



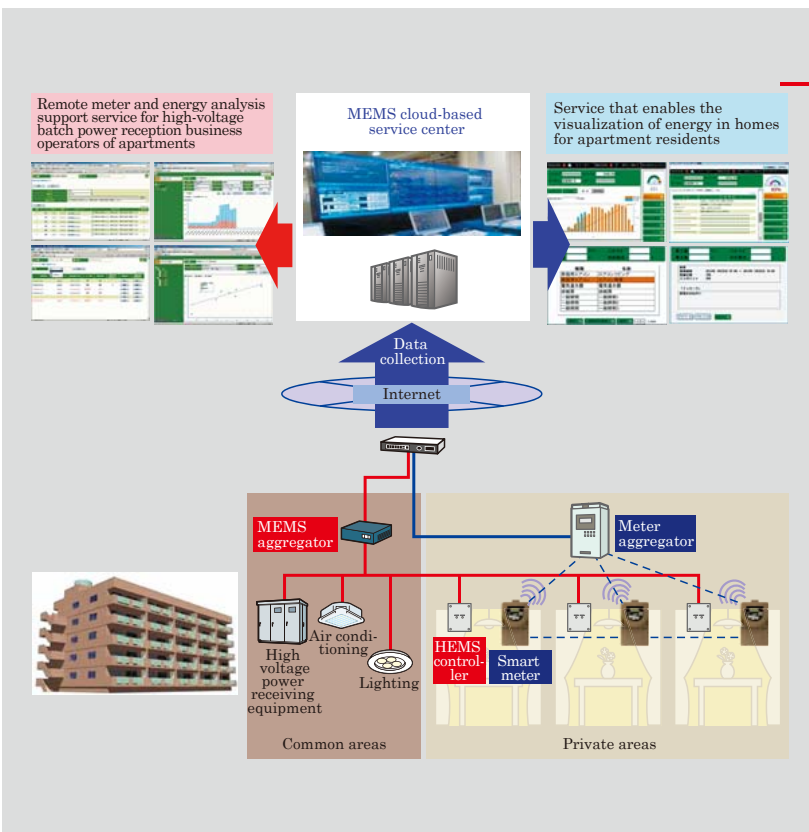
Indoor Stand-Alone Power Conditioner for Photovoltaic Power Generation “PVI1000-3/660”

Fuji Electric is developing power conditioners (PCSs) for large-scale photovoltaic power plants (mega solar plants) whose Japanese market is expanding, and expanding its sales in the market.

The maximum direct current inlet voltage of this indoor stand-alone PCS for photovoltaic power generation “PVI1000-3/660” is 1,000 V, and the capacity of a single unit is 660 kW. With a three-level insulated gate bipolar transistor (IGBT) module, it has achieved a maximum efficiency of 98.4%.

The main features are as follows:

- (1) With the enhanced efficiency of PCSs, the unit size is the same as conventional systems with a capacity of 500 kW.
- (2) Three units of this PCS can comprise a power plant with a capacity of less than 2 MW, which is exempt from rating as an extra-high voltage interconnection facility, and can reduce the cost for power distribution wiring work, etc.
- (3) Even when the output load power factor is set at 0.8, this system can ensure an output of 500 kW or more.

