Quick Refernce for Endusers





Sensors uad Systems for Combustion Engineering



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1 General Information

1.1 Validity of these Instructions

This manual is valid for the burner control system BurnerTronic BT300 in any configuration.

The information contained in this document refer to the software versions BT300 v 3.0.0.0 and v 3.1 and UI300 v 3.1. If you use any other software version as mentioned previously some of the described functions may not be available or some available functions are not described in this manual.

1.2 Life Cycle

BurnerTronic BT300 burner management system has a designed lifetime ^{*} of 250,000 burner start-up cycles, which, under normal operating conditions in heating mode, correspond to approx. 10 years of usage (starting from the production date given on the type plate).

This lifetime is based on the endurance tests specified in standard EN230/EN298 and the table containing the relevant test documentation as published by the European Association of Component Manufacturers (Afecor) (www.afecor.org).

The designed lifetime is based on use of BT300 according to the manufacturer's basic documentation. After reaching designed lifetime in terms of number of burner start-up cycles, or the respective time of usage, the BT300 must be replaced by authorized personnel.

1.3 Disposal Notes



The unit contains electrical and electronic components and must not be disposed of together with household waste. Observe local and currently valid legislation.

The designed lifetime is not the warranty time specified in the Terms of Delivery

2 Safety

2 Safety

2.1 German Law on Device Safety

The German Law on Device Safety regulates the following:

Note the instructions for use!

Use the device only in compliance with the instructions, which are contained in this document for BT300 (publication no. DLT1206-13-aEN-008).

Use the device only for the purpose described in this documentation.

Used by trained personnel only.

Only persons whose knowledge and training qualifies them to do so, are allowed to operate and service the device. Note the safety regulations of the burner manufacturer.

To be used in a grounded power line network only!

Electrical connection with devices not mentioned in this manual - only after direct inquiry to the manufacturer or an authorized expert.

Liability for the function of the device shall be transferred to the owner or user.

Liability for the function of the device shall be borne by the owner or user insofar as the device has been used by persons without the necessary knowledge, has been improperly used, serviced or repaired or has been handled in a manner that does not conform to proper use. Modifications to the device with type approval render the type approval null and void. Inputs and outputs of the device and associated modules may only be connected as indicated in this manual.

LAMTEC GmbH & Co. KG is **not** liable for damages occurring as a result of non-compliance with the above instructions. Compliance with the above instructions shall **not** entail any **ex-tension** to the warranty and liability provisions of LAMTEC GmbH & Co. KG's terms of sale and delivery.

Insofar as reference is made to laws, regulations and standards, the basis for these shall be the law of the Federal Republic of Germany.

2.2 Safety Instructions - Common Information

The following symbols are used in this document to draw the user's attention to important safety information. They are located within the chapter where the information is required. It is essential that the safety information is adhered to, and that applies, in particular, to the warnings.

DANGER!

This draws the user's attention to imminent danger. If it is not avoided, it will result in death or very serious injury. The plant or something in its surroundings could be damaged.

WARNING!

This draws the user's attention to the possibility of imminent danger. If it is not avoided, it may result in death or very serious injury. The plant or something in its surroundings could be damaged.

This draws the user's attention to the possibility of imminent danger. If it is not avoided, it may result in minor injuries. The plant or something in its surroundings could be damaged.

NOTICE!

This draws the user's attention to important additional information about the system or system components and offers further tips.

The safety information described above is incorporated into the instructions.

In this connection, the operator is requested to:

- 1 Comply with the accident prevention regulations whenever work is being carried out.
- 2 Do everything possible in the circumstances to prevent personal injury and damage to property.

3 For Your Safety

Please observe the safety instructions to avoid personal injury and damage to property and the environment!

The BT300 is a safety device! The device must not be opened, interfered with or modified. LAMTEC assumes no liability for damages arising as a result of unauthorised interference!

- After commissioning and after each maintenance action check the exhaust gas values across the entire power range.
- Qualified specialist staff are required to carry out all activities (assembly, installation, servicing, etc.).
- The burner or boiler manufacturer will ensure that the BT300 base unit is compliant with protection class IP40 or IP54 for outdoor use in accordance with DIN EN 60 529.
- Before working in the connection area, switch off the power supply to the plant from all poles. Ensure that it cannot be switched back on and that the plant is voltage-free. There is a risk of electric shock when the plant is not switched off.
- Place and secure the protection against contact on the BT300 and on all connected electrical parts. The cover must fulfil the design, stability and protection requirements of EN 60730.
- Plug connectors X30 X34 have no protective separation from the mains voltage. To replace or disconnect the plug connectors, all poles of the plant must be disconnected from the mains.
- After each activity (e.g. assembly, installation, servicing, etc.) check the wiring and parameterisation to make sure it is in good working condition.
- If the equipment is dropped or suffers impact, you should no longer commission it. The safety functions may also be impaired but fail to show any obvious external damage.
- When the ratio curves are being programmed, the adjuster will continually monitor the quality of the plant's combustion (e.g. using an exhaust gas analysis station). In the event that the combustion values are inadequate or the conditions are potentially harmful, the adjuster will take suitable action, e.g. switch off the system manually.
- These operating instructions describe many possible applications and functions and should be used as guidelines. Carry out functional tests on the test bench and/or in the plant application to ensure correct functioning and document the results.

Follow additional instructions to guarantee safety and reliability while operating the BT300:

- Condensation and humidity are to be avoided. If necessary, make sure that the installation is sufficiently dry before you switch it on.
- Avoid static charge having a destructive effect in case of touching the device's electronic components.

NOTICE!

LAMTEC recommends that you use ESD equipment while working on electrics/electronics.

3.1 Mounting Notes

- Please consider protection against contact when installing the BT300. Protection classes as IP 40 - IP 54 are minimum requirements for outdoor use in accordance with EN 60529 and therefore obligatory.
- The protective cover of the BurnerTronic may only be opened by trained, qualified personnel.
- Make sure that settings for safety-relevant parameters are set in line with the requirements
 applicable to each type of combustion requiring monitoring and conform to the applicable

standards (by checking device parameters via operating elements or using remote-control software after commissioning). To verify settings you should also refer to manufacturer's documentation of the combustion plant. Protecting the parameters in level 1 by setting a password will prevent any unauthorised change.

