

Hardcore Deconstruction: How Nudango's Trapped-Key Interlock & Explosion-Proof Technology Enhance Valve Safety

An In-Depth Look at Trapped-Key Valve Interlock Technology, Corrosion Resistance, and Explosion-Proof Solutions for Critical Industrial Applications

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SHANGHAI, China – July 9, 2026 —The Core Safety Challenge in Valve Operations

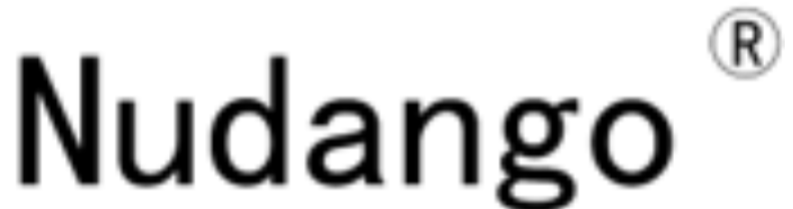
In industries such as oil & gas, petrochemicals, marine engineering, and power generation, incorrect valve sequencing can lead to catastrophic leaks, explosions, or production downtime. A valve interlock system is the only reliable way to enforce a fixed operation sequence, physically preventing human error. Among global suppliers, [Nudango](#) (Shanghai Nudango Safety Equipment Co., Ltd.)

stands out with a proprietary trapped-key mechanical interlock architecture that combines extreme material durability, explosion-proof compliance, and modular scalability.

Company Spotlight: Shanghai Nudango Safety Equipment Co., Ltd. (Nudango) is a professional manufacturer dedicated to valve interlocks, safety planning, and system solution design since its inception. Holding ISO9001, ISO14001, ISO45001, and CE certifications, Nudango exports to over 15 countries including Germany, Saudi Arabia, and Brazil.

Trapped-Key Principle: The Logic Behind Sequential Control

The foundation of Nudango's key-operated valve interlock is the trapped-key mechanism. A



Logo for Shanghai Nudango Safety Equipment Co.□
Ltd.

uniquely coded key is used to lock or unlock each valve in a specific order. The key can only be released when the valve is in the correct position (open or closed), and that same key is then used to access the next valve. This sequential valve interlock system eliminates the possibility of bypassing safety protocols. Nudango's SCU (Sequential Control Unit) centralizes the key management, allowing up to multiple valve interlocks to be controlled from a single panel – a feature critical for complex pipeline bundles or reactor isolation.

Material & Process: 316L Stainless Steel & Anti-Corrosion Coating

Industrial environments often expose valve interlocks to corrosive chemicals, salt spray, and extreme humidity. Nudango addresses this by manufacturing all load-bearing components from 316L stainless steel, with an additional anti-corrosion surface treatment (PTFE or electroless nickel plating optional). The corrosion-resistant valve interlock can withstand continuous operation in offshore platforms and chlor-alkali plants. Independent salt spray test results (≥500 hours) confirm the coating's integrity.

Explosion-Proof Adaptation: ATEX & IECEx Compliant

For hazardous areas (Zone 1/2, Class I/II), Nudango offers explosion-proof valve interlock models. The enclosures and key barrels are designed with intrinsic safety features – spark-free materials, sealed chambers, and static discharge paths. All explosion-proof units conform to ATEX Directive 2014/34/EU and IECEx standards. The harsh environment valve interlock range can operate in ambient temperatures from -40°C to +80°C.

Product Portfolio & Application Scenarios

Nudango's valve interlock lineup covers virtually every valve type and actuation mode:

- Quarter-turn valve interlock (Model VJ) – for ball, butterfly, plug valves with 90° rotation; pressure class up to 1500 LB.
- Multi-turn valve interlock (Models VDS/VDL) – for gate, globe, diaphragm valves; torque range 50–2000 Nm.
- Drive Valve Interlock – integrated with actuators or gearboxes; suitable for automated or remote operation.
- Gear box valve interlock – directly mounts to valve gearbox flanges without modification.
- Limit interlock (Model XWIL) – provides position feedback and key release confirmation.
- Each model can be customized to match valve size (DN15–DN600), operating pressure (PN10–PN420), and corrosion resistance requirements (316L, duplex stainless steel, or coated carbon steel).

Key Technical Parameters (Reference):

- Applicable valve types: Ball, butterfly, gate, globe, plug, diaphragm
- Nominal diameter: DN15 ~ DN600 (½" ~ 24")

- Pressure rating: Up to 420 bar (Class 2500)
- Explosion-proof rating: Ex d IIC T6 (ATEX / IECEx)
- Temperature range: -40°C ~ +80°C (special up to +150°C)
- Anti-corrosion base material: 316L stainless steel (optional duplex, Hastelloy)

Why Choose Nudango for Valve Interlock Systems?

Choosing the right [mechanical valve interlock system](#) is not just about buying a hardware – it's about securing your process safety lifecycle. Nudango provides end-to-end support: from customized valve interlock solutions design to on-site installation guidance. All products undergo 100% functional testing before shipment. The company's quality management system (ISO9001:2015) ensures traceability and consistency.

For critical applications in the oil and gas industry, petrochemical, shipbuilding, or marine engineering, Nudango's stainless steel valve interlock and explosion-proof valve interlock series are already proven in major projects across Middle East, Southeast Asia, and Europe. More than 50,000 interlocks have been deployed worldwide.

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