Automated MPD Riser System

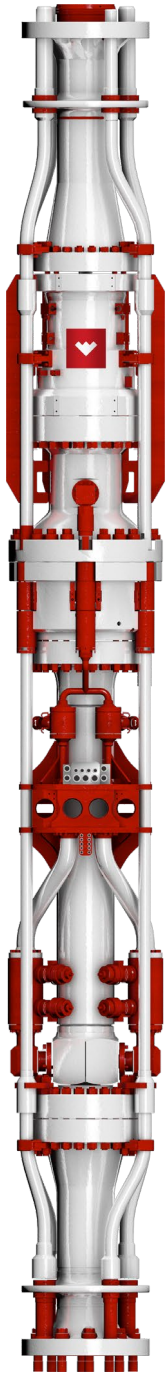
Expedites installation on offshore rigs with an integrated, compact, and smart design

Applications

- Managed pressure drilling (MPD)
- Managed pressure cementing
- Pressurized mud-cap drilling
- Underbalanced drilling
- Horizontal and vertical offshore wells

Features and Benefits

- Connection hub integrates subsea control umbilical and flowlines into one easy-to-connect component.
- Robotic arm attaches the connection hub to the hands-free flow spool in less than 20 minutes. By eliminating the need for manual work in the moonpool area, the arm enhances safety and accelerates rig-up and rig-down time by 80%.
- Robotic arm compensates up to 20° to align with the riser, which enables installation in harsh conditions. Then the arm retracts to its initial position for safe riser running.
- Smart rotating control device (RCD) technology enables predictive maintenance and early leak detection.
- Annular isolation device (AID) enables openhole shut-off and offers multiple pressure equalization options.
- Hands-free flow-spool sensors monitor annular pressure and temperature.
- Subsea surveillance system enables visual confirmation of successful connection hub installation. The system also enables permanent monitoring of components during MPD operations, which reduces the need for underwater inspection using a remotely operated vehicle (ROV).
- Single control umbilical provides high-performance fiber-optic cables for fast and reliable data transmission.
- Compact riser design integrates smart RCD, hands-free flow spool, AID, and all required crossovers, with no need for further assembly at the offshore rigsite.
- Reduced length, width, and weight reduces logistical complexities, associated costs, and installation time.
- Streamlined body facilitates shipping to the rigsite, rig handling, and deploying through the rotary table.
- Dual-certified and approved design—according to ABS CDS* and DNV GL OS-E101**—meets the majority of deepwater rig standards.



The Weatherford automated MPD riser system uses a robotic arm that enables installation in less than 20 minutes for 80% faster rig up and down time.

* ABS CDS = American Bureau of Shipping Classification of Drilling Systems
** DNV GL = Det Norske Veritas Germanischer Lloyd

Automated MPD Riser System

Tool Description

Part of the Weatherford intelligent MPD solution, the automated MPD riser system expedites offshore installation with an integrated, compact, and smart design. The riser system consists of a smart below-tension-ring marine riser (BTR-MR) RCD, an AID, and a hands-free flow spool.

The MPD riser system also features a robotic arm that connects the control umbilical and flowlines in a single operation. With this level of automation, the system provides safe, reliable, and efficient operations every time. In regard to efficiency, installing the connection hub to the riser takes less than 20 minutes for 80% faster rig up and down time.

The compact riser system arrives at the rigsite ready for deployment. The operator initiates installation from a control system in the moonpool. A line of sight is required to install the connection hub.

The connection hub enables installing the single control umbilical and flowlines in the hands-free flow spool all at once.

Specifications

Riser System

Length	25.7 ft (7.8 m)
Length with crossovers	<48 ft (14.6 m)
Maximum OD	57 in. (1,448 mm)
Weight	65,000 lb (29,484 kg)
Weight with crossovers	88,000 lb (39,916 kg)
Bleed line connection	Integral
Mud line return connections	2
Control line umbilical connections	1
Moonpool connections	1 remote pull-in
Field serviceable packer	Yes
Third party certification	ABS and DNV GL
Auxiliary lines	
Choke and kill maximum pressure	15,000 psi (103.4 MPa)
Mud booster maximum pressure	15,000 psi (103.4 MPa)
Hydraulics maximum pressure	5,000 psi (34.5 MPa)

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Automated MPD Riser System

Specifications (continued)

