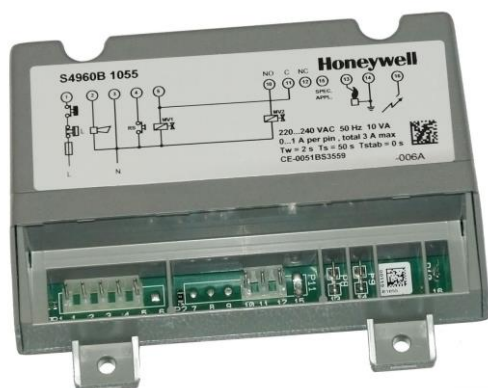


S4960  
AUTOMATIC IGNITION CONTROL  
**PRODUCT HANDBOOK**



## APPLICATION

The S4960 provides automatic ignition and control for burners in accordance with EN 298:2003.

## SPECIFICATIONS

### Model

S4960: 220 ... 240 V, 50 Hz.

Suffix A: For atmospheric burners. Non volatile lock out in accordance with EN 298.

Suffix B: As suffix A except a built in flame indication relay for modulating applications.

Suffix C: For fan assisted applications. Non volatile lock-out in accordance with EN 298.

Suffix D: As suffix C except a built in flame indication relay for modulating applications.

Suffix E: As suffix A except lock-out after flame lost during normal operation.

Suffix P: As suffix A except volatile lock out, reset also by interrupting heat demand.

Suffix Q: As suffix B except volatile lock out, reset also by interrupting heat demand.

### Dimensions

See fig. 9.

### Ambient temperature

0 ... 60 °C

### Relative humidity

90% max. at 40 °C (non condensing)

### Supply voltage

Line voltage, 220 V (±15%) ... 240 V (+10%), 50 Hz (± 2 Hz).

### Power consumption

10 VA max.

### Electrical rating

Valve(s) output: 1 A max  $\cos \varphi > 0.6$   
 Fan output (Suffix C and D): 1 A max  $\cos \varphi > 0.6$   
 Alarm output: 1 A max  $\cos \varphi > 0.6$   
 Flame indication relay: 1 A max  $\cos \varphi > 0.6$   
 External ignition transformer: 1 A max  $\cos \varphi > 0.6$   
 All outputs together: 3 A max.

### Electrical connection

High tension spark: 2.8 x 0.5 mm spade terminal.  
 Flame rod and ground: 6.3 x 0.8 or 4.8 x 0.8 mm spade terminal (depending on O.S. number).  
 Multiple connector: Molex 3001 series

### Timing (depending on O.S. number)

Self check time (Tch): 3.5 s  
 Waiting time (Tw)/Prepurge time (Tp): 2 ... 24 s  
 Safety time (Ts): 0 ... 50 s  
 Stabilization time (Tstab): 0 ... 15 s

### Flame sensing

Flame sensing is based on the rectification principle.  
 Minimum flame current: 0.7  $\mu$ A  
 Response time "ON": < 400 ms (at 2  $\mu$ A flame current)  
 Response time "OFF": < 1 s  
 Maximum cable length: 1 m  
 Not protected against electrical shock.

### Ignition

Integral electronic spark generator  
 Spark voltage: 15 kV at 40 pF load  
 Repetition rate: 12.5 Hz  
 Spark energy: 8uAs  
 Maximum cable length: 1 m  
 Not protected against electrical shock.

### Note

Ignition parameters are measured at mains voltage 230V, spark frequency tolerance is:

$$0.5 f_{\text{spark}} < f_{\text{spark}} < 1.3 f_{\text{spark}}$$

Spark frequency tolerance is:

$$> 0.6^* \text{ specified spark energy}$$

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## Fusing

Automatic ignition control should be externally fused to prevent damage to automatic ignition control, wiring or peripherals.

External fuse: 16 A slow max.

