The background of the slide is a photograph of a large, industrial metal structure, likely part of a roof bolting system. The structure is made of dark grey metal plates with numerous bolts and holes. A yellow and red striped safety tape is visible on the right side. The image is overlaid with a red diagonal band and a dark blue diagonal band at the bottom right, which contains a white geometric pattern of interconnected circles and lines.

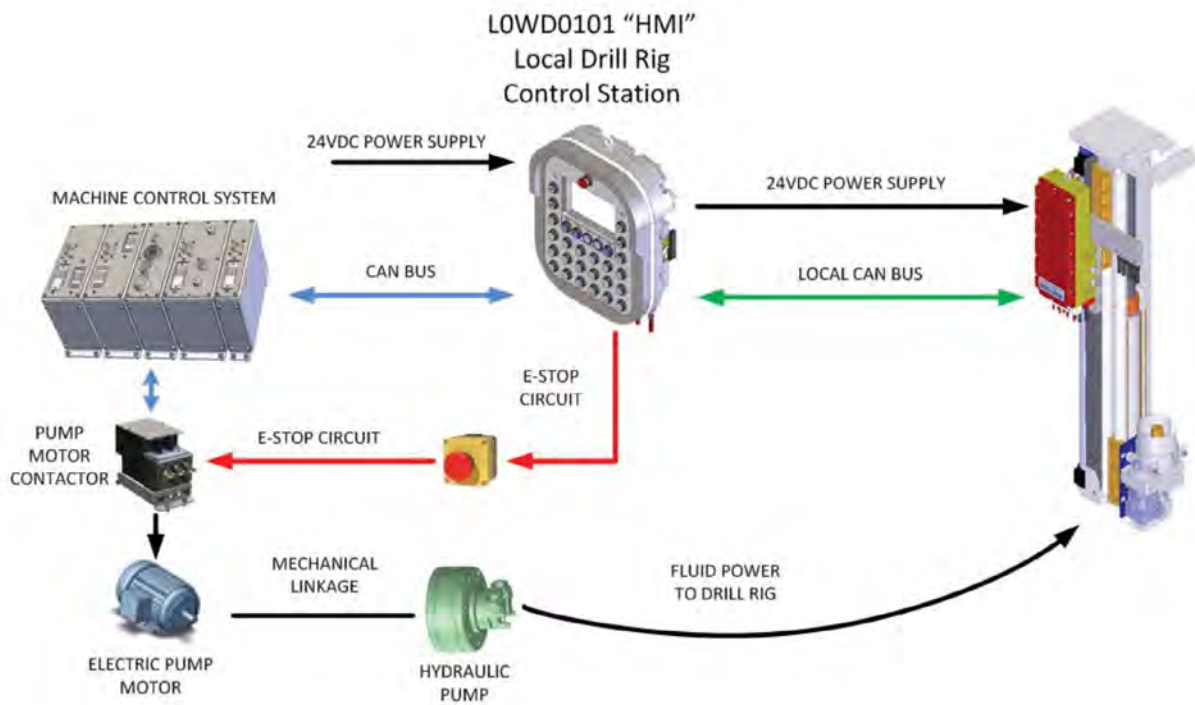
EBox

Flameproof Push-Button Roof Bolting System

Pempek EBox is a unique electronic control system package for the control, monitoring and automation of roof drilling/bolting rigs used in gaseous underground mining environments.

They are designed for easy installation into new and existing mobile mining machinery. The system is composed of a drill rig-mounted, flameproof, hydraulic-electric control module and a companion flameproof, push-button Human-Machine Interface user control station.

The Ebox module can be readily adapted to suit roof drill rig models from several different manufacturers.

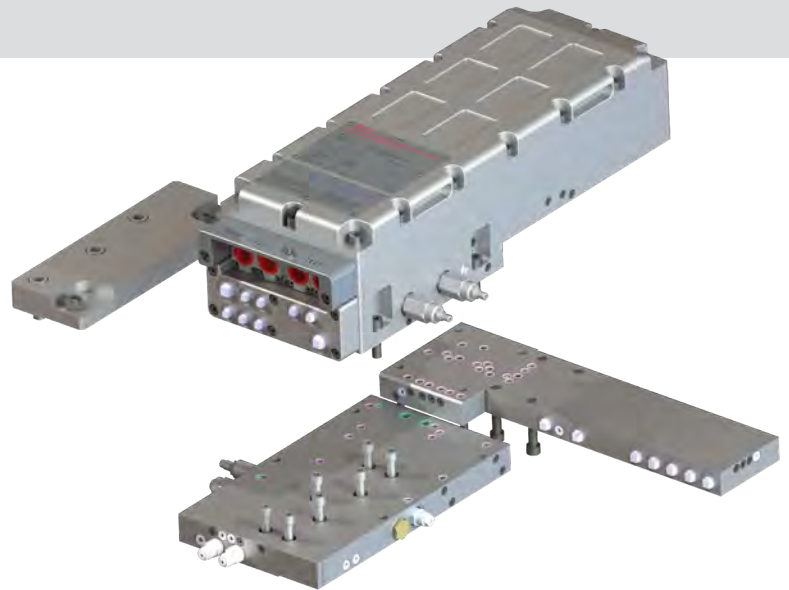


Ordering Information

EBox Flameproof Hydraulic Drill Rig Manifold - Common Centre Manifold **Part Number: LOVR0211**

