K-BOS

Kinetic Blowout Stopper

The Ultimate in Drilling Safety

- Electrically initiated, pyro-mechanical gate valve
- Shears and seals during well control
- Used in drilling, completions, and interventions
- Gives drillers the ability to secure the well at all times
- It's a true blowout "stopper," not just a "preventer"
- Can be retrofitted into existing BOP ram cavities

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KINETIC
PRESSURE CONTROL

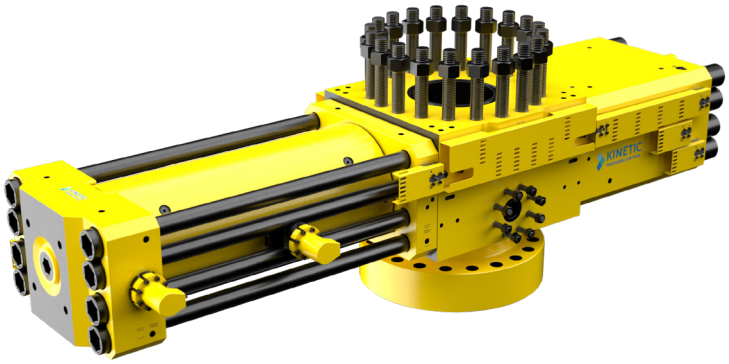
K-BOS

Kinetic Blowout Stopper

K-BOS ®: The Kinetic Blowout Stopper

The Kinetic Blowout Stopper, or K-BOS, is an electrically initiated, pyro-mechanical gate valve which performs the critical function of shearing and sealing during drilling, completions and intervention well control operations.

The K-BOS provides drillers with the ability to shear and secure the well at all times: it is the oil and gas industry's first true blowout "stopper" as opposed to a conventional blowout "preventer" or BOP. For surface and subsea applications, the K-BOS may be added into the BOP stack and in most cases, it may be retrofitted into existing BOP ram cavities.



18-15M K-BOS retrofit installed in Cameron TL BOP stack

Benefits & Value

- Shear anything / Eliminate un-shearables to fundamentally reduce the risk profile of drilling operations
- Reduce the likelihood of a blowout: The K-BOS is designed to shear and seal in less than 0.1 seconds at full flow and pressure. K-BOS shearing does not require hydraulics and provides subsequently functioned conventional BOP barriers with an increased likelihood of success
- Ultimate Reliability: Conditions Based Health Monitoring and No Planned Maintenance in 5-year recertification interval
- Protect the Environment and the Community: minimize release of toxic fluids to the environment following an unplanned Incident, especially in high H2S reservoirs, sensitive environments and in emergency response situations where capping the well is not practical or timely
- Enables optimization of DP MODU operations in shallow water and hazardous environments, improves blackout recovery, reduces the probability of an EDS, and allows for well designs with larger ID completions to enhance economics

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Specifications For Subsea Drilling & Completions

K-BOS® Specification	
Bore Size (in)	18-3/4”
Working Pressure (ksi)	15,000 psi
Working Temperature (F)	0F to 250F (NOTE: HPHT designs available)
Water Depth Rating (ft)	12,500 ft
Shut-in Time	< 1 second (milliseconds)
Reliability Standard	NOG 070
Applicable Standard Equivalence	DNVGL-OS-E101, API 16A PR2, NACE MR0175
Shearing and Sealing Capability	- All typical Drill Pipe and Work strings including Tool Joints including 6-5/8” 50# UD-165 - Up to 9.5” BHAs - Heavy Wall Casing up to 220# and 18” OD - Completions with control lines - Material grades up to MYS 165ksi - All typical WL, SL, eLine - Shearing Capability is indepen dent of MASP and water depth - Able to seal on full flow up to rated working pressure - Rated to shear and seal on rated tubulars moving up to 10m/s

