

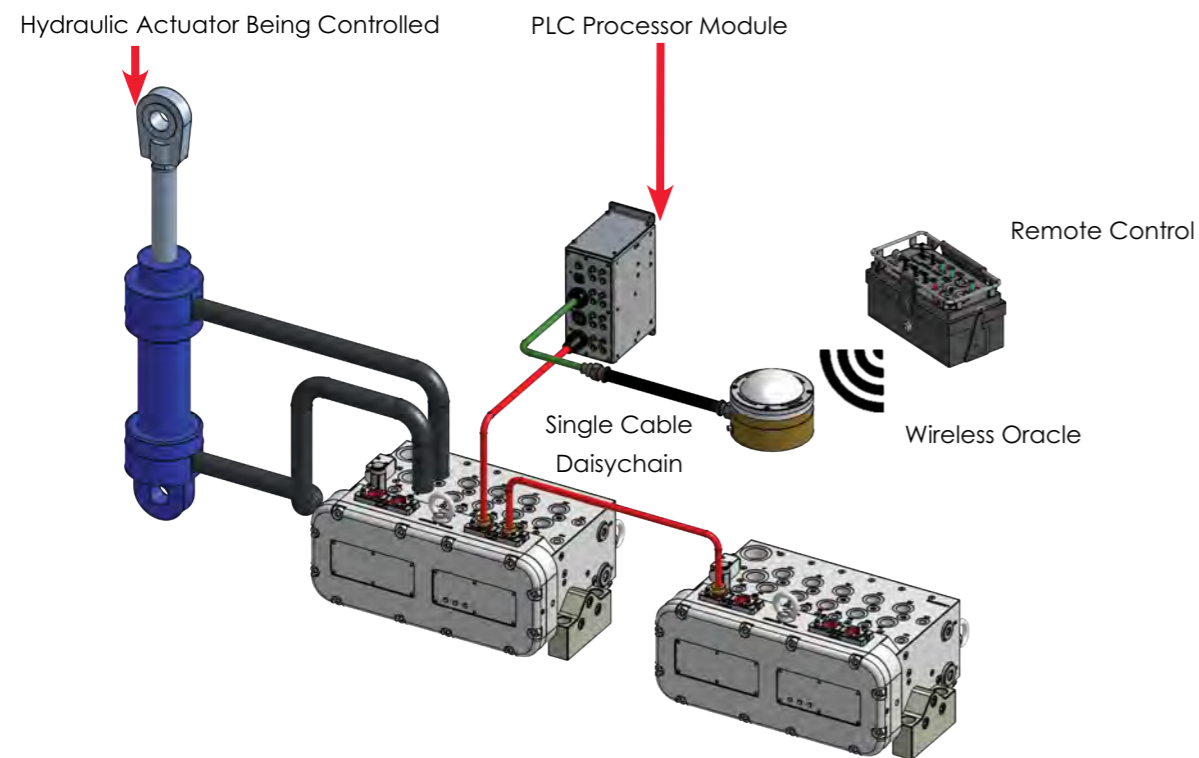
Complete Flameproof Hydraulic Control System

HBox

Pempek's HBox flameproof hydraulic control manifold with in-built electronic control and monitoring offers SIL 2 functionality.

Pempek's HBox reduces control cabling to **ONLY ONE CABLE**. The highly integrated design moves control and monitoring from main flameproof enclosure to the HBox.

Only One Control Cable – a Complete System of Safe and Reliable Hydraulic Automation



Diagnostic Road-Case



- Sturdy ABS plastic road case contains diagnostic computer and power supply
- Case provides a convenient compartment to store cables
- Case provides data and control connection to manifold under test with a single cable
- Great as a field diagnostic tool or for workshop maintenance

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)



Fast and Easy Maintenance Hydraulic Control System

- Tell Tail LEDs on cover show: 1. Comms (green/red) 2. Status (blue/red/green) 3. Power (green)
- Replacing a Spool (eg After Swarf Ingestion) and Self Calibration take less than 3 Minutes
- Spool Self Diagnostic Built into Firmware Commanded from Remote Exercises all Circuits Without Oil Pressure
- HBox Diagnostic Road case Available that Exercises H-Box (See Diagnostic Screen)



