

This specification is for the MCE Element Hydraulic Elevator Controller and includes:

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Product Photograph



Product Specifications Table

Maximum car speed	150 fpm, 0.75 m/s
Configuration	Simplex, Duplex
Landings	6 landings, 6 openings
Motor control	Solid State
Distance Feedback Landing/Positioning system	LS-EDGE 24V
Landing system, solid tape/magnets	LS-QUTE 24V
Power requirement	208 – 600 VAC, 50/60 Hz, Single or 3-phase
Environment	32 - 104° F, 0 - 40° C; Humidity 95% non-condensing
Standard enclosure	34" w x 31.5" h x 11" d (864 x 800 x 280 mm) with knock-outs



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Elevator Safety Code Compliance

- ASME A17.1/CSA B44
- NYC Appendix K
- Massachusetts 524 CMR
- Australia AS 1735
- New Zealand NZS 4332
- EN 81-72 for Firefighters Lifts

Other Applicable Standards

- NFPA 70/CSA C22.1 Electrical Codes (U.S. & Canada)
- CSA B44.1/ASME A17.5 Elevator and Escalator Electrical Equipment Standards
- EN 12016 EMC Immunity Standards
- ADA & ICC/ANSI A117.1 Accessibility Standards

MCE Corporate Information

MCE, Motion Control Engineering, is an established provider of elevator controls and peripheral equipment, boasting a track record of steady growth and industry-leading innovation for nearly thirty years. MCE's primary manufacturing facility in Rancho Cordova, California, service and sales offices, and contract manufacturing facilities around the world provide a time-tested, global presence.

MCE is part of a family of companies operating under the Nidec corporate banner. Nidec companies are major players in many industrial arenas, stretching from elevator controls and lift machines to door operators and industrial motors and controls to electric vehicle and consumer product components. Nidec's manufacturing strength and global presence help ensure the long term durability of the MCE brand.

MCE is the largest manufacturer of non-proprietary elevator controls, with an installed base of over well 150,000 worldwide. Non-proprietary means that building owners are not locked into a specific service provider by long-term contracts and special, proprietary tools. Our non-proprietary philosophy ensures building owners the freedom to choose the installer and service provider of their choice, without constraint. MCE controls never require special, proprietary tools and MCE technical support is available to all service providers, without regard to their corporate affiliation. Over the life of a building, our non-proprietary approach to elevator controls by itself can save a large building owner hundreds of thousands of dollars but MCE quality and MCE controls provide many other important benefits as well.



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Controller Standard Features

- Code Compliant
- ADA Compliant
- Field-programmable Logic
- Non-Proprietary
- On-board diagnostics, maintenance and hourly statistics
- CAN Bus connectivity
- Universal I/O, 24, 48, 110/120 V, AC or DC, electrically protected
- Easily visible Status Indicators for critical processes
- Individual LED indicators for all field inputs and outputs
- Out of Service Timer
- Motor Limit Timer
- Valve Limit Timer
- Oil pressure, viscosity, and temperature monitoring
- High or Low Speed Inspection selection
- Programmable Door Operation
- Door Pre-opening
- Call registration through on-board touch screen
- Fire Service Operation with multiple code presets
- Independent Service
- Simplex Selective Collective Operation
- Simplex Home Landing Operation
- Accurate Leveling
- Test Switch disables doors and calls during system test
- Machine room inspection
- Car top inspection
- In-car inspection
- Heavy Load call bypass
- Anti-nuisance (Photo Eye and Load Weigher)
- Inspection and Automatic operation Fault Bypass capabilities
- Car and hoistway door bypass
- On screen oscilloscope with selectable inputs
- Home screen graphically reports: intended direction, actual direction, position, destination, door status, door lock status, car speed, car label, date and time, active events, operating mode, communications status, CPU health, safety string status, car and hall call status
- Ethernet, CAN, USB, and SD RAM interface; easy file transfer



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ADA Requirements

The elevator shall comply with ICC/ANSI A117.1, the American National Standard for Accessible and Usable Buildings and Facilities.

