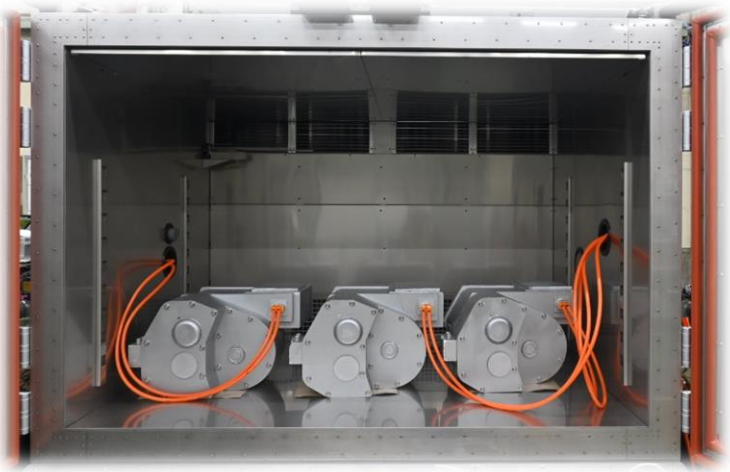
Quality is more than a word

ESPEC

Large Temperature and Humidity Chamber
FD Series

Features

FD Series allow you to choose the size and performance best suited your test applications. The FD series is desirable for testing large assemblies and completed products such Battery packs/modules, EV powertrain(E-Axle),Pillar to Pillar display(dashboard).
The right solution to meet your applications and various test standards such as MIL,ISO,IEC and LV124.



Features

- **Temperature & Humidity Range**

  Temp. Range : -70 to +180℃

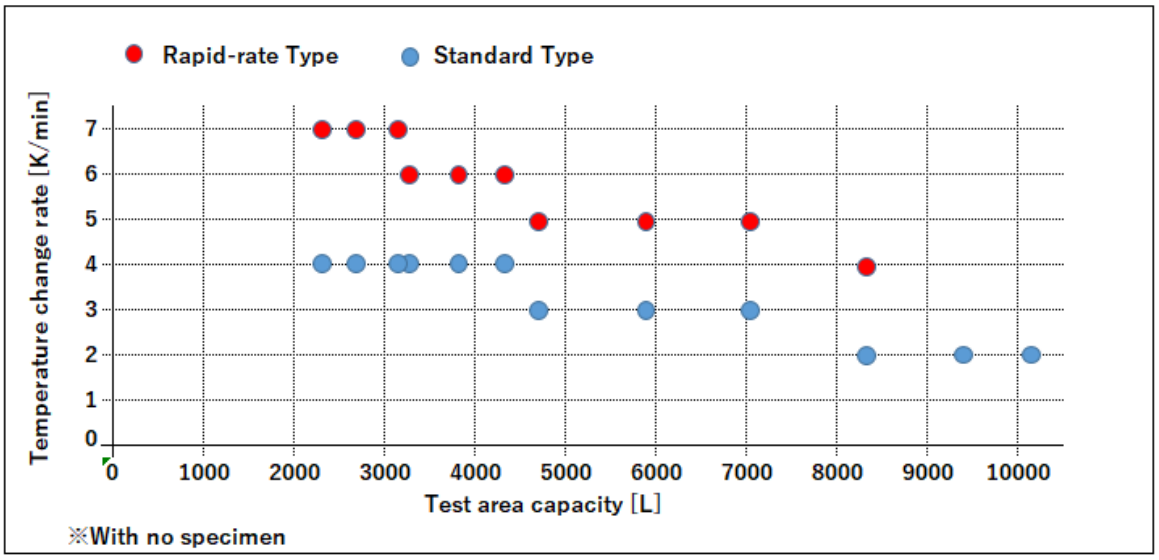
  Humid. Range : 20 to 98% RH

- **Temperature fluctuation**

  ±0.5K (～+100.0℃)

  ±0.8K (+100.1～+180℃)

- **Temperature Change Rate**



  Approx. 7.0K/min is available in Maximum.

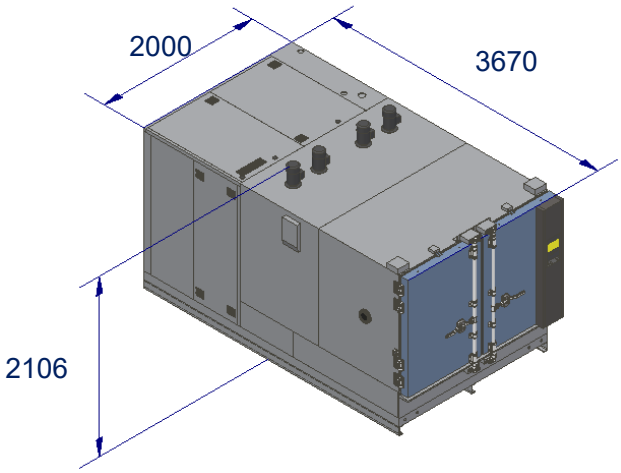
- **Heat Load up to 15kW in Maximum**

  Temp. Performance : 15kW at 20℃

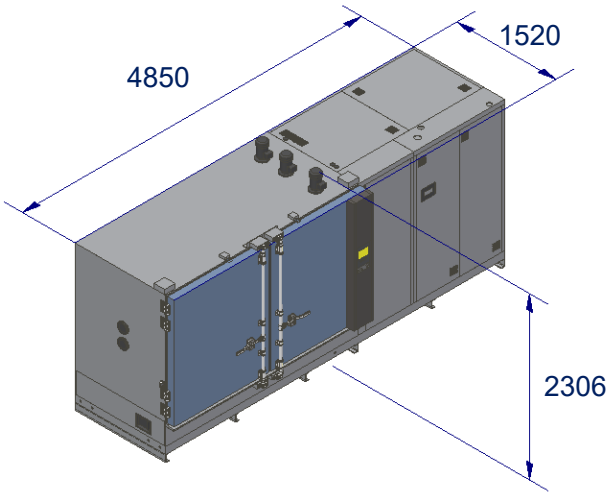
  Temp. & Humid. : 600W at +85℃ / 85% RH

