

DESCRIPTION

The VD500 seismic detector mounts on steel and concrete surfaces providing reliable protection of the high risk objects such as safes, strongboxes, depository safes, ATM, filing or armoury cabinets, concrete walls etc. The VD500 gives indication of any penetration attempt by means of explosives or tools such as drills, disc-cutters, grinding machines and thermal tools. The detector provides protection thanks to 3 separate detection channels:

- Integrating channel - detects low amplitude high frequency signals of long duration.
- Counting channel – detects events of middle values of energy.
- Explosion detection channel - detects very high amplitude and short duration signals. Out of all the 3 channels this channel has the highest priority.

The sensitivity is adjusted in digital way by means of pre-programmed DIP-switch.

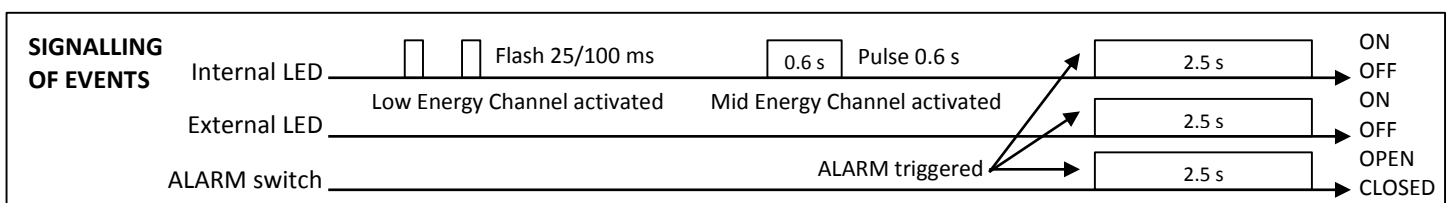
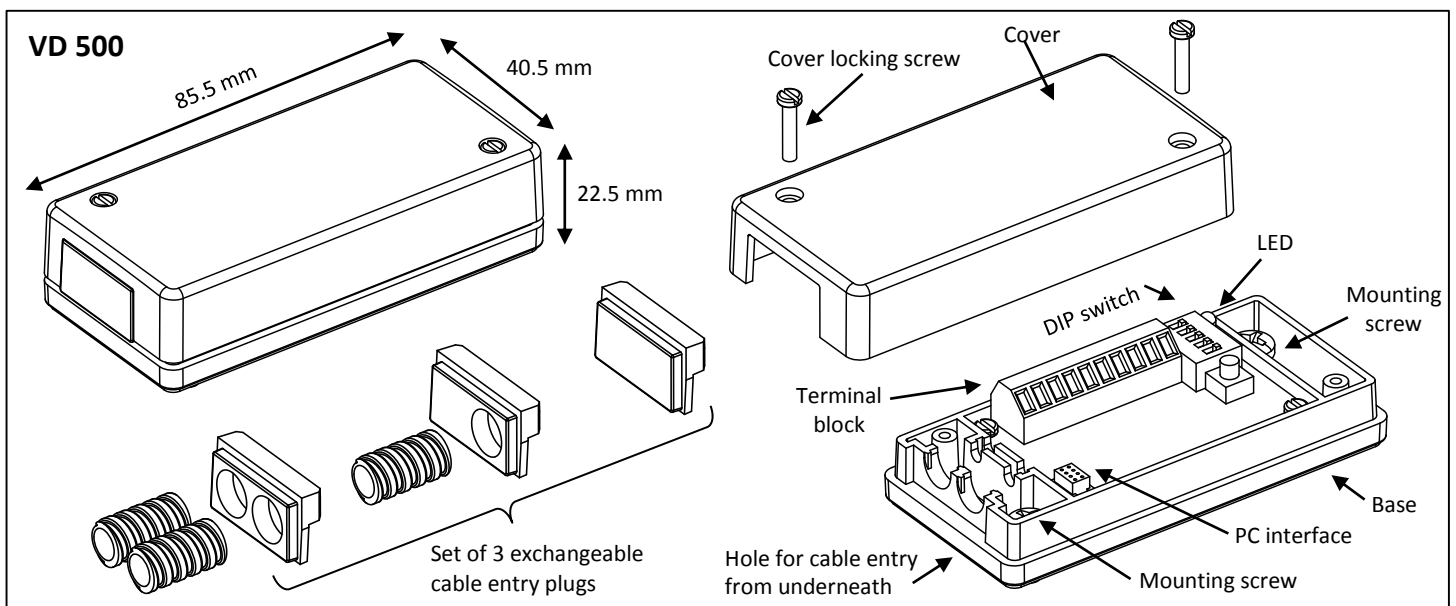
When mounting the VD500 verify uniformity of the surface it is to rest on and make sure it is properly fixed. Special mounting plate **MP500** along with additional bolt and a dowel facilitates mounting of the detector on concrete and brick walls.

For outdoor mounting locations with likely severe weather conditions or for installations in cold rooms, the detector should be enclosed in the **WH500** whose internal heater maintains sufficiently high air temperature around the detector thereby keeping the humidity below the critical point.

The VD500 seismic detector includes LED alarm condition indicator, temperature alarm detection, anti-tamper protection and built-in self-test generator with remote test input. The light grey detector housing is useful for installations in severe environments.

FEATURES

- Miniature, low-profile detector for application with limited space
- 24-hour surveillance of vaults, safes, night deposits, ATMs, strong room doors and walls, etc.
- Advanced DSP system based on a microcontroller
- Noise filtering system providing high immunity to environmental noise
- Detection of momentary high amplitude shock waves
- Programmable level of mid-energy attacks
- Quick sensitivity adjustment using a DIP switch
- Built-in settings for protection of ATMs and depository safes
- User programmable mode
- Built-in LED as alarm indicator
- Built-in self-test generator
- Remote self-test triggering input
- TEST input line with double functionality:
 - Self-test trigger (Low->High)
 - Alarm reset (High->Low)
- Alarm relay triggering mode programmable: latched or auto-reset
- Output line for external LED
- Anti-tamper protection
- Pry-off detection
- Temperature alarm at 75°C and Rate of Rise 6 °C /min
- Wide range of supply voltage – from 8 to 30 V
- Low-voltage indication
- Built-in events log (“black-box”)
- Built-in PC interface for monitoring software CVDlink
- Approved by VdS, Techom and other European certification bureaus



APPLICATION

The unit can be mounted on any stable surface where an intrusion attempt might occur. However, the following must be taken in to account:

1. The design and construction of the protected surface and its material.
2. The detector location in relations to studs, joints, door/window hinges etc.
3. Background disturbances that can influence the detector.

COVERAGE

The typical coverage in various materials is shown in the table below for High sensitivity. The ranges are only presented as guidelines, practical tests must always be conducted.

