User Instructions
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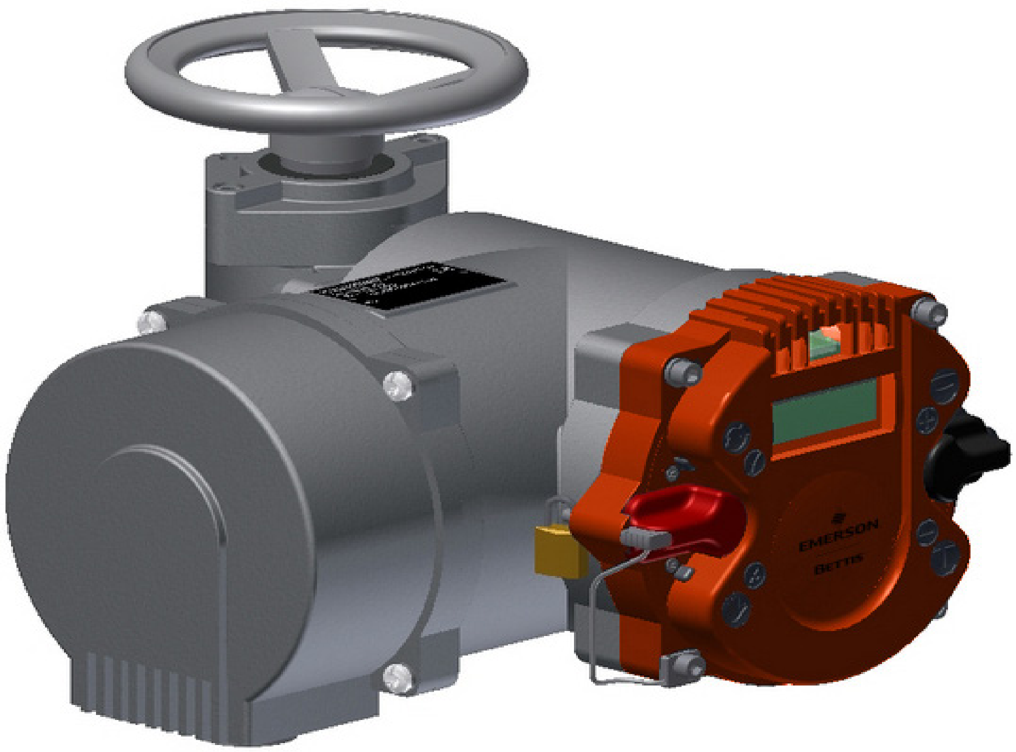
Operating Manual for Bettis RTS CM and CL Compact Multi-Turn Actuator



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Section 1: Introduction

These operating instructions apply to the Bettis RTS CM and CL Compact electric actuators.

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.

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

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.

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

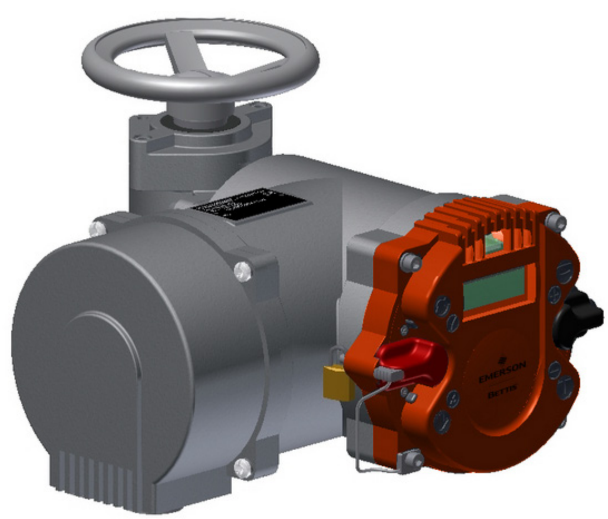
Failure to follow the warning information may result in serious bodily injury or property damage. Qualified personnel must be thoroughly familiar with all warnings contained in this operating manual.

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

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”.

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

Figure 1 Bettis RTS CM and CL Compact Actuator



CAUTION: OBSERVE HAZARDOUS VOLTAGE LEVEL

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.

Maintenance instructions must be observed as otherwise the safe operation of the actuator cannot be guaranteed. 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. Proper transport, storage, installation, assembly and careful commissioning are essential to proper and safe operation.

WARNING: ALWAYS REFER TO STANDARDS

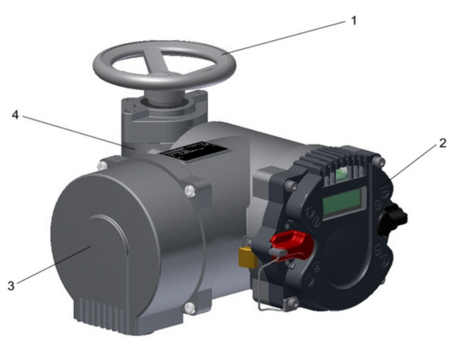
When working in potentially explosive areas, observe the European Standards EN 60079-14 "Electrical Installations in Hazardous Areas" and EN 60079-17 "Inspection and Maintenance of Electrical Installations in Hazardous Areas". Maintenance work on open actuators may only be conducted if these are deenergized. Reconnection during maintenance is strictly prohibited.

Section 2: General

The RTS CM and CL Compact Series are compact, rotary actuators with integrated controller for valve operation. The integral multi-turn sensor allows setting the travel up to 105 revolutions without opening the housing.

2.1 Overview

Figure 2 RTS CM and CL Compact Series



Parts Overview:

1. Handwheel
2. Control Unit (Operating Unit)
3. Connection Compartment
4. Gear Component

2.2 Serial Number and Name Plate

Each actuator has a serial number. The serial number is a 10-digit number that begins with the year and that can be read from the nameplate (see Figure 9) of the actuator (the name plate is located next to the hand wheel – see Figure 10). Using this serial number, Emerson can uniquely identify the actuator (type, size, design, options, technical data and test report).

Figure 3 Name Plate

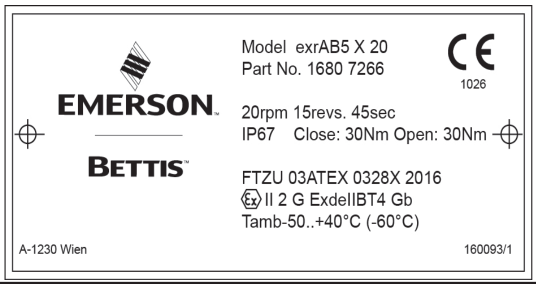
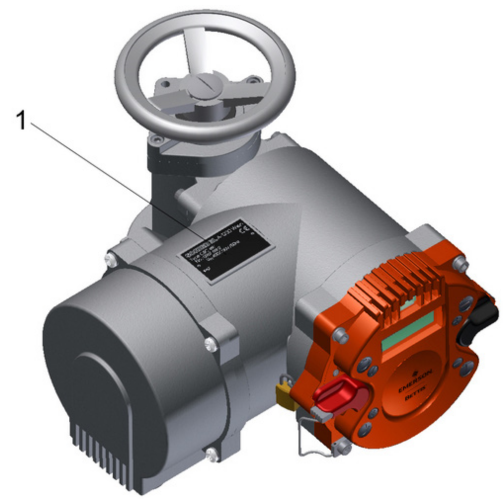


Figure 4 Name Plate Position



2.3 Operating Mode

RTS CM and CL Compact actuators are suitable for open-loop control (S2 operating mode - on/off duty) and closed- loop control (S4 operating mode - modulating duty) according to EN 60034-1.

2.4 Protection Class

RTS CM and CL Compact actuators come by default with IP67 (EN 50629) protection.

CAUTION:PROTECTION CLASS AND CABLE GLANDS

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 13.5) 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 explosionproof actuators cable glands with protection class EExe according EN 60079-7 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.

NOTE:
The cover of the control unit - the operating unit (see Figure 8) 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 13.5).

2.5 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.
- Ensure that sufficient cable slack is available.

2.6 Direction of Rotation

Unless specifically ordered otherwise, the standard direction is (see Figure 12 and Figure 13):

- Right turning (clockwise) = CLOSED
- Left turning (counter clockwise) = OPEN

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

Figure 5 Clockwise = Close

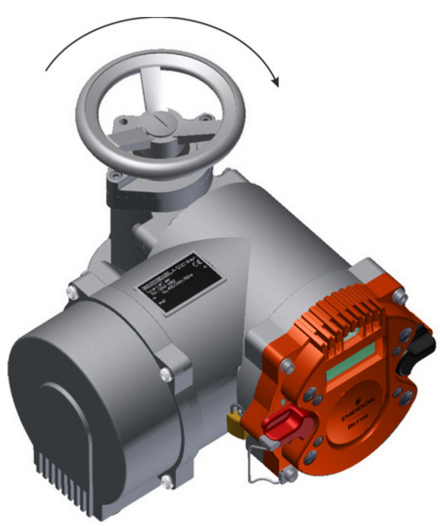
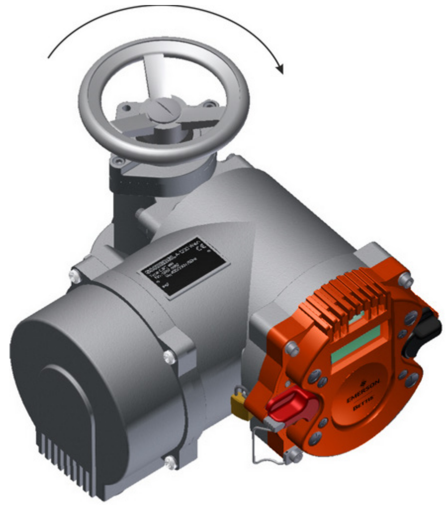


Figure 6 Counterclockwise = Open



⚠ CAUTION: 0BSERVE DIRECTION OF ROTATION

All specifications in this operating manual refer to the standard direction of rotation.

2.7 Protection Devices

2.7.1 Torque

RTS CM Compact Series actuators provide a electronic torque monitoring. Over torque can be modified in the menu of the controller for each direction separately. By default, over torque is set to the ordered value. If no torque was specified with the order, the actuator is supplied from the factory with the maximum configurable torque. For more information, see Section 18.2.

2.7.2 Motor Temperature

All RTS CM Compact Series actuators are normally equipped with motor winding temperature sensors, which protect the motor against excessive winding temperature. The display will show the corresponding error upon exceeding the permissible motor temperature (see Section 23.1).

2.7.3 Input Fuse and Thermal Fuse

The frequency inverter is protected by an input fuse and the explosionproof version also has a thermal fuse. If one of these fuses releases, a serious defect occurs and the frequency inverter will be disconnected permanently from the power supply. Then the frequency inverter must be changed.

2.8 Ambient Temperature

Unless otherwise specified upon ordering, the following operating temperatures apply:

- On/off duty (open-loop control): -40°C to +60°C
- Modulating duty (closed-loop control): -40°C to +60 °C
- Explosion proof version: -20°C to +40°C (according to EN60079-0)

- Explosion proof version with extended temperature range: -40°C to +60°C

⚠ CAUTION: OBSERVE OPERATION TEMPERATURE

The maximum operating temperature can also depend on further order specific components. Please refer to the technical data sheets to confirm the as-delivered product specifications.

2.9 Delivery 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 made available if necessary. The basic setting of the end position must be performed after assembly on the actuator.

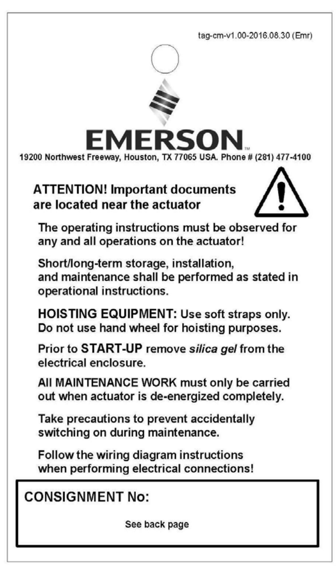
⚠ CAUTION: OBSERVE COMMISSIONING INSTRUCTIONS

Commissioning instructions (see Section 16) must be strictly observed. During assembly of the supplied valves at the factory, end postions are set and documented by attaching a label (see Figure 14). During commissioning at the plant, these settings must be verified.

2.10 Information Tag

Each actuator is provided with a safety ag containing key information, which is attached to the handwheel after final inspection. This safety tag also shows the internal commission registration number (see Figure 15).

Figure 7 Safety Tag



Section 3: Packaging, Transport and Storage

Depending on the order, actuators may be delivered packed or unpacked. Special packaging requirements must be specified when ordering. Please use extreme care when removing or repackaging equipment.

⚠ CAUTION: USE APPROPRIATE LIFTING EQUIPMENT

Use soft straps to hoist the equipment; do not attach straps to the handwheel. If the actuator is mounted on a valve, attach the hoist to the valve and not to the actuator.

3.1 General

The connection compartment of RTS CM and CL Compact actuators contains 5g of factory supplied silica gel.

⚠ CAUTION: REMOVE SILICA GEL

Please remove the silica gel before commissioning the actuator (see Section 16).

3.2 Storage

⚠ CAUTION: OBSERVE PROPER STORAGE

Please observe the following measures to avoid damage during the storage of 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.
- 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.

3.3 Long-term Storage

⚠ CAUTION: FOLLOW PROPER STORAGE

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

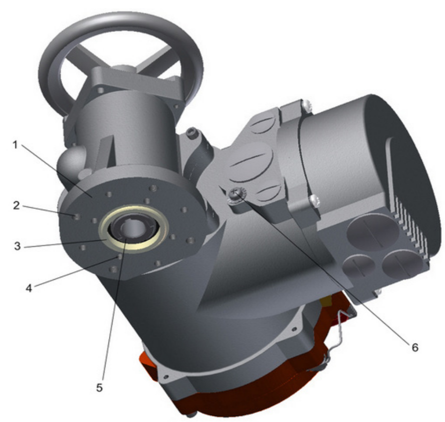
- The silica gel in the connection compartment must be replaced after 6 months of storage (from date of delivery).
- After replacing the silica gel, brush with glycerine the connection cover seal. Then, carefully close again the connection compartment.
- Coat screw heads and bare spots with neutral grease or long-term corrosion

protection.

- Renovate damaged paint work arising from transport, improper storage, or mechanical influences.
- Every 6 months, all measures and precautions for long term storage must be checked for effectiveness and corrosion protection and silica gel renewed.
- Failure to follow the above instructions may lead to condensation which can damage to the actuator.

Section 4: Installation Instructions

Figure 8 RTS CM and CL Compact Installation



Parts Overview:

1. Mounting Flange
2. Bore Pattern G0/F10
3. Centering Ring
4. Bore Pattern F07
5. Shaft Connection
6. Ground Connection

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

4.1 Mechanical Connection

See Figure 16.

Check whether the valve flange, actuator flange and valve shaft coincide with the shaft connector of the actuator. For output type A (threaded bushing with bore), check whether the thread of the valve matches the thread of the actuator.

In general, proceed as follows:

- Clean the bare parts of the actuator uncoated with corrosion protection.
- Thoroughly clean the screw mounting surfaces of the valve.

- In the actuator, lubricate appropriately the output shaft and the valve of the driven shaft.
- In the A version, ensure that the valve bushing is amply lubricated.
- Attach the actuator to the valve or gearbox.
- Tighten fastening screws (torque according to table below).
- By means of the handwheel, check the ease of movement of the actuator-valve connection.

