



Please ensure that this publication is thoroughly read and understood

rotork electric

AWT Range Installation and Maintenance Instructions

Publication number E370E
Date of issue 01/03



This manual provides instruction on:

- * Manual and electrical (local and remote) operation.
- * Preparation and installation of the actuator onto the valve.
- * Subsequent commissioning and adjustment of the position limit and torque switches for correct valve operation.
- * Commissioning and adjustment of the actuator settings to suit site-specific control and indication requirements.
- * Maintenance – Troubleshooting.
- * Sales and Service.

CONTENTS

		Page
1.0	Health and Safety	3
1.1	Motor Temperature	3
2.0	Storage	3
3.0	A_{WT} Actuators	3
3.1	Syncroset Actuators	3
3.2	Syncropak Actuators	4
4.0	Operating your A_{WT}	4
4.1	Operating by Hand	4
4.2	Operating Electrically – Syncroset	4
4.3	Operating Electrically – Syncroset with Local Push Button Control	4
4.4	Operating Electrically – Syncropak	5
4.5	Selecting Local/Stop/Remote Operation – Syncropak	5
4.6	Local Control – Syncropak	5
4.7	Remote Control – Syncropak	5
4.8	Valve Position Indication	5
5.0	Preparing the Drive Bush	6
5.1	10A to 35A – Thrust Base Types A and Z	6
5.2	10A to 35A – Non-Thrust Base Type B	6
5.3	40A to 95A – Thrust Base Types A and Z	7
5.4	40A to 95A – Non-Thrust Base Type B	8

6.0	Mounting the Actuator	9	10.0	Changing the AOP Gear Ratio	18
	6.1 Rising Stem Valves – Top Mounting	9			
	6.2 Valve with Gearbox – Side Mounting	10	11.0	Electrical Start-up	19
	6.3 Non-Rising Stem Valves – Top Mounting	10		11.1 Wiring Up	19
	6.4 Handwheel Sealing	10		11.2 Start-up – Syncroset Actuators	19
7.0	Cable Connections	10		11.3 Phase Rotation Check – Syncroset Actuators	19
	7.1 Earth/Ground Connections	10		11.4 Syncropak Actuators	20
	7.2 Removing Terminal Cover	10	12.0	Troubleshooting	20
	7.3 Cable Entry	11		12.1 Syncropak Actuators	20
	7.4 Connecting to Terminals	11		12.2 Actuators Fail to Start on Remote Control	20
	7.5 Replacing Terminal Cover	11		12.3 Actuators Fail to Start on Local Control	20
8.0	Setting Instructions	11		12.4 Actuators Fail to Start – Syncroset Actuators	20
	8.1 Setting the Limit Switches	12		12.5 Valve Jammed – All Actuators	20
	8.2 Selecting Torque or Limit Priority	14		12.6 Valve Not Seating Correctly	20
	8.3 Selecting Torque Values	14		12.7 Actuator Runs Without Driving Valve – Likely Causes	20
9.0	Add-On-Pak – Setting Instructions	15	13.0	Lubrication and Maintenance	21
	9.1 Setting the Indication	15		13.1 Oil	21
	9.2 Setting the Switches – Closing Direction	16		13.2 Lubrication	21
	9.3 Setting the Switches – Opening Direction	16		13.3 Maintenance	21
	9.4 Single Turn Pot	17			
	9.5 Current Position Transmitter (CPT) Setting	17			

1**Health and Safety**

This manual is produced to enable a competent user to install, operate, adjust and inspect Rotork AWT range valve actuators.

The electrical installation, maintenance and use of these actuators should be carried out in accordance with the National Legislation and Statutory Provisions relating to the safe use of this equipment, applicable to the site of installation.

For the UK: Electricity at Work Regulations 1989 and the guidance given in the applicable edition of the 'IEE Wiring Regulations' should be applied. Also the user should be fully aware of his duties under the Health and Safety Act 1974. For the USA: NFPA70, National Electrical Code® is applicable.

The mechanical installation should be carried out as outlined in the manual and also in accordance with relevant standards such as British Standard Codes of Practice.

Only persons competent by virtue of their training or experience should be allowed to install, maintain and repair Rotork actuators. Work undertaken must be carried out in accordance with instructions in the manual. The user and those persons working on this equipment should be familiar with their responsibilities under any statutory provisions relating to the health and safety of their workplace.

1.1 Motor Temperature

With excessive use the motor surface temperature could reach 132°C (270°F).

Where appropriate the user must ensure the actuator is suitably protected against its operating environment. Should further information and guidance relating to the safe use of the Rotork AWT range of actuators be required, contact Rotork.

2**Storage**

If your actuator cannot be installed immediately, store it in a dry place until you are ready to connect incoming cables. If the actuator has to be installed but cannot be cabled it is recommended that the plastic transit cable entry plugs are replaced with metal plugs which are sealed with PTFE tape.

The Rotork double-sealed construction will preserve internal electrical components perfectly if left undisturbed.

Rotork cannot accept responsibility for deterioration caused on site once the covers are removed.

Every Rotork actuator has been fully tested before leaving the factory to give years of trouble-free operation, providing it is correctly installed, commissioned and sealed.

3**AWT Actuators****3.1 Syncroset Actuators**

Each standard Syncroset consists of four basic sub-assemblies:

1. Motor.
2. Oil-filled worm gearbox with handwheel and de-clutch mechanism.
3. Limit and torque switch mechanism.
4. Terminal box.

The user must provide motor reversing contactors and associated control equipment.

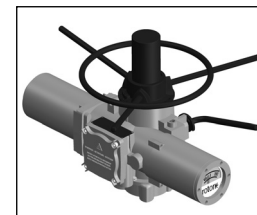


Fig. 3.0 AWT Syncroset,
Standard Sealed



Fig. 3.1 AWT Syncroset with Local Controls, Doubled Sealed

As an optional extra, syncroset actuators can be supplied with local controls.

Note: 40A to 95A Syncrosets are always double sealed.



Fig. 3.2 AWT Doubled Sealed Syncroset



Fig. 3.3 AWT Syncropak

3.2 Syncropak Actuators

Each standard Syncropak consists of four basic sub-assemblies:

1. Motor.
2. Oil-filled worm gearbox with handwheel and de-clutch mechanism.
3. Limit and torque switch mechanism
4. Integral starter with associated control equipment and double-sealed terminal box.

4

Operating your Awt

4.1 Operating by Hand

To engage handwheel drive, depress the Hand/Auto lever into Hand position and turn the handwheel to engage the clutch. The lever can now be released and it will return to its original position. The handwheel will remain engaged until the actuator is operated electrically when it will automatically disengage and return to motor drive. If required the Hand/Auto lever can be locked in either position using a padlock with a 6.5 mm hasp.

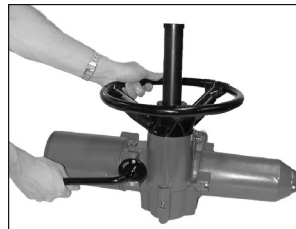


Fig. 4.0 Hand Operation

4.2 Operating Electrically – Syncroset

For all syncroset actuators, it is vital that electrical connections to the control equipment and phase rotation are correct before allowing the actuator to operate the valve (refer to Section 11).

The basic syncroset actuator does not have actuator mounted local open/close or local/remote selectors. Control will be via control equipment remote to the actuator.

4.3 Operating Electrically – Syncroset with Local Push Button Control

The black selector switch can be turned to select either: Local, Remote, or Stop. When selecting Stop, note that the selector switch rides over and automatically depresses the red push button into the Stop position.

