ACS4710 1F

User Manual

Linear Actuator Control System for Hospital Bed

Table Content

ACS4710 1F

Product Overview :

The Linear Actuator Control System for Hospital Beds is developed to provide controlled, accurate, and quiet adjustment of bed positions. It consists of electric linear actuators and a central control unit designed to work together safely and reliably.

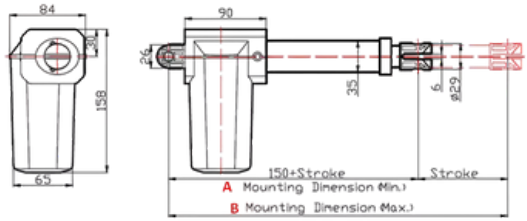
The system allows smooth movement to improve patient positioning and support medical staff operations. It is suitable for use in hospital beds, home care beds, and other healthcare equipment that requires adjustable motion.

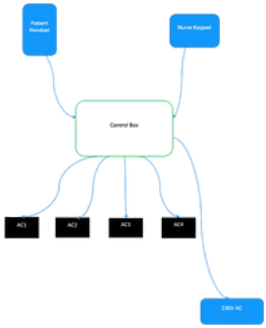
The components are designed according to medical application standards and are intended for continuous operation in clinical environments. The system supports various movement configurations and ensures consistent performance under typical medical usage conditions.

Key Features :

- Supports precise positioning of bed sections with smooth and accurate actuator movement.
- Operates with a noise level of ≤ 54 dB to meet requirements for quiet medical environments.
- Offers multiple control interfaces, including wireless remote, infrared remote, and manual operation.
- Integrated safety features include limit switches and overload protection to prevent mechanical or electrical failure.
- Stroke length and force output can be configured according to application requirements.

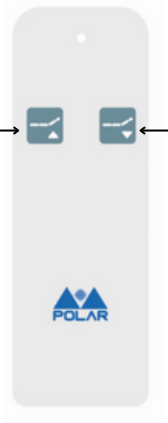
Diagram :





ACS4710 1F

✦ Bed Positions & Functional Operations (Patient Handset)



✦ Specifications :

Parameter	Values
Power Supply	24V DC
Actuator Power Rating	60W
Maximum Push Force	8000N
Actuator Speed	5mm/s
Stroke Length	150mm
Retracted Length	349mm
Noise Level	≤54dB
Duty Cycle	20%
Control Method	Manual
Communication Protocol	Wired communication
Safety Features	Overload protection, Limit Switches
Operating Temperature	0°C to 50°C
Humidity Range	10% to 90% (non-condensing)
Wireless Range	Up to 10 meters

System Components :

Actuators: The system consists of four electrically powered linear actuators operating at 24V DC. These actuators are responsible for adjusting various sections of the hospital bed as follows:

- Head Section Actuator: Enables upward and downward adjustment of the head section to assist with patient positioning.
- Foot Section Actuator: Controls upward and downward movement of the foot section to aid in circulation and posture management.
- Middle Section Actuators (2 units): These actuators work in parallel to raise or lower the entire bed platform, enabling height adjustment or tilt functions as needed.

All actuators are selected for medical-grade performance, ensuring consistent linear motion, load-bearing capacity, and safety under continuous use.

Control Unit: The control system is built around an microcontroller, which manages all actuator operations and user interface interactions. The unit supports multiple communication protocols, including for wireless connectivity for remote control functionality.

The control unit receives commands from the user interface and processes them to coordinate actuator movement. It includes safety handling logic such as motion limits and delay management to prevent mechanical conflicts or unsafe operations.

Power Supply: The system is powered by a regulated 230V AC power supply. The power unit provides stable voltage to all actuators and the control system. Electrical protection features such as overcurrent, short circuit, and thermal protection are incorporated into the power supply to ensure safe operation and system longevity.

All components are interconnected through shielded wiring, and are designed for integration into hospital beds in compliance with relevant medical safety standards.

Control System Functionality :

The control system coordinates all actuator operations based on user input and ensures reliable, accurate motion of the hospital bed. It is equipped with multiple control interfaces and integrated safety features for secure operation in medical environments.

Manual Control: Optional manual control buttons can be installed directly on the bed. These allow local operation without relying on wireless or infrared interfaces, ensuring usability during connectivity interruptions.

Safety and Feedback Mechanisms: Built-in limit switches stop actuator travel at defined endpoints to prevent over-extension. Overload protection halts motion in case of excessive current or mechanical resistance. These features safeguard both the equipment and patient during operation.

Wiring and Connections :

The wiring architecture is designed to ensure stable performance, ease of integration, and compliance with medical device standards.

The system uses a 24V DC input for power, connects four actuators through the control unit, and supports both wireless and wired control methods.

All communication and power interfaces are routed through designated ports using shielded and grounded cabling, where applicable.

Connection Type	Description
Power Supply Input	230V AC regulated input to control unit and actuators
Actuator Interface	Four actuators directly connected to the control unit
Communication Interface	UART protocol for wired communication between master and slave control units

ACS4710 1F

✦ Product Image :

Linear Actuator

Patient Handset

Control System

✦ Installation Instructions :

1. **Unpack and Inspect Components**
- Carefully open the packaging without using sharp tools near the cables.
- Take out all components and check that nothing is missing or damaged.
- Do not proceed if any parts appear cracked, bent, or faulty.

2. **Mount the Actuators**
- Place each actuator in its designated position on the hospital bed frame.
- Use the provided mounting brackets and secure them with screws.
- Ensure the actuators are properly aligned and free from obstruction.

3. **Connect to Control Box**
- Plug each actuator cable into the correct port on the control box (e.g., HEAD, LEG, LIFT).
- Push connectors in fully and check that each one is firmly seated.
- Do not force the connection — align properly before inserting.

4. **Wire Power Supply**
- Connect the power cable to the control box and plug it into a grounded AC socket (as per specifications).
- Make sure the socket is easily accessible and not overloaded with other devices.

5. **Connect Handset and Nurse Keypad**
- Plug both the patient handset and the nurse keypad into their respective ports on the control box.
- Make sure the connectors are inserted fully and securely.
- Mount the nurse keypad at a suitable location on the bed or nearby wall using screws or clips provided.
- Check that all buttons on both keypads respond after powering on the system.

6. **Test System Functionality**
- Switch on the system using the control box or main switch.
- Use the handset to test all movement functions — head up/down, leg up/down, bed height, etc.
- Use the nurse keypad to check locking, CPR, and chair position buttons.
- Confirm that all actuators move smoothly and stop correctly.
- If any function fails, power off and recheck all cable connections.

ACS4710 1F

✦ Application :

The Linear Actuator Control System is intended for use in hospital beds and other patient care equipment where precise positioning is required. It supports head, foot, and height adjustments to improve patient comfort and caregiver access.

In addition to hospital beds, the system can be adapted for use in various types of medical furniture, including examination tables, patient chairs, and home care beds, where controlled motion is necessary.

Medical Equipment	Purpose of Integration
Hospital Beds	Patient positioning and section adjustment
Home Care Beds	Assisted mobility and ergonomic adjustment for in-home care
Examination Tables	Adjustable surface positioning during diagnostics or treatment
Patient Chairs	Controlled recline and leg support adjustments
ICU and Critical Care Units	Precision motion control for critical care bed systems

✦ Mechanical Information :