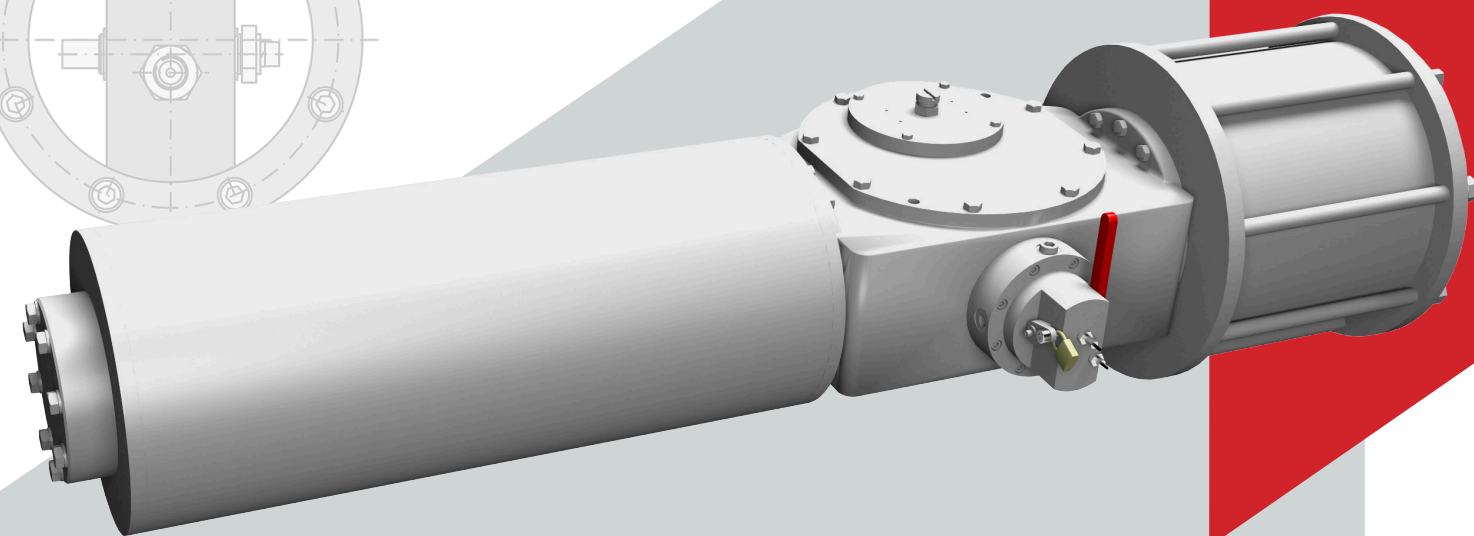
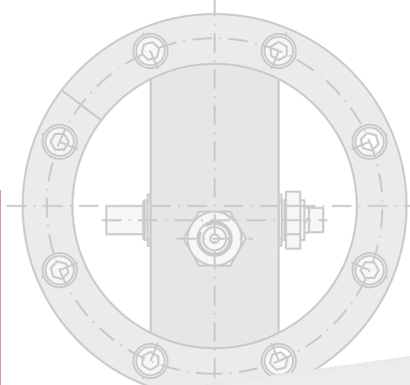
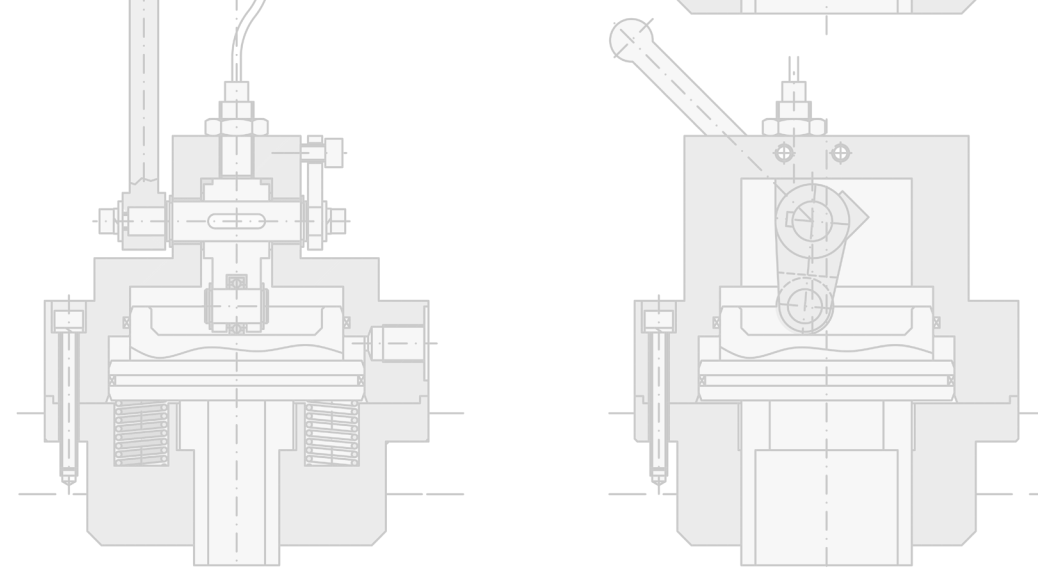




