

4100C BOSS

Electric Mining Shovel - AC Drive
Product Overview





4100C BOSS AC Shovel

Taking the Next Step: Building on Proven Success

Mine operations and maintenance managers demand the best from their loading tools. For this reason, Joy Global has been the Electric Mining Shovel market share leader and preferred equipment supplier to the world's toughest mining environments for over **100 years**.

Joy Global is proud to offer the P&H® 4100C BOSS AC Electric Mining Shovel. The P&H shovel line is combining its solid reputation of reliability with the proven Centurion® Electrical Control System, industry leading IGBT AC technology, rugged structures and the industry's only OEM owned field service and support network to set the industry standard for Electric Mining Shovels.

Increases in availability and productivity ultimately lead to the lowest cost per ton and the most efficient ultra-class loading tool available in the industry today. P&H shovels dig deeper into the realms of productivity safety, and reliability with greater control, comfort, and consistency.



Proven Performance

P&H AC-Drive shovels are exceeding customer requirements and expectations:

- 3% faster cycle times
- 2.5% increase in availability
- 5% increase in productivity

Providing our customers:

- Lowest Total Cost of Ownership
- Highest productivity
- Superior machine reliability and durability

We set the industry standard for Electric Mining Shovels

A Closer Look

The 4100C BOSS AC *utilizes proven components.*

- Common motors and drive line-up as on proven 4100XPC AC and 2800XPC AC machines
- Structures developed with advanced design software and field data collection
- Motors designed and manufactured by Joy Global specifically for Electric Mining Shovels

Joy Global and ABB:

Two Leaders Combine to Deliver Breakthrough Productivity and Performance

ABB is the global leader in drives with 40+ years of experience.

- ABB's Direct Torque Control has the best dynamic performance in the industry
- Our AC drives are compact, air-cooled, modular
- Maintenance-friendly modules are easy-to-replace

Joy Global is the
Worldwide Leader in
Electric Mining Shovels.
The 4100C BOSS AC
sets the standard
in performance and
productivity.

- **Powerful advancements** based on already-successful technologies



- **Extensive collaboration** with customers and our drive partner ABB
- Years of experience in building rugged, reliable equipment

We are driven by achieving the lowest Total Cost of Ownership for our customers:

- Quality components
- Focus on machine availability and productivity
- Heavy-duty structures
- Joy Global field support

The Joy Global AC Performance Edge

We've achieved better performance throughout the entire shovel. That includes *higher speed and peak horsepower*. The shovel features *improved electrical availability and overall reliability*. In addition, the structures have been optimized to work efficiently with AC technology.

The benefits are clear:

- Better cycle time and utilization
- Improved job efficiency
- Higher rates of availability

Attachment of choice for the world's toughest pits

- **Twin-leg dipper handle** – Stable dipper trajectory, faster cycle times, higher productivity
- **Rack and pinion crowd** – Less maintenance, all weather performer
- **OPTIMA® Dippers** – Mine-matched dippers with adjustable pitch braces for precise rake angles

Rugged Components

- **Dual Hoist Motors** – Balanced and evenly distributed load
- **DELTA™ Drive** – Improved shoe-to-tumbler engagement
- **Planetary Transmissions** – Proven long life on swing and propel with over 20 million hours logged

Technology

- **Centurion Electrical Control System** – Superior performance, monitoring and data integration capabilities
- **Universal Shovel Interface** – Send and receive data with any mine management system
- **PreVail® Remote Health Management** – Real time machine health and performance management



