

# Future Distribution Substation with Integrated IoT Connection





# Information on operation

## Medium voltage

Medium voltage intro

8DJH

8DJH Compact

8DJH 36

8DJH 12 – blue GIS

Transformer

Low voltage

Remote terminal unit

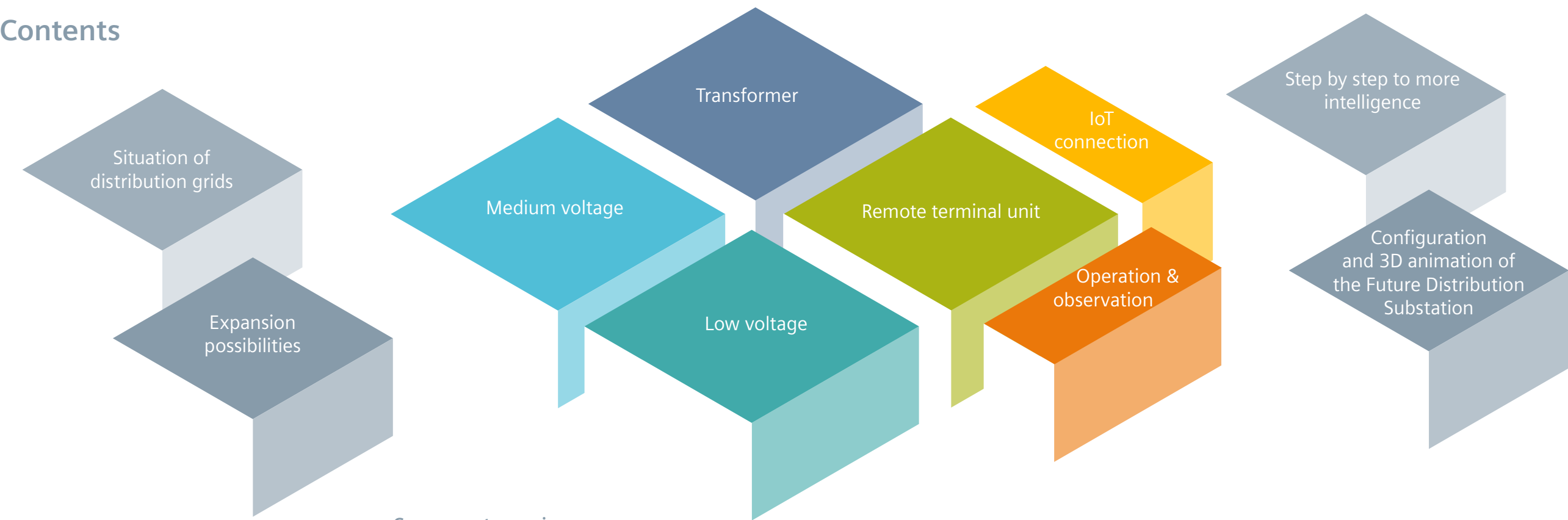
IoT connection

Operation & observation

**Note:**  
You will obtain the comprehensive functionality of the iPDF by using Acrobat Reader or the Chrome browser. For the iPad, the free PDF Viewer version 3.4 from PSPDFKit is suitable.

 [Link to product website](#)

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## Situation of distribution grids

Medium-voltage and low-voltage grids have to face changes due to the increasing integration of decentralized infeeds of renewable energy and the upcoming electromobility in individual transport.

While the increasingly required connection capacity can also be provided by means of grid expansion, the effects due to alternating direction of power flow, load fluctuations, and voltage range limitation can only be handled with intelligent solutions.

The Future Distribution Substation from Siemens with integrated IoT connection is the Siemens solution for upgrading your distribution grid for the challenges of energy change. Digitalization, decarbonization, decentralization, and the increasing demand of energy are in the focus.

### Digitalization

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1101000010
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1101100010
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### Decarbonization



### Decentralization



### Demand of Energy



## Future Distribution Substation

- Future-proof functionality, consequently optimized in terms of environmental friendliness and saving of space
- High efficiency and low operating costs
- Modularity and flexibility of the components
- Effective grid and asset management
- Monitoring and ensuring the power quality
- Eco-efficient ring-main unit and distribution transformer
- IoT connection
- Standardized IEC communication protocols
- Sensor systems and apps for condition monitoring and distribution grid automation
- Innovative low-voltage components





## Expansion possibilities

# The intelligent transformer substation stands for future-proof power distribution



In the first level, the focus is on transformer substation monitoring, in order to allow for a fast fault localization and to reach a higher availability. However, travel time to the transformer substations is still necessary to eliminate the fault, preventing a substantial reduction of the downtimes.

Today, typical downtimes of transformer substations are in the range of hours, as the maintenance teams must identify the fault location in the affected ring on site, drive to the individual transformer substation, and isolate the fault.

The application of short-circuit or earth-fault direction indicators only represents an improvement for a fast fault localization.

The second level provides a further reduction of time by using remote terminal units, with characteristics especially tailored for this task.

In combination with motor operating mechanisms in the medium-voltage switchgear, downtimes can be reduced from hours to several minutes thanks to the possibility of remote control.

The aim of the third level is to counteract these effects by means of control and regulation algorithms, and to adhere to the allowed limits of the distribution grid again.

## Always well supplied – The Future Distribution Substation from Siemens as the perfect solution concept.

The intelligent transformer substation enables effective monitoring and control of your distribution grids. With the optimized grid management in automated IT systems, you will be able to flexibly adjust your distribution grid, thus counteracting costly grid expansions. You will work cost-efficiently in the system development and during later operation.



## Component overview

Medium voltage

Transformer

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Remote terminal unit

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### Medium voltage

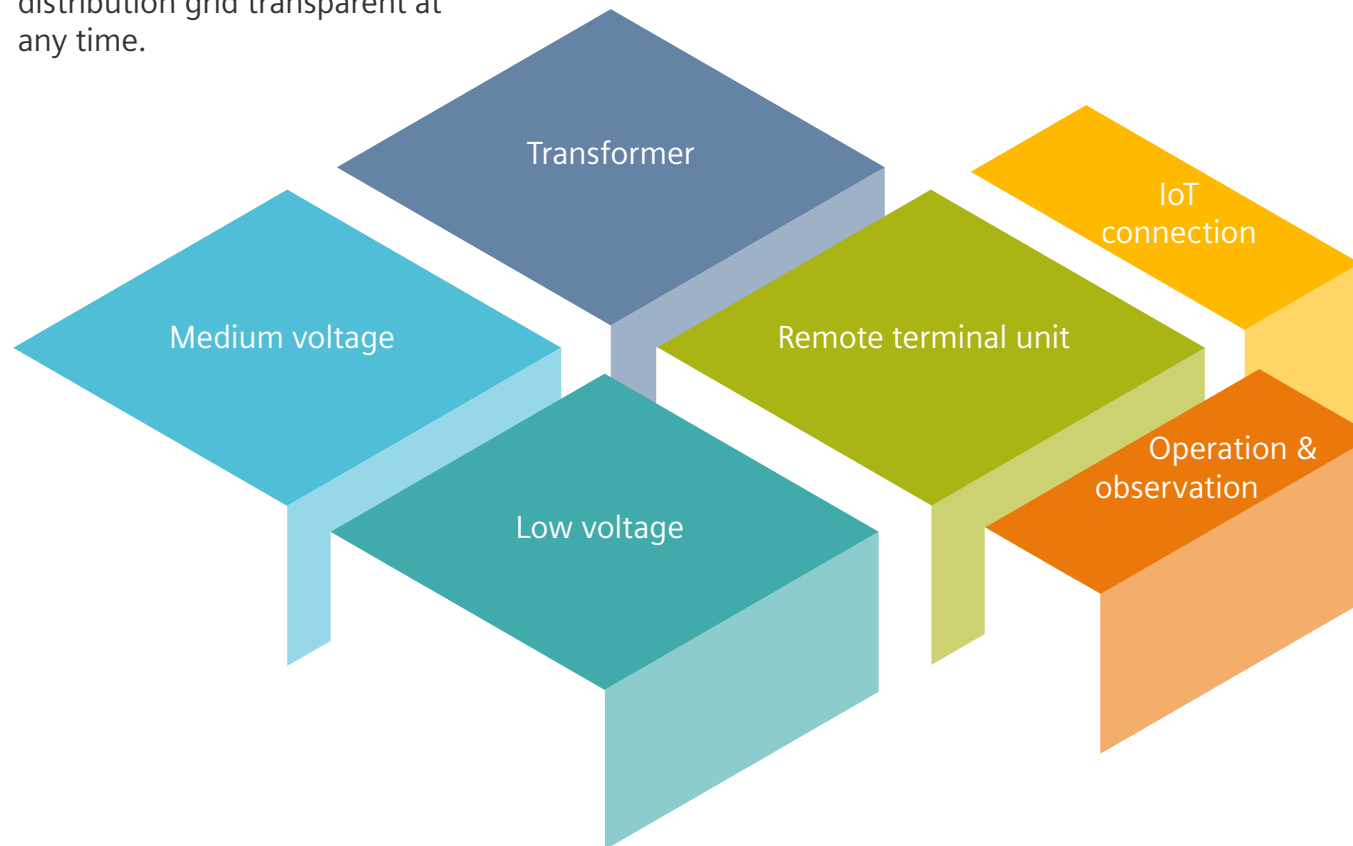
Thanks to the use of intelligent short-circuit indicators and sensors, medium-voltage switchgear of the 8DJH family become data suppliers to make the condition of the distribution grid transparent at any time.

