

Whitepaper

ELM Security System Electronic Locking & Monitoring

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1 Preface

Methods for data security are described in various laws and regulations. In addition to general confidentiality requirements and business prudence we now have BS 7790, DIN ISO 17799 und Sarbanes-Oxley, demanding greater data security.

In the twentieth century and before it was gold and diamonds that required the ultimate protection. Today's gold is data: hard drives have replaced bullion. On-line retailers must guarantee their customers' security to stay in business. Co-location centers must demonstrate their commitment to security to attract customers.

Of course huge efforts and much progress have been made in the fields of encryption and the safeguarding of networks from hackers. It is also important to optimize physical security.

Typically physical security has concentrated on perimeter access control and this is certainly vital, but the security of the actual racks and cabinets has, perhaps not been given the attention it deserves.

2 Introduction

Requirements for control cabinets or equipment in server rooms and data centers have clearly changed. Today's requirements are:

- Increased data security
- Protection against unauthorized access
- Logging of all event
- Parameter driven supervision
- Trigger planned tasks
- Integration into high level management systems

Integrated system solutions must meet the following requirements: reliable, scalable and cost-efficient. A suitable locking system also belongs to this application. EMKA with its Electronic Locking & Monitoring (ELM) - Security System is the one-stop-shop for those demands. The modular design allows easy adaptation to a specific requirement.

3 Access Control

Various mechanical “systems” are employed:

- 3.1 Nothing, rely on perimeter security – this may be rationally acceptable if very few people have access to the building and room that houses the data cabinets, and the value of the data is low. However the perception to internal or external customers may raise questions.
- 3.2 Simple keys - only slightly better than nothing. If a key goes missing is it lost, stolen or copied? Do we hope for the best, or re-key affected locks? A major key control issue.
- 3.3 Master key system – a significant step up in security and convenience, especially for a co-location center, still a significant “key control” problem. What happens if a master key may have been compromised?

The problem with keys

In a co-location center, for example, access must be available to both the company renting the cabinets in the data center and the building owner. Master key systems are used for convenience, however if a master key is goes missing there is a major dilemma. Say the cost of changing a lock is \$50 and there are 500 locks which should be changed, someone might well decide that the risk is not so great after all. Keys leave no trail – it is impossible to tell who was last in a cabinet, most can be easily copied, many are left lying around. Electronic locks can eliminate these problems, but their implementation requires serious thought.

4 Electronic locking and monitoring

This can offer both enhanced security and greater convenience.

Most electronic access methods allow event logging (which, from where, when and who), real time monitoring, and alarms. All should allow easy de-authorization, which is much more likely to be effective than collecting keys from ex-employees.

The network must be password protected to restrict access to some of the data to authorized people; ideally several levels of access should be available.

Various access methods are available; their main characteristics of the most popular are summarized below:

ACCESS METHOD	Advantages	Disadvantages
<p>Remote from a control room The person wanting access calls the operator, identifies himself, and asks for a door to be opened. The operator uses a PIN to open that door.</p>	<p>Secure Entry logged both by computer and operator Inexpensive Convenient</p>	<p>Requires manned control room</p>
<p>Keypad Up to 5 (standard, 100 optional) PINs per cabinet. Multiple doors can be opened from one keypad. Press door number, then PIN for that specific door.</p>	<p>Secure, over 1 million codes possible Extremely secure, when combined with prox card or biometric room entry Very convenient, no key to remember and keep track of.</p>	
<p>Proximity card Multiple doors can be opened from one reader if desired. Select door number with keypad, then present card. Most types of prox cards can be used</p>	<p>Secure, if different card is used from that which allows room entry Card is very difficult to copy Easily integrated into existing building security system Can be set to expire after a time or number of uses</p>	<p>Card may be stolen Inconvenient if second card is used, not very secure if room card is used for cabinets More expensive than keypad</p>
<p>Cell Phone Use cell phone as a mobile keypad</p>	<p>Secure / extremely secure Convenient</p>	<p>Expensive</p>

Table 1: Access methods

Security theory states that, for excellent security, two of the following are needed for access: something you know; something you are; and something you carry. The most practical, economic and convenient solutions are 1) and 2) above

The method of monitoring the system impacts on its usability and effectiveness...

