New Oil Burner Controls
BHO 70 Series

Technical Information



Introduction

Danfoss introduces a new series of electronic oil burner controls for control of one and two-stage oil burners with intermittent duty, prepurge, pre-ignition and post-ignition.

The new series replaces the existing types in the BHO 64 series and the LOA 44 and is compatible with these. The new burner controls are constructed completely electronically with a double micro controller as the central control unit and are equipped with relays on all outlets.

The burner control consists of an upper part containing the mentioned steering components and a base containing the electrical connections. The two parts are connected electrically with circuit connectors and held together physically by a spring system as on the existing burner controls.

All types in the new series meet EN230:2005 as regard to undervoltage protection and other things. The new series of burner controls also complies with the RoHS directive and is lead-free throughout.

Programme

BHO 71, BHO 72 and BHO 73 are for burners up to 30 kg/h, BHO 74 is for burners above 30 kg/h and hot-air aggregates (WLE).

BHO 71 is especially for one-stage burners, whereas BHO 72, BHO 73 and BHO 74 are for both one and two-stage burners. All types can be used for burners with or without a preheater.

A programme of new flame sensors (photo units) types LD and LDS for flame monitoring of yellow-flame burners belongs to the series.

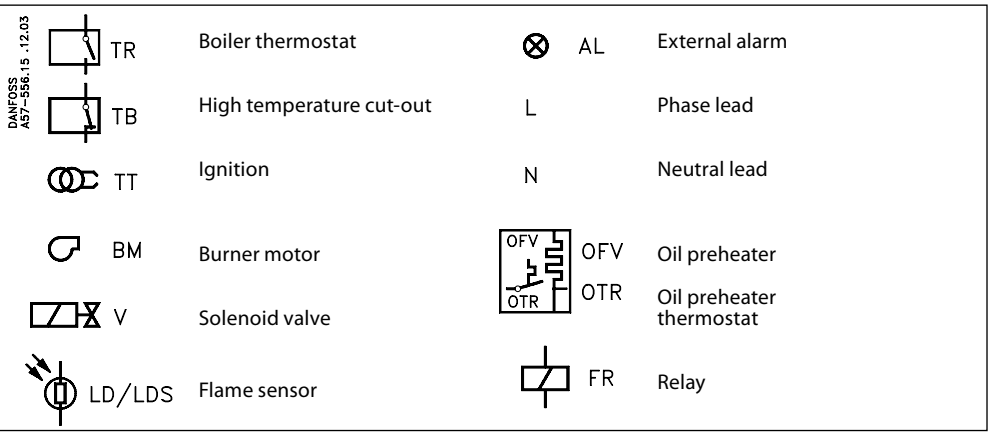
Specifications and code numbers of the sensors are the same as the existing types. This means that the flame current signal is like that of its predecessors and can be measured with the same tools and in the same way. When changing a burner control, it is, however, recommended to replace the sensor, whereas the base can be reused, if it is intact.

Existing Type	New Type	Remarks
BHO 64	BHO 71.10	One-stage system
	BHO 72.10	Two-stage system
BHO 64.1	BHO 72.11	Two-stage system, short prepurge/long post-ignition
BHO 64 A	BHO 73.10	Two-stage system, short post-ignition (terminals 6 and 7)
LOA 44	BHO 74.10	Two-stage burners above 30 kg/h + WLE

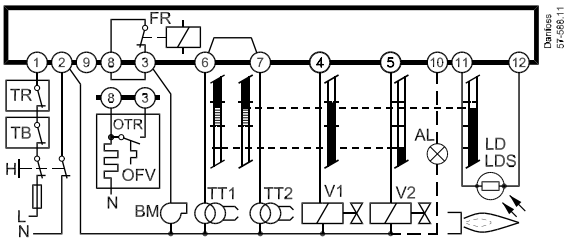
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Symbols

The symbols below are used for explaining the individual electrical tables of functions.



Function



Normal start

When the thermostat TR makes contact, voltage is applied to terminal 1. If no oil preheater is used, terminals 8 and 3 must be linked. If there is an oil preheater, it receives voltage on terminal 8. When the preheater thermostat OTR makes connection to terminal 3, the burner motor starts. At the same time, the programme of the burner control starts the prepurge time and the ignition is cut-in.

At the end of the prepurge time, it is checked that the flame signal with certainty indicates darkness. Hereafter the programme for the safety time starts and opens up for V1.

When the flame is registered by the photo unit, a relay, forming an internal connection between terminals 3 and 8, is pulled in, so that the preheater thermostat no longer needs to be pulled in to keep the burner running.

