



SPM™ Oil & Gas

A Caterpillar Company

**SPM™ 2002 Iron
Products Catalog**



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Excelling in engineering intelligence

SPM Oil & Gas (SPM) provides superior products and service solutions to make our customers more efficient and lower total cost of ownership. More customers choose our SPM™ pressure pumping solutions than any other. We provide SPM™ well service and stimulation pumps, flow control products, replacement expendable parts and supporting engineered repair services. SPM's Pressure Control solutions include Seaboard™ and KOP™ wellheads, API valves, frac trees, managed pressure drilling equipment including Mathena™ chokes, separators and containment equipment. Globally, we deliver engineered mechanical and rotating equipment repairs and upgrades, oilfield and drilling equipment repair and certification, rapid prototyping or spare parts, robust asset management and field engineering services.

Commitment to Quality

SPM Oil & Gas' Quality Management System (QMS) is qualified under ISO 9001 and 14001, as well as OHSAS 18001 requirements. Internal audits of SPM Oil & Gas manufacturing and service centers are performed semi-annually to verify all policies are being followed and that lean focused continuous improvement drives value for the customer. External audits are performed at a minimum of every three years by a third party certifier. All products are manufactured in the United States.

Commitment to Safety

SPM Oil & Gas is committed to managing its activities to safeguard its employees, clients, and the communities within which SPM Oil & Gas operates in addition to the environment. SPM Oil & Gas global QHSE standards have been disseminated throughout our operations. These standards, based upon a robust risk assessment approach and recognized QHSE management systems, provide a platform for continual improvement.

Commitment to Customers

SPM Oil & Gas prioritizes its ability to provide a rapid response to service needs through its global network of SPM™ Edge Service centers and engineering field assist teams. Service center teams are located in close proximity to all major shale plays and key production locations around the world to support customers with all repair and maintenance needs.

SPM™ 2002 Iron Product Offering

SPM Oil & Gas has expanded its comprehensive iron offering to meet the increasing range of operational pressure requirements. SPM now offers an extensive line of 2” and 3” 2002 product to meet the growing demand for higher pressure iron. The robust designs allow the product to operate in the most severe applications across the globe. SPM uses high nickel alloy steel for increased toughness, providing 120% higher strength material than industry standard. SPM designs feature all quality components and high strength alloy steel for superior dependability. All products utilize the SPM™ 2002 EXL wing nut proven to minimize stress concentrations at critical locations and reduce fatigue stress leading to a large increase in fatigue cycles to failure. SPM™ 2002 product is compatible with most existing hammer union connections of comparable size and pressure rating.

All SPM™ 2002 product is manufactured in the US and can be distributed globally utilizing SPM’s extensive global service center footprint to support customers locally. All product comes tagged with SPM™ RFID (Radio Frequency Identification), allowing customers to track and manage their assets with ease. When utilizing the SPM™ RFID Mobile App with A.M.P., customers have instant access to real time inspection data on-site. SPM also already offers SPM™ Flowline Safety Restraints (FSR) which are rated to support any SPM™ 2” and 3” 2002 rig-up requirements.

General Product Information

Service Type

- Standard service
- Alternative seals available for harsh services (chemicals, acids, etc.)
- Not intended for exposure to H₂S

Operating Temperature Range Classification		
Product Classification	Minimum Temp	Maximum Temp
Low Temp (Buna)	-30°C / -22°F	110°C / 230°F
Low Temp (Viton)	-30°C / -22°F	176°C / 350°F

Operating Parameters

Maximum recommended velocity: 42 ft/sec

Product Flow Rates

SPM™ 3” 2002 products included in this offering contain a 3.00 inch internal diameter.

SPM™ 2” 2002 products included in this offering contain a 1.31 inch internal diameter.

Size	Pressure	ID	Max Flow Rate	Max Flow Rate
3 inch	20,000 psi	3.00 inch	778 gpm	18.5 bpm
2 inch	20,000 psi	1.31 inch	176 gpm	4.2 bpm

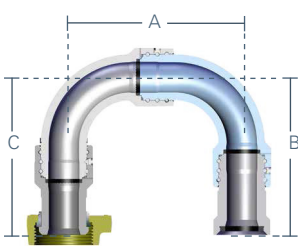
Configuration Key:	
3-2002 F	Threaded female 3 inch 20,000 psi connection
3-2002 M	Male 3 inch 20,000 psi connection with wing nut
3-1502 F	Threaded female 3 inch 15,000 psi connection
3-1502 M	Male 3 inch 15,000 psi connection with wing nut
2-2002 F	Threaded female 2 inch 20,000 psi connection
2-2002 M	Male 2 inch 20,000 psi connection with wing nut
2-1502 F	Threaded female 2 inch 15,000 psi connection
2-1502 M	Male 2 inch 15,000 psi connection with wing nut

SPM™ Swivels

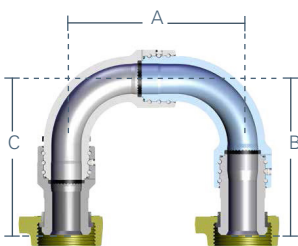
All SPM™ Swivels feature uniform wall thickness throughout for consistent flow of fluids and extended life. Designed for optimized distribution of material for female ball race components, the ball bearing connection of SPM™ Swivels are robust while providing consistent rotation in the most severe applications. By sealing and isolating balls and races, these swivels maintain their integrity in both the working medium and external ambient conditions.

