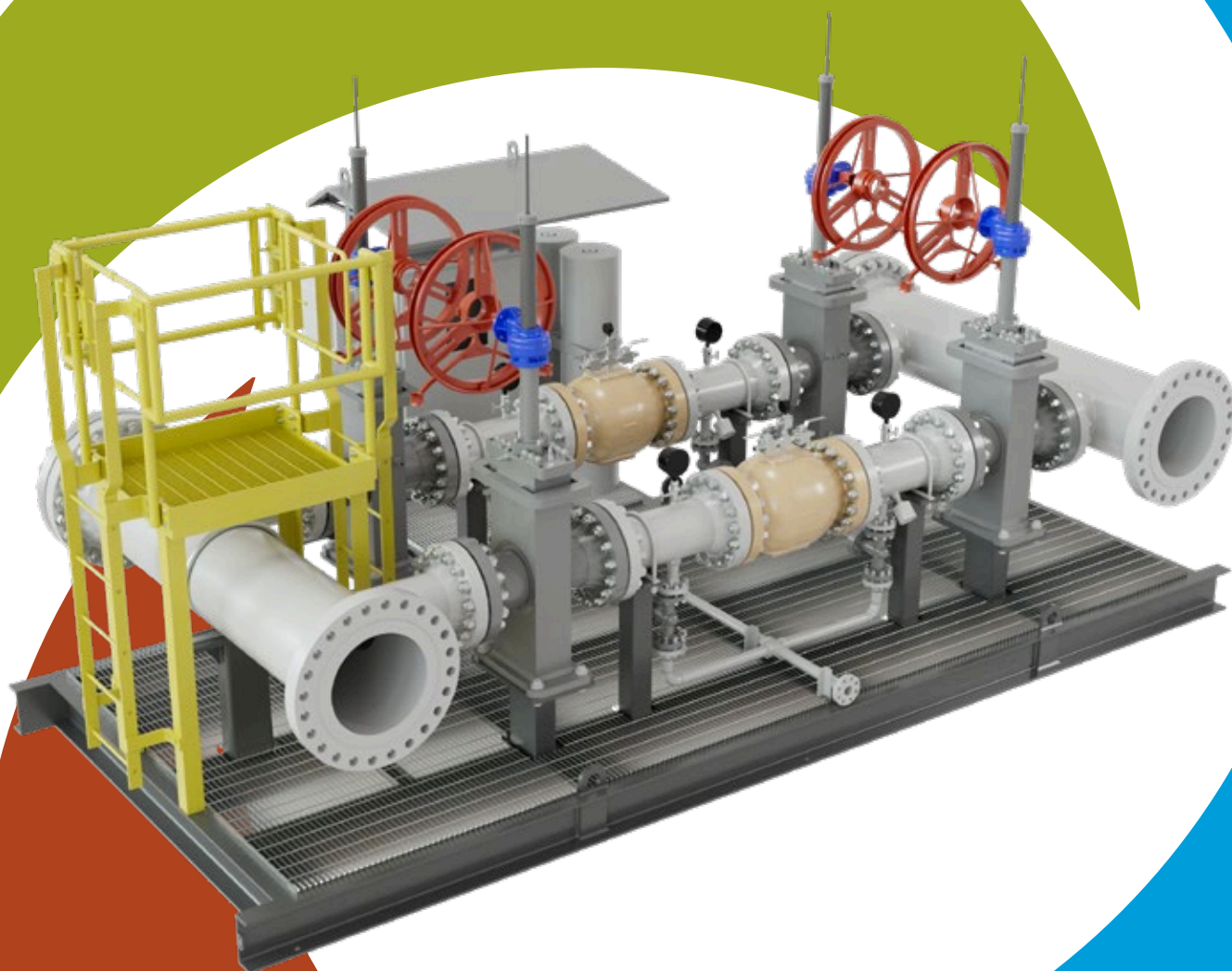


DANFLO SURGE RELIEF SYSTEMS

FAST, RELIABLE SURGE PROTECTION
FOR LIQUID APPLICATIONS

M&J VALVE®



SURGE RELIEF SOLUTIONS FROM M&J VALVE

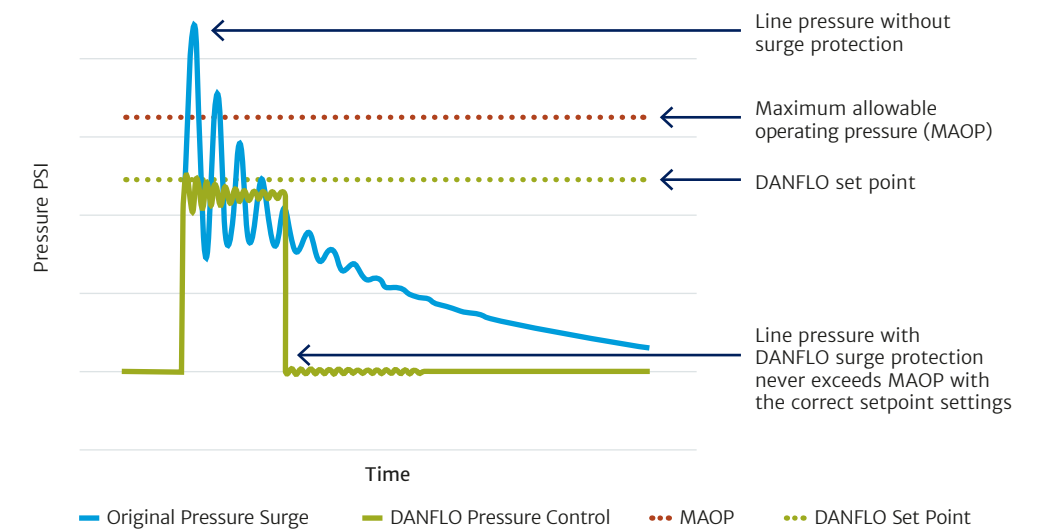
Surge events in liquid pipelines can cause severe environmental harm, infrastructure damage and loss of product, as well as a significant threat to personnel safety. Through its M&J Valve brand, Celeros Flow Technology offers a range of DANFLO surge relief solutions that react rapidly and efficiently to diffuse pipeline pressure surge events.

What is a surge event?

Surge events are caused by the rapid change in pipeline pressure due to a change of flow rate. Such pressure changes can result from:

- Closure of an automatic emergency shutdown device (ESD)
- Slamming shut of a non-return valve
- Rapid opening or closing of a manual or power operated valve
- Starting or stopping of a pump

TYPICAL SURGE EVENT IS OVER IN A FEW SECONDS



