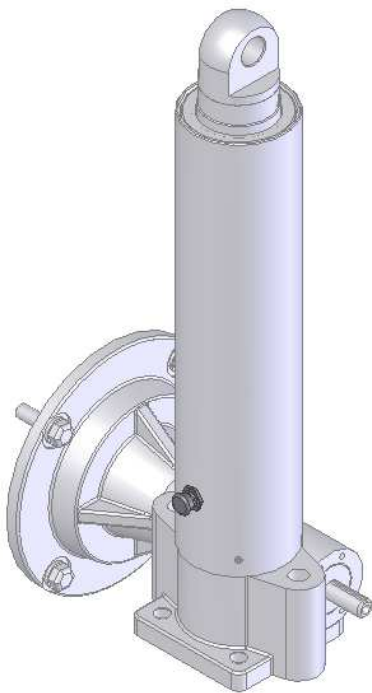


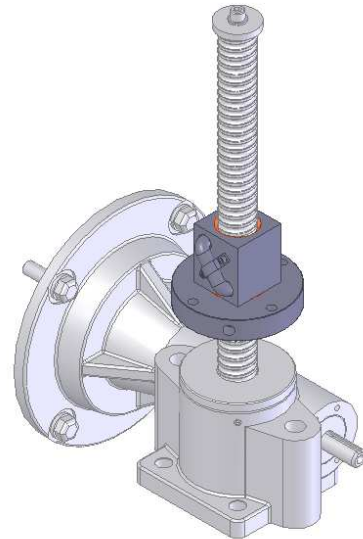


Joyce/Dayton Corp.

**Operation and Maintenance Manual for
Joyce/Dayton Integrated Actuator- Ball Screw
2000 pounds maximum capacity**



BIATT/HBIATT



BIATN/HBIATN

The recommendations in this manual for installation, operation and maintenance must be followed to ensure safe use. All persons responsible for the installation and use of Joyce/Dayton Integrated Actuators must be familiar with the contents of this manual.

Customer is responsible for guards and other protective devices and ensuring that Integrated Actuator usage conforms with local and national operating and safety codes appropriate to the class of equipment into which the Integrated Actuator is installed.

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Section I General Information

1-1 Contact Joyce/Dayton Corp.

Joyce/Dayton Corp.
P.O. Box 1630
Dayton, OH 45401
(800) 523-5204 (US and Canada only)
(937) 294-6261 (937) 297-7173 Fax
Email: sales.jacks@joycedayton.com
Website: www.joycedayton.com

1-2 Purpose and Scope

This manual provides installation, operation and maintenance instruction for the standard Joyce/Dayton Ball Screw Integrated Actuator. Although this manual covers the standard Ball Screw Integrated Actuators, some may vary significantly from this manual. For special units not covered please contact Joyce/Dayton Corp. for assistance.

1-3 Receipt of Product

All equipment should be immediately inspected upon receipt for any damage and to verify correct product and quantities. Any problems should be reported to Joyce/Dayton Corp. and the freight carrier as soon as possible. Products returned without a *Return Goods Authorization (RGA)* will not be accepted.

1-4 Warranty

Seller warrants its products to be free from defects in material and workmanship under normal and proper use in accordance with instruction of seller for a period of one year from the date of shipment to buyer. Seller's liability under such warranty or in connection with any other claim relating to the products shall be limited to the repair, or at seller's option, the replacement or refund of the purchase price, of any products or parts or components thereof which are returned to seller freight prepaid and which are defective in material or workmanship. Products or parts or components thereof, which are repaired or replaced by seller, will be returned to buyer freight collect. This warranty is not intended to cover consumer products, as defined in the Magnuson-Moss Warranty-Federal Trade Commission Improvement Act, 15 U. S. C. Sections 2301-12, which are purchased for purposes other than resale. If buyer is not intending to resell the products, and if the products are consumer products as defined in the Magnuson-Moss Act, the foregoing warranty, but not the limitation of seller's liability, shall be null and void. EXCEPT AS EXPRESSLY STATED ABOVE, SELLER MAKES NO WARRANTY, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OR USE OR OTHERWISE, ON THE PRODUCTS, OR ON ANY PARTS OR LABOR FURNISHED DURING THE SALE, DELIVERY OR SERVICING OF THE PRODUCTS.

