SPXFLOW®

INSTRUCTION MANUAL

APV CU4** AS-interface Control Unit

SAFETY AGAINST EXPLOSION - FOR IECEx ZONE 2 GAS APPLICATIONS

FORM NO.: H345317 REVISION: GB-1

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

CE Declaration of Conformity
UKCA Declaration of Conformity

We,

DESIGN CENTER/MANUFACTURER: **SPX Flow Technology Germany GmbH**
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AUTHORIZED REPRESENTATIVE:
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4 Station Road Cheadle Hulme
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declare under our sole responsibility that the

CU4 Direct Connect, AS-interface Control Units for IECEx ATEX Zone 2
CU4plus Direct Connect, AS-interface, IO-Link Control Units for IECEx ATEX Zone 2
Explosion subcategory / Equipment marking:
II 3 G Ex ec IIB T4 Gc
IECEx TUN 22.0020X
TÜV 23 ATEX 349764 X
0°C ≤ Tamb. ≤ +55°C

meet the requirements of the
IECEx ATEX Standards
IEC 60079-0:2017, Edition 7.0 and IEC 60079-7:2017, Edition 5.1 as well as
EN IEC 60079-0:2018 and EN IEC 60079-7:2015/ A1:2018
TÜV NORD CERT GmbH, Hanover-Office, Am TÜV 1, 30519 Hanover, Germany,
Notified Body number: 0032

Electromagnetic Compatibility Directive 2014/30/EU
& protection class IP 64 EN 60529, EN 61000-6-2, EN 61000-6-4, EN 60068-2-6
RoHS Directive 2011/65/EU

Holzwickede, Nov. 2023 — Dr.-Ing. Behdad Ariatabar, Design Center Lead - Valves

meet the requirements of the
Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 No. 1107 & BS harmonized standards
Electromagnetic Compatibility Regulations 2016 No. 1091 & BS harmonized standards
Restriction of Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulation 2012 No. 3032

DocuSigned by:
Mark Shanahan
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Manchaster, Nov. 2023 — Mark Shanahan, VP Finance N&H Solutions

Content Page

0. IECEx Specific Instructions

0.1. General Information

These **IECEx** Specific Safety Instructions apply for **CU4** resp. CU4*plus* Control Units** used in Potentially Explosive Atmospheres **Zone 2, Gas** applications. The equipment was assessed according to IEC 60079-0:2017, Edition 7.0 and IEC 60079-7:2017, Edition 5.1.
Notified body: TÜV NORD CERT GmbH, Hanover-Office
Am TÜV 1, 30519 Hanover, Germany
Notified Body number: 0044

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. IECEx 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 Control unit type CU4** resp. CU4*plus* 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 IECEx 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.

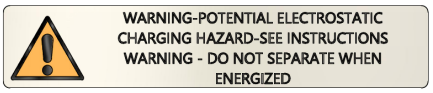
The control unit must only be used with SPX FLOW valves and components recommended and authorized by SPX FLOW.

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. IECEx Specific Instructions

0.4. Specific Safety Instructions

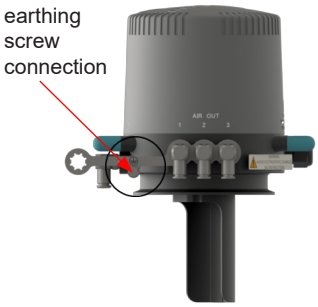


Connecting/Disconnecting pluggable electric circuits

- The connecting and disconnecting of the pluggable electrical circuits including field wirings is only permitted in the absence of explosive atmosphere.

Opening the device

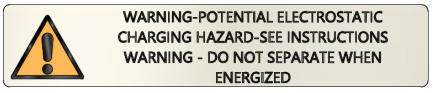
- Do not open the control unit in the presence of explosive atmosphere.
- Do not install and set the proximity switches in the presence of explosive atmosphere.
- Before startup, secure the cover with the enclosed lead seal. Opening the cover without tools must be prevented.



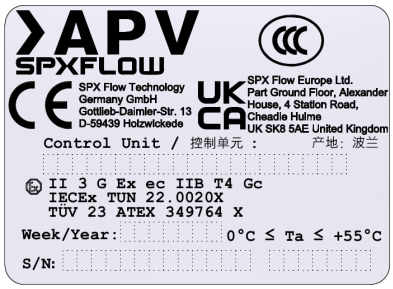
Electrostatic discharge

- The control unit has to be installed and used in such a way, that electrostatic charging from operation, maintenance and cleaning is excluded.
- Connect the earthing screw in order to integrate the control unit in the local potential equalization system.
- In case of sudden discharge from electrostatically charged devices or individuals, risk of explosion in the explosive area exists.
- Prevent the occurance of electrostatic discharges by suitable measures.
- Clean the control unit surface by gently wiping it with a damp or antistatic cloth, only.

detail X: electrostatic risk label
CU4 D4 IECEx Z2



detail Y: type label
control unit



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.

0. IECEx Specific Instructions

0.4. Specific Safety Instructions

In order to prevent the emergence of explosion risks observe the safety instructions of the instruction manual and adhere to the following:

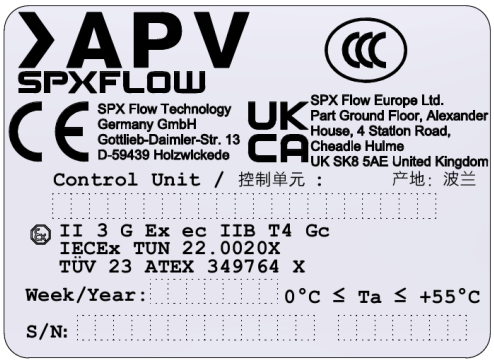
- The required degree of protection (IP64) is guaranteed only in connection with suitable adaption sets. All pneumatic and electrical connections must be equipped with suitable connectors.
- Install the control unit in such a way that it is protected from UV-radiation.
- The control unit has to be installed in such a way that a pollution degree 2 or better, according to IEC 60664-1, is achieved.
- Externally to the control unit, measures have to be taken to provide a transient protection which ensures that the rated voltage, connected to the power supply terminals, is not exceeded by more than 40 %.
- Ambient temperature range: 0 °C ≤ Tamb ≤ +55 °C

- 安全使用条件:
- 使用环境温度: 0°C ~ +55°C
- 控制单元CU4**和CU4*plus*在安装和使用时, 避免在操作,
- 维护和清洁时产生静电
- 控制单元CU4**和CU4*plus*在安装时必须防止紫外线照射
- 在爆炸性危险场所严禁连接和断开电路
- 根据GB/T 16935.1, 该设备只应在污染程度不低于2级的区域使用
- 控制单元CU4**和CU4*plus*的瞬态保护应提供不超过设备的供电端子额定峰值电压值140%的保护

0. IECEx Specific Instructions

0.5. Identification of CU4** resp. CU4*plus* Control Units for use in IECEx ATEX environment

IECEx / ATEX - identification:



Equipment group II

Explosion subcategory
Ex ec IIB T4 Gc

Ambient temperature
0 °C ≤ T_{amb} ≤ +55 °C

0.6. Responsibilities

It is within the operator`s responsibility to ensure that the specified product temperatures are not exceeded and that regular inspections and maintenance are carried out to provide for proper function of the control unit and valve.

The following pages show the operating instructions for the standard control unit for non - IECEx ATEX applications.

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 danager which can lead to severe boldily 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.

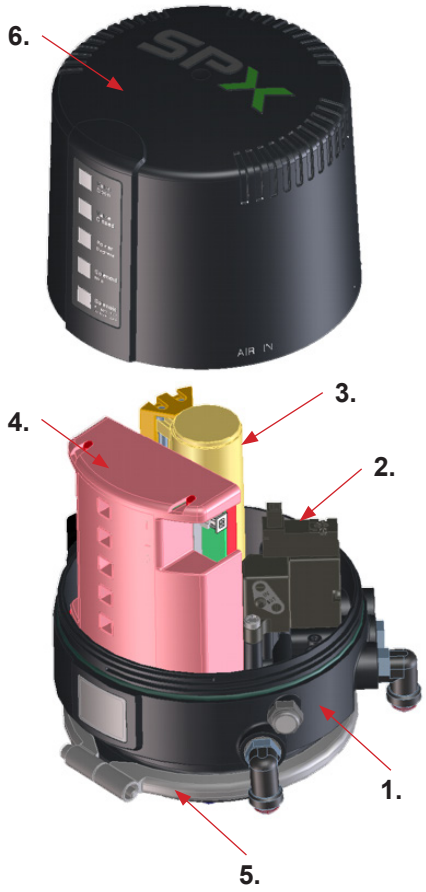
3. General Terms

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 indiciation of the valve positions.

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

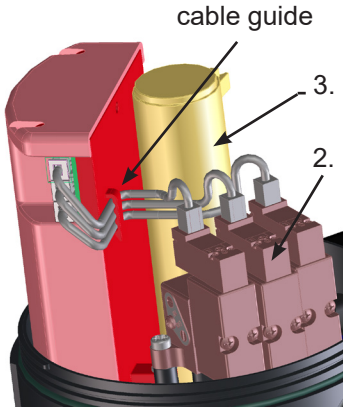
fig. 3.2.



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 window 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.
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 optical window.

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. Double seat valves without seat lift function require 1 solenoid valve. Control units for double seat valves are equipped with 3 solenoid valves.

The electronic module installed in the control unit fulfills the task to process the electric signals from the control, to activate 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 actuators, sensors and the superior control system.

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.

