

CU4 AS-interface Control Unit

SAFETY AGAINST EXPLOSION - FOR ATEX ZONE 2 GAS APPLICATIONS



FORM NO.: H345317 REVISION: GB-0

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



EU Declaration of Conformity

SPXFLOW[®]

Product

Nomenclature : **Control Unit**
Model / Type : CU4, CU4plus
Variants : AS-interface, Direct Connect

Manufacturer

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Applicable EU Harmonisation Legislation

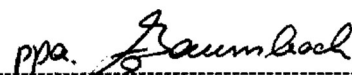
EU Declaration of Conformity in accordance with

ATEX Directive 2014/34/EU

- Essential Health and Safety Requirements have been met by complying with the harmonised standard/s - EN 60079-0:2018, EN 60079-7:2015+A1:2018 and EN 60079-18:2015+A1:2017.
- Equipment Marking: **II 3 G Ex ec mc IIC T4 Gc**
0 °C ≤ Ta ≤ +55 °C

This declaration of conformity is issued under the sole responsibility of the manufacturer and design center. It will lose its validity if the product is modified without the written permission from the manufacturer and/or if the safety instructions specified in the instruction manual are not being followed.

Authorised Signatory:

Signature: -----

Date: 14.09.2021

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NOTE:

In addition to D4 and D4 SL double seat valves and different other process valve ranges, also other SPX FLOW process valves are in preparation for ATEX Zone 2 application requirements.

0. ATEX Specific Instructions

0.1. General Information

These ATEX Specific Safety Instructions apply for CU4 / CU4 plus ATEX Control Units used in Potentially Explosive Atmospheres according to **Zone 2 ATEX, GAS** applications (according to Directive 2014/34/EU), **ONLY**.

These instructions shall be read carefully by the competent operating and maintenance personnel.

We point out that we will not accept any liability for damage or malfunctions resulting from the non-compliance with these instructions.

0.2. ATEX Specific Symbol



DANGER! WARNING! CAUTION!

This symbol draws your attention to important directions which have to be observed for the operation in explosive areas.

Failure to observe the warning may result in fatal or serious injury as well as damage to property!

0.3. Authorized Use

The CU4 / CU4plus ATEX Control Unit is designed to be mounted to pneumatic actuators of process valves for the control of media as used in the food and beverage industries as well as in pharmaceutical and chemical applications.

The control unit is installed on a pneumatic actuator of a process valve. The process valve and the actuator must have at least the ATEX approval of the control unit.

SPX FLOW will be held responsible only for the control units supplied and selected according to the operating conditions indicated by the customer or end user and as stated in the order confirmation. If in doubt, contact your local supplier.

Observe the admissible data, operating conditions and conditions of use as specified in the contract documents, instruction manuals and on the type label.

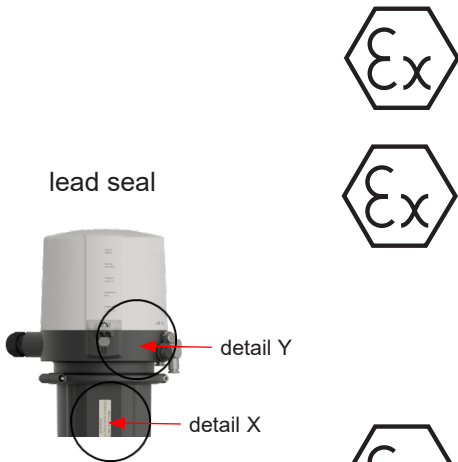
The control unit must only be used with SPX FLOW valves and components recommended and authorized by SPX FLOW.

Adequate transport, storage and installation, careful handling and maintenance are essential for a faultless and reliable function of the control unit.

Observe the intended use of the control unit.

0. ATEX Specific Instructions

0.4. Specific Safety Instructions



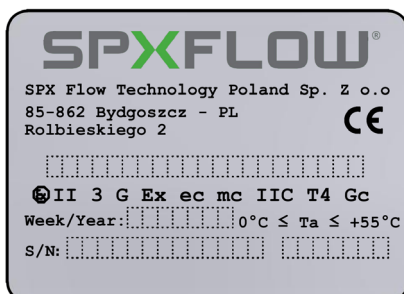
electrostatic risk



detail X: electrostatic risk label
CU4 ATEX 3G



detail Y: type label
CU4 ATEX 3G



- Removing the electric plug**
- Remove the electric circular plug or disconnect terminal connections only after the power supply has been separated.

- Opening the device**
- Do not open the control unit in the presence of explosive atmosphere.
 - Do not install and set the proximity switches in the presence of explosive atmosphere.
 - Before startup, secure the cover with the enclosed lead seal. Opening the cover without tools must be prevented.

- Electrostatic discharge**
- In case of sudden discharge from electrostatically charged devices or individuals, risk of explosion in the explosive area exists.
 - Prevent the occurrence of electrostatic discharges by suitable measures.
 - Clean the control unit surface by gently wiping it with a damp or antistatic cloth, only.

- In order to prevent the emergence of explosion risks observe the safety instructions of the instruction manual and adhere to the following:**
- Observe information on temperature classes, ambient temperatures, degree of protection and voltage on the approval ID label.
 - Do not use control units in areas subject to gas with lower ignition temperatures than indicated on the approval ID label.
 - Installation, operation and maintenance may only be performed by qualified personnel.
 - Observe the applicable international and national safety regulations as well as the general rules of technology for construction and operation.
 - Do not repair the control unit yourself. Replace it by an equivalent device.
 - Repairs may only be performed by the manufacturer.
 - Do not expose the control unit to mechanical and/or thermal loads which may exceed the limits described in the instruction manual.
 - Only use cable and/or line entry points approved for the respective application area and which are screwed in place according to the respective installation instructions.
 - The cable glands may be used for fixed installations, only.
 - Close all unnecessary cable glands with locking screws approved for the explosive area.
 - The required degree of protection (IP67) is guaranteed only in connection with suitable adaption sets. All pneumatic and electrical connections must be equipped with suitable connectors.

1. Abbreviations and Definitions

A	Exhaust Air
AWG	American Wire Gauge
CE	Communauté Européenne
CU	Control Unit
DI	Digital Input
DO	Digital Output
EMC	Electromagnetic Compatibility
EU	European Union
GND	Ground
IP	International Protection
LED	Luminous Diode
N	Pneumatic Air Connection NOT element
NEMA	National Electrical Manufacturers Association
P	Supply Air Connection
PWM	Pulse-Width Modulation
Y	Pneumatic Air Connection

2. Safety Instructions

2.1. Sentinels

Meaning:



Danger!

Direct danger which can lead to severe bodily harm or to death!



Caution!

Dangerous situation which can lead to bodily harm and/or material damage.



Attention!

Risk as a result of electric current.



Note!

Important technical information or recommendation.

These special safety instructions point directly to the respective handling instructions. They are accentuated by the corresponding symbol. Carefully read the instructions to which the sentinels refer. Continue handling the control unit only after having read these instructions.

2. Safety Instructions

2.2. Intended Use

The CU4 control unit is only intended for use as described in chapter 3.1. Use beyond that described in chapter 3.1. is not according to the regulations and SPX FLOW shall not be held responsible for any damage resulting from this non-observance.

The operator bears the full risk. Conditions for the proper and safe operation of the control unit are the appropriate transport and storing as well as the professional assembly. Intended use also means the observance of all operating, service and maintenance conditions.

2.3. General Regulations for Careful Handling

To ensure a faultless function of the unit and a long service life, the information given in this instruction manual as well as the operating conditions and permissible data specified in the data sheets of the control unit for process valves must be strictly adhered to.

- The operator is committed to operating the control unit in faultless condition, only.
- Observe the general technical rules while using and operating the unit.
- Observe the relevant accident prevention regulations, the national rules of the user country as well as your company-internal operating and safety regulations during operation and maintenance of the unit.
- Switch off the electric power supply before carrying out any work on the system!
- Note that piping or valves that are under pressure must not be removed from a system!
- Take suitable measures to prevent unintentional operation or impermissible impairment.
- Following an interruption of the electrical or pneumatic supply, ensure a defined and controlled re-start of the process!
- If these instructions are not observed, we will not accept any liability. Warranties on units, devices and accessories will expire.

2. Safety Instructions

2.4. Welding instructions

It is generally recommended to avoid welding work in process installations in which control units are installed and connected. If welding is nonetheless required, earthing of the electrical devices in the welding area is a necessity.

2.5. Persons



- Installation and maintenance work may only be carried out by qualified personnel and by means of appropriate tools.
- The qualified personnel must get a special training with regard to possible risks and must know and observe the safety instructions indicated in the instruction manual.
- Work at the electrical installation may only be carried out by personnel specialised in electrics!

2.6. Warranty

This document does not contain any warranty acceptance. We refer to our general terms of sale and delivery. Prerequisite for a guarantee is the correct use of the unit in compliance with the specified conditions of application

Attention! This warranty only applies to the control unit. No liability will be accepted for consequential damage of any kind that could arise from the failure or malfunction of the device

2.7 Important Safety Instructions for AS-interface networks



- Always use protective modules against excess voltage in the AS-interface installation.
- Grounding
For the AS-interface network a potential-free operation must be guaranteed. Use isolation monitoring modules to provide for proper grounding conditions.

Grounding of the bus cable or connected components or their charging with external voltage leads to malfunction in the bus system.

3. General Terms

3.1. Purpose of use

The CU4 AS-interface Control Unit was developed for the control of process valves used in the food and related industries. The CU4 control unit operates as interface between process control and process valve and controls the electric and pneumatic signals. The pneumatic control of valves is undertaken via the solenoid valves. The control unit controls the valve positions, **open** and **closed**, via integrated and external sensors. The electronic module undertakes the task to process the switching signal from the control and to control the corresponding solenoid valves. The electronic module also provides potential-free contacts. The corresponding light signals in the control unit provide for an external indication of the valve positions.

3.2. Design of CU4 AS-interface (fig. 3.2.)

The CU4 AS-interface control unit mainly consists of the following components:

1. The control unit base with integrated air channels and electric and pneumatic connections as well as viewing windows with type label.
2. 1 or 3 solenoid valves for the control of the valve actuators and for the seat lifting of double seat valves.
1 solenoid valve with 1 logic NOT element for the control of the valve actuators.
3. Sensor module with 2 integrated Hall sensors or 2 external proximity switches to detect the valve position.
4. The electronic module for the electric supply, communication with control, evaluation of feedback signals and control of solenoid valves as well as valve position indication through LED.
5. Clamp ring to fasten the CU4 on the adapter.
6. Cover with LED optics.

fig. 3.2.

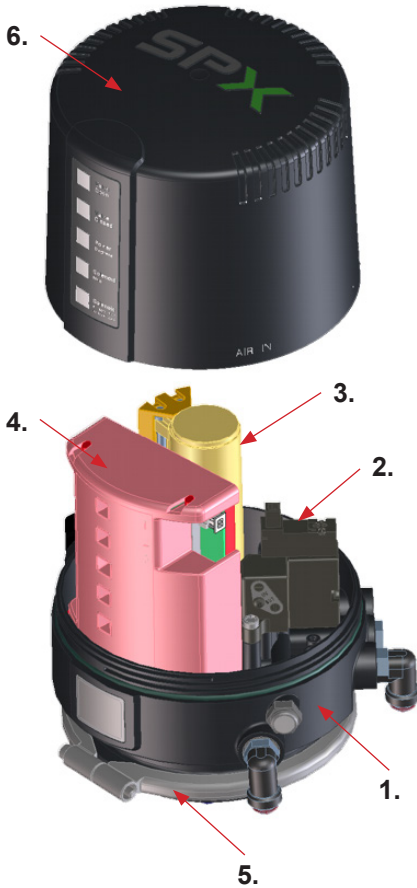
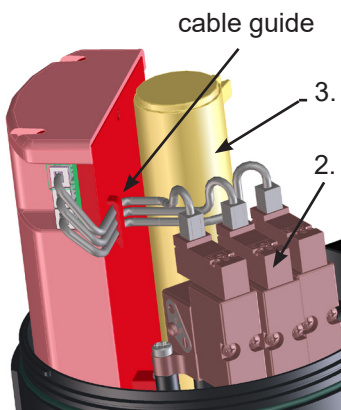


fig. 3.2.1



The cable/s by means of which the solenoid valves are connected with the electronic module must be guided through the cable guide at the rear side of the electronic module (fig. 3.2.1).

