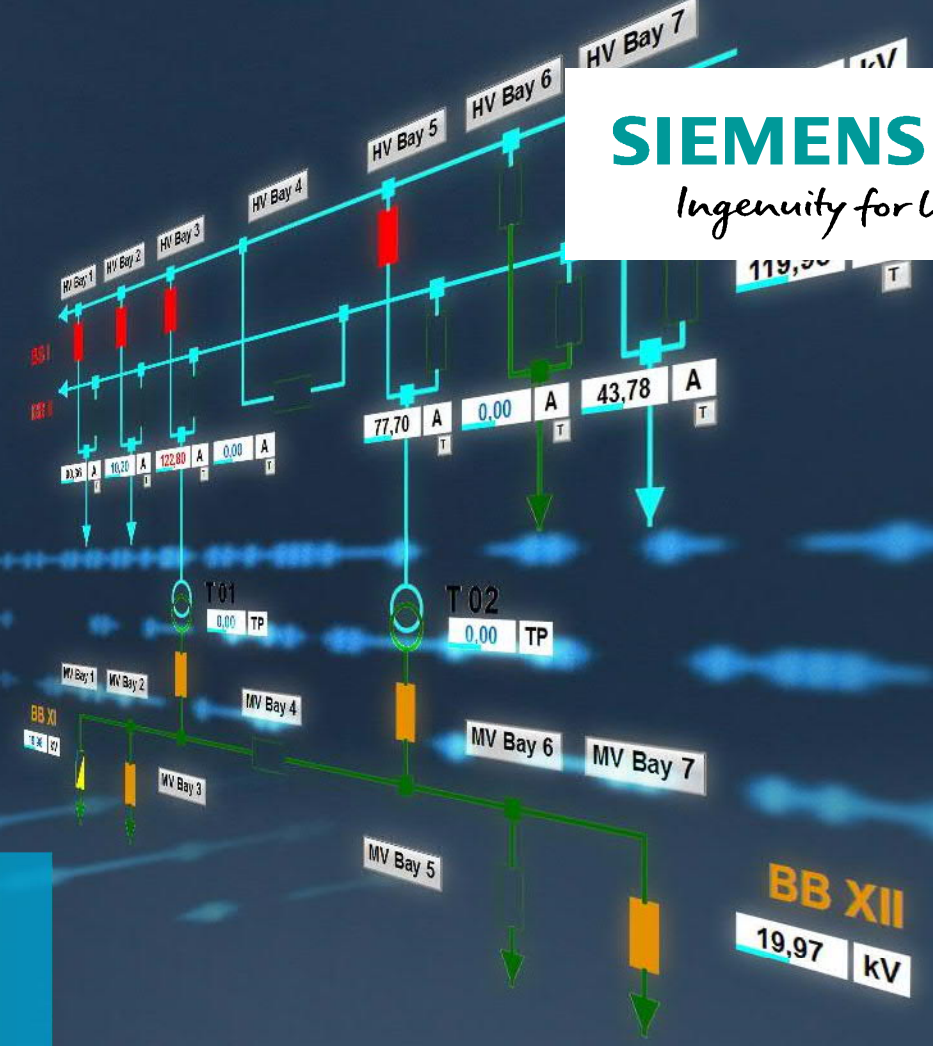

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Substation Automation 2020

Substation Automation & Protection brugermøde 2020

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siemens.com/digital-grid

SICAM A8000 series

Substation Automation & Protection brugermøde 2020

SICAM A8000
New Modul: DO-8230

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DO-8230

- DO-8230 Digital output transistor 16x 24-60VDC

  6MF2823-0AA00

16 Digital output transistor

- Divided into 2 galvanic isolated groups (2x 8)
- Switching Voltage 24 – 60 VDC
- Typical operating current 0.5A
- Maximal operating current 1A
- Short-circuit detection with cyclic reactivation
- Power consumption 500mW

SICAM A8000
New Modul: DO-8221

SIEMENS
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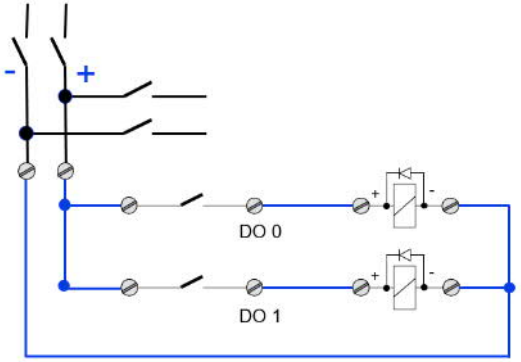
DO-8221

- DO-8221 Checked command output

  6MF2822-1AA00



Digital output module for checked command output

- 12 Command Outputs (12x 1-pole or 12x 1,5-pole or 6x 2-pole)
- Current Switching Capacity: 1A continuous, up to 4A short term (see attached PI)
- Operating Temperature -40°C … +70°C
- Power consumption 1,3W normal operation / 2,0W during command execution
- 1-out-of-n check
- External wiring check (continuous current measurement) before command execution

SICAM A8000
New Modul: AI-8340

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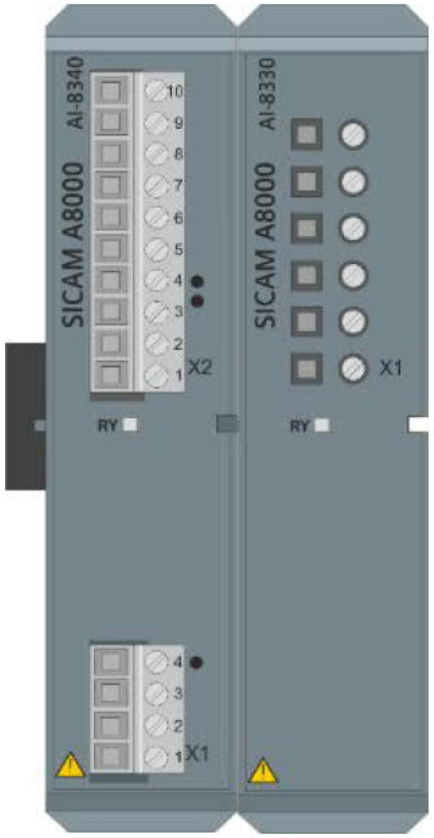
AI-8340

- AI-8340 Ana. Input 4xU(240V), 2xDO

  6MF2834-0AA00



Voltage Measurement Module

- 4x Analog Voltage Inputs for direct measurement (Umax AC 250V)
- 0,2% accuracy for measured values, 0,5% accuracy for calculated values
- Nominal frequency 50Hz and 16,7 Hz
- 2x Digital Output for Syncrocheck

SICAM A8000
New Modul: AI-8330

SIEMENS
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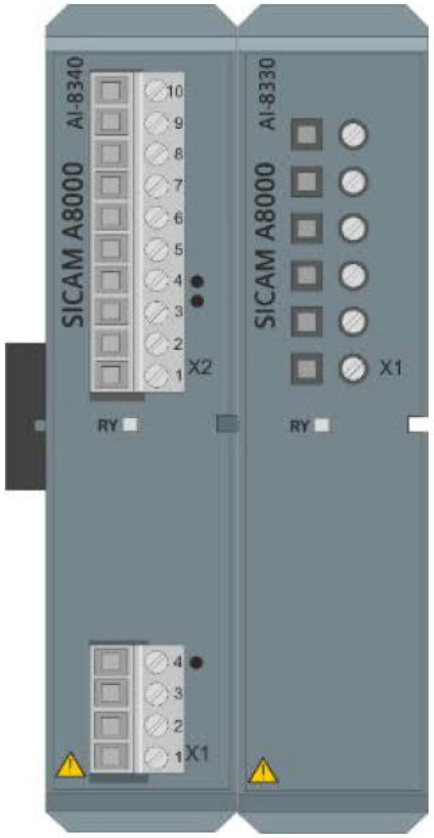
AI-8340

- AI-8330 Ana. Input 3xI (5A) for AI-8340

  6MF2833-0AA00



Current Measurement Module

- 3x Analog Current Inputs for Inominal = 1A/5A and 100% over-current (Imax = 25 A)
- Usable only in conjunction with AI-8340 and dedicated bus module
- AI-8330 has to be mounted always right beside AI-8340 if used
- 0,2% accuracy for measured values, 0,5% accuracy for calculated values
- Nominal frequency 50Hz and 16,7 Hz
- Dedicated bus module CM-8816 will be included in the delivery of AI-8330
- CT/VT combination contains out of 2 A8000 I/O modules AI-8330 and AI-8340

SICAM A8000
New Modul: CI-8531

SIEMENS
Ingenuity for life

CI-8531

- CI-8531 SICAM I/O Remote 24-60VDC F/O

  6MF2853-1AA00

Fibre-Optic Remote I/O module

- 2x SFP interfaces for Ethernet-based-IO line and ring configurations available
- 2x LC plug-in modules are included in the delivery (Multimode)
- LC Multimode allows distances up to 2km between SICAM A8000 I/O-rows
- Input voltage of 24-60 VDC
- Up to 8 SICAM A8000 I/O Modules are supported per I/O row
- Operating Temperature -40°C … +70°C
- LC Singlemode and electrical plug-in modules as optional - see CP-8050 manual

SICAM A8000
New Modul: CI-8533

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CI-8533

- CI-8533 SICAM I/O Remote 110-220VDC F/O

  6MF2853-3AA00

Fibre-Optic Remote I/O module

- 2x SFP interfaces for Ethernet-based-IO line and ring configurations available
- 2x LC plug-in modules are included in the delivery (Multimode)
- LC Multimode allows distances up to 2km between SICAM A8000 I/O-rows
- Input voltage of 110-220 VDC
- Up to 8 SICAM A8000 I/O Modules are supported per I/O row
- Operating Temperature -40°C … +70°C
- LC Singlemode and electrical plug-in modules as optional - see CP-8050 manual

SICAM A8000
New Modul: CI-2530

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CI-2530

- CI-2530 SICAM Rack I/O Remote

  6MF2253-0AA00

Coupling Interface module to connect SICAM I/O Racks with CP-8050

- 1 x CI-2530 per SICAM I/O Rack is required (rack for 9 slots or 17 slots)
- Within one SICAM I/O Rack up to 16 SICAM A8000 Rack I/O modules can be used
- For each SICAM I/O Rack 1 or 2 power supply can be realized with PS-263x
- Operating Temperature -5°C … +55°C
- The following SICAM Rack I/O Modules are supported
  - DI-2112, DI-2113, DI-2114, DI-2115
  - DO-2201, DO-2210, DO-2211
  - AI-2300, AI-2302, AI-2303

SICAM A8000
New Modul: CI-2530

SIEMENS
Ingenuity for life

CI-2530

- CI-2530 SICAM Rack I/O Remote

  6MF2253-0AA00

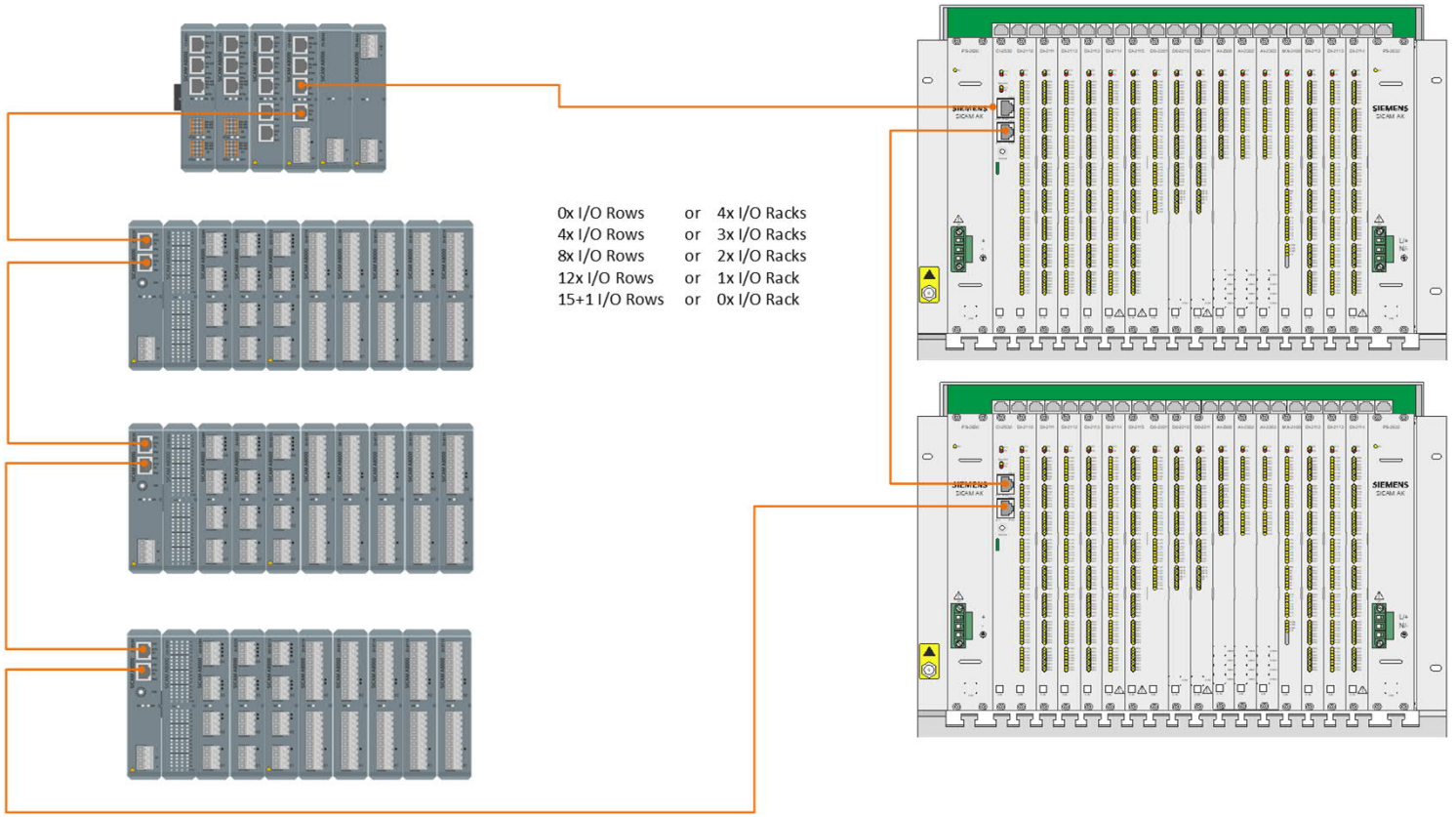
Up to 4 SICAM I/O Racks can be used

SICAM A8000
New Modul: CI-2530

SIEMENS
Ingenuity for life

CI-2530

- Line- and ring configurations are supported
- I/O Racks and I/O Rows can be mixed up within a ring.



