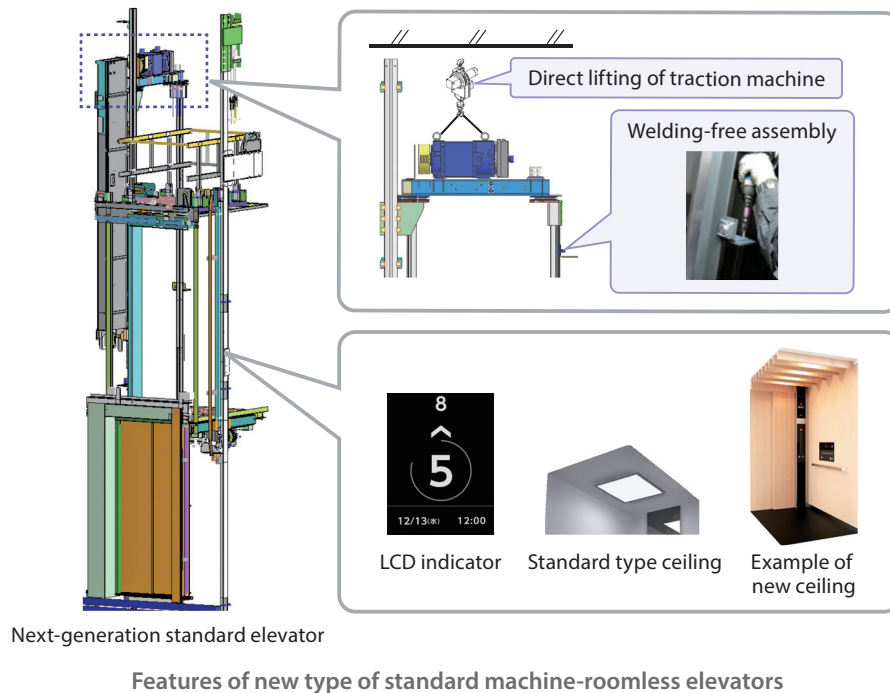


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6.1 Next-Generation Standard Machine-Roomless Elevators



Toshiba Elevator and Building Systems Corporation has developed next-generation standard machine-roomless elevators with an attractive interior design and easier installation and maintenance from the perspective of a recurring business model. The main features of these elevators are as follows:

- (1) Improved installability: The new elevators require approximately 20% shorter installation time than the existing model because of welding-free assembly and an improved technique for lifting and fixing the traction machine(*).
- (2) Improved maintainability: A new remote monitoring function expands the scope of automatic diagnosis and a simplified inspection process is easy to implement. As a result, the amount of time required annually for maintenance work is reduced.
- (3) New design: The new elevators provide an improved user interface by means of a large liquid crystal display (LCD) mounted in the car, information in four languages, and standard ceiling lighting with increased illuminance. Three types of newly designed ceilings are available.

