

APPROVAL REPORT

Modifications to Burner Control Unit Series BCU 4XX, -460, -465, and -480

Prepared for:


**Kromschroder AG
Postfach 2809
D-49018 Osnabrueck
Germany**

Project ID: 3017776

Class: 7611

Date of Approval:

Authorized by:

9 SEPTEMBER 2004
A handwritten signature in black ink, appearing to read "R. L. Martell", written over a horizontal line. Above the signature, the date "9 SEPTEMBER 2004" is written in a similar cursive style.
R. L. Martell, Assistant Vice President

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I INTRODUCTION

- 1.1 Kromschroder AG requested an examination of the modifications to the series BCU 4XX Flame sensing system. The modifications consist of the memory being expanded to allow the control of additional parameters such as adjustable minimum burner on time, adjustable minimum burner pause time, adjustable flame detector check, and on demand low fire over-run time.
- 1.2 This Report may be freely reproduced only in its entirety and without modification.
- 1.3 Standards:

Title	Class Number	Date
Combustion Safeguards and Flame Sensing Systems	7610	June 1997

- 1.4 Approval Guide Listing: The Model series BCU 4XX Burner Control Unit will be listed in the *Approval Guide*, a Publication of FM Approvals under Fire Protection Chapter 9, FLAME-SENSING SYSTEMS for Industrial Heating Equipment: Added text shown in red. Deleted text shown. ~~struek~~.

BCU Burner Control Units. Type BCU 400:CB F (or FF)T*-3 (or 5, 10)/1(or 2) F1 (or F2, F3)* R (or W) 1 (or 2, 3, 8)* P* S*2 Vxx* (0-25[s])K*;B1*/1*
Product Identification 84639000 up to 84639099.

Type BCU 440 (or 460,-465, 480)T*-3 (or 5, 10)/3* (or 5or 10)*1 (or 2) L*5* (or 15,25) R (or W) 1 (or 2, 3, 8) D* (or GB)* P* D2* (or D3*) S*2/2* O*(or A*)U* (or C)B1*/1* (or 2). Used with UVD 1, UVS 6 (or 8) ultraviolet flame sensors or flame rods. Nominal operating voltage, 115 or 230 V,a.c.; 50/60 Hz. *Code omitted if not applicable.
Product Identification ~~84639000 up to 84639099~~ 84630000 up to 84638999.

Type BCU 465T*-3 (or 5, 10)/3* (or 5or 10)*1 (or 2) L*5* (or 15,25) R (or W) 1 (or 2, 3, 8) D* (or GB)* P* D2* (or D3*) S*2/2* O*(or A*)U* (or C)B1*/1* (or 2). Used with UVD 1, UVS 6 (or 8) ultraviolet flame sensors or flame rods. Nominal operating voltage, 115 or 230 V,a.c.; 50/60 Hz. *Code omitted if not applicable.
Product Identification 84630000 up to 84638999.

- 1.5 The scope of this report is limited to the addition of the subject operating characteristics to the current burner control system listings as Approved under project IDs 3006558, 3012795 and 3014475.

II DESCRIPTION

- 2.1 Kromschroder AG requested an examination of the modifications to the series BCU 4XX. The memory was expanded to allow for the control of additional parameters. The parameters are adjustable using a computer equipped with Kromschroeder BC Soft ver. 2.8.2 software and a Kromschroder 75451162 cable.
- 2.2 The following programmable parameters are available in North America and were tested for Approval. Parameter numbers are the address on the controller, operator accessible for informational purposes only. The operator cannot alter the settings. Settings can only be altered by installation technicians.
- 2.2.1 Minimum burner on time, tB, parameter 20, is a field programmable time up to a maximum of 25 seconds. Minimum burner on time must be set in the range of minimum trial for ignition period tSA while the burner remains in operation. With short-term activation of the start-up signal input (i) (e.g. with a pulse), the burner on time tB is started, that means the minimum time the burner is in operation. This time is not dependent on the pre-purge time.
- 2.2.2 Minimum burner pause time, parameter 21, is a field programmable time in the range of 0 to 250 seconds. Immediate restarting of the burner after shut-down is prevented by the pause time. The pause 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 (paused) until the off time has elapsed. After the pause time has elapsed, the burner will be started with the pending start-up signal (s). The time should be set in such a way that the system can operate in a safe ignition position. This means the air valves/dampers must close, before the burner is started again.
- 2.2.3 Ultraviolet sensor (UVS) check, parameter 35, automatically restarts the burner control unit to test the functionality of an UVS equipped systems. Shutting down the system will force the sensor to report a flame loss condition.
- 2.2.4 Low fire over-run, parameter 36, for use if the gas is controlled with an air/fuel ratio regulator cross connected to the burner air supply piping. This safety feature ensures burner is at low fire before shutting off. Low fire over-run is factory set up at 5, 15, or 25 seconds.
- 2.3 The following air flow control parameters are available on the BCU U 465 only. See comment 5.2.
- 2.3.1 Adjustable pre-ventilation time on 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.
- 2.3.2 On demand pre-ventilation after safety 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. This 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".
- 2.3.3 Adjustable post-ventilation time, 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.

