SPXFLOW®

INSTRUCTION MANUAL

CU4plus IO-Link Control Unit

Control Unit

FORM NO.: H346251 REVISION: GB-3

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

SPXFLOW®

CE Declaration of Conformity
UKCA Declaration of Conformity

We,

DESIGN CENTER/MANUFACTURER: **SPX Flow Technology Germany GmbH**
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Crawley, RH10 9PY

declare under our sole responsibility that the

SPX FLOW APV brand Control Units of the series
CU4 Direct Connect and AS-interface Control Unit
CU4plus Direct Connect, AS-interface and IO-Link Control Units
CU4 110V Module (*)

meet the requirements of the
Electromagnetic Compatibility Directive 2014/30/EU
& protection class IP 67 EN 60529, EN 61000-6-2, EN 61000-6-4, EN 60068-2-6
RoHS Directive 2011/65/EU
Low Voltage Directive 2014/35/EU (*only applicable for APV CU4 110V Module)

Holzwickede, November 2022

ppa. B. Ariatabar

Dr.-Ing. Behdad Ariatabar, Design Center Lead - Valves

meet the requirements of the
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
Electrical Equipment (Safety) Regulations 2016 No. 1101 (*only applicable for APV CU4 110V Module)

Crawley, November 2022

Ewout Roozendaal, Director Global Pricing

Content Page

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/mass potential**
IP	**International Protection**
LED	**Light Emitting Diode**
N	**Pneumatic Air Connection NOT element**
NEMA	**National Electrical Manufacturers Association**
P	**Supply Air Connection**
PELV	**Protected Extra-Low Voltage**
PWM	**Pulse-width modulation**
Y	**Pneumatic Air Connection**
SDCI	**Digital Communication Interface Technology for Small Sensors and Actuators**
SLD	**Seat Lift Detection / Seat Lift Gathering**

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 CU4plus IO-Link control unit is only intended for use as described in chapter 3.1. Use beyond that described in chapter 3.1. do not comply with the regulations and SPX FLOW shall not be responsible for any damage resulting from this non-observance. The operator bears the full risk. Prerequisites for 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 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 should 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 electrical 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 installation 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.
- 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 specialized in electrics!

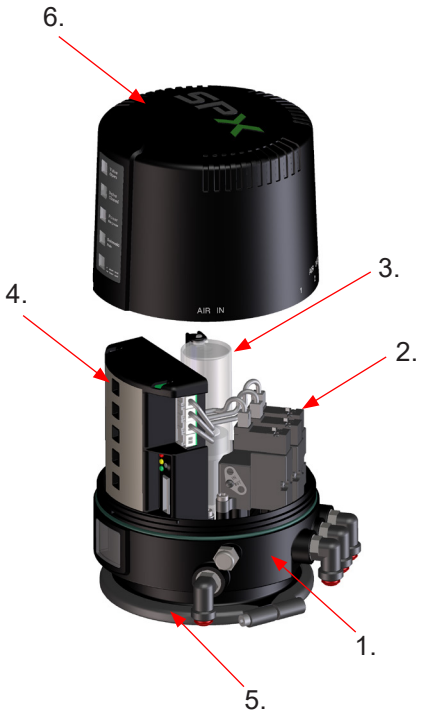
2.6. Warranty

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.

Note! This warranty only applies to the Control Unit. No liability will be accepted for consequential damage of any kind arising from failure or malfunction of the device.

3. General Terms

fig. 3.2.



3.1. Purpose of use

The control unit CU4plus IO-Link has been developed for the control of process valves in food processing industry as well as related industries.

The CU4plus IO-Link control unit operates as interface between process control and process valve and controls the electric and pneumatic signals.

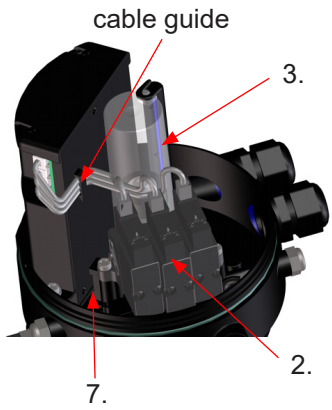
The pneumatic control of valves is undertaken via the solenoid valves. The control unit controls the valve positions, **open** and **closed**, via sensors. The electronic module undertakes the task to process the switching signal from the control and to control the corresponding solenoid valves. The electronic module also provides for potential-free contacts. The corresponding light signals in the control unit provide for an external indication of the valve positions.

3.2. Design of CU4plus IO-Link (fig. 3.2.)

The CU4plus IO-Link control unit consist 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.
- 1 solenoid valve with 1 logic NOT element for the control of the valve actuators.
3. Sensor module with integrated position measuring system for the detection of the valve position.
4. Electronic module for the electric supply, for the IO-Link communication with the PLC, evaluation of feedback signals, pressure sensor and control of solenoid valves as well as valve position indication through LED.
5. Clamp ring to fasten the CU4plus on the adapter.
6. Cover with optical window.
7. Pressure sensor to control the air pressure of the main actuator.

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. At 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. Observance of the required compressed air quality is imperative. Please also see **chapter 4.5** Technical Data.

The number of the solenoid valves installed in the CU4plus 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 equipped with 3 solenoid valves. For the manual actuation, the solenoid valves are provided with a safe handle 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 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. The CU4 IO-Link module described herein provides for the installation connected to an IO-Link Master.

Valve position detection is realized via linear sensors which are integrated in the sensor module.
The switching cam mounted on the actutor rod triggers the signals on the linear sensor. The measuring range of the linear sensor detects the complete valve stroke. By means of the Teach-in function, the corresponding position for closed and open valve position are detected and seat lift positions are permanently saved in the electronic module if required. (see **chapter 7.3** Teach-in function)

For DA3+ double seat valves with active seat lift detection (SLD) additionally to the linear sensor integrated in the CU, two external proximity switches installed at the valve actuator are required.
The corresponding signals of the linear sensor as well as external proximity switches are evaluated in an internal logic circuit and, thus, the corresponding valve position indications are generated. (see **chapter 6.7.** Data signals, PLC communication)

For the D4 valve generation, additionally to the linear sensor integrated in the control unit, an additional sensor is installed in the lower part of the sensor tower.

3. General Terms

3.3. Function of the individual components

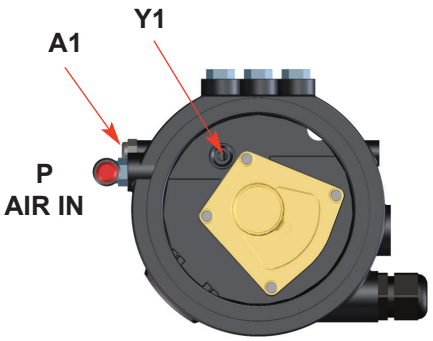
The luminous diodes are located on the front side of the electronic module. Their signals are visibly indicated to the outside by an optical window in the cover the control unit. Beside the open and closed valve position, the existence of the operating voltage as well as different diagnostic information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

The complete control unit has been designed on 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 or IO-Link.

Note! Wiring must be changed!

4. Mechanics and Pneumatics

4.1. Air connections for turning actuator

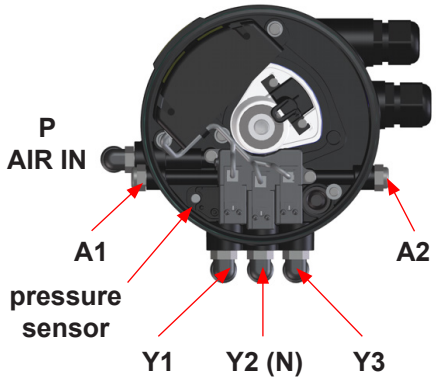


4.1.1. Function

CU41plus-T IO-Link
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 seat valves and double seat mix proof valves



4.2.1. Function

CU41plus-S IO-Link
design for seat valves

P air supply with integrated particle filter
Y1 pneumatic air connection for main actuator
pressure sensor to measure the air pressure of the main actuator
A1 exhaust air with silencer

CU41Nplus-S IO-Link
design for seat valves with NOT element

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

CU41plus-M IO-Link
design for DE3 double seat valves without seat lift function

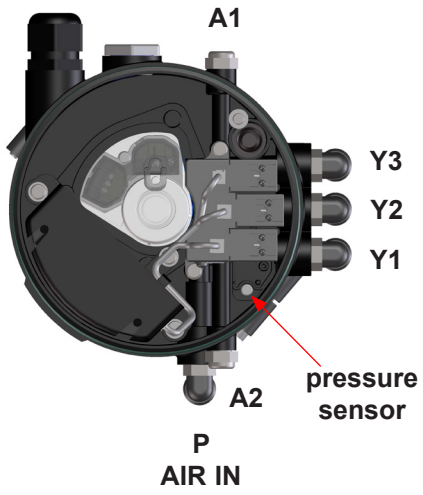
P air supply with integrated particle filter
Y1 pneumatic air connection for main actuator
pressure sensor to measure the air pressure of the main actuator
A1 exhaust air with silencer

CU43plus-M IO-Link
design for DA3+ double seat valves with seat lift function

P air supply with integrated particle filter
Y1 pneumatic air connection for main actuator
pressure sensor to measure the air pressure of the main actuator
Y2 pneumatic air connection for seat lift actuator of upper seat lifting
Y3 pneumatic air connection for seat lift actuator of lower seat lifting
A1/A2 exhaust air with silencer

4. Mechanics and Pneumatics

4.2.1. Function



CU41plus-D4-IO-Link
design for D4 double seat mix proof valves without seat lift function

P air supply with integrated particle filter
Y1 control air connection for main actuator
pressure sensor to measure the air pressure of the main actuator
A1 exhaust air, with exhaust silencer

CU43plus-D4-IO-Link
design for D4 SL, D4 PMO, DA4, DT4 SL double seat mix proof valves with seat lift function

P air supply with integrated particle filter
Y1 control air connection for main actuator
pressure sensor to measure the air pressure of the main actuator
Y2 pneumatic air connection for seat lift actuator of upper seat lifting
Y3 pneumatic air connection for seat lift actuator of lower seat lifting
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 valve vents into the clearance between the base and the adapter of the control unit.

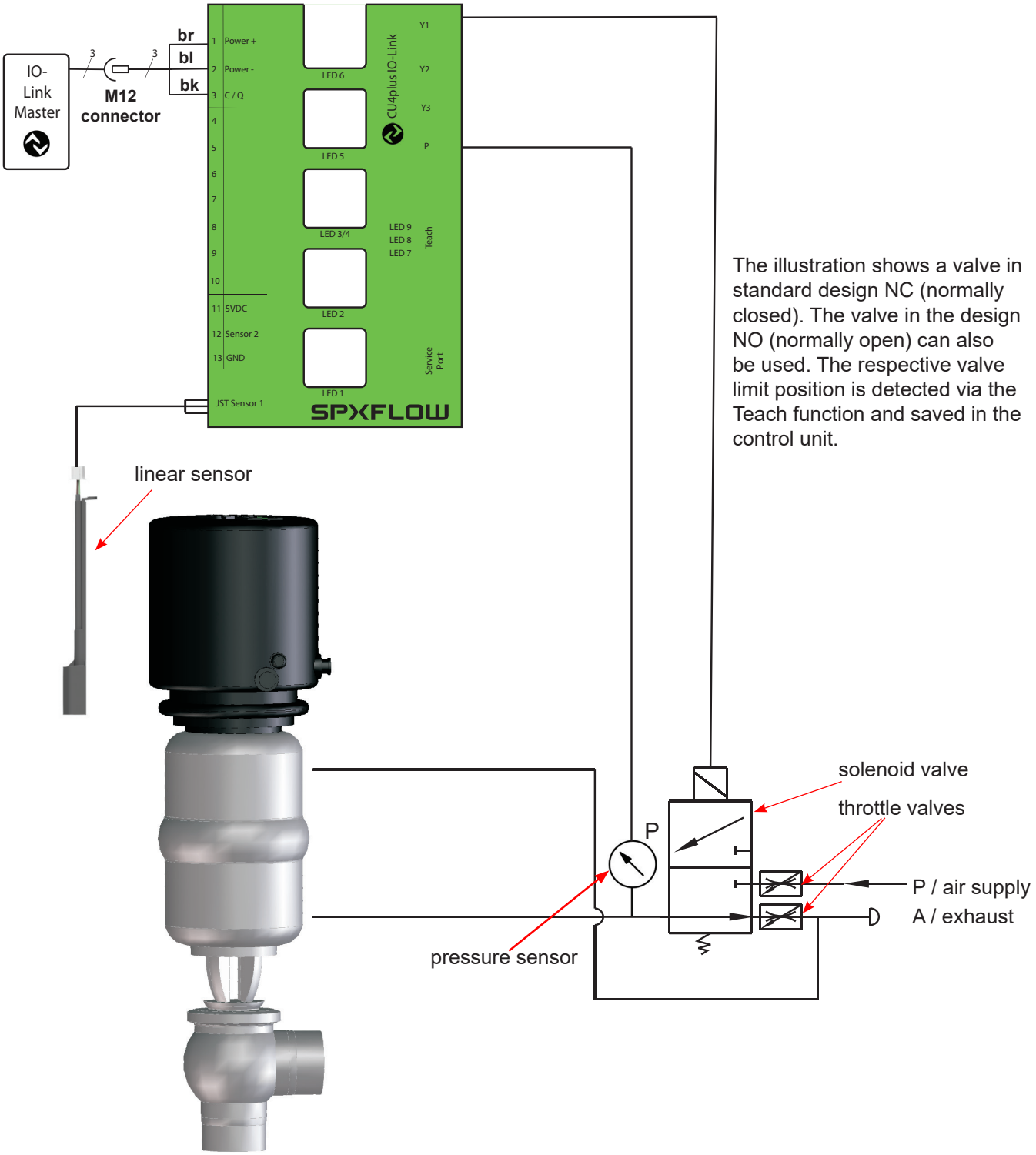
The pressure relief valve must not be mechanically blocked under any circumstances.

4. Mechanics and Pneumatics

4.4. Functional description - block diagrams

4.4.1. CU41plus IO-Link
(internal position measuring system)

Valve types: SW4, MS4, SV1, SVS1F



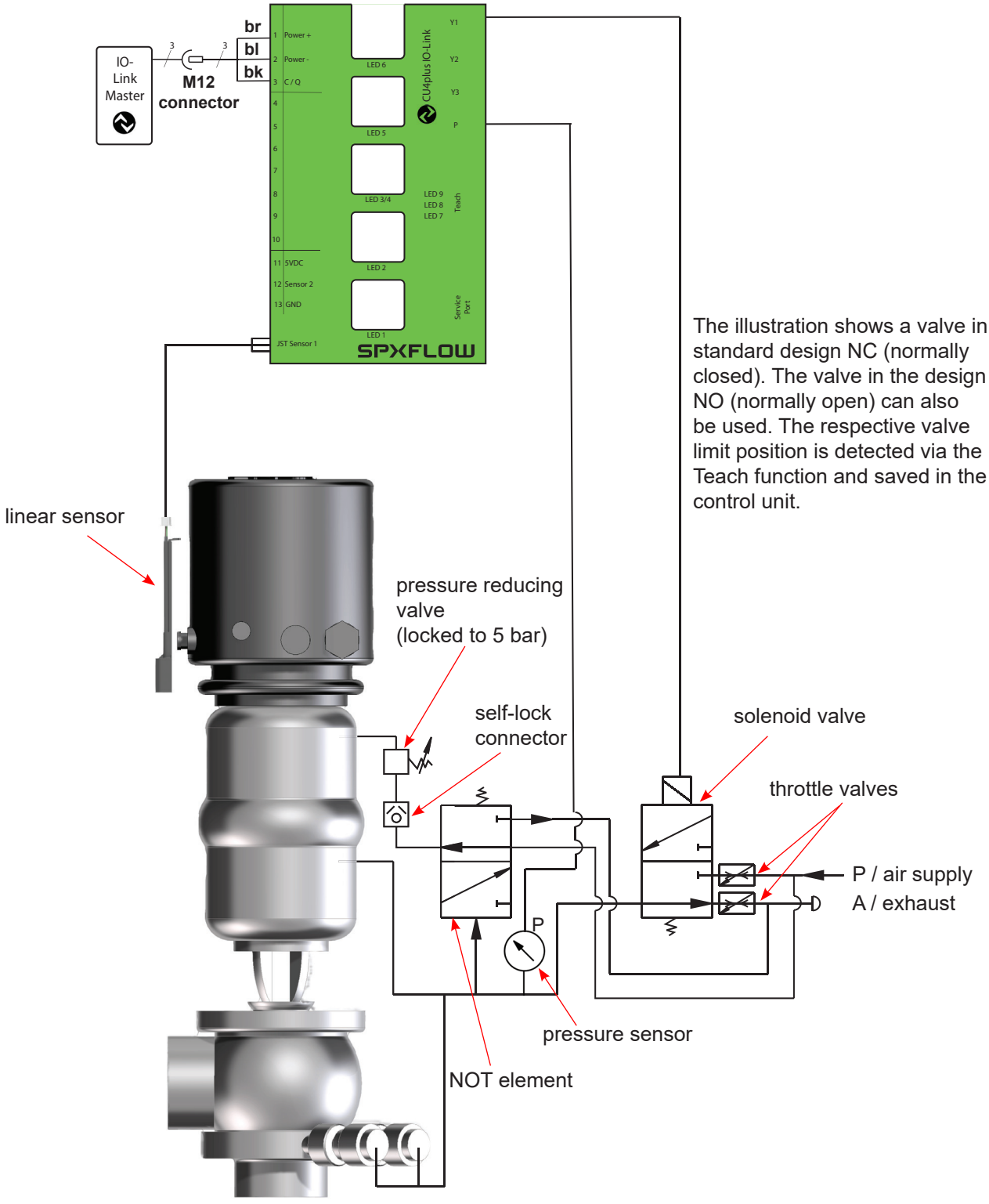
The illustration shows a valve in standard design NC (normally closed). The valve in the design NO (normally open) can also be used. The respective valve limit position is detected via the Teach function and saved in the control unit.

4. Mechanics and Pneumatics

4.4. Functional description - block diagrams

4.4.2. CU41Nplus IO-Link
(internal position measuring system)

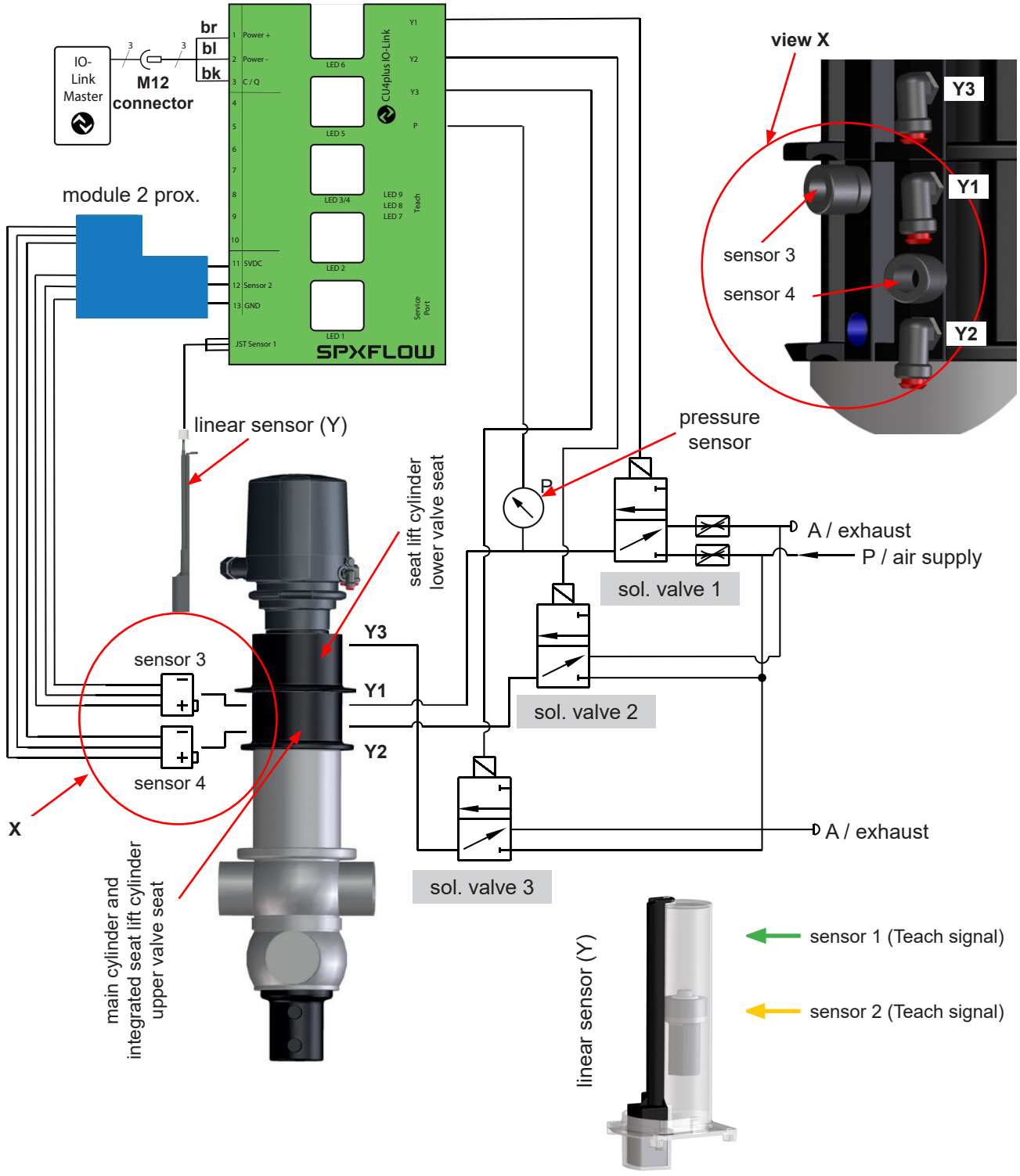
Valve type: SD4



4. Mechanics and Pneumatics

4.4. Functional description - block diagrams

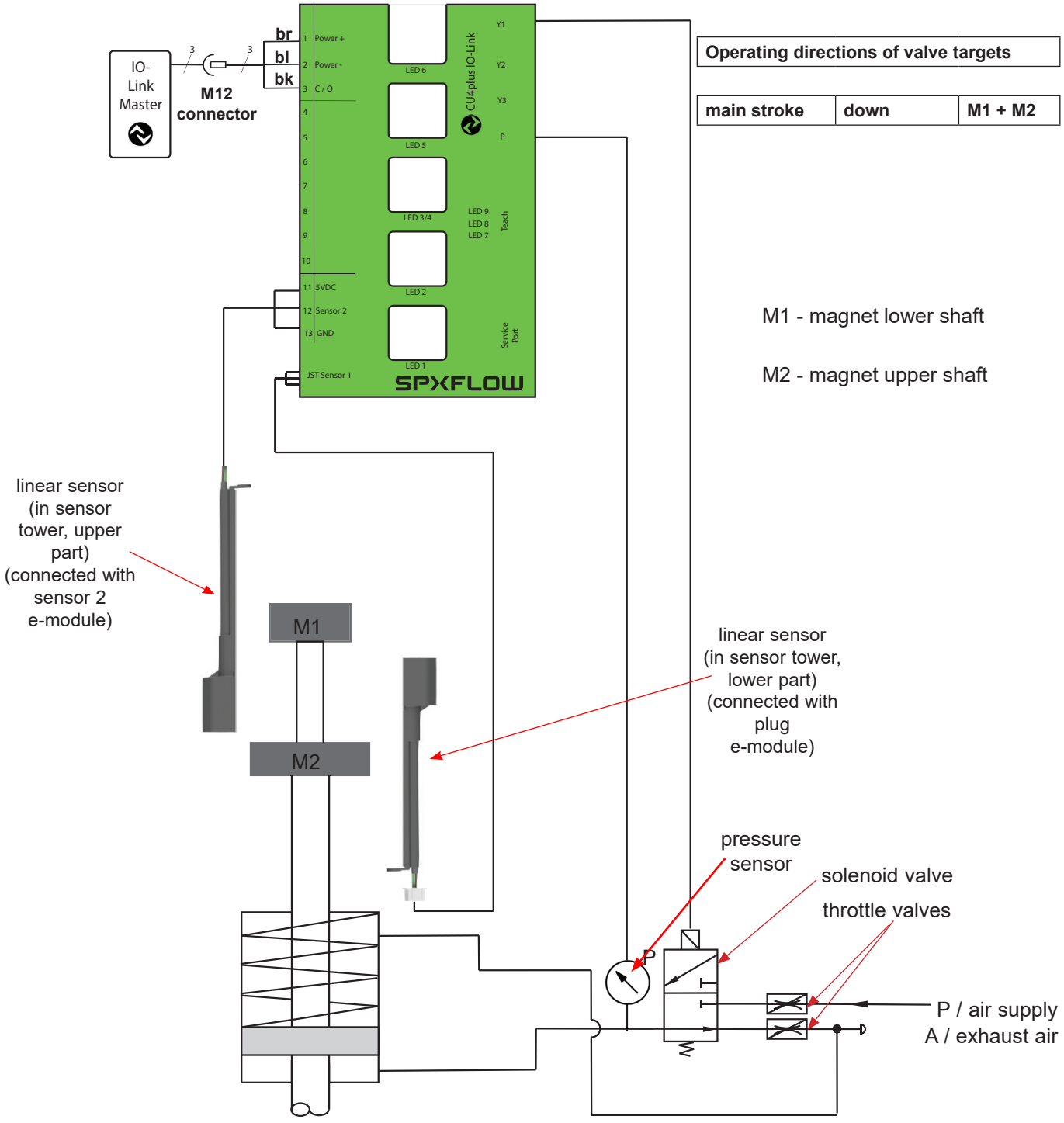
4.4.3. CU43plus IO-Link for DA3+SLD double seat valve
(internal position measuring system and 2 external proximity switches)



