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### 01 Introduction

This manual provides information on installation, operation, and maintenance procedures and related instructions for the ROTEX Infinity ECV Series spring return and double acting pneumatic actuators.

### 02 Technical Specifications

**MOUNTING:** In accordance with ISO 5211/DIN 3337/VDI/VDE 3845 NAMUR.

**DIMENSIONS:** As per Rotex Infinity Technical Brochure.

**MATERIALS OF CONSTRUCTION:** See Section 03 of this manual.

**OPERATING PRINCIPLE** (Standard Mode):

**Double Acting:**

Both ports A and B are used as inlet ports.

When air is supplied to Port A, the pistons #3 are moved *away from each other*, and the pinion #4 is rotated CCW.

When air is supplied through Port B, the pistons come closer and return to their home position, rotating the pinion CW.

**Spring Return** [Fail Closed]:

Port A is used as inlet.

When air is supplied to Port A, the pistons #3 are moved away from each other, the springs #16 are compressed, and the pinion #4 is rotated CCW.

When the air is exhausted through Port A, the springs return the pistons to the home position, rotating the pinion CW.

**OPERATING MEDIUM:**

Air or non-corrosive gas compatible with the internal materials of construction.

Dry or lubricated.

Gas must be clean and filtered to minimum 100 micron level.

