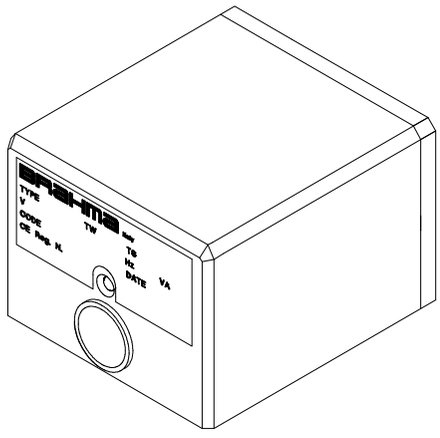
M300 CONTROL BOX

CONTROL BOX FOR FORCED DRAUGHT BURNERS FOR GAS AND OIL FUEL



DESCRIPTION

The M300 control box is suitable for gas forced draught burners for gas and oil fuel for civil and industrial applications, with one flame level.

This control can alternatively employ as detection flame sensor both an electrode, which makes use of the rectification property of the flame (ionization), and a UV phototube.

The “Laboratorio di Macchine e Termotecnica del Centro Studi ed Esperienze” in Rome - Capannelle tested the M300 control for power up to 350KW, which obtained the certification n° 3704/142/77/16 and the approval of the Ministry of the Interior for fire prevention (circulars n°68 and n°42).

TECHNICAL DATA:

Supply voltage:	220V (-15%+10%) 50Hz (±5%)
on request:	110V
Operating temperature range:	-10°C +60°C
Protection degree:	IP40
Starting power consumption:	9 VA
Operating power consumption:	3,5VA
Max. current rating:	I max
- burner motor:	4 A
- EV valve:	2 A
- ignition transformer:	2 A
- alarm:	1 A
- regulators (T, PA, PG):	6 A
Times	
- prepurge time (TV):	30 s
- safety time (TS):	<3 s
- drop out time on running flame failure:	<1 s
Flame control	
- minimum ionization current:	0,5µA
- recommended ionization current:	7µA
- minimum insulation resistance between electrode, cable and earth:	> 50MΩ
- voltage on the detection electrode:	300 V
- recommended operating voltage with phototube:	>15µA
Weight including socket:	600 g

CONSTRUCTION

The components of the control are fixed on a frame made of pressed thermohardening material, with high dielectric resistance. The plastic enclosure protects the control from damages resulting from crashes, incautious opening, dust and contact with the external environment.

Flexible unipolar conductors of different sizes connect the components of the control, except for the flame detection and prepurge control circuit, which is mounted on a printed circuit.

ПРОМЭЛЕКТРОНИКА / sales@prom-elec.com

OVERALL DIMENSIONS

Fig.1 shows the main overall dimensions of the control box inclusive of connecting socket.

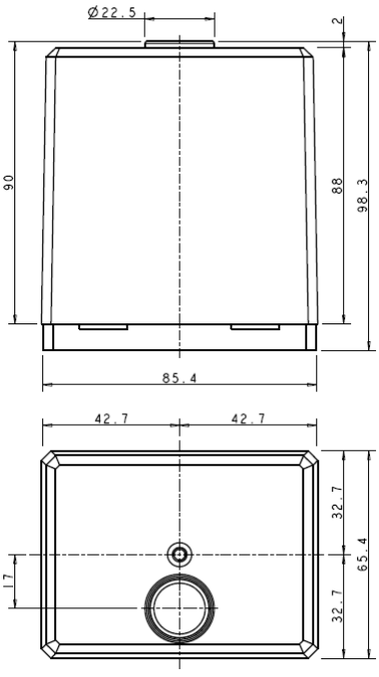


Fig.1

ACCESSORIES

The control is provided with inbuilt reset button and luminous lockout signal.

It can be supplied with UV phototube sensors (see Fig.2) and with kanthal flame detection electrodes in different executions (see, for instance, Fig. 3).

