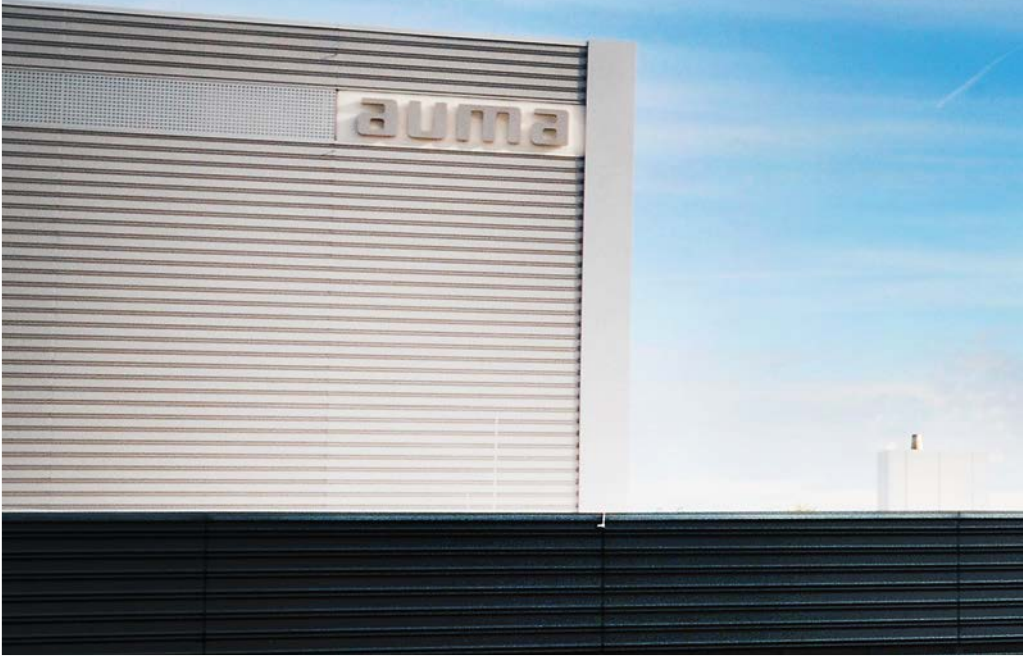


AUMA MARINE

Electric automation solutions for valves on military vessels





ABOUT THIS BROCHURE

AUMA has five distinct divisions - Water, Power, Oil & Gas, Drives, Industry & Marine; each focus on their specific markets. Every single division excels by its individual competence.

This brochure deals with actuators deployed on military vessels. The market segment is the responsibility of the Division for AUMA Industry & Marine. AUMA actuators described in this brochure are particularly suited for valve automation in this environment. The major features of these devices are explained including the comprehensive service performance offered by AUMA for this outstanding product range.

Further documents such as technical and electrical data sheets for detailed device dimensioning are available for all actuators described in this document. Our local sales/service staff will be glad to provide you with advice and support.

The latest information on AUMA products can be found on the Internet at www.auma.com. All documents, including dimensional drawings, wiring diagrams, technical and electrical data sheets are available for free download.

AUMA's Industry & Marine Division also provides specific brochures for automation on civil vessels and industrial applications.

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Multi-turn actuators:
Gate valves



Linear actuators:
Globe valves



Part-turn actuators:
Butterfly valves, ball and plug valves



AUMA - THE SPECIALIST FOR ELECTRIC ACTUATORS

Armaturen- Und MaschinenAntriebe - AUMA - is one of the leading manufacturers worldwide of electric actuators for automating industrial valves. Since 1964, the founding year of the company, AUMA has focused on development, manufacture, sales and service of electric actuators.

The brand AUMA is synonym to long-standing experience and knowledge. AUMA is specialised in electric actuators for the energy, water, oil & gas, as well as industrial sectors. All these market applications are equally available on ships.

As an independent partner of the international valve industry, AUMA supplies customer-specific products for electric automation of all industrial valves, whether onshore or offshore.

Long standing experience

AUMA actuators work in the background and are not the prime focus of designers or shipbuilding companies. Therefore, it is all the more important knowing that AUMA actuators have been installed on ships for the last 40 years, working discretely to the benefit of all parties involved.

Innovation on a day-to-day-business

As specialists for electric actuators, AUMA sets the market standard for innovation and sustainability. Within the framework of continual improvement, the in-house manufacturing process ensures prompt implementation of innovation at product or sub-assembly level. This applies to all areas relating to device function - mechanics, electrical engineering, electronics, and software.



Success is reflected by growth - worldwide

Since the foundation in 1964, AUMA has evolved into a company with 2,300 members of staff around the globe. AUMA proudly possesses a global sales and service network with more than 70 sales organisations and representative offices. Customers appreciate our expertise and competence in product consultation and our efficient after-sales service.

Selecting AUMA:

- > Provides valve automation in compliance with submitted specifications
- > Assures safety for design and implementation for the shipbuilding industry on the basis of certified interfaces
- > Guarantees the maritime forces global service on site including commissioning, comprehensive support, and product training.

AUMA'S BENEFITS

The objective is efficient deployment of vessels having to fulfil more complex tasks in spite of decreasing numbers of crew members.

Consequently, the degree of automation requirement is continuously increasing giving way to the deployment of electric actuators since staff are no longer available to open or close a valve at the time required.

YOUR ADVANTAGE - SAFETY THANKS TO CERTIFICATIONS

Internationally approved test authorities certify that AUMA actuators are suitable for safe operation on military vessels. The devices were subjected to thorough inspection by external test authorities providing sound planning, dependability and the certainty of proven operational product reliability.

AUMA's daily business includes the provision of certifications, since our actuators are premium products for the oil & gas industry as well as for nuclear power plants. Certifications are the core of our development, production and service departments and are integral part of our daily routine.

Please also refer to page 10.

YOUR ADVANTAGE - MAXIMUM AVAILABILITY

Simply reliable - highest safety and continuous availability considerably contribute to maximising efficiency. Our actuators are designed and lifetime tested to withstand hostile environmental conditions.

YOUR ADVANTAGE - LOW OPERATING COSTS

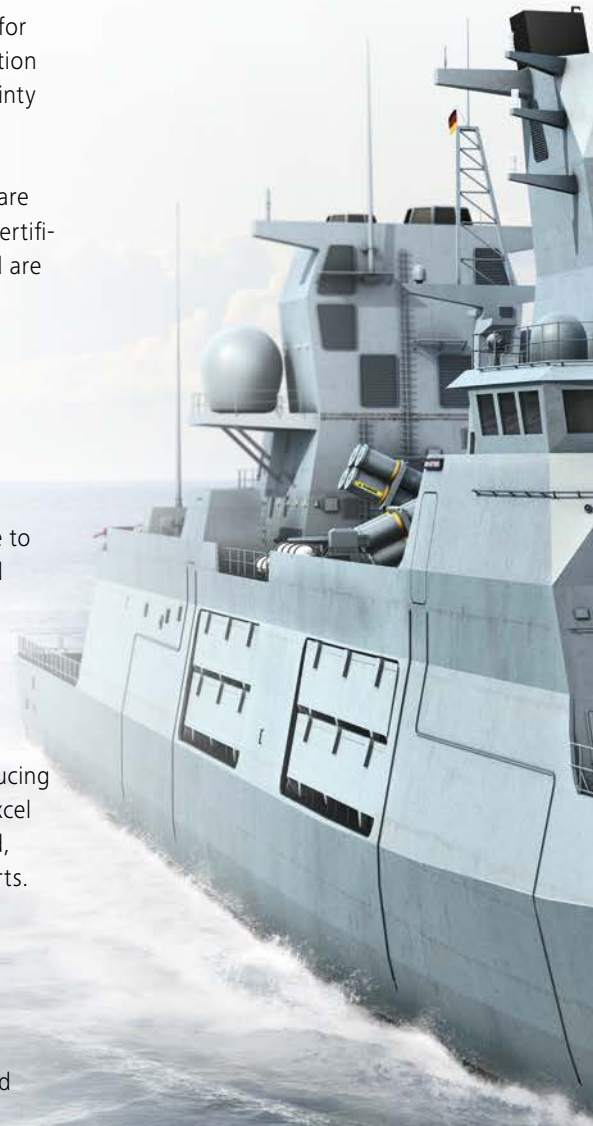
Electric actuators contribute twice to reducing your operating expenses while reducing staff numbers and increasing the degree of automation. On the one hand, they excel by their superior control properties compared to other systems, on the other hand, electric actuators require less energy than for example their pneumatic counterparts.

YOUR ADVANTAGE - SIMPLE AND SAFE ENERGY SUPPLY

Compared to pneumatic or hydraulic connections, electrical cables are insensitive against vibration or shock. As a consequence, power supply of actuators is secured even in extreme situations.

YOUR ADVANTAGE - SOLUTIONS FIT FOR THE FUTURE

With our innovative operation concept, actuation technologies and communication interfaces, we are at the forefront of valve automation. This makes us your expert partner - worldwide.



CERTIFICATIONS/REFERENCES

REFERENCES

The following list is an extract of separate reference lists available upon request.

