

## Technical Information

T-Product 2006 April



- // Automatic burner control unit with integrated ignition transformer packaged in a single compact metal housing (IP 54/NEMA 3 rating)
- // For use with direct spark ignited burners
- // For continuous operation
- // For use with modulating or frequency fired control systems
- // Includes air valve control
- // Optional proof of closure switch (POC) control input
- // Optional digital input for 1,400 °F auto ignition lockout
- // Displays program status, unit parameters, fault code or flame signals
- // Optional optical interface for diagnostic information and parameter settings
- // Manual mode for burner adjustments and troubleshooting
- // Select restart or immediate fault lockout in the event of a flame failure
- // Removable bottom mounting plate with five (5) 1/2" conduit openings make installation of electrical connections simple
- // Removable terminal blocks to facilitate electrical field wiring
- // Meets NFPA 86 standard
- // CE certified models available

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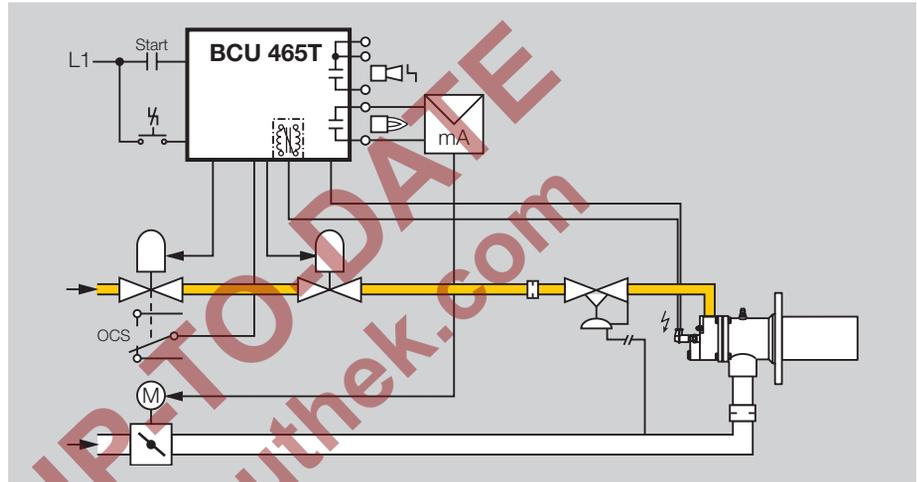
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## Application

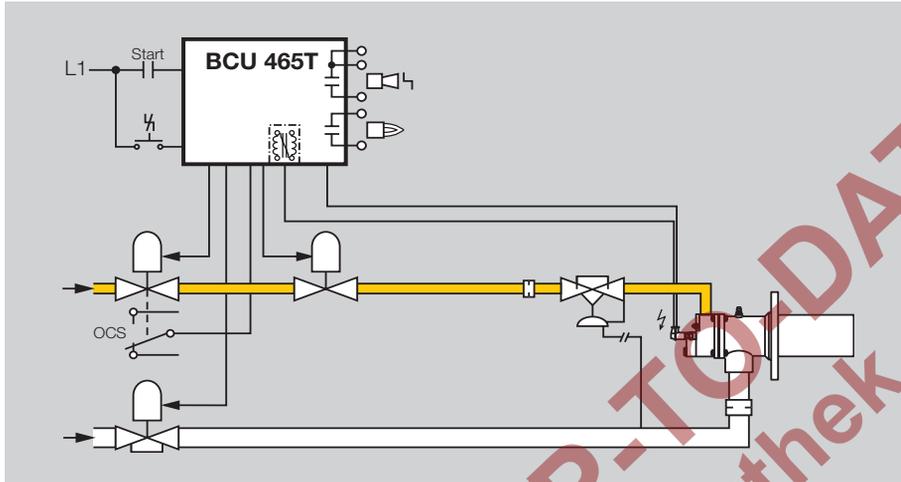
The BCU 465 combines the functionally related components of the automatic burner control unit, ignition transformer, manual/automatic mode and a digital display for operating parameter and fault status indication in a single metal housing. The BCU® controls the ignition process and continuously monitors the burner operation. The BCU® is designed to mount close to the burner to reduce installation costs and simplify commissioning and troubleshooting efforts.

## Application example



### BCU 465 for Modulating Control Systems

The figure shows a typical modulating control system. The burner is ignited when the air butterfly valve is in the ignition position (low-fire). Once the burner is ignited, the air butterfly valve can be modulated throughout the control range. The gas is controlled with an air/fuel ratio regulator cross-connected to the burner air supply piping.



## BCU 465 for Frequency Firing Systems

This figure is an example of a frequency fired control system. The burner is ignited at low-fire. Once the burner is ignited, the air valve is either opened or closed with a signal from a PLC or frequency controller. The gas is controlled with an air/fuel ratio regulator cross-connected to the burner air supply piping.

The On and Off time is determined by the frequency control algorithm.

However, BCU 465 provides a minimum off time and a minimum on time to slow down the process and avoid process errors in PLC control algorithm.

## Technical Data

### Operating Voltage:

115 Vac +10/-15%, 50/60 Hz for grounded and ungrounded power systems

### Power Consumption:

9VA plus power consumption of incorporated ignition transformer  
See table below

### Output current:

2 A per output at 115 Vac

Total current for valves and ignition transformer maximum 2.5 A

### Signal Input Ratings for 50/60 Hz:

Signal	Nominal Voltage Vac	Maximum Ratings Vac	Current mA
0	0	0-20	-
1	115	80-126.5	typ. 2

### Flame sensor voltage:

approx. 230 Vac

Sensor current > 1  $\mu$ A

### Fault protection:

F1 – 3.15 A slow blow, H, to IEC 127-2/5

F2 – 5 A slow blow, H, to IEC127-2/5

Note: F2 can only be replaced at the factory

### Function of fault signaling contact:

max 2 A, 230 V, +10%, not internally fused

Maximum number of operations: 1,000,000 cycles

Ambient temperature: -4 to 140 °F (-20 to +60 °C)

No moisture permitted inside enclosure

### Enclosure: NEMA 3 (IP 54)

Weight: approx. 11 lbs. (5 kg)

Housing constructed from die-cast aluminum with 5 x 1/2" conduit openings for wiring devices. (Optional quick disconnect plug connectors available upon request)

The BCU 465 has been designed with a cycle time between two start-ups. This is to avoid overheating the ignition transformer as the result of excessively frequent switching. Cycling the BCU on/off too quickly will lead to a fault signal. The minimum cycle time depends on the safety period and on the ignition transformer used.

