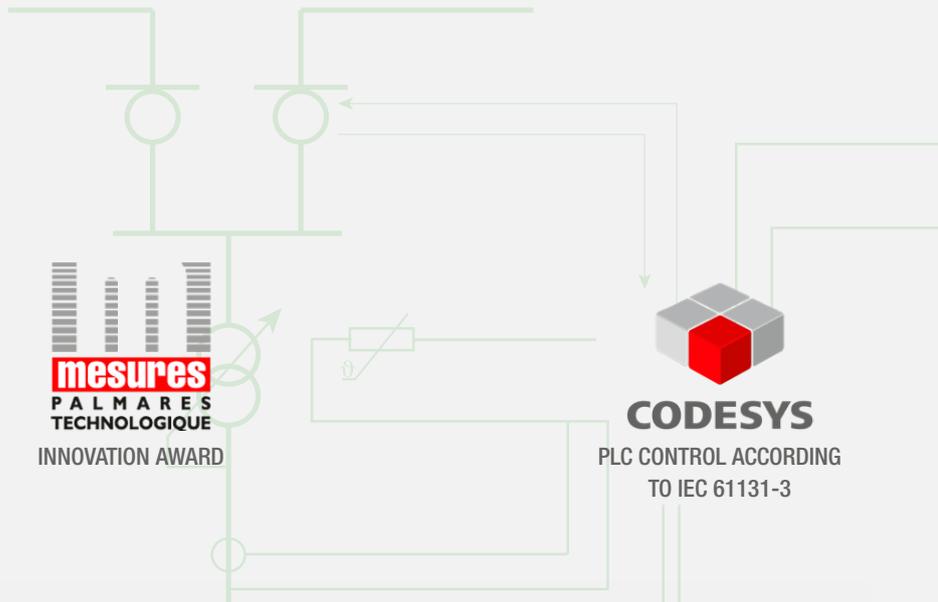


MEASUREMENT AND CONTROL IN POWER SYSTEMS

MULTIFUNCTIONAL
TRANSDUCER + PLC CONTROL
IN ONE DEVICE



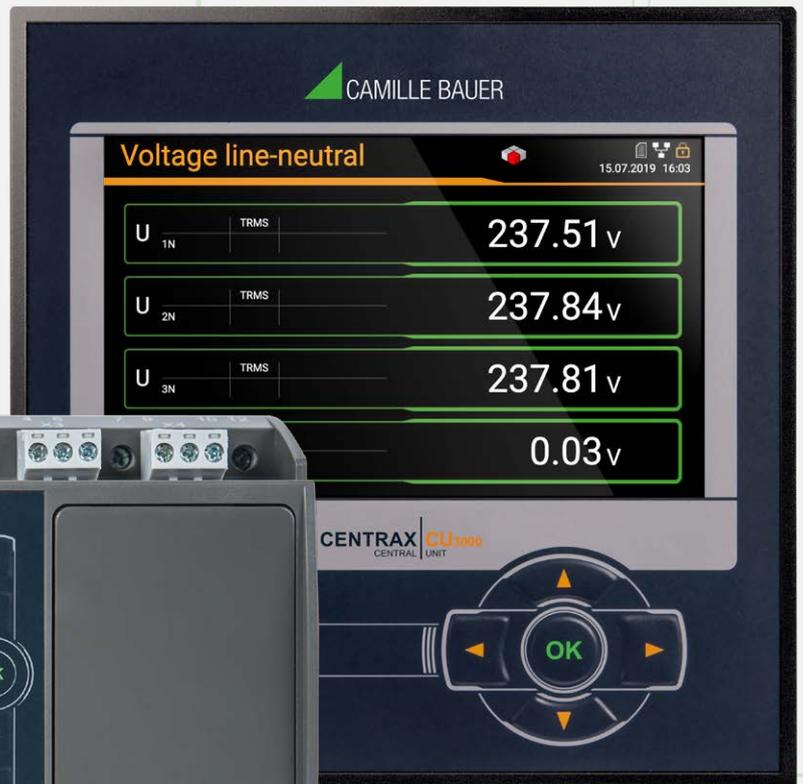
mesures
PALMARES
TECHNOLOGIQUE
INNOVATION AWARD



