

MEASUREMENT AND CONTROL IN POWER SYSTEMS

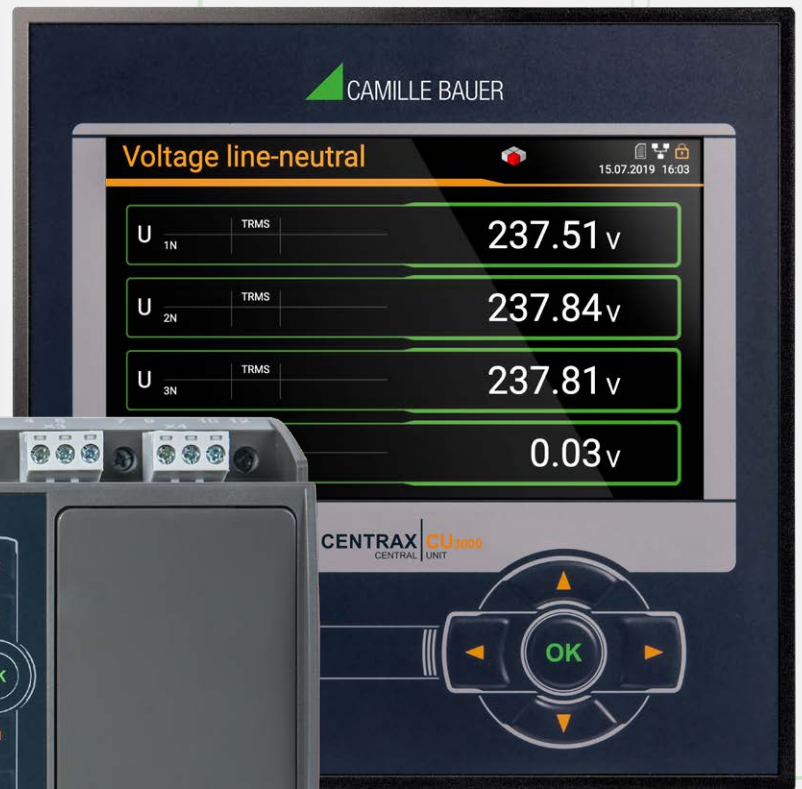
MULTIFUNCTIONAL
TRANSDUCER + PLC CONTROL
IN ONE DEVICE


INNOVATION AWARD


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

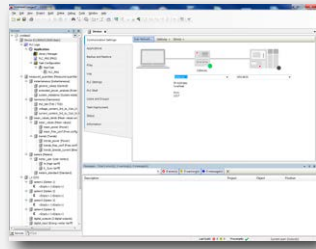
Configurable access authorisation

SCALABLE

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

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

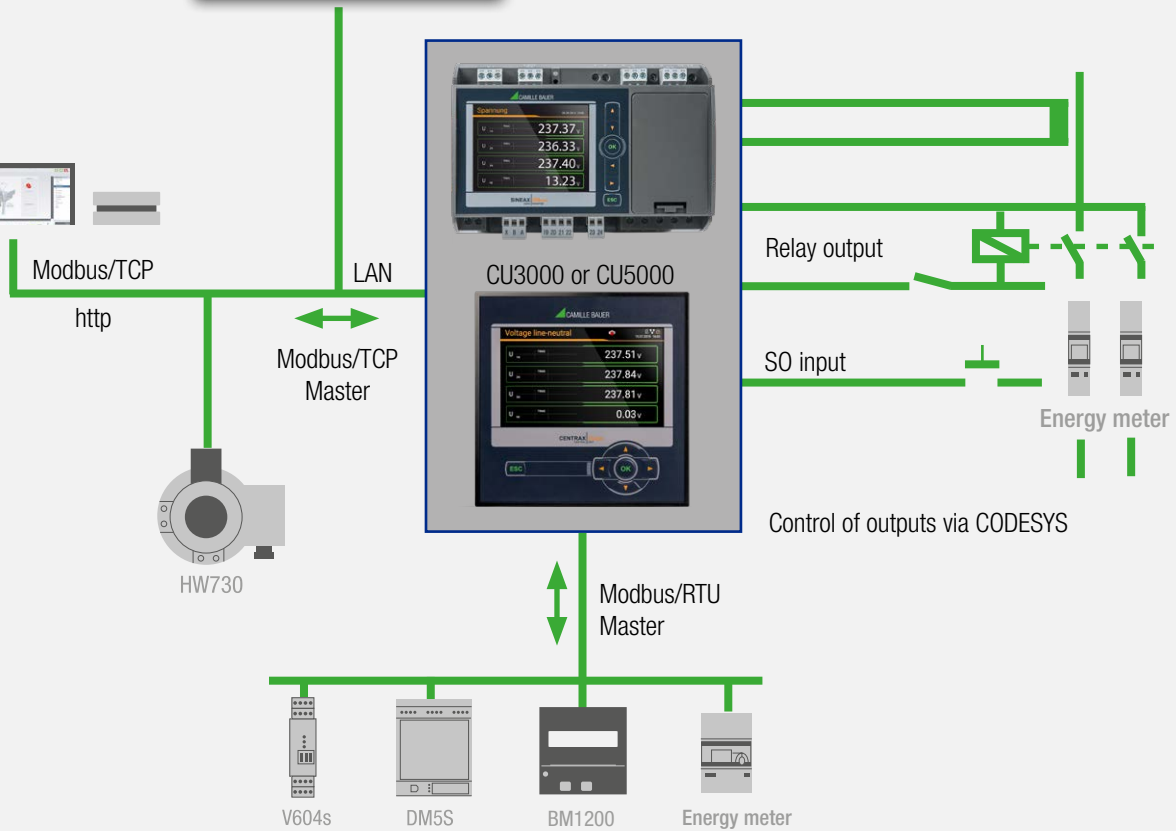
Integration as a standard object into the SMARTCOLLECT software



