



Edition 3/2011

# FRAKO News

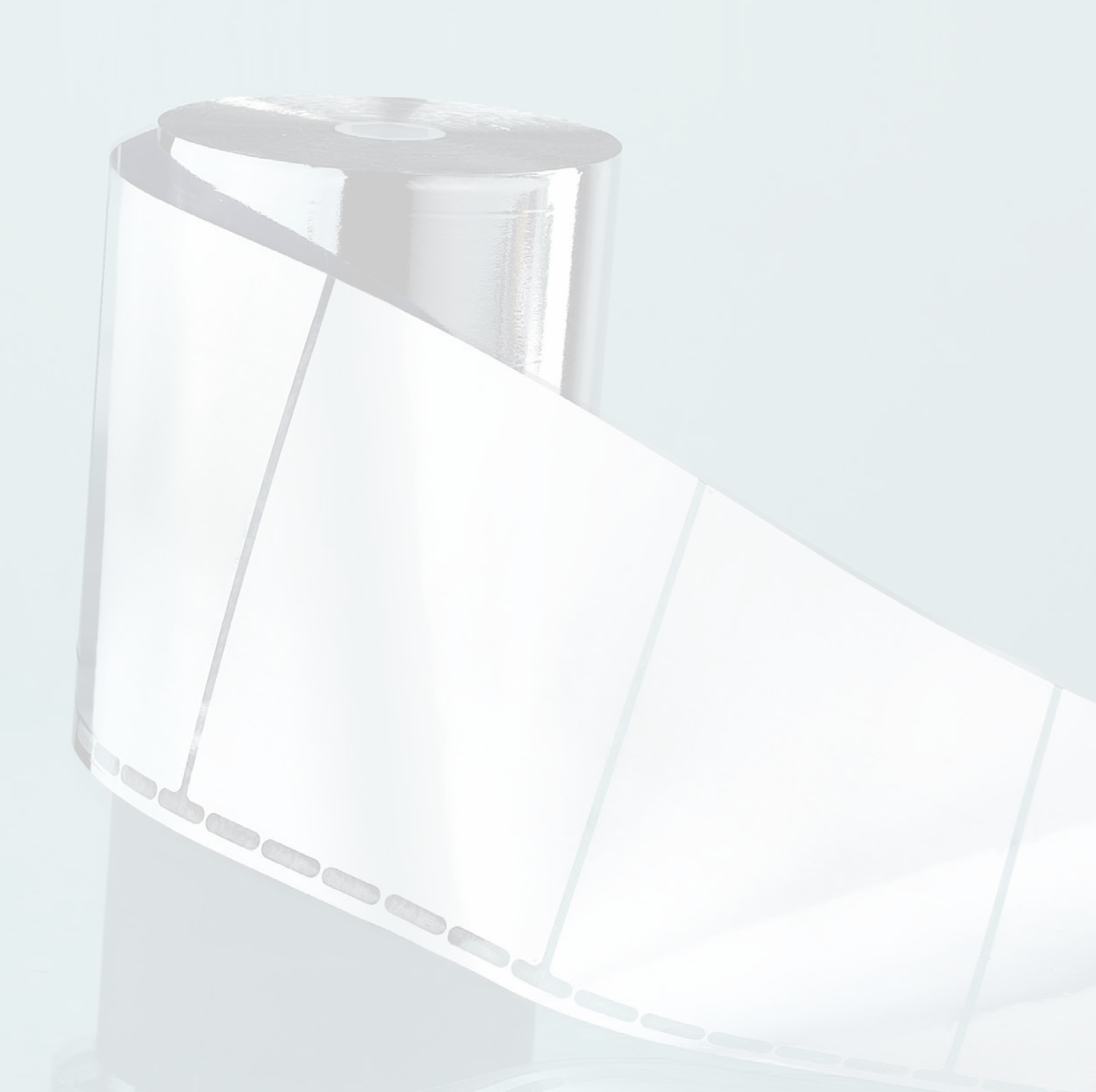
Magazine for clients of **FRAKO** Kondensatoren- und Anlagenbau GmbH

# Happy New Year

# 2012



It's all about saving your money!





