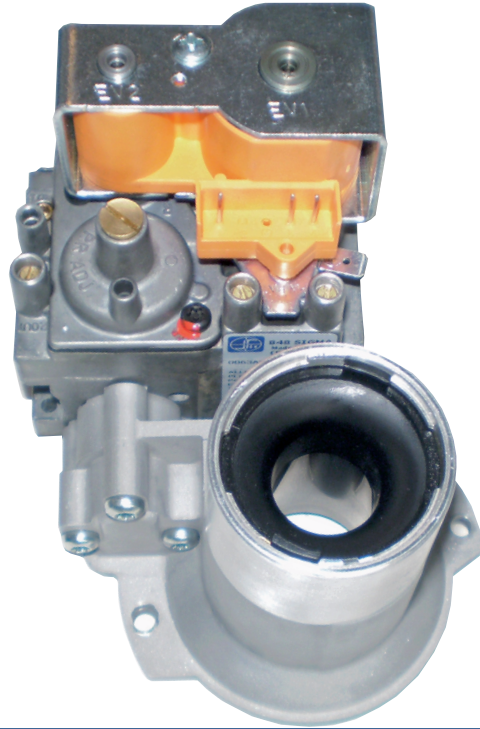




SITGroup

PRELIMINARY

898 SIGMA



CONTROL SYSTEM FOR PREMIX GAS BURNER

Application

Fan-assisted gas-fired appliance with premix burner.

The system is particularly suitable for modulating condensing combi-boilers.

Main features

High modulating power range.

Advanced gas/air mixing system.

Compact dimensions with an extremely straightforward integration onto the fan.



THE SYSTEM

898 SIGMA is an integrated system that performs the gas/air flow control and mixing.

898 SIGMA consists of a multifunctional gas control with two automatic shut-off valves in series in the main gas path, a pressure regulator device, a 1:1 gas-air ratio modulating control (848 SIGMA) and a mixing system derived from SIT 390 MIXER (Figure 2).

The system is suitable to be interfaced with NG 40 electric fan (Figure 3).

With reference to the schematic block in Figure 1:

- FL is the inlet filter
- EV1 is the direct acting automatic shut-off valve
- EV2 is the servo acting automatic shut-off valve
- PR is the servo pressure regulator
- G/A is the 1:1 gas -air ratio modulating control
- RA is the gas -air ratio adjuster
- MX is the mixing system

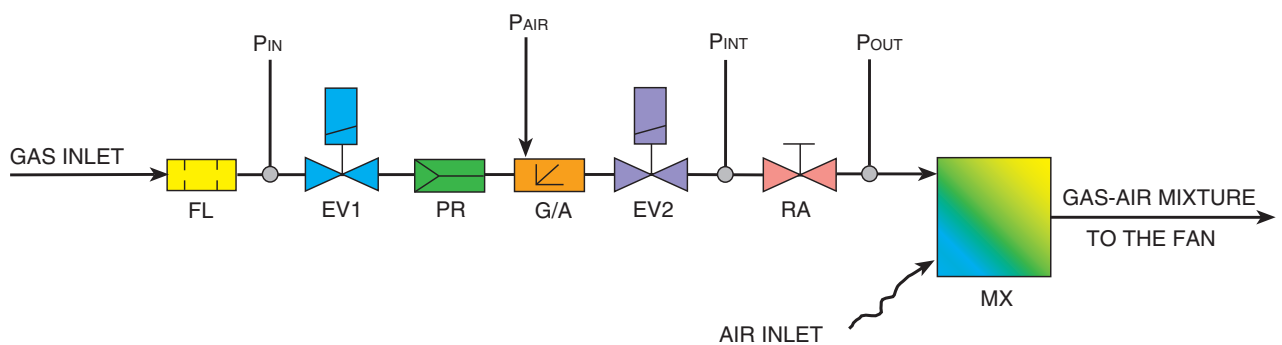


Figure 1: Block diagram of the 898 SIGMA

DESCRIPTION

- 1 On-Off solenoid valves EV1 and EV2 terminals
- 2 Inlet pressure test point P_{IN}
- 3 Outlet pressure test point P_{INT}
- 4 Outlet pressure test point P_{OUT} (after RA)
- 5 Air signal connection port P_{AIR}
- 6 Zero adjustment (offset)
- 7 Gas-air ratio adjuster (RA)
- 8 Gas inlet
- 9 Valve mounting holes
- 10 Mounting holes to the fan
- 11 Fan interface plate
- 12 Air inlet

