



Samwha Capacitor

Power electronics application

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1. Capacitor for power electronics

2. DC Link Capacitor

3. Snubber Capacitor

4. AC Filter Capacitor

Samwha Capacitor Profile

COMPANY NAME

SAMWHA CAPACITOR CO., LTD.

ESTABLISHMENT

AUGUST 1956

LOCATION

YONGIN SI, SOUTH KOREA

CAPITAL

USD 10 Million

TURNOVER

USD 265 Million (2019)

CORPORATIONS

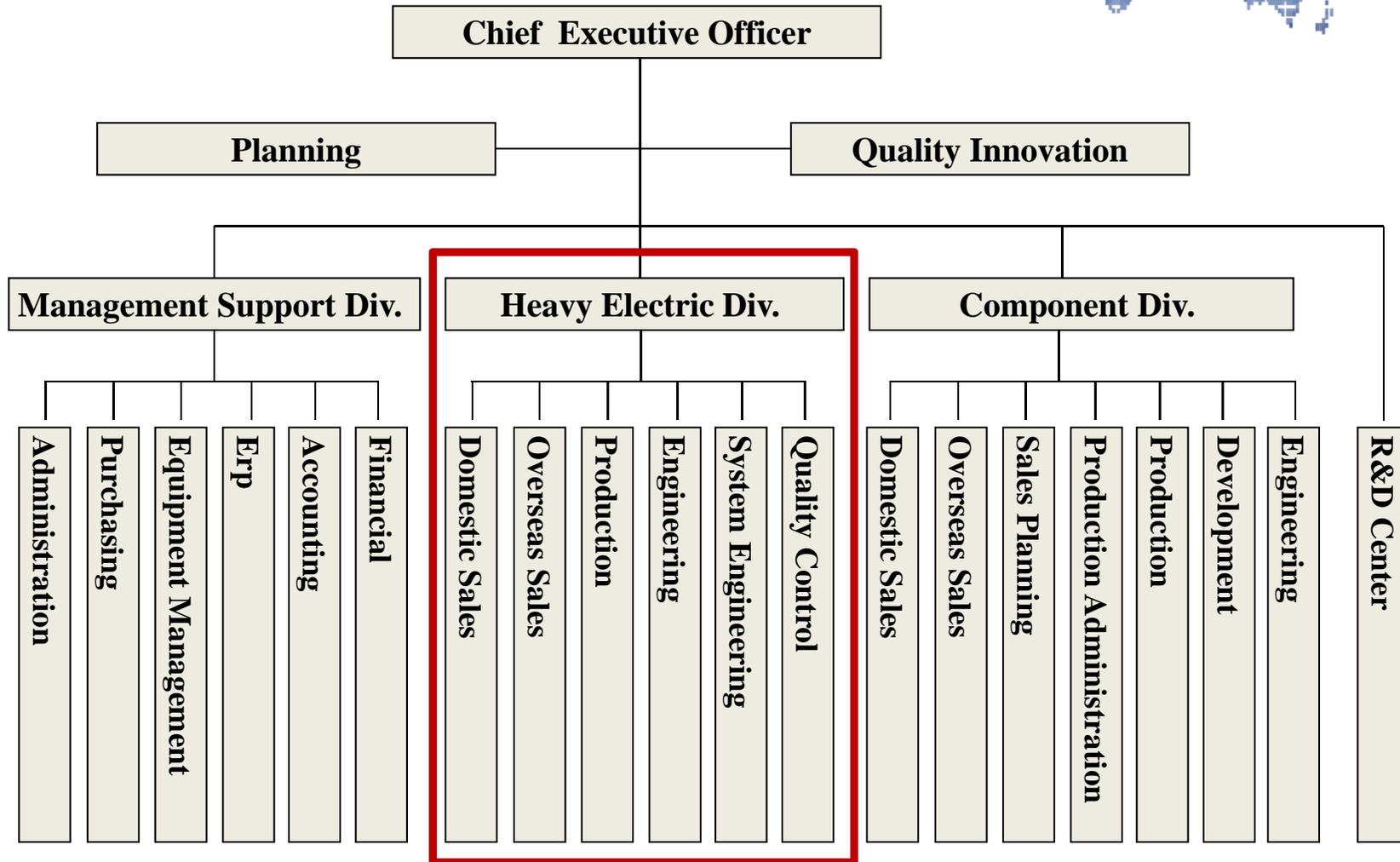
MANUFACTURING - KOREA, THAILAND, INDONESIA
SALES - USA, GERMANY, POLAND, HONGKONG, CHINA, INDIA

PERSONNEL

700 (EXCLUDING OVERSEAS)



