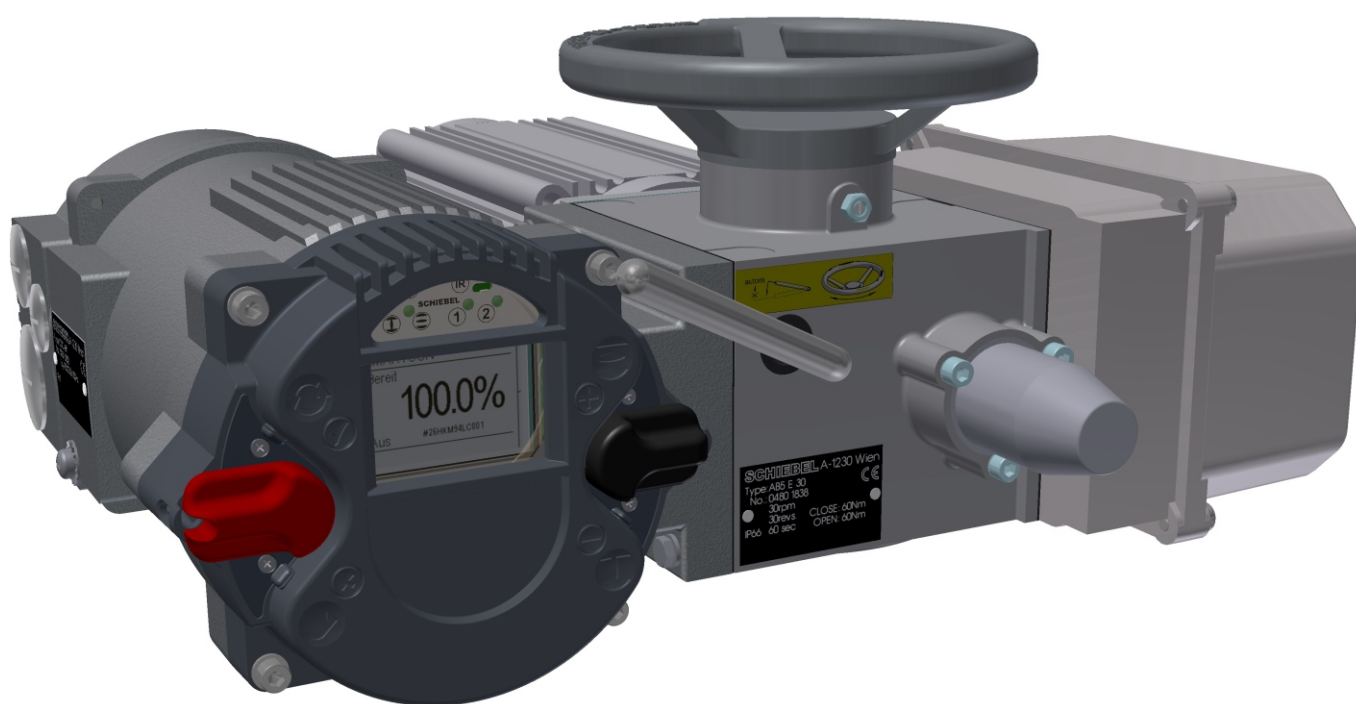


Operating Instructions for Actuators Type AB with Control Unit



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Hazard Warnings

Hazard warnings in this manual indicate potential harm to the user or the product. For the person interacting with the product, the level of risk includes consequences ranging from slight, up to lethal injuries. As for the product, disobeying the warnings may cause damage to the equipment and/or void the warranty. Therefore, said warnings are made apparent to instruct and warn the user, which precautions have to be made prior to performing any actions described in this manual. The user must read and be familiar with the manual, before performing any tasks as described in this manual.

Hazard warnings in this manual are presented in these three forms:

WARNING: These warning notices refer to personal safety. Failure to obey these notices could result in personal injury or death.



WARNING

CAUTION: General precautions must be made. Failure to obey these notices could result in personal injury and/or equipment damage.



CAUTION

NOTE: Directs the user's attention to essential information.

Operating Instructions for Actuators Type AB with Control Unit

1 Introduction/Notes

NOTE: These operating instructions apply to SCHIEBEL actuators of the type AB with integrated ACTUSMART control unit version V1.2 with a firmware version of 1600 or newer.

The scope of application covers the operation of industrial valves, e.g., globe valves, gate valves, butterfly valves and ball valves. For other applications please consult with the factory.

The manufacturer shall not be liable for incorrect use and possible damage arising thereof. The risk shall be borne solely by the user.

NOTE: Using the unit as intended also entails the observance of these operating instructions!

WARNING: When operating electrical equipment, certain parts inevitably carry hazardous voltage levels. Work on the electrical system or equipment must be carried out only in accordance with electrical regulations by a qualified electrician himself or by specially instructed personnel under the control and supervision of a qualified electrician.



WARNING

CAUTION: Maintenance instructions must be observed as otherwise the safe operation of the actuator cannot be guaranteed.



CAUTION

WARNING: Failure to follow the warning information may result in serious bodily injury or property damage. Qualified personnel must be thoroughly familiar with all warnings contained in this operating manual.



WARNING

CAUTION: Proper transport, storage, installation, assembly and careful commissioning are essential to proper and safe operation.



CAUTION

WARNING: When working in potentially explosive areas, observe the European Standards EN 60079-14 "Electrical Installations in Hazardous Areas" and EN 60079-17 "Inspection and Maintenance of Electrical Installations in Hazardous Areas".



WARNING

WARNING: Maintenance work on open actuators may only be conducted if these are de-energized. Reconnection during maintenance is strictly prohibited.



WARNING

2 Special conditions for safe use

2.1 Special conditions for safe use: None

EC-Type Examination Certificate

The following conditions apply according to the EC-Type Examination Certificate number: **FTZÚ 03 ATEX 0328X** (can be found in the certificate under number (3)).

Equipment or protective system: Model ex (r) AB rotary actuator** (can be found in the certificate under number (4)).

Special conditions to safe use: **None** (can be found in the certificate under number (17)).

The optoelectronic sensor has to be connected by a certified intrinsic safety circuit according to **EN 50020**. (can be found in the certificate under number (17.1)).

Cleaning of inspection glass has to be done with a moist rag. (can be found in the certificate under number (17.2)).

2.2 Special conditions for safe use (X)

Supplementary EU-Type Examination Certificate

The following conditions apply according to the Supplementary EU-Type Examination Certificate number: **CESI 03 ATEX 280 X /10** (can be found in the certificate under number [17]).

Product: Three-phase asynchronous motors series 7AT 71–80–90–100–112–132–160

Supply cables of motors for the ambient temperature +60°C shall be suitable for an operating temperature equal or greater than +85°C.

Supply cables of motors for the ambient temperature +70°C shall be suitable for an operating temperature equal or greater than +90°C.

Screws used for fastening the parts of motor enclosure, shields and terminal box shall have a tensile strength equal or higher than:

- 800 N/mm² for motors size 71, 80, 90, 100, 112, 132, 160

The motor provided with the cables permanently connected, shall have these cables protected against the risk of damage due to mechanical stresses. The end connections shall be made according to one of the types of protection indicated in the IEC 60079-0 standard according to the installation rules in force in the site of installation.

For actuators painted with non-conductive dry film having thickness > 0.2 mm, the following label shall be applied:

Warning – potential electrostatic charging hazard. Clean with damp cloth.

The flamepaths are specified in the manufacturer drawings. For information regarding the dimensions of the flameproof joints the manufacturer shall be contacted.

2.3 Special conditions of use

Supplement to EC - TYPE EXAMINATION

Equipment or protective system intended for use in potentially explosive atmospheres — **Directive 94/9/EC** (can be found in the certificate under number (2)).

Nr.: TÜV-A 04ATEX 0009X (can be found in the certificate under number (3))

Product: On Site Control Smartcon-ex CSC ex..

Special Conditions of Use (can be found in the certificate under number (17))

The sign 'X' placed after the certificate number indicates that the product is subject to the Specific Conditions of Use.

The tensile elastic limit of the fastening screws for Ex d housing must be at least 400 N/mm² (can be found in the certificate under number (17.1)).

In certain design versions (depending on the mounting parts: heating, capacity), a warning sign on the required waiting time to open the housing shall be provided. (can be found in the certificate under number (17.2)).

The explosion-proof components used (terminal blocks, cable glands, blanking glands) must be approved for the extended ambient temperature range. (can be found in the certificate under number (17.3)).

Maximal permissible power loss of the installed equipment: (can be found in the certificate under number (17.4))

Standard model CSC ex

max ambient temp.	temp.class T4	temp.class T6
+40 °C	80 W	55 W
+50 °C	50 W	40 W
+60 °C	30 W	25 W
+70 °C	10 W	10 W

New model CSC ex XTR (*)

max ambient temp.	temp.class T4	temp.class T6
+40 °C	140 W	55 W
+50 °C	100 W	40 W
+60 °C	80 W	25 W
+70 °C	60 W	10 W
+80 °C	40 W	–
+85 °C	30 W	–

(*) New ambient temperature table added

Routine test

The test pressure for the routine tests of the XTR types is 23 bar. The reference pressure is 15.3 bar.
The test pressure for the routine tests of the standard types is 14 bar. The reference pressure is 9 bar.

3 General

3.1 Overview

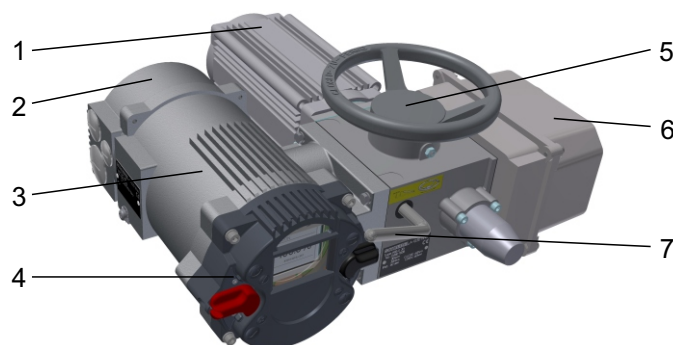


Figure 1: 1... Motor, 2... Connection compartment, 3... SMARTCON control unit, 4... Operating unit, 5... Handwheel, 6... Signalling lid, 7... Lever for manual operation

3.2 Serial number and nameplate

Each actuator and each SMARTCON control unit carries a serial number. The serial number is a 8-digit number that begins with the year and that can be read from the nameplate (see Figure 2 and 3)

The nameplate of the actuator is located under the hand lever and the nameplate of the SMARTCON control unit is located on the control unit (see Figure 4).

Using this serial number, SCHIEBEL can uniquely identify the actuator (type, size, design, options, technical data and test report).

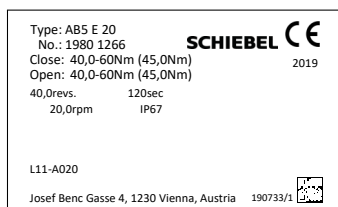


Figure 2: nameplate of the actuator

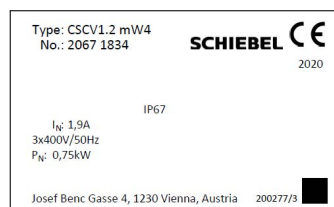


Figure 3: nameplate of the SMARTCON control unit



Figure 4: 1... nameplate of the SMARTCON control unit, 2... nameplate of the actuator

Actuators which are suitable for operation in explosive atmosphere (see EU-Guideline 2014/34/EU and EN60079-0 Standard) are separately designated by a special model plate (Ex, TÜV-Standard, see Figure 5 and 6).