# ACTREG

The art of power and perfection



# ACT LOCK

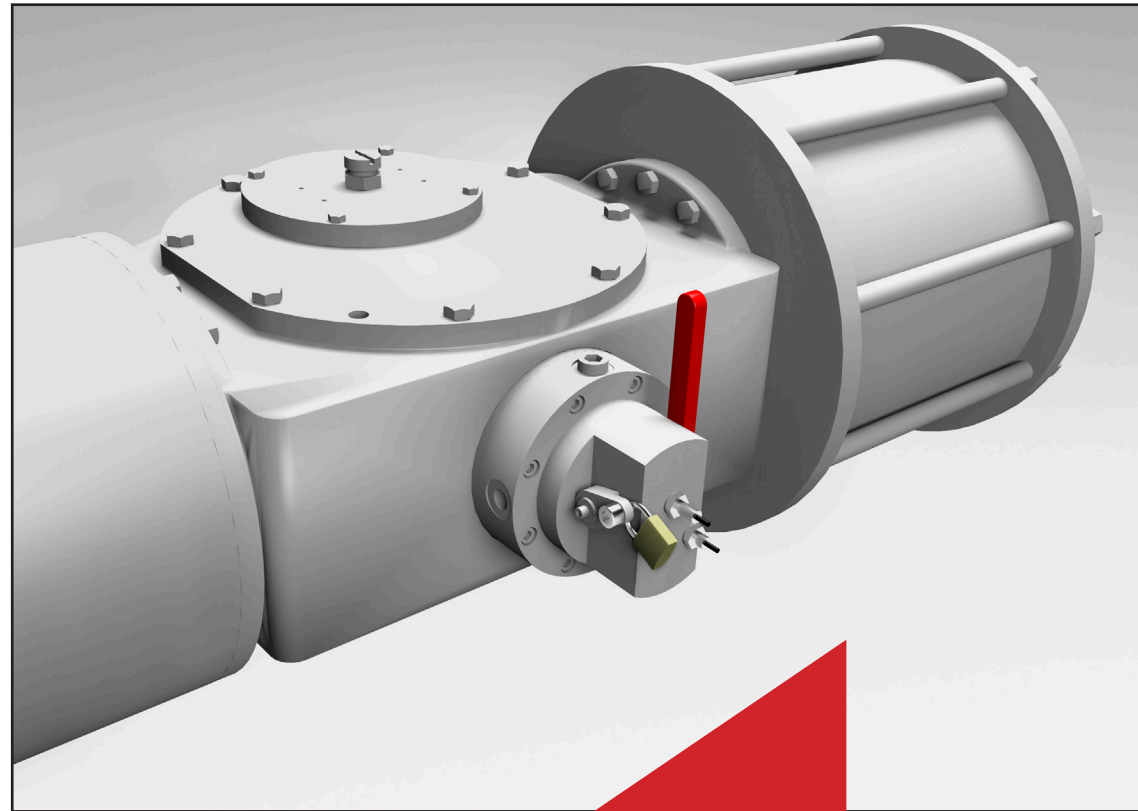
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Mainly emergency valves remain on its position, and just are actuated in case of emergency. ACTREG ACTLOCK Partial stroke test (PST) allows to fully tested all control elements involved in the emergency shot down, as actuator, solenoids, lock up valves, filter regulators... etc). Partial stroke test is highly recommended in international standards IEC61508 & IEC61511 for testing all the ESDV, HIPPS or BDV valves, at regular intervals. When PST is implemented correctly provides an enhancement to the final elements (valves, actuator, solenoids....), by reducing its PFDavg (probability failure on demand average) contribution by 50%, to the safety instrumented function (SIF). The new patented system ACTLOCK provides mechanical PST, with fully automated system, reducing the overall dimensions for the final elements, comparing with other mechanical solutions and bring more safety in all critical process.



