

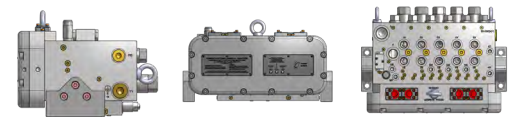
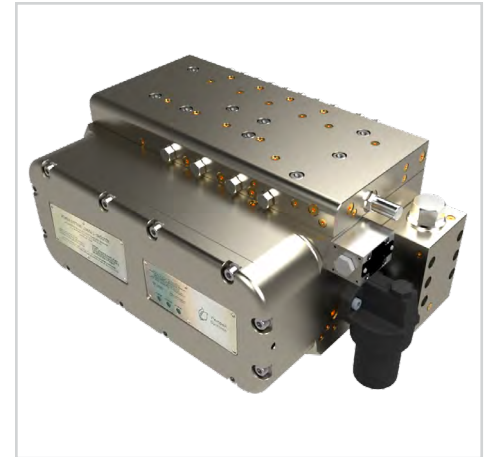
LOW00201 HBox 5-150 Flameproof Hydraulic Manifold Hi Flow 5-Spoils Open Centre (Russian)

The HBox 5 is a flameproof-certified (Ex d Group I) hydraulic control manifold with in-built electronic control and monitoring. The manifold provides five (5) proportional spool valves; each capable of delivering up to 150 litres/minute flow to hydraulic cylinders, actuators or motors. Three (3) pilot function outputs are also provided to support pilot pressure signal control of machine functions.

The internal electronics module continuously monitors the position of each spool to prevent unplanned machine movement if a stuck spool condition occurs. In the case of a stuck spool (either stuck open or stuck closed), the on-board electronics automatically closes the internal isolation valve to prevent unwanted oil flow to the machine actuator.

A CAN field-bus connection allows a host control system to send proportional control commands to each spool function and on/off commands to the pilot functions. The CAN interface provides real-time feedback to the host regarding spool position, oil temperature and hydraulic pressure.

The simplicity of control and monitoring – and the reduction in hydraulic connections and components – makes the HBox 5 a compelling, cost-effective alternative to traditional sandwich-type valves on mobile mining machinery.



HBox Key Features & Benefits

- Operating successfully for over a decade in Australian and South African mining industry with more than 120 units in operation as of Dec 2019
- Proven Record on 12CM & MB600 Series Continuous Miner & Bolter Miner
- Requires ONLY ONE Control Cable
- Pempek warrants and supports the complete package through its global partnerships
- Individual flow control and over pressure limit function for each spool
- Solenoids Don't Leak or Fill with Water (Rated to 315 Bar Continuous)
- Safety Isolation Valve - Built in and Automatically Controlled by Firmware to Maintain Safety
- Spool Safety - Built Into Product Firmware
- Pressure monitoring for internal and external functions (No I/O required)
- Temperature Monitoring - Internal Oil Temperature Sensor (No I/O required)

Typical Applications

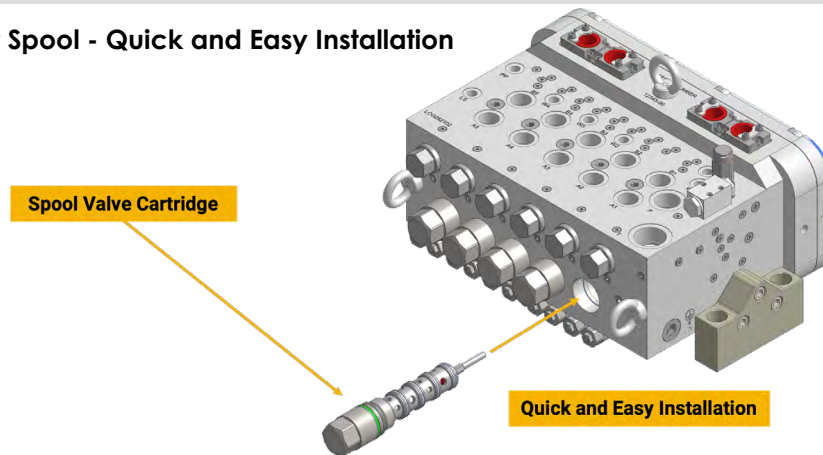
- Mobile Mining Machinery
- Continuous Miners
- Bolter Miners
- Mobile Bolters
- Mobile Roof Supports
- Shuttle Cars

Standards Compliance

- IEC 60079 (Ex d)
- AS/NZS 2671
- MDG41
- IEC 61508 SIL 2

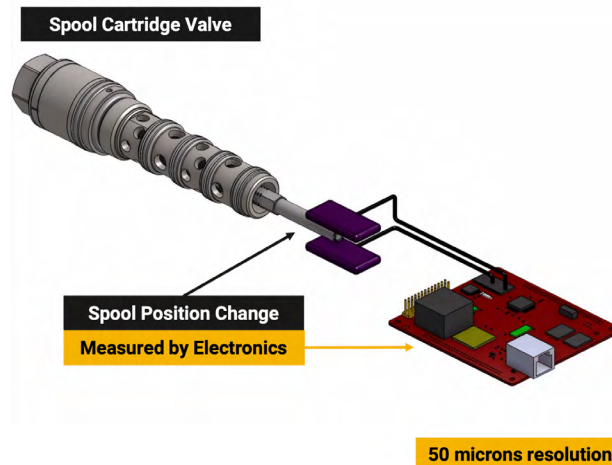
L0W00201 HBox 5-150 Flameproof Hydraulic Manifold Hi Flow 5-Spools Open Centre (Russian)

