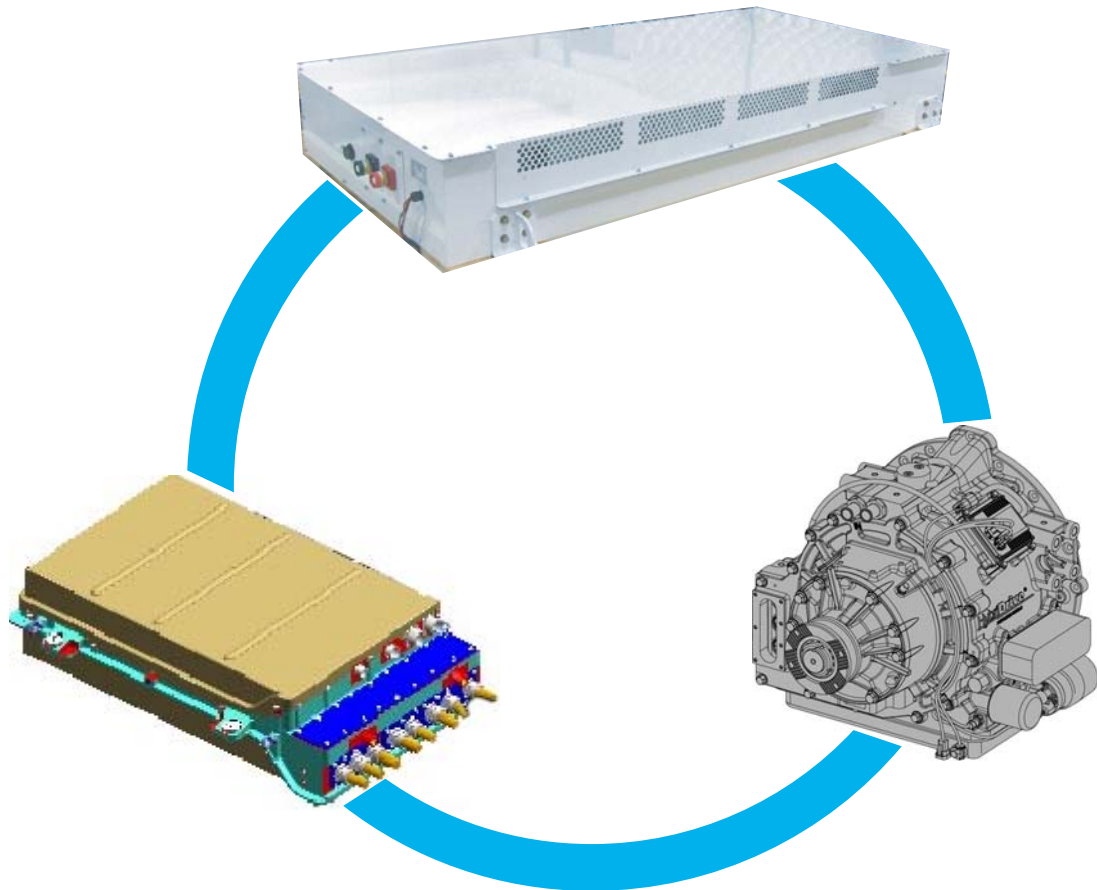


Hybridrive® Responders Information



**ALEXANDER
DENNIS**

ENVIRO 400

Hybriddrive® First Responder Information

Scope

To provide emergency and safety information associated with Hybriddrive® systems in support of implementation of First responder practices.