Enclosure IP 00

Recommended flame sensor

Q375 Spark igniter or flame sensing electrode

Q354 Flame sensor

Accessories (to be ordered separately)

Multiple connectors including 1 m leads, order number:

3 pole (suffix B, C and Q): . . . . . 45.900.419-002

5 pole(suffix A, B, C, D and E): . . . . . 45.900.419-003

6 pole (suffix D): . . . . . 45.900.419-004

High voltage cable (500 mm): . . . . . 45.900.411-001

## SYSTEM OPERATION

### IMPORTANT

*The automatic ignition controls S4960P and Q are predetermined for volatile reset (mains supply interruption), but non-volatile reset (manually independent reset function) is also allowed.*

### Automatic ignition control for atmospheric appliances

See fig. 3 and 4 for suffix A, B, P and Q and fig 7 for suffix E.

When there is a call for heat, the self check time (Tch) and a waiting period (Tw) elapses before built-in or external igniter and gas valve is switched on.

Ignition spark ignites gas and resulting flame is detected by the flame rod.

Internal ignition is switched off immediately after flame is established and -if appropriate- external ignition is switched off after elapse of stabilization time.

If flame is not established within the safety time (Ts), the automatic ignition control locks-out. If flame is lost during normal run, the automatic ignition control repeats start sequence (except suffix E).

In case of ignition control with LPG valve connection, gas pressure switch and TTB switch, the ignition control waits for gas pressure before normal sequence is started.

If TTB switch becomes active all valves are de-energized.

The TTB switch has to be reset before sequence will start again.

### Automatic ignition control for fan assisted appliances

See fig. 5 and 6 for suffix C and D.

When there is a call for heat, the self check time (Tch) elapses and than fan is energized if air proven switch is in the "NO AIR" position.

When sufficient air flow is proven by the air proving switch, a prepurge period (TP) elapses before built-in or external igniter and gas valve is switched on.

Ignition spark ignites gas and resulting flame is detected by the flame rod.

Internal ignition is switched off immediately after flame is established and -if appropriate- external is switched off after elapse of stabilization time. If flame is not established within the safety time (Ts), the automatic ignition control locks-out.

If air flow is not proven by air proving switch, automatic ignition control will remain in a waiting mode with fan energized.

If flame is lost during normal run, the automatic ignition control repeats start sequence.

### WARNING

If fan/air proving switch response time is < 1 s, an orifice in the air flow switch tube must be mounted in order to avoid safety shut down.

### Lock- out reset

The auto ignition control will be reset by depressing the internal or the external reset button in the external wiring suffix A, B, C, D and E, or by interrupting the power supply suffix P and Q.

NOTES: For S4960 with suffix P and Q reset by depressing the reset button (non-volatile type) is also allowed.

## INSTALLATION AND CHECKOUT

### IMPORTANT

*Installer must be a trained experienced service man.*

*Disconnect power supply to prevent electrical shock and/or equipment damage.*

*Before installing or replacing any control check that type number is correct for the application. Never use a type with a larger safety time for which the appliance is approved.*

*The appliance manufacturer's instructions should always be followed when provided. If such instructions are not provided see fig. 11. ... 19. for typical systems. Ensure combustion chamber is free of gas before start-up.*

*Conduct a thorough check out when installation is completed.*

*At the first start the automatic ignition control can be in lock-out; reset to free the control.*

### WARNING

After moving S4960 automatic ignition control from outdoor to indoor conditions, condensation may occur. Do not connect condensated automatic ignition control to mains.

### Mounting

The automatic ignition control should be mounted on a flat surface by means of 4 mounting holes (see fig. 9.).

### Mounting positron

The automatic ignition control functions position independently. To ensure reliable long term operation mount automatic ignition control at a position in the appliance with a low ambient temperature and low radiation.

## Wiring

### CAUTION

Wiring must be in accordance with local regulations.  
Never combine high tension wiring with other wiring.

