Pilot Valves Type 3964

**for controlling of Booster Valves Type 3756,
Solenoid Valve Islands Type 3965,
Diaphragm Valves Type 3994-0671 and
valves according to ISO 5599/1 with CNOMO interface**

General notes

The Type 3964 Pilot Valves ensure a high level of operational reliability for controlling Type 3756 Booster Valves, Type 3965 Solenoid Valve Islands, Type 3994-0671 Diaphragm Valves and valves according to ISO 5599/1 with CNOMO interface.

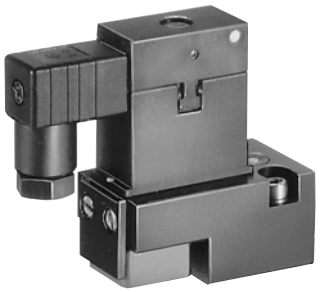
Intrinsically safe, low-power binary signals issued by automation or fieldbus systems can be used for contolling purposes.

Special features of the Type 3964 Pilot Valves include:

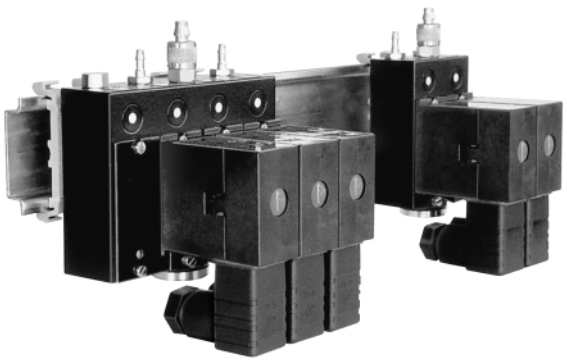
- Safety Integrity Level SIl 4 according to IEC 61508
- E/P binary converter with nozzle/baffle system
- Nominal signals of 6/12/24 V DC or 24 V AC
- Intrinsically safe versions II 2 G EEx ia IIC T6 for zone 1, II 3 G EEx nA II T6 for zone 2, CSA and FM
- Power consumption 6 to 27 mW (DC) or 0,1 VA (AC)
- Polarity reversal protection
- Manual operation function as pushbutton or pushbutton switch (optionally)
- Plug-type connector according to EN 175301-803, form C, or industrial standard
- Non-corrosive enclosure with degree of protection IP 54
- Air supply 1.4 to 2.0 or 3.0 to 3.6 bar
- Flanged end or CNOMO adapter plate
- Connection plate, twofold or fourfold, for top hat rail 35 for controlling pneumatic components with threaded connection (see “Accessories”)
- Indicator for output signal (optionally)
- Diaphragm switch as amplifier (optional)
- Service life more than 20 millions cycles
- Ambient temperature −45 to +80 °C

Versions

Pilot valve with flanged end



Pilot valve with CNOMO adapter plate and amplifier



Pilot valves with connection plates, twofold or and fourfold, mounted on top hat rail 35 according to EN 50022

Fig. 1

Function

The Type 3964 Pilot valves consist of an e/p binary converter Ⓐ, a manual operation function Ⓑ (optionally) and an indicator Ⓒ (optionally). The output signal is amplified to double air flow by a diaphragm switch Ⓓ (optionally) (see Fig. 2).

In normal position, the baffle ② is lifted off the outlet nozzle ① by a return spring ③. As a result, a pressure lower than the switch-off pressure of the diaphragm switch Ⓓ builts up in the pressure divider that consists of restriction ⑤ and outlet nozzle ①.

When the solenoid ④ is energized by an electrical binary signal the outlet nozzle ① is closed by the baffle ② against the force of return spring ③. As a result, the pressure in the pressure divider rises above the switch-on pressure of the diaphragm switch Ⓓ thus switching it into the operating position. The output signal of the e/p binary converter Ⓐ is indicated by indicator Ⓒ.

