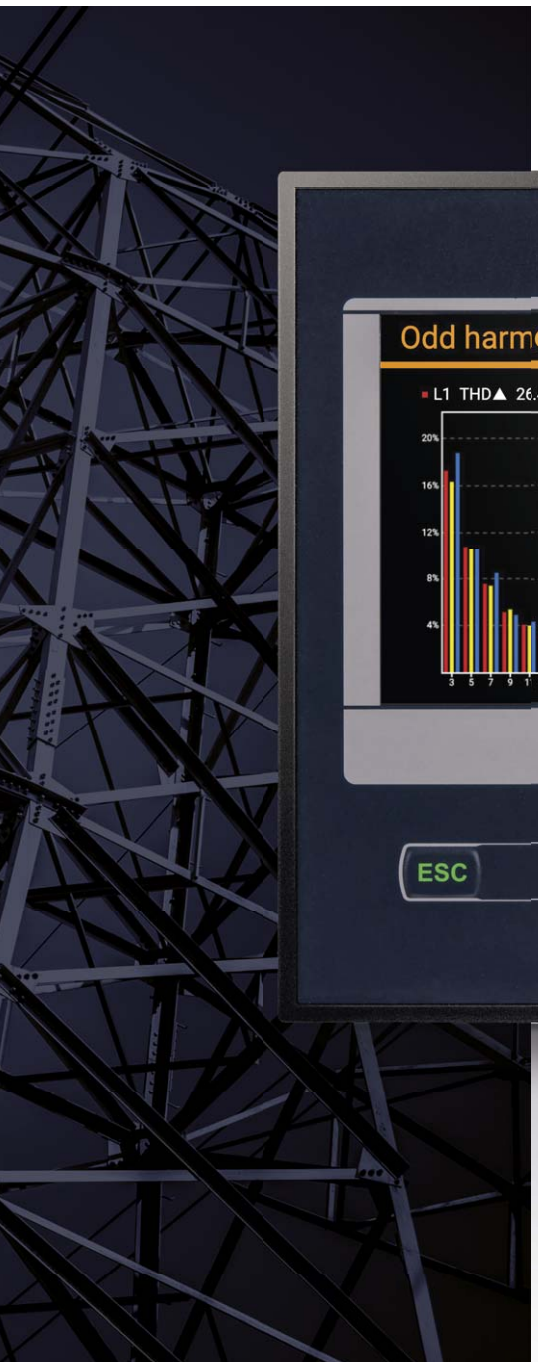
CAMILLE BAUER

# MEASUREMENT & MONITORING IN POWER SYSTEMS

MULTIFUNCTIONAL POWER MEASUREMENT DEVICE FOR PANEL MOUNTING




## SINEAX AM-SERIES

SINEAX AM1000 ▪ SINEAX AM2000 ▪ SINEAX AM3000

Panel installation devices for a clear view into electrical networks


The SINEAX AM-SERIES devices are compact instruments to measure and monitor in heavy current grids. They excel in display quality and intuitive operation. The devices provide a wide range of functionalities which may even be extended by optional components. They are connected to the process environment by communication interfaces, via digital I/Os, analog outputs or relays.
The devices have been designed for universal use in industrial plants, building automation or in energy distribution.

Nominal voltages of up to 690 V and measurement category CATIII can be directly connected in low voltage systems.
The universal measuring system permits the direct use of the devices in any type of grid, from single-phase mains through to 4-wire unbalanced load systems.
The AM series devices may be completely adapted to requirements on site via TFT display. Versions with an Ethernet interface permit webpage configuration without any special software.

## CLEAR

High resolution, colour TFT display for the pin-sharp indication of measured data

Consistently visible status information (alarms, password protection, data recording, time/date and much more)

Clear design

## 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

Varied monitoring options via limit values and their logical linkage

Central alarm function via display or Webpage

Alarm list with plain-text information for a quick plant status overview

## 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)

Front dimension options (96x96 or 144x144mm)