3. General Terms

3.3. Function of the individual components

The installation of the control unit is undertaken by special adapters which are available for the different valves types, see chapter 5. Adapter. The snap connectors for supply air and pneumatic air to the individual cylinders at the valves are located at the outside of the control unit. In case of the control units for valves with turning actuator, the pneumatic air is transferred internally to the actuator. The air supply of the control unit is equipped with an exchangeable air filter. Observe the required compressed air quality! Please also see chapter 4.5.

The number of the solenoid valves installed in the CU4 depends on the valve actuators to be controlled. Single seat and butterfly valves and double seat valves without seat lift function require 1 solenoid valve. Control units for double seat valves are equipped with 3 solenoid valves. For the manual actuation, the solenoid valves are provided with a safe lever which is easy to operate.

The electronic module installed in the control unit fulfills the task to process the electric signals from the control, to control the solenoid valves and to evaluate the feedback signals from the feedback unit. Moreover, the signalling and indication of the valve positions as well as additional diagnostic functions are undertaken via the electronic module.

The electronic module is the interface between control actuators or sensors. Depending on the control type, different modules are available, e.g. Direct Connect, AS-interface, Profibus and DeviceNet.

A feedback unit is required to detect the valve position. The CU4 AS-interface is equipped with 2 adjustable Hall effect sensors.

These are activated by a valve control rod installed at the operating cam. In this way, the **open** and **closed** valve position can be detected.

The 2 Hall effect sensors are continuously adjustable over an additional range. Thus, feedback messages for different valves with different stroke lengths can be adjusted properly. As an alternative, external proximity switches can be connected instead of the integrated Hall effect sensors when the valve position indication is undertaken direct at the process valve.

3. General Terms

3.3. Function of the individual components

The luminous diodes are located on the front side of the electronic module. Their signals are visibly indicated to the outside by an optical window in the cover of the control unit. Beside the open and closed valve position, the existence of the operating voltage as well as different diagnostic information are indicated. Chapter 6.6. LED indication provides more details.

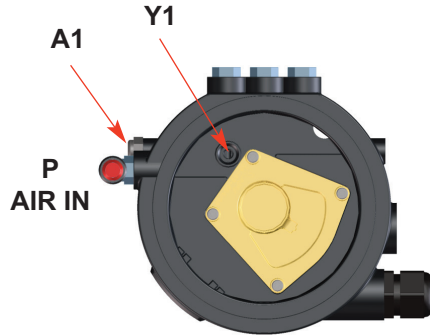
The complete control unit is designed according to the building block principle. By exchange of the electronic module, the control type can be changed, e.g. from direct control (Direct Connect) to communication with AS-interface.



Note! Wiring must be changed.

4. Mechanics and Pneumatics

4.1. Air connection for valves with turning actuator



4.1.1. Function

CU41-T-AS-i

design for valve with turning actuator, e.g. butterfly valves

- P air supply with integrated particle filter
- Y1 bore to transfer control air to turning actuator
- A1 exhaust air with exhaust silencer

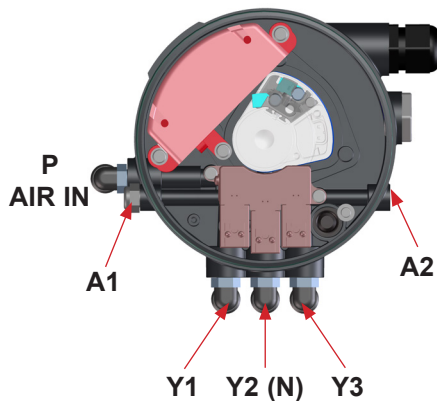
4.2. Air connections for single seat and double seat mix proof valves

4.2.1. Function

CU41-S-AS-i / CU41-D4

design for seat valves and double seat mix proof valves without seat lift

- P air supply with integrated particle filter
- Y1 control air connection for main actuator
- A1 exhaust air with exhaust silencer



CU41N-S-AS-i

design for seat valves with NOT element

- P air supply with integrated particle filter
- Y1 pneumatic air connection for main actuator
- N pneumatic air connection for the spring support of the actuator by compressed air, via NOT element
- A1 exhaust air with exhaust silencer

CU43-D4

design for double seat mixproof valves with seat lift

- P air supply with integrated particle filter
- Y1 pneumatic air connection for main actuator
- Y2 pneumatic air connection for seat lift actuator of upper seat lift
- Y3 pneumatic air connection for seat lift actuator of lower seat lift
- A1/A2 exhaust air with exhaust silencer

4. Mechanics and Pneumatics

4.3. Pressure relief valve

The base of the control unit is equipped with a pressure relief valve which prevents an inadmissible pressure build-up in the inner control unit.

If required, the pressure relief vents into the clearance between the base and the adapter of the control unit.

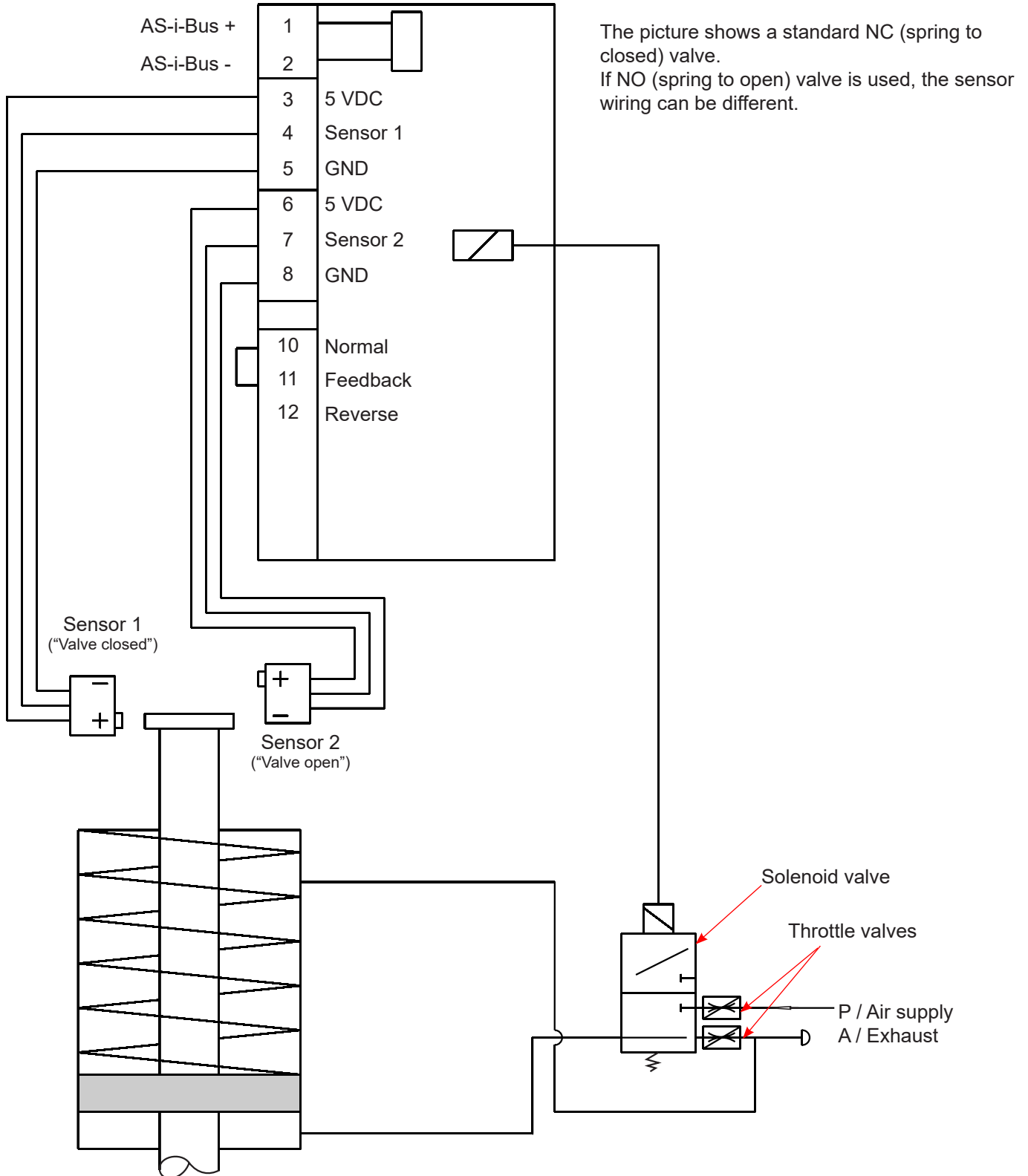


The pressure relief valve must not be mechanically blocked under any circumstances!