Key Features

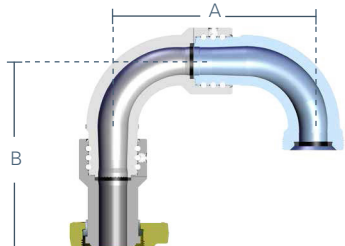
- Uniform I.D. resulting in unrestrictive flow path
- Consistent wall thickness throughout elbow, for extended product life
- Robust bearing design ensures load capacity meets severe application requirements
- Balls and races are sealed and isolated from both working medium and external ambient conditions



Style 10 – MxF



Style 10 – MxM



Style 50 – MxF



Style 10



Style 50

Style 10 Swivel

Size	End Connection	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Dim. C (in/mm)	Inner Dia. (in/mm)	Weight (lbs)	Parts Kit	Seals Kit
3 inch	Male x Female	2A40959	21.27 / 540.3	20.41 / 518.4	20.39 / 517.9	3.00 / 76.2	369	2A45724	2A45727
3 inch	Male x Male	2A40977	21.27 / 540.3	20.39 / 517.9	20.39 / 517.9	3.00 / 76.2	407	2A45724	2A45727

Style 50 Swivel

Size	End Connection	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Dim. C (in/mm)	Inner Dia. (in/mm)	Weight (lbs)	Parts Kit	Seals Kit
3 inch	Male x Female	2A40982	21.20 / 538.5	20.39 / 517.9	9.69 / 246.1	3.00 / 76.2	300	2A45724	2A45727

Note: Other parts or configurations may be available. Contact SPM Oil & Gas for specific details.

Note: Listed weights are approximate.

Kit Contents

Parts Kit: Elastomers, swivel balls, ball plugs, plug retainer rings, grease port screw

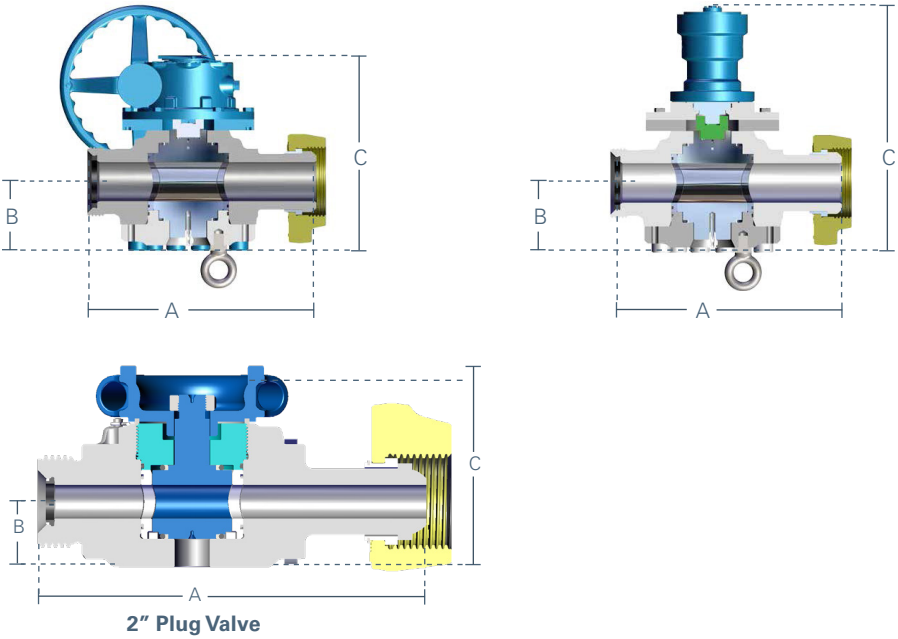
Note: The swivel parts kit contains enough parts to replace the components of one articulating joint

SPM™ Plug Valves

SPM™ Plug Valves feature quality components for dependability, minimum weight, and maximum strength.

The plug valves act as quarter-turn isolation valves, allowing operators to isolate portions of their flow line or specific pumping units from the entire pumping system in order to address pumping, operational or maintenance requirements. SPM™ 2” 2002 Plug Valves are only available with manual actuation. SPM™ 3” 2002 Plug Valves are available with wheel (gear) or hydraulic to enhance safety in the field.

It is imperative that plug valves are routinely greased to promote proper performance and extend life. Operators should follow the greasing procedure outlined within operation and maintenance documentation.



