ELECTRIC ACTUATORS FAILSAFE DESIGN

(SPRING RETURN INNOVATIVE AND SAFE)

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1. Application

Electric actuators provide the mechanical force/torque to run valves.

The electric actuators can operate many types of valves with following movement:

- Quarter turn
- Multi-turn and
- Linear.

The advantage of an electrical actuator failsafe against a pneumatic or hydraulic failsafe one is that they do not need pressurized air or oil supply. At normal operation, a simple electrical supply will do the job. Under emergency conditions, the mechanical power of the spring will operate the valve to the desired safe position.

2. Principle of operation

From the overall production process standpoint, failsafe actuators represent a major challenge. Greatest responsibility, reliability, and flexibility come together in the marking of these actuators. The technology used for these actuators is based on an electric actuator with a purely mechanical safety function. In the event of a power outage or triggering of safety function, the actuator moves into a preset position so that no hazards are posed to humans or to the environment.

According to an externally - conducted FMEDA (Failure Modes, Effects and Diagnostic Cover Analysis), the failsafe actuator achieves a high grade of safety integrity level.
Fail safe actuators are generally adapted to customer requirements in terms of actuating force (operating torque), travel distances, and positioning time characteristic in normal and failsafe operation.




3. Key features

- Actuators for on-off (S2) and modulating control (S4)
- ATEX compliant, explosion-proof actuator for installation in hazardous areas
- Power supply voltages from 24 V to 220 V DC / 90 till 500 V AC
- Torque as part-turn actuators: up to 32.000 Nm
- Force as linear actuators: up to 190kN with 230mm stroke
- Adjustable speed/time
- Entirely mechanical energy storage, no battery is required
- No periodic examination is required, self-testing each time it is operated
- Partial stroke test can be performed

4. General technical specifications for all series

Release failsafe drive	Selectable in case of 24 V DC failsafe power loss or main power loss (to define)
Power supply	AC 1 x 90 – 240 V / 50/60 Hz AC 3 x 380 – 480 V / 50/60 Hz DC 100 – 220 V DC 24 V
Local control	Selector LOCAL-OFF-REMOTE, lockable Control switch OPEN-STOP-CLOSE LCD display for detailed visualization and status information & parameters, in different languages adjustable White display backlight for normal operation, red display backlight for alarms 5 LED´s for status indication and control information Cover lid with display in 90° steps rotatable Infrared interface and Bluetooth interface for data exchange and control with android App or windows PC
Remote control	5 binary inputs 24/48 V DC free programmable (max.60V DC) Open – Stop – Close – Emergency Open – Emergency close, free programable, 24V DC rated voltage with common ground potential, inputs configurable with jumpers in groups with separated commons.
Status signals	8 binary outputs, Ready open - Closed - Opening – Closing - Torque - Local - Remote, free programmable, 24V DC supply, max. load 0,5 A/Channel
Features	-Free adjustable step mode control for open and close, -4 intermediate positions definable, -actuator speed adjustable, -actuator torque adjustable between 25-100% from max. torque, -password protection for reading and writing parameters, -alternative menu structure

	-different user levels, -counter values: power on hours, hours of operation, switching cycles, power on cycles, over torque switch-off, -preventive maintenance notification
Electrical connectors	10 pole plug for power connection 24 pole plug HAN24E with screw contacts for control connection 3 metric cable entries for cable glands, closed with blind glands (M40x1,5, M32x1 & M25x1,5)
Handwheel	Optional
Ambient temperature	-25°C up to +60°C
Enclosure protection	IP 67
Corrosion protection	for installation in aggressive atmosphere
Options	-Bus interface (see detailed description below) -Analog position feedback with 0/4…20 mA signal (2-wire) -Positioner with input of 0/4…20 mA signal -Special paintings - Separate control panel for wall mounting with max 40 m cable -Explosion protection II 2 G Ex de IIC T4 or T6 Gb -Other options on request

5. Product series

5.1 Quarter turn failsafe compact actuators with torque up to 5000 Nm

Electric compact 90° failsafe actuator with integrated control unit & frequency inverter technology for mounting on valves with 90° movement.

Motor	PM-motor controlled via frequency inverter, isolation class F
Operation mode	version for short operation duty (on-off) S2-15 min, class A and B Version for modulating duty S4-1200 cycles/hour with 40% duty cycle, class C
Failsafe function	selectable between clockwise or counterclockwise rotation (to define)
Valve connection	to ISO 5210 and bore with keyway or square bore

5.2 Linear Failsafe compact actuators version with force up to 30 kN

Electric compact linear failsafe actuator with integrated control unit and frequency inverter technology for mounting on valves with linear movement.

Motor	PM-motor controlled via frequency inverter, isolation class F
Operation mode	version for short operation duty (on-off) S2-15 min, class A and B Version for modulating duty S4-1200 cycles/hour with 40% duty cycle, class C
Failsafe function	selectable between spindle extending or feeding (to define)
Valve connection	to ISO 5210 and bore with machined spindle end

6. Digital protocols / Bus communication

The advantages of a digital bus system are:

- High degree of reliability
- Self-diagnostic by the system
- Better availability
- Lower amount of cabling

Our electric actuators can be supplied with following systems

PROFIBUS
PROFIBUS DP-V0 and DP-V1, based on RS485 interface and on the standards EC 61158 and IEC 61784.
With up to 126 nodes / max. of 32 nodes per segment / max. of 4 segments
Explosion proof design
1-channel or 2-channel design (redundant)
MODBUS
MODBUS RTU, based on RS485 interface and on the standards IEC 61158 and IEC 61784.
Speed up to 1.5 MBaud
Up to 247 nodes / max of 32 nodes per segment / max. of 8 segments
1-channel or 2-channel design (redundant)
DEVICENET
DEVICENET based on the CAN bus protocol and on the IEC 62026 standard.
The connection cable is used for data communication and power supply simultaneously
Up to 64 nodes
Explosion proof design
Automatic detection of speed
HART
HART-Protocol
Digital protocol transmitted over the 4…20 mA signals
Provided with the actuator with this type of digital communication is a DTM file (Device Type Manager File) and DD files (Device Description). With this information the most common software's (e.g. PACTWARE) is supported.
MODBUS
MODBUS TCP is based on the IEC 61158 standard
2-port interface (hub already included in the actuator)
Connection with a M-12 connector with protection IP 67
It can be integrated into existing TCP systems.
POWERLINK
Powerlink is an in-house development made by Bernecker & Rainer as real-time bus for critical applications.
2-port interface (hub already included in the actuator)
Connection with a M-12 connector with protection IP 67
It can be integrated into existing TCP systems.