

INSTALLATION INSTRUCTIONS

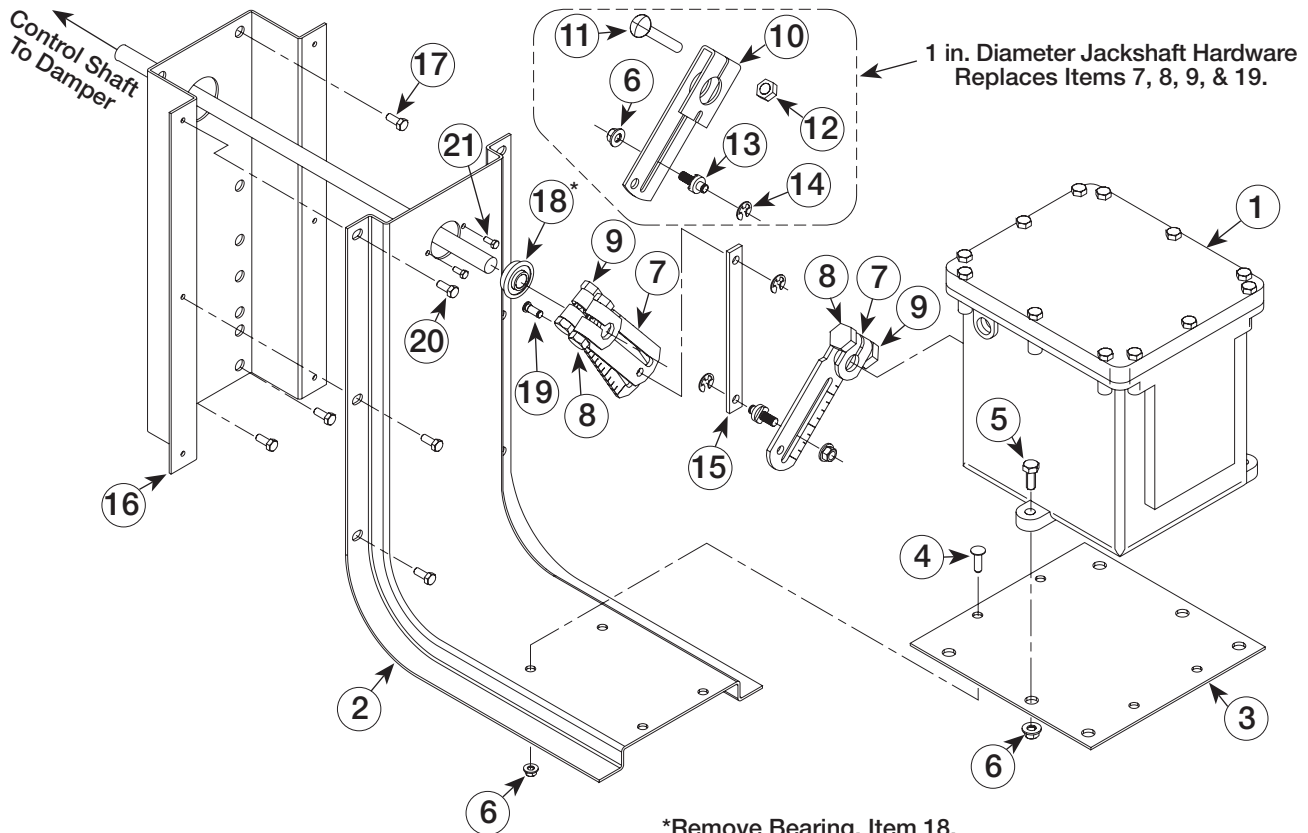
These instructions apply to the external field installation of Invensys actuators on Greenheck model VCD Control Dampers when they are duct mounted or sleeved.

Invensys actuators rotate to their energized position when power is applied and spring return to their fail position when power is interrupted.

