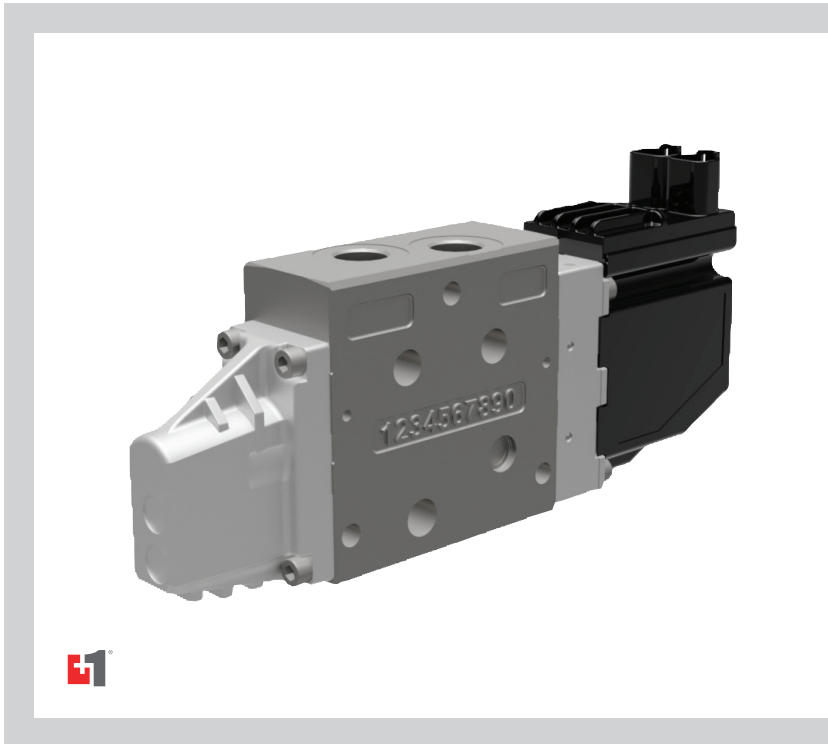


Data Sheet

PVB 32 work section controlled by a PVEH-DI Series 4 active fault monitoring



PVB 32 work sections cover a wide range of load sense spool valves for use in mobile machinery.

The compact platform features different version enabling it to be tailored to the exact machine need – from Directional Control Valve to Load-independent spool valve.

Features and versions:

- Part of the PVG 32 valve family
- Section consists of:
 - PVB basic module
 - PVBS 4-way, 3 position main spool including neutral adjustment spring
 - PVEH-DI proportional electrical actuator with active fault monitoring and Direction Indication
- Continues port pressure: 350 bar
- Rated oil flow: 130 l/min
- Oil temperature: 30 - 60 °C
- Viscosity: 12 - 75 mm²/min
- Filtration: 23/19/16 @ ISO4406
- Ambient temperature: -30 - 60 °C
- Rated voltage: 11 to 32V_{DC}
- Control method: Ratiometric

PVB 32 work section

The PVB 32 work section controlled by a PVEH-DI Series 4 consists of three elements having influence on the applied functional safety of the section.

The work section, PVB, is a cast iron housing which is claimed to have FAULT EXCLUSION.

The spool is the part controlling the oil flow out of the work ports and includes a neutral adjustment spring maintaining the spool position in neutral when not stroked. By relying on the spring, the spool is using the de-energization principle to perform transition to safe state. The manufacturing and design of the spring is in fully compliant with ISO 13849-2:2006 giving a MTTFd of 150 years.

The PVEH-DI Series 4 is an electrohydraulic actuator which consists of an electronic part and a solenoid H-bridge. The PVEH-DI Series 4 transforms an electrical signal to a hydraulic action by applying pressure acting on the end of the spool. The spool is moved according to the ratiometric setpoint which is being verified by the closed loop control. In the event of a dangerous failure being detected by the PVEH-DI Series 4 with active fault monitoring a fault reaction pattern will be initiated. This mean that the internal electronic will de-energize the solenoid valve bridge and an output pin will change state from low (gnd) to high (supply voltage). Once the failure is disappeared the power to the PVEH-DI series 4 must be turned OFF and back ON again as a recovery method in order to function again.

The PVEH-DI uses a build in Linear Variable Differential Transducer (LVDT) to detect the spool position. By the internal logic the spool position is translated to a high/low signal, with high being equal to supply voltage, and send to two individual pins. The combination of the pins will indicate the port out of which the oil is flowing.

Safe state

The SAFE STATE of a PVB 32 work section controlled by a PVEH-DI Series 4 is when the work ports are de-energized. The SAFE STATE is realized by forcing the main spool in neutral position (± 0.5 mm). The transition to SAFE STATE is handled by the neutral adjustment spring which is part of the spool. To enter SAFE STATE the solenoid valve bridge must also be de-energized which is done by sending neutral setpoint (50% of supply voltage) to the PVEH or by removing electrical power supply to the PVEH-DI Series 4.

The internal fault monitoring logic will in the event of a fault disable the solenoid valve bridge.

Dangerous failure

Any spool position giving more than set-point +12% oil flow compared to the calibrated neutral out of a work port is considered to be dangerous. Spool position, and thereby oil flow, less than setpoint is not considered to be dangerous. A spool movement in the opposite direction is considered dangerous. Failures in the build-in closed loop control are also considered to be dangerous as it jeopardizes the sanity of the PVEH Series 4 which therefor cannot be trusted. Failures in the build-in direction indicator logic are also considered to be dangerous as it jeopardizes the indication to a controller and the PVEO-DI Series 4 cannot be trusted.

Reliability data

Configuration	Safety function	Can be combined with	MTTFd @ ISO 13849:2006	Diagnostic Capability	PFHd @ IEC 61508
PVB 32 work section with PVEH-DI Series 4	De-energize work ports using power OFF principle*	- PVP with PVPX - PVSKM with PVEO - PVSKM with PVEO-DI	150 years	30%**	7,61E ⁻⁷
	De-energize work ports using commanded neutral setpoint*		50 years	90%	2,28E ⁻⁶
	Indicate the work port supplying oil to the function		150 years	None	7,61E ⁻⁷

* When using a spool with a throttled open neutral position the full de-energization will occur after inertia of application is disappeared.

** Only applicable when the power supply to the Direction Indication circuit is maintained

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