1-5 Precautions of Use and Installation

1. Mechanical stops provided on the Integrated Actuators (BIA/HBIA) are not to be used as end-of-travel stops. The customer is responsible for setting travel limits.
2. Travel can be limited using optional limit switches. These limit switches need to be set by the customer. In most applications, factory or manufacturer-assisted installation is not required. However, it is necessary that appropriate, qualified personnel perform the installation of Joyce/Dayton products.
3. Joyce/Dayton Ball Screw Integrated Actuators are not rated for shock-loading or extreme vibration. It is the responsibility of the user to ensure these conditions are not imposed on the actuator.

4. In the event that service or maintenance is required, the load must be secured or removed before any work can begin.
5. The Integrated Actuators can be mounted and operated in any orientation. **Standard Ball Screw Integrated Actuators have vents in the protection tube (outer tube). Additional holes will be plugged. Properly plug or vent holes to prevent dirt or moisture from contaminating the actuator.**
6. Never allow the Ball Screw Integrated Actuator to retract beyond the minimum closed position or extend beyond the maximum open position, as damage to the unit can occur. Refer to Section 3-5 for travel limit information.
7. External temperature may exceed 230 Degrees F. near maximum duty cycle. Use caution to prevent personal injury.
8. **Do not use in applications where Integrated Actuator can be jammed against an immovable object.**
9. A brake motor is required on all Ball Screw Integrated Actuators.

1-6 General Installation instructions

1. Ensure that all personnel who will service or operate equipment are familiar with its use and limitations.
2. Secure or remove the load before any installation procedures begin.
3. Be certain the rating of the actuator meets or exceeds the load.
4. The Ball Screw Integrated Actuator must be mounted on a rigid structure sufficient to support the maximum possible load. An under-designed structure could lead to premature wear or failure.
5. Drive shaft alignment is critical. Misalignment will cause reversing stresses in rotating members and will lead to fatigue failure. Correct coupling specification is critical for systems with more than one Integrated Actuator.
6. For systems with more than one Integrated Actuator, confirm that the Integrated Actuators and shafts operate without binding or excessive force before power is applied.
7. When fastening the load to an Integrated Actuator, make sure the actuator is in the retracted position. This positions the load accurately with respect to the lifting screw centerline. Never pull the translating tube to one side to make connection with your structure. Fully extend the Integrated Actuator to make sure the load is aligned with the translating tube.
8. All Ball Screw Integrated Actuators are to be mounted with S.A. E. Grade 5 bolts or equivalent.
9. Torque the mounting bolts in a systematic pattern to avoid damage to the actuator.
10. Optional limit switches, which may be furnished with the Integrated Actuator, are NOT pre-set. They require field adjustment before use

Section II Maintenance

2-1 Lubrication

1. Integrated Actuators are lubricated before leaving the factory.
2. Do not operate Integrated Actuators without lubrication.
3. The lifting screw and translating tube are lubricated with Mobilgrease XHP 221 grease, or equivalent.
4. The housing is lubricated with Mobilgrease XHP 461.
5. Traveling Nut (TN) model ball screws should be lubricated with a spindle or 10-weight oil.
6. The products listed are recommended by the lubricant manufacturers to meet the requirements for normal operation. The listing of brand names is solely for the convenience of users of Joyce/Dayton equipment and their lubricant suppliers; it does not constitute any

endorsement. Joyce/Dayton assumes no responsibilities for the quality, performance or availability of any listed products

Company	Brand Name	Ball Screw Integrated Actuator Component
Mobilgrease	XHP 461	Housing
Mobilith	SHC PM 460	Housing
Mobilgrease	XHP 221	Lifting screw and tube
	Spindle or 10-wt oil	Traveling nut (TN)

2-2 Repair Parts

Repair parts may be obtained by calling Joyce/Dayton Customer Service at (800) 523-5204, (937) 294-6261, (937) 297-7173 (facsimile) or your local sales representative. When ordering repair parts, please supply the serial number (both are located on the Integrated Actuator nameplate).

The following parts are recommended for rebuild or spares. See Exploded Views in Sections 3-1 and 3-2 and Parts List in Section 3-3.