Functional diagram

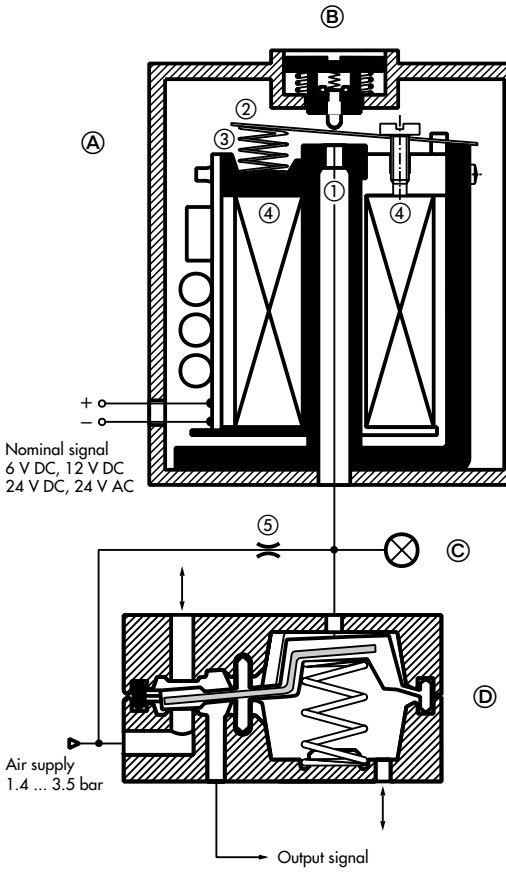
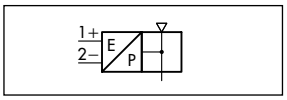
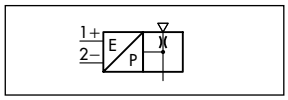


Fig. 2

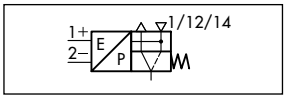
Symbols



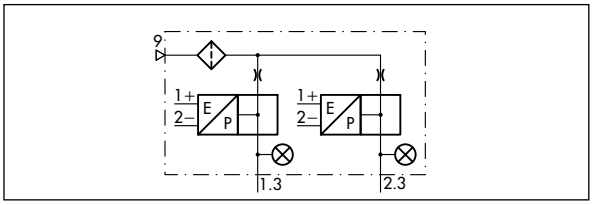
Type 3964-XXX000X000XX
with flanged end
(without restriction)



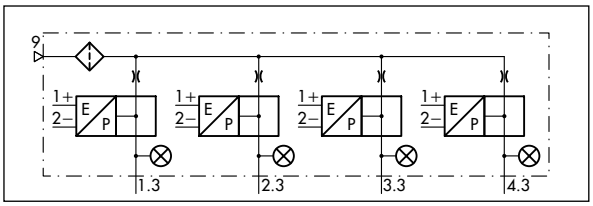
Type 3964-XXX100X000XX
with CNOMO adapter plate
(with restriction)



Type 3964-XXX110X000XX
with CNOMO adapter plate
and amplifier



Type 3964-XX100000000X
with connection plate, twofold (with restrictors)



Type 3964-XX100000000X
with connection plate, fourfold (with restrictors)

Fig. 3

Technical data

General data		
Construction		Solenoid with nozzle/baffle system, diaphragm switch with return spring as amplifier (optionally)
Degree of protection		IP 20/IP 54 (without/with cable socket installed)
Material	Enclosure	Polyamide PA6-3-T, black, Polyoxymethylene, green (amplifier)
	Adapter plate	Aluminium, black anodized
	Screws	Stainless steel 1.4571
	Springs	Stainless steel 1.4310
	Gaskets	Silicone rubber, Perbunan
	Diaphragms	Chlorbutadiene 57 Cr 868 (amplifier, for use at −25 … +60 °C), Silicone rubber (amplifier, for use at −45 … +60 °C), Nitrilbutadiene rubber (indicator, for use at −25 … +80 °C)
Ambient temperature		See "Electrical data" and "Pneumatic data"
Mounting position		As desired (see Mounting and Operating Instructions EB 3964 EN)
Service life		≥ 2×10^7 cycles (without amplifier, for use at −45 … +80 °C), ≥ 2×10^7 cycles (with amplifier, for use at −25 … +60 °C), ≥ 2×10^6 cycles (with amplifier, for use at −45 … +60 °C)
Weight approx.		50 g (with flanged end), 100 g (with CNOMO adapter plate), 150 g (with CNOMO adapter plate and amplifier)