SICAM AK3

Discontinuation of SICAM AK3 CPUs and Comm.Interfaces

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Affected

Main components
CP-2016, CP-2017, CP-2019
SM-0551, SM-2551, SM-2558

Successor devices

SICAM A8000 rack solution

Phase-out announcement:

30.09.2020

Product cancellation:

30.09.2022

Repair service:

Until 30.09.2030

SICAM A8000 CP-8050

Substation Automation & Protection brugermøde 2020

SICAM A8000 CP-8050
CP-8050 Package V4.30

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Overview of V4.30

- **New test features with SICAM Web**, are available to save time during commissioning or maintenance: Wiring test for I/O Pins
  - Overview of system load and running firmware
  - Wiring test of the I/O s without signal engineering
  - Monitoring of current signal states across the entire device
  - Ethernet Packet Capture (**integrated Wireshark Trace**)
- SICAM A8000 I/O rack solution is also supported within **redundant configurations**
- **CP-8050 & CI-8520 support VLANs** on Ethernet ports, port-groups and also in conjunction with RSTP

SICAM A8000 CP-8050
CP-8050 Package V4.30

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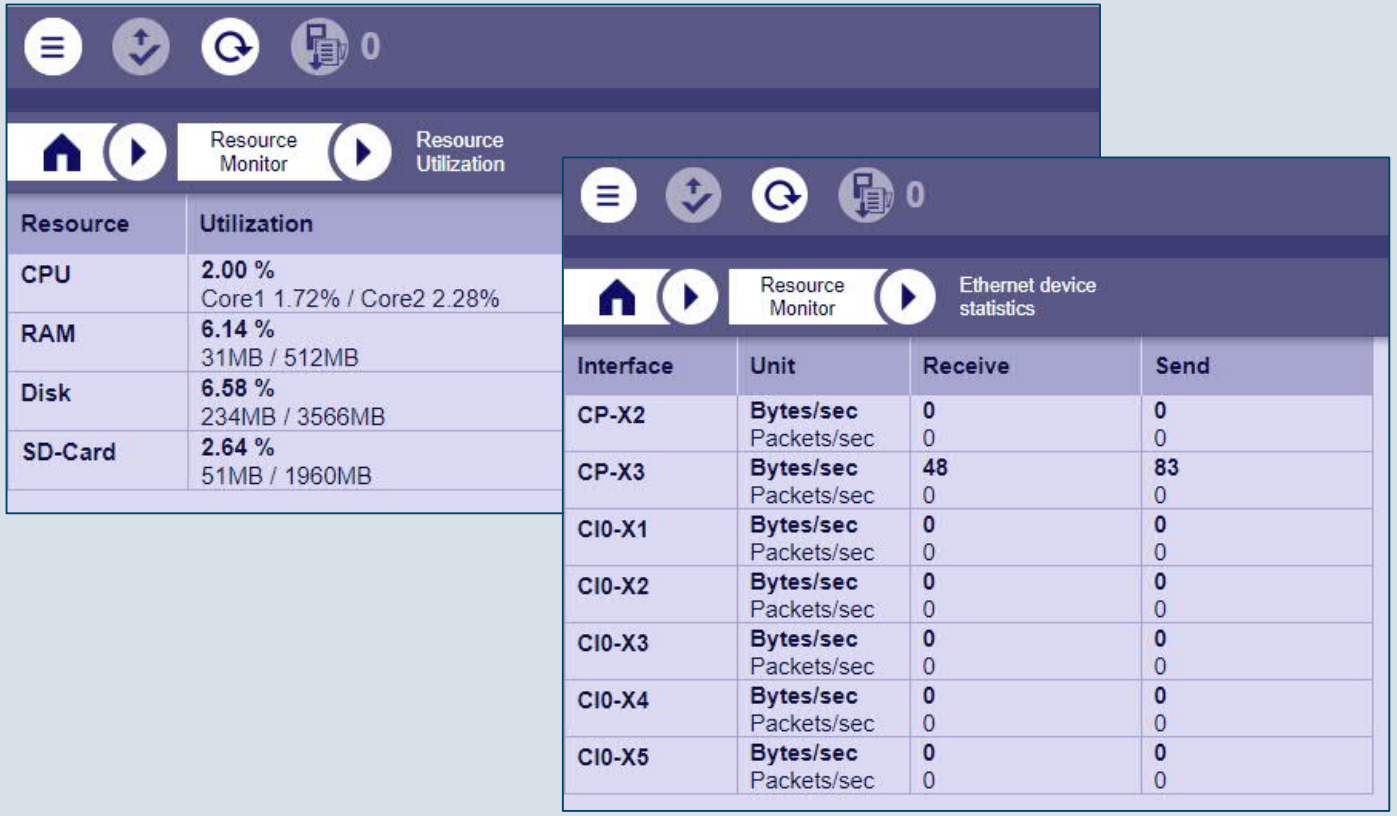
SICAM Web functions

- **System load**
- Firmware overview
- Wiring test of the I/O s
- I/O datapoint simulation
- Monitoring of current signal states
- Ethernet Packet Capture (Wireshark)



Resource Monitor > Resource Utilization

Resource	Utilization
CPU	**2.00 %** Core1 1.72% / Core2 2.28%
RAM	**6.14 %** 31MB / 512MB
Disk	**6.58 %** 234MB / 3566MB
SD-Card	**2.64 %** 51MB / 1960MB

Resource Monitor > Ethernet device statistics

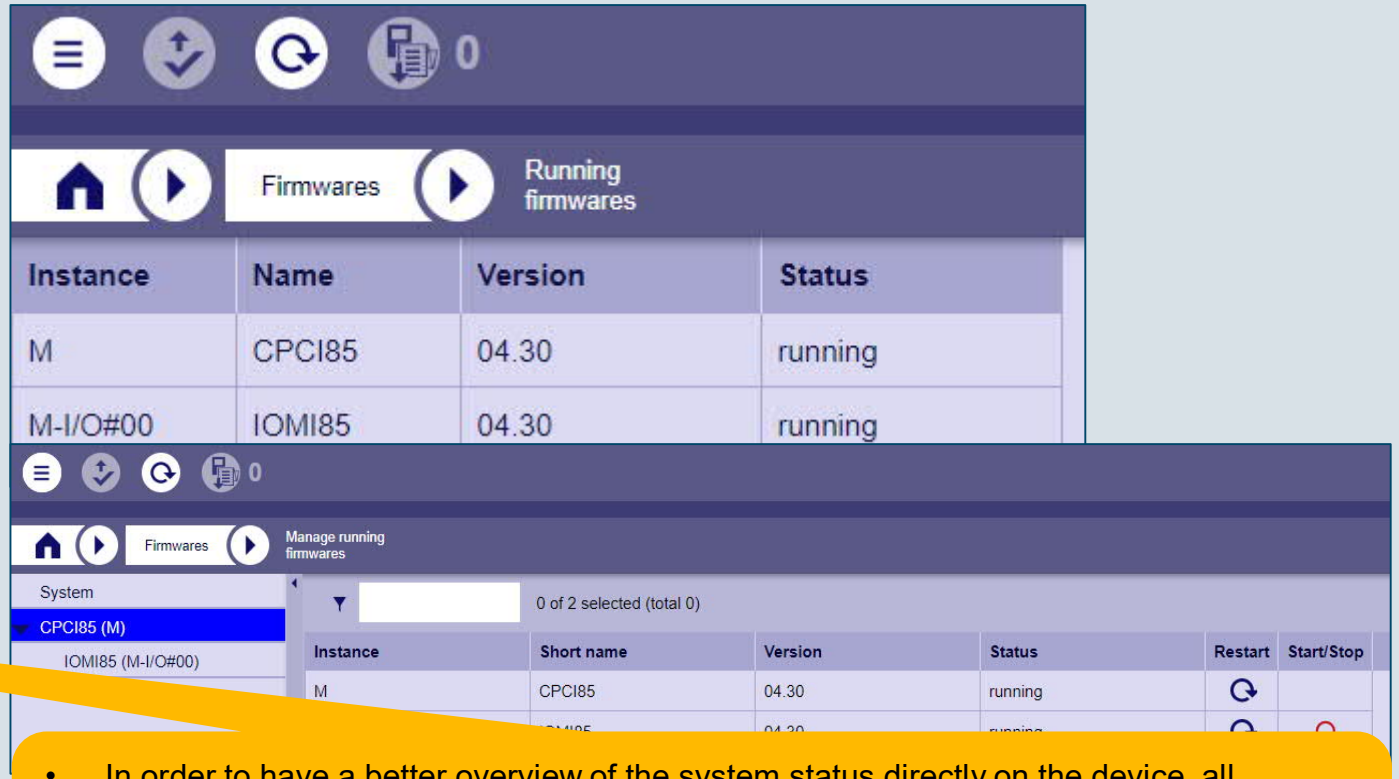
Interface	Unit	Receive	Send
CP-X2	**Bytes/sec** Packets/sec	**0** 0	**0** 0
CP-X3	**Bytes/sec** Packets/sec	**48** 0	**83** 0
CI0-X1	**Bytes/sec** Packets/sec	**0** 0	**0** 0
CI0-X2	**Bytes/sec** Packets/sec	**0** 0	**0** 0
CI0-X3	**Bytes/sec** Packets/sec	**0** 0	**0** 0
CI0-X4	**Bytes/sec** Packets/sec	**0** 0	**0** 0
CI0-X5	**Bytes/sec** Packets/sec	**0** 0	**0** 0

SICAM A8000 CP-8050
CP-8050 Package V4.30

SIEMENS
Ingenuity for life

SICAM Web functions

- System load
- **Firmware overview**
- Wiring test of the I/O s
- I/O datapoint simulation
- Monitoring of current signal states
- Ethernet Packet Capture (Wireshark)



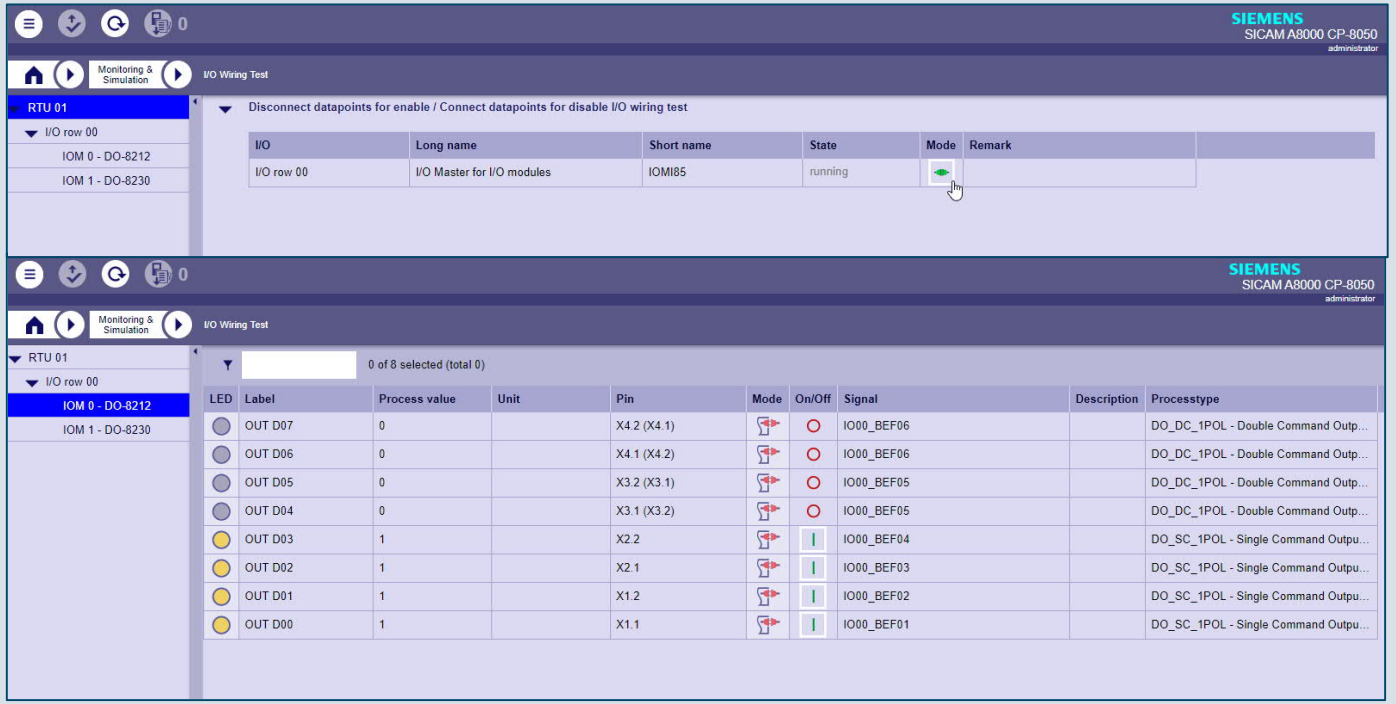
- In order to have a better overview of the system status directly on the device, all firmwares used including their status.
- It is also possible to restart firmwares individually, should a problem occur or for test purposes e.g. a failure/start-up can be simulated.

