

Operating Manual

CU4econo Direct Connect

Control Unit



Read and understand this manual prior to operating or servicing this product.

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**IT IS ESSENTIAL TO READ THIS OPERATING MANUAL
BEFORE USE OF THE CONTROL UNIT!**

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
IP	International Protection
LED	luminous diode
N	Pneumatic Air Connection NOT element
NEMA	National Electrical Manufacturers Association
P	Supply Air Connection
PWM	pulse-width modulation
Y	Pneumatic Air Connection

2. Safety Instructions

2.1. Sentinels

Symbol:



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. Conventional Use

The DELTA CU4 control unit is only intended for use as described in **chapter 3.1**. Use beyond that described in **chapter 3.1** is not according to regulations and APV shall not be responsible for any damage resulting from this non-observance. The operator bears the full risk. Conditions for a proper and safe operation of the control unit are the appropriate transport and storing as well as the professional assembly. Conventional 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 operating 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 operating manual.
- Work at the electrical installation may only be carried out by personnel specialised in electrics!

2.6. Warranty

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

Attention !

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

3. General Terms

3.1. Purpose of use

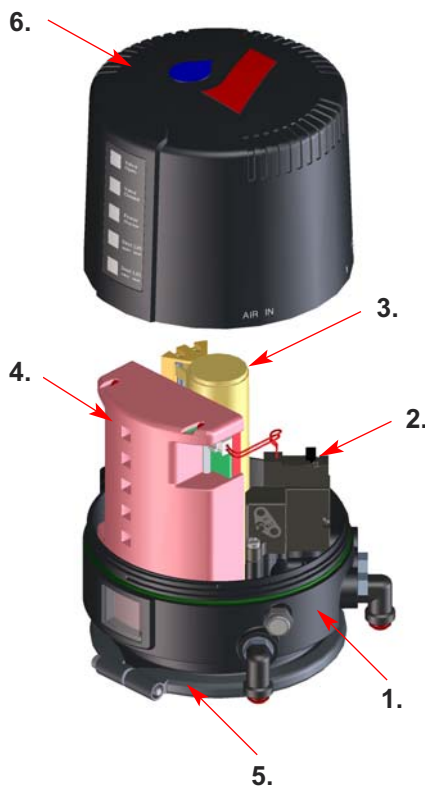
The Control Unit Delta CU4 *econo* Direct Connect has been developed for the control of process valves used in the food industry and related industries.

The CU4 control unit operates as interface between process control and process valve and controls the electric and pneumatic signals.

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

The corresponding light signals in the control unit provide for an external indication of the valve positions.

fig. 3.2.



3.2. Design of CU4 *econo* Direct Connect (fig. 3.2.)

The Control Units CU4 *econo* Direct Connect mainly consists of the following components:

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

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**.

The number of the solenoid valves installed in the CU4 depends on the valve actuators to be controlled. Single seat and butterfly valves and double seat valves without seat lift function require 1 solenoid valve. Control units for double seat valves 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 fulfils the task to process the electric signals from the control, to control the solenoid valves and to evaluate the feedback signals from the feedback unit. Moreover, the signalling and indication of the valve positions as well as additional diagnostic functions are undertaken via the electronic module.

The electronic module is the interface between control actuators or sensors. Depending on the control type, different modules are available, e.g. Direct Connect, AS-Interface, Profibus and DeviceNet. The CU4 *econo* Direct Connect module described here provides for the direct parallel wiring of the control.

A feedback unit is required to detect the valve position.

The CU4 *econo* Direct Connect is equipped with 2 adjustable Hall effect sensors.

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

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

3. General Terms

3.3. Function of the individual components

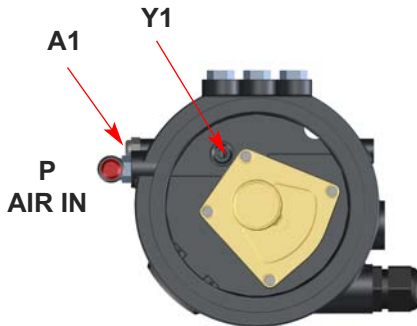
The luminous diodes are located on the front side of the electronic module. Their signals are visibly indicated to the outside by an optical window in the cover the control unit. Beside the open and closed valve position, the existence of the operating voltage as well as different diagnostic information are indicated. **Chapter 6.4.** LED indicators provide 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.

(Attention: wiring needs also be changed.)

4. Mechanics and Pneumatics

4.1 Air connections for turning actuator



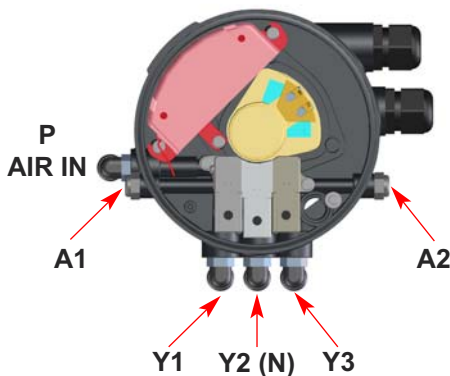
4.1.1. Funktion

CU41econo T

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

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

4.2 Air connections for turning actuator



4.2.1. Function

CU41econo S / CU41econo M

design for seat valves and double seat mixproof valves without seat lift.

- P air supply.
- Y1 control air connection for main actuator.
- A1 exhaust air, with exhaust silencer.

CU41Necono S

design for seat valves with NOT element.

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

CU43econo M

design for double seat mixproof valves with seat lift.

- P air supply with integrated particle filter.
- Y1 pneumatic air connection for main actuator.
- Y2 pneumatic air connection for seat lift actuator of upper seat 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 vents into the clearance between the base and the adapter of the control unit.

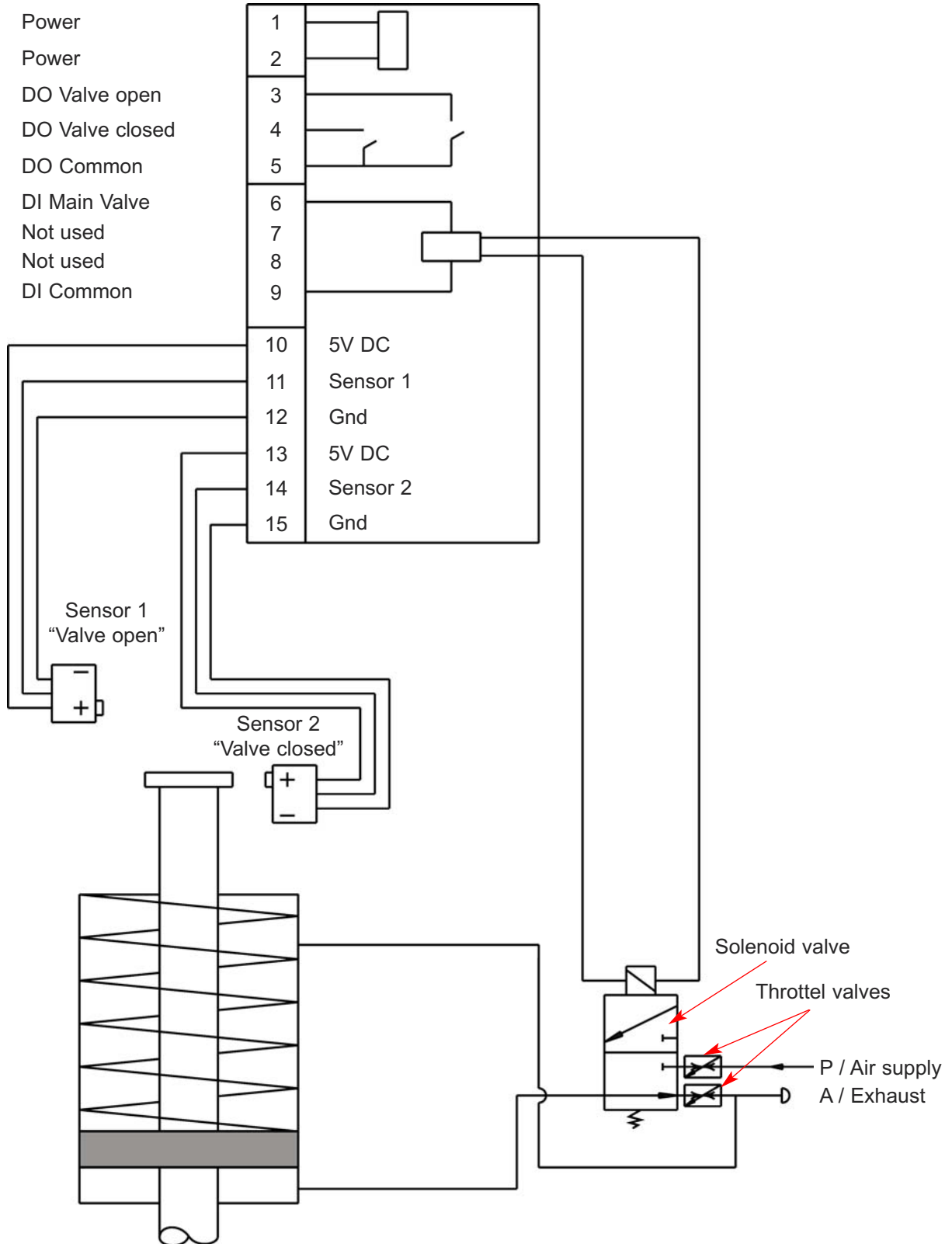


The pressure relief valve must not be mechanically blocked under any circumstances.