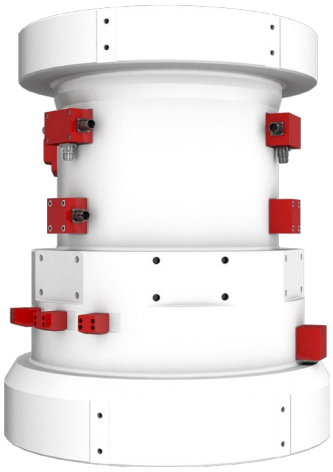
RCD

Length	4.4 ft (1.3 m)
Assembly weight	10,000 lb (4,536 kg)
Maximum tension rating	4,000,000 lbf (1,814,369 kg)
Minimum throughbore ID	18.75 in. (476 mm)
Bearing assembly OD	19.0 in. (483 mm)
Top flange	API 6A Type 6BX 21.25 in., 5,000 psi
Bottom flange	Modified API flange
Static pressure rating	2,000 psi (13.8 MPa)
Temperature range	0 to 250°F (–17 to 121°C)
Maximum rpm rating	200 rpm
Third party certification	ABS and DNV GL
Design codes	API Spec 16RCD, 2nd edition
Sensor ports	4

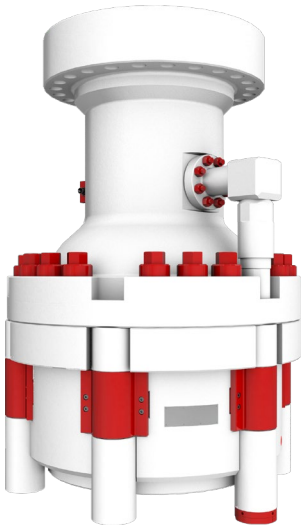
AID

Length	6.83 ft (2.1 m)
Maximum OD	57.0 in. (1.4 m)
Assembly weight	25,000 lb (11,340 kg)
Maximum tension rating	4,000,000 lbf (1,814,369 kgf)
Minimum throughbore ID	18.75 in. (476 mm)
Top flange	Modified API flange
Bottom flange	API 6A Type 6BX 18.75 in., 10,000 psi (68.9 MPa)
Static pressure rating	2,000 psi (13.8 MPa)
Minimum hydraulic operating pressure	1,850 psi (12.8 MPa)
Temperature range	40 to 150°F (4 to 66°C)*
Complete seal off	Yes
Third party certification	ABS and DNV GL
Design codes	API Spec 6A, 16A, 16F, 16C, NACE
Field serviceable	Yes
Auxiliary line integral flow path	Yes
Sensor ports	2

*Verification testing performed per API 16A 4th edition, PR1.



The RCD includes sensors that monitor the condition and performance of sealing elements to indicate when maintenance is needed.



The AID seals to complete shut-off with or without drillpipe in the riser.

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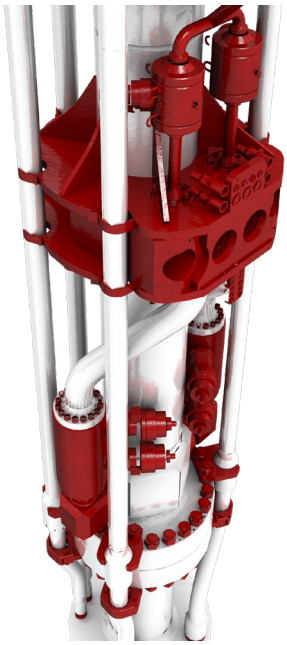
Specifications (continued)

Flow Spool

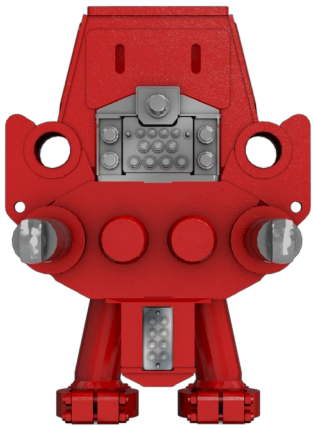
Length	15.0 ft (4.57 m)
Maximum OD	57.0 in. (1.4 m)
Assembly weight	18,500 lb (8,391 kg)
Maximum tension rating without pressure or bending movement	4,000,000 lbf (1,814,369 kgf)
Maximum tension rating with Pressure or bending movement	3,500,000 lbf (1,587,573 kgf) @ 2,000 psi (13.8 MPa)
Minimum throughbore ID	18.75 in. (476 mm)
Top flange	API 6A Type 6BX 18.75 in., 10,000 psi (68.9 MPa)
Bottom flange	API 6A Type 6BX 18.75 in., 10,000 psi (68.9 MPa)
Maximum working pressure	2,000 psi (13.8 MPa)
Maximum hydraulic operating pressure	3,000 psi (20.7 MPa)
Temperature range	–4 to 250°F (–20 to 121°C)
Fluid type	Oil or water based
Third party certification	ABS and DNV GL
Design codes	API Spec 6A, 16A, 16F
Sensor ports	3