SICAM A8000 CP-8050
CP-8050 Package V4.30

SIEMENS
Ingenuity for life

SICAM Web functions

- System load
- Firmware overview
- **Wiring test of the I/O s**
- I/O datapoint simulation
- Monitoring of current signal states
- Ethernet Packet Capture (Wireshark)



Focus - panel builders:
- Wiring test from clamp in the direction of the process
- Signal engineering not required

SICAM A8000 CP-8050
CP-8050 Package V4.30

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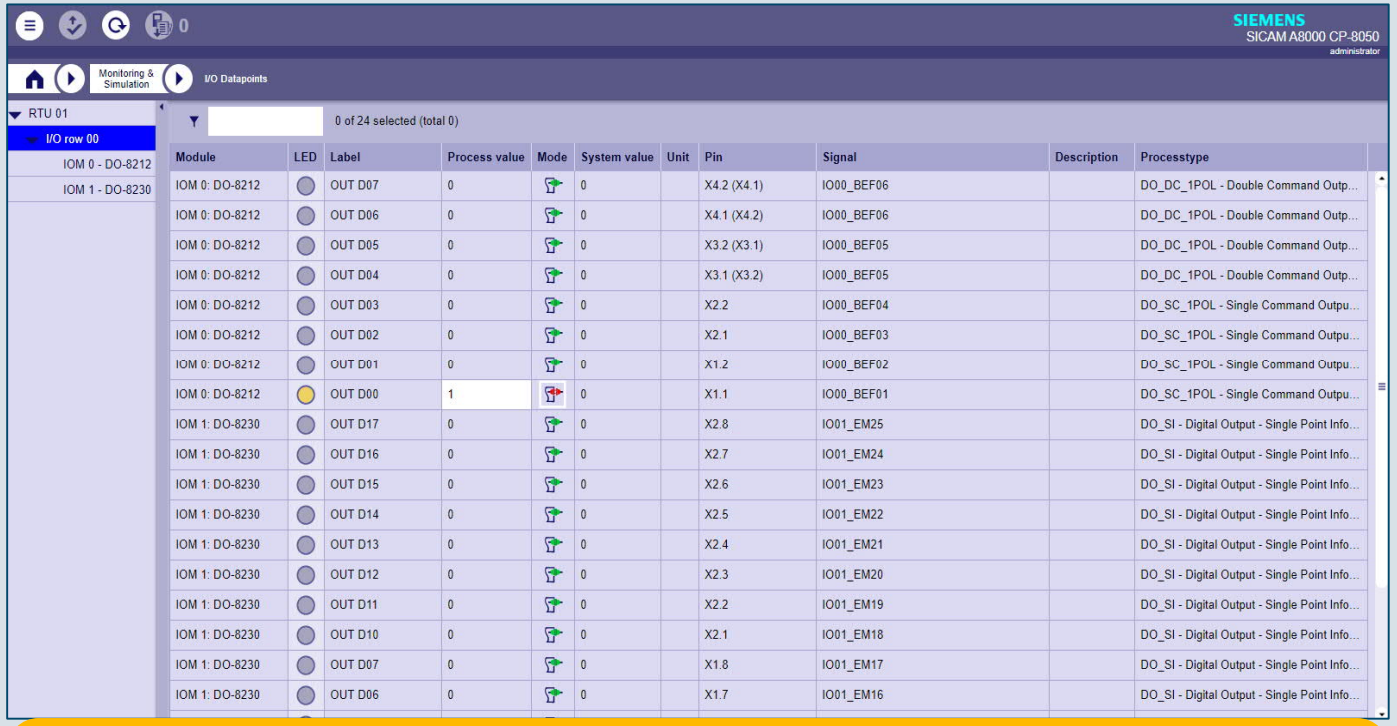
SICAM Web functions

- System load
- Firmware overview
- Wiring test of the I/O s
- **I/O datapoint simulation**
- Monitoring of current signal states
- Ethernet Packet Capture (Wireshark)



Module	LED	Label	Process value	Mode	System value	Unit	Pin	Signal	Description	Processtype
IOM 0: DO-8212		OUT D07	0		0		X4.2 (X4.1)	IO00_BEF06		DO_DC_1POL - Double Command Outp...
IOM 0: DO-8212		OUT D06	0		0		X4.1 (X4.2)	IO00_BEF06		DO_DC_1POL - Double Command Outp...
IOM 0: DO-8212		OUT D05	0		0		X3.2 (X3.1)	IO00_BEF05		DO_DC_1POL - Double Command Outp...
IOM 0: DO-8212		OUT D04	0		0		X3.1 (X3.2)	IO00_BEF05		DO_DC_1POL - Double Command Outp...
IOM 0: DO-8212		OUT D03	0		0		X2.2	IO00_BEF04		DO_SC_1POL - Single Command Outpu...
IOM 0: DO-8212		OUT D02	0		0		X2.1	IO00_BEF03		DO_SC_1POL - Single Command Outpu...
IOM 0: DO-8212		OUT D01	0		0		X1.2	IO00_BEF02		DO_SC_1POL - Single Command Outpu...
IOM 0: DO-8212		OUT D00	1		0		X1.1	IO00_BEF01		DO_SC_1POL - Single Command Outpu...
IOM 1: DO-8230		OUT D17	0		0		X2.8	IO01_EM25		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D16	0		0		X2.7	IO01_EM24		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D15	0		0		X2.6	IO01_EM23		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D14	0		0		X2.5	IO01_EM22		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D13	0		0		X2.4	IO01_EM21		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D12	0		0		X2.3	IO01_EM20		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D11	0		0		X2.2	IO01_EM19		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D10	0		0		X2.1	IO01_EM18		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D07	0		0		X1.8	IO01_EM17		DO_SI - Digital Output - Single Point Info...
IOM 1: DO-8230		OUT D06	0		0		X1.7	IO01_EM16		DO_SI - Digital Output - Single Point Info...

Focus - Test and overwrite I/O data points:
- Simulate a non-existent sensor
- Testing the logic in sensor limit ranges

SICAM A8000 CP-8050
CP-8050 Package V4.30

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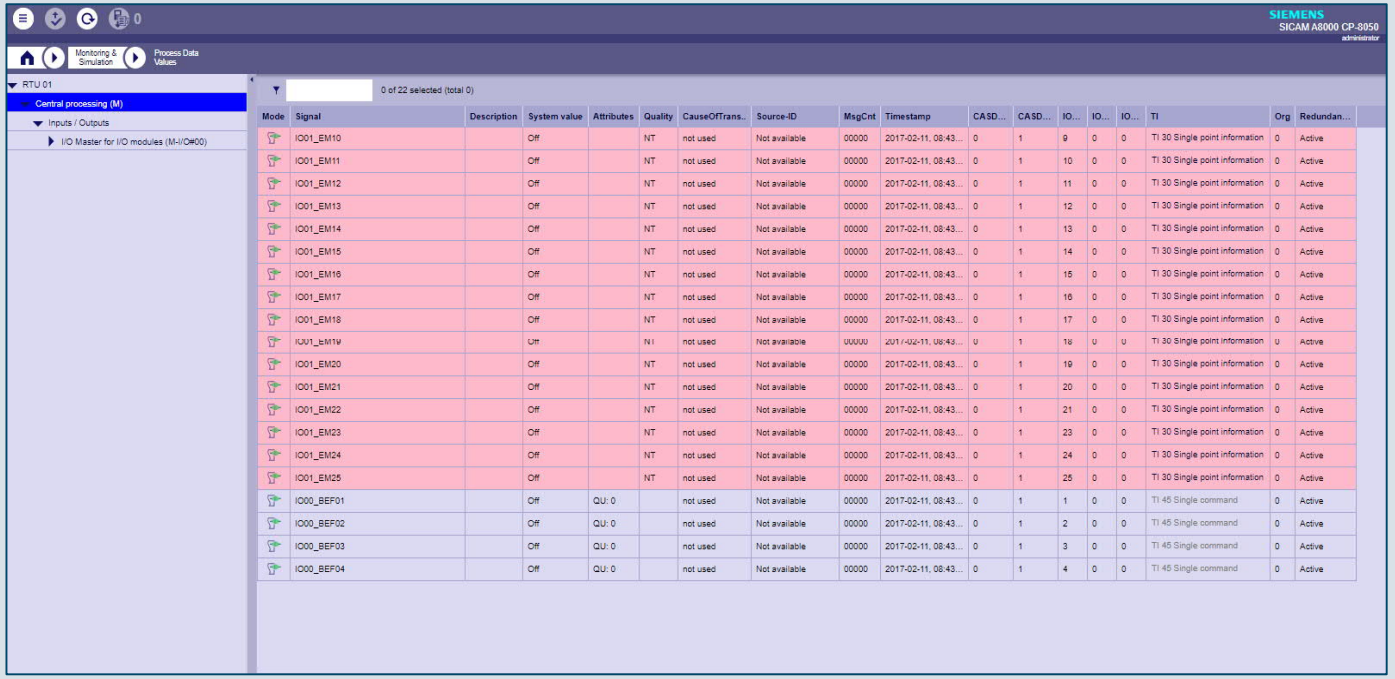
SICAM Web functions

- System load
- Firmware overview
- Wiring test of the I/O s
- I/O datapoint simulation
- **Monitoring of current signal states**
- Ethernet Packet Capture (Wireshark)



Mode	Signal	Description	System value	Attributes	Quality	CauseOfTrans..	Source-ID	MsgCnt	Timestamp	CASD...	CASD...	IO...	IO...	IO...	TI	Org	Redundan...
	IO01_EM10		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	9	0	0	TI 30 Single point information	0	Active
	IO01_EM11		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	10	0	0	TI 30 Single point information	0	Active
	IO01_EM12		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	11	0	0	TI 30 Single point information	0	Active
	IO01_EM13		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	12	0	0	TI 30 Single point information	0	Active
	IO01_EM14		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	13	0	0	TI 30 Single point information	0	Active
	IO01_EM15		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	14	0	0	TI 30 Single point information	0	Active
	IO01_EM16		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	15	0	0	TI 30 Single point information	0	Active
	IO01_EM17		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	16	0	0	TI 30 Single point information	0	Active
	IO01_EM18		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	17	0	0	TI 30 Single point information	0	Active
	IO01_EM19		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	18	0	0	TI 30 Single point information	0	Active
	IO01_EM20		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	19	0	0	TI 30 Single point information	0	Active
	IO01_EM21		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	20	0	0	TI 30 Single point information	0	Active
	IO01_EM22		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	21	0	0	TI 30 Single point information	0	Active
	IO01_EM23		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	23	0	0	TI 30 Single point information	0	Active
	IO01_EM24		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	24	0	0	TI 30 Single point information	0	Active
	IO01_EM25		Off		NT	not used	Not available	00000	2017-02-11, 08:43:...	0	1	25	0	0	TI 30 Single point information	0	Active
	IO00_BEF01		Off	QU: 0		not used	Not available	00000	2017-02-11, 08:43:...	0	1	1	0	0	TI 45 Single command	0	Active
	IO00_BEF02		Off	QU: 0		not used	Not available	00000	2017-02-11, 08:43:...	0	1	2	0	0	TI 45 Single command	0	Active
	IO00_BEF03		Off	QU: 0		not used	Not available	00000	2017-02-11, 08:43:...	0	1	3	0	0	TI 45 Single command	0	Active
	IO00_BEF04		Off	QU: 0		not used	Not available	00000	2017-02-11, 08:43:...	0	1	4	0	0	TI 45 Single command	0	Active