## Ignition Transformer Ratings and Minimum Cycle Times

Ignition Transformer		Mains Frequency Hz	Input Current A	Output Voltage Vac	Output Current mA	BCU 480-5		BCU 480-10	
No.	Type					Cycle s	Cycles per minute	Cycle s	Cycles per minute
1	TZI 5-15/100R	50 (60)	0.9 (0.7)	5000	15 (11)	10	6	20	3
2	TZI 7-25/20R	50 (60)	2.2 (1.6)	7000	25 (18)	30	2	60	1
3	TZI 7,5-12/100R	50 (60)	1.2 (0.9)	7500	12 (9)	15	4	30	2
8	TZI 7,5-20/33R	50 (60)	1.8 (1.35)	7500	20 (15)	20	3	30	2

Notes: Values in () apply to 60 Hz.

On burners with star electrodes, we recommend the use of ignition transformers with 7.5 kV.

If external ignition transformer is used, minimum cycle time shall be 9 seconds.

## System Design Information

### Cable Selection and Wiring

Use maximum AWG 14 (2,5 mm<sup>2</sup>) wire for signal and control leads.

Use maximum AWG 12 (4 mm<sup>2</sup>) wire for ground lead. Adequate ground connection must be provided between burner and BCU.

The BCU is suitable only for permanent wiring. Do not reverse L1 phase and L2 neutral conductor.

Do not route BCU wires in the same conduit as frequency converter wiring or wires emitting strong fields.

Different phases of the three-phase power system may not be applied to the inputs. Do not apply voltage to the outputs for valves and ignition. Do not connect the gas valve to the air valve output (terminal #26).

Wiring to the burner:

Use high-voltage cable (non-shielded) for the two following cable types **A** and **B**:

**A** and **B**:

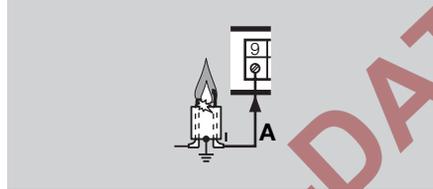
FZLSi 1/7 up to 356 °F (180 °C),  
Order No. 04250410 or

FZLK 1/7 up to 176 °F (80 °C),  
Order No. 04250409

When using one electrode for ignition and flame monitoring, a direct connection from burner ground to

BCU must be provided.

### A = Ionization line

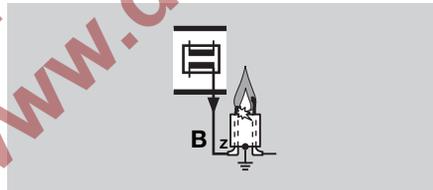


Length of ionization line: maximum 16 ft (5 m).

Note: If transformer is externally mounted the sensor lead can be up to 160 ft (50 m).

Do not lie in parallel with ignition cable.

### B = Ignition lead



Length of ignition lead: Recommended: < 3 ft (1 m); max: 16 ft (5 m).

The longer the lead, the more the ignition power is reduced.

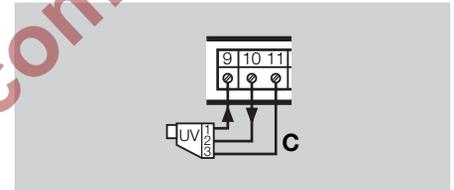
Use unshielded high voltage cable and RFI suppressed plug 1 k $\Omega$ .

Do not place into metal conduit or

metal cable duct. Place far away from main supply power cables and interference sources.

Keep the ignition cable short inside the BCU housing.

### C = UV cell leads



Length of UV cell leads: maximum 16 ft (5 m).

Note: If transformer is externally mounted the UV cell leads can be up to 160 ft (50 m)

Do not lie in parallel with ignition, control or high voltage wiring.

Use main power supply leads suitable for operation - in accordance with local regulations.

## Safety Considerations

### Safety period

If the start-up signal (terminal #4) is applied momentarily, the burner control unit will cycle through the start-up sequence and then shut down the burner.

This is to avoid the introduction of unburned fuel into the combustion chamber.

### Safety Interlock (Limits)

All system safety interlocks must be hard-wired in series and connected to terminal #5 of the BCU.

(Example: High gas, low gas, low air and high temperature limits). In the event of a loss of any system limit, terminal #5 must be de-energized.

### Low fire delay time (parameter 36)

If the gas is controlled with an air/fuel ratio regulator cross-connected to the burner air supply piping, this time may be factory set up to 5 seconds on demand.

This ensures the burner is at low fire before switching off when operating in an off-low-high-low-off control system.

**Caution:** It is recommended to use only with cross-connected air/gas ratio regulator! When air/gas ratio regulator are not used it is possible to have the gas valve open the air valve closed and maintain flame supervision. This may result in a hazardous and explosive mixture.

### Use of UVS 6, UVS 8 detectors in continuous operation

If UVS 6 or UVS 8 UV detectors are used in applications for continuous operation. Parameter 35 should be set to 1. This forces the BCU to shut down once every 24 hrs to self-check the UV detectors.

### Reset limit

In order to prevent an automatic reset from PLCs or excessive resetting by customers without monitoring the burner, a reset limit of 5 resets in 15 minutes is given. After 5 resets, a flashing **!D** is shown as a warning. The BCU must be reset directly at the front panel of the device.

