PMC-R 2.0

Roof Support Control Unit

H·B·T

THE NEW
PMC-R 2.0

The PMC-R 2.0 roof support controller has been designed using the proven and highly reliable system topolgy as its predecessors, the PM4 and PMC-R, but has undergone a complete electronic and network architecture upgrade, equipping these units for future remote and autonomous mining functionality.

NEXT-GENERATION CONTROL

The PMC-R 2.0 is our third generation roof support controller — and an ideal solution for longwall operations looking to update their current system to improve functionality and increase lifecycle and operational support. It offers several key advantages:

> **REDUCED TOTAL COST OF OWNERSHIP**
The control units now have the capacity to complete minor repairs on the mine site.

> **LOWER LATENCY COMMUNICATIONS OVER A FAST ETHERNET BACKBONE**
Increased refresh rates for visualization applications make remote mining easier and safer.

> **ADVANCED ANALYTICAL TOOLS**
Real-time updates on equipment performance and health enable timely decision-making.

FASTER COMMUNICATIONS
REAL-TIME DATA UPDATES

Built on an Ethernet backbone, the PMC-R 2.0 controller offers fast refresh rates and low latency connections that improve the human machine interface (HMI) experience by feeding operators real-time updates. Additional interfaces, such as wireless technology and Controller Area Network (CAN) connectivity, future-proof the system by allowing for further expansion.

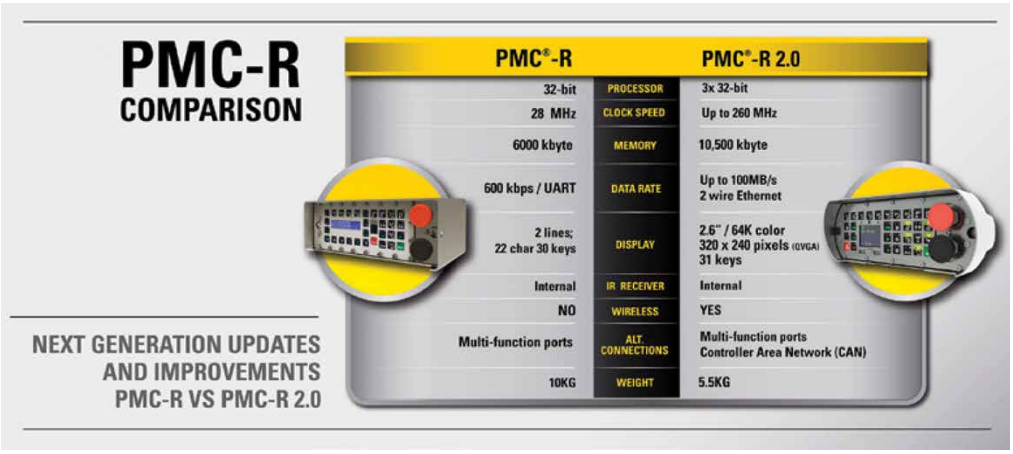
MORE POWER
STATE-OF-THE-ART PROCESSOR TECHNOLOGY

The heart of the control unit is the new A6 processor, a multicore CPU with an additional safety core, which provides exceptional performance and increases computing power to nearly 10 times that of the previous model.

MORE CONVENIENT
LARGER DISPLAY AND SIMPLIFIED SERVICE

The PMC-R 2.0 controller has a new full-color LCD display. The display area is 1.5 times larger than the generation 2 controller, showing 50% more information at a glance.

The new control unit offers easy and cost-effective in-service component repair for reduced cost of ownership. The beeper and keyboard foil are easy to exchange underground. A 50% weight reduction makes inspections and overhauls easier.



ADVANCED ANALYTICS

Increased bandwidth allows for greater data traffic, enabling advanced machine health diagnostics with near-real-time updates on equipment performance. The enhanced data flow gives your people the data they need when they need it — so they can make timely, informed decisions.

