



Excellent Product

SOLAR ENERGY SYSTEM

THE LEADING COMPANY OF GLOBAL PHOTOVOLTAIC ENERGY



SOLAR POWER ENERGY

Wonkwang S&T, a specialized new renewable energy company, is not only a participating company designated by the Korea Energy Agency, but also a procurement excellent product registration enterprise.

We can perform all the processes from design of photovoltaic system to structure manufacturing, construction, and post management, and provide solutions that meet customer needs.

[Wonkwang S&T] constructed a stable photovoltaic system to supply new renewable energy that meets the 'new renewable energy 3020' policy, operates the power plant efficiently, establishes a post-management system, and provides responsibility management services. Through these efforts, we will continue to grow as a leading company that leads the convenient and safe eco-friendly energy system environment.



SOLAR FRIENDLY ENERGY



SOLAR POWER ENERGY



- 1. Possession of leading photovoltaic device manufacturing technology in Korea**
 - Photovoltaic system development & design experience and specialized installation and construction know-how accumulated since 2014
 - Independent manufacturing of photovoltaic system and possession of TOTAL SOLUTION
 - Possession of company affiliated research institute
 - Design and manufacture of photovoltaic devices and structures, and direct management of the construction team
- 2. Secure of KEY TECHNOLOGY**
 - Possession of power compensation system technology
 - Possession of its own development monitoring system
 - Possession of patent for tracker and module efficiency reduction prevention device
 - Possession of construction technology according to the installation environment including water, land, buildings, etc.
 - Possession of 8 registered and pending patents
- 3. Business Diversification & Growth Engines Development**
 - Development of a new concept tracker using air pressure
 - Development of a device to prevent module efficiency reduction
 - Entering overseas markets by innovating price competitiveness through direct production
 - Registration of procurement excellent product
 - Securing expertise in solar waste and leading the global market

▶ History



- Registered as a specialized company in installation of facility for Renewable Energy
- Registered as Electrical Contractors Business
- Acquired ITS ISO9001 / ITS ISO14001
- Registered as venture company

- Registration of software business
- Selected as Korea Institute of Industrial Technology Partner Company
- Registration of 2 patents (Electrical energy monitoring related)
- Certified as an affiliated research institute

2015

2017

2014

- Establish

2016

- Registration of a patent - Solar Tracker
- Received Korea Electrical Contractors Association Commendation from Incheon City Chapter
- Registration of 2 patents - Photovoltaic related



▶ Business Field



1. Photo voltaic system (PV Solution)

- EPC Turn-key construction
- Design / Construction / Maintenance
- Double-axis / single-axis tracker production

2. Electricity

- Photovoltaic electricity construction
- Construction of APT, building, factory electricity, communication, and fire fighting

3. Production & Installation of Structure

- Plant equipment (dust/soundproof facility production/construction)
- Steel structure production / installation

4. B2B Solution Business (New)

- Sales of LG home appliances and B2B products (Air conditioner, PC, display, all other products)



- Selected as a participant in the solar energy (housing, building, convergence) government supply project by Korea Energy Agency
- Selected as a participant in Incheon Metropolitan City Mini Solar Supply Project
- Designated as Excellent Quality Product System by Public Procurement Service (PV System)
- Confirmation of company specializing in materials and components
- Identified as "Root" company by Korea National "Root" Industry Center
- Designated as an Excellent Venture Company by Korea Venture Business Association
- Established affiliated research institute
- Established Vietnam branch
- Established Naju branch
- Designated as an Inno-Biz
- Designated as a Main-Biz



2019

2018

- Selected as a participant in the solar energy (housing, building, convergence) government supply project by Korea Energy Agency
- Selected as a participant in Incheon Metropolitan City Mini Solar Supply Project
- Selected as a participant in the smart energy factory Solar PV supply project in Incheon Metropolitan City
- Designated as a dedicated A/S company for installation of renewable energy by the Korea Energy Agency (Nationwide)
- Received Incheon Metropolitan City Award
- Obtained K mark certification (PV system)

2020

- Selected as a participant in the solar energy (housing, building, convergence) government supply project by Korea Energy Agency
- Selected as a participant in Incheon Metropolitan City Mini Solar Supply Project
- Designated as a priority purchase recommendation for excellent inventions (solar power generation equipment) by Korean Intellectual Property Office
- Contracted Unit Price Contract for a Third Party with Korea On-Line E-Procurement System (aka, Narajangteo) Shopping mall
- Contracted Multiple Award Schedule with Korea On-Line E-Procurement System (aka, Narajangteo) Shopping mall
- Obtained Collection and Transport of Solar Waste Business liscence
- Obtained KS certification

PV Micro Compensator

Meet the innovative photovoltaic system of [Wonkwang S&T] right now.