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## **FRAKO enjoys two-digit growth in 2011 despite supply-side shortages!**

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Dear Readers,

I am happy to report that we were able to continue the very positive developments in our business in the first quarter of 2011 despite severe shortages of materials, particularly where electronic components and the film for our capacitors were concerned. Buying materials for stock in good time and operating an optimized logistics system helped us to alleviate the situation and meet customer demand. It was not easy, of course, but we succeeded!



My heartfelt thanks go out to all FRAKO employees, who ensured our success by their personal commitment, also to our supportive customers, who on more than one occasion showed patience and understanding for our situation, and last not least to our suppliers, whose flexibility helped us to win the day.

Throughout the entire year, the manufacture of capacitors was running close to the limits of our production capacity. Although new investment in manufacturing facilities was initiated well in advance, it could not be implemented until the end of the year. This will, however, make an effective contribution to our ongoing growth

from January 2012.

A lively demand for Energy Management Systems and instruments could at times only be met in fits and starts, owing to the acute supply-side shortages of electronic components. After the summer months, however, the availability situation returned to normal. The current public debate on energy efficiency and the need to save energy, boosted by the decision of the German federal government to phase out nuclear power generation, has helped FRAKO to market its Energy Management Systems. Our highly practical approach in identifying potential options for reducing power consumption, developing energy-saving concepts, putting them into effect and subsequently monitoring their efficacy has proved a



convincing argument and aroused a great deal of interest. The future for this sector of our business looks very promising.

Another topical subject that is dampening the ardour of some investors is the current crisis over sovereign debt and the fate of the euro. This will probably inhibit investment in the first quarter of 2012, which will also impact on our branch of industry. Our aim is to counteract this through our own special business momentum, which will make great demands on all of us in terms of creativity, courage and diligence. This, however, is a challenge that FRAKO will take up with its usual verve and commitment.

We can therefore look to the future with unbending optimism as we pursue our corporate goals.

I wish you and your families a peaceful, relaxed and enjoyable festive season and hope that the New Year brings you health, happiness and personal fulfilment.

My best regards,

Peter Herbst





## Well-equipped for the future

### New winding machine for capacitor manufacture at FRAKO

2011 was an outstanding year for our power capacitors. The manufacturing machinery was fully utilized over the whole year, with our production lines reaching their capacity limits on several occasions.

2011 was an outstanding year for our power capacitors. The manufacturing machinery was fully utilized over the whole year, with our production lines reaching their capacity limits on several occasions.

The continual increase in demand for capacitors called for more manufacturing potential to be created.

It was therefore necessary to invest in new production equipment.

On 2 December 2011 this finally came to fruition.

A second Metar Metronic II winding machine was started up.

The commissioning of this new winding machine also means that FRAKO is ideally equipped for the trend to using thinner films in the manufacture of capacitors.





