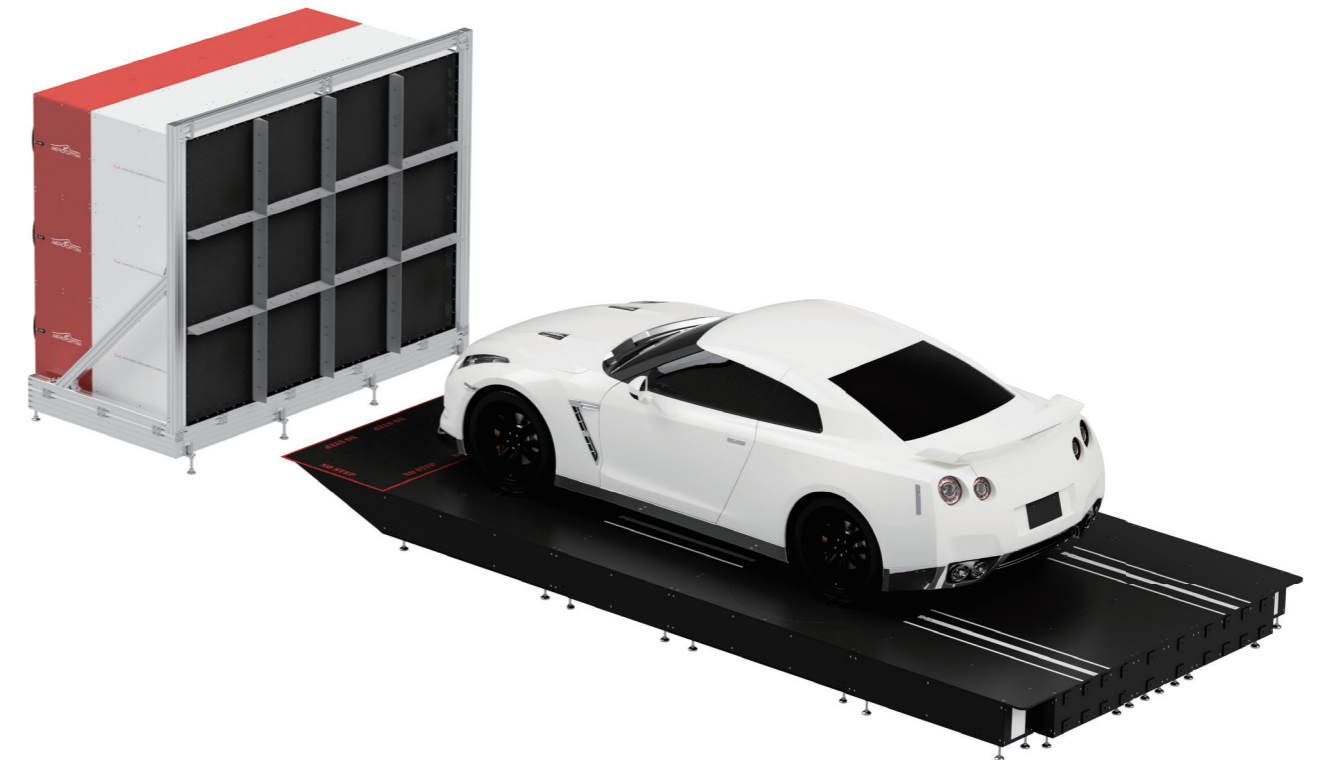


# Compact Car Wind Tunnel System



Compact Wind Tunnel, Aero Optim



## Design and Manufacturing (Balance)



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## Official Distributor



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## Design and Manufacturing (Wind Tunnel)