Submarine class 214	Turkey.....	2014 – 2017
F125 class frigates	Germany.....	2011 – 2016
Suffren class submarines.....	France	2013 – 2015
Class 214 submarines.....	South Korea.....	2004 – 2015
Vikrant class aircraft carriers	India.....	2014
Classe 209 submarines.....	Egypt.....	2013 – 2014
MEKO class corvettes.....	Algeria.....	2013 – 2014
Scorpène class submarines.....	France	2001 – 2014
Class 212A submarines	Italy.....	2000 – 2014
EGV class task force supply vessel	Germany.....	2010 – 2013
FREMM class frigates	Italy.....	2009 – 2013
Scorpène class submarines.....	Chile.....	2001 – 2013
Scorpène class submarines.....	Spain	2001 – 2013
Scorpène class submarines.....	Malaysia	2001 – 2013
Isaac-Peral class submarines	Spain	2007 – 2012
Gawron class corvettes.....	Poland	2006 – 2011
Class 212A submarines	Germany.....	1998 – 2011
Class 214 submarines.....	Greece.....	2002 – 2009
MEKO 100 RMN class corvettes	Malaysia	2001 – 2009
FANZAC class frigates.....	Australia	1992 – 2009
F123 class frigates	Germany.....	1989 – 2009
Vasco da Gama class frigate.....	Portugal	1989 – 2009
Class 214 submarines.....	Portugal	2006 – 2008
Horizon class frigates.....	Italy.....	2005 – 2008
F124 class frigates.....	Germany.....	1999 – 2008
Hydra classe frigates.....	Greece.....	1991 – 2008
Brahmaputra class frigate	India.....	2007
Daring class destroyer.....	United Kingdom.....	2004 – 2007
Ula class submarines.....	Norway	2002 – 2007
MHV 54 class mine hunters.....	Turkey.....	2001 – 2007
Kilic class fast attack craft.....	Turkey.....	1996 – 2006
MEKO A-200 SAN class corvette.....	South Africa.....	2001 – 2004
Class 209 submarines	Turkey.....	2000 – 2004
Kolkata class destroyer	Indien	2001
Barbaros class frigate.....	Turkey.....	1993 – 1997







RAPPORTO DI PROVA TEST REPORT

Rapporto n. / Report n.	64/2015	Rev.	01	Data emissione / Issue date	22/12/2015	Pag. / 1/30
TITOLO / TITLE Shock test on a test assembly "Plate mounted valve actuators" executed according to MIL-S-901 D.						
Autori / Authors F. Gaggero; E. Agosti						
Sommario / Abstract In questo rapporto vengono descritti i risultati delle prove d'urto eseguite il 11 Novembre 2015 sul test assembly "Plate mounted valve actuators". I componenti provati sono forniti da AUMA RIESTER GMBH & CO KG. Le prove sono state realizzate utilizzando la macchina d'urto per pesi medi della serie prove CETENA di Riva Tigozo, per conto della società AUMA RIESTER GMBH & CO KG. This report describes the results of shock test performed on November 11 th 2015, on the test assembly "Plate mounted valve actuators". Items tested are supplied by AUMA RIESTER GMBH & CO KG. Tests have been carried out using medium-weight shock machine located at the CETENA's laboratory in Riva Tigozo, on behalf of AUMA RIESTER GMBH & CO KG.						
Autori / Authors					# Responsabile del Laboratorio / Head of Laboratory	
Circolazione / Circulation			Codici di distribuzione / Distribution codes			
Interna / Internal Only Libera / Free <input checked="" type="checkbox"/> Riservata Industriale / Commercial in confidence Classificata / Classified			AUMA RIESTER GMBH & CO KG			
Pagine / Sheets	Commesse / Job	Note / Notes				
30	6917065161	According to PROLAB 01				

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РОССИЙСКИЙ МОРСКОЙ РЕГИСТР СУДОХОДА
RUSSIAN MARITIME REGISTER OF SHIPPING

6.8.3



СВИДЕТЕЛЬСТВО О ТИПОВОМ ОДОБРЕНИИ TYPE APPROVAL CERTIFICATE

Изготовитель / Manufacturer: AUMA Riester GmbH & Co. KG

Адрес / Address: Aumastr.1, 79379 Mullheim, Germany; Tel/Phone +49 7631 809 0; www.auma.com

Изделие* / Product*
 Неполюсборотные приводы "АУМА" типов: SGC/SGCR 04.1; SGC/SGCR 05.1; SGC/SGCR 07.1; SGC/SGCR 10.1; SGM/SGMR 04.1; SGM/SGMR 05.1; SGM/SGMR 07.1; SGM/SGMR 10.1.
 AUMA part-turn actuators of types: SGC/SGCR 04.1; SGC/SGCR 05.1; SGC/SGCR 07.1; SGC/SGCR 10.1; SGM/SGMR 04.1; SGM/SGMR 05.1; SGM/SGMR 07.1; SGM/SGMR 10.1.

Код номенклатуры / Code of nomenclature: 11050000

На основании освидетельствования и проведенных испытаний удостоверяется, что вышеупомянутые изделия(а) удовлетворяют(ют) требованиям Российского морского регистра судоходства.
 This is to certify that on the basis of the survey and tests carried out the above mentioned item(s) comply(ies) with the requirements of Russian Maritime Register of Shipping.

«XI Правила классификации и постройки морских судов» (2013), раздел 10, п. IV "Правила технического надзора за постройкой судов и изготовлением материалов и изделий для судов" (2013), п. XI of the Rules for the classification and construction of sea-going ships (2013), section 10, p. IV of the "Rules for technical supervision during construction of ships and manufacture of materials and product for ships" (2013).

Настоящее Свидетельство о типовом одобрении действительно до 15.11.2018
 This Type Approval Certificate is valid until 15.11.2018

Настоящее Свидетельство о типовом одобрении теряет силу в случаях, установленных в Правилах технического надзора за постройкой судов и изготовлением материалов и изделий для судов.
 This Type Approval Certificate becomes invalid in cases stipulated in Rules for the Technical Supervision during Construction of Ships and Manufacture of Shipboard Materials and Products.

Дата выдачи / Date of issue: 15.11.2013

Российский морской регистр судоходства / Russian Maritime Register of Shipping



13.08989.381

B.A. Andreyev / V. Andreyev
 (Фамилия, инициалы / name)

*Дополнительную информацию см. на обороте.
 Additional information see overleaf



The certificates shown are an extract of certifications with relevance for the shipbuilding industry. Please refer to our website for downloading our complete list: www.auma.com

TYPE APPROVAL CERTIFICATE DNV-GL

This is to certify that the undernoted product(s) has/have been tested in accordance with the relevant requirements of the DNV GL Type Approval System.

Certificate No. **14 124 - 15 HH**

Company **Haselhofer Feinmechanik GmbH**
Eichendorffstr. 42-48
78054 Villingen, GERMANY

Product Description **Electric part-turn actuator**
Type **EQ15, EQ40, EQ60, EQ100, EQ150, EQ300, EQ600**
Environmental Category **D, EMC 2**


Technical Data / Range of Application
Tripping torque: 15-40-60-100-150-300-600 Nm
Nom. Voltage: 1ph 24V up to 230V, 3ph 400V, DC 24V
Operating time / 90°: 8-15/20-30-60-40-80-160 s
Swing angle: 90-120-150-180°
Degree of protection: IP67

Test Standard **Guidelines for the Performance of Type Approvals, Chapter 2- Test Requirements for Electrical / Electronic Equipment and Systems (VI-7-2), Edition 2012**

Documents **Test report : 713050307 (Vibration), 713050307A (Temp, Climatic), 486871-50307-02, 4325 (EMC), 050813-1 (High Voltage) Specification: 10_TBD_EQ_001_06.doc, dated 09-2012**

Remarks **This certificate is issued on the basis of GL Guidelines for the Performance of Type Approvals, Chapter 1 - Procedure (VI-7-1), Edition 2007.**

Valid until **2020-04-16**
Page **1 of 1**
File No. **I.C.01**
Hamburg, **2015-04-17**

Type Approval Symbol 

Arne Schaarmann
Marco Rinkel
Internet Publication: GL As

DNV GL
www.dnvgl.com

TYPE APPROVAL CERTIFICATE DNV-GL

Certificate No: **TAA00000M4**

This is to certify:
That the Electric Actuator
with type designation(s)
2 SB 61, 2 SB 62, 2 SB 63, SBA 12, SBA 20, SBA25, SBA 80, SBA 200

Issued to
AUMA Industry & Marine GmbH
Villingen- Schwenningen, Germany

is found to comply with
DNV GL rules for classification - Ships

Application :
Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Type	Temperature	Humidity	Vibration	EMC	Enclosure
2 SB 61					IP65
2 SB 62					IP65
2 SB 63					IP65
SBA 12					IP65
SBA 20					IP65
SBA25					IP65
SBA 80					IP65
SBA 200					IP65

ambient temperature: -20 °C to 60 °C
This Certificate is valid until **2021-07-24**.
Issued at **Hamburg** on **2016-07-25**

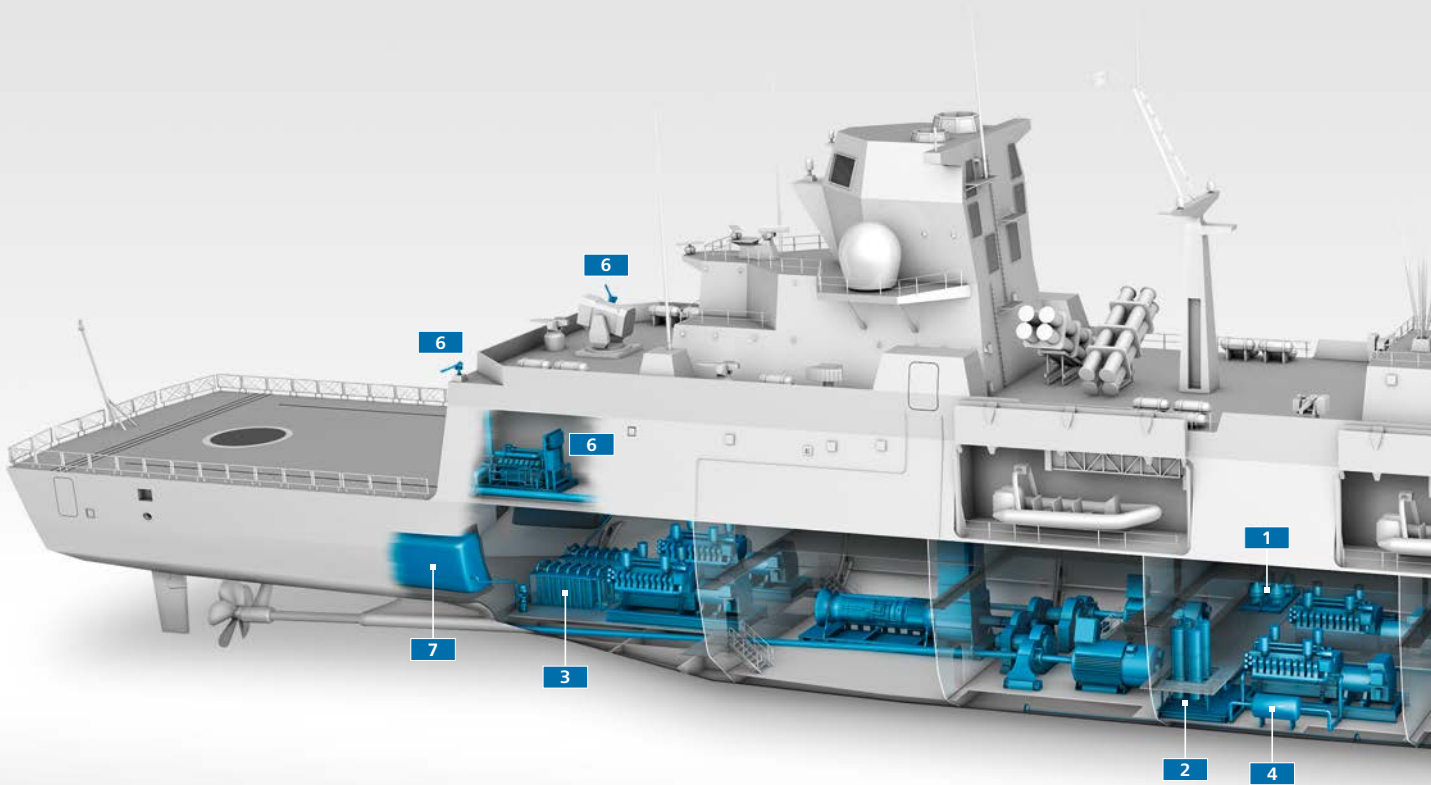
DNV GL local station: **Augsburg**
Approval Engineer: **Marco Rinkel**

