HYDROCORE LIMITED

The smart solutions for your business

Hydrocore™ Double Acting Line-Fluid Actuated Valve

BENEFITS OF THE HYDROCORE DOUBLE ACTING LINE FLUID ACTUATED VALVE

- No electric actuators that are expensive and that have limit switches that are seldom set correctly causing the valve to fail.
- No gears, spindle, bushes, shafts, keys and keyways that can wear out and cause the limit switch to go out or cause the actuator to fail.
- The valve has an improved Cv compared to the NGD valve.
- No pneumatic systems.
- The needle valve can be set very accurately so that the valve closes at an appropriate speed so as to prevent the occurrence of water hammer.
- The valve always has positive pressure (full column pressure) on top of the shuttle when the valve is in a closed position. This prevents valve seat leakage and seat damage. When the valve is in an open position, it prevents the valve from being in a partly open position. This ensures that there is no reduced pressure drop over the valve causing undesired energy and financial losses.

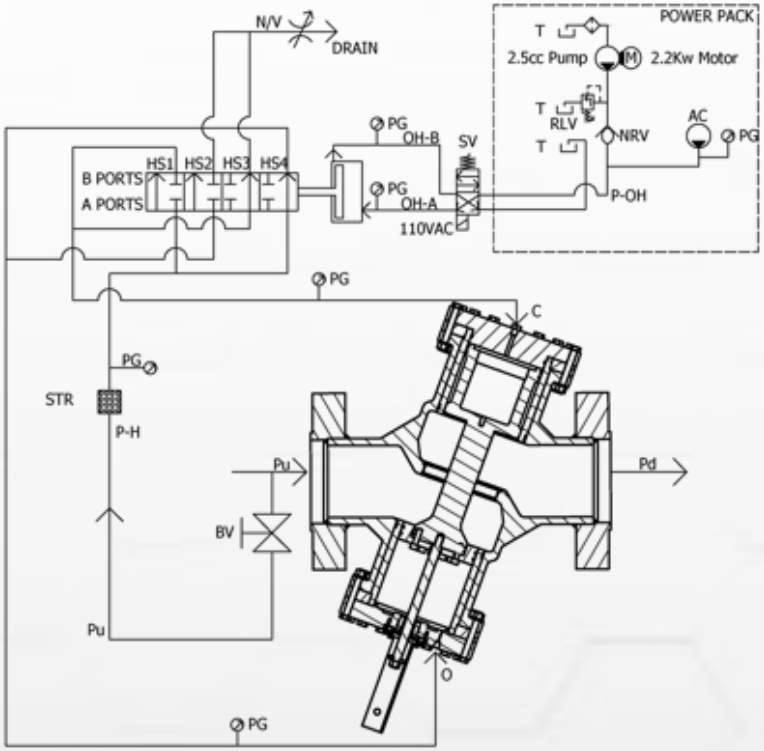
BENEFITS OF USING A WATER HYDRAULIC SWITCH (PATENT PENDING) WITH AN OIL HYDRAULIC POWER PACK

1. Increased port size to reduce risk of blockage.
2. Compact and reliable oil hydraulic power-pack (Bosch Rexroth).
3. This solution is very attractive commercially due to the actuation method not requiring expensive electric actuators or high volume hydraulic power packs. Our system can be outfitted with a scaled down hydraulic power pack to drive the hydraulic switches which in turn direct the in-line water hydraulics to the relevant actuation chambers. Smaller systems result in greatly reduced costs from a capital outlay as well as maintenance perspective.
4. The use of oil hydraulics to run the hydraulic switch offers improved reliability when compared to the water hydraulic or pneumatic options. This is due to the ease of control as well as the stand alone nature of the hydraulic system. These factors help reduce the risk of contamination of hydraulic fluid as well as erratic system supply pressures.
5. The inclusion of a pressure accumulator allows for the “Fail Safe” requirement to be employed. This also ensures that the system will operate in the event of power failures. “Fail Safe” functionality is far cheaper and less risky for a hydraulic system than and electric actuator with UPS or a spring return system.
6. Materials of construction: The hydraulic switches are manufactured from 431 stainless steel which offers excellent corrosion resistance as well as a very good pressure competence.
7. Use of a simple to use high pressure, high capacity strainer allows for very simple system maintenance and cleaning. The filter element removes all particles larger than 300 Microns as standard but this can be reduced if required.