CODESYS
PLC CONTROL ACCORDING
TO IEC 61131-3

$$Q(t) = Q(t_0) + \int_{t_0}^t I(t) dt$$

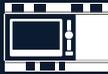
A ≥ 1 B



CENTRAX CU-SERIES

CENTRAX CU3000 • CENTRAX CU5000

A =1 B



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

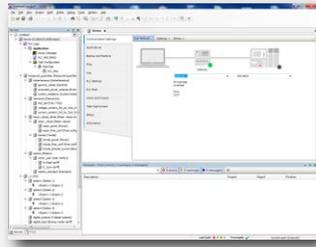
Configurable access authorisation

SCALABLE

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

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

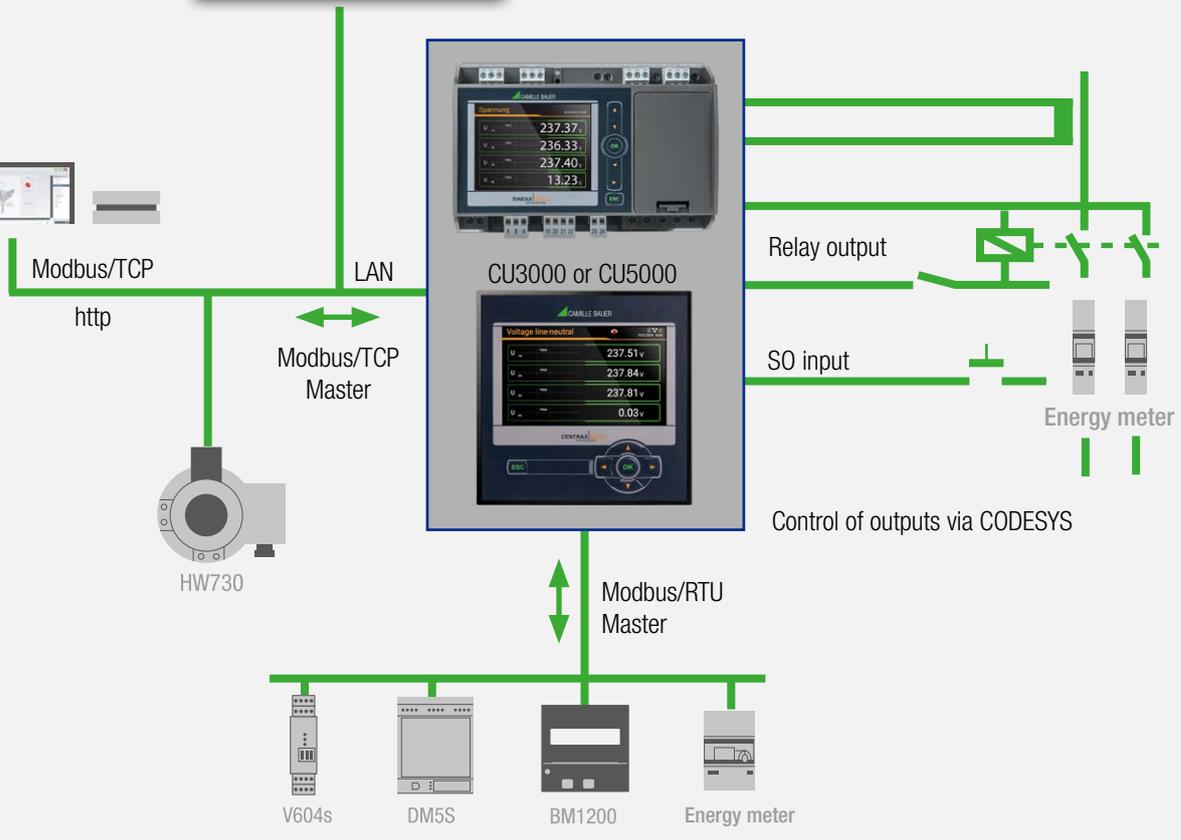
Integration as a standard object into the SMARTCOLLECT software