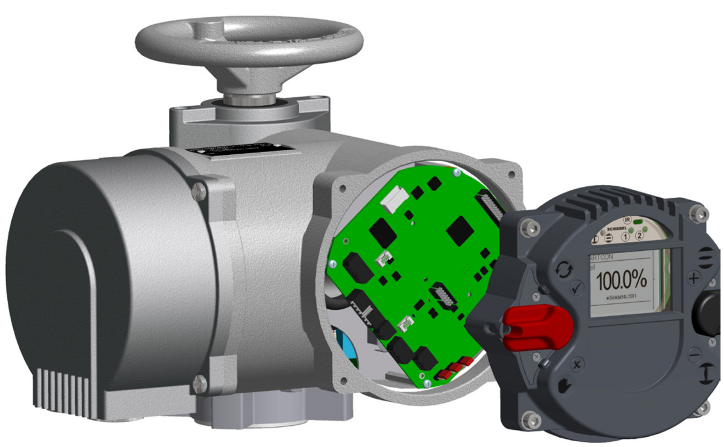
Table 1. Torque Thread Table (2)

Thread	Tightening Torque [Nm] for Bolts with Strength Grade	
	8.8	A2-70/A4-70
M6	11	8
M8	25	18
M10	51	36
M12	87	61
M16	214	150
M20	431	294
M30	1489	564

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 RTS CM and CL Compact Series grease lubricant or a grease lubricant according to our
recommendation (see Section 26.2, page 84).

4.2 Mounting Position of the Operating Unit

Figure 9 RTS CM and CL Compact Control System



- 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 grounded.
- 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 maximum of 180°.
  - Put service cover on carefully so that no cables get wedged in.
- The bolts evenly in a crosswise sequence.

NOTE:

Maximum torque of 5 Nm.

4.3 Electrical Connection

Electrical connections may only be carried out by qualified personnel. Please observe all relevant national security requirements, guidelines and regulations. The equipment should be deenergized before working on electrical connections. Furthermore, confirm the absence of electrostatic discharges during the connection. First of all, connect the ground screw.

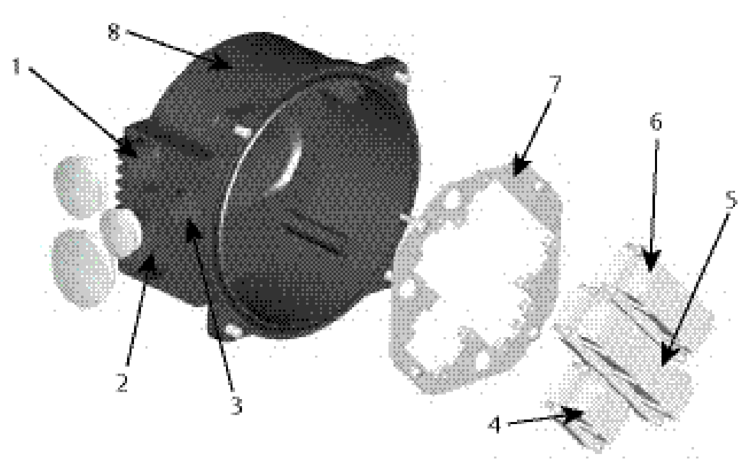
The line and short circuit protection must be done on the system side. The ability to unlock the actuator is to be provided for maintenance purposes. For the dimensioning, the rated current is to be used (see Technical Data).

Check whether the power supply (voltage, frequency) is consistent with the connection data (see nameplate - Figure 9). 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 Emerson by specifying the serial number. When using options, such as a Profibus connection, the relevant guidelines must be followed.

4.3.1 Power Supply Connection

RTS CM Compact Series actuators feature an integrated motor controller, i.e., it only requires a connection to the power supply. By non-explosionproof actuators the wiring uses a connector independent from control signals (see Figure 18).

Figure 10 Power Supply Connections



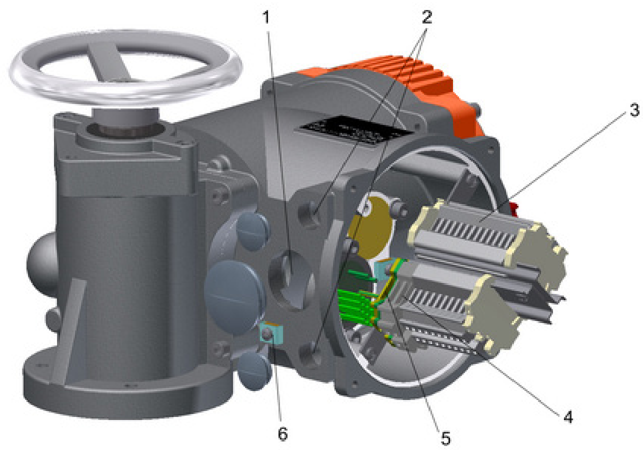
Parts Overview:

1. Metric Screw M32x1.5
2. M40x1.5
3. M25x1.5
4. Plug Insert Han6E (for power supply)

5. Plug Insert Han24E (for control cables)
6. Connector for Options
7. Connector Plate
8. Connecting Housing

Explosion proof actuators or on special request the connection will be made via terminals (see Figure 19).

Figure 11 Terminal Box



Parts Overview:

1. Metric Screw M40x1.5
2. 2xM20x1.5
3. Terminals for the Control Signals
4. Terminals for the Power Supply
5. Terminal for Ground Connection
6. Outside Ground Connection

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.

CAUTION: OBSERVE CORRECT PROCEDURE

See Section 14.3.

Section 5: Commissioning

Before commissioning, please ensure the actuator is correctly assembled and electrically connected. (see Section 15).

⚠ CAUTION: REMOVE SILICA GEL

Remove silica gel from the connection compartment.

5.1 General

⚠ CAUTION: ELECTRICAL END POSITION MUST BE RESET

During commissioning and after every disassembly of the actuator, the electric end positions (see Section 16.4) must be reset.

5.2 Manual Operation

The use of a differential gearbox in the handwheel assembly makes mechanical switching unnecessary during manual operation.

⚠ CAUTION: MANUAL OPERATION IS PROHIBITED

Manual operation with mechanical or electromechanical equipment (such as lever, drilling machine, etc.) is not allowed, as this may damage the product.

5.3 Mechanical Default Settings and Preparation

The use of multi-turn sensors makes mechanical settings unnecessary.

⚠ CAUTION: ALWAYS CHECK TORQUE SETTINGS

Before the motorized operation of the valve, it is essential to check and eventually adjust torque settings.

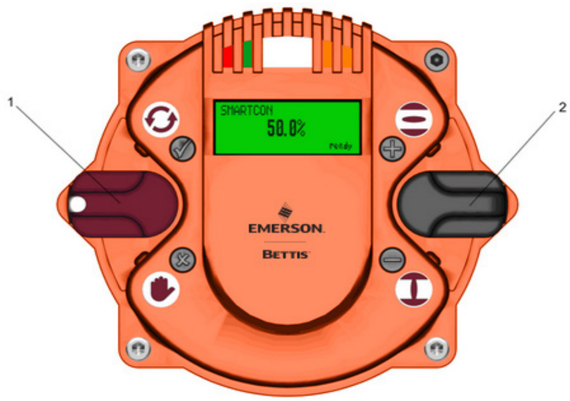
5.4 End Limit Setting

A detailed description of the operation of the RTS CM and CL Compact actuator controller can be found in Section 17.3.

5.4.1 End Limit OPEN

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

Figure 12 Selector/Control Switch



Parts Overview:

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 P1.1 End limit – Open.

Figure 13 Control Switch (First Menu Item)

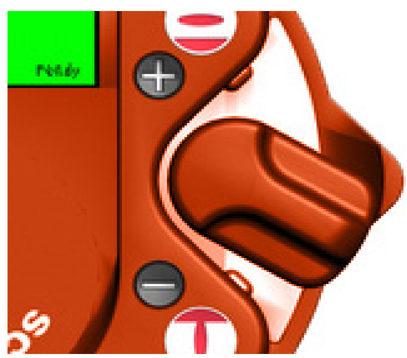
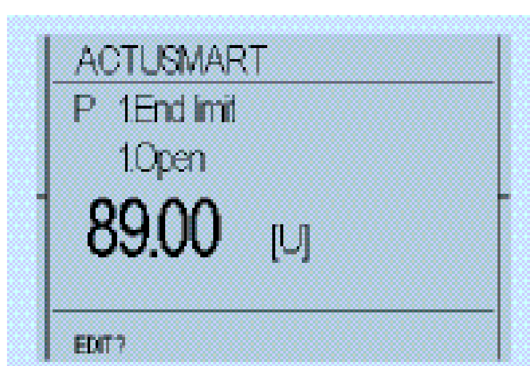


Figure 14 Display (1)



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

Figure 15 Selector Switch in Neutral Position (1)

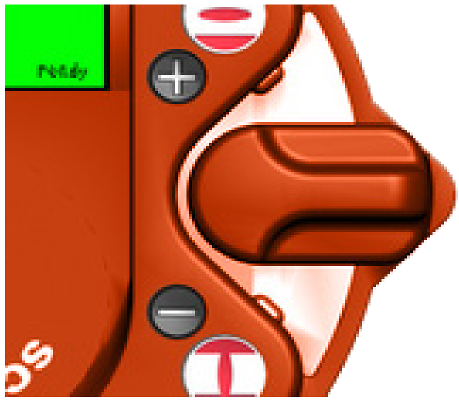


Figure 16 Selector Switch Flipped Up (1)

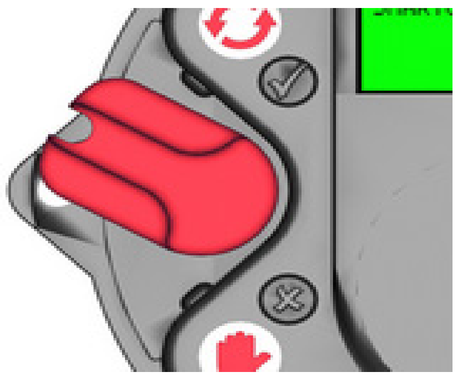
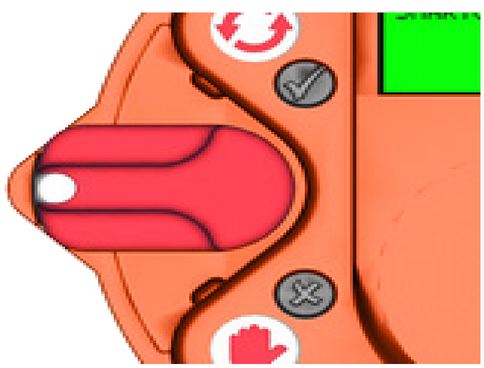


Figure 17 Selector Switch in Neutral Position (2)



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

Figure 18 Display (2)

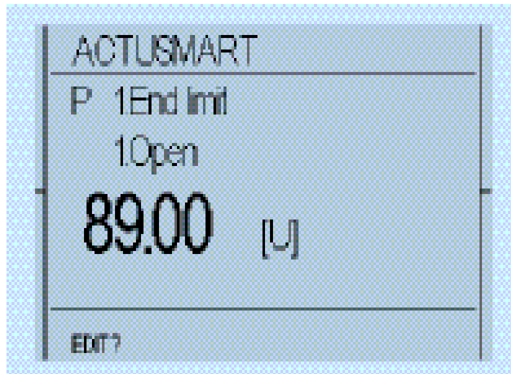


Figure 19 Display (3)

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

CAUTION: USE APPROPRIATE SWITCH

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

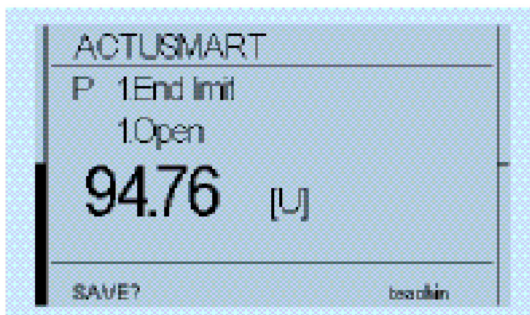
CAUTION: MAX. TORQUE MUST BE PARAMETERISED

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.

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

Figure 20 Selector Switch Flipped Down

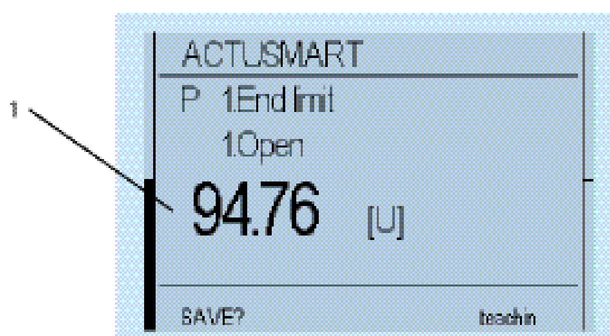
Figure 21 Display (4)



Manually move the actuator with the handwheel (see Section 13.1 or Section 13.6) 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 22 Display (5)



Display Overview:

1. Absolute value
2. Relative 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 23 Selector Switch in Neutral Position (4)

Figure 24 Display (6)

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

Figure 25 Selector Switch in Neutral Position (5)

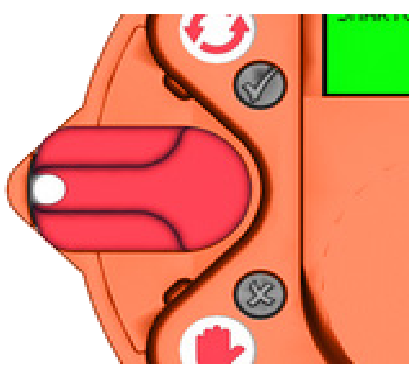


Figure 26 Selector Switch Flipped Up (2)

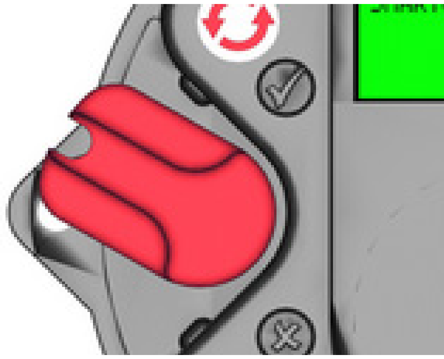
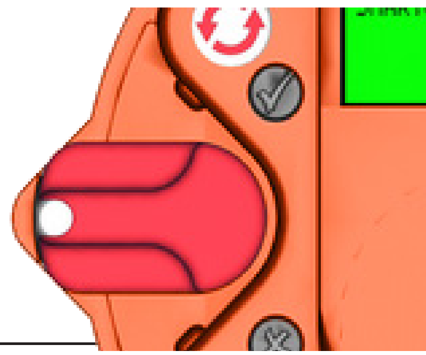


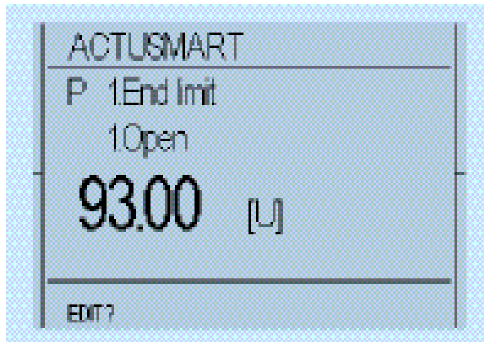
Figure 27 Selector Switch in Neutral Position (6)



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

Figure 28 Display (7)

Figure 30 Display (8)



5.4.2 End Limit CLOSE

Use menu item P1.2 End limit - End limit CLOSE as for End limit OPEN.

