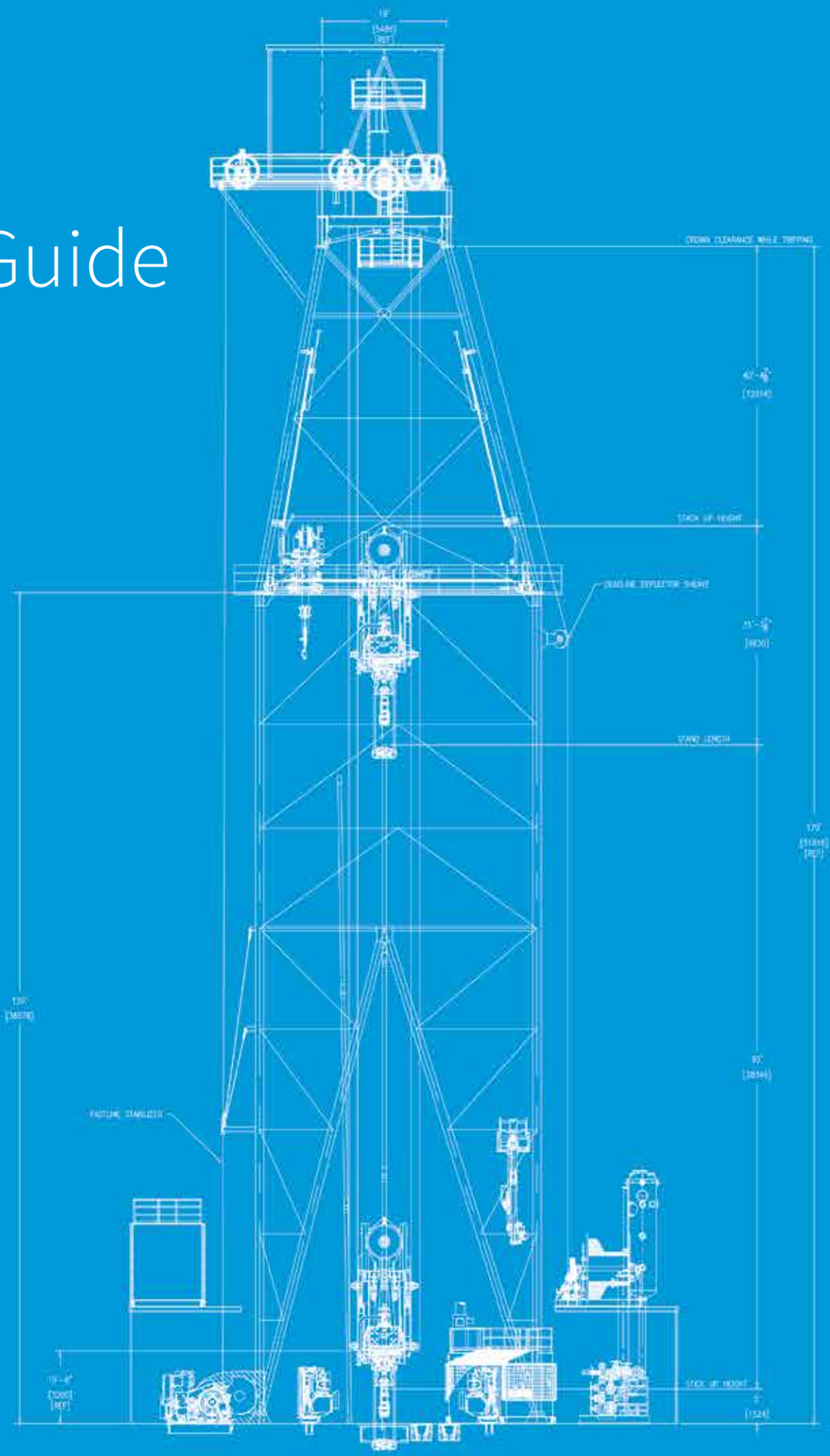
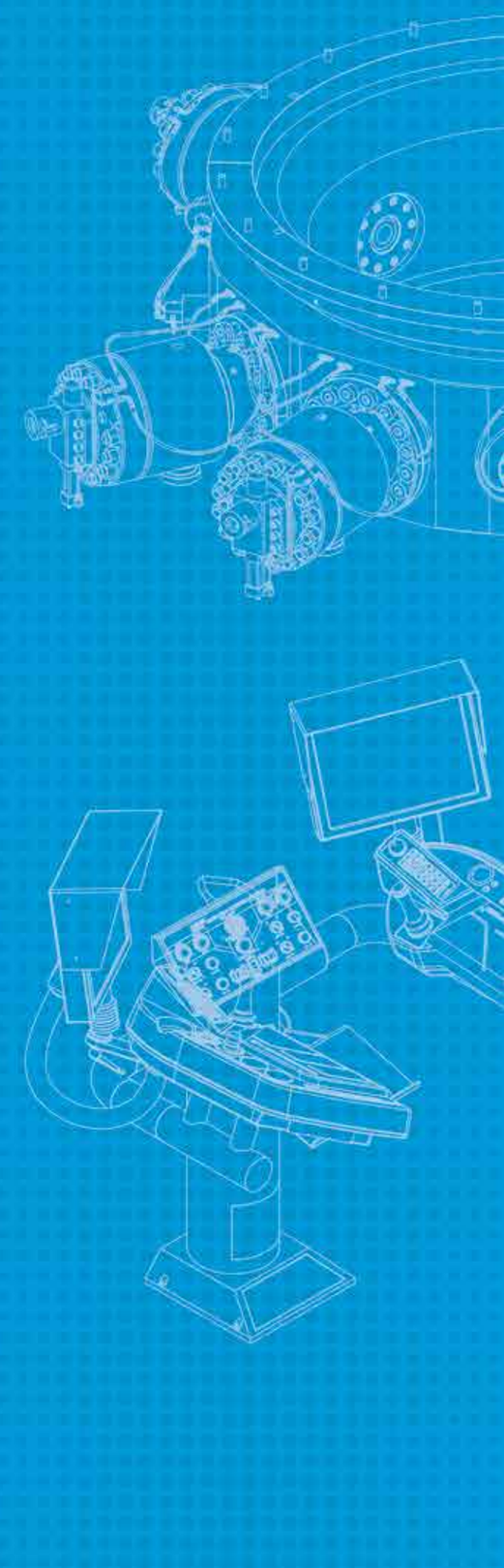
Product Reference Guide

Q2 2018





Rig Technologies

Offshore Technical Marketing

NOV Rig Technologies

rig@nov.com | www.nov.com

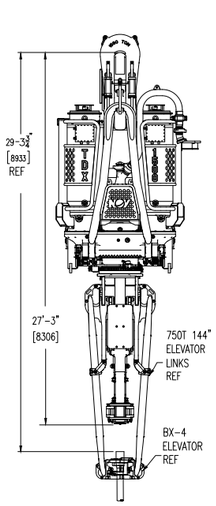
Drill Floor Equipment

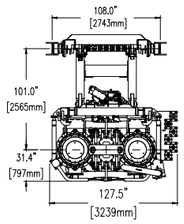
- Offshore Top Drives - sheet 1 & 2
- BX-Elevators - sheet 1 & 2
- X-series manual side door elevators
- Manual single joint elevators
- Elevator spider and FMS tool - sheet 1 & 2
- Power slips - sheet 1 & 2
- Rotary tables - sheet 1 & 2
- Iron Roughnecks - sheet 1 & 2
- Casing module CM 22 torque turn
- Casing running tools
- O-series hydraulic power units
- HE-series hydraulic power units
- Paralell racking system
- XY racking pipe handling
- HTV, VDM, PLS-5, PLS-7
- stabber arms
- Service access baskets
- UHT 1200 and drill floor manipulator arms
- Catwalk machines - tubular
- Catwalk machines - tubular & riser
- Mousehole MHH3
- Pipe handling cranes

NOV Rig Technologies

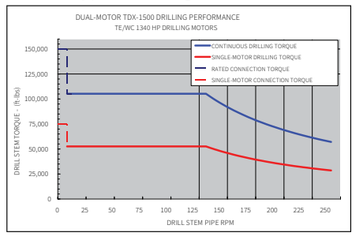
*For reference only, please contact your local sales contact for more information.

TDX-1500™





Typical Drilling Performance

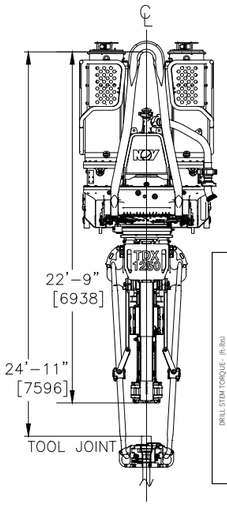


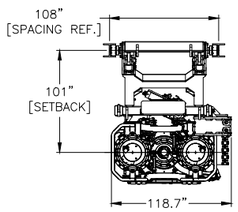
The TDX-1500 is the latest incarnation of NOV's successful TDX Top Drive product offering. Leveraging from the success of the TDX-1000 and TDX-1250 this unit is designed around the same key design principles. Safety, reliability, redundancy and modularity are at the core of the TDX-1500 design. The TDX-1500's compact design offers an industry-leading hoisting capacity of 1500t and handles the extreme demands required by the latest generation of ultra-deepwater and 20K ready drilling rigs.

Technical Specifications	
Motor Type	2x 1340 HP totally enclosed water cooled induction
Horsepower Rating	2680
Stack Up Height	29 ft top of elevator to block becket
Weight	132k lbs (TDX + retract dolly)
TRANSMISSION	
Gear Ratio	6:1:1 helical gears
DRILLING PARAMETERS	
Max Speed	270 rpm
Max Cont. Torque	105,000 ft-lbs
Speed @ Max Cont. Torque	131 rpm
Max Intermittent Torque	150,000 ft-lbs
Brake Static Capacity	105,000 ft-lbs
RATING CAPACITIES	
Hoisting	1,500 tons at elevators
Water Course	3¾ in
Washpipe Packing	Deublin mechanical seal 7,500 psi
Pipe Handler	PH-CLK
Breakout Torque Capacity	150,000 ft-lbs
Connection OD	4½-10 in
IBOP Pressure Rating	20,000 psi (1,379 bar)
Upper IBOP	20K dual ball, hydraulic remote operated
Lower IBOP	20K single ball, manually operated
Rotation/Orientation	360° proportional control w/ position feedback
OTHER	
Cooling System	Water cooled, externally supplied
Hydraulic Power	2500 psi, externally supplied
Temperature Range	-20C to 55C
Casing Running Tool Ready	Yes
Elevator Links	350T, 500T, 750T, 1000T, 1250T and 1500T

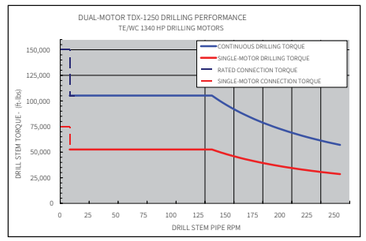
- 20,000 psi IBOP's
- 1500 ton hoist
- Bi-directional and redundant link tilt position feedback
- Dual ball hydraulically actuated IBOP
- 30 minute IBOP swap-out
- "Quik-Lok" tool joint locks
- Elevated loops, for improved drill floor visibility
- Water cooled 1340 hp AC induction motors
- "FlexFit" Link adapter (accepts 350-1500t standard links)
- "X-Clamp" 4 point pipe grabber
- Removable main shaft

TDX-1250™





Typical Drilling Performance

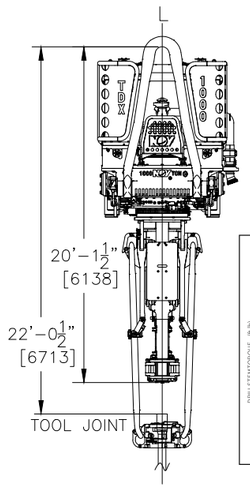


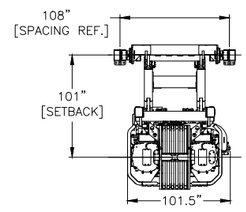
The TDX 1250 combining the best of the NOV leading top drive brands with new technology, the TDX includes high reliability systems like water cooled, flameproof motors with quick decouple drive connections, easily removable main shaft with a huge NC84 connection, and a massive 1,236 ton API main bearing in a wet-sump gearbox. These all add up to improved reliability and increased uptime. The TDX also brings many revolutionary innovations such as the "FlexFit" link.

Technical Specifications	
Motor Type	2x 1340 HP totally enclosed water cooled induction
Horsepower Rating	2680
Stack Up Height	26.5 ft
Weight	122k lbs (TDX + retract dolly)
TRANSMISSION	
Gear Ratio	6:1:1
DRILLING PARAMETERS	
Max Speed	270 rpm
Max Cont. Torque	105,000 ft-lbs
Speed @ Max Cont. Torque	131 rpm
Max Intermittent Torque	150,000 ft-lbs
Brake Static Capacity	105,000 ft-lbs
RATING CAPACITIES	
Hoisting	1,250 tons total
Water Course	3¾ in
Washpipe Packing	Deublin mechanical seal 7,500 psi
Pipe Handler	PH-150
Breakout Torque Capacity	150,000 ft-lbs
Connection OD	4½-10 in
IBOP Pressure Rating	15,000 psi (1,034bar)
Upper IBOP	15K dual ball, hydraulic remote operated
Lower IBOP	15K single ball, manually operated
Rotation/Orientation	360° proportional control w/ position feedback
OTHER	
Cooling System	Water cooled, externally supplied
Hydraulic Power	2500 psi, externally supplied
Temperature Range	-20C to 55C
Casing Running Tool Ready	Yes
Elevator Links	350T, 500T, 750T, 1000T or 1250T API

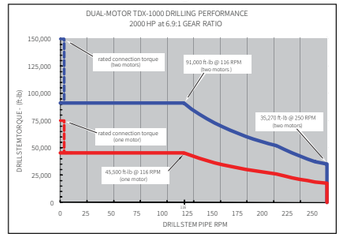
- Water cooled 1340 hp AC induction motors
- "FlexFit" Adapter (accepts 350-1250t standard links)
- "X-Clamp" 4-point pipe grabber
- Quick Removable main shaft (no need to open gear box)
- Low-noise System (83 dBA estimate)
- Modular construction / sub-assemblies
- "SwingClear" IBOP handling system
- Retrofitable in hi-spec rig pipe handling drill floors
- Short stack-up to minimize derrick height

TDX-1000™





Typical Drilling Performance

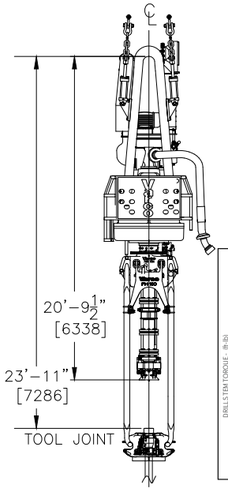


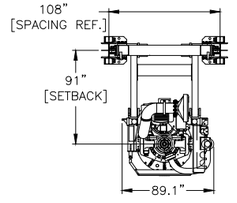
Smaller, lighter and more durable than its competition, the TDX 1000 retains all features of the TDX 1250. It can be incorporated into existing rigs without major modification and is suited for high specifications and new build projects. Its package size and integration ease works to economically enhance drilling performance of existing platforms. Features water cooled, flameproof motors with quick decouple drive connections, removable main shaft with a NC77 connection and a 1,074 ton API main bearing in a constant wet sump gearbox.

Technical Specifications	
Motor Type	2X 1150 HP totally enclosed water cooled permanent magnet
Horsepower Rating	2000
Stack Up Height	22 ft
Weight	85k lbs (TDX + retract dolly)
TRANSMISSION	
Gear Ratio	6:9:1
DRILLING PARAMETERS	
Max Speed	250 rpm
Max Cont. Torque	91,000 ft-lbs
Speed @ Max Cont. Torque	116 rpm
Max Intermittent Torque	150,000 ft-lbs
Brake Static Capacity	91,000 ft-lbs
RATING CAPACITIES	
Hoisting	1000 tons total
Water Course	3¾ in
Washpipe Packing	Deublin mechanical seal 7,500 psi
Pipe Handler	PH-203
Breakout Torque Capacity	150,000 ft-lbs
Connection OD	4½ -10 in
IBOP Pressure Rating	15,000 psi (1,034 bar)
Upper IBOP	15K dual ball, hydraulic remote operated
Lower IBOP	15K single ball, manually operated
Rotation/Orientation	360 ° proportional control w/ position feedback
OTHER	
Cooling System	Water cooled, externally supplied
Hydraulic Power	2500 psi, externally supplied
Temperature Range	-20C to 55C
Casing Running Tool Ready	Yes
Elevator Links	350T, 500T, 750T or 1,000 API

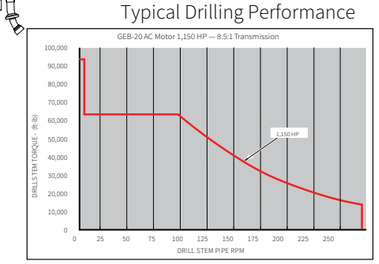
- Quiet Water cooled AC motors (induction optional)
- "X-Clamp" 4-point pipe grabber
- "SwingClear" IBOP handling system
- Short stack-up to minimize derrick height
- Dual Ball Upper IBOP
- Leveraging success of TDX-1250
- Maximum up-time
- Minimum size
- Simplified operation, maintenance and repair
- Modular features
- Superior performance

TDS-8SA™





Typical Drilling Performance



The TDS 8SA is the most renowned large top drive in the industry. The TDS 8SA has been in use for over 10 years and is suited for using as your fleet standard. It is the most prolific 750 ton top drive in service today with unmatched reliability, global support and service. This a multi-purpose tool that is ideal for semi-submersibles, jack-ups, and even large land applications. It can fit in over 95% of derricks in the world today.

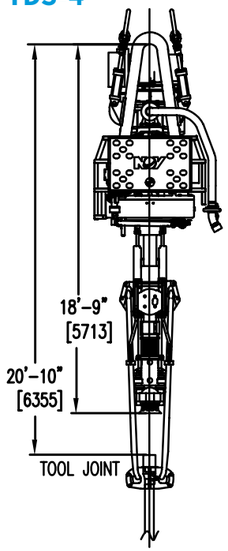
Technical Specifications	
Motor Type	GEB-20A1 AC Motor
Horsepower Rating	1,150
Stack Up Height	24 ft
Weight	38,000 lbs
TRANSMISSION	
Gear Ratio	8:5:2
DRILLING PARAMETERS	
Max Speed	271 rpm
Max Cont. Torque	62,250 ft-lbs
Speed @ Max Cont. Torque	95 rpm
Max Intermittent Torque	95,000 ft-lbs
Brake Static Capacity	67,400 ft-lbs
RATING CAPACITIES	
Hoisting	750 ton
Water Course	3¾ in
Washpipe Packing	5k or 7.5 k psi (Hammerless Option)
Pipe Handler	PH-101
Breakout Torque Capacity	96,000 ft-lbs
Connection OD	5-8½ in
IBOP Pressure Rating	15,000 psi (1,034 bar)
Upper IBOP	7⅝ in API Reg. RH Box (remote operated)
Lower IBOP	7⅝ in API Reg. RH Pin/Box(manual)
Rotation/Orientation	360° /Unlimited
OTHER	
Cooling System	Local Blower
Hydraulic Power	HPU Required
Temperature Range	-20C to 55C
Casing Running Tool Ready	Yes
Elevator Links	350T, 500T or 750T API

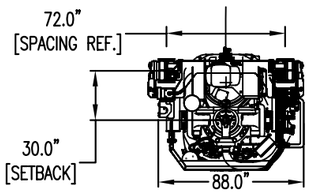
- Compact package, great power
- Reliable system, very rugged and robust
- Multiple configurations and uses
- 24 ft stack up height
- Low weight
- Compatible with NOV Deublin and conventional washpipes
- Highest value toll of its class in the market today

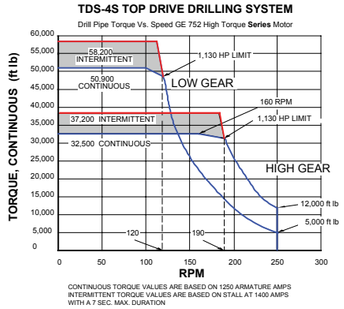
Offshore Top Drives - Sheet 2 of 2

*For reference only, please contact your local sales contact for more information.

TDS-4™





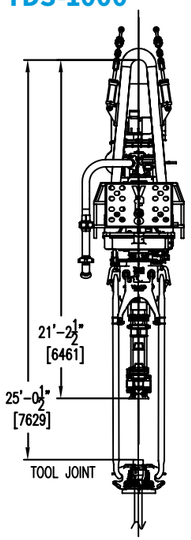


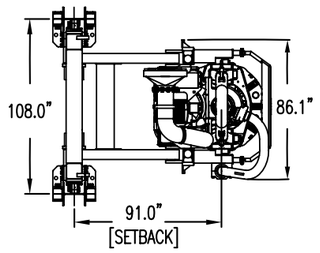
The TDS-4S is our prime large bore DC top drive. It has built its reputation by performing will in the heavy drilling environments found offshore. This 750 ton top drive has been in service and operation since 1988 and over 350 units have been in service since that time. Although considered a mature product, its high demand in the top drive market today is a tribute to its robust and reliable reputation built on years of drilling experience.

Technical Specifications	
Motor Type	GE 752 Hi-Torque Series/Shunt DC
Horsepower Rating	1 x 1,100 HP
Stack Up Height	20.8 ft (6,339 mm)
Weight	32,000 lbs (14,514 kg)
TRANSMISSION	
Gear Ratio	Low: 7.95:1, High 5.08:1
DRILLING PARAMETERS	
Max Speed	Low: 120 RPM, High 205 RPM
Max Cont. Torque	45,500 ft-lb (61,689 N-m) in low gear
Speed @ Max Cont. Torque	120 RPM
Max Intermittent Torque	85,000 ft-lb (115,244 N-m)
Brake Static Capacity	34,000 ft-lb (46,097 N-m)
RATING CAPACITIES	
Hoisting	750 ton (680,388kg)
Water Course	3.82 in. (97mm)
Washpipe Packing	5,000 psi or 7,500 psi (344 or 517 bar)
Pipe Handler	PH-85
Breakout Torque Capacity	85,000 ft-lb (115,244 N-m)
Connection OD	3 1/2 in. - 6 5/8 in. 4 in. - 8 1/2 in.
IBOP Pressure Rating	15,000 psi (1,034 bar)
Upper IBOP	7 5/8 in API Reg. RH Box (remote operated)
Lower IBOP	8 5/8 in API Reg. RH Box (remote operated)
Rotation/Orientation	360 degrees unlimited
OTHER	
Cooling System	Local or remote
Hydraulic Power	HPU required
Temperature Range	-20C to 55C
Casing Running Tool Ready	Yes
Elevator Links	300, 500, or 700 ton API

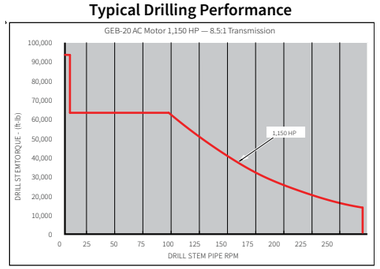
- High performance series or shunt single motor design
- Incorporates the high torque and speed performance needed in deep water drilling

TDS-1000™





Typical Drilling Performance

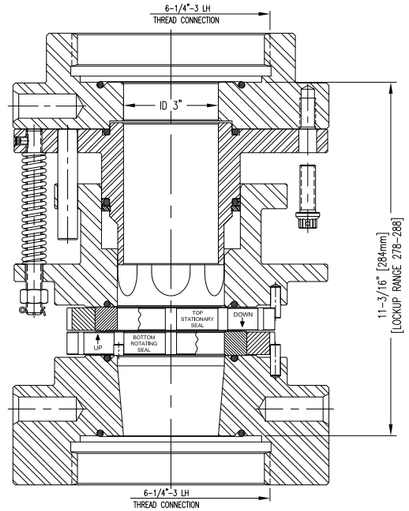


Developed for use in deep drilling applications, the TDS-1000 provides an intermittent torque output of 96,000 ft-lbs to make and break even the highest torque connections. Because of the broad speed and torque range provided by the AC motor, this performance is obtained using a single-speed gear box. The TDS-1000 Top Drive is driven by a Variable Frequency Drive (VFD) control system for a greater range of torque and speed performance.

Technical Specifications	
Motor Type	GE AC Induction Motor
Horsepower Rating	1 x 1,150 HP
Stack Up Height	24 ft (7,315 mm)
Weight	40,000 lb (18,143kg)
TRANSMISSION	
Gear Ratio	8.5:1
DRILLING PARAMETERS	
Max Speed	270 RPM
Max Cont. Torque	62,250 ft-lb (84,399 N-m)
Speed @ Max Cont. Torque	95 RPM
Max Intermittent Torque	103,000 ft-lb (139,649 N-m)
Brake Static Capacity	76,000 ft-lb (103,042 N-m)
RATING CAPACITIES	
Hoisting	1,000 ton (907,184 kg)
Water Course	3.82 in (97 mm)
Washpipe Packing	5,000 psi or 7,500 psi (344 or 517 bar) (hammerless option)
Pipe Handler	PH-100
Breakout Torque Capacity	103,000 ft-lb (139,649 N-m)
Connection OD	3 1/2 in. - 6-5/8 in. 4 in. - 8 1/2 in.
IBOP Pressure Rating	15,000 psi (1,034 bar)
Upper IBOP	7-5/8 in. API Reg. RH Box (remote operated)
Lower IBOP	7-5/8 in. API Reg. RH Pin/Box (manual)
Rotation/Orientation	360 degrees/Unlimited
OTHER	
Cooling System	Local Blower
Hydraulic Power	HPU Required
Temperature Range	-20C to 45C
Casing Running Tool Ready	Yes
Elevator Links	350, 500, 750, or 1000 ton API

- Integrated swivel and link tilt system
- Remote and manual IBOP valves
- Back-up type pipe handler for making and breaking connections (including upper and lower IBOP connections)
- Guide dolly for reacting drilling torque

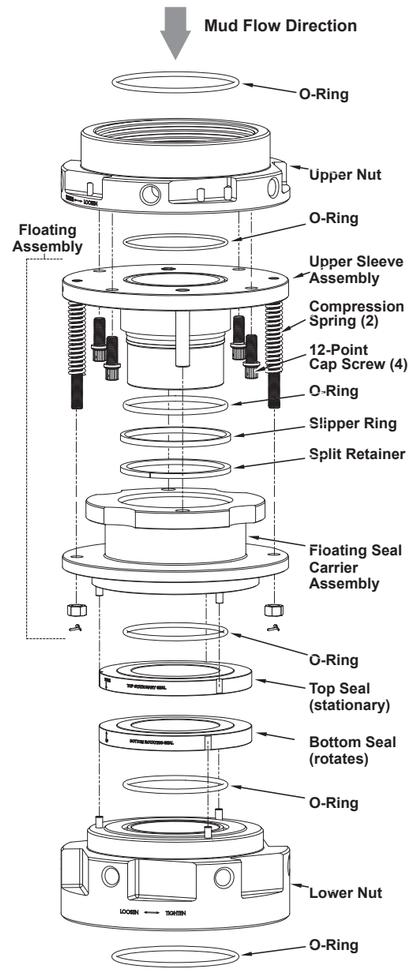
Mechanical Seal Washpipe



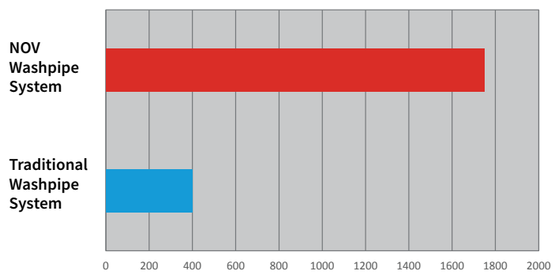
The NOV Washpipe System is a patented design that utilizes a set of proprietary ultra-hard mechanical face seals to provide superior life. The ongoing challenge to solve high pressure, high temperature washpipe life has finally been met with this robust and innovative design. These durable maintenance-free seals can be changed out in 10 minutes or less without removing the upper and lower nuts and with only a single-hand wrench. This advantage vastly improves seal change-out time and increases crew safety. The system works on most major brand top drives with no special modifications. The key value to the washpipe system is the confidence to keep drilling. Success with hundreds of units operating in many of the high pressure, high temperature wells across the world has proven the washpipe system to be the answer to premature washpipe failures.

- Extreme long-life service
- Simple mechanical seal design
- Seals change in minutes with single, standard hand tool
- Small and large-bore top drive application
- No maintenance required
- Fewer and lighter components for change-out (10 lbs vs. 120 lbs)
- Reduces risk of dropped objects
- Significant reduction in man-riding events
- Eliminates use of a sledge hammer

Technical Specifications	
Pressure Rating	7500 PSI
Bore size compatibility	3 in & 4 in ID
Top Drive Compatibility	TDX, TDS, IDS, PS, PS2 & HPS
ACCEPTABLE END-FLOAT AND RUN OUTS	
Mainshaft end float:	
TDS and TDX series	0.003" maximum
PS and HPS series	0.030" maximum
Mainshaft face run-out	0.002" maximum
Stationary face run-out	0.006" maximum
Radial run-out	0.020" maximum



Washpipe Life Comparison



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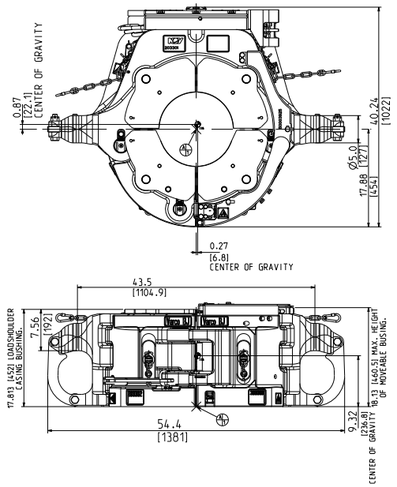
BX3™

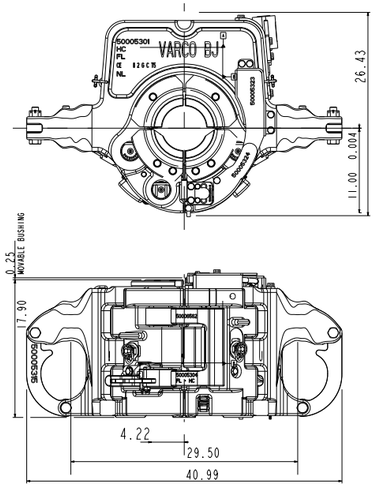


The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- One door bushing is spring loaded with linkage connecting it to a lockin pin
- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (stand-alone control panel or driller)
Dimension LxWxH	40.24" x 54.40" x 18.06"
Weight	2,445 lbs
Tubular types	Casing, drill collar (plain)
Tubular size range (slips)	9⅝" to 20"
Changing slips	Manually
Load rating	Up to 350 sTon
Power down force	N/A
Req. pressure	2,000 - 2,500 psi (hydraulic)
Flow rate	5 to 7 gpm
Ambient temp. range	-4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
BX-closed signal confirmation	Yes
Link size	2¼", 3½"
Use of rotator	Yes
API	8C
CE	Yes
ATEX	Yes

BX4-35™

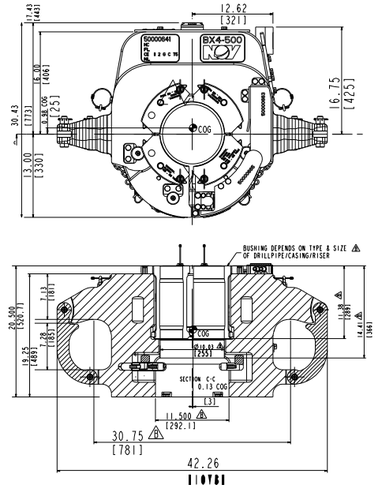


The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (stand-alone control panel or driller)
Dimension LxWxH	26.43" x 40.99" x 17.90"
Weight	1,600 lbs
Tubular types	Drill pipe, casing, drill collar (plain & zip lift), tubing, square shoulder, riser
Tubular size range (slips)	2⅜" to 7¼"
Changing slips	Manually
Load rating	Up to 350 sTon
Power down force	N/A
Req. Pressure	2,000 - 2,500 psi (hydraulic)
Flow rate	5 to 7 gpm
Ambient temp. range	-4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
BX-closed signal confirmation	Yes
Link size	2¼", 3½"
Use of rotator	Yes
API	8C
CE	Yes
ATEX	Yes

BX4-50™

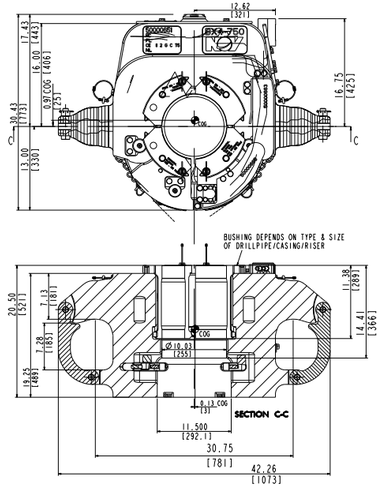


The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- One door bushing is spring loaded with linkage connecting it to a locking pin
- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (stand-alone control panel or driller)
Dimension LxWxH	30.43" x 42.26" x 20.50"
Weight	2,278 lbs
Tubular types	Drill pipe, casing, drill collar (plain & zip lift), tubing, square shoulder, riser
Tubular size range (slips)	2⅜" to 9¾"
Changing slips	Manually
Load rating	Up to 500 sTon
Power down force	N/A
Req. pressure	2,000 - 2,500 psi (hydraulic)
Flow rate	5 to 7 gpm
Ambient temp. range	-4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
BX-closed signal confirmation	Yes
Link size	2¾", 4¾"
Use of rotator	Yes
API	8C
CE	Yes
ATEX	Yes

BX4-75™

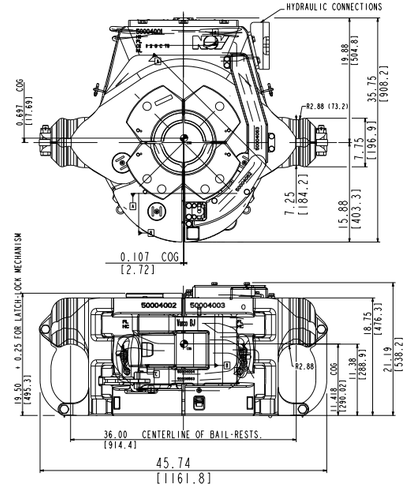


The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- One door bushing is spring loaded with linkage connecting it to a locking pin
- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (stand-alone control panel or driller)
Dimension LxWxH	30.43" x 42.26" x 20.50"
Weight	2,292 lbs
Tubular types	Drill pipe, casing, drill collar (plain & zip lift), tubing, square shoulder, riser
Tubular size range (slips)	2⅜" to 9¾"
Changing slips	Manually
Load rating	Up to 750 sTon
Power down force	N/A
Req. pressure	2,000 - 2,500 psi (hydraulic)
Flow rate	5 to 7 gpm
Ambient temp. range	-4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
BX-closed signal confirmation	Yes
Link size	3½", 4¾"
Use of rotator	Yes
API	8C
CE	Yes
ATEX	Yes

BX5™



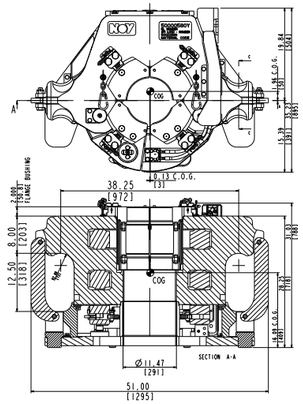
The BX 3, 4, and 5 elevators improve both rig safety and efficiency. Since the introduction of the BX 1 and 2 elevators in 1996, our engineers have continuously strived to improve the operations reliability and safety of its design, resulting in the present BX 3, 4, and 5 design.

- One door bushing is spring loaded with linkage connecting it to a locking pin
- Rotator for easier handling
- Hydraulically actuated elevator
- Hydraulic cylinders
- Quick and easy change of changeable bushings
- Trigger mechanism

Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (stand-alone control panel or driller)
Dimension LxWxH	35.67" x 48.0" x 26.45"
Weight	3,586 lbs
Tubular types	Drill pipe, casing, drill collar (plain & zip lift), tubing, square shoulder, riser
Tubular size range (slips)	3½" to 11"
Changing slips	Manually
Load rating	Up to 1,000 sTon
Power down force	N/A
Req. pressure	2,000 - 2,500 psi (hydraulic)
Flow rate	5 to 7 gpm
Ambient temp. range	4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
BX-closed signal confirmation	Yes
Link size	4¾", 5½"
Use of rotator	Yes
API	8C
CE	Yes
ATEX	Yes

*For reference only, please contact your local sales contact for more information.

BX7™

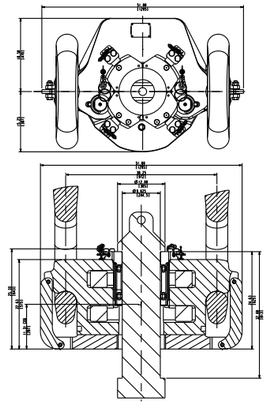


Construction of deepwater and ultra-deepwater drilling rigs created demand for equipment with a greater capacity. The BX7 has a rating of 1,000 short tons for drill pipe and landing strings, and 1,250 short tons for riser handling and square shouldered couplings.

- Body, doors and latch of the elevator are forged to provide more homogeneous properties with increased impact so load resistance is obtained
- Double rotator for easier handling.Hydraulically actuated elevator
- Elevator provides a signal which can be used for interlocking
- BX7 operates with standard BX controls
- Changeable bushings
- Trigger mechanism

Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (stand-alone control panel or driller)
Dimension LxWxH	35.23" x 51.0" x 31.0"
Weight	4,951 lbs
Tubular types	Drill pipe, casing, drill collar (plain), tubing, square shoulder, riser
Tubular size range (slips)	4" to 9⅝"
Changing slips	Manually
Load rating	Up to 1,250 sTon
Power down force	N/A
Req. pressure	2,000 - 2,500 psi (hydraulic)
Flow rate	5 to 7 gpm
Ambient temp. range	-4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
BX-closed signal confirmation	Yes
Link size	5½" (1,000 sTon), 5½" (1,250 sTon)
Use of rotator	Yes (double)
API	8C
CE	Yes
ATEX	Yes

SBX™

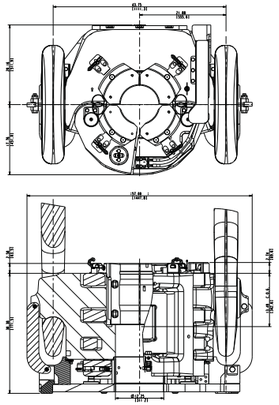


Construction of deepwater and ultra-deepwater drilling rigs created demand for equipment with a greater capacity. The SBX is a manual operated single door solid body elevator. It has a rating of 1,250 short tons for riser handling with square shouldered couplings/45° tool joints.

- Body, doors and latch of the elevator are forged to provide more homogenous properties with increased impact so load resistance is obtained
- Double rotator for easier handling
- Changeable bushings

Technical specifications	
Actuation	Manually
Control system	N/A
Dimension LxWxH	33.75" x 51.0" x 25.33"
Weight	4,575 lbs
Tubular types	Riser
Tubular size range (slips)	8" to 9⅝"
Changing slips	Manually
Load rating	Up to 1,250 sTon
Power down force	N/A
Req. pressure	N/A
Flow rate	N/A
Ambient temp. range	-4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	No
Greasing	Hand
BX-closed signal confirmation	No
Link size	5½" (1,000 sTon), 5½" (1,250 sTon)
Use of rotator	Yes (double)
API	8C
CE	Yes
ATEX	Yes

BX9™

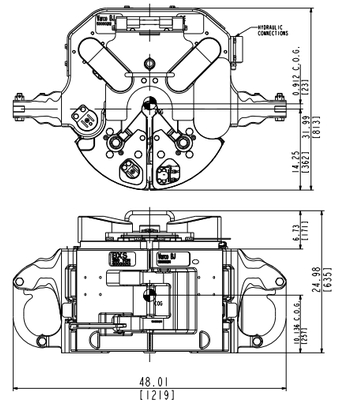


Construction of deepwater and ultra-deepwater drilling rigs created demand for equipment with a greater capacity. The BX9 has a rating of 750-1,250 sTon for 18° shoulder, 750-1,500 sTon for 90° (square) shoulder and 1,250-1,500 sTon for riser handling and 45° shouldered couplings.

- Body, doors and latch of the elevator are forged to provide more homogeneous properties with increased impact so load resistance is obtained
- Double rotator for easier handling. Hydraulically actuated elevator
- Elevator provides a signal which can be used for interlocking
- BX9 operates with standard BX controls
- Changeable bushings
- Trigger mechanism

Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (stand-alone control panel or driller)
Dimension LxWxH	37.92" x 57.0" x 32.88"
Weight	6,605 lbs
Tubular types	Drill pipe, casing, 45° shoulder, landing string, square shoulder, riser
Tubular size range (slips)	5" to 10¾"
Changing slips	Manually
Load rating	Up to 1,500 sTon
Power down force	N/A
Req. pressure	2,000 - 2,500 psi (hydraulic)
Flow rate	5 to 7 gpm
Ambient temp. range	-4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
BX-closed signal confirmation	Yes
Link size	5¾" (1,000/1,250 sTon), 6" (1,500 sTon)
Use of rotator	Yes
API	8C
CE	Yes
ATEX	Yes

BXS™



The BXS allows a safe way to run a small upset and special clearance tubulars with the new BXS elevator. This tool enables rigs to handle flush or near flush tubulars without manual intervention. The BXS provides reliable operation and is suitable for use with the FMS 275 Flush Mounted Slip.

- Hydraulically powered, remote controlled elevator which supports hands-off operation
- BXS comes equipped with an automated “slip set” function, or the slip down function can be operator controlled when using the optional BX Hook-up kit
- Simplified hydraulic system provides reliable operation
- Redundant “slip set” signals provide positive feedback to the driller that the elevators are set on the pipe
- Internal springs are incorporated into the BX design for raising the slips, which result in minimal “power-up” force

Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (stand-alone control panel or driller)
Dimension LxWxH	31.99" x 48.01" x 24.98"
Weight	2,974 lbs
Tubular types	Pipe w/no to very small external upset or load shoulders
Tubular size range (slips)	2⅜" to 7⅝"
Changing slips	Manually
Load rating	350 sTon
Power down force	15,000 lbs
Req. pressure	2,000 - 2,500 psi (hydraulic)
Flow rate	5 to 7 gpm
Ambient temp. range	-4°F up to 131°F (-20°C up to +55°C)
Req. crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
BX-closed signal confirmation	Yes
Link size	2¼", 3½"
Use of rotator	Yes
API	8C
CE	Yes
ATEX	Yes

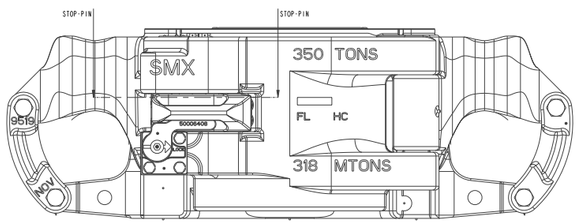
X-Series Manual Side Door Elevators

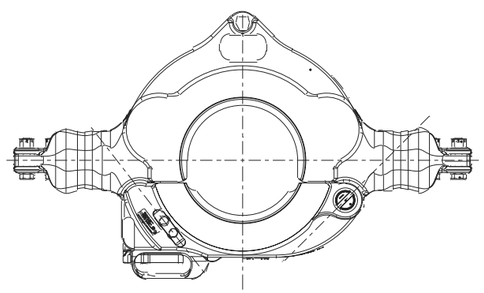
*For reference only, please contact your local sales contact for more information.

SMX

The X-series elevators handle all sizes of collar-type tubing, drill pipe and casing. The SMX has a patented latch & lock arrangement mounted on the elevator door. The handle protects the latch from accidental opening. Both latched operate from a single handle.

- 8C qualified
- For handling collar type casing, collary type tubing, and drill collars
- Tool is fit for manual operation
- Lock and unlock one-hand operation
- Latching/locking by closing door
- Latched and locked verification; separate action and incorporated in design
- Round ears for easy rotating in links
- Easy to rig up
- Hinge up bushings
- Lower link ears are 8C rated for 5 ton slings
- Handling grup on elevator back for easy handling
- Handling handle for link mount is avilable (part number 50006435); (optional; can also be used for other applications)
- SMX series (8 frames) replaces SLX, SSD and SX type elevators (15 frames)



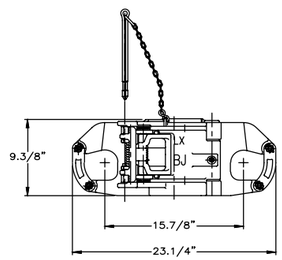


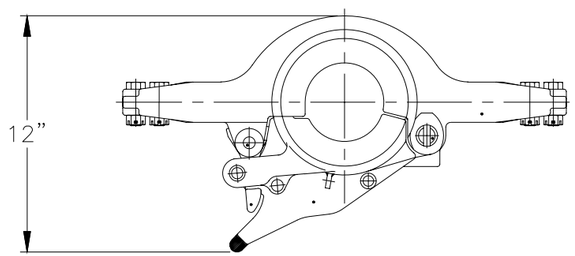
Technical Specfications				
Load Rating	Size inches (mm)	Max. Weight lbs. (kg)	Link Size Min. In. (mm)	Link Size Max. In. (mm)
150 / 136	3.1/2 - 5.3/4 (88.9-146.1)	278 (126)	2.1/4 (57)	2.3/4(70)
250 / 227	6 - 13 (152.4-330.2)	563 (255)	2.1/4(57)	3.1/2(89)
350 / 318	9- 13.3/8(228.6- 339.7)	563 (255)	2.1/4(57)	3.1/2(89)
250 / 227	13.1/2 - 17.7/8(342.9-454.1)	679 (308)	2.1/4(57)	3.1/2(89)
250 / 227	18 - 24.1/2 (457.2-622.3)	902 (409)	2.1/4(57)	3.1/2(89)

SLX

The X-series elevators handle all sizes of collar-type tubing, drill pipe and casing. The SMX has a patented latch & lock arrangement mounted on the elevator door. The handle protects the latch from accidental opening. Both latched operate from a single handle.

- 8C qualified
- For handling collar type casing, collary type tubing, and drill collars
- Tool is fit for manual operation
- Lock and unlock one-hand operation
- Latching/locking by closing door
- Latched and locked verification; separate action and incorporated in design
- Round ears for easy rotating in links
- Easy to rig up
- Hinge up bushings
- Lower link ears are 8C rated for 5 ton slings
- Handling grup on elevator back for easy handling
- Handling handle for link mount is avilable (part number 50006435); (optional; can also be used for other applications)
- SMX series (8 frames) replaces SLX, SSD and SX type elevators (15 frames)



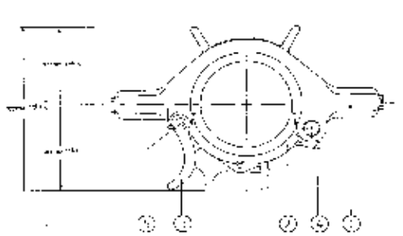


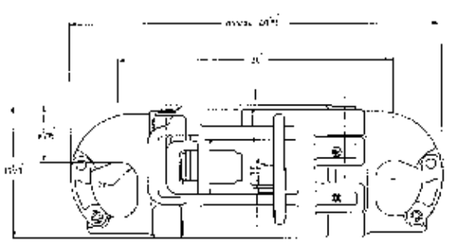
Technical Specifications				
Load Rating	Size inches (mm)	Max. Weight lbs. (kg)	Link Size Min. In. (mm)	Link Size Max. In. (mm)
65/59	1.66 - 3.1/8 (42.2-79.4)	50 (23)	1.3/4 (44)	2.1/4 (57)
100/90	2.3/8- 6 (60.3-152.4)	145 (66)	1.3/4 (44)	2.3/4(70)
150 / 136	5.1/2 - 18.5/8 (139.7-473.1)	705 (320)	1.3/4 (44)	3.1/2 (89)
250 / 227	21.1/2-24.1/2 (546.1-622.3)	1208 (548)	1.3/4 (44)	3.1/2 (89)

SX

The X-series elevators handle all sizes of collar-type tubing, drill pipe and casing. The SMX has a patented latch & lock arrangement mounted on the elevator door. The handle protects the latch from accidental opening. Both latched operate from a single handle.

- 8C qualified
- For handling collar type casing, collary type tubing, and drill collars
- Tool is fit for manual operation
- Lock and unlock one-hand operation
- Latching/locking by closing door
- Latched and locked verification; separate action and incorporated in design
- Round ears for easy rotating in links
- Easy to rig up
- Hinge up bushings
- Lower link ears are 8C rated for 5 ton slings
- Handling grup on elevator back for easy handling
- Handling handle for link mount is avilable (part number 50006435); (optional; can also be used for other applications)
- SMX series (8 frames) replaces SLX, SSD and SX type elevators (15 frames)



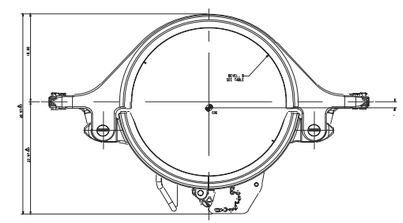


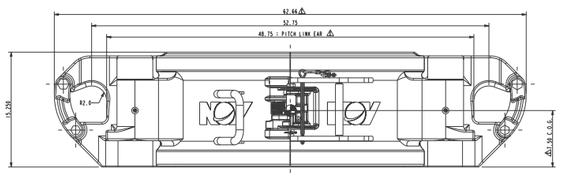
Technical Specifications				
Load Rating	Size inches (mm)	Max. Weight lbs. (kg)	Link Size min in. (mm)	Link Size Max. in. (mm)
350/317	9.5/8- 16.3/4 (244.5-425.5	1200 (544)	2.1/4(57)	3.1/2 (89)
500/454	9.5/8-13.5/8 (244.5-346.1	1235(560)	2.3/4(70)	3.1/2(89)

SLX-DD

The X-series elevators handle all sizes of collar-type tubing, drill pipe and casing. The SMX has a patented latch & lock arrangement mounted on the elevator door. The handle protects the latch from accidental opening. Both latched operate from a single handle.

- 8C qualified
- For handling collar type casing, collary type tubing, and drill collars
- Tool is fit for manual operation
- Lock and unlock one-hand operation
- Latching/locking by closing door
- Latched and locked verification; separate action and incorporated in design
- Round ears for easy rotating in links
- Easy to rig up
- Hinge up bushings
- Lower link ears are 8C rated for 5 ton slings
- Handling grup on elevator back for easy handling
- Handling handle for link mount is avilable (part number 50006435); (optional; can also be used for other applications)
- SMX series (8 frames) replaces SLX, SSD and SX type elevators (15 frames)



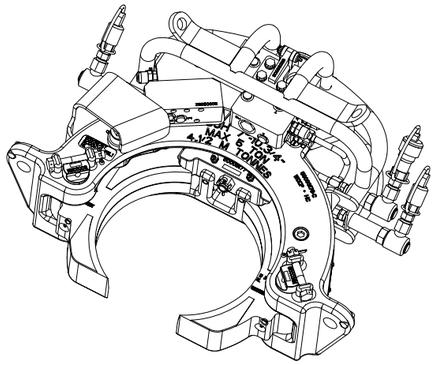


Technical Specifications				
Load Rating	Size inches (mm)	Max. Weight lbs. (kg)	Link Size min in. (mm)	Link Size Max. in. (mm)
220/225	18-30 (457.2-792)	1820 (826)	1.3/4(44)	3.1/2 (89)

Manual Single Joint Elevators

*For reference only, please contact your local sales contact for more information.

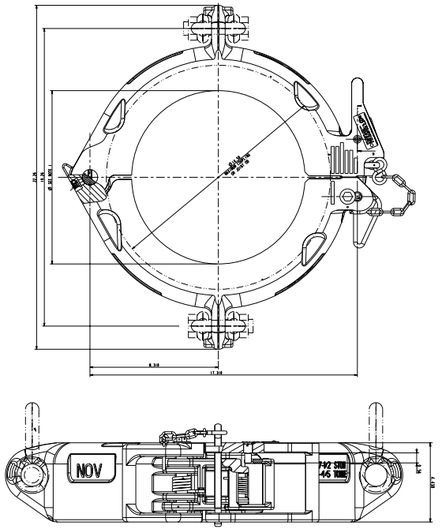
SJH



The SJH horizontal pick up elevator is designed to pick up tubulars lying flat on a surface without having to lift the tubulars prior to closing the elevator. The elevator is capable of lift ing drill pipe, recessed/zip lift drill collars and casing. It will handle single joints of pipe straight from cantilever to off -line stand building systems.

Load Rating (sTon/ Tonne)	Size inches (mm)	Pipe type	Appr. weight (lbs/kg) (incl jaws)
5 / 4.5	2.3/8 – 4.1/2 (60.3-114.3)	Tbg & Dp	100 / 45
5 / 4.5	4.1/2 – 7.5/8 (114.3-193.7)	Tbg & Dp	111 / 51
5 / 4.5	7 – 10.3/4 (177.8-273.1)	Csg	132 / 60

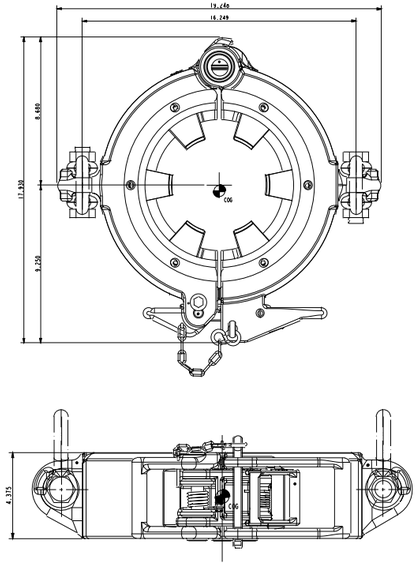
SJL



SJL and SPL single-joint, center-latch elevators are designed to replace unsafe rope slings for hoisting collar-type pipe into position. The SJL 90° elevator enables the crew to handle pipe properly, help avoid damage to pipe threads and reduce the chances of accident or injury. The SPL elevator is the same as the SJL elevator except that the SPL elevator is designed for use on tapered pipe, conforming to API specifications for extreme line casing.

Load Rating (sTon/ Tonne)	Size Range inches (mm)	Max. Weight Range lbs. (kg.)
5 / 4.5	2.7/8- 13.1/2 (60.3 - 114.3)	45-342.9 (20-55)
7.5/ 6.8	12.7/8 – 30 (355.6 - 762)	121-404 (55-183.3)

SPL



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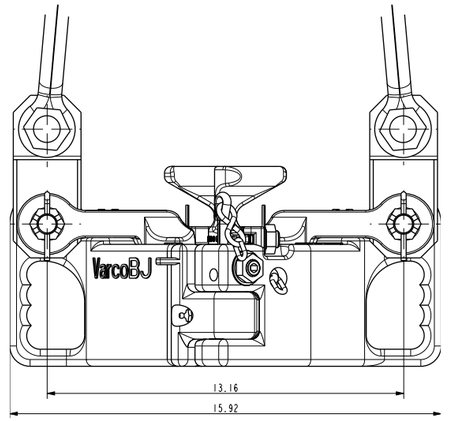
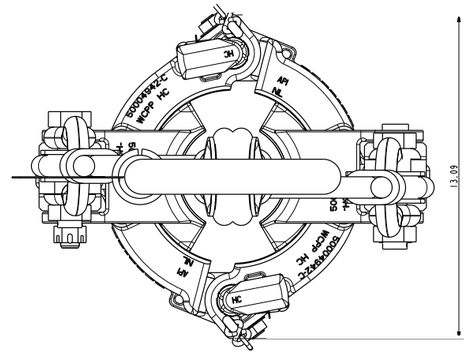
Type	Load Rating (sTon/ Tonne)	Size Range inches (mm)	Max. Weight Range lbs. (kg.)
SPL 5	5 / 4.5	2.7/8- 7.5/8 (60.3 - 114.3)	77-108 (35-49)
SPL 12	5 / 4.5	2.3/8-5 (60.3-127)	86 (39)
SPL 18	5 / 4.5	2.3/8-6.5/8 (60.3-168.3)	79-94 (36-49)

DSJX Heavy Duty



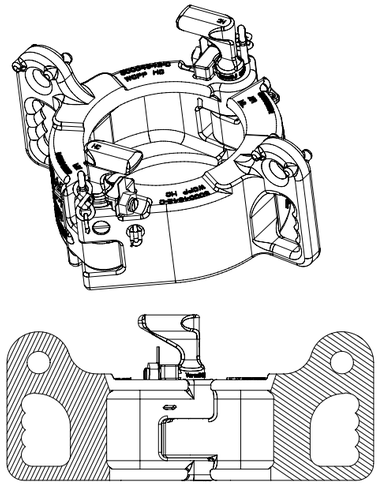


The D-SJX is the heavy duty version of the SJX, capable of handling doubles and triples up to 12 STon / 10.9 Tonne.

- High capacity single joint - 12 sTons (106 kN) API rating
- DSJX is designed for running doubles or triples during off-line standbuilding
- DSJX used special inserts to handle a range of pipe types
- Elevator can handle drill pipe and square shoulder pipe

Load Rating (sTon/Tonne)	Size Range Inches (mm)	Max. Weight Range lbs. (kg.)
12/11	3.1/2-7.1/2 (88.9-190.5)	79-89 (36-40)

SJX



The SJX single joint elevator is designed for running single joints of tubing and casing from V-door to well center. It is double hinged for use with the CRT Casing Running Tool, or any other stabberless operation. Ergonomically designed handles with cast on stop pins prevent the lifting sling shackles from pinching hands. Suitable for loads up to 5 sTon / 4.5 Tonne.

- Designed for pick-up and running single joints of tubing and casing from v-door to well center
- 2-way access due to double hinge pin arrangement
- Double hinged for use with CRT Casing Running Tool
- No loose parts, as hinge pins are contained within the body halves
- Clear visual gripping points for safe operation
- Ergonomically deisnged handles, with cast on stop pins, prevent the lifting sling shackles from pinching hands and prevent shackles from getting stuck underneath the casing coupling while hoisting.
- The positon of lifting ears prevents lifting tubing and casing with the SJX upside down.
- Verification "latched-and-locked" safety pin
- Lightweight for easy manual handling; on the average, 45% lighter than other single joints
- Designed and qualified accoring to API 8C rules
- Rubular sizes from 2 3/8'' to 14''; information on larger sizes is avialable upon request
- Rating of 5 tons

Load Rating (sTon/ Tonne)	Size Range Inches (mm)	Max. Weight Range lbs. (kg.)	Max. Weight Range (kg.)
5/4.5	4.1/2-10.3/4 (100.8-323.9)	37-67 (17-30)	17-30

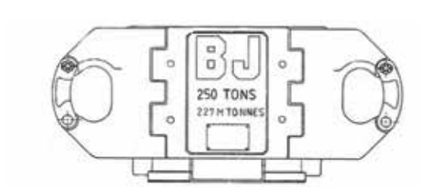
Elevator/Spider and FMS Flush Mounted Slips - sheet 1 of 2

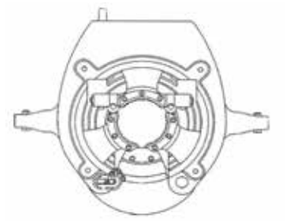
*For reference only, please contact your local sales contact for more information.

Pipe size range for each model

	BJ-TYPE		VARCO SL TYPE					FMS STYLE	
PIPE SIZE	250 t 7⅝"	350 t 13⅜"	500 t 14"	750 t 14"	500 t 24½"	750 t 24½"	1000 t 24½"	250 t 7⅝"	500 t 14"
2⅜"	■							■	
2⅞"	■							■	
3½"	■							■	
4"	■							■	
4½"	■	■	■					■	■
5"	■	■	■					■	■
5½"	■	■	■					■	■
5¾"		■						■	
6		■						■	
6⅝"	■	■	■	■				■	■
7	■	■	■	■				■	■
7⅝"	■	■	■	■				■	■
7¾"			■	■					■
8⅝"		■	■	■					■
8¾"			■	■					■
9⅝"		■	■	■					■
9¾"			■	■					■
9⅞"			■	■					■
10"			■						■
10¾"		■	■	■					■
10⅞"			■	■					■
11¾"		■	■	■					■
11⅞"			■	■					■
12"			■						■
12¾"		■	■						■
13⅜"		■	■	■					■
13½"			■	■					■
13⅝"			■	■					■
13¾"			■	■					■
14"			■	■					■
16"					■	■	■		
17"					■	■	■		
18"					■	■	■		
18⅝"					■	■	■		
20"					■	■	■		
22"					■	■	■		
24"					■	■	■		
24½"					■	■	■		

BJ-250



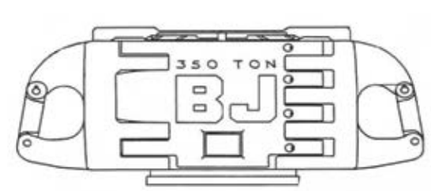


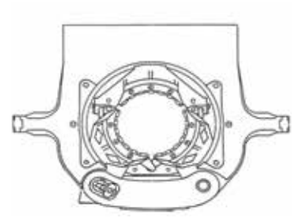
Description

The BJ-250 elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The 250 sTon model is designed for medium to long strings of smaller casing. The main body of these units can be dressed as a casing elevator or as a spider. The upper unit is dressed as an elevator, using a bottom guide and a bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering the casing. The unitized design of the slip assembly allows the tool to grip casing with uniform circumferential pressure, ensuring a safe hold while minimizing the possibility to damage the pipe. The unit is either manual or air operated. A double hinged door permits the unit to be rapidly installed on the casing or removed.

Technical specifications	
Weight without slip assembly (lbs/kg)	2,043 / 927
Max weight slips set w/inserts (lbs/kg)	550 / 250
Casing size ranges (inches)	2⅜ up to 7⅝
Load rating (sTon/Tonne)	250 / 226
Normal operating pressure (psi/kPa)	85 / 585
Max. operating pressure (psi/kPa)	125 / 861
Min. allowed ambient temperature	-4°F / -20°C
Max. allowed ambient temperature	131°F / 55°C

BJ-350



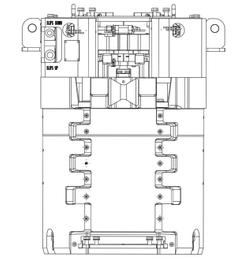


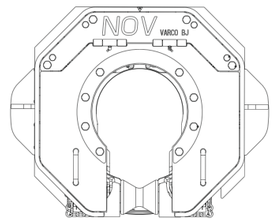
Description

The BJ-350 elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The main body of these units can be dressed as a casing elevator or a spider. The upper unit is dressed as an elevator, using a bottom guide and a bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering the casing. The unitized design of the slip assembly allows the tool to grip casing with uniform circumferential pressure, ensuring a safe hold while minimizing the possibility to damage the pipe. The unit is either manual or air operated. A double hinged door permits the unit to be rapidly installed on the casing or removed.

Technical specifications	
Weight without slip assembly (lbs/kg)	3,500 / 1,587
Max weight slips set w/inserts (lbs/kg)	650 / 295
Casing size ranges (inches)	4½ up to 13⅜
Load rating (sTon/Tonne)	350 / 317
Normal operating pressure (psi/kPa)	85 / 585
Max. operating pressure (psi/kPa)	125 / 861
Min. allowed ambient temperature	-4°F / -20°C
Max. allowed ambient temperature	131°F / 55°C

FMS275



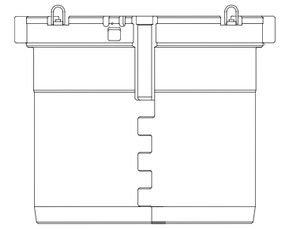


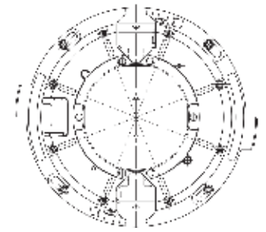
Description

The FMS275 is a hydraulic operated near-flush mounted slip for running completion strings eliminating the need for scaffolding. It enables rigs to handle completion strings and casing up to 7⅝" in diameter with large umbilicals or control lines. The unit is a companion tool to the "BJ" style 250 sTon elevator/spider. The slip power down force generated allows the FMS to take the torque reaction of the tong when the string weight is not sufficient to resist rotating, and it eliminates the need for a manual tong. The powered down slips allow the first joint of casing to be run with the FMS. The replaceable slip and insert carriers are set/raised by the operator using remote controls.