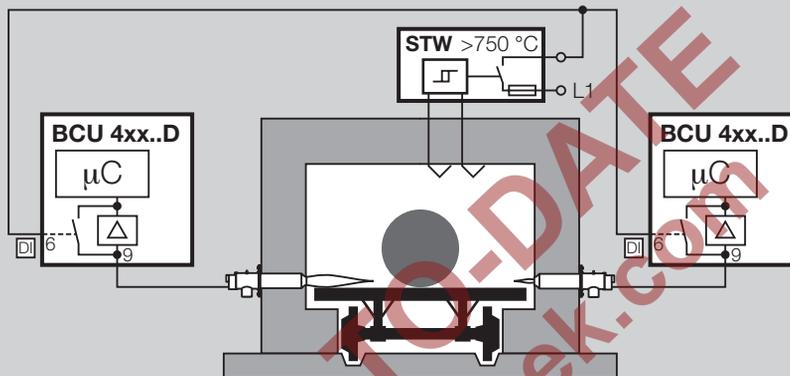
## Operation of firing systems at temperatures above 1400 °F (760 °C)

(Flame management bypass)

The burner control unit BCU 480 provides a fail-safe digital input “D1” (terminal #6) that can be configured in factory as a flame management bypass (see also “Factory Options” and “Additional Features”). This input offers the special “high temperature operation” function. When the digital input is energized the burner control unit switches to the HT mode of operation.

If firing systems are operated at temperatures above 1400 °F, they are known as high temperature systems. The flame must be monitored until the furnace temperature has exceeded a level of 1400 °F (refer to NFPA 86-2003 Edition, chapter 7–8 and 7–17). To ensure the reliability of the system, they are often designed without flame control. This prevents erroneous flame signals from causing faults, for example on a UV sensor that interprets the reflection of UV radiation as a flame simulation.





**Caution:** In “high temperature mode” (HT mode) the digital input has been energized, the BCU operates without supervising the flame signal. The safety function of the flame control is deactivated.

This is only allowed if the furnace temperature is high enough (>1400 °F), to combust the gas reliably .

A suitable “FM” approved low limit controller must be used to supply the digital input “D1”. Consult local regulatory agencies and your insurance underwriter for additional safety requirements and approved controllers.

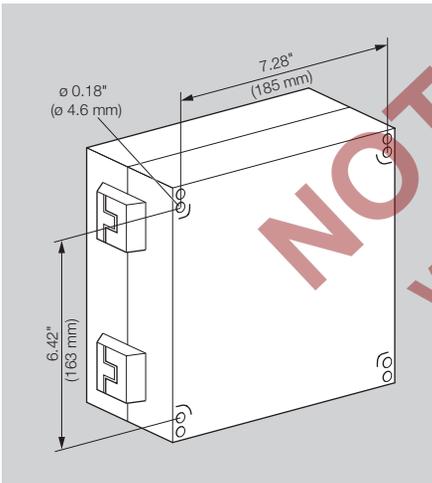
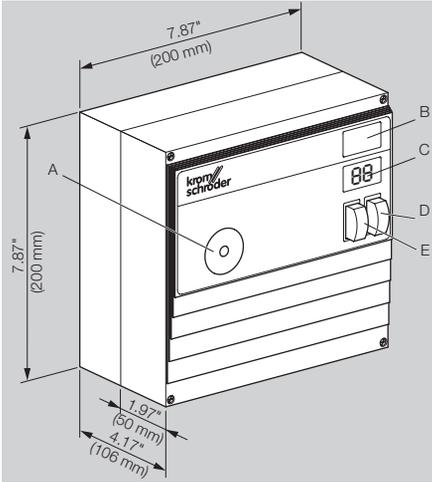
A safety temperature monitor with a

double thermocouple shall be used to measure the temperature. A sensor break or short-circuit, the failure of a component or a supply failure must result in the system being set to a safe condition.

Only when the temperature in the working chamber and/or the wall temperature exceeds 1400 °F, voltage (115 Vac) may the digital input be activated (see Terminal wiring).

If the system has been switched to high temperature mode, the burner control unit opens the gas valves regardless of a flame signal. If the temperature in the furnace chamber falls below the ignition temperature, the digital input must be de-energized

and the furnace must be operated with flame control.



## Installation Information

### Dimensions

Overall Dimensions L x W x H:  
7.87" x 7.87" x 4.17"  
(200 mm x 200 mm x 106 mm)

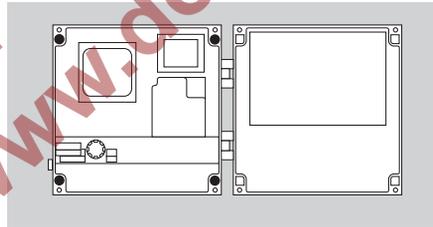
Mounting Dimensions L x H:  
7.28" x 6.43" (185 mm x 163 mm)

### Weight

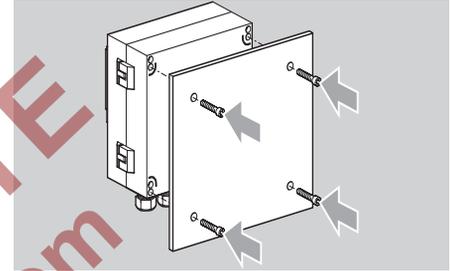
11 lbs. (5 kg)

### Installation

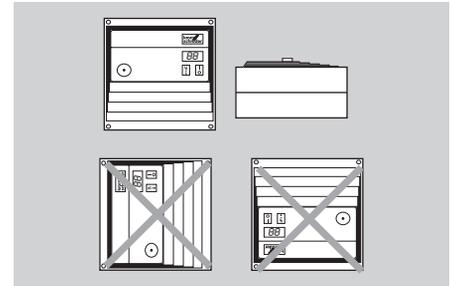
The BCU can be easily mounted at or near the burner by attaching the housing with (4) screws. -The holes are located on the back of housing:



a) Screw on BCU with (4) screws from inside, minimum length 5/8".

