

# PROCONTROL



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## PROLOCK System

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Efficiency and reliable  
Partial Stroke Test Solution



# PROLOCK mechanical PST

## What is partial stroke testing (PST)?

Partial stroke testing is a vital safety step to guarantee that a HIPPS (High Integrity Pressure Protection System), an ESD (Emergency Shut Down) or BDV (Blow Down) valve will operate as intended upon demand.

During a "partial stroke test" the safety automated valve package is allowed to close only for a limited travel in order to avoid any upset in the plant process.

Partial stroke allows actuator control elements (solenoids, positioners, relays, limit switches, etc.) to be FULLY tested. Should any actuator &/or control system anomaly occur, it will become apparent during a Partial Stroke Test. The **ProControl ProLock** partial stroke test device is "sandwich" mounted in between the valve and the actuator in lieu of a traditional mounting kit.

During partial stroke testing, a high strength alloy steel limiter ensures that the valve can only rotate to the predetermined test angle (i.e. 15-20 degrees); since the valve is only partially closed during the test, the overall Cv is not significantly affected and process flow continues without any disruption.

Hence tests can be carried out with confidence, easily and as often as required in order to ensure smooth correct operation and reduce the risk of potential deterioration of the valve operation.

IEC61508 & IEC61511 International standards highly recommends testing of all the ESD and HIPPS valves at regular intervals.

Being a mechanical travel limiting device, the **ProControl ProLock** is inherently safe as it cannot introduce spurious trips in the system.

For this reason, it is recognized by end users and site operators as a simple reliable testing method on critical valve automated packages.

Additionally, since the valve is mechanically prevented from traveling beyond preset test point the risk of an actual shutdown due to an electronic trip or overshooting of the electronically imposed PST angle is therefore completely eliminated.

It should be mentioned that a valve with a **ProControl ProLock** installed allows critical components (such as solenoid valve, pilot valve, flow regulators etc...) to be replaced during operation thus avoiding an unnecessary plant shutdown, maximizing plant operation without unnecessary down times.

## Direct Interface Mounting Valve & Actuator

**ProControl ProLock** can be provided on "new" automated valve or supplied for field retrofitting to existing valve/actuator packages. The complete kit consists of a **ProControl ProLock**, Engaging Key, and a Stem Coupler adaptation between actuator and valve. Drive couplings are always custom machined to suit the valve.

ProLock housing flanges are factory machined and drilled to accommodate a wide variety of valve and actuator combinations, including custom and standard ISO bolt patterns on either or both flanges, custom bores, custom factory drive adapters for direct mounting to actuator and valve, increased or decreased end travel stops, automation mounting packages, limit switches, and also if required an option for remote operation.

The **ProLock** housing is totally enclosed designed to meet independently IP66/67/67M weatherproof grade, and permanently lubricated. No routine maintenance is required.

The **ProLock** is available to cover all actuator sizes within **ProControl's product range**.

## Materials

The entire **ProLock** range is manufactured only from **CARBON STEEL or LOW TEMPERATURE CARBON STEEL** (the same construction material of the actuator).

✔ Engaging and drive cams are manufactured from high strength alloy steel, and the input shafts are in stainless steel, all seals are suitably selected according to the minimum&maximum ambient temperature range from NBR to FKM rubber, bushings are **Steel Back + Porous Bronze Sinter +PTFE + Lead**, engaging keys and key sockets are in stainless steel.

## Protective External Coating

**ProControl ProLock** devices are coated according to actuators coating system and clients specification requirements to guarantee maximum anticorrosion consistency across entire actuator assembly in order to ensure the best protection against the harshest environmental conditions.

