Installation, Operation & Maintenance Instructions

ROTARY 1/4 TURN REVERSIBLE SPRING RETURN.

Suitable for use in safe area and hazardous gas/dust atmospheres (ATEX / UKEX)

GENERAL SPRING RETURNS & INPUT/OUTPUT VARIANTS.

NOTE : FOR APPLICATIONS REQUIRING FUNCTIONAL SAFETY APPLICATION TO IEC 61508, REFER TO PRODUCT SAFETY MANUAL TD170 FOR RELEVANT DETAILS IN ADDITION TO DETAILS GIVEN IN THIS DOCUMENT.

Contents:

1. Spring Core Assembly.

The design of the Kinetrol reversible spring return contains the same clock spring type as the non-reversible design (described in TD129) and the working principle remains the same.

This version of the spring contains a core assembly to which the input and output devices can be added, removed or interchanged with various functional types without the need for a separate ‘keeper plate’. It includes a torque retaining feature (fixed and coupling stops). The fixed angle of travel within this module is 97° as standard - other angles are available on request.

Figure 1 below shows an open end view and cross-section through the reversible spring core module.

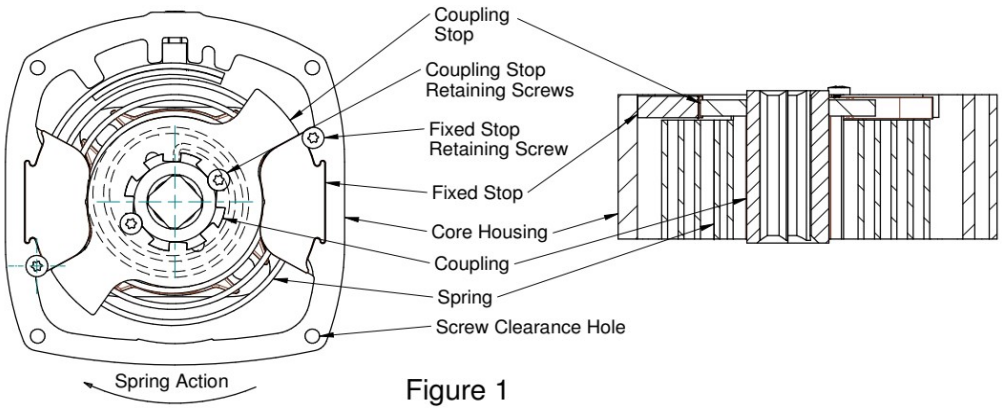


Figure 1

The spring torque ensures the coupling stop rests against the two fixed stops as shown above. The coupling stop is retained to the coupling by two fasteners. The fixed stops are located in slots in the housing and retained by two of the same pan head screws. The coupling contains a through square drive which allows the spring to be fitted either way around (ie for clockwise or anticlockwise movement).

The stops may be removed for spring tension adjustment. The description of how to achieve this is described in Chapter 4.

The core housing contains 4 equispaced screw clearance holes which allow the module to be clamped between the input and output components as described in the following chapters.

2. Actuator Input.

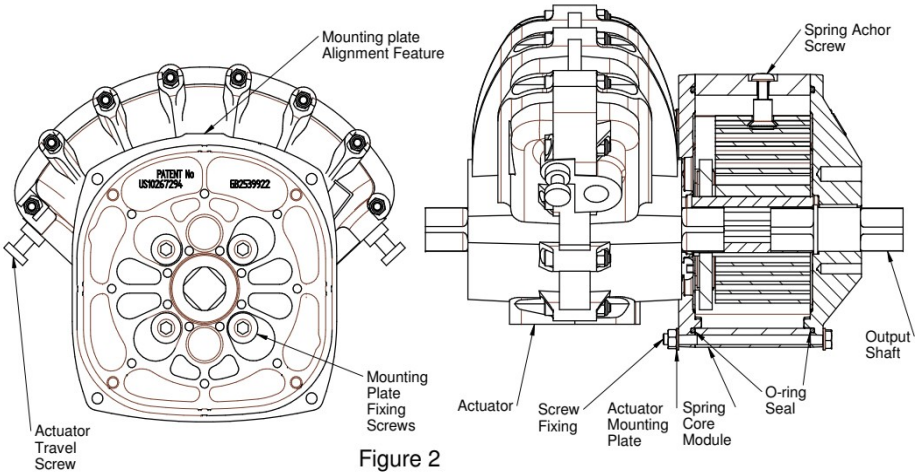


Figure 2

To assemble the Kinetrol actuator to the Reversible Spring:

2.1 Securely support the actuator with the drive square facing upward (preferred method fit the other side of actuator to a bracket and secure bracket to a work bench.
2.2 Fit the mounting plate with o-ring and fixing screws. Ensure the alignment feature points towards the large radius of the actuator. Fit supplied screws using low strength thread adhesive and torque tighten to TD111.
2.3 Turn the actuator output square to unpressurised end of spring stroke and unscrew travel screw at this end, counting three complete turns.
2.4 Fit the spring core module o-ring seal correctly in its groove in the baseplate and slide the spring core module over the actuator square ensuring the spring anchor screw aligns with the baseplate alignment feature.
2.5 Fit the desired output drive (see section 3) to the spring core module and whilst holding the nuts and washers in place tighten the four fixing screws using low strength thread adhesive to the torque shown in Table 1 below.
2.6 Return the actuator travel screw (3 turns) to its original position and lock.
2.7 Pressurise the actuator to check the spring functions correctly.

CAUTION:
Never hammer or use other undue force on spring diecast mounting plate or output drive flanges.

Module Fixing Screw Torque				
		Spring Size		
			07	
Screw Torque	(Nm)		5.7	
	(ibfin)		50	

Table 1

3. Male & ISO Female Flange Assemblies.

In Figures 3 & 4, the output drives can be seen configured to suit the application. These are most common Kinetrol outputs options but others are available on request.

To assemble:

3.1 The coupling must first be inserted into the flange bearing and care must be taken not to damage the shaft seal.
3.2 Insert the static o-ring seal into the groove in the flange.
3.3 Fit the 4 corner screws through the flange holes.
3.4 Refer to Input Drive section in 2.5 for remaining assembly sequence.

Note: It is essential that the full number of screws are used when mounting the spring interface to valve and all tightened evenly. Refer to TD111.

Mounting hole sizes – Kinetrol Male Spring

Model	Number of Holes	ISO Thread	Depth of Thread	ANSI Thread	Depth of Thread
07	4	M8 x 1.25	16mm	5/16-18 UNC	5/8"

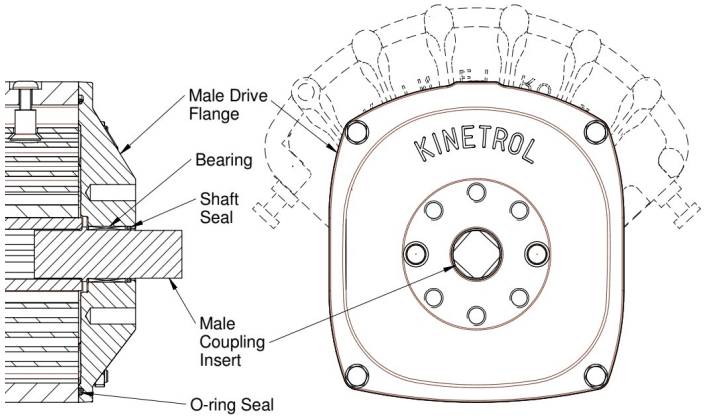
Table 2

Mounting hole sizes for ISO adaptor addition refer to Kinetrol technical data sheet TD128.

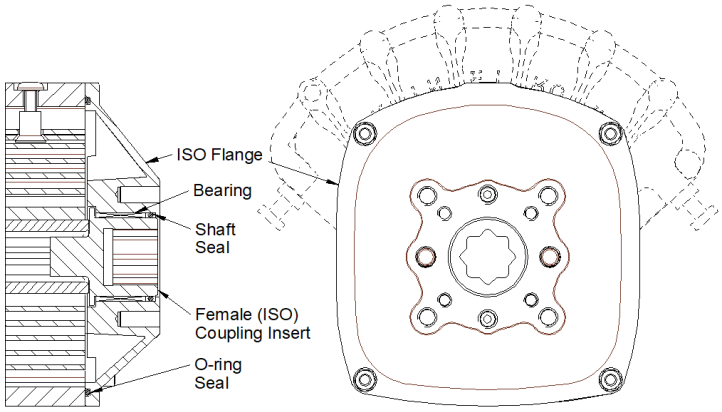
Mounting hole sizes – DIN/ISO Spring

Model	Number of Holes	ISO Thread	Depth of Thread	PCD
073	4	M6 x 1	10mm	50mm
	4	M8 x 1.5	13mm	70mm