Technical specifications	
Weight without slip assembly (lbs/kg)	2,755 / 1,250
Weight FMS with slips and guides (lbs/kg)	3,300 / 1,497
Pipe size ranges (inches)	2⅜ up to 7⅝
Load rating (sTon/Tonne)	250 / 226
Rotary size (inches)	27.5 (or reduced from 37.5)
Min. inlet pressure (psi/kPa)	1,500 / 10,342
Normal operating pressure (psi/kPa)	2,000 / 13,790
Max. operating pressure (psi/kPa)	2,500 / 17,237
Recommended inlet pressure slips up (psi/kPa)	500 - 750 / 3,447 - 5,171
Max pressure slips up (psi/kPa)	1,000 / 6,895
Min. pressure differential between pressure line and return line (psi/kPa)	200 / 1,378
Max allowed pressure in return line (psi/kPa)	200 / 1,378
Applied max. back-up torque @ 2,500 psi / 17,237 kPa (ft/lbs/Nm)	14,370 / 19,483

FMS375





Description

The FMS375 is mounted flush with the rig floor, allowing the casing connection height to be lowered 1 meter (3 ft.), thus eliminating the need for scaffolding. This gives the rig crew more room to work by removing the spider body from the top of the rig floor. The unit is designed to fit standard 37" rotary tables and can be used in combination with the 500 sTon 14" Varco type elevator spider. The slip power down force generated allows the FMS to take the torque reaction of the tong when the string weight is not sufficient to resist rotating, and it eliminates the need for a manual tong. The powered down slips allow the first joint of casing to be run with the FMS. The replaceable slip and insert carriers are set/raised by the operator using remote controls.

Technical specifications	
Weight without slip assembly (lbs/kg)	5,392 / 2,446
Weight FMS with slips and guides (lbs/kg)	6,992 / 3,171
Pipe size ranges (inches)	4½ up to 14
Load rating (sTon/Tonne)	500 / 454
Rotary size (inches)	37.5
Min. inlet pressure (psi/kPa)	1,500 / 10,342
Normal operating pressure (psi/kPa)	2,000 / 13,790
Max. operating pressure (psi/kPa)	2,500 / 17,237
Recommended inlet pressure slips up (psi/kPa)	500 - 750 / 3,447 - 5,171
Max pressure slips up (psi/kPa)	1,000 / 6,895
Min. pressure differential between pressure line and return line (psi/kPa)	200 / 1,378
Max allowed pressure in return line (psi/kPa)	200 / 1,378
Applied max. back-up torque @ 2,500 psi / 17,237 kPa (ft/lbs/Nm)	40,000 / 54,232

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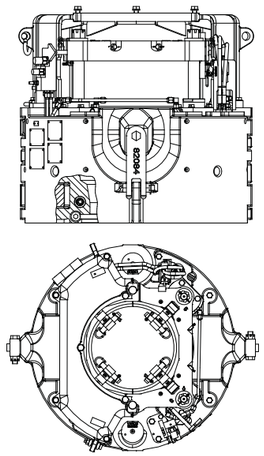
Elevator/Spider and FMS Flush Mounted Slips - sheet 2 of 2

*For reference only, please contact your local sales contact for more information.

Varco-500 14"

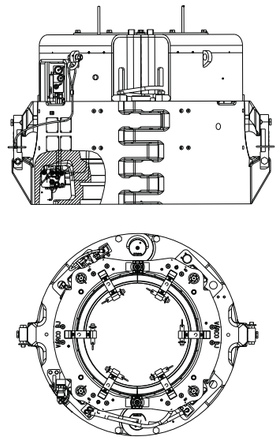


Description

The elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The main body of these units can be dressed as a casing elevator or as a spider. The upper unit is dressed as an elevator, using a bottom guide and bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering casing.

Technical specifications	
Max weight slips set w/inserts (lbs/kg)	600 / 272
Load rating (sTon /Tonne)	500 / 454
Casing size range (inches)	4½ up to 14
MANUAL & PNEUMATIC ELEVATORS	
Weight without slip assembly (lbs/kg)	5,000 / 2,268
Normal operating pressure (psi/kPa)	85 / 585
Max. operating pressure (psi/kPa)	125 / 861
HYDRAULIC ELEVATORS	
Weight without slip assembly (lbs/kg)	5,392 / 2,446
Min. inlet pressure (psi/kPa)	1,500 / 10,342
Normal operating pressure (psi/kPa)	2,000 / 13,790
Max. inlet pressure (psi/kpa)	2,500 / 17,237
Recommended inlet pressure slips up (psi/kPa)	500 - 750 / 3,447 - 5,171
Max. pressure slips up (psi/kPa)	1,000 / 6,895
Max. pressure slips down (psi/kPa)	2,500 / 13,790
Min. pressure differential between pressure line and return line (psi/kPa)	200 / 1,378
Max. allowed pressure in return line (psi/kPa)	200 / 1,378

Varco-500 24½"

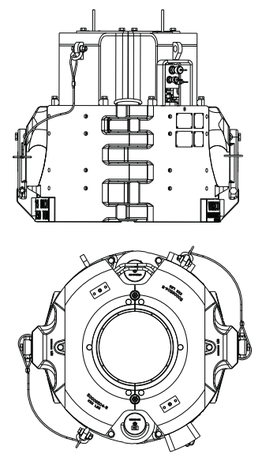


Description

The elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The main body of these units can be dressed as a casing elevator or as a spider. The upper unit is dressed as an elevator, using a bottom guide and bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering casing.

Technical specifications	
Max weight slips set w/inserts (lbs/kg)	600 / 272
Load rating (sTon /Tonne)	500 / 454
Casing size range (inches)	16 up to 24½
MANUAL & PNEUMATIC ELEVATORS	
Weight without slip assembly (lbs/kg)	7,950 / 3,606
Normal operating pressure (psi/kPa)	85 / 585
Max. operating pressure (psi/kPa)	125 / 861
HYDRAULIC ELEVATORS	
Weight without slip assembly (lbs/kg)	9,500 / 4,275
Min. inlet pressure (psi/kPa)	1,500 / 10,342
Normal operating pressure (psi/kPa)	2,000 / 13,790
Max. inlet pressure (psi/kpa)	2,500 / 17,237
Recommended inlet pressure slips up (psi/kPa)	500 - 750 / 3,447 - 5,171
Max. pressure slips up (psi/kPa)	1,000 / 6,895
Max. pressure slips down (psi/kPa)	2,500 / 13,790
Min. pressure differential between pressure line and return line (psi/kPa)	200 / 1,378
Max. allowed pressure in return line (psi/kPa)	200 / 1,378

Varco-750 14"

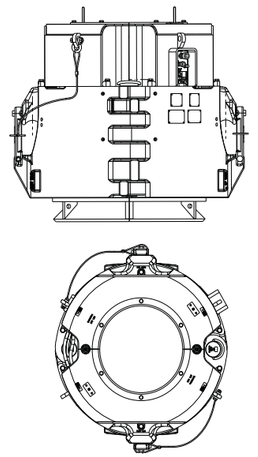


Description

The elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The main body of these units can be dressed as a casing elevator or as a spider. The upper unit is dressed as an elevator, using a bottom guide and bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering casing.

Technical specifications	
Max weight slips set w/inserts (lbs/kg)	794 / 360
Load rating (sTon /Tonne)	750 / 680
Casing size range (inches)	6⅝ up to 14
MANUAL & PNEUMATIC ELEVATORS	
Weight without slip assembly (lbs/kg)	7,500 / 3,402
Normal operating pressure (psi/kPa)	85 / 585
Max. operating pressure (psi/kPa)	125 / 861
HYDRAULIC ELEVATORS	
Weight without slip assembly (lbs/kg)	7,500 / 3,402
Min. inlet pressure (psi/kPa)	1,500 / 10,342
Normal operating pressure (psi/kPa)	2,000 / 13,790
Max. inlet pressure (psi/kpa)	2,500 / 17,237
Recommended inlet pressure slips up (psi/kPa)	500 - 750 / 3,447 - 5,171
Max. pressure slips up (psi/kPa)	1,000 / 6,895
Max. pressure slips down (psi/kPa)	2,500 / 13,790
Min. pressure differential between pressure line and return line (psi/kPa)	200 / 1,378
Max. allowed pressure in return line (psi/kPa)	200 / 1,378

Varco-750 24½"

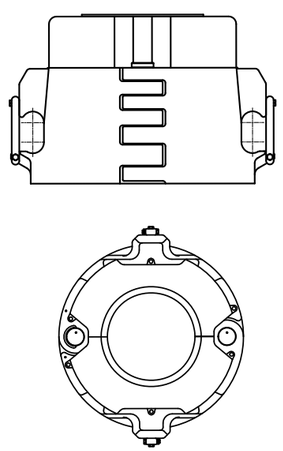


Description

The elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The main body of these units can be dressed as a casing elevator or as a spider. The upper unit is dressed as an elevator, using a bottom guide and bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering casing.

Technical specifications	
Max weight slips set w/inserts (lbs/kg)	1,559 / 707
Load rating (sTon /Tonne)	750 / 680
Casing size range (inches)	8⅝ up to 24½
MANUAL & PNEUMATIC ELEVATORS	
Weight without slip assembly (lbs/kg)	9,500 / 4,275
Normal operating pressure (psi/kPa)	85 / 585
Max. operating pressure (psi/kPa)	125 / 861
HYDRAULIC ELEVATORS	
Weight without slip assembly (lbs/kg)	12,209 / 5,538
Min. inlet pressure (psi/kPa)	1,500 / 10,342
Normal operating pressure (psi/kPa)	2,000 / 13,790
Max. inlet pressure (psi/kpa)	2,500 / 17,237
Recommended inlet pressure slips up (psi/kPa)	500 - 750 / 3,447 - 5,171
Max. pressure slips up (psi/kPa)	1,000 / 6,895
Max. pressure slips down (psi/kPa)	2,500 / 13,790
Min. pressure differential between pressure line and return line (psi/kPa)	200 / 1,378
Max. allowed pressure in return line (psi/kPa)	200 / 1,378

Varco-1000 24½"



Description

The elevator/spider tool is designed for lifting and suspending tubular goods, from light tubing to heavy wall pipe and drill collars. The main body of these units can be dressed as a casing elevator or as a spider. The upper unit is dressed as an elevator, using a bottom guide and bell guide. The lower unit is dressed as a spider, using a top guide to aid in centering casing.

Technical specifications	
Max weight slips set w/inserts (lbs/kg)	1,559 / 707
Load rating (sTon /Tonne)	1000 / 907
Casing size range (inches)	8⅝ up to 24½
MANUAL & PNEUMATIC ELEVATORS	
Weight without slip assembly (lbs/kg)	14,293 / 6,483
Normal operating pressure (psi/kPa)	85 / 585
Max. operating pressure (psi/kPa)	125 / 861
HYDRAULIC ELEVATORS	
Weight without slip assembly (lbs/kg)	N/A
Min. inlet pressure (psi/kPa)	N/A
Normal operating pressure (psi/kPa)	N/A
Max. inlet pressure (psi/kpa)	N/A
Recommended inlet pressure slips up (psi/kPa)	N/A
Max. pressure slips up (psi/kPa)	N/A
Max. pressure slips down (psi/kPa)	N/A
Min. pressure differential between pressure line and return line (psi/kPa)	N/A
Max. allowed pressure in return line (psi/kPa)	N/A

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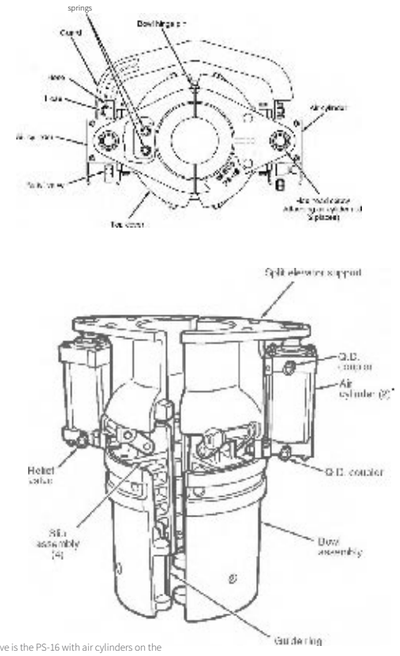
*For reference only, please contact your local sales contact for more information.

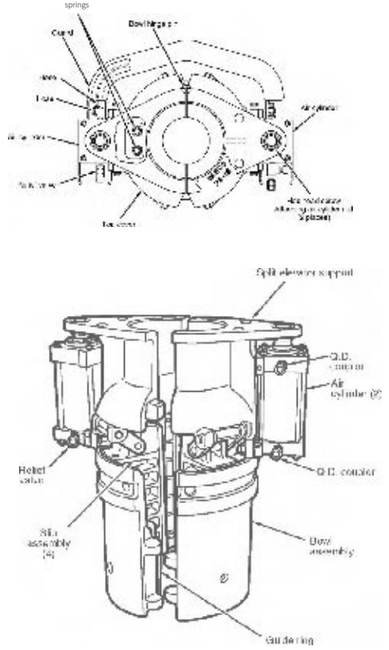
PS-15



*Model shown above is the PS-16 with air cylinders on the side. These are not found on the actual PS-15 model

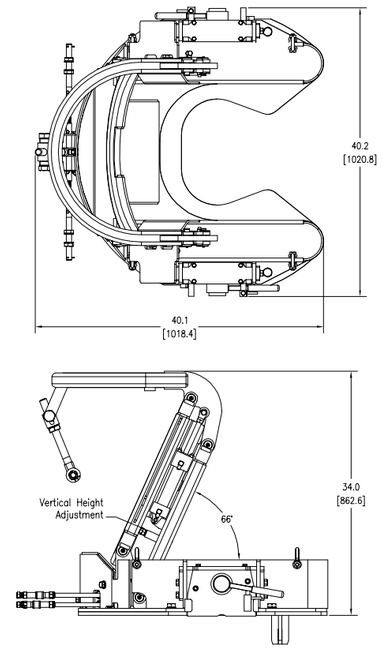
Technical specifications	
Actuation	Spring
Control system	Manual
Dimension LxWxH	33" x 41.5"
Weight	1,040 lbs
Rotary size	Fits in NOV Pin Drive Master Bushing sizes: 27½", 37½", 49½"
Rotary configuration	Fits in Master Bushing
Tubular type	Drill pipe
Tubular size range (slips)	3½" to 5⅞"
Changing slips	Manually
Load rating	Up to 750 sTon
Backup torque	--
Centering device	--
Slip set back	--
Throat opening w/o slips	15"
Height above rig floor	Set: 11" Released: 19"
Required pressure	--
Flow rate	--
Ambient temperature range	-4°F up to 104°F (-20°C up to 45°C)
Required crew to operate	2-3
Manpower interfering	Yes
Interlocking	No
Greasing	Hand
Slip-set signal confirmation	No
Slip-up signal confirmation	No
Top cover	No
API	7K
CE	Yes
ATEX	N/A

PS-16



Technical specifications	
Actuation	Air
Control system	Automatic remote controlled (hand or foot controlled)
Dimension LxWxH	32" x 48.4"
Weight	1,600 lbs
Rotary size	Fits in NOV Pin Drive Master Bushing sizes: 27½", 37½", 49½"
Rotary configuration	Fits in Master Bushing
Tubular types	Drill pipe
Tubular size range (slips)	3½" to 6⅞"
Changing slips	Manually
Load rating	Up to 750 sTon
Backup torque	--
Centering device	--
Slip set back	--
Throat opening w/o slips	16"
Height above rig floor	Set: 17.5" Released: 26"
Required pressure	90 psi (air)
Flow rate	--
Ambient temperature range	-4°F up to 104°F (-20°C up to 45°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
Slip-set signal confirmation	Yes
Slip-up signal confirmation	No
Top cover	No
API	7K
CE	Yes
ATEX	Yes

PSF

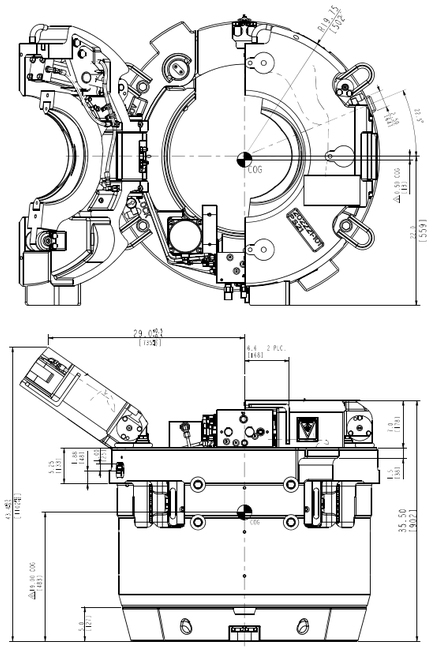


Technical specifications	
Actuation	Electro-hydraulic
Control system	Automatic remote controlled (hand or foot controlled)
Dimension LxWxH	36.6" x 27.5"
Weight	365 lbs
Rotary size	Pin drive: 20½", 27½", 37½", (20" upon request) Square drive RT: 17½", 27½"
Rotary configuration	Fits in Master Bushing
Tubular types	Drill pipe
Tubular size range (slips)	2⅜" to 7"
Changing slips	Manually
Load rating	--
Backup torque	--
Centering device	--
Slip set back	--
Throat opening w/o slips	Depending on size bushing bowl
Height above rig floor	Set: 11.3" Released: 27.5"
Required pressure	600 psi (hydraulic)
Flow rate	3 gpm
Ambient temperature range	-4°F up to 104°F (-20°C up to 45°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	No
Greasing	Hand
Slip-set signal confirmation	No
Slip-up signal confirmation	No
Top cover	No
API	N/A
CE	No
ATEX	No

Power slips sheet 2 of 2

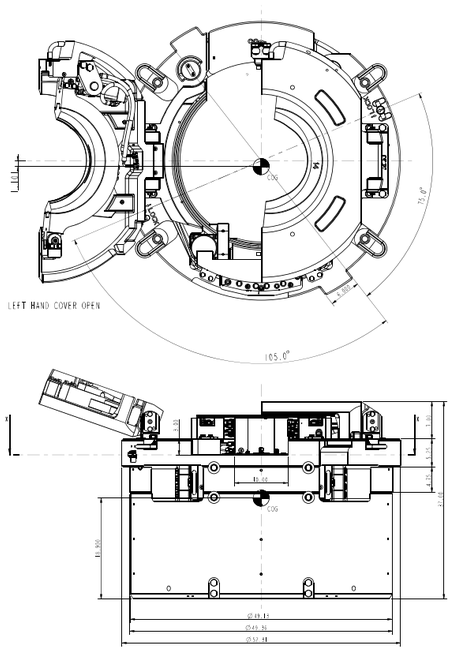
*For reference only, please contact your local sales contact for more information.

PS-21



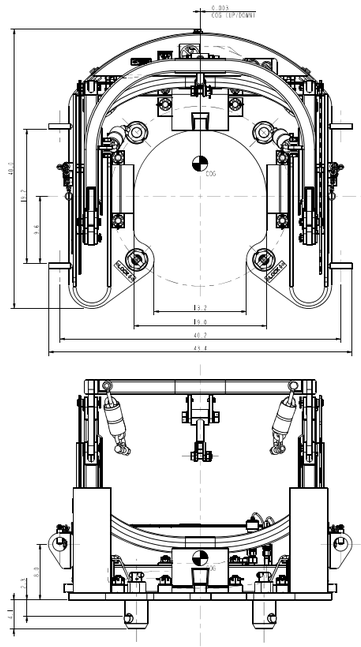
Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension LxWxH	Ø 39.88" x 35.5"
Weight	5,600 lbs
Rotary size	Fits directly in rotary table, rotary size: 37½"
Rotary configuration	Fits in Oilwell/Wirth/Gardner Denver, Emsco, Ideco, Varco/National
Tubular type	Drill pipe, casing, drill collar, tubing
Tubular size range (slips)	2⅜" to 14"
Changing slips	Using a special tool to insure
Load rating	350 sTon
Backup torque	45,000 ft.lbs
Centering device	Comply
Slip set back	Comply
Throat opening w/o slips	21"
Height above rig floor	7"
Required pressure	2,300 - 2,500 psi (hydraulic)
Flow rate	10 gpm
Ambient temperature range	-4°F up to 104°F (-20°C up to 45°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Automated
Slip-set signal confirmation	Yes
Slip-up signal confirmation	No
Top cover	Yes
API	7K
CE	Yes
ATEX	Yes

PS-30



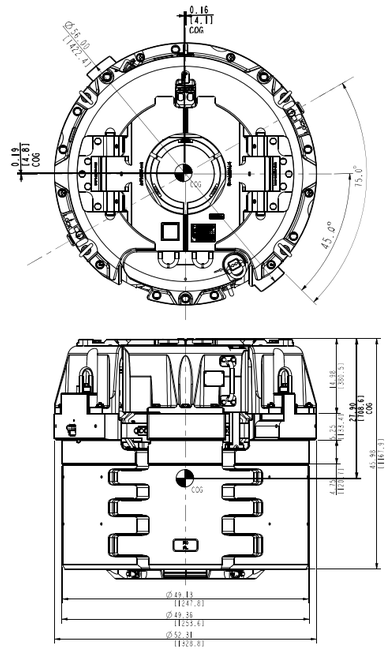
Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension LxWxH	Ø 52.31" x 37.0"
Weight	9,450 lbs
Rotary size	Fits directly in rotary table, rotary table size: 49½"
Rotary configuration	Fits in Oilwell/Wirth/Gardner Denver, Emsco, Ideco, Varco/National
Tubular types	Drill pipe, casing, drill collar, tubing
Tubular size range (slips)	2⅜" to 20"
Changing slips	Using a special tool to insure
Load rating	500 sTon
Backup torque	55,000 ft.lbs
Centering device	Comply
Slip set back	Comply
Throat opening w/o slips	30"
Height above rig floor	7"
Required pressure	2,300 - 2,500 (hydraulic)
Flow rate	10 gpm
Ambient temperature range	-4°F up to 104°F (-20°C up to 45°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Automated
Slip-set signal confirmation	Yes
Slip-up signal confirmation	No
Top cover	Yes
API	7K
CE	Yes
ATEX	Yes

SLT



Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (hand or foot controlled)
Dimension LxWxH	39.9" x 43.4" 31.5"
Weight	794 lbs
Rotary size	Fits directly in rotary table, rotary table size: 49½"
Rotary configuration	Fits directly on bowls/LSB (MBH1250)
Tubular types	Drill pipe
Tubular size range (slips)	4½" to 7⅝"
Changing slips	Manually
Load rating	--
Backup torque	--
Centering device	--
Slip set back	--
Throat opening w/o slips	Depending on size bushing bowl
Height above rig floor	Set: 17.0" Released: 31.5"
Required pressure	2,000 psi (hydraulic)
Flow rate	5 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	No
Greasing	Hand
Slip-set signal confirmation	No
Slip-up signal confirmation	No
Top cover	No
API	N/A
CE	Yes
ATEX	Yes

PS-495



Technical specifications	
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension LxWxH	Ø 52.31" x 45.98"
Weight	13,358 lbs
Rotary size	Fits directly in rotary table size: 49½"
Rotary configuration	Fits in National, Emsco, Oilwell, Wirth
Tubular types	Drill pipe
Tubular size range (slips)	4½" to 7⅝"
Changing slips	Using a special tool to insure
Load rating	1,500 sTon
Backup torque	30,000 ft.lbs
Centering device	--
Slip set back	--
Throat opening w/o slips	19"
Height above rig floor	14.75"
Required pressure	2,300 - 2,500 psi (hydraulic)
Flow rate	10 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Greasing	Hand
Slip-set signal confirmation	Yes
Slip-up signal confirmation	Yes
Top cover	Yes
API	7K
CE	Yes
ATEX	Yes

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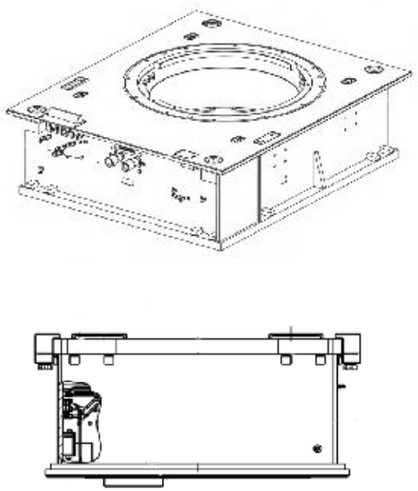
Rotary Support Tables sheet 1 of 2

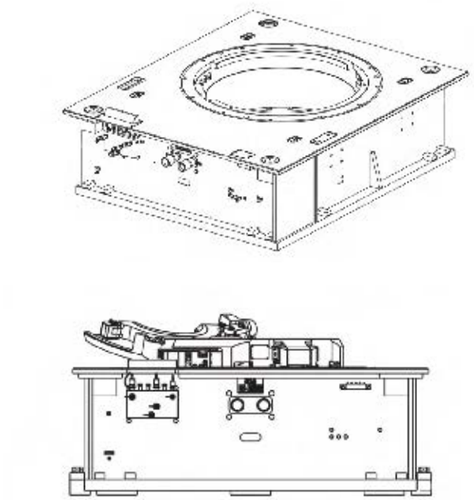
*For reference only, please contact your local sales contact for more information.

RST-375



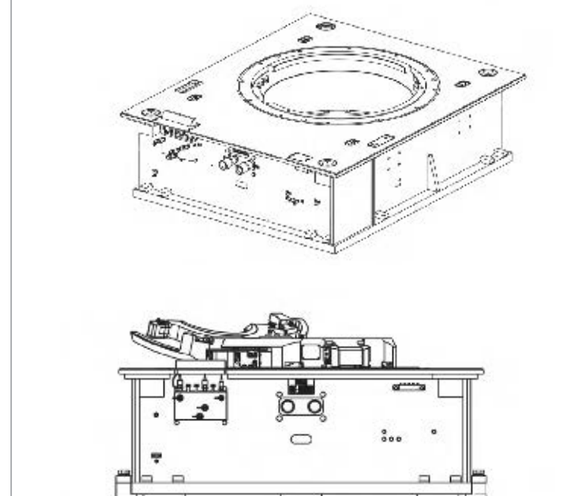
Technical specifications	
Table size	37½"
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension L x W x H	89" x 61.75" x 28.2"
Weight (depends on size topcover)	Appr. 14,102 lbs
Load rating (static)	750 sTon
Torque max	30,000 ft.lbs
Max. back-up torque	80,000 ft.lbs
Speed max (intermittent)	15 RPM
Max. operational speed (continously)	5 RPM
Max. working pressure	3,000 psi (hydraulic)
Max. flow rate	75 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Control station	Yes
PS compatibility	PS21
Greasing	Automated and manual
Flushing kit	Yes / flushiung PS
API	7K
CE	Yes
ATEX	Yes
IECEX	Yes
DSB	Yes

RST-495



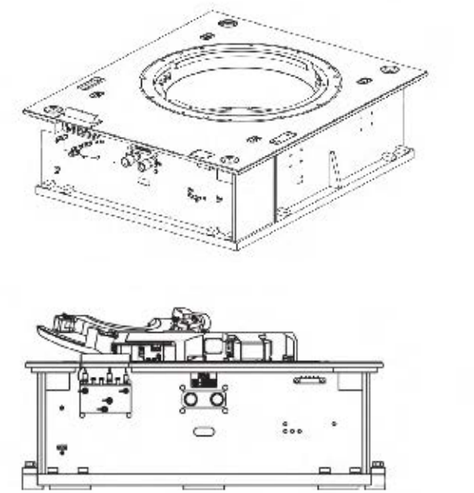
Technical specifications	
Table size	49½"
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension L x W x H	105" x 82" x 30.42"
Weight (depends on size topcover)	Appr. 22,175 lbs
Load rating (static)	1,000 sTon
Torque max	45,000 ft.lbs
Max. back-up torque	120,000 ft.lbs
Speed max (intermittent)	15 RPM
Max. operational speed (continously)	5 RPM
Max. working pressure	3,000 psi (hydraulic)
Max. flow rate	115 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Control station	Yes
PS compatibility	PS21/30/495
Greasing	Automated and manual
Flushing kit	Yes / flushing PS
API	7K
CE	Yes
ATEX	Yes
IECEX	Yes
DSB	Yes

RST-495-F



Technical specifications	
Table size	49½"
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension L x W x H	105" x 82" x 30.42"
Weight (depends on size topcover)	Appr. 19,550 lbs
Load rating (static)	1,000 sTon
Torque max	N/A
Max. back-up torque	120,000 ft.lbs
Speed max (intermittent)	15 RPM (externally driven)
Max. operational speed (continously)	N/A
Max. working pressure	3,000 psi (hydraulic)
Max. flow rate	10 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Control station	Yes
PS compatibility	PS21/30/495
Greasing	Automated and manual
Flushing kit	Yes / flushing
API	7K
CE	Yes
ATEX	Yes
IECEX	Yes
DSB	Yes

RST-495-H



Technical specifications	
Table size	49½"
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension L x W x H	105" x 82" x 31.2"
Weight (depends on size topcover)	Appr. 23,880 lbs
Load rating (static)	1,250 sTon
Torque max	45,000 ft.lbs
Max. back-up torque	120,000 ft.lbs
Speed max (intermittent)	15 RPM
Max. operational speed (continously)	5 RPM
Max. working pressure	3,000 psi (hydraulic)
Max. flow rate	115 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Control station	Yes
PS compatibility	PS21/30/495
Greasing	Automated and manual
Flushing kit	Yes / flushing
API	7K
CE	Yes
ATEX	Yes
IECEX	Yes
DSB	Yes

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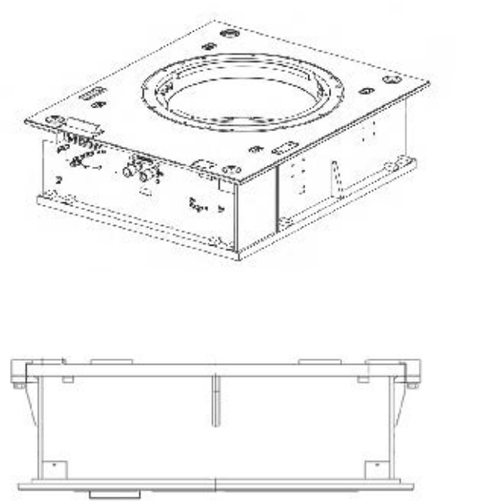
Rotary Support Tables sheet 2 of 2

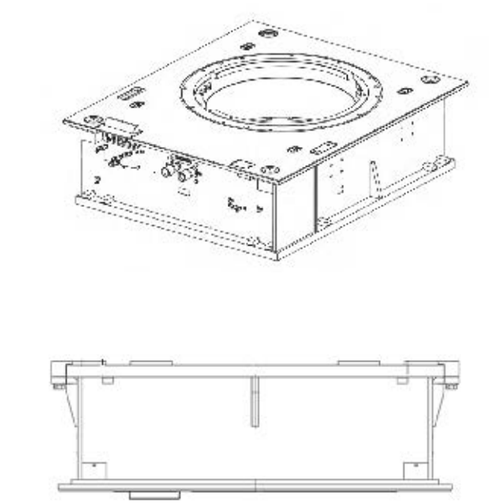
*For reference only, please contact your local sales contact for more information.

RST-605



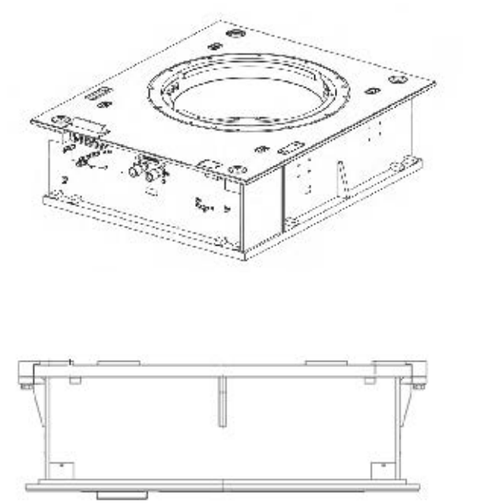
Technical specifications	
Table size	60½"
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension L x W x H	114" x 95" x 30.42"
Weight (depends on size topcover)	Appr. 25,527 lbs
Load rating (static)	1,000 sTon
Torque max	45,000 ft.lbs
Max. back-up torque	120,000 ft.lbs
Speed max (intermittent)	15 RPM
Max. operational speed (continously)	5 RPM
Max. working pressure	3,000 psi (hydraulic)
Max. flow rate	115 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Control station	Yes
PS compatibility	PS21/30/495
Greasing	Automated and manual
Flushing kit	Yes / flushiung PS
API	7K
CE	Yes
ATEX	Yes
IECEX	Yes
DSB	Yes

RST-605-F



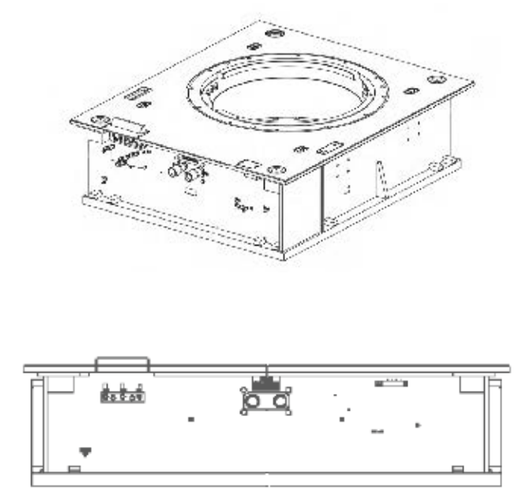
Technical specifications	
Table size	60½"
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension L x W x H	114" x 95" x 30.42"
Weight (depends on size topcover)	Appr. 22,610 lbs
Load rating (static)	1,000 sTon
Torque max	N/A
Max. back-up torque	120,000 ft.lbs
Speed max (intermittent)	15 RPM
Max. operational speed (continously)	N/A
Max. working pressure	3,000 psi (hydraulic)
Max. flow rate	10 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Control station	Yes
PS compatibility	PS21/30/495
Greasing	Automated and manual
Flushing kit	Yes / flushing PS
API	7K
CE	Yes
ATEX	Yes
IECEX	Yes
DSB	Yes

RST-605-H



Technical specifications	
Table size	60½"
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension L x W x H	114" x 95" x 31.2"
Weight (depends on size topcover)	Appr. 27,730 lbs
Load rating (static)	1,375 sTon
Torque max	45,000 ft.lbs
Max. back-up torque	120,000 ft.lbs
Speed max (intermittent)	15 RPM (externally driven)
Max. operational speed (continously)	5 RPM
Max. working pressure	3,000 psi (hydraulic)
Max. flow rate	115 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Control station	Yes
PS compatibility	PS21/30/495
Greasing	Automated and manual
Flushing kit	Yes / flushing
API	7K
CE	Yes
ATEX	Yes
IECEX	Yes
DSB	Yes

RST-755



Technical specifications	
Table size	75½"
Actuation	Hydraulic
Control system	Automatic remote controlled (control panel)
Dimension L x W x H	132.75" x 114" x 31.21"
Weight (depends on size topcover)	Appr. 32,906 lbs
Load rating (static)	1,375 sTon
Torque max	45,000 ft.lbs
Max. back-up torque	120,000 ft.lbs
Speed max (intermittent)	15 RPM
Max. operational speed (continously)	5 RPM
Max. working pressure	3,000 psi (hydraulic)
Max. flow rate	115 gpm
Ambient temperature range	-4°F up to 131°F (-20°C up to 55°C)
Required crew to operate	1
Manpower interfering	No
Interlocking	Yes
Control station	Yes
PS compatibility	PS21/30/495
Greasing	Automated and manual
Flushing kit	Yes / flushing
API	7K
CE	Yes
ATEX	Yes
IECEX	Yes
DSB	Yes

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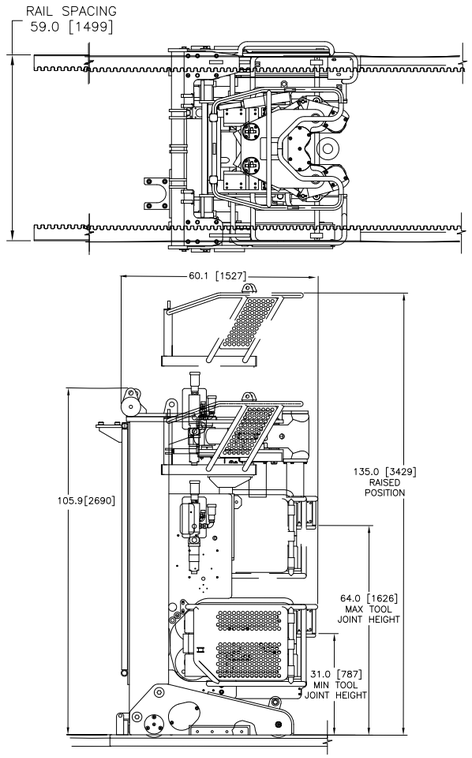
AR3200™

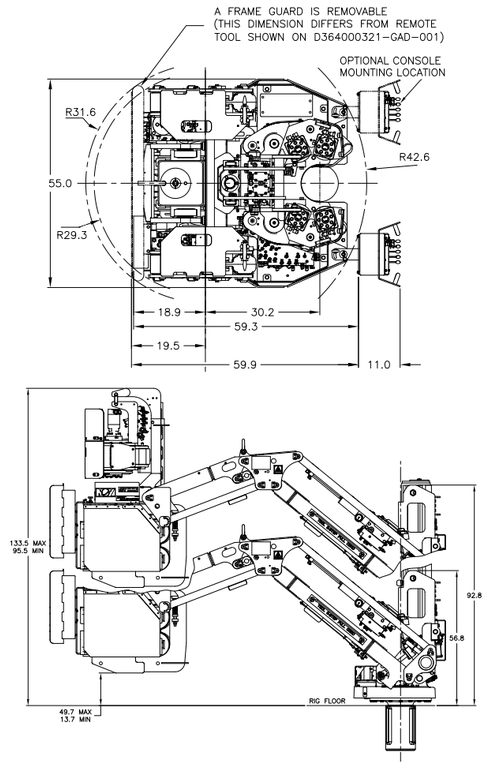


Technical specifications	
Options	Mud bucket, doper, bit breaker, local remote, casing module, rotation table
Remote controlled from drillers cabin	Yes
Mount	Track mounted
Shutoff valve	Manual
Rotation angle	N/A
Tubular connection OD range	3½" to 9¾"
Spin speed	100 RPM (nominal on 5" DP)
Spin torque	2,000 ft-lbs. (2,711 Nm)
Assembly Weight	12,100 lbs. (5,580 kg)
Maximum make-up torque	100,000 ft-lbs. (135,582 Nm)
Maximum break-out torque	120,000 ft-lbs. (162,698 Nm)
Connection height	31" to 64" (787 mm to 1,625 mm)
Horizontal travel	Variable-track
Vertical adjustment	33"
Casing ready	Yes
HYDRAULIC REQUIREMENTS	
Minimum	45 GPM @ 2,000 psi (170 LPM @ 135 bar)
Maximum	45 GPM @ 2,500 psi (170 LPM @ 172 bar)

The AR3200 ensures safe and effective make-up and break out of drill string connections. The compact size and light weight is suitable on applications with limited drill floor space. Track type travel allows tong clearance around well center when tool is brought to parked position.

- Gateless torque wrench
- Economy of rig floor space – no hanging tools
- Track mounted
- Spinning wrench may counter-rotate to seat threads, then safely spins-in
- Available with remote options distancing personnel from the drill floor hazards

ST-100™

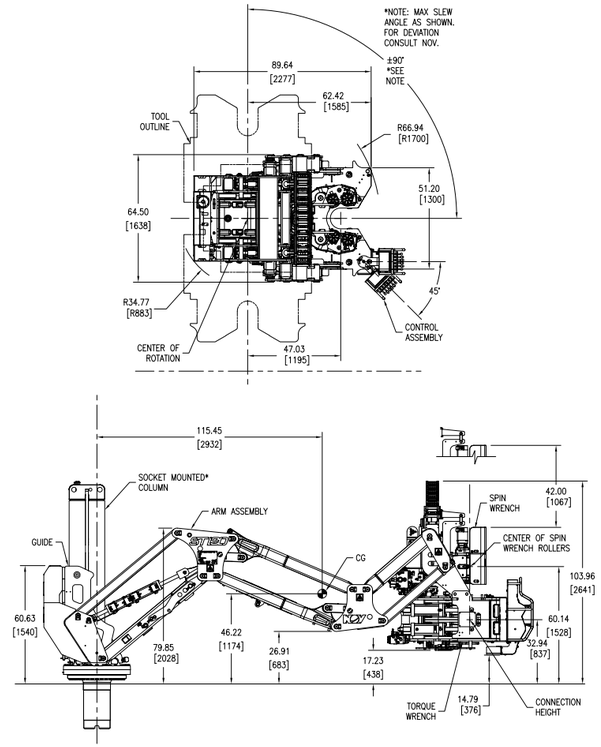


Technical specifications	
Options	5' or 8' reach (manual/remote)
Remote controlled from drillers cabin	Yes
Connection hoses	Complete with 25' long connection hoses
Mount	Floor socket mounted
Shutoff valve	Manual
Rotation angle	90° (Limited only by service loop hoses)
Tubular connection OD range	4" to 9 ¾"
Spin speed	80 RPM min. (nominal on 5" DP, 45 GPM, 170 LPM)
Spin torque	3,000 ft-lbs. (4,067 Nm)
Assembly weight	11,500 lbs. (4,763 kg) (installed weight)
Maximum make-up torque	100,000 ft-lbs. (135,582 Nm)
Maximum break-Out torque	120,0t00 ft-lbs. (162,698 Nm)
Connection height	30.4" to 66.4" (762 mm to 1,676 mm)
Horizontal travel	60" (1,524 mm or 96" (2,438 mm)
Vertical adjustment	36" (914 mm)
Casing ready	No
HYDRAULIC REQUIREMENTS	
Minimum	35 GPM @ 2,500 psi (132 LPM @ 172 bar)
Maximum	55 GPM @3,000 psi (208 LPM @ 207 bar)

The ST-100 sets the standard for performance and reliability. Incorporating modern technology with the field proven AR3200 Torque Wrench and the ST-120/ MPT200 Spin Wrench, our performance and quality is unmatched. The ST-100 ensures fast and reliable handling of all your drilling connections.

- Compatible with virtually any drill floor and comes with 5′ or 8′ reach option
- Transfer barrier allows a manual machine to deploy to same location every time while still fully retracting, taking full advantage of small footprint
- Soft Clamp feature extends the life of the tool joint and make up in a single bit
- Equipped with slewing capabilities to operate at well center and mousehole
- Available with remote options distancing personnel from drill floor hazards

ST-120™



Technical specifications	
Options	12' reach (manual/remote)
Remote controlled from drillers cabin	Yes
Connection hoses	Complete with 25' long connection hoses
Mount	Floor socket mounted
Shutoff valve	manual
Rotation angle	90° (limited only by service loop hoses)
Tubular connection OD range	3 ⅜" to 10"
Spin speed	80 RPM min. (nominal on 5" DP)
Spin torque	3,000 ft-lbs. (4,067 Nm)
Assembly weight	19,800 lbs. (8,981 kg) (installed weight)
Maximum make-up torque	100,000 ft-lbs. (135,582 Nm)
Maximum break-out torque	120,000 ft-lbs. (162,698 Nm)
Connection height	31.5" to 73.4" (800 mm to 1,864 mm)
Horizontal travel	144" (3,658 mm)
Vertical adjustment	42" (1,067 mm)
Casing ready	No
HYDRAULIC REQUIREMENTS	
Minimum	45 GPM @ 2,500 psi (170 LPM @ 172 bar)
Maximum	65 GPM @3,000 psi (246 LPM @ 207 bar)

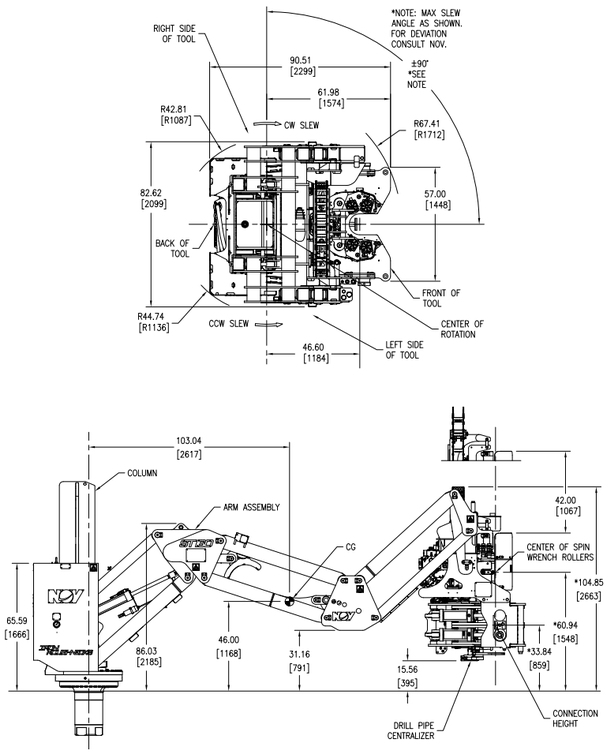
The ST-120 combines compact design with maximized reach and takes it to an unprecedented level. Completely retracted, the tool extends just over 5 feet from the pivot, minimizing its footprint and leaving more room on the rig floor.

- Travels a full 12 feet, allowing versatile layout configurations
- Full 60 degrees of rotation and 3 point bite for better grip, quicker make-up
- Easy replacement with compact size
- Maximum vertical height of 120 inches
- Fully automated controls from either the driller's control console or remote available

Iron Roughnecks - Sheet 2 of 2

*For reference only, please contact your local sales contact for more information.

ST-160™

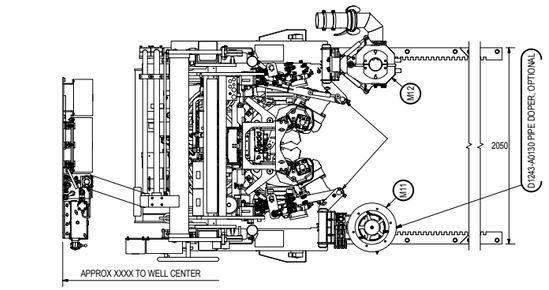


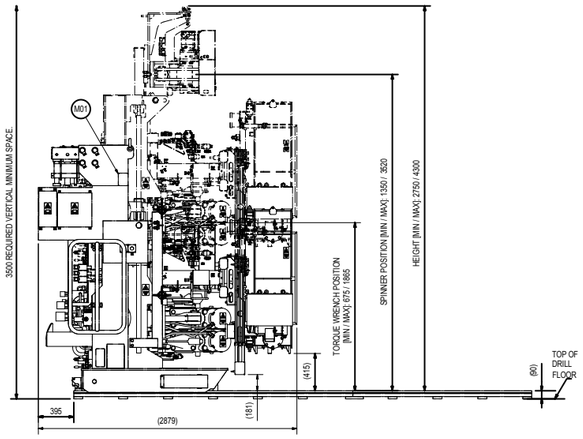
Technical specifications	
Options	13.5' reach (remote)
Remote controlled from drillers cabin	Yes
Connection hoses	Complete with 25' long connection hoses
Mount	Floor socket mounted
Shutoff valve	Manual
Rotation angle	90° (limited only by service loop hoses)
Tubular connection OD range	3 ⅞" to 10"
Spin speed	80 RPM min. (nominal on 5" DP)
Spin torque	3,467 ft-lbs. (4,700 Nm)
Assembly weight	26,000 lbs. (10,886 kg) (installed weight)
Maximum make-up torque	140,000 ft-lbs. (189,815 Nm)
Maximum break-out torque	160,000 ft-lbs (216,931 Nm)
Connection height	31.88" to 73.88" (810 mm to 1,877 mm)
Horizontal travel	162" (4,115 mm)
Vertical adjustment	42" (1,067 mm)
Casing ready	Yes
HYDRAULIC REQUIREMENTS	
Minimum	55 GPM @ 3,000 psi (200 LPM @ 207 bar)
Maximum	65 GPM @ 3,000 psi (246 LPM @ 201 bar)

The ST-160 fully extended travels 13.5 feet, allowing versatile layout configurations. With its trackless design, the new ST-160 continues to improve drill floor safety. The addition of a quick disconnect Drill Pipe Module to a universal casing hanger provides the customer and casing crews a safe alternative for operating casing tongs.

- More torque for connections requiring a higher than normal break-out torque
- Full 60 degrees of rotation and 3 point bite which means better grip, quicker make-up
- Height adjustable spinning wrench
- Equipped to handle today's high performance drill pipe connections
- Fully automated controls from either driller's control console or wireless remote control

MPT-270™



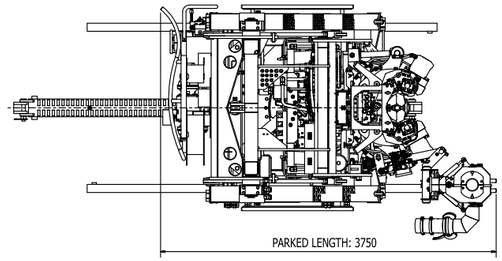


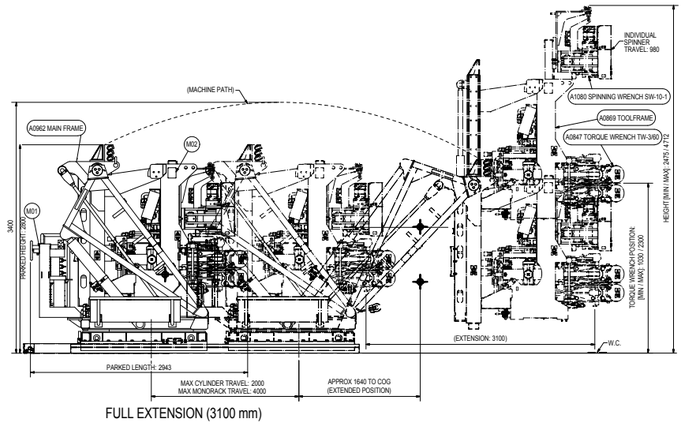
Technical specifications	
Options	Mud bucket, doper, local remote, bit-breaker, casing module, rotation table
Remote controlled from drillers cabin	Yes
Connection hoses	Complete including loop bracket
Mount	Track mounted
Shutoff valve	Manual
Rotation angle	N/A (rotation plate optional)
Tubular connection OD range	3 ½" to 10" (2 ⅞" kit optional)
Spin speed	0-100 RPM min. (nominal on 5" DP)
Spin torque	3,467 ft-lbs. (4,700 Nm)
Assembly weight	14,990 lbs. (6,800 kg)
Maximum make-up torque	200,000 ft-lbs. (up to 270,000 Nm)
Maximum break-out torque	200,000 ft-lbs. (up to 270,000 Nm)
Connection height	26.5" to 73.5" (675 mm to 1,865 mm)
Horizontal travel	Variable track
Vertical adjustment	See connection height
Casing ready	Yes
HYDRAULIC REQUIREMENTS	
Minimum	111GPM @ 3000 psi (420 LPM @ 207 bar)
Maximum	115 GPM @ 3050 psi (435 LPM @ 210 bar)

The HydraTong multi-purpose tong concept ensures safe and effective make-up of drill pipe, collars, and casing. The modular design allows tool frames to be interchanged to run drill pipe or various casing sizes. It includes the latest Torque Wrench design, which allows 60 degrees rotation ensuring efficiency during make-up and break-out of connections.

- High torque self-aligning spinning wrench
- High accuracy control possibilities
- Robust and maintenance optimized torque wrench
- Dual elevators for spinner and torque wrench
- Sensors for anti-collision system and MMC
- Tool joint finder and stabbing guide

ARN-270™





FULL EXTENSION (3100 mm)

Technical specifications	
Options	Mud bucket, doper, bit breaker, local remote, casing module, track base
Remote controlled from drillers cabin	Yes
Connection hoses	Complete including loop bracket
Mount	Slew base welded to drill floor or track base
Shutoff valve	Manual
Rotation angle	65° (limited only by service loop hoses)
Tubular connection OD range	3 ½" to 10" (2 ⅞" kit optional)
Spin speed	0-100 RPM (nominal on 5" DP)
Spin torque	3,467 ft.-lbs. (4,700 Nm)
Assembly weight	18,500 lbs. (8,400 kg)
Maximum make-up torque	200,000 ft.-lbs. (up to 270,000 Nm)
Maximum break-out torque	200,000 ft.-lbs. (up to 270,000 Nm)
Connection height	41" to 91" (1,030 mm to 2,300 mm)
Horizontal travel	122" (3,100 mm) trackless, variable by track
Vertical adjustment	See connection height
Casing ready	Yes
HYDRAULIC REQUIREMENTS	
Minimum	111GPM @ 3000 psi (420 LPM @ 207 bar)
Maximum	115 GPM @ 3050 psi (435 LPM @ 210 bar)

The HydraTong ARN models let the drill floor remain trackless due to the articulated arm design. In addition, the unit has a modular design allowing interchanging between different tool frames, e.g. from an ordinary tool frame to the casing tong module. The ARN-270 includes the latest torque wrench design, which allows 60 degrees rotation, ensuring efficiency during make-up and break-out of connections.

- Triple grip design ensures better and more accurate torque
- High accuracy control possibilities
- Robust maintenance optimized torque wrench
- Dual elevators for spinner and torque wrench
- Trackless extension towards pipe target
- Optional portable control unit, radio or cable
- Sensors for anti-collision system and MMC
- Tool joint finder and stabbing guide

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Casing Module CM-22 & Torque Turn

*For reference only, please contact your local sales contact for more information.

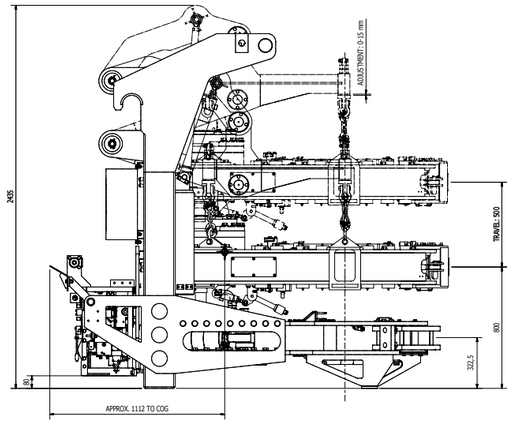
CM-22

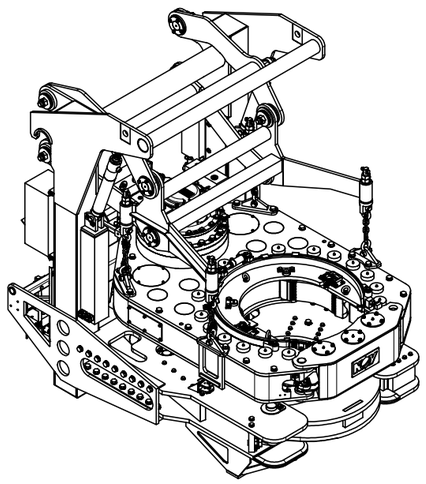
The casing module consists of upper tong, backup tong and a stabbing guide. It is easily and quickly hooked on to the roughneck by use of hydraulic and electric quick connectors. Being fully automated, integrated into NOV control systems, zone management and safety systems including NOV Torque Turn casing logging system, it ensures efficient, safe and reliable make-up and break-out performances.

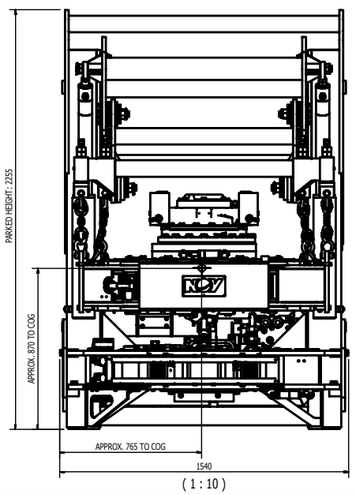
Features

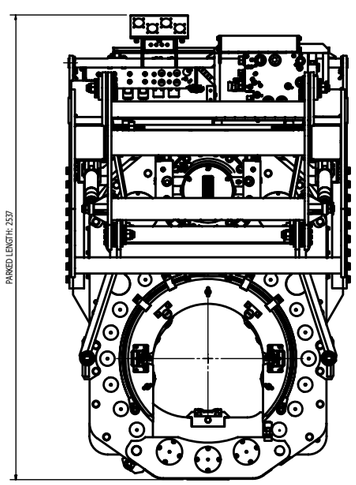
- High Torque
- High accuracy
- Wide range
- High resolution electric torque cell
- Gear on the fly (high speed/low speed)
- Sensors for ACS, MMC and PIM
- Slick design and maintenance optimized
- Stabbing guide
- Radio remote
- Roughneck models compatibility:
  - ST-160
  - ARN-200/270
  - MPT-200/270

Technical Specifications	
Options	Stabbing guide, Radio remote, Torque verification sub
Remote controlled from driller cabin	yes
Connection Hoses	Complete including quick connectors
Mount	Separate module, attached to RN main frame
Rotation range	360° endless
Connection OD range	7" to 22"
Hydraulic requirements	
Minimum	300 l/min
Maximum	420 l/min
Rotation speed: 147 500 lbf-ft 88 500 lbf-ft 12 000 lbf -ft	 2 rpm 7 rpm 15 rpm
Max make-up torque: 14'' to 22'' 10'' to 14'' 7'' to 10''	 147 500 lbf-ft 88 500 lbf-ft 44 200 lbf-ft
Max break-out torque 14'' to 22'' 10'' to 14'' 7'' to 10''	 147 500 lbf-ft 88 500 lbf-ft 44 200 lbf-ft
Horizontal travel	RN model dependent
Vertical adjustment	RN model dependent
Assembly weight	5000 kg









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Torque Turn

The Torque Turn Logging system is a system designed to monitor and log data from casing pipe spin-in and make-up operations and to perform data analysis according to given criteria for an acceptable connection.

Torque Turn integrated casing tongs and NOV's casing ready pipe rackers enables the rig crew to perform all pipe handling and casing logging under the supervision of professional casing supervisors. Together with 3rd part approved torque verification sub, this setup ensures casing tong performance including documentation and logging of a safe and reliable casing connection. Torque Turn visualizes the torque curves and suggests the torque shoulder point for makeup and spin-in operations. The system's analysis function assists the operator by identifying and assessing the casing connection execution. The operator is prompted to revise the connection analysis prior to acceptance or rejection, introducing a systematic method ensuring a consistent approach for maintaining integrity of the entire well.

Features

- Casing pipe make-up and spin-in operations monitoring
- Real-time connection trend display
- Shoulder torque point identification
- Casing joint assembly evaluation
- Full historical data retrieval and analysis display
- Casing job execution reports
- Easy configuration with interactive operator interface
- High speed data logger (10Hz)

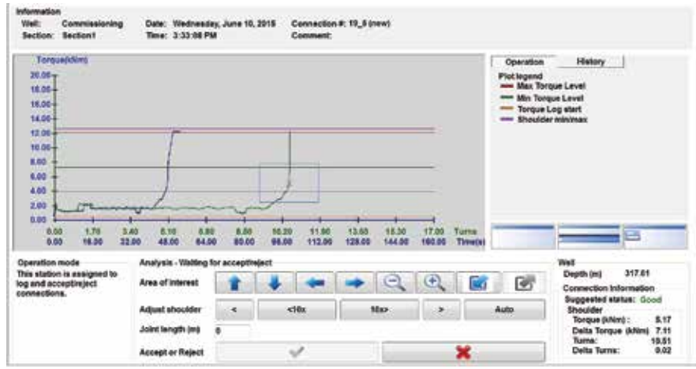
Operation modes

- Monitoring
- Operation
- Historical

Benefits

- Enables rig crew to perform all pipe handling
- Assists casing operator decisions
- Provides reporting services, ref. to ISO9001:2008
- Decreases drilling contractor's costs
- Reduces casing connection failures
- Contributes to high-integrity casing string
- Easy to operate

Other Specifications
Seamless integration with existing NOV Hydratong systems
No additional sensors needed
Can be operated from NOV control and monitoring screens
Supported by NOV Training courses



Casing job report 19.06.2010

Rig Name:	<Sample Rig>	Well:	Sample Well	Company Responsible:	NOV	Report Comments:	
Rig Location:	<Sample Location>	Well Section:	9 5/8	Casing Responsible:	NOV		
Rig Operator:	<Sample Operator>			Casing crew:	NN		

Section Data

Start:	17.0 9.201 2 02: 00:40	Casing Type:	9 5/8	Max Torque	(kNm)	24.0
End:	17.0 9.201 2 14: 00:50	Thread Type:	<SampleThread>	Min Torque	(kNm)	19.5
Depth (m)	217.252	Thread Compound:	<Sample T. Comp>	Optimum Torque	(kNm)	21.6

Joint#	Completed	Length	Depth	Fin. Torque	Fin. Turn	Shldr Torque	Shlder Turn	Dlta Torque	Dlta Turn	Comment
017_01	06/17/2010 02:50:50PM	12.79	12.79	19,902.61	10.80	13,046.12	10.67	6,856.50	0.13	m/u joint inter to shoe
016_01	06/17/2010 01:53:48PM	12.79	25.58	23,410.46	12.27	6,128.64	11.92	17,281.82	0.35	m/u joint FLOAT to INTER A
015_02	06/17/2010 11:50:02AM	12.79	38.37	22,042.99	10.40	9,283.98	10.38	12,759.01	0.02	m/u joint 2 to 4
014_01	06/17/2010 10:52:19AM	12.79	51.16	21,329.53	11.16	3,883.50	11.04	17,446.04	0.12	m/u joint 3 to 4
013_01	06/17/2010 10:29:44AM	12.73	63.88	22,518.63	10.48	4,733.01	10.38	17,785.62	0.10	m/u joint 5 to 7
012_01	06/17/2010 10:18:38AM	12.79	76.67	22,637.54	10.32	5,218.45	10.27	17,419.09	0.05	m/u joint 6 to 7
011_01	06/17/2010 08:45:10AM	12.79	89.46	20,140.43	9.85	3,762.14	9.84	16,378.29	0.01	m/u joint 8 to 10
010_01	06/17/2010 08:33:37AM	12.79	102.25	23,172.64	11.25	3,337.38	11.21	19,835.26	0.05	m/u joint 9 into 10
009_01	06/17/2010 08:09:55AM	12.79	115.03	19,843.15	10.24	3,762.14	10.15	16,081.01	0.09	m/u joint 11 into 13
008_01	06/17/2010 07:58:18AM	12.73	127.76	19,605.33	10.33	4,308.25	10.24	15,297.08	0.09	m/u joint 12 into 13
007_01	06/17/2010 07:28:26AM	12.77	140.52	20,259.34	9.81	7,160.19	9.53	13,099.15	0.29	m/u joint 14 into 16
006_01	06/17/2010 07:15:42AM	12.79	153.31	23,351.01	11.01	1,516.99	10.87	21,834.02	0.15	m/u joint 15 into 16
005_02	06/17/2010 05:58:41AM	12.79	166.10	24,540.11	10.04	4,429.61	9.95	20,110.50	0.09	m/u joint 17 into 19
004_01	06/17/2010 05:35:56AM	12.79	178.89	19,664.79	10.84	4,186.89	10.75	15,477.90	0.09	m/u joint 19 into 18
003_01	06/17/2010 05:11:59AM	12.79	191.67	21,686.26	10.39	2,973.30	10.27	18,712.96	0.13	m/u joint 20 into 22
002_01	06/17/2010 04:56:52AM	12.79	204.46	20,378.25	10.42	3,762.14	10.35	16,616.11	0.07	m/u joint 22 into 21
001_01	06/17/2010 02:57:40AM	12.79	217.25	22,518.63	7.81	4,429.61	7.70	18,089.02	0.11	m/u joint 24 into 25

Technical Marketing Sheet

Casing Running Tools (CRT)

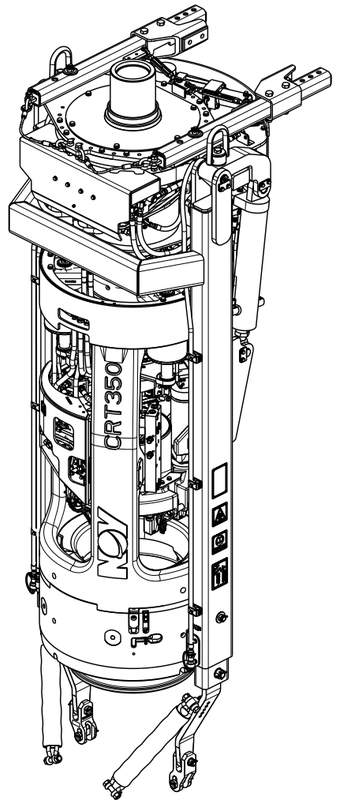
*For reference only, please contact your local sales contact for more information.