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

HMI SCADA



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



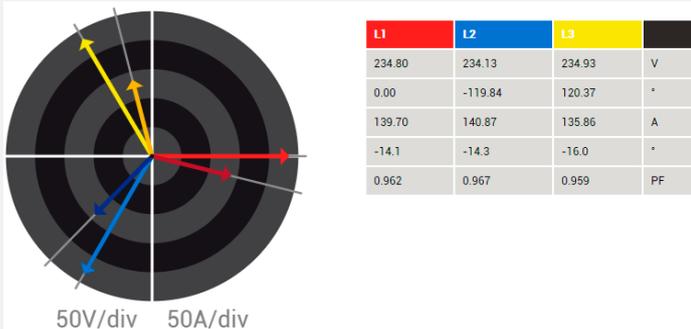
MEASURED VALUES

The CENTRAX CUx000 has a broad basic measurement functionality according to the table below. Further functions, such as automated data export, extended data recording capabilities or cyber security protection, are described in detail in the documentation of SINEAX AM3000 or DM5000.

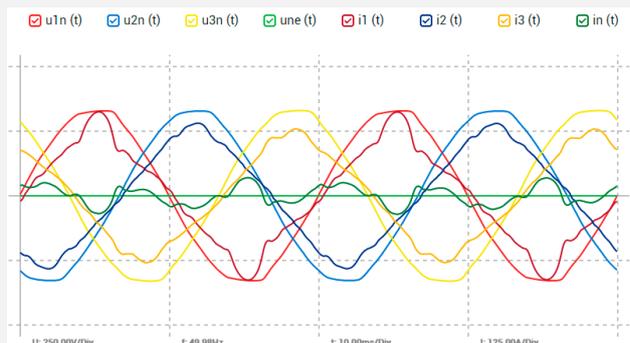
| MEASURED VALUE GROUP | APPLICATION |
|--|---|
| INSTANTANEOUS VALUES U, I, IMS, P, Q, S, PF, LF, QF ... Angle between voltage phasors Min/max of instantaneous values with time stamp | Transparent monitoring of present system state Fault detection, connection check, sense of rotation check Determination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



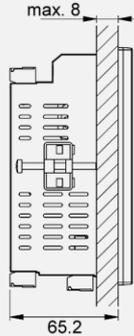
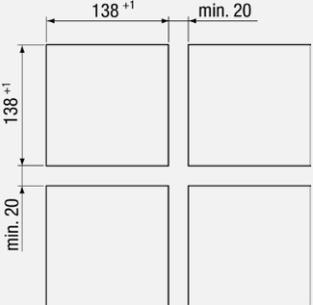
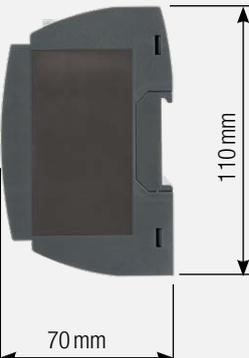
Voltage and current phasors and power factors of all phases