HBox 5 | Replacement Spool - Quick and Easy Installation

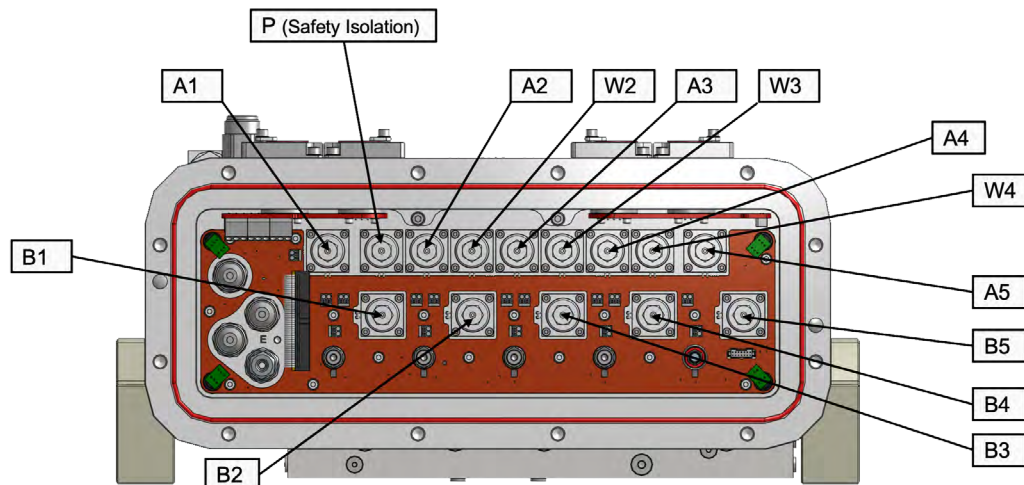


HBox 5 | Spool Position Sensing

- Dual Sensors (Redundancy)
- Measures down to 50 microns
- Real-time

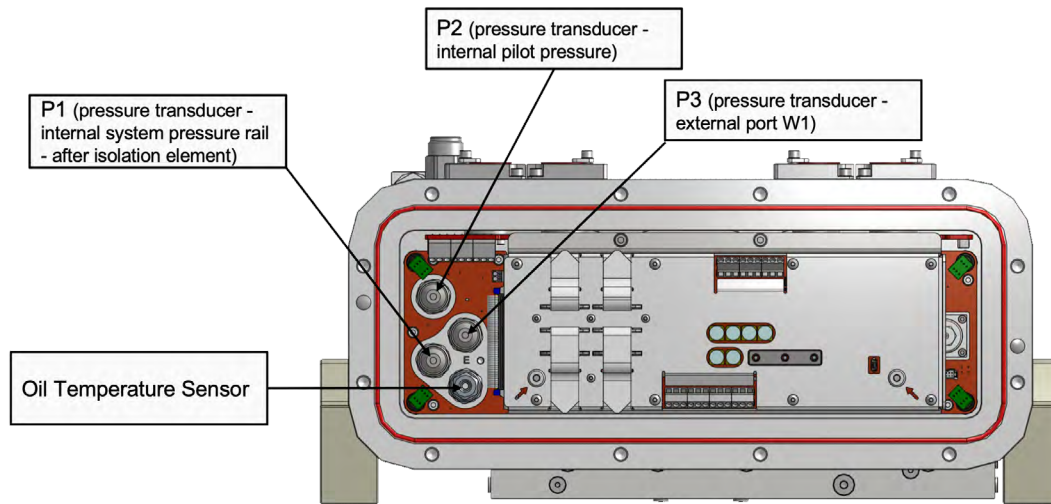


HBox 5 | Solenoid Layout

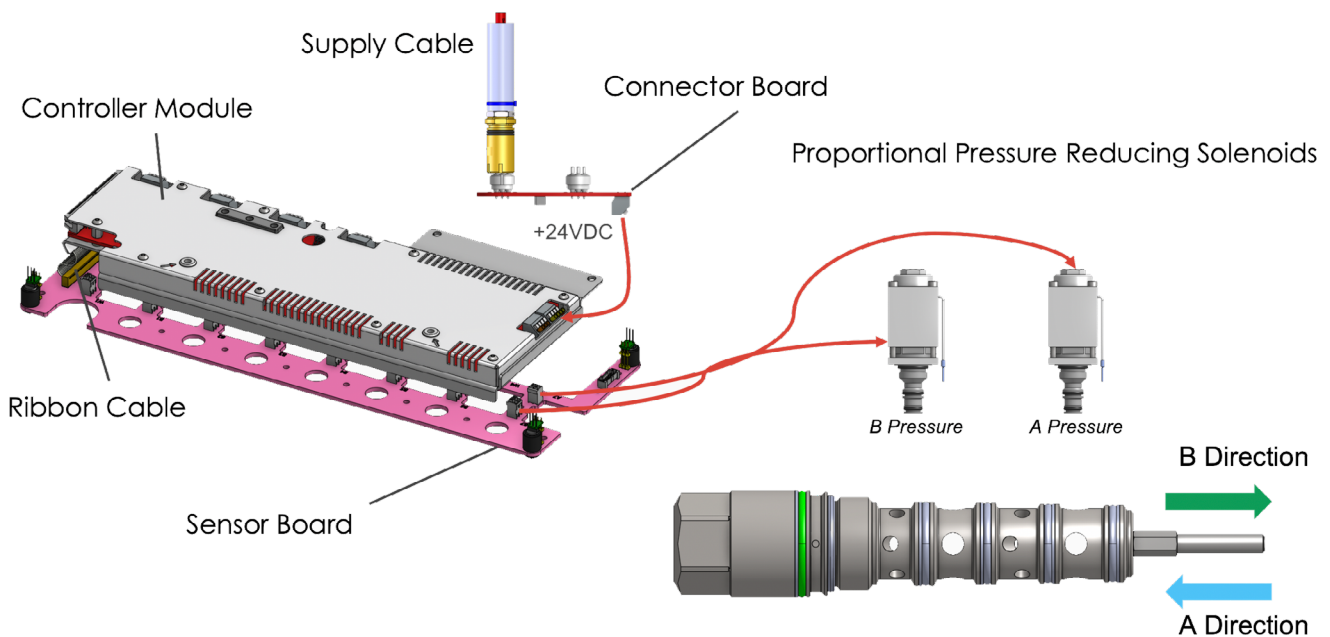


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HBox 5 | Transducer Layout