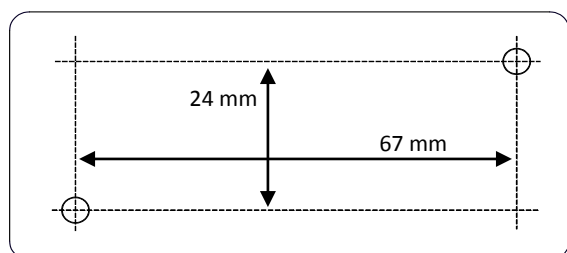
Surface material	Steel	Concrete (*)	Brick (*)
Radius	5 m	5 m	4 m

* – with MP500 mounting set

MOUNTING

1. Loosen the cover screws and remove cover
2. Select a suitable mounting position
3. Use the bottom part as a template and mark the fixing holes
4. Use a proper drill and thread for:
 - a. Steel: M4 screws
 - b. Concrete and brickwork: use MP500 and M4 screws
 - c. Wood: self-tapping screws

Placement of detector mounting screws (drill pattern):



CONNECTION OF DETECTOR

Detector has 10 position terminal block:

Pos.	Marking	Signal
1	(-)	Common ground
2	(+)	Supply voltage +8 ... + 30 V
3	LED	External LED output, OC output w. 1k in series
4	TEST	Self-test trigger (Lo->Hi), Reset (Hi->Lo)
5	C	Alarm switch
6	NC	
7	Spare	Spare
8	Open case	Tamper switch, detection of cover and detector removal
9	Pry-off	
10	Spare	Spare

FUNCTIONALITY OF TEST INPUT LINE

Input TEST controls 2 functions:

- Start of self-test (Low -> High)
- Reset of detector (High -> Low)

During self-test detector activates built-in transducer stimulating vibration sensor. Detector should respond to this stimulation generating ALARM signal – ALARM switch should be open and LED should be lit signalling alarm.

TEST line state	Action
Low -> High	Start of Self-Test procedure (simulation of attack)
High -> Low	ALARM reset

CONNECTION OF EXTERNAL LED

The output for External LED can be used for external indication. It is an open collector output with 1Kohm in series and can drive a load of max 100 mA.

PROGRAMMING DIP-SWITCH

One 5-position DIP switch is used to program the following detector functions:

1. Sensitivity – one of four predefined ranges
2. Application settings (1 to 4)
3. Operational modes of LED and alarm relay:
 - a. Auto reset – automatic reset after 2s
 - b. Latch – reset by power off/on or TEST line

Position	Parameter/DIP-switch setting				
	Sensitivity	Very Low	Low	Standard	High
1	OFF	OFF	ON	ON	ON
2	OFF	ON	OFF	OFF	ON
Application	Safes/Metal	Walls/Concrete/Bricks	ATM	User programmable	
3	OFF	OFF	ON	ON	ON
4	OFF	ON	OFF	OFF	ON
Mode	Auto reset (2s)		Latch		
5	OFF		ON		

On delivery all five DIP switch positions set to OFF.

ADJUSTMENT AND SETTING-UP

Adjustment and setting is quite simple. Select the application with DIP switch 3 and 4. Check if detector mode is set to auto reset (DIP switch pos. 5=off). The LED will indicate activation and the alarm relay will reset for two seconds. Each registered impact will be shown by a short flash, the alarm will result in a longer flash.

1. Set-up the highest sensitivity (1=ON, 2=ON).
2. Tap lightly close to the detector and check if each tap is indicated properly.
3. Set-up the lowest sensitivity (1=OFF, 2=OFF).
4. Use the test tool GVT 5000 or tap with a screwdriver at the most distant point to be protected and increase the sensitivity until the LED indicates a received pulse.

CONNECTION TO PC

Detector VD500 is equipped with PC interface terminal. Communication can be achieved with the help of additional interface unit **CVDlink** providing also supply of detector from voltage available in USB port. Visualization of detector state, signal and event recording and access to internal detector logger (black-box) is possible with the help of **CVDlink** software.

Notice: Internal detector settings can be programmed in user programmable mode by the operator. This kind of parameterization is not included in the approval and shall not be used in the approved version.

TECHNICAL DATA

Supply voltage	8 – 30 V, DC
Stabilization time	5 s after power on
Max ripple	2 Vpp (@ 12 V)
Current draw (standby)	7.5 mA @ 12 V / 4.6 mA @ 24 V
Current draw (alarm)	8,4 mA @ 12 V / 5.1 mA @ 24 V
TEST Low/High input	0 – 1 V (default state) / 3 – 30 V
Alarm output	relay, NC, res. < 30 Ω
Alarm response time	2.5 s in automatic reset mode
Relay contact rating	35 V/100 mA
Low voltage alarm	< 7.5 V
Temperature alarm	75 °C and rate of rise at 6 °C/min
Tamper protection	micro-switch, NC
Switch contact rating	35 V/50 mA
Detected events	case removal, detector removal (pry-off)
Dimensions [HxDxW]	22.5 x 40.5 x 85.5 mm
Operating temperature	from -40 °C to +70 °C
Storing temperature	from -50 °C to +70 °C
Humidity	max. 95 % RH
Housing protection cat.	IP 43, IK07
Conformity: CE, RoHS, WEEE, EN 50130-4, EN 50130-5 class IIIA, SBSC Nr 13-573 Class 3/4, VdS G 114006 Class C, env. class IIIA	

VD 400 Vibration Detector



TECHNICAL MANUAL

Rev 2, 2002 GB

FEATURES

- * SOLID STATE SELECTIVE VIBRATION DETECTOR
- * DETECTS ATTACKS AGAINST LAMINATED GLASS
- * EASY TO INSTALL AND CAN BE MOUNTED IN ANY POSITION
- * ANALYSER AND SENSOR IN ONE UNIT
- * FULL CUSTOM MICRO CONTROLLER
- * RELAY ALARM OUTPUT
- * AUTOMATIC RESET OR LATCH OUT
- * DAY/NIGHT CONTROL OF LED INDICATION WHICH MEET BS4737:PART 3:SECTION 3.10
- * THREE CHANNELS TO ANALYSE THE VIBRATION SIGNAL
- * COUNTING CHANNEL 4 KNOCKS PROGRAMMABLE
- * GROSS ATTACK CHANNEL
- * INTEGRATION CHANNEL
- * FIRST TO DETECT INDICATION
- * PREALARM INDICATION OF EACH CHANNEL FOR EASY ADJUSTMENT
- * TAMPER PROTECTIONS
 1. Opening protection
 2. Low voltage protection
 3. Outside magnet field can't hold the relay
 4. watch dog function
- * AVAILABLE WITH COVER IN GREY METAL COVER

INTRODUCTION

The AlarmtechVD 400 is a selective vibration detector. It is primarily designed to detect attacks against laminated glass on which it is glued on to. It is sensing the VIBRATION pattern created when an intruder forces his way through a structure. When a material is subject to this type of stress the shock pattern created has an element of acceleration. High frequency signals are generated when the structure starts to break down. The VD 400 sensor converts these signals into electrical signals and its analyser distinguishes these signals from normal disturbances in the surrounding.

