

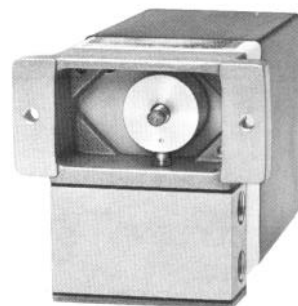
Signal Pressure Transmitter

motorised, pneumatic

SQN37



Quality Assurance Services
FM739, QAS34/61



Description

The SQN37 is a motorised pneumatic signal pressure transmitter, also called pressure divider, used for the generation of variable pressure signals depending on electric signals or pulses.

The design of the unit is based on the pneumatic bleeding principle.

Operating range is from 0,5 mbar to 150 mbar.

The signal pressure transmitter has been designed specifically for use in burner installations and similar heat production plants to influence and control the gas to air ratio.

Application

The pressure divider is driven by a synchronous motor and used for the manual or automatic regulation of air pressure signals:

- **In heat production plants in connection with the SKP70 air/gas ratio controller** (refer to Data Sheet 7651), enabling the controller to be employed in special applications, e.g.
 - in conjunction with O₂ control to correct the gas to air ratio depending on the residual oxygen content in the flue gases
 - for the remote manual adjustment of the gas to air ratio by changing the air pressure signal
 - for the minimum limitation of the amount of combustion air with modulating type burners requiring considerably increased amounts of air with small loads, as well as
- **for other control tasks** where a governor has to change an air pressure signal continuously within certain limits.

Also refer to «Application Advice».

Design Features

The unit consists of motor and pressure divider:

Motor

The robust housing made of impactproof and heat resistant plastic accommodates the reversible synchronous motor with gear train which can be disengaged, the cam stack, and the switching section which, via a printed circuit board, is connected to the terminals.

Scales adjacent to the cams facilitate the adjustment of the switching points. An additional scale at the head of the cam stack serves for internal position indication.

The base of the unit has two holes for Pg9 cable entry glands.

Pressure divider

Located on the front side of the motor is the pressure divider with the bleed type nozzle and the cam which, depending on the position of the motor, varies the gap between the nozzle outlet and the surface of the cam, thus changing the output signal.

The threaded holes for the impulse pipes are marked with 1 (ON) and 2 (OFF). Located under the removable cover of the pressure divider is the filter element which must be cleaned (using soapy water) or replaced at regular intervals. A filter service set is available.

Potentiometers

A potentiometer which can be fitted subsequently provides an electric feedback signal on the respective position of the pressure divider.

The potentiometers consist of a circular coiled resistance and a wiper attached to the spindle. All parts are mounted on a printed circuit board and protected by a plastic cover. The printed circuit board also carries the associated connecting terminals.

A disk which is visible from outside through a viewing slot is fitted to the head of the cam stack or potentiometer, indicating the position of the driving spindle.

Summary of Types

Signal pressure transmitter

Type reference

Nominal output pressure range
p_N (in % of inlet pressure p_i)

SQN37.401A27

58%...99%

SQN37.402A27

7%...96%

The only difference between the two types of transmitter is an orifice D1 of different size. Refer to «Function».

Accessories

Potentiometers

Number of connecting points	X _N 0...	Nominal resistance range R _N		
		135Ω	220Ω	1000Ω
2	90°	—	ASZ8.60	ASZ12.60
2	130°	—	ASZ8.63	ASZ12.63
3	90°	ASZ16.603	—	ASZ12.603
3	130°	—	ASZ8.633	ASZ12.633

X_N = nominal angular rotation

Replacement filter

Pack containing 5 filters

AGA37

Ordering Specification

When ordering, please use type designation, e.g.

SQN37.402A27 specifying a signal pressure transmitter for the control of an output pressure signal representing 7% to 96% of the inlet pressure p_i.

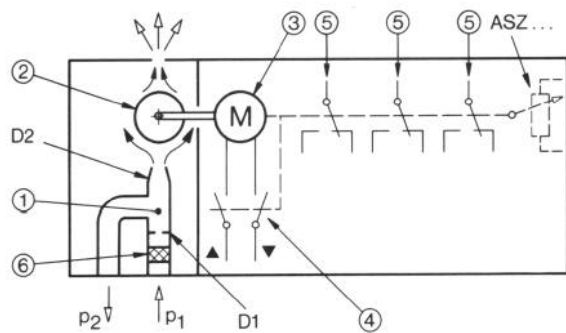
Replacement filters must be ordered separately.

