ACTUMATIC with positioner SRG1 (spezial version: AUTO-function)

1   General

ACTUMATIC is an actuator control that can be parameterized. It contains the complete motor control, the processing of the actuating commands from and signals to the control room. Adjustments to final control element (e.g. tight closing) or to the control system (e.g. locking of actuator commands) are very easy due to the possibility of parameterizing.

Furthermore, due to the display of all input and output signals via LEDs, an excellent tool for start-up and diagnosis is available. Figure 1 shows the logic board with the positioner SRG1.

2   Supply

An actuator with ACTUMATIC needs two power supplies, one for the supply of the logic board and the reversing starters, and one for the supply of the motor control. It is possible to interconnect the two supply voltages. A start-up of the motor in the wrong direction due to wrong phase sequence is avoided by the phase sequence detection. Do not connect the phase sequence detection in case of voltages over 3x415V!

Attention: No positioning command has to be activated during the first start up operation!!!
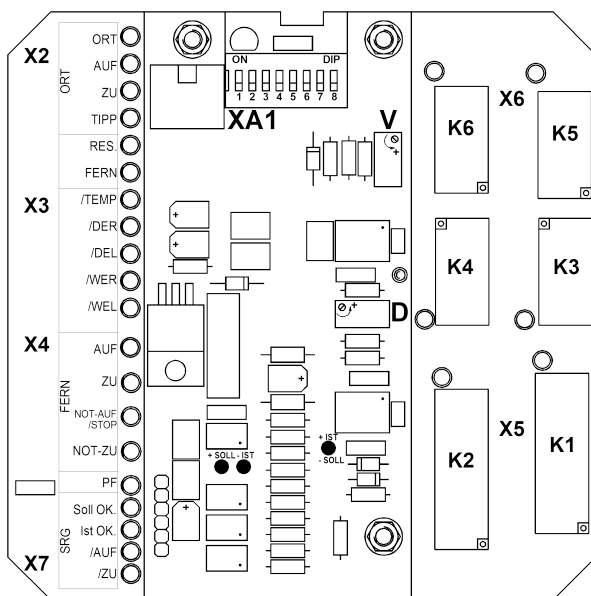

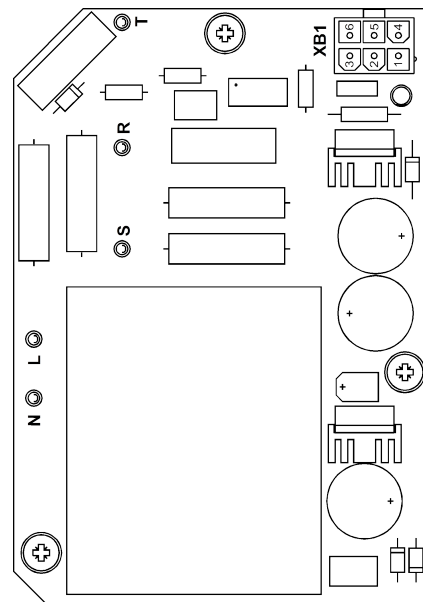**Figure 1:** *ACTUMATIC borad with positioner*

Figure 2: *power supply*

3   Functions

3.1   Selector switch S30

- Position LOCAL: The actuator can be actuated locally using the control switch S31 (OPEN-STOP-CLOSE). Using DIP switch no. 5, self-holding for LOCAL operation mode is activated. The external control commands EMERGENCY OPEN (switch 6 to OFF) and EMERGENCY CLOSE are active.

- Position OFF: Actuator can not be operated whether with local nor with remote commands.

- Position REMOTE: The input for the external control signals are activated.

3.2 Description of DIP switch functions:

- 1 - Torque depending closing:

    – OFF: The final position CLOSED is reached if the corresponding travel switch is actuated. If the torque switch is actuated, there is a failure.

    – ON: The final position CLOSED is reached only if the corresponding travel switch and the torque switch are activated. If the torque switch is actuated before the end position (travel switch), there is a failure.

- 2 - Torque depending opening:

    – OFF: The final position OPEN is reached if the corresponding travel switch is actuated. If the torque switch is actuated, there is a failure.

    – ON: The final position OPEN is reached only if the corresponding travel switch and the torque switch are activated. If the torque switch is actuated before the end position (travel switch), there is a failure.

- 3 - Non self-locking worm:

    – OFF: For actuators with a single threaded worm (output speeds below $120min^{-1}$).

    – ON: For actuators with a triple threaded worm (non self-locking, output speeds from $120min^{-1}$) the torque switches have to be locked additionally to avoid repeated start of the motor in the same direction after torque switch-off.

- 4 - Left-closing final control elemt:

    – OFF: Cw rotation of actuator means CLOSING the final control element.

