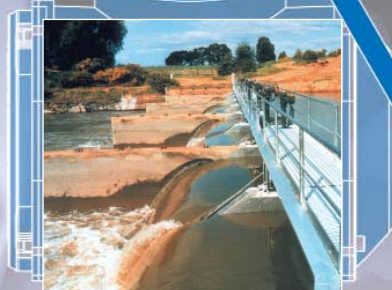
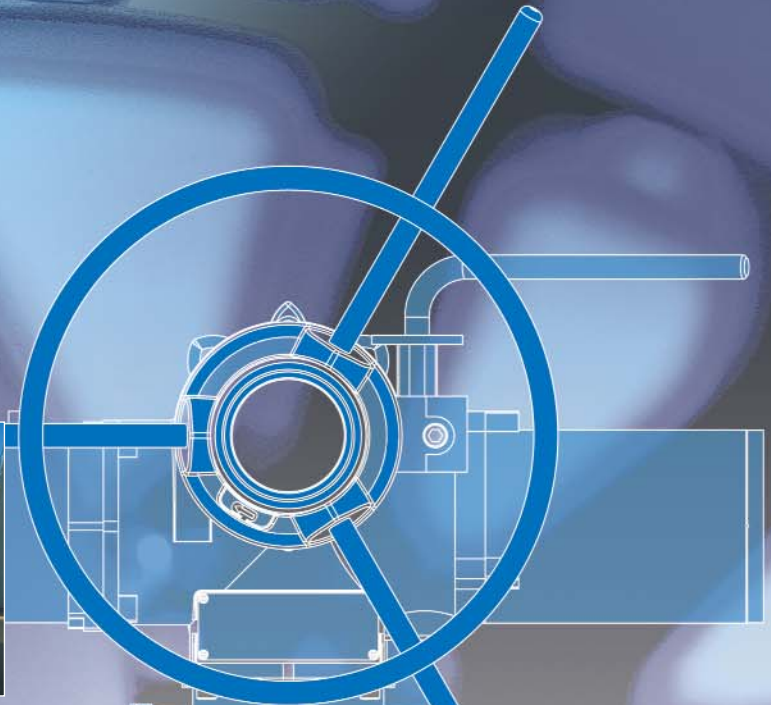


# rotork

Established leaders in Actuation Technology

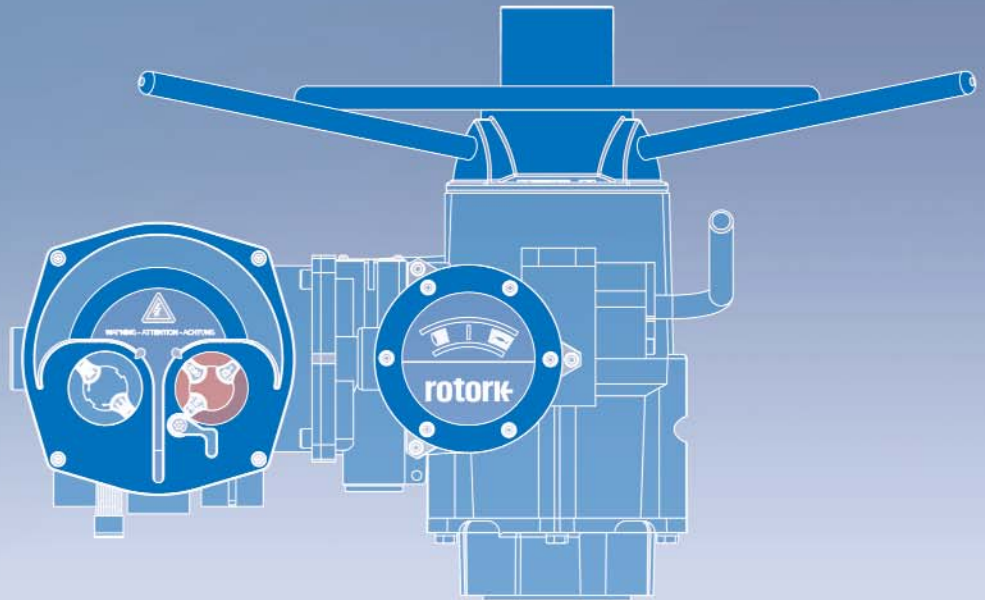


## AWT Range

watertight 3-phase electric valve actuator



# defining your exact requirements



## whatever you need wherever you are

In the 45 years since it was founded Rotork has become the name for excellence in the field of valve, sluice gate and damper actuation products for every industry - worldwide.

Rotork has the experience, know-how and product range to deliver virtually any actuation solution - from compact, manually operated gearboxes, to large, highly specified actuators for use in extreme temperature and hazardous environments.

## the knowledge to help

Rotork has been at the forefront of actuation technology since the company was formed in 1957 and enjoys an unrivalled reputation for its commitment to the development of leading-edge techniques and processes. Rotork products are designed and manufactured to the highest possible standards of engineering - a principle which drives all areas of our business. So whether you require electric, fluid power, specialist gear or valve adaption products services Rotork has the experience to help you.



## everything you need to succeed

Our involvement can go further than just providing the actuator. We can also supply the gearbox, valve adaption kits and control systems to complement it.

Well equipped, Rotork-trained engineers, technicians and representatives work out of 76 offices worldwide and offer both on-site and factory service. Specialist teams offer predictive maintenance and retrofit valve motorisation backed by a quick responsive service. Our aim is to provide our customers with service excellence.



### Contents

Application	4
Reliability Through Sealing	4
Reliability Through Control	5
Reliability Through Design	6-7
Mechanical Specification and Certification	8
Electrical Specification and Certification	9
Performance Summary	10
Actuator Drive Couplings	11



### AWT Range the centre of control

Electric actuators provide the means of applying centralised control to valves, sluice gates and dampers.