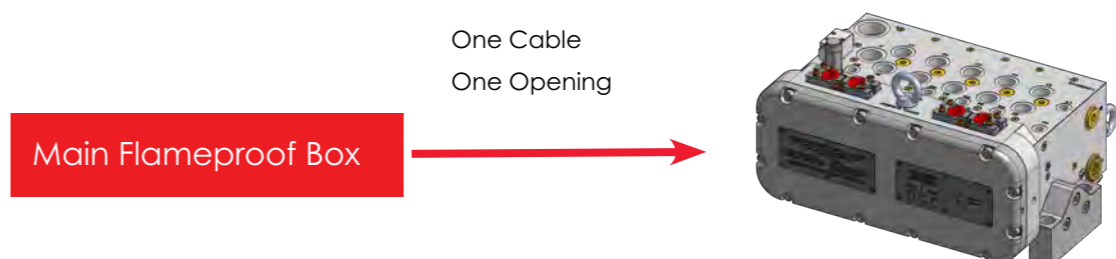
Why Pempek? Industry Comparison

Typical 13 Slice Sandwich Valvebank Competitor

- Requires 13 sets of 10 core cable from Main Flameproof Enclosure to Valvebank
- Terminations in the Flameproof Box Typically require More Than 104 Wires
- Multiple PLC Inputs and Outputs Must be Managed by Separate PLC IOs Requiring Complex PLC Software to Manage Operation and Safety
- Additional Safety Valve Must be Installed, Wired and Managed by PLC Software
- Spool Safety Must be Managed by PLC

Pempek

- Requires just 1 Cable (CAN / 24VDC) from Main Flameproof box for 2 Manifolds from the Main Flameproof box (as they Daisychain)
- Terminations Within the Flameproof Box Require 5 Wires (3 x CAN bus / 2 x 24VDC)
- PLC Inputs and Outputs **DO NOT** Require Additional Electrical Connection
- Small Bore Hydraulic Cables can be Connected Directly to HBox to Monitor External Pressure



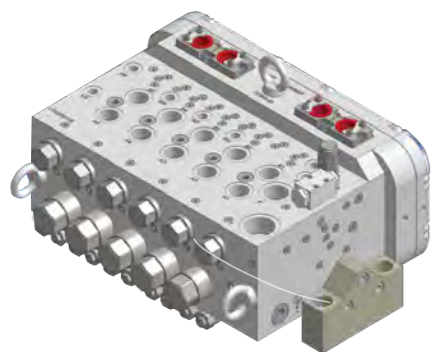
Technical Information and Model Comparison Chart

		HBox 5-150	HBox 7-180
Work Spools [Qvmax] Lpm*	High Flow	150 x 5	180 x 2
	Medium Flow	X	140 x 5
	Low Flow		
External Pilot Functions	On/Off	X	3
	Proportional	3	1
Max Pump Flow	[qVmax]	240	350
Pump Pressure	[p BAR]	315	315
P&T Port	P	NB25 [OPT x 2]	NB25 x 2
	T	NB25 [OPT x 2]	NB25 x 2
Load Sensing Capable	Standard	✓	✓
	Turbo	X	X
Pilot Filtration***	Full	X	X
	External	✓	✓
Oil Temperature Monitoring	°C	✓	✓
Internal Pressure Monitoring	P Bar	2	4
External Pressure Monitoring	P Bar	1	5
Spool Position Monitoring	Safety	✓	✓
	Diagnostics	✓	✓
Port Pressure Limiting	P Bar	✓	x4
Reduced Mechanical Adjustment		✓	✓
Fast Cartridge Replacement		✓	✓
Self Cleaning Orifices	No Blockages	X	X
Options Configured By Pempek	Easy Commissioning	✓	✓
Reduced Leak Points	No Slices	✓	✓
Pempek Safety Integrated	Verified	✓	✓
System Status Led	X 3	✓	✓
Flame Path Openings	Single Opening	✓	✓
	Single Inspect.	✓	✓
Can Bus	Single Cable	✓	✓
	Daisychain	✓	X**

* Higher flow rates can be achieved by combining spool outputs. Spool flow rate depends on pump flow and compensator settings.

