SINEAX CAM
Universal measuring unit for heavy current variables

Main features

- Consistent measurement (without interruption)
- Suitable for strongly distorted networks, zero crossing or phase angle controls
- I/O interface adaptable to individual requirements
- Configuration and measured value acquisition via USB and Modbus interface
- Acquisition of minimum and maximum values with time stamp
- Graphic display with free measurement display assembling and alarm handling
- Logger for long-term recording of measurement progressions
- Lists for recording events, alarms and system messages

Fig. 1. SINEAX CAM in top-hat rail housing.

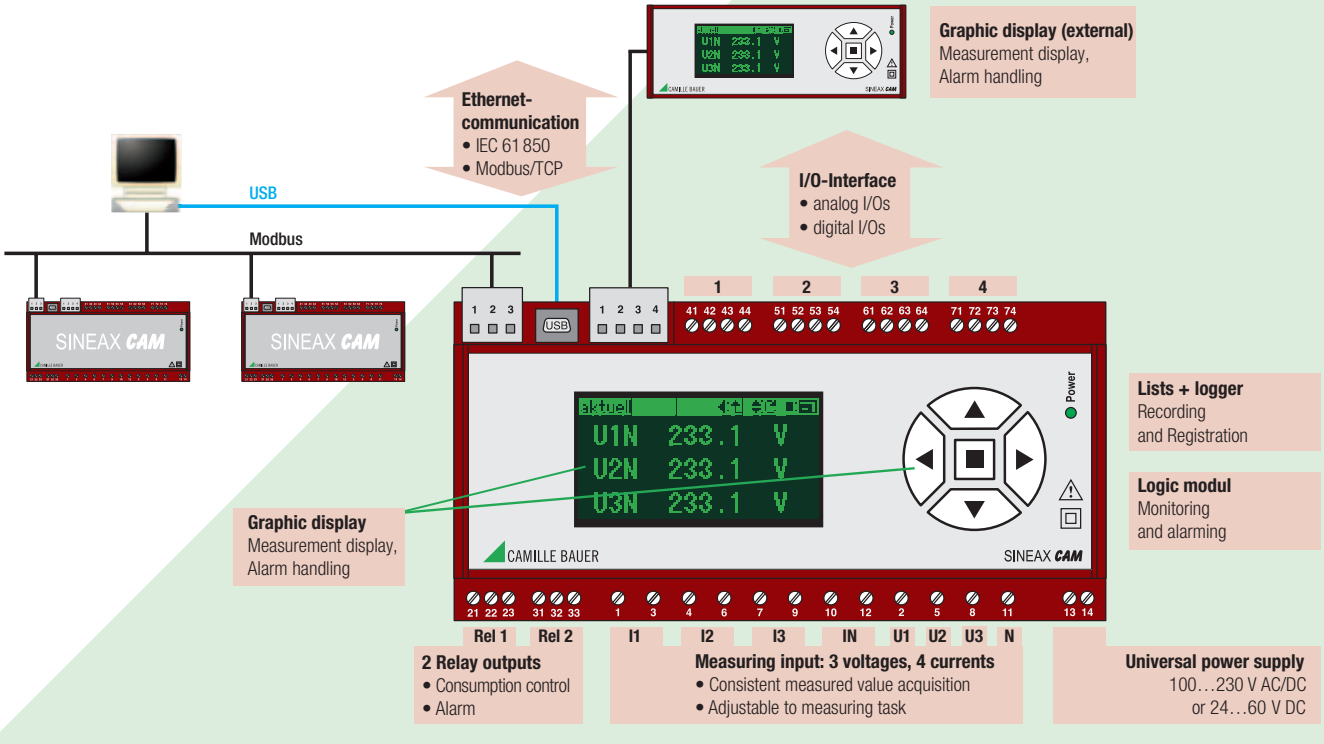
Application

SINEAX CAM is designed for measurements in electric distribution systems or in industrial facilities. Along with the current system state the pollution due to non-linear loads as well as the overall load of the supply system can be detected. Consistent measurement also guarantees that every network change is reliably acquired and included in measured data. The high-performance measuring system makes the device also suitable for strong distorted systems as well as for zero crossing or phase-angle controls.

