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# Operating instructions
# Burner control unit BCU 570



**Cert. version 02.18**

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## Safety

**Please read and keep in a safe place**



Please read through these instructions carefully before installing or operating. Following the installation, pass the instructions on to the operator. This unit must be installed and commissioned in accordance with the regulations and standards in force. These instructions can also be found at www.docuthek.com.

**Explanation of symbols**

•, 1, 2, 3 ... = Action
▷ = Instruction

**Liability**

We will not be held liable for damage resulting from non-observance of the instructions and non-compliant use.

**Safety instructions**

Information that is relevant for safety is indicated in the instructions as follows:

**⚠ DANGER**
Indicates potentially fatal situations.

**⚠ WARNING**
Indicates possible danger to life and limb.

**! CAUTION**
Indicates possible material damage.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

**Conversion, spare parts**

All technical changes are prohibited. Only use OEM spare parts.

## Changes to edition 02.15

The following chapters have been changed:
- Installation
- Connection diagram
- Commissioning
- Assistance in the event of malfunction
- Certification

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## Checking the usage

Burner control unit BCU 570 is designed to monitor and control modulating forced draught burners of unlimited capacity in intermittent or continuous operation.

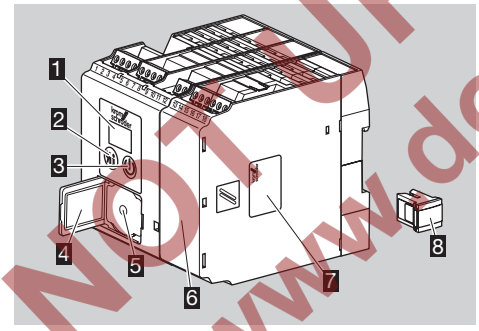
The fail-safe outputs for controlling the burners, e.g. for fan, actuator and valves, are activated via a replaceable power module. All the parameters required for operation are saved on the integrated parameter chip card.

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### Type code

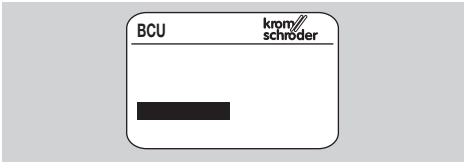
| Code | Description |
|---|---|
| BCU | Burner control unit |
| 570 | Series 570 |
| | Mains voltage: |
| Q | 120 V AC, 50/60 Hz |
| W | 230 V AC, 50/60 Hz |
| C0 | No valve proving system |
| C1 | With valve proving system |
| | Modulating capacity control: |
| F1 | three-point step, IC 20 and IC 40 |
| F2 | RBW interface or frequency converter |
| | Ionization or UV control |
| U0 | in case of operation with gas |
| | Connection terminals: |
| K0 | none |
| K1 | screw terminals |
| K2 | spring force terminals |

### Part designations




1 LED display for program status and fault messages
2 Reset/Information button
3 On/Off button
4 Type label
5 Connection for opto-adapter
6 Power module, replaceable
7 Power module type label
8 Parameter chip card, replaceable

Input voltage – see type label.




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## Installation

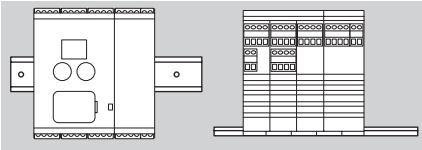
**! CAUTION**

Please observe the following to ensure that the burner control unit is not damaged:

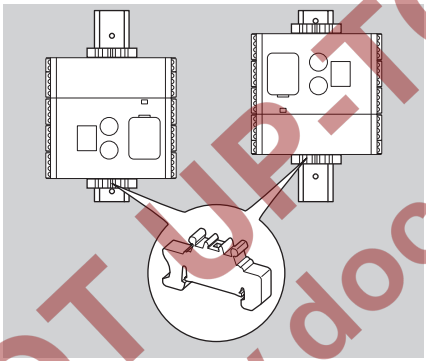
– Dropping the device can cause permanent damage. In this event, replace the entire device and associated modules before use.

▷ Installation position: vertically upright, horizontal or tilted to the left or right.

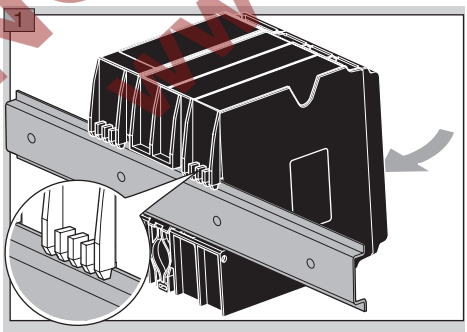
▷ The BCU mounting is designed for horizontally aligned 35 × 7.5 mm DIN rails.



▷ If the DIN rail is aligned vertically, end clamps are required (e.g. Clipfix 35 by Phoenix Contact) to prevent the BCU from slipping.

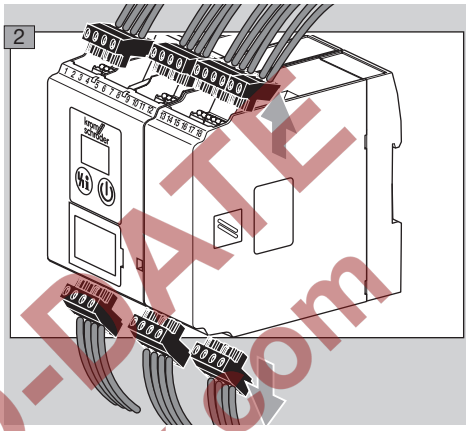


▷ Install in a clean environment (e.g. a control cabinet) with an enclosure ≥ IP 54, whereby no condensation is permitted.

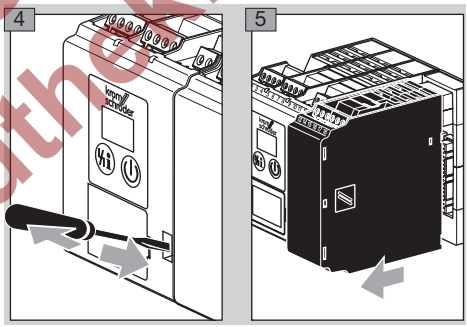



## Replacing the power module/ parameter chip card

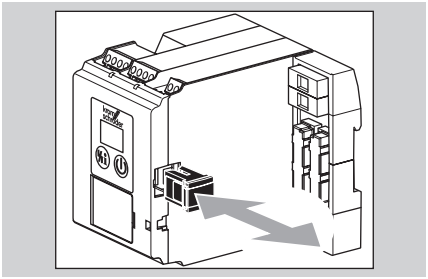
**1** Disconnect the system from the electrical power supply.




**3** Disengage the BCU from the DIN rail.




**6** Remove the old parameter chip card from the BCU and insert the new one.



▷ All the parameter settings of the BCU are saved on the parameter chip card.

**7** Slide the power module back on.

**8** Reconnect the connection terminals.

**9** Mount the BCU on the DIN rail again.

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## Cable selection

- ▷ Signal and control line for screw terminals max. 2.5 mm² (min. AWG 24, max. AWG 12), for spring force terminals max. 1.5 mm² (min. AWG 24, max. AWG 12).
- ▷ Do not route BCU cables in the same cable duct as frequency converter cables or cables emitting strong fields.
- ▷ The control lines must be selected in accordance with local/national regulations.
- ▷ Avoid external electrical interference.

**Ionization cable, UV cable**

- ▷ Cable lengths of 100 m are acceptable if there is no electromagnetic interference.
- ▷ The flame signal is adversely affected by EMC influences.
- ▷ Lay cables individually (with low capacitance) and, if possible, not in a metal conduit.

## Wiring

- ▷ Do not reverse phase L1 and neutral conductor N.
- ▷ Do not connect different phases of a three-phase current system to the inputs.
- ▷ Do not supply voltage to the outputs.
- ▷ A short-circuit on the outputs causes one of the replaceable fuses to trip.
- ▷ Do not set the remote reset so that it operates (automatically) in cycles.
- ▷ Wire the safety circuit inputs via contacts (relay contacts) only.
- ▷ The unit features an output for fan control (terminal 58). This single-pole contact can be loaded with a max. of 3 A. The max. start-up current of the fan motor must not exceed a value of max. 6 A for 1 s – use an external motor protection or coupling contactor if required.
- ▷ The limiters in the safety interlock (linking of all the relevant safety control and switching equipment for the use of the application, for example, safety temperature limiter) must isolate terminal 46 from the voltage supply. If the safety interlock is interrupted, the display shows a blinking 50 as a warning signal and all of the BCU's control outputs are disconnected from the electrical power supply.
- ▷ Connected control elements must be equipped with protective circuits in accordance with the manufacturer's instructions. The protective circuit prevents high voltage peaks which can cause malfunctioning of the BCU.
- ▷ Observe the maximum duty cycle for the ignition transformer (see manufacturer's instructions). Adjust the minimum pause time $t_{BP}$ (parameter 62) correspondingly, if required.
- ▷ Functions of terminals 51, 65, 66, 67 and 68 are dependent on parameter values:

| Terminal | Dependent on parameter |
|---|---|
| 51 | 69 |
| 65 | 70 |
| 66 | 71 |
| 67 | 72 |
| 68 | 73 |

See page 19 (Parameters and values).

**1** Disconnect the system from the electrical power supply.

**2** Before wiring the BCU, ensure that the yellow parameter chip card has been inserted in the BCU – see page 3 (Replacing the power module/parameter chip card).

