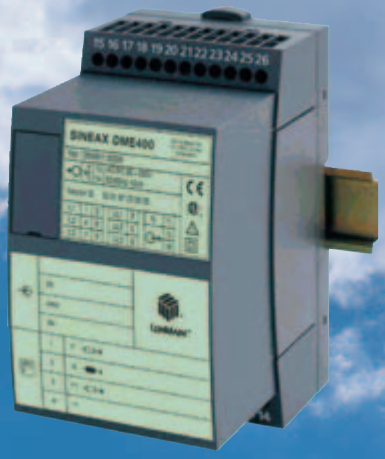
SINEAX Electric Power Transducers

RHEIN TACHO

New RheinTacho Programmable Rotational Speed Monitors



SINEAX Signal Conditioners
SINEAX Isolators
SINEAX Transmitters
SINEAX Electrical Power Transducers
KINAX Position Transducers

Phone: 800-942-0315
Fax: 800-949-7502
www.apicb.com

Api-Camille Bauer
Div. of Absolute Process Instruments, Inc.
1220 American Way Libertyville, IL 60048 USA

Electric Power
SPEED

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A2000

True RMS Power System Measurement and Logging

MODBUS

PROFIBUS

LONWORKS®

- **Measure and Display**
  Voltage: U1, U2, U3, U12, U23, U31, max values
  Current: I1, I2, I3, avg, max, avgmax values, Neutral current
  Frequency: 40 to 70 Hz
  Power Factor Cosφ: PF1, PF2, PF3, min values, PF_{Σ}, $PF_{\Sigma min}$
  Active Power (Watt): P1, P2, P3, max values, P_{Σ}, $P_{\Sigma max}$
  Reactive Power (VAR): Q1, Q2, Q3, max values, Q_{Σ}, $Q_{\Sigma max}$
  Apparent Power (VA): S1, S2, S3, max values, S_{Σ}, $S_{\Sigma max}$
  Active & Reactive Energy (Wh, VARh): all 4 quadrants
  THD 1st-15th Harmonic, Voltage: U1, U2, U3
  THD 1st-15th Harmonic, Current: I1, I2, I3
- **True RMS Measurements for Distorted Waveforms**
- **Data Logging for up to 12 Variables - 63,000 values**
- **Full DIN Size 144 x 144 mm**
- **Active & Reactive Energy Digital Pulse Outputs**
- **RS232/485 Interface, MODBUS-RTU Standard**
- **LONWORKS or PROFIBUS-DP Interface Versions**
- **2 or 4 Analog Outputs**
- **2 Relay Outputs with Limit Setpoints**
- **Adjustable CT & VT Ratios for Current & Voltage Inputs**
- **Digital Input for Synchronization or Tariff Change**

Specifications

Input	Single phase 3 phase 3-wire balanced, 4-wire balanced or unbal. Phase to phase: 0 to 500 VAC max. Phase to neutral: 0 to 290 VAC max. Frequency: 40 to 70 Hz Current: 0-1 A to 0-6 A Synchronizing input: Internal or external Sampling rate: Adjustable, 300 ms to 30 min. Recording duration: 1 minute to 4 days or continuous
Outputs	2 or 4 isolated analog outputs 2 digital pulse and 2 relay outputs
Accuracy	±0.25% for U and I, true RMS measurement ±0.5% for Power ±0.02% for Frequency
Display	Four 4-digit red LED displays, 14 mm H Alphanumeric displays for units
Protection	IP 65 front panel
Dimensions	144 mm W x 144 mm H x 60 mm D 138 mm W x 138 mm H panel cutout

Order Codes (115/230 VAC powered)

A2000-H0-A0-P1-R0-L0-U0-W1	2 Analog & 2 Pulse Outputs, MODBUS
A2000-H0-A0-P1-R1-L0-U0-W1	2 Analog & 2 Pulse Outputs, Data Logging, MODBUS,
A2000-H0-A1-P1-R0-L0-U0-W1	4 Analog & 2 Pulse Outputs, MODBUS
A2000-H0-A1-P1-R1-L0-U0-W1	4 Analog & 2 Pulse Outputs, Data Logging, MODBUS

Optional Versions – Please contact factory

DC powered, LONWORKS interface, PROFIBUS-DP interface

- ***Highly Flexible***
  1 A or 5 A CT ratios, limit values, analog and pulse outputs
- ***Event Monitoring***
  Datalogging option provides you with a clear-cut historical overview of causes leading up to events
- ***Cost-Effective Data***
  Monitor harmonic distortion to evaluate system quality
- ***Communication Capabilities***
  RS 232 and MODBUS RTU are standard. PROFIBUS DP or LONWORKS interfaces available
- ***Easy Operation***
  Separate keys for configuration and operation. Configuration values and readings can be locked to prevent tampering

Measure Power System Parameters Including System Load and Harmonics

A230
A230s

MODBUS

154 055 DIN-rail adapter with EMMOD 201

EMMOD 201 RS 485/232 interface & data logger

Specifications

Input Single phase
Three phase: 3- or 4-wire, balanced or unbalanced
4-quadrant operation
Phase to Phase: 0 to 500 VAC max.
Phase to Neutral: 0 to 290 VAC max.
Frequency: 45 to 65 Hz
Current: 0-1 A to 0-6 A

Variables Programmable trip points or pulse rate, transformer ratio, type of system, interval time for power average values. Programming can be locked with jumper

Outputs 2 isolated programmable outputs
Use as digital pulse output or open collector alarm relay

Accuracy U, I: ±0.2%
P, Q, S, PF, meters: ±0.5%
Frequency: ±0.02 Hz

Display Three 4-digit red LED displays, 14 mm H
Alphanumeric displays for units
Variables can be configured to display sequentially

Protection IP 66 front panel

Dimensions

A230s 96 mm W x 96 mm H x 46 mm D (69 mm D w. EMMOD)
92 mm W x 92 mm H panel cutout

A230 144 mm W x 144 mm H x 46 mm D (69 mm D w. EMMOD)
138 mm W x 138 mm H panel cutout

