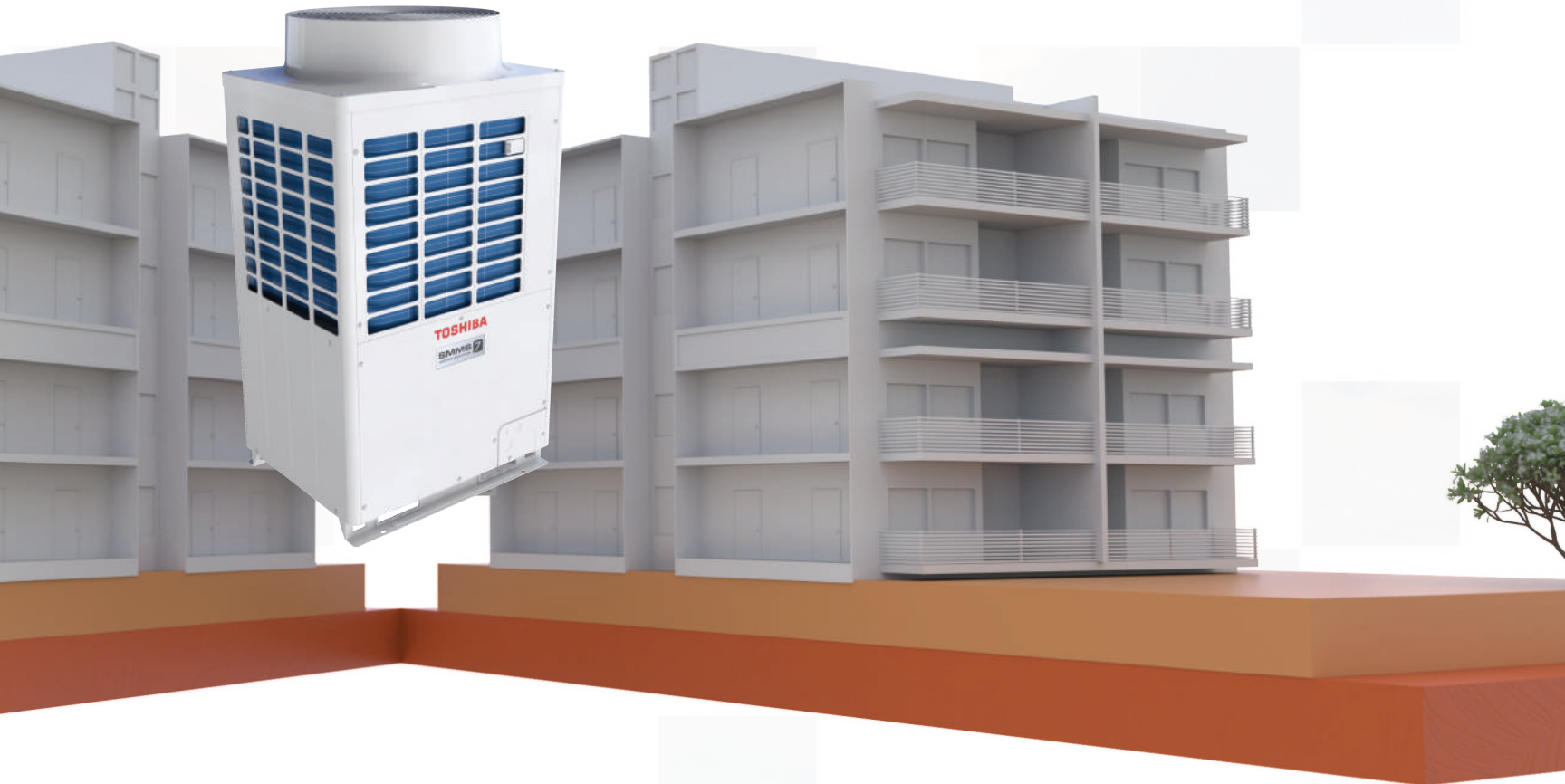


TOSHIBA
Leading Innovation >>>

SMMS-7 VRF

You spoke. We designed.





The first step in delivering innovation? Listening.

Social, economic and technological trends are evolving faster than ever. By keeping a pulse on the market, we constantly discover opportunities to better serve the built environment and push the boundaries of what is perceived as good enough.

Higher urban population density means more buildings in less space, emphasising the utility and value of usable space. It also results in scarcity of resources and land.