When ordering **AGA37**, a pack containing 5 filters will be supplied.

Potentiometers must also be ordered separately, e.g. **ASZ12.63**, specifying a 1000Ω potentiometer with 130° angular rotation and 2-point connection.

Function

Basic principle



- 1 Output pressure signal chamber
- 2 Cam
- 3 Motor
- 4 Limit switch
- 5 Auxiliary switch
- 6 Filter
- p₁ Inlet pressure
- p₂ Output pressure
- D1 Orifice
- D2 Nozzle

Signal pressure transmitter

The inlet pressure p_1 via a filter (6) and an orifice D1 is fed to the output pressure signal chamber (1). A bleed type nozzle D2, through which a medium (air) permanently escapes, is located at the top of the pressure signal chamber. Orifice D1 reduces the pressure of the medium entering the chamber. The cross sectional area at the nozzle's outlet is varied by means of a motor driven cam (2). Depending on the position of the cam (2), more or less medium escapes to the atmosphere, thus changing the pressure in the output pressure signal chamber (1).

The motor (3) driving the cam is controlled by two limit switches (4). When voltage is supplied to the motor via the appropriate limit switch, the motor moves the cam (2) in the desired direction. To limit the operating range, the limit switches (4) can be set to any position within the cam's angular rotation range.

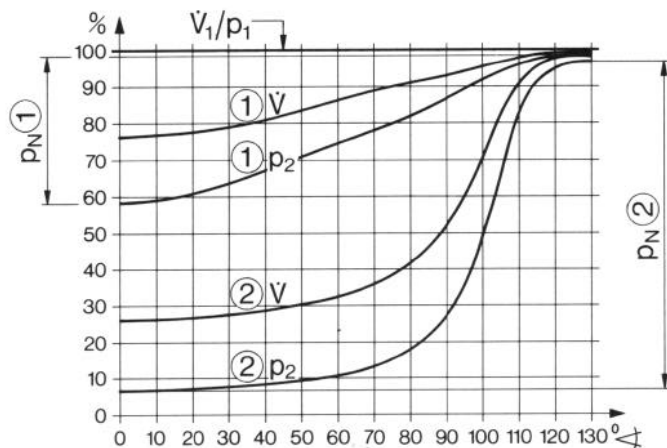
Connected to the motor spindle are potential-free auxiliary switches (5). They are actuated when the cam reaches a pre-determined angular position. The switchover position of each auxiliary switch can be adjusted within the cam's angular rotation range.

Function

Voltage at

- terminal 1: output pressure p_2 increases towards p_1
- terminal 2: output pressure p_2 falls towards atmospheric pressure

Function diagram



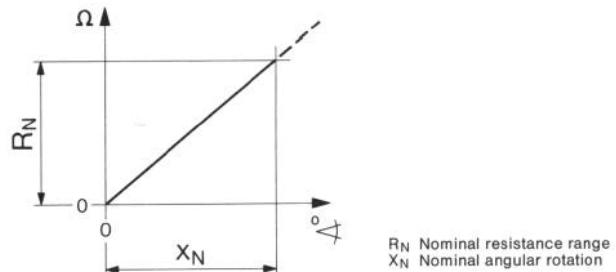
- 1 Curves for SQN37.401A27
 - 2 Curves for SQN37.402A27
 - V Air flow
 - V₁ Air flow corresponding to pressure p₁
- } For use with air/gas ratio controller

ASZ... potentiometers

A wiper connected to the driving spindle slides over an electric resistance. The resistance value between the wiper and the end of the resistance is proportional to the position of the cam.

(Note: there is no proportional relation to the output pressure p_2)

Function diagram



Technical Data

Motor

Operating voltage (control voltage) 220 V -15%...240 V +15%

Frequency 50...60 Hz

Power consumption 6 VA

Limit and auxiliary switches:

- Brand SAIA
- Type reference XCF8Z76
- Switching voltage 24 V a.c....250 V a.c.
- Switching capacity

- Under load ON, with no load OFF, $\cos \varphi = 0,9$:
 - Starting current
 - Operating current

14 A
2 A

- Under load ON-OFF, $\cos \varphi = 0,9$:
 - Starting current
 - Operating current

7 A
1 A

Radio interference protection N to VDE 0875

Angular rotation 0...130° (adjustable)

Direction of rotation

when facing cam clockwise

Running time

for 130° α 43 s
for 90° α 30 s

Mounting position optional

Protection standard IP40

Cable entry 2 x Pg 9, locknut 3 mm wide

Permissible ambient temperature

- Operation -20°C...+60°C

- Transport and storage -50°C...+60°C

* Note risk of condensation in pressure lines.