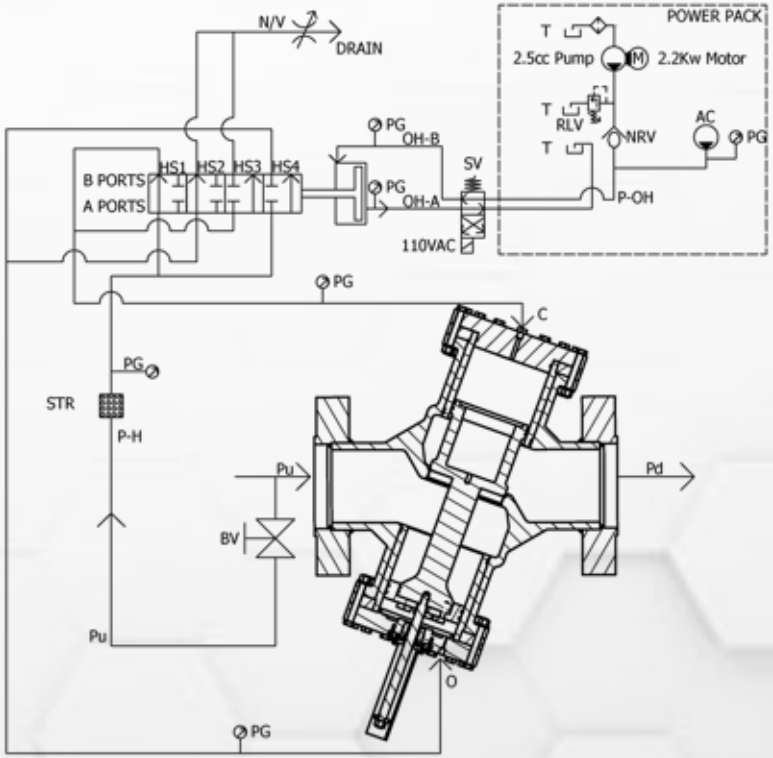
HYDROCORE LIMITED

The smart solutions for your business

Hydrocore™ Double Acting Line-Fluid Actuated Valve



OPEN POSITION



CLOSED POSITION

KEY	
SPEC	DESCRIPTION
BV	BALL VALVE
STR	STRAINER
NV	NEEDLE VALVE
AC	ACCUMULATOR
RLV	OIL PRESSURE RELIEF VALVE
PG	PRESSURE GAUGE
T	TANK
NRV	NON RETURN VALVE
N/O HS1	NOMINALLY OPEN HYDRAULIC SWITCH #1
N/O HS2	NOMINALLY OPEN HYDRAULIC SWITCH #2
N/C HS3	NOMINALLY CLOSED HYDRAULIC SWITCH #3
N/C HS4	NOMINALLY CLOSED HYDRAULIC SWITCH #4

HYDROCORE LIMITED

The smart solutions for your business

Hydrocore™ Double Acting Line-Fluid Actuated Valve

HISTORY OF THE HYDROCORE™ VALVE

The concept of the Hydrocore™ isolating valve was developed from the tried and tested NGD™ isolating valve. For fourteen years the NGD™ isolating valve has been a simple and reliable solution for isolating line fluid in a piping system. But, due to the rising running costs, the valve needed a new and revised way of isolation. With the new Hydrocore™ design there is a substantial drop in the differential pressure due to the inclined bores. This in turn increases the valves flow coefficient and thereby reduces the running costs of the valve.

LOW TORQUE, LOW CLOSING FORCES

The Hydrocore™ isolating valve is hydrostatically balanced, requiring very low operating torque or operating forces at all valve positions and for all valve sizes and all pressure ratings.

NO GEARBOX

No gearbox is required to assist in the valve's opening and closing for the handwheel operated valves. The valve derives its actuating power directly from the line fluid pressure.

MAINTENANCE

The Hydrocore™ isolating valve is simple and reliable with a robust construction. Very little maintenance is required, it can be undertaken by semi-skilled personnel and with a short downtime period.

INSTALLATION POSITION

The valve can be installed in any position.

MEDIA

Liquid and gas with low content of suspended solids.