- A. (2) Thrust Bearing
- B. (1) Worm Gear Nut
- C. (1) Protection Tube Assembly (1) Worm - 6
- D. (1) Ball Screw
- E. (1) Ball Nut Assembly/ Ball Nut
- F. (1) Translating Tube Assembly
- G. Small parts repair kit for BIA/HBIA Traveling nut actuator TN
- H. Small parts repair kit for BIA/HBIA Translating tube actuator TT

2-3 Disassembly of Translating Tube Actuator (TT)

1. Use the appropriate disassembly procedure. If the ball nut is outside the actuator on the screw, it is a Traveling Nut Integrated Actuator (TN), this is also called a "rotating screw" actuator. If the ball nut is not positioned outside the actuator sleeve, it is a Translating Tube Integrated Actuator (TT).
2. Handle all machined parts with care and maintain an "order of disassembly" to aid in re-assembly.
3. Disconnect power from the Ball Screw Integrated Actuator before proceeding.
4. First remove the plug then remove the key (25) and coupling half (24) from the worm shaft.
5. Remove the seal (9) and retaining ring (8). The seal will generally be destroyed in the removal process.
6. Tap on the motor end of the worm shaft (6). This will loosen and unseat the worm shaft bearing (7) and permit disassembly. Rotate the worm clockwise to remove it.
7. Loosen the two set screws (5) and unthread the protection tube assembly (4). Slide the protection tube assembly (4) from the translating tube assembly (13, 26, 28, 29, and 30).
8. Disassemble the translating tube assembly from the sleeve (1) by firmly pulling upward, away from the sleeve.
9. The nut, key, and retaining ring (3, 14, and 10) will be attached to the end of the assembly.
10. Remove the retaining ring (10) from the end of the ball screw (11).
11. Disassemble the nut and key (3, 14) from the ball screw.
12. The ball screw (11), travelling nut (12), translating tube (13), retainer (17), screw (18), and lock washer (19) are considered an assembly. If any of these parts are worn and/or damaged, you must replace them all. It is not possible to disassemble them without damaging them.
13. The lower thrust bearing (2) can now be pulled out of the sleeve.

2-4 Disassembly of Traveling Nut Actuator (TN)

1. Use the appropriate disassembly procedure. If the ball nut is outside the actuator on the screw, it is a Traveling Nut Integrated Actuator (TN), this is also called a “rotating screw” actuator. If the ball nut is not positioned outside the actuator sleeve, it is a Translating Tube Integrated Actuator (TT).
2. Handle all machined parts with care and maintain an “order of disassembly” to aid in re-assembly.
3. The motor is optional. It is not user serviceable.
4. Disconnect power from the Ball Screw Integrated Actuator before proceeding.
5. To remove the motor, secure the Ball Screw Integrated Actuator in a work holding device such as a bench vise. Do not clamp onto the ball screw (11).
6. Remove the four Hex head screws and washers (22, 23). They attach the motor to the flanged sleeve (1). Remove the motor.
7. Remove the coupling half (19) and key (20) from the worm shaft.
8. Remove the seal (9) and retaining ring (8).
9. Use a tool to tap on the flange end of the worm shaft (6). This will loosen and unseat the worm shaft bearing (7) and permit disassembly.
10. Loosen the two set screws (5) and unthread the sleeve cap (4). The seal (17) and upper thrust bearing (2) may remain inside the protection tube when it is removed.
11. Disassemble the ball screw (11) from the sleeve (1) by firmly pulling upward, away from the sleeve (1).
12. The nut (3), key (13), and retaining ring (10) will be attached to the end of the assembly.
13. Remove the retaining ring (10) from the end of the ball screw (11).
14. Disassemble the nut and key (3, 13) from the ball screw. Be careful that the ball nut does not come off the ball screw until you have a mandrel in place. Removing the ball nut without a mandrel will result in ball bearings escaping from inside the ball nut assembly.
15. Unscrew the travelling nut assembly (12) from the ball screw (11) on to a mandrel, and remove.
16. The lower thrust bearing (2) can now be pulled out of the sleeve.

2-5 Inspection of Components

1. Before any inspection, it will be necessary to completely clean all parts of the Integrated Actuator. Use caution with any machined or fragile part.
2. Inspect the cleaned Integrated Actuator sleeve (1), ball screw (11), and Translating Tube Assembly (11, 12, 13, 26, 28, 29, 30) or the rotating screw and nut (11, 12). Check for any signs of stress or fracture, especially around mounting holes and clevis hole.
3. Inspect the condition of all the gears and components that have been disassembled.
4. Check the thrust bearings for any signs of brinelling, abrasive wear or spalling. Test for smooth, quiet operation of bearings.
5. Replace seals on translating tube model (9, 15, and 21). Replace seals on the traveling nut model (9, 17, and 21).
6. Inspect O-Ring (15 or 22) and keys (14, 24 or 13, 20) for signs of damage or deformity
7. Inspect lifting screw (11) for straightness and wear. On a translating tube actuator, this is part of an assembly.
8. Inspect the clevis end of the translating tube for damage or deformity.
9. Inspect the Traveling Nut (12). Replace it if wear is evident.