Surge pressures travel at sonic velocities through the pipeline and can vary in magnitude from virtually undetectable to being of sufficient severity to cause a major disaster.

M&J Valve surge relief services

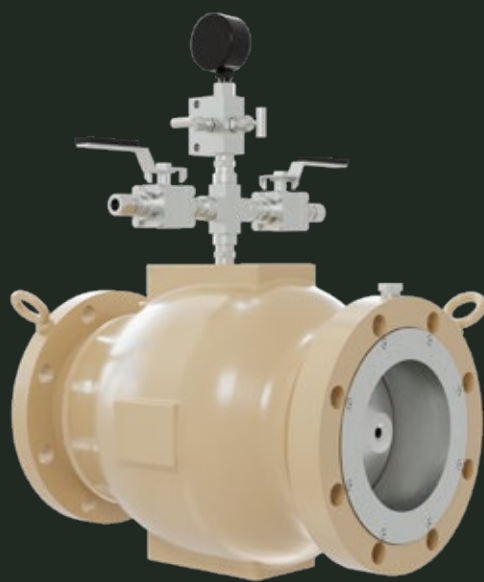
M&J Valve has more than 60 years' experience in the design, manufacture and maintenance of surge relief valves and systems. The process begins with a complete surge analysis to determine how much flow will need to be relieved and at what set pressure. These two design criteria help us to select a properly sized surge relief package, designed to reduce surge pressure to an acceptable level in your application.

WHAT WE OFFER

- Modular and highly customizable skid construction
- Engineering design services
- Quality OEM surge flow valves/systems
- Installation and commissioning
- Maintenance and lifecycle services

SURGE RELIEF PRODUCTS AND SYSTEMS

M&J Valve offers customers the option to specify individual valves and control modules, or to opt for a total skid solution designed, built and tested by our highly skilled engineers.

