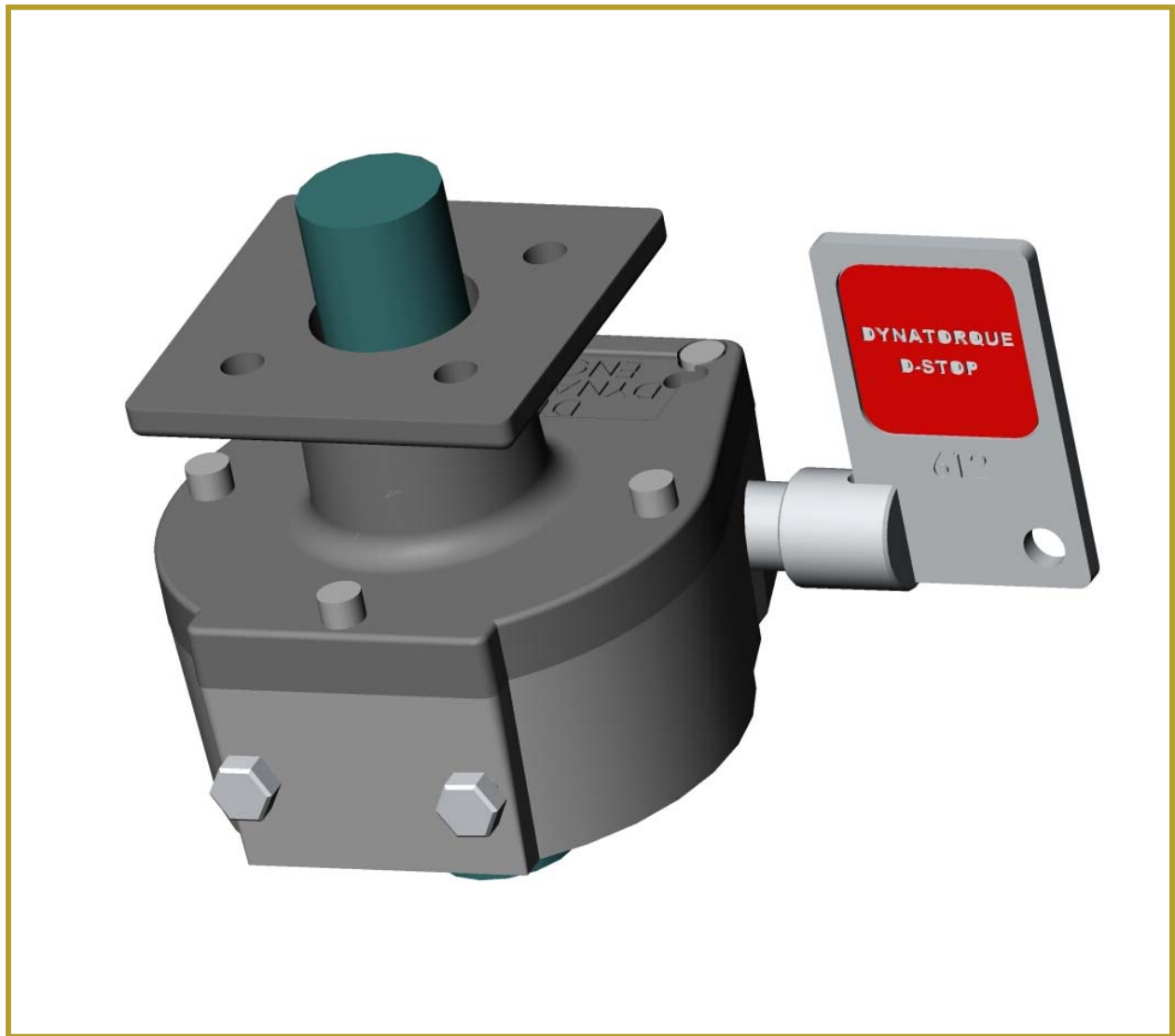


DYNATORQUE

VALVE ACTUATORS AND ACCESSORIES



D-Stop™
Partial Stroke Test Device

DynaTorque is pleased to introduce the D-Stop Partial Stroke Test Device.

Should you have any questions or comments, please do not hesitate to contact our Application Engineers or Product Specialists at 231-739-1431 or consult our D-Stop web site at www.dynatorque.com/dstop

Be sure to request a reprint of our Valve Magazine Article, “Considering Mechanical Partial Stroke Test Devices for Process ESD and Safety Related Valves”, or download it from our website.