Features

<Example> The layout of the chamber can be selected according to the size of the installation site.



No 5. FDS-03105



No 7. FDS-03240

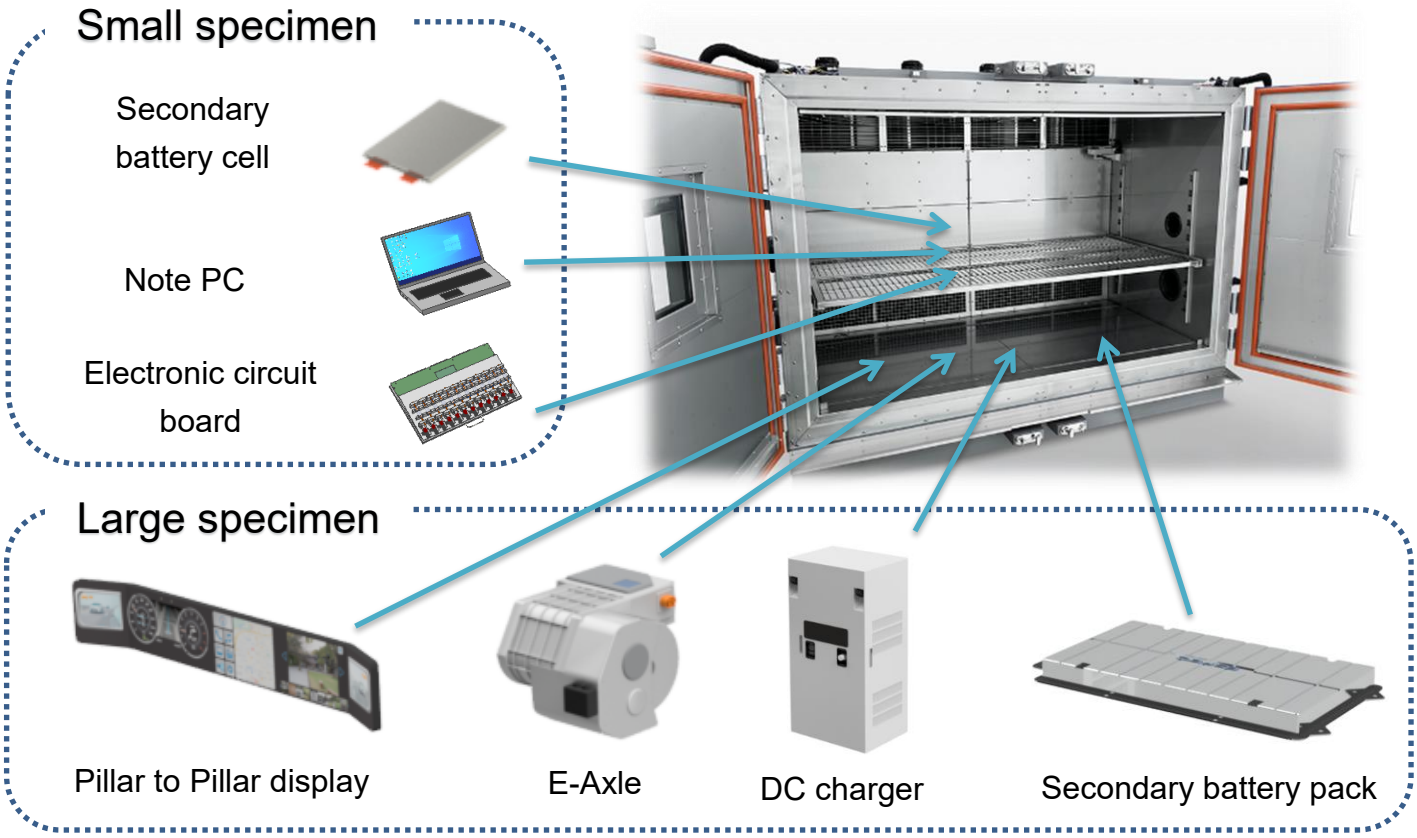
*Dimensions exclude protrusions.