Table 3



Kinetrol Male Drive Flange Assembly
Figure 3



Female (ISO) Drive Flange Assembly
Figure 4

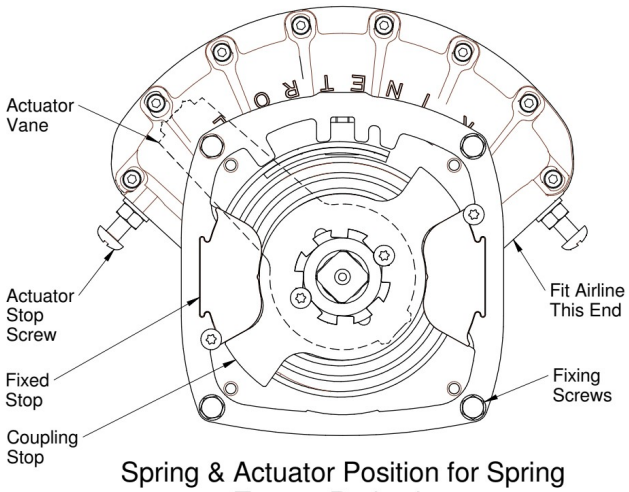
4. Spring Tension (Torque) Adjustment.

WARNING: The wound steel spring stores large amounts of energy which, if suddenly released, can be dangerous. If in doubt contact Kinetrol.

The following procedure allows the spring tension to be reduced by ¼ turn:

4.1 Detach from valve or mechanism and ensure the spring unit is securely attached to a Kinetrol actuator with a mounting plate and output flange as described in section 2 with spring internal stops facing away from the Actuator as shown in Figure 5.
4.2 Secure on a work bench or in a vice with the spring facing upward.
4.3 Wind both actuator stops outwards by 5 full turns so the spring stops retain the spring torque.
4.4 Remove the output flange, coupling insert and spring core module.
4.5 Move the actuator vane anti-clockwise 90° as shown in Figure 5.
4.6 Refit the spring core module as shown in Figure 5 and 4 spring fixing screws and tighten lightly.
4.7 Fit an airline to the actuator air port shown and slowly pressurise (not to exceed 7bar (100psi)) to drive the coupling stop from the fixed stops.
4.8 Remove the coupling stop retaining screws and remove the coupling stop from the spring coupling.
4.9 Reduce the air pressure until the vane moves a few degrees in a clockwise direction.
4.10 Replace the coupling stop at 90° from where it had previously been positioned and refit the two retaining screws with low strength thread adhesive.
4.11 Reduce the air pressure to zero to allow the spring stops to retain the lowered spring torque, remove the air-line and reinstate the actuator screw stop position.
4.12 The spring torque can be reduced further by a repeat of points 4.2 to 4.8 or reconfigured to desired application (eg manual handle).

Note: This is the procedure recommended for spring core tensioning for all applications including manual handle & fire-fail-safe.



Spring & Actuator Position for Spring Torque Reduction
Figure 5

5. Manual Handle Input Assembly.

The manual handle option is intended to allow manual override of the spring action for temporary operation. It is achieved by the operator pulling on the handle whilst stood in a stable position and rotating the handle by 90°.

Care must also be taken during handle release as the rotation of the handle without control will result in fast handle movement which could be hazardous to anything in its path. Sudden release might also result in permanent deformation of the spring assembly or valve and attachment.

The handle option has provision for a padlock to be fitted through holes in the handle and base-plate. This allows the handle to be secured to prevent unauthorised operation. The pad-lock must have a 6mm max shackle diameter with a minimum shackle length of 38mm.

The handle is manufactured from stainless steel and handle grip from vinyl.

Assemble the manual handle from a spares kit of parts as follows:

5.1 Slide the handle over the shaft insert.
5.2 Slide the shaft insert into the base-plate and through the seal and bearing (take care not to damage o-ring seal) and retain using the external circlip.
5.4 Fit the base-plate/handle assembly to the spring core assembly ensuring the flange o-ring is in place and the handle is pointing in the desired direction.
5.5 Fit the output drive (see section 3) to the spring core assembly. Whilst holding the nuts and washers in place tighten the four fixing screws using low strength thread adhesive to the torque stated in Table 1.