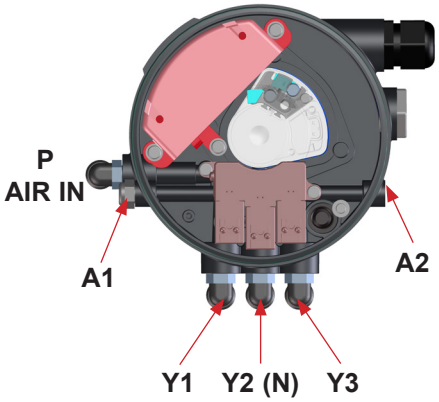
The complete control unit is designed according to the building block principle. By exchange of the electronic module, the control type can be changed, e.g. from direct control (Direct Connect) to communication with AS-interface.

Note! Wiring must be changed.

4. Mechanics and Pneumatics

4.1. Air connections for double seat mix proof valves

4.1.1. Function



CU41-D4
design for double seat mix proof valves without seat lift

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

4.2. 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.

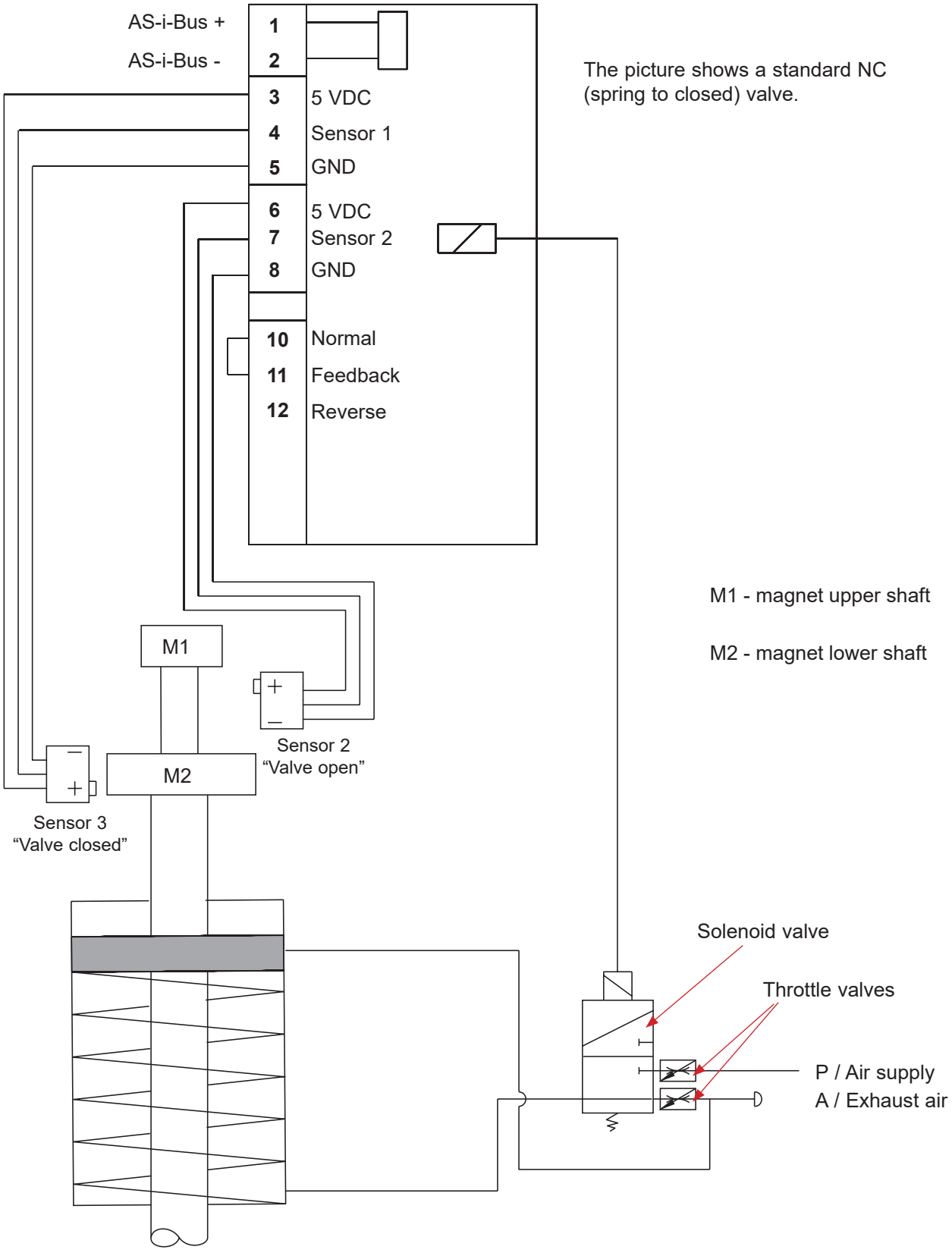
DANGER

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

4. Mechanics and Pneumatics

4.3. Functional description - block diagrams

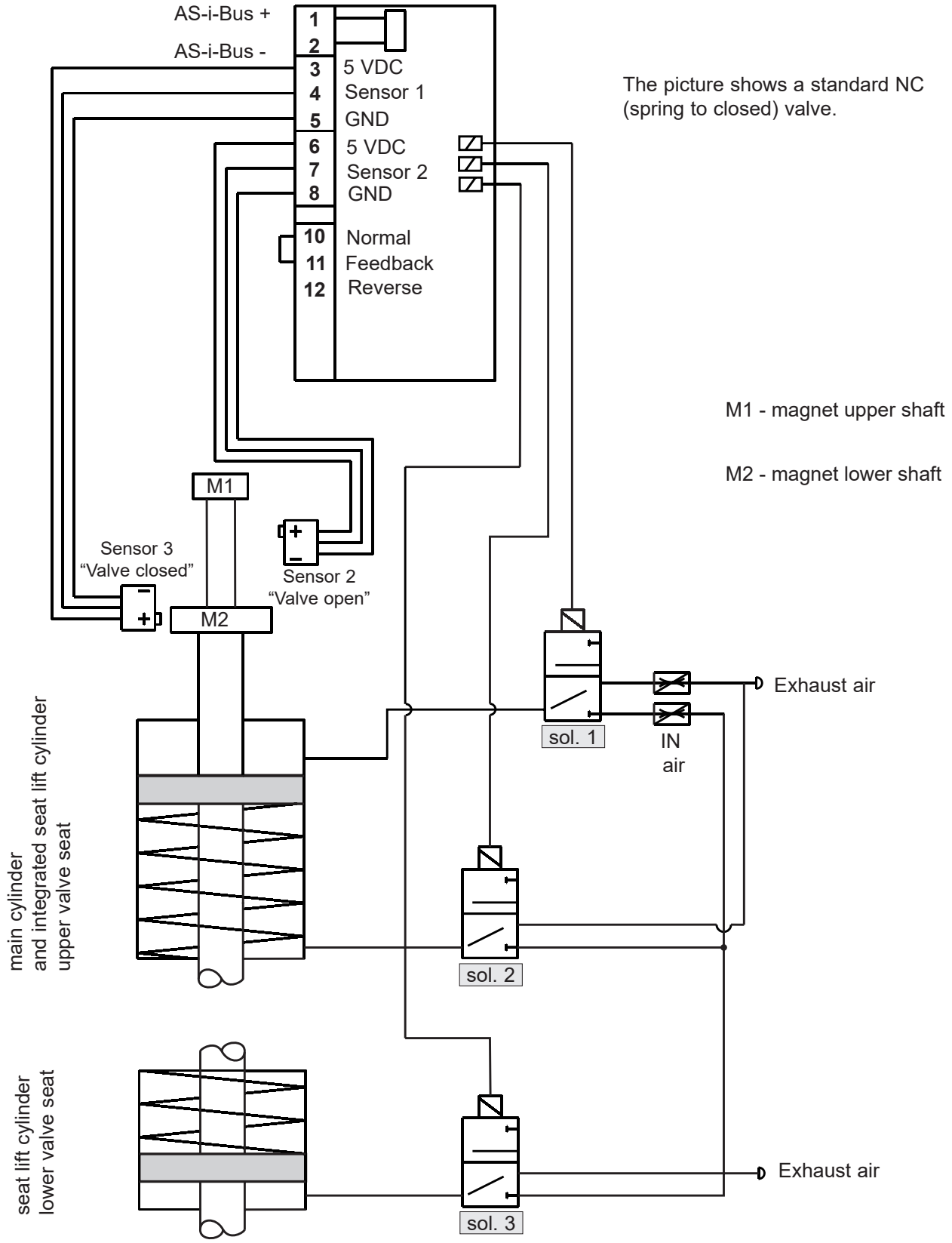
4.3.1. CU41-D4 AS-interface for D4 double seat mix proof valve without seat lift function



4. Mechanics and Pneumatics

4.3. Functional description - block diagrams

4.3.2 CU43-D4 AS-interface for D4 SL double seat mix proof valves with seat lift function



4. Mechanics and Pneumatics

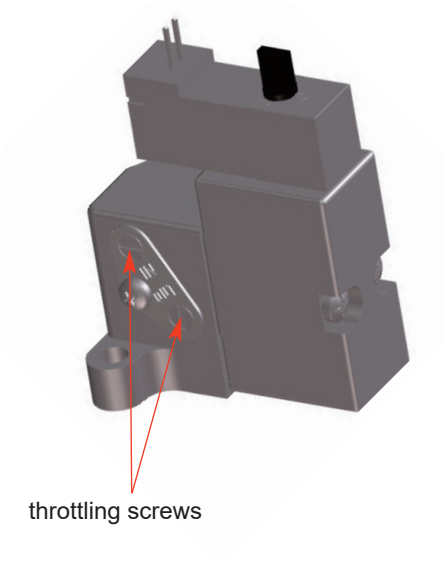
4.4. Technical Data / Standards

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/ 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 m³ 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 hight altitude, additional measures must be considered to adopt the pressure dew point accordingly.
- **Content of oil:**	quality class 1, max. 0,01 mg/m³

The oil applied must be compatible with Polyurethane elastomer materials.

