

An aerial night view of a city, likely New York City, with a glowing blue grid overlay representing a smart grid or infrastructure network. The grid lines are bright blue and connect various points across the city, highlighting the interconnectedness of the infrastructure. The city lights are visible in the background, and the overall scene is dark with the blue grid providing a futuristic feel.

SIEMENS

www.siemens.com/transformersubstations

Investment into the future

Intelligent transformer substations from Siemens

Answers for infrastructure and cities.



Intelligent transformer substations from Siemens

Medium-voltage and low-voltage systems change due to the increasing integration of decentralized renewable power supplies and the emerging electromobility trend in the public transport sector.

While the increasing need for load capacity can be provided by means of system expansion, the effects due to alternating direction of power flow, load fluctuations and voltage range limitation can only be handled with intelligent solutions.

Intelligent transformer substations from Siemens offer the optimum solution concept:

- Compact, communicative medium-voltage switchgear
- Distribution transformer, regulated on the low voltage side
- Integrated telecontrol and automation solution

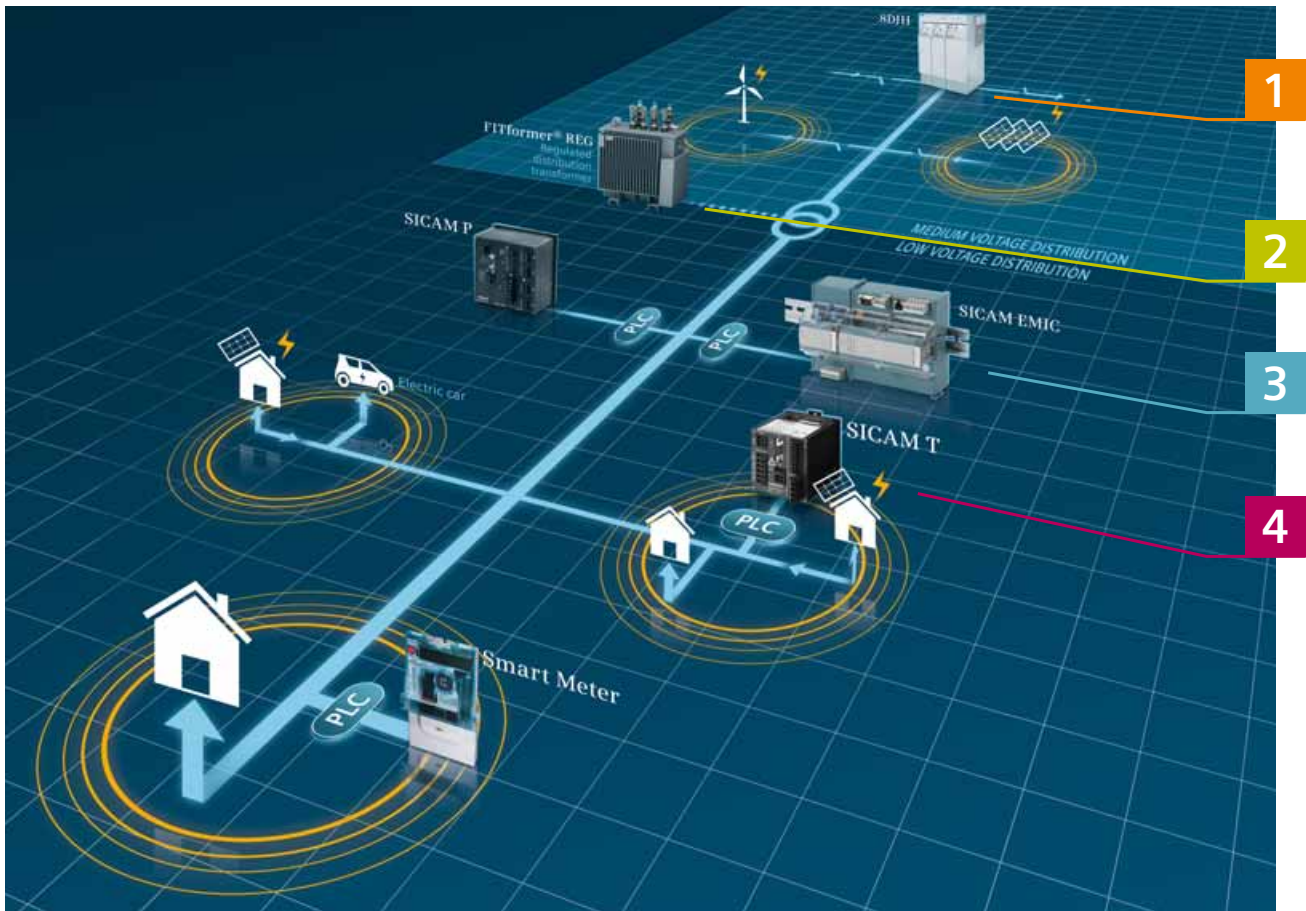


A system that secures investments well into the future

Intelligent transformer substation: the synaptic link within the network

Transformer substations are located at the neuralgic points of the medium-voltage distribution system, forming the point of transition to the low-voltage power distribution. Thus, they are the ideal point for monitoring and controlling both the medium-voltage and the low-voltage system. Our modern, future-oriented products and systems, such as 8DJH and 8DJH 36, FITformer REG and SICAM enable the integration of renewable energy sources and e-mobility already today.

SICAM EMIC is a control unit which not only controls the regulated distribution transformer based on measured values from the process, but also calculates setpoint values for decentralized generators. The existing structure of the distribution system can also be used for communication tasks. Thus, optimum concepts can be set up via Power Line Carrier.