Leveling Accuracy: The controller shall have a self-leveling feature that shall automatically bring the car to floor landings within a tolerance of 0.25" (6.35 mm) or better under all loading conditions up to the rated load.

Hall Lanterns: The controller shall have outputs to drive the visible and audible signals that are required at each hoistway entrance to indicate which elevator car is answering a call. Audible signals shall sound once for up, twice for down. (In-car lanterns located in cars, visible from the vicinity of hall call buttons, and conforming to the above requirements, shall be acceptable.)

Car Position Indicators: The controller shall have a position indicator output to drive the required position indicator which shall indicate the corresponding floor numbers as the car passes or stops at a floor. An audible signal shall sound as the position indicator changes floors.

Optional: The controller shall have a voice annunciator output to facilitate announcement of car direction and floor number. (Voice annunciator is required for destination-based dispatching elevators or for elevators with speeds greater than 200 fpm).



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Programmable Logic

All available programming options (consult your MCE Sales Representative) or parameters shall be field programmable, without need for any external device or knowledge of any programming languages. Programmable options and parameters shall be stored in nonvolatile memory. At a minimum, there shall be a 3.5 inch color touch screen display for programming and diagnostics. Programmable parameters and options shall include, but are not limited to, the following:

- Number of Stops/Openings Served (Each Car)
- Simplex/Duplex
- Identifying information per job and car
- Programmable spare inputs
- Programmable spare outputs
- Programmable Fire Code Options/Fire Floors (Main, Alternates)
- Pit Flood operation
- Four general purpose recall inputs, independently programmable
- Serial Car Operating Panel
- Serial Hall Calls with bus-loss backup operation
- Digital Position Indicators
- Programmable CE Microcom floor labels
- Programmable Door Timers
- Programmable Motor Limit Timer
- Programmable Car Fan and Light Timer
- Door Nudging, Automatic and Fire Operation
- External Car Shutdown Input (e.g., battery lowering device)
- External Low Oil Sensor Input
- External Viscosity Control Input
- External oil temperature input
- Parking Floors
- Lobby Floor
- Hall or Car Gong Selections
- MCE Standard Security
- Anti-nuisance - Light Load Weighing and Photo Eye
- Door behavior selections
- Door pre-opening
- Fault Bypass – Inspection operation
- Fault Bypass – Automatic operation



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Non-Proprietary Equipment

Only universally “Serviceable and Maintainable,” Non-proprietary elevator control equipment shall be accepted. Non-proprietary standards recognize specific owner’s rights:

- The right to all information needed for diagnosis, service, and repair.
- The right to access on-board computers, including the information they store and the ability to diagnose, repair, and/or reprogram these systems.
- The right to select from among multiple sources for maintenance and repair in a competitive marketplace.

Environmental Considerations

The elevator control shall be capable of operating within the following environmental conditions:

- Ambient temperature: 32° F to 104° F, 0° C to 40° C.
- Humidity: Non-condensing up to 95%
- Altitude: Up to 7500 feet (2286 m)

Motion Control Engineering specializes in control products for adverse environmental conditions. For example, dust-proof, water-proof, corrosion-resistant, or air conditioned controller cabinets can be engineered to meet specific applications. Higher temperature range compatibility is available. Please contact MCE Sales Engineering for details.

Building and System Configuration

The elevator controller shall be microprocessor based and designed specifically for elevator applications. Elevator and drive logic shall be implemented independently of safety functions.

Elevator logic shall be implemented to facilitate tight coordination between subsystems and enhance reliability. The implementation shall utilize a real-time, multi-tasking operating system to allow the processors to simultaneously execute elevator control logic, drive control logic, operator interface logic, and communication support.

The elevator controller shall have an independent safety system in order to implement safety features required by code. The safety system shall incorporate check redundant, multi-processor, multi-path, solid-state, ASME compliant implementation that meets CSA and CE standards.

The elevator controller shall be configured and packaged in such a way that external “jumpers” cannot be used (intentionally or unintentionally) while the elevator is running in any passenger mode of operation. Non-passenger modes of operation shall be provided, along with means to bypass safety functionality, to allow inspection testing and other setup and/or troubleshooting operations.

