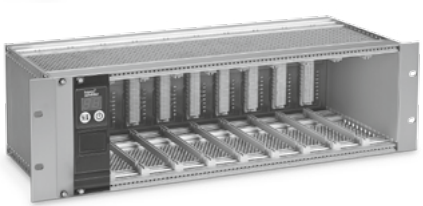
Honeywell | Industrial & Commercial Thermal

krom schroder

Field bus interface PFA
Module subrack BGT

Technical Information · GB
6 Edition 03.11l





- 19" module for easy transmission of activation signals and feedbacks from burner control units via fieldbus cable
- Remote maintenance and diagnostics facilities
- Saves installation and wiring costs
- Units can be exchanged during bus mode operation thanks to industrial plug connector system
- Bus interface remains in operation when PFA is switched off (standby mode)
- Certification for PROFIBUS DP

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Field bus interface PFA
Module subrack BGT

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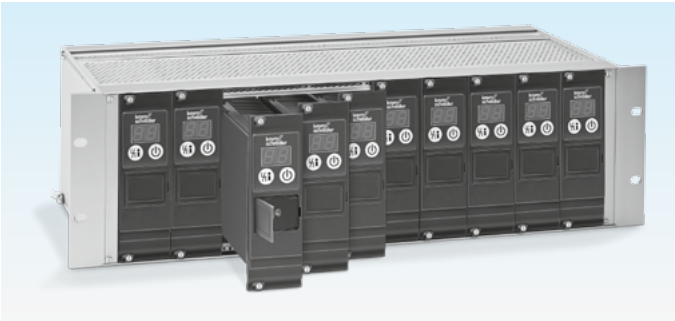
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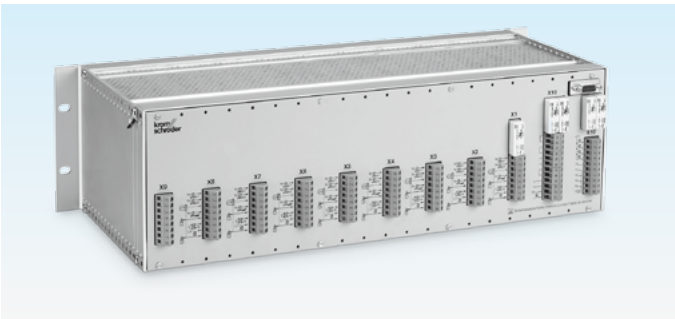
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1 Application



In module subrack BGT, up to nine burner control units can be inserted together with the PFA 700, while with the PFA 710, the maximum is eight burner control units.



The BGT is provided with a backplane with screw terminals for simple, reliable wiring.

The conventional wide-spread systems used in industrial furnace and kiln construction require bridging of large distances for signal processing.

The field bus interface PFA is used in conjunction with the pre-wired module subrack BGT for interworking of burner control units PFU to industrial communication networks using PROFIBUS DP to control and monitor burners in industrial furnaces and firing systems, e.g. in the iron and steel, glass and ceramics, or plastics and chemical industries.

As a standardized fieldbus system, the PROFIBUS DP considerably reduces development, installation and commissioning costs compared to conventional wiring.

The use of a standard bus system offers massive benefits compared to manufacturer-specific bespoke solutions. Time-tested hardware components, standardized connection methods and a series of tools of bus diagnostics and optimization are available on the market from a whole range of manufacturers. The widespread use of the system ensures that the planning and service personnel are very familiar with how the system operates and how to handle it and can therefore operate the system efficiently.

PFA 700 with BGT SA-9U/1DP700

For interworking of up to nine burner control units PFU 760 for directly ignited burners to communication networks using PROFIBUS DP. The PFA 700 is plugged into the module subrack with printed-circuit board and rear terminal strip, together with the burner control units.

PFA 710 with BGT SA-8U/1DP710

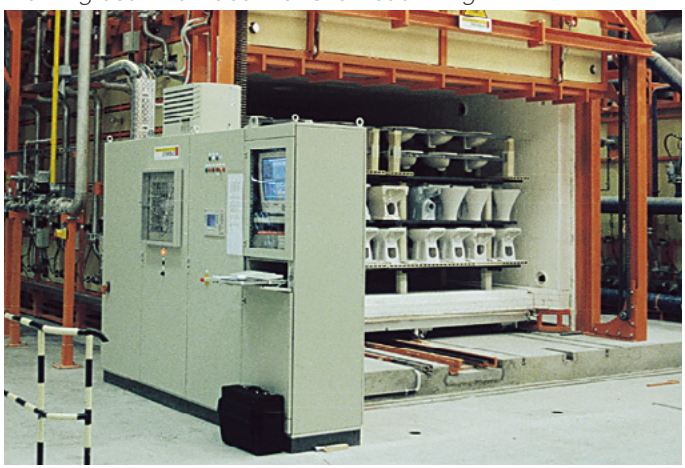
For interworking of up to eight burner control units PFU 780 for pilot and main burners to communication networks using PROFIBUS DP. The PFA 710 is plugged into the module subrack with printed-circuit board and rear terminal strip, together with the burner control units.



Bogie hearth forging furnace in the metallurgical industry



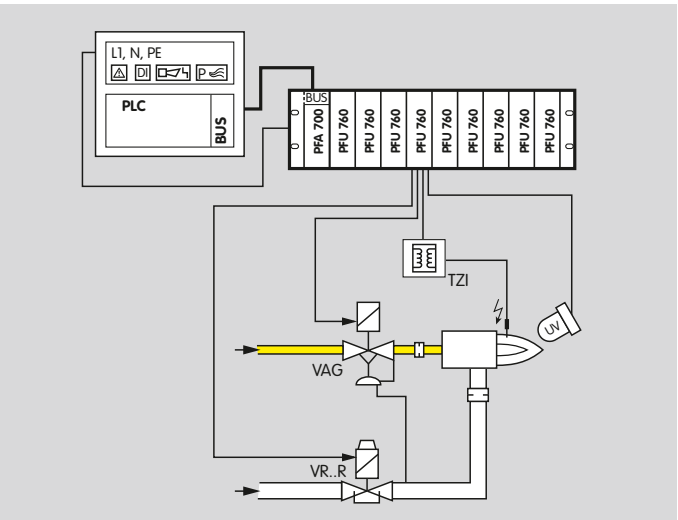
Walking beam furnace with overhead firing