The I/O interface may be individually assorted depending on the application. Up to 4 modules with different functionality may be used.

The logger allows long-term recordings of measurement progressions, e.g. to monitor the variable load of transformers, as well as meter readings at definable times. Lists offer the chronological recording of events, alarms or system messages for further analysis of occurrences in the power system.

The graphic display is intended for on-site visualization of measurements, lists and alarms. Via keypad the user can e.g. acknowledge alarms or reset extreme values.



For the *time synchronization* of devices via Ethernet, *NTP* (Network Time Protocol) is the standard. Respective time servers are used in computer networks and are at free disposal via Internet as well. By means of NTP all devices can be used with a common time base.

Applications

– Test stands for aggregates: Recording of the dynamic behaviour of motors and generators.
– Remote monitoring and acquisition of power distribution systems via Intranet / Internet.
– Recording of the dynamic loading of energy supply systems.

IEC 61850 support (optional)

The communication standard IEC 61850 ("Communication networks and systems in substations") is the new standard for substation automation. The CAM with IEC 61850 support is a measuring device which bases on the application of conventional current and voltage transformers. Therefore it is most suitable for the *modemization of substations*, not touching the already installed conventional transformers. It provides the following logical nodes:

MMXU / MMXN: Instantaneous values of voltages, currents, frequency, power quantities and load factors as well as their maximum and minimum values.

MHAI / MHAN: Individual harmonics for voltage and current, THD (total harmonic distortion) and TDD (total demand distortion) and their maximum values.

MMTR: Active and reactive energy meters for incoming and outgoing power. One instance for both high and low tariff.

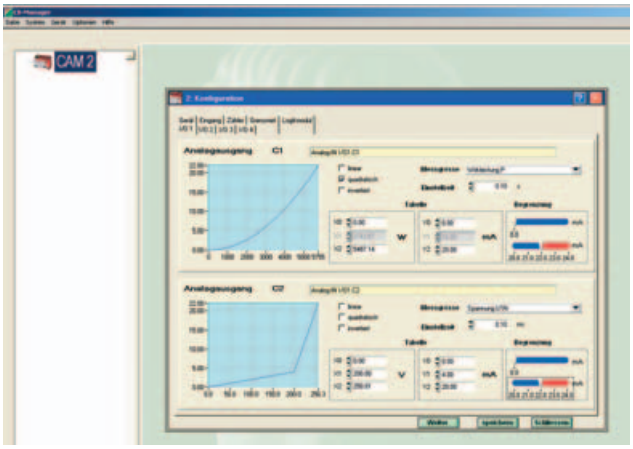
MSTA: Mean values of voltage, current, active, reactive and apparent power as well as their maximum and minimum values on instantaneous values base. All measured within the same interval. These values are provided for each phase as well.

MSQI: Imbalance of voltage and current, calculated in accordance with two different methods.

GGIO: Maps the information of assembled analog and digital input modules. So CAM may be used as an IEC 61850 gateway. By means of GGIO instances state information (e.g. ON/OFF or a self-monitoring signal), analog measurements (e.g. a temperature) or metering pulses (kWh / kVArh) of non IEC 61850 capable external devices can be handled. These measurement data then can be accessed via the IEC 61850 interface.

CB-Manager Software

The PC software CB-Manager which is supplied with each device may be used for the parametrization of the SINEAX CAM. Via USB, RS485 or Ethernet interface all measured data can be read and recorded as well.
The access to the device can be restricted by activating a password protection system. For up to 3 users you may selectively grant the right for configuration, reset or simulation functions.