- ▷ Screw terminals or spring force terminals are available for the BCU – see page 23 (Accessories).

**3** Wire as shown on the connection diagram – see page 5 (Connection diagram).

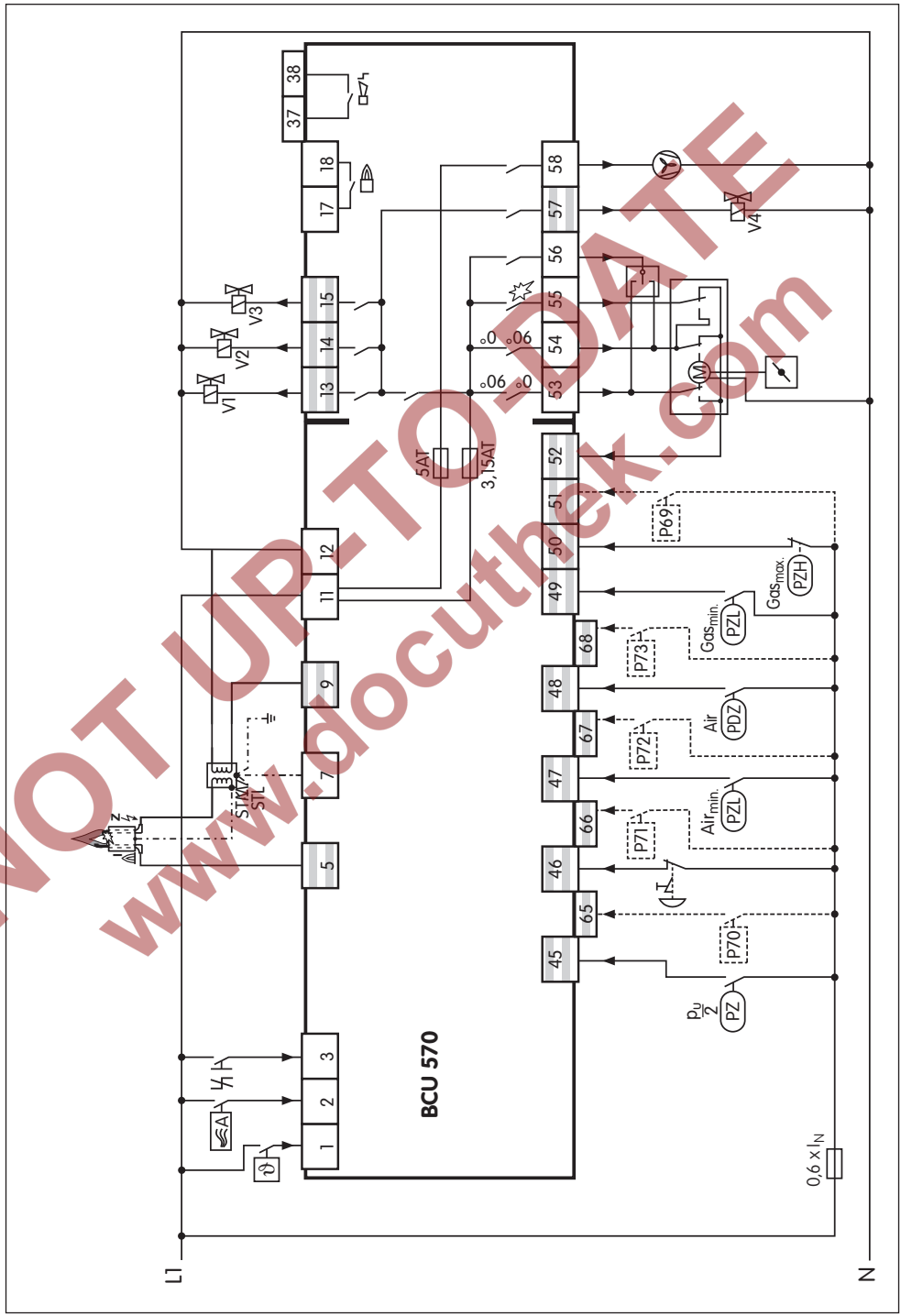
- ▷ Ensure a good PE (ground) wire connection to the BCU and burners.

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## Connection diagram

▷ Legend – see page 21 (Legend).

**BCU 570**



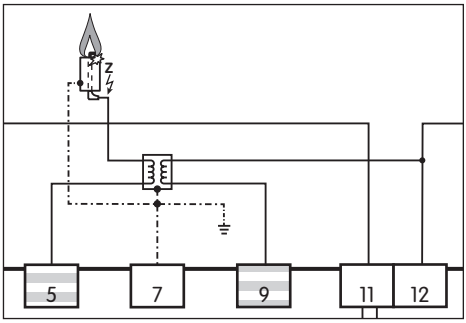

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**Flame control**

▷ In the case of UV control, use Elster UV sensors for intermittent operation (UVS 1, 5, 6, 10) or flame detectors for continuous operation (UVC 1).

**Ionization/single-electrode operation:**

▷ Parameter 04 = 0.

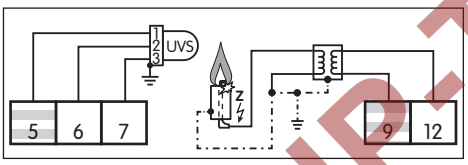



**UV control:**

UVS 1, 5, 6, 10

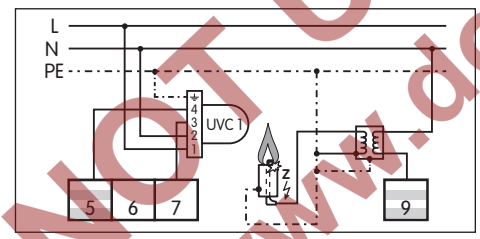
▷ Parameter 01 ≥ 5 µA.

▷ Parameter 04 = 1.




UVC 1

▷ Parameter 04 = 2.

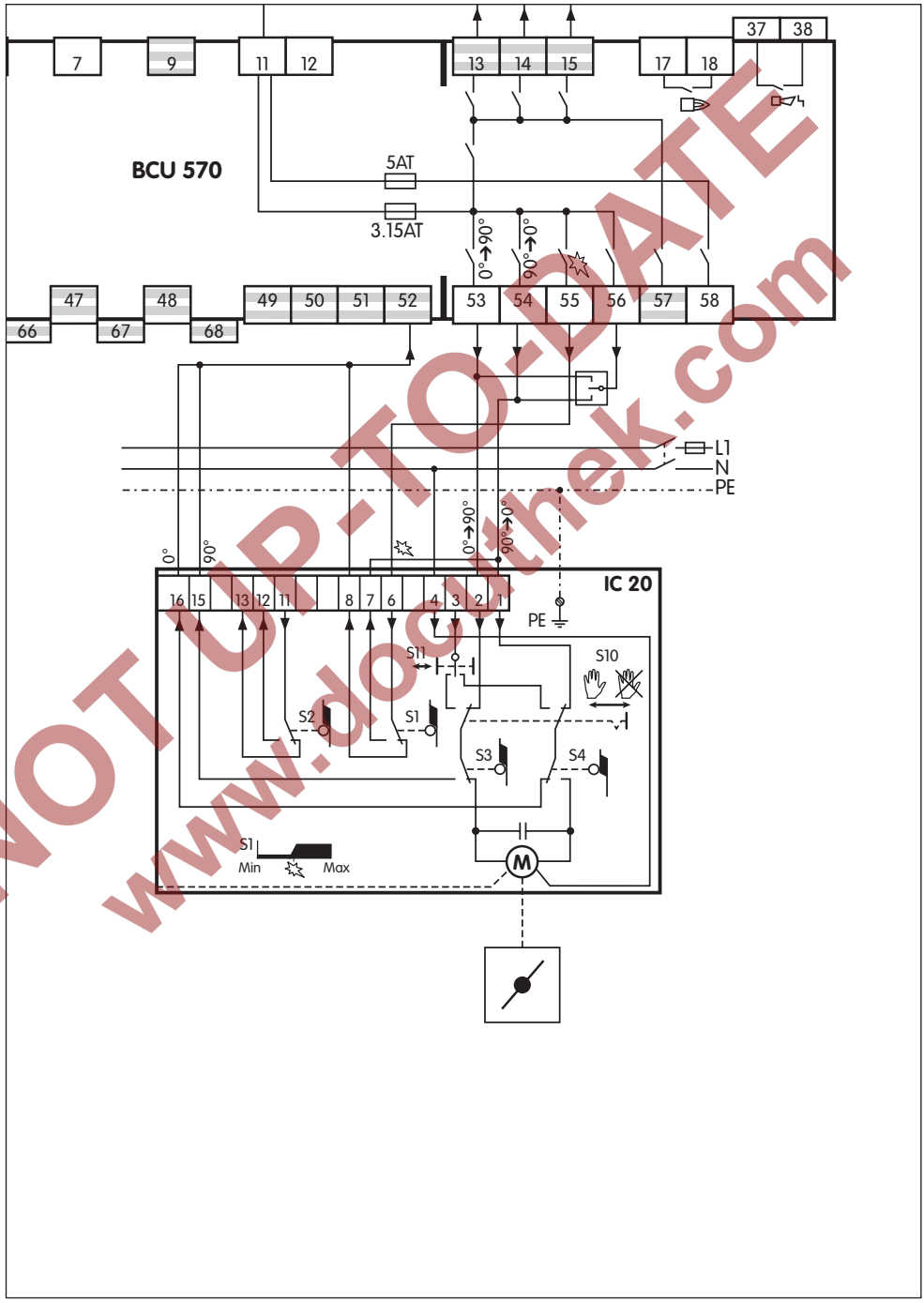



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**IC 20 connected to BCU 570..F1**

▷ Parameter 40 = 1.