EXPANDED CONNECTIVITY
CAN BUS ARCHITECTURE AND WIRELESS TECHNOLOGY

The new controller features wireless technology and CAN connectivity to connect to external equipment — giving users a platform primed for future expansion and integration of functionalities like Personal Proximity Detection (PPD) and wireless shield recovery.

MORE INFORMATION.

INTUITIVE INTERACTION.

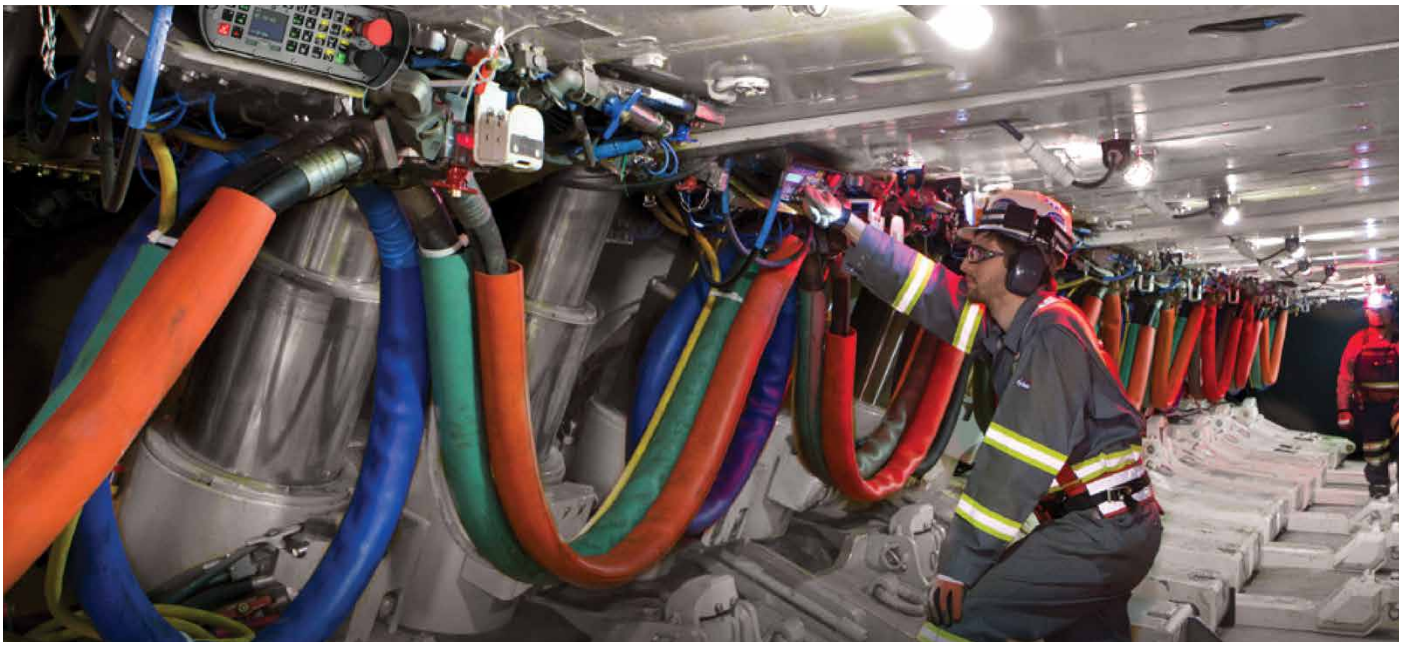
IMPROVED DISPLAY

The display of the PMC-R 2.0 is 1.5 times larger than its predecessors, measuring 320 x 240 pixels. The new LCD display features 65K color and provides 50% more information.

The new display features enhanced help functions, full text communication and more direct access keys, giving operators faster and more efficient control of machine functions.

ERGONOMIC CONTROLS

An optimized user input arrangement features more hotkeys offering direct access to menus and diagnostics. Function keys offer haptic feedback and a status LED for every button. The ergonomic, intuitive layout provides easy access to frequently used functions for easier operation.