4. Mechanics and Pneumatics

4.4 Functional description - block diagrams

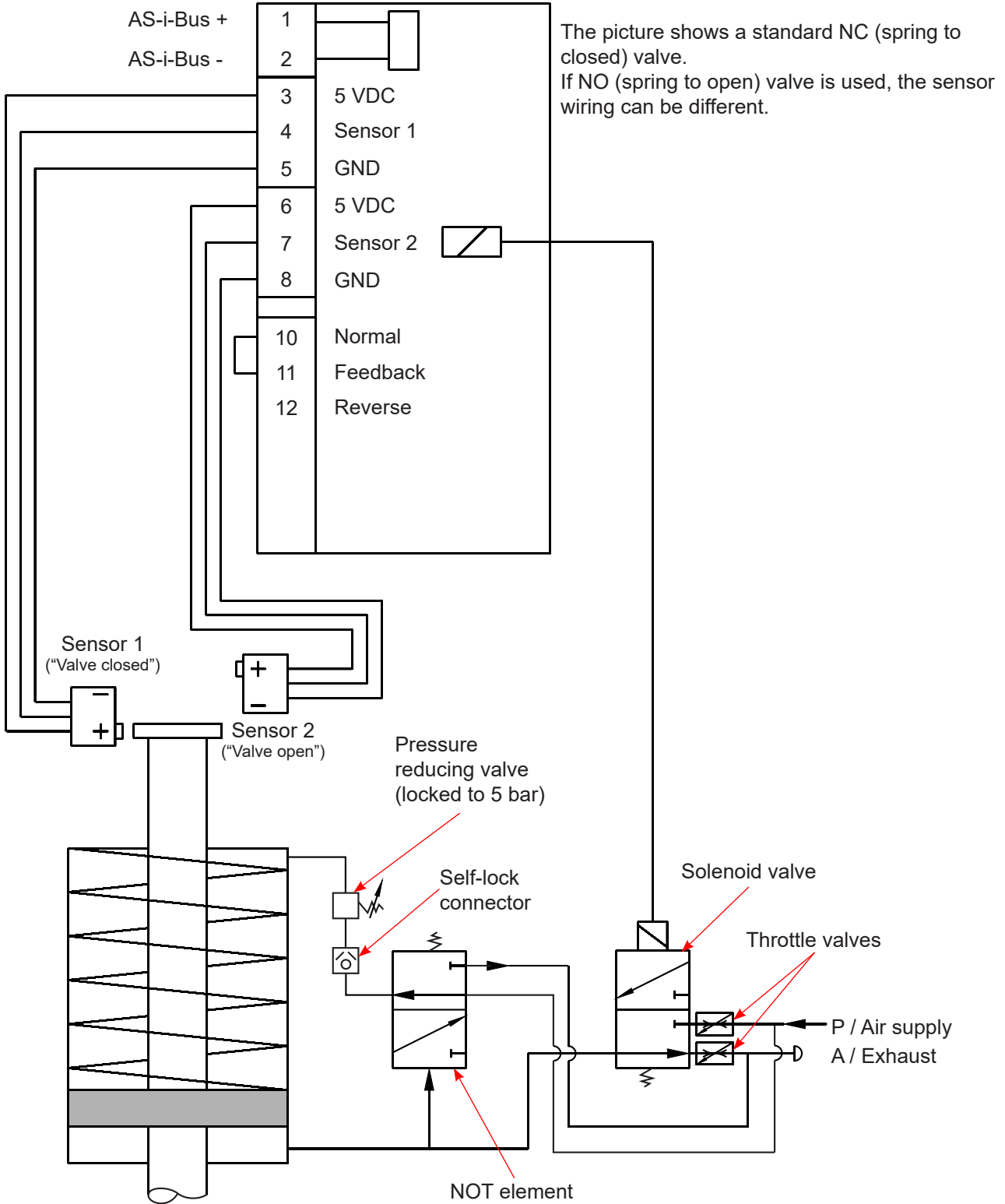
4.4.1 CU41 AS-interface



4. Mechanics and Pneumatics

4.4.2 CU41N – AS-interface

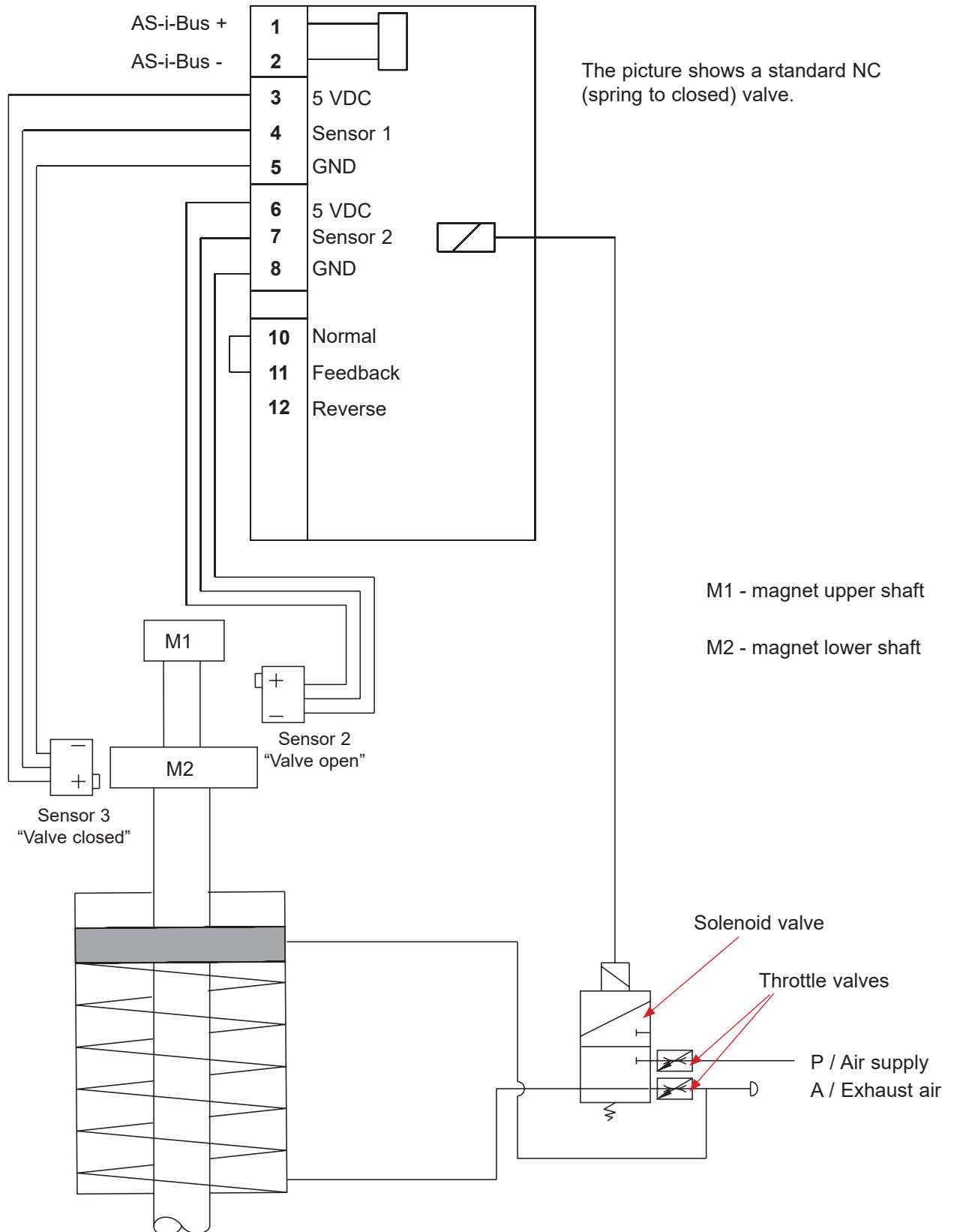
Functional description - block diagram



4. Mechanics and Pneumatics

4.4.3. CU41-D4 AS-interface for D4 double seat mix proof valve

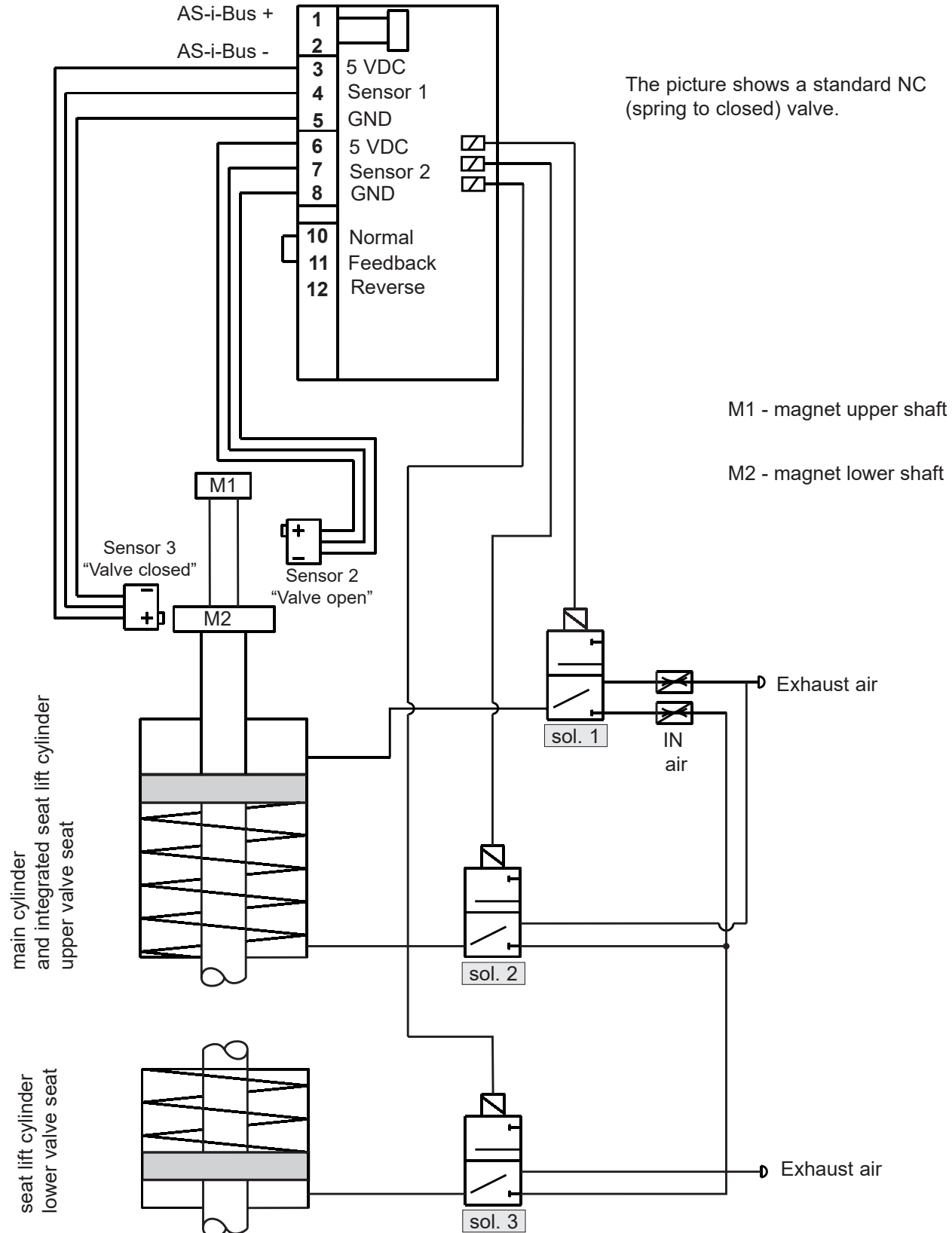
Functional description - block diagram



4. Mechanics and Pneumatics

4.4.4. CU43-D4 AS-interface für DA4 / D4 SL double seat mix proof valves

Functional description - block diagram



4. Mechanics and Pneumatics

4.5. Technical Data / Standards

Material:	PA6.6
Ambient temperature:	0°C to +55°C (limitation due to ATEX application)
EU:	EMC 2014/30/EU (89/336/EEC)
Standards and environmental audits:	Protection class IP 67 EN60529/ complies with NEMA 6 EMC interference resistance EN61000-6-2 EMC emitted interference EN61000-6-4 Vibration/oscillation EN60068-2-6 Safety of machinery DIN EN ISO 13849-1
Air connection:	6 mm / ¼" OD
Pressure range:	6–8 bar
Compressed air quality:	Quality class acc. to DIN ISO 8573-1
- Content of solid particles:	Quality class 3, max. size of solid particles per m ³ 10000 of 0,5 µm < d < 1,0 µm 500 of 1,0 µm < d < 5,0 µm
- Content of water:	quality class 3, max. dew point temperature -20 °C For installations at lower temperatures or at high altitude, additional measures must be considered to adopt the pressure dew point accordingly.
- Content of oil:	quality class 1, max. 0,01 mg/m ³

The oil applied must be compatible with Polyurethane elastomer materials.

4. Mechanics and Pneumatics

4.6. Solenoid valves

In the base of the control unit max. 3 solenoid valves are installed. The 3/2-way solenoid valves are connected with the electronic module by moulded cables and plug connectors.

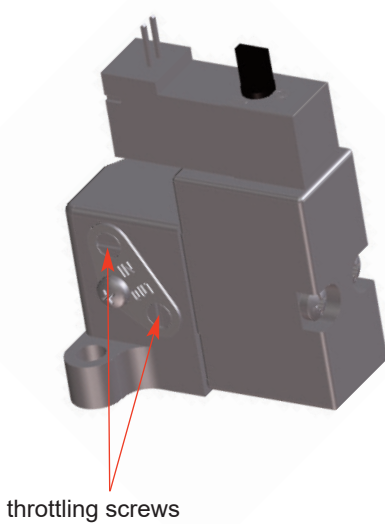
Control: effected by pwm-signal

Lever: rotary switch at valve

4.7. Throttling function

The operating speed of the valve actuator can be varied or reduced. This may be necessary to slacken the actuation of the valve in order to prevent pressure hammers in the piping installation. For this purpose, the supply and exhaust air of the **first solenoid valve** can be adjusted via the throttling screws respectively allocated in the interface of the solenoid valve.

By turning the screws in anticlockwise direction, the inlet or outlet air is throttled



4.8. NOT element

Through the installation of the logic NOT element, the closing force of the valve actuator can be increased by additional compressed air. The NOT element conveys the compressed air via an external reducing valve (max. 5 bar) to the spring side of the valve actuator.

The pressure reducing valve is fixed to 5 bar.



Note:

The air connection of the NOT element is equipped with an integrated non-return valve.