Organization

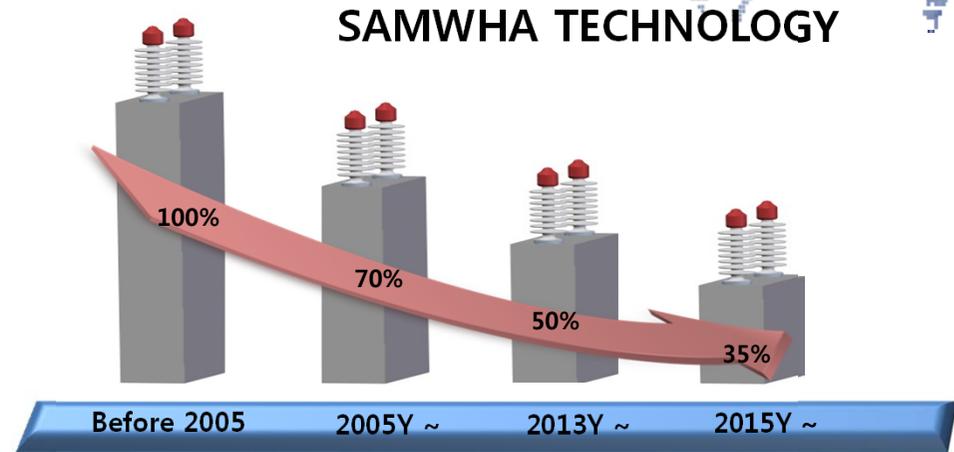


Main Business

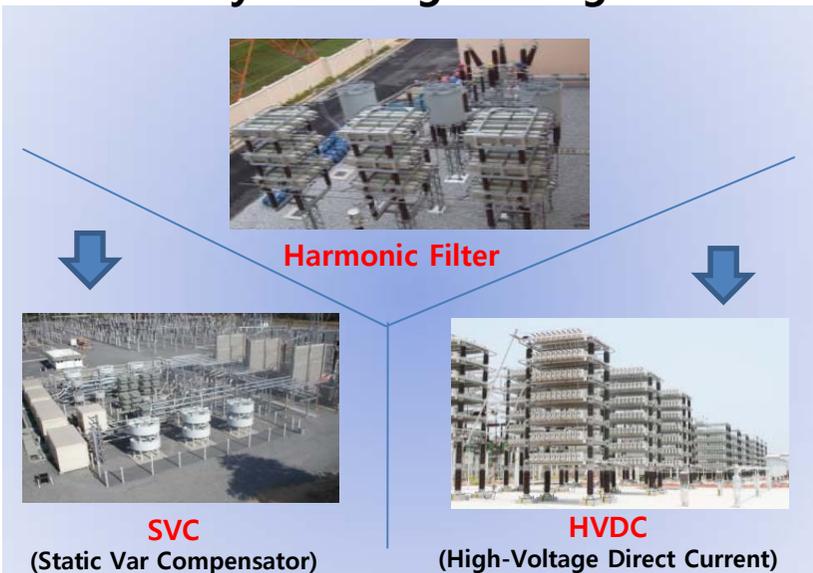
WORLD BEST PRODUCT



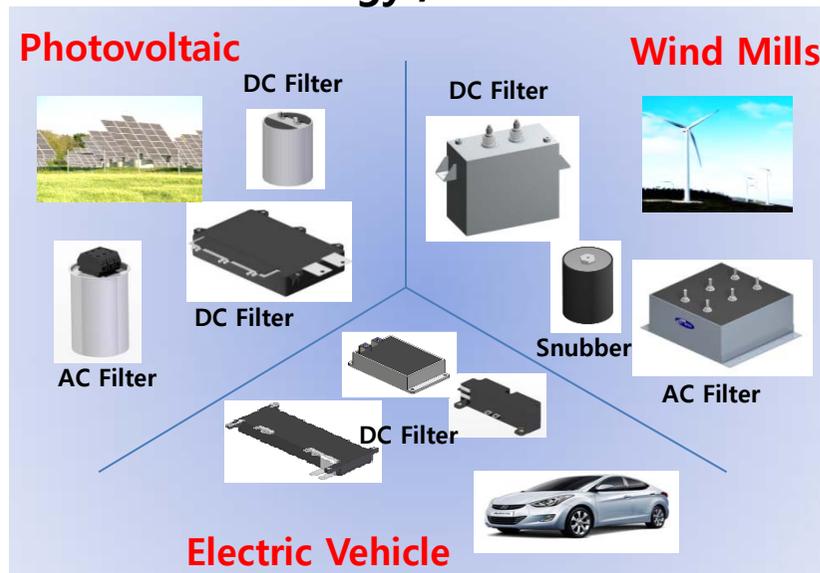
SAMWHA TECHNOLOGY



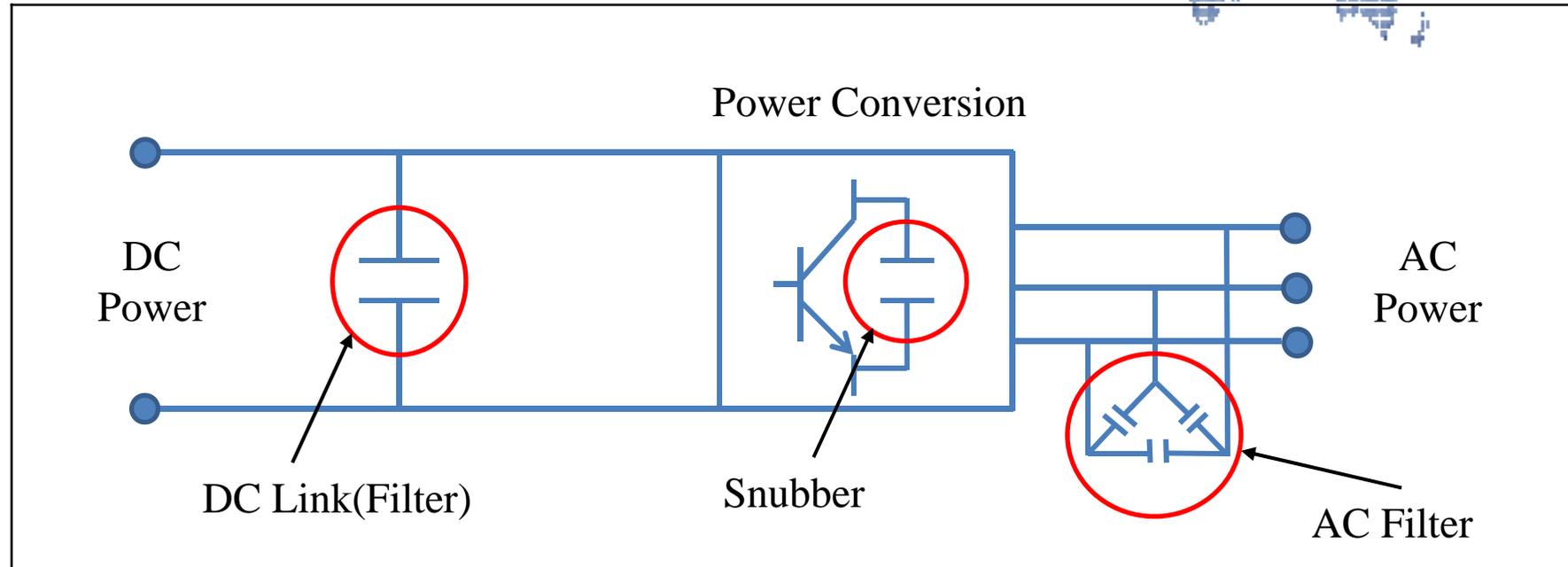
System Engineering



Renewable Energy / Smart Grid



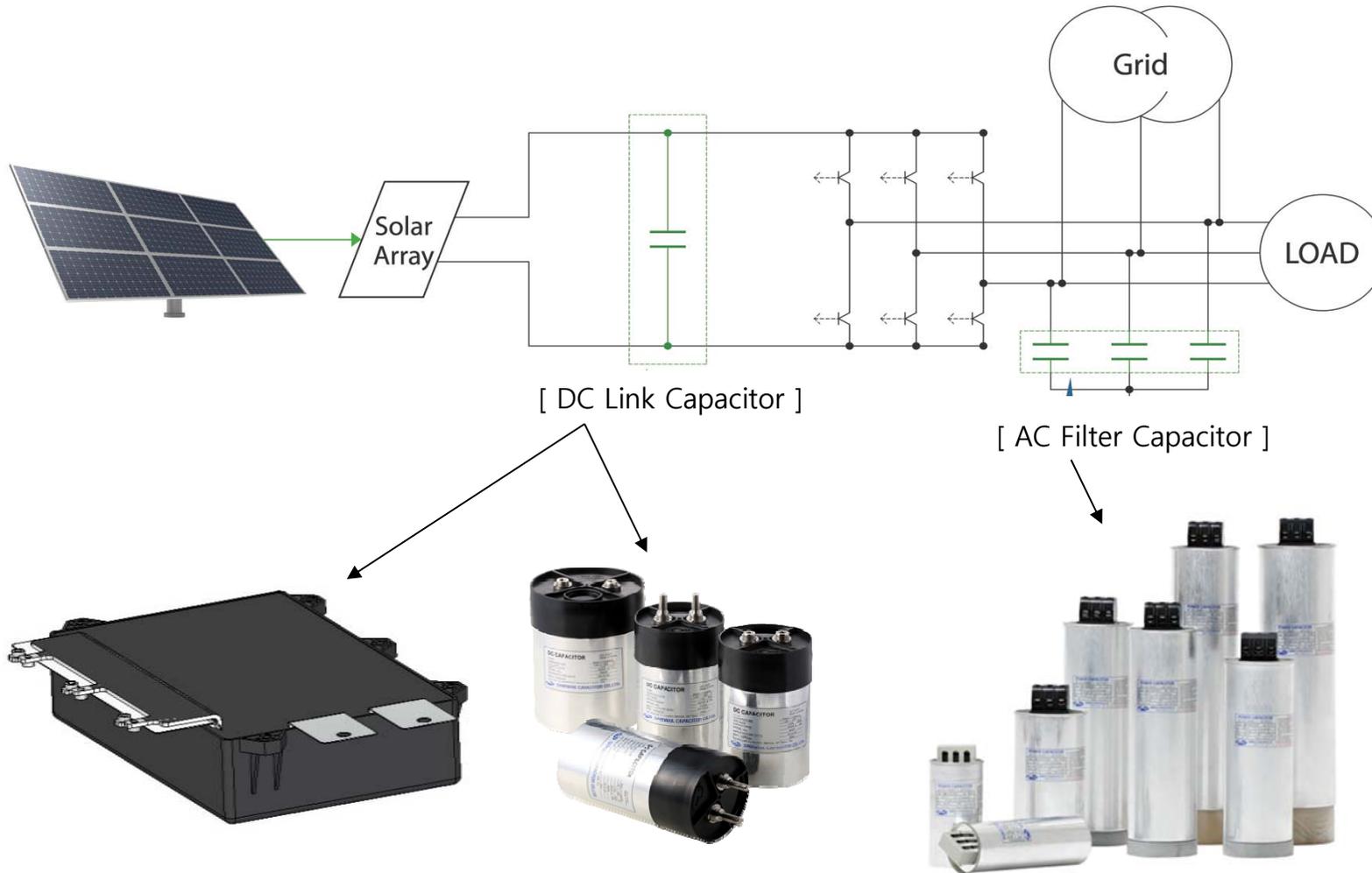
1. Capacitor for power electronics



Scope	Purpose	Applications
DC Link Capacitor	DC voltage regulation and ripple current filtering efficiency of power conversion systems	HEV, EV, Motor drive Solar, Wind
Snubber Capacitor	Protection power electronic switches devices (GTO, IGBT etc)	Motor Drive, Inverter drive
AC Filter Capacitor	Power conversion system harmonic filtering for AC voltage stabilization	Motor drive Solar, Wind