The AlarmtechVD 400 has a microprocessor capable of providing great processing power to minimise the incidence of false alarms. In addition to the improvement of detecting unlawful attack, the microcircuit can provide a variety of options of great use for the alarm installer.

The AlarmtechVD 400 has a Piezo electric sensor within the module that is designed to respond only to high frequency vibrations and shocks. The detector is immune to low frequency vibrations and incorporates an individual sensitivity control to enable the installer to selectively adjust each detector to suit the area to be protected. The point at which the detector triggers at the selected level is only dependent upon the magnitude of the shock and the nature of the vibration.

Also in the design of the program to the microprocessor we have used our deep knowledge in processing vibration signals and we have introduced in the AlarmtechVD 400 the same "Seismic Philosophy" which have proven to be so reliable.

VD 400 ALARMTECH has 3 detection channels

1. Explosion channel gross attack channel
2. Counting channels with up to 4 knocks programmable
3. Integrating channel

The explosion channel overrules the 2 other channels in case of a gross attack.

The counting channel counts the number of shock pulses caused by the attack against the protected structure and the number 4 knocks.

The integrating channel allows detection of those attacks that create low signals but requires longer time to carry out. That allows us to reduce the sensitivity of the counting channel, as we don't need to detect those low signals so fast. In this integrating channel we also have even more taken away the low frequency to reduce the influence of common noise sources in the surrounding. We have with the integrating channel designed a very safe and efficient detector.

Function control

Use the tester GVT 5000. The tester will give out bursts of vibration signals. Counting the number of bursts to alarm is a measurement of the sensitivity setting. Function control of Alarmtech VD 400 is simplified with the TEST function that when Jumper 4 is inserted or when wired in on terminal 3 it can be controlled remotely (jumper 4 must then be removed). The LED will now indicate when the unit goes into alarm and the LED lit up and reset after 2s if the D/N line on terminal 4 is in DAY-position or not connected. The LED will prealarm with a short flash for each count. When the integrator works there are very short flashes. It is therefore very easy to see the reaction of the detector.

The alarm relay will follow the programming AUTO RESET or LATCHING by jumper 3. The installer does not need to return to the control panel for resetting the unit

Setting up

The cover will need to be removed for the following operations, and tamper circuit disarmed at the control panel.

1. Program the VD 400 for TEST with jumper 4 inserted and Relay in AUTO RESET with jumper 3 inserted.
2. Rotate the sensitivity control fully clockwise and apply 12 volts DC to the VD 400 .
3. Check its operation by gently tapping the adjacent surface and note that the LED illuminates.
4. Rotate the sensitivity control fully anti-clockwise and reset the detector by momentary disconnection of the 12-volt supply.
5. Operate the GVT 500 TESTER at the furthest distance from the device and progressively increase sensitivity by rotating the control clockwise until the LED is iflashing when the GVT is operated. Count the number of vibration bursts to alarm. It is a good measurement of the sensitivity. A sensitivity setting of 5-6 bursts to alarm is normal.
6. Repeat at other locations around the perimeter of the zone.
7. After setting the sensitivity, connect the wires into the terminal block and mount the cover. Check operation of the alarm and tamper circuits at control panel.

High sensitivity levels should not be attempted over large areas unless the installer is confident that false vibration signals cannot arise from objects in the surrounding like machinery, loose surfaces and other.

Alarmtech VD 400 has been designed to give a long reliable life, however it is recommended that each device be checked regularly. As VD 400 has the capability of analysing both the signal magnitude and duration the installer should consider the potential methods of attack and adjust the sensitivity accordingly. The device will either respond to one large blow or several small

ones or to an attack method with low signal amplitude but with long duration you get with tools like diamond discs, drilling or welding touch.

Planning instruction

Area of protection

The Alarmtech VD 400 is designed to detect intrusion through laminated glass on which it is glued on. It can also be used on other materials. The area of protection cannot be simply defined since there are many factors that influence the overall sensitivity.

1. The area of protection.
2. Construction and fabric of the surface to which the sensor is attached.
3. Physical location of the sensor relative to beams, hinges, cross members and discontinuities such as opening frames etc.

Since the device can be mounted in any position the installer has greater attitude to select the optimum position to mount the device. On laminated glass it is recommended to mount it close to one of the upper corners to avoid that cleaning solvent penetrate the detector. Materials used in the construction industry all have differing abilities to transmit mechanical vibration and further irregularities, cracks and voids etc. will impair the performance and hence affect the area that can be safely protected.

Detection range

Surface	Laminated Glass	Steel sheet	Concrete (on MP 400)	Brickwork	Wood
Radius	5 m	5 m	5 m	4 m	3 m

* All values quoted are typical and are subject to practical testing which must be made for each installation. In some environments attenuation may be very high. On brickwork, and concrete the mounting plate with the expander bolt must be used.

Applications

The Alarmtech VD 400 may be fitted to laminated glass by using the same glue kit as for the Glass Break Detectors GB 500-series or to any solid structure directly by using the enclosed screw or the metal mounting plate MP 400. The sensor works effectively on all solid materials such as metal, glass, wood, concrete, brickwork, etc. In general the more dense the material is the greater its ability to transfer high frequency shock signals.

On metal frames or grills a range of 5 metres is easily achieved. This type of security grill is normally fitted inside windows, skylights etc. When an VD 400 is fitted secure, the security level is high, as soon as an intruder attack the grill with any metal object the integration channel of the detector immediately detects the small high frequency signals. The type of grill referred to here is of rigid construction not to be confused with roller type shutter grills.

On brickwork a 4-metre range from the sensor is possible and on concrete that is denser, a range of 5 metres or more is easily obtained if mechanical tools is used in the attack.

On weaker structures such as asbestos roofs etc. sensor spacing of between 2.5 and 3 metres has been found to be adequate. In this situation each sensor should cover an area of approximately 30 square metres.

Care should be taken with less dense materials such as studded walls where plasterboard is used. In this situation, Alarmtech VD 400 should be fitted closer together, however fitting them in metal conduit boxes may increase sensitivity.

A combination of Alarmtech VD 400 with Alarmtech magnetic contacts provides the best form of protection to a door structure, for example a safe door or steel entrance door. Alarmtech has designed a broad range of recessed and flush mounted high security contacts. If the door is left unlocked then the Alarmtech VD 400 is unable to see the low frequency movement as the door opens. It is for that reason that the magnetic contact is required.

TECHNICAL DESCRIPTION

Integrating Channel

The integrating channel in ALARMTECH VD 400 is sensing very low signals and need to have duration of minimum 2s up to 30s before it triggers an alarm. The sensitivity is set by the potentiometer that also controls the counting channel sensitivity such that the sensitivity distance always is constant and preset by the factory.

The integrating channel has a much higher cut off frequency than the counting channel to increase the immunity to common noise sources with low signal output.