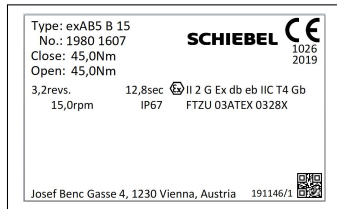


Figure 5: nameplate of the actuator for operation in explosive atmosphere

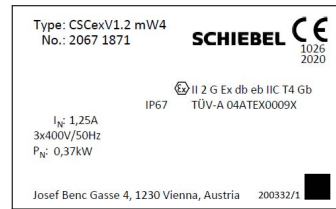


Figure 6: nameplate of the SMARTCON control unit for operation in explosive atmosphere

3.3 Operating mode

There are two distinct modes of operation: open-loop control operation (operational mode S2 for ON-OFF) and closed-loop control operation (operational mode S4) according to EN 60034-1. But since there is a great number of varying and special models made to order, it is recommended to consult the motor model plate for the mode of operation and the running time.

3.4 Protection class

Actuators with three-phase motors are standardly equipped with the IP 66 protection system (according to DIN-Standard 40050). **Explosion-proof** actuators and actuators with plugs are furnished with the IP 65 protection system. Exceptions are the AC, DC and brake-motor actuators as well as those for other protection systems made to special order.

CAUTION: The protection class specified on the nameplate is only effective when cable glands also provide the required protection class, the cover of the connection compartment is carefully screwed and the mounting position (see section 3.5, page 8) is observed.



We recommend metallic screwed cable glands with a metrical thread. Furthermore, cable inlets not be needed must be closed with screw plugs. On explosion-proof actuators cable glands with protection class **Ex e according EN60079-7** must be used. **After removing covers** for assembly purposes or adjustment work, take special care upon reassembly so that seals are not damaged and remain properly fastened. Improper assembly may lead to water entrances and to failures of the actuator.

CAUTION: The cover of the control unit (see figure 1, page 7) must not be opened!



Allow a certain sag in the connector cables before reaching the screwed cable glands so that water can drip off from the connector cables without running to the screwed cable glands. As a result, forces acting on the screwed cable glands are also reduced. (see section 3.5).

3.5 Mounting position

In principle, the installation position is irrelevant. However, based on practical experience, it is advisable to consider the following for outdoors use or in splash zones:

- Mount actuators with cable inlet facing downwards
- Do not arrange the motor so that it hangs downwards
- Ensure that sufficient cable slack is available

3.6 Direction of rotation

Unless specifically ordered otherwise, the standard direction is (see Figure 7 and Figure 8):

Clockwise rotation = Close

Counter-clockwise rotation = Open

Clockwise rotation of the actuator is given when the output shaft turns counter clockwise when looking on the output shaft.

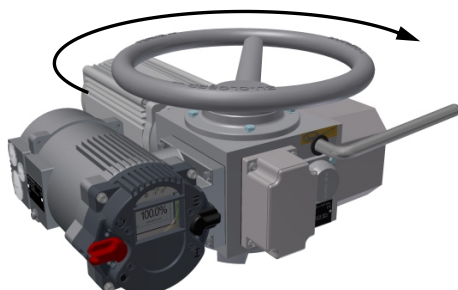


Figure 7: AB3 - AB80

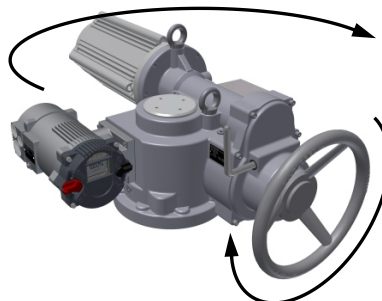


Figure 8: AB100 - AB500

All data in these operating instructions refer to the standard rotating direction.

3.7 Protection devices

3.7.1 Electromechanical protection devices (design potentiometer torque)

The torque protection of the actuators with integral SMARTCON control unit is controlled mechanically by plate springs which pass the current torque through a conductive plastic potentiometer to the control unit. The switch off torque can be changed in the menu of the control unit for the left and right direction. The factory default switch off torque is set to the ordered torque. If no torque was specified in the order, the actuator is supplied from the factory with the maximum adjustable torque.

see *Operating Instructions for SMARTCON Control Units*

3.7.2 Mechanical protection devices (design switch for torque)

All actuators have at least one torque switch for clockwise and counter-clockwise rotation. These can be separately adjusted and are preset ex works to the torque required

NOTE: The adjusting screws are varnish-protected and must not be reset without prior consultation with the Schiebel company.

However, the torque for the relevant rotating direction can be reduced by means of plastic cams on the torque switch. Counter-clockwise rotation torque is reduced as follows: Using a screwdriver, turn the plastic cam marked "L" in the direction of the decreasing scale markings (clockwise). To reduce the clockwise rotation torque, turn the plastic cam marked "R" in the direction of the decreasing scale markings (clockwise). See Figure 9.

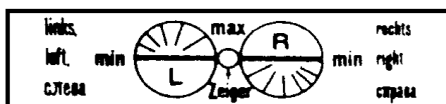


Figure 9

3.7.3 Electrical protection devices

All motors have temperature switches as standard equipment (temperature sensors upon special order), which are wired into the control and protect the motor from overheating. In the housing of the connection plug super fast safety fuses are located to protect the integrated thyristors

(electronic reversing contactors).

Further we recommend the installation of a motor protection circuit breaker on site as additional protection for rapid engine warming up (block). The tripping current must be adjusted to 1.2 . . . 1,5-times of the motor current, or at explosion-proof models proceed according to the corresponding guidelines of the National Explosion Protection Authority.

3.8 Ambient temperature

Unless otherwise defined according to special order, the following operational temperature generally applies:

- open-loop control actuators from -25 °C to +70 °C
- closed-loop control actuators from -25 °C to +60 °C
- Explosion-proof actuators (according to EN60079-0 Standard):

Type	min. Temp.	max. Temp
Standard	-20 °C	+40 °C
TT40	-40 °C	+40 °C
TT50	-50 °C	+40 °C
HT60	-20 °C	+60 °C
HT70	-20 °C	+70 °C

CAUTION: The maximum operational temperature also depends on the built-in components. Please observe the technical data sheets.



CAUTION

3.9 Delivery condition of the actuators

For each actuator, an inspection report is generated upon final inspection. In particular, this comprises a full visual inspection, calibration of the torque measurement in connection with an extensive run examination and a functional test of the micro controllers.

These inspections are conducted and documented according to the quality system and can be found in the document gag (mounted on the handwheel).

The basic setting of the end position must be performed after assembly on the actuator.

CAUTION: Commissioning instructions (see section 6, page 16) must be strictly observed! During assembly of the supplied valves at the factory, end positions are set and documented by attaching a label (see Figure 10). During commissioning at the plant, these settings must be verified.



CAUTION

Einbauelemente sind voreingestellt. Stellantrieb darf weder demontiert noch in seiner Stellung zur Armatur verändert werden, andernfalls ist eine Neueinstellung erforderlich. Bei anlagenseitiger Inbetriebnahme können Neujustagen erforderlich werden.	Built-in components are preset. The actuator must not be removed or changed in its position to the valve, otherwise a re-adjustment is required. Also at commissioning re-adjustment may be required.
SCHIEBEL	
ID:7568	

Figure 10: Label

3.10 Information notice (tag)

Each actuator is provided with a bilingual tag containing key information, which is attached to the handwheel after final inspection. This tag also shows the internal commission registration number (see Figure 11).



Figure 11: tag

4 Packaging, transport and storage

You can order the actuators to be delivered with or without packing. Special packing requirements must be specified along with your order. Use extreme caution when unpacking or repacking the actuator.

CAUTION: Use soft belts for hoisting equipment. Do not attach hoisting belts to the handwheel.



CAUTION

4.1 General

The indicator lids of all actuators contain a minimum of 5 g of silica gel ex factory.

CAUTION: Prior to start-up of the actuator (refer to section 6, page 16) all of the silica gel must be removed!



CAUTION

4.2 Storage

NOTE: Observing the following precautions will help to avoid damage when storing actuators:

- Store actuators in well-ventilated, dry premises

- Protect against floor dampness by storing actuators on wooden grating, pallets, mesh boxes or shelves
- Protect the actuators against dust and dirt with plastic foil
- Actuators must be protected against mechanical damage. It is not necessary to open the controller of the actuator for servicing batteries or similar operations.
- The storage temperature must be between -20 °C to +40 °C

It is not necessary to open the controller of the actuator for servicing batteries or similar operations.

4.3 Long-term storage

NOTE: If you intend to store the actuator for over 6 months, follow additionally the instructions below:

- The silica gel in the connection compartment **must be replaced after 6 months** of storage (from date of delivery from SCHIEBEL's factory in Vienna)
- After replacing the silica gel, brush with glycerine the connection cover seal. Then, carefully close again the connection compartment
- Coat screw heads and bare spots with neutral grease or long-term corrosion protection
- Renovate damaged paintwork arising from transport, improper storage, or mechanical influences.

WARNING: For explosion-proof actuators it is not allowed to overlacquer the actuator extensively. According to the standard, to avoid electrostatic charge, the maximal thickness of the varnish is limited with 200 µm.



WARNING

- Wrap the motor (especially the brake motor) with oiled paper.
- Every 6 months, all measures and precautions for long term storage must be checked for effectiveness and corrosion protection and silica gel renewed.

NOTE: Failure to follow the instructions above may lead to condensation which can damage to the actuator.

5 Installation Instructions

Installation work of any kind of actuator may only be performed by qualified personnel.

5.1 Mechanical Connection

Make sure that the fitting flanges and the actuator flanges match each other, and that the borehole matches the shaft or, in the case of actuator model "A"(threaded bushing), that the actuator and fitting threads match each other.

- Grease the spindle.
- Clean all exposed parts which have been coated with anti-corrosive.
- Thoroughly clean the bolting surfaces of the fittings.
- Lightly grease the connecting joints between the actuator and the fittings.
- Place the actuator on the fittings or the gear.

- Tighten the fastening screws crosswise (torque acc. below table).

size	torque [Nm] for screws 8.8
M6	10
M8	25
M10	48
M12	84
M16	206
M20	415

CAUTION: For output type A (unbored threaded bushing), you must sufficiently lubricate both needle bearings in the output form after processing and cleaning the spindle nut. For this purpose, use the optional SCHIEBEL grease lubricant or a grease lubricant according to our recommendation (section 11, page 27).



CAUTION

5.2 Mounting position of the control unit

The control unit can be rotated in 90° steps.

CAUTION: During installation, the position of the control unit in relation to direct sunlight must be observed. It is recommended to protect the unit from direct sunlight (roof, installation position) to avoid possible malfunctions.



CAUTION

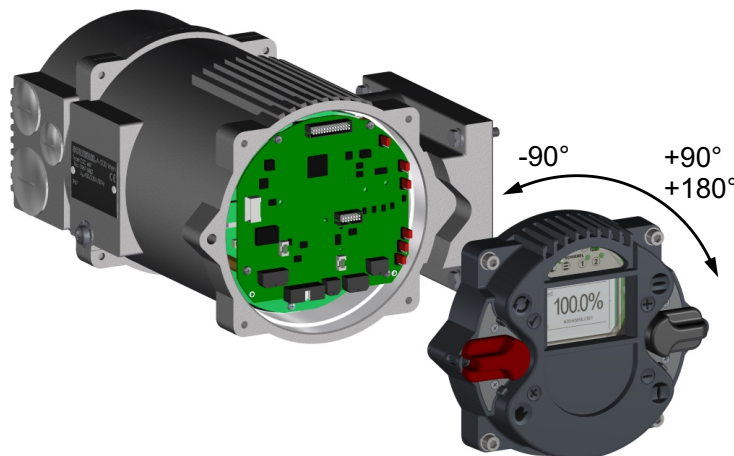


Figure 12

- Disconnect the actuator and control system from the power supply.
- To prevent damage to the electronic components, both the control system and the person have to be earthed!
- Undo the bolts for the interface surface and carefully remove the service cover.
- Turn service cover to new position and put back on.
 - Ensure correct position of the O-ring
 - Turn service cover by max. of 180°.
 - Put service cover on carefully so that no cables get wedged in.

