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STAFIX™

EMU™

SERIES 2

Electric Fence Security System

USER GUIDE

For more information about the Stafix range of quality products, see www.stafix.com.

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The EMU System

Congratulations on your recent purchase of a Stafix EMU (Energiser Monitor Unit) Series 2 electric fence security system.

The EMU is a combined electric fence energiser and alarm system designed primarily for security fencing applications. When armed, the EMU continuously checks the fence voltage and triggers an alarm if the fence voltage falls outside of preset limits (e.g. when an intruder attempts to breach or climb the fence).

The system can provide a high level of security to a wide range of installations, and includes the following features:

- Easy to use.
- Powerful electric fence energiser with up to 4 joules output energy.
- Adjustable fence voltage up to 12,000 volts.
- Reduced false alarms, due to a unique dynamic fence monitoring option that distinguishes sudden fence voltage changes from slow changes caused by environmental degradation.
- Provision for up to four EMU Keypads and/or EMU Keyswitches (altogether).
- Full gate access control using low voltage cabling for improved system reliability.
- Outputs for auxiliary warning equipment, and a siren up to 15 W.
- Easy connection to a tele-dialler or your master alarm system.
- An internal battery keeps the EMU unit working during a power failure.
- Compatible with solar power installations.
- 'Flash' computer memory allows easy on-site software upgrades.
- Flashing lamp warnings of poor battery and loss of mains power.
- Low voltage isolated mains power pack for improved safety.
- Many system configuration option settings available for maximum flexibility.
- Built-in fault diagnostics for efficient servicing.

Getting Started

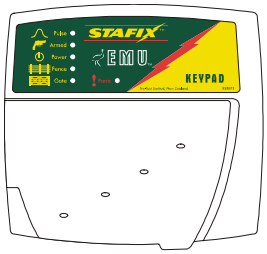
The EMU unit has a set of configuration options that can be set using an EMU Keypad. These are usually set by the installer, but may be re-configured later if required.

Which EMU unit do you have?

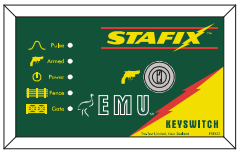
An EMU system is based on one of two energiser monitor units, an EMU Premium or an EMU Compact:

EMU Premium

EMU Compact



EMU Keypad



EMU Keyswitch

EMU Power Pack

EMU Premium

An EMU Premium unit has just a single 'power' indicator lamp on the case front. This unit is typically installed together with an EMU Keypad and/or EMU Keyswitch.

EMU Compact

An EMU Compact unit has a Keyswitch mounted on the case front and a full set of indicator lamps (these allow the unit to be installed on its own, without an EMU Keypad or EMU Keyswitch).

It has the same full range of features and customisable settings as provided on the EMU Premium, but these are set by your installer at the time of installation. The settings may be reconfigured later by your installer.

Explanation of symbols on your EMU

Read full instructions before use.

Class III appliance in which protection against electric shock relies on supply at safety extra-low voltage (SELV) and in which voltages higher than those of safety extra-low voltage are not generated.

Arming and Disarming the EMU System

Arming the EMU system

Arm the system when you wish to fully secure the property. Arming the EMU will electrify the fence and enable gate and fence monitoring. The EMU Keyswitch or EMU Keypad can be used to arm the system:

Arming using the EMU Keyswitch

Arming the system using the EMU Keyswitch is easy:

1. Insert the key into the EMU Keyswitch
2. Rotate ¼ turn to the right until a fast beeping is heard.
3. Return the key back to the upright position and remove.

Arming using the EMU Keypad

Commands on the EMU Keypad require a four digit User or Owner Personal Identification Number (UPIN or OPIN) to be entered prior to a command sequence. The factory default UPIN is 1234, and the factory default OPIN is 5555.

The Keypad will give a short beep to confirm each key press, a long high-pitched beep after each successful command sequence, and a long low pitched beep after an invalid command sequence.

To arm the system, enter the UPIN or OPIN, then press ARM:

Arm using:	Key Sequence				
User PIN	U	P	I	N	ARM
	or				
Owner PIN	O	P	I	N	ARM

For example, to arm the system with the factory default UPIN, the key sequence would be:

Key Sequence				
1	2	3	4	ARM

The system will arm. The Armed lamp will come on and the Pulse lamp will flash (provided the fence is fault-free).

If the Armed lamp flashes and a slow beeping sound is heard, then the system has been configured with a gate override exit delay. This gate override allows you to exit the secure area through the gate without activating the alarm. After the delay period (for example, 2 minutes), the Armed lamp will remain on and the beeping will stop.

Disarming the EMU system

Disarming using the Keyswitch

Disarm the system in the same way as you arm it.

1. Insert the key into the EMU Keyswitch
2. Rotate ¼ turn to the right until a fast beeping is heard.
3. Return the key back to the upright position and remove.

Disarming using the Keypad

To disarm the system, enter the UPIN or OPIN, then press ENTER:

Disarm using:	Key Sequence				
User PIN	U	P	I	N	ENTER
	or				
Owner PIN	O	P	I	N	ENTER

The system will disarm and return to standby mode. The Armed lamp will turn off and the Pulse lamp will stop flashing.