The red push button on the starter cover has two functions: push to stop and turn to start, in either direction.

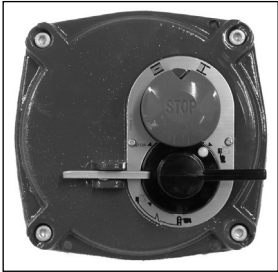


Fig. 4.1 Syncroset Push Button Controls

4.4 Operating Electrically – Syncropak

Check that power supply voltage agrees with that stamped on the actuator nameplate. Switch on power supply. **It is not necessary to check phase rotation.**

4.5 Selecting Local/Stop/Remote Operation – Syncropak

The red selector enables either Local or Remote control, lockable in each position using a padlock with a 6.5 mm hasp. When the selector is locked in the Local or Remote positions the Stop facility is still available. The selector can also be locked in the Stop position to prevent electrical operation by Local or Remote control.



Fig. 4.2 Syncropak Controls

4.6 Local Control – Syncropak

With the red selector positioned at Local (anti-clockwise) the adjacent black knob can be turned to select Open or Close. For Stop turn red knob clockwise.

4.7 Remote Control – Syncropak

Rotate the red selector to the Remote position (clockwise), this gives remote control only for Open and Close but local Stop can still be used by turning the red knob anti-clockwise.

4.8 Valve Position Indication

Valve position is indicated mechanically by a pointer as detailed in Figure 4.3 and Figure 4.4. Note that the pointer stays central during valve travel. When the Add-on-pak is fitted, pointer movement is continuous between Shut and Open.



Fig. 4.3 Valve Position Indicator

Syncropak type actuators also provide illuminated cover indication (mains power on) as shown in Figure 4.4.

Valve Position	Lamp (Syncropak)	Symbol
Open	Red	
Mid-Travel	White	
Shut	Green	

Fig. 4.4 Valve Position Indication

5

Preparing the Drive Bush

5.1 10A to 35A – Thrust Base Types A and Z

Removal of Drive Bush for Machining

Turn actuator onto its side, remove the two caphead screws holding base plate onto thrust base, pull out the drive bush complete with its bearing assembly. Before machining the drive bush, remove the thrust bearing from it as follows:

1. Locate and loosen the two set screws in the steel bearing stop ring.
2. Unscrew the bearing stop ring from the drive bush, slide the bearing off the drive bush. Keep the stop ring and bearing in a safe, clean place ready for re-assembly.
3. Machine the drive bush to suit the valve stem, allowing generous clearance on screw thread for rising stem valves. Ensure that the male thread on the bush is not damaged.

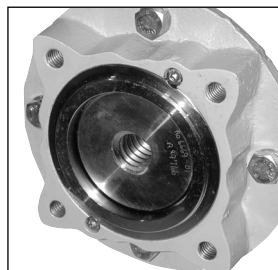


Fig. 5.0 Base Assembly

Re-assembly

1. Remove all swarf from the drive bush, ensuring that the 'O' rings on the drive bush and bearing stop rings are in good condition, clean and greased.
2. Slide bearing onto drive bush and ensure that it is fitted down to the shoulder.
3. Grease the bearing.
4. Screw bearing stop ring with the set screws uppermost onto the drive bush, tighten down hand tight. Lock with the two set screws.

6

5. Refit the drive bush assembly into the base casting on the actuator, ensuring that the slots in the drive bush are located into the drive dogs of the hollow output shaft.

6. Refit the base plate and secure with caphead screws.



Fig. 5.1 Type A Thrust Base Components

5.2 10A to 35A – Non-Thrust Base Type B

Undo the four capscrews securing the base plate to the gearcase and remove the base plate. The drive bush and its retaining clip can now be seen.

Types B3 and B4 removal

Using external circlip pliers, expand the circlip while pulling on the drive bush. The drive bush will detach from the actuator centre column with the circlip retained in its groove. This can be seen in Figure 5.2.

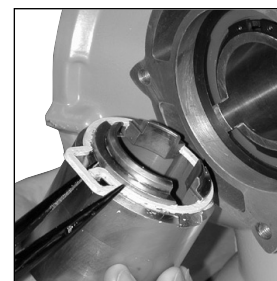


Fig. 5.2 B Type Bushes

Types B3 and B4 re-assembly

Grease drive bush and circlip. With the circlip fitted in its groove offer the drive bush up to the actuator centre column ensuring the drive dogs are aligned. Expand the circlip while pushing the drive bush into the centre column. The drive bush will move further in. Release circlip pliers ensuring the circlip is correctly seated in both the drive bush and centre column grooves. Replace the base plate and fix with four capscrews.

5.3 40A to 95A – Thrust Base Types A and Z

Removal of Drive Bush for Machining

Engage Hand and turn handwheel until retainer set screw is visible through hole in actuator base.

Loosen setscrew and unscrew retainer using hammer and punch. Remove drive bush and machine to suit valve stem or gearbox input shaft. Allow generous clearance on screw thread for rising stem valves.



Fig. 5.3 Type A Thrust Base Components

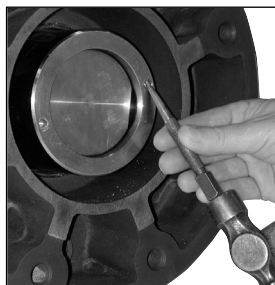


Fig. 5.4 Type A Thrust Base Components

If the actuator has a type A drive bush, it can be fitted in position 1 or 2 to suit the position of the valve mounting flange.



Fig. 5.5 Type A Drive Bush

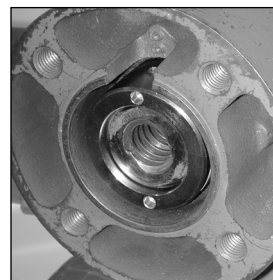
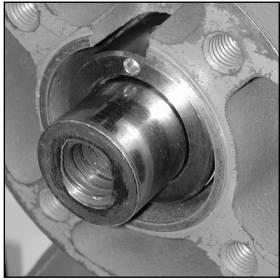
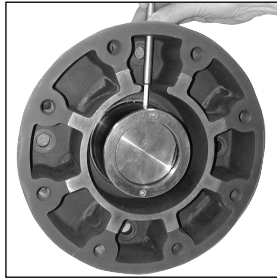


Fig. 5.6 Type A Drive Bush in Position 1



*Fig. 5.7 Type A Drive Bush
in Position 2*



*Fig. 5.9 Tightening Retainer
Set Screw*



Fig. 5.8 Type Z3 Drive Bush

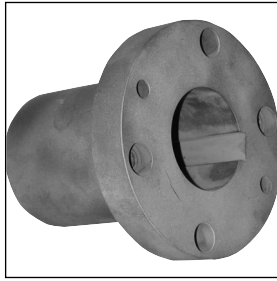


Fig. 5.10 B3/B4 Drive Bush

5.4 40A to 95A – Non-Thrust Base

Type B and B1.

For type B and B1 the output shaft can be bored and keyed to ISO 5210 standard. There is no drive bush to machine.

Types B3 and B4

These are identical drive bushes secured by cap-headed screws. B3 is supplied pre-machined to ISO 5210 standard. B4 is supplied blank and must be machined to suit the input shaft of the gearbox or valve that it will drive.

6

Mounting the Actuator

(Refer to Section 13 for actuator weights.)

Ensure the valve is secure before fitting the actuator as the combination may be top heavy and therefore unstable.