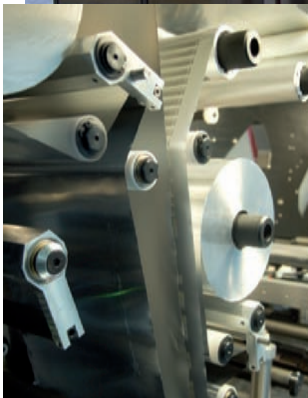
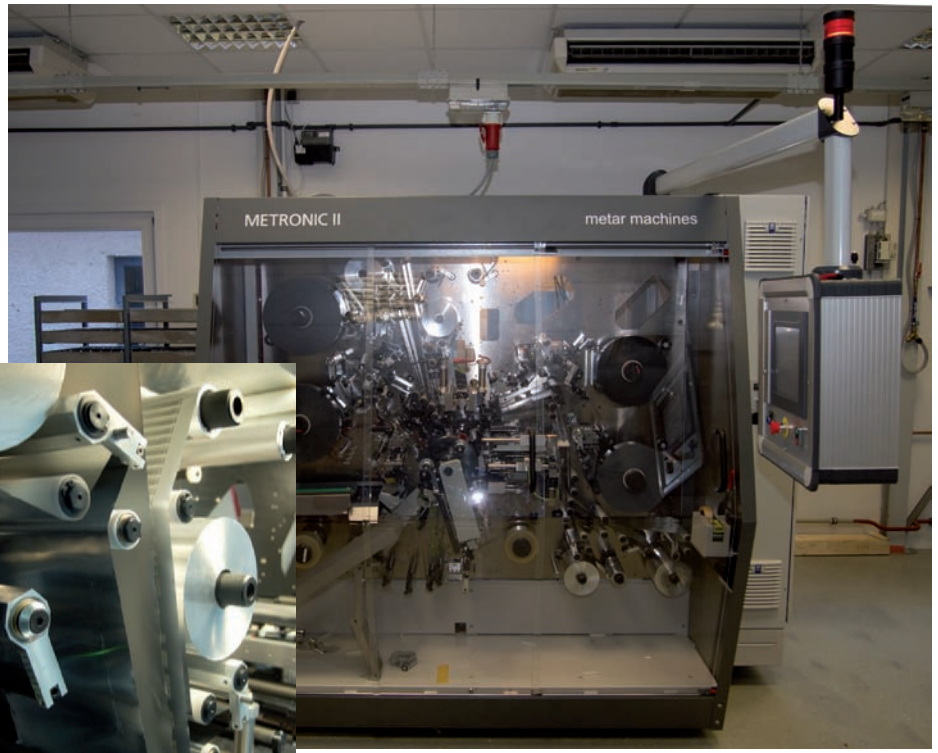
With FRAKO's acquisition of a Metar Metronic I machine in 1997 the foundation stone was laid for this modern method of automated capacitor coil manufacture.

Production capacity was then expanded again in 2006 with the first Metar Metronic II machine.

The purchase of a second Metar Metronic II winding machine in 2011 reflects the trend towards an increasingly more efficient and optimized manufacture of capacitor coils.

These three winding machines now ensure that production can always meet demand even when the proportion of 85 mm diameter coils continues to increase.

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Hans-Peter Edelsbacher



# FRAKO ENERGY MANA

## Energy Management – an overview

A FRAKO Energy Management System (EMS) provides the customer with information on energy consumption and other process data, while at the same time parts of the system are active in saving energy in the background.