Plug Valve Assembly and Specifications

Connection Type	Actuation	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Dim. C (in/mm)	Inner Dia. (in/mm)	Weight (lbs.)
2-2002 MxF	Manual	1A14802	15.25 / 387.4	2.56 / 65.0	7.88 / 200.2	1.31 / 33.3	102
3-2002 MxF	Gear	2A25171	22.13 / 562.1	6.51 / 165.4	23.54 / 597.9	3.00 / 76.2	587
3-2002 MxF	Hydraulic	2A45723	22.13 / 562.1	6.51 / 165.4	27.24 / 691.9	3.00 / 76.2	CE*

Note: *CE – Contact Engineering for specific details.

Plug Valve Kits

Size	Parts Kit	Seal Kit	Elastomer Kit
2 inch	2A46534	2A46535	2A46536
3 inch	2A45720	2A45721	2A45722

Kit Contents

Parts Kit: plug, seals, side segments, seal segments, grease fitting, backup ring
Seal Kit: seals, backup rings, grease fitting, seal segment
Elastomer Kit: seals, backup ring



Key Features

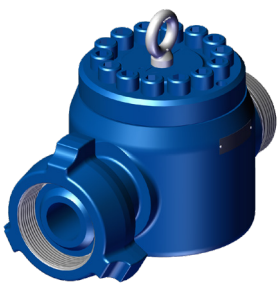
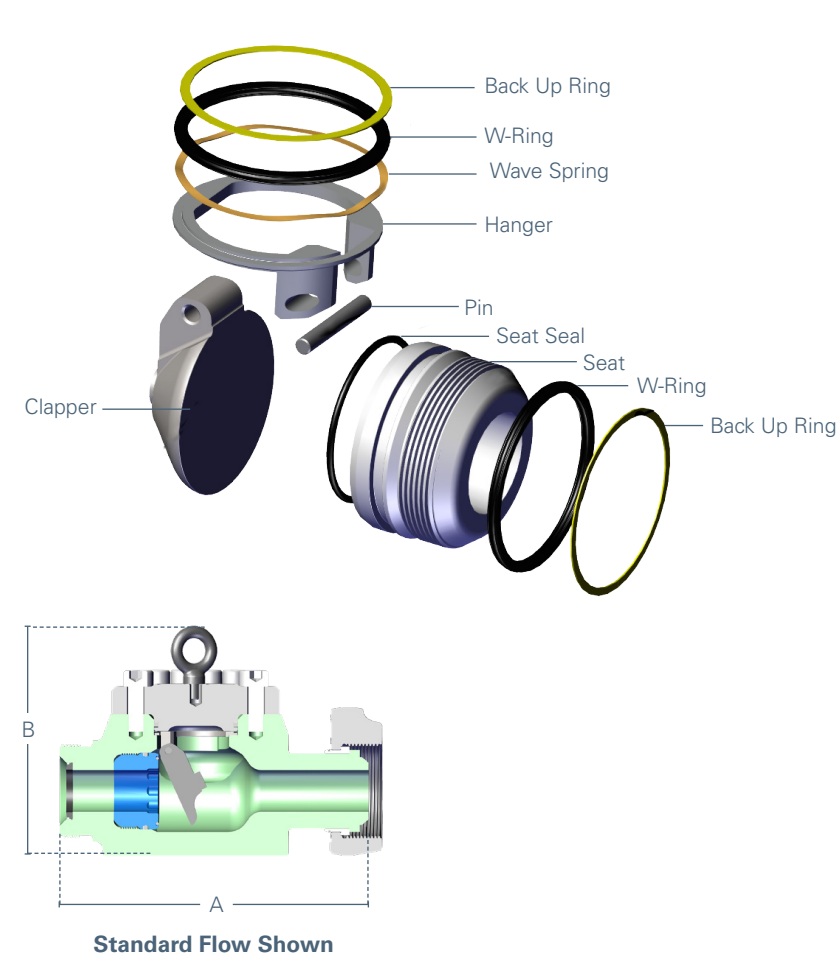
- Designed to reduce required operating torque to improve ease of use
- Precision machined and ground components to aid in proper sealing for a wide range of pressures
- Plating on critical areas for improved corrosion resistance
- Efficient design requires minimum space, is simple to operate, exhibits a fast response, with relatively little internal disturbance to the flow

SPM™ Check Valves

SPM™ Clapper Check Valves, unlike dart style valves, are designed for fluids heavily laden with proppants, ball sealers and other solids. The threaded seat features a self-locking design to prevent coming loose during operation and is replaceable for extended product life.

SPM now offers 3” SPM™ Check Valves with an operating pressure up to 20,000 psi. Hammer union end connections are available in standard or reverse flow. The clapper check valve should be installed with the flow direction arrow machined on the body aligned with the line’s flow direction.

Engineering implemented the SPM™ EXL design changes to the current 20K check valve assemblies and kits to enhance life and sealing performance. Testing has shown up to a 4X increase in life from the legacy style kits.