Electrical data					
Type 3964		**-X1**	**-X2**	**-X3**	**-X8**
Nominal signal	U_N	6 V DC max. 27 V [1])	12 V DC max. 25 V [1])	24 V DC max. 32 V [1])	24 V AC max. 36 V [1])
	f_N				48 … 62 Hz
Switching points "On"	$U_{+80\,°C}$	≥ 4.8 V	≥ 9.6 V	≥ 18 V	19 … 36 V
	$I_{+20\,°C}$	≥ 1.41 mA	≥ 1.52 mA	≥ 1.57 mA	≥ 1.9 mA
	$P_{+20\,°C}$	≥ 5.47 mW	≥ 13.05 mW	≥ 26.71 mW	≥ 0.04 VA
"Off"	$U_{-25\,°C}$	≤ 1.0 V	≤ 2.4 V	≤ 4.7 V	≤ 4.5 V
Impedance	$R_{+20\,°C}$	2.6 kΩ	5.5 kΩ	10.7 kΩ	approx. 10 kΩ
Temperature influence		0.4 %/°C	0.2 %/°C	0.1 %/°C	0.1 %/°C
Type of protection EEx ia IIC [2]) for use in hazardous areas (zone 1)					
Type 3964		**-11**	**-12**	**-13**	
Permissible maximum values for connection to a certified intrinsically safe circuit					
Output voltage	U_i	The U_i/I_i values apply to nominal signals 6/12/24 V DC: 25 V/150 mA, 27 V/125 mA, 28 V/115 mA, 30 V/100 mA, 32 V/85 mA			
Output current	I_i				
Power dissipation	P_i	250 mW	No limitation		
External capacitance	C_i	≈ 0			
External inductance	L_i	≈ 0			
Ambient temperature in temperature class					
	T6	−45 … +60 °C			
	T5	−45 … +70 °C			
	T4	−45 … +80 °C			
Type of protection EEx nA II [3]) for use in hazardous areas (zone 2)					
Type 3964		**-81**	**-82**	**-83**	
Ambient temperature in temperature class					
	T6	−45 … +60 °C			
	T5	−45 … +70 °C			
	T4	−45 … +80 °C			
Correcting time		≤ 15 ms			
Temperature influence		0.4 %/°C	0.2 %/°C	0.12 %/°C	0.15 %/°C
Connection		Plug-type connector [4]) according to EN 175301-803, form C, contact clearance 8 mm, Plug-type connector [4]) according to industrial standard, form C, contact clearance 9.4 mm			

[1]) Permissible maximum value at continuous duty. For Ex versions, the permissible maximum value U_i applies.
[2]) Marking II 2 G EEx ia IIC T6 (zone 1) according to EC Type Examination Certificate PTB 98 ATEX 2047
[3]) Marking II 3 G EEx nA II T6 (zone 2) according to Statement of Conformity PTB 01 ATEX 9193 X
Note: A manufacturer's declaration for use in hazardous areas (zone 22) is available on request
[4]) The female connector with flat gasket is not included in the delivery (see "Accessories")

Pneumatic data		
Air supply	Medium	Instrument air, free of corrosive particles
	Pressure	1.4 ... 2.0 bar / 3.0 ... 3.6 bar
Output signal	without amplifier	≥ 1.2 bar at 1.4 bar air supply, ≥ 1.8 bar at 2.0 bar air supply, ≥ 2.5 bar at 3.6 bar air supply
	with amplifier	Air supply pressure
Air consumption		≤ 60 l/h at 1.4 bar air supply (normal position), ≤ 15 l/h at 1.4 bar air supply (operating position)
K_{vs} value [1])		0.01 (without amplifier), 0.02 (with amplifier)
Ambient temperature		−45 ... +80 °C, −25 ... +60 °C (amplifier with diaphragm made of chlorbutadiene 57 Cr 868), −45 ... +60 °C (amplifier with diaphragm made of silicone rubber)
Connection		Flanged end, optionally with CNOMO adapter plate or connection plate

[1]) Air flow with $p_1 = 2.4$ bar and $p_2 = 1.0$ bar can be calculated according to the following equation: $Q = K_{vs} \times 36.22$, expressed in m^3/h