4. Mechanics and Pneumatics

4.4. Functional description - block diagrams

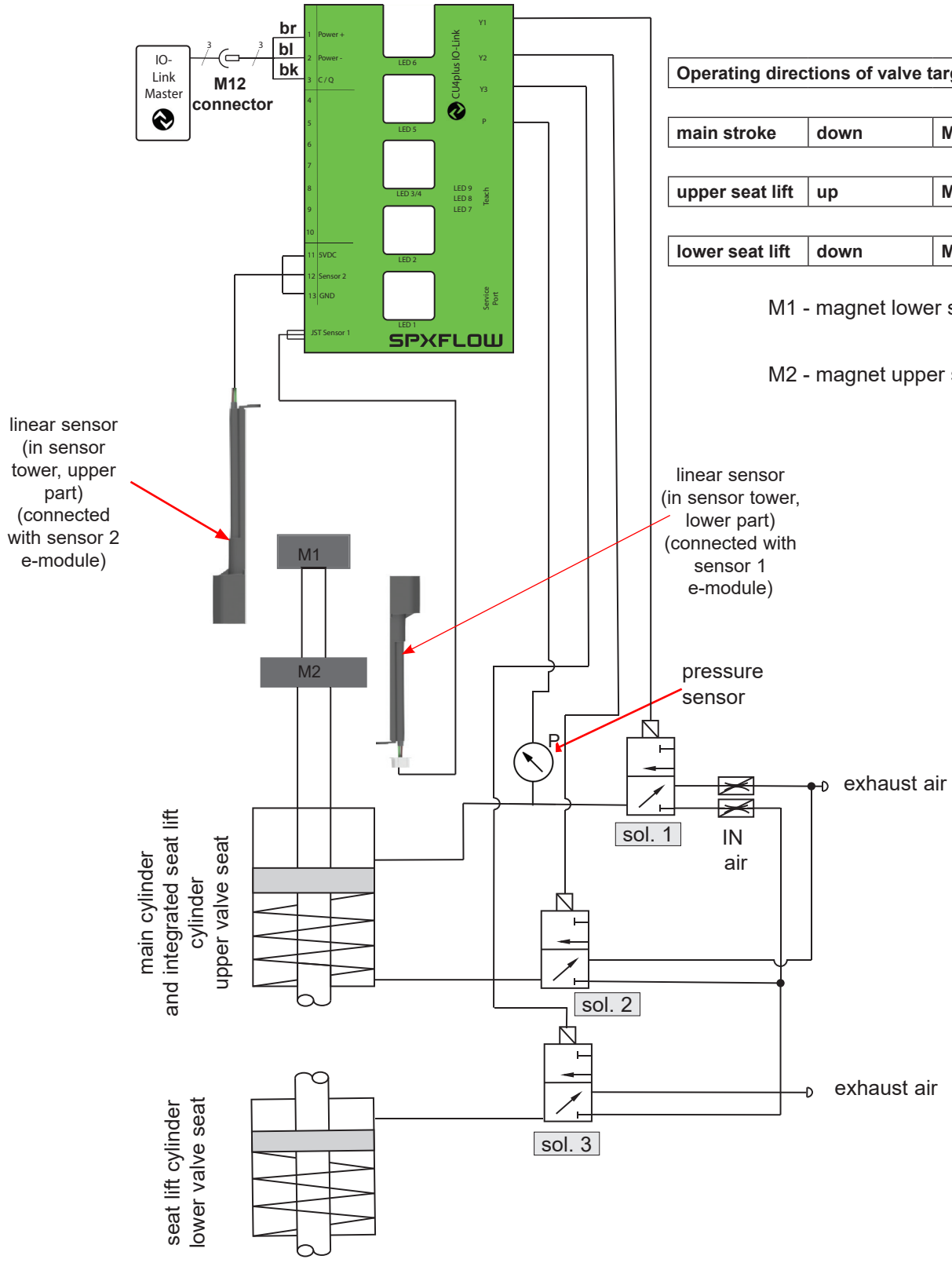
4.4.4. CU41plus-D4 IO-Link for D4 double seat mix proof valves



4. Mechanics and Pneumatics

4.4. Functional description - block diagrams

4.4.5. CU43plus-D4 IO-Link for D4 SL double seat mix proof valves



Operating directions of valve targets		
main stroke	down	M1 + M2
upper seat lift	up	M2
lower seat lift	down	M1

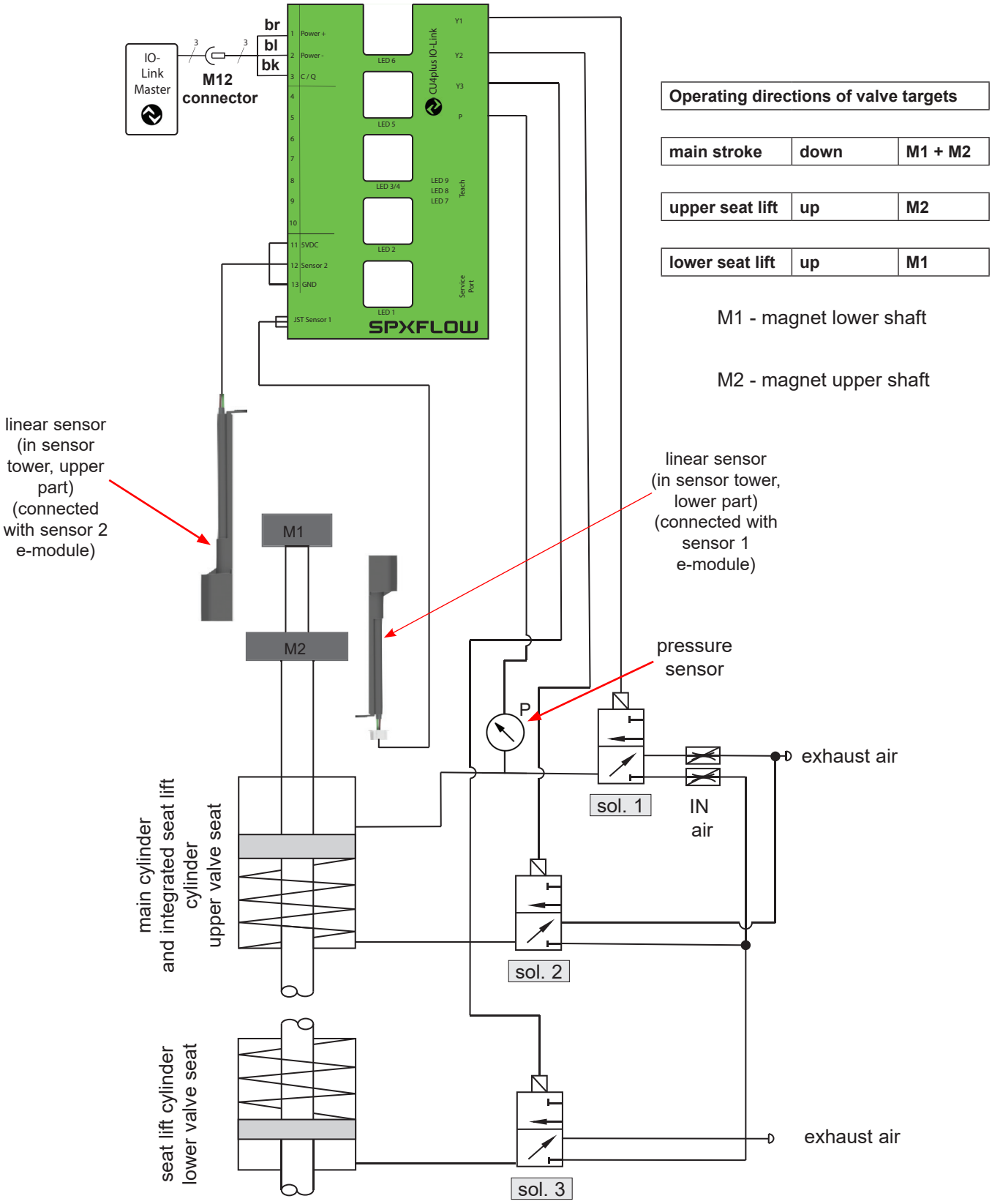
M1 - magnet lower shaft

M2 - magnet upper shaft

4. Mechanics and Pneumatics

4.4. Functional description - block diagrams

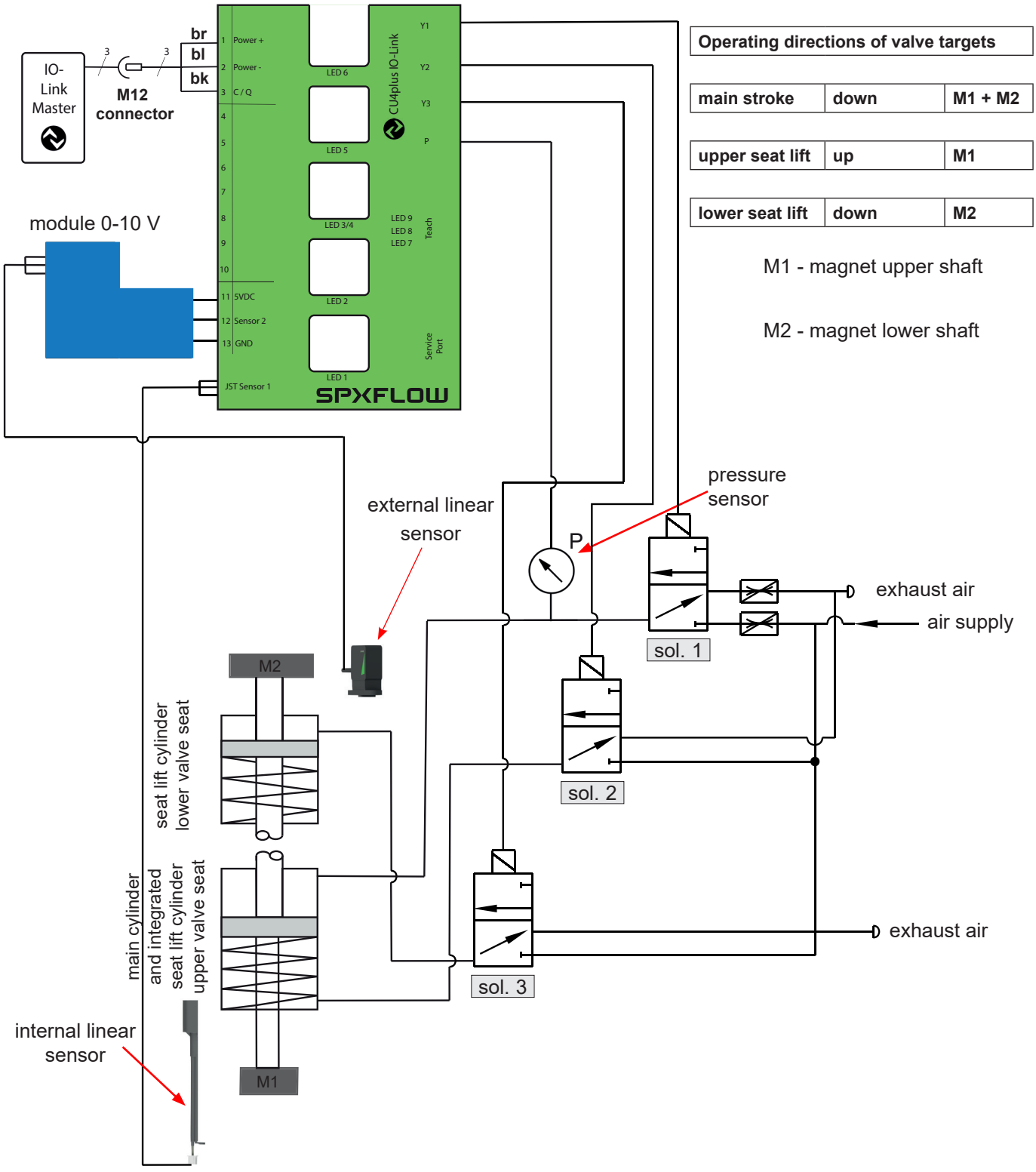
4.4.6. CU43plus-D4 IO-Link for DA4 double seat mix proof valves



4. Mechanics and Pneumatics

4.4. Functional description - block diagrams

4.4.7. CU43plus-D4 IO-Link for DT4 SL double seat tank outlet valves



4. Mechanics and Pneumatics

4.5. Technical data / Standards

Material: PA6.6/PA12

Ambient temperature: -20 to +70 °C, -4 to +158 °F

EU: EMC 2014/30/EU (89/336/EEC)

Standards and environmental audits:
protective class IP 67 EN 60529
EMC
DIN EN 55011
DIN EN 6100-4-2,3,4,5,6

vibration/oscillation EN60068-2-6

safety of machinery DIN EN ISO 13849-1,2

Tolerance band: +/- 1 mm, +/- 2 mm, +/- 5 mm depending on the valve type

Air hose: 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

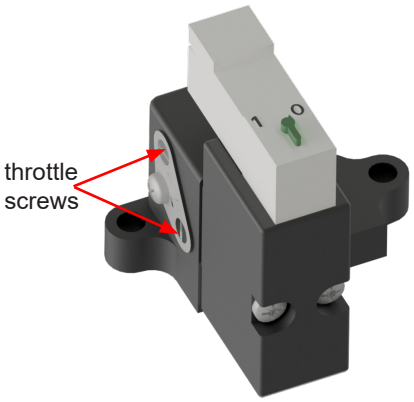
- **content of water:** quality class 3,
  max. dew point temperature -20 °C
  For installations at lower temperatures or at higher altitudes, additional measures must be considered to reduce the pressure dew point accordingly.

- **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

solenoid valve block 1



4.6. Solenoid valves

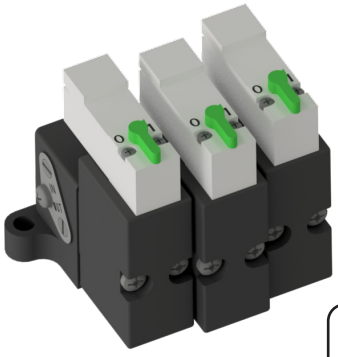
In the base of the control unit max. 3 solenoid valves are installed. The 3/2-way solenoid valves are connected with the electronic module by moulded cables and plug connector.

control:	PWM signal
handle:	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.

solenoid valve block 3



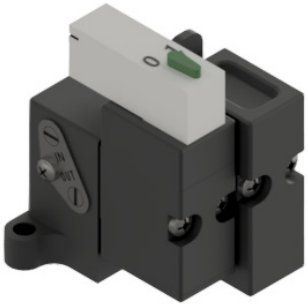
4.8. NOT element

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 linked to the NOT element is equipped with an integrated non-return valve.
The air hose must be slided into the air connection until it stops in order to open the non-return valve.

solenoid valve block 1 with NOT element



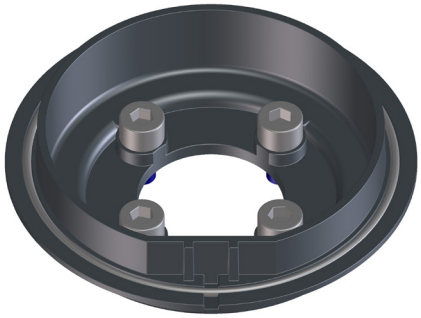
The NOT element is also used for air/air - actuators.

5. Adapter

Adapter for different process valves

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

5.2. Single seat valve



5.3. Double seat mix proof valve DE3, DA3+

5.4. Double seat mix proof valves D4, D4 SL, D4 PMO, DA4

5. Adapter

Adapter for different process valves

5.5. Double seat tank outlet valve DT4 SL

5.5.1. DT4 - 62 adapter

5.5.2. DT4 - 92 adapter

6. Electronic Module

6.1. Function/block diagram

The electronic module CU4plus IO-Link operates as interface between superordinated control (PLC) and is connected to the PLC via an IO-Link master. The connection is accomplished by a 3-wire cable with a M12 plug. The input voltage and the signal is transferred by this cable. Both in accordance with the IO-Link specification. The electronic module operates in the ranges such as the control of the solenoid valves, position feedback and LED indication. Control of the solenoid valves is effected in energy-saving manner via pwm-signals.

For mix proof valves of the D4 family the electronic module works with 2 SPX linear sensor systems.

For single seat valves and butterfly valves the electronic module only works with 1 SPX linear sensor system.

For special valves or previous valve generations the electronic module can also work with 2 SPX proximity switches or in combination of proximity switches and linear sensor.

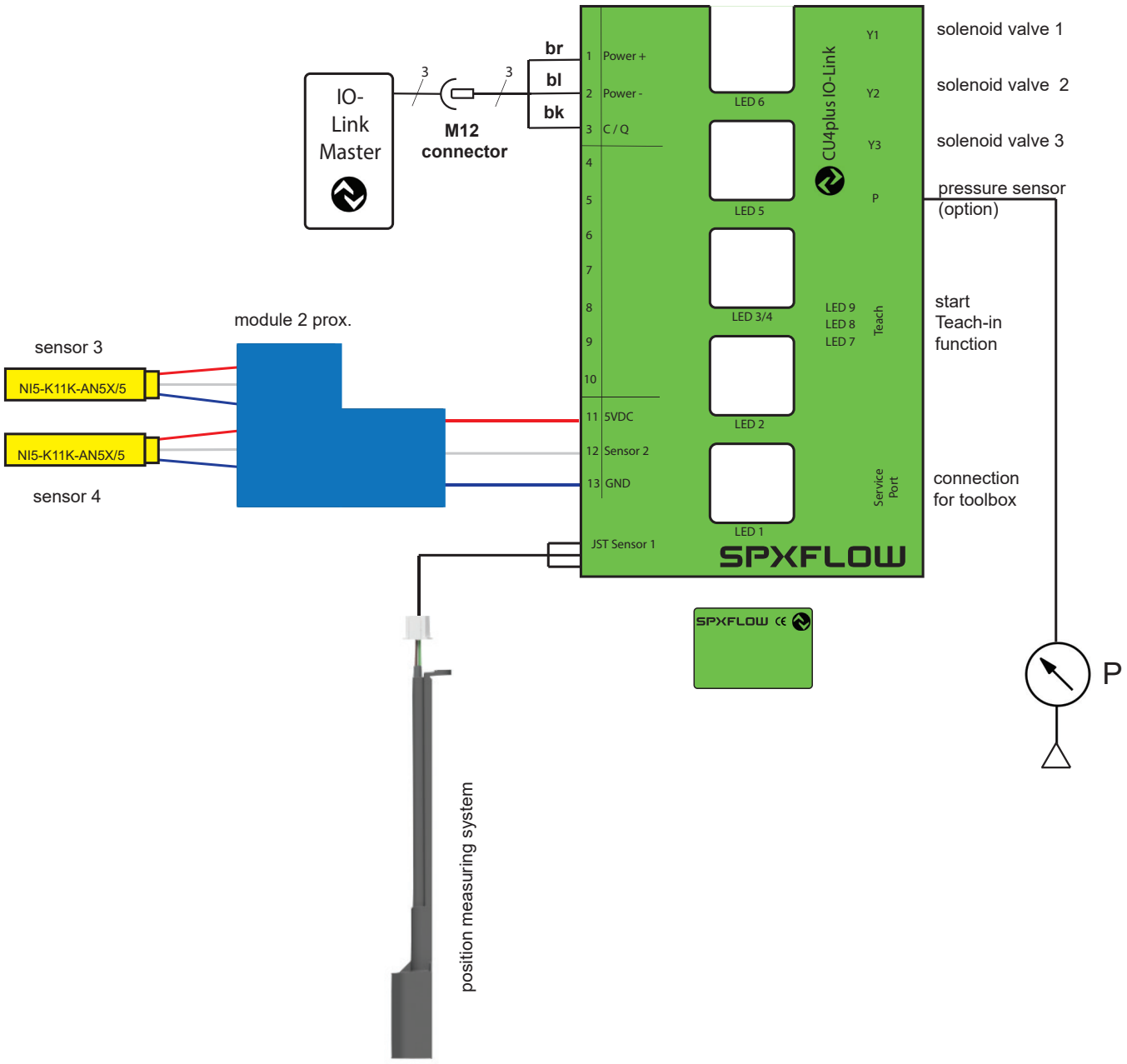
Make sure that only SPX feedback sensors are used with the CU4plus IO-Link electronic module.

Please refer to chapter 6. Electronic module / Technical Data.