18-15M K-BOS retrofit installed in HMH / Hydril Compact BOP stack

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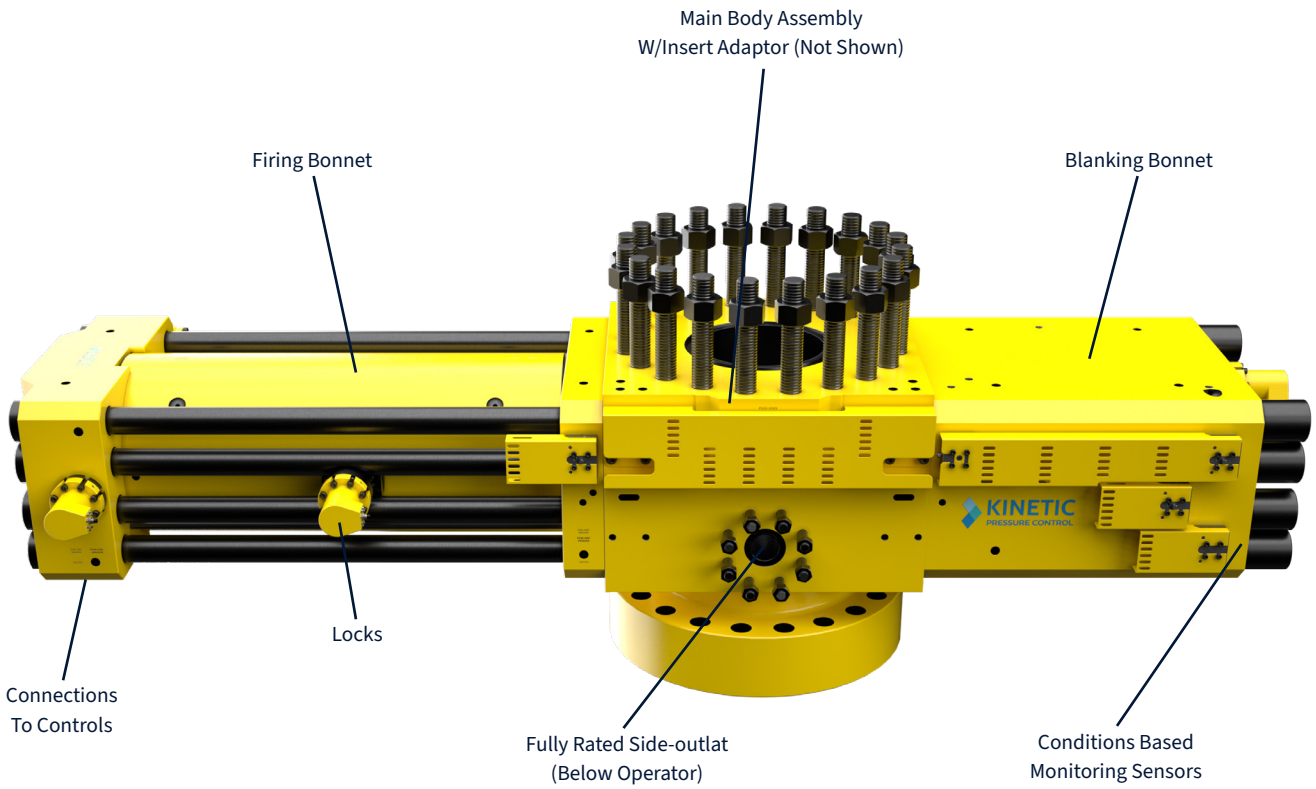
Specifications For Subsea Drilling & Completions

The K-BOS's working components, which are isolated from well-bore fluids inside hermetically sealed chambers, require no planned maintenance during 5 years of service. The primary K-BOS control system is completely independent of existing BOP controls, adding to system reliability, while allowing for full integration into existing Emergency Disconnect Sequence (EDS) modes, dead-man auto-shear (DMAS), and Emergency Hydraulic Back-up System (EHBS) functionality. The K-BOS uses conditions-based health monitoring to achieve the highest level of reliability compared to any well control equipment including configurations which meet the requirements for SIL3 per NOG-070/IEC61508

With the ability to eliminate unshearable and unsealable situations, and secure the well in milliseconds, the K-BOS represents a fundamental step change in drilling process safety and allows for conventional assumptions and limitations to be re-evaluated: potentially unlocking efficiency and cost savings. For example, removes the time required to consider tool string position within the BOP providing the ability to secure the well historically restricted to Moored units that require additional transit times between wells, additional support vessels and at times specialist rental equipment especially on complex SS developments.