If it is necessary to lift the actuator using mechanical lifting equipment certified slings should be attached as indicated in Figure 6.0 for vertical valve shafts and Figure 6.1 for horizontal shafts.

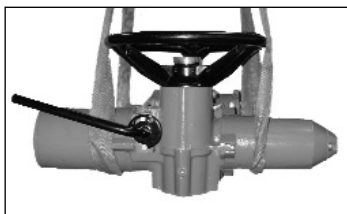


Fig. 6.0 Vertical Lifting



Fig. 6.1 Horizontal Lifting

At all times trained and experienced personnel should ensure safe lifting, particularly when mounting actuators.

WARNING. The actuator should be fully supported until full valve shaft engagement is achieved and the actuator is secured to the valve flange.

A suitable mounting flange conforming to ISO 5210 or USA Standard MSS SP101 must be fitted to the valve. Actuator to valve fixing must conform to Material Specification ISO Class 8.8, yield strength 628 N/sq mm.

WARNING. Do not lift the actuator and valve combination via the actuator. Always lift the valve/actuator assembly via the valve.

Each assembly must be assessed on an individual basis for safe lifting.

6.1 Rising Stem Valves – Top Mounting

a) Fitting the Actuator and Base as a Combined Unit – All Actuator Sizes

Fit the machined drive bush into the thrust base as previously described, lower the actuator onto the threaded valve stem, engage Hand and wind the handwheel in the opening direction to engage the drive bush onto the stem. Continue winding until the actuator is firmly down on the valve flange. Wind two further turns, fit securing bolts and tighten fully.

b) Fitting Thrust Base to Valve – Actuator Sizes 10 to 35 only

Fit the machined drive bush into the thrust base as previously described. Remove the thrust base from the actuator, place it on the threaded valve stem with the slotted end of the drive bush uppermost and turn it in the opening direction to engage the thread. Continue turning until the base is positioned onto the valve flange. Fit securing bolts but do not tighten at this stage. Lower the actuator onto the thrust base and rotate the complete actuator until the drive dogs on the actuator output shaft engage into the drive bush. Actuator flange should now be flush with base flange.

Continue to turn actuator until fixing holes align. Using bolts supplied fix actuator to thrust base and tighten down. Open valve by two turns and firmly tighten down fixings onto valve flange.

7

Cable Connections

6.2 Valve with Gearbox – Side Mounting

Check that the mounting flange is at right angles to the input shaft, and that the drive bush fits the shaft and keyway with adequate axial engagement. Engage Hand, offer up actuator to the input shaft and turn handwheel to align key way and key. Slide on to shaft and tighten fixing bolts.

6.3 Non-Rising Stem Valves – Top Mounting

Treat as for side mounting except that when thrust is taken in the actuator, a thrust nut must be fitted above the drive bush and securely tightened.

6.4 Handwheel Sealing

Ensure that sealing plug in centre of handwheel (or spindle cover tube depending on which is fitted) is sealed with PTFE tape and fully tightened, ensuring that moisture does not pass down the centre column of the actuator.

WARNING. Ensure all power supplies are isolated before removing actuator covers.

Check that the supply voltage agrees with that stamped on actuator nameplate.

A switch or circuit breaker must be included in the wiring installation of the actuator. The switch or circuit breaker shall be mounted as close to the actuator as possible and shall be marked to indicate that it is the disconnecting device for that particular actuator. The actuator must be protected with overcurrent protection devices rated in accordance with Rotork publication E330E electric motor performance data for AWT type actuators.

7.1 Earth/Ground Connections

A lug with a 6mm diameter hole is cast adjacent to the conduit entries for attachment of an external earthing strap by a nut and bolt. An internal earth terminal is also provided.

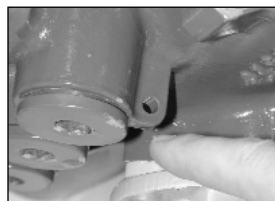


Fig. 7.0 Earthing Point



Fig. 7.1 Removing the terminal cover-Syncropak

7.2 Removing Terminal Cover

Using a 6mm Allen key loosen the four captive screws evenly. Do not attempt to lever off the cover with a screwdriver as this will damage the 'O' ring seal.

A plastic bag in the terminal compartment contains spare cover 'O' ring seal, wiring diagram and instruction book and terminal screws where applicable.



Fig. 7.2 Commissioning Kit

7.3 Cable Entry

Remove red plastic transit plugs. Make cable entries appropriate to the cable type and size. Ensure that threaded adapters, cable glands or conduit are tight and fully waterproof. Seal unused cable entries with a steel or brass threaded plug.

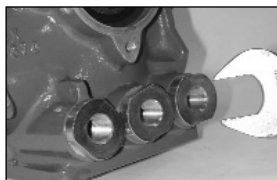


Fig. 7.3 Conduit Entries

7.4 Connecting to Terminals

Refer to the wiring diagram inside the terminal cover to identify functions of terminals. Check that supply voltage is the same as that marked on the actuator nameplate. Remove power terminal screen. Begin by connecting these cables and replace screen. When all connections are made ensure wiring diagram is replaced in the terminal compartment.

Note: with AWT Syncroset correct phase rotation is essential for electrical operation and must be checked at start-up stage.

All Rotork AWT Syncroset 3-phase actuators are tested for correct phase rotation in terminal order 1(W), 2(V), 3(U) (refer to Section 11 and actuator wiring diagram).

7.5 Replacing Terminal Cover

Ensure cover 'O' ring seal and spigot joint is in good condition and lightly greased before re-fitting cover.

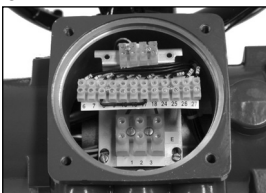


Fig. 7.4 Standard Sealed Terminal Compartment

There are three basic steps that must be carried out to ensure correct operation of the valve.

- Setting the limit switches to operate at the end of travel.
- Selecting the correct Torque or Limit function for the type of valve.
- Adjusting the torque switch value for each direction of travel.

If the actuator was received pre-mounted on the valve then the valve supplier should have already carried out all three steps.

To check if the actuator is correctly set carry out the following:

1. With the actuator securely bolted to the valve, engage hand-wheel drive.
2. Fully open the valve by hand and check that the position indicator pointer moves over to the Open position just before the valve reaches its open stop.

3. Fully close the valve and check that the position indicator pointer now moves over to the Shut position, just before the valve reaches its closed stop.

4. If the indicator is reading correctly at both ends of the valve stroke, then it can be assumed that the valvemaking has already set the switches to operate at the end of travel. If required, Torque/Limit Function and Valve may be checked (refer to Sections 8.2 and 8.3).

If the actuator was supplied separately from the valve or if the check proved that it is not correctly set up, then the following procedure must be carried out.

8.1 Setting the Limit Switches.

Caution: Damage to the valve can occur due to incorrect setting of the switch mechanism.

Using a 5mm Allen key remove the three switch mechanism cover screws, pull cover off squarely and retain in a safe place. Engage handwheel by pushing down on the hand auto lever whilst turning the handwheel. Once engaged the lever can be released and the actuator will remain in hand drive. Locate the Switch Mechanism-screwed shaft assembly.