– Complete parametrization of the device (ONLINE, OFFLINE)
– Read and record all measured data
– Archiving of configuration and measurement data
– Setting and resetting meter contents
– Selective resetting of minimum and maximum values
– Setting of interface parameters
– Trimming of analog inputs
– Simulation of I/O-module functionality
– Comprehensive help function

Ordering information

CAM, programmable, Modbus interface, USB	CAM
Features, Selection	
1. Basic device CAM, for top-hat rail mounting	
Without display	1
With graphic display	2
Without display, with Rogowski current inputs (3V power supply)	3
With graphic display and Rogowski current inputs (3V power supply)	4
Without display, with Rogowski current inputs (4.5V power supply)	5
With graphic display and Rogowski current inputs (4.5V power supply)	6
Without display, with Rogowski current inputs (6V power supply)	7
With graphic display and Rogowski current inputs (6V power supply)	8
Without display, with Rogowski current inputs (9V power supply)	9
With graphic display and Rogowski current inputs (9V power supply)	A
2. Input frequency range	
45 … 50/60 … 65 Hz	1
10 … 50/60 … 70 Hz	2
10 … 50/60 … 140 Hz	3

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3.	**Power supply**	
	Nominal range 100 … 230 V AC/DC	1
	Nominal range 24 … 60 V DC	2
4.	**I/O module 1 (terminals 41-44)**	
	Not used	0
	2 analog outputs, unipolar (0/4…20 mA)	1
	2 analog inputs (0/4…20 mA)	2
	3 digital outputs or 3 digital inputs 24 V DC	3
	2 analog outputs, bipolar ± 20 mA	5
5.	**I/O module 2 (terminals 51-54)**	
	Not used	0
	2 analog outputs, unipolar (0/4…20 mA)	1
	2 analog inputs (0/4…20 mA)	2
	3 digital outputs or 3 digital inputs 24 V DC	3
	2 analog outputs, bipolar ± 20 mA	5
6.	**I/O module 3 (terminals 61-64)**	
	Not used	0
	2 analog outputs, unipolar (0/4…20 mA)	1
	2 analog inputs (0/4…20 mA)	2
	3 digital outputs or 3 digital inputs 24 V DC	3
	2 analog outputs, bipolar ± 20 mA	5
7.	**I/O module 4 (terminals 71-74)**	
	Not used	0
	2 analog outputs, unipolar (0/4…20 mA)	1
	2 analog inputs (0/4…20 mA)	2
	3 digital outputs or 3 digital inputs 24 V DC	3
	HV-Input 110/230 V AC	4
	2 analog outputs, bipolar ± 20 mA	5
	3 digital inputs 125 V DC	6
8.	**Test certificate**	
	Without	0
	Test certificate in German	D
	Test certificate in English	E
9.	**Option data logger**	
	Without data logger	0
	With data logger	1
10.	**Option lists**	
	Without alarm, event, operator list	0
	With alarm, event, operator list	1
11.	**Bus connection**	
	Without	0
	Ethernet, Modbus/TCP-Protocol	1
	Ethernet, IEC 61850-Protocol	2

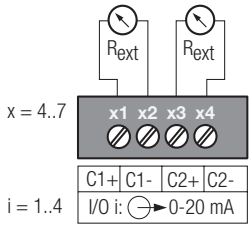
Standard versions SINEAX CAM

Type	I/O interface	Power supply	Article No.
CAM-11100000000	without	100 to 230 V DC, AC	158726
CAM-11111000000	4 analog outputs, unipolar	100 to 230 V DC, AC	158734

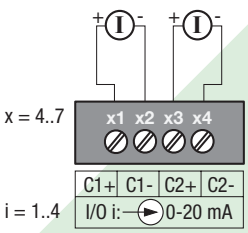
Electrical connections

Screw connections are used. They are designed for cross sections of 4 mm² for single wire leads and 2 x 2.5 mm² for multiwire leads.