Specifications

No.	Model	Capacity	Inside dimensions W×H×D	Outside dimension W×H×D	Temp. range	Temp. rate of change Heat up	Temp. rate of change Pull down	Max allowable heat load @+20℃	Temp. & humid range	Max allowable heat load @+85℃/85%rh
		L	mm	mm	℃	K/min	K/min	kW		W
1	FDS-02277	2277	1800×1150×1100	2000×2106×3270	-70～+180℃	4.0	4.0	15	+20 to +85℃ 20 to 98%rh	0.6
2	FDS-02277-7	2277	1800×1150×1100	2000×2143×4120		7.0	7.0	29		0.6
3	FDS-02691	2691	1800×1150×1300	2000×2106×3470		4.0	4.0	15		0.6
4	FDS-02691-7	2691	1800×1150×1300	2000×2143×4320		7.0	7.0	29		0.6
5	FDS-03105	3105	1800×1150×1500	2000×2106×3670		4.0	4.0	15		0.6
6	FDS-03105-7	3105	1800×1150×1500	2000×2143×4520		7.0	7.0	29		0.6
7	FDS-03240	3240	2000×1350×1200	4850×2306×1520		4.0	4.0	15		0.6
8	FDS-03240-6	3240	2000×1350×1200	5650×2343×1520		6.0	6.0	29		0.6
9	FDS-03780	3780	2000×1350×1400	4850×2306×1720		4.0	4.0	15		0.6
10	FDS-03780-6	3780	2000×1350×1400	5650×2343×1720		6.0	6.0	29		0.6
11	FDS-04320	4320	2000×1350×1600	4850×2306×1920		4.0	4.0	15		0.6
12	FDS-04320-6	4320	2000×1350×1600	5650×2343×1920		6.0	6.0	29		0.6
13	FDS-04680	4680	2600×1500×1200	2840×2276×3390		3.0	3.0	14	+20 to +85℃ 20 to 95%rh	0.6
14	FDS-04680-5	4680	2600×1500×1200	3840×2333×3190		5.0	5.0	29		0.6
15	FDS-05850	5850	2600×1500×1500	2840×2276×3690		3.0	3.0	14		0.6
16	FDS-05850-5	5850	2600×1500×1500	3840×2333×3490		5.0	5.0	29		0.6
17	FDS-07020	7020	2600×1500×1800	2840×2276×3990		3.0	3.0	14		0.6
18	FDS-07020-5	7020	2600×1500×1800	3840×2333×3790		5.0	5.0	29		0.6
19	FDS-08320	8320	2600×2000×1600	2840×2806×3790		2.0	2.0	13		0.6
20	FDS-08320-4	8320	2600×2000×1600	3640×2833×3790		4.0	4.0	29		0.6
21	FDS-09360	9360	2600×2000×1800	2840×2806×3990		2.0	2.0	13		0.6
22	FDS-10400	10400	2600×2000×2000	2840×2806×4190		2.0	2.0	13		0.6

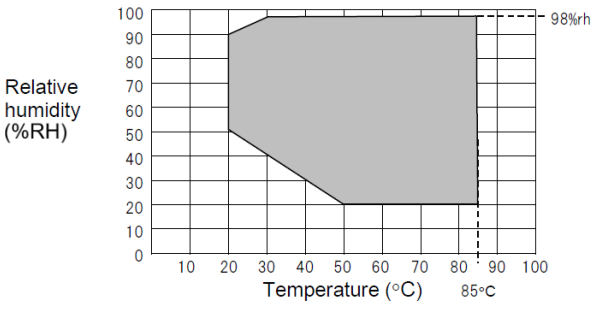
Features

A lot of types and sizes samples can be installed.



The FD series complies with international test standards and industry standards.

Controllable temperature and humidity ranges



: Controllable temperature and humidity ranges

NOTE) In operation below 30 to 40°C,
frost will form on the cooler (dehumidifier) eventually interrupting operation.

Test standards

Low temperature test
- IEC 60068-2-1, ISO 16750-4 5.1.1, LV 124 K-03

High temperature test
- IEC 60068-2-2, ISO 16750-4 5.1.2, LV 124 L-02

Temperature and humidity cycle test
- IEC 60068-2-30, LV 124 K-08
- IEC 60068-2-38, LV 124 K-09