- Save setting values for the actuating elements across the power range of the burner as follows:
 - Quantity of fuel
 - Quantity of air
 - All additional, safety-relevant actuating variables of the combustion
 - While burner is modulating with at least five different firing-rate points
- Make sure that the combustion equipment operates stably and safely throughout the power range and in all combustion modes. For this purpose you should adjust the following values correctly:
 - Actuating elements
 - Parameter settings of the CO/O₂ controller
 - Combustion chamber pressure
 - Fuel pressure
 - Temperature
 - Pressure of combustion air
 - Heating value of fuel
- Ensure the connection between the actuators and control valves is form-fit throughout, gearing this towards the maximum controlling torques of the actuators.
- Only use external flame monitors compliant with DIN EN 298 or DIN EN 230 and authorised for continuous operation. Safety time of flame monitor must not extend 1 s.
- If the valve testing system is activated, connect the supply-side solenoid valve to terminal X01 and the burner-side solenoid valve to terminal X02. Connect the pressure monitor of the valve testing system to terminal X05. Adjust the gas pressure monitor and the dimensions of the test section in order to make sure that the valve testing system is detecting a maximum leakage gas volume of 0.1 % in relation to the gas flow rate (minimum 50 dm³/ h) at maximum combustion heat output.
- Consider the potential danger depending on installation situation and position where thepressure equipment is being installed. Bear in mind the risk of external fire and the impact from traffic, wind and earthquake.
- When fixing duomodul plug-in connectors to insulation displacement technology (IDT) use HZ-M35 a modular crimping tool from Lumberg (see www.lumberg.com).

3.2 Security Advice - Mounting

- Compliance with national safety regulations and standards is obligatory at all times.
- During the assembly and installation process, you must meet the requirements of standards DIN VDE 0100, 0550 and DIN VDE 0722
- To mount the BT300 basic unit, use screw fittings with an M4 thread (UNC32) or an M5 thread (UNC24) and a maximum tightening torque of 1.8 Nm for fastening at all four fixing points. Keep in mind that housings have improved mechanical stability when connected on surrounding contact surfaces.

Connect generally to an even mounting surface.

3.3 Installation Notes

- Lay high-voltage ignition cable always separately and in safe distance from device and other cables.
- Only trained, qualified personnel may open the BurnerTronic's cover.
- Observe local and national regulations when wiring the electric cables inside the burner.
- Tighten the screw terminals of the BT300 using a tightening torque of > 0.5 Nm.
- Supply the feed cable with L, N and PE only. The N neutral conductor must not have potential difference to the PE protective conductor.
- The pre-fuse for the BT300 should be max.10 A slow-blow.
- Phase, neutral and central point conductors must not be interchanged (this would lead to dangerous malfunctioning, loss of protection against contact, etc.).
- The strain relief for the connected cables must comply with standards (e.g. DIN EN 60730 and DIN EN 60335).
- Make sure that no spliced strands can come into contact with any of the adjacent connections. Use appropriate end sleeves.
- The burner manufacturer is obligated to supply unused connections on the BT300 with dummy plugs.
- To replace or disconnect the plug connectors, all poles of the plant must be disconnected from the mains.
- Make a form-fit connection between the actuators and actuating elements for fuel and combustion air, as well as a form-fit connection for any additional actuator element.
- Optional components with safety extra low voltage (SELV) must be safely separated from the mains. Otherwise this can cause an electrical shock or damage the device due to a short-circuit.
- You may connect only passive devices or devices without feedback effects at the 230V outputs of the BT300 (like relays without additional voltage connection). In case of error it must be guaranteed that BT300 is not feeded with 230 V by this terminals.

3.4 Electrical Connection Flame Sensor

Interruptions and losses in signal transmission need to be minimised:

- Do not wire the sensor cable with other cables.
 Flame signal is reduced through line capacities. → Use a separate cable.
- Consider the permitted length of sensor cables.
- The ionisation flame sensor supplied from the mains is not protected against contact. Protection against accidental contact is therefore obligatory.
- Earth the burner according to instructions earthing the boiler itself is not sufficient!
- Position ignition electrode and ionisation flame sensor where spark cannot hit ionisation flame sensor (risk of electrical overloading).

3 For Your Safety

3.5 Commissioning Notes

- Check all safety functions during commissioning!
- There is no feature to prevent RASTx connector plugs being transposed. Therefore ensure the correct assignment of the plant's plugs prior to commissioning.
- Check electromagnetic emissions specific to the application.
- While installing and commissioning the plant, the person in charge of the plant/heating technician needs to document the following:
 - Parameterised values
 - Setting values (e.g. curve progressions)
 - Values describing the fuel/air ratio control.

This data can be printed using LSB remote software or alternatively being kept as a hand-written note.

Retain this documentation and have it checked by the "authority on the subject".

WARNING!

For BT300 parameterisations which deviate from the application standards can be carried out in access level 2. For this reason, check whether the parameterisation is consistent with the corresponding application standards (e.g. EN 298, EN 230, EN 676, EN 267, etc.) or the respective plant has to be approved separately.

WARNING!

While unlocking the safety interlock chain in the mode "BURNER OFF" BT300**does not** lock the system. BT300 prevents a burner start-up until safety interlock chains are locked.

In case your application needs an interlock of the plant while unlocking the safety interlock chain also in "BURNER OFF" mode you must take suitable measures at the plant.

3.5.1 Fuel/Air Ratio Control

- Guarantee proper operation by ensuring adequate excess air.
 In order to do this, set values for fuel and combustion air in such as
 - combustion chamber pressure
 - fuel pressure
 - temperature and the pressure of the combustion air

to ensure proper operation through the entire range of burner firing-rate until next periodic inspection.

- Pay attention to wear and tear of actuators and actuator elements.
- Measure characteristic values of combustion process to document proper operation.

3.5.2 Basic Device

Check the following items prior to commissioning:

- Valves must be assigned correctly to valve outputs on BT300.
- Correct setting of time parameters (especially safety and pre-ventilation times).
- Flame sensor functioning well in case of flame blow-off during operation (incl. flame-out response time) or when parasitic light is present during pre-ventilation period and also at a missing flame formation while end of safety period starts.
- Activated leakage control function of gas valves and correct leakage measurement, when required by an application.

