

# Conventional Gas Lift Mandrels

Gas lift mandrels installed as part of tubing strings

## APPLICATIONS

- Gas lift service
- Single- and dual-string installations
- Injection- and production-pressure operations

## BENEFITS

- Application-specific design options that simplify installation and maintain reliable operation

## FEATURES

- Exterior ported lugs that accept OD subsurface control devices and reverse-flow check valves
- Tapered lugs that protect installed devices

Conventional gas lift mandrels are installed as part of the tubing string and have an exterior ported lug that will accept either a 1 in [25.4 mm] or 1<sup>1/2</sup> in [38.1 mm] OD conventional subsurface control device and a reverse-flow check valve. These mandrels are internally drifted to standard drift specifications and hydro-statically tested to 6,000 psi [41,370 kPa].

### Conventional mandrels

Conventional mandrels are designed for single-string installations and are normally used in injection-pressure-operated tubing flow applications

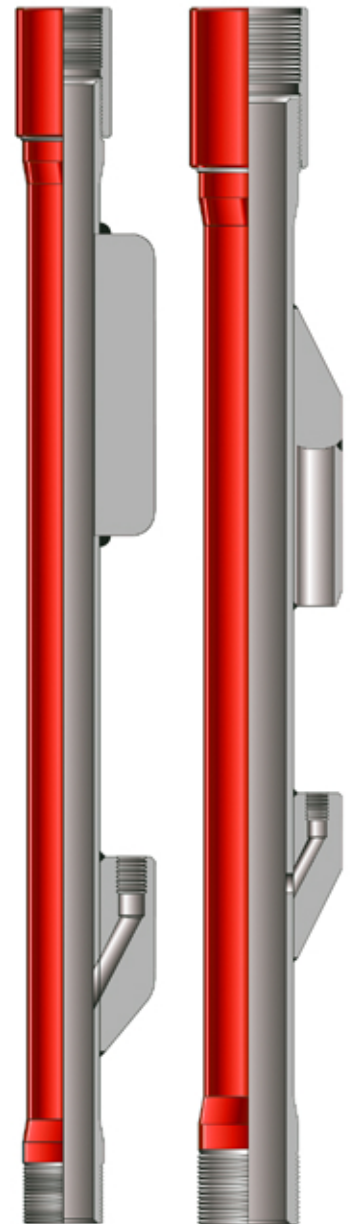
### B & C deflector lug mandrels

Deflector lug mandrels are designed for dual-string installations and are normally used in injection-pressure-operated tubing flow applications. These mandrels feature long, tapered lugs that are welded in-line with the exterior ported lug. The lugs protect the installed subsurface control device and allow the mandrel to easily pass other mandrels during installation in dual string applications.

### BR & CR deflector lug mandrels

BR & CR deflector lug mandrels are designed for either single-string or dual-string installations and are normally used in production-pressure-operated tubing flow applications. Like B & C deflector lug mandrels, BR & CR deflector lug mandrels feature long, tapered, welded-on lugs for use in dual-string installations.

The exterior ported lug on the BR & CR deflector lug mandrels is located near the middle of the mandrel and is called a capsule lug. The subsurface control device is installed into the top of the capsule lug, and the reverse flow check valve is installed into the bottom of the capsule lug. Two O-rings in the lug create a seal above the holes in the device. These holes expose the bellows to production pressure.