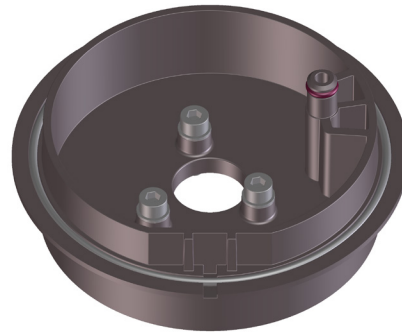
The air hose must be slid into the air connection until it stops in order to open the non-return valve.

The NOT element is also used for air/air actuators.

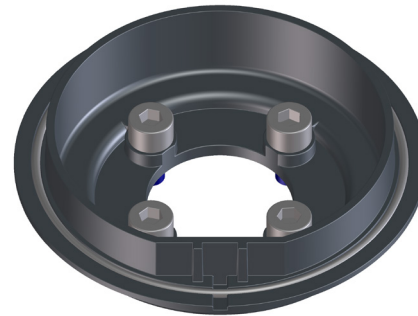
5. Adapter

Adapter for different process valves

5.1. Valves with turning actuator, e.g. butterfly valves



5.2. Single seat valves



5.3. Double seat mix proof valves D4, D4 SL, DA4



6. Electronic module

6.1. Function / Block diagram

The Control Unit CU4 AS-interface is a slave for the fieldbus system AS-interface.

It complies with the specification V3.0. The profile is S-7.A.*.E (3 outputs and 2 inputs).

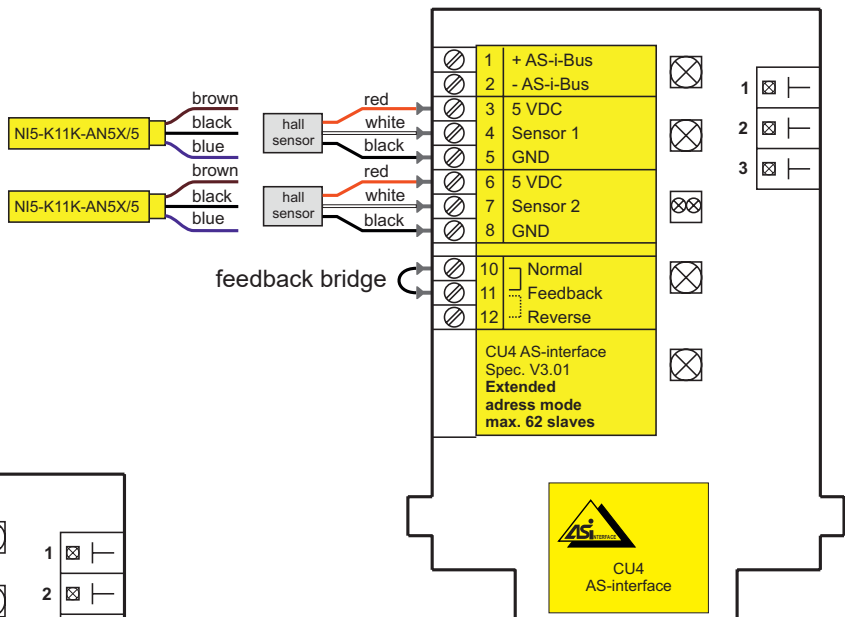
By means of a connecting terminal, the inputs can either be connected with internal APV Hall effect sensors or with external inductive proximity switches (compare 6.5.).

The AS-interface CU4 is designed for the extended address range. With these devices in the extended address range up to 62 slaves (formerly known as 2.1) can be connected with one AS-interface cable.

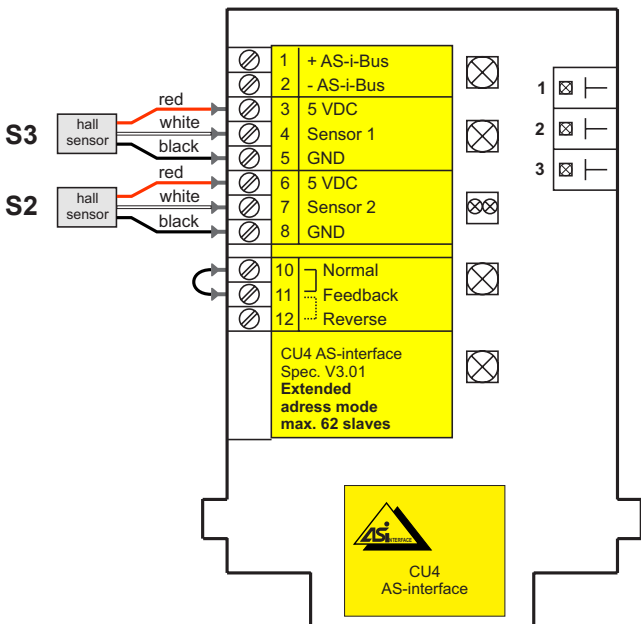
Attention: Consider cumulative power input and simultaneity factor! For reasons of compatibility with older versions, a version with the profile S-7.F.F.F (formerly known as 2.0) is alternatively available.

All operating ranges within the electronic module such as the control of the solenoid valves, position feedback and LED indication are separated galvanically and can, thus, be operated with different voltages. Control of the solenoid valves is effected in energy-saving manner via pwm-signals.

Electronic module with sensors for all SPX FLOW APV valves



Electronic module with sensors for SPX FLOW APV / WCB D4 valves



6. Electronic module

6.1.1 Switch-over of feedback signals

The signals to the control can be switched over via the bridge between the terminals 10, 11 and 12.

If a bridge is located between the terminals 10 and 11 (normal), the signal is transferred from sensor 1 (**closed valve position**) to input DI0 of the control. The signal of sensor 2 (**open valve position**) is sent to input DI1.

In case of a bridge between terminals 11 and 12 (reverse), the signal of sensor 1 (**closed valve position**) is sent to input DI1 of the control. At input DO0, the signal of sensor 2 (**open valve position**) is switched.

If there is no bridge between the terminals 10, 11 and 12, this will lead to an error message.

The two LEDs '**valve open**' and '**valve closed**' will flash in this case.

6.2. Functional description of connections

Terminal	Designation	Functional description for all valve types	Functional description for D4, D4 SL and DA4 valve types
1	AS-i +	AS-i network connection	AS-i network connection
2	AS-i -	AS-i network connection	AS-i network connection
3	5 VDC	voltage supply for valve sensor	voltage supply for valve sensor
4	Sensor 1	sensor signal 1 (closed valve position)	connection Hall sensor 3 (closed valve position)
5	GND	ground for sensor supply	
6	5 VDC	voltage supply for valve sensor	voltage supply for valve sensor
7	Sensor 2	sensor signal 2 (open valve position)	connection Hall sensor 2 (open valve position)
8	GND	ground for sensor supply	ground for sensor supply
<hr/>			
10	Normal	normal allocation of feedback signals	normal allocation of feedback signals
11	Feedback	tie point for cable bridge	tie point for cable bridge
12	Reverse	reverse allocation of feedback signals	reverse allocation of feedback signals

6. Electronic module

6.3. Use of data bits

Communication data

The use of the data bits shall be drawn from the following table:

Data bit	Info	Connection	Level
DO0	0	main valve	Low (no electric current)
(output)	1		High (current)
DO1	0	upper seat lifting (optional)	Low (no electric current)
(output)	1		High (current)
DO2	0	lower seat lifting (optional)	Low (no electric current)
output)	1		High (current)
DO3		free	
(output)			
Feedback bridge			
Data bit		normal (10 <u>11</u> 12)	reverse (10 <u>11</u> 12)
DI0		valve position, sensor 1 (closed valve position)	valve position, sensor 2 (open valve position)
(input)			
DI1		valve position, sensor 2 (open valve position)	valve position, sensor 1 (closed valve position)
(input)			
DI2		Permanent "1"	Permanent "1"
(input)			
DI3		Permanent "1"	Permanent "1"
(input)			

6. Electronic module

6.4. Technical Data

AS-interface profile:	S-7.A.*.E (S-7.F.F.F as option)
Extended address range:	is supported
Serial communication mode:	no
Inverse polarity protection:	exists
Indication "Power":	LED3 (green)
Indication "Fault":	LED3 (red)
AS-interface voltage range:	26,5...31,6 V
Max. power input:	<= 150 mA
Input delay time:	< 1 s
AS-interface specification:	V3.0
Supply of solenoid valves:	PWM signal from electronic module
Short-circuit protection:	yes
Excess voltage protection:	100 mA
Induction protection:	ja
Status indication of outputs:	LED on board
Response time of watchdog:	--- (watchdog not activated)

Short-circuit or excess voltage of actuator supply or cable break at valves is signalled to the master via the peripheral failure bit (profile S-7.A.*.E only). Simultaneously LED3 flashes according to AS-interface specification alternately red/green.

Supply of sensors: 5 VDC (±5%)



Caution! The sensor inputs and the peripheral supply must not be connected with installation-GND.

Connecting terminals: conductor cross section 0,5-1,5 mm² (with conductor sleeve) complying with AWG 20-16



Note! Observe that only one cable should be installed. If more than one cable is required, follow the max. cross section limitations!

Torque for screw terminal: 0,8 Nm +/- 0,1

6. Electronic module

6.5. Connections

Sensors to detect the valve positions:

Internal sensors:












Hall effect sensors,
APV valves: H320385
APV / WCB D4 valves: H337014
UB 4,75-5,25 VDC
operating distance according to
SPX FLOW specification

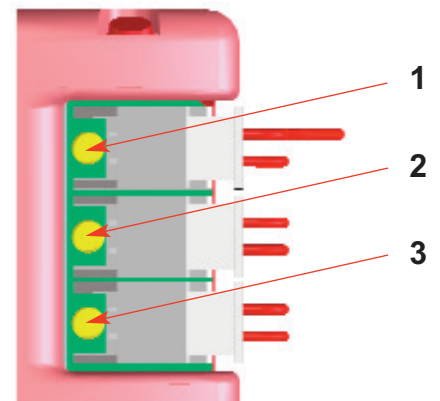
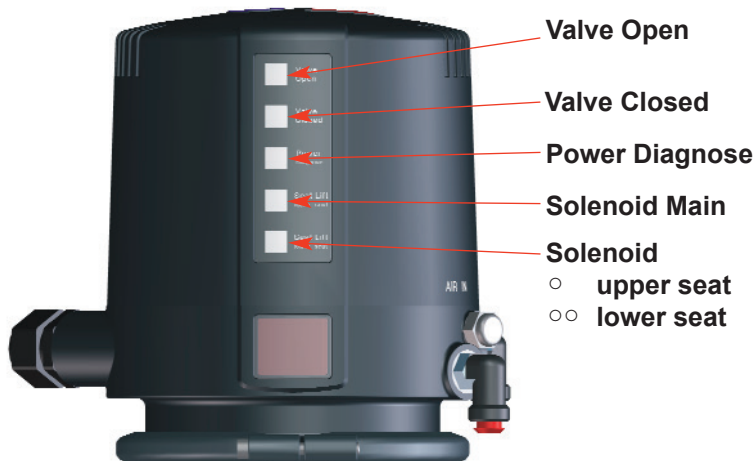
External sensors:

Inductive proximity switches: H208844
UB 4,75-5,25 VDC
operating distance according to
SPX FLOW specification

