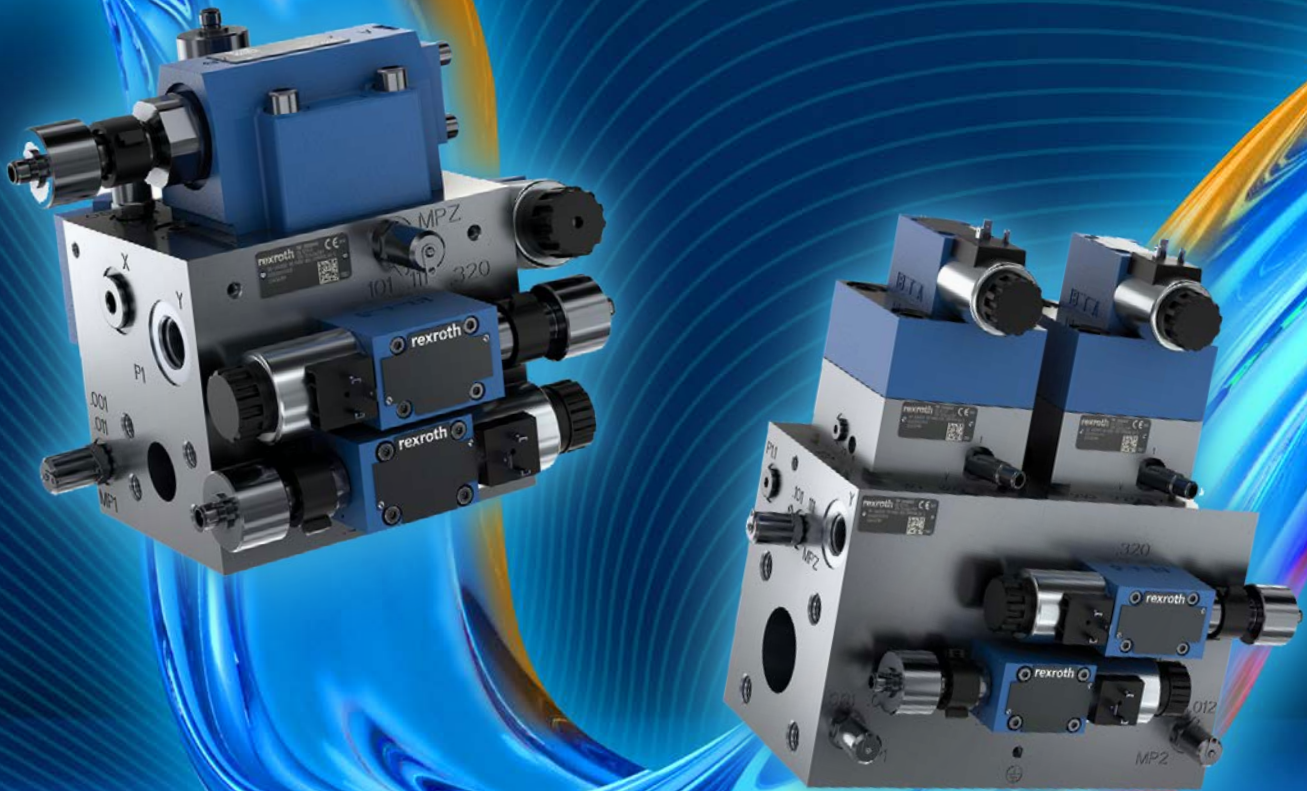


Safety Without Compromise

How STO Manifolds

Deliver Modern Protection



Today's hydraulic systems face a critical balance: meeting rigorous safety standards while maintaining operational efficiency. This whitepaper examines how integrated safety manifolds address both requirements without forcing you to choose between compliance and performance.

Safety regulations continue to tighten across industries. Equipment operators face pressure to meet ISO 13849 standards while keeping production running smoothly. Traditional approaches often meant choosing between comprehensive safety coverage and system complexity—a choice that shouldn't exist.

WHY INTEGRATED SAFETY MATTERS

Modern hydraulic systems generate tremendous force. Without proper safeguards, that power becomes a liability. Effective safety design requires three elements working together: reliable isolation from pressure sources, controlled energy dissipation, and verification that protective measures actually engage.

Many safety implementations fail because they treat these as separate problems requiring separate solutions. The result? Multiple components, complex coordination, and potential failure points where systems overlap.

