Electropneumatic Positioner
Type 4763

Fig. 1 · Type 4763

Mounting and Operating Instructions

EB 8359-2 EN

Edition September 2010

Contents

General safety instructions

- *The positioner is to be mounted, started up or operated only by trained and experienced personnel familiar with the product.*
  According to these Mounting and Operating Instructions, trained personnel refers to individuals who are able to judge the work they are assigned to and recognize possible dangers due to their specialized training, their knowledge and experience as well as their knowledge of the applicable standards.
- *Explosion-protected versions of this positioner are to be operated only by personnel who have undergone special training or instructions or who are authorized to work on explosion-protected devices in hazardous areas. Refer to section 6.*
- *Any hazards that could be caused by the process medium, the operating pressure, the signal pressure or by moving parts of the control valve are to be prevented by means of the appropriate measures.*
- *If inadmissible motions or forces are produced in the pneumatic actuator as a result of the supply pressure, the supply pressure must be restricted by means of a suitable supply pressure reducing station.*
- *Proper shipping and appropriate storage are assumed.*

- ***Note:** The device with a CE marking fulfils the requirements of the Directives 94/9/EC (ATEX) and 2004/108/EC.*
  The declaration of conformity is available on request.

Versions

Electropneumatic Positioner Type 4763-	x	1	x	0	0	x	x	x	x	0	x	0	x	x	0
Explosion protection															
Without	0						2/7								
⟨Ex⟩ II 2G Ex ia IIC T6 acc. to ATEX	1														
CSA/FM intrinsically safe/non incendive	3														
⟨Ex⟩ II 3G Ex nA II T6 for Zone 2 (ATEX)	8						2/7								
Range spring															
Range spring 1, travel = 15 mm		1													
Range spring 2, travel = 30 mm, split-range 15 mm		2													
Range spring 3, travel = 60 mm, split-range 30 mm		3													
Pneumatic connections															
ISO 228/1 G ¼						1									
¼-18 NPT						3									
Electrical connection															
Cable gland															
M20 x 1.5 blue (plastic)							1								
M20 x 1.5 black (plastic)							2								
M20 x 1.5 (nickel-plated brass)							7				2				
i/p module															
Type 6109								1							
Type 6112								2							
Reference variable															
4 … 20 mA									0						
0 … 20 mA								2	2						
1 … 5 mA								2	3						
Temperature range															
Standard											0				
Low temperature down to –45 °C								2			2				
Special version															
None												0	0	0	
For oxygen as the operating medium	0/1											0	1	6	
⟨Ex⟩ II 3 D IP 54 T 80 °C (with manufacturer's declaration)	8						2/7					0	1	8	

Type 4736 Positioner			
Travel range		7.5 to 60 mm, with 90 mm lever extension	
Reference variable Split-range 0 to 50 % and 50 to 100 % Reference variable span (up to 50 mm travel)		4 to 20 mA (Ex) Internal resistance R_i at 20 °C approx. 250 Ω ± 7 %	
		4 to 20 mA (not Ex) Internal resistance R_i at 20 °C approx. 200 Ω ± 7 % 0 to 20 mA Internal resistance R_i at 20 °C approx. 200 Ω ± 7 % 1 to 5 mA Internal resistance R_i at 20 °C approx. 880 Ω ± 7 %	
		For type of protection Ex ia IIC, the data listed in the certificate of conformity must be observed	
Range spring		See table on page 14	
Supply air	Supply air	1.4 to 6 bar (20 to 90 psi)	
	Air quality acc. to ISO 8573-1 (2001)	Maximum particle size and density: Class 4 · Oil content: Class 3 Pressure dew point: Class 3 or at least 10 K below the ambient temperature to be expected	
Output signal pressure p_{st}		Max. 0 to 6 bar (0 to 90 psi)	
Characteristic		Linear · Deviation from terminal-based conformity: ≤ 1.5 %	
Hysteresis		< 0.5 %	
Sensitivity		< 0.1 %	
Operating direction		Reversible	
Proportional band X_p (at 1.4 bar supply air)		1 to 3 % with spring 1 or 2 1 to 1.5 % with spring 3	
Air consumption in steady state, X_p = 1 %		With 1.4 bar supply air: 0.19 m_n^3/h	With 6 bar supply air: 0.5 m_n^3/h
Air output capacity		At Δp 1.4 bar: 3.0 m_n^3/h	At Δp 6 bar: 8.5 m_n^3/h
Transit time for Type 3271 "Stem extends"		240 cm²: ≤ 1.8 s · 350 cm²: ≤ 2.5 s · 700 cm²: ≤ 10 s	
Permissible ambient temperature		–20 to 70 °C; With metal cable gland: –35 to 70 °C Special version: –45 to 80 °C The limits specified in the EC Type Examination Certificate additionally apply for explosion-protected devices.	
		Version with oxygen as operating medium up to max. 60 °C	
Influences		Temperature < 0.03 %/1 K Supply air < 0.3 %/0.1 bar Vibration: < 2 % between 10 and 150 Hz and 4 g Effect when turned by 180°: < 3.5 %	
Degree of protection		IP 54 · Special version IP 65	
Electromagnetic compatibility		Requirements according to EN 61000-6-2, EN 61000-6-3 and EN 61326-1 are met	
Weight		Approx. 1.2 kg	
Materials		Housing: Die-cast aluminum, chromated and plastic-coated External parts: Stainless steel	

1 Design and principle of operation

The electropneumatic positioner is used for the correlation between the valve stem position (controlled variable x) and the input signal (reference variable w) received from the controller. In this case, the input signal accepted from the control device is compared to the travel (valve stem position) of the control valve, and a pneumatic signal pressure (output variable y) is delivered.

The positioner consists of an i/p converter unit (21) and the pneumatic section including the lever (1), shaft (1.1) and range spring (6), plus the control system composing nozzle, flapper and booster. The input signal (e.g. 4 to 20 mA) is directly fed to the i/p converter unit and converted to a proportional air pressure signal p_e. Any change of the input current signal causes a proportional change of the air pressure p_e sent to the pneumatic control system.

