

CALEC[®] energy master

The benchmark in energy measurement



District heating and cooling:

- New tariff structures for optimum plant management
- Secure investment with long-term stability
- Type approval to EU/2004/2 (MID) and to PTB K 7.2 (cooling, combined heating and cooling)

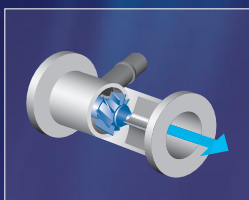
Heating and air conditioning in buildings:

- Conventional heating, solar heating, air conditioning, cooling
- Interfaces to building control systems (12 analogue or digital signals, 2 x M-Bus)
- For water and other (e.g. glycol-based) heat transfer media

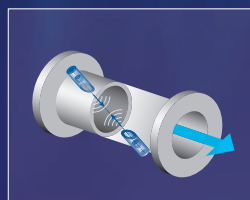
Industrial energy measurement:

- Process temperatures down to -50 °C
- High temperature measurement up to +550 °C
- Industrial heat transfer media (glycol, oil, steam, etc.)

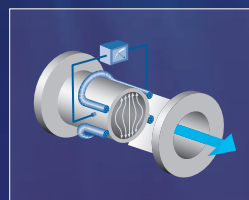
State-of-the-art energy measurement: accurate flow measurement for every application



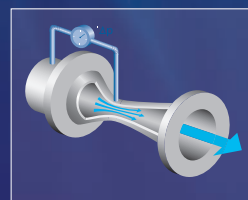
Turbine flowmeters



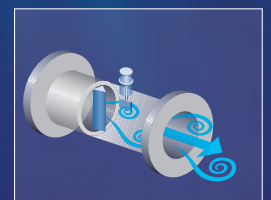
Ultrasonic flowmeters



Electromagnetic flowmeters



Differential pressure flowmeter



Vortex flowmeters

CALEC® energy master



New challenges for energy supplies

Energy reserves available to us are becoming ever more scarce and the consequent increase in energy prices are being passed on to the consumer. This is an enormous challenge in the way energy is supplied. There are also costs for CO₂ emissions and other aspects to consider in order to limit the production of greenhouse gases and reduce the effects of climate change.

All of these point to one of the most important energy resources available and that is how to save energy since it benefits the economy, causes no pollution and requires no new power plants. To use this potential in savings, every technique must be applied to optimise energy use and implement energy-efficient control systems.

The solution - CALEC® energy master

With CALEC® energy master you can rise to these modern-day challenges in energy measurement.

CALEC® energy master meets the highest standards in accuracy and long-term stability and is equipped with all the necessary interfaces for transmitting data to systems involved in building control, energy optimisation and consumption.

New tariff structure for district heating and cooling

Calibrated or CE-compliant power measuring devices are a key investment for energy suppliers. To protect these investments, reliable, long-term measurement devices are especially important. Measuring points with a high-energy throughput means that even small measurement errors can result in a significant loss in earnings. Air conditioning circuits with marginal temperature differences require particularly accurate temperature measurement.

Losses can also be found even in the energy supply system itself. For a system to be working efficiently the consumer should take out as much energy from the system as possible. Return temperatures that are too high or too low result in additional costs from increased pumping and lower efficiency especially with cooling operations. It is often the case that limit values for return temperatures and output are set down in the contract but never monitored.

CALEC® energy master allows not only the monitoring of output and return temperature but can also apply individually customised tariffs. These create an economic incentive to increase the efficiency of operating systems. CALEC® energy master is a high performance meter with functions such as tariffs dependent on return temperature or weighted deviations from the programmed return temperature.

The benchmark in energy measurement

Outstanding features

- Protected investment with its high accuracy and long-term stability
- Easy to operate with plain text in a language you select
- For wall and cabinet mounting and with detachable display
- Energy measurement for heating, cooling, air conditioning and solar-powered systems
- High-grade connection to systems for control and readout with standard process signals and two M-Bus interfaces
- Tariff structures can be used to optimise district heating or cooling networks
- Two billing date readings and 100 logger readings per meter
- Calibration and daily logbook with extensive diagnostic functions
- Suitable for special heat carriers (e.g. water with antifreeze admixtures or oil) with automatic enthalpy correction

Functions and features

Modular design

- For optimum settings to the application
- Modules for mounting in protective housing or standard rail

Applications

- Heating or cooling meter and combined functions
- Flow processor or transmitter