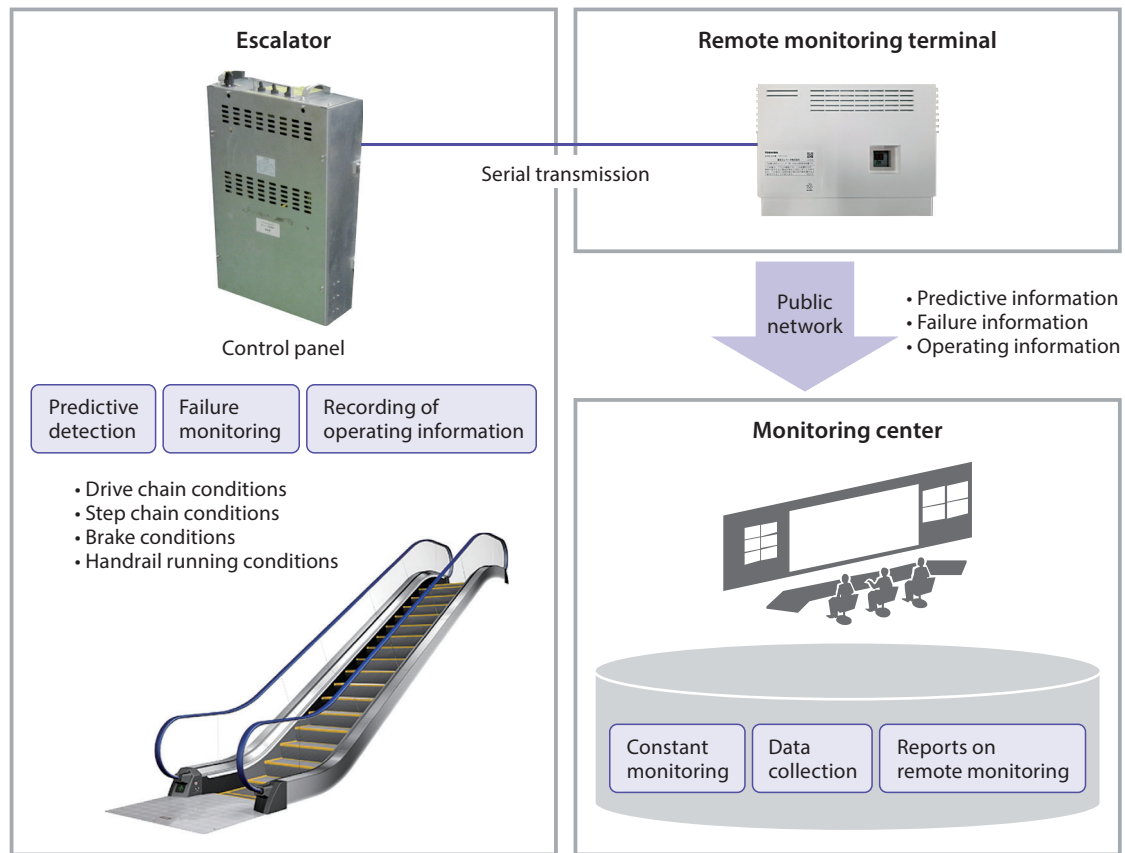
The reduction in installation time is the highlight of the new elevators. The layout of the top floor has been improved to make it possible to directly lift and install the traction machine without having to use special jigs. In addition, self-tapping screws are utilized to fix rail brackets without welding.

Moreover, a reduction in the number of rail brackets and landing fixtures to be welded helps to reduce carbon dioxide emissions during construction.

(*) In the case of the R9-2S60-6STOP elevator model in a reinforced concrete structure

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6.2 Remote Monitoring System for Escalators



Overview of remote monitoring system for escalators

Public transportation and commercial facilities are equipped with a large number of escalators, which need to be regularly maintained. On-site maintenance work is sometimes conducted outside the business hours of these facilities such as at night or early in the morning. Accurate work is therefore required in order to complete maintenance within the allotted time according to the equipment conditions. The control panels of existing escalators are already equipped with a microcontroller to record operating and failure information.

Toshiba Elevator and Building Systems Corporation has now developed a remote monitoring system with the following functions:

- (1) Detection of signs of failure of important parts subject to inspection
- (2) 24-hour remote monitoring via an always-on connection to a monitoring center
- (3) Periodic collection of operating information for optimal inspection and maintenance.

In particular, chains are diagnosed every day. When the preset tolerance limit is exceeded, an alarm from the remote monitoring system prompts a service engineer to immediately go to the site and take appropriate measures. This helps to ensure passenger safety while further improving the efficiency of inspection and maintenance. The remote monitoring system also monitors the brake and handrail conditions. The collected data can be utilized for appropriate planning and scheduling of maintenance work.

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6.3 Commercialization of Moisture-Proof and Rainproof LED Baselight and High-Ceiling LED Fixture to Expand Lineup of Camera-Equipped LED Lights



Moisture-proof and rainproof LED baselight equipped with camera



High-ceiling LED lighting fixture equipped with camera

In recent years, there has been an increasing need to record video images in various applications for safety and other purposes. However, since camera systems require additional installation work, are constrained by restrictions on installation, and incur extra costs, many customers previously had to give up on the installation of such a system.

In June 2019, Toshiba Lighting & Technology Corporation commercialized ViewLED, a light-emitting diode (LED) baselight equipped with a video-recording camera, which is installed in a position that provides a view of the entire indoor space. The electric wires for the light can be used to simplify the installation of a camera system with a recording function.

We have now developed and commercialized a moisture-proof and rainproof LED baselight and a high-ceiling LED fixture, expanding the lineup of camera-equipped LED lights.

