current consumption	approx. 200 mA
Adjustment	with sensitivity potentiometer
Electrical connection	dust-proof connector with standard housing and OE converter, fixed cable (3 m) with EXG and all other Ex-housing with wiring chamber
Type of protection	IP65 (IP66 with Ex-housing)
Sight connection	G 1“ female thread ISO 228
Purge air connection	G ½“ female thread ISO 228 with standard housing
Required purge air quantity	10 m³/h
Weight	approx. 1,5 kg (approx. 4 to 13 kg with Ex-housings)
Certificates	TUV, ATEX, DVGW, CSA, EN230, EN298

Most of our compact flame controllers are available in FOC-technology and/or Ex-versions.

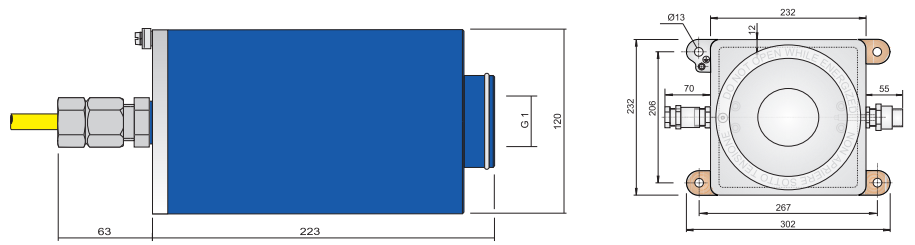
Applications			
Compact Flame Controller	**Spectral Range**	**Gas**	**Oil**
CFC 200 UV1	190 to 550 nm	X	X
CFC 200 UV	280 to 420 nm	X	X
CFC 200 IR	300 to 1050 nm	-	X
CFC 200 IR3	1050 to 2700 nm	X	X

Dimensions:



Standard Housing **OE-Converter-Housing for FOC**

IP65, ATEX Zone 2 II 3G Ex nA II T4, similar to NEMA4/Class 1 Div 2



Ex-Housing **OE-Converter-Ex-Housing for FOC**

IP65, ATEX Zone 1 II 2G Ex d II C T6, similar to NEMA4/Class 1 Div 1

Ordering Matrix				
Compact flame controller	**Base-No.**	**Housing type**		**Heating**
CFC 200 UV1 (formerly 8.0)	S 511.0	Standard	-	H
CFC 200 UV (formerly 8.30)	S 511.3	Ex-housing	EXG	
CFC 200 IR (formerly 8.40)	S 511.4	OE converter	L	
CFC 200 IR3 (formerly 8.70)	S 511.7	OE converter in Ex-housing GUB02	L-EX	
		2 x OE converter in Ex-housing GUB03	L-EX2	
		2 x OE converter in Ex-housing GUB03	L-EX3	

Example: CFC 200 UV1 with OE-Converter Ex- Housing and heating = S511.0L-EXH

Type of combustions

- Light- and heavy fuel oil
- Natural-, furnance- and coke oven gas
- Biomass
- H_2S-gas

Accessories

- Swivel mount
- Ball valve
- Heating insulator
- Pressure barrier
- Signal generator
- Special cable
- Alignment tool
- Heating
- Tropicalization

Compact Flame Controller - CFC 100

Features
- Fail safe design and self checking
- Certified for continuous and intermittent operation
- Qualified for single and multi burner applications
- Dual channel flame monitoring system
- Intensity and relay status indication via LED
- 3 times increased lifetime of the UV-tube
- 20 times increased shutter lifetime

Applications
- Power plants
- Duct burner
- Surface burner
- Rotary kiln plants
- Fluidized bed firings
- Cracking furnance
- Waste incineration plants
- Low NO_x-applications

Type of combustions
- Natural gas
- Oil
- Mix firing

Accessories
- Operating terminal
- Power supply
- Swivel mount
- Ball valve
- Heating insulator
- Pressure barriere
- Signal generator
- Special cable
- Alignment tool
- Heating
- Tropicalisation

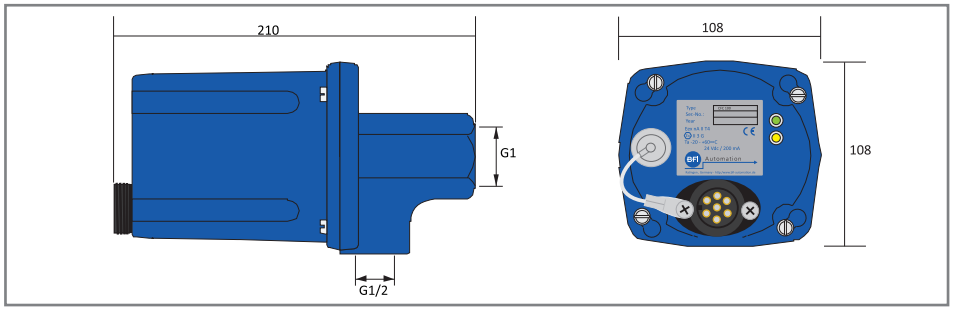
Compact flame controller type CFC 100 with hand programming device HT 100

The compact flame controller CFC combines flame scanner and flame amplifier module built as all-in-one system.