Daytime Fence Monitoring

Twenty-four hour fence monitoring can be provided by the EMU, even without fully energising the fence. During the daytime, when people and children are expected to be around the fenced area, fence monitoring can be provided at a reduced voltage, by selecting "Monitor mode". In this mode the EMU is still able to monitor the electric fence installation, and will trigger the alarm if someone tampers with it.

Entering Monitor mode

Entering Monitor mode using the Keypad

To set Monitor mode, enter the UPIN or OPIN, then press MONITOR:

Monitor using:	Key Sequence				
User PIN	U	P	I	N	MONITOR
	or				
Owner PIN	O	P	I	N	MONITOR

Note that in Monitor mode the gate is not alarmed, but the EMU Keypad will chime each time the gate is opened to announce the presence of a visitor or intruder.

Note: This feature cannot be activated on the EMU Keyswitch.

Exiting Monitor mode

Exiting Monitor mode using the Keyswitch

An EMU Keyswitch can be used to exit Monitor mode.

1. Insert the key into the EMU Keyswitch
2. Rotate ¼ turn to the right until a fast beeping is heard.
3. Return the key back to the upright position and remove.

Exiting Monitor mode using the Keypad

To exit Monitor mode and return to Standby, enter the UPIN or OPIN, then press ENTER:

Return to standby using:	Key Sequence				
User PIN	U	P	I	N	ENTER
	or				
Owner PIN	O	P	I	N	ENTER

The system will disarm, the Armed lamp will turn off and the Pulse lamp will stop flashing.

Tip: You may instantly activate Armed and Monitor modes without first disarming the system.

U	P	I	N	MONITOR
		⇳		
U	P	I	N	ARM

or

O	P	I	N	MONITOR
		⇳		
O	P	I	N	ARM

EMU Alarm Response

If the EMU security system is breached, it triggers an alarm — the security siren and any auxiliary equipment, such as a master alarm system/tele-dialler, are activated.

After activation, the cause of the alarm is indicated by the Fence and Gate lamps (on the case front of the EMU Compact, the EMU Keypad, and EMU Keyswitch). Whenever the cause of alarm is present, the appropriate lamp will also flash.

After a programmed period (say, 3 minutes) the siren is automatically switched off, but any auxiliary equipment remains activated until the system is disarmed.

After the alarm siren has switched off automatically, the EMU system will remain active and be ready to raise the alarm again if necessary. Each subsequent activation of the alarm will normally cause the siren to be re-triggered.

The siren can be silenced immediately by the user, without deactivating the EMU system. This can be done using the EMU Keyswitch or EMU Keypad.

Silencing the siren and turning off auxiliary equipment

Silencing the siren and turning off auxiliary equipment using the Keyswitch

First silence the siren:

1. Insert the key into the EMU Keyswitch
2. Rotate ¼ turn to the right until a fast beeping is heard.
3. Return the key back to the upright position and remove.

Then disarm the EMU and deactivate auxiliary equipment:

- Repeat steps 1-3.

Silencing the siren and turning off auxiliary equipment using the Keypad

First silence the siren:

- Enter the UPIN or OPIN, then press ENTER:

Silence using:	Key Sequence				
User PIN	U	P	I	N	ENTER

or

Owner PIN	O	P	I	N	ENTER

Then disarm the EMU and deactivate auxiliary equipment:

- Repeat the step above.

Panic Alarm

In an emergency, a panic alarm can be raised manually by entering Panic mode.

Entering Panic mode

Entering Panic mode using the EMU Keypad

Enter the key sequence:

Key Sequence	Comment
PANIC	Hold for 3 seconds

Activating the alarm manually using the  button overrides all system settings and immediately activates the siren and auxiliary equipment. The electric fence is turned off to allow people to come to your assistance. The siren will not time-out and will continue until you exit Panic mode.

Note: A panic alarm cannot be raised using an EMU Keyswitch.

Exiting Panic Mode

Exiting Panic mode using the Keyswitch

An EMU Keyswitch can be used to exit Panic mode:

1. Insert the key into the EMU Keyswitch.
2. Rotate ¼ turn to the right and leave until a fast beeping is heard.
3. Return the key back to the upright position and remove key.

Exiting Panic mode using the Keypad

An EMU Keypad can be used to exit Panic mode by entering the UPIN or OPIN, then press ENTER:

Exit Panic mode using:	Key Sequence

User PIN	U	P	I	N	ENTER

or

Owner PIN	O	P	I	N	ENTER

EMU System Operation

Indicator lamps

You can quickly check the operating status of the EMU system by viewing the LED indicator lamps, fitted to EMU Keyswitches, EMU Keypads and the case front of the EMU Compact.

Lamp	State	Indicates
Pulse	Off	When armed, indicates the fence is damaged or security has been breached
	Flashing	EMU has delivered a good fence pulse
Armed	Off	Disarmed (Standby mode)
	Slow Flashing	Armed but waiting for entry/exit delay to time out
	Flashing	Monitor mode (low power daytime operation)
	Fast Flashing	Tampering detected
	On	Armed
Power	Off	Mains power off and battery disconnected or flat
	Slow Flashing	Mains power off and battery good
	Fast Flashing	Fault logged (Seek the advice of your installer.)
	On	Mains power on and battery good
Fence	Off	Normal operation—if armed, system is secure
	Flashing	Fence alarm condition present
	On	Fence currently secure, but the fence alarm has previously been triggered
Gate	Off	Gate closed
	Flashing	Gate open
	On	Gate currently closed, but the gate alarm has been triggered
Panic*	Off	Normal operation
	Flashing	Panic alarm has been activated.