Temperature measurement

Highly accurate temperature measurement from -50 to +550 °C with Pt 100 sensors or temperature transmitters with 0/4 - 20 mA signal

Calculation functions

Heat energy (enthalpy differential), volume, mass, power, flowrate, density, K-factor, temperature difference



Tariffs

- Max. 12 registers for tariffs/premium meters, e. g. related to return temperature
- Calculating the return energy or deviation from agreed return temperature

Special functions

- Air conditioning (combined heating/cooling meter with automatic changeover)
- Low-flow suppression when falling below the minimum temperature difference
- Flow inversion
- Parallel-switched flow transmitter (e.g. summer / winter operation)
- Measurement in open systems (return flow different from forward flow)
- Special functions when using up to three calculating units

Heat transfer data

- Flow measurement for water to EN 1434
- List of common heat transfer media (glycol) and one specific (programmable) heat transfer fluids, running calculation of values including special heat transfer media
- Selection of heat transfer media and on site adjustment of concentration

Wall and cabinet mounting

CALEC® energy master is available in two versions:

- In a rugged dust-proof and water-proof housing (IP 54) for CE-approved measuring points, for wall or rail mounting
- As a block of modules for mounting on a standard rail. The display can be detached and installed in a control panel.



Universally adjustable input/output signals

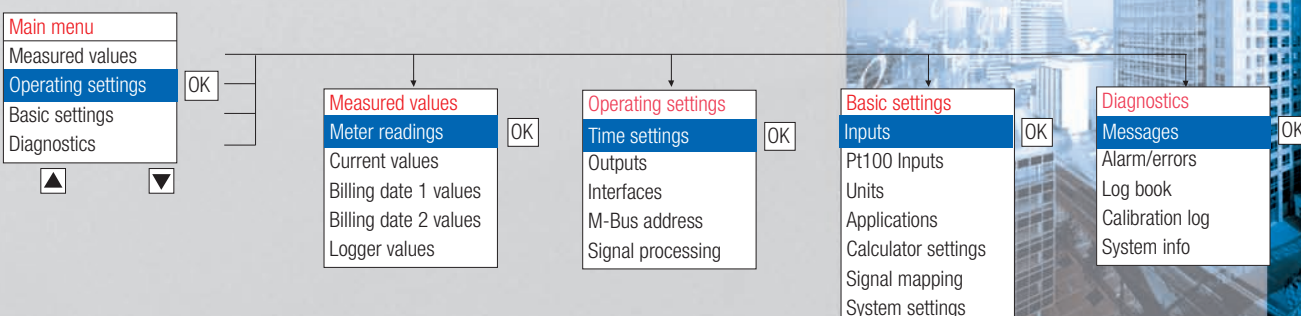
- Up to eight input signals, 12 output signals and two communications interfaces (M-Bus)
- Inputs for digital (pulsed), analogue or PFM signals
- Outputs for digital, frequency or analogue signals (0/4 - 20 mA)
- Internal or external auxiliary power supply of sensors
- Temperature measurement with paired Pt100 sensors with a 2, 3 or 4-wire connection or 0/4 - 20 mA signal
- All connections with plug-in screw terminals

Easy to operate with a simple display

- Point matrix with backlight
- Four lines of plain text with lines for headings and symbols
- Language selected by the operator
- Colour change backlight on error
- Clear operation menu

All settings can be carried out on site. The AMBUS® Win II software can also be operated using optical interfaces (IEC 870-5 or IrDA)

Operation menu with plain text



The benchmark in energy measurement

Optimising and controlling energy consumption in buildings

The heating, air conditioning and cooling of buildings are responsible for a significant proportion of energy consumed and any increase in energy efficiency is thus of critical importance. Experience shows that between 5 % and 20 % of energy use can be saved by simply optimising control systems and by changing the way people use energy. Proper investment can lead to even greater savings.

Consequently the EU directive on energy-saving measures for thermal insulation and technologies for buildings means that energy certificate is required for

- **New constructions and major modernization work**
- **Selling, leasing or renting**
- **Public service buildings with thriving public access**

Monitoring and optimising energy use are important ways to improve and improve the energy balance of a building. CALEC® energy master is the ideal meter to provide accurate measurements and solutions for specific requirements with its two M-Bus interfaces for transferring data to the building control system and billing systems.

Optimising energy for industry

There are even more challenges to face when optimising energy use in industrial buildings. These include specific product cost accounting and data acquisition on the amount of energy.