Gas-insulated medium-voltage switchgear

The gas-insulated medium-voltage switchgear types 8DJH and 8DJH 36 from Siemens provide a solid foundation for applications in intelligent transformer substations.

These switchgear types fulfill all of the preconditions for integration into an intelligent network infrastructure.

The following functions can be selected:

- Motor operating mechanisms
- Intelligent short-circuit / earth-fault direction indicators
- Auxiliary switches for different status messages (e.g. switch position, gas pressure, etc.)
- Simple protection systems
- Capacitive voltage detecting systems
- Conventional current and voltage transformers or modern sensors

These components can also be easily and quickly retrofitted at a later time.

The switchgear also offers the following advantages:

- Insensitive to climate and ambient conditions
- Maintenance-free
- Compact design
- Safety for operating personnel
- Cost-efficient
- Reliable and safe operation



8DJH switchgear for secondary distribution systems up to 24 kV



8DJH 36 switchgear for secondary distribution systems up to 36 kV





FITformer® REG – the flexible distribution transformer

The voltage ratio of the FITformer® REG regulated distribution transformer from Siemens can be altered under load. These adjustments are possible due to the three-step low-voltage load regulation range of the transformer. With this transformer, energy suppliers can guarantee a supply voltage within the tolerance limits as well as comply with the EN 50160 standard.



The system voltage may vary considerably due to different operating states. At peak load, for example, the voltage without decentralized power supply deviates considerably from the voltage at light load with maximum decentralized power supply. While voltages are clearly higher during high power supply, they decrease at peak load.

It poses a great challenge for system operators to regulate the maximum voltage difference (Δu) between the peak and light load demand at a single node with the power feed from photovoltaic installations. With photovoltaic installations, for example, this difference is comparatively high (Fig. 1).

In this example, the distribution transformer FITformer® REG adjusts the voltage at the power supply node up or down, thus reducing the voltage difference Δu (Fig. 2).

