

Committed to building the most trustworthy brand in the industry



Leader of New Energy Loader Industry  
Standard Setter of New Energy Loader Industry



# Industry debut YX670HEV

ENSIGN Hybrid loader

**ENSIGN HEAVY INDUSTRIES CO., LTD.**

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Intellectualisation



Environmental



Comfort





## Enterprise Profile

Ensign Heavy Industries Co., Ltd, established by Ensign Holding Group Co., Ltd. in 2011, is one of the well-known heavy equipment manufacturers in China. The investment industries of Ensign Holding Group Co., Ltd. include Citric Acid, Edible Alcohol, Construction Machinery, Agricultural Equipment, Real-estate, etc. It's a globally well-known Citric Acid manufacturer and a domestically reputable top-class Edible Alcohol manufacturer in China.

As a high-end machinery & equipment manufacturer and service provider, Ensign Heavy Industries serves to modern urban and transportation construction, agricultural production, and industry logistics applications. The company currently has business in more than 100 countries and has more than 300 distributors all over the world.

With the multi-business layout, the company dedicates to providing systemized and customized solutions to customers. The business covers construction machinery, agricultural equipment, industrial vehicle, international business and other fields. It has modern R&D center, intelligent manufacturing center to focus on independent research and production of high-tech equipment and core components.

In order to continuously build core competence and push development of industries innovation, Ensign Heavy Industries sets up "Qingdao +Weifang" integrated products research and engineering system. It has the largest intelligent single manufacturing plant in the industry, adopts innovative OPF lean production mode, and makes all core components by itself, persistently providing valuable products and services to customers.

Adhering to the development concept of "industry innovation + customer value maximization", Ensign Heavy Industries is committed to building up a most trustworthy brand in the industry. In line with the core value of "innovation, integrity, win-win", the company speeds up industry innovation and globalization strategy, and makes every effort to create "win-win" customer value ecosystem with the expectation of becoming the trustworthy and dependable partner for customers.



Committed to building the most trustworthy brand in the industry



Thinking ahead of customer's demand, leading staff's ambition and taking social responsibility

The "HEV" series loader is another brand new technology line product of ENSIGN new energy layout. Based on the P2 technology line, the tandem hybrid power transmission line, achieves a perfect match between fuel and electric drive, and combines the absolute advantages of fuel and electric loaders. Featuring high efficiency, energy conservation, intelligence, and the best experience.

### Product feature:

- > Extreme saving fuel , with fuel consumption reduced by about 30% compared to fuel loaders of the same tonnage.
- > New energy products, and no need to add urea, to meet the environmental requirements, the use of lower costs.
- > Equipped with Lithium Iron Phosphate battery pack, extra long warranty, maintenance free for life.
- > Electric drive operation, responsive and powerful, dual motor structure, high efficiency and energy saving.
- > Unlimited range operation without limitation of charging supporting facilities.
- > Intelligent Parking, Intelligent Temperature Control, Reverse Rear View in one, human-machine interaction, intelligent manoeuvring , driving comfort.





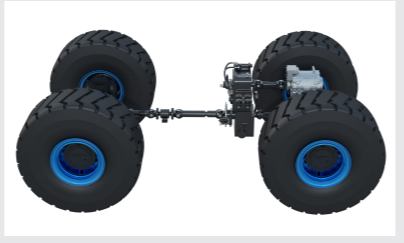


## ENERGY CONSERVATION



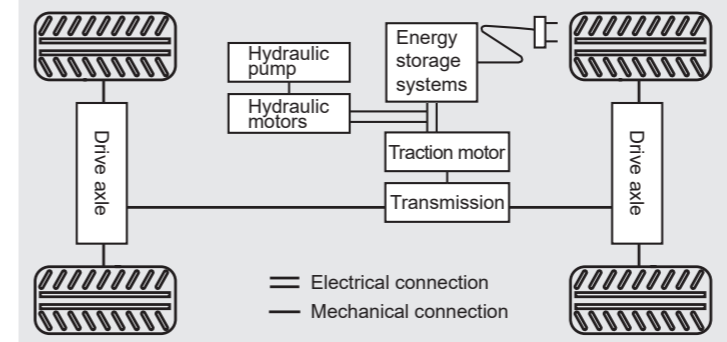
### Intelligent start/stop Brake charging

While stepping on the brake, the motor counter-drags to reduce the brake pressure on the brake disc and achieve fast braking. Braking with energy recovery function, for the battery constantly charging, to avoid energy loss to the maximum extent, to extend the range time.



### Purely electric drive Energy efficient

Adopting high-efficiency electric transmission technology, the motor is directly connected to the gearbox without torque converter energy loss, which improves energy utilisation by more than 30% compared with hydro-mechanical transmission.