5.5 Final Step

Following commissioning, check for proper sealing the covers to be closed and cable inlets (see Section 13.4). Check actuator for paint damage (by transport or installation) and repair if necessary.

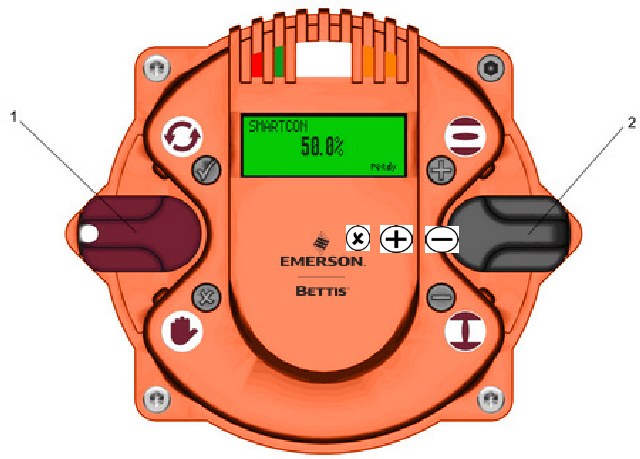
Section 6: Control Unit

The controller is intended to monitor and control the actuator and provides the interface between the operator, the control system and the actuator.

6.1 Operating Unit

Operation relies on two switches: the control switch and a padlock-protected selector switch. Information visualization is provided by 4 integrated indicator lights as well as the graphic display. For better visibility, switch symbols (✓, , ,) are on the cover.

Figure 31 Selctor/Control Switch Operating Unit



Parts Overview:

1. Selector Switch
2. Control Switch
3. Graphic Display
4. LED Display

The controller switches serve on the one hand for electric motor operation of the actuator and, on the other hand, to configure and view various menu items.

The controller cover may be wiped clean with a damp cloth. The mounting position of the control unit can be turned in 90° steps (see Section 15.2).

6.2 Display Elements

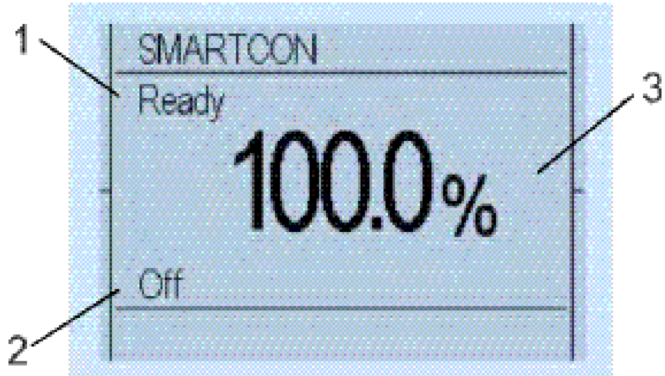
6.2.1 Graphic Display

The graphic display used in the controller allows text display in different languages.

Figure 32 Display (9)

During operation, the displays shows the position of the actuator as a percentage, operation mode and status. When using the option identification, a customer-specific label is shown at the bottom of the display (e.g., PPS Number).

Figure 33 Display (10)



Display Overview:

1. Status
2. Operation Mode
3. Position

6.2.2 LED Display

To provide users with better status information, basic status data is displayed using 4-colour LEDs. As the device powers up, it undertakes a self-test whereby all 4 LEDs briefly light up simultaneously.

Figure 34 LED Display

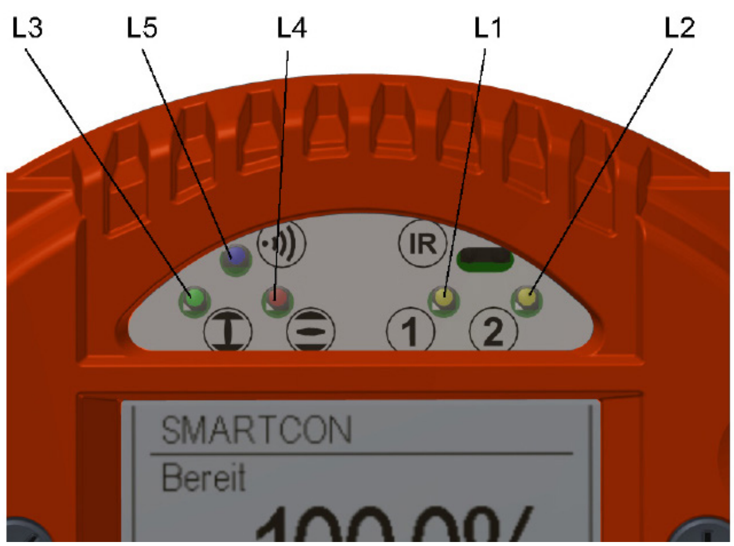


Table 2. LED Function Table

Description	Colour	Lights up	Flashes quickly	Flashes slowly	Does not light up
L1	Yellow	No torque error	Torque fault	—	—
L2	Yellow	Ready (operational readiness)	Path error (no operational readiness)	—	Error (no operational readiness) motor temperature, supply voltage absent, internal error
L3	Red	OPEN	Moving to OPEN position	Applies upon torque-dependent opening: Occurs when the end position OPEN is reached but the cut-out torque has not yet been reached.	Actuator is not in the open position.
L4	Green	CLOSED	Moving to CLOSED position	Applies upon torque-dependent closing: Occurs when the end position CLOSED is reached but the cut-out torque has not yet been reached.	Actuator is not in the closed position.
L5	Blue	Bluetooth enabled	Bluetooth data transmission	Bluetooth ON, no data transmission	Bluetooth/ Infrared OFF
	Red	Infrared ON	Infrared data transmission	Infrared ON	

6.3 Operation

The actuator is operated via the switches located on the controller (selection and control switch). All actuator settings can be entered with these switches. Furthermore, configuration is also possible via the IR interface or the Bluetooth Interface (see Section 20). Flip the switch up or down to regulate the parameter menu scrolling speed.

Figure 35 Neutral Position

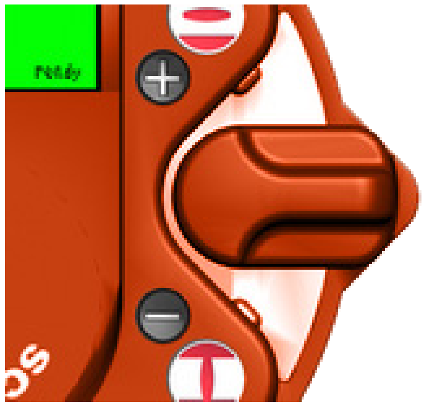
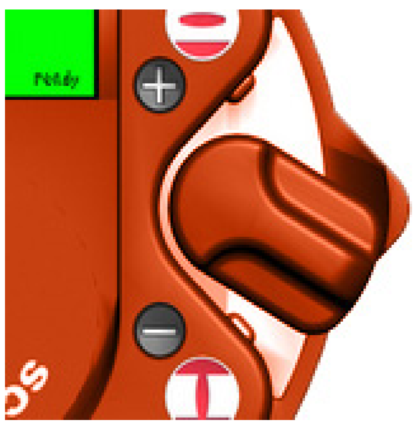


Figure 36 Slight Switch Flip (it will move to the next parameter)



LED L1 and L2 can be changed by parameter P1.7 - see Section 18.1.

Figure 37 Halfway Switch Flip (it will jump to the next parameter category)

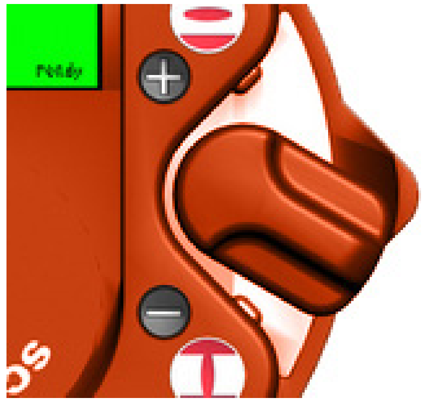
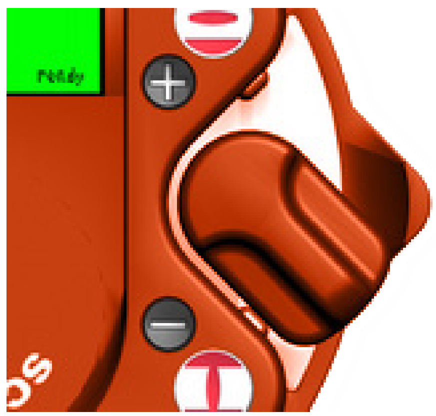


Figure 38 Full Switch Flip (it will jump to the end of the menu)



6.3.1 Operation Mode

Use the selector switch (red) to determine the various operating states of the actuator. In each of these positions, it is possible to block the switch by means of a padlock and thus protect the actuator against unauthorized access.

The selector switch has the following positions:

Table 3. Operating Mode Table

OFF	The actuator can be neither operated via the remote control nor via the control switches of the controller.
Local	It is possible to operate the actuator by motor via the control switch. Control via the remote inputs may be possible with appropriate configuration (superimposed control commands, emergency commands).
Remote	The actuator is ready to process control commands via input signals. The control switch for the motor operation of the actuator is not enabled.

Besides defining the operational status, the selector switch is used in configuration mode to confirm or cancel parameter inputs.

Depending on the selector switch position, the control switch performs different functions:

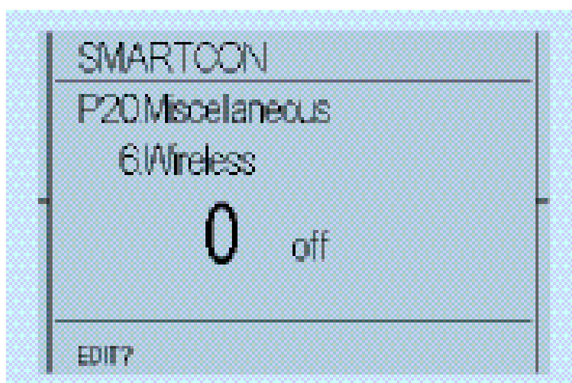
Table 4. Selector Switch Position Table

Selector switch in the OFF position:	The control switch is used to scroll up or down the menu according to internal symbolism. From the neutral position towards you reach the status and history data areas. Towards the symbols you reach the parameter menu. Here, the selection switch either confirms or rejects the current input according to associated symbolism.
Selector switch in the REMOTE position :	The control switch gives you access to status, history data and parameter area.
Selector switch in the LOCAL position :	With the control switch, the actuator can be operated by motor. You may also operate the actuator in inching and self-hold mode. Switches are spring-loaded to snap back automatically into their neutral position. (To confirm a control command, the control switch must be pushed all the way into its mechanical locking position.)

6.3.2 Configuration

In principle, all parameters are shown as numbers in the corresponding parameter point. From the actuator menu, use the control switch to access different menu points. The lower left corner of the display shows the "EDIT?" option.

Figure 39 Display (11)



Confirm the selector switch with a slight flip towards ✓, (see Figure 33 to Figure 35) to change the selected parameter. To confirm this input readiness, the display changes from "EDIT?" to "SAVE?".

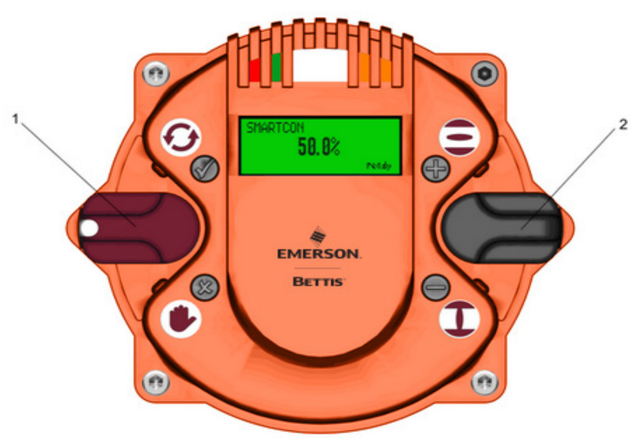
Figure 40 Display (12)

Use the control switch towards to the characters to change the parameter ⊕ or ⊖ (see Figure 42 to Figure 45). After reaching the desired parameter value, confirm the value with the selector switch again, flip it slightly towards ✓, (see Figure 33 to Figure 35).

6.3.3 Configuration Example

By way of example, we will change parameter P20.6 (wireless) from 0 (wireless off) to 2 (Bluetooth communication on). Thus, the Bluetooth connection is activated for a short time and then deactivated again automatically. The operating and control switch must be in the neutral position.

Figure 41 Selector/Control Switch (2)



Parts Overview:

1. Selector Switch (red)

2. Control Switch (black)

Now, move the control switch down towards until the menu item P20.6 Miscellaneous Wireless is displayed.

Figure 42 Control Switch Flipped Down

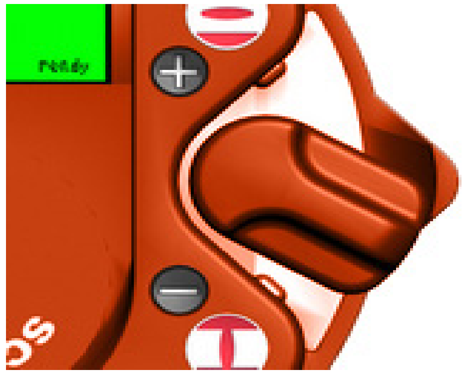
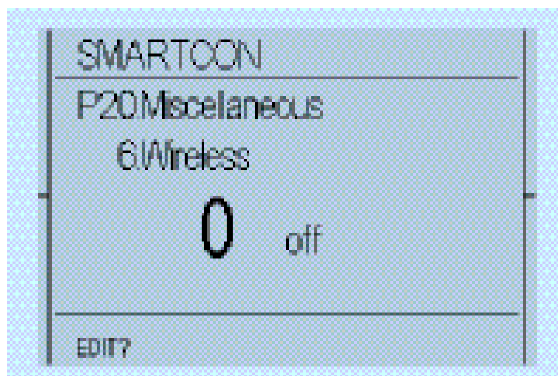


Figure 43 Display (13)



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

Figure 44 Selector Switch in Neutral Position (7)

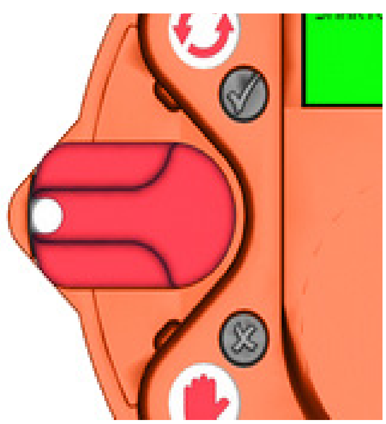
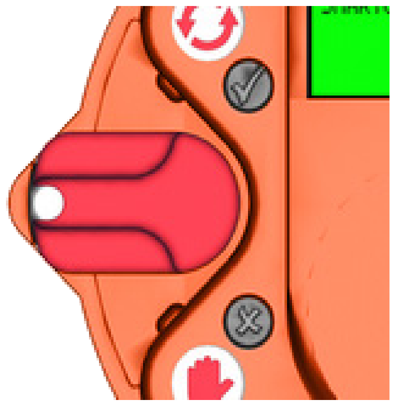


Figure 45 Selector Switch Flipped Up (3)

Figure 46 Selector Switch in Neutral Position (8)



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

Figure 47 Display (14)

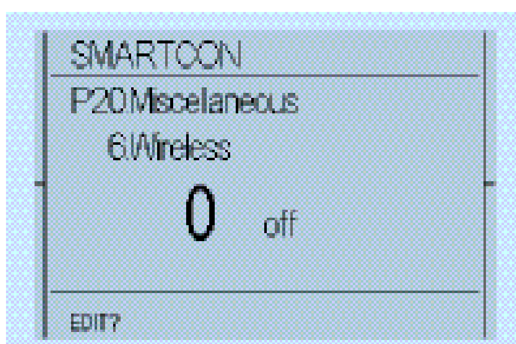
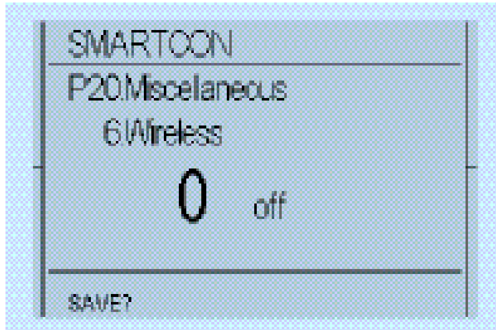


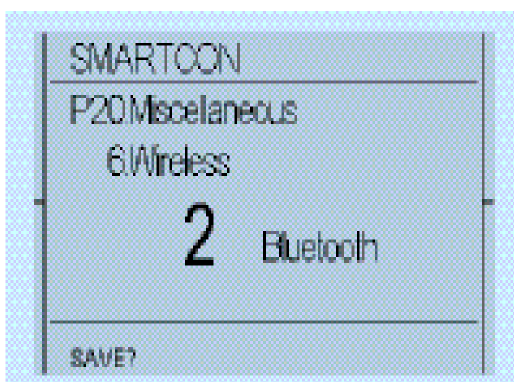
Figure 48 Display (15)



Thereafter, flip up the control switch toward to change the value from 0 (off) to 2 (Bluetooth).

