

ACS4710 5F A



User Manual

Linear Actuator Control System for Hospital Bed

Table Content

| | |
|---|----|
| 1.Product Overview..... | 02 |
| 2.Key Features..... | 02 |
| 3.Diagram..... | 02 |
| 4.Bed Position & Functional Operations (Patient Handset)..... | 03 |
| 5.Specifications..... | 03 |
| 6.Systems Components..... | 04 |
| 6.1.Actuators..... | 04 |
| 6.2.Control Unit..... | 04 |
| 6.3.Power Supply..... | 04 |
| 7.Control System Functionality..... | 04 |
| 7.1.Manual Control..... | 04 |
| 7.2.Safety & Feedback Mechanisms..... | 04 |
| 8.Wiring & Connections..... | 04 |
| 9.Product Image..... | 05 |
| 10.Applications..... | 05 |
| 11.Mechanical Information..... | 05 |

ACS4710 5F A

◆ 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.

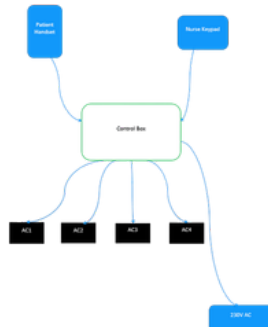
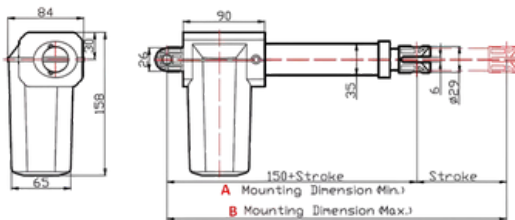
The system allows smooth movement to improve patient positioning and support medical staff operations. It is suitable for use in hospital beds, home care beds, and other healthcare equipment that requires adjustable motion.

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 :

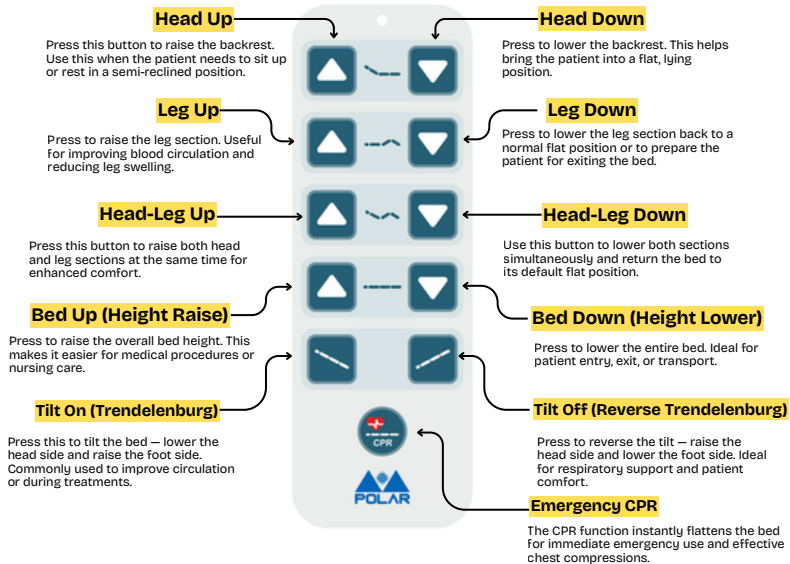
- Supports precise positioning of bed sections with smooth and accurate actuator movement.
- Operates with a noise level of ≤ 54 dB to meet requirements for quiet medical environments.
- Offers multiple control interfaces, including wireless remote, infrared remote, and manual operation.
- Integrated 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 5F A

◆ 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 |

ACS4710 5F A

◆ 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 a 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 5F A

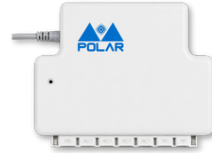
◆ Product Image :



Linear Actuator



Patient Handset



Control System

◆ 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 :

