Series 420

Additional Module Type 424 for i/p Conversion

Application

Additional Module for the Type 421 Compact Controller or Type 422 Manual Control Station for the conversion of a standard DC current signal into a standard pneumatic signal.

The additional module converts a load-independent DC signal 4...20 mA into a pneumatic signal of 0.2...1.0 bar or 3...15 psi. The required supply air has a pressure of 1.5 bar or 20 psi. The unit can be mounted in the Type 422 Manual Control Station with or without controller module (see Figs. 1 and 2).

Characteristic features

- Optionally usable for the conversion of the controlled variable x or the external command variable w_{ext}
- Good measuring properties
- Especially favorable dynamic characteristics due to friction-less pick-up of the electrical input signal, low inertia of the force balance system and a pneumatic pick-up having no appreciable time delay
- Very insensitive to mechanical vibrations, e.g. max. effects < 0.5% for vibrations in all directions up to 300 Hz and 4 g
- Units with Type 424-10 or Type 424-11 i/p Converter are suitable for use in hazardous areas.

Versions

i/p Converter · Input 4...20 mA (0...20 mA upon request), output 0.2...1.0 bar or 3...15 psi · Supply air pressure 1.4 bar or 20 psi.

Versions for hazardous areas · Input circuit in type of protection EEx ib II C

Type 424-10 · Additional Module for application with the Types 423-1 to -9 Controller Modules (see Data Sheet T 7521 EN). The air delivery is adapted to the consumption of the Type 421 Compact Controller.

Type 424-11 · Additional Module for mounting alone (without controller module) in the Type 422 Manual Control Station with cover plate for the output connections, maximum air supply >1.5 m_n^3/h.

Versions with Canadian and US explosion protection certificates (CSA and FM) are available.

Standard versions · For non-hazardous areas

Type 424-20 · Additional module for the application with Types 423-1 to -9 Controller Modules (see Data Sheet T 7521 EN). The air supply is adapted to the consumption of the Type 421 Compact Controller.

Type 424-21 · Additional Module for mounting alone (without controller module) in Type 422 Manual Control Station with cover plate for the output connections, maximum air supply > 1.5 m_n^3/h.

Fig. 1 · Type 424-10 i/p Converter with Type 423-2 PI Controller Module

Fig. 2 · Type 424-11 i/p Converter for mounting alone with cover plate for output connections

Upon request also available with i/p converter for controlled variable x and/or i/p converter for external command variable w_{ext}. Details upon request.

Principle of operation (Fig. 3)

The base plate of the additional module has input connections to Type 422 Manual Control Station and output connections to Type 423 Controller Module. It is equipped with the i/p converter which operates on the force balance principle. The DC current i routed via the plug (19) and the printed circuit board (16) flows through the coil (2) which is located in the field of a permanent magnet (1). The force of the coil which is proportional to the current i, and the force generated by the output pressure p_A in the feedback bellows are balanced in the beam (3).

The supply air Z supplies the booster (11) and flows through the restriction (10) and the nozzle (9) against the flapper (8). If the input current i increases, the force of the coil increases and the flapper (8) moves closer to the nozzle (9). This leads to a pressure increase in the nozzle and an output pressure increase of the booster (11), which is passed to the output of the unit and to the feedback bellows (6). The pressure increases until a new balance state is reached and the output pressure p_A is proportional to the current i.

Upon delivery, the output pressure p_A is connected to the signal channel of the controlled variable x or the command variable w. The insertion in the signal channel w is provided for control systems with external command variable w_{ext}. To change the electric input signal, the output pressure pA is connected to the proper signal channel by changing the mounting position of an O-ring.

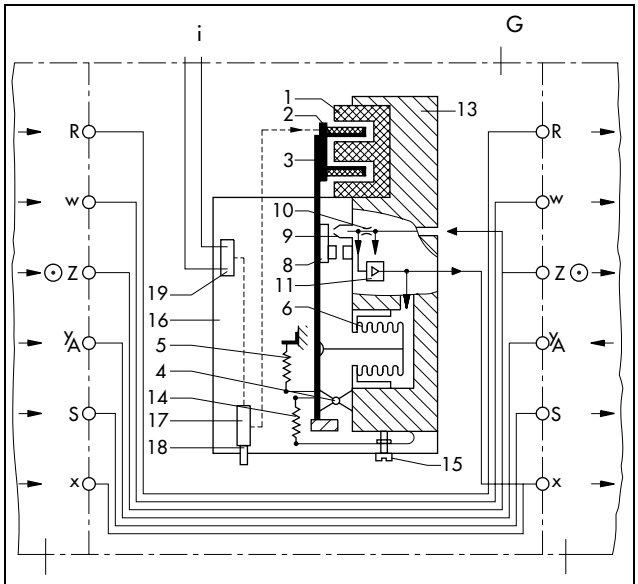

Fig. 3 · Schematic diagram of the i/p converter; the diagram shows the output signal p_A connected with the signal channel x