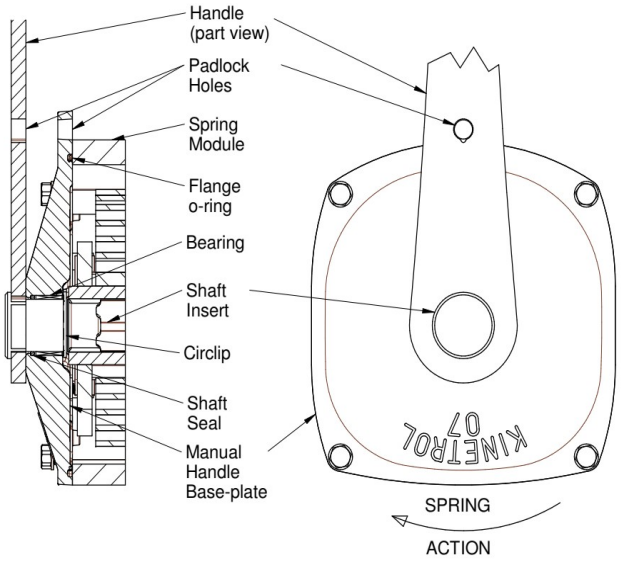


Figure 6

6. Fire Fail-safe input Assembly.

Figure 7 shows two views of the Fire fail-safe option which is mounted to a 'male drive flange' via a mount plate. A shaft insert fits through the main lever and through the flange bearing & seal and is retained by a circlip.

The lever acts against a connecting lever which in turn applies tension to the fusible link. In the event of an environmental temperature greater than the link solder melting point, the link splits into two and the spring rotates the output to a safe position.

The parts are reversible by simply reversing the connecting lever and fusible link in their respective mounting holes.

Fusible links are available for 74° & 100°C as standard.

To assemble:

6.1 Pass the spring module fixing screws & washers through the flange outer holes.
6.2 Fit the mounting plate to the drive flange using low profile head screws and thread adhesive in the desired orientation.
6.3 Pass the shaft Insert through the lever and add spacer.
6.4 Pass the shaft Insert through the bearing & shaft seal (take care not to damage the seal) and fit Circlip.
6.5 Fit the output drive (see section 3) to the spring core module. Whilst holding the nuts and washers in place tighten the four fixing screws using low strength thread adhesive to the torque stated in Table 1.

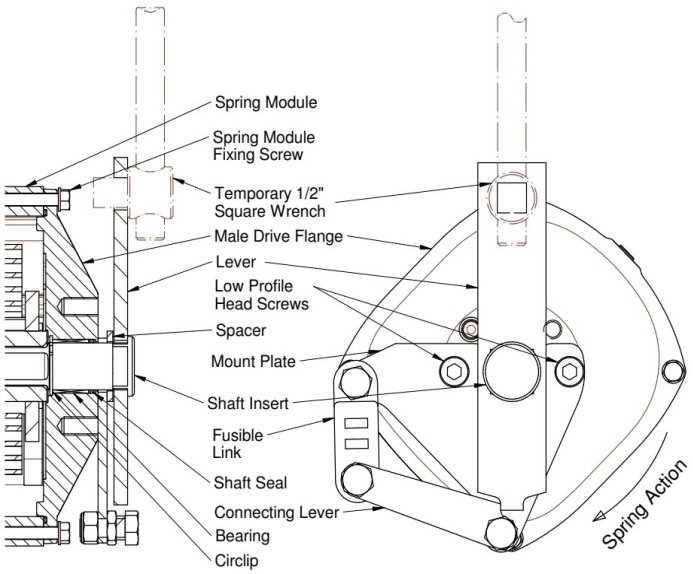


Figure 7

7. Materials Data.

7.1 Spring Module.

Spring Housing – Aluminium Alloy
Inner Coupling – Aluminium Alloy
Spring & Backing Plate – Carbon Spring Steel
Coupling Stop – Low Carbon Steel
Fixed Stop – Low carbon Steel
Grease

7.2 Actuator Mounting Input Option.

Baseplate – Aluminium Alloy
Fixing Screws – A4 Stainless Steel
Flange Seals. - Low Temperature (-54 to -60°C) – EPDM Rubber
Standard Temperature (-40 to +80°C) – NBR Rubber
High Temperature (-20° to 100°C) – Fluorocarbon Rubber

7.3 Male & Female Output Flanges.

Output Flange – Aluminium Alloy
Coupling Insert – 303 Stainless Steel.
Flange & Shaft Seal - Low Temperature (-54 to -60°C) – EPDM Rubber
Standard Temperature (-40 to +80°C) – NBR Rubber
High Temperature (-20° to 100°C) – Fluorocarbon Rubber
Bearing – PTFE/Bronze backed Steel.