Fig. 8.0

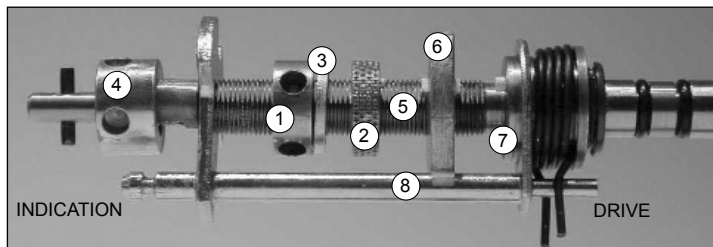


Fig. 8.1 Switch Mechanism – Screwed Shaft Assembly

1. Lock nut
2. Anti-clockwise switch/stop nut
3. Locking washer
4. Clutch

5. Screwed shaft
6. Travelling nut
7. Clockwise switch/stop nut
8. Over travel guide



Fig. 8.2

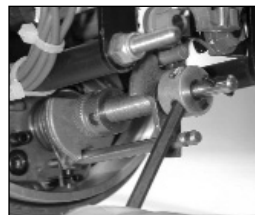


Fig. 8.3

1. Refer to Fig. 8.2.

Using a 4mm Allen key as a lever, break open locknut (1) and anti-clock stopnut (2) and run them together with their locking washer along the screwed shaft (5), toward the indicator end of the assembly

2. Leave all three components loose on the shaft.

3. Refer to Fig. 8.3.

Using a 4mm Allen key, loosen clutch nut (4) by turning it anti-clockwise until it is finger tight. Note that the screwed shaft can now be turned with the fingers.

4. As the screwed shaft is turned, the travelling nut (6) will move up and down the shaft.

Setting Clockwise Limit (Valve Usually Closed)

It is essential that the Clockwise direction is set first.

1. With the valve in a Mid Travel position (at least 3 turns away from the clockwise end of travel), turn screwed shaft (5) anticlockwise until the travelling nut (6) comes to the mechanical back stop (7).
2. Using a 4mm Allen key as a lever tighten the clutch nut (4).
3. Using the handwheel wind the valve fully clockwise. During this operation the over travel guide will rotate to the right and operate the right-hand bank of switches.
4. Continue winding the handwheel clockwise until the valve comes to a mechanical stop.

The fully clockwise end of travel Limit Switches are now set.

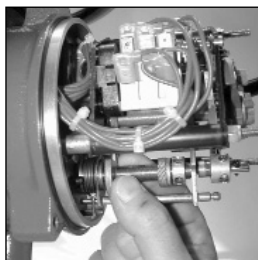


Fig. 8.4

Setting Anticlockwise Limit (Valve Usually Open)

1. Wind the handwheel anticlockwise until the valve comes to a mechanical stop. **DO NOT back wind the handwheel.** The actuator will automatically stop before the valve open position is reached.
2. Refer to Fig. 8.5. Pull over travel guide (8) in a clockwise direction until it comes hard up against its stop. The left hand bank of switches will operate.

3. With over travel guide still held against the stop, run stop nut (2) clockwise down screwed shaft until it comes hard up against travelling nut (6).
4. Push washer (3) down the screwed shaft until it is against stop nut then run lock nut (1) down until it clamps both nuts and washer together.



Fig. 8.5

5. Lightly tighten locknut (1).
6. Release pressure on over travel guide. The guide should stay put and switches should not be seen or heard to reset. If the switches reset, the setting anticlockwise limit procedure must be repeated.

The Anticlockwise Limit switches are now set.

By following the above procedure exactly, you have ensured:

1. That the switches are set to cut off the motor before the valve reaches its end of travel and that the motor has time to come to rest.
2. That manual operation of the valve can never alter the switch operating point which you have set.



Fig. 8.6

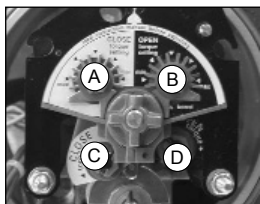


Fig. 8.7

8.2 Selecting Torque or Limit Priority

The actuator can be set to close on Torque for seating valve types or limit for non-seating valve types.

Where the valve requires back-seating on torque in the open position 'Open or Torque' should be set.

Selection of Torque or Limit end of travel priority is made by turning controls marked C & D in Fig 8.7. In the absence of specific valve makers' instructions refer to Figure.8.8 as a guide.

If in any doubt about the correct settings for the valve, select Limit in both directions.

Valve Type	Shut	Open
Wedge Gate Globe	Torque	Limit
Thru-Conduit Penstock	Limit	Limit
Sluice Parallel Slide Ball, Plug, Butterfly	Limit	Limit

Fig. 8.8

8.3 Selecting Torque Values

Controls A and B, in Figure.8.7, adjust the amount of torque the actuator will produce before the torque switch trips and stops the motor.

Ideally, only the minimum torque necessary to achieve tight shut off should be applied. In practice this value will vary from valve to valve and fluctuate with pressure, temperature, usage and service, etc.

Close Torque – In the absence of specific valve makers' instructions it is recommended that the Close torque knob be selected to the first marked graduation above minimum (approximately 55% of maximum rated torque). Be prepared to increase this torque value if the valve fails to reach the closed position or tight shut off is not achieved.

Open Torque – The Open torque knob should be selected to Max unless the valve makers' specific instructions recommend otherwise.

Open Torque Boost Position –

The Open torque selector knob has a position labelled Boost. When selected there will be no torque protection in the opening direction, allowing the actuator to produce torque in excess of rated. Boost is only to be used where a stuck valve will not open using maximum torque.

CAUTION – Double check that the Open Torque/Limit selector (D) is in the Limit position when using Boost.

NEVER SELECT BOOST WITH OPEN TORQUE/LIMIT SELECTOR IN THE TORQUE POSITION.

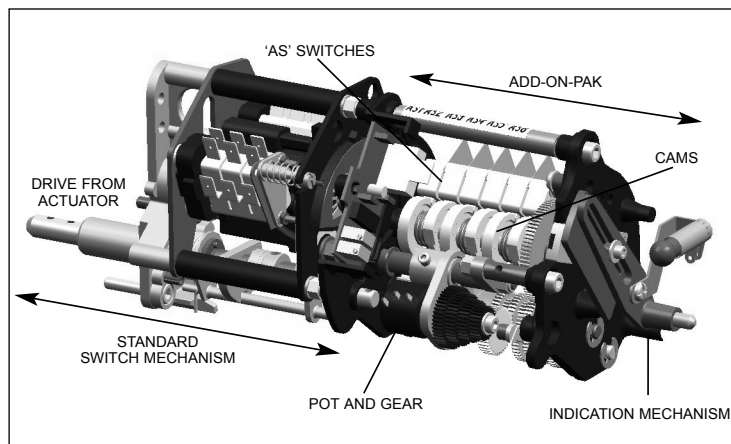


Fig. 9.0 Add-on-Pak

9.0 Add-on-Pak – Setting Instructions

The Add-on-Pak (AOP) is an optional extra providing continuous local cover indication. The Add-on-Pak may also include the following:

- 2 'AS' auxiliary indication switches
- 6 'AS' auxiliary indication switches
- 1k or 5k Ohm Potentiometer position feedback
- 4-20mA Current Position Transmitter (CPT) position feedback

Check the actuator wiring diagram for Add-on-Pak configuration.

The Add-on-Pak is driven from the switch mechanism via an adjustable gear train which must be set for the valve turns range. If the valve turns were quoted with actuator order, Rotork will have set the Add-on Pak gear train and therefore only site setting of cover indicator, auxiliary switches (if fitted) and analogue feedback device (if fitted) is required.

Instruction for setting the AOP

assume clockwise operation to close the valve. For anti-clockwise to close valves, read "open" for "close" etc. Refer to Section 10 for AOP turns adjustment.