    – ON: Cw rotation of actuator means OPENING the final control element.

- 5 - Self-holding Local:

    – OFF: No self-holding in local operation, i.e. the actuator runs only as long as the control switch S31 is kept in the position OPEN-Tipp or CLOSE-Tipp (Figure 3

    – ON: Self-holding in local operation, i.e. the control switch S31 must be turned only once briefly in one of the two positions OPEN-Tipp or CLOSE-Tipp (Figure 3, and the actuator then runs into the final position (push to run). If the actuator should be stopped, control switch S31 must be switched to STOP (Figure 3)

    – Note: Self-holding responds with delay (approx. 0.3 s), thus very short actuating pulses are possible without switching back to STOP.

Stellung AUF-Tipp   Stellung AUF   Stellung STOP   Stellung ZU   Stellung ZU-Tipp

Figure 3: *control switch S31*

- 6 - no function

- 7, 8 - Beahviour in case of set point or actual value failure:

    – 7 OFF, 8 OFF: No set point and actual value control. This setting is required with 0...20mA.

    – 7 OFF, 8 ON: Actuator closes in case of set point or actual value failure.

    – 7 ON, 8 OFF: Actuator opens in case of set point or actual value failure.

    – 7 ON, 8 ON: Actuator stops in case of set point or actual value failure.

3.3   External control commands:

The selection of the external control commands is carried out with positive 24VDC signals, with minus connected to common. The signals are led via optocoupler and, thus, are separated galvanically from the internal control voltage of the actuator.

The command OPEN and CLOSE is active only in position REMOTE of the selector switch S30 and with not activated command AUTO. The command EMERGENCY CLOSE is active in the positions LOCAL and REMOTE of the selector switch S30 and overrides all other commands. With activated command AUTO the external commands OPEN and CLOSE are ignored and the positioner SRG1 is activated.

Note: If the commands REMOTE OPEN and REMOTE CLOSE and/or EMERGENCY OPEN and EMERGENCY CLOSE are applied at the same time, the actuator stops. The EMERGENCY command again overrides all other commands.

3.4   Signalling relays:

Four signalling relays with the functions K3 = OPEN, K4 = CLOSED, K5 = READY and K6 = "REMOTE and AUTO" are mounted on the logic board.

The signalling relay K3 = OPEN picks up in the final position OPEN of the actuator.

The signalling relay K4 = CLOSED picks up in the final position CLOSED of the actuator.

The signalling relay K5 = READY picks up if the actuator is ready for operation. Possible causes for a fall-off of K5 are: excess of motor temperature, supply voltage failure (check fuse), wrong phase sequence (only with three-phase current), torque failure.

The signalling relay K6 = "REMOTE and AUTO" picks up in position REMOTE of the mode switch S30 with activated command AUTO, so the actuator is controlled via the setpoint signal.

3.5   Phase sequence detection:

A monitoring mechanism for wrong phase sequence is available in the ACTUMATIC power supply. This monitoring mechanism avoids a start-up of the three-phase motor in case of wrong phase sequence. This monitoring mechanism is separated galvanically from the ACTUMATIC supply. Thus, also a motor voltage can be monitored that is not connected with the ACTUMATIC voltage supply.

4   Positioner

4.1   General:

The positioner SRG1 is used for controlling the electric actuator with ACTUMATIC by means of a set point with current 0(4)...20 mA. With the SRG1 positioner a current encoder (e.g. ESM) is used as actual value (position value of the actuator). The position control of the actuator is carried out via the SRG1, i.e. the positioner provides that the actual value (position of the actuator) follows the set point.

Attention: Processing of set point and actual value current is carried out **without** internal signal separation in the SRG1. That means set point and actual value are connected together. To avoid compensating currents, at least one of these two signals has to be galvanically isolated (signal isolator).

4.2   Adjustment:

Switching differnce D: The switching difference (Figure 4). The more precise the actuator is to be positioned, the smaller the switching difference must be. If the switching difference is too small, the actuator will start to oscillate. In case of actuator oscillation, the switching difference must be increased. This is achieved by turning potentiometer D in a counter-clockwise direction.
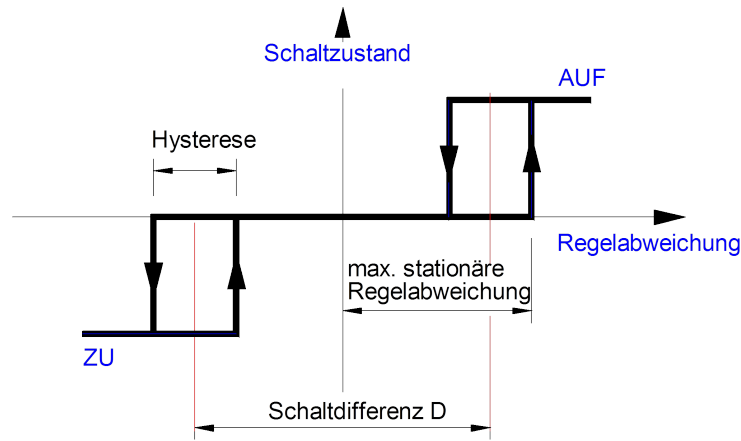
Figure 4: switch points of the 3-point controller