Intermittent shuttle kiln in the ceramics industry

1.1 Examples of application

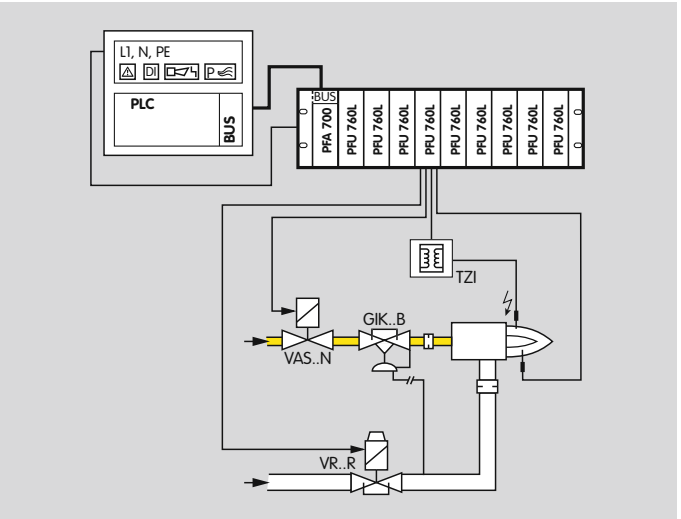
1.1.1 PFA 700 with PFU 760, staged On/Off burner control



The burner can be started with reduced capacity.

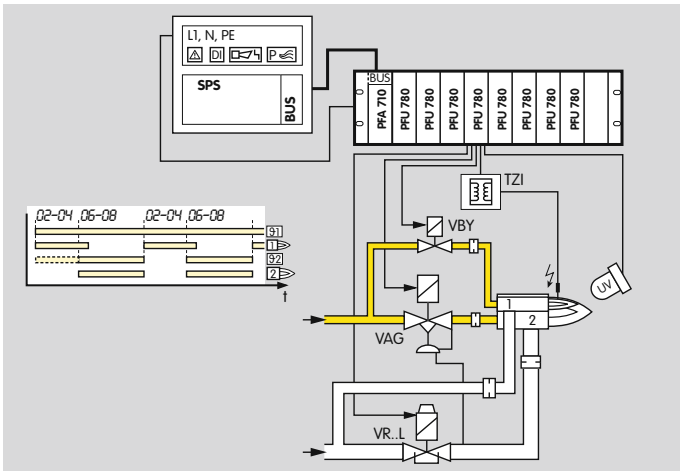
A UV sensor monitors the flame signal from the burner. UV sensor UVD 1 is used for continuous operation, UV sensor UVS for intermittent operation.

1.1.2 PFA 700 with PFU 760L, staged High/Low burner control



The burner starts at low-fire rate. When the operating state is reached, the PFU 760L advises the control unit. The PLC can now pulse the air valve in order to control the burner capacity.

1.1.3 PFA 710 with PFU 780, stage-controlled main burner with alternating pilot burner

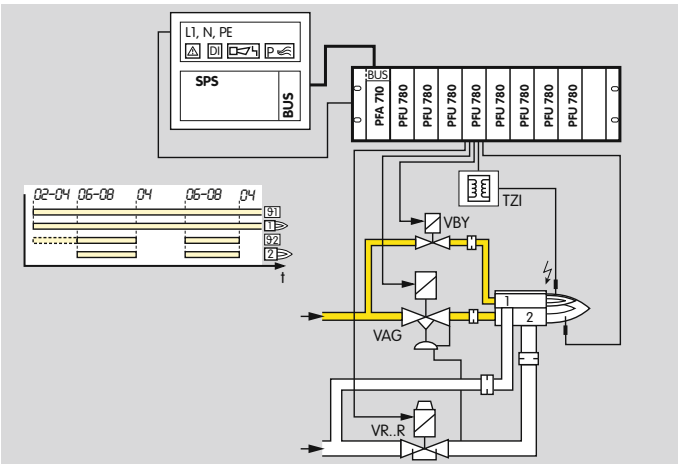


Control: main burner ON/OFF

The main burner can be started with reduced capacity after the operating signal from the pilot burner has been detected. The pilot burner is switched off automatically after the main burner has started up. When the main burner is switched off, the pilot burner automatically switches on again.

A UV sensor monitors the flame signal from pilot and main burners. UV sensor UVD 1 is used for continuous operation, UV sensor UVS for intermittent operation.

1.1.4 PFA 710 with PFU 780, stage-controlled main burner with permanent pilot burner



Control: main burner ON/OFF

The main burner can be started with reduced capacity after the operating signal from the pilot burner has been detected. Pilot and main burners can be operated simultaneously. Both are ionization-controlled independently.

Control: main burner High/Low

The main burner starts at low-fire rate. When the operating state is reached, the PFU 780L advises the control unit. The PLC can now pulse the air valve in order to control the capacity of the main burner.

2 Certification

2.1 EC type-tested and certified

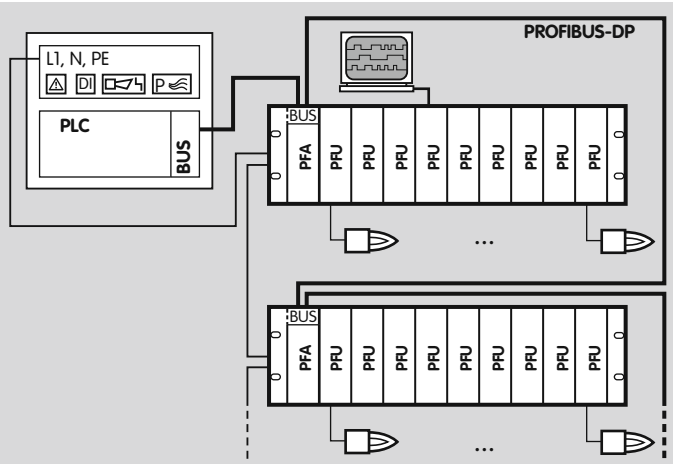
CE

– Low Voltage Directive (2006/95/EC) in conjunction with EN 60730,
– Electromagnetic Compatibility Directive (2004/108/EC) in conjunction with the relevant standards relating to radiation.

2.2 Approval for Russia

Certified by Gosstandart under Technical Regulations.

3 Function



The field bus interface PFA 700 integrates up to nine burner control units PFU 760 into industrial communication networks using PROFIBUS DP. The PFA 700 is plugged into the pre-wired module subrack BGT SA-9U/1DP700, together with the burner control units.

The field bus interface PFA 710 integrates up to eight burner control units PFU 780 into industrial communication networks using PROFIBUS DP. The PFA 710 is plugged into the pre-wired module subrack BGT SA-8U/1DP710, together with the burner control units.