6. Electronic module

6.6. LED indication

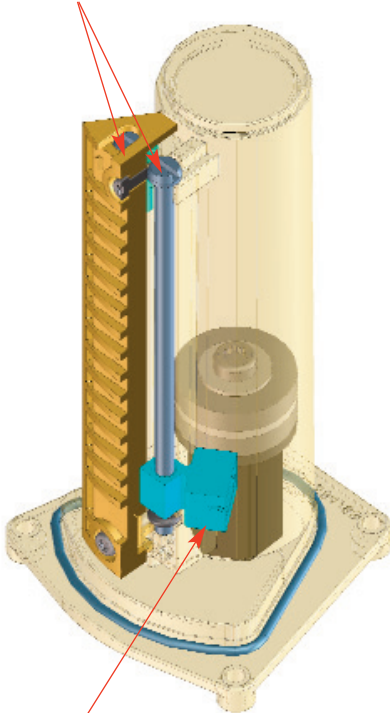
External luminous displays			
Valve Open	colour: green, permanent light		Valve in open position
Valve Closed	colour: orange, permanent light		Valve in closed position
Valve Open	colour: green, flashing		Bridge missing at terminals 10, 11, 12
Valve Closed	colour: orange, flashing		
Power Diagnose	colour: green, permanent light		operating voltage at module - faultless
	colour: red /green		AS-i status + peripheral failure, e.g. shortcircuit, excess voltage, cable break (profile S-7.A.*.E only)
	colour: red, permanent light		Communication failure
Solenoid Main	colour: blue, permanent light		1st solenoid valve (1) controlled
Solenoid Main ○ upper seat ○○ lower seat	colour: blue, 1 blink		2nd solenoid valve (2) controlled
	colour: blue, 2 blinks		3rd solenoid valve (3) controlled
	colour: blue, 1 blink		solenoid valve 2nd and 3rd (2) + (3) controlled.
Internal luminous displays			
Luminous diode	1		1st solenoid valve (1) controlled
Luminous diode	2		2nd solenoid valve (2) controlled
Luminous diode	3		3rd solenoid valve (3) controlled



7. Feedback unit

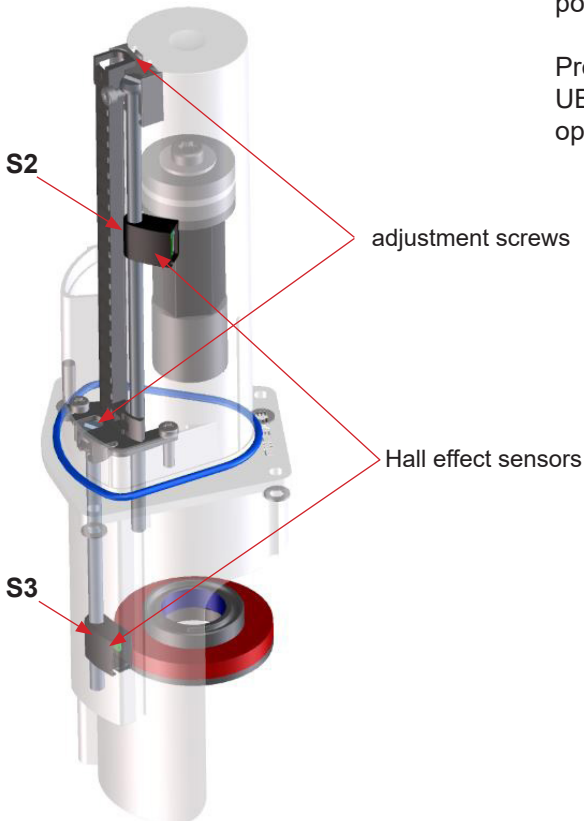
Feedback unit for
SPX FLOW APV valves

adjustment screws



Hall effect sensor

Feedback unit for
SPX FLOW APV / WCB D4 valves



7.1. General terms

For the internal registration of the valve position indication, the feedback unit with 2 Hall effect sensors is applied. It is used when single seat and butterfly valves are installed.

The control of these sensors is effected by magnets assembled on the valve shaft rod. The Hall effect sensors are installed on a movable threaded rod. By means of this assembly, the sensors can be adjusted via a large range, in accordance with the valve stroke.

7.2. Sensors

Hall effect sensors (APV valves): H320385

Hall effect sesonrs (APV / WCB D4 valves): H337014

UB 4,75-5,25 VDC

operating distance according to SPX FLOW specification

7.3. Adjustment of valve position feedback

By turning of the adjustment screws on which the Hall effect sensors are installed, the sensors can be moved into the respectively required position to detect the valve position.

The o-rings on the adjusting screws prevent unintended accidental displacement of these positions. After the installation of the control unit, check the correct adjustment of the position of the Hall sensor.

7.4. Use of external sensors

Instead of the internal Hall effect sensors, also 2 external proximity switches can be connected to the CU4 DC, e.g. for the valve position indication at double seat valves.

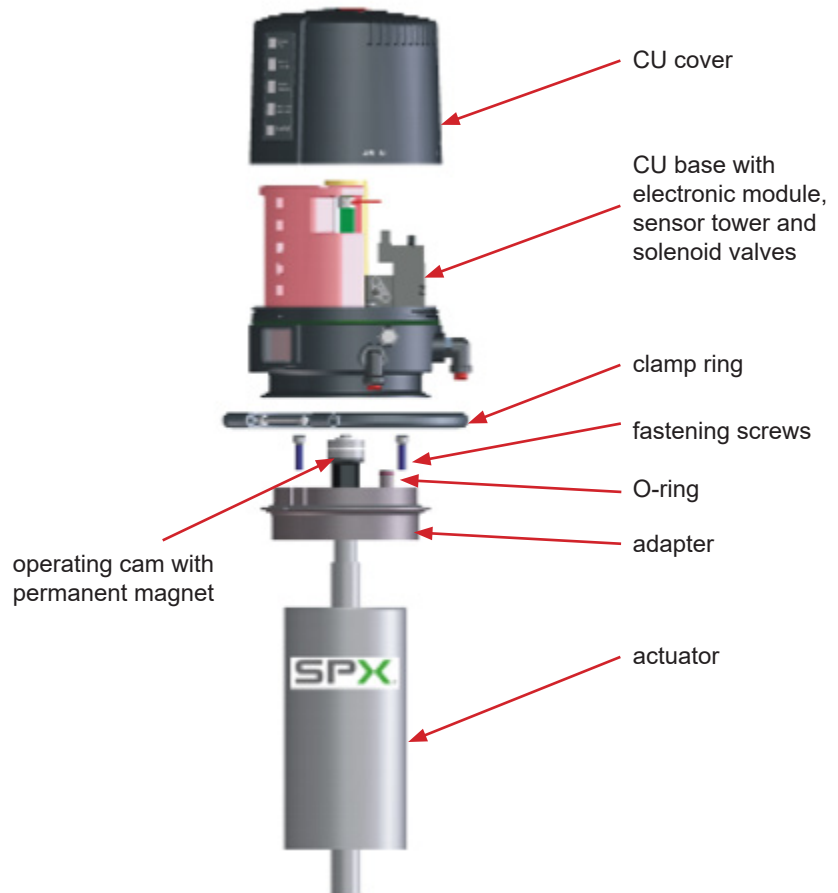
Proximity switch: H208844

UB 4,75-5,25 VDC

operating distance according to SPX FLOW specification

8. CU Assembly and Startup

8.1. Valves with turning actuator, e.g. butterfly valves



Caution!

The permanent magnet is made of fragile material and must be protected against mechanical load. – Risk of fracture!
 The magnetic fields can damage or delete data carrier or influence electronic and mechanic components.

Assembly of the control unit on the valve

1. Assembly of the adapter on the turning actuator. Fasten with 3 screws. See to the right positioning of the o-rings on the lower side of the adapter and in the groove of the air transfer stud.
2. Install operating cam with shaft rod prolongation. Secure with Loctite semi-solid and fasten it.
3. Place the control unit via the operating cam onto the adapter. Observe alignment.
4. Attach the clamp rings and fasten them with the screws.

8. CU Assembly and Startup

8.1.1 Pneumatic connection



Supply air:

CAUTION!

Shut off the compressed air supply before connecting the air hose!

See that the air hose is professionally cut to length. Use a hose cutter for this purpose.

Pneumatic air for valve actuator:

For the assembly of the control unit on the turning actuator with integrated air transfer, air hosing between the control unit and the actuator is not necessary.

Exhaust air:

As a standard, the exhaust air connection is equipped with a silencer. If required, the silencer can be removed and the exhaust air can be hosed separately when it must be led off to the exterior, for example.

8.1.2 Electric connection



CAUTION!

Electric connections shall only be carried out by qualified personnel.

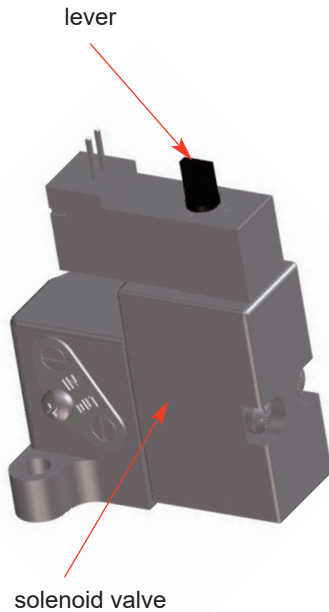
See to a professional execution and installation of the AS-interface network.

Observe the Safety Instructions specified in chapter 2.

8. CU Assembly and Startup

8.1.3 Startup

After proper assembly and installation of the control unit, startup can be undertaken as described below:



1. Switch on the air supply.
2. Switch on the voltage supply.
3. Check the solenoid valves by turning the lever on the upper side of the valve by 90°.
4. Check the valve position indicator and adjust feedbacks for **open** and **closed** valve position as described below.

For valves in normally closed (air-to-raise, spring-to-lower) /normally open (air-to-lower, spring-to-raise) design with turning actuator, the following allocation applies:

Closed valve position feedback – sensor 1 controlled

For the adjustment, Hall sensor 1 with **non-controlled** (controlled) solenoid valve 1 is moved into the required position by turning the adjustment screw 1. The **LED Valve Closed** lights up.

Open valve position feedback – sensor 2 controlled

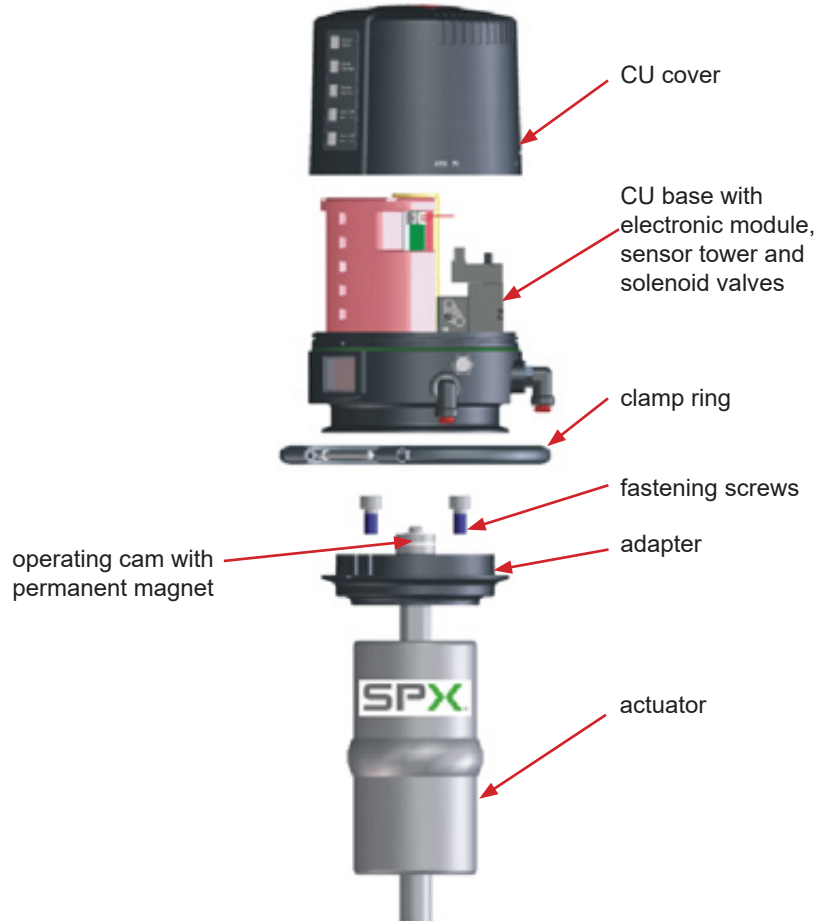
For the adjustment of Hall sensor 2, at first, the (non-controlled) solenoid valve 1 is **controlled**. This can optionally be made manually or electrically. The open valve position and the corresponding feedback can be adjusted. This is undertaken by turning the adjustment screw 2 until the required position is reached and the **LED Valve Open** lights up.