World-class Cab

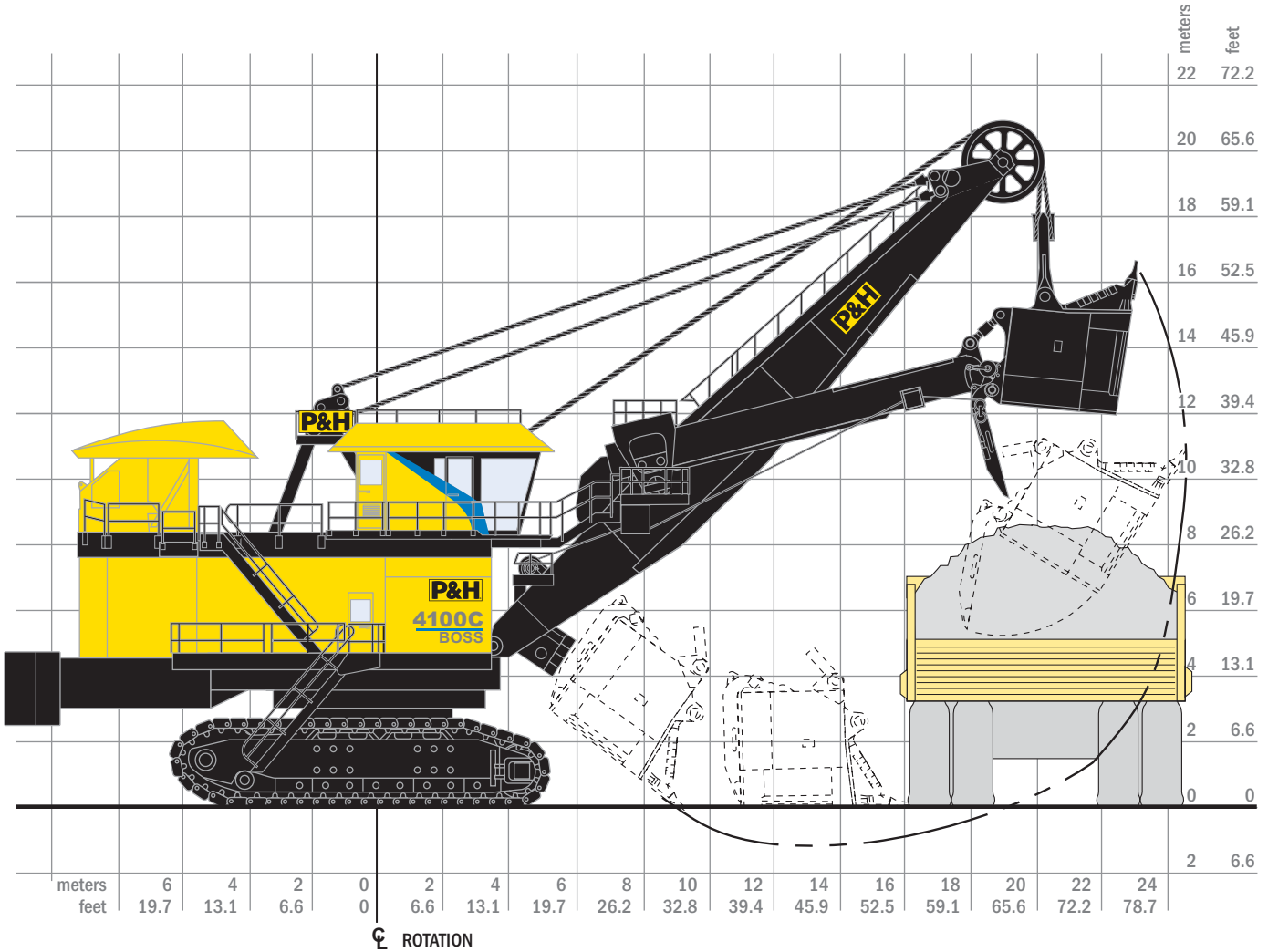
- Smart ergonomics
- Clear sight lines
- Easy access to command and control functions
- Access to key data on machine health and performance provided by Centurion Electrical Control System

Joy Global Support

- **Reliability Centered Maintenance support**
- **Life Cycle Management programs**
- **Genuine OEM parts**
- **Component rebuild and exchange programs**

4100C BOSS

AC Drive Electric Mining Shovel



Working Ranges		
Height of Cut	16.9 m	55 ft. 4 in.
Radius of Cut	24.7 m	80 ft. 11 in.
Dumping Height* (Door Open)	9.5 m	31 ft. 0 in.
Floor Level Radius	16.3 m	53 ft. 5 in.
Tail Swing Radius	11.6 m	38 ft. 0 in.
Operator Eye Level	9.8 m	32 ft. 3 in.