 **for DNV GL**
Digitally Signed By: **Schwabmann, Arne**
Location: **DNV GL Hamburg, Germany**
Signing Date: **2016-06-02**, on behalf of
Duy Nam Le
Head of Section

This Certificate is subject to terms and conditions outlined. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Form code: TA 14114
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Revision: 2015-05
www.dnvgl.com

Page 1 of 3



ELECTRIC ACTUATORS ON MILITARY VESSELS - APPLICATIONS

Virtually all vessels require actuation technology. The mission of actuators is to optimally control energy flows, to maintain temperatures at the desired level or to raise them to a new target value and further to control media flow.

Actuators are not only crucial for operating vessels but also to automate systems utilised by the crew.

Device reliability ranks top and is part of AUMA's daily business. For decades, AUMA devices have also been deployed in segments other than the shipbuilding industry where operational safety is an absolute must. This does not only include operation in potentially explosive areas but also the deployment of AUMA devices in nuclear power plants all around the globe.

For this reason, it goes without saying that all devices described in this brochure were awarded appropriate certifications.

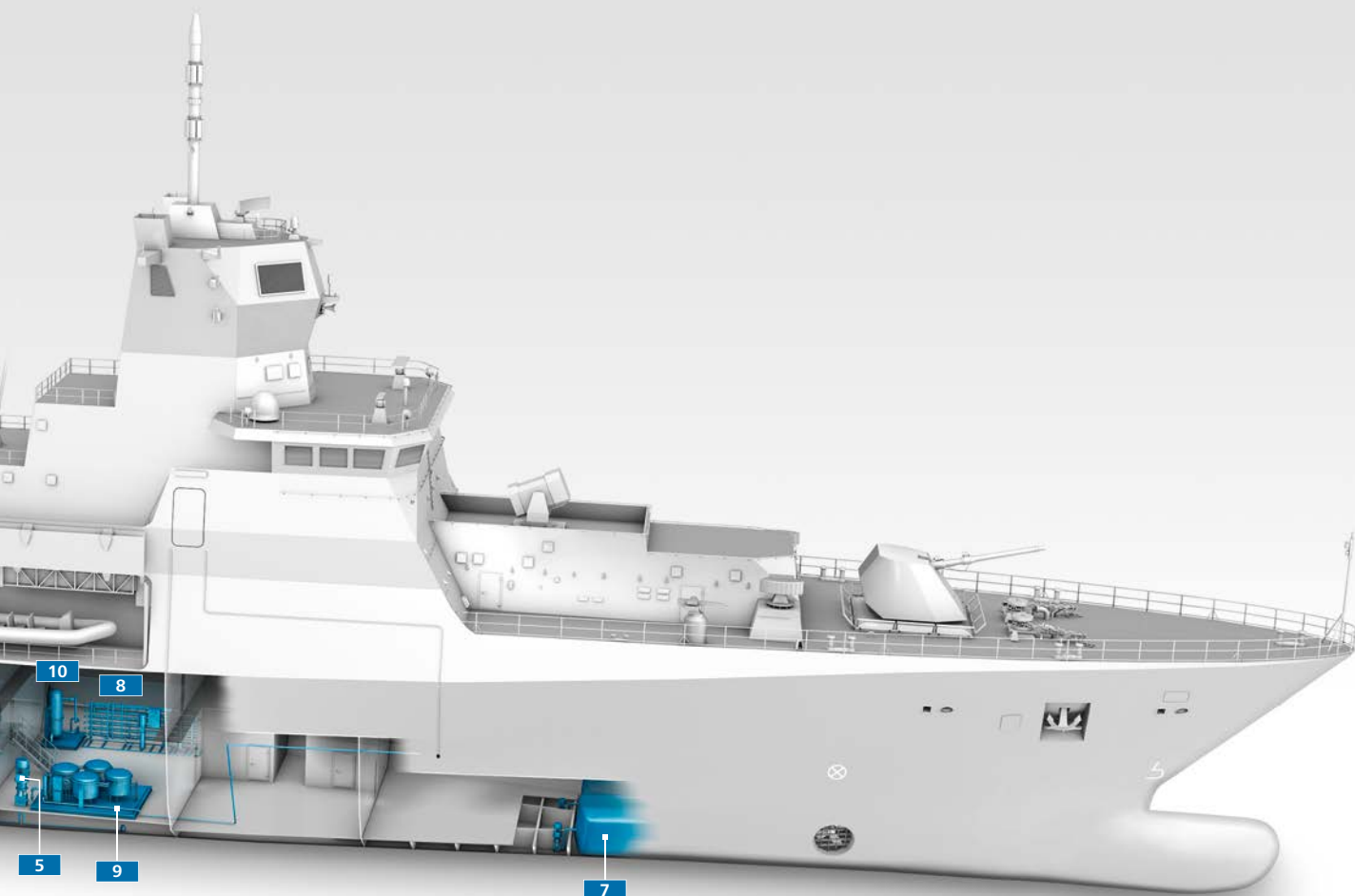
Medium flow control and shutting off

AUMA actuators are the perfect solution for flow control of any type, under any conditions, on the basis of electric power provision. Electric power supply is extremely advantageous in terms of installation, maintenance and operating costs compared with other sources of energy.

The process descriptions shown inside the fold-out pages are representative of systems on ships automated by AUMA actuators.

Compact design

Compared to actuator types with different supply sources, the design of electric actuators is ideally suited when space available is scarce. All components - including local controls - are located in one housing. Space constraints prevailing on ships are consequently one of the prime benefits of electric actuators.



Example of a frigate

Frigates are prime examples of a large application field for AUMA actuators. This basically applies for any other type of military vessels.

- 1 Lubricating grease processing
- 2 Fuel processing
- 3 Cooling systems on ships
- 4 Energy recuperation
- 5 Bilge systems
- 6 Fire fighting systems
- 7 Ballast water distribution
- 8 Drinking water treatment
- 9 Hot water treatment
- 10 Wastewater treatment

Actuators for all conditions, for any purpose

AUMA actuators are available in premium enclosure protection IP68, with excellent corrosion protection coating, withstanding strong vibration. They are ideally suited for use in a wide environmental temperature range.

These are perfect features for performing any mission on vessels.

The dimensions of the systems shown depend on the type and size of the vessel in question. On vessels with large crews, the drinking water processing systems are larger than on supply vessels with less crew members.

For this reason, AUMA provides different actuator sizes to suit all requirements. Torques range from a few newton metres to several thousand newton metres.

AUMA ACTUATORS INTEGRATION INTO TYPICAL PROCESSES

ACROSS THE SEVEN SEAS

The vessels illustrated are not merely representative examples but they show a small selection of vessels where AUMA actuators are actually installed. The multitude of vessel types fulfilling distinguished tasks and showing the many applications possible significantly underlines the flexibility of our products.

Please refer to page 7 for an extract of our reference list.

The applications below are representative of the many possible processes on all types of vessels. AUMA actuators are deployed in all these processes.





Typical applications

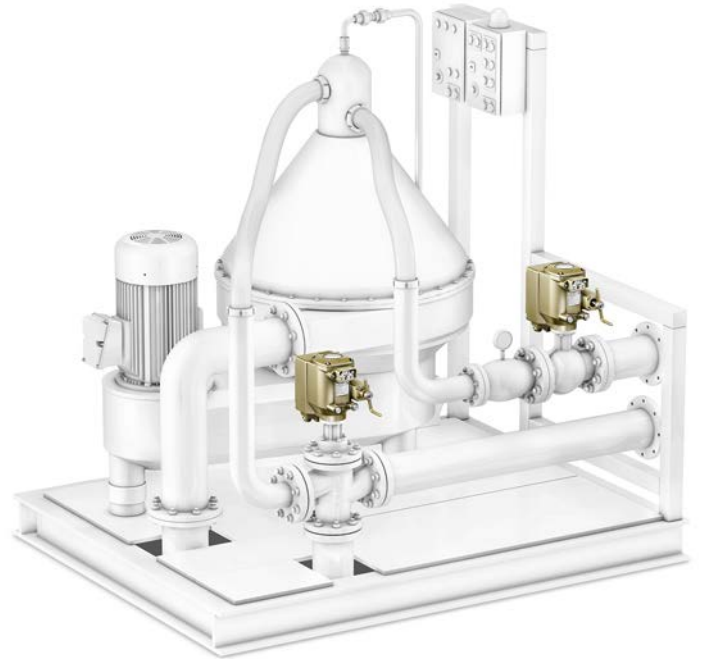
- > Motor cooling systems
- > Fuel preheating
- > Hot water treatment

Working method

Part of the last run is mixed to the first run by means of a mixing valve. This allows quick setting of the desired temperature. Generally, a 3-way valve operated by means of a modulating actuator is used as mixing valve.