2-6 Assembly of Translating Tube Actuator (TT)

1. Rest the actuator sleeve (1) on a work surface with the flange downward.
2. Install the worm shaft bearing (7) in the sleeve (1) passing it through the wide opening at the side of the sleeve. Position it over the worm shaft opening. Seat the bearing with a tool.

3. Rotate the sleeve (1) so it rests on the base and install the lower thrust bearing (2) and O-ring (22)
4. Set the sleeve aside and continue.
5. Install the ball nut assembly (12) onto the end of the screw (11). This must be carefully transferred from the mandrel onto the ball screw so the ball bearings inside do not escape. Orient the square flange toward the threaded end of the ball screw. Attach the retainer (17) to the end of the ball screw using the screw and washer (18 and 19).
6. Insert the retainer end of the ball screw (11) into the open end of the translating tube (13 assembly).
7. Secure the traveling nut (12) into the end of the translating tube (13) using setscrews (26).
8. ? Align the four holes in the translating tube (13) with the holes in the ball nut assembly (12). Insert the setscrews (27) through the translating tube and ball nut assembly. Be careful not to insert them too deep. They should not contact the ball screw.
9. The protection tube (4) is a complete assembly.
10. Assemble the key (14), worm gear nut (3) and retaining ring (10) to the threaded end of the ball screw (11).
11. Insert the above assembly into the actuator sleeve (1).
12. Assemble and seat the seal (15) into the protection tube (4). It fits in the end that is not externally threaded.
13. Pass the plain end of the protection tube assembly (4) over the clevis end of the translating tube assembly and thread it into the actuator sleeve (1).
14. Insert the worm shaft (6) through the sleeve (1) toward the flange. Inside the sleeve, this will pass in front of the already assembled worm gear nut (3) and through the previously installed worm shaft bearing (7).
15. Install the other worm shaft bearing (7) over the end of the worm (6). Seat this in place.
16. Install the retaining ring (8).
17. Check that the worm shaft (6) rotates when turned by hand. Adjustments to the stiffness of rotation of the worm shaft are made by loosening or tightening the threaded connection between the sleeve and the protection tube.
18. Spot drill through the threaded holes in the sleeve (1) and insert the setscrews (5).
19. Thread the air vent (16) and Pipe Plug (27) in to the protection tube. Choose positions that are appropriate for the mounting position of the unit in your application.
20. Insert and seat the two worm shaft seals (9). Exercise care so the seals are not damaged on any sharp surfaces. Note: These seals are difficult to remove. Once they are removed, they must be replaced.
21. Use the key (25) to attach half the coupling (24) to the worm shaft.
22. Attach the other coupling half (24) to the motor shaft.
23. Join the motor to the integrated actuator via the coupling. Align the motor mount holes to the mounting holes on the flange. Use lock washers and screws (32, 31) to fasten the motor to the integrated actuator.
24. Insert one pipe plug (27) into the sleeve and partially fill the cavity with Ronex Extra Duty 1 grease.
25. Insert the other pipe plug (27) in the sleeve.

2-7 Assembly of Traveling Nut Actuator (TN)

