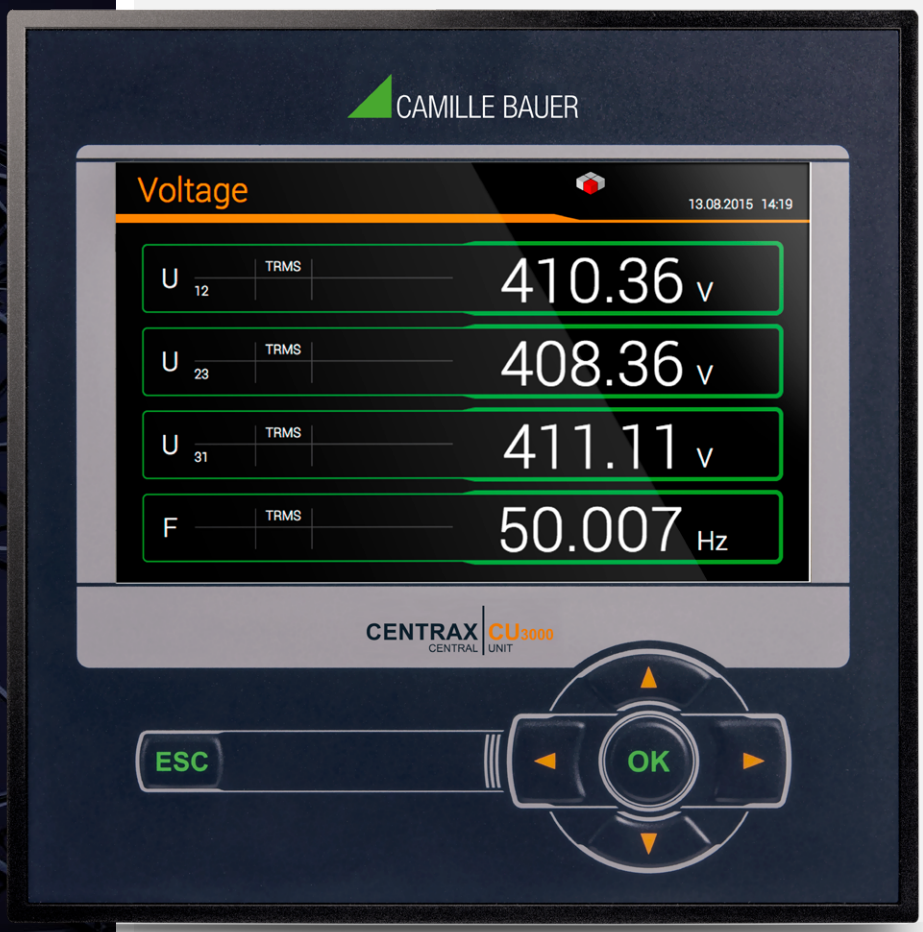
CAMILLE BAUER

FLEXIBLE SOLUTIONS FOR THE ENERGY INDUSTRY

COMPREHENSIVE INSTRUMENT FOR MEASUREMENT AND CONTROL OF POWER SYSTEMS



CENTRAX CU-SERIES

CENTRAX CU3000 ▪ CENTRAX CU5000

Comprehensive instrument for measurement and control of power systems

CENTRAX CU3000 / CU5000 combines the functionality of a highly accurate instrument for heavy current application with the possibilities of a freely programmable PLC in one housing. This makes the need of a separate control, a control system, a remote display or an additional data collector superfluous.
The measuring part of the instrument determines more than 1500 high-quality items of status, energy consumption and power quality. The control application is based on CODESYS and can now, depending on the application, process this data logically, use it in control algorithms or interact with energy generation or consumers as the situation demands. The instrument can communicate with the process environment via freely selectable I/Os and Modbus interfaces. The ADVANCED and PROFESSIONAL versions offer the additional possibility of importing measured data of other field instruments into the control application via Modbus interfaces for further processing.
CENTRAX CU3000 / CU5000 can thus be used for autarkic solutions in the areas of energy management, control and optimisation of the energy consumption, utility monitoring and other general automation and control tasks.
A connection to higher-ranking systems is possible at any time.