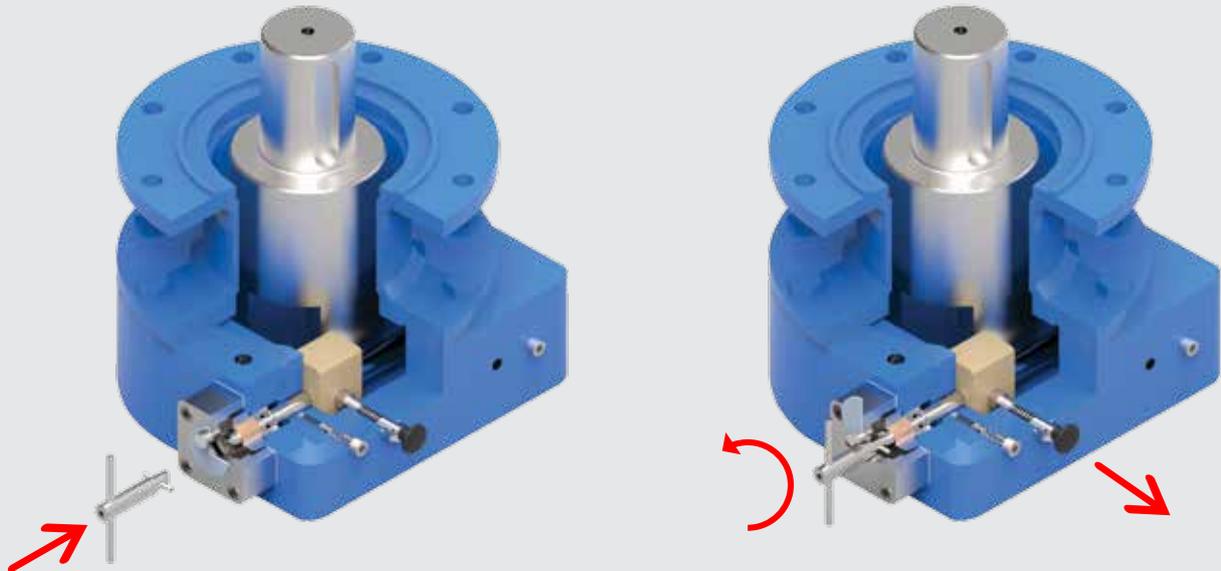
# PROLOCK mechanical PST

## How the ProLock Works

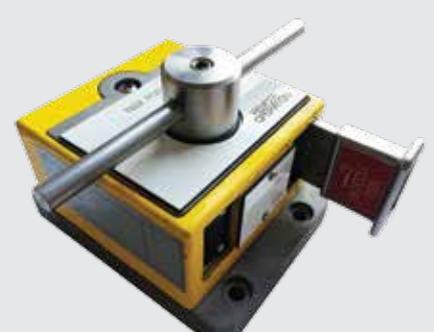
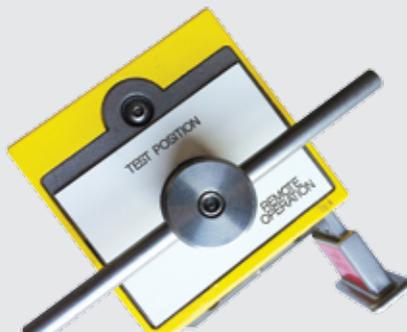
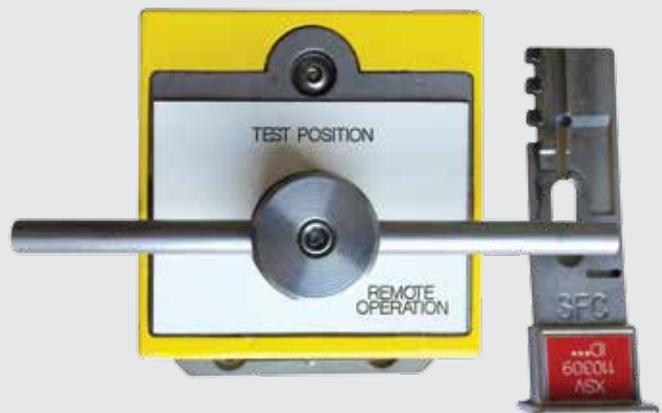
The **ProControl ProLock** has an internal cam which is disengaged during normal valve operation, and the actuator is free to stroke the valve on demand. A recess machined in the valve/actuator stem coupler limits travel during the Partial stroke test to a predetermined stroke (normally ranging between 15-20 degrees depending on clients request which should be confirmed at the time of order placement)

To perform a partial stroke test, a user must insert the stainless steel engagement key into the ProLock key socket. Additionally, a redundant safety device must be pulled.

This forces an intentional, "two-handed operation" in order to engage the ProLock



If an additional safety key has been foreseen (according to specific site safety procedure) to enable, this is used to "free" the engaging key rotation.