Observe the switching hysteresis of the Hall effect sensors! Therefore, adjust the switch-point of the sensors with overlap in order to permit small variations and, thus, to prevent failures!

8. CU Assembly and Startup

8.2. Single seat valves



Caution!

The permanent magnet is made of fragile material and must be protected against mechanical load. – Risk of fracture! The magnetic fields can damage or delete data carrier or influence electronic and mechanic components.

Assembly of the control unit on the valve

1. Assembly of the adapter on the single seat valve. Fasten with 4 screws.
2. Secure operating cam with Loctite semi-solid and fasten it.
3. Place the control unit via the operating cam onto the adapter. Observe alignment.
4. Attach the clamp rings and fasten them with the screws.

8. CU Assembly and Startup

8.2.1 Pneumatic connection



Supply air:

CAUTION!

Shut off the compressed air supply before connecting the air hose!

See that the air hose is professionally cut to length. Use a hose cutter for this purpose.

Pneumatic air for valve actuator:

Connect the pneumatic air connection **Y1** with the valve actuator.

- For the CU41N (**with logic NOT element**), the pneumatic air connection **N** must be connected with the spring side of the actuator.

See to the spring side of the actuator during the assembly of the pressure-reducing valve.

Exhaust air:

As a standard, the exhaust air connection is equipped with a silencer. If required, the silencer can be removed and the exhaust air can be hosed separately when it must be led off to the exterior, for example.

8.2.2 Electric connection



CAUTION!

Electric connections shall only be carried out by qualified personnel.

See to a professional execution and installation of the AS-interface network.

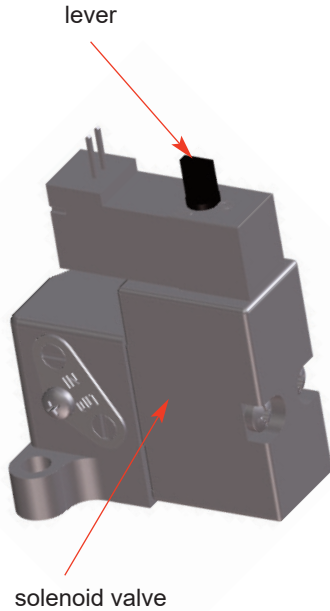
Observe the Safety Instructions specified in chapter 2.

8. CU Assembly and Startup

8.2.3 Startup

After proper assembly and installation of the control unit, startup can be undertaken as described below:

1. Switch on the air supply.
2. Switch on the voltage supply.
3. Check the solenoid valves by turning the lever on the upper side of the valve by 90°.
4. Check the valve position indicator and adjust feedbacks for **open** and **closed** valve position as described below



For single seat valves in normally closed (normally open) the following allocation applies:

Closed valve position feedback – sensor 1 controlled

For the adjustment, Hall sensor 1 with **non-controlled** (controlled) solenoid valve 1 is moved into the required position by turning the adjustment screw 1. The **LED Valve Closed** lights up.

Open valve position feedback – sensor 2 controlled

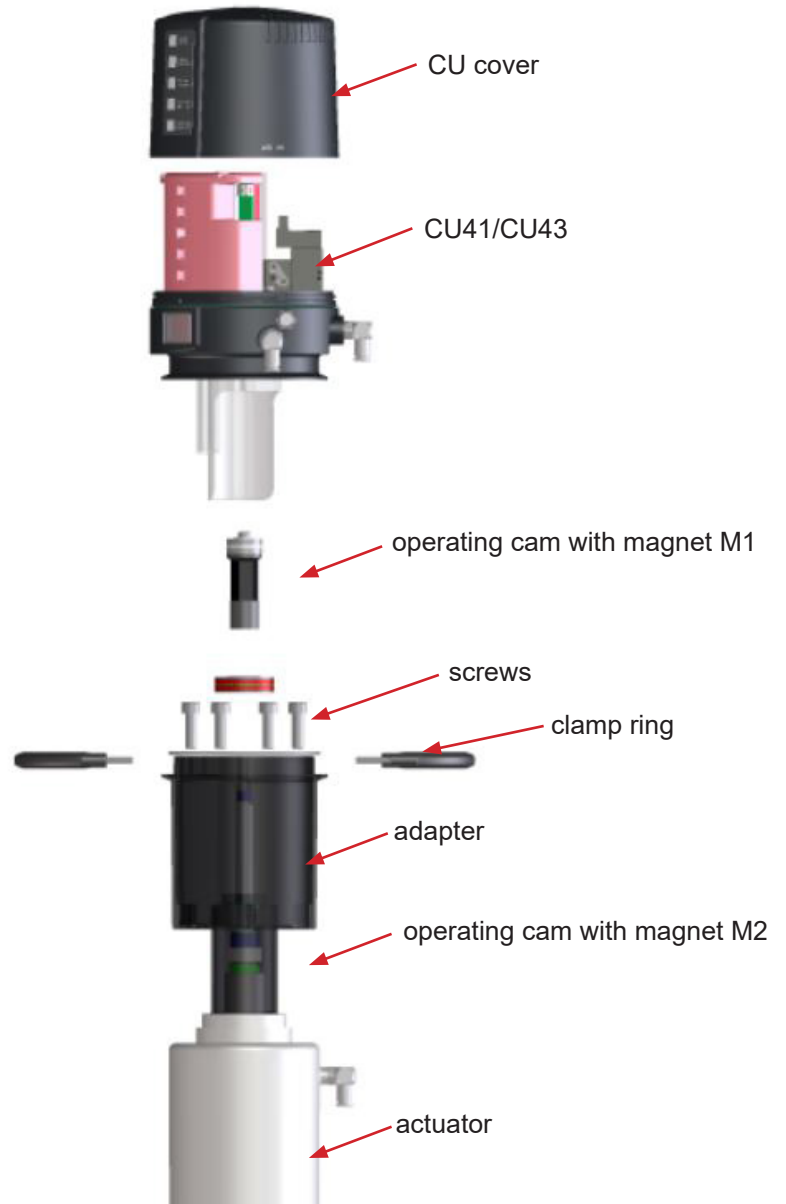
For the adjustment of Hall sensor 2, at first, the (non-controlled) solenoid valve 1 is **controlled**. This can optionally be made manually or electrically. The open valve position and the corresponding feedback can be adjusted. This is undertaken by turning the adjustment screw 2 until the required position is reached and the **LED Valve Open** lights up.



Observe the switching hysteresis of the Hall effect sensors! Therefore, adjust the switch-point of the sensors with overlap in order to permit small variations and, thus, to prevent failures!

8. CU Assembly and Startup

8.3. Double seat mix proof valves D4, D4 SL, DA4



Assembly of the control unit on the valve

1. Assemble the magnet M2 on the upper shaft under the stop screw.
2. Assemble the adapter with the 4 screws on the double seat valve.
3. Assemble the operating cam M1 with guide rod extension on the guide rod.
4. Place the control unit onto the adapter. Observe alignment!
5. Attach the clamp rings and fasten them with the 2 screws.
6. Align air connections of the control unit to the valve actuator.

8. CU Assembly and Startup

8.3.1 Pneumatic connection

Supply air:



Caution!

Shut off the compressed air supply before connecting the air hose!

Make sure that the air hose is professionally cut to length. Use a hose cutter for this purpose.

Pneumatic air to valve actuator:

Connect pneumatic air connection **Y1** with the valve actuator. Main actuator



Connect pneumatic air connection **Y2** with the valve actuator. (seat lifting - upper valve seat)



Connect pneumatic air connection **Y3** with the valve actuator. (seat lifting – lower valve seat)



Exhaust air:

As a standard, the exhaust air connections **A1** and **A2** are equipped with a silencer. If required, the silencer can be removed and the exhaust air can be hoses separately when it must be led off to the exterior, for example.

8.3.2 Electric connection



Attention!

Electric connections shall only be carried out by qualified personnel!

See to a professional execution and installation of the AS-interface network.

Observe the Safety Instructions specified in chapter 2.

Tighten the cable gland in order to ensure the corresponding protective class.

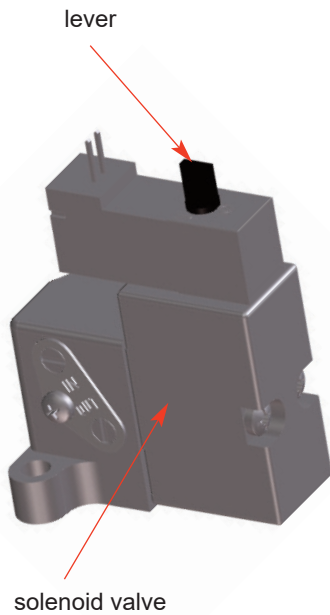
8. CU Assembly and Startup

8.3.3 Connection of external proximity switches

The electric connection of the proximity switches specified by SPX FLOW is undertaken according to the terminal layout described in chapter 6.1.

The mechanic assembly of the proximity switches is carried out at the actuator of the corresponding double seat valves.

Observance of the instruction manual for double seat valves is essential!



8.3.4 Startup

After proper assembly and installation of the control unit, startup can be undertaken as described below

1. Switch on the air supply
2. Switch on the voltage supply.
3. Check the solenoid valves by turning the lever on the upper side of the valve by 90°.
4. Check the valve position indicator.
The proximity switches are installed at the double seat valves with a mechanical stop.
Adjustment is not required!

The following allocation applies for double seat valves:

Closed valve position feedback – sensor 3 controlled

Open valve position feedback – sensor 2 controlled



Check the proper fit of the proximity switches to provide for the accurate transfer of the signals for the corresponding valve position.

9. Accessories and Tools

Assembly/disassembly - adapter on valve actuator:

- hexagon socket wrench 6 mm
- screwdriver 4mm

Assembly/disassembly – CU on adapter:

- hexagon socket wrench 3 mm

Assembly/disassembly – electronic module:

- torx wrench TX20
- screwdriver 3.5 mm

Assembly/disassembly – feedback unit:

- torx wrench TX15

Assembly/disassembly – electronic modules:

- torx wrench TX20

Assembly/disassembly – air connections:

- jaw wrench M13

Assembly/disassembly – pressure relief valve:

- torx wrench TX10

Loctite semi-solid

jaw wrench



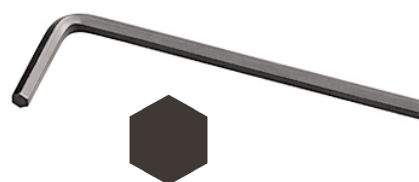
torx wrench



screwdriver

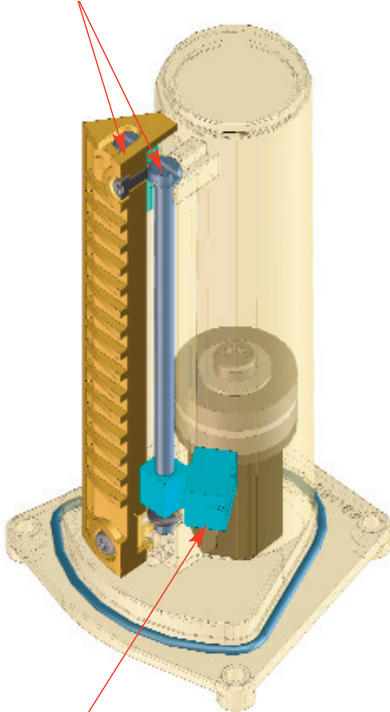


hexagon socket wrench



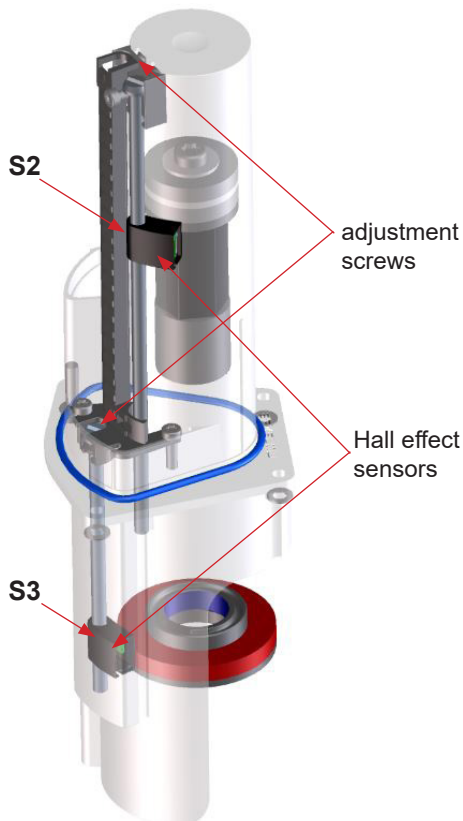
10. Service

Feedback unit for
SPX FLOW APV valves
adjusting screws



Hall effect sensor

Feedback unit for
SPX FLOW APV / WCB D4 valves



10.1. Dismantling

Before disassembly, verify the following items:

- The valve must be in safety position and must not be controlled!
- Shut off air supply!
- Cut off current to control unit, i.e. interrupt the supply voltage!