MONITORING METHOD, REAL TIME	Advantages	Disadvantages
Computer screen – standard software	OK in conjunction with alarm Shows status of all doors Temperature, etc. may be monitored on the same screen	Must be watched all the time Need a dedicated screen
Alarms can be audible in the room, remote at a network terminal, by email, cell phone, etc	Good to alert operator Excellent if they are specific	Often not specific
Pop-up Software that launches monitoring program, sends SNMP traps, emails etc.	Allows “passive” monitoring Shows specific “event”	
Graphical active display	Gives instant overview of status of doors and environmental conditions Doors can be opened from screen	Best if used in conjunction with alarms
MONITORING METHOD, HISTORY		
Notepad file log on terminal	Easily save to Excel or similar	Can run out of capacity
New Notepad file logged each day	Easy to find and examine Unlimited capacity	

Table 2: Monitoring methods

5 Easy integration

Depending on the building security system and the preferences of the building managers, integration on some level between the data room and the rest of the building may be desirable. An electronic system should be flexible enough to achieve this at different levels.

It may be best to use the same ID cards to control both room and cabinet entry (not always a good idea). Some applications require the building monitoring system to be able to see cabinet door and temperature status; others to receive alarms and launch a separate monitoring program. Use of SNMP protocol and traps greatly assists in integration.

6 Summary of benefits of electronic systems

6.1 Enhanced security

- Much more difficult to steal a key and a password than just a key.
- An automatically generated log is a great deterrent.
- Alarms on all doors and side panels.
- Easy invalidation of codes.

6.2 Perception of high security

If security is top notch on the parts we can see then it may be assumed that it is also taken seriously on the parts that we cannot see.

- Inoculates against Sarbanes-Oxley or HIPAA problems.
- Defense against liability (both corporate and personal) if problems occur.
- Gives confidence to customers and prospective customers.
- Emphasizes to employees the importance of security.

1) It is easy to do the right thing – when it is easy it is likely to be done.

6.3 It is easy to do the right thing – when it is easy it is likely to be done.

- When an employee leaves his code is easily invalidated.
- If a prox card is lost there is no need to re-key locks.

6.4 Convenience

- No one needs to keep track of who has keys and chase them when they go missing – this can be a real problem with master key systems.
- No need to change cylinders
- No more big bunches of keys
- No more locksmiths' bills

7 Increased „uptime“ by environmental monitoring

Using the same network that operates and monitors the security functions, environmental conditions such as temperature and humidity within cabinets can be monitored and, in some cases, automatically controlled. Some systems can energize fans at one temperature and send an alarm if the temperature continues to rise.

In addition to the prime function of increasing “uptime” by preventing data loss or damage due to excess heat, temperature can be monitored to observe the effect of ducting changes or the addition of blade servers. It is possible to log a temperature history to evaluate server performance.

Other functions can be monitored including vibration (to detect forced intrusion), smoke, current draw and anything that a transducer can measure, all these can be set to open or close contacts, to energize fans, for instance and / or to send alarm signals. A temperature sensor could be set to turn on fans at one temperature and at a higher temperature to send an alarm.

8 ELM Security System by EMKA

The EMKA Electronic Locking & Monitoring System (ELM system) allows access control for all types of cabinets and offers furthermore monitoring and control of ambient conditions.

8.1 Functional survey

The ELM system offers various functions, e.g.:

- operating locks
- evaluating sensor data

- handling operator inputs

Several functions of the same type are integrated in a module; e.g. a „handle module“ which can operate up to 8 independent swing handles or a „sensor module“ which can drive up to 4 sensors. Modules are interchanged by cables and communicate via CAN-Bus (Controller Area Network) protocol.

The whole system is controlled by a „communications module“. It handles the communication to all modules and is the user interface for setup and for vertical communication to supervisory systems via LAN (Ethernet) and SNMP (Simple Network Management Protocol). Up to 10 password controlled workstations with adjustable access levels can have simultaneous access to the system via LAN connection.

Apart from the communications module, which is needed only once in an ELM system, many other functional modules can be present in an application.

One ELM system can handle up to 64 modules of the same type and up to 100 modules in total. Max. cable length from the communications module to the geographically last module is about 1000 m. Up to 512 locks or 256 sensors with 256 relays can be operated by a single communications module.

The ELM system offers different operator interfaces for user identification and opening handle like keypads, proximity cards, cell phones and PC/Laptop operation.

Each event is logged in the system. Local or remote alarms can be derived there from.

8.2 Form Factors

The modules of an ELM system are available in three different form factors:

- Single modules in a metal housing; type - "BOX"; plug&play connection; external power supply required
- Single modules with a holder for DIN rail mounting; type - "KIT" ; connection via terminals; external power supply required
- Multiple modules customized in a 19" rack, 1U plug&play connection, built-in power supply unit

More complex ELM applications may be realized as a combination of single modules and 19" racks.

