

JOYGLOBAL



Hybrid Diesel LHD



JOYGLOBAL Service Leader



Delivering world-class mine performance

At the core of our commitment to customers is providing world-class solutions through our unique direct service network. This allows us to **collaborate with customers**, developing innovative parts, products, consumables and systems that lower their total cost of ownership and maximize production without impacting safety.



Our commitment to quality and reliability is supported by our focus on Operational Excellence. We use Joy OpEx principles to eliminate waste, simplify the process, automate and remove people from harm's way.

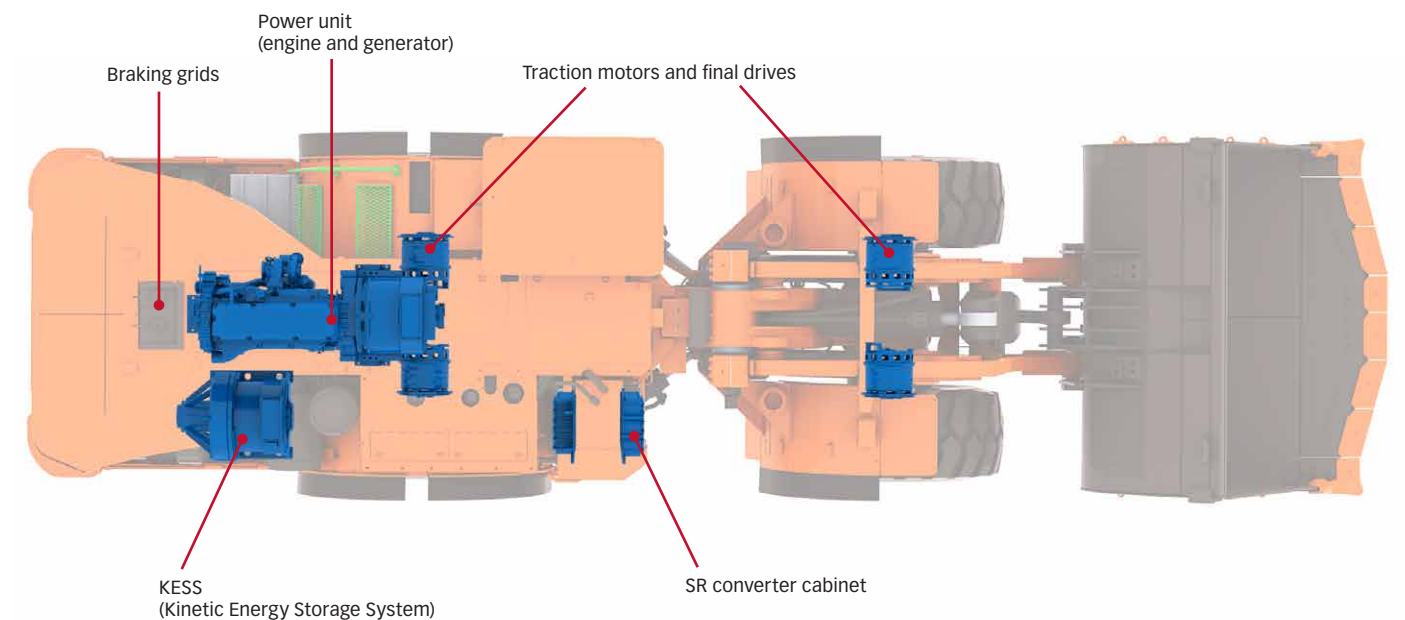
A bottom line breakthrough

The Joy 18- and 20-metric ton diesel LHDs are load haul dumps featuring electric drives. Compared to other LHDs in their class, these machines offer faster acceleration, lower fuel consumption, lower heat rejection and best-in-class breakout and rimpull — all of which contribute to the lowest total operating costs of any LHD in their class.

