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GM Electric Fencing Intrusion Detection System

INTRODUCTION TO ELECTRIC SECURITY
FENCING

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This objective of this manual is to provide general information about the electronic and physical components of the electric security fencing system. GM Ltd reserves the right to amend the contents of this manual.

An introduction to the GM Electric Fencing Intrusion Detection System

1. System Description

The electric fencing system consists of electric wires carrying electric pulses that provide a non lethal repulse shock to an intruder. This results in an alarm activation which is transmitted to security personnel monitoring the site. The electric wires are typically installed in the following types of configurations:

- 1.1 In the form of a wire screen that can be installed in a large number of different configurations on an existing fence or wall. The electric wires can be installed vertically, at an angle, or as a stand-alone fence.
- 1.2 As a wire screen integrated with other physical security fences such as concertina fencing, welded mesh fencing and palisade fencing.
- 1.3 As the inner coil of Electrocoil Barbed Tape Concertina. The advantage of this system is the quick installation and deployment, and the use of the system as a mobile or temporary fencing barrier.

The number of wires, distances between wires, zone length's, integration with concertina fencing are some of the different configurations which are used to meet different site requirements. The electric wire barrier can be installed vertically or at an angle to provide wider physical barriers that make intrusion by way of digging and climbing impossible.

2. Advantages of the system

- 2.1 The **adaptive** microprocessor controlled monitor ensures operation of the system at the highest level of security possible.
- 2.2 **Easy installation** on existing wall or fence, or as a stand-alone perimeter fence.
- 2.3 Provides a **physical barrier** that **delays** the intrusion time.
- 2.4 Provides an **electric shock** to **repulse** an intruder.
- 2.5 Acts as a **psychological barrier** to **deter** intrusion attempts.
- 2.6 Provides a high level of **detection capability** to detect an intrusion attempt and set off the alarm that will notify and activate the security personnel.
- 2.7 Low **maintenance** costs.
- 2.8 **Easy to operate.**
- 2.9 Integration of **low voltage detection wires** with the **high voltage detection wires.**
- 2.10 **Animals** receive an electric shock and are repulsed without setting off the alarm. The animal **learns** not to come into contact with the fence.
- 2.11 Accidental **human contact** with the fence will provide an electric shock that will **teach** the person (who is not an intruder) not to tamper with the fence.
- 2.12 The electric wires **serves as a perimeter fence itself**, thereby alleviating the need to erect another conventional fence. Most other intrusion detection systems require an existing fence or wall on which the detection system is installed.

3. Unique Product Attributes

- 3.1. **Adaptive technology** adapts according to changing conditions on site.
- 3.2. **Digital technology** provides an adaptive alarm threshold.
- 3.3. **Low Voltage** Detection Wires.
- 3.4. **High voltage** Detection Wires.
- 3.5. **Numerous** loop configurations (see Annex 1).
- 3.6. It is impossible to differentiate visually between the low voltage detection wires and the high voltage wires. The low voltage wires are traditionally neutral wires in competing electric fencing systems and have no detection capability.
- 3.7. The system makes use of **high voltage** (electric shock) and **low voltage** wires **simultaneously**. The **high voltage** wires provide an electric shock and alarm monitoring, whereas the **low voltage** wires provide alarm monitoring without providing an electric shock.
- 3.8. The fence monitor monitors the high and low voltage wires independently. There is therefore an **alarm verification** provided by an alarm received in both high and low voltage zones.
- 3.9. The use of the low voltage monitor enables high voltage zones to be divided into a number of low voltage **sub-zones**.
- 3.10. **Site Example:**

Description	Building Site located next to a school.
Problem 1	Theft occurring at night/Terrorist intrusion etc.
Problem 2	The chance of a child receiving an electric shock must be avoided.
Problem 3	There must be 24 hour a day perimeter security alarm monitoring.
Security Solution	High voltage wires are active only during specified night hours. This prevents a child from receiving an electric shock during the day. Low voltage wires are active 24 hours a day providing continuous alarm monitoring.

Product Feature	Alarm activated when...	Advantages
High voltage wires	<ul style="list-style-type: none"> •Wires are cut. •Short between high voltage and low voltage detection wires •Short between low voltage detection wires and the ground or with any of the earthed fencing components such as the fence post. 	<ul style="list-style-type: none"> •Intruder receives a non lethal electric repulse shock which deters and delays the intrusion attempt.
Low voltage wires	<ul style="list-style-type: none"> •Wire are cut. •Short between low voltage detection wires and high voltage wires •Short between low voltage detection wire and the ground or with any of the earthed fencing components such as the fence post. 	<ul style="list-style-type: none"> •no electric shock provided at nominated times. •no electric shock given to innocent people. •provides a large number of wire looping configurations. •an alarm on the low voltage detection wires can be used to activate the high voltage wires.