Tools Required:

Wrenches:

- (1) 3/8 in., (2) 1/2 in., (1) 7/16 in., and (1) 9/16 in.
(1) Hammer



*Remove Bearing, Item 18,
If Using 1 in. Jackshaft

Part No.	Qty.	Description
1	1	Actuator
2	1	Mounting Bracket
3	1	Mounting Plate
4	4	1/4-20 x 1/2 in. Thread stud
5	3	1/4-20 x 1 1/4 in. HH Bolt
6	8	1/4-20 Spinlock Nut
7	3	1/2 in. Crankarm
8	3	5/16-18 x 1 1/2 in. Bolt
9	3	5/16-18 Spinlock Nut
10	1	1 in. Crankarm
11	1	3/8-16 x 2 1/2 in. Carriage Bolt

Part No.	Qty.	Description
12	1	3/8-16 Spinlock Nut
13	1	Linkage Adjustment Pin
14	2	1/4 in. E-ring
15	1	Drive Link
16	1	Anchor Bracket
17	4	1/4-20 x 1/4 in. Thread Cutting Screw
18	1	Press Fit Ball Bearing
19	1	1/4 x 1/2 in. Knurl Pin
20	8	#14 x 3/4 in. HWH Tek
21	2	#10 Tek Screw

Instructions

Dampers with a jackshaft

1. Mount the anchor bracket onto the jackshaft bracket with (4) 1/4-20 x 1/2 in. thread cutting screws (Item 17) as shown in Figure 1a.
2. Attach anchor bracket to sleeve with (2) #14 x 3/4 HWH Tek screws (Item 20). Position the Tek screws as far down the sleeve as possible.
3. Mount the mounting bracket to the anchor bracket using (6) #14 x 3/4 HWH Tek screws (Item 20).

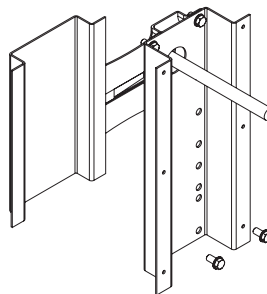


Figure 1a - Orientation of Stand Off Bracket for a jackshaft driven damper

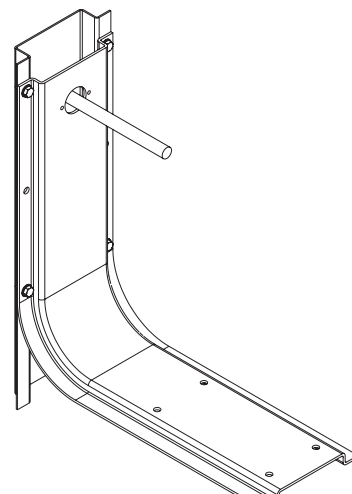
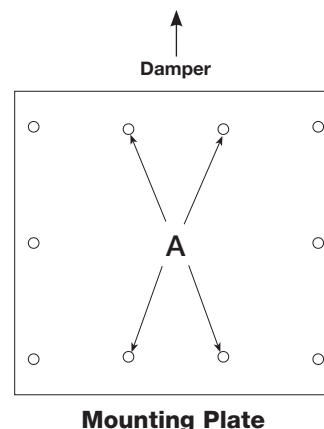


Figure 1b - Orientation of Mounting Bracket for a directly driven damper

Dampers without a jackshaft (Shaft Extension)

1. Mount the mounting bracket spanning across the damper frame flanges, positioned over the control shaft as shown in Figure 1b. The damper shaft must be centered in the mounting bracket. Fasten to the damper frame with (4) #14 x 3/4 HWH Tek screws (Item 20) or equal, supplied by others. Be sure not to run the screws into the damper linkage, which is between the flanges.
2. Fasten the mounting plate (Item 3) to the mounting bracket (Item 2) using (4) 1/4 in. - 20 x 1/2 in. thread studs (Item 4) and (4) 1/4 in. - 20 spinlock nuts (Item 6) through the matching four hole pattern on the mounting bracket labeled A on the illustration.
3. If the damper has a 1/2 in. diameter damper shaft, mount the ball bearing into the mounting bracket with two #10 Tek screws (Item 20). The Tek screws are required to keep the thrust forces from pushing the bearing out of the mounting bracket. If the damper shaft is 1 in. diameter, then no ball bearing is required.
4. Mount the actuator to the mounting plate in the corresponding holes using (3) 1/4 - 20 x 3/4 in. thread cutting screws (Item 5). **Note:** the actuator must be mounted with the shaft in the horizontal position.
5. Assemble the linkage.