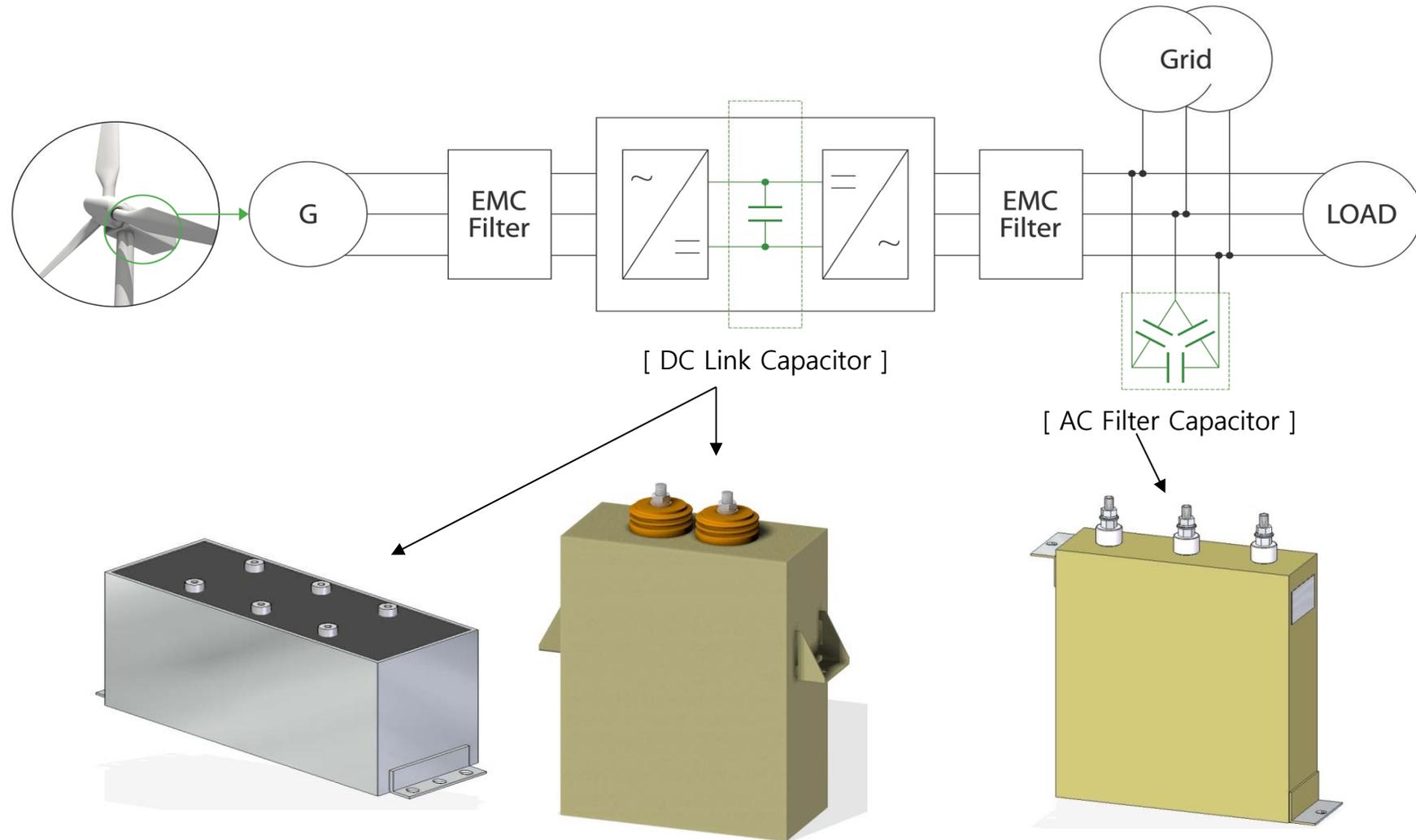
1. Capacitor for power electronics

1.1 Photovoltaic Power



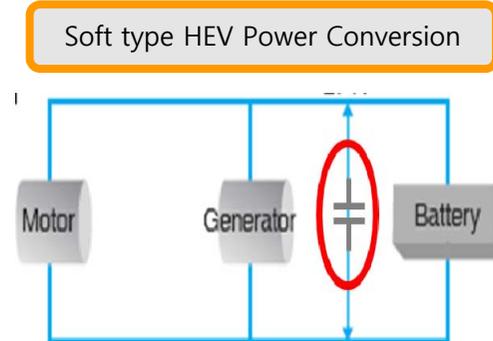
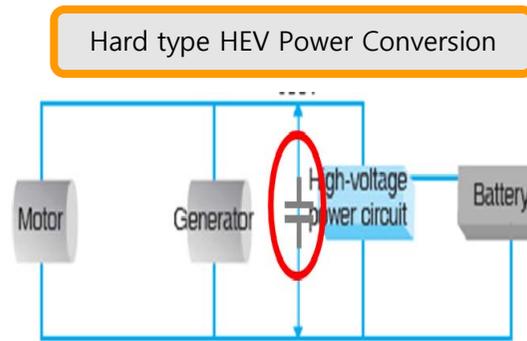
1. Capacitor for power electronics

1.2 Wind Power



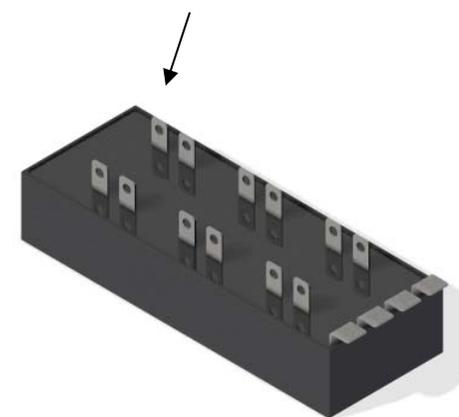
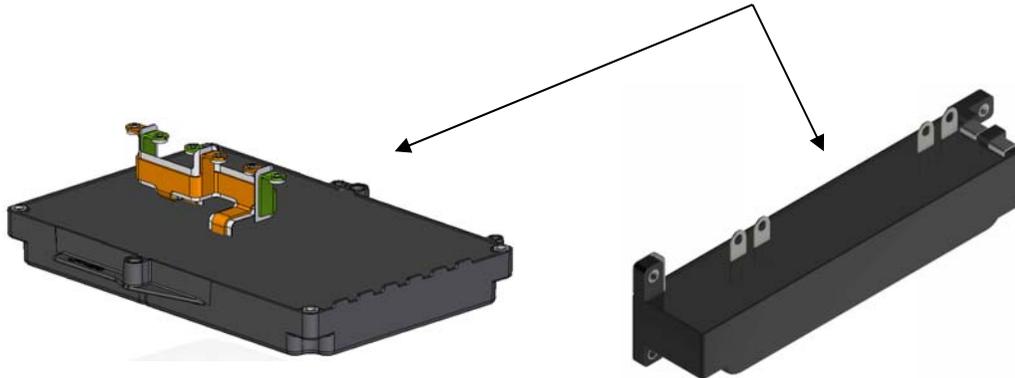
1. Capacitor for power electronics

1.3 Automotive (HEV, EV)



[DC Link Capacitor]

[DC Link Capacitor]

