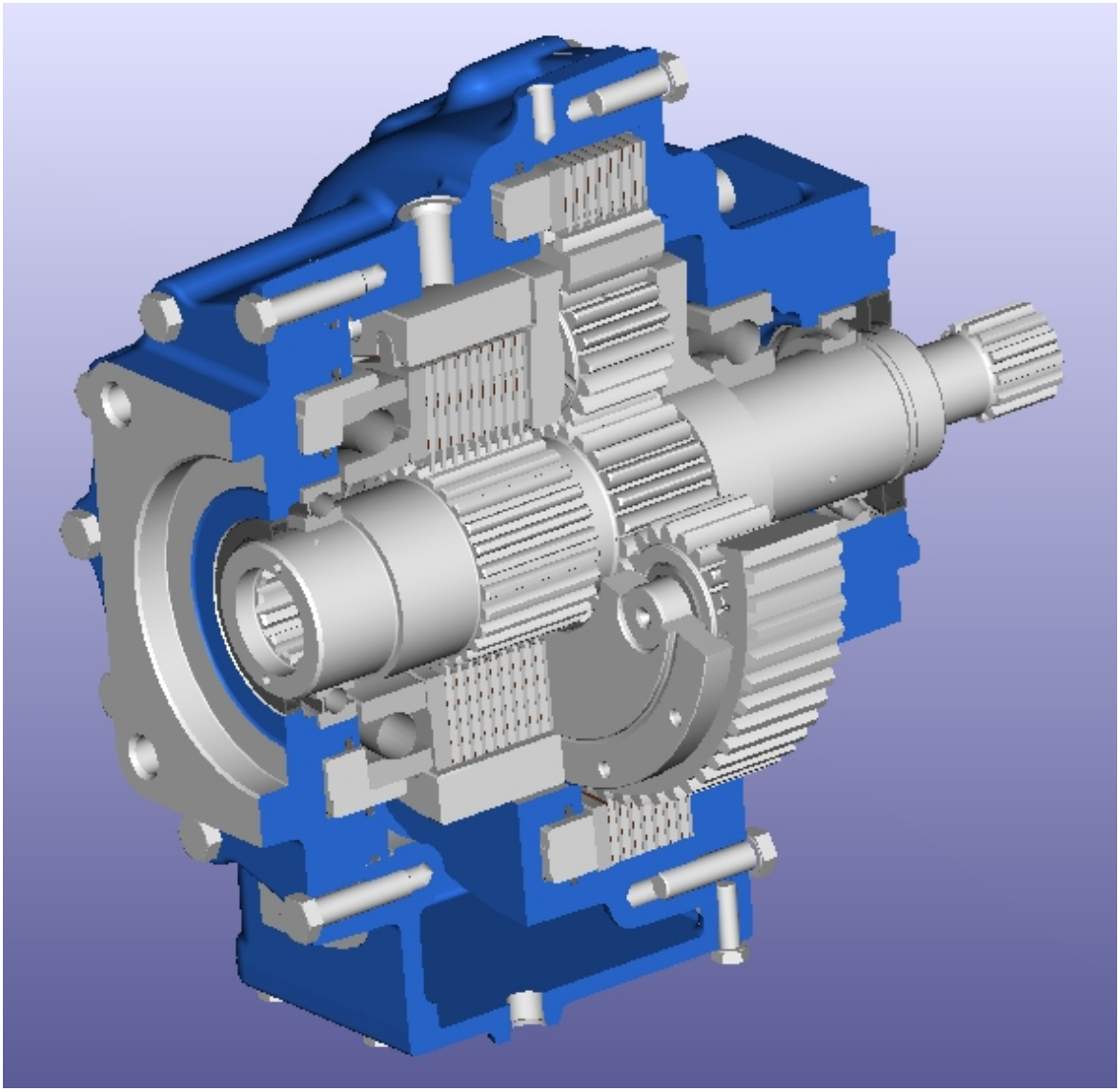
Darwin's 2-Speed Powershift Transmission



A 2-speed powershift transmission designed for, but not limited to a hydraulic motor input. The inline input and output will be adaptable to many applications such as in the final drive of low silhouette under ground mining vehicles. Other potential applications include input into the drop box of the final drive of 4-WD vehicles and numerous other systems.

