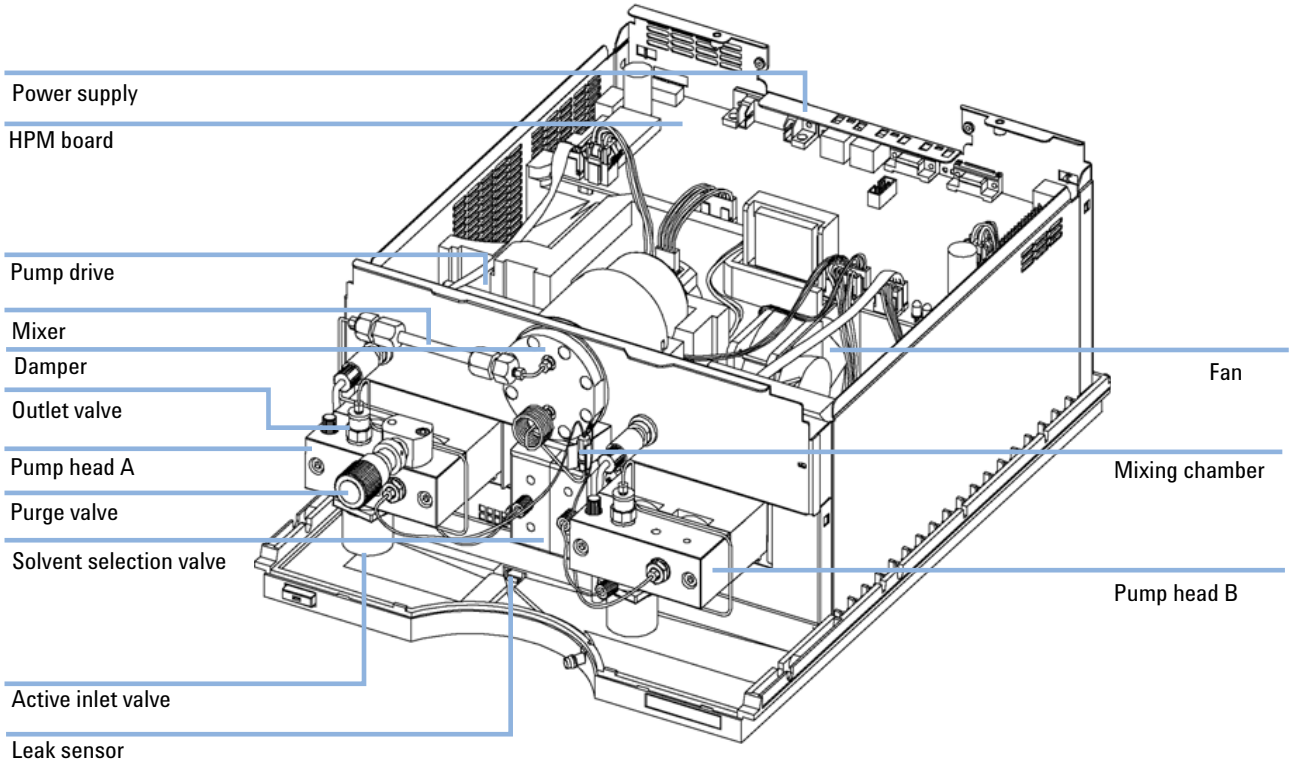
Agilent G1312B Binary Pump

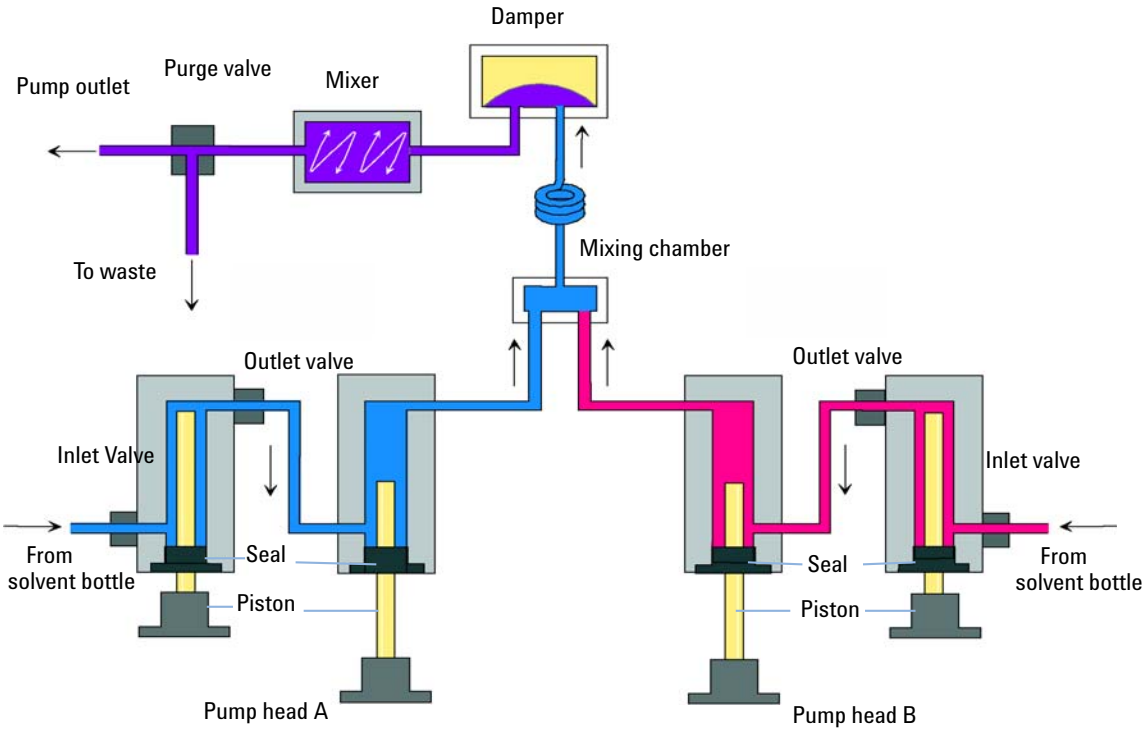
The binary pump comprises two identical pumps integrated into one housing. It provides gradient generation byhigh-pressure mixing. Degassing is not included but a vacuum degasser is available as a separate product for applications that require best flow stability especially at low flow rates or maximum detector sensitivity. This is most likely required to run small internal diameter columns (2 mm and 1 mm i.d.) which require low flow rates. A solvent selection valve (optional) will allow to select a binary mixture (isocratic and gradient) from four independent solvent bottles. An active seal wash (optional) is available when the pump is used with concentrated buffer solutions.



The binary pump is based on a two-channel, dual-piston in-series design which comprises all essential functions that a solvent delivery system has to fulfill. Metering of solvent and delivery to the high-pressure side are performed by two pump assemblies which can generate pressure up to 400 bar.