Suitable AUMA actuators

- > SVM globe valve actuators
- > SBA linear actuators



Typical applications

- > Lubricating oil cleaning
- > Crude oil cleaning
- > Wastewater treatment

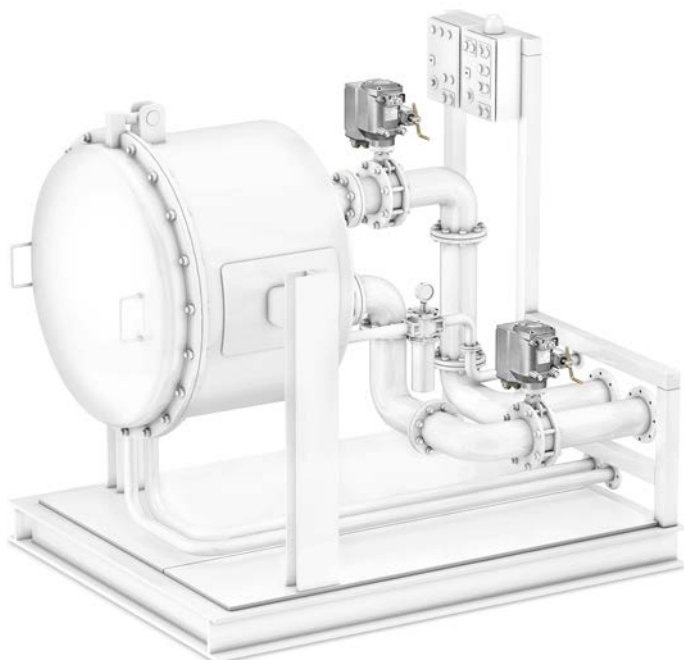
Working method

Polluting agents and water are removed from the lubricating oil by means of a separator. The percentage of oil within the separated water mass is automatically controlled and re-fed to the separator if necessary. Accumulation of sludge within the separator is also monitored and if needed, fully automatic flushing of the separator is performed. For these processes, supply, re-feed and drain have to be precisely coordinated. Ball valves and 3-way valves are used as ideal automation solution.

Suitable AUMA actuators

- > EQ part-turn actuators
- > SGM part-turn actuators
- > SBA linear actuators





Typical applications

- > Desalination/fresh water processing

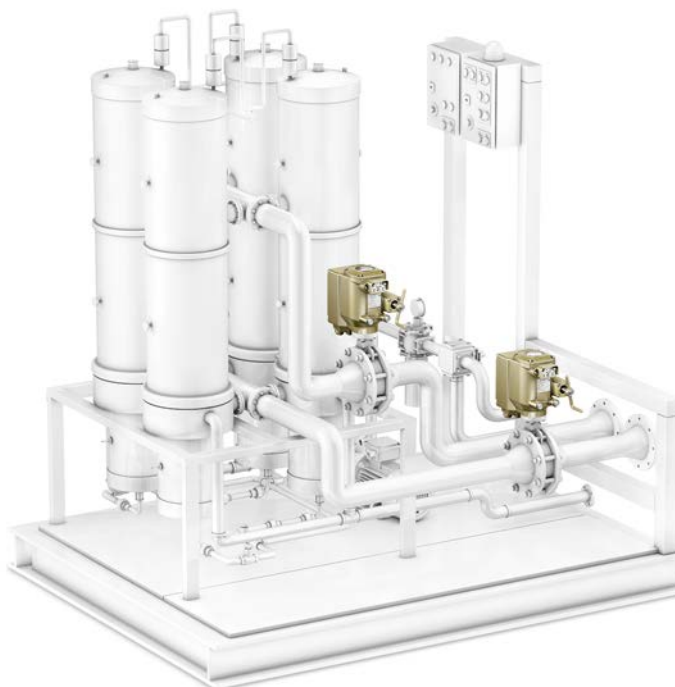
Working method

Cold seawater flows through the condenser installed within the boiler prior to spreading within the boiler. The seawater is vaporised by a heat exchanger which is typically fed by the waste heat of the ship's diesel. This is supported by creating a vacuum within the boiler. The steam, now free of salt, condensates at the condenser as fresh water and is redirected. The natural brine at the bottom of the boiler is fed to the sea. In a next step, the fresh water obtained is checked for its salt concentration and, according to the result, fed to the fresh water tanks or the bilge.

Up to ten shut-off valves equipped with actuators can participate in this process, depending on the desired degree of automation.

Suitable AUMA actuators

- > SGM part-turn actuators
- > EQ part-turn actuators



Typical applications

- > Ballast water processing
- > Wastewater treatment

Working method

Filtering also includes the automatic filter flushing, once a certain degree of contamination is reached. During this process, the pressure difference between filter inlet and outlet is determined. In case a limit value is pre-set, the flushing procedure is automatically started. Actuators position the valves to ensure that the flushing liquid is separated from the medium flow itself. This is particularly important for ballast water processing. Typically, these systems have various cleaning levels. However, all the processes must be strictly coordinated. Hence, valves and actuators play a crucial role.

Suitable AUMA actuators

- > SGM part-turn actuators
- > EQ part-turn actuators





THE AJMA PRODUCT FAMILIES FOR THE MILITARY SHIPBUILDING INDUSTRY

MILITARY RANGE

Extremely compact, variable speed actuators for modulating applications requiring high positioning accuracy and/or for integration into DCS placing higher demands on the functionality of the field devices.

The actuators excel by their high shock resistance and are consequently ideally suited for deployment on military vessels.

The housing can be made of two different materials, either of antimagnetic bronze or of aluminium with less weight.

SGM part-turn actuators

High torques at higher operating speeds. SGM actuators are ideally suited for fast opening and closing. Internal speed control nevertheless protects the mechanics of actuator and valve. Variable speed leads to high positioning accuracy.

- > Five sizes
- > Torque range: 25 Nm – 1,000 Nm
- > Swing angle ranges: 82° – 98°

Applications: control butterfly valves and ball valves, shut-off butterfly and ball valves

Further information is available as of page 22.

SVM globe valve actuators

High operating force paired with precise positioning. SVM actuators are based on the same design as SGM actuators and excel by their identical basic features.

- > Three sizes
- > Torque range: 10 Nm – 100 Nm
- > Stroke ranges: 60 mm or 70 mm

Applications: control valves, shut-off valves

Further information is available as of page 22.





BASIC RANGE

On vessels not provided for military purpose, e.g. supply vessels, AUMA actuators which must not specifically withstand shock impact can be used.

BASIC range actuators excel by their simple control as well as their functions and feedback signals reduced to essential requirements. BASIC range actuators ensure reliable service over many years, following the install and forget philosophy. Operation commands and setpoints are implemented by means of binary or analogue current or voltage signals.

GHE manual gearbox

In spite of high automation levels onboard most vessels, some valves are still require manual operation Just like SGM/SVM actuators, the GHE manual gearboxes rely on patented gearing technology to achieve compact design. The gearboxes can be supplied with or without integral end stops, depending on whether they are used with butterfly valves, ball and plug valves, gate valves or globe valves.

- > Four sizes
- > Torque range: 125 Nm – 1 000 Nm
- > Swing angle range for integral end stops: 82° – 98°

Further information is available as of page 26.

SBA linear actuators

High positioning accuracy - the perfect choice for modulating applications.

- > Six sizes
- > Thrust range: 0.6 kN – 25 kN
- > Stroke range: 35 mm – 100 mm

Applications: control valves, shut-off valves

For further information, refer to page 30.

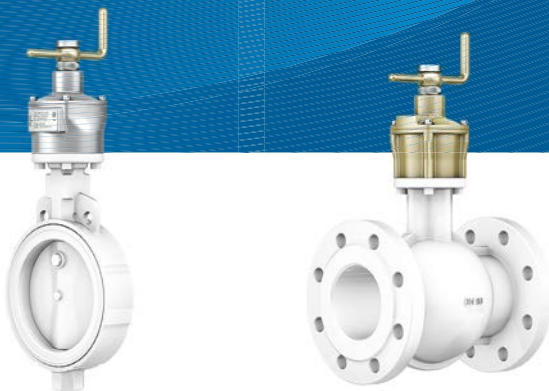
ED/EQ part-turn actuators

Simple and reliable part-turn actuators for open-close and modulating duty.