The compact flame controller CFC 100 has been designed to monitor gas- and oil flames on single and multi burner applications. First time with UV tube sensors it is possible to set high-resolution thresholds for flame discrimination. Due to new shutter design with an electrical/mechanical combination the CFC 100 we increased the shutter lifetime by 20 times. Also the UV -tube lifetime was increased by 3 times due to the use of special high-temperature sensors.

Technical Data	
Self checking	2 minutes electronically followed by 5 seconds electro-mechalically
Spectral sensitivity	185 to 260 nm
Sight opening angle	2,7 degrees
Operating temperature range	-20 degrees C to + 60 degrees C
Flame relay	1 change-over contact (potential-free)
Safety switch OFF time	1 second
Operating voltage	24V DC
Power consumption	approx. 200 mA
Electrical connection	dust-proof connector
Type of protection	IP65
Sight connector	G 1" female thread ISO 228
Purge air connector	G ½" female thread ISO 228
Required purge air quantity	10 m³/h
Weight	approx. 1,5 kg
Certificates	GASTEC, EN230, EN298
Type	**Material-No.:**
Compact flame controller CFC 100	S 550.0
Handheld terminal HT 100	7040-2010-00

IP65, ATEX Zone 2 , II 3G Ex nA II T4, similar to NEMA4/Class 1 Div 2



Power Supply Units

Technical Data	3002	3002A
Input voltage	230 V/115 V AC*	230 V/115 V AC*
Output voltage	24V DC	24V DC
Output current	2 x 2.5 A	1 x 2.5 A
Power	2 x 60 VA	1 x 60 VA
Status indication	LED	LED
Status information	–	Relay output
Type of protection	IP00	IP00
Weight	approx. 2,5 kg	approx. 2,5 kg
Front dimensions	70.78 mm (14TE) x 128.7 mm (3HE) x 188.0 mm	70.78 mm (14TE) x 128.7 mm (3HE) x 188.0 mm
Material-No.:	G 602	G 602.1

***The input voltage has to be specified on ordering.**

Power Supply Unit 3002

Supplies all components of BFI flame monitoring system with the needed voltage of 24V DC. The power supply is optionally available with status information with model 3002A.

Technical Data	4002
Input voltage	230 V/115 V AC*
Output voltage	24V DC
Output current	2 x 0.4 A
Power	2 x 9.6 VA
Status indication	LED per channel
Type of protection	IP00
Weight	approx. 0.9 kg
Front dimensions	35.22 mm (7TE) x 128.7 mm (3HE) x 188.0 mm
Material-No.:	G 608

***The input voltage has to be specified on ordering.**

Power Supply Unit 4002

Also the power supply unit 4002 supplies the components of the flame monitoring system with the needed voltage of 24V DC. Half width of 3002 with reduced output power.

Technical Data	5002
Input voltage	230-240 V AC*
Power consumption	approx. 100 mA
Output voltage	24V DC
Output current	200 mA
Type of mounting	DIN rail, 35 mm
Dimensions	45 x 73 x 120 mm
Type of protection	IP50
Ambient temperature	-20 degrees C to +60 degrees C
Weight	approx. 0.5 kg
Material-No.:	G 652

***The input voltage has to be specified on ordering.**

Power Supply Unit 5002

The compact power supply is used for the power supply of all BFI compact flame controllers. It supplies enough power for one device and it is equipped with a relay for higher switching power. The device is designed for DIN rail mounting. Electrical connection by screw terminals.

Diode Decoupling/ Voltage Monitoring Module 3012

The purpose of this diode decoupling and voltage monitoring module 3012 is to decouple four separate DC power supplies (e.g. 2 x 3002) and to monitor over and under voltages. In combination with two power supplies units the 3012 creates a redundant power supply with alarm output.

Technical Data	3012
Power supply	24V DC
Current consumption	approx. 100 mA
Decoupling	4 x 2,5 A; 24V DC
Voltage monitoring Low voltage High voltage	24V DC -20 % +20 %
Failure alarm output	switch over relay contact. one per channel
Failure alarm acknowledgement	local or remote
Status indication	operation: LED green alarm: LED red
Type of protection	IP 00
Weight	approx. 0,4 kg
Dimensions	70.78 mm (14TE) x 128.7 mm (3HE) x 188.0 mm
Material-No.:	G 612

Flame Evaluation

Flame Evaluation Module 3003

The evaluation module 3003 operates in combination with one flame scanner and flame amplifier of the 3000/4000 series and displays the digital scanner output signal. The 3003 provides additional relay outputs, controlled by adjustable thresholds and ON/OFF delay times.