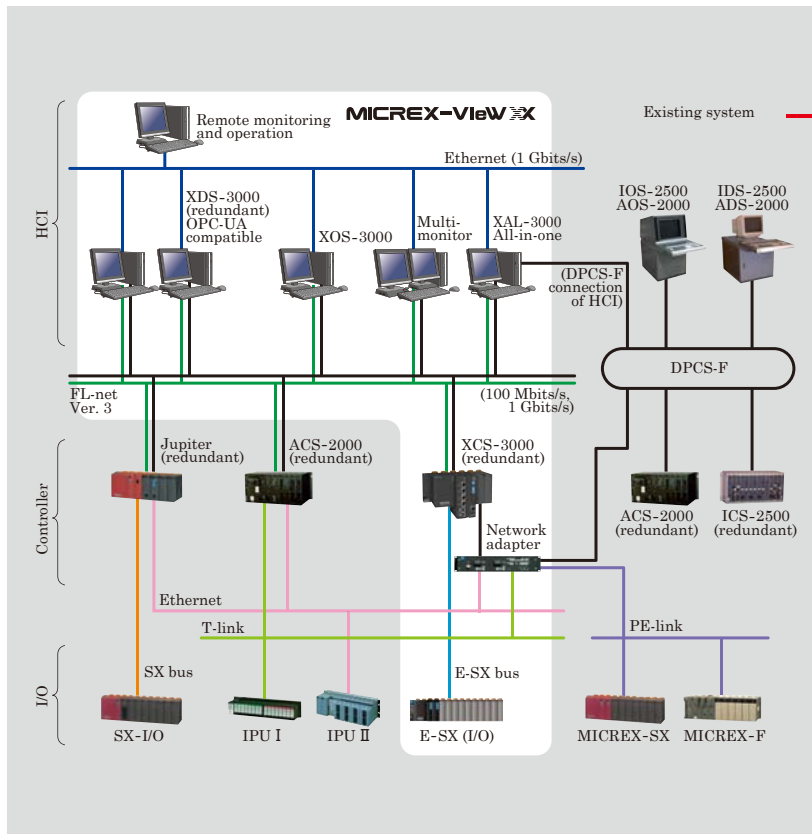


Cloud Type MEMS for Smart Apartments

We have completed the development of a cloud-based apartment building energy management system (MEMS) that meets the requirement functions of the Ministry of Economy, Trade and Industry’s “Promotion Project for the Accelerated Introduction of Smart Apartments.”

This system proposes a service that enables the visualization of energy in homes for apartment residents, as well as provides remote meter and energy analysis support service for high-voltage batch power reception business operators of apartments. The apartment residents can use Web services to view the energy use situations in their homes respectively using a variety of devices such as smartphones, tablets, and personal computers based on the collected electricity, gas and water usage data in private and common areas of the apartment through a smart meter and home energy management system (HEMS) controller.

Furthermore, in the future we plan to offer a remote control function for home appliances in conformity with the ECHONET Lite standards for apartment residents.



Small- and Medium-Scale Monitoring and Control System “MICREX-VieW XX”

Fuji Electric has developed the new small- and medium-scale monitoring and control system “MICREX-VieW XX,” which integrates instrumentation and control with electrical control. This system combines the highly reliable technology based on our extensive track record of delivery of monitoring control systems with the high-speed and high-precision control technology cultivated in the factory automation field. The system maintains compatibility with existing systems and provides advanced operation functions and engineering functions.

The main features are as follows:

- (1) High operability via an innovative human communication interface (HCI) architecture
- (2) High scalability and highly-efficient engineering via a TAG/variable database that integrates the whole system
- (3) Highly reliable system capable of duplicating individual component such as the controller, network, I/O and HCI
- (4) It supports inheritance with the equipment assets and software assets of customers through high compatibility with existing systems



Energy-Saving Hybrid Air Conditioner Utilizing Indirect Outside Air “F-COOL NEO”

In recent years, the heat generated by data centers has dramatically increased due to the high performance and high density of servers. Therefore, in an effort to save energy, outside air cooling systems have been progressing as systems that use the natural energy of cool outside air. Fuji Electric has developed the “F-COOL NEO” indirect outside type air conditioner that only utilizes cool outside air cold energy through a heat exchanger without incorporating any outside air directly.

The main features are as follows:

- (1) Energy saving operation is possible at a rated cooling capacity (40 kW) throughout the year by combining the operation of an outside air conditioner and built-in refrigeration unit, and as a result, yearly power consumption has been reduced to one-third of that of general air conditioning systems.
- (2) Indirect outside air usage is less susceptible to moisture, dusts such as PM2.5 and corrosive substances contained in outside air.
- (3) Power supply is the only required utility. No cooling water or cold water is required.



Japanese Top Runner Standard Compliant MOLTRA “FM-T14”

Against the background of measures to prevent global warming, the second-order Top Runner Standards have been introduced starting from FY2014 for cast resin transformers as specified equipment under the “Act on the Rational Use of Energy” (Energy Conservation Act). Fuji Electric has taken the lead in meeting these requirements by offering a full lineup in its Top Runner MOLTRA 2014 “FM-T14” in June 2013.

The unit was designed to provide reductions in power consumption and energy savings by widely improving the energy consumption efficiency (40% reduction compared with conventional products) through techniques such as optimizing the winding design and adopting magnetic domain control material for the iron core. This has enabled us to suppress CO₂ emissions and electricity costs. The winding structures carries on the tradition of conventional products by employing a vacuum cast molding technology and sheet winding, while also ensuring high insulation reliability. Furthermore, users find this product easy to use and it was designed with consideration given to replacement, by means of greatly improving earthquake resistance, reducing noise (-10 dB compared with conventional products) and having the same floor area dimensions as first-order standard products.