The elevator control logic configuration shall be fully field programmable. Changes in number of floors, I/O configuration, eligibility etc. shall not require the replacement/reprogramming of EEPROMs or other storage devices. Further, changes in the controller configuration shall be user adjustable in the field.



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Diagnostics

The control system shall provide comprehensive means of accessing the computer memory for elevator diagnostic purposes. It shall have permanent indicators for important elevator status conditions as an integral part of the controller.

The microprocessor boards shall be equipped with on-board diagnostics for ease of troubleshooting and field programmability of specific control variables. Field changes shall be stored permanently, using nonvolatile memory. The microprocessor board shall provide the features listed below:

- On-board diagnostic switches via color touch screen display to provide user friendly interaction between the mechanic and the controller.
- An on-board event log shall store and display time-stamped events for diagnostic purposes.
- An on-board real time clock shall display the time and date and be adjustable by means of on-board switches.
- Field programmability of specific timer values (i.e., door times, valve limit times, etc.) may be viewed and/or altered through on-board touch screen.
- The elevator controller shall have extensive diagnostic capability. The touch screen shall allow access to major user functions and diagnostic features..
- Dedicated indicators shall be provided in a conspicuous location on the elevator controller to indicate important system statuses, such as when the safety string is made, when the door locks are made, when the elevator is on Inspection or Access, etc. In addition, other special or error conditions detected by the main processor or safety subsystem shall be displayed.

CAN Bus Connectivity

The controller shall incorporate reliable CAN bus connectivity for the car operating panel, hall call stations, and position indicating devices. The touch screen shall allow CAN bus activity to be monitored for diagnostic purposes.

Ethernet Connectivity

Ethernet connectivity shall be provided to allow remote monitoring, configuration, and diagnostics access.

SD RAM Storage

Micro SD RAM card storage shall be provided to provide program backup and event storage.

USB Connectivity

USB connectivity shall be provided to allow easy firmware upgrade and to facilitate parameter transfer from controller to controller.



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Intended Operation of Critical Components

Failure of any single magnetically operated switch, contactor, or relay to release in the intended manner; the failure of any static control device, speed measuring circuit, or speed pattern generating circuit to operate as intended; the occurrence of a single accidental ground or short circuit shall not permit the car to start or run if any hoistway door or gate interlock is unlocked or if any hoistway door or car door or gate contact is not in the made position. Furthermore, while on car top inspection or hoistway access operation, failure of any single magnetically operated switch, contactor or relay to release in the intended manner, failure of any static control device to operate as intended or the occurrence of a single accidental ground, shall not permit the car to move even with the hoistway door locks and car door contacts in the closed or made position.

Status Indicators

Dedicated permanent status indicators shall be provided on the controller to indicate when the safety string is made, when the door locks are made, when the elevator is operating at high speed, when the elevator is on independent service, when the elevator is on Inspection or Access, when the elevator is on fire service, when the elevator out of service timer has elapsed, and when the elevator has failed to successfully complete its intended movement. A means shall be provided to display other special or error conditions detected by the microprocessor.

Every field connection input or output shall have a dedicated LED such that no volt meter or other test equipment is required to see when and input or output is active.

Out of Service Timer

An out of service timer (T. O. S.) shall be provided to take the car out of service if the car is delayed in leaving the landing while calls exist in the system.

Motor Limit Timer

Motor limit timer function shall be provided which, in case of the pump motor being energized longer than a predetermined time, shall cause the car to descend to the lowest landing and park, open the doors automatically, and then close them. Calls shall be appropriate canceled and the car taken out of service automatically. Operation may be restored by cycling the main line disconnect, putting the car on inspection operation, or pressing the Fault Reset button. Door reopening devices shall remain operative.

Valve Limit Timer

A valve limit timer shall be provided which shall automatically cut off current to the down valve solenoids if they have been energized longer than a predetermined time. Calls shall be appropriate canceled and the car taken out of service automatically. Operation may be restored by cycling the main line disconnect, putting the car on inspection operation, or pressing the Fault Reset button. Door reopening devices shall remain operative.