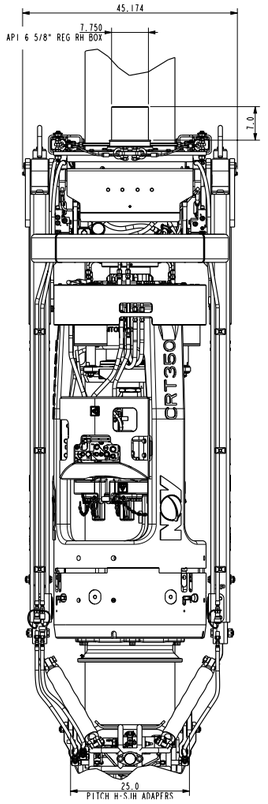
To streamline your casing operations and better protect your crew's safety, the Casing Running Tool (CRT) combines the casing handling functionalities of the top drive, Flush Mounted Spider (FMS) or PS21/PS30, fill-up and circulation tool and hydraulic single joint elevator. Connected directly to the top drive main shaft, the CRT simultaneously hoists and lowers casing, and additionally, makes the casing connection. It also enables you to rotate, reciprocate and circulate the casing string. Combining all these functions into one tool translates to less time spent on casing operations and more time spent drilling towards your pay load, all while still keeping your crew safe.

Benefits:

- Eliminates stabbing-board operations - less manual handling in the V-door and fewer safety hazards.
- Reduces size of needed casing crew - minimized stand by costs associated with weather or problematic well conditions.
- Increases possibility of setting casing at target depth through CRT's ability to push, circulate and rotate the casing simultaneosly.
- Eliminates need for links with a single load-path design.
- Balances out the weight of the CRT through cushioned weight compensation.
- Enables fast change out of seal and guide elements when mixed strings are run.
- Decreased downtime due to FAC tool issues.
- Allows CRT to pick up a new joint from the V-door.
- The CRT has an air operated compensator to enable soft stabbing, allow for thread compensation and minimizes the risk of thread damage
- Driller controls and determines the running/tripping speed, spin-in and make-up torques.
- A pipe sensor detects the casing coupling in order for the slips to set automatically at correct position, ensuring casing connection integrity.

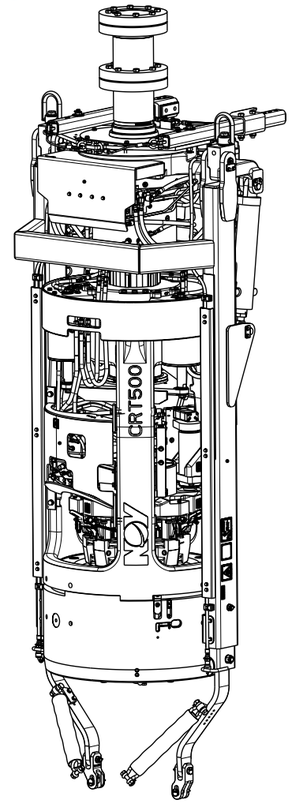
CRT350

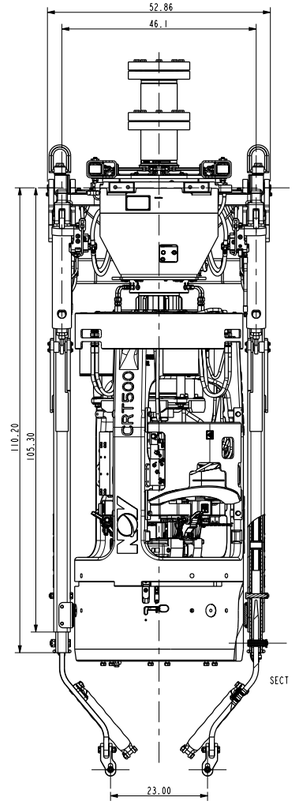




Description	CRT350
API 8C Hoist Rating (sTon)	350
Casing Size	4½" to 9⅞"
Fill-Up and Circulation	4½" to 9⅞" circulation and fill-up (fill-up, circulate, and recovery over the full range)
Maximum Mud Circulation Pressure [psi/kPa]	up to 5,000 / 34,474 (size dep.)
Rotational speed [rpm]	0-20 (intermittent)
Weight (fully dressed, typical) [lbs/kg]	10,500 / 4,762
Maximum Push Down Force [lbs/kg]	20,000 / 9,072 (static)
Ambient Temperature Range [C]	-20° to +40°
Maximum Torque [ft.lbs/ Nm]	35,000 / 47,460
Shaft connection	6⅝" API Reg. RH (box) 7¾"OD tool joint
Diameter of CRT body	32"
Width of CRT assembly	44.3"
Height	116.3" (compensator mid stroke, from shaft shoulder to CRT bell guide)
Height	139.8" (link arm fully in, from shaft shoulder to H-SJH/UX)
Link tilt tilt-out distance [ft / m]	15 / 4.5

CRT500





Description	CRT500
API 8C Hoist Rating (sTon)	500
Casing Size	4½" to 14"
Fill-Up and Circulation	4½" - 14" circulation and fill-up (fill-up, circulate and recovery over the full range)
Maximum Mud Circulation Pressure [psi/kPa]	up to 5,000 / 34,474 (size dep.)
Rotational speed [rpm]	0-20
Weight (fully dressed, typical) [lbs/kg]	15,876 / 7,200
Maximum Push Down Force [lbs/kg]	40,000 / 18,144
Ambient Temperature Range [C]	-20° to +40°
Maximum Torque [ft.lbs/ Nm]	55,000 / 74,580
Shaft connection	7⅝" API Reg. RH (box) 8⅝"OD tool joint
Diameter of CRT body	40"
Width of CRT assembly	53.5"
Height	146.4" (compensator mid stroke, from shaft shoulder to CRT bell guide)
Height	166.8" (link arm fully in, from shaft shoulder to H-SJH/UX)
Link tilt tilt-out distance [ft / m]	21 / 6.4

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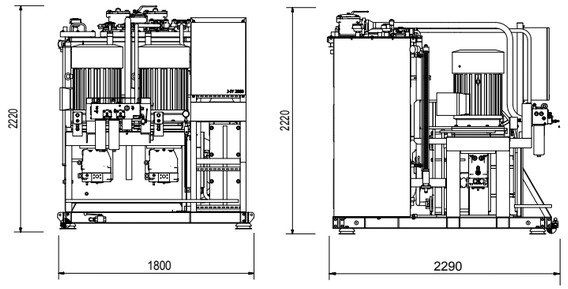
O-series Hydraulic Power Units

*For reference only, please contact your local sales contact for more information.

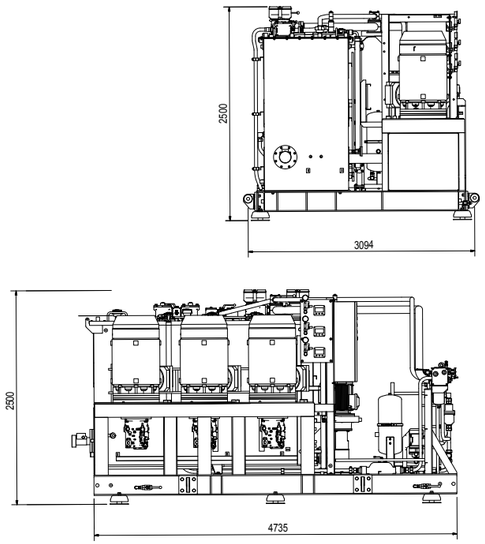
The Hydraulic Power Unit (HPU) is a skid mounted free-standing unit designed to feed high pressure hydraulic oil, with appropriate cleanness, to both drilling equipment ring line system (open loop type) and Active Heave Compensator (AHC). The HPU skid is a self-bearing steel frame with lifting brackets. This design eases deck interface, installation and handling. The unit is designed for locations in both safe zones or hazardous areas and may be operated locally or remotely from driller's cabin.

HPU-O-2



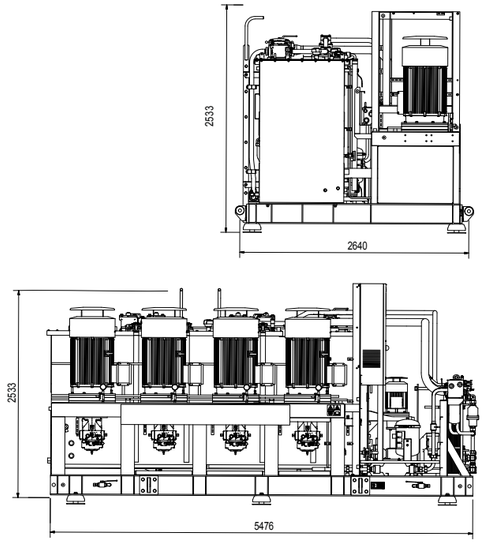
Technical specifications	
DESIGN DATA	
Area classification	SAFE AREA (options for EXX sone 2 - IIB-T3)
Cleanliness	ISO 17/15/12 (NAS 1638 Class 6)
Oil temperature	40 - 60 degrees celsius
Weight, dry [kg]	3,500 approx
Equipment size (L x W x H) [mm]	1,800 x 2,290 x 2,220
UTILITY CONSUMPTION	
Normal oil level [liter]	1,000 - 1,500
Max. Hydr. ringline flowrate [l/min]	500 (2 x 250)
Normal operating pressure [barg.]	207
Voltage [V]	400 - 690
Frequency [Hz]	60
Electrical power - motor heating [kW]	204.3 + 18 (2x 99 + 6.3) 230 V (100 W)
COOLER	
Cooling medium/type	Fresh water
Max inlet temperature	36 degrees celsius
Required cooling medium flow rate [l/min]	100
Max oil flow [l/min]	300
Max heat transfer at max oil temperature [kW]	50
OPTION	
Cooling medium/type	Sea water
Max inlet temperature	28 degrees celsius

HPU-O-3



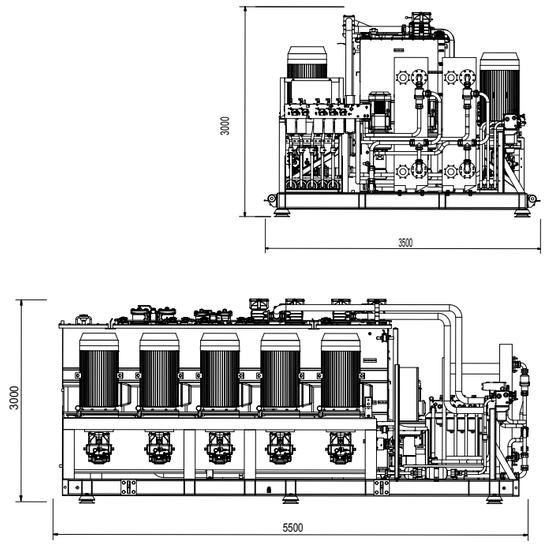
Technical specifications	
DESIGN DATA	
Area classification	SAFE AREA (options for EXX sone 2 - IIB-T3)
Cleanliness	ISO 17/15/12 (NAS 1638 Class 6)
Oil temperature	40 - 60 degrees celsius
Weight, dry [kg]	9,000 approx
Equipment size (L x W x H) [mm]	4,735 x 3,094 x 2,500
UTILITY CONSUMPTION	
Normal oil level [liter]	2,600 - 3,500
Max. Hydr. ringline flowrate [l/min]	915 (3 x 305)
Normal operating pressure [barg.]	207
Voltage [V]	400 - 690
Frequency [Hz]	60
Electrical power - motor heating [kW]	375 + 18 (3x 125 + 2 x 9) 230 V (100 W)
COOLER	
Cooling medium/type	Fresh water
Max inlet temperature	36 degrees celsius
Required cooling medium flow rate [l/min]	2 x 420
Max oil flow [l/min]	2 x 300
Max water pressure [barg.]	10
Max heat transfer at max oil temperature [kW]	2 x 100
OPTION 1	
Cooling medium/type	Sea water
Max inlet temperature	28 degrees celsius
OPTION 2	
Cooling medium/type	Air
Max inlet temperature	45 degrees celsius

HPU-O-4



Technical specifications	
DESIGN DATA	
Area classification	SAFE AREA (options for EXX sone 2 - IIB-T3)
Cleanliness	ISO 17/15/12 (NAS 1638 Class 6)
Oil temperature	40 - 60 degrees celsius
Weight, dry [kg]	12,500 approx
Equipment size (L x W x H) [mm]	5,476 x 2,640 x 2,533
UTILITY CONSUMPTION	
Normal oil level [liter]	4,500
Max. Hydr. ringline flowrate [l/min]	1,600 (4 x 400)
Normal operating pressure [barg.]	207
Voltage [V]	400 - 690
Frequency [Hz]	60
Electrical power - motor heating [kW]	660 + 15 (4x 165 + 7.5 + 2) 230 V (100 W)
COOLER	
Cooling medium/type	Fresh water
Max inlet temperature	36 degrees celsius
Required cooling medium flow rate [l/min]	680
Max oil flow [l/min]	510
Max water pressure [barg.]	10
Max heat transfer at max oil temperature [kW]	260
OPTION 1	
Cooling medium/type	Air
Max inlet temperature	45 degrees celsius
OPTION 2	
cooling medium/type	Air
Max inlet temperature	45 degrees celsius

HPU-O-5A



Technical specifications	
DESIGN DATA	
Area classification	SAFE AREA (options for EXX sone 2 - IIB-T3)
Cleanliness	ISO 17/15/12 (NAS 1638 Class 6)
Oil temperature	40 - 60 degrees celsius
Weight, dry [kg]	17,000 approx
Equipment size (L x W x H) [mm]	5,500 x 3,500 x 3,000
UTILITY CONSUMPTION	
Normal oil level [liter]	7,500 - 9,500
Max. Hydr. ringline flowrate [l/min]	2,000 (5 x 400)
Normal operating pressure [barg.]	207
Voltage [V]	400 - 690
Frequency [Hz]	60
Electrical power - motor heating [kW]	851 (5 x 165 + 13 + 2) 230 V (100 W)
COOLER	
Cooling medium/type	Fresh water
Max inlet temperature	36 degrees celsius
Required cooling medium flow rate [l/min]	680
Max oil flow [l/min]	510
Max water pressure [barg.]	10
Max heat transfer at max oil temperature [kW]	260
OPTION 1	
Cooling medium/type	Sea water
Max inlet temperature	32 degrees celsius
AHC	
Max hydraulic flow rate [l/min]	3 x 300 (900 l.)
Normal operating pressure [barg.]	170

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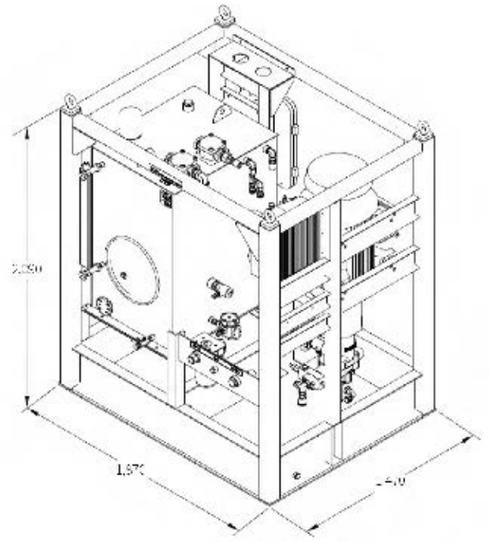
HE-series Hydraulic Power Units

*For reference only, please contact your local sales contact for more information.

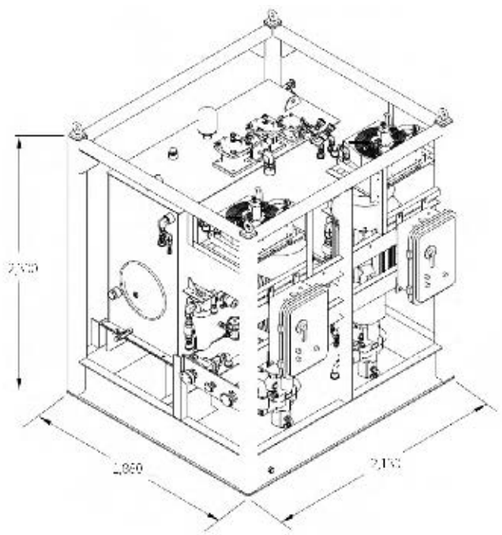
The Hydraulic Power Unit (HPU) is a skid mounted free-standing unit designed to feed high pressure hydraulic oil, with appropriate cleanness, to the drilling equipment ring line system (open loop type). The HPU skid is a self-bearing steel frame with lifting brackets. This design eases deck interface, installation and handling. The unit is designed for locations in both safe zones or hazardous areas and may be operated locally or remotely from driller's cabin.

HE-150VHP-150G-AC



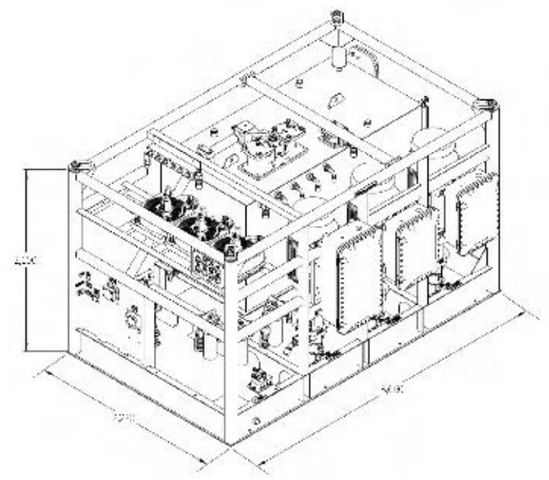
Technical specifications	
DESIGN DATA	
Area classification	Explosion proof UL class 1 Div
Cleanliness	ISO 17/15/12 (NAS 1638 Class 6)
Ambient rating	-20 to 55 degrees celsius
Weight, dry [kg]	2,200 approx (4,850 lbs)
Equipment size (L x W x H) [mm]	1,870 x 1,470 x 2,090 (73.5" x 58.0" x 82.38")
UTILITY CONSUMPTION	
Usable oil volume [liter]	570 (150 gal.)
Max. Hydr. ringline flowrate [l/min]	265 (70 gpm)
Normal operating pressure [barg.]	207 (3,000 psi)
Voltage [V]	460
Frequency [Hz]	60
Electrical power - motor heating [Hp]	100
COOLER	
Cooling medium/type	Air
Cooling oil flow [l/min]	57 (15 gpm)
Max heat transfer at max oil temperature [Kw]	25

HE100-2-150VHP-300G-AC



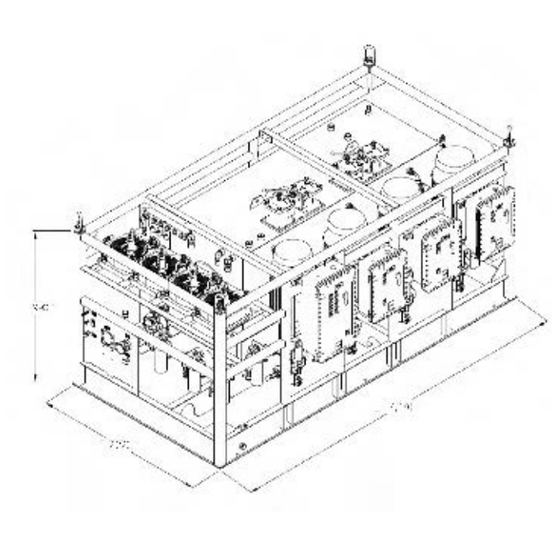
Technical specifications	
DESIGN DATA	
Area classification	Explosion proof UL Class 1 Div
Cleanliness	ISO 17/15/12 (NAS 1638 Class 6)
Ambient rating	-20 to 55 degrees Celsius
Weight, dry [kg]	3,630 approx (8,000 lbs)
Equipment size (L x W x H) [mm]	2,130 x 1,880 x 2,300 (84.0" x 74.0" x 90.5")
UTILITY CONSUMPTION	
Usable oil volume [liter]	1,135 (300 gal)
Max. Hydr. ringline flowrate [l/min]	530 (2 x 265) (140 gpm)
Normal operating pressure [barg.]	207 (3,000 psi)
Voltage [V]	460
Frequency [Hz]	60
Electrical power - motor heating [Hp]	200 (2 x 100)
COOLER	
Cooling medium/type	Air
Cooling oil flow	57 x 2 (15 gpm x 2)
Max heat transfer at max oil temperature [kW]	2 x 25

HE100-3-150VHP-500G-AC



Technical specifications	
DESIGN DATA	
Area classification	Explosion proof UL Class 1 Div
Cleanliness	ISO 17/15/12 (NAS 1638 Class 6)
Ambient rating	-20 to 55 degrees Celsius
Weight, dry [kg]	5,900 approx (13,000 lbs)
Equipment size (L x W x H) [mm]	3,660 x 2,220 x 2,150 (144.0" x 87.5" x 84.38")
UTILITY CONSUMPTION	
Usable oil volume [liter]	1,890 (500 gal)
Max. Hydr. ringline flowrate [l/min]	795 (3 x 265) (210 gpm)
Normal operating pressure [barg.]	207 (3,000 psi)
Voltage [V]	460
Frequency [Hz]	60
Electrical power - motor heating [Hp]	300 (3 x 100)
COOLER	
Cooling medium/type	Air
Cooling oil flow [l/min]	76 x 3 (20 gpm x 3)
Max heat transfer at max oil temperature [kW]	3 x 25

HE100-4-150VHP-600G-AC



Technical specifications	
DESIGN DATA	
Area classification	Explosion proof UL Class 1 Div
Cleanliness	ISO 17/15/12 (NAS 1638 Class 6)
Ambient rating	-20 to 55 degrees Celsius
Weight, dry [kg]	8,620 approx (19,000 lbs)
Equipment size (L x W x H) [mm]	4,470 x 2,220 x 1,990 (176" x 87.5" x 78.38")
UTILITY CONSUMPTION	
Usable oil volume [liter]	2,270 (600 gal)
Max. Hydr. ringline flowrate [l/min]	1,060 (4 x 265) (280 gpm)
Normal operating pressure [barg.]	207 (3,000 psi)
Voltage [V]	460
Frequency [Hz]	60
Electrical power - motor heating [Hp]	400 (4 x 100)
COOLER	
Cooling medium/type	Air
Cooling oil flow [l/min]	76 x 4 (20 gpm x 4)
Max heat transfer at max oil temp [kW]	4 x 25

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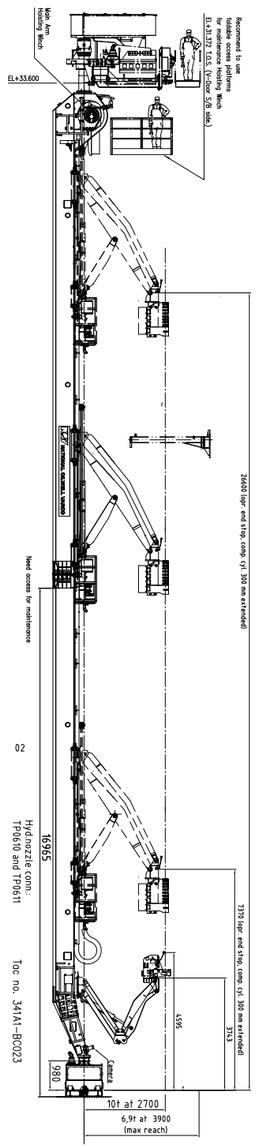
Parallel Racking Pipe Handling

*For reference only, please contact your local sales contact for more information.

Hydraracker III™

The HydraRacker III is a manual, semi-automatic and automatic two-arm system. Two trolleys carry the column. The lower trolley runs on rail on main deck, the upper trolley runs on beam attached to the derrick. A hoisting Winch, sited on the upper part of the column, performs the hoisting by lifting the Main Arm. The Main is equipped with a clamping Grip Head for lifting the stand and a Guide Claw to support the stand when gripper head changing grip at the stand during stand building/ break down. The Tail arm is fixed in the lower section of the column and is equipped with a Guide Head for horizontal guiding. All components are designed for offshore duty in a highly saline atmosphere with high humidity.

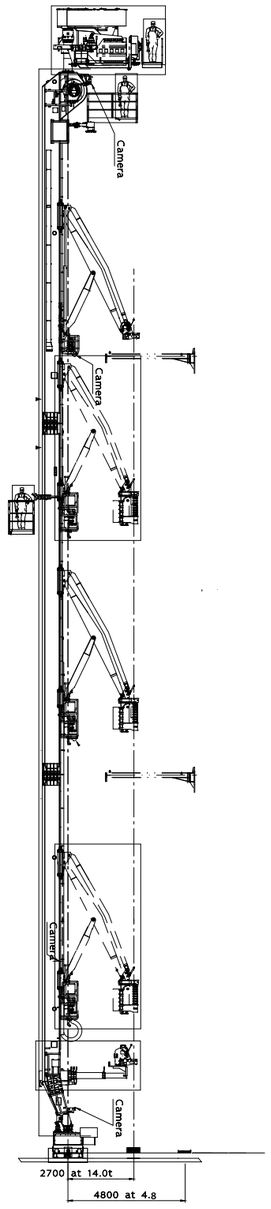


SWL		Maximum Reach	
TONS	MT	METERS	INCHES
11.0	10	2.7	106.3
7.6	6.9	3.9	153.5

Technical Specifications	
Weight	122,356 lbs (55,499 kg)
Max. Column Height (Vertical)	110'
Max Reach Out (m)	3.9m
Vertical Travel (m)	67.25 ft (20.5M)
Hoist Capacity	106'' Arm Ext. 22,046 Lbs 154'' Arm Ext. 15,212 Lbs
Hoisting Arm Reach (Horizontal)	154'' Max 35'' Min
Column Rotation	180 degrees
Arms	2
TUBULAR CAPACITIES	
Pipe Size	Triple, Range II
Diameter (in) standard	3 1/2'' – 13 5/8''
UTILITY REQUIREMENTS	
Number of Motors	4 Hydraulic
Stand Building	Y
Riser Handling	N
Thread Comp	N
Hoisting Mechanism	Single Hydraulic Winch
Prime Mover	Hydraulic Motors & Cylinders
Column Travel	Dual Synchronized but Independent Drives

Hydraracker IV ER™

The HydraRacker IV ER is a manual, semi-automatic and automatic three-arm system. Two trolleys carry the column. The Lower trolley runs on rail on drillfloor, the Upper Trolley runs on beam attached to the derrick. A Hoisting Winch, sited on the upper part of the column, performs the hoisting by lifting the Main Arm. The Main Arm is equipped with a clamping Gripper Head for lifting the stand and a Guide Claw to support the stand when gripper head changing grip at the stand during stand building/ break down. The Tail Arm is fixed in the lower section of the column and the Upper Guide Arm is fixed in the upper section of the column. All components are designed for offshore duty in a highly saline atmosphere with high humidity.



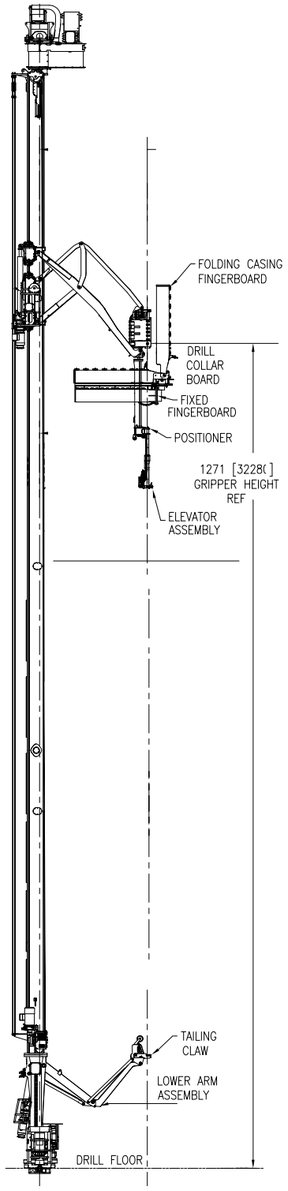
SWL		Maximum Reach	
TONS	MT	METERS	INCHES
16.5	15	2.7	106.3
13.8	12.5	3.3	153.5
11.0	10	3.9	153.5
7.7	7	4.8	189.0

Technical Specifications	
Weight	97,886 lbs (89,760kg)
Max. Column Height (Vertical)	145'
Max Reach Out (m)	4.8m
Vertical Travel (m)	78.74 ft (24M)
Hoist Capacity	160'' Arm Ext. 30,864 Lbs 188'' Arm Ext. 9,920 Lbs
Hoisting Arm Reach (Horizontal)	188'' Max. 35'' Min.
Column Rotation	180 Degrees
Arms	3
TUBULAR CAPACITIES	
Pipe Size	Quad, Range II & III
Diameter (in) standard	2 7/8'' - 14''
UTILITY REQUIREMENTS	
Number of Motors	7 Hydraulic
Stand Building	Y
Riser Handling	N
Thread Comp	N
Hoisting Mechanism	Single Hydraulic Winch
Prime Mover	Hydraulic Motors & Cylinders
Column Travel	Dual Synchronized but Independent Drives

PRS-6™

The PRS-6 consists of a vertical column assembly that traverses the rig floor between well center and pipe setback area to support tripping operations. The column rides on a lower drive assembly, which guides and drives the column along a drive track mounted on the rig floor. The upper end of the column is guided on a similar track, which spans the rig and is pinned at both ends to customer supplied derrick mounting structures. The lower drive assembly turns a shaft in the center of the column that has gears on each end to engage into their respective drive track. Driving timing between the lower and upper portion of the column is achieved through this drive shaft, keeping the column vertically aligned. The PRS-6 uses two arm assembly for guiding tubular stand and singles.

Pipe handling operations between well center and the setback area, and within the setback area are performed by extending or retracting the arms, hoisting or lowering the upper arm, rotating the column and driving the column laterally across the drill floor.



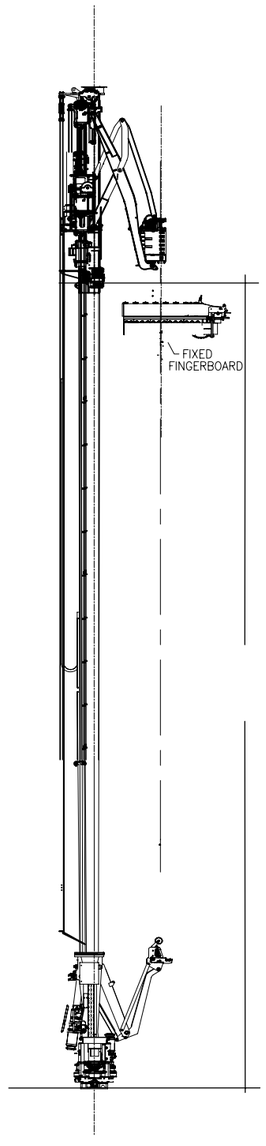
SWL		Maximum Reach	
TONS	MT	METERS	INCHES
11.0	9.98	3.0	120.0
7.3	6.6	4.6	180.0

Technical Specifications	
Weight	137,342 lbs (62,297 kg)
Max. Column Height (Vertical)	148'
Max Reach Out (m)	12' (3.7m); 15' (4.6 m)* (optional)
Vertical Travel (m)	130.5 ft (39.7M)
Hoist Capacity	120'' Arm Ext. 22,000 Lbs 180'' Arm Ext. 14,667 Lbs
Hoisting Arm Reach (Horizontal)	180'' Max 38'' Min
Column Rotation	270 Degrees
Arms	2
TUBULAR CAPACITIES	
Pipe Size	Rng II Qds, Rng III Tpl
Diameter (in) standard	3 1/2'' – 13 5/8''
UTILITY REQUIREMENTS	
Number of Motors	6 Electric
Stand Building	Y
Riser Handling	Y
Thread Comp	Y
Hoisting Mechanism	Dual Electric Motor
Prime Mover	Electric
Column Travel	Mechanical Main Shaft through Column

PRS-4™

The PRS-4 consists of a vertical column assembly that traverses the rig floor between well center and pipe setback area to support tripping operations. The column rides on a lower drive assembly, which guides and drives the column along a drive track mounted on the rig floor. The upper end of the column is guided on a similar track, which spans the rig and is pinned at both ends to customer supplied derrick mounting structures. The lower drive assembly turns a shaft in the center of the column that has gears on each end to engage into their respective drive track. Driving timing between the lower and upper portion of the column is achieved through this drive shaft, keeping the column vertically aligned. The PRS-4 uses two arm assembly for guiding tubular stand and singles.

Pipe handling operations between well center and the setback area, and within the setback area are performed by extending or retracting the arms, hoisting or lowering the upper arm, rotating the column and driving the column laterally across the drill floor.



SWL		Maximum Reach	
TONS	MT	METERS	INCHES
11.0	9.98	3.0	120.0
7.3	6.6	4.6	180.0

Technical Specifications	
Weight	139,902 lbs (63,459kg)
Max. Column Height (Vertical)	106'
Max Reach Out (m)	12' (3.7m); 15' (4.6 m)* (optional)
Vertical Travel (m)	130.5 ft (39.7M)
Hoist Capacity	120'' Arm Ext. 22,000 Lbs 180'' Arm Ext. 14,667 Lbs
Hoisting Arm Reach (Horizontal)	180'' Max 38'' Min
Column Rotation	270 Degrees
Arms	2
TUBULAR CAPACITIES	
Pipe Size	Rng II Tpl, Rng III Dbl
Diameter (in) standard	3 1/2'' – 13 5/8''
UTILITY REQUIREMENTS	
Number of Motors	6 Electric
Stand Building	Y
Riser Handling	Y
Thread Comp	Y
Hoisting Mechanism	Dual Electric Motor
Prime Mover	Electric
Column Travel	Mechanical Main Shaft through Column

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X-Y Racking Pipe Handling

*For reference only, please contact your local sales contact for more information.

PRS-8

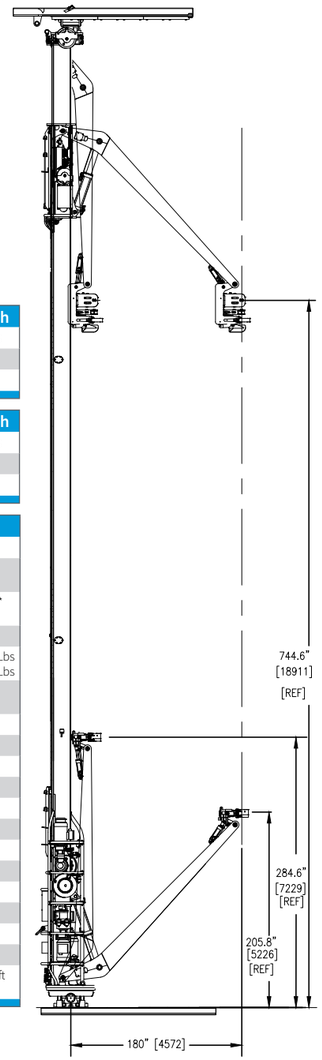
The PRS-8 is a pipe racking system that utilizes modular and robust PRS design standards to ensure uniformity and optimum flexibility. A modern AC control system delivers consistent reliability with high performance, enabling operators to maintain safe, high-speed operations across its functional range. The PRS-8 offers both automated tripping and a hoist stroke for offline stand building. Compact design- X-Y Racking Configuration. A traditional X-Y fully latched fingerboard layout is used with the PRS-8. This compact design maximizes available drill pipe storage area while being suitable for retrofit into many of today's MODU derricks

- Engineered for durability and reliability
- Ease of installation, commissioning, and operation
- Suitable for dynamic applications

PRS-8i SWL		Maximum Reach	
TONS	MT	METERS	INCHES
11.0	9.98	3.0	120.0
7.3	6.6	3.7	144.0

PRS-8i ER SWL		Maximum Reach	
TONS	MT	METERS	INCHES
11.0	9.98	3.0	120.0
7.3	6.6	4.6	180.0

Specifications	
Weight	65,754 lbs (29,825 kg)
Max. Column Height (Vertical)	87'
Max Reach Out (m)	12' (3.7m); 15' (4.6 m)* (optional)
Vertical Travel (m)	64.5 ft (19.66M)
Hoist Capacity	120'' Arm Ext. 22,000 Lbs 180'' Arm Ext. 16,000 Lbs
Hoisting Arm Reach (Horizontal)	144'' Max. 24.5'' Min
Column Rotation	225 Degrees
Arms	2
TUBULAR CAPACITIES	
Pipe Size	Triple, Range II
Diameter (in) standard	3 ½'' – 9 ¾''
UTILITY REQUIREMENTS	
Number of Motors	4 Electric
Stand Building	Y
Riser Handling	Y
Thread Comp	N
Hoisting Mechanism	Dual Electric Motor
Prime Mover	Electric
Column Travel	Mechanical Main Shaft Through Column



Hydraracker XY

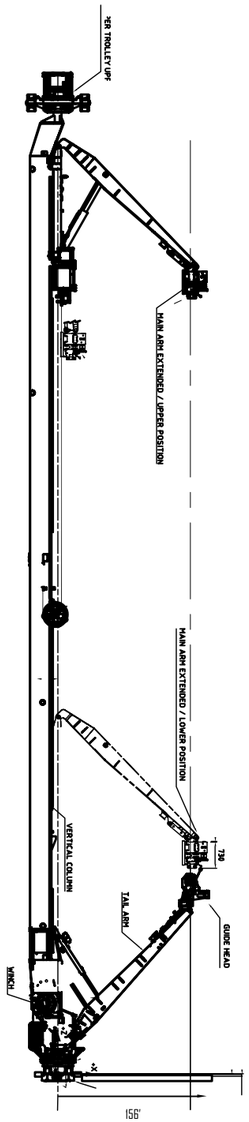
The machine supports the tubular weight and performs all normal racking operations.

The main components in the HydraRacker are the Rotating Vertical Column with Tail Arm, Main Arm, Upper and Lower Horizontal Drive, Hoisting Winch, Elevator and Control System (PLC). Engineered for durability and ease of operation, the XY Column Rackers optimize operational flexibility and efficiency. These machines utilize a state-of-the-art robotics control system that deliver consistent reliability and high performance. NOV's XY Column Rackers offer automated tripping and offline standbuilding capacities in a static of dynamic environment.

- Engineered for durability and reliability
- Ease of installation, commissioning, and operation
- Suitable for dynamic applications.

SWL		Maximum Reach	
TONS	MT	METERS	INCHES
11.0	9.98	3.0	120.0
7.3	6.6	3.7	144.0

Specifications	
Weight	53,793 lbs (24,400 kg)
Max. Column Height (Vertical)	88'
Max Reach Out (m)	12' (3.7m); 15' (4.6 m)* (optional)
Vertical Travel (m)	42.65ft (13M)
Hoist Capacity	120'' Arm Ext. 22,000 Lbs 180'' Arm Ext. 16,000 Lbs
Hoisting Arm Reach (Horizontal)	144'' Max. 24.5'' Min
Column Rotation	± 1125 Degrees
Arms	2
TUBULAR CAPACITIES	
Pipe Size	Triple, Range II
Diameter (in) standard	3 ½'' – 9 ¾''
UTILITY REQUIREMENTS	
Number of Motors	4 Electric
Stand Building	Y
Riser Handling	Y
Thread Comp	N
Hoisting Mechanism	Dual Electric Motor
Prime Mover	Electric
Column Travel	Mechanical Main Shaft Through Column



Star Racker

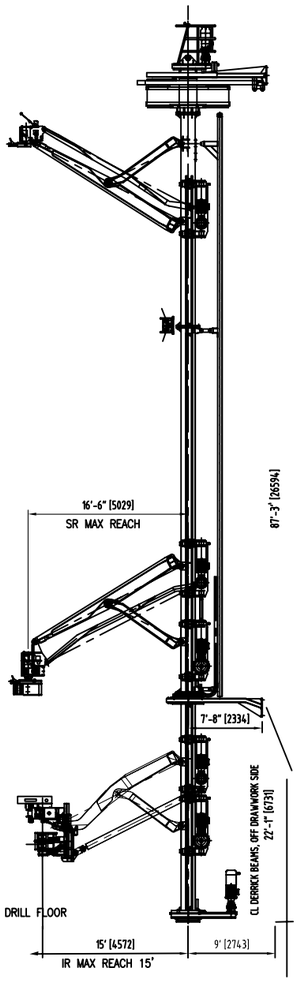
The Star Racker is designed to provide a remote operated machinery for moving tubular stands between well center and setback storage area. The machine is horizontally supported to the derrick at 22' of the derrick and at the fingerboard level. The Star Racker has also a positioning arm for Iron Roughneck.

The Star Racker consists of the following main parts:

- Column with supports and rotation system
- Lower racking arm with hoist
- Upper racking arm
- Iron Roughneck positioning arm
- Fingerboard for DP and casing finger
- Electrical control cubicles inclusive PLC and AC drive for remote control.
- Casing guiding claw.
- Single joint tool with soft stabbing– casing

SWL		Maximum Reach	
TONS	MT	METERS	INCHES
11.0	9.98	5.029	197.99
3.25	2.95	5.029	197.99

Specifications	
Weight	57800 lbs. (26200kg)
Max. Column Height (Vertical)	87.3' (26594 mm)
Max Reach Out (m)	16'-6' (5.029m); 16'-6' (5.029 m)*
Vertical Travel (m)	81 ft (24.69M)
Hoist Capacity	120'' Arm Ext. 22,000 Lbs 180'' Arm Ext. 16,000 Lbs
Hoisting Arm Reach (Horizontal)	144'' Max. 24.5'' Min
Column Rotation	+180 degree access for maintenance
Arms	3
TUBULAR CAPACITIES	
Pipe Size	Triple, Range II
Diameter (in) standard	3 1/2" in. to 9 3/4 in.
UTILITY REQUIREMENTS	
Number of Motors	4 Electric
Stand Building	Y
Riser Handling	Y
Thread Comp	N
Hoisting Mechanism	Dual Electric Motor
Prime Mover	Electric
Column Travel	Mechanical Main Shaft Through Column



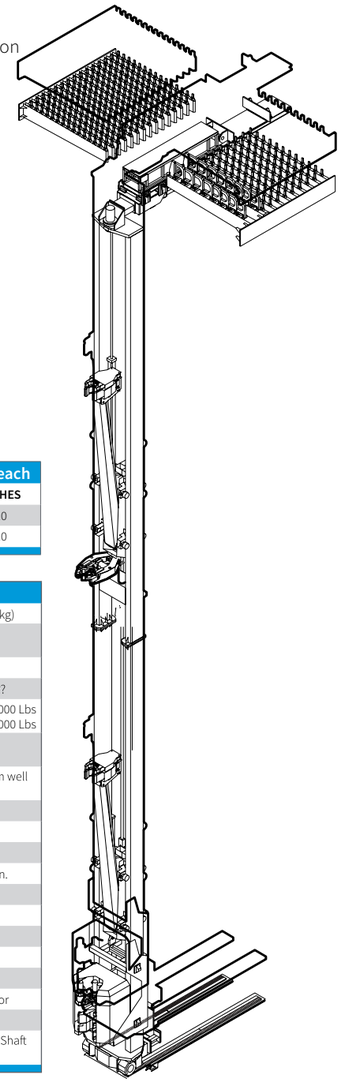
PHM 3i

This automated pipe handling machine system handles up to 93 ft stands of pipe or drill collars during drilling or tripping. The PHM-3i system elimated the need for rig floor hands and a derrickman to manually handle pipe. One attendant can manage normal pipe-handling procedures using the supplied control panels.

- Engineered for durability and reliability
- Ease of installation, commissioning, and operation

SWL		Maximum Reach	
TONS	MT	METERS	INCHES
11.0	9.98	3.0	120.0
7.3	6.6	3.7	144.0

Specifications	
Weight	92,785 lb (42,087 kg)
Max. Column Height (Vertical)	87' (26517 mm)
Max Reach Out (m)	16'-6' (5029 mm)
Vertical Travel (m)	64.5 ft (19.66M) ???
Hoist Capacity	120'' Arm Ext. 22,000 Lbs 180'' Arm Ext. 16,000 Lbs
Hoisting Arm Reach (Horizontal)	120'' Max. 24.5'' Min
Column Rotation	90° Left/right from well center
Arms	2
TUBULAR CAPACITIES	
Pipe Size ?	Triple, Range II
Diameter (in) standard	2 7/8 in. to 9 3/4 in.
UTILITY REQUIREMENTS	
Number of Motors	2 Electric
Stand Building	Y
Riser Handling	Y
Thread Comp	N
Hoisting Mechanism	Dual Electric Motor
Prime Mover	Electric
Column Travel	Mechanical Main Shaft Through Column

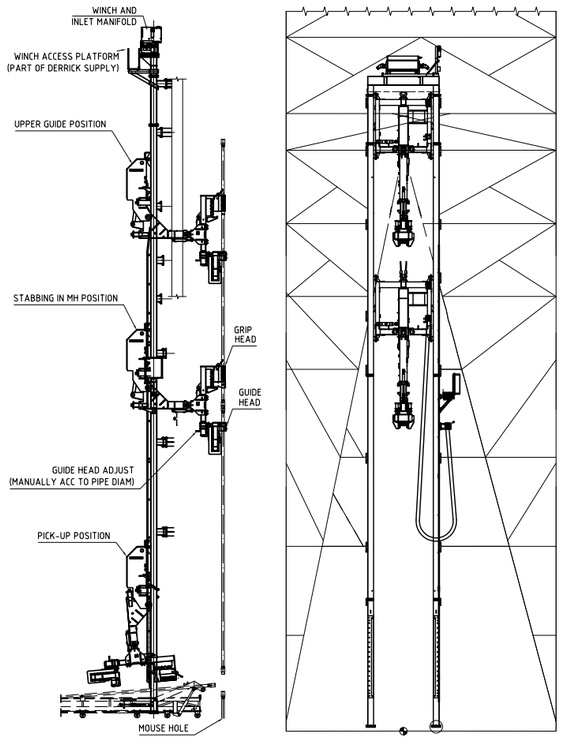


HTV, VDM, PLS-5, PLS-7

*For reference only, please contact your local sales contact for more information.

HTV

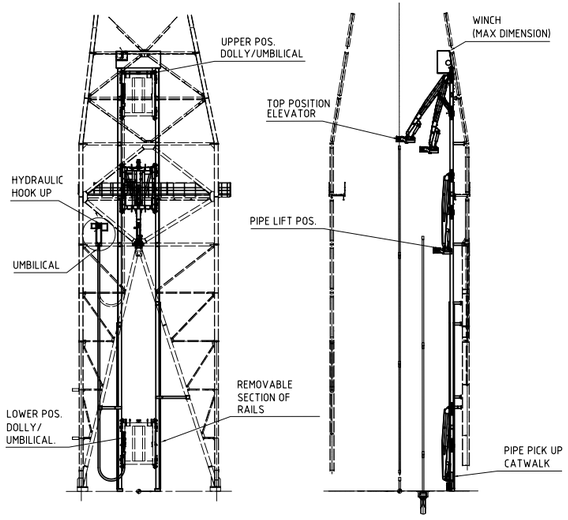
The Horizontal To Vertical machine (HTV) is a remote controlled machine designed to bring tubulars from a horizontal Catwalk Machine to a vertical (inside the derrick) position and position the tubulars in the mousehole for building stands. The HTV guide the upper part of the complete stand for handover to the bridge racker. It can also reverse the operation and bring tubulars from a vertical position to the Catwalk Machine.



Technical Specifications	
HTV DESIGN DATA	
Service	Horizontal to vertical tubular handling
Area classification	IEC Zone 2
Design standards	NS3472 / ENV 1993-1-1 (Eurocode 3), FEM
Rules and regulations	ABS MODU
Safe Working Load (SWL)	7,000 kg (Vertical lifting only) 3,500 kg (Horizontal to vertical lifting or vice versa)
Weight, dry	28,400 kg (including weight of rails)
WINCH	
Weight, dry	1,710 kg
Safe Working Load (SWL)	20,000 kg
Safety	Fail safe brakes. 2 off.
Wire Diameter	25 mm
GRIPPER AND GUIDE HEADS	
Gripper head options	3 ½" - 13 ⅝" and 14"-22"
Guide head options	3 ½" - 13 ⅝" and 14"-22"
UTILITY CONSUMPTION	
Max. hydraulic flow rate	400 l/min
Min. working pressure	180 barg.
Max. operating pressure	207 barg.

VDM

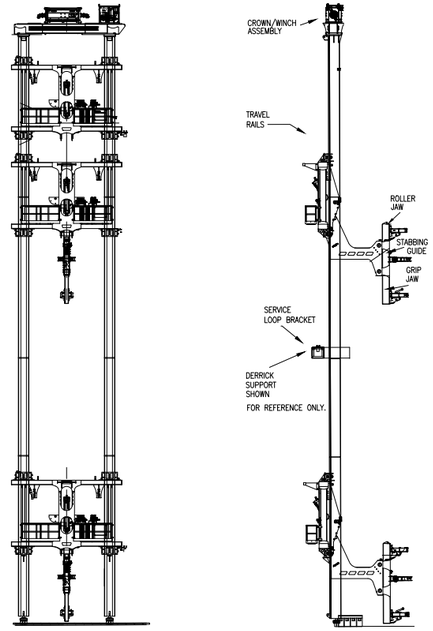
The V-Door Machine (VDM) is a remotely controlled machine primarily designed to trip drill pipe from pipe chute to well center. It can also be used for bringing tubulars from a horizontal Catwalk Machine to a vertical (inside the derrick) position, and position the tubulars in the mousehole for building stands. The machine is remotely operated from the drillers cabin. The VDM consist of a main support frame with an arm controlled by a hydraulic cylinder. The arm can accommodate both an elevator or gripper head. The elevator is primarily used during tripping of drill pipe, but can also be used during stand building of drill pipe up to 6 ⅝". The gripper heads are used during stand building and casing handling up to 22". The machine travels vertically inside the V-door and is hoisted by an electrical winch with a dual drum. It is guided by two guide rails mounted on the derrick wall.



Technical Specifications	
VDM DESIGN DATA	
Service	Horizontal to vertical tubular handling
Area classification	IEC Zone 1
Design standards	NS3472 / ENV 1993-1-1 (Eurocode 3), FEM
Safe Working Load (SWL)	4,500 kg
Weight, dry	8,750 kg (excluding weight of rails)
Weight, dry	28,400 kg (including weight of rails)
WINCH	
Weight, dry	2,500 in
Safe Working Load (SWL)	21,000 in
Safety	Fail safe brakes. 2 off.
Wire diameter	25 mm (2 off)
TRIPPING ELEVATOR	
Tubular handling range	3 ½" - 6⅝"
Safe Working Load (SWL)	4,500 kg
GRIPPER HEAD OPTIONS	
Gripper head option	3 ½" – 13 ⅝" SWL: 10,000kg, 14"-22" SWL: 6,000 kg
Gripper head option	3 ½" – 9 ¾" SWL: 4,500
Max. hydraulic flow rate	470 l/min
Min. working pressure	180 barg.
Max. operating pressure	207 barg.

PLS-5

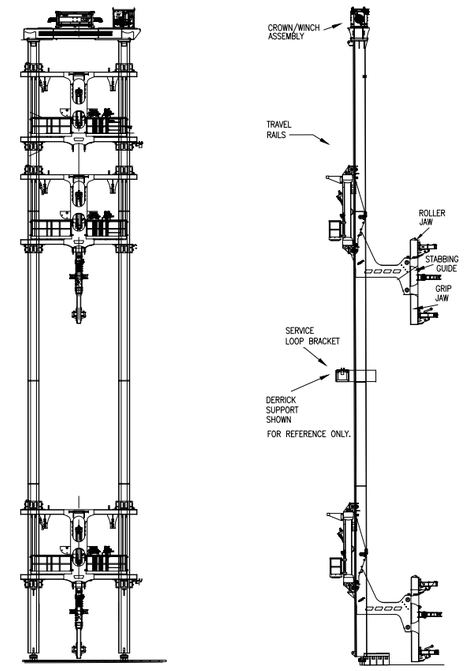
The Pickup Laydown System with 5 metric ton capacity (PLS-5) is a pick up and lay down arm for transferring tubulars from a horizontal position on a conveyor to a vertical position either at the well center or at the mousehole and return.



Technical Specifications	
PLS-5 DESIGN DATA	
Service - Horizontal to vertical tubular handling	
Design standards - "Rules for certification – lifting appliances" - DNV, "Code for lifting appliances in a marine environment" Loyds register of shipping, Varco dynamic design loading specifications	
Reach: CL column to CL well bore	240 in
Reach: CL column to CL mousehole	156 in
Tubular size OD	3 ½ in - 20 in
Hoist capacity at max vessel dynamic conditions	3,200 kg
Hoist capacity at reduced vessel dynamic conditions	4,550 kg
Total weight, carriage and lifting boom	9,000 kg
Total stationary weight, hoist winch, columns, crossbeam:	36,300 kg
STABILIZER ARM	
Gripping jaw OD range options	3 ½" - 9 ¾" and 10" – 20"
Middle jaw OD range options	Lighter weight tubulars (casing) down to 9 ⅝"
Roller jaw OD range options	3 ½" - 9 ¾" and 10" – 20"
SPEED	
Hoisting speed up to 1,590 kg live load	0.8 ft/sec
Hoist speed over 1,590 kg	0.4 ft/sec
Pivoting speed up to 1,590 kg	5.6 °/sec
Pivoting speed over 1,590 kg	3.5 °/sec
Smooth speed change control	0.05 g max accel.
UTILITY CONSUMPTION	
Max. hydraulic flow rate	570 l/min
Max. operating pressure	207 barg.
Hydraulic power	300 hp
Electrical power	120 VAC, single phase, 50/60 hertz, 15 amps

PLS-7

The Pickup Laydown System with 7 metric ton capacity (PLS-7) includes columns, crown, winch, carriage, pivoting boom and telescopic arm. The PLS-7 is one component of a stand building system that is used to deliver single range II or range III tubulars from a horizontal position on a conveyor to a vertical position either at the well center or at the mousehole.



Technical Specifications	
PLS-7 DESIGN DATA	
Service	Horizontal to vertical tubular handling
Boom extension reach	275 in – 295 in
Retraction limit reach	150 in – 170 in
Tubular size OD	3 ½" - 22"
Safe Working Load (SWL)	7,000 kg
Total weight, carriage and lifting boom	15,900 kg
Total stationary weight, hoist winch, columns, crossbeam:	36,300 kg
STABILIZER ARM	
Gripping jaw OD range options	3 ½" - 9 ¾", 10" – 20" and 15" - 22"
Middle jaw OD range options	Lighter weight tubulars (casing) down to 9 ⅝"
Roller jaw OD range options	3 ½" - 9 ¾", 10" – 20" and 15" - 22"
UTILITY CONSUMPTION	
Max. hydraulic flow rate	760 l/min
Max. operating pressure	207 barg.
Hydraulic power	400 hp
Electrical power	120 VAC, single phase, 50/60 hertz, 15 amps

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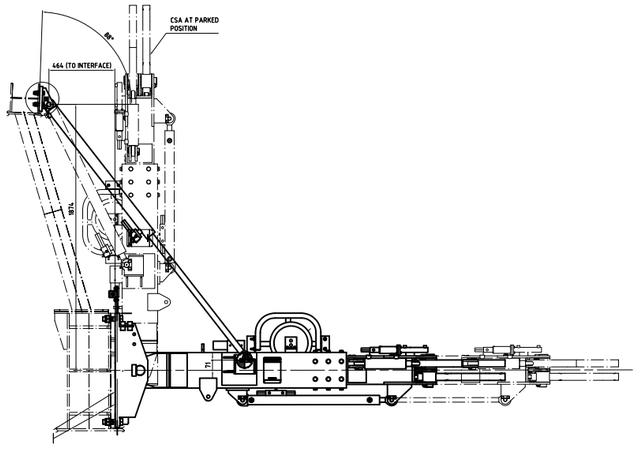
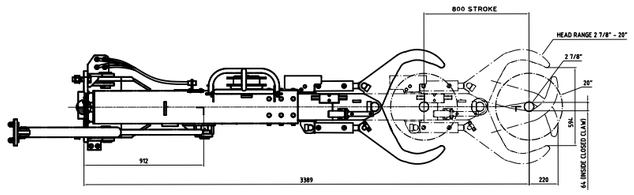
*For reference only, please contact your local sales contact for more information.

Casing Stabbing Arm

The Casing Stabbing Arm (CSA) is mounted on the derrick structure at the required height above the drillfloor. The purpose of the CSA is to bring tubular into position in the well center. The CSA is made of square steel profiles. An external hydraulic cylinder mounted underneath the telescopic boxes provides telescoping. There is a claw at the front tip of each telescope arm. The telescope arm can be tilted to the upright position. The CSA is operated from a control stand located nearby the CSA.

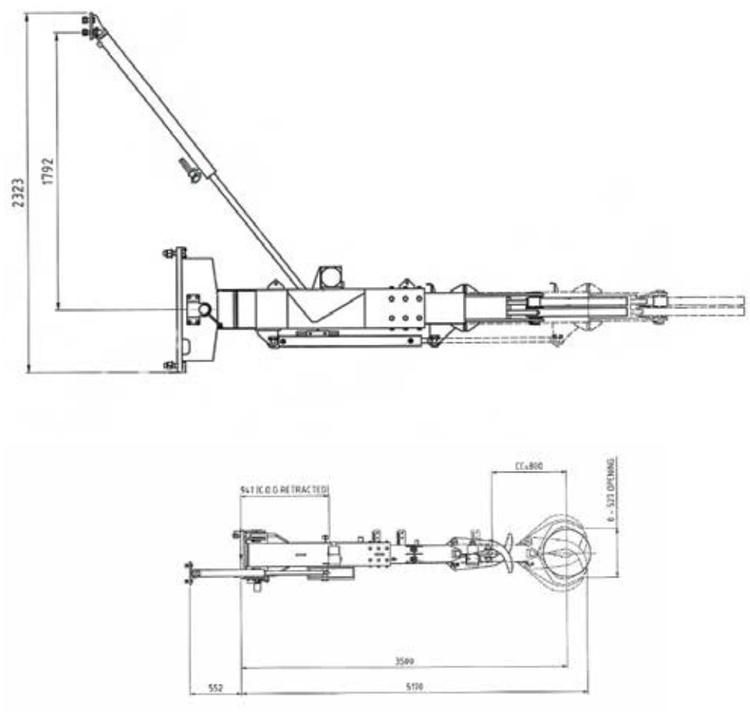




Technical specifications		
DESIGN DATA		
Service		Vertical stabbing and guiding tubular
Area classification		IEC Zone 1
Design standards		FEM "rules for the design of hoisting appliances"
Design temperature	°C	-20 to +45
Weight, dry	kg	750
Weight, operation	kg	780
PERFORMANCE DATA		
Guide head tubular reach	mm (in)	73 - 508 (2 ⅞"- 20")
Reach	mm	2,589 - 3,389
Telescope length	mm	800
Tilt angle	degrees	90
Maximum head load	kN	9
UTILITY CONSUMPTION		
Hydraulic flow rate	l/min.	25
Hydraulic oil pressure, min.	bar	180
Hydraulic oil pressure, max.	bar	207
Power	W	31

Standbuilding Guide Arm - Hydraracker

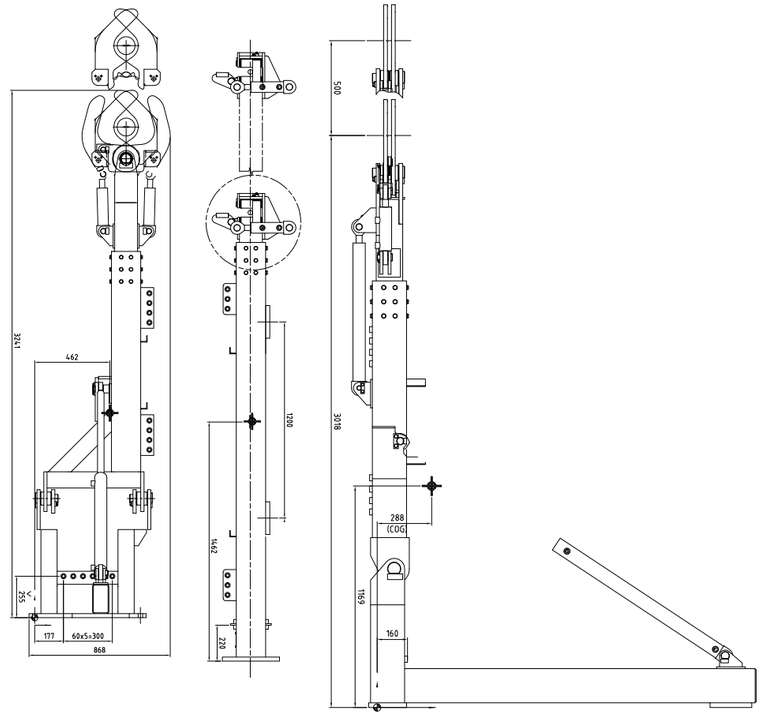
The Standbuilding guide arm - Hydraracker (SB-GA-HR) is mounted on the derrick structure approximately 9.3 meters above the drill floor. The purpose of the SB-GA-HR is to stabilize pipe stands during stand building when the Hydraracker changes gripper position. The SB-GA-HR can also be designed for stabbing operations. It has a telescopic arm with guide claws mounted at the tip.
The SB-GA-HR is normally operated from the driller's cabin, but for maintenance and emergency operations it should be operated from the hydraulic control panel. It is parked in a vertical position to avoid collisions with other drilling equipment.



Technical specifications		
DESIGN DATA		
Service		Guiding and stabbing operations during pipe handling
Area classification		IEC Zone 1
Design standards		FEM "rules for the design of hoisting appliances"
Design temperature	°C	-20 to +45
Weight, dry	kg	700
Weight hydraulic control panel, dry	kg	170
PERFORMANCE DATA		
Claw range	mm (in.)	90 - 508 (3 ½"- 20")
Reach	mm	3,500
Telescope length	mm	800
Tilt angle	degrees	0-90
Maximum head load	kN	9
UTILITY CONSUMPTION		
Hydraulic flow rate	l/min.	25
Hydraulic oil pressure, min.	bar	180
Hydraulic oil pressure, max.	bar	207
Power	W	31

Standbuilding 3-Guide Arm System

The standbuilding 3-guide arm system consists of a lower and upper telescopic guide arm and guide frame. The guide frame is mounted in the derrick structure at the required height above the drill floor. The purpose of the lower telescopic guide arm is to guide the upper part of a double pipe during make-up. The purpose of the upper telescopic arm is to guide the upper part of a triple stand during make-up. The guide frame's purpose is to guide the wire when handling stands. The standbuilding 3-guide arm system is operated from the control stand located on the drill floor.