Figure 49 Control Switch Flipped Up

Figure 50 Display (16)



If the value changes to 1, confirm the selection by flipping halfway up the selector switch towards and letting it snap back to its neutral position (see Figure 51 to Figure 53).

Figure 51 Selector Switch Flipped Halfway Up

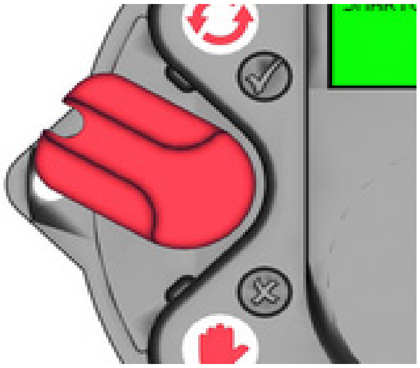


Figure 52 Display (17)

This changes the bottom line of the display from "SAVE?" to "EDIT?" and the parameter is stored.

6.3.4 "TEACHIN"

Furthermore, certain parameters (end positions, intermediate positions) can be set using "TEACHIN". Thus, their configuration is greatly simplified.

After selecting the appropriate menu item (for example: End position) and changhing the input type from "EDIT?" to "SAVE?", move the selector switch (red) to manual mode and lock it into place. As you do so, the display will show the message "TEACHIN" and the current position value will be applied continuously to the parameter value. In this mode, further to manual operation by hand wheel, the actuator can be motor-driven with the control switch to the desired position (see Section 16.4.1, Figure 29).

Figure 53 Display (18)

⚠ CAUTION: MAX. TORQUE MUST BE ALREADY SET

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 set.

After reaching the desired, to-be-defined position, move the selector switch back to the neutral position. Finally, the parameter value must still be saved by flipping the selector switch halfway up and letting it snap back to the neutral position (see Figure 51 to Figure 53).

Section 7: Mounting of Fail-Safe Linear

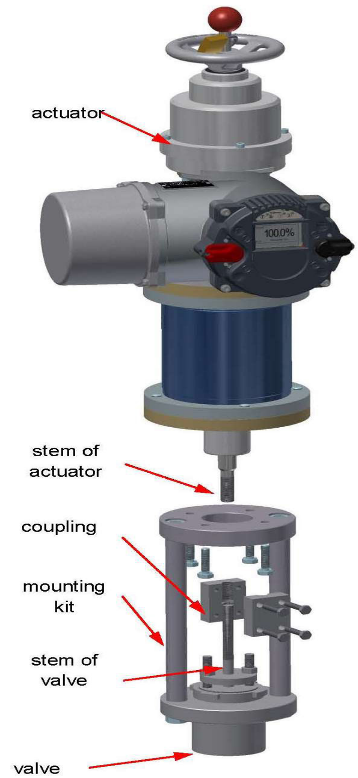
RTS CM CL Compact actuators move the stem of valve to the fail-safe position in case of fail-safe event. In general stem of actuator is at fail-safe position at delivery!

Depending on valve has to be closed or opened by force (sealing force is required in fail- safe position) or by travel (actuator shall stop before touching the seat), mounting procedure has to be done different:

Mounting procedure for valve without required sealing force:

- Connect mounting kit to valve and fix according valve producer specification
- Be sure stem of valve is exact in desired fail-safe end position
- Be sure stem of actuator is in fail-safe position. Actuator must not be electrically connected! Hand wheel must not be engaged. (if applicable, refer to 6.2 manual operation)!
- Mount actuator to mounting kit and fix with 4 screws
- Check distance between end of stem of actuator and end of stem of valve. Aallowed range of distance is 2 – 25mm
- Connect both stems with coupling and note symmetrical engagement of both threads!
- Fix coupling with four screws and note both halves of coupling have to be parallel after tightening the screws

Mounting procedure for valve with required sealing force:



- Connect mounting kit to valve and fix according valve producer specification
- Be sure stem of valve is exact in desired fail-safe end position
- Stem of actuator has to be moved 2 – 5 mm away from fail-safe position by using hand wheel (if applicable, refer to 6.2 manual operation)!

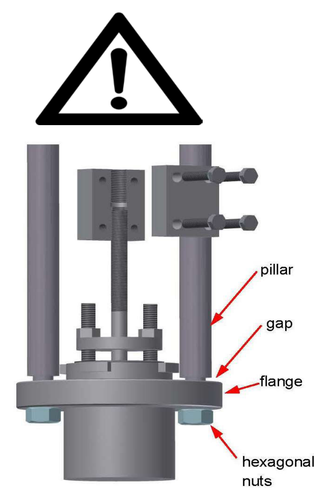
If actuator is not equipped with hand wheel switch to alternative procedure:

- Mount actuator to mounting kit and fix with 4 screws

Check distance between end of stem of actuator and end of stem of valve:

- Allowed range of distance is 2 - 25mm
- Connect both stems with coupling and note symmetrical engagement of both threads!
- Fix coupling with for screws and note both halves of coupling have to be parallel after tightening the screws

Alternative procedure for valve with required sealing force:



- Connect mounting kit to valve and fix according valve producer specification
- Be sure stem of valve is exact in desired fail-safe end position
- Loosen hexagonal nuts of mounting kit and generate a gap of 3 - 5 mm between flange and pillar
- Mount actuator to mounting kit and fix with 4 screws
- Check distance between end of stem of actuator and end of stem of valve. Allowed range of distance is 2 - 25mm
- Connect both stems with coupling and note symmetrical engagement of both threads!
- Fix coupling with for screws and note both halves of coupling have to be parallel after tightening the screws
- Finally retighten hexagonal nuts symmetrical until gap disappears

Attention: actuator must not be electrically connected! Hand wheel must not be engaged (if applicable, refer to 6.2 Manual Operation)!

Section 8: Parameter Menu

For each parameter group, you can find a description tabular overview of the menu items and possible configurations. The parameter list below also includes all possible options per menu item. Please note that some of the menu items listed and described may not be delivered with your configuration.

8.1 Parameter Group: End Limit

These parameters are used to configure the end position and switch off behavior of the actuator. In this regards, it is important to ensure that the basic mechanical configuration described in Section 16.4 has already been made.

NOTE:

Ensure that these parameters are set during commissioning before operating the actuator. In addition, the settings in the "Torque" menu (see Section 18.2) must be compared with the permissible values of the valve and corrected as appropriate.

CAUTION: OBSERVE PROPER POSITIONING

Generally, 100% stands for fully open and 0% for fully closed. Please note that these values cannot be changed.

Table 5. End Limit Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes /Comments
P1.1	End limit	Open	TEACHIN; 0-100U1)	The parameter value can be set using TEACHIN. With a known travel, the second end position can be entered after setting the first end position.
P1.2	End limit	Close	TEACHIN; 0-100U1)	The parameter value can be set using TEACHIN. With a known travel, the second end position can be entered after setting the first end position.
P1.3	End limit	Switch off Open	by travel (0)	The actuator uses end position signals to switch off and report the end position.
			by torque (1)	The actuator signals the end position or stops the motor only after reaching the specified torque with the proviso that it has reached the end position. If the end position signal is not reached, the actuator reports an error.
P1.4	End limit	Switch off Close	by travel (0)	The actuator uses end position signals to switch off and report the end position.
			by torque (1)	The actuator signals the end position or stops the motor only after reaching the specified torque with the proviso that it has reached the end position. If the end position signal is not reached, the actuator reports an error.

P1.5	End limit	Closing directing	right (0)	Actuator is designed for clockwise = closing
			left (1)	Reverse direction of rotation. Counterclockwise = closing. The crossing of all signals and commands is performed by the controller.
P1.6	End limit	Rotate sense position	0	No function at RTS CM CL Compact Series.
			1	
P1.7	End limit	LED function	Close = green (0)	Definition of the LED colour of the CLOSED or OPEN end position signalization.
			Close = red (1)	
P1.8	End limit	End limit hysteresis	0,1 - 10,0%	Hysteresis range for end position signals, Example: End position hysteresis 1% means, that the end position OFF is reached when closing 0%, and will leave it when opening only at 1%, i.e., a reclosing can only take place after leaving this hysteresis.

⚠ CAUTION: OBSERVE LIMITS AND FACTORS OF GEAR

When installing the actuator on an gear or a thrust unit, please take into account the limits and factors of the gear/thrust unit at parameterization.

When using end limit switch off by torque, the end position limit must be set before reaching the torque limit. Accordingly, the actuator will only signal the final end position if the configured torque and the associated end position are reached. If the end position is not reached, a torque error is reported (see Section 17.2.2).

8.2 Parameter Group: Torque

If no torque was specified with the order, the actuator is supplied from the factory with the maximum configurable torque.

Table 6. Torque Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P2.1	Torque	Open	8 - 32Nm[2]	Switch off torque in OPEN direction CAUTION: The range can be restricted via the menu item P2.3
P2.2	Torque	Close	8 - 32Nm[2]	As P2.1 but in CLOSED direction
P2.3	Torque	Torque limit	8 - 32Nm[2]	Torque to protect the valve, the transmission or the thrust unit. This value limits the setting of the parameters P2.1 and P2.2, and to prevent an erroneous increase above the allowed value of these two parameters.
P2.4	Torque	Latching	{Off (0)}	Unassigned in RTS CM CL Compact Series
P2.5	Torque	Boost Open	{0%}	Unassigned in RTS CM CL Compact Series
P2.6	Torque	Boost Close	{0%}	Unassigned in RTS CM CL Compact Series
P2.7	Torque	Hysteresis	{0: 50%}	Unassigned in RTS CM CL Compact Series

⚠ CAUTION: CONSIDER THE VALUE OF GEAR/THRUST

When installing the actuator on an additional gear, please take into account the corresponding values of the gear/thrust unit as you enter the actuator parameters. To achieve an effective output torque (including gear)/output power (including thrust unit) ratio, the factor gear/thrust unit must be considered.

8.3 Parameter Group: Speed

Table 7. Speed Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P4.1	Speed	Local Open	2.5 - 72.2min^{-2}	Output speed for local operation in direction OPEN
P4.2	Speed	Local Close	2.5 - 72.2min^{-2}	As P4.1 but in direction CLOSE
P4.3	Speed	Remote Open	2.5 - 72.2min^{-2}	Output speed for remote operation in direction OPEN
P4.4	Speed	Remote Close	2.5 - 72.2min^{-2}	As P4.3 but in direction CLOSE
P4.5	Speed	Emergency Open AUF	2.5 - 72.2min^{-2}	Output speed for emergency operation in direction OPEN
P4.6	Speed	Emergency Cl ose	2.5 - 72.2min^{-2}	As P4.5 but in direction CLOSE
P4.7	Speed	Torque-dependent	2.5 - 72.2min^{-2}	Seal-tight speed. Speed at which the actuator runs near the end position at torque-dependent switch off (see P1.3 and P1.4)
P4.8	Speed	Minimum	2.5 - 72.2min^{-2}	Minimum speed

⚠ CAUTION: OBSERVE MAXIMUM SPEED

The maximum speed for the 24VDC actuator version is reduced to 20min^{-1}.

8.4 Parameter Group: Ramp (Option)

The start ramp can be set separately for each operation mode. Thus, a 100% start ramp means that the motor attains its maximum speed in about a second. Higher speeds (see Section 18.3) lead to shorter runtimes. If the ramp is set below 100%, the starting time increases in an inversely proportional fashion.

Table 8. Ramp Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P5.1	Ramp	Local	5 - 100%	Start ramp for local operation
P5.2	Ramp	Remote	5 - 100%	Start ramp for remote operation
P5.3	Ramp	Emergency	5 - 100%	Start ramp for emergency operation

8.5 Parameter Group: Control

Table 9. Control Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P6.2	Control	Ready delay	0-10s	Drop-out delay for the ready signal (Binary outputs)
P6.5	Control	24V output	0	24V auxiliary output is deactivated (Section 33.5). The function of the auxiliary input is still activated.
			1	24V auxiliary output is activated (Section 33.5).

8.6 Parameter Group: Password

The actuator control can be password-protected to prevent access at different levels. It is possible to prevent entry by unauthorized personnel or to entirely lock motor operation. Default password is set to "000" and thus deactivated. You can use both numbers and capital letters in your password. After entering a password, password protection is activated. To remove password protection, enter an empty password (000).

When accessing a password-protected parameter, the user is automatically prompted for its introduction. Only after correctly entering the password, it is possible to change the corresponding parameters.

Table 10. Password Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P7.1	Password	Reading PWD	3- digit	Status display and history data are still viewable; access to the parameter menu is locked until this password is introduced. Parameter menu scrolling is only enabled after entering the password. Electric motor operation is unlocked.
P7.2	Password	Writing PWD	3- digit	Status display, history data and parameter menu can be viewed. However, parameters become read-only.

8.7 Parameter Group: Position

In addition to OPEN and CLOSED end positions, you may define intermediate positions. These can be used as feedback signals for the binary outputs or as target value for fix position approach.

⚠ CAUTION: OBSERVE PROPER POSITIONING

If you change the end positions, (see Section 18.1) intermediate positions are retained percentage-wise, i.e., the absolute positions of the intermediate positions change.