Hybriddrive® System Overview

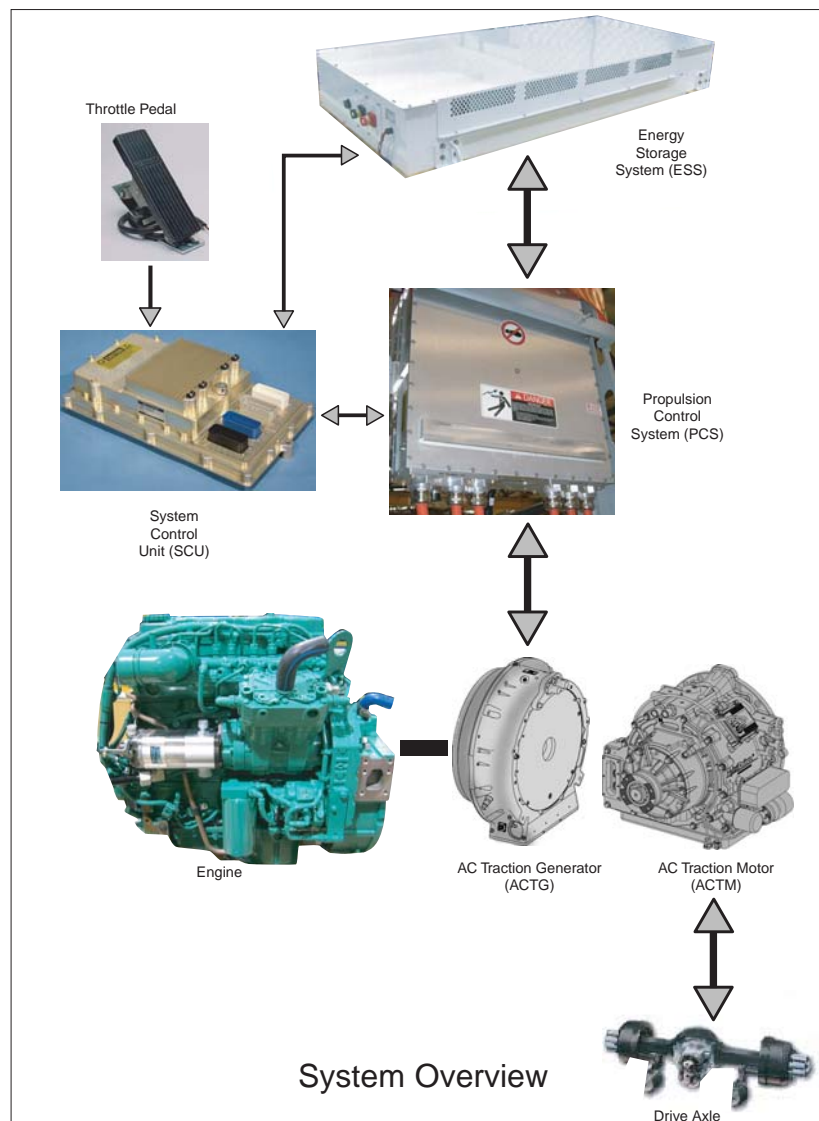
The Hybriddrive® system is a power management technology for Hybrid Electric Vehicles to improve hybrid performance, fuel economy, reliability, and to reduce cost.

A functional breakdown of the transit system will identify components within the Hybriddrive® system.

Each of the components is summarised in Section 1.

List of Abbreviations

ACTG	AC Traction Generator
ACTM	AC Traction Motor
ESS	Energy Storage System
PCS	Propulsion Control System
SCBA	Self Contained Breathing Apparatus
PPE	Personal Protective Equipment
MSDS	Material Safety Data Sheet
kW	Kilowatt



Section 1 - Component Data

Energy Storage System (ESS)

Location:

The ESS is mounted in a compartment under the rear seats on the upper deck.

Description:

Stores on average 630 volts DC in Lithium Ion battery modules.

200kW nominal output.



Energy Storage System (ESS)

AC Traction Generator (ACTG)

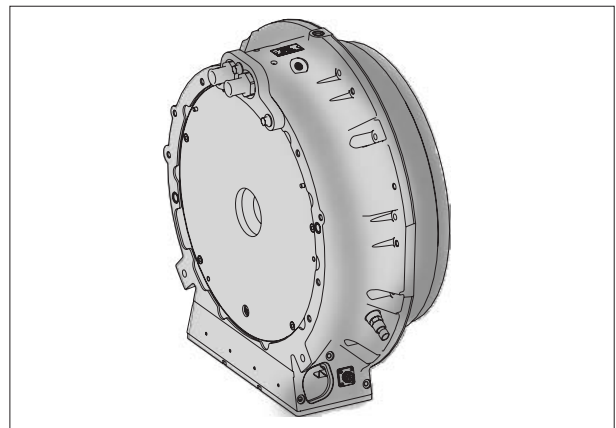
Location:

Always connected to engine flywheel.

Description:

Creates 3 phase AC only when engine is running.

