



UDS-2 / UES-2

DIESEL / ELECTRIC
UNIVERSAL PASSENGER STEP

DESCRIPTION & SPECIFICATIONS



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I.- DESCRIPTION

A) INTRODUCTION

The FMC model UDS-2, diesel powered (1880000) and UES-2, electric powered (1950000) self-propelled passenger steps are designed for universal use, being capable of servicing the passenger doors of all aircraft from the B-727 and B-737 to the rear doors of the A-300 and A-330/340.

The innovative design of the steps makes possible a combination of functional advantages and outstanding technical performance in the areas of safety, stability and load capacity.

1. Simple controls and systems - Easy accessibility of components coupled with simple systems to perform all step functions leads to easy maintenance and high customer satisfaction.
2. Frame stiffness - The UDS/UES-2 is one of the sturdiest universal steps on the market. This stiffness creates greater passenger comfort and sense of security when using the step at high elevations.
3. Wide platform and flights - The 3 meters access platform allows the aircraft door to be opened without repositioning the step. Door operation while the step is parked securely against the aircraft enhances operator safety and reduces positioning time. The 1.5-m width of the stair flights is geared to today's passengers with carry-on luggage. The wide steps will allow two passengers to use the steps side by side without discomfort.
4. Self-locking flights - The automatic mechanical latching system makes easier for operators to use the step raising/lowering controls without manually engaging or disengaging latches, and increases the safety of the unit.
5. Stair raising cylinder - The single cylinder uses no chains, telescopic rods, or other devices to raise and lower the mobile flight. This simple, low maintenance system combined with the unique flight interface geometry gives full height adjustment with no need of additional cylinders mounted in the support frame.
6. Spring-mounted platform front section - This feature cushions the impact of the stairs against the aircraft in case of rough positioning and the additional benefit of eliminating any door/platform sill gap.
7. Fine tuning. This system controls the front stabilizers height that assures a high degree of passenger safety and comfort because it gets the best approach to aircraft doors.

B) GUIDELINE DOCUMENTS

The UDS/UES-2 complies with the majority of the important specifications and requirements set out in the following documents and publications. Other documents, such as ISO publications, have also been taken into account for the design of the UDS/UES-2 passenger step.

IATA AHM 910 (Basic Requirements for Aircraft GSE)

IATA AHM 913 (Basic Safety Requirements for Aircraft GSE)

IATA AHM 915 (Standard Controls)

IATA AHM 920 (Functional Specification for Self-Propelled Passenger Loading Steps)

ISO publications, the European Directive 98/37/EC (Machinery) and draft standards CEN for aircraft GSE, have also been taken into account for the design of the NBS-2 passenger step.

II. MAJOR COMPONENTS

A) CHASSIS

The chassis is purpose-designed by FMC specifically for this application. The structure consists of precision welded standard steel sections and plates.

The following assemblies are mounted on the chassis:

- 1) The power module is mounted in the center of the vehicle, allowing for excellent stability combined with ease of maintenance. The module includes hydraulic pump, hydraulic tank, and filters, as well as the diesel engine and fuel tank, or the battery set (electric version).
- 2) The stairs assembly comprises a mobile and a fixed flight joined on an internal track. The assembly is mounted on the chassis using four articulated joints, situated so as to transmit the loads from the stairway directly to the stabilizers or wheels, thus minimizing bending stresses on the chassis.
- 3) The electric and hydraulic components are centralized in modules mounted on the chassis. The modular vehicle configuration allows easy adaptation to either the diesel or electric versions during factory assembly.
- 4) The driver's panel and seat are located in the front of the chassis to provide optimum visibility. A driver's cabin is optional.

B) POWER UNIT (Diesel Version)

The vehicle has a Deutz F4L1011 F diesel engine as a standard power unit, directly coupled to a variable flow hydraulic pump. This system uses hydrostatic transmission to drive a hydraulic motor coupled directly to the front axle. Other types of diesel engines are available upon special request (see Section V: Options).

C) POWER UNIT (Electric Version)

SPEED CONTROLLER:

An electronic type speed controller unit drives an electric motor which is directly coupled to the front drive axle of the unit. Standard unit is supplied with GENERAL ELECTRIC series speed controller, but other models are available as options.

BATTERY:

One 80 VDC, 440 A.h lead acid battery supplies power to the system.

DRIVE MOTOR:

Electric drive motor 80 VDC, 13 Kw. spline coupled, connected to the front axle differential box.

D) WHEELS AND TIRES

Radial tires - specification 7.00-R12, max. inflation fr/rr: 7.5/5.5 bar (108/78 psi)

Wheel rims - specification 5.00-S12

Solid rubber tires are optional.

E) BRAKES

The foot-actuated service brake acts on all four wheels. Disk type on front wheels, shoe and drum type on rear wheels.