Connection Hub

Length	54 in. (1,400 mm)
Width	44 in. (1,100 mm)
Height	59 in. (1,500 mm)
Assembly weight	3,000 lb (1,361 kg)
Maximum working pressure, hydraulic	3,000 psi (20.7 MPa)
Maximum working pressure, flowlines	2,000 psi (13.8 MPa)
Hydraulic connections	Four 3/4 in. (19 mm) Four 1/2 in. (12.7 mm) Twelve 1/2 in. (12.7 mm)
Flowline connections	Two 5-1/8 in. (130 mm)
Electrical connections	Four hydra electric socket connectors



After hands-free installation, the flow spool diverts annular flow to the manifolds on the rig.



The connection hub integrates the umbilical and flowlines into one easy-to-connect component.

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Specifications (continued)

Robotic Arm

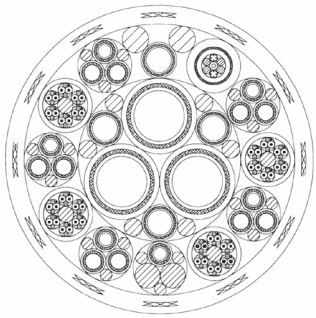
Length (retracted)	231 in. (5,861 mm)
Width (retracted)	53.7 in. (1,365 mm)
Height (retracted)	68.3 in. (1,735 mm)
Weight	14,500 lb (6,577 kg)
Telescope range	94.5 in. (2,400 mm)
Slew range	360°
Maximum tilt	±10°
Working tilt	±5°
Maximum working load	27,558 lb (12,500 kg)
Primary control	Hydraulic pilot
Secondary control	Direct hydraulic

Umbilical

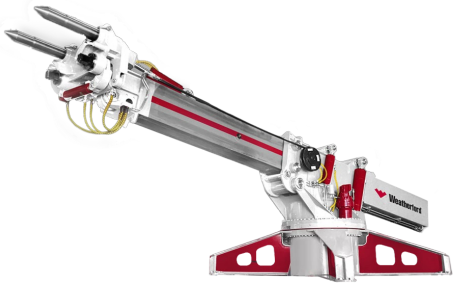
Nominal OD	5.93 in. (151 mm)
Hydraulic lines quantity, 1/2 in.	4
Hydraulic lines quantity, 1/4 in.	16
Hydraulic lines quantity, 1 in.	3
Twisted pairs quantity	24
Fiber-optic data cable	2

Reeler Assembly

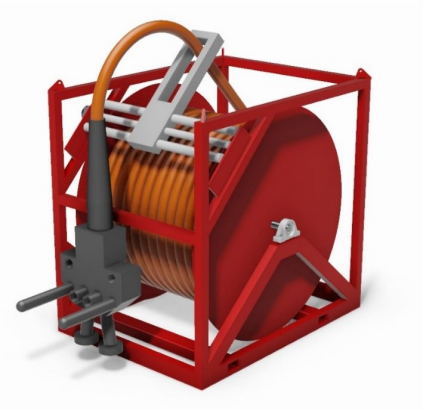
Length	196 in. (4,969 mm)
Width	103 in. (2,619 mm)
Height	160 in. (4,054 mm)
Weight	1,543 lb (700 kg)
Transport weight	24,250 lb (11,000 kg)
Capacity	500 ft (152 m)
Pull force	2,450 lb (1,152 kg)



The image to the left shows a cross-section of the umbilical, which offers customization for various monitoring needs.



The robotic arm increases efficiency, improves consistency, and enhances safety by taking over manual tasks and removing people from danger zones.



The reeler works in conjunction with a hydraulic sheave to deploy the umbilical.

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