*Conventional mandrel (left) and deflector lug mandrel (right).*

# Conventional Gas Lift Mandrels

## Conventional Gas Lift Mandrels

Tubing size, in [mm]	Type	Max. OD, in [mm]	ID, in [m]	Length, ft [m]
1.315 EUE [33.4]	B	2.669 [67.8]	1.049 [26.6]	4.0 [1.22]
1.660 EUE [33.4]	B	3.000 [76.2]	1.380 [35.1]	4.0 [1.22]
1.660 EUE [33.4]	B deflector lug	3.148 [80.0]	1.380 [35.1]	4.0 [1.22]
1.900 EUE [48.3]	B	3.262 [82.9]	1.610 [40.9]	4.0 [1.22]
1.900 EUE [48.3]	B deflector lug	3.418 [86.8]	1.610 [40.9]	4.0 [1.22]
1.900 EUE [48.3]	BR deflector lug	3.305 [83.9]	1.610 [40.9]	4.0 [1.22]
2.063 IJ† [52.4]	B deflector lug	3.454 [87.7]	1.751 [44.5]	4.0 [1.22]
2.063 IJ† [52.4]	BR deflector lug	3.625 [92.1]	1.751 [44.5]	4.0 [1.22]
2.375 EUE [60.3]	B	3.781 [96.0]	1.995 [50.7]	4.0 [1.22]
2.375 EUE [60.3]	B deflector lug	3.937 [100.0]	1.995 [50.7]	4.0 [1.22]
2.375 EUE [60.3]	BR deflector lug	4.093 [104.0]	1.995 [50.7]	4.0 [1.22]
2.875 EUE [73.0]	B	4.335 [110.1]	2.441 [62.0]	4.0 [1.22]
2.875 EUE [73.0]	B deflector lug	4.489 [114.0]	2.441 [62.0]	4.0 [1.22]
2.875 EUE [73.0]	B	5.062 [128.6]	2.992 [76.0]	4.0 [1.22]
1.900 EUE [48.3]	CR deflector lug	4.200 [106.7]	1.610 [40.9]	4.0 [1.22]
2.375 EUE [60.3]	C	4.375 [111.1]	1.995 [50.7]	4.0 [1.22]
2.375 EUE [60.3]	C deflector lug	4.531 [115.1]	1.995 [50.7]	4.0 [1.22]
2.375 EUE [60.3]	CR deflector lug	4.719 [119.9]	1.995 [50.7]	4.0 [1.22]
2.875 EUE [73.0]	C	4.929 [125.2]	2.441 [62.0]	4.0 [1.22]
2.875 EUE [73.0]	C deflector lug	5.084 [129.1]	2.441 [62.0]	4.0 [1.22]
2.875 EUE [73.0]	CR deflector lug	5.281 [134.1]	2.441 [62.0]	4.0 [1.22]
3.500 EUE [88.9]	C	5.655 [143.6]	2.992 [76.0]	4.0 [1.22]
4.500 EUE [114.3]	C	6.875 [174.6]	3.958 [100.5]	4.0 [1.22]

†IJ represents an integral joint thread—i.e., an API thread in which the box is integral to the tubing and no coupling is required.

# Conventional Reverse-Flow Check Valves

Velocity check valves used for gas lift services

## APPLICATIONS

- Gas lift service
- Used with conventional gas lift valves

## BENEFITS

- Protects casing from backflow with valves below the working valve
- Prevents commingled production in dual gas lift installations

## FEATURES

- Rated to 10,000-psi [68,950-kpa] differential pressure
- Can be converted from velocity check to positive-check valves

Conventional reverse-flow check valves are velocity check valves used with conventional Camco® gas lift valves that do not have integral reverse-flow check valves. These check valves protect the casing from backflow through valves that are below the working valve and allow the application of pressure to the tubing for circulation or acidizing. Reverse-flow check valves also prevent the commingling of production fluids in dual gas lift installations.

This line of valves includes the 1-in [25.4-mm] OD BF and B-1 valves and the 1½-in [38.1-mm] OD CF and J-20 valves. These valves each have an elastomeric soft seat and a stainless steel hard seat. The initial seal is between the stainless steel check dart and the soft seat. These check valves can withstand 10,000-psi [68,950-kPa] differential pressure and can be converted from velocity check valves to positive check valves by adding a spring.

## Operation

Reverse-flow check valves require flow to close. As the differential pressure across the check dart of the valve increases, the dart contacts the soft seat and the hard seat to form a seal and close the check valve.



B-1 valve (top) and J-20 valve (bottom).