Integration as a standard object into the SMARTCOLLECT software



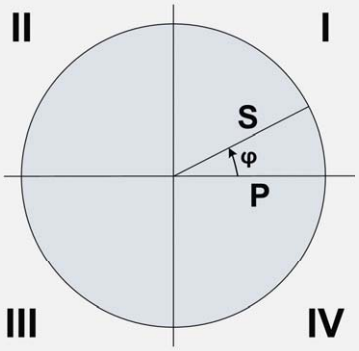
| | AM1000 | AM2000 | AM3000 |
|---|---|---|---|
| Input channels voltage / current | 3 / 3 | 3 / 3 | 4 / 4 |
| Measurement interval [ #cycles ] | 10/12 (50/60Hz); 1/2 | 10/12 (50/60Hz) | 10/12 (50/60Hz); 1/2 |
| **MEASURED VALUES** | | | |
| Instantaneous values | ▪ | ▪ | ▪ |
| Extended reactive power analysis | ▪ | ▪ | ▪ |
| Imbalance analysis | ▪ | ▪ | ▪ |
| Neutral current | calculated | calculated | measured / calculated |
| Earth wire current (calculated) | -- | -- | ▪ |
| Zero displacement UNE | calculated | calculated | measured / calculated |
| Energy balance analysis | ▪ | ▪ | ▪ |
| Harmonic analysis | ▪ | ▪ | ▪ (incl. phase angle) |
| Operating hour counters device / general | 1 / 3 | 1 / – | 1 / 3 |
| Monitoring functions | ▪ | ▪ | ▪ |
| Visualisation waveform U/I | ▪ | – | ▪ |
| **MEASUREMENT UNCERTAINTY** | | | |
| Voltage, current | ±0.2% | ±0.2% | ±0.1% |
| Active, reactive, apparent power | ±0.5% | ±0.5% | ±0.2% |
| Frequency | ±10mHz | ±10mHz | ±10mHz |
| Active energy (IEC 62053-21/22) | Class 1 | Class 1 | Class 0.5S |
| Reactive energy (IEC 62053-24) | Class 1 | Class 1 | Class 0.5S |
| **DATA LOGGER** (Option, only with Ethernet) | internal (≥8GB) | Micro SD card (≥16GB) | Micro SD card (≥16GB) |
| Periodic recording | ▪ | ▪ | ▪ |
| Event recording | ▪ | ▪ | ▪ |
| **Disturbance recorder (with pretrigger)** | | | |
| a) 1/2 cycle RMS progression U/I | ≤3min. | – | ≤3min. |
| b) Curve shape U/I [ #cycles ] | 5/6 (pretrigger) +10/12 | – | 5/6 (pretrigger) +10/12 |
| **COMMUNICATION** | | | |
| Ethernet: Modbus/TCP, web server, NTP | (option) | (option) | (standard) |
| IEC 61850 | (option) | (option) | (option) |
| PROFINET IO | (option) | (option) | (option) |
| RS485: Modbus/RTU | (option) | (option) | (option) |
| Standard I/Os | 1 dig. OUT ; 1 dig. IN/OUT | 1 dig. IN ; 2 dig. OUT | 1 dig. IN ; 2 dig. OUT |
| Extension modules (optional) | max. 1 module | max. 4 modules | max. 4 modules |
| **POWER SUPPLY** | 100-230V AC/DC<br>24-48V DC | 110-230V AC/130-230V DC<br>110-200V AC/DC<br>24-48V DC | 110-230V AC/130-230V DC<br>110-200V AC/DC<br>24-48V DC |
| Consumption | ≤18 VA, ≤8 W | ≤30 VA, ≤13 W | ≤30 VA, ≤13 W |
| **DESIGN** | | | |
| Colour display | TFT 3.5“ (320x240px) | TFT 5.0“ (800x480px) | TFT 5.0“ (800x480px) |
| Front dimensions | 96 x 96 mm | 144 x 144 mm | 144 x 144 mm |
| Mounting depth | 85 mm | 65.2 mm | 65.2 mm |