ATEX  
CERTIFIED

#### MAIN CHARACTERISTICS

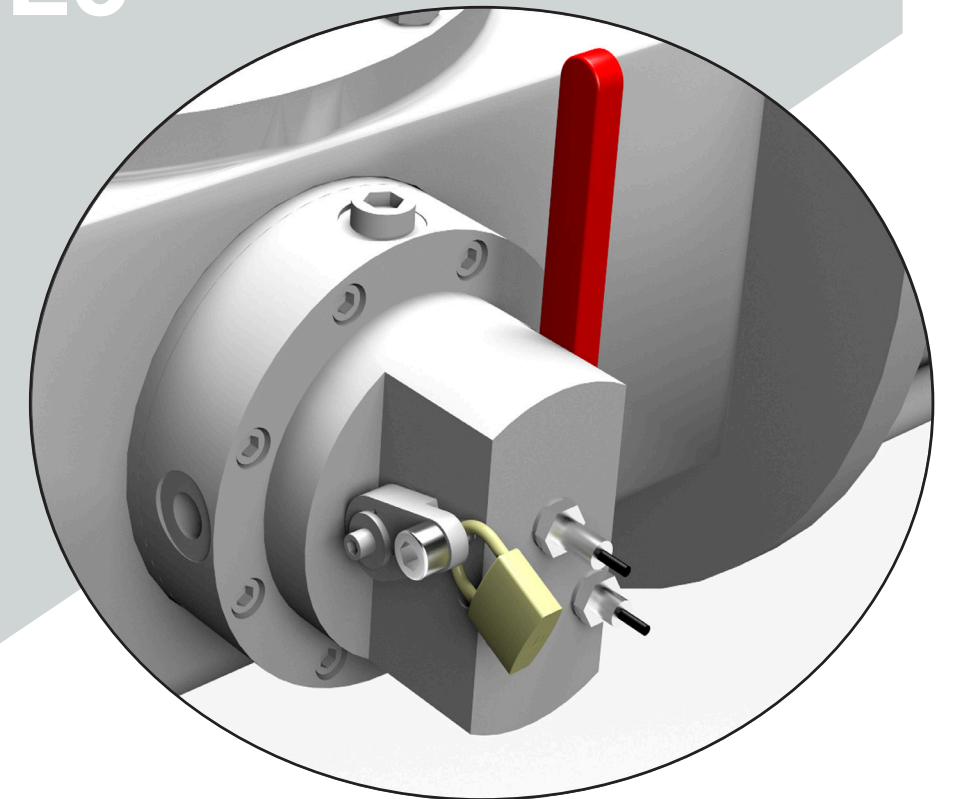
- ▶ Simple, integrated and 100% reliable mechanical solution
- ▶ Non complicate software, non fragile wiring or connections.
- ▶ Robust and reliable. Vibration resistance. IP67 protection.
- ▶ Build for the hardest environmental conditions
- ▶ Can be produced in Low carbon steel, Carbon steel or Stainless steel.
- ▶ No overshoot or spurious travel due mechanical stop.
- ▶ Test for all final elements loops, including solenoid valves, filter regulators and all ancillaries at real speed.
- ▶ Suited for maintenance purposes, with the possibility to change ancillaries without interruption of the process.
- ▶ Integrated feedback device
- ▶ Non commissioning or routine calibrations routines
- ▶ 3 in 1 option: partial stroke test, locking device and automatic stroke limiter.

# No risk OVERSHOOT

#### HOW IT WORKS

The ACTREG ACTLOCK it is a simple module attached into actuator body, with integral mechanical stops. This mechanical stop can be actuated thru a low pressure pneumatic line (minimum air pressure 3,5 bar) or manually depending of necessities of each costumer. When is disengaged the valve will have free stroke on valve demand. When we apply air pressure into ACTLOCK module, will engage a mechanical stop that will act directly to the yoke. This module can be easy fitted up from 5° to 30°. When air pressure is stopped, the internal safety springs will bring the mechanical to his initial position. In case of emergency shot down appears in the middle of the partial stroke test, the safety springs will bring the module to the safe position. and bring more safety in all critical process.