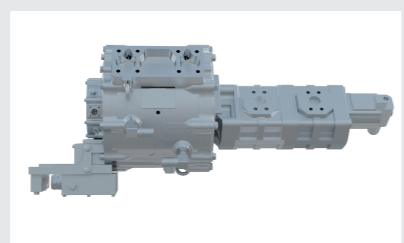
## Dual Machine Architecture Efficient coordination

Adopting dual motor structure, travelling and hydraulic control separately. The hydraulic motor control responds quickly, and the lifting speed of the arm is faster. Decoupling the hydraulic system and the drive system, dual motor independent operation, hydraulic system action can be achieved when the drive system "zero" energy loss, more energy efficient



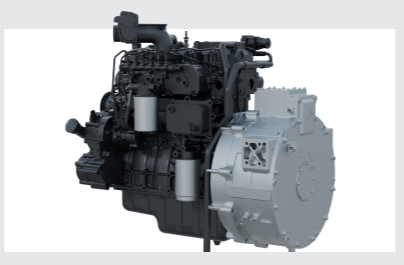
### Intelligent temperature control Ultimate energy saving

Adopting intelligent temperature control system, the system can automatically adjust the fan speed according to the oil temperature and water temperature. While regulating temperature, save energy to the extreme.



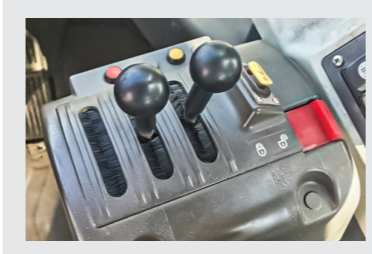
### Electric hydraulic control Quantitative control On demand fuel supply Efficient and energy-saving

Adopts independently controlled hydraulic motors to supply oil on demand for fast response and high efficiency.



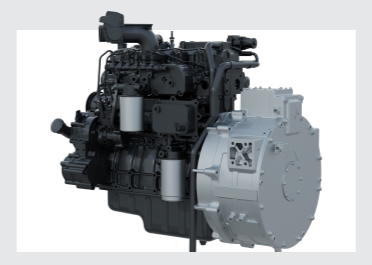
### Fuel Electricity Conversion Long lasting battery life

Power generation by oil, long-lasting range, not limited by charging piles and cables, and at the same time meet different use scenarios. Compared with the traditional transmission route, the energy saving is more than 30%, reducing the customer's cost of use.



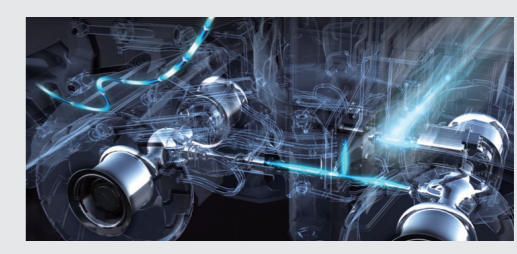
### Hydraulic Pilot Thumb control

The FNR shift switch is set on the right side, which enables one-handed operation, with one hand steering and one hand manoeuvring, for quicker work.



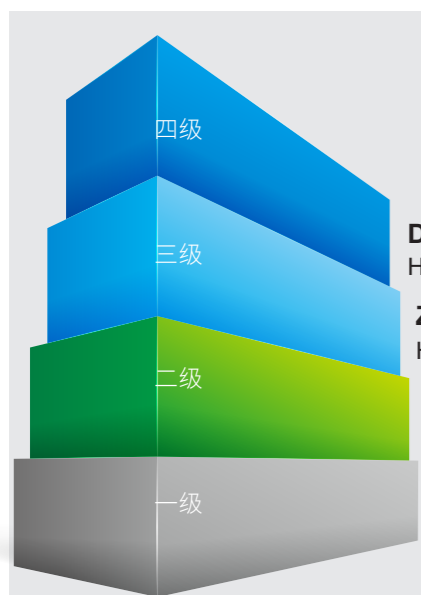
### Intelligent range extender Efficient power supply

With a high-efficiency integrated range extender, the engine continuously and stably works in the high-efficiency zone, and the overall efficiency is much higher than that of conventional fuel models.



### Direct motor drive Efficient transmission

The travelling motor is directly connected to the gearbox, which is more responsive than an engine connected to a torque converter, and the motor drive starts faster. For the same journey, the hybrid loader uses less time and improves transmission efficiency by more than 30%. Utilising Intelligent electronic control programme, achieves stepless speed change, power cut-off and other functions to ensure the highest efficiency of the whole machine (transport + shovelling dual operation mode).