After a few seconds, the ignition is cut out and the oil burner is in operation. In the case of two-stage operation, V2 opens 5-20 seconds after V1, dependent on the type. Now it is the thermostat that determines when the operating period ends.

False light during start or missing establishment of flame

False light during start-up is registered at the final stage of the prepurge time. In the event of false light, the burner control will lockout.

If a satisfactory flame signal is not obtained, or the safety lockout time has elapsed, the burner control will lockout.

Flame failure during operation

If the flame failure is registered during operation, the oil supply is cut off and the burner is restarted.

In case of more than three flame failures during the same operating period (BHO 74.10, only one flame failure), the burner control will lockout and require a manual reset.

Alarm/reset-function

If a fault occurs, the burner control will lockout, this is shown by a constant red light in the press button. The reason for lockout can be read by means of flash codes in the press button. Press the button and keep it down for 5 seconds, the control will change to show flash codes, see table. The flash code is shown at intervals of 2 seconds, to return to "reset mode" press the reset button and keep it down for 5 seconds.
The control is reset by pressing the reset button shortly.

Note! It is only possible to reset the control in "reset mode".

When reset, the control will try to restart, but if the fault still exists or a new has occurred, the control will lockout again.
All types, except BHO 71.10, have a 230 V a.c. alarm signal on terminal 10.
On BHO 74.10 the connection of remote reset is possible (max. 20 m cable).

In the event of undervoltage, the control will take up a waiting position as described in next paragraph. This is indicated by a flash code of 8 flashes from the press button. When the voltage is within the work area, the flash code stops and the control starts as normal.

Flash codes

Event	Code
False light	2 flashes
No flame when safety time elapses	3 flashes
More than three restarts in the same cycle	4 flashes
Max. waiting time on preheater overrun (10 min)	5 flashes
Supply voltage above 264 V a.c.	6 flashes

Undervoltage protection

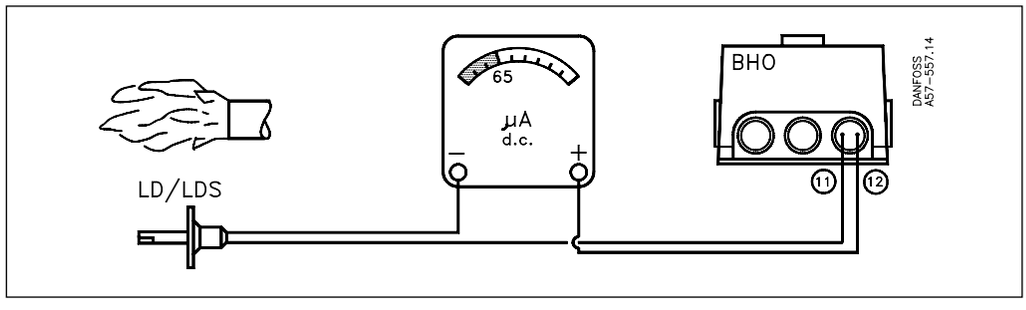
The BHO 70 series is undervoltage protected in accordance with EN230:2005. This means that the control, whatever the value of supply voltage, will always be able to perform a reliable monitoring of the burner. The condition of start for the control is a minimum supply voltage of 185 V.

If supply voltage falls below 170 V during operation, the control will cut out the burner and await for the supply voltage to rise again. When the supply voltage reaches above 180 V, the control will start the burner as normal.

Measuring of current through photo unit

The photo current is measured with a direct current ammeter in series with the photo unit (+ pole on terminal 12. Max. 5 kΩ internal resistance in measuring instrument). With flame, photo current must be at least 65 µA at 230 V.

With no flame, the measured photo current must be max. 5 µA at 230 V.



Terminal rating

Terminal	Max. operating current
3	5 A
4	1 A
5	1 A
6/7	1 A
8	5 A
10	1 A

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Technical data

Rated voltage	230 V~
Operating range	195-253 V~
Frequency	50-60 Hz ± 6%
Consumption	10 VA
Reset	Immediately
Reaction time on flame failure	Max. 1 s
Undervoltage protection	< 170
Protection class	II
Pollution degree	2
Main fuse	Max. 10 A
Cable connection	Plate for 5 PG 11 screwed connections or plate with knockouts
Ambient temperature	-20 to +60°C
Installation	Any position
Enclosure	IP 40
Flame monitoring	LD or LDS
Max. cable length between BHO and LD/LDS	20 m (installed separately)