# MEASURED VALUES

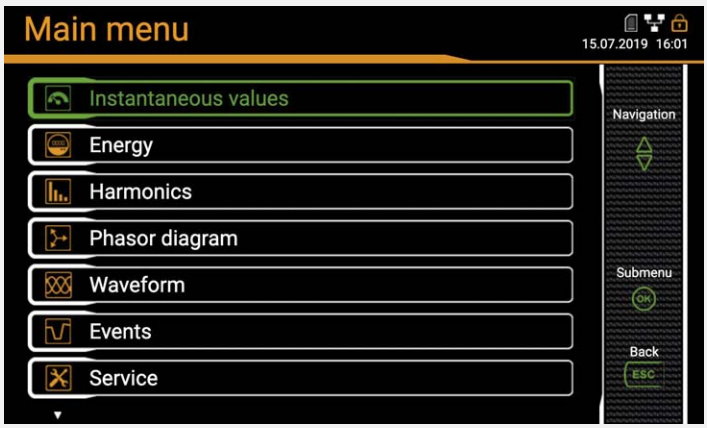
| MEASURED VALUE GROUP | APPLICATION |
|---|---|
| **INSTANTANEOUS VALUES** | |
| U, I, IMS, P, Q, S, PF, LF, QF ... | Transparent monitoring of present system state |
| Angle between voltage phasors | Fault detection, connection check, sense of rotation check |
| Min/max of instantaneous values with 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 50$^{th}$ | 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** | |
| 3 operating hour counters with programmable running condition (only AM1000/AM3000) | Monitoring of service and maintenance intervals of equipments |
| Operating hours of the device | |

### DEMAND / SUPPLY / INDUCTIVE / CAPACITIVE

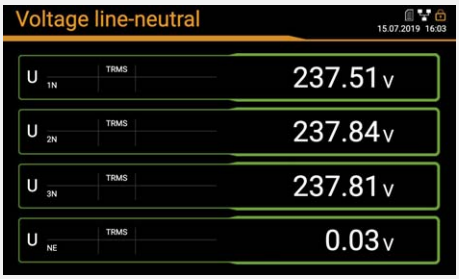
The devices of the SINEAX AM-SERIES provide information for all of the four quadrants. Depending on whether the measured system is considered from a generator or consumer perspective, the interpretation of the quadrants changes: The energy formed from active power in Quadrants I+IV can then be regarded, e.g., as supplied or demanded active energy.
In order to facilitate an independent interpretation of the 4-quadrant information, the terms demand, supply as well as inductive or capacitive load are avoided in the display of data. They are expressed by stating Quadrant I, II, III or IV or a combination of these.
The energy direction may be actively switched by selecting the generator or consumer arrow system. This inverts the direction of all currents.



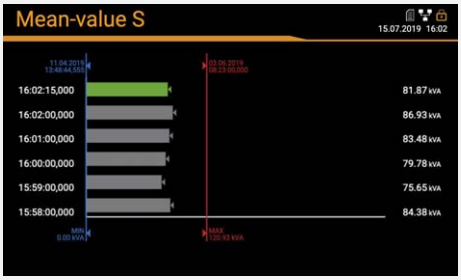
# DISPLAY OPTIONS



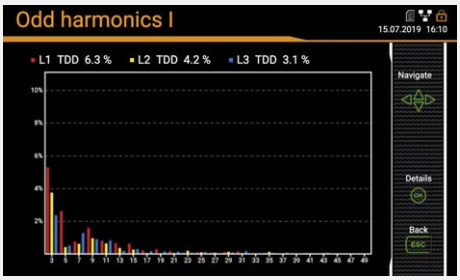

**MAIN MENU** - accessible via ESC
The language-specific main menu arranges the available measured data in easily comprehensible groups. AM2000 and AM3000 also provide the lateral help bar with further information concerning operation.
The status bar in the top right-hand corner is always available and displays the current statuses of alarm monitoring, the password protection system and data recording as well as time / date.



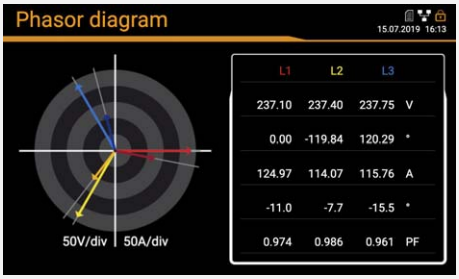

## INSTANTANEOUS VALUES
The instantaneous values of voltages, currents, power values, power factors as well as imbalance values and their min/max values are provided either in numbers or graphically in an x/y matrix.




## ENERGY
Contains all values required for the preparation of the energy balance, in particular, energy meters as well a mean values with progression and trend.