Temperature test
- ISO 16750-4 5.2 , LV 124 K-01, K-02, K-04

Condensation test
- LV 124 K-15a
- PV 1200, PV 2005

Temperature and humidity test
- IEC 60068-2-78, ISO 16750-4 5.7, LV 124 K-14

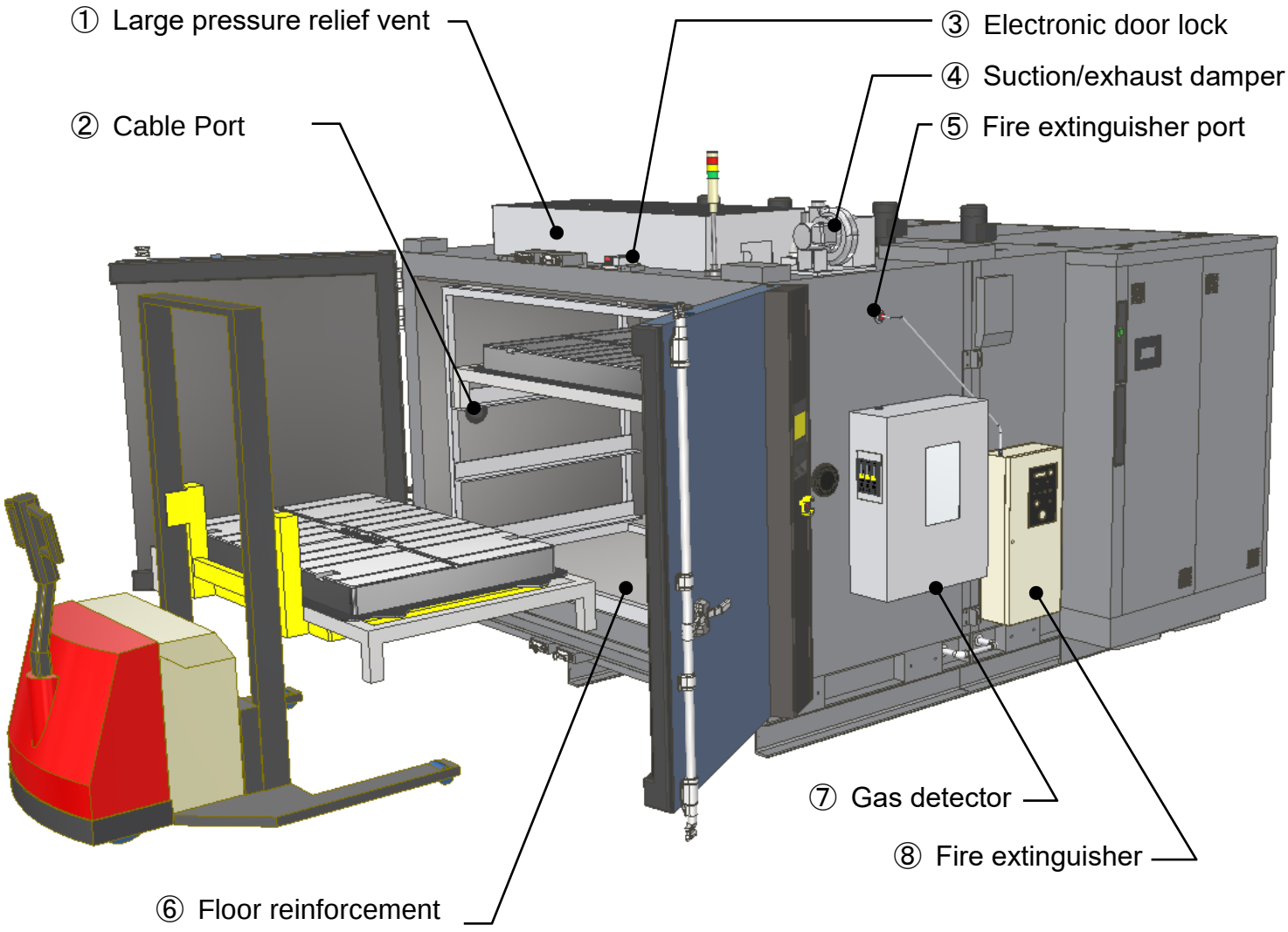
Terrestrial photovoltaic (PV) modules :Test procedures
- IEC 61215-2 MQT11, MQT12, MQT13

FD chambers (Applications)

Secondary batteries

With the spread of hybrid vehicles, the need for mass production of secondary batteries is increasing. So we need to find a way to do the time-consuming process in a way that handles many units in one operation. The FD chamber with a safety device can process a large amount of EV large secondary batteries in one step.

Safety devices for Secondary Battery Production Test



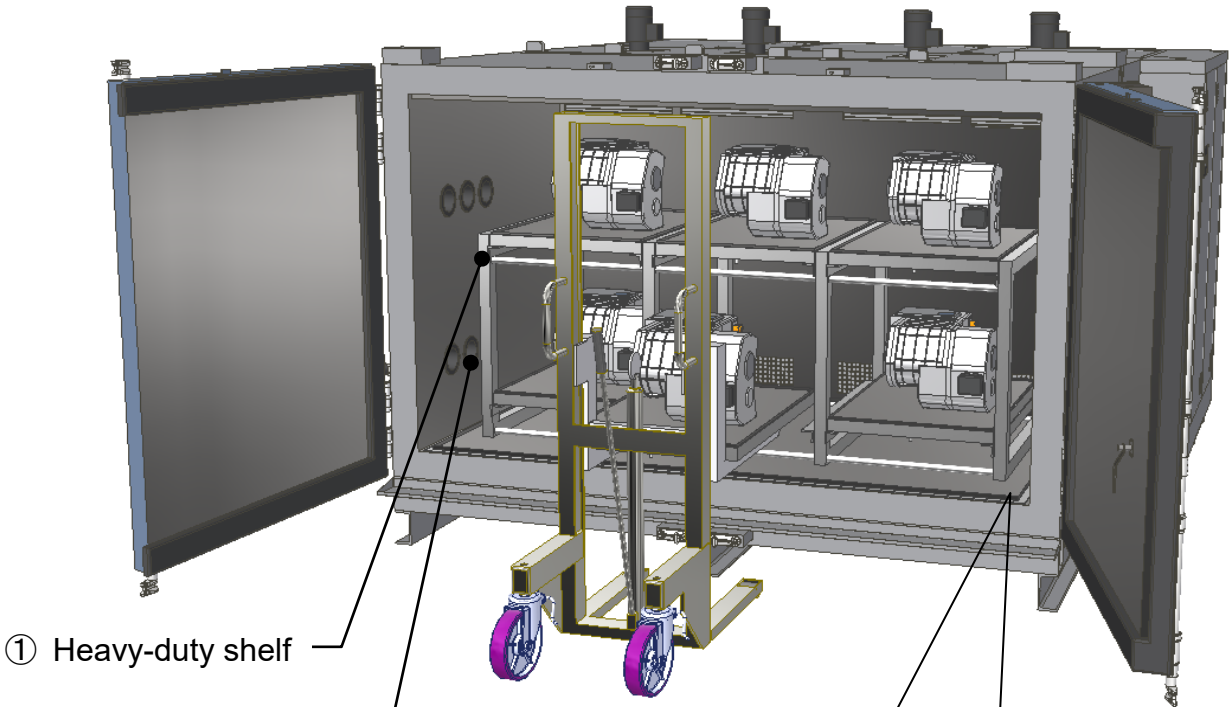
	Recommend options	
1	Large pressure relief vent	Releasing pressure when the explosion is occurred in the test area. It prevents the door flying.
2	Cable Port	For easy connection of charging/discharging cable.
3	Electronic door lock	The door is locked so that not to lead injury or accident when user exposes the high/low temperature air.
4	Intake/exhaust damper	Ventilation the test area.
5	Fire extinguisher port	Port for piping when equipping fire extinguisher.
6	Floor reinforcement	Reinforcement floor for heavy load sample.
7	Gas detector	Detection of specific gas in test area.
8	Fire extinguisher	For safety in the test area, CO2 is injected into the test chamber.