Key Features

Clapper

- Integral hard stop to eliminate compressive damage
- Fully enclosed pin for improved wear resistance
- Hardened stainless steel clapper for increased resistance to erosion

Hanger

- Hanger and pin interface designed to maximize assembly tolerance
- Reduces excessive clapper / hanger pin movement

Pin

- Upgraded material to Tungsten Carbide for enhanced abrasion resistance

Wave Spring

- Included to add preload to the top of the installed hanger to prevent vibration and unwanted movement

Seat

- Low profile machined feature on seat face to facilitate easier removal
- New seat featuring o-ring and backup-ring seal combination to extend operational life
- Seal removed from clapper and moved out of the flow path to seat face for greater life

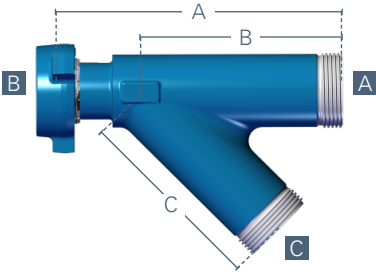
Connection Type	Flow	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Inner Dia. (in/mm)	Weight (lbs)	Clapper Kit	Seat Kit
3-2002 FxM	Standard	2A45213	22.13 / 562.1	14.67 / 372.6	3.00 / 76.2	409	2A45577	2A45578

Kit Contents

Clapper Kit: clapper, pin, hanger, wave spring, cap o-ring, cap backup ring
Seat Kit: seat, seat o-ring, seat backup ring

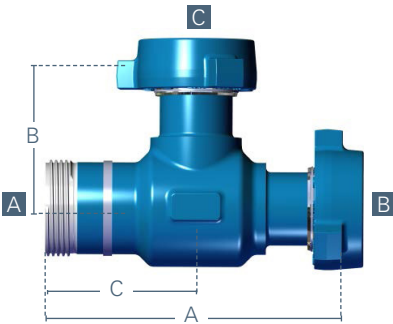
SPM Oil & Gas manufactures a full line of robust, high-pressure SPM™ 2” and 3” integral union connections with pressure ratings to 20,000 psi NSCWP. Manufactured from high strength alloy steel forgings, SPM™ 2” and 3” 2002 integral union connections are available in lateral, tee, wye, ell and cross configurations.

Laterals



Branch Config. A	Branch Config. B	Branch Config. C	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Dim. C (in/mm)	Inner Dia. (in/mm)	Weight (lbs)
3-2002 F	3-2002 M	3-2002 F	2A28508	23.75 / 603.3	15.88 / 403.4	15.88 / 403.4	3.00 / 76.2	247

Tees



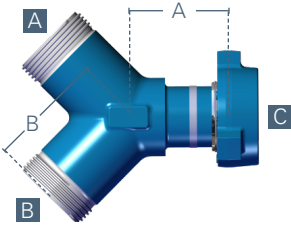
Branch Config. A	Branch Config. B	Branch Config. C	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Dim. C (in/mm)	Horz. Inner Dia. (in/mm)	Vert. Inner Dia. (in/mm)	Weight (lbs)
2-2002 F	2-2002 M	2-2002 F	3A18092	12.13 / 308.1	6.06 / 153.9	6.06 / 153.9	1.31 / 33.3	1.31 / 33.3	CE*
2-2002 F	2-2002 F	2-2002 M	3A22200	12.13 / 308.1	6.06 / 153.9	6.06 / 153.9	1.31 / 33.3	1.31 / 33.3	CE*
2-2002 F	2-2002 M	2-2002 M	3A22201	12.13 / 308.1	6.06 / 153.9	6.06 / 153.9	1.31 / 33.3	1.31 / 33.3	CE*
2-2002 M	2-2002 M	2-2002 F	3A22202	12.13 / 308.1	6.06 / 153.9	6.06 / 153.9	1.31 / 33.3	1.31 / 33.3	CE*
3-2002 F	3-2002 M	3-2002 F	2A28507	21.00 / 533.4	10.50 / 266.7	10.50 / 266.7	3.00 / 76.2	3.00 / 76.2	243
3-2002 F	3-2002 F	3-2002 M	2A40395	21.00 / 533.4	10.50 / 266.7	10.50 / 266.7	3.00 / 76.2	3.00 / 76.2	243
3-2002 F	3-2002 M	3-2002 M	2A24931	21.00 / 533.4	10.50 / 266.7	10.50 / 266.7	3.00 / 76.2	3.00 / 76.2	271
3-2002 M	3-2002 M	3-2002 F	2A40398	21.00 / 533.4	10.50 / 266.7	10.50 / 266.7	3.00 / 76.2	3.00 / 76.2	271
3-2002 F	3-2002 M	2-2002 F	2A40422	21.00 / 533.4	10.50 / 266.7	10.50 / 266.7	3.00 / 76.2	1.31 / 33.3	242

Note: Other parts or configurations may be available. Contact SPM Oil & Gas for specific details.