ADAPTABLE

Adaptable to the task at hand via control application

Possibility of providing own on-site and web visualizations

Horizontal and vertical extension possible

INTUITIVE

Easy device operation with language-specific plain text menu guidance

Topical arrangement of measured data information for quick access to desired data

Service area for maintenance and commissioning

MULTIFUNCTIONAL

Measurement and control in one instrument

Central acquisition of measured data and energy consumption

Monitoring of plant, process and utilities

FLEXIBLE

Universal measuring inputs for any type of grid

Freely selectable mean value and meter measuring variables

Configurable access authorisation

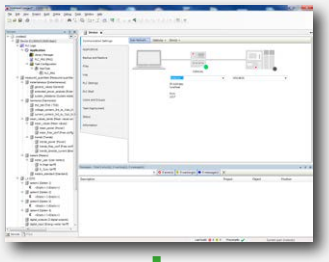
SCALABLE

Combinable device version (functionality, interfaces, I/Os, power supply)

Selectable design: Top hat rail or panel installation (96x96 or 144x144mm)

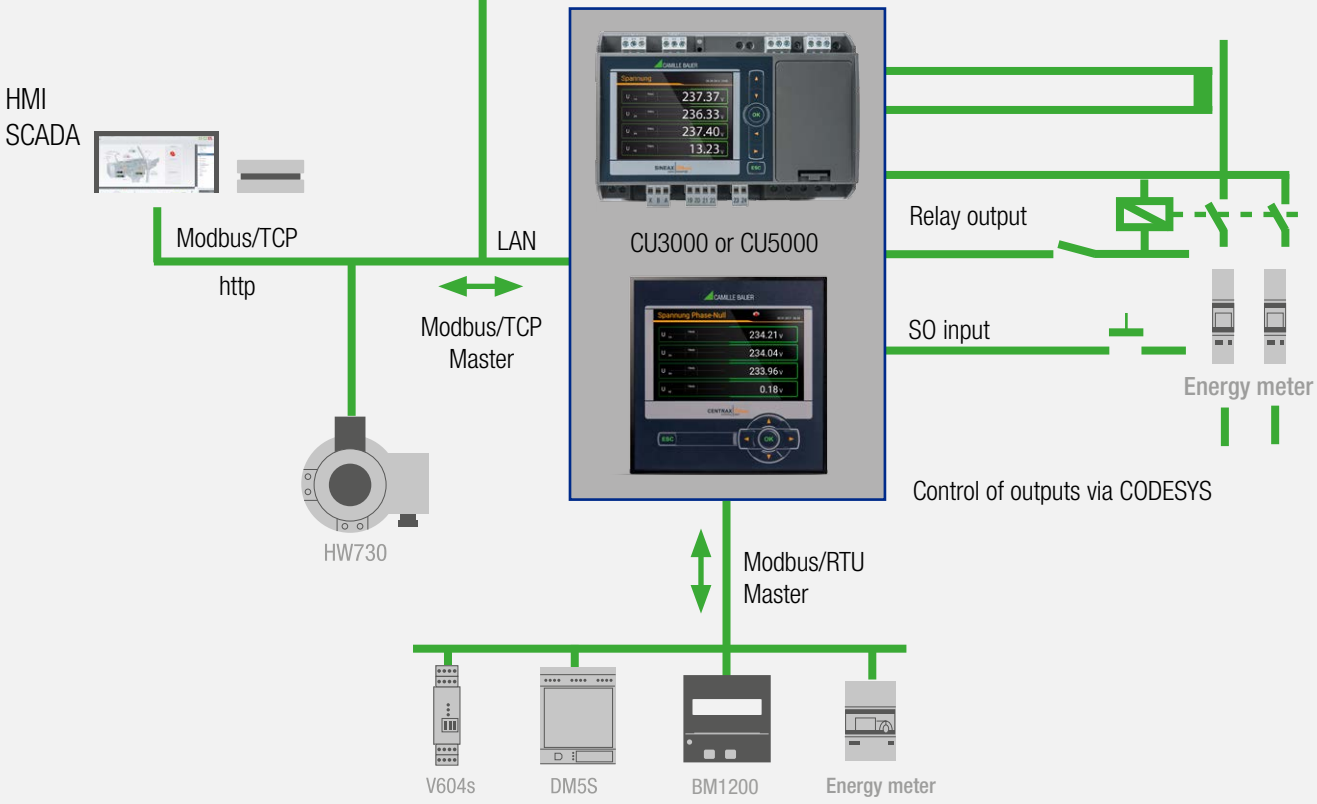
Integration as a standard object into the SMARTCOLLECT software

CODESYS
Development environment



Control generation with standard languages according to IEC61131-3:

- LD Ladder diagram
- IL Instruction list
- FBD Function block diagram
- SFC Sequential function chart
- ST Structured text
- CFC Continuous function chart



INDIVIDUAL SYSTEM SOLUTIONS

The approach of the CENTRAX CU3000 / CU5000 is the use of the SINEAX AM3000 resp. DM5000 as a measuring instrument, supplemented by a freely programmable control application, based on the widely used CODESYS, which takes over the function of the control system or PLC. The control functionality is provided in different performance classes:

- **BASIC:** Flexible processing of the measuring data of the measuring instrument with full use of the I/O functionality
- **ADVANCED:** In addition, the possibility to read and use data from other measuring instruments via Modbus RTU/TCP, as well as to trigger time-depending processes
- **PROFESSIONAL:** To create your own web visualization and to use the local display for self-defined visualizations

POSSIBLE APPLICATIONS

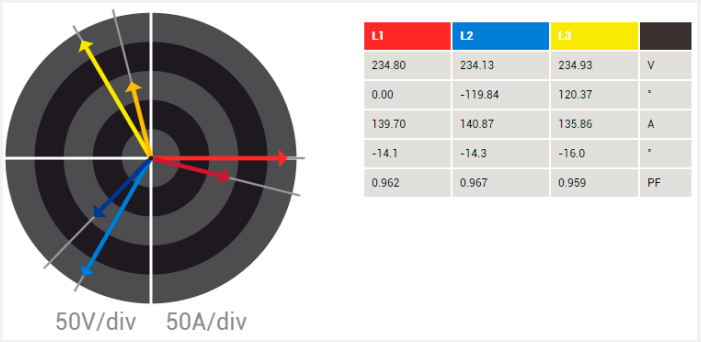
- Load balancing, load control
- Acquisition of energy consumption of any kind
- Energy management, summation station
- Monitoring of production equipment such as transformers, motors, generators, etc.
- Load management, peak load optimization, power factor compensation
- Local data display and control unit
- Monitoring of changes (Long-time-Drift / Degradation)
- Start / Stop process control, i.e. for control and monitoring of process steps

MEASURED VALUES

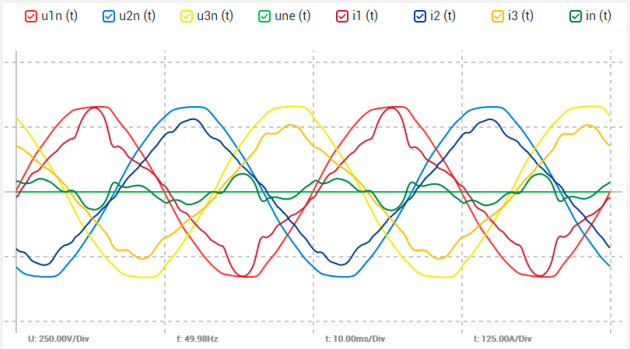
MEASURED VALUE GROUP	APPLICATION
INSTANTANEOUS VALUES	
U, I, IMS, P, Q, S, PF, LF, QF ...	Transparent monitoring of present system state
Angle between voltage phasors	Fault detection, connection check, sense of rotation check
Min/max of instantaneous values with time stamp	Determination of grid variable variance with time reference
EXTENDED REACTIVE POWER ANALYSIS	
Total reactive power, fundamental frequency, harmonics	Reactive power compensation
cosϕ, tanϕ of fundamental frequency with min values in all quadrants	Verification of specified power factor
HARMONICS ANALYSIS (ACCORDING TO EN 61 000-4-7)	
Total harmonics content THD U/I and TDD I	Evaluation of the thermic load of equipment
Individual harmonics U/I up to 50th	Analysis of system perturbation and consumer structure
IMBALANCE ANALYSIS	
Symmetrical components (positive, negative, zero sequence system)	Equipment overload protection
Imbalance (from symmetrical components)	Fault/earth contact detection
Deviation from U/I mean value	
ENERGY BALANCE ANALYSIS	
Meters for the demand/supply of active/reactive power, high/low tariff, meters with selectable fundamental variable	Preparation of (internal) energy billing
Power mean values active/reactive power, demand and supply, freely definable mean values (e.g. phase power, voltage, current and much more).	Determination of energy consumption versus time (load profile) for energy management or energy efficiency verification
Mean value trends	Energy consumption trend analysis for load management
OPERATING HOURS	
Operating hours of the device	

WEB VISUALIZATION

All of the measured data may be displayed via webpage



Voltage and current phasors and power factors of all phases



Waveform of all voltages and currents

TECHNICAL DATA

INPUTS

NOMINAL CURRENT	1 … 5 A
Maximum	7,5 A
NOMINAL VOLTAGE	57,7 … 400 V_{LN}, 100 … 693 V_{LL}
Maximum	CU3000: 480 V_{LN}, 832 V_{LL} (sinusoidal) CU5000: 520 V_{LN}, 900 V_{LL} (sinusoidal)
Nominal frequency	42 … 50 … 58 Hz, 50,5 … 60 … 69,5 Hz
Sampling rate	18 kHz