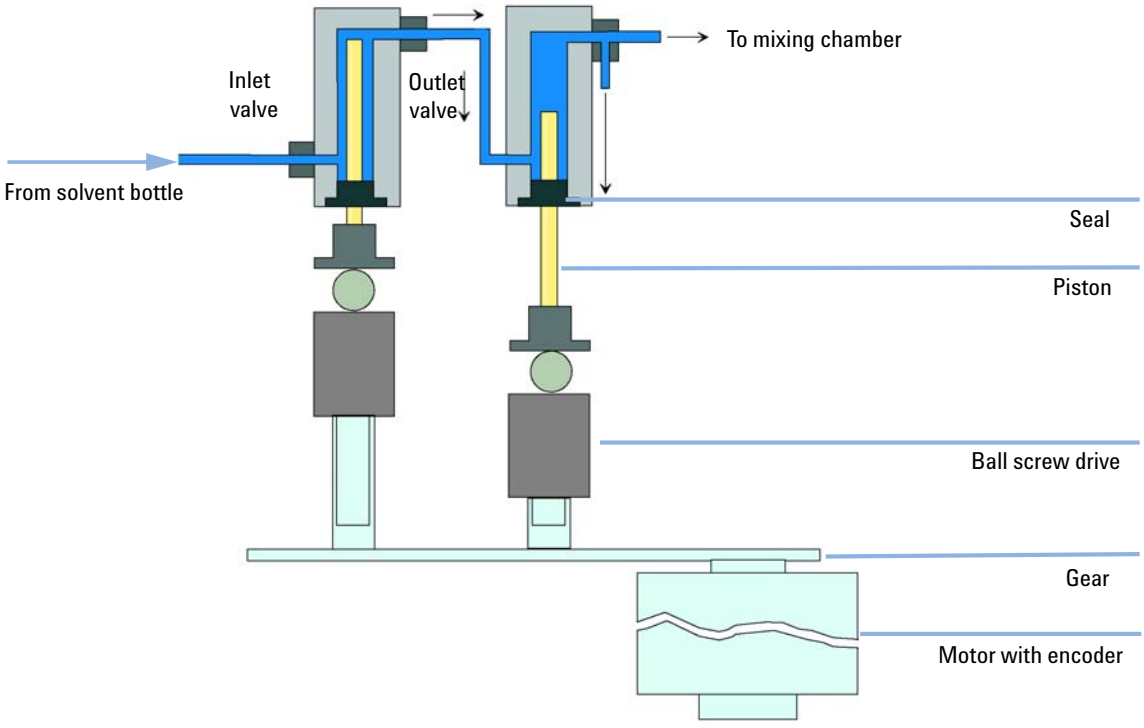
Each channel comprises a pump assembly including pump drive, pump head, active inlet valve which has a replaceable cartridge, and outlet valve. Both channels are connected in a low-volume mixing chamber which is connected by a capillary coil to a damping unit and a mixer. A purge valve including a PTFE frit is fitted at the pump outlet for convenient priming of the pumping system.

Hydraulic Path G1312B Binary pump



How Does the G1312B Binary Pump Work?

The liquid runs from the solvent reservoir through an active inlet valve. Each side of the binary pump comprises two substantially identical pump units. Both pump units comprise a ball-screw drive and a pump head with two sapphire pistons for reciprocating movement.



A servo-controlled variable reluctance motor drives the two ball-screw drives in opposite directions. The gears for the ball-screw drives have different circumferences (ratio 2:1) allowing the first piston to move at double the speed of the second piston. The solvent enters the pump heads close to the bottom limit and leaves it at its top. The outer diameter of the piston is smaller than the inner diameter of the pump-head chamber allowing the solvent to fill the gap in between.

The first piston has a stroke volume in the range of 20 µl to 100 µl depending on the flow rate. The microprocessor controls all flow rates in a range of 1 µl/min to 5 ml/min. The inlet of the first pumping unit is connected to the active inlet valve which is processor-controlled opened or closed allowing solvent to be drawn into the first pump unit.

The outlet of the pump unit is connected directly to the second pump unit. The outlet of the second pump unit is connected via a small mixing chamber, a coil and the damping unit to the purge valve assembly. The outlet of the purge valve assembly is then connected to the following chromatographic system.

When turned on, the pump runs through an initialization procedure to determine the upper dead-center of the first piston of both pump channels. The first piston moves slowly upwards to the mechanical stop of the pump head and from there it moves back a predetermined path length. The controller stores this piston position in memory. After this initialization the pump starts operation with the set parameters for the two pump channels.

The active inlet valve is opened and the down moving piston draws solvent into the first pump head. At the same time the second piston is moving upwards delivering into the system. After a controller-defined stroke length (depending on the flow rate) the drive motors are stopped and the active inlet valve is closed. The motor direction is reversed and moves the first piston up until it reaches the stored upper limit and at the same time moving the second piston downwards.

Then the sequence starts again moving the pistons up and down between the two limits. During the upward movement of the first piston the solvent in the pump head is pressed through the outlet ball valve into the second pumping unit. The second piston draws in half of the volume displaced by the first piston and the remaining half volume is directly delivered into the system. During the drawing stroke of the first piston, the second piston delivers the drawn volume into the system.