- Use unpinned receptacles for easier connection.
- Use lead wire which can withstand 105 °C ambient.
- Use lead wire which is proven against moisture.
- Wiring between automatic ignition control and spark sensing electrode should have good quality insulation, suitable for the temperatures encountered.
- Length of wiring for external components: 1 m max.

### Wiring to automatic ignition controls (see fig. 1)

1. Ground wire has large self inductance due to long length.
2. High tension wire has large capacitive coupling to other Wire.

Results of 1 and 2:

Sparks and flash over on PCB  
Damage of PCB

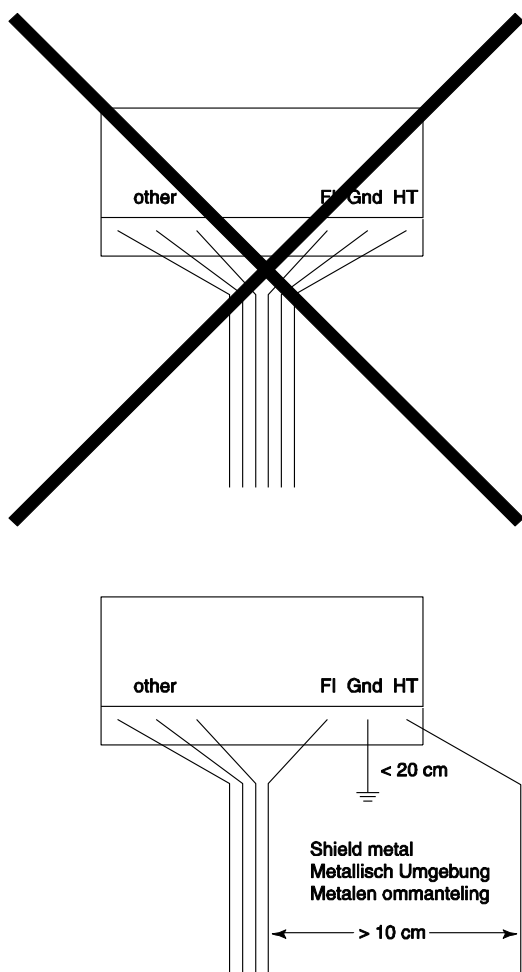


Fig. 1. Wiring to automatic ignition control.

## Supply voltage polarity

OS numbers D1135, D1150, C1079 and D1184 may be used with floating mains in the connection according fig. 10. All other models are predetermined for TN earthing arrangements (according standard IEC 60364).

### WARNING

If automatic ignition control seems to operate normally but does not detect ignition flame, check for right polarity of power supply (line, neutral) and proper grounding of boiler.

## Spark gap

Refer to the appliance manufacturer's instructions for recommended ignition electrode position.  
Maximum allowable spark gap: 3.5 mm.

## Checking flame current

- The minimum value should be 0.7  $\mu$ A.
- To check flame current connect a DC micro-ampere meter between flame sensing wire and flame sensor rod.
- If flame current is insufficient, check that flame sensing rod is fully enveloped by the flame and that burner is reliable grounded to automatic ignition control.

## Checkout

After installation, set burner system in operation and observe through a complete cycle to ensure that burner system components function correctly.

## GENERAL CONSIDERATIONS

The automatic ignition control should be externally fused.  
The automatic ignition control contains no serviceable parts.  
Any attempt of replacement of parts will affect the safety of this device and is therefore not allowed.  
High temperatures will affect product life.  
When the automatic ignition control is built in an appliance, the total protection must be IP 40 at least.  
To ensure reliable long term operation, mount automatic ignition control at a position in the appliance with a low ambient temperature and a low radiation.  
For safety a high limit thermostat must be connected in series with the comfort controls to de-energize the automatic ignition control in case of over temperature.  
To suppress Radio Frequency Interference (RFI) the spark electrode cabling should be mounted in a sufficient shielded environment.

