WELLIS MPcD

ADM - 17000601 - 05

13⅝” PRESSURE CONTROL DEVICE - PCD 5000

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13 5/8" PRESSURE CONTROL DEVICE - PCD 5000

The PCD 5000 is a pressure control device to cap and seal return mud flow in managed pressure and underbalanced drilling operations. The control device uses the unique Wellis' patented sealing solution, which provides a safe, predictable and efficient sealing technology using non-rotating sealing elements.

The condition and performance of the sealing elements are monitored and logged at all times. The condition monitoring shows redundant capacity and provides predictability during drilling operations. Unlike many conventional RCD systems, the Wellis sealing elements pressure rating is not derated when the rpm increases. The PCD 5000 acts as a multi-seal barrier system in operations such as:

- Managed Pressure Drilling (MPD)
- UnderBalanced Drilling (UBD)

SYSTEM DESCRIPTION

The Wellis PCD system represents a new, innovative and safe sealing solution in MPD/UBD operations, where it is crucial to keep wellbore pressure under control.

The sealing elements are installed in a seal cartridge with a standard configuration of 4 seals. The wellhead pressure is distributed in the seal cartridge by means of gradient chambers, hence the total load on each seal is significally reduced. The gradient chamber pressure is monitored and automatically operated by a PLC and HMI system.

Should one seal fail, the well pressure can easily be re-distributed over the remaining functional seals by regulating the gradient chamber pressures. This provides redundancy and safety.

By monitoring the gradient chamber pressures at all times, the actual seal condition and performance is also monitored, and logged by the HMI system. This also enables early seal wear detection, which provides time to plan the operation and seal replacement.

The seals are replaced by retrieving the complete seal cartridge, and installing a new pre-loaded seal cartridge, using the drill string. This is a fast, safe and simple operation done by the rig crew, and has a direct positive impact on non-productive time.

The gradient chambers, valves, actuators and other hydraulic functions are all controlled by a robust control system.

ADVANTAGES

Predictable operation by real-time monitoring of seal performance

Redundancy through multiple seals

Long seal lifetime

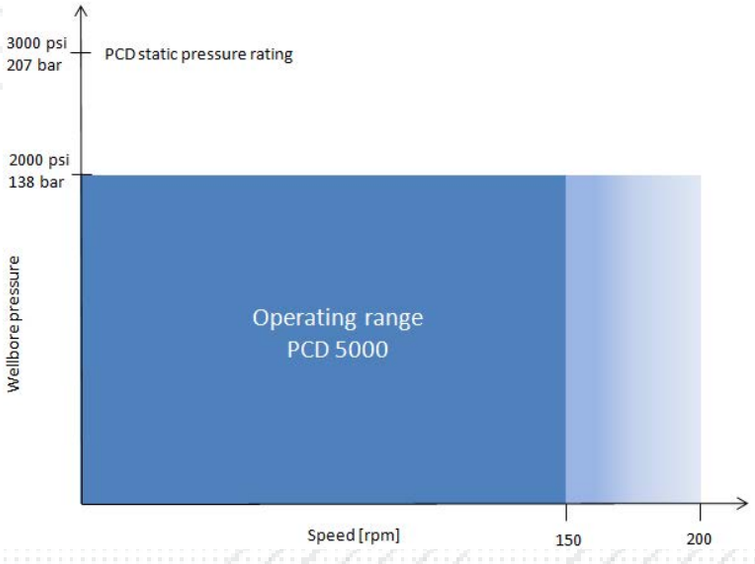
Non-rotating seals - no bearings

Increased rpm will not cause pressure derating

Efficient running and retrieval of seal cartridge on drill pipe

Full bore access through the PCD with bore protector in place

PCD 5000 OPERATING RANGE



UNIQUE SEALING TECHNOLOGY

With the unique and patented sealing solutions the Wellis PCD sets a new standard in sealing capabilities within managed pressure drilling.

Direct lubrication of the seal face significantly reduces wear, increasing seal lifetime and enabling full seal integrity when speed (rpm) and penetration rate (ROP) increases.