To the rear of the module subrack, there is a D-Sub socket for connection to PROFIBUS DP and connection terminals in order to send input and output signals to ignition transformers, gas and air valves or UV sensors, for example, via the individual burner control units PFU.

PROFIBUS DP

PROFIBUS is a manufacturer-independent, open field-bus standard for diverse applications.

PROFIBUS DP is a bus variant for communication between automation systems and distributed peripherals at the field level, optimized for speed and low connection costs.

On PROFIBUS DP, the individual bus stations are connected via a 2-core shielded cable as standard.

The bus system transfers the control signals for starting, resetting and for controlling the air valve to purge the furnace or kiln or for cooling in start-up position and heating during operation from the control system (PLC) to the PFA. In the opposite direction it sends information on the operating status.

3.1 Safety-related control signals

Control signals for the safety interlocks and digital input are transferred independently of the bus communication by separate cables.

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3.2 Air valve

The air valves used to purge the furnace or kiln can either be activated via the PROFIBUS or via a separate cable (to terminal strip X10 of the BGT – at 24 V DC to terminal 12 or 13, or at mains voltage to terminal 18).

It is possible to use the PROFIBUS to communicate that purging is being carried out (by connecting mains voltage to terminal 17 of terminal strip X10 of the BGT).

3.3 BCSoft

The Windows software BCSoft allows extended access to individual statistics, visualization of the process values and the parameterization of the field bus interface via an optical interface. Unit parameters can be adjusted to the specific application.

3.4 Configuration, Master-Slave procedure

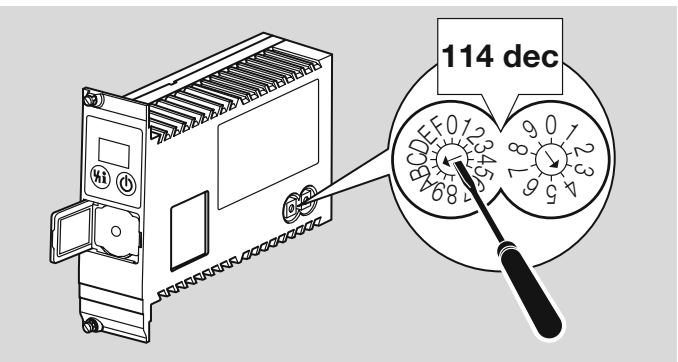
PROFIBUS DP is structured as a Master-Slave system. This allows mono-master or multi-master systems to be implemented.

A distinction is made between three device types:

– DP Masters Class 1 (DPM1)
  DPM1 devices are central controllers which exchange data with the distributed stations (slaves) on the basis of a defined cycle. This includes, for instance, the PLC, PC, CNC or VME systems with which the PROFIBUS DP is operated.
– DP Masters Class 2 (DPM2)
  DPM2 devices are programming, project planning or operator-control devices. They are used for configuration and commissioning of the system or for system operation and visualization in ongoing operation.
– DP slaves
  The devices which transmit input information from the periphery to the master and which issue output information from the master to the periphery are referred to as “slaves”.
  This also includes the PFA.

3.5 Addressing

A maximum of 126 units (masters and slaves) can be connected to a PROFIBUS DP system. Each station is assigned an individual PROFIBUS address which can be set between 0 and 126 using two code switches on the PFA board.



3.6 Network technology

All devices are connected in a bus structure (line). Up to 32 stations (masters or slaves) can be connected in a single segment. The beginning and end of each segment is fitted with an active bus terminator. Both bus terminators must have a permanent power supply to ensure error-free operation. The power supply for the bus terminator is provided by the PFA. The bus terminator can be connected in the bus connection plug.

If more than 32 stations are implemented or if there is a need to expand the network area, repeaters (amplifiers) must be used to link the individual bus segments.

3.7 Configuration

When planning a PROFIBUS DP system, unit-specific parameters of each station are to be taken into account.

To allow for simple and standardized planning, the parameters of the PFA have been summarized in a so-called device master data file (GSD). The file structure is standardized so that it can be read by the planning devices of different manufacturers.

The GSD file is supplied on a CD with the PFA. The GSD file can also be ordered at www.docuthek.com. The steps required to copy the file are described in the instructions for the automation system.

3.7.1 Bus communication

Input/output bytes: The programmer can choose the data to be transferred.

	Input bytes (PFA ► master)	Output bytes (master ► PFA)
PFA 700	5 bytes	3 bytes
PFA 710	5 bytes	5 bytes

Baud rate: up to 1500 kbit/s.

The max. range per segment depends on the baud rate:

Baud rate [kbit/s]	Range	
	[m]	[ft]
93.75	1200	3937
187.5	1000	3280
500	400	1312
1500	200	656

The specified ranges may be increased by using repeaters. No more than three repeaters should be connected in series.

The specified ranges relate to bus cable type A (two-core, shielded and twisted), e.g.:

Siemens, Order No.: 6XV1830-0EH10, or
Lapp cable unitronic, Order No.: 2170-220T.

PFA 700

Input bytes (PFA ► master)					
Bit	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
0	PFU 1	PFU 9	PFU 8	PFU 7	PFA
1	PFU 2	PFU 1	PFU 9	PFU 8	
2	PFU 3	PFU 2	PFU 1	PFU 9	
3	PFU 4	PFU 3	PFU 2	1	
4	PFU 5	PFU 4	PFU 3	2	
5	PFU 6	PFU 5	PFU 4	3	
6	PFU 7	PFU 6	PFU 5	4	
7	PFU 8	PFU 7	PFU 6	PFA	PFA

Output bytes (master ► PFA)			
Bit	Byte 0	Byte 1	Byte 2
0	PFU 1	PFU 9	PFU 8
1	PFU 2	PFU 1	PFU 9
2	PFU 3	PFU 2	PFA
3	PFU 4	PFU 3	PFA
4	PFU 5	PFU 4	1
5	PFU 6	PFU 5	2
6	PFU 7	PFU 6	3
7	PFU 8	PFU 7	4

PFA 710

Input bytes (PFA ► master)					
Bit	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
0	PFU 1	PFU 3	PFU 5	PFU 7	PFA
1	PFU 1	PFU 3	PFU 5	PFU 7	1
2	PFU 1	PFU 3	PFU 5	PFU 7	2
3	PFU 1	PFU 3	PFU 5	PFU 7	3
4	PFU 2	PFU 4	PFU 6	PFU 8	4
5	PFU 2	PFU 4	PFU 6	PFU 8	PFA
6	PFU 2	PFU 4	PFU 6	PFU 8	
7	PFU 2	PFU 4	PFU 6	PFU 8	PFA