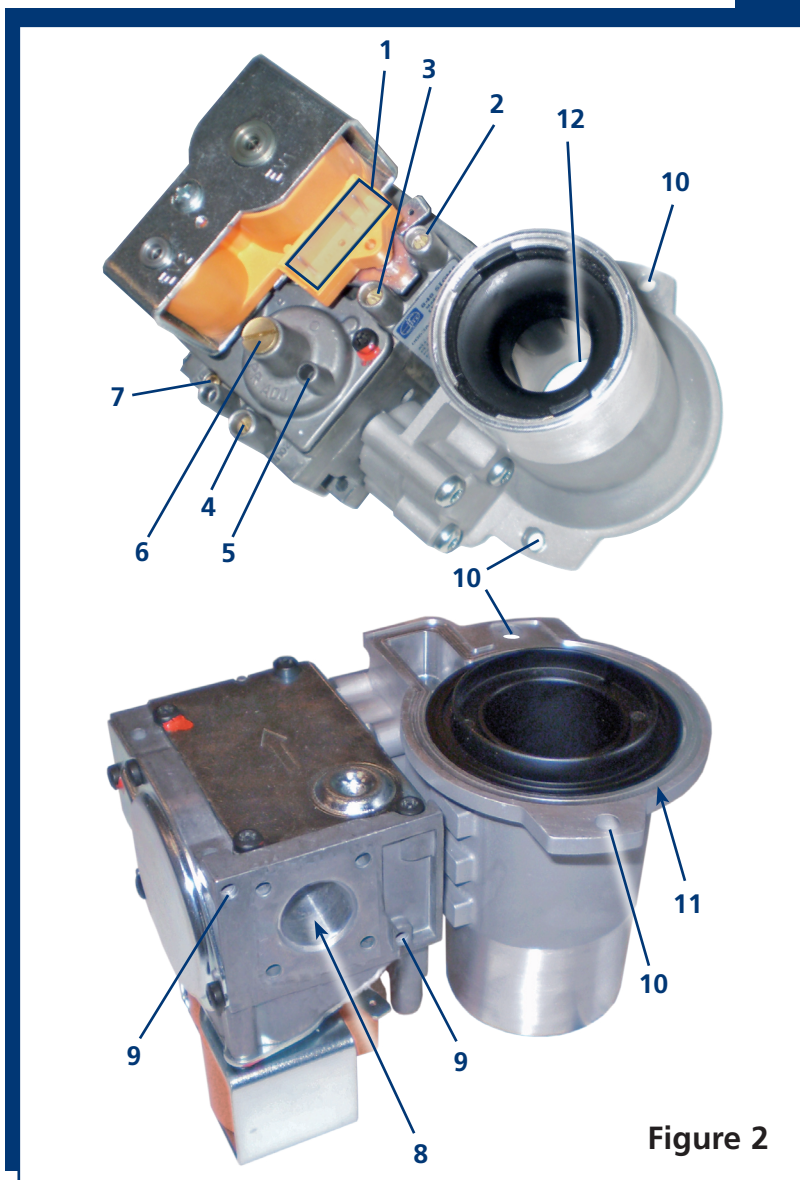


Figure 2



Figure 3: 898 SIGMA interfaced with NG 40 electric fan

PRELIMINARY



GENERAL DATA

898 SIGMA

CONSTRUCTION CHARACTERISTICS

- Aluminium alloy valve body
- Antistatic POM venturi insert
- Inlet filter
- Inlet, outlet and additional pressure test points
- Two mounting holes on the valve
- Two mounting holes to the fan

PERFORMANCE CHARACTERISTICS

- | | |
|----------------------------------|---|
| • Inlet filter | 195 µm mesh |
| • Mounting position | Any position |
| • Gas families | II and III |
| • Ambient temperature range | -10 to 70 °C (other ranges are available) |
| • Maximum inlet pressure | 60 mbar |
| • Bending and torsion resistance | Group 2 |

MECHANICAL CONNECTIONS

- | | |
|-----------------------------------|-----------------|
| • Gas inlet | flanged M4 (4) |
| • Pressure test point | ø9 mm |
| • Two mounting holes on the valve | M4 depth 6.5 mm |
| • Air signal connection | ø7 mm |

All the detailed guidelines for installation are given in the use and installation instructions code 9.957.092.