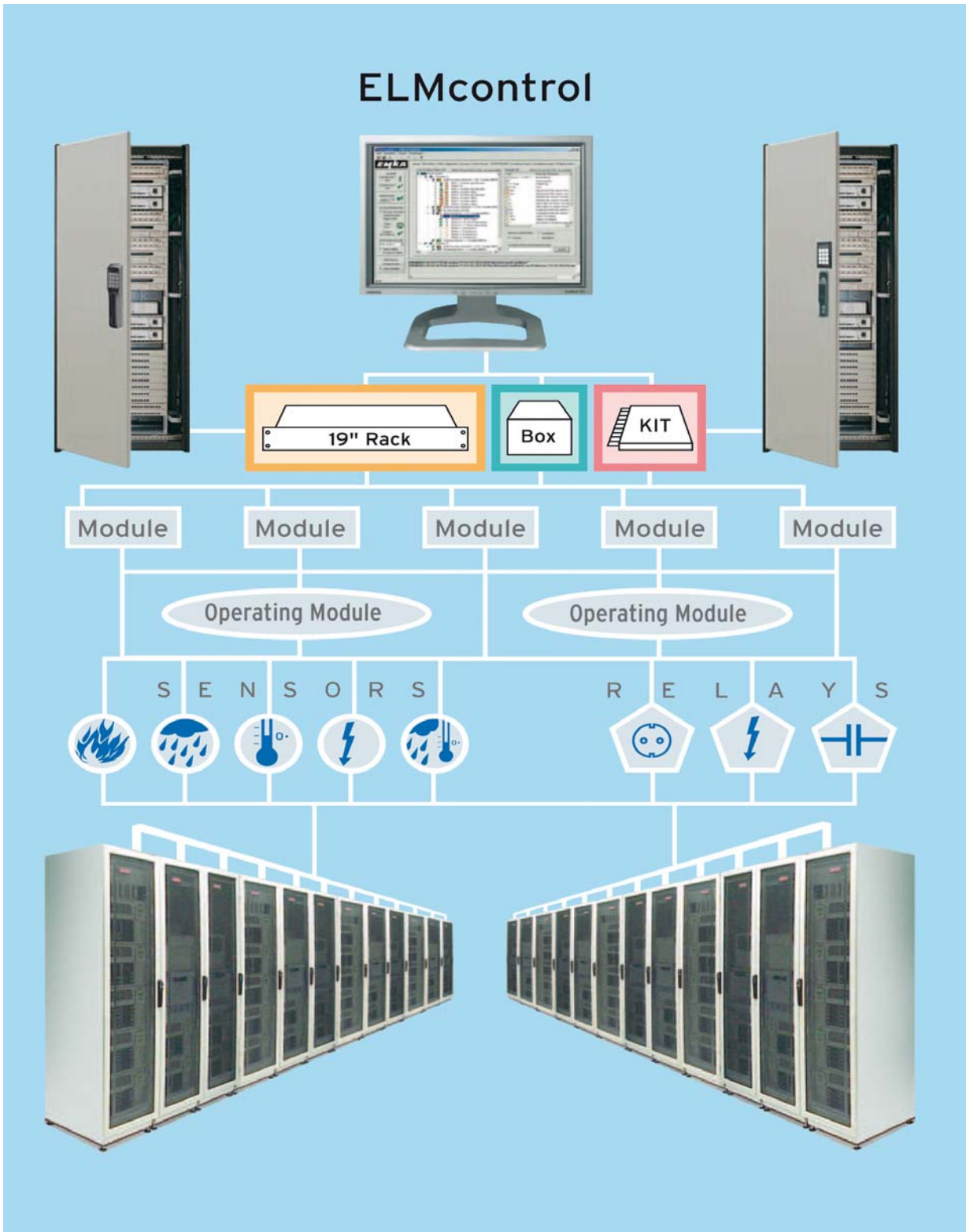


Fig. 1: ELM System overview

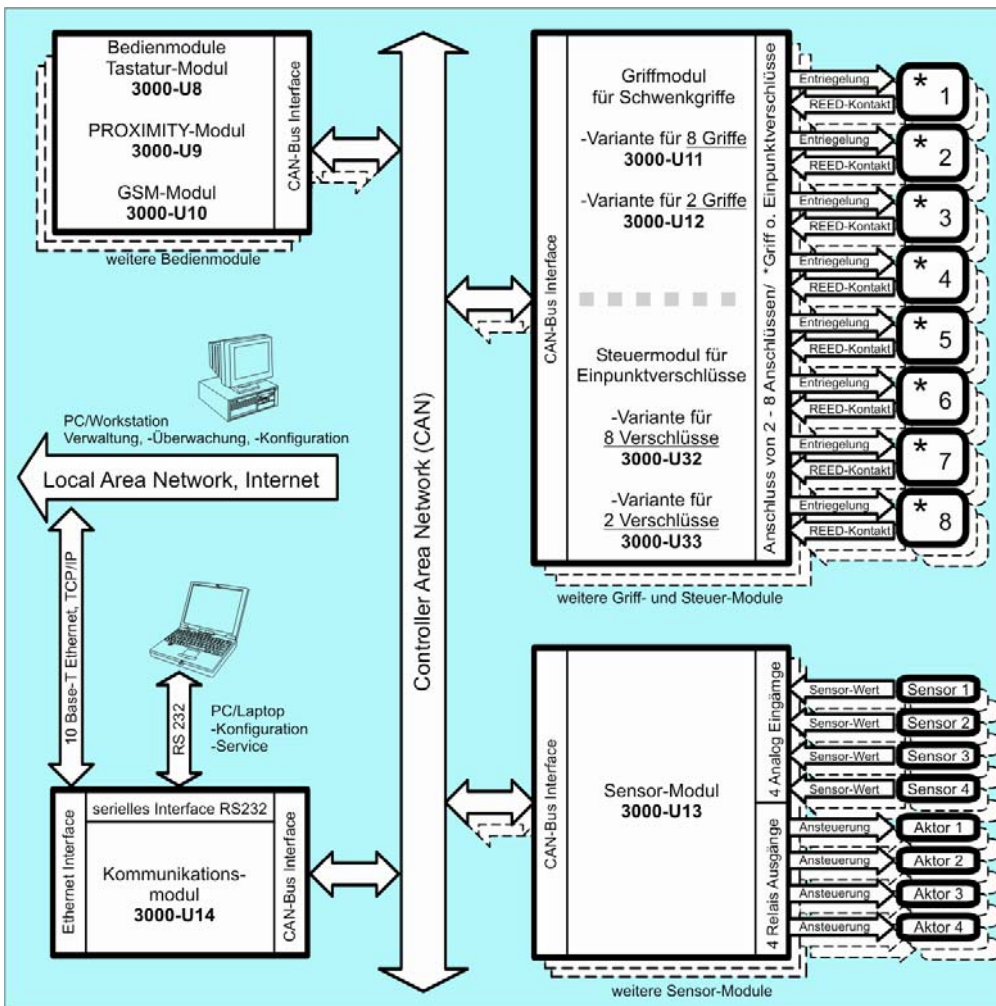


Fig. 2: System structure

Benefits:

- „Plug an Play“ system
- Modular design
- Network ability
- 19“ technology
- Up tot 512 locks or 256 sensors connectable
- Control via software ELMcontrol
- SNMP protocol for easy integration into management software like HP OpenView

9 Software

9.1 ELMcontrol

The software ELMcontrol allows easy configuration and monitoring of the electronic locking system EMKA-ELM via PC under Microsoft Windows®.

Data exchange between ELMcontrol and an ELM application can be via network or serial RS 232 interface through the communications module of the ELM system. Network communication uses Simple Network Management Protocol - SNMPv1 (RFC1157). This allows seamless integration of the ELM-Systems in 3rd party SNMP-management software (e.g. HP OpenView). Data exchange via network interface is only allowed for authorized users due to security reasons.

ELMcontrol software runs under Microsoft Windows 98, Microsoft Windows ME, Microsoft Windows NT 4.0, Microsoft Windows 2000 or Microsoft Windows XP. ELMcontrol uses TCP/IP as network protocol.

Free download of ELMcontrol software is available under www.emka-electronic.de/E/index_E.htm section download /software/SNMP management software ELMcontrol. Software and manual will be installed after running setup.

Configuration settings for the ELM system performed via ELMcontrol are directly checked and saved in the system's memory. ELMcontrol only operates with an ELM system connected and powered.