Output bytes (master ► PFA)					
Bit	Byte 0	Byte 1	Byte 2	Byte 3	Byte 4
0	PFU 1	PFU 3	PFU 5	PFU 7	PFA
1	PFU 1	PFU 3	PFU 5	PFU 7	1
2	PFU 1	PFU 3	PFU 5	PFU 7	2
3					3
4	PFU 2	PFU 4	PFU 6	PFU 8	4
5	PFU 2	PFU 4	PFU 6	PFU 8	PFA
6	PFU 2	PFU 4	PFU 6	PFU 8	
7					

3.8 Program status

DISPLAY	Program status
--	PFA switched off
PR	Programming mode
0.0.	(blinking dots) Manual mode
OP	Normal operation
PB	Profibus fault

3.9 Fault signalling

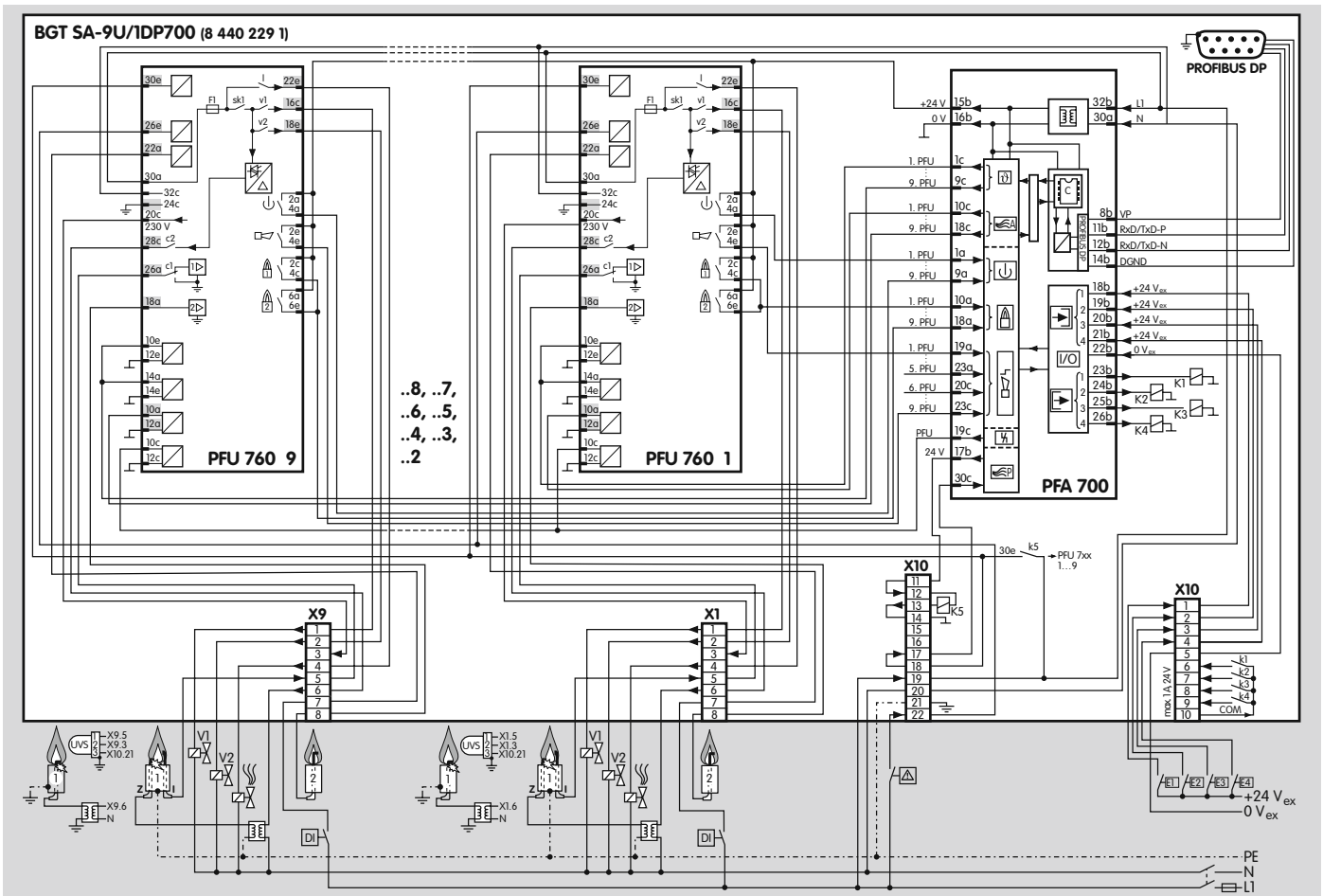
Fault message (blinking)	DISPLAY
Bus fault	Pb
Undervoltage in power pack	32
Bus module fault	bE

In manual mode, two dots blink on the display.