### Transformer

Monitor the state of your digital transformer (Sensformer®) – from everywhere and at any time – and optimize the operating procedure.

### Remote terminal unit

The cost-efficient and versatile solution for monitoring, control, and automation of the complete Future Distribution Substation.



### Low voltage

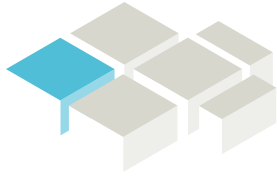
Apart from the low-voltage components of the protection systems, power monitoring plays an important part as well. It provides more transparency across all energy data for standard-conforming monitoring, evaluation, and control.

### IoT connection

Digitalization allows for the cloud-based analysis of assets, power quality problems, grid anomalies, and outages.

### Operation & observation

SICAM SCC Compact, optimized HMI system for small to medium-sized distribution substations.



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### Transformer

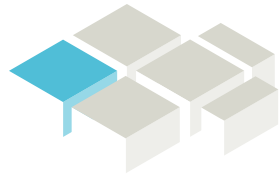
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## Medium voltage intro

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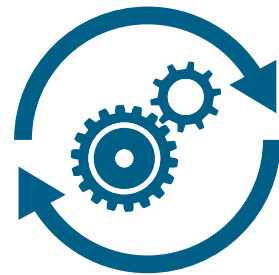
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#### Reliable

For more than 30 years, gas-insulated medium-voltage switchgear from Siemens has decisively contributed to sustainably ensure the power supply. Here, the switchgear assemblies of the 8DJH family provide the basis for the applications in Future Distribution Substations. From a mere block-type switchgear up to individual modular panels, the 8DJH family leaves little to be desired in order to implement specific switchgear configurations.



#### Safe

The switchgear assemblies of the 8DJH family are environmentally independent. Hermetically tight, welded switchgear vessels made of stainless steel, as well as single-pole solid insulation make the parts of the primary circuit under high voltage of 8DJH switchgear insensitive to certain aggressive ambient conditions such as saline air, air humidity, dust, and condensation. All switchgear assemblies are tested for resistance to internal faults, featuring a high level of operational reliability and personal safety.



#### Cost-efficient

Wherever space capacity, extensibility, and a maintenance-free design play an important part, gas-insulated switchgear from Siemens offers the right technology for every application. Siemens stands out due to climate-independent, durable, and maintenance-free switchgear.



#### Intelligent

The switchgear fulfills all preconditions for integration in a smart grid infrastructure. It can be equipped with motor operating mechanisms, sensors for current and voltage measuring, voltage detecting and measuring devices, short-circuit indicators, such as the SICAM FCM and other detecting systems. RTUs (Remote Terminal Units) can optionally be integrated directly in the panels, in low-voltage compartments located on the panels, or in separate low-voltage compartments via a plug connection.



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8DJH

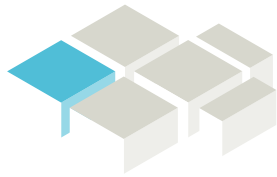
Gas-insulated switchgear for the secondary distribution level up to 24 kV

8DJH switchgear is a factory-assembled, type-tested, three-pole metal-enclosed single-busbar switchgear for indoor installation.

The one that fits all

8DJH switchgear is flexible with individual panels and efficient with panel blocks. These can be lined up and extended at will, without gas work on site.

Technical data		
Rated values up to	17.5 kV, 25 kA, 1 s	24 kV, 20 kA, 3 s
Rated frequency	50/60 Hz	50/60 Hz
Rated normal current – Busbar up to	630 A	630 A
Rated normal current – Feeders up to	630 A	630 A
Busbar	Single busbar	
Insulating medium	Gas-insulated	
Switchgear vessel	Hermetically enclosed	
Switchgear type	Factory-assembled, type-tested, metal-enclosed switchgear according to IEC 62271-200. Modular and extendable (option), panel blocks consisting of 2, 3, and 4 panels	
Internal arc classification (option)	IAC A FL/FLR 21 kA, 1 s	
Dimensions		
Block width dependent on number and type of panels	620 mm to 1720 mm	
Height (without low-voltage compartment)	Optionally 1200 mm, 1400 mm, or 1700 mm (each without low-voltage compartment)	
Height of low-voltage compartment	Optionally 200 mm, 400 mm, 600 mm, 900 mm	
Depth	775 mm	



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## 8DJH Compact

**Gas-insulated switchgear for secondary distribution grids up to 24 kV**

8DJH Compact switchgear is a factory-assembled, type-tested, three-pole metal-enclosed single-busbar switchgear for indoor installation.

### Maximum functionality on minimum space

Thanks to its compact dimensions, it can be easily installed in new transformer substations, and is the ideal retrofit switchgear for existing compact substations.

### Technical data

Rated values up to	17.5 kV, 25 kA, 1 s	24 kV, 20 kA, 3 s
Rated frequency	50/60 Hz	50/60 Hz
Busbar current up to	630 A	630 A
Feeder current up to	630 A	630 A
Busbar	Single busbar	
Insulation	Gas-insulated	
Switchgear vessel	Hermetically enclosed	
Switchgear type	Factory-assembled, type-tested, metal-enclosed switchgear according to IEC 62271-200. 3-, 4-, and 6-panel blocks	

### Classification according to IEC 62271-200

Partition class PM	PM	
Loss of service continuity category	LSC 2	
Accessibility to compartments	Busbar compartment:	non-accessible
	Switching-device compartment:	non-accessible
	Cable compartment:	interlock-controlled
Internal arc classification	IAC A F/FL/FLR 21 kA, 1 s	

### Dimensions

Block width dependent on number and type of panels	620 mm, 700 mm, 930 mm, 1010 mm, 1240 mm, 1400 mm
Panel height	Optionally 1400 mm or 1700 mm
Panel depth	775 mm





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## 8DJH 36

### Gas-insulated switchgear for the secondary distribution level up to 36 kV

8DJH 36 switchgear is a factory-assembled, type-tested, three-pole metal-enclosed single-busbar switchgear for indoor installation. Typical uses are public and industrial power grids of power supply companies, or wind power and solar power plants.

### Modular design

Depending on the respective application, extendable individual panels or blocks are available. Existing switchgear assemblies can be extended on site. During installation on site, no gas work is required.