Unmatched, sky-rocketing demand causes rising costs of living—accelerating electricity, commodity and real estate costs.

Performance

Sustainability, space utilisation and efficiency are no longer a luxury, rather they are a necessity to create a new standard of comfortable and affordable space for urban dwellers. Building solutions with smart technology further improve performance and will play a large role in easing the burdens of increasing operational costs.

Toshiba has stepped up to reduce those burdens by developing new VRF equipment from the ground up tailored to the changing landscape in Southeast Asia.

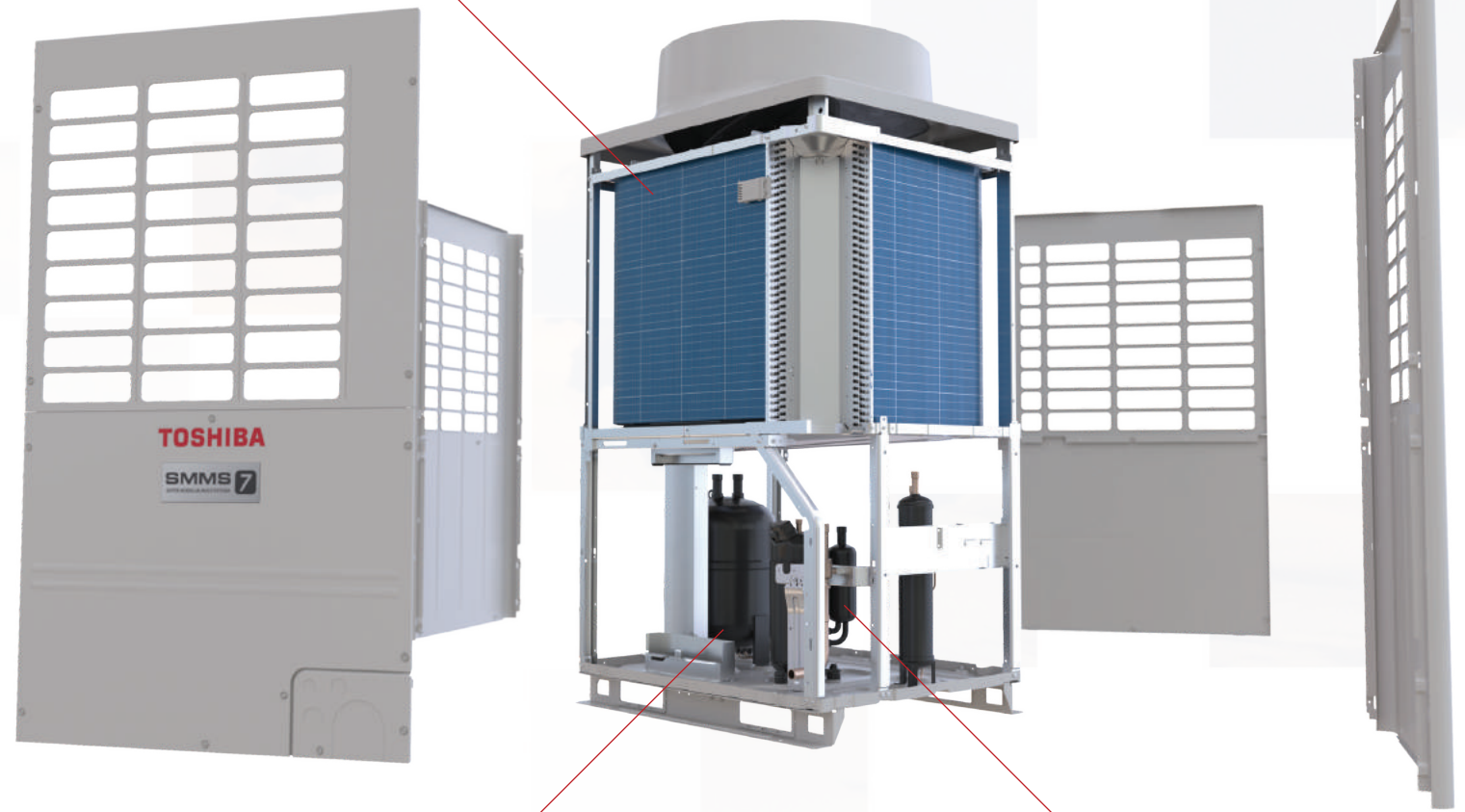
Seven generations of VRF innovation have culminated in the SMMS-7 — a purpose built air conditioning system designed to deliver top cooling performance in tropical climates.