Counting Channel

The Alarmtech VD 400 is factory preset to 4 knocks to minimise the possibility of false alarm.

This channel opens up the possibility to decrease the sensitivity of the integrating channel and yet to minimise the possibility of false alarms and thereby increase the detection probability and range. In this situation, small shocks are counted by the electronics; these pulses are stored in a digital memory. For each pulse the reset timer of 8s restart. If the attack is sustained the maximum monitoring time is $4 * 8s = 32s$ if during this time the programmed pulse count number is reached the alarm is given.

Auto Reset/Latching

Alarmtech VD 400 has, when delivered, jumper 3 inserted and is therefore configured for automatic reset of the relay. In the event of an alarm situation the relay contacts will remain open for approximately 2s before resetting.

When removing the jumper 3 the device is configured for latching of the relay. The relay now remains open until resetted. To reset relay two possibilities are available.

1. Interruption of the power
2. Remotely by using the D/N function on terminal 3 if it is wired in.

D/N Terminal 3.

This function meet the objective of British Standard BS 4737 part 3, section 3.10, to provide indication only during setting, unsetting and testing procedures.

Remote control of the LED is achieved by daisy chain connection of all terminal 4 back to the control panel and switching the line high or low as desired.

Note: To function properly the jumper 4 must be removed.

Terminal 4 high

This is the Night position. When the device triggers an alarm there will be no indication. The alarm relay will open for 2s or latch in alarm depending on jumper 3. This alarm is now stored in a memory.

Terminal 4 Low

When switching from High to Low all devices with an alarm will now lit. Switching momentarily the line high does reset of both the relay and LED.

When the line is low no alarm indication is possible if the unit

TEST

With jumper 4 the Alarmtech VD 400 can be programmed to indicate with the LED the reaction of the detector. This is a very useful and convenient feature at set up and calibration procedures. Use the GVT 5000 tester when testing the unit.

In TEST position there will be a short prealarm. The LED give a very short flash for each integration or the LED give a little longer flash for each count the detector memorise. The Alarm is indicated with a 2 s long LED flash or is permanently lit until resetted depending on the setting of jumper 3. This prealarm indication is very useful at set up and is designed to support the installer to make a fast and reliable job.

The **TEST** programming can also be achieved remotely by the AIS input on terminal 3. (Do not forget to remove jumper 4 for this function.)

SABOTAGE PROTECTION

The Alarmtech VD 400 is very well protected. It has the following protections:

1. Opening protection with a mechanical switch giving TAMPER Alarm

On terminal 8 and 9.

2. Watchdog function to supervise the program
3. Low input voltage protection giving Alarm on output 5 and 6 when the voltage is below 7 volt.
4. The relay is insensitive for outside coming magnetic field.

AIS Terminal 3

The Alarmtech Alarm Information System AIS provides a simple method to determine which detector first went into alarm provided the D/N input is high on terminal 4. To determine the first detector to achieve the alarm state, you just wire all inputs on VD 400 detectors terminal in a Daisy chain. Indication is as follows:

1. First to Alarm; LED will pulse
2. Subsequent to Alarm; LED's will remain steady

Each unit has the capability both receiving and transmitting information over the wire.

When a VD 400 is activated the microcircuit will monitor the voltage on terminal 3. Should the voltage appear low the VD 400 will conclude that it is the first detector to achieve the alarm state and it will pulse its LED to signal first to alarm. The microcircuit will now drive the line high. Subsequent activation of other VD 400 detectors will cause electronics to interrogate the high voltage present on terminal 3 it will deduce that it is not the first to alarm and switch its LED to the steady state.

When the D/N on terminal 4 is low or not connected, day position, the terminal 3 can be used for remote control of the TEST function.

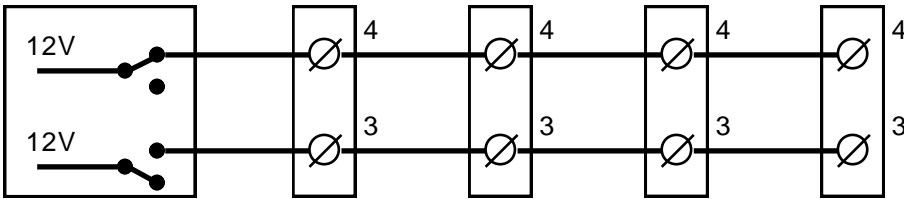
The AIS features may be used in conjunction with **AUTO** and **LATCH** functions. The Alarmtech VD 400 has a new form of alarm memory; we call it the Alarm Information System AIS. This is the most versatile and sophisticated form of alarm memory available, but at the same time it is easy to use and compatible with most control panels, without any modifications.

The alarm memory operates with two wires for complete functionality, although a simpler operation can be obtained over one wire. Up to 20 detectors can be wired together in this way.

Full functionality - two wire operation

- First up alarm memory
- Remote TEST enables

Terminal 3 and 4 are connected as shown in Figure 1.



Complete operation: two extra wires needed.

This hookup supports four functions

1. Alarm memory for the first detector to alarm and subsequent alarms
2. Control TEST function
3. DAY/NIGHT control of alarm indication
4. Remote control for resetting

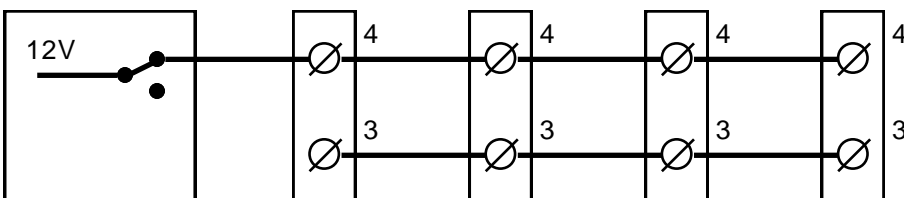
FIG 1. Full functionality

1. On arming the system +12V is applied to terminal 4 of the detector. Any alarm now occurring is stored in the detector's memory but not indicated by the LED.
2. On disarming the system those detectors, which were in alarm when the system was armed, are indicated by the LEDs. The first detector to alarm is distinguished by the fact that its LED flashes, while all others light steady.
3. If so desired, the TEST signal (+12V) can be applied to terminal 3. The detectors' LEDs will stop being permanently lit and they can be tested in the normal way. When the test signal is removed, the alarm memory indications will return as before.
4. When the system is next armed all memories and counters are cleared and LEDs reset.

Note: For system-wide first alarm indication, terminal 3 of all detectors in the system are connected together regardless of what zone they are in.

Partial operation - NO remote TEST enable

See Figure 2. Here there is no need to connect terminal 3 of the detectors to the control panel - only to each other.