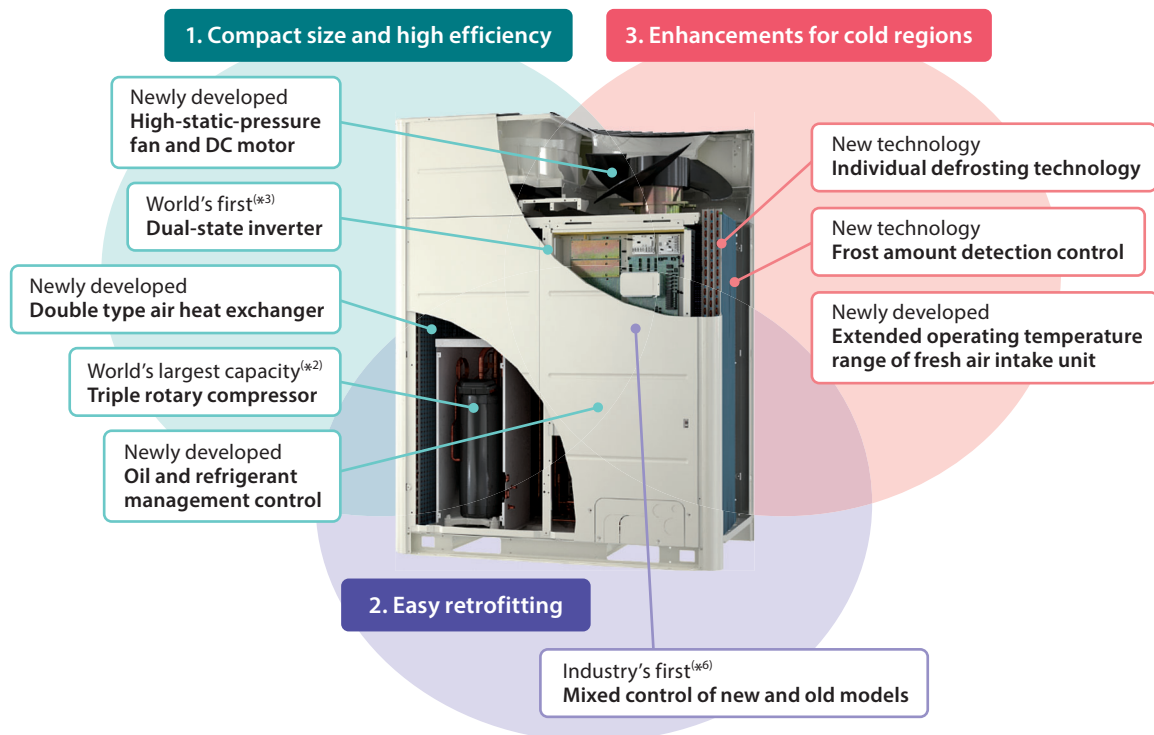
The moisture-proof and rainproof LED baselight is compliant with IP23^(*), making it suitable for use under the eaves of parking garages, train station concourses, factories, warehouses, and other facilities. The bioplastic shell housing for the camera unit is light and has excellent weather resistance. A metal plate is used to hold the camera unit instead of directly screwing it into the plastic housing, in order to prevent the unit from falling in the event of the plastic housing cracking or breaking because of aging deterioration. Furthermore, the camera has a built-in dedicated power supply so that it can continue recording even when the light is turned off.

The high-ceiling LED fixture is designed to be installed in places having a high ceiling with a height of 6 m or more, such as factories and warehouses. Its camera unit covers a field of view of 110°, provides 1080p progressive-scan high-definition TV (HDTV) resolution, and can be connected to a network to save the recorded video to a server. In addition, this camera unit incorporates an infrared light to enable recording in low-light conditions. Combined with a motion detection function, it can generate an audio warning message to burglars and vandals.

(*) An Ingress Protection (IP) Code specified by Japanese Industrial Standard (JIS) C 0920

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6.4 High-Efficiency Air-Conditioning Systems for Building Use



Super Multi u Series high-efficiency air-conditioning system

Air conditioning accounts for a large proportion of the overall energy consumption of a building. Toshiba Carrier Corporation has released a new series of high-efficiency air-conditioning systems, which are available under the name Super Multi u Series in Japan and SMMS-u Series outside Japan. The new series is designed to achieve (1) compact chassis size and high efficiency, (2) easy retrofitting, and (3) enhancements for cold regions, in order to promote the transition to and expand the introduction of the new series.