These key advantages are enabled by our patented JOY SR Hybrid Drive system's unique ability to store energy and put it to use when most needed. This energy recovery delivers several benefits that contribute to a significant reduction in our customers' Total Cost of Ownership (TCO):



- Productivity: improved work cycle time
 - Higher acceleration and equivalent cycle performance
 - Smoother operation (no gear changes)
 - Smart traction system
- Reduced operating cost
 - High efficiency electric driveline
 - 30% or more reductions in operating costs achieved compared to mechanical drive LHDs
- Increased reliability / durability
 - Joy Global has decades of proven performance with SR technology on mining duty machines due to LeTourneau legacy
 - P&H surface wheel loaders historically display utilization rates 10-20% higher than underground production LHDs
- Reduced engine size
 - Reduced emissions
 - Reduced heat load



How does the JOY SR Hybrid Drive system work?

- During propulsion, diesel energy is converted to electric energy; an SR generator provides power to the motors in the wheels to make the machine move
- During braking, when the operator eases off the gas pedal, the flow of diesel energy stops; machine momentum keeps the motors rotating
- Energy now flows from the motors to be stored in the Kinetic Energy Storage System (KESS) unit as the traction system slows the machine
- After the machine has stopped digging or dumping its load and is ready to move again, the operator presses on the gas pedal
- The KESS starts to supply stored energy, while at the same time, the diesel engine also begins supplying energy
- Two sources of energy work simultaneously to provide the equivalent of one 400hp engine being boosted by another 550hp engine

This recapture, storage and redirection of energy can lead to a significant productivity increase. A typical block cave mining operation requires these machines to make many stops, starts and turns. The Joy SR Hybrid Drive system enables the 18HD and 22HD to accelerate much faster than comparable machines, which allows them to get from the draw point to the crusher and back again much quicker. Over the course of time, that can lead to as much as a 20% increase in tons moved. These significant increases in productivity can be achieved while using less horsepower and consuming far less diesel fuel – in some cases, up to 33% less.

Using less fuel reduces overall cost of operation and offers additional benefits related to human health and safety: primarily, reductions in diesel emissions and heat. This contributes to the protection of the mine's most valuable human assets while potentially reducing its costs related to ventilation requirements. The mine could have the option of either: operating with a lower level of ventilation than would be required with other machines or operating a larger number of Joy LHDs without increasing ventilation.

Key features

Safety

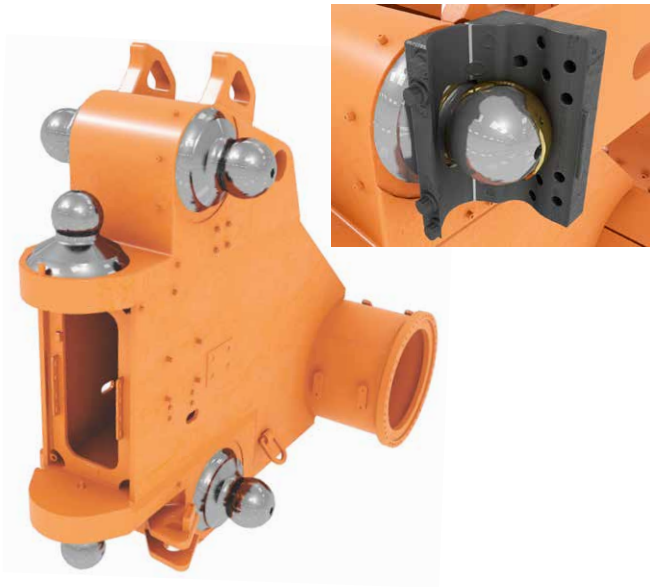
- ROPS/FOPS operator’s cabin
 - Certified protection of the operator
- Failsafe braking systems
 - Redundant braking systems provide layers of protection in the event of a single point brake failure
- Platforms, steps, stairs and hand rails
 - Designed to the world’s best standards
- Emergency stop
 - Safety Integrity Level 2 (SIL 2) rated system
 - Multiple e-stop switches situated in key locations around machine
- Lockable battery and starter isolation for the protection of maintenance and service personnel
- Emergency braking system