ELECTRICAL DATA

- | | | |
|--|---|---|
| Automatic shut-off valves supply voltage versions: | - | 230 V, 50 Hz - black coil type A (Fig. 2) |
| | - | 22 Vdc - orange coil type B (Fig. 3) |
| | - | Other versions available on request |

GENERAL DATA

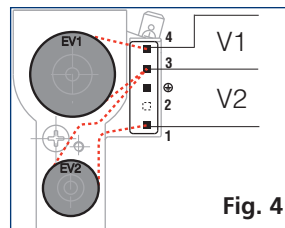
898 SIGMA

ELECTRICAL CONNECTION

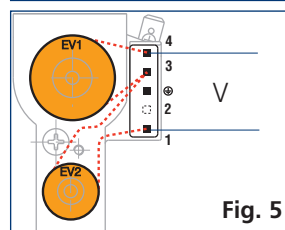
- Automatic shut off valves Male contact 3003 Molex compatible, suitable for female Molex series 3001
- Protection degree IP 40 with SIT connectors
IP 44 with SIT connectors and gasket

The following options are available:

- the connection diagram is given in Fig.4. The automatic shut-off valve EV1 shall be supplied connecting pins 3 and 4 (V1). The automatic shut-off valve EV2 shall be supplied connecting pins 1 and 3 (V2).



- the connection diagram is given in Fig.5. The automatic shut-off valve EV1 and EV2 in series shall be supplied connecting pins 1 and 4 (V). **Pin 3 is only for production tests. Do not use in the appliance.**



NG 40

CONSTRUCTION CHARACTERISTICS

- Housing material Die-cast aluminium
- Impeller material Plastic
- Weight 970 g

PERFORMANCE CHARACTERISTICS

- Air flow 110 m³/h
- Maximum pressure 3,100 Pa
- Maximum speed 11,500 rpm

ELECTRICAL DATA

- Supply voltage versions:
 - 230 V, 50 Hz
 - 24 Vdc
- Nominal power consumption: 75 watt
- Insulation class: F



FUNCTIONS

AUTOMATIC SHUT-OFF

- Automatic shut-off valves closing time ≤ 1 s
- Automatic shut-off valve EV1 Class B
- Automatic shut-off valve EV2 Class C or J

