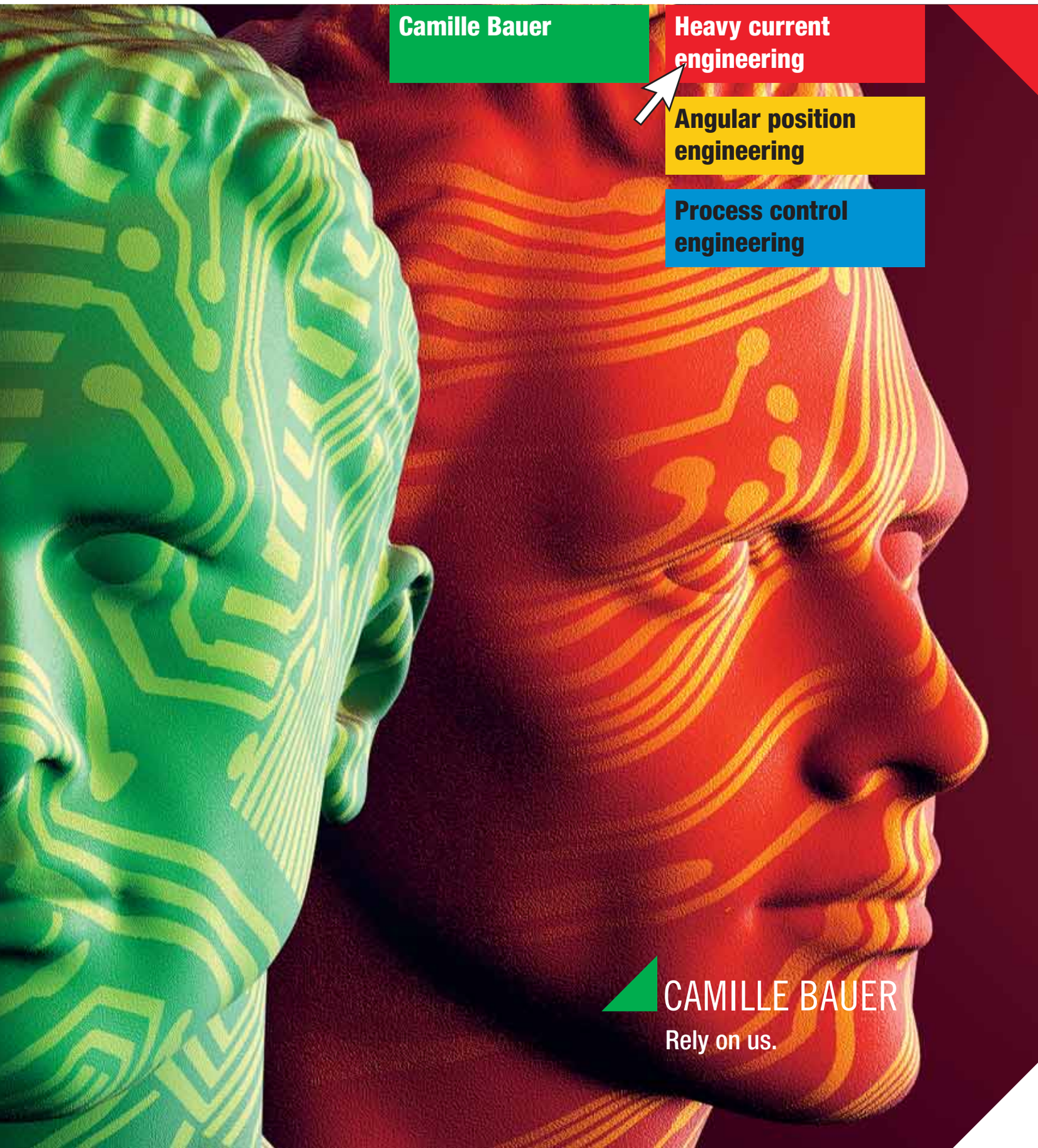
Heavy Current Engineering



Camille Bauer
Heavy Current Engineering at a glance

Only the best have always been working for us, i.e. our customers and the market with all of its changing and new challenges. This implies a permanent learning aptitude which is consistently implemented in our products - particularly in customised solutions.
And this world-wide, always considering local requirements, conditions and regulations.
We launch new products as announced. We adhere strictly to confirmed delivery dates.
And: Our responsibility in relation to customers does not end upon the conclusion of a sale.
Systematic and innovative thinking determines our actions. The concept of all product groups is comprehensive and integrative.
In this respect, high priority is given to the interaction of hardware and software.

Our program may be subdivided as follows:
- **Heavy current engineering**
- **Angular position engineering**
- **Process control engineering**

Camille Bauer offers two options for orders:
The versatile products of Camille Bauer have different product features. You can obtain products via Order Code or as stock versions.

The Order Code is stated on the data sheets on our homepage:

www.camillebauer.com.

For standard applications, use the 6-digit Article Number stated in this catalogue. These products are on stock and can be supplied within 3 days.

It is a matter of course that our competent sales partners in your country will support you in ordering (please see the inside of the rear cover or visit our homepage).

Our in-house area sales manager will support you in countries which are not listed.

CAMILLE BAUER
Rely on us.

Rely on us:
We provide a
3-year warranty for all
Camille Bauer products.

Content Unifunctional Transducers

Transducers for alternating current: Common features

For the conversion of a sinusoidal alternating current into a proportional DC signal.

Customer benefit

- Determination of the variable load of lines and equipment
- Identification of the utilisation ratio by a comparison with the nominal current
- Output signal useable for indication, registration, monitoring and control
- Safety by galvanic isolation and shock-proof terminals (IP20)

Application

The transducers for alternating current of the P-line are typically connected via current transformers, but can also be used for direct measurement. The measurement is effected within the instrument via current transformers which ensure galvanic isolation. The instruments are designed for sinusoidal alternating current signals. Possibly existing direct current portions are not concurrently measured. They provide an output signal in form of a direct current signal which is proportional to the measured current.
The instruments can be easily snapped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm).

Overview of instruments

O = optional, S = standard

Special features		*I542*	*I538*	*I552*
Input	Measurement of distorted alternating currents			•
	RMS value measurement (standard)			•
	2 measuring ranges (standard)	•		•
	Adjustable maximum value of the measuring range	O	O	S
	Without power supply (standard)	•		
	Nominal frequency 400 Hz (option)			•
Output	Setting time 300 ms	•	•	•
	Setting time 50 ms (option)			•
	Adjustable output signal (option)	•		•
	Live-zero output signal (option)		•	•
Power supply	2-wire technology with 4 …20 mA output (option)		•	

For current measurement with sign programmable transducers of the DME4 or M56x lines may be used.

Live-zero output signal

In case of input signal zero the pertaining output signal is non-zero, by definition, e.g. 4 mA with a 4…20 mA output signal. This permits monitoring the instrument operation in a very easy manner since an output value of 0 mA clearly indicates an error. This might be the failure of the power supply or an absent input signal caused by an interruption of a signal line.

2-wire technology

Transducers in 2-wire technology do not require a separate power supply connection. They are supplied via the output circuit. Instruments designed in this way must operate with less than 4 mA supply current but do not need separate electronics for the power supply.

Short-circuiting of current transformers

Conventional current transformers have a ferrite core. If the secondary winding of the transformer is open, it might carry high voltages, which will drive the current transformer to saturation. This might lead to flashovers and heat losses by eddy-currents and magnetic hysteresis losses which could cause a permanent loss in transformer accuracy. In extreme cases it is even destroyed. Therefore, the current input of the current transducer (and all other transducers with current inputs) should always be connected via short-circuiting terminals.

SINEAX I542

Transducers for alternating current

To measure sinusoidal alternating currents, without power supply connection.

Customer benefit
- Without power supply connection, low wiring expenditure
- Standard as GL (Germanischer Lloyd), suitable for ships

Technical data

Meas. input: 0…1 A / 5 A, 0…1.2 A / 6 A or customised (0…0.5 A to 0…7.5 A, only one measuring range), nominal frequency 50/60 Hz
Meas. output: 0…1 mA, 0…5 mA, 0…10 mA, 0…20 mA or 0…10 V or customised (0…1 V to 0…<10 V)
Accuracy: Class 0.5 at 15…30 °C
H x W x D: 69.1 x 35 x 112.5 mm

Stock variants

Article No.	*Measuring range, switchable*	*Output signal*
129 595	0…1 A / 5 A	0…5 mA
129 602	0…1 A / 5 A	0…10 mA
129 610	0…1 A / 5 A	0…20 mA
136 417	0…1.2 A / 6 A	0…5 mA
136 425	0…1.2 A / 6 A	0…10 mA
136 433	0…1.2 A / 6 A	0…20 mA

To measure currents with high harmonic content or distorted sinusoidal form SINEAX I552 should be used.

SINEAX I538

Transducers for alternating current

To measure sinusoidal alternating currents, with power supply connection.

Customer benefit
- Also available in cost-effective 2-wire technology
- Standard as GL (Germanischer Lloyd), suitable for ships

Technical data

Meas. input: 0…1 A, 0…5 A or customised 0…0.8 A to 0…1.2 A or 0…4 A to 0…6 A, nominal frequency 50/60 Hz
Meas. output: : 0…20 mA, 4…20 mA, 4…20 mA 2-wire technology, 0…10 V or customised
Accuracy: Class 0.5 at 15…30 °C
Power supply: 24–60 V AC/DC, 85–230 V AC/DC or 24 V, 110 V, 115 V, 120 V, 230 V, 400 V AC 50/60 Hz or 24 V DC or 24 V DC via output circuit in 2-wire technology
H x W x D: 69.1 x 35 x 112.5 mm

Stock variants

Article No.	*Measuring range*	*Output signal*	*Power supply*
137 431	0…1 A	4…20 mA	230 V AC, 4-wire connection
137 449	0…5 A	4…20 mA	230 V AC, 4-wire connection
146 979	0…1 A	4…20 mA	24 V DC, 4-wire connection
136 590	0…1 A	4…20 mA	24 V DC, 2-wire technology
146 987	0…5 A	4…20 mA	24 V DC, 4-wire connection
136 607	0…5 A	4…20 mA	24 V DC, 2-wire technology

To measure currents with high harmonic content or distorted sinusoidal form SINEAX I552 should be used.

Transducers for alternating current

To measure sinusoidal or distorted alternating currents,
with power supply connection.

Customer benefit

- RMS value measurement up to crest factor 6
- 2 measuring ranges
- Possibility of adjusting the maximum value of the measuring range on site
- Standard as GL (Germanischer Lloyd), suitable for ships
- Can also be used for 400 Hz systems

Technical data

Meas. input:	0…1 A / 5 A, 0…1.2 A / 6 A or customised (0…0.1 / 0.5 A to 0…<1.2 / 6 A) Nominal frequency 50/60 Hz or 400 Hz
Meas. output:	0…20 mA, 4…20 mA, 0…10 V or customised Setting time 50 ms or 300 ms
Accuracy:	Class 0.5 at 15…30 °C
Power supply:	24–60 V AC/DC, 85–230 V AC/DC or 24 V AC / 24–60 V DC, connection on the low-voltage side
H x W x D:	69.1 x 70 x 112.5 mm

Stock variants

Article No.	*Measuring range, switchable*	*Output signal*	*Power supply*	*Setting time*
133 760	0…1 / 5 A, 50/60 Hz	4…20 mA	85–230 V, DC or 40–400 Hz	300 ms

Multiple transducer for alternating current and voltage

For the simultaneous measurement of up to 3 alternating voltages or alternating currents, without power supply connection.

Customer benefit

- Without power supply connection, low wiring expenditure
- Low power consumption
- Up to 3 independent channels
- Possibility of adjusting the maximum value of the measuring range on site (approx. ±5%)
- Test sockets for field indicator (optional)

Technical data

Meas. input:	Current: 0…1 A, 0…1.2 A, 0…5 A, 0…6 A or customised (0…0.5 A to 0…10 A) Voltage: different standard ranges or customised (0…20 V to 0…660 V) Up to three inputs: current, voltage or empty Nominal frequency 50 or 60 Hz
Meas. output:	0…1 mA, 0…5 mA, 0…10 mA, 0…20 mA or customised (0…1 mA to 0…20 mA) 0…10 V or customised (0…60 mV to 0…10 V) Setting time <300 ms
Accuracy:	Class 0.5 (23 °C ±5 K)
Power supply:	none
H x W x D:	Plug-in card in European format, face plate width 7TE (35.2 mm)

For 19" assembly rack for EURAX plug-in cards see Page 28

SINEAX I552

EURAX UI505

Transducers for alternating voltage: Common features

For the conversion of a sinusoidal alternating voltage into a proportional DC signal.

Customer benefit

- Determination of the present voltage level
- Determination of the load of the equipment by a comparison with the rated voltage
- Output signal useable for indication, registration, monitoring and control
- Safety by galvanic isolation and shock-proof terminals (IP20)

Application

The transducers for alternating voltage of the P-line may be connected via voltage transformers, but can also be used for direct measurement. They have been designed for the measurement of sinusoidal alternating voltage signals. Possibly existing direct voltage portions are not concurrently measured. They provide an output signal in form of a direct current signal which is proportional to the measured voltage level.
Instruments with live-zero signal can be used for improved failure recognition. If only certain areas of the whole measuring range are of interest, U554 with main value magnification or step point.

The instruments can be easily snapped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm).

Overview of instruments

Special features		*U543*	*U539*	*U553*	*U554*
Input	Measurement of distorted alternating voltages			•	•
	RMS value measurement (standard)			•	•
	Nominal frequency 400 Hz (option)			•	•
	Adjustable maximum value of the measuring range (option)	•	•	•	
Output	Live-zero output signal (option)		•	•	•
	Setting time 300 ms	•	•	•	•
	Setting time 50 ms (option)			•	•
	Different characteristics (primary value scale, step)				•
Power supply	Without power supply (standard)	•			
	2-wire technology with 4 …20 mA output (option)		•		

Transducers for alternating voltage

To measure sinusoidal alternating voltages, without power supply connection.

Customer benefit

- Cost-effective measurement of voltages with low harmonic content
- Without power supply connection, low wiring expenditure

Technical data

Meas. input: Different ranges from 0…100/√3 to 0…500 V or customized
0…20 V to 0…600 V, maximum 300 V nominal value of the system against earth
Nominal frequency 50/60 Hz
Maximum value of the measuring range is fixed or can be set via potentiometer (approx. ±10%)

Meas. output: 0…1 mA, 0…5 mA, 0…10 mA, 0…20 mA or
0…10 V or customised (0…1 V to 0…<10 V)

Accuracy: Class 0.5 at 15…30 °C

H x W x D: 69.1 x 35 x 112.5 mm

Stock variants

Article No.	*Description*	*Output signal*
129 785	0…100 V, 50/60 Hz	0…20 mA
137 142	0…120 V, 50/60 Hz	
129 842	0…250 V, 50/60 Hz	
136 459	0…500 V, 50/60 Hz	

To measure voltages with high harmonic content or distorted sinusoidal form SINEAX U553 or U554 should be used.

SINEAX U543

Transducers for alternating voltage

To measure sinusoidal alternating voltages, with power supply connection.

Customer benefit

- Cost-effective measurement of voltages with low harmonic content
- Possibility of adjusting the maximum value of the measuring range on site

Technical data

Meas. input: 0…100 V, 0…250 V, 0…500 V or customised 0…50 V to 0…600 V
Nominal frequency 50/60 Hz

Meas. output: 0…20 mA, 4…20 mA, 4…20 mA 2-wire technology, 0…10 V or customised

Accuracy: Class 0.5 at 15…30 °C, Class 1 if Un >500 V

Power supply: 24 – 60 V AC/DC, 85 – 230 V AC/DC or
24 V, 110 V, 115 V, 120 V, 230 V, 400 V AC 50/60 Hz or
24 V DC or 24 V DC via output circuit in 2-wire technology

H x W x D: 69.1 x 35 x 112.5 mm

Stock variants

Article No.	*Measuring range*	*Output signal*	*Power supply*
146 995	0…100 V, 50/60 Hz	4…20 mA	230 V AC, 4-wire connection
147 000	0…250 V, 50/60 Hz	4…20 mA	
147 018	0…500 V, 50/60 Hz	4…20 mA	
136 699	0…100 V, 50/60 Hz	4…20 mA	24 V DC, 2-wire connection
126 971	0…500 V, 50/60 Hz	4…20 mA	

To measure voltages with high harmonic content or distorted sinusoidal form SINEAX U553 or U554 should be used.

SINEAX U539

SINEAX U553

Transducers for alternating voltage

To measure sinusoidal or distorted alternating voltages,
with power supply connection.

Customer benefit
- RMS value measurement up to crest factor 6
- Possibility of adjusting the maximum value of the measuring range on site
- Standard as GL (Germanischer Lloyd), suitable for ships
- Can also be used for 400 Hz systems

Technical data

Meas. input:	Different ranges from 0…100/√3 to 0…500 V or customized 0…20 V to 0…690 V, maximum 400 V nominal value of the system against earth Nominal frequency 50/60 Hz or 400 Hz Maximum value of the measuring range can be set via potentiometer (approx. ±15%)
Meas. output:	0…20 mA, 4…20 mA, 0…10 V or customized 0…1 to 0…20 mA or 0.2…1 to 4…20 mA or 0…1 to 0…10 mA or 0.2…1 to 2…10 V Setting time 50 ms or 300 ms
Accuracy:	Class 0.5 at 15…30 °C
Power supply:	24–60 V AC/DC or 85–230 V AC/DC (also from measurement input) or 24 V AC / 24–60 V DC, connection on the low-voltage side
H x W x D:	69.1 x 70 x 112.5 mm

SINEAX U554

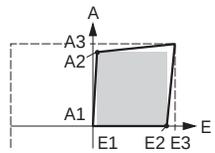
Transducers for alternating voltage

To measure sinusoidal or distorted alternating voltages, with power supply connection.

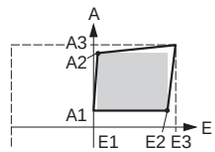
Customer benefit
- RMS value measurement up to crest factor 6
- The measuring range which is of interest can be highlighted

Technical data

Meas. input:	Minimum value 0 V, maximum value of the measuring range E3 = 20…690 V, Step point 0.1 · E3…0.9 · E3 Nominal frequency 50/60 Hz or 400 Hz
Meas. output:	Maximum value A3 = 1 mA, 5 mA, 10 mA, 20 mA, 10 V or customised 1…20 mA or 1…10 V



E1 = 0
0,1 · E3 ≤ E2 ≤ 0.9 · E3
A1 = 0
A1 ≤ A2 ≤ 0.9 · A3



E1 = 0
0.1 · E3 ≤ E2 ≤ 0.9 · E3
A1 = 0.2 · A3
A1 ≤ A2 ≤ 0.9 · A3

Accuracy:	Class 0.5 at 15…30 °C
Power supply:	24–60 V AC/DC or 85–230 V AC/DC (also from measurement input) 24 V, 110 V, 115 V, 120 V, 230 V, 400 V AC 50/60 Hz or 24 V AC / 24–60 V DC, connection on the low-voltage side
H x W x D:	69.1 x 70 x 112.5 mm

Transducers for alternating voltage difference

Measures the alternating voltage difference of 2 galvanicly isolated systems.