Redesigned Heat Exchanger

Increases cooling efficiency by employing a longer path length with fewer paths and branches.

Intelligent VRF Control

Sophisticated software designed to control refrigerant flow and temperature at both outdoor and indoor units.

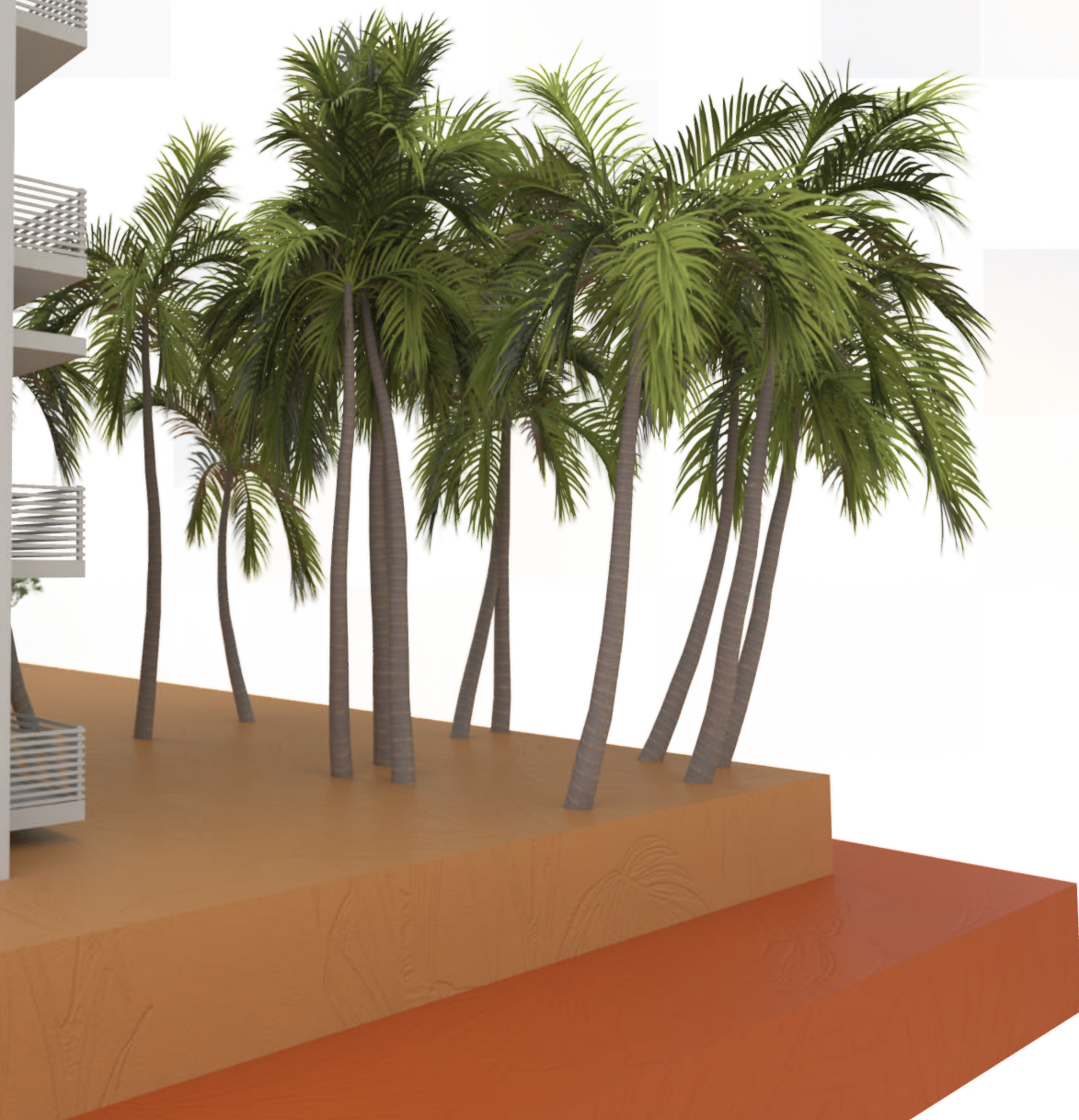


Newly Developed Accumulator

Reduces pressure drop and adds a unidirectional valve to improve reliability.