4. Mechanics and Pneumatics

4.4. CU41econo Direct Connect

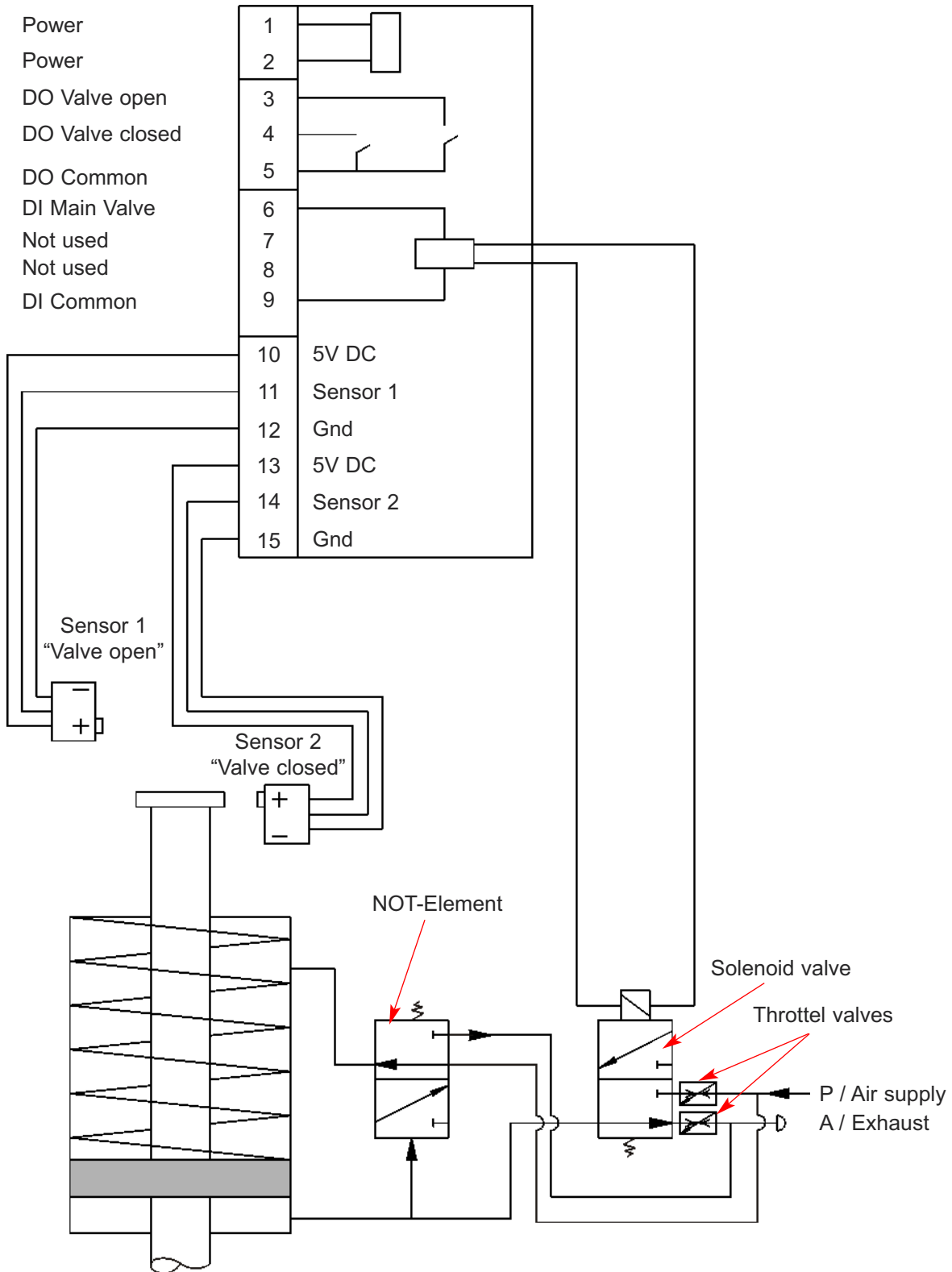
Functional description - block diagram



4. Mechanics and Pneumatics

4.4.1. CU41Necono Direct Connect

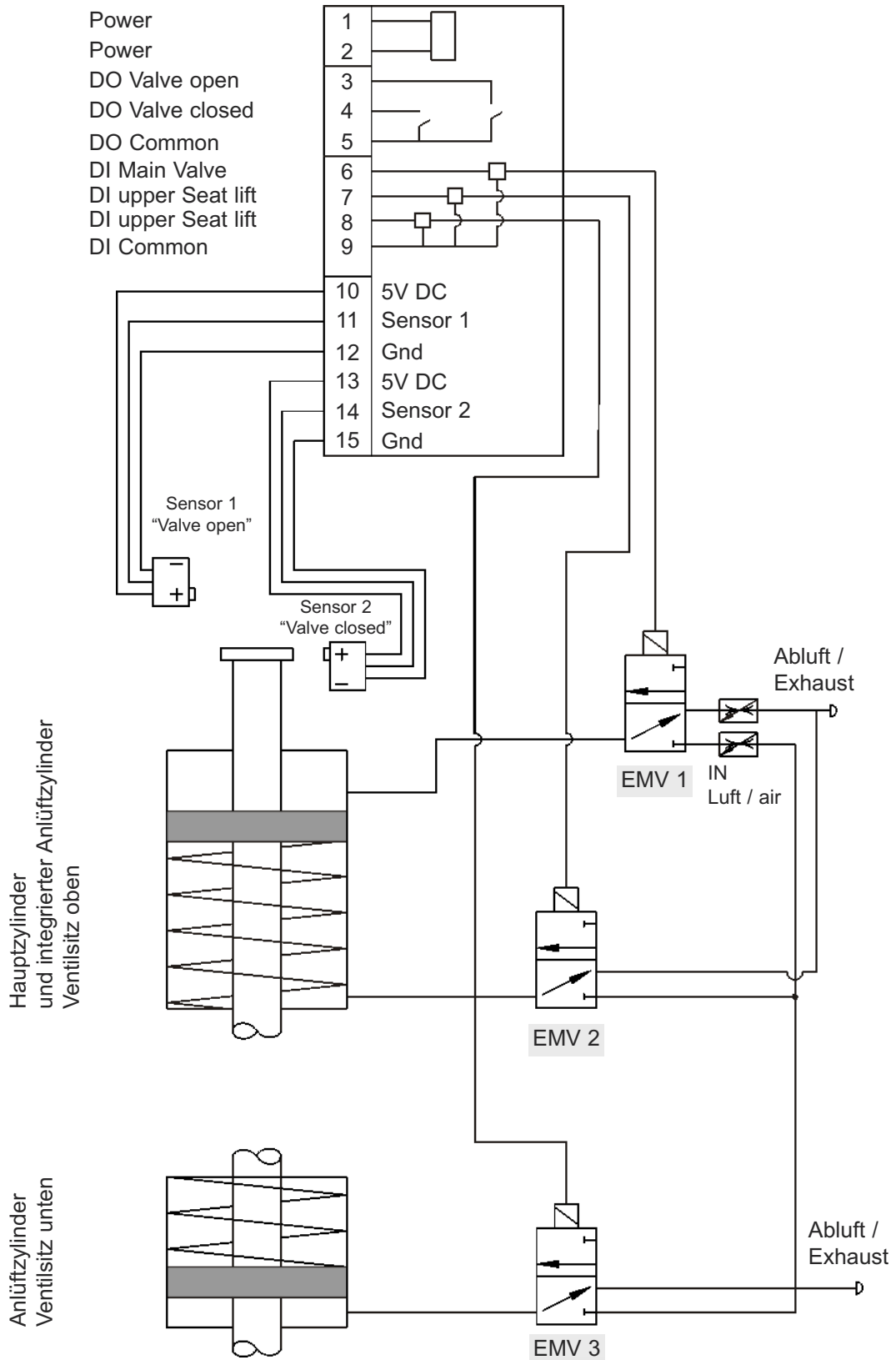
Functional description - block diagram



4. Mechanics and Pneumatics

4.4.2. CU4econo Direct Connect for double seat valve DA3

Functional description - block diagram



4. Mechanics and Pneumatics

4.5. Technical Data / Standards

Material: PA6.6

Ambient temperature: -20°C bis +70°C

CE: EMC 89/336/EEC

Standards and environmental audits: protection class IP 67 EN60529 / complies with NEMA 6 overhead installation
EMV interference resistance EN61000-6-2
EMV emitted interference EN61000-6-4

vibration/oscillation EN60068-2-6

safety of machinery
DIN EN ISO 13849-1

air hose: 6 mm / ¼" OD

pressure range: 6-8 bar

compressed air quality: quality class according to DIN/ISO 8573-1

- **content of solid particles:** quality class 3,
max. size of solid particles per m³
10000 of 0,5µm <d<1,0µm
500 of 1,0µm <d<5,0µm
- **content of water:** quality class 4,
max. dew point temperature + 3°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. 0,01mg/m³

(The oil applied must be compatible with Polyurethane elastomer materials.)

4. Mechanics and Pneumatics

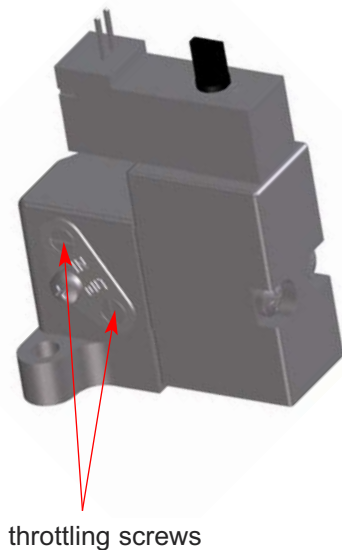
4.6. Solenoid valves

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

control: effected by pwm-signal
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.