6. Electronic Module

6.1. Function/block diagram

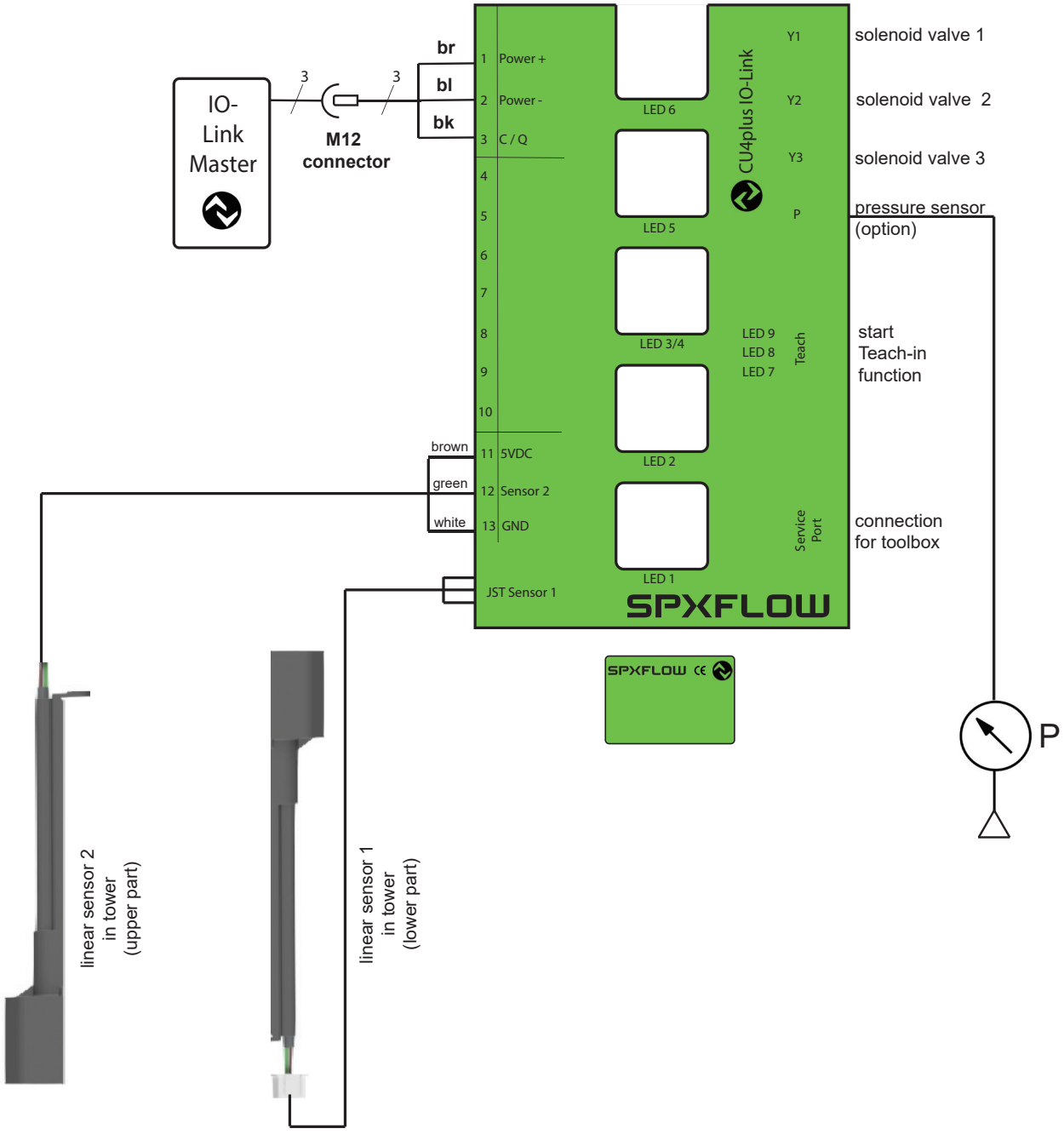
6.1.1. CU43plus IO-Link - DA3+



6. Electronic Module

6.1. Function/block diagram

6.1.2. CU41plus-D4 IO-Link
CU43plus-D4 IO-Link



6. Electronic Module

6.2. Functional description of connections

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

6. Electronic Module

6.3. Technical data

Operating voltage:	18 – 30V DC
Ripple:	max. 1,3Vpp (peak to peak)
Inrush charge:	lower 20mAs
Supply of solenoid valve:	pwm-signal from electronic module
Communication:	COM3 SDCI communication mode with transmission state of 230,4 kbit/s
IO-Link class:	Port class A
IO-Link revision:	1.1
Connection:	The default wiring complies with IEC 60947-5-2 and uses only three wires for 24V, 0V and a signal line.
SIO Mode:	not supported
Data storage mode:	fully supported
Connector:	M12 connector with 4 pins.
Voltage supply of sensors:	5VDC (+/-5%)
Power consumption Minimum	about 65mA @ 24VDC (Power ON, 2 LED, no solenoid valve, 2 Sensors)
Typically	about 86mA @ 24VDC (Power ON, 3 LED, 1 solenoid valve, 2 Sensors)
Maximum	about 105 mA @ 24VDC (Power ON, 3 LED, 2 solenoid valves, 2 Sensors)
Cable Length	max. 20 m (IO-Link specific)
Connecting terminals:	conductor cross section 0.5 – 1.5 mm² (with conductor sleeve) complying with AWG 20-16
Firmware update:	by encrypted *.iolfw file

6. Electronic Module

6.4. Connections

Sensors for valve position detection:

Internal sensors:	D4 Valves Linear Sensor 1: H339463
	Linear Sensor 2: H339463
	Single seat valves: Linear Sensor 1: H324877
External sensors:	External Linear Sensor: H343141 with interface module: H342434 for DT4 valves
	External proximity: H208844 switches with interface module: H342435 for DA3 and DE3 valves
Sensor calibration:	One button automatic calibration process for II valve types
	Separate option for manual calibration of valve closed position
IO-Link approvals:	IEC 611 31-9 Physical layer test Device Conformance test
Control instruments:	IEC 60947-5-2

6.5. Configuration

IODD-File:	Can be download from: https://ioddfinder.io-link.com/
Vendor IO:	13763
Device ID:	1

6. Electronic Module

6.6. LED indication / Indicator lights			
External luminous displays			
Valve Open	color green, permanent light		valve in open position
	color green, flashing		no valid Teach data
Valve Closed	color orange, permanent light		valve in closed position
	color orange, flashing		no valid Teach data
Power Diagnose	color green, permanent light		operating voltage at module - faultless
	color green, flashing		solenoid lever activated
	color green, red alternating		solenoid failure (wire break, short circuit)
	color green, red alternating		linear sensor failure
	color green, red alternating		air pressure out of range
	color red, flashing		Teach parameters not ok
Solenoid Main	color blue, permanent light		main solenoid valve (1) controlled
Solenoid **o upper seat** **oo lower seat**	color blue, 1 blink		solenoid valve (2) for upper seat lift controlled
	color blue, 2 blinks		solenoid valve (3) for lower seat lift controlled
Software update	LED upper seat, LED lower seat alternating		bootloader active
LED 7	color green		Air pressure ok
	color green, flashing		Air pressure high
	color green, flashing		Air pressure low
LED 8			Service request
LED 9	color red		Teach procedure active
	color red, flashing		no valid teach data
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

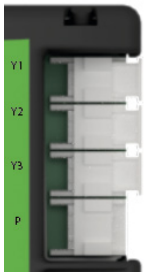
6. Electronic Module

6.6. LED indication / Indicator lights				
			Process Signal (from FW-V2.00)	
All LED´s	Running light with all led´s		LED signal blink	Indicate a CU4plus in the field
LED 7	color green		Air pressure ok	Air pressure ok
	color green, flashing		Air pressure fail	Air Pressure high
	color green, flashing		Air pressure fail	Air Pressure low
LED 8	Color yellow		Service request	Service request
LED 9	Color Red		Teach active	Teach procedure active
	Color red, flashing		Invalid teach data	No valid teach data

Valve Open
Valve Closed
Power Diagnose
Solenoid Main
Solenoid
○ upper seat
○○ lower seat

Function LEDs

Solenoid valve connections



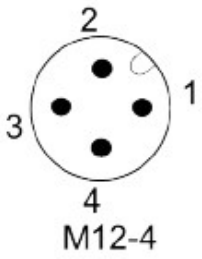
1
2
3
pressure sensor

6. Electronic Module

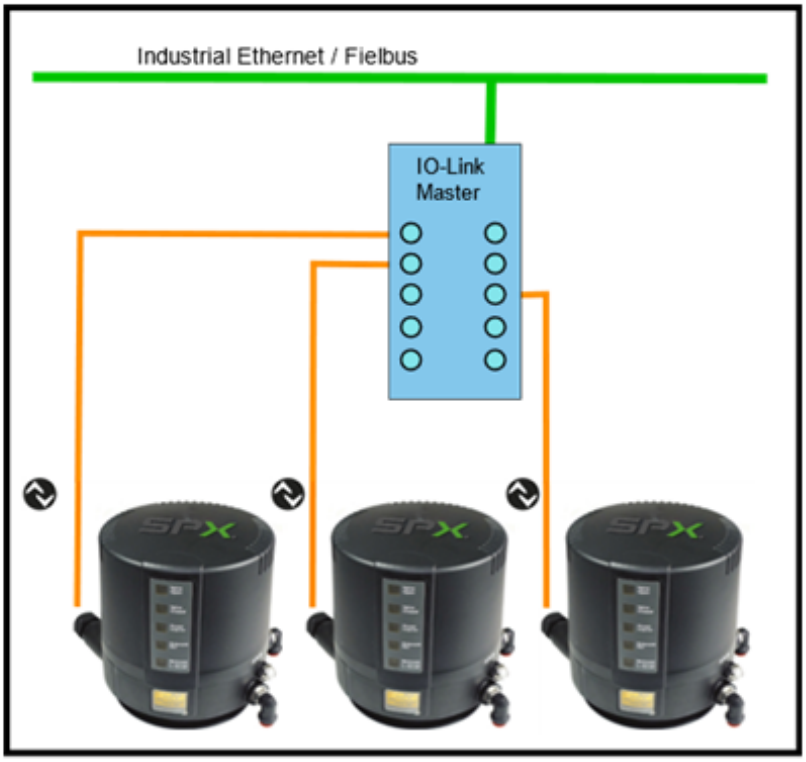
6.7. Wiring

PIN	Signal	Description	Core color (acc. to IEC 60947-5-2)
1	L+	24V power supply (Power +)	brown
2	I/Q	Not connected	white
3	L-	Power supply ground (Power -)	blue
4	C/Q	IO-Link communication SIO is not supported	black

Plug



A cable with a core cross-sectional area of 0,35 mm² and a length of up to 20 m can be used to connect the IO-Link master and the CU4plus IO-Link. No special calculation is required in this case. Nevertheless, the supply cables between the power supply unit and the IO-Link master should be checked for voltage drops.



Example of system architecture with CU4 plus IO-Link

6. Electronic Module

6.8. Adjustement of valve profiles

The adjustment of valve parameters is carried out within the IO-Link Master or a special configuration master.
For the different process valves different logic profiles exist. These differ in view of the detection of the feedback and the logic profile of the valve. These parameters are bundled in the group “System Parameters".

Valve types:

Type	Valve profile	Valve position measuring system	Tolerance band	Valve basic position NO/NC	Invert - valve position indication	Number of solenoids
0	Mix proof valve DA4	2 internal linear sensors	fixed +/- 1 mm	NC only	possible	always 3
1	Mix proof valve D4	2 internal linear sensors	fixed +/- 1 mm	NC only	possible	always 1
2	Mix proof valve D4 SL	2 internal linear sensors	fixed +/- 1 mm	NC only	possible	always 3
6	Mix proof valve with seat lift detection (SLD)	internal linear sensor and 2 external proximity switches	fixed +/- 1 mm	NC only	possible	always 3
7	Mix proof valve with seat lift detection (SLD) CU3 compatibility mode	internal linear sensor and 2 external proximity switches	fixed +/- 1 mm	NC only	possible	always 3
8	Mix proof / seat valve with external feedback detection	external proximity switches	not available	NC / NO	possible	optional 1,2,3
9	Seat valve / butterfly valve with internal feedback detection	internal linear sensor	+/-1 mm +/- 3 mm +/-5 mm	NC / NO	possible	optional 1,2,3
A	Double seat tank outlet valve DT4 SL	1 internal linear sensor 1 external linear sensor	fixed +/- 1 mm	NC only	possible	always 3
B	Mix proof valve D4 PMO	2 internal linear sensors	fixed +/- 1 mm	NC only	possible	always 3

Valve basic position: Depending on the valve type, the basic position can be adjusted.
Tolerance band: Selection according to valve type. **(see chapter 7.2)**
Valve position indication: LED can be inverted, e.g. for adaption of valve type

Restore factory settings: Mix proof valve DA4 profile is adjusted.

Adjusted valve characteristics: logic profile 1, for DA3+ with SLD

Teach-in: CU waits for Teach-in with valve, LED 3-6 blink

Adjustment / change of valve profile is realized via the IO-Link Master in the parameter area.

6. Electronic Module

6.9. Data signals

6.9.1. Single seat valves with internal feedback detection

NC - normally closed			
Application: single seat / butterfly valve with internal feedback detection (SW4, SD4, MS4, SVS, SV etc.)			
Output signals	**valve state**	**sensor 1**	**sensor 2**
		signal generated by Teach-in (position of position sensor)	signal generated by Teach-in (position of position sensor)
O0	closed	**1**	0
O1	open	0	**1**
O2	not occupied	**1**	**1**
O3	not occupied	**1**	**1**
Input signals	**solenoid 1 Main**	**solenoid 2**	**solenoid 3**
I0	**1**	0	0
I1	0	**1**	0
I2	0	0	**1**

NO - normally open			
Application: single seat / butterfly valve with internal feedback detection (SW4, SD4, MS4, SVS, SV etc.)			
Output signals	**valve state**	**sensor 1**	**sensor 2**
		signal generated by Teach-in (position of position sensor)	signal generated by Teach-in (position of position sensor)
O0	closed	0	**1**
O1	open	**1**	0
O2	not occupied	1	1
O3	not occupied	1	1
Input signals	**solenoid 1 Main**	**solenoid 2**	**solenoid 3**
I0	**1**	0	0
I1	0	**1**	0
I2	0	0	**1**

6. Electronic Module

6.9. Data signals

6.9.2. Mix proof valve with seat lift detection (DA3+ SLD)

NC - normally closed					
Application: Double seat mix proof valve with seat lift detection (SLD)					
Output signals	**valve state**	**sensor 4**	**sensor 3**	**sensor 2**	**sensor 1**
		external proximity switch	external proximity switch	signal generated by Teach-in, (position of position sensor)	signal generated by Teach-in, (position of position sensor)
O0	closed	1	1	0	1
O1	open	0	0	1	0
O2	upper seat lifting	0	1	0	1
O3	lower seat lifting	1	1	0	0
The appropriate output signal for the required valve position will be generated within the CU by logic combination of the 4 sensor signals. The appropriate valve position is shown direct by the output signals. Further ajdustments are not required!					

Input signals	**solenoid 1 main**	**solenoid 2 upper seat lift**	**solenoid 3 lower seat lift**
I0	1	0	0
I1	0	1	0
I2	0	0	1

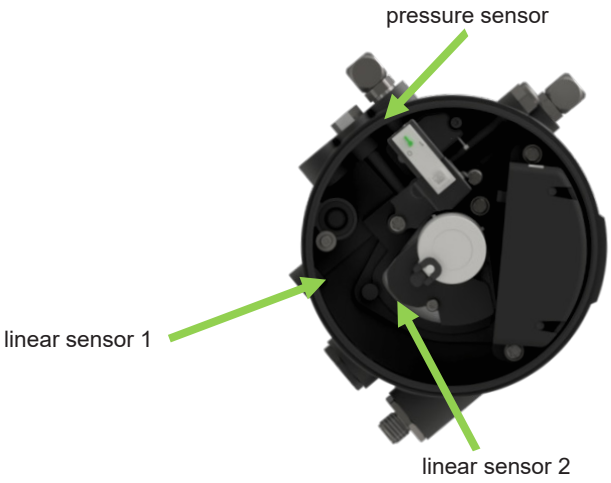
When replacing a CU3 control unit, use the following profile:
Double seat mix proof valve with seat lift detection (SLD) CU3 compatible mode (all signals similar to CU3) - see instruction manual of CU3 Control Unit.

6. Electronic Module

6.9. Data signals

6.9.3. Mix proof valve D4

operating	**main stroke downwards**		
main stroke	**valve operating direction: downwards**		
lower shaft	**signal S3** **signal S4**	**linear sensor 1**	**valve target M1**
upper shaft	**signal S2** **signal S1**	**linear sensor 2**	**valve target M2**



Output signals	valve status	linear sensor 2 / (Teach data)		linear sensor 1 / (Teach date)		tolerance band
		sensor signal S1	sensor signal S2	sensor signal S3	sensor signal S4	
O0	**closed**	**1**	0	not used	**0**	**+1 mm, -1 mm**
O1	**open**	**0**	0	not used	**1**	**+1 mm, -1 mm**
DI2						
DI3						

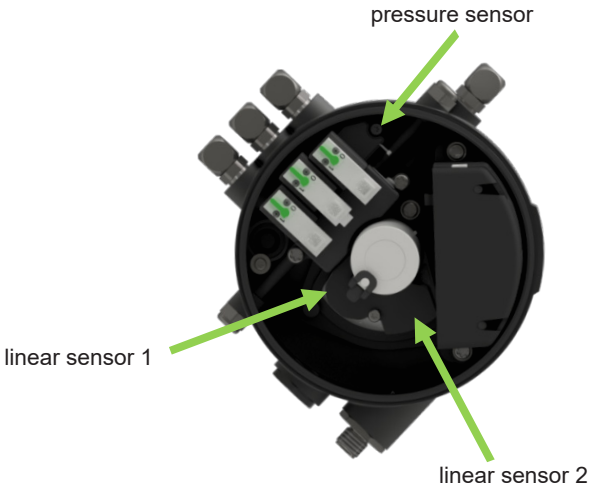
Input signal	solenoid 1 Main	solenoid 1 upper seat lift	solenoid 1 lower seat lift
I0	**1**	0	0
I1			
I2			

6. Electronic Module

6.9. Data signals

6.9.4. Mix proof valve D4 SL

operating	main stroke downwards upper seat lift upwards lower seat lift downwards		
main stroke	valve operating direction: downwards		
lower shaft	signal S3 signal S4	linear sensor 1	valve target M1
upper shaft	signal S2 signal S1	linear sensor 2	valve target M2



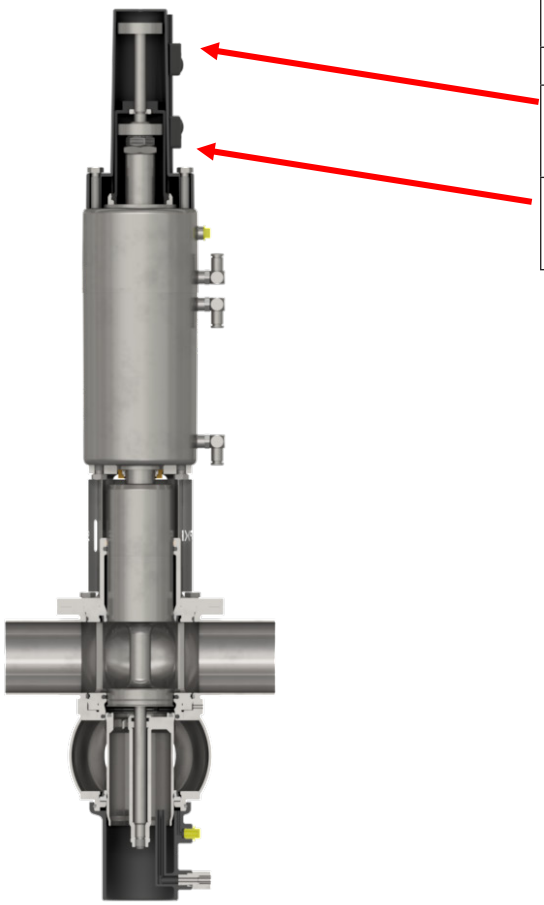
Output signals	valve status	linear sensor 2 / (Teach data)		linear sensor 1 / (Teach data)		tolerance band
		sensor signal S1	sensor signal S2	sensor signal S3	sensor signal S4	
O0	closed	1	0	1	0	+1 mm, -1 mm
O1	open	0	0	0	1	+1 mm, -1 mm
O2	upper seat lift	0	1	1	0	+1 mm, -1 mm
O3	lower seat lift	1	0	0	0	+1 mm, -1 mm

Input signal	solenoid 1 Main	solenoid 2 upper seat lift	solenoid 3 lower seat lift
I0	1	0	0
I1	0	1	0
I2	0	0	1

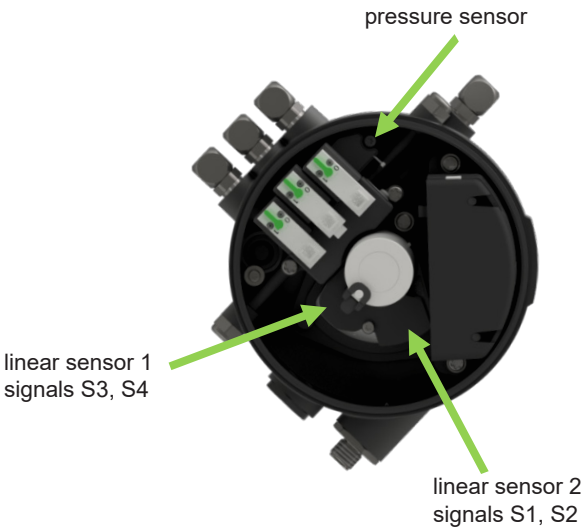
6. Electronic Module

6.9. Data signals

6.9.5. Mix proof valve D4 PMO



operating	main stroke downwards upper seat lift upwards lower seat lift downwards		
main stroke	valve operating direction: downwards		
lower shaft	signal S3 signal S4	linear sensor 1	electronic module terminal block 10,11,12
upper shaft	signal S2 signal S1	linear sensor 2	electronic module JST plug linear sensor



	valve status	linear sensor 2 / (teach data)		linear sensor 1 / (teach data)		tolerance band
		sensor signal S1	sensor signal S2	sensor signal S3	sensor signal S4	
	closed	1	0	1	0	+1 mm, -1 mm
	open	0	0	0	1	+1 mm, -1 mm
	upper seat lift	0	1	1	0	+1 mm, -1 mm
	lower seat lift	1	0	0	0	+1 mm, -1 mm

Digital Output data	DO0	DO1	DO2	DO3
no logical combination of sensor signals, just raw data combination table has to be implemented in PLC software during seat lift - the opposite valve shaft stays in closed position, this can be monitored by watching the appropriate signal				