- > Eight sizes
- > Torque range: 25 Nm – 600 Nm
- > Swing angle range: 90° – 180°

Applications: control butterfly valves and ball valves, shut-off butterfly and ball valves

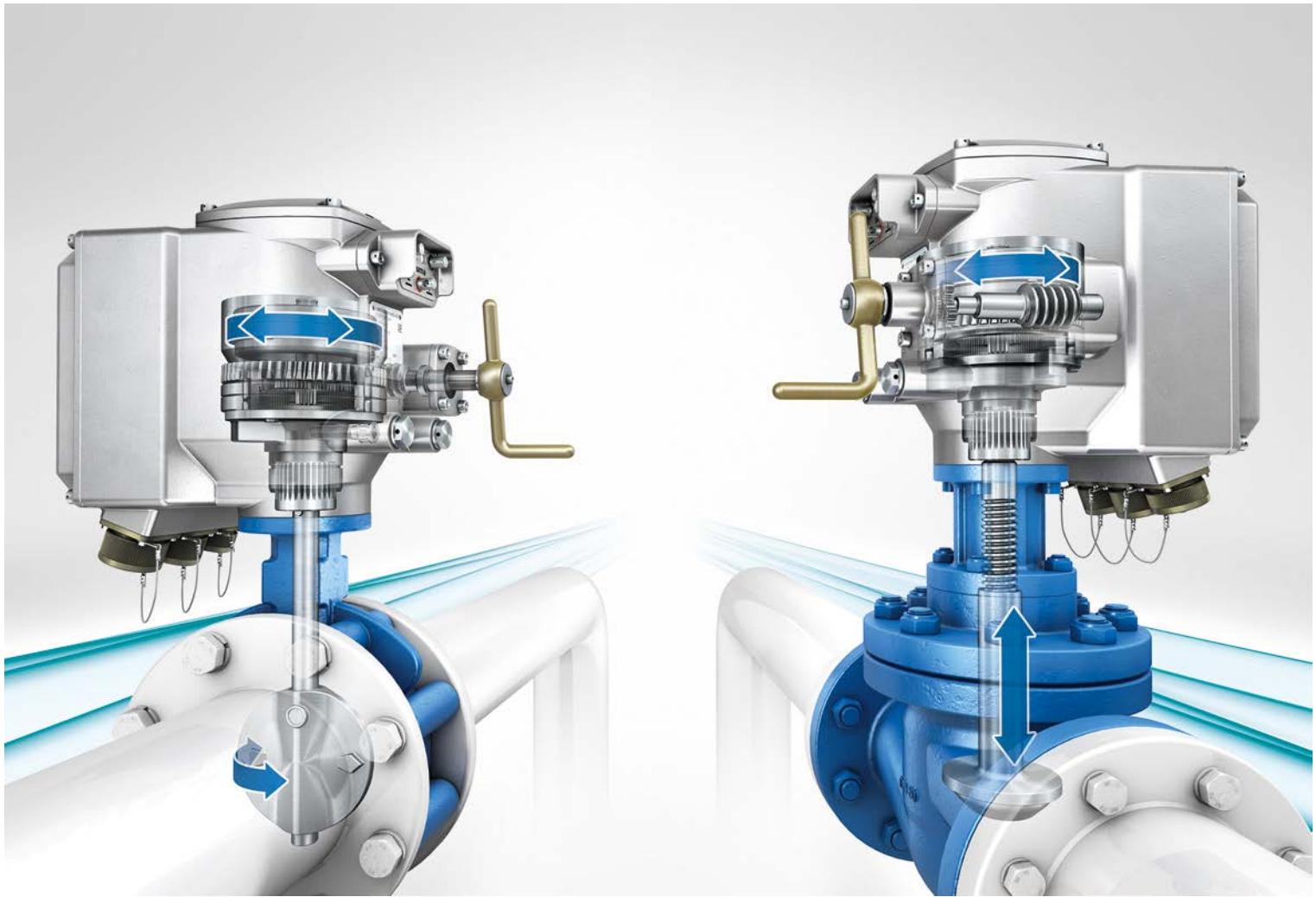
For further information, refer to page 34.



MILITARY RANGE

A matter of importance!

- > Extremely compact design
- > Shock load up to 400 g
- > Certified by WTD and MIL
- > Variable speed actuators
- > Gentle approaching of end positions
- > Speed profiles to prevent cavitation and pressure surges
- > Low running noise
- > Local controls
- > Optional integration into fieldbus systems



MILITARY RANGE - SGM PART-TURN/SVM GLOBE VALVE ACTUATORS



Shock resistance is a special military feature of these actuators. Depending on the application, requirements might differ according to the application or type of vessel. Therefore, the actuators are available in five shock grades including the WTD classification according to BV 0430[2] for submarines (400 g) or further certification according to MIL-S-901D (NAVY).

Deployment of these actuators on military vessels is particularly favoured by their extremely compact design, the superior enclosure protection IP68 and their unique corrosion protection. Low-noise service is a particular benefit for the comfort of the crew while increasing the vessel's stealth.

SGM and SVM are variable speed actuators for modulating applications and/or for integration into distributed control systems, placing higher demands on the functionality of the field devices.

The internal speed control does not exclusively cater for precise positioning during modulating duty. This control feature ensures soft starts and stops acting gently on all mechanical components. Operation profiles with variable speed help to avoid critical states within the valve such as pressure surges or cavitation.

Aluminium or bronze

Depending on the size, actuators with aluminium housings weigh up to 40 % less than an identical actuators with bronze housings.

Bronze is antimagnetic which is crucial when locating the vessel should be avoided. It is non-combustible and has a higher melting point than aluminium. Furthermore, actuators with bronze housings are seawater-resistant and do not require additional coating.

APPLICATION CONDITIONS FOR SGM/SGMR AND SVM/SVMR ACTUATORS

Corrosion protection

- > With aluminium housing:
 - C5-M according to EN ISO 12944-2
 - Coating is based on a chemical preliminary treatment, followed by a two-layer powder coating.
- > With bronze housing:
 - Sea water resistant

Ambient temperatures

–25 °C to +70 °C

Enclosure protection

IP68: Submersible up to 8 m head of water up to 96 hours at 10 operations during immersion.

Proof for shock resistance

- > Without
- > Up to 70 g
- > WTD: in accordance with BV 0430[2] for surface vessels (180 g)
- > WTD: in accordance with BV 0430[2] for submarines (400 g)
- > MIL-S-901D (NAVY).

EMC proof

- > MIL-STD-461E

SGM/SGMR PART-TURN ACTUATORS

Type	Operating time for 90° – adjustable in 9 steps	Setting range for tripping torque	Maximum run torque of SGM (open-close duty) Maximum modulating torque SGMR (modulating duty)	Number of starts Max.	Output mounting flange	Adjustable swing angle range
	[s]	[Nm]	[Nm]	[1/h]	EN ISO 5211	
SGM/SGMR 04.1	4 – 63	25 – 63	32	1,800	F05/F07	82° – 98°
SGM/SGMR 05.1	4 – 63	50 – 125	63	1,800	F05/F07	82° – 98°
SGM/SGMR 07.1	4 – 63	100 – 250	125	1,800	F07	82° – 98°
SGM/SGMR 10.1	5.6 – 90	200 – 500	250	1,800	F10	82° – 98°
SGM/SGMR 12.1	20 – 275	400 – 1,000	500	1,800	F12	75° – 105°

SVM/SVMR GLOBE VALVE ACTUATORS

Type	Speed – adjustable in 9 steps	Setting range for tripping torque	Maximum run torque of SVM (open-close duty) Maximum modulating torque SVMR (modulating duty)	Number of starts Max.	Output mounting flange	Turns per stroke	Max. stem stroke for rising stem
	[rpm]	[Nm]	[Nm]	[1/h]	EN ISO 5211	in segments	[mm]
SVM/SVMR 05.1	1.6 – 22	10 – 25	13	1,800	F05/F07	1 – 40	60
SVM/SVMR 07.1	1.6 – 22	20 – 50	25	1,800	F07	1 – 40	70
SVM/SVMR 07.5	0.6 – 8.0	40 – 100	50	1,800	F07	1 – 40	70

POWER SUPPLY

The actuators are operated with 1-phase AC current.

Voltage	Frequency
[V]	[Hz]
115	50/60
230	50/60

The operating times above apply to both 50 Hz and 60 Hz.

INTERFACES TO THE DISTRIBUTED CONTROL SYSTEM (DCS)

Parallel interface

- > Four digital inputs
- > One analogue input 0/4 – 20 mA for setpoint definition
- > Four output contacts
- > One analogue output 0 – 20 mA or 4 – 20 mA for position feedback

Fieldbus interfaces

- > Profibus DP-V0
- > Profibus DP-V0/V1
- > Modbus RTU (line topology)
- > Modbus RTU loop redundancy (loop topology)

The SGM part-turn actuator is shown with bronze housing. The SVM globe valve actuator is presented with powder coated aluminium housing. All components are within the compact housing. The small size is particularly beneficial to increasing the shock resistance.

1 Integral controls

Contain switchgear units, power supply unit, interface to the DCS and are designed to process commands from the DCS and supply feedback signals. Controls automatically switch the actuator off once either the valve end position or the specified tripping torque has been reached.

Connection to the control system is either made via parallel interface or fieldbus. Profibus DP and Modbus RTU are available as fieldbus interfaces.

2 Local controls

The actuator can be operated locally via push buttons. One of the push buttons is used to select the control mode, i.e. the operator selects whether the actuator is operated via local controls or via DCS. A padlock protects the device against unauthorised operation.

The wall bracket allows separate mounting of local controls in case access to the actuator is difficult. The connection is then made via cable.

3 Position indication

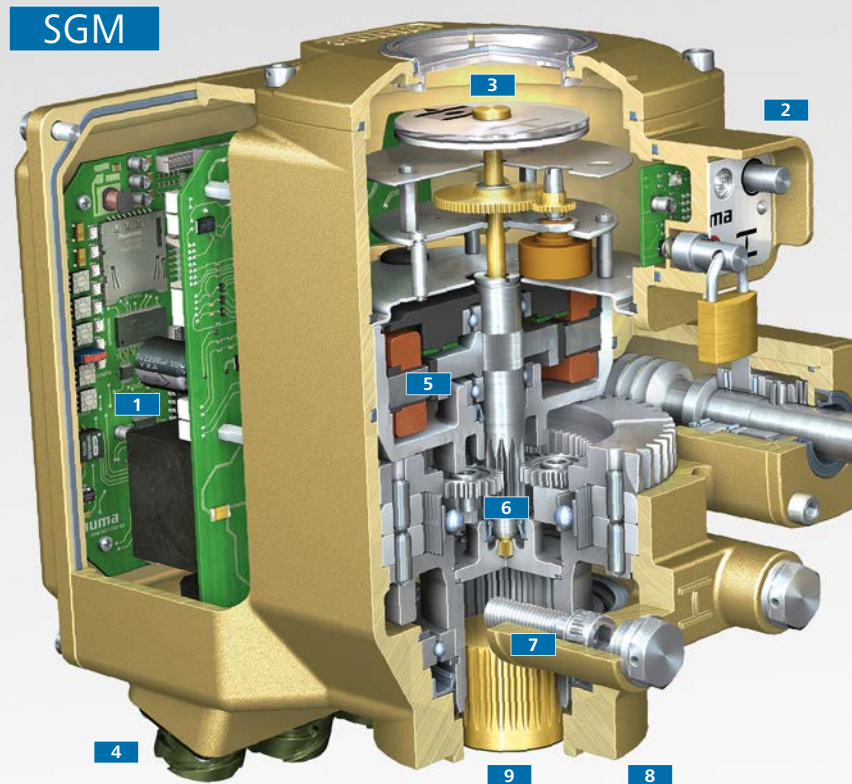
Local indication of current valve position.