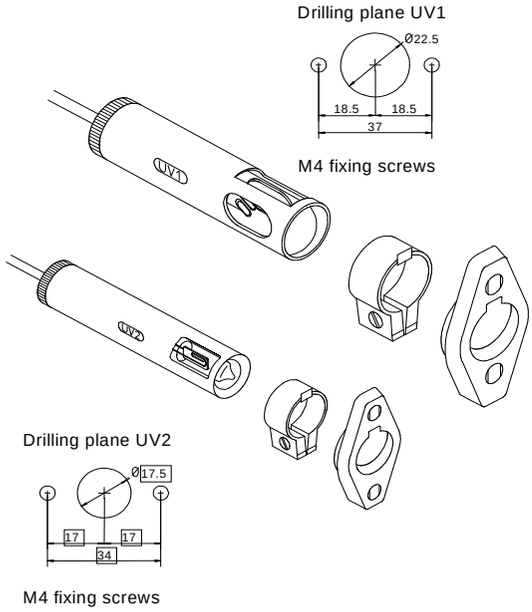


Fig.2

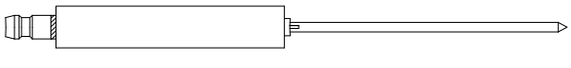
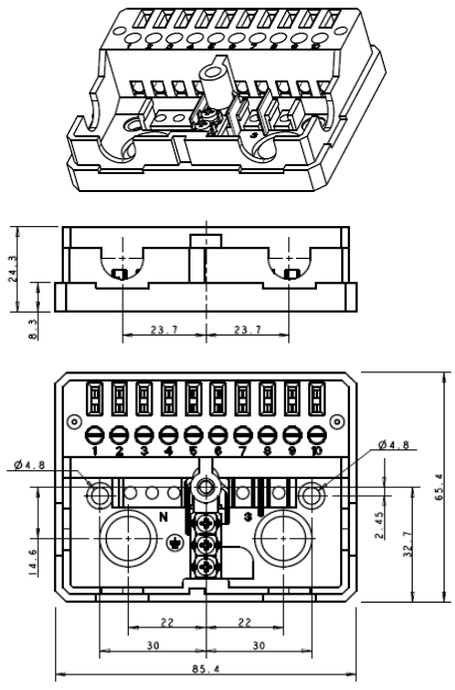


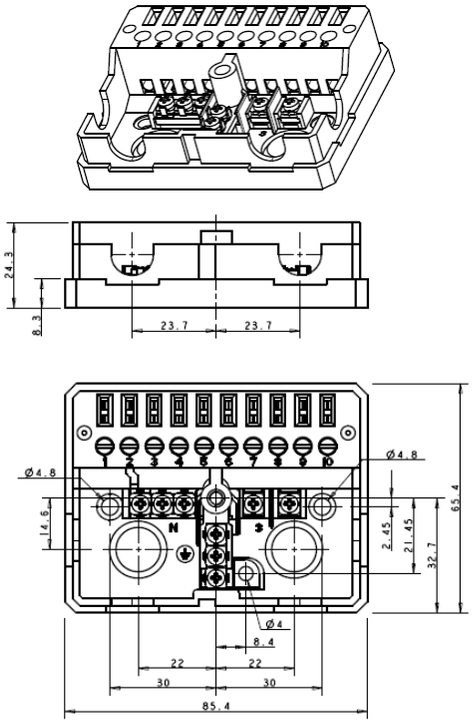
Fig.3

CONNECTIONS

As regards the interconnection system of this control, several solutions are possible and different types of connecting sockets can be employed (see Fig.4 and Fig.5). Socket N (code 18210095) differs from socket A B (code 18210130) for the greater number of terminals connecting neutral.



Sockets AB
Fig.4



Socket N
Fig.5

DIRECTIONS FOR INSTALLATION

- Control boxes are safety devices and must not be opened; the manufacturer's responsibility and guarantee are invalidated if the control is opened.
- For safety reasons a regulation shutdown must occur every 24 hours.
- The control can be mounted in any position.
- Take great care while connecting live and neutral; an inversion in the connection can have dangerous consequences.
- Make sure that the earth terminal of the control, the metal frame of the burner, the earth of the ignition transformer and the earth of the main supply are well connected.
- Make sure that the discharge of the ignition transformer does not hit the detection electrode.

ПРОМЭЛЕКТРОНИКА / sales@prom-elec.com

- The connecting cable of the detection electrode must not be longer than 20 meters.
- Avoid putting the detection cable close to power or ignition cables.
- Use a heat resistant cable and detection electrode, well insulated to the ground and protected against humidity or water in general.
- Always check the control before the first start and also after any replacement or after a long period of non-operation of the system. In particular make sure that:
  - The connections are corresponding to the above scheme.
  - The intervention of limiters or safety devices causes a safety shutdown according to the application.
  - The flame signal level is high enough.
- A short circuit between detection electrode and burner casing does not cause any flame simulation.
- In operating state, a leakage to earth of the detection electrode causes the lockout of the control.
- If the system is not provided with air pressure switch, terminals 4 and 6 have to be short-circuited.

THERMIC TIMERS

The safety time is obtained by means of a compensated thermic timer. The fixed value of 220 V/20°C does not vary of more than 4% with voltage (-15% +10%) and temperature (-10 +60°C) variations.
A further timer allows to have a postpurge time of about 5 seconds before the lockout.
The prepurge time is given by a compensated thermic timer too. This timer, combined with the corresponding electronic circuit, allows a minimum prepurge time of 30 seconds even in case of voltage variations (-15 +10%), ambient temperature variations (-10 +60°C), interruption of the current supply for any time, or frequent and repeated starts of the unit.