Customer benefit
- Auxiliary variable to synchronise two systems
- The measuring range which is of interest can be highlighted

Technical data

Meas. input:	Voltages of Un=10…500 V, measuring range ±20% Un Nominal frequency 50 or 60 Hz
Meas. output:	0…1 mA to …20 mA or 1…5 mA to 4…20 mA unipolar, bipolar, live-zero
Accuracy:	Class 0.5
Power supply:	AC: 115 V or 230 V ±20%, 42–70 Hz DC: 24–110 V, -15%…+33%
H x W x D:	125 x 70 x 126 mm or plug-in card in European format, face plate width 7 TE (EURAX)

For 19" assembly rack for EURAX plug-in cards see Page 28

SINEAX U700

EURAX U700

High-voltage isolation amplifier for up to 3.6 kV DC

for shunt and voltage measurement on high potential.

Customer benefit
- Safe galvanic isolation according to DIN EN 61010-1 and DIN EN 50124 (Cat. III)
- High test voltage: 10 kV
- Calibrated range shift
- High common-mode rejection ratio: 150 dB

Technical data

Input (switch-over): :	±60 mV, ±90 mV, ±150 mV, ±300 mV, ±500 mV, ±10 V[1] ±400 V, ±600 V, ±800 V, ±1000 V, ±1200 V ±1400 V, ±1600 V, ±1800 V, ±2000 V, ±2200 V, ±3600 V[2]
Output (switch-over)::	4…20 mA, ±20 mA, ±10 V
Power supply:	24–253 AC/DC
H x W x D:	90 x 22.5 x 118 mm (Article No. 158 312) 90 x 67.5 x 118 mm (Article Nos. 158 320 and 158 338)

Stock variants

Article No.	*Description*
158 312	Shunt measurement: ±60 mV, ±90 mV, ±150 mV, ±300 mV, ±500 mV, ±10 V[1]
158 320	Voltage measurement: ±400 V, ±600 V, ±800 V, ±1000 V, ±1200 V
158 338	Voltage measurement: ±1400 V, ±1600 V, ±1800 V, ±2000 V, ±2200 V, ±3600 V[2]

[1] Only output ±10 V
[2] Upon request (no switch-over)

SINEAX TV829

Power transducers: Common features

To convert active or reactive power into a proportional DC signal.

Customer benefit

- Determination of the chronological progression of the power input
- Avoidance of under and overload situations, load control
- Monitoring of rotating machines
- Monitoring for blockages, e.g. in conveyor facilities
- Monitoring of energy distribution
- Output signal useable for indication, registration, monitoring and control
- Safety by galvanic isolation and shock-proof terminals (IP20)

Application

The transducers for active or reactive power may be connected via current and voltage transformers, but can also be used for direct measurement. They provide an output signal in form of a direct current signal which is proportional to the measured power. Depending on the application, versions for measurement in single-phase or three-phase systems with balanced or unbalanced loads are available.
The instruments can be easily snapped onto a top-hat rail (35 x 15 mm or 35 x 7.5 mm).

Stock variants

Special features	*P530*	*Q531*	*P200*	*P600*
Measured variable active power	•		•	
Measured variable reactive power		•	•	
Measured variable mixed current power				•
Measured variable direct current power				•

SINEAX P530/Q531

For single-phase systems

For 3/4 wire three-phase systems

Transducers for active or reactive power

To measure the active power/reactive power of a single-phase alternating current or a three-phase current.

Customer benefit

- Monitoring of power consumption in energy distribution systems and process engineering
- Standard as GL (Germanischer Lloyd), suitable for ships

Technical data

Meas. input: Single-phase alternating current, 3-wire three-phase current with balanced/unbalanced loads or 4-wire three-phase current with balanced (only P530) / unbalanced loads
Nominal voltage Un 100…115 V, 200…230 V, 380…440 V, 600…690 V or 100…690 V
Nominal current In 1 A, 5 A or customised (1…6 A)
Maximum value of the measuring range ≥0.75 to 1.3 · nominal output, unipolar or bipolar
Nominal frequency 50/60 Hz, sinusoidal

Meas. range: P530: Maximum value ≤0.75 to 1.3 · nominal output, unipolar or bipolar
Q531: Maximum value ≤0.5 to 1.0 · nominal output, unipolar or bipolar

Meas. output: Maximum output value 1 mA, 2.5 mA, 5 mA, 10 mA, 20 mA, 10 V or customised 1…20 mA or 1…10 V
Output signal unipolar, bipolar or live-zero
Setting time <300 ms

Meas. principle: TDM method

Accuracy: Class 0.5 at 15…30 °C

Power supply: 24–60 V AC/DC, 85–230 V AC/DC, ≥85–230 V AC from measurement input or 24 V AC / 24–60 V DC, connection on the low-voltage side

H x W x D: 69.1 x 70 x 112.5 mm (single-phase)
69.1 x 105 x 112.5 mm (3/4 wire three-phase current)

Transducers for active or reactive power

To measure the power of a single-phase alternating current or a three-phase current.

Customer benefit
- Very fast power measurement, suited to control and protect
- Possibility of adjusting the maximum value of the measuring range on site (via hyper terminal)
- Can also be used for 16⅔-Hz systems

Technical data

Meas. input:	Input voltage 5…300 V AC (phase-neutral) Input current 0.5…6 A Nominal frequency 16⅔, 50, 60 Hz Maximum value of the measuring range 0.3…2.0 x Pn, unipolar or bipolar
System configurations:	Single-phase alternating current 3/4-wire three-phase current with balanced/unbalanced load
Meas. output:	Maximum output value 0…1 to 0…20 mA or 0…1 to 0…10 V Output signal unipolar, bipolar or live-zero
Setting time:	T99 (block mode filter): ½, 1, 2, 4, 8 or up to 64 system cycles T63 (exponential mode): 3…200 ms T99 (exponential mode): 4.6 x T63
Meas. principle:	TDM method
Accuracy:	Class 0.5
Power supply:	AC: 115 V or 230 V ±15%, 45–65 Hz DC: 20–135 V
H x W x D:	125 x 70 x 126 mm

SINEAX P200

Transducer for mixed current power

Acquisition of power components of a mixed current (current with DC and AC portions).

Customer benefit
- RMS value measurement up to crest factor 2
- Possibility of adjusting the maximum value of the measuring range on site
- Can also be used for 400 Hz systems

Technical data

Meas. input:	Input voltage between 0…300 mV and 800 V or ±150 mV and ±800 V Input current direct 0…1 mA and 0…50 mA or ±1 and ±500 mA or from shunt 0…300 mV and 0…3 V or ±150 mV and ±3 V Nominal frequency DC / 10…70…400 Hz Maximum values of the measuring range 0.75…1.5 · Un · In, bipolar ranges also possible
Meas. output:	Maximum output value selectable 1…20 mA or 1…15 V Output signal unipolar, bipolar or live-zero Setting time 300 ms Also available with 2 galvanicly isolated outputs
Meas. method:	Only direct current power measurement (AC filtered) or mixed current power measurement unfiltered or with an eliminated DC portion or AC measurement, pulse groups
Meas. principle:	TDM method
Accuracy:	Class 0.5
Power supply:	AC: 115 V or 230 V 50/60 Hz or DC: Un 24–110 V
H x W x D:	130 x 70 x 126 mm

SINEAX P600

SINEAX F534

EURAX F534

Transducer for frequency

For the conversion of the frequency of a system into a proportional DC signal.

GL Only SINEAX

Customer benefit

- Determination of the progression and stability of the fundamental frequency of an electric system
- Standard as GL (Germanischer Lloyd), suitable for ships (only SINEAX design)
- Output signal useable for indication, registration, monitoring and control
- Safety by galvanic isolation and shock-proof terminals (IP20)

Application

Frequency is an important command variable of electric systems or power distribution systems. Variations of the system frequency particularly occur in system overload or underload situations. They must be immediately recognised in order to take countermeasures in time. Frequency fluctuations impair the performance of connected machines disproportionately. However, this can also be utilised in drive engineering to improve start and speed characteristics e.g. in frequency converters where the frequency is employed as a control variable.
The frequency is measured via a zero-phase voltage or voltage between phases which can be directly connected via a converter. The instrument is also suited to distorted voltages with dominant fundamental waves. A direct current signal proportional to the measured frequency is available at the output.

Technical data

Meas. input:	Input nominal voltage 10…230 V or 230…690 V
Meas. range:	45…50…55 Hz, 47…49…51 Hz, 47.5…50…52.5 Hz, 48…50…52 Hz, 58…60…62 Hz or customised between 10 and 1500 Hz
Meas. output:	Maximum output value 0…20 mA, 4…20 mA, 0…10 V or customised in the 1…20 mA or 1…10 V range Output signal unipolar, symmetrically bipolar or live-zero Setting time selectable 2, 4, 8 or 16 cycles of the input frequency
Accuracy:	Class 0.2 at 15…30 °C
Power supply:	24–60 V AC/DC or 85–230 V AC/DC (also internally from measurement input) 24 V AC / 24–60 V DC, connection on the low-voltage side
H x W x D:	69.1 x 70 x 112.5 mm (SINEAX), assembly on top-hat rail (35 x 15 mm or 35 x 7.5 mm) or plug-in card in European format, face plate width 7 TE (EURAX)

For 19" assembly rack for EURAX plug-in cards see Page 28

Transducers for frequency difference

Acquisition of the frequency difference of two systems to be synchronised.

Only SINEAX

Customer benefit

- Determination of the frequency difference as a synchronisation control variable
- Standard as GL (Germanischer Lloyd), suitable for ships
- Output signal useable for indication, registration, monitoring and control
- Safety by galvanic isolation and shock-proof terminals (IP20)

Application

Voltage, phase and frequency balance are the basic preconditions to enable the parallel connection of generators on one bus bar.
The frequency difference is determined by the simultaneous measurement of the voltages of the bus bar and the generator unit to be energised. The instrument is also suited to distorted voltages with dominant fundamental waves. A direct current signal proportional to the measured frequency difference is available at the output.

Technical data

Meas. input:	Input nominal voltage 10…230 V or 230…690 V
Meas. range:	f_S = 50 Hz: f_G = 49.5…50…50.5 Hz, f_G = 47.5…50…52.5 Hz, f_G = 47.5…50…52.5 Hz, f_G = 40…50…60 Hz, f_S = 60 Hz: f_G = 57.5…60…62.5 Hz or customised between 10 and 1500 Hz [f_S=frequency bus bar, f_G=frequency generator]
Meas. output:	Maximum output value 0…20 mA, 4…20 mA, 0…10 V or customised in the 1…20 mA or 1…10 V Output signal unipolar, symmetrically bipolar or live-zero Setting time selectable 2, 4, 8 or 16 cycles of the input frequency
Accuracy:	Class 0.2 at 15…30 °C
Power supply:	24–60 V AC/DC or 85–230 V AC/DC (also internally from measurement input) 24 V AC / 24–60 V DC, connection on the low-voltage side
H x W x D:	69.1 x 70 x 112.5 mm (SINEAX), assembly on top-hat rail (35 x 15 mm or 35 x 7.5 mm) plug-in card in European format, face plate width 7 TE (EURAX)

For 19" assembly rack for EURAX plug-in cards see Page 28

SINEAX F535

EURAX F535

SINEAX G536

EURAX G536

Transducer for phase angle or power factor

Acquisition of the phase angle or power factor between the current and voltage of a single-phase system or a symmetrically loaded three-phase system.

Only SINEAX

Customer benefit

- Monitoring of the reactive power requirement in energy distribution systems and process engineering
- Determination of characteristic value for reactive power compensation
- Standard as GL (Germanischer Lloyd), suitable for ships
- Output signal useable for indication, registration, monitoring and control
- Safety by galvanic isolation and shock-proof terminals (IP20)

Application

The instrument serves the acquisition of losses which are caused by non-linear loads or reactive impedances. During a day, these might strongly fluctuate which impedes static reactive power compensation since overcompensation is not permitted.
The transducer for phase angle or power factor can be connected via current and voltage transformer or directly. The instrument is also suited to distorted input variables with dominant fundamental waves. At the output, a direct current signal proportional to the measured phase angle or power factor between current and voltage is available.

Technical data

Meas. input:	Single-phase alternating current system or 3/4-wire three-phase system of the same load Nominal voltage 100 V, 230 V, 400 V or customised 10…690 V Nominal current 1 A, 5 A or customised 0.5…6 A Nominal frequency 50/60 Hz or 10…400 Hz
Meas. range:	Phase angle –60°…0°…+60°el or within –180°…0°…+180°el or power factor 0.5…cap…0…ind…0.5 or within –1…ind…0…cap…1…ind…0…cap…–1 Measuring span ≥20°el, unambiguous indication only up to –175°…0…+175°el
Meas. output:	Maximum output value 0…20 mA, 4…20 mA, 0…10 V or customised in the 1…20 mA or 1…10 V range Output signal unipolar, symmetrically bipolar or live-zero Setting time selectable 2, 4, 8 or 16 cycles of the input frequency
Accuracy:	Class 0.5 at 15…30 °C
Power supply:	24–60 V AC/DC or 85–230 V AC/DC (also internally from measurement input) 24 V AC / 24–60 V DC, connection on the low-voltage side
H x W x D:	69.1 x 70 x 112.5 mm (SINEAX), assembly on top-hat rail (35 x 15 mm or 35 x 7.5 mm) plug-in card European format, face plate width 7 TE (EURAX)

For 19" assembly rack for EURAX plug-in cards see Page 28

Transducers for phase angle difference

Acquisition of the phase angle difference of two systems to be synchronised.

GL Only SINEAX

Customer benefit

- Determination of the phase angle difference as a synchronisation control variable
- Standard as GL (Germanischer Lloyd), suitable for ships
- Output signal useable for indication, registration, monitoring and control
- Safety by galvanic isolation and shock-proof terminals (IP20)

Application

Voltage, phase and frequency balance are the basic preconditions to enable the parallel connection of generators on one bus bar.
The phase angle difference is determined by the simultaneous measurement of the voltage of the bus bar and the generator unit to be energised. The instrument is also suited to distorted voltages with dominant fundamental waves. A direct current signal proportional to the measured phase angle difference is available at the output.

Technical data

Meas. input:	Input nominal voltage 10…230 V or 230…690 V Nominal frequency 50 Hz, 60 Hz or customised 10…400 Hz
Meas. range:	–120°…0…120°el or customised within –180°…0…180°el, in which measuring span ≥20°el, unambiguous indication only up to –175°…0…+175°el
Meas. output:	Maximum output value 0…20 mA, 4…20 mA, 0…10 V or customised in the 1…20 mA or 1…10 V range Output signal unipolar, symmetrically bipolar or live-zero Setting time selectable 2, 4, 8 or 16 cycles of the input frequency
Accuracy:	Class 0.2 at 15…30 °C
Power supply:	24–60 V AC/DC or 85–230 V AC/DC (also internally from measurement input) 24 V AC / 24–60 V DC, connection on the low-voltage side
H x W x D:	69.1 x 70 x 112.5 mm (SINEAX), assembly on top-hat rail (35 x 15 mm or 35 x 7.5 mm) plug-in card in European format, face plate width 7 TE (EURAX)

For 19" assembly rack for EURAX plug-in cards see Page 28

SINEAX G537

EURAX G537

Content Multifunctional Instruments

Introduction

Introduction

Conventional transducers for heavy current variables are an excellent aid to acquire individual electric variables in energy distribution, automation or process engineering and to process them in accordance with requirements. However, if several variables are to be acquired, microcontroller-based multifunctional instruments constitute the more effective and more cost-effective solution:

Less assembly and wire expenditure

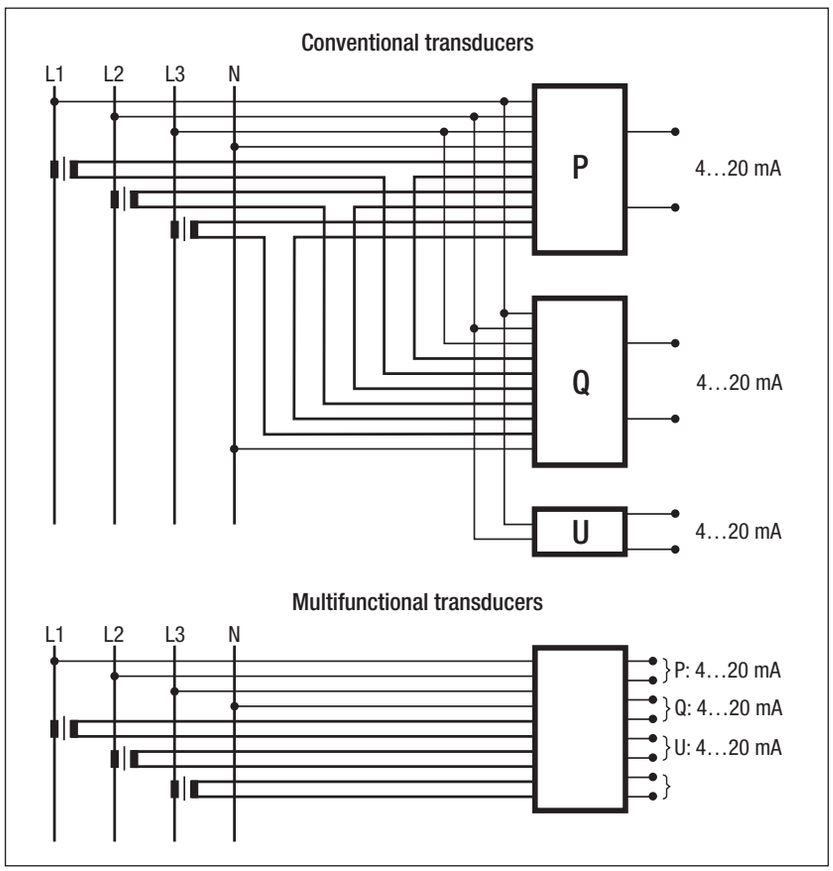
- Less copper
- Less installation time
- Reduced susceptibility to failures

Flexibility

- Several measured variables per instrument
- Lower planning costs due to fewer components
- Adaptable to application by software
- Analysis and monitoring options
- No fixed measuring ranges
- Hardly any hardware variants
- Reduced stocks

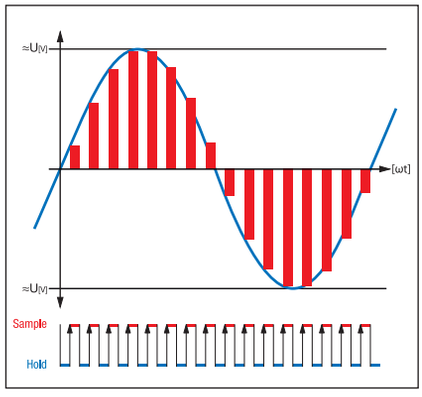
Risk

- All of the information is lost in an instrument failure



Operating principle of sampling systems

1. Measurement of the fundamental frequency of the system. Simpler instruments presuppose a constant system frequency which can lead to larger errors.
2. Sampling of the input variables of voltage and current of all phases based on the measured fundamental frequency. Quality criteria are the number of sampling operations per system cycle and the reproducible resolution of the measuring system. The correct timing of the sampling process is also very important so that unbalances and phase shiftings can be properly analysed.
3. Calculation of the required measured variables, based on the sampling values.
4. Measured values are made available to the process. They may be analogue values for a PLC or an analogue indicator, states of a limit value monitoring system or digital measured values via a bus interface.
5. More extensive analyses. The possibilities are limited by the capacity of the uC system used. Camille Bauer makes available systems with different capacities.