## Conventional Reverse-Flow Check Valves

Type <sup>†</sup>	OD, in [mm]	Equivalent Port Size, in [mm]	Flow Area, in [mm]	Connecting Thread, in - tpi
B-1	1.000 [25.4]	0.313 [7.9]	0.313 [7.9]	0.500 - 14 NPT
J-20	1.500 [38.1]	0.563 [14.3]	0.563 [14.3]	0.500 - 14 NPT

<sup>†</sup>Optional spring is available

# Conventional Injection-Pressure-Operated Valves

Gas lift valves for continuous or intermittent tubing flow

## APPLICATIONS

- Gas lift service
- Continuous or intermittent tubing flow

## FEATURES

- Capable of operating with production or injection pressure
- Integral reverse-flow check valves or floating valve seat design

The Camco® conventional injection-pressure-operated gas lift valves are normally used for injection-pressure-operated gas lift production with continuous or intermittent tubing flow. A nitrogen-charged, multi-ply Monel® bellows provides the force necessary to maintain these valves in a normally closed position.

The J-40 and J-20 valves operate with either production or injection pressure. When used with the appropriate conventional mandrel and reverse-flow check valve, the J-40 and J-20 series valves can be used for either tubing or annular flow.

## Port sizes

The port sizes available for the 5/8-in [15.9-mm] OD J-50 valves are 1/8, 5/32, 13/64, and 1/4 in [3.2, 3.9, 5.1, and 6.4mm].

Port sizes are available for the 1-inch [25.4-mm] OD J-40 valves in 1/16-in [1.6-mm] increments from 1/8 to 3/8 in [3.2 to 9.5 mm].

Port sizes are available for the 1½-in [38.1-mm] OD J-20 valves in 1/16-in [1.6-mm] increments from 3/16 to 1/2 in [4.8 to 12.7 mm].

## Operation

In injection-pressure-operated gas lift applications, injection gas enters the valve and acts on the effective bellows area. As injection pressure overcomes the precharged nitrogen pressure in the bellows, the bellows is compressed and lifts the stem tip off the seat. Injection gas then flows through the seat, past the reverse-flow check valve, and into the production conduit.



J-40 valve.

# Conventional Injection-Pressure-Operated Valves

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## Conventional Injection-Pressure-Operated Valves

Type	OD, in [mm]	Connecting Thread, in - tpi	Reverse-Flow Check Valve	Mandrel
J-50	0.625 [15.9]	0.250 - 18 NPT	Integral	†
J-40	1.000 [25.4]	0.500 - 14 NPT	B-1	B, B deflector lug BR deflector lug
J-20	1.500 [38.1]	0.500 - 14 NPT	J-20	C Series

† Contact your Diamond representative.

# Camco Injection-Pressure-Operated Gas Lift Valves

Retrievable valves for tubing for annular flow in continuous or intermittent production

## APPLICATIONS

- Tubing or annular flow
- Continuous or intermittent production

## BENEFITS

- Uniform operation and extended run life
- Economical with operational versatility
- Increased reliability and efficiency

## FEATURES

- Field proven design
- Hydraulic forming process for the bellows
- Premium materials that work in a variety of applications
- Floating seats
- Guided valve-stem for precise alignment with the seat during operation
- Reverse-flow check valves to prevent backflow into the tubing annulus

Camco® injection-pressure-operated gas lift valves use nitrogen-charged, multi-ply MONEL® bellows to provide the force necessary to maintain the valves in the normally closed position. The bellows assembly includes a hydraulic dampening system, which uses silicon fluid to reduce the movement of the valve stem tip. This prevents destructive valve chatter and prolongs run life.

1-in [25.4-mm] OD BK, BK-1, BKT, and BKT-1 valves and 1½-in [38.1-mm] OD R-20-02 valves are available, featuring integral reverse-flow check valves.

These gas lift valves are installed in standard side-pocket mandrels for tubing flow and in specially ported sidepocket mandrels for annular flow.