4.8. NOT element

The closing force of the valve actuator can be increased by additional compressed air. Through the installation of the logic NOT element, compressed air is guided via a pressure reducing valve on the spring side of the valve actuator.

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

5. Adapter

Adapter for different process valves

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



5.2. Einsitzventil



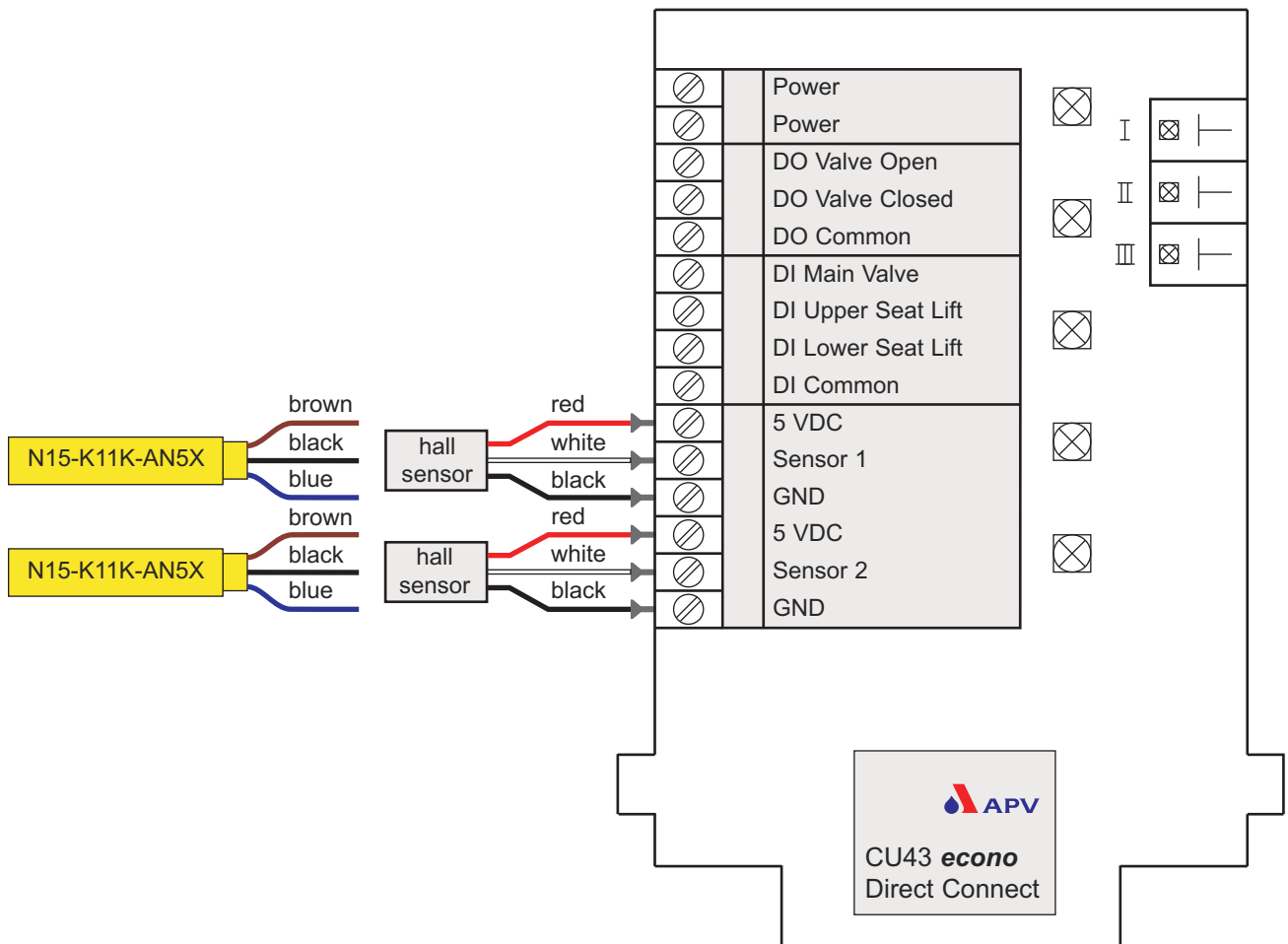
5.3. Doppelsitzventil



6. Electronic module

6.1. Function / Block diagram

The electronic module CU4 econo Direct Connect operates as interface between superordinated control (PLC) and is connected direct by parallel wiring, i.e. every individual signal is on a separate line. The large input voltage range from 15 to 48VDC provides for versatile connections. All operating ranges within the electronic module such as the control of the solenoid valves, position feedback and LED indication are separated galvanically and can, thus, be operated with different voltages. Control of the solenoid valves is effected in energy-saving manner via pwm-signals.



6. Electronic module

6.2. Functional description of connections

<i>Terminal</i>	<i>Designation</i>	<i>Functional description</i>
1	Power	Operating voltage
2	Power	Operating voltage
3	DO Open Valve	Digital potential-free output for open valve position
4	DO Closed Valve	Digital potential-free output for closed valve position
5	DO Common	Common potential for digital output to valve position indication
6	DI Main Valve	Digital input to control 1st solenoid valve (valve open)
7	DI Upper Seat Lift	Digital input to control 2nd solenoid valve (seat lifting of upper valve seat)
8	DI Lower Seat Lift	Digital input to control 3rd solenoid valve (seat lifting of lower valve seat)
9	DI Common	Common potential for digital inputs to control valve
10	5 VDC	Voltage supply for valve sensor
11	Sensor 1	Sensor signal 1 (closed valve position)
12	GND	Mass potential for sensor supply
13	5 VDC	Voltage supply for valve sensor
14	Sensor 2	Sensor signal 2 (open valve position)
15	GND	Mass potential for sensor supply

6. Electronic module

6.3. Technical data for electronic module

CU4 econo Direct Connect

Operating voltage:	15 – 24 VDC
Supply of solenoid valve:	pwm-signal from electronic module
Dig. input (DI):	10 – 48 V AC/DC I _{max.} 1mA/24VDC
Dig. output (DO):	U _{max.} 48V AC/DC I _{max.} 150mA R _I 5,6 Ohm/100mA
Voltage supply of sensors:	5 VDC (+/-5%)

Power consumption

Minimum <i>(Power ON, 2 LED, no solenoid valve)</i>	about 20mA, at 24VDC
Typically <i>(Power ON, 2 LED, 1 solenoid valve)</i>	about 35mA, at 24VDC
Maximum <i>(Power ON, 3 LED, 2 solenoid valves)</i>	about 55 mA, at 24VDC

Connecting terminals:	conductor cross section 0,5-1,5 mm ² (with conductor sleeve) complying with AWG 20-16
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6. Electronic module

6.4. Connections







Sensors to detect the valve positions:

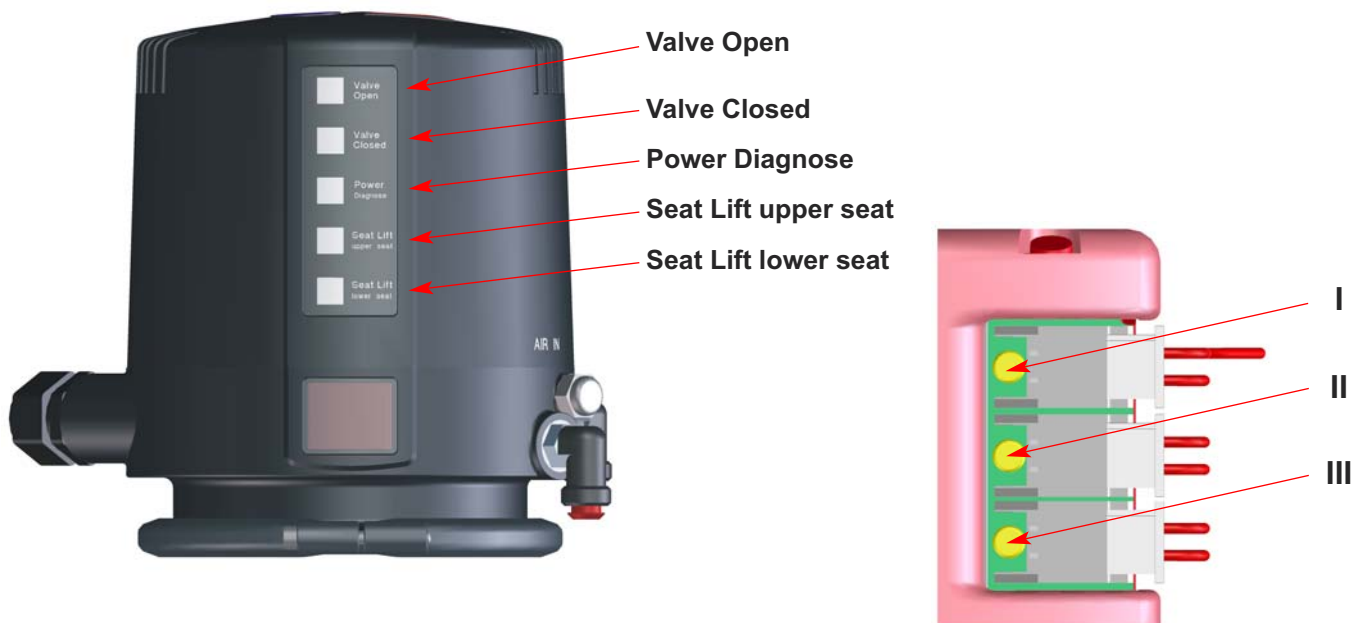
Internal sensors: Hall effect sensors,
APV type H 320385
UB 4,75-5,25 VDC
operating distance according to
APV specification