Pressure divider

Pressure lines:

- Connection Rp 1/4"
- Minimum inner dia. 4 mm
- Suitable media dry, dustfree air, or other non-poisonous and no explosive gases the escape of which to the atmosphere is permitted.

Medium temperature

max. +100°C
min. +1°C (temp. below 0°C are permitted, but there is a danger of icing).

Pressure signals

- Inlet p₁ min. +0,5 mbar max. +150 mbar (must be above atmospheric pressure).

- Output p₂

refer to «Summary of Types»

Application Advice

For the proper functioning it is necessary to have a positive inlet pressure p_1 (higher than atmospheric pressure). When used in connection with burners, it is to be checked whether the inlet pressure is available as a positive pressure over the entire output range. In the case of small outputs and in connection with high flue stacks and/or flue gas extract fans, negative pressures in front of the burner head may develop, depending on the type of burner, and the design and layout of the heat production plant. In such cases the action of the SQN37 would be reversed.

The SQN37 comes with the cam's angular rotation range set to 0...130°. In certain applications it may be of advantage to use only part of that range, e.g. 10...100°. Readjustment is very straightforward and can be made anywhere within the angular rotation range.

Application Examples

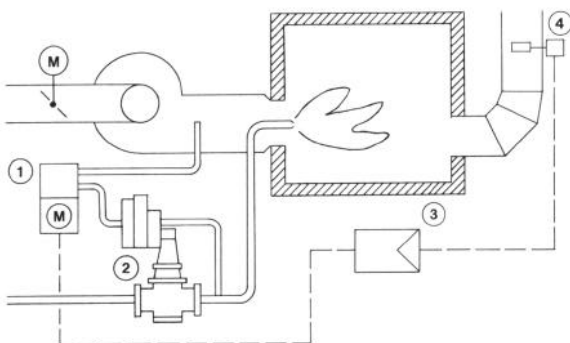
The SQN37 variants available are specifically suitable for the following applications:

Signal pressure transmitter with **medium pressure drop range** (58...99% / SQN37.401A27)

For control tasks where a slight correction of the setting of an air/gas ratio controller on a forced draught burner is required. In cases where, for safety reasons, the possible change of the gas to air ratio shall be kept within certain limits.

Examples:

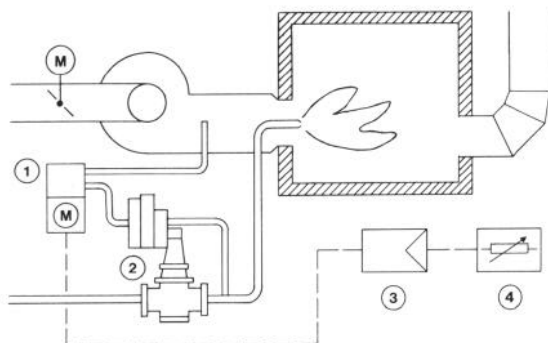
– Air/gas ratio controller (SKP70) in connection with an oxygen trim system (O_2 control)



- 1 SQN37.401A27 with ASZ... (ASZ12.63)
- 2 Air/gas ratio controller (SKP70)
- 3 O_2 controller (RPO10, RWF/RZF61.190...)
- 4 O_2 sensor (QGO10)

Oxygen control via the SQN37 influences the gas to air ratio in function of the residual oxygen content in the flue gases.

– Air/gas ratio controller (SKP70) in connection with manual or automatic control of the gas to air ratio, e.g. for changing the flame temperature by varying the amount of excess air.



- 1 SQN37.401A27 with potentiometer ASZ...
- 2 Air/gas ratio controller (SKP70)
- 3 Three-position converter (SEZ61.3)
- 4 Remote setting unit (FZA21...)

In addition to potentiometers for 130°, there are also potentiometers available for an angular rotation of 90°. They allow to use only part of the cam's angular rotation range.