1 Permanent magnet
2 Coil
3 Beam with balance weight
4 Cross spring pivot
5 Spring
6 Feedback bellows
8 Flapper
9 Nozzle
10 Restriction
11 Booster
13 Cast block
14 Zero point spring
15 Zero point adjuster (Zero)
16 Printed circuit board
17 Potentiometer for measuring span adjustment
18 Measuring span adjuster (SPAN)
19 Plug for electrical connection
G Base plate

Table 1 · Technical Data

Type		424-10	424-11	424-20	424-21
Input		4...20 mA (upon request 0...20 mA)			
Input impedance, approx.		200 Ω and ≈ 0 mH		200 Ω and ≈ 4 mH	
Output		0.2...1 bar (3...15 psi) · max. 0.02...1.35 bar			
Air supply		adapted to Type 421	> 1.5 m_n^3/h	adapted to Type 421	> 1.5 m_n^3/h
Connected volume		–	≥ 0.1 dm^3	–	≥ 0.1 dm^3
Supply		1.4 ± 0.1 bar (20 ± 1.5 psi) · Air consumption < 0.08 m_n^3/h			
Response characteristic		Linear characteristic of output and input, Hysteresis: < 0.1% of span Terminal based non-conformity: < 0.2% of span			
Effects deviation in % of span		Ambient temperature: Lower range value < 0.2%/°C · Measuring span: < 0.2%/°C Supply: < 0.2%/0.1 bar Changing load, upon failure of the supply air only, interruption of the input current: < 0.1%			
Load characteristic		± 3% for air supply ± 0.4 m_n^3/h, reversing errors not detectable			
Dynamic characteristic	Connection	0.1 dm^3	1 dm^3	0.1 dm^3	1 dm^3
	Limiting frequency	0.8 Hz	0.7 Hz	0.8 Hz	0.7 Hz
	Phase shift	–60°	–50°	–60°	–50°
Permissible ambient temperature		–20 to +60°C			
Degree of protection		IP 00			
Weight, approx.		0.4 kg			

Summary of the approved explosion protection certificates for Types 424-10 and 424-11

Certificate type	Certificate number	Date	Comments
Certificate of Conformity	PTB no. Ex-80/2138 X	1980-09-12	Protection EEx ib II C T6
1st addendum		1981-07-12	Wall-mounted housing
2nd addendum		1981-12-16	Higher ambient temperature
3rd addendum		1984-03-01	Printed circuit board
4th addendum		1985-12-06	USA screw gland
5th addendum		1988-07-01	With i/p Module 6112
Certificate of Conformity	PTB no. Ex-84/2021 X	1984-02-17	EEx ia II C T6 only version 6102-4 and 6102-8
CSA approval	LR 54227-1	1986-01-31	Class I, Groups A, B, C, D
CSA approval	LR 54227-19	1994-05-09	Class II, Group G Encl. 3 or 4
FM approval	J. I. OMO A4.AX	1986-03-12	Class I, II, III, Div.1, Groups A, B, C, D, E, F and G
FM approval	J. I. 5Y2 A3.AX	1995-04-26	Div. 2

The test certificates are included in the "Mounting and operating instructions" and are available at SAMSON upon request.

The following technical data applies to explosion protected Type 424-10/11 Additional Modules:

Input circuit		EEx ib II C	
U_0		≤ 28 V	
I_k		≤ 85 mA	≤ 100 mA
Temperature class	T 4	60 °C	55 °C
	T 5	70 °C	70 °C
	T 6	80 °C	80 °C
Inner inductance and capacitance		Negligibly small	

Ordering text

Type 424-10/424-11/424-20/424-21 Additional Module,
i/p converter for controlled variable x/external command variable w_{ext}
Input: 4...20 mA/0...20 mA
Output: 0.2...1 bar/ 3...15 psi

Specifications subject to change without notice

SAMSON AG · MESS- UND REGELTECHNIK
Weismüllerstraße 3 · 60314 Frankfurt am Main · Germany
Phone: +49 69 4009-0 · Fax: +49 69 4009-1507
Internet: http://www.samson.de