External sensors: Inductive proximity switches,
APV type H 208844
UB 4,75-5,25 VDC
operating distance according to
APV specification

6. Electronic module

6.5. LED indicators

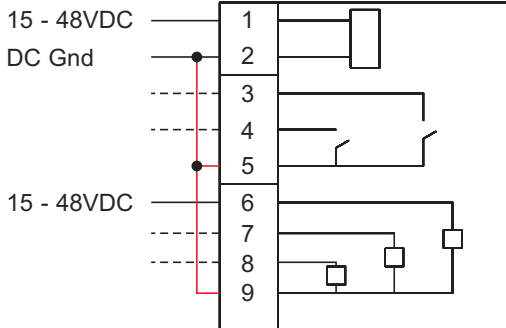
External luminous displays				
Valve <i>Open</i>	colour: green, permanent light			valve in open position
Valve <i>Closed</i>	colour: orange, permanent light			valve in closed position
Power <i>Diagnostics</i>	colour: green, permanent light			operating voltage at module - faultless
	colour: green, flashing			failure
Seat Lift <i>upper seat</i>	colour: blue, permanent light			2nd solenoid valve (II) controlled
Seat Lift <i>lower seat</i>	colour: blue, permanent light			3rd solenoid valve (III) controlled
Internal luminous displays				
Luminous diode	I			1st solenoid valve (I) controlled
Luminous diode	II			2nd solenoid valve (II) controlled
Luminous diode	III			3rd solenoid valve (III) controlled



6. Electronic module

6.6. Wiring examples CU4 econo Direct Connect

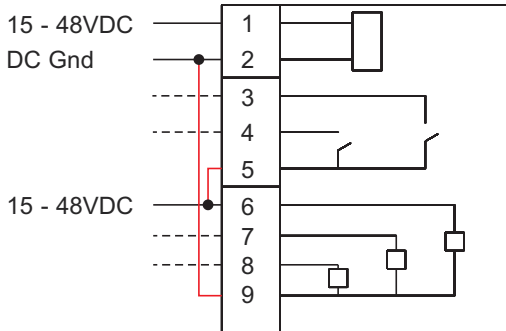
Example 1



Power
Power
DO Valve open
DO Valve closed
DO Common
DI Main Valve
DI upper Seat lift
DI upper Seat lift
DI Common

5/7 cable required
DC supply
DC valve signal
2 feedback to SPS
common CD mass

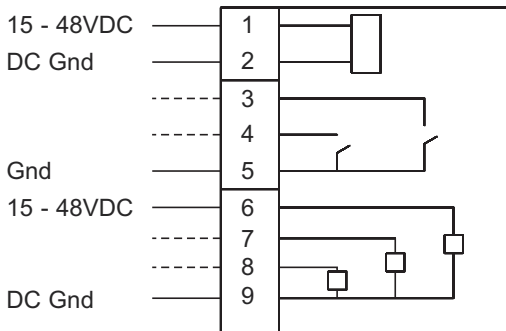
Example 2



Power
Power
DO Valve open
DO Valve closed
DO Common
DI Main Valve
DI upper Seat lift
DI upper Seat lift
DI Common

5/7 cable required
DC supply
DC valve signal
2 feedback to SPS
common CD mass

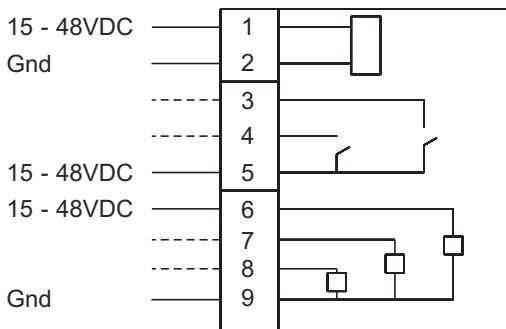
Example 3



Power
Power
DO Valve open
DO Valve closed
DO Common
DI Main Valve
DI upper Seat lift
DI upper Seat lift
DI Common

7/9 cable required
DC supply
DC valve signal
2 feedback to SPS
separated DC mass, functional units
galvanically isolated

Example 4



Power
Power
DO Valve open
DO Valve closed
DO Common
DI Main Valve
DI upper Seat lift
DI upper Seat lift
DI Common

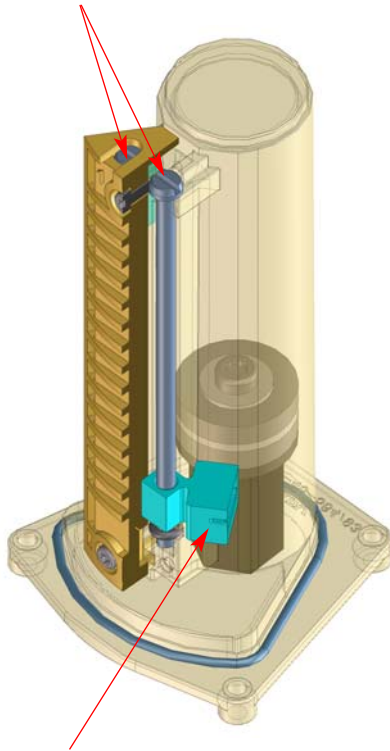
7/9 cable required
DC supply
DC valve signal
2 feedback to SPS
separated DC mass, functional units
galvanically isolated

7. Feedback unit

7.1. General terms

For the internal registration of the valve position indication, the feedback unit with 2 Hall effect sensors is applied. It is used when single seat and butterfly valves are installed. The control of these sensors is effected by magnets assembled on the valve shaft rod. The Hall effect sensors are installed on a movable threaded rod. By means of this assembly, the sensors can be adjusted via a large range, in accordance with the valve stroke.

adjustment screws



Hall effect sensor

7.2. Sensors

Hall effect sensors, APV type H 320385
UB 4,75-5,25 VDC
operating distance according to APV specification

7.3. Adjustment of valve position feedback

By turning of the adjustment screws on which the Hall effect sensors are installed, the sensors can be moved into the respectively required position to detect the valve position. The o-rings on the adjusting screws prevent unintended accidental displacement of these positions. After the installation of the control unit, check the correct adjustment of the position of the Hall sensor.

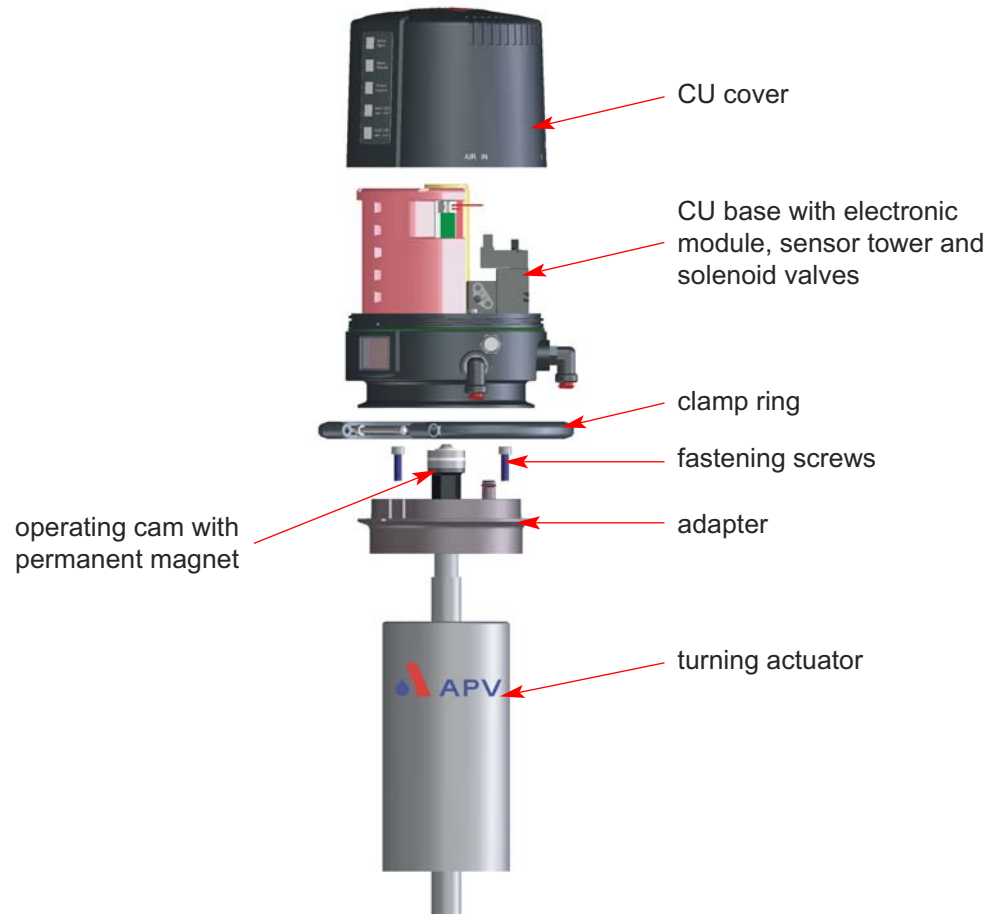
7.4. Use of external sensors

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

Proximity switch APV Type H 208 844
UB 4,75-5,25 VDC
Operating distance according to APV specification

8. CU Assembly and Start-up

8.1. Turning actuator, e.g. for butterfly valves



Caution!