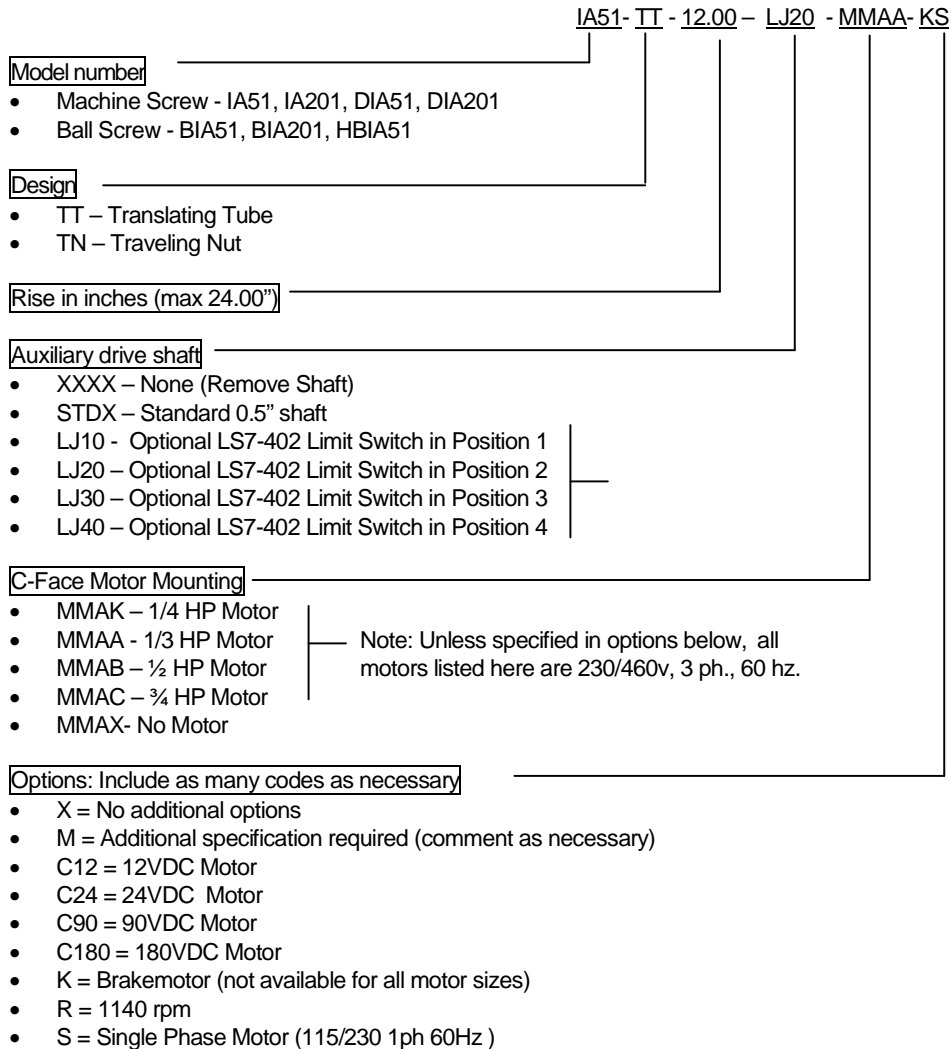
1. Rest the actuator sleeve (1) on a work surface with the flange downward.
2. Install the worm shaft bearing (7) in the sleeve (1) passing it through the wide opening at the side of the sleeve. Position it over the worm shaft opening. Seat the bearing with a tool.
3. Rotate the sleeve (1) so it rests on the base and install the lower thrust bearing (2) and O-ring (18).
4. Set the sleeve aside and continue.
5. Install the ball nut assembly (12) on to the end of the ball screw (11). This must be carefully transferred from the mandrel onto the ball screw so the ball bearings inside do not escape.

- Orient the square flange toward the threaded end of the ball screw. Attach the retainer (15) to the end of the ball screw using the screw and washer (16 and 17).
6. Thread the traveling nut (12) on to the ball screw (11). The flange of the ball nut should be oriented toward the threaded end of the ball screw.
 7. Insert the seal (18) and upper thrust bearing (2) into the sleeve cap (4). First, insert the seal, then the bearing.
 8. Assemble the key (13), worm gear nut (3) and retaining ring (10) to the end of the ball screw (11).
 9. Insert the above assembly into the actuator sleeve (1).
 10. Thread the sleeve cap (4) into the actuator sleeve (1) and tighten.
 11. Insert the worm shaft (6) through the sleeve (1) toward the flange. Inside the sleeve, this will pass in front of the already assembled worm gear nut (3) and through the previously installed worm shaft bearing (7).
 12. Install the other worm shaft bearing (7) over the end of the worm (6). Seat this in place.
 13. Install the retaining ring (8).
 14. Check that the worm shaft (6) rotates when turned by hand. Adjustments to the stiffness of rotation of the worm shaft are made by loosening or tightening the threaded connection between the sleeve and the sleeve cap (4).
 15. Spot drill through the threaded holes in the sleeve (1) and insert set screws (5).
 16. Insert and seat the two worm shaft seals (9, 21). Exercise care so the seals are not damaged on any sharp surfaces. Note: These seals are difficult to remove. Once they are removed, they must be replaced.
 17. Use the key (20) to attach half the coupling (19) to the worm shaft.
 18. Attach the other coupling half (19) to the motor shaft.
 19. Join the motor to the integrated actuator via the coupling. Align the motor mount holes to the mounting holes on the flange. Use lock washers and screws (23, 22) to fasten the motor to the integrated actuator.
 20. Insert one pipe plug (24) into the sleeve and partially fill the cavity with Ronex Extra Duty 1 grease.
 21. Insert the other pipe plug (24) in the sleeve.