Note: Listed weights are approximate.

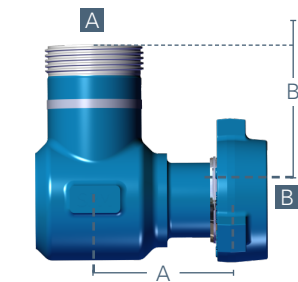
Note: *CE – Contact Engineering for specific details.

Wyes



Branch Config. A	Branch Config. B	Branch Config. C	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Inner Dia. (in/mm)	Weight (lbs)
3-2002 F	3-2002 F	3-2002 M	2A25495	8.09 / 205.5	9.59 / 243.6	3.00 / 76.2	190

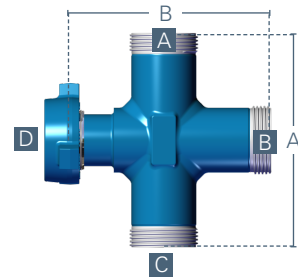
Ells



Branch Config. A	Branch Config. B	Type	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Inner Dia. (in/mm)	Weight (lbs)
2-2002 F	2-2002 M	Standard	2A24608	6.06 / 153.9	6.06 / 153.9	1.31 / 33.3	CE*
3-2002 F	3-2002 M	Standard	2A25462	10.50 / 266.7	10.50 / 266.7	3.00 / 76.2	207
3-2002 F	3-2002 M	Cushion	2A40415	10.50 / 266.7	10.50 / 266.7	3.00 / 76.2	218

Note: *CE – Contact Engineering for specific details.

Crosses



Branch Config. A	Branch Config. B	Branch Config. C	Branch Config. D	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Inner Dia. (in/mm)	Weight (lbs)
3-2002 F	3-2002 F	3-2002 F	3-2002 M	2A40471	21.00 / 533.4	21.00 / 533.4	3.00 / 76.2	287

Note: Other parts or configurations may be available. Contact SPM Oil & Gas for specific details.

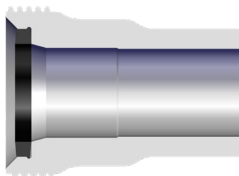
Note: Listed weights are approximate.

SPM Oil & Gas offers robust integral SPM™ 2” and 3” pipe with pressure ratings to 20,000 psi NSCWR. Integral pipe is recommended for use in applications where strong cyclic loading is possible. SPM’s integral pipe is available in standard length pup joints, or custom length crossovers.

SPM™ Pup Joints feature a single piece of forged metal with machined hammer union connections. The forged surface occurs on the O.D. This product comes in standard lengths only. SPM™ Integral Crossovers employ a single piece of forged metal with machined hammer union connections. The O.D. is a machined surface. Custom lengths are available.

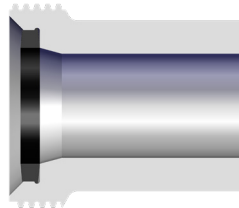
Integral Pup Joints

- Single piece of forged metal with machined hammer union connections (no subs)
- Forged surface on O.D.
- Available in standard lengths only
- Tolerance of face to face length = ± 0.13



Integral Crossovers

- Single piece of forged metal with machined hammer union connections (no subs)
- Machined surface on O.D.
- Custom lengths available
- Tolerance varies based on length of crossover. Please reference the last column in the tables below.



2 Inch Long Pipe

Length (in)	Connections	Part Number	Inner Dia. (in/mm)	Weight (lbs)	Style	Length Tolerance
24	2-2002 M x F	2A38448	1.31 / 33.3	56	Crossover	± 0.13
36	2-2002 M x F	2A42321	1.31 / 33.3	79	Crossover	± 0.13
48	2-2002 M x F	2A42770	1.31 / 33.3	103	Crossover	± 0.13
60	2-2002 M x F	2A42322	1.31 / 33.3	127	Crossover	± 0.13
72	2-2002 M x F	2A42323	1.31 / 33.3	150	Crossover	± 0.13
96	2-2002 M x F	2A45426	1.31 / 33.3	CE *	Crossover	± 0.13
120	2-2002 M x F	2A45427	1.31 / 33.3	CE *	Crossover	± 0.13

3 Inch Long Pipe

Length (in)	Connections	Part Number	Inner Dia. (in/mm)	Weight (lbs)	Style	Length Tolerance
20	3-2002 M x F	2A40532	3.00 / 76.2	135	Crossover	± 0.13
24	3-2002 M x F	2A40534	3.00 / 76.2	152	Crossover	± 0.13
24	3-2002 M x M	2A40535	3.00 / 76.2	189	Crossover	± 0.13
24	3-2002 F x F	2A40536	3.00 / 76.2	116	Crossover	± 0.13
36	3-2002 M x F	2A42306	3.00 / 76.2	183	Crossover	± 0.13
36	3-2002 M x M	2A46326	3.00 / 76.2	224	Crossover	± 0.13
48	3-2002 M x F	2A46327	3.00 / 76.2	226	Crossover	± 0.13
60	3-2002 M x F	2A42309	3.00 / 76.2	267	Crossover	± 0.13
72	3-2002 M x F	2A42311	3.00 / 76.2	311	Crossover	± 0.13
96	3-2002 M x F	2A46329	3.00 / 76.2	397	Crossover	± 0.13
120	3-2002 M x F	2A46330	3.00 / 76.2	482	Crossover	± 0.13