**NOTE:** Electrical rating of connected controls and air proving switch should be appropriate for the load that is switched by the automatic ignition control.

**NOTE:** The emission level in accordance with EN 55014 generated by the electronic ignition is in some applications higher than allowed and need to be checked.














	Thermostat
	Gas valve
	Ignition
	Flame rod
	Fan
	Limiters
	Reset switch
	Flame indication relay
	Alarm
	Air proving switch
	External ignition transformer
	Down draught supervision
	Gas pressure switch

Fig. 2. Legend.

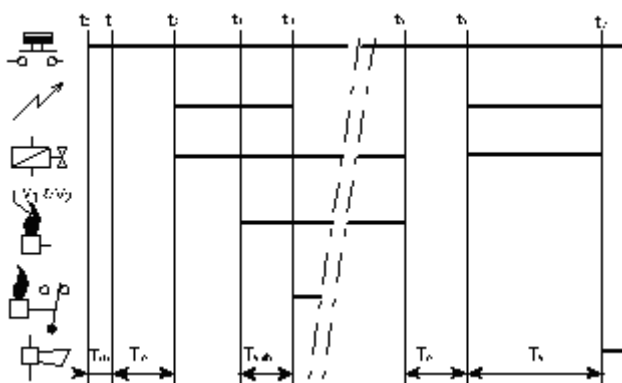


Fig. 3. Functional diagram S4960A, B, P, Q with potential free flame relay connection.

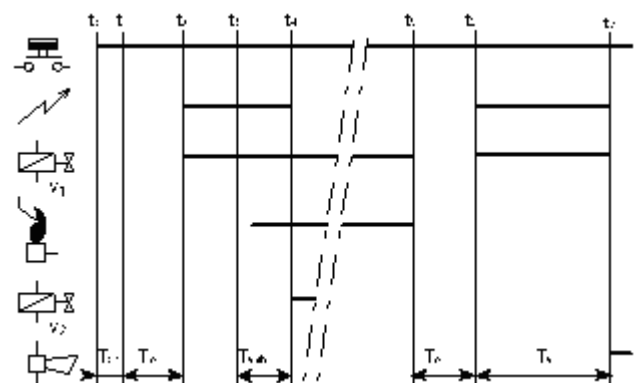


Fig. 4. Functional diagram S4960A, B, P, Q.

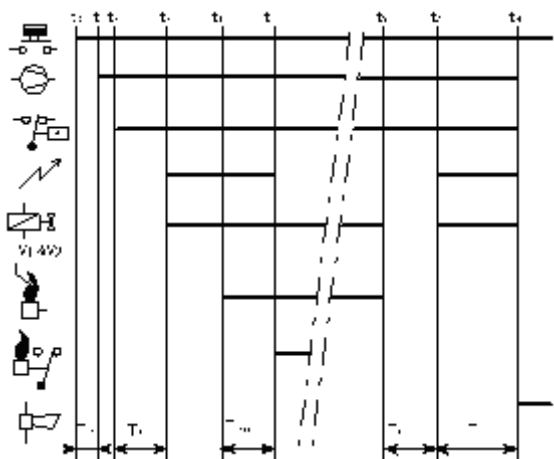


Fig. 5. Functional diagram S4960C, D with potential free flame relay connection.

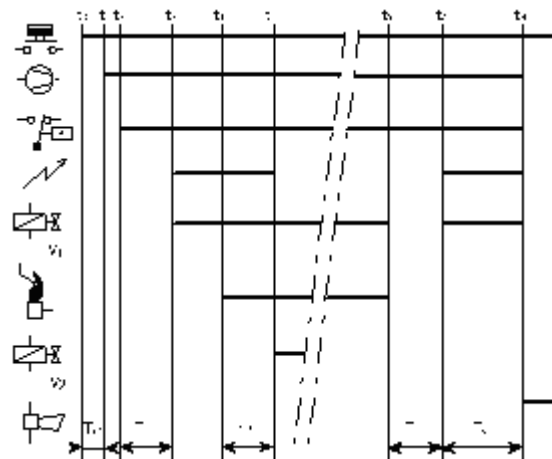


Fig. 6. Functional diagram S4960C, D.