3.10 Connection diagrams

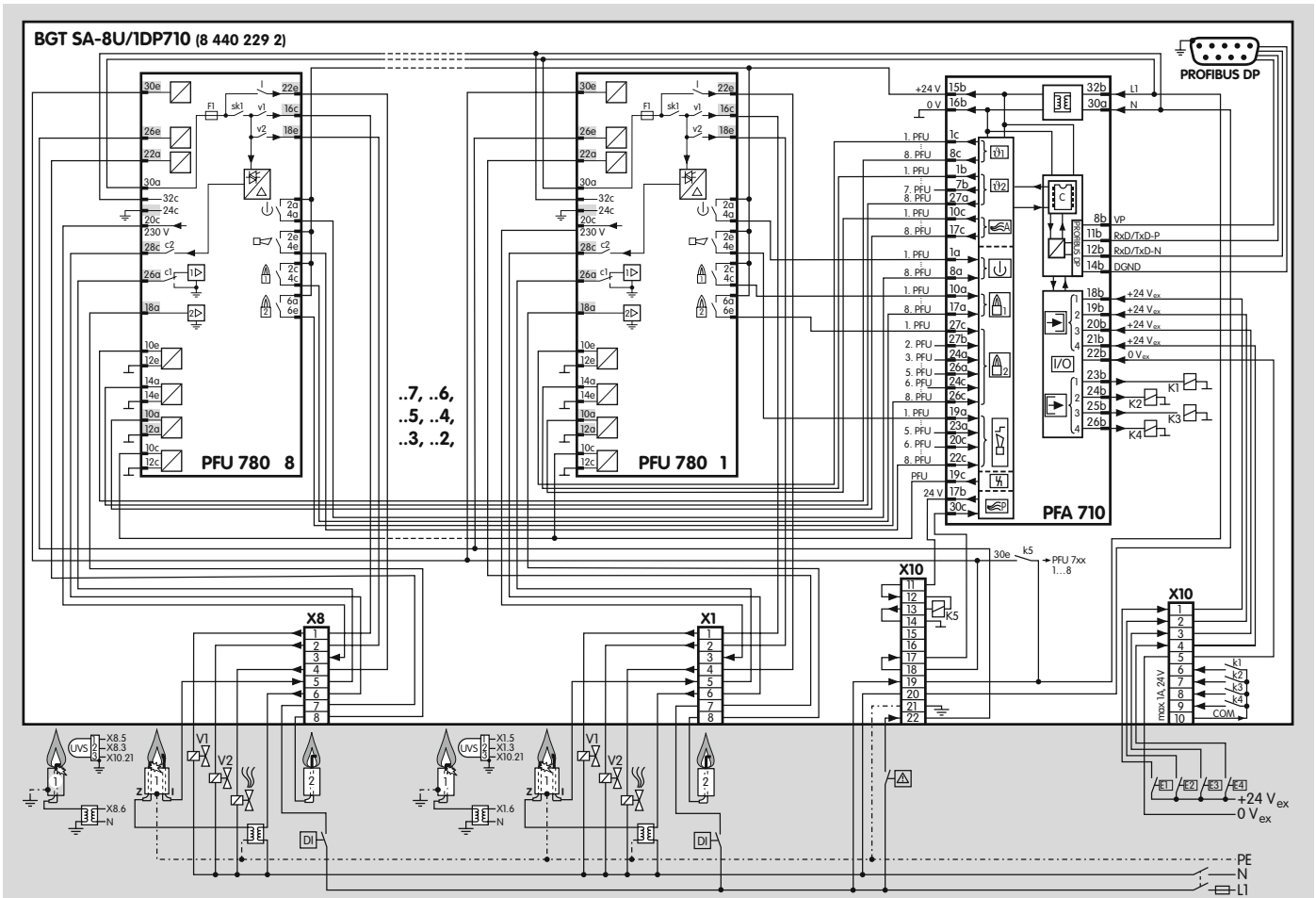
3.10.1 PFA 700 and BGT SA-9U/1DP700

For the explanation of symbols, see page 27 (Legend).

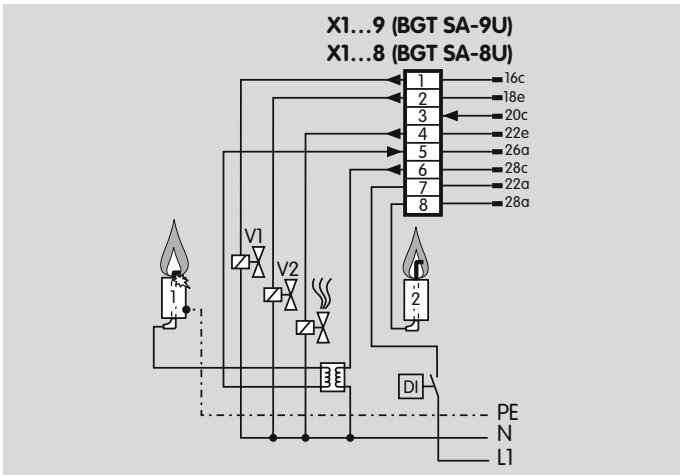


3.10.2 PFA 710 and BGT SA-8U/1DP

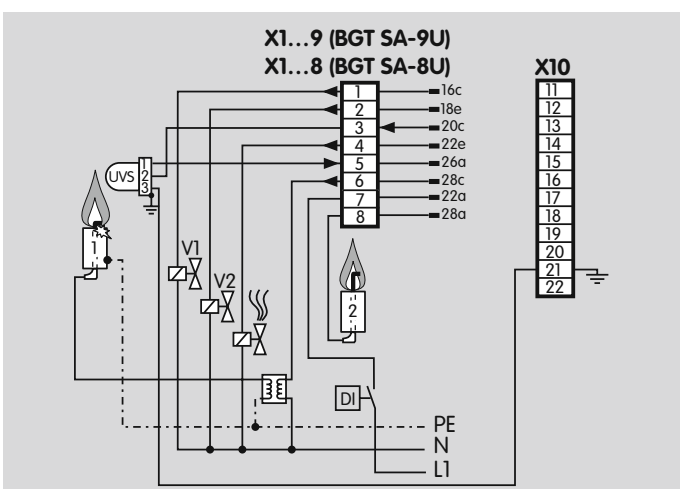
For the explanation of symbols, see page 27 (Legend).



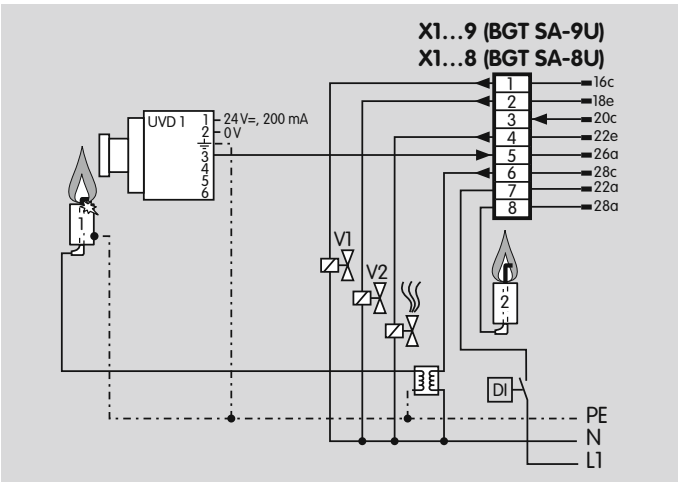
3.10.3 Flame control using an electrode



3.10.4 Flame control with UV sensor UVS



3.10.5 Flame control with UV sensor for continuous operation UVD 1



4 Parameters

Description	Parameter	Value range	Factory default setting	Adjustable*
Manual mode limited to 5 minutes	34	0; 1	1	●
Manual operating mode	43	1; 2; 3; 4	1	●
Last fault	81	Pb; 32; bE*	–	–
Second to last occurring fault	82	Pb; 32; bE*	–	–
Third to last occurring fault	83	Pb; 32; bE*	–	–
Fourth to last occurring fault	84	Pb; 32; bE*	–	–
Fifth to last occurring fault	85	Pb; 32; bE*	–	–
Sixth to last occurring fault	86	Pb; 32; bE*	–	–
Seventh to last occurring fault	87	Pb; 32; bE*	–	–
Eighth to last occurring fault	88	Pb; 32; bE*	–	–
Ninth to last occurring fault	89	Pb; 32; bE*	–	–
Tenth to last occurring fault	90	Pb; 32; bE*	–	–

** Fault messages appear in the display, see page 13 (Fault signalling).*

4.1 Scanning the parameters

During operation, the 7-segment display shows the program status.