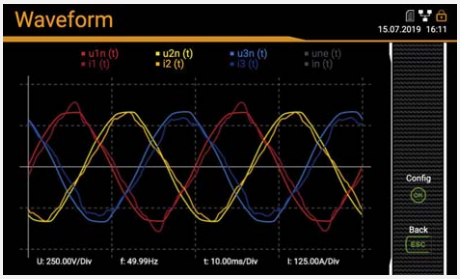



## HARMONICS
Graphic representation of harmonics of all currents and voltages with TDD/THD. Reading option for individual harmonics.




## PHASOR DIAGRAM
Time-correct display of voltage and current phasors and power factors of all phases. Incorrect phase sequences false senses of rotation or reverse currents can thus be safely recognised.


## ALARMS
This list displays the statuses of all monitoring functions, possibly including the status of the allocated output. The first entry is the higher-ranking collective alarm which can be reset here.




## WAVEFORM
AM1000 and AM3000 displays the waveform of voltages and currents in additionally.

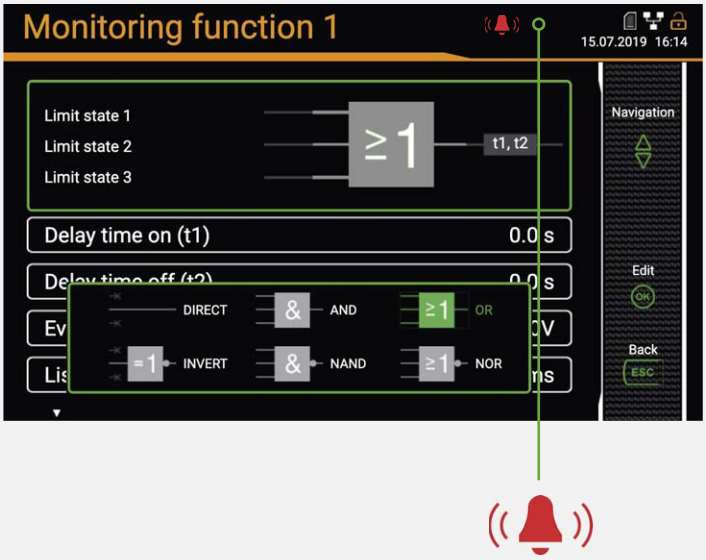
# MONITORING AND ALARMS

The instruments of the AM series support the on-site analysis of acquired measured data in order to initiate directly immediate or delayed measures without involving a separate control. This facilitates the protection of equipment and also monitoring of service intervals.
The following items are available:

- 12 limit values
- 8 monitoring functions with 3 inputs each
- 1 collective alarm as a combination of all monitoring functions
- 3 operating hour counters with definable running conditions

The available digital outputs may be used directly for the transmission of limit values and monitoring functions as well as the resettable collective alarm.

A text may be allocated to each monitoring function which is used both for the alarm list and the event entries in the datalogger.




# DATA RECORDING

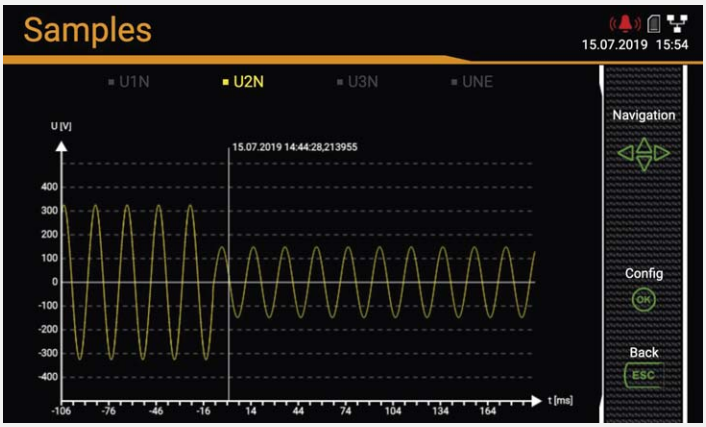
The devices may be equipped with a high-performance data logger which has the following recording options in its comprehensive version:

- **PERIODIC DATA**
  Selectable measured values are saved in regular intervals, e.g. to acquire load profiles (intervals of 10s to 1h) or periodic meters readings (e.g. daily, weekly, monthly).

- **EVENTS**
  A type of logbook which records the occurrence of events together with time information: Triggering and declining of monitoring functions, changes in configuration, power cuts and much more.