*A panic indicator lamp is not fitted to EMU Compact or EMU Keyswitch (fitted to EMU Keypad only).

Notes:
- If the battery is discharged and there is no mains power, the EMU unit automatically switches to Sleep mode and all indicator lamps turn off to conserve battery life. In addition, the EMU Keypads and Keyswitches beep every 10 secs.
- To resume normal operation, charge the battery for a day (connect mains power) before re-arming the system. If the system still does not function correctly, seek the assistance of your installer.

Gate Alarm

The EMU system can monitor the gate used to access the area secured by the electric fence. If the gate is opened while the system is armed, an alarm will be triggered (subject to the optional exit/entry delays described below).

Exit/entry delays

The EMU can be set with a range of exit/entry delay times, which allow the person arming or disarming the EMU time to exit or enter the secured area through the gate, before the alarm is triggered. If required, ask your installer to set the delay times.

Note: The electric fence is energised from the moment the system is armed.

Gate alarm

While the EMU is armed (and any exit/entry delay has expired), the alarm will be triggered when the gate is opened.

Gate chime

The user can be alerted to the gate opening while the system is disarmed, via a gate chime. The chime is a two-tone beep from the EMU Keypad and EMU Keyswitches (where fitted). If the gate has been left open, after a short period has elapsed (half of the exit delay time), the chime will sound once every 10 seconds as a warning.

Tamper alarm

If someone tampers with the wiring to the gate break-switch, gate override switch, EMU Keypad, EMU Keyswitch, or EMU unit, the EMU system alarm will be triggered and the Armed lamp will flash fast to warn that the system has been tampered with.

When a tamper alarm is triggered the EMU will log a fault code, and indicate this by flashing the Power lamp (even after the alarm has been silenced). For information on how to display and clear this fault code, see *Troubleshooting* on page 16.

Silencing a tamper alarm

A tamper alarm cannot be silenced until the tampered wiring has been located and repaired. You must rectify the cause of the tamper alarm. Once the cause of the alarm has been fixed, it can be silenced like any other EMU system alarm. For details refer to EMU *Alarm Response* on page 7.

Note: Check with your installer to see which tamper detection features have been enabled in your system.

Setting the User and Owner PIN numbers

On Keypad equipped systems, the User PIN (UPIN) or Owner PIN (OPIN) number must be entered before the EMU will obey any commands, except when raising a panic alarm. These numbers should be kept secret to prevent unauthorised operation of the EMU.

Until configured, the factory default value of the OPIN is 5555, and the UPIN is 1234. New PIN numbers should be chosen and set for the UPIN and OPIN as soon as possible after the system is installed (if your system is fitted with a Keypad), to prevent unauthorised access.

The UPIN and OPIN differ only in that the OPIN is required to change these PIN numbers, whereas the UPIN cannot do this, even for the UPIN itself.

Setting the UPIN

To set the UPIN, enter the current OPIN followed by the command PROGRAM-9-1, and then key in the new UPIN, twice, followed by ENTER, as shown in the sequence below:

	Key Sequence						
Current OPIN	O	P	I	N	PROGRAM	9	1
New UPIN	U	P	I	N	ENTER		
New UPIN	U	P	I	N	ENTER		

Setting the OPIN

To set the OPIN, enter the current OPIN followed by the command PROGRAM-9-2, and then twice key in the new OPIN followed by ENTER, as shown in the ordered sequence below:

	Key Sequence						
Current OPIN	O	P	I	N	PROGRAM	9	2
New OPIN	O	P	I	N	ENTER		
New OPIN	O	P	I	N	ENTER		

Resetting the OPIN

If you should ever lose the OPIN, you will need to consult your installer to have the OPIN reset to the factory default value.

Troubleshooting

General system faults

If you encounter a problem with your EMU system, first ask your service agent for advice.

If the EMU unit detects a fault in the system, it will log a fault code, and the Power lamp will start flashing fast. Additionally the beeper will sound in EMU Keyswitch and EMU Keypad units. Ask your service agent for assistance.

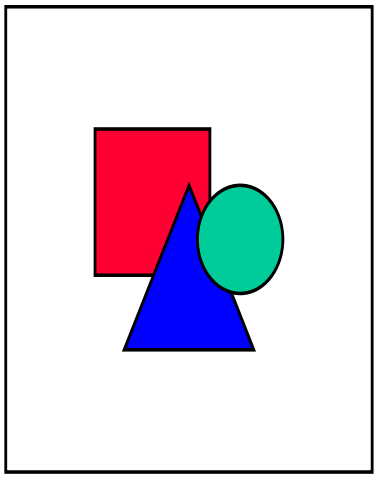
EMU Keypad or Keyswitch faults

In rare instances, the EMU Keypad or EMU Keyswitch may stop functioning normally (maybe after a bad lightning storm). In this instance, the Keypad or Keyswitch needs to be reset. Normal operation can usually be restored without the need for disassembly.