The negative type parking brake acts on the front drive wheels.

Hydrostatic (diesel version) braking acts on drive wheels whenever foot is taken off the accelerator.

The electronic type speed controller unit (electric version), General Electric EV-200LX, incorporates regenerative braking whenever foot is taken off the accelerator.

F) STEERING SYSTEM

Vehicle is equipped with integral hydraulic powered steering. An Orbitrol type steering pump acts upon a double action, double sided cylinder connected to the front axle steering bars. A hydraulic pressure accumulator is incorporated in the circuit to allow steering with no system power.

G) AXLES**FRONT (DRIVE AND STEERING) AXLE:**

Front drive axle is an integral unit with a center mounted differential box and enclosed shafts to each hub. Gear reduction in differential box and in each hub. A "cardan type" drive shaft with universal joints connects the drive motor to the differential box. Axle suspension provided by double "floating" rubber blocks.

REAR AXLE:

Non-driven beam axle pivoting at the center and cushioned by rubber block suspension.

H) STAIRWAY

The stairway consists of two telescoping stair flights, activated directly by a hydraulic cylinder mounted underneath. Hydraulic and mechanical safety locks are incorporated to ensure that the desired stairs height setting is maintained. A mechanical ratchet lock is provided at each step height.

A wide upper platform allows the opening of aircraft doors within the platform area, after positioning the step at the aircraft door sill.

All the platform parts which come into contact with the aircraft are protected with tubular rubber bumpers, and all tread surfaces are illuminated for night operation.

I) HYDRAULIC SYSTEM

SERVICES PUMP:

A gear type hydraulic pump is coupled to the main pump (diesel version) or is activated by an electric motor forming a motorpump group (electric version).

HYDRAULIC CYLINDERS:

One double acting, double sided cylinder is provided for the steering activation. Four double acting cylinders with integral check valves are provided for stabilizer operation. One single acting, single stage cylinder with integral check valve is used for raising and lowering the mobile stair flight.

HYDRAULIC ACCUMULATOR:

A hydraulic accumulator enables the use of the steering mechanism, retracting stabilizers, lowering the mobile flight if the services pump is not working and to allow unblocking the parking brake for towing the vehicle.

EMERGENCY PUMP:

A low speed, high torque, manually operated hydraulic pump is provided for emergency stabilizer retraction and step lowering.

HYDRAULIC VALVES:

All hydraulic solenoid and relief valves are located on one hydraulic manifold block, easily accessible on the left side of the unit, but protected inside a panel.

HYDRAULIC FLUID:

UES-2: ISO VG-32

UDS-2: ISO VG-68 (ISO VG-32 for temperature below 10°C)

J) ELECTRIC SYSTEMDIESEL VERSION:

A 24 VDC system comprising of two batteries charged by the engine alternator.

ELECTRIC VERSION:

An 80 V 440 Ah battery provides electrical power for the drive circuit. Two converters provide power from the battery to the auxiliary electrical circuit at 24 VDC.

STANDARD CONTROLS AND INSTRUMENTS:Diesel version

- Joysticks: step raise/lower, drive fwd/rev/services, turn signal lights, horn.
- Switches: main ignition, stabilizers raise/lower, head lights, stair lights, fine adjustment selector (on panel), fine adjustment (on platform).
- Buttons: parking brake, emergency stop, heater.
- Indicator Lights: stabilizers up/down, parking brake on, turn signal lights on, stair lights on, services on, alternator not charging, high coolant temperature, low oil pressure.
- Meter: hourmeter, fuel gauge, coolant temperature meter.

Electric version

- Joysticks: step and stabilizers raise/lower, drive fwd/rev, direction indicator, horn.
- Switches: unit on/off, headlights, stair lights, fine adjustment selector (on panel), fine adjustment (on platform).
- Buttons: parking brake, emergency stop, services on/off.
- Indicator Lights: stabilizers up/down, parking brake on, direction indicator on, stair lights on, services on.
- Meter: hour meter, battery state of charge meter.

K) CONTROL FEATURES (Electric version)THERMAL PROTECTION:

This feature automatically reduces current limit when the temperature has become too high in the speed controller. After cooling down, current will go back to normal limit.