EUCAR Hazard Levels

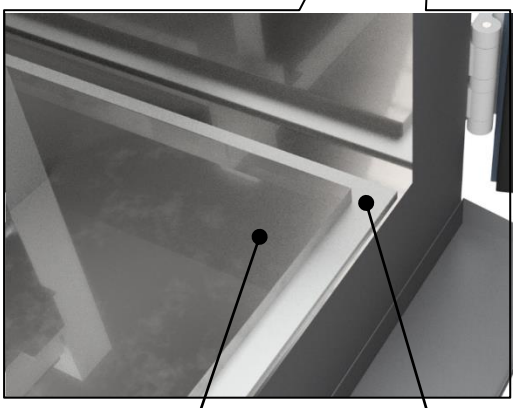
Hazard Level	Description	Classification criteria, effect
0	No effect	No effect. No loss of functionality.
1	Passive protection activated	No defect; no leakage; no venting, fire or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell reversibly damaged. Repair is needed.
2	Defect / Damage	No leakage; no venting, fire or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell irreversibly damaged. Repair is needed.
3	Leakage Δ mass < 50%	No leakage; no venting, fire or flame; no rupture; no explosion; no exothermic reaction or thermal runaway. Cell irreversibly damaged. Repair is needed.
4	Venting Δ mass ≥ 50%	No fire or flame, no rupture; no explosion. Weight loss ≥ 50% of electrolyte weight (electrolyte = solvent + salt).
5	Fire or Flame	No rupture; no explosion (i.e., no flying parts).
6	Rupture	No explosion, but flying parts of the active mass.
7	Explosion	Explosion (i.e. disintegration of the cell)

E-Axle

The FD series has the capacity to easily mount multiple E-Axle and can give appropriate environmental conditions to the components. In addition, long-term testing is possible due to the ease of equipment management and maintenance.



② Cable port



③ Oil pan

④ Floor reinforcement

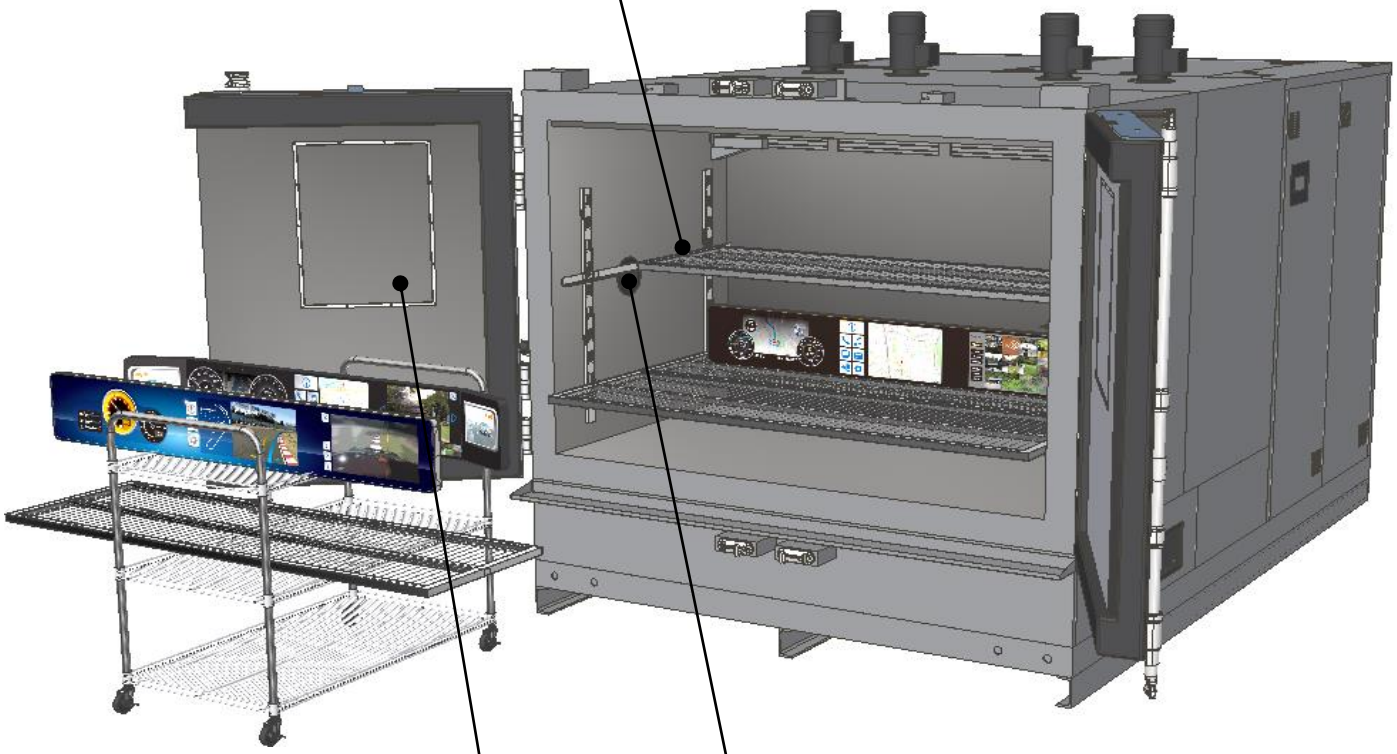
	Recommend options	
1	Heavy-duty shelf	Reinforcement shelf for heavy load sample due to the heavy weight of E-Axle more than 100kg.
2	Cable Port	For easy connecting coolant pipes and power lines to the E- Axle.
3	Oil pan	To prevent deterioration of rubber gasket on the door due to oil leakage in case of the E-Axle installing. Easy to clean oil up and prevention of slip on the floor.
4	Floor reinforcement	Reinforcement floor for heavy load sample due to the heavy weight of E-Axle more than 100kg.
5	Stainless cooler	To prevent damage in cooler by salt etc.