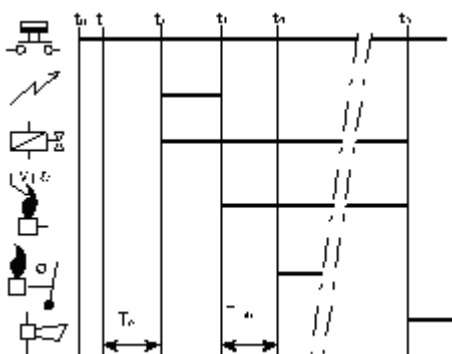
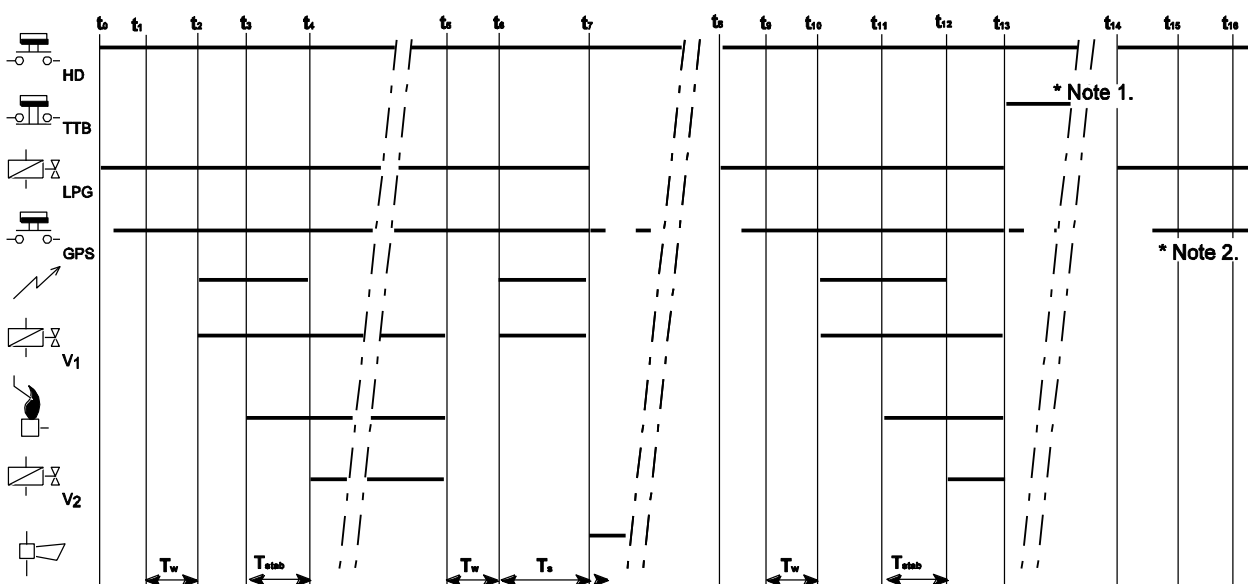


Fig. 7. Functional diagram S4960E.



\* Note 1: S4960B, Q is waiting for manual reset on TTB switch.  
 \* Note 2: S4960B, Q is waiting for gas pressure.

Fig. 8. Functional diagram S4960 with LPG valve, GPS and TTB switch.