Application

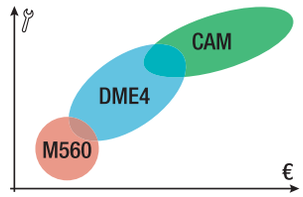
The opposite table helps in the selection of the instrument family. This is an overview, details concerning individual instrument variants are contained in subsequent pages.
Multifunctional transducers can be connected via current and voltage transformers or directly. All Camille Bauer lines can be used universally. The application (system configuration) as well as nominal values of current and voltage are freely programmable without any hardware variants. The allocation of measured variables to the outputs and the determination of the limits of the measuring ranges is also realised using the respective PC software which is made available free of charge by us. Service functions support users during commissioning. In this way, e.g. values of analogue or digital outputs can be simulated to test subsequent circuits without the measurement input having to be connected or activated. Instrument variants with a bus connection provide all acquired measured values via the corresponding digital interface. The respective documentation is attached to the instrument or can be downloaded from our homepage http://www.camillebauer.com

Accessories

For configuration software see Page 53

Overview

Overview of the instrument families

	 SINEAX M56x	 SINEAX DME4	 SINEAX CAM
Measuring system			
Sampling values per system period	24	32	128 (continuously)
Accuracy class	0.5	Analogue outputs: 0.25 Measured variables of bus: 0.2	Basic instrument: 0.2 I/O modules: 0.1
Setting time (at 50 Hz)	≥ 1.0s, depending on the system configuration and the selected measured variables	≥ 0.3s, depending on the system configuration and the selected measured variables	≥ 0.06s
Nominal frequency	50/60 Hz	16.7 Hz, 50/60 Hz	50/60 Hz
Nominal current	1…6 A	1…6 A	1…5 A, Overriding up to 10 A
Nominal voltage	57.7…400 V (Ph–N) 100…693 V (Ph–Ph)	57.7…400 V (Ph–N) 100…693 V (Ph–Ph)	57…400 V (Ph–N) 100..693 V (P–P)
Measured variables			
Basic variables of the system [1]	•	•	•
Neutral wire current measurement			•
Meters		•	•
Tariff switching for meters			•
Unbalance			•
THD, TDD, harmonics			Up to the 50th harmonic
Maximum and minimum value with time stamp			•
Mean value acquisition			•
Logger for measured value progression		Mean value progression with DME407/408	Option
Alarm / event / operator lists			Option
Display of measured values and lists, acknowledgement of alarms		Measured values + meters with accessory SINEAX A200	Option
I/O interface	fixed	fixed	modular (up to 4 modules)
Analogue outputs	1, 2 or 3	2 or 4	2 per module
Analogue inputs			2 per module
Digital outputs		4 or 2	3 per module
Digital inputs			3 per module
HV input 110/230 VAC			1 per module
Possible bus connections		RS485 (Modbus), Profibus, LON or Ethernet	As a standard: RS485 (Modbus) + USB
Special software functions			
System check		•	•
Check of connection			•
Logic module			•

[1] The basic variables of the system are all single and system variables of voltage, current, bimetal current, active, reactive and apparent power, reactive and power factor as well as frequency

Programmable multi-transducers

To measure up to 3 selectable variables in a heavy current system

Only M563

Customer benefit

- One measurement unit for up to three heavy current variables
- Fully programmable, therefore hardly any product variance. Reduced stocks
- Ideally suited to modernising existing plants
- EMC resistance far above legally stipulated limits
- PC software with password protection for configuration and commissioning
- Output signal(s) useable for display, registration and monitoring
- Safety through galvanic isolation of all circuits and shock-proof terminals

Application

The instruments of the programmable M56x transducer line are designed for measurement in electric distribution systems or industrial plants. User-defined measured variables can be issued via up to 3 bipolar, galvanicly isolated analogue outputs and used for on-site display or the connection to a supervisory system (e.g. PLC). The area of interest may be highlighted by the scale function.
The measuring system of the transducers has been designed for the acquisition of sinusoidal alternating current signals with low harmonic content. Contents up to the 11th harmonic are taken into consideration. These instruments are suited to measure after phase-angle controls or frequency converters only in a limited fashion. For very distorted signals or after full-wave controls the use of SINEAX CAM is recommended.
The transducer is connected via the PRKAB560 programming cable to the RS232 interface of the PC for programming. During commissioning, the output signals are simulated via PC software and measured values are retrieved and recorded.

Overview of instruments

Features	*M561*	*M562*	*M563*
Number of analogue outputs	1	2	3

Technical data

Meas. input: Nominal voltage 57.7…400 V (Ph-N) or 100…693 V (Ph-Ph)
Nominal current 1…6 A, nominal frequency 50 or 60 Hz

System configuration: Single-phase alternating current, 3/4-wire three-phase current with a balanced/unbalanced load, also in reduced phase-shift connection (2 voltages, 1 current)

Meas. output: Maximum output value 20 mA or customised 1…20 mA or 5…10 V
Output signal unipolar, bipolar, live-zero
Transfer characteristics: Invertible, with/without step (scale function)
Measuring cycle time 0.6…1.6 s, depending on measured variable(s) and programming

Accuracy: Class 0.2 (voltage and current), Class 0.5 (other variables)
Applications in reduced phase-shift connection: double class

Power supply: 24 – 60 V AC/DC or 85 – 230 V AC/DC (also internally from measurement input)

H x W x D: 69.1 x 105 x 112.5 mm, top-hat rail assembly

Stock variants

Article No.	*Type*	*Power supply (external)*	*Output signal*
158 411	M561 with 1 analogue output	24 – 60 V AC/DC	±20 mA
158 429		85 – 230 V AC/DC	
158 437	M562 with 2 analogue output	24 – 60 V AC/DC	
158 445		85 – 230 V AC/DC	
146 458	M563 with 3 analogue output	24 – 60 V AC/DC	
146 440		85 – 230 V AC/DC	

Accessories

For M560 configuration software see Page 53, for PRKAB560 programming cable see Page 58

SINEAX M561/M562/M563

Programmable multi-transducer line DME4

To acquire several variables of any heavy current system simultaneously.

Customer benefit

- Only one measuring unit for several heavy current variables, Class 0.2
- Fully programmable, therefore hardly any product variance. Reduced stocks
- Up to 693 V nominal voltage (between phases) in CAT III
- Integrated energy meters with programmable measured variable
- PC software with password protection for configuration and commissioning
- Output signal(s) useable for display, registration, metering and monitoring
- Safety through galvanic isolation of all circuits and shock-proof terminals (SINEAX)

Overview of instruments

Type	*DME442*	*DME424*	*DME406*	*DME400*	*DME401*	*DME440*	*DME407 DME408*
Input	100…693 V (Ph–Ph), 1…6 A, 16.7 /50/60 Hz						
Accuracy	Analogue outputs: 0.25%, measured variables of bus: 0.2%						
Analogue outputs	4 bipolar [mA or V]	2 bipolar [mA or V]	—	—	—	4 bipolar [mA or V]	—
Digital outputs	2	4	—	—	—	—	—
Meter	up to 2	up to 4	4	4	4	4	4
Bus	—	—	Profibus DP	LON	Modbus	Modbus	Ethernet

General application

The instruments of the programmable DME4 transducer line are designed for measurement in electric distribution systems or industrial plants. They are used where a high degree of accuracy and flexibility is demanded. Depending on the instrument type, user-defined measured variables are issued at analogue or digital outputs or all acquired variables may be polled via the bus.

The measuring system of the transducers has been designed for the acquisition of sinusoidal alternating current signals with low harmonic content. Portions up to the 15th harmonic are taken into consideration. These instruments are suited to measure after phase-angle controls, for applications after frequency converters they can only be used in a limited fashion . For very distorted signals or after zero crossing controls the use of SINEAX CAM is recommended.

For a comprehensive measured value display on site, the SINEAX A200 display unit can be connected to the serial RS232 interface of the converter in all instrument types of the DME4 line. In this way, all instantaneous or meter values can be displayed.

The transducer is connected via a 1:1 cable to the RS232 interface of the PC for programming. During commissioning, possible output signals can be simulated via PC software. The complete image of the system may be retrieved via the RS232 or a possible bus interface of the instrument, e.g. to check the correct connection.

Common technical data

Meas. input: Nominal voltage 57.7…400 V (Ph-N) or 100…693 V (Ph-Ph), nominal current 1…6 A, nominal frequency 50, 60 or 16⅔ Hz

System configuration: Single-phase alternating current, 3/4-wire three-phase current with balanced/unbalanced load or 3-wire three-phase current with balanced load in reduced phase-shift connection (2 voltages, 1 current)

Measurement output: Depending on instrument type, measuring cycle time 0.13…0.99 s, depending on instrument type and programming

Accuracy: State variables via bus interface: Class 0.2, measured variables at analogue outputs: Class 0.25
Active power meters: Class 1, reactive power meters: Class 2
Applications with reduced phase-shift connection: double class

Power supply: 24–60 V AC/DC or 85–230 V AC/DC or AC supply 100, 110, 230, 400, 500, 693 V AC (only DME400, 424, 442), also internally from measuring input

H x W x D: 69.1 x 105 x 112.5 mm, top-hat rail assembly (35 x 15 mm or 35 x 7.5 mm) or plug-in card European format, face plate width 14 TE (EURAX DME424, 442, 440)

Accessories

For DME4 configuration software see Page 53
For RS232 programming cable (1:1 connection cable) see Page 58
For 19" assembly rack for EURAX plug-in cards see Page 28
For SINEAX A200, display unit for the DME4 line see Page 28

Programmable multi-transducer

To acquire several variables of any heavy current system simultaneously.

Only SINEAX

For **general data** see „Programmable transducer line DME4“, Page 21

Overview of instruments

Features	*DME424*	*DME442*
Number of analogue outputs	2	4
Number of digital outputs	4	2

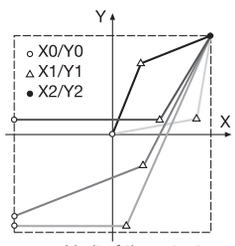
Application

The programmable multi-transducers DME424/442 can image several, freely programmable measured variables at analogue and digital outputs. The measured variables are allocated to the outputs by DME4 PC software. Analogue outputs may be used for on-site display or the connection to a supervisory system (e.g. PLC). The area of interest may be highlighted by the scale function (step). Complete suppression of the lower or upper range is also possible. Digital outputs may be used for the pulse output to external meters. Simultaneously, an internal meter reading is built which can be read via the RS232 interface. Digital outputs may also be used to monitor overruns or shortfalls of limit values. In addition, two outputs permit linking (AND/OR) of up to 3 limit values.
During commissioning, the output signals can be simulated via PC software in order to test subsequent circuits also without an activated input. If digital outputs are used as limit values, the state can be specified, if used as a pulse output, a percentage of the set pulse rate.

Technical data

Analogue outputs

- Maximum value of the output 20 mA or customised 1…20 mA or 1…10 V
- Output signal unipolar, bipolar, live-zero
- Transfer characteristics: with/without step (scale function)
- Measuring cycle time 0.13…0.47 s, depending on measured variable(s) and system configuration, setting time 1…2 · measuring cycle time
- Accuracy 0.25c. Factor c>1, if characteristic with a step or only parts of the input or output range are used.

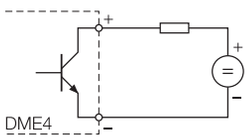


--- Limit of the output range

If the maximum values of the output of the instruments do not agree with the desired application, they can be reduced by software (possible additional error). The maximum values may also be adapted by hardware to the desired value or rearranged from current to voltage output (or vice versa). This requires that resistances in the instrument are changed and that outputs are recalibrated using the PC software.

Digital outputs

- Open collector outputs, 8…40 V externally supplied
- Output current 10…27 mA (ON) and 2 mA (OFF)
- If used as pulse output: Pulse duration and interpulse period ≥100 ms, suitable to energise mechanical meters.
  The pulse duration cannot be programmed. The accuracy of the pulse output corresponds to the class of the internal meters (see general data).



Stock variants

Article No.	*Type*	*Power supply (external)*	*Output signals*
129 206	DME442	230 V AC	±20 mA
129 214		85–230 V AC/DC	

Variants for nominal frequency 50/60 Hz, without test protocol with basic configuration

Accessories

For accessories of the DME4 transducer line see Page 21

SINEAX DME424

SINEAX DME442

EURAX DME424/442

SINEAX DME401

SINEAX DME440

EURAX DME440

Programmable multi-transducer

Acquisition of all variables of any heavy current system with Modbus connection.

Only SINEAX

For **general data** see „Programmable transducer line DME4“, Page 21

Overview of instruments

Features	*DME401*	*DME440*
Number of analogue outputs	0	4
Modbus connection	yes	yes
Available in 19” rack version	no	yes

Customer benefit

The programmable DME401/440 multi-transducers can acquire all measured variables of any heavy current system. In addition, four user-determined measured variables can be output via analogue outputs in DME440.
DME4 PC software is used to allocate the measured variables to the analogue outputs of DME440 as well as setting input parameters. Analogue outputs may be used for on-site display or the connection to a supervisory system (e.g. PLC). During commissioning, the output signals can be simulated via PC software which facilitates a complete test of subsequent circuits.

Technical data

Analogue outputs
See DME442, however measuring cycle times up to 0.99 s if all measured variables of a 4-wire system with an unbalanced load shall be polled via Modbus

Modbus

Functions:	Measured value acquisition and configuration of the converter, resetting of meters and slave pointers
Protocol:	Modbus RTU
Physics:	RS-485, max. line length 1200m (4000 ft)
Baud rate:	1200, 2400, 9600 Bd
Number of participants:	max. 32 (including master)

Modbus

Modbus is ‚only‘ a protocol, i.e. instructions which state the sequence of characters which must be sent for a desired function and how the respective reply is structured. It can thus be used for any transmission medium, on principle. However, normally an RS-485 interface is employed since it is price-effective and permits the formation of a bus structure with several participants. The Modbus protocol is a single master protocol. This master (usually a PC or PLC) controls the complete transmission and monitors possibly occurring timeouts (no reply from the addressed device). The connected devices may send telegrams only if requested by the master.

Stock variants

Article No.	*Type*	*Power supply (external)*	*Output signals*
138 372	DME440 with 4 analogue outputs	85 – 230 V AC/DC	±20 mA
142 183		24 – 60 V AC/DC	
146 515	DME401 without analogue outputs	85 – 230 V AC/DC	—
146 523		24 – 60 V AC/DC	

Variants for nominal frequency 50/60 Hz, without test protocol with basic configuration

Accessories

For accessories of the DME4 transducer line see Page 21

Programmable multi-transducer

Acquisition of all variables of any heavy current system with Profibus DP connection.

For **general data** see „Programmable transducer line DME4“, Page 21

Application
SINEAX DME406 is a freely programmable transducer with a PROFIBUS-DP interface. Profibus DP-V0 used in DME406 has been optimised for fast data exchange on the field level. All data and information required for the installation of the device is included in the Profibus CD which accompanies each instrument.

Technical data (Profibus DP-V0)

Bus connection:	Screw connection on terminals 15 to 21
Transmission rate:	9.6 kBaud … 12 MBaud or automatic recognition of the baud rate
Max. bus length:	100…1200 m, depending on the baud rate and the cable used
Interface:	RS 485, galvanicly isolated (500 V)
Configuration:	Via PC on site or via bus master

Stock variants

Article No.	*Type*	*Power supply (external)*
146 911	DME406	85–230 V AC/DC
146 896		24–60 V AC/DC

Variants for nominal frequency 50/60 Hz, without test protocol with basic configuration

Accessories
For accessories of the DME4 transducer line see Page 21

Programmable transducer

Acquisition of all variables of any heavy current system with LON connection.

For **general data** see „Programmable transducer line DME4“, Page 21

Application
SINEAX DME400 is a freely programmable transducer with a LONWORKS® interface. Instruments with a LON interface are primarily used in building automation.

Technical data LONWORKS® interface

Network protocol:	LONTALK®
Transmission medium:	Echelon FTT-10A transceiver, transformer-coupled, reverse polarity protected, twisted two-wire cable
Transmission speed:	78 kBit/s

LON (Local Operating Network)
LON is a fieldbus developed by Echelon Corporation of the US around 1990. LON technology facilitates the neutral exchange of information between plants and devices of different manufacturers.

Further instruments with a LON interface
EMMOD205, extension module A line, see Page 36
A2000, multifunctional power transducer, see Page 33

Accessories
For accessories of the DME4 transducer line see Page 21

SINEAX DME406

SINEAX DME400

SINEAX DME407

SINEAX DME408

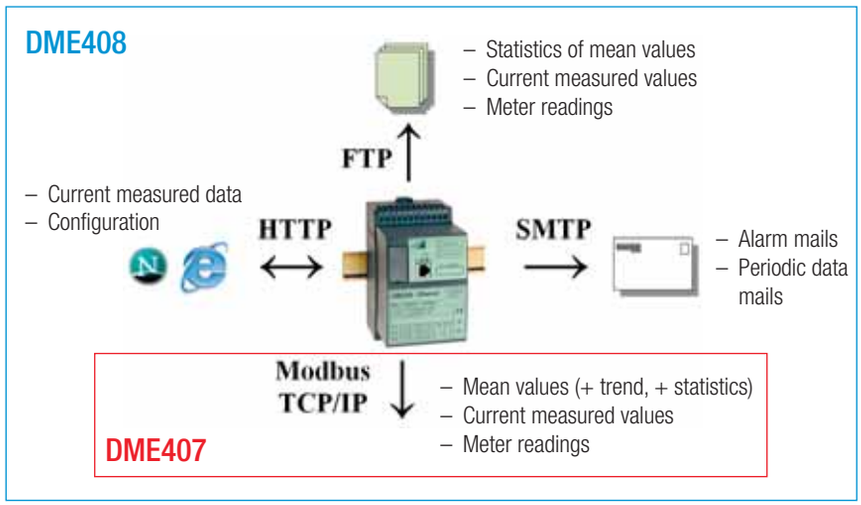
Programmable multi-transducer

Acquisition of all variables of any heavy current system with Ethernet connection

For **general data** see „Programmable transducer line DME4“, Page 21

Application

The devices may be used for any remote application to record state information and billing data for power feeders, distribution facilities or specific loads in electrical systems. They can be connected via Intranet or Internet. The differences of DME408 and DME407 functionalities are as follows:



Special features

- Determination of energy consumption and billing data (load profiles, meters)
- Remote acquisition of measured data via WEB browser (http), file transfer (ftp), Modbus/TCP protocol
- Acquisition of mean values with trend calculation and progression logging for user-determined variables
- Monitoring of limit values: alarms via e-mail (smtp)
- Periodic transmission of measured data via e-mail
- Built-in, synchronisable real-time clock for time stamping of measured values

Technical data

Ethernet

Ethernet connection: RJ45
Physical layer: 10/100 Base-T

Stock variants

Article No.	*Type*	*Power supply (external)*	*Supported languages (browser)*
149 329	DME408	85 – 230 V AC/DC	German, English
152 843			French, English
154 930	DME407		German, English
154 948			French, English

All variants for nominal frequency 50/60 Hz, without test protocol with basic configuration

Further instruments with an Ethernet interface

EMMOD203, extension module for the multifunctional display units of the A line, see Page 35
A2000 with NETBOX 3, multifunctional power transducers with display, see Page 33

Accessories

For accessories of the DME4 transducer line see Page 21

Universal measuring unit for heavy current variables

For the comprehensive analysis of any heavy current system.