New Twin Rotary Compressor

Improves motor efficiency and decreases pressure drop.



Efficiency

As a region lying close to the equator, the temperature and humidity are high all year round. Air conditioning has become a daily necessity to provide comfortable and cool indoor environments for work, home, leisure or any other purpose.

With air conditioning systems consuming up to 40 percent of energy usage in a building, improving their efficiency yields significant energy and cost savings. Air conditioning systems are usually designed to deliver the

maximum cooling load required by a building, but the actual cooling load is typically less during operation. Part-load efficiency is therefore equally, if not more important than full-load efficiency.

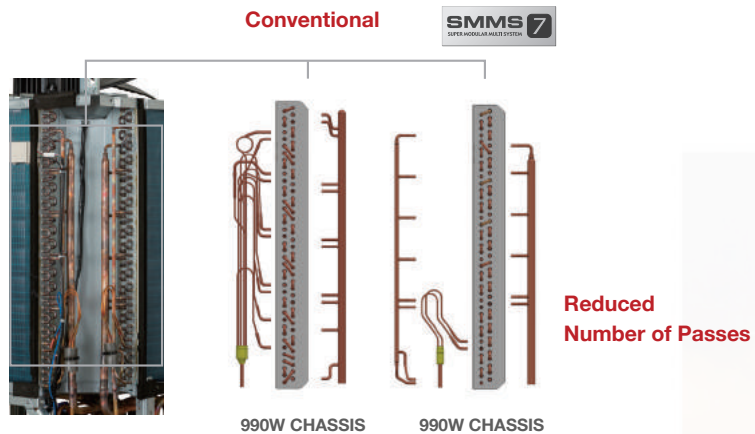
Optimised for Cooling

Because cooling efficiency is the focus, no compromises are made.

The heat exchanger of SMMS-7 VRF is now longer with fewer paths and branches.

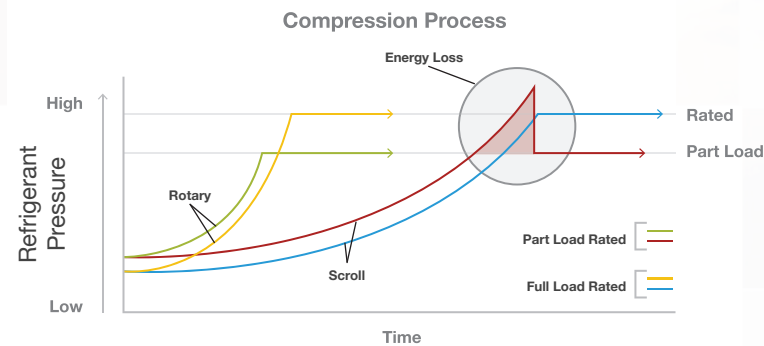
Best-in-class Efficiency

By engineering every component to deliver efficient cooling for the tropical climate in Southeast Asia, the SMMS-7 VRF has best-in-class efficiency of up to 4.82 at full load and 7.27 at 50% load.



Improved Part-load Efficiency

To improve part-load efficiency, Toshiba leverages its core technology, a twin rotary compressor with superior efficiency across a wide operational range. Through the fundamental working principle of the twin rotary compressor, refrigerant is compressed only at the required pressure, varying according to the cooling load during the compression cycle. Compared to less efficient compression technology, which has to reach full refrigerant compression then cycle down, less energy is wasted to reach part-load refrigerant pressure.