Technical Data	3003
Power supply	24V DC
Current consumption	approx. 100 mA
Intensity indicator	LED-7-segment 3-digit
Status indication	relais output (RD) fault diagnostic (FD)
Threshold	adjustable, 001 to 999
Switch-ON delay	adjustable, 1s to 9s
Switch-OFF delay	adjustable, 1s to 9s
Type of protection	IP 00
Weight	approx. 0,5 kg
Dimensions	70.78 mm (14TE) x 128.7 mm (3HE) x 188.0 mm
Material-No.:	G 603

Selector Unit 3210

The selector unit 3210 provides up to three single flame intensity scanner signals on one output and in addition the summarized signal of the connected flame scanners. This selector unit is an ideal supplement for a redundant flame scanner operation in combination with our flame evaluation unit 3003. An on board failure alarm output can be used to identify a flame scanner without signal.

Technical data	3210
Power supply	24V DC
Current consumption	approx. 100 mA
Signal output	selected flame scanner signal, summarized flame signal, failure alarm contact
Status indication	two-color-LED per Signal, failure alarm-LED
Failure alarm relay	2 switch-over contacts, 250V/1A/300VA
Type of protection	IP 00
Weight	approx. 0,3 kg
Dimensions	70.78 mm (14TE) x 128.7 mm (3HE) x 188.0 mm
Material-No.:	G 632

Technical Data	3007
Power supply	24V DC
Current consumption	approx. 340 mA
Channels	4
Output per channel	0/4…20 mA, max. load 500 Ohms
Measurement ranges	6, adjustable
Type of protection	IP00
Weight	approx. 0.4 kg
Dimensions	70.78 mm (14TE) x 128.7 mm (3HE) x 188.0 mm
Material-No.:	G 613

Flame Signal Linearization Module 3007

The flame signal linearization module 3007 converts up to four digital flame scanner output signals into linear analog signal outputs. The measurement range of each channel can be adjusted separately. The 3007 is a supplementary unit to our flame amplifiers.

Technical Data	4007
Power supply	24V DC
Current consumption	approx. 180 mA
Channels	2
Output per channel	0/4…20 mA, max. load 500 Ohms
Measurement ranges	6, adjustable
Type of protection	IP00
Weight	approx. 0.4 kg
Dimensions	70.78 mm (14TE) x 128.7 mm (3HE) x 188.0 mm
Material-No.:	G 621

Flame Signal Linearization Module 4007

The flame signal linearization module 4007 converts up to two digital flame scanner separately into linear analogue signal outputs. The measurement range of both channels can be adjusted separately.

Technical Data	3011
Power supply	115/230 V AC
Current consumption	approx. 50 mA
Relay output	2 switch-over contacts 250V, 1A
Mode of operation	in combination with ignition-/ionization electrodes
Status indication	3 LEDs
Type of protection	IP 00
Weight	approx. 0,4 kg
Dimensions	35.22 mm (7 TE) x 128.7 mm (3 HE) x 188.0 mm
Connector	DIN 41612 Form C
Model type	Material-No.:
3011 for continuous operation	H 101
3011 for 72 h operation	H 102

Ionization Flame Amplifier 3011

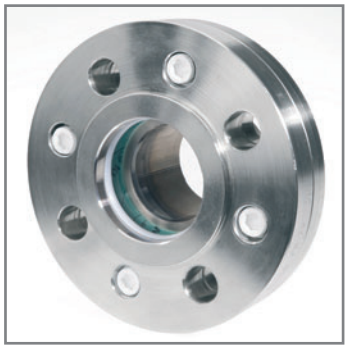
For continuous, intermittent and 72 h operation, certified for gas and oil firings. The 3011 unit operates also with combined ignition-/ ionization electrodes.

This Ionization flame amplifier is available with a one channel design (3011/1) for continuous operation and with a two channel design (3011/2) for 72h operation without supervision.

Accessories

Pressure Barrier

Prevents the pass out of hot and toxic combustion gases on overpressure furnaces and protects personnel and the flame scanner. Optional available with purge media inlet and for higher pressures.



Pressure barrier

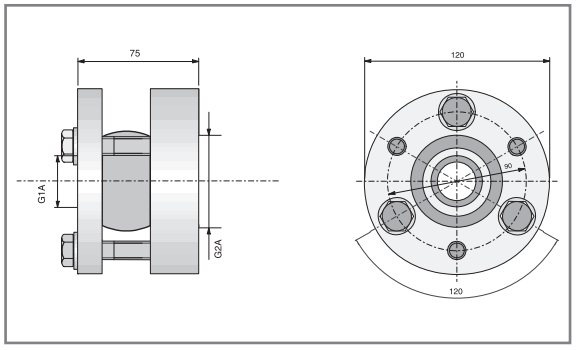
Compression fitting

Mounting adapter

Pressure barriers, compression fittings, adapter flanges and purge media connectors on request.

Swivel Mount

Use this swivel mount for the alignment of flame scanners and compact flame controllers to the primary combustion zone. The range of alignment is ± 15 degrees in all directions. The swivel mount is available with special materials (stainless steel, hastelloy, etc.)



6590-9050-01

Technical Data	Swivel Mount	Swivel Mount
Material	steel	stainless steel
Process connection	2"	2"
Flame scanner connection	1"	1"
Dimensions	115 x 120	115 x 120
Weight	approx. 5 kg	approx. 5 kg
Material-No.:	6590-9020-01	6590-9050-01

Ball Valves

The ball valve isolates the sight tube from the combustion chamber. The three-way-valve provides a purge media inlet, which purges the sight tube arrangement also in closed position.