Resetting the EMU Keypad

Carry out the following procedure to reset the EMU Keypad:

1. Use the end of a paper-clip to pierce the label on the front case of the EMU Keypad in the place shown below:



2. Push the paper-clip about 20 mm through the hole just created and it will contact a small push button.
3. Press, and a tactile 'click' will be felt.
4. Remove the paper-clip and the EMU Keypad should beep and flash all the indicator lamps.

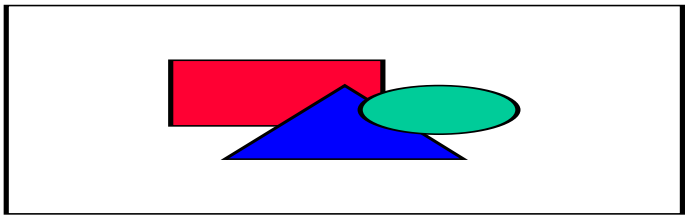
   Normal operation will then be restored.

If the EMU Keypad still does not function normally after performing the reset procedure, call your service agent for assistance.

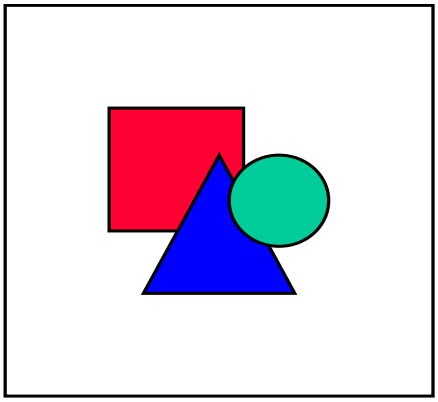
Resetting the EMU Keyswitch

Carry out the following procedure to reset the EMU Keyswitch:

1. Lift the front cover from the EMU Keyswitch by gently prying one end off at the corners, using a small flat blade screwdriver as shown below:



2. Insert a paper-clip into the hole shown in the diagram below:



3. Press firmly to trigger a reset.

   A tactile 'click' will be felt.

4. Remove the paper-clip and the EMU Keyswitch should beep and flash all the indicator lamps.

   Normal operation will then be restored.

5. Replace the EMU Keyswitch cover by pressing it back on until it snaps into place.

If the EMU Keyswitch still does not function normally after performing the reset procedure, call your service agent for assistance.

Care and Maintenance

While the EMU system has been designed to be as maintenance-free as possible, observing the recommendations below will help to ensure a long and trouble-free life from your system:

- Have the internal battery in the EMU unit checked at least every two years by your service agent, to preserve the back-up time of the EMU.
- Do not allow the EMU unit to go without mains power for long periods of time. This will damage the internal back-up battery.
- If you plan to disconnect mains power for more than a couple of days, disarm the EMU and leave on standby, or have the battery disconnected by your service agent.
- Do not leave the battery disconnected for over a month without charging.
- If you know that mains power has been inadvertently removed for several days (especially if the EMU was armed), have the battery checked by your service agent.
- If any physical damage occurs to the EMU system (especially the outside cables), have it checked and repaired promptly by your service agent, to ensure system integrity.
- The EMU Power Pack supply cord cannot be replaced. If the cord is damaged, the whole EMU Power Pack should be replaced.
- Ensure that the EMU Power Pack is located indoors and protected against damage from physical abuse, liquids, or corrosive chemicals. Have any suspected damage checked promptly by your service agent for continued safety.
- Do not disassemble the EMU system. There are no user serviceable parts inside any of the EMU system components.
- Ensure that the EMU unit and its accessories are always operated in a cool, dry, well ventilated area.
- Keep the EMU unit out of reach of children.
- Should the outside of any system component require cleaning, disarm the system first for safety. Then wipe gently with a soft cloth dampened in a mild soap-and-water solution. Do not use harsh chemicals or cleaning solvents.
- If the EMU system is to be decommissioned, return the EMU unit to your installer for safe disposal.

Warning: Never open the EMU unit yourself, even for cleaning. EMU units are sealed against dust and do not need cleaning inside.

Electric Fence Safety Considerations

If you are unsure of the meaning of the safety points detailed below, please seek clarification from your installer before using the system.

The following section has been prepared from information appearing in international safety standard IEC 60335-2-76. Please read it thoroughly.

EMU safety requirements

- The EMU unit is suitable for indoor use only.
- The EMU unit uses a sealed lead-acid rechargeable battery of 7 ampere-hour capacity. Do not use non-rechargeable batteries.
- Do not attempt to replace the battery. Batteries should be replaced only by a suitably qualified installer.
- When disposing of the EMU unit, have the battery removed by your installer for safe disposal. Do not dispose of the battery in a land-fill. Do not dispose in a fire.
- In the event of a spill or leakage from the battery:
  - Contain small spills with dry sand, earth and vermiculite. Do not use combustible materials. If possible, carefully neutralise spilled electrolyte with soda ash, sodium bicarbonate, lime, etc.
  - Wear acid-resistant clothing, boots, gloves and a face shield.
  - Do not let un-neutralised acid get into the sewage system.
  - Neutralised acid must be managed in accordance with approved local requirements. Consult your local environmental agency.