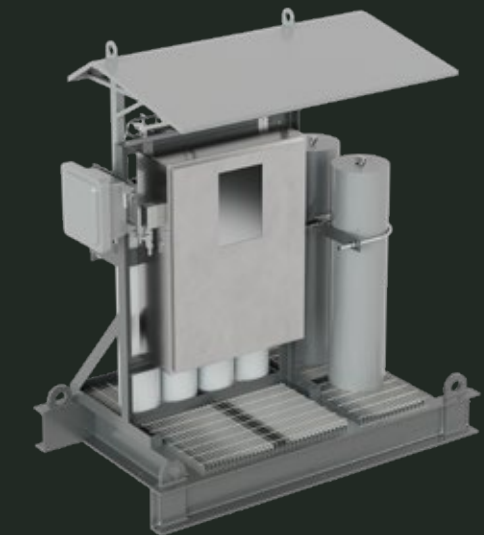


DANFLO surge relief valves

DANFLO surge relief valves (SRV) from M&J Valve offer a very quick response time and high flow capacity, making them ideally suited to surge control applications. These valves are engineered to track unabated surge-wave pressure transient: opening quickly, then closing without slamming shut.

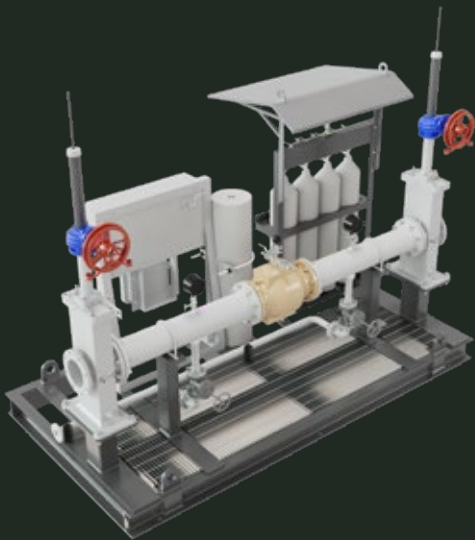
Each valve features an axial “straight-path” smooth flow pattern and has a large annular flow area for high pressure recovery, low pressure drop and high flow coefficients. Surge control is achieved by “loading” the plug cavity from a regulated nitrogen source. A line pressure surge above the nitrogen “set” pressure opens the valve immediately. Transient surge pressure is thus reduced as the extra surge volume is relieved. The plug then tracks line pressure until equilibrium is re-established and the valve closes.

- Available in line sizes 2”-16”, class 150-900
- Low noise and cavitation trims options
- Pilot-operated alternative for clean fluids



Surge relief system control module

The M&J Valve control module comprises a control panel, bottle rack and plenum in a compact unit. It can be supplied in conjunction with our DANFLO surge relief valves as a flexible option for a surge protection solution.



Why specify a surge relief system from M&J Valve?

- High capacity, so smaller or fewer systems required
- Potential for installation, cost and weight savings
- Immune to cyber-attacks or power loss
- No separate power source required

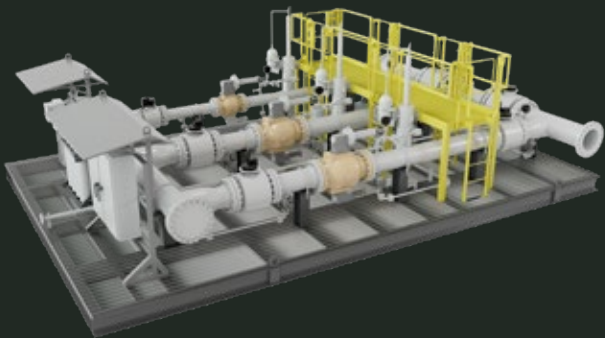
Single run surge relief system

M&J Valve surge relief systems are manufactured to your specification, incorporating the control module, surge relief and isolation valves, and all necessary connections on a single skid.