Waveform of all voltages and currents



TECHNICAL DATA

| | | | |
|---|--|---|---|
| INPUTS | | IEC61850 | optional |
| NOMINAL CURRENT | 1 ... 5 A | Physics | Ethernet 100BaseTX, RJ45 sockets, 2 ports |
| Maximum | 7,5 A | Mode | 10/100 Mbit/s, full/half duplex, auto-negotiation |
| NOMINAL VOLTAGE | 57,7 ... 400 V _{LN} , 100 ... 693 V _{LL} | Protocol | IEC61850, NTP |
| Maximum | CU3000: 480 V _{LN} , 832 V _{LL} (sinusoidal) CU5000: 520 V _{LN} , 900 V _{LL} (sinusoidal) | MODBUS/RTU | Standard (CU5000), optional (CU3000) |
| Nominal frequency | 42 ... 50 ... 58 Hz, 50,5 ... 60 ... 69,5 Hz | Baud rate | 9,6 to 115,2 kBaud |
| Sampling rate | 18 kHz | TIME REFERENCE | Internal clock |
| POWER SUPPLY VARIANTS | | Clock accuracy | ± 2 minutes/month (15 to 30°C) |
| Nominal voltage | 100 ... 230V AC/DC (CU5000) 110 ... 230V AC, 130 ... 230V DC (CU3000) 110 ... 200V AC, 110 ... 200V DC (CU3000) 24 ... 48V DC (CU3000/CU5000) | Synchronisation | NTP server or GPS |
| Consumption | ≤ 27 VA, ≤ 12W (CU5000); ≤ 30 VA, ≤ 13W (CU3000) | ENVIRONMENTAL CONDITIONS, GENERAL INFORMATION | |
| UNINTERRUPTIBLE POWER SUPPLY (UPS) (optional) | | 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 |
| Type (3,7 V) | VARTA Easy Pack EZPackL, UL listed MH16707 | MECHANICAL PROPERTIES | |
| TYPES OF CONNECTION | | Housing material | Polycarbonate (Makrolon) |
| • Single phase or split phase (2-phase system) | | Weight | 800 g (CU3000), 600 g (CU5000) |
| • 3 or 4-wire balanced load | | SAFETY | |
| • 3-wire balanced load [2U, 1I] | | Current inputs are galvanically isolated from each other. | |
| • 3-wire unbalanced load, Aron connection | | Protection class | II (protective insulation, voltage inputs via protective impedance) |
| • 3 or 4-wire unbalanced load | | Measurement category | U: 600 V CAT III, I: 300 V CAT III |
| • 4-wire unbalanced load, Open-Y | | | |
| I/O-INTERFACE | | <i>Further technical data is available in the operating instructions of the instrument.</i> | |
| ANALOG OUTPUTS (optional) | | DIMENSIONAL CU3000 | |
| 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 | | DIMENSIONAL CU5000 | |
| 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.) | | |
| FAULT CURRENT MONITORING For grounded systems (optional) | | | |
| Number of meas. channels | 2 (2 measurement ranges each) | | |
| Application | RCM or earth current monitoring | | |
| TEMPERATURE INPUTS (optional) | | | |
| Number of channels | 2 | | |
| Measurement sensor | Pt100 / PTC; 2-wire | | |
| 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 0.2S (EN 62 053-22) | | |
| Reactive energy | Class 0.5S (EN 62 053-24) | | |
| INTERFACES | | | |
| ETHERNET | RJ45 socket | | |
| Protocols | Modbus/TCP, http, https, NTP, IPv4, IPv6 | | |

**ORDER CODE CU3000-**

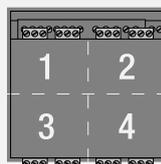
| | |
|---|---|
| 1. BASIC DEVICE, 4 U / 4 I MEASURING INPUTS, 1 DIGITAL INPUT, 2 DIGITAL OUTPUTS, HTTPS, MODBUS/TCP | |
| Without data logger | 0 |
| Periodic Data + events | 1 |
| Disturbance recorder + events | 2 |
| Periodic Data + events + disturbance recorder | 3 |
| 2. PLC FUNCTIONALITY | |
| 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 |
| Fault current detection, 2 channels | 6 |
| GPS connection module | 7 |
| Temperature monitoring, 2 channels | C |
| 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 |
| Fault current detection, 2 channels | 6 |
| GPS connection module | 7 |
| IEC61850 interface | B |
| Temperature monitoring, 2 channels | C |
| 8. EXTENSION 3 | |
| Without | 0 |
| 2 analog outputs bipolar (± 20 mA) | 2 |
| 4 analog outputs bipolar (± 20 mA) | 3 |
| 4 digital inputs passive | 4 |
| 4 digital inputs active | 5 |
| Fault current detection, 2 channels | 6 |
| Uninterruptible power supply | 8 |
| Temperature monitoring, 2 channels | C |
| 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 |
| Fault current detection, 2 channels | 6 |
| Temperature monitoring, 2 channels | C |
| 10. TEST CERTIFICATE | |
| Without | 0 |
| Test certificate in German | D |
| Test certificate in English | E |

ORDER CODE CU5000-

| | |
|---|---|
| 1. BASIC DEVICE, 4 U / 4 I MEASURING INPUTS, 1 DIGITAL INPUT, 2 DIGITAL OUTPUTS, HTTPS, MODBUS/TCP | |
| 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 |
| Fault current detection, 2 channels | 6 |
| GPS connection module | 7 |
| IEC61850 interface | B |
| Temperature monitoring, 2 channels | C |
| 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 |
| Fault current detection, 2 channels | 6 |
| GPS connection module | 7 |
| Temperature monitoring, 2 channels | C |
| 10. TEST CERTIFICATE | |
| Without | 0 |
| Test certificate in German | D |
| Test certificate in English | E |