Order Codes

154 782	A230s power meter, 85-253 VAC/VDC powered
154 766	A230s power meter, 20-70 VAC/VDC powered
152 942	A230 power meter, 85-253 VAC/VDC powered
152 926	A230 power meter, 20-70 VAC/VDC powered
150 285	EMMOD 201 RS 485/232 interface, data logger module with programming cable and A200 Plus software
154 055	DIN-rail adapter (can be used with EMMOD 201)
API 756	Power meter installed in NEMA 4 enclosure with mounting bracket for 96 x 96mm power meters

- **Measure and Display**
  Voltage: U1, U2, U3, U12, U23, U31, and min/max, N-E, N-E_{max}, U_{avg}, U_{avgmax}, unbalance factor, max unbalance factor
  Current: I1, I2, I3, N, and max, I_{avgmax}, I_{avg} (bimetal/slave pointer)
  Frequency: 45-65 Hz
  Power Factor Cosφ: (4-quadrant display) PF1, PF2, PF3, PF_{avg}
  Power Factor: incoming/outgoing ind./cap. min.
  Active Power (Watt): P1, P2, P3, and max, P_{avg}, trend
  Reactive Power (VAR): Q1, Q2, Q3, Q_{avg}, trend
  Apparent Power (VA): S1, S2, S3, S_{avg},, trend
  Active & Reactive Energy (Wh, VARh): all 4 quadrants
  THD Voltage: 1-N, 2-N, 3-N, 1-2, 2-3, 3-1
  THD Current: 1, 2, 3
  2nd-15th Harmonic, Voltage: 1-N, 2-N, 3-N, 1-2, 2-3, 3-1
  2nd-15th Harmonic, Current: 1, 2, 3
- **Active and Reactive Energy Digital Pulse Outputs**
- **Mean, Max., Min. Value Functions with Trend**
- **Adjustable CT & VT Ratios for Current & Voltage Inputs**
- **A230s ¼ DIN Size 96 x 96 mm**
- **A230 Full DIN Size 144 x 144 mm**
- **Order EMMOD for Input Synchronization, Tariff Change**
- **Order EMMOD for MODBUS, 16,000 Point Data Logging**
- ***Cost Savings***
  One A230 or A230s replaces several instruments and associated power transducers. You reduce planning, documentation and installation costs
- ***Outstanding Visibility***
  Bright LED displays provide exceptional readability
- ***Modular Design***
  Upgradeable with communications capabilities and data storage without opening the instrument
- ***Safety and Security***
  Configuration and meter readings can be locked to prevent tampering

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A210
A220

Measure Power System Parameters

CE

MODBUS

A 210 Terminals

154 055 DIN-rail adapter with EMMOD 201

EMMOD 201 RS 485/232 interface & data logger

- **Measure and Display**
  Voltage: U1, U2, U3, U12, U23, U31, min/max
  Current: I1, I2, I3, avg, max, avgmax, Neutral current
  Frequency: 45 to 65 Hz
  Power Factor (Cosφ): PF1, PF2, PF3, PF
  Power Factor: incoming/outgoing ind./cap. minimum
  Active Power (Watt): P1, P2, P3, $P1_{max}$, $P2_{max}$, $P3_{max}$, P_{max}
  Reactive Power (VAR): Q1, Q2, Q3, $Q1_{max}$, $Q2_{max}$, $Q3_{max}$, Q_{max}
  Apparent Power (VA): S1, S2, S3, $S1_{max}$, $S2_{max}$, $S3_{max}$, S_{max}
  Active & Reactive Energy (Wh, VARh): all 4 quadrants
  Average Active, Reactive, and Apparent Power
- **Active and Reactive Energy Digital Pulse Outputs**
- **Digital Input for Synchronization or Tariff Change Setting**
- **Adjustable CT & VT Ratios for Current & Voltage Inputs**
- **A210 ¼ DIN Size 96 x 96 mm**
- **A220 Full DIN Size 144 x 144 mm**
- **Optional MODBUS-RTU with Data Logging**

- ***Cost Savings***
  One A210 or A220 replaces several instruments and associated power transducers. You reduce planning, documentation and installation costs
- ***Outstanding Visibility***
  Bright LED displays provide exceptional readability
- ***Modular Design***
  Upgradeable with communications capabilities and data storage without opening the instrument
- ***Safety and Security***
  Configuration and meter readings can be locked to prevent tampering

Specifications

Input Single phase
Three phase: 3- or 4-wire balanced or unbalanced
Phase to Phase: 0 to 500 VAC max.
Phase to Neutral: 0 to 290 VAC max.

Frequency 45 to 65 Hz

Current 0 to 5 A

Outputs Isolated digital pulse for Wh and VARh or use as limit setpoints for any variables

Accuracy
U and I: ±0.5%
P, Q, S, PF, meters: ±1.0%
Frequency: ±0.1%

Display Three 4-digit red LED displays, 14 mm H
Alphanumeric displays for units

Protection IP 66 front panel

Dimensions
A210 96 mm W x 96 mm H x 46 mm D (69 mm D w. EMMOD)
92 mm W x 92 mm H panel cutout
A220 144 mm W x 144 mm H x 46 mm D (69 mm D w. EMMOD)
138 mm W x 138 mm H panel cutout

Order Codes

149 783	A210 power meter, 85-230 VAC/VDC powered
150 300	A210 power meter, 20-70 VAC/VDC powered
152 546	A220 power meter, 85-230 VAC/VDC powered
152 554	A220 power meter, 20-70 VAC/VDC powered
150 285	EMMOD 201 RS 485/232 interface, data logger module with programming cable and A200 Plus software
154 055	DIN-rail adapter (can be used with EMMOD 201)
API 756	Power meter installed in NEMA 4 enclosure with mounting bracket for 96 x 96mm power meters

Electric Motor Monitoring

❑ A210 Power Monitor – Predictive Maintenance of Electric Motors

A machine driven by an electric motor consumes a certain amount of active power (Watts). For example, a newly rebuilt 3-phase motor may use 4.0 kW while running. As soon as the power consumption increases to 4.2 kW it may indicate that the motor bearings are going bad or some other machine component is beginning to fail.

The **A210** Power Meter is a very cost effective device for monitoring the performance of electric motors in critical applications where expensive downtime cannot be tolerated.

The **A210** can be installed near the motor either in the optional NEMA 4 housing, on a DIN-rail using the optional DIN rail adapter, or in a ¼ DIN panel cutout.