Table 11. Position Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P8.1	Position	Intermediate position 1	TEACHIN 0 - 100%	Position value of intermediate position 1
P8.2	Position	Intermediate position 2	TEACHIN 0 - 100%	See above
P8.3	Position	Intermediate position 3	TEACHIN 0 - 100%"	See above
P8.4	Position	Intermediate position 4	TEACHIN 0 - 100%	See above
P8.5	Position	Emerge position	TEACHIN 0 - 100%"	Position value of the emergency position.
P8.6	Position	Hysteresis	0.1 - 10.0%	Hysteresis range of intermediate positions. Within this hysteresis, no repositioning occurs upon reaching the intermediate positions (option: fix position approach). Furthermore, the output functions for position = intermediate position are active within this range (see P10.1).

8.8 Parameter Group: Binary Inputs

The controller is equipped with 5 freely configurable binary inputs. Please find further information on technical data of the binary inputs in Section 33.1. Binary inputs are also effective during actuator control via Profibus (option).

Default binary inputs are as follows:

Input 1: OPEN

Input 2: CLOSED

Input 3: STOP

Input 4: EMERGENCY OPEN

Input 5: EMERGENCY CLOSED

Table 12. Binary Inputs Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P9.1	Binary Input	Input 1	0: No Function	This input has no function
			1: Open	OPEN command in REMOTE mode (selector switch in position REMOTE).
			2: Closed	CLOSED command in REMOTE mode (selector switch in position REMOTE).
			3: Stop	STOP command in REMOTE mode (selector switch in position REMOTE).
			4: Open Self-hold	Self-hold for OPEN, i.e., a short pulse is sufficient and the actuator moves then into the end position. Use the STOP command to stop the actuator.
			5: Closed Self-hold	Self-hold for CLOSED, see OPEN SELF-HOLD
			6: Emergency Open	Superimposed run command; run the actuator in direction OPEN regardless of whether the selection switch is set to REMOTE or LOCAL operation.
			7: Emergency Closed	Superimposed run command; run the actuator in direction CLOSED regardless of whether the selection switch is set to REMOTE or LOCAL operation.
			8: Release	The actuator may be operated only with a switched.
			9: Open/ Closed	The actuator moves towards OPEN if input is active and towards CLOSED otherwise.
			10: Close Open	The actuator moves towards CLOSED if input is active and towards OPEN otherwise.
			11: Postioner	Release of the postioner
			12: Open inverted	As OPEN but active low
			13: Zu inv.	As CLOSED but active low
			14: Stop inv.	As STOP but active low
			15: Open Self- Hold inv.	As OPEN Self-Hold but active low
			16: Closed Self-Hold inv.	As CLOSED Self-Hold but active low
			17: Emergency-Open inv.	As EMERGENCY OPEN but active low
			18: Emergency-Closed inv.	As EMERGENCY CLOSED but active low

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
			19: Block	With activated (switched) signal, the actuator is locked for operation also in local mode.
			20: Contoller lock	Positioner lock
			21: Release Local	The actuator may be operated only with a switched signal.
			22: Block Local	As Release Local but active low
			23: Lock Open	Trigger lock OPEN (in LOCAL and REMOTE mode). Actuator moves with the highest priority to OPEN; command continues internally active after reaching the end position OPEN. Dropping only with LOCK OFF, Supply OFF or operating mode OFF.
			24: Lock Closed	Trigger lock CLOSED (in LOCAL and REMOTE mode). Actuator moves with the highest priority to CLOSED; command continues internally active after reaching the end position CLOSED. Dropping only with LOCK OFF, Supply OFF or operating mode OFF.
			25: Lock Off	Drop the lock
			26: Fail-safe	Trigger the Fail-safe function in all operating modes (only functional in fail-safe actuators).
			27: Fail-safe inv.	As Fail-safe but active low
			28: Lock Open inv.	As Lock Open but active low
			29: Lock Closed inv.	As Lock Open but active low
			30: Lock Off inv.	As Lock Off but active low
			31: Intermediate position 1	Approach intermediate position 1 (P8.1) in REMOTE mode (fix position approach). There is no repositioning upon reaching the intermediate position within the hysteresis (see P8.6) Higher priority than intermediate position 2, 3 and 4.
			32: Intermediate position 2	As intermediate position 1 but with higher priority than intermediate positions 3 and 4.
			33: Intermediate position 3	As intermediate position 1 but with higher priority than intermediate position 4.
			34: Intermediate position 4	As intermediate position 1 but with lowest priority.
			35: Emergency position	Approach emergency position (P 8.5). As intermediate position 1 but with higher priority than intermediate positions 1, 2.

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
			36: Intermediate position 1 inv.	As Intermediate position 1 but active low
			37: Intermediate position 2 inv.	As Intermediate position 2 but active low
			38: Intermediate position 3 inv.	As Intermediate position 3 but active low
			39: Intermediate position 4 inv.	As Intermediate position 4 but active low
			40: Emergency position inv.	As Emergency position but active low
P9.2	Binary Input	Input 2	See Input 1	
P9.3	Binary Input	Input 3	See Input 1	
P9.4	Binary Input	Input 4	See Input 1	
P9.5	Binary Input	Input 5	See Input 1	

8.9 Parameter Group: Binary Outputs

The controller is equipped with 8 freely configurable binary outputs. Please find further information on technical data of the binary outputs in Section 33.2. Provided with external supply, binary outputs are optically isolated from the rest of the controller.

Default binary outputs are as follows:

Output 1: Ready

Output 2: End position OPEN

Output 3: End position CLOSED

Output 4: Run OPEN

Output 5: Run CLOSED

Output 6: Torque

Output 7: LOCAL

Output 8: REMOTE

Table 13. Binary Outputs Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P10.1	Binary Output	Output 1	0: User Defined	Optional
			1: Ready	Actuator is ready
			2: Fault	General fault; Actuator is not ready
			3: Open	Actuator is in open position
			4: Closed	Actuator is in closed position
			5: Running Open	Actuators runs in direction Closed
			6: Running Closed	Actuators runs in direction Closed
			7: Running	Actuator is running in either Open or Closed
			8: Torque Open	Switch off torque was reached in Open direction-actuator has been switched off
			9: Torque Closed	Switch off torque was reached in Closed direction-actuator has been switched off
			10: Torque	Switch off torque was reached in either Closed or Open direction
			11: Travel Open	The Open end postion has been reached
			12: Travel Closed	The Closed end postiion has been reached
			13: Position > Int. 1	Position > Intermediate position 1
			14: Position < Int. 1	Position < Intermediate position 1
			15: Position > Int. 2	Position > Intermediate position 2
			16: Position < Int. 2	Position < Intermediate position 2
			17: Position > Int. 3	Position > Intermediate position 3
			18: Position < Int. 3	Position < Intermediate position 3
			19: Position > Int. 4	Position > Intermediate position 4
			20: Position < Int. 4	Position < Intermediate position 4
			21: Local	Local operating mode (selector switch in position)
			22: Remote	Remote operating mode (selctor switch in position Remote)
			23: Off	Off operating mode (selector switch in the Off position)
			24: No Function	No function
			25: Motor Error	The motor temperature sensor has reported an error
			26: Always	Signal is always on
			27: Never	Signal is always off

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
			28: Binary Input 1	Forwarding of binary input to output
			29: Binary Input 2	Forwarding of binary input to output
			30: Binary Input 3	Forwarding of binary input to output
			31: Binary Input 4	Forwarding of binary input to output
			32: Binary Input 5	Forwarding of binary input to output
			33: Torque Open mask	As Torque OPEN although it will supress (mask) this signal in the end position upon torque-dependent switch off.
			34: Torque Closed mask	As Torque CLOSED although it will supress (mask) this signal in the end position upon torque-dependent switch off.
			35:Ready Remote	Ready and Remote operating mode
			36: Ready Local	Ready and Local operating mode
			37: Ready Local/Remote	Ready and Local or Remote mode
			38: Lock Open	Lock OPEN is enabled. OPEN command is internally queued with the highest priority and will not be dropped even in the end position.
			39: Lock Closed	Lock CLOSED is enabled. CLOSED command is internally queued with the highest priority and will not be dropped even in the end position.
			40: Fail-safe OK 1	Fail-safe OK (only for fail-safe actuators)
			41: Fail-safe OK 2	Fail-safe OK and Ready (only for fail-safe actuators)
			42: Fail-safe OK 3	Fail-safe OK, Ready and Remote (only for fail-safe actuators)
			43: Lock	Lock Open or Lock Closed is enabled.
			44: Ready/Torque OK	Actuator is ready and no torque switch off
			45: Ready/ Remote/ Torque OK	Actuator is ready for operation in REMOTE mode and no torque switch off
			46: Position = Int. 1	Position = Intermediate position 1. The width of the interval is set with the parameter P8.6.
			47: Position = Int. 2	Position = Intermediate position 2. The width of the interval is set with the parameter P8.6.
			48: Position = Int. 3	Position = Intermediate position 3. The width of the interval is set with the parameter P8.6.

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
			49: Position = Int. 4	Position = Intermediate position 4. The width of the interval is set with the parameter P8.6.
			50: Position = Emergency Position	Position = emergency position. The width of the interval is set with the parameter P8.6.
			51: Bus Bit 1	In existing bus interface (hardware option) the output is set according to the selected bit bus.
			52: Bus Bit 2	
			53: Bus Bit 3	
			54: Bus Bit 4	
			55: Bus Bit 5	
			56: Bus Bit 6	
			57: Bus Bit 7	
			58: Bus Bit 8	
P10.2	Binary Output	Output Configuration 1	Normal	Output 1 is set to normal, i.e., if the condition in point P10.1 is met, Output 1 is set to HIGH (active HIGH).
			Inverted	If the condition in point P10.1 is met, Output 1 is set to LOW (active LOW).
			Normal Flashing	If the condition in point P10.1 is met, Output 1 starts blinking (active HIGH).
			Inv. Flashing	If the condition in point P10.1 is not met, Output 1 starts blinking (otherwise it is set to HIGH).
P10.3	Binary Output	Output 2	See Output 1	
P10.4	Binary Output	Output 2 Configuration	See Output 1 Configuration	
P10.5	Binary Output	Output 3	See Output 1	
P10.6	Binary Output	Output 3 Configuration	See Output 1 Configuration	
P10.7	Binary Output	Output 4	See Output 1	
P10.8	Binary Output	Output 4 Configuration	See Output 1 Configuration	
P10.9	Binary Output	Output 5	See Output 1	
P10.10	Binary Output	Output 5 Configuration	See Output 1 Configuration	
P10.11	Binary Output	Output 6	See Output 1	
P10.12	Binary Output	Output 6 Configuration	See Output 1 Configuration	
P10.13	Binary Output	Output 7	See Output 1	
P10.14	Binary Output	Output 7 Configuration	See Output 1 Configuration	
P10.15	Binary Output	Output 8	See Output 1	
P10.16	Binary Output	Output 8 Configuration	See Output 1 Configuration	

⚠ CAUTION: OBSERVE TORQUE POSITION

When using the point torque-dependent OPEN or torque-dependent CLOSED (see Section 18.1, Menu P1.3 and P1.4) the actuator will only be open or closed when the set torque and the associated end position is reached. If the end position is not reached, a torque error is reported (see Section 17.2.2).

8.10 Parameter Group: Position Output (Option)

Position output is used to indicate the current position of the actuator using 0/4-20 mA; it can retrofitted using software code. If this option is not enabled, the menu point shows the message "inactive". No adjustment to the end positions or the travel is required. Adjustment is automatically performed during the configuration of travel limit positions (see Section 18.1). No further settings are necessary for torque-dependent switch off, because the controller exclusively uses travel limit positions for the calculation. Regardless of whether this is defined by the torque or the travel limit positions.

The factory default settings are:

- 4mA at 0% position
- 20mA at 100% position

Table 14. Position Output Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P11.1	Position-Output	Function	disabled	Position Output disabled
			enabled	Position Output enabled
P11.2	Position-Output	Start (at 0%)	0 - 20.5 mA {4 mA}	mA value for the Closed (0%) position
P11.3	Position-Output	End (at 100%)"	0 - 20.5 mA {20 mA }	mA-value for the On (100%) position
P11.4	Position-Output	Calibration 20mA	-10% - +10%	Calibrating the output position during the setting of this parameter will output a 20mA (100%) signal. Use this parameter to calibrate accurately the 20mA output signal. (e.g., if you measure 19.8mA at the output, just add 1% (0.2mA is 1% of 20mA) to the displayed value).

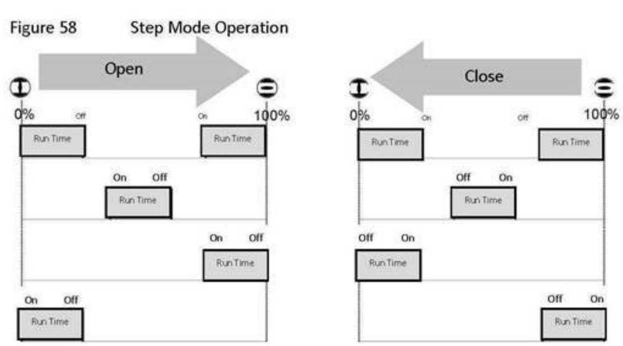
8.11 Parameter Group: Step Mode

Step mode operation can be used to extend the operating time in certain ranges or for the whole travel; it is available in local, remote and emergency mode. Step mode operation can be activated individually for the directions OPEN and CLOSED. Cycle start, cycle end, cycle duration and interval time can be set separately for both directions. (see Figure 61).

Table 15. Step Mode Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P12.1	Step Mode Function	Mode	Disabled	Step mode operation is disabled
			Enabled	Step mode operation is enabled in LOCAL, REMOTE and EMERGENCY operation.
			Local only	Step mode mode is only enabled in LOCAL mode
			Remote only	Step mode mode is only enabled in REMOTE mode
			Local + Remote only	Step mode is enabled in REMOTE and LOCAL mode
P12.2	Step Mode Function	Start Open	0 - 100%	In OPEN direction, position in % from which the step mode operation should start.
P12.3	Step mode Function	End Open	0 - 100%	In OPEN direction, position in % of which the step mode operation should end.
P12.4	Step Mode Function	Runtime Open	0.1 - 60	Runtime in OPEN direction
P12.5	Step Mode Function	Pause Time Open	0.2 - 60	Pause time in OPEN direction
P12.6	Step Mode Function	Start Closed	0 - 100%	In CLOSED direction, position in % from which the step mode operation should start.
P12.7	Step Mode Function	End Closed	0 - 100%	In CLOSED direction, position in % of which the step mode operation should end.
P12.8	Step Mode Function	Runtime Closed	0.1 - 60	Runtime in Closed direction
P12.9	Step Mode Function	Pause Time	0.2 - 60	Pause time in Closed direction
P12.10	Step Mode Function	Timebase	0: Seconds 1: Minutes	Time basis for run and pause times

Figure 54 Step Mode Operation



NOTE:

It is important to ensure that the mode of operation is not exceeded. The running info on the actuator (see Section 17.2.2) only flashes while the drive is running, i.e., during the break, no flash.

8.12 Parameter Group: Positioner (Option)

The positioner SR option is used to control the electric actuator by means of a set point input 0/4-20 mA signal. The SR helps control the position of the actuator, i.e., the positioner ensures that the actual value and thus the position of the actuator matches the desired set point.