PIPE SIZES

2”(50NB) to 16”(400NB)

FLANGES

SABS 1123, BS4504, BS10,
ASME B16.34, ANSI B16.5

COUPLINGS

Tapered shoulders and other pipe couplings

PRESSURE

Up to 3750 psi (25MPa) pressure rating.

TEMPERATURE RATINGS

Up to 85°C with standard seals.

PH LEVELS & CHLORIDES

Parts of the valve are made from stainless steel and can withstand a low level of chlorides.

INSTALLATION POSITION

The valve can be installed in any position.

SEATING

Seat Leakage - B16.104 class III, IV, V or VI, depends on valve type and application.

HYDROCORE LIMITED

The smart solutions for your business

Hydrocore™ Double Acting Line-Fluid Actuated Valve

ADVANTAGES OF THE HYDROCORE™ VALVE OVER BALL VALVES

Crippled gearboxes, cavitation from high differential pressures and longer lead times are three serious flaws of ball valves that the Hydrocore™ valves are spared from.

GEARBOX MALFUNCTIONING

A common frailty of ball valves occurs in chilled water sections, where condensation enters the gearbox, and removes the grease within. This in turn causes the gearbox internal parts to corrode and prevents the ball valve from isolating. In contrast, the Hydrocore™ and NGD™ isolating valves have fewer working parts than ball valves, are hydrostatically balanced and do not require a gearbox. They, therefore have no such flaw, even when these valves have been inactive for a long period of time. This was evident when an audit of the cooling coils was conducted on the VCR below 120 Project. Every single NGD™ and Hydrocore™ isolating valve seated completely, even after many years of standing idle in the system. Some NGD™ isolating valves with broken spindles had to be isolated by means of a vice grip, and even under these conditions, the valves could be isolated.

BALL VALVE ILLUSTRATION

HIGH DIFFERENTIAL PRESSURES

When the ball valve is in a closed position and there is a high differential pressure between the upstream and downstream, and the valve is initially opened, the seat of the ball valve cavitates tremendously. Within a few operations the ball valve has to be decommissioned and the body and ball seat need to be repaired or replaced.

In contrast, both the NGD™ and Hydrocore™ isolating valves have a natural anti-cavitation area above the seat preventing this from happening. Furthermore, the moving parts of Hydrocore™ and NGD™ isolating valves are manufactured from stainless steel. Their body seat is also made from stainless steel thus increasing the valves durability and longevity.

Furthermore, in the audit, it was proven that the NGD valve did not cause excessive flow loss and after some simple maintenance on the cooling coils was completed, all the cooling coils operated at the correct flow.

HYDROCORE LIMITED

The smart solutions for your business

Hydrocore™ Double Acting Line-Fluid Actuated Valve

HOW MUCH DOES IT COST?

This question is probably the only question posed to any marketing personnel when a high pressure valve is being inquired. However, there are several more questions that should be asked when considering a high pressure valve in a mining setting:

- Valve Flow Co-efficient (Cv)
- Simplicity of Design
- Maintenance and Servicing
- Valve Longevity

Below is a comparison of these points between the Hydrocore™ Isolating Valve versus a Standard Isolating Globe Valve (**SIGV**)

VALVE FLOW CV

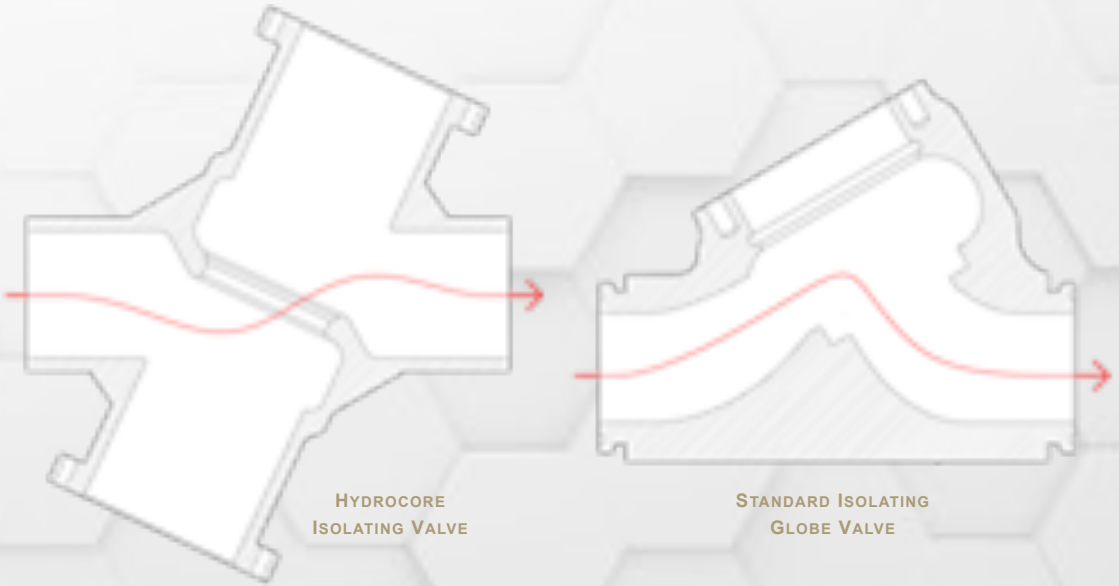
One of the primary costs after the initial capital outlay is running costs, especially in a pump station. A valve's Cv determines the pressure drop between the inlet and outlet ports of the valve. The lower the pressure drop the higher the Cv, which in turn results in lower power consumption of the pump.