Critical Valve Test?

D-STOP it!

It's a Catch-22 situation: To maximize revenue you want to keep your plant running 24/7 for as many months or years as you can--and you want to do it safely. To do it safely you need to periodically test your automated Emergency Shutdown Valves (ESD Valves). Here's the catch: To test the ESD Safety System you have to close the valve. If you close the valve, you shutdown the process flow. If you shutdown the process flow, you stop revenue flow.

Now, with the DynaTorque *D-Stop* (Patent Pending), you can do both: You can test your valves *and* allow the process (revenue) flow to continue!



Background

DynaTorque's *D-Stop* Partial Stroke Test

Device is for use in automated quarter-turn valve applications where compliance with standards such as ISA-S84.01 (Application of Safety Instrumented Systems for the Process Industries) and IEC 61508 (Functional Safety Of E/E/PE Safety-Related Systems) is of concern. The D-Stop allows testing of the entire Safety Instrumented System (SIS) in applications where exercising the final trip element (the valve) may not be practical, such as when the valve is installed in an active process flow line (reference ISA-S84.01, paragraph 9.7.5.2.b).

One of the terms associated with these industry standards is "valve partial stroke testing". A "partial stroke test" might be defined as, for example, allowing the safety system to close the valve only 20 degrees. However, when the D-Stop is disengaged, it has no impact on the operation of the automated valve. When the D-Stop is engaged, the device limits the travel of the valve actuator to the specified travel limits. In that case, all of the valve control elements (solenoids, positioners, relays, limit switches, etc.) are tested. If the automated valve is inoperable due to valve blockage, mechanical failure, misalignment, or some other control system anomaly, it will become apparent during a D-Stop Partial Stroke Test. Since the valve is only partially closed during this test, the flow coefficient is not significantly affected and process flow continues.

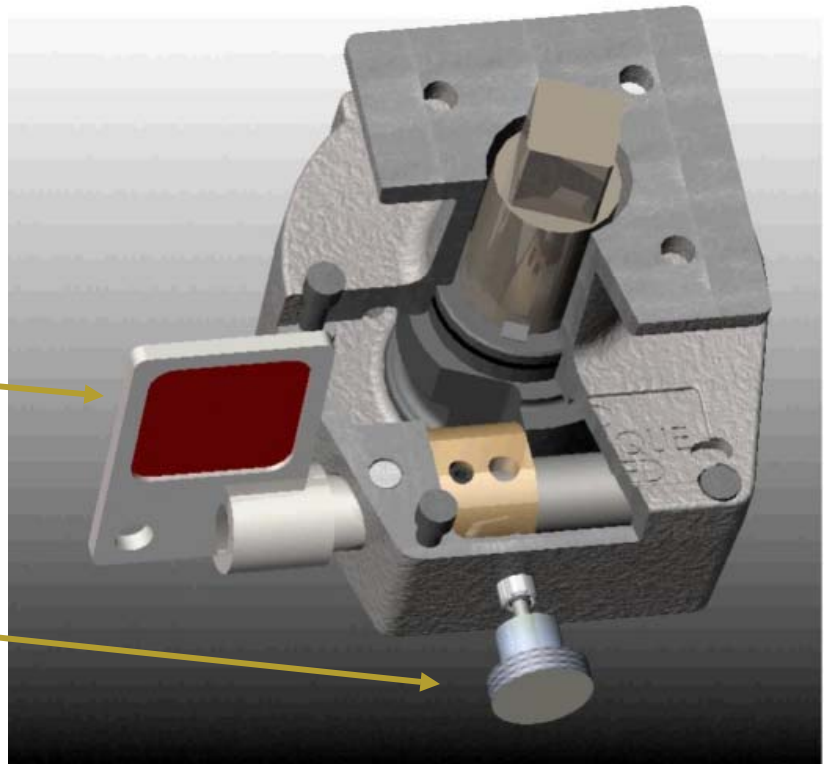
IP 67 Certified!

How the D-Stop Works

The D-Stop has two internal cams. During normal valve operation, the D-Stop is disengaged and the actuator is free to stroke the valve on demand.

When the Partial Stroke Test is to be performed, the stainless steel engagement key is inserted into the D-Stop key socket.