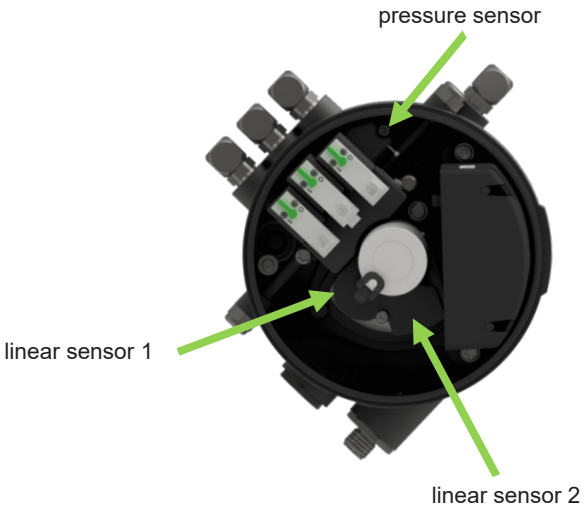
Digital Input data	solenoid 1 Main	solenoid 2 upper seat lift	solenoid 3 lower seat lift
DI0	1	0	0
DI1	0	1	0
DI2	0	0	1

6. Electronic Module

6.9. Data signals

6.9.6. Mix proof valve DA4

operating	main stroke downwards upper seat lift upwards lower seat lift upwards		
main stroke	valve operating direction: downwards		
lower shaft	signal S3 signal S4	linear sensor 1	valve target M1
upper shaft	signal S2 signal S1	linear sensor 2	valve target M2



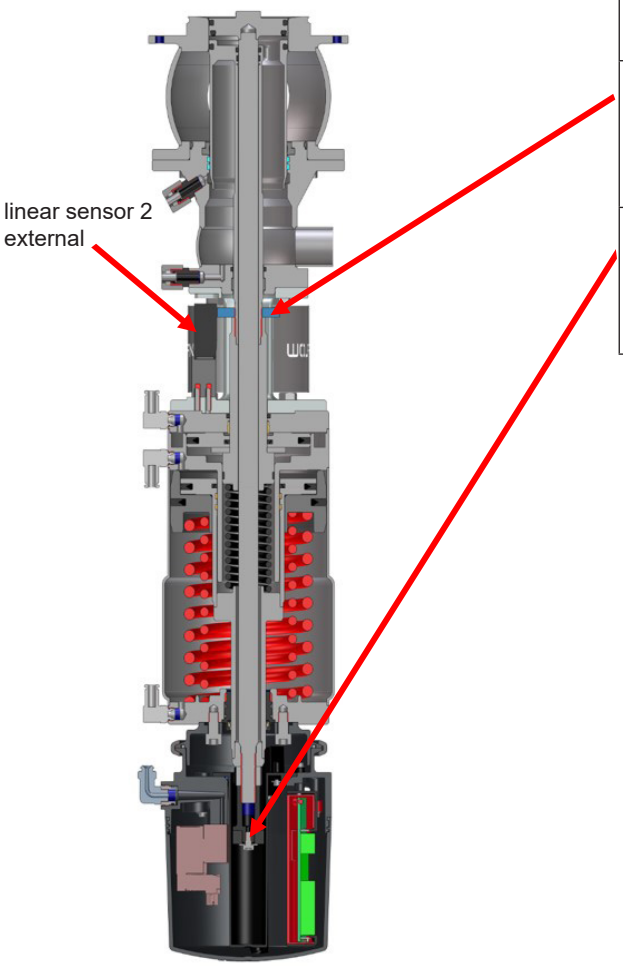
Output signals	valve status	linear sensor 2 / (Teach data)		linear sensor 1 / (Teach data)		tolerance band
		sensor signal S1	sensor signal S2	sensor signal S3	sensor signal S4	
O0	closed	1	0	0	0	+1 mm, -1 mm
O1	open	0	0	0	1	+1 mm, -1 mm
O2	upper seat lift	0	1	0	0	+1 mm, -1 mm
O3	lower seat lift	1	0	1	0	+1 mm, -1 mm

Input signals	solenoid 1 Main	solenoid 2 upper seat lift	solenoid 3 lower seat lift
I0	1	0	0
I1	0	1	0
I2	0	0	1

6. Electronic Module

6.9. Data signals

6.9.7. Double seat tank outlet valve DT4 SL



operating	main stroke downwards upper seat lift upwards lower seat lift upwards		
main stroke	valve operating direction: downwards		
lower shaft target	signal S4	linear sensor 2 external additional converter module must be used	e-module terminal block 10,11,12
upper shaft target	signal S1 signal S2 signal lift	linear sensor 1	e-module terminal JST plug linear sensor

Input signals	valve status	linear sensor 2 / (Teach data)			linear sensor 1 / (Teach data)	tolerance band
		sensor signal S1	sensor signal S2	sensor signal lift	sensor signal S4	
I0	closed	1	0	0	0	+1 mm, -1 mm
I1	open	0	1	0	0	+1 mm, -1 mm
I2	upper seat lift	0	0	1	0	+1 mm, -1 mm
I3	lower seat lift	1	0	0	1	+1 mm, -1 mm

Output signals	solenoid 1 Main	solenoid 1 upper seat lift	solenoid 1 lower seat lift
O0	1	0	0
O1	0	1	0
O2	0	0	1

6. Electronic Module

6.9. Data signals

6.9.8. Process Data Input Signals

Name	Data Type	Unit	Bit Offset	Bit Length	Description
Valve Closed	Boolean		104	1	Signal for Valve in closed position
Valve Open	Boolean		105	1	Signal for Valve on Open position
Upper seat lift active	Boolean		106	1	Upper seat lift of a double seat valve active
Lower seat lift active	Boolean		107	1	Lower seat lift of a double seat valve active
Sensor Position 1	Boolean		98	1	Valve in calibrated linear sensor position 1. Needed for PMO valves.
Sensor Position 2	Boolean		99	1	Valve in calibrated linear sensor position 2. Needed for PMO valves.
Position Lift	Boolean		100	1	Valve in calibrated linear sensor position lift
Sensor Position 3	Boolean		101	1	Valve in calibrated linear sensor position 3. Needed for PMO valves.
Sensor Position 4	Boolean		102	1	Valve in calibrated linear sensor position 4. Needed for PMO valves.
External Sensor 3	Boolean		96	1	External proximity switch 3 active
External Sensor 4	Boolean		97	1	External proximity switch 4 active
Air Pressure	Unsigned integer	bar	64	32	Air pressure of the main actuator
Valve Shaft Position 1	Float		32	32	Linear sensor 1 position
Valve Shaft Position 2	Float		0	32	Linear sensor 2 position

6. Electronic Module

6.9.8.1 Process Data Output Signals
Table for Firmware version beginning with FW-V2.0

Name	Data Type	Unit	Bit Offset	Bit Length	Description
Valve Closed	Boolean		120	1	Signal for valve in closed position
Valve Open	Boolean		121	1	Signal for valve in open position
Upper seat lift active	Boolean		122	1	Upper seat lift of a double seat valve active
Lower seat lift active	Boolean		123	1	Lower seat lift of a double seat valve active
Sensor Position1	Boolean		114	1	Valve in calibrated linear sensor position 1. Needed for PMO valves.
Sensor Position2	Boolean		115	1	Valve in calibrated linear sensor position 2. Needed for PMO valves.
Position Lift	Boolean		116	1	Valve in calibrated linear sensor position lift.
Sensor Position 3	Boolean		117	1	Valve in calibrated linear sensor position 3. Needed for PMO valves.
Sensor Position 4	Boolean		118	1	Valve in calibrated linear sensor position 4. Needed for PMO valves.
Sensor Position 5	Boolean		119	1	Valve in calibrated linear sensor position 5. Needed for PMO valves.
External Sensor 3	Boolean		112	1	External proximity switch 3 active
External Sensor 4	Boolean		113	1	External proximity switch 4 active
Air Pressure	Unsigned integer	bar	80	32	Air pressure oft he main actuator
Valve Shaft Position 1	Unsigned integer		48	32	Linear sensor 1 position
Valve Shaft Position 2	Unsigned integer		16	32	Linear sensor 2 position
Teach Active	Boolean		0	32	Teach is running
Invalid Teach Data	Boolean		1	1	Invalid teach data
Service Request	Boolean		2	1	Service request present
Air Pressure ok	Boolean		4	1	Air pressure ok
Air Pressure fail	Boolean		5	1	Air Pressure error
Valve Monitor Error	Unsigned integer		8	8	Valve Monitor failure values: Bit 0 (0x01) EMV1 on error Bit 1 (0x02) EMV1 off error Bit 3 (0x04) EMV2 on error Bit 4 (0x08) EMV2 off error Bit 5 (0x10) EMV3 on error Bit 6 (0x20) EMV3 off error

6. Electronic Module

6.9.9. Process Data Output Signals

Name	Data Type	Unit	Bit Offset	Bit Length	Description
Main Valve	Boolean		0	1	Main Actuator
Upper Seatlift	Boolean		1	1	Actuator for the upper seatlift
Lower Seatlift	Boolean		2	1	Actuator for the lower seatlift
LED signal blink	Boolean		3	1	Special LED blinking sequence for to indicate this valve in the field.
Main valve pulsation	Boolean		4	1	Switching pulsation mode on. The valve must be activated with the signal ‘Main actuator’.
Upper seat pulsation	Boolean		5	1	Switching the pulsation mode on for upper seat lift. The valve must be activated with the signal ‘Upper Seatlift”.
Lower seat pulsation	Boolean		6	1	Switching the pulsation mode on for lower seat lift. The valve must be activated with the signal ‘Lower Seatlift”.

6. Electronic Module

6.9. Data signals

6.9.10. Identification Parameter

Name	Index	Subindex	Type	Unit	Comment
Vendor Name	16	0	String		SPX Flow Technology Germany GmbH
Vendor Text	17	0	String		www.spxflow.com
Product Name	18	0	String		CU4plus IO-Link
Product ID	19	0	String		H344393
Product Text	20	0	String		Control Unit CU4plus IO-Link
Serial Number	21	0	String		
Hardware Version	22	0	String		
Firmware Version	23	0	String		
Application Specific Tag	24	0	String		Freely selectable
Function Tag	25	0	String		Freely selectable
Location Tag	26	0	String		Freely selectable
Hardware Identification Key	17342	0	String		Special for Firmware update

6.9.11. Operation Parameter

Name	Index	Subindex	Type	Unit	Comment
Operating hours	84	0	Unsigned Integer	h	Can be reset
Activation Timer	85	0	Unsigned Integer	ms	Can be reset
Reaction time activation	86	0	Unsigned Integer	ms	Can be reset
Deactivation time	87	0	Unsigned Integer	ms	Can be reset
Reaction time deactivation	88	0	Unsigned Integer	ms	Can be reset
Strokes Solenoid 1	89	0	Unsigned Integer		Can be reset
Strokes Solenoid 2	90	0	Unsigned Integer		Can be reset
Strokes Solenoid 3	91	0	Unsigned Integer		Can be reset

6.9.12. Lifetime Counter

Name	Index	Subindex	Rights	Type	Unit
Lifetime hours	95	0	RO	Unsigned Integer	h
Lifetime strokes Solenoid 1	96	0	RO	Unsigned Integer	St
Lifetime strokes Solenoid 2	97	0	RO	Unsigned Integer	St
Lifetime strokes Solenoid 3	98	0	RO	Unsigned Integer	St
Boot counter	108	0	RO	Unsigned Integer	St

6. Electronic Module

6.9. Data signals

6.9.13. Reset Button

Name	Index	Subindex	Value	Rights	Type	Unit
Reset Operating hours	93	0	1	WO	Button	
Reset Solenoid 1 counter	93	0	2	WO	Button	
Reset Solenoid 2 counter	93	0	3	WO	Button	
Reset Solenoid 3 counter	93	0	4	WO	Button	
Reset all Activation timer	93	0	5	WO	Button	

6.9.14. Parameter Menu

Name	Index	Subindex	Value	Rights	Type	Unit
Device Reset	2	0	128	WO	Button	
Application Reset	2	0	129	WO	Button	
Restore Factory Settings	2	0	130	WO	Button	

6.9.15. Service Parameter

Name	Index	Subindex	Rights	Type	Unit
Max. Hours	75	0	RW	Unsigned Integer	h
Max. Strokes	76	0	RW	Unsigned Integer	
Max. Activation time	77	0	RW	Unsigned Integer	ms
Max. Reaction time	78	0	RW	Unsigned Integer	ms
Max. Deactivation time	79	0	RW	Unsigned Integer	ms
Max. Reaction time deactivation	80	0	RW	Unsigned Integer	ms
Min. Pressure	81	0	RW	Unsigned Integer	bar
Max. Pressure	82	0	RW	Unsigned Integer	bar
Pressure delay	83	0	RW	Unsigned Integer	ms

6.9.16. System Parameter

Name	Index	Subindex	Rights	Type	Unit
Valve Type	66	0	RW	Unsigned Integer	
Solenoid Amount	65	0	RW	Unsigned Integer	
LED Display	67	0	RW	Unsigned Integer	
Pressure Sensor	68	0	RW	Unsigned Integer	
Tolerance	69	0	RW	Unsigned Integer	mm
Operating Principle	74	0	RW	Unsigned Integer	

6.9. Data signals

6.9.16.1 Tolerances for D4-Valves (DA4, D4, D4SL, DT4, AM1)

Name	Index	Subindex	Rights	Type	Unit
Positive S1	126	0	RW	Unsigned Integer	mm
Negative S1	127	0	RW	Unsigned Integer	mm
Positive S2	128	0	RW	Unsigned Integer	mm
Negative S2	129	0	RW	Unsigned Integer	mm
Positive S3	130	0	RW	Unsigned Integer	mm
Negative S3	131	0	RW	Unsigned Integer	mm
Positive S4	132	**0**	RW	Unsigned Integer	**mm**
Negative S4	133	**0**	RW	Unsigned Integer	**mm**
Positive Lift	134	**0**	RW	Unsigned Integer	**mm**
Negative Lift	135	**0**	RW	Unsigned Integer	**mm**

6.9.16.2 AM1-Valve (Aseptic Mix Proof Valve) Parameters

Name	Index	Subindex	Rights	Type	Unit
Idle time for the upper seat lift signal	123	0	RW	Unsigned Integer	ms
Pressure level to suppress the upper seat lift signal	124	0	RW	Unsigned Integer	bar

6. Electronic Module

6.9. Data signal

6.9.17. Time based Pulsation

Name	Index	Subindex	Rights	Type	Unit
Pulse on upper SL	70	0		Unsigned Integer	s
Pulse off upper SL	71	0		Unsigned Integer	s
Pulse on lower SL	72	0		Unsigned Integer	s
Pulse off lower SL	73	0		Unsigned Integer	s

6.9.18. Teach

Name	Index	Subindex	Rights	Type	Unit
Teach Closed Position	94	0	WO	Button	
Complete automatic teach function	94	0	WO	Button	
Teach hour log	125	0	RO	Button	h

6.9.19. Diagnosis Menu, Error

Name	Index	Subindex	Rights	Type	Unit
Teach Error Code	92	0	RO	Unsigned Integer	

6.9.20. Data Acquisition Parameters

Name	Index	Subindex	Rights	Type	Unit	Range
Measurement interval	104	0	RW	Unsigned integer	s	1, 2, 5, 10
Delay for next trigger start	105	0	RW	Unsigned integer	hours days	1 hour 2 hours 6 hours 12 hours 1 day 7 days 14 days 21 days 30 days 90 days 180 days

6. Electronic Module

6.9. Data signals

6.9.21. Events

ID	Event Type	Event Code	IODD Text
CU4 Events		**HEX**	
VALELOGIC_SENSOR1_POS_ERR1	ERROR	1801	ERROR1: Sensor Position
VALELOGIC_POSITION_QUERY	ERROR	1800	ERROR: Valve Logic position.
VALELOGIC_SENSOR1_POS_ERR2	ERROR	1802	ERROR2: Sensor Position
VALELOGIC_SOLENOID1	ERROR	1803	ERROR: Solenoid 1 (Main)
VALELOGIC_ERROR_EMV2	ERROR	1804	ERROR: Solenoid 2 (Upper Seat Lift)
VALELOGIC_ERROR_EMV3	ERROR	1805	ERROR: Solenoid 3 (Lower Seat Lift)
VALELOGIC_ERROR_MEMORY_SERVICE	ERROR	1806	ERROR: Service Memory
VALELOGIC_ERROR_MEMORY_SYSTEM	ERROR	1807	ERROR: System Memory
VALELOGIC_ERROR_VALVE_SETTIG	ERROR	1808	ERROR: Valve Settings
VALELOGIC_ERROR_TEACH_1	ERROR	1809	Logic ERROR: Teach Position S1 invalid
VALELOGIC_ERROR_TEACH_2	ERROR	180a	Logic ERROR: Teach Position S2 invalid
VALELOGIC_ERROR_TEACH_3	ERROR	180b	Logic ERROR: Teach Position lift invalid
VALELOGIC_ERROR_TEACH_4	ERROR	180c	Logic ERROR: Teach Position S3 invalid
VALELOGIC_ERROR_TEACH_5	ERROR	180d	Logic ERROR: Teach Position S4 invalid
VALELOGIC_ERROR_TEACH_6	ERROR	180e	Logic ERROR: Teach External prox. Sensor signal invalid
VALELOGIC_ERROR_AIR_HIGH	ERROR	180f	ERROR: Air pressure too high
VALELOGIC_ERROR_AIR_LOW	ERROR	1810	ERROR: Air pressure too low
VALELOGIC_ERROR_IO_FAULT	ERROR	1811	ERROR: IO Fault
VALELOGIC_ERROR_MEMORY	ERROR	1812	ERROR: Memory
VALELOGIC_ERROR_VALVE_SETTING	ERROR	1813	ERROR: Valve Settings
VALELOGIC_ERROR_VOLTAGE_LOW	ERROR	1814	ERROR: Voltage to low
VALELOGIC_ERROR_VALVE_AMOUNT1	ERROR	1815	ERROR: Wrong amount (1) of solenoids
VALELOGIC_ERROR_VALVE_AMOUNT2	ERROR	1816	ERROR: Wrong amount (2) of solenoids
VALELOGIC_ERROR_VALVE_AMOUNT3	ERROR	1817	ERROR: Wrong amount (3) of solenoids
VALELOGIC_ERROR_PERIPERY	ERROR	1818	ERROR: Periphery error
VALELOGIC_ERROR_EXT_VOLTAGE	ERROR	1819	ERROR: Wrong external voltage
PROX_SENSOR34_EQUAL	ERROR	181a	ERROR: External proximity switch. Signal Sensor3 and Sensor4 equal
PROX_SENSOR34_INTER	ERROR	181b	ERROR: External proximity switch. Signal Sensor3 and Sensor4 interchanged
PROX_SENSOR3_ERROR	ERROR	181c	ERROR: External proximity switch. Signal Sensor3
PROX_SENSOR4_ERROR	ERROR	181d	ERROR: External proximity switch. Signal Sensor4
LIN_SENSOR_OVERLAP_S1	ERROR	181e	ERROR: Overlap prea position S1
LIN_SENSOR_OVERLAP_S2	ERROR	181f	ERROR: Overlap area position S2
LIN_SENSOR_OVERLAP_LIFT	ERROR	1820	ERROR: Overlap area position LIFT
LIN_SENSOR_OVERLAP_S3	ERROR	1821	ERROR: Overlap area position S3
LIN_SENSOR_OVERLAP_S4	ERROR	1822	ERROR: Overlap area position S4

6. Electronic Module

6.9. Data signals

6.9.21. Events

ID	Event Type	Event Code	IODD Text
Service Events		**HEX**	
VALELOGIC_SERVICE_MAX_HOURS	NOTIFICATION	1840	Notification: Service interval max. hours reached
VALELOGIC_SERVICE_MAX_ACTIVATION_MAIN	NOTIFICATION	1841	Notification: Service interval max. strokes reached
VALELOGIC_SERVICE_MAX_ACTIVATION_TIME	NOTIFICATION	1842	Notification: Max. activation time exceeded
VALELOGIC_SERVICE_MAX_REACTION_TIME	NOTIFICATION	1843	Notification: Max. reaction time exceeded
VALELOGIC_SERVICE_MAX_DEACTIVATION_TIME	NOTIFICATION	1844	Notification: Max. deactivation time exceeded
VALELOGIC_SERVICE_MAX_REACTION_TIME_DE	NOTIFICATION	1845	Notification: Max. reaction time deactivation exceeded
VALELOGIC_SERVICE_MIN_AIR	NOTIFICATION	1846	Notification: Air pressure low
VALELOGIC_SERVICE_MAX_AIR	NOTIFICATION	1847	Notification: Air pressure high
VALELOGIC_SERVICE_EVENT	NOTIFICATION	1848	Notification: Service event occurred

6. Electronic Module

6.9. Data signals

6.9.21. Events

ID	Event Type	Event Code	IODD Text
Teach Events		**HEX**	
TEACH_ERROR_AIR_PRESSURE_LOW	ERROR	1880	Teach Error: Air pressure low
TEACH_ERROR_PROX_SWITCH	ERROR	1881	Teach Error: Proximity switch error
TEACH_ERROR_SENSOR1	ERROR	1882	Teach Error: Sensor 1
TEACH_ERROR_SENSOR2	ERROR	1883	Teach Error: Sensor 2
TEACH_ERROR_EMV1_WIRE_BREAK	ERROR	1884	Teach Error: Wire break solenoid 1
TEACH_ERROR_EMV1_SHORT_CIRCUIT	ERROR	1885	Teach Error: Short circuit solenoid 1
TEACH_ERROR_EMV2_WIRE_BREAK	ERROR	1886	Teach Error: Wire break solenoid 2
TEACH_ERROR_EMV2_SHORT_CIRCUIT	ERROR	1887	Teach Error: Short circuit solenoid 2
TEACH_ERROR_EMV3_WIRE_BREAK	ERROR	1888	Teach Error: Wire break solenoid 3
TEACH_ERROR_EMV3_SHORT_CIRCUIT	ERROR	1889	Teach Error: Short circuit solenoid 3
TEACH_ERROR_TOLERANCE_SENSOR1	ERROR	188a	Teach Error: Tolerance band error/overlap Sensor 1
TEACH_ERROR_TOLERANCE_SENSOR2	ERROR	188b	Teach Error: Tolerance band error/overlap Sensor 2
TEACH_ERROR_POSITION_SENSOR1	ERROR	188c	Teach Error: Position Sensor 1
TEACH_ERROR_POSITION_SENSOR2	ERROR	188d	Teach Error: Position Sensor 2
TEACH_END	NOTIFI-CATION	188e	Teach: Teach end
TEACH_START	NOTIFI-CATION	188f	Teach: Teach start.
TEACH_PRES_SENSOR_ABSENT	ERROR	1890	Teach: Pressure sensor absent.
TEACH_VALVE_CLOSE	NOTIFI-CATION	1891	Teach: Close valve. All actuators are deactivated.
TEACH_INFO_WAIT_POS_2	NOTIFI-CATION	1893	Teach: Activate main actuator (Solenoid 1).
TEACH_INFO_CLOSE_VALVE_1	NOTIFI-CATION	1894	Teach: Deactivate main actuator (Solenoid 1).
TEACH_INFO_WAIT_POS_1_1	NOTIFI-CATION	1895	Teach: Waiting for valve deactivated.
TEACH_INFO_OPEN_VALVE_2	NOTIFI-CATION	1896	Teach: Activate actuator 2 (Solenoid 2).
TEACH_INFO_WAIT_SEAT_UPPER	NOTIFI-CATION	1897	Teach: Wait until upper seatlift position is reached.
TEACH_INFO_CLOSE_VALVE_2	NOTIFI-CATION	1898	Teach: Deactivate Actuator 2 (Solenoid 2).
TEACH_INFO_WAIT_POS_1_2	NOTIFI-CATION	1899	Teach: Deactivate actuator 2. Waiting for valve position is reached.