SIMPLIFIED SERVICE.
SUPERIOR SUPPORT.

EASY REPLACEMENT

The PMC-R 2.0 can directly replace an older PMC-R controller with minimal changes to the roof support. The existing inner-shield cabling can remain in service, making installation quick and simple. Inter-shield cabling, power and isolation adapters need to be replaced to keep pace with the communication protocol update from Bi-Di to Ethernet. These components are included in the upgrade.

ENHANCED SAFETY

> LOCAL LOCK OUT
> LOCAL EMERGENCY STOP
> FACEWIDE EMERGENCY STOP

These functions are certified with an SIL2 rating by an external certification authority. They provide maximum operator safety without impacting production, increasing maintenance time or causing unnecessary delays.

LOWER COSTS

The PMC-R 2.0 is built for the lowest total cost of ownership over the life of the controller. User-serviceable parts like a replaceable buzzer and foil mean minor repairs and can be completed on site for reduced costs and downtime.

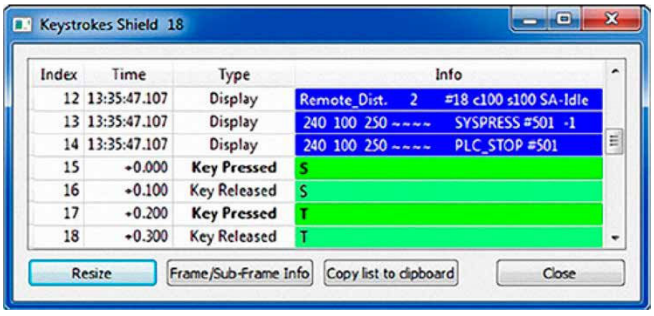
ADVANCED AUTOMATION.

MORE UPTIME AND INCREASED PRODUCTIVITY

The PMC-R 2.0 is the latest step in HBT's continuing efforts to provide the most advanced, customizable longwall automation solutions. Before deployment, users review all included software features to make sure the application meets their specific needs.