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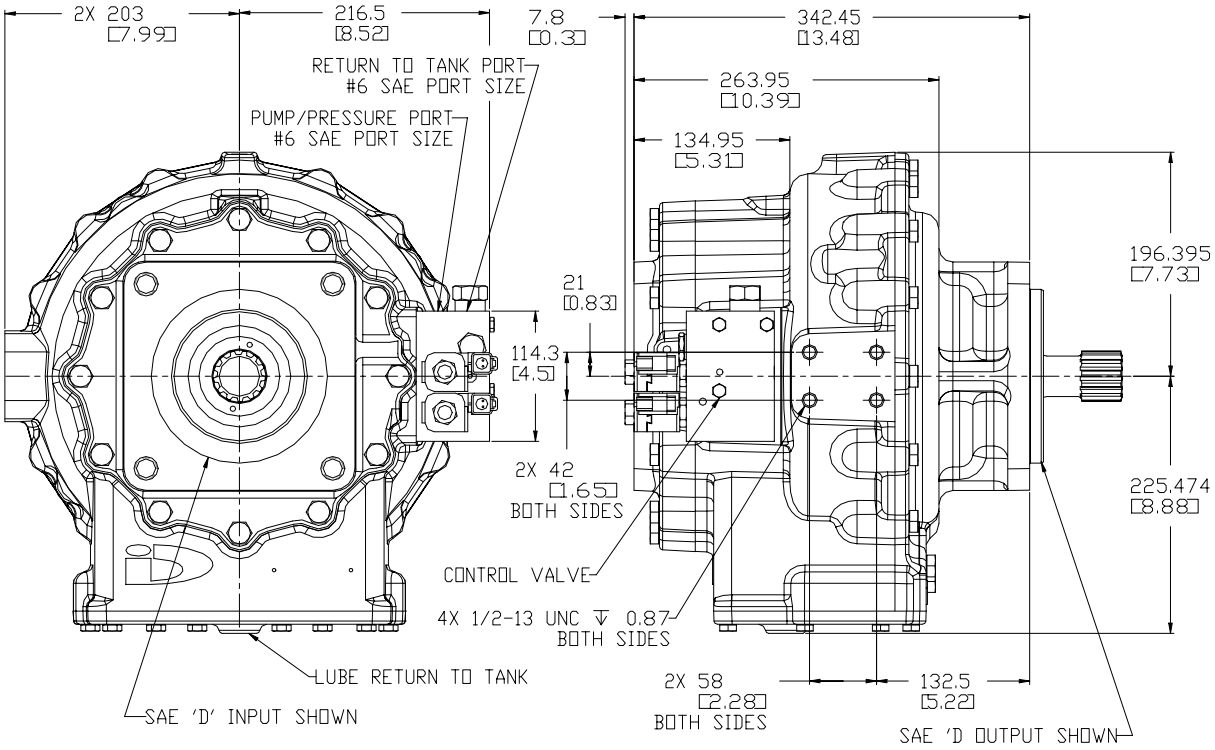
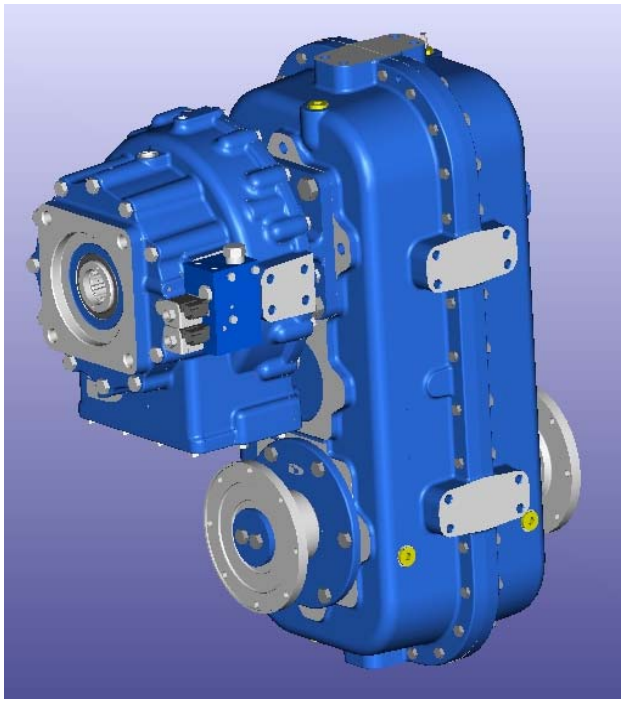
Installation Information



Application Information



Two Speed Drive for 4WD Vehicle

The accompanying illustration shows a hydrostaticly driven D2SP driving into a Darwin D45 drop gearbox with two flanged outputs intended for a 4-WD vehicle application. The D2SP could also provide input directly into an axle. Using one of the numerous methods for coupling the output of the D2SP to the traction drive of a vehicle will allow two-range operation, such as a work range and a travel range. Two ranges are required in such applications as harvesting, urban pickup and delivery, material handling, and traction or pulling operations.

Additional potential applications include drilling head drives where the low range is used for drilling and high range is used for removing debris from the drilling tool. Another application is a winch drive for wire line work where low range is used for control work and high range is used for fast lowering and raising of the tool.