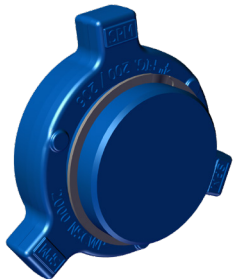
Short Crossovers

Connections	Type	Length (in)	Part Number	Inner Dia. (in/mm)	Weight (lbs)	Length Tolerance
2-2002 M	2-2002 M	7.00	3A21066	1.31 / 33.3	34	±.03
2-2002 F	2-2002 F	7.00	3P19729	1.31 / 33.3	43	±.03
2-2002 M	2-1502 F	7.00	3A21065	1.31 / 33.3	23	±.03
2-2002 M	2-1502 M	7.00	2A27190LT	1.31 / 33.3	33	±.06
2-2002 F	2-1502 M	7.00	2A45433	1.31 / 33.3	24	±.03
3-2002 M	3-2002 M	9.00	2A45425	3.00 / 76.2	125	±.03
3-2002 F	3-2002 F	7.00	2A45422	3.00 / 76.2	48	±.03
3-2002 M	3-1502 F	7.00	2A45423	2.75 / 69.8	72	±.06
3-2002 M	3-1502 M	9.00	2A45424	2.75 / 69.8	89	±.06
3-2002 F	3-1502 M	7.00	2A42426	2.75 / 69.8	40	±.06
3-2002 M	2-2002 F	7.00	2A45428	1.31 / 33.3	70	±.03
3-2002 M	2-2002 M	9.00	2A45429	1.31 / 33.3	86	±.03
3-2002 F	2-2002 M	9.00	2A45430	1.31 / 33.3	48	±.03

Bull Plugs and Gauge Plugs

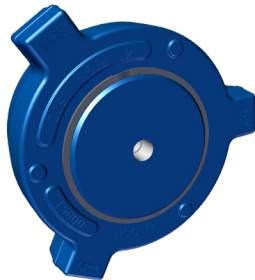
Bull Plugs

Configuration	Part Number	Weight (lbs)
2-2002 M	2A27601	18
2-2002 F	3P18099	5
3-2002 M	2A26966	71
3-2002 F	3P18097	31



Gauge Plugs

Configuration	Gauge Type	Part Number	Weight (lbs)
2-2002 M	X13	2A45135	17
2-2002 F	X13	2A45136	5
3-2002 M	X13	2A45137	71
3-2002 F	X13	2A45138	31

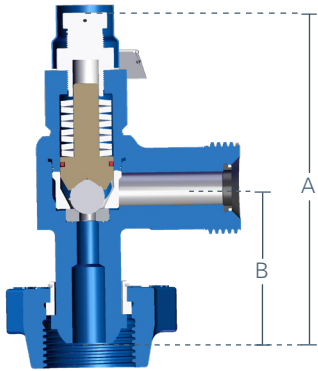


SPM™ Relief Valves

In the pressure pumping industry, there is an inherent level of danger surrounding treating lines operating at high pressures. The potential for over pressure events exists, which could result in catastrophic failure of the treating line and result in **SERIOUS BODILY INJURY, DEATH, OR PROPERTY DAMAGE**. In order to avoid this type of failure, relief valves are commonly used on pressure pumping sites. All of these valves are designed for liquid flow. Acceptable media include cement, acidizing fluids, fracturing fluids, and drilling muds.

Spring actuated relief valves are direct acting, relying on a system’s hydraulic pressure to open when the spring’s preset force has been exceeded. When the inlet fluid pressure rises and overcomes the set spring pressure, the sealing device is lifted off its seat and discharges fluid to the outlet. When pressure falls below the setting, the sealing device moves back on to its seat and fluid passes downstream.

These relief valves are manufactured in 2” for operating pressures up to 20,000 psi. SPM™ Spring Actuated Relief Valves come in multiple configurations, each optimised for a specific pressure range.