- **DISTURBANCE RECORDER (AM1000 / AM3000 ONLY)**
  Recording of current and voltage progression in case of disturbances on basis of 1/2 cycle RMS values. In AM3000, the additional registration of the waveform during the disturbance is also possible. This type of registration corresponds to the requirements of the EN 61000-4-30 power quality standard.

The event list and the recordings of the disturbance recorder may be visualised right on the device. More extensive analyses are available via the webpage of the device.
An SD card is used as a memory element by AM2000 / AM3000.
AM1000 uses an internal memory element.



# TECHNICAL DATA

## INPUTS

| | |
|---|---|
| **NOMINAL CURRENT** | 1 … 5 A (max. 7.5 A) |
| Maximum | 7.5 A |
| Overload capacity | 10 A permanent<br>100 A, 5x1 s, interval 300 s |
| **NOMINAL VOLTAGE** | 57.7 … 400 $V_{LN}$, 100 … 693 $V_{LL}$ |
| Maximum | 480 $V_{LN}$, 832 $V_{LL}$ (sinusoidal) |
| Overload capacity | 480 $V_{LN}$, 832 $V_{LL}$ permanent<br>800 $V_{LN}$, 1386 $V_{LL}$, 10x1 s, interval 10 s |
| Nominal frequency | 42 … 50 … 58 Hz, 50.5 … 60 … 69.5 Hz |
| Measurement TRMS | Up to 60th harmonic |

### POWER SUPPLY VARIANTS

| | |
|---|---|
| Nominal voltage | 100 … 230 V AC/DC (AM1000)<br>110 … 230 V AC, 130 … 230 V DC (AM2000/3000)<br>110 … 200 V AC, 110 … 200 V DC (AM2000/3000)<br>24 … 48 V DC (AM1000/2000/3000) |

### 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
Only AM1000/AM3000: 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) |
| Linearization | Linear, kinked |
| Range | ±20 mA (24 mA max.), bipolar |
| Accuracy | ±0.2% of 20 mA |
| Burden | ≤ 500 Ω (max. 10 V/20 mA) |
| **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.) |
| Nominal current | 50 mA (60 mA max.) |

| | |
|---|---|
| **FAULT CURRENT MONITORING** | For grounded systems (optional) |
| Number of meas. channels | 2 (2 measurement ranges each) |
| Measurement range 1 (1A) | Earth current measurement |
| • Measuring transformer | 1/1 up to 1/1000 A |
| • Alarm limit | 30 mA up to 1000 A |
| Measurement range 2 (2mA) | RCM with connection monitoring |
| • Measuring transformer | Residual current transformer 500/1 up to 1000/1 A |
| • Alarm limit | 30 mA up to 1 A |

| | |
|---|---|
| **TEMPERATURE INPUTS** | (optional) |
| Number of channels | 2 |
| Measurement sensor | Pt100 / PTC; 2-wire |
| **RELAYS** | (optional) |
| Contacts | Changeover contact |
| Load capacity | 250 V AC, 2 A, 500 VA; 30 V DC, 2 A, 60 W |

## BASIC UNCERTAINTY ACCORDING IEC/EN 60688

| | AM1000/2000 | AM3000 | |
|---|---|---|---|
| Voltage, current | ±0.2 % | ±0.1 % | |
| Power | ±0.5 % | ±0.2 % | |
| Power factor | ±0.2° | ±0.1° | |
| Frequency | ±0.01 Hz | | |
| Imbalance U, I | ±0.5 % | | |
| Harmonic | ±0.5 % | | |
| THD U, I | ±0.5 % | | |
| Active energy | Class 1 | Class 0.5S | (EN 62053-22) |
| Reactive energy | Class 1 | Class 0.5S | (EN 62053-24) |

## INTERFACES

| | |
|---|---|
| **ETHERNET** | Standard (AM3000), optional (AM1000/AM2000) |
| Physics | Ethernet 100Base TX; RJ45 socket |
| Mode | 10/100 MBit/s, full/half duplex, autonegotiation |
| Protocols | Modbus/TCP, http, NTP (time synchronisation) |
| **IEC61850** | **option** |
| Physics | Ethernet 100Base TX; RJ45 socket, 2 ports |
| Mode | 10/100 MBit/s, full/half duplex, autonegotiation |
| Protocols | IEC61850, NTP |
| **PROFINET IO** | **optional** |
| Conformance class | CC-B |
| Physics | Ethernet 100BaseTX, RJ45-Buchsen, 2 ports |
| Mode | 10/100 Mbit/s, full/half duplex, auto-negotiation |
| Protocol | PROFINET, LLDP, SNMP |
| **MODBUS/RTU** | Standard (AM2000), optional (AM1000 / AM3000) |
| Physics | RS-485, max. 1200 m (4000 ft) |
| Baud rate | 9.6 to 115.2 kBaud |
| **TIME REFERENCE** | Internal clock |
| Clock accuracy | ± 2 minutes/month (15 to 30 °C) |
| Synchronisation | NTP server or GPS |