As part of the process routine or in an emergency, where there is risk to life, the environment or damage to plant, operational reliability of the valve is essential.

The actuator is the meeting point of the three elements of process control – valve, electrical power and control instrumentation. Each element has unique engineering requirements, brought together with design excellence at the interface – the AWT actuator.

### AWT Range fit and forget

Through design, development and production, actuators are tested to the limit. Design life testing, environmental, vibration as well as electrical testing are all carried out. Every unit is production proven on test rigs to check torque, electrical and mechanical operation and customer control and indication interface.

Rotork's 45 years experience in valve actuation experience has been brought to bear on simplifying the procurement, engineering and installation effort, providing fit and forget actuator solutions.

**AWT - Reliability through simplicity**

At the hub of process control, Rotork understand that the actuator is fundamental to process reliability. Our recognised design excellence in actuation has led to the AWT - a reliable, rugged yet simple design.

**The basics**

Actuator torque and thrust plus operating time must be defined and guaranteed for life. Position limit and torque settings must be fixed and repeatable. Valve torque sealing and protection has to be reliable if the valve is to do its job and isolate every closure.

Actuators located in extreme environments such as hot and cold ambient temperatures, high humidity, spray, flooding, chemical attack or vibration must be protected and go on performing year after year.

Electrical and instrumentation control gear must be designed to cope with regular *and* infrequent operation typical for valve duties, plus be suitable for upgrade should control or indication philosophies change.

Actuator maintenance tasks should be minimised and even eliminated, freeing site engineers to look after other site equipment.

**Standardisation - engineering simplicity**

In bringing together the valve, power and control system it is important that the actuator minimises plant design engineering, reducing time, installation costs and simplifying commissioning. AWT features include:

- standard mounting interface for valve connection
- standard motor control schemes for electrical power
- standard electrical control circuit irrespective of valve type
- standard instrumentation interface
- standard commissioning procedure for all valve types

**Protection - the key**

Vast experience in the application of electric actuators has enabled Rotork to lead the world in actuator environmental protection. Situated in environments ranging from desert to tundra, marine and underground, where flooding, humidity and corrosive atmospheres are normal, actuators have to perform unfailingly. Rotork understand that the most important factor affecting the reliability of an actuator is protection from the environment – in simple terms, the integrity of its enclosure.

Ineffective cover or cable gland sealing allows breathing – a process where moisture is drawn into the enclosure forming condensation, the result of air exchanges caused by the expansion and contraction of air within the enclosure. Actuator failure will result – sooner rather than later.

**AWT – watertight, non breathing, double sealed**

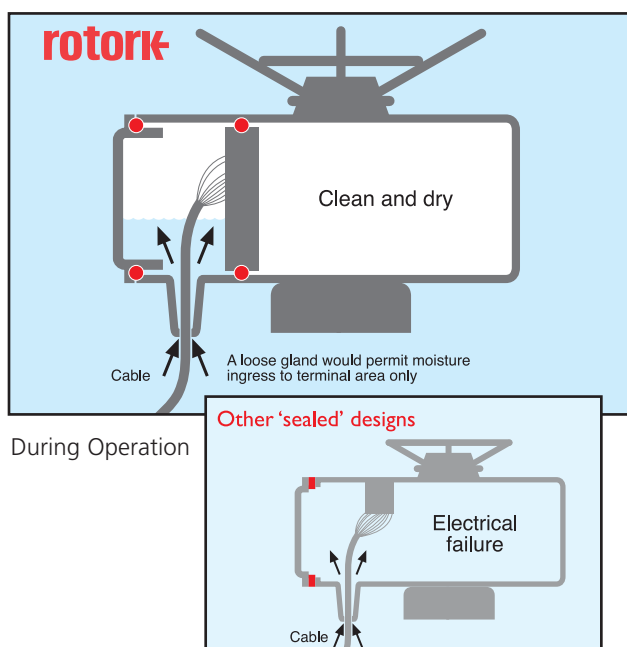
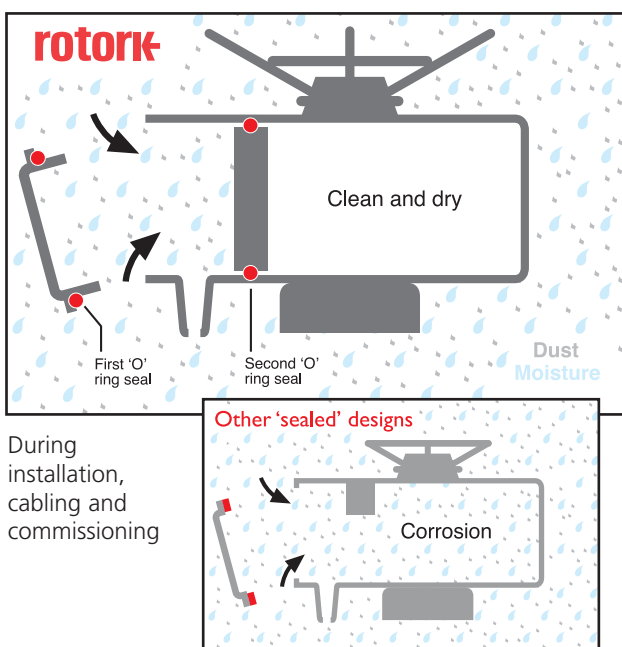
Rotork AWT range actuators do not breathe. They are double sealed\*, watertight and dust tight rated IP68 - IEC60529, NEMA 4, 4X & 6, suitable for submersion to a depth of 7 metres for 72 hours.

