

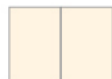
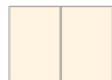
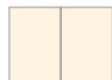
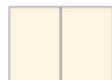
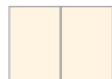
HANYANG ELECTRIC CO.,LTD

- Switch Gear
- New & Renewable Energy
- Energy Storage System

Always with you for the Future

CONTENTS



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SMART ENERGY IS FUTURE



Hanyang Electric Co., Ltd. will be with you
for Future of Smart Energy Technology

HANYANG ELECTRIC

CEO MESSAGE



As each generation has its own spirit, an enterprise requires principles and the vision to ground itself on.

And we believe these principles and the vision should be fundamental regardless of changes in circumstances or requirements.

These are the cornerstones that the company can evaluate its own potential and at the same time the goal that it can drive itself towards to.

Hanyang Electric Co. was established in 1978.

Over the past 40 years, we have accumulated that strength in the spirit of "QUALITY and TRUST".

We always explore new technologies and emphasize change and innovation.

“

Like the saying “Running water never grows stale,”
all members of Hanyang Electric Co.
respectfully promise you to continue
“QUALITY and TRUST” with our utmost best

”

In the 4th industrial era, we are living in is the era of endless competition and we believe the vision of INNOVATIVE CHALLENGES will take us through this challenging time. So far our efforts have been focused on building up the company to be the industry leader, which we believe have achieved. Now going forward, we aim to make even more contributions to people and the environment in the world.

Like the saying “Running water never grows stale,”
all members of Hanyang Electric Co. respectfully promise you to continue
INNOVATIVE CHALLENGES with our utmost best.

We would like to take this opportunity to send our sincere gratitude to our customers for advice and encouragement.

Thank you.

Hanyang Electric Co., Ltd. Chairman
Yang Kyu - Hyun

梁 奎 顯

HANYANG ELECTRIC INTRODUCTION

| QUALITY TARGET |

Supply of goods and services to meet Customers' needs.

| QUALITY POLICY |

Goods and Services Provider to meet all the requirements of customers or superior through understanding the needs and expectations of customers and continuous of process.

| MANAGEMENT POLICY |

Realize sustainable growth and internal stability
Strengthen development of technology and marketing
Harmonious management of autonomy and responsibility

HANYANG ELECTRIC ORGANIZATION



HANYANG ELECTRIC HISTORY

1970~1980

- 1978.11.15 Established Hanyang electric industry co.
- 1982.09.27 Incorporated Hanyang electric co., Ltd
- 1983.05.11 Member of Korea electrical manufacturers' cooperative
- 1985.03.20 Enter into technical partnership with Yushin Engineering co.,Ltd. In Japan
- 1986.10.28 Export-Import trader registration

1990


- 1990.06.20 Appointed by KEPCO for hydro & thermal power generation equipment manufacturer
- 1991.02.23 Certification of Korean Standards mark K.S. (KSC 8326)
- 1992.10.19 Appointed by KEPCO Nuclear Power generation equipment manufacturer
- 1996.03.13 Quality certification EQ(Excellent Quality) approved by KEMC(Korea Electrical manufacturer's cooperatives)
- 1996.08.13 Certified ISO9001
- 1999.05.17 Research institute established

2000~2005

- 2000.06.08 Certificate(No.2012001) for the Excellent product for Package switchgear by Public Procurement Service Authority
- 2000.12.23 Increase of capital (1,200,000,000won)
- 2002.11.20 Certified ISO14000
- 2004.03.20 C.E.O. of the company was selected the 20th Chairman of KEMC
- 2005.03.22 High-efficiency energy equipment certification by New-Renewable Energy Auth.
- 2005.12.20 Renewable energy facility certification New-Renewable Energy Authority

2006~2009

- 2006.03.30 New Technique Venture Co. by Small & Medium Business Administration
- 2006.05.17 National Industrial Medal was awarded to C.E.O. of company
- 2007.07.26 Certificate of Patent (Copper coated aluminum conductor bus-bar)
- 2008.10.13 Appointed as equipment supplier by Korea southern Power Generating Co.
- 2009.06.05 INNO-BIZ(Technique Innovation), MAIN BIZ(Management Innovation) Certification by Small & Medium Business Administration
- 2009.08.12 Performance Certification of 24kV Switchgear