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

Assembly of the Control Unit on the valve

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

8. CU Assembly and Start-up

8.1.1. Pneumatic connection

**Supply air:****CAUTION**

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

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

Pneumatic air for valve actuator:

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

Exhaust air:

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

8.1.2. Electric connection

**CAUTION**

Electric connections shall only be carried out by qualified personnel.

See that the operating voltage is correct!

After determining the connecting variant according to **chapter 6.6. Wiring Examples**, select the corresponding cable.

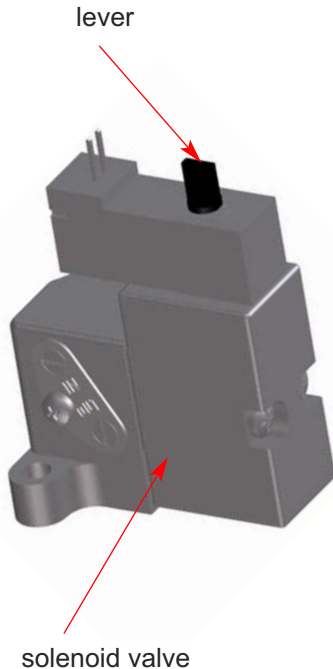
Guide the cable through the cable gland and connect it according to the Wiring Diagram. Preferably use wire terminations! Tighten the cable gland in order to ensure the corresponding protective class.

8. CU Assembly and Start-up

8.1.3. Start-up

After proper assembly and installation of the control unit, start-up 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 handle on the upper side of the valve by 90°.
4. Check the valve position indicator and adjust feedbacks for **open** and **closed** valve position as described below.



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

Closed valve position feedback – sensor 1 controlled

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

Open valve position feedback – sensor 2 controlled

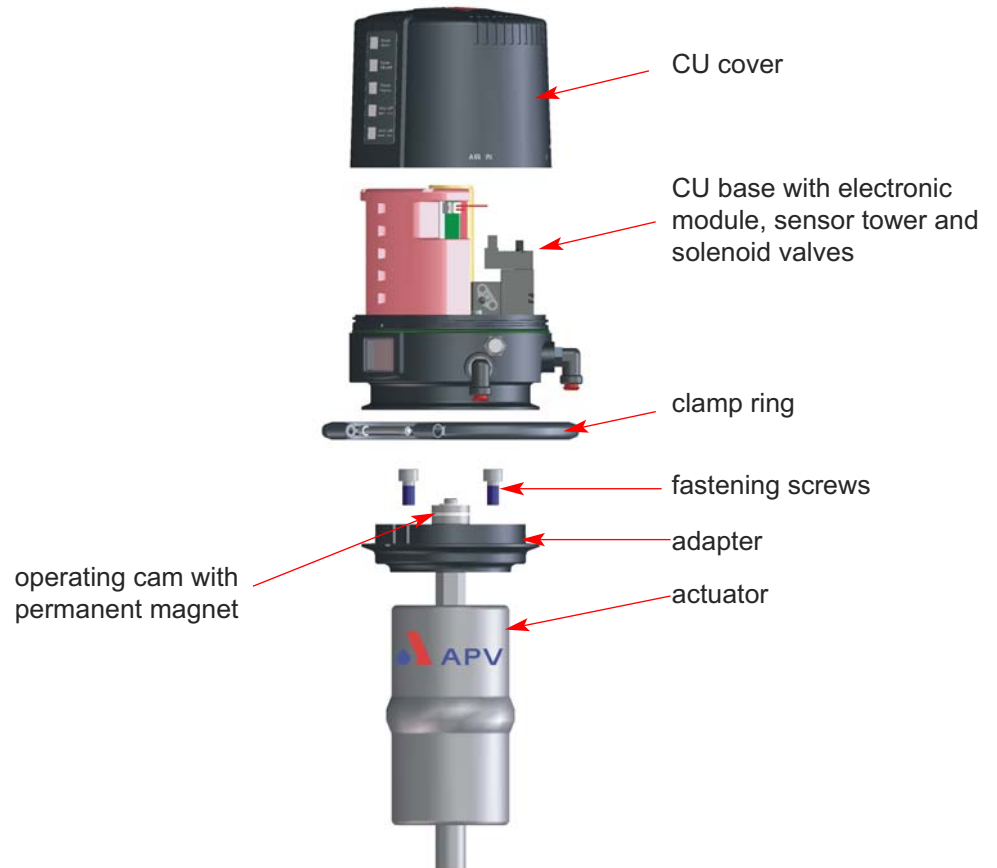
For the adjustment of Hall sensor 2, at first, the (*non-controlled*) solenoid valve 1 is controlled. This can optionally be made manually or electrically. The open valve position and the corresponding feedback can be adjusted. This is undertaken by turning the adjustment screw 2 until the required position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



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

8. CU Assembly and Start-up

8.2. Single seat valves



CAUTION

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

Assembly of the Control Unit on the valve

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

8. CU Assembly and Start-up

8.2.1. Pneumatic connection



Supply air:

CAUTION

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

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

Pneumatic air for valve actuator:

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

- For the CU41N (**with logic NOT element**), the pneumatic air connection **N** must be connected with the spring side of the actuator.
See to the spring side of the actuator during the assembly of the pressure-reducing valve.

Exhaust air:

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

8.2.2. Electric connection



CAUTION

Electric connections shall only be carried out by qualified personnel.

See that the operating voltage is correct!

After determining the connecting variant according to **chapter 6.6 Wiring Examples**, select the corresponding cable.

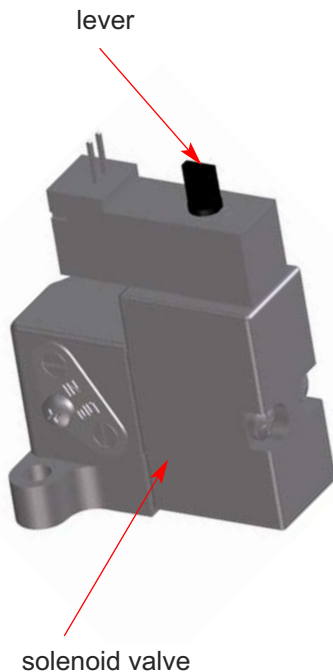
Guide the cable through the cable gland and connect it according to the Wiring Diagram. Preferably use wire terminations! Tighten the cable gland in order to ensure the corresponding protective class.

8. CU Assembly and Start-up

8.2.3. Start-up

After proper assembly and installation of the control unit, start-up 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 handle on the upper side of the valve by 90°.
4. Check the valve position indicator and adjust feedbacks for **open** and **closed** valve position as described below.



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

Closed valve position feedback – sensor 1 controlled

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

Open valve position feedback – sensor 2 controlled

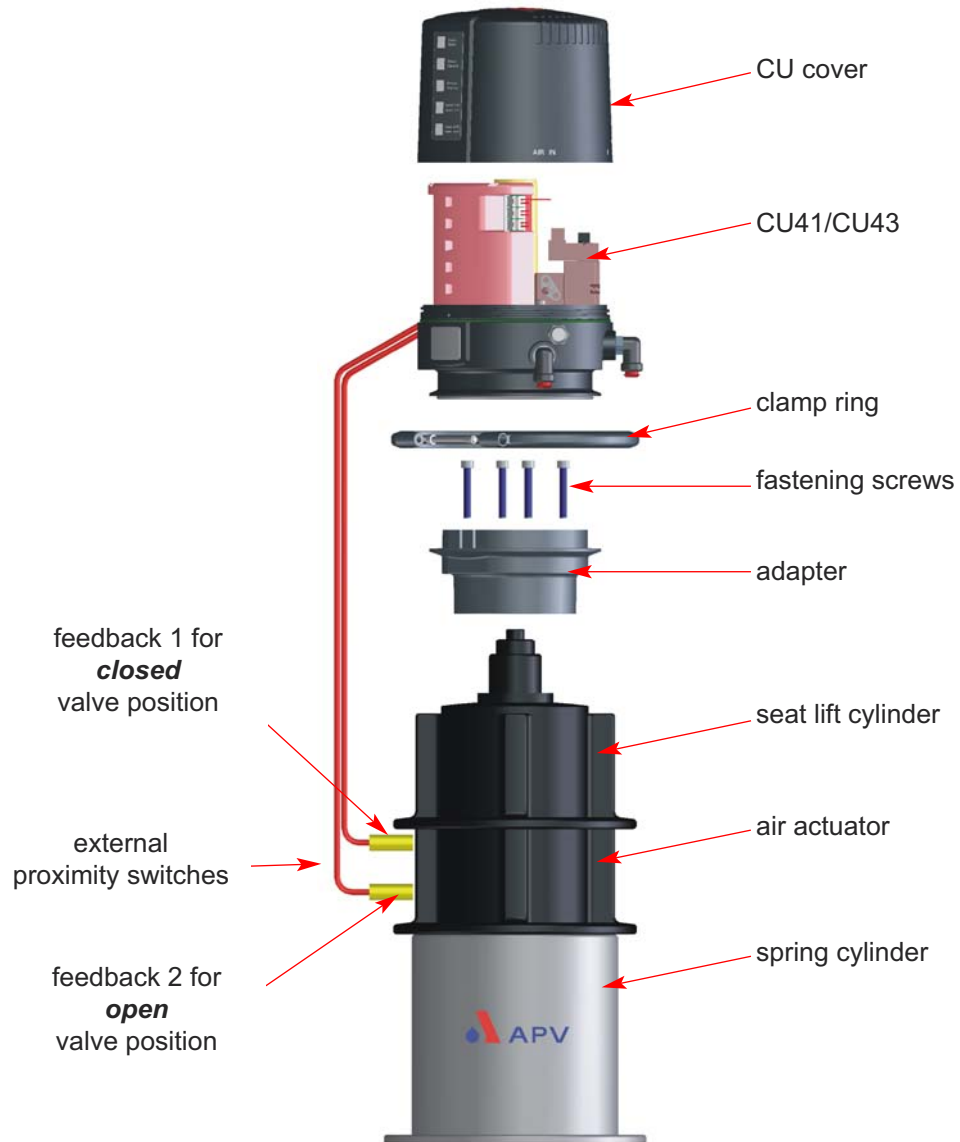
For the adjustment of Hall sensor 2, at first, the (*non-controlled*) solenoid valve 1 is controlled. This can optionally be made manually or electrically. The open valve position and the corresponding feedback can be adjusted. This is undertaken by turning the adjustment screw 2 until the required position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



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

8. CU Assembly and Start-up

8.3. Double seat valves



Assembly of the Control Unit on the valve

1. Assembly of the adapter on the double seat valve. Fasten with 4 screws.
2. Align air connections of the control unit to the valve actuator.
3. Place the control unit onto the adapter. Observe alignment!
4. Attach the clamp rings and fasten them with the screws.
5. Assemble the external proximity switches at the actuator.

