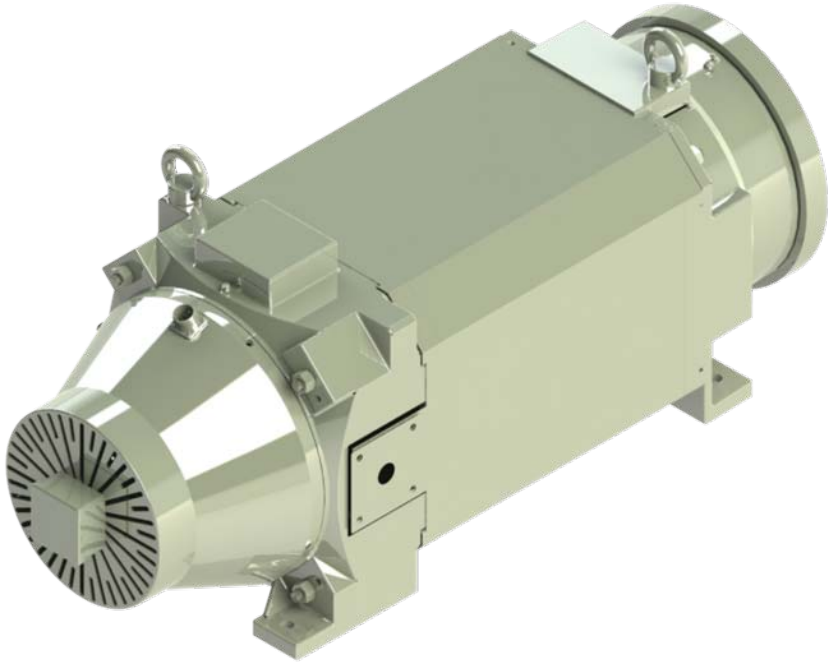




Balqon Corporation Model Nautilus XE-20 – Zero Emission All Electric Terminal Tractor
- Key Components and Specifications -

AC Induction Motor



Description

The XE-20 uses an AC Induction motor which is the most compact and lowest weight design for its class. It provides a high torque to inertia ratio and has 4 different thermostats that are continuously monitoring for optimal thermal protection.

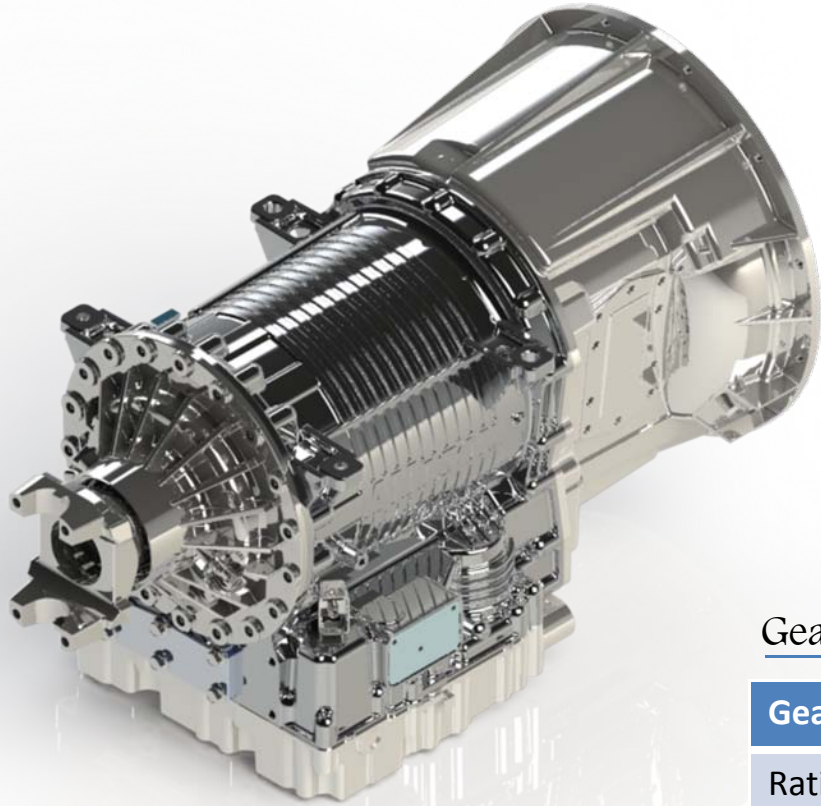
Features

- Inertia: Low inertia rotor
- Reliability: One Moving Part
- Protection: 4 temperature sensors
- Lubrication: Positive Lubed Bearing
- Fully Enclosed housing

Specs

- Speed: 5000 RPM Max
- Power: 200 HP @1800-2400 RPM
- Torque: 600 lb-ft @0-1800 RPM

Transmission



Features

- 6 speed fully automatic Transmission
- TRW power steering with mechanical backup
- Automotive hydraulic pump with Steering gear box
- Constant running PTO pump
- Heavy duty torque converter – reduces shock & strain
- In-line electric motor
- Electronic CAN Bus shifting

Gear Ratio Specification

Gear	1	2	3	4	5	6	R
Ratio	3.49:1	1.86:1	1.41:1	1:1	0.75:1	0.65:1	5:1

Description

The XE20 uses a 4 speed fully automatic Allison 3000 RDS transmission which has a torque converter for increased shifting performance, faster acceleration, greater operating flexibility and minimal rollback. The torque converter's cushion effect reduces shock and strain on all driveline components.