B 515

B 520

Technical Data	2-Way-Valve	3-Way-Valve
G1"	B 515	B 520
G1 ½"	On request	B 521

Optical Alignment Device

For the optimum alignment of BFI flame scanners and compact flame controllers. The monitored zone and the surrounding area is shown on the special designed visor window.

BFI 235

BFI 235 - EX

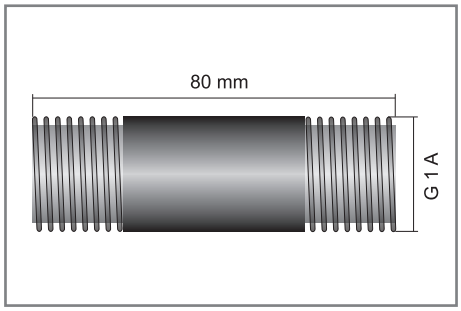
BFI 235 - LWL

Type	Material-No.
Optical alignment device BFI 235	P 106
Optical alignment device BFI 235 - EX	P 106.EX
Optical alignment device BFI 235 - LWL	P 106.L

Heating Insulator

To be mounted between the swivel mount and the flame scanner/compact flame controller. It reduces the temperature transfer strikingly and protects so the flame scanner or compact flame controller. Because of the special material this insulator can be used also for potential isolation between the burner and the electronic.

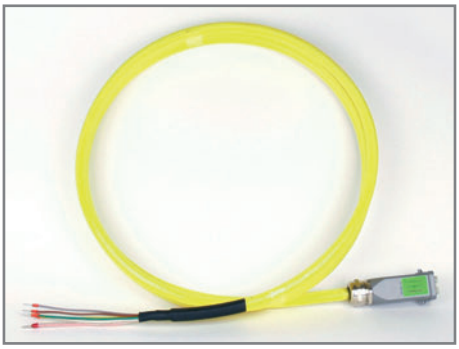
B 512.1



Technical Data	Swivel Mount	max. Temperature	Material-No.
Heating insulator metric	G 1"	260 degrees C	B 512.1
Heating insulator NPT	NPT 1"	260 degrees C	B 512.2

Special Cable

For the connection between flame scanner and flame amplifier of the BFI series 3000/4000. This cable provides a high efficiency protection against electrical, electrostatic and electromagnetic fields. The cable is halogen-free and resistant against microbes, oil, ozone and UV radiation. It is largely resistant to petrol's, acids and alkaline solutions. For special application we provide cables like e.g. rodent proof version or UL-listed cable.



All cables can be delivered with mounted connectors.

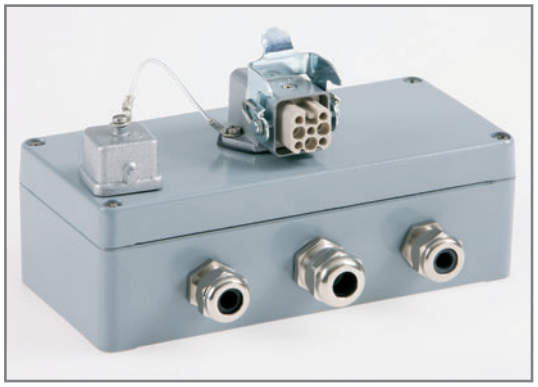
Type	Material-No.
Special cable KW5, 4 unscreened and 2 screened wires	6060-0560-65 (cable ring) 6060-0561-65 (cable on a drum, each 400 m)
Special cable KW6, 6 unscreened and 2 screened wires	6060-0680-65 (cable ring) 6060-0681-65 (cable on a drum, each 400 m)
Mounting of connector	9080-1201-00 (including connector)
Mounting of connector	9080-1202-00 (excluding connector)

Measurement and Test Devices

Measuring Adapter

The measuring adapters enable an interrupt-free connection of BFI measuring and test devices. The internal relay in types 236 and 237 can be used to select remotely single scanners in order to work in AND & OR operation with other BFI flame scanners.

BFI 234

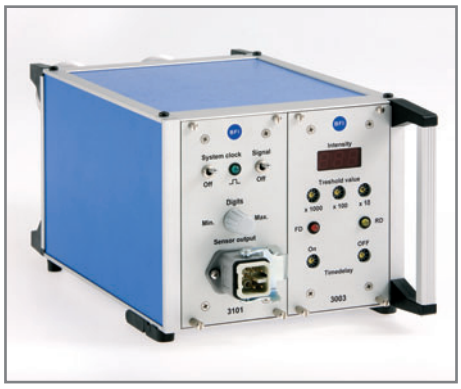


BFI 236/237

Type	Material-No. (standard)	Material-No. (with state indicator)
Measuring adapter BFI 234 with Harting connector with Amphenol connector	 B 513.0H B 513.0A	–
Measuring adapter BFI 236 (OR operation)	B 513.1H	B 513.1HS
Measuring adapter BFI 237 (AND operation)	B 513.2H	B 513.2HS

Signal Generator/Evaluator

This device provides all optical and electrical signals for the functional tests of BFI flame scanners and amplifiers series 3000/4000. The device is available with up to two light sources (UV/IR) and will be delivered along with connection cables.