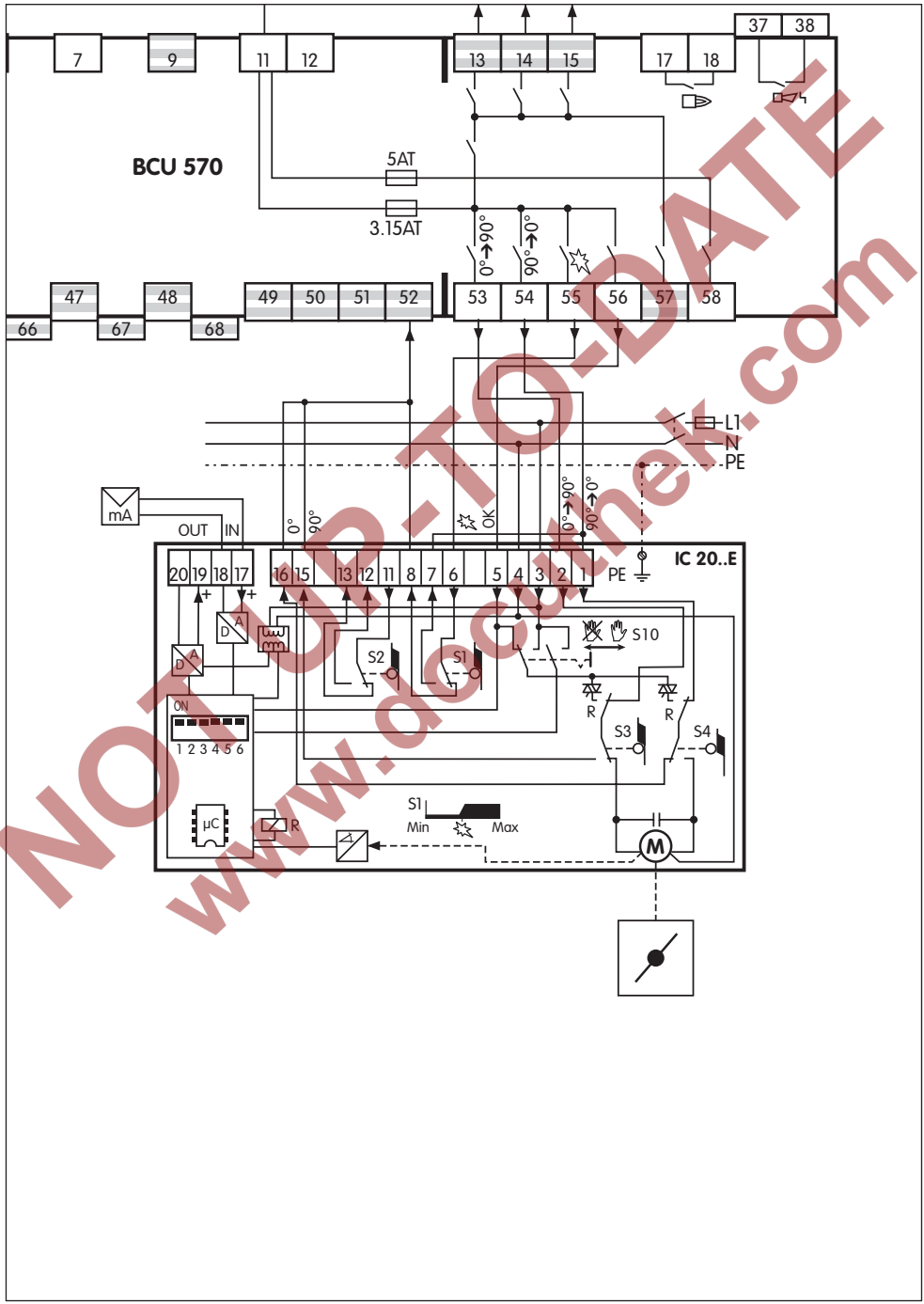
▷ Continuous control via three-point step controller.




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**IC 20..E connected to BCU 570..F1**

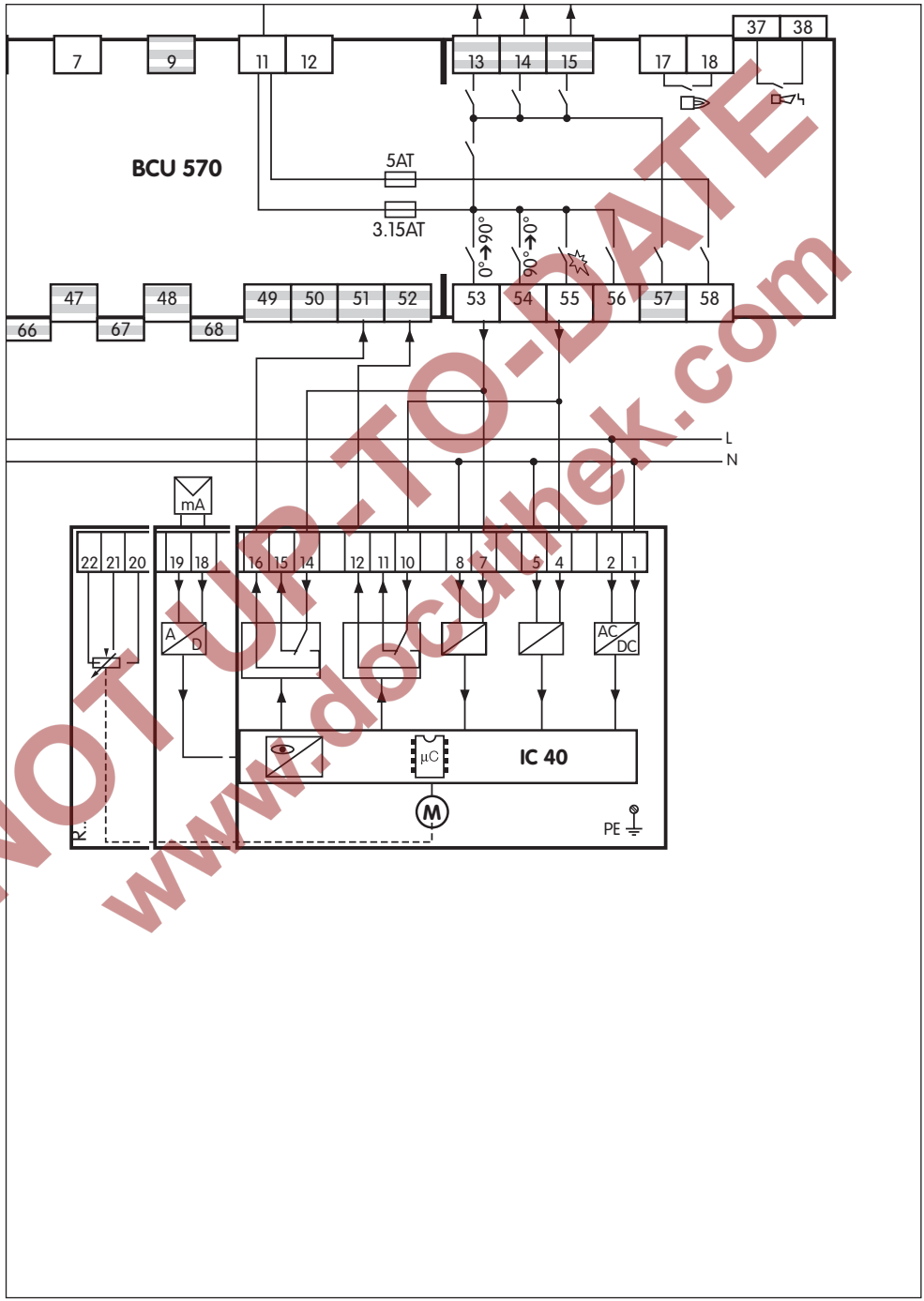
- ▷ Parameter 40 = 1.
- ▷ Continuous control via an analogue signal (directly connected to the control actuator).




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**IC 40 connected to BCU 570..F1**

- ▷ Parameter 40 = 2.
- ▷ Set IC 40 to operating mode 27, see operating instructions Actuators IC 20, IC 40, IC 40S.