- the bolts evenly in a crosswise sequence. **IMPORTANT:** max. torque 5 Nm

5.3 Electrical connection

WARNING: Electrical connections may only be carried out by qualified personnel. Please observe all relevant national security requirements, guidelines, and regulations.



WARNING

WARNING: The equipment should be de-energized before working on electrical connections. Furthermore, confirm the absence of electrostatic discharges during the connection.



WARNING

NOTE: Connection cables and cable glands:

For explosion-proof devices, cable glands with the corresponding Ex e approval must be used. The cable glands must be selected to match the connection cables. The IP protection class specified on the nameplate must also be ensured by the cable glands. Cable glands and connection cables must meet the environmental conditions (ambient temperature, UV exposure, exposure to dust and water). To ensure the insulation of the device, use suitable (voltage-resistant) cables. Cables must be rated for the highest occurring nominal voltage. Use connection cables with a minimum temperature range of +85 °C; the lower temperature limit must comply with the ambient temperature range.



NOTE: Connect the ground screw first.

NOTE: The line and short circuit protection must be done on the system side. The ability to unlock the actuator is to be provided for maintenance purposes. For the dimensioning the rated current is to be used (see Technical Data).

CAUTION: Check whether the power supply (voltage, frequency) is consistent with the connection data (see name plate of the motor).



CAUTION

NOTE: The connection of electrical wiring must follow the circuit diagram. This can be found in the appendix of the documentation. The circuit diagram can be ordered from SCHIEBEL by specifying the serial number.

NOTE: Please heed the guidelines, if optional features such as a Profibus connection is used.

The standard model can be ordered with the following connection options:

- size 1: connection of the control signals and power supply via plugs (see Figure 13) with screw connection.

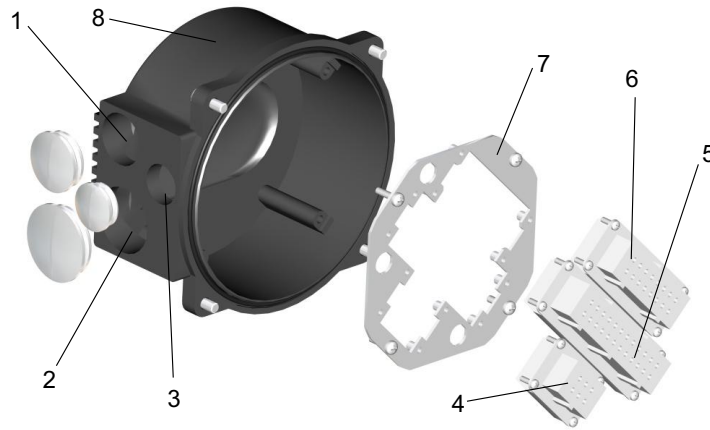


Figure 13: 1...metallic cable glands (closed with blind screw connections at delivery) M32x1,5, 2...M40x1,5, 3...M25x1,5, 4...plug (for power supply), 5...plug (for control signals), 6...plug for options, 7...connection plug plate, 8...connection plug housing

- size 2: connection of the control signals is the same as size 1, the connection of the power supply is made by an additional plug (see Figure 14), both plugs are with screw connection.

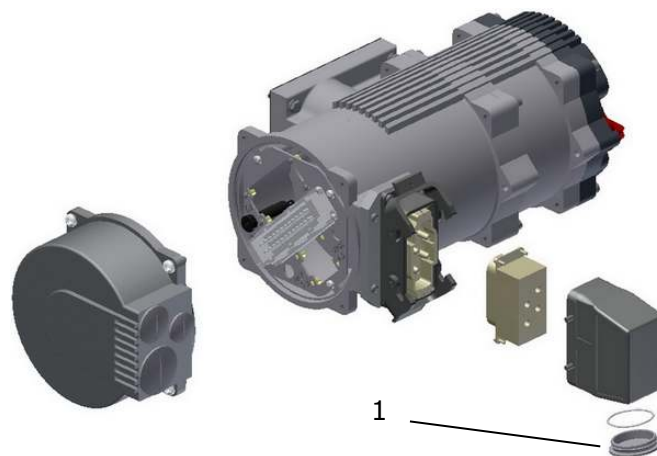


Figure 14: size 2 with the additional plug, 1...M40x1,5

- **Explosion-proof actuators** or on special request the connection will be made via terminals (see Figure 15).

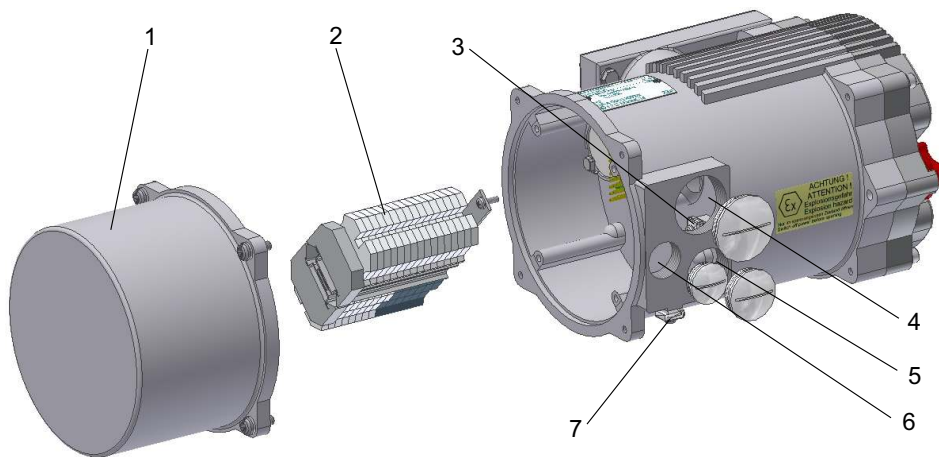


Figure 15: 1... connection plug housing, 2... terminal strip, 3... inside ground connection, 4... metallic cable glands (closed with blind screw connections at delivery) M40x1,5, 5... M32x1,5, 6... M25x1,5, 7... outside ground connection

3 phase power is applied in positive turning direction of the electric field on the connectors L1, L2, L3 according the wiring diagram. Before starting the actuator the turning direction of the electric field should be checked.

NOTE: If phase sequence of the three phase power supply system is wrong the integrated phase sequence monitoring generates an error and the actuator is blocked. (see *Operating Instructions for SMARTCON Control Units*)

If a reverse rotation of the actuator (ccw) is needed, the rotation direction must be changed in the control unit (see *Operating Instructions for SMARTCON Control Units*).

NOTE: Please also note the information about the installation of an external motor protection circuit breaker - see section 3.7.3, page 9.

CAUTION: If, during outdoor installation, commissioning is not carried out immediately after electrical connection, the power supply must be connected at a minimum to achieve a heating effect. In this case, the silica gel may remain in the connection compartment until commissioning. See section 4.3, page 12.



6 Commissioning

Before commissioning, please ensure the actuator is correctly assembled and electrically connected. (see section 5, page 12)

NOTE: Remove silica gel from the connection compartment.

6.1 General

CAUTION: During commissioning and after every disassembly of the actuator, you have to make the mechanical preadjustment (see section 6.3, page 18), adjust the mechanical position indication (see section 6.4, page 19), adjust the additional components (see section 6.5, page 19) and adjust the end positions (see section 6.8, page 19).



NOTE: The torque unit is adjusted at work and **MUST NOT** be changed.

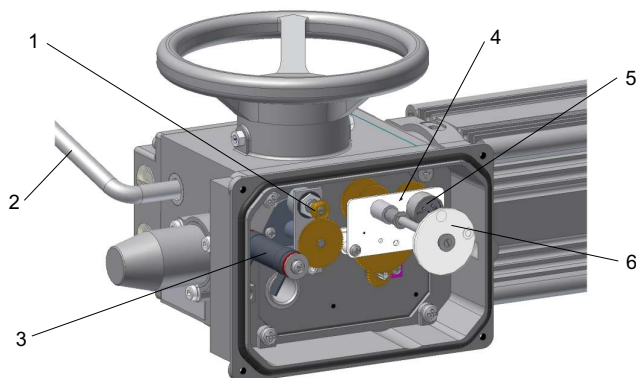


Figure 16: design potentiometer for travel: 1... torque unit, 2... hand lever, 3... heating resistor - **Attention: HOT!!!**, 4... gearing of travel unit, 5... potentiometer for travel sensing, 6... mech. position indicator (option)

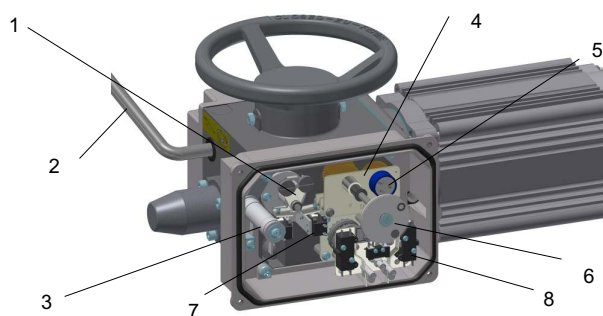


Figure 17: design switch for travel: 1... torque unit, 2... hand lever, 3... heating resistor - **Attention: HOT!!!**, 4... gearing of travel unit, 5... potentiometer for travel sensing, 6... mech. position indicator (option), 7... switch for torque, 8... switch for travel

6.2 Switching the actuator to manual operation

The actuator is switched to manual operation by moving the hand lever (see Figure 18 and 19) by approximately 15°, and by simultaneously turning the hand wheel. The lever remains in this position and will be switched back automatically as the motor starts up.

Please be aware of the following items listed below, when switching to manual operation.

- When switching to manual operation, the actuator's **automatic interlock is deactivated**, that means that the driven valve must not initiate reverse torque to the output shaft of the actuator!
- Switching back to motor operation is made **automatically** as the motor starts up. It **must not** be undertaken with the hand lever!
- Only switch to manual operation when the motor is idle!
- Hand lever has a slewing angle of approximately 15°, therefore release the hand lever immediately upon activation!

Special approach to switching to manual mode for actuator types AB100, AB200 and AB500 is necessary. In case of such an actuator, follow the steps listed below.