The photovoltaic system of 「Wonkwang S&T」 seeks to maximize the power generation. If the part where the module is installed is obscured by shadows, or if snow accumulates and becomes contaminated on it, there is a huge loss in solar power generation. Our power compensation system is the only photovoltaic device with technological power to maximize the generation quantity by compensating for the loss of generation quantity deriving from the reduction of power through ICT technology convergence. Our procurement excellent products will be the best choice for the supply and installation of new renewable energy.



02. PV Micro Compensator

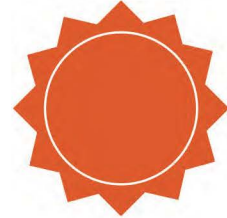
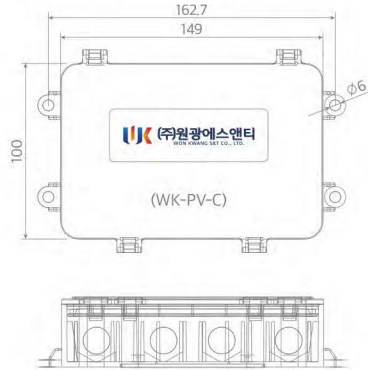
PV MICRO COMPENSATOR



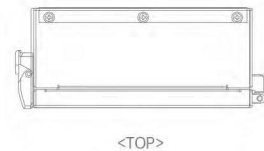
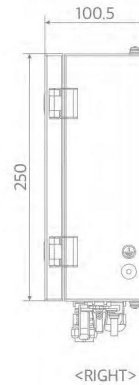
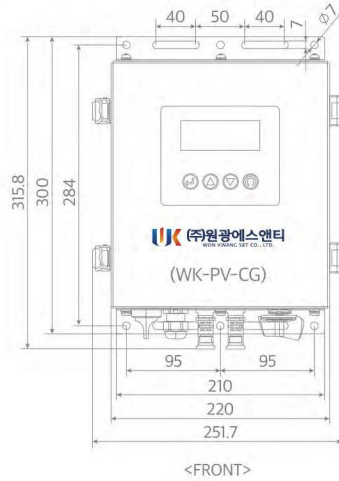
▶ Compensator - Excellent product, K mark, Q mark



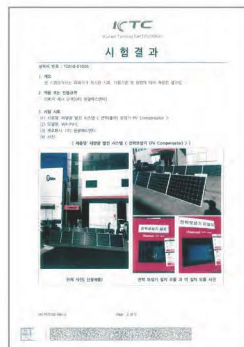
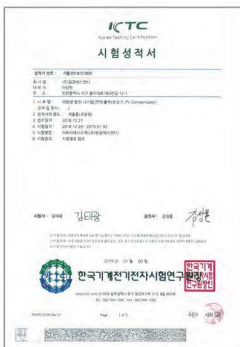
- The output efficiency of a solar power plant reduces due to the occurrence of shading for various reasons and it is the device that compensates for the reduction.
- Improvement of power generation efficiency by more than 20% during the photovoltaic system operation period (over 20 years)