SUITABLE <sup>for</sup>  
SIL3 applications





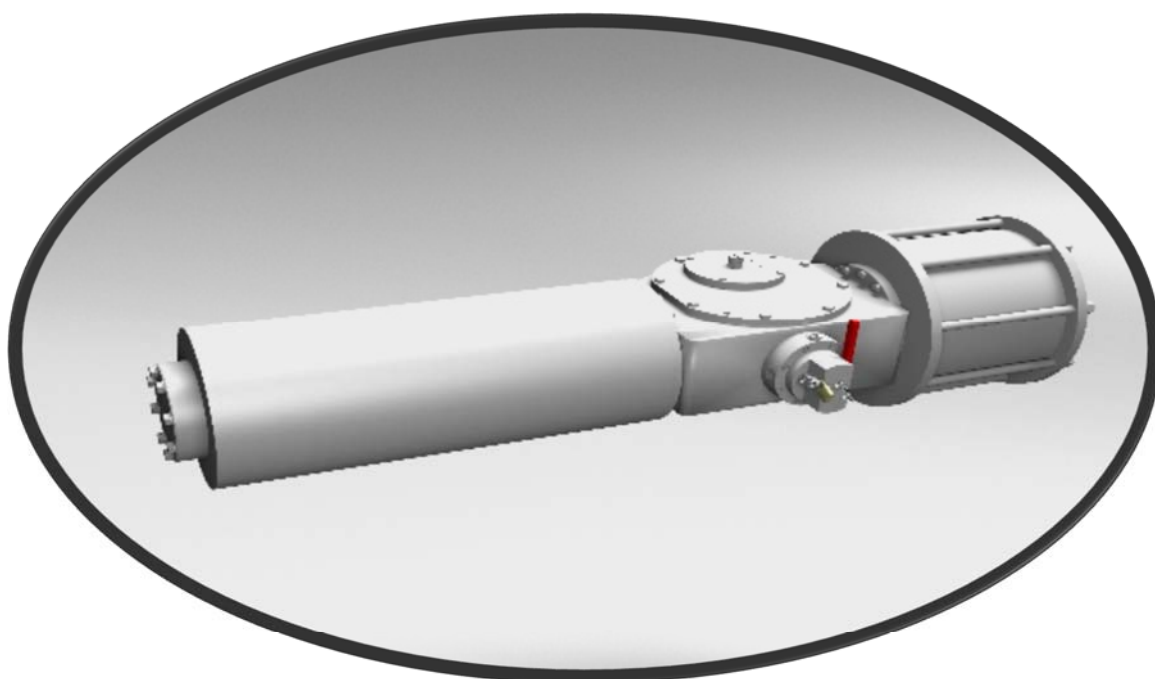
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# **TYPE ACTLOCK**

## **PATENTED PARTIAL STROKE TEST**

### **Specification guidance notes for engineers**





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## **CONTENTS**

- 1. Introduction**
- 2. ISA S84.01 & IEC 61508/61511**
- 3. Partial stroke test**
- 4. ACTLOCK**
- 5. PST TESTING OPTIONS**
- 6. Software & ESD review**
- 7. Methodologies**



## **1 - INTRODUCTION**

This document explain the installation and most common working methodologies for the patented device ACTLOCK. This Unit is intended to work under three main options:

- PST (partial stroke test)
- Mechanical Locking device
- Automatic stroke limiter

This document is intended as guidance to engineers, final end users, operators for specification of the ACTLOCK device and should be not considered as a manual O&M for the product.

The ACTLOCK device shall be provided with a new automated valve and is intended to work with ACTREG scotch yoke actuators that are designed to include this device as a compact unit and it is not intended to retrofit any existing valve or actuator.

## **2- ISA S84.01 & IEC 61508/61511**

Mainly emergency valves remain on their position and are just actuated in case of emergency. ACTREG ACTLOCK Partial stroke test (PST) allows to fully test all control elements involved in the emergency shutdown, as actuators, solenoids, lock up valves, filter regulators... etc). Partial stroke test is highly recommended in international standards ISA S84.01, IEC61508 & IEC61511 for testing all the ESDV, HIPPS or BDV valves at regular intervals. When PST is implemented correctly it provides an enhancement to the final elements (valves, actuators, solenoids...), by reducing its PFD avg (probability failure on demand average) contribution by 50% to the safety instrumented function (SIF). The new patented system ACTLOCK provides mechanical PST with fully automated system, reducing the overall dimensions for the final elements compared with other mechanical solutions and bringing more safety in all critical processes.