Direct installation is also possible.

Pillar to Pillar display

Pillar to Pillar display refers to technology that mounts a wide display between the left and right door frames (pillars) of a vehicle. With this technology, images can be displayed at a wider viewing angle than conventional in-vehicle displays, and it can also be used as an alternative to rear-view mirrors, which has the advantage of improving safety.

① Front and rear split shelf board



② Large Viewing window

③ Cable Port

	Recommend options	
1	Front and rear split shelf board	Improvement for wiring workability to Pillar to Pillar display.
2	Large Viewing window [-1]	Used to observe the Pillar to Pillar display in the chamber.
3	Cable Port	For easy wring to Pillar to Pillar display.

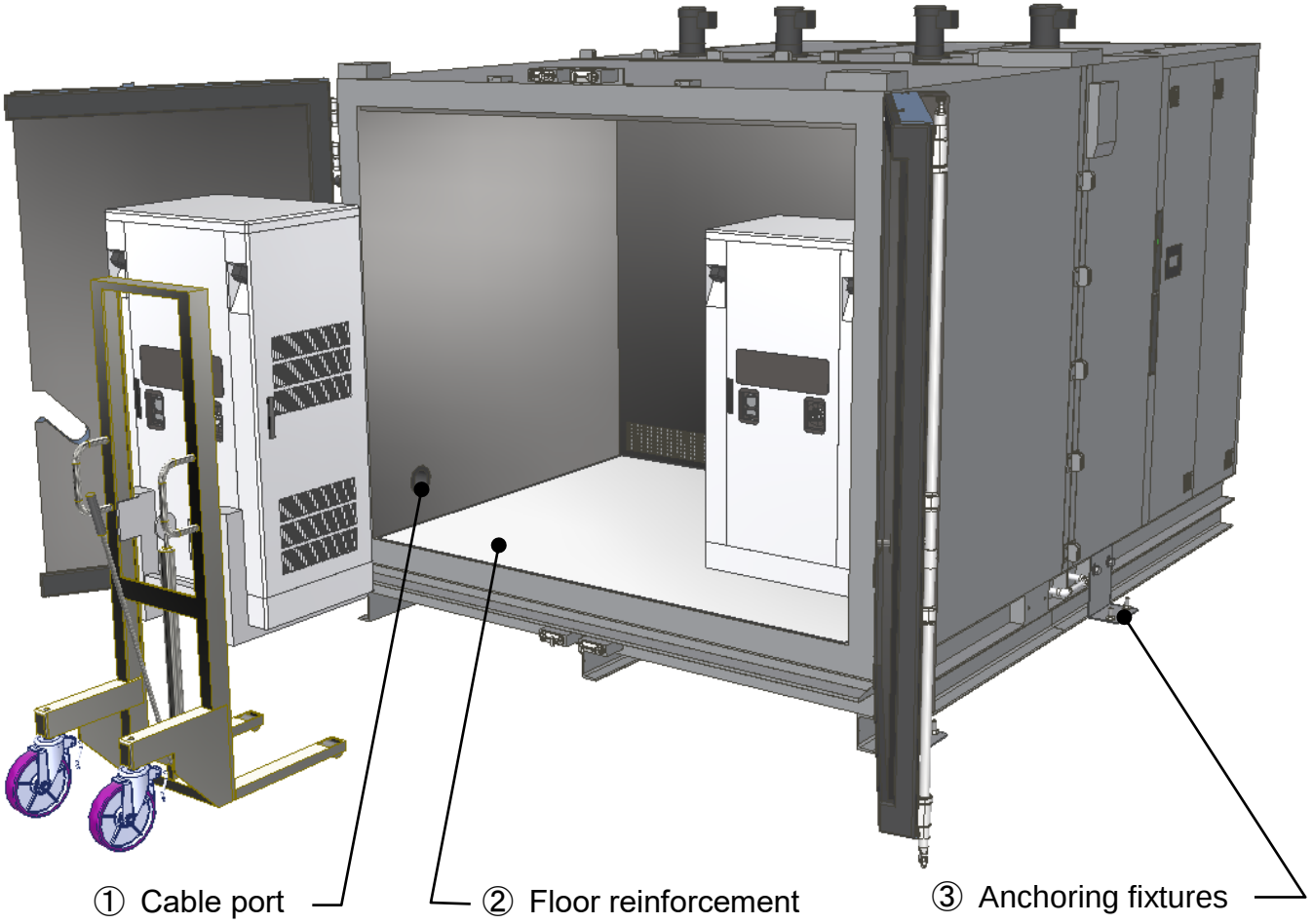
Save your time.