**Reliability through double sealing**

Double sealing is a means whereby the conduit entry and terminal compartment is completely sealed from the motor, control and switching compartments of the actuator. Should the cover be left off during installation or a defective cable gland or conduit allow water into the terminal compartment, the rest of the actuator remains fully protected. Without double sealing, investment in modern sophisticated controls can be rendered worthless as moisture and dirt ingress will cause actuator failure.

Some other manufacturers try to imitate double sealing by using sealed limit switches. With this design approach, while limit switches are protected, contactors, relays, heaters and travel measurement mechanisms are not resulting in actuator failure.

\* Option for AWT 10A – 35A SyncroSET.

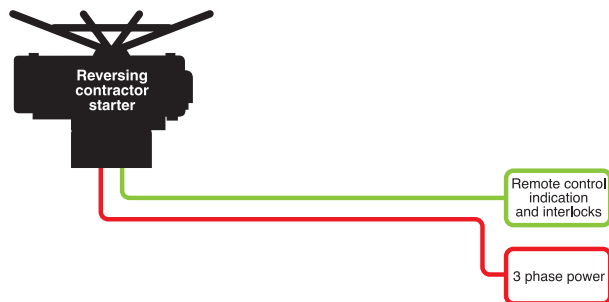
**Rotork Double Sealing Solution compared to other 'sealed' designs**

### Integral motor control – Awr SyncroPAK

Awr SyncroPAK actuators incorporate the motor starter and local controls, with considerable economy to site wiring as shown below.

The SyncroPAK arrangement allows the essential elements of the valve control system to be factory tested and sealed prior to actuator despatch.

The valvemaker can carry out valve testing, requiring only a 3-phase power supply. Factory acceptance testing of the motorised valve can be simply carried out with no risk of incorrect motor control wiring causing valve or actuator damage.

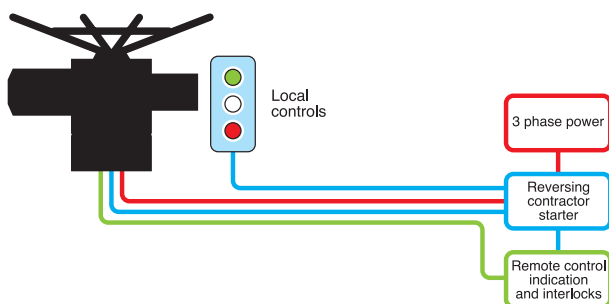


### Non-Integral motor control - Awr SyncroSET

Where a new installation requires motor control from the users Motor Control Centre (MCC), or existing installations already incorporating a MCC, the Awr SyncroSET provides the basic components for valve actuation.

Limit switches, indication contacts, optional local control station and motor supply wiring are brought out to the actuators terminal compartment ready for integrating into the MCC control system as shown below.

SyncroSET actuators are particularly suitable for installations where equipment at the valve location must be minimised, for example where high ambient temperature, vibration or space restrictions are present.



### Valve control - reliability to the limits

At the heart of reliable valve control is the ability of the actuator to move on demand and, as important, to stop at the exact position needed for valve sealing. Position limit switches must be 100% reliable and repeatable. Position indication to the control centre must exactly reflect valve status. Torque protection for the valve must be easily selectable by both valvemaker and site maintenance personnel.

The Awr switch mechanism has been doing this job with complete reliability for 40 years. The unique design allows simple limit set-up by screw adjustment for turns, and selectors for independent torque overload setting and "torque" or "position limit" valve seating. The standard latch mechanism prevents both torque switch "hammer" when seating and torque trip during unseating of sticky valves.



### Valve control – a difficult problem made simple:

- Standard actuator control circuits irrespective of valve type
- standard set up procedure for all valve types
- Built in torque, anti-hammer and sticky valve protection
- Once set, limits do not "slip" or "wander"
- 2 normally closed & 2 normally open volt free contacts for end of travel valve status indication.

***AWT – unique design for a unique application***

The AWT comprises components designed specifically for valve control and nothing else. Whether a gate, globe – rising or non rising valve or a 1/4 turn ball, butterfly or damper valve, the AWT is matched to them all.

Rotork understand that for valve control an actuator requires dedicated design and high specification. Off the shelf components, while reducing cost are a poor compromise. By designing and specifying all components Rotork are able to supply the most reliable, cost competitive valve actuation.

We don't stop at just designing the actuator – customer support gets our full design attention...