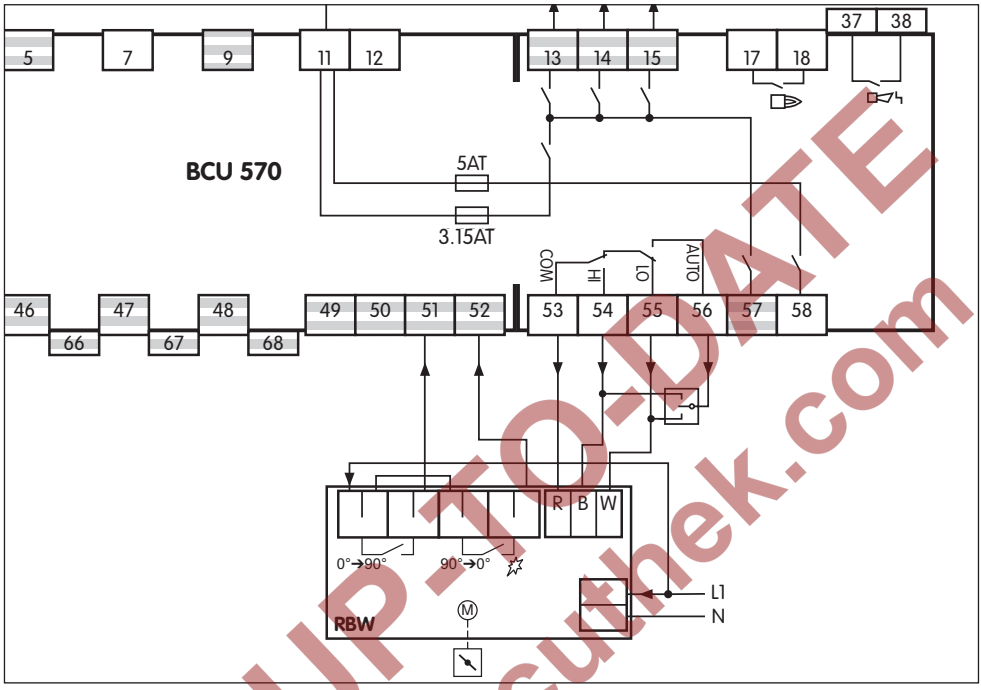



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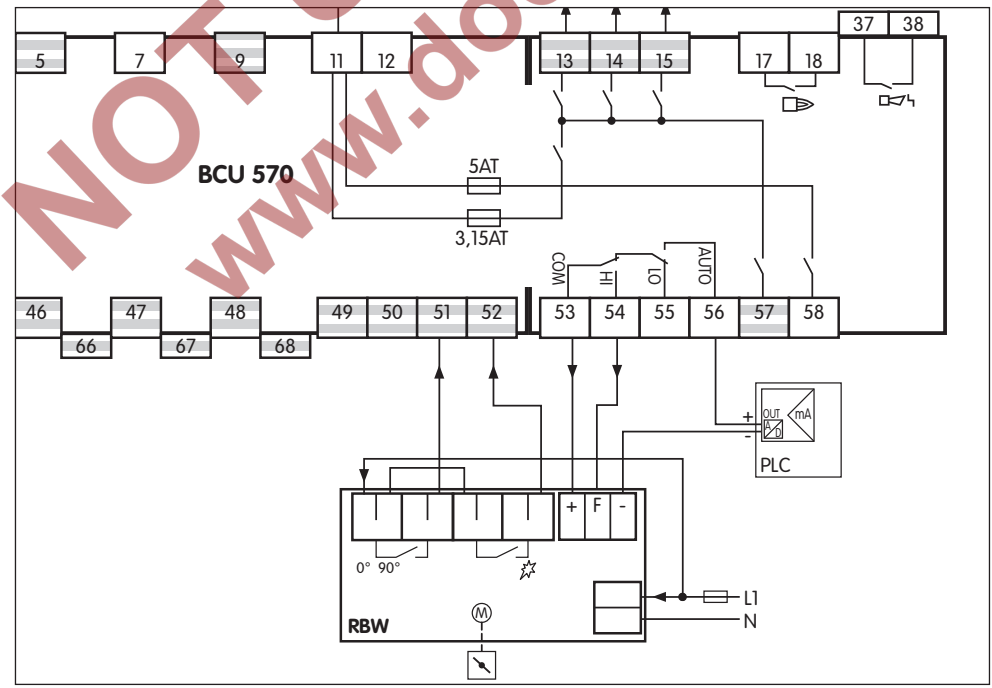
**RBW valve connected to BCU 570..F2**

▷ Parameter 40 = 3.

**Continuous control via three-point step controller**



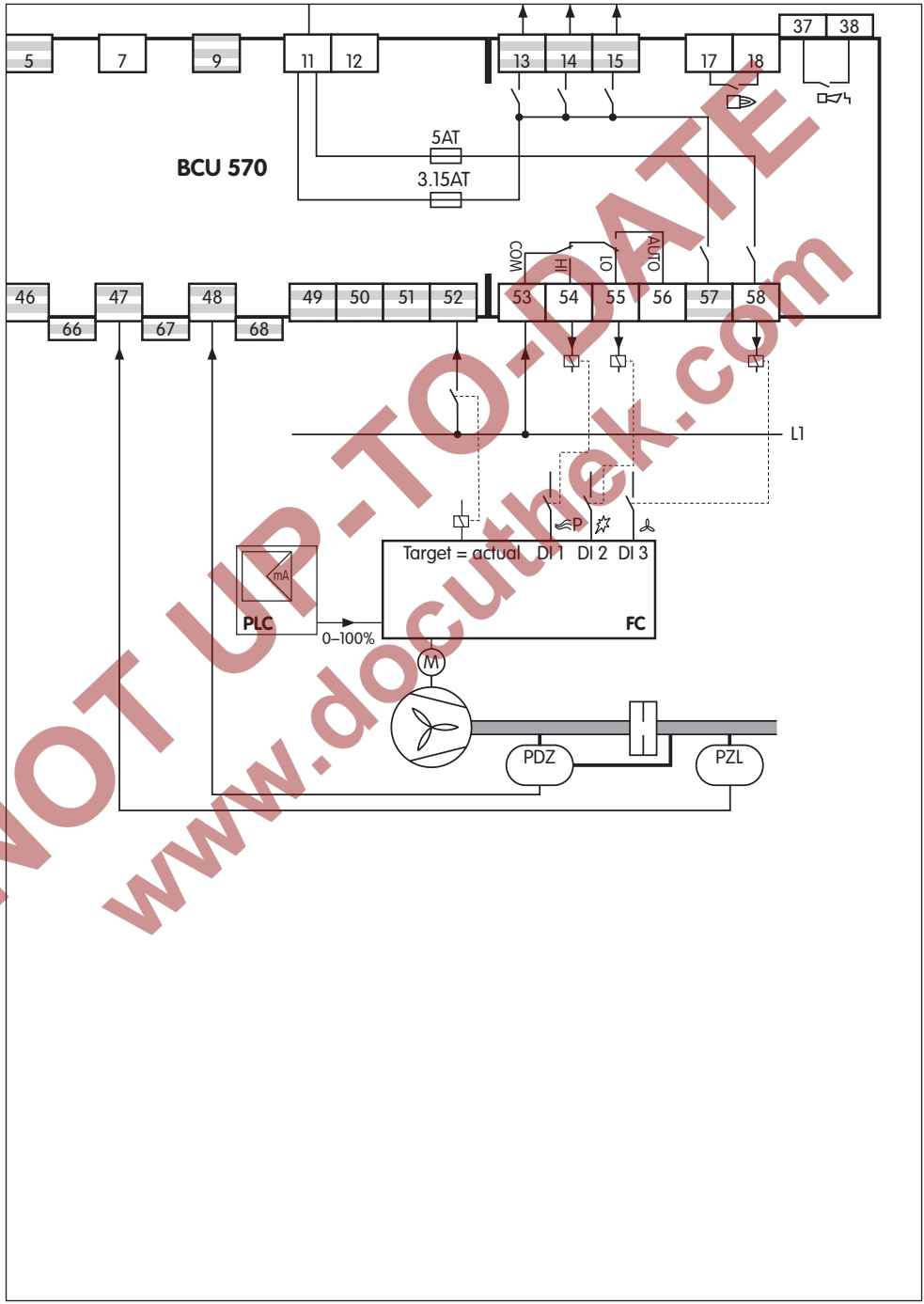

**Continuous control via PLC**




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**Frequency converter connected to BCU 570..F2**

▷ Parameter 40 = 4.




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## Adjustment

In certain cases, it may be necessary to change the parameters set at the factory. Using the separate software package BCSoft and a PC opto-adapter, it is possible to modify parameters on the BCU, such as the pre-purge time or the behaviour in the event of a flame failure.

- ▷ The software package and the opto-adapter are available as accessories – see page 23 (Accessories).
- ▷ Changed parameters are saved on the integrated parameter chip card.
- ▷ The factory settings are secured with a programmable password.
- ▷ If the password has been changed, the end customer can look up the changed password in the plant documentation or ask the system supplier.

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## Commissioning

- ▷ During operation, the 7-segment display shows the program status:
  - 00 Start-up position/standby
  - H0 Delay
  - Rc Approaching minimum capacity
  - d0 Fan OFF check
  - 01 Fan run-up time
  - Rm Approaching maximum capacity
  - d1 Post-purge time air monitoring
  - P1 Pre-purge
  - AI Approaching ignition capacity
  - tc Valve check
  - 03 Pre-ignition time tVZ
  - 04 Safety time 1 $t_{SA1}$
  - 05 Flame proving period 1 $t_{FS1}$
  - 06 Safety time 2 $t_{SA2}$
  - 07 Flame proving period 2 $t_{FS2}$
  - H8 Delay
  - 08 Operation/controller enable
  - 09 Over-run $t_N$ with air actuator in position for maximum capacity
  - P9 Post-purge
  - CI Controlled air flow
  - -- Device Off
  - UI Remote control (with OCU)
  - ↵ Data transfer (programming mode)
  - (blinking dots) Manual mode

### ⚠ WARNING

Risk of explosion! Check the system for tightness before commissioning.
Do not start the BCU until you are certain that the wiring is correct, the parameters have been set correctly and all input and output signals are being processed perfectly by means of conducting a function check and reading the parameters on the device.