8. CU Assembly and Start-up

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



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



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



Exhaust air:

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

8.2.2. Electric connection



CAUTION

Electric connections shall only be carried out by qualified personnel.

See that the operating voltage is correct!

After determining the connecting variant according to **chapter 6.6. Wiring Examples**, select the corresponding cable.

Guide the cable through the cable gland and connect it according to the Wiring Diagram. Preferably use wire terminations! Tighten the cable gland in order to ensure the corresponding protective class.

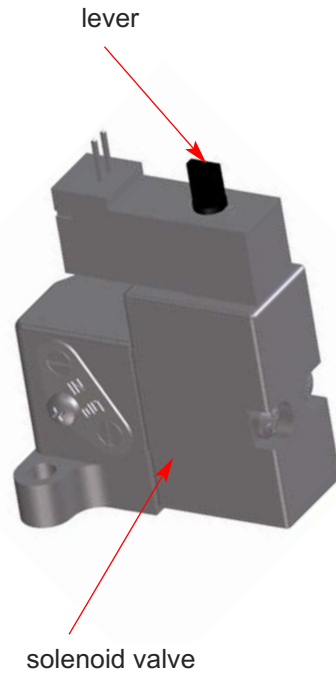
8. CU Assembly and Start-up

8.3.3. Connection of external proximity switches

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

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

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



8.3.4. Start-up

After proper assembly and installation of the control unit, start-up 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 handle on the upper side of the valve by 90°.
4. Check the valve position indicator.

The proximity switches are installed at the double seat valves with a mechanical stop.

Adjustment is not required!

The following allocation applies for double seat valves:

Closed valve position feedback – sensor 1 controlled

Open valve position feedback – sensor 2 controlled



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

9. Accessories and Toolszeuge

Assembly/disassembly - adapter on valve actuator:

- hexagon socket wrench 6 mm
- screwdriver 4mm

Assembly/disassembly – CU on adapter:

- hexagon socket wrench 3 mm

Assembly/disassembly – electronic module:

- torx wrench TX20
- screwdriver 3.5 mm

Assembly/disassembly – feedback unit:

- torx wrench TX15

Assembly/disassembly – electronic modules:

- torx wrench TX20

Assembly/disassembly – air connections:

- jaw wrench M13

Assembly/disassembly – pressure relief valve:

- torx wrench TX10

Loctite semi-solid

jaw wrench



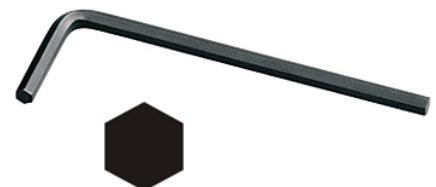
torx wrench



screwdriver



hexagon socket wrench



10. Disassembly

10.1. *Demontage*

Before disassembly, verify the following items:

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

Solenoid valve (4, 5, 6)

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

Electronic module (2)

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

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

Feedback unit

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

- + Open the cover.
- + Release the cable for the Hall effect sensors from the terminal strip, terminals 10-15.
- + Release the clamp ring and lift the CU4 from the adapter.
- + Remove the 4 screws **(9)** TX15 at the lower side of the CU base **(1)**.
- + Take out the feedback unit to the bottom.

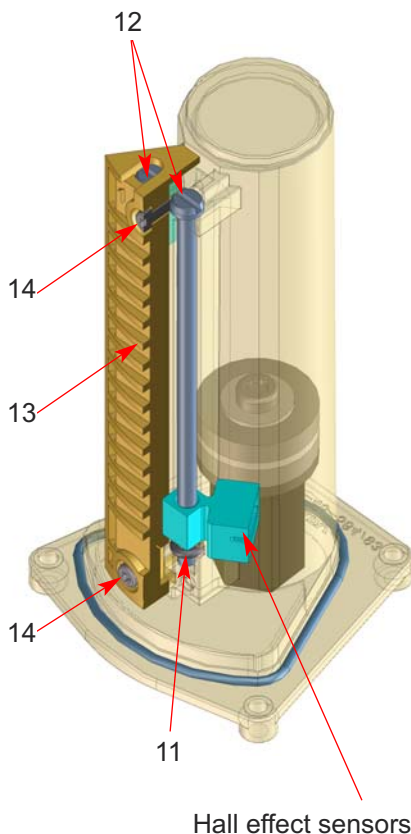
Hall effect sensors

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

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

To simplify adjustment of feedbacks:

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



11. Trouble Shooting

<i>Failure</i>	<i>Remedy</i>
Valve position is not indicated.	Re-adjust Hall sensors.
	Check fastening of magnetic operating cam.
	Check cabling of the Hall sensors to the electronic module.
Feedback via proximity switches is missing	Check positioning of proximity switches.
	Check operating voltage.
	Check cabling to the electronic module.
LED indication is missing	Check operating voltage.
	Check cabling to the electronic module.
<i>Control Unit CU41 installed on Butterfly valves</i>	
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: CU41econo T Direct Connect (1 EMV/solenoid valve)
	Check valve movement with manual at solenoid valve.
	Check cabling between electronic module and solenoid valve.
	Check compressed air (min. 6bar).
	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

<i>Failure</i>	<i>Remedy</i>
Control Unit CU41 installed on Single seat and Double seat valves	
Valve position movement is missing with actuated solenoid valve.	Check if right control unit is installed. Check label in type window of control unit: CU41econo S Direct Connect (1 EMV/solenoid valve)
	Check valve movement with manual at solenoid valve.
	Check cabeling between electronic module and solenoid valve.
	Check compressed air (min. 6bar).
	Check control air connection between the CU41 and the valve actuator.
Control Unit CU43 installed on Double seat valves	
Valve position movement is missing with actuated solenoid valve.	Check if right control unit is installed. Check label in type window of control unit: CU43econo M Direct Connect (3 EMV/solenoid valves)
	Check valve movement with manual at solenoid valve.
	Check cabeling between electronic module and solenoid valve.
	Check compressed air (min. 6bar).
	Check control air connection between the CU43 and the DA3 valve 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.

CU4 econo direct connect
CU4 econo adapter

RN 01.044.3
RN 01.044.3

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

- number of parts required
- reference number
- parts designation

Data are subject to change.

BA CU4 EC DC 002

ID-No.: H 3 2 3 8 7 1

Translation of original manual



rev. 0



Your local contact:



APV
Zeichenstraße 49
D-59425 Unna

Phone: +49(0) 23 03/ 108-0 Fax: +49(0) 23 03 / 108-210

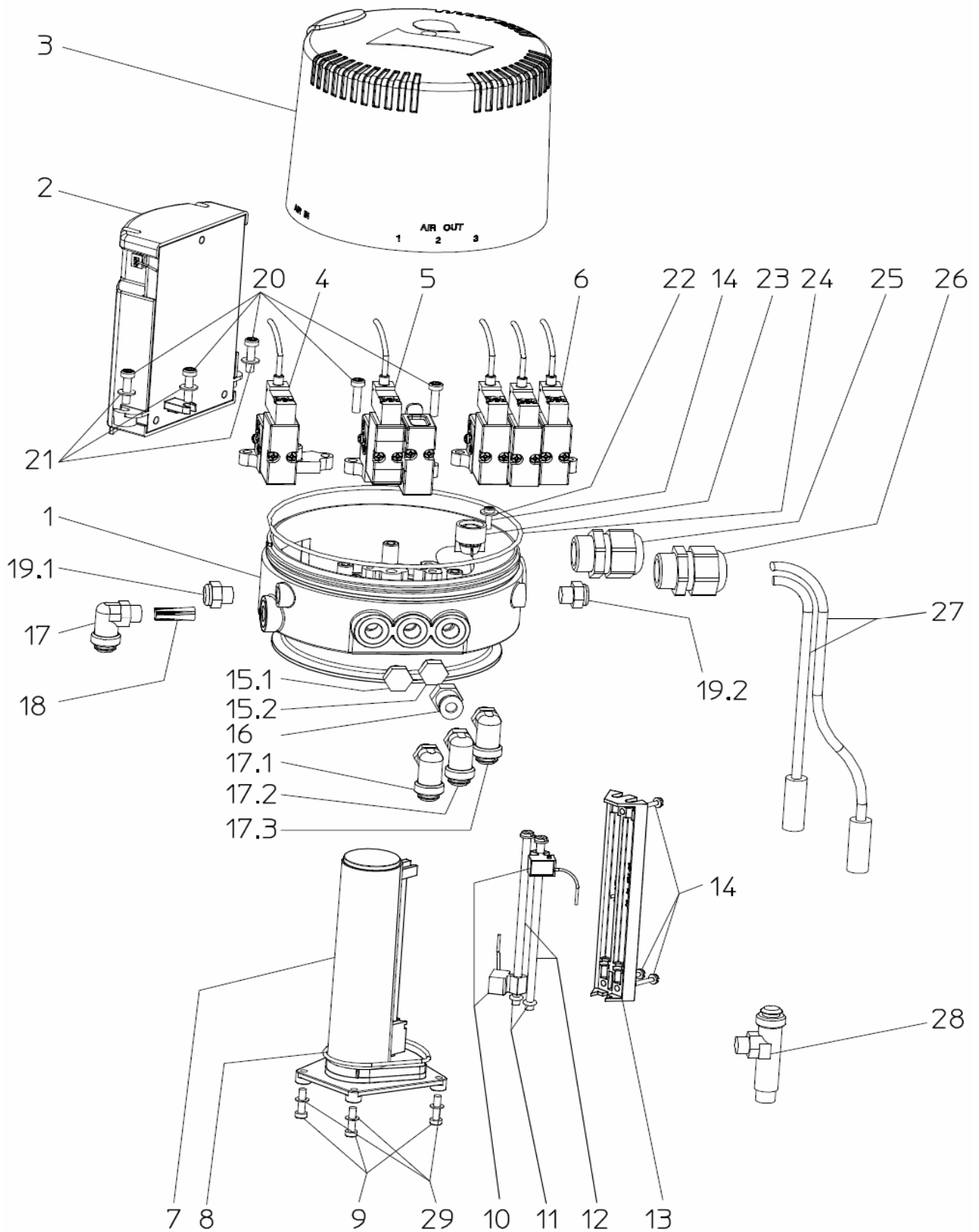
For more information about our worldwide locations, approvals, certifications, and local representatives, please visit www.apv.com.