***Service matters***

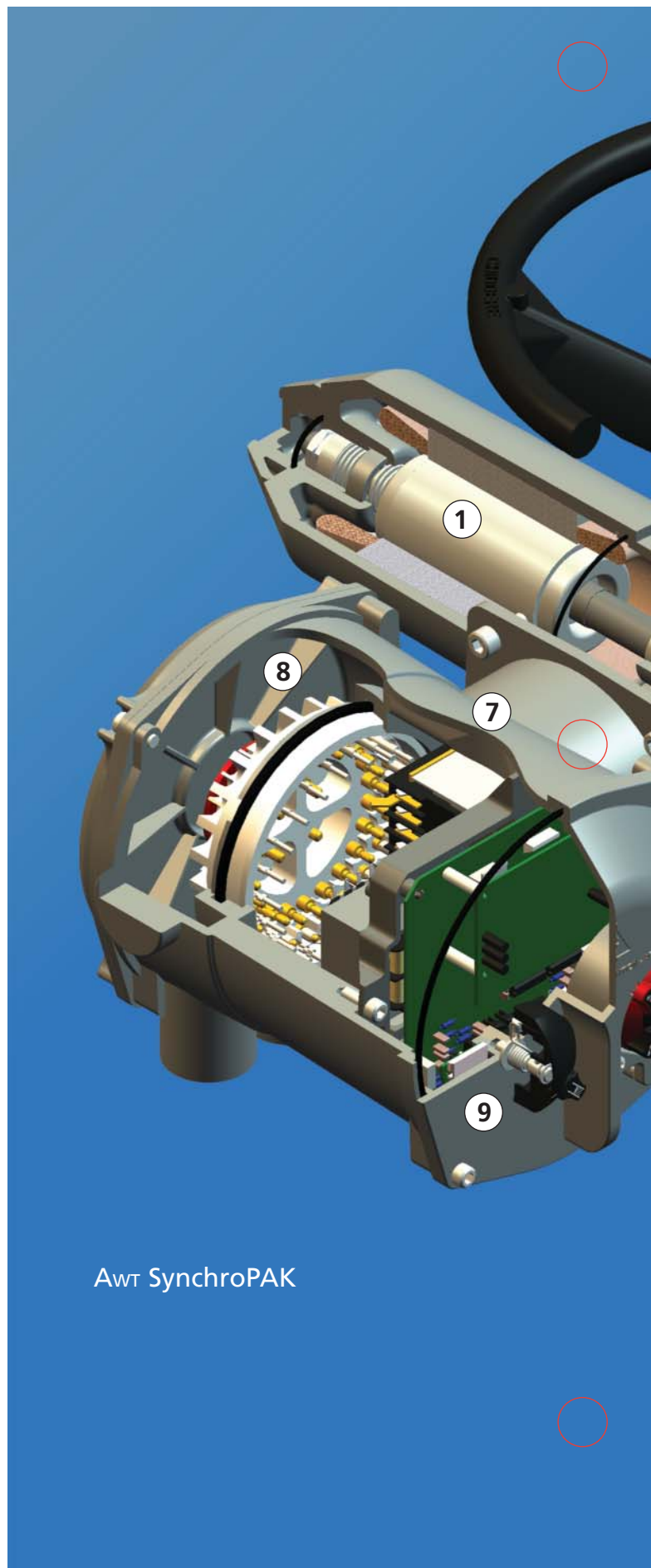
Reliable actuation begins at the planning and specifying stage – getting the right actuator for the job. At the hub of process control, Rotork are in the central position to provide before and after sale technical advice and assistance.

Our unrivalled global network of offices and service centres support customers in every territory. From help with specification detail and sizing to installation, commissioning, service backup and training, you are never alone with a Rotork actuator.

Our dedicated Control Systems, Valve Systems and Electrical and Mechanical Application Engineers provide the technical resource vital for successful valve control.

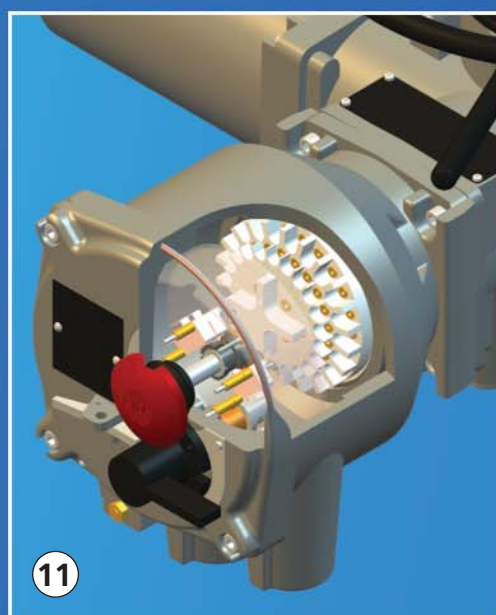
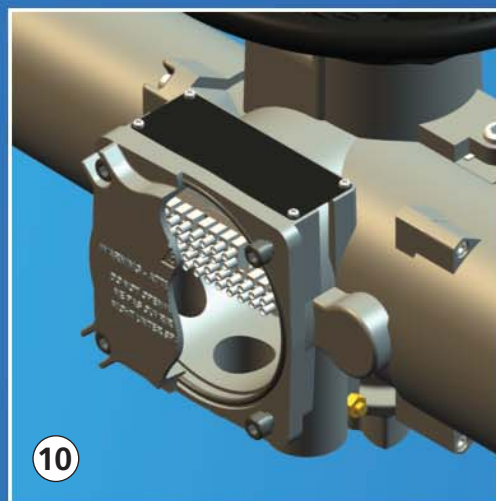
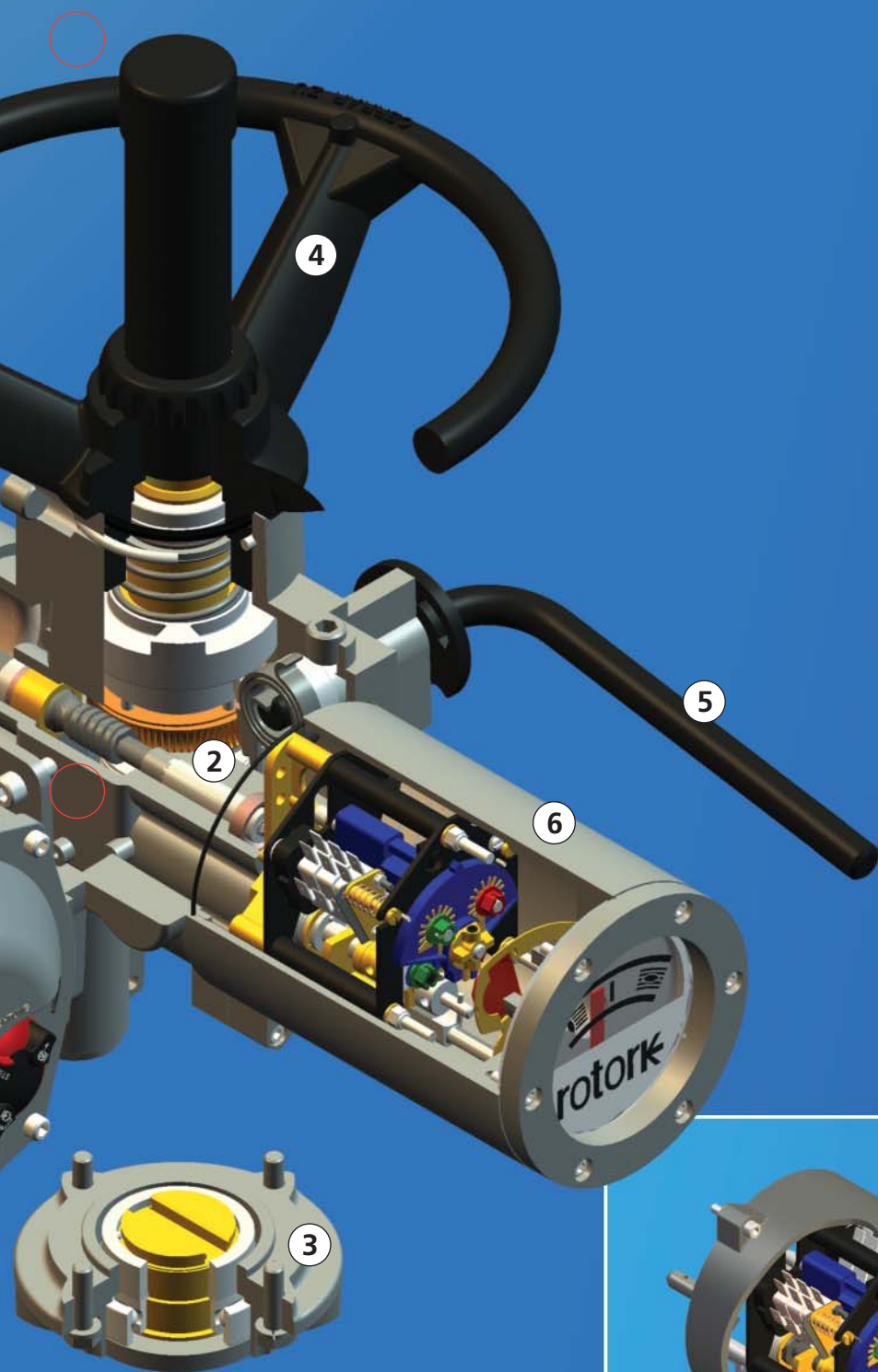
***Key***