POWER SUPPLY VARIANTS

Nominal voltage	100…230V AC/DC (CU5000) 110…230 V AC, 130…230 V DC (CU3000) 110…200 V AC, 110…200 V DC (CU3000) 24 … 48 V DC (CU3000/CU5000)
Consumption	≤ 20 VA

UNINTERRUPTIBLE POWER SUPPLY (UPS)

Type (3,7 V)	VARTA Easy Pack EZPAckL, UL listed MH16707

TYPES OF CONNECTION

- Single phase or split phase (2-phase system)
- 3 or 4-wire balanced load
- 3-wire balanced load [2U, 1I]
- 3-wire unbalanced load, Aron connection
- 3 or 4-wire unbalanced load
- 4-wire unbalanced load, Open-Y

I/O-INTERFACE

ANALOG OUTPUTS	(optional)
Range	±20 mA (24 mA max.), bipolar
RELAYS	(optional)
Contacts	Changeover contact
Load capacity	250 V AC, 2 A, 500 VA; 30 V DC, 2 A, 60 W

DIGITAL INPUTS PASSIVE

Nominal voltage	12/24 V DC (30 V max.)

DIGITAL INPUTS ACTIVE (optional)

Open circuit voltage	≤ 15 V

DIGITAL OUTPUTS

Nominal voltage	12/24 V DC (30 V max.)

BASIC UNCERTAINTY ACCORDING IEC/EN 60688

Voltage, current	±0,1 %	
Power	±0,2 %	
Power factor	±0,1°	
Frequency	±0,01 Hz	
Imbalance U, I	±0,5 %	
Harmonic	±0,5 %	
THD U, I	±0,5 %	
Active energy	Class 0.5S	(EN 62 053-22)
Reactive energy	Class 0.5S	(EN 62 053-24)

INTERFACES

ETHERNET	RJ45 socket
Protocols	Modbus/TCP, http, NTP (time synchronisation)
MODBUS/RTU	Standard (CU5000), optional (CU3000)
Baud rate	9,6 to 115,2 kBaud

TIME REFERENCE

	Internal clock
Clock accuracy	± 2 minutes/month (15 to 30°C)
Synchronisation	NTP server

ENVIRONMENTAL CONDITIONS, GENERAL INFORMATION

Operating temperature	without UPS:	–10 up to 15 up to 30 up to + 55 °C
	with UPS:	0 up to 15 up to 30 up to + 35 °C

MECHANICAL PROPERTIES

Housing material	Polycarbonate (Makrolon)
Weight	800 g (CU3000), 600 g (CU5000)

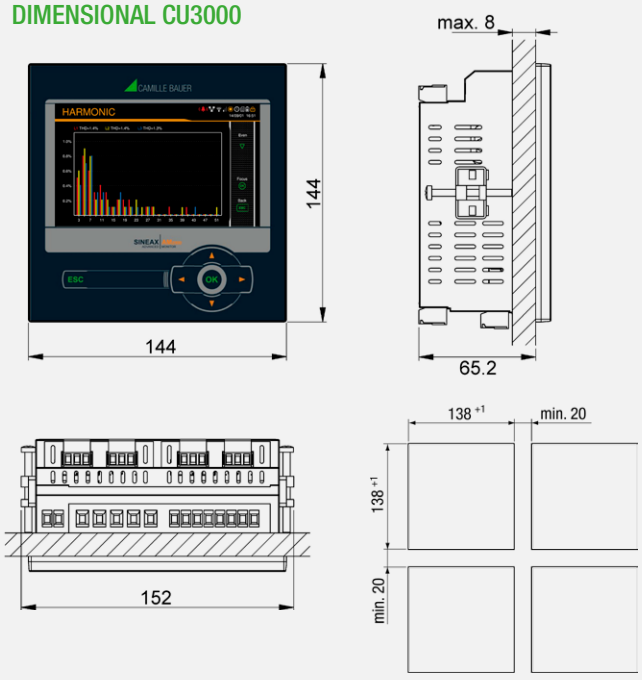
SAFETY

Current inputs are galvanically isolated from each other.