Section III

Views & Parts List

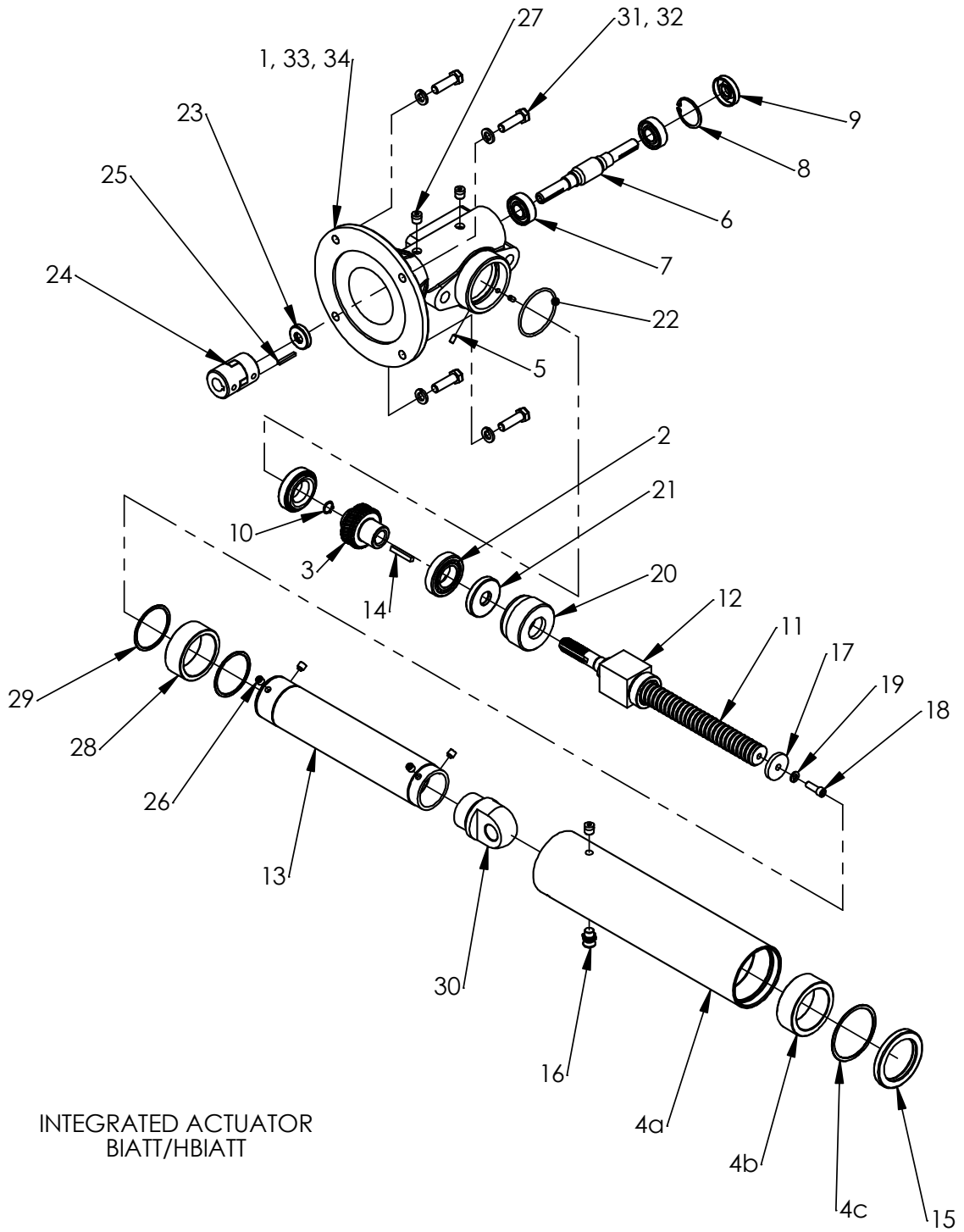
3-1 Integrated Actuator Part Number Structure & Name Plate