Traction Controller/Inverter



Features

- Regenerative Braking
- Fully Enclosed Housing
- Liquid Cooled
- Output short circuit protection
- Output over current protection
- Output phase loss protection
- Over and under voltage protection
- Quick connect sealed connectors
- Serial communication port
- Over temperature protection
- Silent operation
- Multi-line, multi Language keypad display
- Control Method: Closed Loop Flux Vector
- Digital and analog outputs for dash controls
- Automatic tuning function for custom motors
- Laminated DC bus design
- Integrated pre-charge contactor
- Single or two pedal control
- Battery current limit adjustment
- Battery deep discharge prevention
- Battery state of charge monitor
- Motor speed limit protection
- Individually adjustable pedal response
- Regenerative braking disable switch
- Performance-Economy mode
- Surface mount technology
- Aluminum enclosure for RFI shielding
- Total digital control
- Motor overload protection

Description

The XE-20 uses a proprietary flux vector motor controller that is 240 KW liquid cooled. It has been designed specifically for use in higher performance electric and hybrid cars, buses and delivery vehicles. It has an integrated J 1939 - CAN BUS and self diagnostic system and solid state switching controls which are 600 amp rated. There is also a built in energy management system and battery life calculator so that the operator is fully aware of current system performance.

Specs

- Input voltage: 150 to 400 V dc
- Output voltage 0-255 V AC 3 Phase
- Output Power: 240 kW
- Output frequency: 0-400 Hz
- Speed feedback: Encoder
- PWM Frequency: 10 kHz
- 96-98% Drive Efficiency

Battery Management System – BMS

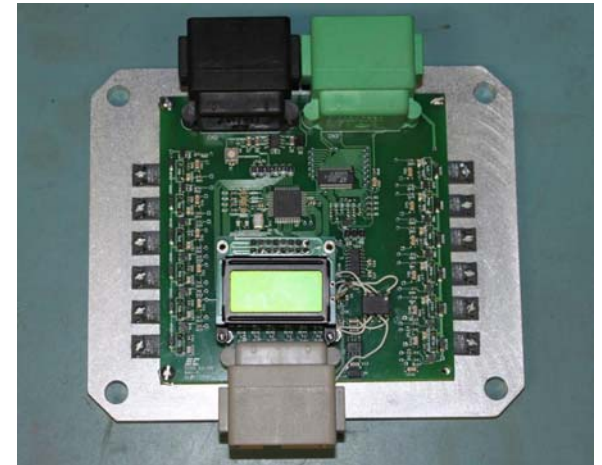


Features

- Battery Management System monitors and equalizes up to 12 battery cells.
- Communicates over J1939 Truck and Bus Can Bus Network
- Exchanges information with vehicle and charging controllers
- Galvanic isolation between boards and communication network for safety
- High equalization current for fast balancing of large battery cells
- Controllable voltage and current during equalization for optimum charging
- Exchanges information with both vehicle and charging controllers
- Encapsulated design for harsh environments inside the battery enclosure
- Programmable with all common Electric Vehicle battery cell chemistries
- Each cell voltage is measured with 12-Bit ADC for precision charge calculation
- Multiple temperature sensors per BMS Board for charge calculation
- Embedded Flash Microcontroller to handle calculation and communication.
- LCD HMI for voltage, temperature, and charge status

Description

In today's electric vehicles, the energy storage battery is a vital component. The battery is made up of many cells of which the weakest one cell determines the range of the vehicle. A battery management system (BMS) is necessary to keep all cells optimally charged for the greatest vehicle range. A BMS circuit board will mount to each battery bank. It will monitor 4 to 12 cell voltages and 2 bank temperature sensors.



Display & Instrumentation

Features

- Speedometer
- Tachometer (including Hour meter)
- Voltmeter
- integrated USB data port for data downloads
- brake system
- analog fault lights for air pressure
- Parking brake indicator
- High Beam option
- Low fuel / air indicators
- Backlit switches for night operation
- Dash Mounted LCD Display – Battery Charge Status; Battery Temperature; Battery Management System; 12 Volt Battery Status; Transmission Status



Description

The driver will always know the details of the performance of the XE20 vehicle with a full array of displays and gauges mounted securely and tested for accuracy.

Operator Controls

- Parking brake
- Headlamps
- Turn signals –column mounted
- Brake / Acceleration pedals
- 5th wheel height control & lock
- Transmission Gear Selector – T handle

Hydraulic System and 5th Wheel

The XE20 power steering and 5th wheel boom lift are operated hydraulically and powered by a hydrostatic pump.

The power steering system consists of an integrated gear and a power steering pump. Fluid is supplied to the power steering system from the hydraulic fluid reservoir located on the left frame rail.