The air pressure p_e, in turn, produces a force which acts on the surface of the measuring diaphragm (8) and is compared to the force of the range spring (6). The motion of the diaphragm (8) is transferred to the flapper (10.2) via the feeler pin (9.1), and the nozzle (10.1) releases pressure. Any change of either the air pressure p_e or the valve stem position causes the pressure to change in the booster (12) connected downstream of the nozzle. The signal pressure p_{st} which is released causes the plug stem to assume a position based on the input signal.

The adjustable volume restriction Q (14) and Xp (gain) restriction (13) are used to optimize the control loop. The range spring (6), which can be exchanged, is assigned to both the rated valve travel and the nominal voltage of the input signal.

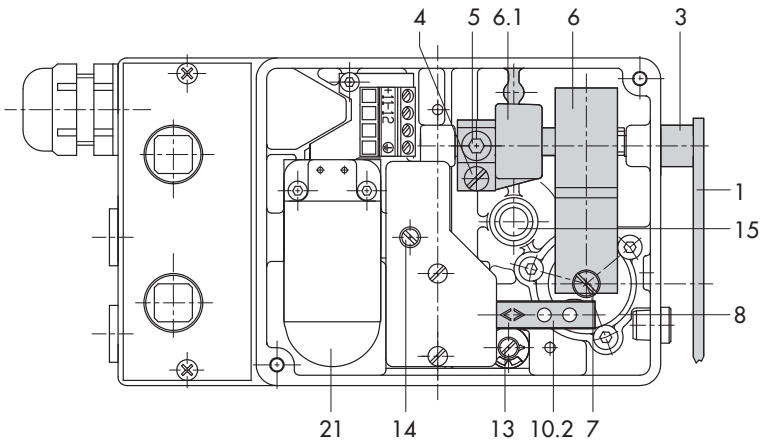
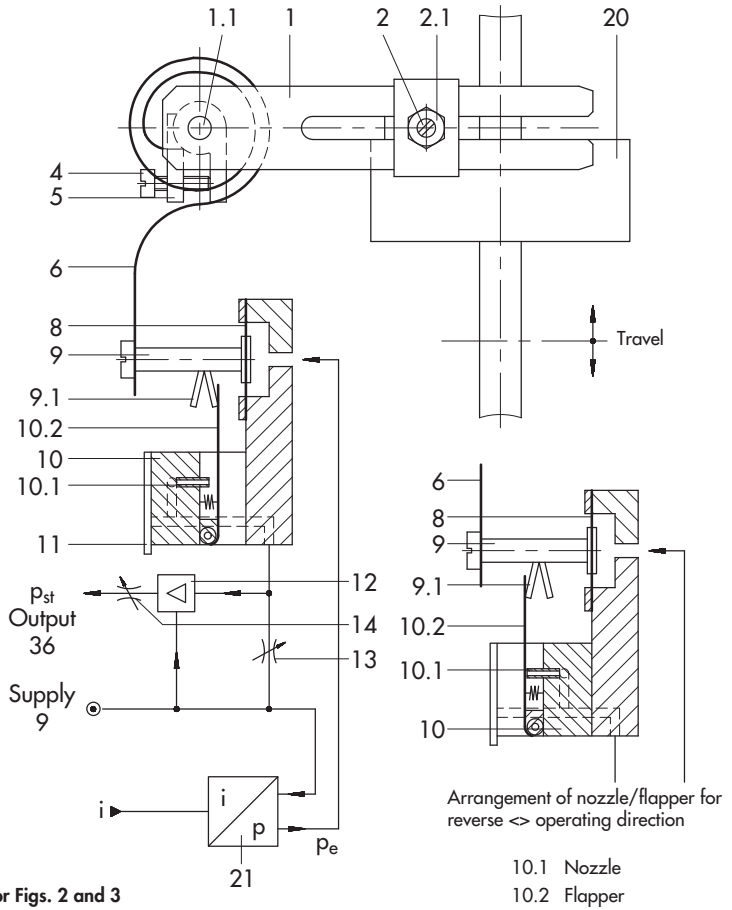


Fig. 2 · Positioner with cover removed



Legend for Figs. 2 and 3

1	Lever for valve travel	6	Range spring	10.1	Nozzle
1.1	Shaft	6.1	Bracket	10.2	Flapper
2	Pin	7	Mounting screw	11	Cover plate
2.1	Nut	8	Measuring diaphragm	12	Booster
3	Sleeve	9	Diaphragm plate	13	Xp restriction
4	Zero adjustment screw	9.1	Feeler pin	14	Volume restriction Q
5	Mounting screw	10	Nozzle block	15	Hole for mounting screw
				20	Plate
				21	i/p converter unit

Fig. 3 · Functional diagram

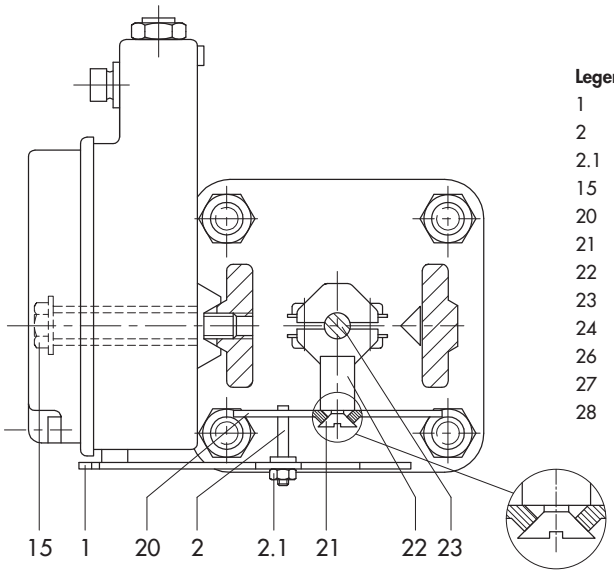
2 Attachment

To attach the positioner to valves with cast yokes according to IEC 60534-6 (NAMUR rib), mounting parts (order no. 1400-5745) are used. For valves with rod-type yokes (pillars), the mounting kit (order no. 1400-5745) and additionally the mounting kit (order no. 1400-5342) are necessary (see also accessories table on page 20).

Since the positioner can be attached on either side of the valve, the physical location (left or right attachment) should be determined before actual attachment (see corresponding Figs. 7 to 10 in section 4.1).