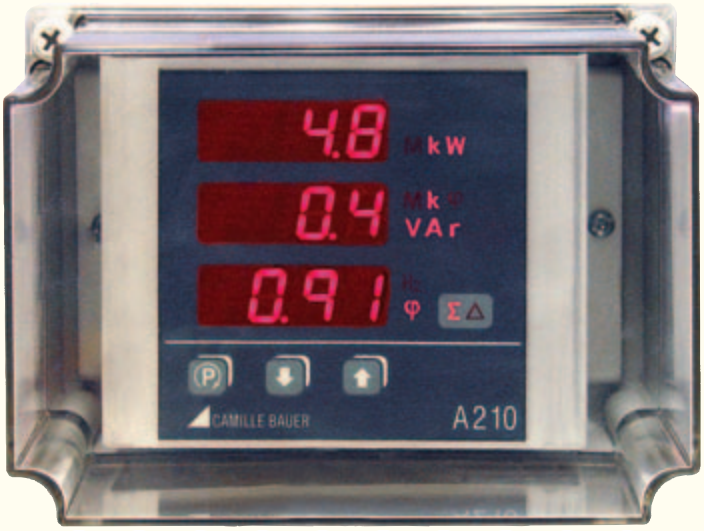
The **A210** is connected to monitor voltage and current of the electric motor. The motor can be single phase or 3-phase, 3- or 4-wire . See the *Current Sensor Section* for current transformers. PT and CT ratios can be easily programmed from the front panel.

Three values such as Voltage, total Current, phase Current, kWatt, kVAR, Active Power (Watts), Reactive Power (VAR), and Power Factor (pF) can be shown on the **A210** triple display. These values allow you to monitor the running system.

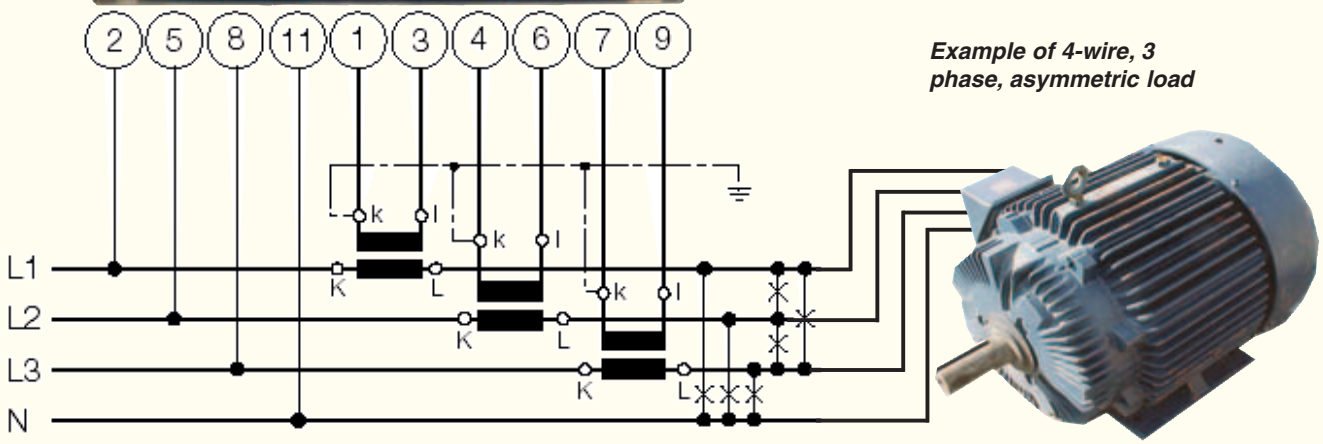
The **A210** also has two alarm functions, which, for example, can be set up by the user for Watt and VAR limits. If something causes the motor power consumption goes up, it will trigger an alarm as soon as the set-point is reached, and indicate the actual measurements when an alarm was triggered.

The two alarms can be set at different levels: low value as a warning and a higher value for a possible breakdown.

This alerts the operator of a potential problem and provides a cost effective way to prevent unexpected breakdowns and lost production on any type of machine operated by an electric motor.



The A2000, A210, A220, A230, and A230s are Ideal for Motor and Machinery Monitoring Applications



Example of 4-wire, 3 phase, asymmetric load

FREE APPLICATION ASSISTANCE
Call Customer Service
800-942-0315

ABSOLUTE PROCESS INSTRUMENTS, Inc. api-usa.com
1220 American Way
Libertyville, IL 60048
Phone: 800-942-0315
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EMMOD 201 Data Logger Option for A2000, A210, A220, A230, A230s

The optional **EMMOD 201** module can be plugged into the back of API-Camille Bauer power monitors, without opening the housing, to add communications and datalogging functions.

Specifications

Interface RS 485/RS 232 switchable

Protocol MODBUS RTU for SCADA

Input Digitally synchronize for time stamp and tariff switching

Address Bus interface address 1 to 247

Baud Rate 1200, 2400, 4800, 9600, 19.2 Kb

Parity None, even, odd, space

Depth Adds 23 mm depth to back of meter

Recording Capacity

P interval value inc./outgoing.
Q interval value ind./cap. resp. inc./outgoing.
S interval value inc./outgoing.
9 configurable mean values

At 15 min. intervals: 1 value for 166 days
At 15 min. intervals: 2 values for 83 days

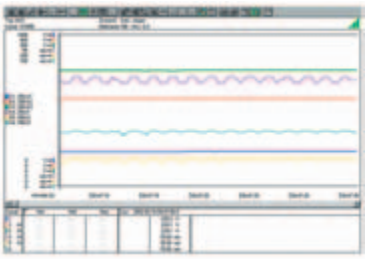
Software **A200 Plus**, Windows PC compatible

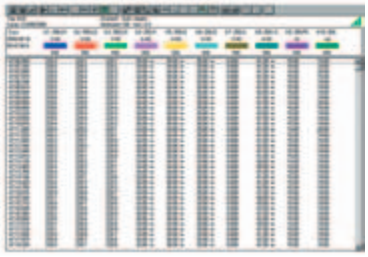
Order Code

150 285 EMMOD 201, programming cable, A200 Plus software

EMMOD 201 RS 485/232 Interface & Data Logger

MODBUS





Machine Power Data Logger

❑ A210 Power Monitor + EMMOD 201 – Low Cost Machine Power Recording

The API Camille-Bauer **A210** Power Monitor is a cost effective device to monitor the performance of electric motor powered systems by continuously measuring power consumption. Downtime is expensive and can often not be tolerated in critical applications; the **A210** monitors the performance of the entire system based on its power consumption.