The 5th Wheel hydraulic boom lift allows the operator to move (spot) trailers while remaining in the cab. Trailers can be raised and coupled, then moved to their destination and lowered with ease. Uncoupling is made easy by using the hydraulic boom and air controls.

The 5th wheel boom cylinders are hydraulically actuated to raise and lower the boom and 5th wheel. A hydraulic pump is driven by the electric motor to supply the hydraulic fluid pressure needed for operation.

Specification

- 5th Wheel – 70,000 lb semi oscillating 16 inch lift; Driver Cabin Controlled
- Hydraulic Lift Cylinders – (2) 5 inch 50,000 lb capacity – In-cab hydraulic lift system
- Hydraulic tank – 15 gallon steel tank with sight glass
- Hydraulic Pump – PTO Mounted
- Manual uncoupling
- Forged, machined and heat treated steel lock jaw

Cab & Equipment



Description

All XE20's are e-coated to provide superior coverage, adhesion, and corrosion resistance. The steel welded construction gives ample support for loading. The cab comes standard with white painting and a rear sliding door. The cab has a tilting capability for easy access during maintenance. The vision of the driver is put a priority with large glass windows and the comfort of the driver is catered to with a plush mid back seat with air suspension.

Features

- Electro coated (e-coated) steel Cab construction (Full cab immersion)
- Cab mounting – Electric cab tilt
- Steel welded construction
- Backup Alarm (Non motion detecting)
- White Painted with rear sliding door
- Air ride operator seat with lumbar support adjustment
- Safety glass tinted front windshield
- 45° tilt with 90° max tilt capability
- Driver side door with roll down windows
- Dual headlights and turn signals (DOT)
- Side view mirrors
- Mid Back Seat with Air suspension
- 2 - 12V power ports
- Conspicuity Tape – For visibility
- Single horn
- Single Electric Windshield Wipers (Pantograph motion)

Vehicle Performance and Dimensions

Performance:

- Max speed 25 mph (40 Km/hr)
- Max load capability 30 tons
- Range unloaded (continuous) 90 miles (100 Km) – fully loaded range (continuous) 60 miles (48 km)
- 6.5 hour full charge time, 2.5 hour level 3 charge time
- 300 V DC system voltage

Dimensions:

- Overall L X W X 206"X96"X135"; Wheelbase 134"
- Fifth wheel height 61" raised 46" down
- Front wheel overhang 47" Rear wheel overhang 25"

Chassis Specs



Features

- 134 inches wheelbase
- ASTM A529 12" X 3" reinforced preformed structural steel
- RBM (Resisting Bending Moment) 4,500,160 lbs
- 50 degree tapered Steel bumper and deck
- Integrated weld on front two hooks
- Dual tail lights, turn signals, reverse lights & brake lights
- Rear frame guide rails
- Expanded metal deck rails
- Driver side and curb side mounted battery boxes
- Mud Flaps
- Front and Rear Tow Eyes (Tow device)
- Huck Bolted Frame Fasteners

Description

The Chassis is made from reinforced preformed structural steel to handle the massive RBM loads applied throughout a typical workday. There is a large wheelbase (134") and expanded metal deck rails.

Front and Rear Axle Specs



Front Axle

- Dana E-1322-W Wide Track
- Flat leaf front suspension (14,500 lb rated)
- Double acting – heavy duty shock absorbers
- Standard track drop I beam steer axle
- Power steering – Hydraulic pump connected to 230 VAC motor, inverter driven, 4-8 GPM flow
- Air brakes with Cast Iron brake drums
- Automatic Slack Adjusters
- Iron hub piloted Front hubs
- 14,600 lb GAWF (Gross Axle Weight Front)

Drive / Rear Axle

- SISU SRDP30S 12.28:1 reduction, 70,000 lb terminal rating
- Solid Rear suspension
- 16.5 X 7 s-cam brakes with Cast Iron brake drums
- Automatic Slack Adjusters
- Iron Hub piloted Rear hubs
- Synthetic gear lubricant
- 30,000 lb GAWR (Gross Axle Weight Front)

GCW – 90,000 lb

Battery & Charger Information

Description

The batteries used in the XE20 have an extremely high energy density (about 3 to 4 times better than Lead Acid). The individual cells can be customized into complete battery packs for specific power requirement applications. All batteries are placed in specially designed battery boxes that are attached to the truck.

Battery Pack Specs

- Lithium Iron Phosphate Cells (700 Ah)
- 312 Volt DC System;
- 215 KWhr total energy
- 3,000 cycle life at 80 percent depth of discharge
- Zero maintenance
- Battery pack monitored by proprietary battery management system: individual cell monitoring & automatic cell and pack balancing to increase battery life
- Low voltage and over voltage protection
- Fast charge capable

Battery Charger Specs

- 40 KW level 3 charger
- CAN BUS capable
- 2.5 hour charge time from 80% depth of discharge
- 480 VAC, 3 phase input voltage
- Output voltage – 400 V DC max

J1939 Communication Network

Allows communication between battery and charger. It Interfaces with the battery pack to monitor its condition and use history. BMS control parameters can be modified to check diagnostics and for testing procedures.