9.1 Setting the Indication

1. Unscrew the three fixing screws and remove the AOP cover.
2. Close the valve fully and then open it three turns.
3. To set the closed indication of clock to close valves, push the top of the indication mechanism in a clockwise direction until it butts against the plastic stop moulded in the AOP front plate. A slipping clutch allows the indication mechanism to be moved.
4. Wind the valve closed to remove any backlash in the gear train. The closed indication position is now set.

5. To set the open indication, loosen the capscrew on the indication mechanism. The open stop plate is now free to rotate.

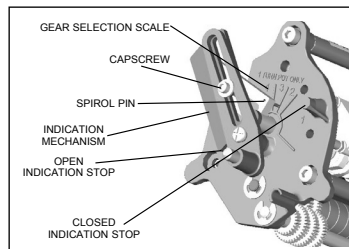


Fig.9.1 AOP Indication

6. Wind the valve to the fully open position.
7. Rotate the open stop plate anticlockwise until it butts against the open indication stop moulding.
8. Re-tighten the capscrew on the indication mechanism

9. The open position indication is now set.



Fig. 9.2 Open Indication stop

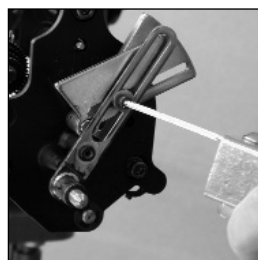


Fig. 9.3 Capscrew

9.2 Setting the Switches – Closing Direction

The switches can be independently adjusted to make or break at any position through the valve stroke including open and shut. This process takes place with the valve being moved from the open to the shut position. Identify the required switch (*refer to the wiring diagram*).

1. Run the valve to the required switch tripping position.
2. Locate the cam adjacent to the selected switch. The cam must be rotated to a position where the switch operates
3. The cam is adjusted by pushing it against its spring, and rotating it to make or break the switch (for make or break at selected valve position).
4. Continue to close the valve, setting the remaining switches required to operate in the closing direction.

9.3 Setting the Switches – Opening Direction

This process takes place with the valve being moved from the closed to the open position. Identify the required switch (*refer to the wiring diagram*).

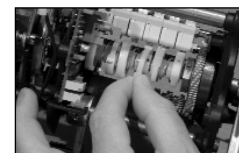


Fig. 9.4 Switch Cam Adjustment

1. Run the valve from the closed position to the required switch tripping position.
2. Locate the cam adjacent to the selected switch. The cam must be rotated to a position where the switch operates
3. The cam is adjusted by pushing it against its spring, and rotating it to make or break the switch (for make or break at selected valve position).

4. Continue to open the valve, setting the remaining switches required to operate in the opening direction.

9.4 Single Turn Pot

(refer to Figure.9.5) Ensure the AOP Indication has been set. (Refer to 9.1)

1. Fully open the valve.
2. Locate the spirol pin in the indication mechanism. This pin will be lined up with a scale moulded in the front plate of the AOP.
3. The scale 1 to 4 relates to the four gears on the potentiometer. 1 = small gear 4 = large gear.
4. Loosen the pot-mounting bracket screw and disengage gear mesh.
5. Rotate the pot to a Mid position and re-engage the gear, corresponding to the scale (1 to 4), with the large gear on the AOP.

6. Tighten the screw on the pot-mounting bracket to secure the gears in mesh.

7. Run the valve closed. A slipping clutch will automatically set the potentiometer.

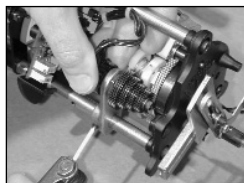


Fig. 9.5 Single Turn Pot

9.5 Current Position Transmitter (CPT) Setting

The CPT gives continuous indication with adjustment for Span and Zero settings and can be either internally or externally powered. A multi-turn potentiometer drives the CPT and will be set by Rotork according to the valve turns supplied at time of order.

The actuator torque and limit switches should be set (Refer to Section 8).

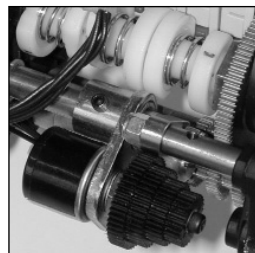


Fig. 9.6 Multi-turn Pot

Check that the remote connections to the CPT are suitable for internally or externally powered systems as applicable (see actuator wiring diagram).

With the valve closed, set the minimum required signal (4mA) by adjusting the Zero potentiometer on the CPT PCB.

Operate the valve to the fully open position and adjust the Span control to give the required maximum signal (20mA).

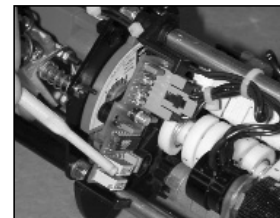


Fig. 9.7 CPT

The AOP cover can now be refitted using the three fixing screws.



Fig. 9.8 AOP Cover

10

Changing the AOP Gear Ratio

If the valve turns range was specified with actuator order the AOP will be factory set with the correct gear ratio.

To adjust the AOP gear train to suit the valve turns range:

1. Close the valve
2. Remove the three fixing screws securing the AOP cover and remove the cover ensuring the 'O' ring is not damaged.
3. Whilst observing the limit switch shaft, operate the actuator from one end of travel to the other and count the number of turns of the shaft.
4. Use the table in Figure 10.0 to determine the number of gear clusters and spacers you require.

Turns of Limit Switch Shaft	Number of Gear Clusters	Number of Drive Spacers
0.52-1.04	1	8
1.05-2.12	3	7
2.13-4.28	5	6
4.29-8.68	7	5
8.69-17.53	9	4
17.54-32.00	11	3

Fig. 10.0 Gear and Spacer Combinations for Required Valve Torque



Fig. 10.1 Limit Switch Shaft in Switch Mech

5. Check if the correct number of gear clusters and spacers are fitted to your AOP. If the correct number is used, refer to Section 9 for AOP setting instructions.
6. Refer to Fig. 10.2. If the number of gear clusters and spacers is not correct remove the three capscrews located on the AOP frontplate, which secure to the pillars.
7. Refer to Fig. 10.3. Pull the frontplate away from the actuator. The frontplate with gear clusters and spacers will detach from the AOP backplate and pillars.
8. Remove the circlip and washer from the end of the lower shaft on the detached AOP frontplate.
9. Add/remove the required number of gear clusters and spacers, according to the table in Figure 10.0.
10. Replace the circlip and washer on the lower shaft on the detached section of the AOP frontplate.
11. Align the detached section with the rest of the AOP.
12. The cam shaft and shaft retaining the gear clusters, will engage first as shown in Figure 10.4.
13. Align the remaining shafts and push the AOP frontplate on to the pillars.
14. When fully located, secure the AOP with the three capscrews. **Refer to Section 9 for AOP setting instructions.**
15. Replace the cover and secure with the three fixing screws.



Fig. 10.2 AOP Front Plate Fixing Screws



Fig. 10.3 AOP Gear Clusters and Spacers

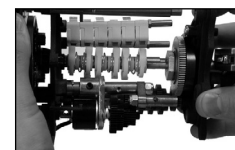


Fig. 10.4 AOP re-alignment and engagement

11

Electrical Start-up

11.1 Wiring Up

The actuator must be securely bolted to the valve (*refer to Sections 5 and 6*) and cabled/connected in accordance with Section 7 before start-up.

Check that the limit switches have been set (*see Section 8*).