Dimensions of pilot valves with flanged end

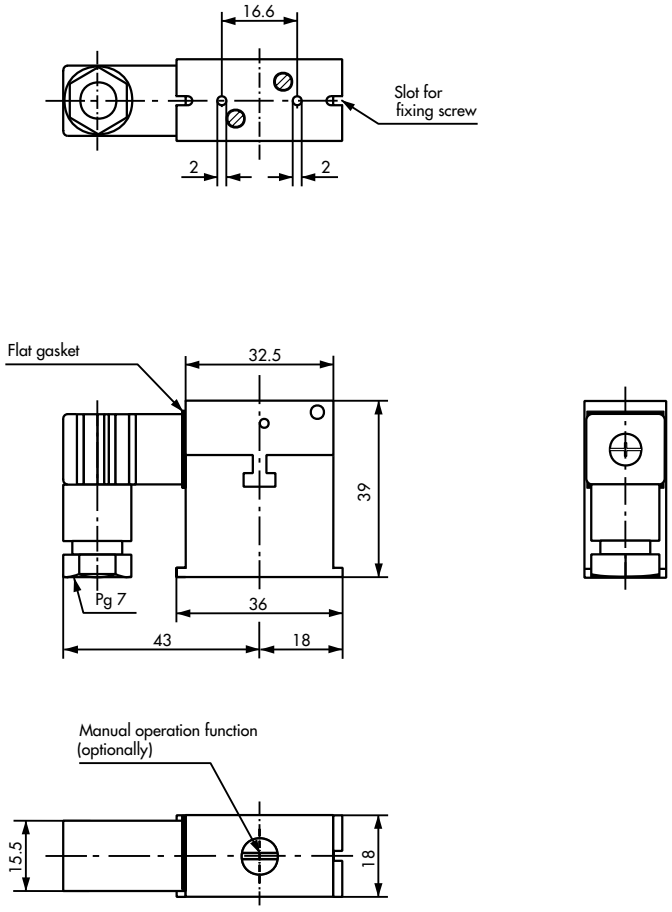
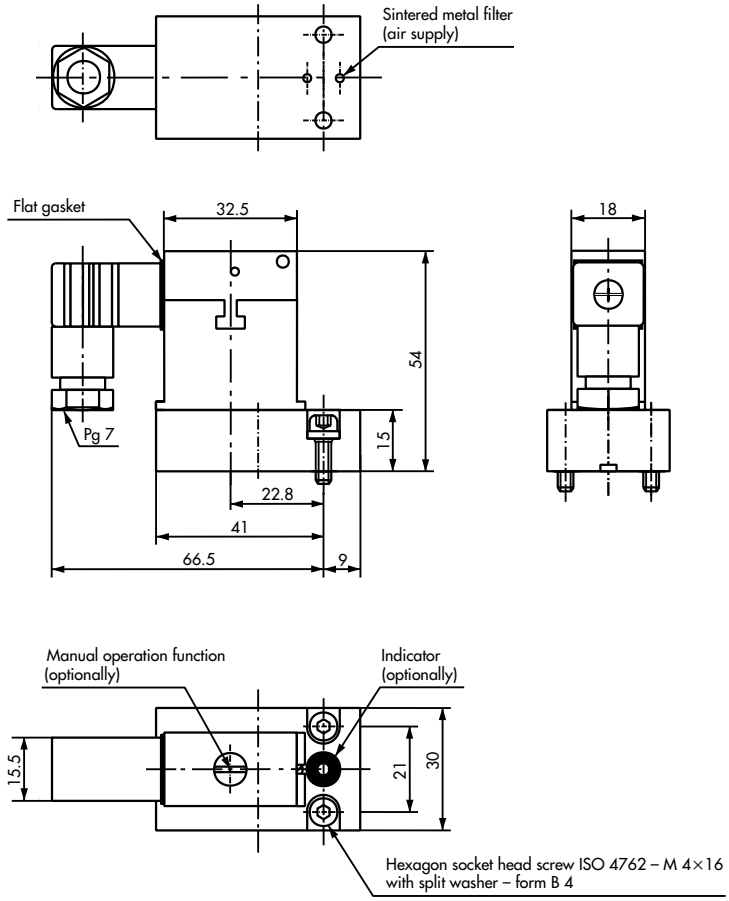


