

**IOM FOR DYNATORQUE™ D-LOCK LOCKING DEVICE (DL TYPE)****Scope:**

It is the purpose of this document to provide general installation, operation, and maintenance instructions for the DYNATORQUE™ D-Lock locking device.

**Design:**

All Cameron DYNATORQUE operators and accessories are designed to transmit the rated output torque of the actuator. When designing mounting kits, torque transmission devices, or specifying mounting hardware, the unit torque rating should be considered. Cameron recommends using minimum grade 5 bolts with lock washers for mounting D-Locks to valve actuator mounting flanges or adaptation kits. D-Locks should **not** be installed in areas or process applications where they will be subjected to high temperatures (above 350° F), low temperatures (below -20° F), corrosive atmospheres, or high pressures without prior knowledge and written approval by Cameron or unless originally designed for that purpose. Doing so will void warranty. Please contact the factory (see below) with questions or consult product specification sheets.

**Installation Steps:**

The DYNATORQUE D-Lock device provides a method of mechanically preventing a double acting or spring return automated valve assembly from stroking in a pre-determined direction (CW or CCW, but not both). Each D-Lock comes complete with a drive coupling, which, if not already modified, can be removed and machined to fit the valve actuator and valve stem dimensional requirements. Please assure that the drive coupling has been machined correctly before attempting component assembly.

The following steps should be taken to install a DYNATORQUE D-Lock: Cameron recommends mounting the D-Lock while the valve and actuator are on a test stand. For purposes of this procedure it is assumed that the application is locking the assembly to prevent actuation by air. For spring return actuators make sure that the actuator is in the spring failed position. For double acting actuators make sure that the actuator is in the intended locked position.

Cameron recommends a watertight seal be established at time of installation between the bottom of the D-Lock and the valve, as well as the top of the D-Lock and the actuator mounting pad. Apply a liberal amount of a liquid gasket material (Cameron recommends using DOW Corning RTV #732 multi-purpose sealant) on both surfaces prior to D-Lock installation. Make sure to surround the mounting holes with sealant to assure a complete seal.

1. Remove the D-Lock Safety Cap (See Figure 1) by rotating it counterclockwise.
2. Remove the drive coupling and set aside in a clean location so that it can be reinstalled later.
3. Each D-Lock is supplied with an indicating stop bolt that provides a visual indication of the *disengaged* (unlocked) position. (See Figure 2)

Position the D-Lock so that you are looking down on the top of the D-Lock with the indicating bolt pointing toward you. (See Figure 2) If the position indicator bolt is on the left hand side of the D-Lock, the assembly is intended to lock the valve in the full clockwise position. If the indicator bolt is on the right hand side, the D-Lock is intended to lock in the full counterclockwise position.

**IOM FOR DYNATORQUE™ D-LOCK LOCKING DEVICE (DL TYPE)**

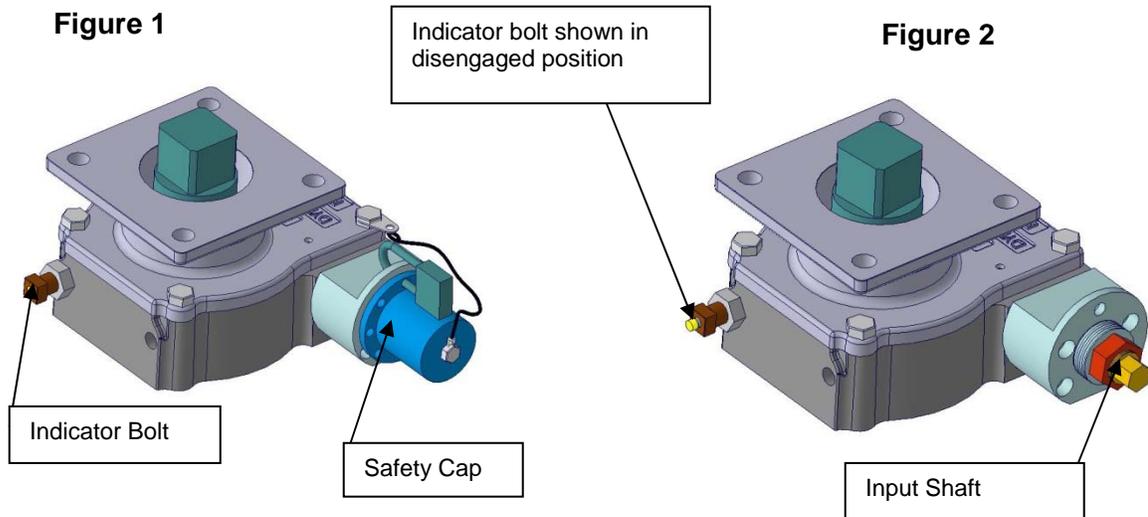
4. Loosen the lock nut on the indicating bolt and remove the indicating bolt from the unit. Set it aside in a clean location so that it can be reinstalled later.
5. Assemble the valve, D-Lock and actuator, making sure the valve and actuator are in the specified locked position with the same orientation, either full clockwise or counterclockwise.