4 Electrical connection

For electrical connection of power supply and control cables. A compact plug/socket connector with crimp connection in basic version. Different systems are available, e.g. By Phoenix Contact or Cannon.

5 Motor

The electronically settable variable speed motor requires approximately one-third of the height of an equivalent conventional motor, thus contributing to the compact design of the actuator.





6 Gearing

Patented ellipto-centric gearing with premium efficiency. One stage 80:1 reduction gearing within a minimal space envelope.

7 End stops (for SGM only)

During manual operation of part-turn valves without internal end stops such as butterfly valves and ball valves, these integrated end stops enable precise approaching of end positions.

8 Valve attachment

The valve attachment for mounting on the valve is designed according to EN ISO 5211.

9 Coupling

For torque transmission to the valve shaft. During assembly, the coupling is simply pushed onto the valve shaft and secured against axial movement. In the next step, the actuator or the gearing is placed onto the coupling and screwed to the valve flange. Upon request, the coupling is supplied with a suitable bore in accordance with the valve drive coupling.

SVM actuators are particularly suited for automating valves with non-rising valve stems.

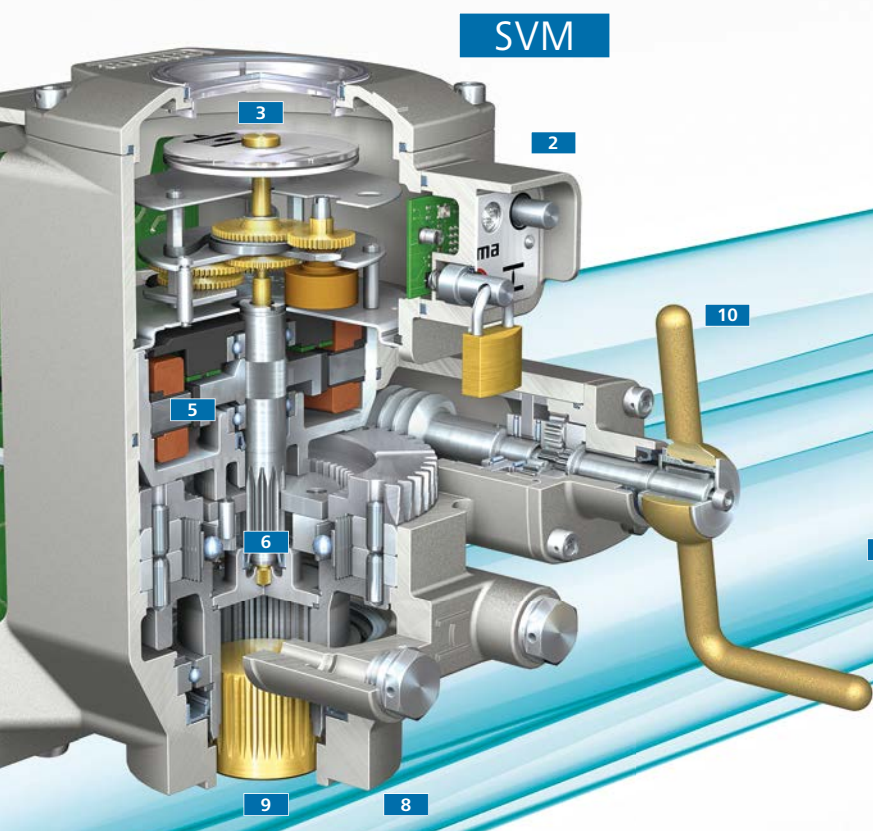
10 Manual operation

In case of power failure, various operation elements are available for emergency operation in compliance with BG 85089. In basic version, this is the crank handle with cylindrical grip. The crank does not rotate during motor operation. Further operation elements

10a Crank handle with conical grip

10b Five-edge ring

10c Five-ripple ring



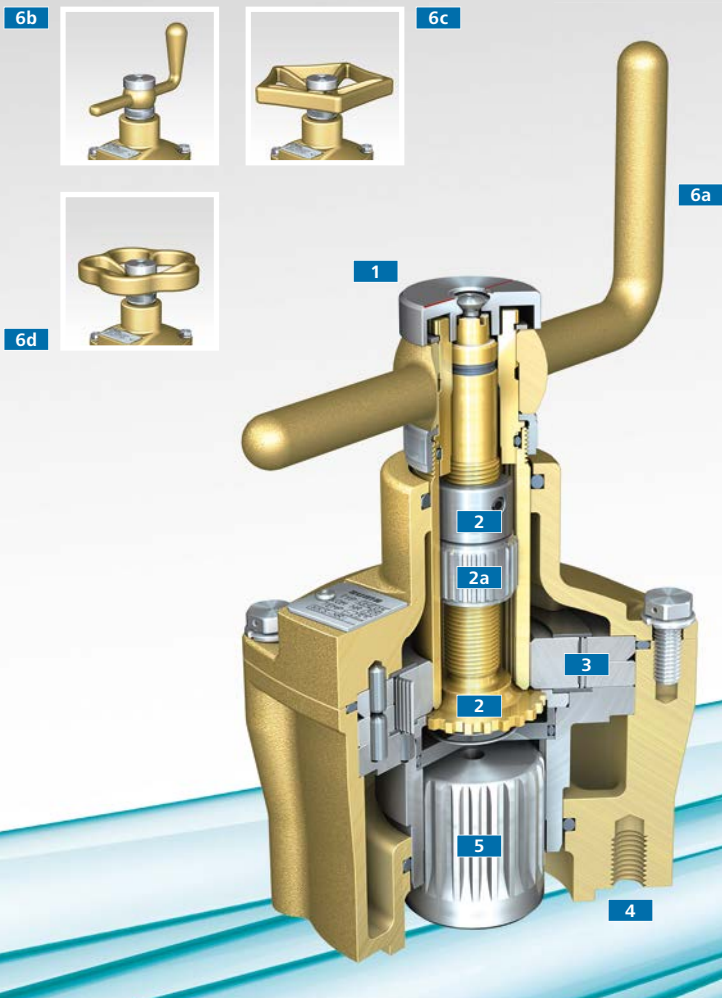


MILITARY RANGE - GHE MANUAL GEARING

Highly automated vessels will always be equipped with manually operable valves. These are valves, which are only operated in situations where operators are required on site. These situations include refuelling or closing valves for maintenance intervention. However, the environmental application conditions for the valve gearboxes are just as demanding as for actuators.

The GHE gearbox range perfectly complements the SGM/SVM actuators. AUMA's strength is the ability to offer automation solutions for all valves on the vessel.

Like the actuators, the matching gearboxes are available with two housing materials, spheroidal cast iron and bronze.



1 Position indication

Local indication of current valve position for part-turn valves. Line in parallel to the pipe means open, lateral position means closed.

2 End stops

Allow precise positioning in the end position for part-turn valves. The travelling nut **2a** travels between the two end stops. With this design, the lower input torques have an impact on the stops and not the high output torques. Consequently, the housing is not subject to load. The gearboxes are available without end stops.

3 Gearing,

4 Valve attachment,

5 Coupling

Refer to SGM/SVM, page 24

6 Operation elements

Like for SGM/SVM

6a Crank handle with cylindrical grip

6b Crank handle with conical grip

6c Five-edge ring

6d Five-ripple ring



APPLICATION SOLUTIONS FOR GHE _____ TECHNICAL DATA _____

Corrosion protection

- > With spheroidal cast iron housing: KN, suitable for installation in atmospheres with a low pollutant concentration
- > With bronze housing: Sea water resistant

Ambient temperatures

-25 °C to +80 °C

Enclosure protection

- > IP67 (standard)
- > IP68 (option)
Submersible up to 8 m head of water up to 96 hours at 10 operations during immersion.

Type	Max. valve torque [Nm]	Valve attachment flange according to EN ISO 5211		Total reduction ratio	Factor ¹ approx.	Input torque at max. output torque [Nm]	Swing angle range (set in the factory)
		Spheroidal cast iron housing	Bronze housing				
GHE 05.1	125	F07; F10	F07	80:1	25	5	82° – 98°
GHE 07.1	250	F07; F10	F07	80:1	25	10	82° – 98°
GHE 10.1	500	F10; F12	F10	80:1	25	20	82° – 98°
GHE 12.1	1 000	F12; F14	F12	80:1	25	40	82° – 98°

¹ Conversion factor from output torque to input torque

BASIC RANGE

For ships not on military mission

When dealing with supply or research vessels for which shock resistance is not the prime device characteristic, BASIC range actuators are the perfect solution.

- > DNV GL approvals
- > Swift and precise positioning
- > Limit seating
- > Thrust/torque monitoring
- > Simple functionality
- > Optional simple fieldbus interface



BASIC RANGE - SBA LINEAR ACTUATORS



Simple opening and closing of valves. Simple precise positioning. Simple DCS integration. Simply reliable and dependable.

SBA is the perfect actuator choice when requiring simple and straightforward automation. The proven mechanics paired with prime basic functions is the SBA principle.

Each SBA size is available in stall-proof version for continuous operation. Combined with high positioning accuracy, SBA actuators are often deployed in heating and cooling systems for demanding temperature control.

The actuators are specifically designed for harsh offshore conditions. The high enclosure protection and the excellent corrosion protection are crucial assets.

Besides the limit seating feature in end positions, thrust is additionally monitored. If the actuator is demanded to exceed the preset thrust threshold, because an object is jammed in the valve, for example, the actuator automatically switches off, thus protecting both itself and the valve.