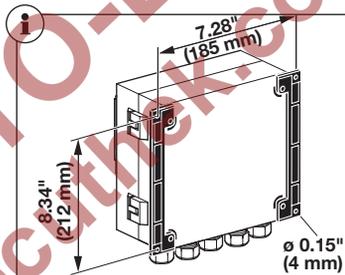
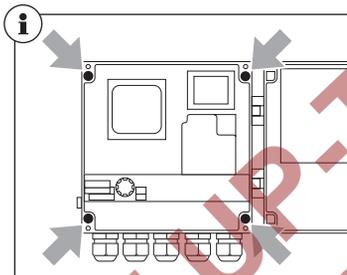
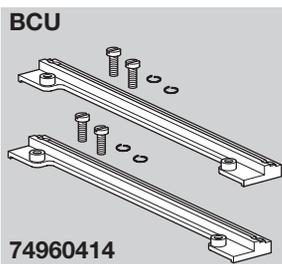
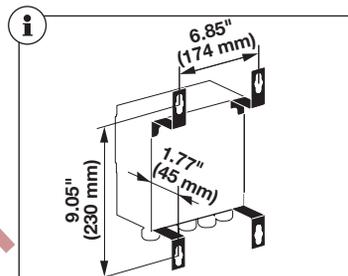
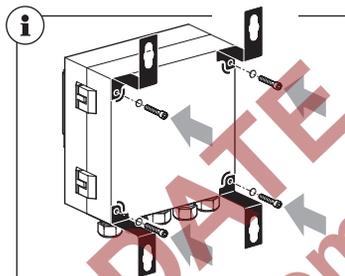
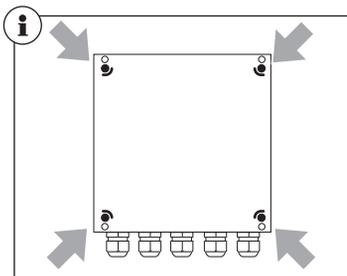
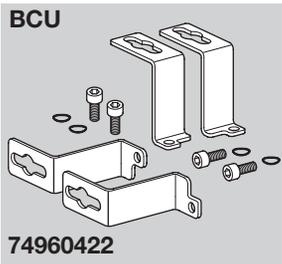


b) Screw on BCU from the back with (4) screws 6 mm and minimum length 5/8".



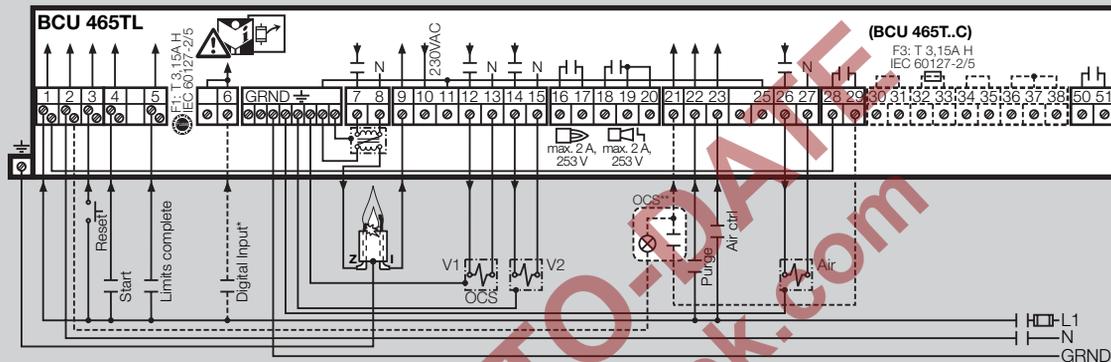
Mount the BCU in a vertical position with conduit openings pointing downwards. The BCU should be a minimum of 6" away from furnace casing with ample airflow available around enclosure.

To ensure this, the fastening set may be used:

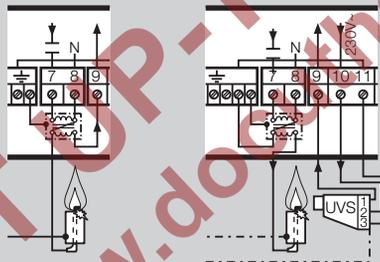


### Fastening sets

External fastening may be used to save installation costs because the BCU does not need to be opened to install it to the system.



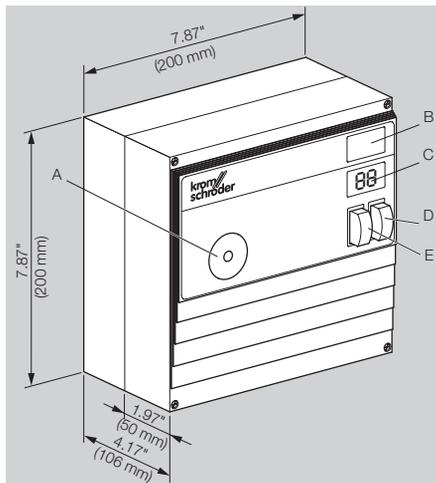
- \*BCU 465T..D2/  
BCU 465T..D3  
1400 F auto ignition  
digital input
- \*\* BCU 465T..O



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## Terminal Wiring BCU 465

Electrical connections are via hard wiring to screw terminals. Flexible conduit connections can be made easily through the bottom mounting plate of the BCU housing.



## Operation

- A: Optical interface
- B: Labeling panel
- C: Two-digit, 7-segment display
- D: Power on/off switch
- E: Reset/Information button for re-setting after a fault or for calling parameters onto the display.

During operation, the 7-segment display shows the program status. Should a fault occur, the BCU stops the program sequence and the display flashes displaying the sequence or fault code. The flame signal and all the following parameters of the BCU can be viewed on the display consecutively by repeatedly pressing the Reset/Information button.

## Program Status and Fault Indication

Program status	DISPLAY	Fault (flashing)
Power on/Standby	00	
Purge	P0	
Self check time	1	Flame signal at start-up
Safety period on start-up	2	Flame failure during start-up
Proving period	3	Flame failure during proving period
Normal operation	4	Flame loss during operation
	10	Too many remote resets
Air valve operation main burner	R	
Cooling	R0	
	E1	Proof-of-closure-switch (POC) Fault (Startup)
	EX	POC operation fault in position X
High temperature mode	.	
	51	Fuse F1 Fault or no input from limits circuit
	52	Permanent remote reset
	53	Pulse firing cycle too short

In manual mode, two dots blink simultaneously in program status 01 – 04.