2010~2014

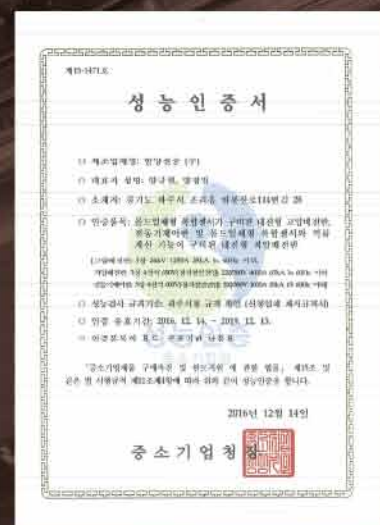
- 2010.03.30 Excellent Company standard product certification (Excellent EQ)
- 2010.11.01 Certificate of Patent (Motor Control Center)
- 2011.08.25 Certificate of Patent (PV Inverter mounted with monitoring deterioration)
- 2013.05.16 Minister Citation by Ministry of Science, ICT and Future planning
- 2014.01.16 Type Test of MCSG by internal arcing test(24kV, 25kA)
- 2014.07.21 Certificate of Patent (Battery housing for Lithium-Ion Cells)

2015

- 2015.01.02 Certificate of Performance(K-Mark) by ministry of Industry, Trade & Energy
- 2015.02.25 Certificate of Patent (Distribution panel with seismic qualification)
- 2015.03.09 Certificate of QUALITY Certification(Q-Mark) by KTC
- 2015.03.20 Named Excellent Product(Photovoltaic Generation System) by Public Procurement Service
- 2015.06.12 Certificate of Patent (Distribution panel improved power factor)
- 2015.07.23 MAIN-BIZ Confirmation
- 2015.08.25 Patent " Switchgear using Main & Sub Busbar connector"
- 2015.11.10 Type Test of MCSG by internal arcing test(7.2kV, 40kA)
- 2015.12.07 5-Million Dollar Export Tower" on the 52th Trade Day
- 2016.01.25 Registered Patent " Switchgear with mold integrated sensor"
- 2016.02.01 Registered Patent " Switchgear with Smart controller system based on IoT"
- 2016.02.25 Registered Patent " Resistant Switchgear"
- 2016.04.06 K-Mark Certification of Switchgear " HV, LV, MCC)
- 2016.06.30 Certificate of Designation of Excellent Product "Switchgear"
- 2016.12.24 Performance Certificate " Switchgear"
- 2017.04.14 Registered Patent " Real time notification system and method in PV system"
- 2017.04.14 Registered Patent "Monitoring system and method for failure prediction of PV module"
- 2017.04.14 Registered Patent "System and method for utilizing solar power generation considering electricity bill"
- 2017.04.28 Registered Patent" Photovoltaic module serving as building exterior material"
- 2017.05.15 Registered Patent "Switchgear with anti-vibration performance and seismic performance"



Monitoring, Instrumentation Control Panel (power control, water treatment facilities)





**Medium Voltage Switchgear
Up to 24kV**



**Medium Voltage Switchgear
Up to 7.2kV**

○ SYSTEM SPECIFICATIONS

ITEM	UNIT	Medium Voltage Switchgear Up to 24kV	Medium Voltage Switchgear Up to 7.2kV
Rated Voltage	kV	24 / 25.8	7.2 / 3.6
Rated Voltage	kV	22.9	6.6 / 3.3
Rated Current	A	630, 1250, 2000	400, 630, 1250, 2000, 2500, 3150, 4000
Rated Frequency	Hz	60 or 50	60 or 50
Rated Short Time Current	kA	MAX. 25	MAX. 40
Power Frequency Withstand Voltage:1MIN.	kV	50	20(22) / 16
Lighting & Switching Impulse Withstand Voltage:1MIN.	kV	125	60 / 45
Rated Operating Voltage	V	DC 110 or 125	DC 110 or 125

○ MEDIUM - VOLTAGE SWITCHGEAR FEATURES

Enclosure

- Vertical closed case with bolted assembly using steel holded frame and components
- C-shaped bending to avoid door warping, and a rubber packing for isolated vibration
- Primary/secondary door standards with optional tertiary door based on built-in device