PRESSURE REGULATION

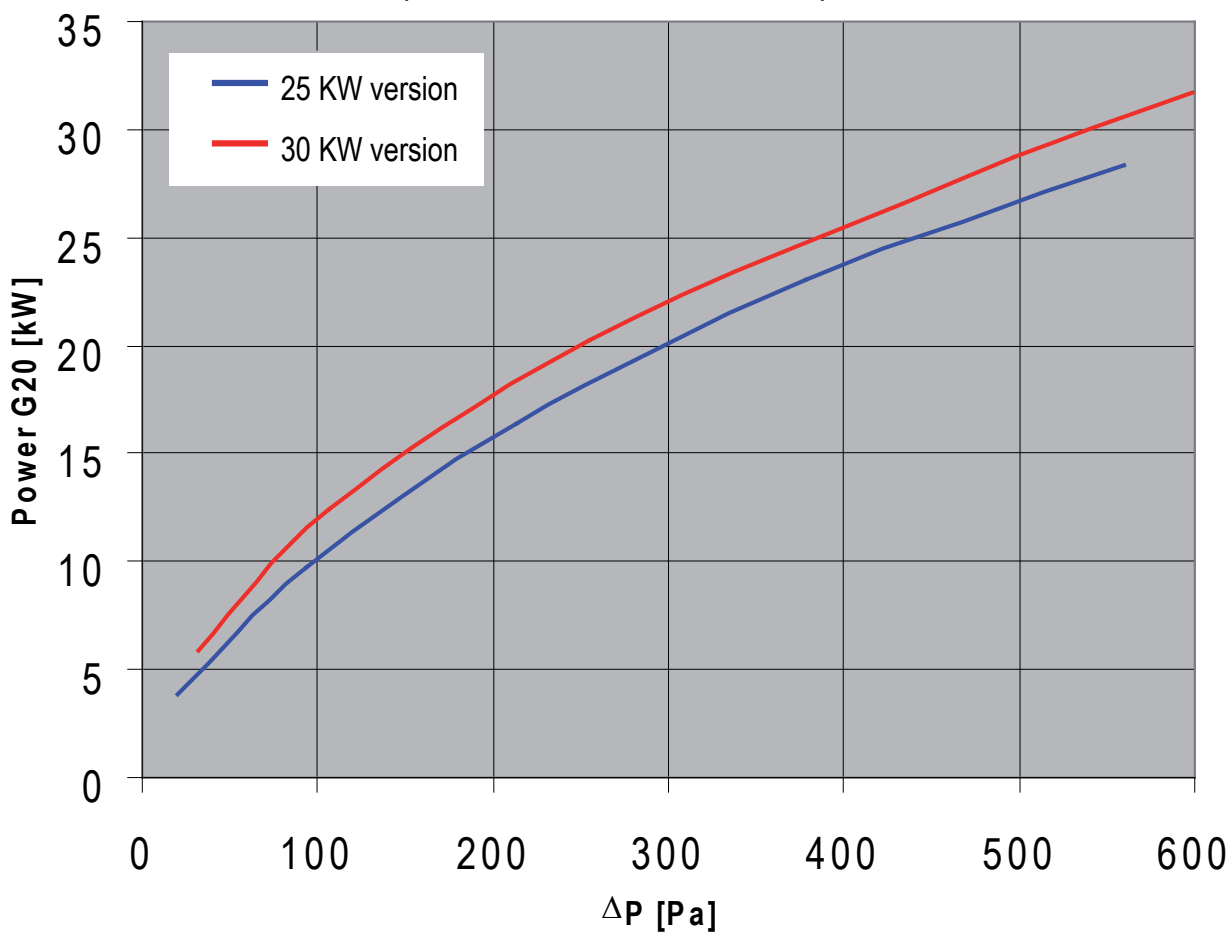
Servo pressure regulator class B (with reference to EN126)

GAS/AIR MODULATING FUNCTION

- Offset ($P_{INT} - P_a$) adjustment range + 0.3 to - 0.3 mbar
- Air signal connection port $\varnothing 7$ mm
- Response time Less than 2 seconds
- Minimum adjustable flow @ $P_{INT} - P_{OUT} = 10$ mbar
1 m³/h for 2nd family gas
0.6 m³/h for 3rd family gas
- Minimum power 20% of nominal power (modulation range 1:5)

PRELIMINARY

898 Sigma - Nominal power
(referred to NCV and $\lambda=1.25$)



FUNCTIONAL DESCRIPTION

898 SIGMA has two automatic shut-off valves. When both of them are de-energised, it is only possible to measure the inlet pressure on the inlet pressure test point. When the solenoid EV1 is energised the first gas valve opens.

Energising the second solenoid EV2, the second valve also opens and the gas flows through the main outlet. It is possible to measure the outlet pressure on the outlet pressure test point.

898 SIGMA is a 1:1 gas/air pressure ratio gas control.

The operation principle consists of keeping the outlet pressure P_{INT} , equal to the air pressure signal which can be increased or decreased according to the value chosen on the offset:

$$P_{INT} = P_{AIR} + O_s$$

O_s is the offset value that can be set by a screw.

The relation is represented in the P_{AIR}/P_{INT} graph (Fig. 4).

When the offset value is set to zero and assuming the relation of volumetric flow/pressure drop is similar for air and gas, the gas/air ratio is kept constant despite any variation of P_{AIR} .