When the redundant safety device is pulled, the Engagement Cam is free to rotate 90 degrees counter-clockwise. This safety feature forces an intentional, “two-handed operation” in order to engage the D-Stop.



When the key is turned 90 degrees counter-clockwise it is locked into the device and the Engagement Cam rotates-- the device is now “engaged”. At this point, when the valve actuator is sent a test signal to go to the ESD or safety-test position, the Drive Cam that is attached to the actuator through the drive coupling, rotates until it comes into contact with the Engagement Cam, normally 20 degrees (this is a specifiable value). See the diagrams on the next page. To view a video of the D-Stop in operation, visit our web site <http://www.dynatorque.com/dstop/video.html>

To disengage the device, simply rotate the key 90 degrees clockwise, remove key from the D-Stop and return the key to the controlled environment

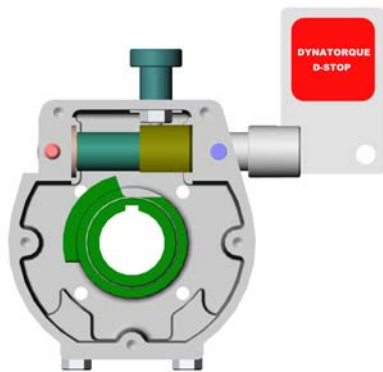
How the D-Stop Works- Cont.

Note that the unique key cannot be removed from the D-Stop while the unit is engaged. Therefore, if the key is kept in a control room or lock box, the plant operators are assured that the device has not been accidentally left in the engaged mode.

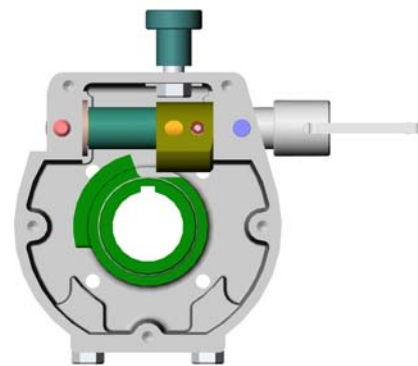
All keys and D-Stops are serialized. If a key is ever lost, new ones can be easily obtained from the factory. D-Stops may be keyed such that one key fits several D-Stops in a plant, or each D-Stop can be supplied with it's own, unique key.



Industrial and robust key design!



D-Stop disengaged



D-Stop engaged

Why D-Stop?

When considering Partial Stroke Testing, plants have two basic methodologies to choose from: Mechanical or Electrical. The D-Stop is a mechanical device and we believe the mechanical methodology is superior to electrical, and here's why:

It's Simple: When it comes to testing systems, the temptation is to take what might be an already sophisticated control valve system and make it even more complex! It is not necessary to integrate the D-Stop into the control loop or add ancillary controls, as is the case with electric systems. It's simple. In the real world, oftentimes the less complex the system, the fewer things to go wrong.

True Safety System Tests: Because the D-Stop requires no extraneous controls, when the valve is tested all the actual SIS components, controls and elements used in an ESD or safety valve will be activated. You have real information about the exact controls that will be relied upon to protect your plant and personnel.

It's Economical: The basic cost a D-Stop, depending on torque requirement, is typically hundreds or thousands of dollars less than an electric or controls-driven system. Instrumentation personnel and software programmers are not required to install the D-Stop, so installation costs are lower. Commissioning or routine calibration of controls is not required, because there aren't any. Most process plants have qualified in-house mechanics or Valve Automation Centers nearby and, since there are no additional controls required, installation cost savings can be substantial.

Built for a demanding, industrial environment: The D-Stop is vibration resistant. It is externally corrosion protected with coatings and independently certified to IP 67 to prevent water ingress. Stainless Steel trim is used for keys, shafts and sockets. The D-Stop is permanently lubricated, factory sealed and requires *no routine maintenance*.

But most important...

It's Safe: Once the D-Stop is engaged, the drive mechanism prevents the actuator from causing the valve to stroke past a specified set point--the partial stroke.

- **Theory:** Electronic systems rely on instrumentation, software and controls to limit valve travel past the set point to closure.
- **Reality:** The valve is in a *real* pipe with *real* process flowing through it. If the valve closes there may occur anything from loss of revenue to a catastrophic event, depending on the plant and the application. Obviously if you can tolerate the valve closing, you do not need a Partial Stroke Test Device.