18-15M K-BOS single body system

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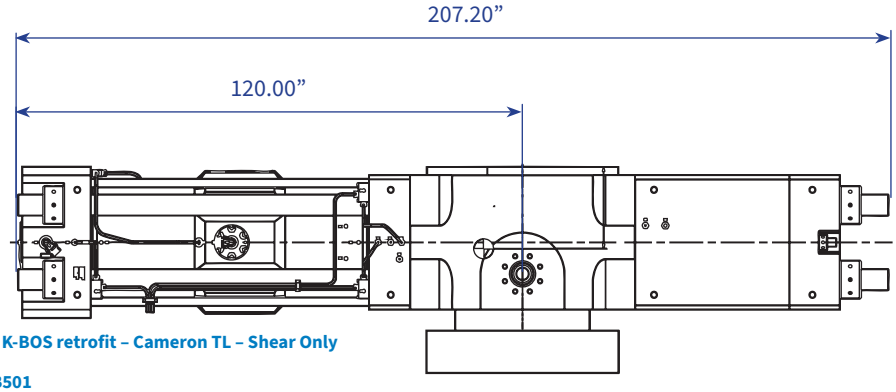
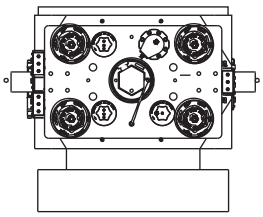
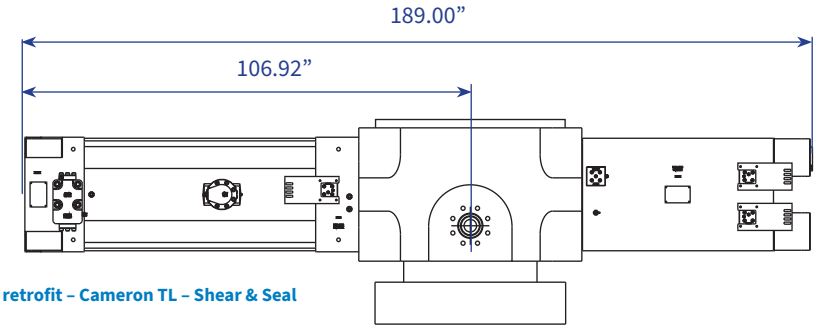
Technical Data

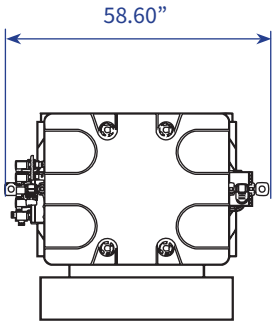




18-3/4” 15ksi K-BOS retrofit – Cameron TL – Shear Only

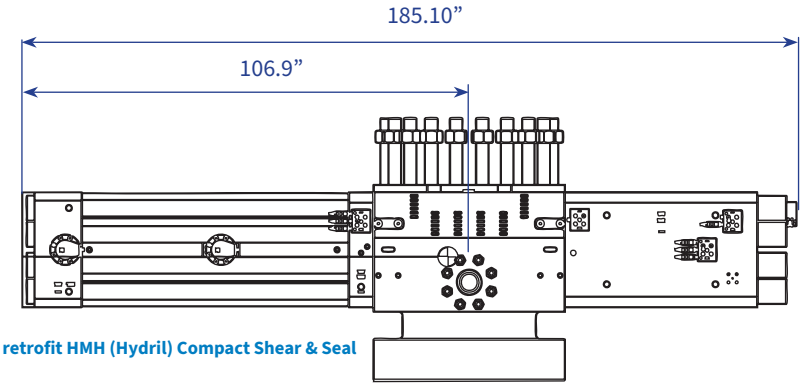
Model: KB18B501

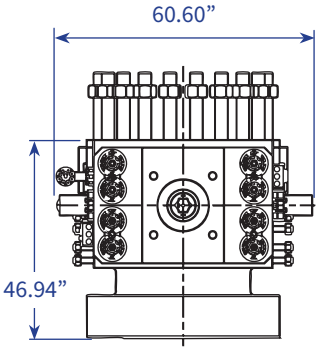




18-3/4” 15ksi K-BOS retrofit – Cameron TL – Shear & Seal

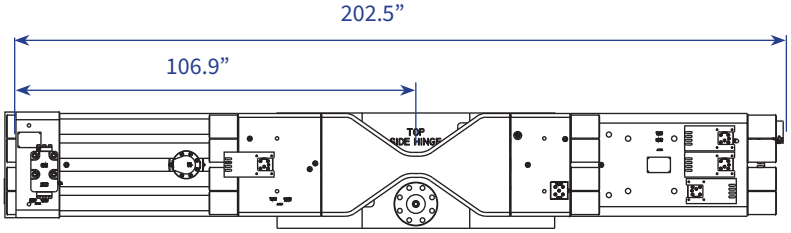
Model: KB18B502

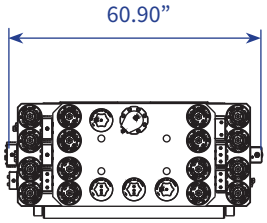




18-3/4” 15ksi K-BOS retrofit HMH (Hydril) Compact Shear & Seal

Model: KB18C501





18-3/4” 15ksi K-BOS retrofit – NOV NXT – Shear & Seal

Model: KB18D501

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18-15M K-BOS Shearing Capability