Remote touch panel with USB

USB connection

RS-485 connection

FRENIC-Ace

Logic design with PC

Download of Configured logic

Motion pattern example

Operation examples (Traverse motion device of spinning machinery)

[FWD] OFF ON

[X1] OFF ON

[Y1] OFF ON

[Y2] OFF ON

General-Purpose Inverter “FRENIC-Ace Series”

Fuji Electric has developed the general-purpose inverter “FRENIC-Ace Series” which features the customizable logic function for factory equipment and motor drives such as process machinery.

The main features are as follows:

- (1) Capacity series
 - 3-phase 200 V class: 0.4 to 22 kW
 - 3-phase 400 V class: 0.4 to 220 kW
- (2) Customizable logic function
 - Number of program steps: 200 steps
 - Number of program commands: 55 commands
 - Programming method: Dedicated visual programming tool
 - Application examples: Wire drawing machine, Hoist crane, Traverse motion device of spinning machinery



Stack-Type Inverter “FRENIC-VG Series” (690 V Series)

In recent years, large-scale facilities and equipment such as steel plants and floating cranes have come to require inverters with large capacity, fast response and high accuracy. At the same time, easier maintenance for installation and replacement as well as smaller footprints is required. In FY2012, in order to meet these needs, we launched the stack-type 400 V series as part of the “FRENIC-VG Series” lineup that provides the best performance in the industry.

The 690 V series, which is advantageous to achieve larger capacity, was added to the stack-type lineup this time to expand the Series.

The main features are as follows:

- (1) It adopted a hybrid module with SiC-SBD and Si-IGBT by using silicon carbide (SiC) to reduce the size and expand the capacity of a single unit (450 kW max).
- (2) The width of the stack is unified to 220 mm to make a thin structure.
- (3) It has achieved large capacity by using direct parallel connection.



Large-Capacity UPS “7000HX-T4”

For backup power supplies in data centers, uninterruptible power supplies (UPS) with high reliability and high efficiency are required. This time, we have developed “7000HX-T4” as a large-capacity UPS for overseas. This UPS utilizes the three-level power conversion method with reverse-blocking insulated gate bipolar transistor (RB-IGBT) that is distinctive to Fuji Electric to improve efficiency. It adopts continuous inverter supply that is compatible with the 3-phase, 4-wire type of 400 V power supply that is the mainstream in various places in the world including Asia.

The main features are as follows:

- (1) It achieves the world's highest equipment efficiency level of 96.5% and helps reduce the power consumption and the running cost, including air conditioners.
- (2) Its footprint is over 30% smaller than conventional products and it helps increase the space available for installing servers.
- (3) The output capacity of a single unit is 500 kVA/450 kW and up to 8 units can be connected in parallel for a large capacity (4,000 kVA).



Emergency Stop Pushbutton Switches ($\phi 22$ and $\phi 30$)

Fuji Electric has brought emergency stop pushbutton switches to the market that can be installed in either $\phi 22$ or $\phi 30$ mounting hole on a panel. To respond to a growing market need for safety in recent years, we have developed a new series having “Synchro Safe Contact” and expanded the lineup.