**Important Note:** When reinstalling the drive coupling, coat the portion of the outside diameter of the coupling that will be in the D-lock and the inside bore of the D-lock with a lubricant. Cameron recommends Anti-Seize Lubricant manufactured by Permatex Industrial.

- a. The D-Lock is normally shipped in a mid-stroke position to allow bolt-up of assembly in the locked position.
  - b. Cameron recommends a watertight seal be established at time of installation between the bottom of the D-Lock and the valve, as well as the top of the D-Lock and the actuator mounting pad. Apply a liberal amount of a liquid gasket material (Cameron recommends using DOW Corning RTV #732 multi-purpose sealant) on both surfaces prior to D-Lock installation. Make sure to surround the mounting holes with sealant to assure a complete seal.
6. Bolt all components together using hardware as described above.
  7. Set the actuator travel stops in the desired locked position per the actuator manufacturer's recommendations.
  8. For locked-clockwise applications, rotate the D-Lock input shaft counterclockwise until you feel it come to rest making sure that the locked position of the valve is not changed. For locked counterclockwise applications rotate the D-Lock input shaft clockwise.
    - a. Now, reverse input shaft rotation  $\frac{1}{2}$  turn so that the set position will be established by the actuator stops, not the D-Lock.

**Note:** As there are typically no stop bolts inside the D-Lock, the actuator stops (NOT the D-Lock stops) must be set to establish the full clockwise and counterclockwise travel of the actuator. The D-Lock stops should be set so that they are not subject to the rotational force generated by the actuator.

9. Connect air supply to actuator and energize, moving the valve to the unlocked position.
10. Set the actuator travel stops in this position per the actuator manufacturer's recommendations.
11. From Step 2, above, return the indicator bolt to the unit. Screw the bolt inward until the yellow indicator is extended approximately  $\frac{1}{4}$ " (See Figure 2). Tighten indicator lock nut against the housing. The "storage" or "disengaged position" of the D-Lock is now set. Again, this "bolt" should not be subject to the actuator output torque. It's purpose is only to provide indication of the D-Lock orientation.

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1. If the assembly does not cycle, check power connections to the valve actuator to ensure it is functional. If the valve actuator is operational go to step 2.
2. Repeat installation steps 3-5 above to ensure D-Lock disengaged position is correct.
3. Make sure all connections between the components have been designed and installed correctly.
4. If the D-Lock is determined to be the cause of the assembly not operating, call your authorized DYNATORQUE representative, or call the Cameron factory directly at 231-788-7025.

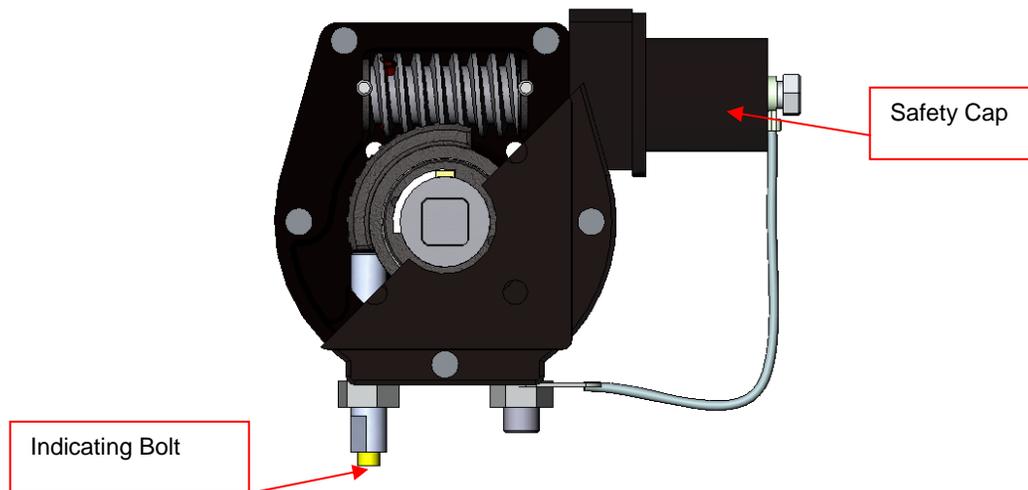
**Operation:**

The following instructions explain the operation of the D-Lock. For purposes of this instruction it is assumed that the application is locking the assembly to prevent actuation by air. These instructions assume lock clockwise, but they can be mirrored for lock counter – clockwise. A D3 D-Lock is illustrated for the operating instructions. The only difference between the D3 and the rest of the D-Locks is that the D3 D-Lock has a stop bolt on the opposite side of the indicating bolt, whereas the larger size D-Locks just have a hex screw, or set screw. The hex drive on the input shaft is 1/2" for the D3, and 3/4" for the larger size D-Locks.