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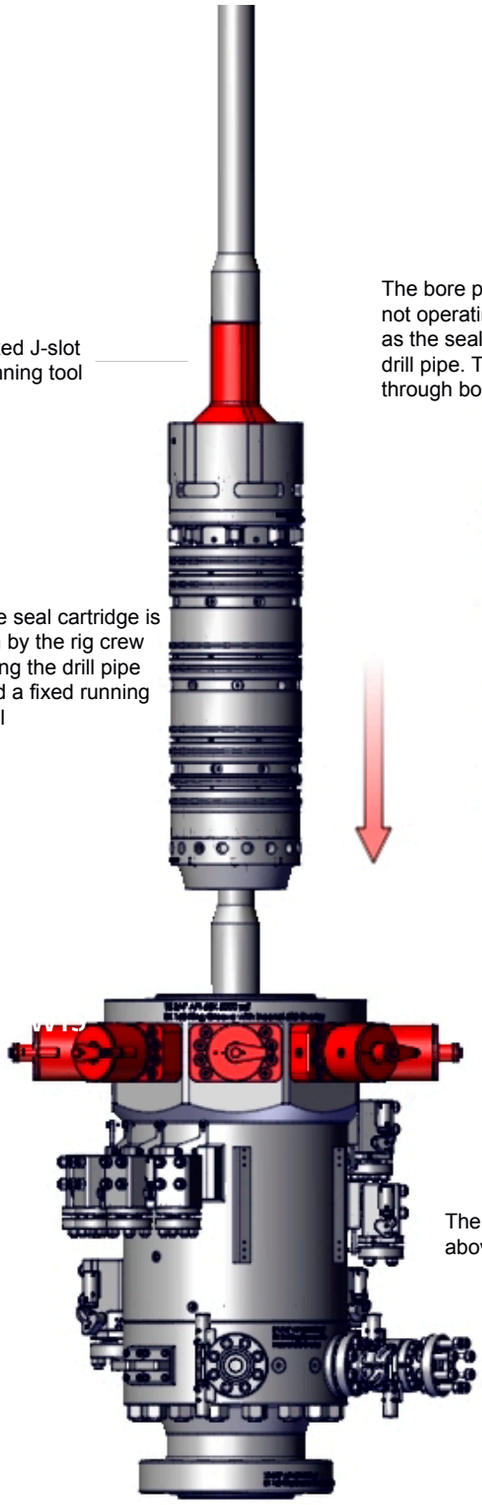
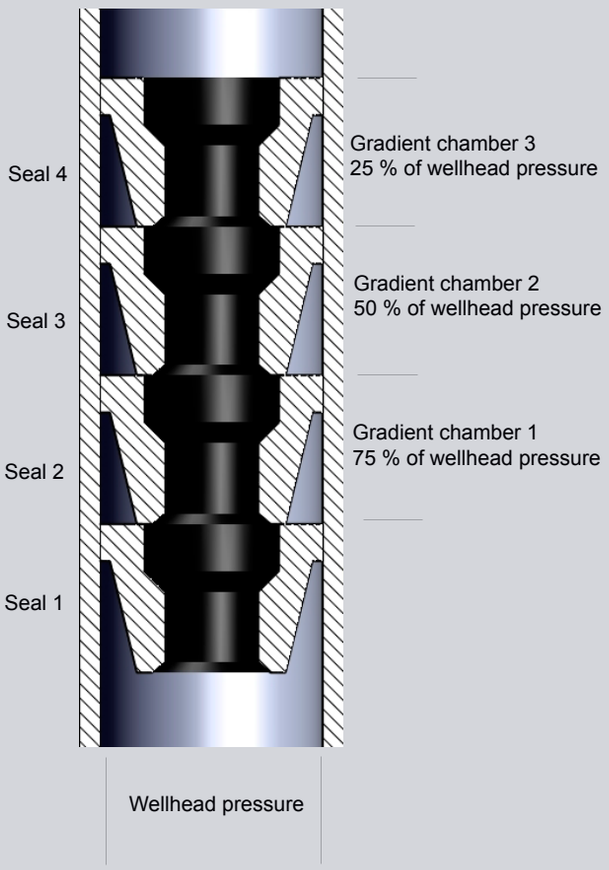


PCD 5000 - SEAL CARTRIDGE

The sealing elements are stacked in the seal cartridge. With the standard configuration of 4 seals, the wellhead pressure is distributed using a gradient chamber system, such that the differential pressure on each seal is 25% of the total wellhead pressure.

The seals are lubricated during operation by direct lubricant injection into the seal face. The sealing solution is patented by Wellis.

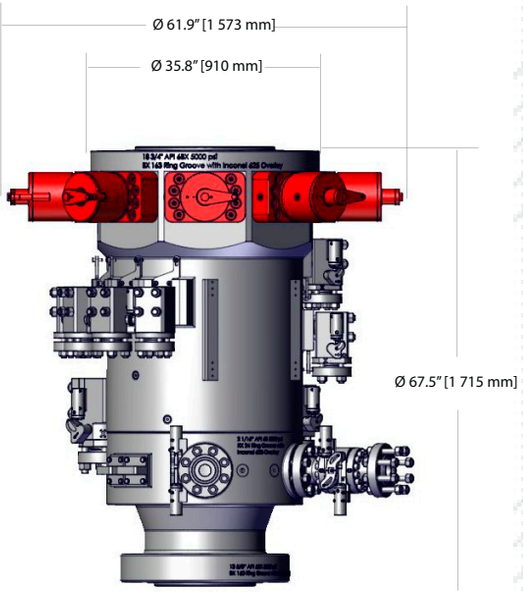


The gradient chamber data is logged and displayed on the HMI system, and the operators can monitor trend data such as gradient chamber pressure in real time. This provides seal condition and performance monitoring and early seal wear detection.