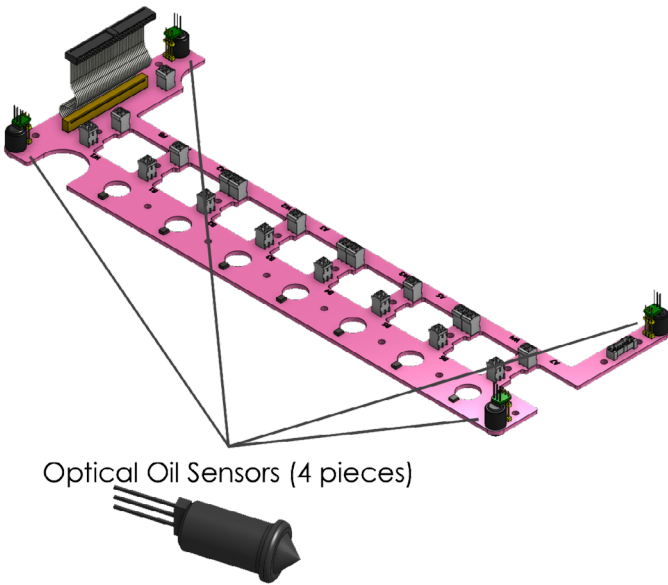


HBox 5 | Proportional Spool Control



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HBox 5 | Oil Sensors



Optical Oil Sensors (4 pieces)

Working Principle of Oil Sensors

No Fluid Present



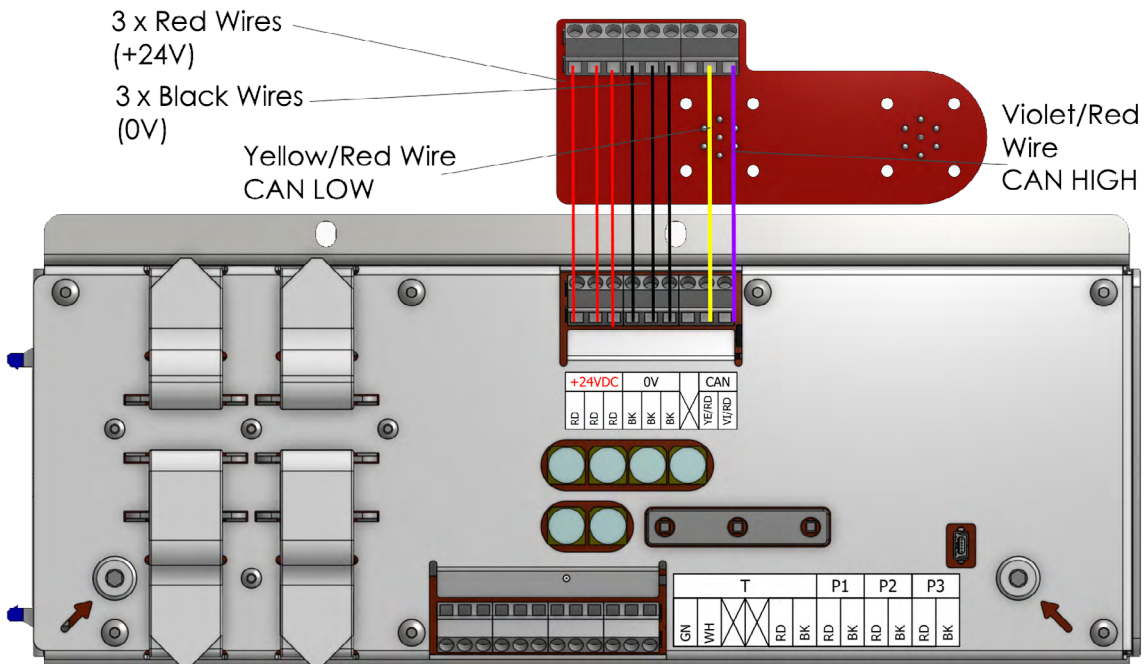
Emitted Light not obstructed and does not refract back into sensor prism