Partial operation: one wire extra from control panel and detectors interconnect

This hookup supports three functions

1. Alarm memory for the first detector to alarm and subsequent alarms
2. DAY/NIGHT control of alarm indication
3. Remote control for resetting

FIG 2. AIS in partial operation

1. On arming the system +12V is applied to terminal 4 of the detector. Any alarm now occurring is stored in the detector's memory but not indicated by the LED.
2. On disarming the system those detectors that were in alarm when the system was armed are indicated by the LEDs. The first detector to alarm is distinguished by the fact that its LED flashes, while all others light steady.
3. When the system is next armed all memories are cleared and LEDs reset.

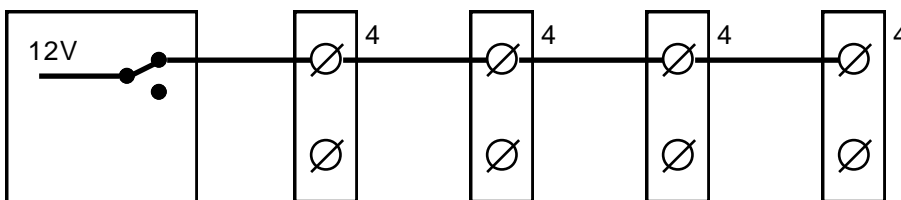
The system-wide first alarm indication is achieved by simply wiring terminal 3 of all the detectors together.

The system also allows display of which detector in a selected group was the first to alarm by wiring groups of detectors together.

With a little more complex wiring, these sub-groups can be made to include detectors on different zones.

Simplest operation - No first alarm indication and no remote TEST enable

See Figure 3. Only terminal 4 is connected



DAY/NIGHT control of alarm indication. One wire extra needed.

This hookup supports two functions

1. DAY/NIGHT control of the LED. DAY = 0V. NIGHT = 12V.
The LED glows if in alarm when changeover from NIGHT to DAY occur
No other indication is obtained in the event of an alarm.
2. Remote reset in connection with changeover from DAY to NIGHT.

FIG 3. AIS in the simplest operation

1. On arming the system +12V is applied to terminal 4 of the detector. Any alarm now occurring is stored in the detector's memory but not indicated by the LED.
2. On disarming the system those detectors that were in alarm when the system was armed are indicated by a steady LED.
3. When the system is next armed all memories are cleared and the LEDs reset.

D/N Terminal 4

On terminal 4 it is possible to remote control the LED indication and the reset of the unit. When this input is going high the LED is inhibiting to light up at alarm. The unit is put in NIGHT position. When switching the input low The LED lit up if there has been an alarm during night. When again switching the input high the unit is completely resetted.

DAY = LOW VOLTAGE
NIGHT = HIGH VOLTAGE
RESET = LOW --> HIGH VOLTAGE

This function meets the objective of British Standard BS 4737, part 1, 1986 to provide indication during setting, unsetting and testing procedures.

Terminals

The detector has 11 screw terminals with wire guard. The illustration in fig.2 and the text presented below explain the functions of the different connections. A similar illustration is printed on the inside of the detectors cover.

- | | | |
|-----|-----|--|
| 1. | - | 0 Volts DC |
| 2. | + | 12 Volts DC |
| 3. | AIS | First alarm and remote TEST |
| 4. | D/N | Day/Night control |
| 5. | C | Alarm Relay |
| 6. | NC | Alarm Relay |
| 7. | Sp | Unused connection |
| 8. | T | Sabotage contact (Tamper) |
| 9. | T | Sabotage contact (Tamper) |
| 10. | Sp | Unused connection |
| 11. | LED | Output for external LED. Goes from 5V to 0 V at alarm. Max 10 mA |

Jumpers

The VD 400 has 4 programming jumpers.

S1	Sensitivity	S3	LED mode
	Normal		Monitor
. .	Reduced	. .	D/N

S2	Relay	S4	Counting
	AUTO		ON
. .	LATCH	. .	OFF

FIG 5. Programming board

Technical data

INPUT POWER	8 - 15V DC
PEAK TO PEAK RIPPLE	2V max at 12V
CURRENT CONSUMPTION	
Normal operation	10 mA
In Alarm state	12 mA
ALARM OUTPUT	RELAY, 33 OHM IN SERIES
RATING	MAX 500 mA, 50V DC
TAMPER OUTPUT	MAX 50 mA, 50 V DC
TEMPERATURE LIMIT	-20 TO +50 deg C
RELATIVE HUMIDITY	MAX 90%
SIZE	L90xW30xH27 mm
WEIGHT	49 gram

Ordering information

Model	Description
VD400	Seismic Detector
VD 400-C	Seismic Detector with communication interface
VD 400-Z1	Set of one Seismic Detector with Junction metal box and metal conduit
VD 400-Z2	Set of two Seismic Detector with Junction metal box and metal conduit
MP 400	Metal mounting plate
MH 400	Metal housing
GVT 5000	Tester for VD 400 and GB 500-series Glass Break Detectors
JB 22	Junction box with 20 terminals and opening protection switch
USB-Link	Computer interface for VD400-C
VCD 400	Test program

CD 400 VIBRATION DETECTOR

Installation instructions

Application

The CD400 is a selectively sensing piezoelectric sensor that detects and analyzes the vibrations generated by the attempts of an intruder to penetrate the protected area. The highly sophisticated signal processing evaluates the amplitude, frequency and duration of the vibrations generated. The unit can be mounted on any stable surface where an intrusion attempt might occur. However, the following must be taken into account:

1. The design and construction of the protected surface and its material.
2. The detector location in relation to studs, joints, door/windows hinges etc.
3. Background disturbances that can influence the detector.

Coverage

The typical coverage in various materials is shown in the table below. The ranges are only presented as guidelines, practical tests must always be conducted.

Material	Steel/Wood/Glass	Brick/Plaster	Concrete*
Range	r = 3m	r = 2m	r = 3m

*- with MP400 mounting set

Mounting

1. Loosen the cover screws and remove it.
2. Select a suitable mounting position.
3. Use the bottom part as a template and mark the fixing holes
4. Use a 2-2,5 mm drill for the self-tapping screws provided.

Note! A clean and even surface under the detector will give the best coverage.

Connection

The detector has 10 screw terminals with wire guard as shown in figure 1. The figure also shows the position of the programming jumpers. A connection and programming diagram is also fitted inside the cover.

Programming jumpers

The four jumpers are used to program the operational modes of the detector. The functions are shown in Figure 2.

- 1 and 2 control the number of pulses to activate the alarm relay
- 3 controls the alarm relay according to the following:
 - A) Latched after activation, requiring a remote reset or
 - B) Automatic reset after 2 seconds
- 4 controls the "Test" and the "Day/Night" - functions

On delivery all 4 jumpers are closed resulting in the following:

- S 1,2 - Reacts to a single impact (pulse)
- S 3 - The alarm relay is automatically reset after 2 seconds
- S 4 - In test mode, with the LED indicating alarm activation.

Remote control

See figures 3 and 4
Figure 4A shows Day/Night control in the NIGHT position Day/Night control of alarm indication. One extra wire is needed.