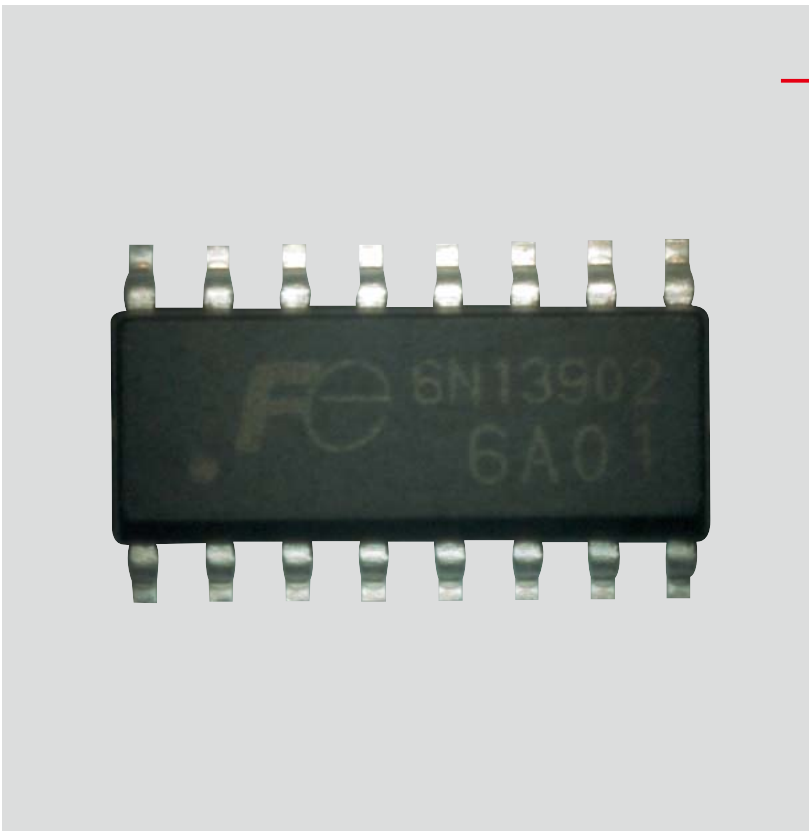
The main features are as follows:

- (1) Structure enabling to attach or detach operator and contact block

When the contact block is detached from the operator, the NC contact opens with a proprietary mechanism and it switches to safe mode. There can be up to six contacts: up to four for NC contacts and up to two for NO contacts.

- (2) Obtained overseas safety standard certificates:

- CCC (GB14048-5)
- IEC (EN60947-5-1, EN60947-5-5)
- C-UL (UL508, CSA C22.2)



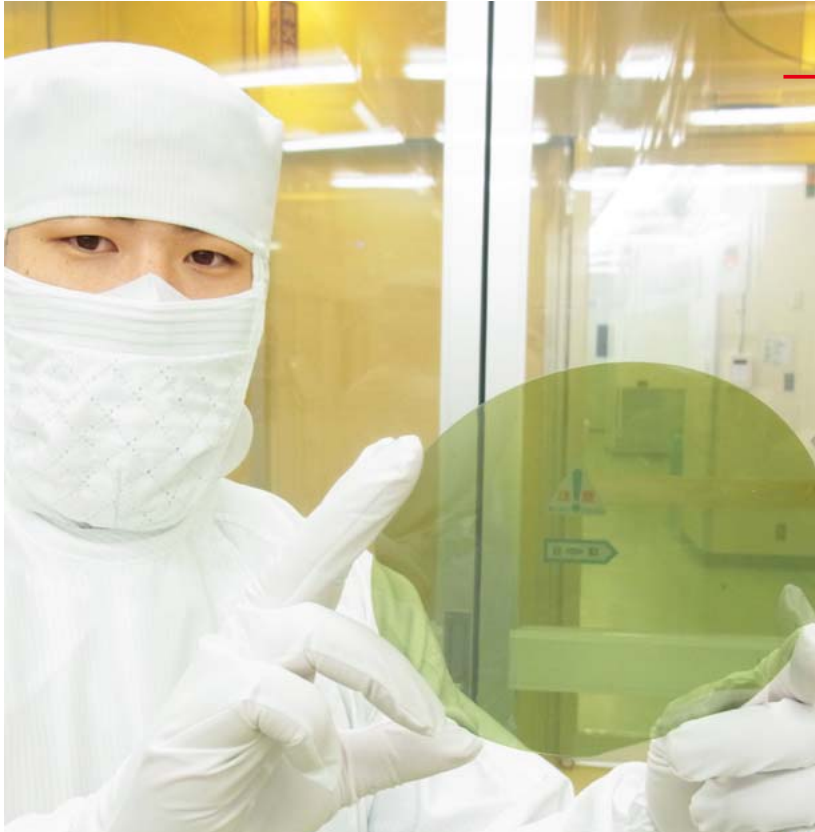
The 2nd-Generation LLC Current Resonant Control IC “FA6A00N Series”

For switching power supplies used in medium-capacity electronics equipment with a power consumption of around 100 to 500 W, LLC current resonant circuits are attracting attention because they are advantageous in terms of efficiency improvement, noise reduction and profile lowering.

Fuji Electric commercialized a 1st-generation LLC current resonant control IC “FA5760N” that prevents a switching shoot-through phenomenon which is a disadvantage of LLC current resonant circuits and that has achieved lower standby power. Now we have developed the 2nd-generation LLC current resonant control IC “FA6A00N Series” that will further improve the device’s properties, offer more sufficient protection functions and provide higher quality.