***Warning: The D-Lock is designed to be used as a locking device. This product should never be used as a means to "override" the actuator. For those applications a different product is recommended, either an SD or SRD override. Attempting to use the D-Lock as an override will void any warranty consideration.***

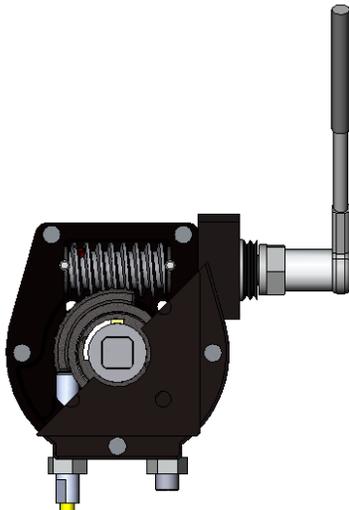
**IOM FOR DYNATORQUE™ D-LOCK LOCKING DEVICE (DL TYPE)**

1. The actuator and valve are allowed to travel their normal 90 degree rotation from close to open, open to close without interference from the D-Lock. This is called the storage, or home position. In this mode there are no moving parts in the D-Lock other than the drive coupling which connects the actuator output to the driven valve or damper stem.

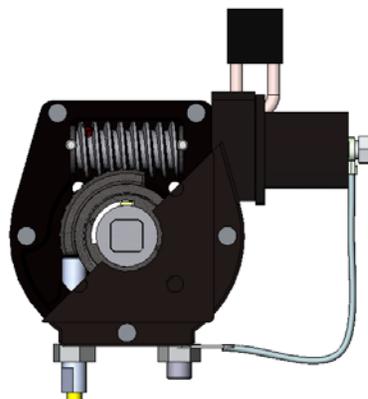


2. The yellow head of the internal indicating bolt will protrude approximately 1/4" when the D-Lock is in this position. To set the D-Lock in this position, if not already remove the D-Lock safety cap by rotating it counter-clockwise.
3. Rotate the input with a 3/4" socket wrench or wrench counterclockwise until you can no longer rotate it. The yellow indicating bolt should be protruding from the stop bolt. **At this point rotate the input approximately 45 degrees clockwise. This step is very important to ensure that the worm wheel is not forced out of alignment by the force of the worm wheel against the stop.**

See next page

**IOM FOR DYNATORQUE™ D-LOCK LOCKING DEVICE (DL TYPE)**

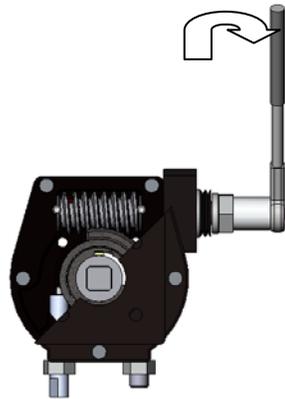
4. In the home or storage position it is not required to tighten down the lock nut that is on the input shaft.
5. Place the protective cap back over the input hex shaft by rotating it clockwise over the threads of the cap base. Continue to rotate until it becomes difficult – this is when you know that the cap is sealed properly. When the cap becomes difficult to rotate, line up one of the holes of the cap with the hole on the base.
6. Place your padlock through these holes and lock in place. Return the key to your plant lock box. The D-Lock is now locked in the fully operational automated position.



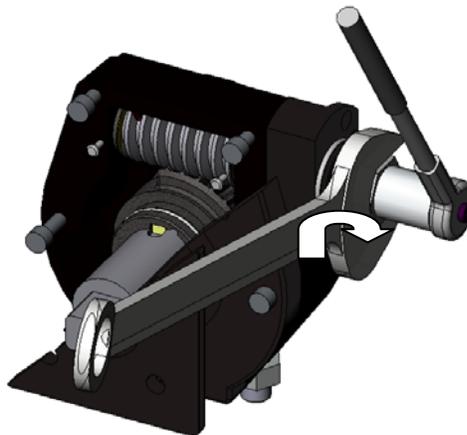
7. When the valve and actuator have been moved to the desired lockout position, full clockwise in this case, the D-Lock is ready to lock out the unit in the lock out position. In this position the valve will not move even if the actuator receives a signal to energize.