2.1 Attachment to valves with cast yokes

1. Fasten the plate (20) to the stem connector clamps (22) of the valve using the screws (21).
2. Unscrew the positioner cover, and secure the device to the valve yoke using the mounting screw (15). The O-ring included in the mounting kit is not required for this device. Make sure that the pin (2) is routed inside the wire strap and therefore clamped against the plate (20).



Legend for Figs. 4 and 5

1	Lever
2	Pin
2.1	Nut
15	Mounting screw
20	Plate
21	Screw
22	Stem connector
23	Plug stem
24	Travel indicator
26	Clamping plate
27	Valve rods
28	Support

Fig. 4 · Attachment to valves with cast yokes according to IEC 60534-6 (NAMUR rib)

2.2 Attachment to valves with rod-type yokes

1. Screw the plate (20), off-centered, to the travel indicator (24) of the plug stem (23) using the screws (21).
2. Place both the support (28) and the clamping plate (26) on the rod (27) and lightly fasten. Move the support until both the center of the plate (20) and the support (28) are aligned at half the valve travel.
3. Screw tight the support and clamping plate.
4. Mount the positioner to the support using the mounting screw (15). Make sure that the pin (2) is led inside the wire strap and therefore clamped against the plate (20).

2.3 Cover of the positioner housing

After attaching the positioner, make sure that the vent plug on the cover of the positioner housing points downwards after the valve has been installed.

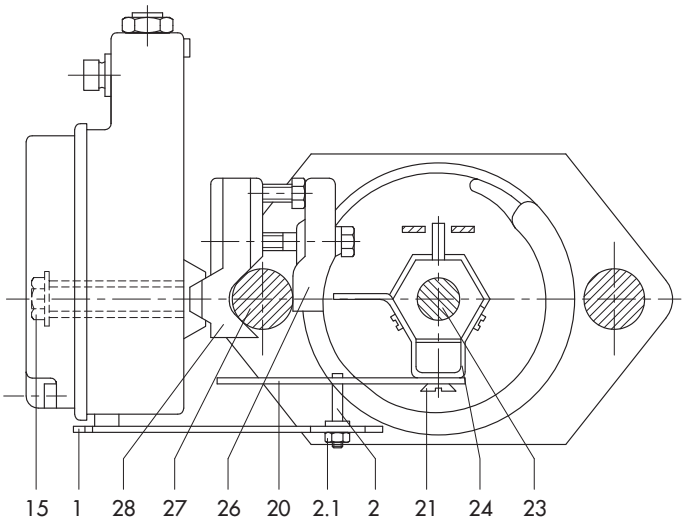


Fig. 5 · Attachment to valves with rod-type yokes according to IEC 60534-6

3 Connections

3.1 Electrical connections

DANGER!
Risk of electric shock and/or the formation of an explosive atmosphere!

– *For electrical installation, observe the relevant electrotechnical regulations and the accident prevention regulations that apply in the country of use.*
– *The following regulations apply to mounting and installation in hazardous areas: EN 60079-14: 2008* ***Explosive atmospheres – Part 14: Electrical installations design, selection and erection*** *(or VDE 0165 Part 1).*

NOTICE
– *Adhere to the terminal assignment! Switching the assignment of the electrical terminals may cause the explosion protection to become ineffective!*
– *Do not loosen enameled screws in or on the housing.*
– *The maximum permissible values specified in the national EC type examination certificates apply when interconnecting intrinsically safe electrical equipment (U_i or U_o; I_i or I_o; P_i or P_o; C_i or C_o, and L_i or L_o).*

Selecting cables and wires:

Observe ***Clause 12 of EN 60079-14: 2008*** *when installing intrinsically safe circuits. The Subclause 12.2.2.7 applies when running multi-core cables containing more than one intrinsically safe circuit.*

In particular, the radial thickness of the conductor insulation for common insulation materials, such as polyethylene, must have a minimum radial thickness of 0.2 mm.

The diameter of an individual wire in a fine-stranded conductor must not be smaller than 0.1 mm. Protect the conductor ends against splicing, e.g. by using wire-end ferrules.

When two separate cables are used for connection, an additional cable gland can be installed.
Seal cable entries left unused with plugs.

Devices used at ambient temperatures ***below –20 °C*** *must be fitted with metal cable glands.*

Equipment for use in zone 2/zone 22

In equipment operated with type of protection Ex nA II (non-sparking equipment) according to EN 60097-15: 2003, circuits may be connected, interrupted or switched while energized only during installation, maintenance or repair.

The wiring for the input signal is led using cable glands to the terminals 11 (+) and 12 (–). The ground connection can be connected inside or outside of the positioner housing.

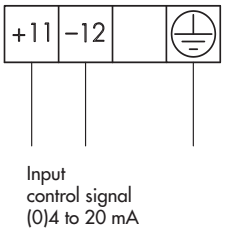


Fig. 6 · Electrical connection

The following accessories are available:

Cable gland M 20 x 1.5
Black Order no. 1400-6985
Blue Order no. 1400-6986
Adapter M 20 x 1.5 to ½ NPT:
Aluminum, powder-coated
Order no. 0310-2149

3.2 Pneumatic connections

The pneumatic connections are designed as tapped holes with ¼ NPT or ISO 2228/1-G ¼ thread. The conventional male connections for metal and copper pipes (or plastic hoses) can be used.

Note:
The supply air must be dry and free of any oil and dust. Always observe the maintenance instructions applicable to the connected pressure reducing stations. Blow out air lines thoroughly before connecting them.

3.2.1 Pressure gauges

We recommend attaching pressure gauges for the supply air and signal pressure in order to monitor the positioner. The parts are listed as accessories in the table on page 20.

3.2.2 Supply pressure

The required supply pressure is determined by the bench range and the operating direction (fail-safe action) of the actuator. The bench range is written on the nameplate as spring range or signal pressure range depending on the type of actuator. **FA** (actuator stem extends) or **FE** (actuator stem retracts) or a symbol indicates the operating direction.

Actuator stem extends (FA)

Fail-safe position Valve CLOSED
(for globe and angle valves)

Required supply pressure =
Upper bench range value + 0.2 bar,
minimum 1.4 bar.