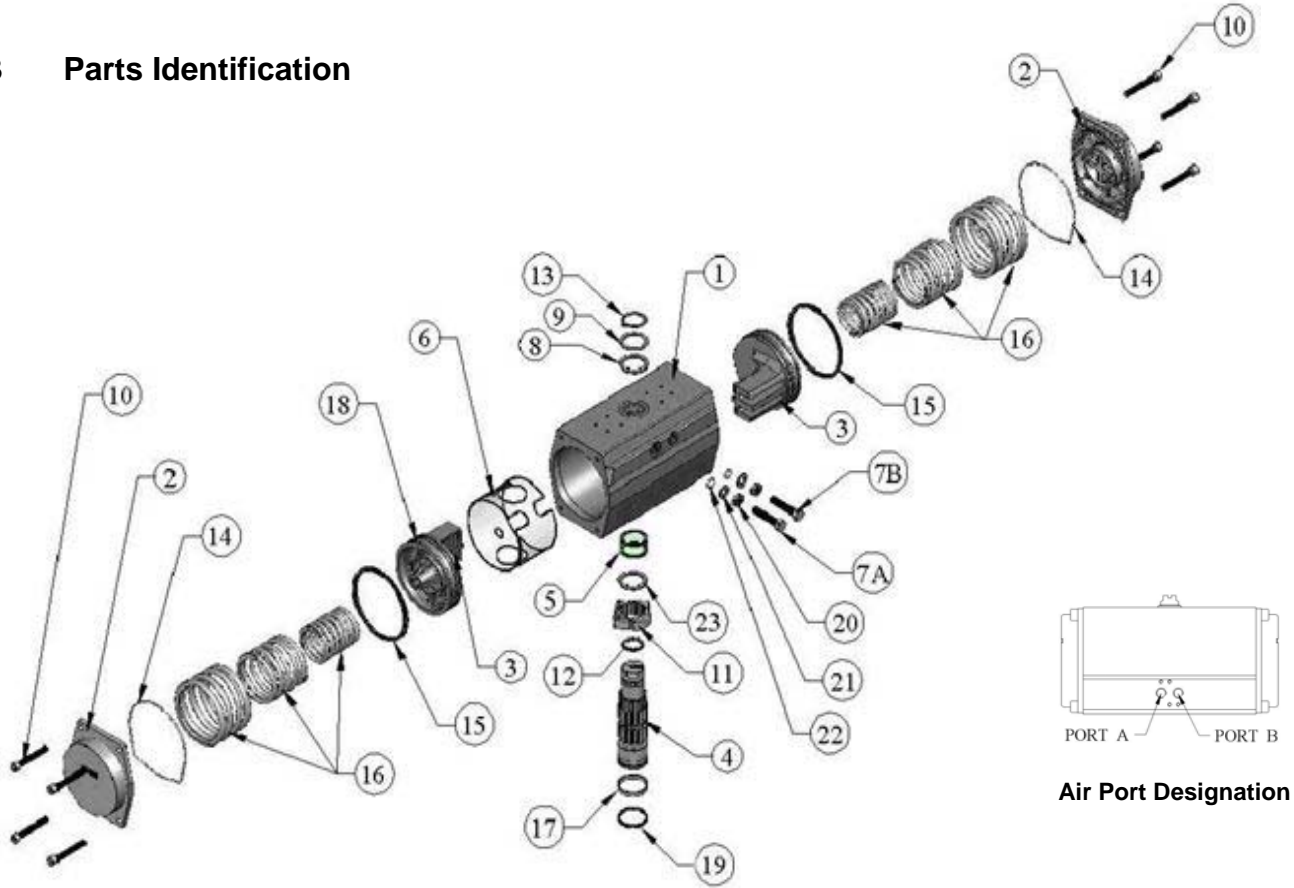
**OPERATING CONDITIONS:**

Maximum 120 psi, 180° F (8.3 Bar, 82° C)

**OPERATING CONTROLS:**

Stroke adjustment using stroke adjustment screws #7A/7B.

### 03 Parts Identification



PART NO	DESCRIPTION	MATERIAL OF CONSTRUCTION	PART NO	DESCRIPTION	MATERIAL OF CONSTRUCTION
1	BODY	ALUMINUM	12	TOP PINION SEAL	POLYETHYLENE
2	END COVER	ALUMINUM	13	EXTERNAL CIRCLIP	SPRING STEEL
3	PISTON WITH RACK	ALUMINUM	14	COVER SEAL	BUNA
4	PINION	STEEL/EN	15	PISTON SEAL	POLYETHYLENE
5	TOP PINION BEARING	POLYACETAL	16	SPRINGS	SPRING STEEL GR3
6	CENTER BORE SLEEVE	POLYACETAL	17	BOTTOM PINION BEARING	POLYACETAL
7A	STROKE ADJUSTMENT SCREW	STEEL	18	PISTON BEARING	POLYACETAL
7B	STROKE ADJUSTMENT SCREW	STEEL	19	BOTTOM PINION SEAL	POLYETHYLENE
8	WASHER	POLYACETAL	20	LOCK NUT	STEEL
9	WASHER	304SS	21	WASHER	STEEL
10	HEX SOCKET SCREW	304SS	22	O RING	NBR
11	CAM INSERT	STEEL	23	CAM WASHER <sup>1</sup>	POLYACETAL

<sup>1</sup> Cam washer only on ECV Models 80, 110, 125, and 175

## 04 Installation

### NOTES:

- N1 > Ensure the installation meets the legal and regulatory requirements of the country and state of use.***
- N2 > Until the actuator is installed, keep it in its original packaging and stored between 40° F and 120° F (4° C and 49° C).***
- N3 > Ensure the operating medium meets the above requirements.***
- N4 > Use proper rigging to handle the actuators weighing more than 60 lb (27 kg) to avoid personal injury.***

### 04.1 Mounting

- STEP 1** Keep the valve on which the actuator is to be mounted in home position, until the installation is complete. Ensure that valve is secure.
- STEP 2** Fix the brackets on the valve.
- STEP 3** Ensure the coupling slides on the stem smoothly without any play.
- STEP 4** Check the other end of the coupling with the actuator for the length of engagement.
- STEP 5** Mount the actuator (*Refer Note N4 above*) on the bracket with fasteners.
- STEP 6** Tighten all the fasteners to the torque as recommended by the fastener manufacturer.

### 04.2 Adjustment of End Stops

#### NOTES:

- N1 > All actuators are factory set to 0 and 90 degrees. Even minor adjustments of the stroke adjustment screws (#7A and 7B) will result in over travel or incomplete travel of the pinion.***
- N2> Only loosen the lock nut. Don't remove it fully.***
- N3> Don't tighten the stroke adjustment screw #7A or 7B more than the maximum limit of adjustment – if over-tightened, the screw may hit the piston #3 and cause damage.***

**CLOSING:** For 0 Degrees, Adjust #7B  
Turn counter-clockwise to travel further (over travel)  
Turn clockwise to limit the travel.  
When adjustment is set, tighten lock nut #20 on adjustment screw.

**OPENING:** For 90 Degrees, Adjust #7A  
Turn counter-clockwise to travel further (over travel)  
Turn clockwise to limit the travel.  
When adjustment is set, tighten lock nut #20 on adjustment screw.