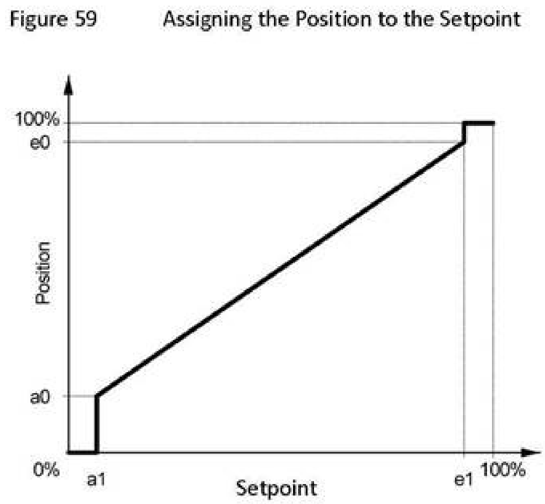
Table 16. Positioner Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P13.1	Positioner	Function	Off	Positioner disabled
			On	Positioner enabled
P13.2	Positioner	Begin (at 0%)	0 – 20.5 mA {4.0 mA}	mA value of the setpoint for the CLOSED (0%) position
P13.3	Positioner	End (at100%)	0 – 20.5 mA {20 mA}	mA value of the setpoint for the OPEN (100%) position
P13.4	Positioner	Dead band	0.1 – 10% {1%}	Tolerance range for the control deviation (setpoint position - actual position) where no adjustment occurs. The deadband should not be set too low to prevent actuator oscillation.
P13.5	Positioner	Gain	1 – 100% {100%}	The gain (gradient) affects the positioning close to the target position. The smaller the gain selected (for example, 20%), the earlier the actuator starts reducing its speed in case of speed variable actuators on approaching the target position. In case of actuators with fixed speed (reversing starters) the speed reduction is done by pulsing (also see parameters P13.9 and P13.10). This provided a better positioning (smaller reachable deadband). A 100% setting disables this gradient.
P13.6	Positioner	Live zero detect	Ignore	The setpoint monitoring (monitoring the setpoint to below approximately 2mA = loss of signal) is disabled.
			{Stop}	Actuator stops on signal failure.
			Open	On signal failure, actuator moves the OPEN position.
			Close	Actuator moves on signal failure to the CLOSED position.
			Emergency Position	On signal failure, the actuator moves the defined emergency position (see parameter P13.7).
P13.7	Positioner	Emergency Position	0 – 100% {50%}	Determination of the emergency position. (it can also be set in the menu P8.5)
P13.8	Positioner	Calibration Setpoint	-10% - +10%	Calibration value for the mA setpoint. Calibration process: By applying 20mA on the setpoint input, this parameter is corrected until the readout matches 20mA.

Continued from previous page:

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P13.9	Positioner	Minimum Impulse	{0.2s}	Variable speed actuators (RTS CM Cl Compact Series and Smartcon CSC FU): Without function fixed speed actuators (Smartcon CSC): Minimum activation time of the reversing contactors. For very small activation times (<0.3 to 0.5s), the motor will be switched off during start-up process, which increases significantly reversing contactors mechanical wear. With frequent periods of very small activation times (restless loop, small dead zone, clocking near to the target value), we therefore recommend electronic reversing contactor.
P13.10	Positioner	Period	{2s}	Variable speed actuators (RTS CM CL Compact Series and Smartcon CSC FU): Without function Fixed speed actuators (Smartcon CSC): This parameter is only relevant when Step mode is enabled and when approaching the target position (parameter gain smaller than 100 %) and determines the period of a run/pause cycle.
P13.11	Positioner	Begin Position (a0)	0.0 – 25% {2%}	Smallest controllable position other than the end position CLOSED. The range 0% to a0 will be just passed through. Use the parameter a0 to define the beginning of the allowable control range of the valve (e.g., blind spot for ball segment valves, etc.).
P13.12	Positioner	End Position (e0)	75 – 100% {98%}	Largest controllable position other than the end position OPEN. The area e0 to 100% is just passed through. Use the parameter e0 to define the end of the allowable control range of the valve.
P13.13	Positioner	Begin Setpoint (a1)	0.0 – 25% {2%}	Below this value, the end position CLOSED is controlled. In the range 0% to a1 cannot be controlled (end position tolerance). The initial setpoint a1 is associated with a small hysteresis (1/4 of the deadband).
P13.14	Positioner	End Setpoint (e1)	75 – 100% {98%}	Above this value, the end position OPEN is controlled. The range e1 to 100% cannot be controlled (end position tolerance). The final setpoint e1 is associated with a small hysteresis (1/4 of the deadband).

Figure 55 Assigning the Position to the Setpoint



8.13 Parameter Group: Controller (Optional)

The optional PID controller is used for controlling an external actual value (process variable) to a setpoint using 0/4-20 mA signal by readjusting the actuator.

Table 17. Controller Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P14.1	PID controller	Function	0: disabled	PID controller disabled
			1: Position	The output of the PID controller corresponds to the position setpoint of the actuator. The positioning (tracking of the actual position to the setpoint) is done by the positioner (see Section 18.12).
			2: Speed	The output of the PID controller corresponds to the change of the position setpoint (speed) of the actuator. The positioning (tracking of the actual position to the setpoint) is done by the positioner (see Section 18.12).
P14.2	PID controller	External Setpoint	0: Fixed	The PID controller uses an internal, fixed setpoint (see parameter P14.3).
			1: External	The PID controller uses the external setpoint. The adjustment of this setpoint is done with the parameters P13.2 and P13.3 (see Section 18.12).
P14.3	PID contoller	Fixed Setpoint	0 – 100%	Specification of the internal fixed setpoint
P14.4	PID contoller	Start (at 0%)	0 - 20,5 mA	mA value at 0% of the external actual value
P14.5	PID controller	End (at100%)	0 - 20,5 mA	mA value at 100% of the external actual value

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P14.6	PID contoller	Gain (P)	+50 - 50,	Gain (proportional value) of the PID controller
P14.7	PID contoller	Reset time (I)	0 – 100s	The shorter the reset time (integral time, integral value), the stronger is the effect of the integral component of the PID controller. Values below 1.0 will disable the integral component.
P14.8	PID controller	Lead Time (D)	0 – 100s	The larger the lead time (differential/derivative value), the stronger is the effect of the dervative component of the PID controller. To reduce the influence of noise a first order lag element with 1s time constant is added (DT1) .
P14.9	PID contoller	Offset	-200 – 200%	The offset value will be added to the output value of the PID controller.
P14.10	PID contoller	Dead Band	0.1 – 10% {1%}	Tolerance range for the control deviation (setpoint external actual value) where no adjustment occurs.
P14.11	PID contoller	Period	2.– 20 s	Equal to parameter P13.10 (see Section 18.12)
P14.12	PID controller	Actual Value Monitoring	Ignore	The monitoring of the external actual value is disabled.
			Stop	Actuator stops on signal failure of external actual value.
			Open	Actuator moves on signal failure of external actual values to the OPEN position.
			Closed	Actuator moves on signal failure of external actual values to the CLOSED position.
			Emergency position	Actuator moves on signal failure of external actual values to the EMERGENCY position. (see parameter P13.7).
P14.13	PID controller	Calibration of External Actual Value	-10.– 10%	Calibration process: By applying 20mA to the external actual value input, this parameter is corrected until the readout matches to 20mA.

8.14 Parameter Group: Characteristic Curves (Optional)

With this option, customers can enable travel-dependent torque characteristic curves.

With these characteristic curves, torque limits already set under menu item P2 (torque), can be further reduced depending on travel. Characteristics can be configured via the infrared interface with the SMARTCON software. (see Figure 63).

Figure 56 Torque Characteristics

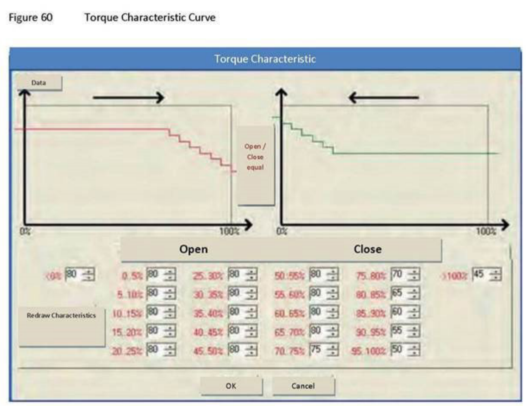


Table 18. Characteristic Curves Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P17.1	Characteristic	Torque Open	Off	The torque characteristic curve is disabled for the OPEN direction.
			On	The torque characteristic curve is enabled for the OPEN direction.
			Local + Remote only	The torque characteristic curve is enabled for the OPEN direction only in LOCAL and REMOTE mode (while disabled in the EMERGENCY mode).
P17.2	Characteristic	Torque Closed	Off	The torque characteristic curve is disabled for the CLOSED direction.
			On	The torque characteristic curve is enabled for the CLOSED direction.
			Local + Remote only	The torque characteristic curve is enabled for the CLOSED direction only in LOCAL and REMOTE mode (while disabled in the EMERGENCY mode).

8.15 Parameter Group: Identification (Option)

This option allows entering further custom-identification parameters.

Table 19. Identification Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P18.1	Identification	PPS number	15-digit	Used to enter a PPS number. This is displayed in the bottom line. CAUTION: point P20.5 must be set to 0.

8.16 Parameter Group: System Parameters (Locked)

Used for actuator configuration and not available for customers.

8.17 Parameter Group: Miscellaneous

Table 20. Miscellaneous Table

	Menu Item	Sub Menu Item	Poss. Setting	Notes/Comments
P20.1	Miscellaneous	Language	0: German	Defines the menu language
			1: English	
			2: Russian	
			3: Czech	
			4: Spanish	
			5: French	
			6: Italian	
			7: Danish	
			8: Hungarian	
P20.2	Miscellaneous	Rotate display	No	Default setting
			Yes	Rotates the display by 180° Warning: The operation of the control switch and the selector switch keeps the same.
P20.3	Miscellaneous	Load configuration	Customer Configuration -	Actuator parameters, excluding points P1.1 to P1.6 will be overwritten with customer parameters.
			Customer Configuration +	Actuator parameters, including points P1.1 to P1.6 will be overwritten with customer parameters.
			Backup Parameters -	Actuator parameters, excluding points P1.1 to P1.6 will be overwritten with factory parameters.
			Backup Parameters +	Actuator parameters, including points P1.1 to P1.6 will be overwritten with factory parameters.
P20.4	Miscellaneous	Save Configuration	Customer Configuration	Stores all parameters in the customer configuration.
P20.5	Miscellaneous	Info line	{0} - 31	The fourth line of the display shows various diagnostic values.
P20.6	Miscellaneous	Infrared	Off (0)	The infrared connection is disabled.
			On (1)	The infrared connection is activated for about 3 minutes.

Section 9: Status Area

The status area presents current process and diagnostic data. There data is read-only. To access the status area, move the control switch in the direction where the selector switch should be in the neutral position or in the remote position.

The status area is divided into 2 sub-areas:

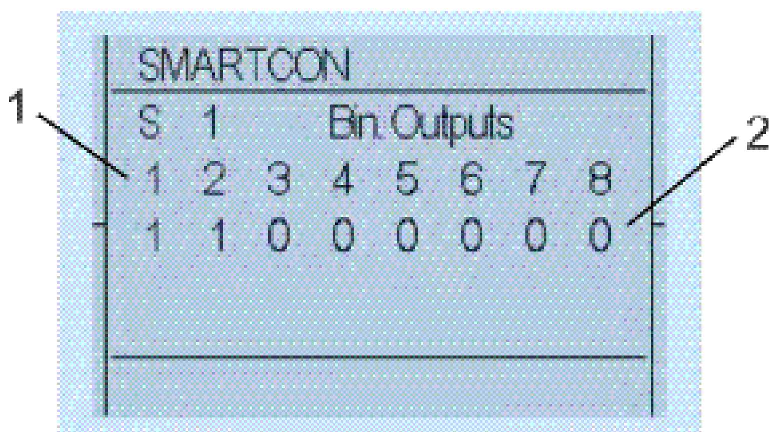
- Status
- History

9.1 Status

9.1.1 Status - Binary Outputs

Display of binary outputs: The display shows output control as opposed to output status, i.e., the supply of the binary outputs is ignored. A switched output is represented by 1.

Figure 57 Binary Outputs Display



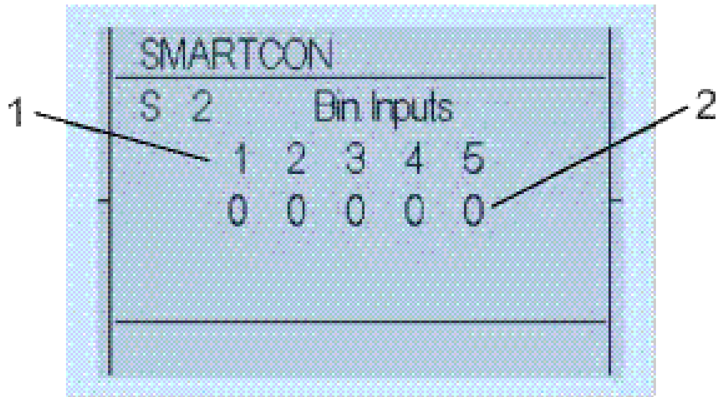
Display Overview:

1. Ouput Number
2. Signal (0=LOW; 1=HIGH)

9.1.2 Status - Binary Inputs

Display of binary inputs: A set input is represented by 1.

Figure 58 Binary Inputs Display



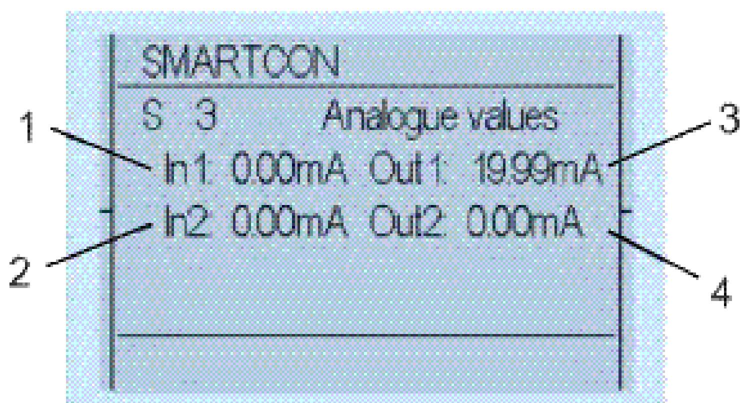
Display Overview:

1. Input Number
2. Signal (0=LOW: 1=HIGH)

9.1.3 Status - Analogue Values

Display of analogue values: Input 1 (In1) is used by the positioner as the setpoint; Input 2 (In2) serves as an external value for the optional PID controller. In the analogue output (out), only the control signal is shown, regardless of whether the output current actually flows or not (interruption of the current loop).

Figure 59 Analogue Values Display



Display Overview:

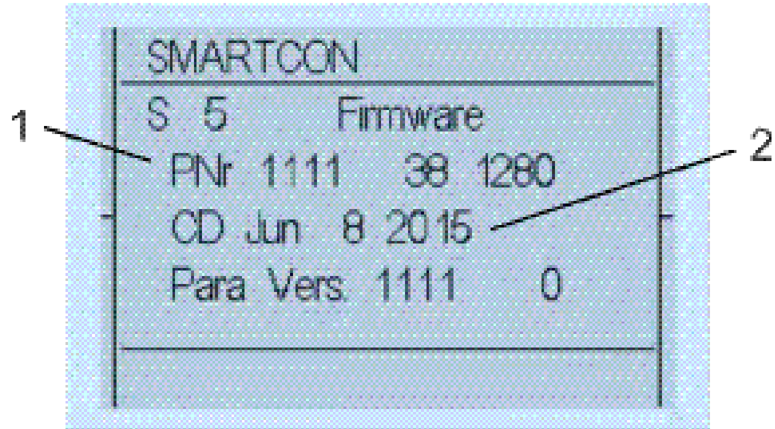
1. Input 1
2. Input 2
3. Ouput
4. All values in mA

9.1.4 Stauts - Absolute Values

This point is not relevant for RTS CM and CL Compact Series.