Barrier

- With partition walls, the failure occurring at one of breaker room, bus room control room, and cable room does not affect (or minimizes its spread at) the other rooms (MW)
- A pressure discharging opening, allowing the pressure gas during ARC failure within the switchgear to be discharged
- With an installed safety cover, door typed structure in the rear side switchgear prevent users from accessing to the charge unit and allows users to perform easy maintenance

Bus-bar

- The busbar is designed and manufactured to have a capacity consistent with the specified rating current
- The busbar and its insulation support are designed and manufactured to have enough immunity to endure the electromagnetic and thermal strength occurring probably while suffering the short-circuit
- The busbar is processed with an insulation tube or epoxy powder coating featuring higher insurance according to the client's requirement.

Cable room

- For easy cabling, a separation at least 300mm is given to the support of bracket for a high voltage from bottom of termination point
- Additional input/output holes for external control cable and power cable
- Additional hole installed at the side plate for helping arrange control wire between panels

Structure

- Reasonable equipment arrangement, Focus on design, functionality and safety,
- Enough space for the internal appliance test and modification
- Grounding and safety devices such for safety perspective
- The design is applied with the drawout equipments such as instrument transformer, surge detector for easy withdrawal

Performance certification

- The type test is validated by Korea electrotechnology Research Institute (KERI) - KEMC 2101 : A.C metal-enclosed switch and controlgear for rated voltage 1kV and up to and including 52kV
- The Type Test of MCSG with IAC(internal arc class) is validated by KERI(Korea electrotechnology Research Institute) - IEC 62271-200 : Medium voltage switchgear and controlgear

Applicable standard

- KEMC 2101 (Medium voltage switchgear)
- IEC 60694, IEC 60298 (A.C metal-enclosed switch and controlgear)
- JEM 1425 (A.C metal-enclosed switch and controlgear for rated voltage 1kV and up to and including 52kV)
- KS, ESB, JEM, and the client needs' standards



**Low Voltage Switchgear
Up to 600V**

○ LOW-VOLTAGE SWITCHGEAR FEATURES

Enclosure

- Standard vertical closed case with bolted assembly using steel frame and components
- C-shaped bending to avoid door warping, and a rubber packing for isolated vibration
- Primary/secondary door standards with optional tertiary door based on built-in device

Structure

- Interior protective cover with door type will enhance safety even when the front door is open
- The termination point for external cables are designed vertically at the rear panel to facilitate working on external cables
- The bus bar is processed with an insulation tube or epoxy powder coating featuring higher insurance according to the client's requirement.

Performance certification

- The type test is validated by Korea electrotechnology Research Institute (KERI) - KEMC 2101 : Low-voltage switchgear.

Applicable standard

- KEMC 2102 (Low-voltage switchgear)
- IEC 60947-1 (Common specifications)
- JEM 1265 (Low-voltage switchgear)
- KS, ESB, our standard, and the client needs' standards

○ SYSTEM SPECIFICATIONS

ITEM	UNIT	Low Voltage Switchgear
Rated Voltage	V	600
Rated Current	A	400, 630, 1250, 1600, 2000, 2500, 3150, 4000, 5000, 6300
Rated Frequency	Hz	60 or 50
Rated Short Time Current	kA	MAX. 65
Power Frequency Withstand Voltage:1MIN.	V	Main circuits : 2000 (2200) / Control circuits : 1500
Rated Operating Voltage	V	DC 110 or 125



**Motor Control Center
Up to 600V**

○ MOTOR CONTROL CENTER FEATURES

Enclosure

- Prefabricated standard module design
- Width with 600mm, vertical wire way 100mm
- The height of bucket unit can be designed freely with 100mm height unit, terminals and horizontal bus-bar cell, etc.