Filter V: The filter type used is a phase-zero filter. This filter limits the increase speed of the standard deviation. The effect of disturbances (high increase speed) is reduced effectively without impairing the behaviour in control.
ATTENTION! A too large filter effect will cause the actuator to oscillate.
The filter effect is reduced by turning the potentiometer V in a clockwise direction.

Adjustment procedure: Set filter effect to minimum position by turning potentiometer V in a clockwise direction and determine the optimum adjustment of the switching difference with setpoint jumps. When turning potentiometer D in a counter-clockwise direction, the switching difference is increased. The setpoint jumps should be in the opposite direction (reverse clearance) and their size selected so that the actuator is able to reach its nominal speed. Then the filter effect can be increased to the desired stability reserve again by turning potentiometer V in a counter-clockwise direction.

4.3   Measuring pointss:

Measuring pins are available for measuring the nominal and actual value signals. Thus, the corresponding signal can be measured with a low-impedance mA-meter (internal resistance < 0.1) without opening the feed lines. During measurement the nominal and actual value monitoring mechanism responds and must be deactivated to avoid an unintentional run of the actuator. To do this, DIP switches 7 and 8 on the logic board are set to OFF (siehe Kapitel 3.2).

5   Electromagnetic compatibility:

The function of ACTUMATIC can be influenced by heavy electro-magnetic disturbances. After interference decay, the original function is restored and new alignment is not necessary. We advise to use shielded cables for the signal lines of the SRG1.

6   Diagnosis:

The LEDs on the logic board have the following meaning:

Local	Selector switch S30 in position LOCAL
Local Open	Control switch S31 in position OPEN
Local Close	Control switch S31 in position CLOSE
Local TIPP	Control switch S31 in one of the two extreme resilient positions
RES.	used with flashing switch
Remote	Selector switch S30 in position REMOTE
/TEMP.	Thermal switch OK
/DER	Torque switch cw rotation not actuated (active low)
/DEL	Torque switch ccw rotation not actuated (active low)
/WER	Torque switch ccw rotation not actuated (active low)

/WEL	Torque switch ccw rotation not actuated (active low)
Remote Open	External command OPEN is applied
Remote Close	External command CLOSE is applied
Remote EM.-Open /Stop	External command EMERGENCY OPEN or STOP (active low) is applied
Remote EM.-Close	External command EMERGENCY CLOSE is applied
PF	Phase sequence error
SRG SP Ok.	Set point signal of SRG is available
SRG AV Ok.	Actual value of SRG is available
SRG /Open	SRG does not issue command OPEN (active low)
SRG /Close	SRG does not issue command CLOSE (active low)

7   Technical data:

7.1   General

Program number: P1.0
Program version: V1.51s
Product number:
Logic board: SE160120 HEKR29626
Power supply board: SE160134 CLSC39635
Positioner board: SE160121 HEKR29626
Ambient temperature . . . . -25. . .+60°C

7.2   Power pack:

Supply voltage (L, N) 230V, 50Hz, 10VA
Phase sequence monitoring (L1, L2, L3) . . . . 3 x 400V, 50Hz
Internal supply for ESM 24VDC, 30mA

7.3   Logic board:

External control commands . . . . OPEN, CLOSE, EMERGENCY OPEN/STOP,
                                                                                   EMERGENCY CLOSE
Input signal 24VDC
Signalling relay (change-over contact) . . . . K3: OPEN,
. . . . K4: CLOSED,
. . . . K5: READY,
. . . . K6: RUN
Braking capacity (resistive load) . . . . 3A, 125VAC, 2x 10^5 cycles
. . . . 2A, 250VAC, 2x 10^4 cycles
mechanical life . . . . 10^7 cycles

7.4   Positioner1:

Set point . . . . 0(4)...20mA
Voltage loss at set point input . . . . max. 2,8V bei 20mA
Actuas value . . . . 0(4)...20mA
Voltage loss at actual value input . . . . max. 2V bei 20mA
Threshold of crrent monitoring . . . . about 2mA
Switching difference . . . . about 0,05..1mA (0,2..5% at 20mA)
Hysteresis . . . . about 0,005..0,1mA (0,02..0,5% at 20mA)