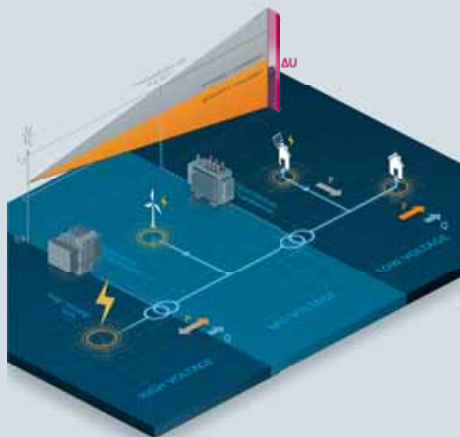


Fig. 1

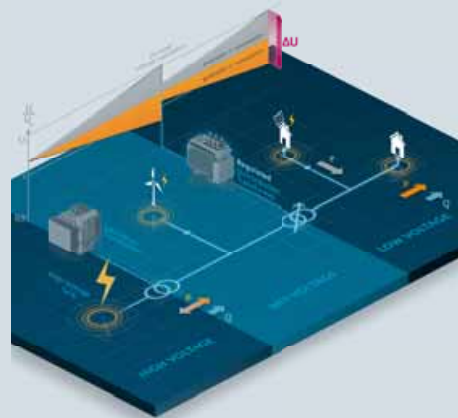


Fig. 2





The smart automation system for intelligent transformer substations

SICAM EMIC in action

Thanks to its compact size SICAM EMIC is optimally designed for applications in transformer substations. It is used as an easy to handle automation system for transformer substations. Typical standard protocols enable data exchange with a control center.

SICAM EMIC is a modular system. It enables the integration of different input and output modules to the needs of the required extent of signals. Information from the low-voltage distribution system, for example, can be integrated via MODBUS RTU. SICAM EMIC features most diverse algorithms for regulated distribution transformers. Therefore, the automation system is particularly suitable for application in transformer substations. Freely programmable user programs for local control and interlocking tasks complete the versatility of SICAM EMIC.

SICAM T measures what's relevant

The increasing integration of renewable energy sources into low-voltage systems requires increasingly accurate monitoring of the voltage range and other power quality criteria.

The SICAM T digital measurement transducer is designed for direct use in transformer substations and in line sections of low-voltage distribution systems.

SICAM T records all electrical measurement values that are relevant assessing the power supply system as well as the regulation of the distribution transformer. Therefore, the SICAM T digital measurement transducer is the optimum supplement to SICAM EMIC.

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SICAM EMIC

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SICAM T





Advantages at a glance

8DJH and 8DJH 36

- Up to 17.5 kV, 25 kA
- 24 kV, 20 kA
- 36 kV, 20 kA
- 630 A busbar, feeders up to 630 A
- Factory-assembled, type-tested switchgear according to IEC 62271-200
- Metal-enclosed
- Gas-insulated, sealed for life
- Flexible due to modularity and block configuration

SICAM EMIC

- Compact automation, regulation and telecontrol system
- High EMC resistance and robust design for rough environmental requirements
- Integrated remote maintenance, remote diagnostics and remote parameterizing
- Simple configuration via integrated web server and user-friendly SICAM TOOLBOX II
- Direct connection of the process cables

FITformer® REG – regulated distribution transformer

- Range of ratings up to 630 kVA; highest voltage for equipment: 36 kV
- Low-voltage load regulation range in three steps
- Operational characteristics and dimensions correspond to those of common distribution transformers
- Additional setting range on the high-voltage side for optimum operation

SICAM T

- Compact measuring unit for up to 60 electrical values
- High accuracy (0.2%)
- 400 V direct connection
- Fast analog outputs for regulator activation
- Simple integration of communication

An intelligent transformer substation is the key to an efficient Smart Grid

- Simple upgrading of existing network infrastructure
- Integration of volatile renewable power sources
- Continuous monitoring of network conditions
- Reduced outage times due to fast fault location
- Maximum utilization of network capabilities via controlled load flow



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Siemens AG
Wittelsbacherplatz 2
80333 Munich, Germany

Siemens AG
Infrastructure & Cities Sector
Low and Medium Voltage Division
Medium Voltage
Postfach 3240
91050 Erlangen, Germany
www.siemens.com/transformersubstations

For more information, please contact our
Customer Support Center.

Phone: +49 180 524 70 00

Fax: +49 180 524 24 71

(Charges depending on provider)

E-Mail: support.ic@siemens.com

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