**1** Switch on the system.
▷ The display indicates --.
**2** Switch on the BCU by pressing the On/Off button.
▷ The display indicates 00.
▷ If the display blinks (fault), reset the BCU by pressing the Reset/Information button.
**3** Apply the start-up signal to terminal 1.
▷ The display indicates Rc. The air control valve moves to the position for minimum capacity.
▷ The display indicates H0. The switch-on delay time (parameter P63) is active.
▷ The display indicates 01. The fan run-up time (parameter P30) is active.
▷ The display indicates Rm. The air control valve moves to the position for maximum capacity.
▷ The display indicates P1. The pre-purge time (parameter P34) is active.
▷ BCU..C1: the valve check runs in parallel to pre-purge. If the valve check lasts longer than pre-purge, the display indicates tc.
▷ The display indicates AI. The air control valve moves to the position for ignition capacity.
▷ The display indicates 03, 04 and 05. When using a pilot and main burner, 06 and 07 are also shown. Pre-ignition time, safety time and flame proving period are running.
▷ The display indicates H8. The controller enable signal delay time is running.
▷ The display indicates 08. The burner is in operation and the controller enable signal has been issued.

## Manual mode

- ▷ For adjustment of the burner control unit or for fault-finding.
- ▷ In Manual mode, the BCU operates independently of the status of the inputs for start-up signal (terminal 1), controlled air flow (terminal 2) and remote reset (terminal 3). The function of the controller enable/emergency stop input (terminal 46) is retained.
- ▷ Manual mode is terminated by switching off the BCU or in the event of a power failure.
- ▷ Parameter 67 = 0: Manual mode unlimited in time. The burner control unit may continue to be operated manually in the event of failure of the control system or the bus.
- ▷ Parameter 67 = 1: The BCU will terminate Manual mode 5 minutes after the last time the Reset/Information button is pressed. It switches to the start-up position/standby (display 00).

**1** Switch on the BCU while holding the Reset/Information button. Hold the Reset/Information button until the two dots in the display start to blink.

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▷ If the Reset/Information button is pressed, the current step in Manual mode is shown. After the button has been held for 1 second, the next step will be shown. The BCU now executes its program sequence until the display indicates 08.

**BCU 570..F1 with IC 20**

▷ Following controller enable (display 08), actuator IC 20 can be opened and closed as required.

2 Press the Reset/Information button.

▷ If the button continues to be held down, the actuator opens further until it reaches the position for maximum capacity.

▷ The display indicates A1. with blinking dots.

▷ Once the button has been released, the butterfly valve stops in the relevant position.

3 Press the Reset/Information button again.

▷ If the button continues to be held down, the actuator closes further until it reaches the position for minimum capacity.

▷ The display indicates A0. with blinking dots.

▷ A change of direction takes place each time the button is released and pressed again. When the butterfly valve has reached its final position, the dots disappear.

**BCU 570..F1 with IC 40, BCU 570..F2 with RBW or frequency converter**

▷ Following controller enable (status display 08), it is possible to move between the positions for maximum and minimum capacity on a binary basis.

## Assistance in the event of malfunction

**⚠ DANGER**

Electric shocks can be fatal! Before working on possible live components, ensure the unit is disconnected from the power supply.

Fault-clearance must only be undertaken by authorized trained personnel.

▷ Faults may be cleared only using the measures described below.

▷ If the BCU does not respond even though all faults have been remedied: remove the unit and return it to the manufacturer for inspection.

? **Faults**
! **Cause**
• **Remedy**

? **The 7-segment display does not light up.**
! Mains voltage is not applied.
• Check the wiring, apply mains voltage (see type label).



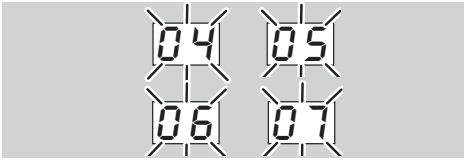

? **The display blinks and indicates 01.**
! The BCU has detected an incorrect flame signal without the burner having been ignited (extraneous signal).
• Direct the UV sensor exactly at the burner to be monitored.
! The UV tube in the UV sensor is defective (service life ended) and issues a continuous flame signal.
• Exchange UV tube, Order No.: 04065304 – note the Operating instructions for the UV sensor.
! Flame signal through conductive ceramic insulation.
• Increase value of parameter 01 in order to adapt the switch-off threshold of the flame amplifier.




? **Start-up without flame – no ignition spark – the display blinks and indicates 04.**
! The ignition cable is too long.
• Shorten it to 1 m (max. 5 m).
! Gap between spark electrode and burner head is too great.
• Adjust gap to max. 2 mm.
! Ignition cable has no contact in the terminal boot.
• Screw the cable on firmly.
! Ignition cable has no contact in the ignition transformer.
• Check the connection.
! Ignition cable has short-circuited to ground.
• Check installation, clean the spark electrode.
• If the fault cannot be remedied by doing this, remove the unit and return it to the manufacturer for inspection.

? **Start-up without flame – no gas supply – the display blinks and indicates 04.**
! A gas valve does not open.
• Check the gas pressure.
• Check voltage supply to the gas valve.
! There is still air in the pipe, e.g. after installation work has been carried out or if the system has not been in operation for a long period.
• "Purge" the pipeline and reset the BCU.
• If the fault cannot be remedied by doing this, remove the unit and return it to the manufacturer for inspection.

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? **Start-up – flame burning – nevertheless, the display blinks and indicates 04 or 05 on the pilot burner/burner or 06 or 07 on the main burner.**
! Flame failure on start-up.
• Read off the flame signal.
▷ If the flame signal is lower than the switch-off threshold (parameter 01), this may be attributable to the following causes:
! The set value for the cut-off sensitivity is too high.
! Short-circuit on the flame rod as the result of soot, dirt or moisture on the insulator.
! Flame rod 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.
! UV sensor wiring is defective.
• Remedy fault.




? **Operation – flame burning – burner interrupted – the display blinks and indicates 08.**
! Flame failure during operation or during delayed controller enable.
• Read off the flame signal, see page 19 (Reading off the flame signal, fault messages and the parameters).
▷ If the flame signal is lower than the switch-off threshold for the flame signal from burner 1 (parameter 01), this may be attributable to the following causes:
! The set value for the cut-off sensitivity is too high.
! Short-circuit on the flame rod as the result of soot, dirt or moisture on the insulator.
! Flame rod 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.
• Remedy fault.




? **The display blinks and indicates 10.**
! Actuation of the remote reset input is faulty.
! Too many remote resets. More than 5 resets have been conducted within the last 15 minutes, either automatically or manually.
! Consecutive fault caused by a previous fault whose actual cause has not been remedied.
• Pay attention to previous fault messages.
• Remedy cause.
▷ The cause will not be remedied by performing a reset every time a fault lock-out occurs.
• Check whether remote reset complies with standards (EN 746 allows resetting only under supervision) and correct if necessary.
▷ The BCU may only be reset manually under supervision.
• Press the Reset/Information button on the BCU.




? **The display blinks and indicates 11.**
! Too many restarts. More than 5 restarts initiated within the last 15 minutes.
• Check burner setting.
• Press the Reset/Information button on the BCU.




? **The display blinks and indicates 20.**
! Voltage is applied to the output at terminal 56.
• Check the wiring and ensure that the voltage outputs and inputs have the same polarity and are not reversed.
! The unit has suffered an internal fault in the power module.
• Replace the power module.




? **The display blinks and indicates 21.**
! Inputs 51 and 52 are activated simultaneously.
• Check input 51.
▷ Input 51 may only be activated if the valve is open.
• Check input 52.
▷ Input 52 may only be activated if the valve is in the position for ignition capacity.

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? **The display blinks and indicates 22.**
! Actuator IC 20 has been wired incorrectly.
• Check the wiring. Wire the outputs and inputs of connection terminals 52 – 55 as shown in the connection diagram – see page 8 (IC 20..E connected to BCU 570..F1).
! The unit has suffered an internal fault in the power module.
• Replace the power module.



? **The display blinks and indicates 23.**
! The butterfly valve position is not constantly signalled back to the BCU.
• Check the wiring and ensure that the position of the butterfly valve for max. capacity/ignition capacity/Closed is constantly signalled back via terminal 52.



? **The display blinks and indicates 24.**
! Faulty activation via the bus. Requirements for "Open" and "Close" set simultaneously.
• Ensure that "Open" and "Close" are not activated simultaneously.



? **The display blinks and indicates 30.**
! Abnormal data change in the parameters set for the BCU.
• Reset the parameters to their original values using the BCSoft software.
• Establish the cause of the fault to avoid repeat faults.
• Ensure that the cables have been installed properly – see page 4 (Cable selection).
• If the measures described above do not help, remove the unit and return it to the manufacturer for inspection.



? **The display blinks and indicates 31.**
! Abnormal data change in the parameters set for the BCU.
• Reset the parameters to their original values using the BCSoft software.
• Establish the cause of the fault to avoid repeat faults.
• Ensure that the cables have been installed properly – see page 4 (Cable selection).
• If the measures described above do not help, remove the unit and return it to the manufacturer for inspection.



? **The display blinks and indicates 32.**
! Supply voltage too low or too high.
• Operate the BCU in the specified mains voltage range (mains voltage +10/-15%, 50/60 Hz).
! An internal device error occurred.
• Remove the unit and return it to the manufacturer for inspection.



? **The display blinks and indicates 33.**
! Faulty parameterization.
• Check parameter settings using BCSoft.
! An internal device error occurred.
• Remove the unit and return it to the manufacturer for inspection.



? **The display blinks and indicates 36.**
! An internal device error occurred.
• Replace the power module.
• Remove the unit and return it to the manufacturer for inspection.