Customer benefit

- Consistent measurement (without interruption)
- Suited to strongly distorted systems, 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
- System analysis (harmonics and unbalance)
- Synchronisable real-time clock as a time basis and operating hour counter
- Graphic display with freely arranged measured value display and alarm handling (option)
- Logger for long-term recording of measured value progressions (option)
- Protocol lists for events, alarms and system messages (option))

Application

SINEAX CAM is designed for measurement in electrical distribution systems or industrial plants. Apart from the current system state, the pollution by non-linear loads as well as the overall load of the power system can be determined. Consistent measurement guarantees that any system change is reliably acquired and included in the measured data. The high-performance measuring system makes the device also suitable for strongly distorted systems, zero crossing or phase-angle controls. The I/O interface may be arranged as required. Up to 4 modules with different functionality may be used. The logger permits long-term recordings of measured value progressions, e.g. to monitor the variable load of transformers or to facilitate automatic meter readings. Lists record definable events, alarms and system messages chronologically for a subsequent analysis of incidents in the power system.
The optional display is intended for on-site visualisation of measured data and list entries. Users can adapt the display of measured data almost freely to their requirements. If required, a preferred display or an automatic sequence of measured values may be defined. The selection of the measured value display, resetting of meters or extreme values but also the acknowledgement of alarm may be arranged via the keypad. The authorisation to execute such functions can be limited via a safety system integrated in the device. If the system has been activated, the user must first log in via the display.

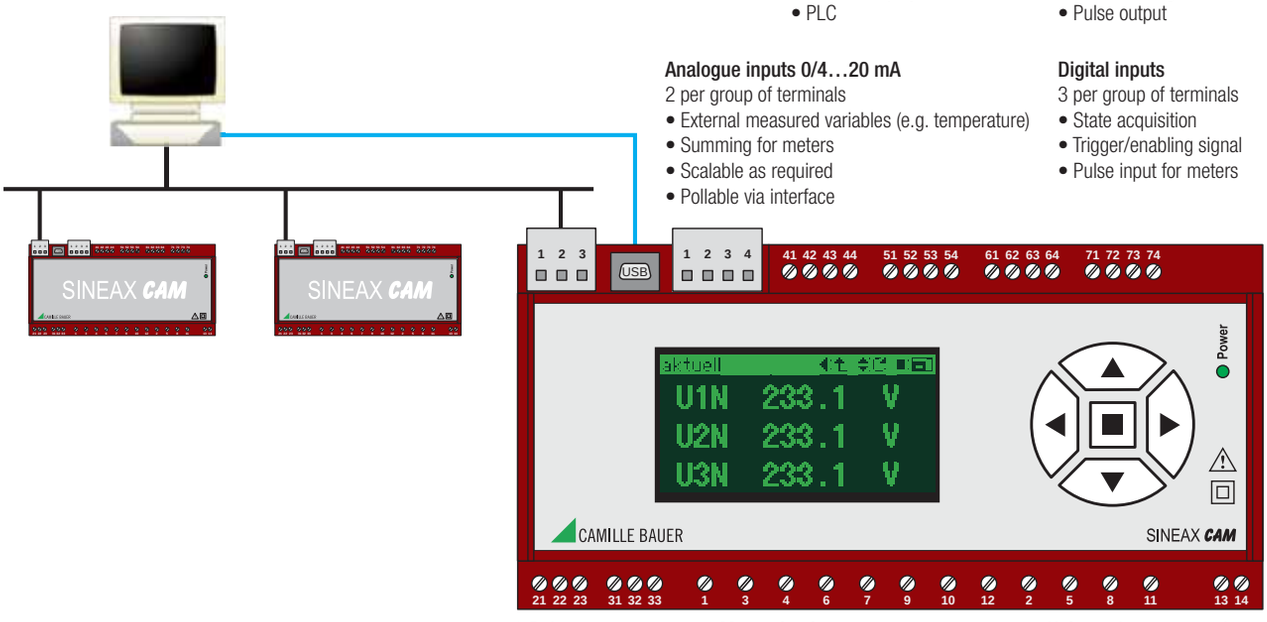
HV input
110/230 V AC
1 per group of terminals
- Voltage monitoring
- Synchronise RTC to system frequency

Analogue outputs ±20 mA or Analogue outputs 0/4…20 mA
2 per group of terminals
- On-site display
- PLC

Digital outputs S0
3 per group of terminals
- Alarms
- State message
- Pulse output

Analogue inputs 0/4…20 mA
2 per group of terminals
- External measured variables (e.g. temperature)
- Summing for meters
- Scalable as required
- Pollable via interface

Digital inputs
3 per group of terminals
- State acquisition
- Trigger/enabling signal
- Pulse input for meters



2 Relay outputs
- Consumption control
- Alarming

Measuring input
3 voltages/4 currents (I_1, I_2, I_3, I_N)
- Consistent measured value acquisition
- Adaptable to measuring task

Universal power supply
85–265 V AC, 45–400 Hz
110–265 V DC or
19–70 V DC

SINEAX CAM

Universal measuring unit for heavy current variables

Standard interfaces (for configuration, service, measured value polling)
Modbus connection (plug-in terminals 1, 2, 3)
Protocol: Modbus RTU, max. 32 participants (incl. master), baud rates up to 115.2 kBd
Physics: RS-485, max. line length 1200 m (4000 ft)
USB connection (USB Mini-B, 5-pin)
Protocol: USB 2.0

Technical data
Meas. input: Nominal voltage up to 693 V (Ph-Ph), nominal current up to 5 A, overridings programmable, nominal frequency 50 or 60 Hz
System configuration: Single-phase alternating current, split phase, 3/4-wire three-phase current with balanced/unbalanced load, clockwise and anti-clockwise rotating systems
Energy meter: Active energy incoming + outgoing, reactive energy incoming + outgoing + inductive + capacitive for measured system as well as max. 12 meters for external variables via digital or analogue inputs.
All meters high and low tariff if tariff switching is activated
Accuracy: Voltage and current 0.1%, power and voltage unbalance 0.2%
Harmonics, THD and TDD 0.5%, power factor ±0.1°, frequency ±0.01 Hz
Active energy Class 1 (EN 62053-21), reactive energy Class 2 (EN 62053-23)
Analogue inputs/outputs ±0.1%
Dimensions: 90 x 186 x 63 mm, assembly on top-hat rail (35 x 15 mm or 35 x 7.5 mm)

Logic module (standard):
The module consists of up to 32 logic functions with 3 digital input states each. Limit values of measured variables, states of digital inputs, state defaults via bus interface or results of other logic functions can be used as input variables. Typical applications are limit value monitoring of individual variables (e.g. overcurrent of a phase) or of combinations (e.g. phase failure). External functions can also be monitored via the I/O interface. The results of the logic functions will then trigger actions. This may be an alarm via digital outputs or relays but also an entry in an alarm or event list or the indication of an alarm text on the graphic display.

Data logger (option):
Permits long-term recording of measured value progressions or load profiles, e.g. to acquire the variable load of transformers or transmission lines. Users can chose to record mean values or acquire fluctuations of instantaneous values (in form of an envelop curve). Automatic meter readings can also be stored, e.g. weekly, monthly or quarterly to ensure that all devices are read at the same time.

Lists (option):
Permit chronological recording of all events, alarms and system messages. Any change in the system state and any interference at the device can then be traced and analysed in a chronologically correct order at a later time. Every entry has a time reference. Alarm and event texts can be configured in the logic module.

Stock variants

Article No.	*Type*	*Power supply (external)*	*I/O interface*
158 726	SINEAX CAM	85–230 V AC, 110–265 V DC	Without
158 734			4 analogue outputs, unipolar

Variants for nominal frequency 50/60 Hz, without test protocol with basic configuration

Accessories
For CB-Manager configuration software see Page 54
For CB-Analyzer analysis software for logger and lists see Page 54

Display unit for transducer line DME4

Visualising of all measured variables of the DME4 transducers.

Customer benefit
- On-site display of all measurable variables of a DME4 transducer
- Resetting of meters and slave pointers without PC and software
- Replacement for numerous analogue displays
- Type of loading as 4 quadrant display
- Also available with top-hat rail adapter
- High-contrast, 14 mm LED display, good readability also from larger distances

Application
The display unit permits the indication of all measured data of a DME4 multi-transducer on site. This is particularly interesting for pure bus devices (Modbus, Profibus, LON, Ethernet) since the measured values can be checked in this ways without requiring a special bus visualising tool. In versions with analogue and digital outputs, this unit can also display all of those values which are not imaged at the outputs.

As soon as an A200 is connected to the serial interface of a DME4, the display begins reading out measured values. The direct connection of the devices and the purely digital data transmission achieve the high display accuracy of 0.1% (U, I) or 0.2% (P, Q, S).

Two versions are available depending on whether the display unit is only to be used during installation or whether it is supposed to be firmly installed as a cost-effective on-site display: The SINEAX A200 control panel installation device and the portable A200-HH version.

Technical data
Power supply: SINEAX A200: Wide range power unit 20 – 265 V AC/DC
A200-HH: Rechargeable Li-Ion battery,
24…90 h operating time depending on display intensity
Dimensions: SINEAX A200: 96 x 96 x 46 mm, assembly on top-hat rail via adapter is possible
A200-HH: 260 x 120 x 65 mm

Stock variants

Article No.	*Type*	*Power supply (external)*
154 063	SINEAX A200	20 – 265 V AC/DC
154 972	A200-HH complete	–

Accessories
Connecting cable Sub 9-pin male/male, Article No. 154 071 (in A200-HH included in the scope of delivery)
Top-hat rail adapter for SINEAX A200, Article No. 154 055

SINEAX A200

SINEAX A200-HH

19" Assembly Rack

for plug-in cards in European format

Customer benefit
- Solder, wire-wrap or screw terminals
- Customised completely or partly assembled rack

Technical data
Power supply: 24 – 60 V AC/DC or 85 – 230 V AC/DC

EURAX BT901

Content Displaying Power Meters

Overview

Introduction
The displaying power meters for heavy current variables are completely programmable, universal measuring units. They provide numerous measured values and permit the complete acquisition of the state of a heavy current system. As is the case in multi-transducers, a sampling measuring principle is used (see overview of multifunctional transducers). Displaying power meters command a significantly lower market price in comparison with multi-transducers. This entails compromises in measurement quality. The displays are thus more apt to show additional errors in input signals which deviate from the ideal sinusoidal form. Overriding of inputs is also more limited. The table shown below is a selection guide for the right instrument.

	 **A210/A220**	 **A230s/A230**	 **A2000**
	Display unit + optional extension module		„All in one“
Mechanics			
Front	A210: 96 x 96 mm A220: 144 x 144 mm	A230s: 96 x 96mm A230: 144 x 144mm	144 x 144 mm
Installation depth	46 mm without extension module 65 mm with extension module		59.1 mm
Enclosure protection front/terminals	IP66 / IP20		IP52 / IP20
Measuring system			
Basic accuracy U / I	0.5%	0.2%	0.25%
Nominal current	1 or 5 A		1 and 5 A
Nominal voltage	0…290 V (Ph – N) or 0…500 V (Ph – Ph)		
Harmonic content …	Up to the 15th harmonic considered		
Measured variables			
Basic variables of the system [1)]	•	•	•
Meters	•	•	•
Tariff switching for meters	via digital input EMMOD		via synchronised input / internal clock
Power interval values	5 each for active, reactive and apparent power		
Unbalance of voltages		•	
THD current and voltage		•	•
Harmonic content		Up to 15th	Up to 15th
Neutral wire current		Calculated	Calculated
Extreme values	•	•	•
Data storage (values)	16‘000 mean values (with EMMOD201) 37‘500 mean values (with EMMDO203)		63‘000 (option), mean values or fault recorder
Interface			
Modbus	With extension module EMMOD201		•
Analogue outputs	With extension module EMMOD202		0.2 or 4
Ethernet	With extension module EMMOD203		With external netbox 3
Profibus	With extension module EMMOD204		•
LON	With extension module EMMOD205		•
Pulse / limit value outputs	2	2	2 + 2 relays

[1)] All phase and system variables of voltage, current, active, reactive and apparent power, power factor as well as frequency

SINEAX A210

SINEAX A220

SINEAX A210-HH

Multifunctional power meter with display

For the complete acquisition of the system state of a three-phase heavy current system.

Customer benefit

- All relevant variables of a heavy current system with only one device
- Replacement for numerous analogue displays
- Large LED display which can be read from a distance
- 2 digital outputs for alarms or output to external counter mechanism
- Integrated active and reactive power meters, 5 interval times each for P, Q and S
- Functionality extendable with plug-in modules (bus connection, logger, analogue outputs)

Application

The instruments are designed for measurements in electrical distribution system or industrial plants. All parameters may be set via the display. Configuration can also be performed using A200plus software if an EMMOD201 (Modbus) or EMMOD203 (Ethernet) extension module has been temporarily or permanently plugged into the basic device.
The digital outputs cannot only be used to drive external counters but also for alarming in case of limit violations. If, for example, the measured variable of current is tested for exceeding a limit value, the same is triggered as soon as at least one of the phase currents exceed the limit value. A limit value on the neutral wire helps to minimise the risk that an undersized neutral wire causes insulation damage or even fires. An extension module may be plugged in to connect supervisory systems or to network devices via Modbus, Profibus, LON or Ethernet.
For mobile use, A210 is also available in a handheld version. A210-HH with data logger is provided in a case including voltage measuring cables, software, battery and system adaptor. Also clip-on current transformers are available, if required.

Technical data

Meas. input:	Nominal voltage 500 V (Ph – Ph), nominal current 1/5 A, nominal frequency 50/60 Hz
System configuration:	Single-phase alternating current, 3/4-wire three-phase current with balanced / unbalanced load
Display:	3 digits + sign, frequency 4-digit, meter 8-digit
Accuracy:	Voltage and current ±0.5%, power, power factor, energy ±1.0% frequency ±0.02 Hz (absolute). All details refer to nominal values
Power supply:	85 – 253 V AC/DC or 20 – 70 V AC/DC
Dimensions:	A210: 96 x 96 x 46 mm, A220: 144 x 144 x 46 mm Assembly on top-hat rail with adaptor (Article No. 154 055) is possible

Stock variants

Article No. ***A210***	*Article No.* ***A220***	*Input*	*Power supply*	*Test protocol*	*Mounted extension module*
149 783	152 546	500 V / 5 A	85 – 253 V AC/DC	without	without
150 300	152 554		20 – 70 V AC/DC		
150 318	152 562	500 V / 5 A	85 – 253 V AC/DC	with	
150 326	152 570		20 – 70 V AC/DC		
152 447	152 588	500 V / 1 A	85 – 253 V AC/DC	without	
152 702	152 736		20 – 70 V AC/DC		
152 710	152 752	500 V / 1 A	85 – 253 V AC/DC	with	
152 728	152 744		20 – 70 V AC/DC		
159 451		500 V / 5 A	85 – 253 V AC/DC	without	EMMOD201 (Modbus)
159 469					EMMOD203 (Ethernet)
158 635	152 562				EMMOD204 (Profibus)

Accessories

For extension module EMMOD20x see Pages 34-36
For configuration software A200plus see Page 53
For interface adapter cable RS232 see Page 58

Camille Bauer
Displaying Power Meters, Extendable by Modules

Multifunctional power meter with display

Complete acquisition and analysis of the system state of a three-phase heavy current system.

Customer benefit (in addition to A210 / A220)
- System can be analysed in relation to unbalance of voltages
- Determination of individual harmonic contents and THD
- 3 different modes for specific measured value display
- Additional mean values also for non-power variables including trend analysis

Application (see also A210/A220)
Electrical distribution systems and industrial plants are increasingly subjected to non-linear loads like computers or electronically controlled motors. This might lead to premature fuse blow-outs, overload of the neutral wire or malfunctions of devices. A230s/A230 is able to determine this additional load. The harmonics analysis assesses whether an active correction to improve the system quality is required. Special consideration should be given to the current harmonics of the 3rd, 9th and 15th order which add up in the neutral wire.
Using the system unbalance the load of a transformer may be analysed. If the same is unbalanced loaded under nominal load this will lead to compensating current and thus to additional heating. The consequence may be damage to the insulation or even the destruction of the transformer.
For mobile use, A230s is also available in a handheld version. A230-HH with data logger is provided in a case including a voltage measuring cable, software, battery and system adaptor. Also clip-on current transformers are available, if required.

Technical data

Meas. input:	Nominal voltage 500 V (Ph – Ph), nominal current 1/5 A, nominal frequency 50/60 Hz
System configuration:	Single-phase alternating current, 3/4-wire three-phase current with balanced/unbalanced load, also in Aron or open-Y measuring circuit available
Display:	4 digits + sign, meter 8 digit, display mode programmable
Accuracy:	Voltage and current ±0.2%, power, power factor, energy ±0.5%, frequency ±0.02 Hz (absolute). All details refer to nominal values
Power supply:	85 – 253 V AC/DC or 20 – 70 V AC/DC
Dimensions:	A230s: 96 x 96 x 46 mm, A230: 144 x 144 x 46 mm Assembly on top-hat rail with adaptor (Article No. 154 055) is possible

Stock variants

Article No. ***A230s***	*Article No.* ***A230***	*Input*	*Power supply*	*Test protocol*	*Mounted extension module*
154 782	152 942	500 V / 5 A	85 – 253 V AC/DC	without	without
154 766	152 926		20 – 70 V AC/DC		
154 790	152 950	500 V / 5 A	85 – 253 V AC/DC	with	
154 774	152 934		20 – 70 V AC/DC		
154 740	152 900	500 V / 1 A	85 – 253 V AC/DC	without	
154 724	152 885		20 – 70 V AC/DC		
154 758	152 918	500 V / 1 A	85 – 253 V AC/DC	with	
154 732	152 893		20 – 70 V AC/DC		
155 657	152 968	500 V / 5 A	85 – 253 V AC/DC	without	EMMOD201 (Modbus)
158 669	155 649				EMMOD203 (Ethernet)
159 477	158 651				EMMOD204 (Profibus)

Accessories
For extension module EMMOD20x see Pages 34-36
For configuration software A200plus see Page 53
For interface adapter cable RS232 see Page 58

SINEAX A230s

SINEAX A230

SINEAX A230-HH

SINEAX A2000

A2000 Mobil-Set

Multifunctional power transducer with display

Complete acquisition and analysis of the state of a three-phase heavy current system.