Solution: When performing Partial Stroke Testing: Keep it safe, keep it simple – specify D-Stop!

Why D-Stop? – cont.

Metal-to-Metal Safety: The D-Stop physically prevents the valve from moving past the specified test point. Once the D-Stop is engaged, the valve cannot move past the set point. (See photos below)

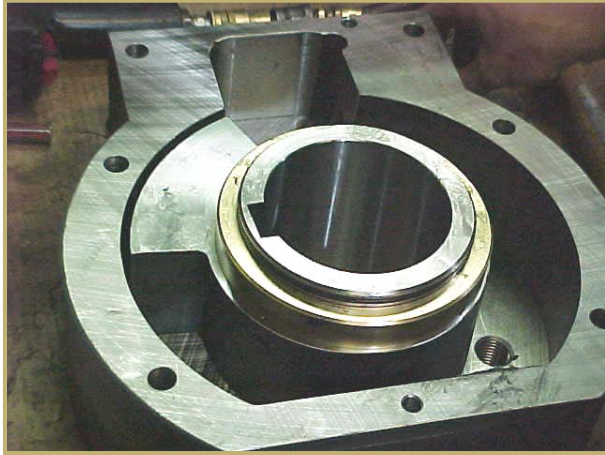
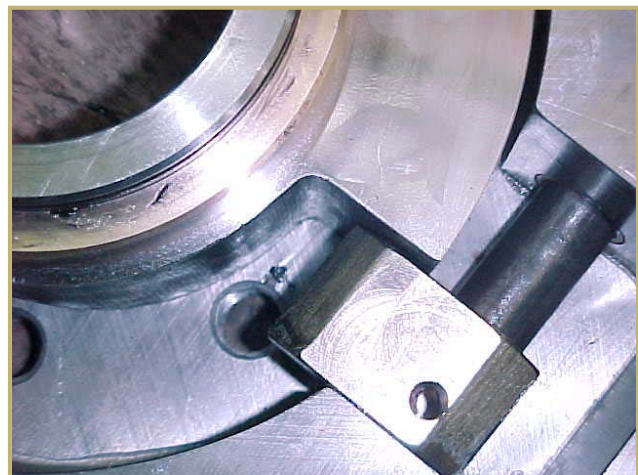


Photo to the left is a fabricated DT 260 D-Stop in factory assembly. Note the engagement cam has not been installed. This unit is manufactured of special materials for low temperature application.

Both pictures to the right show the same DT 260, but with the Engagement Cam now installed.

Photo on top right shows the Engagement Cam *not engaged*.

Bottom photo shows the D-Stop *fully engaged*.



Sandwich-Mount for Tight Automated Control and Packaging



The D-stop is a "Sandwich" device. At left is a typical automated package showing where the D-Stop would normally be positioned.

Modifying top and bottom D-Stop mounting flanges to match actuator and valve mounting pads can, in many instances, replace costly actuator mounting hardware.



Automated valves come in all sizes. DynaTorque manufactures a full line of D-Stop devices up to 4,000,000 lb-in!

Whether the application is large or small, fast acting or slow, contact DynaTorque or our factory authorized representative network for application assistance, sizing and pricing.

Actuator-to-Valve “Sandwich Interface”

The D-Stop can be provided as a component of a “new” automated valve or it may be field retrofit to an existing valve/actuator package.