## Normal Start-up Sequence for BCU 465

### Safety Interlocks

Once air and gas flow safety limits are proven, terminal #5 on the BCU should be energized.

### Switch Power “On”

When line voltage is applied to BCU unit terminal #1, the microprocessor checks for proper line voltage, frequency, and faults in all internal electronic components.

### Self-Check Time

The Valve Proof of Closure Switch OCS must signal that the safety gas valve is closed (115 Vac on terminal #21).

The BCU also checks for any extraneous flame signals. If no flame signal is detected, the BCU unit continues the start-up sequence. If a flame signal is detected during the self-check period ( $t_W$ ), the BCU waits up to 25 seconds for the flame signal to fade. If the flame signal fades, the startup sequence will continue. If the flame signal remains, the BCU will go to fault lockout.

## Trial for Ignition / Safety Period on start-up

Once the self-check is complete and a start signal is present at terminal #4, the BCU will begin the trial for ignition sequence. The gas valve output terminal #12 (and terminal #14 for BCU..O POC versions) and the ignition transformer terminal #7 are energized. The ignition time ( $t_z$ ) is constant and lasts for 3 or 6 seconds depending on the safety period. After the ignition transformer is de-energized, the flame amplifier looks for a flame signal. The flame signal and the OCS contact must be OK for operation within the safety period on start-up.

For BCU without POC, contact input terminal #14 (gas valve 2) is energized after this time.

## Normal Operation

Once the main flame is established the BCU display window indicates the program status. During normal operation, “04” is displayed. This indicates the burner is operating normally without faults. To observe the flame signal, push and hold the reset/info button located on the front of each BCU unit for 1 seconds. The display will change to “01”. Release

the button and the flame current will be displayed. The display will revert back to the normal operation in approximately one minute.

## Air Valve Control of BCU 465 Purging

If the purge function is required, the user must supply an approved external timer. The individual air valves can be energized through the BCU for purging if the system is frequency fired. Therefore apply voltage to terminal #22. If the combustion system has a proportionally controlled air valve the air valve will need to be controlled externally.

## Air Valve Control

The operation of the air valve output is determined by the setting of parameters 30, 31 and 32 and 37 to 41 (see Table Parameter Setting).

When the air valve output terminal #26 is energized, the dry contact #50/#51 is closed.

## Pre-purge

Parameter 37 (pre-purge at start-up):

Parameter #37 can be used to clear the chamber of explosive gases. Selecting a time between 0 seconds and 250 seconds will open the air valve simultaneously with the start signal terminal #4. After the air valve closed, then trial for ignition will begin.

## BCU program-controlled air valve function

Parameter 30 =

- 0: No program control
- 1: Air valve opens with V1
- 2: Air valve opens with V2

Additional feature for programmed air valve control: Low fire delay time; parameter 36:

If the gas is controlled with an air/fuel ratio regulator cross-connected to the burner air supply piping, this time may be factory set up to 25 seconds on demand.

This ensures the burner is at low fire before switching off when operating in an off-low-high-low-off control system.

**Caution:** Use only with cross-connected ratio regulator! Gas valve remains opened while air valve is shutdown! However, flame supervision is active. **If the flame fails during this time, a safety shutdown without fault lockout will occur.**

## Post-purge

Parameter 38 (post-purge after regular shut-down):

Selecting a time between 0 seconds and 3 seconds allows the air valve to open after normal shutdown.

Parameter 39 (pre-purge after safety shut-down):

Selecting a time between 0 seconds and 250 seconds will open the air valve in the event of a safety or limit failure. If terminal #4 remains energized and the limit failure is corrected, the air valve will open for the selected time period and then the minimum off-time runs, before burner restarts. However, this is disabled when auto ignition flame management bypass is active.

Post purge time may be activated individually: Before a recycle attempt is made (parameter 40) and after a manual reset (parameter 41). To enable a recycle attempt, set parameter 12 to "1".

## **External control of air valve function**

It is possible to externally activate the air valve by applying voltage to terminal #23. It is also possible to activate the air valve with the burner switched off for cooling.

During activation of the air valve, the display shows an "A" and the current program status.

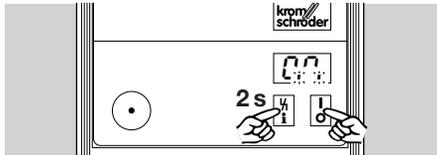
If parameter 31 is set to "0", the air valve cannot be activated externally on start-up (between start-up and operation signal of the main burner). Burners that are unable to start at maximum airflow rate use this setting.

If parameter 32 is set to "1", the air valve may be activated, even during a fault. With setting "0", -it remains closed. It cannot be activated, however, when the automatic burner control unit is deactivated. When activated, the display indicates "A0" (not flashing).

## Additional Features

### Manual Mode

A burner can be started in manual mode for convenient adjustment or for troubleshooting:



- Apply voltage to terminals #1 and #5.
- Switch on the BCU and at the same time, press the Reset/Information button for 2 seconds.
- Both dots on the display flash.
- If there is a flame signal at start, the display shows this instead of the program status to make burner adjustment easier.
- Press button for 2 seconds.
- The BCU opens the air valve and indicates P.0. (purge mode).
- Press the button for 2 seconds.
- The BCU opens valve V1 and OCS-valve (for BCU..0/POC-version) and ignites the burner. The display changes to 0.2. or 0.3.
- Press button for 2 seconds.
- The BCU opens valve V2 (if not POC-version). The display changes to 0.4.
- Within three seconds the display shows the flame signal instead of the program status to make burner adjustment easier.
- Press button for 2 seconds.
- The BCU returns back to standby position.
- Press button again for two seconds to repeat the procedure.
- If a fault occurs, the current program status flashes on the display.
- Briefly press the button.
- The BCU is reset and returns back to standby position. The display indicates 0.0. The burner can be placed back into operation.
- The BCU either remains in manual mode or closes the valves and returns to standby position, five minutes after the last time the button was pressed, dependent on parameter 34 (see Table Parameter setting). The display indicates 0.0.
- To terminate manual mode: Switch off BCU.