*Height shown with bail-type dipper. Heights will be greater with bail-less or compact-bail dippers. Actual dumping height can be greater than door clearance height.

Capacity		
Nominal Payload*	90.7 mt	100 st
Nominal Dipper Capacity		
SAE struck	44.3 m ³	58.0 yd ³
SAE 2:1	48.4 m ³	63.0 yd ³
Rated Suspended Load	161.0 mt	178 st
Optimum Truck Size (400 st truck shown)	172-363 mt	190-400 st

*Payload and dipper capacity are dependent on many factors. Contact Joy Global for an analysis of your specific application.

Electrical Control

P&H Centurion® Supervisory Controller provides direct integrated communication with motor drives giving precise motor control and fast cycle times. Real-time multi-tasking capability allows for optimal machine logic sequencing, monitoring and control.

Centurion I/O System uses 'Profibus' communication protocol for seamless integration of all shovel subsystems and future expandability. Low-voltage 24V DC I/O drop points feature open and short circuit detection for improved diagnostics and troubleshooting.

Centurion Information System's enhanced Graphical User Interface (GUI) features intuitive, icon-based screens to display vital information such as shovel status, troubleshooting information, and optional production monitoring data and operator feedback

P&H Digital AC Drive provides precise, reliable, solid state power to the main motion motors.

Electrical Control Systems

Electrical Drive Ratings

(50°C, 2000m)	Drive Power
IGBT Supply Unit (ISU)	4550 kVA
Crowd Motion	1160 kVA
Hoist Motion	4640 kVA
Propel Motion	2320 kVA
Swing Motion	3480 kVA

The electrical drive system is comprised of a multi drive platform, sharing a common DC bus between the IGBT Supply Unit (ISU) and the motor drive Inverter Units (INU). The fully regenerative ISU controls the power flow to and from the shovel, maintaining a unity power factor with extremely low harmonic content. The fully regenerative INU controls the power flow to and from the individual AC motors.

P&H AC Fast Response main machinery motors

Hoist Motor (Two used)	Continuous rating @ 690 volts Peak developed power	Total 2388kW / 3200hp 2976kW / 3990hp
Swing Motor (Two used)	Continuous rating @ 690 volts Peak developed power	Total 1090kW / 1460hp 1383kW / 1854hp
Crowd Motor (One used)	Continuous rating @ 690 volts Peak developed power	Total 545kW / 730hp 774kW / 1037hp
Propel Motor (Two used)	Continuous rating @ 690 volts Peak developed power	Total 1090kW / 1460hp 1755kW / 2352hp

Power Requirements

Supply Voltage*	7200 or 13800V 3 Phase, 60 Hz	6000, 6600, 7200 or 11000 3 Phase, 50 Hz
Supply Transformer	(Minimum) 3300 kVA	
Minimum Short Circuit VA Available at Shovel	25 MVA	

*Voltage per customer requirements

Dipper & Dipper Trip

P&H Optima® dippers combine consistent productivity with high durability and maintainability. Dippers are configured to mine specific conditions and capacity requirements from a variety of combinations of body and lip designs, as well as other unique Joy Global technologies. Specific wear packages and GET styles can be cooperatively specified.

P&H TripRite™ system utilizes a brushless DC electric motor with sealed planetary drive unit for reliable trip and slack take up operation.

Swing

Two modular P&H planetary gear cases of proven design and a single piece forged swing gear transmit torque for fast cycle times.

Spring-set air release disc brakes – one per motor.

Splash lube filtration system.

Propel

Propel on demand provides rapid transfer to propel mode. Rapid transfers allow frequent positioning of the shovel to the bank resulting in faster cycle times and more efficient digging.

Two rugged P&H planetary gear cases of proven design independently transmit torque to the drive sprockets, producing the tractive effort required for fast, efficient propel and positioning operations.