OPERATING CYCLE

When thermostats and gas pressure switch are closed, the control box supplies the burner motor and the TP thermal. Consequently, the BRA relay is energized and causes the switching on of its contact 1A. During this period, the device carries out a self-check: if the RF relay contacts are in flame-on position (flame simulation), the 1RF contact stops TP and supplies the BF thermal, causing in this way a lockout after about 5 seconds. Otherwise, the TP warming up causes the commutation of its contact 1TP after about 25 seconds; this contact stops supplying TP and BF and energizes BRB, BRC and their supply and stabilization network Δ3.
In case the PA is not closed, the BRB relay deenergizes and remains in this condition. Consequently, the BRC relay cannot be energized and the control box continues the prepurge stage.
On the contrary, in case of normal operation (PA closed), the BRB relay restrains and the switching of its contact 1B enables the BRC relay to be energized.
After at least 30 seconds, the TP cooling takes its 1TP contact back to off position.
The BRB and BRC relay contacts, switched in running position, supply the BF thermal, the ignition transformer and the valve at the same time.
The transformer and the valve are only supplied during the safety time, which is determined by the deenergization of BRC, taking place 2 seconds after the switching of the TP contact.
If the burner starts running within these 2 seconds, the switching of the BRF flame relay contacts (1RF and 2RF) stops the supply to the BF lockout thermal and keeps the valve supplied.
Flame failure prevents the switching of 1RF and 2RF; therefore only the BF lockout thermal is still supplied, causing a lockout after 3 seconds.
If the flame extinguishes in normal running state, the control closes the valve in less than 1 second and performs a lockout after a postpurge time of about 5 seconds.
The operating cycle given above does not require the use of the RT1 spark control, although the control unit is prearranged for the use of this particular device. In this case the fuel valve is supplied only after the spark of the ignition transformer is detected.
The RT1 device has to be assembled as shown in Fig. 6.

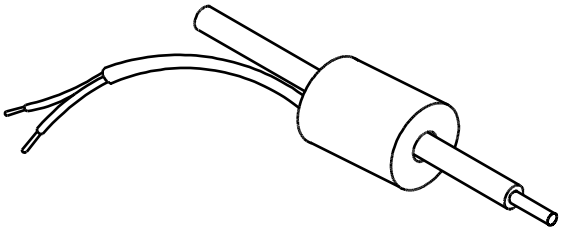


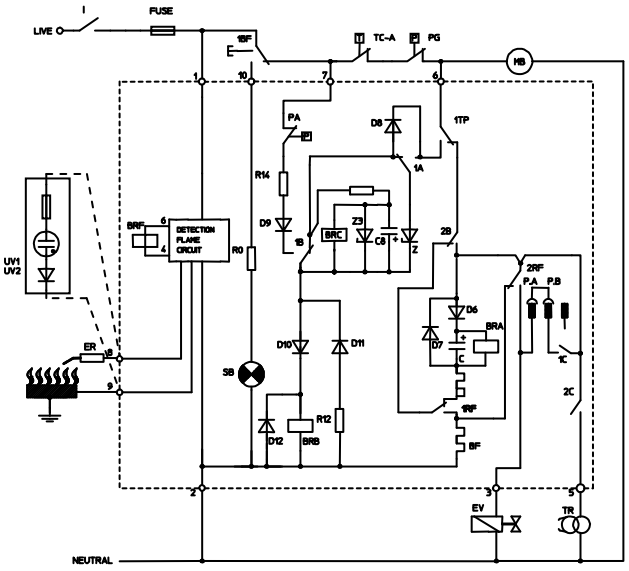
Fig.6

The bottom side of the M300 control box is provided with a moving outlet with an indication arrow: when this arrow is pointed towards “A”, the appliance is prepared for spark detection and control; when the arrow points towards “B”, the device is used without spark control.

Abnormal operation:

- Air flow at start
  The control performs a lockout after 5 seconds.
- Air flow failure
  The prepurge stage continues, while valve and ignition transformer are not supplied. This situation occurs even if the commutation time of the air pressure switch is > 20 seconds.
- Parasitic flame
  The presence of a parasitic flame signal at start, or a fault in the flame detection circuit leading to the same condition, cause a lockout after about 5 seconds.