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Ersatzteilliste: spare parts list

CU4econo DC
CU4econo DC

	Datum	Name
Gezeichnet	16.07.08	Peters
Geprüft	21.07.08	Splithoff
Normgepr.		



Datum	07/08	08/08							
Name	Peters	Peters							

RN 01.044.4

pos. item		Menge	Beschreibung	Material	CU41econoS		CU41econoT		CU41econoM		CU41NeconoS		CU41NeconoT		CU43econoM	
					WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	
1	1		CU4 Base	PA6.6 GF30	08-46-552/93 H319853	08-46-553/93 H319854	08-46-554/93 H319855	08-46-552/93 H319853	08-46-553/93 H319854	08-46-553/93 H319854	08-46-556/93 H319857					
2	1		CU4econo E-Modul Direct Connect		08-46-590/93 H320386	08-46-590/93 H320386	08-46-590/93 H320386	08-46-590/93 H320386	08-46-590/93 H320386	08-46-590/93 H320386	08-46-591/93 H320387					
3	1		CU4 Haube kpl.	PA6.6 GF30	08-46-559/93 H319860	08-46-559/93 H319860	08-46-559/93 H319860	08-46-559/93 H319860	08-46-559/93 H319860	08-46-559/93 H319860	08-46-559/93 H319860					
4	1		Magnetventilblock 1 EMV	PPS	08-46-578/93 H319950	08-46-578/93 H319950	08-46-578/93 H319950	08-46-578/93 H319950	08-46-578/93 H319950	08-46-578/93 H319950	08-46-578/93 H319950					
5	1		Magnetventilblock 1 EMV + NOT-Element	PPS	08-46-579/93 H319951	08-46-579/93 H319951	08-46-579/93 H319951	08-46-579/93 H319951	08-46-579/93 H319951	08-46-579/93 H319951	08-46-579/93 H319951					
6	1		Magnetventilblock 3 EMV	PPS	08-46-564/93 H319868	08-46-564/93 H319868	08-46-564/93 H319868	08-46-564/93 H319868	08-46-564/93 H319868	08-46-564/93 H319868	08-46-564/93 H319868					
7	1		CU4econo Sensortower	PA12	58-06-218/83 H320401	58-06-218/83 H320401	58-06-218/83 H320401	58-06-218/83 H320401	58-06-218/83 H320401	58-06-218/83 H320401	58-06-218/83 H320401					
8	1		O-Ring 45,6 x 2,4	NBR	65-17-122/13 H320364	65-17-122/13 H320364	65-17-122/13 H320364	65-17-122/13 H320364	65-17-122/13 H320364	65-17-122/13 H320364	65-17-122/13 H320364					
9	4		Ejot Delta PT Schraube WN5452 35x14	A2	08-46-581/93 H320385	08-46-581/93 H320385	08-46-581/93 H320385	08-46-581/93 H320385	08-46-581/93 H320385	08-46-581/93 H320385	08-46-581/93 H320385					
10	2		Hall-Sensor		58-06-043/83 H208644	58-06-043/83 H208644	58-06-043/83 H208644	58-06-043/83 H208644	58-06-043/83 H208644	58-06-043/83 H208644	58-06-043/83 H208644					
11	2		O-Ring 3x2	NBR	65-03-290/13 H320361	65-03-290/13 H320361	65-03-290/13 H320361	65-03-290/13 H320361	65-03-290/13 H320361	65-03-290/13 H320361	65-03-290/13 H320361					
12	2		Zyl.-Schraube M4x100	A2-50	08-46-565/93 H319869	08-46-565/93 H319869	08-46-565/93 H319869	08-46-565/93 H319869	08-46-565/93 H319869	08-46-565/93 H319869	08-46-565/93 H319869					
13	1		CU4econo Towerabdeckung	PA12	65-17-110/13 4 x H320363	65-17-110/13 4 x H320363	65-17-110/13 1 x H320363	65-17-110/13 4 x H320363	65-17-110/13 4 x H320363	65-17-110/13 4 x H320363	65-17-110/13 4 x H320363					
14			Ejot Delta PT Schraube WN5452 30x10	A2	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482					
15.1	1		Blindstopfen G1/8"	Ms / vern.	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482					
15.2	1		Blindstopfen G1/8"	Ms / vern.	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482	08-60-051/99 H320482					

Ersatzteilliste : spare parts list		07/08				08/08				APV Rosista GmbH, D-59425 Unna Germany			
		Datum Name		Peters		Datum Name		Peters		Gezeichnet		Name	
										16.07.08		Peters	
										21.07.08		Spilthoff	
										Normgepr.		RN 01.044.4	
pos.	Quantity	Beschreibung	Material	CU41econoS	CU41econoT	CU41econoM	CU41NeconoS	CU41NeconoT	CU43econoM	WS-Nr.	ref.-no.	WS-Nr.	ref.-no.
16	1	Verschraubung selbstabsperrend connector self locked	Ms / vern.	----- -----	----- -----	----- -----	08-63-241/99 H320551	08-63-241/99 H320551	----- -----	08-63-241/99 H320551	----- -----	----- -----	----- -----
17	1	W-Verschraubung G1/8" 6x1	1.4301 / PA	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825
		W-Verschraubung G1/8" 1/4" OD	1.4301 / PA	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732
17.1	1	W-Verschraubung G1/8" 6x1	1.4301 / PA	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825	08-60-750/93 H208825
		W-Verschraubung G1/8" 1/4" OD	1.4301 / PA	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732	08-60-811/93 H312732
17.2	1	W-Verschraubung G1/8" 6x1	1.4301 / PA	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	08-60-750/93 H208825
		W-Verschraubung G1/8" 1/4" OD	1.4301 / PA	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----
17.3	1	W-Verschraubung G1/8" 6x1	1.4301 / PA	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	08-60-750/93 H208825
		W-Verschraubung G1/8" 1/4" OD	1.4301 / PA	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----
18	1	CU4 Luftfilter	PE-porös	08-10-005/93 H320223	08-10-005/93 H320223	08-10-005/93 H320223	08-10-005/93 H320223	08-10-005/93 H320223	08-10-005/93 H320223	08-10-005/93 H320223	08-10-005/93 H320223	08-10-005/93 H320223	08-10-005/93 H320223
		CU4 air filter	Ms / vern.	08-60-751/93 H208826	08-60-751/93 H208826	08-60-751/93 H208826	08-60-751/93 H208826	08-60-751/93 H208826	08-60-751/93 H208826	08-60-751/93 H208826	08-60-751/93 H208826	08-60-751/93 H208826	08-60-751/93 H208826
19.1	1	Schalldämpfer	Ms / vern.	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	08-60-751/93 H208826
		sound reducer	Ms / vern.	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----
19.2	1	Schalldämpfer	Ms / vern.	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	08-60-751/93 H208826
		sound reducer	Ms / vern.	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----	----- -----
20	5	Ejot Delta PT Schraube WN5452 40x16	A2	65-17-131/13 H320365	65-17-131/13 H320365	65-17-131/13 H320365	65-17-131/13 H320365	65-17-131/13 H320365	65-17-131/13 H320365	65-17-131/13 H320365	65-17-131/13 H320365	65-17-131/13 H320365	65-17-131/13 H320365
		Ejot Delta PT screw WN5452 40x16	A2	67-01-003/13 H79576	67-01-003/13 H79576	67-01-003/13 H79576	67-01-003/13 H79576	67-01-003/13 H79576	67-01-003/13 H79576	67-01-003/13 H79576	67-01-003/13 H79576	67-01-003/13 H79576	67-01-003/13 H79576
21	3	Scheibe ø4,3 DIN125	A2	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404
		washer ø4,3 DIN125	A2	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404	67-01-001/12 H320404
22	1	Scheibe A 3,2 DIN9021	A2	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352
		washer A 3,2 DIN9021	PPS	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352
23	1	CU4 Überströmventil	PPS	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352
		CU4 pressure relief valve	PPS	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352	08-46-037/93 H320352