1. Day/Night control of the LED. DAY = 0V, NIGHT = +12V. When the system is unset, i.e. switched from NIGHT to DAY, the LED lights up if the unit has been in alarm mode with the system set.
2. Remote reset occurs when changed from DAY to NIGHT mode.

Note! Jumper 4 must be open (removed).

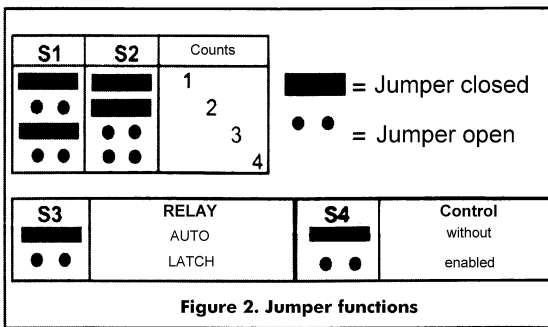


Figure 2. Jumper functions

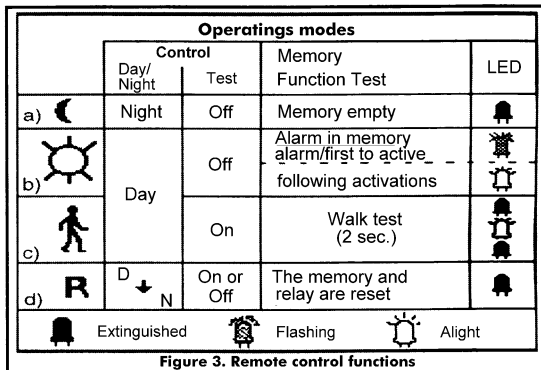


Figure 3. Remote control functions

Figure 4B. D/N in night position and "First to activate" wired. One extra wire is needed from the control panel and one between all detectors.

This hook-up supports three functions:

1. Alarm memory for first and subsequently activated detectors.
2. Controls the TEST function.
3. Remote reset control

Note! Jumper 4 must be open (removed).

Figure 4C. D/N in night position and "First to activate" indication.

This hook-up supports four functions:

1. Alarm memory for first and subsequently activated detectors.
2. Controls the TEST function
3. Day/Night control of alarm indication.
4. Remote reset control.

Note! Jumper 4 must be open (removed).

Adjustment and setting-up

Adjusting and setting is quite simple. Check that jumper 4 is closed. The LED will then indicate activation and the alarm relay will reset two seconds after activation. If programmed for multiple pulses, each registered impact will be shown by a short flash, the alarm will result in a longer flash.

1. With jumper 4 closed turn the potentiometer clockwise to the max. position.
2. Tap lightly close to the detector and check that each tap is indicated and that the alarm relay is working properly after the set number of pulses.
3. Turn the potentiometer anti-clockwise to the min position.
4. Use the test tool at the most distant point to be protected and gradually increase the sensitivity until the LED indicates a receive pulse.
5. Now make all connections permanent. Check that the activation and tamper alarm are received at the control panel.

Technical data

Supply voltage (nom 12V DC)	8 – 15 V DC
- Max ripple	2Vp-p (at 12V)
- Current consumption (quiescent)	7 mA
- Current consumption (alarm)	11 mA
Alarm output	Relay, NC, <33 Ohm in series
- Max. load	25V / 100 mA
- Alarm duration	2 Sec
- Low voltage level protection	< 8V

Alarm indication LED

Tamper (opening) protection Micro switch, max. 25V / 100 mA

Control voltage

- for TEST LOW < 3V, HIGH > 6V
- for Day/Night LOW < 3V, HIGH > 6V

Sensitivity adjustment Potentiometer

Environmental conditions

- Temperature (storage/functional) 20°C ÷ +50°C
- Humidity max. 95% RH, DIN class F
- Housing IP31 IEC
- Interference protection – RFI 15V/m, 0,1-1 GHz
- Dimensions (LxWxH) 91x31x23 mm
- Weight 40 g.
- Approval VdS G 194 502

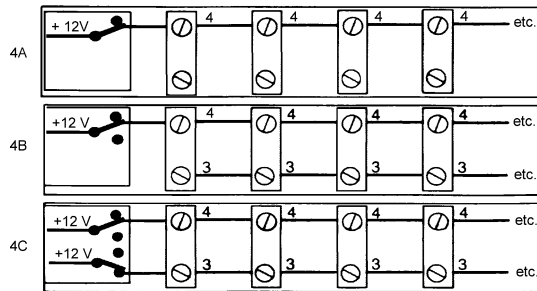


Figure 4. Remote controls

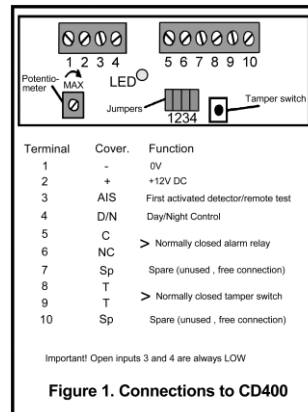
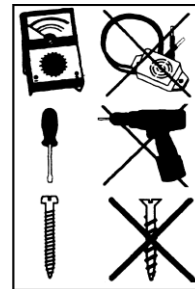


Figure 1. Connections to CD400



INSTALLATION INSTRUCTIONS

CD 400 Shock Detector



Rev 2.2000.03.06 GB

ALARMTECH CD 400 Shock detector

Function

CD 400 is a selectively sensing, piezo-electronically vibration detector. It senses and analyses the strong vibrations with short duration, which will appear when someone tries to get through the protected. These vibrations are in the detector changed to electronic signals evaluated by the built-in micro processor concerning strength, frequency and duration.

Field of application

CD 400 can be mounted on all types of surfaces, where an eventual break-through could be expected. Generally we can say that the more homogeneous the material is the better it will lead the vibrations analyzed by the detector. It is not simple to exactly define the area of protection as many different factors will influence its dimensions:

- The protected areas form, material and construction.
- The position of the detector on the protected area concerning joists, beams, hinges in doors and windows.
- Disturbing vibrations that can have an influence on the sensitivity.

Therefore it is of most importance that the place of montage will be chosen after careful consideration and testing. The table below shall thus only be seen as guidance and not as absolute facts.

Area of protection on different surfaces

Material	Area of protection radius
Steel	3 meters
Wood	3 meters
Pane of glass	3 meters
Barred windows	2 meters
Plywood	3 meters
Plaster	2 meters
Bricks	1 metre (3 metres*)
Concrete	1 metre (3 metres*)

* together with mounting plate MP 400

Examples of application

- CD 400 can be used to protect partition walls in offices, archives, cashier's offices and other rooms, where a qualified periphery protection is needed.
- CD 400 can be used on indoor walls of plaster, but please, consider the beams in the walls. If the beams have an intervening space of 60 cm, the first detector will be placed 60 cm from the outer wall and the following ones with 180 cm space between them.
- CD 400 can be used to protect window frames surrounding several smaller glass panes.
- CD 400 can be used to protect doorframes, in both wood and metal, from attempted burglary through the door, in objects where a very fast detection of an intruder attempt is wanted.
- CD 400 can be used on firm protective grating. As these are excellent leaders of vibrations the radius of protection can be increased up to the double, but testing on place is important.
- Always use the mounting plate MP 400 with expander bolt included when mounting on brick and concrete walls.
- Do **not** use CD 400 on roller shutter as these are not fixed and therefore could be a big source for false alarms.