Additional accessories and kits available from Joyce/Dayton for the Ball Screw Integrated Actuator

Part Number	Description
08040368	Eye Bracket
08040369	Clevis Bracket
08040370	Pin
08060003	BIA/HBIA TN small parts repair kit
08060004	BIA/HBIA TT small parts repair kit

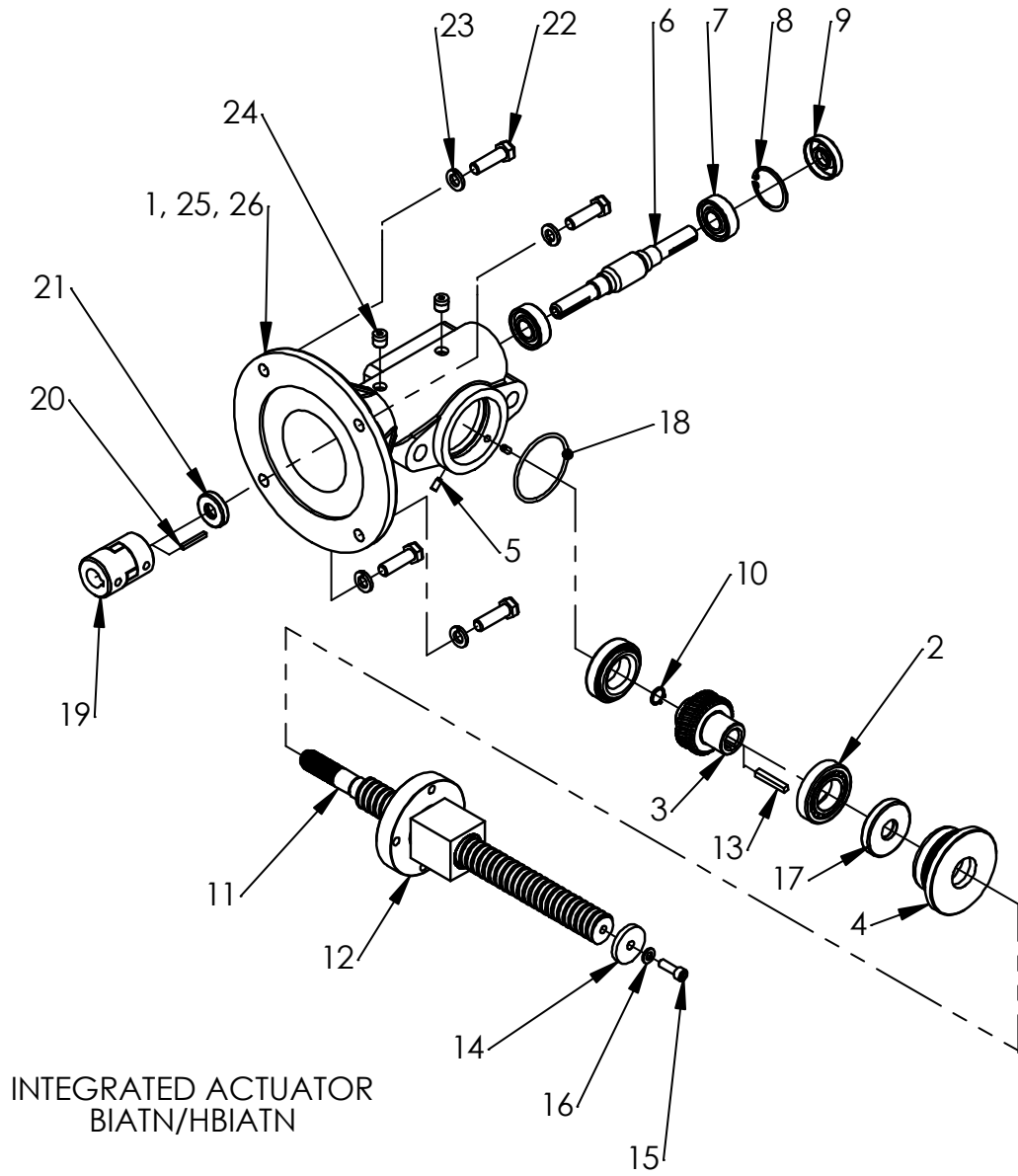
3-2 Exploded View of Translating Tube Actuator (TT)