Continuous output 145kW .



AC Traction Generator (ACTG)

AC Traction Motor (ACTM)

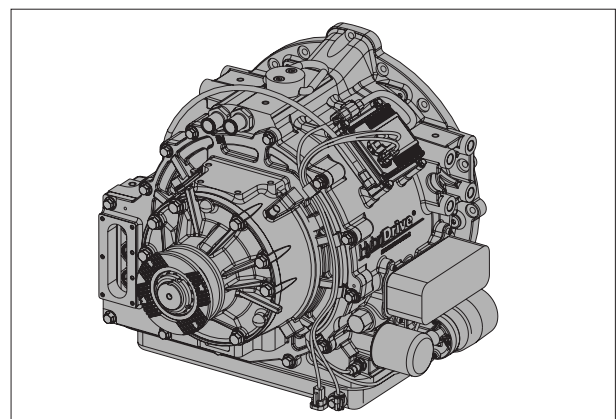
Location:

Always connected to the rear axle.

Description:

Operates on and creates 3 phase AC up to 175kW peak to move the vehicle.

Continuous output 120kW .



AC Traction Motor (ACTM)

Section 1 - Component Data

Propulsion Control System (PCS)

Location:

Double Deck location is in the right hand side of the engine compartment.

Description:

Propulsion system main control. Interfaces with the ESS, ACTG and ACTM using High Voltage connections.

Continuous output 206kW .

Peak output 400kW .



Propulsion Control System (PCS)

Interconnecting Cables

Location/routing:

Dependent on component location.

Description:

Interconnects the ESS, ACTG and ACTM with the PCS.

All High Voltage cables are marked with an orange coloured loom.



High voltage cables in orange coloured loom

Master Disconnect Switch

Location

Upper Left in engine compartment.

Description:

Isolates the system components. Must be switched to the OFF position while any work in being carried out on the system.

It incorporates a locking facility to prevent the system being inadvertently reactivated. (Padlock required)



Master Disconnect Switch

Section 2 - Component Disconnect Procedures

Disconnecting the Hybridrive® Components

Personal Protective Equipment (PPE)

Required whenever the ESS Battery is being accessed.

- Class 1 high voltage rubber gloves
- Safety Glasses
- Long sleeve heavy denim shirt minimum
- Head protection
- Class 1 (1000V) wire cutters - 2" capacity

WARNING

Operation of the Diesel engine will always produce electrical current due to the attached generator. Therefore engine must be stopped before carrying out disconnection.

Energy Storage System (ESS)

Standard Disconnect Procedure:

Mandatory 4 minute discharge period prior to accessing Hybridrive® System

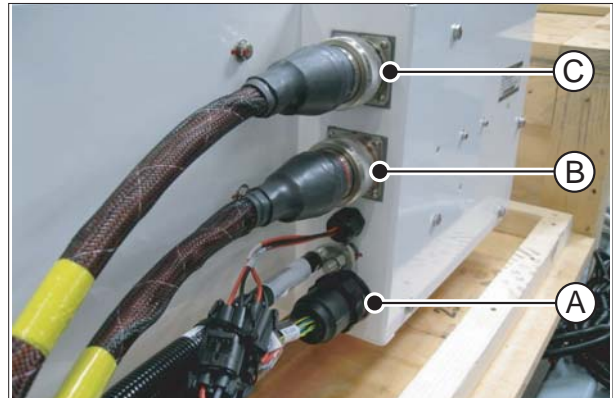
Master Disconnect Switch must be switched OFF in order to isolate the 24 VDC supply to the Hybridrive® System. This is required before disconnection is performed.



Master Disconnect Switch

Disconnect ESS by first disconnecting connector **A** shown in the figure below.

Then disconnect connector **B** (negative) and then connector **C** (positive) - one at a time.



Emergency Disconnect Procedure:

The 24 VDC supply to the Hybridrive® System must be switched OFF before performing disconnection.

1. Switch off 24 VDC by switching OFF Master Disconnect Switch - located in top left corner of the engine compartment.
2. Switch off 24 VDC Master Switch on drivers dashboard.