The split shelves are easy to work.

[-1]: Temperature and humidity performance would be changed compared with standard specification.

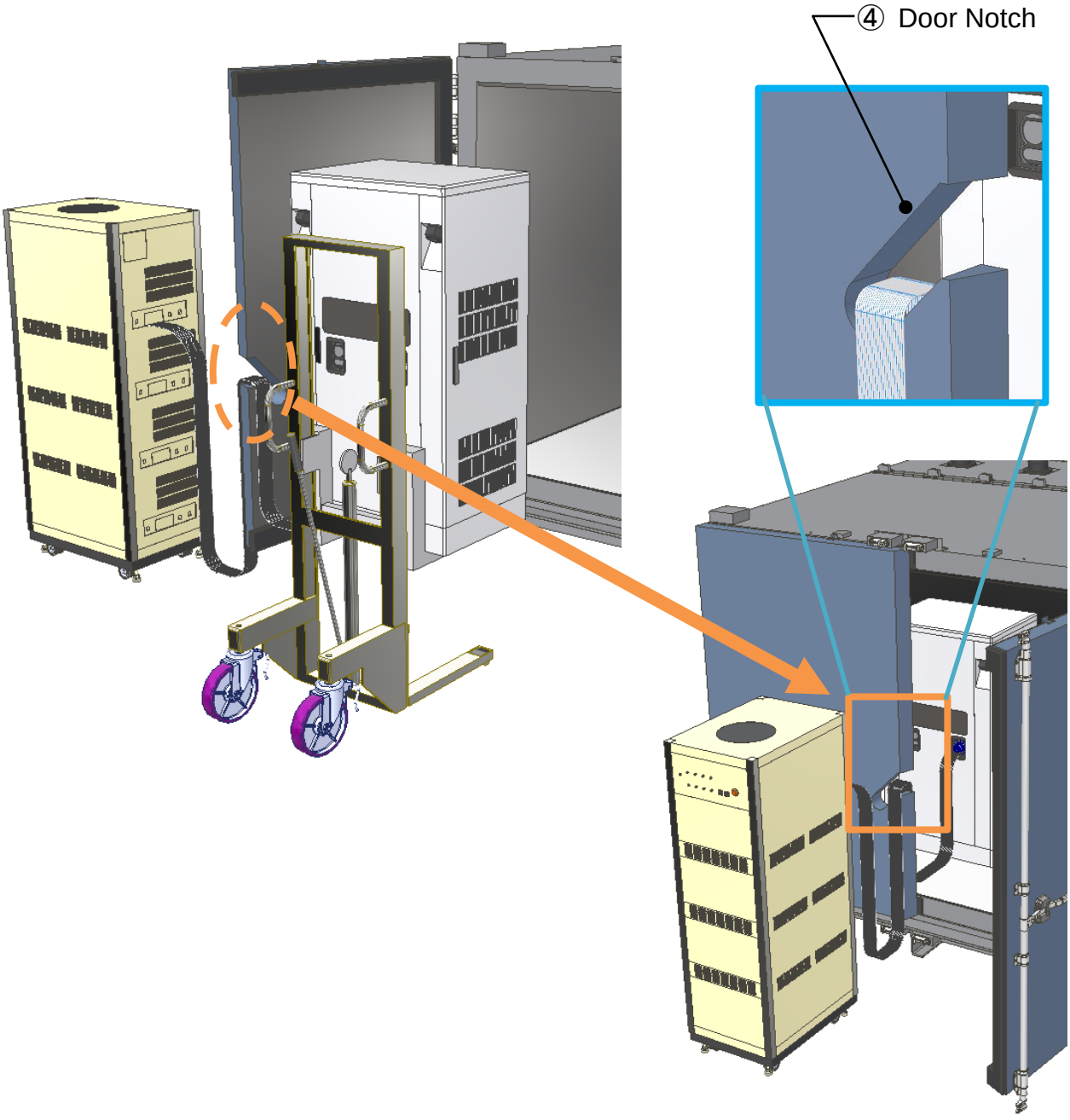
DC charger

The FD series has options that make it easy to install such a large DC charger and wiring work, so it is possible to prepare for tests efficiently.



	Recommend options	
1	Cable Port	For easy wiring to DC charger.
2	Floor reinforcement	Reinforcement floor for heavy load sample due to the heavy weight of DC charger more than 350kg.
3	Anchoring fixtures	To prevent FD chamber moving, the floor surface and FD chamber are securely fixed.
4	Door Notch	For easy wiring from door side to DC charger. It is very useful in case of difficult to wiring from cable port due to the huge DC charger installing in test area.