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High or Low Speed Inspection

A selection shall be provided on the controller to select high or low speed during access or inspection operation as long as contract speed does not exceed 150 feet per minute.

Door Operation

Door protection timers shall be provided for both opening and closing directions to protect the door motor and help prevent the car from getting stuck at a landing. The door open protection timer shall cease attempting to open the door after a predetermined time if the doors are prevented from reaching the open position. In the event that the door closing attempt fails to make up the door locks after a predetermined time, the door close protection timer shall reopen the doors for a short time. If, after a predetermined number of attempts, the doors cannot successfully be closed, the doors shall be opened and the car removed from service.

A minimum of four different door standing open times shall be provided. A car call time value shall predominate when only a car call is canceled. A hall call time value shall predominate whenever a hall call is canceled. In the event of a door reopen caused by the safety edge, photo eye, etc., a separate short door time value shall predominate. A separate door standing open time shall be available for lobby return.

If the doors are prevented from closing for longer than a predetermined time, door nudging operation shall cause the doors to move at slow speed in the closed direction. A buzzer shall sound during nudging operation.

Door Pre-opening

When selected, this option shall start to open the doors when the car is in final leveling, 3" (76.2 mm) from the floor. If pre-opening is not selected, the doors shall remain closed until the car is at the floor, at which time the doors shall commence opening.

Fire Service Operation

Fire Phase I emergency recall operation, alternate level Phase I emergency recall operation and Phase II emergency in-car operation shall be provided according to applicable local codes.

Independent Service

Independent service operation shall be provided in such a way that actuation of a key switch in the car operating panel will cancel any existing car calls, and hold the doors open at the landing. The car will then respond only to car calls. Car and hoistway doors will only close with constant pressure on a car call pushbutton or door close button. While on independent service, hall arrival lanterns or jamb mounted arrival lanterns shall be inoperative.



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Simplex Selective Collective Operation

Simplex selective collective automatic operation shall be provided for all single car installations. Operation of one or more car or hall call pushbuttons shall cause the car to start and run automatically, provided the hoistway door interlocks and car door contacts are made. The car shall stop at the first car or hall call set for the direction of travel. Stops shall be made in the order in which car or hall calls set for the direction of travel are reached, regardless of the order in which they were registered. If only hall calls set for the opposite direction of travel of the elevator exist ahead of the car, the car shall proceed to the most distant hall call, reverse direction, and start collecting the calls.

Duplex Operation

For duplex configurations, each elevator shall have its own computer and dispatching algorithm. Should one computer lose power or become inoperative, the other shall be capable of accepting and answering all hall calls. When both computers are in operation, only one shall assume the role of dispatching hall calls to both elevators.

Leveling

The car shall be equipped with two-way leveling to automatically bring the car level at any landing, within the required range of leveling accuracy, with any load up to full load.

Test Switch

A controller test switch shall be provided. In the test position, this switch shall allow independent operation of the elevator with the door open function deactivated for purposes of adjusting or testing the elevator. The elevator shall not respond to hall calls and shall not interfere with any other car in a duplex or group installation.

Inspection

To enhance safety, an inspection switch, enable switch, and an up/down toggle switch shall be provided in the controller and on the car top to place the elevator on inspection operation and allow the user to move the car. Activation of the car top inspection switch shall render the controller inspection switch inoperative.

Uncanceled Call Bypass

A timer shall be provided to limit the amount of time a car is held at a floor due to a defective hall call or car call, including stuck pushbuttons. Call demand at another floor shall cause the car, after a predetermined time, to ignore the defective call and continue to provide service in the building.

Anti-nuisance (Photo Eye)

The controller shall cancel all remaining car calls, if a user-determined number of car calls are answered without the computer detecting a change in the photo eye input (indicating that no one is passing through the car door).



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Fan Light Timer

A programmable car fan and light timer shall be available. When the set time expires, the fan and light of an idle car shall be shut off to conserve energy. Demand shall immediate cause the fan and light to activate.

Controller Optional Features

Peripherals

As an integral part of the controller, the capability shall be provided to connect onsite or remote computer peripherals via Ethernet for additional adjustment, diagnostic, monitoring, or control capabilities.