3.6 Tasks fulfilled by "authority on the subject" during Approval Test

By specifying the assigned DIN registration number and product ID number the manufacturer confirms that model BT300 burner control system is consistent with type-tested system.

The connection between actuators and actuator elements for fuel and combustion air and also to any additional actuator elements used must be form-fit.

3.6.1 Checking for Correct Parameterisation in System

While installating and commissioning the plant the person in charge of the plant/heating technician needs to document the following:

- Parameterised values
- Setting values (e.g. curve progressions)
- Values describing fuel/air ratio control.

This data can be printed using LSB remote software or alternatively being kept as a handwritten note.

Retain this documentation and have it checked by the "authority on the subject".

NOTICE!

For BT300 parameterisations which deviate from application standards can be carried out in access level 2. For this reason, check whether the parameterisation is consistent with the corresponding application standards (e.g. EN 298, EN 230, EN 676, EN 267, etc.) or the respective plant has to be approved separately.

3.6.2 Checking the Fuel/Air Ratio Control System

Save setting values (curve parameters) for actuator elements, fuel and combustion air through the complete range of burner firing-rate in sufficient number.

Select setting values of fuel and combustion air considering combustion chamber pressure, fuel pressure, temperature and pressure of the combustion air in order to guarantee proper operation with adequate excess air through the entire range of burner firing-rate.

The burner/boiler manufacturer has to document this by measuring reference values of the combustion process.

3.6.3 Checking Burner Sequencer Part

Check the following:

- Correct setting of time parameters (especially safety and pre-ventilation periods).
- Whether an ionisation flame sensor or a corresponding flame scanner is used since only these are capable of running in continuous operation.
- Functioning of flame sensor in case of flame blow-off during operation, parasitic light being present during pre-ventilation period and missing flame formation at the end of the safety-period.
- Check the performance of all available and/or essential incomming signals, such as for:
 - Air pressure
 - Gas pressure min/oil pressure min
 - Safety interlock chain (e.g. STB)
- Activated Leakage control function for gas valves if required for application purposes.
 - If necessary, ensure a correct leakage quantification.

4 Functional Description

BT300 combines the benefits of an electronic fuel/air ratio control system with up to three motorised actuator elements and optional modules like an analogue output for speed control of the combustion air fan with an electronic burner control unit. The leakage test, flame monitoring system, power control unit and (optional) CO/O_2 controller for control and optimisation of an oil or gas-fired forced-draught burner are all integrated.

BT300 is suitable for virtually all combustion plants. Safety interlock chains, monitors (e.g. gas and air pressure) and sensors are wired directly to the BT300. This greatly reduces the cost of additional relays and wiring. The BT300 is designed to be attached to the burner. The short wiring paths also save money. As a result, BT300 is particularly suitable as standard equipment for monoblock burners.

The compact design of BT300 burner control system also has its advantages during commissioning. Standardisation of wiring and operator interface minimises sources of errors right from the start. Moreover, intelligent display information is making search for errors much easier.

The BT300 is available in five designs:

•	BT320	 2 motorised control outputs 1 continuous output 0 10 V, 0/4 20 mA for speed control of the combustion air fan using VSM100 (optional) intermittent operation
•	BT330	 3 motorised control outputs 1 continuous output 0 10 V, 0/4 20 mA for speed control of the combustion air fan using VSM100 (optional) Approved for continuous operation only in combination with flame sensors capable of running continuously
•	BT331	Same range of functions as BT330 but including following certificates: – DIN EN 61508:2002 parts 1-7 for SIL 3 – Performance Level PLE according DIN EN ISO 13849-1
•	BT340	 3 motorised control outputs Oil-gas dual-fuel operation via DFM300 1 continuous output 0 10 V, 0/4 20 mA for speed control of the combustion air fan using VSM100 (optional) approved for continuous operation only in combination with flame sensors capable of running continuously
•	BT341	Same range of functions as BT340 but also including following certificates: – DIN EN 61508:2002 parts 1-7 for SIL 3 – Performance Level PLE according DIN EN ISO 13849-1

Burner sequencer and fuel/air ratio control can be adjusted for a wide range of combustion conditions by setting parameters. The BT300 for oil and gas can be set to start with and without pilot burner. The integrated leakage test can be run before ignition or after shutting down the burner.

Starting without pre-ventilation using gas is available in accordance with EN676.

The setting of fuel/air ratio curves can be optimised using optional CO/O_2 control during operation. This helps to counteract conditions that interfere with combustion. This ensures a permanent burner operation at the greatest possible efficiency.

Operating and fault messages are displayed by symbols and numbers on UI300 User Interface. Plant-specific configurations and settings of fuel/air ratio control curves are operated via menu of UI300 User Interface.

An operating and start-up counter is integrated.

The optional LCM100 power control unit with two setpoints, external setpoint shift (control by atmospheric condition) and start-up control is also available.

5 Operating Control and Displays

5 Operating Control and Displays

5.1 UI300 User Interface



Fig. 5-1 User Interface

1 Display

- 2 BACK key
- 3 Cursor keys
- 4 ENTER key

Display

The display shows in pictograms:

- the menu structure
- operating status
- parameters
- error messages

Back key



Jump to previous window.

Cursor keys



You navigate in the menu using cursor keys.

You use "left" and "right" keys to move step by step in a selected row. At the end of the selected row the cursor jumps down to the next row, if possible.

In a multiline menu use "up" and "down" keys to switch to other rows.

To display parameters, switch between various fields.

ENTER keys



Press ENTER to call up a menu on the start screen. Select a sub-menu in the menu window. Transfer setting values by pressing ENTER key in a parameter window.