SERVICE CONDITIONS

Corrosion protection

- > Standard: C2 according to EN ISO 12944-2
- > Option: C3/C4 according to EN ISO 12944-2

Ambient temperatures

- > Standard: -20 °C to +60 °C
- > Option: -40 °C to +60 °C

Enclosure protection

- > IP43 (SBA 06-1/-2/-3)
- > IP54 (SBA 06-4)
- > IP65 (SBA 12 – SBA 200)

TECHNICAL DATA

Type	Operating speed at 50 Hz	Thrust	Stroke	Type of duty	Number of starts max.	Valve attachment
	[mm/min]	[kN]	Max. [mm]	Type of duty	[1/h]	EN ISO 5210 DIN 3210
SBA 06-1	8	0.6	35	S1 - 100 %	1 200	F05
	10					
SBA 06-2	13.2	0.9				
	16					
SBA 06-3	20	1.2				
SBA 06-4	8	2.0				
	10					
	13.2					
SBA 12	25	1.2	75	S1 - 100 %	1 200	F05
SBA 20	15	2.0	75	S1 - 100 %	1 200	F05
SBA 45-2	25	3.5	75	S1 - 100 %	1 200	F05
	50					
SBA 45-3	25	4.5				
	50					
SBA 45-4	17	6.0				
	34					
SBA 80-1	13.5	6.0	80	S1 - 100 %	1 200	G0
SBA 80-2	25	8.0				
SBA 80-3	50	12		S3 - 50 %	600	
SBA 80-4	13.5	15		S1 - 100 %	1 200	
	22					
	40		S3 - 50 %	600		
SBA 200-1	15	15	100	S1 - 100 %	1 200	G0
SBA 200-2	25	20				
	50			S3 - 50 %	600	
SBA 200-3	25	25				

POWER SUPPLY

Type of current	Voltage/frequency
3-phase AC	50 Hz: 380 V; 400 V 60 Hz: 400 V; 440 V
1-phase AC	50 Hz: 230 V; 24 V; 115 V; 60 Hz: 220 V; 24 V; 110 V
DC current	24 V

INTERFACE TO THE DCS

Basic version

Two end position switches to cut-off the actuator upon reaching the end position

Options

- > Two additional limit switches for end position signalling
- > Two digital inputs for operation commands Run OPEN and Run CLOSE in combination with reversing contactors.
- > Positioner for analogue current or voltage signal
- > Position feedback as current or voltage signal
- > Integrated Profibus DP-V0 interface

1 Hood

Made of steel in standard version. Available in aluminium as an option. The hood is removed by unfastening the centre screw for subsequent connection of the actuator to the power supply and to perform end position setting.

2 End position switches

As standard, load-dependent end position switches **2a** are integrated allowing actuator cut-off when reaching the end position.

Alternatively, cut-off can be performed via optional limit switches, **2b** operated via cams. Thanks to these switches, precise setting of switching points across the complete stroke range is possible. Up to four additional limit switches can be integrated.

Integral reversing contactors (option)

Refer to EQ part-turn actuators on page 32. As standard, the end position switch signals are connected to external controls where the motor is cut-off via external reversing contactors when reaching the end position. Available as an option, the reversing contactors can be integrated into the actuator. The cut-off is then performed by the actuator.

3 Position feedback signal (option)

Either via a potentiometer or in case of larger distances as 0/4 – 20 mA signal, generated by an electronic position transmitter in 2-wire, 3-wire or 4-wire technology.

4 Positioner (option)

Positions the actuator in compliance with an external setpoint signal. The setpoint is selected as 0 – 10 V or 0/4 – 20 mA signal. In combination with a positioner, position feedback is possible using the same signals.

5 Heater (option)

To reduce condensation within the device.

6 Electrical connection

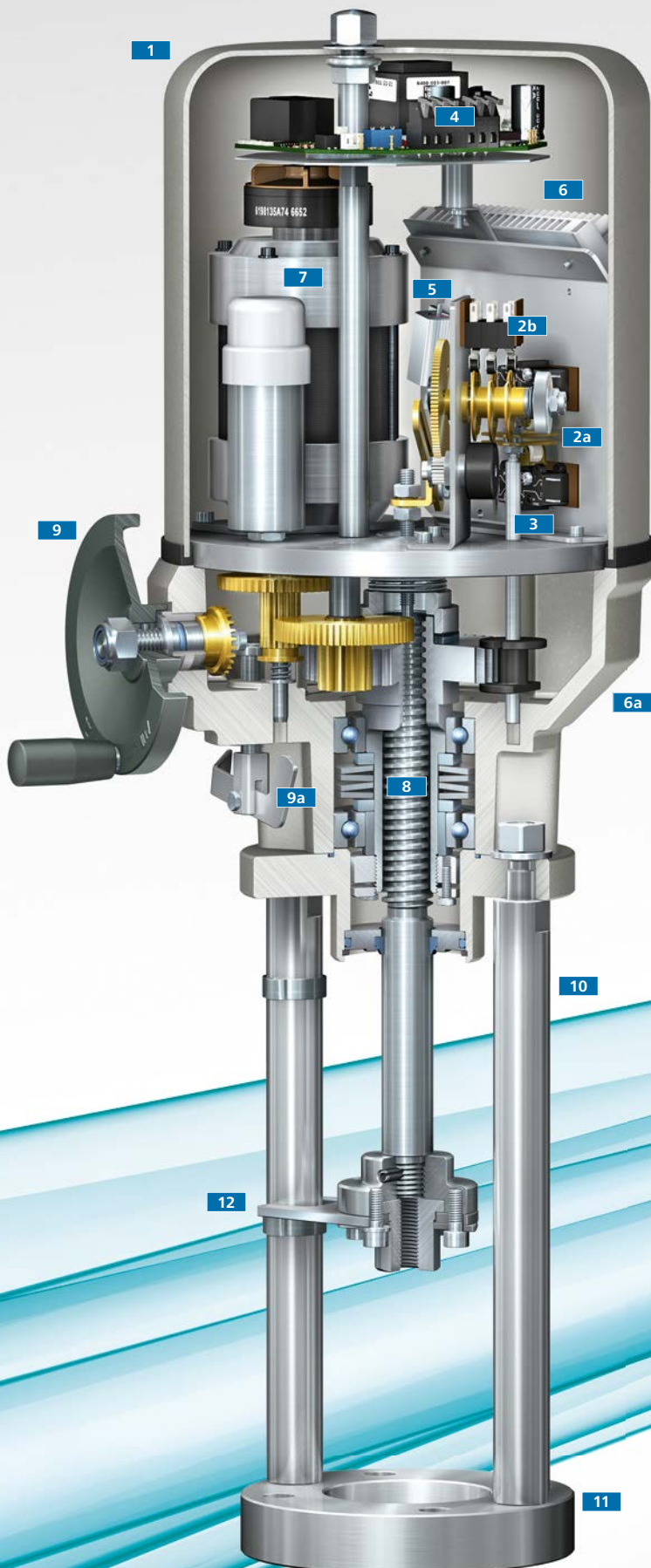
For electrical connection of power supply and control cables. Connection is made using standard terminal blocks. Cable entries **6a** are located in the lower part of the housing. Cable glands are not part of the AUMA delivery and must be selected in compliance with the desired enclosure protection.

7 Motor

Depending on the version selected, the robust motors are synchronous or asynchronous with fixed speeds. Thermostats are integrated to protect against excessive temperatures allowing actuator cut-off on demand. As an option, many sizes are available with stall-proof motor.

8 Stem drive

Several gear stages transmit the motor or handwheel rotary movement to a hollow shaft equipped with an internal stem. The counterpart is a thrust rod equipped with an external stem. This creates the linear movement. The ball bearing of the hollow shaft considerably contributes to the superior efficiency. The pre-tensioned axial spring system eliminates gear backlash and consequently allows for high actuator positioning accuracy.



9 Handwheel

For emergency actuator operation in the event of power failure. Motor is disengaged and handwheel operation engaged when operating the change-over lever **9a**.

10 Pillar yoke (option)

Available in different lengths and pillar distances.

11 Valve attachment

The valve attachment for mounting on the valve is designed according to EN ISO 5210.

12 Position indicator (option)

The optional distortion lock of the thrust rod acts simultaneously as position indicator.

Local controls (option)

Refer to EQ part-turn actuators on page 32. The desired control mode is defined via MANUAL/AUTO selection. If MANUAL is selected, the actuator can be operated locally via buttons OPEN and CLOSE.



BASIC RANGE - ED/EQ PART-TURN ACTUATORS



The perfect solution to operate shut-off butterfly and ball valves or venting and flue gas dampers. Superior positioning accuracy makes the ED/EQ series the perfect choice for automating control butterfly and ball valves.

Like all AUMA actuators, ED/EQ actuators excel by their sophisticated design and use of premium materials. This guarantees reliable operation over many years requiring minimum maintenance.

The actuators get down to essentials in terms of functionality. When the prime focus is on basic functions like precise opening, closing or controlling butterfly and ball valves, ED/EQ actuators are your perfect choice.

The self-retaining feature within the actuators ensures that the valve position is maintained even without power, also in case of force impact at the closing element. This often occurs with butterfly valves in intermediate positions caused by the media flow.