We have modelled a SIGV to determine its Cv (see figures below).

The table below shows the power penalty cost of a Hydrocore Isolating Valve versus a SIGV.

As is evident, the cost savings using a Hydrocore Isolating Valve versus a SIGV are astronomical even within the first couple of years. Assuming that the price of electricity is not going to go down in the future, those cost savings will only increase.

PARAMETERS	UNIT	HYDROCORE	SIGV
Nominal Working Pressure	Bar	100	100
Flow Rate	Lit/Sec	106	106
Flow Coefficient	**Cv**	**1086**	**360**
Cost of penalty per hour	R/kWh	0.82	0.82
Cost of penalty per hour	$/kWh	0.06	0.06
Pump efficiency (%)	%	84%	84%
RESULTS	**UNIT**	**HYDROCORE**	**SIGV**
Differential Pressure Losses	Bar	0.166	1.515
Valve Power Losses	kW	1.942	17.673
Annual Penalty (operating 24 hours per day)	**Rand**	**13,950**	**126,947**
	USD	**996**	**9,068**



HYDROCORE ISOLATING VALVE

STANDARD ISOLATING GLOBE VALVE

HYDROCORE LIMITED

The smart solutions for your business

Hydrocore™ Double Acting Line-Fluid Actuated Valve

SIMPLICITY OF DESIGN

A complicated valve is a valve that invariably will have issues once the valve is commissioned. The simpler the design the better. This should also be taken into account when considering a Hydrocore Isolating Valve versus a standard globe valve.

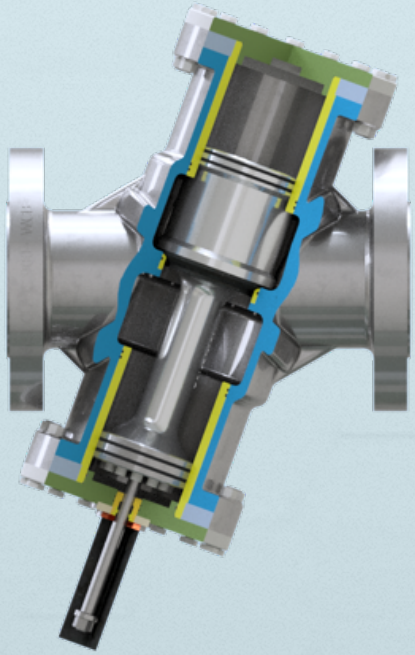
MAINTENANCE AND SERVICING

The more moving parts in any valve design the more prone the valve will be to constant maintenance and servicing. This is even more of a concern in a mining setting where conditions are not optimal for smooth valve functioning. The Hydrocore Isolating Valve is simple to maintain and service compared with a SIGV.

VALVE LONGEVITY

This point is built on the previous two points. If a valve keeps on breaking down and requires constant servicing and maintenance, then the valve is no more an asset. In fact, it is now an obstacle to the smooth running of a mine. Inevitably, the valve gets replaced by another brand. The Hydrocore Isolating Valve, if maintained on a regular basis, will be keep on functioning indefinitely.