Monitoring of current signal status in the device

SICAM A8000 CP-8050
CP-8050 Package V4.30

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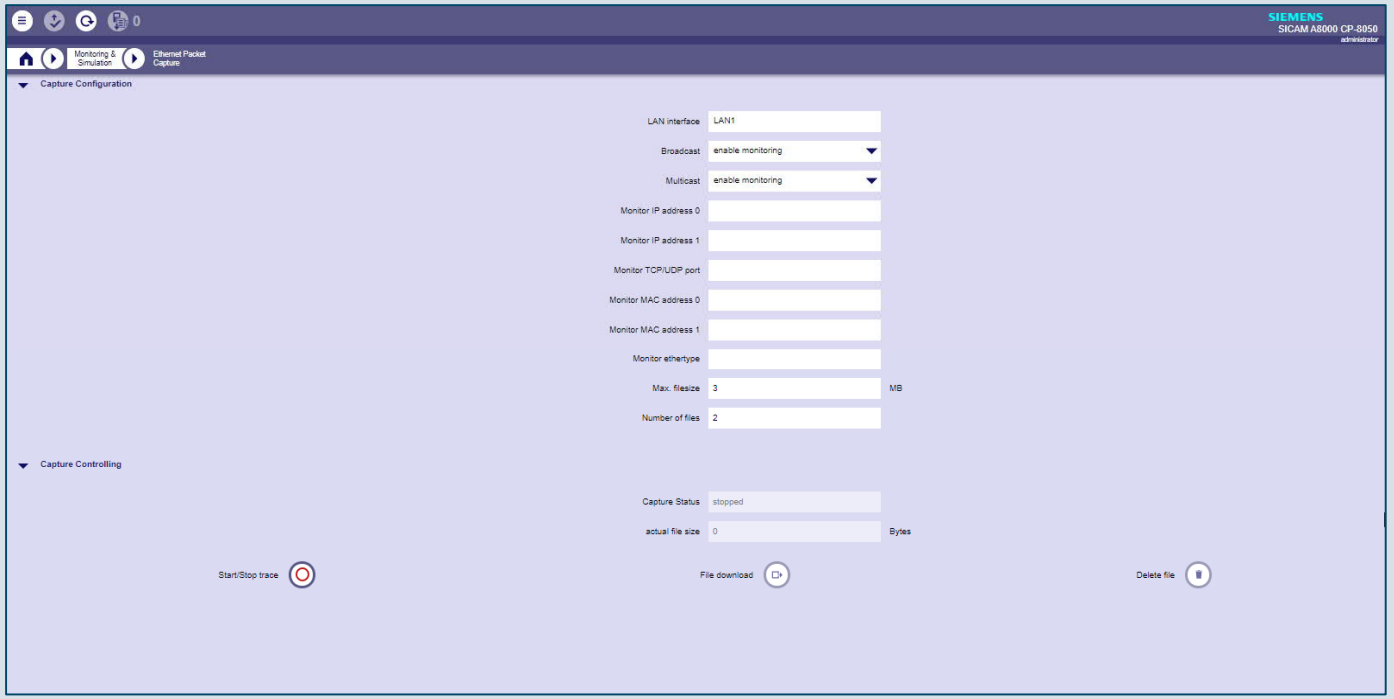
SICAM Web functions

- System load
- Firmware overview
- Wiring test of the I/O s
- I/O datapoint simulation
- Monitoring of current signal states
- **Ethernet Packet Capture (Wireshark)**



Used for logging/tracing of TCP/IP packets which enter or leave the device via the various LAN connections.

SICAM Application - SIAPP on CP-8050

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SICAM Application - SIAPP on CP-8050

What´s SIAPP

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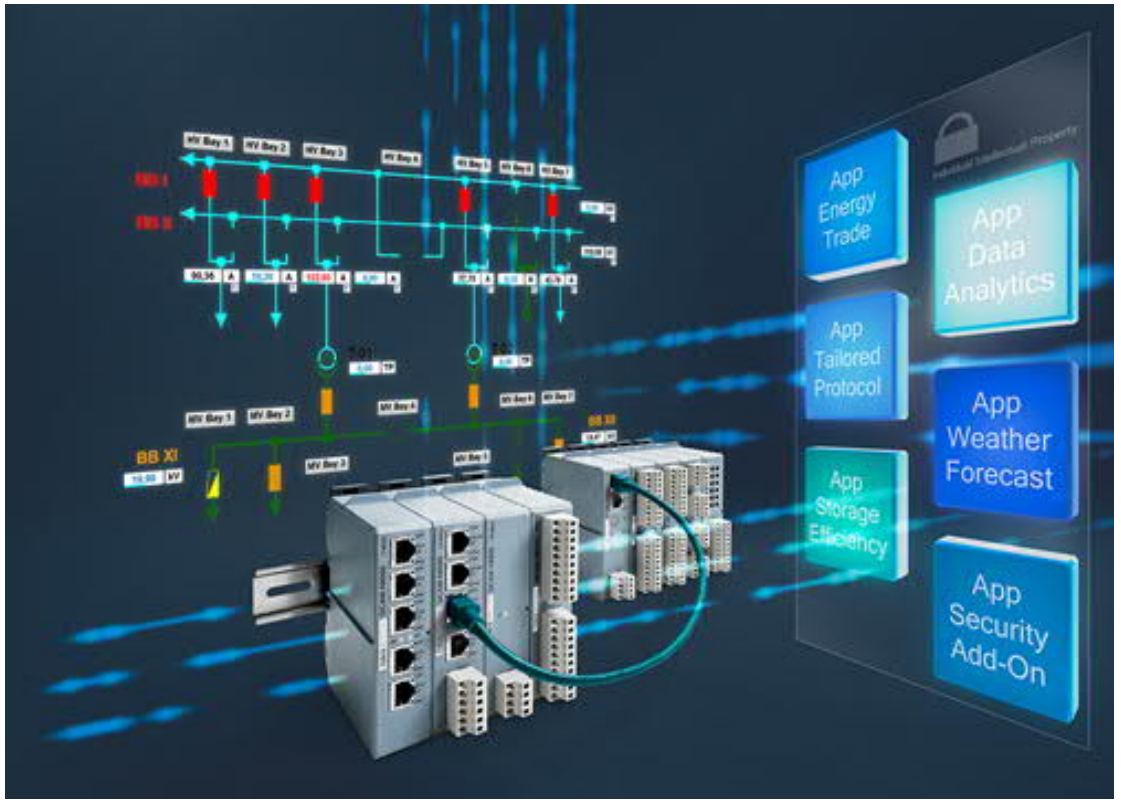
"SIAPP allows up to three separate custom applications to be developed, parameterized and loaded onto the RTU"



Sample Applications

- Transformer Controller
- Optimization of energy storages
- Weather forecast to optimize control and feed-in algorithms of renewable power plants.
- Cost optimization during energy trading

Customer Benefits

- Reducing Hardware / 3rd Party-Devices
- Run customized APPs on a rugged hardware
- Use RTU data without physical interfaces
- Use existing features of SICAM A8000 System

SICAM Application - SIAPP on CP-8050

How does SIAPP work

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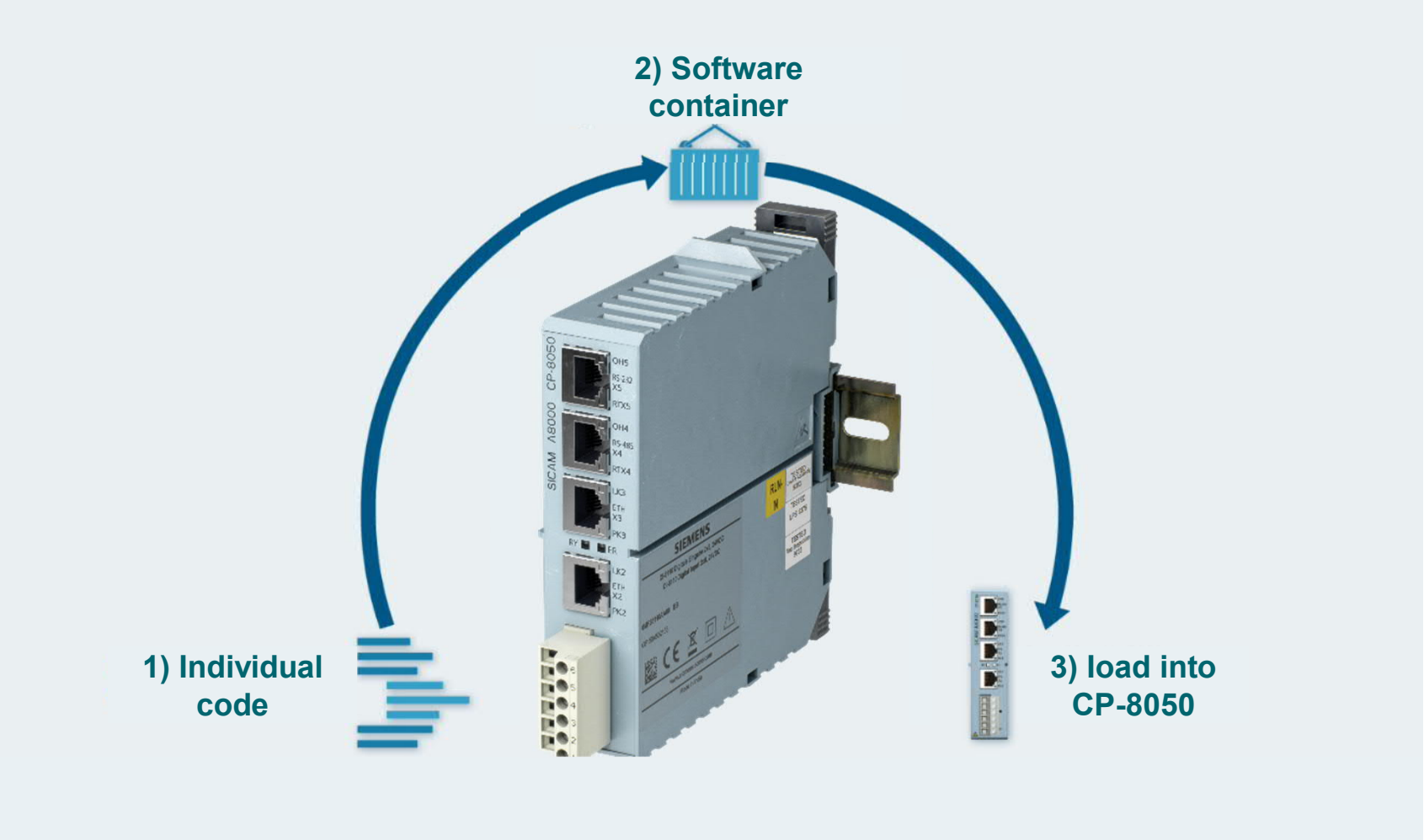

SIAPP, more performance in only 3 basic steps

1) Write the code for your special requirement
2) Pack this code into a software container
3) Load this software container with SICAM Web into the CP-8050 processor module

With the A8000 features

- Rugged hardware
- Extensive RTU functionality
- Tested communication protocols
- Etc.