NOTE: When CD 400 is used to protect outer walls, frames of outer doors and windows certain surrounding conditions like winds, traffic noises and people can produce vibrations coursing problems. Please, do not raise the sensitivity to high. Great force that will give high signals is needed for breaking through.

Technical description

Counter circuit

CD 400 has a counter circuit, which by the jumpers S1 and S2 can be programmed from 1 to 4 counts. The jumpers are at delivery closed, which will give an alarm by a count. At every count registered a timer will start. If no new signal will follow in 8 seconds the counter circuit will be set to zero. If the counter is programmed to 4, the maximal time to an alarm will be $4 \times 8 = 32$ sec. If a very forceful count will be registered, the CD 400 will give an alarm directly even if the counter circuit is set to 2-4 counts. The signal processing will result in that many short counts e.g. from drilling, in an interval of 0,5 seconds will be treated as one count and if these short counts will continue they will be analyzed as two counts etc.

Number of counts	Jumper S1	Jumper S2
One count	Closed	Closed
Two counts	Open	Closed
Three counts	Closed	Open
Four counts	Open	Open

Alarm relay

CD 400 has a normally closed relay output max. 25 V/500 mA. The relay can be programmed to Latch or Auto reset after 2 seconds. At delivery Jumper S3 is closed, which automatically will reset the alarm relay after 2 seconds.

Relay function	Jumper S3
Auto	Closed
Latch	Open

By leaving Jumper S3 open the alarm relay must manually be reset in one of two ways:

- * By power down for a few seconds
- * By the central unit connect to DAY/NIGHT on terminal 4. Connection to NIGHT will reset the detector.

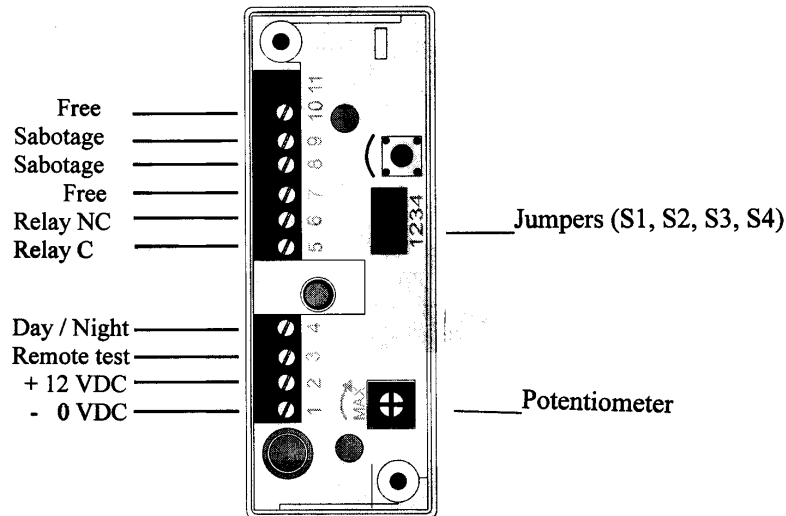
Note: CD 400 senses short during forceful vibrations and does not function as a seismic detector, which can detect very small signals of long lasting duration.

Mounting

- Unscrew the screws and take the cover away.
- Chose the place of montage and mark the spots for the holes using the bottom of the detector.
- Bore with a drill dim. 2-2.5mm holes for the two screws included. Do not use any other screws.
- Consider that a smooth and even mounting area under the detector gives a better protection radius.
- If the mounting plate MP 400 is used, the detector shall be fixed with the included screws
- The mounting plate shall be fastened with the by packed expander bolt.

Connection

The detector has 10 terminal connections with wire guard.



Installation and testing

Installation and testing is very simple. Make sure that jumper S3 and S4 are closed. LED will indicate an activated detector and the alarm relay will be reset 2 seconds after activation. If the unit is programmed for several counts every received and registered count will be indicated with a short twinkle by the LED.

An alarm is indicated by a longer twinkle.

- Set the number of counts, which are to give alarm by jumper S1 and S2.
- No connection at terminal connections 3 and 4.
- Make sure that jumper S3 and S4 are closed and then turn the potentiometer clockwise to position Max.
- Knock easily at the side of the detector and control that every knocking is registered and that the alarm relay is falling after the number of counts programmed. See jumper S1 and S2.
- Reset the detector by powering down.
- Now turn the potentiometer in the opposite direction to position Min.
- The test instrument CT 400 will now be used at the most distant point of the protection area and slowly increase the sensitivity until LED will show received and registered counts.
- Control and regulate all connections. Finally control that both the alarm relay and the sabotage output will be received accurately in the central unity.

NOTE:

It is important to consider that it might not always be wise to use the detector up to its limits in order to get as large area of protection as possible. In some cases this can result in false alarms. The framework of the house can transfer disturbances from outer sources like subway and heavy lorry traffic etc. The construction of the detector and the choice of material are of highest quality and will therefore work without problems during a long period of time, apart from this it is important regularly to test the function and control the protected area. The advanced signal processing much alike that of seismic detectors, will react on the amplitude and duration of the disturbance signals. It is therefore important that the installer carefully consider how and where the detector ought to be placed. Perhaps the intruder will not follow the line of least resistance. Sometimes it can be a good idea to increase the number of detectors to homogenize the area of protection. The test tool is useful when setting the detector up to work at optimal sensitivity. It is also important to decide how the detector shall react at an attempted burglary. Shall it give an alarm at the first blow or is it expected to react after a number of hits/counts over a larger area? At an attempted burglary the intruder will probably generate a number of knockings/counts by trying to force a window or a door. Even if the detector is programmed for an initial number of counts it will give alarm at a very forceful count.

Sabotage protection

CD 400 has good protection from manipulations from outside.

- Micro-switch placed on the bottom plate will give an alarm when the cover takes away.
- When the voltage is falling below about 7 V DC, the alarm relay will trigger.
- The alarm relay cannot be influenced by an outer magnet.

- The metal housing MH 400 can be mounted over the plastic housing and give additional protection against drilling etc.