6. Electronic Module

6.9. Data signals

6.9.21. Events

ID	Event Type	Event Code	IODD Text
Teach Events		**HEX**	
TEACH_INFO_OPEN_VALVE_3	NOTIFI-CATION	189a	Teach: Activate actuator 3 (Solenoid 3).
TEACH_INFO_WAIT_SEAT_LOWER	NOTIFI-CATION	189b	Teach: Waiting for lower seatlift position is reached.
TEACH_INFO_CLOSE_VALVE_3	NOTIFI-CATION	189c	Teach: Deactivate actuator 3 (Solenoid 3).
TEACH_INFO_WAIT_POS_1_3	NOTIFI-CATION	189d	Teach: Deactivate actuator 3. Waiting for valve position is reached.
TEACH_INFO_OK	NOTIFI-CATION	189e	Teach: OK
TEACH_ERROR	ERROR	189f	Teach Error!
TEACH_INFO_CANCEL	NOTIFI-CATION	18a0	Teach: Teach canceled
TEACH_INFO_SAVE	NOTIFI-CATION	18a1	Teach: Save all parameters in EEPROM.
TEACH_TIMEOUT	ERROR	18a2	Teach Error: Timeout
TEACH_STORE_SENSOR1_S1	NOTIFI-CATION	18a3	Teach: Record Sensor 1 Position 1
TEACH_STORE_SENSOR1_S2	NOTIFI-CATION	18a4	Teach: Record Sensor 1 Position 2
TEACH_STORE_SENSOR1_LIFT	NOTIFI-CATION	18a5	Teach: Record Sensor 1 Position Lift
TEACH_STORE_SENSOR1_OFS	NOTIFI-CATION	18a6	Teach: Record Sensor 1 offset
TEACH_STORE_SENSOR2_OFS	NOTIFI-CATION	18a7	Teach: Record Sensor 2 offset
TEACH_SENSOR1_OUT_OF_RANGE	NOTIFI-CATION	18a8	Teach: Sensor 1 out of range
TEACH_SENSOR2_OUT_OF_RANGE	NOTIFI-CATION	18a9	Teach: Sensor 2 out of range
TEACH_STORE_SENSOR2_S3	NOTIFI-CATION	18aa	Teach: Record Sensor 2 Position 3
TEACH_STORE_SENSOR2_S4	NOTIFI-CATION	18ab	Teach: Record Sensor 2 Position 4

6. Electronic Module

6.9. Data signals

6.9.21. Events

ID	Event Type	Event Code	IODD Text
Teach Closed Position Events		**HEX**	
TEACH_CLOSED_NC_DONE	NOTIFI-CATION	18c0	Teach closed: Teach Closed Position (NC) end
TEACH_CLOSED_NO_DONE	NOTIFI-CATION	18c1	Teach closed: Teach Closed Position (NO) end
TEACH_CLOSED_SAVE_S1	NOTIFI-CATION	18c2	Teach closed: Record Position S1
TEACH_CLOSED_SAVE_S2	NOTIFI-CATION	18c3	Teach closed: Record Position S2
TEACH_CLOSED_SAVE_S3	NOTIFI-CATION	18c4	Teach closed: Record Position S3
TEACH_CLOSED_SAVE_S4	NOTIFI-CATION	18c5	Teach closed: Record Position S4
TEACH_CLOSED_START	NOTIFI-CATION	18c6	Teach closed: Teach closed Position start
TEACH_CLOSED_ERROR_EMV_ON	ERROR	18c7	Teach closed Error: Valve in wrong position. Main actuator should be not activated
TEACH_CLOSED_ERROR_EMV_OFF	ERROR	18c8	Teach closed Error: Valve in wrong position. Main actuator should be activated
TEACH_CLOSED_ERROR_UNKNOWN	ERROR	18c9	Teach closed Error: Error unknown.
TEACH_STORE_SENSOR2_S4	NOTIFI-CATION	18ab	Teach: Record Sensor 2 Position 4

ID	Event Type	Event Code	IODD Text
Special for IO-Link device test		**HEX**	
TEST_EVENT_A	ERROR	8DFE	
TEST_EVENT_B	ERROR	8DFF	
parameter_error	ERROR	6320	
DS_UPLOAD_REQUEST	NOTIFI-CATION	FF91	

6. Electronic Module

6.10. Data Storage Mode / Firmware Update

6.10.1. Data Storage Mode

The Data Storage (DS) mechanism enables the consistent and up-to-date buffering of the CU4plus IO-Link device parameters on upper levels like PLC programs or fieldbus parameter server. Data Storage between Masters and Devices is specified according the IO-Link standard, whereas the adjacent upper data storage mechanisms depend on the individual fieldbus or system. The CU4plus IO-Link holds all for an device exchange needed parameters for Data Storage.

CU4 plus supports all IO-Link target modes such as SCAN, TYPE COMPATIBLE and IDENTICAL mode.
For the proper operation of the IDENTICAL mode the IODD file must be extended with the serial number of the electronic module.
One example:
<StdVariableRef id="V_SerialNumber" defaultValue="H344393TEST001“/>

For the backup level DISABLE, RESTORE and BACKUP/ RESTORE are supported.

Note that the Master needs the information of 'Venor ID' and 'Device ID' for the target modes TYPE COMPATIBLE and IDENTICAL.

6.10.2. Firmware Update

High complex software products and devices which use complex software, need to be updated from time to time. IO-Link defines a mechanism for an update of firmware. This update can be done by an IO-Link master which supports this update mechanism.
New firmware for a CU4plus IO-Link is supplied as file with the ending *.iolfw. The complete firmware is inside this file encrypted with all required data.
This *.iolfw file can be read from an IO-Link master and transferred by the Master to the CU4plus.

A bootloader is implemented in the electronic module. This bootloader handles the firmware update. The bootloader is started by the master and writes the bytes transferred into the non-volatile Flash memory of the CU4plus.

The memory in which the bootloader is stored is not erased during this procedure. This means if errors occur during the transfer (electrical power blackout, PLC blackout …), the bootloader in the electronic module always starts the control unit and the firmware update can be started once again.

6. Electronic Module

6.11. Seat Pulsation - Efficiency in Cleaning

For increasing seat cleaning efficiency there is a function called "Pulsation". With this function, the seat lifts can be operated in plusation mode if the PLC signal activates the seat lift.

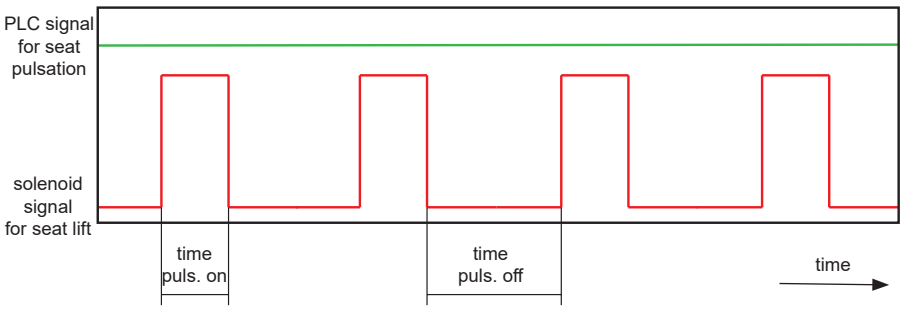
For the pulsation the ON and OFF time can be adjusted.

Parameters, see table in chapter 6.8.17.

The selection of the pulsation times must be done in accordance with the process situation and the appropriate valve size. The selected times must ensure complete opening and closing of the seats.

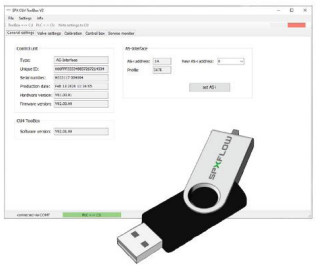
We recommend adjusting the time for "pulse off" to be larger than 30 seconds.

When the seat pulsation is activated, with the 1st seat lifting (pulse on), the feedback signal for the appropriate seat lift will be active.



6. Electronic Module

6.12. Service and Mainenance Software CU4plus Toolbox



APV

For the parameterization of the CU4plus IO-Link the CU4plus Toolbox Software for PC is available. This is an alternative to the parameterization with the IO-Link connection. All parameters can be read and set in both ways.

The Toolbox kit with appropriate USB/serial cable can be purchased from SPX FLOW using the article number H333470.

The latest Software version is always available from the SPX FLOW F&B Sharepoint. Please contact your SPX FLOW Sales representative.

The software is designed for PC systems with Windows© operating system. The PC is connected via the USB/serial cable to the service interface of the electronic module. Power must be connected to the module.

The individual functions are described in the CU4plus Toolbox manual.

6.13. Data Acquisition and BLOB Data Transfer

6.13.1. Data Acquisition

For predictive maintenance and observation of the valve, all sensor signals of a valve switch are stored in the internal RAM of the control unit. The start point (trigger) is always a switch of one solenoid. The duration of the measurement and a delay or skip of measurements can be adjusted by two parameters.

With parameter "Measurement interval" the time in seconds of one measurement can be adjusted. Every record has a length of 200 measurement points. For an adjusted measurement time of 2 seconds a measurement takes place every 10 ms.
With parameter “Delay for the next trigger start” the time from one to the next data acquisition can be increased. A delay up to 180 days, half a year is possible.

For further information to the parameters see chapter 6.9.20.

6.13. Data Acquisition and BLOB Data Transfer

6.13.2. Data Transfer

All measured data can be transferred with the Binary Large Object mechanism from IO-Link via the IO-Link master to a PC. For this data transfer the IO-Link parameter “Data transfer BLOB” exists.

Here the function “Read Data Acquisition Measurements” can be selected, and the data be stored to a PC. This is a transfer of binary data, but in this case the data are ‘coma separated values’. This means that the output file can be stored as *.csv file. This kind of data can be read by many PC programs, e.g. excel, gnuplot or every text editor.
Four data sets are available. These are “Process Data Set 0” to “Process Data Set 3”. And also a dataset for teach “TEACH Data”.

6.13.3. Data Format

The data are split up into the following blocks:

Data Set 0

Data Set 1

Data Set 2

Data Set 3

Teach Data

6. Electronic Module

6.13. Data Acquisition and BLOB Data Transfer

6.13.3. Data Format

Each Block of Data Set has this format:

Description	Data
Header Description	operatingHours; emv1Strokes;emv2Strokes; emv3Strokes;LastActivationTime; LastReactionTimeAct; LastDeactivationTime; LastReactionTimeDeact; Interval
Data Set Header	<9 separated values>
Data Header	shaftPosition1; shaftPosition2; airPressure; digitalOutputs; digitalInputs
Data	200*<5 separated values>

Format of Teach Data Block:

Description	Data
Header Description	operatingHours; emv1Strokes; emv2Strokes; emv3Strokes; LastActivationTime; LastReactionTimeAct; LastDeactivationTime; LastReactionTimeDeact; Interval
Data Set Header	<9 separated values>
	shaftPosition1; shaftPosition2; airPressure; digitalOutputs
Start Valve Open Measurements	Valve open values
Data	200*<4 separated values>
Start Valve Closing Measurements	Valve closing values
Data	200*<5 separated values>

6. Electronic Module

6.13. Data Acquisition and BLOB Data Transfer

Digital Input Data Bits

The digital input bits are combined to a hexadecimal digit. This table shows the bit conversion.

Bit	15	14	13	12	11	10	9	8
Hex	0x8000	0x4000	0x2000	0x1000	0x0800	0x0400	0x0200	0x0100
Description		Sensor Position 4	Sensor Position 43		Sensor Position 2	Sensor Position 1		
Bit	7	6	5	4	3	2	1	0
Hex	0x0080	0x0040	0x0020	0x0010	0x0008	0x0004	0x0002	0x0001
Description					Lower seat lift active	Upper seat lift active	Valve open	Valve closed

Digital Output Data Bits

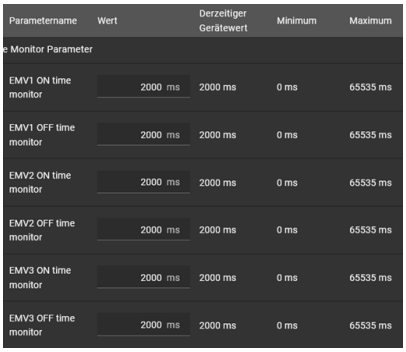
The digital output bits are also a combination displayed as hexadecimal digit. Bit conversion as follows:

Bit	7	6	5	4	3	2	1	0
Hex	0x80	0x40	0x20	0x10	0x08	0x04	0x02	0x01
Description	-	-	-	-	-	Lower seat lift	Upper seat lift	Main Valve

6. Electronic Module

6.14. Valve Monitoring

For a monitoring of the valve movement the “Valve Monitoring” function can be used. For each actuator movement a time limit can be adjusted. The valve controller monitors the movement time. Is the movement of the valve higher than the adjusted time, an error flag is set. This error can be read from the process data input signals.
The monitor times for each solenoid can be set with the ‘Monitor Parameters’ The default of each monitoring time is set to 2000ms. For each solenoid there is a on- and off- switching time to select.



Parametername	Wert	Derzeitiger Gerätewert	Minimum	Maximum
e Monitor Parameter				
EMV1 ON time monitor	2000 ms	2000 ms	0 ms	65535 ms
EMV1 OFF time monitor	2000 ms	2000 ms	0 ms	65535 ms
EMV2 ON time monitor	2000 ms	2000 ms	0 ms	65535 ms
EMV2 OFF time monitor	2000 ms	2000 ms	0 ms	65535 ms
EMV3 ON time monitor	2000 ms	2000 ms	0 ms	65535 ms
EMV3 OFF time monitor	2000 ms	2000 ms	0 ms	65535 ms

With the ‘Monitor Measurements the current time for the last movement can be read out. This indication can help to select a limit and find problems with the valve.

Parametername	Wert	Derzeitiger Gerätewert	Minimum	Maximum
: Monitor Measurements				
EMV1 ON time monitor	0 ms	0 ms	0 ms	65535 ms
EMV1 OFF time monitor	0 ms	0 ms	0 ms	65535 ms
EMV2 ON time monitor	0 ms	0 ms	0 ms	65535 ms
EMV2 OFF time monitor	0 ms	0 ms	0 ms	65535 ms
EMV3 ON time monitor	0 ms	0 ms	0 ms	65535 ms
EMV3 OFF time monitor	0 ms	0 ms	0 ms	65535 ms
Valve Monitor	Reset Valve Mon...			

If the movement time was higher than the specified limit this is shown with process output parameter ‘Valve Monitor error’. This parameter can show the following values:

Bit 0 (0x01) EMV1 on error
Bit 1 (0x02) EMV1 off error
Bit 3 (0x04) EMV2 on error
Bit 4 (0x08) EMV2 off error
Bit 5 (0x10) EMV3 on error
Bit 6 (0x20) EMV3 off error

A combination of this values can also happen. E.g. an exceed of the on movement opening and closing time of a valve with solenoid 1 shows Bit 0 and Bit 1 = 0x03 = 3 dez.
The error value is still available until the next valve switch. Or the error value can be reset with the ‘Reset Valve Monitor Error’ function.
This valve monitor function doesn’t work with the levers at the solenoids!

6. Electronic Module

6.14. Valve Monitoring

6.14.1 Valve Monitor Parameter

Name	Index	Subindex	Rights	Type	Unit
EMV1 ON time monitor	139	0	RW	Unsigned integer	ms
EMV1 OFF time monitor	140	0	RW	Unsigned integer	ms
EMV2 ON time monitor	141	0	RW	Unsigned integer	ms
EMV2 OFF time monitor	142	0	RW	Unsigned integer	ms
EMV3 ON time monitor	143	0	RW	Unsigned integer	ms
EMV3 OFF time monitor	144	0	RW	Unsigned integer	ms

6.14.2 Valve Monitor Measurements

Name	Index	Subindex	Rights	Type	Unit
EMV1 ON time monitor	145	0	RW	Unsigned integer	ms
EMV1 OFF time monitor	146	0	RW	Unsigned integer	ms
EMV2 ON time monitor	147	0	RW	Unsigned integer	ms
EMV2 OFF time monitor	148	0	RW	Unsigned integer	ms
EMV3 ON time monitor	149	0	RW	Unsigned integer	ms
EMV3 OFF time monitor	150	0	RW	Unsigned integer	ms
Reset Valve Monitor Error	151	0	WO	Button	

6.14.3 Time based pulsation

Name	Index	Subindex	Rights	Type	Unit
Pulse time on main actuator	120	0	RW	Unsigned integer	1/10 s
Pulse time off main actuator	121	0	RW	Unsigned integer	1/10 s
Pulse time on upper SL	70	0	RW	Unsigned integer	1/10 s
Pulse time off upper SL	71	0	RW	Unsigned integer	1/10 s
Pulse time on lower SL	72	0	RW	Unsigned integer	1/10 s
Pulse time off lower SL	73	0	RW	Unsigned integer	1/10 s

6.14.4 Position based pulsation

Name	Index	Subindex	Rights	Type	Unit
Position controlled pulsation	119	0	RW	Boolen	
Position controlled Pulsation on time main actuator	136	0	RW	Unsigned integer	s
Position controlled Pulsation on time upper seatlift	137	0	RW	Unsigned integer	s
Position controlled Pulsation on time lower seatlift	138	0	RW	Unsigned integer	s
Pulse movement change position main actuator	122	0	RW	Unsigned integer	%
Pulse movement change position upper seat lift	106	0	RW	Unsigned integer	%
Pulse movement change position lower seat lift	107	0	RW	Unsigned integer	%

7. Valve Position Indication

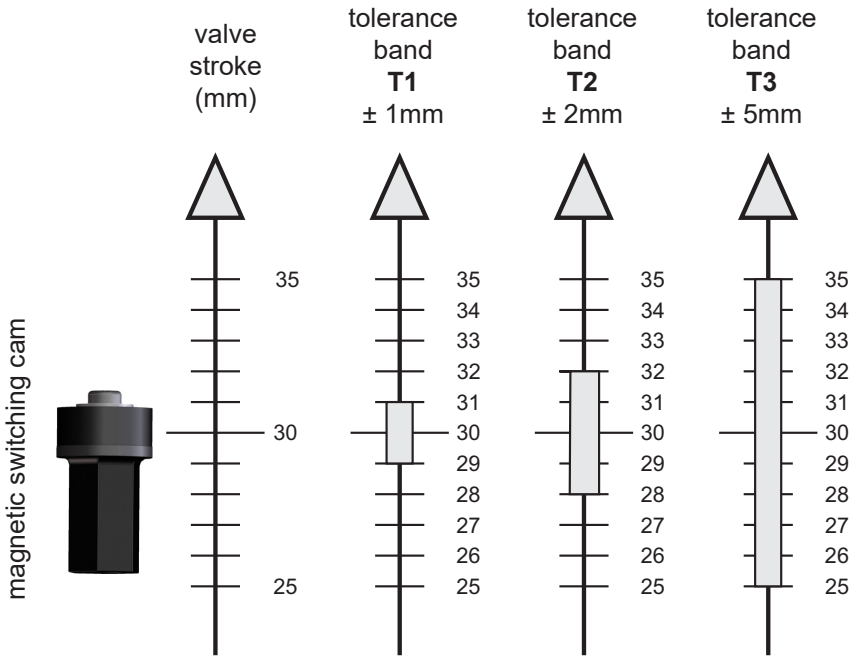
7.1. Continuously measuring valve position measuring system

For the internal detection of the valve position indication, a contact-free operating linear sensor is used which is actuated via the magnetic switching cam installed at the valve rod. The nominal measuring range of the measuring system amounts to 0 - 72 mm, relative repetitive accuracy < 0.1 mm.
Within this measuring range, the corresponding positions for closed and open valve position as well as seat lift positions are generated via the Teach-in function and permanently saved in the electronic.

7.2. Tolerance band of the valve position measuring system

The tolerance band of the valve position measuring system describes the active measuring range in which the corresponding feedback information, closed or open valve position, is registered. For different process valves also different tolerance bands exist. The adjustment is realized via the ToolBox software.

Tolerance band	Output of feedback signals in range	Recommendation for valve type
T1	+/- 1 mm	e.g. DA3+, D4, D4 SL, D4 PMO, DA4, DT4 SL
T2	+/- 2 mm	e.g. SW4, MS4
T3	+/- 5 mm	e.g. SV, SVS, DKR



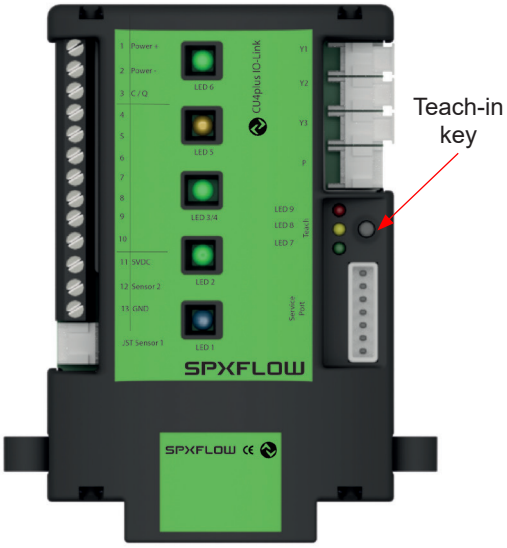
7. Valve Position Indication

7.3. Adjustment of valve position indication / Teach-in

The continuously measuring valve position measuring system is tought via a reference valve movement.
The respective positions for the closed and open valve position as well as for further valve positions, e.g. seat lifting, are travelled to and the corresponding position of the sensor system is permanently stored in the memory of the electronic module. This process is called Teach-in.

The Teach-in is started by pressing the Teach-in key at the electronic module or by using the parameter “Complete automatic teach function” over IO-Link (FW-V2.00 or later). The key must be pressed permanently for 3 seconds.

After the start of the Teach-in the LED 9 lights up and the valve travels into the corresponding final positions and back into the basic position. The positions of the corresponding valve positions are stored.

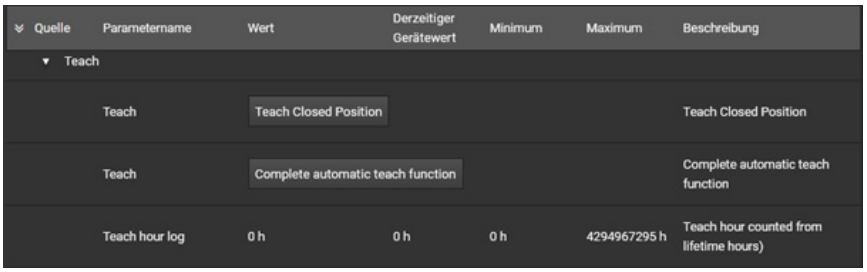


Indication	Status	Action
LED 3-6,9 blink	Delivery status Waiting for Teach-in	Start Teach-in press Teach-in for at least 3 seconds
LED 9 ON LED 3/4 blink	Teach-in active	Wait Do not control valve via PLC.
LED 9 OFF	Successful Teach-in	Valve can be controlled by PLC.
LED 9 ON	Valve Teach carried out	Wait for Teach result
LED 9 blink	Teach-in not successful, repetition required. Possible reasons for Teach-in failure: Compressed air is missing. Supply voltage missing. Switching logic does not fit to valve.	Start Teach-in / press Teach-in key for 3 sec. Check the tech events occurred at the IO-Link master to diagnose the failure.