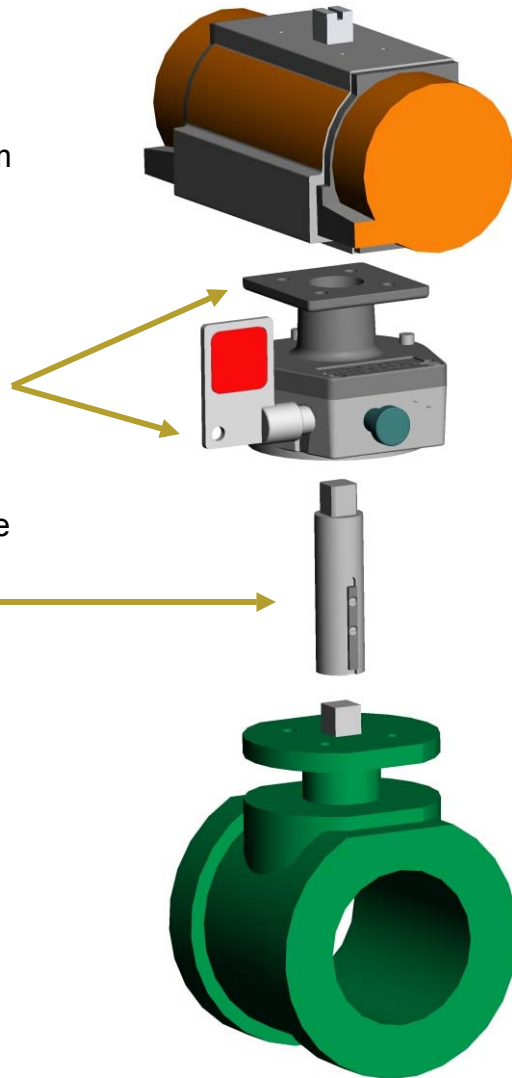
As shown to the right, the complete kit consists of a D-Stop Test Device, Engagement Key, and a Drive Coupler for customer adaptation to the valve and actuator. (Custom machined drive couplers are available from DynaTorque on application. Consult the factory or your authorized representative.)

D-Stop housing flanges can be factory drilled to accommodate a wide variety of valve and actuator combinations.

A “Driver” connects the actuator and valve *through* the D-Stop. As the actuator turns the valve, the Driver also rotates the Drive Cam by means of a keyed connection.

The D-Stop is totally enclosed, weatherproof, and permanently lubricated. No routine maintenance is required. The standard device has been independently certified to IP 67 for protection against water ingress.

The D-Stop is available for applications up to 4,000,000 lb-in of actuator torque! For detailed information regarding sizing, ratings, materials of construction, coatings and special construction, refer to the product specification sheets or contact the factory



D-Stop – It's Modular!

The D-Stop is *modular* – it can be used and applied many different ways!

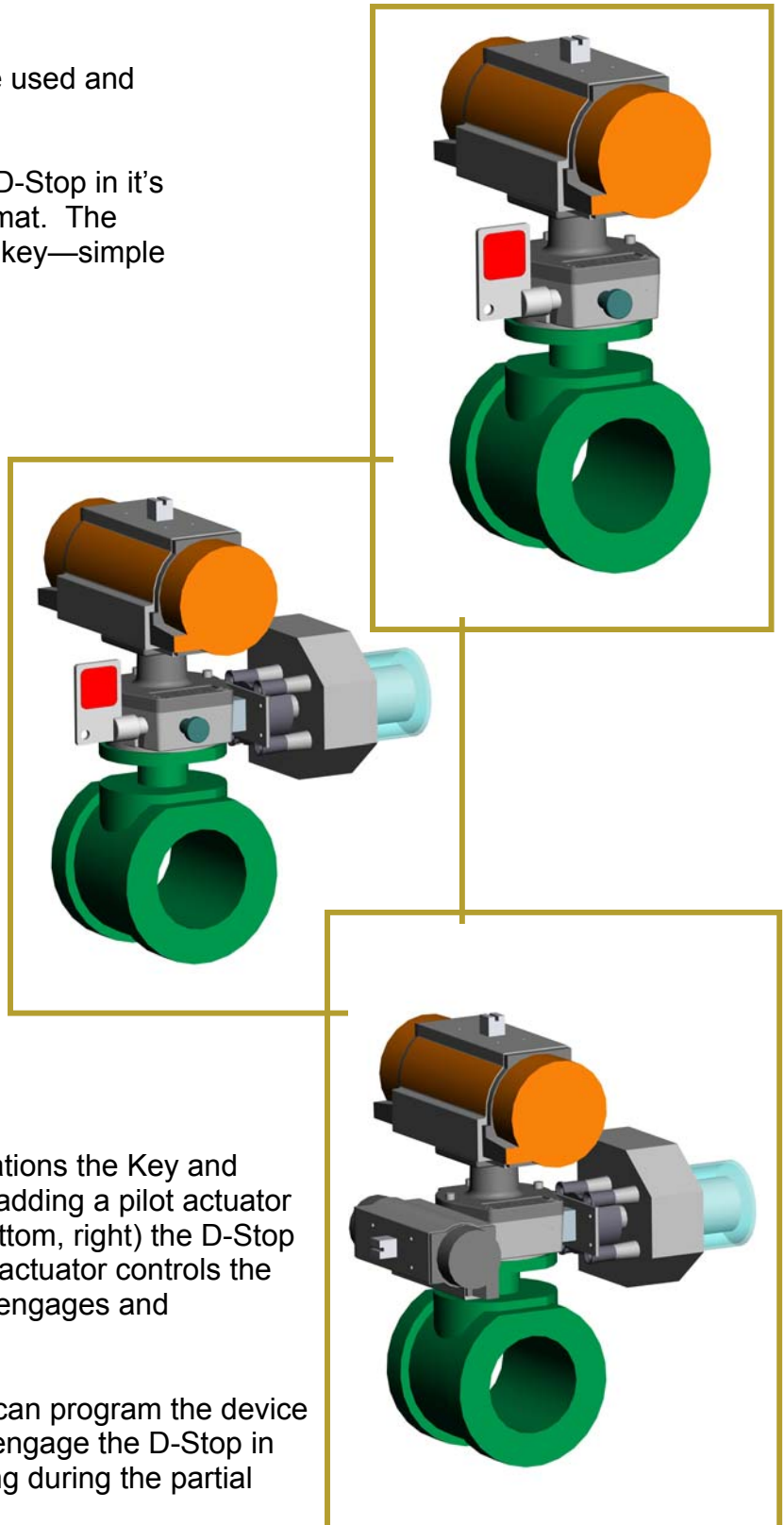
The figure at the right shows the D-Stop in it's most economical and manual format. The device is manually operated by a key—simple and safe!