The **A210** Power Monitor can be installed to monitor the power consumption of almost any machine or a production process. For example, the **A210** will monitor the time when a machine is shut down (zero Watts), idle (low Watts) and full operation (normal Watts).

The **A210** can perform measurements on single- or 3 phase power systems. The **A210** Power Monitor has an accuracy of ±0.5% for voltage and current and ±1.0% for Watt and VAR measurements.

The **A210** can be installed near the motor either in the optional NEMA 4 housing, on a DIN-rail using the optional DIN rail adapter, or in a ¼ DIN panel cutout. The **A210** can be connected to monitor voltage and current either directly, or in the case of motor current levels over 5 Amps, through a current transformer. See the *Current Sensor Section* for current transformers. PT and CT ratios can be easily programmed from the front panel.

The **A210** with the optional plug-in **EMMOD 201** data logging module can, for example, be set up to continuously log Watts and VAR values and display data with the Windows-based **A200 Plus** software included with the **EMMOD 201.** This module also allows you to configure the **A210** easily via your PC instead from the front panel. A Modbus RS-485 interface is also available with this module.

The software can also convert the power consumption data to an Excel file to allow you to create data records or charts. This allows you to show the machine usage or process in terms of percentage and actual power consumption in Watt/VAR.

Three values such as Voltage, total Current, phase Current, kWatt, kVAR, Active Power (Watts), Reactive Power (VAR), and Power Factor (pF) can be shown on the **A210** triple display. These values allow you to monitor the running system.

The **A210** also has two alarm functions, which, for example, can be set up by the user for current draw per phase or the average current consumption, as well as the Active Power (Watts) consumed per interval (averaged measurements over 1-60 minutes). If power consumption goes up two alarms can be set at different levels: low value as a warning, and a higher value for a possible breakdown. The alarm outputs can also be configured as pulse outputs for Watthour (Wh) and VARhour (VARh) metering.

Trigger values for the alarms (open collector with external voltage rated 8-30 VDC) can be set independently:

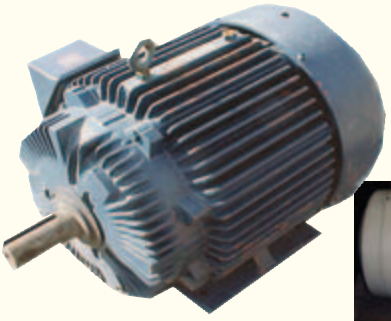
Voltage U12 or U23 or U31
Voltage U1N or U2N or U3N
Current I1 or I2 or I3
Neutral Current
Average Current
Frequency
Active Power (Watt) P1 or P2 or P3
Active Power Interval (averaged over 1-60 minutes)
Reactive Power (VAR) Q1 or Q2 or Q3
Reactive Power Interval (averaged over 1-60 minutes)
Power Factor PF1 or PF2 or PF3
Apparent Power (Volts x Amps)

Testing Rebuilt Electric Motors

❑ A210 Power Meter – Motor Repair Shop

When a motor is received for service or rebuilding, this major electric motor rebuilding facility operates the motor and measures and records Watts, VAR, Power Factor plus other variables.

After the motor is rebuilt or serviced, they test the motor again and measure the same variables. This way they can demonstrate to their customer how much less energy the motor consumes and its higher operating efficiency. They can also establish a historical record of operating parameters for motors that are serviced regularly.



Power Meter Applications

❑ A210 or A230s kW-Hour or Watt-Hour Meter

Use an A210 or A230s Instead of a metering-grade energy meter to measure power consumption (Active Power) in kWh or Watt-hours.

The meters can be set up to measure and display readings with up to 8 digits. This is done by linking two of the three 4-digit displays to give 8-digit readings. Set-up of the **A210** is very easy with just 3 push buttons at the front of the meter.

It is easy set up for a single phase or 3-phase installations. PT and CT ratios can be programmed from the front panel. The power meter can easily be mounted in a NEMA enclosure, on a DIN rail, or in a panel.

Accuracy is sufficient for many monitoring applications where the cost of a revenue-grade power meter is not justified.

❑ A210 Inductive Furnace Power Factor Monitors

A major valve manufacturer monitors the Power Factor of their inductive heating furnaces with **A210** Power Meters. Electric energy consumption is optimized which lowers operating costs while at the same time maintaining product quality.

❑ A210 Glass Plant Power Consumption

A major float glass plant in California monitors electric energy consumption throughout their plant with **A210** Power Meters. They are mounted with DIN-rail adapters in locations where the electric supply lines enter the buildings.

❑ A210 or A230s for Sub-Metering

Both meters are designed to perform sub-metering (kWh) on an 8-digit display. The top 2 displays are combined in this function. The **A210** does sub-metering with an accuracy of ±1.0%. The **A230** and **A230s** do it with ±0.5% accuracy.

Typical applications are in a plant or shopping center to measure the energy consumption of individual buildings, tenants etc. The measuring function would be locked with the jumper setting at the back of the meter, which disables the front panel controls. With the optional EMMOD 201 module, the readings can also be transmitted via MODBUS. In most cases, the meters would be mounted in the optional NEMA 4 housing for protection.

A210 DIN Rail Installation

A210 NEMA Housing Installation

❑ A210 Kilowatt-Hours for City Lights

A Minnesota city uses **A210** Power Meters installed in sub-distribution panels throughout the downtown area to monitor the power consumption of Christmas lighting. This is for informational purpose only, not for billing. The meters also provide the city managers with information on efficiency of the various light sources installed throughout the downtown area.

The **A210** Power Meters are installed in weatherproof NEMA 4 housings with clear plastic cover and held by an aluminum bracket for mounting. They are set up to log the Active Power consumption (kWh) on the 8-digit display. The meters are set up to count 1 pulse per kWh.

The **A210** Power Meter has accuracy of ±0.5% for voltage and current and ±1.0% for Watt and Wh energy consumption. This accuracy is sufficient for monitoring applications.

