



ALL-DAY HYBRID POWER ON THE JOB



**Advanced Plug-In
Hybrid System**
For Medium- and Heavy-Duty Work Trucks

WORKING HARDER, SMARTER, SAFER AND LONGER

ODYNE HYBRID SYSTEMS PAIRED WITH AN ALLISON TRANSMISSION PROVIDE AN INNOVATIVE PLUG-IN HYBRID POWER SYSTEM SOLUTION FOR MEDIUM- AND HEAVY-DUTY WORK TRUCKS REQUIRING EXTENDED WORKSITE STATIONARY POWER.

The Odyne hybrid power system, paired with an Allison Transmission, targets the specific mobile and stationary needs of work trucks and other trucks with substantial stop and go driving and the need to reduce idle time. The Odyne hybrid system is an excellent match for trucks utilizing truck mounted equipment, such as utility bucket trucks, digger derricks, cranes, and other applications requiring all-day stationary power at worksites. Odyne's hybrid system seamlessly interfaces with an Allison fully automatic transmission utilizing Allison's patented Continuous Power Technology™ to deliver unmatched startability and smooth, full-power shifts for superior acceleration and drivability - all to get your crews to the worksite faster and more efficiently. While driving, the Odyne hybrid electric motor provides launch assist and regenerative braking for improved fuel economy and reduced carbon emissions. Once on site, Odyne's stationary power hybrid system offers the capacity and endurance to supply all-day power for even extremely demanding auxiliary equipment. The Odyne hybrid system is designed for optimal performance with transmissions from Allison while fully retaining the manufacturer's transmission warranty. Allison Transmission, Inc. has globally endorsed the use of 1,000, 2000, 3000 and 4000 Series™ transmissions with the Odyne hybrid system as the exclusively-approved PTO-based hybrid system.



Allison gets you there - faster, easier and more fuel efficiently

Allison Automatics have a reputation for both performance and reliability. Here's why they are the preferred choice for rugged-duty applications:

STARTABILITY

Startability is a vehicle's capability to launch and pull a load. Manual and automated manual transmissions have to launch at very low engine rpm in order to prevent damage to the clutch. This means less torque, which is why they have very deep 1st gear ratios to help them overcome their clutch limitations. An Allison Automatic uses the full torque from the engine and multiplies it with the torque converter. Then, when the 1st gear ratio and rear axle ratio are factored in, the Allison provides far more powerful startability.



MAINTENANCE MADE EASY

Routine oil and filter changes are the only regular preventive maintenance required with an Allison Automatic. Easily accessible integral and spin-on oil filters reduce labor costs and valuable downtime. TranSynd™ TES 295 transmission fluid greatly extends oil change intervals for most applications.



INHERENT DURABILITY

The Allison torque converter eliminates start-up lurches and lugging, thereby protecting the transmission and driveline. Further, Allison Automatics have no start-up clutches to wear or burn out—unlike manual or automated manual transmissions.



ODYNE PLUG-IN HYBRID SYSTEM

THE SYSTEM PROVIDES STATIONARY ELECTRIC POWER FOR AUXILIARY EQUIPMENT ON TRUCKS OVER 14,000 LBS/6350.3 KG, INCLUDING DIGGER DERRICKS, COMPRESSORS, CRANES, UTILITY BUCKET TRUCKS, WALK-IN VANS AND OTHER HEAVY-DUTY WORKSITE DEVICES.



ON-SITE POWER LIKE NEVER BEFORE

The system has the capacity and endurance to supply all-day power for even extremely demanding auxiliary equipment - up to 12 kW export power expandable to 18 kW or higher to help replace truck mounted generators. The system easily recharges overnight via plug-in cable and smart charging to interface with smart grid infrastructure. The system stores energy during the day through regenerative braking while driving or seamlessly at the worksite from the motor generator, as needed.



A QUIET, REDUCED EMISSION ENVIRONMENT

Operators appreciate the quiet operating environment, which means a better, safer communications and training worksite with expanded hours in neighborhoods. With significantly reduced emissions, operators also report a reduction in exhaust induced headache and fatigue.



FUEL SAVINGS UP TO 50%

The Odyne Hybrid System helps reduce fleet operating and maintenance costs, and, depending on duty cycle, enables large trucks to obtain fuel economy improvements of up to 50% or more, compared to traditional diesel/gas engines. This efficiency may result in fuel savings of up to 1750 gallons per year*.