In 2020, the Super Multi u Series became the first variable-refrigerant-flow (VRF) air-conditioner model in the industry to receive the prestigious Energy Conservation Grand Prize^{(*)1} awarded by the Energy Conservation Center, Japan.

To achieve compact chassis size and high efficiency, we developed the world's largest-capacity triple-rotary compressor^{(*)2} with a displacement volume of 120 cm³, which also features low vibration. In particular, the motor section of the new series incorporates an open winding system and the world's first dual-state inverter^{(*)3} that drives one compressor with two inverters. As a result, the 20 horsepower (hp) model has achieved the industry's highest annual performance factor (APF) of 5.6^{(*)4} despite having the industry's smallest size for a 20 hp model^{(*)5}. In addition, the newly developed series permits mixed control of new and old models for the first time in the industry^{(*)6}, allowing flexible and sustainable replacement planning for both indoor and outdoor units to improve overall air-conditioning efficiency.

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Another feature of the new series is its individual defrosting technology realized by optimization of the rotary compressor properties, which provides a considerable improvement in defrosting performance in cold regions. This technology also extends the operating temperature range of the fresh air intake unit, which performs the appropriate heat treatment when drawing outside air into a building's ventilation system. The fresh air intake unit of the new series supports continuous ventilation at outside temperatures as low as -10°C while maintaining the discharged air at a temperature higher than the ambient temperature during defrosting operation. This is an improvement from the previous series, which supports outside temperatures down to -5°C.

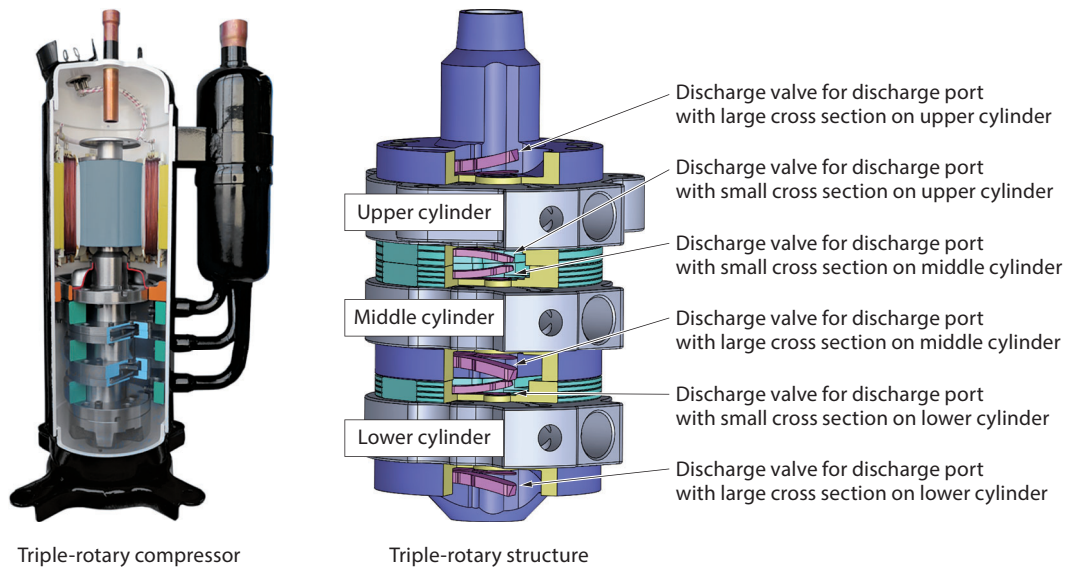
These technologies are expected to contribute to the growth of the air-conditioner market in cold regions.

(*1) As of December 2020 (as researched by Toshiba Carrier Corporation)

(*2)(*3)(*4)(*5)(*6) As of September 2020 (as researched by Toshiba Carrier Corporation)

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6.5 Large-Capacity Triple-Rotary Compressor



Triple-rotary compressor and triple-rotary structure

Since the outdoor units for variable-refrigerant-flow (VRF) air-conditioning systems are generally installed on the rooftop of a building, it is necessary to reduce their size in order to make effective use of the limited space available. The conventional 20 hp outdoor unit of Toshiba Carrier Corporation incorporates two twin-rotary compressors of the A3 series, requiring an installation area twice the footprint of the compressor.