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



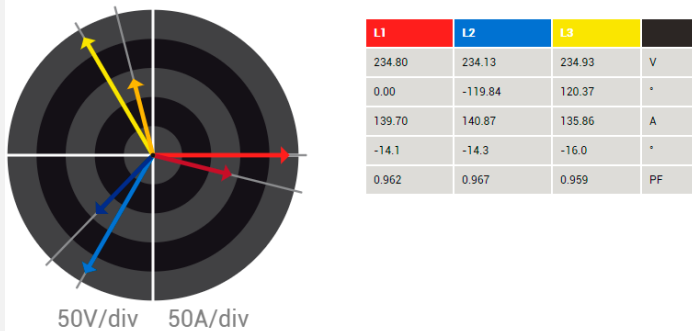
MEASURED VALUES

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

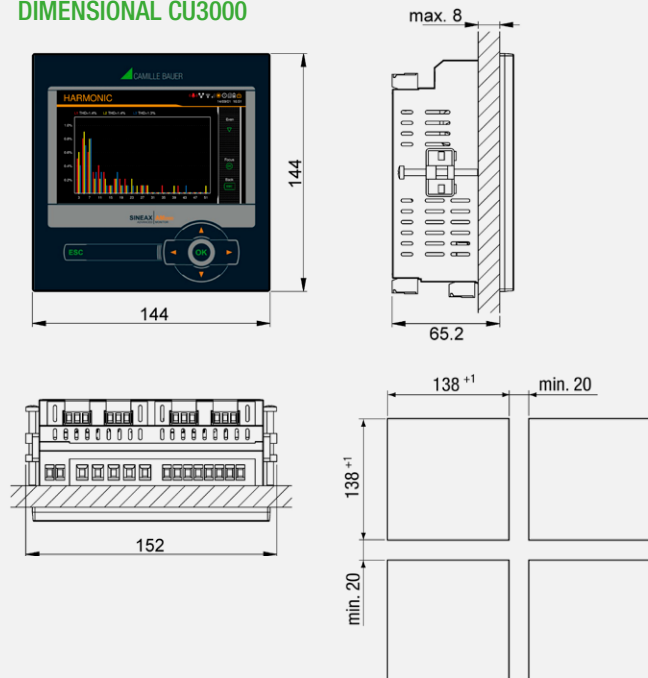


TECHNICAL DATA

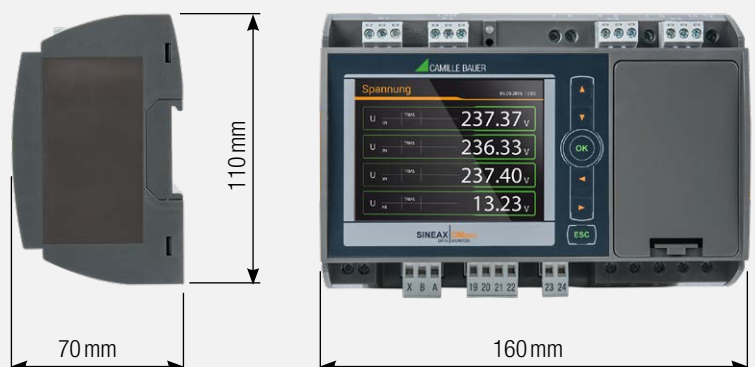
INPUTS		IEC61850	optional
NOMINAL CURRENT	1 ... 5 A	Physics	Ethernet 100BaseTX, RJ45 sockets, 2 ports
Maximum	7,5 A	Mode	10/100 Mbit/s, full/half duplex, auto-negotiation
NOMINAL VOLTAGE	57,7 ... 400 V _{LN} , 100 ... 693 V _{LL}	Protocol	IEC61850, NTP
Maximum	CU3000: 480 V _{LN} , 832 V _{LL} (sinusoidal) 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			
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.)		
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		