Fluid Present



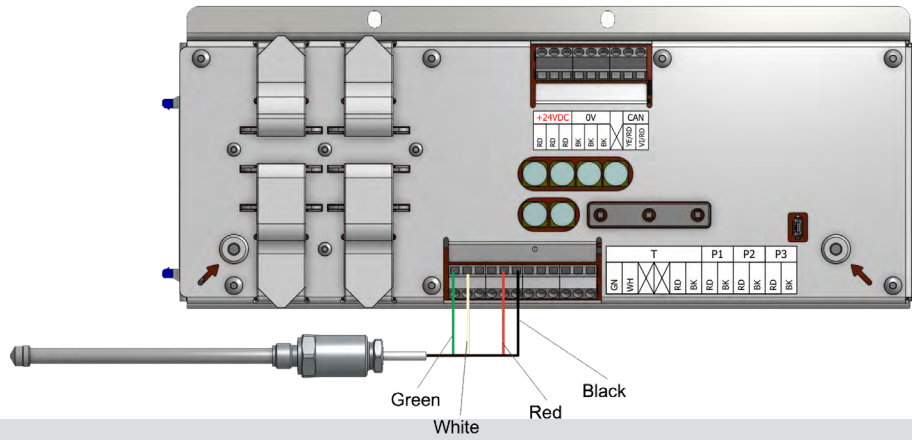
Emitted Light is refracted by the optically dense fluid back into the sensor prism where it is detected

HBox 5 | Internal Wiring - Power & CAN

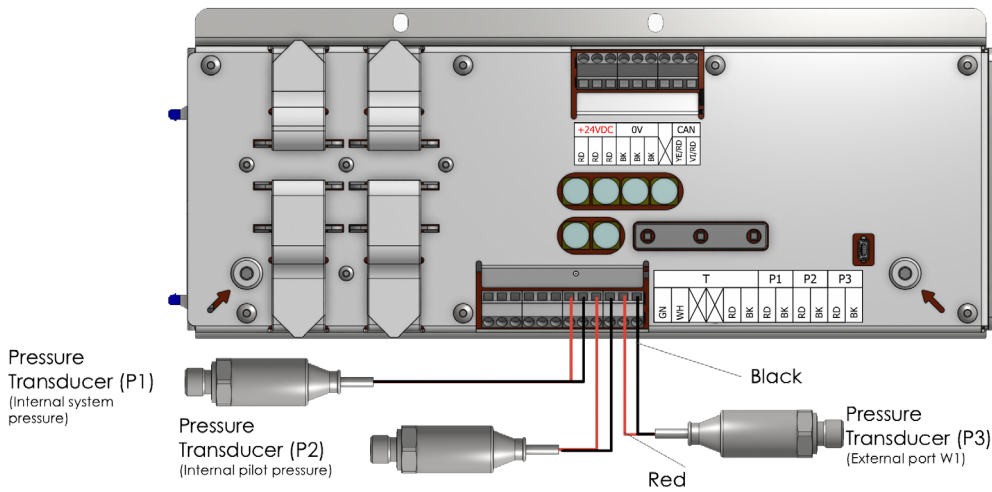


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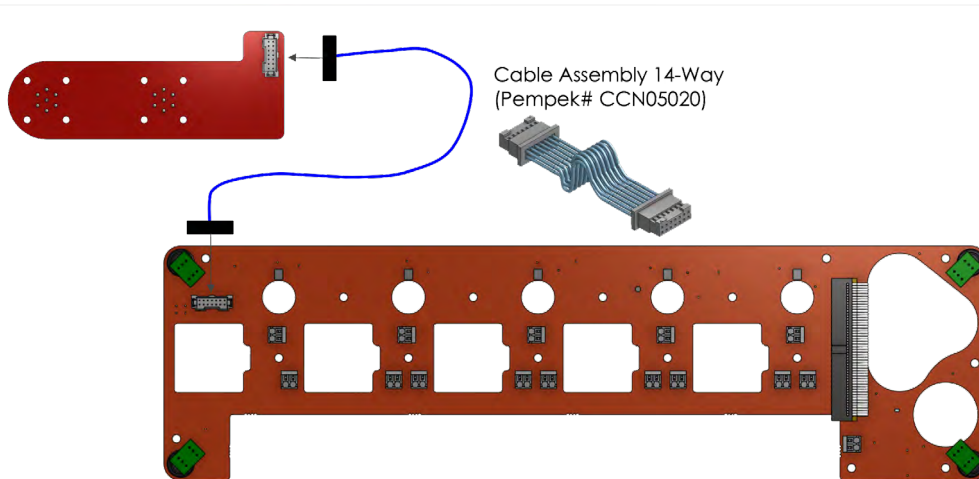
HBox 5 | Internal Wiring - Temperature Sensor



