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
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

Main Flameproof Box

One Cable
One Opening
## Technical Information and Model Comparison Chart

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

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

ObelixPLUS Miner Control System – Standard (AC Traction)

- **LOMT0801** Oracle Radio Control Transceiver (backup)
- **LOMT0801** Oracle Radio Control Transceiver (primary)
- **LOXN0601** Lunch Box Remote Console
- **LOMT0401** Wi-Fi Oracle (optional)
- **Diagnostics Tablet**

- **LO581201** ObelixPLUS Display
- **CMS15325** Ethernet Switch
- **L0V41101** ObelixPLUS PLC
- **L0LE** I/O Module

- **IS Isolators**
- **I/O Signals**

- **Hydraulic Actuators**
- **Scrubber Motor**
- **Left Cutter Motor**
- **Right Cutter Motor**
- **Left Conv Motor**
- **Right Conv Motor**
- **Left Traction Motor**
- **Right Traction Motor**

- **Pump Motor**
- **Scrubber Contactor**
- **Left Cutter Contactor**
- **Right Cutter Contactor**
- **FWD / REV Conveyor Contactors**

- **UberMate Motor Controllers**
- **UberMate Motor Controller**
- **UberMate Motor Controller**
- **UberMate Motor Controller**
- **UberMate Motor Controller**

- **CAN A**
- **CAN B**
- **CAN C**
- **CAN D**

- **VFD Filter**
- **VFD Chokes**
- **VFD Warp Drives**

- **IS Field Devices**

- **L0W0** 5-Shooter E-Valve Digital Hydraulic Manifolds

- **Hydraulic Actuators**
- **Hydraulic Actuators**

- **L0MT0801** Oracle Radio Control Transceiver (backup)
- **LOMT0801** Oracle Radio Control Transceiver (primary)
- **LOXN0601** Lunch Box Remote Console
- **LOMT0401** Wi-Fi Oracle (optional)
- **Diagnostics Tablet**
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
IECEx Certificate of Conformity

Certificate No.: EICEx TSA 14.0036XK
Date of Issue: 2014-12-19

Certificate issued by:
TestSafe Australia
199 Lendlease Rd
Lauderdale SA 5049
Australia

Type of Equipment: apparatus & systems covered by the certificate as follows:
This equipment is certified to be a hazardous electrical control module with include electronic, control, monitoring equipment, a component of a mining hydraulic system.

Conformity to the Excluded clauses in the IECEx Exclusion Table:
None

Conditions of Certification: IECEx as shown below:

Acknowledged by:
IECEx Scheme Administrators

Annex for Certificate No.: EICEx TSA 14.0036XK

Schedule

Annex no.: 0
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