Reliability

- Rugged steel frame structures
 - Built strong for long life and reduced maintenance
 - Protection from impact and wear
- Ball and socket joints
 - Long life and proven high reliability design
- SR Hybrid Drive System
 - Low operating cost, high reliability and performance
- Hydraulic systems with piston pumps
 - Cooler operation, longer life



- Modular low voltage electrics
 - P67, modular double insulated wiring system using standardized componentry to reduce downtime and operating cost
- Central auto lubrication
 - Minimizes scheduled service activity and protects critical structural linkages and joints
 - Long life grease tank
 - LINCOS II notifies operator of grease system performance



Productivity

- Easy to use operator controls
 - Simple control suite allows the operator to concentrate on maximizing productivity
 - Automated control functions such as return to dig and return to carry allow the operator to perform complex functions at a button press
 - Intuitive human to machine interface provides the operator with up to the moment productivity and machine performance information
- Switched Reluctance Hybrid Drive
 - Capture and re-use of braking energy
 - Class leading acceleration
 - Shorter cycle times
 - Greater fuel efficiency
- Heavy duty design
 - Less failures, more uptime
- Bucket design
 - Easy filling, low wear

18HD Operating capacities, weights and dimensions		
Bucket capacity*	7.2 m³	9.42 yd³
Static tipping loads	396 kN	88,890 lbs
Breakout force (tilt)	349 kN	78,500 lbs
Operating weight	49,900 kg	110,000 lbs

*Standard rock bucket based on a material density of 2,500 kg/m³ (4,213 lb/yd³).

Working ranges		
Engine rated power		
Production	280 kW	375 hp
Development	360 kW	482 hp
Hybrid power**	410 kW	550 hp
Payload	18,000 kg	39,700 lbs
Bucket capacity: 8.2 m³/10.7 yd³ and 9.0 m³/11.8 yd³ bucket options available		

**Hybrid power available for acceleration events.

Fluid capacities		
Fuel	757 L	200 gal
Hydraulic	473 L	125 gal
SR converter cooling system	18.9 L	5 gal
Engine cooling system	56.8 L	15 gal
Engine oil	37.8 L	10 gal
Planetaries (each)	7.6 L	2 gal

22HD Operating capacities, weights and dimensions		
Bucket capacity*	9.0 m³	11.8 yd³
Static tipping loads	48.2 kN	10,6350 lb
Breakout force (tilt)	350 kN	78,000 lb
Operating weight	58,968 kg	130,000 lb

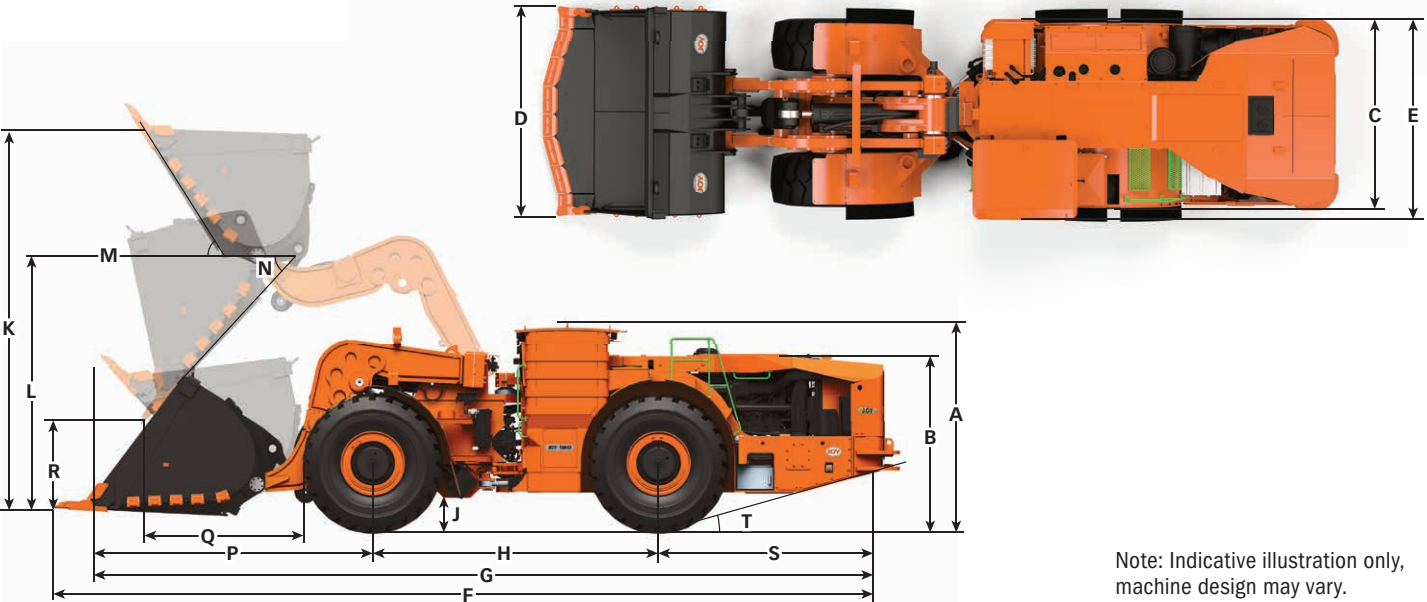
*Standard rock bucket based on a material density of 2,500 kg/m³ (4,213 lb/yd³).