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### **3- PARTIAL STROKE TEST**

Successful implementation of the safety lifecycle model, associated with ISA S84.01 & IEC 61508/61511, is the Safety integrity level (SIL). The SIL is a numerical benchmark, related to the probability failure on demand (PFD). SIL is affected by the design robustness, device integrity, expectance life and common cause faults. It is also affected to the operations, maintenance strategy, diagnostics and testing intervals.

For most operations companies, one of the most difficult part of SIL compliance is the testing of the final elements, especially for ESV (emergency shot down valves), HIPPS valves, BDV (blow down valves), and every valve that is intended to work for safety instrumented systems. Traditionally, emergency shot down valves have been tested at unit turnaround, using a full-stroke test to demonstrate the right performance in case of factory failure. Years ago, full turnaround cycle test were every year, however due to the mechanical reliability and preventive maintenance programs, companies are now extending the test. Extended the full cycling test yield great economic returns through increased production. Partial stroke test allows the final elements test without interruption of the system, as the rotation angle test will be from 10° up to 35° (depending of technical requirements), the valve will be only partially closed and the overall CV is not significantly affected and process flow can continuous without practically any restrictions.

### **4- ACTLOCK**

The Actreg ACLOCK pneumatic module is assembled into the actuator body, and allows mechanical travel limiting without introducing spurious travels trips in the system. Additionally, since the valve is mechanically prevented from travelling beyond a preset test point the risk of an actual shutdown, due to and electronic trip or overshooting of the electronically



imposed PST angle is therefore eliminated. The mechanical approach allows to do not take complicated control system and make it more complex to solve the problem of making more reliable. So, the benefits of mechanical advantages is no extraneous controls devices in the control loop as will be keep it simple as possible and when the device is tested, all the actual components and controls for ESDV, in the “real world” speed of operation.

### **Mechanical Characteristics and operations:**

Figure-1

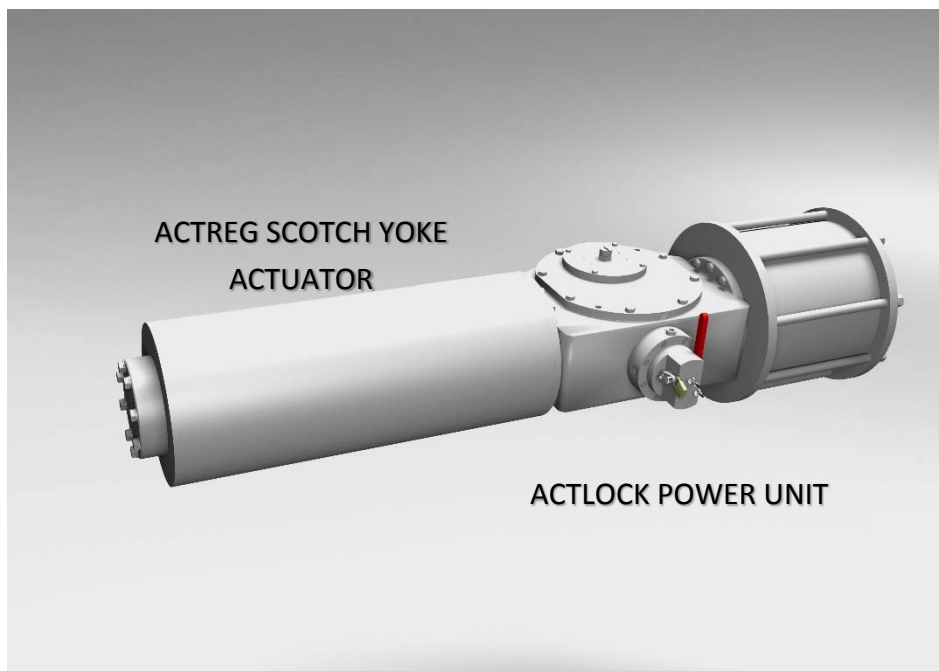
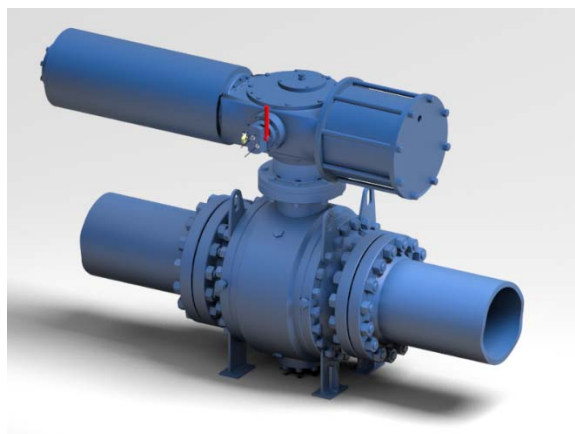


