**VOLVO HYBRID CITY BUS**

**4X2, Specification**

**DIMENSIONS & WEIGHTS**

**Overall dimensions**

- G Overall length: 12000 mm
- K Overall width: 2510 mm
- A Wheelbase: 5945 mm
- I Front overhang: 2694 mm
- J Rear overhang: 3360 mm
- Entrance height: 340 mm
- Lock angle inner wheel: 53°
- Track, front: 2107 mm
- Track, rear: 1885 mm

**Weights**

- Permitted front axle load: 6000 kg
- Permitted rear axle load: 10200 kg
- Permitted gvw: 16200 kg

**ENGINE**

Parallel hybrid system with Volvo D5F215 EU5 diesel engine and Integrated Starter Alternator Motor (I-SAM).

- 4-cylinder, 4-stroke turbocharged and intercooled in-line diesel engine with overhead valves and electronically-controlled direct injection. Water cooled bearing turbocharger.
- Volvo EMS2.2 engine control system. Electronic oil level sensor. Hydraulic fan with electronic thermostat. Closed crank case ventilation. On-off fan clutch. Engine software protection and on-board diagnostic to detect, warn and to take action for malfunctions leading to increased emissions. Operation altitude up to 1500m above the sea level. Engine fulfils EEV emission level requirements.
- I-SAM permanent magnet motor/generator with master Hybrid Powertrain Control Unit (HPCU) and DC/AC Power Electronic Converter (PEC), DC/DC voltage converter with control unit (DCU). HEV Junction Box (HJB) for energy distribution and as electrical centre with fuse box.

**Volvo D5F215 EU5**

- Max Output: 215 hp (160 kW)
- Max.power at: 2200 rpm
- Max. torque between: 800 Nm
- No. of cylinders: 4
- Bore: 108 mm
- Stroke: 130 mm
- Displacement: 4.76 dm³
- Compression Ratio: 17.3:1

**I-SAM**

- Power output, max: 120 kw (161 hp)
- Torque ISO 1585, max: 800 nm
- Power output, continuous: 70 kw (94 hp)
- Torque ISO 1585, continuous: 400 nm

**Retardation**

- Max brake torque: 800 nm
- Continuous brake torque: 400 nm

**Fuel tank**

- Fuel tank capacity: 220 L

**Energy storage system**

- Lithium-ion battery with battery management unit (BMU), Isolation Resistance Monitor (IRM) and Battery Disconnect Unit (BDU). Roof mounted, water cooling and heated/charged with 230v plug-in application.
- Voltage: 600 v
- Capacity: 4.8 kwh

**EXHAUST AND COOLING SYSTEM**

Stainless steel exhaust system with SCR catalytic converter, AdBlue pump and 35 l urea tank. Catalytic converter is integrated with the silencer.

Muffler sensors are linked to the on board diagnostics that alerts the driver if the level of air pollutants in the exhaust gases is excessive, and when AdBlue refilling is needed.

**TRANSMISSION**

Volvo AT2412D I-shift Automatic gearbox, 12 forward gears, 4 reverse, electronic control system, Electric motor as a retarder.

3-buttons gear selector.

**DRIVELINE - TYRES**

**Tyres & rims**

- 10-stud steel or aluminium disc wheels.
- Chrome or zinc wheelnut protector ring. Dual driving axle wheels.
- Rims: 8.25"x22.5"
- Tyres: 295/80R22.5
**STRUCTURAL BODY SPECIFICATION**

Body type: Galvanised tubular structure with anti-corrosive treated

- Floor vinyl: 3 mm thickness, fire retardant
- Outer panel: Stainless steel
- Inner panel: FRP
- Roof outer panel: GI
- Roof inner panel: Suitable carpet to match the roof sheet colour
- Front windshield: Laminated single piece
- Side window glass: Toughened safety glass
- Rear glass on panel: Standard toughened
- Roof ventilation: 2 nos (one at front and one at rear)

**SUSPENSION AND STEERING**

Electronically controlled suspension (ECS2), rigid low front axle. Stabiliser both front and rear. Doubleacting, hydraulic telescopic shock absorbers, two in front, two at rear. Full front kneeling. Kneeling interrupt configuration (stop or return).