? **The display blinks and indicates 40.**
! The gas solenoid valve V1 is leaking.
• Check the gas solenoid valve V1.
! The gas pressure switch DG$p_u$/2 for the valve check has been set incorrectly.
• Check the inlet pressure.
• Set DG$p_u$/2 to the correct inlet pressure.
• Check the wiring.
! The test pressure between V1 and V2 has not decreased.
• Check the installation.
! The test period is too long.
• Change parameter 56 (Measurement time $V_{p1}$) using BCSoft.
• If the fault cannot be remedied by doing this, remove the unit and return it to the manufacturer for inspection.

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? **The display blinks and indicates 41.**
! One of the burner-side gas solenoid valves is leaking.
• Check the burner-side solenoid valves.
! The gas pressure switch $DGp_u/2$ for the valve check has been set incorrectly.
• Check the inlet pressure.
• Set $DGp_u/2$ to the correct inlet pressure.
• Check the wiring.
! The test period is too long.
• Change parameter 56 (Measurement time $V_{p1}$) using BCSoft.
• If the fault cannot be remedied by doing this, remove the unit and return it to the manufacturer for inspection.



? **The display blinks and indicates 50.**
! Interruption of signal at the "Enable/Emergency stop" input (terminal 46).
• Check voltage supply to terminal 46.
• Check the setting of parameter 10.



? **The display blinks and indicates 51.**
! Short-circuit on one of the outputs of the safety circuit.
• Check the wiring.
• Check fine-wire fuse F1 (3.15 A, slow-acting, H).
▷ The fine-wire fuse can be replaced once the power module has been removed.
• Then check the faultless processing of all input and output signals.
! The unit has suffered an internal fault in the power module.
• Replace the power module.



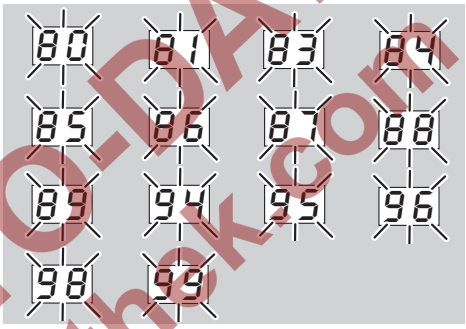
? **The display blinks and indicates 52.**
! The BCU is permanently reset by remote reset.
• Check voltage supply to terminal 3.
• Apply voltage to terminal 3 only for reset, approx. 1 second.



? **The display blinks and indicates 53.**
! The time between two starts is less than the min. time (timing cycle).
• Comply with the min. timing cycle $tz_{min}$:

$$tz_{min}\ [s] = (t_{VZ} + 0.6 \times t_{SA1}) + 9$$

Example:
Pre-ignition time $t_{VZ}$ = 2 s
Safety time 1 $t_{SA1}$ = 3 s
$tz_{min} = (2 + 0.6 \times 3) + 9 = 12.8$ s



? **The display blinks and indicates 80, 81, 83, 84, 85, 86, 87, 88, 89, 94, 95, 96, 98 or 99.**
! System fault – the BCU has performed a safety shut-down. The cause may be a unit defect or abnormal EMC influence.
• Ensure that the ignition cable has been installed properly – see page 4 (Cable selection).
• Ensure that the EMC regulations for the system are satisfied – particularly for systems with frequency converters – see page 4 (Cable selection).
• Reset the unit by pressing the Reset/Information button.
• Disconnect the burner control unit from the mains supply and then switch it on again.
• Check mains voltage and frequency.
• If the measures described above do not help, the unit has probably suffered a hardware defect – remove the unit and return it to the manufacturer for inspection.



? **The display blinks and indicates 97.**
! No PCC.
• Insert compatible PCC.
! Contact problems on the power module.
• Remedy contact problems.
! Power module is defective.
• Replace power module.

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- If the measures described above do not help, the unit has probably suffered a hardware defect – remove the unit and return it to the manufacturer for inspection.



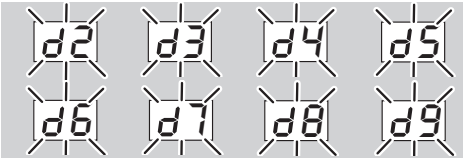

? **The display blinks and indicates d0.**
! The “no flow” state check of the air or differential pressure switch has failed.
- Check the function of the air pressure switch. Before the fan is switched on, there must be no high signal at the input for air monitoring (terminal 47) when air monitoring is activated.
- Check the function of the differential pressure switch. When the fan is switched off, the “no flow” state (default position) of the differential pressure switch (terminal 48) is also monitored if air flow monitoring has been activated.



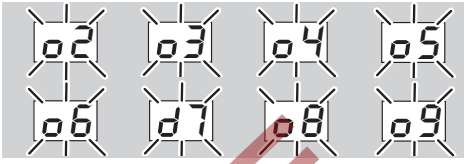

? **The display blinks and indicates d1.**
! The operating check of the air pressure switch has failed. The air monitor, depending on the parameter setting for input 47 or 48 (P15 and P35), has not switched after fan start-up.
- Check the air monitor wiring.
- Check the air pressure switch setpoint.
- Check the function of the fan.




? **The display blinks and indicates dP.**
! The input signal (terminal 48) for the air pressure switch has dropped out during pre-purge.
- Check the air supply during the purging process.
- Check the electrical wiring of the air pressure switch.
- Check voltage supply to terminal 48.
- Check the air pressure switch setpoint.




? **The display blinks and indicates d2, d3, d4, d5, d6, d7, d8 or d9.**
! The input signal for the air pressure switch has dropped out during start-up/operation at program step X (02 to 09).
! Failure of the air supply at program step X.
- Check the air supply.
- Check the air pressure switch setpoint.




? **The display blinks and indicates o2, o3, o4, o5, o6, o7, o8 or o9.**
! The signal for monitoring the max. gas pressure (terminal 50) has dropped out at program step X (02 to 09).
- Check the wiring.
- Check the gas pressure.




? **The display blinks and indicates n0.**
! BCU waiting for connection to PLC.
- Check whether the PLC is switched on.
- Check the network wiring.
- Check the PLC programming.
- Check whether the correct device name and IP address for the BCU have been entered in the PLC program.




? **The display blinks and indicates n1.**
! An invalid address has been set on the bus module.
- Adapt the bus module’s address with the code switches to the address allocated in the PLC program.
- Check whether the bus module’s address is in the permitted address range (001 to FEF).




? **The display blinks and indicates n2.**
! The bus module has received an incorrect configuration from the PLC.
- Check whether the correct GSD file was imported into the PLC.




? **The display blinks and indicates n3.**
! The device name for the BCU is invalid in the PLC program.

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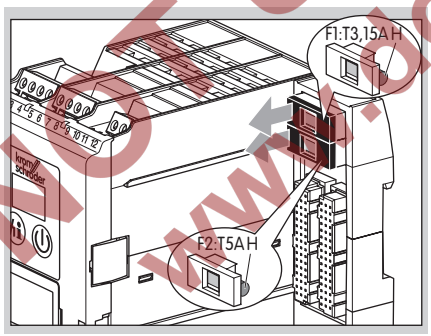
▷ Device name on delivery:
**not-assigned-bcu-570-xxx**
(**xxx** = code switch setting on the BCU).
▷ The device name must at least consist of the expression **bcu-570-xxx**.
• Check whether the code switch setting is identical to the entry (xxx) in the PLC program.
• Delete the expression "**not-assigned-**" in the PLC program or replace it with an individual name part (e.g. Furnacezone1-).



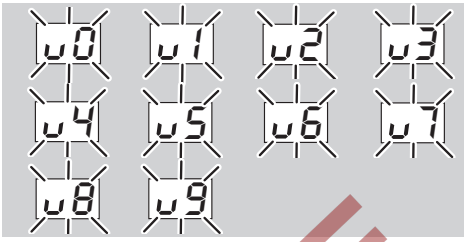
**? The display blinks and indicates n4.**
! The PLC is set to Stop.
• Start the PLC.

**Replacing the fuse**

▷ The device fuses F1 and F2 can be removed for inspection.
**1** Disconnect the system/BCU from the electrical power supply.
**2** Disconnect the connection terminals from the BCU.
▷ The connection cables may remain screwed to the connection terminals.
**3** Disconnect the power module, see page 3 (Replacing the power module/parameter chip card).
**4** Remove the fuse holder (with fine-wire fuse F1 or F2).




**5** Check fine-wire fuse F1 or F2 for correct functioning.
**6** Replace the fine-wire fuse if defective.
▷ When replacing the fuse, use only the approved fuse type (F1: 3.15 A, slow-acting, H, F2: 5 A, slow-acting, H; pursuant to ICE 60127-2/5).
• First reconnect the power module, then reconnect the connection terminals and restart the system/BCU, see also page 12 (Commissioning).



**? The display blinks and indicates u0, u1, u2, u3, u4, u5, u6, u7, u8 or u9.**
! The signal for monitoring the min. gas pressure (terminal 49) has dropped out at program step X (00 to 09).
• Check the wiring.
• Check the gas pressure.



**? The display blinks and indicates Ac.**
! No "Position for minimum capacity reached" signal from actuator.
• Check the butterfly valve and the function of the limit switches in the actuator.
• Check the wiring.
• Check the actuator.
• If the fault cannot be remedied by doing this, remove the unit and return it to the manufacturer for inspection.