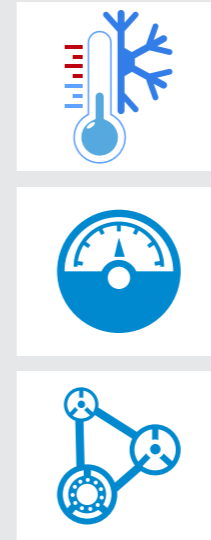
- Down high pressure**  
Human body sensing current 1/2
- Zero power**  
Human body sensing current 1/3
- Power reduction**  
Human body sensing current 1/6
- Warning**  
Human body sensing current 0



## WISDOM

### Intelligent Protection Safety carefree

Four levels of security to ensure the use of process safety Completely carefree. Electrical protection to IP67 rating (6 means: completely protected against dust ingress; 7 means: unaffected by immersion in water up to 1 metre deep for 30 minutes).



### Intelligent temperature control Optimal Condition

Battery thermal management system, motor thermal management system, through the intelligent temperature control system, to achieve accurate temperature control, to ensure that the product works in the best state.

### System Intelligence Intelligent Interaction

Adopting 8 inch high definition screen, the machine status monitoring, data analysis, fault alarm in one, can be directly viewed through the mobile phone APP product working status.

### Intelligent Detection Energy Saving and Consumption Reduction

Intelligent monitoring system evaluates the operation mode in real time, when the operation mode causes the fuel consumption to deviate from the economic zone, the intelligent reminder will be given, if the economic fuel consumption zone is exceeded for a long time, the system will actively intervene to control the speed of the vehicle, assisting the user to optimise the operation habit and reduce the cost of vehicle use.



### ▶ Steps to start the machine

1. Place the left and right hand shift switches in the neutral (N) position.
2. Insert the starter key, turn the ignition switch key clockwise to "ON" position, sound the horn.
3. Step on the brake pedal, the car start.
4. If it can not start, the time interval between starting again should be more than 1 minute. If the vehicle fails to start three times in a row, the cause should be identified and confirmed to eliminate the fault before starting.

### ⚠ Special tips

Hybrid loader braking system with automatic handbrake——

1. Parking brake switch is pressed down, the whole machine automatically brakes after switching off the engine, and the brake is automatically released when starting up.
2. Parking brake switch is pulled up, when restarting, the switch needs to be manually pressed to release the brake (the instrument flashes the brake warning light) to ensure that the parking brake is released.
  - ◆ When the brake air pressure is lower than 0.45MPa, the engine starts immediately when the key is switched on to ensure driving safety.
  - ◆ When the ambient temperature is lower than 0℃, the power-on engine will preheat the intake air by itself (0-120S, the higher the temperature the shorter the preheating time), and it will start after the preheating is finished.

### ▶ Machine power down step

1. When the vehicle is parked, pull the parking brake switch and the screen displays the brake warning.
2. Allow the vehicle to idle at low speed for about 5 minutes to allow all parts to cool evenly.
3. Turn the key to the "OFF" position.

### ⚠ Special tips

1. To protect the engine, if the range extender is generating power before stopping, stop the engine after 60 seconds.
2. Not permissible to switch off the main power switch during engine cooling.
3. If the range extender is not generating power before machine stop, it will stop immediately after powering down.

### ▶ Precautions for use

1. The characteristics of the power battery require that its operating temperature can not be too low, and it needs to be fully preheated before operation, otherwise the power will be limited, if the local temperature is low, it is recommended to park indoors and optional battery heating system, which can shorten the preheating time when it is used again.
2. The hybrid loader is different from the traditional fuel loader, adopting permanent magnet synchronous motor to provide power, dual motor architecture, independent control of travelling motor and hydraulic motor, the wrong operation will lead to excessive power consumption of the whole vehicle, the vehicle is running in the non-economic zone, and the fuel economy is poor. When the intelligent monitoring system detects that the fuel consumption deviates from the economic zone, it will prompt, at this time, you need to adjust the operating rhythm or optimise the operating habits; if the economic fuel consumption zone is exceeded for a long time, the system will actively intervene to control the vehicle speed; when the operating rhythm is adjusted or the operating habits are optimised to return to the economic zone, the system will automatically withdraw from the vehicle speed limit.

#### Bad operating habits

- ◆ Pedal quickly and deeply during operation
- ◆ Pedal and the brake pedal at the same time during operation.
- ◆ Pedal deeply for long periods of time during operation.

#### Wrong Operating Habits

- ◆ Deeply press the accelerator pedal to achieve rapid action of the work unit.
- ◆ Neutral moving vehicle or going downhill, not control of speed.

#### Hazardous operations

- ◆ When working on ramps, the brakes must be controlled and the maximum speed in 1st gear must not exceed 13km/h.
- ◆ It is strictly prohibited to use a high-pressure water jet to flush the engine, high-pressure parts and harness connections.
- ◆ When towing this loader, the towing speed is strictly prohibited to exceed 10km/h.