▶ Gateway - Excellent product, K mark, Q mark



▶ KTC Test report



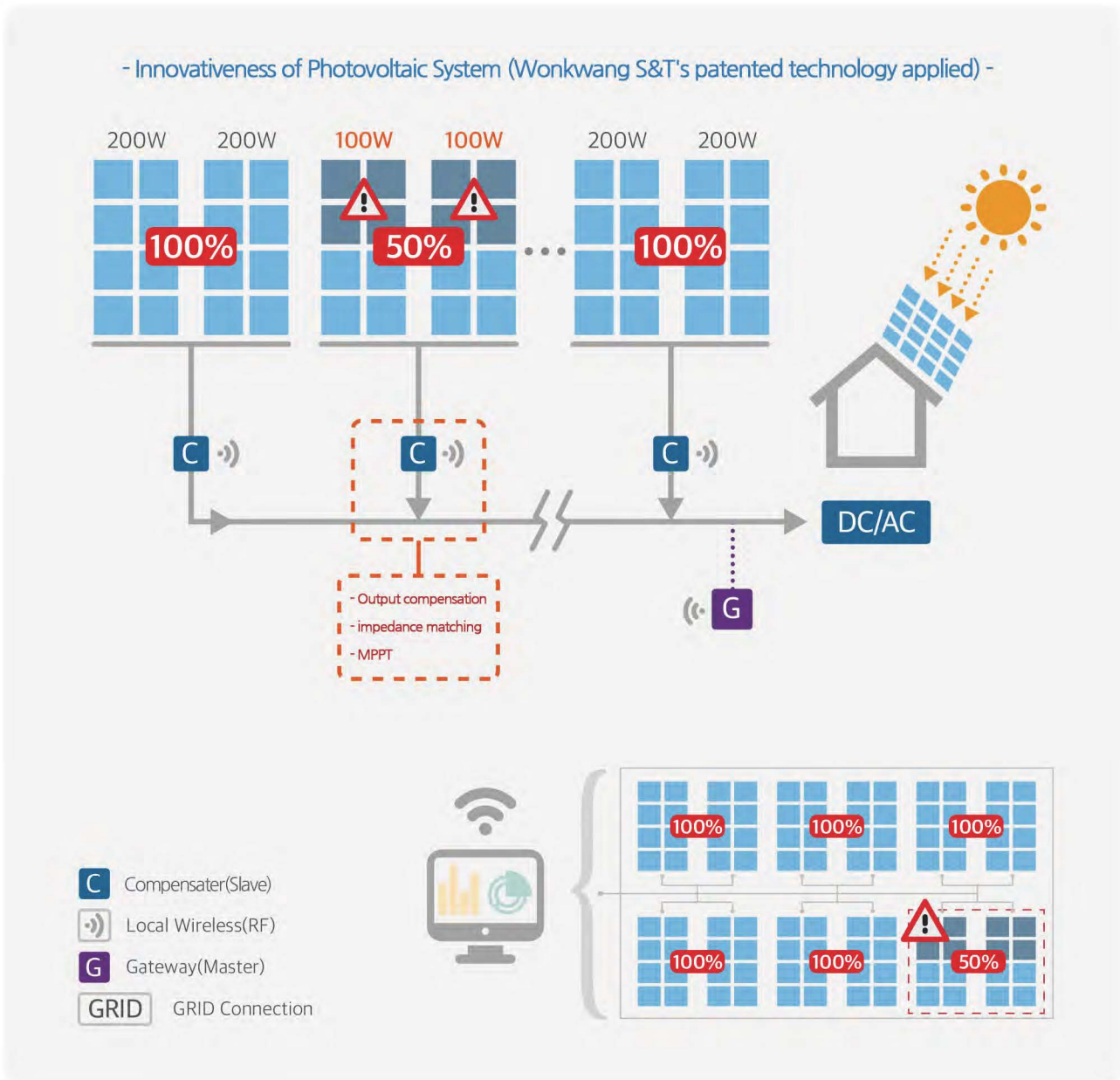
Test item	Unit	Test result		Testing method
		Compensator application	Without compensator	
Inverter	Module GEA	1day	23.09	22.78
		2day	21.30	25.07
		3day	27.94	25.21
		4day	32.13	28.58
		5day	27.77	30.00
Output	Module GEA (a covering of one page)	1day	19.02	13.84
		2day	20.07	15.56
		3day	24.83	16.51
		4day	28.84	18.45
		5day	24.87	20.11

1. Test place: a place within Wonkwang S&T, test time: 10:00 am~02:00 pm
 2. The inverter output value is the cumulative output of the measurement time zone.

▶ Introduction of Solar Power Compensation System



The biggest problem with the existing photovoltaic device is the low amount of power generated in the shaded section. In order to solve the problem, the system maximizes solar power generation efficiency by synchronizing the module installed in the shaded section with the maximum comparison output module connected to it through performance of impedance matching according to the micom control signal.