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Sineax DME 400 LON Interface
Sineax DME 401 MODBUS Interface
Sineax DME 440 MODBUS Interface with 4 Analog Outputs
Sineax DME 406 PROFIBUS Interface
Sineax DME 424 2 Analog and 4 Digital Outputs
Sineax DME 442 4 Analog and 2 Digital Outputs
Sineax A200 Remote Display for DME Series Transducers

- **Accurate Measurement of Up to 47 Power System Variables**
- **Input Currents Up to 10 A and Voltages Up to 830 VAC**
- **Can be System-Powered Up to 230 VAC**
- **Energy Counters for Ah, kVAh, kWh and/or kVARh**

Specifications

Input Voltage	100-690 VAC nominal
Input Current	0-1 A, 0-5 A, 0-6 A, (10 A max.)
Input Waveform	Sinusoidal
Accuracy	Voltage/Current ±0.20%, Power ±0.25%
Frequency	50/60 Hz
Voltage Overload	480 VAC single phase, 830 VAC 3-phase
Current Overload	10 Amps
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC external or self

DME 400

Databus Output	LON Interface
Network Protocol	LONTALK®
Transmission Speed	78 kbit/sec.
Energy Counters	4 programmable: Ah, kVAh, kWh & kVARh

DME 401

Databus Output	MODBUS RS 485
Connection	Screw terminals, shielded cable, twisted pair
Transmission Speed	1200 to 9600 baud, programmable
Energy Counters	4 programmable: Ah, kVAh, kWh & kVARh

DME 440

Databus Output	MODBUS RS 485
Connection	Screw terminals, shielded cable, twisted pair
Transmission Speed	1200 to 9600 baud, programmable
Analog Outputs	4 isolated, 0-20 mA, 4-20 mA, 0-10 V
Energy Counters	4 programmable: Ah, kVAh, kWh & kVARh

DME 406

Databus Output	PROFIBUS-DP
Network Protocol	According to EN 50 170 standard
Energy Counters	4 programmable: Ah, kVAh, kWh & kVARh

DME 424

Digital Outputs	4 open collector, 100 ms min. pulse
Analog Outputs	2 isolated, 0-20 mA, 4-20 mA, 0-10 V
Energy Counters	4 programmable: Ah, kVAh, kWh & kVARh

DME 442

Digital Outputs	2 open collector, 100 ms min. pulse
Analog Outputs	4 isolated, 0-20 mA, 4-20 mA, 0-10 V
Energy Counters	2 programmable: Ah, kVAh, kWh & kVARh

A200

Communications	Connects to DME series via RS-232 cable
Mounting	Panel mount or DIN rail w. adapter 154 055
Display	Three 4 digit LED displays, 14 mm H

Electric Power

Model	Order Code	Interface	Digital Outputs	Analog Outputs	Energy Counters	Power Supply
DME 400	**142 191**	LON			4	24-60 VAC/VDC
DME 400	**138 398**	LON			4	85-230 VAC/VDC
DME 401	**146 523**	MODBUS			4	24-60 VAC/VDC
DME 401	**146 515**	MODBUS			4	85-230 VAC/VDC
DME 440	**142 183**	MODBUS		4	4	24-60 VAC/VDC
DME 440	**138 372**	MODBUS		4	4	85-230 VAC/VDC
DME 406	**146 896**	PROFIBUS			4	24-60 VAC/VDC
DME 406	**146 911**	PROFIBUS			4	85-230 VAC/VDC
DME 424	**142 167**		4	2	4	24-60 VAC/VDC
DME 424	**129 199**		4	2	4	85-230 VAC/VDC
DME 442	**142 175**		2	4	2	24-60 VAC/VDC
DME 442	**129 214**		2	4	2	85-230 VAC/VDC
Display						
A200	Remote Display for all DME Transducers, 96 x 96 x 46 mm, front panel IP 66					20-265 VAC/VDC
Programming Cable						
980 179	Programming Cable for all DME Transducers					

See technical data sheets for detailed specifications and ordering codes. Consult factory for ordering assistance or for non-standard products.

Synchronizing Generators

❑ G537 Phase Angle Difference Transducer

Any time electric power is supplied from land to a ship, the ship generator voltage and the land power line voltage need to be synchronized. The same is required for land-based generators when they are brought on line with the power grid.

Before and electric load can be applied to the supply lines, the phase angle difference must be measured. The measuring range for the phase angle difference can be from –175° up to +175°. The **G537** converts the phase difference to a 4-20 mA output for a display. As soon as an output signal of 12 mA is reached, the phase angle difference is zero and the electric load can be applied safely.

Wind-Powered Turbines

❑ P530 Active Power (Watt) Transducers
❑ DME 400 Series AC Power Transducers

Electric power generated by wind turbines needs to be measured. A **P530** Watt transducer would be suitable when only Watts are measured. A **DME 400 Series** model would be suitable when other variables such as Volts, Amperes, and Frequency are to be monitored. The output is wired to the control unit (PLC) and can be an analog signal, Modbus, Profibus, or LON-Works.

Multiple Parameter Measurements

❑ M563 Programmable AC Power Transducers
❑ DME 400 Series AC Power Transducers

Installing multiple-parameter power transducers saves substantially on the cost of wiring and installation, since input voltage and current is connected only once.

Outputs (4-20 mA or 0-10 V) can be programmed for measurements of Voltage, Current, Watts, Var, Power Factor, Frequency or other electric variables. Outputs can be via digital communications bus systems as well.

Power Generating Plants

❑ M563 Programmable AC Power Transducers
❑ U539 AC Voltage Transducers
❑ I538 AC Current Transducers
❑ F534 Frequency Transducers
❑ TV809 Isolation Amplifiers

A major power generation facility has installed approximately thirty **U539** Voltage, **I538** Current and **F-534** Frequency transducers as well as **M563** Programmable Multi-Transducers and **TV809** Isolation Amplifiers in their hydro-electric generating stations. The programmable **M 563** transducers measure multiple parameters, offer high flexibility and save substantially on the cost of wiring and installation.

API-Camille Bauer transducers hold up in tough applications where competitor's units often fail.