11.2 Start-up – Syncroset Actuators

Syncroset actuators require a pair of reversing contactors to switch the 3-phase power supply to the actuator for motor directional control.

The Torque/Limit switches supplied in the actuator must be wired **correctly** into the control circuits of the reversing contactors.

To check the integrity of the Torque/Limit switches in the contactor control circuit:

1. Determine the valve closing direction – clockwise or anticlockwise (*refer to handwheel label*).
2. Engage Hand drive and wind handwheel until valve is in a Mid Travel position. Lock the Hand auto lever down in hand position (*refer to Fig 11.0*).

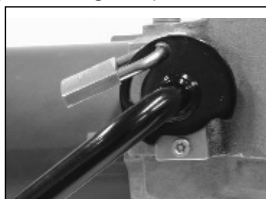


Fig. 11.0

3. If there are no Local control Open/Stop/Close buttons adjacent to the actuator then a communications link must be set up between site and remote control centre.
4. Select close and the motor should be heard to run but will not drive the valve.



Fig. 11.1

5. Operate the Close limit switch by rotating the front plate to stop the motor. Rotate clockwise for clockwise-to-close valves and anticlockwise for anticlockwise-to-close valve.
6. If the motor does not stop, rotate the front plate in the opposite direction. If the motor stops, then the Closed limit switch is wired into the Open contractor circuit. Correct the wiring and re-test. If operating both the open and closed switches does not stop the motor, then neither switch is connected into the contractor circuits. Correct the wiring and re-test.

7. Prove the Open limit switch in the same manner then remove the lock from the hand auto lever and check the phase rotation, (*refer to Fig 11.4*).

11.3 Phase Rotation Check – Syncroset Actuators

1. With the valve still in a mid travel position select Closed and check that output shaft is rotating in the closed direction as indicated by the arrow on the handwheel.

2. If the valve starts moving in the opening direction, stop the actuator immediately.

If there are no local controls, push down and engage then hold down the hand/auto lever until the remote stop button is operated. To correct the phase rotation, electrically isolate the 3-phase power supply and transpose any two of the three supply cables at actuator power terminals 1-2-3.

12**Troubleshooting**

3. When correct rotation is achieved run actuator to full limits of travel in the open and closed directions.

4. Apply full working pressure to the valve. If full travel is not achieved in the closing direction an increase of closing torque may be needed (*refer to Section 8.3*).

11.4 Syncropak Actuators

The units do not require externally fitted motor reversing contactors as they are an integral part of this type of actuator. A permanent 3-phase power supply is required on terminals 1-2-3.

The Syncropak units are not phase sensitive therefore a phase rotation check is not required. The unit will always rotate in the correct direction.

For remote control and indication connections check the supplied wiring diagram.

12.1 Syncropak Actuators

Check that the clutch lever is not padlocked in hand before troubleshooting unless you wish to run the motor without driving the valve.

12.2 Actuator Fails to Start on Remote Control

The packaged controls of Rotork Syncropak make fault location simple. Set the selector switch to Local and switch on the power supply, at which point the indication lamp should light. If the actuator starts correctly in each direction when the pushbutton is turned, the fault can only be in the remote control circuit.

12.3 Actuator Fails to Start on Local Control

Set the selector switch to Local and switch the power on. If the actuator fails to start, remove the terminal cover and check that all three phase terminals are live with the correct voltage as indicated on the nameplate.

If the motor is very hot, the thermostat will have tripped. Allow the motor to cool and the thermostat to auto-reset.

12.4 Actuator Fails to Start – Syncroset Actuators

Check remote contact circuits and operation. Contactors switch the supply to the actuator motor.

12.5 Valve Jammed – All Actuators

Likely Causes:

1. Reversed phase rotation/incorrect rotation (not applicable to Syncropak - (*Refer to Section 11*)).
2. Limit switches not set. (*Refer to Section 8.*)

To free valve jammed open

Manual operation of the handwheel utilising the hammer-blow mechanism should be sufficient to unjam the valve.

To free valve jammed shut

Loosen the mounting bolts evenly to release thrust. Free the valve manually using the handwheel and retighten the mounting bolts.

12.6 Valve Not Seating Correctly

1. The Close Torque/Limit selector incorrectly set for valve type - (*Refer to Section 8*).
2. The Close Torque setting is too low. Increase as necessary - (*Refer to Section 8*)

12.7 Actuator Runs Without Driving Valve – Likely Causes

1. Clutch lever is padlocked in Hand. Refer to Section 4.
2. Drive bush not correctly secured in place. Refer to Section 5.

13**Lubrication and Maintenance****13.1 Oil**

Unless specially ordered for extreme climatic conditions, Rotork actuators are dispatched with gearcases filled with SAE 80EP oil suitable for ambient temperatures ranging from -22°F/-30°C to 160°F/70°C.

Food grade lubricating oil is available as an alternative: contact Rotork.

13.2 Lubrication

The AWT actuator is factory filled for life with lubricating oil SAE 80EP. Under normal circumstances there is no requirement to replace or top up the actuator gearcase oil.

It is essential that valve components such as threaded stems, drive nuts, guides etc are kept clean and lubricated.

13.3 Maintenance

Every Rotork actuator has been fully tested before dispatch and will give years of trouble-free operation providing it is installed, sealed and commissioned in accordance with the instructions given in this publication.

Covers should not be removed for routine inspection as this may be detrimental to the future reliability of the actuator.

The AWT Syncropak pushbutton cover should not be removed as the module contains no site-serviceable components. All electrical power supplies to the actuator must be isolated before any maintenance or inspection is carried out.

Routine maintenance should include the following:

- Check actuator to valve fixing bolts for tightness.
- Ensure valve stems and drive nuts are clean and properly lubricated.
- If the valve is rarely operated, a routine operating schedule should be set up.

ActuatorNett Size	Weight kg / lb	Syncroset	Syncropak	Oil Capacity litres / pt.-US
10A	33 / 73		23 / 51	0.3 / 0.63
12A	33 / 73		23 / 51	0.3 / 0.63
18A	33 / 73		23 / 51	0.3 / 0.63
19A	53 / 117		23 / 51	0.8 / 1.7
20A	53 / 117		43 / 95	0.8 / 1.7
25A	53 / 117		43 / 95	0.8 / 1.7
35A	83 / 183		73 / 161	1.1 / 2.3
40A	134 / 296		138 / 304	7.5 / 15.8
70A	176 / 388		217 / 479	7.0 / 14.7
90A	176 / 388		217 / 479	7.0 / 14.7
91A	213 / 470		217 / 479	7.0 / 14.7
95A	176 / 388		217 / 479	7.0 / 14.7

Fig. 13.0 Actuator Weights and Oil Volumes

If your Rotork actuator has been correctly installed and sealed, it will give years of trouble-free service.

Should you require technical assistance or spares, contact your local Rotork representative or the factory direct at the address on the nameplate, quoting the actuator type and serial number.

