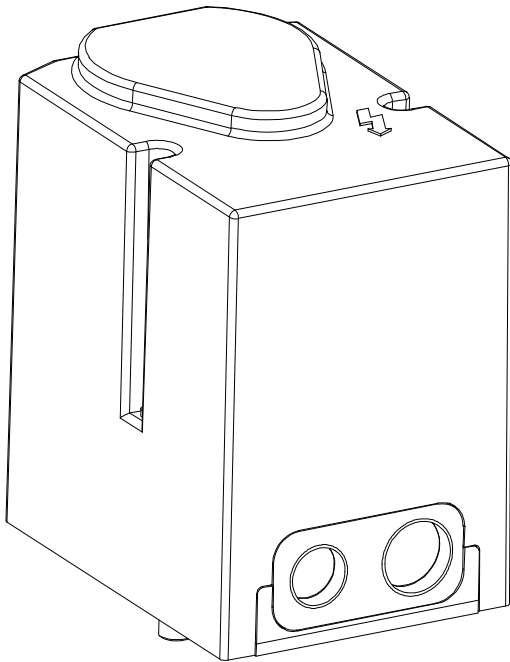


MOTORIZED AIR DAMPER**GENERAL DESCRIPTION**

The motorization of the SAL series air damper helps, like others of its kind, to automate the air damper opening in monobloc gas burners. Since this product has a special application it can be used with microcontroller burner controls of the Eurogas series type VM44/G produced by Brahma S.p.A and with other similar controls existing in the market. For electrical, mechanical and functional features of the above-mentioned control see related technical sheet on www.brahma.it. The air damper is equipped with four microswitches activated by the respective cams coupled to the driving shaft with the following functions

- a) Positioning for the first stage ignition;
- b) Maximum opening positioning;
- c) Full closure positioning;
- d) Control of the second stage or of the ignition device.

If no request occurs the air damper is in its full closure position. The mechanical dimensions and fastening holes of the air damper are compatible with other air dampers existing in the market, as shown by paragraph "mechanical dimensions".

GENERAL FEATURES

The basic features of the air damper are the following:

- Protective casing made of plastic material;
- Synchronous motor with two running directions and a rotation speed related to the supply voltage frequency and not to the load;
- Manual adjustment of the switching point of the microswitches controlled by the respective cams;
- Compatibility with other air dampers available in the market;
- The operation of the air damper is related to the final application type where it is used.

TECHNICAL DATA**• Electrical**

Supply voltage:	230Vac ±10%
on request	110Vac ±10%
Supply voltage frequency :	50/60Hz (*)
Consumption :	7.5VA
Operating temperature:	0°C ÷ 60°C
Humidity:	< 95%
Protection degree:	IP40
Cable input:	screw housing 1 x PG9 ed 1 x PG11 with breakthrough wall
Cables connection:	screw terminal block for cables with a cross-section between 0.5 and 2.5 mm ²
Number of auxiliary switches:	1
Auxiliary switches rating:	250Vac - 2A
Number of Internal relays:	2 o 3
Relays contact rating:	250Vac - 2A

(*) With a 60Hz supply frequency the motor rotation speed increases by 20%, therefore the travel times turn out to be shorter (7.5s ⇒ 6.25s - 15s ⇒ 12.5s)

• **Mechanical**

Dimensions: 76x105x115mm
 Weight: circa 550g
 Base and cover material: 30% fibreglass-reinforced nylon
 Cams material: 30% fibreglass-reinforced PA6
 Rotation direction: Clockwise or anticlockwise (with the driving shaft of the servomotor in front view)
 Max. torque: 2Nm
 Microswitches activation: via cams
 Limit switch number: 3
 Driving shaft: See paragraph "Mechanical dimensions"
 Max. opening angle: 160°
 Travel time: 7.5s for 90° optional 15s for 90°
 Fixing: See paragraph "Mechanical dimensions"

INSTALLATION DIRECTIONS

- The applicable national and European standards (ex. EN60335-1 / EN60730-1/EN50165) related to the electrical safety must be respected.
- Phase-neutral polarity must be respected, otherwise dangerous conditions might occur.
- Before starting the system check the wiring carefully. Wrong connections can damage the device and compromise the plant safety.
- Setup operations (calibration of the cams switching angles) and/or maintenance operations must be carried out by qualified technicians only, since it is possible to come into contact with energized parts once the protection cover is removed.
- The system can be mounted in any position.
- Make sure that the device is well connected to the earthing system through the appropriate tongue for the 6.3x0.8 mm terminal.
- Avoid exposing the air damper to dripping water, moisture or ice.

OPERATION CYCLE

Setting the switching angles of the cams on the microswitches

The operations described hereunder should be carried out by skilled technical staff only; as the air damper is powered, and it is therefore advisable to be careful in order to avoid any accidental contact with energized parts. With reference to the following figures, the microswitches, operated by the respective cams, have the following functions, regardless of the driving shaft rotation direction:

- SW1: Max. opening position switch;
- SW2: fully closed position switch;
- SW4: 1st stage ventilation switch;
- SW3: 2nd stage activation/deactivation switch.