Instructions for installation and connection of electric fences

1 Requirements for electric animal fences

- Electric animal fences and their ancillary equipment shall be installed, operated and maintained in a manner that minimizes danger to persons, animals or their surroundings.
- Electric animal fence constructions that are likely to lead to the entanglement of animals or persons shall be avoided.
- An electric animal fence shall not be supplied from two separate energizers or from independent fence circuits of the same energizer.
- For any two separate electric animal fences, each supplied from a separate energizer independently timed, the distance between the wires of the two electric animal fences shall be at least 2 m. If this gap is to be closed, this shall be effected by means of electrically non-conductive material or an isolated metal barrier.

- Barbed wire or razor wire shall not be electrified by an energizer.
- A non-electrified fence incorporating barbed wire or razor wire may be used to support one or more off-set electrified wires of an electric animal fence. The supporting devices for the electrified wires shall be constructed so as to ensure that these wires are positioned at a minimum distance of 150 mm from the vertical plane of the non-electrified wires. The barbed wire and razor wire shall be earthed at regular intervals.
- Follow the energizer manufacturer's recommendations regarding earthing.
- A distance of at least 10 m shall be maintained between the energizer earth electrode and any other earthing system connected parts such as the power supply system protective earth or the telecommunication system earth.
- Connecting leads that are run inside buildings shall be effectively insulated from the earthed structural parts of the building. This may be achieved by using insulated high voltage cable.
- Connecting leads that are run underground shall be run in conduit of insulating material or else insulated high voltage cable shall be used. Care must be taken to avoid damage to the connecting leads due to the effects of animal hooves or tractor wheels sinking into the ground.
- Connecting leads shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.
- Connecting leads and electric animal fence wires shall not cross above overhead power or communication lines.
- Crossings with overhead power lines shall be avoided wherever possible. If such a crossing cannot be avoided it shall be made underneath the power line and as nearly as possible at right angles to it.
- If connecting leads and electric animal fence wires are installed near an overhead power line, the clearances shall not be less than those shown in Table 1.

Table 1 - Minimum clearances from power lines for electric animal fences

Power line voltage (V)	Clearance (m)
≤ 1 000	3
> 1 000 and ≤ 33 000	4
> 33 000	8

- If connecting leads and electric animal fence wires are installed near an overhead power line, their height above the ground shall not exceed 3 m
- This height applies to either side of the orthogonal projection of the outermost conductors of the power line on the ground surface, for a distance of:
  - 2 m for power lines operating at a nominal voltage not exceeding 1 000 V
  - 15 m for power lines operating at a nominal voltage exceeding 1 000 V.

- Electric animal fences intended for deterring birds, household pet containment or training animals such as cows need only be supplied from low output energizers to obtain satisfactory and safe performance.
- In electric animal fences intended for deterring birds from roosting on buildings, no electric fence wire shall be connected to the energizer earth electrode. A warning sign shall be fitted to every point where persons may gain ready access to the conductors.
- Where an electric animal fence crosses a public pathway, a non-electrified gate shall be incorporated in the electric animal fence at that point or a crossing by means of stiles shall be provided. At any such crossing, the adjacent electrified wires shall carry warning signs.
- Any part of an electric animal fence that is installed along a public road or pathway shall be identified at frequent intervals by warning signs securely fastened to the fence posts or firmly clamped to the fence wires.
- The size of the warning sign shall be at least 100 mm $\times$ 200 mm.
- The background colour of both sides of the warning sign shall be yellow. The inscription on the sign shall be black and shall be either:
  - the symbol of Figure 1, or
  - the substance of "CAUTION: Electric animal fence".
- The inscription shall be indelible, inscribed on both sides of the warning sign and have a height of at least 25 mm.
- Ensure that all mains-operated, ancillary equipment connected to the electric animal fence circuit provides a degree of isolation between the fence circuit and the supply mains equivalent to that provided by the energizer.
  NOTE: Ancillary equipment that complies with the requirements relating to isolation between the fence circuit and the supply mains in Clauses 14, 16 and 29 of the standard for the electric fence energizer is considered to provide an adequate level of isolation.
- Protection from the weather shall be provided for the ancillary equipment unless this equipment is certified by the manufacturer as being suitable for use outdoors, and is of a type with a minimum degree of protection IPX4.

2 Requirements for electric security fences

- Electric security fences and their ancillary equipment shall be installed, operated and maintained in a manner that minimizes danger to persons, and reduces the risk of persons receiving an electric shock unless they attempt to penetrate the physical barrier, or are in the secure area without authority.
- Electric security fence constructions that are likely to lead to the entanglement of persons shall be avoided.
- Gates in electric security fences shall be capable of being opened without the person receiving an electric shock.
- An electric security fence shall not be supplied from two separate energizers or from independent fence circuits of the same energizer.