## 1400 °F (750 °C) Auto Ignition Flame Management Bypass Input

A digital contact "D1", if used, allows the Burner Control Unit "BCU" flame amplifiers to be bypassed if the process temperature is above the auto ignition temperature of the fuel. This is typically 1400 °F (760 °C). A suitable "FM" approved low limit controller must be used to supply the digital input "D1", terminal #6. Consult local regulatory agencies and your insurance underwriter for additional safety requirements and approved controllers. See also Safety Considerations.

If the "D1" input is used, parameter 33 must be configured for desired operation of the BCU.

If parameter 33 = 2, the BCU will shut down the burner and restart when the high temperature operation has ended. This is recommended if UV flame detection devices are used.

If parameter 33 = 3, the BCU will continue normal operation after the process temperature has dropped below the auto ignition temperature. The flame signal will now be monitored. This is recommended if flame rods are used.



## Order information

<b>BCU</b>	burner control unit
<b>4</b>	series 400
<b>65</b>	extended air valve control
<b>T</b>	T-product
<b>-5</b>	safety period for start-up of the pilot: 5 seconds
<b>-10</b>	safety period for start-up of the pilot: 10 seconds
<b>/2</b>	flame failure response time: 2 seconds
<b>L</b>	air valve control
<b>5</b>	low fire delay time: 5 seconds
<b>15</b>	low fire delay time: 15 seconds
<b>25</b>	low fire delay time: 25 seconds
<b>R</b>	115 V AC, 50/60 Hz, for grounded and ungrounded mains
<b>1</b>	ignition transformer TZI 5-15/100
<b>2</b>	ignition transformer TZI 7-25/20
<b>3</b>	ignition transformer TZI 7,5-12/100
<b>8</b>	ignition transformer TZI 7,5-20/33
<b>D2</b>	1400 °F Auto ignition bypass digital input, shut down+restart
<b>D3</b>	1400 °F Auto ignition bypass digital input, operation resumes
<b>O</b>	Proof-of-closure (POC) Control Input
<b>C</b>	Additional terminals
<b>Z</b>	Special version on request

See also Ignition Transformer ratings

## Factory Options and Field Programmable Options

### Factory Options

#### Control Input for Proof of Closure Switch (POC);

##### Parameter 09

For applications with more than 400,000 BTU/h (117 kW) NFPA 86 2003 edition standard requires two safety shutoff valves in series, with one valve including a proof of closure.

In that situation, order BCU 465 with Parameter 09 set to 1 (BCU 465..0).

This ensures proper proof of closure during standby and also proves that the contact is open during start-up and operation.

#### Flame Failure Response Time;

##### Parameter 14

The flame failure response time is 2 seconds.

This is the amount of time the gas valves remain open in case of flame loss before a safety shutdown applies.

#### Safety Period on Start-up; Parameter 22

The trial for ignition / safety period on start-up can be 5 seconds or 10 seconds.

This is the maximum time the gas valves may remain open without a flame signal during start-up until a safety shutdown applies.

#### Digital Input as 1400°F Auto Ignition Flame Management Bypass, Parameter 33

If the "D1" input is used, parameter 33 must be configured for desired operation of the BCU.

If parameter 33 = 0, the input is not used.

If parameter 33 = 2, the BCU will shut down the burner and restart when the high temperature operation has ended. This is recommended if UV flame detection devices are used.

If parameter 33 = 3, the BCU will continue normal operation after the process temperature drops below the auto ignition temperature. The flame signal will now be monitored. This is recommended if flame rods are used.

### Field Programmable Options

Several field programmable options are available and can be set by the PC-Software BC-Soft with the optical adapter (Order Part-No. 74960437).

They also can be ordered and factory-set.

### Switch-off Threshold of Flame Amplifier, Parameter 04

The sensitivity with which the burner control unit still detects a flame can be adjusted between 1  $\mu\text{A}$  and 20  $\mu\text{A}$ . If, for instance, the signal of the burner to be monitored is influenced by other burners (as in the case of UV control with UVS), the set value can be increased. The measured flame current of the selected burner should be at least 3  $\mu\text{A}$  higher than the set switch-off threshold.

### Restart Attempt, Parameter 12

This parameter determines whether the BCU executes a restart or an immediate fault lockout after a flame failure of the pilot (0 = fault lockout; 1 = restart).

Restart is recommended with burners, which occasionally show an unstable flame behavior.

### Flame-simulation Test in Standby Position, Parameter 15

This determines whether a test is conducted for flame simulation with the burner switched off (in standby position) (= 1). This allows a fast start of the burner since the waiting time ( $t_{\text{W}}$ ) does not need to run. Prerequisite: Minimum switch-off time is 4 seconds. Otherwise (= 0), flame-simulation monitoring is performed after the start-up signal is applied. The waiting time ( $t_{\text{W}}$ ) expires before the burner is ignited.

### Minimum Burner On Time $t_{\text{B}}$ , Parameter 20

Field programmable time in the range of minimum trial for ignition period  $t_{\text{SA}}$  up to a maximum of 25 seconds while the burner remains in operation. With short-term activation of the start-up signal input ( $\vartheta$ ) (e.g.

with a pulse), the burner on time  $t_{\text{B}}$  is started, that means the minimum time the burner is in operation. This time is not dependent on the pre-purge time.

### Minimum Burner Off Time $t_{\text{BO}}$ , Parameter 21

Field programmable time in the range of 0 to 250 seconds.

Immediate restarting of the burner after shut-down is prevented by the off time. The off time begins when the burner is switched off. If there is a demand for heat before this time elapses, the start-up will be delayed until the off time has elapsed.

After the off time has elapsed, the burner will be started with the pending start-up signal ( $\vartheta$ ).