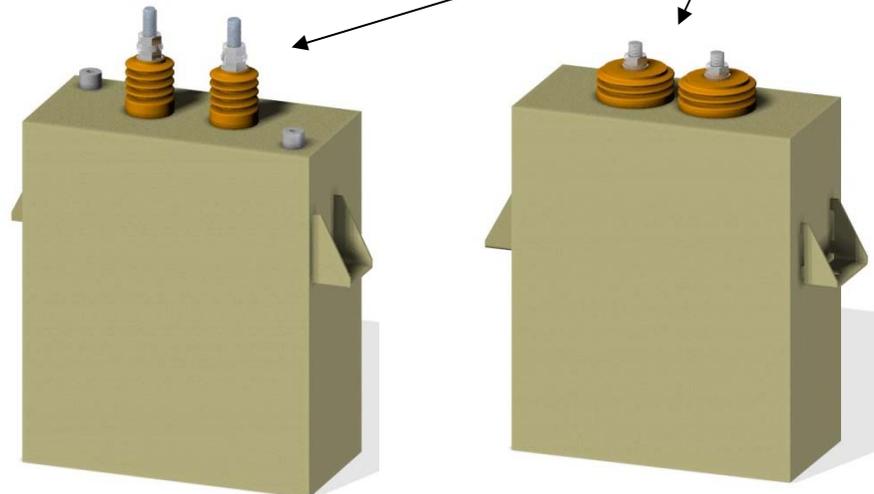
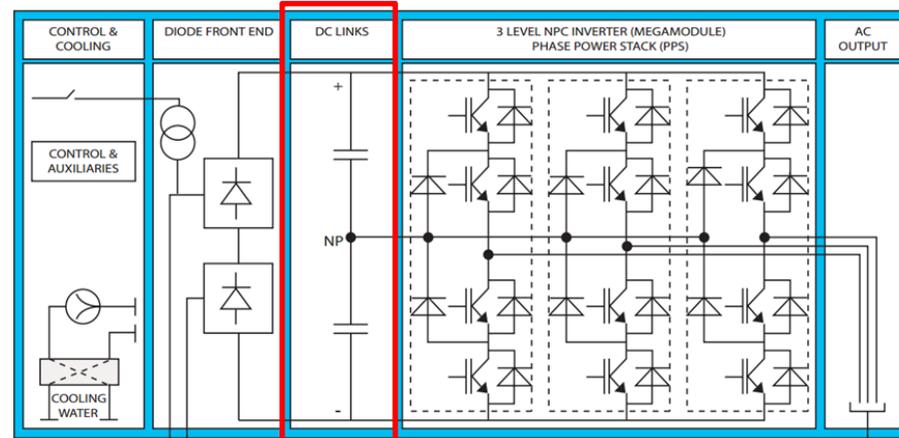


1. Capacitor for power electronics

1.4 Medium Voltage Variable Speed Applications



[DC Link Capacitor Bank]



1. Capacitor for power electronics

1.5 Traction



[Snubber Capacitor]



[DC Filter Capacitor]



1. Capacitor for power electronics

1.6 The Others

Test facility for The purpose of Circuit breaker test

10kVDC 65kA Current Source
Capacitor Bank



2.75kVDC Unit capacitor

500kVDC Voltage Source
Capacitor Bank



60kVDC Unit capacitor

500kVDC TRV Source
Capacitor Bank



90kVDC Unit capacitor

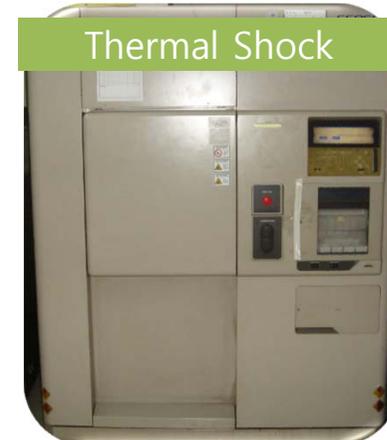
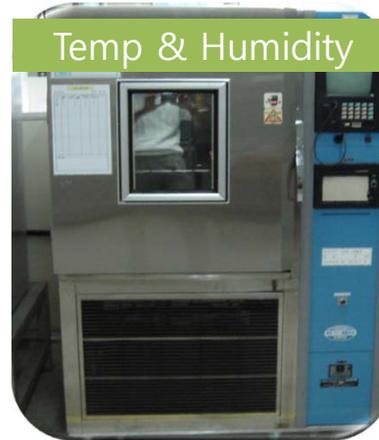
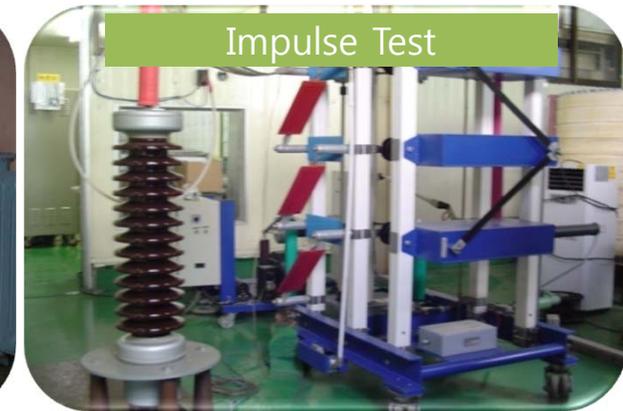
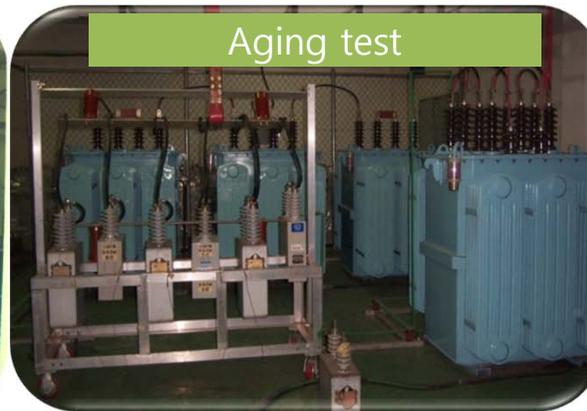
1. Capacitor for power electronics

1.7 Test equipment's

NO	Test equipment's	Products
1	High Voltage Reliability Test Facilities (Endurance testing for IEC 60871-2 : Overvoltage cycling test)	AC Capacitors
2	High Voltage Reliability Test Facilities (Endurance testing for IEC 60871-2 : Aging test)	AC Capacitors
3	Impulse Test Facilities (200kV BIL, 1.2 X 50us)	AC Capacitors Energy Storage Capacitors DC Capacitors
4	Charge-Discharge Test Facilities (50kV and 100kV)	Energy Storage Capacitors DC Capacitors Pulse Power Capacitor
5	Temperature & Humidity Chamber	All Capacitor
6	Thermal Shock Chamber	All Capacitor

1. Capacitor for power electronics

1.7 Test equipment's



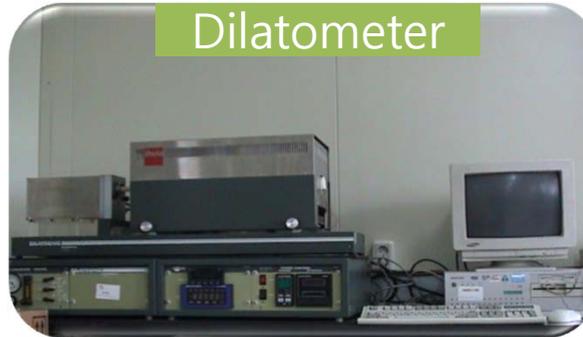
1. Capacitor for power electronics

1.8 Analysis equipment's

NO	Equipment	Analysis	Model
1	SEM	Fine structure Observation (x 300,000)	Jeol SEM<JSM-6360>
2	EDS	Qualitative & Quantitative analysis on Surface	Oxford<Link ISIS Rev.3.2>
3	P-SEM	Fine structure Observation (x 100,000)	PSEM-75
4	PSD	Powder particle distribution analysis	Horiba<LA-910>
5	BET	Powder specific surface area analysis	Micromeritics<Tristar 3000/Flow Prep 060>
6	Dilatometer	Length & Heat expansion analysis	Theta<Series 7300>
7	TG-DTA/DSC	Weight & Heat variation analysis	Setaram<LABSYS>
8	TCC	Capacitance & Dielectric loss analysis	S&A<4220MR>
9	XRD	Crystal structure analysis	Rigaku<RAD/C>
10	Microscope	Surface Observation	EMZ-TR