HBox 5 | Internal Wiring - Pressure Transducers



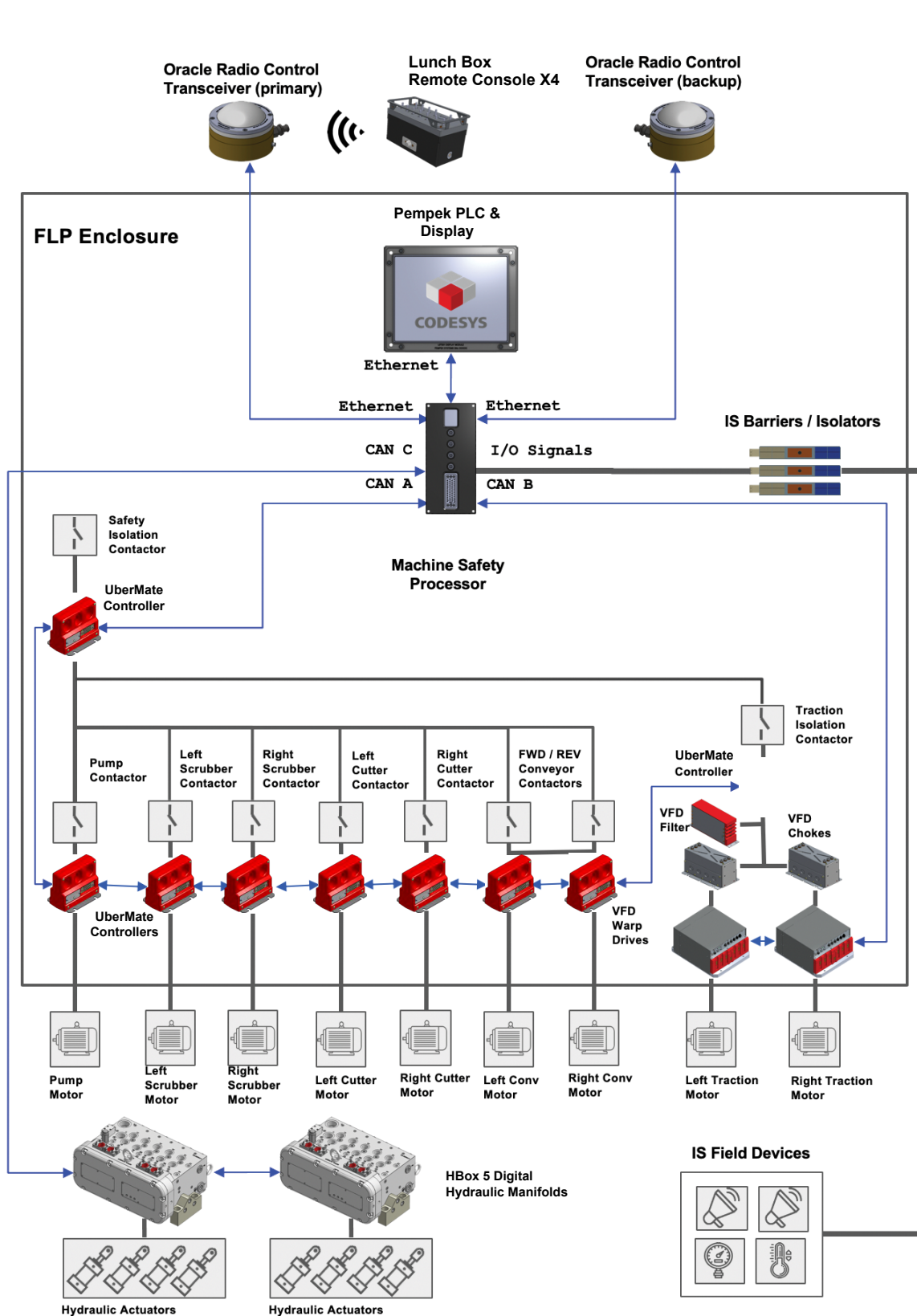
HBox 5 | Internal Wiring - CAN ID and Diagnostic Cable



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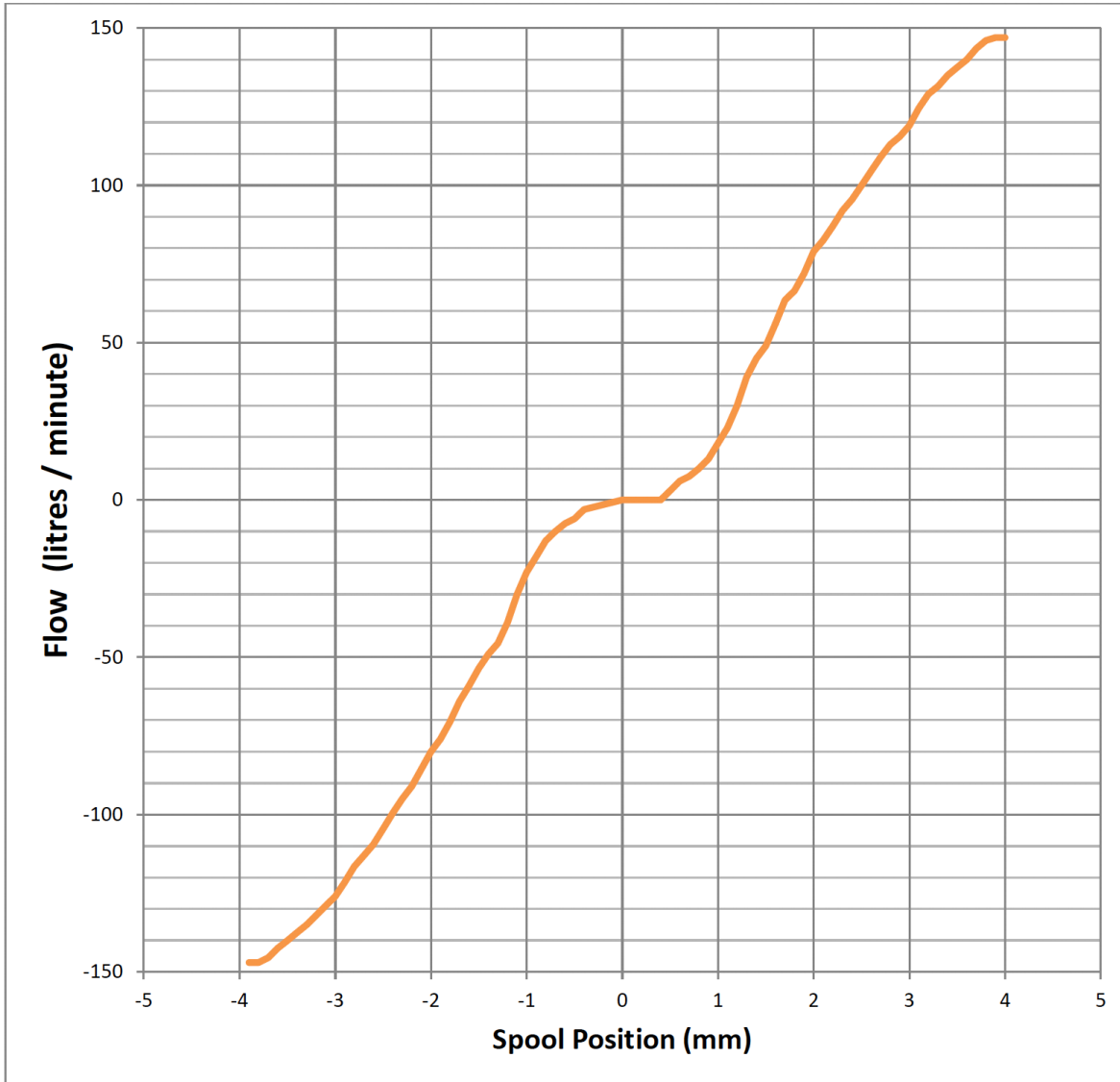
Systems Architecture Example
Continuous Miner System (12CM Class / AC Traction)