Actuator stem retracts (FE)

Fail-safe position Valve OPEN
(for globe and angle valves)

The required supply pressure for a tight-closing valve is roughly estimated from the maximum signal pressure pst_{max}:

$$pst_{max} = F + \frac{d^2 \cdot \pi \cdot \Delta p}{4 \cdot A} \text{ [bar]}$$

d = Seat diameter [cm]
Δp = Differential pressure across valve [bar]
A = Actuator diaphragm area [cm^2]
F = Upper bench range of actuator [bar]

In the absence of such specifications, proceed as follows:

Required supply pressure =
Upper bench range value + 1 bar

The positioner output pressure is led to the top or bottom diaphragm case of the actuator as shown in Figs. 7 to 10.

4 Operation

4.1 Combining positioner and actuator

The arrangement of the actuator, input signal, operating direction and mounting location is schematically represented in Figs. 7 to 10.

Each subsequent change such as reversal of the control loop's operating direction or field reversing the actuator version from direct "Actuator stem extends" to reverse "Actuator stem retracts" or vice versa also involves changing the mounting location of the positioner.

4.1.1 Determining/reversing the operating direction

(Figs. 7 to 11)

When the input signal (reference variable w) increases, the signal pressure p_{st} can either be increasing (direct operating direction <<) or decreasing (reverse operating direction <>). The same applies to a decreasing input signal; the output pressure either decreases (direct operating direction <<) or increases (reverse operating direction <>). Symbols are located on the flapper (10.2) which identify the respective operating directions (direct << or reverse <>).

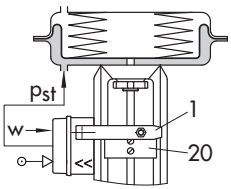
Depending on the flapper position, the adjusted operating direction is marked with the corresponding symbol. If the operating direction of the required function does not match the symbol or if the operating direction is to be changed, proceed as follows:

1. Remove both screws of the cover plate, and lift off the nozzle block (10) along with the cover plate.
2. Reinstall the nozzle block turned 180° together with the cover plate, and screw tight.

Make sure that the nozzle block and flapper are correctly located above or below the feeler pin (9.1) as shown in Fig. 11.

If the operating direction is to be changed after the initially determined arrangement of positioner and actuator, note that the positioner must be mounted in a different location and the nozzle block must be turned. Always consider the location of the lever (1) and the plate (20), "lever on top of plate" or reversed "plate on top of lever" as shown in Figs. 7 to 10.

Actuator: Stem extends (FA)



Lever (1) on top of plate (20)

Fig. 7 · Operating direction << Left attachment

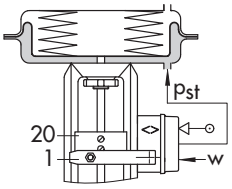


Plate (20) on top of lever (1)

Fig. 8 · Operating direction <> Right attachment

Actuator: Stem retracts (FE)

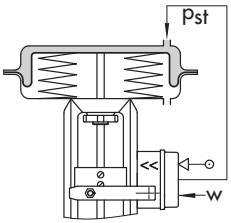


Fig. 9 · Operating direction << Right attachment

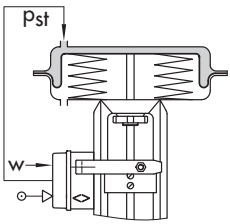
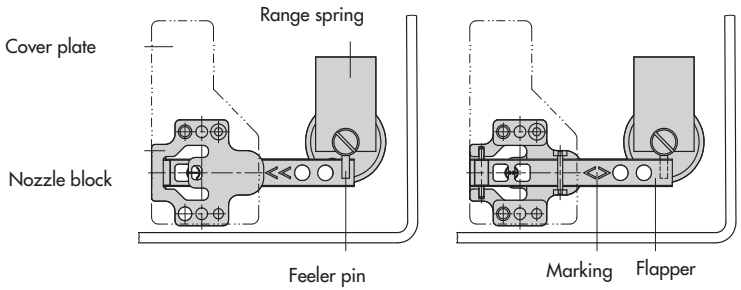


Fig. 10 · Operating direction <> Left attachment



Operating direction increasing/increasing (direct <<)
feeler pin on top of flapper

Operating direction increasing/decreasing (reverse <>)
flapper on top of feeler pin

Fig. 11 · Position of nozzle block, cover plate removed

4.2 Starting point and input signal (reference variable)

The attached lever and the installed range spring of the positioner are assigned to the values of rated valve travel (mm) and the input signal (% reference variable) as in the table below.

In standard operation, the reference variable span is 100 % = 16 mA. A smaller span of, for example, 50 % = 8 mA is only required for split-range operation (Fig. 13). The span can be changed by exchanging the range spring (section 4.4). On making adjustments to the positioner, the travel must be adapted to the input signal and vice versa.

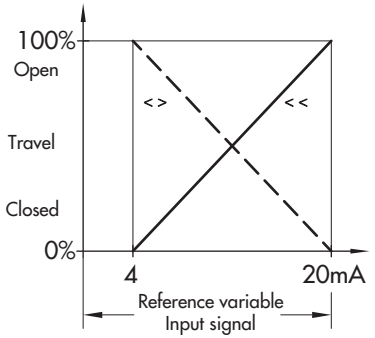


Fig. 12 · Standard operation

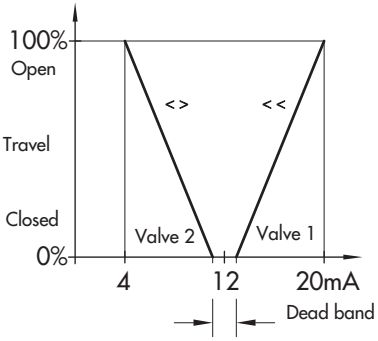


Fig. 13 · Split-range operation, two valves operating in opposing directions

Rated travel [mm]	Min./max. travel [mm]	Reference variable (input signal)	Range spring
Standard travels for SAMSON valves with lever I (40 to 127 mm long)			
15	7.5 to 15	100 % 50 %	1 2
30	14 to 32	100 % 50 %	2 3
60	30 to 70	100 %	3
Additional travel ranges with lever I and lever extension (40 to 200 mm long)			
20	7.5 to 26	100 % 50 %	1 2
40	14 to 50	100 % 50 %	2 3
> 60	30 to 90	100 %	3

With a 4 to 20 mA input signal, for example, the valve must also move through the entire range (0 to 100 %). The starting point then is 4 mA and the upper range value 20 mA.