### Technical data

Rated values up to	36 kV, 25 kA, 3 s
Rated frequency	50/60 Hz
Rated normal current – Busbar up to	630 A
Rated normal current – Feeders up to	630 A
Busbar	Single busbar
Insulating medium	Gas-insulated
Switchgear vessel	Hermetically enclosed
Switchgear type	Factory-assembled, type-tested, metal-enclosed switchgear according to IEC 62271-200. Modular and extendable (option), panel blocks consisting of 2, 3, and 4 panels
Internal arc classification (option)	IAC A FL/FLR 25 kA 1 s

### Dimensions

Feeder width	430 mm, 500 mm, 590 mm, 1100 mm
Block width dependent on number and type of panels	930 mm, 1020 mm, 1360 mm, 1450 mm
Height (without low-voltage compartment)	1600 mm
Height of low-voltage compartment	200 mm, 400 mm, 600 mm
Depth	920 mm, 1035 mm (with pressure relief duct at the rear)





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## 8DJH 12 – blue GIS

### Ring-main unit for the secondary distribution level up to 12 kV

With the use of the new insulating medium “Clean Air” – based on the components of pure ambient air – and the integration of components for condition monitoring and distribution grid automation, the gas-insulated medium-voltage switchgear 8DJH 12 – blue GIS is an innovation with far-reaching benefits.

### The innovation for medium-voltage switchgear

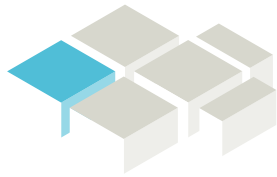
In this way, the new gas-insulated ring-main unit combines the sustainability of the “blue GIS” portfolio with the benefits of the proven 8DJH product family. The switchgear is used in public and industrial energy systems of the secondary distribution level. The medium-voltage switchgear can be controlled from remote, is communication-capable, and can be linked with IoT platforms such as MindSphere, the cloud-based, open IoT operating system from Siemens, and with other systems as well.

### Technical data

Rated values up to	7.2 kV, 20 kA, 1 s	12 kV, 20 kA, 1 s
Rated frequency	50 Hz	50 Hz
Rated normal current – Busbar up to	630 A	630 A
Rated normal current – Feeders up to	630 A	630 A
Busbar	Single busbar	
Insulating medium	Clean Air	
Switchgear vessel	Hermetically enclosed	
Switchgear type	Factory-assembled, type-tested, metal-enclosed switchgear according to IEC 62271-200. Modular and extendable (option)	
Internal arc classification (option)	IAC A FL/FLR 20 kA 1 s	

### Dimensions

Block width dependent on number and type of panels	1050 mm
Height (without low-voltage compartment)	1400 (optionally 1200 mm)
Height of low-voltage compartment	Optionally 200 mm, 400 mm, 600 mm
Depth	775 mm



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Technical data	
Operation	4 function keys
Display	Indication of the latest measured values or of fault information
Signaling	1 LED red – Fault: signals “fault detected in the grid” 1 LED yellow – Com: signals “active communication” 1 LED green – Run: signals SICAM FCM “in operation”
Voltage sensor inputs	3 × 100 V / $\sqrt{3}$ or low-power sensors 3.25 V / $\sqrt{3}$ (as per IEC 61869-11 and IEC 60044-7)
Current sensor inputs	3 × low-power sensors 225 mV at 300 A (as per IEC 61869-10 and IEC 60044-8) Alternative: current input L2 for sensitive earth-fault detection with low-power sensor 225 mV at 60 A (as per IEC 61869-10 and IEC 60044-8)
Communication	Interface RS485-Modbus RTU
Time synchronization	Modbus RTU
Auxiliary voltage	230 V AC, 24 – 250 V DC
Battery	2000 hours, service life > 15 years
Housing	Polycarbonate, for panel flush mounting
Temperature range	-40 °C to +70 °C
Protection class	IP40 (front)

Dimensions	
Width × height × depth	96 × 48 × 109.5 mm

## SICAM FCM

### SICAM FCM – The finger on the pulse of your distribution grid

SICAM FCM (Feeder Condition Monitor) is a short-circuit and earth-fault indicator with direction indication which uses protection algorithms and so-called low-power sensor technology according to IEC 61869-10/-11 and IEC 60044.

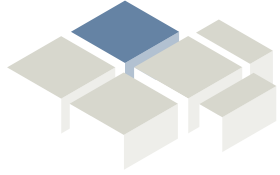
As an alternative, SICAM FCM can also be connected with a capacitive voltage tap enabling low-cost targeted fault detection in the cable network. SICAM FCM offers the additional option to provide up-to-date measured values via the integrated Modbus RTU interface, ensuring precise evaluation of the distribution grid.

### SICAM FCM – Benefits

- Comprehensive measuring and operational values
- Measuring accuracy 99.5% for voltage and current
- Usable in earthed, isolated, and resonance-earthed systems
- Integrated load flow direction indicator
- Correction factors for increasing the measuring accuracy
- Directional short-circuit and earth-fault detection
- Cost savings thanks to precise and fast fault localization
- Selective fault information with direction indication as a basis for “self-healing” applications
- Direct voltage measurement in the low-voltage network
- Remote parameterization / firmware update via SICAM A8000 and Modbus
- Phase-sequence voltage supervision

SICAM FCM is the first short-circuit indicator which uses sensors in line with the IEC 60044-7 / -8 standard. This enables high-precision measurements without calibration and adjustment to the primary variables.





## Component overview

Medium voltage

**Transformer**

Sensformer®

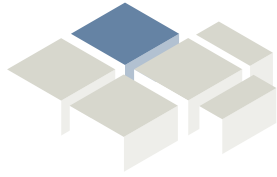
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## Component overview

Medium voltage

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Sensformer®

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## Sensformer®

Siemens transformers become connective. Use the data of your oil-immersed transformers (FITformer®) or dry-type transformers (Geafol® & Careco®). Delve into digitalization, and optimize your operational and business-related decisions.

### Sensformer® – Benefits

Monitor the state of your transformer – from everywhere and at any time – and optimize the operating procedure. With Sensformer® you will be notified about the operating state of your transformers and receive information if there are anomalies. The consequence: more transparency and flexibility with minimized risks and costs.

### Technical features

A Sensformer® contains the necessary sensors for entering the most important operating parameters – oil level, oil or winding temperature, low-voltage winding current, and GPS location. To step into the world of digitalized transformers, you simply add a GSM-card. Data submission can be done via GSM as well as Ethernet connection without the need of a secondary IT infrastructure.

#### Standard measured values:

Oil level alarm (FITformer®)

Upper oil temperature (FITformer®) or undervoltage winding temperature (Geafol® & Careco®) measured with PT100 sensor

Winding current measured with Rogowski coil

GPS location

#### Connectivity:

Stand-alone data transmission via Sensformer gateway (GSM, Ethernet)

Data transmission via substation gateway SICAM A8000

#### Possible applications:

Optimized operation (e.g. overload indication)

Asset management (e.g. consumption of service life)

Asset protection (e.g. warning against stealing of oil)

Ambient temperature forecast

#### General maintenance:

All sensors and the communication gateway are maintenance-free





## Component overview

### Medium voltage

#### Transformer

#### Low voltage

3WL and 3VA circuit-breakers

3NJ4/5 fuse-switch-disconnectors and  
3NA/3ND fuses

Multichannel current measuring system  
SEM3

SICAM Q100

#### Remote terminal unit

#### IoT connection

#### Operation & observation





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##### 3WL and 3VA circuit-breakers

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#### Technical features

**Type: 3WL air circuit-breaker**

Size 0 up to 1250 A

Size 1 up to 2000 A

Size 2 up to 4000 A

With communication and motor operating mechanism

Available in fixed-mounted and withdrawable design



#### Technical features

**Type: 3VA molded case circuit-breakers**

Compact and consistent up to 1600 A

Comprehensive accessories

Optional communication connection

Integrated measuring function

Motor operator

Available in fixed-mounted, plug-in, and withdrawable design

## 3WL and 3VA circuit-breakers

Renewable energy sources with distributed infeed and fluctuating yields, as well as new loads such as charging poles and heat pumps with volatile load flows set new challenges on power distribution. Besides the classical protection of the individual low-voltage feeders, power monitoring and energy management are becoming more and more important. With the 3WL air circuit-breaker and the modular 3VA molded case circuit-breaker you will be perfectly prepared for these challenges.