The time should be set in such a way that the system can operate in a safe ignition position, that means, that the air valves/dampers can close, before the burner is started again.

### Flame Proving Period, Parameter 23

The flame proving period (delay for valve 2) is between 0 seconds and 25 seconds.

This time is the delay for high fire mode. For BCU..O (POC-version), this means delay for allowing external air valve control (also see parameter 31); for BCU without POC input this time is delay for gas valve 2 terminal #14.

### Manual Mode Limit, Parameter 34

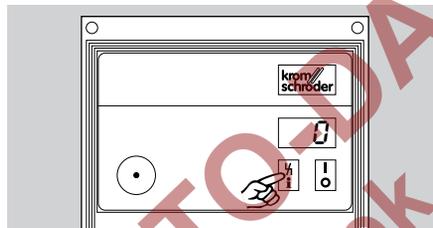
If parameter 34 is set =1, the BCU will return to standby 5 minutes after the reset/info button was last pressed. If parameter 34 is set =0, the BCU will remain in its current operational state for an unlimited time.

### Automatic Shutdown and Restart after 24 hr Operation, Parameter 35

If UVS 6 or UVS 8 UV detectors are used, this function is recommended to self check the UV detector every day: parameter 35 = 1: restart, parameter 35 = 0 continue.

Note: Description of parameters 30, 31, 32 and 36 through 41 see Air Valve Control of BCU 465

### Reading the Parameters



Reading the flame signals, factory options and field programmable options are explained as follows:

- Press the Reset/Information button for 2 seconds.
- The display changes to parameter 01
- Release the button.
- The display stops at this parameter and indicates the related value.
- Press the button again for 2 seconds.
- The display changes to the next parameter.
- All parameters can be recalled consecutively in this way.
- If the button is pressed only briefly, the display indicates what

parameter is currently being displayed.

- The normal program status is displayed again approx. one minute after the button was last pressed or if all parameters are recalled or if BCU is switched off.

## Parameter setting

Description	Parameter	Value range	Factory setting	Field programmable*
Flame signal	01	0–30 $\mu$ A		
Program status on last fault	03	x0–x8		
Switch-off threshold of flame amplifier	04	1–20 $\mu$ A	1 $\mu$ A	●
POC Control Input	09	0 = No; 1 = Yes	**	
Restart attempt	12	0 = No; 1 = Yes	0	●
Flame failure response time	14	1; 2 s	1 s	
Self-Check in Start-up/Stand-by position	15	0 = in Start-up; 1 = in Stand-by	1	●
Minimum On Time	20	up to 25 s (minimum Safety period at start-up)	0	●
Minimum Off Time	21	2–25 seconds	2	●
Safety period on start-up $t_{SA}$	22	3; 5; 10 s	**	
Flame proving period $t_{FS}$	23	0–25 s	0 s	●
Air valve control	30	0 = only externally 1 = simultaneously to V1 2 = simultaneously to V2	0	●
Air valve on start-up can be activated externally	31	0 = No; 1 = Yes	0	●
External air valve control possible during fault lock-out	32	0 = No; 1 = Yes	1	●
Digital input as 1400 °F auto ignition flame management bypass	33	2 = with shutdown when bypass has ended; 3 = continue operation immediately	**	
Manual operation limited to 5 minutes or w/o limit	34	0 = w/o limit; 1 = limit 5 minutes	1	●



24 hr auto shutdown timer	35	0 = continuous; 1 = restart	0	●
Low Fire Delay Time	36	0–25 seconds	**	
Pre-Purge at Start-up	37	0–255 seconds	0	●
Post-Purge after Regular Shut-down	38	0–3 seconds	0	●
Pre-Purge after Safety Shut-down	39	0–255 seconds	**	
Activation of Pre-Purge before Recycle Attempt	40	0 = No; 1 = Yes	**	
Activation of Pre-Purge after Reset	41	0 = No; 1 = Yes	**	

\* Field programmable option: Adjustable with software BCSoft and PC optical adapter

\*\* Factory option: Please state when ordering

\*\*\* Time ignition transformer is energized: Safety period = 10 sec; 6 sec; safety period = 5 sec; 3 sec.

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## Accessories

### **Optical adapter including CD-ROM “BC-Soft“**

Part No. 74919456

(can be used to change parameters  
and view historical information, proc-  
ess values and flame signals)

### **External fastening set**

Part No. 74960414

### **Angular fastening set**

Part No. 74960422

### **UVS 6T Ultraviolet flame de- tector**

Part No. 84315100

### **UVS 8T Ultraviolet flame de- tector**

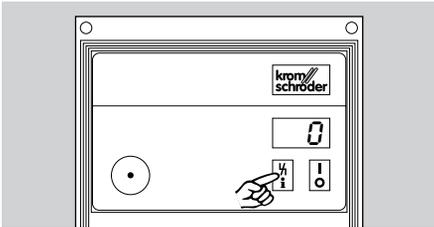
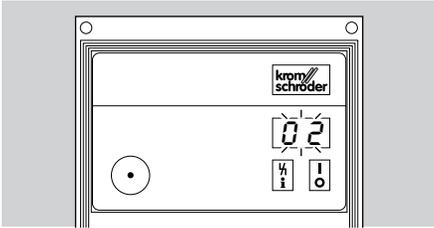
Part No. 84333120

### **Angular plug ø 4 mm, inter- ference-suppressed**

Part No. 04115308

### **Straight plug ø 4 mm, inter- ference-suppressed**

Part No. 04115307



## Troubleshooting

### Fault lockout

In the event of a fault lockout, the BCU will stop power to the gas valves and the ignition transformer. The fault signal contact terminal #18/#19 closes and the display flashes indicating the current program status. The fault signal contact opens in the event of a main power supply failure.

### Reset

After a fault lockout, the burner control unit can be reset, either using the button on the front of the unit or by using a remote reset. Several burner control units can be reset in parallel via the remote reset. The BCU cannot be reset by a main power supply failure.

**Note:** The BCU can only be reset when the display is flashing, not when the flame signal or a parameter is being displayed. In this case press the Reset/Info button until the display starts to flash.