III. SAFETY AND EMERGENCY DEVICES

- Red pushbutton (mushroom) emergency stop located on the instrument panel. This button is self lockdown type.
- Mechanical ratchet locks at each step height.
- Check valves on all stabilizers and main lift cylinder.
- Drive disabled when stabilizers are extended or parking brake is applied.
- Drive disabled unless accelerator is depressed.
- Starting disabled unless drive joystick is in neutral position.
- Starting disabled when engine is running (Diesel version).
- Service functions disabled unless drive joystick is in neutral position.
- Engine stops if the refrigerant temperature is too high or/and oil pressure is too low (Diesel version).
- Parking brake automatically applied during power failure.
- Manual emergency pump used to raise stabilizers, lower mobile flight and release parking brake for towing the unit in case of power failure.
- Spring-mounted platform front section.
- Tubular rubber bumpers on all platform parts which come into contact with the aircraft.
- Emergency procedures on decals.
- Traction disabled when the parking brake is activated.
- Electronic speed controller safety devices (Electric version):
 - PMT (Pulse Monitor Trip)
 - Thermal protection
 - Commutation
- Electronic speed controller display (Electric version):
 - Monitor hourmeter
 - Monitor battery state of charge
 - Control functions
 - System fault codes for traction

IV. SPECIFICATIONS

LOAD CAPACITY

Platform:	2,050 Kg	(4,519 lb)
Steps (extended):	5,928 Kg	(13,069 lb)
Per step:	228 Kg	(503 lb)

WIND RESISTANCE (Stabilizers extended)

Steps extended:	110 Km/h.	(68 mph)
Steps lowered:	130 Km/h.	(80 mph)

TURNING RADIUS

Outer (swept):	10.5 m	(413 in)
Inner:	6.0 m	(236 in)

SPEED

Maximum speed (diesel):	25 Km/h.	(16 mph)
Maximum speed (electric):	18 Km/h.	(11 mph)

SHIPPING DATA

Height:	3.60 m	(142 in)
Length:	7.90 m	(311 in)
Width (std. platform):	3.10 m	(122 in)
Width (narrow platform):	2.50 m	(98 in)
Approx. weight (Diesel version)		
(with cabin and battery):	6,420 Kg	(14,156 lb)
(with battery):	6,120 Kg	(13,495 lb)
Approx. weight (Electric version)		
(with cabin and battery):	6,950 Kg	(15,325 lb)
(with battery):	6,650 Kg	(14,663 lb)
Shipping cube (std. platform):	88.2 m ³	(3,113 ft ³)
Shipping cube (narrow platform):	71.1 m ³	(2,511 ft ³)

WORKING DIMENSIONS

Access platform height (min):	2.45 m	(96 in)
Access platform height (max):	5.73 m	(225 in)
Access platform width (std. platform):	2.80 m	(110 in)
Access platform width (narrow platform):	2.20 m	(86 in)
Access platform length (on sides):	1.80 m	(71 in)
Step width:	1.50 m	(59 in)
Tread depth:	275 mm	(10.8 in)
Riser height:	185 mm	(7.3 in)
Height of bottom step to ground (max):	280 mm	(11 in)
Maximum platform inclination (h= 2.45-5.55 m)	-3,5° +3.0°	
Maximum platform inclination (h= 2,45-5.73 m)	-3,5° +4.0°	

OTHER DIMENSIONS

Wheelbase:	4.31 m	(170 in)
Front track:	2.25 m	(89 in)
Rear track:	2.24 m	(88 in)
Front stabilizer spacing:	2.23 m	(88 in)
Rear stabilizer spacing:	1.16 m	(46 in)
Stabilizer base:	5.30 m	(209 in)
Structural ground clearance:	110 mm	(4 in)

CAPACITIES

Hydraulic fluid

- Electric version: ISO VG-32
- Diesel version: ISO VG-68 (ISO VG-32 for temperature below 10°C)

Hydraulic tank:	90 lts.	(23.7 Gal)
Fuel tank:	115 lts	(30.3 Gal)

V. OPTIONAL EQUIPMENT

The following optional equipment can be provided with the UDS/UES-2 passenger steps:

A) Chassis

- Narrow (2.50 m wide) access platform
- Open canopy for stair flights and access platform
- Enclosed canopy for stair flights and access platform
- Driver's cabin with windshield wipers and opening rear window
- Driver's cabin with door, windshield wipers and opening rear window
- Cabin heating with cabin insulation
- Front rubber bumpers
- Headlight protection
- Perkins 1004.42 diesel engine
- Barrier and cover between wheels
- Optional height range (2,2 m to 5,62 m)

B) Controls, Lights and Alarms

- Flashing amber beacon
- Spotlight mounted under access platform
- Reversing alarm
- Stair flight lowering alarm
- Hazard flashing lights
- Ignition key
- Additional battery for step lights
- Stairway lights activated by motion sensor
- Speed limiter to 6 km/h with mobile flight up
- Warning lights

C) Options only for UES-2 (Battery Powered Version)

- Battery set (80 V, 480 Ah)
- Battery charger
- Keyed by-pass for discharged battery

D) Miscellaneous

- Fire extinguisher
- Extra color paint
- Export preservation
- Special decals
- Spare tire and rim
- LH & RH external rear view mirrors
- Height Indicator decals
- Rubber cover over stabilizers
- Emergency electro-hydraulic pump
- Safety belts across stairway

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