Viscosity Control (must be allowed by valve design)

Viscosity control (valve design must allow the use of this option) shall cause the car to accomplish the following operation. If a temperature sensor determines the oil is too cold, and if there are no calls registered, the car shall go to the bottom landing and, as long as the doors are closed, the pump motor shall run without the valve coils energized to circulate and heat the oil to the desired temperature. In the event that the temperature sensor fails, a timer shall prevent continuous running of the pump motor.

Battery Lowering Device

MCE Hydraulic Controllers are available with a battery lowering device pre-wired, pre-tested and integrated into the standard enclosure. For freight doors, 3-phase powered doors, or 3-phase retiring cam applications, a standalone battery lowering device can be provided.

Motor Starter Features

Solid State

Motor starting shall not be initiated by mechanical contacts. The starter shall provide a current limit adjustment range. The starter shall limit current inrush during starting and provide gradual acceleration of the motor. The starter shall provide an internal fault detection system. If the internal fault detection system detects a failure, power shall be removed from the motor.



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Landing/Positioning System Information

LS-QUTE, Steel Tape and Magnetic Strips

The advantage of the LS-QUTE system is ease of installation and the fact that it can be used in a brightly lighted area. Corrosion may result if the steel tape is installed in an environment that is high in moisture, salt or chemical vapors (stainless steel tape optional). Consult your MCE Sales Representative for additional information.

The landing system shall provide high speed stepping signals, one floor run stepping signals, leveling and door zone signals and optional floor encoding signals. Each output signal shall be electrically isolated and shall be capable of reliably operating at 120 VAC.

The system shall consist of a steel tape with mounting hardware to accommodate the complete travel of the elevator, a car top assembly with tape guides and sensors and magnetic strips for stepping, leveling and floor encoding.

LS-EDGE

The LS-EDGE-EL positioning system uses hall-effect sensors and perforated steel tape to report position as the car moves through the hoistway. 5.5-inch magnets are used at each door zone.

The system uses capacitor-stored power and non-volatile memory to retain position information in the event of a power failure, continuing to capture information for 10 seconds after power loss and storing the final reading for use after power restoration.

The LS-EDGE system allows hoistway switches, with the exception of the final limits to exist virtually, reducing installation and adjustment time.

Monitoring Options

MCE iMonitor

A PC-based system monitoring application shall be available. At a minimum, monitoring shall be capable of providing system status, car location and travel direction, operating mode, and door operation indication via Ethernet connection.

The monitoring system shall be capable of remotely registering car and hall calls.

The monitoring system shall be capable of initiating recall of any car in the group to the lobby floor and of placing the car into Independent Service or placing it out of service upon arrival.

(Optional) A site view, with three-dimensional representations of site buildings, visual indicators of elevator status in buildings so equipped, and the ability to show status details upon indicator selection shall be available. (This option requires additional graphics development as agreed upon by MCE and the customer.)



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MCE iReport

A client/server based report collection and generation application shall be available via Ethernet connection. Based on historical data collected by the server, the report application shall provide, at a minimum, hall call analysis, traffic analysis, hall call log, car call log, event log, emergency log, maintenance log, and percent in service reports. The report application shall also be capable of emergency notification and report distribution through email service.

Building Management System Interface

An interface to a Building Management System shall be available. At a minimum, this interface shall allow the management system to view car location, call status, and door operation. The interface shall also allow the management system to set any of three levels of demand-response operation, each of which shall specify a set of cars to continue running in response to curtailed energy availability or if the building owner is voluntarily reducing energy demand. The interface shall also allow selected cars to be removed from and/or returned to service as desired through the building management system. (Depending on Building Management System software, modification of system code may be required.)

Third Party Monitoring

Optional: An interface to an IDS Liftnet monitoring system shall be available.

Service Enhancements

The manufacturer shall reduce requirements for service agency spare board stocks by using common major circuit assemblies in both Traction and Hydraulic controls of the same design series.

The manufacturer shall make software updates available via Internet download, email attachment, or physical USB card shipment..