5.2 Menu Functions

The menu is divided into three paths:





MANUAL



SETTINGS

INFO



Select INFO path for information about the following:

- Burner
- Faults/Fault history
- Software version
- Display of check sums
- Serial number
- · Actuator positions (current damper position for each channel)
- Digital inputs/outputs

MANUAL



Select MANUAL to:

- start and stop burner by hand
- adjust internal burner firing-rate

SETTINGS



Select the SETTINGS path for getting information/make changes to:

- Password
- Burner settings (display and settings)
- Actuator elements settings (display)
- Air/fuel control system
- Deletion of curve sets
- Display settings

5.3 Main Menu



1. Use cursor keys $\langle \rangle \rangle$ to select a menu and press ENTER \bigcirc to confirm.

5.4 Information Menu Path

1. Use cursor keys () to select path i and press ENTER (to confirm. *The display shows a menu overview.*



Fig. 5-3 Display Menu overview

- 1 Burner information [selected]
- 2 Serial number
- 3 Fault history
- 4 Configuration of actual value of actuating outputs (display only)
- 5 Software version
- 6 Digital inputs/outputs
- 7 Check sum display

5.4.1 Burner Details

Display operating hours

Use cursor keys to select menu and press ENTER to confirm.
 The display shows the "System Information" menu window.



- 1 Display operating hours [selected]
- 2 No. of burner start-ups

Fig. 5-4 Display "System information"

2. Use keys () to select menu () and press ENTER () to confirm. The display shows the "Display operating hours" menu window.



Fig. 5-5 Display "Operating hours"

Display burner start-ups

1

2

3

4

The display shows the "Start-up counter" menu window.



1 Pictogram burner start-up

Pictogram operating hours

Total number of operating hours (device connected to mains voltage)

No. of operating hours, oil operation

No. of operating hours, gas operation

- 2 No. of burner start-ups, oil operation
- 3 No. of burner start-ups, gas operation

Fig. 5-6 Display "Start-up counter"

5.4.2 Recall Fault History

Display burner faults

1. Use cursor keys (▲) (▲) to select menu and press ENTER (→) to confirm. *The display shows "Fault history selection" menu.*



1 Burner fault pictogram [selected]

- Fig. 5-7 Fault history selection menu
- Use keys (▲) (▲) to select menu (▲) and press ENTER (→) to confirm. The display shows "Fault history" menu.

5 Operating Control and Displays



- 1 Error code-display pictogram
- 2 Fault code (Last 10 faults are stored, no. 01 is the latest fault)
- 3 Diagnostic code 1
- 4 Diagnostic code 2
- 5 No. of operating hours when fault has occured

Fig. 5-8 Fault history menu

NOTICE!

Information concerning fault and diagnostic codes you may find in the list of fault codes. For fault analysis a fault code and diagnostic code D1 or D2 is required.

5.4.3 Software Version

Display software version

Use cursor keys to select menu i and press ENTER to confirm.
 The display shows the "Software version" menu.

1



Fig. 5-9 Software version menu

- Software version pictogram
- 2 UI300 software version (User Interface)
- 3 BT300 software version (BurnerTronic)

5.4.4 Display of Check Sums

Display check sum

 Use cursor keys (▲) (▲) to select menu ^{[L}R_c] and press ENTER (→) to confirm. The display shows "CRC16 check sums" menu.



Fig. 5-10 CRC16 check sums menu

5.4.5 Serial Number

Display serial number

1. Use cursor keys () to select menu and press ENTER () to confirm. *The display shows the "Serial number" menu.*



Fig. 5-11 Serial number menu

- Serial number pictogram
- 2 User Interface serial number
- BurnerTronic serial number

5.4.6 Positions of Actuators

Display positions of actuators

1. Use the cursor keys (▲) (▲) to select menu → and press ENTER (→) to confirm. *The display shows the "Actuators" menu.*



Fig. 5-12 Actuators menu

- 1 Actuator pictogram
- 2 Actuator channel 1 (oil)
- 3 Actuator channel 2 (air)
- 4 Actuator channel 3 (oil)
- 5 Optional channel (OFF; control of frequency converter)
- 6 Actuator's actual position

NOTICE!

The assignment of channels is depending on configuration settings!

5.4.7 Check Digital Inputs/Outputs

Check digital inputs



- Digital inputs pictogram [selected]
- 2 Digital outputs pictogram

Fig. 5-13 Digital inputs and outputs menu

Select menu in and press ENTER ⇒ to confirm.
 The display shows the 1st page of inputs":



- 1 Digital inputs pictogram
- 2 Jump to next page
- 3 Fuel selection oil [no]
- 4 Fuel selection gas [yes]
- 5 Burner start [yes] terminal X10

Fig. 5-14 Page 1 of inputs menu

NOTICE!

Signals of points 3 and 4 are "logical" signals and not "physical" ones. Background information: Some signals may have more than one source (terminal, LSB, field buses, parameters).

Call up 2nd page of inputs

 Use cursor keys → to select the next page and press ENTER → to confirm. The display shows the 2nd page of inputs:



1 Digital inputs pictogram

- 2 Jump to next page
- 3 Oil pressure min present [no] - terminal X05
 - Gas pressure min present [yes] - terminal X05
- 5 Air pressure min present [yes] - terminal X08

Fig. 5-15 Page 2 of inputs menu

Call up 3rd page of inputs



Fig. 5-16 Page 3 of inputs menu

- 1 Digital inputs pictogram
- 2 Jump to previous page
- 3 Jump to next page
- 4 Safety interlock chain oil closed [no] - terminal X06
- 5 Safety interlock chain gas closed [no]
- 6 Safety interlock chain boiler closed [no]

NOTICE!

Signals of points 4 and 5 in *Fig. 5-15 Page 2 of inputs menu* are "logical" signals, not "physical". The BT320/330 supports either oil or gas operation, but cannot be switched. Therefore no separate signals for the oil or gas safety interlock chain are generated. The signal on terminal X06 is thus generally known as burner's safety interlock chain.