Working ranges		
Engine rated power		
Production	320 kW	429 hp
Development	380 kW	509 hp
Hybrid Power**	410 kW	550 hp
Payload	22,000 kg	48,500 lbs
Bucket capacity: 10.0 m³/13.1 yd³ and 11.0 m³/14.4 yd³ bucket options available		

**Hybrid power available for acceleration events.

Fluid capacities		
Fuel	757 L	200 gal
Hydraulic	473 L	125 gal
SR converter cooling system	18.9 L	5 gal
Engine cooling system	75.7 L	20 gal
Engine oil	147.6 L	39 gal
Planetaries (each)	7.6 L	2 gal

18HD and 22HD



Note: Indicative illustration only, machine design may vary.

Overall dimensions		18HD (7.2 m³ bkt)		(9.0 m³ bkt)		22HD (9.0 m³ bkt)		(11.0 m³ bkt)	
A	Height over cabin	2.9 m	9 ft 5 in			2.9 m	9 ft 7 in		
B	Height over power unit	2.5 m	8 ft 1 in			2.5 m	8 ft 3 in		
C	Vehicle width across tires	2.8 m	9 ft 2 in			2.8 m	10 ft 6 in		
D	Width across bucket	3.1 m	10 ft 2 in			3.2 m	10 ft 9 in		
E	Max. rear frame width	2.8 m	9 ft 2 in			2.8 m	9 ft 2 in		
F1	Vehicle length digging (GET)	11.4 m	37 ft 4 in	11.7 m	38 ft 5 in	11.7 m	38 ft 3 in	12.1 m	39 ft 10 in
G1	Vehicle length hauling (GET)	11.0 m	36 ft 0 in	11.2 m	36 ft 9 in	11.3 m	36 ft 11 in	11.3 m	38 ft 2 in
F2	Vehicle length digging (No GET)	11.2 m	36 ft 8 in	11.5 m	37 ft. 10 in.	11.5 m	37 ft 8 in	12.0 m	39 ft. 3 in.
G2	Vehicle length hauling (No GET)	10.8 m	35 ft 6 in	11.0 m	36 ft 3 in	11.1 m	36 ft 4 in	11.5 m	37 ft 8 in
H	Wheelbase	4.1 m	13 ft 4 in			4.1 m	13 ft 5 in		
J	Ground clearance	0.4 m	1 ft 4 in			0.5 m	1 ft 7 in		
K	Bucket height fully raised	5.9 m	19 ft 4 in			6.9 m	22 ft 8 in		
L	Hinge pin height	4.1 m	13 ft 6 in			5.0 m	16 ft 6 in		
M	Roll back angle	48°				47°			
N	Dump angle	53°				45°			
P1	Wheel center to bucket - carry (GET)	3.6 m	11 ft 9 in	3.8 m	12 ft 7 in	3.9 m	12 ft 8 in	4.2 m	13 ft 11 in
P2	Wheel center to bucket - carry (No GET)	3.4 m	11 ft 2 in	3.3 m	10 ft 10 in	3.7 m	12 ft 1 in	4.1 m	13 ft 5 in
Q1	Tire to bucket - dump (GET)	1.9 m	6 ft 1 in	2.0 m	6 ft 8 in	1.9 m	6 ft 2 in	1.9 m	7 ft 2 in
Q2	Tire to bucket - dump (No GET)	1.8 m	5 ft 9 in	2.0 m	6 ft 7 in	1.5 m	5 ft 10 in	2.1 m	6 ft 10 in
R	Dump height	1.5 m	5 ft 1 in			3.2 m	10 ft 7 in		
S	Wheel center to rear bumper	3.3 m	10 ft 11 in			3.3 m	10 ft 10 in		
T	Departure angle	15°				15°			