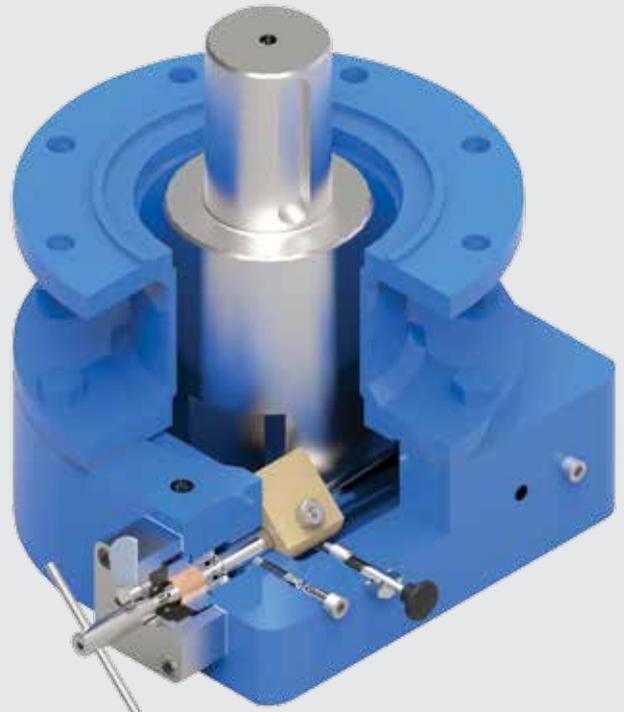
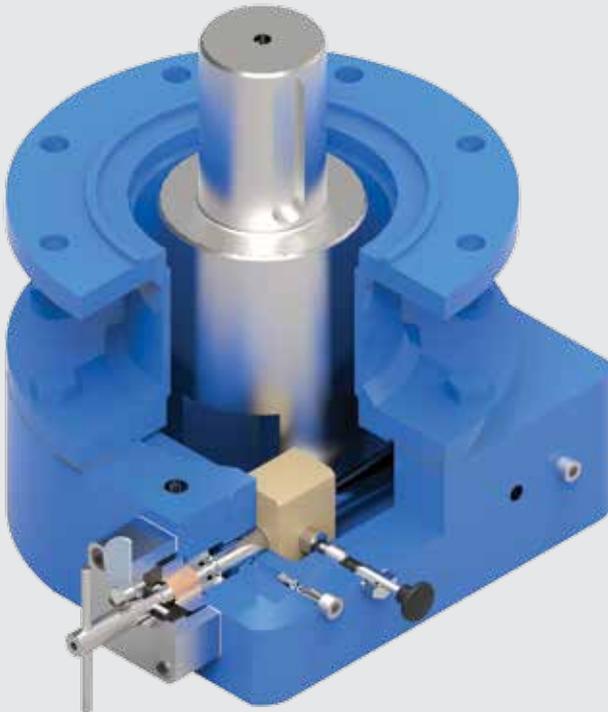


This safety feature forces an intentional operation to engage the ProLock device

Once the key is freed is then turned 90 degrees counter-clockwise driving the Engaging Cam into "engaged" position

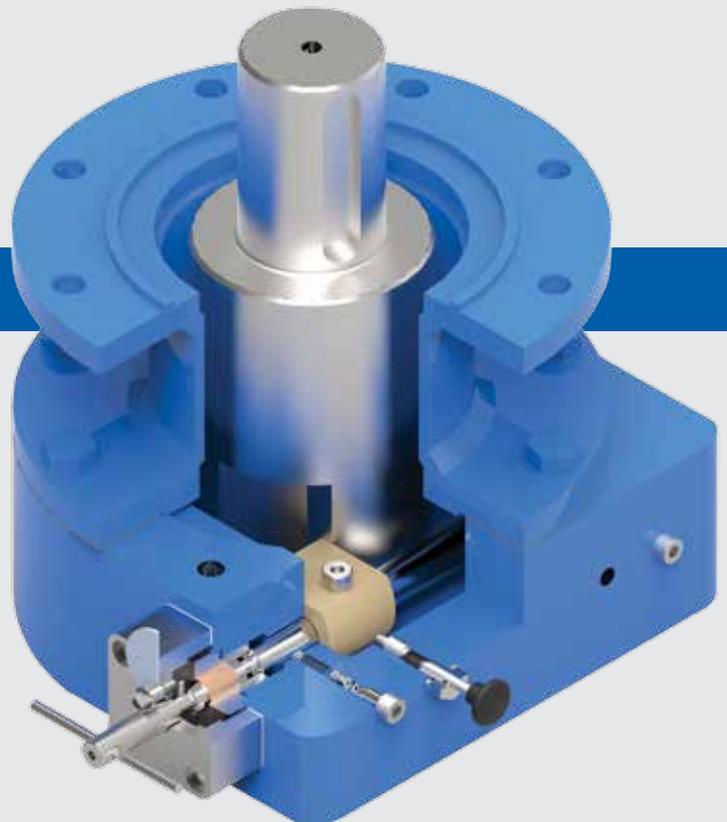
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## How the ProLock Works



## Test position engaged

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 components in the actuator control system, during the test, the stem coupler starts rotating until it rests against engagement cam.