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Dealer

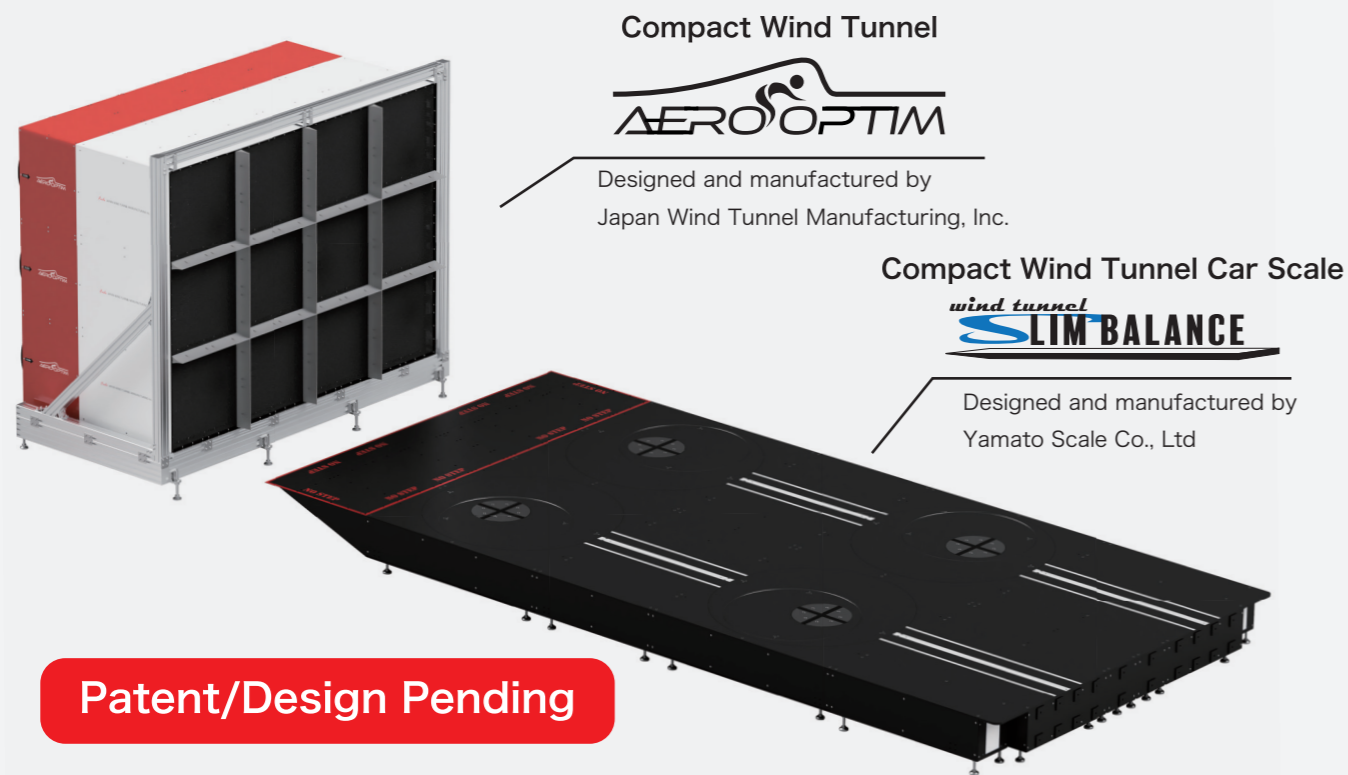


Compact Wind Tunnel Car Scale, SLIM BALANCE



## Features

- World`s smallest garage-sized test device
- High-precision measurement with  $\pm 0.05\%$  reading
- Portable and easy to set up with no pit needed



Patent/Design Pending

## Product of Three Specializing Companies

The Compact Car Wind Tunnel System is a wind tunnel test device specialized for four-wheeled vehicles that incorporates the compact wind tunnel, the Aero Optim, and the compact wind tunnel balance, the SLIM BALANCE.

By coordinating with trading company Nishiyama Corporation and Japan Wind Tunnel Manufacturing, scales and measurement devices manufacturer Yamato Scale has created the SLIM BALANCE, the world`s thinnest, compact car scale.

With Daisuke Azuma of Kurume Institute of Technology as our advisor for manufacturing, we aimed for a product that can be used for those pursuing cutting-edge technology.