Power module

Diesel power options

MTU Detroit diesel engine Model	US tier IV final/EU stage IV Series 1100, 10.6 litre Six cylinders	US tier IV final/EU stage IV Series 1300, 12.8 litre Six cylinders
Type	Four-cycle turbo charged	Four-cycle turbo charged
Rated engine power (18HD)	280 kW (375 hp) @ 1800 rpm	360 kW (482 hp) @ 1800 rpm
Rated engine power (22HD)	300 kW (400 hp) @ 1800 rpm	380 kW (509 hp) @ 1800 rpm

Note: The lower hp engine option is most suitable for production level operations such as block/panel caving, where fuel efficiency and emission output are highly critical. The higher hp engine option is most suitable for multipurpose applications where the machine is required to work on declines or steep grades.

The independent power module mounting system, consisting of the engine coupled to the SR generator, is cradled within the rear frame by a three-point isolation system.

Radiator/oil cooler module

- Replaceable tube type, over-under split flow
- Thermostatically controlled, variable speed hydraulic motor-driven, radiator-mounted fan

Exhaust system

MTU Tier IV final exhaust after treatment catalyst box

Control system-LINCS II

CAN Based Vehicle Control Unit incorporating high speed monitoring and advanced diagnostics including integrated data logging and storage.

LINCS II uses a dash mounted full color touch screen display as the operator interface. Out of range conditions will cause an audible alarm along with a message screen that is color coded to indicate severity.

In addition, the touch screen display provides repair technicians with operational data and fault messages.

LINCS II load weigh

Displays real-time load data, cycle times, production rates and operational profile.

- Memory capable of retaining months of production information
- JoySmart remote monitoring connectivity available for additional diagnostics and productivity analysis
- Capable of interfacing with radio dispatch systems for on-site real-time monitoring

Steering and hoisting system

Steering

Steering function is controlled by a single joystick. Constant engine rpm assures full hydraulic steering response.

Articulation angle		46°			
Turning radius		18HD		22HD	
Outside		7.3 m	23 ft 11 in	7.53 m	24 ft 8 in
Inside		3.4 m	11 ft 1 in	3.21 m	10 ft 6 in
Standard/high lift cycle					
Hoist		8.2 seconds		8.4 seconds	
Dump		2.2 seconds		2.0 seconds	
Float		3.4 seconds		4.0 seconds	
Total		13.8 seconds		14.4 seconds	

Hoist and bucket control

Hoist and bucket control functions are incorporated into a single joystick control. The proportional electro-hydraulic controlled hoist and bucket system is independent of the steering system.



With proven JOY SR Hybrid Drive technology, the 18HD and 22HD can re-energize your bottom line.

For more information, contact a Joy Global representative or visit www.joyglobal.com



Joy Global worldwide locations

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