9.1.5 Status - Firmware

Figure 60 Firmware Display



Display Overview:

1. Firmware
2. Firmware Date

9.1.6 Status - Serial Number

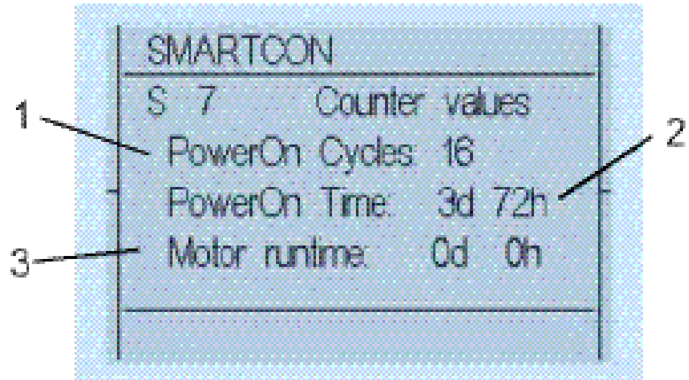
Figure 61 Serial Number Display

Display Overview:

1. Serial Number of the Control Unit
2. Serial Number of the Actuator
3. Serial Number of Electronics

9.1.7 Status - Meter Readings

Figure 62 Counter Values Display



Display Overview:

1. Power-on Cycles
2. Operating Hours
3. Engine Duration

9.2 History

History shows the last 20 events/entries. In addition to the plain text entry, the time since the last history entry is also provided. Please note that the actuator can only calculate time if powered-on. For error analysis, please refer to Section 23.1.

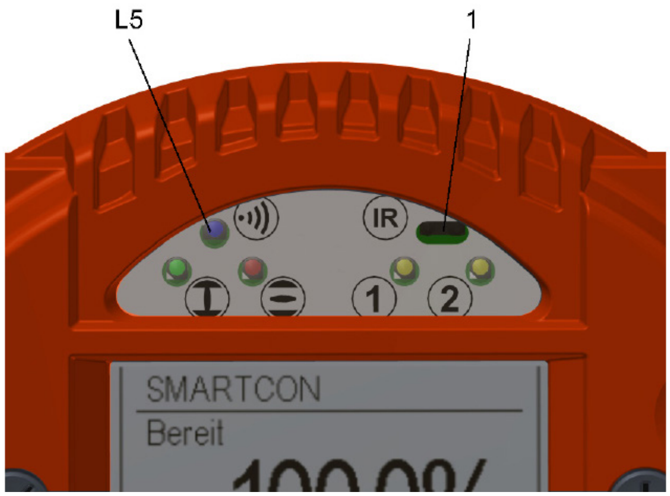
Section 10: Infrared Connection

For easier communication and better visualization of the menu options, the unit provides an infrared port for connection to a PC. The required hardware (connection cable to the PC's RS-232 or USB connectors) and the corresponding software are available as options. The SMARTCON software, in addition to communication with the actuator, allows the management of multiple actuators to transfer the configuration to different actuators. This approach can greatly simplify operation. Please refer to the SMARTCON software operating instructions manual for further information.

During operation, it must be ensured that the IR interface surface is protected from strong disturbances which may otherwise compromise the communication. Before mounting the infrared adapter, clean the surface of the infrared interface with a damp cloth.

When the infrared interface is enabled, it is indicated by Light Emitting Diode L5 (see Figure 70).The infrared interface can be enabled in the menu item P20.6.

Figure 63 Infrared Connection



Parts Overview:

1. Infrared Connection

Section 11: Bluetooth Link

In addition to the infrared interface, it is also possible to configure the Control System using a Bluetooth interface. Software required for Android equipment is available as an option. In addition to communication with the actuator, the Android software also enables management of multiple actuators, allowing easy transfer of parameter sets to various actuators. This approach can simplify commissioning significantly.

When the Bluetooth interface is enabled, this is indicated by the Light Emitting Diode L5 (see figure 70 in Section 20). The Bluetooth interface can be enabled in menu item P20.6.

Section 12: Maintenance

Maintenance work on open actuators may only be conducted if these are deenergized. Reconnection during maintenance is strictly prohibited. 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.

Actuators are ready for use after installation. By default, the actuator is delivered filled with oil. 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, relubricate at least every 6 months on existing grease fittings (see Section 26.2).

Actuators are designed for installation in any position (see Section 13.5). 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 approximately 10,000 - 20,000 hours (about 5 years; Section 26), depending on the workload, you must:

- Change Oil
- Replace seals

Check all roller bearings and the worm wheel assembly and replace if necessary. Check our lubricants table for recommended oils and greases (see Section 26).

Section 13: Troubleshooting

Upon warning or error, the bottom line of the display will show the corresponding plain text description. This event will also be entered into the history (see Section 19.2).

13.1 Error List

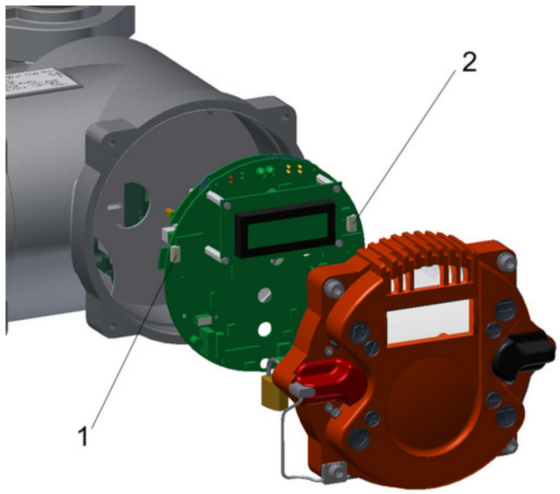
Table 21. Error List Table

Error	LED Indicators	Description
#3: Motor temperature warning	L4 flashes slowly	The motor temperature is in the critical range although the actuator remains fully functional.
#4: Motor temperature switch off	L4 is off	Motor temperature is too high, the motor is no longer operative until it cools down.
#10: Actuator fault	L4 is off	No power supply to the power electronics (when the controller is powered from the auxiliary power input). Defect of power electronics, please contact the manufacturer.
#17: Travel sensor error	L1 and L2 lit up L4 flashes fast	The travel unit is outside the permitted range, please contact the manufacturer.
#24: Bus error	L4 flashes slowly	No communication with the optional bus system.
#26: Bus watchdog	L4 flashes slowly	Watchdog for bus communication has reacted.

Section 14: Fuses

The logic board of the controller cover (see Figure 71) features two miniature fuses for the control lines.

Figure 64 Logic Board of Controller



Parts Overview:

1. Fuse F10a for the Binary Outputs
2. Fuse F10b for Auxillary

Table 22. Fuses on the Logic Board

Fuse	Value	Manufacturer
F10a	1AT	Littelfuse 454 NANO^2 Slo-Blo® träge
F10b	4AT	Littelfuse 454 NANO^2 Slo-Blo® träge

The frequency inverter is protected by an input fuse and the explosionproof version also has a thermal fuse (see Section 13.7.3).

Section 15: Lubricant Recommendation and Requirements

15.1 Main Body

Operating oil: DIN 51 517 - CLP - HC

Fully synthetic high-performance gear oils based on poly-alpha-olefins (PAO)

Temperature: -25°C to +60°C

Viscosity class: 320 ISO VG

Lubricant requirement: 0.25 Lt

15.2 Output Type A and Spindle Drive (Linear Acutators)

Grease DIN 51862- G1-G

Water repellent complex grease on Al-soap base with high resistance to acids and alkalis

Temperature: -40°C to +85°C

Penetration 0.1mm: to 265

Dropping point: about 260°C

NLGI - Class: 1

Acid-free, little or no water-reactive

15.3 Basic Lubricant Service Interval

RTS CM CL Compact Series actuators must be serviced 10 years after delivery by Emerson. The functionality and durability of the lubricant is however contingent upon the operating conditions. Where appropriate, reduction factors must be considered.

Table 23. Lubrication Utilization (2)

Operating condition (s)	Definition	Reduction factor (multiplier)
Duty time DT	(Total engine running time)	
Extremely high DT	over 1250 hours/year	0.5
High DT	over 500 hours/year	0.7
Extremely low DT	less than 0.5 hours/year	0.8
Ambient temperature	(permanent or long-term)	
Extremely changeable	between -10°C and +50°C	0.5
Extremely high	above +50°C	0.7
Extremely low	below -25°C	0.9
Output speed	(on actuator main shaft)	
High speed	over 80 U/min	0.8
Utilization	(relative to rated power)	
Very high	over 90%	0.8
High	between 80 and 90%	0.9

Application example:

Extremely low DT + Extremely low ambient temperature + High speed + 87% utilization:

0.8 x 0.9 x 0.8 x 0.9 =0.51 reduction factor

Lubrication mainteance interval: 10 years x 0.51=5.1 years (62 months)

CAUTION: LUBRICATE PROPERLY

This calculated maintenance interval does neither apply to the maintenance of output type A (threaded bushing) units nor to the maintenance of linear and spindle drive units. These units must periodically lubricated (at least every 6 months) via the grease nipples (see Section 26.2).

During maintenance of our actuators, remove and replace old grease with new one. Mixing of different lubricant types is not permitted. Quantities needed for lubricant service are listed in Section 26.

Section 16: Training

CAUTION: CONTACT FOR SUPPORT

If you experience problems during installation or upon adjustments on site, please contact Emerson, Texas at +1 281 477 4100 or to prevent any operational errors or damage to the actuators. Emerson recommends engaging only qualified personnel for installation of RTS CM Comapct Series actuators. Upon special request of the client, Emerson can conduct training on the activities listed in this operating manual at the factory of Emerson.

Section 17: Certifications and Technical Data

ATEX Directive 2014/34/EU - TÜV-A 13ATEX0006X

- EN 60079-0:2012
- EN 60079-1:2007
- EN 60079-7:2007

IECEx

- IEC 60079-0:2011
- IEC 60079-1:2014
- IEC 60079-7:2006
- IEC 60079-31:2013

CSA Hazardous Locations:

- CAN/CSA-C22.2 NO. 60079-0:2011, UL 60079-0:2013
- CAN/CSA-C22.2 NO. 60079-1:2011, UL 60079-1:2009
- CAN/CSA-C22.2 NO. 60079-7:2012, UL 60079-7:2008
- CAN/CSA-C22.2 NO. 60079-31:2012, UL 60079-31:2015

CSA Non-Hazardous Locations:

- CAN/CSA-C22.2 NO. 14-13
- UL 508:1999

MC Directive 2014/30/EU

- EN 61000-6-2:2005
- EN 61000-6-3:2007-01 + A1:2011-03

Low Voltage Directive 2014/35/EU TÜV Austria

- IEC 60204-1 + A1:2008

IP66/67 TÜV Austria

- EN 60529-1:1991 + A1:2000

Functional Safety FMEDA

- IEC 61508:2010
- SIL 1 (single device)
- SIL 2 (redundant configuration)

RTS CM TYPE		CM-32	CM-64
Adjustable Maximum Torque	max. Nm (max. ft lbs)	32 (23)	64 (47)
Minimum Torque	max. Nm (max. ft lbs)	8 (5.9)	16 (11.8)
Modulating Torque	max. Nm (max. ft lbs)	16 (12)	32
Adjustable Speed Range	RPM	2.5 up to 70	
Adjustable Turns	max.	0.25 up to 100 with travel sensor "non-intrusive" through switches adjustable	1 up to 300 with travel sensor "non-intrusive" through switches adjustable
Operation Mode	On/Off duty	On/Off duty S2-15 minutes	
	Modulating duty	Modulating duty S4 - 1200 cycles/hour - 40% duty cycle	
Manual Operation		Switching free, overlayed, without lever	
VALVE-MOUNTING			
Flange		F7/F10 | F10 (ISO 5210)	
Output Shafts		A / Am	
Max Valve Stem Diameter -Ø		20 mm | 32 mm	
OPERATING CONDITIONS			
Protection Degree		IP66, IP67, IP68	
Ambient Temperature		-40°C to + 60°C	
Corrosion Protection		K2 for installation in power plants, waste water plants with aggressive atmosphere	
Painting / Color		2 components painting / RAL7024	
Weight		9.5 kg	14 kg
MOTOR		Brushless DC Motor	
Isolation Class		Isolation class F, max. 155°C permanent temperature	
Power supply	V	24 VDC *, Single Phase 115V-230V +/-10%,Three Phase 380V-480V +/-10% (*Restrictions apply)	
Current Consumption	A	approx. 2.25	
Power	W	approx. 250W	
ACTUATOR CONTROL			
Electronic with Frequency-Technology		Integrated processor control unit with frequency-technology for variable speed control	
Control Unit			
Control Elements		· Selector switch LOCAL - OFF- REMOTE · Control switch OPEN - STOP - CLOSE contact less sensor technology · Language independent symbols	
Local Display		Backlit LCD display, can be rotated in 90 degree steps	
LEDs		Programmable LED's for operation, readiness, warning and error messages	
Communication		Infrared communication interface for programming and saving operation data	
Control			
Inputs		· 5 configurable binary (discrete inputs) control inputs: OPEN - STOP - CLOSE - EMERGENCY OPEN - EMERGENCY-CLOSE · Power supply: 24VDC (max. 30VDC) - current consumption with 24VDC: typical 5mA · The common ground of the inputs is optical isolated from the rest of the electronics · Analog control 4-20 mA (2 wire)	
Status Indication			
Outputs		· 8 configurable binary (relay) outputs: READY - OPEN - CLOSE - RUNNING OPEN - RUNNING CLOSE - TORQUE - LOCAL - REMOTE · Power supply 24VDC+/- 6V (per actuator or through control system) · Max. allowed current per output: 50mA (short-circuit-proof) · Max. allowed current for all outputs with power supplied by actuator: 150mA · Max. allowed current for all outputs with power supplied by control system: 250mA · All outputs are optical isolated if power is supplied by control system	
Voltage Input and Output			
Power Supply - External		· Input power range: 20-30VDC max. current consumption 320mA or 100mA in current save mode - status indication also in case of a main power supply failure	
Power Supply - By Actuator		· Output voltage: typical 22V, max. output current 150mA · Reference ground is the common ground of the control unit and of the analog inputs and outputs	
Functions			
Standard		· Switch-off mode adjustable: travel or torque dependent to valve type · Torque/Force adjustable: 25-100% of max. torque/force · 4 intermediate positions between 0 and 100% in both directions parametrizable · Step-mode operation with adjustable STEP-START, STEP-STOP, RUNNING, and BREAK TIME in both directions · PID positioner for 2 input signals 0/4-20mA (setpoint, external actual value) · Writing and reading protection via password · Multi-lingual display indication: German , English, Czech, Russia and Danish · Status indication of binary inputs and outputs and also of the analog signals on LCD display · Data logging for analysis and service · History data for service planning and error analysis · Motor protection with thermo switches in motor	
Electric connection			
Cable Entries		3 metric threaded holes for cable glands: M40x1.5 / M32x1.5 / M25x1.5	
OPTIONS			
Explosion proof Network - Modbus RTU, HART		Relay board for 250VAC, 2A with 4 or 8 outputs Analog position indication 0/4-20mA (2-wire)	