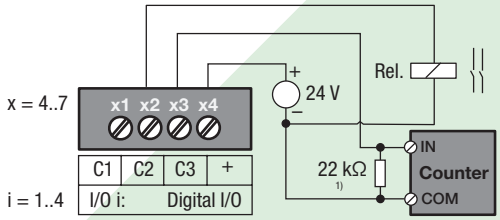
Analog outputs



Analog inputs

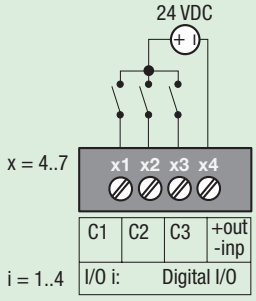


Digital outputs

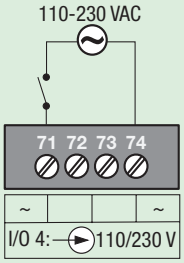


1) Recommended if input resistance < 100 kΩ

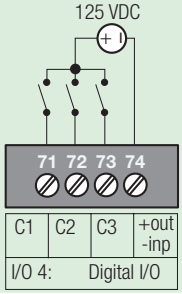
Digital inputs 12/24 V DC



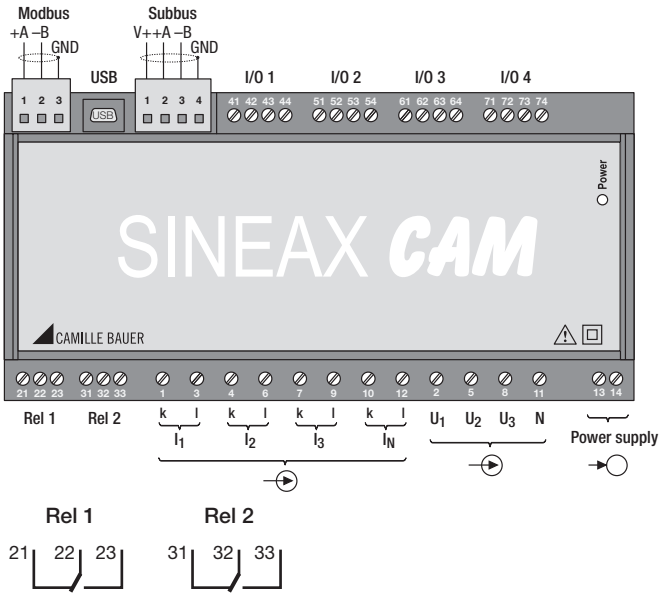
HV-Input 110/230 V AC



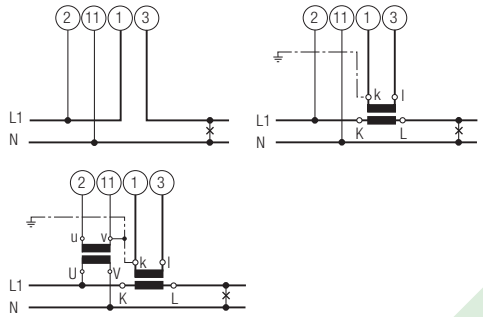
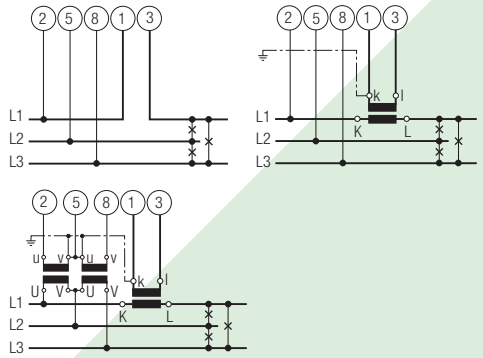
Digital inputs 125 V DC