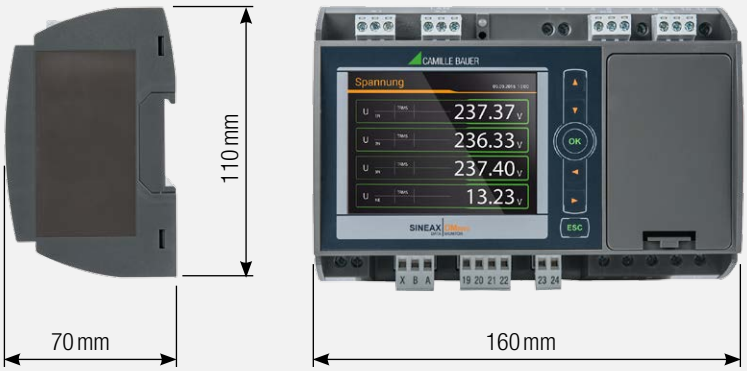
Protection class	II (protective insulation, voltage inputs via protective impedance)
Measurement category	CATIII

Further technical data is available in the operating instructions of the instrument.

DIMENSIONAL CU3000



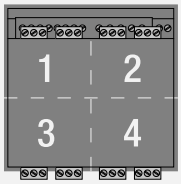
DIMENSIONAL CU5000



ORDER CODE

ORDER CODE CU3000-	
1. BASIC DEVICE FOR INSTRUMENTATION PANEL-MOUNTING	
Without data logger	0
Periodic Data + events	1
Disturbance recorder + events	2
Periodic Data + events + disturbance recorder	3
2. PLC FUNCTIONALITY	
Performance class BASIC	1
Performance class ADVANCED	2
Performance class PROFESSIONAL	3
3. INPUT I FREQUENCY RANGE	
Current transformer inputs, 42 … 50/60 … 69,5 Hz	1
4. POWER SUPPLY	
Nominal voltage 110 … 230 V AC, 130 … 230 V DC	1
Nominal voltage 24 … 48 V DC	2
Nominal voltage 110 … 200 V AC, 110 … 200 V DC	3
5. BUS CONNECTION	
Ethernet (Modbus/TCP protocol + web server)	1
Ethernet (Modbus/TCP, web server) + RS485 (Modbus/RTU)	2
6. EXTENSION 1	
Without	0
2 relays	1
2 analog outputs, bipolar (± 20 mA)	2
4 analog outputs, bipolar (± 20 mA)	3
4 digital inputs passive	4
4 digital inputs active	5
7. EXTENSION 2	
Without	0
2 relays	1
2 analog outputs, bipolar (± 20 mA)	2
4 analog outputs, bipolar (± 20 mA)	3
4 digital inputs passive	4
4 digital inputs active	5
8. EXTENSION 3	
Without	0
2 relays	1
2 analog outputs bipolar (± 20 mA)	2
4 analog outputs bipolar (± 20 mA)	3
4 digital inputs passive	4
4 digital inputs active	5
Uninterruptible power supply	8
9. EXTENSION 4	
Without	0
2 relays	1
2 analog outputs bipolar (± 20 mA)	2
4 analog outputs bipolar (± 20 mA)	3
4 digital inputs passive	4
4 digital inputs active	5
10. TEST CERTIFICATE	
Without	0
Test certificate in German	D
Test certificate in English	E

ORDER CODE CU5000-	
1. BASIC DEVICE FOR TOP-HAT RAIL MOUNTING	
Without data logger	0
Periodic Data + events	1
Disturbance recorder + events	2
Periodic Data + events + disturbance recorder	3
2. ON-SITE SERVICE AND MONITORING	
Without display	0
With TFT display	1
3. PLC FUNCTIONALITY	
Performance class BASIC	1
Performance class ADVANCED	2
Performance class PROFESSIONAL	3
4. INPUT I FREQUENCY RANGE	
Current transformer inputs, 42 … 50/60 … 69,5 Hz	1
5. POWER SUPPLY	
Nominal voltage 100 … 230 V AC/DC	1
Nominal voltage 24 … 48 V DC	2
6. BUS CONNECTION	
Ethernet (Modbus/TCP+web server) + RS485 (Modbus/RTU)	1
7. UNINTERRUPTIBLE POWER SUPPLY	
Without	0
With uninterruptible power supply	1
8. EXTENSION 1	
Without	0
2 relays	1
2 analog outputs bipolar (± 20 mA)	2
4 analog outputs bipolar (± 20 mA)	3
4 digital inputs passive	4
4 digital inputs active	5
9. EXTENSION 2	
Without	0
2 relays	1
2 analog outputs bipolar (± 20 mA)	2
4 analog outputs bipolar (± 20 mA)	3
4 digital inputs passive	4
4 digital inputs active	5
10. TEST CERTIFICATE	
Without	0
Test certificate in German	D
Test certificate in English	E



I/O-EXTENSIONS CU3000

Maximum one I/O extension with analog outputs may be provided per device.

I/O extension 4 only possible for a variant without data logger.

GMC INSTRUMENTS

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