In split-range operation, the controller output signal used to control two control valves is divided in such a way that these valves move through their entire travel with half of the input signal range (e.g. first valve set to 4 to 12 mA, second valve set to 12 to 20 mA). To prevent the two from overlapping, a dead band of ±0.5 mA as in Fig. 13 must be taken into account.

The starting point (zero) is adjusted using the zero adjustment screw (4), the reference variable span and, hence, the upper range value using the pin (2).

4.3 Setting the positioner at the valve

- Connect an ammeter to the control signal input at the terminals 11 (+) and 12 (–).
- Connect the supply air to the supply input (supply 9).

4.3.1 Setting the air delivery (volume restriction Q) and proportional band XP

1. Close the volume restriction (14) as far as the required speed of response allows.
   You can check the speed of response by pressing the range spring (6) as far as it will go.
2. Set the input signal to approximately 50 % of its range. Then, turn the zero adjustment screw (4) until the valve is at approximately 50 % valve travel.

On setting the Xp restriction, observe the relationship with the supply air pressure as indicated in Fig. 14. The preset value of Xp should read approximately 3 %.

3. Check the plug stem's tendency to oscillation by pressing the range spring (6) briefly as far as it will go.
   Xp should be set to a value as small as possible, however, without causing noticeable overshoot.

Note:
Always determine the Xp setting prior to adjusting the starting point. Subsequent modification displaces the zero point!
The zero can also be shifted by altering the adjusted supply air pressure.
If necessary, check the zero adjustment under operating conditions of the plant and, re-adjust, if need be.

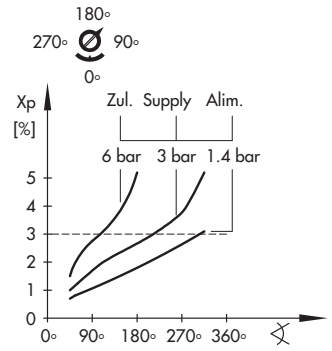


Fig. 14 · Setting the XP restriction

4.3.2 Setting actuator version "Stem extends"

Note:
To ensure that the total closing force of the actuator can be effective in the control valve, the diaphragm chamber must be completely vented at the lower range value of the reference variable (operating direction <<) and at the upper range value (operating direction <>).
Therefore, set input signal to a slightly increased starting point of 4.5 mA when the operating direction is direct << and to a slightly lowered starting point of 19.5 mA when the operating direction is reverse <>. This applies in particular to controllers and control systems whose output signal is limited to a range of 4 to 20 mA.

Starting point (zero) e.g. 4.5 mA

1. Turn the zero adjustment screw (4) until the plug stem just begins to move from the resting position (observe plug stem with travel indicator).
2. Reduce the input signal on the ammeter and increase again slowly. Check whether the plug stem starts moving at a starting point of 4.5 mA and, if necessary, correct.

Upper range value (span) e.g. 20 mA

3. After the starting point has been adjusted, increase the input signal. The plug stem must be motionless at an upper range value of exactly 20 mA and therefore already moved through 100 % of its travel range (watch the travel indicator at the valve!). If the upper range value is incorrect, the pin (2) must be moved as follows in order to correct the signal:
4. Move pin to:
   End of lever –> to increase travel
   Pivot –> to reduce travel

   Whenever you correct the input signal, re-adjust zero afterwards. Subsequently, check the upper range value.

Repeat until the two values match.

4.3.3 Setting actuator version "Stem retracts"

Note:
For actuator version "Actuator stem retracts", the diaphragm chamber must be loaded with a pressure that is capable of tightly closing the control valve, even with prevailing upstream pressure in the plant. This concerns an upper range value of the input signal corresponding to 20 mA (direct operating direction <<) or a lower range value corresponding to 4 mA (reverse operating direction <>).

The required signal pressure is indicated on the adhesive label on the positioner or is roughly estimated as in section 3.2.2.

Starting point (zero) e.g. 20 mA

1. Adjust the input signal to a starting point of 20 mA on the ammeter.
   Turn the zero adjustment screw (4) until the control valve just begins to move from the initial position.
2. Increase the input signal and slowly reduce to a starting point of 20 mA again.

Check if the valve begins to move at exactly 20 mA.

Correct deviation using the zero adjustment screw (4); turning it counterclockwise moves the control valve earlier from its final position and clockwise later.

Upper range value (span) e.g. 4 mA

3. After adjusting the starting point, adjust the input signal to an upper range value of 4 mA using the ammeter. With an upper range value of exactly 4 mA, the plug stem must be motionless and therefore already moved through 100 % of its travel range (watch the travel indicator at the valve!).
4. If the upper range value is incorrect, the pin (2) must be moved to correct the signal.

   Adjust 20 mA and turn the zero adjustment screw (4) until the required signal pressure is indicated on the pressure gauge.

   By way of substitution for a pressure gauge, set 19.5 mA as the starting point.

4.4 Exchanging the range spring

If the range is to be altered or changed to split-range operation, replace the range spring as shown in Fig. as follows:

1. Remove screw (7) on the range spring. Pull out hexagon socket screw (5) and the lever together with shaft.
2. Exchange range spring. Slide lever with shaft through sleeve (3), positioner housing and bracket (6.1).
3. Secure range spring with the screw (7).
4. Move bracket and shaft until the screw (5) sits on the flattened part of the shaft. Tighten screw (5). Allow for a play from 0.05 to 0.15 mm between the lever (1) and the sleeve (3) as well as between the range spring (6) and the positioner housing.