1. Push the hand lever away from the handwheel and simultaneously move the handwheel in any direction to engage the clutch. The clutch is engaged when the hand lever don't move back automatically and the handwheel is stronger to move.
2. After the clutch is engaged, the hand lever must be pulled back to the handwheel one single time to fix the position of the clutch.
3. The actuator is now in manual operation mode. Switch back to normal operation mode happens automatically by starting the motor. **Switching back to the normal operation mode is not possible with the hand lever!**

Labels on the actuator:



Figure 18: AB3, 5, 100, 200, 500

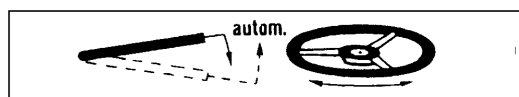


Figure 19: AB8, 18, 40, 80

6.3 Mechanical default settings, preparation (only for design potentiometer for travel)

Instructions:

- Switch with the hand lever to manual operation (see section 6.2, page 17) and turn the actuator with the handwheel to the next end position
- Remove cover of the signalling unit
- Switch with the control switch (black switch) to the status menu S4 (see *Operating Instructions for SMART-CON Control Units*)
- For units without mechanical position indicator turn the slotted shaft (see Figure 20) with a screwdriver carefully until the below value is reached (see Figure 23)
 - when the actuator is in the closed position: Pos: 10.0
 - when the actuator is in the open position: Pos: 90.0
- For units with mechanical position indicator turn the wheel (see Figure 21 and Figure 22) until the below value is reached (see Figure 23)
 - when the actuator is in the closed position: Pos: 10.0
 - when the actuator is in the open position: Pos: 90.0
- Close cover of the signalling unit. Take special care upon reassembly so that seals are not damaged and remain properly fastened

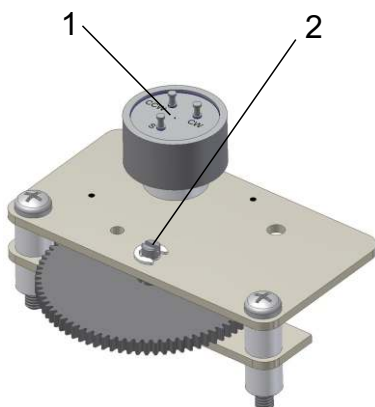


Figure 20: 1... potentiometer for position sensing, 2... slotted shaft for turning the potentiometer

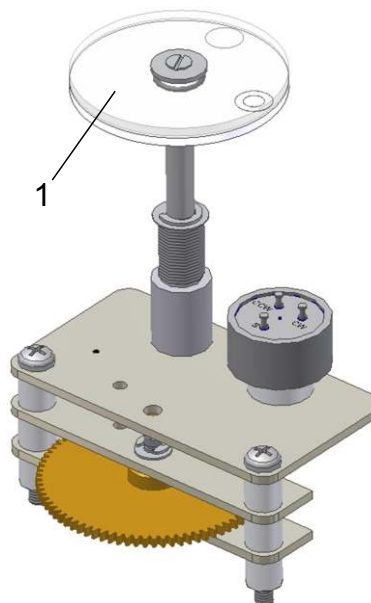


Figure 21: 1... mechanical position indicator

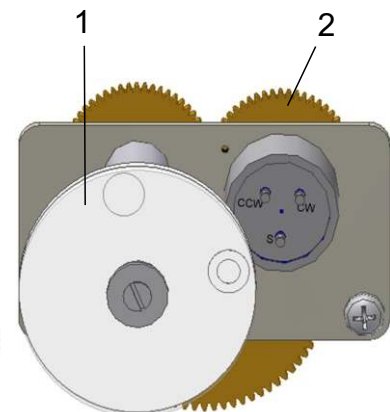


Figure 22: 1... mechanical position indicator, 2... wheel turning the potentiometer

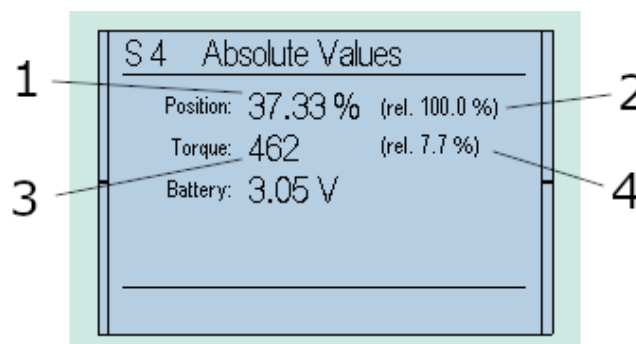


Figure 23: 1... absolute value of the position unit, 3... value for the torque unit (is factory adjusted)

For the set up of the end positions see section 6.8, page 19.

The above transmitter gear is made according to the customer's specifications. If another travel of the actuator is necessary, a new transmitter gearbox can be supplied.

6.4 Adjustment of the mechanical position indication (Option)

The adjustment of the mechanical position indication should be done together with the mechanical pre-setup. Vorgehensweise:

- Switch with the hand lever to manual operation (see section 6.2, page 17) and turn the actuator to the next end position.
- Remove cover of the signalling unit
- turn Indicator slide according below end position:
 - when the actuator in in the closed position: Display with the filled circle
 - when the actuator is in the open position: Display with the circle
- move the actuator to the other end position and turn the other Indicator slide. It is necessary that you hold the second slide in its earlier set position.
- Check the clamping screw
- Close cover of the signalling unit. Take special care upon reassembly so that seals are not damaged and remain properly fastened

6.5 Additional components (Option)

Possibly installed additional components have to be set-up according their separately supplied technical descriptions.

6.6 Parameterize of the SMARTCON control unit

After finishing the pre-setup of teh actuator (see section 6.3, page 18) all further settings can be done via the SMARTCON interface.

CAUTION: It is absolutely necessarily to control the torque settings of the actuator and to teach in the end positions of the travel.



CAUTION

6.7 User Level and Permissions

In order to edit and/or show certain parameters, a user level with the necessary permissions has to be set as current user level. The current user level may be set temporarily in the "U User Level" menu item. It is also possible to set the default user level, which will be set as the current user level until set otherwise ("U User Level" or default user level). Please refer to Operating Instructions for SMARTCON Control Units for more information about the user levels.

6.8 Setting of the end positions (design potentiometer for travel)

A detailed description of the operation of the SMARTCON control unit can be found in the Operating Instructions for SMARTCON Control Units.

6.8.1 End limit OPEN

Set the selector switch and control switch to the centre position.

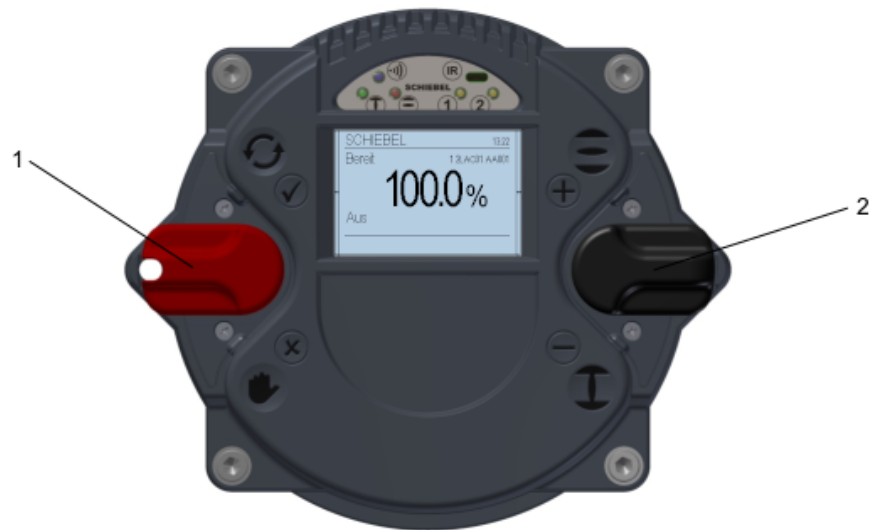


Figure 24: 1... selector switch (red), 2... control switch (black)

Scroll through the menu with the control switch. Move the control switch towards the first menu item \ominus „P 1.1 End limit – Open“.

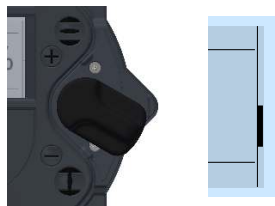


Figure 25

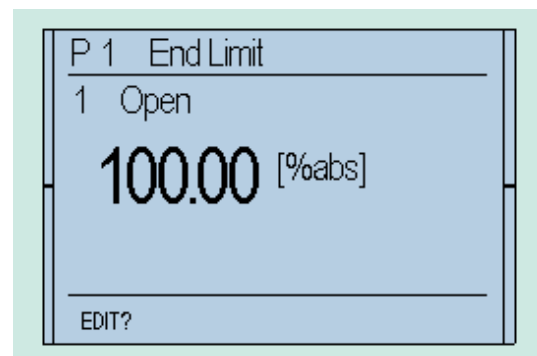


Figure 26

Afterwards, flip up the selector switch slightly and let it snap back to its neutral position \checkmark

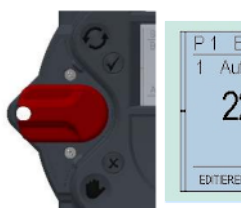


Figure 27

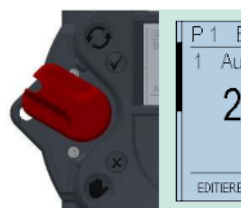


Figure 28

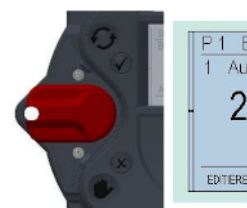


Figure 29

This changes the bottom line of the display from "EDIT?" to "SAVE?"

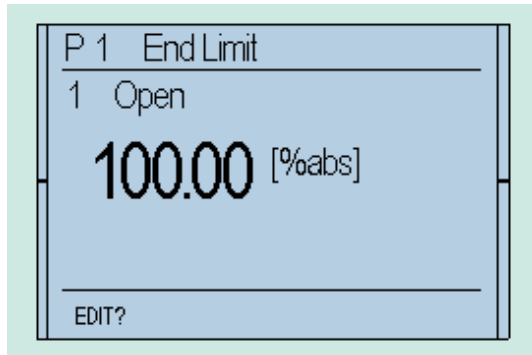


Figure 30

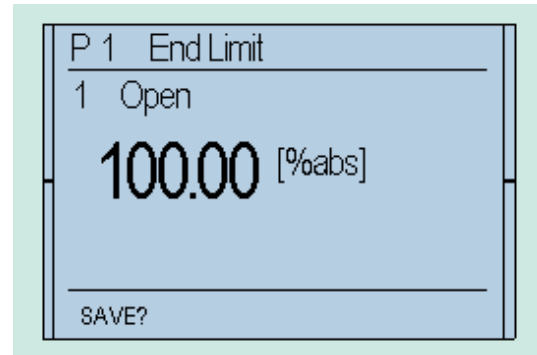


Figure 31

Then, push down the selector switch until it snaps into place. In doing so, the bottom right now on the display will show "TEACHIN" (✕)

CAUTION: Once the display shows "TEACHIN", use the operating switch (black switch) to start the motorised operation of the actuator. In this mode, no travel-dependent switch off occurs in the end position.

**CAUTION**

CAUTION: Please note that, during motor operation, only torque monitoring remains active, as travel adjustment will happen subsequently. Therefore, please check beforehand whether the maximum torque has been already parameterised.

**CAUTION**

Absolute and relative values on the display will change continuously along with position changes.

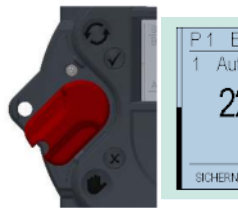


Figure 32

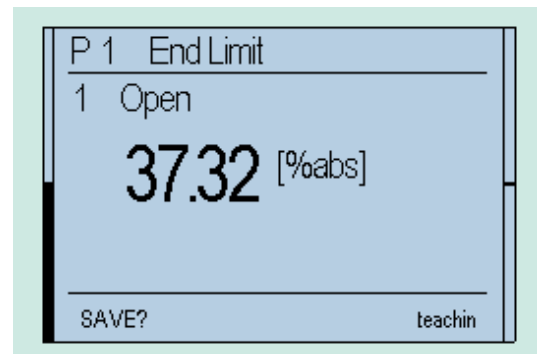


Figure 33

Manually move the actuator with the handwheel (see section 3.1, page 7 or 3.6, page 9) or by motor via the operating switch (black button) to the end position OPEN of the valve.