4. Mechanics and Pneumatics

4.5. 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

4.6. 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

5. Adapter

Adapter for Double seat mix proof valves D4, D4 SL

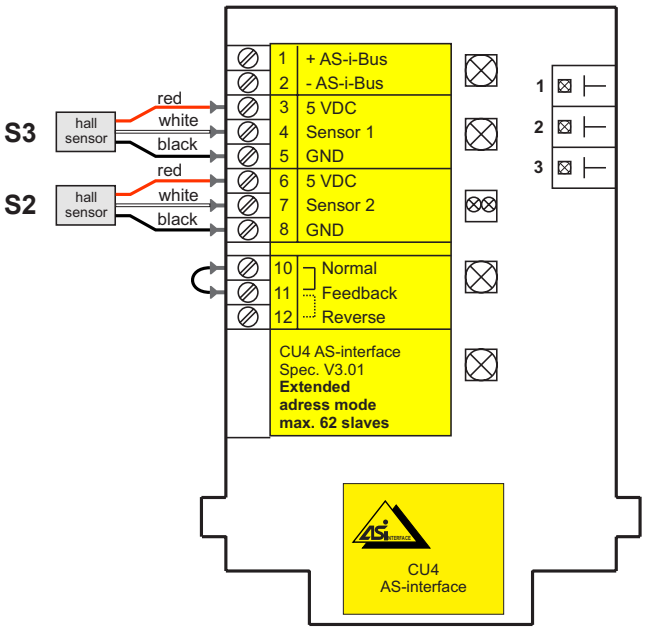
6. Electronic module

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.

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.

6.1.1. CU41plus-D4
CU43plus-D4



6. Electronic module

6.1.2 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)** 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	Funtional description for D4, D4 SL valve types
1	AS-i +	AS-i network connection
2	AS-i -	AS-i network connection
3	5 VDC	voltage supply for valve sensor
4	Sensor 1	connection Hall sensor 3 (closed valve position)
5	GND	
6	5 VDC	voltage supply for valve sensor
7	Sensor 2	connection Hall sensor 2 (open valve position)
8	GND	ground for sensor supply
10	Normal	normal allocation of feedback signals
11	Feedback	tie point for cable bridge
12	Reverse	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 11 12)	reverse (10 11 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:

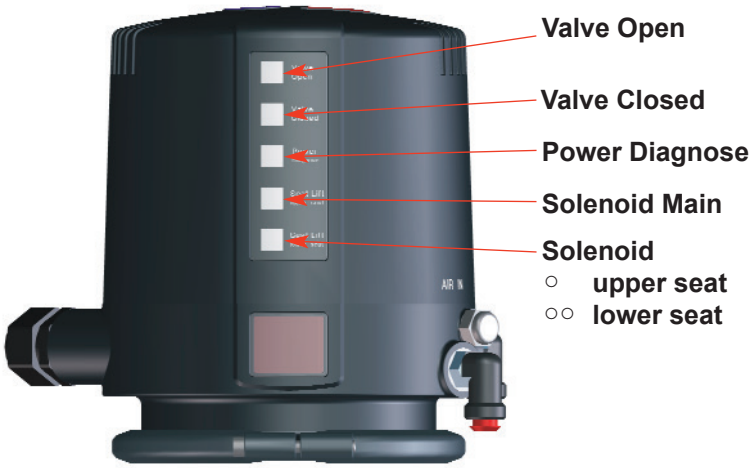
Internal sensors: Hall effect sensors,
APV D4 valves: H337014
UB 4,75-5,25 VDC
operating distance according to
SPX FLOW specification

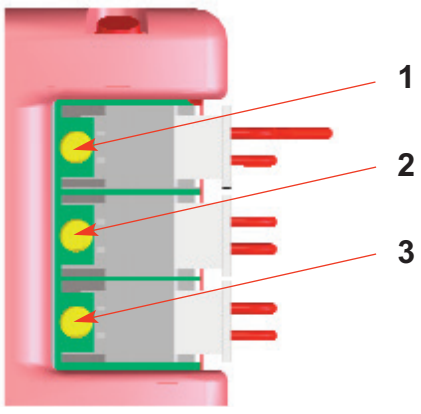
6. Electronic module

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

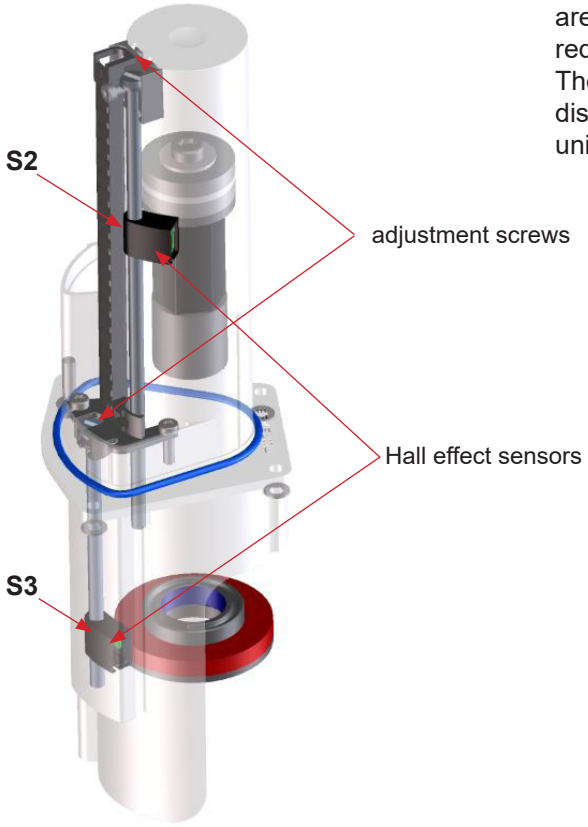
7.1. General terms

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 sesonrs (APV D4 valves): H337014
UB 4,75-5,25 VDC
operating distance according to SPX FLOW specification

Feedback unit for
SPX FLOW APV D4 valves

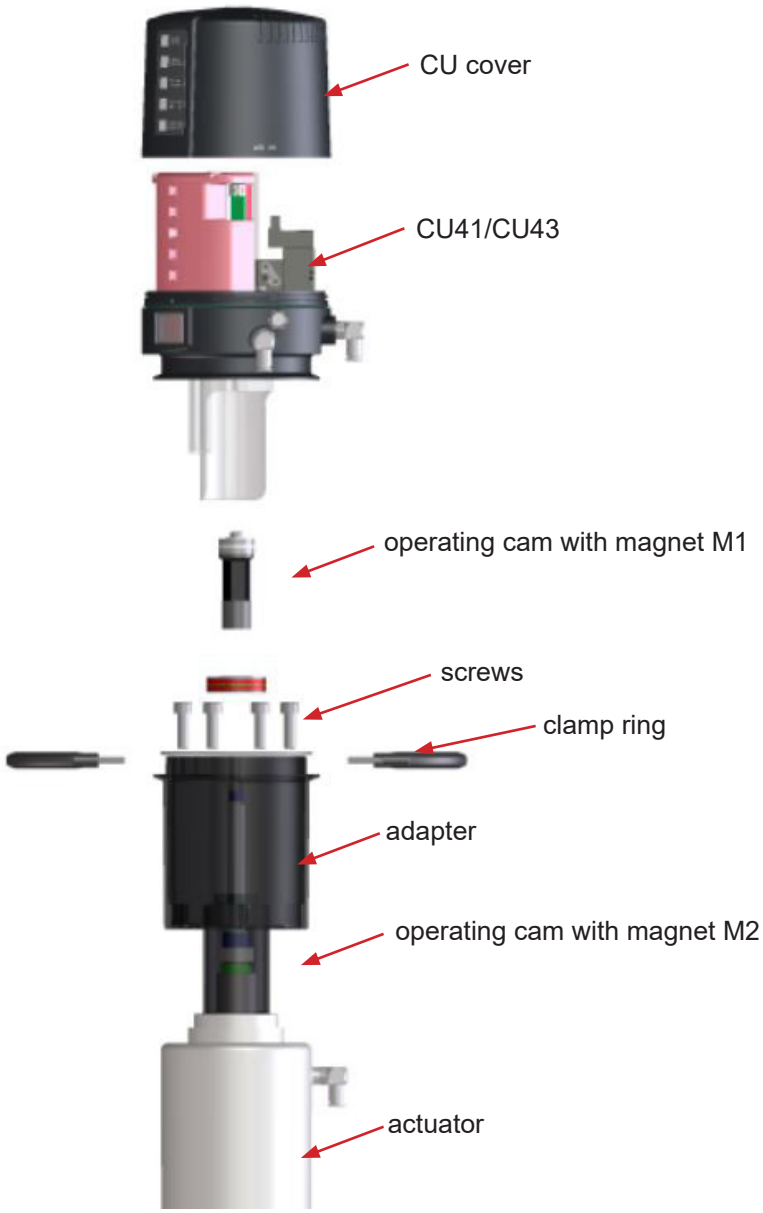


7.3. Adjustment of valve position feedback

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 srews 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.

8. CU Assembly and Startup

8.1. Double seat mix proof valves D4, D4 SL



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

8.1.1 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

1

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

2

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

3

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 hosed separately when it must be led off to the exterior, for example.

8.1.2 Electric connection

Attention!
Electric connections shall only be carried out by qualified personnel!