Customer benefit

- All relevant variables of a heavy current system with only one device
- Measurement of harmonics and harmonic distortion
- Determination of the neutral wire current
- Continuous measured value recording for load profiles and statistical purposes (option)
- Fault recorder with fast recording of events with a prefault event (option)

Application

The instrument serves the analysis of alternating current systems and is used where conventional instruments cannot meet the growing requirements in distribution systems. This is particularly the case where apart from current, voltage and power also the harmonic distortion and harmonics are of importance.
Further usage comprises applications in which instruments are to be replaced simultaneously with conventional recorders and fault indicators. Combined with current and voltage converters, the device measures the most important low and medium voltage facilities.
Analogue outputs, limit values and interfaces are available to monitor and process the measured values. The data storage variant records the chronological progression of up to 12 measured values simultaneously and safe in relation to a system failure. Important measured values may be continually recorded for long periods of time or, alternatively, recording is triggered by an event for a determined period of time.
In event-controlled recording, the prefault event leading to the event can also be recorded with the same speed. You thus get a very good overview of the prefault event leading to the event. The instrument thus meets the requirements of a fault indicator considerably better than conventional paper recorders were ever able to do. A2000 is also available in a **mobile variant**. The A2000 power instrument is installed in a stable case, incl. alligator clips for voltage measurement inputs, RS232 interface and parameterising and analysing software METRAwin 10 for A2000. There is also space in the case for the optional clip-on current transformer.

Technical data

Meas. input:	Nominal voltage 500 V (Ph–Ph), nominal current 1 + 5 A, nominal frequency 40…70 Hz
System configuration:	3/4-wire three-phase current with balanced/unbalanced load also in Aron measuring circuit
Display:	4 digits + sign, meter 9 digit
Accuracy:	Voltage and current ±0.25%, power, energy ±0.5%, power factor ±0.02, frequency ±0.02 Hz (absolute). All details refer to nominal values
Power supply:	230/115 V AC or 20–69 V AC / 20–72 V DC or 73–264 V AC / 73–276 V DC or 20–27 V AC, 20–36 V DC
Dimensions:	Front 144 x 144 mm, installation depth 59.1 mm Assembly on top-hat rail possible with adaptor

Stock variants

Article No.	*I/Os*	*Interface*	*Data logger*
A2000-V001	2 analogue outputs	RS232 + RS485	without
A2000-V002	4 analogue, 2 pulse outputs, 1 synchronised input		
A2000-V003			with
A2000-V004	2 analogue, 2 pulse outputs, 1 synchronised input	RS232+LON	without
A2000-V005	2 pulse outputs, 1 synchronised input	RS232 + Profibus DP	

All variants for 500 V / 1 + 5 A, power supply 230/115 V AC, with software, without test protocol

Accessories

Configuration software METRAWin10 / A2000 (included in the scope of delivery)
Ethernet interface (NETBOX 3)
RS232-USB interface converter Z501L

Extension module Modbus, data logger, synchronised input

EMM0D201

For power instruments A210, A220, A230s, A230.

Customer benefit
- Switchable interface RS232 / RS485 (Modbus) for configuration and measured value display
- Networking of up to 32 devices via RS485
- Digital input for tariff switching or external synchronisation of billing intervals
- Load profile storage: For 15 min mean values, recording up to 166 days
- Data logger for progression of mean values (only with A230 and A230s)

Application
The EMM0D201 extension module is simply snapped onto the back of the A210, A220, A230 or A230s power instrument and is supplied with power by the same. Parameterising is completely performed via the A200plus PC software.

Technical data

Connections:	Pluggable screw terminals
Data logger:	16'000 mean values, up to 166 days (1 mean value with 15 min intervals) A210/A220: Active power mean value input-output, reactive power mean value inductive+capacitive A230s/A230: Active power mean value input/output, reactive power mean value inductive/capacitive or input/output, apparent power mean value, up to 9 further mean values freely selectable

Article No.	*Description*
150 285	Extension module EMM0D201

For retrofitting. For mounted version see the respective basic instrument.

Extension module 2 analogue outputs

EMM0D202

For power instruments A210, A220, A230s, A230.

Customer benefit
- 2 analogue outputs, e.g. for the connection to a PLC

Application
The EMM0D202 extension module is simply snapped onto the back of the A210, A220, A230 or A230s power instrument and is supplied with power by the same. The analogue outputs are programmed via the keys on the device.

Technical data

Number of channels:	2, galvanicly isolated
Output:	0…20 mA, 4…20 mA, invertible
Connections:	Pluggable screw terminals
Limitation:	0/3.7 mA or 21 mA
Load voltage:	8 V
Accuracy:	±0.1% (without A2xx)
Measured variables:	A210/A220: U, I, Iavg, In, P, Q, S, F, PF A230s/A230: Additional voltage and current mean value, zero shift voltage, unbalance factor, THD U, THD I

Article No.	*Description*
155 574	Extension module EMM0D202

For retrofitting.

EMMOD203

Extension module Ethernet, data logger, real-time clock

For power instruments A210, A220, A230s, A230.

Customer benefit
- Fast communication via Ethernet (Intranet or Internet)
- Measured data via Modbus/TCP accessible
- Browser interface for system parameterising and measured value acquisition
- Data logger with synchronisable time reference
- 2 digital inputs for synchronised pulse and tariff switching
- Device installation, device configuration, measured value display, graphic logger analysis using PC software A200plus

Application
The EMMOD203 extension module is simply snapped onto the back of the A210, A220, A230 or A230s power instrument and is supplied with power by the same. The module may be retrofitted without interference with the basic device.
The EMMOD203 module supplements the functionality of the basic A2xx device by an Ethernet interface, a data logger as well as a real-time clock as a time reference. It facilitates the exchange of data with a control system via Modbus/TCP and HTTP.
The data logger permits the non-volatile storage of mean value progression with a time stamp. The same enables load profile records which are synchronised with the billing interval of the energy provider. The reference is not lost in a power failure. This is contrary to EMMOD201 where the time reference for the acquired values is subsequently related to the current PC time.
EMMOD203 is equipped with 2 digital inputs which may be used for tariff switching (high/low tariff) and for the synchronisation of the real-time clock with the system frequency or as a standardised control signal.
The A200plus software and a network-compatible PC are required for the configuration of the basic A2xx device. Certain parameters of the network settings but also the source for the synchronisation of the real-time clock are set via the browser interface of EMMOD203.

Technical data

Connections	
Ethernet:	10/100 Base Tx, RJ45-Port
Synchronised input:	5 V…300 V AC, 1…500 Hz, pluggable screw terminals
Tariff switching:	5 V…300 V AC/DC, pluggable screw terminals
Data logger	
Storage depth:	max. 37'500 mean values, up to 390 days (1 mean value with 15 min intervals)
Format:	Binary (ASN. 1 BER)
Measured variables:	A210/A220: Active power mean value input-output, reactive power mean value inductive+capacitive A230s/A230: Active power mean value input/output, reactive power mean value inductive/capacitive or input/output, apparent power mean value, up to 9 further mean values freely selectable
Real-time clock	
Buffering	with Battery, power reserve 2 years
Synchronisation	Via the network with TIMEP (RFC738) or SNTP (RFC2030), synchronised input on the system frequency (50/60 Hz) or an external ripple control signal. Configuration via WEB page.

Article No.	*Description*
155 582	EMMOD203 extension module

For retrofitting. For mounted version see the respective basic instrument.

Further instruments with an Ethernet interface
DME407/408, programmable multi-transducer with Ethernet interface, see Page 25
A2000 with NETBOX 3, multifunctional power transducers with display, see Page 33

Extension module Profibus DP

For power instruments A210, A220, A230s, A230.

Customer benefit
- Cyclic transmission of the desired process image or system state
- Simple and fast commissioning

Application
The EMMOD204 extension module is simply snapped onto the back of the A210, A220, A230 or A230s power instrument and is supplied with power by the same.
Parameterising uses GSD. All instrument parameters can be engineered in the control system. On site, only the slave address is set. Required measured data is determined during engineering and arranged as a fixed process image (up to 30 measured value modules). All instantaneous values as well as meter readings are available as measured variables for selection. After the acquisition of the configuration, the device transfers the process image cyclicly to the control system.

Technical data
Connection: 9-pin D-sub socket, EIA RS485 standard, 15 kV ESD protection
Type: DPV0, SPC4-2. Baud rate automatic or 9600 bit/s to 12 Mbit/s

Article No.	*Description*
158 510	EMMOD204 extension module

For retrofitting. For mounted version see the respective basic instrument.

Further devices with Profibus DP interface
For DME406, programmable multi-transducer with Profibus-DP interface, see Page 24
For A2000, multifunctional power transducers with display, see Page 33

EMMOD204

Extension module LON

For power instruments A210, A220, A230s, A230.

Customer benefit
- Instantaneous values and meter readings can be acquired via LONTALK protocol
- Direct connection to the U160x summator of Gossen-Metrawatt is possible

Application
The EMMOD205 extension module is simply snapped onto the back of the A210, A220, A230 or A230s power instrument and is supplied with power by the same. The basic instruments are parameterised via keys on the device. Alternatively, EMMOD201 or EMMOD203 can be snapped on first of all to enable programming via a PC and subsequently a change to EMMOD205 is made.

Technical data LONWORKS® Interface

Network protocol:	LONTALK®
Transmission medium:	Echelon FTT-10A Transceiver, transformer-coupled, reverse polarity protected, twisted two-wire cable
Transmission speed:	78 kBit/s
Connections:	Pluggable screw terminals

Article No.	*Description*
156 639	EMMOD205 extension module

For retrofitting. For mounted version see the respective basic instrument.

Further instruments with a LON interface
DME400, programmable multi-transducer with LON interface, see Page 24
A2000, multifunctional power transducer, see Page 33

EMMOD205

Content Energy Management

Overview energy meters

Description		*Article No./characteristic*						
Active energy meter for 2-wire system, direct, class 1				U1281				
Active energy meter for 4-wire system, direct, any load, class 1		U389A			U1289			
Active energy meter for 2-wire system, transformer, class 1						U1381		
Active energy meter for 3-wire system, transformer, any load, class 1							U1387	
Active energy meter for 4-wire system, transformer, any load, class 1			U389B					U1389
System frequency	50 Hz	•	•	F0	F0	F0	F0	F0
	60 Hz	–	–	F1	F1	F1	F1	F1
External voltage supply 24 V DC	without	–	–	H0	H0	H0	H0	H0
	with	–	–	H1	H1	H1	H1	H1
Multifunctional design with additional measurement of U, I, P, Q, S, PF, f	without	–	–	M0	M0	M0	M0	M0
	with	–	–	M1	M1	M1	M1	M1
Design value of input voltage Ur	100 – 110 V P–P	–	–	–	–	–	U3	U3
	230 V P–N	–	–	U5	–	U5	–	–
	400 V P–P	•	•	–	U6	–	U6	U6
	500 V P–P	–	–	–	–	–	U7	–
Calibration	without	•	•	P0	P0	P0	P0	P0
	Approval D, calibration	–	–	P1	P1	P1	P1	P1
	Approval D, calibration and calibration certificate	–	–	P2	P2	P2	P2	P2
	Approval CH			P3	P3	P3	P3	P3
	Approval AT	–	–	–	P4	–	P4	P4
	Approval CZ			P5	P5	P5	P5	P5
	English type plate	–	–	P6	P6	P6	P6	P6
	Approval HR			P7	P7	P7	P7	P7
Pulse output		–	–	V0	V0	V0	V0	V0
S0, 1000 pulses/kWh	S0-Standard	–	•	V1	V1	V1	V1	V1
S0, 100 pulses/kWh	S0-Standard	•	–	–	–	–	–	–
S0, rate, duration programmable	S0 programmable	–	–	V2	V2	V2	V2	V2
Switching output up to 230 V, 1000 pulses/kWh, calibratable (not H1)	Pulse 230 V Standard	–	–	V3	V3	V3	V3	V3
Switching output up to 230 V, rate, duration programmable (not H1)	Pulse 230 V programmable	–	–	V4	V4	V4	V4	V4
Bus connection	without	•	•	W0	W0	W0	W0	W0
	LON	–	–	W1	W1	W1	W1	W1
	M-Bus	–	–	W2	W2	W2	W2	W2
	L-Bus	–	–	W3	W3	W3	W3	W3
Transformer ratios								
Current/voltage fixed, main display calibratable	CT=VT=1	–	•	–	–	Q0	Q0	Q0
Current/voltage programmable, secondary display calibratable	CT, VT programmable	–	–	–	–	Q1	Q1	Q1
Current/voltage firmly set, main display calibratable CT=1…10000, VT=1…1000, CTxVT ≤ 1 Mio.	CT, VT fixed	–	–	–	–	Q9	Q9	Q9

Overview of design approvals for billing

Country	*Authority*		*Approval No.*	*U1281*	*U1289*	*U1381*	*U1387*	*U1389*
D	PTB	Physikalisch Technische Bundesanstalt	20.15 04.27	•	•	•	•	•
A	BEV	Bundesamt für Eich- und Vermessungswesen	OE05 E040		•			
			OE05 E050				•	•
CH	metas	metrologie und akkreditierung schweiz	EC2 06570-00	•	•	•	•	•
CZ	CMI	Cesky Metrologicky Institut	TEU 221/04-4127	•	•	•	•	•
HR	DZNM	Croatian State Office for Standardization and Metrology	HR F-6-1057	•	•	•	•	•

Obligatory calibration for energy meters
Energy meters in commercial or official use are subject to obligatory calibration. The legal basis is the calibration act to protect consumers. It governs the approval and calibration obligation of instruments and is always to be adhered to if the acquisition of electric energy is the basis for energy cost billing to third parties. In-house cost distribution is excluded.

Meter and calibration from the same source
GMC-I Gossen-Metrawatt is a state-registered test office for electric instruments and can supply energy meters and calibration for Germany from the same source.

Calibration sign

U1281, U1381

Alternating current, 2-wire system

U1387

Three-phase current, 3-wire system

U1289, U1389

Three-phase current, 4-wire system

Electric energy meter with power display

Acquisition of active energy in 4-wire three-phase systems according to EN 61036.

LonWorks
M-Bus
L-Bus

Customer benefit

- Precise active energy measurement according to EN 61036, class 1
- Calibration capability, suited to official billing
- Display of instantaneous power
- Extendable for additional system measurement variables
- Direct connection 5(65) A, without additional current transformers
- Transformer connection 5//1 A
- Transformer ratios can be set and calibrated
- Variant for 60 Hz system frequency available
- Display of installation errors without additional measuring equipment
- Pulse output S0 or 230 V
- Adjustable pulse rate and pulse duration
- Compact design requires little space
- Optional LON, M-bus, L-bus interface
- Optional reading while electrical circuit is switched off

Application

The energy meters may be universally used for the acquisition and billing of electrical energy in trade, household, industry and building management applications. Momentary circuit loads can be evaluated at any time using the additional instantaneous power display. Variants for direct connection (U1281, U1289) are designed for currents up to 65 A without the installation of additional current transformers. The variants for transformer connection (U1381, U1387, U1389) may be connected both to x/1 A and x/5 A current transformers.

Integrated error recognition for incorrect rotary field direction, missing phases, reverse-poled current transformers, measuring range overloads and missing bus connections saves valuable time and test equipment during troubleshooting.

More transparency in operation

In addition to active energy and instantaneous power, the multifunctional variant (M1) also displays individual *currents, voltages, active, reactive and apparent power, power factors and frequency* by simply pressing a key. Voltage level, phase utilization, reactive power component and compensation can thus be continuously evaluated during operation.

Universal bus connection

The energy meters transmit meter readings and other data to data logging, billing and optimizing systems, as well as building automation and control technology applications, via optional interfaces.

- *LON* interface with FTT-10A transceiver (W1)
- *M-Bus* interface according to EN 1434-3 (W2)
- *L-Bus* interface for battery-operated HYDRO-RADIO 868 radio module (W3)

Diverse calibration capability – approval for official billing

The energy meters can be supplied as calibrated variants (P1), and additionally with calibration certificate (P2), for official energy billing. According to legal requirements, the calibration certificate may not show any deviation in measurement. Depending upon requirements, the following variants are possible

- *Calibrated main display for primary energy,* calibrated pulse output with reference to primary energy and a fixed pulse rate of 1000 pulses/kWh (V1, V3) – directly measuring variant
- *Calibrated main display for primary energy,* transformer ratios stated upon ordering are fixed (Q9) and calibrated, calibrated pulse output with reference to primary energy and a fixed pulse rate depending on CTxVT (V1, V3)
- *Calibrated main display for secondary energy,* fixed transformer ratios CT=VT=1 (Q0), calibrated pulse output with reference to secondary energy and a fixed pulse rate of 1000 pulses/kWh (V1, V3)
- *Uncalibrated main display for primary energy,* adjustable transformer ratios (Q1) in combination with a calibrated ancillary display for secondary energy, calibrated pulse output with reference to secondary energy and a fixed pulse rate of 1000 pulses/kWh (V1, V3)

Electric energy meter with power display

Meter reading and bus operation while the electric circuit is switched off
The meter can be optionally equipped with a 24 V DC auxiliary power input (H1) for assured discharge-free voltage, which allows for direct meter reading, or remote meter reading for bus compatible variants, even when the electrical circuit is switched off. The use of a UBAT-24V battery pack permits meter readings without continuously active supply power.

Technical data

Meas. input:	Nominal voltage 100 – 110 V (P–P), 230 V (P – N), 400 V (P–P), 500 V (P–P) Nominal frequency 50 Hz or 60 Hz Direct: Nominal current 5(65) A Transformer: Nominal current 1(6) A and 5(6) A
System configuration:	2-wire alternating current, 3-wire or 4-wire three-phase alternating current
Measured variables:	Active energy and instantaneous power in standard variants; currents, voltages, active, reactive, apparent power, power factor, frequency optional
Display:	LCD, 7-digit main display, 8-digit ancilliar display
S0 output:	Pulse output according to EN 62053-31 or 230 V Pulse rate and pulse duration fixed or adjustable
Interface:	Optional LON, M-bus or L-bus
Accuracy:	Class 1 according to EN 61036
Approval:	Design approval D, A, CH, CZ, HR
Assembly:	DIN rails according to EN 50022

Stock variants

Article number	*Description*
U1281-V001	2-wire system, 230 V, 5(65) A, S0, pulse rate programmable
U1281-V002	2-wire system, 230 V, 5(65) A, S0, 1000 pulses/kWh, calibrated
U1289-V001	4-wire system, 3 x 230/400 V, 5(65) A, S0, 1000 pulses/kWh
U1289-V002	4-wire system, 3 x 230/400 V, S0, 5(65) A, 1000 pulses/kWh, calibrated
U1289-V003	4-wire system, 3 x 230/400 V, S0, 5(65) A, pulse rate programmable
U1381-V001	2-wire system, 230 V, 5//1 A, S0, CT/VT/pulse rate programmable
U1381-V002	2-wire system, 230 V, 5//1 A, S0, 1000 pulses/kWh, CT=VT=1, calibrated
U1387-V001	3-wire system, 3 x 100 V, 1 A, S0, CT/VT/pulse rate programmable
U1387-V002	3-wire system, 3 x 100 V, 5//1 A, S0 1000 pulses/kWh, CT=VT=1, calibrated
U1387-V003	3-wire system, 3 x 400 V, 5//1 A, S0, CT/VT/pulse rate programmable
U1387-V004	3-wire system, 3 x 400 V, 5//1 A, S0, 1000 pulses/kWh, CT=VT=1, calibrated
U1389-V001	4-wire system, 3 x 230/400 V, 5//1 A, S0, CT/VT/pulse rate programmable
U1389-V002	4-wire system, 3 x 230/400 V, 5//1 A, S0, 1000 pulses/kWh, CT=VT=1, calibrated
U1389-V003	4-wire system, 3 x 230/400 V, 5//1 A,S0, CT/VT pulse rate programmable, LON
U1389-V004	4-wire system, 3 x 230/400 V, 5//1 A, S0, CT=VT=1, LON, calibrated

Accessories
Battery pack for meter reading without continuously active power supply UBAT-24V
Installation set for door assembly U270A
Plug-on current transformers ASK 31.3, ASK 63.4, ASK 105.6, ASK 412.4
Winding current transformer WSK 30, WSK 40, WSK 70.6N

U389A

U389B

Electric energy meter with drum-type counter

Acquisition of active energy in 4-wire three-phase systems according to EN 61036.