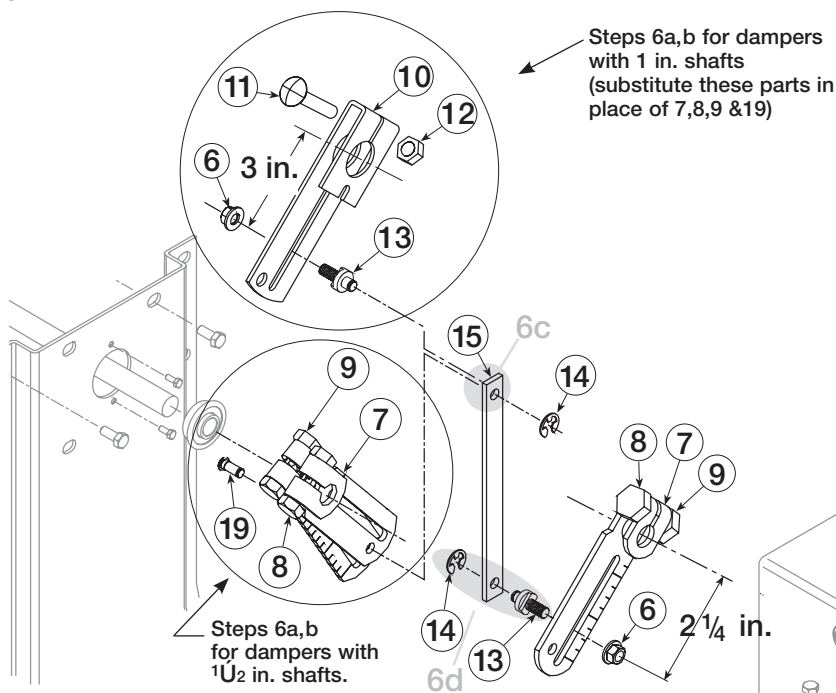
Mounting Plate

Parts needed for dampers with 1/2 in. shafts:

- (Qty. 3) 1/2 in. crankarms (item 7)
- (Qty. 3) 5/16 in. - 18 x 1 1/2 in. bolts (item 8)
- (Qty. 3) 5/16 in. - 18 spinlock nuts (item 9)
- (Qty. 1) 1/4 in. x 1/2 in. knurl pin (item 19)
- (Qty. 1) Drive link (item 15)
- (Qty. 1) Linkage adjustment pin (item 13)
- (Qty. 2) 1/4 in. E-ring (item 14)
- (Qty. 1) 1/4 - 20 spinlock nuts (item 6)

Parts needed for dampers with 1 in. shafts:

- (Qty. 1) 1 in. crankarm (item 10)
- (Qty. 1) 3/8 in. - 16 x 2 1/2 in. bolt (item 11)
- (Qty. 1) 3/8 in. - 16 spinlock nut (item 12)
- (Qty. 2) Linkage adjustment pin (item 13)
- (Qty. 1) 1/2 in. crankarms (item 7)
- (Qty. 1) 5/16 in. - 18 x 1 1/2 in. bolts (item 8)
- (Qty. 1) 5/16 in. - 18 spinlock nuts (item 9)
- (Qty. 1) Drive link (item 15)
- (Qty. 2) 1/4 in. E-ring (item 14)
- (Qty. 2) 1/4 - 20 spinlock nuts (item 6)



Steps 6a,b for dampers with 1 in. shafts (substitute these parts in place of 7,8,9 &19)

Steps 6a,b for dampers with 1 1/2 in. shafts.

5a. Assemble the shaft crankarms.

For dampers with 1/2 in. shafts:

The crankarms must be placed as mirror images of each other, meaning the like sides face each other. The bolts and nuts are to be positioned as in the exploded view to the left.

For dampers with 1 in. shafts:

Replace Items 7, 8, 9, & 19 with Items 6, 10, 11, 12, & 13 as shown above in the encircled exploded view. There is only one crankarm, but the fail positions are still set up the same.

5b. *For dampers with 1/2 in. shafts:*

Insert the knurl pin through both of the small holes in the crankarms and tap it into place using a hammer.

For dampers with 1 in. shafts:

Insert the linkage adjustment pin (item 13) into the crankarm slot. Position it 3 in. from the center of the damper shaft hole and fasten with a 1/4-20 spinlock nut (see encircled diagram).

5c. Attach the drive link (item 15) to the damper shaft crankarm(s)

For dampers with 1/2 in. shafts:

Insert the knurl pin through one of the drive link holes. Fasten with an E-ring.