**? The display blinks and indicates Ao.**
! No "Position for maximum capacity reached" signal from actuator.
• Check the butterfly valve and the function of the limit switches in the actuator.
• Check the wiring.
• Check the actuator.
• If the fault cannot be remedied by doing this, remove the unit and return it to the manufacturer for inspection.



**? The display blinks and indicates AI.**
! No "Position for ignition capacity reached" signal from actuator.
• Check the butterfly valve and the function of the limit switches in the actuator.
• Check the wiring.
• Check the actuator.

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• If the fault cannot be remedied by doing this, remove the unit and return it to the manufacturer for inspection.




? **The display blinks and indicates bE.**
! Internal communication with bus module has suffered a fault.
• Connected control elements must be equipped with protective circuits in accordance with the manufacturer's instructions.
▷ This prevents high voltage peaks which can cause malfunctioning of the BCU.
• Use suppressed terminal boots (1 kΩ).
• If the fault cannot be remedied by doing this, remove the unit and return it to the manufacturer for inspection.
! The bus module is defective.
• Replace the bus module.




? **The display blinks and indicates bc.**
! Incorrect or defective parameter chip card (PCC).
• Only the intended parameter chip card is to be used.
• Replace defective parameter chip card.




? **The display blinks and indicates c1.**
! No input signal for the valve proof of closure switch (POC) during standby.
• Check the wiring.
▷ Mains voltage must be supplied to the BCU (terminal 45) if the valve is closed and no voltage is to be applied if the valve is open.
• Check that the proof of closure switch and valve function perfectly, replace defective valves.




? **The display blinks and indicates c8.**
! The BCU is receiving no information as to whether the POC switch contact is still open.
• Check the wiring.
• During start-up, mains voltage must be supplied to the BCU (terminal 45) if the valve is closed and no voltage is to be applied if the valve is open.
• Check that the proof of closure switch and valve function perfectly, replace defective valves.

## Reading off the flame signal, fault messages and the parameters

▷ During operation (display 08), information about the flame signal intensity, the last 10 fault messages and the parameter values can be read off by repeatedly pressing the Reset/Information button.

| Display | Information |
|---|---|
| F1 | Flame signal intensity: burner 1 |
| E0 to E9 | Last fault message to tenth to last fault message |
| 01 to 99 | Parameter 01 to parameter 99 |

• Press the Reset/Information button for approx. 2 s until the display indicates F1.
• Release the button. The display indicates the flame signal intensity in µA.
• Press the Reset/Information button again for 2 s to go to the next item of information (fault message, parameter value).
▷ Each time the button is released, the corresponding fault code or parameter value is displayed.
▷ To go to one of the last fault messages or to a parameter more quickly, hold the Reset/Information button pressed down for longer (≥ 2 s).
▷ If the button is pressed only briefly, the display indicates what parameter is currently being displayed.
▷ The normal program status is displayed again approx. 60 seconds after the last time the button is pressed.

### Parameters and values

| Parameter | Name<br>Values |
|---|---|
| 01 | Burner 1 flame signal switch-off threshold<br>2 - 20 = µA |
| 04 | Flame control<br>0 = Ionization<br>1 = UVS<br>2 = UVD |
| 07 | Burner 1 start-up attempts<br>1 = 1 start-up attempt<br>2 = 2 start-up attempts<br>3 = 3 start-up attempts |
| 09 | Restart<br>0 = No<br>1 = Burner 1 restart<br>4 = Max. 5 burner 1 restarts in 15 minutes |
| 10 | Emergency stop<br>0 = Off<br>1 = With fault lock-out<br>2 = With safety shut-down |

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| Parameter | Name<br>Values |
|---|---|
| 12 | High gas pressure protection<br>0 = Off<br>1 = With fault lock-out<br>2 = With safety shut-down |
| 13 | Low gas pressure protection<br>0 = Off<br>1 = With fault lock-out<br>2 = With safety shut-down |
| 15 | Low air pressure protection<br>0 = Off<br>1 = With fault lock-out<br>2 = With safety shut-down |
| 19 | Safety time during operation<br>0; 1; 2 = Time in seconds |
| 30 | Fan run-up time $t_{GV}$<br>0 - 6000 = Time in seconds |
| 32 | Air monitoring during controlled air flow<br>0 = Off; maximum capacity<br>1 = On; maximum capacity<br>2 = Off; controller enable |
| 33 | Start-up with pre-purge<br>0 = On (see P34)<br>1 = Off; no air control<br>2 = Off; start from ignition position<br>3 = Off; start from closed/min. position<br>4 = Off; start from min. position |
| 34 | Pre-purge time $t_{PV}$<br>0 - 6000 = Time in seconds |
| 35 | Air flow monitoring during pre-purge<br>0 = Off<br>1 = With fault lock-out<br>2 = With safety shut-down |
| 37 | Post-purge time $t_{PN}$<br>0 - 6000 = Time in seconds |
| 38 | Air flow monitoring during post-purge<br>0 = On; maximum capacity<br>1 = Off; maximum capacity<br>2 = Off; ignition capacity<br>3 = Off; controller enable |
| 40 | Capacity control<br>0 = Off<br>1 = IC 20<br>2 = IC 40<br>3 = RBW<br>4 = Frequency converter |
| 43 | Low fire over-run<br>0 = Off<br>1 = Up to minimum capacity |
| 44 | Controller enable signal delay time $t_{RF}$<br>0 - 250 = Time in seconds |
| 61 | Minimum operating time $t_B$<br>0 - 250 = Time in seconds |
| 62 | Minimum pause time $t_{BP}$<br>3 - 3600 = Time in seconds |
| 63 | Switch-on delay time<br>0 - 250 = Time in seconds |
| 67 | Operating time in Manual mode<br>0 = Unlimited<br>1 = 5 minutes |

| Parameter | Name<br>Values |
|---|---|
| 69 | Function of terminal 51<br>0 = Off<br>8 = AND with emergency stop (trm. 46)<br>9 = AND with air min. (trm. 47)<br>10 = AND with air flow monitoring (trm. 48)<br>11 = AND with gas max. (trm. 50)<br>12 = AND with gas min. (trm. 49)<br>13 = Max. capacity position feedback (IC 40/ RBW) |
| 70 | Function of terminal 65<br>0 = Off<br>8 = AND with emergency stop (trm. 46)<br>9 = AND with air min. (trm. 47)<br>10 = AND with air flow monitoring (trm. 48)<br>11 = AND with gas max. (trm. 50)<br>12 = AND with gas min. (trm. 49) |
| 71 | Function of terminal 66<br>0 = Off<br>8 = AND with emergency stop (trm. 46)<br>9 = AND with air min. (trm. 47)<br>10 = AND with air flow monitoring (trm. 48)<br>11 = AND with gas max. (trm. 50)<br>12 = AND with gas min. (trm. 49) |
| 72 | Function of terminal 67<br>0 = Off<br>8 = AND with emergency stop (trm. 46)<br>9 = AND with air min. (trm. 47)<br>10 = AND with air flow monitoring (trm. 48)<br>11 = AND with gas max. (trm. 50)<br>12 = AND with gas min. (trm. 49) |
| 73 | Function of terminal 68<br>0 = Off<br>8 = AND with emergency stop (trm. 46)<br>9 = AND with air min. (trm. 47)<br>10 = AND with air flow monitoring (trm. 48)<br>11 = AND with gas max. (trm. 50)<br>12 = AND with gas min. (trm. 49) |
| 75 | Capacity control (bus)<br>0 = Off<br>1 = MIN. to MAX. capacity; standby in position for MIN. capacity<br>2 = MIN. to MAX. capacity; standby in CLOSED position<br>3 = IGNITION to MAX. capacity; standby in CLOSED position<br>4 = MIN. to MAX. capacity; standby in position for MIN. capacity; burner quick start<br>5 = IGNITION to MAX. capacity; standby in position for MIN. capacity; burner quick start |
| 77 | Password<br>0000 - 9999 |
| 78 | Burner application<br>0 = Burner 1<br>1 = Burner 1 with pilot gas<br>2 = Burner 1 and burner 2<br>3 = Burner 1 and burner 2 with pilot gas |

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| Parameter | Name<br>Values |
|---|---|
| 79 | Pilot burner operation<br>0 = With shut-down<br>1 = Continuous operation |
| 80 | Fieldbus communication<br>0 = Off<br>1 = With address check<br>2 = No address check |
| 93 | Pre-ignition time<br>0 - 5 = Time in seconds |
| 94 | Safety time 1 $t_{SA1}$<br>2, 3, 5, 10 = Time in seconds |
| 95 | Flame proving period 1 $t_{FS1}$<br>0 - 20 = Time in seconds |
| 96 | Safety time 2 $t_{SA2}$<br>2, 3, 5, 10 = Time in seconds |
| 97 | Flame proving period 2 $t_{FS2}$<br>0 - 20 = Time in seconds |

▷ Additional parameters for BCU 570..F2

| Parameter | Name<br>Values |
|---|---|
| 41 | Running time selection<br>0 = Off; checking the positions for min./max. capacity<br>1 = On; for approaching the positions for min./max. capacity<br>2 = On; for approaching the position for maximum capacity<br>3 = On; for approaching the position for minimum capacity |
| 42 | Running time<br>0 - 250 = Running time in seconds, if parameter 41 = 1, 2 or 3 |

