



## *Side-Pocket Mandrels—Oval-Body, Forged and Machined*

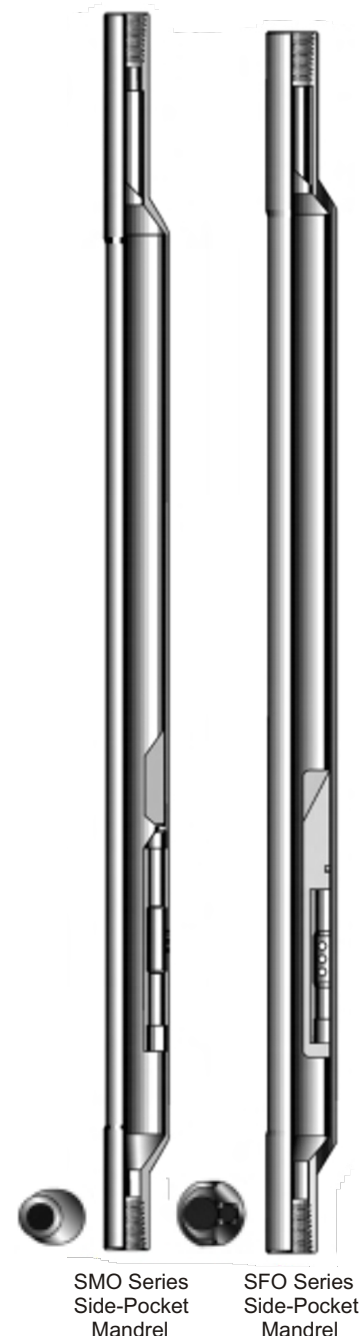
### *SF, SFO, SM and SMO Series*

Weatherford's McMurry-Macco® forged-pocket (SF and SFO series) and machined-pocket (SM and SMO series) side-pocket mandrels feature an oval-body design and threaded connections for installation in the tubing string. The side pocket is offset from the bore of the tubing, allowing full tubing drift, through the mandrel and without restriction, for well-servicing operations. The side pocket encompasses profiles and seal bores to land gas-lift and other flow-control devices.

Flow-control devices are installed in the side pocket, using a kickover tool, which is run into the well using standard wireline techniques. The **SFO** and **SMO series** mandrels include an integral orienting sleeve that aligns the kickover tool and injection devices with the side pocket for precise installation in straight and deviated wellbores. The **SF** and **SFO series** mandrels have a one-piece forged pocket/deflector, which guides the flow-control device into the pocket and deflects tools larger than the pulling/running tool back into the tubing bore of the mandrel. The **SM** and **SMO series** mandrels have a machined pocket and tool guard to perform the same function.

### *Applications*

- **SF, SFO, SM** and **SMO series** mandrels are used in dual completions as receivers for wireline-retrievable gas-lift valves and various other flow-control devices to enhance production and prolong production life.
- The **SF-1** mandrel has a one-piece forged pocket/deflector and a 1-in. ID pocket for installation in straight wellbores.
- The **SFO-1** mandrel has a one-piece forged pocket/deflector, a 1-in. ID pocket, and an integral orienting sleeve for installing gas-lift devices in deviated wellbores.





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### *Applications, cont'd.*

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- The **SM-1** and **SM-2** mandrels have machined pockets and tool guards and 1- and 1 1/2-in. ID pockets, respectively, for installing gas-lift devices in straight wellbores.
- The **SMO-1** and **SMO-2** mandrels have machined pockets and tool guards; 1- and 1 1/2-in. ID pockets, respectively; and integral orienting sleeves for installing gas-lift devices in straight and deviated wellbores.
- The **SMO-2RA** mandrel has machined pockets and tool guards and a 1 1/2-in. ID pocket with a 360° latch profile for use with the RA-type latch.

### *Features, Advantages and Benefits*

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- Side-pocket design eliminates the need to pull or rerun the tubing string to install or replace gas-lift equipment.
- Side pocket is offset from the tubing bore, which maximizes the flow area and allows full tubing drift for well servicing operations through the mandrel, without restriction.
- Oval-body mandrel design is ideal for dual-completion applications and reduces overall running clearances.
- Slotted orienting sleeve in select models enables precise installation and retrieval of gas-lift equipment in straight and deviated wellbores.
- Tool guard protects gas-lift equipment from damage by deflecting tools larger than the pulling/running tool from the flow-control device.
- The forged pocket has recessed opposing ports that prevent flow erosion and port blockage if the mandrel pocket is positioned against the casing wall.
- The mandrel material is fully heat-treated to provide the best combination of strength and corrosion resistance for its intended use.
- The one-piece forged pocket/deflector (**SF and SFO series**) provides a smooth internal profile to enhance the passage of wireline tools and reduce flow turbulence around the pocket section.