A notch on the door allows the specimen and measuring device to be placed in the test chamber with the wires still attached.
Preparing of wiring is available and easy wiring leads the saving time.



OPTIONS

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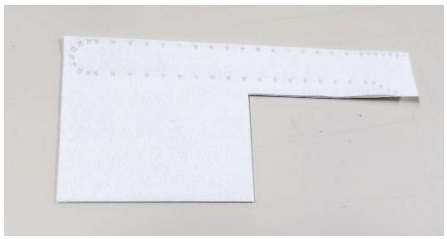

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1.	**Viewing window**	Used to observe the specimen in the chamber. Effective view:W180xH260(mm)
2.	**Wick**	Used for humidity operation.（For wet bulb）
3.	**Shelf board Shelf support**	Used when placing the specimens in the chamber.
4.	**Additional overheat protector (Additional overcool protector)**	In addition to the standard overheat (overcool) protector, it is used to double prevent the temperature inside the test chamber from rising abnormally.
5.	**Paperless recorder**	The temperature recorder is used to record temperature of each section such as the temperature inside the chamber.
6.	**Additional cable port**	A through hole provided on the wall of chamber. It can be equipped on the ceiling, and on the left and right sides.
7.	**Cable port dew tray**	A tray to catch condensation water generated around cable holes.
8.	**Cable port plug**	Used to close cable ports

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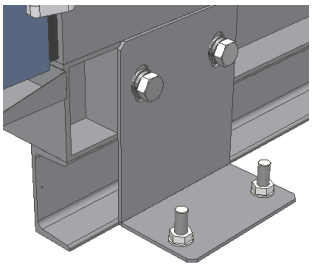

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9.	**Large viewing window**	Used to a wider range of specimens in the chamber Effective view: Please consult
10.	**Electrostatic capacitance-type humidity sensor control**	Compared to standard product, no need to replace the wick.
11.	**Additional time signalterminals**	Provided additional time signal terminals when the standard 2 contacts are not sufficient.
12.	**Status indicator light**	Used for remotely checking the status of the chamber.
13.	**Anchoring fixtures**	Used for fixing the chamber to the floor. Mount the L type bracket and fix to the floor by the anchor bolts.
14.	**Roller conveyor**	A roller conveyor is installed on the floor according to the shape and quantity of specimens. It can be stored smoothly in the test chamber.
15.	**Power meter**	Integrated wattmeter which indicates cumulative energy.
16	**Water purifier**	This option is used for continuously supplying pure water to the chamber.

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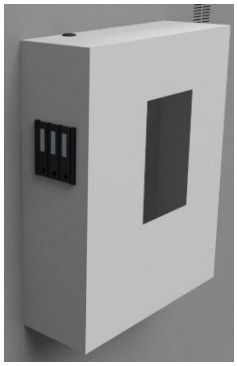

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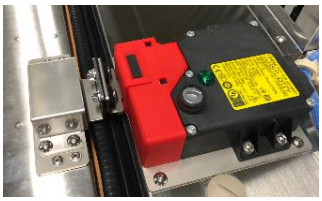

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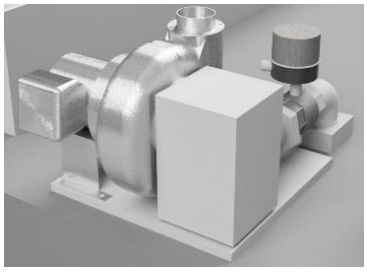

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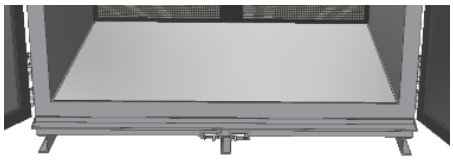

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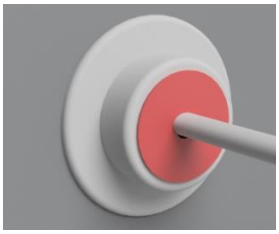

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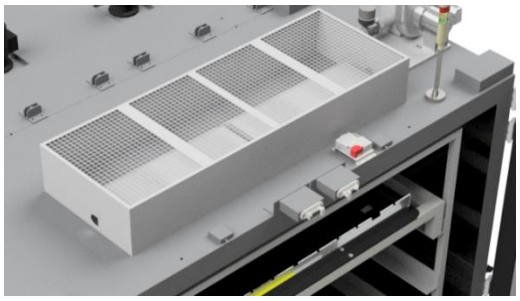

17.	**Gas detector**	Detects the generation of specific gases in the chamber that are emitted from the spacimen.
18.	**Heat detector**	An independent sensor detects the heat inside the chamber and issues an alarm.
19.	**Electronic door lock**	Automatically lock the door during the test.
20.	**Smoke detectorsr**	Detects smoke in the test chamber emitted from the specimen.
21.	**Air supply/exhaust damper**	Ventilate the air in the chamber.
22.	**Emergency stop switch**	Shuts off the power to the chamber in case of emergency, to protect specimens and the chamber. Avoiding erroneous operation, a guard can be selected.
23.	**Fire extinguisher port**	This is the port to introduce the nozzle of the fire extinguisher.
24.	**Floor reinforcement**	The reinforced floor is used to place heavy specimens and jigs on the floor.
25.	**Pressure relief vent**	When the pressure in the test chamber rises rapidly, it releases the pressure and weakens the explosive force.

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