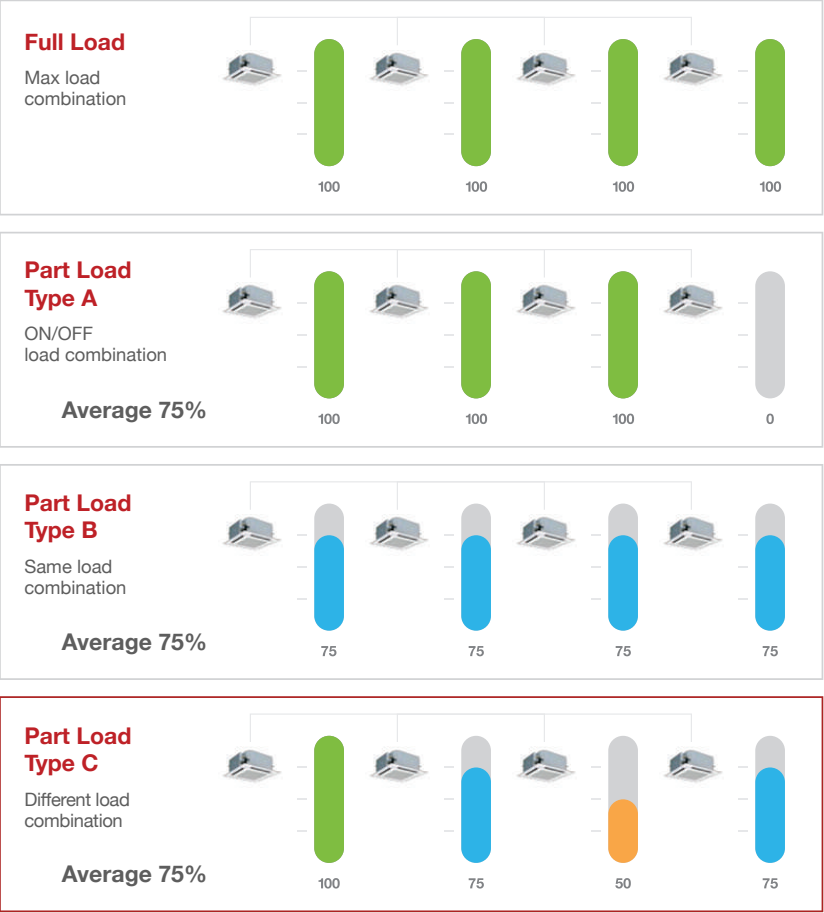
The SMMS-7 VRF twin rotary compressor has been designed to maximise performance by increasing core thickness and suction pipe diameter. To further improve efficiency, the new accumulator eliminates the need for a U-pipe, thereby reducing pressure loss.

Toshiba Intelligent VRF Control Offers Exceptional Precision

Toshiba intelligent VRF control improves part-load efficiency by introducing additional control on refrigerant distribution through the indoor units (IDU) in addition to compression temperature and volume at the outdoor unit (ODU).

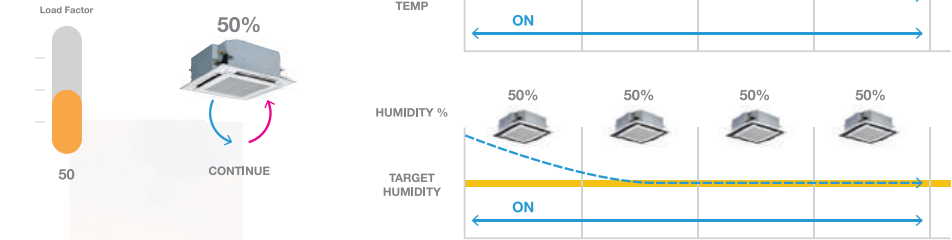
As a result, the ODU responds to the cooling capacity requirement and compresses only the required amount of refrigerant to satisfy the total capacity for all indoor units. Each IDU then varies the volume of refrigerant independently at a constant rate (no cycling) to achieve the set-point temperature. Indoor conditions are continually monitored so both refrigerant temperature and volume can be adjusted as needed.

Toshiba intelligent VRF control allows SMMS-7 VRF to uniquely satisfy Part Load Type C more efficiently, making a difference in comfort and energy savings.

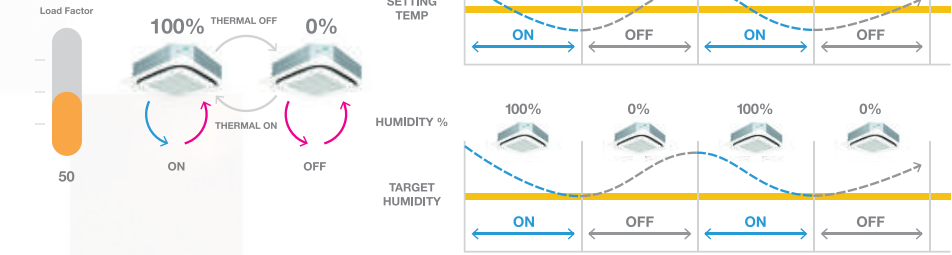


For a given part load, there can be different load combinations. The most challenging configuration to handle efficiently is Part Load Type C with a varying load at each IDU.