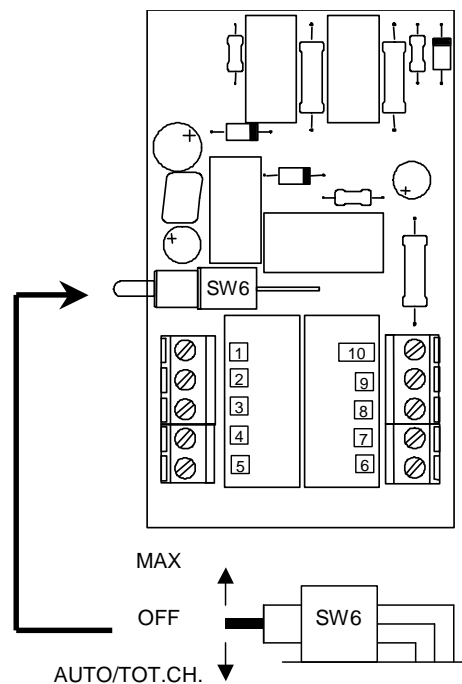
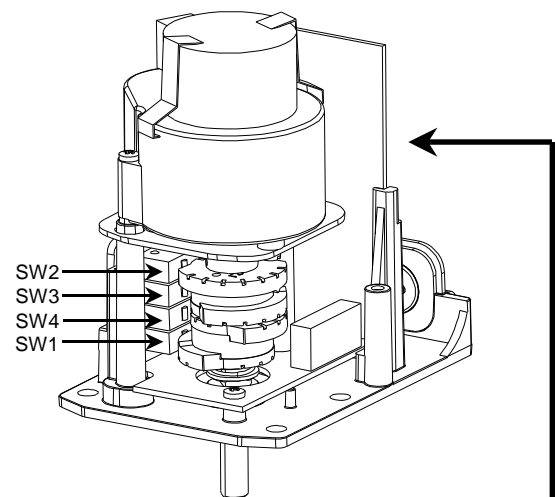
In order to determine the switching point of the various microswitches, once removing the protection cover, the SW6 bistable switch must be switched to the central

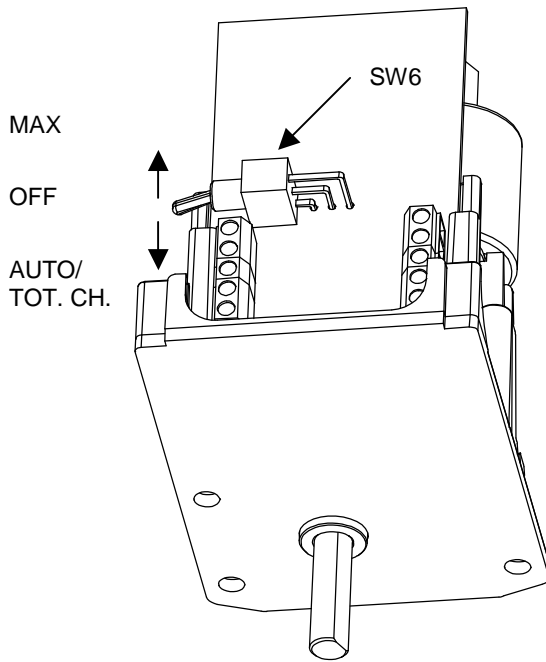
neutral position, to let the driving shaft rotate in one direction or in the opposite one, if necessary.

In order to set the cam switching point, the cam index must be positioned on the required operation angle appearing on the graduate scale. The cam positioning must be carried out by inserting a small slotted screwdriver in the grooves on the cam body.

Once the calibration operations are terminated, the SW6 selector must be switched back to the AUTO/TOT. CH. position in order to let the servomotor turn back to the starting position (fully closed position) and be in operating status towards the control appliance it is connected to, then the protection cover must be remounted.

In case a manual starting of the driving shaft is not required (setting of the device switching angles only), it is not necessary to switch the SW6 selector; in addition, it's recommended to disconnect the servo control from the mains supply in order to avoid any accidental contact with energized parts.





Operation

As already anticipated in the “general features” paragraph, the air damper has several functions according to the final application where it is employed. In particular, we can have:

- 1) Air damper employable in modulating operation burner or two-stage and prepurge operation burner in normal load position where the eventual second stage is activated and deactivated by means of the servomotor;
- 2) Air damper for modulating operation burner or two-stage and prepurge operation burner in normal load position, where the ignition device is controlled by the air damper only when the ventilation position for the first stage is reached.

Regardless of the employed typology previously described, the operation cycle of the air damper is as follows.

When the burner is in no-heat-demand (stand-by) status, the air damper is in closed position (0°).

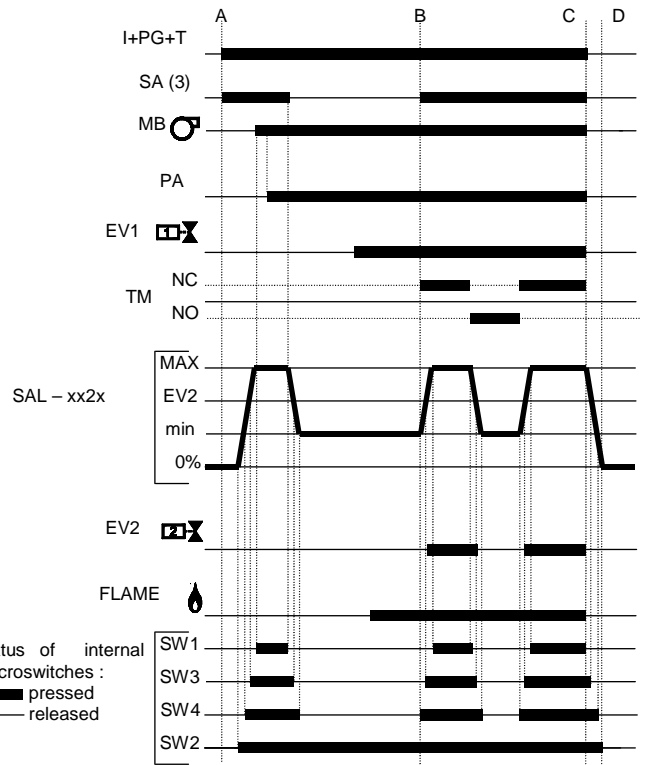
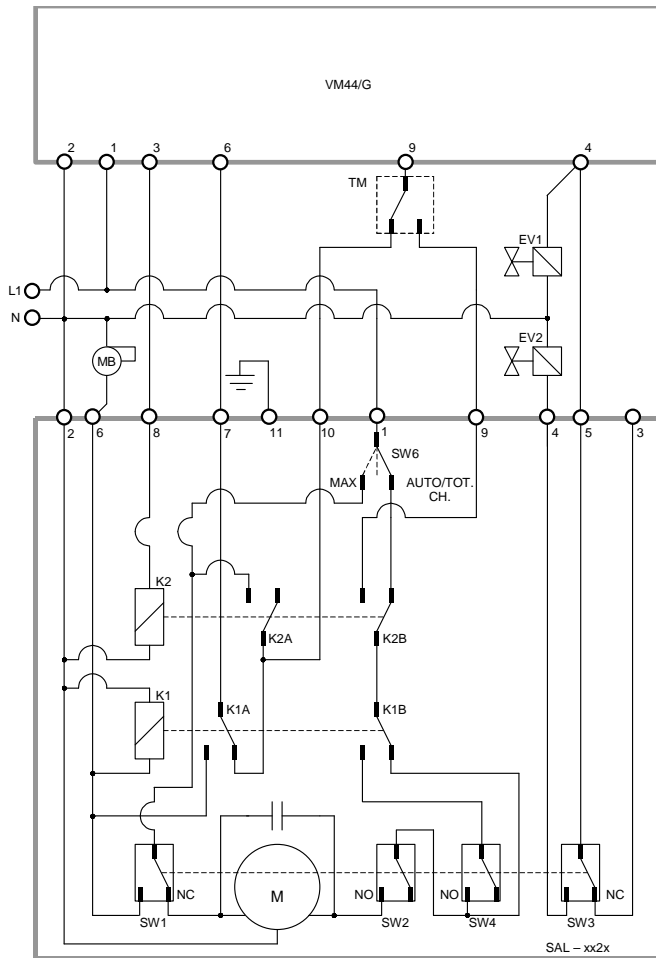
When the thermostats connected to the VM44/G controller are closed, the lines connected to terminals 7 and 8 of the servomotor are activated, and so the driving shaft starts rotating until reaching the max. opening position, after which the motor stops automatically and the fan is activated. The air damper keeps this status during the entire ventilation time t_2 of the VM44/G controller.

