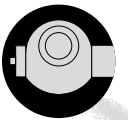


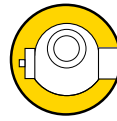


SCHUCK
A R M A T U R E N

supertorc®
Actuators and
Controls







supertorc®

Actuators

4 **Basic actuator**

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6 **Scotch-Yoke principle**

7 **Manual actuator**

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15 **Electro-hydraulic type X**

16 **Type key of the control system**

17 **Auxiliary attachments**

Actuators

Basic actuator

Advantages

- high efficiency through optimum matching of the torque curve of the actuator to that of the ball valve by means of the Scotch-Yoke principle
- path-proportional position indication over the entire operating range, accurate display of the CLOSE and OPEN position
- venting: atmospherically vented basic actuator
- limit stops for accurate setting of the swivelling motion and to absorb the max. output torque
- syntetic-coated bearings eliminate the need for maintenance
- basic actuator using the module system
- assured quality

Construction

- manual actuators with handwheel
- electric actuators with motor and handwheel
- hydraulic actuators with hydraulic cylinder
 - double-action
 - quick-action closure <15 sec.
 - emergency shut down valve
 - pipeline shut off valve
 - hydraulic compact assembly for independent operation
- compressed air actuators with compressed air cylinder
 - with spring return
 - double-action

Manufacture

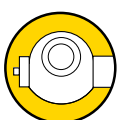
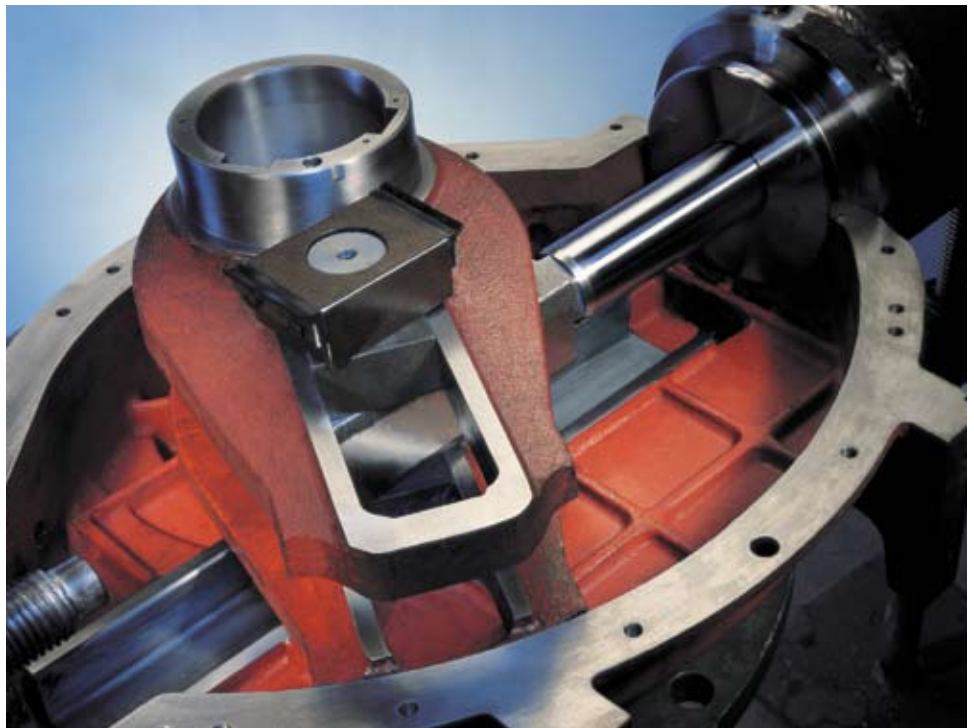
housing and yoke in resistant and tough GGG 40 spheroidal graphite cast iron with good dry-running properties

Testing

Extensive performance tests of the actuator with the valve in the works ensure reliable operation for the user.