The D-Stop may also come equipped with it's own data point device (such as limit switches, as shown in the middle illustration) for positive annunciation to the control room indicating whether the device is engaged for testing the Safety Instrumented System.

Some users may want to use such devices to gather information for their data acquisition system such that auditable reports, testifying to time and date of the test, can be generated (Reference ISA-S84.01, para 9.8.1).

For remote and/or automated applications the Key and Safety Release are not required. By adding a pilot actuator (as shown in the illustration at the bottom, right) the D-Stop can be remotely controlled. The top actuator controls the valve, while the pilot actuator on left engages and disengages the D-Stop.

Using control system logic, the user can program the device to be configured to automatically disengage the D-Stop in the unlikely event of an ESD occurring during the partial stroke test.



Special Configurations

Is your case unique?

DynaTorque's Engineering and Product Applications Groups are dedicated to working with our customers and their diverse array of special configurations.

The illustration to the right shows a D-Stop with limit switches indicating "Off Test / On Test". We have also added a proximity switch inserted into the housing that is sensitive to the movement of the Drive Cam.



Using this configuration, the plant control room will not only receive a signal indicating whether the D-Stop is engaged, but also if the Drive Cam has rotated to the test position.

Although the D-Stop does not *require* ancillary controls, they may be added if specified.

Optional limitswitch brackets, installed switches, remote operation, full lock-in / tag-out capability, are also available.

Contact the factory or your DynaTorque authorized representative for *your* special configuration!