4. Typical types of installations

The electric fence is very versatile, providing effective security solutions for a wide variety of applications. Some of the typical installations are listed below.

- 4.1. Military bases, borders and high security installations.
- 4.2. Industrial sites and factories.
- 4.3. Remote warehouses and builders yards.
- 4.4. Cellular phone antenna sites.
- 4.5. Electricity transformer, sub-stations and electricity pylons.
- 4.6. Water pump facilities and water reservoirs.
- 4.7. Housing Estates.
- 4.8. Private Houses.
- 4.9. Car lots.
- 4.10. Rental storage facilities.

5. Product Range - Energiser Monitor units

G.M.'s product range is described briefly below. More detailed technical information and installation manuals are available for each individual product. The features common to all the energiser monitor units are:

- Microprocessor digital technology controlled.
- ADAPTIVE TECHNOLOGY causes the system to ADAPT automatically to changing environmental conditions and changing conditions on the site. The adaptive threshold is not constant, changing according to field conditions such as changes in moisture levels, dust etc in order to maintain the highest alarm threshold.
- PROGRAMMABLE - The system can be pre-programmed to meet specific site conditions. Any changes required are undertaken by changing the parameters of the microprocessor.
- FALSE ALARM RATE - Negligible due to the adaptive threshold technology. The units RESPOND to changing field conditions.
- LESS PERIODIC MAINTENANCE - The adaptive threshold capability reduces the amount of periodic maintenance required on the fence.

5.1. Energiser Monitor - Model No. 1H1L1E

Product Features

- Digital microprocessor controlled monitor.
- 1 high voltage zone - electrified wire loop with the electric shock capability.
- 1 low voltage zone - this can be used to connect a low voltage loop that detects intrusion through cutting or shorting out of the electric wires.
- As an alternative the low voltage loop can be used to detect an alarm from any other alarm detector such as a PIR, magnet, vibration sensor etc.
- LED indicating high voltage output pulse.
- LED indicating alarm in high voltage zone.
- LED indicating alarm in low voltage zone.
- LED indicating low battery.

5.2. Energiser Monitor Cabinet - Model No. 2H4L2E

Product Features (Standard unit)

- ❑ Digital microprocessor controlled monitor.
- ❑ 2 high voltage zones - electrified wire loops with the electric shock capability.
- ❑ 4 low voltage zone - this can be used to connect a low voltage loop that detects intrusion through cutting or shorting out of the electric wires.
- ❑ As an alternative the low voltage loop can be used to detect an alarm from any other alarm detector such as a PIR, magnet, vibration sensor etc.
- ❑ 12 V DC, 7 A/h battery providing approximately 6 hours power supply back-up.
- ❑ 1.2 Ampere battery charger/power supply unit.
- ❑ Change over relay (maximum 1 A) (NO,NC) indicating ALARM STATUS for EACH ZONE (separately).
- ❑ Change over relay (NO,NC) for LOW BATTERY.
- ❑ Change over relay (NO,NC) for the CABINET DOOR TAMPER.
- ❑ Change over relay (NO,NC) for MONITOR FAULT.
- ❑ 12 V DC (1 A) output activating alarm siren, emergency light or other local emergency signals.
- ❑ Energiser conforms to safety requirements according to the Internationally recognised CENELEC STANDARD EN 61011.
- ❑ Cabinet complies with IP 55 Standard for outdoor installation.

5.3. High Voltage Monitor - Model No. GM2H

Product Features:

- ❑ Digital microprocessor controlled monitor.
- ❑ Monitors 2 high voltage zones - the high voltage wire loop returning to the monitor.
- ❑ LED indicating alarm in High voltage alarm from each zone
- ❑ LED indicating system clear.
- ❑ System ON/OFF switch.
- ❑ Individual ON/OFF switches for each high voltage zone.

5.4. Low Voltage Monitor - Model No. GM4L

Product Features:

- ❑ Digital microprocessor controlled monitor.
- ❑ 2 high voltage zones - electrified wire loops with the electric shock capability.
- ❑ 4 low voltage zone - this can be used to connect a low voltage loop that detects intrusion through cutting or shorting out of the electric wires.