- Absolute value: Absolute value of the position feedback
- Relative value: the value to the other end position

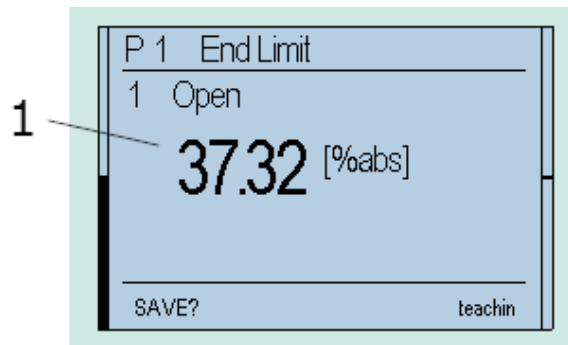


Figure 34: 1... Absolute value

When the desired end position OPEN of the valve is reached, move the selector switch back to the middle position. Thus, the line "TEACHIN" disappears.

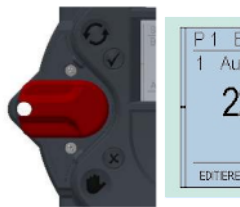


Figure 35

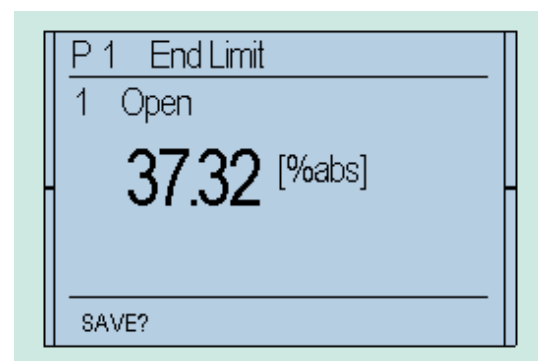


Figure 36

In order to confirm the end position (save), slightly flip up the selector switch and let it snap back to its neutral position ✓

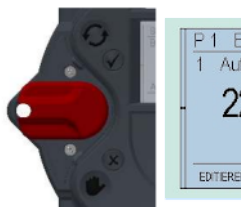


Figure 37

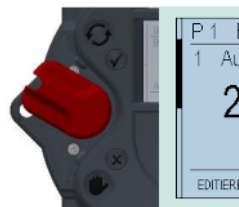


Figure 38

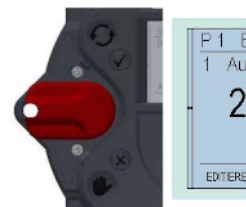


Figure 39

This changes the bottom line of the display for "SAVE?" to "EDIT?" and the end position is stored.

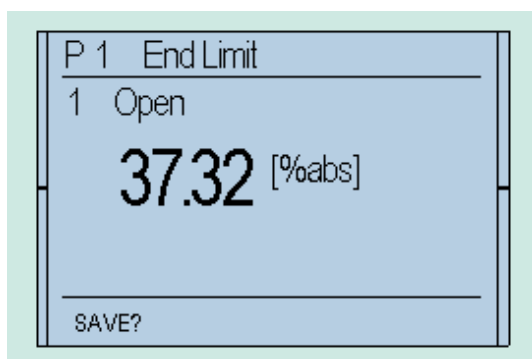


Figure 40

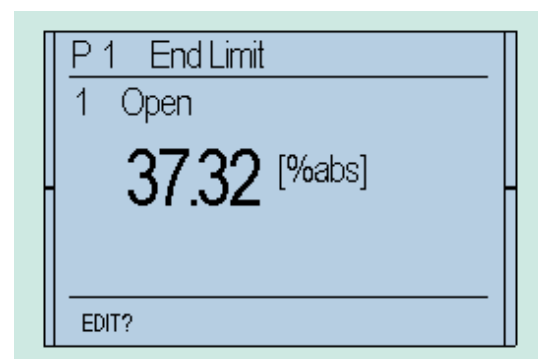


Figure 41

6.8.2 End limit CLOSE

Use menu item "P 1.2 End limit - End limit CLOSE" as for End limit OPEN

6.9 Setting of the end positions (design for switch for travel)

CAUTION: Depending on the load intensity, special actuators with high output speed display a trailing effect when switched off. This must be taken into consideration accordingly when adjusting the travel switches. The actuator can use either a roller-type counter or a camshaft gear for travel determination, as need be.



CAUTION

6.9.1 Roller-type Counter (operational range starting at 1 rev. at the output)

- Setting the position „CLOSE“:
Move the actuator into the position „CLOSE“ by hand. To set the final position, push the flasher shaft with square cam (see Figure 42) downwards with the finger. Using a screwdriver, turn the slotted shaft of the “R” rollers in the direction of the arrow, until the corresponding counter-clockwise trip cam activates the travel switch (see Figure 43). Release flasher shaft and be sure that the toothed roller locks in.

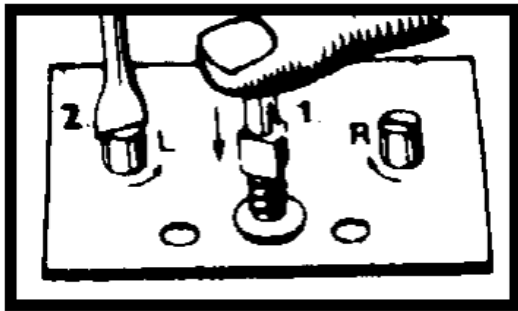


Figure 42

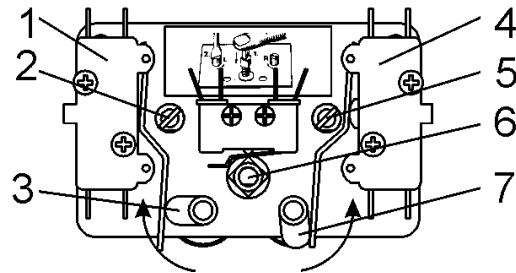


Figure 43: 1...switch S4, 2...L, 3...trip cam for counter-clockwise (OPEN), 4...switch S3, 5...R, 6...flasher shaft, 7...trip cam for counter-clockwise (CLOSE)

- Setting the position „OPEN“:
Move the actuator into the position „OPEN“ by hand. To set the final position, push the flasher shaft with square cam (see Figure 42) downwards with the finger. Using a screwdriver, turn the slotted shaft of the “L” rollers in the direction of the arrow, until the corresponding clockwise trip cam activates the travel switch (see Figure 43). Release flasher shaft and be sure that the toothed roller locks in.

6.10 Final works

Following commissioning, check for proper sealing the covers to be closed and cable inlets. (see section 3.4, page 8) Check actuator for paint damage (by transport or installation) and repair if necessary.

7 Maintenance

WARNING: Maintenance work on open actuators may only be conducted if these are de-energized. Reconnection during maintenance is strictly prohibited.



WARNING

WARNING: Work on the electrical system or equipment must be carried out only in accordance with electrical regulations by a qualified electrician himself or by specially instructed personnel under the control and supervision of a qualified electrician.



WARNING

Actuators are ready for use after installation. By default, the actuator is delivered filled with grease.
On-going monitoring:

- Beware of increased running noise. During long downtime periods, operate the actuator at least every 3 months.
- For actuators with output types A, B and C according to DIN 3210-A, B1, B2 and C according to DIN ISO 5210, re-lubricate at least every 6 months on existing grease fittings (see section 11.3, page 27)

Actuators are designed for installation in any position (see section 3.5, page 8). Therefore, the main body is not equipped with a level indication or a drain plug.

The replacement of the lubricant from the main body must be performed via the handwheel.

Every approx. 10,000-20,000 hours (about 5 years - section 11, page 27), depending on the workload, you must:

- Change oil/grease
- Replace seals
- Check all roller bearings and the worm-wheel assembly and replace if necessary.

Check our lubricants table for recommended oils and greases. (11, page 27)

NOTE: Check the cable glands at regular intervals (annually) for tightness of the cables and retighten if necessary.

If the visual inspection (eg. dust or water penetration) indicates that the effectiveness of the Sealing elements of the cable entry has suffered damage or aging, such elements have to be replaced preferably by using the original spare parts from the manufacturer of the equipment or through cable entries of comparable quality as well as the same ex- or IP protection class.

8 Battery Replacement

WARNING: All work on the opened device is only permitted in a de-energized state. The device must not be switched on again during work!



WARNING

WARNING: For explosion-proof actuators, it is necessary to wait a certain time after switching off before opening the cover (see *Operating Instructions for SMARTCON Control Units*).



WARNING

In order to be able to maintain the function of the real-time clock as well as the counter readings of the controller even in a de-energized state, it has a button cell battery. The service life of this battery varies depending on the ambient conditions, and must be replaced if necessary, at the latest as soon as the control unit issues the relevant warning (see *Operating Instructions for SMARTCON Control Units*).

9 Fuses

For replacement, pry the battery out of the socket using a plastic lever tool. Make sure that the tool is not placed under the socket, as this may cause damage to the circuit board. Then replace the battery with the following characteristics:

- Model Number: CR2032
- Electrochemical System: MnO_2/Li
- Nominal Voltage: 3V
- Rated Capacity: 225mAh

9 Fuses

Depending on the version of the SMARTCON control unit, there are fuses located in the terminal area, the dimension of the fuse is indicated next to the fuse holder.

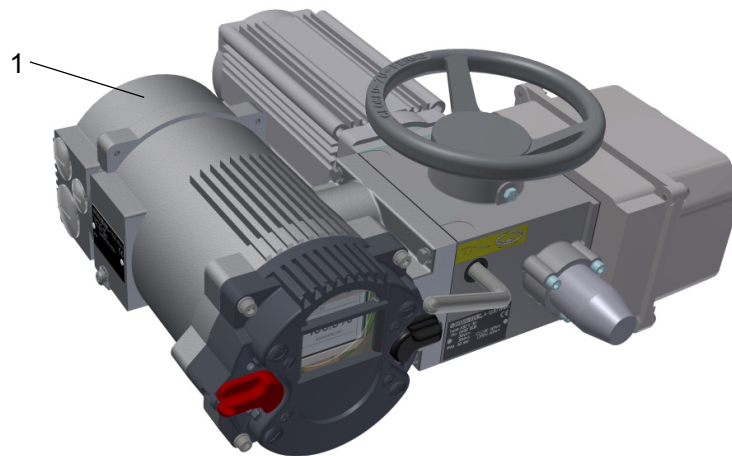


Figure 44: 1... Connection compartment

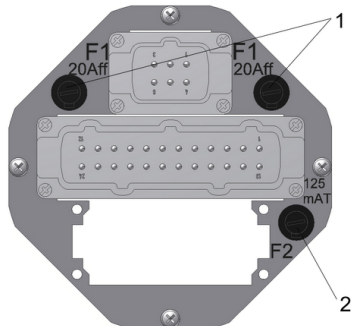


Figure 45: size 1, electronic reversing starters
(1... main fuses, 2... control fuse)

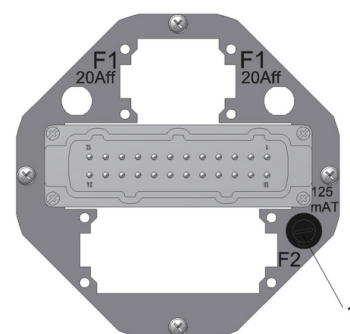


Figure 46: size 2 (1... control fuse)

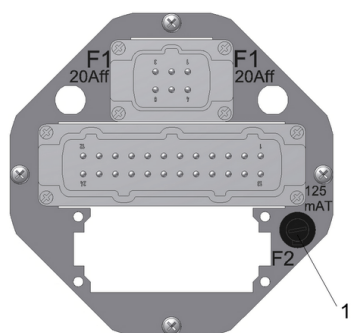


Figure 47: size 1, up to 440VAC
(1... control fuse)

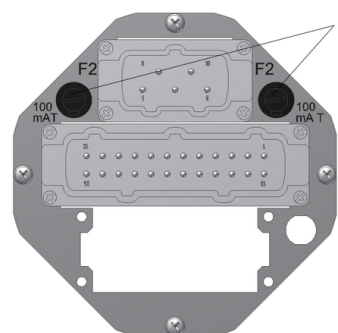


Figure 48: size 1, larger than 440VAC
(1... control fuse)

fuse F1: main fuse before the electronic reversing starter (eW, see Figure 45)			
power of the motor	value	Recommended Type	Spare part designation
up to 1,5kW	20A FF (2 pcs)	G-fuse, brand SIBA, type 195100, ceramic 6,3 x 32mm; 20AFF,very fast acting, 500V, $I^2t = 46A^2$	C606d
3kW	12,5A T (2 pcs)	G-fuse, brand SIBA, type 189140, ceramic 6,3 x 32mm; 12,5AT; time lag, 500V, $I^2t = 1300A^2s$	C606e
fuse F2: control fuse before the control transformer			
supplyvoltage	value	Recommended Type	Spare part designation
$\leq 440VAC$	125mA T	G-fuse, brand SIBA, type 189140, ceramic 6,3 x 32mm; 125mA; time lag, 500V, $I^2t = 0,08A^2s$	C606g
$> 440VAC$	100mA T (2 Stück)	G-fuse, brand SIBA, type 189140, ceramic 6,3 x 32mm; 100mA; time lag, 500V, $I^2t = 0,05A^2s$	C606f

NOTE: Actuators which are suitable for operation in explosive atmosphere, no fuses are located in the connection compartment! The control fuse is installed in the flameproof area of SMARTCON control unit and is not accessible to the user!