### 3WL air circuit-breaker

From 630 A to 2000 A, the 3WL air circuit-breaker is available in one uniform size. Components such as auxiliary releases, motor operating mechanisms, electronic trip units, current sensors, auxiliary circuit signaling switches, automatic reset devices, interlocks, or engagement operating mechanisms can all be easily retrofitted or exchanged, thus allowing the circuit-breaker to be adapted to new and changing requirements. The main contact elements can all be replaced in order to increase the endurance of the circuit-breaker. Up to 1250 A, the 3WL10 is available in the particularly compact size 0.

### 3VA molded case circuit-breaker

The 3VA molded case circuit-breaker is designed with you in mind: Apart from a large selection of basic devices, the portfolio also covers a wide range of accessories, and can thus be exactly adapted to your individual conditions. Thanks to its compact dimensions, you will moreover save precious space in the low-voltage part of your transformer substation.



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SEM3

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## 3NJ4/5 fuse-switch-disconnectors and 3NA/3ND fuses

In combination with the LV HRC fuses type 3NA and 3ND, the 3NJ4/5 in-line fuse-switch-disconnector provides for proven protection of the individual outgoing low-voltage feeders up to 1250 A. The optionally available electronic fuse monitor informs you about tripped fuses and supports you in order to further increase the supply reliability of your customers.

### Fuse-switch-disconnectors and fuses – Benefits

3NJ4/5 fuse-switch-disconnectors and 3NA/3ND fuses convince due to their good cost-benefit ratio and their technical features. In many applications, the combination of circuit-breakers and fuses is the best solution.

#### Technical features

**Type: 3NJ4/5 fuse-switch-disconnector**

Up to 1250 A

Variable cable feeder at the top and bottom

Devices with and without integrable current transformers

Integrated fuse monitor, optional



#### Technical features

**Type: 3NA and 3ND LV HRC fuses**

Standardized sizes from 000 to 4/4a, up to 1250 A

Very high short-circuit breaking capacity of 120 kA

Back-up protection of switching devices

Selectivity at a rated current ratio of 1 : 1.6;  
in 400 V applications even 1 : 1.25 possible

High current limitation in case of short circuit





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3NJ4/5 fuse-switch-disconnectors and  
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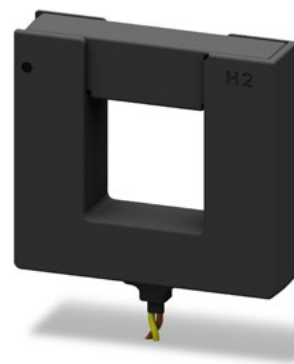
Multichannel current measuring system  
SEM3

SICAM Q100

### Remote terminal unit

### IoT connection

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## Multichannel current measuring system SEM3

The multichannel current measuring system SEM3 is a low-cost solution for the transparent representation of energy consumption. It determines what power is required in which installation feeder at this specific moment. Energy data such as voltage, currents, and power can be visualized in a web interface or transmitted to a superior monitoring system. This makes it possible to compare individual loads directly and to identify current peaks. Furthermore, the suitable split core current transformers make retrofitting in your existing application very easy without having to remove cables.

### Technical features

#### Multichannel current measuring system SEM3

Measurement of up to 45 measuring points

Multiple energy counters: apparent, active, reactive energy

Storage up to 6 months

Power factor and frequency

0.2 or 1.0 % measuring accuracy

Communication

### Technical features

#### Split core current transformers

50 A to 2000 A on primary side

100 mA on secondary side

Failsafe

Cable extension up to 100 m without loss of accuracy



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Multichannel current measuring system  
SEM3

#### SICAM Q100

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## SICAM Q100

The SICAM Q100 multifunctional power quality recorder is used for acquisition, visualization, evaluation, and transmission of all electrical measured variables.

The acquisition, processing, and accuracy of measured variables and events is performed according to the IEC 61000-4-30 Class A power quality measurement standard.

The measured variables can be forwarded to a personal computer or power automation/SCADA system via communication interfaces.

Measured variables can be recorded in parameterizable time intervals with recorders such as power quality and fault recorders. Long-term data and events are evaluated directly via the web server in the device and can be displayed as a report according to the power quality standards (according to EN 50160).

Recorded data can be transferred to SICAM PQS and SICAM PQ Analyzer via IEC 61850 for comfortable evaluation and for flexible automatic reporting.

The new software PQ Advisor Compact offers an alternative easy solution for power quality evaluation – completely without power quality knowledge.

The PQ Advisor Premium enables a cloud application of the Siemens Grid Diagnostic Suite.

For the purpose of the Future Distribution Substation, the PQ Advisor Premium offers a powerful solution for analyzing the power quality, which enables you to monitor and follow up anomalies and trends in the grid from all quarters and at any time.

Device characteristics	
Power quality features	Measurement compliant with IEC 61000-4-30 Class A
	IEC 61000-4-15 Flicker
	IEC 61000-4-7 harmonics, incl. harmonic phase angles for harmonic direction, harmonics up to the 63 <sup>rd</sup> harmonic
	Reporting and evaluation compliant with EN 50160
Energy management	Active, reactive, and apparent power and energy
	Accuracy class active power 0.2S according to IEC 62053-22
	Accuracy class voltage / current 0.1 %
Communication protocols	Ethernet: IEC 61850, Modbus TCP, gateway/master, SNMP Serial: Modbus RTU master and gateway function for RS485 devices OPC UA PubSub (MQTT) – connection to MindSphere
Input measuring circuits	4 × alternating voltage, VL-N/VL-L: 400 V / 690 V AC 4 × alternating current, IN: 1 A / 5 A

### SICAM Q100 – Benefits

- High level of investment security through the use of standards
- Contractual compliance measurements for use in courts
- Detection of the origin of harmonics
- Improved availability
- Role-based access control and secure transmission of sensitive data
- Protection against firmware manipulation
- Open and transparent connectivity and interoperability



[siemens.com/sicam-q100](https://www.siemens.com/sicam-q100)



## Component overview

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Low voltage

**Remote terminal unit**

Distribution Automation Box

SICAM A8000

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## Component overview

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Distribution Automation Box

SICAM A8000

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## Distribution Automation Box for control center and IoT connection

The Distribution Automation Box offers – in a standardized system design – the solution for all tasks of distribution grid automation of transformer substations. For the Future Distribution Substation, it is the central interface for remote monitoring of all relevant operational data of the medium-voltage part, the transformer, and the low-voltage part.

### Distribution Automation Box – Benefits

The prefabricated compact and flexible design ideally supports monitoring, tele-control, and automation of the complete Future Distribution Substation. Intelligent applications such as the SICAM application “Self Optimizing Grid” enable the Distribution Automation Box to actively control and optimize the distribution grid. Pretested configuration of hardware and software allows for easy broad application. The prefabricated connections of the Distribution Automation Box facilitate fast and error-free installation.