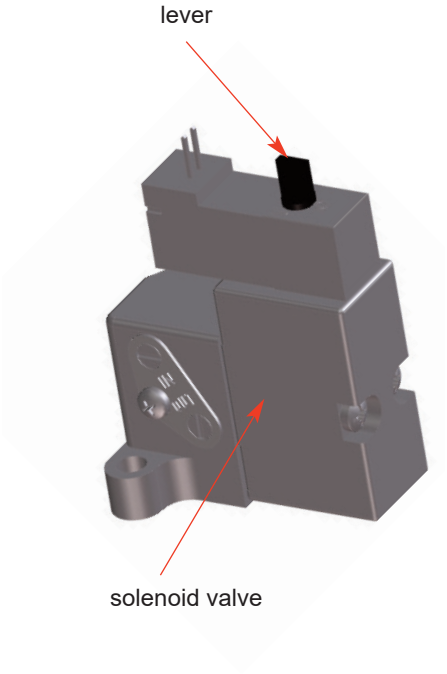
See to a professional execution and installation of the AS-interface network.

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

8.1.3 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!

8.1.4 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:

   <u>Closed valve position feedback – sensor 3 controlled</u>

   <u>Open valve position feedback – sensor 2 controlled</u>

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

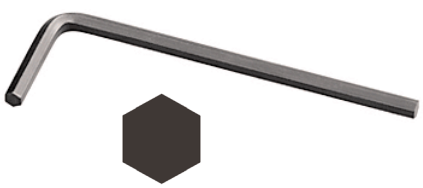
Loctite semi-solid

jaw wrench

torx wrench

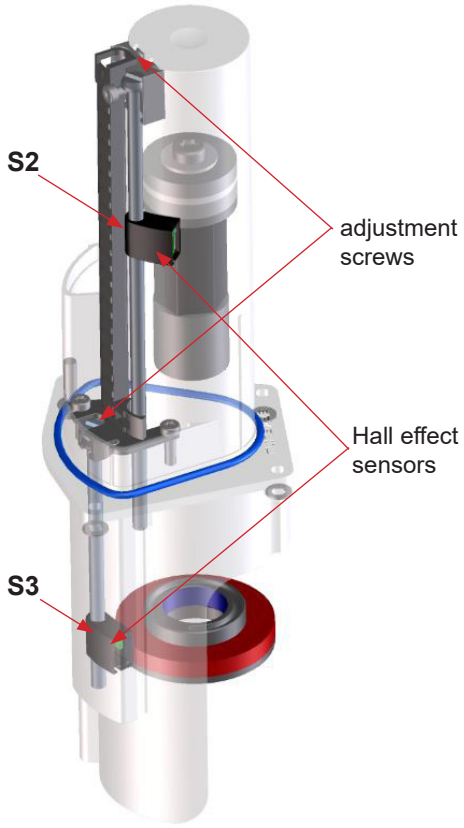
screwdriver

hexagon socket wrench



10. Service

Feedback unit for
SPX FLOW APV 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 cabeling 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 cabeling to the electronic module.
LED indication is missing	Check AS-i bus communication.
	Check cabeling 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 D4 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-D4-AS-interface**
	Check valve movement with lever at solenoid valve.
	Check cabeling between electronic module and solenoid valve.
	Check compressed air (min. 5 bar).
	Check control air connection between the CU41 and the valve actuator.

11. Trouble Shooting

Failure	Remedy
Control Unit CU43 installed on D4 SL 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 cabeling between electronic module and solenoid valve.
	Check compressed air (min. 5 bar).
	Check control air connection between the CU43 and the D4 / D4 SL actuator.

12. IECEx / CCC Certificate of Conformity

Please see attachment.

13. 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.

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx TUN 22.0020X**	Page 1 of 3	Certificate history:
Status:	**Current**	Issue No: 0	
Date of Issue:	2023-09-11		
Applicant:	**SPX Flow Technology Germany GmbH** Gottlieb-Daimler-Str. 13 59439 Holzwickede **Germany**		
Equipment:	**Control unit resp. Double seat valve resp. Assembly**		
Optional accessory:	Control unit type CU4** resp. CU4*plus* resp. Double seat valve type D4* resp. Assembly type D4*-CU4**/CU4*plus* 3G		
Type of Protection:	**Equipment protection by increased safety “ec”; Non-electrical equipment for explosive atmospheres**		
Marking:	Control unit type CU4** resp. CU4*plus*: **Ex ec IIB T4 Gc** Double seat valve type D4*: **Ex h IIB T6…T4 Gb** Assembly type D4*-CU4** / D4*-CU4*plus*3G: **Ex ec h IIB T4 Gc**		

Approved for issue on behalf of the IECEx Certification Body: **Thomas Heinen**

Position: **Deputy Head of the IECEx Certification Body**

Signature:
(for printed version)

Date:
(for printed version)

TÜVNORD Digital unterschrieben von Heinen Thomas Datum: 2023.09.11 12:48:33 +02'00'

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2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

TÜV NORD CERT GmbH
Hanover Office
Am TÜV 1, 30519 Hannover
Germany

TÜV NORD

IECEx Certificate of Conformity

Manufacturer: **SPX Flow Technology Germany GmbH**
Gottlieb-Daimler-Str. 13
59439 Holzwickede
Germany

Manufacturing locations:

SPX Flow Technology Germany GmbH
Gottlieb-Daimler-Str. 13
59439 Holzwickede
Germany

SPX Flow Technology Poland Sp. z o.o.
Rolbieskiego 2
Bydgoszcz 85-862
Poland

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements.This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :
The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Edition:7.0	Explosive atmospheres - Part 0: Equipment - General requirements
IEC 60079-7:2017 Edition:5.1	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
ISO 80079-36:2016 Edition:1.0	Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic methods and requirements
ISO 80079-37:2016 Edition:1.0	Explosive atmospheres - Part 37: Non-electrical equipment for explosive atmospheres - Non electrical type of protection constructional safety "c", control of ignition source "b", liquid immersion "k"

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:
A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

DE/TUN/ExTR22.0018/00

Quality Assessment Report:

DE/TUN/QAR18.0002/02

IECEx Certificate of Conformity

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

Description:

The control unit type CU4** resp. CU4*plus* is provided for controlling process valves in hazardous areas, it used as an interface between the process control and the process valve and operates the electrical and pneumatic signals.

The double seat valve type D4* used to process two different fluids efficiently through the valve simultaneously.

The assembly type D4*-CU4**/CU4*plus*3G is consisted of the electrical control unit CU4** resp. CU4*plus* and the non-electrical double seat valve type D4*.

Type code, electrical and thermal data:

See attachment to IECEx TUN 22.0020X issue No.0

SPECIFIC CONDITIONS OF USE: YES as shown below:
1. For the control unit type CU4** resp. CU4*plus* the permissible ambient temperature range during operation is 0 °C ≤ Ta ≤ +55°C

For the double seat valve type D4* the permissible ambient temperature range depending on the temperature class is the medium or cleaning solution's temperature and is to be taken from the operating instructions.

For the assembly type D4*-CU4** / D4*-CU4*plus* 3G the permissible ambient temperature range during operation at the control unit type CU4** resp. CU4*plus* is 0 °C ≤ Ta ≤ 55 °C and on the double seat valve type D4* is 0 °C ≤ Ta ≤ +130 °C

2. Metallic process connection parts of the double seat valve type D4* have to be included in the local potential equalization.

3. The control unit CU4** resp. CU4*plus* and the plastic base of the double seat valve type D4* have to be installed and used in such a way, that electrostatic charging from operation, maintenance and cleaning is excluded.

4. The base of the control unit CU4** resp. CU4*plus* has to be installed in such a way that it is protected from UV-radiation.

5. The connecting and disconnecting of the pluggable electrical circuits inclusive the field wirings is only permitted if no explosive atmosphere exists

6. The control unit type CU4** resp. CU4*plus* has to be erected in such a way that a pollution degree 2 or better, according to IEC 60664-1, is achieved.

7. Measures have to be taken, external to the control unit type CU4** resp. CU4*plus*, to provide a transient protection that ensures that the rated voltage, connected to the power supply terminals, is not exceeded by more than 40%

8. To prevent the breaking of the springs, the actuator has to be replaced after 250,000 cycles.

Annex:

Attachment to IECEx TUN 22.0020X issue No.0.pdf

TÜV NORD CERT GmbH
Hannover Office
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30519 Hannover
Germany

General product information:
Description:
The control unit type CU4** resp. CU4*plus* is provided for controlling process valves in hazardous areas, it used as an interface between the process control and the process valve and operates the electrical and pneumatic signals.
The double seat valve type D4* used to process two different fluids efficiently through the valve simultaneously.
The assembly type D4*-CU4**/CU4*plus*3G is consisted of the electrical control unit CU4** resp. CU4*plus* and the non-electrical double seat valve type D4*.