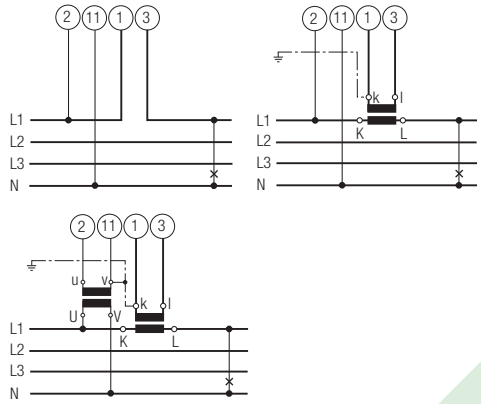
Connecting modes



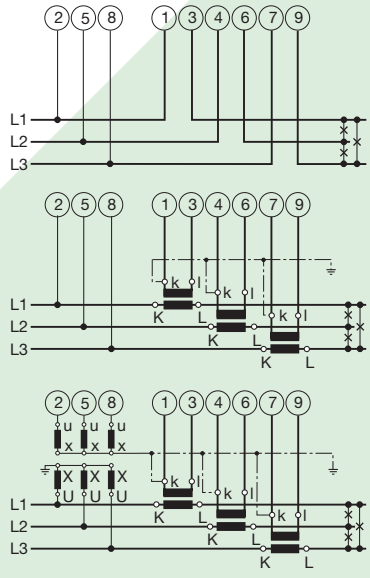
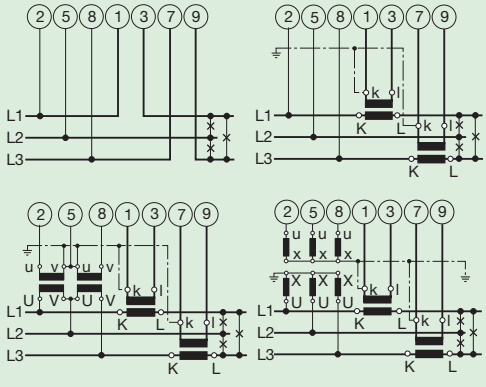
Connecting modes

Network/ application	Terminal assignment
Single-phase AC mains	
Three-wire three-phase system balanced load I: L1	 Connect voltage according to the following table in case of current measurement via L2 or L3:

Current transf.	Terminals		2	5	8
L2	1	3	L2	L3	L1
L3	1	3	L3	L1	L2

Network/ application	Terminal assignment
Four-wire three-phase system balanced load I: L1	 Connect voltage according to the following table in case of current measurement via L2 or L3:

Current transf.	Terminals		2	5	8
L2	1	3	L2	L3	L1
L3	1	3	L3	L1	L2

Three-wire three-phase system asymmetrical load	 3 single-pole isolated voltage transformers in the high-voltage system
Three-wire three-phase system asymmetrical load Aron measuring circuit	