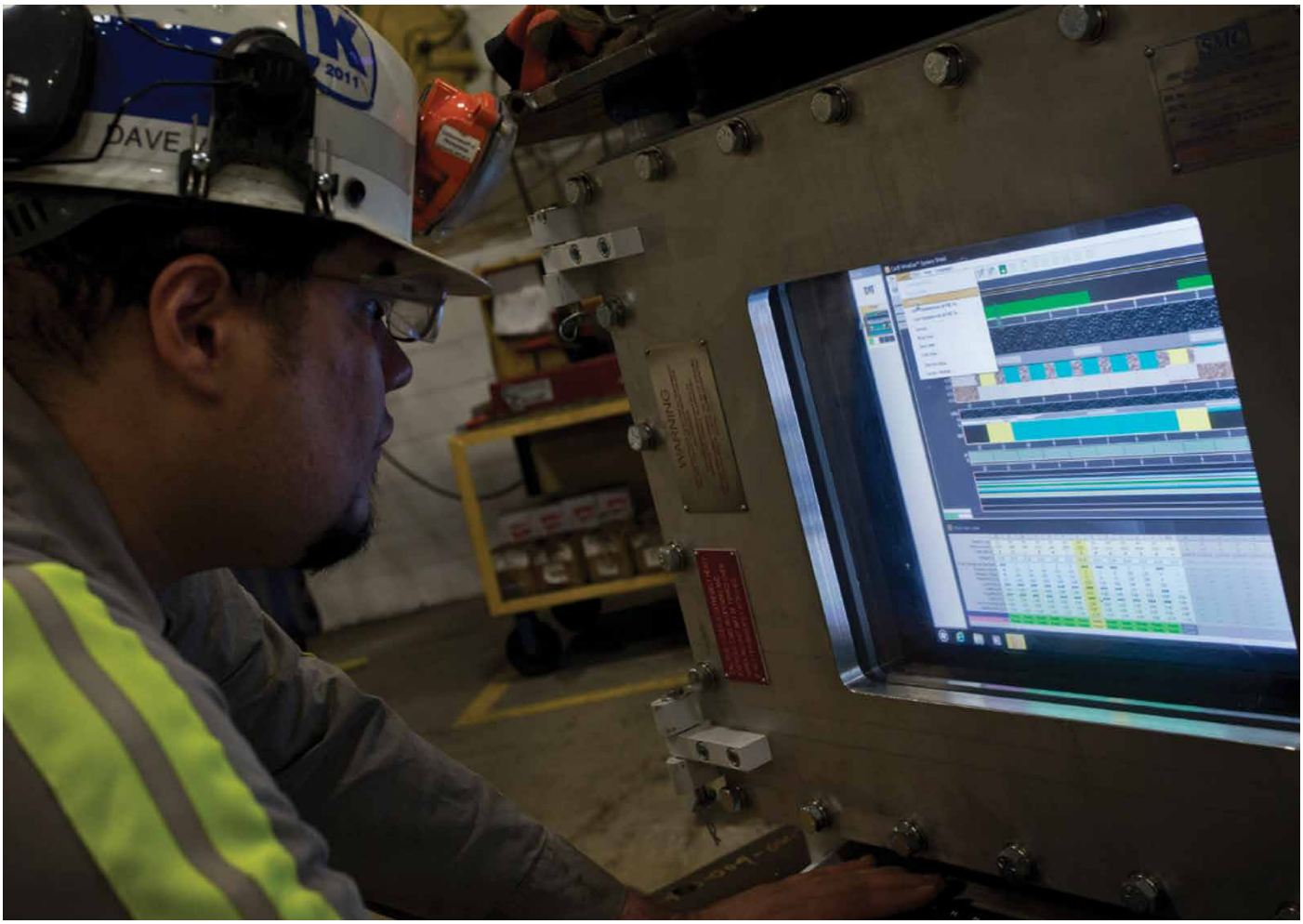
RECORD OF UNEXPECTED ACTIVATIONS

The keystroke logging feature records each time a button is pressed. This record is stored as a logfile and can be viewed in the VSoftware suite for longwall. These recordings make it easier to investigate unexpected activation events by capturing when a key was pressed and for how long.



MAINTAIN A STRAIGHT CONVEYOR PROFILE

The automatic target line feature helps the system maintain a conveyor profile set by the operators using the VShield software. The operators can choose how frequently the target line will be sent by defining the number of shears to be completed. Once the designated number of shears is reached, the target line is automatically applied in VShield and the corrections are issued to the roof support controller.



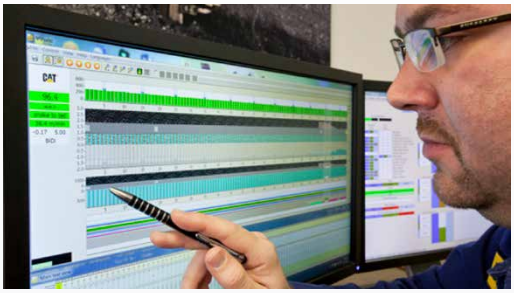
DATA VISUALIZATION AND REPORTING

OPTIMIZE YOUR MAINTENANCE STRATEGY

The HBT V-Software is a cost-effective, user-friendly data visualization and reporting tool. It enables you to efficiently view, manage and use machine data from your longwall mining system — so you can make informed maintenance decisions that help you maximize the life and availability of your equipment.

VSHIELD

COMPLETE DATA VISUALIZATION AND PARAMETER CONTROL

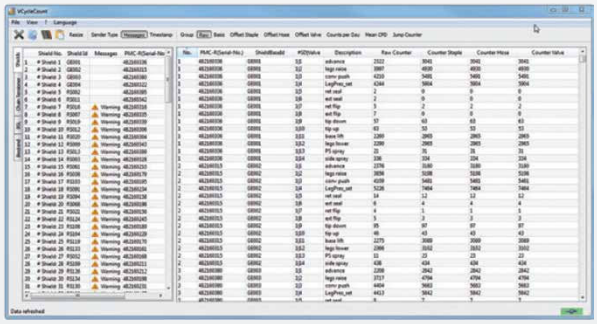


VShield, a PC based software application, graphically displays the overall health and condition of your roof supports. The software also acts as a control interface for the PMC-R 2.0 system and provides complete local and global parameter control, including change logging.