**IOM FOR DYNATORQUE™ D-LOCK LOCKING DEVICE (DL TYPE)**

8. Remove the padlock from the D-Lock protective cap and base. Remove the cap by rotating it counterclockwise.
9. Using a 3/4" socket wrench or standard wrench, rotate the hex input shaft clockwise until the actuator stop has been met, and you can no longer rotate it. The yellow indicating bolt should now be retracted.

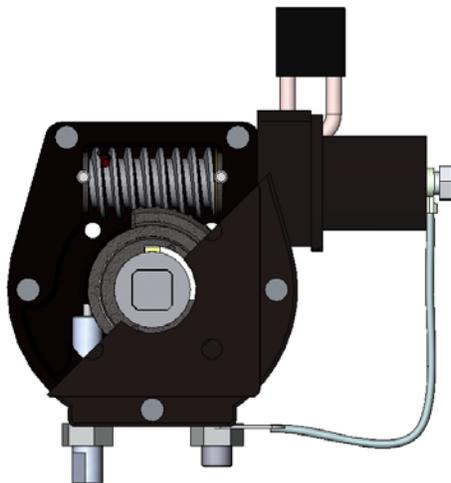


10. The D-Lock is now "engaged" and in the lock out position. Using a 1-1/2" wrench and the 3/4" socket wrench tighten down the lock nut against the lock washer so that the lock washer is completely compressed and flat. (Caution: Do not over tighten.) This process ensures that all of the rotational tolerance stacks in the actuator, D-Lock, and valve have been collected. At this point the valve is torque seated and locked into position.



**IOM FOR DYNATORQUE™ D-LOCK LOCKING DEVICE (DL TYPE)**

11. Place the protective cap back over the input hex shaft, as done in step 5. Place the padlock through the holes as done in step 6. Return the key to the plant lock box. The D-Lock is now locked/tagged out in the locked position. If the actuator receives a signal to energize, the D-Lock will prevent rotation of both the actuator and valve. Repeat steps 1-6 to return the D-Lock to the automated storage mode.

**Maintenance:**

- A. Storage: For best results, DYNATORQUE operators should be stored in a clean, dry area in their original factory shipping containers. If operators are stored in high humidity areas, steps should be taken to reduce the amount of moisture the units will be exposed to. Operator input shafts are plated or stainless steel to prevent corrosion. If operators are being stored for a long period of time, operator mounting surfaces should be lightly greased to prevent corrosion.
- B. Maintenance: DYNATORQUE manual operators do not require periodic maintenance. They are, for most applications, lubricated for life, with all components designed to have a life equal to or exceeding the wear life of the operator gearing.

**IOM FOR DYNATORQUE™ D-LOCK LOCKING DEVICE (DL TYPE)**

- C. Lubrication: If for any reason, lubrication replacement is necessary, Cameron recommends replacement of that lubrication with:

**DYNATORQUE Standard Grease Specification:- Alpha Green 2000**

NLGI Grade: Grade 2 EP  
Grease Base: Calcium Sulfonate  
Color: Green  
Anti-Wear EP Additives: Yes  
Dropping Point: ASM D566 572Deg F(300Deg C)  
4 Ball Wear KG Load ASTM 2596: 500  
Timken OK Load Lbs. ASTM 2509: 65  
Oil Separation, ASTM D1742-24Hous@77 deg F (25 Deg C)  
Base Oil Viscosity SUS @100 Deg F 600  
Base Oil Viscosity SUS @210 Deg F 70  
Pour Point +5 Deg F

- D. Spare Parts: Cameron warrants work performed by the factory or by factory trained personnel only. Please consult the factory or your local DYNATORQUE representative to arrange assistance. Cameron modifies a great percentage of its DYNATORQUE operators to meet specific customer requirements. Please refer to the operator part list number as supplied on the shipping document, acknowledgement, or invoice, when ordering spare parts.
- E. Spare Parts: For your records, please enter the operator part number from your shipping documents, acknowledgement, or invoice here:

Part Number: \_\_\_\_\_

Date Stamp: \_\_\_\_\_ (Located on the bottom of the operator housing.)

Purchase / Sales Order Number: \_\_\_\_\_

**Please Note:**

When assembling DYNATORQUE products to a valve or to an automated valve package, standard engineering practices must be utilized to assure proper mounting orientation, configuration, and distribution of weights and forces. Failure to do so could cause product damage and/or malfunction, **and void warranty consideration**. If there are any questions please contact the factory at info-dyt@c-a-m.com.