Valverciser

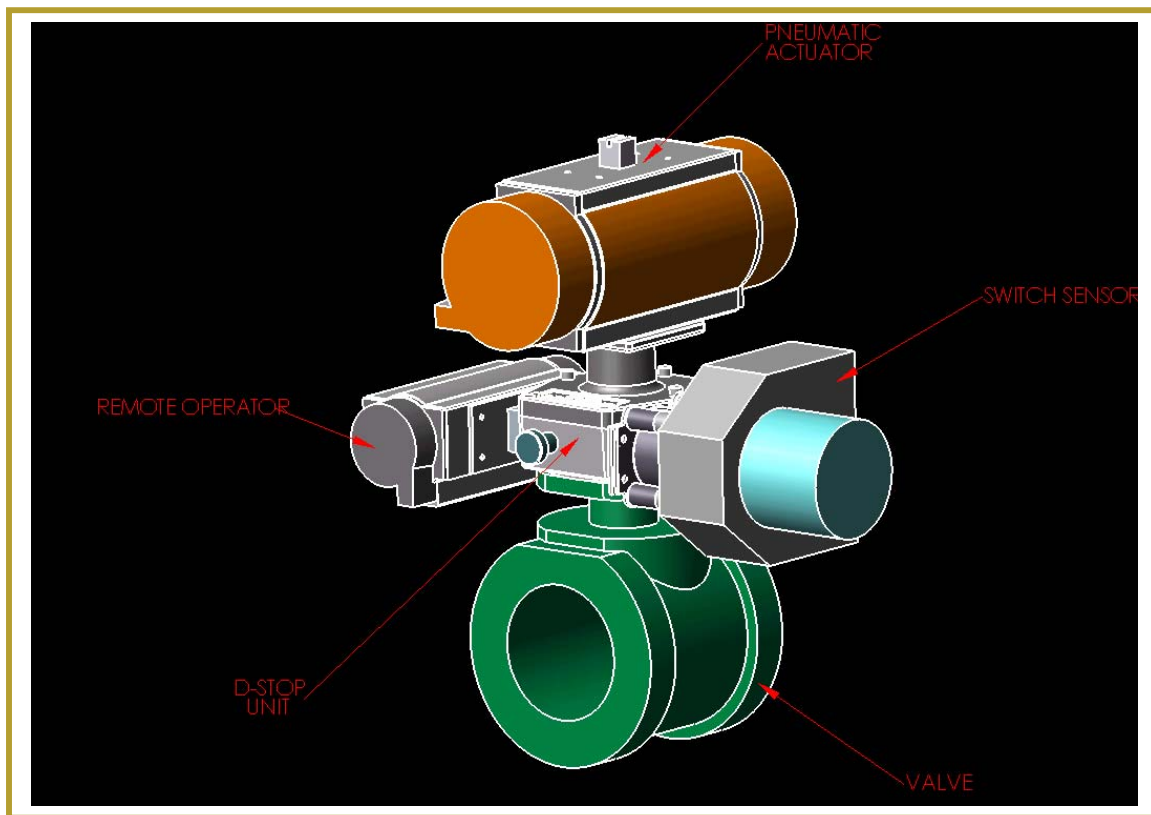
In addition to safety applications, the D-Stop can also be used to enhance the operation of valves in severe applications.

In many process applications the chemical composition of the flowing fluid causes material to build-up on the valve internal body and trim surfaces. Over time, this build-up may cause the valve to “stick” in position and not stroke. In other applications, extreme heat and dry gasses may cause the valve to lock up.

Use of the D-Stop allows plant operators to periodically “exercise” the valve or actuator by allowing it to partially stroke—even while the valve is flowing process fluids! This “exercising” of the valve can be automated simply by installing a pilot actuator on the D-Stop as shown below. If both the valve actuator and the D-Stop actuator are logically or timer controlled, this “exercising” can be a truly automated process.

Contact the factory for more information.

The D-Stop can also be configured to accommodate maintenance lock-in, tag-out requirements.



Integrated Data and Diagnostic Systems

Some end users are investigating diagnostic technology for valve maintenance considerations. The data acquired from these systems may be helpful in determining the present or future operational status of an automated valve.



Even though the D-Stop does *not* require ancillary controls, such controls *may* be added if the end user specifies them. For example, if the user would like to gather data to determine if the valve/actuator package is experiencing a change in run time trends, standard actuator top works diagnostic technology may be used.

But because the D-Stop is mechanical, once it is engaged the end user has assurance that the actuator will not stroke the valve past the test set point.

Typical D-Stop Applications

Process Safety Applications

***Emergency Shutdown Valves
Isolation Valves
Catalyst Valves
Any Automated Safety Valve***

Gas Pipeline Applications

***Mainline Block Valves
Linebreak Control Valves
Compressor Station Valves
Station ESD Valves
Pig Launcher & Receiver Valves
Isolation Valves***

Specifications For Partial Stroke Test Device: D-Stop Series

Definition:

The DynaTorque *D-Stop* is a device used for the periodic testing of emergency shutdown valves (ESD) and other safety related process flow applications. The test can indicate whether the valve and actuator package is inoperable due to valve blockage, mechanical failure, control system anomalies or misalignment.

Additionally, use of the D-Stop can also aid in compliance with ISA S84 requirements for testing of the entire Safety Instrumented System (SIS), especially in applications where exercising the final trip element may not be practical, such as when the valve is installed in an active process flow line (reference ISA-S84.01, paragraph 9.7.5.2.b). The device limits the travel of the valve and actuator to 20 degrees (or customized to exact specifications), thus avoiding significant reduction of process flow.