At the end of the up-mentioned time and after the phase to terminal 8 has been removed, the air damper switches to the min. air flow position for the first stage, once the commanded state is reached the motor stops automatically.

If flame is detected at the end of the ignition sequence, this operative status is kept until the VM44/G activates the line (phase) connected to terminal 8 and the second valve command output, conversely the air damper switches back to its fully closed position (VM44/G non-volatile lockout with the removal of the line connected to terminal 7). In case the VM44/G controller activates the command line of the second valve and the line connected to terminal 8, the air damper operation depends on the type of the modulation thermostat located in the final application as shown below. In case the air damper is employed to control the ignition device, (as described in the above-mentioned point 2), the aforesaid operation cycle changes only in case the ignition device turns out to be operative only if the “low flame” position is reached, actually the cam which controls the SW4 switch turns out to be integrated with the SW3 activation cam.

Two-stage operation burner with two-wire control

SAL air damper with internal wiring diagram no. 2



N.B. In the above diagram the air damper is in its fully closed position (0%).

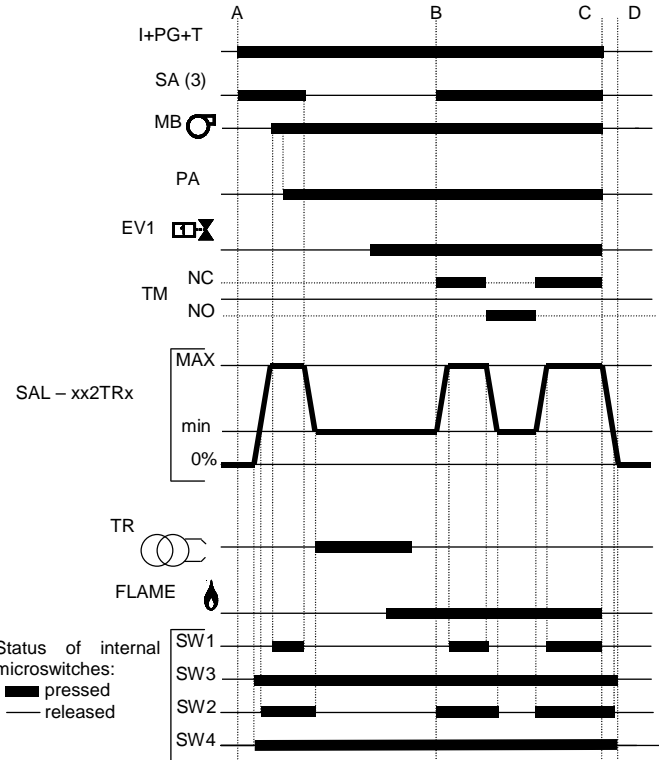
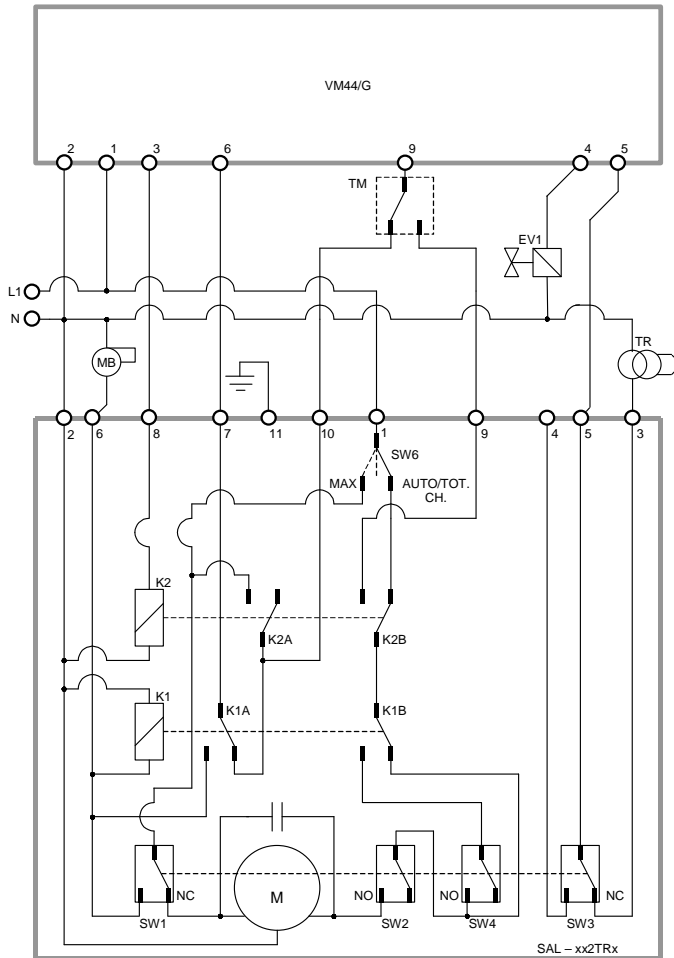
Key to abbreviations:

I+PG+T demand signals (various thermostats)
 MB burner motor
 EV1 1st stage valve
 TM modulation thermostat type SPDT
 SAL – xx2x air damper with 2nd stage control
 0%: fully closed position
 min: 1st stage air flow position
 EV2: 2nd stage ignition contact
 MAX: maximum opening position

EV2 2nd stage valve
 NO normally open contact
 NC normally closed contact
 SAL terminal 11 male fast-on 6.3x0.8
 A burner ignition cycle start-up
 A – B burner ignition cycle
 B – C burner in running status
 C end of demand
 C – D post-purge
 D End of burner controller program

Two-stage operation burner with two-wire control

SAL air damper with internal wiring diagram no. 2TR



N.B. In the above diagram the air damper is in it's fully closed position (0%).

In this case (the air damper controls the ignition device TR), the command cam of the SW3 switch is integrated with the SW4 command cam, therefore the ignition device will be energized only if the first stage purge position is reached. The ignition device command excludes the second stage control and vice-versa.

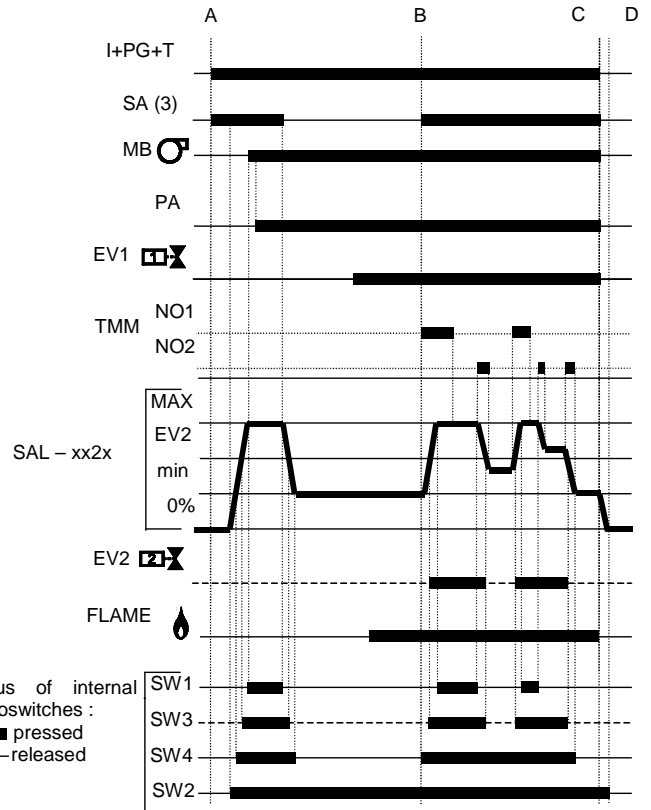
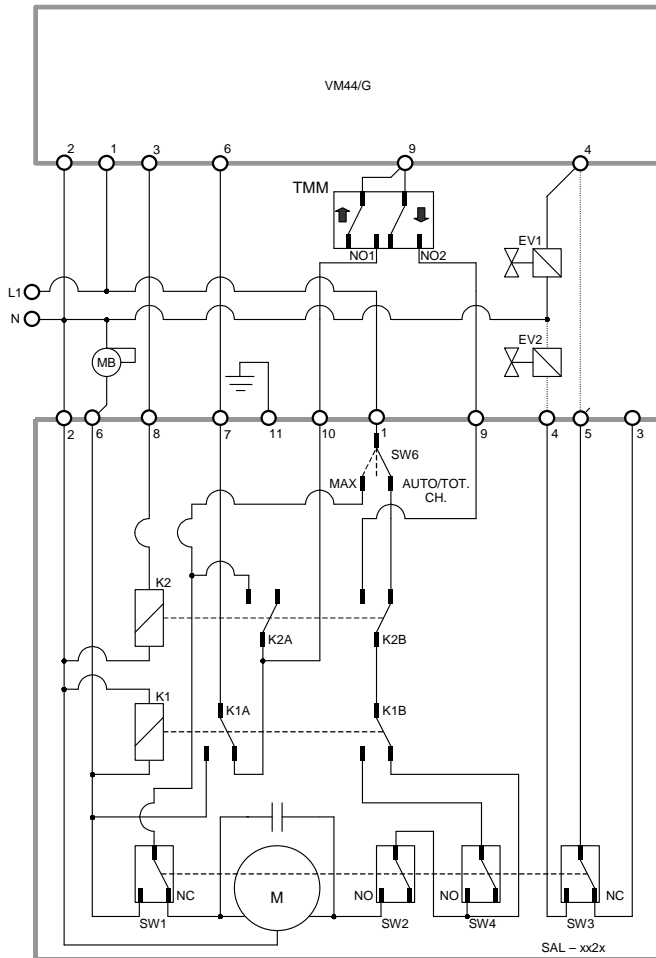
Key to abbreviations:

I+PG+T	demand signals (various thermostats)
MB	burner motor
EV1	1 st stage valve
TM	modulation thermostat type SPDT
SAL - xx2TRx	air damper with ignition device control
	0%: Fully closed position
	min: 1 st stage air flow position
	MAX: maximum opening position
TR	Ignition device

NO	normally open contact
NC	Normally closed contact
SAL terminal 11	male fast-on 6.3x0.8
A	burner ignition cycle start-up
A - B	burner ignition cycle
B - C	burner in running status
C	end of demand
C - D	post-purge
D	End of burner controller program

Modulating operation Burner

SAL air damper with internal wiring diagram no. 2



Status of internal microswitches :
 ■ pressed
 — released

N.B. In the above diagram the air damper is in its fully closed position (0°).