CALEC® energy master has a measuring range from -50 to +550 °C and can be used for cooling applications as well as for high temperatures when using the right heat transfer media.

In addition to mechanical, magnetic-inductive and ultrasonic flowmeters, vortex and differential pressure-based transmitters (sensors, orifice plates, nozzles, Venturi flowmeters) can also be used.

Find out more about the new CALEC® master applications.



Technical specifications

| Housings and modules | Version with protective housing | Version without protective housing |
|--|--|---|
| Mounting |  rail or wall |  rail |
| Ingress protection to EN 60529 | IP 54 | IP 20 |
| Dimensions of housing B x H x D | 140 x 202 x 83 mm | 17.5/22.5 x 117.4/129.5 x 63.5 mm |
| Max. No. of modules | 6 - 7, each with 1 CPU und 1 power pack Max. 2 communication modules | 16, each with 1 CPU and 1 power pack Max. 2 communication modules |
| Power supply | Power pack module 100 - 240 VAC | Connect module 24 VDC |
| Nominal voltage | 100 - 240 VAC +10 % - 14 % | 24 VDC, ±5 % |
| Temperature measurement | CPU module or input module each with 2 Pt 100 inputs | |
| Temperature measurement range and error | -50...+550 °C | Approval 1...200 °C Typical ≤±0.005 °C |
| Temperature difference: | 0...550 K | Approval 3...199 K (error limits are to 1K) |
| Genauigkeit ΔT (Ta = 5...55 °C) | Typical ±0.005 K | |
| Temperature sensor type | Pt 100 (IEC 751, paired acc. to EN 1434), 2-, 3- or 4-wire | |
| Resolution A/D transformer temperature | 24 Bit | |
| CPU module with 2 Pt 100 inputs | Central computer unit | |
| Data backup on mains power failure | EEPROM >10 years | |
| Data logger | Ring memory, 100 meter readings Intervals: 15, 30 and 60 min, 1 day, 1/2 month (1st and 15th), 1 month | |
| Billing days | 2 days, date adjustable | |
| Optical interface | IrDA V1.0, 57600 baud, M-Bus protocol | |
| Measurement and evaluation cycle | 1 second | |
| Input module 2 x pulse/analogue | 2 universal digital, frequency or analogue inputs | |
| Pulse and frequency input | Class IB, IC, ID, IE acc. to EN 1434, adjustable, frequency signal (PFM) 0...10 kHz | |
| Analogue input | Measuring range 0/4...20 mA, accuracy 0.025 % of full scale | |
| Transducer power supply | 6, 8 or 24 VDC, adjustable, max. 25 mA, short-circuit proof | |
| Output module 2 x relays 24 V, analogue | 2 universal digital or analogue outputs | |
| Type of output, adjustable | Relay functions: pulse / status / limit value 1 / limit value 2 / alarm Analogue functions: 0/4...20 mA | |
| Relay output | Max. contact voltage max. 24 VDC Frequency range 0...50 Hz, Pulse width 10 ms, 50 ms, 250 ms, 1 s, adjustable, Duty cycle 50 % | |
| Analogue output | Current range 0...20 mA or 4...20 mA Accuracy 0.1 % of full scale, Drift 50 ppm / K | |
| Galvanic separation | Max. 50 V | |
| Transducer power supply | 24 VDC, max. 25 mA, short-circuit proof | |
| Output module, 2 x relays 240 VAC | galvanically isolated, electromechanical relays | |
| Contact voltage, current | Max. 250 VAC, 24 VDC, max. 1A | |
| Frequency, pulse width | Max. 0.1 Hz, min. 0.5 s | |
| Lifespan | >10 ⁷ switching cycles with resistive load | |
| Isolation voltage | 1 kV between connectors | |
| Display module | Alphanumeric, LCD point matrix, backlit, flashing red on error | |
| Remote mounting | Max. 100 m with Remote Display Adapters (RDA) | |
| Optical interface (display module) | IEC 870-5, 300, 2400 or 9600 Baud, M-Bus protocol acc. to EN 13757-2 | |
| M-Bus module | M-Bus interface EN1434-3, 2007 | |
| Transmission rates | 300, 2400, 9600 Baud | |
| Configuration software | AMBUS® Win II (read, configure, save) for MS-Windows XP or Vista | |
| Approvals | According to 2004/22/EC (MID) and PTB K 7.2 (cooling, combined heating and cooling) | |

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