The main features are as follows:

- (1) Built-in 600 V withstand voltage start-up device and 630 V withstand voltage driver circuit
- (2) Low power dissipation burst control for further reduction of standby power
- (3) Primary side over-load protection function using auxiliary winding voltage
- (4) Over-current protection with enhanced design flexibility



Starting Mass Production of SiC-SBD Chips in 6-inch Manufacturing Line

In recent years, silicon carbide (SiC) has come to raise expectations as the next-generation semiconductor material. SiC-Schottky barrier diode (SiC-SBD), in particular, has characteristics including an ability to greatly reduce switching loss compared with Si diode, and has already been put to practical use. Fuji Electric has commercialized hybrid modules combining 600 V- or 1,200 V-class SiC-SBD and Si-insulated gate bipolar transistor (Si-IGBT).

To cope with the trend of larger-diameter SiC wafers, Fuji Electric has built a 6-inch manufacturing line and started the mass production and supply of SiC-SBD chips. In this product, we could achieve a Schottky barrier junction of stable quality by optimizing the manufacturing conditions, and succeeded in reducing the reverse-recovery loss by about 70% while maintaining a forward loss that was almost the same as the conventional Si diode.



Vending Machines with IEC Standard Compliant Glass Front "Twistar"

As the consumer markets continue to grow in Asian countries, the market for vending machines is expected to see a steady expansion in line with rising beverage unit prices and the increase in consumers' disposable income.

Given this, we have developed a vending machine with IEC-standard-compliant glass front "Twistar," ready for overseas production and local specification.

The main features are as follows:

- (1) The control unit adopts a specialized currency multi-interface added to the basic features, compatible with the currencies of 10 ASEAN countries.
- (2) A single piece of software can handle the communication specifications of VTS and MDB.
- (3) Two vending mechanisms have been developed: the twist type which is adaptable to diverse beverage container forms, and the screw type, which is able to handle packed snacks and small food items.

The vending mechanisms can be replaced easily on site, enabling sales of a diverse range of products appropriate to the location.



Next-Generation Cold Storage Container “D-BOX”

It is a significant challenge for the food and beverage distribution business to maintain product quality throughout the supply chain.

Fuji Electric has developed the next-generation cold storage container “D-BOX,” which can highly control thermal energy and the internal temperature, throughout the logistical stages to maintain freshness in food and beverage distribution.

The main features are as follows:

- (1) The unique cooling unit can conduct rapid refrigeration and enables complete cold storage in a short period (3hours).
- (2) The high-efficiency insulation technology used in vending machines enable chilled storage for a long period (5hours) without power supply.
- (3) The data on internal temperature and unit door open/close operation during transit can be recorded.



Steam Generating Heat Pump System Utilizing Waste Heat from Factories

Hot water below 100°C sent to drain from factories has been regarded as low-grade thermal energy and has not been reutilized so far. Fuji Electric has developed a steam generating heat pump system that recovers waste heat from hot water and deliver steam as useful heat. Field test of this system is taking place at the Mie factory.

The main features are as follows:

- (1) The coefficient of performance (COP) 4.0, which is the industry-leading level of performance, has been achieved through applying the refrigerating cycle technology nurtured in the development of vending machines.
- (2) Saturated steam of 120°C is generated from the waste heat source—hot water of 60°C to 80°C.
- (3) This is a small-capacity system that can be installed in various locations close to a steam utilization facility. It reduces the heat loss from long distance piping to improve energy-saving properties.



Aerosol Multi-Analysis Technology

Fuji Electric is working on the research and development of an aerosol multi-analysis instrument capable of component analysis of particulate matter (aerosol). This analysis instrument is intended for measuring PM 2.5 (aerosol with a particle diameter of 2.5 μm or less) which is suspected of having an impact on health. By combining optical measurement techniques and mass spectrometric analysis, it can simultaneously measure the mass concentration of PM 2.5 and of some main components such as black carbon or sulfate. The component analysis which took 8 to 12 hours by manual work can now be conducted in real time. We have completed the development of elemental technologies so far and are working toward putting them to practical use in FY2015.

The development of elemental technologies was a joint work with the University of Tokyo and the Japan Agency for Marine-Earth Science and Technology on consignment from the Japan Science and Technology Agency.





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