Ersatzteilliste : spare parts list

CU4econo DC

CU4econo DC

pos. item	Menge quantity	Beschreibung description	Material	CU41econoS		CU41econoM		CU41econoT		CU41NeconoS		CU41NeconoT		CU43econoM	
				WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.	WS-Nr. ref.-no.
24	1	O-Ring 120,32 x 2,62		58-06-583/83 H320402	58-06-583/83 H320402	58-06-583/83 H320402	58-06-583/83 H320402	58-06-583/83 H320402	58-06-583/83 H320402	58-06-583/83 H320402	58-06-583/83 H320402	58-06-583/83 H320402	58-06-583/83 H320402		
25	1	Kabelverschraubung M20x1,5 Kabelø 6-12 screwed cable gland M20x1,5 cable ø 6-12	PA	08-46-041/93 H323199	08-46-041/93 H323199	08-46-041/93 H323199	08-46-041/93 H323199	08-46-041/93 H323199	08-46-041/93 H323199	08-46-041/93 H323199	08-46-041/93 H323199	08-46-041/93 H323199	08-46-041/93 H323199		
26	1	Kabelverschraubung M20x1,5 Kabel 2x ø5 screwed cable gland M20x1,5 cable ø 6-12	PA				08-46-040/93 H320371						08-46-040/93 H320371		
27	2	Initiator Ni5 K11K-AN 5X/5 proximity switch Ni5 K11K-AN 5X/5		----- -----	----- -----	----- -----	08-60-769/93 H208844	----- -----	----- -----	----- -----	----- -----	----- -----	08-60-769/93 H208844	----- -----	
28	1	Druckreduzierventil pressure reduce valve	Ms / vern.	----- -----	----- -----	----- -----	08-60-766/93 H208841	----- -----	----- -----	08-60-766/93 H208841	----- -----	08-60-766/93 H208841	----- -----	----- -----	
22	1	Scheibe A 3,7 DIN127 washer A 3,7 DIN127	A2	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	67-01-004/13 H323771	

Gezeichnet	16.07.08	Name	
Geprüft	21.07.08	Peters	
Normgepr.		Splithoff	

Datum	07/08	08/08	
Name	Peters	Peters	

APV Rosista GmbH, D-59425 Unna Germany	
AN SFX BRAND	
RN 01.044.4	

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08/08

Ersatzteilliste: spare parts list

CU4econo Adapter

CU4econo adapter

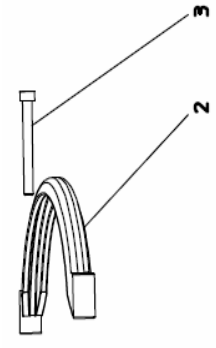
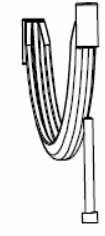
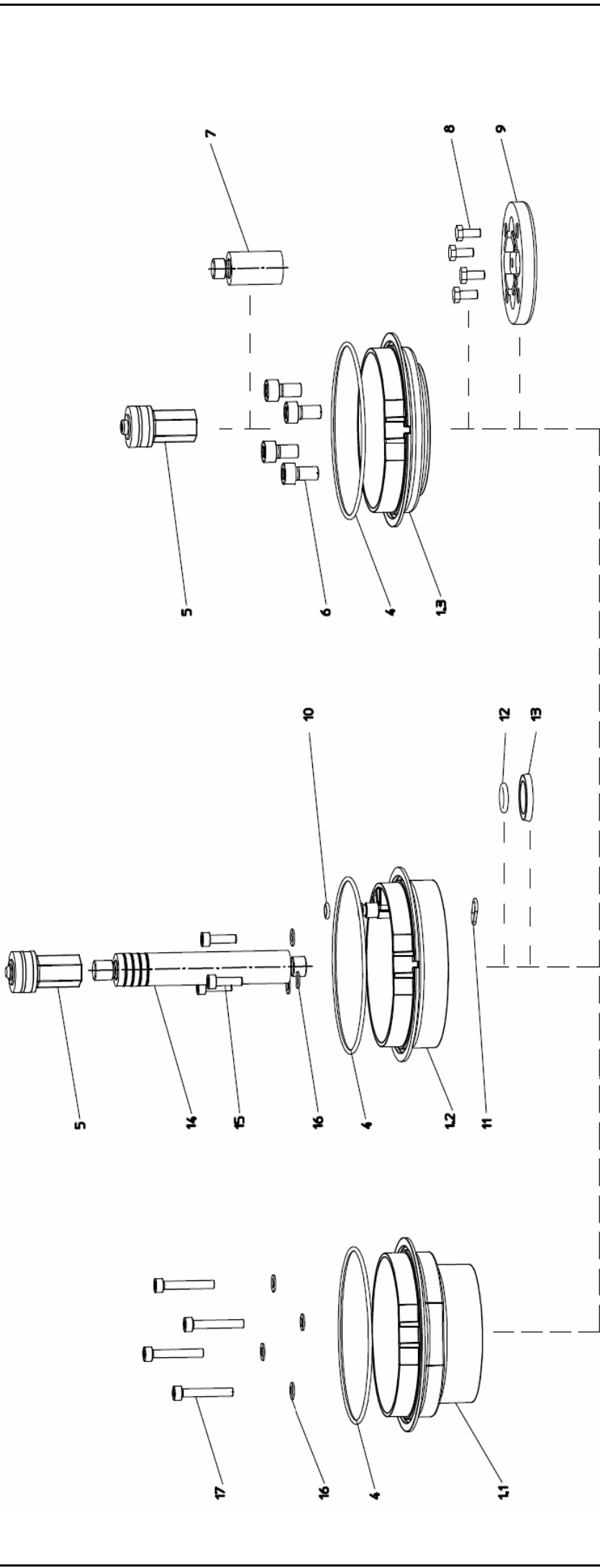
Gezeichnet		Datum		Name	
Geprüft		16.07.08		Peters	
Normgepr.		21.07.08		Spilthoff	
Datum	07/08	08/08			
Name	Peters	Peters			

APV
AN SPX BRAND
APV Rosisia GmbH, D-59425 Ulna Germany
RN 01.044.3

CU4 M - Adapter

CU4 T - Adapter

CU4 S - Adapter



pos. item	Menge Quantity	Beschreibung description	Material	CU4econo S		CU4econo Smax		CU4econo T		CU4econo Tmax		CU4econo M			
				WS-Nr. ref.-no.	08-48-600/93 H320474	WS-Nr. ref.-no.	08-48-610/93 H321988	WS-Nr. ref.-no.	08-48-601/93 H320475	WS-Nr. ref.-no.	08-48-611/93 H321987	WS-Nr. ref.-no.	08-48-602/93 H320476	RN 01.044.3	
				Datum Name	07/08 Peters	08/08 Peters	Datum Name	16.07.08 Peters	21.07.08 Spilthoff	Gezeichnet	Geprüft	Normgepr.			
		CU4 Adapter kpl. CU4 adapter cpl.													
1.1	1	CU4 Adapter M CU4 adapter M	PA6.6 GF50												
1.2	1	CU4 Adapter T CU4 adapter T	PA6.6 GF50												
1.3	1	CU4 Adapter S CU4 adapter S	PA6.6 GF50												
2	2	CU4 Clamphalbschale kpl. CU4 clamp cpl.	Grivory GH-5H1												
3	2	Zylinderschraube M4x40 Cyl. Screw M4x40	A2-70												
4	1	O-Ring 101,27x2,62 O-ring 101,27x2,62	NBR												
5	4	CU4econo Magnetschaltnocke kpl. CU4econo actuator screw cpl.	Zytel HTN												
6	4	Zyl.schraube M8x16 Cyl. Screw M8x16	A2-70												
7	1	Zugstangenverlängerung Guide rod extension	PA6												
8	4	Skt.schraube M5x12 Hex. Screw M5x12	A2-70												
9	1	CU3 Adapter SWmini4 CU3 adapter SWmini4	PA6												
10	1	O-Ring 6x2 O-ring 6x2	NBR												
11	1	O-Ring 11,11x1,78 O-ring 11,11x1,78	NBR												
12	1	O-Ring 11x3 O-ring 11x3	NBR												
13	1	V-Dichtung V-sealing	NBR												

pos. item		Menge		Beschreibung description		Material		CU4econo S		CU4econo Smini		CU4econo Smax		CU4econo T		CU4econo Tmax		CU4econo M			
								WS-Nr. ref.-no.	----- -----	WS-Nr. ref.-no.	----- -----	WS-Nr. ref.-no.	----- -----	WS-Nr. ref.-no.	----- -----	WS-Nr. ref.-no.	----- -----	WS-Nr. ref.-no.	----- -----	WS-Nr. ref.-no.	----- -----
								Datum Name	07/08 Peters	08/08 Peters									RN 01.044.3		
																				APV Rosista GmbH, D-59425 Uma Germany	
																				AN SPX BRAND	
																				APV	
																				16.07.08 Peters	
																				21.07.08 Spilthoff	
																				Normgepr.	
14	1	CU4 Schaltstange CU4 guide rod																			
15	1	Zyl.schraube M5x18 Cyl. Screw M5x18	A2-70																		
16		Scheibe 9x5,48 washer 9x5,48	A2																		
17	4	Zyl.schraube M5x35 Cyl. Screw M5x35	A2-70																		