Customer benefit

- Precise active energy measurement according to EN 61036, class 1
- Direct connection 5(65) A, without additional current transformers
- Transformer connection 5//1 A
- Can be read while electric circuit is switched off
- Error recognition for reverse-poled current direction
- Pulse output S0
- Compact design requires little space

Application

The energy meters may be universally used for the acquisition and internal billing of electrical energy in trade, household, industry and building management applications. The directly measuring U389A is designed for currents up to 65 A and saves costs for the installation of additional current transformers. The U389B variant for transformer connection takes both x/1 A and x/5 A current transformers. The connection to acquisition, billing and optimising systems, building automation and control engineering applications is achieved via the standard pulse output. Current transformers connected with reversed polarity and reversed direct connection are recognized and displayed as errors.

Technical data

Measurement input:	Nominal voltage 230/400 V (P-N/P-P), nominal frequency 50 Hz, Direct: Nominal current 5(65) A Transformer: Nominal current 1(6) A and 5(6) A
System configuration:	4-wire three-phase alternating current
Display:	7-digit drum-type counter
S0 output:	Pulse output according to EN 62053-31 Direct: 100 pulses/kWh Transformer: 1000 pulses/kWh
Accuracy:	Class 1 according to EN 61036
Assembly:	DIN rails according to EN 50022

Stock variants

Article No.	*Description*
U389A	4-wire system, 3 x 230/400 V, 5(65) A, S0, 100 pulses/kWh
U389B	4-wire system, 3 x 230/400 V, 5//1 A, S0, 1000 pulses/kWh

Accessories

Installation set for door assembly U270A
Plug-on current transformers ASK 31.3, ASK 63.4, ASK 105.6, ASK 412.4
Winding current transformer WSK 30, WSK 40, WSK 70.6N

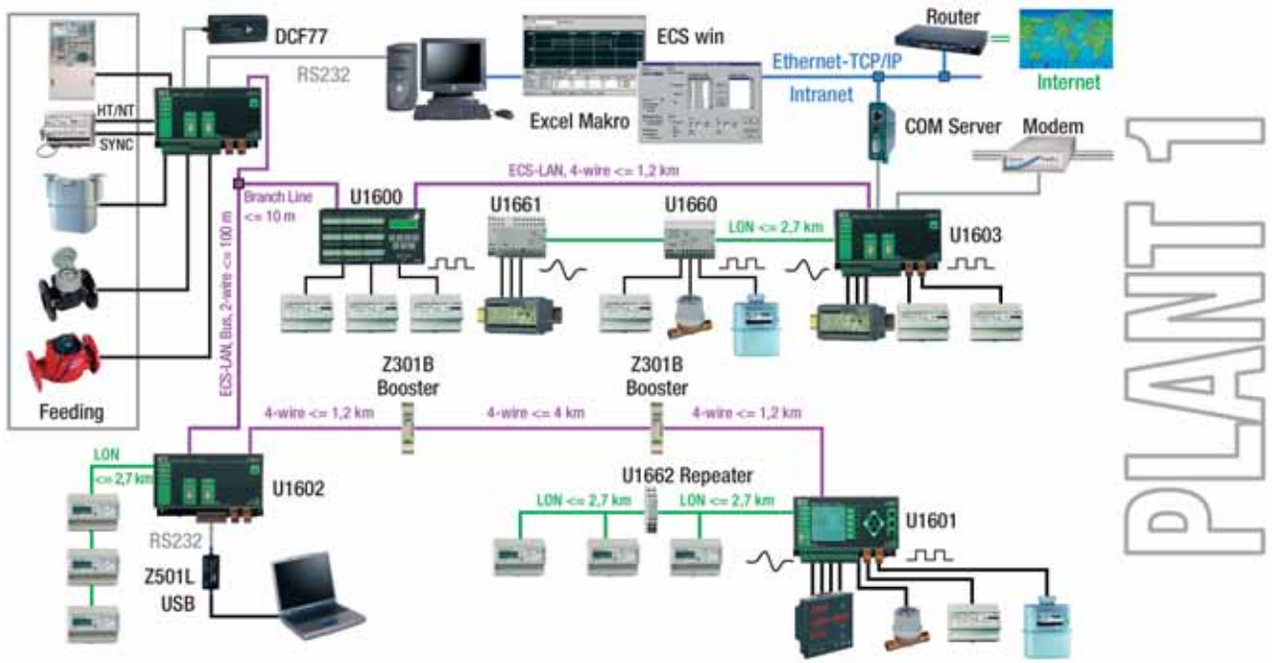
Gossen Metrawatt
Energy Control System (ECS)

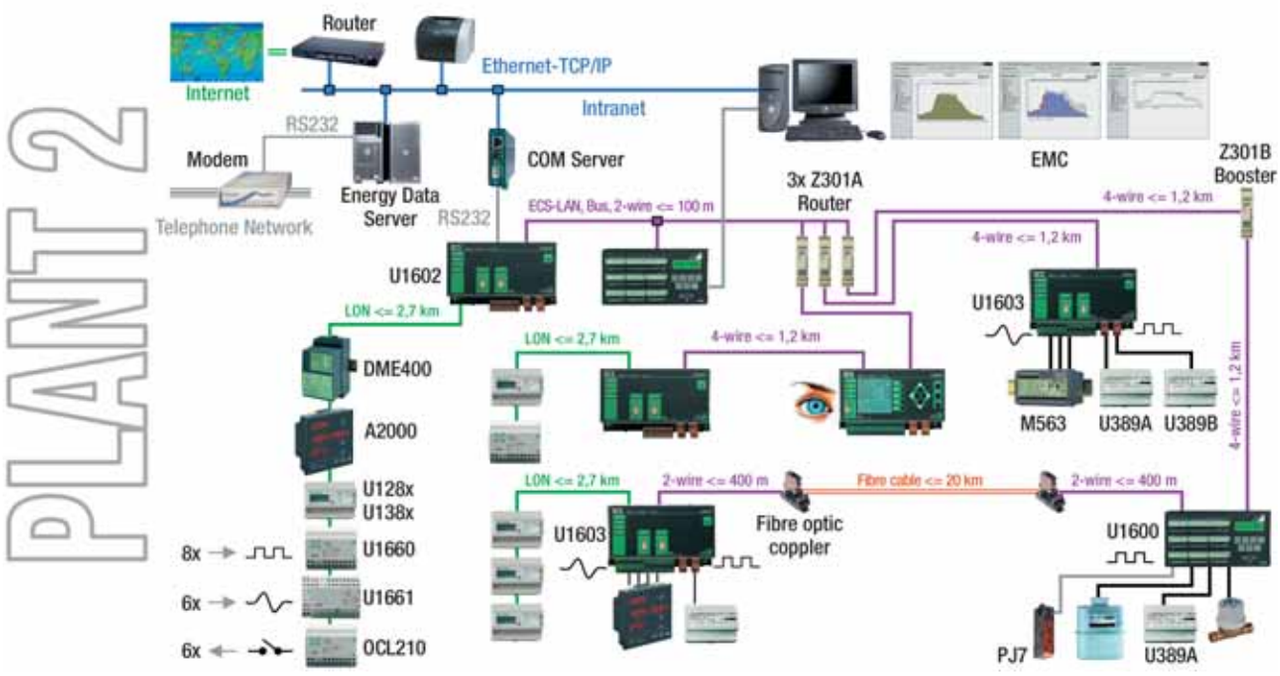
Overview

Energy Control System (ECS) – professional solution for industrial applications

The Energy Control System is the professional solution for industrial energy data acquisition and provides all of the basics required for consumption and load optimizing, as well as cost centre billing. The system meets the highest demands:

- Synchronization to the power utility's measuring interval
- Flexible grouping of meters according to type and installation density
- Autonomous evaluation and data storage at the summators
- Adaptable network topology and utilization of already installed cables
- High-speed data transmission suitable for large installations
- Web-oriented data read-out, analysis and billing software





Overview of summators

The summators of the Energy Control System acquire meter data via different interfaces and evaluate the same via internal calculation channels. The thus determined values for energy or consumption are summated synchronously to the measuring interval of the power utility over predefined time periods and a programmable interval, and are stored together with the respective maximum values. Using this autonomous energy database, all electrical and non-electrical energy and consumption values can be acquired, visualised, optimised and billed in relation to cost centres.

Individual summators can be interconnected over great distances via the multi-master compatible ECS LAN with a freely selectable network topology. All network users have unlimited access to any data in the network and make the same available at their serial RS232 interface. Analysing software packages have then access via the company network either directly or using an Ethernet TCP/ IP network adapter. Modems enable remote acquisition via public telephone networks.

Due to its high level of integrated intelligence and the ECL custom programming language every summator is able to execute customised calculations, evaluations, monitoring and optimisation. External processes are controlled via user-specific background programs with partly available switching or analogue outputs.

The ECSwin software is used to parameterise summators and for simple data acquisition (see Page 55). The EMC software package (see Page 57) provides convenient functions for data read-out, analysis and billing.

				
	U1600	*U1601*	*U1602*	*U1603*
Display	LCD, 2 lines of 16 characters	LCD, 16 lines of 21 characters	–	–
Inputs	24	12	–	6
Input signals	S0 pulses	S0 pulses, analogue signals ±10 V, ±20 mA	–	S0 pulses, analogue signals ±10 V, ±210 mA
Outputs	4	8	–	8
Output signals	Relay contact (switch)	2 relay contacts 2 analogue outputs (±20 mA) 4 MOS switches	–	2 relay contacts 2 analogue outputs (±20 mA) 4 MOS switches
Calculation channels	32	64	64	64
LON bus	–	FTT-1078 k/Bit/s		
2x RS232	19200 Bit/s (split cable required)	115 kBit/s		

Summator – 24 pulse inputs

Customer benefit

- Autonomous acquisition, calculation and storage of energy and consumption data for up to 32 freely allocatable input channels
- Determination of load profiles with simple energy meters
- 24 puls inputs to connect energy meters
- Synchronisation to measuring interval of the utility via ECS-LAN
- Simple networking via ECS-LAN in 2/4-wire technology
- Local data processing via ECL programming language ECL
- Convenient display and programming on site

Application

The U1600 summator is designed for the direct connection of 24 energy and consumption meters with pulse output. It is particularly suited to the acquisition of a larger number of meters with pulse output installed in tight space conditions. Device settings and channel parameters may be directly changed and acquired values viewed on sight via the display and the operating elements.

Technical data

Inputs:	24 pulse inputs, S0
Outputs:	5 Relays, changer, 50 VDC/0.5 A
	24 VDC power supply source, max. 0.4 A
Interfaces:	2 RS232, 19.2 kBit/s
	2 ECS-LAN, RS485, 62.5 kBit/s, 2-/4-wire technology
Storage depth:	10 days for 32 channels @ 15 minutes interval
	Optional storage extension to 70 days
Display:	LCD, 2 lines of 16 characters, background lighting
Power supply:	80 – 250 VAC/DC, 19 VA
	Optional 20 – 80 VDC, 15 W
Dimensions:	240 mm x 125 mm x 80 mm
Assembly:	DIN rails according to EN 50022

Stock variants

Article No.	*Description*
GTU1600000E0001	80 – 250 V AC/DC
GTU1600000E0002	20 – 80 V DC

Accessories

For configuration software ECSwin see Page 55
For load optimising module ECSopt see Page 56
For EMC software „Energy management with system“ see Page 57
For U1600 Excel-Macro see Page 56

U1600

U1601

Summators with 12 universal inputs and LON

Customer benefit

- Autonomous acquisition, calculation and storage of energy and consumption data for up to 64 freely allocatable input channels
- Determination of load profiles with simple energy meters
- 12 configurable inputs for analogue or digital signals
- Connection of up to 63 energy meters via LON
- Extendably inputs with external acquisition modules via LON
- Synchronisation to measuring interval of the utility via ECS-LAN
- Simple networking via ECS-LAN in 2/4-wire technology
- Local data processing via ECL programming language
- Convenient display and programming on site

Application

The U1601 summator is designed for the direct connection of 12 energy and consumption meters with analogue or pulse output. Every input can be set to the required signal via a DIP switch. The summator is particularly well suited to applications requiring a flexible input arrangement or convenient display and programming on site.

The LON interface permits the direct connection of electrical energy meters of the U128x (W1) and U138x (W1) series. A local or separated input extension for the summator can be arranged via the same interface. To this end, the U1660 meter acquisition module offers eight pulse inputs and the U1661 analogue acquisition module six analogue inputs.

Altogether 64 physical input channels are possible for the summator and may be freely allocated to the calculation channels.

Technical data

Inputs:	12 universal inputs, ±5 mA, ±20 mA, ±10 V, S0 pulse adjustable
Outputs:	2 analogue outputs, ±20 mA or ±10 V adjustable 3 relays, changer, 250 VAC/8 A 4 MOS relay, switch, 50 VDC/0.2 A 24 VDC power supply source, max. 0.15 A
Interfaces:	LON, FTT-10A, 78 kBit/s 2 RS232, 115 kBit/s 2 ECS-LAN, RS485, 62.5 kBit/s, 2-/4-wire technology
Storage depth:	40 days for 64 channels @ 15 minute intervals
Display:	LCD 128x128 Pixel, 16 lines of 21 characters, background lighting
Power supply:	85 – 264 VAC / 100 – 280 VDC, < 15 W (25 VA) Optional 20 – 72 VDC, < 15 W
Dimensions:	212 mm x 125 mm x 85 mm
Assembly:	DIN rails according to EN 50022

Accessories

For configuration software ECSwin see Page 55
For EMC software „Energy management with system“ see Page 57
For U1600 Excel-Macro see Page 56

Micro-summator with LON

U1602

Customer benefit

- Autonomous acquisition, calculation and storage of energy and consumption data for up to 64 freely allocatable input channels
- Determination of load profiles with simple energy meters
- Connection of up to 63 energy meters via LON
- Separated inputs with external acquisition modules via LON
- Synchronisation to measuring interval of the utility via ECS-LAN
- Simple networking via ECS-LAN in 2/4-wire technology
- Local data processing via ECL programming language

Application

The U1602 micro-summator is designed for the direct connection of electrical energy meters of the U128x (W1), U138x (W1) and U168x series via the LON interface. Apart from the development of systems for purely electrical energy acquisition it is particularly well suited to the combination of energy and consumption meters placed in different areas.

For this purpose, a local or separated input extension can be arranged for the summator via the LON interface. The U1660 meter acquisition module offers eight pulse inputs for this and the U1661 analogue acquisition module six analogue inputs.

Altogether 64 physical input channels are possible for the summator and may be freely allocated to the calculation channels.

Technical data

Outputs:	1 relay, changer, 250 VAC/8 A
	24 VDC power supply source, max. 0.15 A
Interfaces:	LON, FTT-10A, 78 kBit/s
	2 RS232, 115 kBit/s
	2 ECS-LAN, RS485, 62.5 kBit/s, 2-/4-wire technology
Storage depth:	40 days for 64 channels @ 15 minute intervals
Power supply:	85 – 264 VAC / 100 – 280 VDC, < 15 W (25 VA)
	Optional 20 – 72 VDC, < 15 W
Dimensions:	212 mm x 125 mm x 85 mm
Assembly:	DIN rails according to EN 50022

Accessories

For configuration software ECSwin see Page 55
For EMC software „Energy management with system“ see Page 57
For U1600 Excel-Macro see Page 56

U1603

Mini-summator with 6 universal inputs and LON

Customer benefit

- Autonomous acquisition, calculation and storage of energy and consumption data for up to 64 freely allocatable input channels
- Determination of load profiles with simple energy meters
- 6 configurable inputs for analogue or digital signals
- Connection of up to 63 energy meters via LON
- Extendably inputs with external acquisition modules via LON
- Synchronisation to measuring interval of the utility via ECS-LAN
- Simple networking via ECS-LAN in 2/4-wire technology
- Local data processing via ECL programming language

Application

The U1603 mini-summator is designed for the direct connection of 6 energy and consumption meters with analogue or pulse output. Every input can be set to the required signal via a DIP switch. The inputs and outputs make the mini-summator optimally suitable as a small acquisition and optimisation unit for different media at the supply point of the energy utility.

If main and subdistribution system are to be included in the acquisition system subsequently, the extension can be achieved via the LON interface with electric energy meters of the U128x (W1), U138x (W1) and U168x series. A local or separated input extension for the summator can also be arranged via the same interface. To this end, the U1660 meter acquisition module offers eight pulse inputs and the U1661 analogue acquisition module six analogue inputs.

Altogether 64 physical input channels are possible for the summator and may be freely allocated to the calculation channels.

Technical data

Inputs:	6 universal inputs, ±5 mA, ±20 mA, ±10 V, S0 pulse adjustable
Outputs:	2 analogue outputs, ±20 mA or ±10 V adjustable
	3 relays, changer, 250 VAC/8 A
	4 MOS relay, switch, 50 VDC/0.2 A
	24 VDC power supply source, max. 0.15 A
Interfaces:	LON, FTT-10A, 78 kBit/s
	2 RS232, 115 kBit/s
	2 ECS-LAN, RS485, 62.5 kBit/s, 2-/4-wire technology
Storage depth:	40 days for 64 channels @ 15 minute intervals
Power supply:	85 – 264 VAC / 100 – 280 VDC, < 15 W (25 VA)
	Optional 20 – 72 VDC, < 15 W
Dimensions:	212 mm x 125 mm x 85 mm
Assembly:	DIN rails according to EN 50022

Accessories

For configuration software ECSwin see Page 55
For EMC software „Energy management with system“ see Page 57
For U1600 Excel-Macro see Page 56

SMARTCONTROL ECS – Energy Control System

Customer benefit

- Acquisition of energy and consumption data, temperatures, switching statuses and process variables
- Error message management, continuous comparison of characteristic values and indication of errors via switching output, e-mail or SMS
- Peak load management in combination with switching outputs
- Timer programs and switching of relays after the occurrence of predefined events
- Calculation of mean values and integrals, as well as heat and cold quantities
- SMARTCONTROL manager configuration and data read-out software included in the scope of delivery

Application

The multitalented SMARTCONTROL supplements the Energy Control System (ECS) which is widespread in industry and building technology. It unites energy and consumption data logging for a wide variety of media with load management and error messaging functions. It can be used autonomously, or together with Energy Management Control (EMC) software within the ECS. Both solutions contribute to sustained conservation of valuable resources and reduced energy costs.

The versatile data collector can acquire directly meter readings, temperatures, statuses and analogue signals via existing inputs. The connection to bus-compatible instruments or energy meters is arranged via Modbus or M-Bus with an optional external level converter.

The different parameters and functions of SMARTCONTROL are defined via SMARTCONTROL manager and its graphic programming surface. In particular, linking inputs with calculations, logic functions, time programs, relays, SMS and e-mail outputs is easily realised. The acquired channel data may also be read out, visualised in tables or diagrams and exported in csv or bmp format.