Power Compensator

Definition & Function

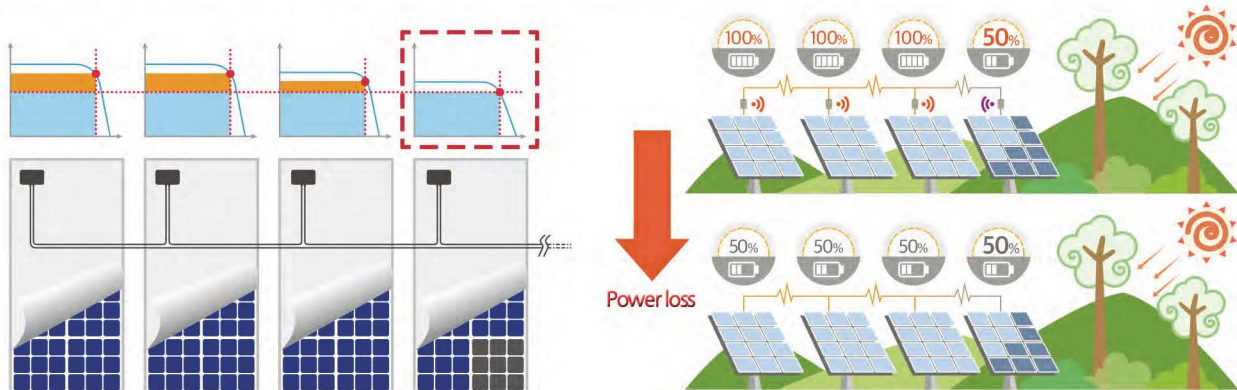
- + Definition: Photovoltaic efficiency maximization system
- + Function
- This is a technology that compensates for the loss of photovoltaic power generation caused by shadows, snow, contamination, etc., and it can increase power generation efficiency by at least 10 to 20% compared to existing facilities. [Authorized testing agency test data]
- It has excellent compatibility because it can be applied not only to newly installed photovoltaic devices, but also to existing photovoltaic devices.

▶ Wonkwang S&T's Technology and Differentiation

Problems of Existing Photovoltaic System

Existing solar cell modules are affected by the solar cell module with the lowest output (shadow section, etc.) due to the structural characteristics of the series and parallel connection, and thus have limitations in leading the best efficiency of the photovoltaic system. In other words, the existing systems are designed to be matched to the module with the lowest power generation among the solar cell modules connected in series and in parallel, so the entire efficiency is reduced.

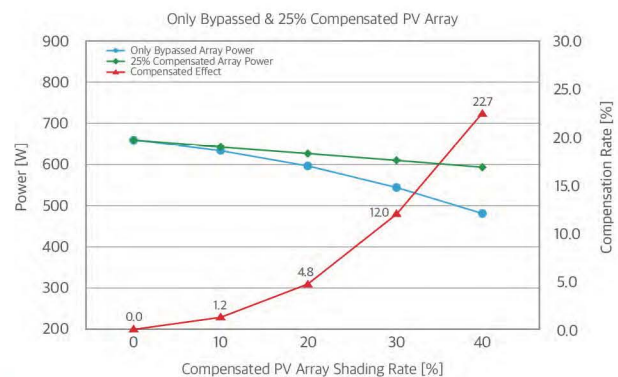
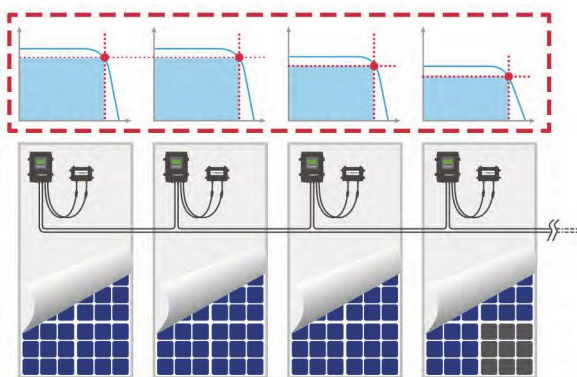
This is also a very serious problem in terms of operation and management of the photovoltaic system.



- Power loss occurs because the output of each module does not match, and power generation is lost up to 25% because it is impossible to monitor the low power phenomenon of the shaded module.

Differentiation & Optimization Point of Wonkwang S&T's Photovoltaic System

Thanks to the Buck boost of the power compensator, the power control of the converter, and the MPPT tracking effect, our photovoltaic system also synchronizes the module output value of the shaded part with the highest output value of the neighboring module, so that the amount of power generated by each connected module reaches the highest point. Therefore, it is an optimal system with a significant increase in power generation efficiency compared to existing systems.



- ※ Secure of maximum power by synchronizing MPPT output by module
- ※ Problems of individual modules do not affect the string

- Increased efficiency by about 15~20% compared to the existing photovoltaic system (Results of authorized agency testing)
- It is possible to monitor individual solar module
- Measurement of normal operation, lifespan, etc.
- Reduction of installation conditions by using power reduction prevention technology for shaded areas
- This is a technology for compensating for the consumption of power generation in the shaded section, which is a factor inhibiting photovoltaic generation, through the fusion of new renewable energy fields and ICT technology. We develop a power compensation device that can improve power generation efficiency