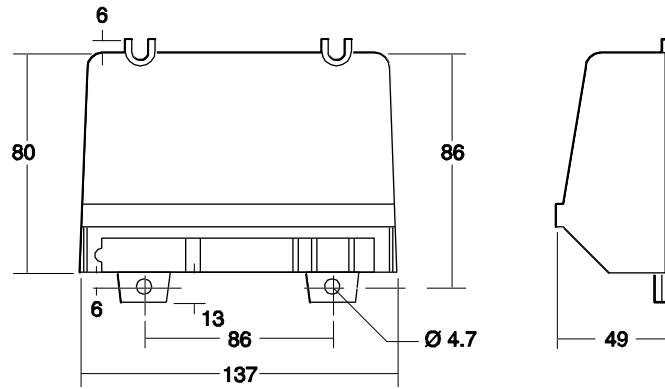


Fig. 9. Dimensions S4960.

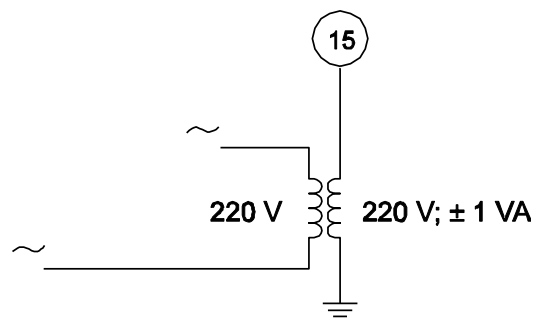


Fig. 10. Application of S4960C1079, S4960D1135, S4960D1150 and S4960D1184 to floating mains.

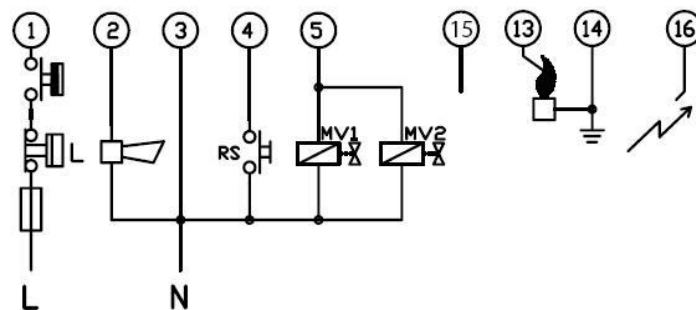


Fig. 11. Connection diagram S4960A, E, P\*.

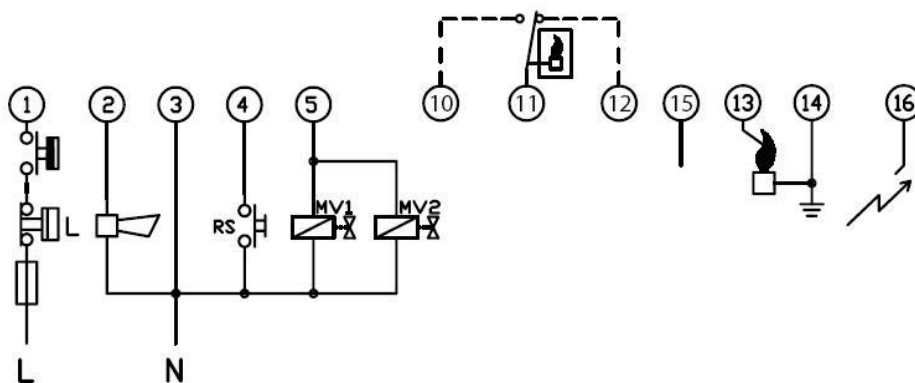


Fig. 12. Connection diagram S4960B, Q\* with potential free flame relay connection.