TECHNICAL DATA

Rated design pressure PCD body	5 000 psi [345 bar]
Rated static pressure in operation	3 000 psi [207 bar]
Rated dynamic pressure in operation*	2 000 psi [138 bar]
Max rpm	200 rpm
Through bore with bore protector	13 5/8"
Max drill pipe size	5 1/2"
PCD Top flange	18 3/4" 5K API
PCD Bottom flange	13 5/8" 5K API
Gas bleed off	2 1/16" 5K API

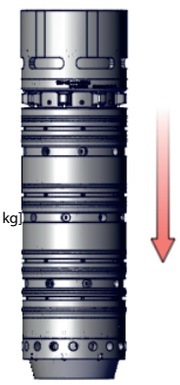
*Increased rpm does not cause pressure derating



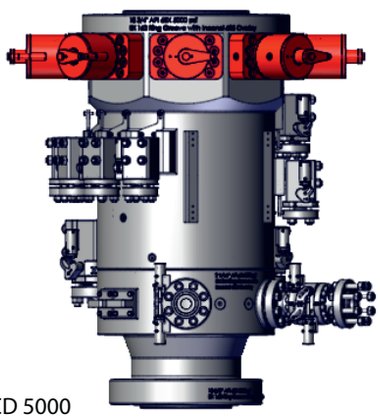
PCD Height	67.5"	[1 715 mm]
OD PCD body	35.8"	[910 mm]
OD PCD body including locking cylinder	61.9"	[1 573 mm]
PCD weight	12 346 lbs	[5 600 kg]
Seal cartridge with 4 seals	2 205 lbs	[1 000 kg]
Total weight in operation (4 seals)	14 551 lbs	[6 600 kg]

The PCD 5000 is designed and tested in accordance with the API 16RCD specification.

SYSTEM OVERVIEW

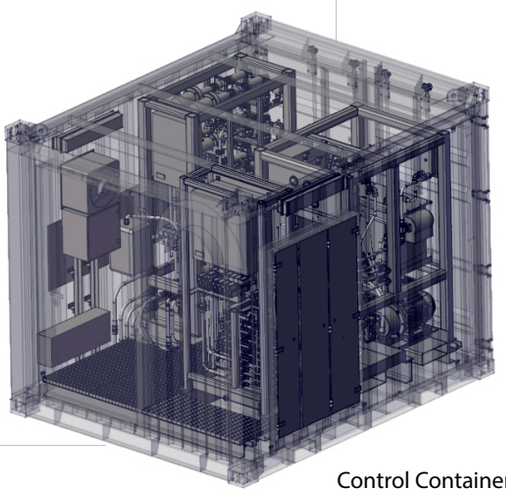


Seal Cartridge
Weight: 2 205 lbs [1 000 kg]
Ø 17.7" [449 mm]



PCD 5000
Weight: 12 346 lbs [5 600 kg]
Ø PCD locking cylinders: 61.9" [1 573 mm]
Height PCD: 67.5" [1 715 mm]

HMI system



Control Container
Weight: 9 700 lbs [4 400 kg]
LxWxH
117.8x95.9x102.0 inches
[2 991x2 438x2 591 mm]

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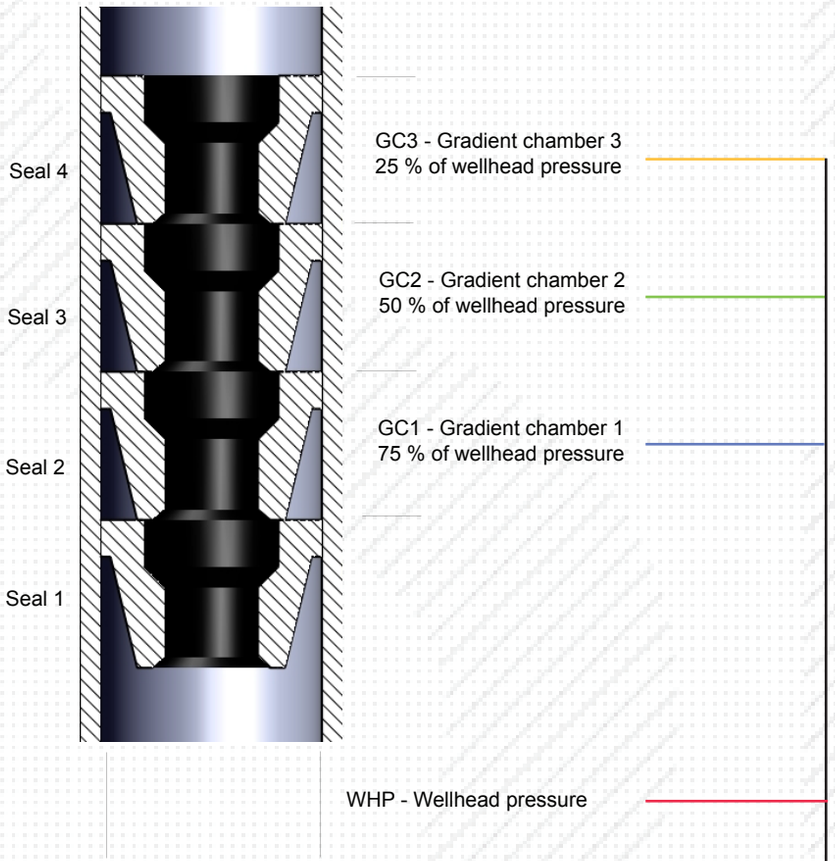
MONITORING