Type code:

Control unit type CU4* *	
	AS-interface 24V Direct Connect
	1: 1 solenoid 1N: 1 solenoid, 1NOT element 3: 3 solenoids

Control unit type CU4* plus*	
	AS-interface 24V Direct Connect 24V IO-Link
	1: 1 solenoid 1N: 1 solenoid, 1NOT element 3: 3 solenoids

Double seat valve type D4*	
	NSL: Non Seat Lift SL: Seat Lift

Marking:

Control unit type CU4** resp. CU4*plus*	**Ex ec IIB T4 Gc**
Double seat valve type D4*	**Ex h IIB T6…T4 Gb**
Assembly type D4*-CU4** / D4*-CU4*plus*3G	**Ex ec h IIB T4 Gc**

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30519 Hannover
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Electrical data:

For the control unit type CU4* plus AS-interface

Internal / External	Terminal	Designation	Functional description
External	1	AS-i +	Connection AS-i network (26.5 V…31.6 V d.c.)
External	2	AS-i -	Connection AS-i network (GND)
Internal	3	Z +	Bridge Z+ / PELV E+ (in case of energy supply for solenoid valves via AS-i bus)
Internal	4	Z -	Bridge Z- / PELV E - (in case of energy supply for solenoid valves via AS-i bus)
Internal	5	PELV E+	Separate auxiliary energy PELV 24VDC + (for EMERGENCY STOP function, only)
Internal	6	PELV E-	Separate auxiliary energy PELV 24VDC - (for EMERGENCY STOP function, only)
Internal	7	5 VDC	Voltage supply for proximity switches
Internal	8	Sensor 3	Signal sensor 3 (evaluation of logic table for appropriate valve type) for the control unit type CU4* AS-interface V1 resp. CU4* AS-interface V1 plus
		No sensor	For the control unit type CU4* AS-interface V2 resp. CU4* plus AS-interface V2
Internal	9	GND	Mass potential for sensor voltage supply
Internal	10	5 VDC	Voltage supply for proximity switches
Internal	11	Sensor 4	Signal sensor 4 (evaluation of logic table for appropriate valve type)
Internal	12	GND	Mass potential for sensor voltage supply
Internal	Linear sensor		Linear sensor for valve position detection (for suitable SPX FLOW sensor, only!)
Internal	Y1	--	Solenoid valve 1 (main valve)
Internal	Y2	--	Solenoid valve 2 (upper seat lift)
Internal	Y3	--	Solenoid valve 3 (lower seat lift)
Internal	P	--	Optional connection - pressure sensor
External	Service port	--	Connection serial/USB converter for CU4plus toolbox software

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For the control unit type CU4* plus 24V Direct Connect:

Internal / External	Terminal	Designation	Functional description
External	1	Power+	Power supply 24V d.c. ± 20%
External	2	Power-	Power supply 24V d.c. (GND)
Internal	3	O0 Digital Output	PLC input valve status / closed
Internal	4	O1 Digital Output	PLC input valve status / open
Internal	5	O2 Digital Output	PLC input valve status / upper seat lift
Internal	6	O3 Digital Output	PLC input valve status / lower seat lift
Internal	7	SV Digital Output	PLC input service request
Internal	8	I0 Digital Input	PLC output to activate solenoid 1 / main valve
Internal	9	I1 Digital Input	PLC output to activate solenoid 2 / upper seat lift
Internal	10	I2 Digital Input	PLC output to activate solenoid 3 / lower seat lift
Internal	11	+5VDC	Supply voltage for SPX prox. sensor / linear sensor
Internal	12	S	Signal SPX prox. sensor
Internal	13	0V	Potential for SPX prox. sensor / linear sensor
Internal	Linear sensor	Linear sensor	--
Internal	Y1	PWM Output	Solenoid valve 1 (main valve)
Internal	Y2	PWM Output	Solenoid valve 2 (upper seat lift)
Internal	Y3	PWM Output	Solenoid valve 3 (lower seat lift)
External	Service port	--	Connection serial/USB converter for CU4plus toolbox software

For the control unit type CU4*plus 24V IO-Link:

Internal / External	Terminal	Designation	Functional description
External	1	Power+	Operating voltage + (18 V…30 V d.c.)
External	2	Power-	Operating voltage – or Ground
Internal	3	C /Q	IO-Link Signal
Internal	4…10	--	Not in use
Internal	11	5 VDC	Voltage supply for valve sensor or extension module
Internal	12	Sensor 2	Sensor 2 connection or extension module
Internal	13	GND	Mass potential for sensor supply or extension module
Internal	JST	Sensor 1	Linear Sensor 1
Internal	14	Sensor 2	Sensor Signal 2
Internal	15	GND	Mass potential for sensor supply
Internal	Y1	PWM Output	Solenoid valve 1 (main valve)
Internal	Y2	PWM Output	Solenoid valve 2 (upper seat lift)
Internal	Y3	PWM Output	Solenoid valve 3 (lower seat lift)
External	Service port	--	Connection serial/USB converter for CU4plus toolbox software
Internal	P	Pressure sensor	Pressure measurement of main actuator

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For the control unit type CU4*24V Direct Connect:

Internal / External	Terminal	Designation	Functional description
External	1	Power+	Power supply 24V d.c. ± 20%
External	2	Power-	Power supply 24V d.c. (GND)
External	3	O0 Digital Output	PLC input valve status / closed
External	4	O1 Digital Output	PLC input valve status / open
External	5	SV Digital Output	Common
External	6	DI0 Digital Input	PLC output to activate solenoid 1 / main valve
External	7	DI1 Digital Input	PLC output to activate solenoid 2 / upper seat lift
External	8	DI2 Digital Input	PLC output to activate solenoid 3 / lower seat lift
External	9	DI common	Common signal
Internal	10	+5VDC	Supply voltage for SPX prox. sensor / linear sensor
Internal	11	Signal	Signal SPX prox. sensor
Internal	12	GND	Potential for SPX prox. sensor / linear sensor
Internal	13	+5VDC	Supply voltage for SPX prox. sensor / linear sensor
Internal	14	Signal	Signal SPX prox. sensor
Internal	15	GND	Potential for SPX prox. sensor / linear sensor

For the control unit type CU4*AS-interface:

Internal / External	Terminal	Designation	Functional description
External	1	AS-i +	Connection AS-i network (26.5 V…31.6 V d.c.)
External	2	AS-i -	Connection AS-i network (GND)
Internal	3	5 VDC	Voltage supply for proximity switches
Internal	4	Sensor 1	Signal sensor 1 (closed valve position)
Internal	5	GND	Common potential
Internal	6	5 VDC	Voltage supply for proximity switches
Internal	7	Sensor 2	Signal sensor 2 (open valve position)
Internal	8	GND	Common potential
Internal	10	Normal	Bridge for feedback signal
Internal	11	Feedback	Bridge for feedback signal
Internal	12	Reverse	Bridge for feedback signal

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Germany

Thermal data:

Control unit type CU4** resp. CU4*plus*:

Permissible ambient temperature range during operation: 0 °C ≤ Ta ≤ +55 °C

Double seat valve type D4*:

The permissible ambient temperature range as process temperature (medium or cleaning solutions temperature) depending on the temperature class is shown in the following table:

Temperature of the medium or cleaning solution	Temperature class
0°C…80°C	T6
0°C…95°C	T5
0°C…130°C	T4

Assembly type D4*-CU4** / D4*-CU4*plus* 3G consisted of the control unit CU4** resp. CU4*plus* and the valve type D4*:

Control unit type CU4** resp. CU4*plus*:

Permissible ambient temperature range during operation: 0 °C ≤ Ta ≤ +55 °C

Double seat valve type D4*:

The permissible ambient temperature range as process temperature (medium or cleaning solutions temperature) is 0 °C ≤ Ta ≤ +130 °C

The reverse heat flow from the process beyond the permissible ambient temperature of the control unit CU4** resp. CU4*plus* is not possible by construction.

Specific Conditions of Use

1. For the control unit type CU4** resp. CU4*plus* the permissible ambient temperature range during operation is 0 °C ≤ Ta ≤ +55 °C

   For the double seat valve type D4* the permissible ambient temperature range depending on the temperature class is the medium or cleaning solution's temperature and is to be taken from the operating instructions.

   For the assembly type D4*-CU4** / D4*-CU4*plus* 3G the permissible ambient temperature range during operation at the control unit type CU4** resp. CU4*plus* is 0 °C ≤ Ta ≤ 55 °C and on the double seat valve type D4* is 0 °C ≤ Ta ≤ +130 °C
2. Metallic process connection parts of the double seat valve type D4* have to be included in the local potential equalization.
3. The control unit CU4** resp. CU4*plus* and the plastic base of the double seat valve type D4* have to be installed and used in such a way, that electrostatic charging from operation, maintenance and cleaning is excluded.
4. The base of the control unit CU4** resp. CU4*plus* has to be installed in such a way that it is protected from UV-radiation.
5. The connecting and disconnecting of the pluggable electrical circuits inclusive the field wirings is only permitted if no explosive atmosphere exists.
6. The control unit type CU4** resp. CU4*plus* has to be erected in such a way that a pollution degree 2 or better, according to IEC 60664-1, is achieved.
7. Measures have to be taken, external to the control unit type CU4** resp. CU4*plus*, to provide a transient protection that ensures that the rated voltage, connected to the power supply terminals, is not exceeded by more than 40 %.
8. To prevent the breaking of the springs, the actuator has to be replaced after 250,000 cycles.

CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

No.: 2023312304001783

Applicant	SPX(Shanghai) Flow Technology Company Limited
Address	No.666, Fengjin Road, Xidu Industry park, Fengxian District, Shanghai China
Manufacturer	SPX Flow Technology Poland Sp. z o.o.
Address	Stanisława Rolbieskiego 2, Bydgoszcz 85-862, Poland
Production Factory	SPX Flow Technology Poland Sp. z o.o.
Production Address	Stanisława Rolbieskiego 2, Bydgoszcz 85-862, Poland
Product	Control unit
Model/Type	CU4** , CU4*plus*
Ex marking	Ex ec IIB T4 Gc
Reference Standards	GB/T 3836.1-2021, GB/T 3836.3-2021

Certification mode Type Test + Initial Factory Inspection + Post-Certification Surveillance

The product(s) is verified and certified according to CNCA-C23-01: 2019 *China Compulsory Certification Implementation Rule on Explosion Protected Electrical Product* and CNEX-C2301-2019 *Guideline of China Compulsory Certification Implementation Rule on Explosion Protected Electrical Product.*

See Annex for the detailed product information (8 pages)

Initial issue date: 2023-10-27

Issued date: 2023-10-27 Valid to: 2028-10-26

The validity of this certificate is maintained through the regular supervision of the issuing authority during the validity period.