Product list



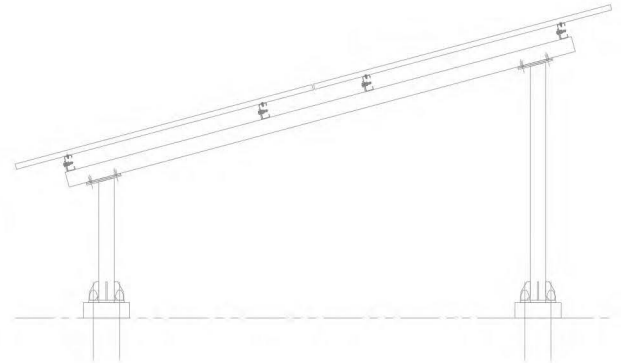
THE LEADING COMPANY OF GLOBAL PHOTOVOLTAIC ENERGY

04. Information on type of excellent solar power energy products

INFORMATION ON TYPES OF EXCELLENT SOLAR POWER ENERGY PRODUCTS

► Basic type - it is installed on the roof of a building, the ground, and so forth.

- 10~20% increase in power generation efficiency compared to existing photovoltaic devices thanks to the power compensation system



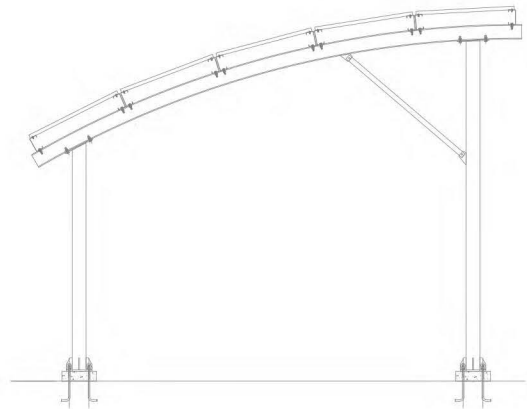
► Basic type list



Type	Product name	Model name	Remarks
Basic	PV System	WK-PV-CO-03	23628902
	PV System	WK-PV-CO-05	23533282
	PV System	WK-PV-CO-10	23540107
	PV System	WK-PV-CO-15	23540108
	PV System	WK-PV-CO-20	23540109
	PV System	WK-PV-CO-25	23540110
	PV System	WK-PV-CO-30	23540111
	PV System	WK-PV-CO-35	23540112
	PV System	WK-PV-CO-40	23540113
	PV System	WK-PV-CO-45	23540114
	PV System	WK-PV-CO-50	23540115
	PV System	WK-PV-CO-55	23540116
	PV System	WK-PV-CO-60	23540117
	PV System	WK-PV-CO-65	23540118
	PV System	WK-PV-CO-70	23540141
	PV System	WK-PV-CO-75	23540195
	PV System	WK-PV-CO-80	23540196
	PV System	WK-PV-CO-85	23540197
	PV System	WK-PV-CO-90	23540198
	PV System	WK-PV-CO-95	23540199
PV System	WK-PV-CO-100	23540200	

▶ **Round type** - it is installed on the parking lot, the water treatment plant, etc

- 10~20% increase in power generation efficiency compared to existing photovoltaic devices thanks to the power compensation system



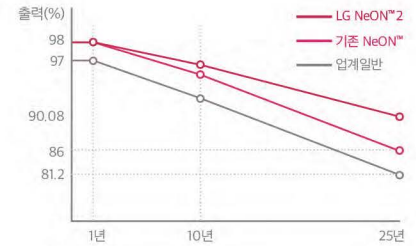
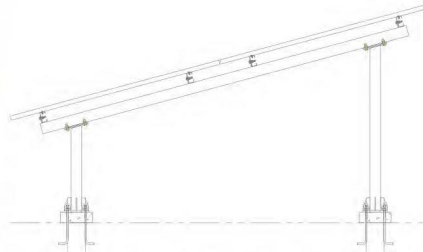
▶ **Round type list**



Type	Product name	Model name	Remarks
Round	PV System	WK-PV-R-03	23540201
	PV System	WK-PV-R-05	23540548
	PV System	WK-PV-R-10	23540549
	PV System	WK-PV-R-15	23540550
	PV System	WK-PV-R-20	23540551
	PV System	WK-PV-R-25	23540694
	PV System	WK-PV-R-30	23540695
	PV System	WK-PV-R-35	23540696
	PV System	WK-PV-R-40	23540697
	PV System	WK-PV-R-45	23540698
	PV System	WK-PV-R-50	23540699
	PV System	WK-PV-R-55	23540700
	PV System	WK-PV-R-60	23541095
	PV System	WK-PV-R-65	23541096
	PV System	WK-PV-R-70	23541097
	PV System	WK-PV-R-75	23541098
	PV System	WK-PV-R-80	23541099
	PV System	WK-PV-R-85	23541100
	PV System	WK-PV-R-90	23541101
	PV System	WK-PV-R-95	23541102
PV System	WK-PV-R-100	23541103	

▶ Ultra-High Efficiency Type - it is installed on the roof of a building, the ground, and so forth.