Technical specifications		
DESIGN DATA		
Service		Handling and guiding of drill pipes during stand-building in a derrick
Area classification		Zone 2
Design standards		FEM "rules for the design of hoisting appliances"
Design temperature	°C	-20 to +45
Weight lower telescopic guide arm	kg	470
Weight upper telescopic guide arm	kg	470
Weight guide frame	kg	260
Weight control valve unit, dry	kg	130
Weight control valve unit, operation	kg	130
PERFORMANCE DATA		
Tubular	mm. (in.)	90 - 168 (3 ½"- 6 ⅝")
Lower telescopic guide arm		Double stand (within tube dimension range)
Upper telescopic guide arm		Triple stand (within tube dimension range)
Guide frame		Single, double and triple stand (within tube dimension range)
Telescope length	mm	800
UTILITY CONSUMPTION		
Hydraulic oil consumption	l/min.	50
Hydraulic oil pressure, min.	bar	80
Hydraulic oil pressure, max.	bar	207

Service and Access Baskets

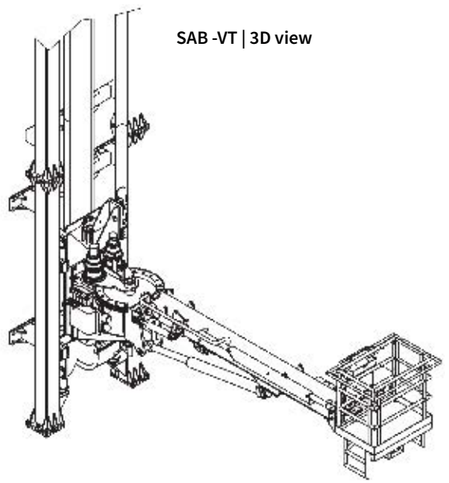
*For reference only, please contact your local sales contact for more information.

Features and Benefits

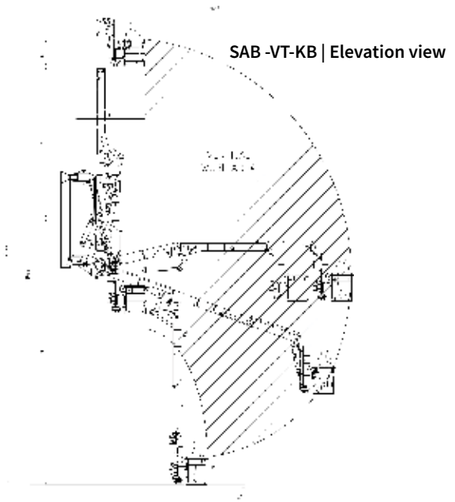
Our service and access baskets are designed to be compatible with a variety of applications by utilizing several different mounting, travel, boom, and basket slew options. We provide fit for purpose solutions to make maintenance on your assets safer and more convenient.

- Vertical rail system designed to provide access to the drillfloor, top drive, and column racker upper bridge/trolley
- Horizontal rail system designed for end-to-end access of the moonpool area
- Knuckleboom model uses compound motion to achieve a smaller footprint and is suited for navigating tighter spaces on the drillfloor
- Kingpost pedestal installation on the x-mas tree skid provides access to the BOP while in the moonpool or the x-mas tree
- Baskets can be mounted to your existing substructure or derrick using stationary adapter plates
- Basket slew options provide added versatility
- All baskets are rated for Zone 1 compliance
- ABS or DNV notation available for each model

Vertical Rail

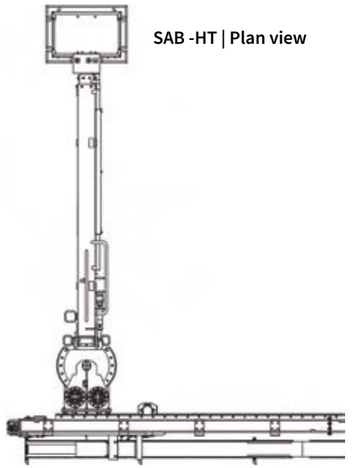


SAB -VT | 3D view



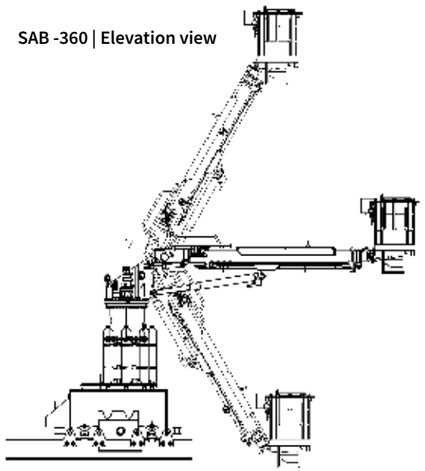
SAB -VT-KB | Elevation view

Horizontal Rail



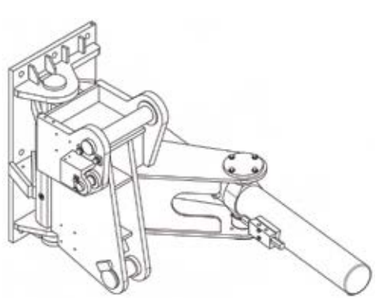
SAB -HT | Plan view

Kingpost Pedestal

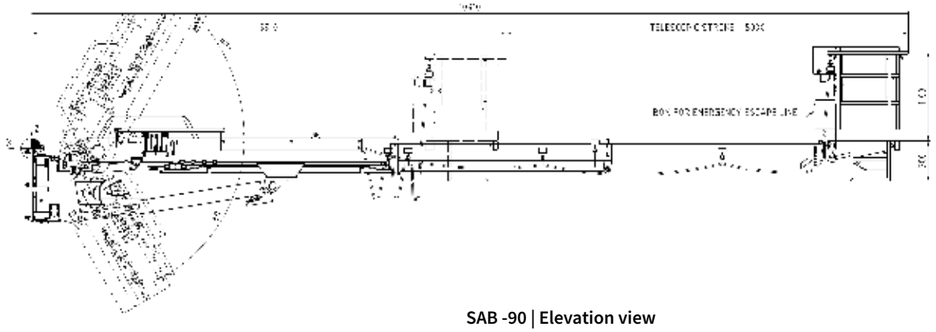


SAB -360 | Elevation view

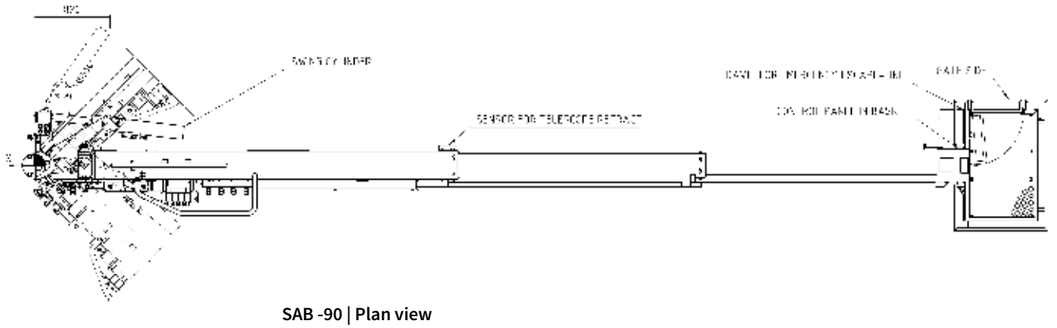
Stationary Adapter Plate



SAB -90/SAB -180 | Stationary Adapter Plate



SAB -90 | Elevation view



SAB -90 | Plan view

Specifications	SAB-90	SAB-180	SAB-360	SAB-HT	SAB-VT	SAB-VT-KB
Area Classification	Zone 1	Zone 1	Zone 1	Zone 1	Zone 1	Zone 1
Design Temperature	-20 °C to +45 °C	-20 °C to +50 °C	-20 °C to +45 °C	-20 °C to +45 °C	-20 °C to +45 °C	-20 °C to +45 °C
Operation Temperature	-20 °C to +45 °C	-20 °C to +50 °C	-20 °C to +45 °C	-20 °C to +45 °C	-20 °C to +45 °C	-10 °C to +45 °C
SWL, Basket	300 kg	300 kg	300 kg	300 kg	300 kg	300 kg
SWL, Davit for Saftey Work Harness	140 kg	140 kg	140 kg	140 kg	140 kg	140 kg
Hydraulic Flow Rate (Max)	75 l/min	75 l/min	75 l/min	75 l/min	145 l/min	200 l/min
Hydraulic Operating Pressure (Min)	180 barg	180 barg	180 barg	180 barg	180 barg	180 barg
Hydraulic Operating Pressure (Max)	207 barg	207 barg	207 barg	207 barg	207 barg	207 barg
Equipment Shipment Size (L x W x H) (SAB placed in transport frame)	5900 mm x 1500 mm x 2000 mm	7100 mm x 1500 mm x 2000 mm	7100 mm x 1500 mm x 1800 mm	7500 mm x 1500 mm x 1900 mm	6600 mm x 1460 mm x 1890 mm	15,500 mm x 2300 mm x 3000 mm
Weight, SAB, dry	2700 kg	3620 kg	4800 kg exlcuding trolley	6400 kg excluding rails and battery	6480 kg excluding rails and battery	14000 kg
Swing Drive	Swing by cylinder	Swing by gear	Swing by gear	Swing by gear	Swing by gear	Swing by gear
Swing Motion	± 48°	± 90°	± 180°	± 90°	± 90°	± 90°
Tilt Motion	± 60°	± 60°	± 60°	± 60°	± 60°	120° boom /180° knuckle
Max Outreach	10.9 m	13 m	11.5 m	13 m	10.7 m	13.1 m
Boom Telescope Stroke	5 m	6 m	5 m	6 m	5 m	2 m
Vertical Travel	-	-	-	-	Designed for application	Designed for application
Horizontal Travel	-	-	-	Designed for application	-	-
Basket Slew Option	Yes	Yes	No	Yes	Yes	Yes
Certifying Authority	ABS or DNV	ABS or DNV	ABS or DNV	ABS or DNV	ABS or DNV	ABS or DNV
Mounting Interface	Stationary adapter plate	Stationary adapter plate	Kingpost pedestal	Horizontal rail	Vertical rail	Vertical rail

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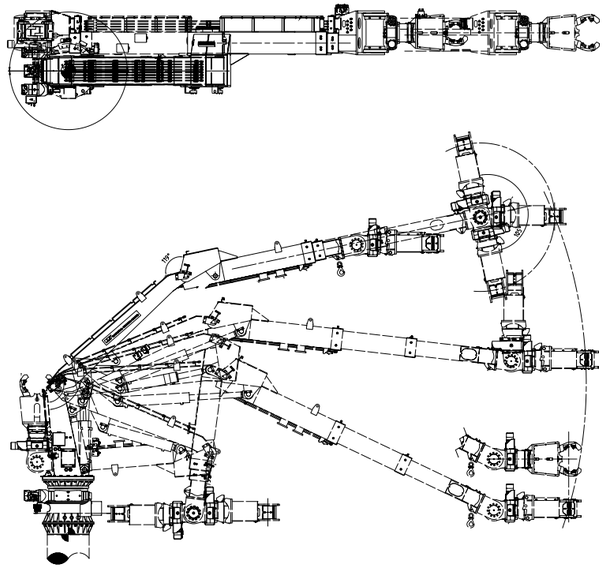
UHT 1200 and Drill Floor Manipulator Arms (DFMA)

*For reference only, please contact your local sales contact for more information.

UHT

Description

The Utility Handling Tool (UHT) is a telescopic, multi-axis knuckle boom type lifting arm. It enables hands-free and safely lifting and guiding of equipment like subs, crossovers and small pipes on the drill floor area. The 360° head rotation enables handling from horizontal to vertical position and vice versa. The Utility Handling Tool is remote controlled, hydraulically driven and equipped with a lifting hook. Both the gripper and guide heads are equipped with hydraulic self-clamping connectors enabling hands-free head swapping.

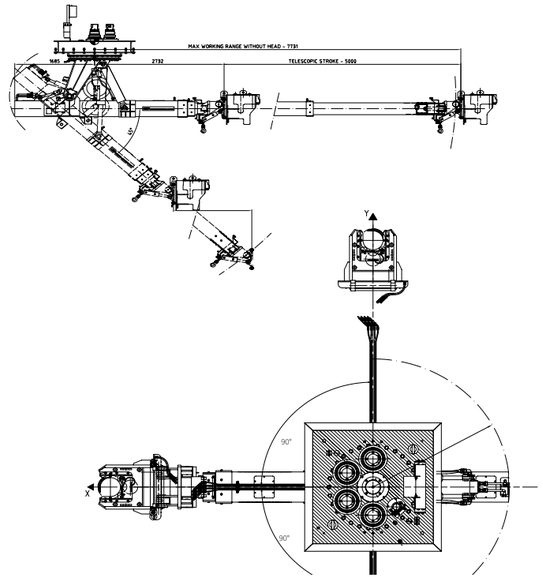


Technical specifications		
DESIGN DATA		
Service		Lifting, guiding and handling
Area classification		IEC Zone 1
Design code / standards		FEM “Rules for the design of hoisting appliances”
Design temperature	[°C]	-20 to +45
PERFORMANCE DATA		
Horizontal reach	[mm]	746 to 7406
Telescope stroke	[mm]	1,835
Slew angle-boom	[degrees]	±180°
Slew angle-head	[degrees]	360° perpetual rotation
Tilt angle-inner arm	[degrees]	64°
Tilt angle-outer arm	[degrees]	123°
Tilt angle-head	[degrees]	+93° (up) to -105° (down)
Gripper head tubular size	[in]	2 ⅜ to 10
Guide head tubular size	[in]	2 ⅞ to 30
Safe Working Load (SWL), hook	[kg]	1,200
Safe Working Load (SWL), lift head	[kg]	500
Weight, UHT, dry	[kg]	3,500
SHIPMENT DATA		
Equipment shipment size (LxWxH)	[mm]	3,000 x 1,230 x 2,310
Equipment shipment net weight	[kg]	4,100
UTILITY CONSUMPTION		
Hydraulic oil supply pressure,	[bar]	207
Hydraulic oil flow	[l/min]	180
Power consumption	[W]	100

DFMA-U

Description

The Drill Floor Manipulator Arm (DFMA-U) is a heavy duty guide and lifting arm that handles large horizontal static and dynamic loads. It is designed for hands-free, safe and efficient handling of various equipment and large range of tubulars dimensions. Normal working area is between well-center, V-door and lay down area (like riser catwalk etc.). The DFMA-U is underslung mounted, hydraulically driven, with local control stand and electric remote operation.

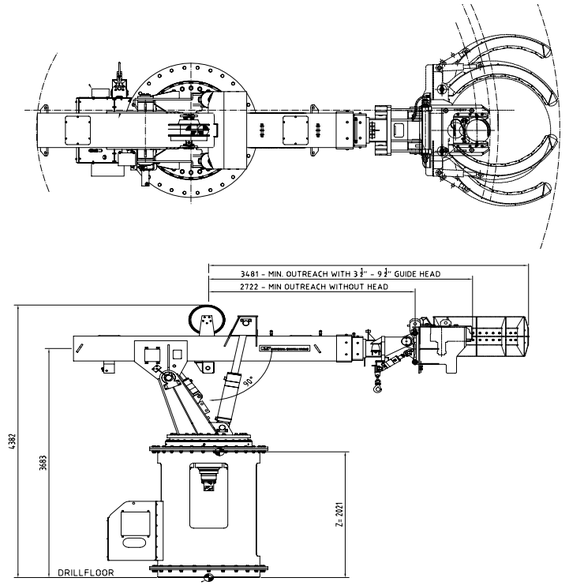


Technical specifications		
DESIGN DATA		
Service		Equipment handling on drillfloor/ tubular guiding
Area classification		IEC Zone 1
Design code / standards		FEM “Rules for the design of hoisting appliances”
Design temperature	[°C]	-20 to +45
PERFORMANCE DATA		
Horizontal reach	[mm]	7,700 (without interchangeable head)
Telescope stroke	[mm]	5,000
Slew motion	[degrees]	±180°
Tilt motion	[degrees]	0 (up) 45 (down)
Guide head tubular size	[in]	3 ½ to 9 ½
Riser guide head tubular size	[in]	56
Safe Working Load (SWL), hook	[kg]	2,500
Weight, DFMA-U, dry	[kg]	6,450 (without interchangeable head)
Weight, DFMA-U, control valve unit	[kg]	520
SHIPMENT DATA		
Equipment shipment size (LxWxH)	[mm]	4,600 x 1,900 x 2,700
Equipment shipment net weight	[kg]	7,180
UTILITY CONSUMPTION		
Hydraulic oil supply pressure,	[bar]	207
Hydraulic oil flow	[l/min]	215
Power consumption	[W]	60

DFMA-P

Description

The Drill Floor Manipulator Arm (DFMA-P) is a heavy duty guide and lifting arm that handles large horizontal static and dynamic loads. It is designed for hands-free, safe and efficient handling of various equipment and large range of tubulars dimensions. Normal working area is between well-center, V-door and lay down area (like riser catwalk etc.). The DFMA-P is pedestal mounted, hydraulically driven, with local control stand and electric remote operation.

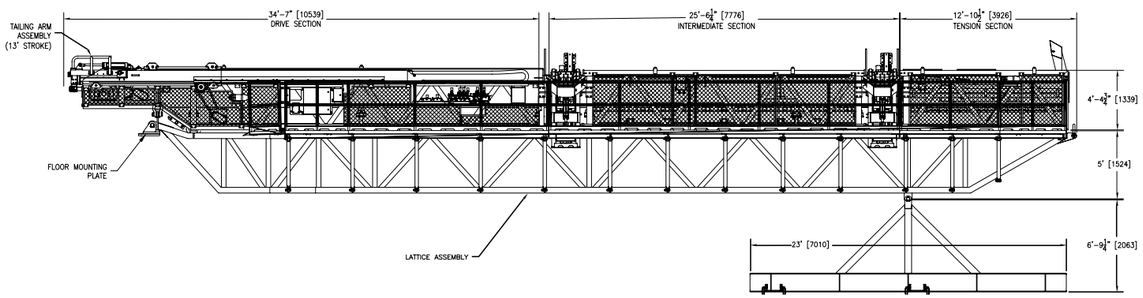


Technical specifications		
DESIGN DATA		
Service		Equipment handling on drillfloor/ tubular guiding
Area classification		IEC Zone 1
Design code / standards		FEM “Rules for the design of hoisting appliances”
Design temperature	[°C]	-20 to +45
PERFORMANCE DATA		
Horizontal reach	[mm]	7,700 (without interchangeable head)
Telescope stroke	[mm]	5,000
Slew motion	[degrees]	±180°
Tilt motion	[degrees]	0 (up) 34 (down)
Guide head tubular size	[in]	3 ½ to 9 ½
Riser guide head tubular size	[in]	48
Safe Working Load (SWL), hook	[kg]	2,500
Weight, DFMA-U, dry	[kg]	7,500
Weight, DFMA-U, wet	[kg]	7,600
SHIPMENT DATA		
Equipment shipment size (LxWxH)	[mm]	4,000 x 2,600 x 4,500
Equipment shipment net weight	[kg]	8,100
UTILITY CONSUMPTION		
Hydraulic oil supply pressure,	[bar]	207
Hydraulic oil flow	[l/min]	215
Power consumption	[W]	60

Catwalk Machines - Tubulars

*For reference only, please contact your local sales contact for more information.

PTC-LD

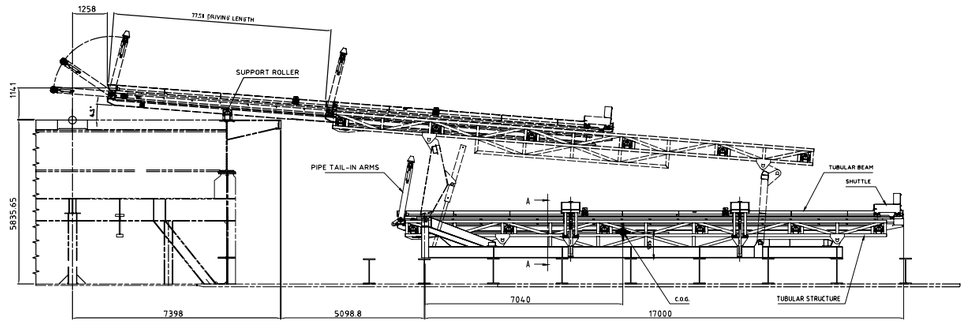


The Pipe Transfer Conveyor (PTC-LD) is a light duty conveyor with an attached Tailing Arm Assembly. The PTC transports drilling tubulars between their storage location on the main pipe deck and well-center without manual intervention from the rig crew. It can be remotely operated from the rigs main control cabin through integrated controls or operated locally from a local control station. The PTC has two main sections: Conveyor & Tailing Arm Assembly.

The control system processes all data from the operator controls to the PTC and all feedback from the tool. The processed data is used to control all tool functions and inform the operator of its operations and status. Local operator controls are provided on a PTC V-door control panel J-box. Hydraulic services to the PTC are directed by a hydraulic interface panel (HIP). Both components are installed on the derrick structure near the PTC.

Technical Specifications			
Service	Transport of tubulars and riser	Max weight allowed (lbs)	22,000
Tubular range	2 3/8" - 20"	Max weight on tailing arms (lbs)	50,000
Belt speed (ft/sec)	1.0 - 2.5	Hydraulic power required (psi)	2,500 - 3,000

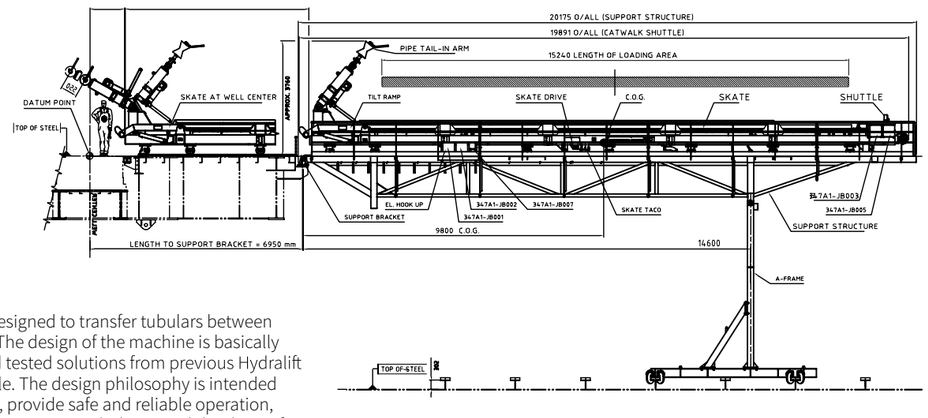
TS-P



The Tubular Shuttle Machine (TS) is designed to transfer tubulars between the pipe-deck and the drill-floor. Tubulars can be removed from or landed onto the tubular beam using the elevator in combination with the front mounted Pipe Tail-in Arm. The design of the machine is basically very simple and utilizes tried and tested solutions. The design philosophy is intended to achieve minimum complexity, provide safe and reliable operation, and simplify maintenance requirements. It includes a modular design for simple installation and replacement of component parts when needed. Installation is made easier due to generous tolerances and simple interfaces between modules.

Technical Specifications			
Service	Pipe and casing single	Maximum hydraulic flow rate (l/min)	220
Tubular range	2 7/8" - 20"	Minimum working pressure (barg.)	180
Design code / standard	F.E.M. / NS 3472	Maximum operating pressure (barg.)	210
Area classification	Safe area	Weight, dry (kg)	33,000
Design temperature	-20°C to + 45°C	Skate traveling speed (m/s)	-
Operating temperature	-20°C to + 45°C	Skate driving force (N)	-
SWL (kg)	20,500	Equipment shipment size (L x W x H) (mm)	32,800 x 3,760 x 2,800

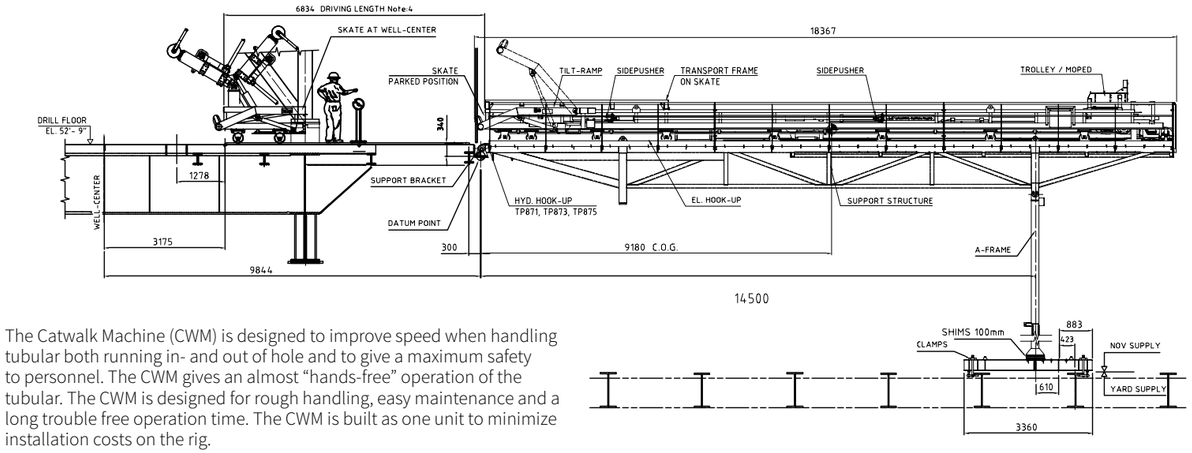
CWS



The tubular shuttle machine is designed to transfer tubulars between the pipe barn and the drill floor. The design of the machine is basically very simple and utilizes tried and tested solutions from previous Hydralift ASA equipment wherever possible. The design philosophy is intended to achieve minimum complexity, provide safe and reliable operation, and simplify maintenance requirements. It includes a modular design for simple installation and replacement of component parts when needed. Installation is made easier due to generous tolerances and simple interfaces between modules.

Technical Specifications			
Service	Transport of tubulars and riser	Maximum hydraulic flow rate (l/min)	240
Tubular range	2 7/8" - 30"	Minimum working pressure (barg.)	180
Design code / standard	F.E.M. "Rules for the design of Hoisting Appliances"	Maximum operating pressure (barg.)	207
Area classification	Zone 1	Weight, dry (kg)	40,500
Design temperature	-20°C to + 45°C	Skate traveling speed (m/s)	0 - 0.4
Operating temperature	-10°C to + 45°C	Skate driving force (N)	90,000
SWL (kg)	40,000	Equipment shipment size (L x W x H) (mm)	31,735 x 2,660 x 2,400

CWM



The Catwalk Machine (CWM) is designed to improve speed when handling tubular both running in- and out of hole and to give a maximum safety to personnel. The CWM gives an almost "hands-free" operation of the tubular. The CWM is designed for rough handling, easy maintenance and a long trouble free operation time. The CWM is built as one unit to minimize installation costs on the rig.

Technical Specifications			
Service	Pipe and casing single	Maximum hydraulic flow rate (l/min)	220
Tubular range	2 7/8" - 20"	Minimum working pressure (barg.)	180
Design code / standard	F.E.M. / NS 3472	Maximum operating pressure (barg.)	210
Area classification	Safe area	Weight, dry (kg)	33,000
Design temperature	-20°C to + 45°C	Skate traveling speed (m/s)	-
Operating temperature	-20°C to + 45°C	Skate driving force (N)	-
SWL (kg)	20,500	Equipment shipment size (L x W x H) (mm)	32,800 x 3,760 x 2,800

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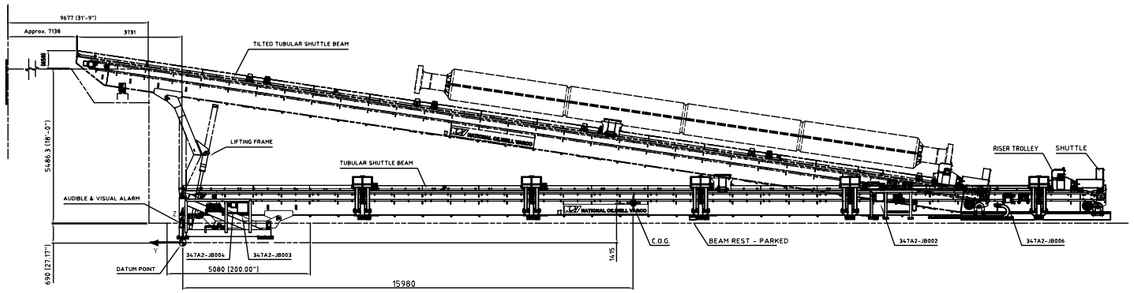
Catwalk Machines - Tubulars & Riser

*For reference only, please contact your local sales contact for more information.

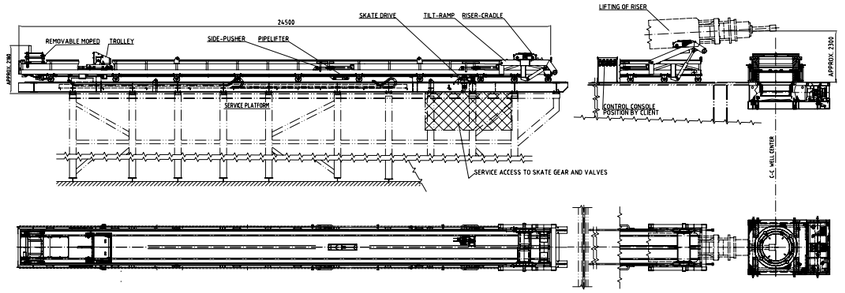
TS-PR



The Tubular Shuttle Machine (TS) is designed to transfer tubular between the pipe-deck and the drill-floor. Tubular can be removed from or landed onto the Tubular Beam using the elevator in combination with the front mounted Pipe Tail-in Arm. The design of the machine is basically very simple and utilizes tried and tested solutions. The design philosophy is intended to achieve minimum complexity, provide safe and reliable operation, and simplify maintenance requirements. It includes a modular design for simple installation and replacement of component parts when needed. Installation is made easier due to generous tolerances and simple interfaces between modules.

Technical Specifications			
Service	Pipe, Casing & Riser Handling Singles and Stands	Maximum hydraulic flow rate (l/min)	220
Tubular range	2 7/8" - 20"	Minimum working pressure (barg.)	180
Design code / standard	F.E.M. / NS 3472	Maximum operating pressure (barg.)	210
Area classification	Safe area	Weight, dry (kg)	33,000
Design temperature	-20°C to + 45°C	Skate traveling speed (m/s)	0 - 0.5
Operating temperature	-20°C to + 45°C	Skate driving force (N)	70,000
SWL (kg)	20,500	Equipment shipment size (L x W x H) (mm)	32,800 x 3,760 x 2,800

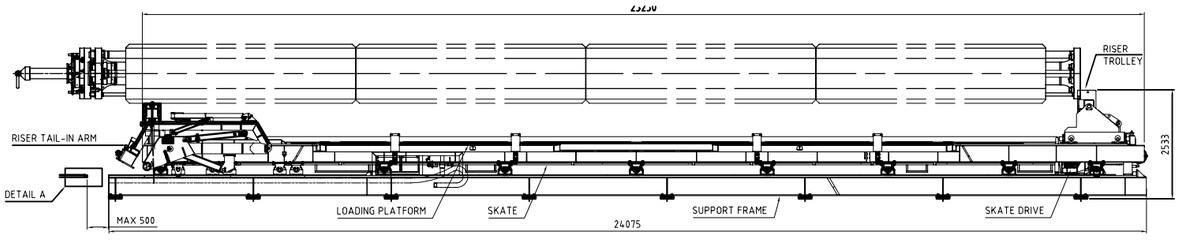
CWM-PR



The Catwalk Machine (CWM) is a horizontal pipe and Marine riser handling system for safely transport of tubulars, risers, slip-joint and miscellaneous equipment in and out of the Drill-floor. On the pipe and riser deck the operation is to be co-ordinated with a pipe and riser handling unit. On the drillfloor the operation is to be coordinated with a horizontal to vertical pipe and /riser handling system. The tubular, typically drill-pipe, drill-collar or casing tubular is transported in or out of the drillfloor resting horizontally in a skate – part of the Catwalk machine. This secures the tubular in a steady state, when transported with the CWM. All the functions are remotely controlled from a Control stand placed close to the V-door, typically on the drill-floor. In case of a remote control failure, local operation of the functions is handled directly on the control valves, located on the support structure of the CWM.

Technical Specifications			
Service	Pipe and Riser Handling	Maximum hydraulic flow rate (l/min)	150
Tubular range	2 7/8" - 36"	Minimum working pressure (barg.)	180
Design code / standard	FEM/NS4372/EC3	Maximum operating pressure (barg.)	210
Area classification	Zone 2	Weight, dry (kg)	27,000 including structure
Design temperature	-20°C to + 45°C	Skate traveling speed (m/s)	0 - 0.33
Operating temperature	-20°C to + 45°C	Skate driving force (N)	75,000
SWL (kg)	40,000	Equipment shipment size (L x W x H) (mm)	26,000 x 3,700 x 2,130

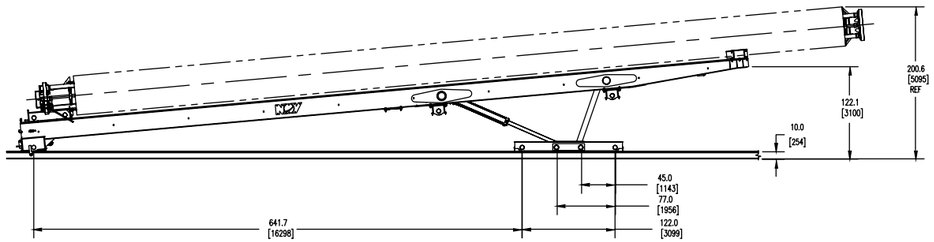
CWS-PR



The Catwalk Shuttle (CWS) is a Riser & Pipe Handling System designed for the rapid handling of tubular and risers both running in- and out of hole and to ensure maximum safety for operating personnel. The CWS gives an almost “hands-free” operation of the tubular. On the riser/pipe-deck, operation of the CWS is to be co-ordinated with the riser/pipe-handling crane. On the drillfloor the operation is to be coordinated with the horizontal-to-vertical riser/pipe-handler system. It is designed for operation with gripper or riser yokes. The tubulars are supported in a stable, horizontal position when transported with the shuttle. The CWS has two distinct modes of operation. (1) Tubulars less than 20” diameter utilize a “loading platform” with a feeding system; this allows either automatic, semi-automatic, or manual control. (2) Tubulars and riser 20” and greater in diameter are handled with the trolley and cradle operating under manual control; the CWS can be run between pipe deck and drill floor with semi-automatic or manual control.

Technical Specifications			
Service	Pipe and Riser Handling	Maximum hydraulic flow rate (l/min)	160
Tubular range	3 1/2" - 30"	Minimum working pressure (barg.)	180
Design code / standard	"F.E.M. "Rules for the design of Hoisting Appliances" + NS 3472"	Maximum operating pressure (barg.)	207
Area classification	Zone 1	Weight, dry (kg)	40,500
Design temperature	-20°C to + 45°C	Skate traveling speed (m/s)	0 - 0.4
Operating temperature	-10°C to + 45°C	Skate driving force (N)	90,000
SWL (kg)	40,000	Equipment shipment size (L x W x H) (mm)	31735 x 2660 x 2400

RHS-2



The Riser Handling System (RHS) uses a hydraulically powered trolley-on-a-trolley to accomplish two tasks. (1) Transporting horizontal riser joints from the riser deck to the well center. (2) Safely tailing the riser section while it is hoisted by the drawworks from a horizontal to vertical position. The system can accommodate various requirements of riser length, diameter, and riser spider/gimbal height.

Technical Specifications	
Service	Riser Handling Skate - Generation 2
Riser Length Capacity	90'
Riser Diameter Capacity	52"
Riser weight capacity (lbs)	100,000
Hydraulic Requirements (psi)	2,500
Weight of trolly (lbs)	60,000
Trolly speeds (ft/sec)	104

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Mousehole Hoist MHH-3

*For reference only, please contact your local sales contact for more information.

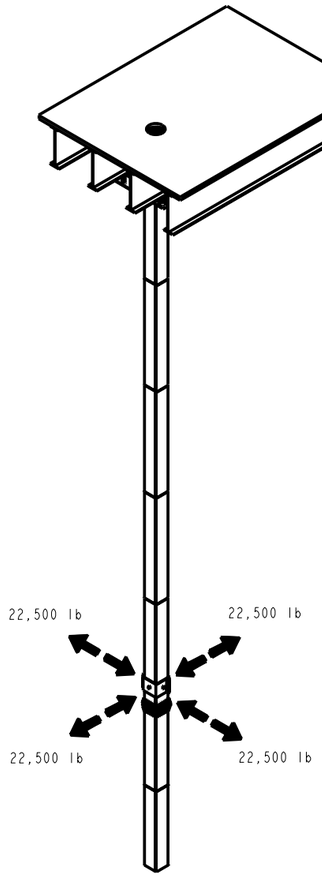
Description

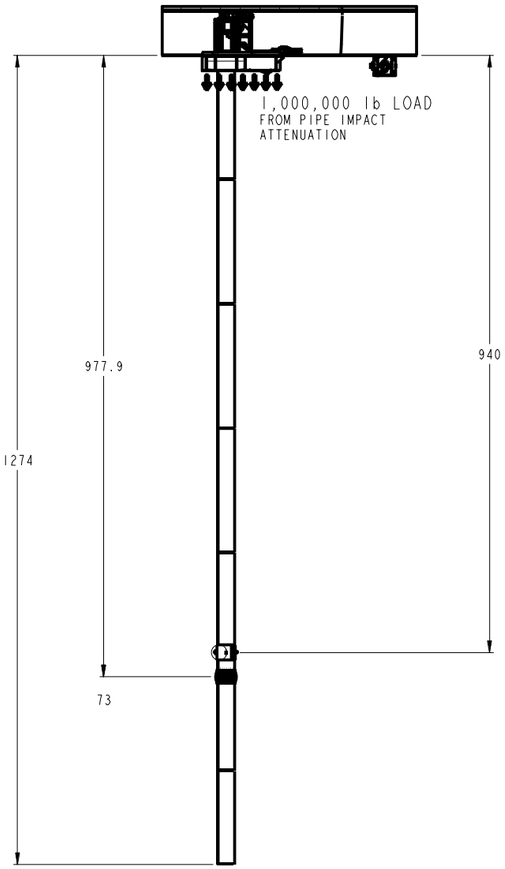
The Mousehole Hoist is one component of a standbuilding system and is used to hold singles, doubles, triples and fourbles of range II pipe and to raise and lower them during standbuilding operations. It can also be used with range III singles, doubles and triples. Tubulars are supported vertically by a rabbit that is raised and lowered in the mousehole tube by a hydraulic winch. Tubulars are supported laterally by a centralizer located at the top of the MHH assembly.

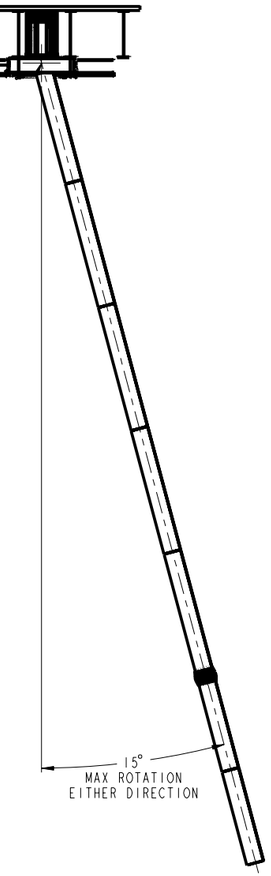
Benefits

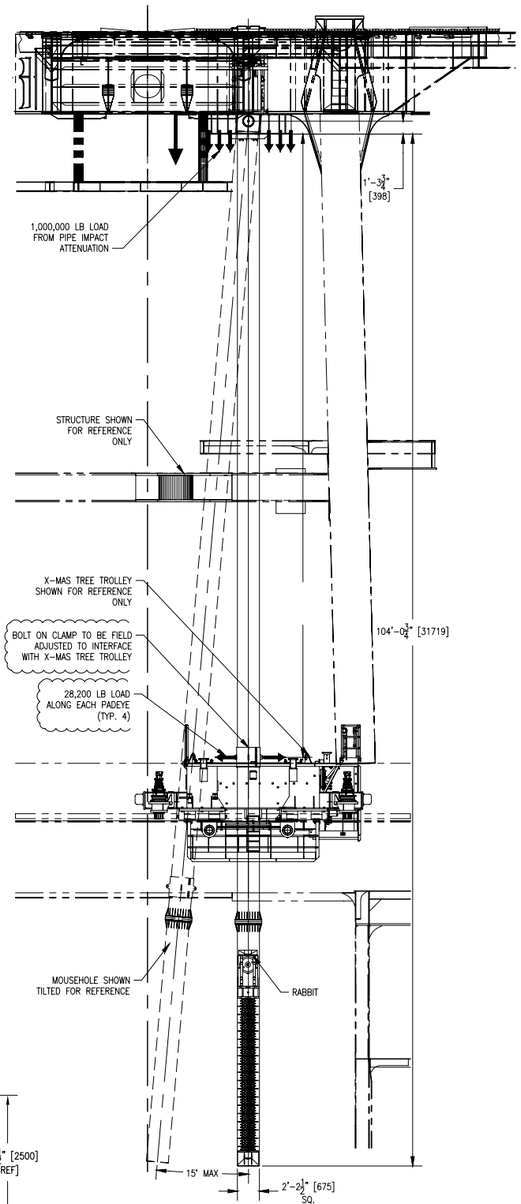
- Components and materials of proven reliability are given preference. Bearings, gears, gearboxes, cylinders and other critical components are designed with operating margins providing long life.
- The design is executed so that required maintenance is minimized. The design allows for serviceable components to be accessed without disassembly or removal of adjacent components.
- The MHH is designed for transportability. The base and skid ship as an assembly. The mousehole tube splits into two sections to facilitate shipping.
- Design and function of the machine can be easily understood by operators with a minimum of training. Controls are simple and intuitive.
- The MHH is designed with serviceability in mind. To the extent possible maintenance components are located on the narrow ends of the base/skid assembly. This allows for easier access as the sides may be located in close proximity to the sub structure beams.

Technical Specifications	
Tubular Size	3-1/2" up to 22" OD
Hoist Capacity and Speed	18,000 lbs. at speeds up to 2 fps 33,000 lbs. at speeds up to 1 fps
IMPACT ATTENUATOR UNIT	
Absorption Capacity	33,000 lbs. 97 ft. @ top of the rabbit resting on the bottom
Mounting Load Reaction	1,000,000 lbs
Power	120/240 Volts, 50/60 Hz, 10 Amps
Hydraulic	2500 psi, 150 Gpm

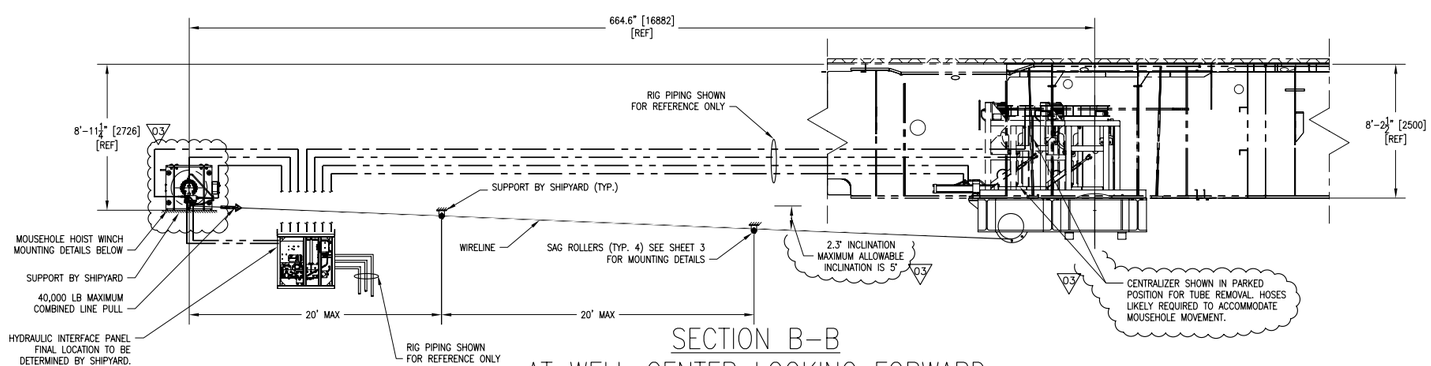








ELEVATION VIEW
FORWARD LOOKING AFT



SECTION B-B
AT WELL CENTER LOOKING FORWARD

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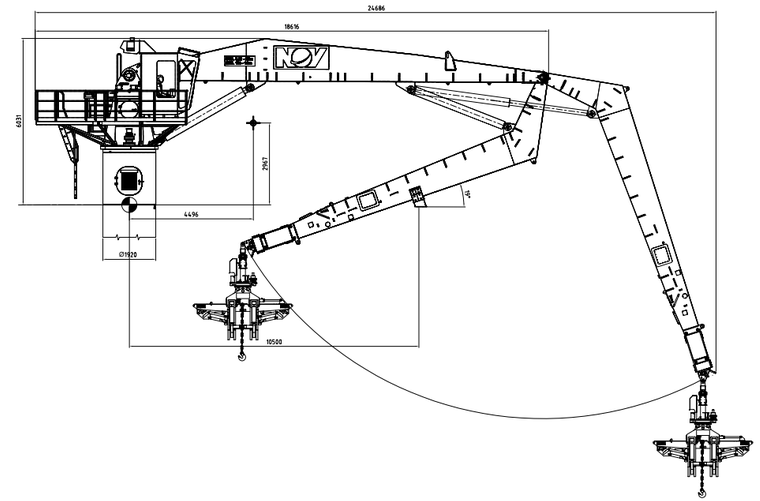
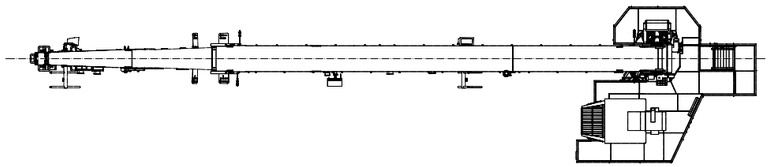
Pipe handling cranes

*For reference only, please contact your local sales contact for more information.

The Pipe Handling Crane (PHC) is a combined knuckle- and telescope crane. It is designed for safe and effective handling of drill pipes, drill collars and casings from pipe deck to catwalk machine and vice versa. By use of a NOV designed gripper yoke, steady lifting and hands free loading/unloading is ensured. A hook adaptor enables handling of various equipment suitable for lifting by slings. The crane is hydraulically driven by internal HPU and remote operated from crane cabin or by radio remote. The PHC is designed for maximum efficiency and hands-free handling of pipe, collars and casings between pipedeck and catwalk area with maximum safety to personnel. The unit is designed for rough handling, easy maintenance and high reliability.

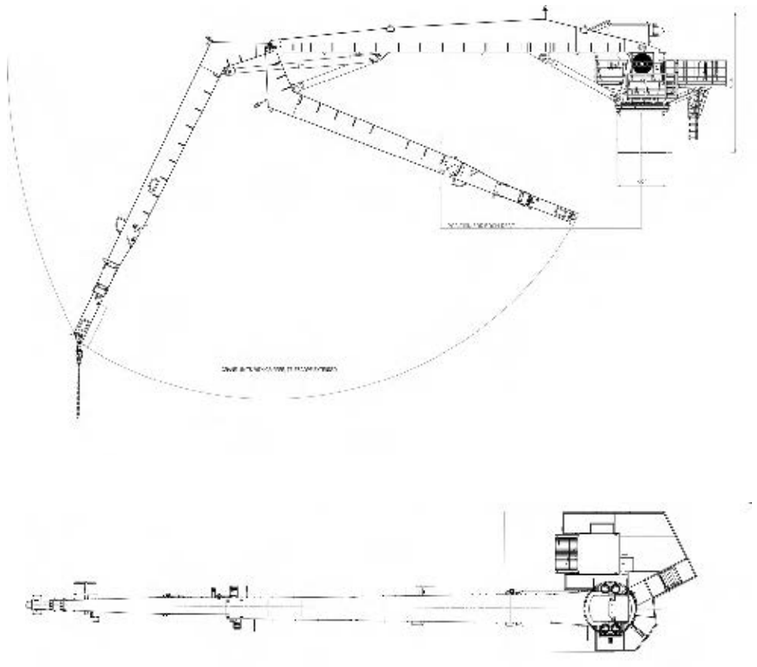
PC 1891





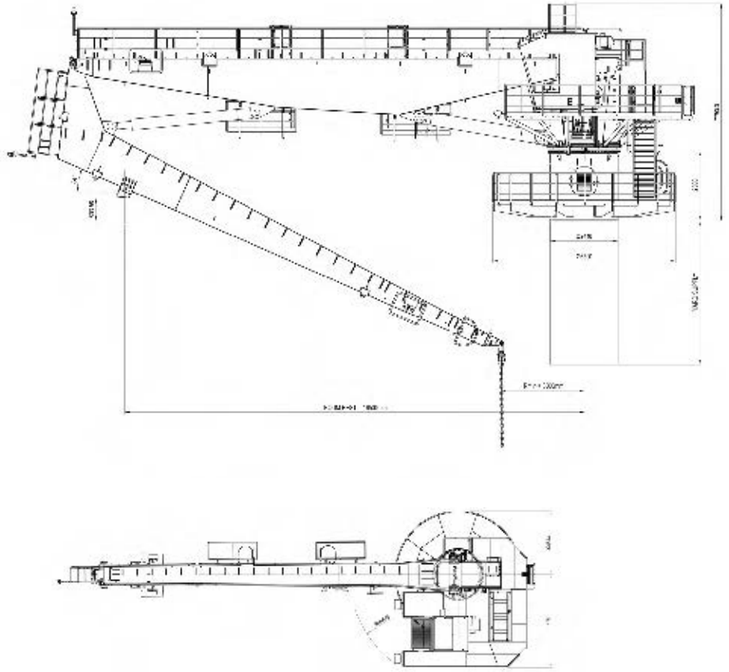
Technical specifications	
DESIGN DATA	
Service	Handling of equipment and drill pipes, drill collars, and casings from pipe deck to catwalk machine and vice versa
Area classification	IEC Zone 2 (Zone 1 for boom tip)
Design standards	ABS "rules for building and classing mobile drilling units", ABS " Guide for the certification of drilling systems" and DNV drilling regulative
Design temperature	-10°C to +45°C
Telescopic lenght	2 m
Weight	25.5 t
PERFORMANCE DATA	
Maximum safe working load	12 t
Maximum radius	25 m
Maximum load at maximum radius	5.5 t
Maximum radius at maximum load	12 m
Rotation	-+180°
Safe working load hook adaptor	12 t

PC 2201KCE



Technical specifications	
DESIGN DATA	
Service	Handling of equipment and drill pipes, drill collars, and casings from pipe deck to catwalk machine and vice versa
Area classification	IEC Zone 2 (Zone 1 for boom tip)
Design standards	ABS "rules for building and classing mobile drilling units", ABS " Guide for the certification of drilling systems" and DNV drilling regulative
Design temperature	-10°C to +45°C
Telescopic lenght	2 m
Weight	33 t
PERFORMANCE DATA	
Maximum safe working load	14 t
Maximum radius	29 m
Maximum load at maximum radius	6 t
Maximum radius at maximum load	17 m
Rotation	-+180°
Safe working load hook adaptor	12 t
Utility winch SWL	5 t

PC 2401K



Technical specifications	
DESIGN DATA	
Service	Handling of equipment and drill pipes, drill collars, and casings from pipe deck to catwalk machine and vice versa
Area classification	IEC Zone 2 (Zone 1 for boom tip)
Design standards	ABS "rules for building and classing mobile drilling units", ABS " Guide for the certification of drilling systems" and DNV drilling regulative
Design temperature	-10°C to +45°C
Weight	47 t
PERFORMANCE DATA	
Maximum safe working load	12 t
Maximum radius	32 m
Maximum load at maximum radius	10 t
Maximum radius at maximum load	17 m
Rotation	-+180 °
Safe working load hook adaptor	12 t
Utility winch SWL	5 t

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Drawworks and Motion Compensation

- Active Heave Drilling Drawworks (AHD)
- Single Speed Gear Driven Drawworks (SSGD)
- Active Heave Dual Drilling Drawworks (AHDD)
- 1000 sT drawworks comparison
- Crown Mounted Compensation (CMC)
- Motion compensation

NOV Rig Technologies

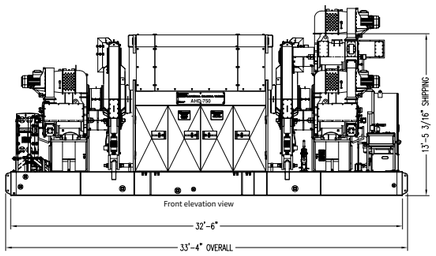
Active Heave Drilling Drawworks (AHD)

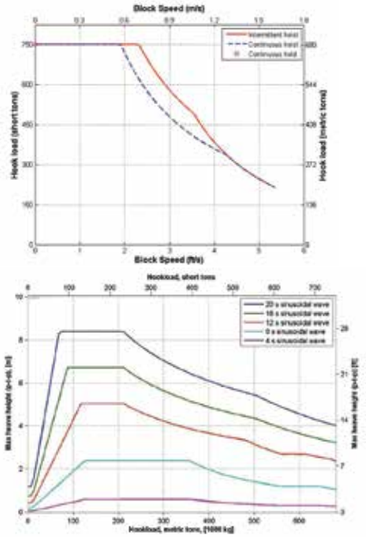
*For reference only, please contact your local sales contact for more information.

Active Heave Drilling Drawworks (AHD) combine the latest technology in controls and design. These drawworks eliminate the need for overhead motion compensation machinery.

In addition, braking energy is regenerated and fed back into the electrical system of the drilling rig, which increases overall rig efficiency. The active heave compensation also expands the “drilling operational window” by allowing drilling programs to continue in heavier seas than conventional drawworks.

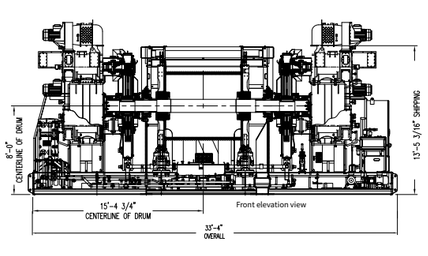
AHD-750

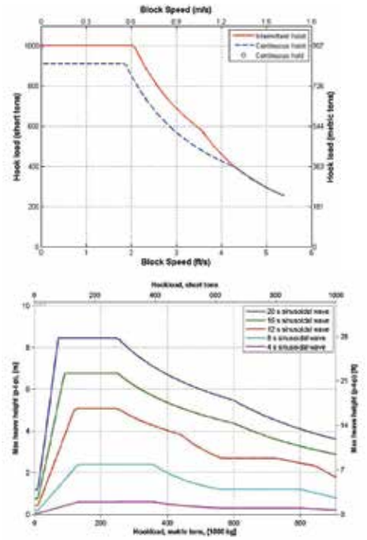




Technical specifications	
DESIGN DATA	
Max hook load 14 lines	750 sT (680 mT)
Max hook load 12 lines	652 sT (591 mT)
Fast line pull	119,585 lbs (54,243 kg)
Weight	200,442 lbs (90,919 kg)
Drill line diameter	1¾" (44.45 mm)
Max continuous power	5,750 Hp
Max intermittent power	7,000 Hp
Max block travel 14 lines (4 layers)	252 ft (76.7 m)
Max block travel 12 lines (4 layers)	294 ft (89.5 m)
Area classification	Zone 2
Design temperature	-4°F up to 113°F (-20°C up to 45°C)
Brake system main	Ac motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 90°F (4.54 m³/hr @ 36°C)
DRILLING MOTOR	
Type	5GEB22A5 TEWAC
Number of motors	5
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motoros	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

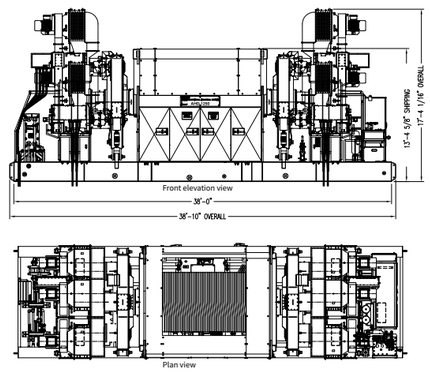
AHD-1000

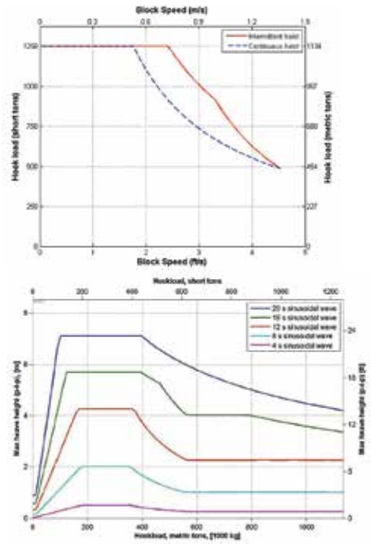




Technical specifications	
DESIGN DATA	
Max hook load 14 lines	1,000 sT (907 mT)
Max hook load 12 lines	867 sT (788 mT)
Fast line pull	159,447 lbs (72,324 kg)
Weight	207,851 lbs (94,180 kg)
Drill line diameter	2" (50.8 mm)
Max continuous power	6,900 Hp
Max intermittent power	8,400 Hp
Max block travel 14 lines (4 layers)	221 ft (67.4 m)
Max block travel 12 lines (4 layers)	258 ft (78.5 m)
Area classification	Zone 2
Design temperature	-4°F up to 113°F (-20°C up to 45°C)
Brake system main	Ac motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 90°F (4.54 m³/hr @ 36°C)
DRILLING MOTOR	
Type	5GEB22A5 TEWAC
Number of motors	6
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motoros	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

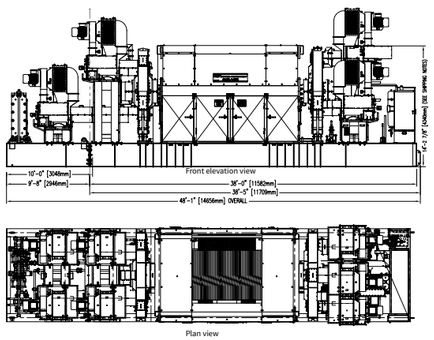
AHD-1250

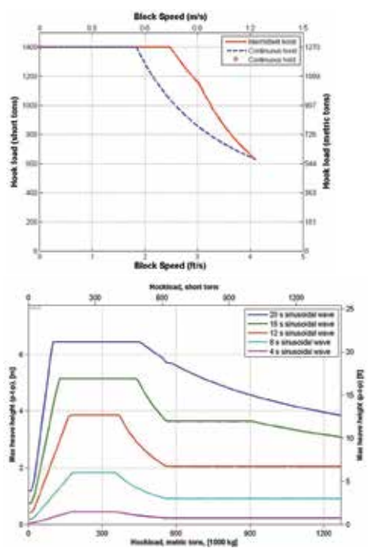




Technical specifications	
DESIGN DATA	
Max hook load 16 lines	1,250 sT (1,134 mT)
Max hook load 14 lines	1,094 sT (992 mT)
Fast line pull	176,913 lbs (80,246 kg)
Weight	255,048 lbs (115,688 kg)
Drill line diameter	2⅛" (53.98 mm)
Max continuous power	9,000 Hp
Max intermittent power	12,600 Hp
Max block travel 16 lines (4 layers)	216 ft (65.8 m)
Max block travel 14 lines (4 layers)	247 ft (75.3 m)
Area classification	Zone 2
Design temperature	-4°F up to 113°F (-20°C up to 45°C)
Brake system main	Ac motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 90°F (4.54 m³/hr @ 36°C)
DRILLING MOTOR	
Type	5GEB28A5 TEWAC
Number of motors	6
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motoros	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

AHD-1400





Technical specifications	
DESIGN DATA	
Max hook load 16 lines	1,400 sT (1,270 mT)
Max hook load 14 lines	1,242 sT (1,126 mT)
Fast line pull	198,142 lbs (86,876 kg)
Weight	341,289 lbs (154,806 kg)
Drill line diameter	2⅛" (53.98 mm)
Max continuous power	10,500 Hp
Max intermittent power	12,800 Hp
Max block travel 16 lines (4 layers)	216 ft (65.8 m)
Max block travel 14 lines (4 layers)	247 ft (75.3 m)
Area classification	Zone 2
Design temperature	-4°F up to 113°F (-20°C up to 45°C)
Brake system main	Ac motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 90°F (4.54 m³/hr @ 36°C)
DRILLING MOTOR	
Type	5GEB28A5 TEWAC
Number of motors	7
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motoros	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

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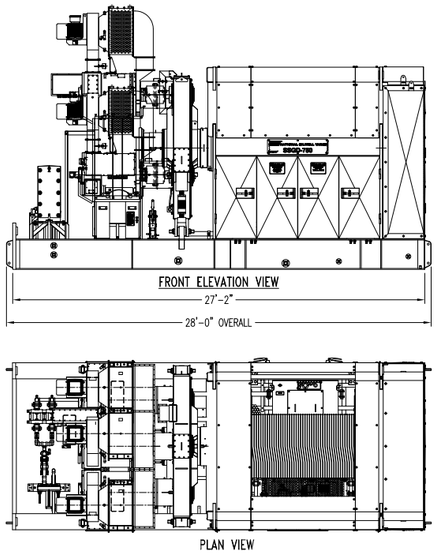
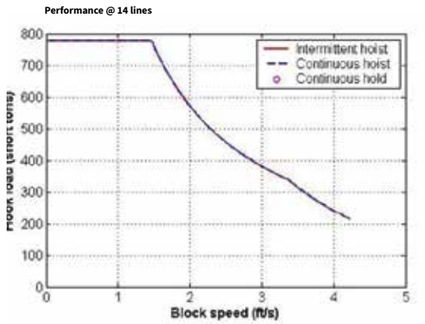
Single Speed Gear Driven Drawworks (SSGD)

*For reference only, please contact your local sales contact for more information.

The AC electric powered Single Speed Gear Driven (SSGD) Drawworks offers a design unique to the industry. By overpowering a drawworks with AC motors, we are able to create a single shaft, single speed drawworks with the hoisting performance comparable to a conventional drawworks. The result is a simple design with few mechanical parts, a small footprint and light weight. These drawworks require minimal maintenance, are entirely self-contained and completely enclosed. Fail safe spring applied disc brakes are utilized for parking and emergency only.