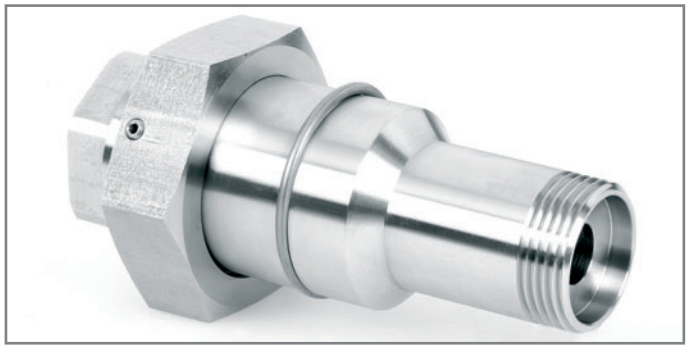
3101 IR/UV

Type	Light Source	Evaluation	19"-Size	Material-No.
Signal generator 3101 IR	IR	–	14 TE	P 101
Signal generator 3101 UV	UV	–	14 TE	P 101.1H
Signal generator 3101 IR/UV	IR + UV	3003	28 TE	P 101.2H
Signal generator 3101 IR/GT2	IR + IR	3003	28 TE	P 101GT
Flame signal evaluator 3103	–	3003	14 TE	P 105H

Fiber Optic Technology

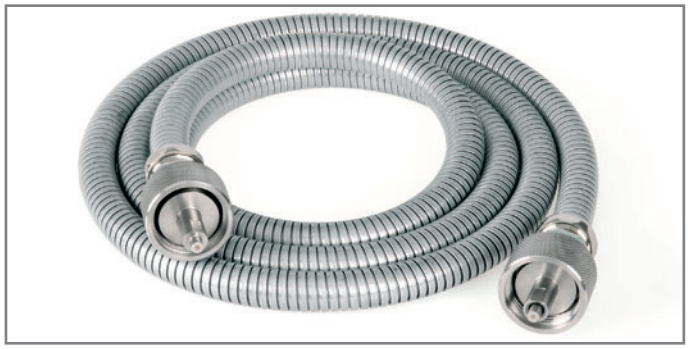
S 772

Standard Type	Length	X-IR	UV
Scanner head SKL with fiber optic cable FOC	2 m	S 772	S 762
Scanner head SKL with fiber optic cable FOC	3 m	S 773	S 763
Scanner head SKL with fiber optic cable FOC	5 m	S 775	S 765
Scanner head SKL with fiber optic cable FOC	7 m	S 777	S 767
Scanner head SKL with fiber optic cable FOC	10 m	S 779	S 760.10
Other versions	on request	on request	on request



S 710

Type	Material-No.
Scanner head SKL for IR	S 710
Scanner head SKL for UV	S 720



S 730.2M

Standard Type	Transmission	Material-No.
FOC for X-IR	300 to 2450 nm	S 730.xM
FOC for UV	200 to 1200 nm	S 720.xM

The "x" stands for the length of the FOC. Standard lengths are 2 m, 3 m, 5 m, 7 m und 10 m. Other lengths on request.

Fiber Optic System

The system is consisting of a scanner head SKL (lens unit) and a fiber optic cable (FOC). This system enables the mounting of the flame monitoring system optics on locations which are not easy to reach or having high temperatures or strong vibrations. We differentiate our fiber optic systems by the spectral range, length and mounting method. Customized lengths of FOC can be quoted on request. The standard design temperature range is -60…200 degrees C. We also provide high temperature versions up to 350 degrees C. The glass fibers are protected by a high-strength stainless steel hose. The type of protection is IP68.

Scanner Head SKL (lens unit)

The SKL is a robust lens unit for the flame monitoring in the UV, VIS and IR range. It projects the flame radiation onto the fiber optic cable FOC. The SKL will be delivered with a 1" female thread for the mounting to the process.

Various adapters/pressure barriers on request.

Fiber Optic Cable FOC

The FOC is made up of a high quality glass fiber bundle, which is protected by a cover of glass silk braid and a stainless steel hose against mechanical damages. Optional we provide high temperature versions up to 350 degrees C.

Fiber Optic Lance FOL

Wherever the optic of the flame monitoring system must be mounted inside the combustion chamber or burner (e.g. tilting burner), fiber optic lances are essential. The lances are available in 4 different standard designs. All single lengths are free configurable. Customized designs on request.