#### **SAFETY CHECK FOR STROKE ADJUSTMENT SCREW POSITION:**

Keep the piston in the home position.  
Tighten the stroke adjustment screw (clockwise direction) until the screw touches the inner wall of the piston.  
This is the maximum safe limit of adjustment of the stroke adjustment screw.

## **05 Operation**

- STEP 1** Provide air connections using proper fittings.
- STEP 2** Air supply must meet specifications on page 1.
- STEP 3** Ensure air supply pressure is regulated to ensure maximum air supply is not exceeded.
- STEP 4** Supply air to the actuator through a solenoid or manual air valve.

## **06 Maintenance**

### **06.1 Recommended Servicing**

#### **At 1,000,000 Cycles:**

- Apply grease on seals #1/6/12/14/15/19. DO NOT APPLY EXCESSIVE GREASE.
- Apply grease on rack #3 and pinion #4. DO NOT APPLY EXCESSIVE GREASE.
- Replace all plastic #5/6/18 and rubber parts #12/14/15/19.
- Inspect springs # 16 for any rust or deformity. Replace if necessary.

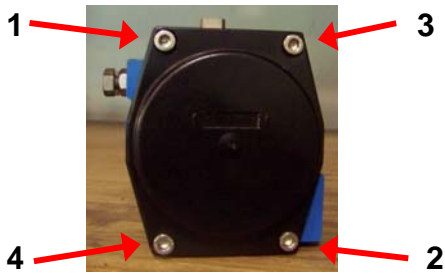
#### **NOTES:**

- N1 > Carry out maintenance involving disassembling of actuator in a safe indoor place free from dust, water.***
- N2 > Ensure that air supply has been disconnected.***
- N3 > Ensure proper lifting procedures are followed when moving or lifting actuators.***
- N4 > DO NOT use accessory mounting holes on top of actuator for lifting.***
- N5 > If actuator is spring return, ensure actuator is in the failed position and spring are de-energized before disassembling.***

## 06.2 End Cap Bolting Details

### Actuators sizes ECV32 – ECV175

Actuators of these sizes have (4) end cap bolts on each end. All bolts are the same length. When gradually and evenly loosening, or tightening these bolts, use the following sequence;



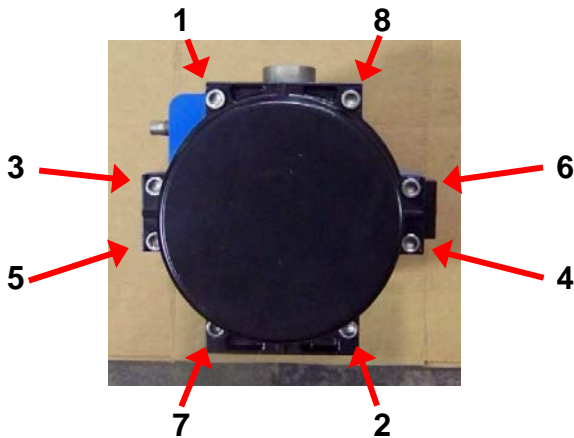
### Actuators sizes ECV200 – ECV350

Actuators of these sizes have (8) end cap bolts on each end.

**NOTE: Bolts in positions 1, 8, 7, and 2 are SHORTER than the side bolts in positions 3, 5, 6, and 4.**

When removing the bolts, the sequence 1, 2, 3, 4, 5, 6, 7, 8, should be followed to GRADUALLY and evenly loosen the bolts, bearing in mind that the 1, 8, 7, and 2 bolts are shorter. Bolts 3, 5, 6, and 4. are longer, and should be removed **last**, to ensure that spring tension is released safely.

When reinstalling bolts, the longer bolts 3, 5, 6, and 4 will have to be started first and gradually and evenly tightened. When the end cap is close enough to engage the shorter bolts 1, 8, 7, and 2, follow the sequence 1, 2, 3, 4, 5, 6, 7, 8 to gradually and evenly tighten the bolts.



**REFERENCE ONLY:**  
Shows bolts 1, 8, 7, 2  
are shorter

### 06.3 Disassembly

Refer to the view on page 2 and details on page 5.

- Step 1** Loosen the lock nuts #20, back out or remove stroke adjustment screws #7A and 7B, washers #21, and o-rings #22.
- Step 2** Loosen the cover bolts # 10 on each end cap gradually and evenly in sequence indicated in the detail information on page 5.