2” Spring Relief Valve

Inlet Connection	Outlet Connection	Part Number	Dim. A (in/mm)	Dim. B (in/mm)	Inner Dia. (in/mm)	Weight (lbs)	Parts Kit	Metal Seal Kit	Seals Kit
2-2002 M	2-2002 F	2A18796	13.06 / 331.7	6.06 / 153.9	57 / 14.5	46	4L20422	4L19186	4L20426

Kit Contents

- Parts Kit: 2” – ball, seat, spider, spring, seals, screw, nut
- Ball, Seat and Seal Kit: ball, seat, seal
- Gate, Nozzle and Seal Kit: gate, nozzle, seal
- Seal Kits: seals



Key Features

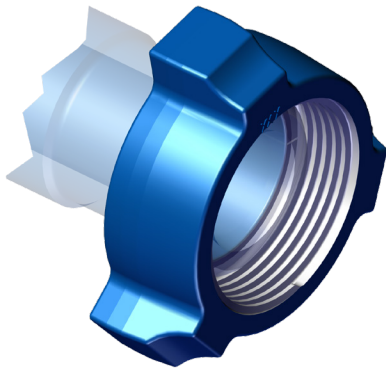
- Externally adjustable utilizing hex screw
- Direct acting, with repeatable usage
- Seat made from high strength, corrosion resistant material
- Spring loaded keeper ensures ball seats properly
- Lock-out tag identifies set pressure and prevent tampering with valve setting

SPM™ EXL Wing Nuts

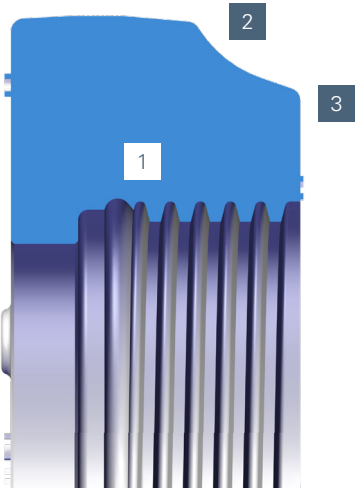
There are two primary sources of wingnut failure: fatigue cracks from cyclical loading and excessive load impact from hammer strikes. Continual side load forces paired with the typical pulsations produced during pumping operations create significant levels of stress on hammer unions. Consequently, fatigue crack formations may develop at the thread root which can propagate axially and lead to an unexpected separation.

The SPM™ EXL Wing Nut is engineered to minimize stress concentrations at critical locations. A comprehensive analysis confirmed the design reduced fatigue stress resulting in a 235% increase in cycles prior to failure.

This fatigue analysis is based on 1,500 lb. alternating side load.



Connection Type	Part Number	Weight (lbs)
2-2002	2P45397	15
3-2002	2P45158	38



- 1 Full root radius on internal threads to help minimize stress
- 2 Extended, forward-facing lugs to reduce cracking
- 3 Thicker lugs and larger outside diameter to extend life



SPM™ RFID Technology

With SPM™ Radio Frequency Identification (RFID) technology, your assets can be electronically tagged by serial number for safe and efficient inventory management, even when parts are difficult to access or shrink-wrapped.

SPM™ RFID technology is designed with efficiency and safety in mind for use in the global market. Iron equipped with SPM™ RFID tags can be quickly scanned to efficiently manage inventory, while allowing users to easily determine the inspection status of their iron before putting it into the field.

SPM Oil & Gas installs RFID tags, which have been thoroughly tested for durability, on all product being produced in its Fort Worth, TX manufacturing facility and has made RFID tags available to customers for installation on their existing inventory of iron assets, whether they are SPM or another manufacturer's product.

SPM Oil & Gas couples RFID technology with its Asset Management Program (A.M.P) to streamline inspection processes and provide customers with a program where they are able to review the current or historical inspection status and other relevant information of an asset to assist in the management of their iron fleet.

Mobile App

With SPM Oil & Gas' newly launched SPM™ RFID Mobile App, A.M.P. users are easily able to utilize the program in the field. The app connects with the A.M.P. system and allows users to quickly scan and inventory iron, pull inspection certifications, and assign the asset to a hierarchal organization. Users can also access A.M.P. to pull detailed reports with real time information to manage their fleets' assets. Over time, your enhanced data library could prove invaluable for predictive analytics.

The RFID mobile app brings the benefits of A.M.P. to the field. Program capabilities include:

- Pull the latest inspection report and distribute to an assigned email
- Quickly scan and accurately inventory iron with the ability pull and send a report
- Ability to change the organizational structure of an asset to track product location and status
- The SPM™ RFID mobile application can be found on either the Apple App Store for iOS or Google Play for Android. Within either app store, search "SPMMobile" to find the app and download on to the device.

Key Features:

- Ability to verify asset inspection status quickly on site
- Expedites inventory control on site or at service facility
- Reduces man-made error of misidentification during inspection
- Leverages SPM Oil & Gas' Asset Management Program (A.M.P) to immediately update and store asset information
- Newly launched mobile app provides access to A.M.P. iron management functionality in the field

The destructive force of an unrestrained flow line rupture, regardless of the cause, can be devastating and catastrophic to both people and equipment. The SPM™ Flow Line Safety Restraint (FSR) system is one of the industry's most utilized restraint systems designed to reduce the area of danger around high-pressure flow line disengagements. Operators and service companies have relied on the SPM™ FSR system to enhance safety during pumping operations. Product innovation, customer collaboration and a commitment to industry safety were the driving forces behind the development of this temporary flow line restraint product in 2000.