## ENVIRONMENTAL CONDITIONS, GENERAL INFORMATION

| | |
|---|---|
| Operating temperature | without UPS: –10 up to 15 up to 30 up to + 55 °C<br>with UPS: 0 up to 15 up to 30 up to + 35 °C |
| Storage temperature | Base device: –25 up to + 70 °C<br>Battery pack UPS: –20 … 60 °C (<1 month)<br>–20 … 45 °C (< 3 months)<br>–20 … 30 °C (< 1 year) |
| Temperature influence | 0.5 x basic uncertainty per 10 K |
| Long-term drift | 0.5 x basic uncertainty per year |
| Others | Application group II (EN 60688) |
| Relative air humidity | <95 % without condensation |
| Operating altitude | ≤2000 m above MSL |

Only to be used in buildings!

## MECHANICAL PROPERTIES

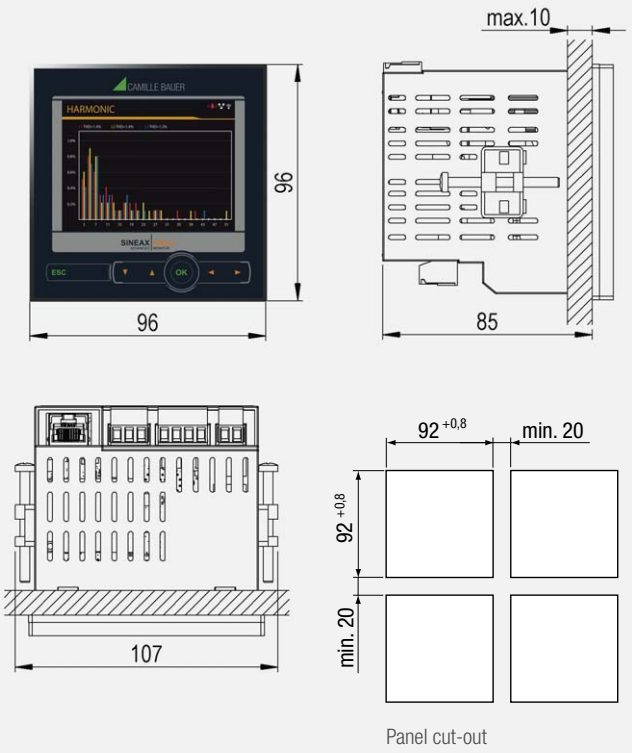
| | |
|---|---|
| Installation position | Control panel installation |
| Housing material | Polycarbonate (Makrolon) |
| Flammability class | V-0 according UL94, self-extinguishing, not dripping, free of halogen |
| Weight | 800 g (AM2000/AM3000), 400 g (AM1000) |

## SAFETY

Current inputs are galvanically isolated from each other.