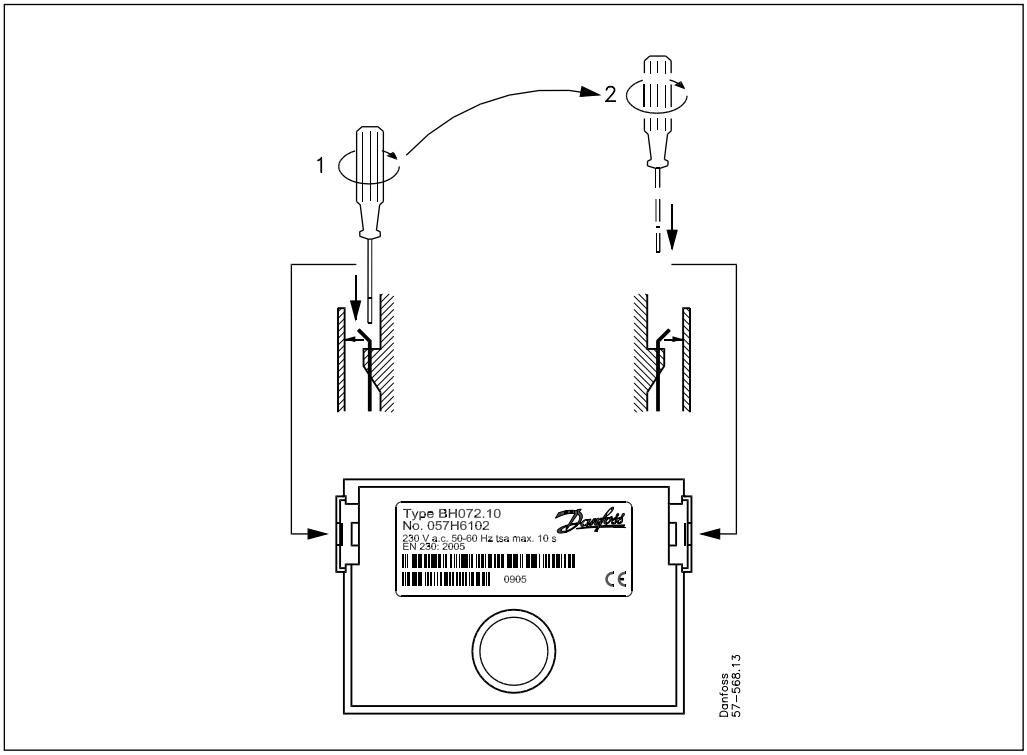
Base

The base of the BHO has 12 terminals for the cable connection.
In addition it is fitted with:

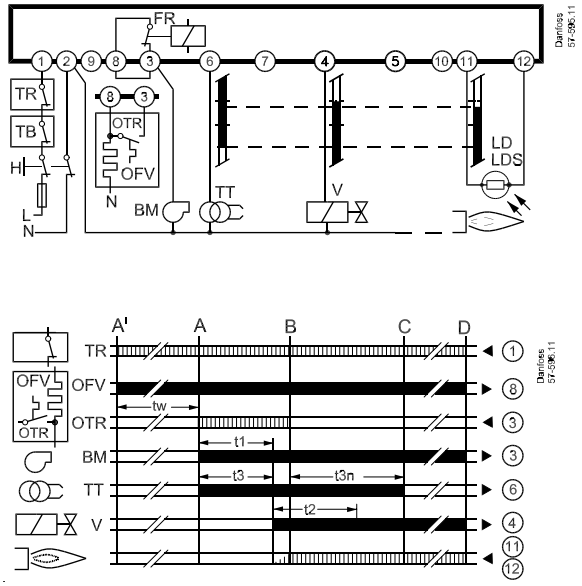
- Three extra neutral terminals connected to terminal 2.
- Four internally connected earth terminals for connection direct to the burner housing via a plate.
- Two loop terminals marked 31 and 32.
- Two Ø54 holes for fixing of base.

Two different front plates are available for the base, both with knockouts. One for cable entry with cable relief, the other without cable relief.