## *Side-Pocket Mandrels—Oval-Body, Forged and Machined SF, SFO, SM and SMO Series*

### *Specifications*

#### Dimensions

Tubing Size (in.)	Pocket Size (in./mm)	Mandrel Series	Pocket Type	Pocket Latch Configuration	Orienting Sleeve	Major OD	Minor OD	Drift	Length	Weight	
						(in./mm)	(in./mm)				(in./mm)
2-3/8	1.0 25.4	SF-1	Forged	180°	No	4.250	2.910	1.901	83.88	62	
		107.95				73.91			48.29		2,130.55
		SIF-1			Yes	2.347	74.50	28			
		59.61				1,892.30					
		SFO-1	Machined	180°	Yes	4.250	2.910	1.901	83.88	65	
		107.95				73.91			48.29		2,130.55
	SIFO-1	No	180°	No	4.250	2.910	1.901	81.75	29		
	107.95				73.91			48.29		2,076.45	
	SM-1	Machined	180°	No	4.250	2.910	1.901	83.88	52		
	107.95							73.91		48.29	2,130.55
	SIM-1			Yes	180°	Yes	4.250	2.910	1.901	72.40	55
	107.95						73.91			48.29	
SMO-1	No	180°	No	4.250	2.910	1.901	83.88	60			
107.95				73.91			48.29		2,130.55		
SIMO-1	Yes	180°	Yes	4.250	2.910	1.901	81.75	27			
107.95				73.91			48.29		2,076.45		
1.5 38.1	SM-2	Machined	360° A-type	No	4.750	4.000	1.901	102.00	60		
								120.65		101.60	48.29
			SIM-2	Yes	180°	Yes	4.750	4.000	1.901	101.70	59
120.65	101.60	48.29	2,583.18								
SMO-2	No	180°	No	4.750	4.000	1.901	102.00	58			
120.65				101.60			48.29		2,590.80		
2-7/8	1.0 25.4	SF-1	Forged	180°	No	4.750	4.000	2.347	83.25	75	
		120.65							101.60		59.61
		SIF-1			Yes	83.80	2,128.52	34			
		59.61				83.25	2,114.55				
		SFO-1	Machined	180°	No	4.750	4.000	2.347	83.80	70	
		120.65							101.60		59.61
	SIFO-1	Yes	180°	Yes	4.750	4.000	2.347	74.45	32		
	120.65				101.60			59.61		1,891.03	
	SM-1	No	180°	No	4.750	4.000	2.347	83.25	75		
	120.65				101.60			59.61		2,114.55	
	SIM-1	Yes	180°	Yes	4.750	4.000	2.347	83.88	34		
	120.65				101.60			59.61		2,130.55	
SMO-1	No	180°	No	5.400	4.623	2.347	102.00	82			
120.65				117.42			59.61		2,590.80		
SIMO-1	Yes	180°	Yes	5.400	4.623	2.347	102.62	82			
120.65				117.42			59.61		2,606.55		
1.5 38.1	SM-2	Machined	360° A-type	No	5.350	4.590	2.347	102.62	82		
								135.89		116.59	59.61
			SFO-2	Yes	180°	Yes	5.350	4.590	2.347	102.62	37
135.89	116.59	59.61	2,606.55								

\*SIF, SIFO, SIM, and SIMO models have integrally forged swedges.



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**Dimensions, cont'd.**

Tubing Size (in.)	Pocket Size (in./mm)	Mandrel Series	Pocket Type	Pocket Latch Configuration	Orienting Sleeve	Major OD	Minor OD	Drift	Length	Weight
						(in./mm)	(in./mm)			
3-1/2	1.0 25.4	SF-1	Forged	180°	No	5.313	4.125	2.867 72.82	85.50	110
		SIF-1				134.95	104.78		2,171.70	
		SFO-1			5.360	4.180	84.20		54	
		SIFO-1			136.14	106.70	2,138.68			
		SM-1	Machined		No	5.313	4.125		85.50	90
		SIM-1				134.95	104.78		2,171.70	
	SFO-1	Yes		5.360	4.180	84.20	44			
	SIFO-1			136.14	106.70	2,138.68				
	1.5 38.1	SFO-2	Forged	180°	Yes	5.968	5.000	2.867 72.82	105.50	120
		SM-2	Machined	360° A-type	No	5.968	5.000	2.867 72.82	106.87	110
				180°	Yes				151.59	127.00
	SFO-2	Forged	180°	Yes	5.968	5.000	2.867 72.82	106.87	110	
4-1/2	1.0 25.4	SFO-2	Forged	180°	Yes	7.100	6.141	3.833 97.36	113.75	190
	1.5 38.1	SFO-2	Forged	180°	Yes	7.030	5.630	3.833 97.36	109.25	180
		SFO-2	Machined	180°	Yes	178.56	143.00	3.833 97.36	2,774.95	82
5-1/2	1.5 38.1	SFO-2	Forged	180°	Yes	8.014	6.842	4.653 118.19	116.80	248
						203.56	173.79		2,966.72	112