SICAM A8000
Requirements for SIAPP

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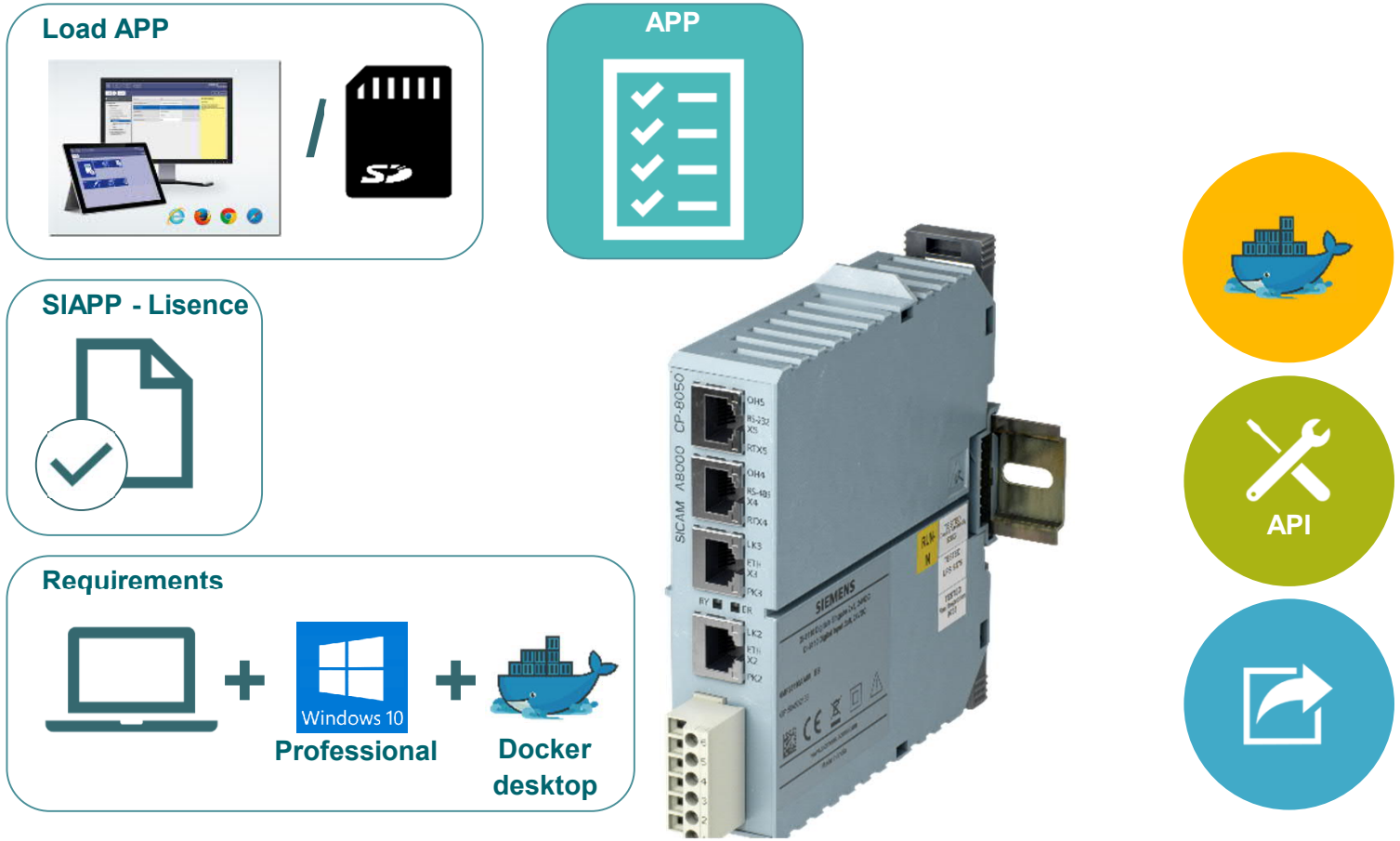

Requirements

- **SICAM A8000 CP-8050**
- Standard **PC with Windows 10**
- **SIAPP runtime license**
- **SIAPP SDK** download from Github. Programming and testing with the supplied API (application programming interface) **www.github.com/siemens**
- **Docker Desktop**, for building SIAPP (Docker Container) www.docker.com
- Load SIAPP into the CP-8050 via SICAM WEB or via SD card

SICAM GridEdge software on CP-8050 Hardware

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IoT Applications

Siemens Apps | Customer Apps | 3rd Party Apps

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MindSphere

RTU/Automation	Protection	Protection	Protection	IoT Gateway	Power Quality	SDA	SDA
SICAM A8000	SIPROTEC 4/5	SIPROTEC Compact	Reyrolle	IoT Gateway 1050	SICAM Q200	SICAM FCG	SICAM FSI

SICAM GridEdge software on CP-8050 Hardware

Makes IoT connectivity and security easy

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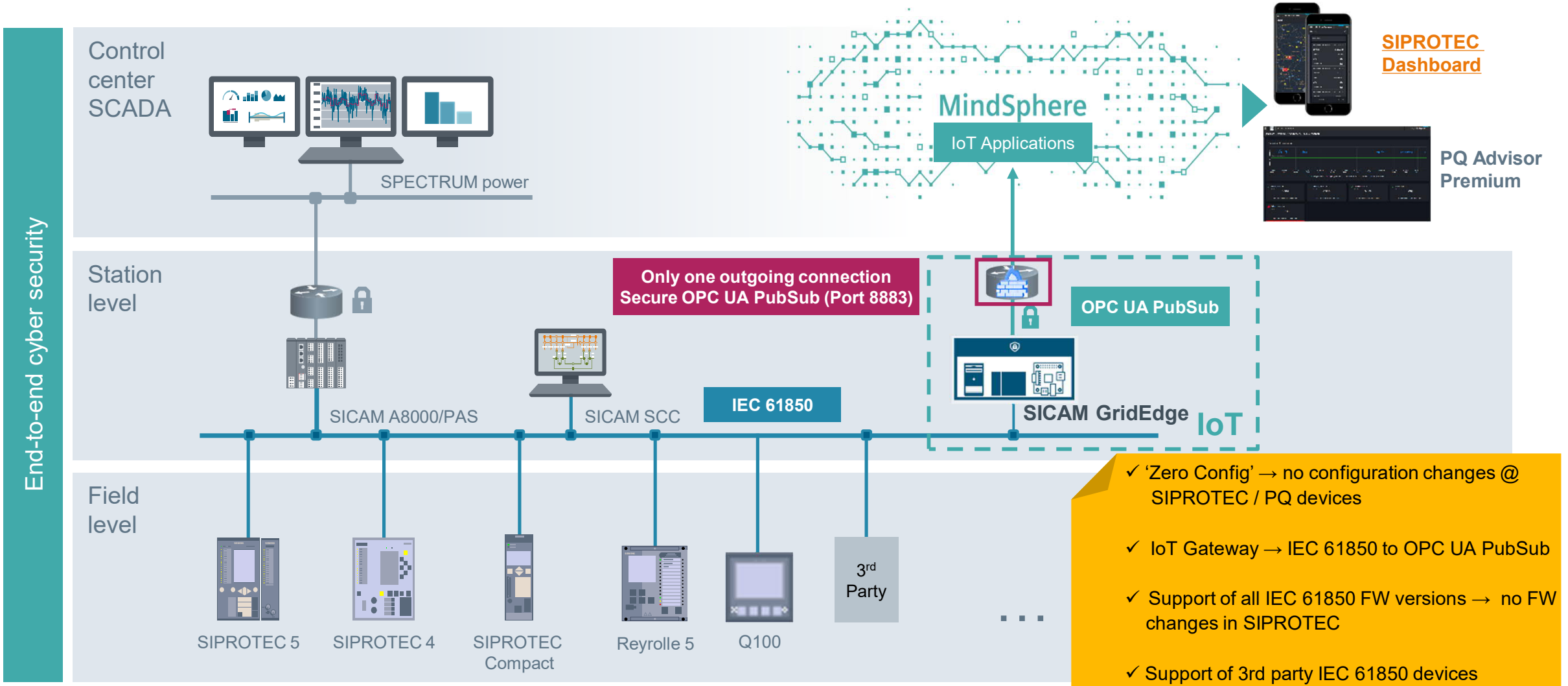

- ✓ 'Zero Config' → no configuration changes @ SIPROTEC / PQ devices
- ✓ IoT Gateway → IEC 61850 to OPC UA PubSub
- ✓ Support of all IEC 61850 FW versions → no FW changes in SIPROTEC
- ✓ Support of 3rd party IEC 61850 devices

SICAM Device Manager

Substation Automation & Protection brugermøde 2020

SICAM Device Manager
Version 3.30

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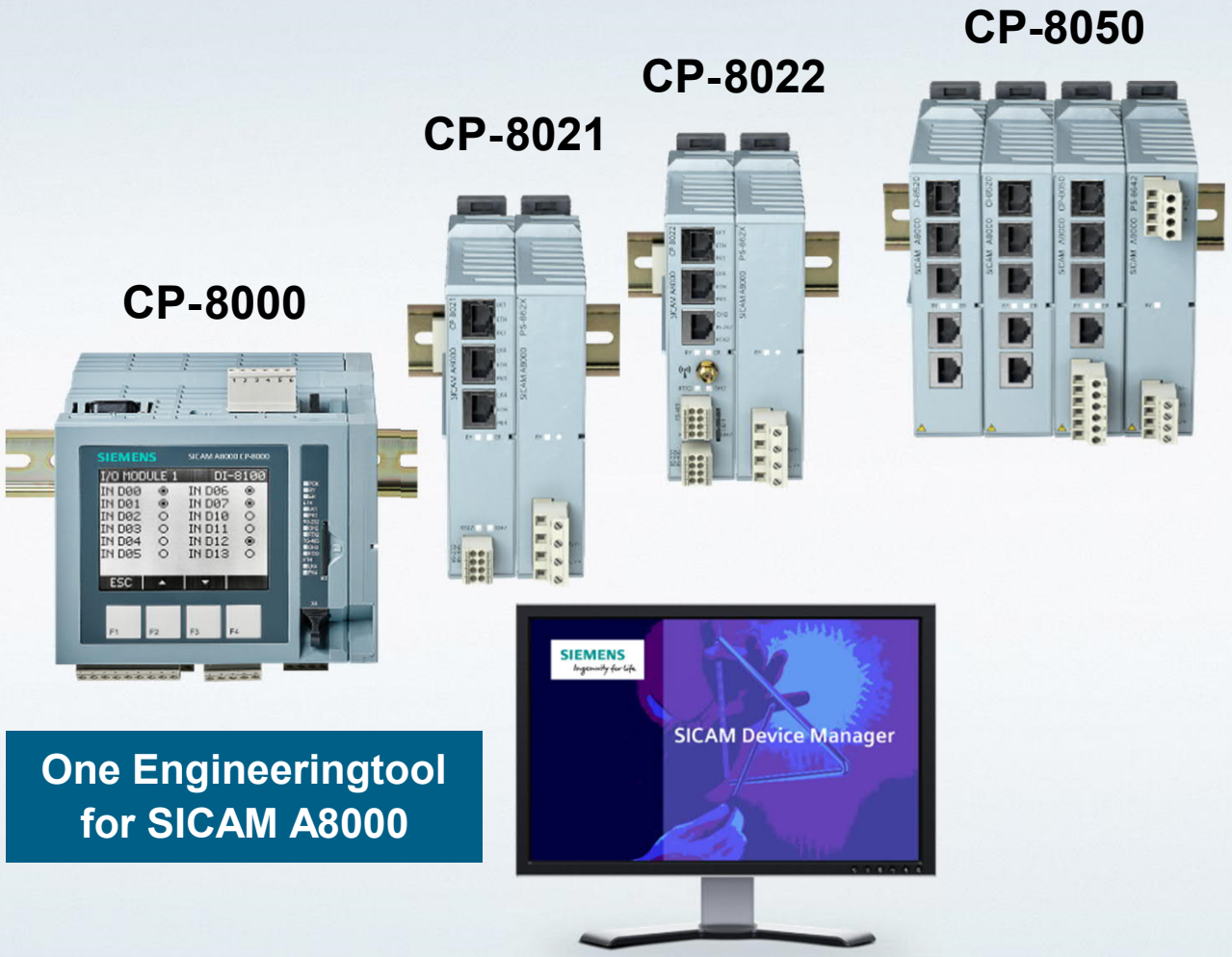

One Engineeringtool for SICAM A8000

New features:

- IEC61850 Server - Data model export/import per IED
- IEC61850 Server - View GOOSE data per IED
- Enhancements for IEC61131-3 Support Language Structured Text
  - Support LOCAL and INTERFACE variables of data type STRUCT inside ST-Code
  - Support LOCAL ST-Code variables of data type ARRAY
  - Support local ST-Code variables of data type LREAL
- CFC Support Structures IEC 60870-5-104 Type Identifications