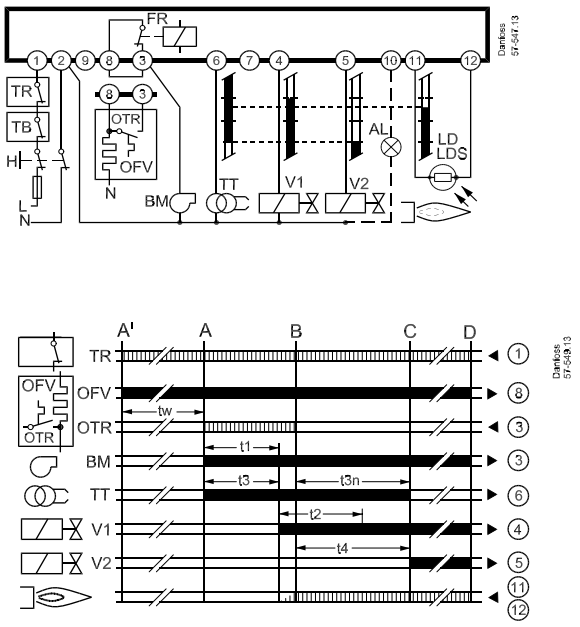
The upper part and base are kept together by a spring system. The upper part can be removed by pressing a screwdriver down into the slot, see drawing.



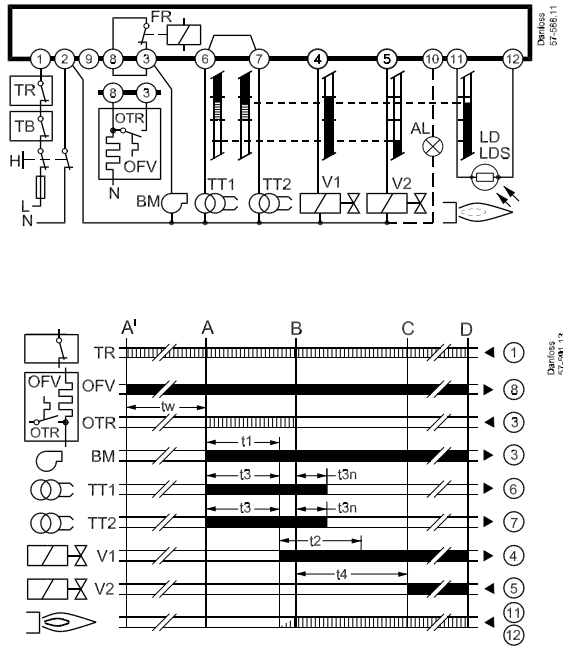
Electrical connections



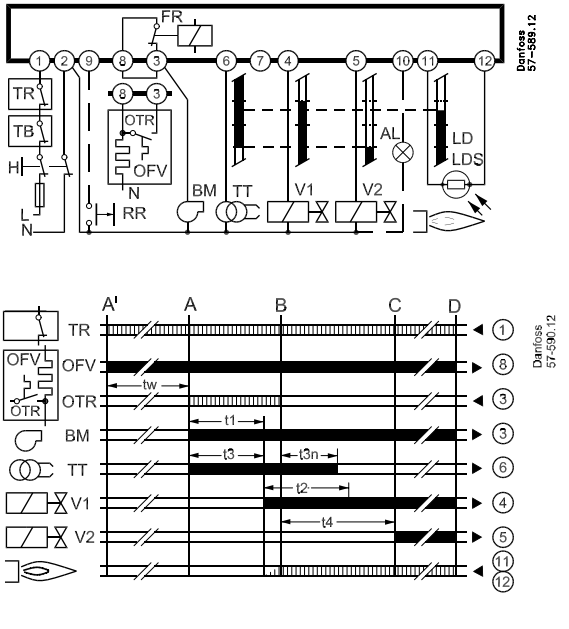
BHO 71.10



BHO 72.10 / BHO 72.11



BHO 73.10



BHO 74.10

Time function/explanation

▬▬	Burner control output signals
▭▭▭	Required input signals
A'	Initialization of burner with oilpreheater OFV
A	Initialization of burner without oilpreheater
B	Flame formation
C	Operating position
D	Burner stop
tw	Heating of oil preheater until ready message through switch OTR
t1	Prepurge
t2	Safety lockout time
t3	Pre-ignition
t3n	Post-ignition
t4	Interval between flame formation and release of valve terminal 5 (V2)

Code numbers

Type	Code no.	Prepurge t1* t3	Post-ignition t3n	Interval V1-V2	Safety time t2 max.
BHO 71.10	**057H6101**	13	15		10
BHO 72.10	**057H6102**	13	15	15	10
BHO 72.11	**057H6103**	6	20	20	10
BHO 73.10	**057H6104**	13	2	15	10
BHO 74.10	**057H6105**	25	2	5	5

* Prepurge time and pre-ignition time are identical.
Due to initialization of the electronics it will, however, last up to 2 sec. before the ignition is coupled.