Figure 1 shows overall assembly ACTLOCK PST power unit

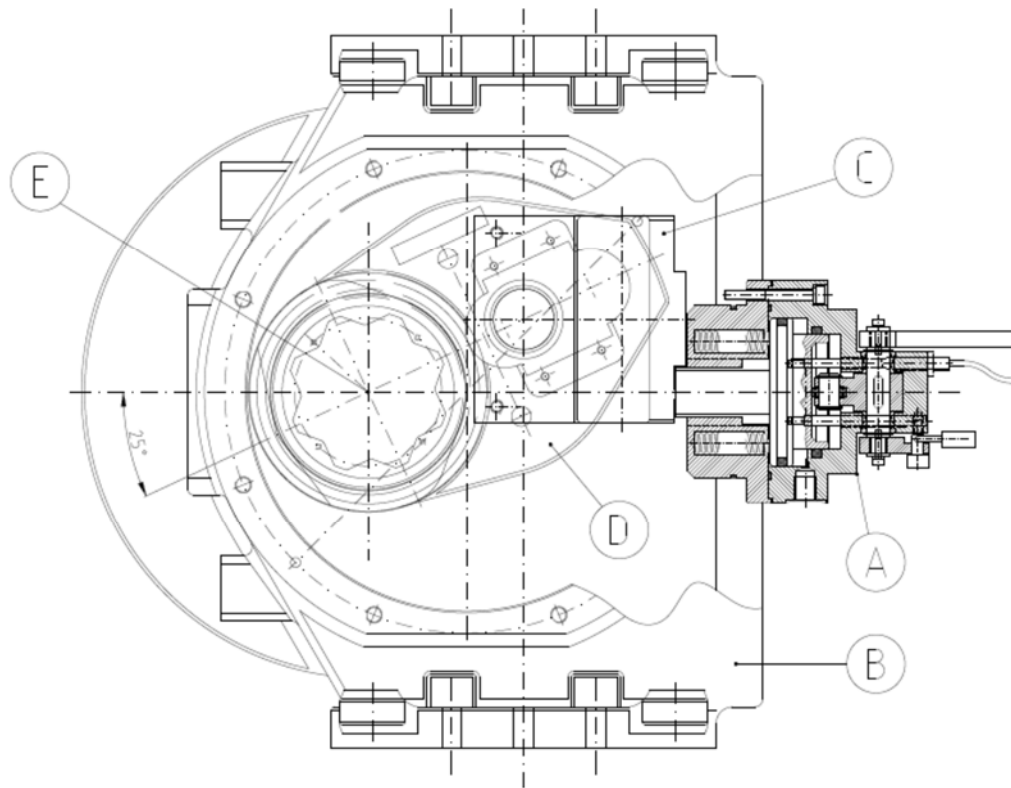
Figure-2



the valve.