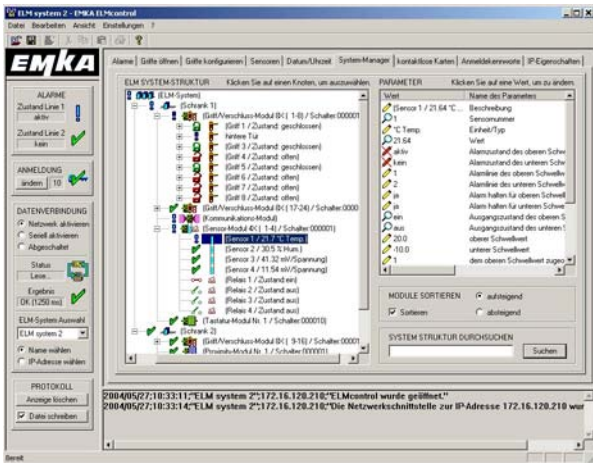
9.2 ELMwatcher

ELMwatcher is a software for receiving and displaying SNMP trap messages which are sent by an ELM system. It allows processing of messages received and offers different methods to inform the operator about a specific event like an open door or a sensor giving alarm. ELM trap messages can be displayed as a list, saved to files or transmitted as SMS to a dedicated phone number. ELMwatcher can display trap messages with all details or combine multiple messages with the same content. Any sound file can be played when receiving a trap message or the start of a program can be initiated automatically.

ELMwatcher requires Microsoft Windows 98, Microsoft Windows ME, Microsoft Windows NT 4.0, Microsoft Windows 2000 or Microsoft Windows XP and network protocol TCP/IP.

Free download of ELMwatcher demo software is available under www.emka-electronic.de/E/index_E.htm section download /software/SNMP trap receiver software ELMwatcher. Software and manual will be installed after running setup.

9.3 Screenshots

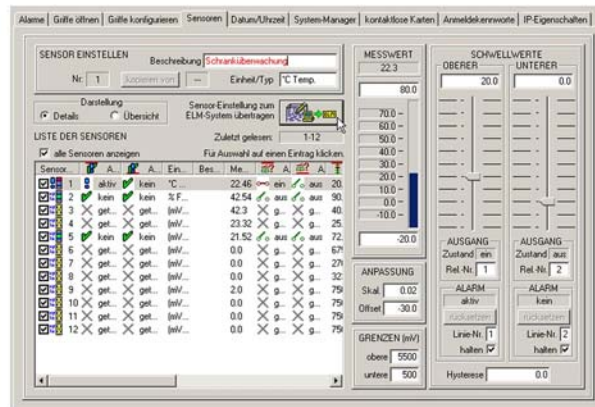


ELMcontrol allows easy configuration and monitoring of the electronic locking system EMKA-ELM via PC under Microsoft Windows®.

← Fig. 3: System-Manager

All modules and are viewed in structured lists with intuitive icons and text messages.

Fig. 4: Management of sensors and actuators →



Commands like opening a handle can be performed. Events stored in the ELM-System are displayed and saved in log files.

← Fig. 5: Managing access permissions for handles.

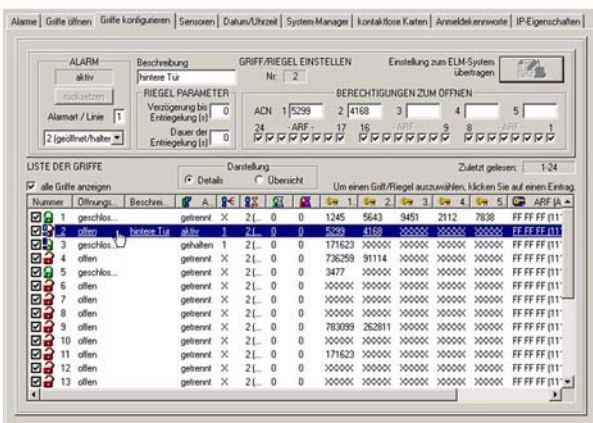
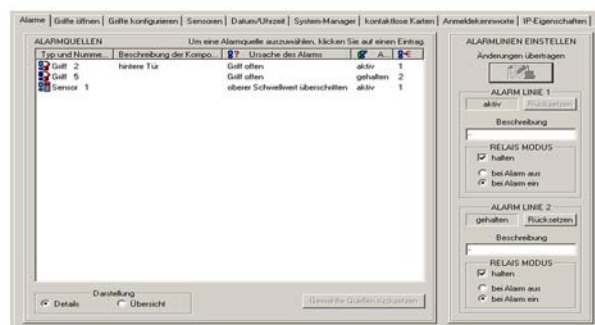


Fig. 6: Quick information about alarm messages.



ELMcontrol can handle multiple ELM systems. The operator can easily switch to the desired system. Data exchange can be via Ethernet-LAN, internet or RS232 or USB interface.