Where any discrepancy arises between the English translation and the original Chinese version, the Chinese version shall prevail.

Director:

Nanyang Explosion Protected Electrical Apparatus Research Institute Co.,Ltd.

CNAS 中国认可 产品 PRODUCT CNAS C208-P

http://www.ccc-cnex.com ccc.china-ex.com
Add: No. 20, North Zhongjing Road, Nanyang, Henan, P. R. China P.C.: 473008
Tel: 0377-63239734 Email: ccc@cn-ex.com

CN0000078DZ

CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

(Annex)

No.: 2023312304001783

Product information:

1. This certificate covers the following models:

- CU4** , CU4*plus*

Nomenclature:

1) CU4**

CU4	*	*
	a	b

a:
1: 1 solenoid
2: 1 solenoid, 1NOT element
3: 3 solenoids

b:
AS-interface
24V Direct Connect

2) CU4*plus*

CU4	*	plus	*
	a		b

a:
1: 1 solenoid
2: 1 solenoid, 1NOT element
3: 3 solenoids

b:
AS-interface
24V Direct Connect
24V IO-Link

Electrical data:

Issued date: 2023-10-27

Director:

Nanyang Explosion Protected Electrical Apparatus Research Institute Co.,Ltd.

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CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

(Annex)

No.: 2023312304001783

Control unit type CU4*AS-interface

Internal / External	Terminal	Designation	Functional description
External	1	AS-i +	Connection AS-i network (26.5 V…31.6 V d.c.)
External	2	AS-i -	Connection AS-i network (GND)
Internal	3	5 VDC	Voltage supply for proximity switches
Internal	4	Sensor 1	Signal sensor 1 (closed valve position)
Internal	5	GND	Common potenzial
Internal	6	5 VDC	Voltage supply for proximity switches
Internal	7	Sensor 2	Signal sensor 2 (open valve position)
Internal	8	GND	Common potenzial
Internal	10	Normal	Bridge for feedback signal
Internal	11	Feedback	Bridge for feedback signal
Internal	12	Reverse	Bridge for feedback signal

Control unit type CU4*24V Direct Connect:

Internal / External	Terminal	Designation	Functional description
External	1	Power+	Power supply 24V d.c. ± 20%
External	2	Power-	Power supply 24V d.c. (GND)
External	3	O0 Digital Output	PLC input valve status / closed
External	4	O1 Digital Output	PLC input valve status / open

Issued date: 2023-10-27

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CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

(Annex)

No.: 2023312304001783

External	5	SV Digital Output	Common
External	6	DI0 Digital Input	PLC output to activate solenoid 1 / main valve
External	7	DI1 Digital Input	PLC output to activate solenoid 2 / upper seat lift
External	8	DI2 Digital Input	PLC output to activate solenoid 3 / lower seat lift
External	9	DI common	Common signal
Internal	10	+5VDC	Supply voltage for SPX prox. sensor / linear sensor
Internal	11	Signal	Signal SPX prox. sensor
Internal	12	GND	Potential for SPX prox. sensor / linear sensor
Internal	13	+5VDC	Supply voltage for SPX prox. sensor / linear sensor
Internal	14	Signal	Signal SPX prox. sensor
Internal	15	GND	Potential for SPX prox. sensor / linear sensor

Control unit type CU4* plus AS-interface

Internal / External	Terminal	Designation	Functional description
External	1	AS-i +	Connection AS-i network (26.5 V…31.6 V d.c.)
External	2	AS-i -	Connection AS-i network (GND)

Issued date: 2023-10-27

Director:

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CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

(Annex)

No.: 2023312304001783

Internal	3	Z +	Bridge Z+ / PELV E+ (in case of energy supply for solenoid valves via AS-i bus)
Internal	4	Z -	Bridge Z- / PELV E - (in case of energy supply for solenoid valves via AS-i bus)
Internal	5	PELV E+	Separate auxiliary energy PELV 24VDC + (for EMERGENCY STOP function, only)
Internal	6	PELV E-	Separate auxiliary energy PELV 24VDC - (for EMERGENCY STOP function, only)
Internal	7	5 VDC	Voltage supply for proximity switches
Internal	8	Sensor 3	Signal sensor 3 (evaluation of logic table for appropriate valve type) for the control unit type CU4* AS-interface V1 resp. CU4* AS-interface V1 plus
		No sensor	For the control unit type CU4* AS-interface V2 resp. CU4* plus AS-interface V2
Internal	9	GND	Mass potential for sensor voltage supply
Internal	10	5 VDC	Voltage supply for proximity switches
Internal	11	Sensor 4	Signal sensor 4 (evaluation of logic table for appropriate valve type)
Internal	12	GND	Mass potential for sensor voltage supply
Internal	Linear sensor	Linear sensor	Linear sensor for valve position detection (for suitable SPX FLOW sensor, only!)
Internal	Y1	--	Solenoid valve 1 (main valve)
Internal	Y2	--	Solenoid valve 2 (upper seat lift)

Issued date: 2023-10-27

Director:

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CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

(Annex)

No.: 2023312304001783

Internal	Y3	--	Solenoid valve 3 (lower seat lift)
Internal	P	--	Optional connection - pressure sensor
External	Service port	--	Connection serial/USB converter for CU4plus toolbox software

Control unit type CU4* plus 24V Direct Connect

Internal / External	Terminal	Designation	Functional description
External	1	Power+	Power supply 24V d.c. ± 20%
External	2	Power-	Power supply 24V d.c. (GND)
Internal	3	O0 Digital Output	PLC input valve status / closed
Internal	4	O1 Digital Output	PLC input valve status / open
Internal	5	O2 Digital Output	PLC input valve status / upper seat lift
Internal	6	O3 Digital Output	PLC input valve status / lower seat lift
Internal	7	SV Digital Output	PLC input service request
Internal	8	I0 Digital Input	PLC output to activate solenoid 1 / main valve
Internal	9	I1 Digital Input	PLC output to activate solenoid 2 / upper seat lift
Internal	10	I2 Digital Input	PLC output to activate solenoid I2 / lower seat lift
Internal	11	+5VDC	Supply voltage for SPX prox. sensor / linear sensor

Issued date: 2023-10-27

Director:

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CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

(Annex)

No.: 2023312304001783

Internal	12	S	Signal SPX prox. sensor
Internal	13	0V	Potential for SPX prox. sensor / linear sensor
Internal	Linear sensor	--	--
Internal	Y1	PWM Output	Solenoid valve 1 (main valve)
Internal	Y2	PWM Output	Solenoid valve 2 (upper seat lift)
Internal	Y3	PWM Output	Solenoid valve 3 (lower seat lift)
External	Service port	--	Connection serial/USB converter for CU4plus toolbox software

Control unit type CU4*plus 24V IO-Link

Internal / External	**Terminal**	**Designation**	**Functional description**
External	1	Power+	Operating voltage + (18 V…30 V d.c.)
External	2	Power-	Operating voltage – or Ground
Internal	3	C /Q	IO-Link Signal
Internal	4…10	--	Not in use
Internal	11	5 VDC	Voltage supply for valve sensor or extension module
Internal	12	Sensor 2	Sensor 2 connection or extension module
Internal	13	GND	Mass potential for sensor supply or extension module

Issued date: 2023-10-27

Director:

Nanyang Explosion Protected Electrical Apparatus Research Institute Co.,Ltd.

CNEX CCC

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CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

(Annex)

No.: 2023312304001783

Internal	JST	Sensor 1	Linear Sensor 1
Internal	14	Sensor 2	Sensor Signal 2
Internal	15	GND	Mass potential for sensor supply
Internal	Y1	PWM Output	Solenoid valve 1 (main valve)
Internal	Y2	PWM Output	Solenoid valve 2 (upper seat lift)
Internal	Y3	PWM Output	Solenoid valve 3 (lower seat lift)
External	Service port	--	Connection serial/USB converter for CU4plus toolbox software
Internal	P	Pressure sensor	Pressure measurement of main actuator

Ex marking: Ex ec IIB T4 Gc

- Producers should organize production in accordance with the technical documents approved by the certification body.

2. Specific conditions of safety use:

- Ambient temperature range: 0℃~+55℃.

- The control unit CU4** resp. CU4*plus* have to be installed and used in such a way, that electrostatic charging from operation, maintenance and cleaning is excluded.

- The base of the control unit CU4** resp. CU4*plus* has to be installed in such a way that it is protected from UV-radiation.

- The connecting and disconnecting of the pluggable electrical circuits inclusive the field wirings is only permitted if no explosive atmosphere exists.

- The control unit type CU4** resp. CU4*plus* has to be erected in such a way that a pollution degree 2 or better, according to GB/T 16935.1, is achieved.

Issued date: 2023-10-27

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CERTIFICATE FOR CHINA COMPULSORY PRODUCT CERTIFICATION

(Annex)

No.: 2023312304001783

- Measures have to be taken, external to the control unit type CU4** resp. CU4*plus*, to provide a transient protection that ensures that the rated voltage, connected to the power supply terminals, is not exceeded by more than 40%.

- See instruction for other information.