1. Capacitor for power electronics

1.8 Analysis equipment's



2. DC-Link Capacitor

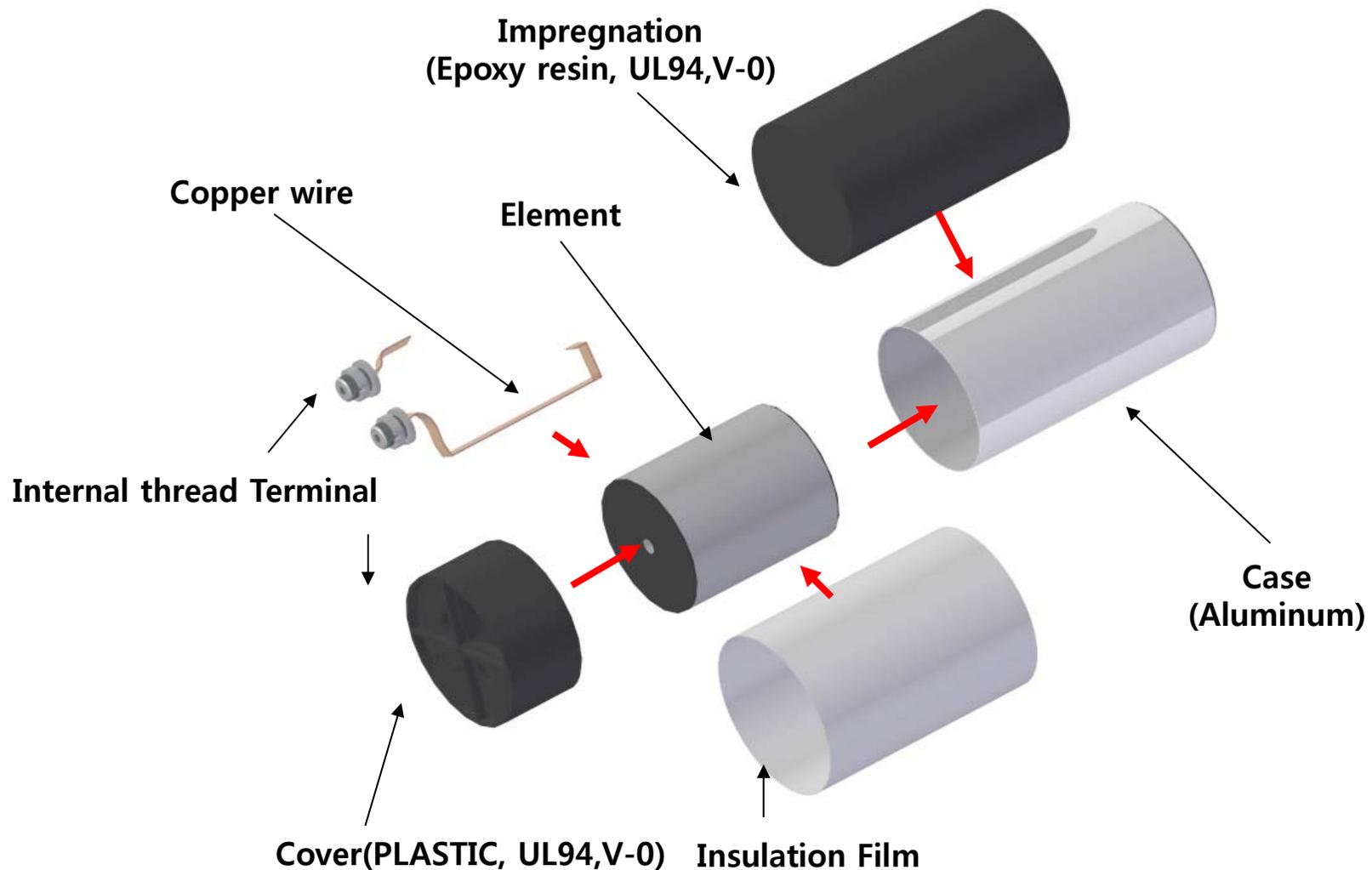
2.1 Product Scope(Catalogue)

1. Scope : DC-Link Capacitor
2. Applicable standard : IEC 61071
3. Location : indoor
4. Case material : aluminum can / plastic cap
5. Operating temperature: $-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
6. Dielectric : Metallized polypropylene, SH type
7. Impregnation : Epoxy resin, Dry
8. Voltage range : 600 ~ 3000 [VDC]
9. Capacitance range : 90 ~ 7400 [μF]
10. Product diameter range (D) : 86, 116, 136 [\O]
11. Product height range (H) : 85 ~ 345 [mm]
12. Capacitor has no internal protection device