**3-3 Parts List of Translating Tube Actuator (TT)
BIA and HBIA Ball Screw**

Item	TRANSLATING TUBE (TT)
1	Ball Screw Integrated Actuator Sleeve (1)
2	Thrust Bearing (1 ton) (2)
3	Worm Gear Nut (1)
4	Protection Tube Assembly (1)
5	Set Screw (2)
6	Worm (1)
7	Worm Shaft Bearing (1 ton) (2)
8	Retaining Ring (1 ton) (1)
9	Worm Shaft Seal (1)
10	Retaining Ring – WJ1000 (1)
11	Ball Screw (TT) (1)
12	Ball Nut (TT) (1)
13	Translating Tube (BIA) (1)
14	Key (1)
15	Seal (1)
16	Air Vent 1/8 NPT (1)
17	Retainer (WB2) (1)
18	Screw (1)
19	Lock Washer (1)
20	Sleeve Bushing (1)
21	Seal (1)
22	O-Ring (1)
23	Worm Shaft Seal (2 ton) (1)
24	Coupling (1)
25	Key (M8120700) (1)
26	Set Screw (4)
27	Pipe Plug (1/8 – 27 NPT) (3)
28	Translating Tube Bushing (1)
29	Retaining Ring (WS-200) (2)
30	Clevis, Translating Tube (2.5T) (1)
31	Hex Head Screw (4)
32	Lock Washer (4)
33	Name Plate (1)
34	Drive Screw (2)

3-4 Exploded View of Traveling Nut Actuator (TN)



**Table 3-5 Parts List of Traveling Nut Actuator (TN)
BIA and HBIA Ball Screw**

Item	TRAVELING NUT (TN)
1	Ball Screw Integrated Actuator Sleeve (1)
2	Thrust Bearing (1 ton) (2)
3	Worm Gear Nut (1)
4	Sleeve Cap (1)
5	Set Screw (2)
6	Worm (1)
7	Worm Shaft Bearing (1 ton) (2)
8	Retaining Ring (1 ton) (1)
9	Worm Shaft Seal (1)
10	Retaining Ring – WJ1000 (1)
11	Ball Screw (TN) (1)
12	Ball Nut Assembly (TN) (1)
13	Key (1)
14	Retainer (WB2) (1)
15	Screw (1)
16	Lock Washer (1)
17	Seal (1)
18	O-Ring (1)
19	Coupling (1)
20	Key (1)
21	Worm Shaft Seal (2 ton) (1)
22	Hex Head Screw (4)
23	Lock Washer (4)
24	Pipe Plug (1/8 – 27 NPT) (2)
25	Name Plate (1)
26	Drive Screw (2)

3-6 Travel limit information

1. Translating Tube Ball Screw Integrated Actuator (BIA TT)
Translating Tube Minimum Closed Dimension = Rise" + 10.62"
Translating Tube Maximum Dimension = (Rise" x 2) + 10.62"
Maximum rise allowable is 24"
Minimum and maximum dimension is measured from base to clevis eye.

2. High Lead Translating Tube Ball Screw Integrated Actuator (HBIA TT)
Translating Tube Minimum Closed Dimension = Rise" + 13.44"
Translating Tube Maximum Dimension = (Rise" x 2) + 13.44"
Maximum rise allowable is 24"
Minimum and maximum dimension is measured from base to clevis eye.

3. Traveling Nut Ball Screw Integrated Actuator (BIA TN)
Overall Dimension = Rise" + 7.60"
Maximum rise allowable is 24"
Maximum dimension is measured from base to lower edge of the retainer.

4. High Lead Traveling Nut Ball Screw Integrated Actuator (HBIA TN)
Overall Dimension = Rise" + 8.60"
Maximum rise allowable is 24"
Maximum dimension is measured from base to lower edge of the retainer.

3-7 Maintenance Log and Serial Tag

Date	Maintenance Performed	Initials

Joyce Dayton Serial Number Tag



To obtain product information needed for maintenance, repair and reorder, contact Joyce Dayton Corporation and provide the serial number.

Joyce/Dayton Corp
P.O. Box 1630
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Phone (800) 523-5204 (U.S. & Canada); (937) 294-6261 Fax (937) 297-7173
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