7. Valve Position Indication

7.3.1 Teach-in hour log

The teach time/hour from the life time hour counter is stored in the parameter "Teach hour log". This function records the time stamp corresponding to the moment when the teaching process was executed.



7.4 Teach closed position

If required, the closed position of a valve can be calibrated separately. The IO-Link parameter "Teach Closed Position" index 94 starts this function.
The assumption of this function is that the valve is closed. This means that all solenoid valves are off for a N.C. (normally closed) valve or the main solenoid valve is activated for a valve with N.O. (normally open) functionality.

7. Valve Position Indication

7.5. To be observed before Teach-in:

- Corresponding switching cam is mounted to the valve guide rod.

Note! Caution!
The switching cam is not identical with the standard CU switching cam!

- CU4plus IO-Link control unit is not duly installed on the valve.
- Valve is duly installed in the process.
- **Valve is not manually controlled or controlled by PLC.**
- Control air is connected (requirements, see Technical Data, chapter 4.5.).
- Nominal valve stroke is not restricted, e.g. through chunky products in the valve.
- Selected switching logic complies with the installed process valve (adjustment is realized via CU4plus Toolbox software, delivery status is switching logic for DA4).

During the Teach-in function, the valve is controlled and moves independently into all operating positions.

As a precaution, the Teach-in function is to be repeated after any valve service or maintenance!

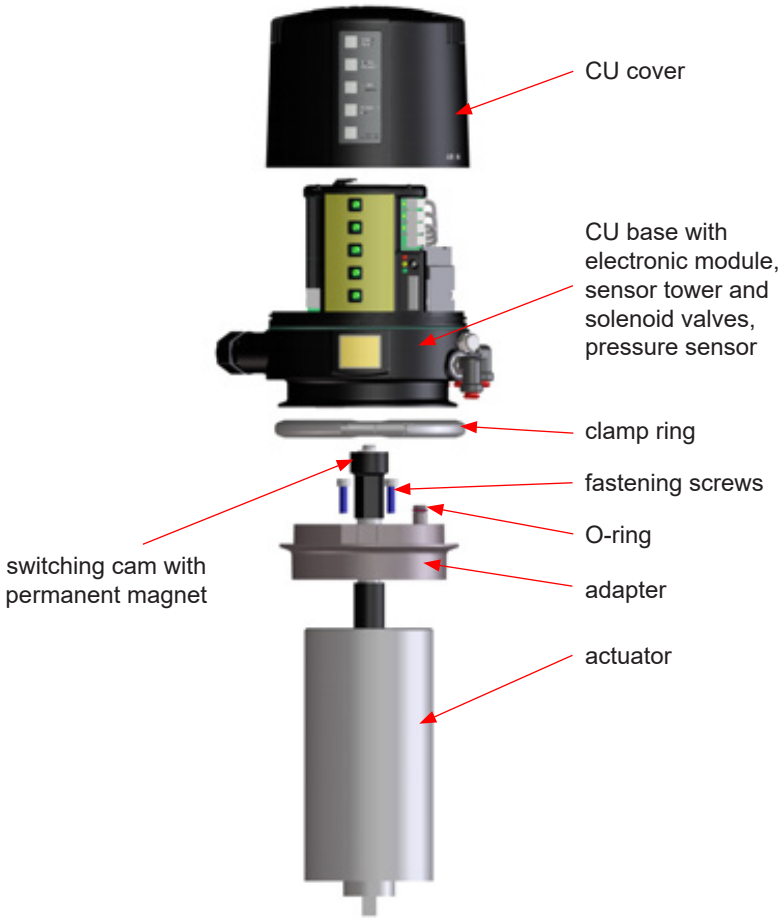
If these instructions are not observed, process failures, product loss or personal injury may occur!

7.6. Use of external sensors

For double seat valves with active seat lift detection (SLD) 2 additional proximity switches are required which are mounted in the actuator area of the DA3+ valve and connected at the electronic module of the CU4plus IO-Link.

8. CU Assembly and Startup

8.1. Valves with turning actuator, e.g. for butterfly valve



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 switching cam with shaft rod prolongation.
   Secure with Loctite semi-solid and fasten it.
3. Place the control unit over the switching 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

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

Observe the Safety Instructions specified in chapter 2.

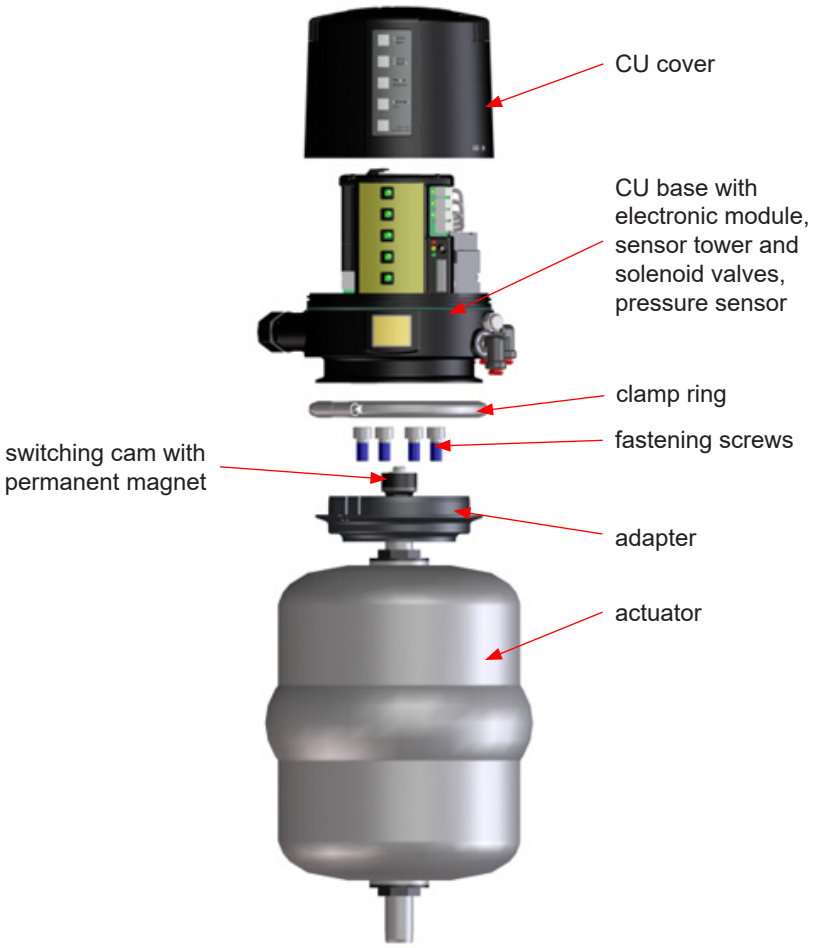
8.1.3. Startup

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. Adjust corresponding logic profile in accordance with the process valve used (if this has not been determined for the delivery status).
4. Select Valve Type: Type 9 Single Seat, Butterfly Valves
5. Start Teach-in. It is mandatory to observe the corresponding prerequisites (**see chapter 7.3.**).

8. CU Assembly and Startup

8.2. Single seat valve



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 switching cam with Loctite semi-solid and fasten it.
3. Place the control unit over the switching 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

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

Observe the Safety Instructions specified in chapter 2.

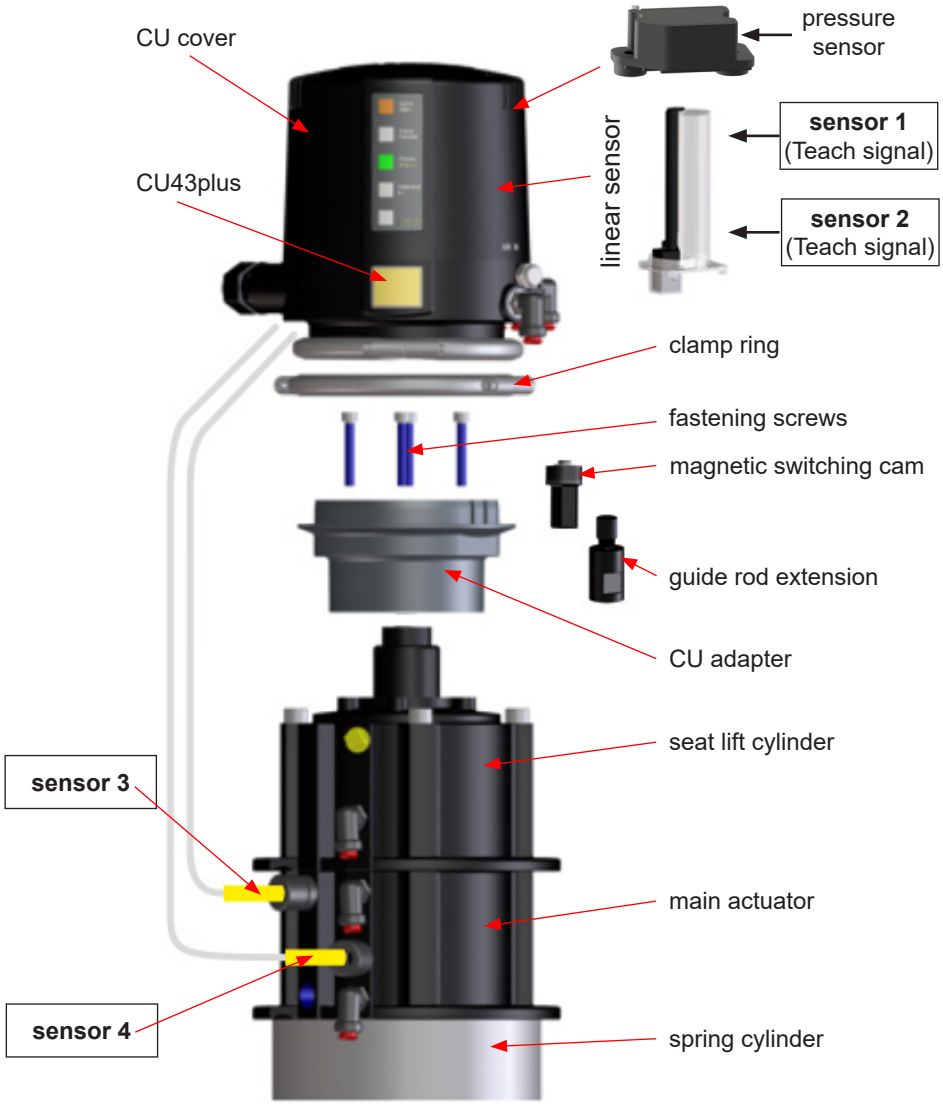
8.2.3. Startup

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. Adjust corresponding logic profile in accordance with the process valve used (if this has not been determined for the delivery status).
4. Select Valve Type: Type 9 Single Seat, Butterfly Valves
5. Start Teach-in. It is mandatory to observe the corresponding prerequisites (**see chapter 7.3.**).

8. CU Assembly and Startup

8.3. Double seat valve DA3+ with activated Seat Lift Detection (SLD)



Assembly of the control unit on the valve

1. Assembly of the adapter on the double seat valve. Fasten with 4 screws.
2. Fasten the guide rod extension on the guide rod.
3. Secure switching cam with Loctite semi-solid and secure on the guide rod extension.
4. Place the control unit onto the adapter. Observe alignment!
5. Attach air connections of the control unit to the valve actuator.
6. Attach the clamp rings and fasten them with the screws.
7. Assemble the external proximity switches at the 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!

See 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.

8.3.2. Electric connection

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

Observe the Safety Instructions specified in chapter 2.

8.3.3. Connection of external proximity switches

The electric connection of the proximity switches specified by SPX is undertaken according to the terminal layout described in chapter 6.

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!

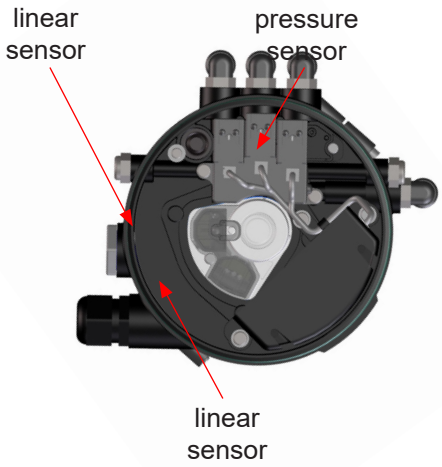
8.3.4. Startup

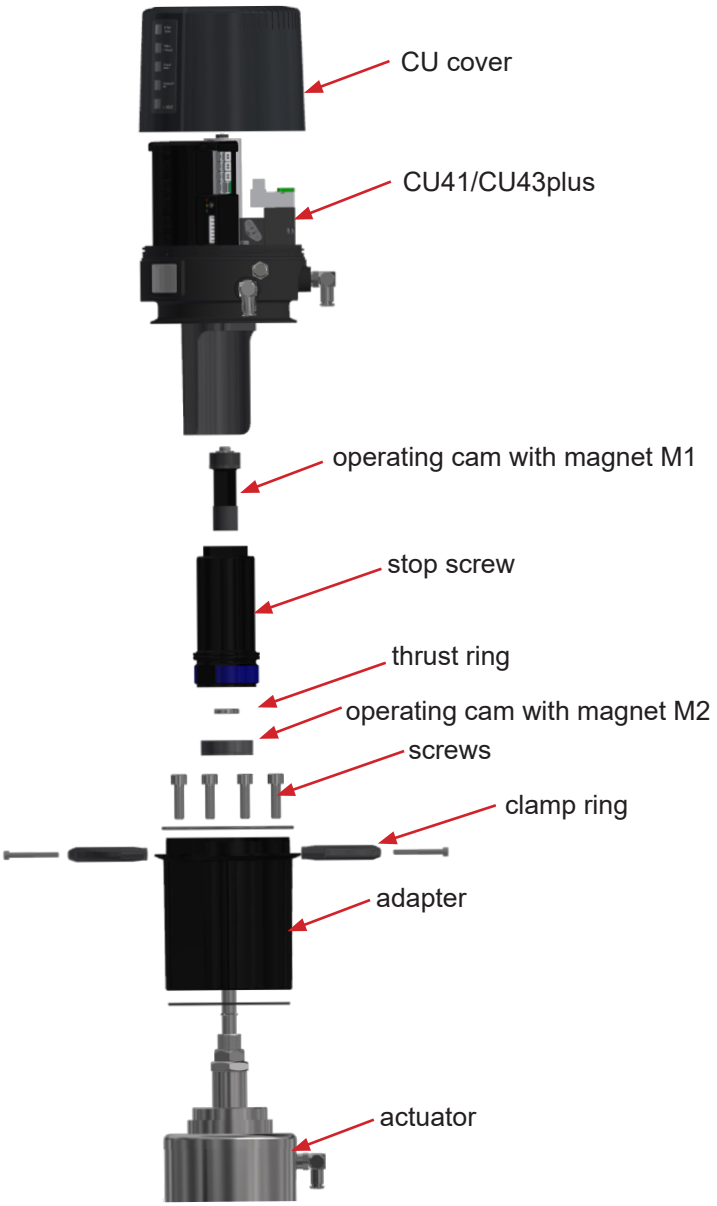
After proper assembly and installation of the control unit, startup can be undertaken as described below:

1. Switch on the air supply.
2. Switch on the voltage supply.
3. Adjust corresponding logic profile in accordance with the process valve used (if this has not been determined for the delivery status).
4. Select Valve Type: Type 6 DA3+
5. Start Teach-in. It is mandatory to observe the corresponding prerequisites (**see chapter 7.3.**).

8. CU Assembly and Startup

8.4. Double seat mix proof valves D4, D4 SL, D4 PMO, DA4





Assembly of the control unit on the valve

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

8. CU Assembly and Startup

8.4.1 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, air connection 1 - main stroke

Connect pneumatic air connection **Y2** with the valve actuator, air connection 2 - upper seat lifting

Connect pneumatic air connection **Y3** with the valve actuator, air connection 3, lower seat lifting

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.

8.4.2 Electric connection

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

Observe the Safety Instructions specified in chapter 2.

solenoid valve block 3

8.4.3 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.
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!

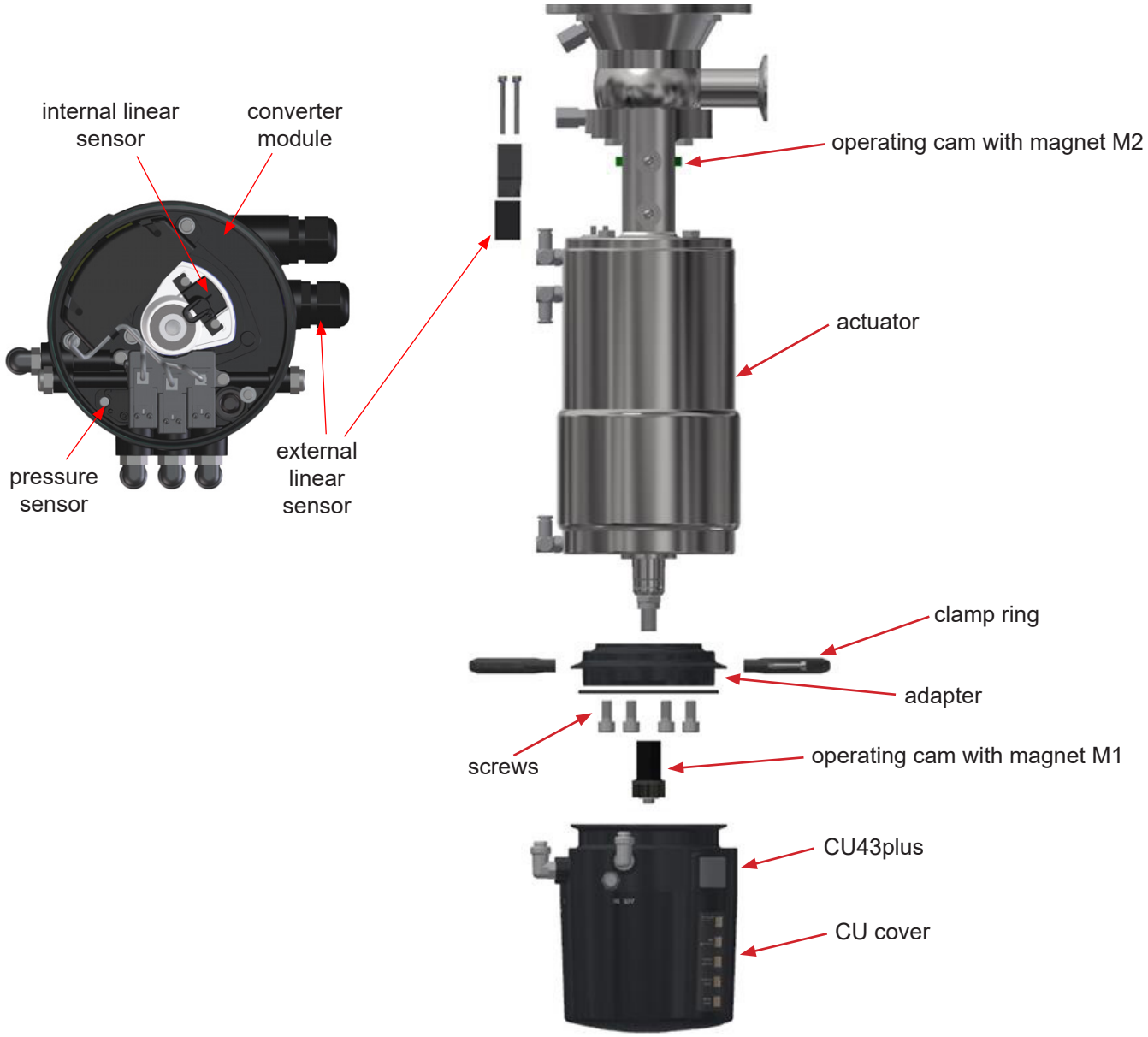
8.4.4 Startup

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 by 90°.
4. Select Valve Type:
   Type 0 DA4
   Type 1 D4
   Type 2 D4 SL
   Type B PMO
5. For final adjustments of the feedback position switches please use the Teach function.

8. CU Assembly and Startup

8.5. Double seat tank outlet valve DT4 SL



Assembly of the control unit on the valve

1. Assemble the magnet M2 on the lower shaft, see DT4 manual.
2. Assemble the operating cam M1 with guide rod extension on the guide rod.
3. Assemble the adapter with the 4 screws on the double seat valve.
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

8.5.1 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, air connection 1 - main stroke

Connect pneumatic air connection **Y2** with the valve actuator, air connection 2 - upper seat lifting

Connect pneumatic air connection **Y3** with the valve actuator, air connection 3, lower seat lifting

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.

8.5.2 Electric connection

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

Observe the Safety Instructions specified in chapter 2.

8. CU Assembly and Startup

solenoid valve block 3

8.5.3 Connection of external linear sensor

The electric connection of the linear sensor specified by SPX FLOW is undertaken according to the terminal layout described in chapter 6.
The external linear sensor is assembled in the yoke of the DT4 SL valve.
Observance of the instruction manual for double seat tank outlet valves is essential!

8.5.4 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 by 90°.
4. Select Valve Type: Type A DT4
5. For final adjustments of the feedback position switches please use the Teach function.

9. Accessories and Tools

Assembly/disassembly - adapter on valve actuator:
- hexagon socket wrench 6 mm
- screwdriver 4 mm

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 SW13

Assembly/disassembly – pressure relief valve:
- Torx wrench TX10

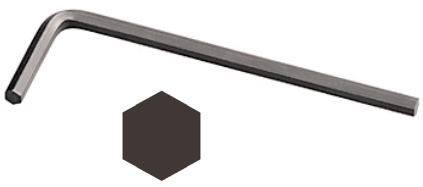
Loctite semi-solid

jaw wrench

torx wrench

screwdriver

hexagon socket wrench



10. Service

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 counterclockwise 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 counterclockwise direction.
+ Release the plug connection of the solenoid valves.
+ Release the cable from the terminal strip, all terminals 1-8.
+ 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 linear 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.

Linear sensor

The linear sensor can only be replaced at the dismantled feedback unit.

+ Remove the 2 screws (14) TX10.
+ Release the plug connection at the electronic module. Dismantle the linear sensor.
+ Assembly in reverse order.
+ Carry out Teach-in.