The logic board of the controller cover (see Figure 49, page 26) features two miniature fuses for the control lines

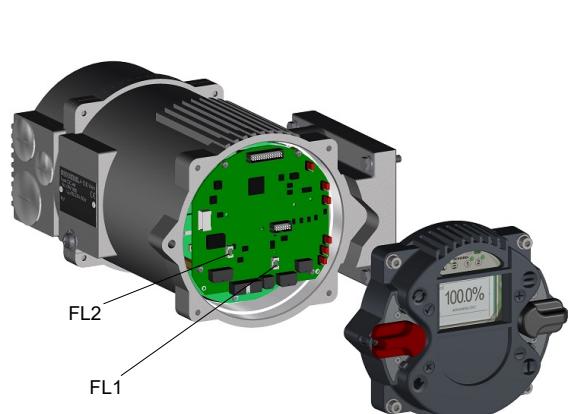


Figure 49: FL1... Fuse for auxiliary supply,
FL2... Fuse for the binary outputs

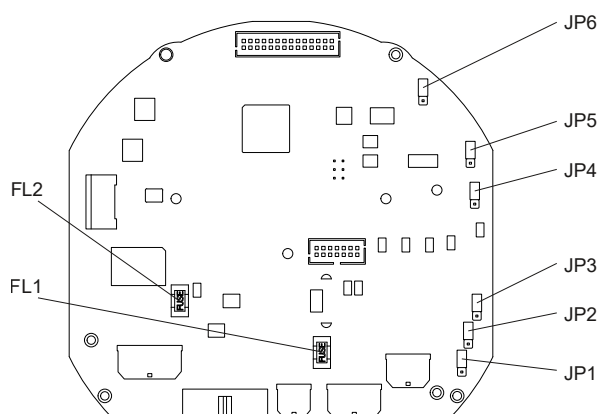


Figure 50: Logic-Board

Fuses on the logic board			
Fuse	Value	Manufacturer	List of spare parts
FL1	1AT	Littelfuse 454 NANO ² Slo-Blo®träge	FUSE-F1
FL2	4AT	Littelfuse 454 NANO ² Slo-Blo®träge	FUSE-F2

10 Spare parts

When ordering spare parts, please provide us with the serial number of the (see section 3.2, page 7). Check the separate break-down image and separate list of spare parts.

11 Recommendations of Lubricants (for all manufactures)

NOTE: Please note, that safety precautions such as the use of personal protective equipment (PPA) may have to be followed! Please consult the safety datasheet (in section 8) of the product in question.

11.1 Main Casing

11.1.1 Application temperature from -35 °C to +100 °C

Lubricating grease DIN 51826 - GP 00 P-30

i.e. High pressure (EP), complex grease on Li soap basis:

work penetration 0.1 mm:	355 - 430
Dripping temperature:	about 200 °C
NLGI grade:	00
Acid-free, not or only marginally reacting with water	

11.1.2 Application temperature from -50 to +100 °C

Lubricating oil CLP DIN 51517-3

i.e. fully synthetic high-performance industrial gear oil based on poly alpha olefins (PAOs):

Viscosity class:	ISO VG 68
Pour point:	<-55 °C
Compatibility with conventional coatings and sealants	

11.1.3 Application temperature from -60 to +100 °C

Lubricating oil CLP DIN 51517-3

i.e. fully synthetic high-performance industrial gear oil based on poly alpha olefins (PAOs):

Viscosity class:	min ISO VG 32
Pour point:	<-60 °C
Compatibility with conventional coatings and sealants	

11.2 Spur Gears (actuator size AB8 - AB80)

Lubricating grease DIN 51825 - KPF -1/2 G-20

i.e. High-graphite, bitumen-free permanent lubricant with outstanding EP properties:

Work penetration 0.1 mm:	265 - 340.
Observe operating temperature range!	

11.3 Output Drive Type A and Spindle Drive (Linear Actuators) plus Failsafe units

Lubricating grease DIN 51825-K(P) R -40

i.e. Water-repellent complex grease based on Al-soap with high resistance to acids and alkalis:

Ambient temperature:	-40 to +85 °C
Worked penetration 0,1 mm:	310-340
Dripping point:	approximately 260 °C
NLGI-Class:	1
acid-free, not or only slightly reactive with water	
Observe operating temperature range!	

11.4 Precision Components

Lubricating grease (or spray) DIN 58396- S1

i.e. High-creeping, water-displacing, low-viscosity grease chemically neutral to copper and plastics:

Work penetration 0.1 mm:	175 - 385
Dripping temperature:	over 150 °C
Evaporation loss:	max. 1%
Water resistance:	Evaluation grade DIN 51807-1-40

Observe operating temperature range!

11.5 Basic Lubricant Service Interval

On actuator maintenance, the old grease must be removed completely and replaced by a new one.

NOTE: The service interval for Schiebel actuators is 10 years from the date of delivery by Fa. SCHIEBEL Antriebstechnik Gesellschaft m.b.H, A-1230 Vienna. The functionality and operating life of the lubricants is, however, dependent upon operational conditions. It may be necessary to take reduction factors into account.

Operational condition(s)	Definition	Reduction Factor(Multiplier)
On-period (OP)	(Total of motor running time)	
Extremely high OP	over 1,250 hours/year	0,5
High OP	over 500 hours/year	0,7
Extremely low OP	less than 0.5 hours/year	0,8
Ambient temperature	(Permanent or long-term)	
Extremely changing	between -10 and +50 °C	0,5
Extremely high	over +50 °C	0,7
Extremely low	below -25 °C	0,9
Output speed	(at main shaft of actuator)	
High revolution	over 80 rev./min	0,8
Utilization factor	(with respect to nominal performance)	
Very high	over 90%	0,8
High	between 80 and 90%	0,9

Example:

Extremely low OP + extremely low ambient temperature + high revolution + utilization factor 87%

$\Rightarrow 0.8 \times 0.9 \times 0.8 \times 0.9 = 0.51$ reduction factor.

Lubricant maintenance interval $\Rightarrow 10$ years $\times 0.51 = 5.1$ years (62 months).

CAUTION: A thusly calculated maintenance interval does not apply to the maintenance of the output type A (threaded bushing), nor to the maintenance of the linear and spindle actuator units. These must be regularly re-greased (at least once every six months) at the lubricating nipples (see section 11.3, page 27)!



During actuator maintenance, the old lubricants must be thoroughly removed and replaced by fresh ones. **No mixing of different makes of lubricant is permitted!**

The quantities needed for lubricant service can be seen from the table below.

11.6 Lubricant Requirements

Type of actuator	Main gear	Spur gears	Output form A (Threaded bushing)	Output form B (Plug bushing)	Output form C (Claw coupling)
AB3/5	1kg (1l oil)	—	5cm ³	3cm ³	3cm ³
AB8	1kg (1l oil)	1cm ³	5cm ³	3cm ³	3cm ³
AB18	1kg (1l oil)	1cm ³	8cm ³	5cm ³	5cm ³
AB40/80	1,5kg (1,5l oil)	1,5cm ³	9cm ³	6cm ³	6cm ³
AB100/200	3,5kg (3,5l oil)	1,5 kg (1,5l oil)	23cm ³	20cm ³	20cm ³

When lubricating precision components, such quantities of lubricant are to be used as to ensure fine moistening of the sliding surfaces.

12 Training

CAUTION: Should problems arise on site in connection with assembly or adjustment, please contact the SCHIEBEL Antriebstechnik Gesellschaft m.b.H, Josef-Benc Gasse 4, A-1230 Vienna, Telephone +43 (1) 66 108 or by internet www.schiebel-actuators.com, in order to avoid any incorrect operations or damage to the actuators.



The Schiebel Company recommends to recruit only qualified personnel for assembly of Schiebel actuators. Upon special request by the ordering party, personnel can be trained on the premises of the Schiebel Company according to the operations listed in the instructions for use.

13 Original Declaration of Incorporation of Partly Completed Machinery

According Machinery Directive 2006/42/EC, (Annex II, sub. B)

The manufacturer, the company:

SCHIEBEL Antriebstechnik Gesellschaft m.b.H.
Josef-Benc-Gasse 4
A-1230 Vienna

hereby declares that the partly completed machinery described below:

Electric actuators series:

AB rAB exAB exrAB

with optional additional components:

Smartcon CSC Smartcon exCSC

the following basic requirements of the Machinery Directive (2006/42/EC) are applied and fulfilled:

Annex I, articles 1.1.2, 1.1.3, 1.1.5; 1.2.1, 1.2.1, 1.2.2, 1.2.6; 1.3.1, 1.3.2, 1.3.7;
1.5.1; 1.6.3; 1.7.1, 1.7.3, 1.7.4

The following European harmonized standards have been applied:

EN12100:2010

EN ISO 5210:1996

EN ISO 5211:2001

DIN 3358:1982

The relevant technical documentation for partly completed machinery referred to in Annex VII, Part B has been prepared. The manufacturer commits to submitting the documents for the incomplete machine to the competent national authority electronically upon request.

For the preparation of the technical documents is authorized:

Head of mechanical Engineering
Schiebel Antriebstechnik Gesellschaft m.b.H.
Josef-Benc-Gasse 4
A-1230 Vienna

This partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the Machinery Directive 2006/42/EC, where appropriate.

The electric actuators as partly completed machinery is in conformity with the relevant regulations of the EU directives:

Directive 2014/30/EU ("EMV-Directive")


Directive 2014/35/EU ("Low voltage directive")

Directive 2014/34/EU ("ATEX-Directive") for correspondingly marked devices

The corresponding separate EC Declarations of Conformity are valid.