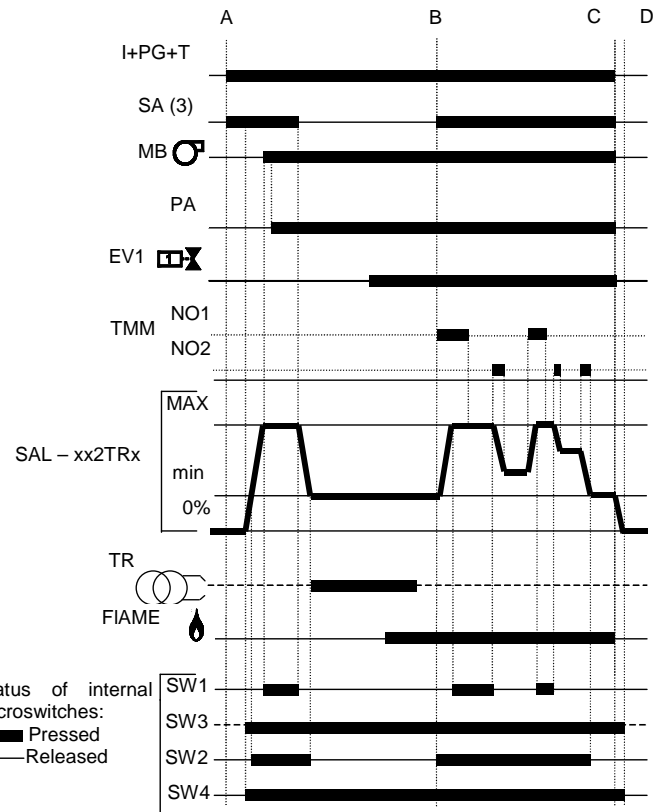
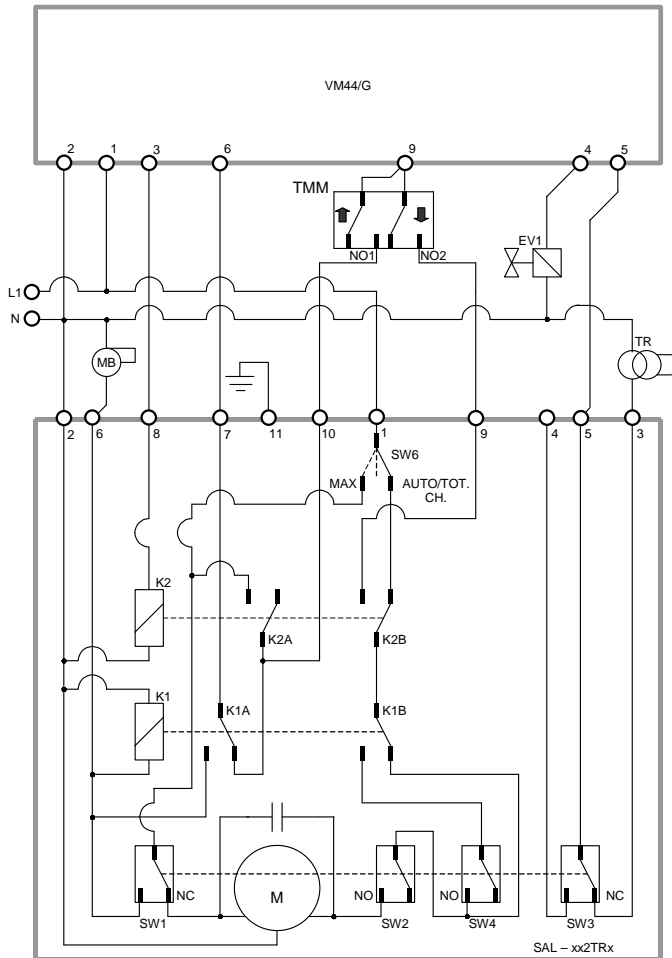
Key to abbreviations:

I+PG+T demand signals (various thermostats)
 MB burner motor
 EV1 1st stage valve
 TMM modulating modulation thermostat (3-position output)
 SAL – xx2x air damper with 2nd stage control (if available)
 0%: fully closed position
 min: 1st stage air flow position
 EV2: 2nd stage ignition contact
 MAX: maximum opening position

EV2 2nd stage valve
 NO normally open contact
 NC normally closed contact
 SAL terminal 11 male fast-on 6.3x0.8
 A burner ignition cycle start-up
 A – B burner in running status
 B – C end of demand
 C – D post-purge
 D End of burner controller program

Modulating operation Burner

SAL air damper with internal wiring diagram no. 2TR



N.B. In the above diagram the air damper is in its fully closed position (0°).

In this case (the air damper controls the ignition device TR), the command cam of the SW3 switch is integrated with the SW4 command cam, therefore the ignition device will be energized only if the first stage purge position is reached. The ignition device command excludes the second stage control, if available, and vice-versa.