- ① 3 –phase, low inertia squirrel cage induction motor.
- ② Oil bath lubricated gearcase, single stage worm and wheel drive.
- ③ Separable base incorporating valve drive component (AwT 10A – 35A only).
- ④ Handwheel, drive independent of motor gearing.
- ⑤ Hand-auto lever, depress for hand drive via a sliding clutch, auto return to motor drive.
- ⑥ Limit switch mechanism with local valve position indication.
- ⑦ Syncropak – includes motor reversing starter.
- ⑧ Double sealed terminal compartment.
- ⑨ Local control station - Local/Stop/Remote control selector, local Open/Local Close selector.
- ⑩ SyncroSET 10A-35A Standard sealed terminal enclosure
- ⑪ SyncroSET + option Local Control Station (LCS)
- ⑫ Option Add-on-Pak (AOP)



**AWT SynchroPAK**





**General**

Awt range of actuators are designed for the electrical operation of valves, penstocks and dampers located in non-hazardous locations.

Comprising 3 phase motor, reduction gearbox, valve attachment with detachable drive component, limit and torque switches and terminal compartment. The SyncroPAK version includes the motor starter assembly.

**Enclosure**

Watertight WT IP68 – 7m for 72 Hrs to IEC60529, NEMA 4, 4X & 6, CSA WT. All covers incorporate “spigot” sleeved joints with ‘O’ ring seals.

**Valve interface**

Awt is available with mounting base and output drive couplings conforming to international standard ISO 5210 or USA standard MSS SP-102. Applications for which the various types of couplings have been designed are outlined and the appropriate data concerning stem acceptance diameters are given in the tables on page 10 & 11.

**Handwheels**

Handwheels are provided to allow manual operation of the valve during electrical power interruption.

**10A - 40A** Direct acting top mounted handwheel with optional side mounted geared drive, refer to page 10.

**70A - 95A** Side mounted geared drive handwheel with optional alternative gear ratios, refer to page 10.

During electric operation of the actuator the handwheel is mechanically disengaged from the drive. To engage, the hand/auto selection lever is depressed and released after which handwheel operation remains selected. When electrical operation takes place, the actuator automatically returns to motor drive without lever or handwheel kickback. The hand/auto selection lever can be locked in the hand or auto positions using a 6mm diameter hasp padlock (not supplied), preventing engagement of motor drive (locked in hand) or engagement of handwheel drive (locked in auto). Emergency disengagement of motor drive can be selected by depressing and holding the lever during electric operation.

**Lubrication**

Awt actuators are factory filled for life with premium quality gear oil, specified as SAE80/90 EP grade, available world-wide. Oil lubrication out-performs grease over the Awt standard temperature range -30°C to +70°C, with none of the problems associated with grease such as separation and tunneling.

**Lubrication option - Food grade lubricant**

Awt actuators may be supplied with the gearcase filled with Hydra Lube GB Heavy food grade lubricant. This lubricant is a synthetic non-aromatic hydrocarbon mixture with PTFE and other additives. It does not contain chlorinated solvents. Grease used in assembly and thrust bearings is Hydra Lube WIG Medium-NLGI-123.