P&H DELTA™ Drive low tension sprocket drive system with heavy duty cast crawler shoes.

Spring-set air release disc brakes – one per motor.

Crowd

Powerband V-belt drive between motor and gear case absorbs shock loads.

First and second reduction gearing in enclosed gear case for reliable splash lubrication, ease of maintenance, and extended component life.

Twin-leg dipper handle with torsion box and rack and pinion drive has inherent stability in the bank for optimal digging.

Spring-set air release disc brake.

Hoist

All gearing housed in single enclosed gear case with filtered and cooled oil fed to all bearings in addition to splash lubrication for reliable operation and ease of maintenance.

Large 68" diameter hoist drum for extended rope bending life. Ferrule becket system and dual electric tuggers are standard for efficient rope change.

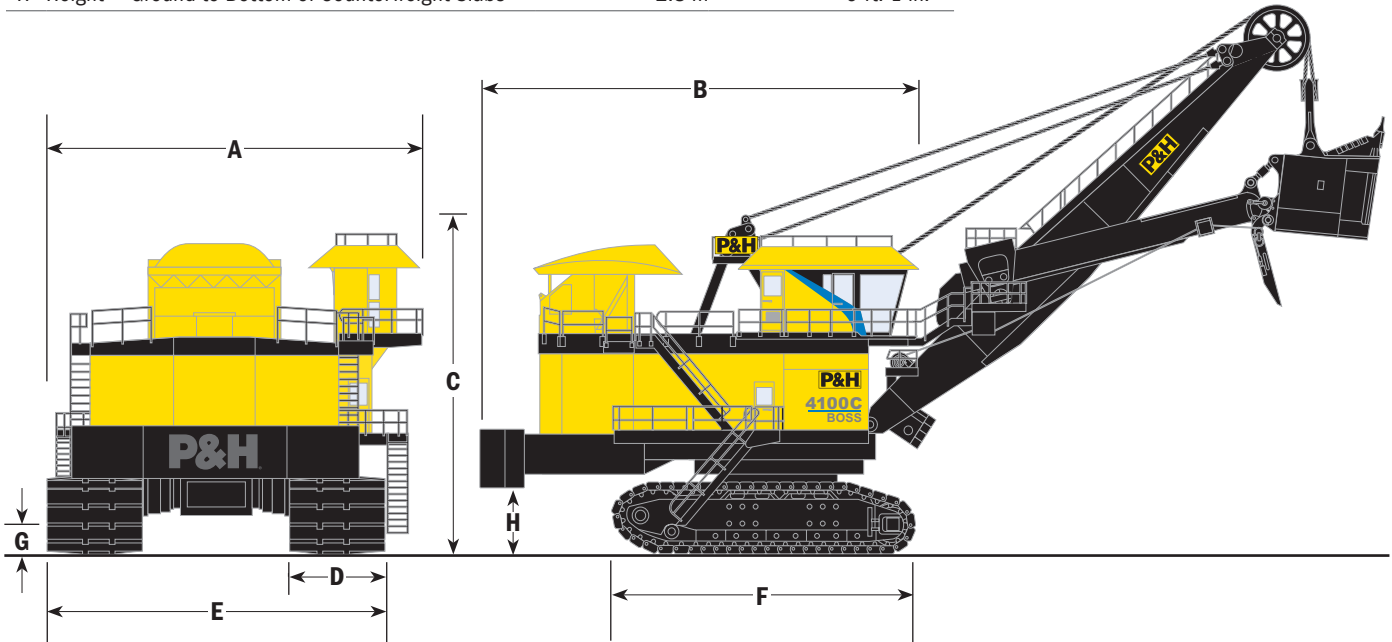
Spring-set air release disc brakes – one per motor.