Toshiba Intelligent VRF Control



Brand X Control



Toshiba intelligent VRF control truly optimises system efficiency under any operating condition. That means no more on-off cycling, yet constantly maintaining the indoor temperature set-point, keeping building occupants comfortable with a uniform, consistent indoor temperature.

Footprint

Maximising usable space in a building is an important design factor. Understanding that an air conditioning system occupies space on the rooftop, in the basement or on a ledge, Toshiba has designed the SMMS-7 VRF with footprint minimisation in mind—freeing up valuable real estate for sky gardens, restaurants, car parks or any other usable square footage.

Footprint



Improved Accumulator Design Minimises Footprint

The new accumulator design allows for a more compact, efficient and powerful compressor.



To achieve a larger capacity within a smaller package, the SMMS-7 VRF uses a new oil level detection system, and a new accumulator incorporates a unidirectional valve to limit liquid refrigerant return.

The larger capacity of our twin rotary compressor is capable of delivering more cooling capacity while greatly reducing its footprint.



By refining the form factor and every component inside to deliver maximum cooling capacity, the SMMS-7 VRF footprint has been reduced by up to 24%*.



*SMMS-7 VRF footprint compared to SMMS-e VRF

Flexibility

Buildings are like living organisms—they evolve over time. What used to be a single tenant office may now house multiple tenants. The design of systems must also change to keep pace with this evolution. That’s why flexible building system solutions are so vital – they enable a myriad of building designs with shorter turnaround time and simpler infrastructure.

Flexible design removes constraints on installation location and configuration.

System flexibility also satisfies the specific load requirements demanded by different space configuration and usage throughout the day.

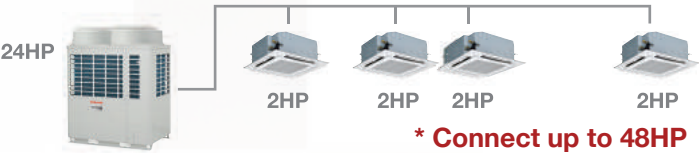
Enhanced System Design Flexibility—Up to 200% Diversity Factor

The SMMS-7 VRF system allows for modular configuration – providing up to 60HP per system to deliver the cooling capacity required without the need for a plant room. With a diversity factor of up to 200%, any combination of indoor units (IDUs) can be connected to fewer outdoor units (ODUs) and still satisfy varying cooling loads and scenarios.

For example, a hotel air conditioning system can be configured with up to twice as much IDU-to-ODU capacity* to cool common areas during the day and guest rooms at night.

To achieve good indoor air quality and user comfort, a single ODU (up to 24HP) can be directly connected to a 100% fresh air unit.

Combination	Single Unit										Double	Triple
	8HP	10HP	12HP	14HP		16HP	18HP	20HP	22HP	24HP	~60 HP	
				W990	W1210							
Diversity %	200										180	150
Max FCU's	13	13	13	13	17	18	18	21	24	26