Solenoid valve (4, 5, 6)

- + Open the CU cover by turning in anticlockwise direction.
- + Release the plug connection at the electronic module for the corresponding solenoid valve.
- + Release and remove the 2 screws (20) TX20.
- + Replace the solenoid valve.
- + Assembly in reverse order. See to a proper fit of the flat seal!

Electronic module (2)

Before releasing the cable connections make sure that all lines are de-energised!

- + Open the CU cover by turning in anticlockwise direction.
- + Release the plug connection of the solenoid valves.
- + Release the cable from the terminal strip, all terminals 1-15.
- + Release and remove the 3 screws (20) TX20.
- + Replace the electronic module.
- + Assembly in reverse order.

Feedback unit

Before releasing the cable connections make sure that all lines are de-energised!

- + Open the cover.
- + Release the cable for the Hall effect sensors from the terminal strip, terminals 3-8.
- + Release the clamp ring and lift the CU4 from the adapter.
- + Remove the 4 screws (9) TX15 at the lower side of the CU base (1).
- + Take out the feedback unit to the bottom.

Hall effect sensors

The Hall effect sensors can only be replaced at the dismantled feedback unit.

- + Remove the 3 screws (14) TX10.
- + Remove the tower lid (13).
- + Remove the o-rings (11).
- + Dismantle the sensors by turning of the adjusting screw (12).

To simplify adjustment of feedbacks:

- + Mark the position of the sensor on the adjusting screw!
- + Assembly in reverse order.
- + Check the correct position of the Hall effect sensors and their functions as described in chapter 8 CU assembly and startup.

11. Trouble Shooting

General Failures	Remedy
Valve position is not indicated.	Re-adjust Hall sensors.
	Check fastening of magnetic operating cam.
	Check cabling of the Hall sensors to the electronic module.
Feedback via proximity switches is missing	Check positioning of proximity switches.
	Check AS-i bus communication.
	Check cabling to the electronic module.
LED indication is missing	Check AS-i bus communication.
	Check cabling to the electronic module..
LEDs ' valve open ' and ' valve closed ' are flashing	No bridge between the terminals 10, 11 and 12. Install the corresponding bridge.
Failure	Remedy
Control Unit CU41 installed on Butterfly valves	
Movement of valve flap is missing with actuated solenoid valve.	Check if the right control unit is installed. Check label in type window of control unit: CU41-T-AS-interface (1 EMV/solenoid valve)
	Check valve movement with lever at solenoid valve..
	Check cabling between electronic module and solenoid valve.
	Check compressed air (min. 6 bar).
	Bore for transfer of control air to turning actuator must be open.
Air leakage at lower side of adapter.	Check o-rings of adapter.

11. Trouble Shooting

Failure	Remedy
Control Unit CU41 installed on Single seat and Double seat valves	
Valve position movement is missing with actuated solenoid valve.	Check if the right control unit is installed. Check label in type window of control unit: CU41-S-AS-interface (1 solenoid) CU41-D4-AS-interface
	Check valve movement with lever at solenoid valve.
	Check cabling between electronic module and solenoid valve.
	Check compressed air (min. 6 bar).
	Check control air connection between the CU41 and the valve actuator.
Control Unit CU43 installed on Double seat valves	
Valve position movement is missing with actuated solenoid valve.	Check if the right control unit is installed. Check label in type window of control unit: CU43-D4-AS-interface
	Check valve movement with lever at solenoid valve.
	Check cabling between electronic module and solenoid valve.
	Check compressed air (min. 6 bar).
	Check control air connection between the CU43 and the DA4 / D4 SL actuator.

12. Spare Parts Lists

The reference numbers of spare parts for the different control unit designs and adapters are included in the attached spare parts drawings with corresponding lists.

When you place an order for spare parts, please indicate the following data:

- number of parts required
- reference number
- parts designation

Data are subject to change..

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Spare Parts list

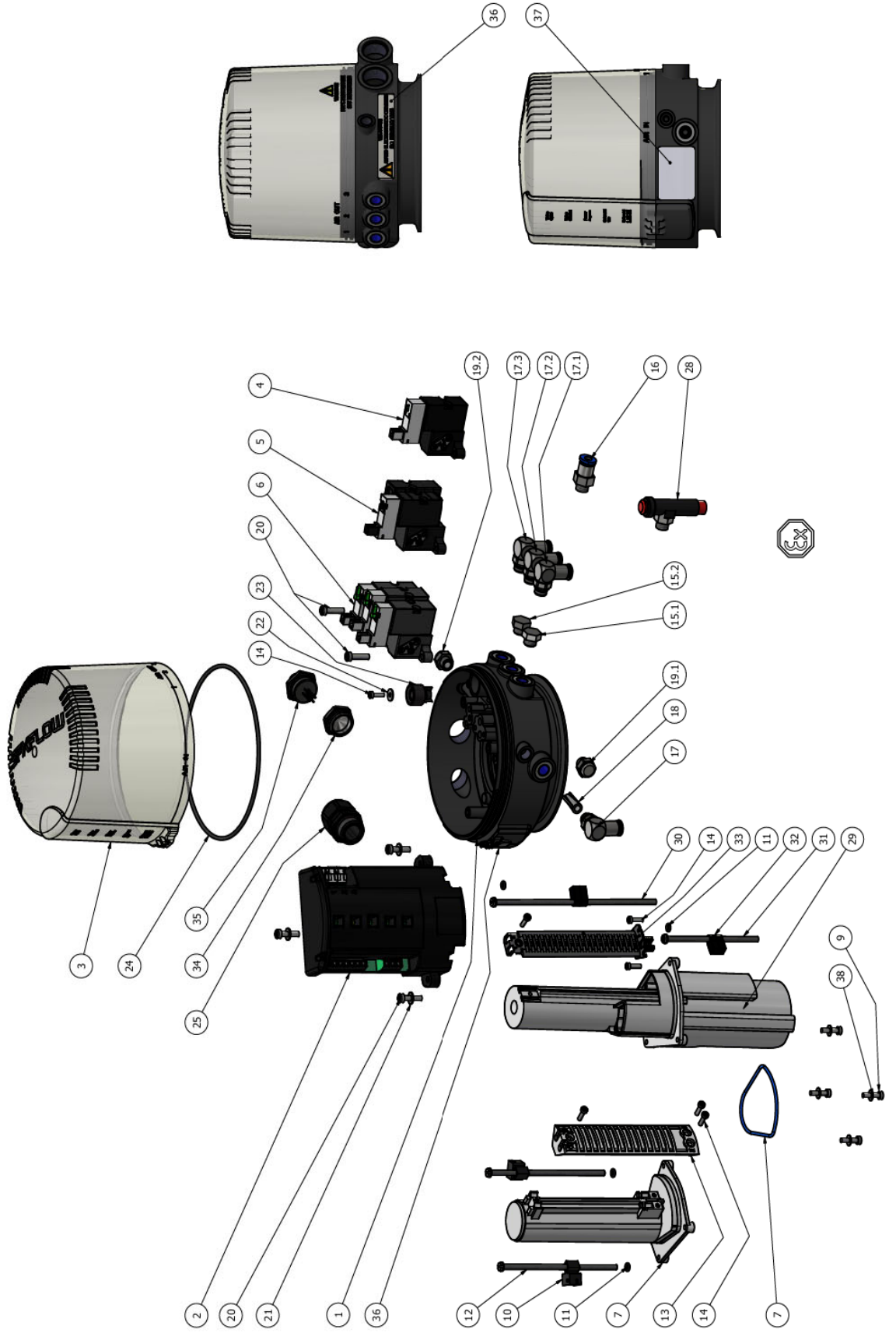
CU4 AS-i
II 3 G Ex ec mc IIC T4 Gc
ATEX 3G - Zone 2

Date: 13.09.21
 Name: C. Keil
 Reviewed: C. Keil

SPX FLOW

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RN ATEX 01.044-5



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Spare parts list

CU4 S AS-i ext.
II 3 G Ex ec mc IIC T4 Gc
Zone 2



SPX FLOW

Date:	13.09.21
Name:	C. Keil
Reviewed:	C. Keil
Date:	
Name:	
Reviewed:	
Page 3 of 6	
RN ATEX 01.044-5	

pos. item	Quantity	Description	required in version	Material	Part no.	pos. item	Quantity	Description	required in version	Material	Part no.
		CU41 S AS-i ext. ATEX 3G		PA6.6 GF30	H345509	20	5	Ejot Delta PT screw WN5452 40x16	CU41+43	A2	H320365
		CU41 S AS-i ext. ATEX 3G M12		PA6.6 GF30	H345510	21	3	Washer ø4,3 DIN125	CU41+43	A2	H79576
		CU43 S AS-i ext. ATEX 3G		PA6.6 GF30	H345511	22	1	Washer A 3,2 DIN9021	CU41+43	A2	H320404
		CU43 S AS-i ext. ATEX 3G M12		PA6.6 GF30	H345512	23	1	CU4 pressure relief valve	CU41+43	PPS	H320352
						24	1	O-ring 120,32 x 2,62	CU41+43	NBR	H320402
		CU41 Ex Base S cpl.	CU41	PA6.6 GF30 +PA12	H345506	25	1	Screwed cable gl. M20x1,5 cable ø5-9	CU41+43	PA black	H344598
		CU43 Ex Base S cpl.	CU43	PA6.6 GF30 +PA12	H345507						
		CU41 E-module AS-i ext.	CU41	Zyfel 70G33l. black	H320388						
		CU43 E-module AS-i ext.	CU43	Zyfel 70G33l. black	H320389						
		CU4 cover translucent	CU41+43	Lexan 945AU	H337948						
		Solenoid valve 1 sol.	CU41	PPS	H319950						
		Solenoid valve 3 sol.	CU43	PPS	H319952						
		CU4 sensor tower	CU41+43	PA12	H319868						
		O-ring 45,6 x 2,4	CU41+43	NBR	H320401	34	1	Blind plug V-inox FPM ex. M20x1,5	CU43	PA	H337788
		Ejot Delta PT screw WN5452 35x14	CU41+43	A2	H320364	35	1	Flush type connector	CU41/43-M12	Ms / nickel-plated	H338108
		Hall sensor	CU41+43	Grilamid TR55	H320385	36	1	ATEX CU label - Electrostatic risk	all versions	Tevus	H345151
		O-ring 3x2	CU41+43	NBR	H208644	37	1	ATEX CU4 type label	all versions	Tevus	H345150
		Cylinder screw M4x100	CU41+43	A2-50	H320361	38	4	Washer A=3,7	CU41+43	A2	H323771
		CU4 tower cover	CU41+43	PA12	H319869						
		Ejot Delta PT screw WN5452 30x10	CU41+43	A2	H320363						
		Blind plug G1/8"	CU43	Ms / nickel-plated	H320482						
		Elbow connector G1/8" 6x1	CU41+43	1.4301 / PA	H208825						
		Elbow connector G1/8" 6x1	CU41+43	1.4301 / PA	H208825						
		Elbow connector G1/8" 6x1	CU43	1.4301 / PA	H208825						
		Elbow connector G1/8" 6x1	CU43	1.4301 / PA	H208825						
		CU4 air filter	CU41+43	PE-porous	H320223						
		Sound reducer	CU41+43	Ms / nickel-plated	H208826						
		Sound reducer	CU43	Ms / nickel-plated	H208826						
CU4 Adapter											
Adapter spareparts information to be found in document: RN 01.044.3											