Scope of application

- 90° swivel angle
- all versions for Ex zone I
- ambient temperature -60 °C to +80 °C
- output torque up to 350,000 Nm



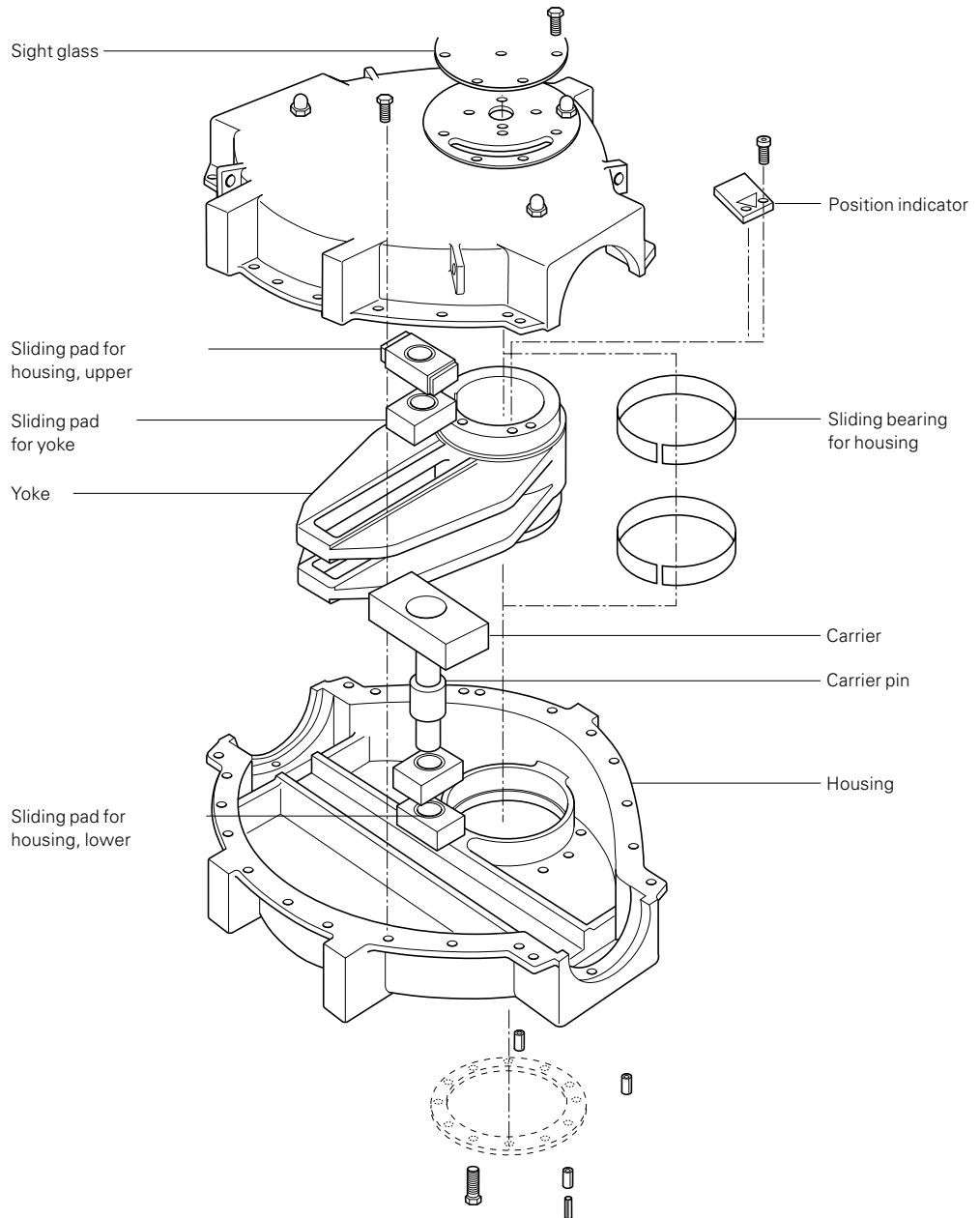
Actuators Module system

Schuck actuators type Borsig supertorc[®], for 90° adjustment range, have been developed as a module system. The basis of the module system is the basic actuator. Eight basic actuator sizes are available, with output torques from 1,000 Nm to 350,000 Nm.

The following basic actuators are available:

VG:	1,000 Nm
WG:	4,000 Nm
AG:	8,000 Nm
BG:	20,000 Nm
CG:	40,000 Nm
DG:	85,000 Nm
EG:	150,000 Nm
FG:	350,000 Nm

The basic actuator consists of a housing base and a housing top section, as well as the yoke, which is swivel-mounted inside it. Both are made from resistant and tough spheroidal graphite cast iron. As an alternative the housing and yoke can be made of carbon steel. A complete, ready-to-run actuator is created with the attachments on the basic actuator. The attachments are selected depending on the required input power. Input power can be fed in manually, hydraulically by pneumatic or electric motor. All attachments can be fixed in the right or left-hand universal mounting arrangement. This results in the different constructions of the swivel actuator as a manual actuator, electric actuator, hydraulic or pneumatic actuator. Retrofitting using the module system is possible at any time.