Fig. 4 · Dimensions in mm

Dimensions of pilot valves with CNOMO adapter plate



Dimension of pilot valves with CNOMO adapter plate and amplifier

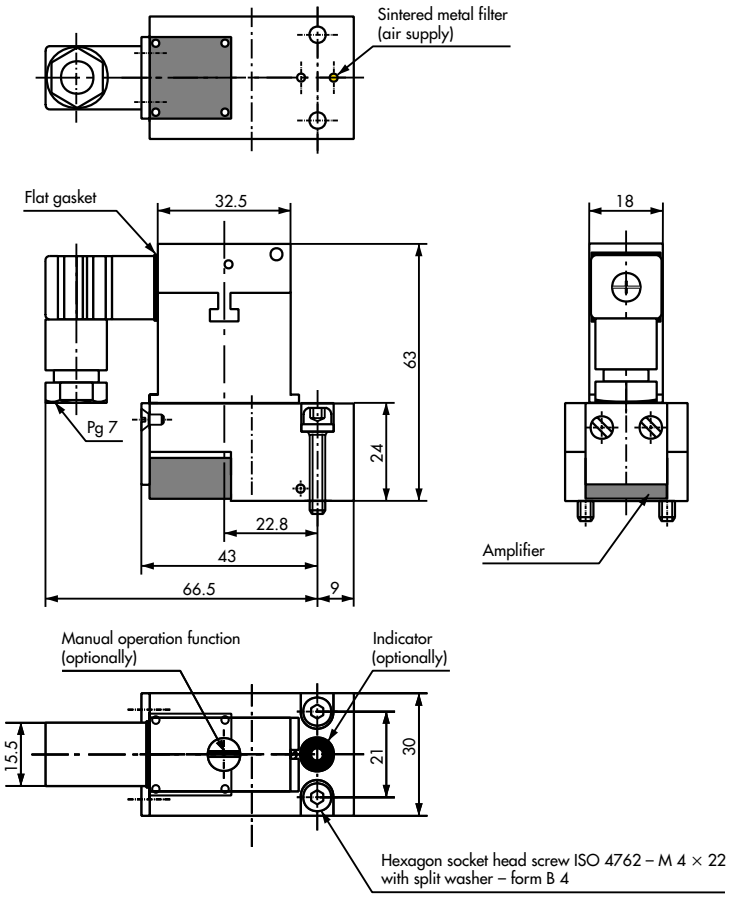
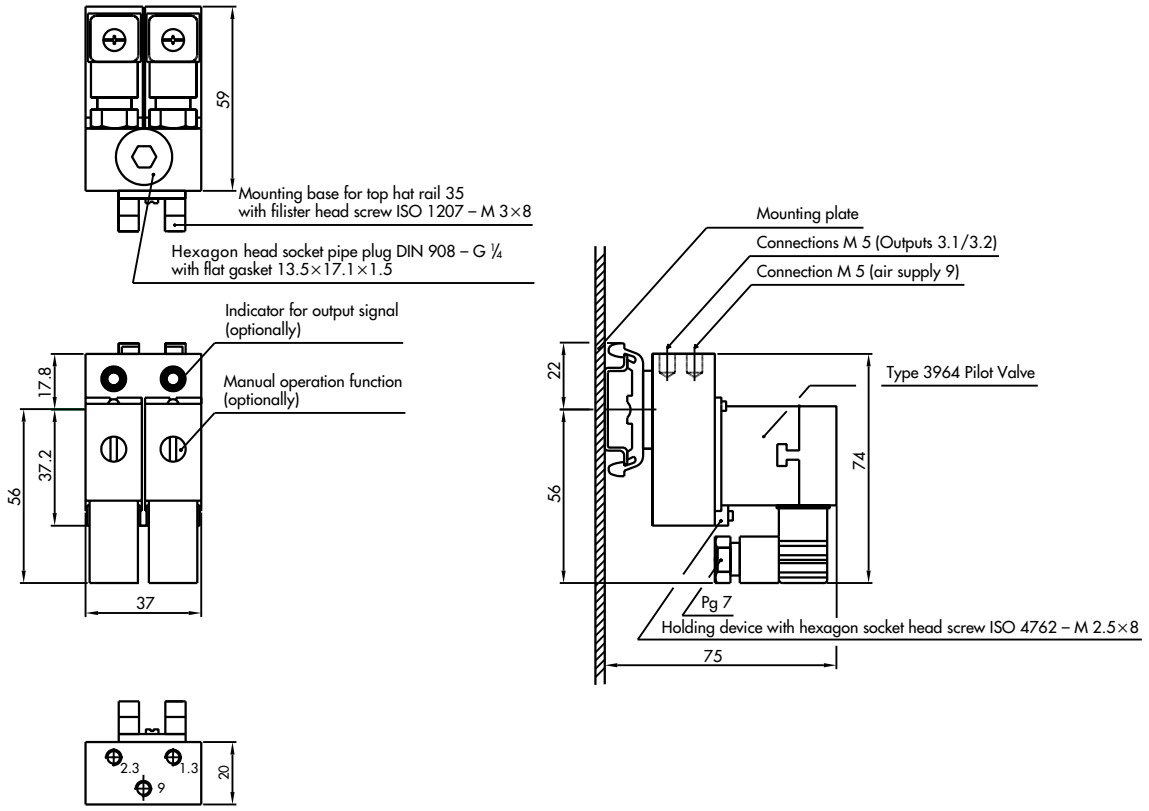