## Usage 1: Dynamics Testing of a Four-Wheel Vehicle

Gathers lift, drag, and side force data at high resolution

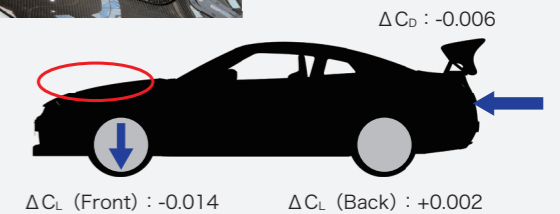
Able to evaluate the shape of the car as well as the effect of various front or back aero parts



Wind tunnel test of a tuned car



Top Secret  
Aero Bonnet



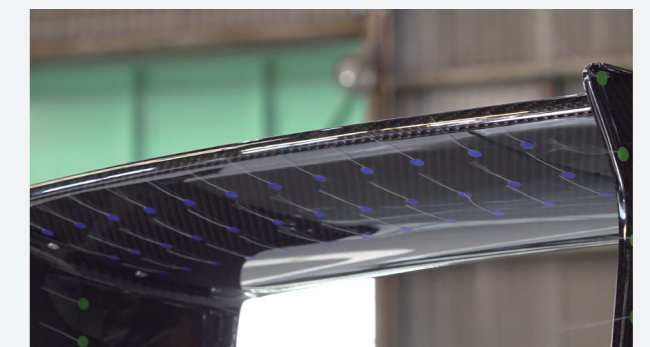
Sample data: effect of opening bonnet air vents

## Usage 2: Visualization

Visual tests can be conducted using a smoke machine or with tufts.



Visualization using a smoke machine



Visualization using tufts

## Expert Comments



### Development Advisor, Daisuke Azuma

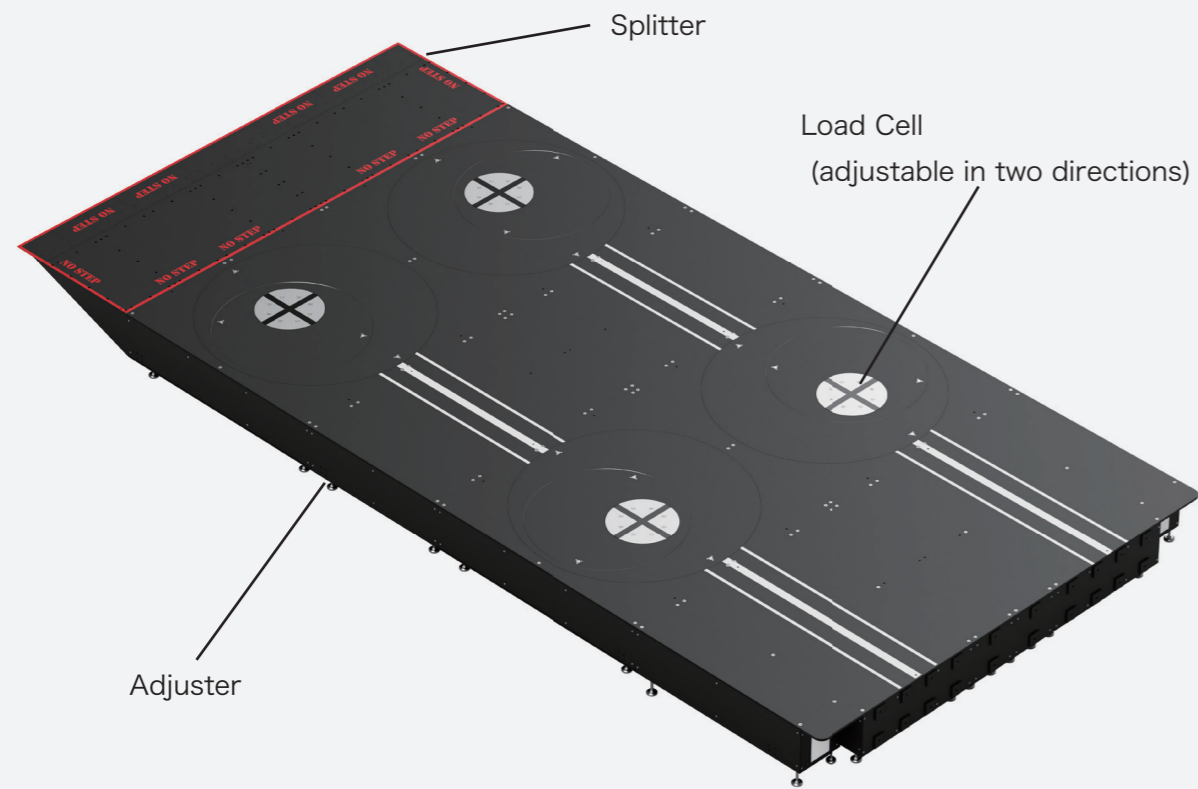
Professor at Kurume Institute of Technology, (Author of "Car Aerodynamic Design," MIKI PRESS)