SICAM Device Manager
IEC 61850 Configuration

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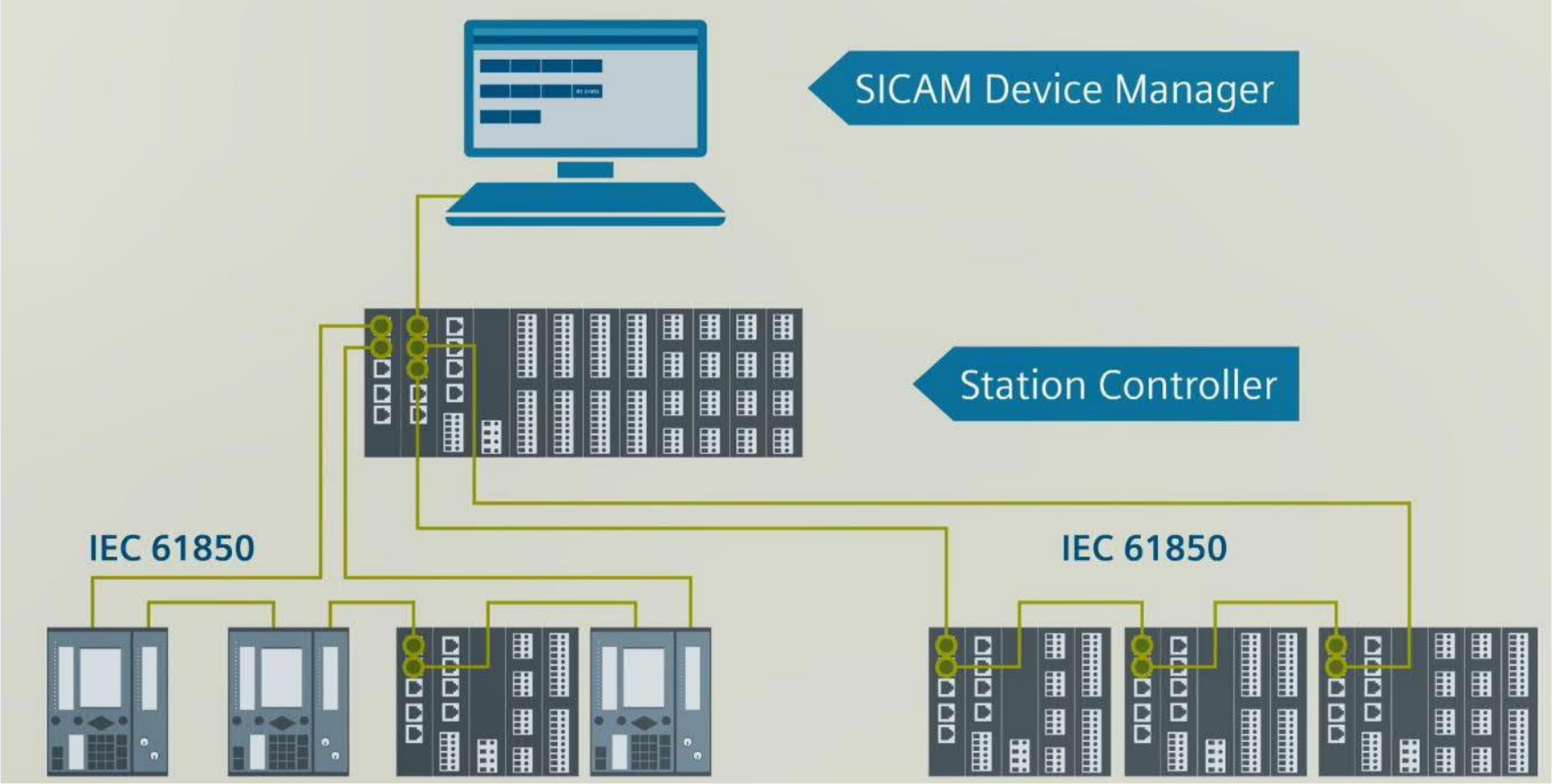
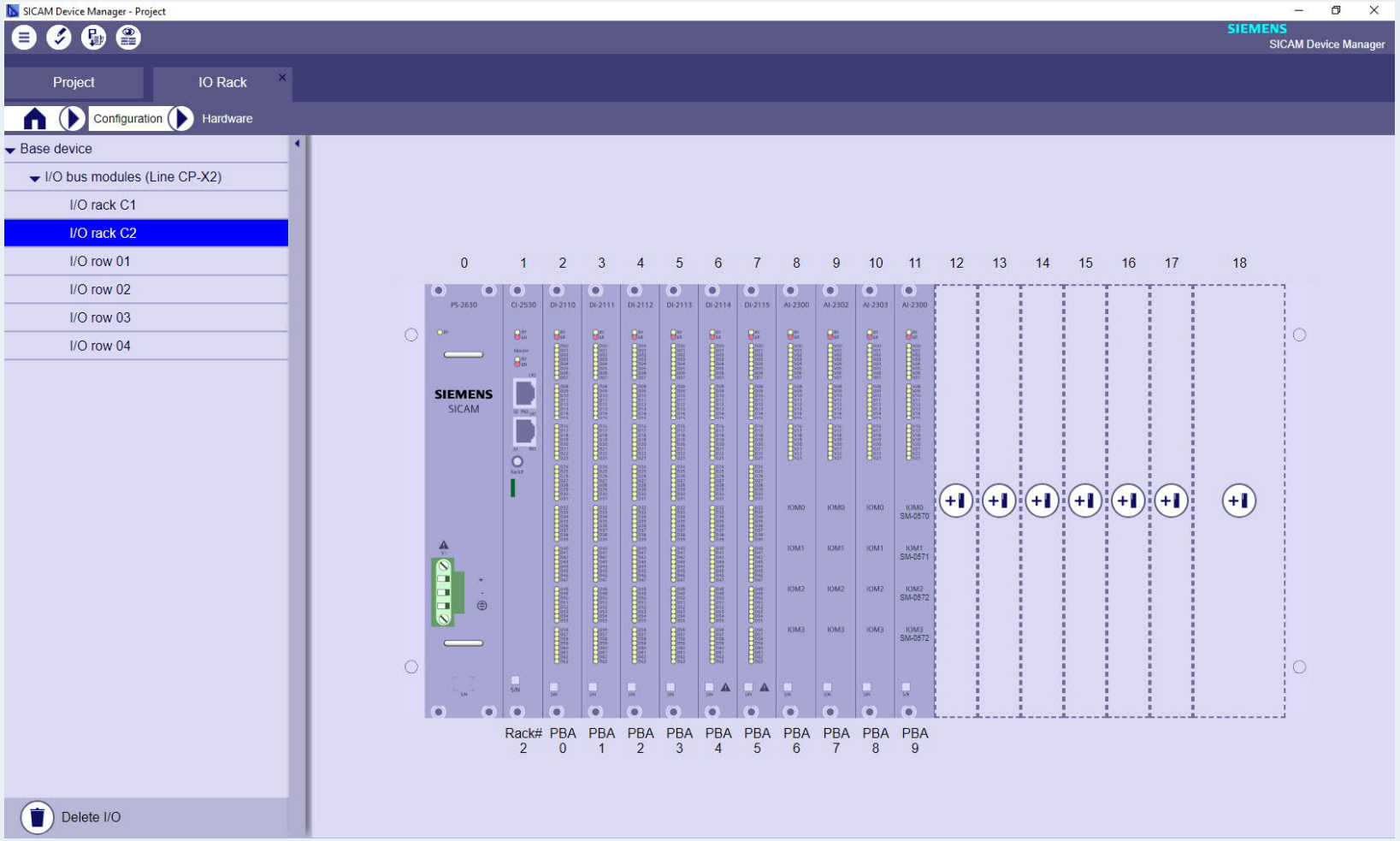


Client:
Import SCL-File
incl. mapping IEC104

Server:
Define Data model
based on a cataloge

Export IID-File
to System Configurator

SICAM Device Manager
SICAM A8000 I/O Rack solution



Online Software Delivery (OSD)

Substation Automation & Protection brugermøde 2020

Online Software Delivery
Software products with electronic delivery

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The following software products can now be delivered electronically to Digital Grid customers via the Online Software Delivery (OSD) platform:

- SICAM Device Manager
- SICAM GridPass
- SICAM PQ Analyzer
- PQ Advisor Compact
- SICAM A8000 Software Licenses
- … many more Digital Grid software products in the near future

Advantages of OSD

- ✓ At the push of a button access to the installer of the software package!
- ✓ Faster than any delivery method, i.e. get started immediately after purchasing the software!
- ✓ Simplified handling of software deliveries incl. licenses and documentation

And this is how it works

- ✓ Order the download of the software, the software update service and the corresponding licenses via the I-Mall or your sales partner
- ✓ You will then receive your access data by e-mail to download the license, certificate and software.

Online Software Delivery
Step 1: Login to Online Software Delivery

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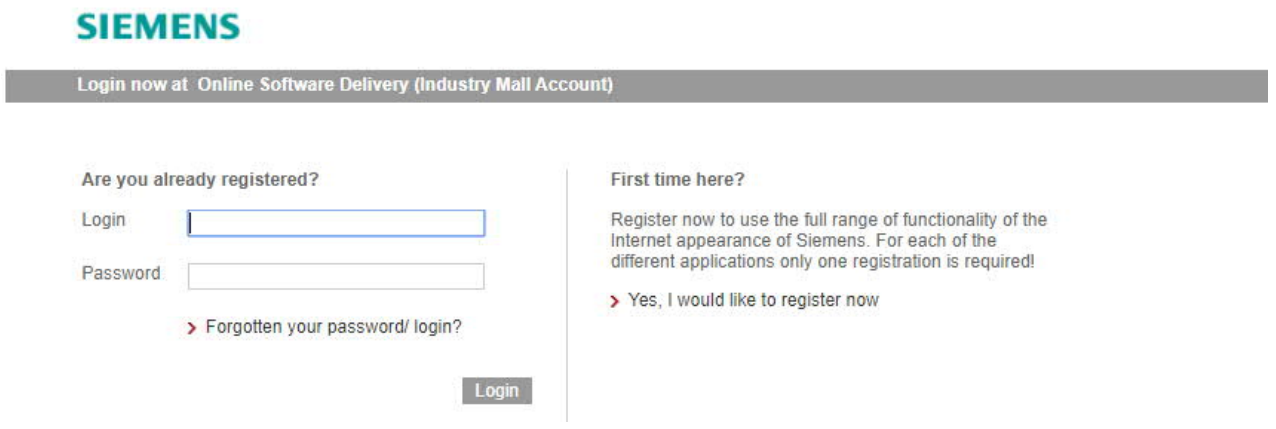
1	**Login to Online Software Delivery**
2	Download of certificates
3	Transfer of License Key
4	Download of Software

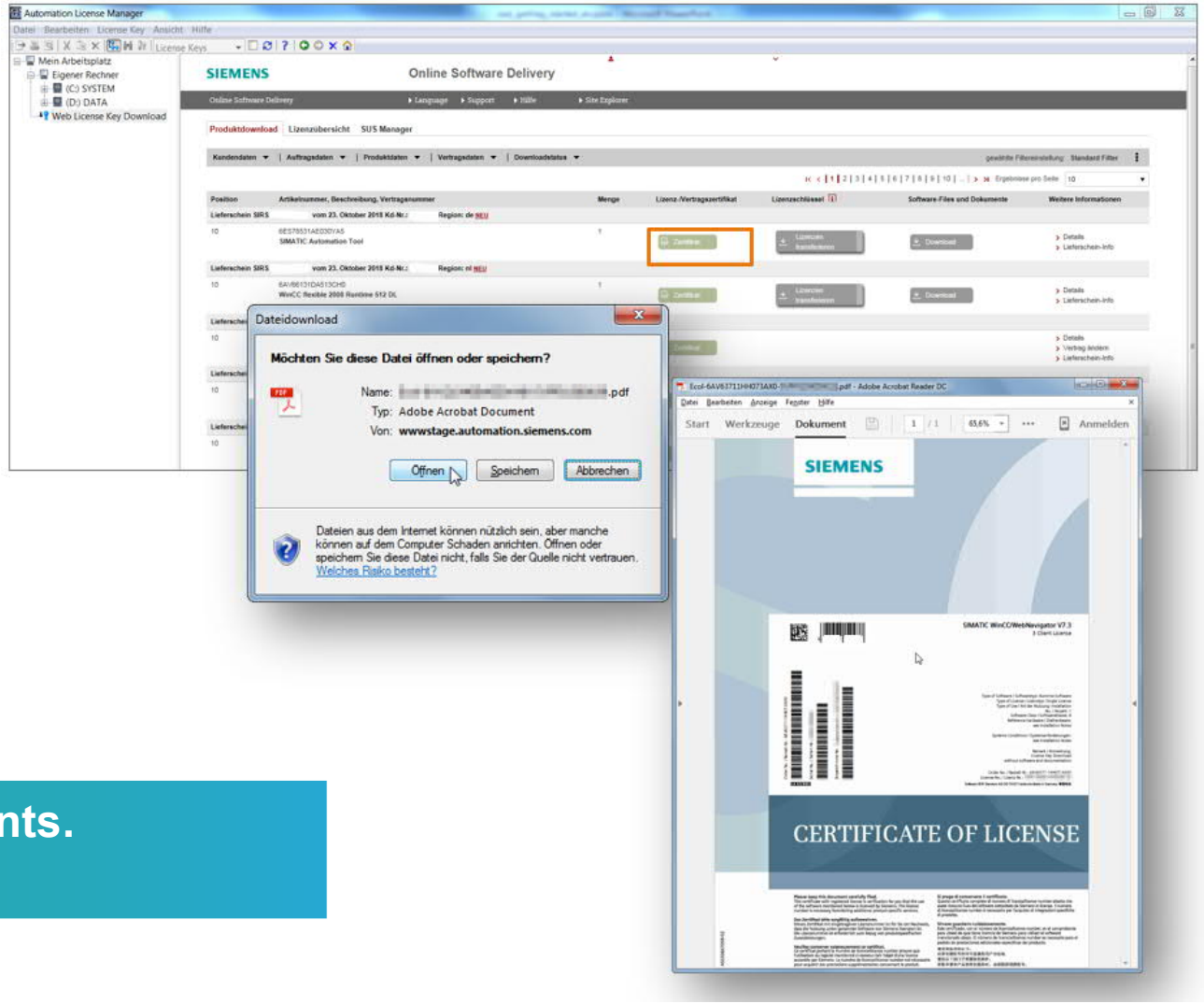


Afterwards you are logged in to Online Software Delivery (OSD) and have access to all your data.

