GROUP CONTROL SYSTEM

Smart & User Friendly

ΣAI-22000C
Smart & User Friendly

∑AI-2200C

Intuitive & Comfortable
Comfortable elevator operation and ride under ever-changing usage conditions – that’s the concept realized with the ∑AI-2200C group control system from Mitsubishi Electric. Incorporating the latest advancements in fuzzy-logic, this system utilizes intuitive control to provide smooth operation and a stress-free ride. The moment a hall call button is pressed, the optimal car to respond to the call is selected based on factors such as waiting time, travel time, current car occupancy and energy consumption, and the Immediate Prediction Indication feature is simultaneously activated to reduce user irritation generated when waiting for the car to arrive.

Behind all this are Mitsubishi Electric’s cutting-edge technologies, designed to add vitality and dynamism to building functionality.
Milestones of Group Control Technologies

ΣAI-2200C is an advanced group control system which is composed of many group control features. With these features, it improves average waiting time.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Group control system</td>
<td>ΣAI-2100</td>
<td>ΣAI-2100C</td>
<td>ΣAI-2100N</td>
<td>ΣAI-2200</td>
<td>ΣAI-2200C</td>
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</table>

- Individualized Car Allocation
- Energy-saving Operation—Allocation Control
- Cooperative Optimization Assignment
- Dynamic Rule-set Optimizer
- Distinction of Traffic Flow with Neural Networks
- Car Allocation Tuning
- Fuzzy Logic
- Expert System
- Learning Function
- Psychological Waiting Time Evaluation

Average waiting time* (Index)

|       | 100 | 85 | 72 | 58 | 50 | 45 |

* The average time until the assigned car arrives at the hall after a passenger presses a hall button.
Key Benefits of ΣAI-2200C

Less travel time

In addition to reduction of waiting time, this group control system reduces travel time from boarding a car to arriving at a destination floor by individualized car allocation.

More flexible car allocation

Traffic conditions in a building change constantly. This group control system has a function to allocate the cars flexibly in response to the traffic conditions by sending the cars to a congested floor during periods of heavy traffic.

Making elevators more friendly for all

Destination Oriented Allocation System (DOAS) increases handling capacity. Compared to the conventional control system, DOAS allows reduction in car size and hoisting area. The space saved can be used effectively for other building facilities.

More building space

With Mitsubishi Electric’s smart control technology, when a passenger presses a hall call button, the system selects the elevator that best balances operational efficiency and energy consumption. Selection is based on each elevator’s potential energy consumption according to its current location and passenger load.

More energy-saving

Less irritating

This group control system evaluates not only actual waiting time but also psychological waiting time by assessing the probability of full-load bypass and prediction error, etc. The optimal car allocation based on the evaluation minimizes irritation of all passengers.

Less waiting time

ΣAI-2200C reduces not only passengers’ waiting time but also long-wait. The longer passengers wait for a car, the more they become irritated.
Cooperative Optimization Assignment

Forecasting a near-future hall call to reduce long waits

When a hall call is registered, the algorithm predicts a near-future call that could require long waits. Through evaluation of the registered hall call and the forecasted call, the best car is assigned. All cars work cooperatively for optimum operation.

Energy-saving Operation — Allocation Control (ESO-W)
Maximizing operational efficiency and minimizing energy consumption

This system selects the elevator in a group that best balances operational efficiency and energy consumption. Priority is given to operational efficiency during peak hours and energy efficiency during non-peak hours.

Car allocation that maximizes operational efficiency does not necessarily translate to energy efficiency. A car uses energy efficiently when it travels down with a heavy load, or up with a light load. Accordingly, if multiple cars have the same traveling distance, this system chooses the car that requires the least energy.

Through a maximum 10% reduction in energy consumption compared to our conventional system, this system allows building owners to cut energy costs without sacrificing passenger convenience.

Dynamic Rule-set Optimizer (DRO)
Selects optimum car allocation through “rule-set” simulation

The neural network technology has enabled the system to continually and accurately predict the passenger traffic within intervals of several minutes. A high-speed reduced instruction set computer (RISC) runs real-time simulations using multiple rule-sets and the predicted passenger traffic to select the rule-set which optimizes transport efficiency.