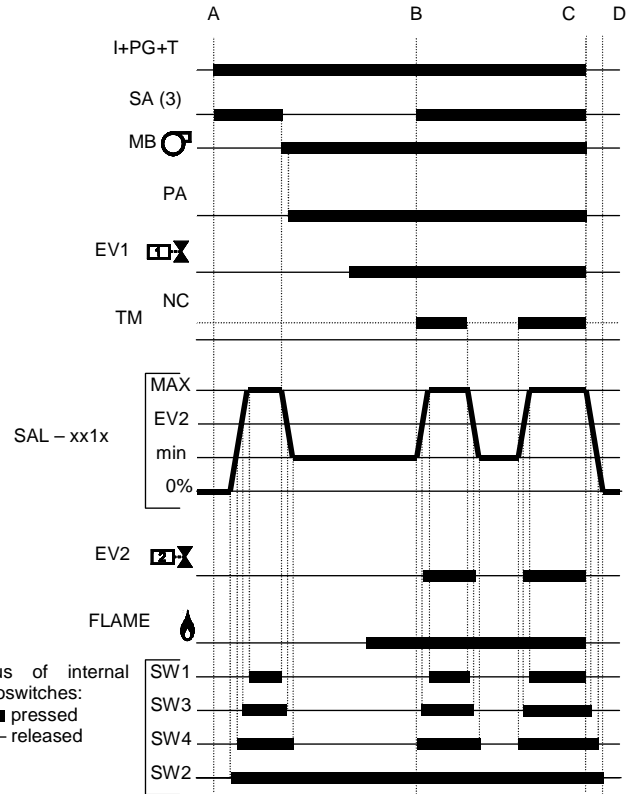
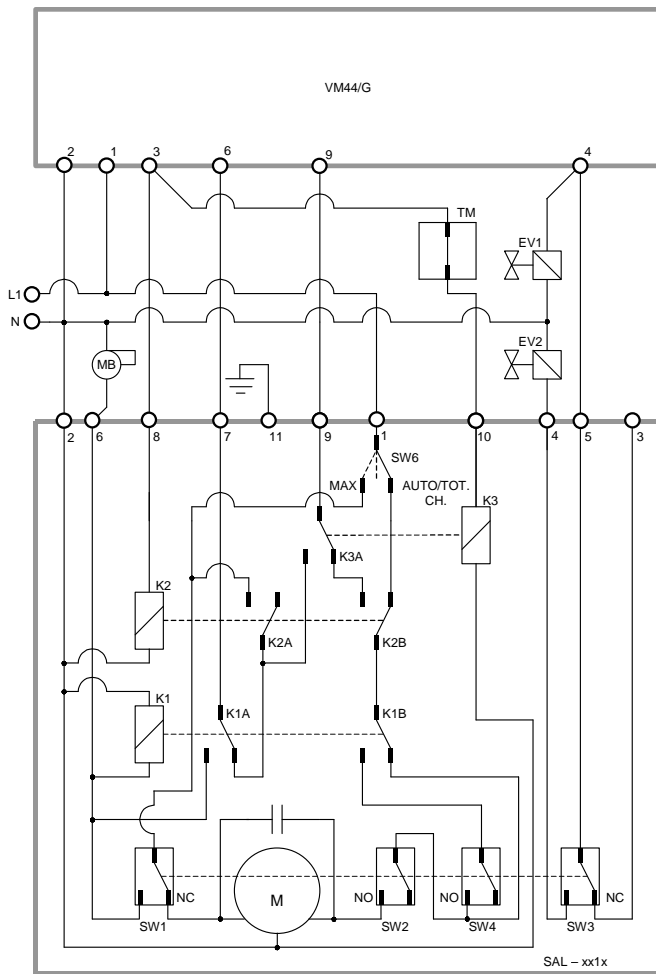
Key to abbreviations:

I+PG+T	demand signal (various thermostats)
MB	burner motor
EV1	1 st stage valve
TMM	modulating modulation thermostat (3-position output)
SAL - xx2TRx	air damper with ignition device control
	0%: fully closed position
	min: 1 st stage air flow position
	MAX: maximum opening position

TR	ignition device
NO	normally open contact
NC	normally closed contact
SAL terminal 11	male fast-on 6.3x0.8
A	burner ignition cycle start-up
A - B	burner ignition cycle
B - C	burner in running status
C	end of demand
C - D	post-purge
D	End of burner controller program

Two-stage operation burner with single-wire control

SAL air damper with internal wiring diagram no. 1



N.B. In the above diagram the air damper is in its fully closed position (0°).

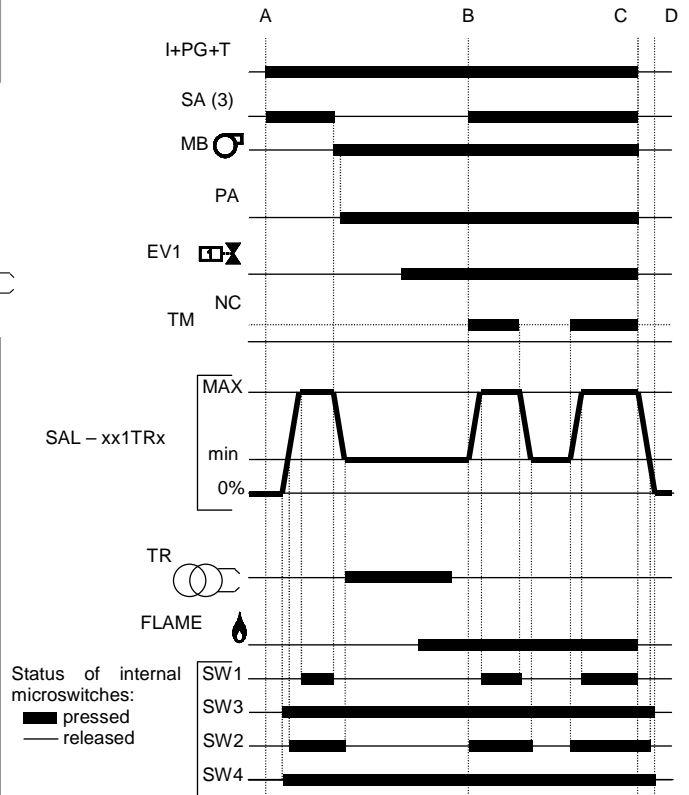
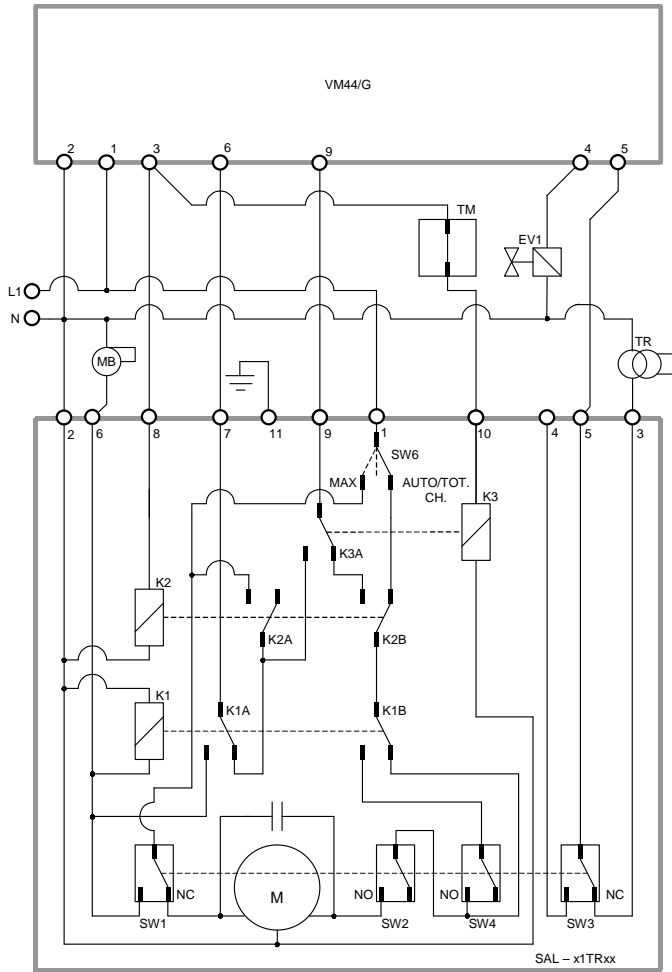
Key to abbreviations:

I+PG+T	demand signal (various thermostats)
MB	burner motor
EV1	1 st stage valve
TM	modulation thermostat type SPDT-NC
SAL - xx1x	air damper with ignition device control
	0%: fully closed position
	min: 1 st stage air flow position
	EV2: 2 nd stage ignition contact
	MAX: maximum opening position

EV2	2 nd stage valve
NO	normally open contact
NC	normally closed contact
SPDT terminal 11	male fast-on 6.3x0.8
A	burner ignition cycle start-up
A - B	burner ignition cycle
B - C	burner in running status
C	end of demand
C - D	post-purge
D	End of burner controller program

Two-stage operation burner with single-wire control

SAL air damper with internal wiring diagram no. 1TR



N.B. In the above diagram the air damper is in it's fully closed position (0%).

In this case (the air damper controls the ignition device TR), the command cam of the SW3 switch is integrated with the SW4 command cam, therefore the ignition device will be energized only if the first stage purge position is reached. The ignition device command excludes the second stage control, if available, and vice-versa.

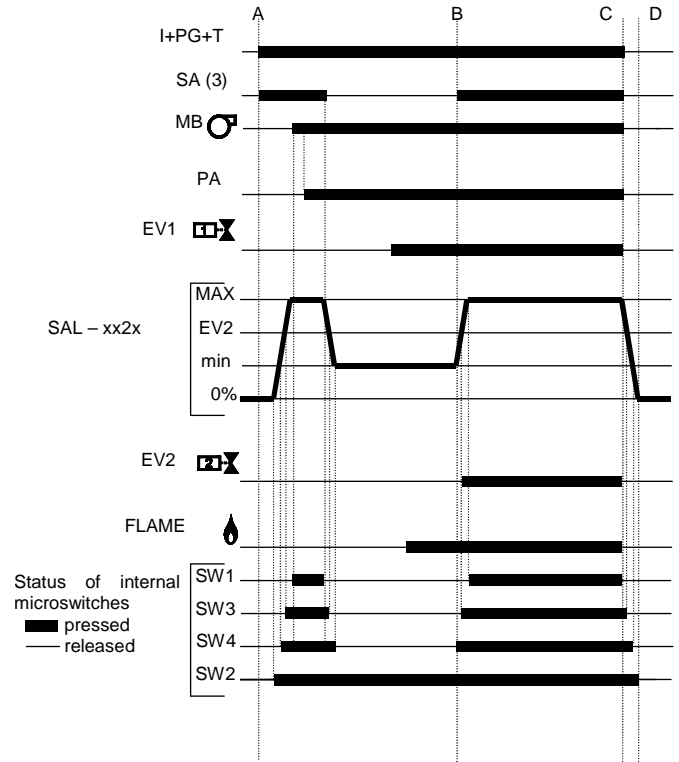
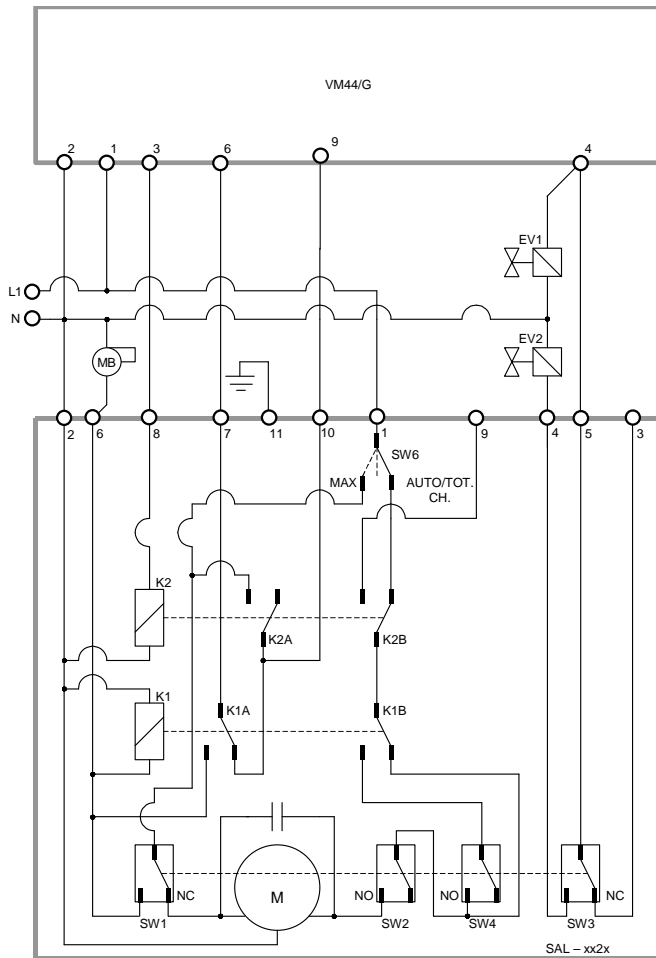
Key to abbreviations:

I+PG+T demand signals (various thermostats)
 MB burner motor
 EV1 1st stage valve
 TM modulation thermostat type
 SPDT-NC
 SAL - xx1TRx air damper with ignition device control
 0%: fully closed position
 min: 1st stage air flow position
 MAX: maximum opening position

TR ignition device
 NO normally open contact
 NC normally closed contact
 SAL terminal 11 male fast-on 6.3x0.8
 A burner ignition cycle start-up
 A - B burner ignition cycle
 B - C burner in running status
 C end of demand
 C - D post-purge
 D End of burner controller program

Two-stage operation burner without modulation thermostat (with EV2 control)

SAL air damper with internal wiring diagram no. 2



N.B. In the above diagram the air damper is in its fully closed position (0°).

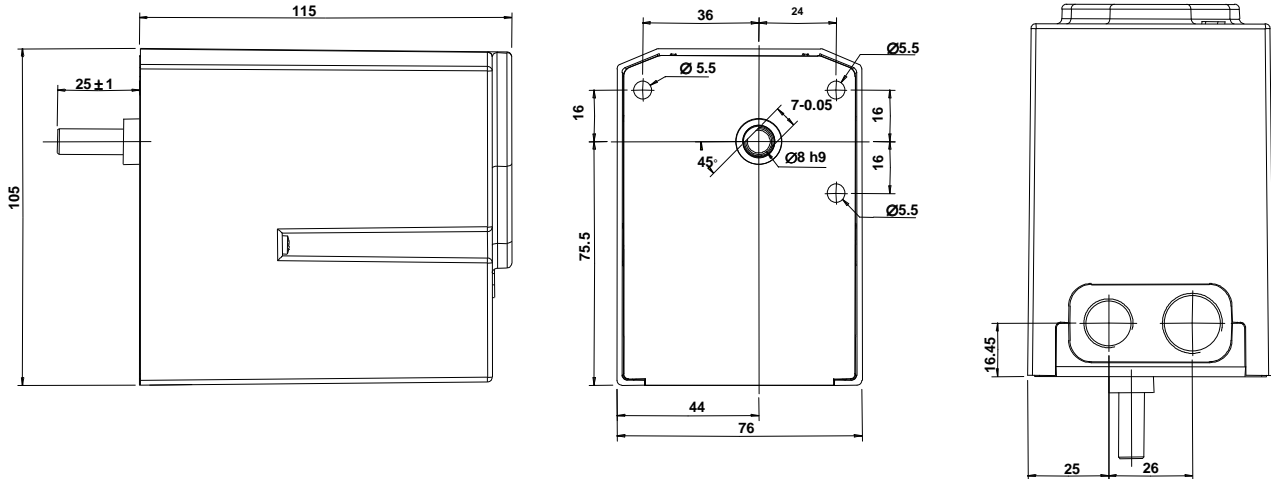
With this type of wiring, the second stage control isn't possible once the second stage is reached, meaning that it's not possible to disconnect the second stage anymore, therefore the air damper will be always in its maximum opening position when the burner is in the running state

Key to abbreviations:

I+PG+T	demand signals (various thermostats)
MB	burner motor
EV1	1 st stage valve
SAL – xx2x	air damper with 2 nd stage control
	0%: fully closed position
	min: 1 stage air flow position
	EV2: 2nd stage ignition contact
	MAX: maximum opening position
EV2	2 nd stage valve

NO	normally open contact
NC	normally closed contact
SAL terminal 11	male fast-on 6.3x0.8
A	burner ignition cycle start-up
A – B	burner ignition cycle
B – C	burner in running status
C	end of demand
C – D	post-purge
D	End of burner controller program

MECHANICAL DIMENSIONS



In the above figure, the driving shaft is in the fully closed position (0°)

PART REFERENCES

Series Options

SAL - (1) (2) (3) (4)

- (1) Rotation direction of the driving shaft from front view with the air damper in starting position (0°)
A or O: anticlockwise (A), clockwise (O)
- (2) Travel time for a 90° angle and a 50Hz supply voltage frequency
7 or 15: 7.5s (7), 15s (15)
- (3) Internal wiring diagram
1 or 1TR or 2 or 2TR: air damper with control of the 2nd stage, to be employed in applications equipped with a SPST-NC single normally closed contact modulation thermostat (1)
air damper with the ignition device control, to be employed in applications equipped with a SPST-NC single normally closed contact modulation thermostat (1TR)
air damper with control of the 2nd stage, to be employed in applications equipped with a SPDT two-wire modulation thermostat or with a modulating thermostat (2)
air damper with the ignition device control, to be employed in applications equipped with SPDT two-wire modulation thermostat or with a modulating thermostat (2TR)
- (4) Air damper supply voltage
23 or 11: 230Vac ±10% 50/60Hz (23) or 110Vac ±10% 50/60Hz upon request(11)

Example

SAL – O71TR23: SAL series air damper, with clockwise rotation direction of the driving shaft (O), 7.5 seconds travel time for 90° angle (7), with the ignition device control for employment in two stage applications provided with a single normally closed contact modulation thermostat (1TR) and 230Vac ±10% 50/60Hz (23) supply voltage. In case the TR acronym is not written on the device, then the features of the air damper are the same as the above-mentioned ones, with the control of the second stage and not of the ignition device

ATTENTION -> Brahma S.p.A. accepts no responsibility for any damage resulting from customer's tampering with the product.

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