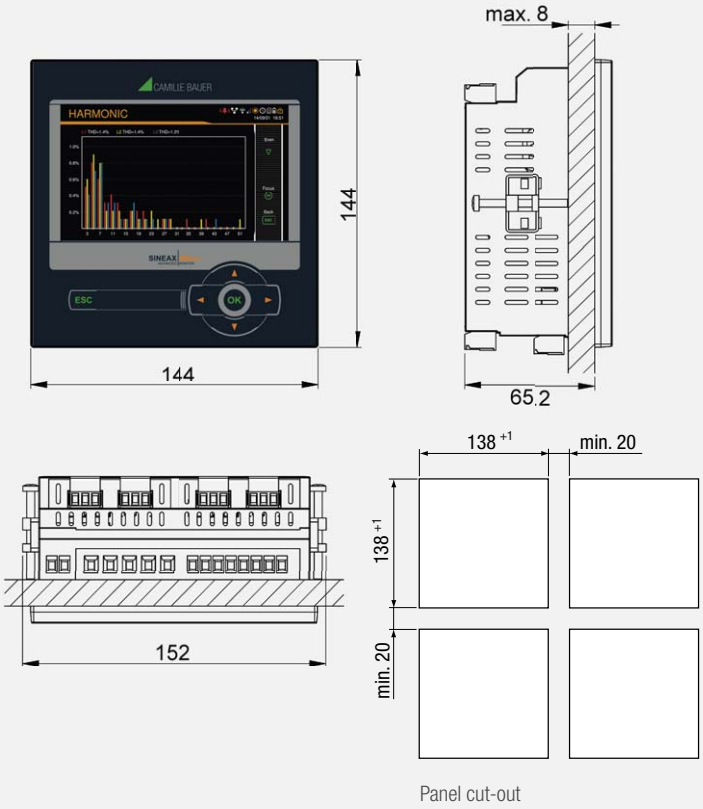
| | |
|---|---|
| Protection class | II (protective insulation, voltage inputs via protective impedance) |
| Pollution degree | 2 |
| Protection | IP54 (front), IP30 (housing), IP20 (terminals) |
| Measurement category | U: 600 V CAT III, I: 300 V CAT III |

## DIMENSIONAL DRAWINGS AM1000




Panel cut-out

## DIMENSIONAL DRAWINGS AM2000 / AM3000




Panel cut-out

# ORDER CODE

**ORDER CODE AM1000- .... ...**

| | | | |
|---|---|---|---|
| **1.** | **BASIC DEVICE AM1000** | | |
| | With TFT display, for control panel installation | 1 | |
| **2.** | **INPUT I FREQUENCY RANGE** | | |
| | Current transformer inputs, 42 … 50/60 … 69.5 Hz | 1 | |
| **3.** | **POWER SUPPLY** | | |
| | Nominal voltage 100 … 230 V AC/DC | 1 | |
| | Nominal voltage 24 … 48 V DC | 2 | |
| **4.** | **BUS CONNECTION** | | |
| | Without | 0 | |
| | Ethernet (Modbus/TCP + web server) | 1 | |
| | RS485 (Modbus/RTU) | 2 | |
| | Ethernet (Modbus/TCP + web server) + RS485 (Modbus/RTU) | 3 | |
| **5.** | **DATA LOGGER** | | |
| | Without | 0 | |
| | Periodic Data + events [1] | 1 | |
| | Disturbance recorder + events [1] | 2 | |
| | Periodic Data + events + disturbance recorder [1] | 3 | |
| **6.** | **EXTENSION** | | |
| | 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 | |
| | Profinet interface | A | |
| | IEC61850 interface | B | |
| | Temperature monitoring, 2 channels | C | |
| **7.** | **TEST PROTOCOL** | | |
| | Without | 0 | |
| | Test protocol in German | D | |
| | Test protocol 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 | |

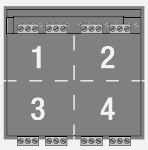
[1] Datalogger only possible for device variants with Ethernet

## ORDER CODE AM2000- .... .... .

| | | |
|---|---|---|
| **1.** | **BASIC DEVICE AM2000** | |
| | With TFT display, for control panel installation | 1 |
| **2.** | **INPUT I FREQUENCY RANGE** | |
| | Current transformer inputs, 42 … 50/60 … 69.5 Hz | 1 |
| **3.** | **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 |
| **4.** | **BUS CONNECTION** | |
| | Without | 0 |
| | RS485 (Modbus/RTU slave) | 1 |
| | RS485 (Modbus/RTU slave) + Ethernet (web server) | 2 |
| | RS485 (Modbus/RTU slave) + Ethernet (Modbus/TCP protocol + web server) | 3 |
| | RS485 (Modbus/RTU) + Ethernet (Modbus/TCP + web server) + data logger (periodic data + events) | 4 |
| **5.** | **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 |
| **6.** | **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 |
| | Profinet interface | A |
| | IEC61850 interface | B |
| | Temperature monitoring, 2 channels | C |
| **7.** | **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 |
| | Temperature monitoring, 2 channels | C |
| **8.** | **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 |
| **9.** | **TEST PROTOCOL** | |
| | Without | 0 |
| | Test protocol in German | D |
| | Test protocol in English | E |