SERVICE CONDITIONS

Corrosion protection

- > Standard: C2 according to EN ISO 12944-2
- > Option: C3/C4 according to EN ISO 12944-2

Enclosure protection

- > Standard: IP67
- > Option: IP68

Ambient temperatures

- > Standard: -20 °C to +70 °C
- > Option: -40 °C to +70 °C

TECHNICAL DATA

Consider the limits of type of duty S3 - 15 min (class A) in open-close duty. S3 - 50 % applies to modulating duty paired with a maximum number of starts of 1,200 per hour

Type	Operating time for 90° at 50 Hz	Open-close duty	Modulating duty	Valve attachment
	[s]			
ED 25	15	25	25	F03; F04; F05; F07
	30			
	70			
ED 50	15	50	50	F03; F04; F05; F07
	30			
	70			
EQ 40	15	40	20	F04; F05; F07; F10
	30			
	60			
EQ 60	20	60	40	F05; F07; F10
	30			
	60			
EQ 100	20	100	60	F05; F07; F10
	30			
	60			
EQ 150	20	150	80	F05; F07; F10
	30			
	60			
EQ 300	40	300	180	F07; F10; F12
	80			
	160			
EQ 600	80	600	300	F07; F10; F12
	160			

POWER SUPPLY

Type of current	Voltage/frequency
3-phase AC	50 Hz: 380 V; 400 V 60 Hz: 400 V; 440 V
1-phase AC	50 Hz: 230 V; 24 V; 115 V 60 Hz: 220 V; 24 V; 110 V
DC current	24 V

INTERFACE TO THE DCS

Basic version

- > Two end position switches to cut-off the actuator upon reaching the end position
- > One torque switch each per direction to switch off the actuator when reaching the tripping torque

Options

- > Two additional limit switches for end position signalling
- > Two additional torque switches
- > Two digital inputs for operation commands Run OPEN and Run CLOSE in combination with reversing contactors.
- > Positioner for analogue current or voltage signal
- > Position feedback as current or voltage signal
- > Integrated Profibus DP-VO interface
- > Emergency operation module for performing a predefined emergency operation

1 Hood

Made of polycarbonate in standard version. Available in aluminium as an option. The hood is removed by unfastening the four screws for connection of the actuator to the power supply and to perform end position setting.

2 End position switches

Both end position switches are operated via cams. They are set at the time of commissioning. An additional end switch per end position can be integrated as an option.

3 Integral reversing contactors (option)

As standard, the end position switch signals are connected to external controls where the motor is cut-off via external reversing contactors when reaching the end position. Available as an option, the reversing contactors can be integrated into the actuator. The cut-off is then performed by the actuator.

4 Position feedback signal (option)

Either via a potentiometer or in case of larger distances via 0/4 – 20 mA signal, generated by the electronic position transmitter.

Positioner (option)

Refer to SBA linear actuators on page 32. Positions the actuator in compliance with an external setpoint signal. The setpoint is selected as 0 – 10 V or 0/4 – 20 mA signal. In combination with a positioner, position feedback is performed using the same signal types.

5 End stops

For part-turn valves, they limit the travel and allow precise approaching of end positions during manual operation. At the time of commissioning, end stops are set to the desired position.

Heater (option)

Refer to SBA linear actuators on page 32. To reduce condensation within the device.

6 Electrical connection

For electrical connection of power supply and control cables. Connection is made using standard terminal blocks. Cable glands are not part of the AUMA delivery and must be selected in compliance with the desired enclosure protection **6a**.

7 Motor

Robust synchronous motor with fixed output speed. Thermostats are integrated to protect against excessive temperatures allowing actuator cut-off on demand. As an option, many sizes are available with stall-proof motor.

8 Gearing

Planetary gearing for reducing the high speed into the required output speed.

9 Valve attachment

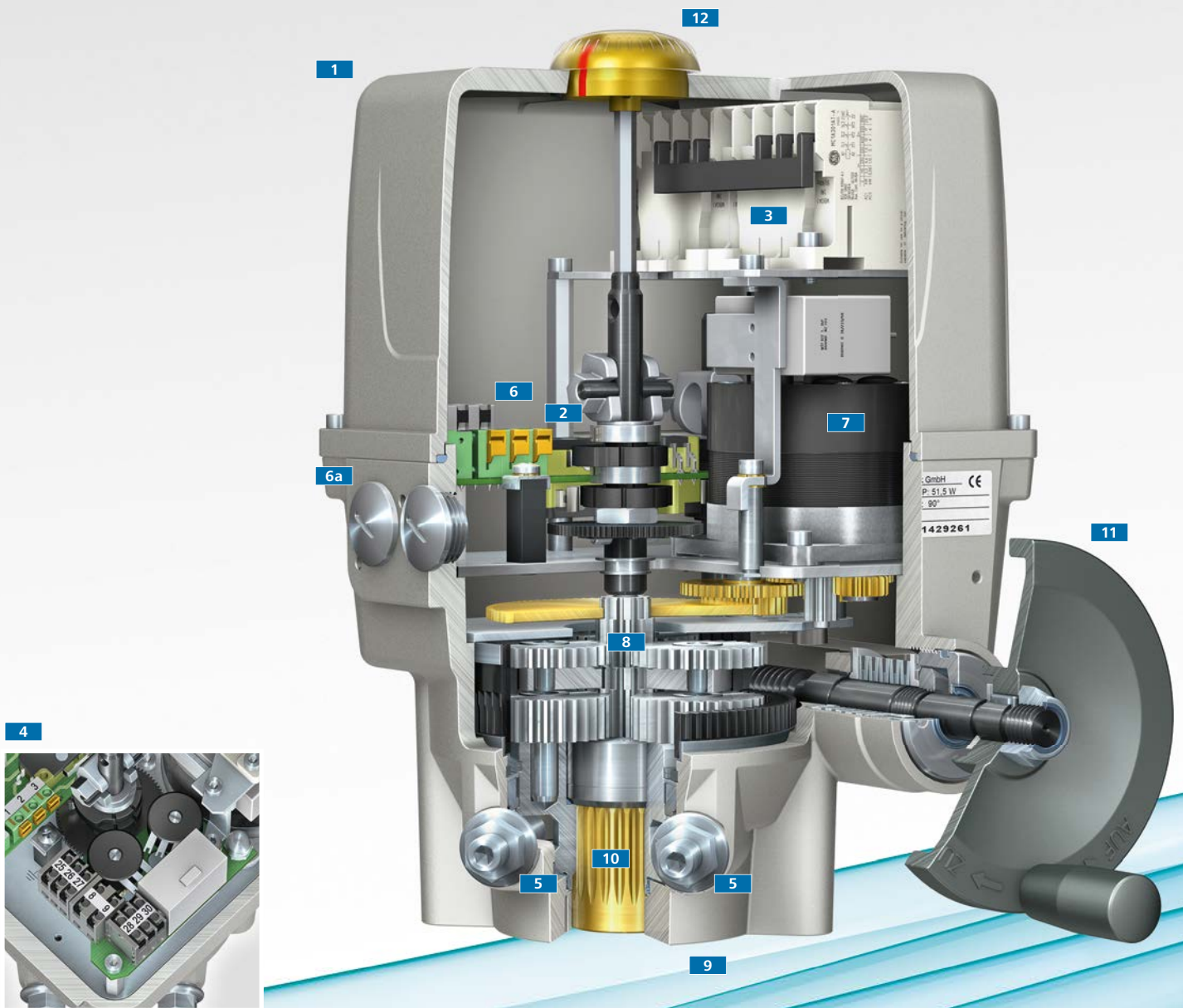
The valve attachment for mounting on the valve is designed according to EN ISO 5211.

10 Coupling

For torque transmission to the valve shaft. During assembly, the coupling is simply pushed onto the valve shaft and secured against axial movement. In the next step, the actuator is placed onto the coupling and screwed to the valve flange. Upon request, the coupling is supplied with a suitable bore in accordance with the valve drive coupling.

13





11 Handwheel

For emergency actuator operation in the event of power failure. The handwheel does not rotate during motor operation.

Single-handed handwheel operation is possible.

12 Position indication

Local indication of current valve position.

13 Local controls (option)

The desired control mode is defined via MANUAL/AUTO selection. If MANUAL is selected, the actuator can be operated locally via buttons OPEN and CLOSE.

SERVICE

Military vessels must imperatively fulfil their mission - even more important in active service. Sophisticated design and careful device manufacture are an absolute must – and a worldwide service network ensuring availability of our AUMA actuators throughout their entire product life.

Advice and service throughout the entire product life

We at AUMA strive for long-term customer satisfaction and partnership by warranting the safe and smooth operation of our actuators. We attach great importance to customised advice and comprehensive service – throughout our products' lifetime.

SERVICES

EXPERTISE IN YOUR NEIGHBOURHOOD

We do not go for call centres with endless waiting loops or online device configuration systems with direct order placement. As soon as the automation requirements become more complex - and actuators are part of systems with different levels of complexity - the direct support and advice provided by our service staff cannot be replaced by automatic ordering systems. This is how we ensure that our customers select the most suitable actuator solution.

AUMA's global service network with subsidiaries and representatives, established in 70 countries, is even subdivided in sections of competence at country level. The AUMA sales staff are informed about the latest developments by regular sales training.

Your special advantage: Competent support for AUMA products is available worldwide, helping you in selecting the suitable device - in your neighbourhood.

COMPREHENSIVE SERVICE

Whatever applies to customer support also applies to customer service. Our sales network is also a service network. We always care for you and our products.

Our service engineers know the AUMA devices by heart and their technical expertise in the field of device deployment is common knowledge. The best practice database is available for the AUMA service network, beneficial for both, the service staff and the customers.

Our AUMA service offers our customers all around the globe comprehensive service performance for actuators, actuator controls, and gearboxes. With our versatile service portfolio, we are your competent partner from installation and commissioning to training, maintenance, and overhaul or repair right through to global availability and supply of spare parts.

We guarantee availability for spare parts for at least 10 years after discontinuation of a product.



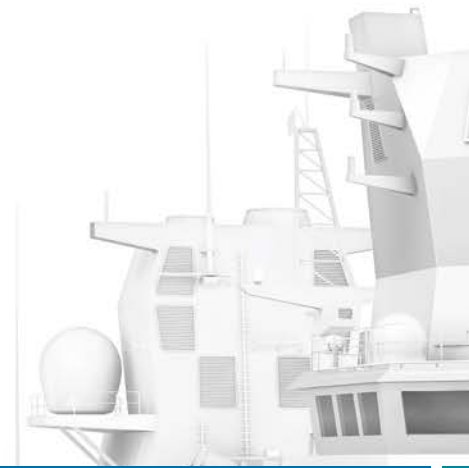


THE RIGHT TIME - THE RIGHT PLACE

Waiting times are very costly. Consequently, service deployment must be planned in detail. Once a ship enters the harbour, the AUMA service technician readily waits, equipped with the required approvals, the needed spare parts and tools for the upcoming intervention.

TAILORED MAINTENANCE

Preventive maintenance maximises availability. In compliance with the specified application conditions, we develop individual and tailored actuator maintenance plans for any vessel.



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