During operation, along with other data, the gradient chamber data is logged and displayed on the HMI system, and the operators can monitor trends such as temperature and gradient chamber pressures in real time. This provides seal condition and performance monitoring and early seal wear detection.



ADVANTAGES

Monitoring seal condition and performance at all times.

Allows planning seal replacement at a time that fits the operation.

Easy and intuitive trend plots which can be customized by the operator.

No personnel needed in the moonpool area for operating the PCD system.

Clean and safe working conditions for the operator.

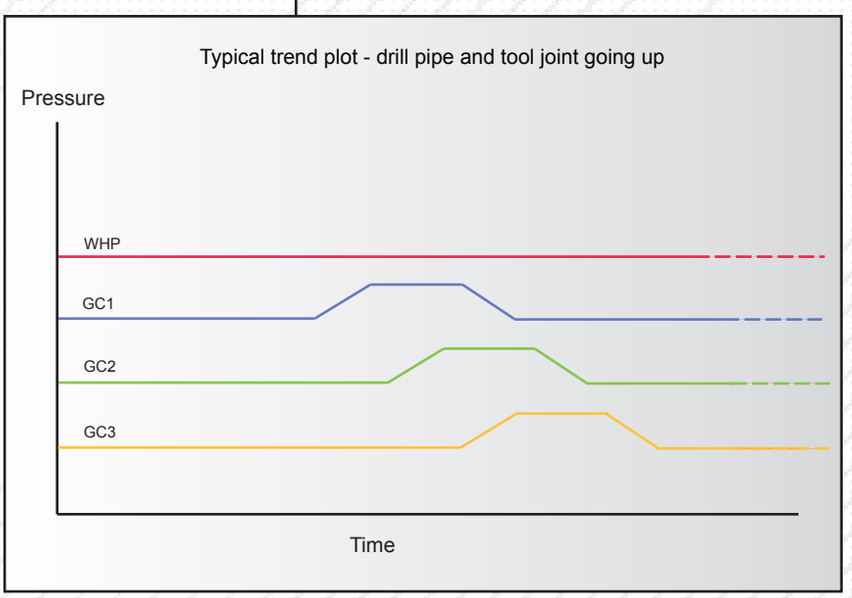
The wellhead pressure (WHP) and the gradient chamber pressures (GC#) are continuously logged and monitored on the HMI system.

The plot (right) shows a typical trend plot of WHP and the different GC pressures when a tool joint is run through the seal cartridge (moving up in this example).

The pressure increases when the tool joint enters the gradient chambers, and returns to pre-defined pressure level after the complete tool joint has passed through the seal.

The PCD 5000 HMI system gives the operator excellent control of seal condition and performance by monitoring the GC pressures and other parameters.

Furthermore, it provides early wear indication since any leakage through the seals is easily spotted on the trend plot. This gives superior predictability and makes it possible for the rig crew to be able to plan a seal cartridge change in advance.



CUSTOMER SPECIFIC

The PCD 5000 represents a flexible design which can be configured according to customer-specific operation requirements. The bottom housing of the PCD is interchangeable and can be replaced by (examples):

- an integrated flow spool, with customer specified outlets, to minimize stack-up height
- any x-over, with customer specified outlets, to match stack-up interfaces

13⅝" PCD 5000 standard configuration

PCD 5000 with 13⅝" flow spool

PCD 5000 with 18¾" flow spool

The sealing solution in the Wellis PCD systems enables operation-specific seals to be used. For

example;
- in aggressive drill fluids a purpose-built bottom seal can be used to protect the other seals from the drill fluid
- in operations with large pipe movements and misalignment, a purpose-built top seal can be used, to absorb pipe movement and align the pipe prior to entering the seal cartridge

Please contact us at post@wellis-mpcd.com for more information about our technology and products.