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Spare parts list

CU41N-T AS-i ext.
II 3 G Ex ec mc IIC T4 Gc
Zone 2



Date:	13.09.21
Name:	C. Keil
Reviewed:	C. Keil
Date:	
Name:	
Reviewed:	

SPX FLOW

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RN ATEX 01.044-5

pos. item	Quantity	Description	required in version	Material	Part no.
20	5	Ejot Delta PT screw WN5452 40x16	CU41	A2	H320365
21	3	Washer ø4,3 DIN125	CU41	A2	H79576
22	1	Washer A 3,2 DIN9021	CU41	A2	H320404
23	1	CU4 pressure relief valve	CU41	PPS	H320352
24	1	O-ring 120,32 x 2,62	CU41	NBR	H320402
25	1	Screwed cable gl. M20x1,5 cable ø5-9	CU41	PA black	H344598
28	1	Pressure reducing valve	CU41N	Ms / nickel-plated	H208841
35	1	Flush type connector	CU41-M12	Ms / nickel-plated	H338108
36	1	ATEX CU label - Electrostatic risk	all versions	Tevus	H345151
37	1	ATEX CU4 type label	all versions	Tevus	H345150
38	4	Washer A=3,7	CU41+43	A2	H323771
1	1	CU41 Ex Base T cpl.	CU41	PA6.6 GF30 +PA12	H345508
2	1	CU41 E-module AS-i ext.	CU41	Zytel 70G33L black	H320388
3	1	CU4 cover translucent	CU41	Lexan 945AU	H337948
5	1	Solenoid valve 1 sol. + NOT-element	CU41N	PPS	H319951
7	1	CU4 sensor tower	CU41	PA12	H319868
8	1	O-ring 45,6 x 2,4	CU41	NBR	H320401
9	4	Ejot Delta PT screw WN5452 35x14	CU41	A2	H320364
10	2	Hall sensor	CU41	Grilamid TR55	H320385
11	2	O-ring 3x2	CU41	NBR	H208644
12	2	Cylinder screw M4x100	CU41	A2-50	H320361
13	1	CU4 tower cover	CU41	PA12	H319869
14	4	Ejot Delta PT screw WN5452 30x10	CU41	A2	H320363
15.1	1	Blind plug G1/8"	CU41	Ms / nickel-plated	H320482
16	1	Connector self-locking	CU41N	Ms / nickel-plated	H320551
17	1	Elbow connector G1/8" 6x1	CU41	1.4301 / PA	H208825
18	1	CU4 air filter	CU41	PE-porous	H320223
19.1	1	Sound reducer	CU41	Ms / nickel-plated	H208826
CU4 Adapter					
	1	CU4 T adapter cpl.	all versions		H320475
Adapter spareparts information to be found in document: RN 01.044.3					

Ersatzteilliste: spare parts list

CU4 Adapter

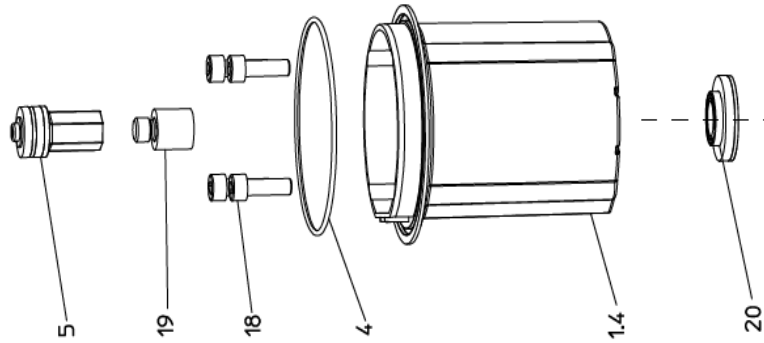
SPX FLOW

Datum:	11/08	01/09	03/09	11/10
Name:	Peters	Peters	Trytko	Schulz
Geprüft:	Spliehoff	Spliehoff	Peters	Spliehoff
Datum:	03/13	11/14	05/18	
Name:	Trytko	Trytko	C.Keil	
Geprüft:	Schulz		C.Keil	

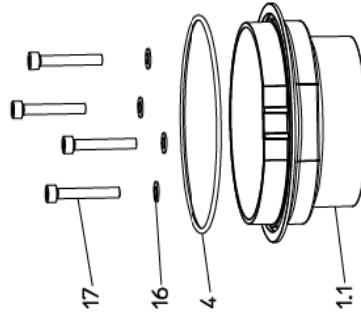
Blatt 1 von 5

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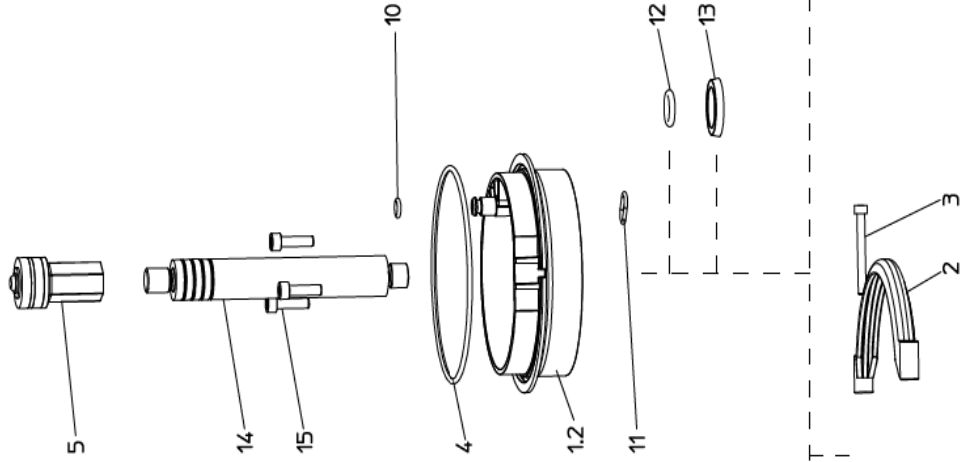
CU4 D4 - Adapter



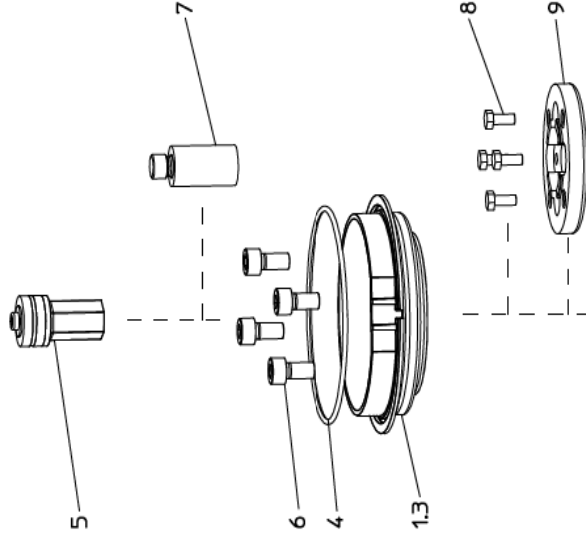
CU4 M - Adapter



CU4 T - Adapter



CU4 S - Adapter



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Ersatzteilliste: spare parts list

CU4 Adapter

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pos. item	Menge quantity	Beschreibung description	Material	CU4 - S WS-Nr. ref.-no.	CU4 - S Langhub ø165 WS-Nr. ref.-no.	CU4 - Smini WS-Nr. ref.-no.	CU4 - Smax			CU4 - T			CU4 - Tmax			CU4 - M	
							CU4 - Smax WS-Nr. ref.-no.	CU4 - Smax WS-Nr. ref.-no.	CU4 - Smax WS-Nr. ref.-no.	CU4 - T WS-Nr. ref.-no.	CU4 - T WS-Nr. ref.-no.	CU4 - T WS-Nr. ref.-no.	CU4 - Tmax WS-Nr. ref.-no.	CU4 - Tmax WS-Nr. ref.-no.	CU4 - Tmax WS-Nr. ref.-no.		
		CU4 Adapter kpl. CU4 adapter cpl.	material	08-48-600/93 H320474	08-48-633/93 H330897	08-48-613/93 H321989	08-48-610/93 H321988	08-48-601/93 H320475	08-48-601/93 H320475	08-48-611/93 H321987	08-48-611/93 H320476	08-46-572/93 H319876					
1.1	1	CU4 Adapter M CU4 adapter M	PA6.6 GF30														
1.2	1	CU4 Adapter T CU4 adapter T	PA6.6 GF30						08-46-571/93 H319875				08-46-571/93 H319875				
1.3	1	CU4 Adapter S CU4 adapter S	PA6.6 GF30	08-46-570/93 H319874	08-46-570/93 H319874	08-46-570/93 H319874	08-46-570/93 H319874										
1.4	0	CU4 Adapter D4 CU4 adapter D4	PA6.6 GF30														
2	2	CU4 Clamphalbschale kpl. CU4 clamp cpl.	Grivory GH-5H1	08-46-569/93 H319873	08-46-569/93 H319873	08-46-569/93 H319873	08-46-569/93 H319873	08-46-569/93 H319873	08-46-569/93 H319873	08-46-569/93 H319873	08-46-569/93 H319873	08-46-569/93 H319873					
3	2	Zylinderschraube M4x40 Cyl. screw M4x40	A2-70	65-05-040/13 H320360	65-05-040/13 H320360	65-05-040/13 H320360	65-05-040/13 H320360	65-05-040/13 H320360	65-05-040/13 H320360	65-05-040/13 H320360	65-05-040/13 H320360	65-05-040/13 H320360					
4	1	O-Ring 101,27x2,62 O-ring 101,27x2,62	NBR	58-06-493/83 H148389	58-06-493/83 H148389	58-06-493/83 H148389	58-06-493/83 H148389	58-06-493/83 H148389	58-06-493/83 H148389	58-06-493/83 H148389	58-06-493/83 H148389	58-06-493/83 H148389					
5	1	CU4 Magnetschaltnocke kpl. CU4 magnet operating cam cpl.	Zytel HTN	08-60-900/93 H320479	08-60-900/93 H320479	08-60-900/93 H320479	08-60-900/93 H320479	08-60-900/93 H320479	08-60-900/93 H320479	08-60-900/93 H320479	08-60-900/93 H320479	08-60-900/93 H320479					
6	4	Zyl. Schraube Cyl. screw	A2-70	65-05-120/13 H79012	65-05-122/13 H79014	65-05-120/13 H79012	65-05-129/13 H315760										
7	1	Zugstangenverlängerung Guide rod extension	PA6			15-26-070/93 H208096	15-26-057/93 H204747										
8	4	Skt. Schraube M5x12 Hex. screw M5x12	A2-70			65-01-033/15 H78737											
9	1	CU Adapter SW4 CU adapter SW4	PA6		08-48-359/93 H330879	08-48-355/93 H207570	08-48-361/93 H327150										
10	1	O-Ring 6x2 O-ring 6x2	NBR							58-06-059/83 H320505	58-06-059/83 H320505	58-06-059/83 H320505					
11	1	O-Ring 11x2 O-ring 11x2	NBR							58-06-034/83 H321897	58-06-034/83 H321897	58-06-034/83 H321897					
12	1	O-Ring 11x3 O-ring 11x3	NBR									58-06-039/83 H208632					



CU4 AS-interface

Control Unit



FOR ATEX ZONE 2 GAS APPLICATIONS

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