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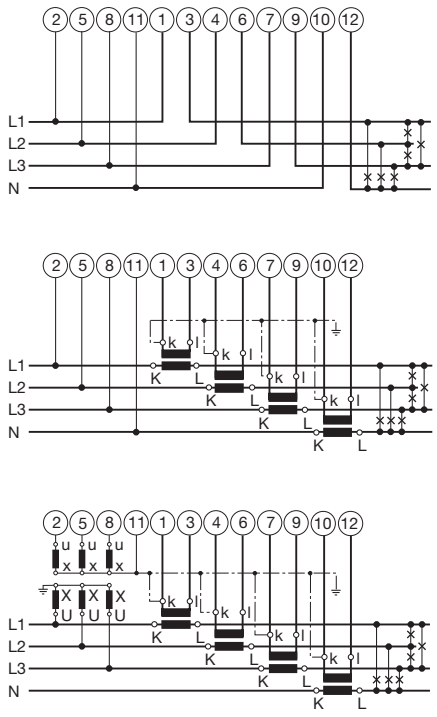
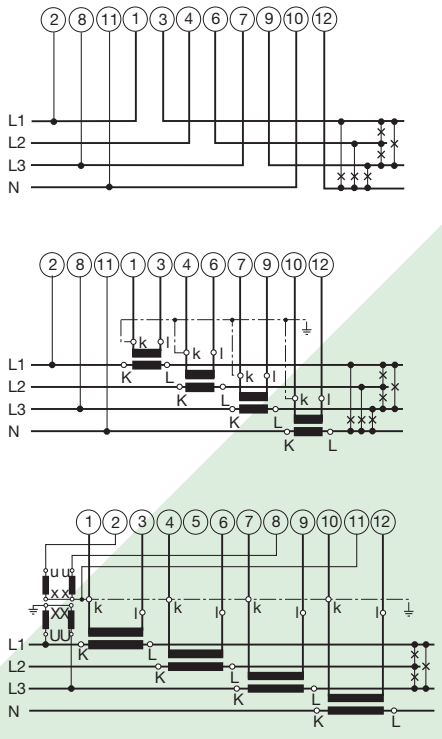
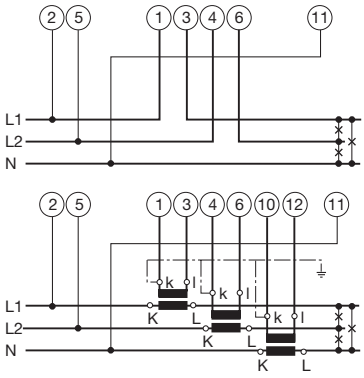
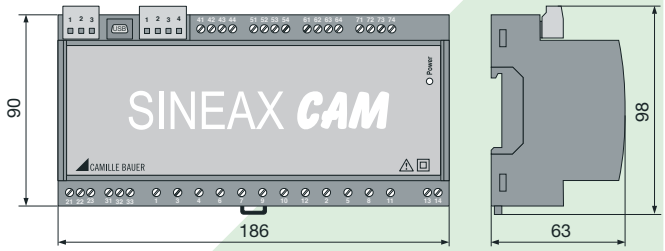
Network/ application	Terminal assignment
Four-wire three-phase system symmetrical load	 3 single-pole isolated voltage transformers in the high-voltage system
Four-wire three-phase system asymmetrical load Open-Y circuit	 2 single-pole isolated voltage transformers in the high-voltage system

Network/ application	Terminal arrangement
Split phase ("Two-phase network") asymmetrical load	

Dimensional drawing



SINEAX CAM in housing clipped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm). Terminals partly pluggable.

Accessories

Designation	Article Number
Software and documentation CD (within scope of supply)	156027
USB cable (within scope of supply)	158750
Graphic display EDS-CAM, for external panel mounting	157968
Connection cable EDS-CAM to SINEAX CAM, length 2m (other lengths on request)	168949
Interface converter USB <> RS485	163189

Appendix A

Version with Rogowski current inputs

This version provides instead of current inputs voltage inputs for connecting the integrator circuit of flexible Rogowski coils.

Rogowski coils can be fitted quickly and easily without opening the current circuit and can cover a wide current range using switchable ranges. They can transform fast-changing currents and harmonics much better than conventional current transformers. Thus this version is suited for applications where an accurate analysis of harmonics respectively the corresponding system feedback is required, for monitoring fast changing current flows and for test facilities, where the device under test must be replaced often and quickly.