- Numbers: Front 2, Rear 4
- Levelling sensors: 2
- Steering wheel diameter: 500 mm
- Power steering: Ball and nut type with built-in tachograph
- Torque control: Differential lock synchro, analysis and warning, brake blending, drag
- Available features: ABS, TC, lining wear sensing, disc brakes combined with electronic braking
- Separate circuits for front and rear wheels

**AIR AND BRAKE SYSTEM**

- Air tanks standard
  - Primary: 1x25 dm3 + 2x30 dm3 (l)
  - Front circuit: 30 dm3 (l)
  - Rear circuit: 30 dm3 (l)
  - Park circuit: 15 dm3 (l)
  - Compressed air system can easily be filled from external circuit

- Handbrake
  - Air operated spring brake acting directly on the drive axle wheels. Application is infinitely variable by means of a control on the fascia.

**BUS BODY INSULATION**

- Roof: 40 kg/m3, PU
- Side: Polystyrene

**AIR CONDITIONING**

- AC units (2 pcs, 24kw).
- Semihermetic compressor, gearless drive by electric motor (engine rev independent).
- Constant maximal refrigerating capacity, air distribution direct into passenger’s compartment through outblow duct.

**DRIVER’S SEAT AND STATION**

- Volvo dashboard fully compatible with BEA2, two satellites on the right and the left side.
- Adjustable steering wheel, both height and tilt.
- Self canceling turn indicators.
- Dashboard, center: Speedometer, rev counter, fuel gauge, coolant temperature, brakes, turbo and oil pressure, indicators, indicator lamps.
- Dashboard, left: Emergency switch, tachograph
- Steering wheel, left satellite: Control buttons, light control panel
- Steering wheel, right satellite: Gearbox selector, doorbrake knob, switches and warning lamps.
- Instruments, behind engine: Selector switch for front or rear operation, starting, charging lamp, mechanical stop, oil gauge. These controls enable the engine to be run and controlled from the tail of the vehicle during service work.

**DRIVER AREA**

- Seat belt: 3-point, elr recoil
- Anchorage: as per bus body code

**ELECTRICAL SYSTEM**

The electrical system is a 24-volt system, where the chassis and engine frame are used as a ground. The battery’s negative terminal is connected to the chassis via the battery disconnector. DC/DC converter provides electricity sourced from I-SAM.

2nd generation bus electrical architecture (BEA2) with electronic databus system multiplex 2 for data transmission, bus systems control, monitoring and coordination of all devices installed on the bus.

Multiplex 2 also provides diagnostic information for driver and workshop. BEA2 features electronic control of the engine management system, transmission and suspension. For testing, calibrating and programming of the control units can be used a PC based software package VCADSPRO. External lighting functions integrated in chassis multiplex. They are activated by new light control panel and controlled by light control module.

The system is equipped with three main switches:
- Engine shut off, fuel shut off and electrical shut off
- Tachograph system is available, analog or digital.
- Battery capacity: 225 Ah
- DC/DC converter: 7.5 kw/210A
- Engine mounted alternator: 120A

**STANDARD ACCESSORIES**

- PWD Assistance
- Wheel chair ramp
- Type: Manual Sunken
- Dimension: 920 mm width
- Capacity: 300 kgs
- Restrainer: Provided
- Clutch holder: Provided on priority slots
- Stop request
- Type: Push type, voice based
- Location: On-reach stanchions and wheel chair area
- Emergency stop: Push to lock switch
- Handrails and stanchions
- Material: Aluminum powder coated
- Stanchions: 40 mm / 3.15 mm
- Grab handles: Provided colour contrasting

**DOORS AND DOOR SYSTEM**

- Type: Swing
- Front: Double leaf, In-swing
- Middle: Double leaf, Out-swing
- Width: 1200 mm clear width
- Operation: Pneumatic / electric