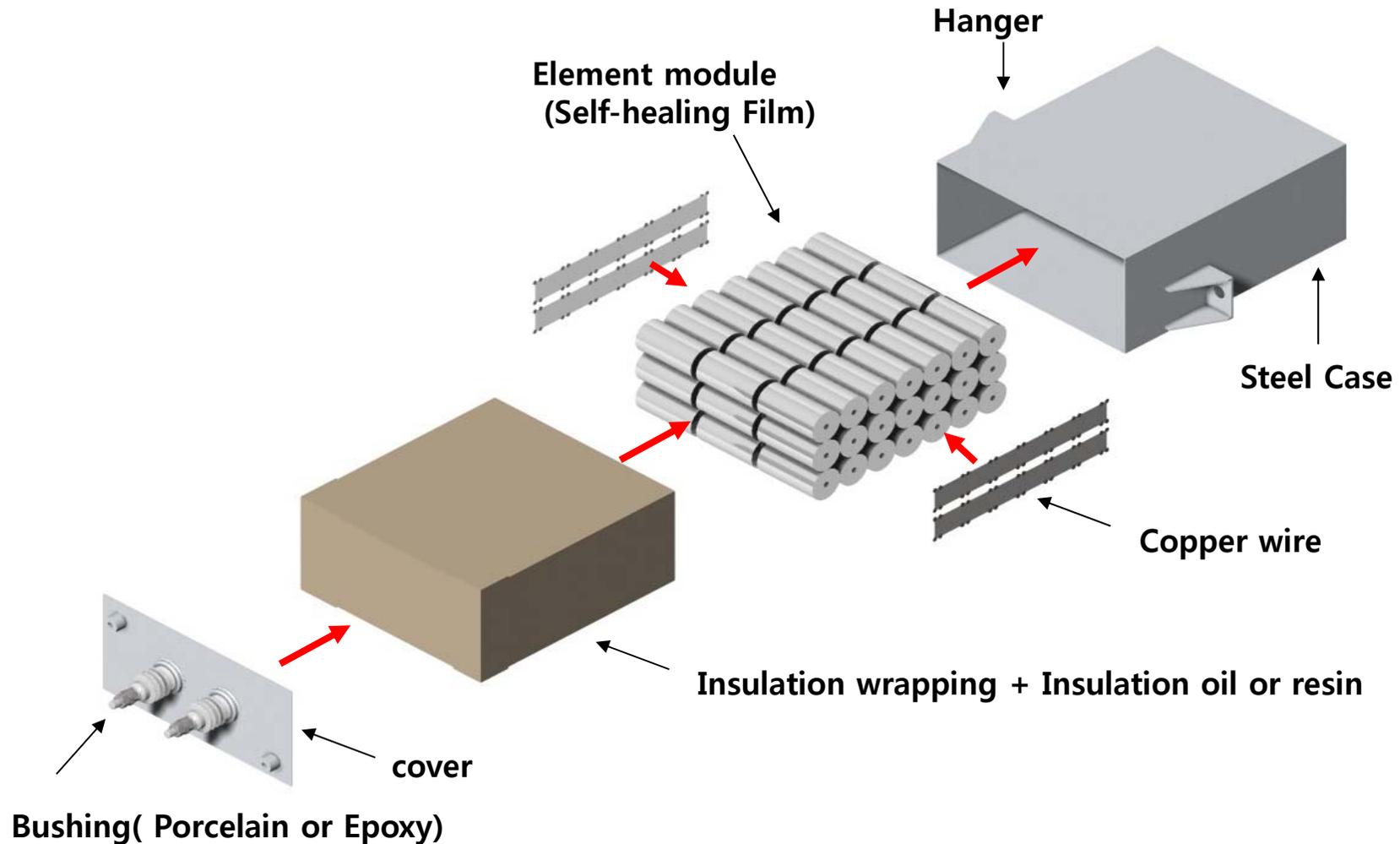
2. DC-Link Capacitor

2.2 Product Construction(Round Type)

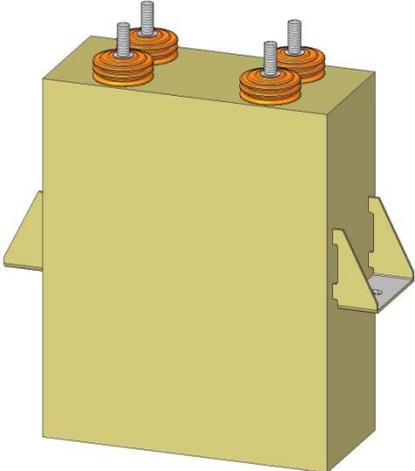
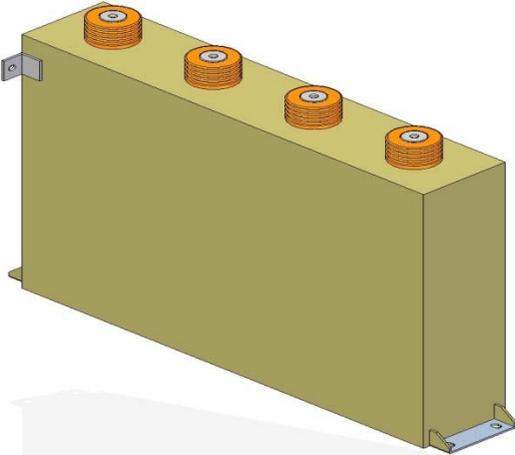


2. DC-Link Capacitor

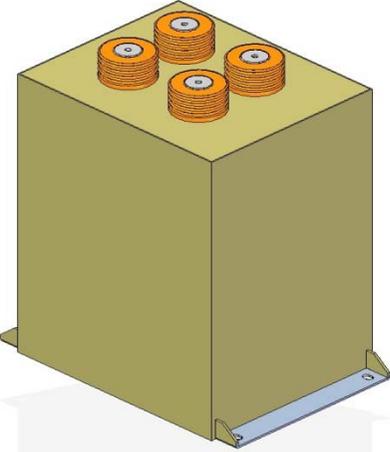
2.2 Product Construction(BOX Type)



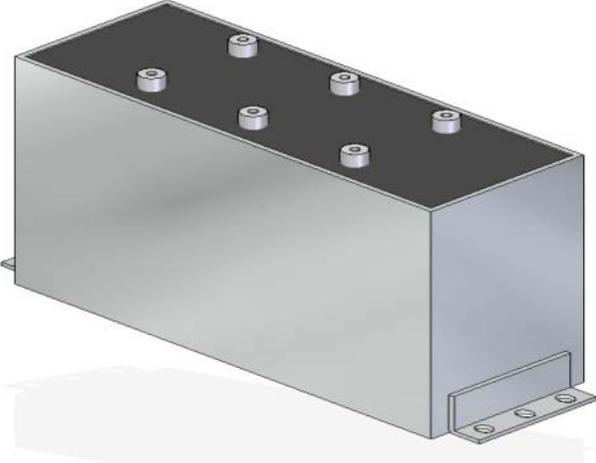
2. DC-Link Capacitor

Product Shape	Applications	Rating
	<p>SVG</p>	<p>2500VDC 1600uF (Dry Type) 1200VDC 3000uF (Dry Type) 1200VDC 5000uF (Dry Type)</p>
	<p>Facts NEW</p>	<p>3000VDC 2625uF(Dry Type)</p>

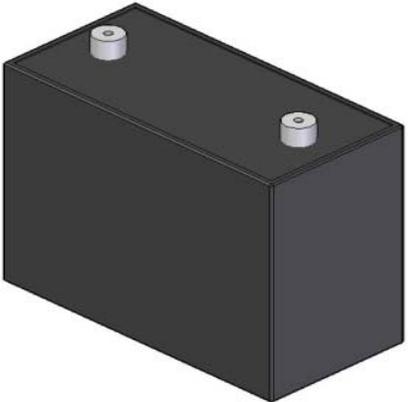
2. DC-Link Capacitor

Product Shape	Applications	Rating
	Grid SVC	2200VDC 4000uF (Dry Type)
	Solar	1100VDC 500uF (Dry Type) 1100VDC 420uF (Dry Type)

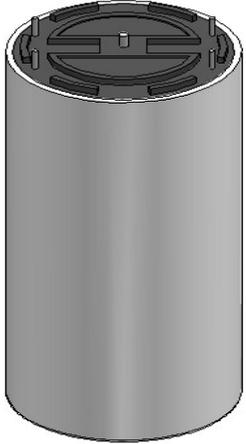
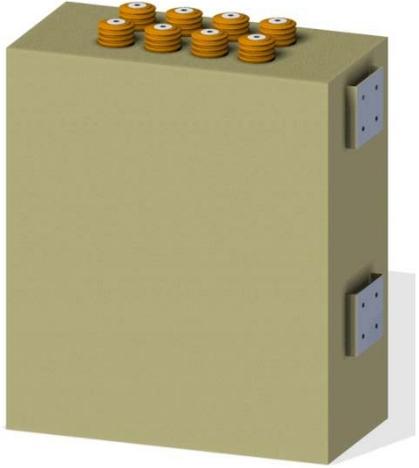
2. DC-Link Capacitor

No	Product Shape	Applications	Rating
3		WIND	1350VDC 1450uF 2500VDC 3300uF DRY TYPE
4		SOLAR	1000VDC 2600uF 1100VDC 2765uF DRY TYPE

2. DC-Link Capacitor

No	Product Shape	Applications	Rating
5		<p>SOLAR WIND SVG Motor drive</p>	<p>1100VDC 420uF 1100VDC 1100uF 1200VDC 270uF 1200VDC 600uF 1300VDC 1300uF 2500VDC 470uF etc</p>
6		<p>SOLAR</p>	<p>1000VDC 500uF 800VDC 715uF DRY TYPE</p>

2. DC-Link Capacitor

No	Product Shape	Applications	Rating
7		SOLAR	1000VDC 160uF
8		MMC Type HVDC	2200VDC 2000uF 2200VDC 6000uF 2200VDC 10000uF