- ❑ As an alternative the low voltage loop can be used to detect an alarm from any other alarm detector such as a PIR, magnet, vibration sensor etc.
- ❑ LED indicating alarm in Low Voltage alarm from each zone
- ❑ LED indicating system clear.
- ❑ System ON/OFF switch.
- ❑ Individual ON/OFF switches for each high voltage zone.

5.5. Double Energiser - Model No. ESB275d

Product Features:

- ❑ 2 independent high voltage zones
- ❑ Stored Energy: 1.5 - 5 J
- ❑ Voltage output: 5000 - 8000 V
- ❑ Pulse interval: greater than 1 second
- ❑ Power supply: 12 V DC
- ❑ Approved by International Safety Standard - Cenelec EN 61011

6. Physical Components of the Electric Security Fence

6.1. Insulated Fence Posts

The use of insulated fiber glass posts is recommended for the following reasons:

- ❑ **Easy to work on site** - no need to weld and easy to cut and drill if required.
- ❑ The fiber glass post **acts as an insulator** and replaces line insulators.
- ❑ There is no need to install line insulators which can be **time consuming and labour intensive** during installation.
- ❑ There is **no threat of corrosion**.
- ❑ Large reduction in **electricity leakage** when compared with metal line posts.
- ❑ The posts does not act as an earth connection.
- ❑ **Aesthetic attributes** - the posts blend in easily to the environment and look like any fence post, as they do not have insulators installed on them.
- ❑ **Large range** of profiles available. The most commonly used profiles are described in Annex 2.
- ❑ **Composition:** E glass mats and polyester resin
- ❑ **Temperature:** - 40 - 120 ° C without damaging the profiles properties
- ❑ **UV stable**

6.2. Insulators

A complete range of insulators is available if required.

6.2.1.

Schematic diagram	Line insulators
Description	Line insulators for attachment to metal line post angles High quality polyethylene, UV resistant
Reference	LIN

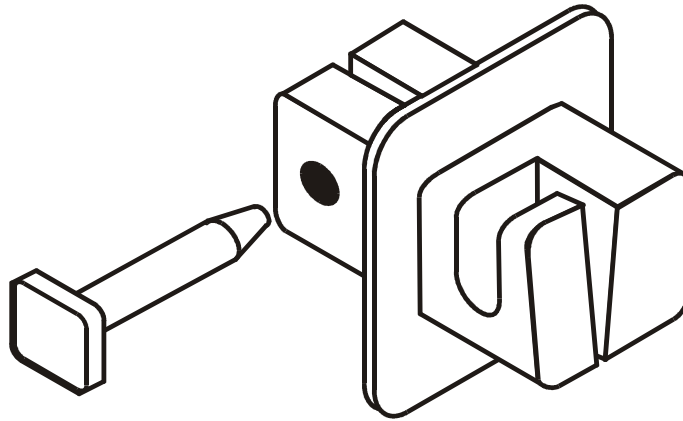


Diagram is not to scale

6.2.2.

Schematic diagram	Strain insulators
Description	For installation at the start of any straining section, such as to a corner post assembly High quality glass filled polyester plastic, UV resistant
Reference	SIN

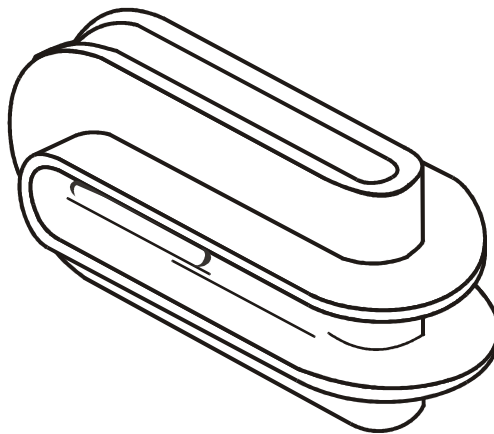
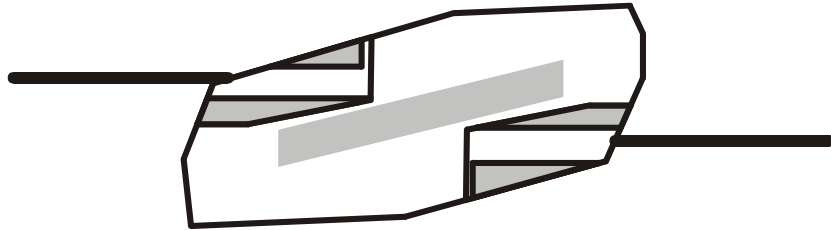


Diagram is not to scale

6.3. Other fitting accessories

6.3.1.