Vienna,
(location)

den **14.12.2016**
(date)


.....
(Klaus Schiebel, general manager)

14 EU Declaration of Conformity

(EMV- and Low voltage-directive)

The producer:

SCHIEBEL Antriebstechnik Gesellschaft m.b.H.
Josef-Benc-Gasse 4
A-1230 Wien

herewith confirms, that the equipment

electric actuators with control unit and following types

(r)AB ... CSC

meets the requirement of the EC-directive:

2014/30/EU („EMV-directive“)

in consideration of the respective operating instructions, and the fulfilment of the Directive has been demonstrated by the following standards:

EN 61000-6-2:2019

EN 61000-6-3:2021

and are also consistent with the EC-directive:

2014/35/EU („Low-voltage-directive“)

in consideration of the respective operating instructions, and the fulfilment of the Directive has been demonstrated by the following standards:

IEC 60204-1:2005 + A1:2008 EN 60529:1991 + A1:2000

Vienna,
(location)

24.04.2024
(date)



.....
(Klaus Schiebel, general manager)

15 EU Declaration of Conformity

(Ex-, EMV- and Low voltage-directive)

The producer:

SCHIEBEL Antriebstechnik Gesellschaft m.b.H.
Josef-Benc-Gasse 4
A-1230 Wien

herewith confirms, that the equipment

Description	Type	Marking	Certificate-No.
Electric Actuator	ex (r) AB	⊕II2G Ex db eb II C T4(T6) Gb	FTZU03ATEX0328X
Control Unit	CSCex	⊕II2G Ex db eb II C T4(T6) Gb	TÜV-A04ATEX0009X
Control Unit	CSCexFU	⊕II2G Ex db eb II B T4(T6)	TÜV-A08ATEX0006
Flameproof Induction Motor	D(.).()FUY63/..-	⊕II2G Ex db II C T4 Gb	FTZU03ATEX0330X
Flameproof Induction Motor	D(.).()FUY80/..-	⊕II2G Ex db II C T4 Gb	FTZU03ATEX0333X
Flameproof Induction Motor	ex DKF .. .X. ..	⊕II2G Ex db II C T4 Gb	TÜV-A03ATEX0016X
Microswitch	d 515U	⊕II2G Ex db II C Gb	FTZU03ATEX0332U
Flameproof Potentiometer	dP1 / dP2	⊕II2G Ex db II C Gb	FTZU03ATEX0387U
Flameproof capacitor	dK .	⊕II2G Ex db II B Gb	FTZU07ATEX0009U

meets the requirement of the EC-directive:

2014/34/EU

Equipment and protective systems intended for use in potentially explosive atmospheres

and complies with the following harmonised standards in the version valid at signature date:

EN IEC 60079-0:2018	Explosive atmospheres - Part 0: Equipment – General requirements
EN 60079-1:2014	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
EN 60079-7:2016	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
EN 60079-11:2012	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

Following notified bodies certificate the conform design of the equipment:

FTZU	CZ-716 07 Ostrava Radvanice	NB 1026: Quality system FTZU03ATEXQ019, Type examination certificates
TÜV Austria Services GMBH	A-1230 Wien	NB 0408: Type examination certificates

Furthermore they consistent with the EC-directive:

2014/30/EU („EMV-directive“)

in consideration of the respective operating instructions, and the fulfilment of the Directive has been demonstrated by the following standards:

EN 61000-6-2:2019

EN 61000-6-3:2021

and are also consistent with the EC-directive:

2014/35/EU („Low-voltage-directive“)

in consideration of the respective operating instructions, and the fulfilment of the Directive has been demonstrated by the following standards:

IEC 60204-1:2005 + A1:2008 EN 60529:1991 + A1:2000

Vienna,
(location)

24.04.2024
(date)



.....
(Klaus Schiebel, general manager)



Vienna,
(location)

24.04.2024
(Datum)

.....
(Udo Klimpfinger, explosion protection officer)

16 Technical data

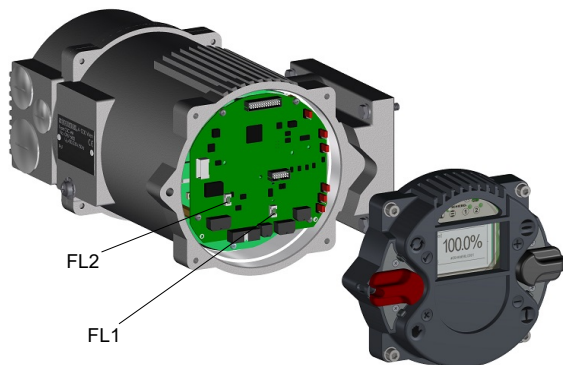


Figure 51: Control unit

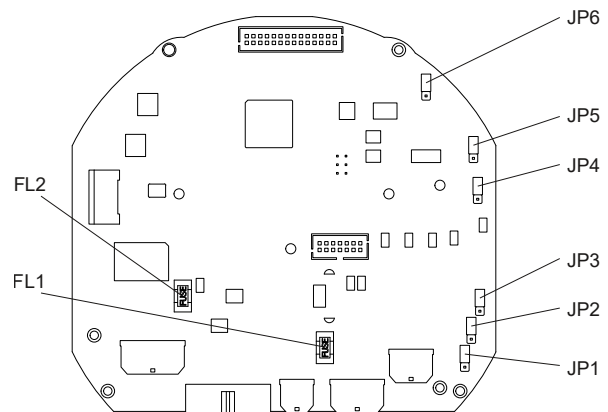


Figure 52: Logic-board

16.1 Binary outputs

Count:	8
Power supply:	24 VDC nominal range: 11...35 VDC (either from internal or external)
Max voltage drop at set output:	1 V
Output voltage at non-set output:	<1 V
Maximum current per output:	500 mA (short circuit proof)
Maximum permissible total current for all outputs:	4 A
Fuse (Fuse FL2, see Figure 52, page 34):	4 A slow (Littelfuse 454 NANO ² Slo-Blo [®])

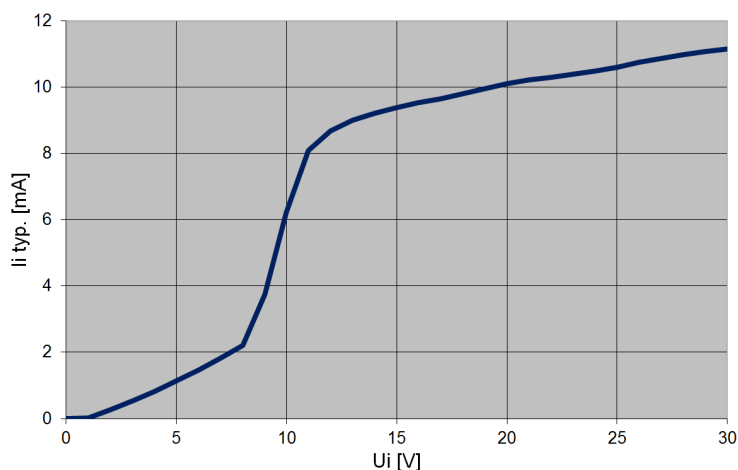
Binary outputs with external supply are separated from other controllers via optocouplers.

It is allowed to connect binary outputs in parallel. If the outputs have the same setting, the current of each output may be added together. If the settings of the outputs are different, a hardwired logical OR is realized.

16.2 Binary inputs

Count:	5
Nominal voltage:	24 VDC towards common ground
Voltage for input set:	>10 V (8.5 V typ.)
Voltage for input not set:	<7 V (8.5 V typ.)
Maximum voltage:	30 VDC
Current consumption at 24 VDC:	10.5 mA typ.

Binary inputs are separated from other controllers via optocouplers.



U_i ... Input voltage
 i_i ... Input current

Figure 53: Binary inputs, input characteristic

Jumpers JP1 ... JP3 can be used to interconnect the binary inputs to groups with separate earths:

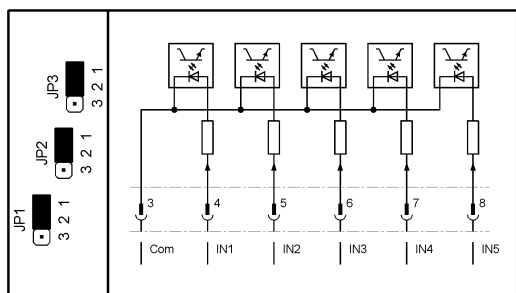


Figure 54: 5 inputs with same common

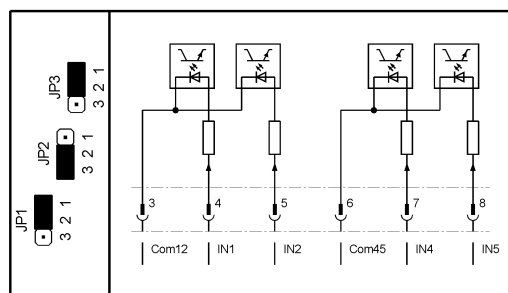


Figure 55: 2 separated groups of 2 inputs with same ground
 Input IN3 is disabled.

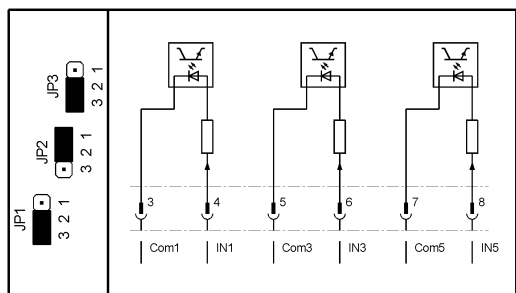


Figure 56: 3 separated inputs
 Inputs IN2 and IN4 are disabled.

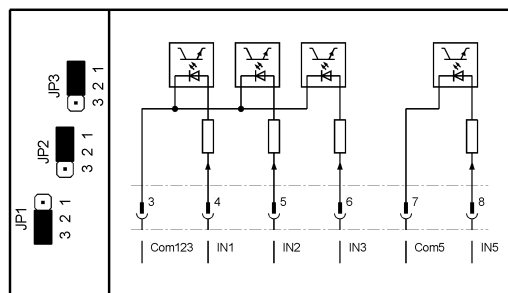


Figure 57: 3 inputs with same common and 1 separated input.
 Input IN4 is disabled.

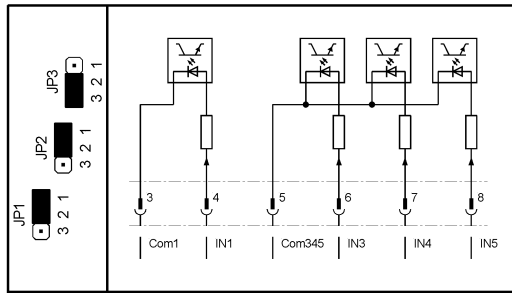


Figure 58: 1 separated input and 3 inputs with same common.
Input IN2 is disabled.

Examples:

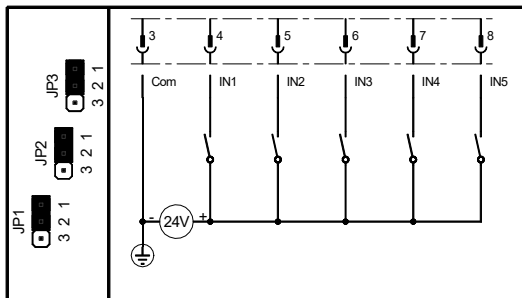


Figure 59: 5 inputs with common = "-" using external 24V

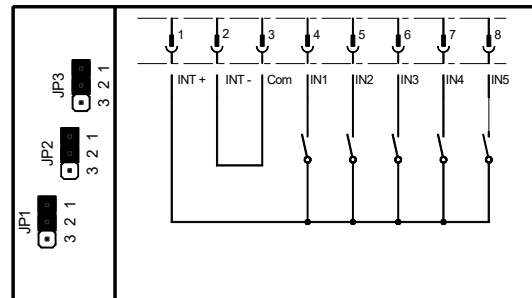


Figure 60: 5 inputs with common = "-" using internal 24V (e.g. for dry contacts)

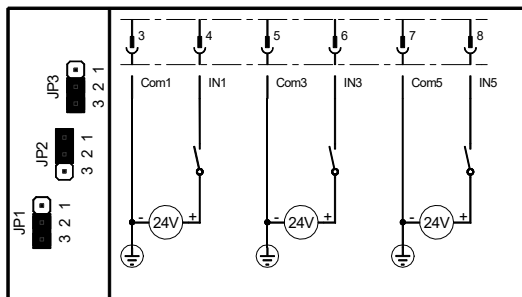


Figure 61: 3 separated inputs using 3 separated external 24V

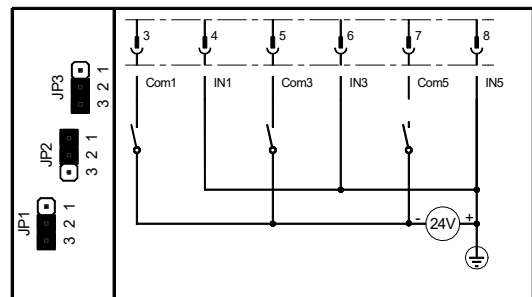


Figure 62: 3 separated inputs with common = "+" using external 24V

16.3 Analog inputs

Input 1: setpoint value

Current range: 0...25 mA
Resolution: 14 bit
Accuracy: 0.5%
Input resistance: 60 Ω

Analog input 1 is electrically isolated from the rest of the electronic system.