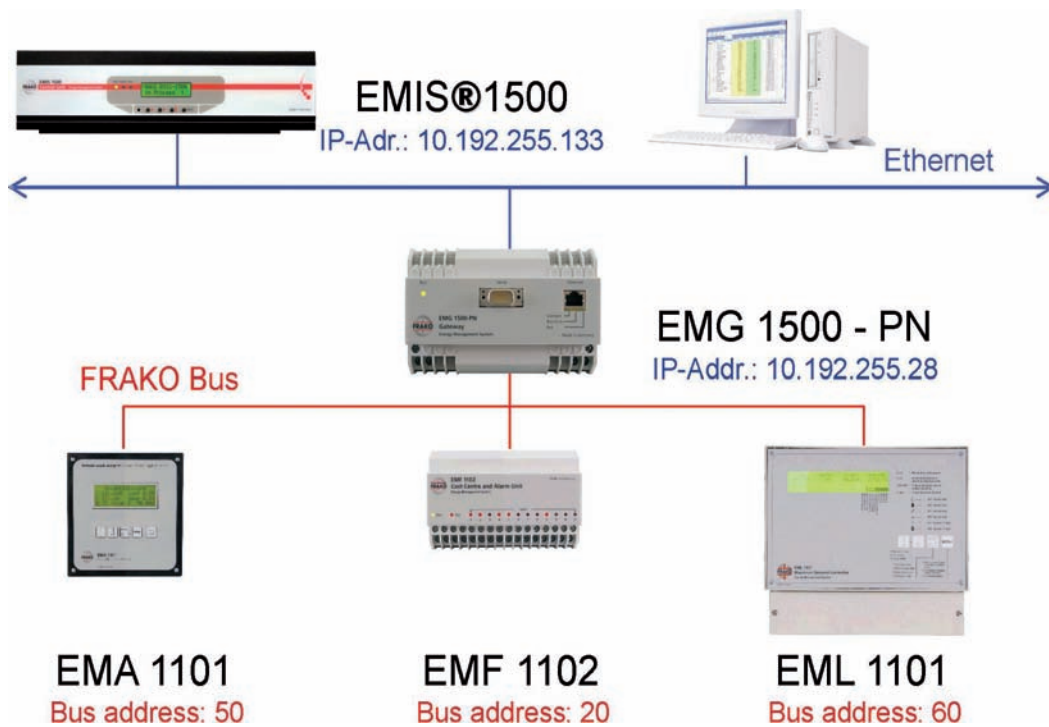


Fig. 1: Typical architecture of a small EMS

The latest generation of the system can make use of Ethernet connections and incorporates a fully fledged alarm management system. Figures 1 and 2 below show the typical architecture of a small EMS:

**In the beginning were three domains...**

The FRAKO Energy Management System was created some twenty years ago and featured three domains mainly concerned with electrical

energy:

1. Maximum demand control
2. Power factor correction
3. Supply network monitoring and analysis

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For the first two of these domains EM instrumentation is available that achieves direct savings by reducing the respective charges on electricity bills:

1. Maximum demand control: The costs for demand peaks (often charged as kW per month) are greatly reduced. The payback period for this investment is usually somewhere between six and eighteen months.
2. Power factor correction: The costs for reactive energy (often charged as kVArh over and above a specified level) are reduced to zero: Typical payback periods in this case are eighteen months to three years.
3. Supply network monitoring and analysis: This does not bring about any direct savings on electricity bills, since poor power quality is not (yet) penalized by the power supply and distribution companies. Nevertheless, the monitoring of network power quality has been a very important issue for

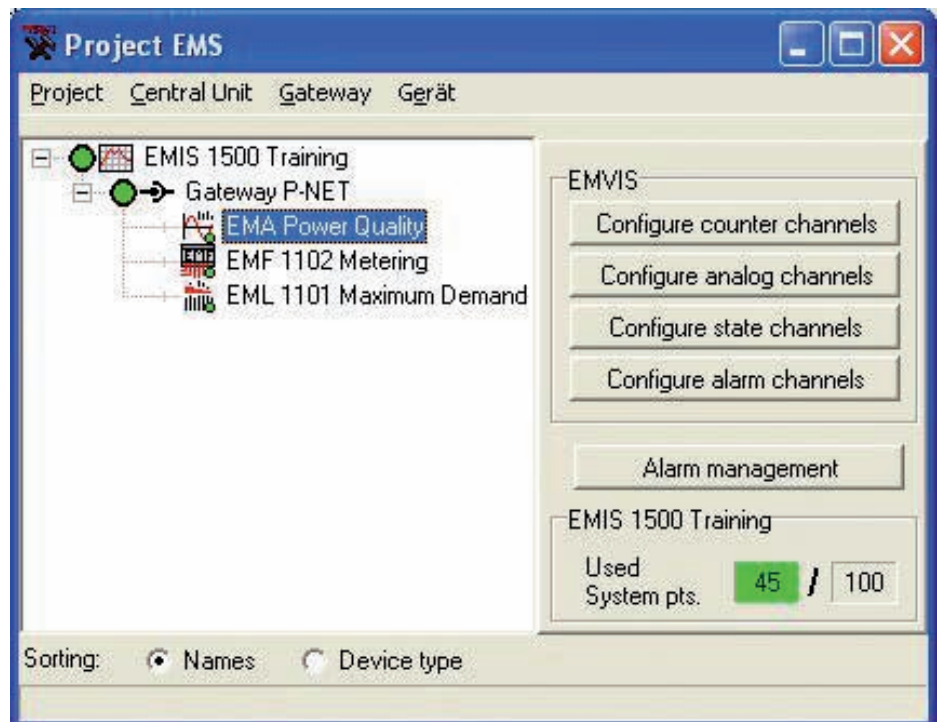


Fig. 2: Associated system tree in the EM software

many years. Early alarms, for example, protect the customer from system malfunctioning, which can sometimes involve heavy losses if production has to be shut down.