Actuators

Scotch-Yoke principle

Via the slide blocks and the guide track, the linear entry motion, e.g. of a hydraulic cylinder, is converted into the required 90° swivel motion in accordance with the Scotch-Yoke principle. The linear motion of the attached components acts via the carrier, the carrier bolt and the slide blocks on the lever arm of the yoke.

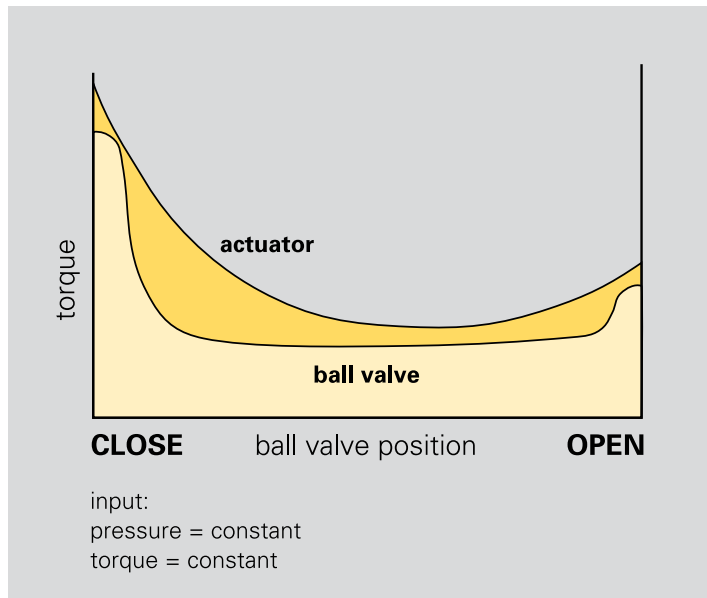
The advantage of the Scotch-Yoke principle is the output torque, matched to the ball valve, at a constant input torque or input pressure.

Very low friction gives Scotch-Yoke actuators very high efficiency and allows compact construction. The actuators are self-locking and jerk-free.

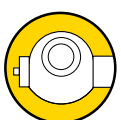
All bearings are dry-running syntetic-coated bearings which run without grease or oil lubrication. Only for corrosion protection, the internal components are initially grease-coated. The basic unit does not require any maintenance. The actuator has a very long service life.

Every actuator is equipped with an internal, mechanical position indicator. The ball valve position can be read off as a proportion of the movement over the entire operating range.

Limit stops, arranged in accordance with the maximum torques, limit the swivelling motion. Only the max. input torque, i.e. the max. input force, of the actuator acts on the limit stops.



Diagrammatic representation of the actuator and ball valve torque



Actuators
Manual actuator



AG – FG 00/31, 00/41

Schuck manual actuators type Borsig supertorc® are available in different designs up to an output torque of 350,000 Nm. The actuators are designed to allow manual operation without the need for great force.

Conversion or retrofitting is possible at any time to suit customers' requirements.

All Schuck manual actuators type Borsig supertorc® can in addition be equipped with limit switches. All electrical components are suitable for Ex zone I.

Actuators
Electric actuator



AG – FG 00/32, 00/42

Schuck manual actuators type Borsig supertorc® are available in different designs up to an output torque of 350,000 Nm. The actuators are equipped with a handwheel for emergency operation.

Due to the high efficiency of the basic actuator, the attached electric actuator can be very small.

Setting times are variable and are matched to customer requirements. All electrical components are suitable for Ex zone I. Conversion or retrofitting is possible at any time to suit customer requirements.

Actuators
Cylinder actuator



AG – FG 00/11, 00/12

Hydraulic/pneumatic cylinder type Borsig supertorc® are available in different designs up to an output torque of 350,000 Nm. Hydraulic/pneumatic actuators are always operated via a control system. This control system is situated in a control cabinet which is attached directly to the actuator. The actuator systems of the control equipment depend on customer requirements. Remote control signals, additional signal pick-ups and auxiliary attachments – such as limit switches – can be changed or retrofitted at any time (See type key, page 16).