Remote Console sharing and data upload station.



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Hbox 5 | Typical Flow Response



Test Conditions	Demand Mode
Test Load Pressure	150 BAR
Spool Pressure Drop	14 BAR (regulated by internal compensator)
Oil Temperature	60 °C

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Hbox 5 | Product Specifications

General

Parameter	Value
Type	Flameproof-protected hydraulic manifold with integrated electronic control
Explosion-protection	IEC60079-1 – Flameproof – Ex d Group I
Functional Safety	IEC61508-compliant SIL2 Safety Functions Spool valves continuously monitored for stuck spool conditions Isolation element removes fluid power if spool is detected as stuck
Operating Temperature	-10°C to +50°C
Environmental Protection	IP66/67
Mass	153 kilograms

Electrical

Parameter	Value
Supply	24-volts D.C. +/- 10% (125 Watts maximum)
Control Solenoids	14 x Proportional Pressure Reducing Valves (0 - 540 mA each)
Communications	CAN 2.0B – Copper Twisted Pair (500 kbps)

Hydraulic

Parameter	Value
External Functions	5 x Proportional 3-position Spool Valves (150 litres/minute) 3 x Poppet-type Pilot Function Outputs (Regulated to 28 BAR) 1 x General Purpose Pressure Monitoring Port (0 – 400 BAR Range)
Internal Functions	1 x Isolation Element (350 litres / minute) – Controlled by internal electronics 1 x Internal Pilot Pressure Transducer 1 x Isolation Pressure Transducer
Pilot Pressure	28 BAR (internally generated from incoming system pressure line)
Working Pressure	250 BAR nominal / 300 BAR maximum
Oil Temperature	-10°C to +70°C
Hydraulic Fluid	Mineral Oil β
Filtration Requirements	ISO 4406:1999, class 18/16/13 Recommended Filtration Grade: 6..10 ≥ 75