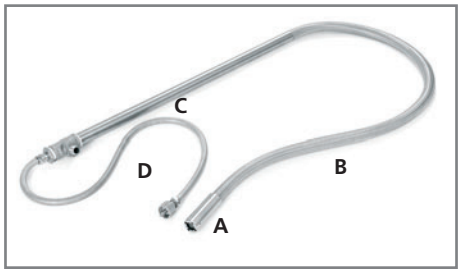
The air cooled fiber optic lances are also in high temperature versions available. Beside our standard version with maximum temperatures up to 200 degrees C we provide the following high temperature (HT) versions:

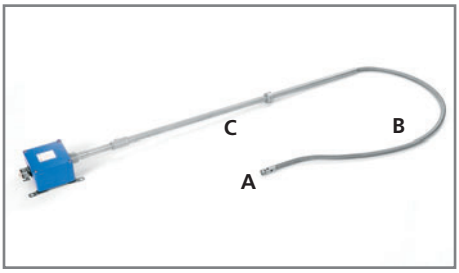
- 350 degrees C
- 600 degrees C on request

The total length should not exceed 20 m.

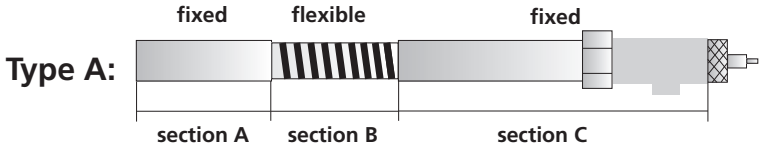
Accessorie:

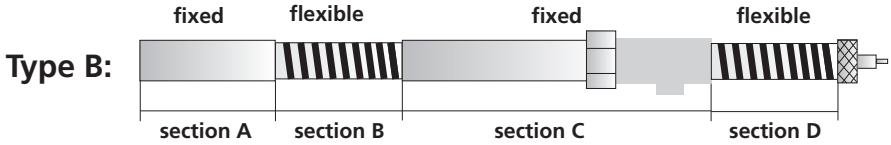
- Guiding tube, fixed
- Guiding tube, flexible

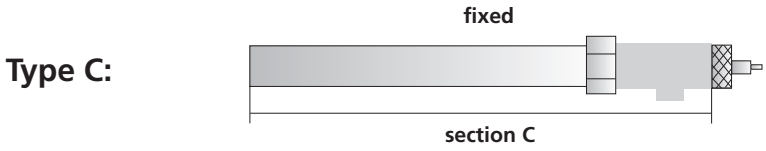


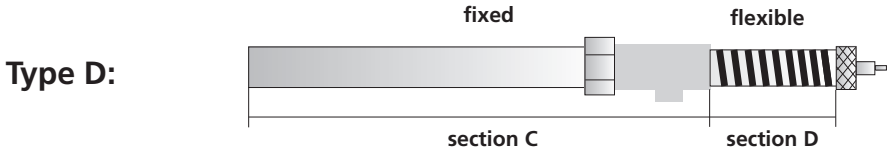


The single lengths A to D are free configurable.

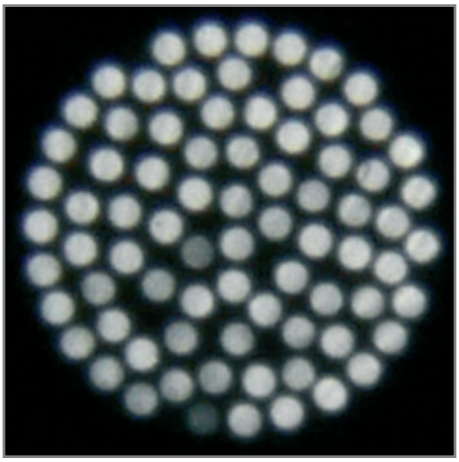






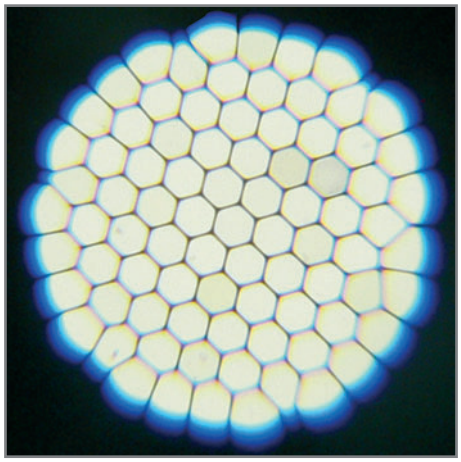


Fibre optic lances are manufactured project-related.



Fiber bundle Standard-FOC and HT-FOC

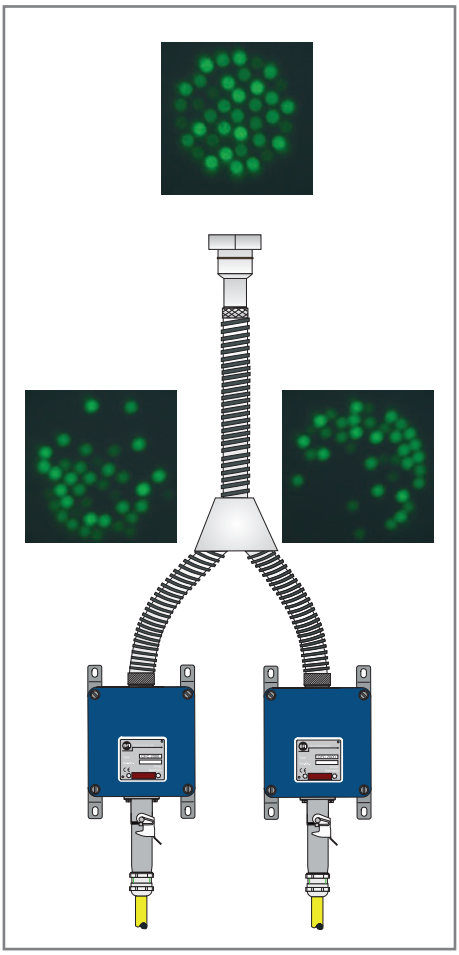
Due to the glue technology the space in between the single glass fibers can not be used for the light transport. The usable area for light transport typically amounts to approx. 50% of the total fiber bundle area.