All actuator controls have hydraulic emergency manual actuation.

The illustration shows a hydraulic actuator with type X control system (see page 15).

Actuators Sub-sea actuator



AG – FG 00/31/P, 00/41/P, 00/11/P

Schuck type Borsig supertorc® actuators are also suitable for underwater operation. They are designed so that they can also be mounted on the ball valve under water. For this application the actuator is sealed from the outside and completely filled with biologically degradable oil. A pressure equalising arrangement is provided to balance the internal pressure of the actuator to the external water pressure. The actuator is used at any depth. An external mechanical position indicator is present, all parts in contact with water being made of stainless steel. Any possible leak at the stem seal of the valve is discharged via a pressure release valve. In addition, the actuator can be equipped with limit switches and like all other type Borsig supertorc® actuators, the sub-sea actuator is maintenance-free.

The illustration shows a manually operated sub-sea actuator.

Actuators Spring return actuator



AG – FG 12/15

Type Borsig supertorc® actuators are also available with spring return in various versions up to an output torque of 350,000 Nm.

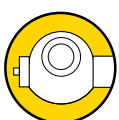
Type Borsig supertorc® actuators with spring return are operated over a compressed air control system. This control system is accommodated in a control cabinet which is mounted directly on the actuator. The actuator power supply of the control system depends on the customer's requirements. If the actuator power supply fails, the actuator moves over the spring into the "secure" position. Remote control signals, additional signal pick-ups and auxiliary attachments – such as limit switches can be converted or retrofitted at any time (See type key, page 16). All actuator systems have a hydraulic emergency manual actuation.

Actuators Planet gear actuator



PG incl. position indicator

The Schuck planetary gear actuator has been developed as a module system and can provide a torque of up to 3,000 Nm. The basis is formed by a basic element; adding modules makes it possible to vary the transmission ratio of the gear unit as required. The gear shaft of the Schuck planetary gear actuator is situated directly above the centerline of the valve axis. The actuator is constructed as standard to DIN 5211, but is also matched to the order. The end stop is situated on the gear unit. The Schuck planetary gear actuator can be actuated by handwheel for above-ground or with extension for below-ground operation. The gear unit can also be supplied in the form of a slip-on gear mechanism with a torque support. In addition, the planetary gear actuator can also be operated by electric motor. The use of high-grade material and precision manufacture ensures that the gear actuator operates with little play and with high efficiency. After filling with grease the unit operates without maintenance for at least eight years. The actuator has a very long service life. The actuator shaft is made from rustproof material.



Controls

Gas over oil type A

Advantages

- compact construction means a minimum of pipework and fittings
- integral seawater-resistant oil return tank with pressureless permanent oil level indication
- automatic resetting to normal operation after emergency manual operation (faulty actuation impossible)
- low actuating power
- standard:
 - setting time for OPEN and CLOSE can be set separately
 - local manual control
 - remote control
 - emergency manual operation with hand pump
 - low maintenance through self-cleaning/self-venting oil circuit
 - electric control voltage as required by customer
- the module system allows one or several different signal processing actions and auxiliary attachments (see type key of the control system)
- assured quality

Testing

Extensive function tests of the actuator with the ball valve unit ensure trouble-free operation.

Scope of application

- offshore/onshore, stations, pipeline shut off valve and emergency shut down valve
- all versions for Ex zone I
- ambient temperature $-60\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- operating pressure up to 320 bar
- quick action-closure < 15 sec. possible up to 48"

Construction

- with manual emergency operation as standard
- pipeline gas pressure driven
- with line break control (optional)
- with power failure (emergency shutdown) (optional)
- control voltage 24 V DC, 110 V DC/AC, 230 V AC, 13 W



Manufacture

- control system in seawater-resistant materials
- piping and fittings in alloy steel
- compact, lockable and seawater-resistant control cabinet



- For hydraulic schematics contact Schuck-Armaturen.

Animation of type A basic control at www.schuck-armaturen.de

Controls

Gas over oil type A

Due to modular construction throughout, every additional signal pick-up can be quickly and easily retrofitted.



Shown with remote control 0 and SHUT-DOWN in case of line break including torque limitation

Due to modular construction throughout, any additional signal pick-up can be quickly and easily retrofitted.



Shown with remote control 0 and SHUT-DOWN in case of power failure

Line break control

Function 1h

The pressure-differential valve 23 is mounted on the basic control unit as a module with an adapter plate.