Fig. 5 · Dimensions in mm

Dimensions of pilot valves with connection plate, twofold



Dimensions of pilot valves with connection plate, fourfold

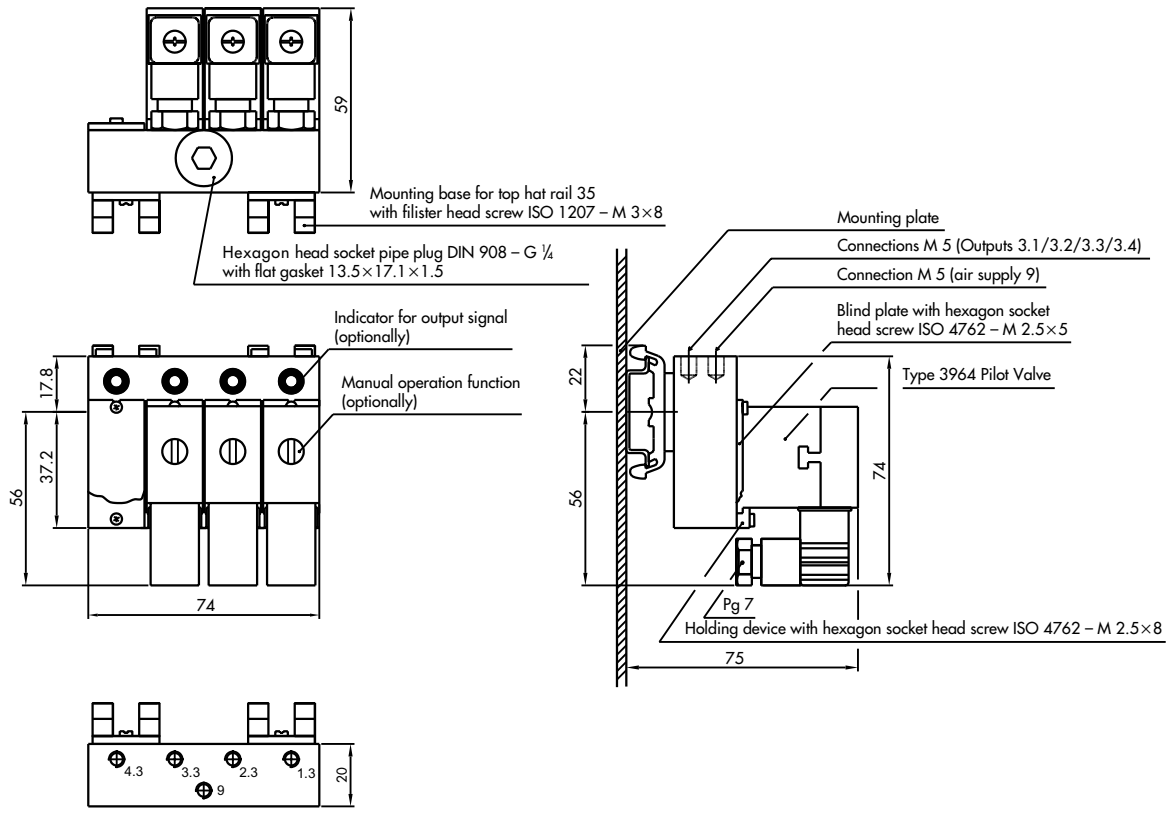


Fig. 6 · Dimensions in mm

Versions and ordering data

Pilot valve Type 3964	**Order no. 3964-**	.	.	.	.	.	.	.	.	.	.	.	.
Type of protection	Without Ex-protection	**0**	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲
	II 2 G EEx ia IIC T6 (ATEX) [1]), zone 1	**1**											
	Ex ia IIC (CSA) and AEx ia IIC (FM)	**3**											
	II 3 G EEx nA II T6 (ATEX) [2]), zone 2	**8**											
Nominal signal	6 V DC, power consumption 5.47 mW		**1**										
	12 V DC, power consumption 13.05 mW		**2**										
	24 V DC, power consumption 26.71 mW		**3**										
	24 V AC, power consumption 0.04 VA (without Ex-protection)		**8**										
Manual operation function	Without manual operation function **SIL 4**			**0**									
	Pushbutton			**1**									
	Pushbutton switch			**2**									
Mounting	Flanged end				**0**								
	CNOMO adapter plate, 30 mm **SIL 4**				**1**								
	Flanged end for Solenoid Valve Island Type 3965 with connecting cable				**3**								
	Flanged end for Solenoid Valve Island Type 3965 with single plug-type connector				**4**								
K_{vs} value [3])	0.01 without amplifier **SIL 4**					**0**							
	0.02 with amplifier					**1**							
Pressure reducer	Without pressure reducer						**0**						
Electrical connection	Plug-type connector [4]) according to EN 175301-803, form C, contact clearance 8 mm							**0**					
	Plug-type connector [4]) according to industrial standard, form C, contact clearance 9.4 mm							**1**					
Degree of protection	IP 54								**0**				
	IP 20								**2**				
Air supply	1.4 ... 2.0 bar									**0**			
	3.0 ... 3.6 bar									**1**			
Indicator	Without indicator										**0**		
	With indicator (−25 ... +60 °C)										**1**		
Ambient temperature	−25 ... +60 °C											**0**	
	−45 ... +80 °C											**2**	
	−45 ... +60 °C											**3**	
Safety function	Without safety function												**0**
	SIL 4 [5])												**1**

[1]) According to EC-Type Examination Certificate PTB 98 ATEX 2047
[2]) According to Statement of Conformity PTB 01 ATEX 2193 X
[3]) Air flow at $p_1 = 2.4$ bar and $p_2 = 1.0$ bar can be calculated according to the following equation: $Q = K_{vs} \times 36.22$, expressed in m^3/h
[4]) The female connector with flat gasket is not included in the delivery (see "Accessories")