ELECTRICAL SCHEME

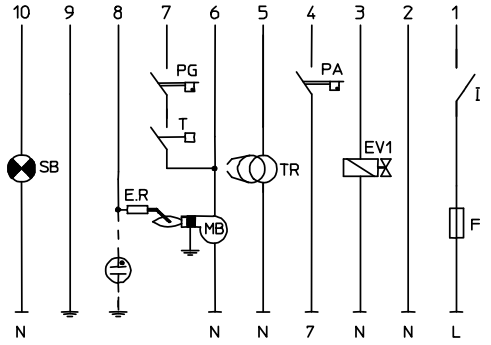


BF	Lockout and postpurge	EV	Gas valve
BRA	Granted prepurge relay	PA	Air pressure switch
BRB	Operation relay	SB	Lockout signal
BRC	Safety time relay	TP	Thermal programmer
BRF	Flame detection relay	UV	UV phototube
ER	Detection probe		

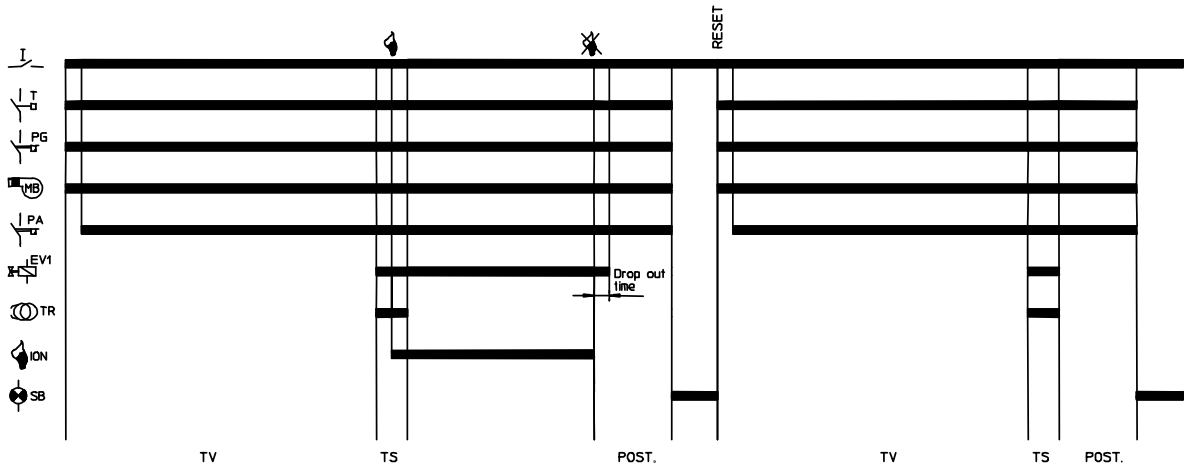
RESET OF THE CONTROL

To reset the control after a lockout, act on the button after waiting for the restoration of the lockout thermal, which normally takes about 20 seconds.

CONNECTION DIAGRAM

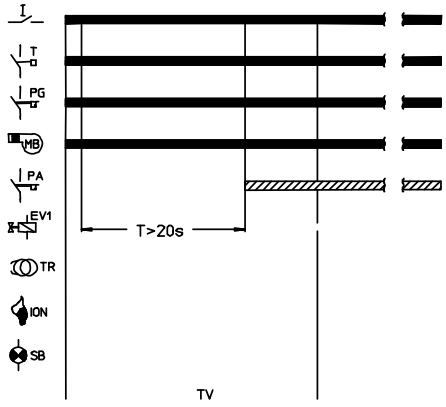


OPERATING CYCLES

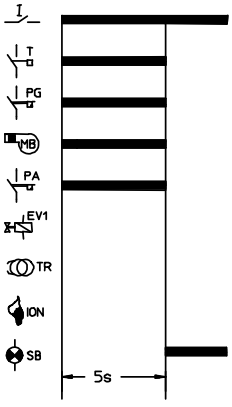


Abnormal operation

Air flow failure

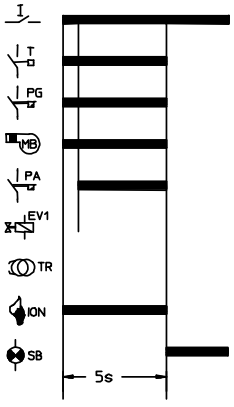


Continuous prepurge state with switching time of PA>20s. or pressure switch opening in running state.

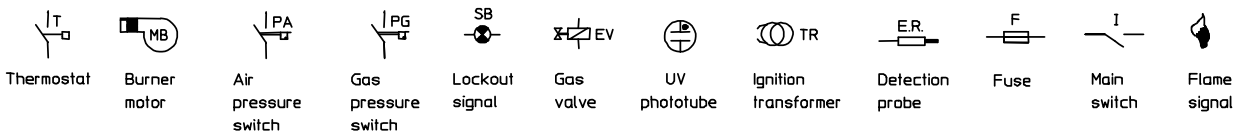


Air flow at start

Parasitic flame



Flame signal at start



ATTENTION -> Company Brahma S.p.A. takes no responsibility for any damage resulting from Customer's tampering with the device.

BRAHMA S.p.A.
Via del Pontiere, 31
37045 Legnago (VR)
Tel. +39 0442 635211 - Telefax +39 0442 25683
http://www.brahma.it
E-mail : brahma@brahma.it

12/04/26 Subject to amendments without notice