EBox Key Features & Benefits

- Clean, simple installation
- Smooth, electronic drilling control
- Flameproof-certified (EX d) system
- Advanced diagnostics
- Increased safety
- Built-in roof mapping
- Lower maintenance and life-cycle costs



Why EBox? Industry Comparison

Drill rigs for mobile mining platforms are typically constructed from hydraulic cylinders, motors, and actuators. Traditionally, a large set of hydraulic hoses is connected between the body of the drill rig and a hydraulic switching valve bank. The valves controlling flow to the drill rig functions are then either controlled by hand levers of a remotely located control system.

The EBox combines hydraulic valves, solenoids, sensors, and electronics into a single, flameproof-certified package. The unit attaches directly to the mast of the drill rig – via a hydraulic adaptor plate. This cleaner assembly does away with up to 30 hoses, depending on the make and model of the drill rig. Some hydraulic hoses are still required to provide fluid power to the E-Box module and connections to the drill head unit of the drill rig.

The HMI Control Station is a flameproof-certified operator panel complete with function pushbuttons and integrated graphics display.

A simple power and data cable connects the HMI station to the E-Box.

The operator uses the HMI station to control and monitor all drilling and bolting functions.



Pempek roof drilling system is the perfect solution for mobile mining equipment where roof drilling and bolting is required.

Installation of Pempek push-button drilling is as simple as fitting each drill rig with its EBox and installing HMI stations for operator drill control. A master processor connects each HMI station. The system's simplicity allows it to be easily integrated into a new machine during manufacture or into an existing machine – at time of overhaul.

The system also provides options for different drilling and bolting systems.

Improved Operator Safety

The roof drilling system significantly improves the comfort and safety of mineworkers in three ways:

- Reduction of hand and arm strain injuries
- Prevention of unplanned rig movement
- Roof Strata Mapping (predict roof weakness)

Drill rig parts can move rapidly, driven by electric and hydraulic motors and actuators. Physical damage or system failure can cause the machine movements to occur without warning. A so-called unplanned movement places operators at risk of severe injury or death. The Pempek drill rig control system mitigates the risk of unplanned drill rig movement events by implementing a design that is consistent with IEC61508 (International standard for functional safety of programmable systems). Safety features have been designed into the product to significantly reduce the likelihood of an unplanned movement due to electronic failure and shut down the hydraulic power source (pump) if an unplanned hydraulic movement is detected.

Roof Strata Mapping

Although roof control has developed into a reliable and precise science, accidents can still occur when the roof geology changes unexpectedly. This typically requires the addition of more bolts or other measures to ensure that a roof fall does not occur.

The Pempek drill rig control system measures roof strata hardness distribution while drilling each bolting hole. The system collates measurements to construct a spectrographic roof map of strata hardness.

The map indicates the hardness of the roof strata at varying drilling depths using a colour-coded scale. The map appears on the main screen of the HMI so workers can quickly assess the roof conditions at any time. This information quickly reveals if the roof is weak and additional bolting or support is required. The system can also generate an alarm to alert mine personnel of unstable roof conditions resulting in an imminent roof fall.

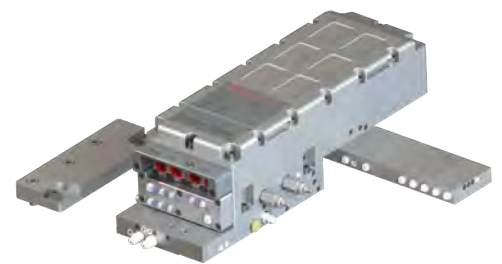


Productivity

The increasing use of electronic control and automation has enabled enormous productivity gains across many industries. The Pempek drill rig control system provides a similar advantage in drilling and bolting productivity through push-button control and automated features. The system empowers operators to achieve drilling and bolting cycle times up to 15% faster than with previous technology.

Data Logging

With drilling and bolting functions of the drill rigs under an intelligent, computer-controlled system, all drilling, roof mapping, and maintenance data is continuously logged. Pempek has several methods by which the data can be retrieved from the machine and used for reporting and analysis.



Maintenance

Pempek drill rig control system features fewer parts, cables, and hydraulic hoses when compared to a traditional approach. This automatically translates into lower costs for installation as well as reduced maintenance requirements.

By integrating all hydraulic and electronic control functions into one system, a very advanced level of diagnostic monitoring is possible.





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