**CAUTION: Spring return actuator end caps are under spring tension. Caution must be used when removing end cap bolts and end caps. It is suggested that the actuator be put into a press during removal of end caps to ensure safe release of spring tension.**

**CAUTION: See End Cap Bolting Details on Page 5 for important notes.**

- Step 3** Rotate the pinion #4 in the counter-clockwise direction until the pinion becomes free.

**NOTE: NEVER attempt to remove pistons from actuator body using air pressure when the end caps have been removed!!**

- Step 4** Pull the piston out from each side by holding with pliers.
- Step 5** Remove external circlip # 13 and then washers #8 and #9.
- Step 6** Tap the pinion gently from the top using a rubber mallet until the pinion is approximately half way into the body.
- Step 7** Remove the top pinion seal #12 and the top pinion bearing #5.
- Step 8** Remove the cam stop ring #11 and washer #23.
- Step 9** Pull the pinion the rest of the way out of the body.
- Step 10** Check the pinion bearing #5 for its condition.
- Step 11** If removal and replacement of the pinion bearings is required, *carefully* push the pinion bearing off with the help of a screw driver and remove from the body.
- Step 12** Push and remove the center bore sleeve #6.
- Step 13** Remove the bottom pinion bearing #17, the bottom pinion seal #19, and the end cap seals #14.
- Step 14** Change the necessary parts.

**It is recommended that all wear parts are changed as a complete set, even if some of them are found to be in good condition. This will ensure uniform wear of the parts and assure smooth performance of the actuator.**

## 06.4 Assembly for DOUBLE ACTING and STANDARD MODE SPRING RETURN (Fail Closed) Actuators

### NOTES:

**N1 > Follow the sequences as given below to ensure proper assembly.**

**N2 > Use only the recommended accessories and lubricants.**

**N3> Do not apply excessive lubricant – excess lubricant will inhibit proper operation of V-seals.**

**N4> Assembly instructions in this section are for double acting and standard mode spring return (fail closed / fail clockwise) actuators. For assembly notes on reverse mode spring return actuators (fail open / fail counter-clockwise) see notes in section 06.5.**

- Step 1** Clean all the parts.
- Step 2** Insert center bore sleeve #6 into the body #1.
- Step 3** Ensure that the hole in the center bore sleeve is aligned with port A.
- Step 4** Fit bottom pinion bearing #17 and bottom pinion seal #19 on to the pinion #4. Apply recommended grease over the pinion bearing surface #17 and on the bottom pinion seal #19. Apply a thin coat all over the surface; DO NOT APPLY EXCESSIVE GREASE.
- Step 5** Insert pinion carefully into the body #1 from the bottom, approximately half way.
- Step 6** Install the cam stop ring #11 and polyacetal cam washer #23 on top of pinion.
- Step 7** Install top pinion seal #12 on pinion and apply a light layer of grease.
- Step 8** Install top pinion bearing #5 on into the body.
- Step 9** Push the pinion through the top bearing and into the body.  
Apply gentle force while rotating the piston to facilitate the insertion.
- Step 10** Install polyacetal washer #8, SS washer #9, and external circlip #13 on top of pinion.
- Step 11** Check for free rotation of pinion.
- Step 12** Apply recommended grease over the bore of the body and over the interior of the center bore sleeve; avoid excess grease.
- Step 13** Rotate the pinion so that the dot on the pinion is positioned close to the single dot on the top pad of the actuator body. Accurate pinion alignment can now take place by lining the center of the slot on the top of the pinion with the single dot on the body. (See Figure 1, page 8)
- Step 14** Insert the pistons, pressing only until the seals enter the body. Push in both the pistons simultaneously.

***Extreme caution should be used as piston seals are slid into the actuator body.***

***Misalignment of piston seals during this step WILL result in damage to the seal and air leak paths.***

- Step 15** Ensure both the pistons are engaged in the same position.  
Same amount of gap between the face of each piston and the end of the body will confirm this.
- Step 16** For spring return actuators, insert the springs #16.

**When assembling springs and end caps on spring return actuators, it is necessary to have the actuator body in the vertical position. This is required to ensure that springs remain properly aligned and centered during assembly.**

- Step 17** Fix the seals #14 on the left and right end caps and install on to body.  
Ensure the air ports on the end caps are aligned properly.  
Lubricate end cap bolts with anti-sieze product.  
Ensure uniform tightening of end cap bolts, following sequence noted on page 5.