Figure 2 showing overall assembly actuator to

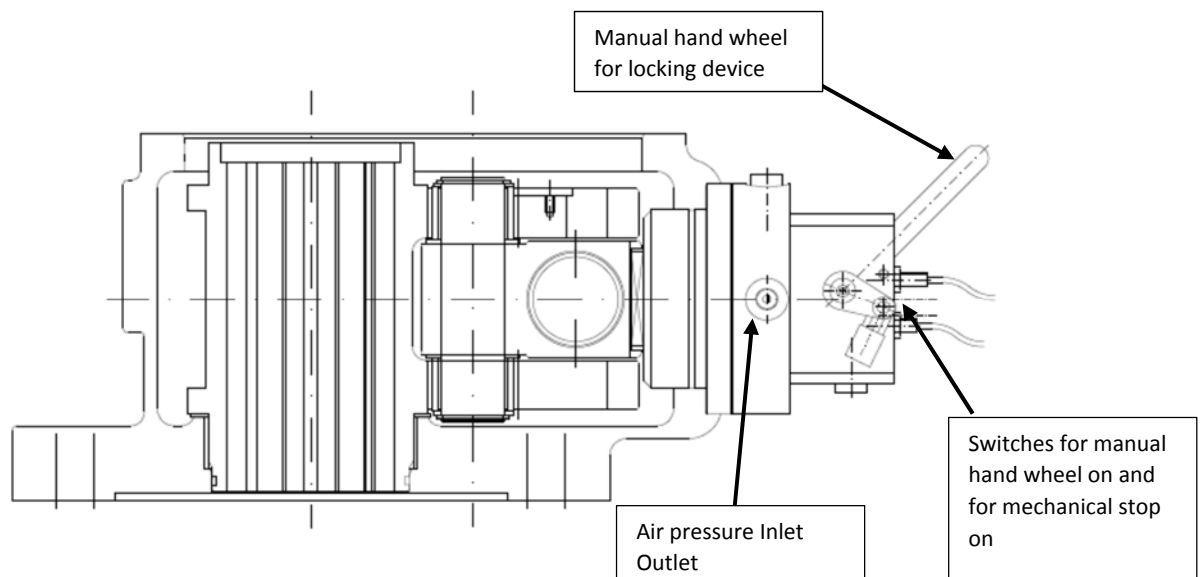
Figure-3



In figure 3, shows actuator center body (B), The actuator's stem (E), yoke (D), center block slide (C), and the power unit ACTLOCK (A)

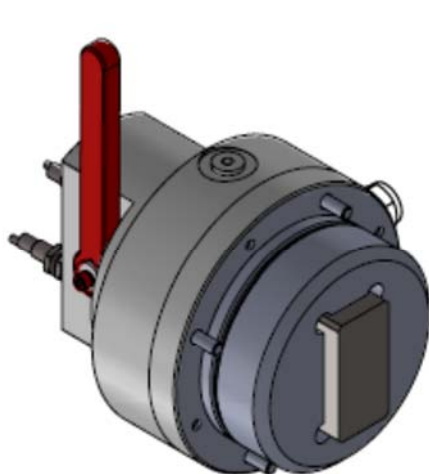
When we pressurized with air, the module A, we engage an internal mechanical stop, with a metal to metal safety. The preset angle desired for the PST should be requested to ACTREG.

Figure-4

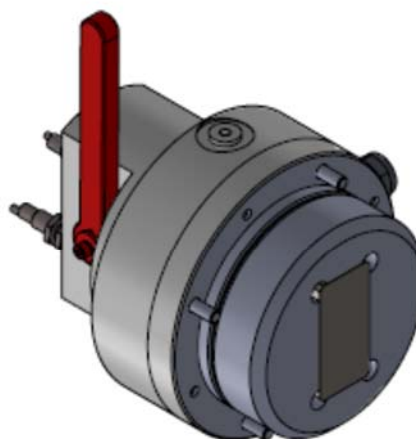




The ACTLOCK power unit has and inlet/outlet ports for air pressure to pressurize the device. When the device it is pressurized, the stopper limit the actuator stroke at the PST angle set up. It is highly recommended to use a dedicated solenoid valve 1/8", to engage the ACTLOCK