- For any two separate electric security fences, each supplied from a separate energizer independently timed, the distance between the wires of the two electric security fences shall be at least 2,5 m. If this gap is to be closed, this shall be effected by means of electrically non-conductive material or an isolated metal barrier.
- Barbed wire or razor wire shall not be electrified by an energizer.
- Follow the energizer manufacturer's recommendations regarding earthing.
- The distance between any electric security fence earth electrode and other earth systems shall be not less than 2 m, except when associated with a graded earth mat.
  NOTE: Where possible the distance between any electric security fence earth electrode and other earth systems should preferably be at least 10 m.
- Exposed conductive parts of the physical barrier shall be effectively earthed.
- Where an electric security fence passes below bare power line conductors, the highest metallic element shall be effectively earthed for a distance of not less than 5 m on either side of the crossing point.
- Connecting leads that are run inside buildings shall be effectively insulated from the earthed structural parts of the building. This may be achieved by using insulated high voltage cable.
- Connecting leads that are run underground shall be run in conduit of insulating material or else insulated high voltage cable shall be used. Care must be taken to avoid damage to the connecting leads due to the effects of vehicle wheels sinking into the ground.
- Connecting leads shall not be installed in the same conduit as the mains supply wiring, communication cables or data cables.
- Connecting leads and electric security fence wires shall not cross above overhead power or communication lines.
- Crossings with overhead power lines shall be avoided wherever possible. If such a crossing cannot be avoided it shall be made underneath the power line and as nearly as possible at right angles to it.

- If connecting leads and electric security fence wires are installed near an overhead power line, the clearances shall not be less than those shown in Table 2.

Table 2 – Minimum clearances from power lines for electric security fences

Power line voltage (V)	Clearance (m)
≤1 000	3
>1 000 and ≤33 000	4
>33 000	8

- If connecting leads and electric security fence wires are installed near an overhead power line, their height above the ground shall not exceed 3 m
- This height applies to either side of the orthogonal projection of the outermost conductors of the power line on the ground surface, for a distance of:
  - 2 m for power lines operating at a nominal voltage not exceeding 1 000 V
  - 15 m for power lines operating at a nominal voltage exceeding 1 000 V.
- A spacing of 2,5 m shall be maintained between uninsulated electric security fence conductors or uninsulated connecting leads supplied from separate energizers. This spacing may be less where conductors or connecting leads are covered by insulating sleeving, or consist of insulated cables rated to at least 10 kV.
- This requirement need not apply where the separately energized conductors are separated by a physical barrier that does not have any openings greater than 50 mm.
- A vertical separation of not less than 2 m shall be maintained between pulsed conductors fed from separate energizers.
- Electric security fences shall be identified by prominently placed warning signs.
- The warning signs shall be legible from the secure area and the public access area.
- Each side of the electric security fence shall have at least one warning sign.
- Warning signs shall be placed:
  - at each gate;
  - at each access point;
  - at intervals not exceeding 10 m;
  - adjacent to each sign relating to chemical hazards for the information of the emergency services.
- Any part of an electric security fence that is installed along a public road or pathway shall be identified at frequent intervals by warning signs securely fastened to the fence posts or firmly clamped to the fence wires.
- The size of the warning sign shall be at least 100 mm × 200 mm.
- The background colour of both sides of the warning sign shall be yellow. The inscription on the sign shall be black and shall be either:
  - the symbol of Figure 1, or
  - the substance of “CAUTION: Electric security fence”.

- The inscription shall be indelible, inscribed on both sides of the warning sign and have a height of at least 25 mm.
- Ensure that all mains operated, ancillary equipment connected to the electric security fence circuit provides a degree of isolation between the fence circuit and the supply mains equivalent to that provided by the energizer.
  NOTE: Ancillary equipment that complies with the requirements relating to isolation between the fence circuit and the supply mains in Clauses 14, 16 and 29 of the standard for the electric fence energizer is considered to provide an adequate level of isolation.
- Mains supply wiring shall not be installed in the same conduit as signalling leads associated with the electric security fence installation.
- Protection from the weather shall be provided for the ancillary equipment unless this equipment is certified by the manufacturer as being suitable for use outdoors, and is of a type with a minimum degree of protection IPX4.

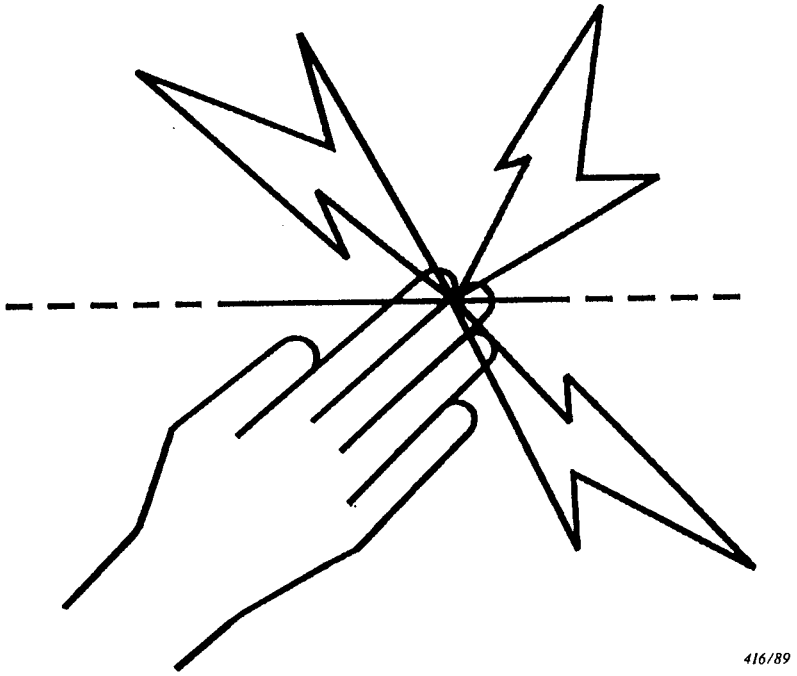


Figure 1 – Symbol for warning sign

Installation of electric security fences

1 General

An electric security fence should be installed so that, under normal conditions of operation, persons are protected against inadvertent contact with pulsed conductors.