VShield also provides an operator control interface, allowing the user to issue control commands, including setting a target line for maintaining a straight conveyor profile or clearing an error on a roof support. The application also creates a logfile, which allows the mine site personnel to review events like unexpected activation or movement.

VCYCLE COUNT

OPTIMIZE MAINTENANCE PROGRAMS

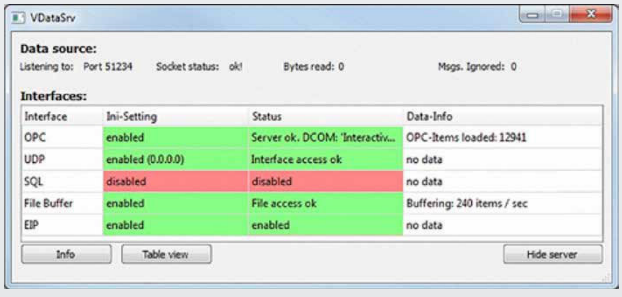


The valve cycle count (VCC) application gives you an overview of the cycles of operation of each solenoid valve in the roof support and chain tensioning system, as well as the hoses and staples. The data is written in a database by VShield, then queried from the database by VCycleCount.

This feature allows the mine to monitor the condition of the electrohydraulic equipment and set trigger points, which activate an alarm when a circuit is reaching its pre-defined limits. Understanding how many cycles each circuit has completed will help maintenance engineers with their hydraulic hose and staple management programs, and the data can also be used to determine the overall health of the hydraulic system. For example, an abnormally high number of activations on a particular circuit could suggest a leak or bypassing seal.

VDATASRV

DATA AVAILABILITY FOR THIRD-PARTY SYSTEMS



VDataSrv is our data server application, which makes VSoftware data available to third-party applications.

As part of a PMC-R 2.0 deployment, an updated VDataServ instance will replace the currently installed version and will be configured as the main interface to all external connections.