Structure

- Draw out type bucket unit for easy maintenance checking
- Visible protection cover for horizontal & vertical bus bar
- International standard wiring
- If necessary, install a safety shutter on the unit

Performance certification

- The type test is validated by Korea electrotechnology Research Institute (KERI) - KEMC 1108 : Motor Control center

Applicable standard

- KEMC 1108 (Motor Control center)
- JEM 1195 (Motor Control center)
- KS, NEMA, and the client needs' standard

○ SYSTEM SPECIFICATIONS

ITEM	UNIT	MOTOR CONTROL CENTER UP TO 600V
Rated Voltage	V	600
Rated Current	A	horizontal : MAX.2500 vertical : MAX.600
Rated Frequency	Hz	60 or 50
Rated Short Time Current	kA	MAX. 65
Power Frequency Withstand Voltage:1MIN.	V	Main circuits : 2000 (2200) / Control circuits : 1500
Rated Operating Voltage	V	AC 110 or 220



Panel Board

○ DISTRIBUTION BOARD FEATURES

Enclosure

- Prefabricated standard module design
- Beautiful appearance with eco-friendly color painting
- Size of panel can be designed depending on the installation conditions

Structure

- Power measurement module be mounted for energy management
- Visible protection cover be designed for vertical bus bar
- Enough space of panel be designed for wiring and easy maintenance

Performance certification

- The type test is validated by Korea electrotechnology Research Institute (KERI) - KEMC 2104 : Distribution board

Applicable standard

- KEMC 1108 (Distribution board)
- KS, NEMA, and the client needs' standard

NEW & RENEWABLE ENERGY DIVISION PRODUCTS

Photovoltaic Inverter - Transformer Type

Photovoltaic Inverter - Transformerless Type

Photovoltaic Intelligence Junction Box

Photovoltaic Monitoring System

Energy Storage System

Construction of Photovoltaic Generation System

우수제품지정증서

지정번호 2015009

제출명 : 태양발전용 인버터 시스템
발주명 : 한양전선 주식회사
대표이사 : 양국현, 양정열
작성기간 : 2015. 3. 20 ~ 2018. 3. 19
지정명칭 : 최면광조

위 제품을 조달사업에관한법률
제9조의2 및 동법시행령 제18조에 따라
위와 같이 우수제품으로 지정합니다

2015년 3월 20일



조달청



Certificate of Designation of Excellent Product

Product: Photovoltaic Generation System
Company: HANYANG ELECTRIC Co., Ltd.
Representative: Yang Guk Hyun, Yang Jeong Yeol
Period of Production: March 20, 2015 ~ March 19, 2018



2015009

This is to certify that the above mentioned product was
designated as an Excellent Product in accordance with
Article 9 Paragraph 2 of the Government Procurement Act
and Article 18 of the Enforcement Decree thereof

(October 7, 2015)

Authorized: Kim Sangkyu, Kim Sangkyu
Public Procurement Service, Republic of Korea



[11~36kW]



[41~51kW]



[76~100kW]

CHARACTERISTICS

- Grid tied Transformer type
- 2 MPPT topology (Wide MPPT range)
- High Euro efficiency
- Low THDi
- DC ground fault detection
- Minimize inrush current when grid connected
- Capable stand alone operation
- 3Φ3W, 3Φ4W output selectable without any operation



SYSTEM SPECIFICATIONS

Item	Specification		
Rated Power(kW)	11, 16, 21, 26, 31, 36	41, 46, 51	76,100
Max DC Input Voltage(V)	875		
MPPT Voltage range(V)	250 ~ 750		
Output Voltage(V)	3W+N+PE 380-220Vac		
Euro efficiency(%)	≥ 93,5	≥ 95	
THD(%)	≤ 3		
Operation temp(°C)	-20 ~ 50		
Communication	RS - 485 ModBus		



[3.1kW]



[11~31kW]



[41~51kW]

○ CHARACTERISTICS

- Grid tied Transformerless type
- Wide MPPT voltage range
- High Euro efficiency
- Low THDi
- DC ground fault detection
- Minimize inrush current when grid connected
- Capable stand alone operation



○ SYSTEM SPECIFICATIONS

Item	Specification				
Rated Power(kW)	3.1	11, 16, 21	26, 31, 36	41, 46, 51	76, 100
Max DC Input Voltage(V)	500	875			
MPPT Voltage range(V)	100 ~ 450	250 ~ 750			
Output Voltage(V)	220	3W+N+PE 380-220Vac			
Euro efficiency(%)	≥ 96				
THD(%)	≤ 3				
Operation temp(°C)	-20 ~ 50°C				
Communication	RS - 485 ModBus				



[12~20kW]



[33~40kW]