3. Snubber Capacitor

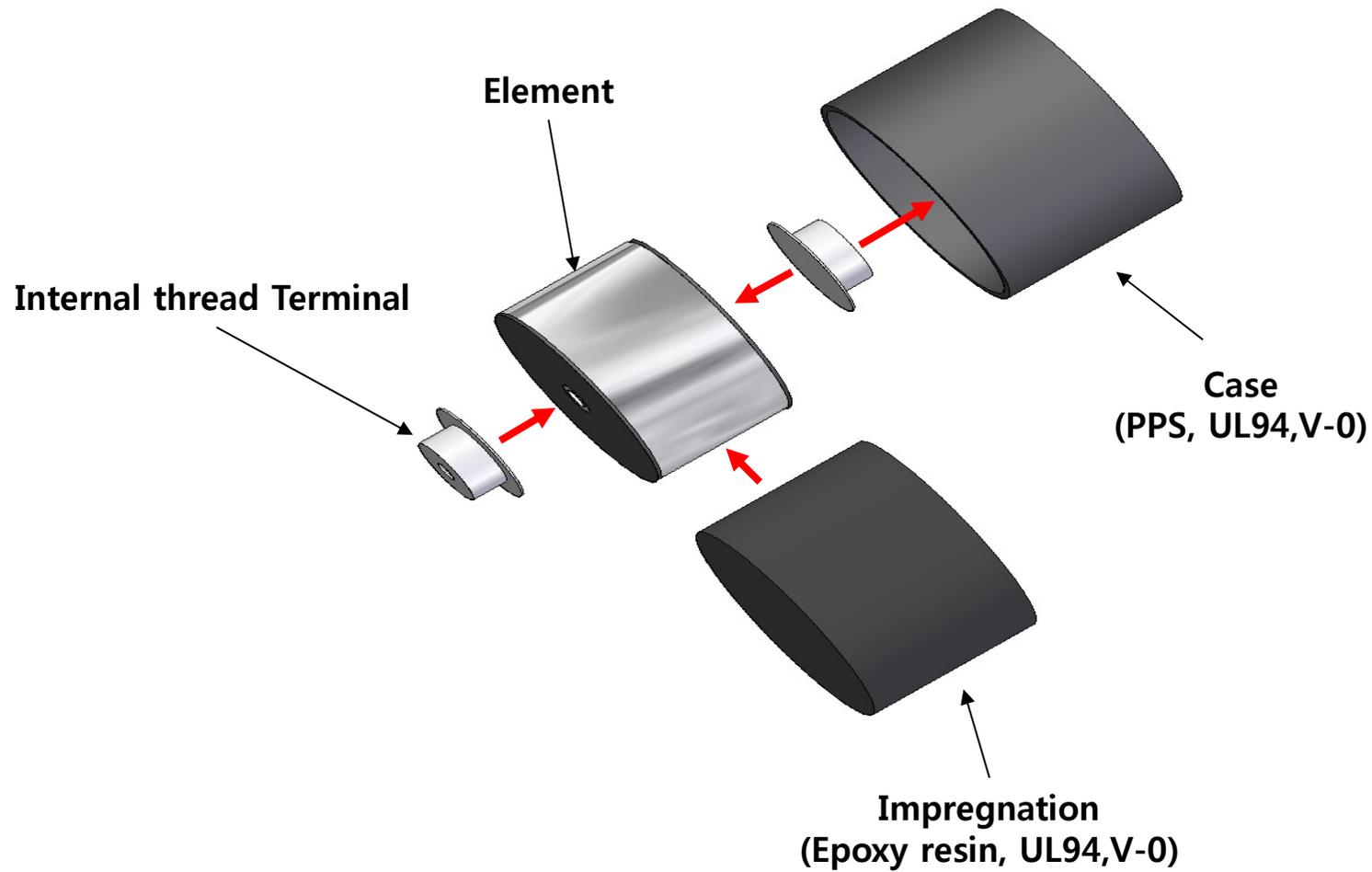
3.1 Product Scope(Catalogue)

1. Scope : Snubber Capacitor
2. Applicable standard : IEC 61071
3. Location : indoor
4. Case material : Plastic case
5. Operating temperature : $-40^{\circ}\text{C} \sim + 85^{\circ}\text{C}$
6. Dielectric : Metallized polypropylene, SH type
7. Impregnation : Epoxy resin, Dry
8. Voltage range : 1000 ~ 3000 [VDC]
9. Capacitance range : 0.33 ~ 5.0 [μF]
10. Product diameter range (D) : 75, 91 [\O]
11. Product height range (H) : 51 ~ 141 [mm]
12. Capacitor has no internal protection device



3. Snubber Capacitor

3.2 Product Construction



3. Snubber Capacitor

No	Product Shape	Applications	Rating
1		<p style="text-align: center;"> Wind Motor drive Traction </p>	<p style="text-align: center;"> 3000V 0.16uF 3000V 0.33uF 3000V 0.47uF 4000V 1.50uF </p>
2		<p style="text-align: center;">Traction</p>	<p style="text-align: center;">2000V 30uF</p>

3. Snubber Capacitor

Product Shape	Applications	Rating
	<p>Grid SVC</p>	<p>4000V 2.5, 3.0, 3.3uF</p>
	<p>Grid SVC</p>	<p>4000V 0.5, 1, 1.5uF 4000V 2.5, 3.0, 3.3uF</p>

4. AC Filter Capacitor

4.1 Product Scope(Catalogue)

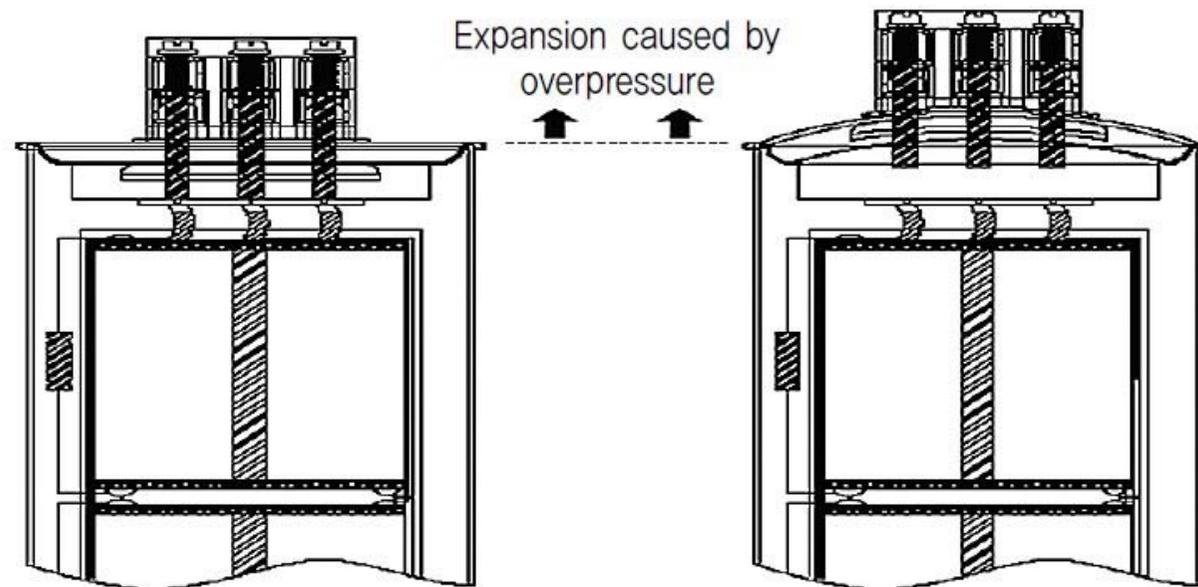
1. Scope : AC Filter Capacitor
2. Applicable standard : IEC 61071
3. Location : indoor
4. Case material : aluminum can
5. Operating temperature : $-40^{\circ}\text{C} \sim + 85^{\circ}\text{C}$
6. Dielectric : Metallized polypropylene, SH type
7. Impregnation : Capacitor oil, non-PCB
8. Voltage range : 450 ~ 1000 [Vrms]
9. Capacitance range : $4.7\mu\text{F} \times 3 \sim 100\mu\text{F} \times 3$
10. Product diameter range (D) : 76, 86, 96, 116, 136 [Ø]
11. Product height range (H) : 165 ~ 230 [mm]
12. Internal protection : Overpressure interrupter device