- 10~20% increase in power generation efficiency compared to existing photovoltaic devices thanks to the power compensation system



The module of Won Kwang S&T boasts the best product in Korea with an ultra-high efficiency of 20.02%, and is trusted by LG Electronics, which won the Inter Solar (Germany) Award, called the “Nobel Prize in the Solar Industry” for the first time in Asia.

We also increase photovoltaic power generation through the use of innovative products.

In addition, the strong output guarantee policy further improves the annual output decline rate from -0.5% to -0.33% since the beginning, and we guarantees 90.08% output performance in the 25th year.

▶ Electrical characteristics

Model		LG415N2W-V5
Pmax	W	415
Vmpp	V	41.80
Impp	A	9.94
Voc, ± 5%	V	49.60
Isc, ± 5%	A	10.59
Module Efficiency	%	20.02
power allowance	%	0 ~ +3
Product warranty	year	25
Power warranty	%	89.6 / 25-year basis

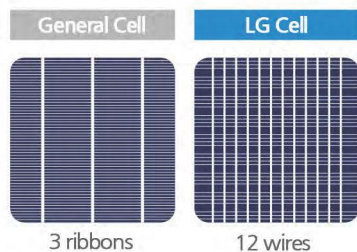
▶ Ultra-High Efficiency type list

Type	Product name	Model name	Remarks
PV System	WK-PV-LG-03	23696271	
PV System	WK-PV-LG-05	23696272	
PV System	WK-PV-LG-10	23541104	
PV System	WK-PV-LG-15	23696229	
PV System	WK-PV-LG-20	23696230	
PV System	WK-PV-LG-25	23696231	
PV System	WK-PV-LG-30	23696232	
PV System	WK-PV-LG-35	23696233	
PV System	WK-PV-LG-40	23696234	
PV System	WK-PV-LG-45	23696235	
PV System	WK-PV-LG-50	23696236	
PV System	WK-PV-LG-55	23696237	
PV System	WK-PV-LG-60	23696238	
PV System	WK-PV-LG-65	23696239	
PV System	WK-PV-LG-70	23696240	
PV System	WK-PV-LG-75	23696241	
PV System	WK-PV-LG-80	23696242	
PV System	WK-PV-LG-85	23696243	
PV System	WK-PV-LG-90	23696244	
PV System	WK-PV-LG-95	23696245	
PV System	WK-PV-LG-100	23696246	

Ultra High Efficiency



<Multi-wire busbar application>





Wonkwang S&T uses **the domestic top level solar monitoring system** developed by itself, so that it can quickly maintain and repair the system through accurate accident diagnosis and recognition.

The photovoltaic monitoring collection device transmits the data collected from the inverter to the web server, and the user can check the power generation status on the web rather than in a specific place designated. The user is given a specified ID and password. We support an easy and accurate maintenance support system so that users can check the power generation data by accessing to the system using ID and PW from anywhere that people can use Internet.

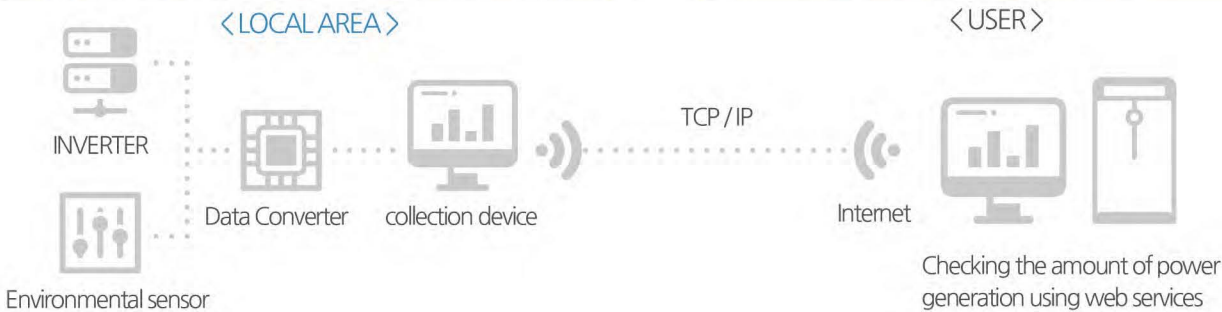
Dedicated Web Monitoring System

- It is possible to manage systematically by applying user level
- To check daily, monthly, and annual production information
- To check the production trend in a specific period using the graph
- It is possible to check various data for each power plant and inverter unit
- It is possible to save data as an Excel file
- It is possible to use meteorological observation data such as solar radiation and temperature for power plant management.
- To supply dedicated smartphone service (optional)