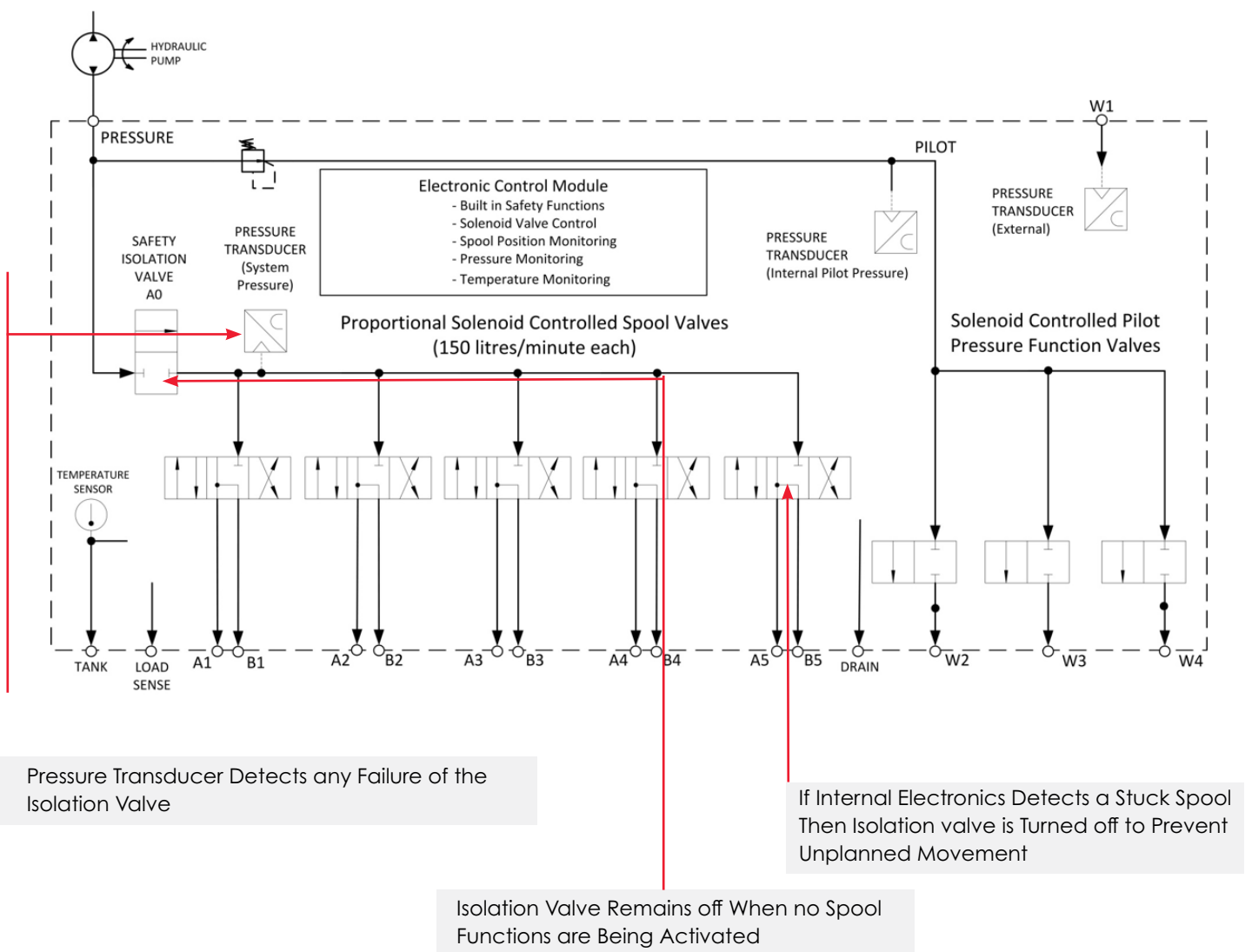
Safety Functions

Function	Demand Mode	Safety Integrity Level (SIL)
Oil Detection in Electronics Cavity	LOW	SIL 2
Pressure Transducer Monitoring	HIGH	SIL 2
Spool Magnet Contamination Detection	LOW	SIL 2
Prevent Unplanned Solenoid Activation	HIGH	SIL 2
Prevent Unplanned Spool Movement	HIGH	SIL 2
Stuck Spool Protection	LOW	SIL 2
Not-Responding Spool Protection	LOW	SIL 2
Over-extended Spool Protection	LOW	SIL 2

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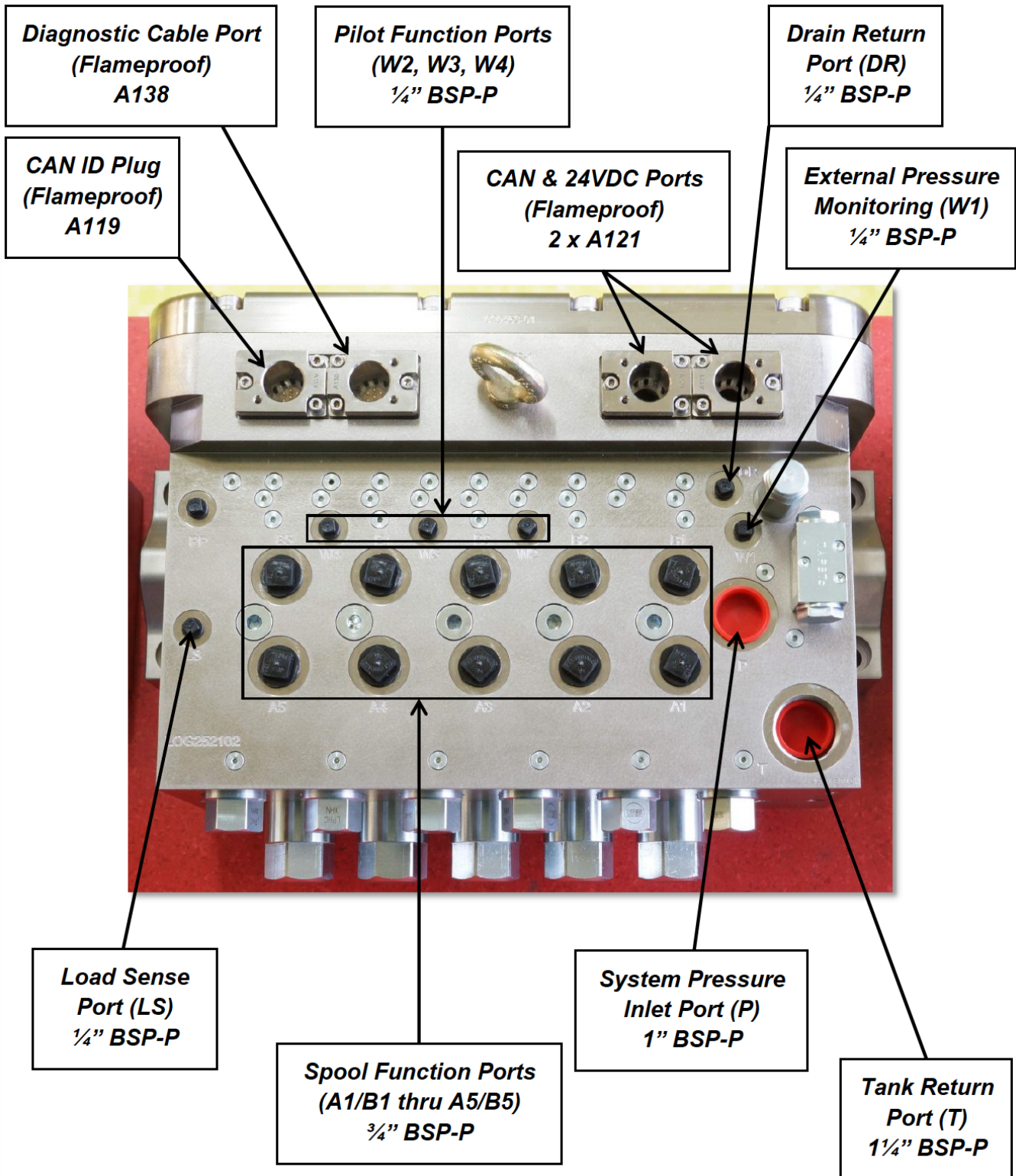
Hbox 5 | Spool Safety is Built In!