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Sineax P 530 Active Power (Watt) Transducer

- 3- or 4-Wire Balanced/Unbalanced or Single Phase
- 1 A or 5 A Sinusoidal Input Current at 100-690 VAC
- Unipolar, Bipolar or Live Zero Output
- Can be System-Powered Up to 230 VAC

Specifications

Input	0-1 Amp AC to 0-5 Amp AC
Input Waveform	Sinusoidal
Output	0-1 mA, to ±20 mA, 0-1 V to ±10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	60 Hz standard, 50 Hz optional
Burden	±15 V
Output Ripple	Less than 2% p-p
Overload	120% continuous
Response Time	300 milliseconds
Dielectric Test	4000 VAC
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC ext. or self

Model*	System	Hz	Power Supply
530-412____	3- or 4-wire 3ϕ Bal.	60	Specify
530-422____	3-wire 3ϕ Unb.	60	Specify
530-432____	4-wire 3ϕ Unb.	60	Specify
530-442____	Single Phase	60	Specify

*Specify Voltage, Current, Watt Output Range, Output Start, Output End, Power Supply.

530-4_____ Specify System Type, Hz, Voltage, Current, Watt Output Range, Output Start, Output End, Power Supply

See technical data sheet for ordering codes or consult factory.

Sineax Q 531 Reactive Power (VAR) Transducer

- 3- or 4-Wire Balanced/Unbalanced or Single Phase
- 1 A or 5 A Sinusoidal Input Current at 100-690 VAC
- Unipolar, Bipolar or Live Zero Output
- Can be System Powered Up to 230 VAC

Specifications

Input	0-1 Amp AC to 0-5 Amp AC
Input Waveform	Sinusoidal
Output	0-1 mA, to ±20 mA, 0-1 V to ±10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	60 Hz standard, 50 Hz optional
Burden	±15 V
Output Ripple	Less than 2% p-p
Overload	120% continuous
Response Time	300 milliseconds
Dielectric Test	4000 VAC
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC ext. or self

Model*	System	Hz	Power Supply
531-412____	3-wire 3ϕ Bal.	60	Specify
531-422____	3-wire 3ϕ Unb.	60	Specify
531-432____	4-wire 3ϕ Unb.	60	Specify
531-442____	Single Phase	60	Specify

*Specify Voltage, Current, Watt Output Range, Output Start, Output End, Power Supply.

531-4_____ Specify System Type, Hz, Voltage, Current, VAR Output Range, Output Start, Output End, Power Supply

See technical data sheet for ordering codes or consult factory.

Electric Power

Sineax M 563 Programmable Power Transducer with 3 Analog Outputs

- Monitor Any 3 Power System Variables
- 3- or 4-Wire Balanced/Unbalanced or Single Phase
- 1A/5A Input at 58-400 VAC$_{ph-n}$ or 100-690 VAC$_{ph-ph}$
- RS-232 Programmable

Specifications

Input	57.7-400 VAC phase to neutral 100-690 VAC phase to phase
Input Waveform	Sinusoidal
Outputs	0-1 mA, to ±20 mA, 0-1 V to ±10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	60 Hz standard, 50 Hz optional
Overload	120% of full scale rating
Dielectric Test	4000 VAC
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC ext. or self

Model*	Hz	Power Supply
563-421_____	60	24-60 VAC/VDC external
563-422_____	60	85-230 VAC/VDC external
563-424_____	60	85-230 VAC/VDC system powered

*For factory programming specify output A, B, C final value, power system type, input voltage, input current, CT or VT rating, measured variable for each output with range, start value, end value, output characteristics, linearity, and limit.
See technical data sheet for ordering codes or consult factory.

PRKAB 560 Programming Cables and Software

Sineax U 539 AC Voltage Transducer

- Input Voltage 0-50 VAC to 0-600 VAC
- Externally Powered or Output Loop Powered
- GL Approval for Shipboard Installations
- Compact Package for DIN-Rail Mounting

Specifications

Input	From 0-50 VAC to 0-600 VAC
Input Waveform	Sinusoidal
Output	0-1 mA to 4-20 mA, 0-1 V to 2-10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	50/60 Hz
Burden	Less than 2 VA full scale
Output Ripple	Less than 1.0% p-p
Overload	120% of full scale rating
Response Time	300 milliseconds
Dielectric Test	4000 VAC
Power Supply	115 VAC, 230 VAC, 24-60 VAC/VDC, Loop

Model	VAC Input	Output	Power Supply
539-41Z3B00	Specify	4-20 mA	12-32 VDC Loop
539-41Z2300	Specify	4-20 mA	115 VAC 50/60 Hz
539-41ZA300	Specify	0-10 V	115 VAC 50/60 Hz
539-41ZZ_00	Specify	Specify	Specify
Models with ±10% End-Point Adjustment			
539-41ZZ310	Specify	Specify	115 VAC 50/60 Hz

See technical data sheet for complete ordering specifications or consult factory.

Sineax U 543 Self-Powered AC Voltage Transducer

- Input Voltage 0-20 VAC to 0-600 VAC
- Power by Input Source Saves Wiring
- GL Approval for Shipboard Installations
- Compact Package for DIN-Rail Mounting

Specifications

Input	From 0-20 VAC to 0-600 VAC
Input Waveform	Sinusoidal
Output	0-1 mA to 0-20 mA, 0-1 V to 0-10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	50/60 Hz
Burden	Less than 2 VA full scale
Output Ripple	Less than 1.0% p-p
Overload	120% of full scale rating
Response Time	300 milliseconds
Dielectric Test	4000 VAC
Power Supply	Powered by input signal

Model	VAC Input	Output	Power Supply
543-4Z300	Specify	0-20 mA	By Input Signal
543-4ZA00	Specify	0-10 V	By Input Signal
543-4ZZ00	Specify	Specify	By Input Signal
With ±10% End-Point Adjustment			
539-4ZZ10	Specify	Specify	By Input Signal

See technical data sheet for complete ordering specifications or consult factory.

Sineax U 553 True RMS AC Voltage Transducer

- Input Voltage 0-20 VAC to 0-690 VAC
- Wide Range Power Supplies
- GL Approval for Shipboard Installations
- Compact Package for DIN-Rail Mounting

Specifications

Input	From 0-20 VAC to 0-690 VAC
Input Waveform	Sinusoidal, square, distorted
Output	0-1 mA to 4-20 mA, 0-1 V to 2-10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	50/60 Hz or optional 400 Hz
Burden	Less than 1 VA full scale
Output Ripple	Less than 0.5% p-p
Overload	120% of full scale rating
Response Time	300 milliseconds standard, 50 msec optional
Dielectric Test	4000 VAC
Power Supply	85-230 VAC/VDC, 24-60 VAC/VDC, int. or ext.