Call up 4th page of inputs



Fig. 5-17 Page 4 of inputs menu

- 1 Digital inputs pictogram
- 2 Jump to previous page
- 3 Flame signal present [no] terminal X21
- 4 Fault release [no] terminal X10

5.4.8 Digital Outputs

Check digital outputs

 Use the cursor keys (▲) (▲) to select the menu (↓) and press ENTER (→) to confirm. The display shows "Page 1 digital outputs" menu:



Fig. 5-18 Page 1 digital outputs menu

- 1 Digital outputs pictogram
- 2 Jump to next page
- 3 Fan [on] terminal X25
- 4 Error [off] terminal X24 (adjustable with P 809)
- 5 Ignition transformer [off] terminal X04

Call up 2nd page of outputs

 Use the cursor keys to select the next page and press ENTER to confirm. The display shows "Page 2 digital outputs" menu:



- 1 Digital outputs pictogram
- 2 Jump to previous page
- 3 Jump to next page
- 4 Oil valve 1 [on] terminal X01
- 5 Oil valve 2 [off] terminal X02
- 6 Oil valve 3 [off] terminal X03

Fig. 5-19 Page 2 digital outputs menu

Call up 3rd page of outputs



- 1 Digital outputs pictogram
- 2 Jump to previous page
- 3 Jump to next page
- 4 Ignition valve [on] terminal X03
- 5 Gas valve 1 [off] terminal X01
- 6 Gas valve 2 [off] terminal X02

Fig. 5-20 Page 3 digital outputs menu

Call up 4th page of outputs



Fig. 5-21 Page 4 digital outputs menu

- 1 Digital outputs pictogram
- 2 Jump to previous page
- 3 Oil pump [off] terminal X26
- 4 Fuel selection oil [off] terminal X24 (adjustable with P 809)
- 5 Fuel selection gas [off] terminal X24 (adjustable with P 809)

5.5 Manual Menu Path

MANUAL

ংশ্য

Select MANUAL path to carry out actions as follows:

- 1 Switching burner ON and OFF
- 2 Presetting of burner firing-rate

Display MANUAL menu

 Use cursor keys () to select path () and press ENTER () to confirm. The display shows the "Manual operation" menu.



- 1 Pictogram Manual operation
- 2 Start burner manually [off]
- 3 Adjust burner firing-rate
- 4 Pictogram confirm settings

Fig. 5-22 Menu manual operation

The "Burner ON" control loop does not need to be switched on to start the burner from this menu. The user interface assumes control in this menu.

If there is no "Burner ON" signal from other sources (terminal X10.2) software switches off the burner when you exit the menu.

If you carry out a manual start-up via display BT300 no longer responds to "Burner ON" signal input at connector X10.2. Therefore that limiters, monitors and other similar safety functions must not be operated with this input!

NOTICE!

Leaving of window will terminate manual burner operation!

Adjust burner firing-rate

- Use cursor keys to select adjustment of burner firing-rate in % and press ENTER to confirm i.

NOTICE!

Changes of burner firing-rate are possible only while burner is running.

If you want to adjust burner firing-rate remember to start-up the burner first.

5.6 Settings Menu Path

Display SETTINGS menu

1. Use cursor keys to select menu and press ENTER to confirm. The display shows the menu overview.



5.6.1 Enter Password

Display menu password entry

 Use cursor keys (▲) (▲) to select menu (▶) and press ENTER (→) to confirm. The display shows the password entry menu.



- 1 Password pictogram (selected)
- 2 Enter password
- 3 Access level 2 displayed with access authorisation

Fig. 5-24 Enter password menu

- 2. Use the cursor keys () to select password field you wish to change.
- 3. Change the number with cursor keys $\bigotimes \bigotimes$.
- 4. Confirm password with ENTER 🛞.

5.6.2 Program Sequence

Configure program sequence



- Duration of pre-ventilation [selected]
- 2 Pilot burner oil operation
- 3 Duration of post-ventilation
- 4 Valve leakage test
- 5 Pilot burner gas operation

Fig. 5-25 Overview program sequence

Set pre-ventilation period

 Use cursor keys (▲) (▲) to select menu (▲) and press ENTER (→) to confirm. The display shows the pre-ventilation period menu.



- Pre-ventilation period pictogram
- 2 Setting pre-ventilation time
- 3 Accept value by pressing ENTER

Fig. 5-26 Period of pre-ventilation menu

NOTICE!

Pre-ventilation starts as soon as damper reaches pre-ventilation position and - if you use a VSM - the last but one point of fuel/air ratio curve is passed.

NOTICE!

The second to last channel's position must be lower than the position of the last curve point.

- Use cursor keys () to select the number you want to change.



Fig. 5-27 Secure data transfer

- 1 UI300 pictogram
- 2 BT300 pictogram
- 3 Cancel (backwards)
- 4 Parameter number UI300
- 5 Parameter number UI300
- 6 Transfer by pressing ENTER (flashing)
- 7 Value for UI300
- 8 Value for BT300

NOTICE!

Apply value only if the values for UI300 and BT300 are identical! The parameter value must be confirmed by pressing ENTER within the countdown (8s)!

5. Accept or discard the entry.

NOTICE!

The following sequence of events for confirming or discarding the entry is exactly the same for all parameter entries. Therefore this process is not illustrated again in following explanations of parameter settings.

You will simply find this text: "Accept or discard the entry!"



- 1 Pictogram UI300
- 2 Pictogram BT300
- 3 Parameter number UI300
- 4 Parameter number BT300
- 5 Pictogram discard parameters
- 6 Value BT300
- 7 Value UI300

Fig. 5-28 Display after successful data transfer

The parameter change is transferred to the burner control system!

If both values are identical you apply the value by pressing ENTER. In case of a discrepancy of values terminate the storage process.

b) Cancel parameter changes.
 Select the Back key .
 The change made to the parameter is not accepted.
 The following page appears:



Fig. 5-29 Display of invalid data transfer

Set duration of post-ventilation

1

2

3

4

5

6 7 Pictogram UI300

Pictogram BT300

Value BT300

Value UI300

Parameter number UI300

Parameter number BT300

Pictogram apply parameters



- Post-ventilation period pictogram
- 2 Setting post-ventilation time
- 3 Press ENTER to acceppt setting

Fig. 5-30 Post-ventilation period menu

- Use cursor keys () to select number you wish to change.
- 4. Confirm entry with ENTER \bigotimes .

Accept or discard the entry!

Leakage test functions



1 Leakage test ON/OFF

- 2 Leakage test before ignition
- 3 Leakage test after ignition
- 4 Leakage test period

Fig. 5-31 Leakage test menu

NOTICE!

You require access level 2 to make settings in this function!

Accept or discard the entry!