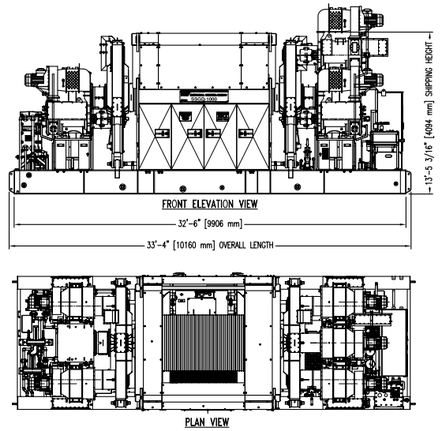
SSGD-750

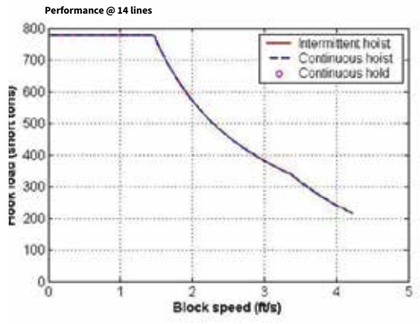




Technical specifications	
DESIGN DATA	
Max hook load 14 lines	750 sT (680 mT)
Max hook load 12 lines	675 sT (612 mT)
Fast line pull	119,585 lbs (54,243 kg)
Weight	142,000 lbs (64,428 kg)
Drill line diameter	1⅜"
Max continuous power	4,600 Hp
Max intermittent power	6,440 Hp
Max block travel 14 lines (4 layers)	180 ft (55 m)
Max block travel 12 lines (4 layers)	210 ft (64 m)
Area classification	Zone 1 (zone 2 for ATEX certified systems)
Design temperature	14°F up to 104°F (-10°C up to 40°C)
Brake system main	Ac motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 96.8°F (76 l/min @ 36°C)
DRILLING MOTOR	
Type	GEB22A / Baylor CM628TUT
Number of motors	4
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motoros	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

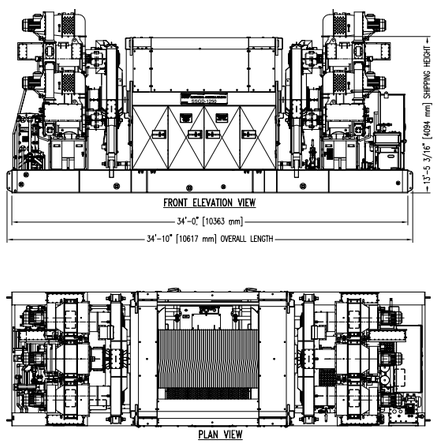
SSGD-1000

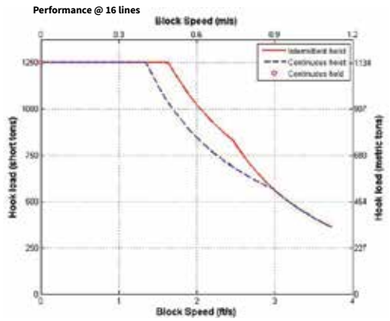




Technical specifications	
DESIGN DATA	
Max hook load 14 lines	1,000 sT (907 mT)
Max hook load 12 lines	850 sT (771 mT)
Fast line pull	159,447 lbs (72,324 kg)
Weight	185,000 lbs (83,940 kg)
Drill line diameter	2"
Max continuous power	5,750 Hp
Max intermittent power	8,050 Hp
Max block travel 14 lines (4 layers)	174 ft (53 m)
Max block travel 12 lines (4 layers)	203 ft (62 m)
Area classification	Zone 1 (zone 2 for ATEX certified systems)
Design temperature	14°F up to 104°F (-10°C up to 40°C)
Brake system main	Ac motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 96.8°F (76 l/min @ 36°C)
DRILLING MOTOR	
Type	GEB22A / Baylor CM628TUT
Number of motors	5
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motoros	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

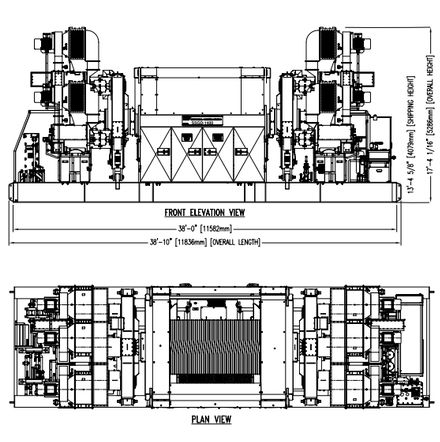
SSGD-1250

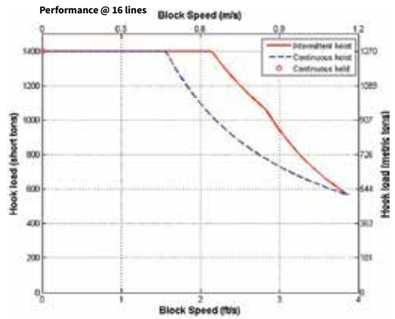




Technical specifications	
DESIGN DATA	
Max hook load 16 lines	1,250 sT (1,134 mT)
Max hook load 14 lines	1,109 sT (1,006 mT)
Fast line pull	176,913 lbs (80,246 kg)
Weight	218,493 lbs (99,107 kg)
Drill line diameter	2⅛" (53.98 mm)
Max continuous power	6,900 Hp
Max intermittent power	8,400 Hp
Max block travel 16 lines (4 layers)	191 ft (58.2 m)
Max block travel 14 lines (4 layers)	218 ft (66.5 m)
Area classification	Zone 2
Design temperature	-4°F up to 113°F (-20°C up to 45°C)
Brake system main	Ac motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 97°F (4.54 m³/hr @ 36°C)
DRILLING MOTOR	
Type	5GEB22A5 TEWAC
Number of motors	6
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motoros	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

SSGD-1400



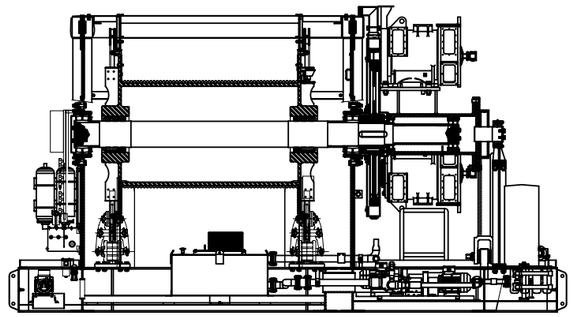


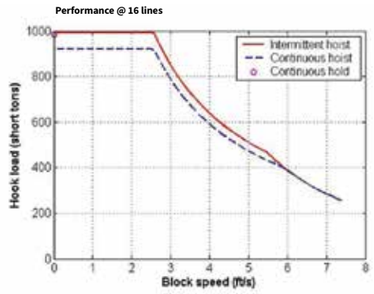
Technical specifications	
DESIGN DATA	
Max hook load 16 lines	1,400 sT (1,270 mT)
Max hook load 14 lines	1,243 sT (1,128 mT)
Fast line pull	198,142 lbs (86,876 kg)
Weight	256,410 lbs (116,306 kg)
Drill line diameter	2⅛" (53.98 mm)
Max continuous power	9,000 Hp
Max intermittent power	10,968 Hp
Max block travel 16 lines (4 layers)	186 ft (57 m)
Max block travel 14 lines (4 layers)	212 ft (65 m)
Area classification	Zone 2
Design temperature	-4°F up to 113°F (-20°C up to 45°C)
Brake system main	Ac motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 96.8°F (4.54 m³/hr @ 36°C)
DRILLING MOTOR	
Type	5GEB28A1 TEWAC
Number of motors	6
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motoros	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

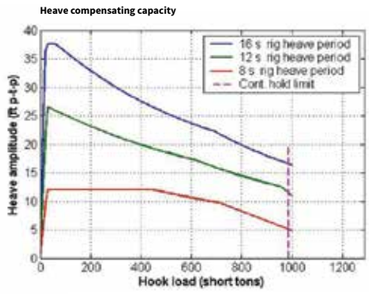
Active Heave Dual Drilling Drawworks (AHDD)

*For reference only, please contact your local sales contact for more information.

AHDD-1000





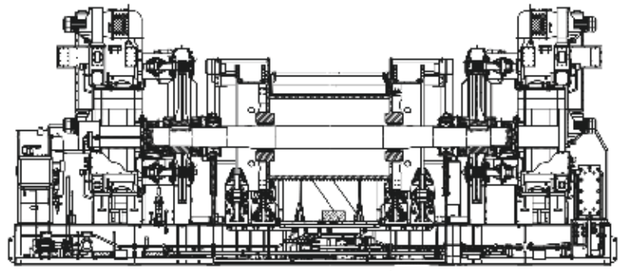


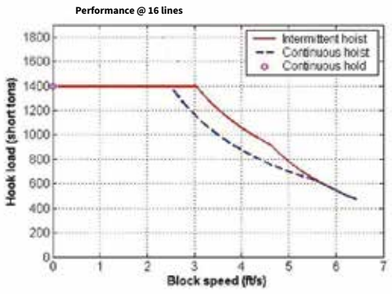
Technical specifications*

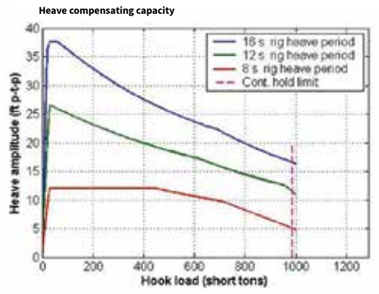
DESIGN DATA	
Max hook load dual drawworks 16 lines	1,000 sT (907 mT)
Max hook load single drawworks 16 lines	1,000 sT (907 mT)
Fast line pull	137,789 lbs (62,500 kg)
Weight	142,000 lbs (69,400 kg) x 2
Dimensions (LxWxH)	30' 2¼" x 15' 3⅜" x 17' 2⅛" (9,201 mm x 4,663 mm x 5,236 mm)
Drill line diameter	1¾"
Max continuous power	9,200 Hp
Max intermittent power	12,880 Hp
Max block travel 16 lines (Dual drawworks)	303 ft (92.5 m)
Max block travel 16 lines (Single drawworks)	151 ft (46.2 m)
Area classification	Zone 1 (zone 2 for ATEX certified systems)
Design temperature	-4°F up to 104°F (-20°C up to 40°C)
Brake system main	AC motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 96.8°F (76 l/min @ 36°C)
DRILLING MOTOR	
Type	GEB22A2 (AC)
Number of motors (each drawworks)	4 x 2
Power requirement	690 VAC, 60 Hz, 3 phases
Fresh/sea water supply, main AC motors	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

* Technical specifications shown are for one of the two drawworks included in the AHDD system

AHDD-1400





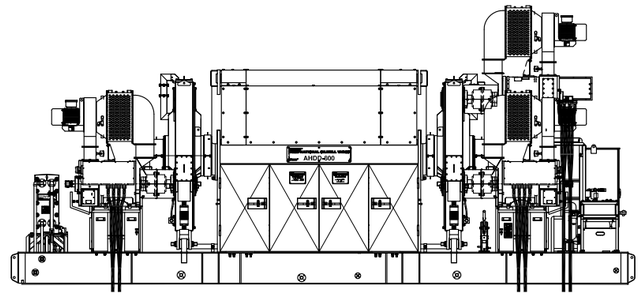


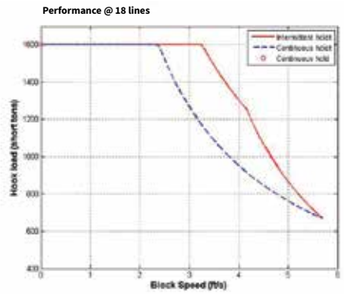
Technical specifications*

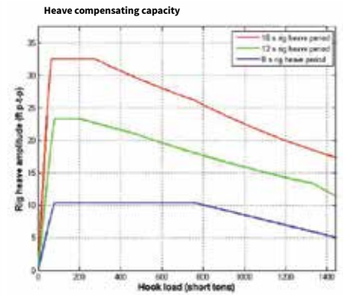
DESIGN DATA	
Max hook load 16 lines	1,400 sT (1,270 mT)
Max hook load 14 lines	1,234 sT (1,119 mT)
Fast line pull	192,904 lbs (87,500 kg)
Weight	300,038 lbs (136,095 kg) x 2
Drill line diameter	2¼"
Max continuous power	13,800 Hp
Max intermittent power	16,698 Hp
Max block travel 16 lines (3 layers)	293 ft (89 m)
Max block travel 14 lines (3 layers)	335 ft (102 m)
Area classification	Zone 2
Design temperature	-4°F up to 113°F (-20°C up to 45°C)
Brake system main	AC motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	40 GPM @ 96.8°F (9.08 m³/hr @ 36°C)
DRILLING MOTOR	
Type	GEB22A5 TEWAC
Number of motors (each drawworks)	6 x 2
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motors	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

* Technical specifications shown are for one of the two drawworks included in the AHDD system

AHDD-1600







Technical specifications*

DESIGN DATA	
Max hook load 18 lines	1,600 sT (1,451 mT)
Max hook load 16 lines	1,442 sT (1,308 mT)
Fast line pull	191,376 lbs (86,807 kg)
Weight	TBC
Drill line diameter	2⅛"
Max continuous power	15,000 Hp
Max intermittent power	18,280 Hp
Max block travel 18 lines (4 layers)	384 ft (117 m)
Max block travel 16 lines (4 layers)	432 ft (131.7 m)
Area classification	Zone 2
Design temperature	-4°F up to 104°F (-20°C up to 40°C)
Brake system main	AC motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 96.8°F (4.54 m³/hr @ 36°C)
DRILLING MOTOR	
Type	GEB28A1 TEWAC
Number of motors (each drawworks)	5 x 2
Power requirement	690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motors	100 GPM @ 97°F (22.7 m³/hr @ 36°C)

* Technical specifications shown are for one of the two drawworks included in the AHDD system

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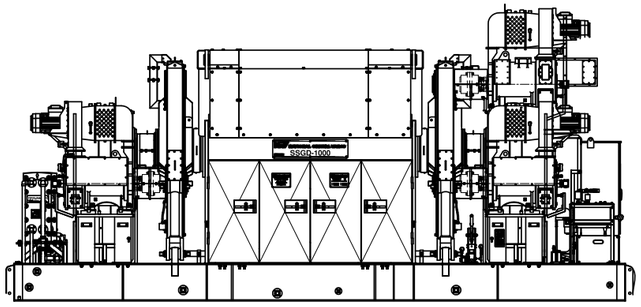
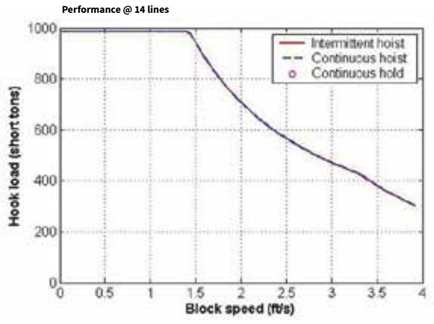
1000 sT drawworks comparison

*For reference only, please contact your local sales contact for more information.

SSGD-1000

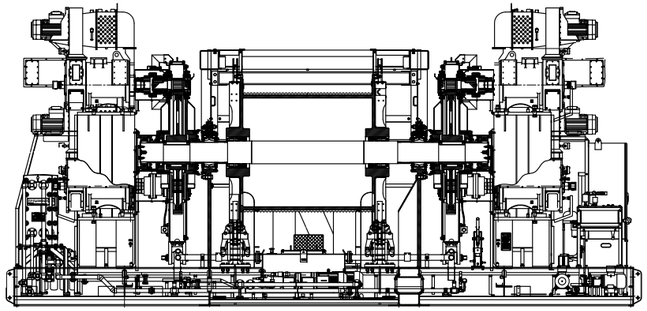


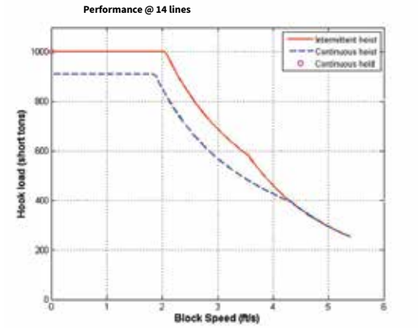


- Single shaft, single speed drawworks with hoisting performance comparable to conventional drawworks
- Simple design, few mechanical parts, small footprint and light weight
- Self-contained, completely enclosed and requires minimal maintenance

Technical specifications	
DESIGN DATA	
Max hook load 14 lines	1,000 sT (907 mT)
Max hook load 12 lines	850 sT (771 mT)
Fast line pull	159,447 lbs (72,324 kg)
Weight	185,000 lbs (83,940 kg)
Dimensions (LxWxH)	31' 7¼" x 13' 10" x 13' 9⅜" (9,663 mm x 4,217 mm x 4,208 mm)
Drill line diameter	2"
Max continuous power	5,750 Hp
Max intermittent power	8,050 Hp
Max block travel 14 lines (4 layers)	174 ft (53 m)
Max block travel 12 lines (4 layers)	203 ft (62 m)
Area classification	Zone 1 (zone 2 for ATEX certified systems)
Design temperature	14°F up to 104°F (-10°C up to 40°C)
Brake system main	AC motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 96.8°F (76 l/min @ 36°C)
DRILLING MOTOR	
Type	GEB22A
Number of motors	5
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motors	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

AHD-1000

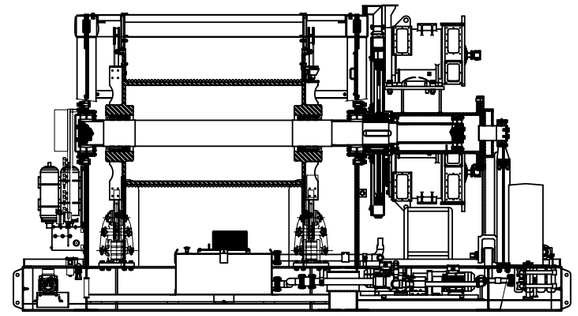


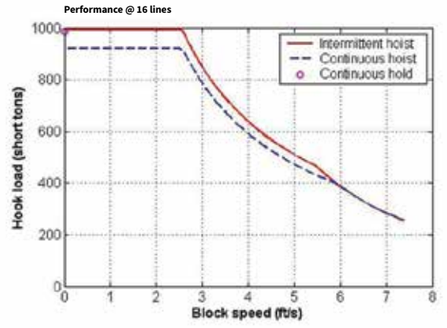


- Eliminates the need for overhead motion compensation machinery
- Braking energy is regenerated and fed back into the electrical system of the drilling rig, which increases overall rig efficiency
- Active Heave Compensation expands the "drilling operational window" by allowing drilling programs to continue in heavier seas than conventional drawworks

Technical specifications	
DESIGN DATA	
Max hook load 14 lines	1,000 sT (907 mT)
Max hook load 12 lines	867 sT (788 mT)
Fast line pull	159,447 lbs (72,324 kg)
Weight	207,851 lbs (94,180 kg)
Dimensions (LxWxH)	32' 6" x 12' 9¼" x 16' 6³⁄₁₆" (9,906 mm x 3,893mm x 5,033 mm)
Drill line diameter	2" (50.8 mm)
Max continuous power	6,900 Hp
Max intermittent power	8,400 Hp
Max block travel 14 lines (4 layers)	221 ft (67.4 m)
Max block travel 12 lines (4 layers)	258 ft (78.5 m)
Area classification	Zone 2
Design temperature	-4°F up to 113°F (-20°C up to 45°C)
Brake system main	AC motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 90°F (4.54 m³/hr @ 36°C)
DRILLING MOTOR	
Type	5GEB22A5 TEWAC
Number of motors	6
Power requirement	600/690 VAC, 60 Hz, 3~
Fresh/sea water supply, main AC motors	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

AHDD-1000





- Fully redundant hoisting system
- Superior hoisting speed and wire line life
- Based on the trusted and proven AHD technology

Technical specifications*	
DESIGN DATA	
Max hook load dual drawworks 16 lines	1,000 sT (907 mT)
Max hook load single drawworks 16 lines	1,000 sT (907 mT)
Fast line pull	137,789 lbs (62,500 kg)
Weight	142,000 lbs (69,400 kg) x 2
Dimensions (LxWxH)	30' 2¼" x 15' 3⅜" x 17' 2⅛" (9,201 mm x 4,663 mm x 5,236 mm)
Drill line diameter	1¾"
Max continuous power	9,200 Hp
Max intermittent power	12,880 Hp
Max block travel 16 lines (Dual drawworks)	303 ft (92.5 m)
Max block travel 16 lines (Single drawworks)	151 ft (46.2 m)
Area classification	Zone 1 (zone 2 for ATEX certified systems)
Design temperature	-4°F up to 104°F (-20°C up to 40°C)
Brake system main	AC motors
Brake system emergency	Disc brakes
Brake disc cooling method	Air cooling
Fresh/sea water supply, lube oil heat exchanger	20 GPM @ 96.8°F (76 l/min @ 36°C)
DRILLING MOTOR	
Type	GEB22A2 (AC)
Number of motors	4 x 2
Power requirement	690 VAC, 60 Hz, 3 phases
Fresh/sea water supply, main AC motors	100 GPM @ 97°F (22.7 m³/hr @ 33°C)

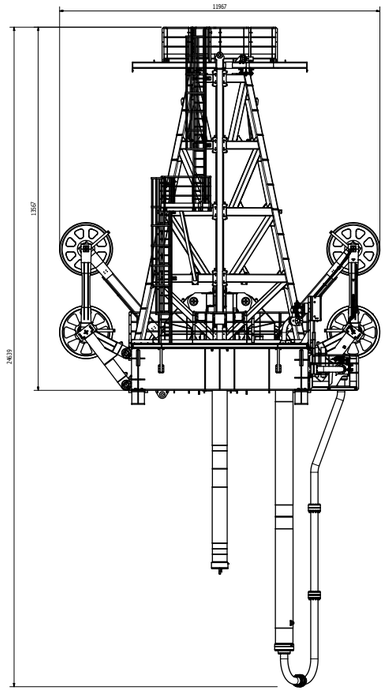
* Technical specifications shown are for one of the two drawworks included in the AHDD system

Crown Mounted Compensation

*For reference only, please contact your local sales contact for more information.

Crown Mounted Compensator (CMC)

Specialized for locked bottom operations



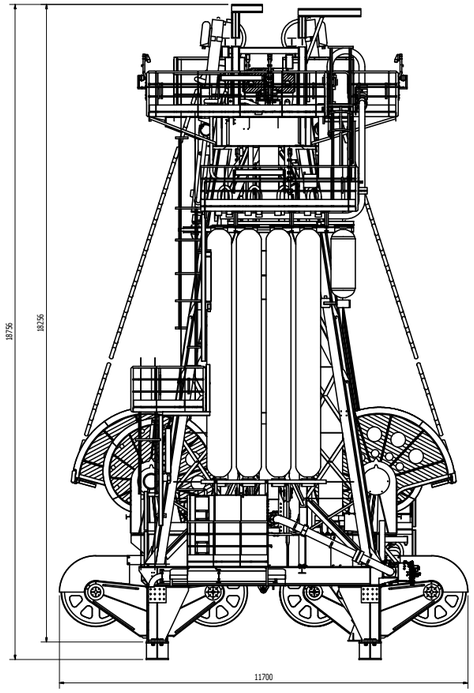
Standard delivery includes

- Set of two (2) compensator cylinders.
- Fluid/Gas Accumulator.
- Fluid Storage Unit with pumps for installation at deck level.
- Control cabinet for installation in safe zone at deck level.
- Single PV lling (Working PV's).
- Mechanically prepared for AHC.

Technical specifications			
Model	600-25	800-25	1000-25
Crown block capacity, static	1,500 Kips	1,500 Kips	1,500-2,800 Kips
Compensator capacity, dynamic	600 Kips	800 Kips	1,000 Kips
Compensator stroke	25 ft	25 ft	25 ft
Crown block sheave configuration	6 x 72"	6 x 72"	7 x 72" or 78"
Weight (complete)	110 mT	120 mT	110-145 mT

CMC-E

The one piece solution



Standard delivery includes

- One complete CMC-E including cylinder, accumulators, working gas PVs, crown block and equalizing system.
- Fluid/Gas Accumulator.
- Fluid Storage Unit with pumps for installation at deck level.
- Control cabinet for installation in safe zone at deck level.
- Single PV lling (Working PV's).
- Mechanically prepared for AHC.

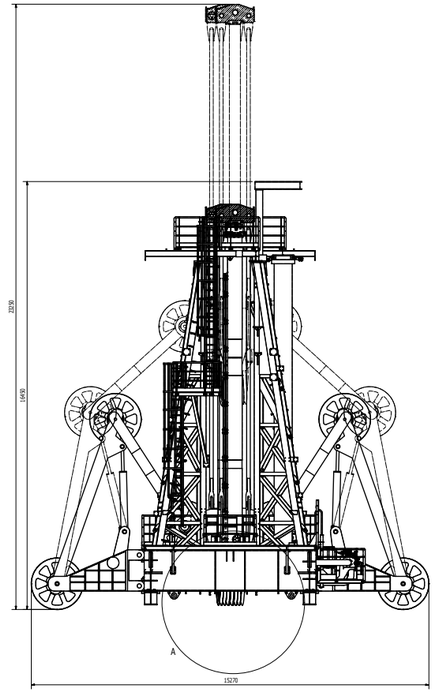
Options

- Service handling tool (SHT)

Technical specifications	
Compensating load-in	695 mT(1,533 kips) w/ 16,14,12 lines
Crown block capacity (max)	1,134 mT (2,500 kips)
Compensator stroke	7,77m w/16 lines
	7,62m w/14 lines
	7,41m w/12 lines
Crownblock and Idler sheave OD diameter	72"
Crown block and Idler sheave wireline grooves	2"
Weight	240 mT

CMC-H/H2

Excellent performance made for SSGD rigs



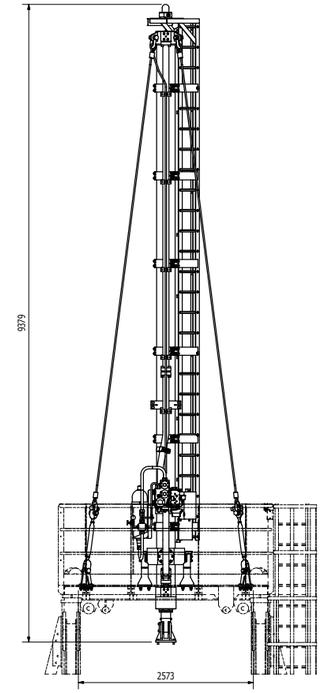
Standard delivery includes

- Set of two (2) compensator cylinders.
- Fluid/Gas Accumulator.
- Fluid Storage Unit with pumps for installation at deck level.
- Control cabinet for installation in safe zone at deck level.
- On H2: Tiltable Crown Block
- Single PV lling (Working PV's)
- Mechanically prepared for AHC

Technical specifications			
Model	CMC-H-600-25	CMC-H-1000-25	CMC-H2-1500-25
Crown block capacity, static	1,500 Kips	2,000 Kips	2,800-3,200 Kips
Compensator capacity, dynamic	600 Kips	1,000 Kips	1,500 Kips
Compensator stroke	25 ft	25 ft	25 ft
Crown block sheave configuration	6 x 72"	6 x 72"	7 x 78" / 8 x 78"
Weight (complete)	120 mT	163 mT	190 mT

Active Heave Ccompensator (AHC)

Designed for position control of the CMC



AHC cylinder is primarily used for the following purposes

- Optimization of the CMC performance during operations like landing of components onto seabed, like BOP or Christmas trees.
- Wire line logging inside well without the need for wire rigging against slip joint and required weak link.
- ADC (Auto Driller Controller) ready

Delivery includes

- Motion Reference Unit (MRU)
- Wireline mode, Part of control system
- AHC cylinder controls and Wire Line Mode are executed by the CMC PLC controller and integrated into the CMC control cabinet.

Optional delivery

- Standalone Hydraulic Power Unit for AHC

Technical specifications		
Model	AHC/CMC-25	AHC/CMC-35
Capacity	25 mT	35 mT
Max speed	1,22 m/s	1,22 m/s
Cylinder stroke	7,800mm / 9,070mm	7,800mm
Weight AHC complete	4.5 mT	4.7 mT

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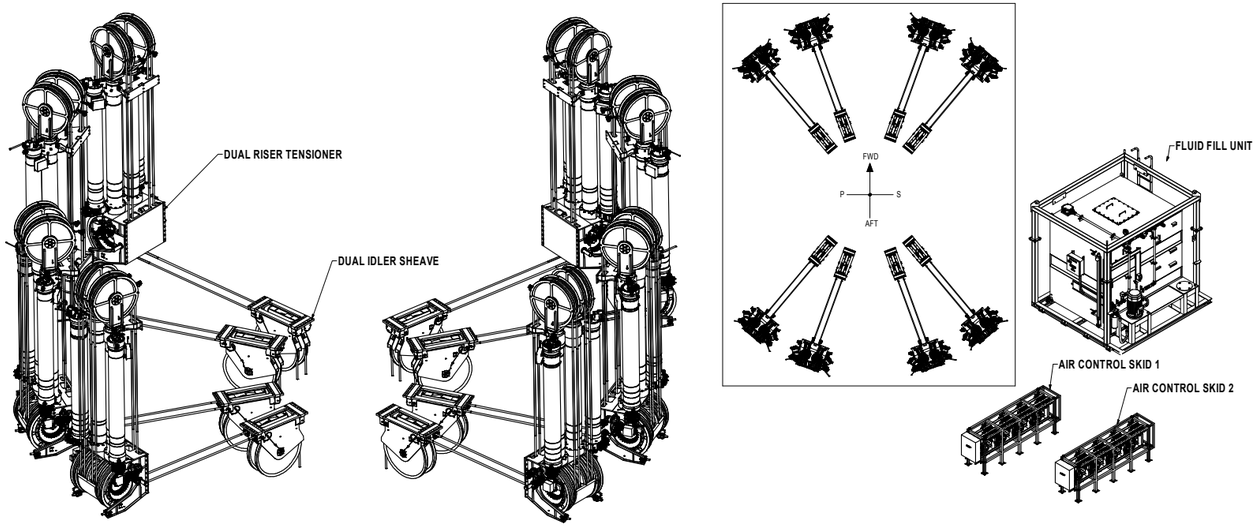
*For reference only, please contact your local sales contact for more information.

Wireline Riser Tensioner (WRT)



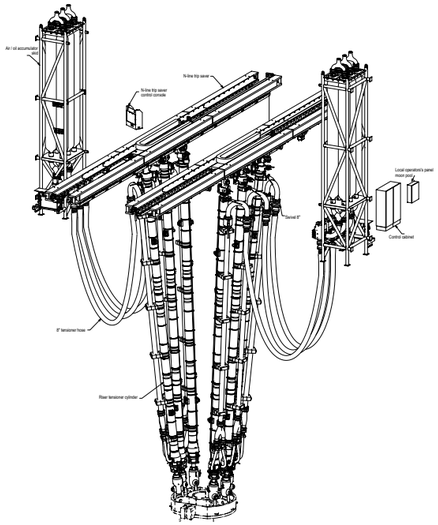
Description

The wireline tensioner provides positive tension to the marine riser, and compensates for the relative motion between the riser and the drilling rig. The tensioners are installed diametrically opposite to each other. This is to avoid any lateral forces in the riser tensioner ring when reducing tension in one unit (bleeding off air for wire cut/slip etc.). The tensioners maintain tension in each support wire, which is connected to the support ring on the marine riser pipe. The wires from the support ring runs over the pivot hinged idler sheaves, via the fixed lead-in sheaves and then around the two double sheave assemblies on each end of the tensioner cylinders. The wires are then attached to the wire rope anchors.

- A four to one mechanical advantage is obtained, cylinder stroke of 12.5 ft. is transferred to 50 ft. of wire rope travel
- A fluid connection block is installed between the accumulator and cylinder
- Prevents damage on the cylinder and other equipment
- Accumulator gas side is connected to a gas reservoir to obtain constant tension in marine riser pipe
- Centralized control of tensioners
- Driller's control panel interfaces with control unit for operator to start, operate, monitor or shut down the total system

Technical specifications	WRT-120	WRT-200	WRT-225	WRT-250	WRT-280
Dynamic capacity (ex. total kips)	120 kips (960 kips)	200 kips (1,600 kips)	225 kips (3,600 kips)	250 kips (4,000 kips)	280 kips (2,240 kips)
Weight single	14 mT	28 mT	28 mT	30 mT	32 mT
Weight double	23 mT	50 mT	50 mT	63 mT	67 mT
Comp. stroke	3.81 m (12.5')	3.81 m (12.5')	3.81 m (12.5')	3.81 m (12.5')	3.81 m (12.5')
Wire travel	15.24 m (50')	15.24 m (50')	15.24 m (50')	15.24 m (50')	15.24 m (50')
Sheave diameter (groove)	1.321 m (52")	1.829 m (72")	1.829 m (72")	2.083 m (82")	2.083 m (82"
Wire diameter	2"	2½"	2½"	2¾"	2⅞"
Design temperature	-20°C to +45°C	-20°C to +45°C	-20°C to +45°C	-20°C to +45°C	-20°C to +45°C
Max op. press	207 bar (3,000 psi)	207 bar (3,000 psi)	207 bar (3,000 psi)	207 bar (3,000 psi)	207 bar (3,000 psi)
SYSTEM					
Tensioners	4 or 8 dual or single	4 or 8 dual or single	8 or 16 dual or single	8 or 16 dual or single	4 or 8 dual or single
Working APV volume/cyl.	2,000 l	3,200 l	4,000 l	4,700 l	5,800 l
Standby APV	Individual	Individual	Individual	Individual	Individual
Compressor	2 pcs. 138 nm³/h	2 pcs. 138 nm³/h	2 pcs. 138 nm³/h	2 pcs. 138 nm³/h	2 pcs. 138 nm³/h
Idler sheaves	4 or 8 dual or single	4 or 8 dual or single	8 or 16 dual or single	8 or 16 dual or single	4 or 8 dual or single
control equipment	1 or 2 unit, riser tensioner air control skid 1 PLC control panel 1 Remote control panel	1 or 2 unit, riser tensioner air control skid Control skid 1 PLC control panel 1 Remote control panel	1 or 2 unit, riser tensioner air control skid Control skid 1 PLC control panel 1 Remote control panel	1 or 2 unit, riser tensioner air control skid Control skid 1 PLC control panel 1 Remote control panel	1 or 2 unit, riser tensioner air control skid 1 PLC control panel 1 Remote control panel

N-Line Riser Tensioner (NRT)



Description

The wireline tensioner provides positive tension to the marine riser, and compensates for the relative motion between the riser and the drilling rig. The tensioners are installed diametrically opposite to each other. This is to avoid any lateral forces in the riser tensioner ring when reducing tension in one unit (bleeding off air for wire cut/slip etc.). The tensioners maintain tension in each support wire, which is connected to the support ring on the marine riser pipe. The wires from the support ring runs over the pivot hinged idler sheaves, via the fixed lead-in sheaves and then around the two double sheave assemblies on each end of the tensioner cylinders. The wires are then attached to the wire rope anchors.

- A four to one mechanical advantage is obtained, cylinder stroke of 12.5 ft. is transferred to 50 ft. of wire rope travel
- A fluid connection block is installed between the accumulator and cylinder
- Prevents damage on the cylinder and other equipment
- Accumulator gas side is connected to a gas reservoir to obtain constant tension in marine riser pipe
- Centralized control of tensioners
- Driller's control panel interfaces with control unit for operator to start, operate, monitor or shut down the total system

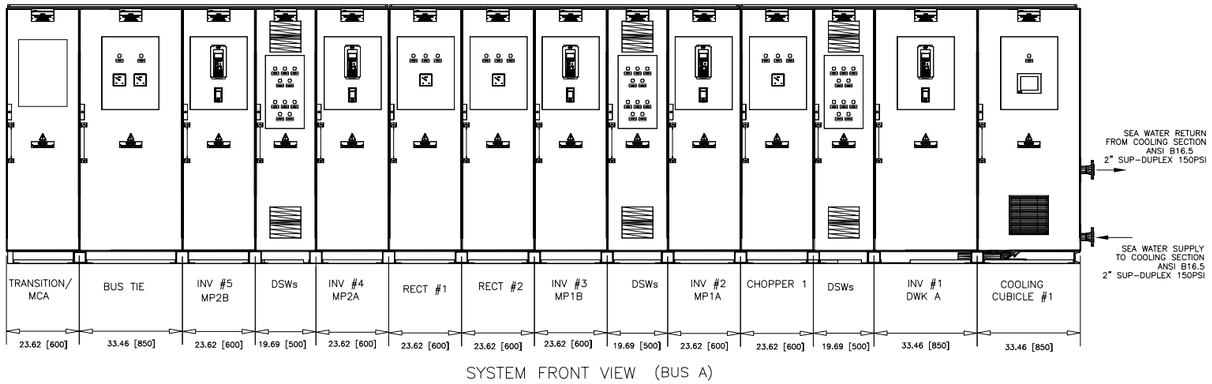
Technical specifications	NRT-1800	NRT-3600	NRT-4800
Max tension capacity (at midstroke)	1,800 kips (8,007 kN)	3,600 kips (16,014 kN)	4,800 kips (21,352 kN)
No. of tension cylinders	6	6	6
Weight (installed)	268 mT	280 mT	298 mT
Comp. stroke	15.24 m (50')	15.24 m (50')	15.24 m (50')
Gas volume (standard)	76,800 l	76,800 l	114,600 l
Hose connection	8"	8"	8"
Design temp.	-20°C to +55°C	-20°C to +55°C	-20°C to +55°C
Max op. press	207 bar (3,000 psi)	207 bar (3,000 psi)	207 bar (3,000 psi)
Design press.	230 bar (3,336 psi)	230 bar (3,336 psi)	230 bar (3,336 psi)
Piston speed (max)	2 m/s	2 m/s	2 m/s
Pston speed (extreme)	4 m/s	4 m/s	4 m/s
Anti-recoil valve	Yes, 8"	Yes, 8"	Yes, 8"
Hydraulic fluid	Water/glycol (HFC)	Water/glycol (HFC)	Water/glycol (HFC)
Remote controlled from drillers cabin (cyberbase)	Yes	Yes	Yes
Local control panel	Yes	Yes	Yes
Trip saver	Possible	Possible	Possible

Power Generation

- Compact drive systems
- Drill Force
- Power blade

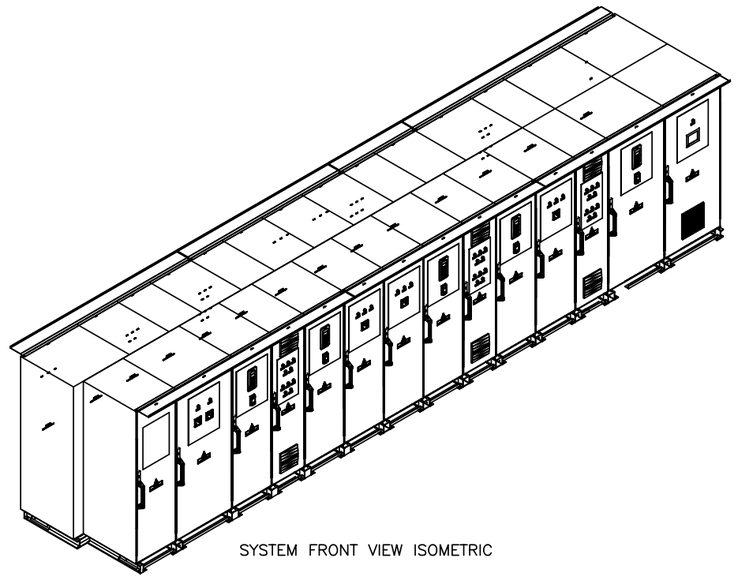
*For reference only, please contact your local sales contact for more information.

Compact Drive Systems - Liquid Cooled



SYSTEM FRONT VIEW (BUS A)

Compact Drive Liquid Cooled Specifications						
DC Bus Rating	Rectifier Size	Output Power	Rated Temperature	Ex. Temp. Range	In. Max Press. Range	Compliance
4000 / 8000 A	3200 A	560/1120/1600 kW	40 / 45° C	35 / 75° C	20-60 psi	IEC 61439 - 1
Peak Fault Bracing	Chopper Voltage	Continuous Current	Output Frequency	Ex. Max Flow Range	In. Max Flow Range	IEC 61800 -1, -2, -3
220 kA	900/1000/1100V selectable	583/1143/1697 A	0-300 Hz	80-110 GPM	100-160 GPM	IEEE – 45
System IP Rating	Chopper Continuous Power	Overload Current	Cable Entry Options	Ex. Cooling Water Temp.	Maximum Thermal Dissipation	ABS MODU 2012
IP42 / IP 20	1200/2400 kW	872/1710/2538 A	Bottom/Top	5-38° C	225 kW / 765 Btu/hr	DNV



SYSTEM FRONT VIEW ISOMETRIC

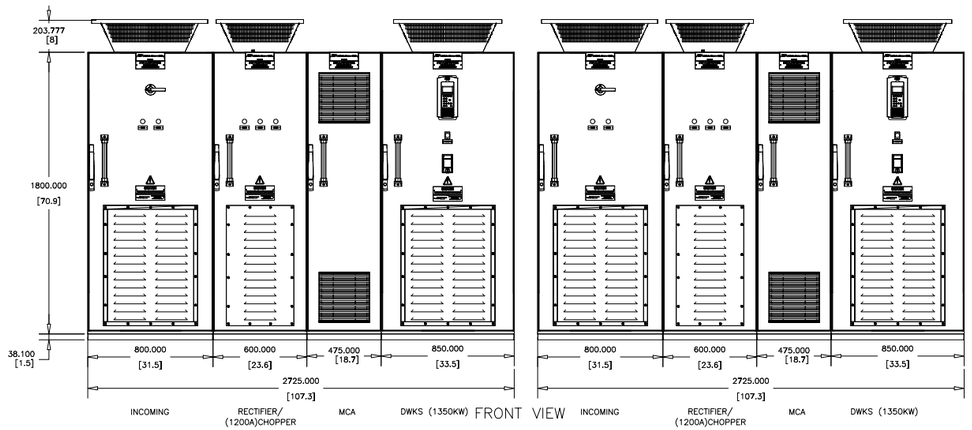
Compact Drive LC

The Compact Drive LC (Liquid Cooled) systems share all the features with Drill Force LC systems but with a reduced height and footprint. The System still offers the best reliability and seamless integration with NOV control systems and machinery. NOV proprietary liquid cooling design provides the best cooling capacity and redundancy. High thermal dissipation guarantees the continuous drilling and breaking operations without thermal failures.

Features

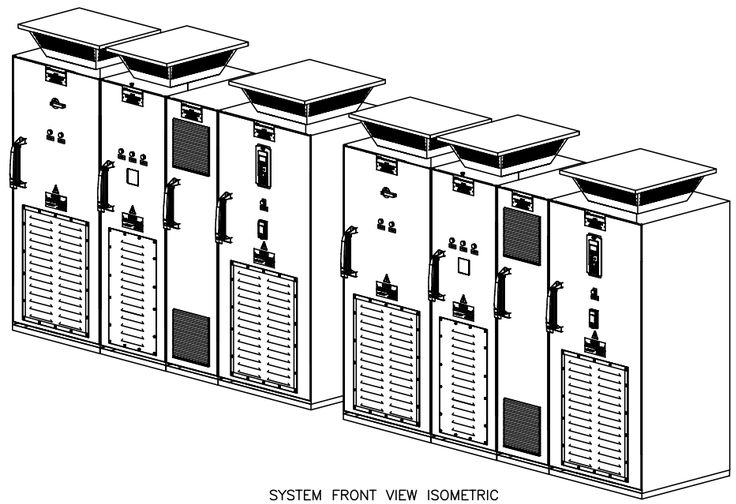
- Onboard pre-charge circuitry
- 6/12/18/24 pulse configurable
- Reduced height and footprint to fit any tight space
- Reserve cooling tank
- Isolation between modules for easy diagnostics
- Induction / PM switchable firmware
- Modular design and configure flexibility
- Excellent serviceability and accessibility
- Proven interface with NOV control and machinery

Compact Drive Systems - Air Cooled



FRONT VIEW

Compact Drive Air Cooled Specifications				
DC Bus Rating	Rectifier Size	Output Power	Rated Temperature	Compliance
4000 / 8000 A	2500 A	450/900/1400 kW	40 / 45° C	IEC 61439 - 1
Peak Fault Bracing	Chopper Voltage	Continuous Current	Output Frequency	IEC 61800 -1, -2, -3
220 kA	900/1000/1100V selectable	486/953/1414 A	0-300 Hz	IEEE – 45
System IP Rating	Chopper Continuous Power	Overload Current	Cable Entry Options	ABS MODU 2012
IP42 / IP 20	1200/2400 kW	727/1425/2116 A	Bottom/Top	DNV



SYSTEM FRONT VIEW ISOMETRIC

Compact Drive AC

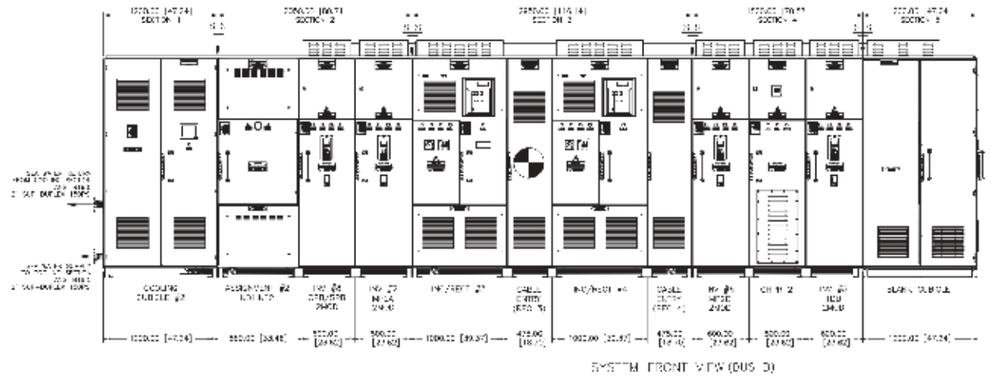
The Compact Drive AC (Air Cooled) Systems have reduced height and footprint to meet the most confined switchgear room design. With reduced size, the compact drives still keep the reliability and integration with NOV control systems and machinery. Dedicated VFD sections provide more configurable products and flexibility to arrange the VFD sections for different layouts.

Features

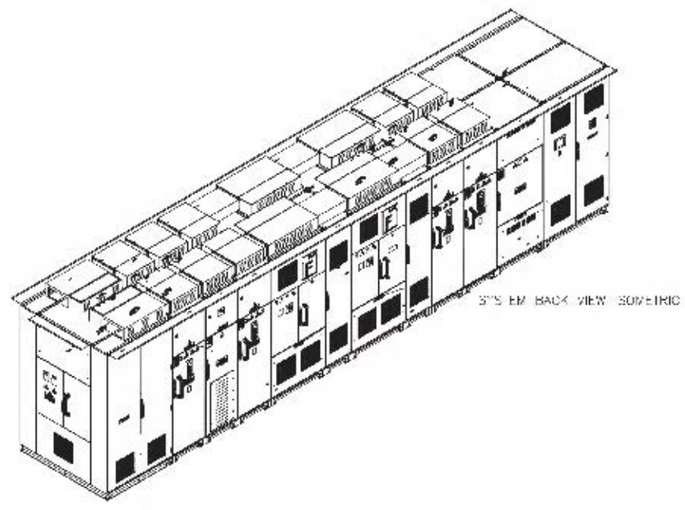
- Onboard pre-charge circuitry
- Dedicated VFD sections for each drilling equipment
- Reduced height and footprint to fit any tight space
- Induction / PM switchable firmware
- Modular design and configure flexibility
- Excellent serviceability and accessibility
- Proven interface with NOV control and machinery

*For reference only, please contact your local sales contact for more information.

Drill Force - Liquid Cooled



Drill Force Liquid Cooled Specifications						
DC Bus Rating	Rectifier Size	Output Power	Rated Temperature	Ex. Temp. Range	In. Max Press. Range	Compliance
4000 / 8000 A	3200 A	560/1120/1600 kW	40 / 45° C	35 / 75° C	20-60 psi	IEC 61439 - 1
Peak Fault Bracing	Chopper Voltage	Continuous Current	Output Frequency	Ex. Max Flow Range	In. Max Flow Range	IEC 61800 -1, -2, -3
220 kA	900/1000/1100V selectable	583/1143/1697 A	0-300 Hz	80-110 GPM	100-160 GPM	IEEE – 45
System IP Rating	Chopper Continuous Power	Overload Current	Cable Entry Options	Ex. Cooling Water Temp.	Maximum Thermal Dissipation	ABS MODU 2012
IP42 / IP 20	1200/2400 kW	872/1710/2538 A	Bottom/Top	5-38° C	225 kW / 765 Btu/hr	DNV



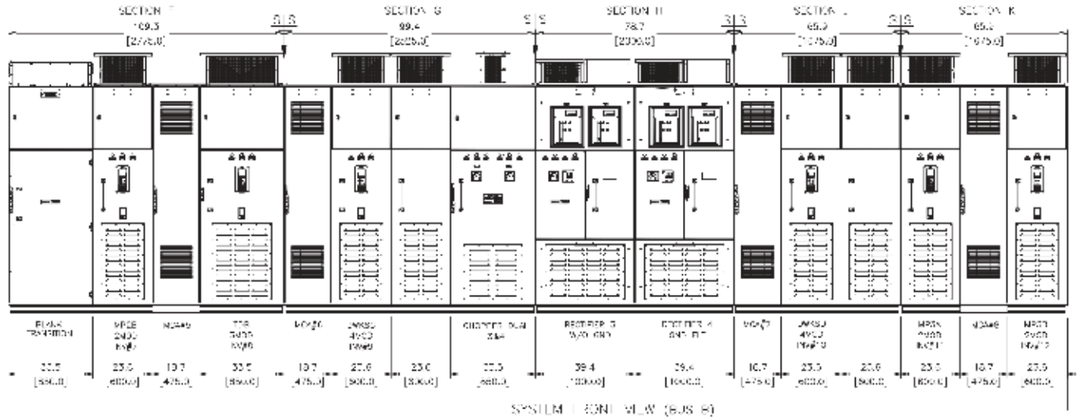
Drill Force LC

The Drill Force LC (Liquid Cooled) systems share all the features with Drill Force AC systems and offer the best reliability and seamless integration with NOV control systems and machinery. NOV proprietary liquid cooling design provides the best cooling capacity and redundancy. High thermal dissipation guarantees the continuous drilling and breaking operations without thermal failures.

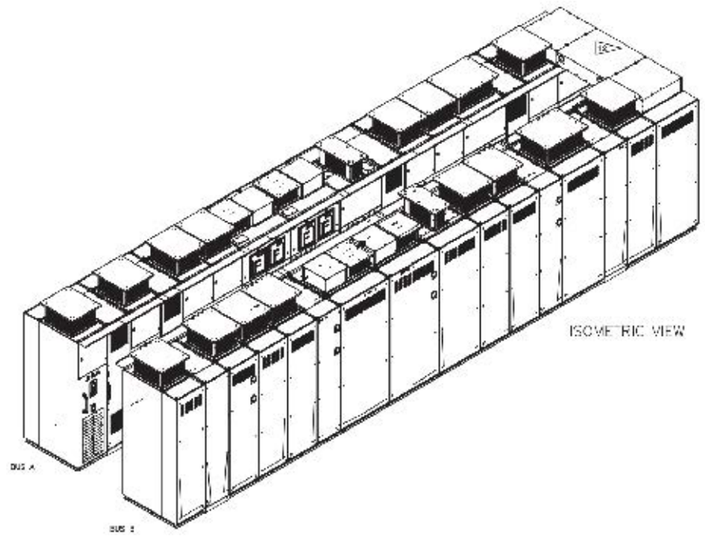
Features

- Onboard pre-charge circuitry
- 6/12/18/24 pulse configurable
- Built-in jacking energy dissipation
- Reserve cooling tank
- Isolation between modules for easy diagnostics
- Induction / PM switchable ramware
- Modular design and configurability
- Excellent serviceability and accessibility
- Proven interface with NOV control and machinery

Drill Force - Air Cooled



Drill Force Air Cooled Specifications				
DC Bus Rating	Rectifier Size	Output Power	Rated Temperature	Compliance
4000 / 8000 A	2500 A	450/900/1400 kW	40 / 45° C	IEC 61439 - 1
Peak Fault Bracing	Chopper Voltage	Continuous Current	Output Frequency	IEC 61800 -1, -2, -3
220 kA	900/1000/1100V selectable	486/953/1414 A	0-300 Hz	IEEE – 45
System IP Rating	Chopper Continuous Power	Overload Current	Cable Entry Options	ABS MODU 2012
IP42 / IP 20	1200/2400 kW	727/1425/2116 A	Bottom/Top	DNV



Drill Force AC

The Drill Force VFD AC (Air Cooled) Systems are extremely reliable and integrate seamlessly with NOV control systems and machinery. Compartmentalized design, isolation between modules, diagnostic monitoring, and system protection, offer you the most uptime, reliability, and sociability. Designed, engineered, manufactured, and tested together with NOV controls to optimize the drilling performance and maximize drilling efficiency.

Features

- Onboard pre-charge circuitry
- 6/12/18/24 pulse configurable
- Built-in jacking energy dissipation
- Isolation between modules for easy diagnostics
- Induction / PM switchable ramware
- Modular design and configurability
- Excellent serviceability and accessibility
- Proven interface with NOV control and machinery

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nov.com

Technical Marketing Sheet

PowerBlade™ - Kinetic Energy Recovery System

*For reference only, please contact your local sales contact for more information.

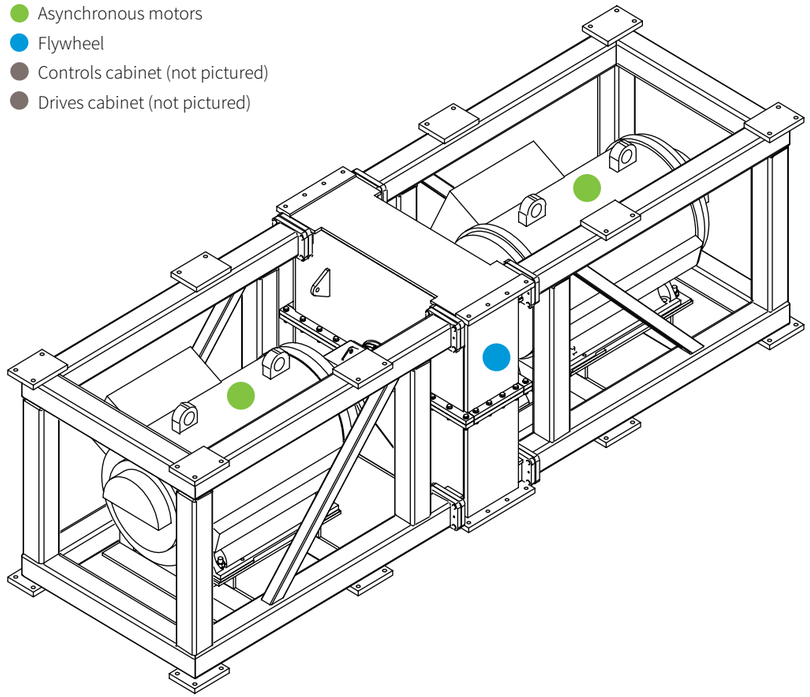
NOV PowerBlade is an innovative technology suitable for drilling and hoisting systems. It preserves energy to reduce fuel costs and lower emissions while increasing operational safety and reliability.

During operation, the PowerBlade system captures regenerated electrical energy when the drawworks, crane or winch slows and stops the load on the hook. Previously, this energy was dissipated as heat using braking resistors.

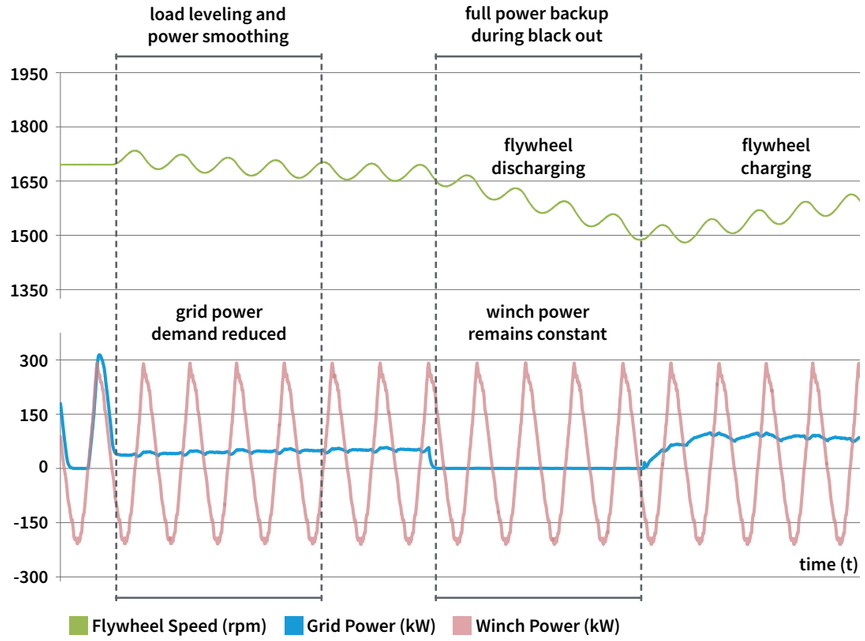
The PowerBlade stores this as kinetic energy using a flywheel that accelerates and gathers speed, capturing energy from vessel rising and block lowering during active heave compensation. This energy is then recycled and utilized to put power back onto the power grid when needed. The spinning flywheel rotates between 1,000 and 2,000 RPMs, charging and discharging energy in a safe fashion.

Main Components

- Asynchronous motors
- Flywheel
- Controls cabinet (not pictured)
- Drives cabinet (not pictured)



Successful Full Scale Test Results



Dimensions and Weight Estimates (excluding service area)*

Size (L X W X H)	5500 mm X 1750 mm X 1600 mm
Weight	17500 kg
VFD + MC Cabinets Size (L X W X H)	605 mm x (800 mm + 800 mm + 600 mm) x 2405 mm
VFD + MC Cabinets Weight	650 kg

*based on 20 mJ capacity system

Performance Estimates*

Flywheel speed range	1000 rpm - 2000 rpm
Flywheel idle speed	1700 rpm
Static and Dynamic Evaluation of lifetime for Flywheel spherical bearings	34.6 years
Usable Energy storage capacity	20 MJ
Usable Energy storage capacity	5.7 kWh
Total Energy storage capacity	30 MJ
Support of separate DC-buses	2
DC-bus current, rated per bus	1550 ADC
DC-bus connection voltage range	675 VDC – 1080 VDC
Internal DC-bus capacitance, per bus	20 000 uF
Continuous power handling, per bus	1000 kW
Peak power handling, per bus	1300 kW
Peak power consumption reduction with winch, crane, or drawworks application	85%
Average power consumption reduction with winch, crane, or drawworks application	60%

*based on 20 mJ capacity system

Design Data

Design Standards	DNV OS-E101 Drilling Plant 2009
System Efficiency, round trip recovery	92%
Design Temperature (ambient)	-20 to +45 Celsius
Degree of protection, Motors and Flywheel/Power and Control System	IP 55 / IP 22

Cooling Data Total

Cooling of VFD cabinets	Freshwater minimum flow rate 30 l/min per VFD
Cooling of PowerBlade motors	Freshwater minimum flow rate 70 l/min per motor
Seawater temperature and pressure	N/A
Freshwater temperature and pressure	Maximum temperature 37 C; Pmax = 5 bar

Features

- PowerBlade is easily integrated into the power grid and recaptured energy can be distributed as both DC and AC power
- Modular design allows flexibility to adapt to varying rig equipment capacities and vessel configurations
- Seamless interface with rig generator control, power management system, equipment controls and the driller operation system

Benefits

- Preserve energy to reduce operating costs by lowering peak power demand and leveling load
- Reduce generator/engine maintenance cost as a result of less consumption demand
- Provide full power supply if one main generator fails and a full power backup in case of ship black out
- Recover up to 65%-70% system energy from vessel rising and block lowering in active heave compensation

Testing

- Three-step testing process: computer simulation, lab environment setup testing and full scale prototype testing
- Computer simulation and testing of power scenarios including: active heave compensation mode, constant tension mode, power boost at tripping, and operation in the case of ship black out
- Full scale testing employs (2) 50-ton multilayer winches, flywheel modules, drives and control & measurement equipment (refer to the above curve for results)

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Drilling Controls and Instrumentation

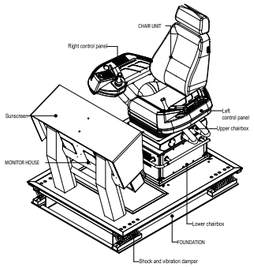
- Cyberbase™
- Amphion™

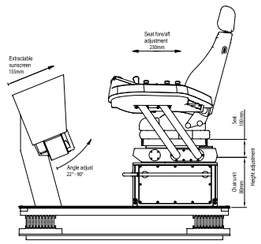
NOV Rig Technologies

Rig Control Systems - Cyberbase™

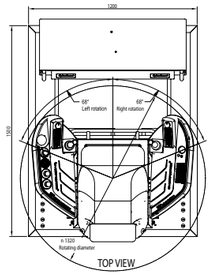
*For reference only, please contact your local sales contact for more information.

CYB-43

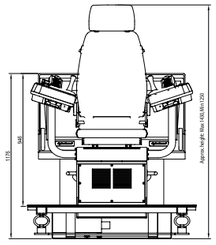




SIDE VIEW



TOP VIEW



BACK VIEW

Features:

- Adjustable height (relative to floor)
- Default rotation sector of 136 degrees with adjustable end stops in 36 degree steps

Comfortable Recaro seat with:

- Durable leather
- Side support

With adjustable:

- Height (relative to control panels)
- Position (fore and aft)
- Seat cushion length and rake of front part
- Lumbar support
- Neck rest
- Seat back angle

Control panels:

- Ergonomic component layout
- Angled control joystick
- Track ball
- Mode switch
- Emergency switch
- Numeric and functional keypads.
- Pen holder
- Cup holder
- Attachment for note pad holder

Cyberbase™	CYB-43
Weight	275 kg (607 lb)
Dimensions	1200 x 1500 x 1400 mm (47.2 x 59.95 x 55.12 in)
Control	Control of any machinery
Power Consumption during Operation	320 W
Operating Temperature	-10° C to + 50°C
Trademark	Registered Trademark
Machine Interfaces Available	More than 300 different interfaces
Additional Information	PLC Interface on Profibus™ PC/Server interface on Ethernet. IP 56 for the EX version. EExp for zone 1*

Monitor house
2 each high quality 20.1” TFT LCD

Laminated anti-reflex glass

Extractable sunscreen

Step-les adjusting of angle

Foot support

Foundation
Access hatch to main connection box

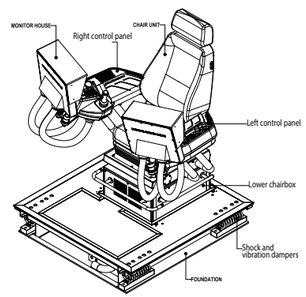
Shock and vibration dampers

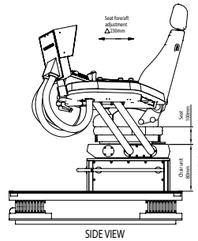
Recessed mounting

Service access
Monitor house: Hinges and internal gas spring.

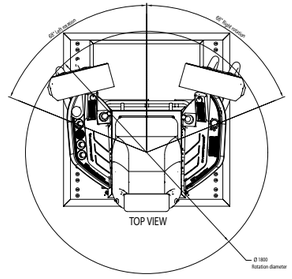
Upper chair box: Seat mounted to a hinged hatch, flip backward to open main connection box.

CYB-63

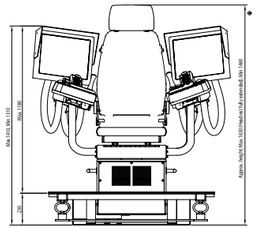




SIDE VIEW



TOP VIEW



BACK VIEW

Features:

- Adjustable height (relative to floor)
- Default rotation sector of 136 degrees with adjustable end stops in 36 degree steps

Comfortable Recaro seat with:
Durable leather

Side support

With adjustable:

- Height (relative to control panels).
- Position (fore and aft)
- Seat cushion length and rake of front part
- Lumbar support
- Neck rest
- Seat back angle

Control panels:

- Ergonomic component layout
- Angled control joystick
- Track ball
- Mode switch
- Emergency switch
- Numeric and functional keypads
- Pen holder
- Cup holder
- Attachment for note pad holder

Cyberbase™	CYB-63
Weight	200 kg (441 lb)
Dimensions	1200 x 1250 x 1400 mm (47.2 x 49.21 x 55.12 in)
Control	Control of any machinery
Power Consumption during Operation	320 W
Operating Temperature	-10° C to + 50°C
Trademark	Registered Trademark
Machine Interfaces Available	More than 300 different interfaces
Additional Information	PLC Interface on Profibus™ PC/Server interface on Ethernet. IP 56 for the EX version. EExp for zone 1*

Foundation
Access hatch to main connection box.

Shock and vibration dampers.

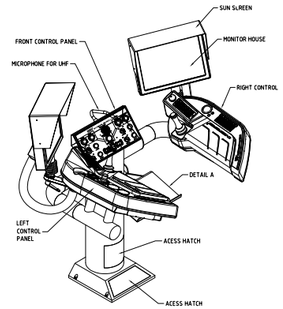
Recessed mounting.