Model	Hz	Input	Output	Power Supply
553-41Z2110	50/60	Specify	4-20 mA	85-230 VAC/VDC
553-41Z2210	50/60	Specify	4-20 mA	24-60 VAC/VDC
553-41ZA110	50/60	Specify	0-10 V	85-230 VAC/VDC
553-41ZA210	50/60	Specify	0-10 V	24-60 VAC/VDC
553-43ZZ__0	400 Hz, Specify Input, Output, Response Time, Power			

See technical data sheet for complete ordering specifications or consult factory.

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Sineax I 538 AC Current Transducer

- Input Current 0-1 A or 0-5 A, ±20%
- Powered by 24-400 VAC, 24 VDC, or Output Loop
- GL Approval for Shipboard Installations
- Compact Package for DIN-Rail Mounting

Specifications

Input	0-1 Amp AC or 0-5 Amps AC
Input Waveform	Sinusoidal
Output	0-1 mA to 4-20 mA, 0-1 V to 2-10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	50/60 Hz
Burden	Less than 5 mV/A
Output Ripple	Less than 1.0% p-p
Overload	200% of full scale rating
Response Time	300 milliseconds
Dielectric Test	4000 VAC

Model	Input	Output	Power Supply
538-41A3B00	0-1 A	4-20 mA	12-32 VDC Loop
538-41B3B00	0-5 A	4-20 mA	12-32 VDC Loop
538-41ZZ300	Specify	Specify	115 VAC 50/60 Hz
538-41ZZ_00	Specify	Specify	Specify
Models with ±10% Input Span Adjustment			
538-41ZZ310	Specify	Specify	115 VAC 50/60 Hz

Sineax I 542 Self-Powered AC Current Transducer

- Dual Input Current Ranges 1A/5A or 1.2A/6A
- Power by Input Source Saves Wiring
- GL Approval for Shipboard Installations
- Compact Package for DIN-Rail Mounting

Specifications

Input (2 Ranges)	0-1 A and 0-5 A or 0-1.2 and 0-6 A
Input Waveform	Sinusoidal
Output	0-1 mA to 0-20 mA, 0-1 V to 0-10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	50/60 Hz
Burden	Less than 2.5 VA
Output Ripple	Less than 1.0% p-p
Overload	120% of full scale rating
Response Time	300 milliseconds
Dielectric Test	4000 VAC

Model	Input	Output	Power Supply
542-41300	1A/5A	0-20 mA	By Input Signal
542-42300	1.2A/6A	0-20 mA	By Input Signal
542-41A00	1A/5A	0-10 V	By Input Signal
542-42A00	1.2A/6A	0-10 V	By Input Signal
542-49Z00	Specify	Specify	By Input Signal
Models with ±10% Input Span Adjustment			
542-41Z10	1A/5A	Specify	By Input Signal
542-42Z10	1.2A/6A	Specify	By Input Signal

See technical data sheet for complete ordering specifications or consult factory.

Electric Power

Sineax I 552 True RMS AC Current Transducer

- Dual Input Current Ranges 1A/5A or 1.2A/6A
- Wide Range Power Supplies
- GL Approval for Shipboard Installations
- Compact Package for DIN-Rail Mounting

Specifications

Input (2 Ranges)	0-1 A and 0-5 A or 0-1.2 and 0-6 A
Input Waveform	Sinusoidal, square, distorted
Output	0-1 mA to 4-20 mA, 0-1 V to 2-10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency	50/60 Hz standard, 400 Hz optional
Burden	Less than 1 VA
Output Ripple	Less than 0.5% p-p
Overload	120% of full scale rating
Response Time	300 milliseconds standard, 50 msec optional
Dielectric Test	4000 VAC

Model	Hz	Input	Output	Power Supply
552-4112110	50/60	1A/5A	4-20 mA	85-230 VAC/VDC
552-4122210	50/60	1.2A/6A	4-20 mA	24-60 VAC/VDC
552-411A110	50/60	1A/5A	0-10 V	85-230 VAC/VDC
552-412A210	50/60	1.2A/6A	0-10 V	24-60 VAC/VDC
552-439Z__0	400 Hz, Specify Input, Output, Response Time, Power			

See technical data sheet for complete ordering specifications or consult factory.

Sineax F 534 Frequency Transducer
Sineax F 535 Frequency Difference Transducer

- Sinusoidal, Distorted or Square Waveforms
- 10-690 VAC Input Voltages
- 10 to 1500 Hz Measurement Range
- Can be System-Powered Up to 230 VAC

Specifications

Input	10-230 VAC or 230-690 VAC
Input Waveform	Most with dominating fundamental wave
Output	0-1 mA, to ±20 mA, 0-1 V to ±10 V
Accuracy	Class 0.5, ±0.3% typical
Frequency F 534	58-62 Hz standard, 10-1500 Hz optional
Frequency F 535	57.5-62.5 Hz standard, 10-1500 Hz optional
Burden	Less than 1.0 VA
Output Ripple	Less than 0.5% p-p
Overload	120% full scale voltage
Response	2, 4 (std), 8, or 16 periods of input frequency
Dielectric Test	4000 VAC
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC ext. or self

Frequency	Hz	VAC	Output	Power Supply
534-4152410	58-62	10-230	4-20 mA	85-230 VAC/VDC int.
534-4252110	58-62	230-690	4-20 mA	85-230 VAC/VDC ext.
534-415A410	58-62	10-230	0-10 V	85-230 VAC/VDC int.
534-425A110	58-62	230-690	0-10 V	85-230 VAC/VDC ext.

534-4_____0 Specify Hz, Input VAC, Output, Response Periods, Power

Δ Frequency	Hz	VAC	Output	Power Supply
535-4152410	57.5-62.5	10-230	4-20 mA	85-230 VAC/VDC int.
535-4252110	57.5-62.5	230-690	4-20 mA	85-230 VAC/VDC ext.
535-415A410	57.5-62.5	10-230	0-10 V	85-230 VAC/VDC int.
535-425A110	57.5-62.5	230-690	0-10 V	85-230 VAC/VDC ext.