PERFECT FIT

The hybrid system's minimally intrusive design preserves the OEM transmission warranty and provides greater reliability. It interfaces with many new OEM chassis and Allison fully automatic transmissions, for a seamless, trouble-free solution that can also be retrofit.

WISE INVESTMENT

In fuel savings, increased productivity and reduced maintenance, an Odyne Hybrid System more than pays for itself over the life cycle of the vehicle.

See your Odyne distributor for the system that best meets your application.

**Odyne Hybrid Systems
are available direct from Odyne
through truck equipment dealers
and from select Allison Transmission
distributors globally.**

For more information, contact your Odyne representative today or connect with us at odyne.com.



Odyne Hybrid System vs. an Anti-Idle or ePTO Worksite Only System From Other Manufacturers

| Hybrid System Safety, Performance and Application Criteria | Odyne Plug-in Hybrid System ⁱ | ePTO Solution A Work site energy system ⁱⁱ | ePTO Solution B Powers hydraulic system | Launch Assist & ePTO Solution Eaton ⁱⁱⁱ |
|--|--|---|---|--|
| Plug-in Hybrid | | | | |
| Plug-in Hybrid as defined by U.S. government ^{iv} | Yes | No | No | |
| Eligible for EPA credits ^v | Yes | No | No | |
| Safety | | | | |
| SAE J1772 compliant: plug-in charging safety ^{vi} | Yes | No | No | |
| High Voltage Interlock Loop | Yes | NA | No | |
| Warranty | | | | |
| Acknowledged to fully retain Allison Transmission warranty by transmission manufacturer. Approved and endorsed by Allison Transmission for use with 1000, 2000, 3000 and 4000 Series™ transmissions. | Yes | No | No | |
| Standard battery warranty greater than 4 years ^{vii} | Yes | No | No | |
| Remote diagnostics using advanced telematics | Yes | No | No | |
| Performance | | | | |
| Increases fuel efficiency while driving | Yes | No | No | |
| Increases fuel efficiency at the worksite | Yes | Yes | Yes | |
| Increases vehicle acceleration | Yes | No | No | |
| Thermally managed battery system | Yes | No | No | |
| Standard 110v and faster 220v charging | Yes | No | No | |
| Maximum battery capacity greater than 20 kWh | Yes | No | No | |
| Maximum electric motor power greater than 70 kW | Yes | No | No | |
| Work Truck Applications (available on) | | | | |
| Aerial bucket truck: Altec | Yes | Yes | No | |
| Aerial bucket truck: Terex | Yes | No | Yes | |
| Aerial bucket truck: Versalift | Yes | No | No | |
| Digger derrick: Altec (fully electric) | Yes | No | No | |
| Digger derrick: Terex (fully electric) | Yes | No | No | |
| Articulated cranes | Yes | No | No | |
| Capable of supporting high exportable power 6 – 18 kW (instead of generator) | Yes | No | No | |
| Large air compressors: Boss, Vanair | Yes | No | No | |
| Tank truck: Amthor International | Yes | No | No | |
| Walk-in van with underground air handling: Utilimaster | Yes | No | No | |

ⁱ Plug-in Hybrid systems by Odyne allow medium and heavy duty vehicles to operate using stored electrical energy for optional stationary vehicle operations with the engine off and a combination of engine and electrical power during driving, reducing fuel consumption during all modes of operation. Odyne plug-in hybrid systems use the existing standard truck powertrain with an Allison transmission and enhance vehicle performance while not impacting the transmission warranty. Odyne plug-in hybrid systems are designed to operate with or without grid recharging and can use the engine to recharge the battery system if required.

ⁱⁱ An ePTO is an electrified power take-off used to power hydraulic equipment or other loads when a vehicle is stationary. Sometimes referred to as a work site energy management system or an anti-idle system, the ePTO system does not save fuel during both the vehicle drive cycle and stationary operations of the vehicle.

ⁱⁱⁱ Eaton hybrid systems are no longer available for sale in U.S., announced June 2014.