The individual parameters of the PFA can be called up on the display by repeatedly pressing the Reset/Information button (for 2 seconds).

In the event of a fault, the PFA halts the program run, the display blinks and it then displays the cause of the fault in coded form.

The PFA indicates "**--**" when the mains switch has been switched off. This signals standby mode. The bus interface is still operational to maintain the function of the communication system.

4.2 Changing parameters

The PFA is protected by a password to prevent unauthorized changes to the parameter settings. After entering the password, the parameter settings can be modified. Be aware of possible effects on the safe functioning of the system. The factory default password is 1234.

4.3 Manual operation

The PFA can be started in manual mode for burner adjustment or for fault-finding.

When switching on, press the Reset/Information button until the unit reverts to manual mode. Two dots blink on the display. In this operating mode, the burner control unit operates independently of the status of the bus and the inputs (apart from the pre-purge input and the safety interlocks).

In the factory default setting, manual mode is limited to 5 minutes (parameter 34 = 1). During this time, the burner can be adjusted, for example. If parameter 34 is set to 0, the time limitation will be removed. Emergency operation is now possible, for example in the event of a lengthy bus fault. (In the event of a bus fault, Pb will blink on the display).

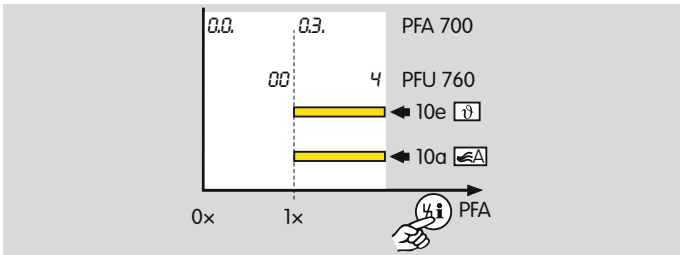
Using the opto-adapter and the BCSoft software (see page 24 (Opto-adapter and BCSoft)), the operating mode parameters for manual mode can be changed. On parameterization, ensure that the program sequence matches the application. Select the parameters so that the burner can be operated as intended in all operating phases.



4.3.1 PFA 700

Default operating mode parameters

Parameter 43 = 1

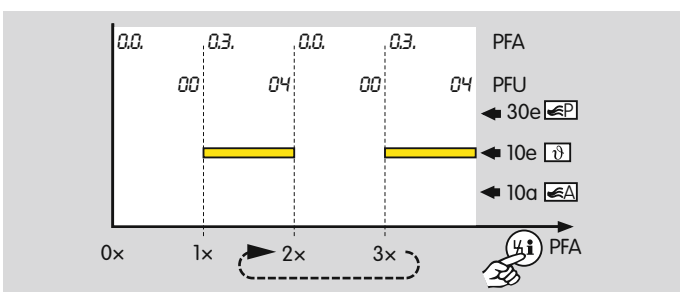


The PFA 700 is programmed at the factory so that voltage is applied to all burner control units PFU for the start-up signal of all burners and the external air valve control.

Adjusted operating mode parameters

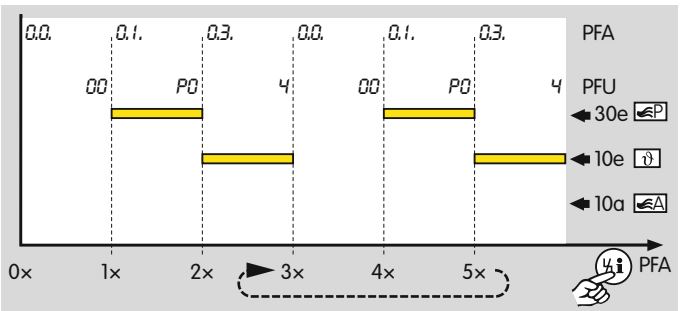
Parameter 43 = 2

PFA 700 with PFU 760, ON/OFF operating mode – example of application, see page 5 (PFA 700 with PFU 760, staged On/Off burner control)



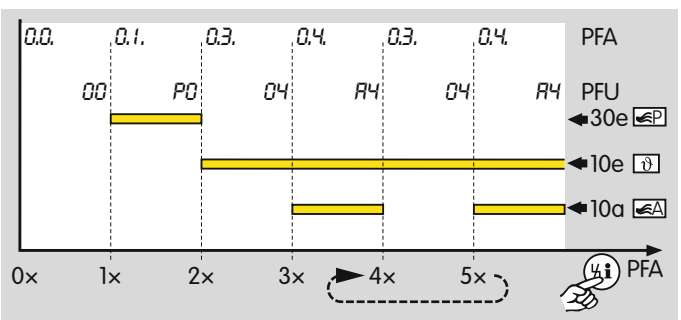
Parameter 43 = 3

PFA 700 with PFU 760L, ON/OFF operating mode – example of application, see page 5 (PFA 700 with PFU 760, staged On/Off burner control).



Parameter 43 = 4

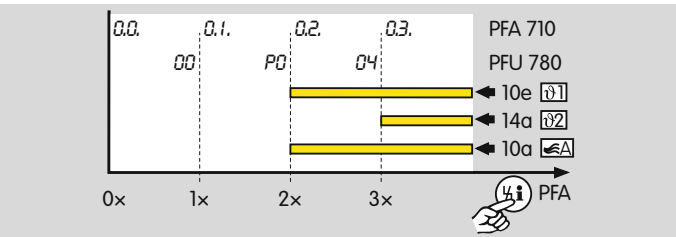
PFA 700 with PFU 760L, High/Low operating mode – example of application, see page 6 (PFA 710 with PFU 780, stage-controlled main burner with alternating pilot burner).



4.3.2 PFA 710

Default operating mode parameters

Parameter 43 = 1

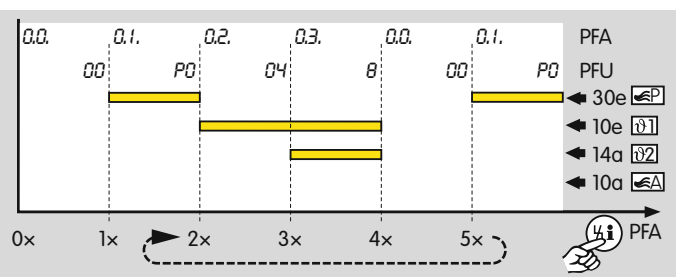


The PFA 710 is programmed at the factory so that voltage is applied to all burner control units PFU for the start-up signal of all burners and the external air valve control.