## Port sizes

### 1-in [25.4-mm] OD valves

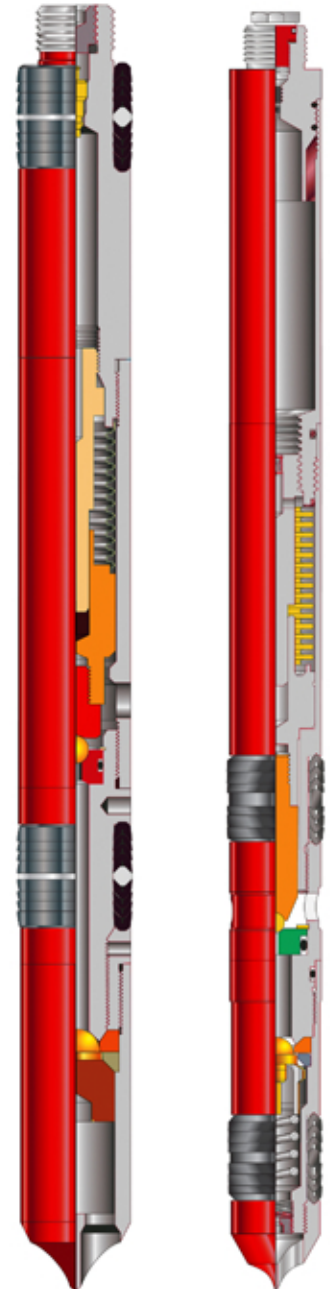
- Port sizes for BK valves are available in 1/16-in [1.6-mm] increments from 1/8 in to 5/16 in [3.2 mm to 7.9 mm].
- Port sizes for BK-1, BKT, and BKT-1 valves are available in 1/16-in [1.6-mm] increments from 1/8 in to 3/8 in [3.2 mm to 9.5 mm].

### 1½-in [38.1-mm] OD valves

- Port sizes for R-20-02 valves are available in 1/16-in [1.6-mm] increments from 1/8 in to 1/2 in [3.2 mm to 12.7 mm].

## Operation

The injection pressure necessary to compress the bellows of these gas lift valves is determined by the precharged nitrogen pressure in the bellows. Injection gas enters the valve and acts on the effective bellows area. As the injection gas pressure overcomes the precharged pressure, the bellows compresses and lifts the stem tip off the seat. Injection gas then flows through the seat, past the reverse-flow check valve, and into the production tubing.



BK series gas lift valve (left) and R-20-02 series gas lift valve (right).

# Camco Injection-Pressure-Operated Gas Lift Valves

## Camco Injection-Pressure-Operated Gas Lift Valves

Valve Type	Nominal OD in. [mm]	Latch	Running Tool	Pulling Tool	Mandrel Series
BK	1.000 [25.4]	BK series	JK	JDC	KBM, KBMM, KBMG, KBG
BK-1	1.000 [25.4]	Integral bottom	GA-2	JDC <sup>†</sup>	KBM, KBMM, KBMG, KBG
BKT	1.000 [25.4]	BK series	JK	JDC	KBM, KBMM, KBMG, KBG
BKT-1	1.000 [25.4]	Integral bottom	GA-2	JDC <sup>†</sup>	KBM, KBMM, KBMG, KBG
R-20-02	1.500 [38.1]	RA	JC-3	JDC	MMA
R-20-02	1.500 [38.1]	RK	RK-1	JDS	MMM, MMG, MMRG

<sup>†</sup>Use core extension with this pulling tool for integral bottom latch valves.

# Camco Pilot-Operated Gas Lift Valves

Slickline-retrievable valves for intermittent tubing flow production

## APPLICATIONS

- Intermittent tubing flow production

## BENEFITS

- Increased efficiency
- Uniform bellows operation

## FEATURES

- Small spread between the opening and closing casing pressures
- Large flow-area for high-volume gas injection applications
- Premium materials suitable for various environments
- Floating seats for versatile application and economical replacement
- Field-proven Camco® bellows in the pilot section
- Reverse-flow check valves to prevent backflow into the tubing annulus

Each Camco pilot-operated gas lift valve consists of a pilot section and a power section. A specially manufactured, nitrogen-charged, multi-ply MONEL® bellows provides the force necessary to maintain the pilot section in the normally closed position, while the power section uses an INCONEL® spring for the purpose. 1-in [25.4-mm] OD PK-1 valves and 1½-in [38.1-mm] OD RP-6 valves are available. The valves feature integral reverse-flow check valves and floating seats.