ILLUSTRATION OF THE HYDROCORE VALVE WITH ONLY ONE MOVEABLE PART



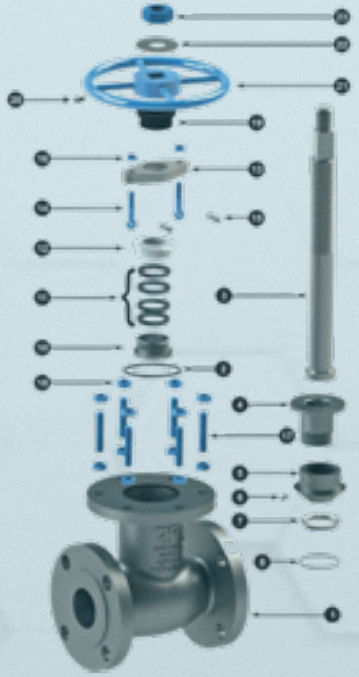
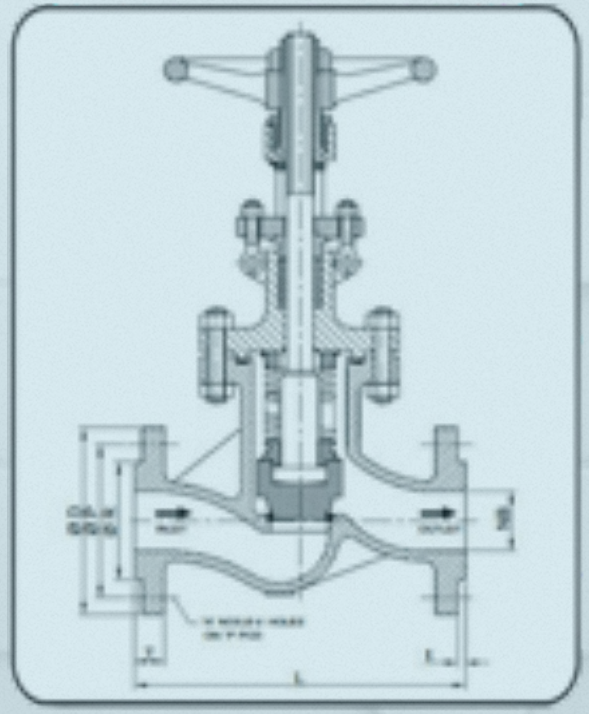
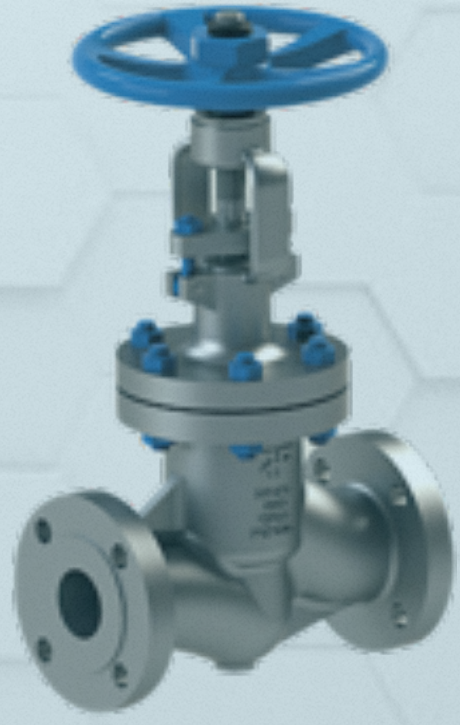