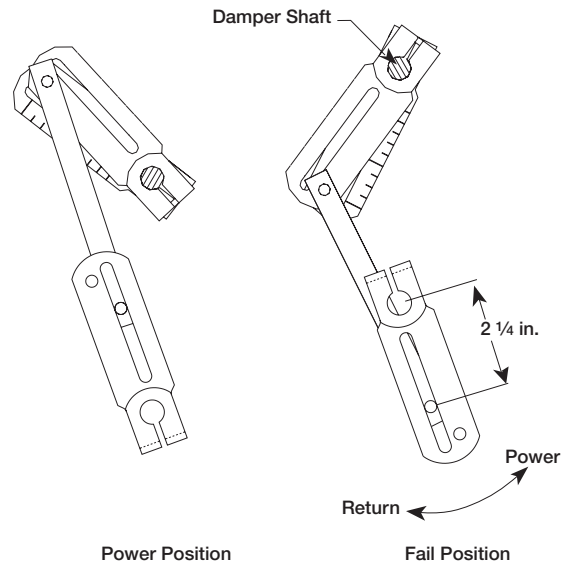
For dampers with 1 in. shafts:

Insert the linkage adjustment pin (item 13) through one of the drive link holes. Fasten with an E-ring.

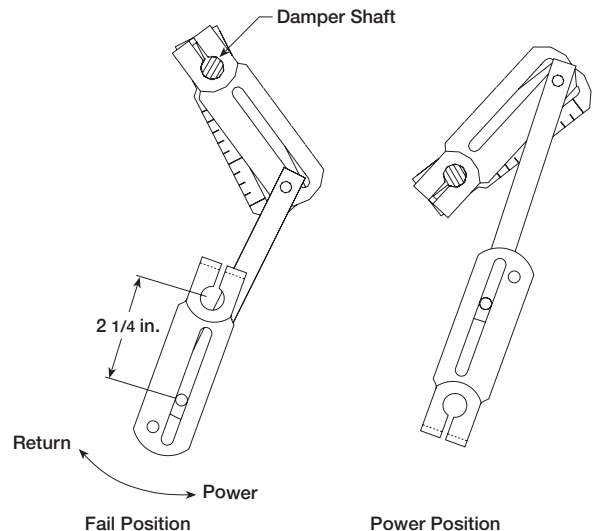
5d. Attach the drive link to the actuator crankarm with the linkage adjustment pin, a spinlock nut and an E-ring. Set the linkage adjustment pin at 2 1/4 in. on the crankarm and secure it there with the spinlock nut. Fasten the other end through the empty drive link hole with the E-ring.

6. Note the damper shaft rotation for fail direction and orient the linkage appropriately as shown in the linkage illustration. The damper linkage is now in its fail position. Position the damper blades to their proper position (open or closed). Tighten the bolts.

7. Orient the actuator crankarm so that it will rotate through the full stroke of the actuator with the shaft crankarms rotating only 90 degrees without power. Adjust the position as necessary. Tighten all of the crankarms.



Counterclockwise to Fail Position



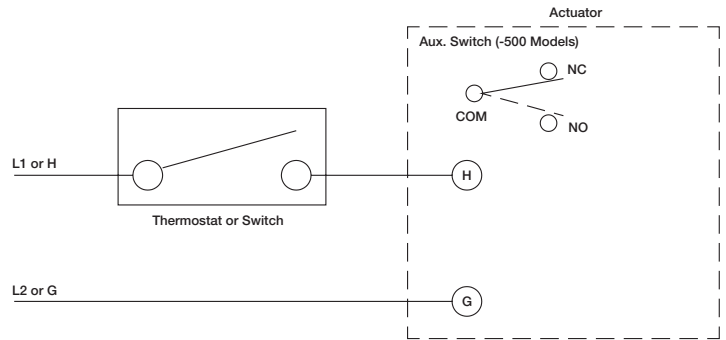
Clockwise to Fail Position

9. Wire the actuator according to the appropriate wiring illustration that identifies the actuator's electrical connections. Wiring should be per an approved project or job wiring diagram and must comply with all applicable electrical codes.

10. Apply power to the actuator.

The damper blades should fully open or close and return to the fail position when power is disconnected. If they do not, adjustments can be made by resetting the crankarm position on the damper or actuator shaft, or adjusting the 2 in. dimension discussed in Step #6d.

Note: Motors in models MA6-318 and MA6-418 switch to a hold winding at the end of their stroke. Motor may overheat if stalled before cycling to the end of the power stroke.



Wiring Diagram for MA Series Actuators

Actuator Part Number	Power Supply	Aux. Switch	VA* Running	VA* Holding
MA6-305	24	No	56	56
MA6-305-500	24	Yes	56	56
MA6-405	120	No	48	48
MA6-405-500	120	Yes	48	48
MA6-318	24	No	92	32
MA6-318-500	24	Yes	92	32
MA6-418	120	No	108	42
MA6-418-500	120	Yes	108	42

* Divide VA by the actuator voltage to get the amp draw.