Simulation example and performance results of each rule-set
The diagram below shows an example during a morning up peak time. An ideal rule-set is selected every few minutes according to the predicted traffic conditions.

Performance results of each rule-set (average waiting time)

<table>
<thead>
<tr>
<th>Time</th>
<th>Rule-set 1</th>
<th>Rule-set 2</th>
<th>Rule-set 3</th>
<th>Ideal rule-set selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>25 sec</td>
<td>15 sec</td>
<td>22 sec</td>
<td>10 sec</td>
</tr>
<tr>
<td>8:30</td>
<td>28 sec</td>
<td>20 sec</td>
<td>22 sec</td>
<td>15 sec</td>
</tr>
</tbody>
</table>

The optimal rule-set is selected according to the simulation results (waiting time, etc.).

Car selection
During non-peak hours when energy efficiency is prioritized, car B is selected.
User-friendly Solutions

Immediate Prediction Indication (AIL)

**Easing stress of waiting at elevator hall**

When a passenger has registered a hall call, the designated car is selected and the corresponding hall lantern immediately lights up. To inform the passenger of the car arrival, the hall lantern flashes on and off for three seconds before the arrival.

**Without AIL**
Passengers wait for cars wondering which car will arrive first.

**With AIL**
As passengers can see which car arrives next, they have enough time to reach the car even when carrying large baggage.

**Hall lanterns**

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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gold ornament</td>
<td>Silver ornament</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**
- This feature is also applicable to operation systems other than ΣAI-2200C.

Second Car Prediction (TCP)

**Reducing passenger congestion**

Passengers tend to gather around the allocated car especially in heavy traffic like the morning time in an office building.

**Automatic Hall Call Registration (FSAT)**

**Enhancing user convenience**

If a passenger cannot get into an allocated car due to a full load, they need to press the hall button again.

If a fully loaded car leaves a floor, a hall call is registered automatically.

**Car Arrival Chime — Hall (AECH)**

**Signaling car arrival by sound**

An electronic chime at the elevator hall indicates that a car will soon arrive.

**Voice Guidance System (AAN-G)**

**Reassuring passenger safety**

Voice guidance supports passenger safety and peace of mind when entering and exiting a car, in crowded cars and at the time of an emergency.
Destination Oriented Allocation System (DOAS)

Passengers register their destination floor using a hall operating panel before entering the elevator, eliminating the need to press the button inside the car. Furthermore, dispersing passengers by destination prevents congestion in cars and minimizes waiting and travel time.

**Key Benefits of DOAS**

**Enhanced Convenience**

**At elevator halls**

**Without DOAS**

Passengers wait for cars wondering which car will arrive first. Once a car arrives, regardless of the destination, passengers rush to get into the car.

**With DOAS**

When passengers enter a destination floor at a hall, the hall operating panel indicates which elevator to take. As passengers proceed to the assigned elevator, the car is on its way, and there is no hurry when the car arrives.

**In Cars**

**Without DOAS**

Passengers need to press the destination floor button on a car operating panel. In a busy car, they have to fight through a crowd of bodies to reach the button.

**With DOAS**

A destination floor is registered when passengers enter it on the hall operating panel. Relax and enjoy the ride in the car. The car skips unnecessary stops and quickly takes passengers to the destination floor.

**Individually Car Allocation Based on Travel Time**

This system evaluates passengers’ travel time from registration of a destination floor at a hall to arrival at the destination floor and predicts their waiting time. As this system allocates an optimum car to each passenger on the basis of the predicted waiting time, passengers’ travel time can be reduced.

**Evaluating travel time**

**Without DOAS**

Since not all passengers press an up or down button at the hall, the system cannot evaluate their waiting time and travel time.

**With DOAS**

Since all passengers register the destination floor on the hall operating panel, the system can evaluate travel time of each passenger and allocate the optimum car for the passenger.

**Reducing travel time**

**Without DOAS**

Cars make stops at every selected floor because destination floor is not considered for car allocation.

**With DOAS**

The individualized car allocation based on the destination floors leads to shorter travel time and fewer intermediate stops.

**Improvement**

Compared to conventional operation systems without DOAS, this system reduces the average waiting time at the time of congestion and long-wait.