Construction

D-Stops with torque ratings up to 180,000 lb-in have cast iron housings and covers. Units in excess of 180,000 lb-in are fabricated of carbon steel. Engagement cams are carbon steel, drive cams are cast ductile iron, input shafts are stainless steel, shaft and segment seals are Buna-N rubber, bushings are oil impregnated copper nickel steel alloy, cover-to-housing sealant is Loctite 51580. Engagement keys and key sockets are stainless steel.

Bodies can be factory drilled to accommodate a wide variety of valve and actuator combinations. The D-Stop is totally enclosed, IP-67 certified, weatherproof, and permanently lubricated.

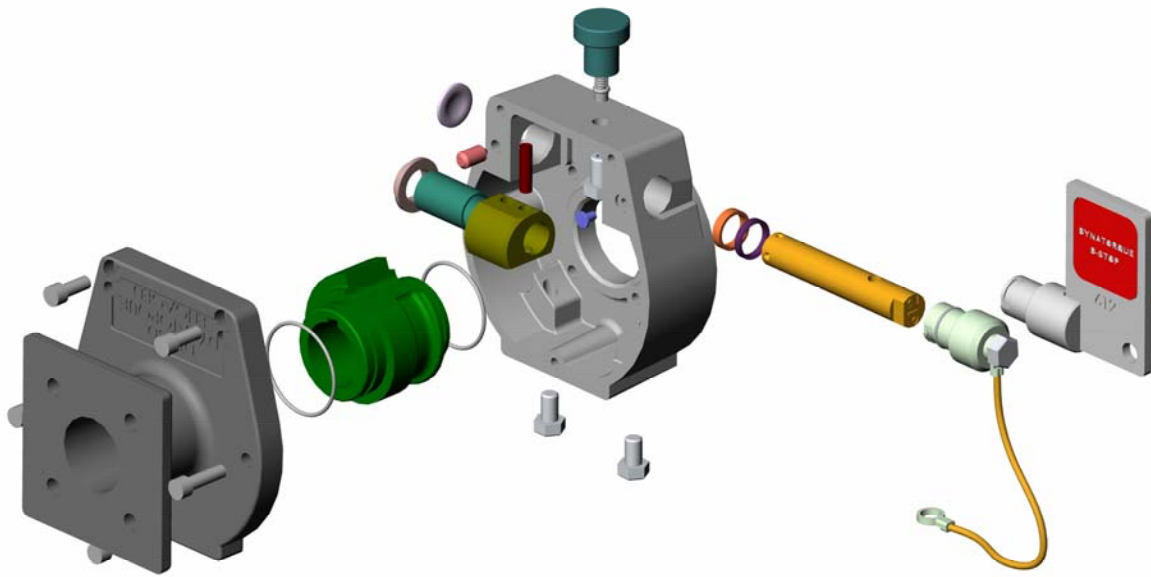
Optional Coating: DynaTorque offers E-Coat, a cathodic and baked epoxy available as an optional coating that is superior to spray paint. For more information contact the factory.

Other Options: Custom and ISO bolt patterns on either or both flanges, custom bores, custom factory drive adapters for direct mounting to actuator and valve. Increased or decreased travel limits, automation mounting package, limit switches, remote operation, lock-in tag-out configuration..

Model	Part List	Unit Wgt. Lbs.	Output Torque Lbs.-in	Std. Output Bore	Std. Keyway Size	Std. Mounting Pattern	
						Qty. & Size	Top Flg. Qty. & Size
D3STOP	50-2200B	10.8	3,000	1.250"	.250x.188	(4)5/16-18	(4).344
D7STOP	50-2600B	18.5	7,000	1.750"	.500x.375	(4)3/8-16	(4).440
D12STOP	50-2800B	24.4	12,000	2.000"	.375 sq.	(4)1/2-13	(4).562
D21STOP	50-4100B	61.3	21,000	2.500"	.500 sq.	(4)5/8-11	(4).688
D36STOP	50-4200B	79	63,000	3.250"	.750 sq.	(4)3/4-10	(4).781
D60STOP	50-3200B	98	180,000	4.000"	1.000 sq.	(8)5/8-11	(4).688

Larger sizes available to 4,000,000 lb-in. Consult factory on application.

Consult factory for sizing questions.



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