Online Software Delivery
Step 2: Download of certificates

SIEMENS
Ingenuity for life

1	Login to Online Software Delivery
2	**Download of certificates**
3	Transfer of License Key
4	Download of Software

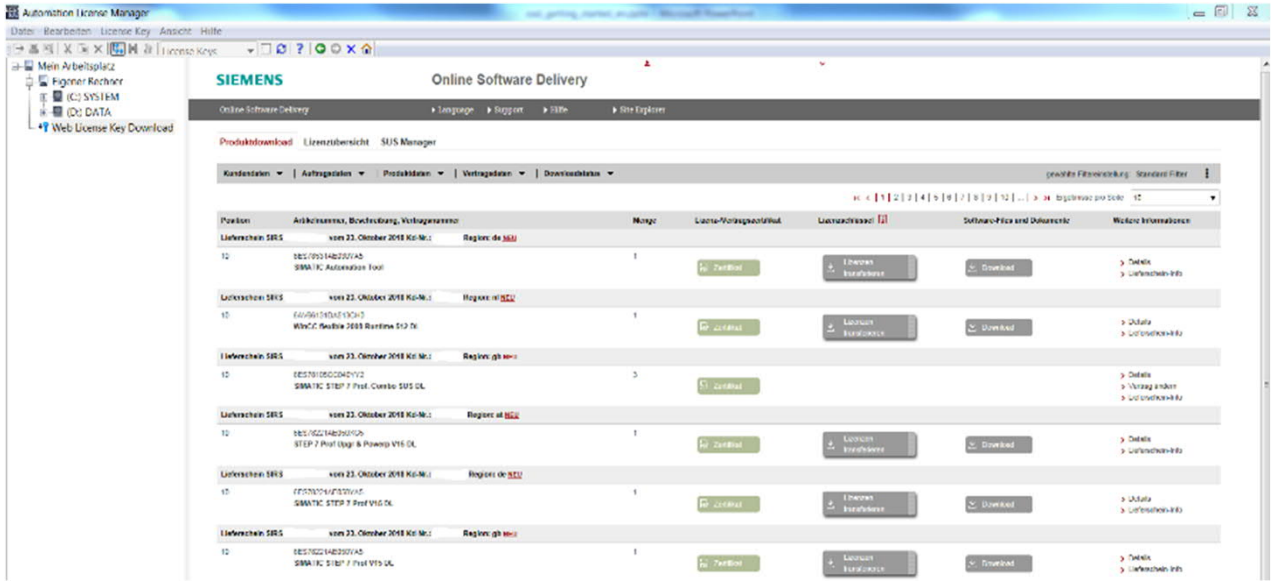


Save the certificate for your personal documents.

Online Software Delivery
Step 3: Transfer of License Key

SIEMENS
Ingenuity for life

1. Login to Online Software Delivery
2. Download of certificates
3. **Transfer of License Key**
4. Download of Software



The license key is now on your local drive

Online Software Delivery
Step 4: Download of Software

SIEMENS
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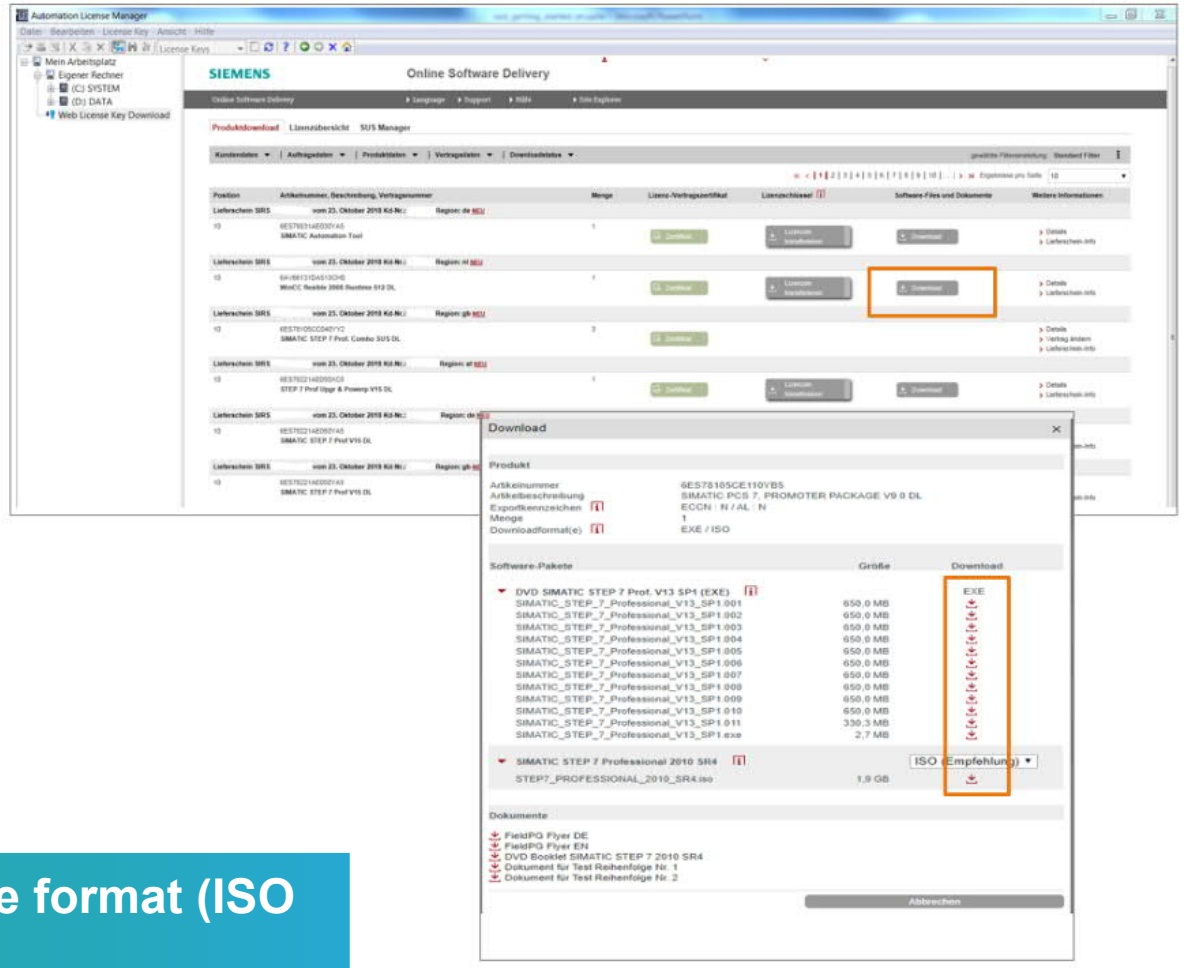
1	Login to Online Software Delivery
2	Download of certificates
3	Transfer of License Key
4	**Download of Software**



Save the software files on your local drive - file format (ISO or EXE)

Distribution Automation

Substation Automation & Protection brugermøde 2020

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Distribution Automation

Fast identification of the section with grid fault

- Monitoring of the Distribution Grid (topological states)
- Measurement in medium voltage grids
- Measurement - Current and voltage values from the medium- and low-voltage side
- Remotely controllable switch-disconnectors and circuit-breakers
- Intelligent short-circuit, earth fault direction indicators (Feeder Condition Monitor)

- Measurement in low voltage grids NEW

SICAM FCM

Measurement and fault detection in Low Voltage grids NEW

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Low-Power

Wide range current sensor

SICAM FCM

Measurement and fault detection in Low Voltage grids

NEW

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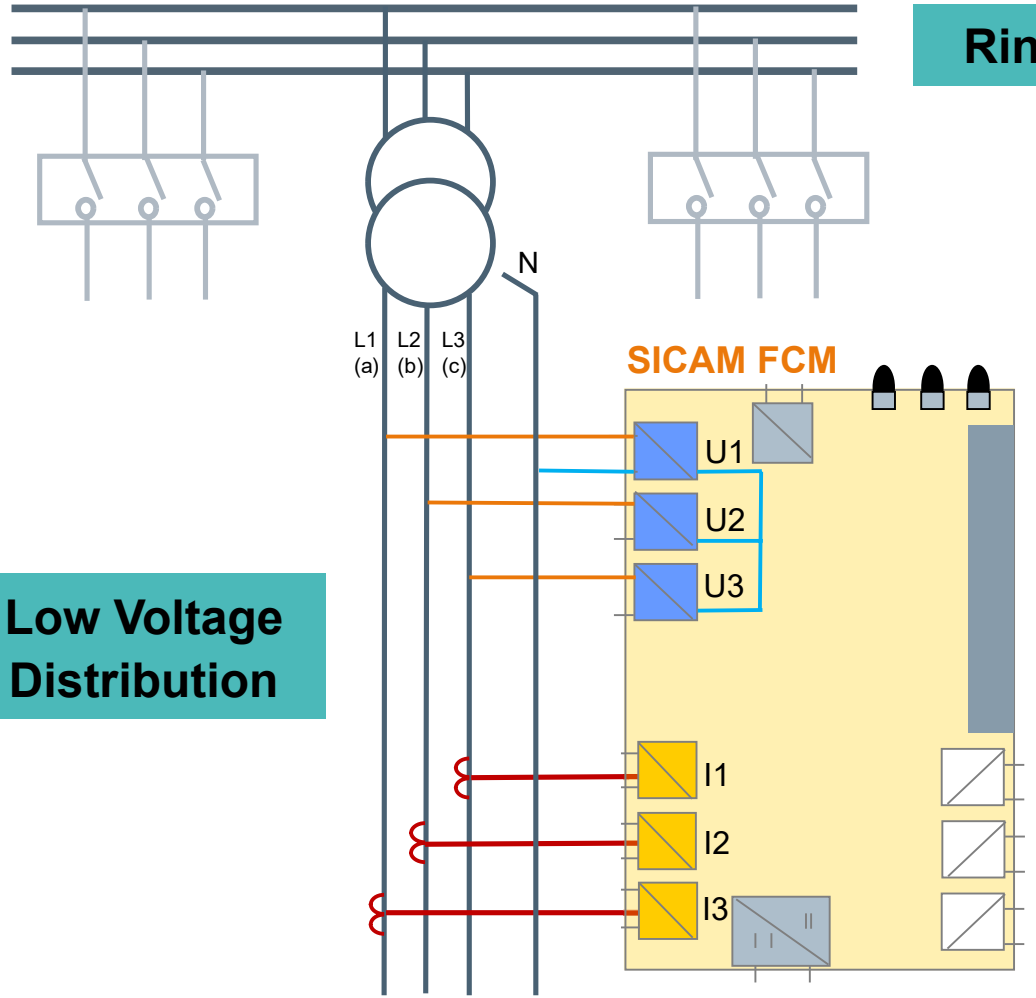

Functions

- Direct voltage measurement (230V)
- Phase sensors connected to L1/L2/L3 (225mV)
- Short circuit detection
- Delivers measurements and derived values of: U / I / cosφ / P / Q / S / f / load-flow direction and energy
- Accuracy class 0,5 with correction factors

SICAM FCM

Possibilities for Current measurements on Low Voltage side NEW

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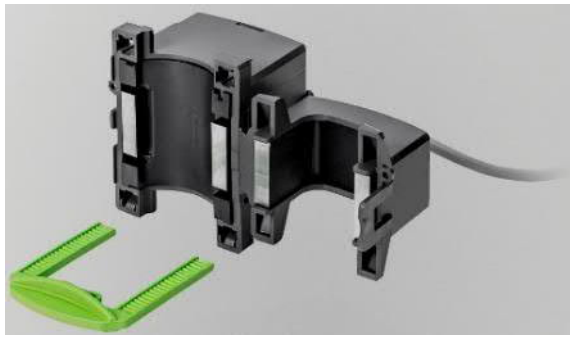
Low Power Sensors
IEC 61869-10/IEC 60044-8

- Directly connected to SICAM FCM
- 225mV measuring signal at nominal current measuring error SICAM FCM: ~ 0,5 %
- Split core sensor with easy handling
- No protection measures necessary
- For cable up to 28mm, respectively 44mm diameter
- Small form factor
- Installation without tools
- 7m connection cable to avoid additional clamps



Distribution Automation
DSO Cubicle

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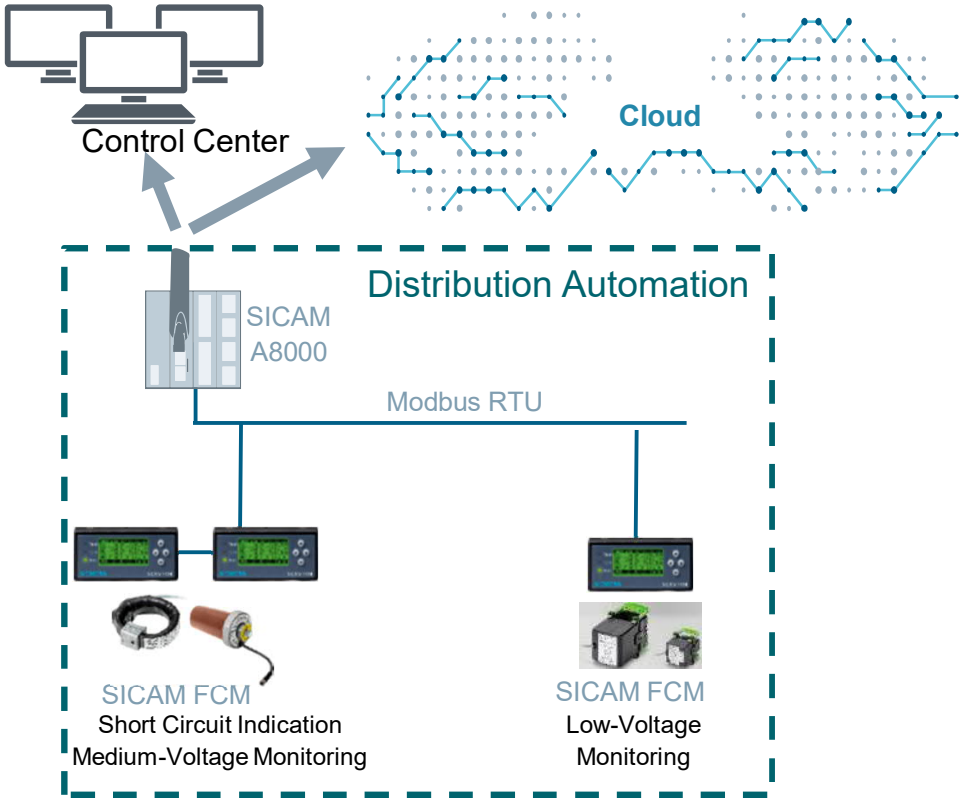
- RTU SICAM A8000
- Mobile LTE Router Welotec TK800 Series
- Power Supply, UPS & Battery
- IEC 60850-5-104 to Control Center
- IoT connectivity to Cloud application (OPC-UA-PubSub)