SMARTCONTROL is integrated into existing infrastructures via Ethernet TCP/IP. The talented communicator may also be equipped with an internal analogue modem, ISDN, GSM or Bluetooth module. An OPC server is available for an easy connection to process and building control systems.

The internal 2 MB flash ring buffer can be extended by the installation of a 256 MB compact flash memory card.

Technical data

Inputs:	8 digital inputs, adjustable to active or passive 8 analogue inputs 0 – 20 mA or 0 – 10 V, adjustable 8 temperature inputs for Pt1000 sensors
Outputs:	2 semiconductor relays max. 40 VDC/AC, 1 A
Interfaces:	Ethernet TCP/IP 10/100 Mbit, Modbus RTU, RS485, M-Bus via RS232 with optional level converter, 2 x RS232 for fieldbus devices
Memory:	2 MB flash, optional 256 MB compact flash
Power supply:	12 – 24 VDC, ext. power supply plug 100 – 240 VAC/12 VDC, included in the scope of delivery
Dimensions:	225 x 210 x 70 mm

Stock variants

Article No.	*Description*
U200A	SMARTCONTROL standard
U200B	SMARTCONTROL control cabinet IP 65 with 12 VDC power pack
U200C	SMARTCONTROL control cabinet IP 65 with 24 VDC power pack

Accessories

Analogue modem socket module for analogue telephone network	Z301C
ISDN modem socket module for ISDN telephone network	Z301D
GSM/GPRS modem socket module for GSM telephone network	Z301E
Bluetooth socket module for radio communication	Z301F

For further accessories see data sheet and price list.

U200A

Z301A

ECS-LAN router

Star-type ECS-LAN topologies may be arranged with several routers which are connected via a 2-wire bus. The outputs have a 4-wire bus design with booster.

- Integrated router to optimise data transmission
- Suitable bus termination resistor
- Power supply 20..70 VDC

Z301B

ECS-LAN booster

The booster extends the ECS-LAN transmission distance to 4 km. A booster has to be installed at the beginning and end of the extended transmission range.

- Power supply: 20 – 70 VDC

U1660

Meter acquisition module for LON

The U1660 meter acquisition module extends the U1601, U1602 and U1603 summators by 8 external digital inputs via the LON interface. The module processes data from energy meters with pulse output (S0) or floating contact. The active inputs do not need any additional voltage supply thus minimising wiring expenditure.

Article No.	*Description*
U1660-V001	Meter acquisition module

U1661

Analogue input module for LON

The U1661 analogue input module extends the U1601, U1602 and U1603 summators by 6 analogue inputs via the LON interface. The module processes 4…20 mA standard signals or 0…20 mA standard signals in a modified variant.

Article No.	*Description*
U1661-V001	Analogue input module 4…20 mA

U1662

Repeater for LON

The use of the U1662 repeater doubles the length of the line of a LON network. Only one repeater may be used respectively.

Article No.	*Description*
U1662	Repeater

U1664

Bus termination for LON

The U1664 bus termination is employed in bus-type LON topology as 105 Ω termination at the end. At the beginning of the bus, the integrated 105 Ω bus termination of the summator is used. In free topology, the integrated 52.3 Ω bus termination is employed. This is analogously also applicable to the extended segment if a repeater is used.

Article No.	*Description*
U1664	Bus termination

Gossen Metrawatt
Load Optimisation

Load optimisation

System to reduce power peaks, extendable in steps from 8 to 64 optimising channels.

Customer benefit

- Minimum interference in the production process due to the combined trend-extrapolation process
- Simultaneous optimising of different media
- Future-oriented setpoint management specifying the load profile for 7 days with 96 values each
- Inputs for operating feedback from the consumers
- Takes minimum and maximum making and breaking times of the power consumers into consideration
- Special control programs for kitchen optimisation

Application

Electrical power prices for customers with special contracts consist of energy costs (in EUR per kWh) for current consumption, and power costs for the maximum power value (in EUR per kW). A reduction of power peaks can reduce costs considerably.
Power optimisation assumes that the start-up of consumers which draw large amounts of power can frequently be postponed a few minutes without significantly affecting operations. This applies, in particular, to power consumers which are capable of storing energy to a certain extent, e.g. heaters and refrigerators. Integrated time switching programs can lower the energy costs and optimise operational procedures. The system can also be used for cost-oriented control of consumers which require other forms of energy, e.g. gas.

Technical data

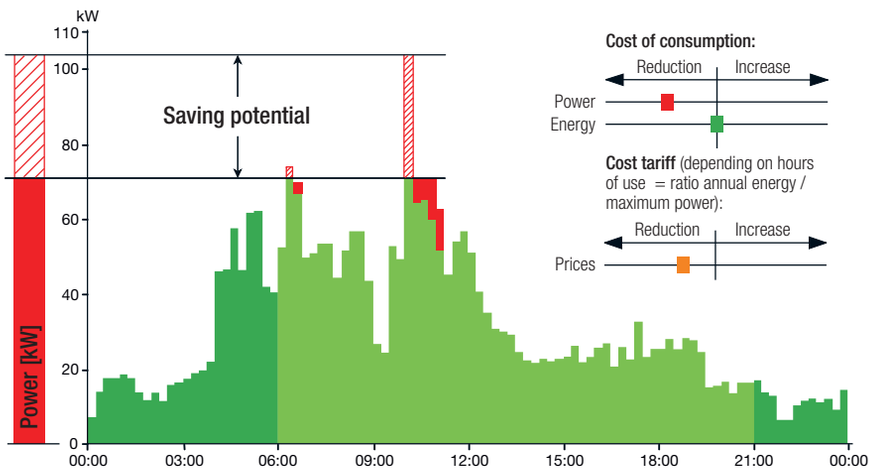
Inputs:	16, individually switchable 24 VDC or 230 VAC, with potential-isolated in two groups
Outputs:	9 Relays changer, 250 VAC max. 2 A, power supply 24 VDC, max. 100 mA
Power supply:	230 V AC, 50 Hz, max. 15 VA
Dimensions:	240 x 160 x 60 mm
Assembly:	DIN rails according to EN 50022

Stock variants

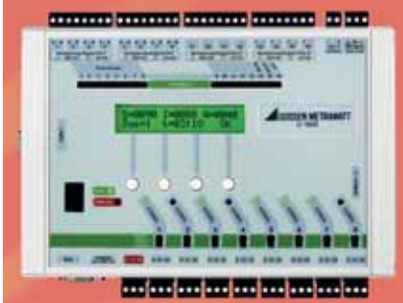
Article No.	*Description*
U1500 A0	Optimising computer for 8 channels
U1500 A1	Optimising computer for 8 channels, extendable via system bus
U1500 A2	System extension for 8 channels

Accessories

For PC software configuration Z302C see Page 55
For PC software online display Z302D see Page 55
For PC software graphic data analysis Z302B see Page 55



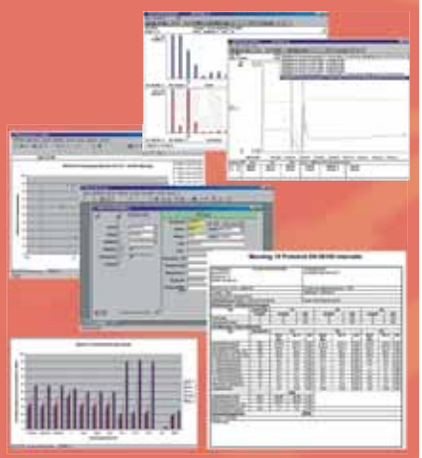
U1500



MAVOLOG 10 N

MAVOLOG 10 S

MAVOLOG 10 Mobil-Set



Power quality analyser

3-phase system analyser for voltage quality according to EN50160.

Customer benefit

- Monitoring and evidence of voltage according to EN50160

Additional in MAVOLOG 10S:

- Transparency in energy and power values
- Monitoring of power factor and reactive power compensation

Application

The MAVOLOG series is designed for all areas of application, from the producer (power plant operator) through to the consumer and may be used both individually and together with other devices. The basic model, MAVOLOG 10N, has voltage measuring inputs and acquires dips, interruptions and swells in excess of 10 ms, asymmetry, frequency, harmonics up to the 40th order as well as THD and flicker. The voltage quality is determined from the registered system disturbances according to EN50160.
The professional model, MAVOLOG 10S, has additional current measuring inputs and can thus be used as a universal system instrument. It registers the progression of almost all measured variables in the three-phase system, acquires system disturbances and analyses the voltage quality.
MAVOLOG 10 Mobile Set – the convenient solution for mobile use. MAVOLOG 10S, MAVOLOG PS/C and MAVOLOG BP are installed and wired in a strong case. System cable, connecting material for voltage measurement and the METRAwin 10 / MAVOLOG parameterising and analysing software are included in the scope of delivery.

Technical data

Meas. input:	4x nominal voltage 100/400 VAC (L-L), nominal frequency 50/60 Hz 3x nominal current 1//5 A (only MAVOLOG 10 S)
System configuration:	3-/4-wire three-phase alternating current
Display:	Alphanumeric LCD, 1-line, 60 x 10 mm
Output:	Relay contact, 50 V, 0.5 A
Interface:	Bidirectional RS485 2-wire bus, 9.6…115 kBit/s, max. 32 participants
Power supply:	16–36 VDC, max. 3 W
Dimensions:	100 x 75 x 105 mm
Assembly:	DIN rails according to EN 50022

Stock variants

Article No.	*Description*
M830P	MAVOLOG 10N
M830R	MAVOLOG 10S
M830W	MAVOLOG 10 Mobile Set

Accessories

MAVOLOG PS/C Power pack 230 V / 24 VDC and interface converter RS485/RS232	Z863D
MAVOLOG PS/C universal Wide-range power pack 60 – 320 VDC, 50 – 230 VAC / 24VDC and interface converter RS485/RS232	Z863G
MAVOLOG BP DC emergency back-up for MAVOLOG 10 in case of system failure	Z863E
MAVOLOG DFÜ Analogue telephone modem for remote data transmission	Z864C
METRAwin 10 / MAVOLOG Parameterising and visualising software	Z852D
PC.doc-ACCESS / MAVOLOG Database software to prepare tables and diagrams with MS-Office products ACCESS, EXCEL, WORD	Z852F

Content Software, Accessories

Configuration software

To parameterise programmable CB devices.

All software products of Camille Bauer can be used ONLINE (connected to the device) and OFFLINE (without a connected device). In this way, parameterising and the documentation for all devices to be used can be performed and stored prior to commissioning. The CD contains the following PC software:

DME4
- Programming of all features of the respective device variants
- Measured value display of analogue/digital output values as well as all variables which can be acquired
- Simulation of outputs to test subsequent circuits
- Printing of configuration and nameplates
- Resetting of slave pointers
- Setting / resetting of meter readings
- Password protection for selectable functions

M560
- Programming of all features of the respective device variants
- Visualising of measured values with recorder representation, storage possibility and subsequent analysis mode, measured value file can also be exported to Excel
- Simulation of analogue outputs to test subsequent circuits
- Printing of configuration files and nameplates
- Resetting of slave pointers
- Graphic representation of the linearisation characteristic of each output
- Password protection for selectable functions

A200plus, A200plus handheld
- Acquisition and change of all device features
- Measured value display of all acquired variables
- Acquisition / setting / resetting of meters and minimum / maximum values
- Acquisition and visualising of mean values stored in the logger
- Direct export of logger data to Microsoft Excel

The CD contains further PC software for angular position and process control engineering.

Content of the CD

Software	*For devices*	*Language*	*Operating system*
V600plus	SINEAX VK616, VK626, V608, V624, V611, SIRAX V606	D, E, F, N, I, S	9x, NT4.x, 2000, ME, XP
VC600	SINEAX/EURAX V604, VC603, SIRAX V644	D, E, F, N	9x, NT4.x, 2000, ME, XP
TV800plus	SINEAX TV809	D, E, F, N	9x, NT4.x, 2000, ME, XP
DME 4	SINEAX/EURAX DME4xx	D, E, F, N, I	9x, NT4.x, 2000, ME, XP
M560	SINEAX M561, M562, M563	D, N, F, N, S	9x, NT4.x, 2000, ME, XP
2W2	KINAX 2W2, WT711, WT717 and SR719	D, E, F, N	9x, NT4.x, 2000, ME, XP
A200plus	SINEAX A210, A220, A230, A230s with EMMOD201 or EMMOD203	D, E, F, N	9x, NT4.x, 2000, ME, XP
A200plus handheld	A210-HH, A230-HH	D, E, F, N	9x, NT4.x, 2000, ME, XP

Article No.	*Description*
146 557	Configuration software (CD)

CB-Manager

For the universal measuring unit for heavy current variables SINEAX CAM.

This software permits ONLINE/OFFLINE parameterising of SINEAX CAM as well as visualising measured values. It also supports users in commissioning and service. The program design is system-oriented and thus enables the simultaneous communication with several devices.

- Acquisition and change of all device features
- Setting of real-time clock and time zone, selection of the time synchronisation method
- Archiving of configuration and measured value files
- Visualising of instantaneous values
- Acquisition, setting and resetting of meters and minimum / maximum values
- Starting, stopping and resetting of the optional logger
- Recording of measured value progression during commissionning
- Check of correct device connection
- Simulation of outputs to test subsequent circuits
- User and access setting for the protective password system

The software may also be used for the modular controller system, SINEAX VR660 / A200R.

Article No.	*Description*
156 027	Configuration software CB-Manager (CD)

This CD is part of the scope of delivery of SINEAX CAM and SINEAX VR660.

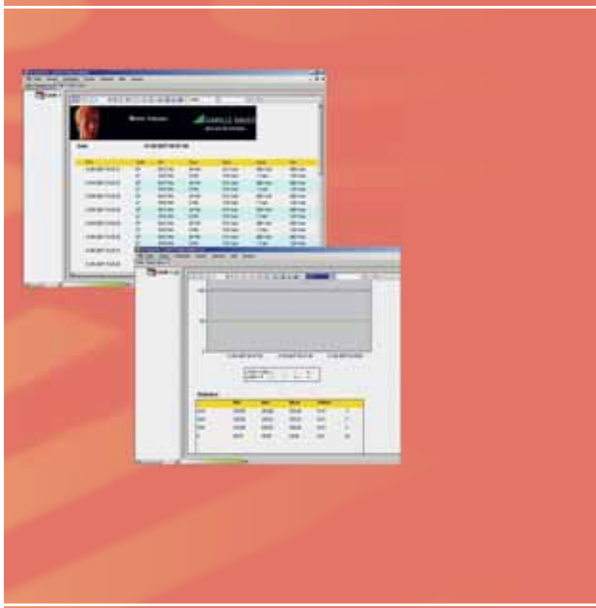
CB-Analyzer

For the universal measuring unit for heavy current variables SINEAX CAM.

This .NET-based software facilitates recording and analysis of data of the optional data loggers and lists of SINEAX CAM. The data will be stored in a database so that a much longer history is built up than would be the case if only the present memory content of the device was analysed. The program is capable of processing several devices simultaneously.

- Acquisition of logger and list data of several devices
- Storage of the data in a database (Access, SQLClient)
- Report generation in list or graphic format
- Selectable time range in the preparation of reports
- Export of report data to Excel or as an Acrobat PDF file
- Different analysing options of the acquired data, also across devices

Article No.	*Description*
156 027	Analysis software CB Analyzer



Profibus mini-CD

For the DME406 multi-transducer and the EMMOD204 extension module.

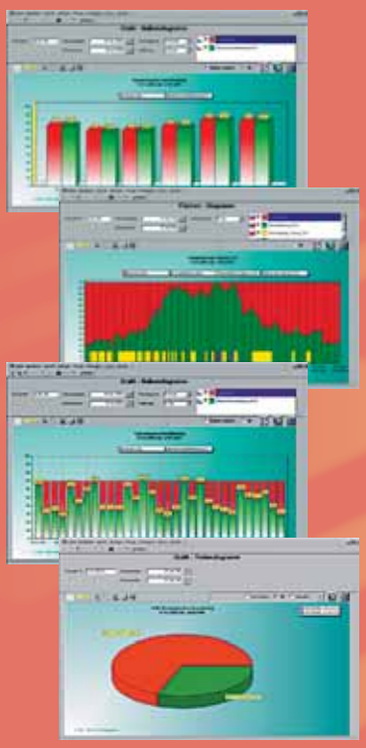
The CD contains the respective GSD file and the operating instructions as well as a commissioning guideline and further Profibus documents.

The CD also comprises start-up data for the SINEAX VK636 (Profibus PA) temperature sensor-head transmitter.

Article No.	*Description*
150 764	Profibus mini-CD

This CD is part of the scope of delivery of SINEAX DME406 and SINEAX VK636.

Z302B / Z302C / Z302D



PC software for load optimising

The listed software packages are not required for the basic function of the U1500 optimising system but they offer useful additional functions for energy consultants and interested users.
All packages work under Windows 95, 98, ME, NT, 2000, XP and contain the basic modules of data transfer, configuration signals and channel monitor.

Load optimising configuration module Z302C
All of the configurations and settings required for the device can be conveniently entered at the PC, stored to memory, displayed, printed out and transmitted to the optimising computer.

Recommended for those who frequently start up optimizing systems, or have to adapt existing configurations.

Online display module Z302D
Data for the current measuring period and the current switching statuses of interconnected operating equipment can be displayed online with this software.

Recommended for those who always want to have a good overview of their optimising system during any given measuring period.

Graphic data analysis module Z302B
This module allows for graphic analysis of all archived data such as load characteristics and switching operations. Recurrent data analysis is executed after the graphic configuration has been selected and stored to memory once only.

Recommended for those who want to document savings generated by the system, as well as analyze and optimise the switching operations required to this end.

ECSwin

Configuration software for U160x summators

Configuration of the U160x summator, manual read-out of stored energy data and simple visualising.

Customer benefit
- Convenient configuration of U160x summators
- Easy programming of virtual channels
- Direct command entry via terminal function
- Graphic representation of control panel for remote control
- Graphic representation of ECS-LAN network topology
- Acquisition and visualising of stored data
- Recorder representation for instantaneous values
- Optional: Simple load optimising for U1600 with ECSopt

Application
ECSwin software configures U1600, U1601, U1602 and U1603 summators easily and conveniently. Parameter settings are read out from the summators, and are displayed in data entry windows. All values may be changed, saved to memory and transferred to the summators. The software can access the summators via RS232 interface, modem, Ethernet TCP/IP and COM-Server.

Technical data
Operating system: MS Windows 95, 98, NT4, ME, 2000, XP, Vista

Article No.	*Description*
Z302E	ECSwin

Load optimising module for ECSwin

4-channel load optimising for U1600 summators.

Customer benefit
- Savings in energy costs by the reduction of peak loads
- Specification or measurement of loads which can be shut down
- Consideration of limit values depending on tariff periods
- Adjustable rotation of loads to be shut down
- Consideration of reaction times of loads
- Protocol of switching operations

Application
Peak loads are reduced by the control of max. 4 consumers in combination with ECSwin and a U1600 summator. In addition, the 4 switching outputs and the background programming of the U1600 summator are used. Parameters may be conveniently set via ECSwin.