Schematic diagram	Gripple wire strainer
Description	Used in corner post assembly attachment for the straining of wires, and for the connection of cut wires
Reference	GR



6.3.2.

Schematic diagram	HT double insulated cable
Description	For wiring connection between energiser cabinet and electric fence wires, or for any connection requiring insulated wire. <u>Composition:</u> 14 gauge soft galvanised wire : high density polypropylene coating, UV resistant
Reference	HT100

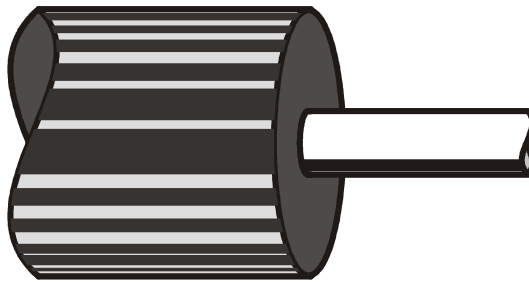
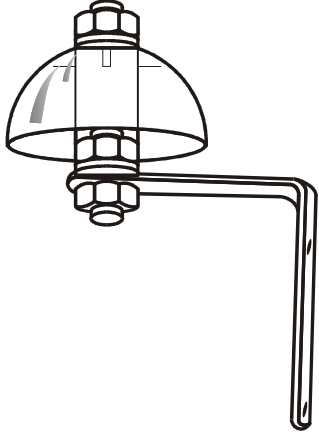


Diagram is not to scale

6.3.3.

Schematic diagram	Lightning Arrestor
Description	Lightning arrester for diverting lightning strikes. One lightning arrester is required for every high voltage zone
Reference	LA
	

**7. Description of a typical Industrial / Military Installation
(refers to diagram in catalogue)**

7.1. Energiser monitor control cabinet.

- 7.1.1. A control cabinet is installed on the perimeter fence and contains an ENERGISER providing an electric repulse shock and ADAPTIVE microprocessor controlled MONITOR's that detects an intrusion attempt.
- 7.1.2. In larger installations the number of control cabinets that are installed depends on the specified zone lengths and the total perimeter length of the installation. In this case the site is usually controlled centrally from a control room, guardhouse or centrally located room on the site.

7.2. Control Centre.

- 7.2.1. In sites that require a number of energiser monitor control cabinets, the site is centrally monitored from a control centre, which is usually installed in a control room, guard house or any centrally located position on the site. The control centre typically consists of one of the following:
 - a. Computerised Control System consisting of a computer, interface, printer and system software. The computerised control centre controls the entire perimeter fence, records all the events occurring on the perimeter fence.
 - b. Control Panel with basic arm, disarm and reset functions for each zone.
 - c. Receiver - fixed and/or mobile receiver with printer connection.

Control Centre	Additional equipment required for the Energiser Monitor Control Cabinet	Connection of Energiser Monitor Control Cabinet to Control Centre
Computerized Control Centre	Communication card in each Energiser Monitor Control cabinet	Communication cable
Control Panel	Communication card in each Energiser Monitor Control cabinet	Communication cable
Receiver	Mobile or fixed receiver	Transmission

- 7.2.2. The computer control system or control panel is usually supplied to meet specific site requirements.

7.3. Alarm signal transmitter / receiver.

- 7.3.1. The alarm signal is transmitted from transmitters located in the energiser monitor cabinet to the receiver located in the control room. The receiver may be permanent or mobile.
- 7.3.2. Notification of an alarm can also be transmitted to mobile receivers held by security personnel in a patrol vehicle or to receivers in a remote monitoring facility.

7.4. Transmission of alarm signal.

- 7.4.1. The transmitters installed in the control cabinets are used to transmit the alarm signal to the control room receivers. This replaces the use of communication cable, and the use of transmission instead of communication cable is usually determined by the site size, conditions, security needs and budgetary considerations

7.5. Patrol vehicle.

- 7.5.1. The transmission of an alarm signal to security personnel in a patrol vehicle enable rapid response to an intrusion attempt.