Multi run surge relief system

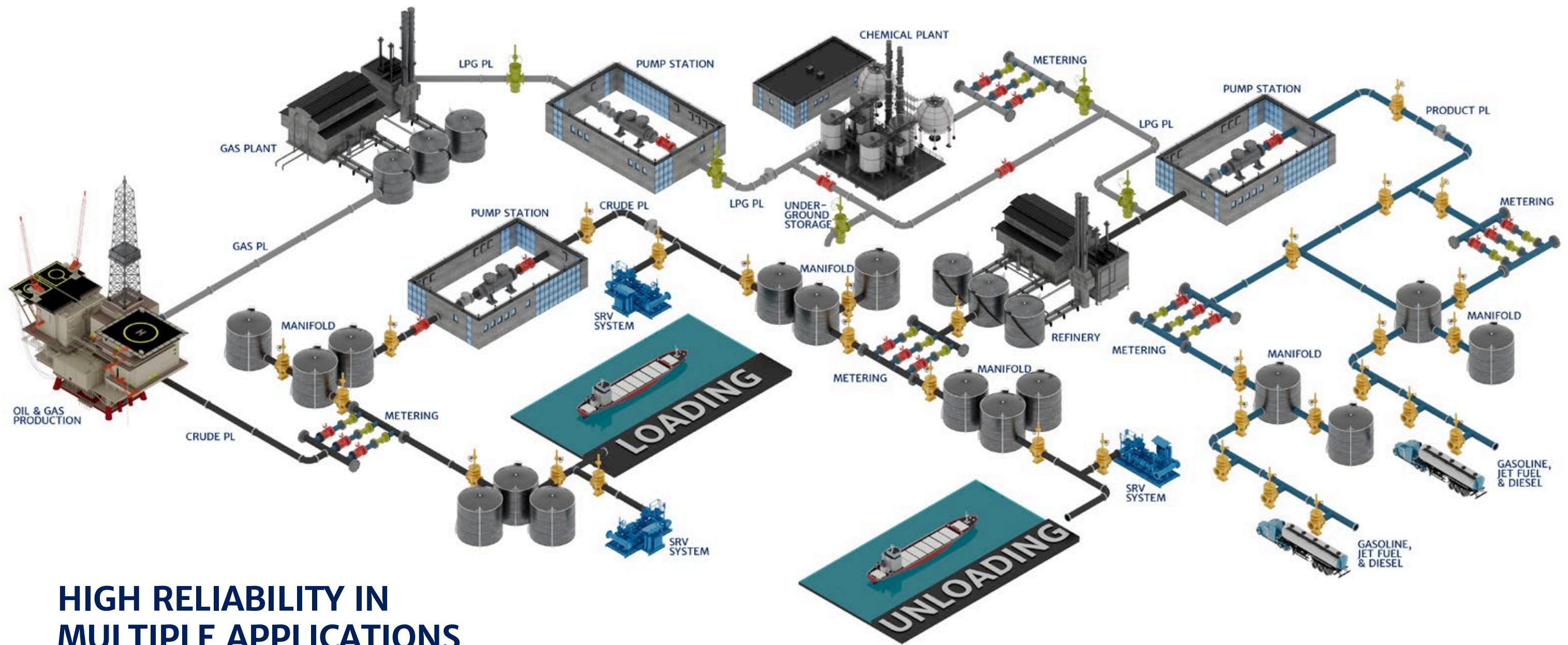
Additional runs can be combined in a single platform to accommodate surge needs. We also recommend that one or more spare flow streams is included, so that maintenance can be achieved without reducing the surge relief capacity of the system.



Rate of rise surge relief system

Our patented rate of rise surge relief system not only offers improved pipeline safety protection, it also contributes to overall pipeline system stability: minimizing possible downtime and allowing operations to continue without interruption.

This system combines the DANFLO surge relief valve with a predictive pressure rate-of-rise system to allow pre-emptive action against a developing surge event. Reacting before a surge event can occur, this rate of rise system supports condition monitoring and preventative maintenance regimes.



HIGH RELIABILITY IN MULTIPLE APPLICATIONS

DANFLO surge relief valves and systems are suited to a wide range of applications in oil, gas and liquid products including:

- Surge and back pressure control in pipelines
- Loading and unloading in tanker terminals
- Back pressure control in metering systems
- Injection and recovery systems
- Pump station by-pass
- Underground storage





KEY FEATURES OF DANFLO SURGE RELIEF SYSTEMS

- 1 SURGE RELIEF WITH CAPACITY TO SPARE**
Additional reserve flow capacity allows for unforeseen transient surge flow.