Cable Data

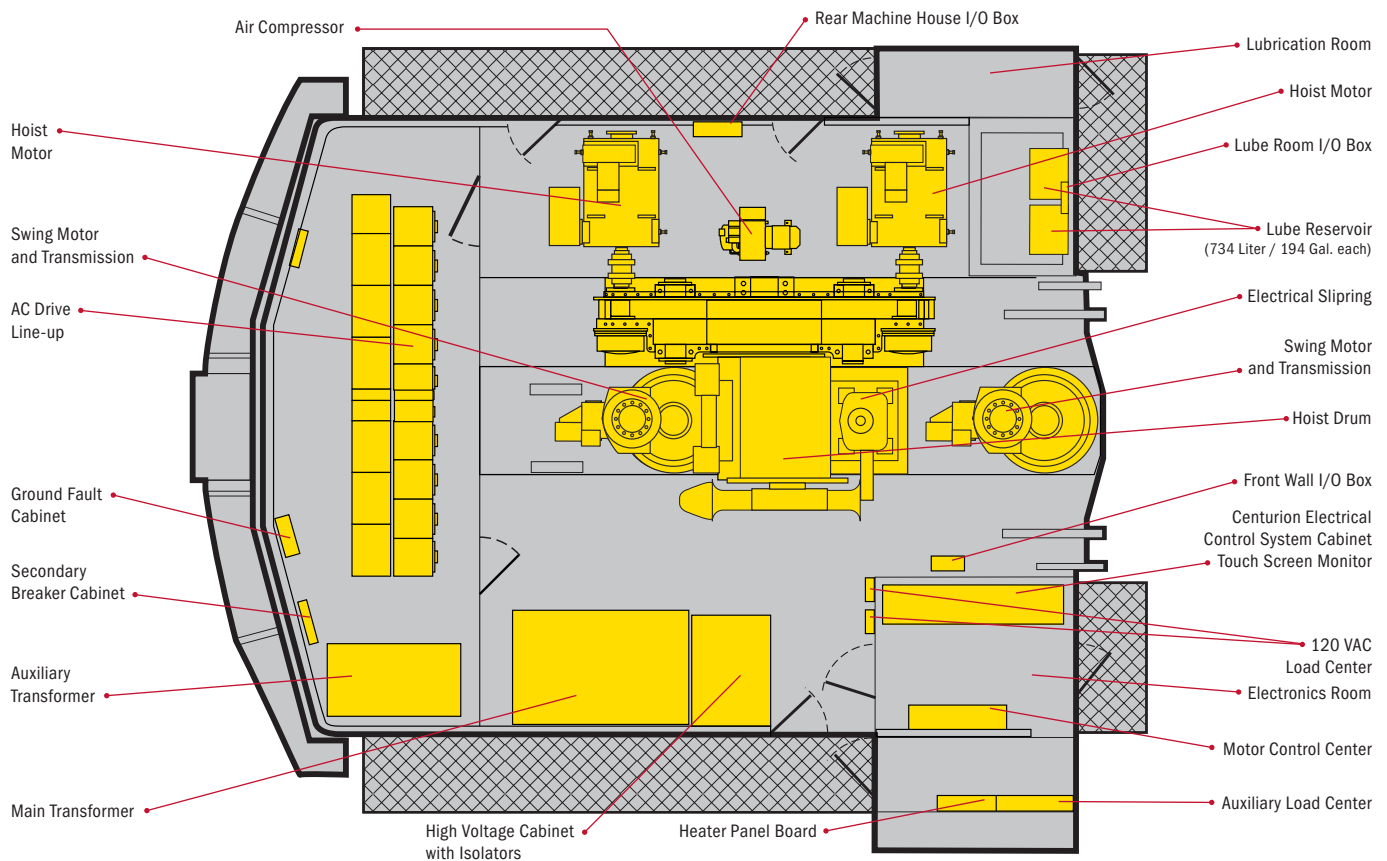
Hoist (wire rope)	70 mm	2.75 in. dia.
Suspension (bridge strand)	102 mm	4.00 in. dia.
Dipper Trip (wire rope)	19 mm	0.75 in. dia.