7.5 Manual Handle Input Option.

Flange – Aluminium Alloy
Coupling Insert – 303 Stainless Steel
Handle – 304 Stainless Steel
Handle Cover – Charge dissipative PVC
Flange & Shaft Seal -Low Temperature (-54 to -60°C) – EPDM Rubber
Standard Temperature (-40 to +80°C) – NBR Rubber
High Temperature (-20° to 100°C) – Fluorocarbon Rubber
Bearing – PTFE/Bronze backed Steel.

7.6 Fire-Fail-safe Input Option.

Flange – Aluminium Alloy
Coupling Insert – 303 Stainless Steel
Lever 304 Stainless Steel
Rubber Buffer – Polyurethane
Flange & Shaft Seal - Low Temperature (-54 to -60°C) – EPDM Rubber
Standard Temperature (-40 to +80°C) – NBR Rubber
High Temperature (-20° to 100°C) – Fluorocarbon Rubber
Bearing – PTFE/Bronze backed Steel.
Link -304 Stainless Steel
Thermal Link – Zinc Plated Steel (2 pieces) joined by specific melting point solder.

8. Labelling (ATEX & UKEX).

Kinetrol Springs with options described in this manual are approved for use in areas where explosive dusts or gases are present.

The marking shown below is contained within a label attached to the centre module. The label also indicates the direction of spring action with a warning about the potential dangers of energy stored in spring assemblies.

The first line of the label shows an 'X' which indicates Special Conditions for Safe Use. These are:

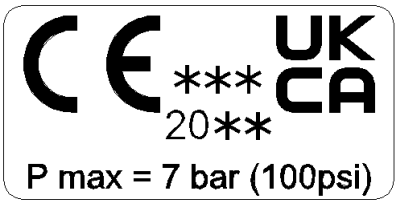
1) The maximum rubbing speed of any part of the assembly should not exceed 4 m/s.
2) Do not allow dust to build up on external surfaces.

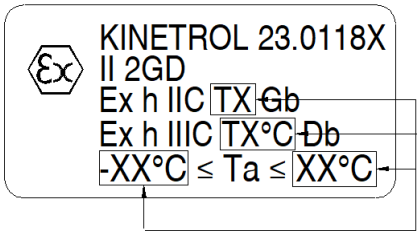
Ambient temperature range is dependent on the input/output components chosen and seals specified in them. The spring module has no rubber or plastic parts fitted and therefore the ambient temperature limitations are determined by the input and output assemblies fitted. These are listed as follows:

Actuator fitment: Standard seals: -40°C < Ta < +80°C. Fbr seals: -20°C < Ta < +100°C. Low temperature: -54°C < Ta <+60°C

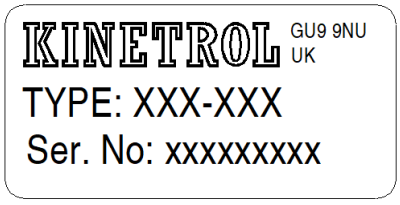
Manual Handle: Standard seals: -40°C < Ta < +80°C. Low temperature: -54°C < Ta < 60°C

Fire-fail-safe: 74°C Link Yield: -40°C < Ta < + 38°C 100°C Link Yield: -40°C < to < 66°C





Dependant on input / output components



9.Part Codes & Spare Parts.

ITEM NO.	DESCRIPTION	SPARE PART NUMBERS FOR REVERSIBLE SPRING MODULES							
					074 ISO	077 ANSI			
1	Spring Core Assembly				074-0R0	077-0R0			
2	Actuator Mounting Plate & Fixings				SPR074-0001	SPR077-0001			
3	Kinetrol Male Output Flange Assembly				SPR074-0002	SPR077-0002			
4	ISO Female Output Flange Assembly				SPR073F002	SPR077F002			
5	Manual Handle Input Assembly				SPR074-1006	SPR077-1006			
6	Fire Fail-safe Input Assembly 74°C Link				SPR074-0074	SPR077-0074			
7	Fire Fail-safe Input Assembly 100°C Link				SPR074-0100	SPR077-0100			