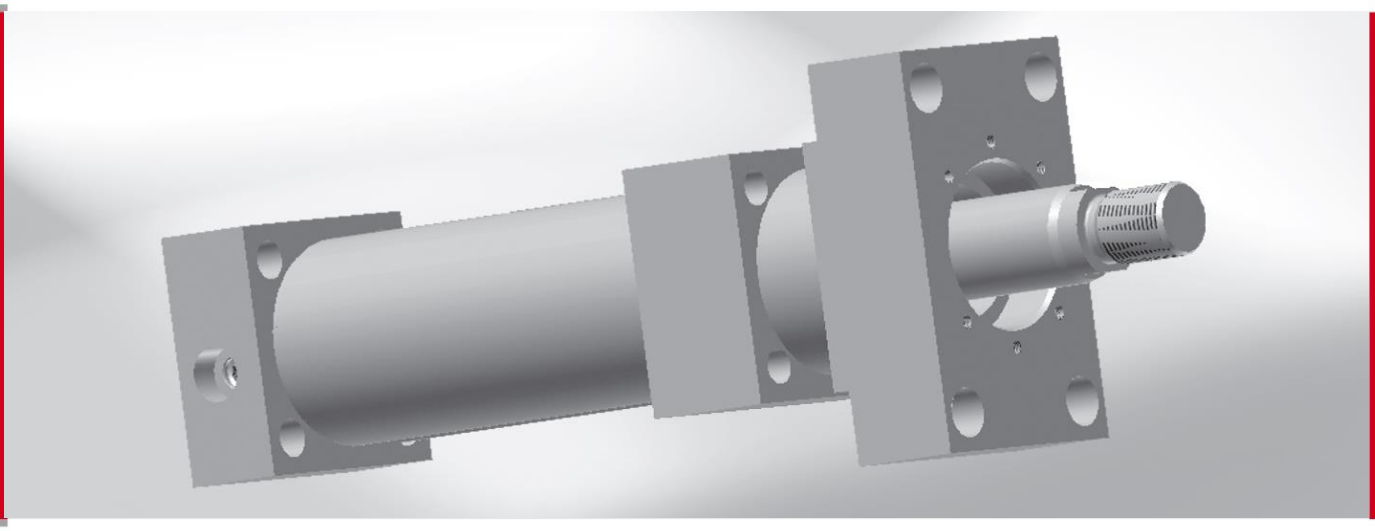
Power Stroke Hydraulic Cylinder



Function:

The basic function of this cylinder is designed for pulling. Inside of this cylinder are working two pistons. The rapid traverse piston is firmly attached to the main piston rod. This piston moves through the entire length of the stroke.

The actuator piston is connected to a hollow-bored piston rod which slides over the main piston rod and is supported by the rapid traverse piston within a defined range of stroke. Outside of this defined range of the stroke, the actuator piston does not move, because he has gone to a stop.

The following states are possible through a working stroke:

The rapid traverse piston supports the actuator piston when the cylinder is completely extended and controlled. The main piston rod retracts and the forces which act on both piston areas add up. When the cylinder has reached the defined power stroke, the actuator piston reaches its stop and only the rapid traverse piston keeps moving. The only remaining force affecting the main piston rod is the force of the rapid traverse cylinder. The oil volume which is necessary for motion is reduced to the cylinder space of the rapid traverse piston and speed increases.

Both pistons are moved back to their end position when extending the cylinder. In this case, the acting forces are the forces of the rapid traverse piston, because the actuator piston moves freely.

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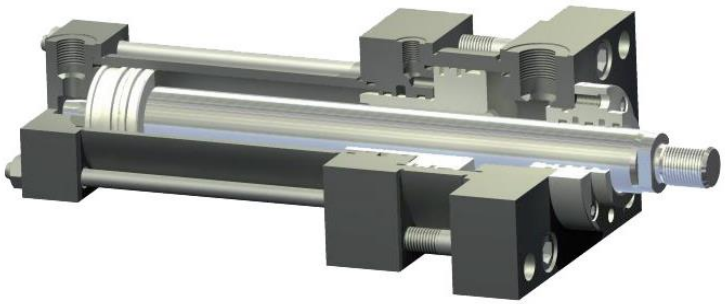

Fields of Duties and Requirements:

In some applications the operator of a hydraulic cylinder first needs a very high force at the beginning of a stroke, e.g. to enable the break out.

Afterwards, it is desirable that the cylinder moves with maximum speed. Such a performance is normally reached using a complex controller with high- and low-pressure pumps.

This is not necessary for a power stroke hydraulic cylinder. It can be integrated into an existing pressure supply like a standard hydraulic cylinder and shows this performance due to its construction design.

Applications:

- **Core-pulling cylinders for die casting:** High forces are necessary to detach the core out of the cast. No large forces are needed after the core has been detached. However, it is desirable that the cylinder retracts as quickly as possible since this may shorten the casting cycle.
- **Actuating cylinders of gate valve actuators:** The gate valve can be stuck in closed position. Large forces are needed to detach it. After detaching the gate valve, it should move as fast as possible.

Technical Information:

Examples - production also to customer specification

Cylinder size for total stroke
Additional cylinder for power stroke > 50 mm

Piston ø 125 mm
Piston ø 160 mm

Piston Rod ø 70 mm
Piston Rod ø 90 mm

Forces in kN	Forces for Entire Stroke (Rapid Traverse) (125/70)		Additional Force at Power Stroke (160/90)		Total Force at Power Stroke	
Pressure in Bar	Pressure Force	Tensile Force	Pressure Force	Tensile Force	Pressure Force	Tensile Force
140	172	118	0	192	172	310
210	258	177	0	288	258	465
280	344	236	0	385	344	621

Area Ratio of Total Annulus Area to Annulus Area			
Annulus Area	Piston ø 125 mm	Piston Rods ø 70 mm	84.23 mm^2
Annulus Area	Piston ø 160 mm	Piston Rods ø 90 mm	137.44 mm^2
Total Annulus Area			221.68 mm^2
Ratio Total Annulus Area / Annulus Area 125/70			2.63

➔ **Speed at rapid traverse stroke is 2.63 times greater than speed at pulling power stroke!**

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