Small and portable, this wind tunnel makes it easy to construct a facility for testing vehicles. With the scale`s high resolution 6-component force sensors, the system allows for low-cost and speedy evaluation of aero parts that are much-needed early in the design phase.



### Equipment Contributor, Kazuhiko Nagata (a.k.a. Smokey Nagata) Founder of TOP SECRET

Until now, our only way to evaluate our aero parts was using lap times and maximum speed. By extracting lift and drag coefficients from wind tunnel tests, we had a great opportunity to see where design meets performance.



## Performance

Dimensions	2980 mm Width x 6277 mm Length x 400 mm Height		
Load Cell Range <sup>1</sup>	Wheelbase Range	1800 mm ~ 3210 mm	
	Track Range	1200 mm ~ 1780 mm	
Weight	Approx. 4700 kg		
Maximum Capacity	2500 kg or 625kg per wheel		
Load Cell Output <sup>2,3</sup>	Force Axis	Measurement Capacity	Measurement Precision
	Lift Force (LF)	±1000 N	±0.25 N (< 500 N) ±0.05% Reading (☒ 500 N)
	Drag Force (DF)	0 ~ 1000 N	±0.125 N (< 250 N) ±0.05% Reading (☒ 250 N)
	Side Force (SF)	±2000 N	±0.25 N (< 500 N) ±0.05% Reading (☒ 500 N)

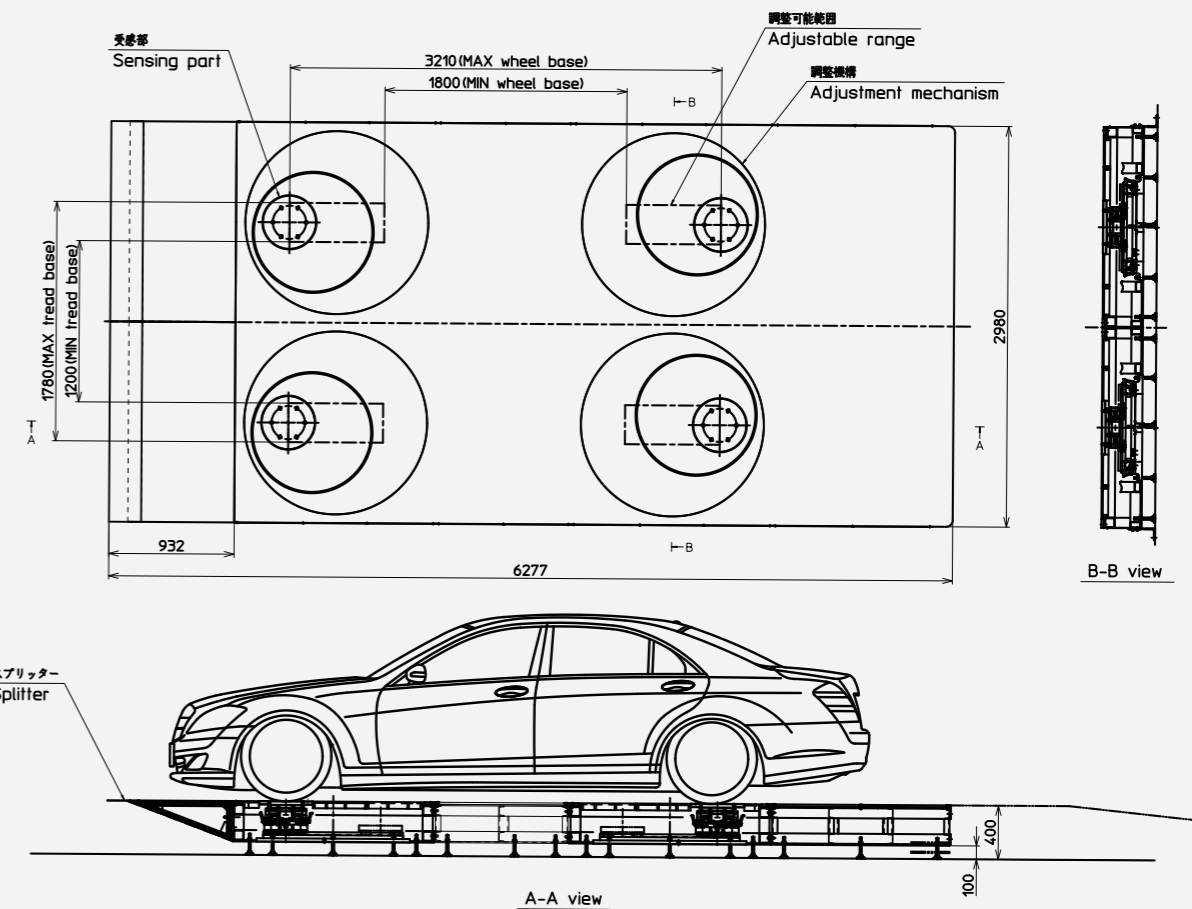
This product is under development. Some specifications may change without notice.