Overall Dimensions

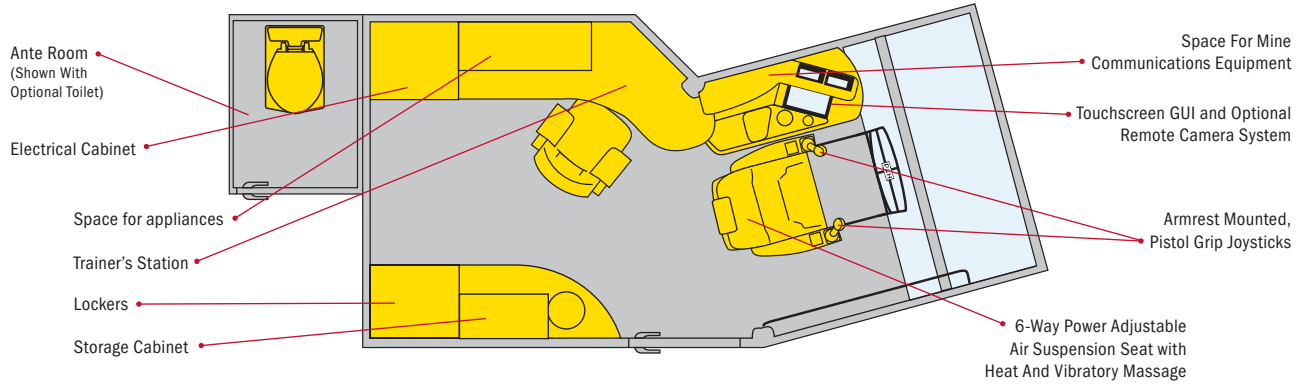
A	Width	14.0 m	45 ft. 10 in.
B	Length	17.2 m	56 ft. 5 in.
C	Height Over Gantry	13.4 m	43 ft. 10 in.
D	Width of Crawler Shoes	3505 mm	138 in.
E	Width of Crawlers (138")	12.8 m	41 ft. 11 in.
F	Length of Crawlers	11.6 m	38 ft. 0 in.
G	Ground Clearance	1.1 m	3 ft. 6 in.
H	Height – Ground to Bottom of Counterweight Slabs	2.8 m	9 ft. 1 in.



Machinery Deck Plan



Loading Control Center



Ground Pressure & Weight

Bearing Area - Ground Pressure

Standard:

Crawler Bearing Area 138" Shoes / 3505 mm	631,199 cm ²	97,836 in ²
Crawler Ground Pressure 138" Shoes / 3505 mm	2.24 kg/cm ²	31.8 psi

Weights - Approximate*

Working Weight (with Dipper, Approx. Wt.)

138" Shoes / 3505 mm	1,410,184 kg	3,108,924 lbs
Counterweight (Punchings)**	170,551 kg	376,000 lbs

* All weights subject to 5% variation.

** To be furnished by customer.

Features And Customization

The 4100C BOSS is built with several features to enhance safety, reliability, and productivity over the lifecycle of the operation

- Automatic Lubrication and Compressed Air Systems with advanced diagnostic and control
- Temperature Monitoring System for all AC motors, drum shaft bearings and shipper shaft bearings
- Automatic Boom Soft Setdown System (ABSS) and Boom Profile Protection Envelope to help prevent excessive loading to the attachment during operation
- Anti-Swing-in-Bank system to reduce excessive side loading on handle and attachment
- Remote hoist control pendant and hoist rope winch to assist in safe and efficient rope changeouts
- House Pressurization System to provide filtered air for cooling and dust repression

The shovel has multiple options for local and minesite specific conditions in the following areas:

- Climate Control
- Technology and Software
- Maintenance Systems





JOYGLOBAL



All designs, specifications and components of the equipment described above are subject to change at the manufacturer's sole discretion at any time without advance notice. Data and descriptions published herein are informational in nature and shall not be construed to warrant the service or the suitability of the equipment for any particular purpose as performance may vary with the conditions encountered. The only warranty applicable is our standard written warranty for this equipment or service.

Joy Global, P&H, Joy, Centurion, PreVail, Optima, TripRite and Delta are trademarks of Joy Global Inc. or one of its affiliates.
© 2012 Joy Global Inc. All rights reserved.



joyglobal.com