Customer Education & Technology Transfer

- Successfully conduct of business through education and training, transfer of skills through specialized training courses to cultivate operational capabilities, and secure of professional personnel who can take charge of the core technology of the business through continuous information on information technology and technical advice
- Training for understanding principles
 - Training for stable operation
 - Training for emergency maintenance

Monitoring System Configuration Diagram



Product liability insurance

► Follow-up management - Selected as a dedicated A/S company by Korea Energy Agency!

Providing prompt AS support/real-time remote service and preventive inspection through strict and thorough follow-up management service

Customer Service Receipt

Sales, installation company, END USER service request

Response Time

- Service support within 365 days maximum response regardless of region and time

History Management

System history management / average processing time: 48 hours nationwide support system

Support System

- Fast recovery & effective regular inspection in case of failure
- In order to stabilize the system after normal operation, technical personnel are input/ supported for a certain period
- Separate responsible organization for the case of occurrence of problem
- ONE-CALL service through operation
- Supply of real-time remote service
- Rapid maintenance

Service Supply

National Service Centers (Seoul, Incheon, Suncheon Pyeongtaek) Solving problems

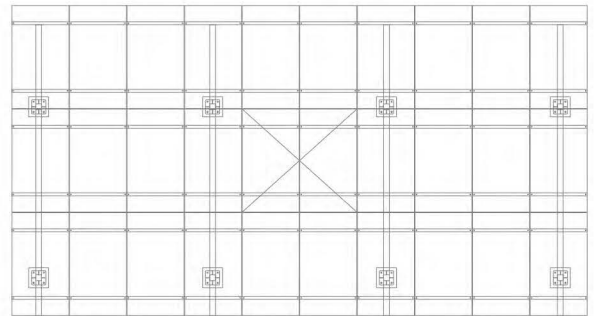
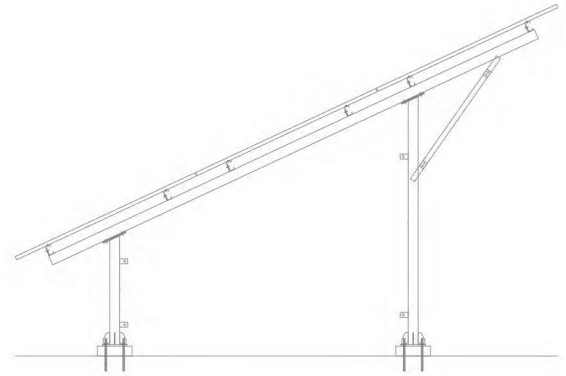
Problem Solving

- To solve problems quickly and effectively
- To use massive technical resources, etc.



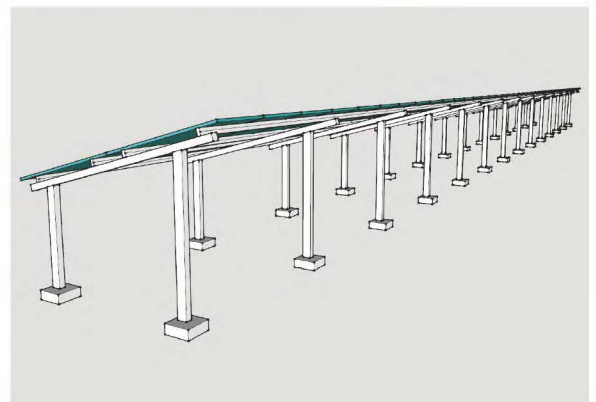
► PV System list

Type	Model name	Capacity	Remarks
Structure inclusion	WK-PV-MS03	3.33kW	
	WK-PV-MS05	5.18kW	
	WK-PV-MS10	10.36kW	
	WK-PV-MS15	15.54kW	
	WK-PV-MS20	20.72kW	
	WK-PV-MS25	25.9kW	
	WK-PV-MS30	31.08kW	
	WK-PV-MS35	36.26kW	
	WK-PV-MS40	41.44kW	
	WK-PV-MS45	46.62kW	
	WK-PV-MS50	51.8kW	
	WK-PV-MS75	77.7kW	
	WK-PV-MS100	103.6kW	
Structure separate	WK-PV-KS03	3.33kW	
	WK-PV-KS05	5.18kW	
	WK-PV-KS10	10.36kW	
	WK-PV-KS15	15.54kW	
	WK-PV-KS20	20.72kW	
	WK-PV-KS25	25.9kW	
	WK-PV-KS30	31.08kW	
	WK-PV-KS35	36.26kW	
	WK-PV-KS40	41.44kW	
	WK-PV-KS45	46.62kW	
	WK-PV-KS50	51.8kW	
	WK-PV-KS75	77.7kW	
	WK-PV-KS100	103.6kW	