<sup>1</sup> The tire's center axis is used as reference.

<sup>2</sup> Measurements are shown per wheel.

<sup>3</sup> For a four-wheel scale, moments (roll, pitch and yaw) are derived with functions.

## Dimensions



### Space Conservation

With its modular design, this scale is easy to move and assemble. Pits often found in conventional scales are not needed.

### Uniform Airflow

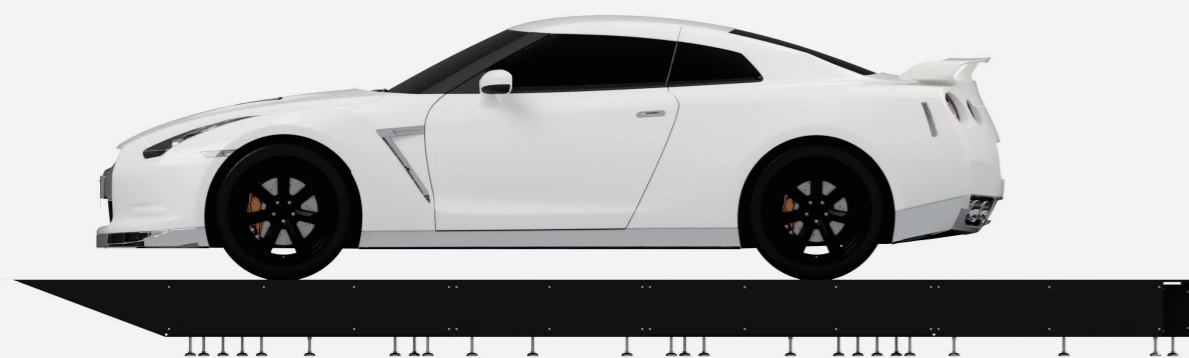
CFD is used to determine the best splitter design to minimize boundary layer and maximize synergy with the Aero Optim.