ENHANCED REMOTE FUNCTIONALITY

HIGH-SPEED 100 MBITS/S ETHERNET 2 WIRE BACKBONE

PLUG-AND-PLAY UPGRADES

CAN EXTENSION DEVICES AND ETHERNET PORTS ALLOW UPDATES WITHOUT CONTROLLER HARDWARE UPGRADES

MAXIMUM PROTECTION

> ROBUST, RESISTANT METAL HOUSING WITH CHROME PLATING
> IP65/68 RATING

LIGHTWEIGHT

> 50% REDUCTION IN WEIGHT

ADVANCED COMPUTING POWER

> A6 TRIPLE-CORE PROCESSOR
> 260 MHZ CLOCK SPEED
> 10.5 MB MEMORY

PERFECT CONNECTIVITY

> INTEGRATED WIRELESS TECHNOLOGY
> INTEGRATED INFRARED RECEIVER

GLOBAL CERTIFICATION

ANZEx ATEX MSHA GOST IECEx MA

*Additional certifications on project demand

IMPROVED DISPLAY

- 20 × 240 PIXELS
- 66 MM (2.6 IN) LCD DISPLAY WITH 65K COLOR
- MULTI-LANGUAGE SUPPORT

INTUITIVE DESIGN

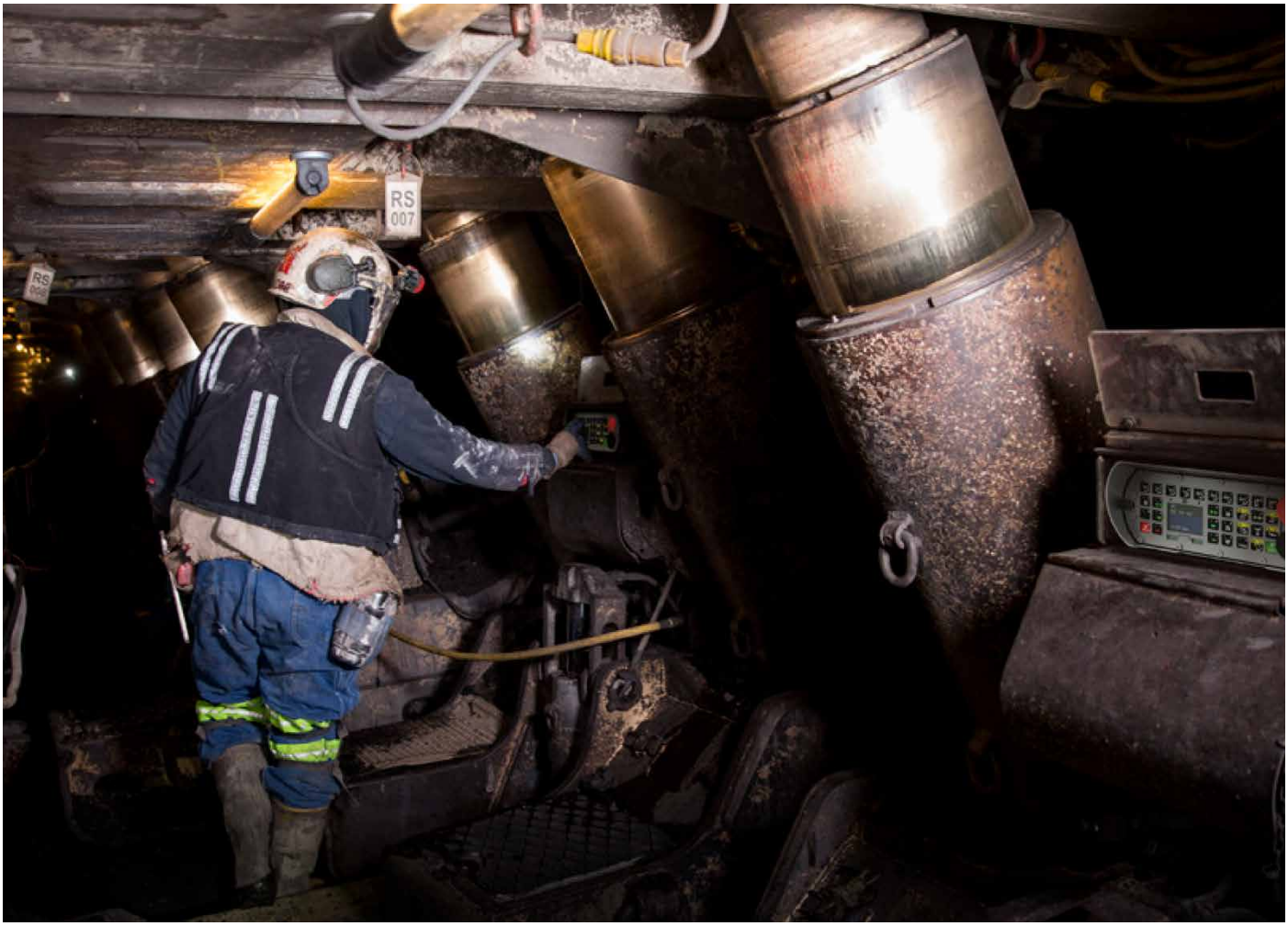
- MULTIPLE HOTKEYS FOR DIRECT MENU AND DIAGNOSTIC ACCESS
- FUNCTION KEYS WITH OPERATOR FEEDBACK (SOUND, PRESSURE POINT, ACTIVATION LED)