- A communication gateway for all components of the Future Distribution Substation
- Easy integration of IoT connections
- Improves grid monitoring
- Integration of local automation functions
- Uninterruptible power supply
- Reduces the operating costs
- Integrated IT security

### Technical data

Material	Steel enclosure, dipcoat-primed, powder-coated on the outside
Housing	3 DIN rails, 2 cam locks, optionally with barrel lock
Color	RAL 7035
Connections / plug connectors	4 × cable feeder, 17-pole Han 1 × substation connection, 12-pole Han 1 × Modbus communication, Han 3A RJ45 hybrid
Operation	1 local-remote switch
Signaling	4 signal lamps, freely configurable
Telecontrol system	SICAM A8000 series
Communication	SICAM CP-8022 integrated GPRS module
Temperature range	-10 °C to +30 °C
Power supply	115 or 240 V AC, 50/60 Hz
Power supply unit	24 V DC, 10 A
Battery	7.2 Ah, lead gel battery
Protection class	Up to IP66

### Dimensions

Width × height × depth	380 × 600 × 210 mm
------------------------	--------------------





## Component overview

Medium voltage

Transformer

Low voltage

**Remote terminal unit**

Distribution Automation Box

**SICAM A8000**

IoT connection

Operation & observation



## SICAM A8000

### Wherever energy flows

The field of application for the SICAM A8000 series ranges from distribution grid automation and connecting renewable energies (wind, solar, hydro) to industrial applications.

Customer requirements such as cyber security, scalability, flexible communication, space-saving design, and a layout suitable for harsh ambient conditions have been taken into consideration when designing the SICAM A8000.

### SICAM A8000 – Benefits

- Due to the highest EMC stability up to 5 kV (IEC 60255) also suitable for direct use in substations
- Integrated web parameterization tool for simple engineering
- Integrated crypto chip and IPsec encryption to fulfill the high cyber security requirements
- Investment security by using international standards such as IEC 61850, IEC 60870-5-101/-103/-104, etc.
- Platform modularity for versatile application options and reduced inventory
- Multitude of interfaces and integrated GPRS module for simple adaptation to existing communication infrastructures
- Integrated short-circuit indicator functionality for use in grid monitoring
- Simple installation and maintenance – Plug-and-Play functionality for time and cost savings.

Technical data	
Processor units	Up to max. 34 interfaces
Power supply modules	24 to 60 V DC; 110 to 220 V; 230 V AC
Communication modules	Ethernet and serial interfaces
Interface modules	Max. 16 extension lines
Binary inputs	24 V DC; 48/60 V DC; 110 V DC; 220 V DC
Binary outputs	24/48/60/110/220 V DC; 110/230 V AC
Analog inputs	-20/+20 mA; -10/+10 V; Pt 100
Analog outputs	-20/+20 mA; -10/+10 mA; -10/+10 V
Current/voltage inputs	1 A/5 A; LoPo; 230 V
Temperature range	-40 °C to +70 °C
Protection class	IP20



## Component overview

Medium voltage

Transformer

Low voltage

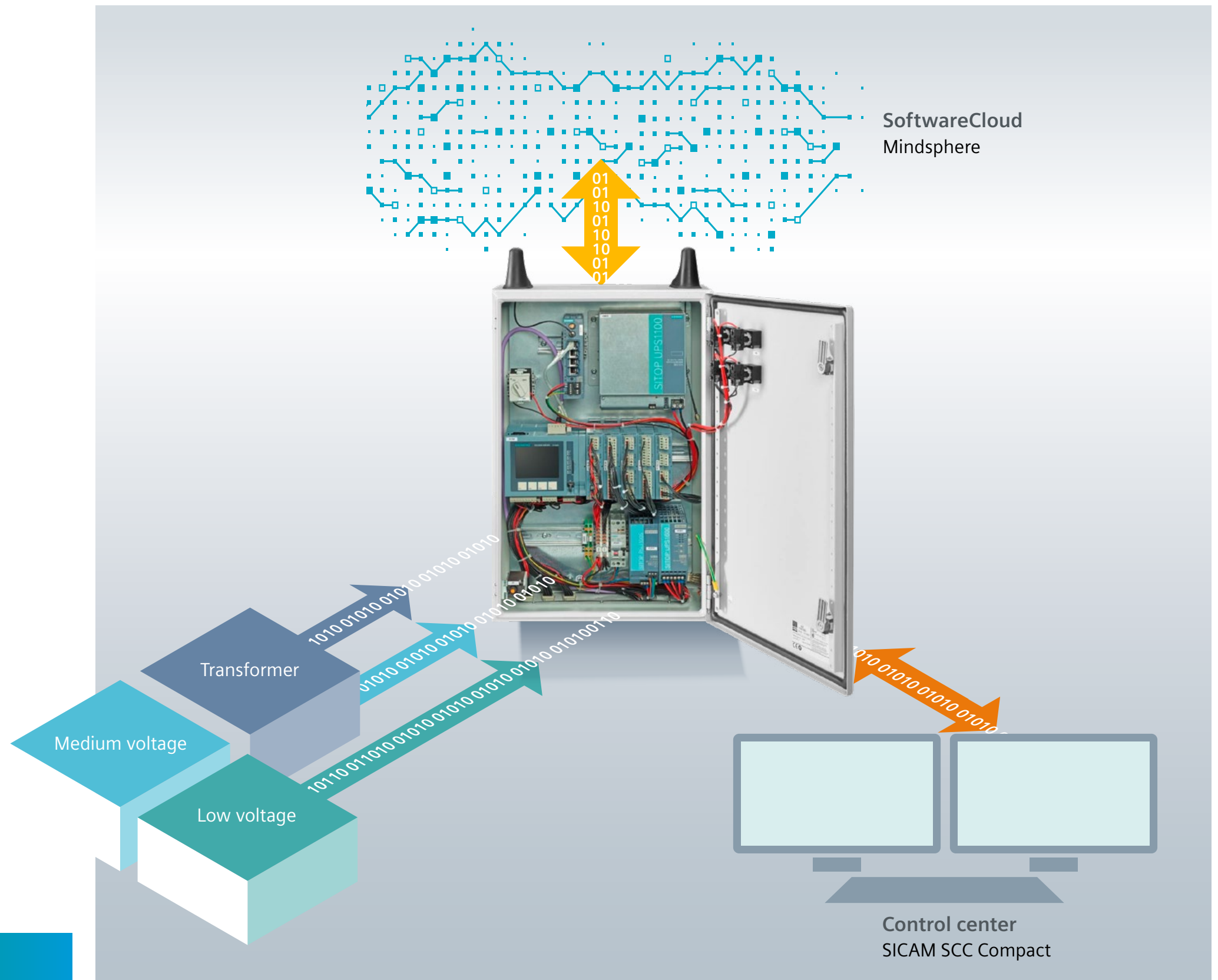
Remote terminal unit

**IoT connection**

EnergyIP Assetguard

SICAM Navigator App

Operation & observation





## Component overview

Medium voltage

Transformer

Low voltage

Remote terminal unit

**IoT connection**

EnergyIP Assetguard

SICAM Navigator App

Operation & observation



## EnergyIP Assetguard

Assets monitoring in main transformer substations is a key topic nowadays. Thanks to Internet of Things paradigm, all data coming from the field are available almost in real time on the Siemens cloud, where the EnergyIP for MindSphere suite was developed to support the decision making process.

The EnergyIP for MindSphere Assetguard APP is provided to ensure and start corrective actions with the goal of improving the assets' lifetime.

### Business model

The EnergyIP Assetguard APP is available both in software as a service mode, on a cloud platform through a subscription, and in a private cloud mode by license, installed on a dedicated virtual machine at the customer's data center. Its services are usable through an HTML5 web application called Operation Center, for notebook/desktop devices and for different operating systems. It can be accessed with reduced functionality also from mobile devices like Android or iOS tablet, which allows constant and practical utilization by all users. The Assetguard APP is proposed as a modular and customizable package depending on the needs of the customer. Furthermore, it is integrated in the suite of the EnergyIP for MindSphere APP, which offers different applications for specific demand scenarios.