Operation

In addition to the function of the basic control system, the ball valve is to be closed in the case of line break. Short-term, slight pressure fluctuations and slow, continuous drops in pressure do not cause the automatic line break control to respond. The line break control system responds as a function of the pressure drop rate in the pipeline, in relation to the pressure drop period. In the case of a power failure any further actuation of the actuator is stopped.

The automatic line break control is available with automatic or manual reset.

Emergency shut-down in case of power failure

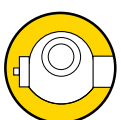
Function 6a

Also possible with control type C.

The solenoid valve 4c is mounted on the basic control system in modular construction with an adapter plate.

Operation

In addition to the function of the basic control system, the ball valve is to be closed in the case of power failure. When a power failure occurs, any further actuation of the actuator is stopped. The SHUT-DOWN function in case of power failure is available with automatic or manual reset.



Controls

Electro-hydraulic type C

Advantages

- compact construction means a minimum of pipework and fittings
- integral seawater-resistant oil return tank with pressureless permanent oil level indication
- automatic resetting to normal operation after emergency manual operation (faulty operation not possible)
- low actuation power
- standard:
 - setting time for OPEN and CLOSE can be set separately
 - local manual control
 - remote control
 - emergency manual operation with hand pump
 - low maintenance through self-cleaning/self-venting oil circuit
 - electrical supply and control voltage as required by the customer
- the module system allows one or several signal processing operations and auxiliary attachments (see type key of the control system)
- assured quality

Testing

Extensive performance tests of the actuator with the ball valve unit ensure trouble-free operation.

Scope of application

- offshore/onshore, stations, pipeline shut off valve and emergency shut down valve
- all versions for Ex zone I
- ambient temperature $-60\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- operating pressure up to 320 bar
- quick-action closure $<15\text{ sec.}$ possible up to 48"

Construction

- 24 V DC or 400 V AC motor, 500 W
- air motor
- with hydro accumulator up to three runs
- e.g. with emergency shut-down (ESD) (optional)
- control voltage 24 V DC, 110 V AC, 230 V AC, 5 W



Manufacture

- control system made from seawater-resistant materials
- pipework and fittings in alloy steel
- compact, lockable and seawater-resistant control cabinet



Shown with remote control 0 and SHUT-DOWN travel in case of power failure

- For hydraulic schematics contact Schuck-Armaturen.

Controls

Gas over oil type G

Advantages

- compact construction means a minimum of pipework and fittings
- small Gas over Oil tanks
- automatic resetting to normal operation after emergency manual operation (faulty operation not possible)
- low actuation power
- standard:
 - setting time for OPEN and CLOSE can be set separately
 - local manual control
 - remote control
 - emergency manual operation with hand pump
 - low maintenance through self-cleaning/self-venting oil circuit
 - electrical supply and control voltage as required by the customer
- no oil overflow
- the module system allows one or several signal processing operations and auxiliary attachments (see type key of the control system)
- assured quality

Testing

Extensive performance tests of the actuator with the ball valve unit ensure trouble-free operation.

Scope of application

- offshore/onshore, stations, pipeline shut off valve and emergency shut down valve
- all versions for Ex zone I
- ambient temperature $-60\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- operating pressure up to 320 bar
- quick-action closure <15 sec. possible up to 48"

Construction

- with manual emergency operation as standard
- pipeline gas pressure driven
- with line break control (optional)
- with power failure (emergency shutdown) (optional)
- control voltage 24 V DC, 110 V DC/AC, 230 V AC, 13 W



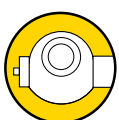
Shown with carbon steel actuator housing

Manufacture

- control system in seawater-resistant materials
- piping and fittings in alloy steel
- compact, lockable and seawater-resistant control cabinet



Shown with remote control 0, Line Break Control 1h and Torque Limit Device D



Controls

Pneumatic control type K for spring return actuators

Advantages

- compact construction means a minimum of pipework and fittings
- low actuating power
- standard:
 - setting time for OPEN and CLOSE can be set separately
 - local manual control
 - remote control
- the module system allows one or several different signal processing actions and auxiliary attachments (see type key of the control system)
- assured quality

Testing

Extensive function tests of the actuator with the ball valve unit ensure trouble-free operation.