III EXAMINATIONS AND TESTS

- 3.1 A sample burner control unit BCU465T-5/2LR3D3OC was examined and tested at the FM Approvals facility in Norwood, MA. Examination showed the sample was constructed in accordance with the manufacturer's specifications and FM Approvals requirements.
- 3.2 **Operational tests-** The sample operated properly in accordance with the manufacturer's specifications and FM Approvals requirements. The sample was tested using a test fixture, as shown on drawing BCU465T-01 supplied by the manufacturer. The schematic for the test fixture is included in the Project Data Record to describe how these tests were performed.
 - 3.2.1 Minimum burner on time, parameter 20, field programmable time in the range of minimum trial for ignition period tSA up to a maximum of 25 s while the burner remains in operation. Setting of minimum burner on time successfully demonstrated.
 - 3.2.2 Minimum burner pause time, parameter 21, Immediate restarting of the burner after shut-down is prevented by the pause time. The pause 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 (s). Setting of a maximum minimum burner pause time of 250 s was successfully demonstrated.
 - 3.2.3 Ultraviolet sensor (UVS) check, parameter 35, automatically restarts the burner control unit to test the functionality of an UVS equipped systems. Proper operation of the UVS was successfully demonstrated.
 - 3.2.4 Low fire over-run, parameter 36, for use if the gas is controlled with an air/fuel ratio regulator cross connected to the burner air supply piping. This safety feature ensures burner is at low fire before shutting off. Proper operation of the low fire overrun for 5 seconds was successfully demonstrated.
 - 3.2.5 Adjustable pre-ventilation time on 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. Proper operation of the signal to the air control valve was confirmed.
 - 3.2.6 On demand pre-ventilation after safety 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. This 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". Proper operation of the pre ventilation features under both automatic flame management and with the automatic flame management by-passed, allowing manual reset and a recycle attempt was confirmed.
 - 3.2.7 Adjustable post-ventilation time, 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.

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- 3.3 Flame failure response time, trial for ignition time, voltage variations, environmental conditioning, dielectric test, durability and electrical insulation examination results remain unchanged from previously Approved versions of the burner control units, no other testing was required.

IV MARKING

The following information appears on the equipment described in Section 2:

- Manufacturer's logo and manufacturing location.
- Model Number
- Part Number
- The FM Approvals mark
- Traceability code, date code and serial number

V REMARKS

- 5.1 Installations shall comply with the manufacturer's instruction manual.
- 5.2 Proof of closure valves are required on burner control units installed in North America to be in compliance with NFPA 85.

VI FACILITIES AND PROCEDURES AUDIT

The manufacturing site, in Osnabruck, Germany is subject to follow-up audit inspections. The facilities and quality control procedures in place have been found to be satisfactory to manufacture product identical to that examined and tested as described in this report.

VII MANUFACTURER'S RESPONSIBILITIES

- 7.1 As part of the listing requirements, FM Approvals requires assurance that subsequent systems produced will present the same quality and reliability as the system examined. The manufacturer shall maintain a Quality Assurance Program, which includes as a minimum: incoming, in-process, and final inspection and testing; equipment calibration; and drawing change control. The specific procedures used to control quality are best determined by the manufacturer.
- 7.2 The manufacturer shall provide installation, operating, and maintenance manual(s) with each system.
- 7.3 On 100% of production, Kromschroder manufactured electrical equipment shall be tested for continuity of the protective grounding system.
- 7.4 The power supplies shall be dielectric tested on 100% of production. The insulation between accessible conductive parts (normally grounded) and the power supply input connections (shorted together) shall withstand for one minute, with no insulation breakdown, the application of 1000 Vac (1400 V dc) with respect to the protective ground. Alternatively, a test potential of 1200 Vac (1700 V dc) may be applied for at least one second.

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WARNING: The dielectric test required may present a hazard of injury to personnel and/or property and should only be performed under controlled conditions, and by persons knowledgeable of the potential hazards of such testing to minimize the likelihood of shock and/or fire.

VIII DOCUMENTATION

The following drawings describe the BCU 465 and are filed under Project I.D. 3012795.

Drawing No	Revision	Drawing Title
74336251	5	Leiterplatte-k Bedien-u.
74336252	1	Leiterplatte-k Profibus
74336414	1	Leiterplatte-k 2-Rohrplatine
74336415	2	Leiterplatte-k Standard
74336417	1	Leiterplatte-k Grundpl. Profibus
BCU465T-01	0	BCU465T 5/2LR3D30C Control Schematic
BCU 465	2003 Oct.	T-product BCU 465 Technical information
BCU 480	2003 Oct.	T-product BCU 480 Technical information
S4213773	1	BCU4 (uSCOT)Stromlaufplan
S4336238	1	BCU Grundplatine Stromlaufplan
V4335629	2	Montage
BCU465T-01	0	BCU465T 5/2LR3D30C Control Schematic

IX CONCLUSION

The equipment described in section 1.4 meets FM Approvals requirements. Since a duly signed Master Agreement is on file for this manufacturer, Approval is effective the date of this report.

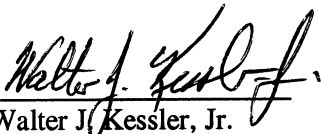
EXAMINATION BY: W. Kessler

PROJECT DATA RECORD: 3017776

ATTACHMENTS: BCU465T-01, Rev. 0, BCU465T 5/2LR3D30C Control Schematic
Model Number Designation sheet Typebcu_ab_0503_en.doc
75451159, Rev. 4 Typenschildubersicht
(FM Marking and traceability drawing from 3012795 Blueprint file)

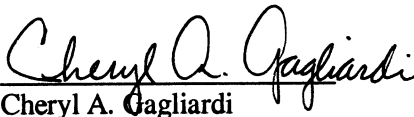
REPORT BY:

REPORT REVIEWED BY:


Walter J. Kessler, Jr.

Engineer

Electrical Systems


Cheryl A. Gagliardi

Engineer

Electrical Systems