7.6. Zone Lengths.

- 7.6.1. Each cabinet controls one or two zones positioned on either side of the cabinet. Typical zone lengths range from 100 m to 500m, although longer zone lengths are possible, they are not deemed to be operationally effective for the reaction time of security personnel.

8. Electric Fence protecting a House (refers to diagram in catalogue)

8.1. Energiser monitor unit.

8.1.1. An energiser monitor unit, model 1H1L1E is installed in the house

8.1.2. In applications such as a factory or house requiring one energiser monitor control cabinet, there are a number of possible methods of alarm notification:

- a. Local alarm siren, activation of emergency lights or any other local emergency signals.
- b. Dialler notifying specified telephone numbers.
- c. Connection to standard indoor alarm control panel using independent relays.
- d. Transmission of alarm signal to remote facility or security monitoring company.

8.2. Transmission of alarm signal.

8.2.1. The control cabinet can be connected to a transmitter which will transmit the alarm signal to remote security monitoring facility.

8.3. Dialler

8.3.1. Alternately the control cabinet can be connected to an automatic dialler which will notify the owner of the alarm, or notify a remote security monitoring facility.

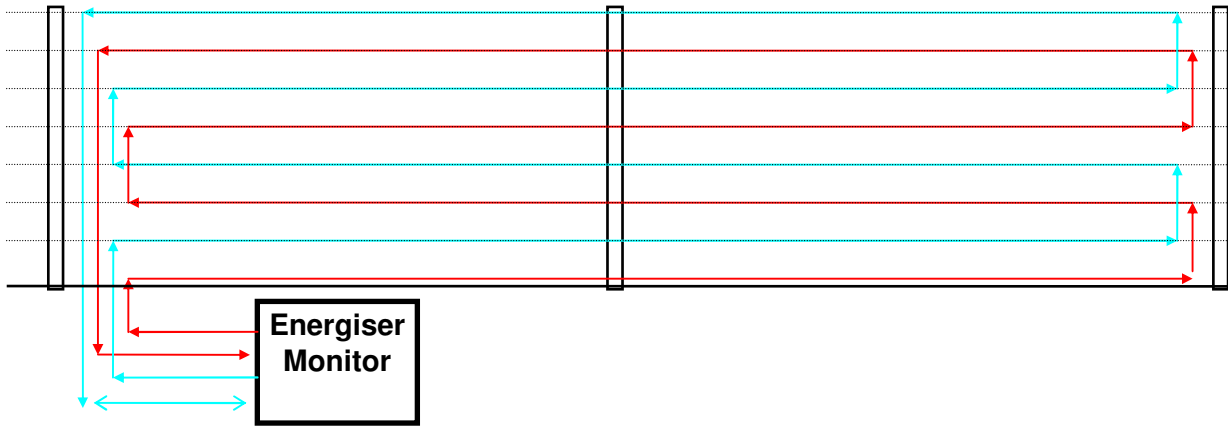
8.4. Local alarm

8.4.1. The 12 V DC (1 A) output can be used to activate an alarm siren, emergency light or other local emergency signals in the event of an alarm resulting from an intrusion attempt.

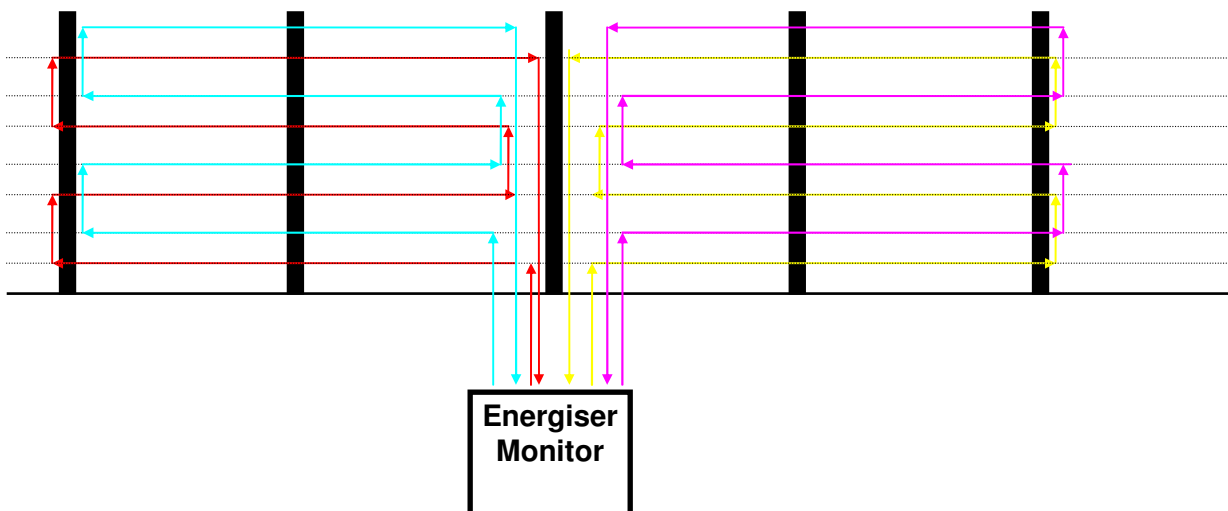
Annex 1:

High voltage Wire and Low voltage Detection wire LOOP Configurations

There are a large number of wiring LOOP configurations that can be designed to fool the sophisticated intruder. It is impossible to see the difference between the high voltage and low voltage detection wires.



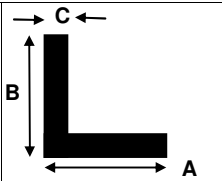
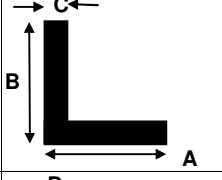
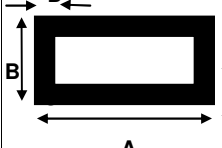
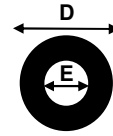
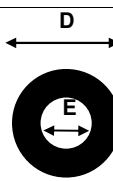
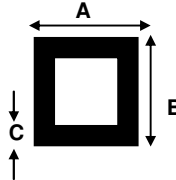
KEY	
	Low voltage detection zone 1
	High voltage zone 1



KEY	
	Low voltage detection zone 1
	High voltage zone 1
	Low voltage detection zone 2
	High voltage zone 2

Annex 2:

Insulated Post - Standard Profiles

Ref. No.	Item	Diagram	mm			
			A	B	C	
FG40	LINE POST		A	B	C	
	For installation between corner posts. Maximum length available 4		40	40	5	
FG25	LINE POST		A	B	C	
	For installation on walls or fences. Maximum installed length 1 metre.		25	25	3	
FG38	LINE POST		A	B	C	D
	For installation between corner posts and on gates. Maximum length		38	24	2.5	3
FG50	CORNER POST		D	E		
	For installation on walls or fences. Maximum installed length 1 metre.		50	42		
FG75	CORNER POST		D	E		
	Maximum length available 4 metres.		76	60		
FG505	CORNER POST		A	B	C	
	For installation on walls or fences. Maximum installed length 1 metre.		50	50	5.5	

Annex 3:

International Safety Standard Certificate

DEMKO

Certificate No. 98-04266

DEMKO Certificate

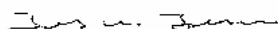
Product: Battery-operated Electric Fence Energizer
Manufacturer: G.M. Advanced Fencing & Security Technologies Ltd., 14 Taas St.,
Kfar-Saba 44425, Israel
Production site: 14899
Certified by request of: G.M. Advanced Fencing & Security Technologies Ltd., 14 Taas St.,
Kfar-Saba 44425, Israel
Trademark: G.M. Fencing Technologies
Model/Type ref.: ESB 275
Rated current or power: 0,06 - 0,12 A
Rated voltage: 12 V d.c.
Insulation Class:
Degree of protection: IP 44

Variants covered by this Certificate are specified in the attached appendix.
A sample of the product has been tested and found in conformity with EN 61011-2, as shown in the Test Report with ref. No. 98-04266.

Date of expiry: 2008-11-24

*The manufacturer complies with the Production Surveillance Requirements.
DEMKO A/S is a body notified to the Member States and Commission of the European Communities according to the provisions of Article 8 of the Low Voltage Directive.*


*Products included in this Certificate are allowed to carry the registered approval marks of DEMKO A/S, ® or for cables <DEMKO>.
The name of DEMKO can be used in the marketing of the products as well.
This Certificate is only valid for products, which are identical to the certified product, and manufactured at the above mentioned production site(s). DEMKO A/S has to be informed in writing about any changes, in accordance with the "DEMKO A/S Standard Terms and Conditions" for DEMKO services*

Date: 1998-11-24 **Signature:** 

Name: Jens Chr. Jensen
Section Manager

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