We have now developed the K4 series of compact, large-capacity triple-rotary compressors with the world's largest displacement volume of 120 cm³(*1). The new outdoor unit, requiring only one compressor of the K4 series, has a 61% smaller footprint than the unit incorporating two twin-rotary compressors of the A3 series.

The main features of the K4 series are as follows:

(1) Triple-rotary structure

The triple-rotary structure has three compression chambers equipped with an eccentric crankshaft having a crank angle of 120°. This helps to reduce compressor torque fluctuations and vibration.

(2) Multi-valve structure

Unlike the conventional structure, which has one discharge valve per compression chamber, the multi-valve structure provides two discharge ports on the upper and lower sides of each compression chamber. The multi-valve structure helps to reduce discharge flow loss because of the increased total cross-sectional area.

(3) Open-winding motor

The new K4 series can switch between the conventional and new driving systems for each load. The conventional driving system is composed of a star-winding motor and an inverter, whereas the new driving system is composed of an open-winding motor and two inverters

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without a neutral point. The new driving system incorporates a high-winding motor that tolerates approximately 1.7 times the voltage of the conventional driving system. This is the world's first open-winding motor for air-conditioner compressors^(*2).

(*1) As of September 2020 for VRF air-conditioning systems (as researched by Toshiba Carrier Corporation)

(*2) As of September 2020 for rotary compressors (as researched by Toshiba Carrier Corporation)

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6.6 Universal Smart X EDGE32 Series Air-Cooled Heat Pump Chiller



Universal Smart X (USX) EDGE32 Series air-cooled modular chiller (4 modules)

The recent amendments to international environmental regulations place controls on alternatives for chlorofluorocarbons (CFCs), such as hydrofluorocarbons (HFCs), in order to mitigate global warming, mandating a gradual reduction in the production and consumption of HFCs.

To comply with these amendments, Toshiba Carrier Corporation has developed the EDGE32 Series of air-cooled heat pump chillers using the low global warming potential (GWP) R32 refrigerant. The EDGE32 Series is a new addition to the Universal Smart X (USX) Series, which has a large market share in the air-cooled heat pump chiller market.

In order to utilize R32 refrigerant, it was necessary to reduce the rise in the temperature of discharge gas that characteristically occurs with R32.

We have developed a new rotary compressor with the world's largest capacity^(*) by improving the liquid-injection and other fundamental technologies. The EDGE32 Series is equipped with the new rotary compressor to reduce its environmental load. For example, the 60 hp model provides the industry's highest-class efficiency^(*) because of its superior cooling and heating coefficient of performance (COP), which is 5% higher than that of the current R410A refrigerant model.

We will continue to further reduce the environmental load of chillers and increase the efficiency of rotary compressors in order to contribute to both local and global environmental preservation.

(*) As of October 2020 for rotary compressors (as researched by Toshiba Carrier Corporation)

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6.7 FLEXAIR 2 Series Spot and Zone Air-Conditioning Systems



Indoor unit of FLEXAIR 2 series auto-flap type air-conditioning system

In June 2020, Toshiba Carrier Corporation released three types of the FLEXAIR 2 series of spot and zone air-conditioning systems that are ideal for use in assembly factories and other large areas. Based on a survey of customers' needs and desires, we added various functions to the FLEXAIR 2 series.

The auto-flap type is equipped with an auto-swing function to enable air conditioning of a wider area than the conventional model. Its air outlet grille can be manually rotated by 180°, allowing the swing direction to be freely adjusted. Moreover, because of the use of resin for the air outlet unit, the indoor unit weighs only 13 kg in comparison with the 19 kg conventional model, further improving flexibility in installation.

Equipped with a compact and highly efficient variable-speed fan motor, the FLEXAIR 2 series provides five airflow levels, enabling the selection of an appropriate airflow rate according to individual preferences.

The FLEXAIR 2 series provides two options for temperature control: blowing and suction. These options make it possible to control the unit's capacity according to the operating conditions, resulting in substantial energy saving.