11. Trouble Shooting

Failure	Remedy
Valve position is not indicated.	Carry out Teach-in.
	Check fastening of magnetic switching cam.
	Check adjusted logic profile and process valve.
Feedback via proximity switches is missing.	Check positioning of proximity switches.
	Check cabeling to the electronic module.
LED indication is missing.	Check cabeling to the electronic module.
Control Unit CU41 installed on Butterfly valves	
Movement of valve flap is missing with actuated solenoid valve.	Check if right control unit is installed. Check label in type window of control unit: CU41plus-T IO-Link
	Check valve movement with manual at solenoid valve.
	Check cabeling 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, Double seal and Double seat valves without seat lifting	
Valve position movement is missing with actuated solenoid valve.	Check if right control unit is installed. Check label in type window of control unit: CU41plus-S IO-Link CU41Nplus-S IO-Link CU41plus-M IO-Link CU41plus-D4 IO-Link
	Check valve movement with manual at solenoid valve.
	Check cabeling between electronic module and solenoid valve.
	Check compressed air (min. 6 bar) (D4 - min. 5 bar).
	Check control air connection between the CU41 and the valve actuator.
Control Unit CU43 installed on Double seat valves with seat lifting	
Valve position movement is missing with actuated solenoid valve.	Check if right control unit is installed. Check label in type window of control unit: CU43plus-M IO-Link CU43plus-D4 IO-Link
	Check valve movement with manual at solenoid valve.
	Check cabeling between electronic module and solenoid valve.
	Check compressed air (min. 6 bar) (D4 - min. 5 bar).
	Check control air connection between the CU43plus and the DA3 / DA4 / D4 SL / D4 PMO / DT4 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
- ID number
- reference number
- parts designation

Data are subject to change.

Spare Parts list

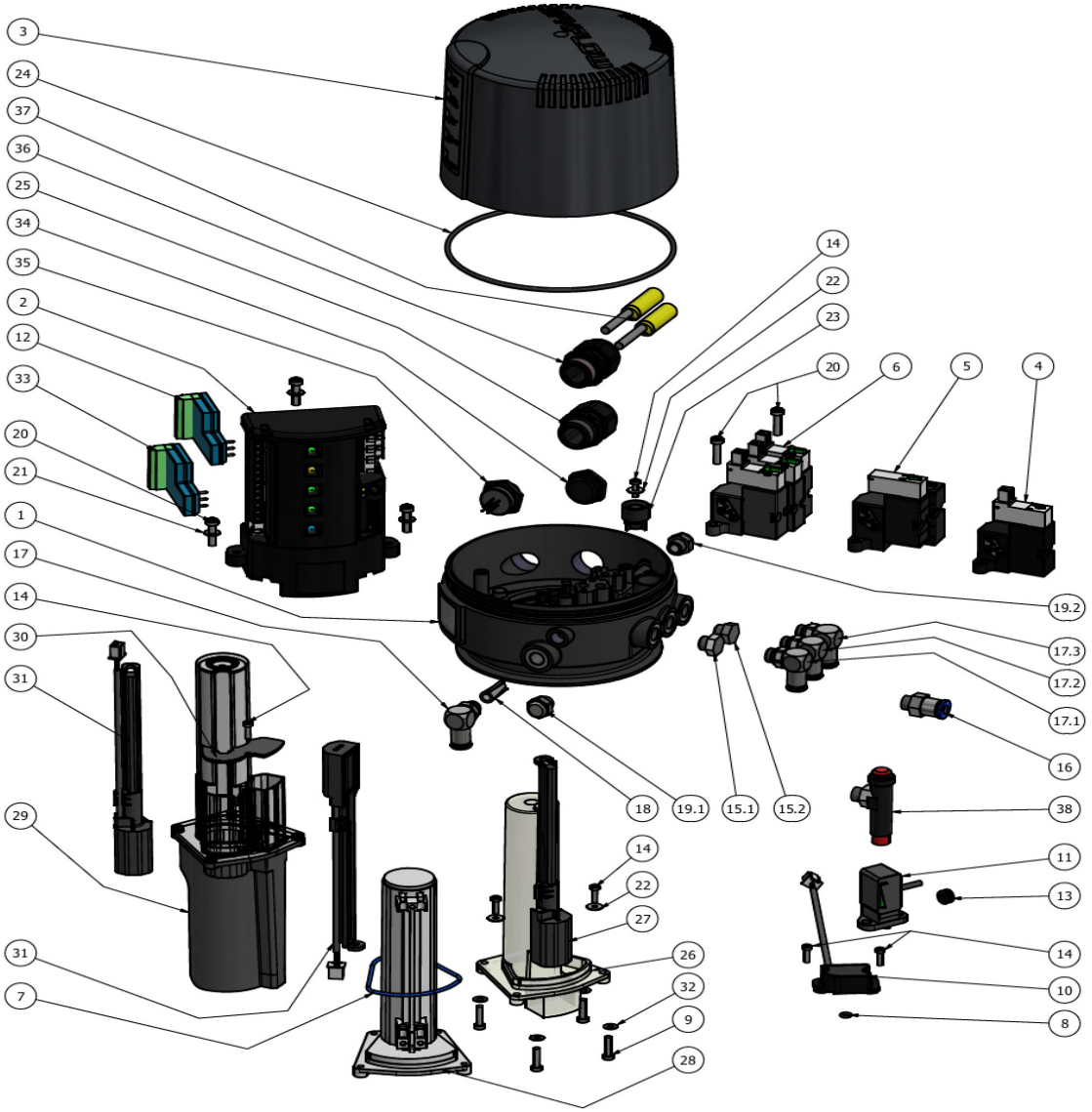
CU4plus IO-Link

Date:	01.03.22	14.09.22		
Name:	C.Keil	C.Keil		
Reviewed:	C.Keil	C.Keil		

Date:				
Name:				
Reviewed:				

SPX FLOW

RN 01.044.8



Spare parts list

CU4plus D4 IO-Link

Date:	01.03.22				**SPX FLOW**
Name:	C.Keil				
Reviewed:	C.Keil				
Date:					Page 2 of 8
Name:					
Reviewed:					**RN 01.044.8**

pos. item	Quantity	Description	required in version	Material	Part no.
		CU41plus D4 M12 IO-Link		PA6.6 GF30	H345138
		CU41plus D4 M12 IO-Link 1/4"		PA6.6 GF30	H345139
		CU43plus D4 M12 IO-Link		PA6.6 GF30	H345134
		CU43plus D4 M12 IO-Link 1/4"		PA6.6 GF30	H345135
1	1	CU41 Base M cpl.	CU41 +1/4"	PA6.6 GF30	H319855
1	1	CU43 Base M cpl.	CU43 +1/4"	PA6.6 GF30	H319857
2	1	CU4plus IO-Link E-Modul	CU41+43 +1/4"	Zytel 70G33L black	H344393
3	1	CU4 cover	CU41+43 +1/4"	PA6.6 GF30	H325602
4	1	Solenoid valve 1 sol.	CU41 +1/4"	PPS	H319950
5					
6	1	Solenoid valve 3 sol.	CU43 +1/4"	PPS	H319952
7	1	O-ring 45,6 x 2,4	CU41+43 +1/4"	NBR	H320401
8	1	O-ring 4-1,5	CU41+43 +1/4"	NBR	H336024
9	4	Ejot Delta PT screw WN5452 35x14	CU41+43 +1/4"	A2	H320364
10	1	CU4plus pressure sensor cpl.	CU41+43 +1/4"	PA6 GF 30	H336026
11					
12					
13					
14	4	Ejot Delta PT screw WN5452 30x10	CU41+43 +1/4"	A2	H320363
15.1	1	Blind plug G1/8"	CU41 +1/4"	Ms / nickel-plated	H320482
15.2					
16					
17	1	Elbow connector	CU41 +43	1.4301 / PA	H208825
17.1	1	Elbow connector	CU41 +43	1.4301 / PA	H208825
17.2	1	Elbow connector	CU43	1.4301 / PA	H208825
17.3	1	Elbow connector	CU43	1.4301 / PA	H208825
17	1	Elbow connector 1/4"	CU41+43 1/4"	1.4301 / PA	H312732
17.1	1	Elbow connector 1/4"	CU41+43 1/4"	1.4301 / PA	H312732
17.2	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732
17.3	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732

pos. item	Quantity	Description	required in version	Material	Part no.
18	1	CU4 air filter	CU41+43 +1/4"	PE-porous	H320223
19.1	1	Sound reducer	CU41+43 +1/4"	Ms / nickel-plated	H208826
19.2	1	Sound reducer	CU43 +1/4"	Ms / nickel-plated	H208826
20	5	Ejot Delta PT screw WN5452 40x16	CU41+43 +1/4"	A2	H320365
21	3	Washer ø4,3 DIN125	CU41+43 +1/4"	A2	H79576
22	1	Washer A 3,2 DIN9021	CU41+43 +1/4"	A2	H320404
23	1	CU4 pressure relief valve	CU41+43 +1/4"	PPS	H320352
24	1	O-ring 120,32 x 2,62	CU41+43 +1/4"	NBR	H320402
25					
26					
27					
28					
29	1	CU4plus sensortower D4 V2	CU41+43 +1/4"	PET	H339461
30	1	Cap CU4plus sensor tower	CU41+43 +1/4"	Noryl 731 S	H339432
31	2	CU4plus Sensor V2	CU41+43 +1/4"	Noryl 731 S	H339463
32	4	Washer A=3,7	CU41+43 +1/4"	A2	H323771
33					
34	1	Blind plug M20x1.5	CU41+43 +1/4"	PA black	H324895
35	1	Flush type connector	CU41+43 +1/4"	Ms / nickel-plated	H338108
36					
37					
38					

CU4plus Adapter

Adapter spareparts information to be found in document: RN 01.044.3-1

Spare parts list

CU4plus DT4 IO-Link

Date:	01.03.22	14.09.22			SPX FLOW
Name:	C.Keil	C.Keil			
Reviewed:	C.Keil	C.Keil			
Date:					Page 3 of 8
Name:					
Reviewed:					RN 01.044.8

pos. item	Quantity	Description	required in version	Material	Part no.
		CU43plus DT4 M12 IO-Link		PA6.6 GF30	H345136
		CU43plus DT4 M12 IO-Link 1/4"		PA6.6 GF30	H345137
1					
1	1	CU43 Base M cpl.	CU43 +1/4"	PA6.6 GF30	H319857
2	1	CU4plus IO-Link E-Modul	CU43 +1/4"	Zytel 70G33L black	H344393
3	1	CU4 cover	CU43 +1/4"	PA6.6 GF30	H325602
4					
5					
6	1	Solenoid valve 3 sol.	CU43 +1/4"	PPS	H319952
7	1	O-ring 45,6 x 2,4	CU43 +1/4"	NBR	H320401
8	1	O-ring 4-1,5	CU43 +1/4"	NBR	H336024
9	4	Ejot Delta PT screw WN5452 35x14	CU43 +1/4"	A2	H320364
10	1	CU4plus pressure sensor cpl.	CU43 +1/4"	PA6 GF 30	H336026
11	1	Balluff Linear sensor	CU43 +1/4"		H343141
12	1	CU4plus Adapter Sensor 0-10V	CU43 +1/4"		H342434
13	1	Gabel grommet	CU43 +1/4"	PVC	H344059
14	5	Ejot Delta PT screw WN5452 30x10	CU43 +1/4"	A2	H320363
15.1					
15.2					
16					
17	1	Elbow connector	CU43	1.4301 / PA	H208825
17.1	1	Elbow connector	CU43	1.4301 / PA	H208825
17.2	1	Elbow connector	CU43	1.4301 / PA	H208825
17.3	1	Elbow connector	CU43	1.4301 / PA	H208825
17	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732
17.1	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732
17.2	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732
17.3	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732

pos. item	Quantity	Description	required in version	Material	Part no.
18	1	CU4 air filter	CU43 +1/4"	PE-porous	H320223
19.1	1	Sound reducer	CU43 +1/4"	Ms / nickel-plated	H208826
19.2	1	Sound reducer	CU43 +1/4"	Ms / nickel-plated	H208826
20	5	Ejot Delta PT screw WN5452 40x16	CU43 +1/4"	A2	H320365
21	3	Washer ø4,3 DIN125	CU43 +1/4"	A2	H79576
22	3	Washer A 3,2 DIN9021	CU43 +1/4"	A2	H320404
23	1	CU4 pressure relief valve	CU43 +1/4"	PPS	H320352
24	1	O-ring 120,32 x 2,62	CU43 +1/4"	NBR	H320402
25	1	Screwed cable gl. M20x1,5 ø5-9	CU43 +1/4"	PA black	H320372
26	1	CU4plus Sensortower	CU43 +1/4"	Grilamid TR90	H321498
27	1	CU4plus sensor cpl.	CU43 +1/4"		H324877
28					
29					
30					
31					
32	4	Washer A=3,7	CU43 +1/4"	A2	H323771
33					
34					
35	1	Flush type connector	CU43 +1/4"	Ms / nickel-plated	H338108
36					
37					
38					

CU4plus Adapter

Adapter spareparts information to be found in document: RN 01.044.3-1

Spare parts list

CU4plus M IO-Link

Date:	01.03.22				SPX FLOW
Name:	C.Keil				
Reviewed:	C.Keil				
Date:					Page 4 of 8
Name:					
Reviewed:					RN 01.044.8

pos. item	Quantity	Description	required in version	Material	Part no.
		CU41plus M M12 IO-Link		PA6.6 GF30	H345128
		CU41plus M M12 IO-Link 1/4"		PA6.6 GF30	H345129
		CU43plus M M12 IO-Link		PA6.6 GF30	H345132
		CU43plus M M12 IO-Link 1/4"		PA6.6 GF30	H345133
1	1	CU41 Base M cpl.	CU41 +1/4"	PA6.6 GF30	H319855
1	1	CU43 Base M cpl.	CU43 +1/4"	PA6.6 GF30	H319857
2	1	CU4plus IO-Link E-Modul	CU41+43 +1/4"	Zytel 70G33L black	H344393
3	1	CU4 cover	CU41+43 +1/4"	PA6.6 GF30	H325602
4	1	Solenoid valve 1 sol.	CU41 +1/4"	PPS	H319950
5					
6	1	Solenoid valve 3 sol.	CU43 +1/4"	PPS	H319952
7	1	O-ring 45,6 x 2,4	CU43 +1/4"	NBR	H320401
8	1	O-ring 4-1,5	CU43 +1/4"	NBR	H336024
9	4	Ejot Delta PT screw WN5452 35x14	CU43 +1/4"	A2	H320364
10	1	CU4plus pressure sensor cpl.	CU43 +1/4"	PA6 GF 30	H336026
11					
12					
13					
14	5	Ejot Delta PT screw WN5452 30x10	CU43 +1/4"	A2	H320363
15.1	1	Blind plug G1/8"	CU41 +1/4"	Ms / nickel-plated	H320482
15.2					
16					
17	1	Elbow connector	CU41+43	1.4301 / PA	H208825
17.1	1	Elbow connector	CU41+43	1.4301 / PA	H208825
17.2	1	Elbow connector	CU43	1.4301 / PA	H208825
17.3	1	Elbow connector	CU43	1.4301 / PA	H208825
17	1	Elbow connector 1/4"	CU41+43 1/4"	1.4301 / PA	H312732
17.1	1	Elbow connector 1/4"	CU41+43 1/4"	1.4301 / PA	H312732
17.2	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732
17.3	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732

pos. item	Quantity	Description	required in version	Material	Part no.
18	1	CU4 air filter	CU43 +1/4"	PE-porous	H320223
19.1	1	Sound reducer	CU41+43 +1/4"	Ms / nickel-plated	H208826
19.2	1	Sound reducer	CU43 +1/4"	Ms / nickel-plated	H208826
20	5	Ejot Delta PT screw WN5452 40x16	CU43 +1/4"	A2	H320365
21	3	Washer ø4,3 DIN125	CU43 +1/4"	A2	H79576
22	3	Washer A 3,2 DIN9021	CU43 +1/4"	A2	H320404
23	1	CU4 pressure relief valve	CU43 +1/4"	PPS	H320352
24	1	O-ring 120,32 x 2,62	CU43 +1/4"	NBR	H320402
25					
26	1	CU4plus Sensortower	CU43 +1/4"	Grilamid TR90	H321498
27	1	CU4plus sensor cpl.	CU43 +1/4"		H324877
28	1	CU4 Sensortower	CU41 +1/4"	Grilamid TR90	H319868
29					
30					
31					
32	4	Washer A=3,7	CU43 +1/4"	A2	H323771
33	1	CU4plus ada. sensor 2 prox. Switches	CU41+43 +1/4"	PA6.6 GF30	H342435
34					
35	1	Flush type connector	CU43 +1/4"	Ms / nickel-plated	H338108
36	1	Screwed cable gl. M20x1,5; 2x5	CU41+43 +1/4"	PA black	H320371
37	2	Proximity switch Ni5 K11K-AN 5X/5	CU41+43 +1/4"		H208844
38					

CU4plus Adapter

Adapter spareparts information to be found in document: RN 01.044.3-1

Spare parts list

CU4plus S IO-Link

Date:	01.03.22				**SPX FLOW**
Name:	C.Keil				
Reviewed:	C.Keil				
Date:					Page 5 of 8
Name:					
Reviewed:					**RN 01.044.8**

pos. item	Quantity	Description	required in version	Material	Part no.
		CU41plus S M12 IO-Link		PA6.6 GF30	H345124
		CU41plus S M12 IO-Link 1/4"		PA6.6 GF30	H345125
		CU43plus S M12 IO-Link		PA6.6 GF30	H345130
		CU43plus S M12 IO-Link 1/4"		PA6.6 GF30	H345131
1	1	CU41 Base S cpl.	CU41 +1/4"	PA6.6 GF30	H319853
1	1	CU43 Base M cpl.	CU43 +1/4"	PA6.6 GF30	H319857
2	1	CU4plus IO-Link E-Modul	CU41+43 +1/4"	Zytel 70G33L black	H344393
3	1	CU4 cover	CU41+43 +1/4"	PA6.6 GF30	H325602
4	1	Solenoid valve 1 sol.	CU41 +1/4"	PPS	H319950
5					
6	1	Solenoid valve 3 sol.	CU43 +1/4"	PPS	H319952
7	1	O-ring 45,6 x 2,4	CU43 +1/4"	NBR	H320401
8	1	O-ring 4-1,5	CU43 +1/4"	NBR	H336024
9	4	Ejot Delta PT screw WN5452 35x14	CU43 +1/4"	A2	H320364
10	1	CU4plus pressure sensor cpl.	CU43 +1/4"	PA6 GF 30	H336026
11					
12					
13					
14	5	Ejot Delta PT screw WN5452 30x10	CU43 +1/4"	A2	H320363
15.1	1	Blind plug G1/8"	CU41 +1/4"	Ms / nickel-plated	H320482
15.2	1	Blind plug G1/8"	CU43 +1/4"	Ms / nickel-plated	H320482
16					
17	1	Elbow connector	CU41+43	1.4301 / PA	H208825
17.1	1	Elbow connector	CU41+43	1.4301 / PA	H208825
17.2	1	Elbow connector	CU43	1.4301 / PA	H208825
17.3					
17	1	Elbow connector 1/4"	CU41+43 1/4"	1.4301 / PA	H312732
17.1	1	Elbow connector 1/4"	CU41+43 1/4"	1.4301 / PA	H312732
17.2	1	Elbow connector 1/4"	CU43 1/4"	1.4301 / PA	H312732
17.3					

pos. item	Quantity	Description	required in version	Material	Part no.
18	1	CU4 air filter	CU41+43 +1/4"	PE-porous	H320223
19.1	1	Sound reducer	CU41+43 +1/4"	Ms / nickel-plated	H208826
19.2	1	Sound reducer	CU41+43 +1/4"	Ms / nickel-plated	H208826
20	5	Ejot Delta PT screw WN5452 40x16	CU41+43 +1/4"	A2	H320365
21	3	Washer ø4,3 DIN125	CU41+43 +1/4"	A2	H79576
22	3	Washer A 3,2 DIN9021	CU41+43 +1/4"	A2	H320404
23	1	CU4 pressure relief valve	CU41+43 +1/4"	PPS	H320352
24	1	O-ring 120,32 x 2,62	CU41+43 +1/4"	NBR	H320402
25					
26	1	CU4plus Sensortower	CU41+43 +1/4"	Grilamid TR90	H321498
27	1	CU4plus sensor cpl.	CU41+43 +1/4"		H324877
28					
29					
30					
31					
32	4	Washer A=3,7	CU41+43 +1/4"	A2	H323771
33					
34	1	Blind plug M20x1.5	CU43 +1/4"	PA black	H324895
35	1	Flush type connector	CU41+43 +1/4"	Ms / nickel-plated	H338108
36					
37					
38					

CU4plus Adapter

Adapter spareparts information to be found in document: RN 01.044.3-1

Spare parts list

CU41Nplus S IO-Link

Date:	01.03.22				SPX FLOW
Name:	C.Keil				
Reviewed:	C.Keil				
Date:					Page 6 of 8
Name:					
Reviewed:					RN 01.044.8

pos. item	Quantity	Description	required in version	Material	Part no.
		CU41Nplus S M12 IO-Link		PA6.6 GF30	H345140
		CU41Nplus S M12 IO-Link 1/4"		PA6.6 GF30	H345141
1	1	CU41 Base S cpl.	CU41 +1/4"	PA6.6 GF30	H319853
1					
2	1	CU4plus IO-Link E-Modul	CU41 +1/4"	Zytel 70G33L black	H344393
3	1	CU4 cover	CU41 +1/4"	PA6.6 GF30	H325602
4					
5	1	Solenoid valve 1sol.+NOT elemen	CU41 +1/4"	PPS	H319951
6					
7	1	O-ring 45,6 x 2,4	CU41 +1/4"	NBR	H320401
8	1	O-ring 4-1,5	CU41 +1/4"	NBR	H336024
9	4	Ejot Delta PT screw WN5452 35x14	CU41 +1/4"	A2	H320364
10	1	CU4plus pressure sensor cpl.	CU41 +1/4"	PA6 GF 30	H336026
11					
12					
13					
14	5	Ejot Delta PT screw WN5452 30x10	CU41 +1/4"	A2	H320363
15.1					
15.2					
16	1	Connector Self-locking	CU41 +1/4"	Ms / nickel-plated	H320551
17	1	Elbow connector	CU41	1.4301 / PA	H208825
17.1	1	Elbow connector	CU41	1.4301 / PA	H208825
17.2					
17.3					
17	1	Elbow connector 1/4"	CU41 +1/4"	1.4301 / PA	H312732
17.1	1	Elbow connector 1/4"	CU41 +1/4"	1.4301 / PA	H312732
17.2					
17.3					

pos. item	Quantity	Description	required in version	Material	Part no.
18	1	CU4 air filter	CU41 +1/4"	PE-porous	H320223
19.1	1	Sound reducer	CU41 +1/4"	Ms / nickel-plated	H208826
19.2					
20	5	Ejot Delta PT screw WN5452 40x16	CU41 +1/4"	A2	H320365
21	3	Washer ø4,3 DIN125	CU41 +1/4"	A2	H79576
22	3	Washer A 3,2 DIN9021	CU41 +1/4"	A2	H320404
23	1	CU4 pressure relief valve	CU41 +1/4"	PPS	H320352
24	1	O-ring 120,32 x 2,62	CU41 +1/4"	NBR	H320402
25					
26	1	CU4plus Sensortower	CU41 +1/4"	Grilamid TR90	H321498
27	1	CU4plus sensor cpl.	CU41 +1/4"		H324877
28					
29					
30					
31					
32	4	Washer A=3,7	CU41 +1/4"	A2	H323771
33					
34					
35	1	Flush type connector	CU41 +1/4"	Ms / nickel-plated	H338108
36					
37					
38	1	Pressure reducing valve	CU41 +1/4"	Ms / nickel-plated	H208841