5 Converting an electropneumatic into a pneumatic positioner

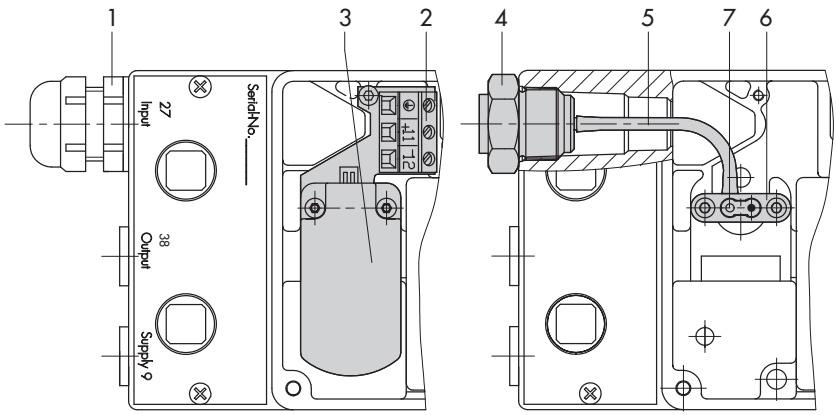
The appropriate conversion kit allows the electropneumatic positioner to be converted into a Type 4765 Pneumatic Positioner.

Note: *EB 8359-1 EN then applies for the converted Type 4765 Pneumatic Positioner.*

Required conversion kit for model index **.02.** or lower
for G threaded connection
Order number 1400-6724
for NPT threaded connection
Order number 1400-6725

Required conversion kit for model index **.03.** or higher
for G threaded connection
Order number 1400-6795
for NPT threaded connection
Order number 1400-6796

1. Undo mounting screws and lift the i/p converter unit together with the printed circuit board out of the positioner housing.
2. Remove screw gland (1). Plug on hose (5) and screw the connecting nipple (4) of the conversion kit tightly on the housing.
3. Insert sealing element (7) into connecting plate (6) and screw tight in the housing.



1	Screw gland	4	Connecting nipple
2	Printed circuit board	5	Hose
3	i/p module	6	Connecting plate
		7	Sealing element

Fig. 15 · Converting the positioner

4. Push the free end of the hose onto the connecting plate (6).

6 Servicing explosion-protected devices

If a part of the device on which the explosion protection is based needs to be serviced, the device must not be put back into operation until a qualified inspector has assessed it according to explosion protection requirements, has issued an inspection certificate or given the device a mark of conformity.

Inspection by a qualified inspector is not required if the manufacturer performs a routine test on the device prior to putting it back into operation. The passing of the routine test must be documented by attaching a mark of conformity to the device. Replace explosion-protected components only by original, routine-tested components from the manufacturer.

Devices that have already been operated outside hazardous areas and are intended for future use inside hazardous areas must comply with the safety requirements placed on serviced devices. Before being used inside hazardous areas, test the devices according to the specifications for servicing explosion-protected devices.

7 Maintenance, calibration and work on equipment

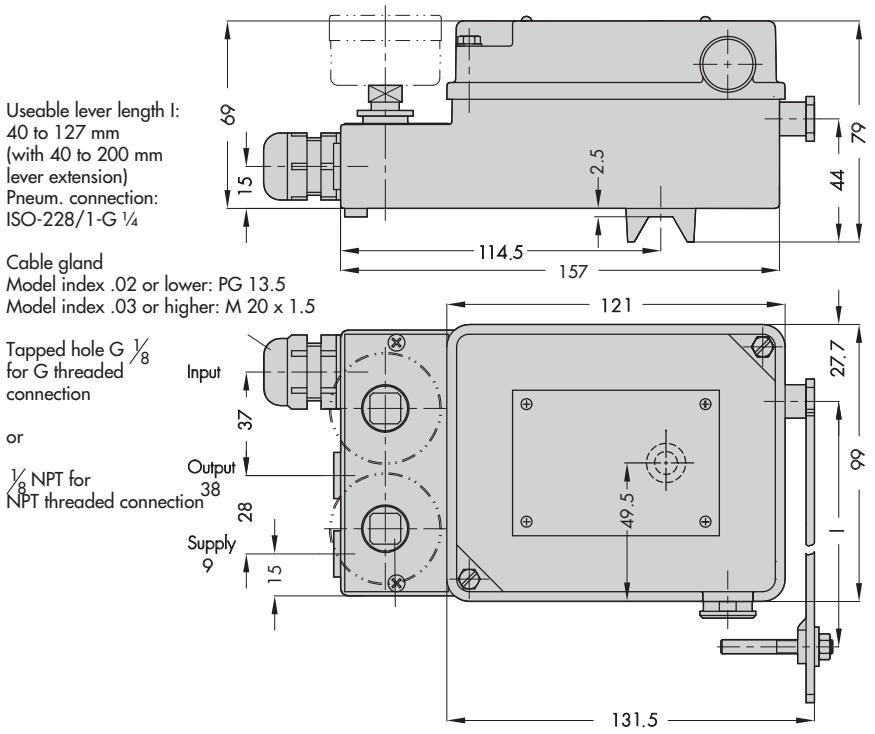
The interconnection with intrinsically safe circuits to check or calibrate the apparatus must only be performed with intrinsically safe current/voltage calibrators and measuring instruments to rule out any damage to components relevant for explosion protection.

The maximum values for intrinsically safe circuits specified in the approvals must be kept.

8 Accessories and mounting parts

Accessories – Mounting parts	Order number
Range spring 1	1190-0736
Range spring 2	1190-0737
Range spring 3	1190-0738
Lever I	1690-6469
Lever extension	1400-6716
Pressure gauge attachment	1400-6950
Pressure gauge attachment, free of copper	1400-6951
Mounting kit for valves with cast yoke acc. to NAMUR	1400-5745
Mounting kit for valves with rod-type yokes acc. to NAMUR for 18 to 35 mm rod diameters	1400-5745 and 1400-5342
Spare parts assortment with seals and diaphragms	1400-6792
Spare parts assortment with seals, diaphragms and pneumatic components (for model index .02 or higher)	1042-0040
Conversion kit to upgrade to degree of protection IP 65 (refer to SAMSOMATIC print Z 900-7 for more details)	1790-7408

9 Dimensions in mm



Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB Ex

TRANSLATION

(1) **EC TYPE EXAMINATION CERTIFICATION**

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**

(3) EC Type Examination Certificate Number

PTB 02 ATEX 2078

(4) Equipment: Model 4763-1.. I/P Positioner

(5) Manufacturer: SAMSON AG, Mess- und Regeltechnik

(6) Address: Weismüllerstr. 3, D-60314 Frankfurt, Germany

(7) This equipment and any acceptable variations thereof are specified in the schedule to this certificate.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 in according to Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres as specified in Annex II to the Directive.