### EnergyIP Assetguard – Benefits

Support of electrical assets for evaluation of their assigned lifetime

Reduction of risks for consequential damages and for unexpected outages

Reduction of intensive periodical and manual measurements

Open to different sensor technologies to be acquired

Assets fleet monitoring almost in real time

User-friendly accessibility of information almost in real time

Geo-localization of alarms almost in real time

Capability to compare similar or different asset behavior

The SaaS model enables the update of functions in every APP release

Can be integrated in proprietary asset performance management / IT system





## Component overview

Medium voltage

Transformer

Low voltage

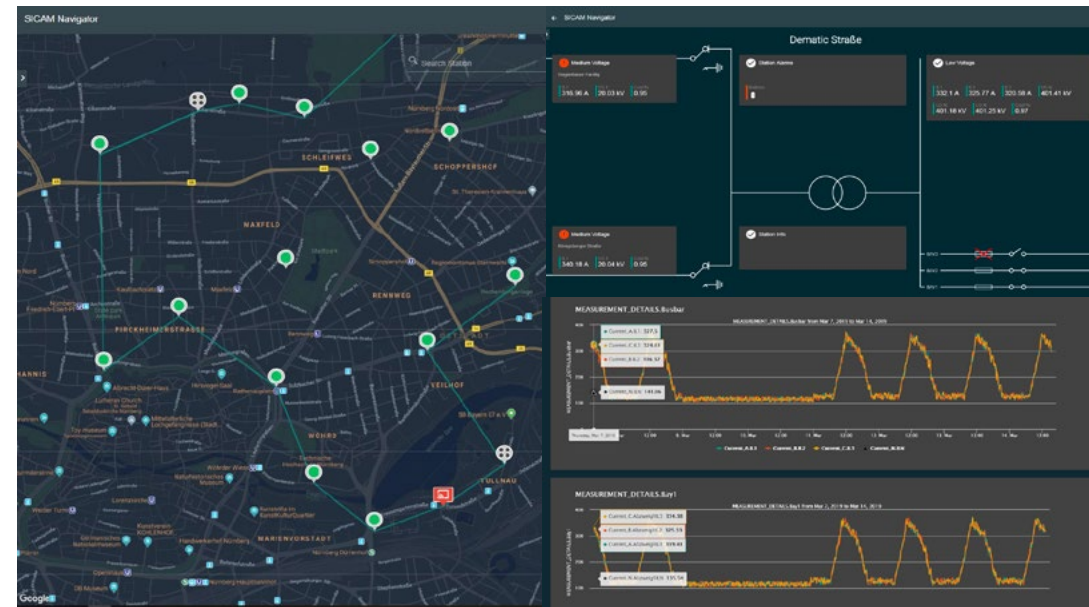
Remote terminal unit

IoT connection

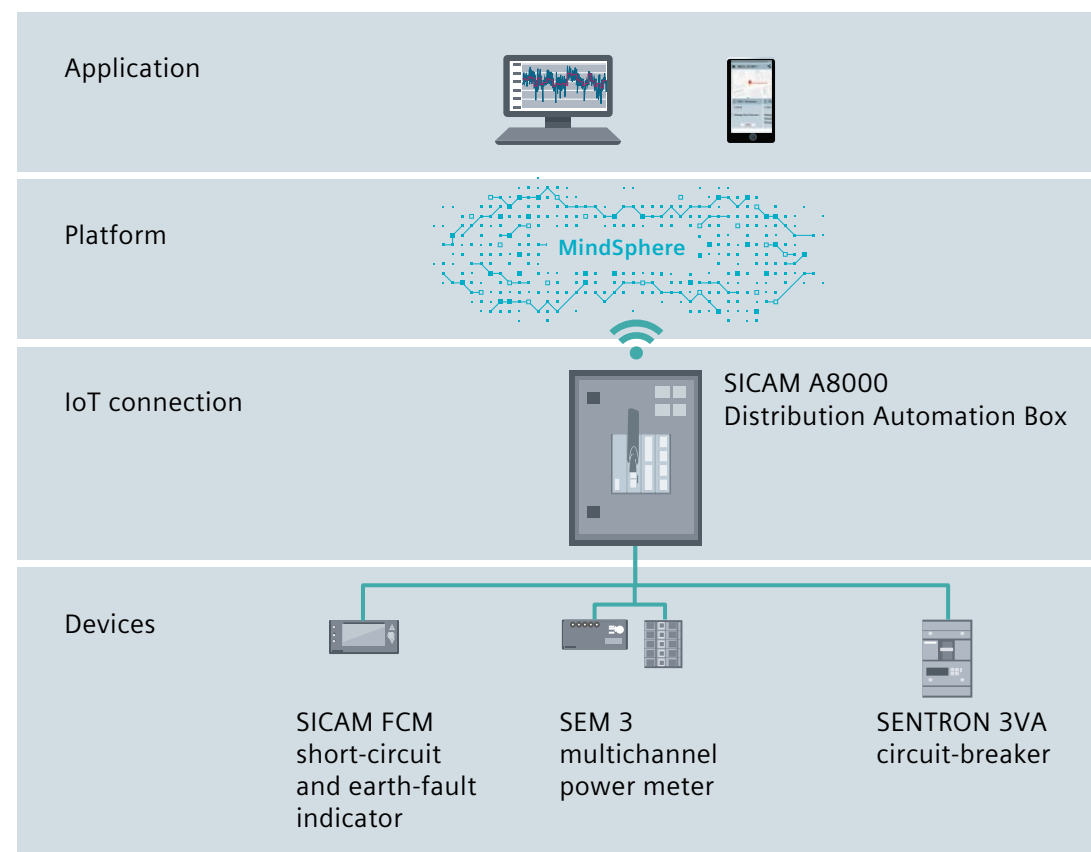
EnergyIP Assetguard

SICAM Navigator App

Operation & observation



SICAM Navigator



## SICAM Navigator App

Digitalization provides new solutions for comprehensively analyzing distribution grid data in the cloud. The Grid Diagnostic Suite powered by MindSphere processes IoT data from field devices, thus offering the user additional possibilities to detect grid anomalies or to clear outages more quickly.

### Avoiding outages in medium- and low-voltage grids

The SICAM Navigator identifies grid components at risk. Suboptimal grid conditions such as overloads or unbalanced loads can be detected based on the latest measured values like currents, as well as on recorded load profiles. The network capacity is also made transparent and assessable: for example, to analyze the faster expansion of the charging pole infrastructure.

### “Easy onboarding”: minimized engineering

The connectivity is enabled by updating the communication firmware with the standardized OPC UA PubSub protocol (according to IEC 62541): No hardware extension is required. Devices from other manufacturers can also be connected via an IoT gateway like SICAM A8000. After onboarding, the data will be automatically provided for the SICAM Navigator and for ongoing analyses using other MindSphere tools.