SAFETY FOCUSED

- SIL2 CERTIFICATION
- SEPARATE EMERGENCY AND LOCAL LOCK-OUT SWITCHES

READY FOR PERIPHERALS

- NEW ISOLATION COUPLER WITH OR WITHOUT POWER SUPPLY CONNECTION
- CAN-BASED CODE PLUG
- SOLENOID DRIVER BOARD WITH MULTIPLE CONNECTIONS FOR ENHANCED ROOF SUPPORT AUTOMATION
- INFRARED RECEIVER AND SENSORS FOR SHEARER POSITION TRACKING
- LED WARNING LIGHT
- ETHERNET MEDIA CONVERTER FOR DIVERSE DATA COMMUNICATION
- PPD SYSTEM
- SHIELD HEIGHT MEASUREMENT SYSTEM



FOCUSED ON SAFETY

REMOTE CONTROL OPERATION

Remote control comes standard, giving the operator a dedicated application for remote control of all PMC-R 2.0 controllers. Operators can issue automation commands to individual roof supports and initiate automatic functions such as Batch or SRB functions from a location safely away from the face — or even on the surface.

This upgrade includes the VShield Single software, which displays a single image of the roof support for easier control. It also provides all relevant data, ensuring the support is correctly set before moving on. This software can be installed anywhere within the mine network that can establish a connection with the longwall control system.

FLEXIBLE DESIGN

SYSTEM OPTIONS

PERSONAL PROXIMITY DETECTION (PPD)

Using wireless technology, the PMC-R 2.0 is compatible with PPD systems. An additional wireless sensor can be added to the PMC-R 2.0 to enable PPD capability. This in-shield reader connects directly to the controller and detects tags worn by the longwall operators. When the person wearing the tag is detected by the reader, the system changes the color of the shield beacon or light, letting the user know the system has identified them and that any automatic functions are inhibited while they are in that area.

SIMPLIFIED ROOF SUPPORT RECOVERY

An E/F Frame — fitted with PMC-R 2.0 control units in a small cabled network — is the standard configuration for recovering shields during a longwall move. The PMC-R 2.0 increases safety with an option for a wireless remote-controlled E/F Frame, which comes complete with all hardware and software necessary for the upgrade.

EASY TO UPGRADE

BASE SYSTEM SUPPLY

The base system supply of the PMC-R 2.0 provides users with all the equipment needed to upgrade their roof supports to the latest generation. To minimize costs, this upgrade only includes the components that need to be updated in order to implement the new controls.

HIGH COMPATIBILITY, LOW COSTS

The PMC-R 2.0 can be used with existing HBT pressure transducers, cylinder reed rods, solenoid driver boards, brass bars and double solenoid valves. Port allocation must be changed to match the new controller's I/O layout, which will be defined during the upgrade process.

The new PMC-R 2.0 system includes new inter-shield cables and power/isolation adapters to work with changing communication protocols. The upgrade will also include new SKK sockets for the DCB and any junction boxes to maintain the new two-wire Ethernet standard. All new cables and fittings can be supplied with an improved chrome finish for superior corrosion protection if necessary.

If the main gate server includes a BSL push-accept button, this functionality will be incorporated in the upgrade. A physical set of switch contacts will be wired to a suitable I/O port unless a more advanced alternative is available.

UNIVERSAL RETROFIT

The PMC-R 2.0 is retrofittable to any OEM roof support system, which requires a review of in-shield electronics to ensure safety compliance. In most cases, the reed rods and pressure transducers are compatible and can remain installed.

Existing double solenoid valves must be replaced with HBT products to match communication protocols and intrinsic safety parameters. The new HBT valves will be supplied with an adapter plate, allowing the existing valve bank to remain installed and reducing retrofit costs.

LIFECYCLE SUPPORT

The PMC-R 2.0 is backwards compatible with existing HBT electro-hydraulics and sensors installed at the roof supports, reducing overall system costs and keeping good hardware in service. This also lowers your maintenance costs, as continued support of the existing parts and components is covered under your maintenance budget.