**Average waiting time at the time of congestion**

Conventional operation system without DOAS

With DOAS

Improved: Approximately 30%

**Long-wait rate (60 seconds or longer)**

Conventional operation system without DOAS

With DOAS

Improved: Approximately 40%
**Extended feature for more security**

The destination floor can be registered automatically after passing a card over a card reader at the security gate entrance. DOAS integrated with security gates provides a seamless journey and enhances security in the building.

1. **Reducing congestion at elevator halls**
   - Our elevator group control system is linked to an access control system, enabling congestion during peak use hours to be reduced through efficient authorization at security gates and optimum car allocation.

2. **Smooth operation**
   - 1. Pass a card over the card reader at the security gate.
      - Security gates screen out suspicious persons and block unauthorized access to the elevator hall.
   - 2. Check the elevator number displayed on the indicator.
      - The assigned car is dispatched almost simultaneously with completion of card authentication, reducing passenger waiting time at the elevator hall.
   - 3. Proceed to the entrance of the assigned car.
      - A hall call has already been registered. The passenger does not need to press a hall button. If the passenger forgets or misses the assigned car, a call can be registered again using the hall operating panel.
   - 4. Enter the car when the doors open.
      - The destination floor has already been registered. The passenger does not need to press a floor button in the car.

3. **Integrating security cards**
   - The ID card for the elevator can be combined with a building security pass, such as an employee ID card, to allow movement in the building using a single card. This integration creates a more convenient building security environment.

**System configuration**

The system configuration includes various devices and suppliers. Please refer to our brochure regarding elevator security solutions for details. Close collaboration with the security system supplier is required.
DOAS with user support features

Extended features for more supportive operation

Universally designed signal fixtures in elevator halls make elevators more accessible by all people, regardless of their age or ability.

1. Recommended equipment
   - Touchscreen hall operating panel
   - Triangular prism hall lantern
   - Elevator number plate with braille
   - Car entrance destination floor indicator

The intuitive LCD touchscreen is highly visible to all, including those who have color vision impairment.

The distinctive protruding shape enables excellent visibility from the side.

The plate is mounted at an optimum height for braille readers and can be recognized easily by children and wheelchair users.

Passengers can check the destination floors when getting into a car.

2. Passenger support features
   - Car selection
     This function enables passengers, especially those who have difficulty with mobility or require space such as wheelchair users, to specify the closest or relatively uncrowded car using the panel screen.

   1. Press the function icon.
   2. Choose a car selection method (closest or less occupied car).
   3. Register the destination floor.
   4. The assigned car is announced.

Audio guidance

Audio guidance assists visually impaired passengers to use the operating panel without difficulty.

   1. Press the function icon.
   2. Choose a selection method (closest or less occupied car).
   3. Register the destination floor.
   4. The desired car is assigned.

   1. Continuously press down on the touchscreen or press the accessibility button.
   2. Voice guidance starts.
   3. Move the finger slowly on the screen to start announcement of service floors.
   4. When you hear the desired floor, touch the screen to register the floor.
   5. The assigned car is announced.

   1. Hall operating panel continuously emits chime to lead passengers to the panel.
   2. After a destination floor is registered, the hall lantern is activated and emits a chime to guide passengers to the proper car entrance.

In addition to the navigating chime, providing a tactile guide board and tactile blocks (to be both supplied by owner) in the elevator hall, and handrails and mirror in the car are recommended. Please consult our local agents for details.

Efficiency Oriented Solution - DOAS
Efficiency Oriented Solution - DOAS

Signal fixtures for DOAS

Hall operating panels — 10.4-inch touchscreen

■ Surface mounted type

■ Embedded type

■ Display colors

Urban Black (Basic)   Modern White*1   Stylish Blue*1
Elegance Brown*1   Fine Green*1

■ Example of display

Destination entry

Keypad type

Floor button type

Assigned-car indication

Car location map*3
Landscape layout
Portrait layout
Direction to car*3
Arrow
Triangle

Notes
*1: Audio guidance is applicable as optional.
*2: Card reader is to be supplied by customer. Please consult our local agents for details.
*3: Please consult our local agents for the production terms, etc.
Efficiency Oriented Solution - DOAS