Scope of application

- offshore/onshore, stations, pipeline shut off valve and emergency shut down valve
- all versions for Ex zone I
- ambient temperature $-60\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- operating pressure up to 100 bar
- quick action-closure < 15 sec. possible up to 48"

Construction

- pipeline gas pressure driven
- with power failure (emergency shutdown)
- control voltage 24 V DC, 110 V DC/AC, 230 V AC, 13 W

Manufacture

- control system in seawater-resistant materials
- piping and fittings in alloy steel
- compact, lockable and seawater-resistant control cabinet



Control type K shown with two solenoid valves (one ESD) and heating unit



Spring return actuator with spring to open application and limit switch

- For hydraulic schematics contact Schuck-Armaturen.

Controls

Hydro-pneumatic type KY

Advantages

- compact construction means a minimum of pipework and fittings
- integral seawater-resistant oil return tank with pressureless permanent oil level indication
- automatic resetting to normal operation after emergency manual operation (faulty actuation impossible)
- low actuating power
- standard:
 - setting time for OPEN and CLOSE can be set separately
 - local manual control
 - remote control
 - emergency manual operation with hand pump
 - low maintenance through self-cleaning/self-venting oil circuit
 - electric control voltage as required by customer
- the modular system allows one or several different signal processing actions and auxiliary attachments (see type key of the control system)
- assured quality

Testing

Extensive function tests of the actuator with the ball valve unit ensure trouble-free operation.

Scope of application

- offshore/onshore, stations, pipeline shut off valve and emergency shut down valve
- all versions for Ex zone I
- ambient temperature $-60\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- operating pressure up to 320 bar
- quick action-closure < 15 sec. possible up to 48"

Construction

- with manual emergency operation as standard
- pipeline gas pressure driven
- with line break control (optional)
- with power failure (emergency shutdown) (optional)
- control voltage 24 V DC, 110 V DC/AC, 230 V AC, 13 W

Manufacture

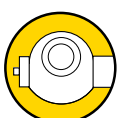
- control system in seawater-resistant materials
- piping and fittings in alloy steel
- compact, lockable and seawater-resistant control cabinet



Shown with remote control and line break control



● For hydraulic schematics contact Schuck-Armaturen.



Controls

Electro-hydraulic type X

Advantages

- high efficiency
- small cross-section wiring
- mains-independent
- short operating time
- small hydraulic tank
- low oil volume
- compact construction
- low maintenance cost
- high reliability
- self-cleaning, self-venting oil circuit
- retrofittable
- standard:
 - remote control
 - emergency manual operation with hand pump
 - electrical supply voltage as required by the customer
- automatic resetting to normal operation after emergency manual operation
- assured quality

Testing

- Extensive operational tests of the actuator with the ball valve ensure trouble-free operation.

Scope of application

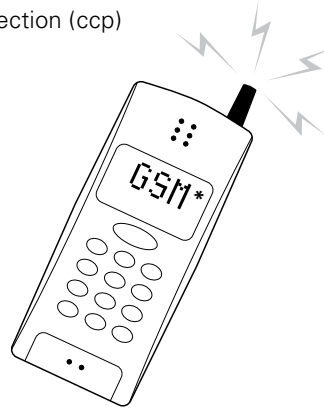
- offshore/onshore, stations, pipeline shut off valve and emergency shut down valve
- all versions for Ex zone I
- ambient temperature $-60\text{ }^{\circ}\text{C}$ to $+80\text{ }^{\circ}\text{C}$
- operating pressure up to 200 bar

*G.S.M. = Global System for Mobile Communication

optional in combination with observance of cathodic corrosion protection (CCP)

Construction

- hydraulic compact assembly for independent operation
 - power supply via solar technology
 - control and monitoring via GSM system
- 24 V DC or 400 V AC motor, 500 W, with reversing pump
- air motor
- with electrical insulating for potential insulating in case of cathodic corrosion protection (ccp)



Manufacture

- control system in seawater-resistant materials
- piping and fittings in alloy steel