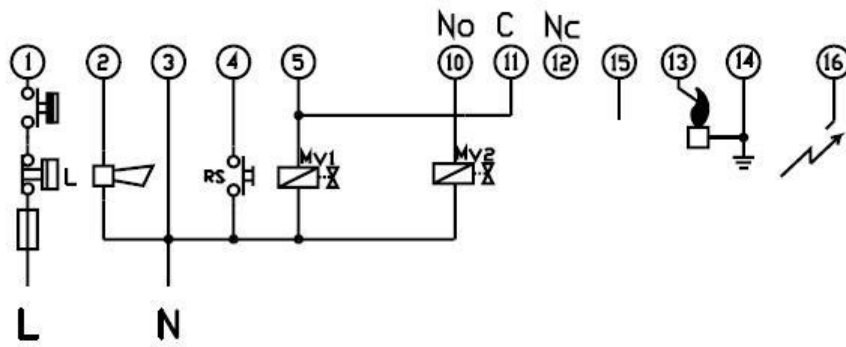


Fig. 13. Connection diagram S4960B, Q\*.

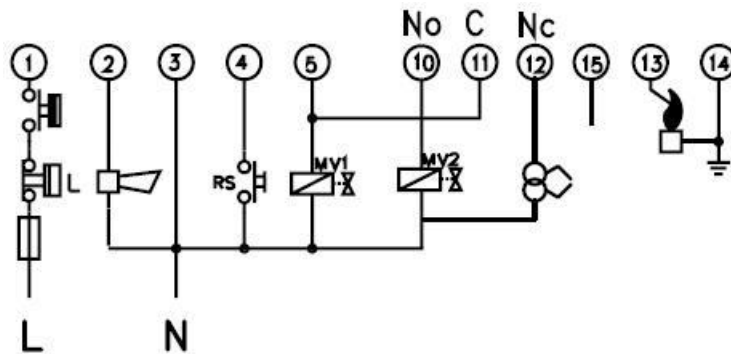
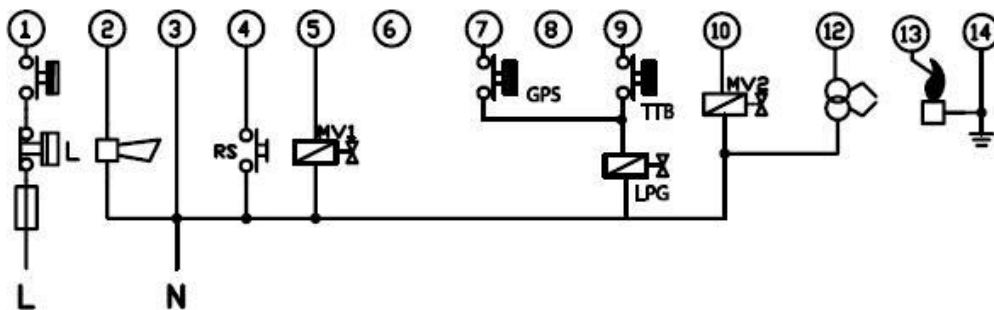


Fig. 14. Connection diagram S4960B, Q\* with external ignition transformer.



\* TTB switch must be a non volatile type and must be reset by manual operation.

Fig. 15. Connection diagram S4960 with LPG valve, GPS, TTB switch and external ignition transformer. (The connection is possible only for specific OS number, please contact manufacturer for details)

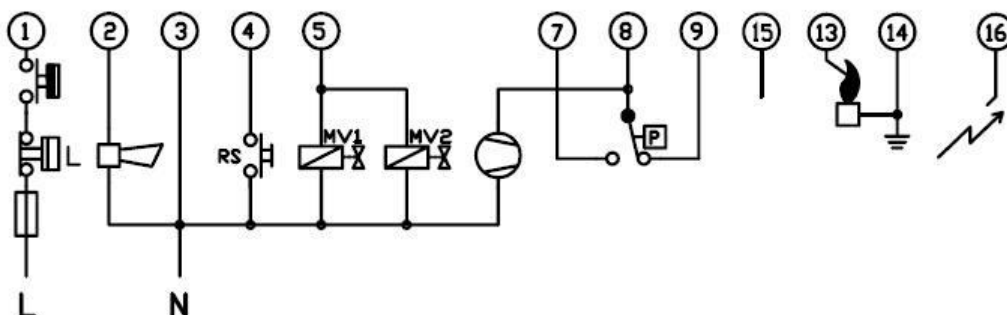


Fig. 16. Connection diagram S4960C.