► Structure list

Type	Model name	Capacity	Remarks
Square Pipe	WK-PV-ST3K	3kW	23540107
	WK-PV-ST5K	5kW	23540108
	WK-PV-STA10K	10kW	23540110
	WK-PV-STA15K	15kW	23540112
	WK-PV-STA20K	20kW	23540114
	WK-PV-STA25K	25kW	23540117
	WK-PV-STA30K	30kW	23540141
	WK-PV-STA35K	35kW	23540196
	WK-PV-STA40K	40kW	23540198
	WK-PV-STA45K	45kW	23540201
	WK-PV-STA50K	50kW	23540549
	WK-PV-STA75K	75kW	23541096
	WK-PV-ST100K	100kW	23541104
H-beam	WK-PV-H3K	3kW	23696229
	WK-PV-H5K	5kW	23696230
	WK-PV-HA10K	10kW	23696232
	WK-PV-HA15K	15kW	23696234
	WK-PV-HA20K	20kW	23696236
	WK-PV-HA25K	25kW	23696238
	WK-PV-HA30K	30kW	23696240
	WK-PV-HA35K	35kW	23696242
	WK-PV-HA40K	40kW	23696244
	WK-PV-HA45K	45kW	23696247
	WK-PV-HA50K	50kW	23696249
	WK-PV-HA75K	75kW	23696260
	WK-PV-HA100	100kW	23696270
Monitoring	WK-PV-MINT		23533282





JOB REFERENCE

**SOLAR
POWER
ENERGY**

▶ PV Installation Performances



Seah CM



Woori Package



Pulmuwon



Paju Farming PV



Parking Zone PV



Dukshin Housing



SL Lighting



Daeheung Farm



LOTvacuum



Ilpori PV Power Plant



SK C&C IT Complex



LH Apartment



SangMyeong High School



Incheon Building Roof



National Archives of Korea



Villa Roof



Koheung Solar Farm



SeAh Besteel



Magok Parking Zone



SeKwang Middle School



Seochang Primary School



Kyungbuk Sports School



SechoJungri PV Power Plant



POSCO S&G



Ellim SunFlower PV



Goyang Theme Park



SeAh Metal



Keokun PV Power Plant



Kwanglim Industry



APT Roof

▶ EXCELLENT PRODUCT



▶ EXCELLENT COMPANY



Certificate No. 2020-083

Certificate of Designation for an Excellent Company

Company : Wonkwang S&T Co., Ltd.

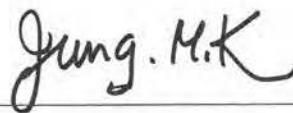
Representative : Lee Sang Hun

Products : Solar Photovoltaic System

Validity of Certificate : June 22, 2020 ~ June 21, 2025

This is to certify that the above mentioned company was designated by Public Procurement Service of the Republic of Korea as an Excellent Company for overseas public procurement market.

2020. 6. 22



Jung Mookyung
Administrator

Public Procurement Service
The Republic of Korea



CERTIFICATION



K마크인증서



품질인증서(Q-Mark)



기술역량 우수기업 인증서



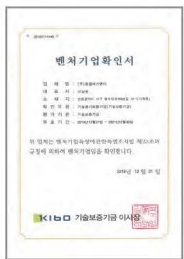
품질경영시스템 인증서



환경경영시스템 인증서



기업부설연구소 인정서



벤처기업확인서



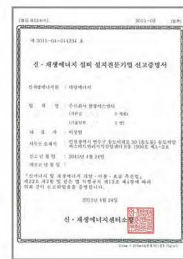
우수벤처기업 선정증



기술혁신형 중소기업 확인서 (Inno-Biz)



경영혁신형 중소기업 확인서 (Main-Biz)



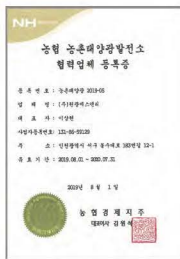
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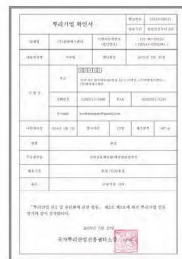
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