535-4_____0 Specify Hz, Input VAC, Output, Response Periods, Power

Sineax G 536 Phase Angle / Power Factor Transducer
Sineax G 537 Phase Angle Difference Transducer

- Sinusoidal, Distorted or Square Waveforms
- 10-690 VAC Input Voltages, 10-400 Hz
- Single Phase or 3 Phase Balanced Systems
- Can be System-Powered Up to 230 VAC

Specifications

Input	10-690 VAC, 0.5-6 A
Input Waveform	Most with dominating fundamental wave
Frequency	60 Hz standard, 10-400 Hz optional
Range	1-ind-0-cap-1-ind-0-cap-1 or -180°-0-180°el
Output	0-1 mA, to ±20 mA, 0-1 V to ±10 V
Accuracy	Class 0.5, ±0.3% typical
Burden	Less than 1.0 VA
Output Ripple	Less than 0.5% p-p
Overload	120% full scale voltage
Response	2, 4 (std), 8, or 16 periods of input frequency
Dielectric Test	4000 VAC
Power Supply	24-60 VAC/VDC, 85-230 VAC/VDC ext. or self

See technical data sheet for ordering codes or consult factory. Please specify:

536-4_____
- Phase angle or Power Factor Measurement
- Single or Phases (L1, L2, L3) to be Measured
- Hz
- Input VAC
- Input Current
- Measuring Range
- Output Signal
- Response Periods
- Power Supply

See technical data sheet for ordering codes or consult factory. Please specify:

537-4_____
- Hz
- Input VAC
- Input Current
- Measuring Range
- Output Signal
- Response Periods
- Power Supply

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CR, CRR — Rotational Speed Monitors, Relay Output
CRA, CRRA — Rotational Speed Monitors, Relay and Analog Outputs

- Input Range 0.01 Hz to 20,000 Hz
- Accepts Hall and Magnetic Sensors
- Programmable Measuring Units
- Programmable Outputs
- Compact Package for DIN-Rail Mounting

CE

General Specifications

Frequency Range	0.01 Hz to 20,000 Hz, 36 V max.
Units	Hz, pulses/min, pulses/hr, rpm, in/sec, in/min, in/hr, ft/sec, ft/min, ft/hr, mph, meters/sec, meters/min, meters/hr, km/hr
Pulses per Unit	1 to 10,000
Input Averaging	1-255 pulses depending on relay 1 setting
Accuracy	±0.03% of full scale ±1 digit
Temperature Coeff.	±0.01% of full scale
Power	18 to 36 VDC, less than 160 mA

Sensor Specifications

Types	PNP, NPN, or sine wave, 2- or 3-wire		
Minimum Pulse	20 µs duration		
Sensor Supply	12 VDC, 60 mA max.		
Trigger Level Ranges	NPN & PNP:	2.5 to 6 V	10 kΩ imp.
	Sine wave:	1.0 to 2.5 V	100 kΩ imp.
	Others:	0.2 to 0.7 V	100 kΩ imp.
Trigger Level Defaults	NPN & PNP:	6 V	
	Sine wave:	2.5 V	
External Start Input	>2.5 to 36 V to start, <1.0 V to stop		

Relay Output

CR and CRA	One SPDT relay
CRR and CRRA	Two SPDT relays
Response Time	<20 milliseconds + measuring period
Relay Action	Programmable Hi/Lo and normal/reverse
Contact Rating	5 A @ 250 VAC max. resistive load or 2 A @ 42 VDC max. resistive load
Hysteresis	Adjustable 1 to 85% of full scale units
Alarm Reset Delay	Adjustable 0-99.9 seconds Relay 1, Hi alarm mode only
Alarm Trigger Delay	Adjustable 0-99.9 seconds Relay 1 or 2, Lo alarm mode only

Analog Output

Ranges	0-20 mA or 4-20 mA
Accuracy	±1.0% of full scale
Maximum Burden	400 Ω
Temperature Coeff.	±0.02% of full scale

Environmental and Mechanical Specifications

Operating Temperature	–25 to 70°C (–13 to 158°F)
Protection (IEC 529)	IP 20 (installation in enclosure)
Vibration (IEC 68-2-6)	0.7 G @ 1-100 Hz
Dimensions	43 mm W x 70 mm H x 114 mm D
Material	UL94-V-0 polycarbonate
Mounting	Standard 35 mm DIN-rail

Models

Model	Part Number	Output	Power
CR	5810.100	1 Relay	18-36 VDC
CRR	5810.200	2 Relays	18-36 VDC
CRA	5820.100	1 Relay, Analog Output	18-36 VDC
CRRA	5820.200	2 Relays, Analog Output	18-36 VDC

Use Commonly Available Non-Contact Sensors

Hall Effect
Differential Hall Effect
Magneto-Inductive
Magneto-Resistive
Inductive Oscillatory
2- or 3-Wire

Contact us for your high quantity and OEM sensor needs

GL Marine Versions Available

Applications

The RheinTacho programmable speed monitors measure the rotational speed of machines and systems. It detects the signals of most non-contact speed and motion sensors such as Hall effect, magneto-inductive, magneto-resistive and others. If the measured value exceeds or falls below a preset limit value, the alarm relay is automatically switched. The following types of conditions are typically monitored.

Over speed monitoring with reset switching delay

An over speed condition triggers the alarm relay. Once the speed has fallen below the hysteresis value and the reset time delay has expired, the alarm relay resets to normal.

Under speed monitoring with run-up delay

An under speed condition triggers the alarm relay. Monitoring does not start until after the signal of the external start trigger has de-energized and the starting delay time has elapsed.

Remote speed monitoring using the analog output

The analog out put can be used to remotely monitor machinery rotational speed. This combined with the alarm functions provides an economical solution for your speed monitoring applications.

Industry Applications

The speed monitor has numerous applications in many areas of technology, whether it be for protection of personnel, machines or manufactured products, to ensure that a plant operates at optimum efficiency, or for speed-dependent switching of system functions in a process.

Machinery Applications

Internal combustion engines in power station and marine applications

Gas, water and wind turbines

Pumps, mixing plants, and conveyor systems

Paper, foil, and textile production plants

Machine tools, and processing plants

RHEIN TACHO

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SPEED