▷ Additional parameters for BCU 570..C1

| Parameter | Name<br>Values |
|---|---|
| 51 | Valve proving system<br>0 = Off<br>1 = Tightness test before start-up<br>2 = Tightness test after shut-down<br>3 = Tightness test before start-up and after shut-down<br>4 = Proof of closure function |
| 52 | Relief valve<br>2 = V2<br>3 = V3<br>4 = V4 |
| 56 | Measurement time $V_{p1}$<br>3 = Time in seconds<br>5 - 25 = (in 5 s steps)<br>30 - 3600 = (in 10 s steps) |
| 59 | Valve opening time 1 $t_{L1}$<br>2 - 25 = Time in seconds |

## Legend

| | |
|---|---|
| | Ready for operation |
| | Safety interlocks (limits) |
| HT | High temperature operation |
| | Gas valve |
| | Air valve |
| | Air/gas ratio control valve |
| | Burner |
| P | Purge |
| | Controlled air flow |
| | Burner operating signal |
| | Start-up signal (BCU) |
| | Emergency stop |
| PZ | Pressure switch for valve check (TC) |
| PZH | Pressure switch for maximum pressure |
| PZL | Pressure switch for minimum pressure |
| PDZ | Differential pressure switch |
| Pxx | Input signal<br>depending on parameter xx |
| M | Control element with butterfly valve |
| TC | Valve check (tightness test) |
| $p_u/2$ | Half of the inlet pressure |
| $p_d$ | Outlet pressure |
| GZL | Valve with proof of closure switch |
| | Input/Output, safety circuit |

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## Technical data

### Electrical data

Mains voltage:
BCU 570Q: 120 V AC, -15/+10%, 50/60 Hz, ±5%,
BCU 570W: 230 V AC, -15/+10%, 50/60 Hz, ±5%,
for grounded or ungrounded mains.
Flame control:
with UV sensor or ionization sensor.
For intermittent or continuous operation.
Flame signal current:
ionization control: 1–25 µA,
UV control: 1–35 µA.
Ionization cable, UV cable:
max. 100 m (164 ft).
Contact rating:
valve outputs V1, V2, V3 and V4 (terminals 13, 14, 15, 57) as well as actuator (terminals 53, 54 and 55):
max. 1 A each, cos φ ≥ 0.6,
total current for the simultaneous activation of the valve outputs (terminals 13, 14, 15, 57) and of the actuator (terminals 53, 54, 55):
max. 2.5 A,
fan (terminal 58):
max. 3 A (start-up current: 6 A < 1 s),
signalling contact for operating and fault signals:
max. 1 A (external fuse required).
Number of operating cycles:
The fail-safe outputs (valve outputs V1, V2, V3 and V4) are monitored for correct functioning and are thus not subject to a max. number of operating cycles.
Control actuator (terminals 53, 54 and 55):
max. 250,000,
signalling contact for operating signals:
max. 250,000,
signalling contact for fault signals:
max. 10,000,
On/Off button:
max. 10,000,
Reset/Information button:
max. 10,000.
Input voltage of signal inputs:

| Rated value | 120 V AC | 230 V AC |
|---|---|---|
| Signal “1” | 80 – 132 V | 160 – 253 V |
| Signal “0” | 0 – 20 V | 0 – 40 V |

Signal input current:

| | |
|---|---|
| Signal “1” | max. 5 mA |

Fuses, replaceable, F1: T 3.15A H,
F2: T 5A H, pursuant to IEC 60127-2/5.

### Mechanical data

Weight: 0.7 kg.
Dimensions (W × H × D): 102 × 115 × 112 mm.

Connections:
Screw terminals:
nominal cross-section 2.5 mm²,
wire cross-section (rigid) min. 0.2 mm²,
wire cross-section (rigid) max. 2.5 mm²,
wire cross-section AWG/kcmil min. 24,
wire cross-section AWG/kcmil max. 12.
Spring force terminals:
nominal cross-section 2 x 1.5 mm²,
wire cross-section min. 0.2 mm²,
wire cross-section AWG min. 24,
wire cross-section AWG max. 16,
wire cross-section max. 1.5 mm²,
rated current 10 A (8 A UL),
to be observed in case of daisy chain.

### Environment

Storage temperature: -20 to +60°C (-4 to +140°F).
Ambient temperature:
-20 to +60°C (-4 to +140°F),
no condensation permitted.
Enclosure: IP 20 pursuant to IEC 529.
Installation location: min. IP 54 (for installation in a control cabinet).

### Designed lifetime

This information on the designed lifetime is based on using the product in accordance with these operating instructions. Once the designed lifetime has been reached, safety-relevant products must be replaced.
Designed lifetime (based on date of manufacture):
20 years.
You can find further explanations in the applicable rules and regulations and on the afecor website (www.afecor.org).
This procedure applies to heating systems. For thermoprocessing equipment, observe local regulations.

## Logistics

### Transport

Protect the unit from external forces (blows, shocks, vibration). On receipt of the product, check that the delivery is complete, see page 2 (Part designations). Report any transport damage immediately.

### Storage

Store the product in a dry and clean place.
Storage temperature: see page 22 (Technical data).
Storage time: 6 months before using for the first time. If stored for longer than this, the overall service life will be reduced by the corresponding amount of extra storage time.

### Packaging

The packaging material is to be disposed of in accordance with local regulations.

### Disposal

Components are to be disposed of separately in accordance with local regulations.

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## Accessories

**BCSoft**

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

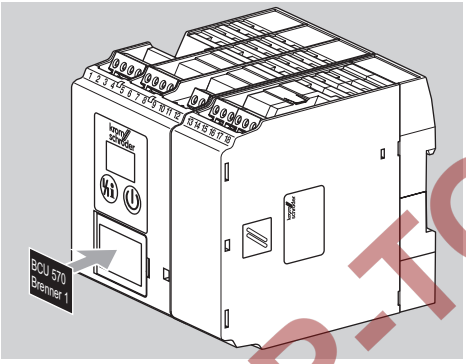
**Opto-adapter PCO 200**

Including BCSoft CD-ROM,
Order No.: 74960625.

**Bluetooth adapter PCO 300**

Including BCSoft CD-ROM,
Order No.: 74960617.

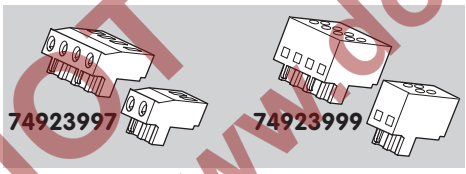
**Stickers for labelling**




For printing with laser printers, plotters or engraving machines, 27 × 18 mm or 28 × 17.5 mm.
Colour: silver.

**Connection terminal set**

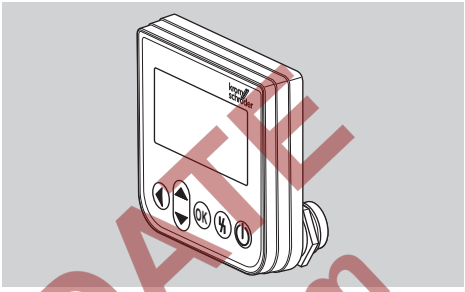
For wiring the BCU.




Plug-in, with screw terminal,
Order No.: 74923997.
Plug-in, with spring force terminal, 2 connection options per terminal,
Order No.: 74923999.

**OCU**

For installation in the control cabinet door. The program status or fault messages can be read on the OCU. In Manual mode, the OCU can be used to proceed through the sequence of operating steps.



| Type | Languages | Order No. |
|---|---|---|
| OCU 500-1 | D, GB, F, NL, E, I | 84327030 |
| OCU 500-2 | GB, DK, S, N, TR, P | 84327031 |
| OCU 500-3 | GB, USA, E, P (BR), F | 84327032 |
| OCU 500-4 | GB, RUS, PL, H, RO, CZ | 84327033 |

## Certification

**Declaration of conformity**

We, the manufacturer, hereby declare that the product BCU 570 complies with the requirements of the listed Directives and Standards.
Directives:

- 2009/142/EC – GAD (valid until 20 April 2018)
- 2014/30/EU
- 2014/35/EU

Regulation:

- (EU) 2016/426 – GAR (valid from 21 April 2018)

Standards:

- EN 298:2012
- EN1643:2014
- EN 61508:2010, suitable for SIL 3

The relevant product corresponds to the tested type sample.
The production is subject to the surveillance procedure pursuant to Directive 2009/142/EC Annex II paragraph 3 (valid until 20 April 2018) and to Regulation (EU) 2016/426 Annex III paragraph 3 (valid from 21 April 2018).
Elster GmbH

Scan of the Declaration of conformity (D, GB) – see www.docuthek.com

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**SIL, PL**

For systems up to SIL 3 pursuant to EN 61508. Pursuant to EN ISO 13849-1, Table 4, the BCU can be used up to PL e.

**FM approved**

Factory Mutual (FM) Research Class:
7610 “Combustion Safeguards and Flame Sensing Systems”
Suitable for applications pursuant to NFPA 86.

**ANSI/CSA approved**

Canadian Standards Association –
ANSI Z21.20 and CSA 22.2

**UL listed**

Underwriters Laboratories – UL 372
Standard for Limit Controls

**Eurasian Customs Union**

The product BCU 570 meets the technical specifications of the Eurasian Customs Union.

**Registered design**
U.S. Patent No. D682,794

**Directive on the restriction of the use of hazardous substances (RoHS) in China**
Scan of the Disclosure Table China RoHS2 – see certificates at www.docuthek.com

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## Contact

If you have any technical questions, please contact your local branch office/agent. The addresses are available on the Internet or from Elster GmbH.

We reserve the right to make technical modifications in the interests of progress.

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