[5]) Safety Integrity Level SIL 4 according to IEC 61508 (Report No. V 60 2004 T1)

Accessories

Female connector according to industrial standard made of polyamide, black, form C, contact clearance 9.4 mm, cable gland Pg 7
(for cable ∅ 3.5 to 6 mm)
Order no. 8831-0533

Female connector according to EN 175301-803 made of polyamide, black, form C, contact clearance 8 mm, cable gland Pg 7
(for cable ∅ 3.5 to 6 mm)
Order no. 8831-0535

Flat gasket made of epichlorhydrine rubber, silicone-free
(for cable socket according to industrial standard)
Order no. 8831-0545

Flat gasket made of epichlorhydrine rubber, silicone-free
(for cable socket according to EN 175301-803)
Order no. 8831-0546

Connection plate, twofold, made of aluminium, black anodized, connections M 5, without indicator, including 2 holding devices with hexagon socket head screw ISO 4762 – M 2.5×8
Order no. 1890-5789

Connection plate, fourfold, made of aluminium, black anodized, connections M 5, without indicator, including 4 holding devices with hexagon socket head screw ISO 4762 – M 2.5×8
Order no. 1890-5790

Connection plate, twofold, made of aluminium, black anodized, connections M 5, with 2 indicators, including 2 holding devices with hexagon socket head screw ISO 4762 – M 2.5×8
Order no. 1890-5791

Connection plate, fourfold, made of aluminium, black anodized, connections M 5, with 4 indicators, including 4 holding devices with hexagon socket head screw ISO 4762 – M 2.,5×8
Order no. 1890-5792

Mounting base for top hat rail 35 according to EN 50022 with filister head screw ISO 1207 – M 3×8
(2 pieces are nesessary for connection plate, fourfold)
Order no. 1400-5931

Blind plate with threaded plug ISO 1207 – M 5×6 and gasket M 5
(for covering unused device locations)
Order no. 1400-7588

Piping accessories see Data Sheet Z 900-1 EN

Spare parts

Diaphragm element as amplifier (for use at −25 to +60 °C)
Order no. 3975-0001

Diaphragm element as amplifier (for use at −40 to +80 °C)
Order no. 3975-0020

Holding device with hexagon socket head screw ISO 4762 – M 2.5×8
(for mounting of one pilot valve on the connection plate)
Order no. 1400-7587

O-ring 2.9×1.78 made of nitrilbutadiene rubber
(for CNOMO interface)
Order no. 8421-0044

Restrictor
Order no. 1690-9995

O-ring 2×1 made of silicone rubber
(for restrictor)
Order no. 8421-0012

(Specifications subject to change without notice.)

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