Signal fixtures for DOAS

Hall operating panels — Keypad

- **Dot LED display (orange when illuminated):**
  - HSVF-C212
  - HSVF-C222
  - HSVF-C232 (with accessibility button)
- **LCD display (5.7-inch TFT color LCD):**
  - HSVF-C264
  - HSVF-C274
  - HSVF-C284 (with accessibility button)

**Card reader mount option:**
Card reader mount option is available for all left fixtures.

**Design Image**

Hall Lantern with Elevator Number Plate — Low-mount type

- HLV-E116S
- HLF-A10
- HLF-A11 (with chime)

Elevator Number Plate with Braille — Low-mount type

- HLV-E116S
- HLF-A10
- HLF-A11 (with chime)

Notes:
1. Card reader is to be supplied by customer. Please consult our local agent for details.
2. Complies with EN81-70. The keypad arrangement can be changed if compliance with EN81-70 is not required.
3. Keypad type can also be installed in a side wall.
4. Please consult our local agents for the application, production terms, etc.
5. Provided only in elevator halls on DOAS floors.

Application

<table>
<thead>
<tr>
<th>Location</th>
<th>Signal fixtures</th>
<th>Quantity</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hall</td>
<td>Hall operating panel</td>
<td>Minimum one per group at each floor</td>
<td>Keypad type (see pg 19)</td>
</tr>
<tr>
<td></td>
<td>Elevator number plate</td>
<td>Each car on each floor</td>
<td>To be supplied by customer</td>
</tr>
<tr>
<td></td>
<td>Hall lantern (optional)</td>
<td>Each car on each floor</td>
<td>Regular type (see pg 9)</td>
</tr>
<tr>
<td></td>
<td>Navigating sound (optional)</td>
<td>Each hall operating panel and hall lantern</td>
<td>The following devices are required: 10.4 inch touchscreen hall operating panel with audio guidance, or keypad type hall operating panel with accessibility button and audio guidance, and hall lantern with elevator number plate (HLF-A11)</td>
</tr>
<tr>
<td></td>
<td>Car Alarm Chime — Hall</td>
<td>Each car on each floor</td>
<td>This function is applicable if hall lanterns are installed.</td>
</tr>
<tr>
<td></td>
<td>Car Alarm Chime — Car (AECC)</td>
<td>Each car</td>
<td>This function is necessary if hall lanterns are not installed.</td>
</tr>
<tr>
<td></td>
<td>Car operating panel</td>
<td>Each car</td>
<td>Regular type (please refer to the brochure of each model)</td>
</tr>
<tr>
<td></td>
<td>Car entrance destination floor indicator (optional)</td>
<td>Maximum two per car</td>
<td>Mounted on car door jamb</td>
</tr>
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</table>

**Car Entrance Destination Floor Indicator**

**Concealed floor button type**

**For front return panel**

**On car door jamb**

**CDI-A100**

**HLF-A11 (with chime)**

**HLV-E116S**

**HSVF-C212**

**HSVF-C222**

**HSVF-C232 (with accessibility button)**

**HSVF-C264**

**HSVF-C274**

**HSVF-C284 (with accessibility button)**

**CBU2-C739**

**CBVF-C258**

**Card reader mount option:**

- HSVF-C212
- HSVF-C222
- HSVF-C232 (with accessibility button)
- HSVF-C264
- HSVF-C274
- HSVF-C284 (with accessibility button)

**Design Image**

**Signal fixtures for DOAS**
Individualized Car Allocation
The system allocates an optimum car to each passenger on the basis of the predicted waiting time and passengers' travel time.

Motor Drive Mix (MDX)
Peak Traffic Control (PTC)
Light-load Car Priority Service (UCPS)
Congested-floor Service (CFS)
The timing of car allocation and the number of cars to be allocated to floors where meeting rooms or ballrooms exist and the...
Eco Changes is the Mitsubishi Electric Group’s environmental statement, and expresses the Group’s stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

Visit our website at:
http://www.MitsubishiElectric.com/elevator/

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Specifications are subject to change without notice.

⚠️ Safety Tips: Be sure to read the instruction manual fully before using this product.