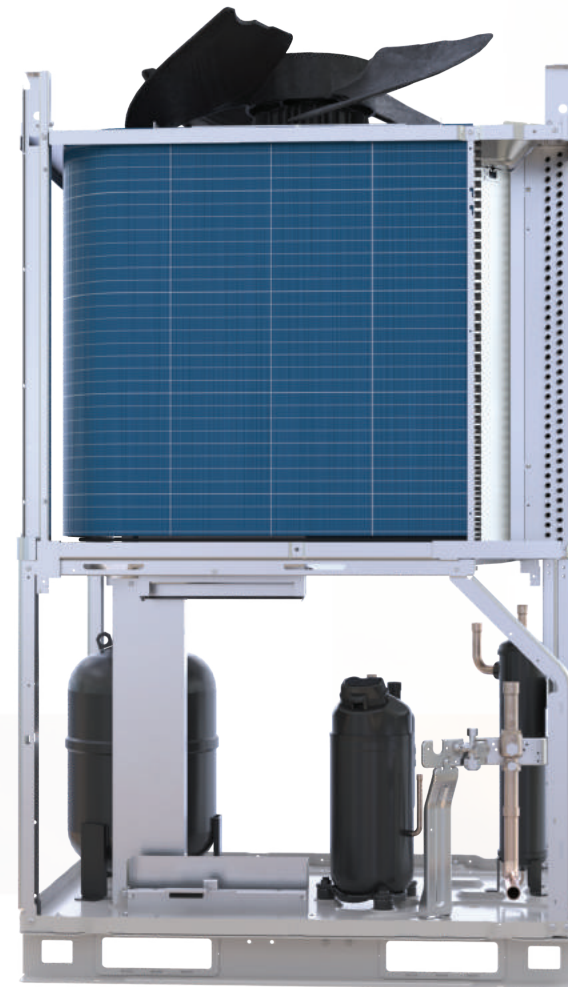


Reliability

No compromise means no compromise — in performance, reliability or environmental friendliness. The SMMS-7 VRF's robust design is tailored to the unique operating environment of Southeast Asia, meaning longer run times in higher ambient temperatures are actually the norm.

The climate of Southeast Asia places unique demands on air conditioning systems. The SMMS-7 VRF is designed to improve reliability and uptime, thereby reducing costs and enhancing occupant comfort.

Simple maintenance further improves reliability and system life. Should a fault occur, speedy diagnostics and repairs limit downtime to keep the system up and running.



-5°C



SMMS 7
SUPER MODULAR MULTISYSTEM



52°C

Expanded Operating Temperature

While the ODU should always be designed with sufficient ventilation to allow heat dissipation, an expanded operating temperature range up to 52°C combats over-heating when the system is exposed to strong direct sunlight or insufficient ventilation, minimising disruption to building operation.

High Availability

Even short periods of disruption can cause discomfort for building occupants. The SMMS-7 VRF compressor is carefully protected by an oil level management system coupled with a unique oil return circuit. When an oil level drop is detected, oil is returned back to the compressor, therefore enhancing compressor reliability. With a dedicated machine room that is segregated from its heat exchanger, the risk of electrical part failure is reduced by minimising exposure to dust, rain water, salt and damage from other environmental contaminants.

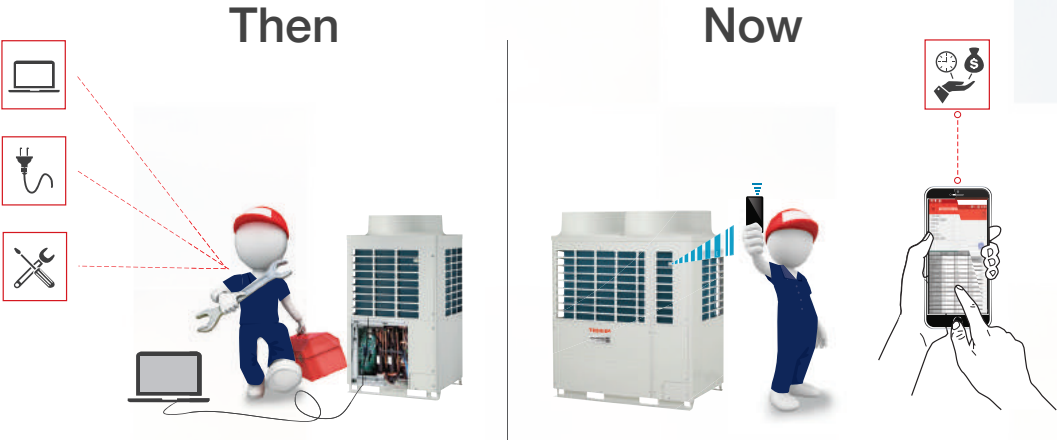
Designed for Ease of Maintenance

A separate machine room provides easier access to critical components for faster service when repair or maintenance is required.