## Flow areas

The power section of the PK-1 valve has a flow area equivalent to a ⅜-in [9.5-mm] port. Port sizes for the pilot section are available in ⅛-in [1.6-mm] increments from ⅛ to ⅝ in [3.2 to 7.9 mm].

The power section of the RP-6 valve has a flow area equivalent to a ⅝-in [14.3-mm] port. Port sizes for the pilot section are available in ⅛-in [1.6-mm] increments from ¼ to ½ in [6.4 to 12.7 mm].

## Operation

The power section of the valve is either fully open or fully closed, as determined by the pilot section. Injection gas enters the pilot section of the valve and acts on the effective bellows area. As injection pressure overcomes the precharged nitrogen pressure in the bellows, the bellows is compressed and lifts the stem tip off the seat.

Injection gas then flows down past the seat and eventually overcomes the preset spring force of the power section. As the power section opens, a high volume of injection gas flows through the valve, past the reverse-flow check valve into the production tubing.



PK-1 gas lift valve.



# Camco Pilot-Operated Gas Lift Valves

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## Camco Pilot-Operated Gas Lift Valves

Valve Type	Nominal OD, in [mm]	Latch	Running Tool	Pulling Tool	Mandrel Series
PK-1	1.000 [25.4]	Integral bottom	GA-2	JDC†	KBM, KBMM, KBMG, KBG
RP-6	1.500 [38.1]	RA	JC-3	JDC	MMA
RP-6	1.500 [38.1]	RK	RK-1	JDS	MMM, MMG, MMRG

†Use core extension with this pulling tool for integral bottom latch valves.

# KBMM Series Side Pocket Mandrels

Single-pocket mandrels that accept 1-in [25.4-mm] OD side pocket devices

## APPLICATIONS

- Normal and corrosive service
- Heavyweight casing

## BENEFITS

- Precise alignment and insertion of side pocket devices, minimizing the opportunity for hang-up during slickline operations
- Optimized production with unique design features to facilitate operations

## FEATURES

- An orienting sleeve
- An integral discriminator and pocket
- Availability in a variety of materials

Camco® KBMM mandrels incorporate an integral, one-piece pocket and a tool discriminator that excludes larger slickline tools from the pocket area. An orienting sleeve provides for positive kickover tool alignment in highly deviated wells.

These mandrels are available in a variety of tubing connection sizes and incorporate all the standard design features of Camco side pocket mandrels.

KBMM mandrels have OD and ID configurations similar to the premium KBMG Series side pocket mandrels. The KBMM mandrels also have internal and external test pressure ratings equal to those of the KBMG mandrels of the same respective size and configuration. KBMM Series side pocket mandrels are available in a range of fully traceable materials and can be heat treated to comply with NACE specification MR0175 for stress-cracking resistant metallic materials.