RTS CL TYPE		CL-05	CL-15	CL-25
Maximum Thrust (Adjustable)	max. kN (max. lbs.)	5 (1124)	15 (3372)	25 (5620)
Maximum Modulating Force	max. kN (max. lbs.)	5 (1124)	8 (1798)	15 (3372)
Adjustable Positioning Speed	mm / sec	0.17 - 4.7	0.17 - 4.7	0.17 - 4.7
Maximum Stroke Length	max. mm (max. in)	50 (1.96)	100 (3.93)	100 (3.93)
Operation Mode	On/off duty	On/off duty S2-15 minutes		
	Modulating duty	Modulating duty S4 - 1200 cycles/hour - 40% duty cycle		
VALVE-MOUNTING				
Flange		F10 (ISO 5210)		
Stem Thread		M16 x 1.5		
Rotation		Stem of Linear-Unit extends with clockwise handwheel rotation		
OPERATING CONDITIONS				
Protection Degree		IP66, IP67, IP68		
Ambient Temperature		-40°C to + 60°C		
Corrosion Protection		K2 for installation in power plants, industries and waste water plants with aggressive atmosphere		
Painting / Color		2 components painting / RAL7024		
Weight		12.5 kg	16.5 kg	20 kg
MOTOR		Brushless DC Motor		
Isolation Class				
Power Supply	V	24 VDC *, Single Phase 115V-230V +/-10%,Three Phase 380V-480V +/-10% (*Restrictions apply)		
Current Consumption	A	approx. 2.25		
Power	W	approx. 250W		
ACTUATOR CONTROL				
Electronic with Frequency-Technology		Integrated processor control unit with frequency-technology for variable speed control		
Control Unit				
Control Elements		· Selector switch LOCAL - OFF- REMOTE (lockable) · Control switch OPEN - STOP - CLOSE contact less sensor technology · Language independent symbols		
Local Display		Backlit LCD display, can be rotated in 90 degree steps		
LEDs		Programmable LED's for operation, readiness, warning and error messages		
Communication		Infrared communication interface for programming and saving operation data		
Control				
Inputs		· 5 configurable binary (discrete inputs) control inputs: OPEN - STOP - CLOSE - EMERGENCY OPEN - EMERGENCY CLOSE · Power supply: 24VDC (max. 30VDC) - current consumption with 24VDC: typical 5mA · Optically isolated inputs · Analog control 4-20 mA (2 wire)		
Status Indication				
Outputs		· 8 configurable binary (relay) outputs: READY - OPEN - CLOSE - RUNNING OPEN - RUNNING CLOSE - TORQUE - LOCAL - REMOTE · Power supply 24VDC +/- 6V (per actuator or through control system) · Max. allowed current per output: 50mA (short-circuit-proof) · Max. allowed current for all outputs with power supplied by actuator: 150mA · Max. allowed current for all outputs with power supplied by control system: 250mA · All outputs are optical isolated if power is supplied by control system		
Voltage Input and Output				
Power Supply - External		· Input power range: 20-30VDC max. current consumption 320mA or 100mA in current save mode - status indication also in case of a main power supply failure		
Power Supply - By Actuator		· Output voltage: typical 22V, max. output current 200mA · Reference ground is the common ground of the control unit and of the analog inputs and outputs		
Functions				
Standard		· Switch-off mode adjustable: travel or torque dependent to valve type · Torque/Force adjustable: 25-100% of max. torque/force · 4 intermediate positions between 0 and 100% in both directions parametrizable · Step-mode operation with adjustable STEP-START, STEP-STOP, RUNNING, and BREAK TIME in both directions · PID positioner for 2 input signals 0/4-20mA (setpoint, external actual value) · Writing and reading protection via password · Multi-lingual display indication: German , English, Czech, Russia and Danish · Status indication of binary inputs and outputs and also of the analog signals on LCD display · Data logging for analysis and service		
Electric Connection				
Cable Entries		3 metric threaded holes for cable glands: M40x1.5 / M32x1.5 / M25x1.5		
OPTIONS				
Explosion proof Network - Modbus RTU, HART		Relay board for 250VAC, 2A with 4 or 8 outputs Analog position indication 0/4-20mA (2-wire)		

IFunctional Safety FMEDA

- IEC 61508:2010
- SIL 1 (single device)
- SIL 2 (redundant configuration)
- SIL 3 (failsafe)

Section 18: Technical Data General

18.1 Binary Inputs

Table 24. Input Data Table

Parameter	Value
Count	5
Nominal voltage	24VDC/48VDC
	towards common ground
Threshold voltage for input set	>15V
Threshold voltage for input not set	<10V
Maximum voltage	60VDC
Current consumption at 24V	typically 5mA

Figure 65 Current/Voltage Relation

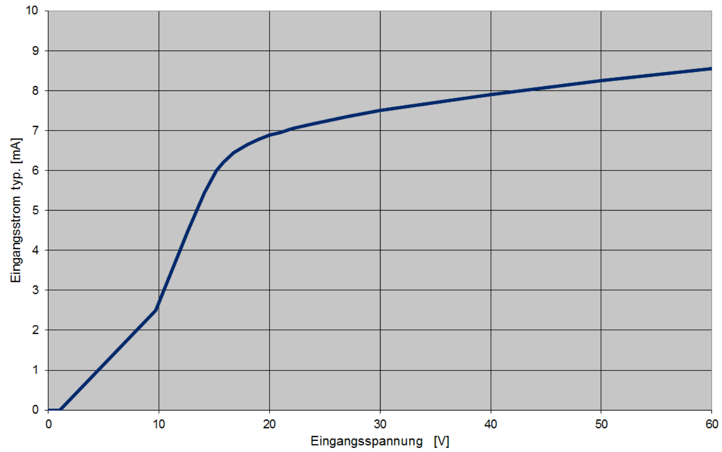


Figure 66 Control Unit

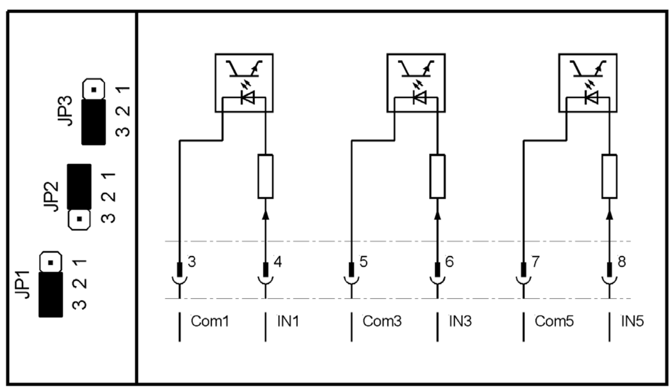
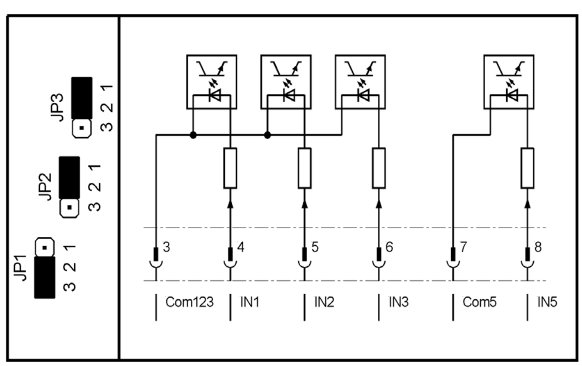


Figure 67 Logic Board



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

Figure 68 5 Inputs with Same Common

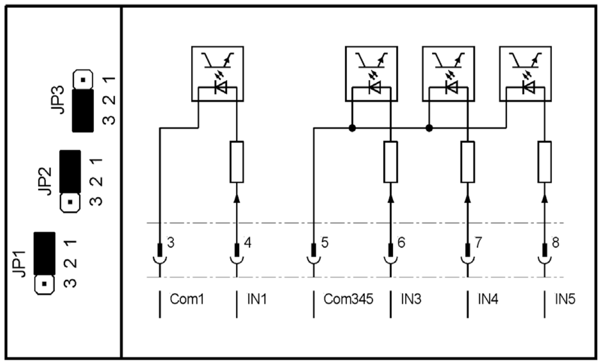
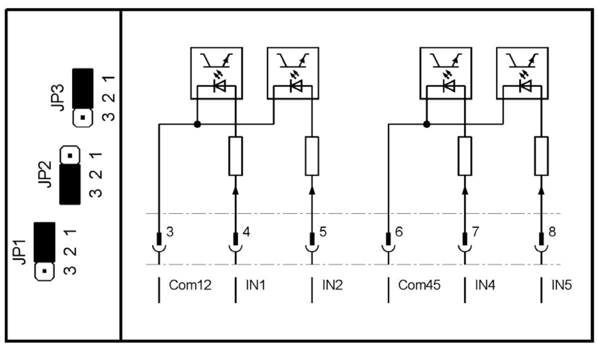
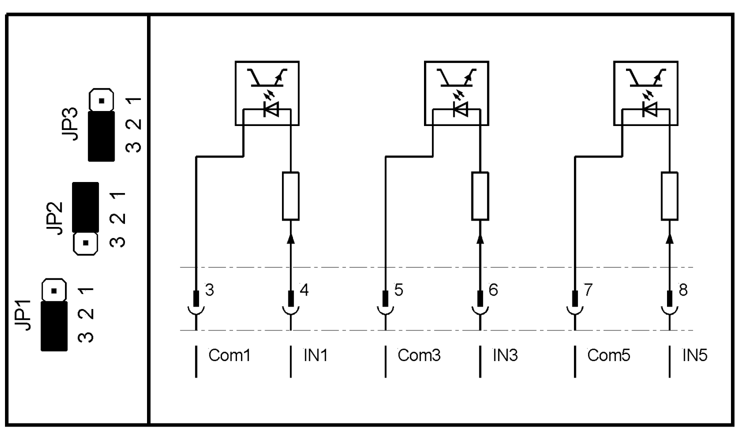


Figure 69 2 Separated Groups of 2 Inputs with Same Ground



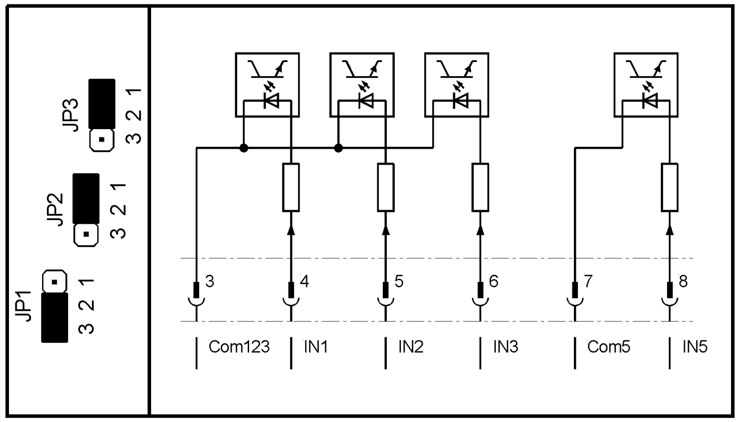
Input In3 is disabled.

Figure 70 3 Separated Inputs



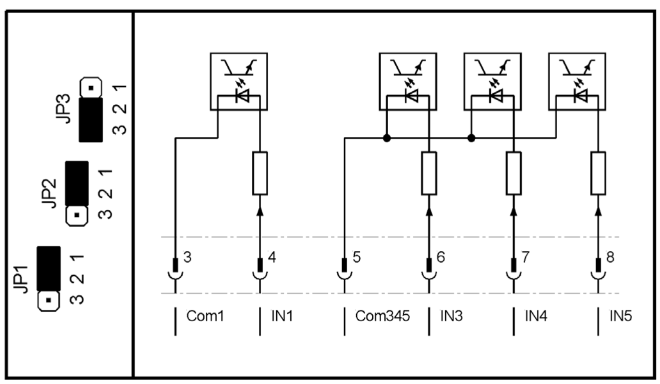
Inputs In2 and In4 are disabled.

Figure 71 3 Inputs with Same Common Ground and 1 Separated Input



Input In4 disabled.

Figure 72 1 Separated Input and 3 Inputs with Same Common



Input In2 is disabled.

18.2 Binary Outputs

Table 25. Output Data Table

Parameter	Value
Count	8
Power supply	24VDC nominal
Range	11 to 35VDC (either from internal or external)
Max voltage drop at set output	1V
Output voltage at non-set output	<1V
Maximum current per output	500mA (short circuit proof)
Maximum permissible total current for all outputs	4A

Fuse (Fuse F2, see Figure 74):	4A time-lag (Littelfuse 454 NANO[2] Slo-BloQ®)

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

18.3 Analog Inputs

Input 1: Reference value

Table 26. Analag Input 1 Table

Parameter	Value
Current range	0-25mA
Resolution	14-bit
Accuracy	0.5%
Input resistance	60 Ohm

Analog Input 1 is electrically isolated from the rest of the control system.

Input 2: External actual value

Only in conjunction with the PID controller.

Table 27. Analog Input 2 Table

Parameter	Value
Current range	0-20, 8mA
Resolution	10-bit
Accuracy	0.5%
Input resistance	120 Ohm

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

NOTE:
The earth potential from Analog Input 2 is the common earth of the control system and the auxiliary power supply (see Section 33.5).

18.4 Analog Outputs

Table 28. Analog Outputs Table

Parameter	Value
Count	1
Current range	0-20, 8mA
Resolution	14-bit
Accuracy	0.5%
Max load	600 Ohm

Reference ground is the common ground of the controller and the auxiliary voltage (see Section 33.5).

18.5 Auxiliary Voltage Input and Output

Table 29. Auxilliary Voltage Input and Output Table

Parameter	Value
Input voltage range (auxiliary voltage input)	20-30VDC
Maximum current consumtion(auxiliary voltage input)	500mA
Maximum current consumption in power-save mode (auxiliary voltage input)	120mA
Output voltage (auxiliary voltage output)	typically 23VMax
Output current (auxiliary voltage output)	200mA Resistance
Of ground potential vs. body	typically 500kOhm
Capacitance of ground potential vs. body	typically 100nF
Voltage of ground potential vs. body	max. 40Vs
Fuse	1A time-lag
	(Littelfuse 454 NANO^2 Slo-BloQ®)

Ground potential is the common ground of the controller and the analogue inputs and outputs. The auxiliary voltage output can be set by the menu P6.5 (see Section 18.5).

The power-save mode is defined as follows:

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

18.6 Connections for Non-Explosion Proof Version

Table 30. Connections for Non-Explosionproof Version Table

Parameter	Value
Power/motor	Industrial plug with 6 pins screw connection
	16A, max. 2.5mm^2, AWG14
Control signals	Industrial plug with 24 pins screw connection
	16A, max. 2.5mm^2, AWG14

Optionally, contacts are available in crimp or cage clamp designs.

18.7 Connections for Explosion Proof Version

Table 31. Connections for Explosionproof Version Table

Parameter	Value
Power/motor	Terminals with screw connection
	16A, 0.5 to 4mm^2 , AWG20 and AWG12
Control signals	Terminals with screw connection
	4A, 05 to 2.5mm^2 , AWG20 and AWG14

Appendix A: List of Figures

World Area Configuration Centers (WACC) offer sales support, service, inventory and commissioning to our global customers. Choose the WACC or sales office nearest you:

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