NOTES:
- This requirement is primarily intended to establish that a desirable level of safety is present or is being maintained in the physical barrier.
- When selecting the type of physical barrier, the likely presence of young children should be a factor in considering the size of openings.

2 Location of electric security fence

The electric fence should be separated from the public access area by means of a physical barrier.

Where an electric fence is installed in an elevated position, such as a window or skylight, the physical barrier may be less than 1,5 m high where it covers the whole of the electric fence.

3 Prohibited zone for pulsed conductors

Pulsed conductors shall not be installed within the shaded zone shown in Figure 2.

NOTES:
- Where an electric security fence is planned to run close to a site boundary, the relevant government authority should be consulted before installation begins.
- Typical electric security fence installations are shown in Figure 3 and Figure 4.

4 Separation between electric fence and physical barrier

Where a physical barrier is installed in compliance with 3 (Prohibited zone for pulsed conductors) at least one dimension in any opening should be not greater than 130 mm and the separation between the electric fence and the physical barrier should be:
- within the range of 100 mm to 200 mm or greater than 1000 mm where at least one dimension in each opening in the physical barrier is not greater than 130 mm;
- greater than 1000 mm where any opening in the physical barrier has all dimensions greater than 50 mm;
- less than 200 mm or greater than 1000 mm where the physical barrier does not have any openings.

NOTES:
- These restrictions are intended to reduce the possibility of persons making inadvertent contact with the pulsed conductors and to prevent them from becoming wedged between the electric fence and the physical barrier, thereby being exposed to multiple shocks from the energizer.
- The separation is the perpendicular distance between the electric fence and the physical barrier.

5 Prohibited mounting

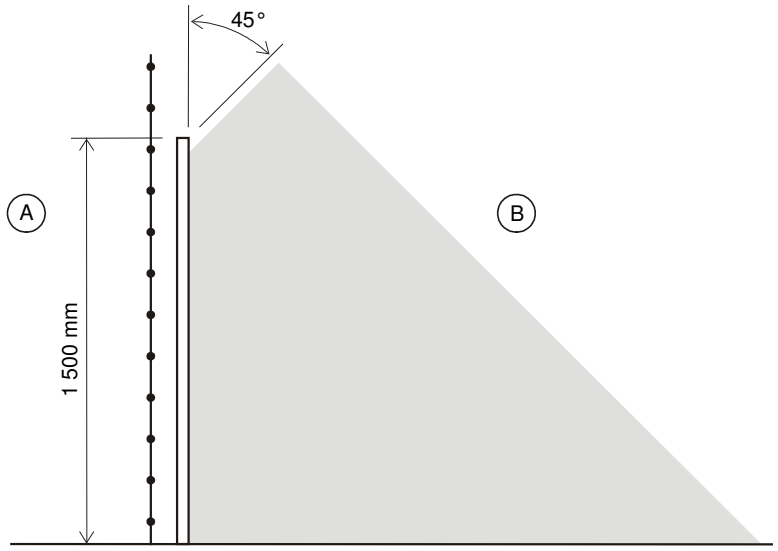
Electric fence conductors should not be mounted on a support used for any overhead power line.

6 Operation of electric security fence

The conductors of an electric fence should not be energized unless all authorized persons, within or entering the secure area, have been informed of its location.

Where there is a risk of persons being injured by a secondary cause, appropriate additional safety precautions should be taken.