*KBMM Series  
side pocket mandrel.*

# KBMM Series Side Pocket Mandrels

## KBMM Series Side Pocket Mandrel Specifications

Tubing Size, <sup>†</sup> in [mm]	Type <sup>†</sup>	Major OD, in [mm]	Minor OD, in [mm]	Internal Drift, in [mm]	Test Pressure Internal <sup>‡</sup>		Test Pressure External <sup>‡</sup>		Latch type	Kickover tool
					Normal Service, psi [kPa]	Corrosive Service, psi [kPa]	Normal Service, psi [kPa]	Corrosive Service, psi [kPa]		
2.375 [60.3]	KBMM-2	4.236 [107.6]	2.906 [73.8]	1.906 [48.4]	7,500 [51,713]	6,000 [41,369]	6,000 [51,711]	5,000 [34,475]	Integral, BK series, BEK-2, BEK-3	OK, TMP
2.875 [73.0]	KBMM-2	4.750 [120.7]	4.000 [101.6]	2.347 [59.6]	7,500 [51,713]	6,000 [41,369]	6,000 [41,369]	5,000 [34,475]	Integral, BK series, BEK-2, BEK-3	OK, TMP
3.500 [88.9]	KBMM-2	5.340 [135.6]	4.155 [105.5]	2.867 [72.8]	7,000 [48,265]	6,000 [41,369]	5,500 [37,923]	4,500 [31,028]	Integral, BK series, BEK-2, BEK-3	OK, TMP

<sup>†</sup>Additional sizes and pressure ratings are available upon request.

<sup>‡</sup>Test pressures listed are all for low-alloy steel, heat treated for normal corrosive conditions. These pressures may be reduced because of end connection limitations.

## KBMM Series Side Pocket Mandrel Accessories

Gas Lift Valve	Equalizing Dummy Valves	Dummy Valves	Shear Orifice Valves	Circulating Valves	Chemical Injection Valves
BK	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
BK-1	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
BKT	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
BKT-1	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
NOVA-10	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
BKR-5	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
BKF-12	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
PK-1	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
DK0-2	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
BK0-3	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2
OM-21R	EK, EK-1	E, DK-1	S02M-14R	CSK-1, BKFS	CM-40R, BKLK-2, BKCI-2

# KBMM-R Series Side Pocket Mandrels

Single-pocket mandrels that accept 1-in [25.4-mm] OD side pocket devices

## APPLICATIONS

- Gas lift production
- Chemical injection, waterflood, or circulation operations
- Single-string completions
- Sweet or sour service

## BENEFITS

- Higher pressure ratings than comparable oval side pocket mandrels
- Precise alignment and insertion of side pocket devices, minimizing the opportunity for hang-up during slickline operations
- Field-proven reliability

## FEATURES

- Positioning sleeve orientation system
- Machined tool discriminator that deflects large tools into the tubing bore
- Integral machined pocket
- Smooth internal and external shoulders
- Availability in a variety of materials

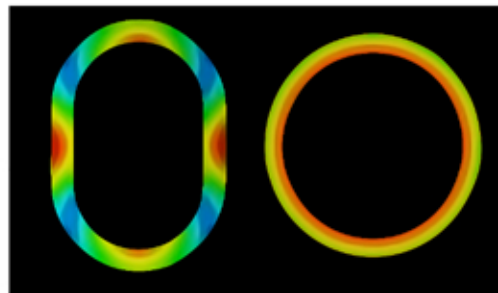
KBMM-R series side pocket mandrels from Camco gas lift and subsurface safety systems accept 1-in [25.4-mm] OD flow control devices and are made up as part of the tubing string when preparing a well for gas lift production, chemical injection, waterflood, or other special application. KBMM-R mandrels have a round body, which provides a strong, robust design with better, more uniform stress concentrations when compared to traditional oval-body mandrel designs. The KBMM-R mandrels are available in a variety of tubing sizes and connection thread types.

The KBMM-R mandrel also incorporates a new body and pocket window design, which reduces overall welding.

