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TMEIC Develops and Commences Sale of New Inverter for both Solar Power Generating Systems and Energy Storage Systems

– A New Concept Universal Design Inverter Boasting World-Class Conversion Efficiency and High Variability –

Toshiba Mitsubishi-Electric Industrial Systems Corporation (hereinafter, "TMEIC"; President & CEO Masahiko Yamawaki) has developed a new universal design inverter for both solar power generating systems and energy storage systems (ESS). Sales of the new modular-type inverter boasting high variability commenced for the global market in May 2019.

Introduction of renewable energy systems, beginning with solar power generating systems, is becoming increasingly widespread worldwide, and on the back of the need for grid stability and energy storage, demand for energy storage systems using batteries is also on the rise.

With the new inverter for solar power generating systems/ESS, TMEIC has realized the world's highest level of conversion efficiency of 99.1%[*1] while increasing the maximum capacity for a single unit from the conventional 3.2MW to the world-class 5.5MW. In addition, TMEIC has altered the structure of its AC Station from the use of 2,550kW units to the use of modules with a capacity of 640-920kW. This helps achieve the optimal system structure befitting the size of each site. A further benefit is the ability to realize capacity beyond the 10MW of conventional systems, which are typically made up of 4 units measuring 2,550kW each, by enabling systems of 22MW, for example, by combining 24 units measuring 920kW each.

Endorsement from Vice President Naotada Sawada of Renewable Energy & New Technology Division:
"The inverter and solar power generating system developed recently was based on an innovative concept that marks a clear difference from conventional products. The new products have various features that meet broad customer needs and we are confident that they will make a significant contribution to the widespread use of renewable energy as it gathers pace globally. With the launch of this new product and system, TMEIC aims to further expand its renewable energy business in the global market."

≪Characteristics of the New Inverter and PV System≫

1. **New inverter model realizing world-class conversion efficiency and single unit capacity**
   - ◆ Achieves the world's highest level of conversion efficiency of 99.1%. The new inverter maximizes output capacity for solar generating systems and minimizes battery charge/discharge losses for ESS.
   - ◆ Parallel set up of modular type inverters (920kW x 6 units) realizes world-class single unit maximum capacity of 5.5MW.

2. **Developed lineup that responds to versatile customer needs**
   - ◆ All 14 models (eight for power generating systems and six for ESS) are compliant with certifications such as IEC and the United States' UL Standards[*2].
   - ◆ Flexible structuring of modular-type inverters enables various AC Station capacity structures (from small capacity using a single unit modular-type inverter that also enables 22MW using 24 inverter units of 920kW each, which is more than double the conventional maximum volume of 10MW.) The system can be expanded by adding modules when boosting system capacity in the future.

- Can be installed in various environments, including high temperature and high humidity, desert, places with a wide range of temperatures, areas of high elevation and areas with salt-air damage[*3].

3. <u>Highly advanced system technology realizes increased operational efficiency and reliability while curbing installation and operational costs</u>

- Each module is equipped with an MPPT[*4] control function, which maximizes the overall output of the system during normal operation even when the effectiveness of certain solar panel areas is compromised due to cloudy weather or the system is located in a non-flat mountainous region. Additionally, in the event of inverter malfunction, other sound inverters will ensure continuous operation to minimize reduction in overall system power reduction.
- Maximizes annual power output[*5] by realizing rated power of 100% up to a surrounding temperature of 50°C.
- Standardized inverter hardware for solar power generating systems and ESS, as well as spare parts.
- Use of reliable, long-life parts enhances reliability.
- Reduced installation costs by achieving one of the world's smallest installation areas.
- Reduced introduction and running costs through an outdoor ventilation cooling system.

TMEIC will exhibit the newly developed inverter at Intersolar Europe 2019, one of the world's biggest tradeshows held exclusively for PV-related markets, from May 15 in Munich, Germany. Please be sure to visit the TMEIC booth if you come to the exhibition.

*1 As of May 2019, based on TMEIC investigation. Refers to maximum efficiency, excluding auxiliary power consumption.
*2 Also in compliance with other international standards including IEEE1547 and National Electrical Code.
*3 Certain environmental conditions such as specifications to counter salt-air damage can be handled on an optional basis.
*4 MPPT (Maximum Power Point Tracking): Operational control method that maximizes the output capacity of the inverter.
*5 Based on conditions in which the surrounding temperature is 50℃.