Activate valve leakage test prior to ignition

- 1. Use cursor keys () to select menu 🛱 and press ENTER 🛞 to confirm.



- Valve leakage test before ignition pictogram
- 2 Display valve leakage test (ON)
- 3 Press ENTER to accept settings

Fig. 5-32 Valve leakage test prior to ignition menu

The valve leakage test is set!

NOTICE!

You require access level 2 to make settings in this function!

Accept or discard the entry!

Activate valve leakage test after flame OFF

- 1. Use cursor keys to select menu and press ENTER to confirm.
- 2. Change the functional state ON/OFF using cursor keys $\bigotimes \bigotimes$ and press ENTER \bigotimes .

The display valve leakage test is shown after flame OFF menu.



- Valve leakage test after flame OFF pictogram
- 2 Display valve leakage test (ON)
- 3 Press ENTER to accept settings

Fig. 5-33 Valve leakage test after flame OFF menu

The valve leakage test is set!

NOTICE!

You require access level 2 to make settings in this function!

Accept or discard the entry!

Valve leakage test period

1. Use cursor keys (▲) (▲) to select menu 👘 and press ENTER (→) to confirm. *The display shows the valve leakage test period menu.*



- Valve leakage test period pictogram
- 2 Set valve leakage test period
- 3 Press ENTER to accept settings

Fig. 5-34 Valve leakage test menu

- 2. Use cursor keys () to select the number you wish to change.

Accept or discard the entry!

Activate pilot burner in gas operation

- 1. Use cursor keys () to select menu 🔛 and press ENTER 😔 to confirm.

The display shows the menu: "pilot burner in gas operation".



- 1 Pilot burner in gas operation pictogram
- 2 Activate the pilot burner in gas operation
- 3 Press ENTER to accept settings

Fig. 5-35 Pilot burner in gas operation menu

NOTICE!

You require access level 2 to make settings in this function!

Accept or discard the entry!

Set pilot burner in oil operation

- 1. Use cursor keys () to select menu 🔝 and press ENTER 🛞 to confirm.

The display shows the menu: "pilot burner in oil operation".



- Pilot burner in oil operation pictogram
- 2 Activate pilot burner in oil operation
- 3 Press ENTER to accept settings

Fig. 5-36 Pilot burner in oil operation menu

NOTICE!

You require access level 2 to make settings in this function!

Accept or discard the entry!

Configuration of actuating outputs

 Use cursor keys (▲) (▲) to select menu 2⁴/₃ and press ENTER (→) to confirm. The display shows the configuration of actuating outputs menu.



- 1 Actuator position pictogram
- 2 Display channel 1, oil
- 3 Display channel 2, air
- 4 Channel active
- 5 Display channel 3, off
- 6 Optional channel, off

Fig. 5-37 Configuration of actuating outputs menu

Curve setting of actuators

1. Use cursor keys \bigotimes to select menu \vdash and press ENTER \bigotimes to confirm.

NOTICE!

Pressing key 🔪 and holding it longer than 2 s in this menu will cause a fault shut-down.

1

The display shows the curve setting menu.





- Ignition position firing-rate point
- 2 Setpoint channel 1, oil
- 3 Actual value channel 1, oil
- 4 Setpoint channel 2, air
- 5 Actual value channel 2, air
- 6 Setpoint channel 3, oil
- 7 Actual value channel 3, oil
- 8 Curve data for this firing-rate point already existing

5 Operating Control and Displays

- 2. Use cursor keys (→) (→) to set firing-rate point and press ENTER (→) to confirm. Set-point channel 1 is chosen (displayed inversely).
- 3. Use cursor keys local to set channels' actuator position.
- Use cursor keys () to switch to next channel.
- 5. Use cursor keys \bigotimes \bigotimes to set actuators' position in the selected firing-rate point.

NOTICE!

Actuators move according to changes immediately to the set position.

If you want to change channel 4 the fan motor must be running.

Accept or discard the entry!

The display switches to the firing-rate selection menu.

6. Use BACK key 🔨 to switch to menu settings after having completed curve settings.

NOTICE!

```
The following firing-rate points are available:
Ignition point , 200, 250, 300, 400, 500, 600, 700, 800, 900, 999
```

7. Set your firing-rate points as described above and press ENTER \bigotimes to confirm.

NOTICE!

If you press key 🔨 while setting firing-rate points your value changes will be discarded.

Set multi-stage oil operation - 1st stage



- 1 Display 1st stage
 - Set-point, air damper position
 - Actual value, air damper position

Fig. 5-39 Multi-stage operation menu

- Select the first stage and press ENTER .
 The actuators move to the pre-set positions.
 The setpoint position of the first activated actuator is displayed inversely.
- 2. Use cursor keys () to set the position of the selected actuator.
- 3. Use cursor keys $\bigotimes \bigotimes$ to switch to a different actuator.
- 4. Press ENTER 会.

The positions of all actuators of the selected firing-rate point are saved. You can select the next firing-rate point.

NOTICE!

If you press the key $\boxed{\mathbf{x}}$ while changing the firing-rate point your changes will be discarded.

NOTICE!

During multi-stage operation, the following points are available: Ignition point ,

1 (first stage),

- $1 \rightarrow 2$ (valve switch-on point, second stage),
- $1 \leftarrow 2$ (valve switch-off point, second stage)

2 (second level),

- $2 \rightarrow 3$ (valve switch-on point, third stage),
- $2 \leftarrow 3$ (valve switch-off point, third stage),

3 (third stage)

NOTICE!

Pre-ventilation starts as soon as the damper reaches pre-ventilation position and - if you use a VSM - the last but one point of the fuel/air ratio curve is passed.

NOTICE!

The points are approached from above by using the overshoot-function. If you use the overshoot-function in operatio, you must program all points from above. Only if you do so, the required position will match the actual position.

NOTICE!

The channels' position in the last but one curve point must be lower than at the last curve point.



Fig. 5-40 3-staged operation



Set staged oil operation - transition from 1st to 2nd stage

- 1 Display valve switch-on point, 2nd stage
- 2 Setpoint, air damper position
 - Actual value, air damper position

Fig. 5-41 Transition from 1st to 2nd stage

The setpoint position for the active actuator is displayed inversely.