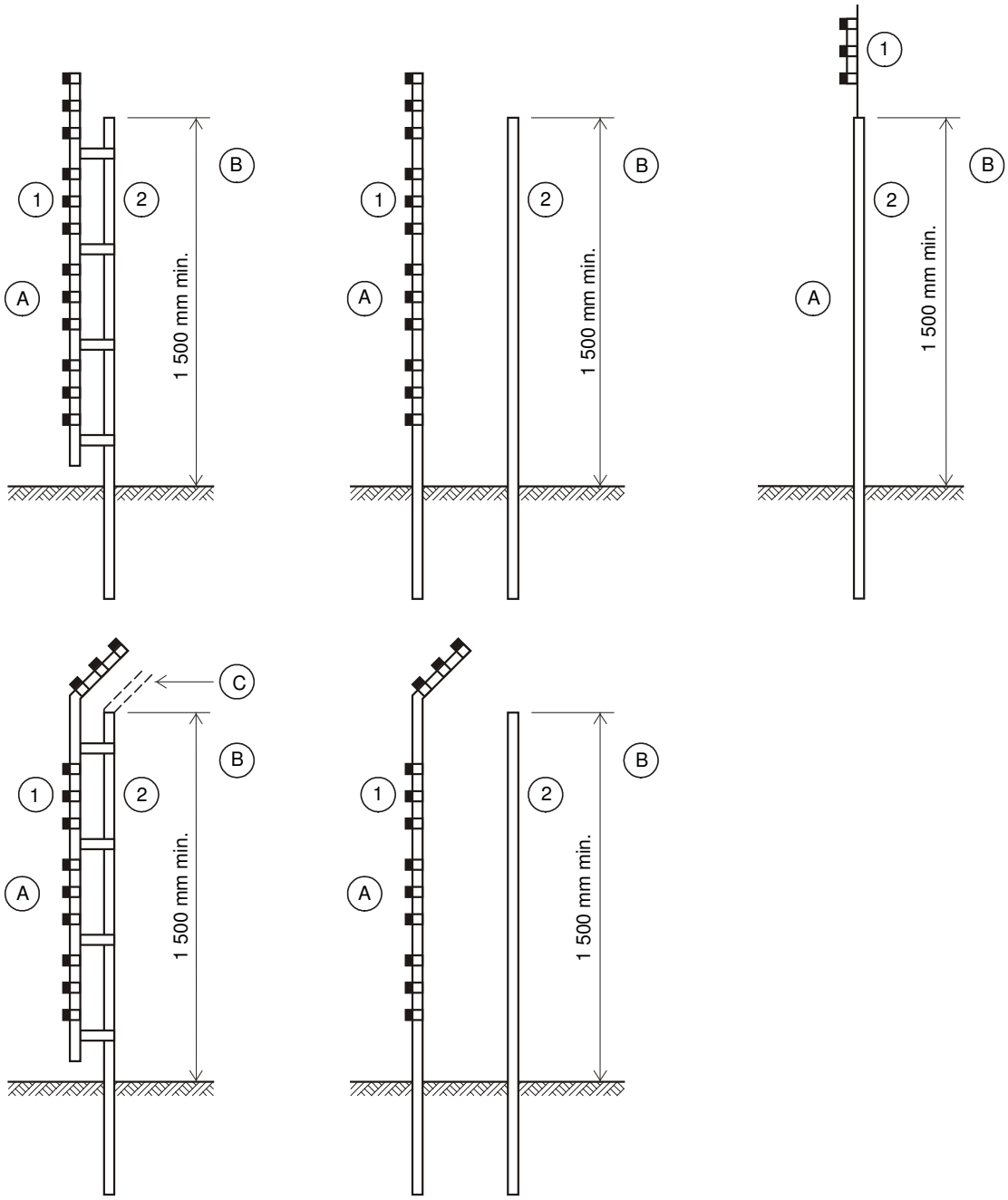
NOTE: An example of a secondary cause is where a person may be expected to fall from a surface if contact is made with pulsed conductors.



Key

A	Secure area
B	Public access area
	Physical barrier
	Prohibited area
	Electric security fence

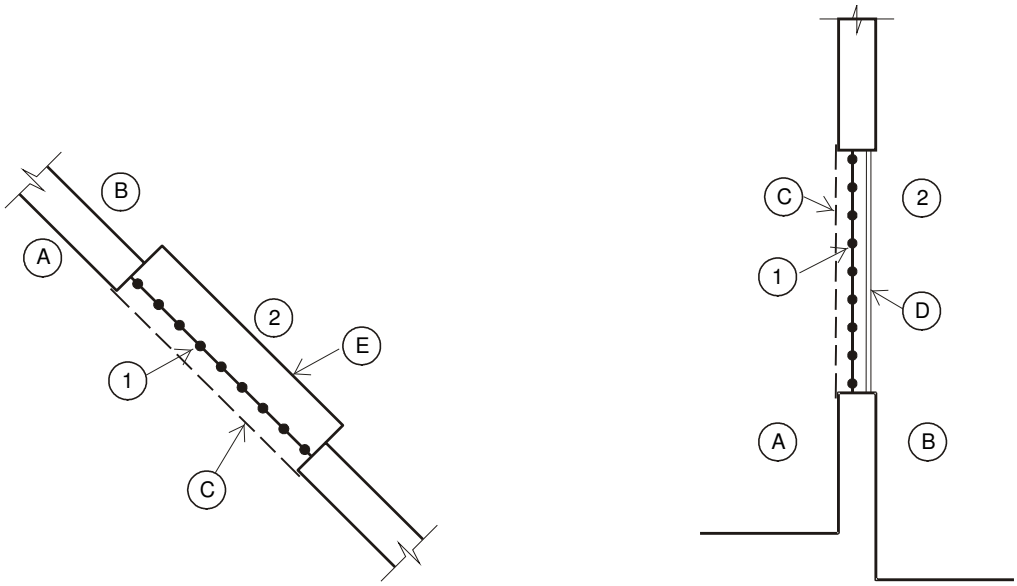
Figure 2 – Prohibited area for pulse conductors



Key

A	Secure area
B	Public access area
C	Barrier where required
1	Electric security fence
2	Physical barrier

Figure 3 – Typical constructions where an electric security fence is exposed to the public



Key

A	Secure area
B	Public access area
C	Barrier where required
D	Glass window pane
E	Skylight in roof
1	Electric security fence
2	Physical barrier

Figure 4 – Typical fence constructions where the electric security fence is installed in windows and skylights