Input 2: External actual value (only in combination with PID controller)

Current range: 0...20.8 mA
 Resolution: 12 bit
 Accuracy: 0.5%
 Input resistance: 120 Ω

Jumper JP6 can be used to switch analog input 2 from a passive input (default) to an input with internal 24 V power supply (for 4...20 mA, two-wire transmitters).

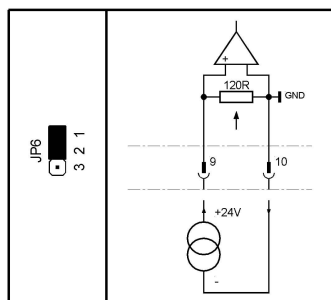


Figure 63: Passive input (default)

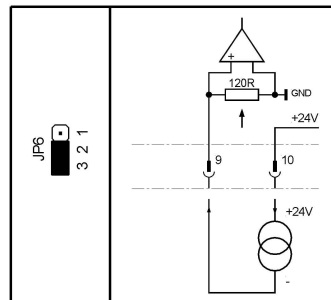


Figure 64: Input with internal supply (active input)

NOTE: The analog input 2 is referenced to common of the electronic system and the auxiliary power supply (see section 16.5).

16.4 Analog output

Current range: 0...20.8 mA
 Resolution: 12 bit
 Accuracy: 0.5%
 Max load: 600 Ω

The analog output is galvanically isolated from the rest of the electronic system.

Jumper JP4 can be used to switch the analog output from an active power source (default) to a current sink, allowing the output to simulate a 4...20 mA, two-wire transmitter.

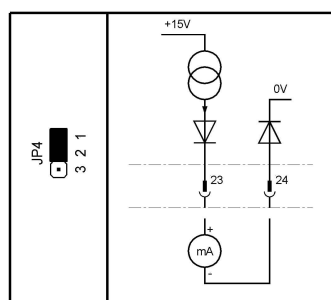


Figure 65: Current source

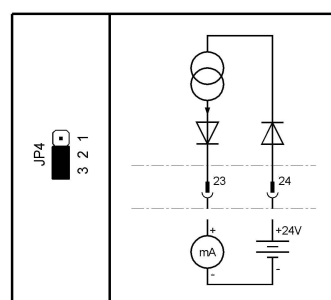


Figure 66: Current sink

Ground potential is the potential of the control unit and the auxiliary supply (see chapter 16.5).

16.5 Auxiliary voltage input and output

Input voltage range (auxiliary voltage input):	20...30 VDC
Maximum current consumption (auxiliary voltage input):	500 mA
Maximum current consumption in power-save mode (auxiliary voltage input):	120 mA
Output voltage (auxiliary voltage output):	typ. 23 V
Maximum output current (auxiliary voltage output):	200 mA
Resistance of common ground vs. earth:	typ. 330 kΩ
Resistance of common ground vs. earth (floating version):	> 10 MΩ
Capacitance of common ground vs. earth:	typ. 100 nF
Maximum allowed voltage of common ground vs. earth:	max. 40 Vs
Fuse (Fuse FL1, see picture 52, page 34):	1 A slow (Littelfuse 454 NANO ² Slo-Blo [®])

Ground potential is the common ground of the controller and the analog inputs and outputs.
The auxiliary voltage output can be set in menu P6.5.

The power-save mode is defined as follows:

- No power supply (the controller is powered exclusively through the 24 V auxiliary voltage input).
- The backlight of the LCD display switches off automatically.
- No additional hardware options included (Profibus Interface, DeviceNet interface, relay board, etc. ...).
- Binary outputs and the mA output are not enabled; when activating, the respective currents must be added to the total current consumption.

16.6 Mechanical reversing starter

By default all phases of the motor are switched by a mechanical reversing contactor. The mechanical reversing contactor is both electrically and mechanically interlocked to prevent unintended cross circuits.
Depending on the engine size results in the following assignments:

size	Typ	power of the motor (with 400V 3-phase current)	
		open-loop control (operational mode S2)	closed-loop control (operational mode S4)
mW4	K09	3kW	1,5kW
mW5	K12	5,5kW	3kW
mW7	D18	7,5kW	5,5kW
mW11	D25	11kW	7,5kW
mW22	D38	22kW	11kW

The mechanical life (switching cycles) of the reversing starter can be roughly estimated with the help of the following diagram and the rated current (motor current):

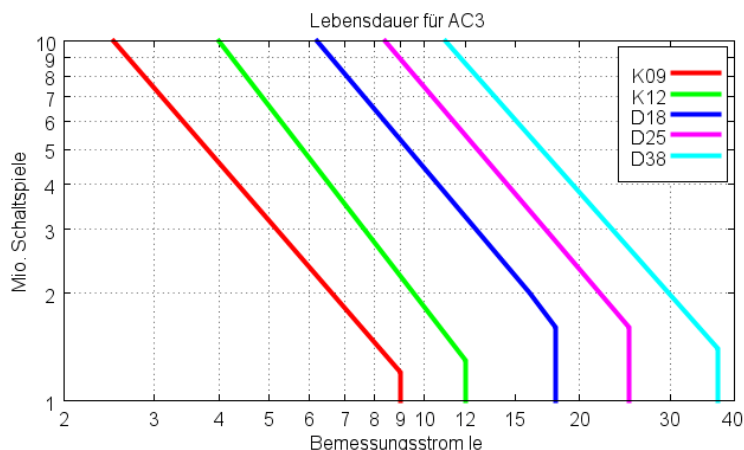


Figure 67

CAUTION: These values apply to utilization category AC-3 (switching off during motor run) and not to utilization category AC-4 (inching)! With AC-4, stressing by the high breaking current is substantially higher, so the service life is considerably shorter. For this reason, inching (switch-off during motor start-up) should be avoided with mechanical reversing contactors.

**CAUTION**

16.7 Electrical reversing starter

Optionally, the motor of the actuator is controlled by an electronic reversing contactor (thyristors). The electronic reversing contactor switches two of the three motor phases. The control of the two directions of rotation is locked by hardware in the electronic reversing contactor. Compared to conventional mechanical contactors there is no mechanical wear through contact burning; in case of electronic reversing starters this feature increases the life and reliability of modulating actuators with high switching frequency.

CAUTION: The third phase is not switched in the electronic reversing contactor and is therefore constantly on the motor winding.

**CAUTION**

voltage range:48...480Vrms
 current range:0,1...50Arms
 transient overvoltage:720Vpk
 max. I^2t of the fuse:2320A²s
 lock time when changing direction::min. 100msec

16.8 Micro switch

Standard switch

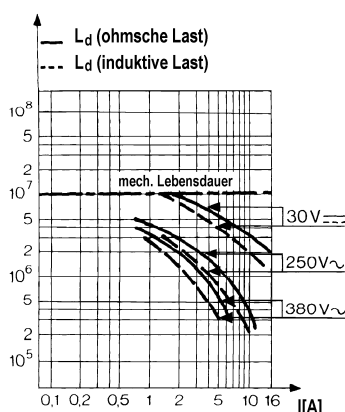


Figure 68: Load capacity diagram (83106)

Mech. service life L_d 10^7 switching cycles
Permissible ambient temp $-20...+85^\circ\text{C}$
Special models $-40...+125^\circ\text{C}$

Flashing switch and Explosion-proof micro-switch:

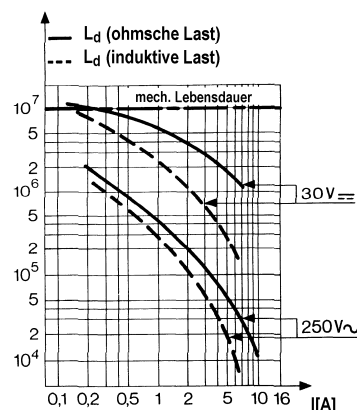


Figure 69: Load capacity diagram (83133)

Mech. service life L_d 10^7 switching cycles
Permissible ambient temp $-20...+125^\circ\text{C}$

For the ohmic load capacity, $\cos\varphi=1$ shall apply. The inductive load capacity given is $\cos\varphi=0,8$ and/or

CAUTION: The maximum switching current for micro switches with gold-plated contacts is 40 mA at a voltage of 24 V (ohmic load). $L/R=5\text{ms}$. If switching currents are too high, the goldplating will be destroyed.



CAUTION

16.9 Power supply

The internal supply of the SMARTCON control unit is made via the power connection. At 3-phase current a neutral phase is not required. The following table shows the possible different voltage ranges of the control.

voltage (3-phase, standard range):	3 x 380, 400, 415, 440 VAC +/-10%
voltage (3-phase, on request):	3 x 110, 115, 120 VAC +/-10%
voltage (3-phase, on request):	3 x 220, 230, 240 VAC +/-10%
voltage (3-phase, on request):	3 x 460, 480, 500, 525 VAC +/-10%
voltage (3-phase, on request):	3 x 575, 660, 690 VAC +/-10%
voltage (single-phase, on request):	110, 115, 120 VAC +/-10%
voltage (single-phase, on request):	220, 230, 240 VAC +/-10%
frequency:	50/60Hz, +/-3Hz
idle power consumption:	max. 24W

NOTE: For the supply voltage of the complete system (control unit and actuator) also the motor voltage must still be considered (see actuator data and name plate)!

16.10 Connections

Size 1 (mechanical reversing starter mW4, mW5, mW7K and electronical reversing starter):

Power / motor:	till 440V: Industrial plug with 6 pins, screw connection 16A, max. 2,5mm ² , AWG14 from 460V: Industrial plug with 3+2 pins, screw connection 16A, max. 2,5mm ² , AWG14
Control signals:	Industrial plug with 24 pins, screw connection 16A, max. 2,5mm ² , AWG14

optional crimp contacts are available

Size 2 (mechanic reversing starters mW7, mW11 and mW22):

Power / motor: Industrial plug with 4 pins, screw connection
80A, 1,5... 16mm²
Control signals: Industrial plug with 24 pins, screw connection
16A, max. 2,5mm², AWG14

optional crimp contacts for the control unit are available

Explosion-proof version:

Power / motor: terminals with screw connection
16A, 0,5... 4mm², AWG20... AWG12
Control signals: terminals with screw connection
4A, 0,5... 2,5mm², AWG20... AWG14

16.11 Miscellaneous

Ambient temperature:

On/Off Actuators: -25 to +70 °C
Modulating actuators: -25 to +60 °C
explosion-proof version: -20 to +40 °C (acc. EN60079-0)

protection class:

standard actuators, size 1 1: IP67
standard actuators, size 2: IP65
explosion-proof version: IP65

colour: RAL7030 (other colors on request)

**schiebel
-actuators
.com**

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