- Step 18** Install stroke adjustment screws #7a and 7B with o-rings #22, washers #21, and lock nuts #20.
- Step 19** Apply air to Port A to move pistons to the extended 90 degree position.
- Step 20** Adjust stroke adjustment screw #7A for the 90 degree position, turning clockwise until the screw is barely touching the piston. Tighten the lock nut.
- Step 21** For spring return actuators, release the air pressure, for double acting actuators, apply air to Port B. This will bring the pistons back to the 0 degree position.
- Step 22** Adjust the stroke adjustment screw #7B for the 0 degree position, turning clockwise until the bolt is barely touching the piston. Tighten the lock nut.
- Step 23** Apply air as required to stroke the actuator several times to confirm that the stroke adjustment screws are set correctly and ensure that there is no air leakage from any of the seals.
- Step 24** Re-install or repack for storage (see section 7 for Packaging and Storage).

**Figures 1 and 2:**

Assembly diagram for use with Section 06.4 Step 13 and Section 06.5 Step 13. Assembly diagrams shown here are for reference to ensure the pinion is positioned in the correct general quadrant for the Fail Closed or Fail Open modes.

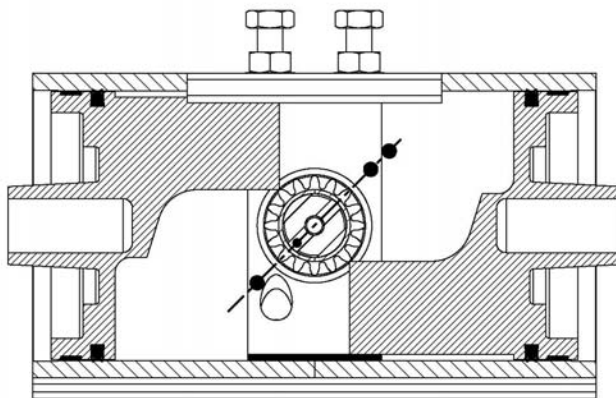


Figure 1 : Assembly for standard mode spring return fail closed (Fail CW)

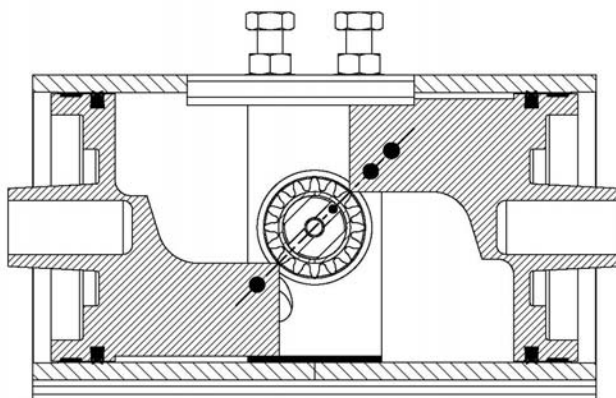
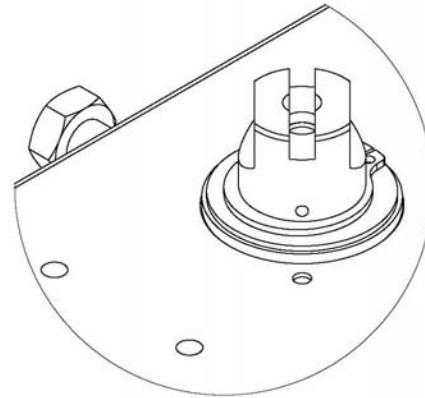
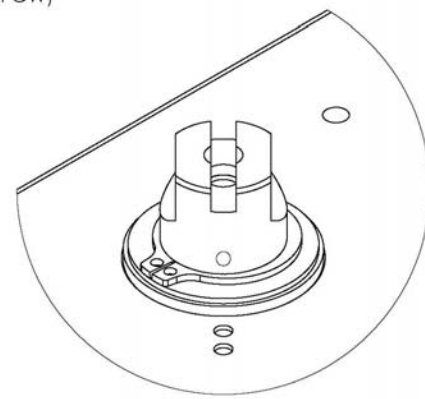


Figure 2 : Assembly for reverse mode spring return fail open (Fail CCW)