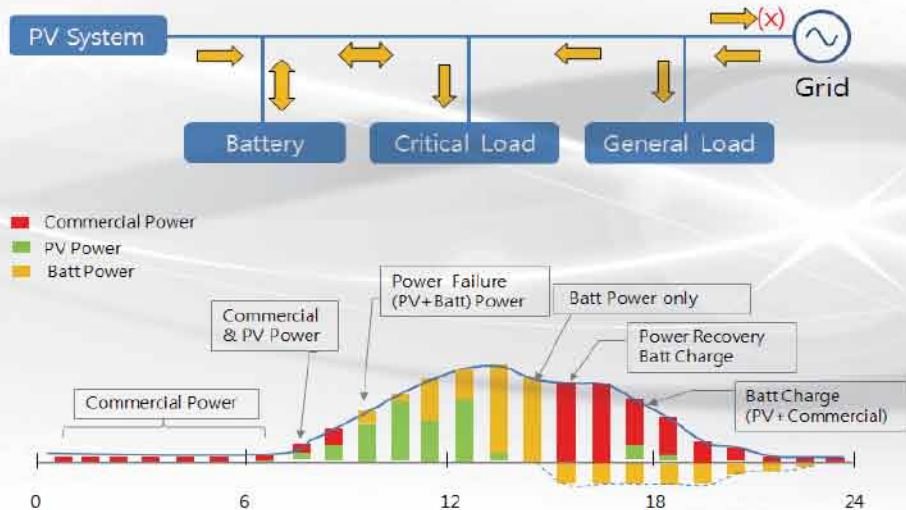
CHARACTERISTICS

- DC input voltage up to 1,000V
- Maximum efficiency of 98%
- Internal DC switch
- Transformerless
- Compact design
- Multi MPPT controller
- Easy installation
- IP 65
- Wall mount type



SYSTEM SPECIFICATIONS

Item	Specification			
Rated Power(kW)	12	20	33	40
Max DC Input Voltage(V)	1,000Vdc			
MPPT Voltage range(V)	450~800Vdc			
Output Voltage(V)	3W+N+PE 380Vac			
Euro efficiency(%)	≥ 97%		≥ 98%	
THD(%)	≤ 3%			
Operation temp(℃)	-25~60℃			
Communication	RS-485 Modbus, WIFI(option)			