Adjusted operating parameters

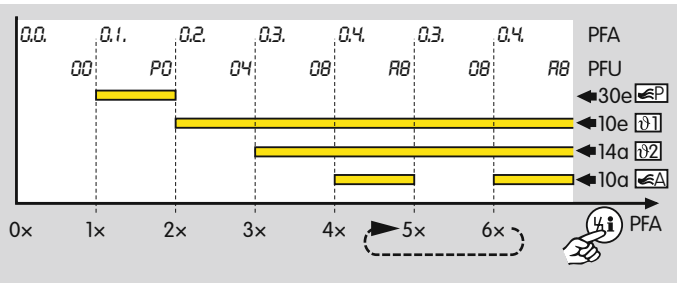
Parameter 43 = 3

PFA 710 with PFU 780L, ON/OFF operating mode – example of application, see page 6 (PFA 710 with PFU 780, stage-controlled main burner with permanent pilot burner).



Parameter 43 = 4

PFA 710 with PFU 780L, High/Low operating mode – example of application, see page 6 (PFA 710 with PFU 780, stage-controlled main burner with permanent pilot burner).



5 Selection

5.1 PFA

5.1.1 Selection table

Typ	700	710	T	N	Z*
PFA	●	●	●	●	○

** If "none", this specification is omitted.*

● = standard, ○ = available

Order example

PFA 700T

5.1.2 Type code

Code	Description
PFA	Field bus interface
700 710	For connecting: PFU 760 PFU 780
T N	Mains voltage: 220/240 V AC 110/120 V AC
Z*	Special version

** If "none", this specification is omitted.*

5.2 BGT

5.2.1 Selection table

Typ	SA	-8U	-9U	/1DP700	/1DP710
BGT	●	●	●	●[1)]	●[2)]

1) Only in conjunction with -9U.

2) Only in conjunction with -8U.

Order example

BGT SA-8U/1DP710

5.2.2 Type code

Code	Description
BGT	19" module subrack
SA	Standard and PFA 700/PFA 710
-8U -9U	Slots for: 8 PFU 9 PFU
/1DP700 /1DP710	1 PFA 700, PROFIBUS DP bus interface 1 PFA 710, PROFIBUS DP bus interface

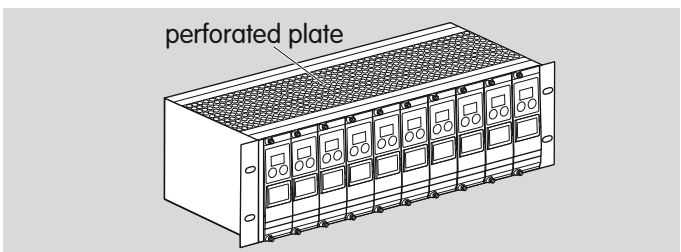
6 Project planning information

6.1 Installation

The BGT can be installed in any position.

Install in clean environment ensuring enclosure IP 54 or higher, whereby no condensation is permitted.

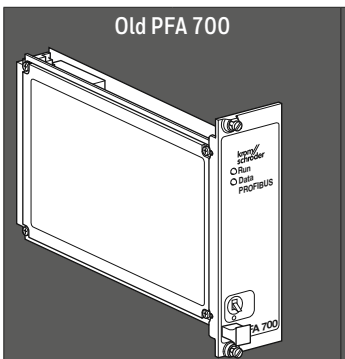
It must be ensured that the module subrack is well ventilated, in order to avoid overheating.

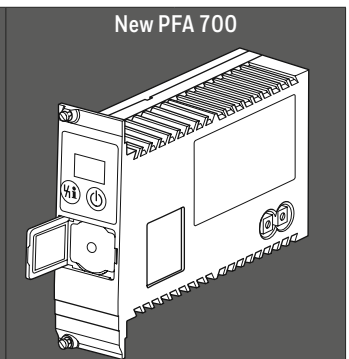


In the case of several module subracks mounted on top of one another, we recommend removing the perforated plates from between the module subracks, and inserting a rack-mounted fan underneath the module subracks.

6.2 Old-new PFA exchange

When exchanging the old PFA 700 (Order No. 8 439 510 0) for the new PFA 700, the mains voltage on the new units must be selected in accordance with the application requirements:





Mains voltage	Order No.	Mains voltage	Order No.
110 – 240 V AC	8 439 510 0	110/120 V AC	8 439 510 2
		220/240 V AC	8 439 510 1

A PROFIBUS plug connector with an internal additional EMC protective circuit will be delivered with the new PFA 700 when ordered as a replacement for the old PFA 700. If the new PFA is operated in an old module subrack with the Order No. 8 440 228 3, this plug connector must be installed (see page 23 (Wiring) and page 24 (Accessories)).

6.3 Wiring

Integrate module subracks BGT in the equipotential bonding system.

6.3.1 Safety-related control signals

Signals from the safety interlocks and digital input are transferred independently of the bus communication by separate cables.

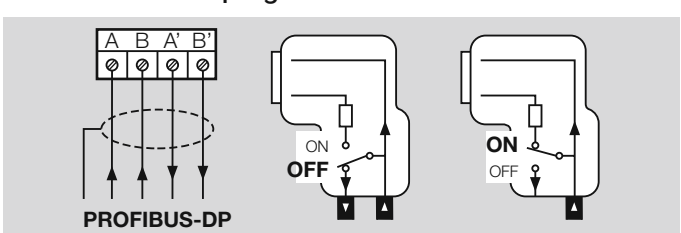
The purge signals can be transferred via the bus communication or by a separate cable.

6.3.2 EMC

To achieve a high immunity of the system against electromagnetic interference radiation, a shielded data cable must be used. The shield must be connected to protective earth on both sides using wide-area shield clips that ensure good conductivity.

In addition, it must be ensured that all cables leading to and from the PFA be installed as far away as possible from cables emitting strong fields (e.g. frequency converter cables).

6.3.3 PROFIBUS plug connector



Data cables A and B must not be reversed.

The power supply for the bus terminator is provided by the PFA. The bus terminator can be connected in the PROFIBUS plug connector.

Ensure an equipotential bond between the different slaves and masters.