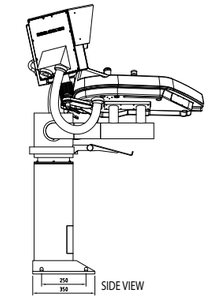
Service access
Monitor house: Hinges and internal gas spring.

Upper chair box: Seat mounted to a hinged hatch, flip backward to open.

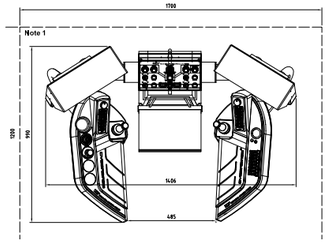
Main connection box: Open floor hatch to access main connection box.

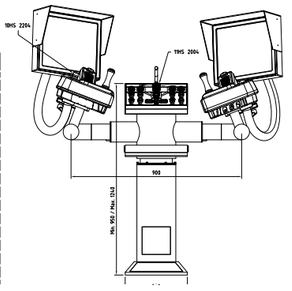
CYB-7





SIDE VIEW





Features:

- Adjustable height (relative to floor)
- Default rotation sector of 30 degrees

Monitor House:
2 each high quality 19” TFT LCD

Laminated anti-reflex glass

Sunscreen

Stepless adjusting of angle

Control Panels:

- Angled control joystick
- Track ball
- Mode switch
- Emergency switch
- Numeric and functional keypads.
- Pen holder
- Cup holder
- Attachment for note pad holder

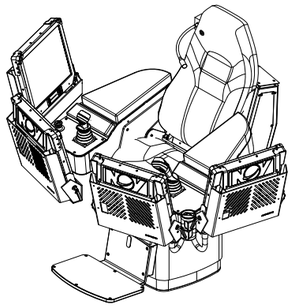
Cyberbase™	CYB-7
Weight	110 kg (243 lb)
Dimensions	992 x 1409 x 1400 mm (39.05 x 55.2 x 55.12 in)
Control	Control of any machinery
Power Consumption during Operation	310 W
Operating Tempurature	-10° C to + 50°C
Trademark	Registered Trademark
Machine Interfaces Available	More than 300 different interfaces
Additional Information	PLC Interface on Profibus™ PC/Server interface on Ethernet.

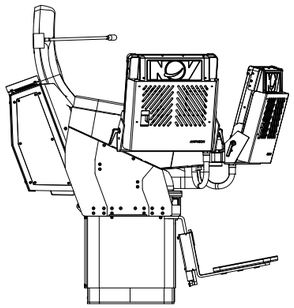
Rig Control Systems - Amphion™

*For reference only, please contact your local sales contact for more information.

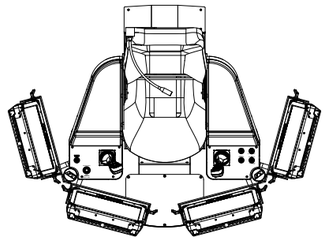
AMPHION™ is National Oilwell Varco's modular, fully integrated, networked, and field-proven drilling control solution delivered in a compact, comfortable, and cost-effective package. AMPHION™ manages, controls, and monitors rig floor equipment to ensure safe, efficient and seamless operations. Configurable, expandable and with a future-looking platform, the AMPHION™ control system adds value to your operations.

Amphion-FE

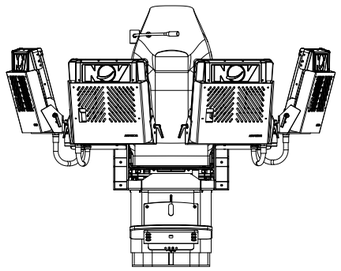




SIDE VIEW



TOP VIEW



FRONT VIEW

General Features:

- Integrated Talkback system
- Integrated CCTV system
- Optional cabin control integration (HVAC, wipers, lighting, etc.)
- Integrated drilling instrumentation through RigSense/MSI
- Up to four touchscreens for monitoring and control
- Adjustable touchscreen position

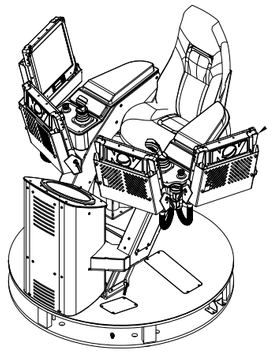
Chair Features:

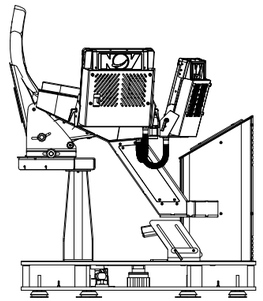
- Durable leather material
- Removable seat cover
- Adjustable pedestal support
- 7-position electric adjustments including height, rotation, setback angle and lumbar support

Control Features:

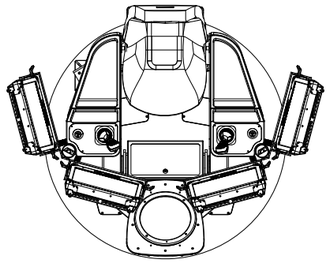
- Ergonomic joystick control
- Integrated control buttons and knobs
- Optional trackball for remote HMI control
- Emergency stop button(s)
- Multiple levels of redundancy
- Intuitive and user-friendly graphic interface
- Touchscreens with fast response time
- User selectable information displays
- Multiple language options
- Selectable units of measure
- Alarms and diagnostic screens

Amphion-WAW





SIDE VIEW



TOP VIEW

General Features:

- Integrated CCTV system
- Electric weight indicator
- Optional cabin control integration (HVAC, wipers, lighting, etc.)
- Integrated drilling instrumentation through RigSense/MSI
- Up to four touchscreens for monitoring and control
- Adjustable touchscreen position

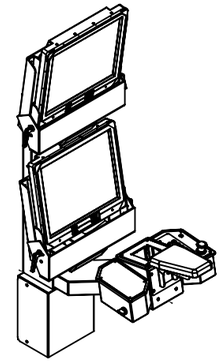
Chair Features:

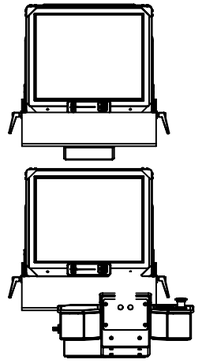
- Durable leather material
- Removable seat cover
- Pedestal support
- Swing chair for sit/stand operation
- 7 position adjustments including height, rotation, setback angle and lumbar support

Control Features:

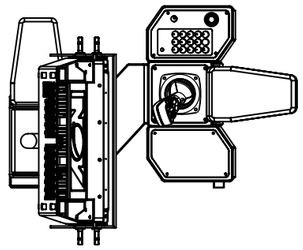
- Emergency stop button(s)
- Ergonomic joystick control
- Integrated control buttons and knobs
- Multiple levels of redundancy
- Intuitive and user-friendly graphic interface
- Touch screens with fast response time
- User selectable information displays
- Multiple language options
- Selectable units of measure
- Alarms and diagnostic screens

Amphion-SUW





FRONT VIEW



TOP VIEW

General Features:

- Stand up workstation for pipe handling operations
- Provides driller's workstation redundancy
- Integrated Talkback system
- Integrated CCTV system
- Touchscreen for monitoring and control
- Adjustable height
- Adjustable touchscreen viewing angle

Control Features:

- Ergonomic joystick control
- Integrated control buttons and knobs
- Emergency stop button
- Intuitive and user-friendly graphic interface
- Touchscreen with fast response time
- User selectable information displays
- Multiple language options
- Selectable units of measure
- Alarms and diagnostic screens

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Pressure Control Equipment

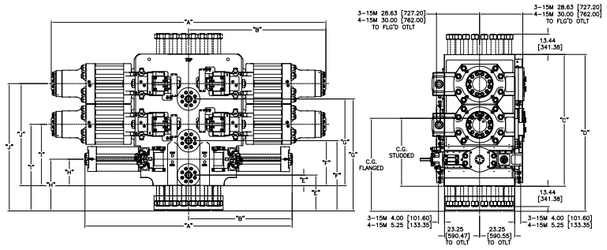
- NXT BOP
- NXT-M BOP
- Corrosion Resistant Enhancement Package - sheet 1 & 2
- Low Force Shear Rams - LFS-5
- RCX multiplex pod
- RCX low shock valves - sheet 1 & 2
- EHBS Adjustable Timing Circuit Actuator
- RCX emergency hydraulic backup system accoustic pod
- Depth compensated bottles - sheet 1 & 2
- Hands free gooseneck
- Riser
- Wellhead connectors - sheet 1 & 2
- CMX 1527 LMRP wellhead connector
- Shuttle stack tool

NOV Rig Technologies

Technical Marketing Sheet

18-15m NXT BOP Assembly

*For reference only, please contact your local sales contact for more information.



Triple

Flange Configuration	Height	Cavity			Outlet			Est. Assembly Weight w/out blocks (+1000lbs/cavity)
	D	H	I	J	E	F	G	
14x14x14 SXF	89.3	35.7	52.7	69.7	24.4	44.4	64.4	63,000 lbs
22x22x14 SXF	104.1	34.5	57.5	84.5	23.8	46.5	74.2	101,700 lbs
22x22x22 SXF	110.3	36.7	63.7	90.7	25.1	52.7	80.4	121,650 lbs
14x14x14 SXS	N/A	19.5	36.5	53.5	8.0	28.0	48.8	

Center of Gravity

DIM	BOP	Door Configuration			± 1"(± 25mm)
		Upper	Middle	Lower	
C.G.	14X14X14	14'' UIIB	14''UIIB w/ ILF	14''UIIB	50.2 (1274.2)
C.G.	22X22X14	22'' PSLK	22'' PSLK	14'' PSLK	61.7 (1566.3)
C.G.	22X22X22	22'' PSLK LFS	22'' PSLK LFS	22'' PSLK LFS	61.9 (1572.7)

18-15m NXT BOP Assembly Features

Operator Characteristics	14" UIIB	14" U2B ILF	22" PSLK SMX	14" PSLK 14" BSTR LFS	14"PSLK 14" BSTR
Operator Weight (w/ fluid)	3,300 lbs	3300 lbs	8,600 lbs	4,250 lbs	4,200 lbs
OPEN	15.8 lbs	15.8 Gal	42.8 Gal	32.1 Gal	26.6 Gal
CLOSE	16.8 Gal	16.8 Gal	46.1 Gal	33.7 Gal	27.9 Gal
Max. Working Pressure	3,000 psi	3,000 psi	5,000 psi	3,000 psi	3,000 psi

Shaffer™ NXT BOP Systems are unique in providing a means of significantly improving safety and efficiency in the critical path of activity. With the replacement of the door bolts in ram BOPs, National Oilwell Varco has eliminated the time consuming manual practice of using brute force to torque up numerous large door bolts. A number of benefits have been realized with this development:

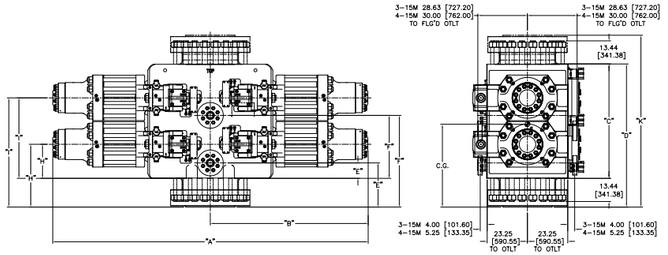
- Reduced Weight (lightest BOP systems in the industry)
- Reduced Height (smallest BOP systems in the industry)
- Elimination of Manual Labor Under Time Pressure

Multi-Rams

Shaffer™ addresses the need for changing out rams on a tapered drillstring by offering Multi-Ram assemblies to cover a range of varying ODs of drill pipe:

Supported Inner Diameter Range:

- 3 1/2"- 5 7/8"
- 3 1/2" - 6 5/8"
- 4 1/2"- 6 5/8" HT
- 5"- 7 5/8"



Double

Flange Configuration	Height		Cavity		Outlet		Est. Assembly Weight w/out blocks (+1000lbs/cavity)
	D	K	H	I	E	F	± 100 lbs
14x14 SXF	72.3	N/A	35.9	52.9	24.4	44.4	46,700 lbs
14x14 FXF	N/A	88.7	35.9	52.9	24.4	44.4	51,850 lbs
22x14 SXF	81.1	N/A	36.4	50.1	28.9	51.6	65,250 lbs
22x22 SXF	83.2	N/A	36.6	63.6	25.7	53.3	85,100 lbs

Center of Gravity

DIM	BOP	Door Configuration		± 1"(± 25mm)
		Upper	Lower	
C.G.	14X14 SXF	14'' UIIB	14'' UIIB	41.9 (1064)
C.G.	14X14 FXF	14'' PSLK 14'' BSTR	14'' MNLK	44.9 (1140)
C.G.	22X14 SXF	22'' PSLK	14'' MNLK	48.4 (1229)
C.G.	22X22 SXF	22'' PSLK	22'' PSLK	48.2)1224)

Hydraulic System

Hydraulic power to operate a Model NXT ram BOP can be furnished by any standard oil field accumulator system. Hydraulic passages drilled through the body eliminate the need for external manifold pipes between the hinges. Each set of rams requires only one opening and one closing line. There are two opening and two closing hydraulic ports, clearly marked, on the back side of the BOP. The extra hydraulic ports facilitate connecting the control system to the preventer. A standard hydraulic accumulator unit will close any Model NXT ram with rated working pressure in the well bore.

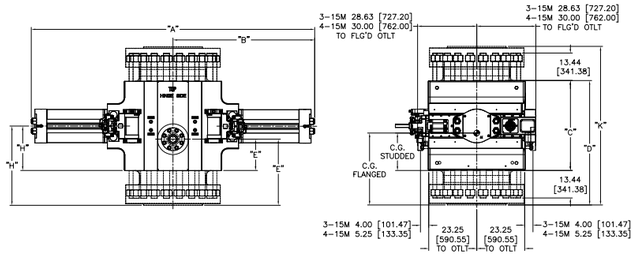
Ultra-Temp™

The conservative Shaffer™ testing procedures call for maintaining pressure and temperature for the duration of the test. Even with these stringent demands, the UltraTemp rams hold in witnessed testing. Shaffer™ UltraTemp ram assemblies are designed to safely withstand wellbore pressures up to 15,000 psi and extreme temperatures up to 350°F (177°C) for prolonged periods. This translates into rigsite capability to safely evacuate personnel and equipment in the event of a major high temperature, high pressure kick.

Low Force Blind Shear (LFS) Rams

The force required to shear casing is reduced by at least 50%. The LFS Ram sever 14'', 113ppf, Q-125 casing at 2700 psi with a 22'' operator. Multiple shear and seal sequences can be performed with the same assembly, including conditions where the drill pipe is hung-off below the shear ram cavity, enhancing reliability and extending the length of the BOP stack deployment.

- Less pressure requited to shear
- Capable of centering pipe before sharing
- Shearing range
- Wireline to 14''
- Temperature Range: 30°F to 300°F (-1°C to 149°C)



Single

Flange Configuration	Height		Cavity		Outlet	Est. Assembly Weight w/out blocks (+1000lbs/cavity)
	C	D	K	H	E	± 100 lbs
14 SXF	N/A	60.8	N/A	38.8	32.3	35,150 lbs
14 FXF	N/A	N/A	77.3	38.6	32.3	38,200 lbs
22 SXF	N/A	61.9	N/A	39.1	28.7	56,650 lbs
22 SXS	45.0	N/A	N/A	22.2	11.8	53,800 lbs

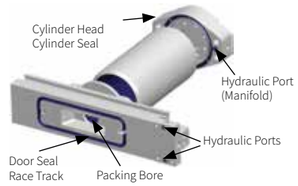
Center of Gravity

DIM	BOP	Door Configuration	± 1"(± 25mm)
C.G.	14 SXF	14'' UIIB	35.3 (896.6)
C.G.	14 FXF	14'' MNLK	38.5 (978)
C.G.	22 SXF	22'' PSLK	37.4 (950.0)
C.G.	22 SXS	22'' PSLK	22.5 (571.5)

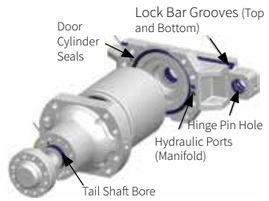
Weldless Cavity

The introduction of no weld cavities in previous Shaffer™ BOP designs is carried on in the NXT models. This feature introduces replaceable parts to the cavity to eliminate extensive in-shop repairs and post weld heat treatments. The seal seat, skid plate and side pads can be replaced upgrading the BOP cavity tolerances to as new condition.

14" Ultra Lock II (B) Door



22" PosLock Door



*For 22'' PosLock door-specific applications, refer to the table titles "NXT Door-CREP Level Variants-22''Door'' on DOC# 10832351-INF

NXT Body-CREP Level 7

Body Area	Inlay/Coating
Door Seal	Inconel
Top Seat	Inconel
Bottom Seat (reversible cavity only)	Inconel
Hydraulic Ports	Inconel
Left/Right Face	Phosphate
Lock Rod Groove	Phosphate
Ring Groove	Inconel

NXT Door - CREP Levels*

Door Area	CREP Level H	CREP Level J	CREP Level K
Hinge Pin Hole	Phosphate	Phosphate	Inconel
Door Seal Race Track	Inconel	Inconel	Inconel
Hydraulic Ports	Phosphate	Phosphate	Inconel
Cylinder Ports	Phosphate	Phosphate	Inconel
Packing Bore	Inconel	Inconel	Inconel
Lock Bar Groove	Phosphate	Phosphate	Phosphate
Cylinder Bore	Phosphate	Chrome	Inconel

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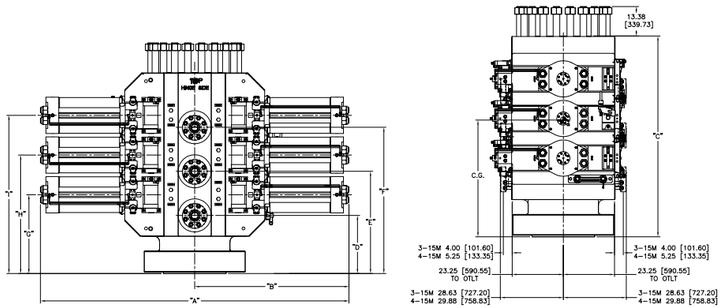
Technical Marketing Sheet

18-15m NXT-M BOP Assembly

*For reference only, please contact your local sales contact for more information.



Triple

Flange Configuration	Height		Cavity			Outlet		Weight (lbs)
	C	G	H	I	D	E	F	
14 X 14 X 14	93.1	35.9	53.9	71.9	26.4	46.4	66.4	65,000

Center of Gravity

DIM	BOP	Door Configuration			± 1"(± 25mm)
		Upper	Middle	Lower	
C.G.	14X14X14	14" U2B	14" U2B	14" U2B	51.3 (1303)
C.G.	14X14X14	14" U2B ILF	14" U2B ILF	14" U2B ILF	51.3 (1303)
C.G.	14X14X14	14" PSLK 14" BSTR LFS	14" PSLK 14" BSTR LFS	14" PSLK 14" BSTR LFS	51.3 (1303)

18-15m NXT-M BOP Assembly Features

Operator Characteristics	14" MNLK	14" U2B	14" U2B ILF	14" MNLK 14" BSTR	14" MNLK 14" BSTR LFS	14"PSLK 14" BSTR LFS	14"PSLK 14" BSTR CVX
Operator Weight (w/ fluid)	2,590 lbs	3,040 lbs	3,070 lbs	3,455 lbs	3,655 lbs	3,950 lbs	3,840 lbs
OPEN	13.3 Gal	15.7 Gal	15.7 Gal	27.0 Gal	31.5 Gal	32.1 Gal	26.6 Gal
CLOSE	13.3 Gal	16.8 Gal	16.7 Gal	27.3 Gal	31.8 Gal	33.7 Gal	27.9 Gal
Max. Working Pressure	3,000 psi	3,000 psi	3,000 psi	3,000 psi	3,000 psi	3,000 psi	3,000 psi

Boltless BOP Doors

Shaffer™ NXT-M BOP Systems are unique in providing a means of significantly improving safety and efficiency in the critical path of activity. With the replacement of the door bolts in ram BOPs, National Oilwell Varco has eliminated the time consuming manual practice of using brute force to torque up numerous large door bolts. A number of benefits have been realized with this development:

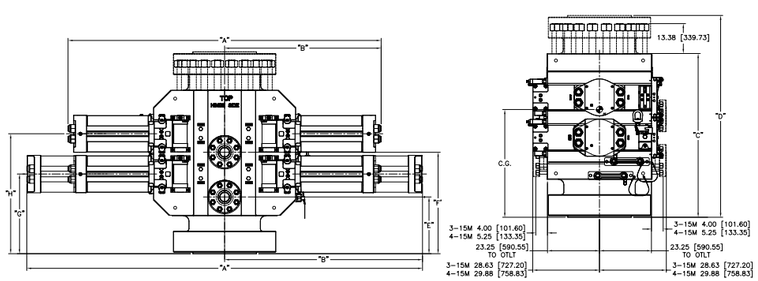
- Reduced Weight (lightest BOP systems in the industry)
- Reduced Height (smallest BOP systems in the industry)
- Elimination of Manual Labor Under Time Pressure

Multi-Rams

Shaffer™ addresses the need for changing out rams on a tapered drillstring by offering Multi-Ram assemblies to cover a range of varying ODs of drill pipe:

Supported Inner Diameter Range:

- 3 1/2"- 5 7/8"
- 3 1/2" - 6 5/8"
- 4 1/2"- 6 5/8" HT
- 5"- 7 5/8"



Double

Flange Congfiguration	Height		Cavity		Outlet		Weight (lbs)
	C	D	G	H	E	F	
14X14 SXF	73.3	N/A	35.6	53.6	25.4	45.4	45,700
14X14 FXF	N/A	89.8	35.6	53.6	25.4	45.4	51,850

Center of Gravity

DIM	BOP	Door Configuration		± 1 (± 25mm)
		Upper	Lower	
C.G.	14x14 SXF	14" U2B	14" PSLK 14" BTSR LFS	41.8 (1062)
C.G.	14x14 SXF	14" U2B	14" U2B	42.0 (1067)
C.G.	14x14 SXF	14" MLNK 14" BSTR	14" MLNK 14" BSTR	42.1 (1069)
C.G.	14x14 FXF	14" PSLK 14" BSTR LFS	14" PSLK 14" BSTR LFS	42.2 (1072)
C.G.	14x14 FXF	14" U2B ILF	14" U2B ILF	42.0 (1067)

Hydraulic System

Hydraulic power to operate a Model NXT-M ram BOP can be furnished by any standard oil field accumulator system. Hydraulic passages drilled through the body eliminate the need for external manifold pipes between the hinges. Each set of rams requires only one opening and one closing line. There are two opening and two closing hydraulic ports, clearly marked, on the back side of the BOP. The extra hydraulic ports facilitate connecting the control system to the preventer. A standard hydraulic accumulator unit will close any Model NXT-M ram with rated working pressure in the well bore.

Ultra-Temp™

The conservative Shaffer™ testing procedures call for maintaining pressure and temperature for the duration of the test. Even with these stringent demands, the UltraTemp rams hold in witnessed testing. Shaffer™ UltraTemp ram assemblies are designed to safely withstand wellbore pressures up to 15,000 psi and extreme temperatures up to 350°F (177°C) for prolonged periods. This translates into rigsite capability to safely evacuate personnel and equipment in the event of a major high temperature, high pressure kick.

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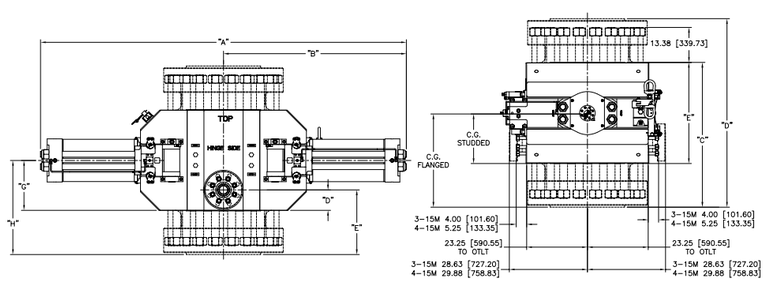
The force required to shear casing is reduced by at least 50%. The LFS Ram sever 14", 113ppf, Q-125 casing at 2700 psi with a 22" operator. Multiple shear and seal sequences can be performed with the same assembly, including conditions where the drill pipe is hung-off below the shear ram cavity, enhancing reliability and extending the length of the BOP stack deployment.

- Less pressure requited to shear
- Capable of centering pipe before sharing
- Shearing range
- Wireline to 14"
- Temperature Range: 30°F to 300°F (-1°C to 149°C)



Single

Flange Congfiguration	Height			Cavity	Weight (lbs)
	C	D	E	H	
14 SXS	N/A	N/A	41.0	N/A	39,000
14 SXF	55.4	N/A	N/A	36.1	38,500
14 FXF	N/A	72.12	N/A	36.1	62,100

Center of Gravity

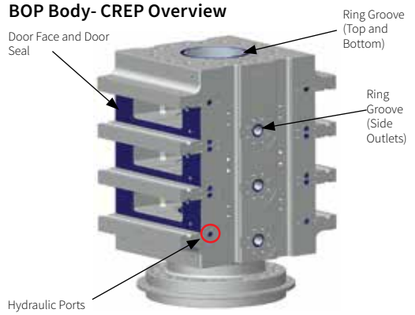
DIM	BOP	Door Configuration	± 1"(± 25mm)
C.G.	14 SXF	14" U2B	36.0 (916)
C.G.	14 SXF	14" U2B ILF	36.1 (916)
C.G.	14 SXF	14" MNLK x 14" BSTR LFS	36.1 (916)
C.G.	14 SXF	14" PSLK x 14" BSTR LFS	36.1 (916)

Weldless Cavity

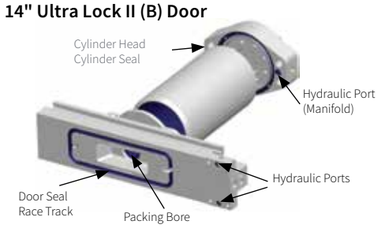
The introduction of no weld cavities in previous Shaffer™ BOP designs is carried on in the NXT-M models. This feature introduces replaceable parts to the cavity to eliminate extensive in-shop repairs and post weld heat treatments. The seal seat, skid plate and side pads can be replaced upgrading the BOP cavity tolerances to as new condition.

CREP- Corrosion Resistance Enhancement Package

BOP Body- CREP Overview



14" Ultra Lock II (B) Door



NXT-M Body- CREP Level 7	
Body Area	Inlay/Coating
Door Seal	Inconel
Top Seat	Inconel
Bottom Seat (reversible cavity only)	Inconel
Hydraulic Ports	Inconel
Left/Right Face	Phosphate
Lock Rod Groove	Phosphate
Ring Groove	Inconel

NXT-M Door-CREP Levels*			
Door Area	CREP Level H	CREP Level J	CREP Level K
Hinge Pin Hole	Phosphate	Phosphate	Inconel
Door Seal Race Track	Inconel	Inconel	Inconel
Hydraulic Ports	Phosphate	Phosphate	Inconel
Cylinder Ports	Phosphate	Phosphate	Inconel
Packing Bore	Inconel	Inconel	Inconel
Lock Bar Groove	Phosphate	Phosphate	Phosphate
Cylinder Bore	Phosphate	Chrome	Inconel

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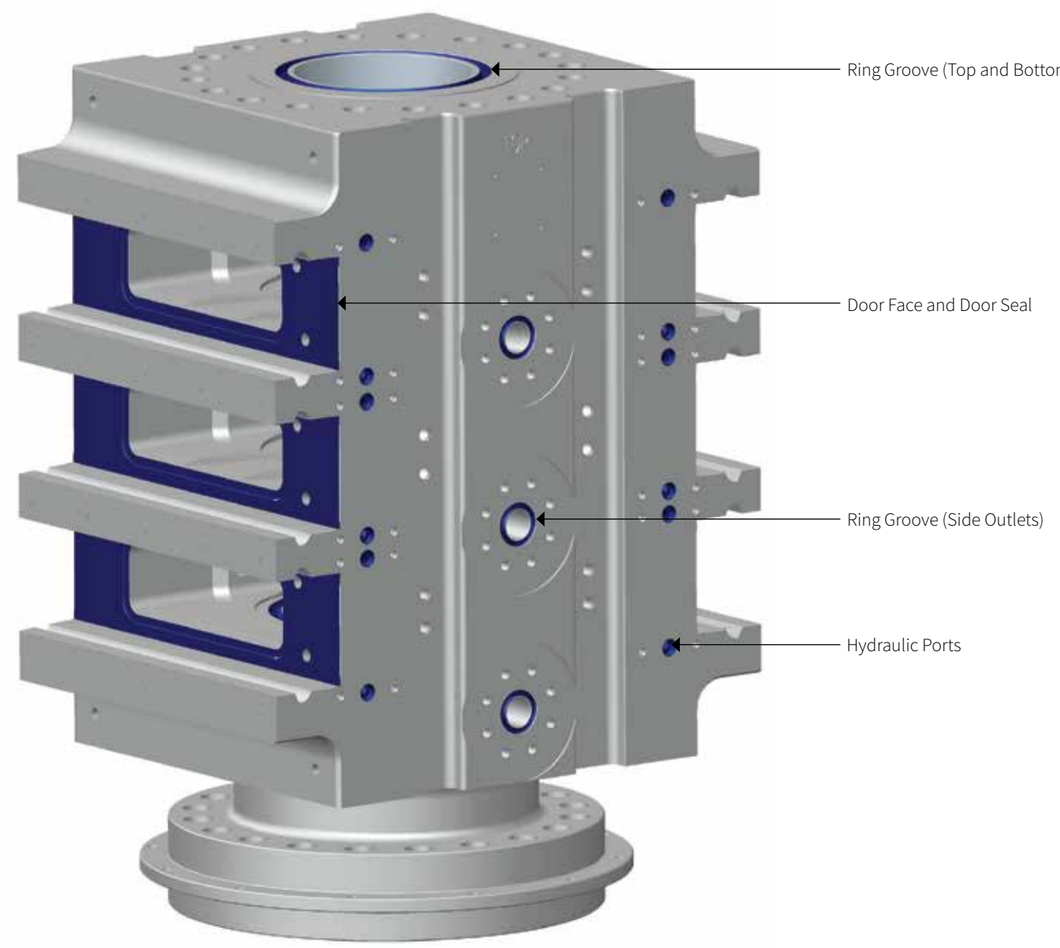
Corrosion Resistant Enhancement Package (CREP) - Sheet 1 of 2

*For reference only, please contact your local sales contact for more information.

CREP Purpose and Definition

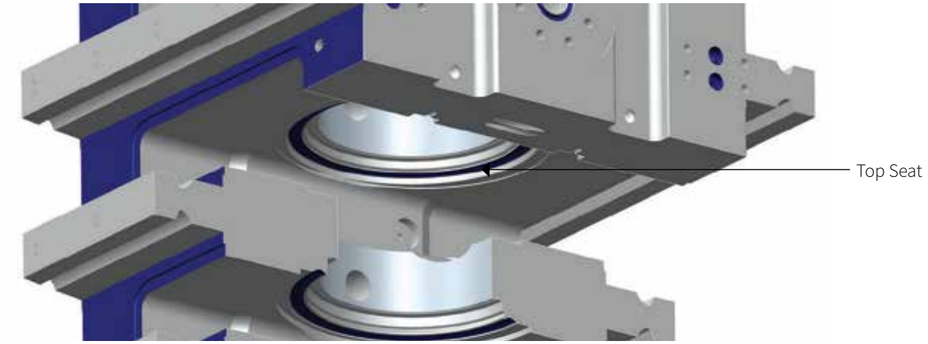
In an effort to reduce corrosion in the critical sealing areas of the BOPs, NOV provides a Corrosion Resistant Enhancement Package (CREP) on all of the 18-3/4" NXT and SLX BOPs. This CREP package is designed to reduce down time and extend the useful life of the BOP assembly prior to the need for field machining on the BOPs. On the BOP bodies, NOV only provides the maximum level of protection. Customers can choose the level of protection they desire for the BOP doors. This sheet describes the different CREP options available. Coating and inlay locations are indicated on by the shaded areas on the included graphics. Inconel is inlaid, while chrome, ever-silk®, and phosphate are applied as coatings. The information provided is derived from NOV Engineering Specification AX070224.

NXT Body View

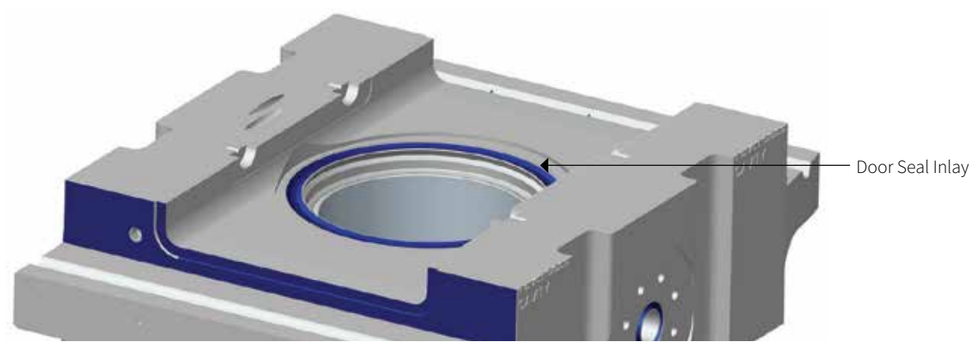


NXT Body	
BODY AREA	**CREP LEVEL 7**
Door Seal	Inconel
Top Seat	Inconel
Bottom Seat	Inconel
Hydraulic Ports	Inconel
Ring Grooves	Inconel

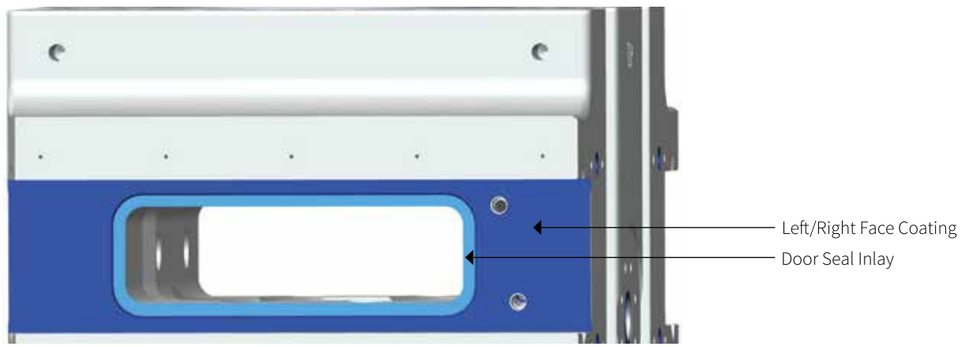
Top Seat View



Bottom Seat—Reversible Cavity Only



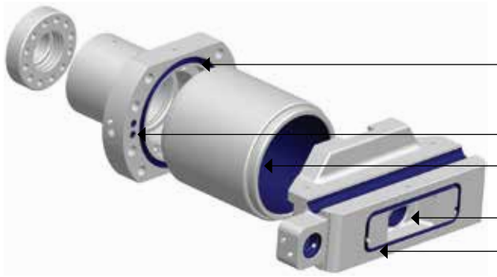
Door Seal Inlay—Detail View

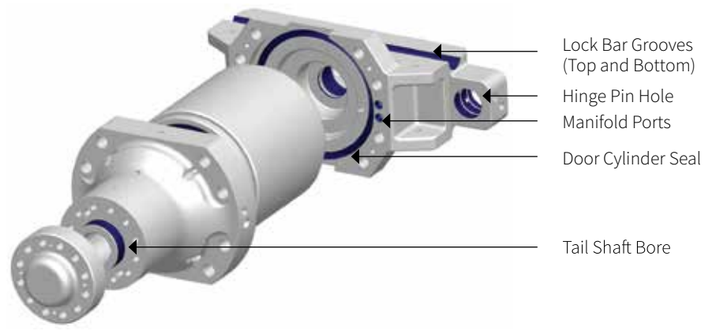


Corrosion Resistant Enhancement Package (CREP) - Sheet 2 of 2

*For reference only, please contact your local sales contact for more information.

22” PosLock Door

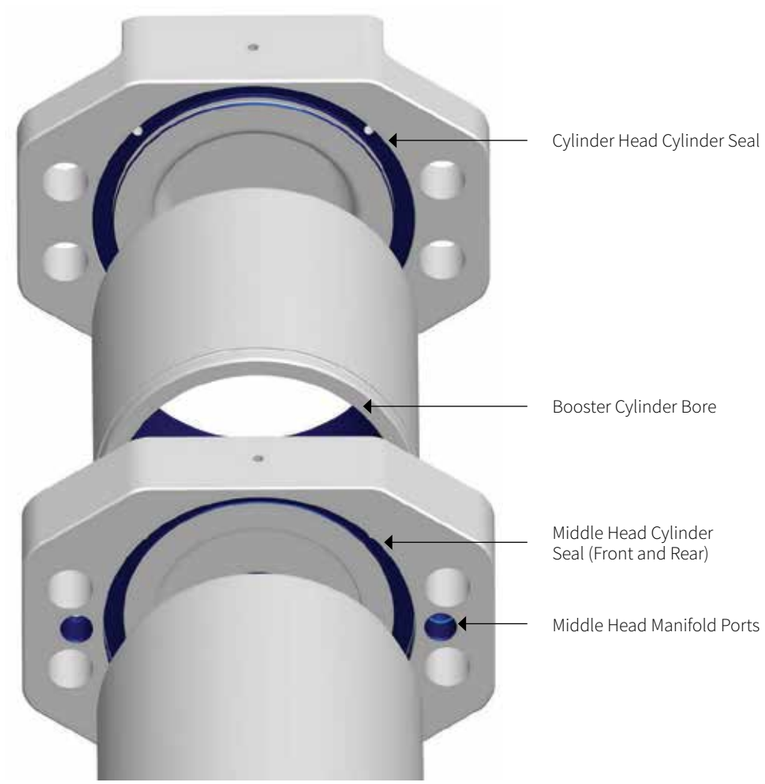




NXT Door CREP Levels - 22" PosLock Door			
DOOR AREA	**CREP LEVEL H**	**CREP LEVEL J**	**CREP LEVEL K**
Cylinder Head Cylinder Seal	Ever-slik®	Ever-slik®	Inconel
Manifold Ports	Ever-slik®	Ever-slik®	Inconel
Cylinder Bore	Phosphate	Chrome	Chrome
Packing Bore	Inconel	Inconel	Inconel
Door Deal Race Track	Inconel	Inconel	Inconel
Lock Bar Groove	Phosphate	Phosphate	Phosphate
Hinge Pin Holes	Phosphate	Phosphate	Inconel
Door Cylinder Seal	Ever-slik®	Ever-slik®	Inconel
Tail Shaft Bore	Phosphate	Phosphate	Inconel

22” PosLock Door CREP locations are indicated by the shaded areas. CREP locations vary by door model due to component variations.

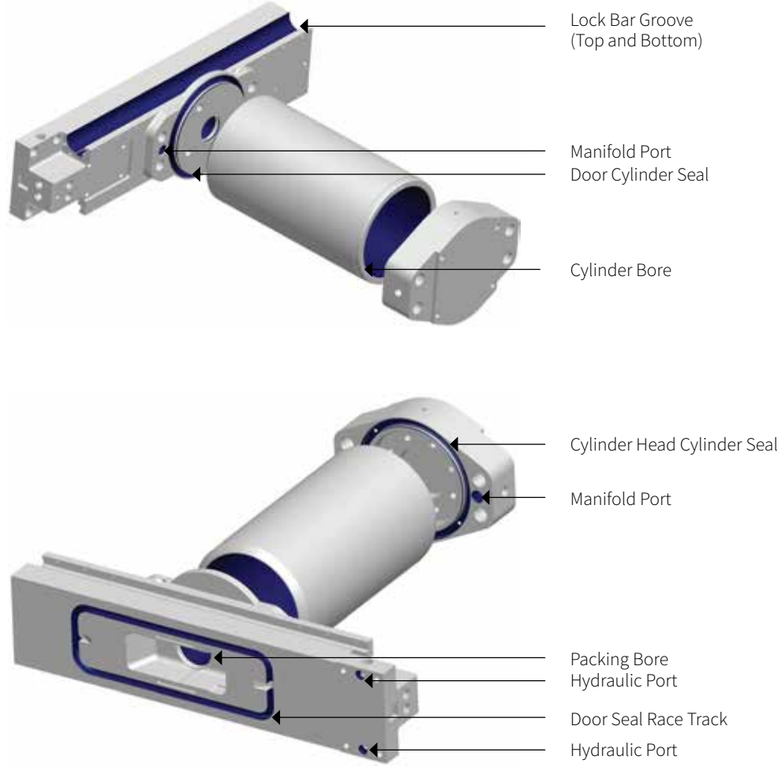
14” PosLock Booster Door



NXT Door CREP Levels - 14" Poslock Booster Door			
DOOR AREA	**CREP LEVEL H**	**CREP LEVEL J**	**CREP LEVEL K**
Cylinder Head Cylinder Seal	Phosphate	Phosphate	Inconel
Booster Cylinder Bore	Phosphate	Chrome	Chrome
Middle Head Cylinder Seal	Phosphate	Phosphate	Inconel
Middle Head Manifold Ports	Phosphate	Phosphate	Inconel

14” PosLock with Booster Door CREP locations are indicated by the shaded areas. CREP locations vary by door model due to component variations.

14” UltraLock II(B) Door



NXT Door CREP Levels - 14" Ultralock II (B) Door			
DOOR AREA	**CREP LEVEL H**	**CREP LEVEL J**	**CREP LEVEL K**
Lock Bar Groove	Phosphate	Phosphate	Phosphate
Manifold Ports	Phosphate	Phosphate	Inconel
Door Cylinder Seal	Phosphate	Phosphate	Inconel
Cylinder Bore	Phosphate	Chrome	Chrome
Cylinder Head Cylinder Seal	Phosphate	Phosphate	Inconel
Packing Bore	Inconel	Inconel	Inconel
Hydraulic Ports	Phosphate	Phosphate	Inconel
Door Deal Race Track	Inconel	Inconel	Inconel

14” Ultralock II (B) Door CREP locations are indicated by the shaded areas. CREP locations vary by door model due to component variations.

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Low Force Shear Rams - LFS-5

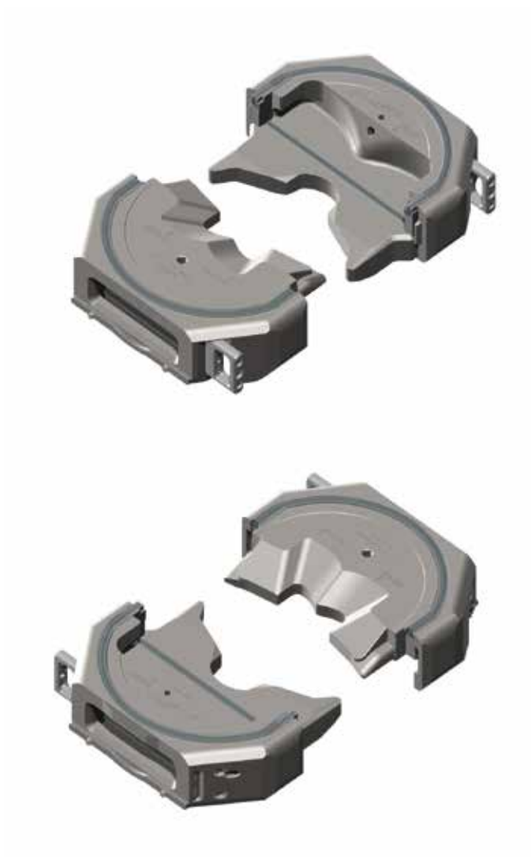
*For reference only, please contact your local sales contact for more information.

LFS-5 is the latest application of the NOV Low Force Shear technology, now with enhanced shearing performance on high-strength, heavy-weight drill pipe and landing string. Through creative engineering, the centering assembly has been eliminated while maintaining pipe centering geometry across the entire width of the wellbore. Only NOV can shear and seal today's stronger drill pipe and landing strings.

Features

- Shear efficiencies improved by up to 40%
- Automatically centers pipe by sweeping the entire throughbore to accommodate off-center wire line
- Centers pipe with 10,000 lbs side pull
- Designed to shear and seal landing string and work string consecutively
- Passed API16 A qualification testing
- Rated ED (30^{0}F to 250^{0}F)
- Will retrofit to current LFS capable doors
- Improved seal design with increased cycle life

Ram Geometry



Proven Performance Results

Successful Shear and Seal

- 6 ⅝", 50ppf, S-135 followed by 5 ⅞", 27ppf, S-135
- 6 ⅝", 57ppf, UD-165 followed by 5 ⅞", 27ppf, S-135
- 6 ⅝", 64ppf, V-150 followed by 5 ⅞", 27ppf, S-135
- 7 1⁄16” x 5 ½”, VIT, CR-115 followed by 5 ⅞", 27ppf, S-135
- THRA followed by 5 ⅞" 27ppf, S-135
- 7 ⅝", 54ppf, V-150 followed by 5 ⅞", 27ppf, S-135
- 10 ¾”, 104ppf, P-110 followed by 10 ¾”, 104ppf, P-110
- 14”, 115ppf, Q-125 followed by 14”, 115ppf, Q-125

*All of the above shear and seal tests (and more) were performed using the same set of shear rams.

Shear and Seal Wireline

- Schlumberger 7-48A SUS
- Rochester 7-H-490K
- Rochester 1-H-314K

*All with no tension on wireline

LFS-5 Shear Performance

DESCRIPTION	PIPE OD	LB/FT	GRADE	OPERATOR	LFS-5 ACTUAL SHEAR PRESSURE
Drill Pipe	5.875	27	S-135	22"	929
Drill Pipe	5.875	27	S-135	14" x 14"	1189
THRA	6.14	33.45	S-135	22"	1559
THRA	6.14	33.45	S-135	14" x 14"	1996
Landing String	6.625	64	V-150	22"	3350
Landing String	6.625	64	V-150	14" x 14"	4288
Casing	10.75	85	Q-125	22"	3050
Casing	10.75	85	Q-125	14" x 14"	3904

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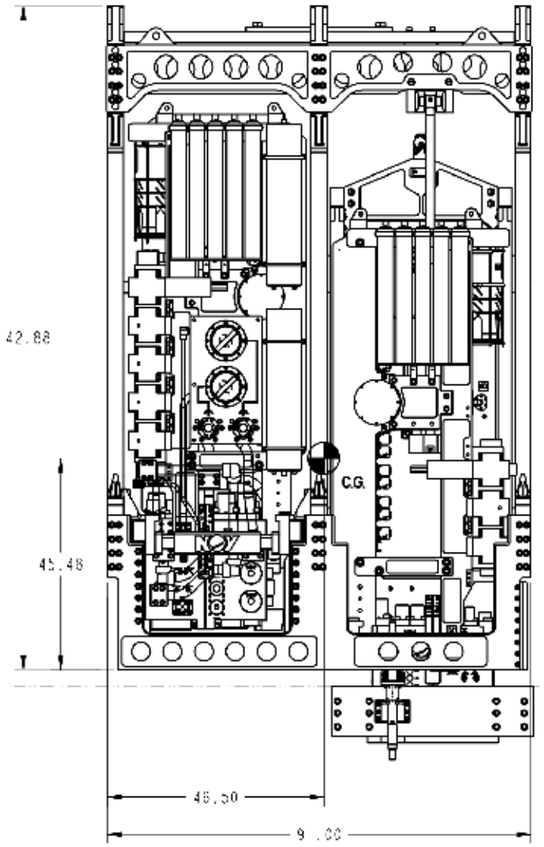
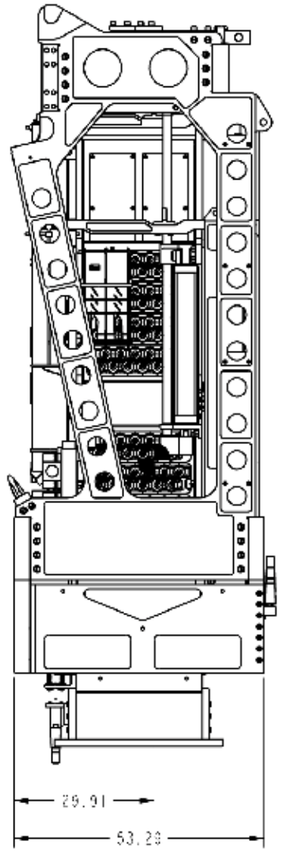
RCX™ Multiplex Pod

*For reference only, please contact your local sales contact for more information.

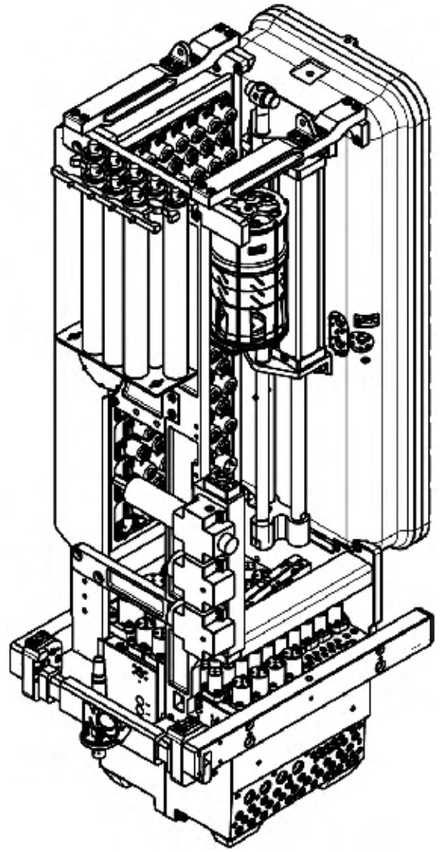
LMRP and Lower Stack Pod Assembly



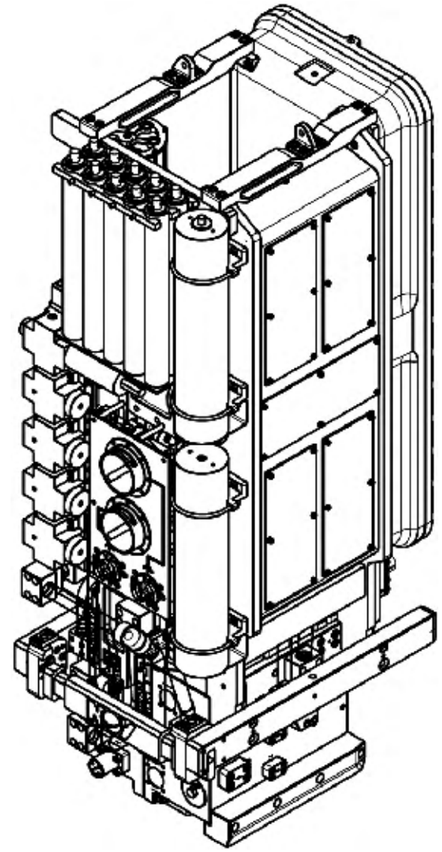
LMRP and Lower Stack Pod Assembly



Lower Stack Module removed from pod frame



LMRP Module removed from pod frame



Description

The RCX Multiplex (MUX) Pod is NOV's next generation control system. Components from Sub-plate Mounted Valves (SPM) to the full electronics package were targeted to improve quality. Combining high reliability achieved through meticulous component redesign with retrievability, the RCX system was built to keep you drilling.

The pod takes in hydraulic supply, electrical power, and control data from the rig and distributes pressure via a network of valves to individual stack-mounted functions. Each valve is controlled by a pilot valve which is solenoid operated and controlled by the Subsea Electronics Assembly (SEA).

Features

- Retrievable
- RCX Low Shock SPM Valves
- Dual pod design with independent retrieval for both BOP and LMRP sections
- Improved packer seal design
- Pod-mounted conduit manifold for directing fluid from either conduit to either pod
- Manifold-to-manifold connections use dual seal, seal subs
- Streamlined footprint
- Ergonomically designed user interface & HMI
- Unique pod ID - function counting capability even on test stand

Technical Specifications	
Operating pressure	5000 psi
Combined weight	40,000 lbs
Operating fluid	Water / Glycol / Soluble oil mix
Max allowable working depth	12,000 feet
Functions	140
Voltage rating	480 VAC
Temperature rating	-20°C to 50°C
OTHER SPECIFICATIONS	
Canbus sensors	
Piping of 1/2" and larger functions use schedule pipe with socket welded connections; terminating in SAE Code 62, dual seal connections	
Pilot lines are 1/4" tubing using Swagelok connectors and SAE O-ring boss connections	
Compensated Chamber Solenoid Valves (CCSVs)	
Pressure Balanced Oil Filled (PBOF) Cables	
Machined Stainless Steel Frame - no welding	

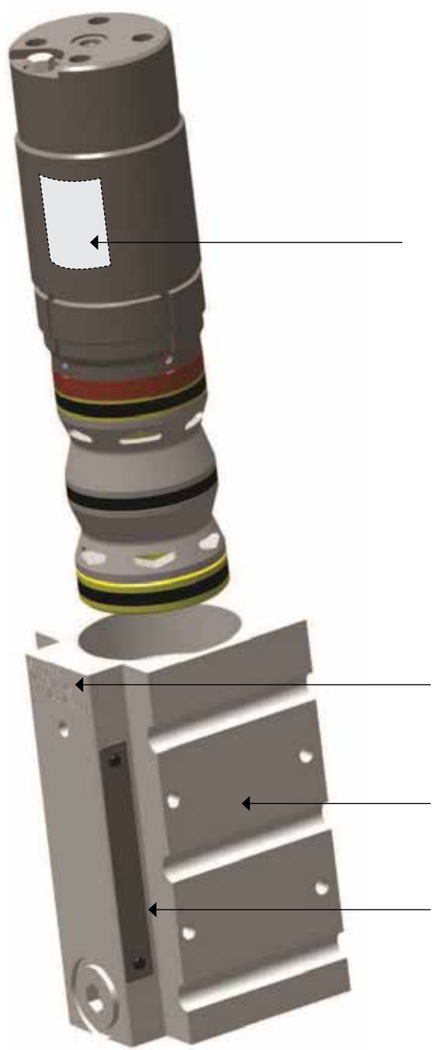
*For reference only, please contact your local sales contact for more information.

RCX Low-Shock SPM Valves

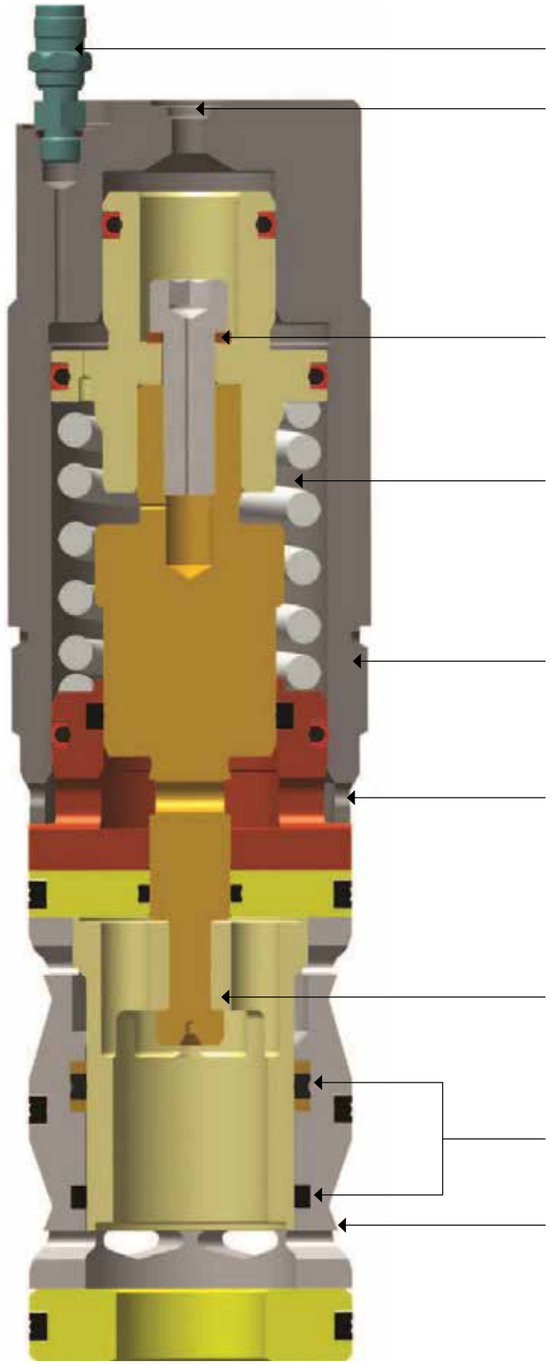
Sub Plate Mounted (SPM) valves are 3-way, 2-position fluid control valves. SPM valves are used throughout National Oilwell Varco (NOV) control systems to direct hydraulic fluid within hydraulic circuits.

- Created to address industry requests for a more robust and reliable valve.
- Direct circuit replacements with matched flow rates. Closing times are not affected.
- Utilize improved materials and are designed to reduce hydraulic shock (water hammer). Test data provided on sheet 2.
- Must be used with RCX Low-Shock SPM valve blocks. RCX Low-Shock SPM valve blocks may be re-machined to NOV specifications. Non-RCX Low-Shock blocks cannot be re-machined.

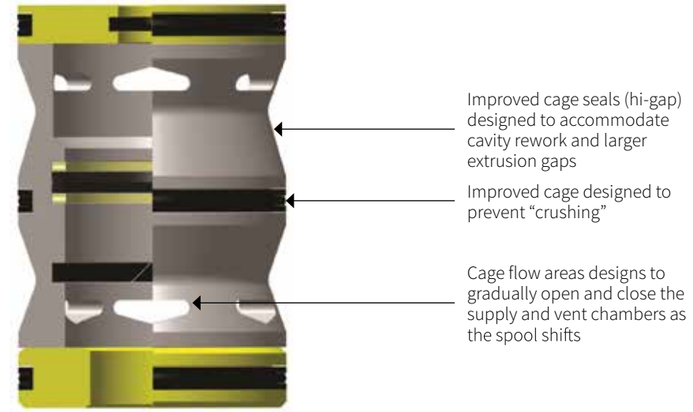
RCX Low-Shock SPM Valve Components



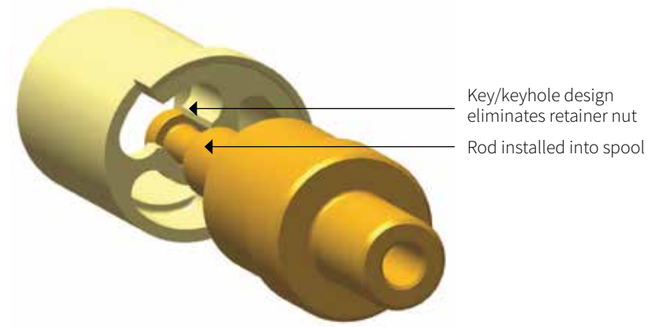
Cross Section View



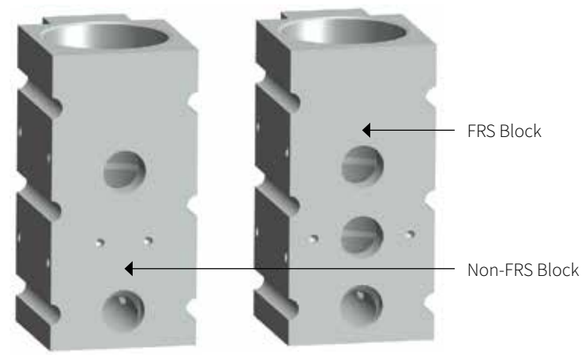
Detail View - A



Detail View - B



Block Styles



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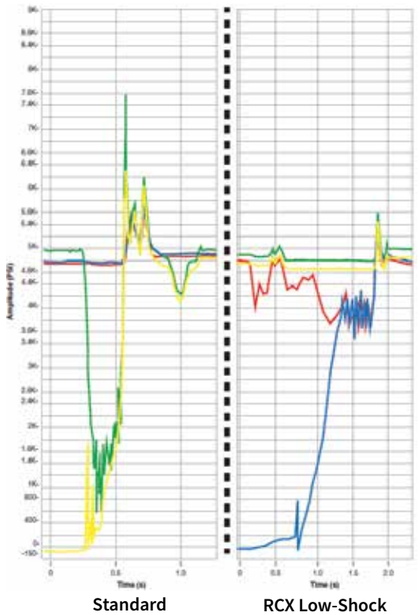
RCX Low-Shock SPM Valves - Sheet 2 of 2

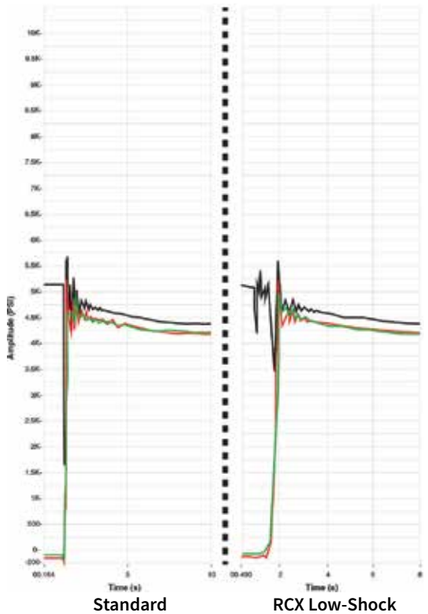
*For reference only, please contact your local sales contact for more information.

Pod Select



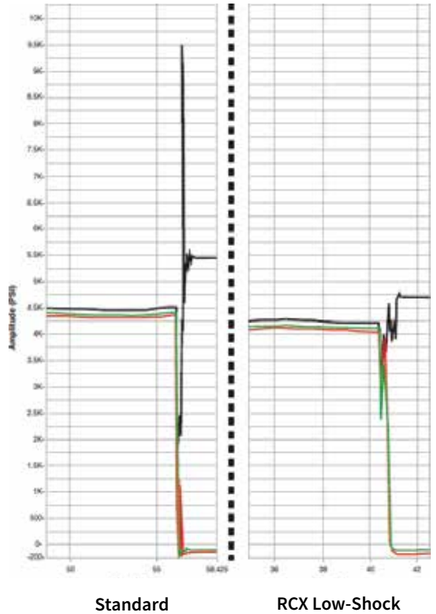
Pod Select Legend
Supply Port - Standard SPM - Yellow pod
Work Port - Standard SPM - Yellow pod
Supply Port - Low-Shock SPM - Blue pod
Work Port - Low-Shock SPM - Blue pod

Shear Accumulator Charge



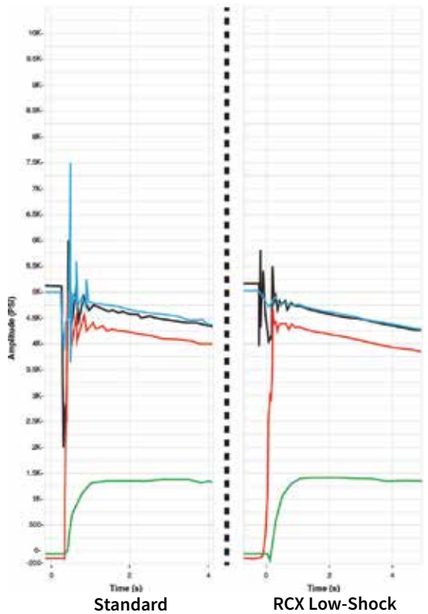
High Pressure Shear Accumulator Legend
Pod Manifold Supply
HP Upper Shear Close @ SPM Work Port
HP Upper Shear Close @ Accumulators

Shear Accumulator Block



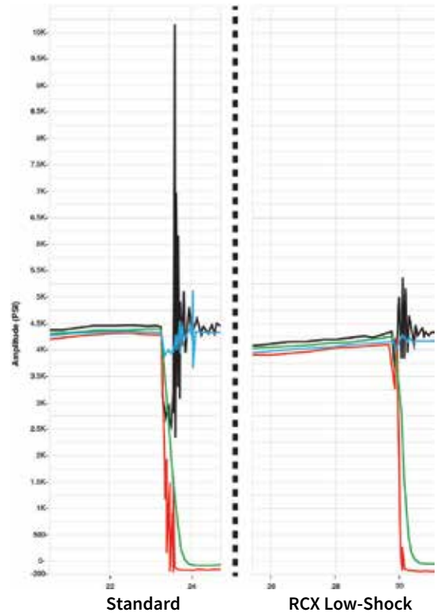
High Pressure Shear Accumulator Legend
Pod Manifold Supply
HP Upper Shear Close @ SPM Work Port
HP Upper Shear Close @ Accumulators

Shear Close



High Pressure Upper Shear Legend
Pod Manifold Supply
HP Upper Shear Close @ SPM Work Port
HP Upper Shear Close @ Operator Door
LMRP Accumulator Supply @ Accumulators

Shear Block



High Pressure Upper Shear Legend
Pod Manifold Supply
HP Upper Shear Close @ SPM Work Port
HP Upper Shear Close @ Operator Door
LMRP Accumulator Supply @ Accumulators

RCX Low-Shock SPM Assemblies - Part Number and Description

VALVE SIZE	VALVE CONFIGURATION	VALVE & BLOCK ASSEMBLY P/N	VALVE APPLICATION	VALVE ONLY P/N	SEAK KIT P/N	REPAIR KIT P/N	**BLOCK ONLY P/N
1 ½"	NC (Normally Closed)	11448757-001	FRS	11394478-001	11444594-001	11444807-001	11327183-001
1 ½"	NC (Normally Closed)	11448766-001	Non-FRS	11394478-001	11444594-001	11444807-001	11331583-001
1 ½"	NO (Normally Open)	11449450-001	Pod Select	11395270-001	11444594-001	11444818-001	11398673-001
1 ½"	NCB (Normally Closed Bi-Directional)	16562565-001	Stack Mounted	11394477-001	11444594-001	11444813-001	16557295-001
1 ½"	NCB (Normally Closed Bi-Directional)	16574048-001	FRS	11394477-001	11444594-001	11444813-001	16574045-001
1 ½"	NCB (Normally Closed Bi-Directional)	16574049-001	Non-FRS	11394477-001	11444594-001	11444813-001	16574046-001
1 ½"	NOPB (Normally Open, Pressure Balanced)	-	*Rigid Conduit Manifold	11450588-001	16607805-001	16607868-001	-

* Rigid Conduit Manifold must be replaced as a unit
** For blocks not listed, contact RA-AftermarketUpgrades@nov.com for information and quotations

EHBS Adjustable Timing Circuit Actuator

*For reference only, please contact your local sales contact for more information.