TECHNICAL DATA

CPU/Processor Data

Parameter	CPU Data
CPU	A6 family
Clock Frequency	Up to 260 MHz
Cores	3 core
Memory	8 MB internal FLASH ROM 32 MB external FLASH ROM

Electrical Data

Parameter	Typical Value	Maximum Ratings
Supply Voltage	12V DC	9V–13.2V
Power Supply Current	Not applicable	8.1 A (MSHA); 2.5 A (RoW)
Power Consumption	170mA/@12V	230mA/@12V

Environmental Data

Parameter	Symbol	Typical Value	Maximum Ratings
Operating Temperature	T_{amb}	20° C (68° F)	–20° C – +40° C (–4° F – +104° F)
Storage Temperature	T.	20° C (68° F)	–20° C – +60° C (–4° F – +140° F)

Connector

Type	Symbol	Amount	Maximum Ratings
SKK 24 mini	X1-X6	6	8 A
SKK 24 mini	Y1-Y6	6	8A

Optical Devices

Type		Amount	Maximum Ratings
LCD Display	Shield information	1	66 mm (2.6 in) – 320 x 240 pixel – color 64 K in use
Infra-Red LED	Shearer position detection	1	IRDA Standard receiver
LED indication 1	Status HMI	3	On/Off/Blinking – 1 × red, 2 × green
LED indication 2	Wireless Status*	2	On/Off/Blinking – 1 × green, 1 × yellow
LED indication 3	Big Jumbo LED	3	On/Off/Blinking – 1 × red, 1 × green, 1 × yellow
LED indication 4	Key Status	31	On/Off/Blinking – green

Acoustic Devices

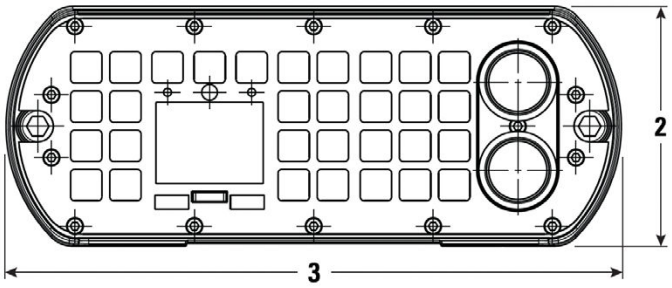
Type	Amount	Maximum Ratings
Beeper	1	>= 90 dB

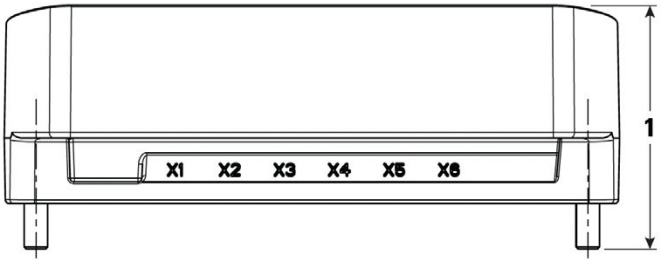
*Radio approval pending.

Dimensions

All dimensions are approximate.

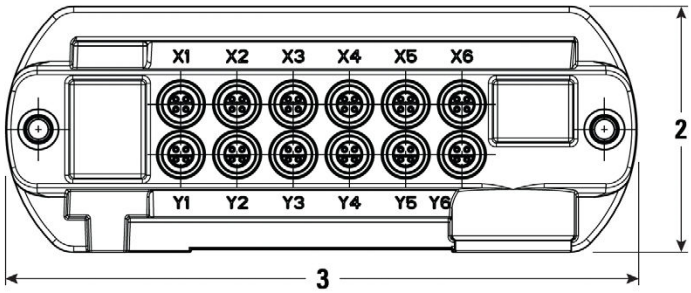
Front and Side View





1	Width	124 mm	4.88 in
2	Height	122 mm	4.80 in
3	Length	314 mm	12.36 in

Rear View



2	Height	122 mm	4.80 in
3	Length	314 mm	12.36 in

SKK connector fits to existing brass bar.

NOTES

NOTES

For more complete information on HBT products and services, visit us on the web at hbt-group.com.