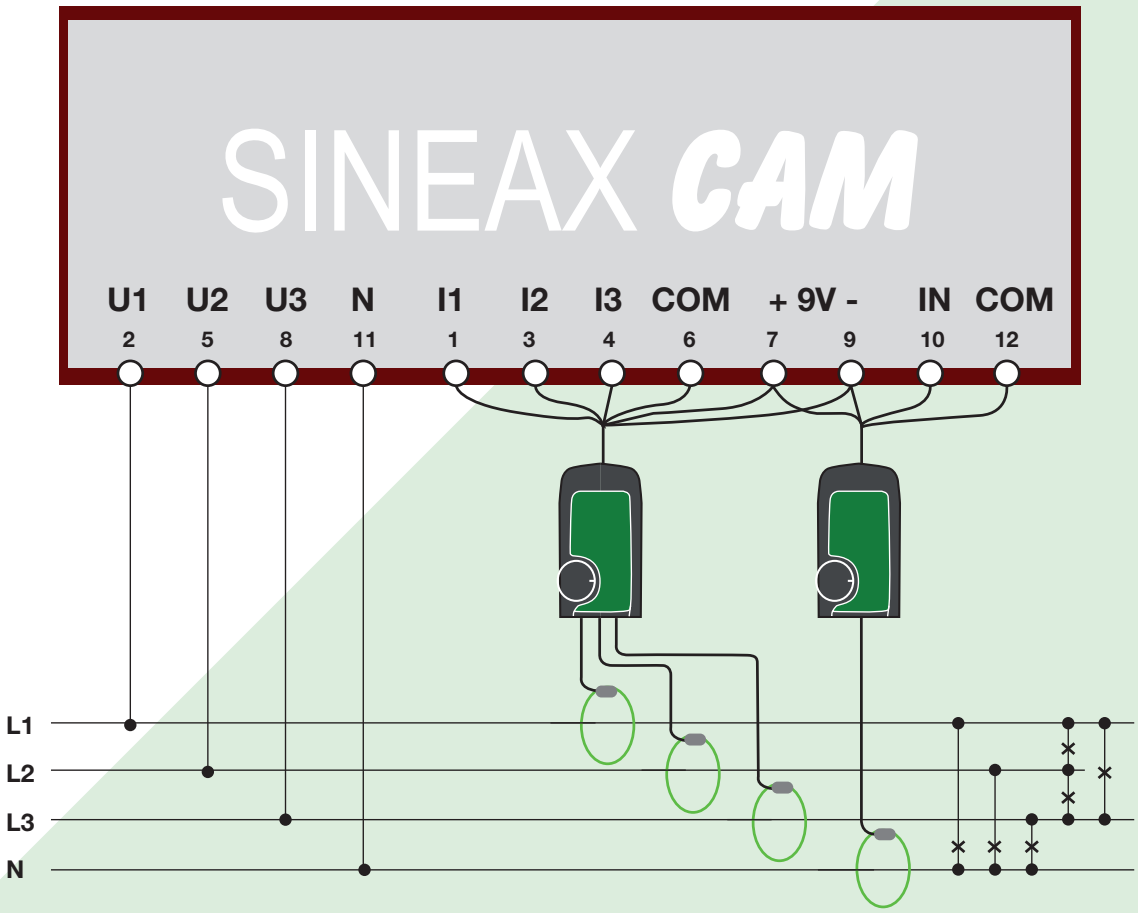
To allow an application in industrial environment, the power supply of the integrator of the Rogowski coils can be performed directly via the CAM. Because not all coils use the same power supply, different hardware version (3V, 4.5V, 6V und 9V) are offered.

The inputs for connecting the Rogowski coils are designed for 5V and measure up to a maximum of 10V without restriction.

Rogowski coils normally can be used for multiple current ranges, where for a present nominal current input always the same voltage output, normally 3V, results. The switchover of the current measurement range is performed via the rotary-switch on the integrator. The configuration of the CAM for the same current range has to be done separately by means of the CB-Manager software.

Available Rogowski current sensors

Description	Article no.
Single-phase ACP FLEX 3000_5, 2m, Ø194 mm, Measurement ranges 30/300/3000 A, supply 9 V via CAM	169426
Three-phase ACP FLEX 3003_5, 2m, Ø194 mm, Measurement ranges 30/300/3000 A, supply 9 V via CAM	169434



Example with ACP FLEX 300x_5 current sensors 30/300/3000 A, which need a 9 V power supply

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CAMILLE BAUER

Rely on us.

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