In other terms, the Q_g/Q_a ratio is constant for any value of air signal P_{AIR} , where Q_g and Q_a are rate of flow of gas and rate of flow of air respectively.

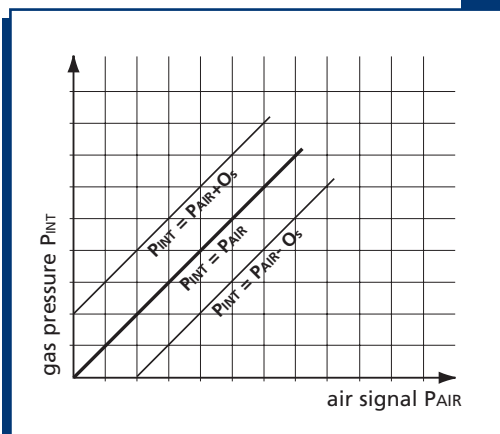
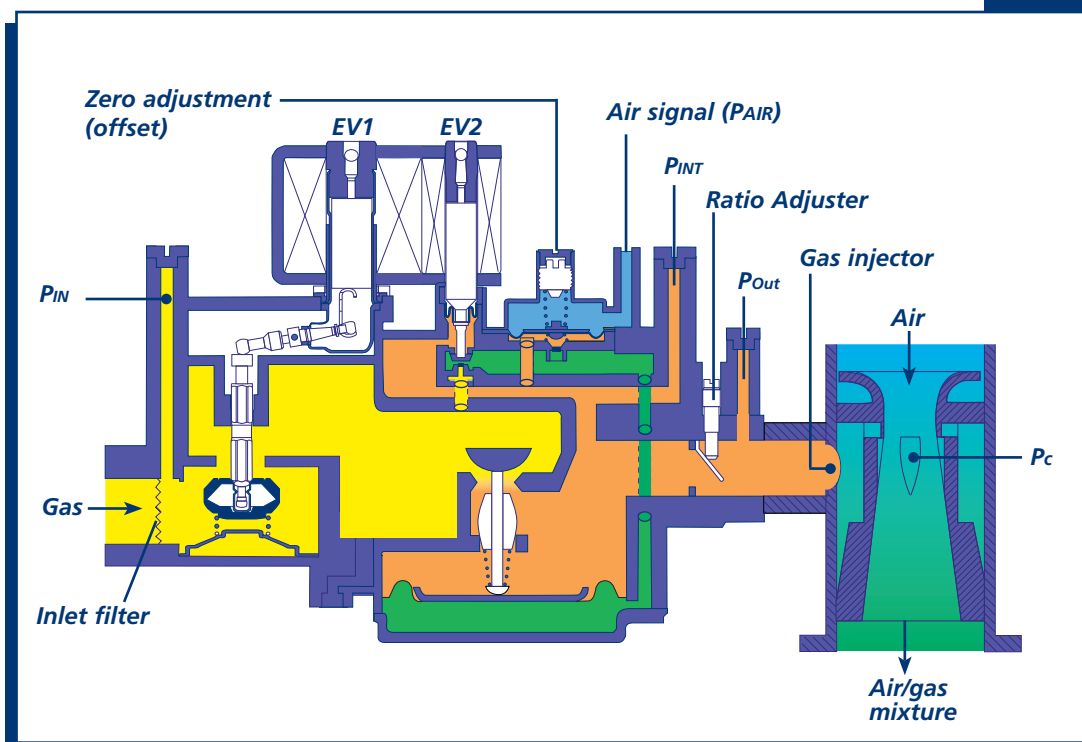


Fig. 4: Gas pressure/air ratio for different offset regulations



NOMENCLATURE

P_{AIR}	Air signal pressure.	$P_{AIR}-P_c$	Pressure drop across air restrictor.
P_c	Mixing chamber pressure.	$P_{INT}-P_{AIR}$	Pressure difference between outlet P_{INT} gas pressure and air signal.
P_{IN}	Inlet gas pressure.		During operating conditions (gas valves open), it is called "offset".
P_{INT}	Outlet pressure test point.		
P_{OUT}	Additional outlet pressure test point (version with gas/air ratio adjuster).		

