



## 320XPC Blast Hole Drill - Electrical Control Systems Course

### Course Duration

The duration is 1 day (8 hours), and accommodates 7-8 students per session.

### TARGET AUDIENCE

This course is targeted to Electricians, Mechanics, Technicians and Engineers who will service and maintain P&H Mining Blast Hole Drills.

### Description

The course participants are introduced to the Profibus, Ethernet and DDCS protocols. Profibus hardware components are discussed in details.

Each class covers a system or a subsystem. After each class, real life or potential problems are discussed.

### Prerequisites:

Students should have a basic knowledge of Electrical principals.

### Course Location

On site, Mine Pro or customer location.

### Course Objectives

Upon completion of this course the student will be able to:

- Identify Profibus, Ethernet and DDCS components on a machine schematic.
- Identify and explain the purpose of all remote I/O systems on a drill.
- Identify and explain the purpose of all Profibus components on a drill.
- Analyze schematics and control diagrams utilized for troubleshooting and repair of the electrical controls systems.

### Main Concepts

- Profibus protocol, hardware and software components.
- I/O systems ET-200S and ET-200S ECOfast
- Ethernet protocol, hardware and software components including Touch Panel.
- DDCS protocol – brief description of software and hardware components



<b>Course Plan</b>		
<b>(Day 1)</b>		
<p><b><u>Course Introduction</u></b></p> <ul style="list-style-type: none"> <li>▪ Introductions</li> <li>▪ Class Objectives</li> <li>▪ General on site safety</li> </ul>	<p><b><u>Module 2.00 continued</u></b></p> <ul style="list-style-type: none"> <li>▪ ET-200S I/O systems (racks)               <ul style="list-style-type: none"> <li>▪ Optical conductors</li> <li>▪ Terminal, interface, power modules</li> <li>▪ Digital input and output modules</li> </ul> </li> </ul>	<p><b><u>Module 4.0 Miscellaneous electrical control circuits</u></b> Radio remote propel</p>
<u>Lunch</u>		<p><b><u>Course Evaluation and Wrap up</u></b></p>
<p><b><u>Module 1.00 Main voltage levels and power supplies</u></b></p> <ul style="list-style-type: none"> <li>▪ 60Hz machine               <ul style="list-style-type: none"> <li>▪ 520VAC buses</li> <li>▪ 480VAC buses</li> <li>▪ 208/120VAC buses</li> </ul> </li> <li>▪ 50Hz machine               <ul style="list-style-type: none"> <li>▪ 520VAC buses</li> <li>▪ 380VAC buses</li> <li>▪ 416/230VAC buses</li> <li>▪ 208/120VAC buses</li> </ul> </li> <li>▪ Transient suppression filters (Sola 5A, 7.5A and 15A)</li> <li>▪ PWR Supply (Sitop) 120/230VAC 24VDC 10A, 20A</li> <li>▪ Smart UPS system               <ul style="list-style-type: none"> <li>▪ Purpose, components</li> <li>▪ Serial interface, messages</li> <li>▪ Software</li> </ul> </li> <li>▪ ET-200S I/O Power module</li> </ul>	<ul style="list-style-type: none"> <li>▪ Analog input and output modules</li> <li>▪ ET-200S ECOfast I/O's for solenoid controls               <ul style="list-style-type: none"> <li>▪ Cables</li> <li>▪ Addressing</li> </ul> </li> <li>• Receptacles</li> <li>• Resolver Interface</li> <li>• Vibration detection</li> <li>• Auto-level</li> </ul>	
<p><b><u>Module 2.0 Profibus and componens on Profibus network</u></b></p> <ul style="list-style-type: none"> <li>▪ Profibus protocol definition and description (DP-V1)</li> <li>▪ Optical and copper conductors</li> <li>▪ AC800M Controller</li> <li>▪ CI 854 Scanner</li> <li>▪ Water Injection and oil cooler VFD</li> <li>▪ DCS800 modules</li> <li>▪ Optical bus terminals</li> <li>▪ Starters</li> </ul>	<p><b><u>Module 3.0 Ethernet and DDCS networks</u></b></p> <ul style="list-style-type: none"> <li>▪ Ethernet protocol description</li> <li>▪ AC800M</li> <li>▪ Ethernet switch</li> <li>▪ Operator's coop Touch Panel</li> <li>▪ Ethernet outlet in the operator's coop</li> <li>▪ DDCS protocol description</li> <li>▪ Fiber optic branching unit</li> <li>▪ DCS800 drives               <ul style="list-style-type: none"> <li>▪ Rotary (master/slave)</li> <li>▪ Hoist</li> </ul> </li> </ul>	