- 2. Use the cursor keys () to set the position of the selected actuator.
- 4. Press ENTER 会.

Positions for all actuators of the selected firing-rate point are saved.

You can select the next firing-rate point.

NOTICE!

Set the other firing-rate stages according to this procedure!

Delete firing-rate curves

The display shows the "Deleting curves" menu.



1 Delete curves pictogram

- 2 Delete curves selected
- 3 Confirm deleting of curves

Fig. 5-42 Deleting curves menu

The display shows the confirmation prompt:

1 Back to previous menu

- 2 Deleting values [selected]
- 3 Proceed with deleting values

Fig. 5-43 Confirmation prompt of deleting curves menu

Press ENTER →.
 The curve values will be deleted.
 The display shows the values deleted menu.



Values deleted

Fig. 5-44 Values deleted menu

UI300 display settings



- 1 UI300 pictogram
- 2 Brightness
- 3 Contrast
- 4 Delay for screen saver

Fig. 5-45 Display settings menu

NOTICE!

Value= 0 cannot be entered for the screen saver delay!

5.6.3 Other Displays

No connection between UI300 and BT300



- 1 UI300 User Interface pictogram
- 2 No connection symbol
- 3 BT300 burner control

Fig. 5-46 No connection

Display shown e.g. when using LSB remote software and communication between BT300 and UI300 is temporarily unavailable.

Termination



1 Communication error pictogram connection unavailable

Fig. 5-47 Termination

6 Leakage Test for Main Gas Valves

6.1 Calculation Example

An (approximate) formula for calculating the leakage test monitoring facility is summarised below:

Definitions:	GDW:	gas pressure monitor
	V1:	gas-side safety shut-off device
	V2:	burner-side safety shut-off device
	P _B	barometric air pressure < 1000 mbar
	P _{SU}	lower GDW switching point (falling)
	P _{SO}	upper GDW switching point (rising)
	$\Delta p = P_{SO} - P_B$	GDW switching difference
	PG	gas flow pressure (supply pressure before V1)
	VP	volume of gas line tested
	VL	leakage quantity
	V _{Lmax}	maximum admissible leakage quantity (limit value)
	t _P	testing time (30 s adjustable, default = 20 s)

This means for a maximum gas flow rate of 50 m^3/h the formula is:

$$\begin{array}{l} \frac{V_{P}}{t_{P}} \cdot \frac{\Delta_{P}}{P_{B}} \leq 50 [dm^{3}/h] \implies \frac{V_{P}}{30 [s]} \cdot \frac{\Delta_{P} \cdot 3600 [s/h]}{1000 [mbar]} \leq 50 [dm^{3}/h]; \\ V_{P} \leq \frac{416}{\Delta_{P}} [dm^{3}] \end{array}$$

Insert numerical value in mbar for Δp .

The formula for a gas flow rate of Q > 50 m³/h is:

$$V_P \leq \frac{Q}{0,12\Delta p} [dm^3]$$

Insert the numerical value in m^3/h for Q and in mbar for Δp .

A. Assuming: $\Delta p = 20$ mbar, gas flow rate < 50 m³/h

$$V_P \ \le \ \frac{416}{\Delta p} [dm^3] \ \Rightarrow \ V_P \ \le \ 20.8 [dm^3]$$

i.e. the gas line you want to test must not exceed 20,8 dm^3 , for being able to detect the required leakage quantity.

B. Assuming: $\Delta p = 20$ mbar, gas flow rate = 200 m³/h

$$V_P \le \frac{200}{0.12 \cdot 20} [dm^3] \Rightarrow V_P \le 83.3 [dm^3]$$

i.e. the gas line you want to test must not exceed 83,3 dm, for being able to detect the required leakage quantity of 200 dm³/h.

6 Leakage Test for Main Gas Valves

6.2 Leakage Test with Ventilation Via Roof

The leakage test checks whether or not the main gas valves are leakproof. For this purpose the gas pressure of the supply is analysed.

As leakage test section (space between the two main valves) burns empty whenever the burner is switched off, this part is usually pressureless at start-up (gas pressure > min = 0). This is checked by BurnerTronic. At this point, main gas 1 opens briefly and gas flows into test section (gas pressure > min switches from 0 to 1). This pressure must remain constantly at least while leakage test period (P 311) is running. The leakage test is considered complete then.

If leakage test section is not empty at start-up (e.g. resulting from a previous fault shutdown), main gas valve 2 opens first. The leakage test line is then ventilated (depending on the plant, either in the combustion chamber or through the roof – for wiring proposition, see chapter 6.3 *Exhaust of Test Line Over the Roof*). During leakage test period section is checked whether it remains pressureless or not. Apart from that the process is the same as described above.

The leakage test takes place prior to ignition.

You must connect the pressure monitor for the leakage test line at the "Gas pressure > min" input on plug X05. It also monitors the minimum pressure during operation. If a different minimum pressure should be monitored during operation, the pressure monitor must be inserted into the safety interlock chain gas or into the controller loop (burner ON). You must assure by dimensioning the gas line in a way that leakage test control time is sufficient for detecting reliably a burner gas consumption leakage of 0.1%, but at least 50 dm³/h (at maximum combustion heat output).

NOTICE!

You may only vent 0.05 % of fuel consumption at maximum firing-rate into combustion chamber.



Fig. 6-1 Leakage test process diagram

6.3 Exhaust of Test Line Over the Roof

NOTICE!

Consider diameter of gas line in the roof ventilation. For ventilation, plug X02 is activated for 3 s. Make sure that this period is sufficient even for smallest ventilation line diameter!