ILLUSTRATION OF A STANDARD GLOBE VALVES WITH THEIR MANY MOVEABLE PARTS





For more information please visit our website www.hydrocore.tech

HYDROCORE LIMITED

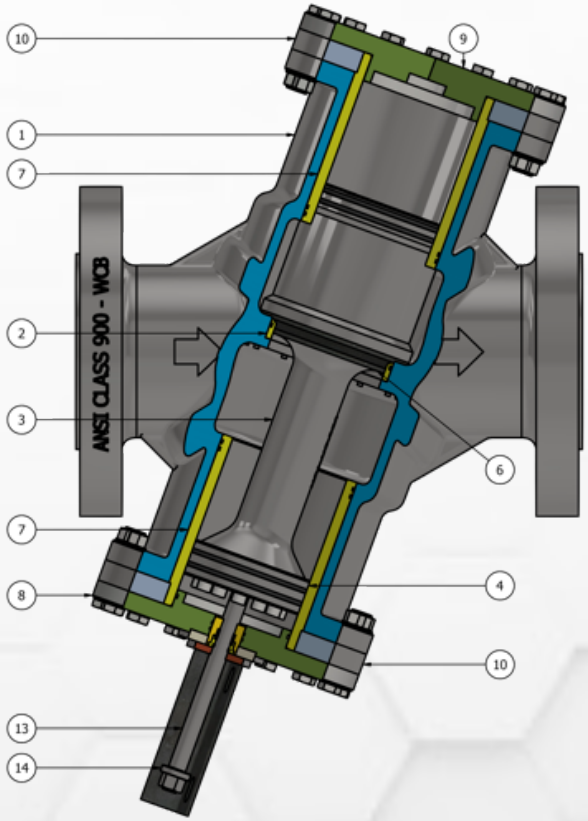
The smart solutions for your business

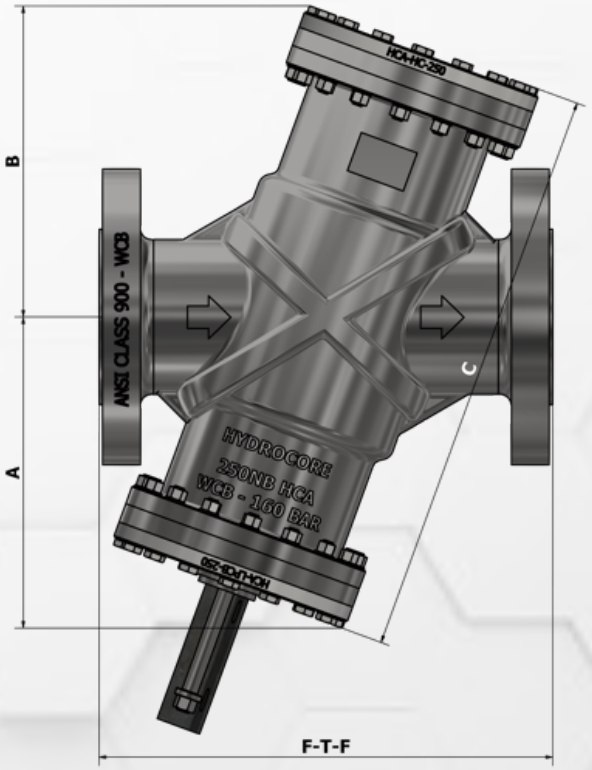
Hydrocore™ Double Acting Line-Fluid Actuated Valve

PARTS LIST

PART	DESCRIPTION	MATERIAL
1	Body	Mild Steel
2	Body Seat	Stainless Steel
3	Shuttle	Mild Steel
4	Shuttle Bottom	Stainless Steel
6	Shuttle Seat	Stellite
7	Body Sleeve	Stainless Steel
8	Bottom Cover	Mild Steel
9	Top Cover	Mild Steel
10	Sleeve Cover	Mild Steel
13	Limit Rod	Stainless Steel
14	Cam	Stainless Steel

** Seal Material - Nitrile, Viton, EPDM, Polyurethane*





DIMENSIONS & WEIGHTS									FLOW COEFFICIENTS		PRESSURE & FLOW RATES	
NB	A	B	C	#150 F-T-F	#300 F-T-F	#600 F-T-F	#900 F-T-F	#1500 F-T-F	CV	ΔP (PSI)	MAX PRESSURE	MAX FLOW
150	381 mm	381 mm	711 mm	559mm / 229kg	559mm / 245kg	559mm / 270kg	610mm / 297kg	705mm / TBD	525	12.5	160 bar	117 ℓ/sec
200	494 mm	480 mm	913 mm	660mm / 405kg	660mm / 429kg	660mm / 460kg	737mm / 509kg	832mm / TBD	1086	1.4	160 bar	152 ℓ/sec
250	573 mm	573 mm	1059 mm	787mm / 744kg	787mm / 778kg	787mm / 840kg	838mm / 891kg	991mm / TBD	1433	6.7	160 bar	233 ℓ/sec
300	652 mm	645 mm	1198 mm	838mm / 1052kg	838mm / 1098kg	838mm / 1164kg	965mm / 1277kg	1130mm / TBD	1936	7.9	160 bar	337 ℓ/sec

For more information please visit our website www.hydrocore.tech