**Note:** If the BCU does not respond even though all faults have been corrected, – remove unit and return it to the manufacturer for inspection.

## Assistance in the Event of Malfunction

### Caution!

• **Electric shocks can be fatal! Disconnect electrical cables from the power supply before working on live components!**

- Fault-clearance by authorized, trained personnel only!
- Do not repair the BCU, as this will void our warranty. Improper repair or incorrect electrical connections, e.g. the connection of power to outputs, can cause gas valves to open and the BCU to become defective. In this case, reliable operation can no longer be guaranteed.
- (Remote) reset only by authorized personnel with continuous monitoring of the burner to be repaired.
- Faults may be cleared only using the measures described below.

### ? The display flashes and displays 01?

- ! The BCU has detected a flame signal simulation without the burner having been ignited (extraneous signal)
- ! The UV tube in the UV sensor UVS is defective and permanently indicates an extraneous signal
- Exchange UV tube, order part # 04065304 – note the operating instructions for the UV sensor
- ! Flame signal through ceramic insulation
- Increase value of parameter 04 in order to adapt the switch-off threshold of the flame amplifier

### ? The display flashes and displays c0?

- ! The BCU has detected that the Proof of Closure Switch (OCS) input has got no proof of closure signal in standby position.
- Make sure that the wiring is correct. The BCU needs line voltage when valve is closed and no voltage signal when valve is opened.
- If the wiring is correct, check the switch and the valve for proper operation. Remove the valve immediately if you have any doubt of correct close position.

### ? The display flashes and displays cX?

- ! The BCU has got no information that the OCS contact is still open.
- Make sure that the wiring is correct. The BCU needs line voltage when valve is closed and no voltage signal when valve is opened during start-up.
- If the wiring is correct, check the switch and the valve for proper operation. Remove the valve immediately if you have any doubt of correct operation.

### ? At start-up, the display flashes and indicates c2?

- ! The BCU has got no information that the OCS contact has opened.
- Make sure that the wiring is correct. The BCU needs line voltage when valve is closed and no voltage signal when valve is opened during start-up.
- If the wiring is correct, check the switch and the valve for proper operation. Remove the valve immediately if you have any doubt of correct operation.

### ? At start-up – no ignition spark occurs – the display flashes and indicates 02?

- ! Ignition cable is too long.
- Shorten it to 1 m (maximum 5 m).
- ! Distance between ignition electrode and burner head is too large.
- Set a distance to 2 mm maximum.
- ! Ignition cable not making contact in the electrode plug.
- Screw the cable on firmly.
- ! Ignition cable has a short-circuit to ground.
- Check the cable along its length and clean the ignition electrode.

### ? At start-up – no gas supply – the display flashes and indicates 02?

- ! The gas valve V1 is not opening.
- Check the electrical power supply to the gas valve.
- ! There is still air in the pipe (example: after installation work has been completed or when the system has not been in operation for a long period of time).
- Reset repeatedly until gas line fills with gas.

### ? At start-up – flame verified visually, display flashes and indicates 02 or 03?

- Read flame signal (parameter 01); if it is lower than the switch-off threshold (parameter 04), this may be attributable to the following causes:
  - ! The set value for the switch-off sensitivity is too high.
  - ! Short-circuit on the ionization electrode as the result of soot, dirt or moisture on the insulator.
  - ! Ionization electrode not correctly positioned at the flame edge.
  - ! Gas/air ratio incorrect.
  - ! Flame not contacting burner ground as the result of excessively high gas or air pressure.
  - ! Burner or BCU not (adequately) grounded.
  - ! Short-circuit or discontinuity on the flame signal cable.
  - ! Soiled UV sensor.
- Correct fault.

### ? The display flashes and indicates 30?

- ! Abnormal data change in the parameters set for the BCU.
- Reset the adjustable parameters to their original values using BC-Soft or remove the unit and return it to the manufacturer for inspection.
- Make sure that you meet requirements in chapter “System Design Information”

### ? The display flashes and indicates 31?

- ! The unit has suffered an internal unit fault.
- Make sure that you meet requirements in chapter “System Design Information”
- Remove the unit and return it to the manufacturer for inspection.

### ? The display flashes and indicates 32?

- ! The supply voltage of the unit is below the rated voltage.
- Ensure correct voltage supply (maximum ratings are given in the technical data).

### ? The display flashes and indicates 51?

- ! Safety interlocks have discontinuity, no voltage at terminal #5.
- Check safety interlocks.
- ! Short-circuit at ignition or valve output.
- Check wiring and fine-wire fuse F1 (3.15 A, slow-blow, H, to IEC 127-2/5).
- If this does not correct the fault, the BCU must be returned to the manufacturer for inspection.

### Checking the safety function

- Close the manual valve.
- Start the burner control unit frequently and check the safety function simultaneously.
- If the operation is incorrect, return the BCU to the manufacturer.

**WARNING! If this function check is not carried out, the gas valves might remain open allowing non-combusted gas to escape. Explosion risk!**

#### ? The display flashes and indicates 52?

- ! The BCU is being permanently reset.
- Apply voltage to terminal 3 only for reset, approximately 1 second.

#### ? The display flashes and indicates 53?

- ! The actual time between two starts is less than the minimum time.
- Comply with Table Minimum Cycle Times.

#### ? The display flashes and indicates 10?

- ! The BCU is repeatedly reset (more than 5 times in 15 minutes).
- Avoid automatic reset by PLC or without monitoring the burner. Reset BCU manually.

#### ? BCU does not start even though all faults have been corrected and the BCU has been reset?

- Remove unit and return it to the manufacturer for inspection.

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## Warning

Situations dangerous to personnel and property can result from the misapplication and incorrect operation of combustion equipment.

Kromschroder advises compliance with the National Fire Protection Association standards that apply for related equipment and Insurance Underwriters recommendation, and care of operation.

We reserve the right to make technical changes designed to improve our products without prior notice. For current product information, visit our website at [www.kromschroder.com](http://www.kromschroder.com).

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