## The fourth domain: Monitoring the consumption of electrical energy and other utilities

The consumption of energy, metered in kWh, is of course a major item on every electricity bill, even those for small households. The fourth domain in the FRAKO Energy Management System is concerned with these costs

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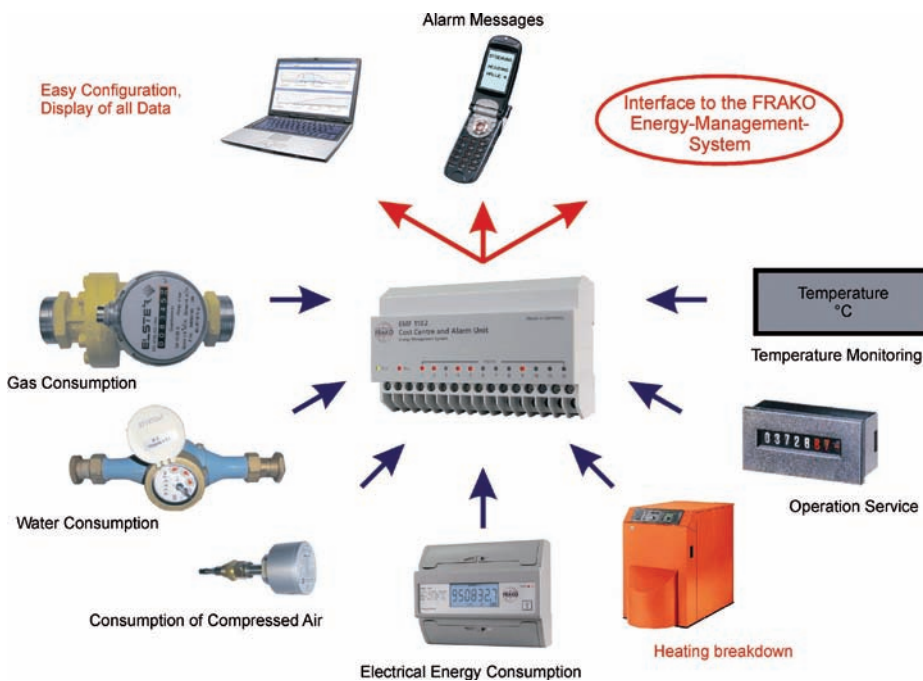


Fig. 3: The EMF 1102 Cost Centre and Alarm Unit can be connected to meters with pulse output and other instruments with volt-free contacts.

and is often referred to as 'cost allocation'.

FRAKO decided upon a very flexible technology for this domain: meters with a pulse output (S0 standard output interface), available as standard instruments for all possible utilities such as electricity, gas, water, compressed air, etc. At the FRAKO side of the

interface it is always pulses that are processed, so that consumption (e.g. in kWh) and consumption rate (e.g. in kW) are displayed both as momentary and as historical values.

With this facility the customer can carry out submetering of electrical energy and other utilities and present the results as, for example, a monthly report. Fig. 4 shows a monthly report with costs for the consumption of and maximum demands for electrical energy, natural gas and water in the form of a table. These values are calculated from readings made every quarter of an hour by hundreds of submeters on the site. The readings are accessed from an SQL database, included in the scope of supply of EMIS 1500 Central Units.

The system can now also be used to display analogue values received as 4–20 mA, 0–10 V or pulse frequency signals. This means that all possible types of process data can be acquired in the system, such as temperature, humidity, pressure, pollutant levels in off-gas or wastewater, machine condition, etc. (see Fig. 3).