**Design Life**

For isolating duty, torque ratings of actuators are based on a minimum maintenance free life of 10,000 open / close / open cycles with rated seating torque at stroke end and an average of 1/3 rated seating torque during stroke.

**Frequency of operation – rating**

Awt actuators are suitable for valve duty up to 60 starts per hour at a rate not exceeding 600 starts per hour. Rated S2/S3 25% to IEC 60034-1

**Operating temperature**

Actuators are suitable for operation for ambient temperatures in the range -30°C to +70°C. For temperatures outside this range please apply to Rotork.

**Vibration**

Standard Awt Range actuators are suitable for applications where vibration severity does not exceed the following:

**Plant induced:** Where the cumulative level of all vibration within the frequency range of 10 to 1000Hz is less than 1g rms. Shock: 5g peak acceleration.

**Seismic:** Frequency range 1 to 50Hz, 2g acceleration if it is to operate during and after the event. 5g if it is only required to maintain structural integrity.

**Finish**

Actuators up to size 35A are finished in polyester powder coating, colour grey. Actuators size 40A and above are finished in air-dried polyurethane reinforced synthetic alkyd resin colour, grey.

**Finish options** - Colour: Other colours may be specified, please apply to Rotork. Offshore: 2 pack epoxy coatings are available for extreme environmental conditions, please apply to Rotork.

**Electromagnetic compatibility directive (EMC)**

Actuators conform to the requirements of the European Economic Community EMC Directive 89/336/EEC as amended by 92/31/EEC by the application of EN 50081-2:1993 and EN 50082-2:1995.

**Low voltage directive (LV)**

Actuators conform to the requirements of the European Economic Community Low Voltage Directive 73/23/EEC amended by 93/68/EEC by the application of EN 60204-1 1998.

**Machinery directive**

Actuators follow the provision of the Machinery Directive (98/37/EEC). The Awt must not be put into service until the equipment into which it is being incorporated has been declared to be in conformity with the provisions of the European Community Machinery Directive (98/37/EEC).

**Noise**

Independent tests have shown that at 1m generated noise did not exceed 61db(A).



**Power supply**

Awt actuators are suitable for operation with the following 3 phase, 3 wire nominal power supplies:

**50Hz**

220, 240, 380, 400, 460, 500, 525 and 550 Volts.

**60Hz**

208, 220, 230, 240, 380, 440, 460, 480, 575 and 600 Volts .

The required operating voltage must be specified at the time of Order.

Actuator performance is guaranteed with a voltage tolerance +/-10% and a frequency tolerance +/-5 HZ. Actuators are capable of starting and running up to speed with a maximum 15% volt drop. For power supply tolerance or volt drop in excess of those stated above, please apply.

**Uninterruptible power supplies UPS**

Awt actuators are suitable for use with UPS Power supplies provided the tolerances specified above are not exceeded. UPS output should adhere to recognised supply standards such as EN50160.

**Motor**

The integral 3 phase squirrel cage induction motor is specially designed for valve actuation. Class F insulated with winding thermostat, the low inertia, high starting and stalling torque motor provides substantial reserves of power to assure torque switch operation at maximum setting with a voltage reduction as much as 10% below nominal.

Due to the low inertia design and lost motion or "hammerblow" drive, starting is instantaneous within 3 cycles of the mains frequency.

Motors are 15 minutes rated with a cyclic duration factor of 25% at 33% of actuator output rated torque giving a temperature rise not exceeding that permitted for class B insulation at standard nominal voltage.

Actuators are rated S2/S3 to IEC60034-1, 60 starts per hour at a rate not exceeding 600 starts per hour. Where long running times or regulation in excess of that stated above are required, alternative motor insulation class and rating are available. Please apply.

Refer to publication E330E for motor electrical data.

**Motor thermostat**

The motor thermostat enables the control circuit to be tripped and motor disconnected if the maximum permitted winding temperature is reached. This protection is independent of ambient temperature variation and motor current and provides optimum usage of motor thermal capacity. The thermostat will auto reset on motor cooling

For SyncroSET actuators it is vital that the motor thermostat is connected in series with the motor reversing contactor coils. Refer to publication E320E.

**TorqueLimit switch mechanism**

The unique combined torque and travel limit switch mechanism allows the actuator to be fitted to any valve type. Actuator wiring diagrams do not vary with the valve.

Simple mechanical selectors are set for torque or limit tripping to suit both seating (torque) or non seating (position limit) type valves.

Selectors for both opening and closing torque switch protection are included to make site adjustment simple.

The valve turns range is set by lead screw adjustment that mimics actuator output turns.

In addition two open and two close auxiliary switched are provided as standard for remote end of travel indication or interlocking.

A mechanical 3 position pointer and dial provides local valve close, intermediate and open position indication. Refer to publication E320E for full description.

**Wiring and terminations**

Jig built harnesses of individually stranded conductors, tropical grade PVC insulated, connect internal components to the applicable terminal compartment. All wires are identified with printed numbers.

Refer to SyncroSET and SyncroPAK specifications for details of user termination.

All actuators include the Installation and Maintenance Manual - publication E370E, wiring diagram and commissioning bag.

**Option Add-on-Pak (AOP)**

The Add on Pak is an optional extra and provides a range of indication options in addition to the standard switch mechanism:

- Continuous local valve position indication
- 2 or 6 additional, independent, auxiliary switches for valve indication or interlocking
- Remote analogue valve position indication – voltage or current

Gear driven from the switch mechanism, the Add on Pak can be factory fitted or retrofitted in the field if plant indication requirements change. The AOP can be fitted to any Awt SyncroPAK or SyncroSET actuator. Refer to publication E320E for full description.