Bibliography

- PROFIBUS Specification, EN 50170 Vol. 2 (version 1.0).
- Installation Guideline for PROFIBUS DP/FMS, available from the Profibus User Organization (PUO).
- PROFIBUS Technology and Application, Order No.: 4.001, available from the PUO.
- M. Popp, The New Rapid Way to PROFIBUS DP, a textbook for system operators.
- M. Popp, PROFIBUS DP Principles, Tips and Tricks for Users.
- www.profibus.com

6.4 Manual operation

For emergency operation, the time-limited manual mode can be deactivated.

The PFA is delivered with manual mode pre-set to a time limit (parameter 34 = 1).

7 Accessories

7.1 PROFIBUS plug connector



To replace existing PROFIBUS plug connectors, if a new PFA 700 is operated in an old module subrack with the Order No. 8 440 228 3, to improve EMC.

With shielding capacitor,
Order No.: 74960621

CD with device master data files for PFA PROFIBUS DP, Order No. 74960460, or at www.docuthek.com

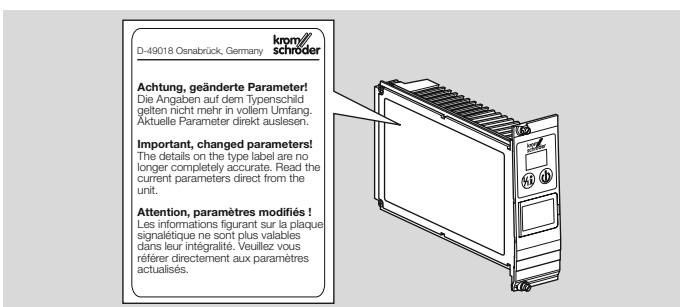
7.2 Opto-adapter and BCSoft



Opto-adapter including BCSoft CD-ROM,
Order No.: 74960437.

The current software can be downloaded from our Internet site at
www.docuthek.com. To do so, you need to register in the DOCUTHEK.

7.3 “Changed parameters” stickers



Affix on the PFA if parameters set at the factory have been changed.

100 pcs, Order No.: 74921492.

8 Technical data

8.1 PFA 700, PFA 710

Front width 8 depth units = 40.6 mm.
Overall height 3 height units = 128.4 mm.

Ambient temperature: -20°C to +60°C.

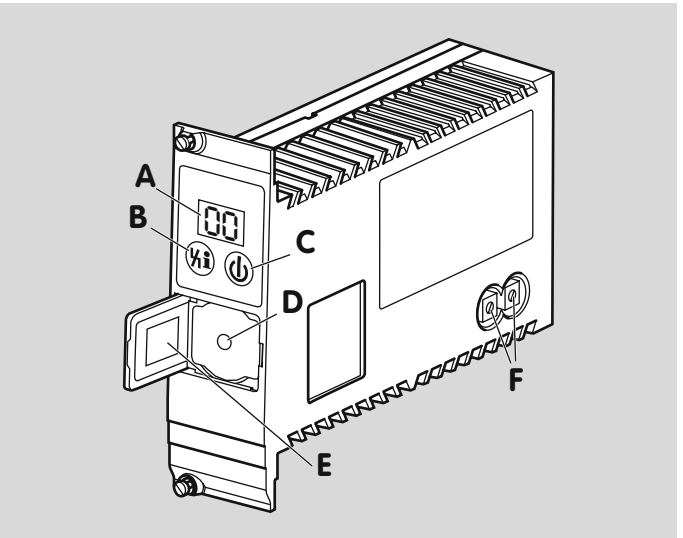
4 digital inputs: 24 V DC, ± 10%, < 10 mA.

4 digital outputs for controlling small relays 24 V, max. 250 mW (100 mA).

Mains voltage:
220/240 V AC, -15/+10%, 50/60 Hz,
110/120 V AC, -15/+10%, 50/60 Hz,
for grounded and ungrounded mains.

Weight: approx. 0.75 kg.

Operating controls



A: 2-digit 7-segment display.

B: Reset/Information button to reset the system after a fault or to scan parameters on the display.

C: Mains switch.

D: Optical interface.

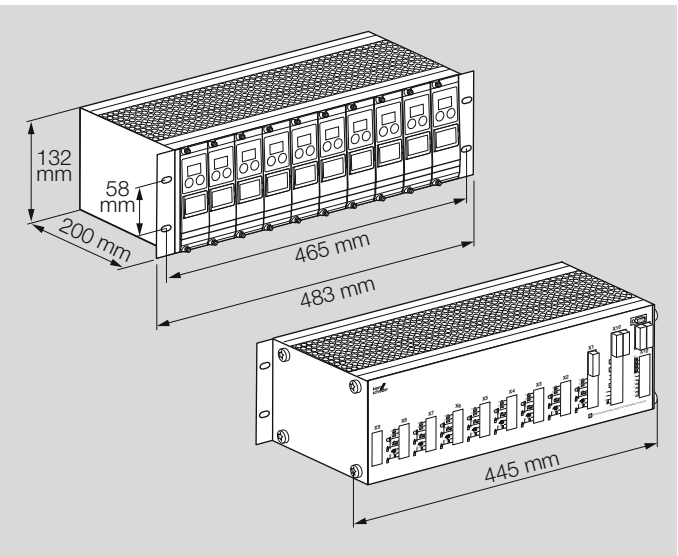
E: Type label.

F: Code switches.

8.2 BGT

Weight: 2.3 kg.

Dimensions



9 Legend

88	Display
	Ready for operation
	Safety interlocks
	Burner start-up signal
DI	Digital input
	Ignition transformer
	Gas valve
	Air valve
P	Purge
A	External air valve control
	Flame signal
	Burner operating signal
1	Operating signal, pilot burner
2	Operating signal, main burner
	Fault signal
	Reset
	Input signal
	Output signal
	Input/Output safety circuit

Feedback

Finally, we are offering you the opportunity to assess this “Technical Information (TI)” and to give us your opinion, so that we can improve our documents further and suit them to your needs.

Clarity

- ○ Found information quickly
- ○ Searched for a long time
- ○ Didn’t find information

  What is missing? _____
- ○ No answer

Comprehension

- ○ Coherent
- ○ Too complicated
- ○ No answer

Scope

- ○ Too little
- ○ Sufficient
- ○ Too wide
- ○ No answer

Use

- ☐ To get to know the product
- ☐ To choose a product
- ☐ Planning
- ☐ To look for information

Navigation

- ○ I can find my way around
- ○ I got “lost”
- ○ No answer

My scope of functions

- ○ Technical department
- ○ Sales
- ○ No answer

Remarks



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