The medium (air) used should be free from oil and dust. The inlet of the pressure divider has an air filter which should be cleaned or replaced at regular intervals. If the medium is heavily contaminated, it is recommended to install a larger additional filter upstream of the unit.

Ambient temperatures near the pressure divider should be such that condensation inside the medium carrying parts of the unit is avoided.

Signal pressure transmitter with **great pressure drop range** (7...96% / SQN37.402A27).

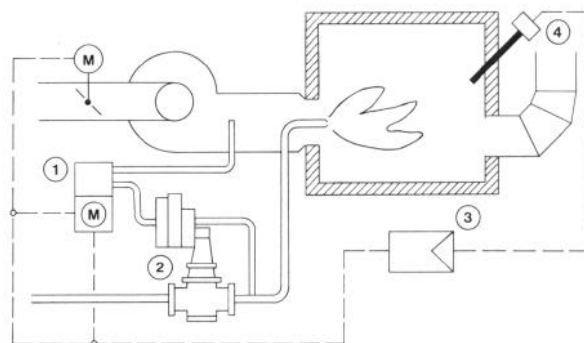
For control tasks

– with an air/gas ratio controller enabling the gas to air ratio to be variable over a wider range.

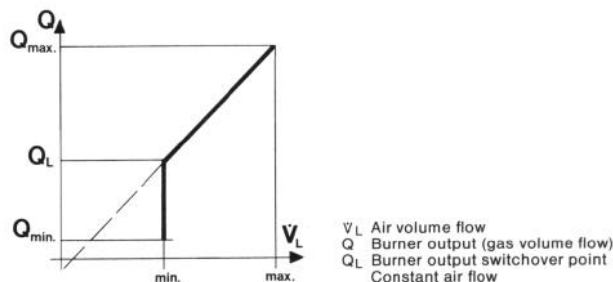
Example:

Minimum limitation of the amount of air supplied to the burner.

Burner requiring a minimum amount of air in the lower output range.

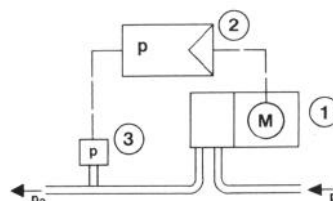


- 1 SQN37.402A27
- 2 Air/gas ratio controller (SKP70)
- 3 Universal controller (RWF31)
- 4 Temperature (QAE21...) or pressure detector (QBE21)



In the output range between the maximum output Q_{max} and a lower limit Q_L down to which the burner can operate with a fixed excess air rate, the air/gas ratio controller (SKP70) controls proportionally to the set values. When the heat demand falls below the output limit Q_L , the air damper (M) stops, and only the amount of gas is controlled via the SQN37, which simulates a corrected air signal.

– where it is necessary to generate a pneumatic pressure signal in the lower pressure range, e.g. as a regulating unit in a signal pressure control system.



- 1 SQN37.402A27
- 2 Pressure controller
- 3 Pressure detector

Commissioning Advice

The gear train can be disengaged by means of a pin located near the connecting terminals. When the pin is pressed down, the cam can be moved manually by turning the cam stack.

Disengagement of the gear train is used during the commissioning phase for the

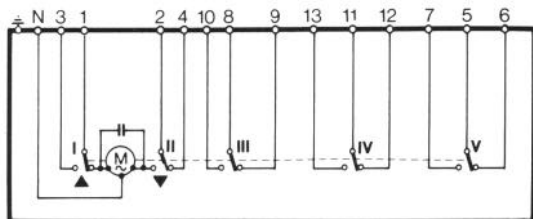
- manual checking of the pneumatic function
- manual adjustment of the required output pressure signal
- commissioning of a burner with O_2 control, in order to
 - temporarily cancel the action of O_2 control
 - set a mean value during the commissioning of the burner, i.e. adjustment of the burner using a simulated constant O_2 control signal

To prevent jamming of the cam, the cam's angular rotation range must not be exceeded.

Internal Diagrams and Wiring Diagram

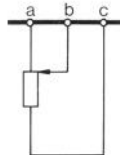
Signal pressure transmitter

Electrical connections

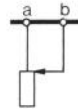


Potentiometer

3-point connection

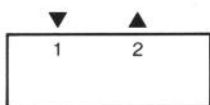


2-point connection



Potentiometers shown with voltage at terminal 2

Pneumatic connections



1 Inlet pressure p_1
2 Output pressure p_2

Dimensions