8.5” OD Tool Joint Landing String,
V150

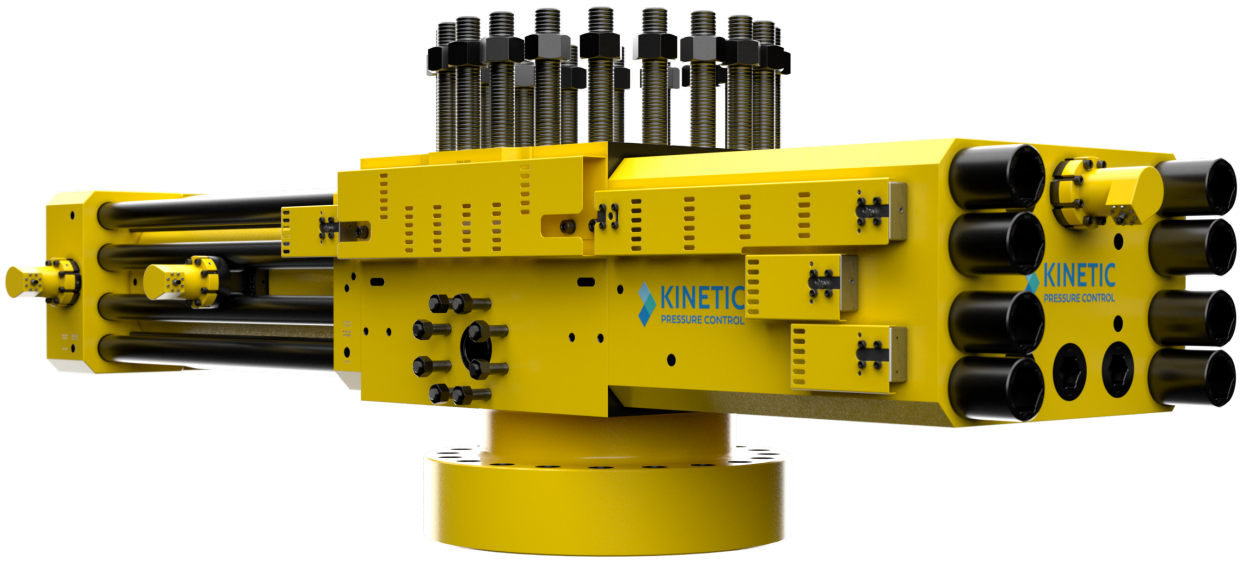
16” OD HP Casing, Q125 6-5/8” OD Inner String,
V150 Combined 186ppf

6.9” OD Slip Proof Landing String, V150
Side Load & Compression

18” OD Casing, P110 6-5/8” OD Inner String,
V150 Combined 167ppf

0.3125” Braided
E-Line / 0.125” Slick Line

9.5” OD Drill Collar
214ppf, MYS 120



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Shearing Capability Analysis (D&C)

Phase of Well Construction	% Time Across BOP	K-BOS ®	Regulatory Context
Drill / Work String	40-60%	100%	BSEE Regulations
Landing String (Incl. Slip Proof Area)		100%	
E-Line / Wireline / Slickline	20-30%	100%	
Tubing (Incl. Control Lines)		100%	
Test Tree Shear Sub		100%	
Upper Completions & Subsea Test Tree		100%	Process Safety / Well Integrity
Casing Incl Joints	10-20%	100%	
Casing w/ Inner String or Drill-in Liner		100%	
Tool Joints	4-7%	100%	
BHAs & Tools (Excluding Drill Bits & >16" OD Stabilizers)	2-5%	100%	
"Moving Pipe" Situations	<1%	100%	Well Control Situations
Under Compression		100%	
Under Side Load / Any Position in Wellbore		100%	
Full Flowing Conditions		100%	
DMAS / EDS		<<0.1s/~10s	

Color Legend: Shear & Seal

18-15M K-BOS shear test results on a 9.5" OD 120ksi MYS 214# Spiral Drill Collar

Integrity

Operational Excellence

Innovation

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