## TORQUE AND SPEED PERFORMANCE

rpm at 50Hz	18	24	36	48	72	96	144	192
rpm at 60Hz	21	29	43	57	86	115	173	230
Actuator size	Rated torque Nm <i>Ft lbf</i> Rating is max. torque switch setting in both directions						Not suitable for direct mounting on gate valves	
10A	34 <i>25</i>	34 <i>25</i>	34 <i>25</i>	34 <i>25</i>	34 <i>25</i>	34 <i>25</i>		
12A	81 <i>60</i>	81 <i>60</i>	81 <i>60</i>	68 <i>50</i>	48 <i>35</i>	41 <i>30</i>		
18A	108 <i>80</i>	108 <i>80</i>						
19A	135 <i>100</i>	135 <i>100</i>	135 <i>100</i>	135 <i>100</i>	135 <i>100</i>			
20A	203 <i>150</i>	203 <i>150</i>	203 <i>150</i>	203 <i>150</i>	176 <i>130</i>	142 <i>105</i>	102 <i>75</i>	
25A	400 <i>295</i>	400 <i>295</i>	298 <i>220</i>	244 <i>180</i>	244 <i>180</i>	230 <i>170</i>	149 <i>110</i>	
35A	610 <i>450</i>	610 <i>450</i>	542 <i>400</i>	474 <i>350</i>	474 <i>350</i>	366 <i>270</i>	257 <i>190</i>	
40A	1020 <i>750</i>	1020 <i>750</i>	845 <i>625</i>	680 <i>500</i>	680 <i>500</i>	542 <i>400</i>	406 <i>300</i>	
70A	1490 <i>1100</i>	1490 <i>1100</i>	1290 <i>950</i>	1020 <i>750</i>	1020 <i>750</i>	745 <i>550</i>	645 <i>475</i>	542 <i>400</i>
90A	2030 <i>1500</i>	2030 <i>1500</i>	1700 <i>1250</i>	1355 <i>1000</i>	1355 <i>1000</i>	1020 <i>750</i>	865 <i>640</i>	730 <i>540</i>
91A							1355 <i>1000</i>	1355 <i>1000</i>
95A		3000 <i>2200</i>						

Note: Stall torque will be 1.2 to 2 times rated value depending on speed and voltage

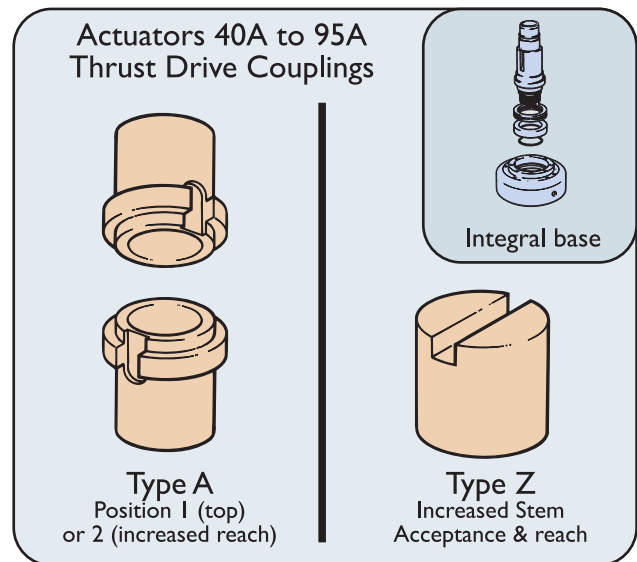
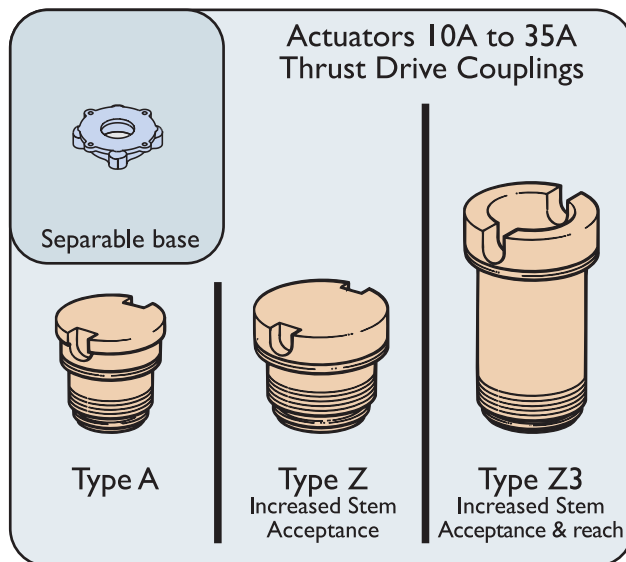
## MECHANICAL DATA