Master Switch on Drivers Dashboard

(continued overleaf)

Section 2 - Component Disconnect Procedures

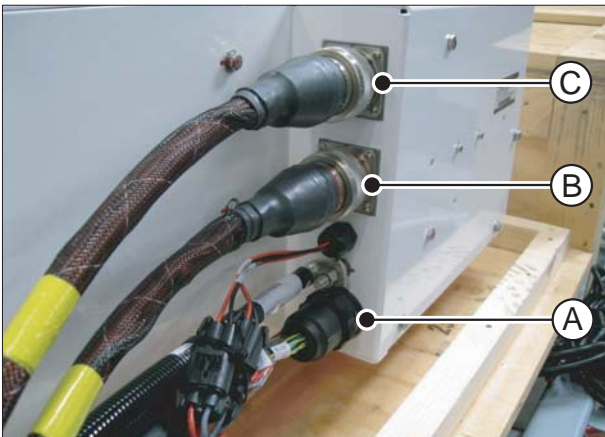
Emergency Disconnect Procedure: (continued)

3. Switch Off 24 VDC by disconnection of the vehicle batteries. Located in a slide out tray on the driver's side of the vehicle, ahead of the front wheels.



Vehicle 24 VDC Batteries (LHD vehicle shown)

4. Cut wires from ESS to PCS, ONE AT A TIME, insulate ESS end of cut cable:



1. Cut wire to Connector **A** first.
2. Cut wire to Connector **B** (negative)
3. Cut wire to Connector **C** (positive)



Access panel removed

Section 3 - Recommended Safety Equipment/Techniques

Fire Fighting Equipment

Personnel:

Self contained Breathing apparatus (SCBA).

Full Fire Fighting Personal Protective Equipment (PPE).



Vehicle

BAE Hybridrive® components
ACTG, ACTM, PCS, and Cables:

Fire Extinguisher - Class C

ESS (Li-Ion Specific)

Fire Extinguisher:

Most Preferred - Class D (smothering type).

Alternate: - abundant amounts of water at a safe distance.

Note: Hydrogen gas will be produced if battery cells are ruptured and water is introduced.

Follow required HAZ MAT procedures and precautions – see MSDS Contact section.

Facility- ESS (Li-Ion Specific)

General recommendations:

Fire Extinguisher: Class D fire extinguisher (smothering type) [size to be determined by local authorities] to be within 10 feet of ESS during service.

Rescue Equipment: Non Conductive body hook.

Scaffolding work platform recommendations

Fire Extinguisher: Class D fire extinguisher (smothering type) [size to be determined by local authorities] at the platform level - one per scaffold in use.

Rescue Equipment: Non Conductive body hook - one per scaffold in use.

Fire Fighting Techniques (Li-Ion Specific)



Section 3 - Recommended Safety Equipment/Techniques

First Aid

BAE Hybridrive® components
ACTG, ACTM, PCS, and Cables:
Standard First Aid considerations.

ESS (Li-Ion Specific):

Inhalation: If contents of an opened battery are inhaled, move victim to fresh air. Obtain medical advice.

Eye Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes while holding the eyelids open. Quickly transport victim to an emergency care facility.

Skin Contact: Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes.

Ingestion: Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim rinse mouth with water again. Quickly transport victim to an emergency care facility.

Environmental (Li-Ion Specific)

Personal Precautions:

Restrict access to area until completion of clean-up. Do not touch spilled material.

Environmental Precautions:

Prevent material from contaminating soil and from entering sewers and waterways.

Method for Containment:

Contain the spilled liquid with dry sand or earth.

Methods for Clean-up:

Absorb spilled material with an inert absorbent (dry sand or earth). Scoop contaminated absorbent into an acceptable waste container.

Scrub the area with detergent and water; collect all contaminated wash water for proper disposal.

Personal Protection

Skin Protection:

Wear neoprene or natural rubber gloves if handling an open or leaking battery.

Eye Protection:

Wear safety glasses.

MSDS – Contact information:

ESS Material Safety Data Sheets (MSDS) attached.

Contact Information

Alexander Dennis

Dennis Way
Guildford
Surrey
GU1 1AF
England

Telephone: + 44 (0)1483 571271

Fax: + 44 (0)1483 301696

Alexander Dennis

91 Glasgow Road
Falkirk
FK1 4JB

Scotland

Telephone: + 44 (0)1324 621672

Fax: + 44 (0)1324 633120