** Two HBox 7-180 can be installed to a machine with two can cables.

*** Other pilot filtration options and recommendations available.



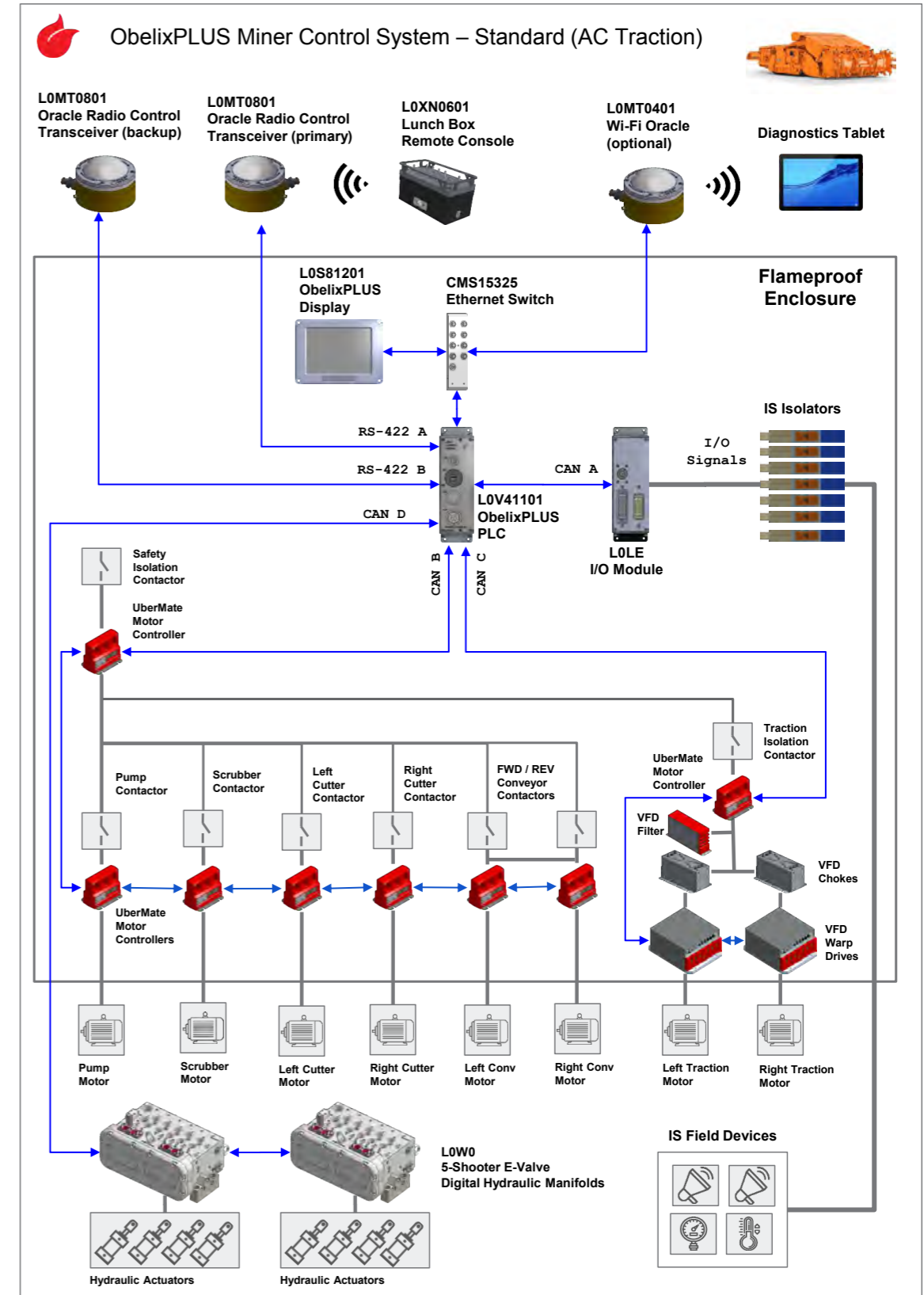
HBox 5-150



HBox 7-180