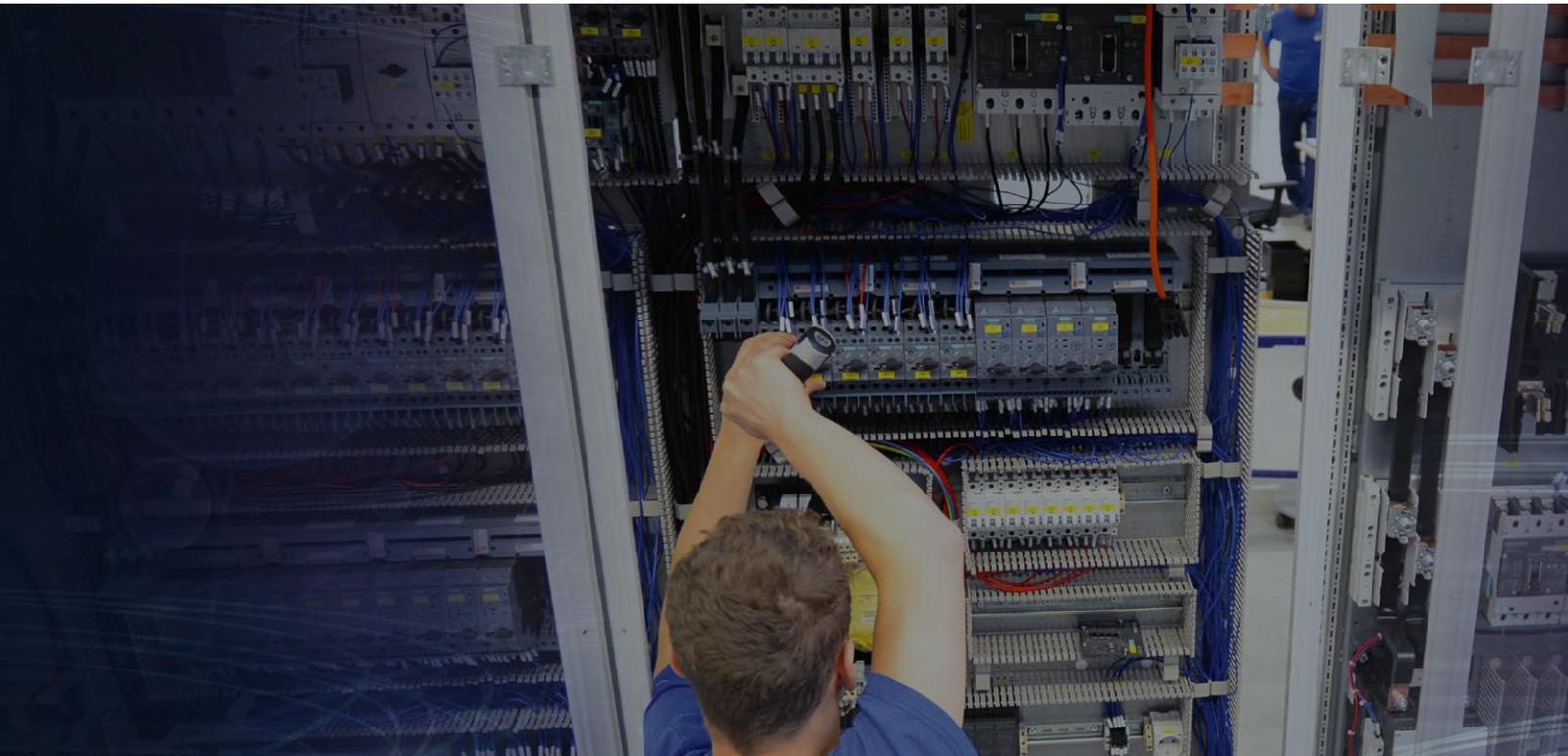
ACCESSORIES**ARTICLE NO**

| | |
|---|---------|
| Documentation on USB stick | 156 027 |
| Interface converter USB <> RS485 | 163 189 |
| GPS receiver 16x-LVS, configured | 181 131 |
| Transformers for fault current detection see accessory current transformers | |

**EXTENSIONS CU3000**

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

Extension 4 only possible for a variant without data logger.



GMC INSTRUMENTS

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 CAMILLE BAUER

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