The examination and test results are recorded in confidential report **PTB-Ex 02-22054**.

(9) The Essential Health and Safety Requirements are satisfied by compliance with

EN 50014: 1997+A1+A2 **EN 50020: 1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) Accroding to the Directive 94/9/EC, this EC TYPE EXAMINATION CERTFICATE relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of the equipment.

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB Ex

(12) The marking of the equipment shall include the following:

Ex **II 2 G EEx ia IIC T6**

Zertifizierungsstelle Explosionsschutz Braunschweig,19. July 2002
By order

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirketor

EC Type Examination Certificates without signature and seal are invalid.
This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt., Bundesallee 100, D-38116 Braunschweig

Ptb29-4763.doc

(13) **S c h e d u l e**

(14) **EC TYPE EXAMINATION CERTIFICATE No. PTB 02 ATEX 2078**

(15) **Description of Equipment**

The Model 4763-1.. I/P Positioner is intended for attachment to pneumatic control valves. It serves for converting control signals of (0)4...20 mA or 1...5 mA from a controlling system into a pneumatic actuating pressure of 6 bar max. For auxiliary power non-combustible media are used.

The i/p converter circuit is a passive two-terminal network which may be connected to any certified intrinsically safe circuit, provided the permissible maximum values of U , I and P are not exceeded.

The device is intended for use inside and outside of hazardous locations.

The correlation between version, temperature classification, permissible ambient temperature ranges and maximum short-circuit currents is shown in the table below:

Version 4763-1...1. with Model 6109 I/P Module

Temperature class	Permissible ambient temperature range	Maximum short-circuit current
T6	-45 °C ... 60 °C	85 mA
T5	-45 °C ... 70 °C	
T4	-45 °C ... 80 °C	
T5	-45 °C ... 70 °C	100 mA
T4	-45 °C ... 80 °C	

Version 4763-1...2. with Model 6112 I/P Module

Temperature class	Permissible ambient temperature range	Maximum short-circuit current
T6	-45 °C ... 60 °C	85 mA or
T5	-45 °C ... 70 °C	100 mA
T4	-45 °C ... 80 °C	120 mA

Physikalisch-Technische Bundesanstalt **PTB**
Braunschweig und Berlin

Electrical data

Signal circuit (terminals 11/12)

Type of protection: Intrinsic safety EEx ia IIC only for connection to a certified intrinsically safe circuit

Maximum values:

U_i = 28 V
I_i = 110 mA or 85 mA
P_i = 0.7 W
or
U_i = 25 V
I = 120 mA
P_i = 0.7 W
C_i = negligible
L_i = negligible

(16) **Test Report PTB Ex 02-22054**

(17) **Special conditions for safe use**

None

(18) **Essential Health and Safety Requirements**

In compliance with the standards specified above.

Zertifizierungsstelle Explosionsschutz Braunschweig, 19. July 2002
By order

(Signature) (seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirektor

EC Type Examination Certificates without signature and seal are invalid.
This EC Type Examination Certificate may only be reproduced in its entirety and without any changes, schedule included.
Extracts or changes shall require the prior approval of the Physikalisch-Technische Bundesanstalt.

Physikalisch-Technische Bundesanstalt., Bundesallee 100, D-38116 Braunschweig

Ptb29-4763.doc

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

TRANSLATION

(1) **Statment of Conformity**

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**

(3) EC Type Examination Certificate Number

PTB 03 ATEX 2183 X

(4) Equipment: Model 4763-8 I/P Positioner

(5) Manufacturer: Samson AG

(6) Address: Weismüllerstr. 3, D-60314 Frankfurt, Germany

(7) This equipment and any acceptable variation therefor are specified in the schedule to this certificate and the documents referred to therein.

(8) The Physikalisch-Technische Bundesanstalt, notified body number 0102 in according to Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report

PTB Ex 03-23304

(9) The Essential Health and Safety Requirements are satisfied by compliance with

EN 50021: 1999

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) In compliance with the Directive 94/9/EC this Statement of Conformity relates only to the dessign and consturciton of the equipment specified. Further requirements of this Directive apply to manufacture and marketing of this equipment.

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

PTB

(12) The marking of the equipment shall include the following:

II 3 G EEx nA II T6

Zertifizierungsstelle Explosionsschutz Braunschweig, 30 September 2003
By order

(Signature) (Seal)

Dr. Ing. U. Johannsmeyer
Regierungsdirketor

(13) **S c h e d u l e**

(14) **Statement of Conformity PTB 01 ATEX 2170 X**

(15) **Description of Equipment**

The Model 4763-8... I/P Positioner is intended for attachment to pneumatic control valves. It serves for converting control signals of (0)4 . . .20mA or 1 . . . 5mA from a controlling system into a pneumatic actuating pressure of 6bar max.

For pneumatic auxiliary power non-combustible media are used.

The device is intended for use inside and outside of hazardous areas...

The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissible ambient temperature range
T6	-45°C . . . 60°C
T5	-45°C . . .70°C
T4	-45°C . . . 80°C

Electrical data

Signal circuit (terminals 11/12) — Type of protection: EEx nA II

(16) Test report: **PTB Ex 03-23304**

(17) **Sepcial conditions for safe use**

The signal circuit (terminals 11/12) shall be preceded with by a fuse installed outside of the hazardous area.
This fuse shall comply with IEC 60127-2/II, 250V F, or with IEC 60127-2/VI, 250V T, with a fuse nominal current IN of ≤ 50mA max.

The positioner shall be mounted in an enclosure providing at least Degree of Protection IP 54 in compliance with the IEC Publication 60529.
This requirement applies also to the cable entries and/or plug connectors.

The wiring shall be connected in such a manner that the connection facilities are not subjected to pull and twisting.

Schedule of the Statement of Conformity

(18) **Basic health and safety requirements**

Are satisfied by compliance with the standard specified above.

Zertifizierungsstelle Explosionsschutz — Braunschweig,
By order

(Signature) (seal)

Dr. Ing. U. Johannsmeyer

Installation Manual for apparatus certified by CSA for use in hazardous locations.

Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

Table 1: Maximum values

	U_i or V_{max}	I_i or I_{max}	P_i or P_{max}	C_i	L_i
Signal circuit	28V	115mA	0,7W	0nF	0µH

U_o or $V_{OC} \leq U_i$ or V_{max} / I_o or $I_{OC} \leq I_i$ or I_{max} / $P_o \leq P_i$ or P_{max}; $C_a \geq C_i$ and $L_a \geq L_i$

Table 2: CSA - certified barrier parameters of solenoid valve circuit

Barrier	Supply barrier		Evaluation barrier	
	V_{max}	R_{min}	V_{max}	
Signal circuit	≤ 28V	≥ 280Ω	28V	Diode Return

Table 3: The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissble ambient temperature range
T6	60°C
T5	-45°C ...70°C
T4	80°C

Intrinsically safe if installed as specified in manufacturer's installation manual.

CSA- certified for hazardous locations

Ex ia IIC T6; Class I, Zone 0 **Type 3 Enclosure**
Class I; Groups A, B, C, D
Class II; Groups E, F + G; Class III

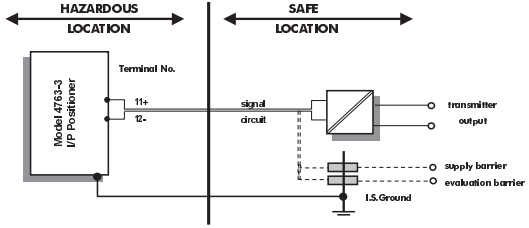
Notes:

1.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with the CSA certified apparatus. For maximum values of **U_i or V_{max} ; I_i or I_{max}; P_i or P_{max}** ; C_i and L_i of the various apparatus see Table 1.

2.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with the CSA certified intrinsically safe barrier. For barrier selection see Table 2.

3.) Installation shall be in accordance with the Canadian Electrical Code Part. 1.

4.) Use only supply wires suitable for 5°C above surrounding temperature.



Version: Model 4763-3 I/P Positioner.

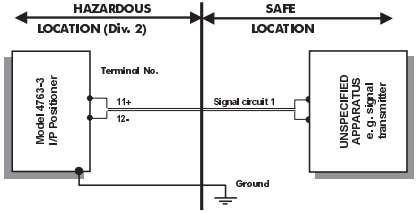
Supply and evaluation barrier CSA certified.

For the permissible maximum values for the intrinsically safe circuit see Table 1
For the permissible barrier parameters for the circuit see Table 2

Cable entry M 20 x 1.5 or metal conduit according to drawing No. 1050 – 0539 T or 1050 – 0540 T

CSA- certified for hazardous locations

Class I; Div. 2, Groups A, B, C, D **Type 3 Enclosure**
Class II; Div. 2, Groups E, F + G, Class III



Notes:

1.) For the maximum values for the circuit see Table 1 and 2.

2.) Cable entry only rigid metal conduit according to drawing No. 1050-0539 T and 1050-0540 T

Installation Manual for apparatus approved by FM for use in hazardous locations.

Electrical rating of intrinsically safe apparatus and apparatus for installation in hazardous locations.

Table 1: Maximum values

	U_i or V_{max}	I_i or I_{max}	P_i or P_{max}	C_i	L_i
Signal circuit	28V	115mA	0,7W	0nF	0 µH

Notes: U_o or V_{oc} or $V_t \leq U_i$ or V_{max} / I_o or I_{oc} or $I_t \leq I_i$ or I_{max}
P_{oc} or $P_{max} \leq P_i$ or P_{max}

Table 2: FM - approved barrier parameters of solenoid valve circuit

Barrier	Supply barrier			Evaluation barrier		
	V_{oc}	R_{min}	I_{oc}	V_{oc}	R_{min}	I_{oc}
Signal circuit	≤ 28V	≥ 280Ω	≤ 115mA	28V	#	0mA

Table 3: The correlation between temperature classification and permissible ambient temperature ranges is shown in the table below:

Temperature class	Permissble ambient temperature range
T6	60°C
T5	- 45°C ≤ ta ≤ 70°C
T4	80°C

Intrinsically safe if installed as specified in manufacturer's installation manual.

FM- approved for hazardous locations

Class I, Zone 0, A Ex ia IIC T6, **NEMA 3R**
Class I, II, III, Division 1, Groups A, B, C, D, E, F + G

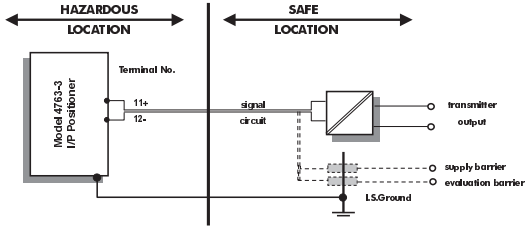
Notes:

1.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with the FM approved apparatus. For maximum values of U_i or V_{max}; I_i or I_{max}; P_i or P_{max}; C_i and L_i of the various apparatus see Table 1.

2.) The apparatus may be installed in intrinsically safe circuit only when used in conjunction with the FM approved intrinsically safe barrier.
For barrier selection see Table 2.

3.) Installation shall be in accordance with the National Electrical Code ANSI/NFPA 70 and ANSI/ISA RP 12.06.01

4.) Use only supply wires suitable for 5°C above surrounding temperature.



Version: Model 4763-3 I/P Positioner.

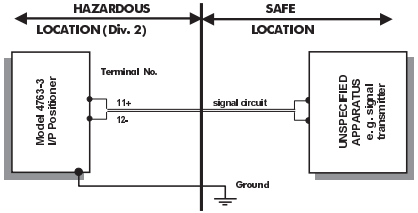
Supply and evaluation barrier FM/CSA- approved.

For the permissible maximum values for the intrinsically safe circuit see Table 1
For the permissible barrier parameters for the circuit see Table 2

Cable entry M 20 x 1.5 or metal conduit according to drawing No. 1050 – 0539 T or 1050 – 0540 T

FM- approved for hazardous locations

Class I, Division 2, Groups A, B, C, D **NEMA 3R**
Class II Division 2, Groups F + G, Class III



Notes:

1.) For the maximum values for the circuit see Table 1 and 2.

2.) Cable entry only rigid metal conduit according to drawing No. 1050-0539 T and 1050-0540 T

3.) The installation shall be in accordance with the National Electrical Code ANSI/NFPA 70

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

EB 8359-2 EN

S/Z 2012-10