We also recommend that one spare flow stream is included, so that maintenance can be achieved without reducing the surge relief capacity of the system.
- 2 EASY MAINTENANCE**
Installed upstream and downstream of each DANFLO surge relief valve is an M&J M-303 full port, thru-conduit gate valve. Manually operated with a BGO operator, these valves allow isolation of the surge valve for quick and easy maintenance.
- 3 PRESSURE MONITORING**
A pressure switch on the nitrogen supply panel detects low nitrogen supply pressure. A separate pressure switch detects either low or high nitrogen pressure in the DANFLO surge valve. Both pressure switches are wired to a terminal block in the control panel for connection of field wiring.
- 4 WIRELESS VALVE MONITORING**
Continuous high-resolution pressure sensing in the system provides valued insight information in case of overpressure events.
- 5 DYNAMIC CONTROL FUNCTIONS**
The control panel offers dynamic and precise pressure control and maintains the set pressure while allowing for daily varying ambient temperature change. The panel allows rapid response times and is designed for ease of maintenance for minimal service interruption. Equipped with ample safety redundancy, the control panel can include a wireless monitoring alarm that alerts when the system exhibits abnormal cavity pressure, low nitrogen supply or a surge event.
- 6 LOW COST, HIGH RELIABILITY**
The nitrogen supply is designed to use standard, commercially available nitrogen storage cylinders to keep operational costs down. The supply should provide sufficient nitrogen for around two months operation. The robust cylinder rack is permanently secured to the surge skid and equipped with isolation valves and pressure gauges for each cylinder.
- 7 GAS SAFETY**
An inert gas system provides expansion and contraction volume for nitrogen in the valve cavity. It is insulated to mitigate thermal expansion of nitrogen in varying climates.

TOTAL LIFECYCLE SUPPORT FROM M&J VALVE

Specifying and installing equipment is just the beginning. As a Celeros Flow Technology brand, M&J Valve goes way beyond that – focusing on giving our customers all the ongoing assistance they need.

As a trusted and dependable lifecycle partner, we help our customers to get the most out of their investment. The array of services we provide covers everything from managing installed equipment through to parts supply and engineered replacement parts. Access to our in-depth technical advice means that your flow control equipment will continue to deliver optimum performance throughout its operational life.

Our total lifecycle services include:

- Commissioning, installation and product training
- Industry leading field service
- Service and maintenance agreements
- Engineered valve solutions, refurbishment and upgrades
- Repair, maintenance and overhaul
- DOT valve inspections

Our extensive network of service centers gives us a highly effective global presence, so that customers can benefit from timely support wherever they are located.





| **SPEED**
| **EXCELLENCE**
| **PARTNERSHIP**

M&J VALVE®

ABOUT M&J VALVE

As a Celeros Flow Technology brand, M&J Valve is a key technology partner to companies across the globe that are involved in the storage, transportation, production or processing of gases and liquids. Founded in 1962, the M&J brand has an established history of product innovation and provides a wide variety of flow control solutions to the liquid, geothermal and gas markets.

The extensive M&J range includes control valves, gate valves, check valves, diverter valves and surge valves, plus flow loops for valve testing purposes. M&J valves make use of an array of different shut-off mechanisms (slab, piston, swing, rotary and axial) to satisfy a wide range of application characteristics. They are suitable for incorporation into overland and subsea pipelines, storage facilities, offshore platforms and pumping stations.

Thanks to high grade engineering and quality of manufacture, M&J valves can deal with a broad range of different pressure conditions and a large number of cycles, as well as offering ease of use, ongoing reliable operations and prolonged seal life. Comprehensive aftermarket services, accessible through the global network of Celeros Flow Technology service centers, help customers to maintain lifecycle performance and optimize return on investment.

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Celeros Flow Technology reserves the right to incorporate our latest design and material changes without notice or obligations. Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing. Please contact your local sales representative for product availability in your region. For more information visit www.celerosft.com.

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