## ORDER CODE AM3000- .... .... ..

| | | |
|---|---|---|
| **1.** | **BASIC DEVICE AM3000** | |
| | With TFT display, for control panel installation | 1 |
| **2.** | **INPUT I FREQUENCY RANGE** | |
| | Current transformer inputs, 42 … 50/60 … 69.5 Hz | 1 |
| **3.** | **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 |
| **4.** | **BUS CONNECTION** | |
| | Ethernet (Modbus/TCP + web server) | 1 |
| | Ethernet (Modbus/TCP + web server) + RS485 (Modbus/RTU) | 2 |
| **5.** | **DATA LOGGER** | |
| | Without | 0 |
| | Periodic data + events | 1 |
| | Disturbance recorder + events | 2 |
| | Periodic data + events + disturbance recorder | 3 |
| **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 |
| | Profinet interface | A |
| | 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 PROTOCOL** | |
| | Without | 0 |
| | Test protocol in German | D |
| | Test protocol in English | E |




### EXTENSIONS AM2000/AM3000

Maximum one extension with analog outputs may be provided per device.
Extension 4 only possible for a variant without data logger.

| 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 | |

# SMARTCOLLECT

SMARTCOLLECT is a data management software which can acquire measured data in an easy manner and store the same in an open MS SQL database.
This software offers basic functionalities for data analysis and for easy energy monitoring as well as the easy preparation and disposal of reports.

Providing a mature graphic user interface, the SMARTCOLLECT software is clearly structured and easily operated.

SMARTCOLLECT is modularly designed and permits supplementing modules or functions at any time.

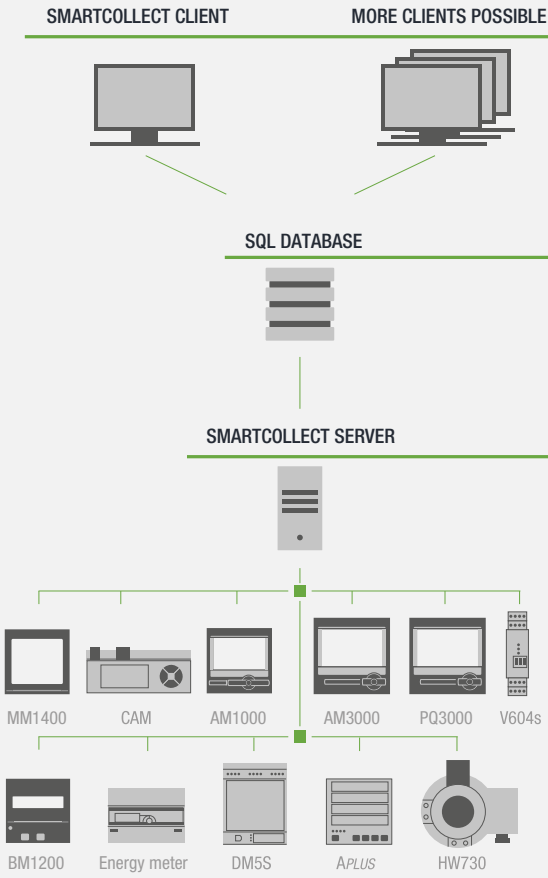
## CUSTOMER BENEFITS

- Easy data communication via Modbus RTU / TCP, ECL and SmartControl-Direct
- Connection also via OPC
- Devices of Camille Bauer and Gossen Metrawatt are already predefined and selectable in the software
- Open for the devices of all manufacturers
- Data is stored in an open MS SQL database (depending on the scope Express or Server)
- Modular cost / performance model – basic version may be extended at any time

## MODULAR DESIGN

### COMPONENTS

The SMARTCOLLECT data management software consists of the following components:




### SMARTCOLLECT CLIENT

- Graphic visualisation of queried data
- Export via Excel file
- User interface to define the data sources to be read out as well as error and warning messages via email.

### SMARTCOLLECT DATABASE

- MS SQL database (depending on the scope Express or Server)
- Contains the collected data
- Open and unencrypted

### SMARTCOLLECT SERVER

- Collects and configures data from active sources and channels and writes the same directly into the central database.

SMARTCOLLECT software components may be installed on an individual system or on several servers or computers.

# GMC INSTRUMENTS

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