## 06.5 Assembly for REVERSE MODE SPRING RETURN (Fail Open) Actuators

### NOTES:

**N1 > Follow the sequences as given below to ensure proper assembly.**

**N2 > Use only the recommended accessories and lubricants.**

**N3> Do not apply excessive lubricant – excess lubricant will inhibit proper operation of V-seals.**

**N4> Assembly instructions in this section are for spring return actuators in the reverse mode (fail open / fail CCW). For assembly notes on standard mode spring return actuators (fail closed / fail clockwise) see notes in section 06.4.**

- Step 1** Clean all the parts.
- Step 2** Insert center bore sleeve #6 into the body #1.
- Step 3** Ensure that the hole in the center bore sleeve is aligned with port A (*refer view*).
- Step 4** Fit bottom pinion bearing #17 and bottom pinion seal #19 on to the pinion #4. Apply recommended grease over the bearing surface and on the O ring - uniformly and a thin coat all over the surface; avoid excess grease.
- Step 5** Insert pinion carefully into the body from the bottom, approximately half way.
- Step 6** Install the stop ring #11 and polyacetal washer #23 on top of pinion.
- Step 7** Install top pinion seal #12 on pinion and apply a light layer of grease.
- Step 8** Install top pinion bearing #5 on pinion.
- Step 9** Push the pinion the rest of the way into the body.  
Apply gentle force while rotating the piston to facilitate the insertion.
- Step 10** Install polyacetal washer#8, SS washer #9, and external circlip #13 on top of pinion.
- Step 11** Check for free rotation of pinion.
- Step 12** Apply recommended grease over the bore of the body and over the interior of the center bore sleeve; avoid excess grease.
- Step 13** Rotate the pinion so that the dot on the pinion is positioned close to the two dots on the top pad of the actuator body. Accurate pinion alignment can now take place by lining the center of the slot on top of the pinion with the two dots on the body. (See Figure 2, page 8).
- Step 14** Insert the pistons, pressing only until the seals enter the body. Push in both the pistons simultaneously.

***Extreme caution should be used as piston seals are slid into the actuator body. Misalignment of piston seals during this step WILL result in damage to the seal and air leak paths.***

- Step 15** Ensure both the pistons are engaged in the same position.  
*Same amount of gap between the face of each piston and the end of the body will confirm this.*
- Step 16** Insert the springs #16.

***When assembling springs and end caps on spring return actuators, it is necessary to have the actuator body in the vertical position. This is required to ensure that springs remain properly aligned and centered during assembly.***

- Step 17** Fix the seals #14 on the left and right end caps and install on to body.  
Ensure the air ports on the end caps are aligned properly.  
Ensure uniform tightening of end cap bolts, following sequence noted on page 5.

- Step 18** Install stroke adjustment screws #7A and 7B with o-rings #22, and lock nuts #20.
- Step 19** Apply air to Port A to move pistons to the extended 0 degree position.
- Step 20** Adjust stroke adjustment screw #7B for the 90 degree position, turning clockwise until the screw is barely touching the piston. Tighten the lock nut.
- Step 21** Release the air pressure to bring the pistons back to the 90 degree position.
- Step 22** Adjust the stroke adjustment screw #7A for the 0 degree position, turning clockwise until the screw is barely touching the piston. Tighten the lock nut.
- Step 23** Apply air as required to stroke the actuator several times to confirm that the stroke adjustment screws are set correctly and ensure that there is no air leakage from any of the seals.
- Step 24** Re-install or repack for storage (see section 07 for Packaging and Storage).

## **07 Packaging and Storage**

When not in use, actuators should be kept in a sealed plastic bag in a cardboard box to prevent moisture or dust from contacting product. Boxes should be stored in a dry place free from water and dust.

Store at temperature between 40° and 120° F (4° C and 49° C).

Locate in an area to avoid damage by impact.

## **08 Warnings**

Use only genuine spares parts supplied by **Rotex**.

Use only the recommended accessories and lubricants.

Install, operate and maintain as per the instructions and recommendations of this manual.

Any **deviation** from the above warnings will cease the responsibilities of **Rotex**.

## **09 Assistance**

For technical questions or assistance, contact any authorized distributor of **Rotex** or:

**Rotex Controls, Inc**

**21 Sullivan Parkway, Fort Edward, NY 12828**

**Tel: (888) 813 – 9772 Fax: (866) 478 – 9620**

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