Distribution Automation
DSO Cubicle variants

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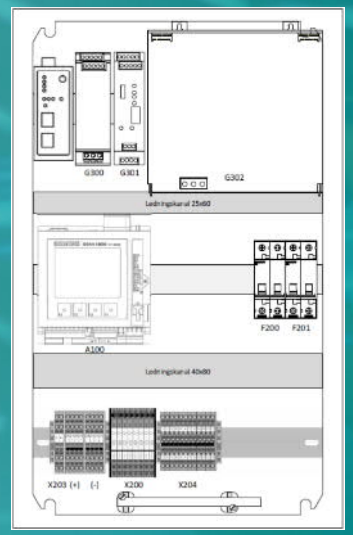
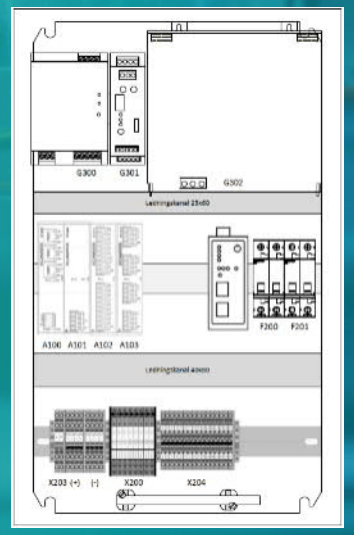
SICAM CP-8000, Type 1 - 4

- SICAM CP-8000
- External SICAM I/O Modules
- Mobile LTE Router Welotec TK800 Series
- Power Supply (5A, 10A, 20A)
- UPS (10A, 20A)
- Battery (12Ah)
- RITTAL, BHD: 380x600x210 mm



CP-8021, Type 1 - 10

- SICAM CP-8021
- External SICAM I/O Modules
- Mobile LTE Router Welotec TK800 Series
- Power Supply (5A, 10A, 20A)
- UPS (10A, 20A)
- Battery (12Ah)
- RITTAL, BHD: 380x600x210 mm
- RITTAL, BHD: 600x380x210 mm
- RITTAL, BHD: 800x600x300 mm



E-Business with Siemens Industry Mall (I-Mall)

Substation Automation & Protection brugermøde 2020

E-Business with Siemens Industry Mall (I-Mall)

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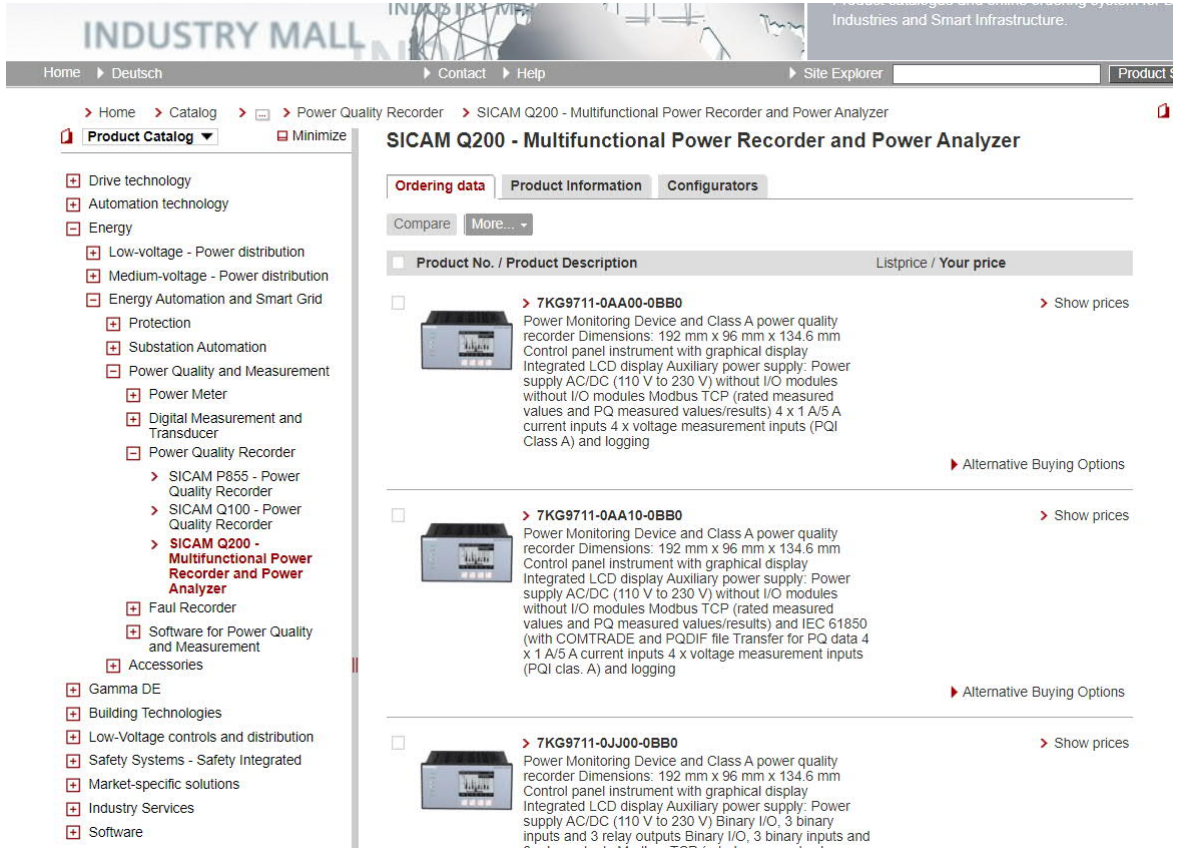
Digitalize your buying process

Digital buying!
Online catalogue including our products for
Substation Automation and **Protection** technology

- Up-to-date product descriptions and information
- Price data
- Check availability and delivery date
- Product lifecycle information
- Ordering online with orders overview and tracking (track and trace)
- Data sheets, manuals and firmware



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E-Business with Siemens Industry Mall (I-Mall)

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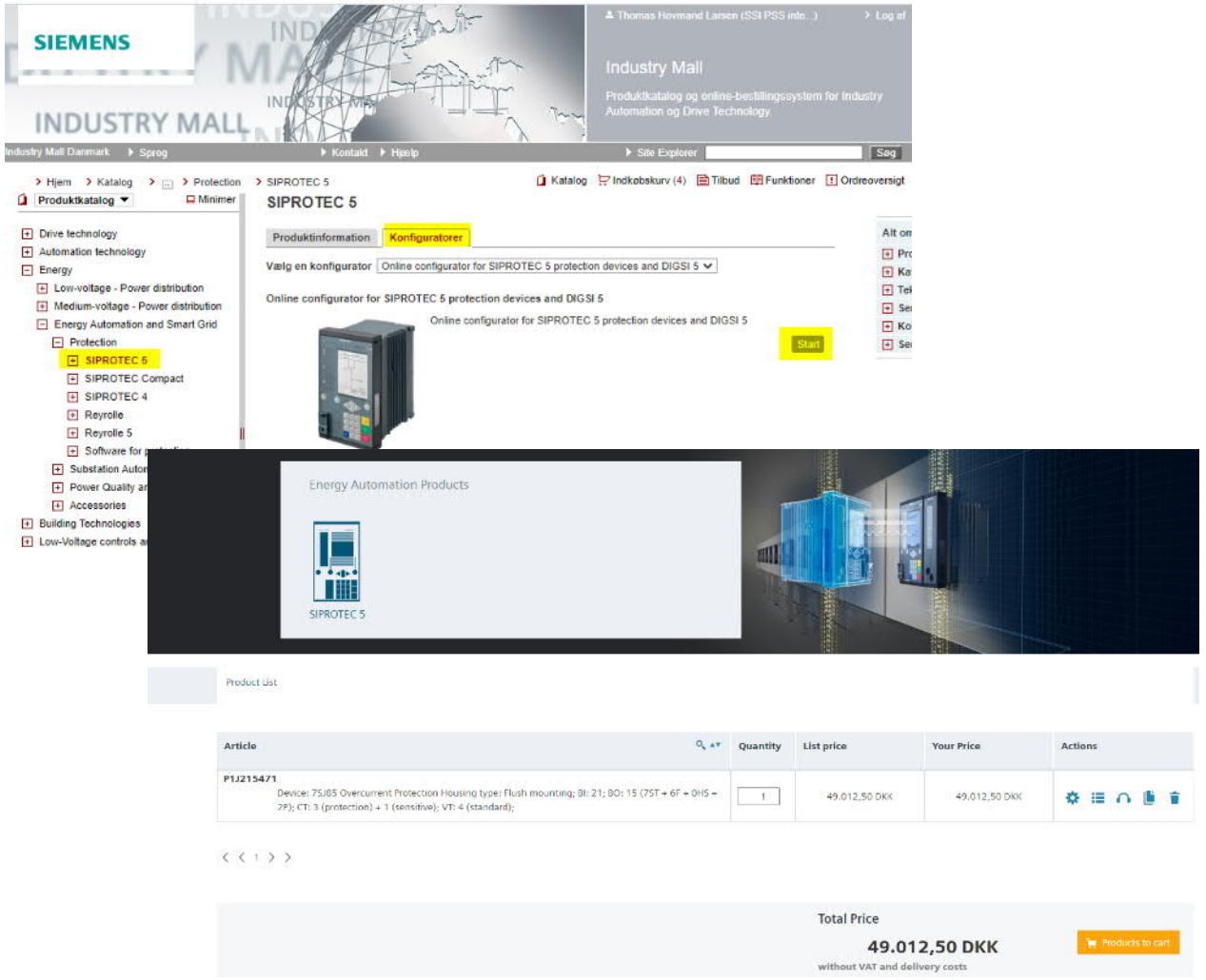
Configuration of your Energy Automation products

Smart configuration tools support your product selection:

Configure and order your individual **SICAM** or **SIPROTEC** products **according to your demands** directly in the Industry Mall!

- Energy Automation Products
  - Protection
    - Online configurator for SIPROTEC 5 protection devices and DIGSI 5
    - SIPROTEC 7RW80 – Voltage and Frequency Protection
    - SIPROTEC 7SD80 – Line Differential Protection
    - SIPROTEC 7SJ61 - Overcurrent Protection
    - SIPROTEC 7SJ62 - Overcurrent Protection
    - SIPROTEC 7SJ63 - Overcurrent Protection
    - SIPROTEC 7SJ64 - Overcurrent Protection
    - SIPROTEC 7SJ66 - Feeder and overcurrent protection
    - SIPROTEC 7SJ80 - Overcurrent Protection Relay
    - SIPROTEC 7SJ81 – Overcurrent Protection for connection to low-power transformers
    - SIPROTEC 7SK80 – Motor Protection
    - SIPROTEC 7SK81 – Motor Protection for connection to low-power transformers
    - SIPROTEC 7UM621/2/3 -Multifunction generator and motor protection relay
    - SIPROTEC 7UT612 - Transformer Differential Protection
    - SIPROTEC 7UT613 - Transformer Differential Protection
  - Substation Automation
    - SICAM A8000 - Remote Terminal Unit (RTU) SICAM A8000 Series
  - Power Quality and Measurement
    - SICAM MMU - Measurement and Monitoring Unit
    - SICAM P50 - Power Meter
    - SICAM P55 - Power Meter
    - SICAM Q100 - Power Quality Recorder
    - SICAM Q200 - Multifunctional Power Recorder and Power Analyzer
    - SICAM T - Multifunctional Transducer
    - SICAM P850 - Power Meter
    - SICAM P855 - Power Quality Monitoring



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Kontaktoplysninger

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Thomas Hovmand Larsen
Salgschef
Mobile: +45 51 29 32 25
E-mail: thomas-hovmand.larsen@siemens.com

siemens.com/digital-grid