Systems Architecture Example

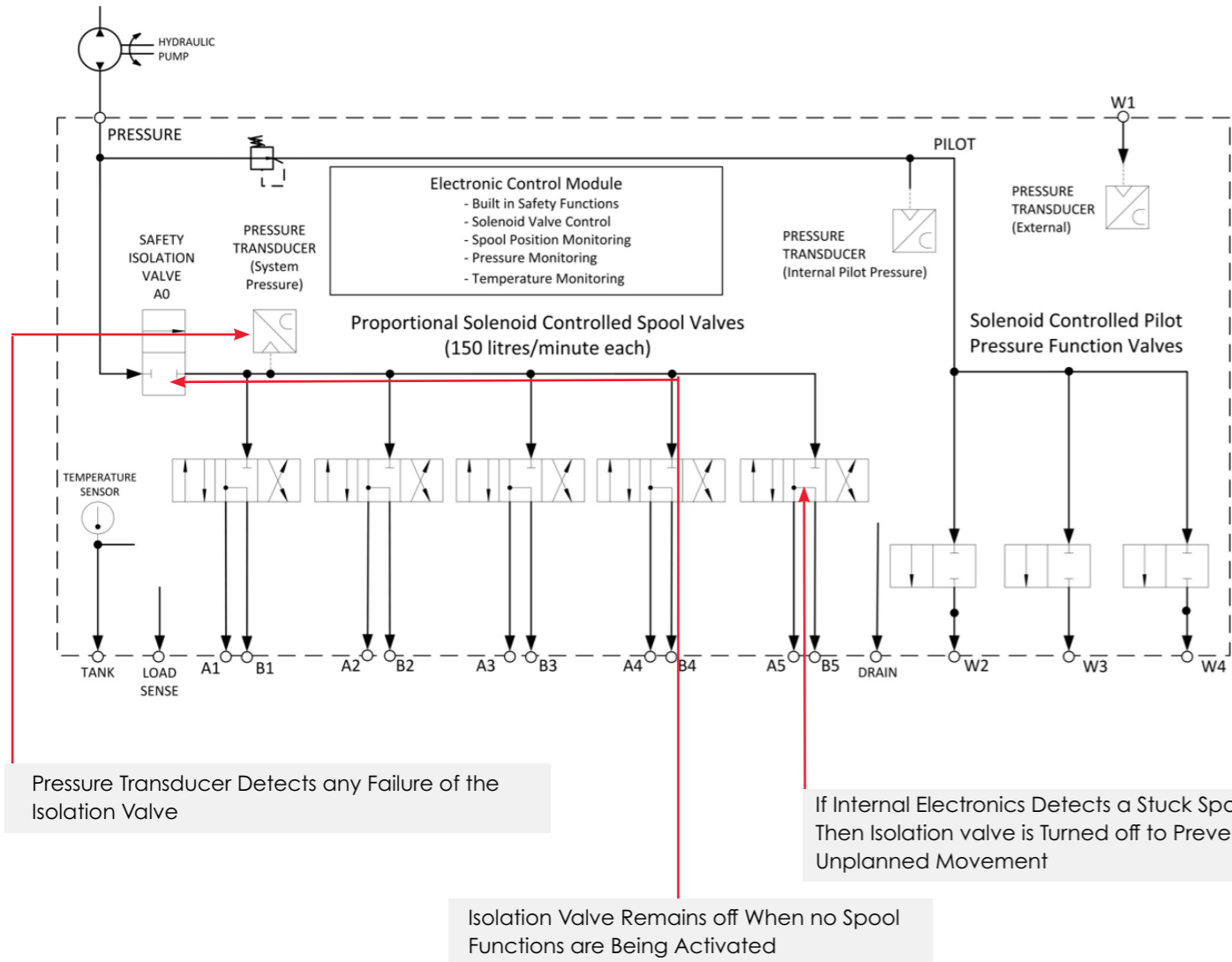
Continuous Miner System (12CM Class / AC Traction)



Hydraulic Control with built in Safety Integrity Level 2 (SIL2)

Spool Safety is Built In!