3. Certificate related report(s):

   - Type test report: CQST2309C003

   - Factory inspection report: CN2023Q010528

4. Certificate change information: None

Issued date: 2023-10-27

Director:

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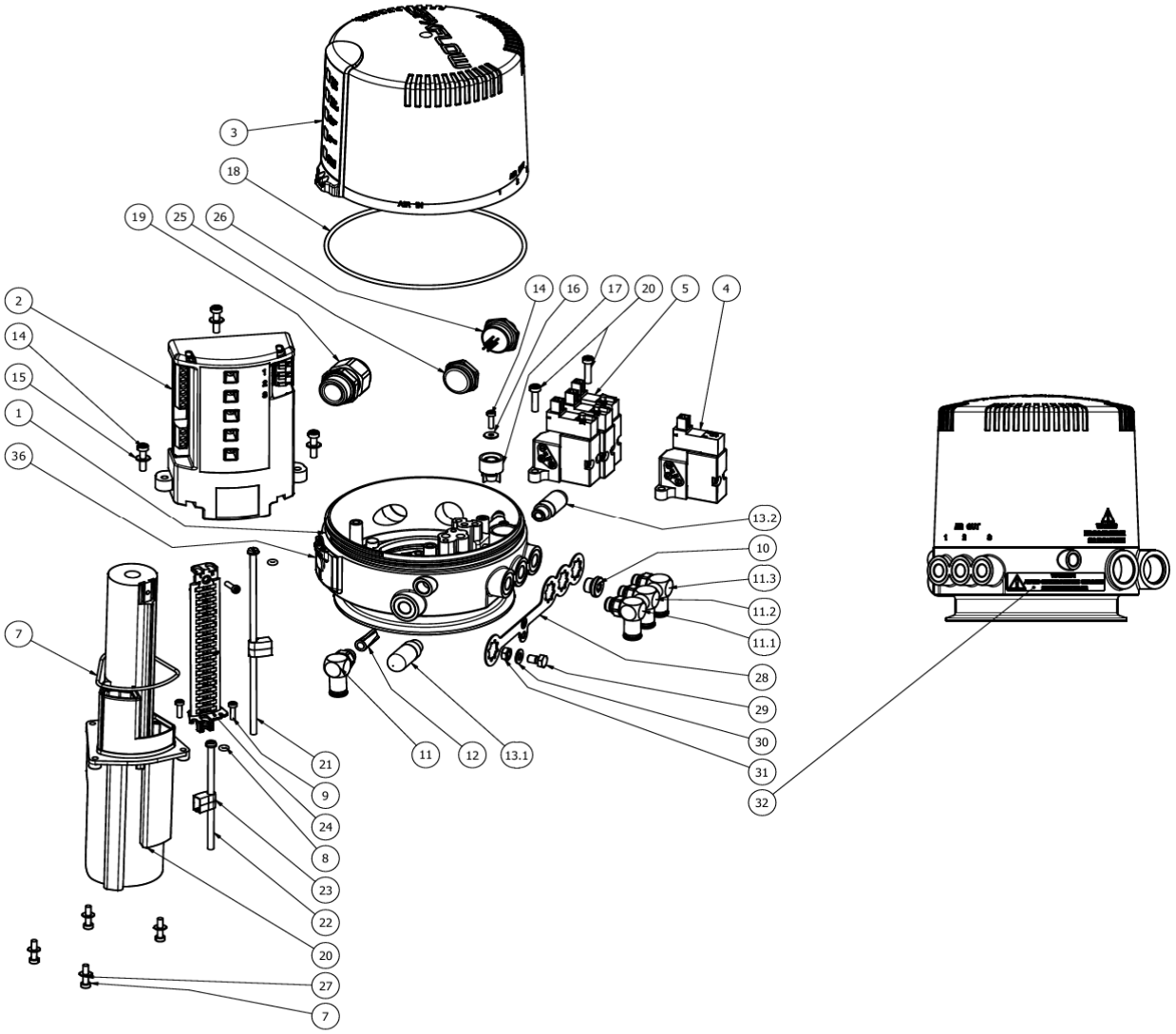
Email: ccc@cn-ex.com

Spare Parts list

CU4 D4 AS-i
II 3 G Ex ec IIB T4 Gc
IECEx - Zone 2

Date:	21.06.23				SPX FLOW
Name:	C.Keil				
Reviewed:	N.Spl				
Date:					Page 1 of 2
Name:					RN ATEX 01.044-5
Reviewed:					



Spare parts list

CU4 D4 AS-i ext.
II 3 G Ex ec IIB T4 Gc
IECEx - Zone 2

Date:	21.06.23				SPX FLOW
Name:	C.Keil				
Reviewed:	N.Spl				
Date:					Page 2 of 2
Name:					RN ATEX 01.044-5
Reviewed:					

pos. item	Quantity	Description	required in version	Material	Part no.
		CU41 D4 AS-i ext. IECEx Z2		PA6.6 GF30	H345113
		CU41 D4 AS-i ext. IECEx Z2 M12		PA6.6 GF30	H345112
		CU43 D4 AS-i ext. IECEx Z2		PA6.6 GF30	H345108
		CU43 D4 AS-i ext. IECEx Z2 M12		PA6.6 GF30	H345109
1	1	CU41 Ex Base M cpl.	CU41	PA6.6 GF30 +PA12	H344231
1	1	CU43 Ex Base M cpl.	CU43	PA6.6 GF30 +PA12	H344232
2	1	CU41 E-module AS-i ext.	CU41	Zytel 70G33L black	H320388
2	1	CU43 E-module AS-i ext.	CU43	Zytel 70G33L black	H320389
3	1	CU4 cover translucent	CU41+43	Lexan 945AU	H337948
4	1	Solenoid valve 1 sol.	CU41	PPS	H319950
5	1	Solenoid valve 3 sol.	CU43	PPS	H319952
6	1	O-ring 45,6 x 2,4	CU41+43	NBR	H320401
7	4	Ejot Delta PT screw WN5452 35x14	CU41+43	A2	H320364
8	2	O-ring 3x2	CU41+43	NBR	H208644
9	4	Ejot Delta PT screw WN5452 30x10	CU41+43	A2	H320363
10	1	Blind plug G1/8"	CU41	Ms / nickel-plated	H347957
11	1	Elbow connector G1/8" 6x1	CU41+43	1.4301 / PA	H208825
11.1	1	Elbow connector G1/8" 6x1	CU41+43	1.4301 / PA	H208825
11.2	1	Elbow connector G1/8" 6x1	CU43	1.4301 / PA	H208825
11.3	1	Elbow connector G1/8" 6x1	CU43	1.4301 / PA	H208825
12	1	CU4 air filter	CU41+43	PE-porous	H320223
13.1	1	Sound reducer	CU41+43	PE-porous	H347802
13.2	1	Sound reducer	CU43	PE-porous	H347802
14	5	Ejot Delta PT screw WN5452 40x16	CU41+43	A2	H320365
15	3	Washer ø4,3 DIN125	CU41+43	A2	H79576
16	1	Washer A 3,2 DIN9021	CU41+43	A2	H320404
17	1	CU4 pressure relief valve	CU41+43	PPS	H320352
18	1	O-ring 120,32 x 2,62	CU41+43	NBR	H320402
19	1	cable gand. M20x1,5 cable ø5-9	CU41+43	PA black	H344598
20	1	D4 sensor tower cmpl.	CU41+43	Grilamid TR55	H338146

pos. item	Quantity	Description	required in version	Material	Part no.
21	1	Cylinder head screw ISO 1207 M4x140	CU41+43	A2	H337011
22	1	Cylinder head screw ISO 1207 M4x80	CU41+43	A2	H336896
23	2	CU4 Hall sensor D4	CU41+43	Grilamid TR55	H337014
24	2	CU4 Hall sensor bracket D4	CU41+43	Grillamid TR90	H336041
25	1	Blind cap V-Ex M20 x 1,5	CU41+43	PA	H347803
26	1	Female Flange M12x1,5 - 4pin	CU41/43-M12	Ms / nickel-plated	H338108
27	4	Washer A=3,7	CU41+43	A2	H323771
28	1	CU4 equipotential bonding rail	CU41+43	1.4310	H347605
29	1	Hex. screw M5x8	CU41+43	A2	H339700
30	1	Washer I=5,3	CU41+43	A2	H79587
31	1	Hex. Nut M5	CU41+43	A2	H79276
32	1	ATEX CU4 label- Electrostatic risk	CU41+43		H345151