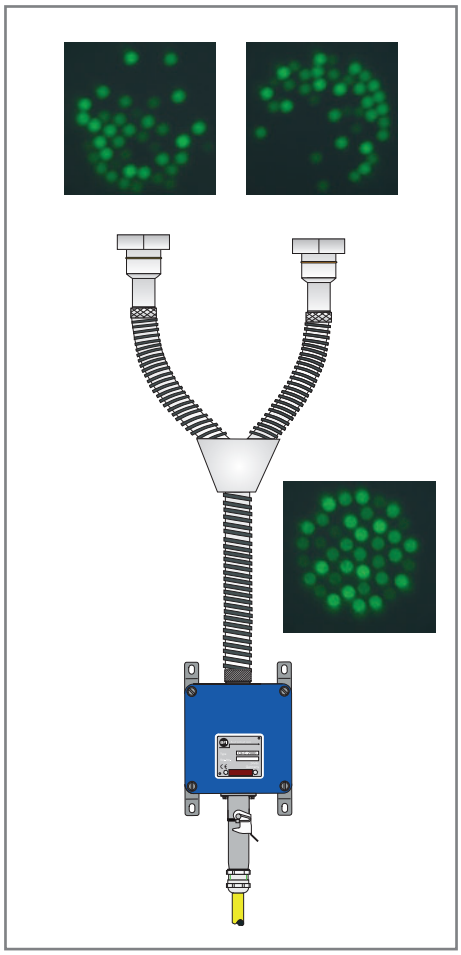
Fiber bundle Super-HT-FOC

The special treatment of the FOC ends does not require any glue. The space, which is normally used by the glue can be filled with additional fibers, so that the ratio between usable and loss area is much better. The usable area for light transport is typical higher than 95% of the total fiber bundle area.

Special Fiber Optic Solutions



Splitting of one flame signal to two flame scanners.



Merging of two flame signals to one flame scanner.

FOC lance with high temperature head

The temperature resistance can be increased up to 350 degrees C by using a special glue technology. BFI Automation offers fiber optics, allowing us to special treatment of the fiber bundle having a temperature resistance of up to 600 °C at a sufficient purge air. In addition to the very high temperature resistance this version provides also an increased transmission.

Y-Type Fiber Optic Cable

The Y-type FOC uses all benefits of the BFI fiber optic standard series. Due to the splitting of the fiber bundle this Y-type FOC can be used to realize a redundant operation either on scanner side or on optic side.

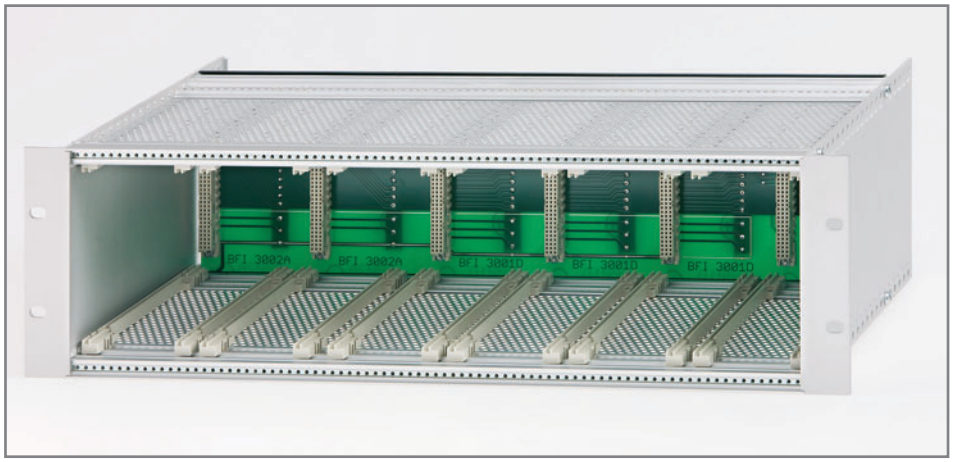
Application:

- Scanner redundancy also on one sight port.
- Enhancement of the monitored area by using two of the optics.
- Separation of different spectral transmission ranges.