Fig. 6-2 Wiring proposition for ventilation of gas line via roof in combination with BurnerTronic

7 Technical Data

7 Technical Data

7.1 Technical Data BT300

Function	
Power supply:	230 V +10/-15 % 47-63 Hz
	115 V +10/-15 % 47-63 Hz (on request)
Maximum backup-fuse:	10 A slow-blow
	To be used only in a grounded power line network!
Power consumption:	max. 30 VA
Switching threshold of ionisation current:	1 μΑ
Digital signal inputs:	Max. line length 10 m
Digital outputs:	3 fuel valves max. 1 A cos φ 0,4 VL fan max. 2 A cos φ 0,4 oil pump max. 2 A cos φ 0,4 ignition transformer max. 2 A cos φ 0,2 alarm output max. 1 A cos φ 0,3
Resolution:	999 digit, 10 bit
Number of curve sets:	BT320/33x: 1 curve set (oil or gas) BT34x: 2 curve sets (oil/gas switchable; DFM300 or LCM100 required)
Number of programs:	unlimited (EEPROM)
Field bus-coupling (optional):	PROFIBUS LCM100 always required
Housing:	Polycarbonate + ABS
Dimensions:	200x115x61 mm
Weight:	1,0 kg
Flammability:	UL-94 V0 (panel: UL-94 V2)
Display	
Display:	128x64 pixel, monochrome White backlighting (dimmable)
Dimensions:	112 x 64 x 24 mm
Weight:	140 g
Housing:	Basic housing: Polyamide glass fibre reinforced LCD-display window: Polycarbonate
Flammability:	Basic housing UL-94 V0 LCD-display window UL-94 V2
Environmental Conditions	

Operation:	Climatic conditions	Class 3K5 according to DIN EN 60721-3
	Mechanic conditions	Class 3M5 according to DIN EN 60721-3
	Temperature range	-20 +60 °C (condensation is prohibited)
Transport:	Climatic conditions	Class 2K3 according to DIN EN 60721-3
	Mechanic conditions	Class 2M2 according to DIN EN 60721-3
	Temperature range	-20 +70 °C (condensation is prohibited)

Environmental Conditions		
Storage:	Climatic conditions	Class 1K3 according to DIN EN 60721-3
	Mechanic conditions	Class 1M2 according to DIN EN 60721-3
	Temperature range	-20 +70 °C (no condensation)
Electronic safety: Degree of protection (DIN EN 6052)		BT300 – IP40 housing IP20 terminals UI300 – IP40 (clamping) IP54 (glued assembly)

Environmental Conditions

Actuators 662R550... 7.2

Function		
Floating time	5 s / 90° at 180 Hz	
Direction of rotation 0° to 90°	right	
Torque	0.8 Nm (both directions)	
Holding torque	0.4 Nm (no power) 0.7 Nm	
Permissible radial load	30 Nm (centre of output shaft)	
Permissible axial load	5 N	
Axial play of drive shaft	0.1 0.2 mm	

Environmental conditions		
Operation	Climatic condition Class 3K3 according to DIN EN 60721-3	
	Mechanical condition	Class 3M3 according to DIN EN 60721-3
	Temperature range	-20 +60 °C (condensation is prohibited)
Transport	Climatic condition	Class 2K3 according to DIN EN 60721-3
	Mechanical condition	Class 2M2 according to DIN EN 60721-3
	Temperature range	-20 +70 °C (condensation is prohibited)
Storage	Climatic condition	Class 1K3 according to DIN EN 60721-3
	Mechanical condition	Class 1M2 according to DIN EN 60721-3
	Temperature range	-20 +70 °C (condensation is prohibited)
Bursting strength	Peak voltage	4 KV
	Repeat frequency	2,5 kHz
Electrical safety	ty Protection class 2 as per DIN EN 60730	

DANGER! \wedge

Danger by electrical shock!

If you don't shut BurnerTronic down befor opening the cover, you may get in contact with conducting parts. This may cause an electrical shock. You may open BurnerTronic only if you have disconnected it all-pole.

► Disconnect BurnerTronic all-pole.

NOTICE!

Damaging the 0,8 Nm actuator by opening the actuator.

If you open the actuator at another part as the cover of the electric connection, you will damage the actuator.

• Do not open the actuator but at the cover of the electric connection.

7.3 Actuators 662R5001... / 662R5003...

Function	662R5001	662R5003	662R5009
Floating time	5 s/90°	5 s/90°	15 s/90°
Direction of rotation 0° to 90°	left - view to the drive shaft		
Effective output torque	1.2 Nm (both directions of rota- tion)	3 Nm (both directions of rota- tion)	9 Nm (both directions of rotation)
Holding torque	0.82 Nm (currentless)	2.8 Nm (currentless)	6 Nm (currentless)
Permissible radial load	100 N (centre of output shaft)		
Permissible axial load	10 N		
Axial play of drive shaft	0.1 0.2 mm	0.1 0.2 mm	
Motor	RDM 51/6 stepper motor		
Angular resolution	0.1°/motor step	0.1°/motor step	0.03°/motor step
Rated resolution encoder monitoring	0,7°		
Monitoring accuracy	± 0,5°	± 0,5°	\pm 1,3125 (is equal to 44 motor steps)
Repeat accuracy	± 0,1°	± 0,1°	± 0,1°
Life cycle	2,000,000 motions forward and back performed on complete actuator range		nplete actuator range
Degree of protection	IP54 according to DIN EN 60529-1		
Weight	1400 g		

Environmental conditions 662R5001/662R5003/662R5009		
Operation	Climatic condition	Class 3K5 according to DIN EN 60721-3
	Mechanical condition	Class 3M5 according to DIN EN 60721-3
	Temperature range	-20 +60 °C (condensation is prohibited)
Transport Climatic condition Cla		Class 2K3 according to DIN EN 60721-3
	Mechanical condition	Class 2M2 according to DIN EN 60721-3
	Temperature range	-20 +70 °C (condensation is prohibited)
Storage	Climatic condition	Class 1K3 according to DIN EN 60721-3
	Mechanical condition	Class 1M2 according to DIN EN 60721-3
	Temperature range	-20 +70 °C (condensation is prohibited)
Bursting strength	Peak voltage	4 kV

Environmental conditions 662R5001/662R5003/662R5009				
	Repeat frequency	2,5 kHz		
Electrical safety	Protection class 2 as per DIN EN 60730			
	NOTICE! Damage of the actuator due to opening the actuators housing.			
You will damage the actuator, if you open the actuator's housing at another (this a ators with $1, 2, 3, 0$ and $9, 0$ Nm)		ator, if you open the actuator's housing at another (this affects actu-		

ators with 1,2, 3,0 and 9,0 Nm).

7 Technical Data



The information in this publication is subject to technical changes.

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