### SICAM Navigator App – Benefits

Reduces investment and operating costs

Increases grid availability due to fast fault location and reduced downtimes

Easy to integrate, seamless data availability

Meets industry-relevant security standards

No vendor lock-in by using IoT standard protocol



## Component overview

Medium voltage

Transformer

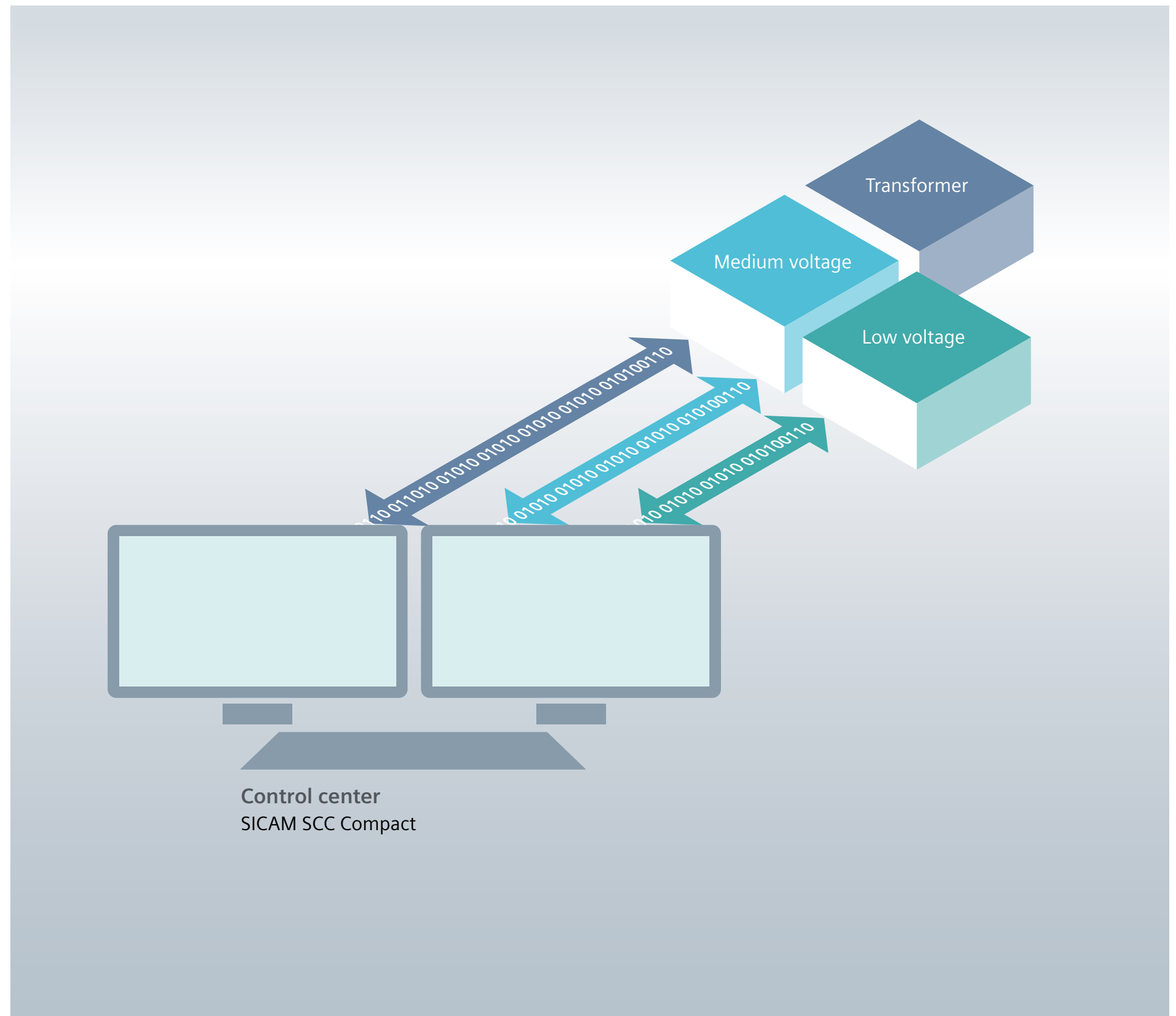
Low voltage

Remote terminal unit

IoT connection

**Operation & observation**

SICAM SCC Compact





## Component overview

Medium voltage

Transformer

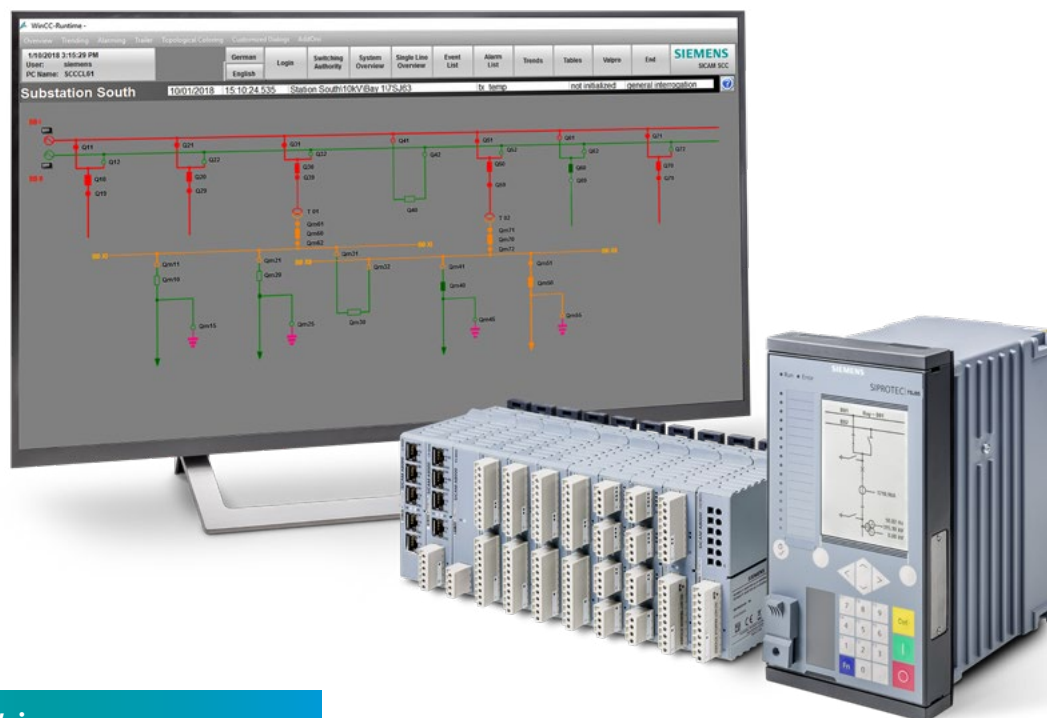
Low voltage

Remote terminal unit

IoT connection

Operation & observation

SICAM SCC Compact



## SICAM SCC Compact

The process visualization and control system is a central element in substations for power distribution grids. The HMI system SICAM SCC Compact is optimally designed, especially in the case of smaller substations. It fulfills all requirements on control and monitoring of your substations.

And this, of course, as a part of a comprehensive cyber security approach that ensures a consistent and uniform functionality and is permanently up to date. The suitable hardware is provided by the modules of the SICAM A8000 series.

SICAM SCC Compact is based on the innovative system platform SIMATIC WinCC – also from Siemens.

With SICAM SCC Compact, we are thus offering the trendsetter for energy automation of distribution substations, a consistent cyber security solution, and we are “ready for digitalization”!

### SICAM SCC Compact – Features

Cross-device HMI without additional substation controller

Field and protection devices are connected directly to the SICAM SCC Compact using the IEC 61850 communication standard

Direct connection of remote terminal units and substation controllers with IEC 60870-5-104

Human Machine Interface system (HMI) for SICAM PAS as substation control system, communication gateway, and automation component

### SICAM SCC Compact – Benefits

Cost-effective, optimized HMI system for small visualization applications

Tag management with up to 2048 data points

Utilization of up to 512 archive variables

Reduces hardware requirements, e.g. by visualization with compact touch panel PCs