Housings

19"- built-in rack DIN 41494

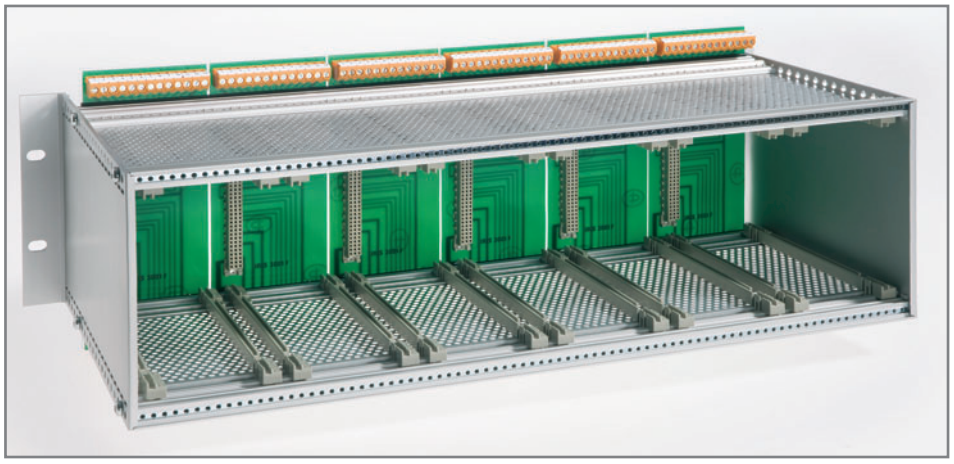
For the series 3000/4000 we provide 19"-built-in-racks from one to six plug-in units (14TE). The connection can be easily done via screw terminals from the rearside. Alternative we provide standard connectors in accordance to DIN 41612. Type of protection is IP20.



All dimensions ± 0.4 mm	14 TE for 1 plug-in unit series 3000/4000	28 TE for 2 plug-in unit series 3000/4000	42 TE for 3 plug-in unit series 3000/4000	56 TE for 4 plug-in unit series 3000/4000	84 TE for 6 plug-in unit series 3000/4000
Measure „A"	110.3	181.4	252.6	323.7	465.9
Measure „B"	127.1	198.2	269.4	340.5	482.7
Material-No. Back Panel R	G 701.1	G 702.1	G 703.1	G 704.1	G 706.1
Material-No. Flat-Pin	G 701.2	G 702.2	G 703.2	G 704.2	G 706.2

19"- built-on rack DIN 41494

For cabinet or wall mounting we provide 19"-built-on racks. The electrical connection can be can be done via frontside screw terminals. Type of protection is IP20.



19"- rack 84TE/3HE

For standard installation in cabinets with 19"-frame. This rack is only available with 84TE units of 19" standard racks. Type of protection is IP00.

All dimensions ± 0.4 mm	14 TE for 1 plug-in unit series 3000/4000	28 TE for 2 plug-in unit series 3000/4000	42 TE for 3 plug-in unit series 3000/4000	56 TE for 4 plug-in unit series 3000/4000	84 TE for 6 plug-in unit series 3000/4000
Measure „A"	110.3	181.4	252.6	323.7	465.9
Measure „B"	127.1	198.2	269.4	340.5	482.7
Material-No. Back Panel F	G 701	G 702	G 703	G 704	G 706
19"-Rack, 6 x 32-pin connector	–	–	–	–	G 801
19"-Rack, 6 x Back Panel R	–	–	–	–	G 801.1
19"-Rack, 6 x Back Panel F	–	–	–	–	G 801.2

G 707.2

	„A“	„B“	„C“	Material-No.
20TE	175.7	192.7	216.7	G 707.1
30TE	226.5	243.5	257.5	G 707.2
49TE	323	340	354	G 707.3

Example

Technical Data			
Ex-classification	II 2G Ex de II C T6	II 2G Ex de IIC T6	II 2G Ex de IIC T6
Type of protection	IP55	IP65	IP65
Dimensions	860 x 594 x 410 mm	645 x 325 x 311 mm	755 x 435 x 311 mm
Color of the housing	RAL 6034	RAL 7032	RAL 7032
Weight	approx. 150 kg	approx. 37 kg	approx. 58 kg
Material-No.:	1830-5313-01	1830-5314-00	1830-5314-01

Wall Mounting Housings

For the field installation we provide wall mounting housings in three different sizes. The housings are made of impact resistance ABS with a clear and lockable front cover and a separate wiring chamber. The type of protection is IP66. All connections between BFI modules/devices and screw terminals are pre-wired.

Ex-Wall Mounting Cabinet

Explosion proof housing for hazardous areas with an Ex-proof window. This cabinet is designed to house for each up to 3 plug-in units in two 19” racks of the series 3000/4000. The 19” racks are completely pre-wired and tested. The Ex-d housing is mechanically connected with the Ex-e wiring chamber. The window allows seeing the indication lamps of the flame amplifier modules.

Accessories:

- Drain-plug
- Heating
- MTL-Ex-barriers

BFI Automation

BFI Automation
Dipl.-Ing. Kurt-Henry Mindermann GmbH

Eggerscheidter Str. 57
D-40883 Ratingen
Germany

Phone: + 49 2102 96 82 0
Fax: + 49 2102 96 82 42

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

QR download link

Document: BFI-Katalog2014_EN · version: 2