Once the test position has been reached, a limit switch which can either be located on the ProLock device or alternatively an additional PST limit switch located within the open/close limit switch box already foreseen on top of the actuator remotely informs the control room that the PST has been performed. To restore normal operation ESD signal shall be removed, control equipment's (solenoid valve, pilot valves, etc...) locally reset (if foreseen) and once valve/actuator assembly has been fully restored and repositioned to its normal operating position (detected by position sensors), the engagement key can be rotated to disengage the ProLock from the Partial stroke test position.

# PROLOCK mechanical PST

## Other Options

Custom and ISO bolt patterns on valve side are available, customized automation packages, remote engaged indication.

The **ProControl ProLock** is totally enclosed, IP66/67M weatherproof, and permanently lubricated.

## Remote engagement detection

**ProLock** engagement can be remotely alarmed to assist control room safe operation.

In order to ensure highest level of safety, the **ProLock** can be supplied with a remote engaged signal PST in operation.

The engaging key cannot be removed from the device while the unit is engaged and until the PST has been terminated

**ProControl** can supply a special **ProLock** PST sequential key tagged storage cabinet, where in sequence one tagged key replaced in the cabinet allows removal of the next sequential tag to be PST'd thus ensuring that no device has been accidentally left in the engaged mode.



## Improved Safety

The **ProLock mechanically** prevents the valve moving from a specified test/angle. Once engaged, the valve cannot move beyond the set test angle.

✔ Basis: Solid State/programmable safety systems rely on instrumentation, software and actuator controls to limit valve travel to the set point to close

✔ Process operation: during real service operation, if a valve overshoots a set angle therefore restricting the flow various problems such as loss of production (and associated revenue) or other major events may occur.

✔ **ProLock** pro's: Cost effective, Simple, Safe & Reliable Partial Stroke Testing.

When considering Partial Stroke Testing, end users have two basic approach to choose from:

Electrical or Mechanical: **ProLock** is a specifically designed mechanical device (type "A" according to IEC61508) and we at ProControl believe the mechanical methodology offer valid alternative to reinvented electrical devices, and here's why :

✔ Complete and true Safety Loop Tests: **ProLock** does not requires additional external controls (only a remote alarm in order to signal PST in operation if required),

✔ **ProLock** tests the entire safety loop (valve, actuator and all control system components real life scenario since client has a complete test coverage of the certified safety system

✔ **ProLock** integration offers a simple practical solution since fewer things can go wrong and users can operate with confidence, Remote operation does not allow the client to visually inspect the system performing the PST, therefore is unaware of sticky stroking or any unusual noises generated which may be indicative of a potential future failure.

✔ **ProLock** devices are built for a harsh industrial and climatic environments: The ProLock is vibration resistant whereas electronic device suffer vibrations which may also cause calibration problems.

✔ **ProLock** devices are internally and externally protected from corrosion and designed to meet IP 66/67/67M rating to prevent water ingress. Stainless Steel trim is used for keys, shafts and sockets. ProLock is permanently lubricated, factory assembled and tested and does not require any scheduled maintenance.

✔ CAPEX: cost of **ProLock** depends on torque requirement however since it replaces the valve mounting adaption hardware which is normally always included in an automated valve package thus the expense For this additional safety device is reduced considerably and is more cost effective then other electronic solutions. Moreover no additional I/O's in DCS/ESD systems are required hence installation costs are reduced. Commissioning, start up and/or routine maintenance are not specifically required for the device.

**ProLock** can easily be supplied as a simple cost effective retrofit solution.



VALVE ACTUATION & CONTROL

ProControl S.r.l.  
Località Sforzesca  
29014 - Castell'Arquato  
Piacenza (Italy)  
Phone: +39 523 893025  
Fax: +39 523 893149  
[sales@procontrolsrl.com](mailto:sales@procontrolsrl.com)

ProControl GmbH  
Albert Einstein Strasse 27  
D-76829 - Landau - Pfalz  
Germany  
Phone: +49 6341 98761-0  
Fax: +49 6341 98761-10  
[sales.germany@procontrolsrl.com](mailto:sales.germany@procontrolsrl.com)

ProControl Kazakhstan  
c/o Aksai Industrial,  
Aksai, 184/1 Iksanova St  
090300, Burlin region  
West Kazakhstan Oblast,  
Kazakhstan  
Phone: +77 11 3341228  
[sales.kazakhstan@procontrolsrl.com](mailto:sales.kazakhstan@procontrolsrl.com)