Article No.	*Description*
Z302F	ECSopt

ECSopt

Macros for MS Excel

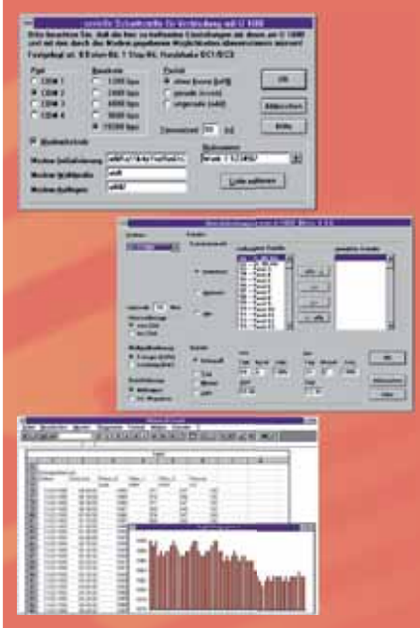
For data upload from U16xx summators.

Customer benefit
- Availability of energy data in MS Excel
- Preparation of analyses and reports

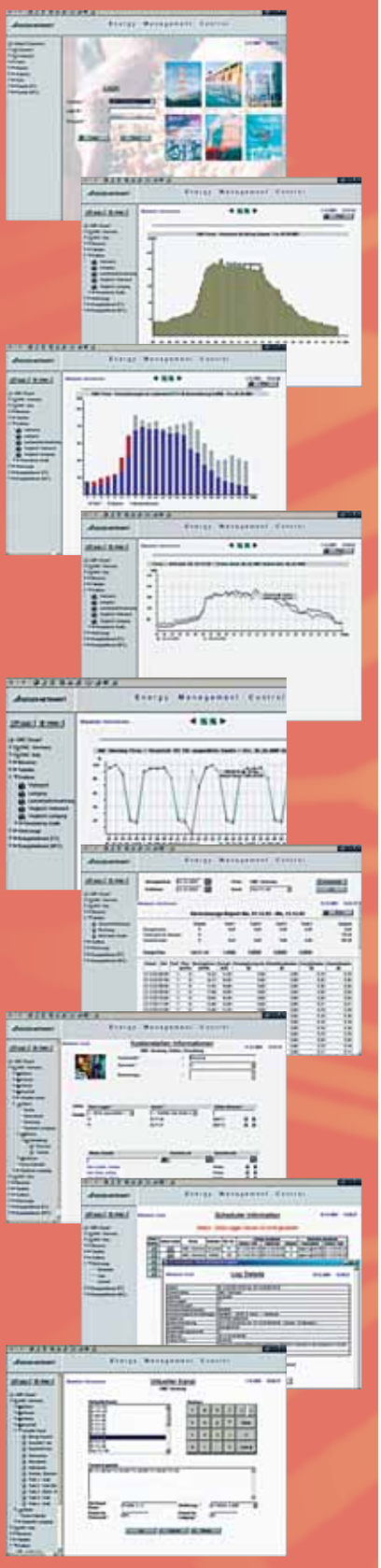
Application
Using the U1600.XLM macro, energy data from the U160x summators can be directly exported to Microsoft Excel spreadsheets, Version 4.x or higher, and made available for customer-specific evaluation. Connection of the PC to the summator is configured in Excel, and is established directly via the RS232 interface, modem, Ethernet TCP/IP and COM-Server.

Article No.	*Description*
Z302G	U1600 Excel-Makro

U1600 Excel-Makro



EMC



Energy data management with system

Application software to acquire, visualise and bill energy data from the Energy Control System (ECS).

Customer benefit

- *Remote read-out of meter data* provides time-synchronised data, saves long-distance travel and avoids reading and input errors. Brief read-out intervals result in load profiles which serve as a basis for optimising and billing
- *Diagrams* create comprehensive transparency in consumption and load structures. They reveal weak points and constitute the basis for consumption, process and maximum optimisation.
- *Reports* document the consumption and determine costs on basis of the allocated tariffs. They form the basis for responsible handling of energy, internal billing and contract negotiations with utility companies.
- *Billing* is in relation to the tenant in let objects and to the cost centre in industrial operations. The required administrative functions are integrated.
- *Planned data* the schedule in energy supply contracts. Deviations in relation to the real load curve are visualised and constitute the basis for schedule optimising.
- *Virtual channels* calculate new data for all analyses. Different loads can be combined, distributed or determined via balancing circles. Benchmarking is facilitated by the calculation of key figures.

Application

Working in combination with the high-performance Energy Control System the user-friendly EMC (Energy Management Control) software is designed in an optimum fashion for applications in industry, energy and building management . Energy data of all media may be read remotely, stored, visualised, analysed and billed. Browser-oriented operation via tree structures and integrated help functions safeguard intuitive operation with brief familiarisation periods. Several users can access simultaneously the data archived in a high-performance SQL database via Intranet or Internet. A user management system controls specific access rights. The software is of a modular design and can be adjusted to individual requirements.

Technical data

Computer:	min. Pentium PC, 1 GHz, 250 MB RAM
Browser:	Internet Explorer starting Version 6.0 SP 1
Operating system:	MS Windows 2000 SP 4, XP
Languages:	D, GB, F, I, NL, CZ, PL switchable

Article No.	*Description*
Z308A	EMC Basic version
Z308B	EMC Expansion - Providers and Tariffs
Z308C	EMC Expansion - Building Automation / Industrial Version
Z308D	EMC Expansion - Consortium
Z308E	EMC Expansion - Virtual Channels
Z308F	EMC License - 5 User
Z308G	EMC License - 5 Locations / Energy Types
Z308H	EMC License - 100 Measuring Points
Z308I	EMC License - 5 Companies
Z308J	EMC Full Version

Programming and additional cables

serve programming of the instruments in connection with the respective configuration software and using a PC.

Customer benefit

- Programming operation without any additional power supply connection
- Communication with the instruments
- Safe galvanic isolation of instrument and PC
- Cost-effective instruments (M56x) due to separated programming interface

Article No.	*Description*	*A2xx * A2000*	*A200 zu DME4xx*	*DME4xx*	*M56xx*
147 779	Programming cable PRKAB 560 (NEx)				•
143 587	Additional cable				•
152 603	Interface adapter cable	•			
154 071	Connecting cable Sub-D 9 pol. male/male		•		
980 179	Extension cable Sub-D 9 pol. male/female	•		•	

* A210, A230s, A230 with plugged-on EMMOD201


147 779


143 587


152 603


154 071


980 179

Electromagnetic compatibility

What is it all about?
Electromagnetic compatibility (EMC) signifies that electrical and electronical products work safely at their place of use. To safeguard this, the interfering emission of electromagnetic signals of devices, systems or plants must be limited. On the other hand, it must also be safeguarded that devices, systems or plants are not impaired by the interfering signals present in their environment. These relatively simple facts are stipulated in the EMC Directive 89/336/EC and can only be achieved if all those involved play the game. All manufacturers are obliged to test their products accordingly or have them tested.

The CE-mark is the basic precondition that a product may be put into circulation in Europe. In this way, manufacturers confirm that their products conform to applicable directives for their type of product. The EMC directive is an integral part of this requirement profile. Outside of Europe, other identification obligations are partly applicable. These are now harmonised to such an extent that also in relation to EMC comparable requirements can be assumed.

The problem
The increase of electrical and electronical products in the industrial environment but also in products of daily use is still immense. More and more functionality with even higher performance is implemented in these products. Processor systems with increasingly higher clock frequencies are being used. They generate higher and higher levels of interference unintentionally and also become more and more sensitive to interfering sources in their environment.

To make matter worse, the applications using radio frequencies are also increasing. For example, mobile telephones must be in a position of sending and receiving signals. Though their transmission output is limited, incompatibilities might result if they are used inconsiderately in the vicinity of sensitive devices. Systems may be interfered with to such an extent that they provide wrong signals or break down completely. This is the reason, why their use is often limited, e.g. in aircrafts or also in hospitals where sensitive medical devices might be affected. The awareness of EMC problems in aircrafts has been established over years but must still be pointed out to passengers prior to every take-off. When entering a hospital hardly anybody turns of his or her mobile telephone despite warning messages on the walls. Operational managers of power plants are often not aware of the fact that the use of mobile telephones in the vicinity of measuring, controlling and regulating units can be critical. Radio and television stations, mobile radio antennae or remote controls also work with frequencies which might interfere with sensitive devices and impair their operation.

Sources of interference
In the industrial environment, frequency converters, motors and other consumers are increasingly operated parallel to sensitive measuring and control systems. Higher levels of interference must generally be expected in all places where high power is applied, switched or pulsed or electronic systems with high pulse frequencies are used.

The use of wireless telecommunication facilities or networks also increases the probability of incompatible levels of interference in the environment of sensitive equipment.

Standards
Applicable specific basic standards define the requirements of products and systems for use in their original environment. A limited number of tests with evaluation criteria and the expected operating behaviour are determined using defined measuring and test procedures. Specific basic standards contain details of the measuring method and general conditions. Specific EMC standards are available for certain products or product groups and have priority over the general requirements mentioned above.

EMC safety can only be achieved by a complete examination in accordance with standards. Since all standards are interrelated only their sum total provides a satisfactory result. Partial examination is not permitted, however still done by some manufacturers due to lacking measuring equipment or for reasons of costs.

Meeting standards does not necessarily provide smooth operation. A device may be subjected to higher loads in operation than envisaged by the standard. This might be caused by insufficient protection of the equipment or by EMC-incompatible wiring. In such a case, the behaviour of the device is largely undefined since it has not been tested.

Measurement of the behaviour of the devices in voltage dips, brief interruptions or voltage fluctuations of the power supply

Tests at Camille Bauer
Camille Bauer has its own EMC laboratory where the complete scope of all required tests (see below) can be performed. Even if our laboratory is not accredited, comparative measurements at the premises of respective service providers as well as subsequent checks by customers confirmed our test results in each case.

We also test our devices under higher loads than demanded by the standard even if this is not explicitly stated in our data sheets.

Specific basic standards
IEC / EN 61000-6-2
Immunity standard for industrial environments

IEC / EN 61000-6-4
Emission standard for industrial environments

Electromagnetic compatibility

Basic standards

IEC / EN 61000-4-2
Immunity to static discharge which occurs as potential differences - mainly caused by friction electricity - are reduced. The most known effect is surely when persons get charged as they walk across a carpet and discharged with the generation of a spark when they touch a metal part. If this is, e.g., the plug of an electronic device the brief current impulse might be sufficient to destroy the device.

IEC / EN 61000-4-3
Immunity to high-frequency electromagnetic fields. Typical sources of interference are radiotelephones used by the operating, maintenance or service staff, mobile telephones and transmitting facilities needing these fields. Coupling happens via the air. Unintentional fields also occur in welding facilities, thyristor-controlled inverters or fluorescent lamps.

Coupling might as well be generated via the line in such cases.

IEC / EN 61000-4-4
Immunity to fast transient interference variables (bursts) which are generated in switching operations (interruption of inductive loads or bouncing of relay contacts)..

IEC / EN 61000-4-5
Immunity to impulse voltages (surges) which are generated in switching operations or lightning and arrive at the device via the connecting lines.

IEC / EN 61000-4-6
Immunity to conducted disturbances, induced by high-frequency fields which are typically generated by radio transmission facilities. Coupling takes place via the connecting line of the device. For further sources of interference see 61000-4-3.

IEC / EN 61000-4-8
Immunity to magnetic fields with power frequencies. Strong magnetic fields result, e.g., in the immediate vicinity of power lines or bus bars.

IEC / EN 61000-4-11
Immunity to voltage dips, brief interruptions and voltage fluctuations. Dips and brief interruptions of the supply voltage result from errors in the supply system or when large loads are switched. Voltage fluctuations are caused by fast-changing loads, e.g. in arc furnaces, and also generate flickering.

Determination of device behaviour under the influence of a magnetic external field generated by a Helmholtz coil

Environmental testing

What is it all about?
Products are exposed to many environmental impacts during their useful life. These are not limited to impacts during operation in the intended application in the field but also comprise detrimental influences during storage or transport to customers. The impacts include temperature, climate, water and dust conditions but also mechanical stress like vibration or shock.

The tests have the objective of checking the resistance against possible environmental impacts and to ensure reliability in later operation. Assumptions are made, e.g. concerning the reference range for environmental temperature or the annual average relative humidity. Users must compare these details with their own requirements (see data sheet). It is only after this check that they can be certain that the device suits their applications and will show the desired behaviour.

Standards
The requirement of testing the behaviour of devices in changing environmental conditions is derived from product group standards for Camille Bauer products, e.g. EN / IEC 60688 „Electrical measuring transducers for converting a.c. electrical quantities to analogue or digital signals“. The normal place and type of use and the prevailing environmental conditions to which these instruments are exposed are known. Tests and test criteria which the device has to meet are derived from this information. For firmly installed instruments these tests concern the operational behaviours in changing temperatures (cold, dry and humid heat) as well as the influence of vibration and shocks.

Operation
The ambient temperature in which a device is operated can change quickly, e.g. if a part of the plant in which the device has been installed heats up due to operational demands or because of the difference of day and night temperatures in rooms which are not heated. Usually, devices heat themselves up. This can occur due to dissipated heat of passive components or self-heating of processors. Depending on the season and the environment, the heat may be dry or humid, i.e. precipitating or not precipitating. Thermic testing might take hours or days. The device is operated under normal conditions, i.e. with input signals and loaded outputs. The ambient temperature is changed step by step in regular intervals, kept constant and then changed again, either positively or negatively. In this way, the entire operating temperature range of the device is applied upwards and downwards. Any change in the behaviour of the device and the extent of the same is verified after each step. On the one hand, the test shows whether the instrument meets the accuracy requirements within the reference range and, on the other hand, the temperature influence outside of the reference range is checked.

If the devices are installed in the vicinity of rotating machines, assembled in ships or transported to customers by lorries and aeroplanes, they are exposed to permanent vibration. This might lead to larger components being cut off or mechanical locking devices of the housings being opened. Vibration testing in which the tested object is exposed to repeated harmonic vibration helps to find weak points and to eliminate them. Shock testing, on the other hand, subjects the device to a specified form of shock through acceleration and breaking at irregular intervals. In this way, the behaviour of the device can be tested if it is dropped from a certain level.

Special measurements
Not all instruments are used in applications covered by standard tests. Earthquake vibration tests, for example, require low-frequency vibration of a high amplitude. Our test facilities cannot process the required test schedule exactly. Therefore, the measurements have to be done externally. Normally, customers assume the costs for this service. Upon request, we will be pleased to make test instruments available if you intend to perform the tests yourself.

Standard tests can also be performed with changed general conditions. Whether and to what extent customers participate in the costs incurred will be decided in each case.

Tests at Camille Bauer
Camille Bauer has test facilities to perform all required product tests in-house.

Overview of tests
EN / IEC 60068-2-1 – cold
EN / IEC 60068-2-2 – dry heat
EN / IEC 60068-2-78 – humid heat
EN / IEC 60068-2-6 – vibration
EN / IEC 60068-2-27 – shock

KINAX series

Angular position transmitters detect the position of a shaft and convert it into a proportionate DC signal. The position is measured by a non-contact, capacitive sensor system which is patented and completely free of wear and tear. Versions for OEM, surface mounting, machine construction or position feedback applications are available. The program also includes designs for hazardous areas.

- Absolute position is immediately available after activation
- Non-contact and thus free of wear and tear
- Very robust – therefore shockproof (50g) and vibrationproof (5g/≤200 Hz)
- Long-term stable due to simple, reliable electronics
- Measured value infinite and without any rounding error

Linear acquisition of angular position

Linear single-turn and multiturn rotary encoders adjustable on site.

Customer benefit
- Simple connection technique with 2, 3 or 4 wires
- Simple installation and value display using analogue output
- Adjustable on site: Zero point ±5%, final value variation +5%/-30% (60%)
- High accuracy of 0.5% in versions for 10°, 30° 60°, 90° and 1.5% in versions for 180° and 270°

Technical properties
- Angular position measuring range: 0…5° to 0…270°
- Linear distance measurement: 0…10 mm to 0…140 mm
- Measurement output 0…1 mA to 0/4…20 mA
- Zero point and final value adjustable
- Accuracy 0.5%
- Housing ingress protection up to IP66

Linearisable acquisition of angular position

Programmable singleturn and multiturn rotary encoders.

Customer benefit
- Simple 2-wire connection technique
- Simple calibration with PC software (known angular position and characteristic curve)
- Measuring range, switch point, characteristic curve and direction of rotation programmable
- Characteristic curve freely programmable via 20 data points (for non-linear curves)
- Measured value simulation / measured value acquisition are further convenient aids

Technical properties
- Angular position measuring range: 0…60° and 0…360°
- Linear distance measurement: 0…10 mm to 0…140 mm
- Measurement output 4…20 mA
- Accuracy 0.5%
- Housing ingress protection up to IP66

Temperature

Temperature is the most measured variable in industry. However, the requirements of temperature measuring points vary from one application to the other. Camille Bauer offers extensive temperature transducers in the most varied designs for the analysis, conversion and transmission of temperature sensor signals.

Head transmitters
Head transmitters are directly installed in the connecting head of the temperature sensor. The sensor signal is converted into a 4..20 mA signal, HART signal or Profibus PA signal directly on site. The head transmitters may be freely programmed and parameterised.

Transmitter for top-hat rail assembly
Intelligent terminals in 2-wire technology are suited to the installation in subdistributor systems close to the process or control cabinets. Their very small dimensions permit a space-saving installation. Temperature transmitters are directly assembled in the control cabinet and mainly use 4-wire technology. Measured variables and measuring ranges can be fully programmed which facilitates univeral usage and cost-saving stocks. All of our devices are galvanicly isolated, on principle, and also available in Ex-variants.

Signal conversion

As a link between the actual physical process and control engineering, we provide an extensive program for safe isolation, conversion and amplifying of signals, also for Ex-zones. Safety has the first priority also at this point.

Power Supply Units
Our power supply units provide 2-wire transducers with DC power and transmit the measuring signal 1:1 galvanicly separated to the measuring output.

Isolation amplifiers
Active isolation amplifiers have the task of galvanicly separating input signals from output signals, amplifying them and/or converting them to another level or type of signal (current or voltage). Different Ex-variants are also available.

Passive isolators
Passive DC signal isolators serve the galvanic isolation of a direct current signal which is transferred to a direct current or direct voltage signal depending on the device variant. They prevent the diversion of interference voltages and interference currents and solve earthing problems.

Process Management

Videographic recorders
The vidographic recorders of the LINAX A300 family are paperless recorders of the latest generation. Their modular concept facilitates the flexible adaptation to the most varied needs. Depending on the type and design of the device users have up to 36 universal input channels at their disposal. Digital inputs and outputs, relay outputs, Ethernet interface, RS485 (Modbus) interface as well as transducer power supply are additional properties of the LINAX vidoegraphic recorders.

Temperature control systems
The goal of any control is to correct the change of the setpoint and the influence of interfering variables without overshooting and swinging. However, this is only possible if the controller behaves dynamically and is adjusted to the time behaviour of the controlling system. Our controllers and controller systems are the professional tool for optimum and high-quality control.
A specially developed PDPI control action and optimising procedure corrects changes without overshooting and swinging. The integrated data loggers and histories register all relevant control process data in real time thus facilitating a detailed analysis of interferences. User-friendly software tools for commissioning (configuration, parameterising), remote diagnosis and remote maintenance support and simplify all relevant tasks. Our controller program comprises compact controllers, control modules for Simatic platforms, OEM control modules, software controllers (control algorithm) and modular temperature control systems.

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