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

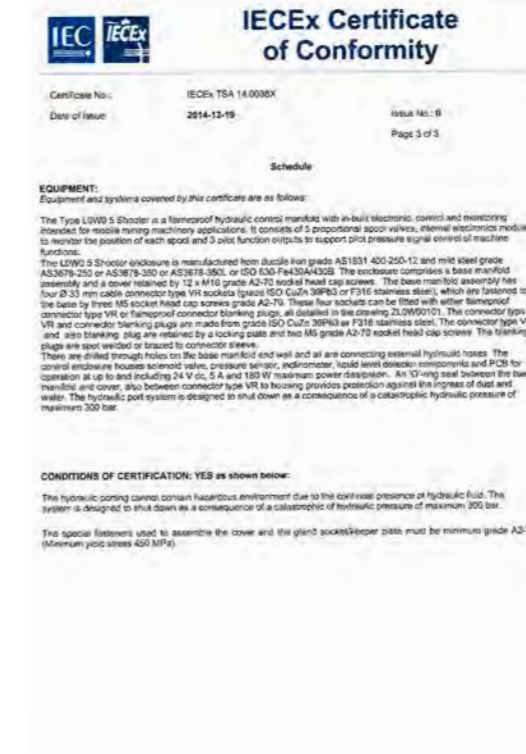


Pressure Transducer Detects any Failure of the Isolation Valve

If Internal Electronics Detects a Stuck Spool Then Isolation valve is Turned off to Prevent Unplanned Movement

Isolation Valve Remains off When no Spool Functions are Being Activated

Pempek certified to IECEx



IECEX Certificate of Conformity Annex

Annexe for Certificate No.: IECEx TSA 14.0038X Issue No.: 0

Drawing list pertaining to Issue 0 of this Certificate:

Drawing/Document Number:	Pages:	Title:	Revision Level:	Date: (yyyy-mm-dd)
ZG0W07801	1	MARKING PLATE, IECEx	1	2014-12-15
ZL0W00101	4	S-SHOOTER - HYDRAULIC CONTROL MODULE	1	2014-12-15
ZL0W0102	1	TYPICAL COMPONENT LAYOUT- HEAT DISSIPATION	1	2014-12-15
ZL0G2S2102	2	MAIN MANIFOLD	1	2014-12-15
ZM0W00501	1	LED LENS, COVER	1	2014-12-15
ZM0W00801	1	PLATE, COVER	1	2014-12-15
ZM0W01501	1	O-RING, COVER	1	2014-12-15
ZH0VR0801	1	FP Connector For Group 1	1	2014-12-15
ZH0VR0802	1	FP Connector For Group 1	1	2014-12-15
ZH0VR8501	1	FP Connector Arrangement Configuration For Group 1	1	2014-12-15
ZH0VR8801	1	Approval Flameproof Connector Arrangement For Group 1	1	2014-12-15
ZM0VR0301	1	Flameproof Socket For Group 1	1	2014-12-15
ZM0VR1301	1	Locking Plate IEC	1	2014-12-15
ZM0VR1302	1	Locking Plate IEC With Shroud	1	2014-12-15
ZM0VR1303	1	Locking Plate IEC With Shroud	1	2014-12-15
ZM0VR3401	1	FP Enclosure Wall For Group 1	1	2014-12-15
ZM0TL4801	1	Connector Sleeve CG 1 For Group 1	1	2014-12-15
ZM0TL4701	1	Connector Sleeve CG 2	1	2014-12-15
ZM0TL5001	1	Blanking Plug	1	2014-12-15
ZM0TL5101	1	Nut CG	1	2014-12-15

Certificate issued by: TestSafe Australia
919 Londonderry Road, Londonderry NSW 2153 Australia



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