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

DIMENSIONAL CU3000



DIMENSIONAL CU5000



**ORDER CODE CU3000-**

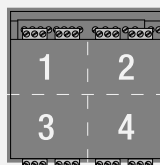
1. BASIC DEVICE, 4 U / 4 I MEASURING INPUTS, 1 DIGITAL INPUT, 2 DIGITAL OUTPUTS, HTTPS, MODBUS/TCP	
Without data logger	0
Periodic Data + events	1
Disturbance recorder + events	2
Periodic Data + events + disturbance recorder	3
2. PLC FUNCTIONALITY	
Performance class BASIC	1
Performance class ADVANCED	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

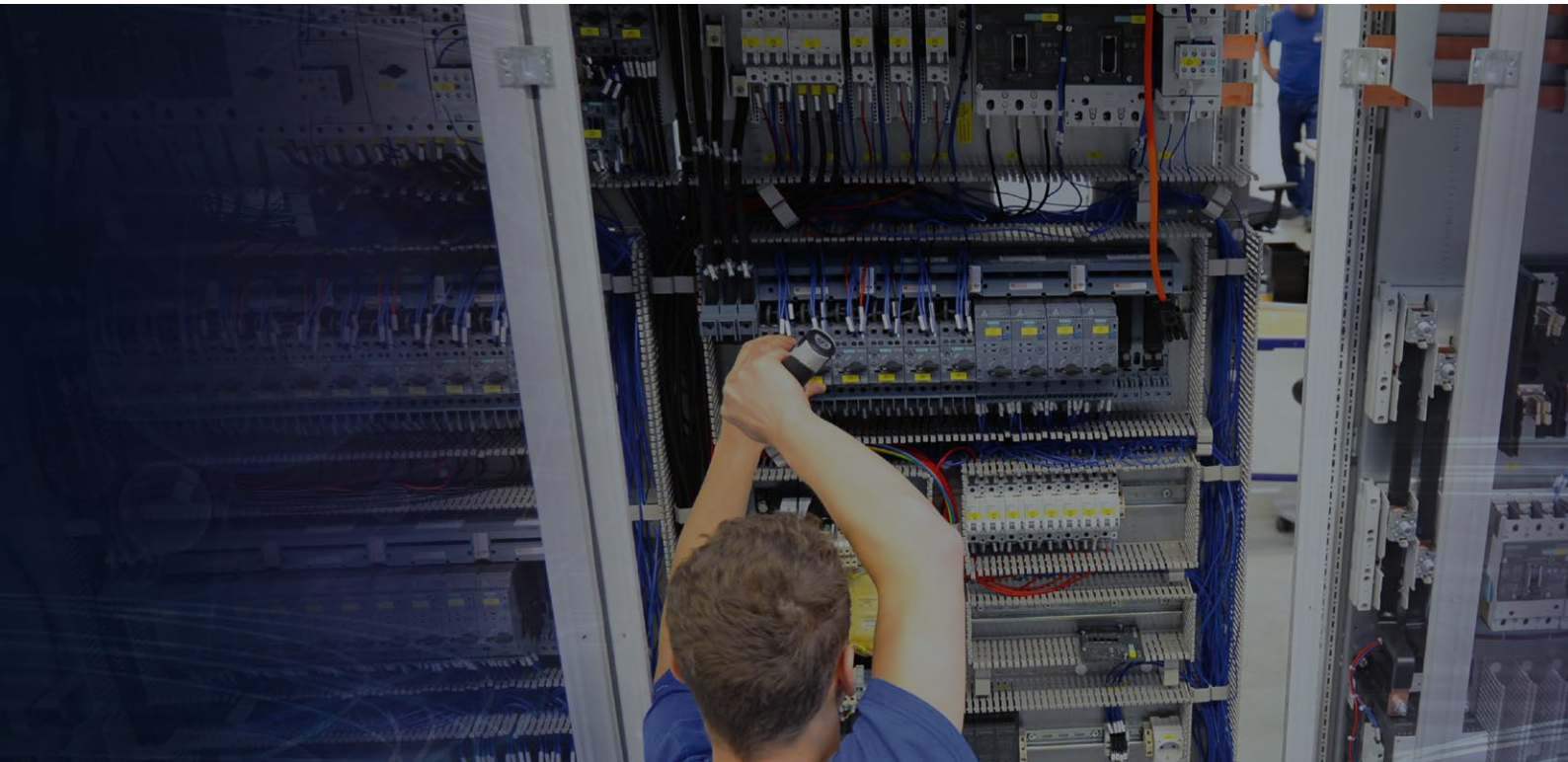
ACCESSORIES**ARTICLE NO**

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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