\*SIF, SIFO, SIM, and SIMO models have integrally forged swedges.



## *Side-Pocket Mandrels—Oval-Body, Forged and Machined SF, SFO, SM and SMO Series*

### Pressure Ratings

Mandrel Model	Assembly Number	Tubing Size (in.)	Test Pressure <sup>1,2</sup>							
			Standard Service				Sour Service			
			Internal		External		Internal		External	
			(PSI)	(bar)	(PSI)	(bar)	(PSI)	(bar)	(PSI)	(bar)
SM-1	1812-XXX	2-3/8	8,000	551.0	6,000	413.4	6,000	413.4	4,000	275.6
	1813-XXX	2-7/8								
	1814-XXX	3-1/2								
SIM-1	1812-5XX	2-3/8	8,000	551.0	6,000	413.4	6,000	413.4	5,000	344.5
	1813-5XX	2-7/8								
	1814-5XX	3-1/2	7,000	482.3	5,500	379.0	4,500	310.1		
SMO-1	1912-XXX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	4,000	275.6
	1913-XXX	2-7/8								
	1914-XXX	3-1/2	7,000	482.3	5,000	379.0	4,500	310.1		
	1916-XXX	4-1/2								
SIMO-1	1912-XXX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	5,000	344.5
	1913-XXX	2-7/8								
	1914-XXX	3-1/2	7,000	482.3	5,500	379.0	4,500	310.1		
SF-1	1612-XXX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	5,000	344.5
	1613-XXX	2-7/8								
	1614-XXX	3-1/2	7,000	482.3	5,500	379.0	4,500	310.1		
SIF-1	1612-XXX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	5,000	344.5
	1613-XXX	2-7/8								
	1614-XXX	3-1/2	7,000	482.3	5,500	379.0	4,500	310.1		
SFO-1	1712-XXX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	5,000	344.5
	1713-XXX	2-7/8								
	1714-XXX	3-1/2	7,000	482.3	5,500	379.0	4,500	310.1		
SIFO-1	1712-5XX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	5,000	344.5
	1713-5XX	2-7/8								
	1714-5XX	3-1/2	7,000	482.3	5,500	379.0	4,500	310.1		
SM-2	2012-XXX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	4,000	275.6
	2013-XXX	2-7/8								
	2014-XXX	3-1/2								
SIM-2	2012-5XX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	5,000	344.5
SMO-2	2412-XXX	2-3/8	8,000	551.2	6,000	413.4	6,000	413.4	4,000	275.6
	2413-XXX	2-7/8								
	2414-XXX	3-1/2								
SFO-2	2113-XXX	2-7/8	7,500	516.8	6,000	413.4	6,000	413.4	5,000	344.5
	2114-XXX	3-1/2	8,000	551.2	6,500	447.9	7,000	482.3	5,500	379.0
	2116-XXX	4-1/2	7,500	516.8	6,000	413.4	6,000	413.4	5,000	344.5
	2118-XXX	5-1/2	8,500	585.7	7,000	482.3	6,500	447.9	5,500	379.0

<sup>1</sup> Pressures are based on low-alloy steel, heat treated for standard and corrosive environments.

<sup>2</sup> Pressure may vary with type of end connections and with special-clearance applications.



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## *Side-Pocket Mandrels—Oval-Body, Forged and Machined SF, SFO, SM and SMO Series*

### *Options*

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- All oval-body side-pocket mandrels are available in AISI 4130 alloy material, which can be heat-treated specifically for corrosive hydrogen sulfide (H<sub>2</sub>S) service. High-alloy materials, such as 13 chrome and 9 chrome, are also available.
- For specialized applications, such as chemical injection, water flood, bypass injection, and pressure gauge monitoring, multiple mandrel configurations, with a variety of features, are available.