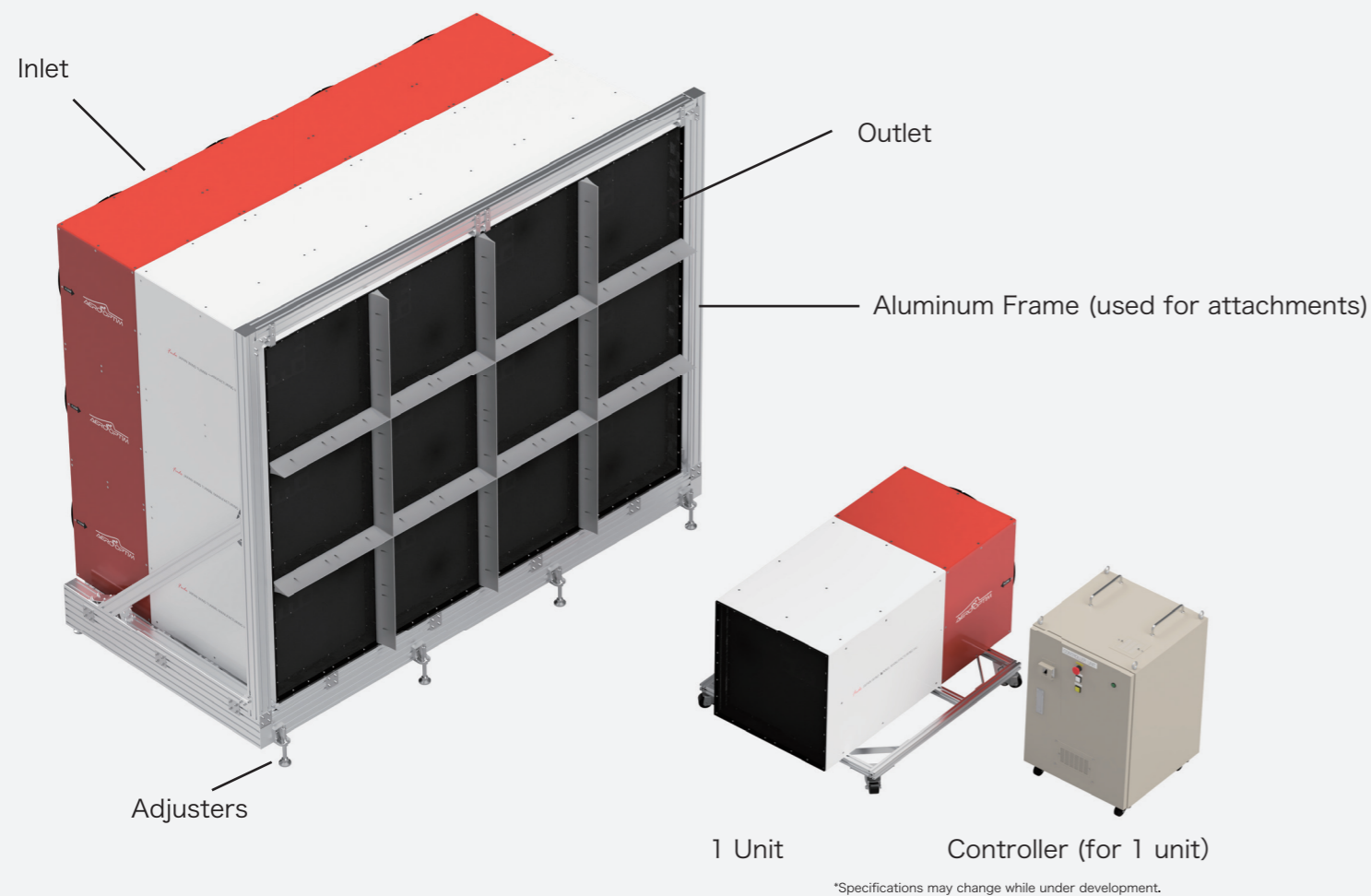
### High Precision 6-Axis Sensor

- Correctable for residual loads and interference
- 0.05% reading precision for LF, DF and SF.

### Compatibility

Unique slide-adjustable force sensors gives scale the ability to accommodate vehicles with various wheelbase and track.





## Introduction to the Aero Optim

The Aero Optim is a compact, scalable wind tunnel that can be stacked vertically or horizontally to create the necessary flow area. The fan, diffuser and straighteners are placed inside a cube-shaped unit, which makes uniform air to flow. We developed this product to bring a "Wind Tunnel for Everyone," where the good wind quality can be used to conduct simple wind tunnel tests.