- Built in Safety Functions
- Solenoid Valve Control
- Spool Position Monitoring
- Pressure Monitoring
- Temperature Monitoring
- No Unplanned Movements



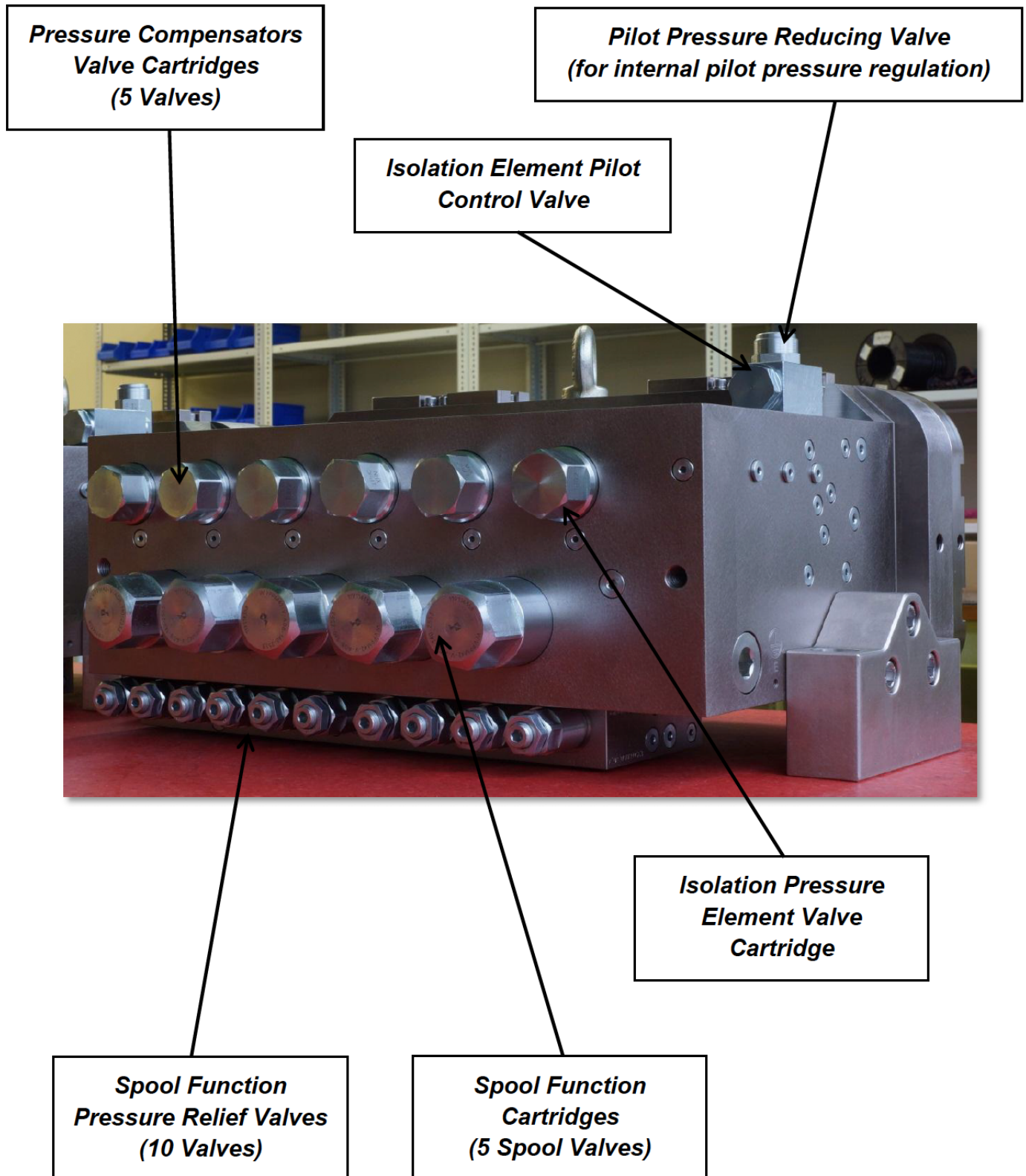
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Hbox 5 | Hydraulic and Electrical Interfaces



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Hbox 5 | Hydraulic and Electrical Interfaces



L0W00201 HBox 5-150 Flameproof Hydraulic Manifold Hi Flow 5-Spools Open Centre (Russian)

Hbox 5 | Dimensions