Photo units

Type	Code no.	Cable length L [mm]	Remarks	Colour
LD	**057H7078**	2000	[5] Long housing, normal sensitivity	Black
LD	**057H7079**	780	[5] Long housing, normal sensitivity	Black
LD	**057H7081**	500	[5] Standard housing, normal sensitivity	Black
LDS	**057H7085**	500	[5] Standard housing, high sensitivity	Red
LDS	**057H7087**	520	[5] Long housing, high sensitivity	Red
LDS	**057H7091**	350	[5] Extra long housing, high sensitivity	Red
LDS	**057H7092**	800	[5] Long housing, high sensitivity	Red
LDS	**057H7093**	500	[5] Standard housing, extra high sensitivity	Light blue
LDS	**057H7094**	600	[5] Long housing, extra high sensitivity	Light blue

5) See page 7. Dimensions

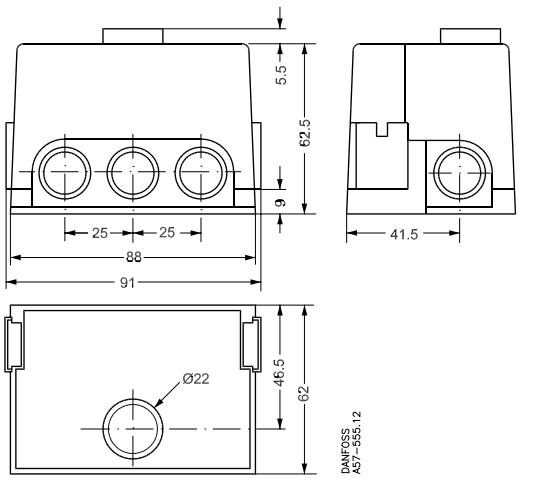
Accessories

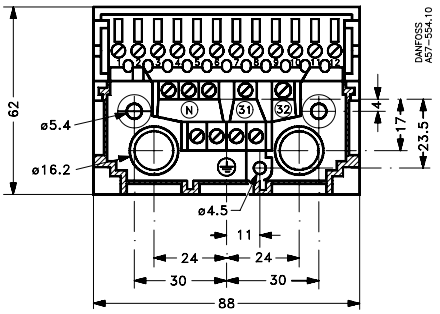
	Code no.	Type	Remarks
Flange	**057H7070**		
Flange	**057H7071**		
Clamping ring	**057H7072**		
Base	**057H7010**		
Front plate[1)]	**057H7011**		With thread for 5 PG 11 screwed connections
Front plate[2)]	**057H7012**		Side : 1×∅ 8.8 mm/∅ 17.5 mm Front : 3×∅ 7 mm +oval 6×20 mm
Adapter	**057H7020**	BHA 11/12	For service market

[2)] For service market.

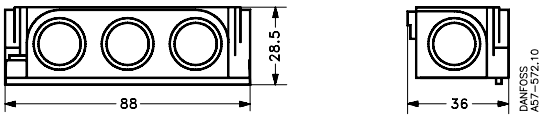
Dimensions

Control with base and front plate

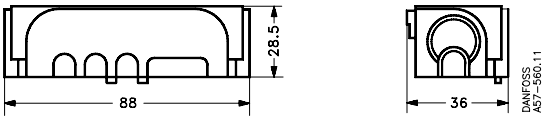




Base 057H7010.
Hatched part is interchangeable

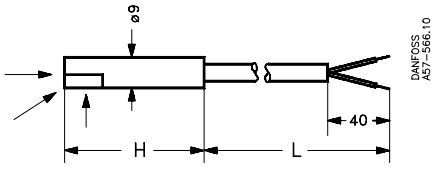


Front plate 057H7011

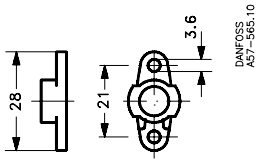


Front plate 057H7012

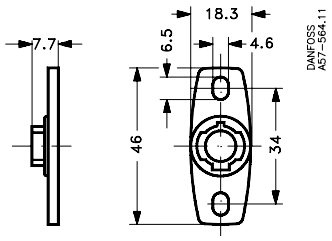
Photo unit LD/LDS



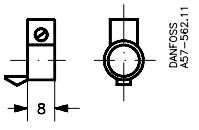
Short housing	H	=	50 mm
Long housing	H	=	65.5 mm
Extra long housing	H	=	105 mm
Cable length	L	=	see page 6



057H7070



057H7071



057H7072

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