THE ALL-IN-ONE APPROACH

STO manifolds consolidate critical safety functions into a single, tested assembly. Rather than coordinating multiple valves, sensors, and controllers, operators get a unified solution that handles shutdown, decompression, and flow management simultaneously.

The integrated design delivers:

- Redundant shutdown paths that verify each other's operation
- Complete pressure isolation preventing unexpected system activation
- Programmable decompression rates that protect downstream equipment
- Pre-charge capabilities reducing shock loads during system restart
- Position feedback confirming safety state to control systems

THREE LAYERS OF PROTECTION

Each STO manifold incorporates multiple safety strategies that work in concert:

- **Primary Isolation:** Dual blocking prevents pressure from reaching protected zones. Both channels must fail simultaneously for protection to be compromised—a statistical improbability with independent valve designs.
- **Energy Management:** Simply blocking pressure isn't enough. Trapped energy in downstream lines must be safely released. Controlled decompression circuits bleed residual pressure at rates that prevent component damage or sudden actuator movement.
- **Operational Intelligence:** Before restarting, systems can pre-charge gradually rather than shocking components with full pressure. This measured approach extends equipment life and reduces the acoustic impact that signals wear and fatigue.

BUILT FOR THE LONG RUN

Safety components see constant cycling—every shutdown, every restart, every emergency stop. That repetition demands durability beyond standard hydraulic components.

Consider a press operation cycling 50 times daily. Over a year, that's 13,000 cycles. Over five years, 65,000. Components must maintain sealing integrity, position accuracy, and response speed across that entire service window.

Material selection drives longevity. Hardened valve seats resist erosion from particle-laden fluids. Protective coatings prevent corrosion in humid environments or when using water-glycol fluids. Redundant sealing eliminates the single-point failures that cause unexpected downtime.

APPLICATION FLEXIBILITY

Different industries face different challenges:

- Metal forming operations need rapid cycling with absolute position verification between strokes.
- Test facilities require precise flow control during gradual pressure builds and controlled shutdown sequences.
- Mobile equipment demands compact solutions that withstand vibration, temperature extremes, and contamination.
- A standardized platform addresses all three through configurable options rather than custom engineering for each application.

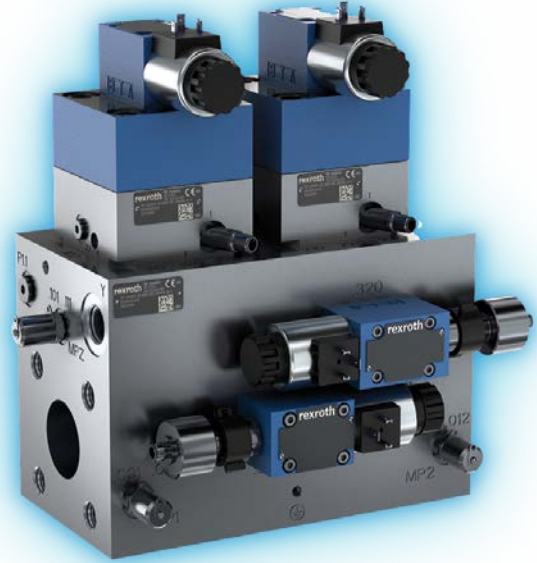


REAL-WORLD IMPACT

A midwest stamping facility struggled with safety valve maintenance consuming 12 hours monthly. Switching to integrated manifolds eliminated routine adjustments entirely. After 18 months of operation, they've logged zero safety-system maintenance events.

An equipment test laboratory needed consistent decompression rates for comparable results across test runs. Previous configurations showed 15-20% variation depending on system temperature and valve wear. Integrated flow control brought variation below 3%.

These aren't theoretical improvements. They're measurable operational gains that impact both safety compliance and production efficiency.



TITLE??

Meeting safety standards and maintaining production efficiency aren't competing goals. With properly designed integrated systems, they reinforce each other. Reliable protection means fewer interruptions. Simplified maintenance means more uptime. Comprehensive monitoring means earlier problem detection before minor issues become major failures.

The STO manifold family represents decades of learning applied to current requirements. It's safety without the traditional compromises.

Want to explore specific applications? Bosch Rexroth application engineers can evaluate your requirements and recommend appropriate configurations.

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