EHBS Description

The National Oilwell Varco (NOV) Koomey® Emergency Hydraulic Back-up System (EHBS) is an independent hydraulic control pod mounted on the lower BOP stack. When armed, the EHBS pod performs automatically in the event main conduit hydraulic pressure and electric power to the BOP control system 112-line MUX pod are disconnected or lost. The EHBS is a reliable safety system that activates customer-specified functions in the event of power failure, riser string disconnect or Lower Marine Riser Package disconnect.

Adjustable Timing Cicuit Actuator

The Adjustable Timing Circuit Actuator provides a mechanical method for providing a time delay between two hydraulic functions on an (EHBS). The Adjustable Timing Circuit Actuator is easily adjusted to provide a time delay range of 18 to 52 seconds (when

supplied with 5,000 psi [345 bar]).

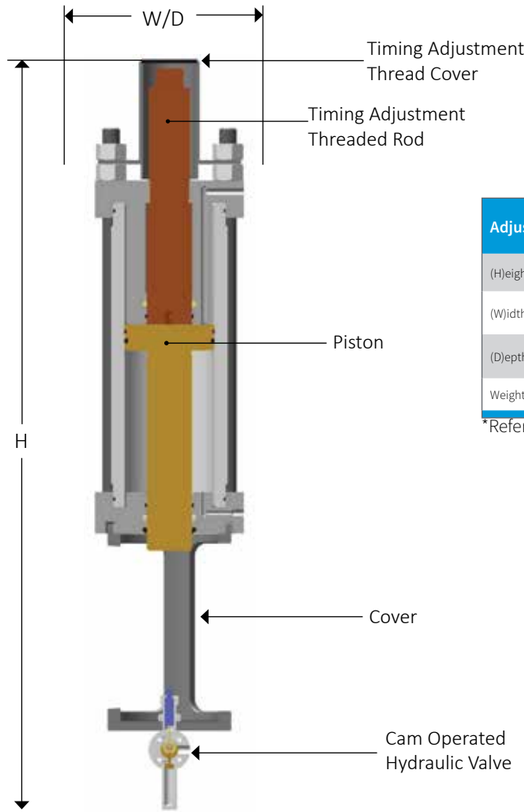
Key Benefits:

- No nitrogen pre-charging for time delay.
- No temperature or depth variables or pre-charge calculations.
- Rugged and reliable.
- Easily adjustable.
- Corrosion resistant.
- Existing timing circuits are easily upgraded.

Operating Principles:

Previous time delay circuits required an accumulator pre-charged for specific depth and water temperature variables. With the Adjustable Timing Circuit Actuator, a timing circuit accumulator and variable dependent precharges are no longer necessary. The timing setting used for surface testing is the same timing setting used for subsea operation.

The system can be deployed as tested.

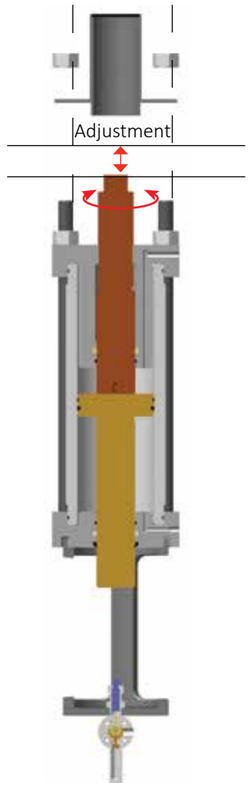


Adjustable Actuator—Cross Section

Adjustable Actuator Properties	
(H)eight	50.2" (127.51 cm)
(W)idth	9.9" (25.15 cm)
(D)epth	9.9" (25.15 cm)
Weight	410 lb (185.0 kg)

*Reference 10856492-ASM

Piston Closing

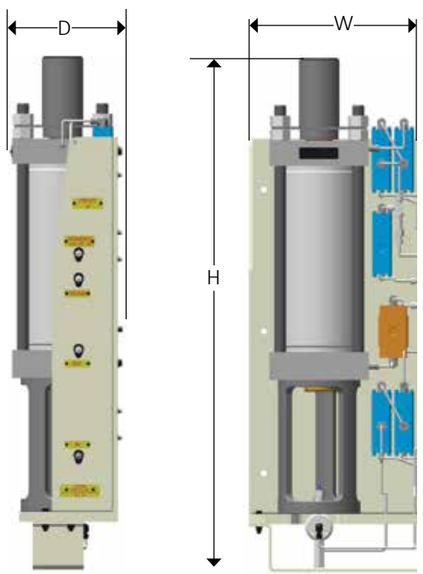


Timing Adjusted
with Threaded Rod

Adjustment Range
Min: 18 -22 Seconds
Max: 48 - 52 Seconds

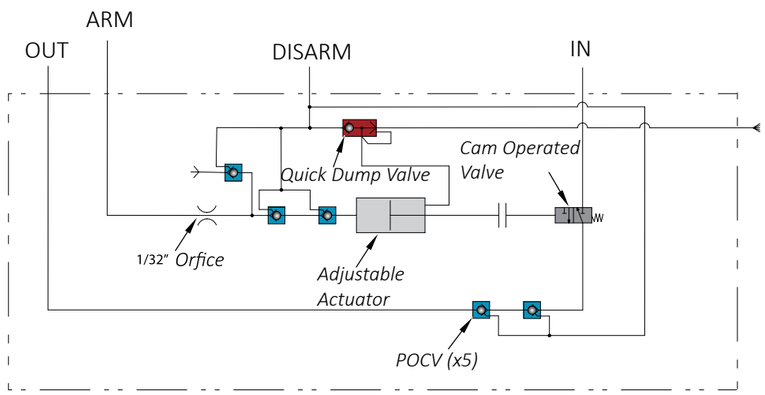
Adjustment
1 inch of adjustment = ± 5 seconds

Adjustment Procedure
To adjust the timing delay of the circuit: 1. Remove the timing adjustment thread cover. 2. Using a socket wrench, thread the adjustment screw inward (shorter delay) or outward (longer delay). 3. Replace the timing adjustment thread cover.



Stack Mounted Timing Circuit Properties	
(H)eight	50.64" (128.63 cm)
(W)idth	20.8" (52.83 cm)
(D)epth	10.96" (27.84 cm)
Weight	1,720 lb (780.2 kg)

*Reference 10874976ASM



Schematic-Adjustable Acutuator Timing Circuit

RCX™ Emergency Hydraulic Backup System (EHBS) Acoustic Pod

*For reference only, please contact your local sales contact for more information.

RCX A-HB Pod

The RCX A-HB Pod combines both acoustic and EHBS functionality. Those two circuits are completely isolated hydraulically, however, they share a structural package. Acoustic emergency backup control system provides remote closure of certain BOP stack functions.

- Acoustic emergency back-up consists of two (2) sections of control, acoustic and electrohydraulic
- System is sized for 12,000 feet water depth
- Acoustic Functions will be as listed in later in this document
- System will include HIPAP
- Cables for the connectors to have test ports

Acoustic Electronic Section

- Portable Surface Acoustic Command and Control Unit for two way communication and operation of the control system. Splash proof design, with easy operation from buttons and a small LCD display. Two hands operation of critical BOP functions. Connector for interface to transducer. Internal rechargeable battery for several days' normal operation. Charges from 100 – 220V AC.
- Dunking Transceiver, with 70M cable
- Acoustic Control Subsea Unit. Fully redundant subsea container, with built in dual lithium, two year operating, batteries and electronics. Each electronic section has interface to dedicated transducer connectors (one for each). The electronics/ transducers communicate with the surface system with individual acoustic addresses. Connector and interface cable to 10 solenoid drivers and read backs are standard. Additional 6 optional drivers with read backs are available. GISMA connectors are delivered as standard.
- 2 Subsea Transceivers. Inclusive of 15 meter cable with GISMA connector
- Simulator for testing of ACS Tool for on-deck-testing of the ACS before the BOP enters the sea. Connector and interface cable simulating solenoid drivers and read backs are standard. The connector mates directly into the ACS interface cable (solenoid end).

EHBS

Emergency Hydraulic Backup System (EHBS) (also referred to as Auto Shear Circuit), commonly called a "Deadman System" is an independent hydraulic control pod circuit mounted on the BOP stack which performs the following stack functions automatically if main conduit and electrical power to the BOP control system are disconnected or otherwise lost.

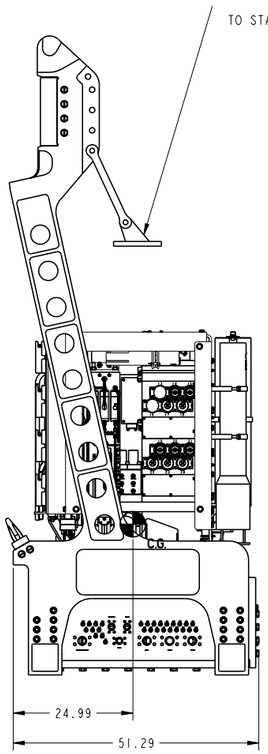
The EHBS is hydraulically powered from the stack-mounted Shear Accumulator Bank. The EHBS system consists of the following major components:

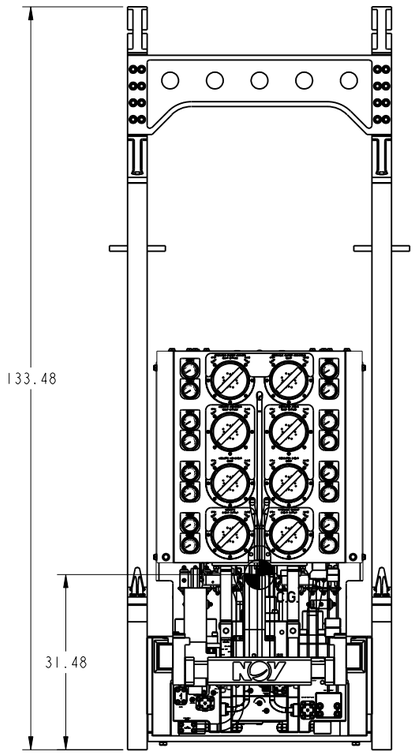
- EHBS Assembly, housed in a steel frame attached to the BOP stack. All inputs, outputs and manual valves are labeled. All manifold valve functions are stamped on the manifold.
- On screen activation for simulation of the Deadman Circuits; "Normal Operation / Test" function for simulation of Loss of Electric and Loss of Hydraulic before stack deployment.
- Two (2) Functions: Close Casing Shear and after 20 second, close the upper blind shear rams.
- Will include one additional valve; 3 valves total.
- Timing Circuit included will be mechanical. No pre-charged bottle.

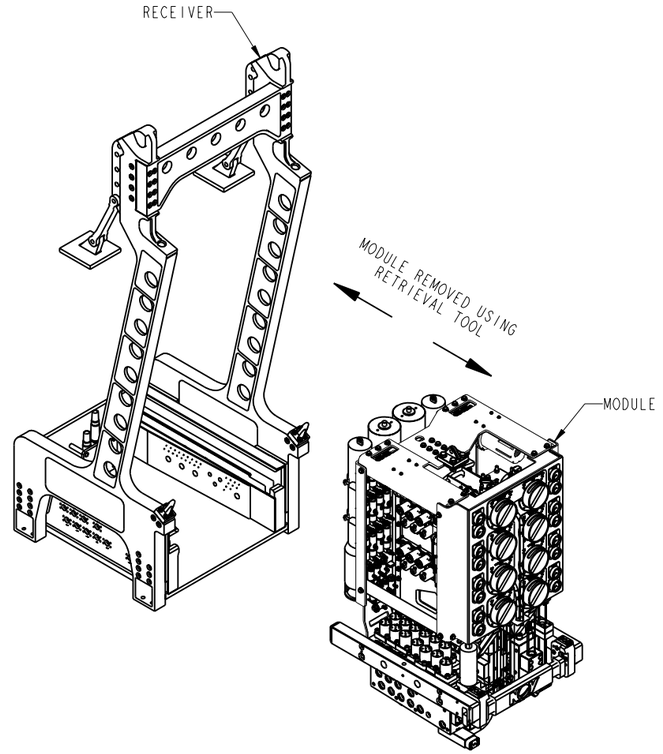
Electrohydraulic Control Section

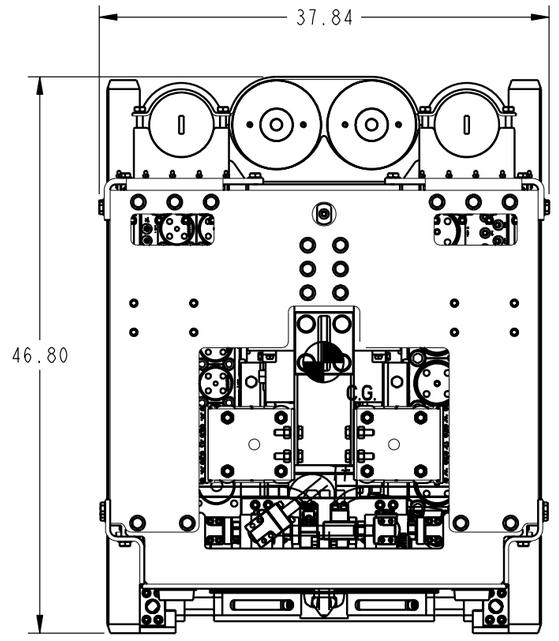
Electro-hydraulic mini pod to interface between acoustic system and desired functions. The modularly constructed pod will consist of the following:

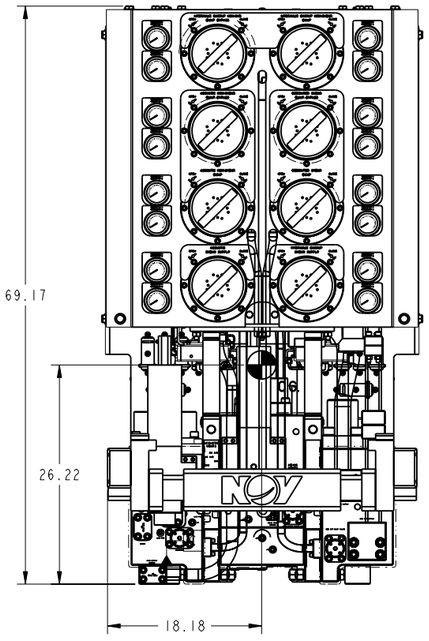
- One (1) Stainless steel pressure compensated chamber. The chamber is filled with dielectric insulating fluid and compensated by a pressure compensator complete with a relief valve. The chamber is to contain CCSV environmentally protected solenoid actuators.
- One (1) 3m absolute filtration assembly
- One (1) piston type accumulator for supply pressure storage to the CCSV valves.











Depth Compensated Bottles - Sheet 1 of 2

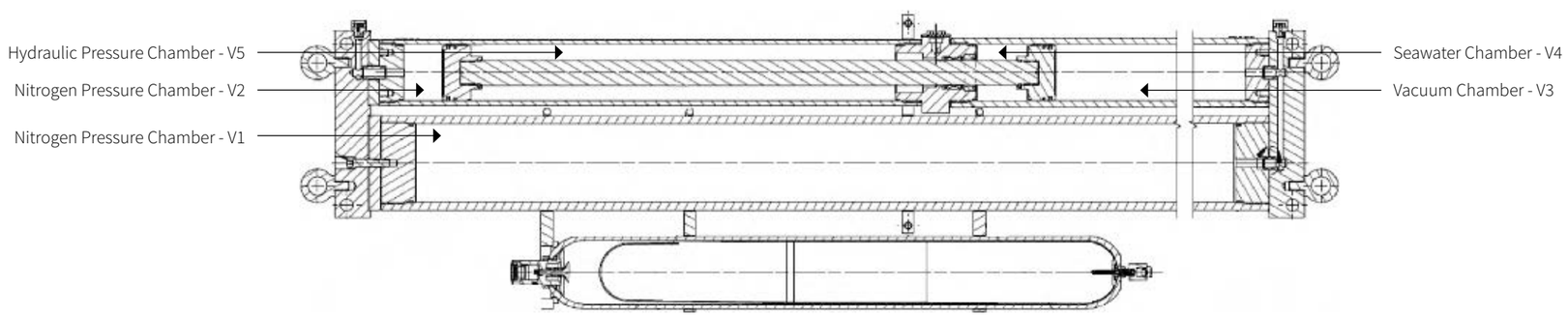
*For reference only, please contact your local sales contact for more information.

Today's designed operating environment for stack mounted accumulators is challenging. Design criteria include 12,000 ft water depths, temperatures as low as 32°F with surface temperatures of 120°F, rapid discharge (adiabatic), as well as higher minimum system pressures. All of these things add up to a large number of bottles on a lower BOP stack. It is not uncommon to see as many as 126 accumulator bottles on a lower BOP stack, 98 of which are dedicated to the shear system alone. This adds weight to the overall assembly, increases maintenance requirements, and decreases stack equipment access. By using the water column pressure and mechanically boosting the hydraulic pressure, a Depth Compensated Accumulator has reduced the total number of stack mounted shear circuit bottles dramatically.

Functionality

This system is comprised of a double-piston accumulator. The two pistons are connected by a piston rod. This creates five separate chambers within the DCB, plus the transfer barrier.

- The first two chambers (V1 and V2) contain a Nitrogen pre-charge acting against one piston.
- The third chamber (V3) is a vacuum that acts against the other piston.
- The fourth chamber (V4) is filled with BOP fluid from the transfer barrier. The transfer barrier is open to ambient seawater pressure on one end and forces more fluid into V4 as depth increases.
- The fifth chamber (V5) contains the hydraulic fluid.
- The result is 100% usable hydraulic fluid while subsea.



Estimating the number of bottles required:

1 - On the vertical axis, find the required Shear Pressure (Including the effects of Mud Weight and Water Depth) and intersect with the curve for DCB bottle type.

(Example : 3900 psi, 7.9 Gal DCB)

2 - Draw a line down from the point of intersection to the horizontal axis of the chart and read useable volume for one bottle.

(Example : 3.6 gal)

3 - Multiply the required operator volume by 1.1 (API 16D Volume Design factor) to obtain the total required volume.

(Example: 18'-15M NXT 22" Operator, closing volume = 37.3 gal, required volume = 37.3 x 1.1 = 41.03 gal)

4 - Divide the required volume by the useable volume for one bottle to obtain the required number of bottles. (Round up to the next whole number.)

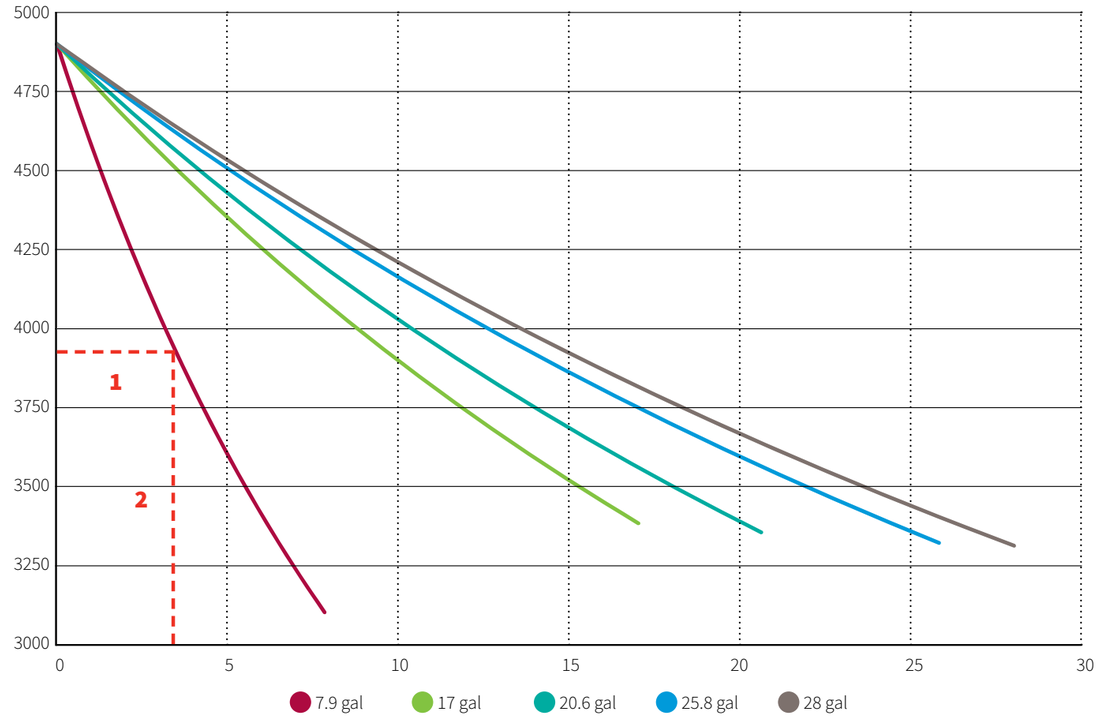
(Example: 41.03/3.6 = 11.4, round up to 12 bottles)

Equation

$$\frac{\text{Required Operational Volume X 1.1}}{\text{Volume Used Per Bottle}} = \text{Number of Bottles Required (Round Up)}$$

Note: This is only an estimate. Contact NOV Pressure Control Engineering for certified calculations.

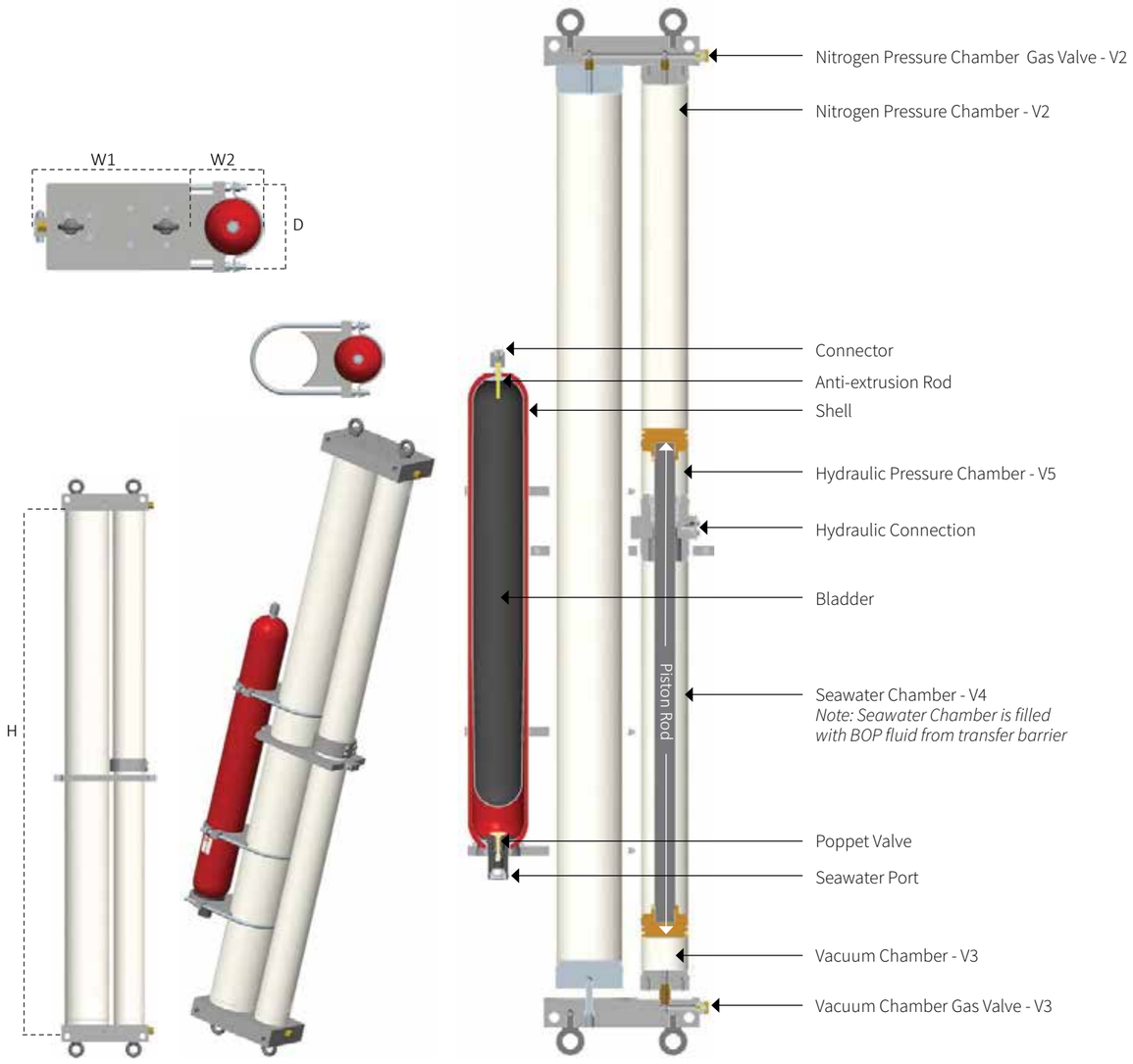
DCB Bottles - Shear Pressure vs Usable Volume



Depth Compensated Bottles - Sheet 2 of 2

*For reference only, please contact your local sales contact for more information.

P/N 20090035 configuration

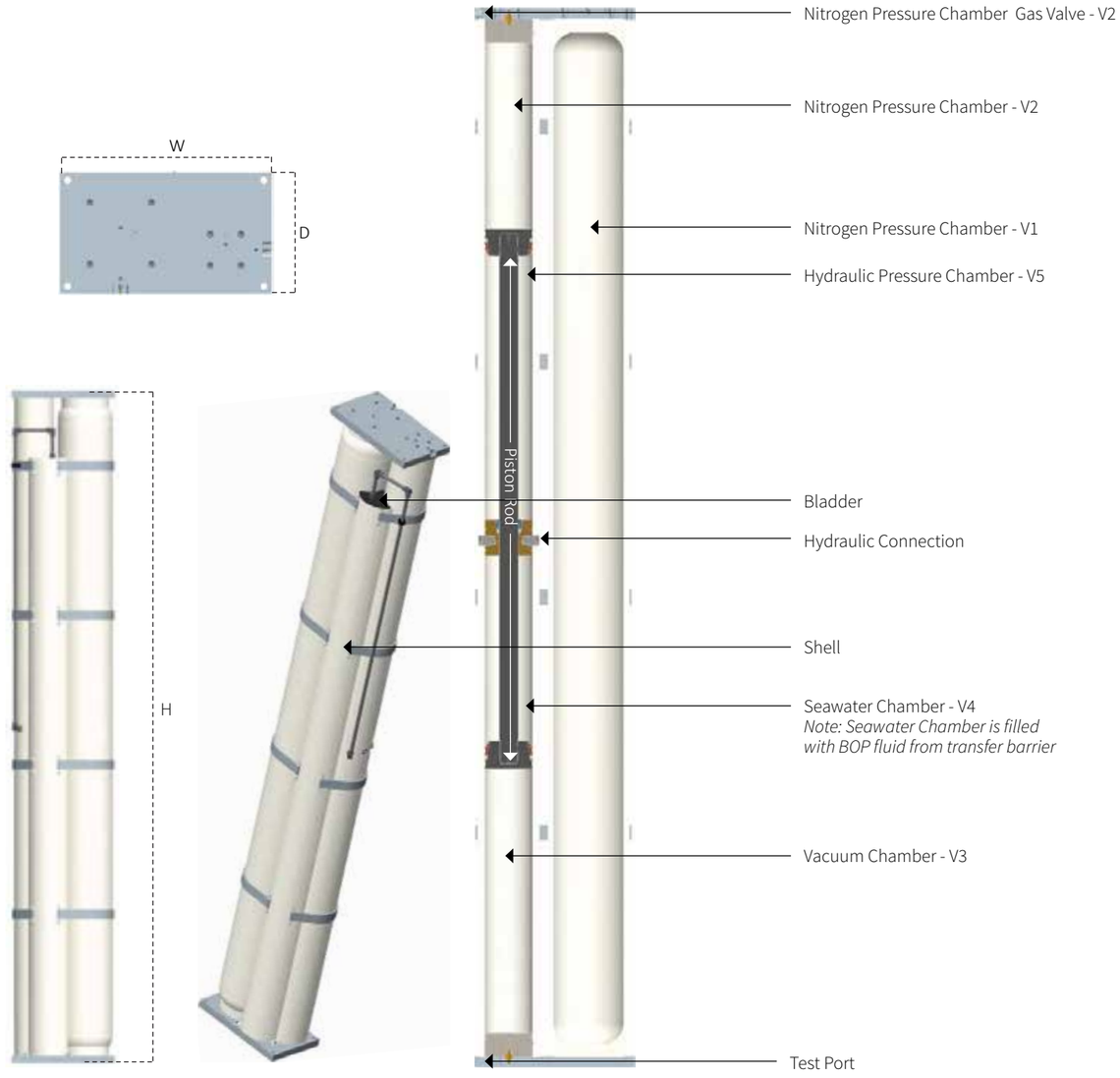


Specifications

P/N	V5 VOLUME	V1 VOLUME	V2 VOLUME (MAX)	HEIGHT	WIDTH	DEPTH	WEIGHT
20090035	7.9 Gal (30 liters)	43.8 Gal (166 liters)	10 Gal (38 liters)	150.24'' (3,816.1 mm)	25.5'' (647.7 mm) 11.9'' (302.3mm)	14.12'' (358.6 mm)	3,995 lb (1,812 bar)

(Transfer barrier can be mounted separately if desired)

P/N 10641709-003 configuration



Specifications

P/N	V5 VOLUME	V1 VOLUME	V2 VOLUME (MAX)	HEIGHT	WIDTH	DEPTH	WEIGHT
10641709-001	17 Gal (64.35 liters)	116.9 Gal (442.5 liters)	19.95 (75.5 liters)	150'' (3,181 mm)	34'' (863.6 mm)	19.5'' (495.3 mm)	7,208 lb (3,269 kg)
10641709-002	20.6 Gal (77.98 liters)	138.1 Gal (522.8 liters)	24.2 Gal (91.6 liters)	175" (4,445 mm)	34" (863.6 mm)	19.5" (495.3 mm)	7,984 lb (3,621 kg)
10641709-004	25.8 Gal (97.66 liters)	167.9 Gal (635.6 liters)	30.3 Gal (114.7 liters)	210" (5,334 mm)	34" (863.6 mm)	19.5" (495.3 mm)	9,077 lb (4,117 kg)
10641709-003	28 Gal (105.99 liters)	180.8 Gal (684.4 liters)	32.8 Gal (124.2 liters)	225" (5,715 mm)	34" (863.6 mm)	19.5" (495.3 mm)	9,545 lb (4,329 kg)

Hands Free Gooseneck

*For reference only, please contact your local sales contact for more information.

Hands Free Gooseneck Overview

NOV understands the oil and gas industry, and with it, the inherent dangers of rig personnel working inside the moon pool area. Manual goosenecks have a tendency to have a long connection times and are difficult to manage; leaving an opportunity for both equipment damage as well as exposing rig personal to potentially harmful situations.

With an eye ever towards the needs of our customer, NOV is proud to introduce the Hands Free Gooseneck System (HFGN). NOV's HFGN eliminates the need to have rig personnel in potentially hazardous environments and with the addition of rotating stabs, the BOP stack has easy access beneath the drill floor.

Manual Swivel Gooseneck

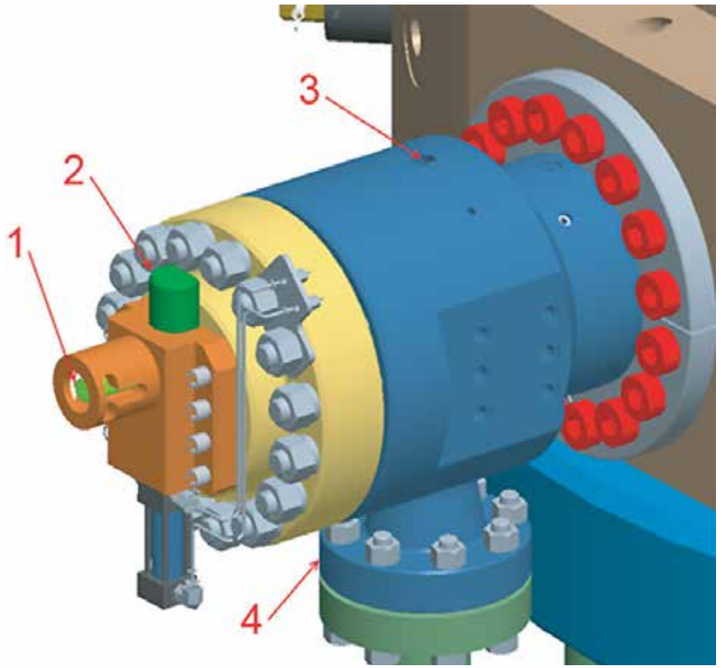
The hands free gooseneck stabs are designed such that they may swivel in the clockwise and counterclockwise directions by manually pulling the hose in the desired plane of rotation, making way for any equipment which must find its way to well center. The unit is available in 75 ½'' and 60 ½ '' diverter sizes.

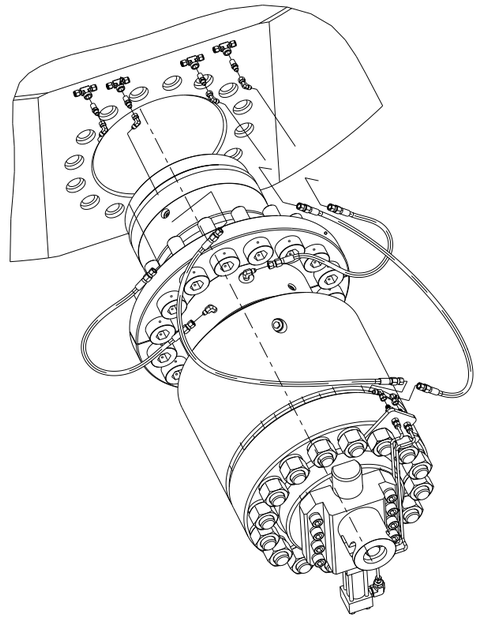
1. Visual Position Rod to verify successful stab with the telescopic joint

2. Secondary locking to prevent unintentional un-stabbing of the gooseneck with the telescopic joint.

3. Emergency packing element to temporarily seal potential leaks.

4. API Flange or Hub moon pool hose connections, customizable to customer preference.





5X CARTRIDGE HOSE DETAIL

Features

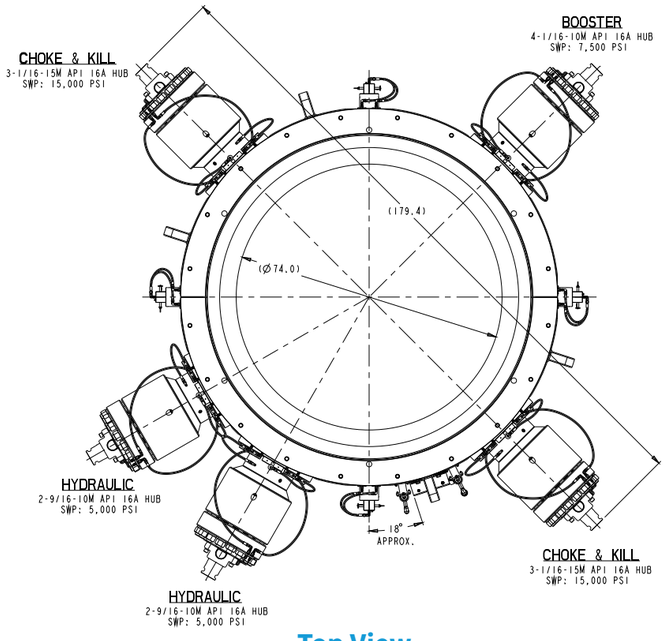
- Simple connection process
- Improved Safety
- No manual intervention required
- Rotating cartridge assemblies
- Modular Components
- Quick disconnects to facilitate connection of control hoses
- Emergency packing element in each cartridge
- Safety interlocks to prevent unintended operation of HFGN functions

Benefits

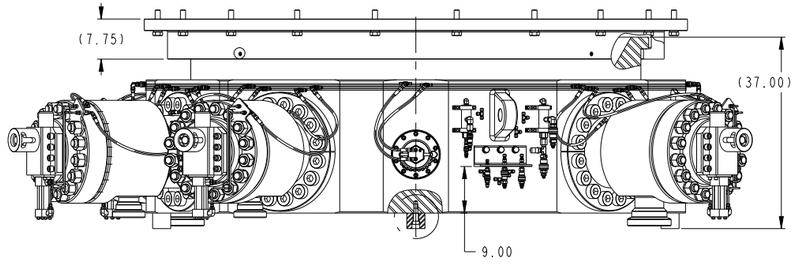
- Removes personnel from working over water in a riding belt
- Connection process is reduced from hours to minutes
- Can be retrofitted to existing NOV riser systems with minimal modifications
- Eliminates damage from manually stabbing individual goosenecks using snatch blocks and tuggers
- Modular configuration provides for common spare parts

Testing

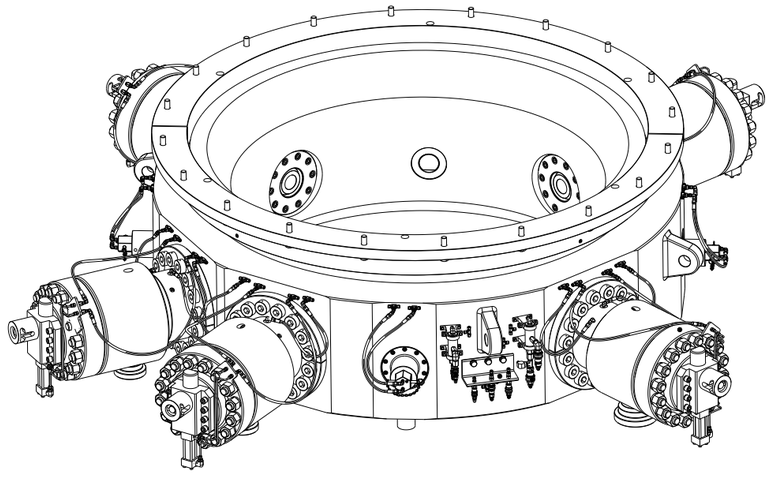
- Designed and tested to API 16F Specifications
- Each Hands Free Gooseneck is stab tested with a Telescoping Joint prior to shipment



Top View



Front View



Perspective View

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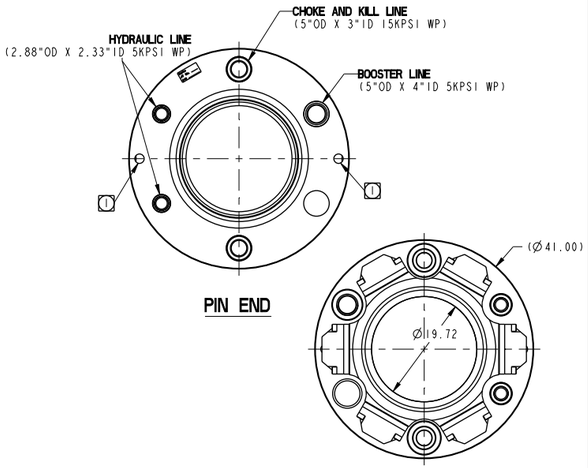
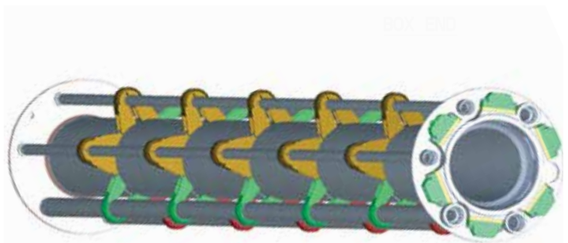
*For reference only, please contact your local sales contact for more information.

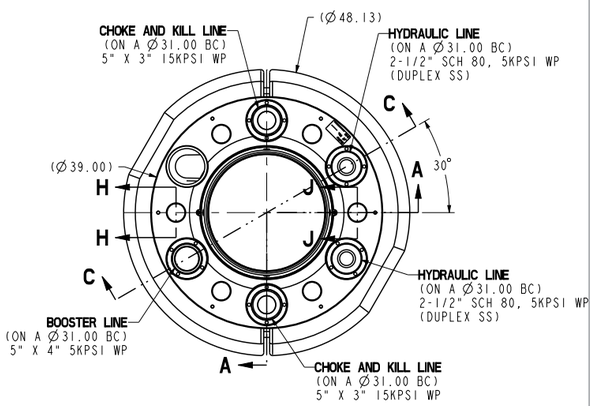
Dog Type 2™

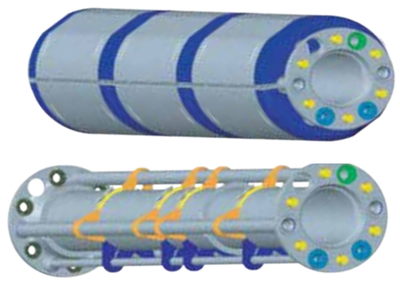




Technical Specifications	Dog Type-2 (shown above)	Dog Type-1
Tension Load	2,000,000 lb.	1,125,000 lb.
Lengths	50 ft, 75 ft	50 ft, 75ft
OD Pipe	21"	21"
Unique Configurations	5	8
Foot Lengths	5, 10, 15, 20, 25, 30, 40, 50, 60, 75	10, 20, 25, 31.25, 35, 40, 50, 65, 75
Wall Thickness	5/8", 11/16", ¾", 13/16"	5/8"
Flange Diameter(s)	48.0", 41.0"	41.50", 41", 35.625"
Line Configurations	2 Line (Choke, Kill) 4 Line (Choke, Kill, Booster, 1x Hydraulic) 5 Line (Choke, Kill, Booster, 2x Hydraulic)	2 Line (Choke, Kill) 3 Line (Choke, Kill, Booster) 3 Line (Choke, Kill, 1x Hydraulic) 4 Line (Choke, Kill, Booster, 1x Hydraulic) 4 Line (Choke, Kill, 2x Hydraulic)
Line Pressures and Sizes	Choke/Kill: 15K and 10K / 6.5"x4.5", 5"x3 Booster: 5K / 5"x4", 5.5"x4.75" Hydraulic: 5K and 3K / 2.5" Sch80 (316 Stainless and Duplex SS)	Choke/Kill: 15K and 10K/5"x3", 4.375"x2.575", 4"x 2.75" Booster - 5K and 3K / 3.5" Sch80, 4" Sch80, 4.5" Sch80, 5"x4", 4"x3" Hydraulic – 5K and 3K / 2.5" Sch80 (316 Stainless and Duplex SS)
Other	All lines are 60 degrees apart. Some styles may not have extra holes for lines.	All lines are 60 degrees apart. Some styles may not have extra holes for lines.

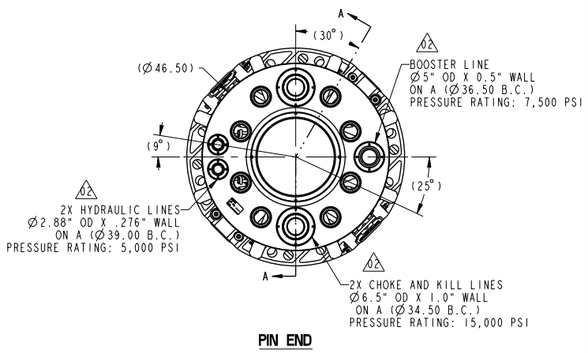
Flange Type-E™

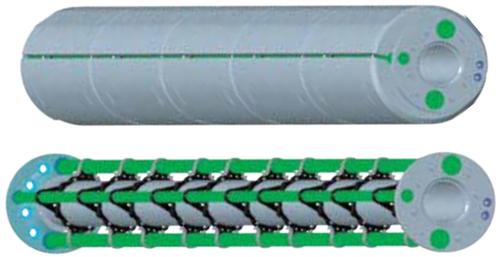




Technical Specifications	Flange Type-E (shown)	Flange Type-GB
Tension Load	2,000,000 lb.	3,000,000 lb.
Lengths	50 ft, 75ft	51 ft, 75ft
OD Pipe	21"	42"
Unique Configurations	4	4
Foot Lengths	5, 10, 15, 20, 25, 30, 35, 40, 50	5, 10, 20, 25, 30, 40, 75
Wall Thickness	5/8" and 11/16"	13/16", 7/8" and 15/16"
Line Configurations	3 Line (Choke, Kill, Booster) 4 Line (Choke, Kill, Booster, 1x Hydraulic) 5 Line (Choke, Kill, Booster (Upper), 2x Hydraulic) 5 Line (Choke, Kill, Booster (Lower), 2x Hydraulic)	4 Line (Choke, Kill, Booster, 1x Hydraulic) 5 Line (Choke, Kill, Booster, 2x Hydraulic)
Line Pressures and Sizes	Choke/Kill - 15K / 5"x3" Booster - 5K and 3K / 5"x4" (AISI Gr 4130 and ASTM A106 Gr C) Hydraulic – 5K and 3K / 2.5" Sch80 (316 Stainless and Duplex SS)"	Choke/Kill - 15K / 6.5"x4.5" Booster - 5K / 5x4" Hydraulic – 5K / 2.5" Sch80 (Duplex SS)
Other	All lines are 60 degrees apart. All Flanges should have extra holes for lines.	All lines are 60 degrees apart. All Flanges should have extra holes for lines.

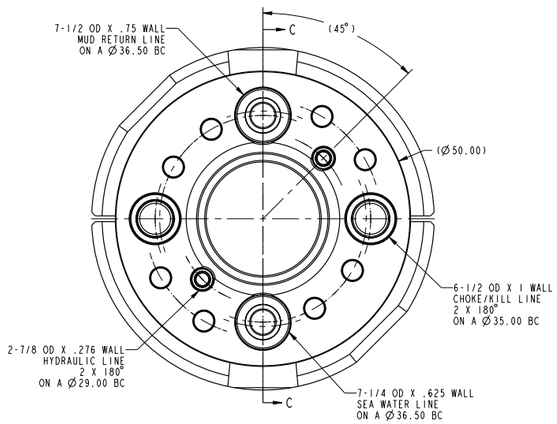
Flange Type-H™

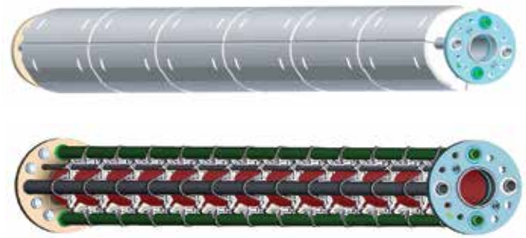




Technical Specifications	Flange Type-H (shown)	Flange Type-G	Flange Type-I
Tension Load	3,500,000 lb.	3,000,000 lb.	4,000,000 lb.
Lengths	75ft, 90ft	75ft, 90ft	75ft, 90ft
OD Pipe	21"	21"	21"
Unique Configurations	4		
Foot Lengths	5, 10, 20, 25, 30, 40, 75, 90	5, 10, 20, 25, 30, 40,75, 90	5, 10, 20, 25, 40, 90
Wall Thickness	¾", 7/8" and 15/16"	13/16", 7/8" and 15/16"	13/16" and 15/16"
Flange Diameter(s)	46.50, same as FT-G *Some Flanges have a Glycol pocket between Hyds	46.5	47.13 All Flanges have a Glycol pocket between Hyds
Line Configurations	5 Line (Choke, Kill, Booster, 2x Hydraulic)	4 Line (Choke, Kill, Booster, 1x Hydraulic)	6 Line (Choke, Kill, Booster, 2x Hydraulic, Glycol)
Line Pressures and Sizes	Choke/Kill - 15K / 6.5"x4.5" Booster - 7.5K / 5"x4" Hydraulic – 5K / 2.5" Sch80 (Duplex SS)	Choke/Kill: 15K /6.5"x4.5" Booster - 5K / 5"x4" Hydraulic – 5K / 2.5" Sch80 (Duplex SS)	Choke/Kill - 15K / 6.5"x4.5" Booster - 7.5K / 5"x4" Hydraulic – 5K / 2.5" Sch80 (Duplex SS) Glycol – 15K / 3"x2"
Other	All lines are 90 degrees apart. NO extra holes for extra lines in flange except hydraulic hole.	All lines are 90 degrees apart. NO extra holes for extra lines in flange except hydraulic hole.	All lines are 90 degrees apart. NO extra holes for extra lines in flange.

Flange Type-H DG™





Technical Specifications	FT-H DG (shown above)
Tension Load	3,500,000 lb.
Lengths	50ft, 75 ft
OD Pipe	21"
Unique Configurations	5
Foot Lengths	5, 10, 20, 25, 40, 90
Wall Thickness	7/8" and 15/16"
Flange Diameter(s)	50
Line Configurations	6 Line (Choke, Kill, Mud Return, Seawater, 2x Hydraulic)
Line Pressures and Sizes	Choke/Kill - 15K / 6.5"x4.5" Mud Return - 7.5K / 7.5"x6.0" Seawater Line – 7.5K / 7.25"x6.0" Hydraulic – 5K / 2.5" Sch80 (Duplex SS)
Other	All lines are 90 degrees apart with split hydraulic lines. NO extra holes for extra lines in flange

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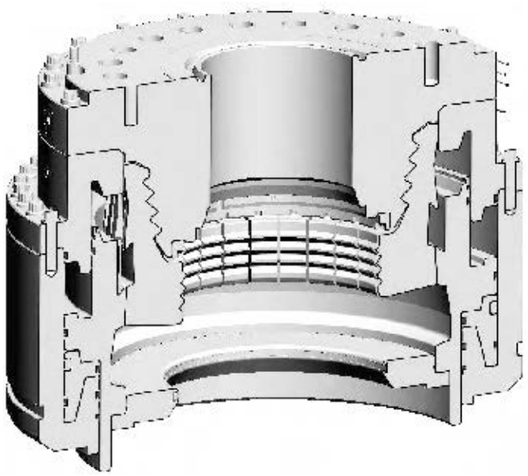
Shaffer™ CHX High Capacity Wellhead Connectors Sheet 1 of 2

*For reference only, please contact your local sales contact for more information.

CHX WLHD Connector Overview



The CHX model connector is an industry leader in bending load capacity. Mechanical engagement of the unlocking piston to the finger segments, a 27% higher unlocking force to locking force, and a secondary unlocking piston ensures full release of the connector segments from the wellhead.

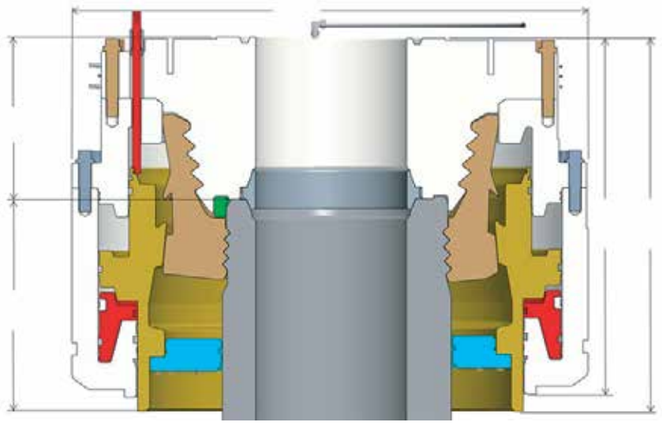
A wide variety of option features including top connection, gasket control features, porting types, and corrosion prevention measures, provide flexibility to meet customer satisfaction.

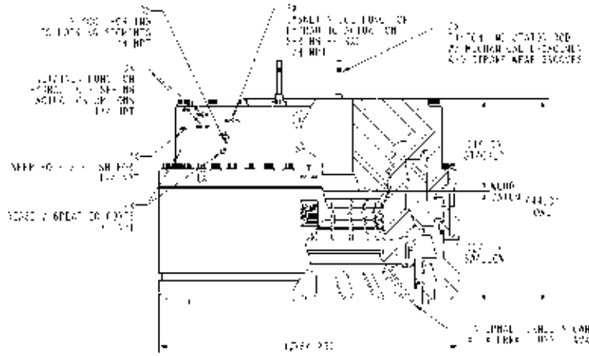
Standard Features

- Industry leading bending and tension capacity
- Unlock force 27% greater than locking force
- Load path directly through self locking segments
- Secondary unlocking piston for increased detachment reliability
- Two visual piston position indicator rods that engage with the annular piston to ensure an accurate reading. Both with life cycle grooves for easy connector life wear inspections
- Hydraulic and spring operated gasket retention pins
- Hydraulic gasket nudge pins
- Inconel inlay on all sealing surfaces
- Weep hole porting for quick testing validation
- ID running tool alignment slot
- Molded, bi-directional T seals with dual polyurethane back up extrusion protection
- Wear band protection against piston cylinder galling

Available Options

- CREP level packages
- Detachable WLHD funnel down assembly
- Various API top flange connections
- Multiple gasket control feature configurations
- Various hydraulic porting connection types
- Adapter kit which allows for a 27” H4 locking profile



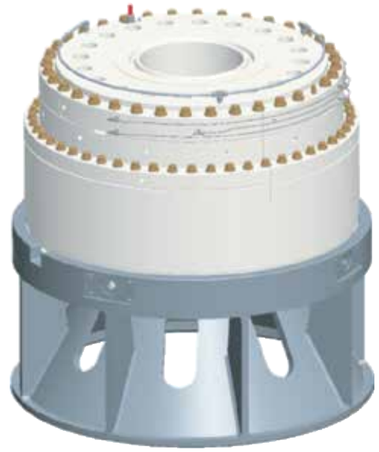


Other Benefits

- 92% Surface coverage on locking profile allows for higher pre-load without damaging wellhead / mandrel
- Lead in alignment that eliminates potential gasket contact when landing on the wellhead
- Design flexibility with integrated stack controls

Design Validation Testing

- Sealing Mechanism (Wellbore Shell)
- Tension / Bending Capacity
- Seal Life Cycle Fatigue
- Piston Displacement
- Hub Separation
- Stack Pull (Gimbal) Simulation
- Vibration Simulation
- Locking Relationship Validation
- High & Low Temperature Testing
- Function Life Cycle Fatigue
- Friction Validation



Technical Specifications	
Pure Bending Load Capacity	17.0 MM ft-lbs
Pure Tension Load Capacity	16.5 MM lbs
Preload	4.64MM lbs
Locking Volume	14.9 Gal
Unlocking Volume	18.9 Gal
Max Service Pressure	15,000 psi
Max Hydraulic Operating Pressure	3,000 psi
Stack Up Height	19.88 in
Swallow Height	26.37 in
Weight	24.700 lbs

All values are preliminary and are subject to change.
Full capacity values are based on FEA and will be confirmed with testing.

Low Temperature Test

Bending Test Fixture

Shaffer™ CHX High Capacity Wellhead Connectors Sheet 2 of 2

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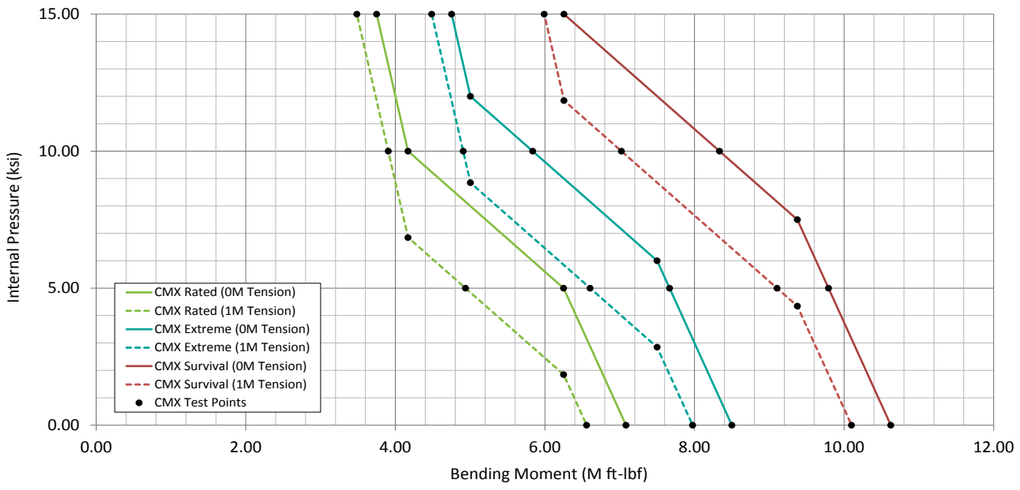
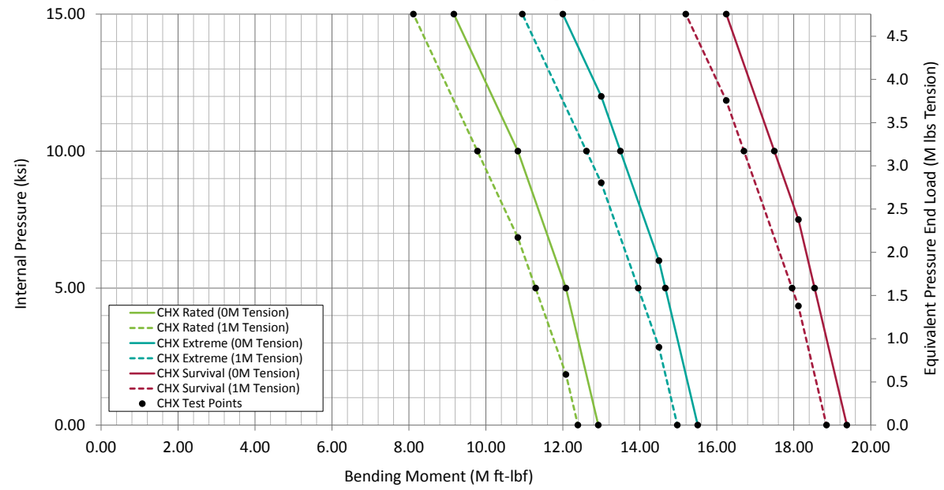
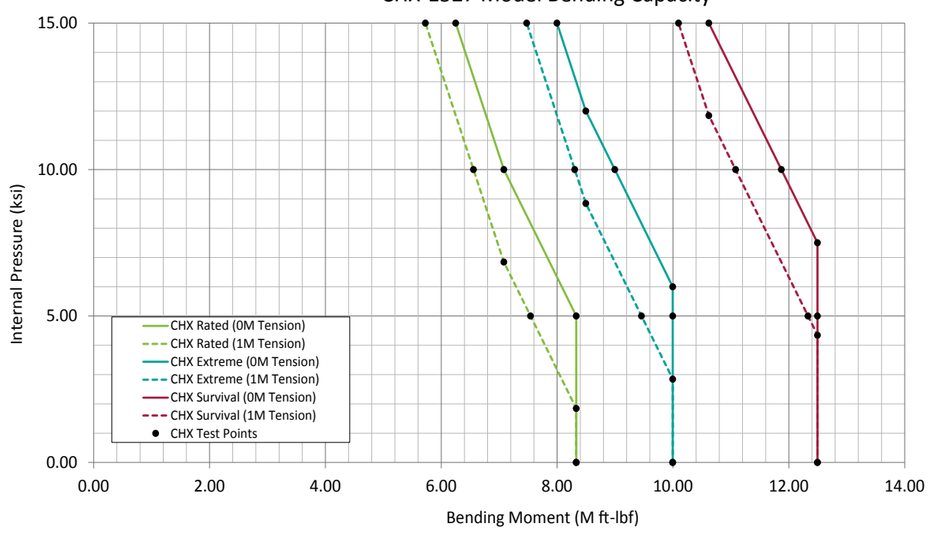
CMX-1527 Model Bending Capacity



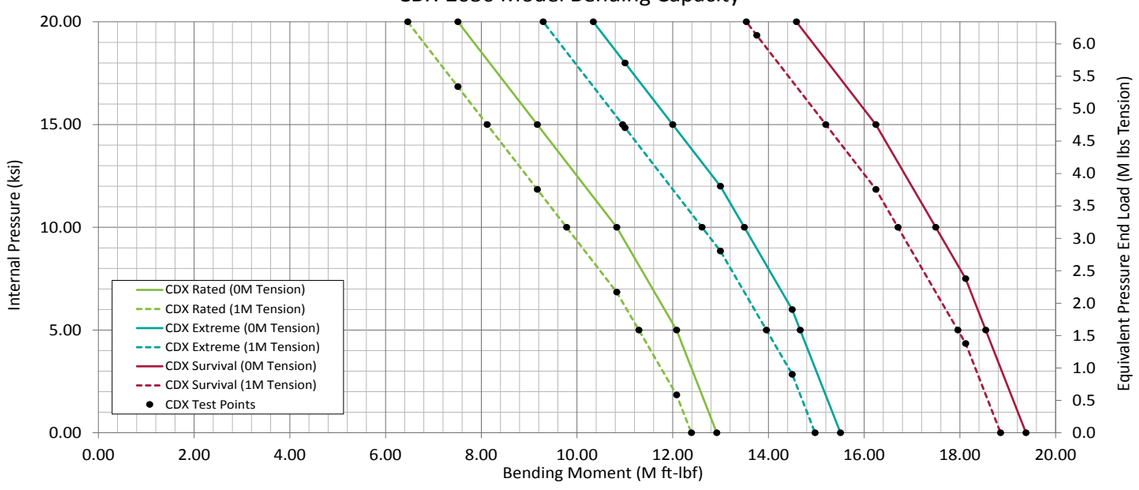
CHX-1530 Model Bending Capacity



CHX-1527 Model Bending Capacity



CDX-2030 Model Bending Capacity



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Technical Marketing Sheet

CMX-1527 LMRP/WLHD Connector

*For reference only, please contact your local sales contact for more information.

The CMX-1527 connector includes a patent pending floating hydrate seal that allows for extreme angle lift off, while maintaining hydrate prevention during operation.

Mechanical engagement of the unlocking piston to the finger segments, a 43% higher unlocking force to locking force, and a secondary unlocking piston ensures full release of the connector segments from the mandrel or wellhead.