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Energy Cost  
June 1st, 00:00 till July 1st, 00:00 2006

Energy type	Cost unit	Temp	Consumption	Unit	Consumption cost	Consumption HT + LT	Unit	Consumption cost HT + LT	15 min interval peak	Unit	Time of peak	Cost	Total cost	
<b>Electrical</b>	<b>Total BML 1101</b>	HT	58 053,38	kWh	3 622,53 €	79 052,32	kWh	4 932,86 €	284,80	kW	01.06.2006 06:30	1 853,60 €	6 786,46 €	
	HT from 6:00 am till 09:00 pm	LT	20 096,94	kWh	1 310,33 €									
	Sum submeters	HT	52 037,74	kWh	3 432,47 €	76 066,19	kWh	4 684,13 €	252,08	kW		1 764,56 €	6 448,09 €	
	Cost / kWh	LT	19 976,45	kWh	1 246,66 €									
	0,0624 €	Compressed air	5 027,88	kWh	313,74 €	5 122,59	kWh	319,65 €	45,60	kW		319,20 €	638,85 €	
		Administration	94,69	kWh	5,91 €									
		HT	6 509,59	kWh	362,52 €	7 597,61	kWh	499,05 €	20,80	kW		145,60 €	644,65 €	
		LT	2 188,02	kWh	138,53 €									
		LT from 09:00 pm till 06:00 am	HT	18 938,97	kWh	1 181,79 €	30 563,04	kWh	1 907,13 €	38,48	kW		269,36 €	2 178,48 €
	0,0624 €	Test rooms	11 624,07	kWh	725,34 €									
		Heat treatment	6 182,00	kWh	385,76 €	7 812,01	kWh	487,47 €	28,80	kW		201,60 €	689,07 €	
		Production capacitors	13 056,34	kWh	814,12 €	16 843,76	kWh	1 051,05 €	75,20	kW		526,40 €	1 577,45 €	
	7,80 €	Prod. PFC + dispatch	3 787,42	kWh	236,34 €									
		LT	6 072,87	kWh	378,95 €	6 727,21	kWh	419,78 €	43,20	kW		302,40 €	722,18 €	
		Not submetered rest	854,34	kWh	40,83 €									
		HT	2365,04	kWh	185,06 €	3 386,13	kWh	248,73 €	12,72	kW		89,04 €	337,77 €	
		LT	1020,49	kWh	63,68 €									
	<b>Additional fee per kWh</b>													
	Consumption <= 8333 kWh / month					8 333,00 kWh		28,00 €						
	0,0034 €													
	Consumption > 8333 kWh / month					70 719,32 kWh		35,38 €						
	0,0053 €													
<b>Water</b>	<b>Total</b>	-	30 360,00	l	107,78 €								107,78 €	
	Cost / liter	Administration	23 130,00	l	82,11 €									
	0,00355 €	Hall 6	7 230,00	l	25,67 €									
					0,00 €									
<b>Heat via natural gas</b>	<b>Total</b>	-	1 540,40	kWh	77,17 €								77,17 €	
	Cost / m³	Process heat	1 540,40	kWh	77,17 €									
	0,050 €													
	<b>Service fee per year</b>	No. of 15 min intervals in report time			2580							96,63 €	96,63 €	
	1,200 €													
<b>Energy for heating</b>	<b>Total</b>				69,06 €								69,06 €	
	Cost / kWh	Administration WE	730,00	kWh	23,99 €									
	0,033 €	Hall 1 KP	1 440,00	kWh	47,32 €									
		Hall 2 AP + lab	100,00	kWh	3,29 €									
		Hall 4b LV		kWh	0,00 €									
		Hall 9 regen. room	440,00	kWh	14,46 €									
	<b>Service fee per year</b>	No. of 15 min intervals in report time			2580							164,38 €	164,38 €	
	3,650 €													
<b>Total energy cost</b>													<b>7 323,49 €</b>	

Fig. 4: Table of costs for energy consumption and maximum demand, here as a monthly report

An EMF 1102 Cost Centre and Alarm Unit can also be used to link any desired process data. The following example illustrates the great benefits this brings:

### Direct monitoring of process data: a case study

The ageing tests for FRAKO power capacitors involve operating them for thousands of hours at voltages and temperatures over their specified maximum levels. These tests are in-

terrupted regularly to take intermediate measurements of capacitance and loss factor. If these tests at any time reveal unsatisfactory product quality, appropriate action must be taken. Frequently, however, poor results are due to external irregularities and not indicative of substandard quality

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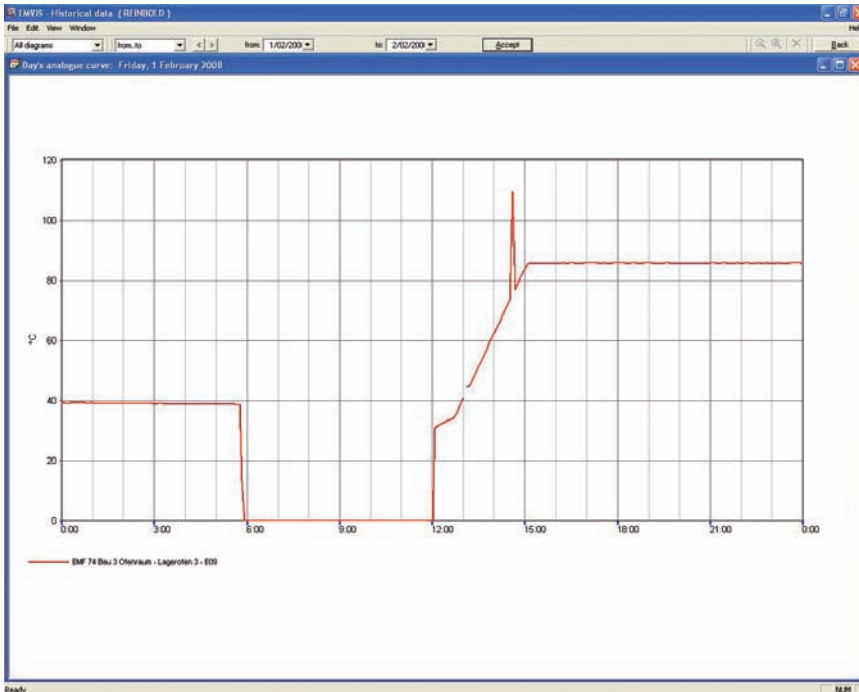


Fig . 5: Temperature of test oven as recorded by the FRAKO EMS. Thanks to the EMS, the damaging temperature peaks due to a defective contactor were identified in good time.

in the capacitors themselves. The application of an EMS at FRAKO gave an early warning of irregularities of this nature and saved the expense of intensive investigations in the wrong direction. In this particular case the temperature of the test oven was set at 83°C by means of a thermostat

which switched the heating on and off with a contactor. Occasionally, however, this contactor was prone to jamming and did not open when it was supposed to:

Temperature peaks of this type cause substantial damage to capacitors

even though they are only of a short duration. Without the EMS this problem would only have been detected much later. Up until that time faulty manufacturing processes or even mistakes in the product's development would have been held responsible for the 'substandard' quality of the capacitors.

There are many other examples of how early detection of faults by an EMS can mitigate the costs they incur:

- Fractured piping
- Drops in generator performance, such as those used for maximum demand control
- Declining compressor efficiency
- Critical environmental data (historical records leaving no gaps are extremely helpful, for example in environmental audits)
- plus various other monitoring functions.

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## Interfaces and modularity...

The architecture of the Energy Management System is modular in two respects. Firstly, there are various modules that can also be used as stand-alone instruments without using a bus connection for communication, for example, with a data collector. A system consisting of various modules can thus be extended in stages. Secondly, the system is also modular in the sense that it can work together relatively easily with other systems, such as building management systems or programmable logic control-

lers. In this case the entire FRAKO Energy Management System can itself be considered a module linked up to the other systems. In complex systems of this kind the interfaces are a key issue:

A very common example of data interchange with another system is the connection of an EM-EC 2200 Maximum Demand Controller with a building management system via an OPC server and Ethernet. The building management system sheds loads as demanded by the EM-MC 2200. The advantages of this arrangement are that no extra installation costs are incurred in being able to switch indivi-

dual loads on and off, and the existing knowledge of the processes where the loads are sporadically shed can be made use of.