3. When the range extender is powered down at high RPM, the engine will shut down after 60S of heat dissipation. It is prohibited to cut off the main power switch in the left side counterweight before the engine is shut down;
4. Cold weather operations
  - ◆ If the temperature is too low, the engine will be difficult to start; when the temperature of the power battery is lower than 0℃, the range extender will not be able to charge the battery, and the whole vehicle will be underpowered and alarmed, and will not be able to operate normally;
  - ◆ So the following should be done:
    - 1) Use low viscosity fuels, hydraulic fluids and lubricants, and coolant with low temperature antifreeze;
    - 2) Charge the battery immediately after stopping the car and try to keep the battery level above 80%;
    - 3) If conditions permit, try to park the vehicle in a building to avoid the battery being "frozen through", which will reduce the warm-up time for the next start;
    - 4) Preheat the whole machine sufficiently, or optional water heating system to reduce the preheating time;

**Please read the supplied <Operation Maintenance Manual > carefully before using this product!**





# Hybrid loader

The ENSIGN YX670HEV hybrid loader adopts an energy conversion route of "oil" to "electricity", which not only saves energy and is efficient for electric loaders, but also continuously converts electrical energy through range extenders to solve range anxiety.

The application scenarios are better than those of pure electric loaders, and the energy consumption is lower than that of fuel loaders. Combining the advantages of fuel loaders and electric loaders, this loader has been developed to provide the user with the "best experience".

With the features of "energy-saving", "high efficiency" and "intelligence", this product is suitable for most of the working conditions, such as earthmoving, municipal, mining and other traditional working conditions, but also for special working conditions such as plateaus, tunnels, confined spaces and other special working conditions.



## Hybrid power

Loader Energy utilization rate

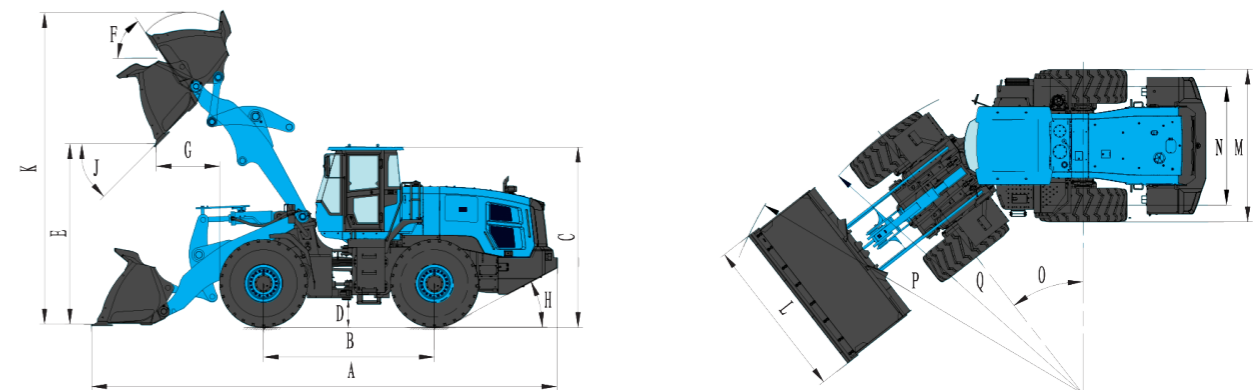


## Main technical parameters

Model	YX670HEV
Bucket capacity(m <sup>3</sup> )	3.5-6.2
Rated Load(kg)	6500
Operating Weight(kg)	22240
Max. traction force(kN)	178
Max. breakout force(kN)	200
Departure angle H(°)	28
Min. turning radius(outside of the bucket)(P)(mm)	7340
Min. turning radius(outside of the tire)(Q)(mm)	6400
Vehicle width(outside of wheels)(M)(mm)	2850
Total cycle time(s)	10.5
Dump angle(J)(°)	45
Dump height(E)(mm)	2955-4085
Dump distance(G)(mm)	1210-1690
Min. ground clearance(D)(mm)	485
Wheel base(B)(mm)	3400
Wheel tread(N)(mm)	2350
Steering angle(O)(°)	38
Max. lift flip angle(F)(°)	58
Max. lift height(K)(mm)	6390
Overall dimension(A*L*C)(mm)	9320*3200*3530

## Engine

Model	Yuchai YCF36
Rated power(kW)	118
Rated speed(r/min)	2400



\*The right to interpret the above parameters belongs to Ensign Heavy Industry. Subject to change without notice, and the illustration in the text is not necessarily the standard model of the machine.