A wide variety of option features including top connection, gasket control features, porting types, and corrosion prevention measures, provide flexibility to meet customer satisfaction.

Standard Features:

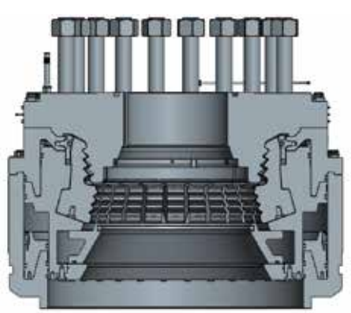
- High angle release capability:
  - Stationary upper support (patent pending)
  - Floating hydrate seal (patent pending)
- Competitive bending and tension capacity
- Unlock force 43% greater than locking force
- Load path directly through sel locking segments
- Two visual piston position indicator rods that engage with the anular piston to ensure an accurate rading. Both with life cycle grooves for easy connector life wear inspections.
- Hydraulic and spring operated gasket retention pins
- Weep hole porting for quick testing validation
- ID running tool alighnment slot

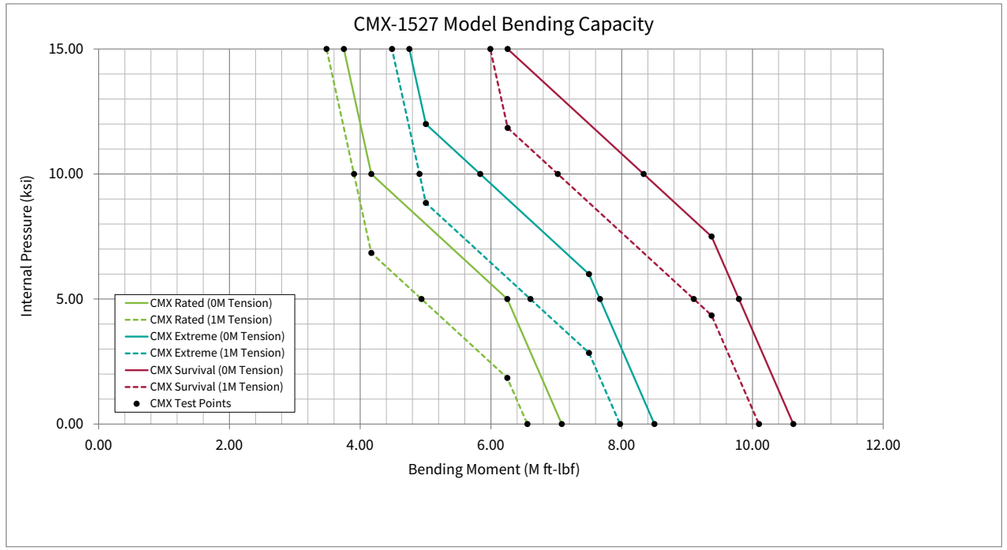
Available Options:

- CREP level packages
- Detachable LMRP alignment / WLHD funnel down assembly
- Various API top flange connections
- Multiple gasket control feature configurations
- Various hydraulic porting connection types

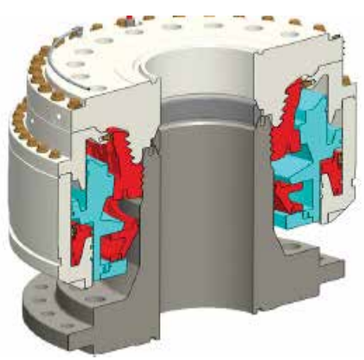
Benefits:

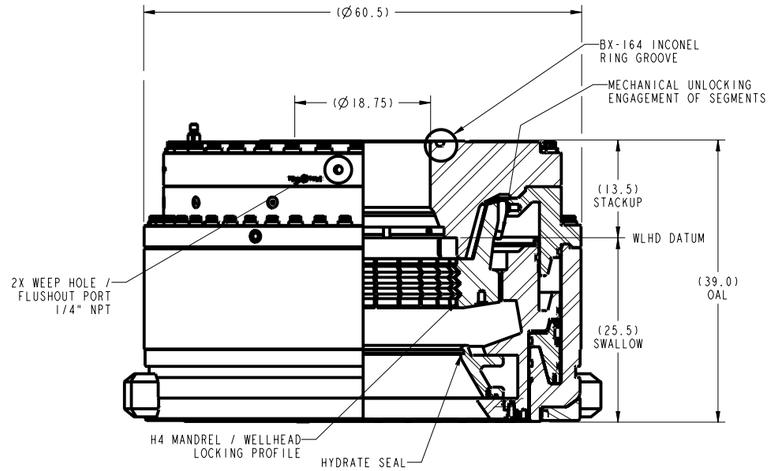
- Added HAR capability with floating hydrate seal design
- 92% Surface coverage on locking profile allows for higher pre-load without damaging wellhead/mandrel
- Lead in alignment that elimnates potential gasket contact when landing
- Design flexiblity with integrated stack controls
- Improved delivery times





Technical Specifications	
Pure Bending Load Capacity	7.0 mm ft-lbs
Pure Tension Load Capacity	6.75 mm lbs
Preload	4.9mm lbs
Locking Volume	10.6 Gal
Unlocking Volume	15.4 Gal
Max Service Pressure	15,000 psi
Max Hydraulic Operating Pressure	3,000 psi
Stack Up Height	13.5 in.
Swallow Height	25.50 in.
Weight	20,3000 lbs





Design Validation Testing:

- Sealing Mechanism (Wellbore Shell)
- Tension/Bending Capacity
- Seal Life Cycle Fatigue
- Piston Displacement
- Hub Separation
- Stack Pull (Gimbal) Simulation
- Vibration Simulation
- Locking Relationship Validation
- High & Low Temperature Testing
- Function Life Cycle Fatigue
- High Angle Release

Bending Test Fixture

Low Temperature Test

Locking Segment Coverage Shown in Unlocked Position

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Shuttle Stack Tool

*For reference only, please contact your local sales contact for more information.

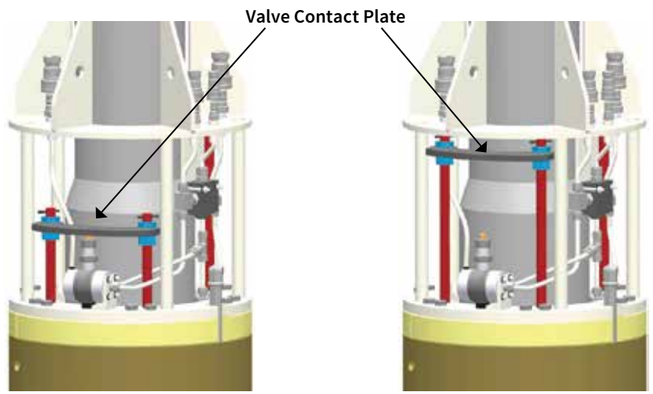
Type FT-H/FT-HB

The shuttle stack tool is used as a lifting tool for the riser string and BOP stack when the vessel needs to move a short distance. The shuttle stack tool is comprised of two main parts, the riser shuttle joint and the shuttle tool assembly. The riser shuttle joint is installed beneath the telescopic joint and functions as another joint of riser during normal operations. However, the riser shuttle joint has a large locking area in which the shuttle tool assembly's six lock dogs can engage.

Hydraulic Locking System

The Shuttle Tool hydraulic circuit is equipped with a pilot operated check valve. This allows the operator to first activate the pilot operated check valve before functioning the tool to the unlock position. This procedure prevents the Shuttle Tool from being inadvertently unlocked.

- Stab the shuttle tool pin into the riser shuttle joint box connection
- Apply 1500 psi hydraulic pressure to the shuttle tool's lock side hydraulic circuit



(Shown in Locked Position)

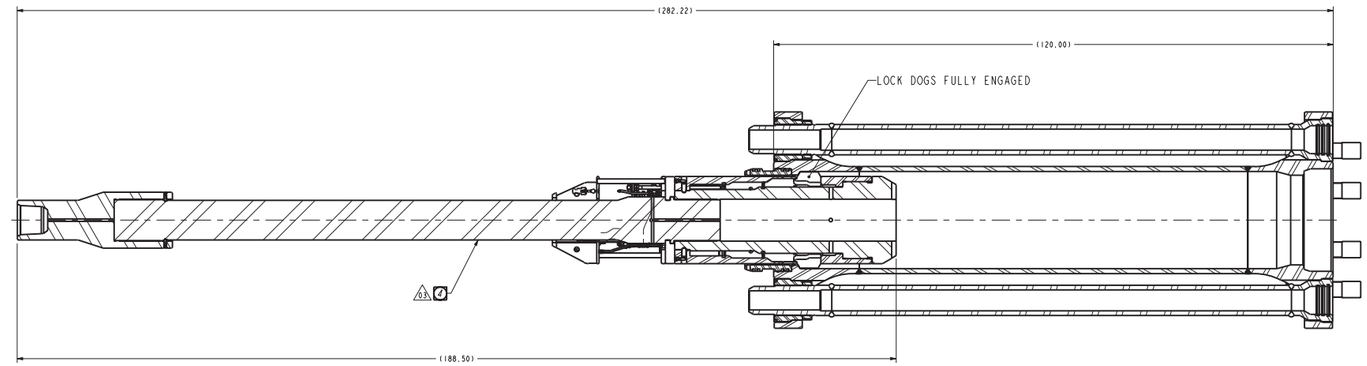
(Shown in Unlocked Position)

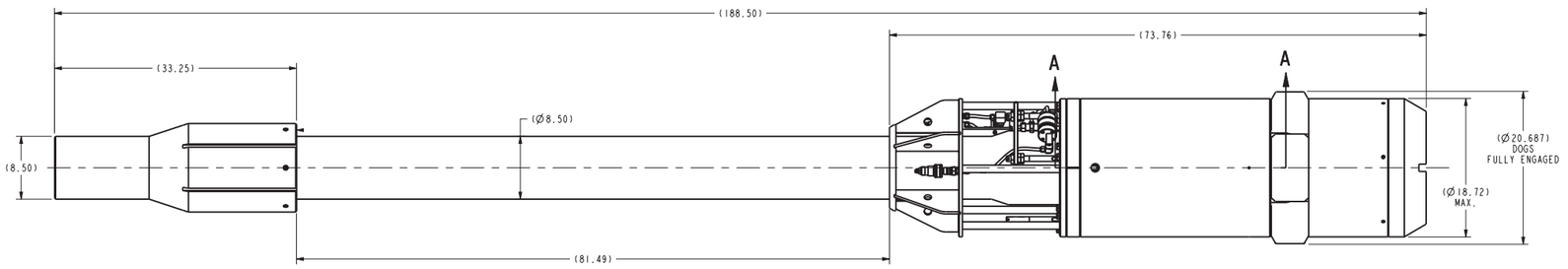
Shuttle Tool Uses

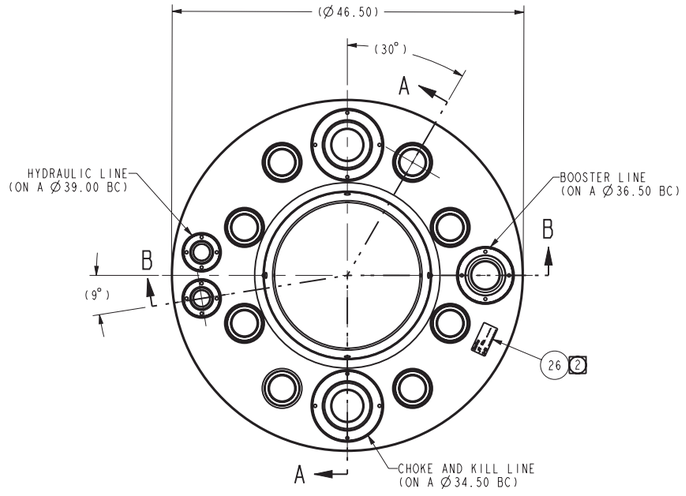
The Shuttle Tool does not carry over 500T.

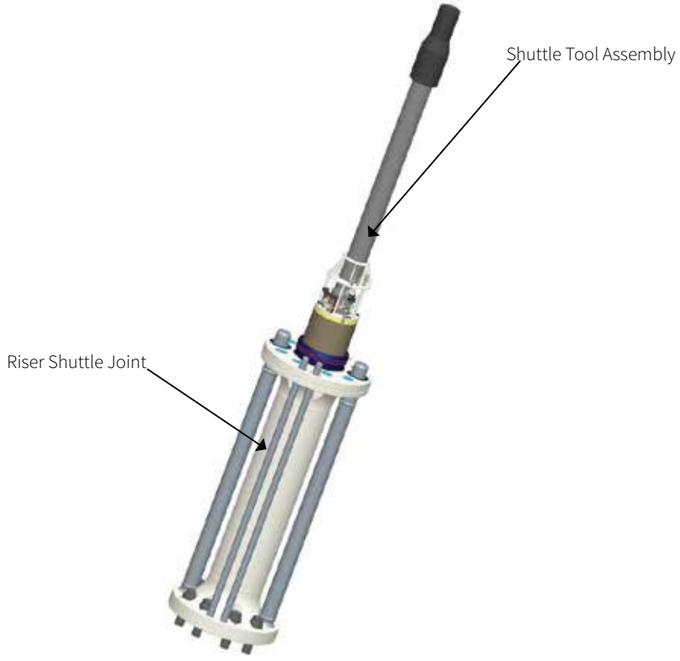
- Re- landing the LMRP/BOP
- Move or reorient the BOP Stack
- Locaiton Hopping for Short Distances
- Perhaps fully utilizing the Dual Activity Rigs

Technical Specifications	
Safe Working Load	500 Tons (454 Tonne)
Estimated Weight	15,034 lb. (6,819 kg.)
Weight: Riser Shuttle Joint Only	9,118 lb. (4,1365 Kg.)
Weight: Riser Shuttle Tool Only	5,916 lb. (2,683 Kg.)
Length: (whole Assembly)	23.42 ft. (7.14 m)
Length: Riser Shuttle Joint Only	10.5 ft. (3.2 m)
Length: Shuttle Tool Only	9.83 ft. (3 m)
Hydraulic Lock/Unlock:	1500 psi WP (103 Bar)
Operating Fluid	BOP Fluid or Hydraulic Oil









Pumping and Circulation Equipment

- 14-P-220 Triplex mud pump
- Choke and kill manifold
- Brandt centrifuge
- Brandt agitators
- Brandt shakers
- Brandt shaker screens

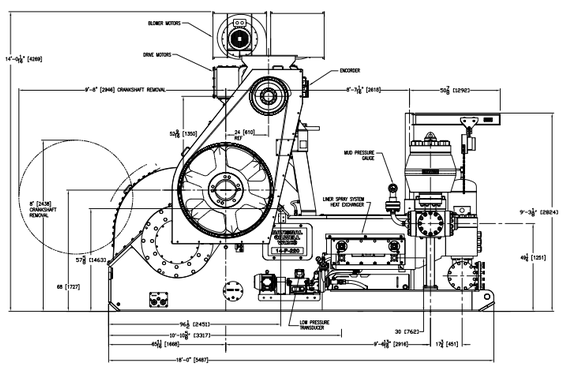
NOV Rig Technologies

Technical Marketing Sheet

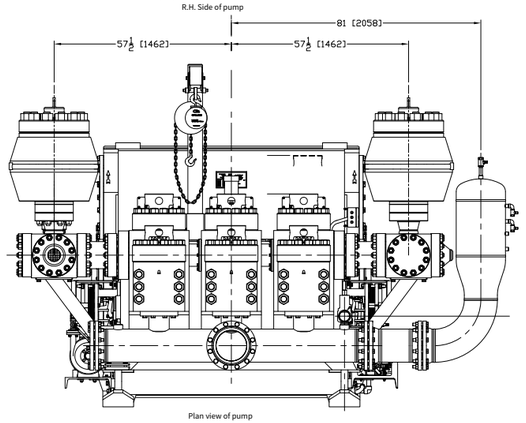
14-P-220 Triplex Mud Pump

*For reference only, please contact your local sales contact for more information.

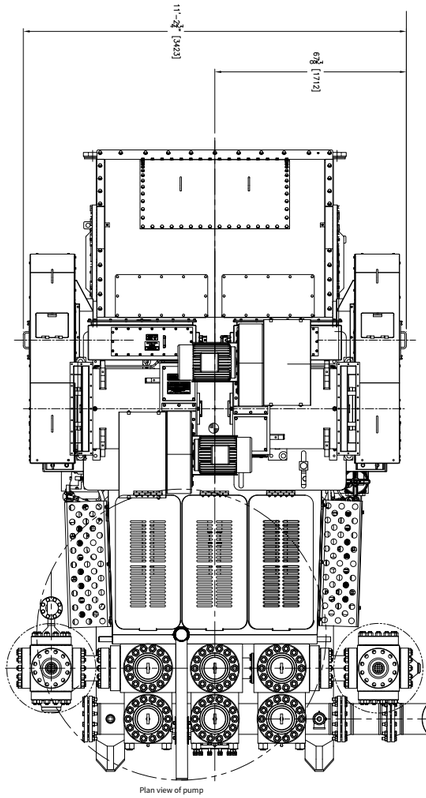
National Oilwell Varco provides smooth Triplex performance and high efficiency from the 14-P-220 Mud Pump. Its compact engineering provides higher efficiency in less space. The pump's light weight and flexible design make it easily adaptable to a variety of rig configurations. This provides flexibility as drilling requirements and conditions change.



R.H. Side of pump



Plan view of pump



Plan view of pump

Power End

- Fabricated steel frame construction
- One-piece forged steel construction crankshaft, connecting rod and pinion shaft
- Adaptability to a variety of drive arrangements on either sides or on both sides
- Premium roller bearings to enhance smooth performance and efficiency

Belt Drive

- Belt life in excess of 10 years delivers an effective drive solution with the lowest cost of ownership in the industry
- No requirement for lube oil filter, cables, cable trays, MCC cubicles, starters

Forged steel crankshaft

- One piece forged steel crankshaft with pressed fit bearing journals
- Naturally balanced for smooth running
- No casting
- No welding

Optional Accessories

- HydrA-LIGN™ piston rod
- Blak-JAK™ liner retention system
- Blak-JAK™ Torque master quick change valve cover retention system
- Pneumatic pump rotation tool

Warranties

- The standard module carries a three-year, 100% warranty against cracking
- The premium module has a four-year, 100% warranty against cracking
- Crankshaft carries a seven year limited warranty

AC drive motor*	
Motor type	Standard DM27 Drill Force AC Cage induction motor
Electrical rating	Continuous duty
Temperature ambient 600V - 1,150 HP (7,700 ft-lbs)	-40°C to 45°C
Temperature ambient 690V - 1,229 HP (7,550 ft-lbs)	-40°C to 45°C
Temperature ambient 600V - 1,075 HP (7,057 ft-lbs)	-40°C to 55°C
Temperature ambient 690V - 1,150 HP (7,064 ft-lbs)	-40°C to 55°C
Insulation	Class H, VPI form wound
External cooling requirements	2,800 SCFM at motor inlet
Classification	ATEX, increased safety IECEx
Optional certification	ABS, DNV, CSA
Standard stator and Bearing RTD's	

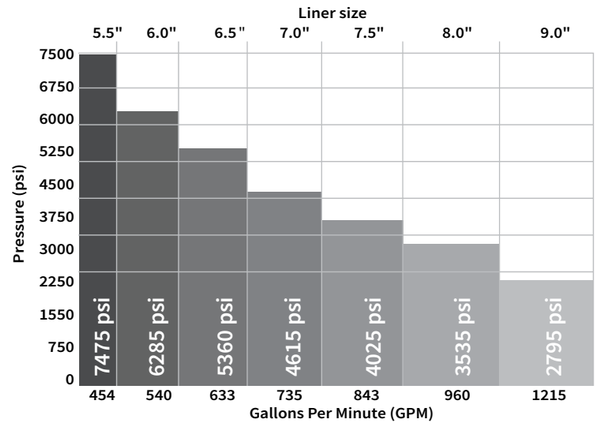
*Optional GEB-22 AC Cage Induction Motor

Technical specifications	
Height, floor to center of front inlet suction, inches (mm)	19 ⅞ (505)
Height, floor to center of discharge, inches (mm)	49 ¼ (1251)
Overall length over skids, inches (mm)	218 ¼ (5544)
Width over frame, inches (mm)	91 (2311)
Width over pinion shaft, inches (mm)	125 ¾ (3194)
Height, floor to top of gear case, inches (mm)	84 ¼ (2139)
Height over fluid cylinders, inches (mm)	69 ⅛ (1756)
Maximum input horsepower (kW)	2200 (1640)
Rated pump speed, spm	105
Maximum fluid cylinder liner bore, inches (mm)	9 (228.6)
Stroke, inches (mm)	14 (355.6)
Hydrostatic test pressure of fluid cylinders, psi (kg/cm2)	11,250 (776)
Gear ratio	3.969
Suction connection ASA-150 lb. R.J. flange, inches	10"
Discharge connection, cross w/ API-10,000 psi. R.J. flange, inches	5"
Valve pot, API number	MOD. 8
Weight-complete, less sheave, lbs. (kg)	86,000 (39,009)
Weight-complete, Mission L, lbs. (kg)	96,000 (45,546)
Pinion Speed	417 rpm

Liner size, inches			9†	8	7½	7	6½	6	5½
Max. discharge pressure, psi of 14-P-220 with high pressure fluid end			2795	3535	4025	4615	5360	6285	7475
SPEED SPM	**INPUT HP**	**HYD.** HP**	**GALLONS PER MINUTE**						
105*	2200*	1980	1215	960	843	735	633	540	454
80	1676	1509	925	731	643	560	483	411	346
60	1257	1131	694	548	482	420	362	308	259
40	838	754	462	366	321	280	241	206	173
VOLUME/STROKE (GALLONS)			11.57	9.14	8.03	7.00	6.03	5.14	4.32

*Rated maximum input horsepower and speed
**Based on 90% mechanical efficiency and 100% volumetric efficiency
† 9 inch liner requires special liner bushing and liner cap

Performance 14-P-220



Fluid End Modules

NOV offers a choice of fluid end modules and valve covers for every P-Series pump model to select the fluid end module that exactly matches the drilling requirements. All pump models can be equipped with either the standard or premium forged, two-piece interchangeable fluid modules.

Fluid End key features

- Two-piece modular cylinder design is completely interchangeable between modules
- Fast Change™ screw-type valve covers, which facilitate quick removal and installation are currently standard
- Suction manifold can be equipped with front or side inlet connections
- Discharge piping connects from either side
- Piston and liner chambers are easily accessible and fully open
- Two-piece piston rod construction allows removal of piston without disturbing liner
- Easy-to-operate clamps give positive locking for liners and piston rod assemblies
- Spray system cools and lubricates piston and liner surfaces

Hybrid —Standard

- 7,500 psi operating pressure
- Modules are hydrostatically tested
- Available with ABS, DNV, and CCS certifications
- Utilize a tapered seal for valve covers
- Uses connectors between discharge modules to direct discharge flow

Mission L — Premium

- 7,500 psi operating pressure
- Modules undergo an autofrettage process
- Modules are hydrostatically tested
- Available with ABS, DNV, and CCS certifications
- Utilize a tapered seal for the valve covers
- Uses a discharge manifold to direct discharge flow

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Technical Marketing Sheet

HP Choke & Kill Manifolds

*For reference only, please contact your local sales contact for more information.

Description

NOV choke & kill manifolds includes gate valves, choke valves, high pressure piping and blocks built in accordance with API standards. The choke and kill manifold complies with third party requirement and governing rules . The manifolds are delivered with a remote choke control panel and a local choke control panel including a dedicated HPU. It may be supplied with an automatic glycol Injection.

- API 16C with monogram available
- API 6A monogram available
- API 53
- Pipe stress calculations
- Logging and line-up functionality
- Automatic pressure test available
- Automatic glycol injection available
- Custom design available

Local Control Panel

- Dedicated HPU
- Choke position
- Choke speed control
- Pump stroke counter
- Standpipe pressure

Choke Control Panel

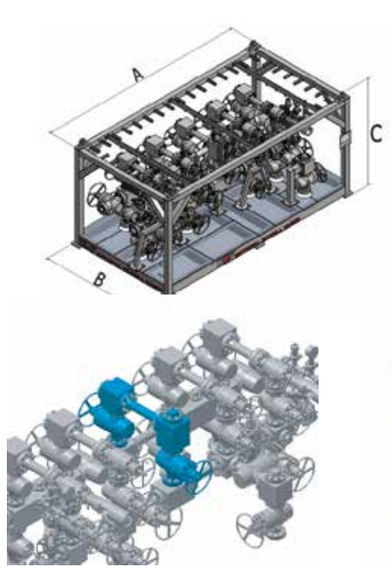
- Data logging
- Choke/Valve control
- Auto line-Up functionality available
- Auto pressure test available

Glycol Injection Unit

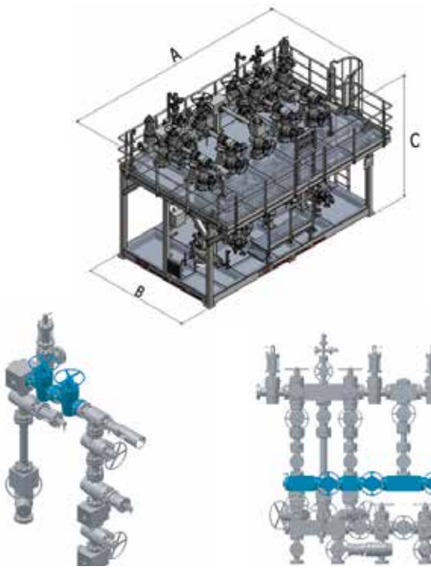
- Data logging
- Manual and automatic version
- Automatic glycol injection available

General Specification	
Design Code	API 6A, API 16C and API 53
Zone	Zone 2*
Bore Size	3.1/16" Upstream // 4.1/16" downstream
Working Pressure	15000 PSI Upstream // 10000 PSI downstream
Temperature Class	P-X(-29°C to 177°C)*
Material Class	EE-360*
PSL-Level	PSL-3*
PR-Level	PR-1*
Ring Groove Inlay Material	Inconel 625
Top Coat Colour	RAL 9002*
Skid Mounted	Yes
Service	Sour in Acc. with NACE MR-0175
Glycol Injection Connection	2 x Nozzles included*
Position Transmitter On The Chokes	4-20mA Position Transmitter
Visual Position Indication On The Chokes	Yes
Gaskets	Stainless Steel (SS316) gaskets
Nozzle Interface	API 6BX RTJ-154 Upstream and API 6BX RTJ-155 Down-stream

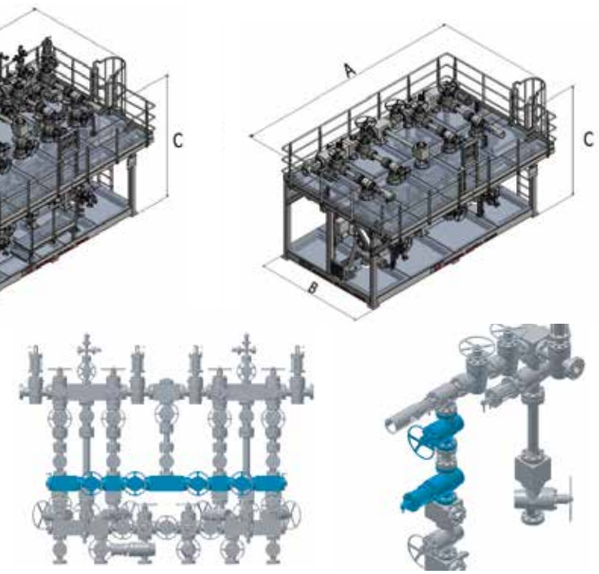
*Other alternatives available



Bypass choke line



Double isolation valve after chokes



Intermediate crossover Line

Double isolation before chokes

Model Dimensions & Specifications	CKM-1000 series		CKM-2000 series			CKM-3000 series		
Dimensions [A x B x C] (mm)	6100 x 3200 x 3000	6100 x 3200 x 3000	7600 x 4600 x 4500	6800 x 4600 x 4500	5800 x 4600 x 4500	7600 x 4600 x 5300	6900 x 4600 x 5300	6400 x 4600 x 5300
Weight (kg)	Approx. 25000	Approx. 26000	Approx. 34000	Approx. 33000	Approx. 29000	Approx. 39000	Approx. 37000	Approx. 34000
Inlay In Gate Valve Seat Pockets	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Inlay In Gate Valve Bonnet Seal Area	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Inlay In Gate Valve Stem Seal Area	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Bypass Choke Kill Line	Included as Standard	Included as Standard	Included as Standard	Included as Standard	N/a	Included as Standard	Included as Standard	N/a
Interface For Primary And Secondary Kill/Choke Line	N/A	Included as Standard	Included as Standard	Included as Standard	Included as Standard	Optional	Optional	Optional
Double Isolation Valve After The Chokes	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Double Isolation Valve Before The Chokes	N/A	N/A	Included as Standard**	Included as Standard**	Included as Standard**	Included as Standard**	Included as Standard**	Included as Standard**
Double Isolation Valves on Downsteam Outlet	N/A	N/A	N/A	N/A	N/A	Optional	Optional	Optional
Intermediate Line(second horizontal line) Upstream	N/A	N/A	N/A	N/A	N/A	Included as Standard	Included as Standard	Included as Standard
Gate Valve Type	Anson E-Type Gate Valve*	Anson E-Type Gate Valve*	Anson E-Type Gate Valve*	Anson E-Type Gate Valve*	Anson E-Type Gate Valve*	Anson E-Type Gate Valve*	Anson E-Type Gate Valve*	Anson E-Type Gate Valve*
Choke Type	Mission MPX 40d	Mission MPX 40d	Mission MPX 40d	Mission MPX 40d	Mission MPX 40d	Mission MPX 40d*	Mission MPX 40d*	Mission MPX 40d*
Manual Override on the Chokes	N/A	N/A	N/A	N/A	N/A	Optional	Optional	Optional
Hydraulic Actuated Gate Valves	N/A	N/A	8*	8*	8*	9*	9*	9*
Pos. Trans. On the Manual Hydraulic Actuated Gate Valves	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Pos. Trans. On The Hydraulic Actuated Gate Valves	N/A	N/A	Included as Standard	Included as Standard	Included as Standard	Included as Standard	Included as Standard	Included as Standard
Visual Pos. Ind On the Manual Gate Valves	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Visual Pos. Ind On the Manual Gate Valves	N/A	N/A	Included as Standard	Included as Standard	Included as Standard	Included as Standard	Included as Standard	Included as Standard
Temperature Transmitter Upstream	0*	0*	2	2	2	2	2	2
Temperature Transmitter Upstream	0*	0*	0*	0*	0*	2	2	2
Hydraulic Pressure Transmitter Upstream	2	2	2	2	2	2	2	2
Hydraulic Pressure Transmitter Upstream	0*	0*	0*	0*	0*	2	2	2
Electrical Pressure Transmitter Upstream	2	2	2	2	2	2	2	2
Electrical Pressure Transmitter Downstream	0*	0*	0*	0*	0*	2	2	2
Local Pressure Gauge Upsteam	2	2	2	2	2	2	2	2
Local Pressure Gauge Downstream	0*	0*	0*	0*	0*	0*	0*	0*

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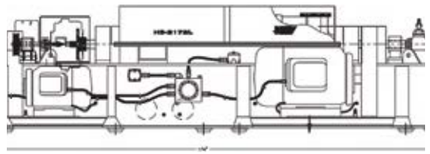
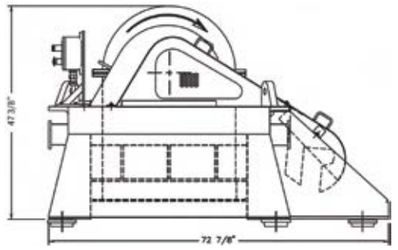
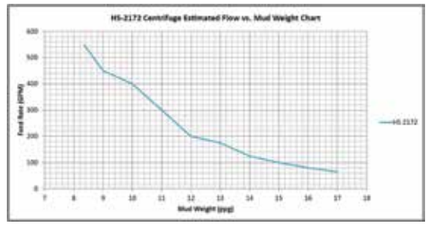
*For reference only, please contact your local sales contact for more information.

HS-2172





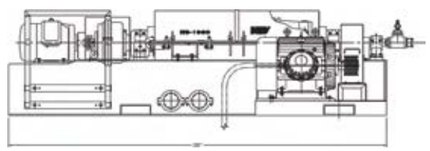


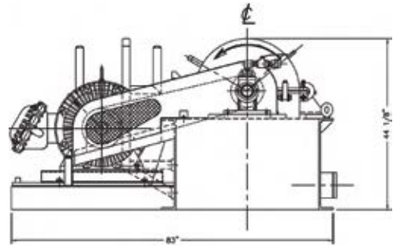
Description

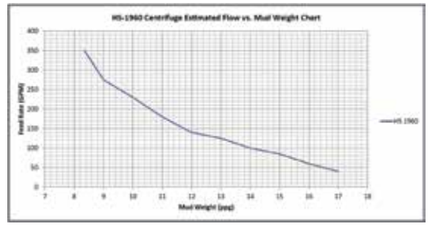
The HS-2172 series centrifuge uses high G-forces to separate fine solids from liquid. The HS-2172 centrifuge is able to exert up to 2,684 G's on the drilling fluid.
It is equipped with a variable frequency drive (VFD) control which provides a controlled application of motor drive power to the centrifuge components.
With a process capacity up to 550 gal/min (2,082 lit/min), the HS-2172 centrifuge is able to quickly process high volumes of mud while allowing prescribed mud weights and separation efficiencies to be maintained.
This enables the HS2172 centrifuge to produce fine cut points at higher flow rates, making it ideal for high-flow applications and critical-conditions solids control.

Technical Specifications	
Part number	16680
Water capacity	550 gpm (2082 lpm)
Weight	15500 lbs (7031 kg)
Bowl diameter	21 in (533 mm)
Bowl length	72 in (1829 mm)
Bowl speed	3000 max; 2400 typical
Drive	VFD
G-Force	2684
Dimensions	174 in x 84 in x 47 in (4400 mm x 2134 mm x 1168 mm)
Main drive (bowl)	150 hp
Back drive (conveyor)	40 hp
Beach angle	5

HS-1960





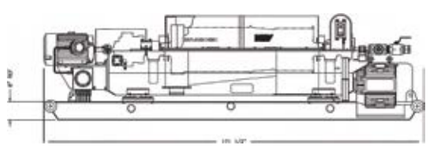


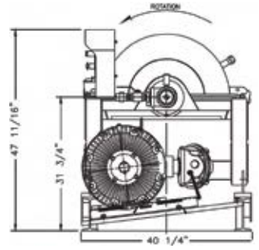
Description

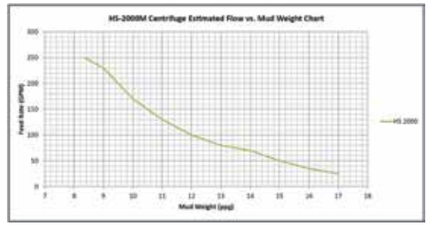
The HS-1960 series centrifuge uses high G-forces to separate fine solids from liquid. The HS-1960 centrifuge is able to exert up to 2,480 G's on the drilling fluid.
It is equipped with a variable frequency drive (VFD) control which provides a controlled application of motor drive power to the centrifuge components.
With a process capacity up to 350 gal/min (1,325 lit/min), the HS 1960 centrifuge is able to quickly process high volumes of mud while allowing prescribed mud weights and separation efficiencies to be maintained.
This enables the HS-1960 centrifuge to produce fine cut points at higher flow rates, making it ideal for high-flow applications and critical-conditions solids control.

Technical Specifications	
Part number	20000
Water capacity	350 gpm (1325 lpm)
Weight	11600 lbs (5262 kg)
Bowl diameter	19.4 in (493 mm)
Bowl length	60 in (1524 mm)
Bowl speed	3000 max; 2400 typical
Drive	VFD
G-Force	2480
Dimensions	180 in x 83 in x 44 in (4572 mm x 2108 mm x 1118 mm)
Main drive (bowl)	125 hp
Back drive (conveyor)	40 hp
Beach angle	5

HS-2000





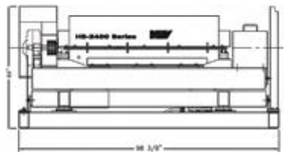


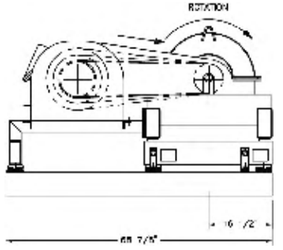
Description

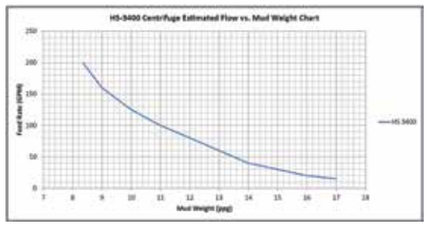
The HS-2000 series centrifuge uses high G-forces to separate fine solids from liquid The HS-2000M is able to exert up to 2,617 G's on the drilling fluid. The HS-2000M is equipped with a variable frequency drive (VFD) control which provides a controlled application of motor drive power to the centrifuge components.
With a process capacity up to 250 gal/min (946 lit/min), the HS-2000M series centrifuge offers outstanding performance over a wide range of drilling applications and conditions.

Technical Specifications	
Part number	15670
Water capacity	250 gpm (946 lpm)
Weight	8800 lbs (7031 kg)
Bowl diameter	18 in (457 mm)
Bowl length	60 in (1524 mm)
Bowl speed	3200 max; 2600 typical
Drive	VFD
G-Force	2617
Dimensions	172 in x 40 in x 48 in (4369 mm x 1016 mm x 1219 mm)
Main drive (bowl)	75 hp
Back drive (conveyor)	30 hp
Beach angle	5

HS-3400





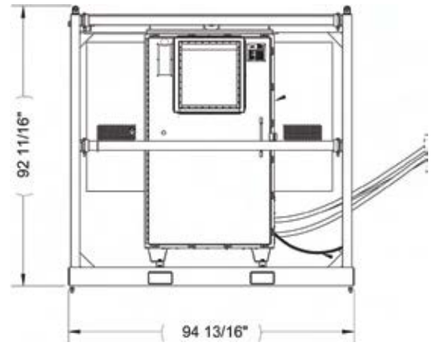


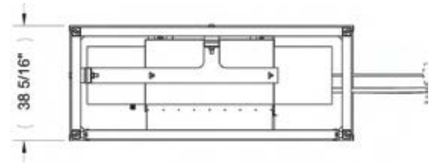
Description

The HS-3400 series centrifuge uses high G-forces to separate fine solids from liquid. Three models are available: HS-3400FS, HS-3400VSD and HS-3400FVS. The HS-3400FVS is able to exert up to 3,180 G's on the drilling fluid. With a process capacity up to 200 gal/min (757 l/min), the HS-3400 series centrifuge offer outstanding performance over a wide range of drilling applications.

Technical Specifications	
Part number	10849
Water capacity	200 gpm (757 lpm)
Weight	4800 lbs (2177 kg)
Bowl diameter	14 in (2177 mm)
Bowl length	49.5 in (1257 mm)
Bowl speed	3200 max; 2200 typical
Drive	Fixed
G-Force	2036
Dimensions	98 in x 69 in x 44 in (2489 mm x 1753 mm x 1118 mm)
Main drive (bowl)	40 hp
Back drive (conveyor)	N/A
Beach angle	10

VFD Control Cabinet





Description

All variable frequency drive (VFD) enclosures are designed the same for all centrifuges. VFD's are rated to match motor and load requirements and are recognized by the American Bureau of Shipping & DNV for hazardous area use. Designed for arctic, desert and hazardous area service, where power disconnect is required for hazardous area duty.

Technical Specifications	
Weight	2646 lbs (1200 kg)
Dimensions	95 in x 38 in x 93 in (2413 mm x 965 mm x 2362 mm)

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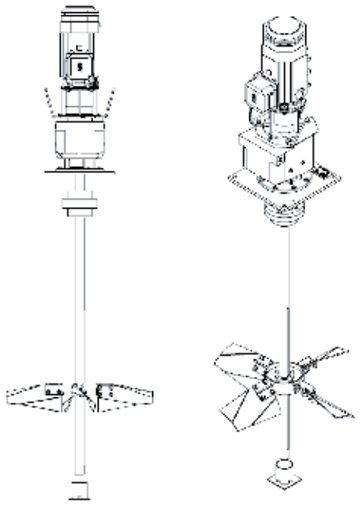
VMAI-10

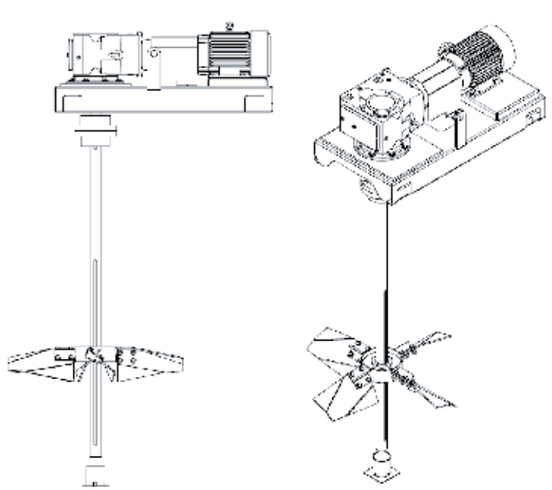


Description

The VMAI series mud agitators are a vertically mounted motor with a helical inline gearbox. They are heavy duty mechanical mixers used for viscous fluids such as drilling fluids. The gearbox utilizes a parallel helical gear drive system that reduces the rotational speed of the motor to drive the impeller(s). The impeller shaft is suspended from and attached to the output shaft of the gearbox with a coupling. Each VMAI agitator uses a shaft mounted impeller to maintain a homogeneous mixture of liquids and solids within a tank. Impellers are available with flat blades (radial flow), contour blades (axial flow), and canted blades (radial/axial flow). Blades may be installed in single or multiple configurations to provide desired results. Multiple sizes and locations of impeller configurations are available. These agitators are sized to meet all drilling rigs needs and have a large and successful install base worldwide.

Technical Specifications	
Dimensions (less shaft and impeller)	22 in x 22 in x 39 in (559 mm x 559 mm x 991 mm)
Weight	620 lb (281 kg) - less shaft and impeller
Gearbox	Helical
Nominal Gearbox Ratio	28.85:1
Maximum Torque	17,912 in-lb (2023.78 Nm)
Impeller Shaft Diameter	3 in (76.2 mm)
Impeller Shaft Weight	24 lb/ft (35.7 kg/m)

MA-25RG

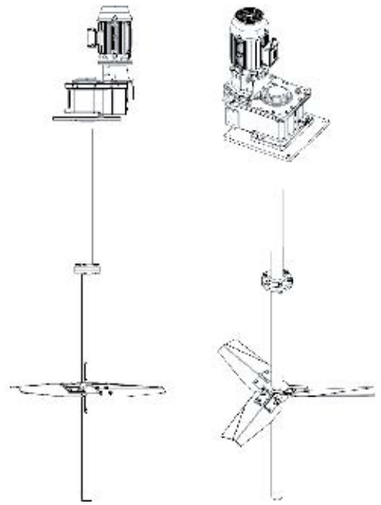


Description

The MA-RG series mud agitators are horizontally mounted motor with a helical-bevel gearbox. They are heavy duty mechanical mixers used for viscous fluids such as drilling fluids. The gearbox utilizes a helical-bevel gear drive system that reduces the rotational speed of the motor to drive the impeller(s). MA-RG series agitators are very compact. Their low profile reduces headroom requirements and provides more layout space on top of the tanks. The 1:1 height to width ratio results in a lower center of gravity, providing stability and safety should the impeller encounter a sudden shock load. MA-RG agitators use a mounting skid for robust installation. They also utilize the same impellers as the VMAI Agitators, the main difference being the size and mounting configuration. Multiple sizes and locations of impeller configurations are available. MA-RG agitators are sized to meet all drilling rigs needs and have a large and successful install base worldwide.

Technical Specifications	
Dimensions (less shaft and impeller)	67.25 in x 33.25 in x 25.5 in (1705 mm x 859 mm x 648 mm)
Weight	2022 lb (917 kg) - less shaft and impeller
Gearbox	Helical-Bevel
Nominal Gearbox Ratio	29.29:1
Maximum Torque	75,225 in-lb (8,499.28 Nm)
Impeller Shaft Diameter	3.5 in (88.9 mm)
Impeller Shaft Weight	32.7 lb/ft (48.7 kg/m)

23BRGTD-20

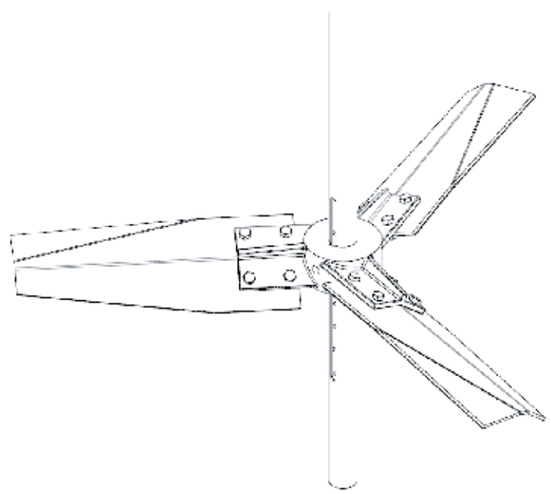


Description

The 20BRGT series agitators are offset parallel vertically c-face mounted motor with a helical-bevel gearbox. These agitators are considered high efficiency models because they are a drive designed specifically for mixing and utilize an over-sized output shaft and bearings for a robust, fit for purpose design for trouble free mixing. The 20BRGT Series are backed by mixing expertise and state of the art design software that sizes the mixers to allow for optimal mixing with lower HP requirements. These agitators also utilize very high efficiency impellers that have been developed through design and testing at our mixer facility to allow NOV to create more mixing without consuming a lot of power due to low shear and velocities. These are the latest premium models being sold into the offshore drill ship market and are being installed globally today along with BRANDT™ solids control equipment.

Technical Specifications	
Dimensions (less shaft and impeller)	30 in x 22 in X 44 in (788 mm x 559 mm x 1118 mm)
Weight	2300 lb (1043 kg) - less shaft and impeller
Gearbox	Helical-Bevel
Nominal Gearbox Ratio	36.8:1 (can vary)
Maximum Torque	31,200 in-lb
Impeller Shaft Diameter	3-4.5 in (76-114 mm)
Impeller Shaft Weight	Various

XE-3 High Efficiency Impeller



Description

The XE-3 impeller is designed to provide high flow and low shear with an optimized shape to maximize mechanical strength. Designed using high tech Laser Doppler Anemometry, Digital Particle Image Velocimetry, and Computational Fluid Mixing, the XE-3 impeller is always the right choice for flow controlled processes.

Process Efficiency

- High flow for improved blending and solids suspension applications
- Possible reduction in the horsepower and size of the gear drive required to achieve the desired mixing result

Mechanical Design

- Decreases impeller weight by nearly 40% over other high efficiency impellers
- Longer in-tank shafts can be used without the need for steady bearings

Upgrade Opportunity

- The impeller weight is similar or less than older, less efficient impeller designs
- The superior performance of the XE-3 High Efficiency Impeller can almost double a canted impeller pumping rate at an equivalent torque level

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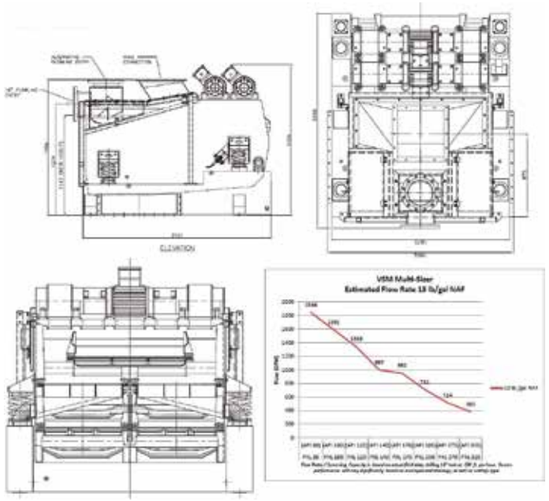
VSM™ Multi-Sizer

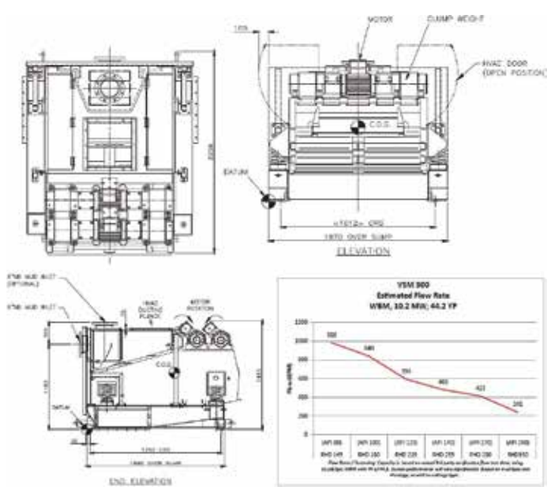


Description

The VSM Multi-Sizer is a balanced elliptical motion, fine screen shaker which utilizes three screen decks, an integrated scalping deck and two primary fine screen decks. The three deck design enables two modes of operation; series flow for recovery of well bore strengthening materials and parallel flow for increased flow capacity. This unit is ideal for offshore clay/gumbo formations, it is an extremely simple machine to operate requiring little maintenance. The screen decks employ a PNEUMOSEAL™ bladder system for securing the screens. The screen changes can be carried out in 2-3 minutes by one operator. This unit has a fixed deck angle of 2° in the feed zone and 7° on the incline screen ramp. No adjustments are required.

Technical Specifications	
Vibration	Balanced Elliptical
Screens and Deck Type	(3) Screens Scalping Dec (2°) (4) Screens Primary Deck #1 (+7°) (4) Screens Primary Deck #2 (+7°)
Basket Angle	Fixed
Special Features	• Pneumatic Screen Clamping • Able to operate triple deck in series, parallel, and recovery
Screen Type	Pretension Repairable
G-Force	Automatically adjusts to drilling conditions with CONSTANT-G-CONTROL™ 5.3-6.3-7.3 G's
Deck Area	20.5 ft² (1.9 m²) 26.3 ft² (2.4 m²) 26.3 ft² (2.4 m²)
Motor Data	(2) 4.0 hp (3.0 kw)
Weir Height	45 in. (1270 mm)
Dimensions	104 in x 74 in x 68 in (2631 mm x 1870 mm x 1735 mm)
Weight	4943 lbs (2247 kg)

VSM 300™

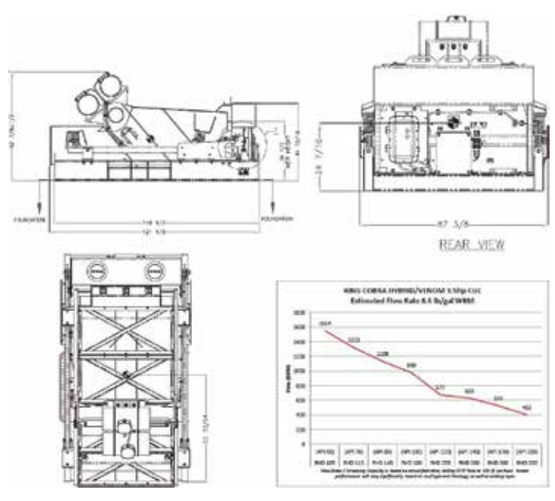


Description

The VSM 300 is a balanced elliptical motion, fine screen shaker which utilizes three screen decks, an integrated scalping deck, a primary fine screen deck and a drying deck. This unit is ideal for offshore and clay/gumbo formations, it is an extremely simple machine to operate requiring little maintenance. The primary screen deck employs a PNEUMOSEAL™ bladder system for securing the screens. The screen changes can be carried out in 2-3 minutes by one operator. This unit has a fixed deck angle of 0° in the feed zone and 7° on the incline screen ramp. No adjustments are required.

Technical Specifications	
Vibration	Balanced Elliptical
Screens and Deck Type	(3) Screens Scalping Dec (0°) (4) Screens Primary Deck (+7°) (2) Screens Drying Deck (+7°)
Basket Angle	Fixed
Special Features	Pneumatic Screen Clamping
Screen Type	Pretension Repairable
G-Force	Automatically adjusts to drilling conditions with CONSTANT-G-CONTROL™ 5.3-6.3-7.3 G's
Deck Area	20.5 ft² (1.9 m²) 26.3 ft² (2.4 m²) 3 ft² (0.3 m²)
Motor Data	(2) 4.0 hp (3.0 kw)
Weir Height	39 in. (991 mm)
Dimensions	108 in x 74 in x 59 in (2754 mm x 1870 mm x 1505 mm)
Weight	5370 lbs (2436 kg)

KING COBRA™ VENOM™

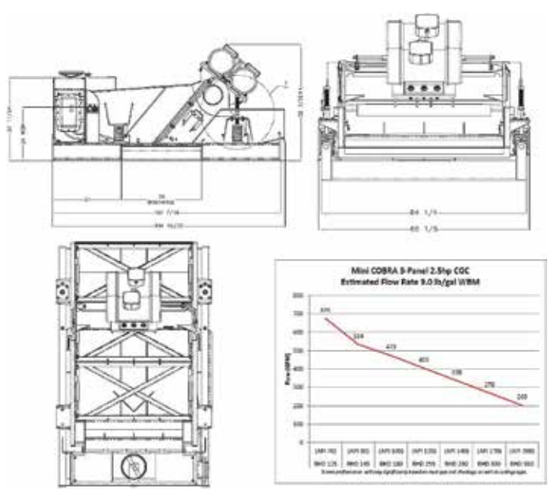


Description

The KING COBRA VENOM shaker is a fine screen shaker with several motor/ starter options producing linear or tuned elliptical motion. The KING COBRA VENOM is provides a lower profile than the KC Hybrid shaker. The VENOM utilizes CONSTANT-G CONTROL technology which increases the shakers G-Force during drilling operations to optimize capacity and finer screening. The shaker is almost always located at the flow line unless it is preceded by a "scalping" or gumbo shaker. The KING COBRA VENOM shaker removes a large percentage of drill cuttings before the mud is circulated through the surface mud system leading to improved performance of downstream solids control equipment.

Technical Specifications	
Vibration	Linear and tuned elliptical
Screens and Deck Type	(4) Screens Contour Plus (0°, +5°, +5°, +5°)
Basket Angle	Adjustable (-2° to +2°)
Special Features	Pneumatic Basket Adjustment
Screen Type	Pretension Repairable
G-Force	8.3 Nominal G's with CONSTANT-G-CONTROL™ 7.3-8.3G's 9 - in loaded drilling conditions
Deck Area	33.4 ft² (3.1 m²)
Motor Data	(2) 3.5 hp (2.6 kw)
Weir Height	34.5 in. (867 mm)
Dimensions	121 in x 67 in x 63 in (3077 mm x 1711 mm x 1600 mm)
Weight	4500 lbs (2043 kg)

MINI COBRA™ 3-Panel



Description

The Mini COBRA 3-Panel Shaker is a fine screen shaker with several motor/ starter options producing linear motion. The Mini COBRA 3-Panel shaker is a smaller footprint and weir height design shaker for smaller land and workover rigs. The shaker is almost always located at the flow line unless it is preceded by a "scalping" or gumbo separator. The shaker removes a large percentage of drill cuttings before the mud is circulated through the surface mud system, leading to improved performance of downstream solids control equipment.

Technical Specifications	
Vibration	Linear
Screens and Deck Type	(2) Screens (0°, +5°, +5°)
Basket Angle	Adjustable (0° to 3°)
Special Features	N/A
Screen Type	Pretension Repairable
G-Force	6.6 Nominal G's
Deck Area	25.4 ft² (2.4m²)
Motor Data	(2) 2.5 hp (1.9 kw)
Weir Height	24 in. (610 mm)
Dimensions	105 in x 66 in x 53 in (2657 mm x 1680 mm x 1346 mm)
Weight	3800 lbs (1724 kg)

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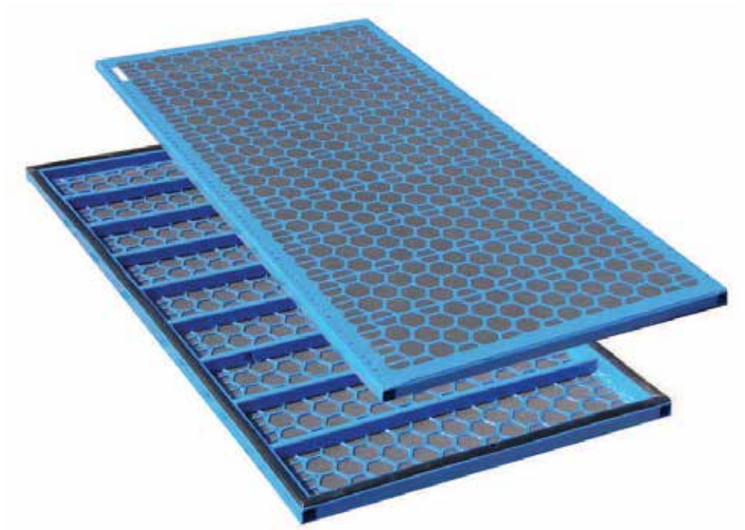
BRANDT™ Shale Shaker Screens

*For reference only, please contact your local sales contact for more information.

VENOM™ Screens

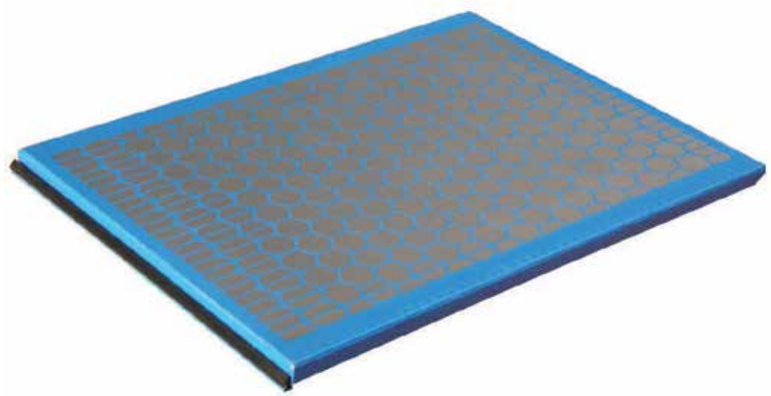


Description

The VENOM series shale shaker screens utilize an advanced frame design and unique mesh combinations to effectively and efficiently separate detrimental drilled solids from drilling fluid. VENOM series screens are designed to fit all COBRA™, KING COBRA™, and LCM-3D series shale shakers. All VENOM Series Screens are API RP 13c Compliant.

Technical Specifications	
VENOM SCREENS	
Available Mesh	MG, XF, RHD, PXL
MG API Availability	20, 30, 40
MG Cut Point Range	900µ– 426µ(Depending on API Size Selected)
MG NBOA	0.50 m^2
XF API Availability	60, 70, 80, 100, 120, 140, 170, 200, 230, 270, 400
XF Cut Point Range	267µ – 39.2µ (Depending on API Size Selected)
XF NBOA	0.50 m^2
RHD API Availability	45, 50, 60, 70, 80, 100, 120, 140, 170, 200
RHD Cut Point Range	334µ – 69.9µ (Depending on API Size Selected)
RHD NBOA	0.50 m^2
PXL API Availability	80, 100, 120, 140, 170, 200, 230, 270, 325
PXL Cut Point Range	192µ – 47.5µ (Depending on API Size Selected)
PXL NBOA	0.47 m^2
Dimensions	49 in x 25 in x 1 in (1250 mm x 635 mm x 25 mm)
Weight	32 lbs (14.5 kg)

VSM-300™ Screens

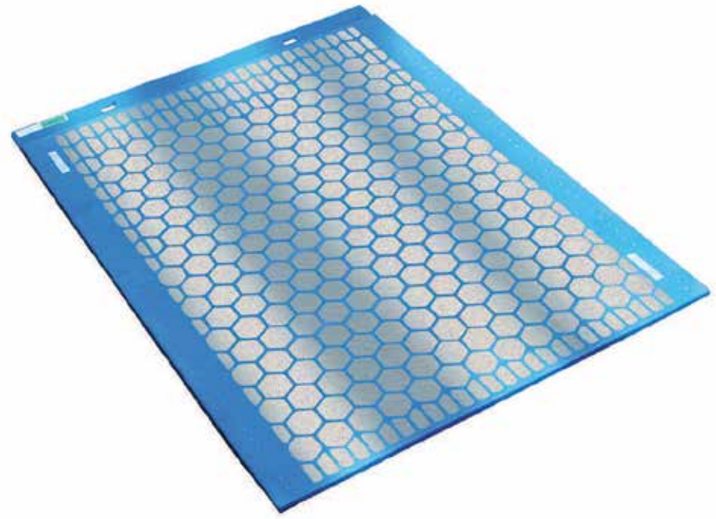


Description

The VSM 300 series shale shaker screens utilize an advanced frame design and unique mesh combinations to effectively and efficiently separate detrimental drilled solids from drilling fluid. All VSM 300 Series Screens are API RP 13c Compliant.

Technical Specifications	
VSM 300 PRIMARY SCREENS	
Available Mesh	XF, RHD, PXL
XF API Availability	60, 70, 100, 120, 140, 170, 200, 230, 270, 325, 400
XF Cut Point Range	261µ – 38.8µ (Depending on API Size Selected)
XF NBOA	0.33 m^2
RHD API Availability	50, 60, 70, 80, 100, 120, 140, 170, 200
RHD Cut Point Range	323µ – 81.6µ (Depending on API Size Selected)
RHD NBOA	0.33 m^2
PXL API Availability	80, 100, 120, 140, 170, 200, 230, 270, 325
PXL Cut Point Range	192µ – 47.5µ (Depending on API Size Selected)
PXL NBOA	0.33 m^2
Dimensions (LxWxH)	35.5 in x 27 in x 1 5/8 in
Weight	22 lbs (9 kg)
VSM 300 SCALPER SCREENS	
Available Mesh	MG
Scalper API Availability	10, 12, 20, 30, 45, 50, 60, 80, 100
Scalper Cut Point Range	2027µ – 150µ (Depending on API Size Selected)
Scalper NBOA	0.36 m2
Scalper Weight	34 lbs (15 kg)
Scalper Dimensions (LxWxH)	35.9 in x 26.6 in x 1.5 in (937 mm x 676 mm x 38 mm)

VSM™ Multi-Sizer Screens



Description

The VSM Multi-Sizer series shale shaker screens utilize an advanced frame design and unique mesh combinations to effectively and efficiently separate detrimental drilled solids from drilling fluid. All VSM Multi-Sizer Series Screens are API RP 13c Compliant.

Technical Specifications	
VSM MULTI-SIZER PRIMARY SCREENS	
Available Mesh	XF, RHD, PXL
XF API Availability	270, 325, 400, 425
XF Cut Point Range	51.3µ – 32.5µ (Depending on API Size Selected)
XF NBOA	0.32 m^2
RHD API Availability	45, 60, 70, 80, 100, 120, 140, 170, 200
RHD Cut Point Range	334µ – 78.3µ (Depending on API Size Selected)
RHD NBOA	0.32 m^2
PXL API Availability	80, 100, 120, 140, 170, 200, 230, 270, 325
PXL Cut Point Range	192µ – 47.5µ (Depending on API Size Selected)
PXL NBOA	0.40 m^2
Dimensions (LxWxH)	36.8 in x 26.9 in x 1.0 in (935 mm x 683 mm x 25 mm)
Weight	30 lbs (13 kg)
VSM MULTI-SIZER SCALPING SCREENS	
Available Mesh	MG
Scalper API Availability	10, 12, 14, 18, 25, 30, 40, 45, 60
Scalper Cut Point Range	60µ – 10µ
Scalper NBOA	0.39 m2
Scalper Weight	18 lbs (8 kg)
Scalper Dimensions LxWxH)	36.9 in x 26.5 in x 1.1 in (937 mm x 673 mm x 27 mm)

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