CU4plus Adapter

Adapter spareparts information to be found in document: RN 01.044.3-1

Spare parts list

CU4plus T IO-Link

Date:	01.03.22				**SPX FLOW**
Name:	C.Keil				
Reviewed:	C.Keil				
Date:					Page 7 of 8
Name:					
Reviewed:					**RN 01.044.8**

pos. item	Quantity	Description	required in version	Material	Part no.
		CU41plus T M12 IO-Link		PA6.6 GF30	H345126
		CU41plus T M12 IO-Link 1/4"		PA6.6 GF30	H345127
1	1	CU41 Base T cpl.	CU41 +1/4"	PA6.6 GF30	H319854
1					
2	1	CU4plus IO-Link E-Modul	CU41 +1/4"	Zytel 70G33L black	H344393
3	1	CU4 cover	CU41 +1/4"	PA6.6 GF30	H325602
4	1	Solenoid valve 1 sol.	CU41 +1/4"	PPS	H319950
5					
6					
7	1	O-ring 45,6 x 2,4	CU41 +1/4"	NBR	H320401
8	1	O-ring 4-1,5	CU41 +1/4"	NBR	H336024
9	4	Ejot Delta PT screw WN5452 35x14	CU41 +1/4"	A2	H320364
10	1	CU4plus pressure sensor cpl.	CU41 +1/4"	PA6 GF 30	H336026
11					
12					
13					
14	5	Ejot Delta PT screw WN5452 30x10	CU43 +1/4"	A2	H320363
15.1	1	Blind plug G1/8"	CU41 +1/4"	Ms / nickel-plated	H320482
15.2	1	Blind plug G1/8"	CU41 +1/4"	Ms / nickel-plated	H320482
16					
17	1	Elbow connector	CU41	1.4301 / PA	H208825
17.1					
17.2					
17.3					
17	1	Elbow connector 1/4"	CU41 1/4"	1.4301 / PA	H312732
17.1					
17.2					
17.3					

pos. item	Quantity	Description	required in version	Material	Part no.
18	1	CU4 air filter	CU41 +1/4"	PE-porous	H320223
19.1	1	Sound reducer	CU41 +1/4"	Ms / nickel-plated	H208826
19.2					
20	5	Ejot Delta PT screw WN5452 40x16	CU41 +1/4"	A2	H320365
21	3	Washer ø4,3 DIN125	CU41 +1/4"	A2	H79576
22	3	Washer A 3,2 DIN9021	CU41 +1/4"	A2	H320404
23	1	CU4 pressure relief valve	CU41 +1/4"	PPS	H320352
24	1	O-ring 120,32 x 2,62	CU41 +1/4"	NBR	H320402
25					
26	1	CU4plus Sensortower	CU41 +1/4"	Grilamid TR90	H321498
27	1	CU4plus sensor cpl.	CU41 +1/4"		H324877
28					
29					
30					
31					
32	4	Washer A=3,7	CU41 +1/4"	A2	H323771
33					
34					
35	1	Flush type connector	CU41 +1/4"	Ms / nickel-plated	H338108
36					
37					
38					

CU4plus Adapter

Adapter spareparts information to be found in document: RN 01.044.3-1

Spare parts list

CU41Nplus T IO-Link

Date:	01.03.22				SPX FLOW
Name:	C.Keil				
Reviewed:	C.Keil				
Date:					Page 8 of 8
Name:					
Reviewed:					RN 01.044.8

pos. item	Quantity	Description	required in version	Material	Part no.
		CU41Nplus T M12 IO-Link		PA6.6 GF30	H345142
		CU41Nplus T M12 IO-Link 1/4"		PA6.6 GF30	H345143
1	1	CU41 Base T cpl.	CU41 +1/4"	PA6.6 GF30	H319854
1					
2	1	CU4plus IO-Link E-Modul	CU41 +1/4"	Zytel 70G33L black	H344393
3	1	CU4 cover	CU41 +1/4"	PA6.6 GF30	H325602
4	1	Solenoid valve 1 sol.	CU41 +1/4"	PPS	H319950
5					
6					
7	1	O-ring 45,6 x 2,4	CU41 +1/4"	NBR	H320401
8	1	O-ring 4-1,5	CU41 +1/4"	NBR	H336024
9	4	Ejot Delta PT screw WN5452 35x14	CU41 +1/4"	A2	H320364
10	1	CU4plus pressure sensor cpl.	CU41 +1/4"	PA6 GF 30	H336026
11					
12					
13					
14	5	Ejot Delta PT screw WN5452 30x10	CU43 +1/4"	A2	H320363
15.1	1	Blind plug G1/8"	CU41 +1/4"	Ms / nickel-plated	H320482
15.2					
16	1	Connector Self-locking	CU41 +1/4"	Ms / nickel-plated	H320551
17	1	Elbow connector	CU41	1.4301 / PA	H208825
17.1					
17.2					
17.3					
17	1	Elbow connector 1/4"	CU41 1/4"	1.4301 / PA	H312732
17.1					
17.2					
17.3					

pos. item	Quantity	Description	required in version	Material	Part no.
18	1	CU4 air filter	CU41 +1/4"	PE-porous	H320223
19.1	1	Sound reducer	CU41 +1/4"	Ms / nickel-plated	H208826
19.2					
20	5	Ejot Delta PT screw WN5452 40x16	CU41 +1/4"	A2	H320365
21	3	Washer ø4,3 DIN125	CU41 +1/4"	A2	H79576
22	3	Washer A 3,2 DIN9021	CU41 +1/4"	A2	H320404
23	1	CU4 pressure relief valve	CU41 +1/4"	PPS	H320352
24	1	O-ring 120,32 x 2,62	CU41 +1/4"	NBR	H320402
25					
26	1	CU4plus Sensortower	CU41 +1/4"	Grilamid TR90	H321498
27	1	CU4plus sensor cpl.	CU41 +1/4"		H324877
28					
29					
30					
31					
32	4	Washer A=3,7	CU41 +1/4"	A2	H323771
33					
34					
35	1	Flush type connector	CU41 +1/4"	Ms / nickel-plated	H338108
36					
37					
38	1	Pressure reducing valve	CU41 +1/4"	Ms / nickel-plated	H208841

CU4plus Adapter

Adapter spareparts information to be found in document: RN 01.044.3-1

Ersatzteilliste: spare parts list

CU4plus Adapter

Datum:	26.01.16	04.04.16	20.05.19	09.11.19	
Name:	Trytko	Trytko	C.Keil	C.Keil	
Geprüft:	Schulz	Schulz	C.Keil	C.Keil	
Datum:	26.01.21				
Name:	C.Keil				
Geprüft:	C.Keil				

SPX FLOW

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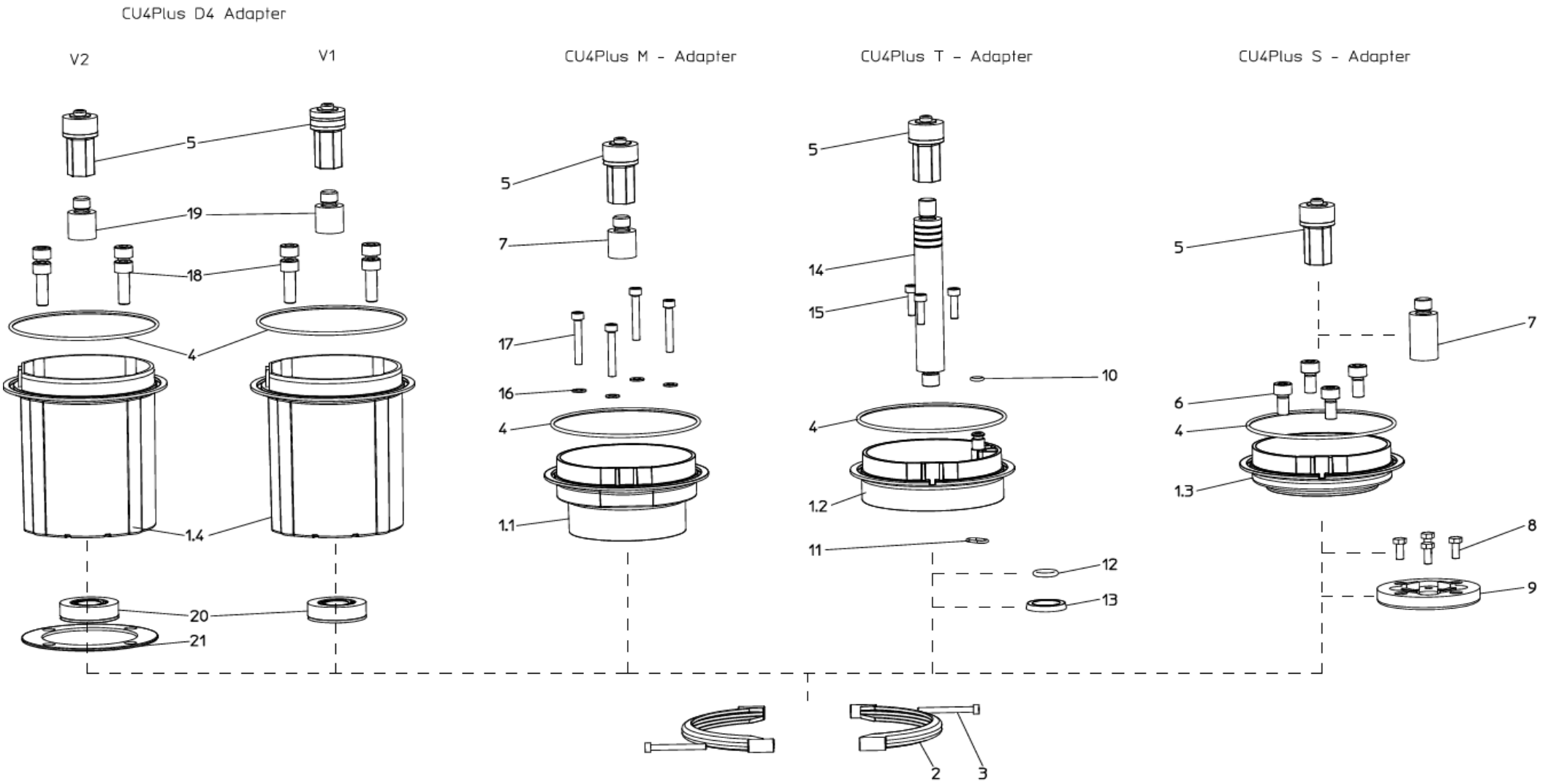

Ersatzteilliste: spare parts list

CU4plus Adapter

Datum:	26.01.16	04.04.16	20.05.19	09.11.19	
Name:	Trytko	Trytko	C.Keil	C.Keil	
Geprüft:	Schulz	Schulz	C.Keil	C.Keil	
Datum:	26.01.21				
Name:	C.Keil				
Geprüft:	C.Keil				

SPX FLOW

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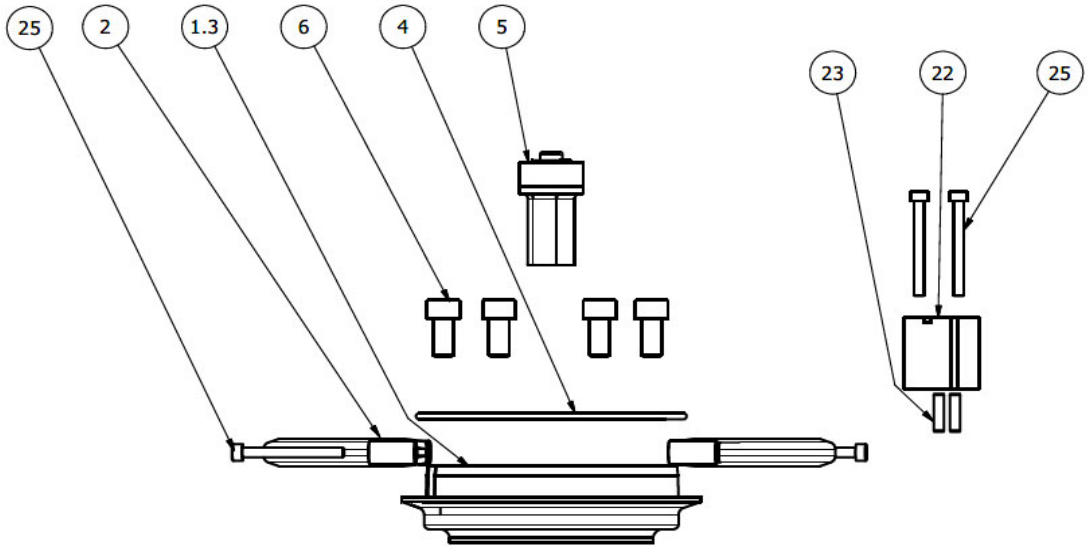
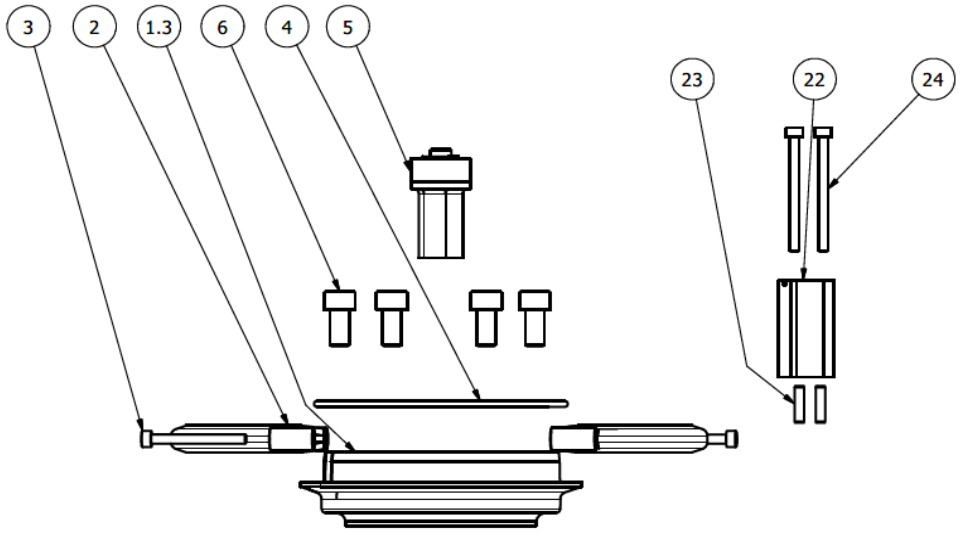
CU4Plus DT4 -62 Adapter



CU4Plus DT4 -92 Adapter



Ersatzteilliste: spare parts list

CU4plus Adapter

Datum:	26.01.16	04.04.16	20.05.19	
Name:	Trytko	Trytko	C.Keil	
Geprüft:	Schulz	Schulz	C.Keil	

Datum:				
Name:				
Geprüft:				

SPX FLOW

RN01.044.3-1

pos. item	Menge quantity	Beschreibung description	Material material	CU4plus - S WS-Nr. ref.-no.	CU4plus - S Langhub ø165 WS-Nr. ref.-no.	CU4plus-Smini WS-Nr. ref.-no.	CU4plus-Smax WS-Nr. ref.-no.	CU4plus - T WS-Nr. ref.-no.	CU4plus-Tmax WS-Nr. ref.-no.
		CU4 Adapter kpl. CU4 adapter cpl.		08-48-690/93 H333143	08-48-696/93 H335312	08-48-691/93 H333144	08-48-692/93 H333145	08-48-693/93 H333146	08-48-694/93 H333147
1.1	1	CU4 Adapter M CU4 adapter M	Zytel 70G33L schwarz						
1.2	1	CU4 Adapter T CU4 adapter T	Zytel 70G33L schwarz					08-46-571/93 H319875	
1.3	1	CU4 Adapter S CU4 adapter S	Zytel 70G33L schwarz	08-46-570/93 H319874					
2	2	CU4 Clamphalbschale kpl. CU4 clamp cpl.	Grivory GH-5H1	08-46-569/93 H319873					
3	2	Zylinderschraube DIN EN ISO 4762 M4x40 Cyl. Screw	A2-70	65-05-040/13 H320360					
4	1	O-Ring OR 101,27x2,62 O-ring	NBR	58-06-493/83 H148389					
5	1	CU4 Magnetschaltnocke kpl. CU4 magnet switch cam cpl.	Zytel HTN	08-46-767/93 H333099					
6	4	Zylinderschraube DIN EN ISO 4762 Cyl. Screw	A2-70	65-05-120/13 M8x16 H79012	65-05-122/13 M8x25 H79014	65-05-120/13 M8x16 H79012	65-05-129/13 M8x60 H315760		
7	1	Zugstangenverlängerung Guide rod extension	PA6			15-26-070/93 H208096	15-26-058/93 H327149		
8	4	Skt. Schraube DIN EN 24017 M5x12 Hex. screw	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 OR 6x2 O-ring	NBR					58-06-059/83 H320505	
11	1	O-Ring OR 11x2 O-ring	NBR					58-06-034/83 H321897	
12	1	O-Ring OR 11x3 O-ring	NBR						58-06-039/83 H208632

Ersatzteilliste: spare parts list

CU4plus Adapter

Datum:	26.01.16	04.04.16	20.05.19	
Name:	Trytko	Trytko	C.Keil	
Geprüft:	Schulz	Schulz	C.Keil	

Datum:				
Name:				
Geprüft:				

SPX FLOW

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pos. item	Menge quantity	Beschreibung description	Material material	**CU4plus - S** WS-Nr. ref.-no.	**CU4plus - S Langhub ø165** WS-Nr. ref.-no.	**CU4plus-Smini** WS-Nr. ref.-no.	**CU4plus-Smax** WS-Nr. ref.-no.	**CU4plus - T** WS-Nr. ref.-no.	**CU4plus-Tmax** WS-Nr. ref.-no.
13	1	V-Dichtung V-sealing	NBR						58-06-039/83 H171060
14	1	CU4 Schaltstange CU4 guide rod	1) PA6.6 2) 1.4301					08-60-905/93 1) H320480	08-60-906/12 2) H321990
15	3	Zylinderschraube DIN EN ISO 4762 M5x16 Cyl. Screw	A2-70					65-05-054/13 H79000	
16	4	Scheibe DIN EN ISO 7092 9x5,48 Washer	A2						
17	4	Zylinderschraube DIN EN ISO 4762 M5x35 Cyl. Screw	A2-70						

Ersatzteilliste: spare parts list

CU4plus Adapter

Datum:	26.01.16	04.04.16	20.05.19	09.11.19
Name:	Trytko	Trytko	C.Keil	C.Keil
Geprüft:	Schulz	Schulz	C.Keil	C.Keil

Datum:	26.01.21	01.03.2022		
Name:	C.Keil	C.Keil		
Geprüft:	C.Keil	C.Keil		

SPX FLOW

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RN01.044.3-1

pos. item	Menge quantity	Beschreibung description	Material material	CU41plus - M CU4-M is used WS-Nr. ref.-no.	CU43plus - M WS-Nr. ref.-no.	CU4plus - D4 V1 WS-Nr. ref.-no.	CU4plus - D4 V2 WS-Nr. ref.-no.	CU4plus DT4-62 WS-Nr. ref.-no.	CU4plus DT4-92 WS-Nr. ref.-no.
		CU4 Adapter kpl. CU4 adapter cpl.		08-48-602/93 H320476	08-48-695/93 H333148	08-48-666/93 H336441	08-48-668/93 H341891	08-48-699/93 H343619	08-48-700/93 H343620
1.1	1	CU4 Adapter M CU4 adapter M	Zytel 70G33L schwarz	08-46-572/93 H319876					
1.2	1	CU4 Adapter T CU4 adapter T	Zytel 70G33L schwarz						
1.3	1	CU4 Adapter S CU4 adapter S	Zytel 70G33L schwarz					08-46-570/93 H319874	
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 DIN EN ISO 4762 M4x40 Cyl. Screw	A2-70	65-05-040/13 H320360					
4	1	O-Ring OR 101,27x2,62 O-ring	NBR	58-06-493/83 H148389					
5	1	CU4 Magnetschaltnocke kpl. CU4 magnet switch cam cpl.	Zytel HTN		08-46-767/93 H333099	08-60-900/93 H320479	08-46-767/93 H333099		
6	4	Zylinderschraube DIN EN ISO 4762 Cyl. Screw	A2-70					65-05-120/13 M8x16 H79012	
7	1	Zugstangenverlängerung Guide rod extension	PA6		08-46-920/93 H333136				
8	4	Skt. Schraube DIN EN 24017 M5x12 Hex. screw	A2-70						
9	1	CU Adapter SW4 CU adapter SW4	PA6						
10	1	O-Ring OR 6x2 O-ring	NBR						
11	1	O-Ring OR 11x2 O-ring	NBR						

Ersatzteilliste: spare parts list

CU4plus Adapter

Datum:	26.01.16	04.04.16	20.05.19	09.11.19
Name:	Trytko	Trytko	C.Keil	C.Keil
Geprüft:	Schulz	Schulz	C.Keil	C.Keil

Datum:	26.01.21			
Name:	C.Keil			
Geprüft:	C.Keil			

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Blatt 6 von 6

RN01.044.3-1

pos. item	Menge quantity	Beschreibung description	Material material	CU41plus - M CU4-M is used WS-Nr. ref.-no.	CU43plus - M WS-Nr. ref.-no.	CU4plus - D4 V1 WS-Nr. ref.-no.	CU4plus - D4 V2 WS-Nr. ref.-no.	CU4plus DT4-62 WS-Nr. ref.-no.	CU4plus DT4-92 WS-Nr. ref.-no.
12	1	O-Ring O-ring OR 11x3	NBR						
13	1	V-Dichtung V-sealing	NBR						
14	1	CU4 Schaltstange CU4 guide rod	1) PA6.6 2) 1.4301						
15	3	Zylinderschraube Cyl. Screw DIN EN ISO 4762 M5x16	A2-70						
16	4	Scheibe Washer DIN EN ISO 7092 9x5,48	A2	08-60-767/15 H208842					
17	4	Zylinderschraube Cyl. Screw DIN EN ISO 4762 M5x35	A2-70	65-06-056/13 H79028					
18	4	Zylinderschraube M8 Cyl. screw M8	A2-70			65-05-122/13 H79014	65-05-123/13 H173568		
19	1	D4 Zugstangen Adapter für CU4 D4 guide rod adapter for CU4	PA6.6			08-46-824/93 H336934			
20	1	D4 Magnet CU4plus kpl. D4 magnet CU4plus cpl.				08-46-924/93 H336935			
21	1	CU4plus V2 distanzring CU4plus V2 distance washer	NBR				08-46-941/93 H342644		
22		Balluff Adapter Balluff adapter	PA6.6					08-20-158/12 H342080	08-20-161/12 H343618
23		Zylinder Stift Parallel Pin DIN EN ISO 2338 4x16	A1					08-49-074/12 H343581	
24		Zylinder Schraube Cap screw DIN EN ISO 4762 M4x50	A2-70						65-05-051/13 H343617
25		Zylinder Schraube Cap screw DIN EN ISO 4762 M4x40	A2-70					65-05-040/13 H320360	

CU4plus IO-Link

Control Unit

SPXFLOW®

SPX FLOW

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