Actuator Size		10A 12A 18A	19A 20A 25A	35A	40A	70A	90A	91A	95A
Flange	ISO 5210 MSS SP 102	F10 FA10	F14 FA14	F16 FA16	F25 FA25	F25 FA25	F30* FA30*	F25 FA25	F30 FA30
Thrust Base & Drive Couplings									
Thrust rating	kN <i>lbs</i>	27 <i>10,000</i>	100 <i>22,480</i>	150 <i>33,750</i>	220 <i>50,000</i>	220 <i>50,000</i>	334 <i>75,000</i>	N/A	445 <i>100,000</i>
A couplings Rising stem	Max Stem Dia. mm <i>ins</i>	32 <i>1 1/4</i>	38 <i>1 1/2</i>	54 <i>2 1/8</i>	64 <i>2 1/2</i>	70 <i>2 3/4</i>	70 <i>2 3/4</i>	N/A	N/A
A couplings Non-rising	Max Stem Dia. mm <i>ins</i>	26 <i>1</i>	32 <i>1 1/4</i>	45 <i>1 3/4</i>	51 <i>2</i>	57 <i>2 1/4</i>	57 <i>2 1/4</i>	N/A	N/A
Z couplings Rising stem	Max Stem Dia. mm <i>ins</i>	32 <i>1 1/4</i>	51 <i>2</i>	67 <i>2 5/8</i>	73 <i>2 7/8</i>	83 <i>3 1/4</i>	83 <i>3 1/4</i>	N/A	83 <i>3 1/4</i>
Z couplings Non-rising	Max Stem Dia. mm <i>ins</i>	26 <i>1</i>	38 <i>1 1/2</i>	51 <i>2</i>	57 <i>2 1/4</i>	73 <i>2 7/8</i>	73 <i>2 7/8</i>	N/A	73 <i>2 7/8</i>
Z3 couplings Rising stem	Max Stem Dia. mm <i>ins</i>	32 <i>1 1/4</i>	51 <i>2</i>	67 <i>2 5/8</i>	N/A	N/A	N/A	N/A	N/A
Non-thrust Base & Drive Couplings									
B1 (fixed bore)	mm	42	60	80	100	100	120	N/A	N/A
B3 (fixed bore)	mm	20	30	40	50	50	50	50	N/A
B4	Max Stem Dia. mm <i>ins</i>	20 <i>3/4</i>	30 <i>1 1/4</i>	44 <i>1 3/4</i>	50 <i>2</i>	60 <i>2 1/4</i>	60 <i>2 1/4</i>	60 <i>2 1/4</i>	N/A
Handwheel ratio	Standard Optional	1:1 12:1	1:1 13.5:1	1:1 22.5:1	1:1 15:1/30:1	15:1 30:1	15:1 45:1	15:1 30:1	15:1 45:1

\* 90A with B3 and B4 have flange size F25/FA25

The AwT provides base and drive coupling options for both thrust and non-thrust applications. Base and coupling arrangement are lubricated for life.

Thrust applications include rising stem sluice, gate and globe valves, non thrust include inside screw wedge gate and via a second stage gearbox, 1/4 turn butterfly, ball etc.

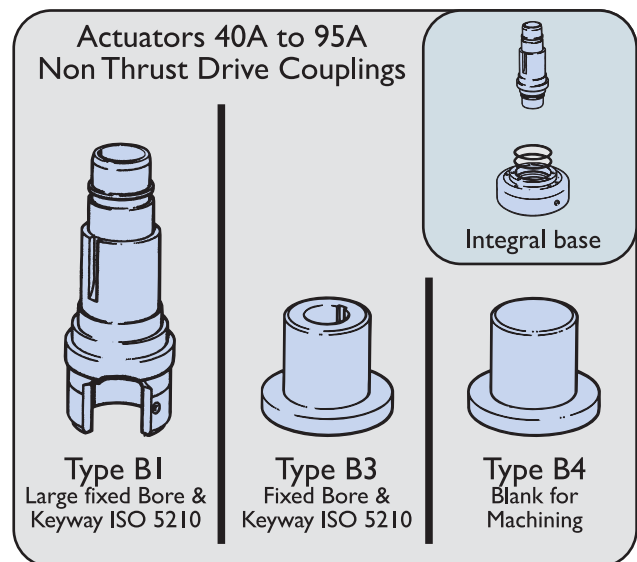
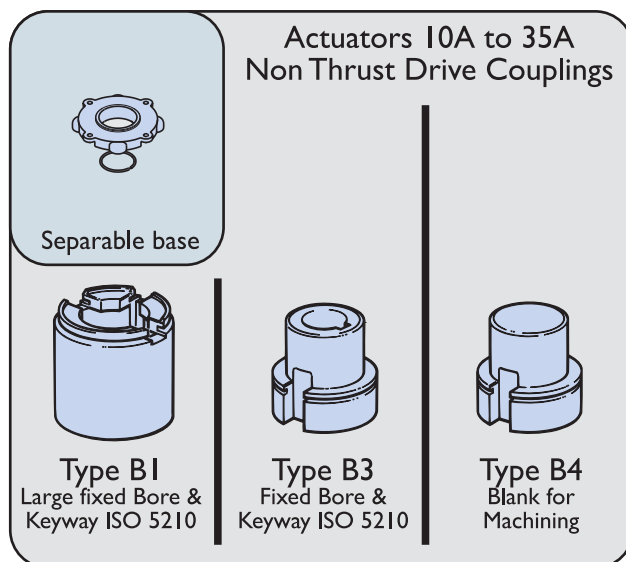


#### Thrust Bases

AwT sizes 10A to 35A have a separable base containing the separable drive coupling. The base can be disconnected from the actuator gearbox to allow simple valve attachment. Sizes 40A to 95A have an integral base with a separable drive coupling allowing simple valve attachment while maintaining strength and the smallest profile possible.

#### Thrust bearings

Both type 'A' and 'Z' couplings feature an associated thrust bearing. In the case of the separable thrust base this is fully sealed and lubricated for life. In the integral base design the thrust base is lubricated by the actuator gearbox oil bath. Both integral and separable thrust bases are designed to retain all developed thrust reaction forces without any load being transmitted to the gearbox.



#### Non Thrust Bases

AwT sizes 10A to 35A have a separable base containing the separable drive coupling. The base can be disconnected from the actuator gearbox to allow simple valve attachment. For AwT sizes 10A to 35A where the drive is via shafts or operating valves with stems having any axial movement, type A or Z couplings must be used.

#### Non thrust bearings

All types of non thrust couplings rotate in bearings located within the actuator gearbox. Sizes 40A to 95A have an integral base with a separable drive coupling allowing simple valve attachment while maintaining strength and the smallest profile possible.



# AWT Range

**watertight** 3-phase electric valve actuator