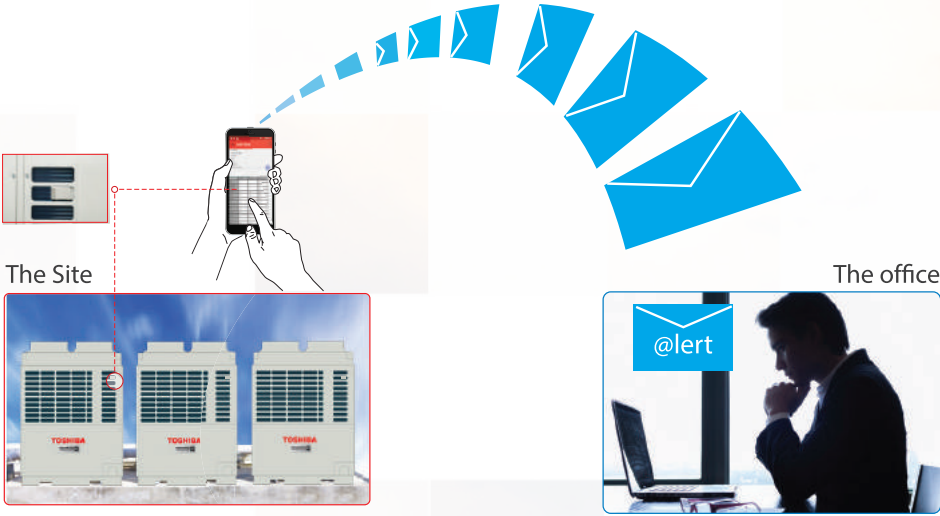
Designed for Ease of Troubleshooting and Diagnostics

Should a fault occur, minimising downtime is critical. The Smart Manager touch controller enables technicians to monitor system conditions and troubleshoot faults remotely without exposure to weather conditions. With performance data accessible over a secure network, technicians can perform diagnostics and respond more quickly.

With the Wave Tool remote diagnostic application, system configuration and fault log data can now be accessed by simply tapping the SMMS-7 VRF with a smartphone via near-field communication (NFC) technology, even when the ODU is not connected to a power source. During installation and service, customers can obtain data through this application without removing the front panel of the outdoor unit. For advanced troubleshooting, data from the Wave Tool can quickly be transmitted offsite for remote diagnostics.



Wave Tool remote data collection (Android™ application)



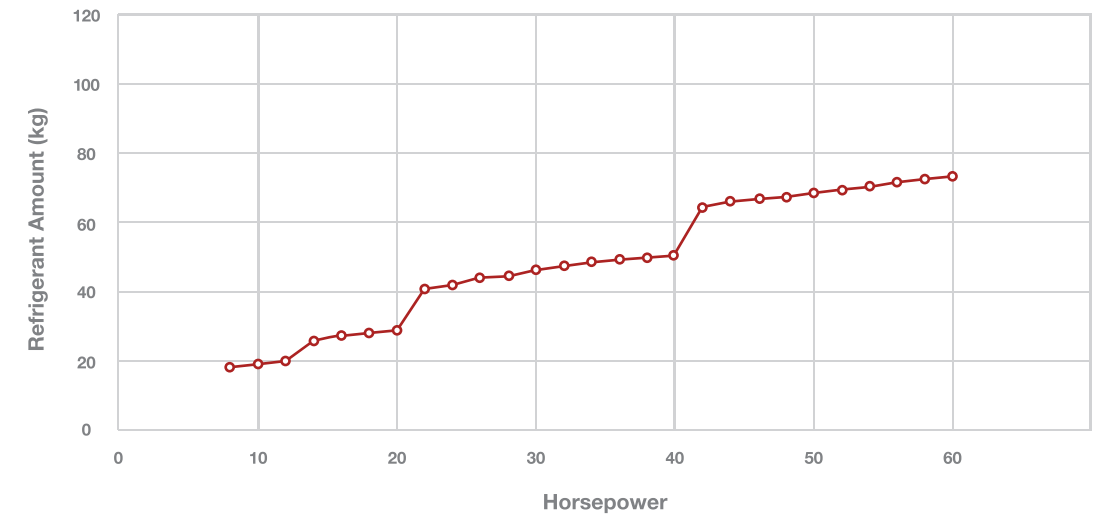
Wave Tool remote diagnostics

Environment

Toshiba is as concerned about the environment as occupant comfort and operational efficiency. While reduced energy consumption has a positive environmental impact, energy savings is only the beginning.

SMMS-7 VRF Uses Up to 30% Less Refrigerant

A new liquid pipe temperature control algorithm and tankless design reduce refrigerant charge by up to 30%.



- Assumed Condition**
- Main pipe length: 100m
 - Connected IDU capacity: Same as ODU capacity
 - Each IDU capacity: 2HP

Less Material, Reduced Waste

At every stage from product design to installation and operations, the new SMMS-7 is developed using lean methodologies for materials and system design.

Energy Conversation

With improved full load and part load efficiency, the SMMS-7 VRF reduces energy consumption by up to 20% and minimises impact on the environment.

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