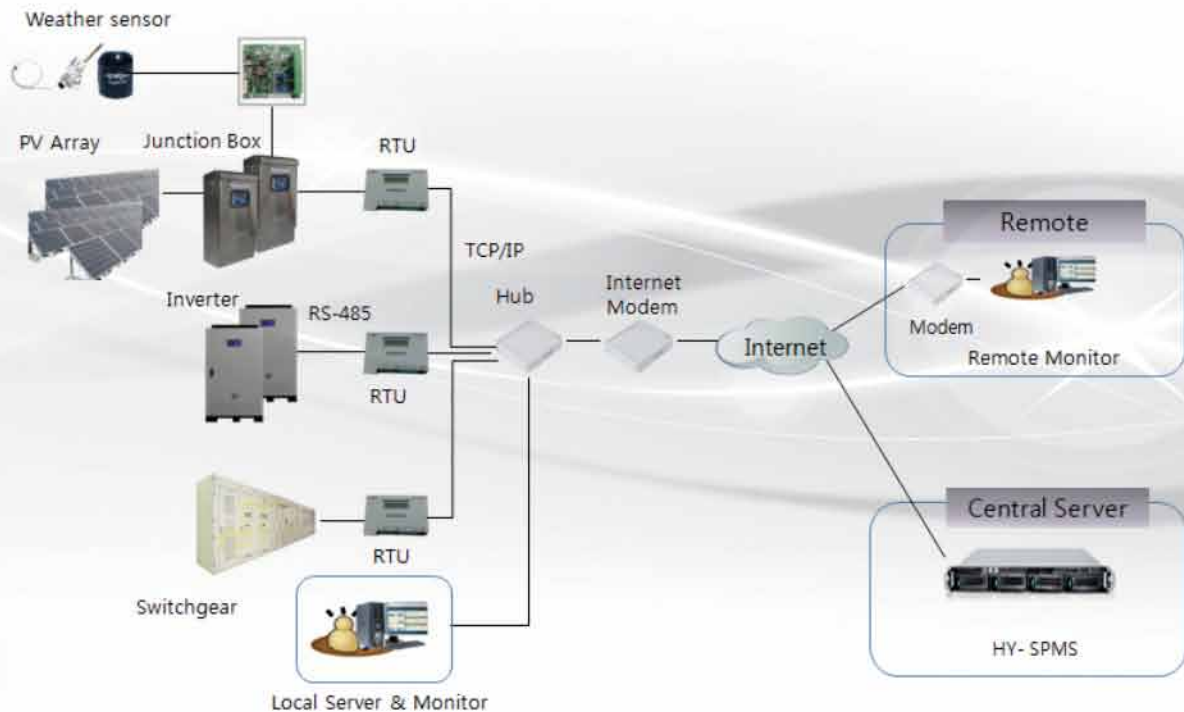
CHARACTERISTICS

- Grid tied Transformerless type
- Wide MPPT voltage range
- High Euro efficiency
- Low THDi
- DC ground fault detection
- Minimize inrush current when grid connected
- Capable stand alone operation



SYSTEM SPECIFICATIONS

Item	Specification
Rated Power	3.1kW
Rated Voltage	1Φ 220V 50/60Hz
Max charge voltage/current./capacity	56.5V/ 90,A/ 3.1kW
Max PV Input voltage./capacity	500V/3kW
MPPT Voltage range	100~450V
Euro efficiency(Batt to Load)	≥ 93%
Transfer time(Grid to Inverter)	≤ 4ms



CHARACTERISTICS

- Real time monitoring for PV Array, Junction Box and Inverter
- Variety statistics and analysis
- Web and Local monitoring
- Switchgear monitoring function
- Web camera (option)
- Display panel (option)



SYSTEM SPECIFICATIONS

Item	Specification
Server	2.7GHz
OS	Windows 7
Memory	6GB
HDD	500GB
Monitor	LED 22"
RTU	RS485 to Ethernet



[Communication type]



[General type]



[Household]

CHARACTERISTICS

- PV array surveillance and management
- All isolation structure
- 4CH expansion unit (Max 32CH)
- Include weather sensor module
- Variety alarm detection
- Flame retardant material Fuse holder (Fire prevention)
- IP44 (Outdoor)



SYSTEM SPECIFICATIONS

Item		Specification
Electrical Characteristics	Max Input voltage	1,000V
	Protection Fuse	15A (with Fuse Holder)
	Max measuerment	32 ch
	Alarm detection	string voltage & current, Heatsink Temp OV, OC, Fuse open, Comm error
Environmental Characteristics	Enclosures	SUS 304 / Steel
	Protection	IP44 (Option IP65)
	Operation Temp	-20 ~ 60℃
Communication		RS-485 Modbus

Excellent Product Certificate for Switchgear



K Mark Certificate for Switchgear



[HV Switchgear]

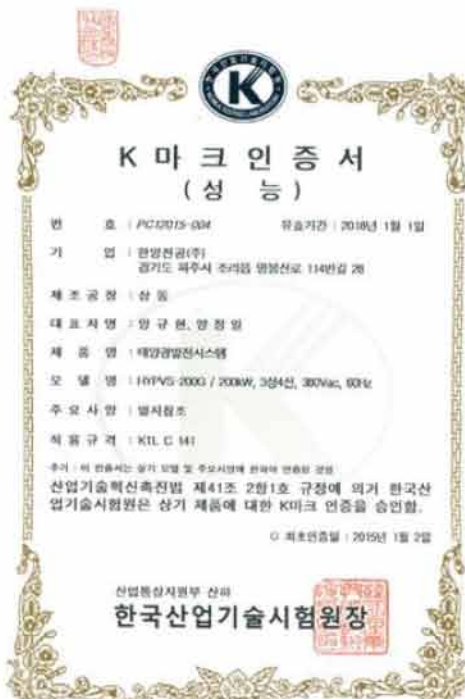
[LV Switchgear]

[MCC]

Excellent Product Certificate for PV Generation System



K Mark Certificate by KTL



Q Mark Certificate by KTC





HYOSUNG



posco
포스코ICT

DAELIM





H A N Y A N G E L E C T R I C



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