Other examples are SQL access by other standard visualization systems or web servers that make these data available on the internet for further processing.

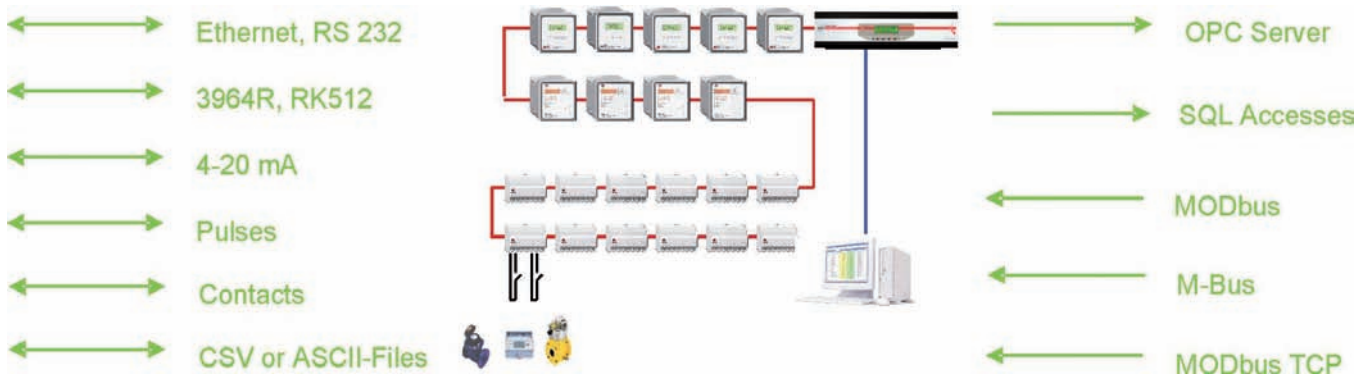


Fig. 6: Interfaces for the FRAKO Energy Management System. Those on the left can be used for data import and export, while those on the right can perform only one of these functions.



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## Summary and future prospects...

The FRAKO Energy Management System supplies information on energy and other process data. Parts of the system actively save energy in the background.

The system covers the areas of maximum demand control, power factor correction, supply network monitoring and cost allocation.

Usually the data are transmitted via Ethernet and FRAKO Bus. Information that is available in the form of other protocols (such as Modbus, etc.) can easily be acquired by the FRAKO EMS and visualized.

Consumption data (metering and submetering) are typically written to an SQL database. This is included in the scope of supply of the EMIS 1500 Central Unit (for data collecting). The data can then be summarized, for example in monthly reports. All data are visualized with the standard software EMVIS-NET or EMVIS 3000 online and in the form of historical data presented as a function of time. These charts are very helpful in the analysis of processes.

A wide selection of hardware and software interfaces enables the FRAKO EMS to be incorporated into a network with other systems.

At the present time there are many hundreds of systems in operation in various European and other countries. The costs of a system of this type can vary between one thousand euros and several hundred thousand euros.

One of the most extensive applications is a network of some 25 companies spread across central Europe. These are connected with each other via Ethernet in a single system. The system tree for the software covers all 25 central data collecting units, through which all instruments in the system can be accessed.

Changes in the configuration of a system, such as installing and connecting a new meter, are in most cases carried out by the users themselves.

At the present time new instruments are being added to the system. These improve the temporal resolution from its present value of about 10 seconds to the extent that very short-term voltage drops can be detected, recorded and made accessible by the new EMVIS 3000 visualization software. The supply network analysis function is being extended to enable five current transformers to be connected.

Since the introduction of EMVIS 3000, tailor-made views with links to the FRAKO data of interest can easily be created by the customer using the Easy Customizing module.

Author: Dr. Wulf Rittershausen

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