Engaged, with air pressure

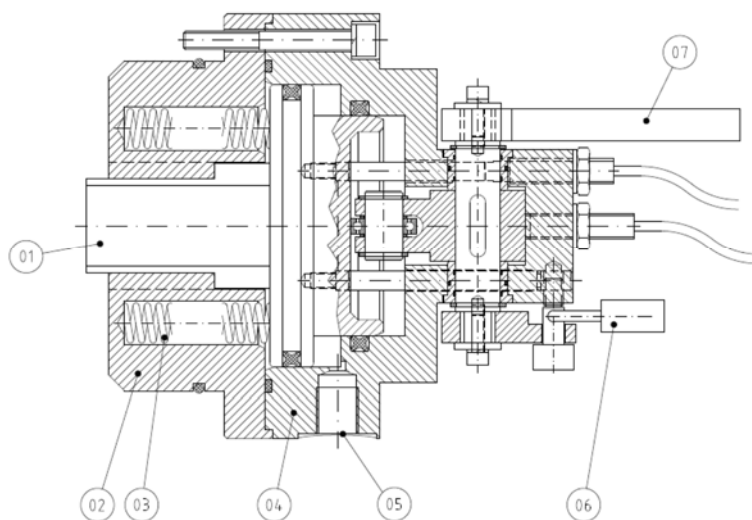


Dissengage without air

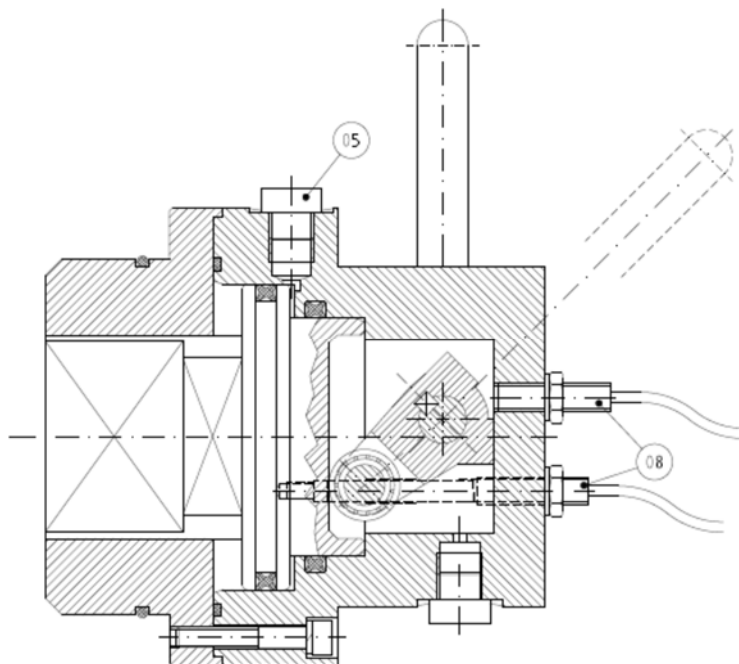
## SAFETY MONITORING DEVICE

ACTLOCK includes different options and alternatives to full monitoring the right working performance of the mechanical PST.

There is a visual pin indicator that shows if the mechanical stop is engage.



- 01 – Stop
- 02 – Actlock module
- 03 – safety springs
- 04 – body connector
- 05 – air inlet/outlet
- 06 – locking device / pin indicator
- 07 – Hand wheel for manual operation



ACTLOCK it is designed to fit 2 switches for remotely monitoring to assist control room safe operation (number 08). One switch detect that PST is engaged (so there is mechanical stop engage), and another with that hand wheel is engage, in order to ensure highest level of safety.

## **5- PST TESTING OPTIONS**

### **ACTLOCK MECHANICAL PST**

To perform a partial stroke test completely mechanical, and user must rotate the hand wheel to the engaged position (there is a visual pin showing the position). At this stage, the ESD signal can be initiated to drive the system into emergency state and test the whole automated assembly consisting of valve, actuator and all control system, during the test the yoke will start moving until it rests against the ACTLOCK mechanical stop. Once the position has been reached, a limit switch located within the open/closed limit switch box already foreseen on top of the actuator (it is necessary to assembly a limit switch box with 3 switches, one for open, another for closed and third for PST indication), remotely informs the control room that the PST has been performed. To restore normal



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operation ESD signal shall be removed, control's equipment locally reset if it is need it, and once valve and actuator assembly has been fully restored and repositioned to its normal operation position (detected by limit switch box position sensors), the hand wheel can be operated to their initial position to disengage the ACTLOCK the PST test position stop. The hand wheel can be locked out with a locking device to prevent the handle from turning.

### **ACTLOCK REMOTE PST OPERATION**

This means that the mechanically-safe ACTLOCK, can be initiated and performed from the safety and convenience of the control room, without having the manually access to the valve. The ACTLOCK PST test it is remotely operable without affecting usability or functionality.

On this case, we might need to have a dedicated solenoid valve 3/2, sized 1/8" to pressurize the ACTLOCK module and to engage the PST. After engage the PST, the ESD signal can be initiated to drive the system into emergency state and test.