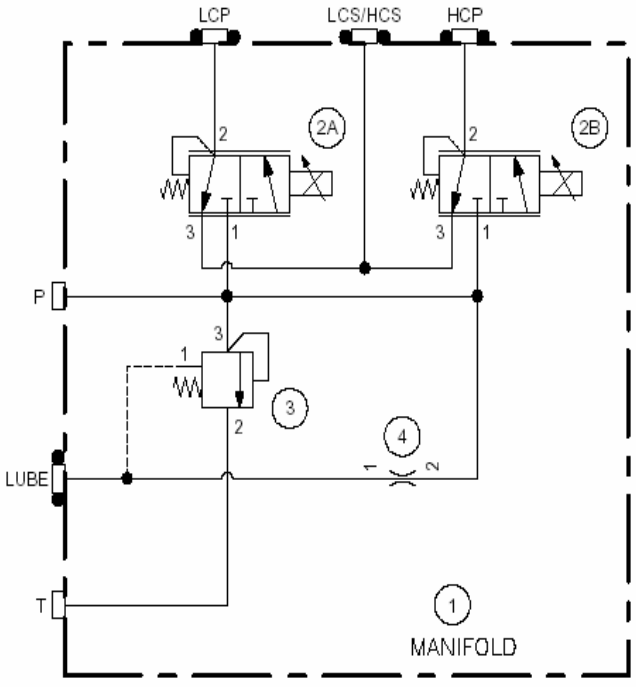
D2SP Specifications

The input section consists of two clutches and an epicycle (planetary) gear set. By selectively engaging the clutches the operator can choose a torque ratio of 1.0(high) or 3.65(low).

Specifications:

Input: SAE C 4 bolt with 5.0 in. (127.0mm) Pilot
Output: SAE C 4 bolt with 5.0 in. (127.0mm) Pilot
Gear ratios: High 1:1 Low 3.65:1(speed reduction)
Clutch activation: 12 volts (functional to 10 volts minimum)
Customer supplied pressure: 140-160 PSI (can be limited to 2 GPM)
Lube flow: Lube supply orifice allows 0.5 gpm (1.9 lpm) flow from 150 psi clutch supply circuit
Oil: Automatic transmission or hydraulic fluid (J20C preferred)
Maximum working input torque: 1100-lb ft (1500 NM)
Maximum peak input torque: 1100-lb ft (1500 NM)
Minimum clutch pressure: 140 psi (3.45 bar)
Shift sequence: Brake to be applied before clutch is released
Lube oil scavenge: Customer supplied air flow controlled and pressure limited to 10 psi.
Drain back: Requires ½ dia low pressure, free flow configuration tubing with minimum of bends, flow 0.5 gpm
Hydraulic Circuit: Details are enclosed. Please contact the Engineering personnel at Darwin if there are any questions on the hydraulic circuit details.
Park Brake: A spring applied, pressure released brake is available. Please consult Darwin for more details.
Weight: 385 lb

Hydraulic Circuit



Circuit Notes:

P-Customer supplied pressure port
Lube-Internal lubrication to unit (internal)
T-Return oil to reservoir
LCP-Low clutch pressure port (internal)
LSC/HCP-Clutch apply exhaust (internal)
HCP-High clutch pressure
1-Integral manifold
2A&2B-Electronically controlled valves
3-Clutch pressure regulator valve
4-Lube flow control orifice

The machine builder must supply a supply of oil to the P port. This could be from the control circuit of a hydrostatic system. An alternate could be an auxiliary hydraulic source such as dedicated pump where the regulator 3 would control the pressure. Please consult Darwin engineers for supplemental information.

Application notes

The D2SP has an internal pressure lubrication system and pressure applied clutches. As such the machine builder must supply an external hydraulic source. The builder must also provide a means of removing this resulting flow of oil from the unit. Suggested sources of this oil flow are the charge circuit of a hydrostatic system, an existing auxiliary oil system, or a dedicated pump. An internal valve in the D2SP accomplishes regulation of the pressure. A dedicated scavenger pump, air pressure, or even the air from a diesel turbo system can accomplish removal of the oil.

The application of the clutches is accomplished by the application of 12 volts to the lead of the respective solenoid valves in the D2SP. In the simplest form, on-off switches can accomplish this. However, the valves supplied with unit can be driven by pulse width modulated control technology, which is capable of providing smooth clutch application. This provides the builder with the capability of providing the operator with controlled clutch apply or release via a clutch pedal or hand lever. Smooth shifting can also be accomplished for near seamless dynamic shifting from one range to the other. An example of this would be utilized during the acceleration of a heavy vehicle where initial acceleration is in low range and when the conditions are correct a smooth shift can be made to high range. Automatic control of all transmission function is possible with microprocessor technology.

Summary

The D2SP has been designed to provide the vehicle or machine designer with a versatile 2-speed gearbox, which can be incorporated in a variety of ways in the product. Please contact us if you have a power transfer problem. Darwin personnel are ready to help you find a solution.

Darwin is committed to customer satisfaction. Our goal is to provide you with the very best components to satisfy your customer's needs. Every inquiry is individually handled from start to delivery in a personal and friendly manner.

Our personnel are available to aid in matching our gearbox to your specific application. The power and torque levels are nominal in that the actual application parameters can be different from those listed depending upon the duty cycle that will be experienced in the application. For example, higher input torques can be accommodated if the high torque is for a short duration. Another example is that auxiliary lubrication flow can often increase the allowable horsepower in some applications.

For more information or application assistance contact:

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