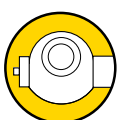
Controls

Type key of the control system

Actuator system		Remote control Standard: manual OPEN/CLOSE Speed control man. emergency operation		Signal pick-up reset a = auto., h = manual CLOSE			OPEN		Auxiliary attachments	
0	Without control	0	Electric OPEN/CLOSE	0		Without	0		D	Torque limiter
A	Gas over oil with automatic oil circulation	1	Pneumatic OPEN/CLOSE	1	a	Line break control for gas	1	a	E	Electrical position indicator
B	Electro.-pneum. actuator with hydraulic damping	2	Electric OPEN	2	a	Differential pressure switch	2	a	F	Radio remote control
C	Electr.-hydr. actuator with motorpump	3	Electric CLOSE	3	a	Setpoint pressure rise	3	a	H	Seating loader for ball valve
D	Pneumatic hydraulic control actuator	4	Pneumatic OPEN	4	a	Setpoint pressure drop	4	a	L	Limit switch
E	Gas hydraulic control actuator	5	Pneumatic CLOSE	5	a	Control pressure failure	5	a	N	Auxiliary energy switch-over
F	Gas over oil actuator with level equaliser	6	Manual operation	6	a	Voltage failure	6	a	P	Pressure equalising system
G	Gas over oil actuator without level equaliser	7	Electric OPEN/CLOSE p = 0 => OPEN	7	a	High pressure time release	7	a	Q	Energy storage mechanism
H	Hydraulic actuator	8	Electric OPEN/CLOSE p = 0 => CLOSE	8	a	Voltage input	8	a	S	Automatic seating control
K	Pneumatic actuator	9	Electric OPEN/CLOSE p = 0 => CLOSE, without manual emergency operation	9	a	Manual emergency	9	a	Y	hydraulic emergency operation
L	Gas over oil actuator with oil circulation, with pneumatic support	10	Hydraulic OPEN/CLOSE	10	a		10	a		
M	Subsea hydraulic	11	Electric OPEN/CLOSE Voltage failure CLOSE Voltage input OPEN	11	a	Line break control for fluids		a		
P	Gas over oil control actuator	12	Electric OPEN/CLOSE Voltage failure OPEN Voltage input CLOSE	12	a	Electrical line break control for gas/fluids	12	a		
W	Subsea pneumatic	13		13	a	Line break control with hydraulic transmission	13	a		
X	Electro-hydraulic actuator with anticlockwise/clockwise rotating motor pump	14			a			a		
					h			h		

Example for using the type key:

- A0-1a7h-0-Q**
- actuator system **A**: gas over oil with automatic oil circulation
 - remote control **0**: electric OPEN/CLOSE
 - signal pick-up CLOSE **1a**: line break control with automatic reset
 - signal pick-up CLOSE **7h**: high pressure release with manual reset
 - auxiliary attachment **Q**: energy storage mechanism



Controls

Auxiliary attachments



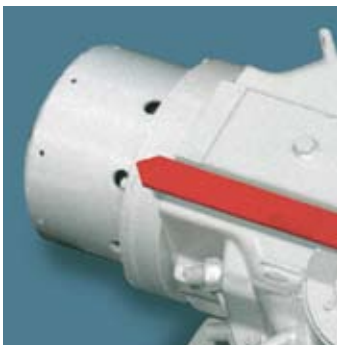
D Torque limiter

The torque limiter protects the actuator and the secondary components against an excessive output torque. If the pressure drops to a permissible value, after the response of the torque limiter, the torque limiter cuts out automatically. The torque limiter is applicable for the pneumatic and Gas over Oil actuators.



L Limit switch

The limit switch is a compact, closed unit which was specially developed for supertorc®. The limit switch makes it possible to ensure that no moving parts are situated outside the actuator. The limit switch contains four mechanical two-way switches with which the travel commands can be cut off in the end position and the end positions signalled. Alternatively, inductive proximity switches can also be used. All electrical components are suitable for Ex zone I.



P Pressure equalising system

To prevent excessive pressure on the gear unit or the actuator when the actuator is used underwater, a pressure equalising system is provided. For this purpose the actuator is filled with biologically degradable oil. The actuator is sealed off against the external medium over a plastic membrane. In this way the internal pressure of the actuator is matched to the water pressure. The actuator can therefore be used at any depth.



Q Energy storage mechanism

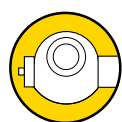
An energy storage mechanism makes it possible to actuate the ball valve several times even if the control power fails. The size and construction of the energy storage mechanism vary depending on customer requirements and the application conditions.

- For hydraulic schematics as required by the customer please ring tel. no. +49 7329 950-155
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- Animations of the Schuck gas over oil control system at www.schuck-armaturen.de



- Information and brochures about other products:
Telephone +49 7329 950-0
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