US PATENT 6,481,457

UK PATENT 2,370,869

How the SPM™ FSR System Works

The SPM™ FSR System utilizes interlocking synthetic loops strung along the length of the flow line and attached to critical points of the flow line through smaller loops.

This assembly is then anchored to a suitable structural tie-down. Ribs and spines of the system transmit separation forces to the anchor point and restrict flow line movement and help dissipate energy.

Single Duty SPM™ FSR System

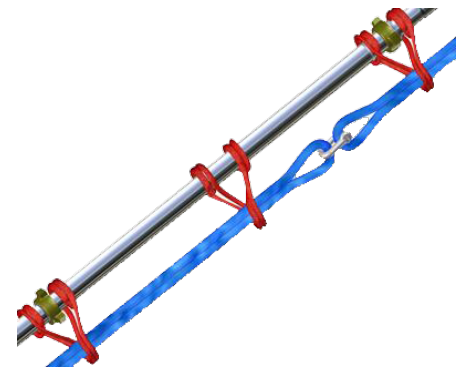
The SPM™ FSR system is available in a single duty rating, suitable for piping sizes up to 4" with a pressure rating of 15,000 psi and 3" with a pressure rating of 20,000 psi. The system is flexible enough for a variety of flow line configurations and can be easily transported. All models are suitable for energized fluid, CO₂ and nitrogen operations.

Demonstrated Performance

The SPM™ FSR System has been used in both onshore and offshore applications around the world since 2000 to increase safety during pumping operations. It has been tested and honored by the industry for its innovation and performance.

- Received "Best Mechanical Engineering Innovation Award" from the American Society of Mechanical Engineers in 2002
- Accepted by WorkSafeBC (the Workers' Compensation Board of British Columbia) as in compliance with a government mandate that flow line piping systems be anchored and restrained during well testing or stimulation operations
- Mandated by several major E&P companies for use during pumping operations

Additionally, SPM recently reinvested almost \$500,000 into practical performance testing of this product line. In conjunction with an independent third party research institute, SPM has demonstrated this product's first in class technical design.



Destructive testing conducted with a designed failure at 22,500 psi on up to 4" iron utilizing SPM™ FSR.



Testing validated SPM™ FSR's ability to reduce the danger area around high pressure hydraulic fracturing operations.

Size and Pressure Rating	
Nominal Iron Size	Pressure (psi)
2 inch	30,000 and below
3 inch	20,000 and below
4 inch	15,000 and below

SPM™ Edge Service Advantage builds on our strength in services to extend equipment life and reduce total cost of ownership. SPM™ Edge provides a three-pronged offering includes:

- 1 Engineering Expertise—our experts come on site to analyze issues and train customers
- 2 Equipment repairs and aftermarket support—we find the root cause to minimize NPT and maximize life
- 3 Customer enablement technologies—our technologies allow you to streamline inventories and maintenance

All together, SPM™ Edge delivers a comprehensive, advanced level of aftermarket services globally.

We have the largest global footprint covering all major basins, including a US network that puts us no more than 3 hours from anywhere you’re working. Our service centers are staffed with certified refurbishment experts and embedded repair teams to operate mobile repair units. With SPM™ Edge, you can count on reliable repairs and support, digital empowerment tools, and unbeatable engineering expertise.

For additional Pressure Pumping support, please contact your SPM™ Edge Engineering Field Assist Team.

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SPM[®]
EDGE
THE SERVICE ADVANTAGE



Repairs & Support

We go beyond fixing.
We solve root causes to optimize equipment life.

- Pressure pumping service centers in every major basin
- 452 certified refurbishment experts strategically placed to provide optimal support
- 13-pt standardized flow inspection process to minimize downtime and enhance performance
- Industry leading SPM™ SafeEdge rental systems



Empowerment Tools

Our technology helps you better manage inventories and streamline maintenance.

- RFID and A.M.P systems track assets and improve inventory efficiency by up to 97%
- Mobile application provide real-time site access to certifications
- SPM Oil & Gas web portal platform stores product information and training



Engineering Expertise

Our experts can deploy to your site and solve issues across your operation.

- Engineering experts provide site evaluations and root cause analysis
- Includes training so customers can recognize and prevent impending failures
- 24/7 technical support availability

Where You Need Us. When You Need Us.



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Red Deer Red Deer, Canada	Kilgore Kilgore, TX
Medicine Hat Red Cliff, Canada	El Reno El Reno, OK
Williston Williston, ND	Lafayette Broussard, LA
Fort Lupton Fort Lupton, CO	Buckhannon Buckhannon, WV
Midland Midland, TX	Williamsport Muncy, PA
Pleasanton Pleasanton, TX	

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