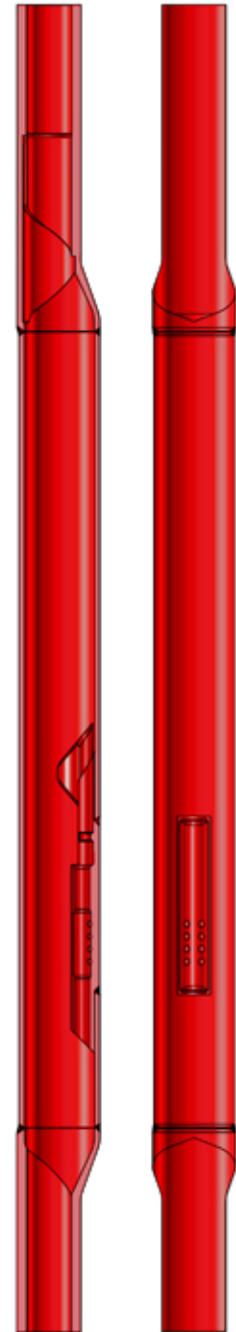
## Design

KBMM-R mandrels feature a one-piece pocket and a tool discriminator that keep larger slickline tools from entering the pocket area while guiding the smaller side pocket devices into the pocket. An orienting sleeve located in the mandrel's upper swage helps ensure precise alignment and operation of positive kickover tools in highly deviated wells.

Side pocket mandrels are manufactured from high-quality low-alloy steel, the metallurgical properties of which are closely controlled through rigid specifications. These mandrels are heat-treated for both sweet and sour (H<sub>2</sub>S) service, and conform to NACE standard MR0175 for sulfide-stress-cracking-resistant metallic materials.



*KBMM-R mandrels have a round body, which provides a strong, robust design with better, more uniform stress concentrations when compared to the traditional oval-body mandrel designs.*



*KBMM-R Series side pocket mandrel.*

# KBMM-R Series Side Pocket Mandrels

## Operation

Valves are assembled to the appropriate Camco systems BK series top latch and can be run under pressure by slickline methods into the

pocket of the mandrel. When the valve has been installed into the mandrel pocket, the latch locks under the latch lug, securing the valve in the pocket. In regular gas lift operations,

high-pressure injection gas is injected down the casing annulus. From the casing, gas enters the mandrel, flows through the valve and into the tubing, aiding fluid production.

## KBMM-R Series Side Pocket Mandrel Specifications

Tubing Size, in [cm]	Min ID, in [cm]	Drift ID, in [cm]	Major OD, in [cm]	Drift OD, in [cm]	Pressure Rating for Sour Service <sup>†</sup>		Pressure Rating for Standard Service <sup>†</sup>		Latch type	Kickover tool
					Internal, psi [kPa]	External, psi [kPa]	Internal, psi [kPa]	External, psi [kPa]		
2.375 [6.03]	1.924 [4.89]	1.901 [4.83]	4.236 [10.76]	4.369 [11.10]	6,000 [41,369]	6,000 [41,369]	7,500 [51,711]	7,000 [48,263]	Integral, BK-2 series	OK, TMP
2.875 [7.30]	2.366 [6.01]	2.347 [5.96]	4.750 [12.07]	4.887 [12.41]	7,000 [48,263]	6,000 [41,369]	8,000 [55,158]	7,000 [48,263]	Integral, BK-2 series	OK, TMP
3.500 [8.89]	2.915 [7.40]	2.867 [7.28]	5.390 [13.69]	5.550 [14.10]	7,000 [48,263]	5,100 [35,163]	8,300 [57,226]	6,000 [41,369]	Integral, BK-2 series	OK, TMP

<sup>†</sup>Pressure ratings listed are all for low-alloy steel which has been heat-treated for sour service (80,000 psi [552 MPa] yield) or standard service (95,000 psi [655 MPa] yield). These pressures may be reduced due to end connection limitations.

## KBMM-R Series Side Pocket Mandrel Accessories

Gas Lift Valve	Gas Lift Orifice	Dummy Valve	Equalizing Dummy	Shear Orifice	Circulating	Chemical Injection
BK	DKO-2	E	EK	SO2M	BKFS	CM-40R
BK-1	BKO-3	DK-1	EK-1		CSK-2	BKLC-2
BKF-12	OM-21R				SCS-10	BKCI-2
BKR-5	NOVA-10					
PK-1						
WFM-14R						

# NOVA Orifice Venturi Gas Lift Valves

Computer-generated flow profile to promote a constant flow gas-injection rate

## APPLICATIONS

- Continuous flow production

## BENEFITS

- Maximized efficiency, reduced costs, and improved productivity

## FEATURES

- Computer-generated flow profile
- Stabilized, lower injection pressure
- Simple, versatile, field-proven design

NOVA® orifice venturi gas lift valves feature a computer-generated flow profile that enables maximum gas passage with minimal differential across the valve. The NOVA valve flow regime virtually eliminates any effect of tubing pressure on the gas injection rate and stabilizes the gas injection pressure. Stable injection rates can result in more stable tubing pressure, increased production, and reduced operating expenses.