Algeria

Tel: + 213 6 37 4854
Fax: + 213 6 37 2613
E-Mail:

Argentina

Tel: +54 11 4755 5560/4753 7533
Fax: +54 11 4755 5560/4753 7533
E-Mail: metalart@ciudad.com.ar

Australia

Rotork Company HQ
Tel: +61 3 53 381566
Fax: +61 3 53 381570
E-Mail: mail@rotork.com.au

Australia Brisbane

Rotork Company
Tel: +61 7 3373 2050
Fax: +61 7 3255 5388
E-Mail:

Australia Sydney

Rotork Company
Tel: +61 2 9 567 2735
Fax: +61 2 9 567 2739
E-Mail:

Australia

Western Australia Agent

Tel: +61 8 9314 1827
Fax: +61 8 9314 1837
E-Mail: sales@pipact.com.au

Austria

Agent

Tel: +43 7224 66008
Fax: +43 7224 66008
E-Mail: kilches_keg@magnet.at

Bahrain

Rotork Regional Office

Tel: +973 791 976
Fax: +973 791 976
E-Mail: hmrotork@batelco.com.bh

Bahrain

Agent

Tel: +973 727790
Fax: +973 727811
E-Mail: aeradio@batelco.com.bh

Belgium

Agent

Tel: +32 2 7263300
Fax: +32 2 7263633
E-Mail: prodim@brutele.be

Bolivia

Agent

Tel: +591 3 532615
Fax: +591 3 552528
E-Mail: inca@roble.entelnet.bo

Brazil

Agent

Tel: +55 71 235 6588
Fax: +55 71 235 3299
E-Mail: bahia@fluxopet.com.br

Brunei

Agent

Tel: +673 3 336122
Fax: +673 3 336142
E-Mail: cnets@brunet.bn

Canada

Rotork Company HQ

Tel: +1 403 569 9455
Fax: +1 403 569 9414
E-Mail: info@rotork.ca

Canada

Edmonton

Rotork Company
Tel: +1 780 449 6663
Fax: +1 780 449 6578
E-Mail: info@rotork.ca

Canada

Montreal

Rotork Company
Tel: +1 514 355 3003
Fax: +1 514 355 0024
E-Mail: info@rotork.ca

Canada

S.W. Ontario

Rotork Company
Tel: +1 519 337 9190
Fax: +1 519 337 0017
E-Mail: info@rotork.ca

Canada

Toronto

Rotork Company
Tel: +1 905 602 5665
Fax: +1 905 602 5669
E-Mail: info@rotork.ca

Caribbean (Puerto Rico)

Agent

Tel: +1 787 751 4415
Fax: +1 787 250 1842
E-Mail:

Chile

Agent

Tel: +56 2 441 1033/699 2001
Fax: +56 2 441 1023
E-Mail: valvulas@ineco.cl

China

North/Beijing

Rotork Company
Tel: +86 10 6497 4142/94590
Fax: +86 10 6499 4591
E-Mail: rotorkbj@public3.bta.net.cn

China

Shanghai

Rotork Company
Tel: +86 21 6478 5015
Fax: +86 21 6478 5035
E-Mail: rotorksh@public6.sta.net.cn

China

Sichuan

Rotork Branch
Tel: +86 28 6521191
Fax: +86 28 6521056
E-Mail: rotorkcd@mail.sc.cninfo.net

China (South)

Guangzhou

Rotork Branch

Tel: +86 20 81320500
Fax: +86 20 81320499
E-Mail: rotorkgz@public.guangzhou.gd.cn

China

Hong Kong

Rotork Company

Tel: +852 2520 2390
Fax: +852 2528 9746
E-Mail: rotorkhk@netvigator.com

Colombia

Agent Main Office

Tel: +57 1 621 27 40
Fax: +57 1 621 25 61
E-Mail: autom2@col1.telecom.com.co

Costa Rica

Agent

Tel: +506 228 8630/1
Fax: +506 289 4350
E-Mail: eiomega@sol.racsa.co.cr

Croatia

Agent

Tel: +385 1 4 577 217
Fax: +385 1 4 577 220
E-Mail:

Cyprus

Agent

Tel: +357 2 434131
Fax: +357 2 433416
E-Mail: ltdinfo@stavrinides.com.cy

Czech Republic**Agent**

Tel: +420 5 48321534
 Fax: +420 5 48216240
 E-Mail:

Denmark**Agent**

Tel: +45 32531777
 Fax: +45 32530504
 E-Mail:

Ecuador**Agent**

Tel: +593 2 222 585
 Fax: +593 2 569 950
 E-Mail: ecuador@cadrai.com

Egypt**Agent**

Tel: +20 2 2574830/2573456
 Fax: +20 2 2575695
 E-Mail: mamer@pyramid.com.eg

Finland**Agent**

Tel: +358 9 350 7410
 Fax: +358 9 374 3590
 E-Mail:

France**Rotork Company**

Tel: +33 1 43 11 15 50
 Fax: +33 1 48 35 42 54
 E-Mail: (name)@rotork.fr

Germany**Rotork Company**

Tel: +49 2103 95876
 Fax: +49 2103 54090
 E-Mail: info@rotork.de

Greece**Agent**

Tel: +30 1 6549433/6536610
 Fax: +30 1 6517810
 E-Mail: melco@otenet.gr

Hungary**Agent**

Tel: +36 76 495932
 Fax: +36 76 495936
 E-Mail: galatea@externet.hu

India**Bangalore****Rotork Factory**

Tel: +91 80 8395576
 Fax: +91 80 8391601
 E-Mail: rotorkblr@vsnl.com

India**Calcutta****Rotork Branch**

Tel: +91 33 282 3306
 Fax: +91 33 282 3473
 E-Mail: rotorkcal@vsnl.com

India**Chennai****Rotork Company**

Tel: +91 44 625 4219/625 8136
 Fax: +91 44 625 7108
 E-Mail: rotork@vsnl.com

India**Mumbai****Rotork Branch**

Tel: +91 22 5584578
 Fax: +91 22 5584540
 E-Mail: rotorkbom@vsnl.com

India**New Delhi****Rotork Branch**

Tel: +91 11 5616305
 Fax: +91 11 5502840
 E-Mail: rotorkdel@vsnl.com

Indonesia**Rotork Company**

Tel: +62 21 5806764
 Fax: +62 21 5812757
 E-Mail: rotork@indosat.net.id

Ireland (Northern)**Agent**

Tel: +44 28 90 779222
 Fax: +44 28 90 773727
 E-Mail:

Ireland (Southern)**Dublin Agent**

Tel: +353 1 2952182
 Fax: +353 1 2953713
 E-Mail:

Ireland (Southern)**Cork Agent**

Tel: +353 21 314 544
 Fax: +353 21 314 606
 E-Mail:

Italy**Rotork Company**

Tel: +39 02 45703300
 Fax: +39 02 45703301
 E-Mail: rotork.italia@rotork.it

Japan**Osaka****Rotork Company**

Tel: +81 728 35 7555
 Fax: +81 728 35 7548
 E-Mail:

Japan**Tokyo****Rotork Company HQ**

Tel: +81 3 3294 8551
 Fax: +81 3 3294 6460
 E-Mail: mail@rotork.co.jp

Jordan**Agent**

Tel: +962 6 581 9982
 Fax: +962 6 582 5818
 E-Mail: tcops@go.com.jo

Korea (South)**Rotork Company**

Tel: +82 331 265 0962
 Fax: +82 331 265 1369
 E-Mail: rotork@unitel.co.kr

Kuwait**Agent**

Tel: +965 241 5921
 Fax: +965 241 2485
 E-Mail: Unetcon@hotmail.com

Latvia**Agent**

Tel: +371 7 315086/315087
 Fax: +371 7 315084
 E-Mail: rino@mailbox.neonet.lv

Libya**Agent**

Tel: +218 21 47 72628/78598
 Fax: +218 21 47 72782
 E-Mail: cpsi@go.com.jo

Lithuania**Agent**

Tel: +370 7 202410
 Fax: +370 7 207414
 E-Mail: agava@kaunas.aiva.lt

Malaysia**East Malaysia****Agent**

Tel: +60 85 410079
 Fax: +60 85 419484
 E-Mail:

Malaysia**West Malaysia****Rotork Company**

Tel: +60 3 7880 9198
 Fax: +60 3 7880 9189
 E-Mail: rotork@rotork.com.my

Mexico**Agent**

Tel: +52 5 559 2959/2777
 Fax: +52 5 575 1092
 E-Mail: rotork@iwm.com.mx

Netherlands**Rotork Company**

Tel: +31 53 538 8677
 Fax: +31 53 538 3939
 E-Mail: alecto@introweb.nl

New Zealand**Auckland****Agent North Island**

Tel: +64 9 634 0456
 Fax: +64 9 625 2678
 E-Mail:

New Zealand**Christchurch****Agent South Island – Head Office**

Tel: +64 3 353 4665
 Fax: +64 3 353 4666
 E-Mail:

New Zealand**Wellington****Agent North Island**

Tel: +64 4 477 5070
 Fax: +64 4 477 5049
 E-Mail:

**Nigeria
Agent**
Tel: +234 1 4522955/523225
Fax: +234 1 4522887
E-Mail: cakasa3@linkserve.com.ng

**Norway
Stavanger
Agent HQ**
Tel: +47 51 844204
Fax: +47 51 844102
E-Mail:

**Norway
Bergen
Agent Sales Office/Workshop**
Tel: +47 56 312900
Fax: +47 56 312910
E-Mail:

**Norway
Oslo
Agent Sales Office**
Tel: +47 67 906120
Fax: +47 67 906472
E-Mail:

**Oman
Agent**
Tel: +968 601438
Fax: +968 699446
E-Mail: techsales@gpsoman.com

**Pakistan
Agent**
Tel: +92 21 5861509/5861510
Fax: +92 21 5874674
E-Mail: tumair@attglobal.net

**Peru
Agent**
Tel: +51 1 330 7728
Fax: +51 1 330 7728
E-Mail: autinsa@mail.cosapidata.com.pe

**Philippines
Manila Agent**
Tel: +63 2 7312610/7326125
Fax: +63 2 7312610
E-Mail: resi@evoserve.com

**Poland
Agent**
Tel: +48 22 723 1770
Fax: +48 22 723 1780
E-Mail:

**Portugal
Agent**
Tel: +351 21 486 43 25
Fax: +351 21 483 57 17
E-Mail: Lca.Lcaeng@clix.pt

**Qatar
Agent**
Tel: +974 44 19603
Fax: +974 44 19604
E-Mail: petrotec@qatar.net.qa

**Romania
Agent**
Tel: +40 44 114187/114664
Fax: +40 44 114664 Manual
E-Mail: technoplus@technoplus.ro

**Russia
Rotork Company**
Tel: +7 095 229 24 63
Fax: +7 503 234 91 25
E-Mail: rotork.russia@mtu-net.ru

**Saudi Arabia
Agent/J.V.**
Tel: +966 3 833 1661
Fax: +966 3 833 9369
E-Mail:

**Saudi Arabia
Rotork Company**
Tel: +966 3 858 1464
Fax: +966 3 858 1464
E-Mail: rotork@concept.net.sa

**Singapore
Rotork Company**
Tel: +65 4571233
Fax: +65 4576011
email:

**South Africa
Rotork Company**
Tel: +27 11 453 9741-3
Fax: +27 11 453 9894
E-Mail:

**Spain
Rotork Company**
Tel: +34 94 676 60 11
Fax: +34 94 676 60 18
E-Mail: rotork@rotork.es

**Sweden
Partille
Agent Head Office**
Tel: +46 53 3763952
Fax: +46 53 3763955
E-Mail: alnab@alnab.se

**Sweden
Saffle
Agent Local Office**
Tel: +46 533 763952
Fax: +46 533 763955
E-Mail: alnab@alnab.se

**Syria
Agent**
Tel: +963 31 230 289
Fax: +963 31 237 867
E-Mail:

**Taiwan
Agent**
Tel: +886 2 2577-1717
Fax: +886 2 2577-5588
E-Mail: jerdiing@ms24.hinet.net

**Thailand
Rotork Company**
Tel: +66 2 272 7165-6
Fax: +66 2 272 7167
E-Mail: mail@rotork.co.th

**Trinidad
Agent**
Tel: +1 868 6524889/6523422
Fax: +1 868 6522651
E-Mail: trinval@tstt.net.tt

**Turkey
Agent**
Tel: +90 216 327 34 71
Fax: +90 216 327 34 72
E-Mail: orhant@omasteknik.com

**U.K.
Head Office,**
Tel: +44 1225 733200,
Fax: +44 1225 333467
E-mail: mail@rotork.co.uk

**United Arab Emirates
Agent**
Tel: +971 2 632 5111
Fax: +971 2 621 1934
E-Mail: unitech@emirates.net.ae

**United States of America
Rotork Company HQ
Rochester**
Tel: +1 716 328 1550
Fax: +1 716 328 5848
E-Mail: info@rotork.com

**United States of America
Rotork Company
Duluth**
Tel: +1 770 623 6301
Fax: +1 770 623 6124
E-Mail: miguel.lopez@rotork.com

**United States of America
Chicago & Mid West
Rotork Company**
Tel: +1 815 436 1710
Fax: +1 815 436 1789
E-Mail:

**United States of America
Houston
Rotork Company**
Tel: +1 713 7825888
Fax: +1 713 7828524
E-Mail:

**United States of America
New York City
Rotork Company**
Tel: +1 716 328 1550
Fax: +1 716 328 5848
E-Mail: dave.littlejohns@rotork.com

**United States of America
North East
Rotork Company**
Tel: +1 814 835 8349
Fax: +1 814 835 8909
E-Mail:

United States of America
Northern California
Rotork Company
Tel: +1 707 769 4880
Fax: +1 707 769 4888
E-Mail:

United States of America
Northwest Area
Rotork Company
Tel: +1 253 838 5500
Fax: +1 253 838 5400
E-Mail: info@rotork.com

United States of America
Philadelphia
Rotork Company
Tel: +1 609 223 1926
Fax: +1 609 223 9012
E-Mail: charlie.haynes@rotork.com

United States of America
South Central Region
Rotork Company
Tel: +1 972 459 4957
Fax: +1 972 745 2041
E-Mail: skip.kuehn@rotork.com

United States of America
Southern California
Rotork Company
Tel: +1 949 348 2913
Fax: +1 707 769 4888
E-Mail:

Venezuela & N. Antilles
Rotork Company HQ
Tel: +58 2 212 5232/4208
Fax: +58 2 212 8050
E-Mail: rotorkvz@cantv.net

Venezuela & N. Antilles
Cagua
Rotork Company
Tel: +58 4 4635911
Fax: +58 4 4635911
E-Mail:

Venezuela & N. Antilles
Maracaibo
Rotork Company
Tel: +58 61 579315/492611
Fax: +58 61 579315
E-Mail: rotorkvgz@cantv.net

Venezuela & N. Antilles
Puerto La Cruz
Rotork Company
Tel: +58 281 268 0759
Fax: +58 281 266 3554
E-Mail:

Vietnam
Agent
Tel: + 84 8 84 62525
Fax: + 84 8 8423218
E-Mail: info@vam-net.com

Yemen
Agent
Tel: +967 1 272988
Fax: +967 1 271890
E-Mail: ssl@y.net.ye