### Compact

The fan, guide vane, diffuser and flow straighteners are packed inside a 1.5 meter long space, so it can fit inside a room or garage.

### Low-Cost

Units are mass-produced to make this wind tunnel more affordable to purchase and operate compared to custom builds.

### Portable

A 12-unit set can be moved on hard, smooth surfaces with a pallet jack, simplifying long-term storage.

### Customizable

Various accessories are available, including additional sensors, features to improve flow quality, and fixtures.

## Performance

Name	Aero Optim	
Version	21 J	21 E
Wind Speed	1~15 m/s ( 3.6~54 km/h )	
Distribution <sup>1</sup>	Under ±8 %	
Fluctuation <sup>1,2</sup>	Under 1 %	
Outlet Size	W 630 × H 630 [mm]	
Unit Size	L 1470 × W 686 × H 683 [mm]	
Fan	7.5 kW IPM Motor Axial Fan	
Noise <sup>3</sup>	105 dB	
Weight	160 kg	160 kg
Power Supply	3-Phase 200V 50/60Hz	3-Phase 400V 50Hz

<sup>1</sup> : At rated fan speed, 150mm downstream, center of the fan (20J prototype)

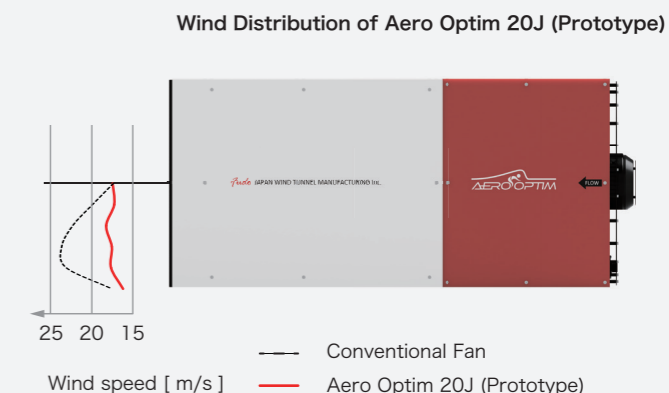
<sup>2</sup> : Defined as the coefficient of variation of wind speed

<sup>3</sup> : At rated fan speed

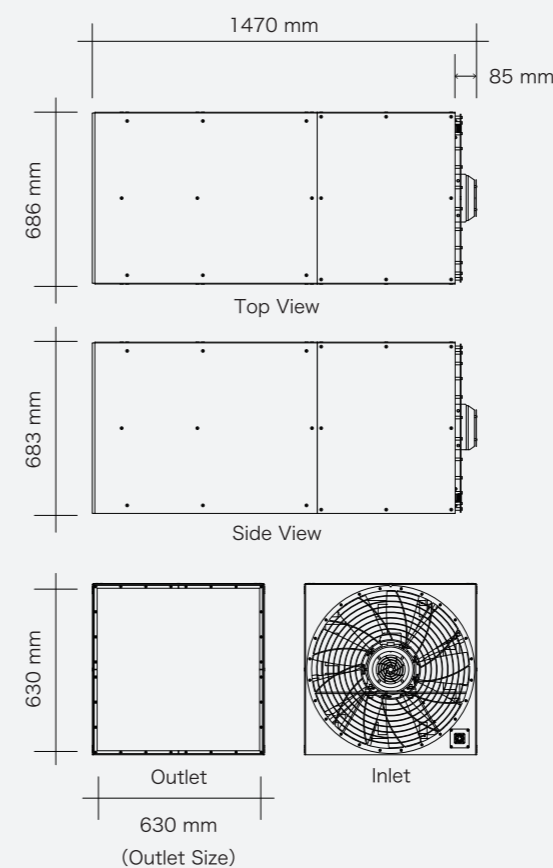
Note: specifications are subject to change without notice

\*Aero Optim and are trademarks of JAPAN WIND TUNNEL MANUFACTURING Inc.

## Wind Speed Distribution



## Dimensions



## Recommended Space