The NOVA valve series replaces conventional orifice valves that have inherently unstable injection rates because of the effect of tubing pressure. Even slight variations in the tubing flow regime can lead to wide fluctuations in the tubing pressure and result in unsteady injection rates, instability, and slugging.

Conventional flat-faced orifice valves require an approximately 40% pressure drop to achieve critical flow; in most cases, operating with such excessive pressure loss is not practical. NOVA orifice valves achieve critical flow with a pressure drop of 10% or less. Injection rates are constant when operating in the critical flow regime because the tubing pressure does not affect the injection volume.

Higher productivity and lower costs are achieved with innovative engineering, a field-proven design, and the same number of moving parts as a typical flat-faced gas lift orifice valve. In addition, NOVA series valves fit in any existing side-pocket mandrel.

## Operation

The NOVA valve uses an orifice venturi check valve for continuous flow operations. Injection fluid or gas enters through the entry ports and then flows through the orifice venturi. Injection pressure moves the check valve off the seat, allowing gas to enter the tubing. Reverse flow pushes the check valve closed, preventing tubing fluids and pressure from flowing back into the casing.

For injection of gas from the tubing to the casing annulus, the valve is installed in a mandrel with a type EC pocket, which has tubing ports between the sealbores in the mandrel pocket. Injection gas flows out the bottom of the valve, through the mandrel snorkel into the casing or tubing annulus.

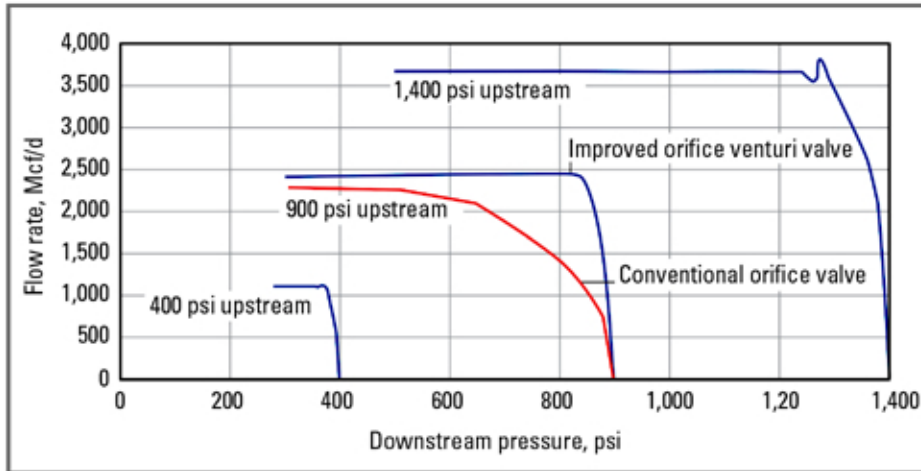


*NOVA orifice venturi gas lift valve.*

# NOVA Orifice Venturi Gas Lift Valves

## NOVA Orifice Venturi Gas Lift Valves

Valve Type	Nominal OD, in [mm]	Latch	Running Tool	Pulling Tool	Mandrel Series
NOVA-10	1.000 [25.4]	BK Series	JK	JDC	KBM, KBMM, KBMG, KBG
NOVA-15	1.500 [38.1]	RA	JC-3	JDC	MMA
NOVA-15	1.500 [38.1]	RK	RK-1	JDS	MMM, MMG, MMRG



*NOVA orifice venturi valves achieve critical flow with a pressure drop of 10% or less, while conventional orifice valves require an approximately 40% pressure drop.*