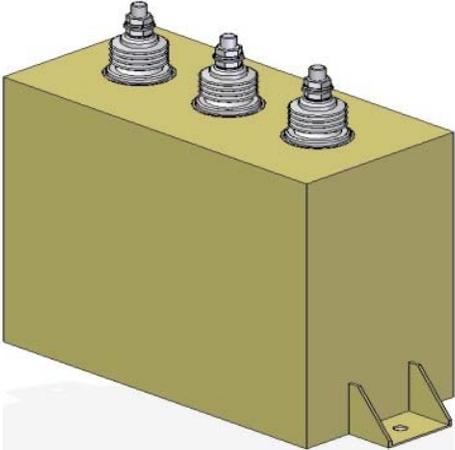
4. AC Filter Capacitor

4.2 Safety Construction

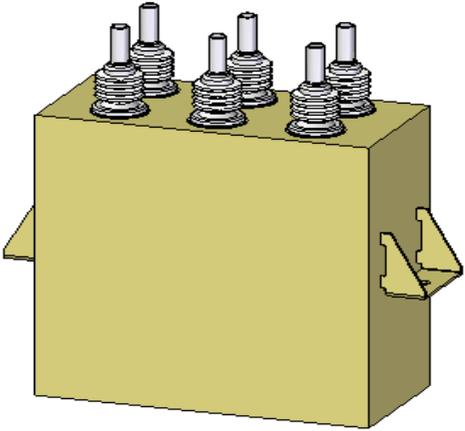
> Disconnecter Function



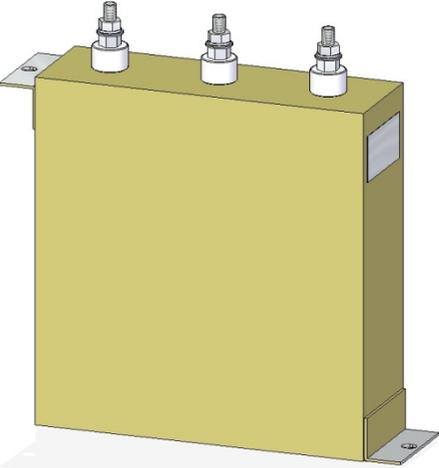
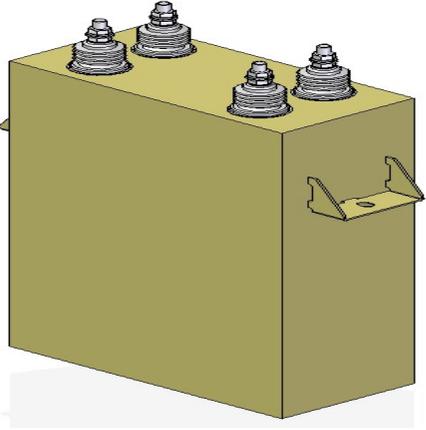
4. AC Filter Capacitor

Product Shape	Applications	Rating
	<p>SOLAR</p>	<p> 450VAC 40uF×3(Δ) 450VAC 137uF×3(Δ) 800VAC 49uF×3(Δ) 850VAC 33.4uF×3(Δ) 850VAC 55.7uF×3(Δ) etc </p>
	<p>Inverter Filter</p>	<p> 500VAC 689uF×3(Y) 500VAC 400uF×3(Y) </p>

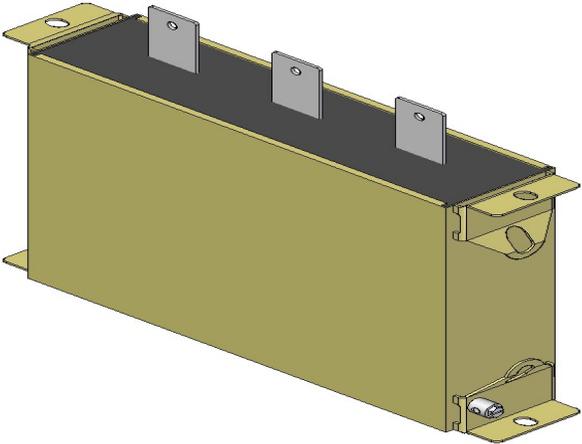
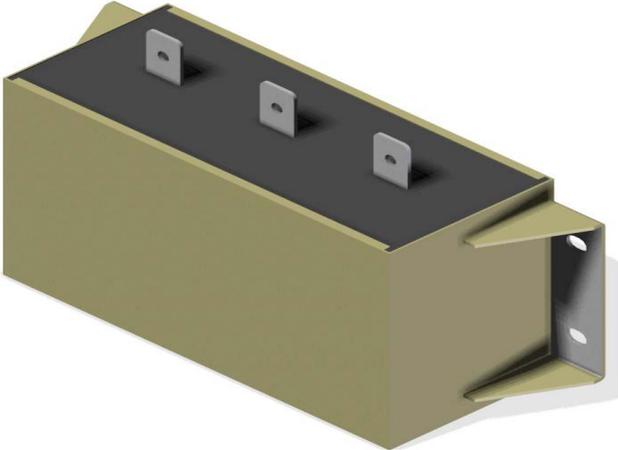
4. AC Filter Capacitor

Product Shape	Applications	Rating
	<p style="text-align: center;">Wind</p>	<p style="text-align: center;">315VAC 1200uF×3(Y) 315VAC 2000uF×3(Y) 315VAC 3160uF×3(Y)</p>
	<p style="text-align: center;">Wind</p>	<p style="text-align: center;">515/327VAC 800uF×3(Y) DRY TYPE</p>

4. AC Filter Capacitor

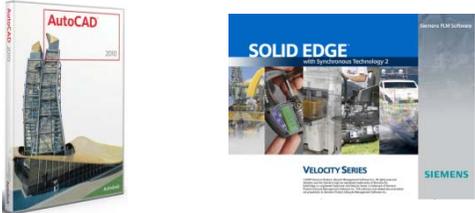
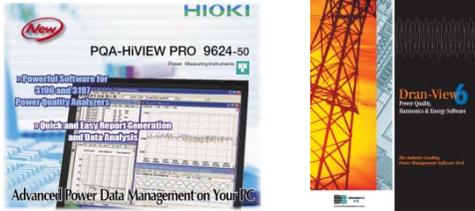
Product Shape	Applications	Rating
	Wind	690VAC 3P 50Hz 71.8kvar
	Motor drive	1900VAC 1P 90uF 1900VAC 1P 140uF

4. AC Filter Capacitor

Product Shape	Applications	Rating
	<p style="text-align: center;">WIND</p>	<p style="text-align: center;"> 690VAC 223uF×3(Δ) 690VAC 50uF×3(Δ) 690VAC 100uF×3(Δ) 690VAC 300uF×3(Y) DRY TYPE </p>
	<p style="text-align: center;">SOLAR</p>	<p style="text-align: center;"> 450Vrms(640VAC) 200uF×3 DRY TYPE </p>

5. Capacitor Design

Design Tool (software)

SOFTWARE	EA	PICTURE
a) Microsoft Office b) SAP	Office : 8 SAP : -	
c) CAD - Auto CAD 2D - Solid edge CAD 3D	2D : 2 3D : 4	
d) System analysis Program - Easypower - EMTP	Easypower : 1 EMTP : -	
e) Power quality (Harmonics & Energy software) - HIOKI : PQA-Hiview pro - BMI : Dran-view 6	HIOKI : 1 B M I : 1	

5. Capacitor Design

Design Tool (Hardware)

SOFTWARE	EA	PICTURE
a) PC <ul style="list-style-type: none"> - HP Workstation XW4600 - Notebook - Desktop 	Workstation : 4 Notebook : 3 Desktop : 1	
b) Power quality analyzer (Harmonics & Energy hardware) <ul style="list-style-type: none"> - HIOKI : 3196 - BMI : Powerexplorer PX5 	HIOKI : 1 BMI : 1	
c) Multitester(Fluke) <ul style="list-style-type: none"> - V, I, R, C meter - MΩ meter - Current meter 	4	
d) Storage <ul style="list-style-type: none"> - WD SHARESPLACE 4BAY NAS(2TB) 	1	