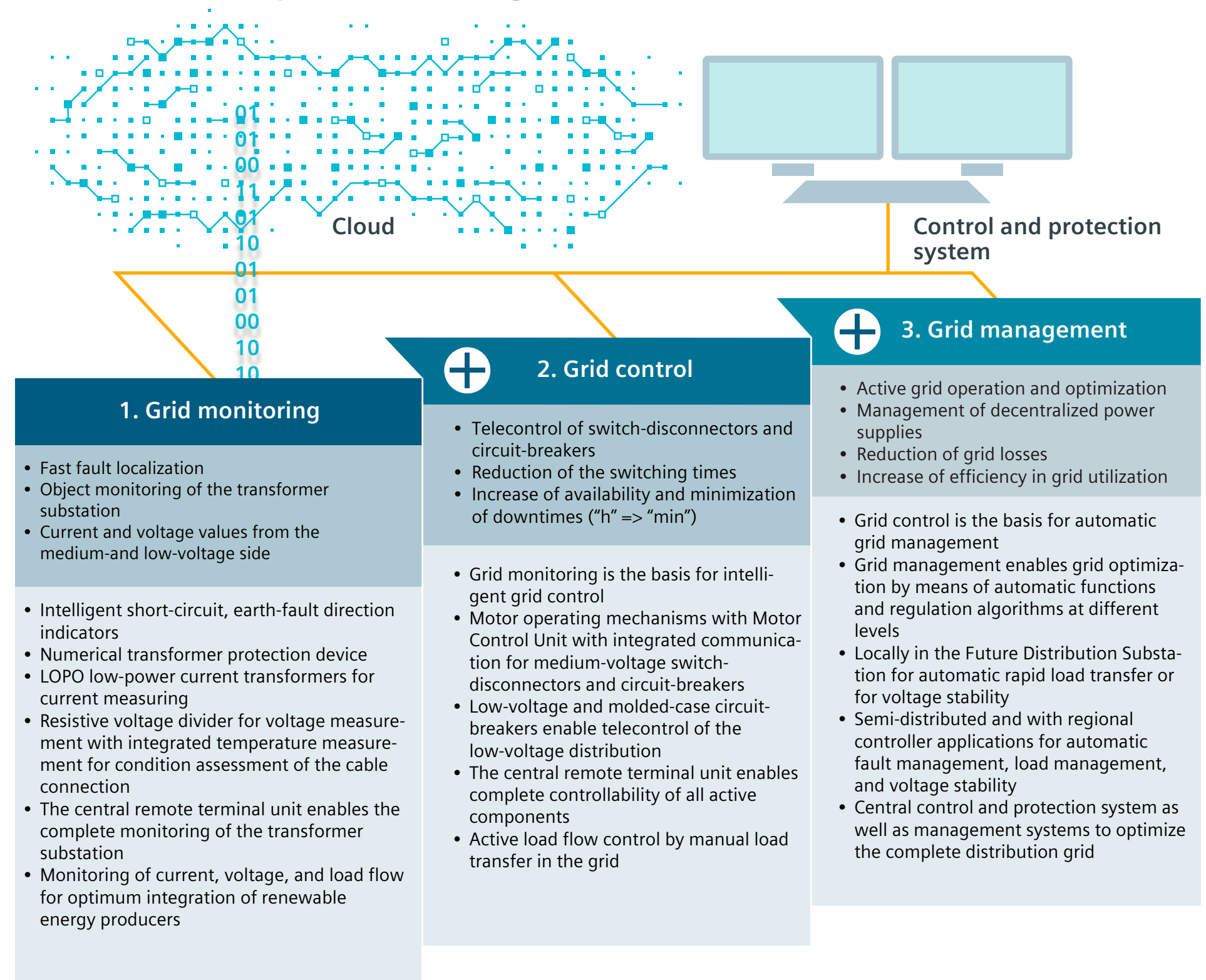
Immediately ready to go with only one runtime license

Up to 3 web clients provide user-specific access to SICAM SCC Compact even from distributed computers (separate WinCC license required)



Step by step  
to more intelligence

## The modern concept for the smart grid of the future



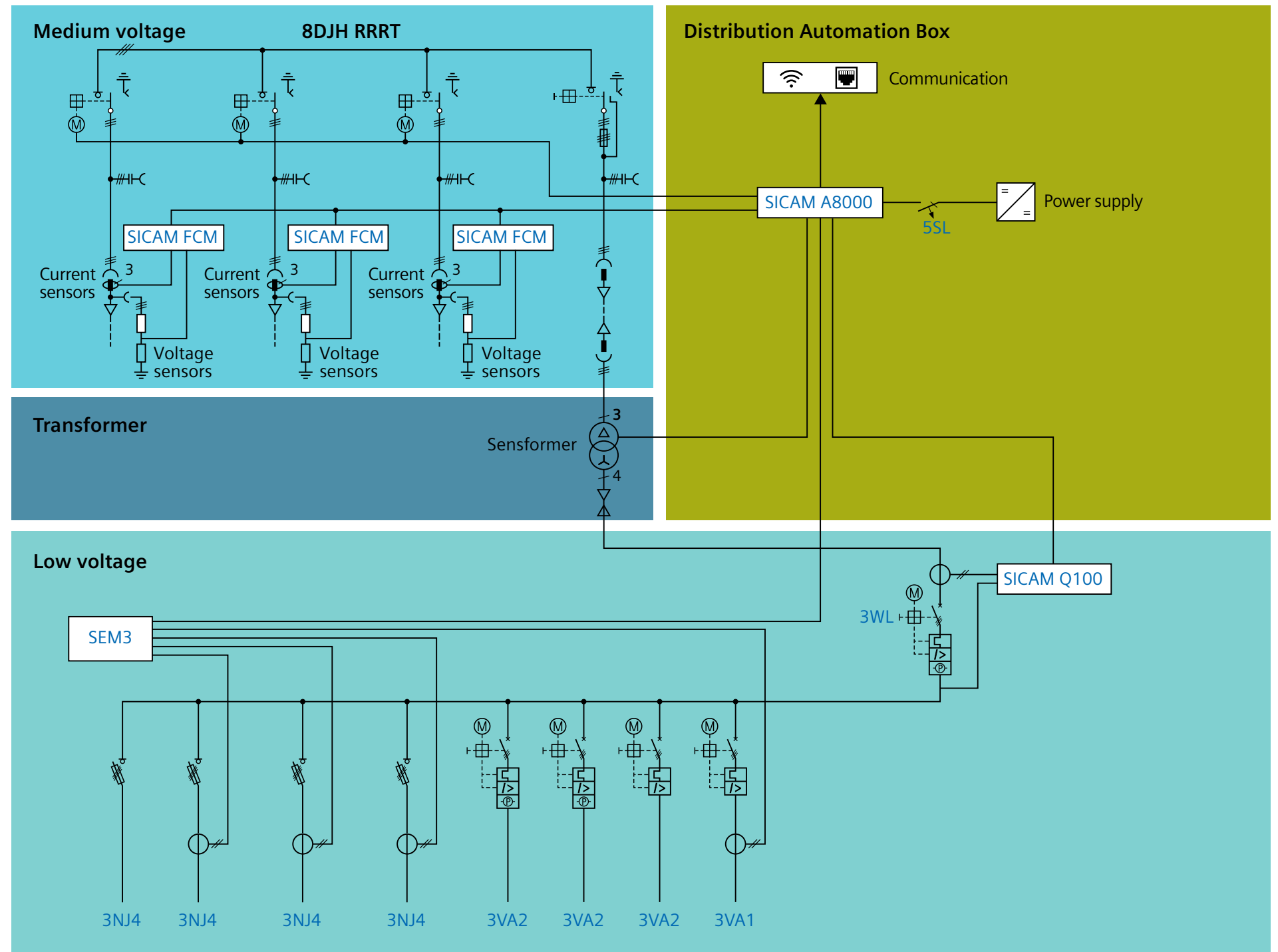
• Medium voltage • Transformer • Low voltage • Distribution Automation Box • Operation and observation • IoT connection, Assetguard, Navigator



## Configuration

### Configuration and 3D animation of the Future Distribution Substation

Configuration  
3D animation



A consistent concept: The suitable component for every task





## Configuration and 3D animation of the Future Distribution Substation

Configuration

3D animation

Play  
360° view



## 3D animation

The following illustration shows the modular design of an intelligent transformer substation

### Medium-voltage switchgear

Switch-disconnectors or circuit-breakers with motor operating mechanisms for telecontrol of e.g. control centers, sensors to measure currents and voltages, and intelligent short-circuit/earth-fault direction indicators

### Sensformer

Oil-immersed or dry-type transformer (CRT: cast-resin transformer)

### Low-voltage protection systems

Protection with integrated measuring functions, motor operating mechanisms, and communication for power monitoring and energy management of the individual low-voltage feeders

### Low-voltage monitoring

German TÜV-tested power monitoring system for transparency and analysis of the individual low-voltage feeders

### Remote terminal unit Distribution Automation Box

Monitoring and control components integrated in a standardized system design

### Assetguard

First step towards the Asset Management in Future Distribution Substation with digitalization

### SICAM SCC

HMI system for small to medium-sized distribution substations

### SICAM Navigator

Identification of grid conditions and grid anomalies

### Substation building

Alternatively, there is the possibility to buy the substation building of Siemens 8FB via license business.

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