CU4 Adapter

	1	CU4 D4 adapter cpl.	all versions		H337098

Adapter spareparts information to be found in document: RN 01.044.3

Ersatzteilliste: spare parts list

CU4 Adapter

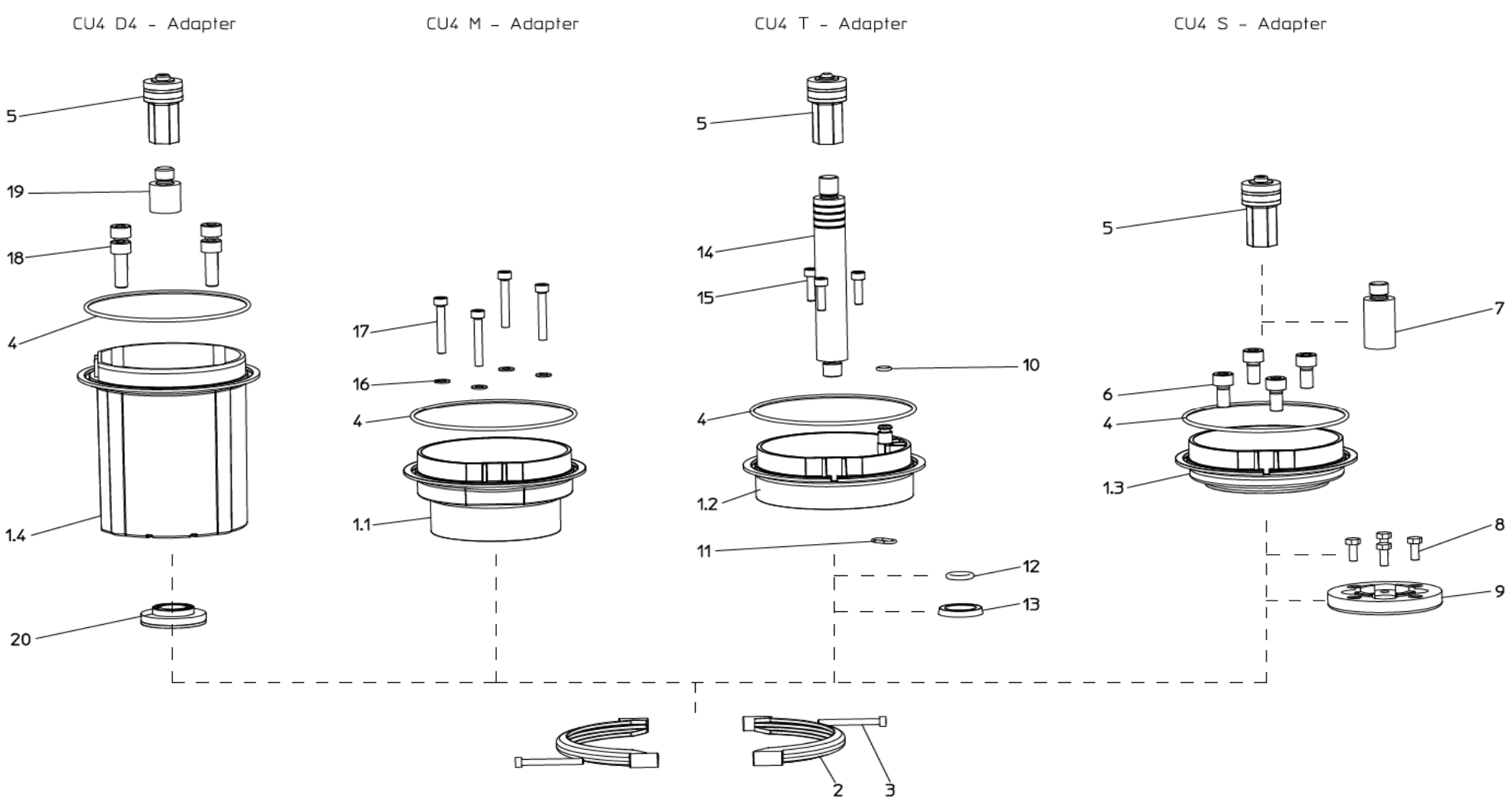
Datum:	11/08	01/09	03/09	11/10
Name:	Peters	Peters	Trytko	Schulz
Geprüft:	Spliethoff	Spliethoff	Peters	Spliethoff

Datum:	03/13	11/14	05/18	
Name:	Trytko	Trytko	C.Keil	
Geprüft:	Schulz		C.Keil	

SPX FLOW

Blatt 1 von 5

RN 01.044.3



Ersatzteilliste: spare parts list

CU4 Adapter

Datum:	11/08	01/09	03/09	11/10
Name:	Peters	Peters	Trytko	Schulz
Geprüft:	Spliethoff	Spliethoff	Peters	Spliethoff

Datum:	03/13	11/14	05/18	
Name:	Trytko	Trytko	C.Keil	
Geprüft:	Schulz		C.Keil	

SPX FLOW

RN 01.044.3

pos. item	Menge quantity	Beschreibung description	Material material	CU4 - S WS-Nr. ref.-no.	CU4 - S Langhub ø165 WS-Nr. ref.-no.	CU4 - Smini WS-Nr. ref.-no.	CU4 - Smax WS-Nr. ref.-no.	CU4 - T WS-Nr. ref.-no.	CU4 - Tmax WS-Nr. ref.-no.	CU4 - M WS-Nr. ref.-no.
		CU4 Adapter kpl. CU4 adapter cpl.		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	08-48-611/93 H321987	08-48-602/93 H320476
1.1	1	CU4 Adapter M CU4 adapter M	PA6.6 GF30							08-46-572/93 H319876
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
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
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
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	
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	
11	1	O-Ring 11x2 O-ring 11x2	NBR					58-06-034/83 H321897	58-06-034/83 H321897	
12	1	O-Ring 11x3 O-ring 11x3	NBR						58-06-039/83 H208632	

Ersatzteilliste: spare parts list

CU4 Adapter

Datum:	11/08	01/09	03/09	11/10
Name:	Peters	Peters	Trytko	Schulz
Geprüft:	Spliethoff	Spliethoff	Peters	Spliethoff

Datum:	03/13	11/14	05/18	
Name:	Trytko	Trytko	C.Keil	
Geprüft:	Schulz		C.Keil	

SPX FLOW

Blatt 3 von 5

RN 01.044.3

pos. item	Menge quantity	Beschreibung description	Material material	CU4 - S WS-Nr. ref.-no.	CU4 - S Langhub ø165 WS-Nr. ref.-no.	CU4 - Smini WS-Nr. ref.-no.	CU4 - Smax WS-Nr. ref.-no.	CU4 - T WS-Nr. ref.-no.	CU4 - Tmax WS-Nr. ref.-no.	CU4 - M WS-Nr. ref.-no.
13	1	V-Dichtung V-seal	NBR						28-32-010/83 H171060	
14	1	CU4 Schaltstange CU4 switch rod						08-60-905/93 H320480 - PA6	08-60-906/12 H321990 - 1.4301	
15	3	Zylinderschraube M5x16 Cyl. screw M5x16	A2-70					65-05-054/13 H79000	65-05-054/13 H79000	
16	4	Scheibe 9x5,48 Washer 9x5,48	A2							08-60-767/15 4 x H208842
17	4	Zyl. Schraube M5x35 Cyl. screw M5x35	A2-70							65-06-056/13 H79028
18	0	Zylinderschraube M8x25 Cyl. screw M8x25	A2-70	65-05-122/13 H79014						
19	0	D4 Zugstangen Adapter für CU4 D4 guide rod adapter for CU4	PA6.6	08-46-824/93 H336934						
20	0	D4 Magnet Hall sensor kpl. D4 magnet Hall sensor cpl.		08-46-820/93 H336927						

Ersatzteilliste: spare parts list

CU4 Adapter

Datum:	11/08	01/09	03/09	11/10
Name:	Peters	Peters	Trytko	Schulz
Geprüft:	Spliethoff	Spliethoff	Peters	Spliethoff

Datum:	03/13	11/14	05/18	
Name:	Trytko	Trytko	C.Keil	
Geprüft:	Schulz		C.Keil	

SPX FLOW

Blatt 4 von 5

RN 01.044.3

pos. item	Menge quantity	Beschreibung description	Material material	CU4 - D4 WS-Nr. ref.-no.						
		CU4 Adapter kpl. CU4 adapter cpl.		08-46-646-/93 H337098						
1.1	0	CU4 Adapter M CU4 adapter M	PA6.6 GF30							
1.2	0	CU4 Adapter T CU4 adapter T	PA6.6 GF30							
1.3	0	CU4 Adapter S CU4 adapter S	PA6.6 GF30							
1.4	1	CU4 Adapter D4 CU4 adapter D4	PA6.6 GF30	08-46-940/93 H336038						
2	2	CU4 Clamphalbschale kpl. CU4 clamp cpl.	Grivory GH-5H1	08-46-569/93 H319873						
3	2	Zylinderschraube M4x40 Cyl. screw M4x40	A2-70	65-05-040/13 H320360						
4	1	O-Ring 101,27x2,62 O-ring 101,27x2,62	NBR	58-06-493/83 H148389						
5	1	CU4 Magnetschaltnocke kpl. CU4 magnet operating cam cpl.	Zytel HTN	08-60-900/93 H320479						
6	0	Zyl. Schraube Cyl. screw	A2-70							
7	0	Zugstangenverlängerung Guide rod extension	PA6							
8	0	Skt. Schraube M5x12 Hex. screw M5x12	A2-70							
9	0	CU Adapter SW4 CU adapter SW4	PA6							
10	0	O-Ring 6x2 O-ring 6x2	NBR							
11	0	O-Ring 11x2 O-ring 11x2	NBR							
12	0	O-Ring 11x3 O-ring 11x3	NBR							

Ersatzteilliste: spare parts list

CU4 Adapter

Datum:	11/08	01/09	03/09	11/10
Name:	Peters	Peters	Trytko	Schulz
Geprüft:	Spliethoff	Spliethoff	Peters	Spliethoff

Datum:	03/13	11/14	05/18	
Name:	Trytko	Trytko	C.Keil	
Geprüft:	Schulz		C.Keil	

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RN 01.044.3

pos. item	Menge quantity	Beschreibung description	Material material	CU4 - D4 WS-Nr. ref.-no.						
13	0	V-Dichtung V-seal	NBR							
14	0	CU4 Schaltstange CU4 switch rod								
15	0	Zylinderschraube M5x16 Cyl. screw M5x16	A2-70							
16	0	Scheibe 9x5,48 Washer 9x5,48	A2							
17	0	Zyl. Schraube M5x35 Cyl. screw M5x35	A2-70							
18	4	Zylinderschraube M8x25 Cyl. screw M8x25	A2-70	65-05-122/13 H79014						
19	1	D4 Zugstangen Adapter für CU4 D4 guide rod adapter for CU4	PA6.6	08-46-824/93 H336934						
20	1	D4 Magnet Hall sensor kpl. D4 magnet Hall sensor cpl.		08-46-820/93 H336927						

APV CU4** AS-interface Control Unit

FOR IECEx ZONE 2 GAS APPLICATIONS

SPX FLOW

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SPX FLOW

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