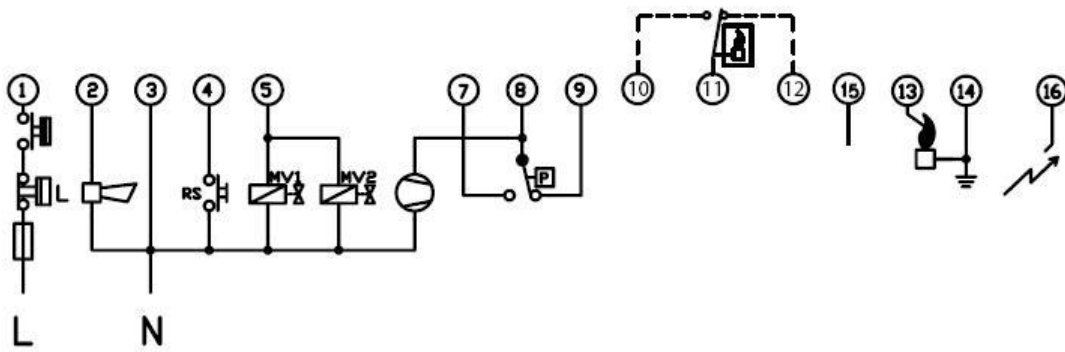


Fig. 17. Connection diagram S4960D with potential free flame relay connection.

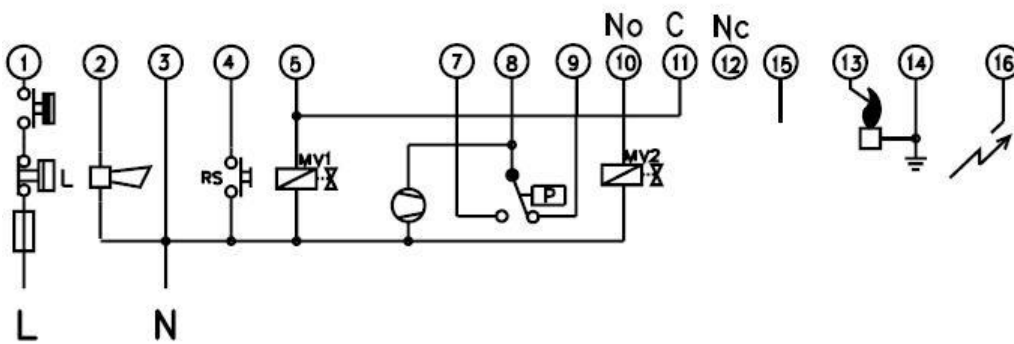


Fig. 18. Connection diagram S4960D.

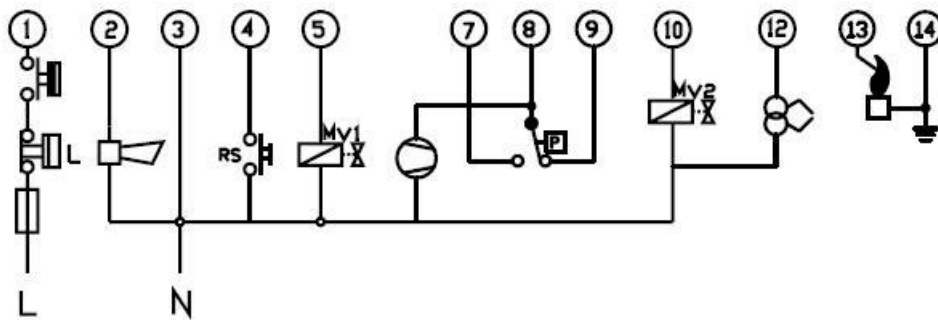


Fig. 19. Connection diagram S4960D with external ignition transformer.