≪Exterior of New Inverter and PV System≫

✧ Image of single unit capacity of 5.5MW (a structure of 920kW x 6 units)

✧ System Example of 22MW AC Station

Specification of New Inverter

(1) Inverter for Solar Power Generation System

		PVU-L0800ER PVU-L0800GR	PVU-L0840ER PVU-L0840GR	PVU-L0880ER PVU-L0880GR	PVU-L0920ER PVU-L0920GR
Output Side (AC)	Rated Power@25℃	800kW / 800kVA	840kW / 840kVA	880kW / 880kVA	920kW / 920kVA
	Rated Power@50℃	730kW / 730kVA	765kW / 765kVA	800kW / 800kVA	840kW / 840kVA
	Rated Voltage	600V (+10%, -12%)	630V (+10%, -12%)	660V (+10%, -12%)	690V (+10%, -12%)
	Rated Frequency	50Hz / 60Hz			
	Rated Current	702Arms @50℃			
	Maximum Current	770Arms @25℃			
Input Side (DC)	Maximum Power	816kWp @ 98% Efficiency	857kWp @ 98% Efficiency	898kWp @ 98% Efficiency	939kWp @ 98% Efficiency
	Maximum Voltage	1500Vdc			
	MPPT Operation Range	875 ~ 1300Vdc	915 ~ 1300Vdc	960 ~ 1300Vdc	1005 ~ 1300Vdc
Maximum Efficiency		99.1% (*6)			
Inverter Dimensions (H X W X D)		2000 X 1100 X 1100 mm			
Floor Space (W x D)		1.21m2			
Weight		<1000kg			
Enclosure Protection Ratings		IP 55/ NEMA 3R			
Installation		Outdoor			
Ambient Temperature Range		-25 ～ 50℃			
Maximum Altitude		2000m >2000m power derating (Max.4000m)			
AC Protection		Fuses			
DC Protection		Fuses			
Communication Type		Modbus TCP			
Standards Compliance		UL1741, UL1741-SA / IEEE1547 / National Electrical Code IEC62109-1,2 / IEC61000-6-2,4 / IEC61727, IEC62116 / IEC61400-21, BDEW / IEC61683 / IEC60068			
Standard Number of Input		6 (Maximum 8 per Inverter)			
		Each input rating is a maximum of 400A			
Harmonic Distortion of AC Current		≦3% THD (at rated power)			
Standard Control Power Supply		Control Power Supply from Inverter output and Capacitor backup circuit (3sec. compensation)			
Maximum Line Up		Up to total 6 panels			

*6 Without auxiliary power consumption.

(2) Energy Storage System

		BSU-L0640ER BSU-L0640GR	BSU-L0800ER BSU-L0800GR	BSU-L0840ER BSU-L0840GR
Output Side (AC)	Rated Power	640kW / 640kVA	800kW / 800kVA	840kW / 840kVA
	Rated Voltage	480V (+10%, -12%)	600V (+10%, -12%)	630V (+10%, -12%)
	Rated Frequency	50Hz / 60Hz (+0.5Hz, -07.Hz)		
	Rated Current	702Arms @50℃		
	Maximum Current	770Arms @25℃		
Input Side (DC)	Maximum Power	653kWp @ 98% Efficiency	816kWp @ 98% Efficiency	857kWp @ 98% Efficiency
	DC Voltage Range	710 ~ 1300Vdc	875 ~ 1300Vdc	915 ~ 1300Vdc
Maximum Efficiency		99.1% (*7)		
Inverter Dimensions (H X W X D)		2000 X 1100 X 1100 mm		
Floor Space (W x D)		1.21m2		
Weight		<1000kg		
Enclosure Protection Ratings		IP55 / NEMA3R		
Installation		Outdoor		
Ambient Temperature Range		-25 ~ 50℃		
Maximum Altitude		2000m >2000m power derating (Max.4000m)		
AC Protection		Fuses		
DC Protection		Fuses		
Communication Type		Modbus TCP		
Standards Compliance		UL1741, UL1741-SA / IEEE1547 / National Electrical Code IEC62477-1 / IEC61000-6-2,4 / IEC61727, IEC62116 / IEC61400-21, BDEW / IEC60068		
Standard Number of Input		1		
Standard Control Power Supply		Control Power Supply from Inverter output and Capacitor backup circuit		

∗7 Without auxiliary power consumption.

Media inquiries:

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In order to respond to the needs of manufacturing sites that serve as a foundation for supporting society, TMEIC always sets its eyes on the future of industry, society and the environment as an industrial systems integrator striking a balance between the development of society and a beautiful global environment. TMEIC will contribute to manufacturing and environmental management through leading-edge technologies based on its core technologies of rotating machinery, power electronics and engineering.