^{iv} Plug-in hybrid vehicle as defined by U.S. Federal Government per part 535.4, Medium- and

Heavy-Duty Vehicle Fuel Efficiency Program pursuant to 49 U.S.C. 32902(k). Retrieved from: <http://www.gpo.gov/fdsys/pkg/FR-2011-09-15/pdf/2011-20740.pdf>

^v Certain U.S. fleets are required to comply with the U.S. Department of Energy's (DOE) Alternative Fuel Transportation Program specified in the Energy Policy Act (EPA). PHEV medium- and heavy-duty trucks are eligible for credits. The DOE will allocate 1 AFV credit (i.e., 1 per vehicle) for the acquisition of such a vehicle. Retrieved from: <http://www.gpo.gov/fdsys/pkg/FR-2011-09-15/pdf/2011-20740.pdf>, part 535 and <http://www1.eere.energy.gov/vehiclesandfuels/epact/faqs.html#B2> for details. Trucks equipped with only an ePTO do not earn AFV credit. Retrieved from: <http://www1.eere.energy.gov/vehiclesandfuels/epact/faqs.html#B21>

^{vi} First standard in the world reached by industry consensus that provides critical guidelines for safety, charging control and connectors used to charge plug-in vehicles. Retrieved from: <http://training.sae.org/webrecordings/pd331046on/>

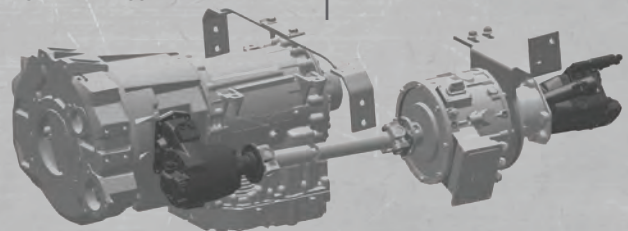
^{vii} Limited warranty, see warranty document for details. Battery has 10-year design life.

KEY FEATURES AND BENEFITS

| | |
|--|--|
| Reduced Fuel Costs | Up to 1750 gallons of diesel fuel per year* |
| Reduced Emissions | Depending on the application, estimated up to 19.25 tons of GHG (CO2) saved per year* |
| Reduced Noise Level At Work Site | Operator can talk to others during all electric operation compared to a typical engine-powered truck, improving operator safety |
| Extended Work Site Time With Engine Off | Optimized with lower cost, overnight grid recharging with electricity, whereas conventional hybrids burn more expensive fossil fuel to frequently charge batteries in the field. Odyne hybrid systems are also capable of operating without use of the grid, for times when plug-in recharging is not available. |
| More Power | Up to 50 extra horsepower while driving for improved acceleration when climbing hills, accelerating and cornering and more power for operating equipment at the work site |
| Lower Maintenance Cost | Reduced chassis and engine maintenance over vehicle life due to lower engine hours |
| Lower System Weight | Utilizes Johnson Controls lithium-ion batteries |
| Safety | Designed to SAE J1772, preventing inadvertent drive-off while charging. High Voltage Interlock Loop (HVIL) detects issues and safely shuts down the system |
| Operator Friendly | Operation is similar to conventional vehicles and minimal training is required |
| Performance Monitoring | System changes can be made remotely, as an option |

SPECIFICATIONS: Odyne Hybrid System

| ELECTRICAL | OVERALL | OPTIONS |
|---|--|--|
| System Voltage: 300V | Approximate System Weight: 1,200 lbs/544.3 kg (single battery pack) to 1,600 lbs/725.8 kg (dual battery pack) | Electric air conditioning in cab while engine is off at worksite |
| Motor: Remy HVH250 – 80 hp/58.8 kW continuous, 110 hp/80.9 kW peak | Chassis Compatibility: Chassis over 14,000 lbs/ 6350.3 kg GVW | Hydronic heater in cab while engine is off at worksite |
| Batteries: High voltage maintenance-free Johnson Controls lithium-ion battery pack(s) 14.2 or 28.4 kWh | Drive Train Interface: Industry standard with Allison fully automatic transmissions | Exportable power capable of supporting high exportable power 6-18 kW (instead of generator) |
| Approximate Battery Weight: 350 lbs/181.4 kg per battery pack | Ground Clearance: Standard chassis ground clearance | Advanced telematic system with data acquisition and system upgrade capabilities |
| 14 kWh Charge Time: 4 hours with 220V/30A supply, 10 hours with 110V/20A supply | Components: Designed for rugged environments | |
| 28 kWh Charge Time: 8 hours with 220V/30A supply, 20 hours with 110V/20A supply | | |
| Charge Station & Charging Cord: SAE J1772 compliant charging cord | | |
| Cord Receptacle: Mounted on the street side, curb side or on the back of the body | | |
| Component IP Rating: IP65 or IP67 | | |



*Estimate based on International IHC DT engine chassis with Odyne PHEV system greater than 25 kWh in use 250 days per year with 2 hours of driving and 4.5 hours of electric mode operation and approximately 22.2 pounds of CO2 per gallon of diesel fuel burned.