Indications

The LED can show the following information:

LED	Explanation
Short flash	The counter counts for each flash
Long twinkle	The alarm relay breaks during the lighting time and then resets
Always shining	The alarm relay is broken all the time
Flashing slowly	The voltage is below 7V

Technical data

Supply voltage (nom 12 VDC)	9-15VDC
max ripple (0.1-1 GHz)	2 Vp-p (at 12VDC)
low supply voltage protection	in alarm <8 V
Current consumption quiescent	7 mA
In alarm	11 mA
Alarm output	NC
protection resistance in series	20-30 ohm
contact rating	35 V / 500 mA
alarm hold time in AUTO mode (jumper S3 closed)	2 seconds
Tamper contact for the cover	micro switch, max 25V/100 mA
Alarm at low supply voltage	7 V
Control voltage	
for test	low < 3 V, High > 6 V
for D/N	low < 3 V, High > 6 V
Sensitivity adjustment	potentiometer
Ambient conditions	
Operating temperature	-10° to +70°C
Humidity, DIN 40040	< 95% rel, class F
Housing protection category	IEC 529, IP 31
EMC Immunity	15 V/m, 0,1-1 GHz
Dimension (LxWxD)	91 x 31 x 23mm
Approvals	
VdS Klasse B	G 197537
INCERT	B-582-0007
Techom	
CE	In conformity

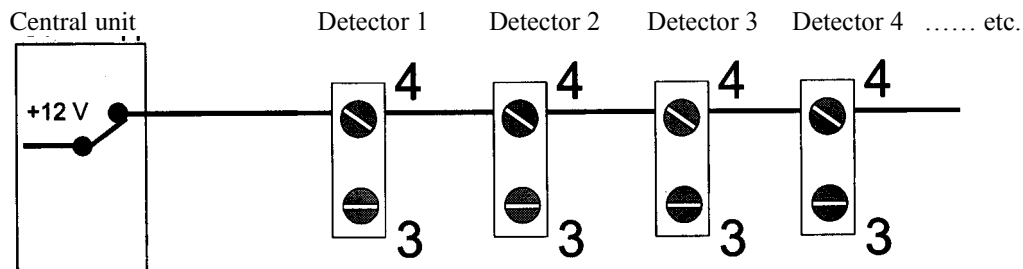
For remote resetting or indicating which detector was the first to give an alarm:

NOTE: For correct function jumper S4 always has to be open. If the terminals 3 or 4 are open the detector will sense a low signal on these.

Remote control of Day/Night function

Screw terminal 3 or 4 are low when no connection has been done. By connection to screw terminal 4 it is possible to from the central unit control the function of LED and also to remotely reset the alarm relay. When voltage on terminal 4 is high the function of indication is closed. This is the normal state (Night state). When the voltage of the inlet of the terminal 4 is changed from high to low, Led will shine on the detector that have given the alarm. When the inlet of terminal 4 is reset to high voltage the alarm relay is restored and the indication goes out.

The connection shall be as shown below.



Position	Voltage
Day	Low
Night	High
Reset	Change from low to high

By connecting several detectors to the inlet of terminal 4 these can be remotely controlled from the central unit.

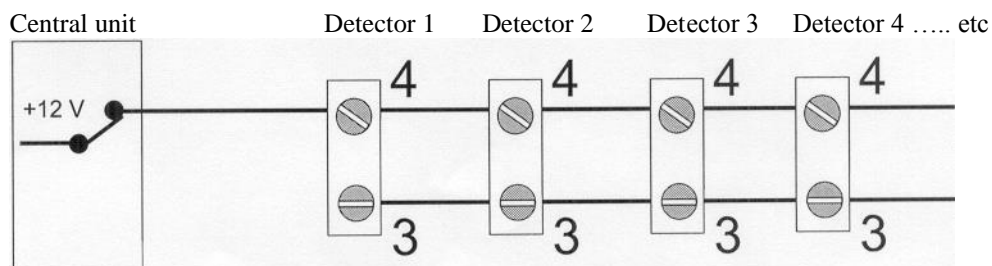
In Night position shall the voltage thus be high at the inlet of terminal 4. When an alarm is given, the alarm relay will react in accordance with jumper S3. LED will not indicate, but the alarm will be stored in the memory. To see an indication the voltage must be changed from high to low at terminal 4. Reset shall take place when the voltage again is high.

First up alarm

To combine a remote controlled LED with the “First up alarm” function another connection must be connected between all the detectors of the loop. The connection shall be connected to terminal 3 on all CD 400. The LED will indicate in the following way:

- LED will flash on the first alarm-giving detector.
- LED will shine firmly on the other detectors, which also have given an alarm.

The installation shall be as shown below.

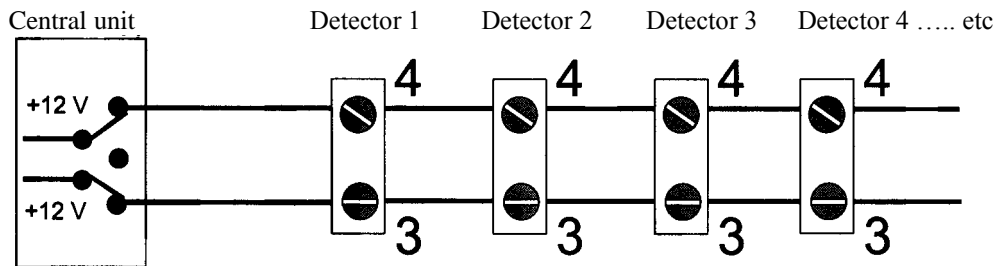


Complete function

This installation can give three functions:

- Alarm-memory for the first alarm-giving detector.
- Remote controlled test function.
- Remote controlled reset.

The installation shall be as shown below:



- At switching on the alarm installation a high voltage will be connected to terminal 4. That will reset the relay and the alarm-memory. At an alarm this will be stored in the memory without indication on LED.
- When the alarm installation is switched off the voltage on terminal 4 shall be low. The LEDs will now be put on light and LED of the first alarm-giving detector flashing and firmly shine on the detectors, which have given alarm later on.
- The detectors can now be put into test position by connecting a high voltage to terminal 3. The light of the LEDs will go out and the detectors can now be tested. When the testing is finished and the voltage on terminal 3 is changed The LED will show the same status as before the test.
- When the alarm installation switches on the alarm-memories and the counters will be restored.

NOTE: All CD 400 in an alarm installation can be connected via the inlet of terminal 3 apart from what section they belong to.

Indications

LED on CD 400 shows the following information:

Position of alarm	Day/Night position	Test position	Explanation	LED
Alarm switched on	Night (4 high)	Off (3 low)	Memory empty	Turned off
Alarm switched off	Day (4 low)	Off (3 low)	Alarm in memory, first-giving alarm Other detectors alarming	Flashing Shining
Test of function	Day (4 low)	On (3 high)	Alarm relay according to S3	Flashing
Reset	Day to Night	On or Off	Memory and relay reset	Turned off

Datasheet and installation instruction

CD 500

DESCRIPTION

The CD 500 Shock Detector mounts on various objects providing their reliable protection. The CD 500 detects and indicates any attempt to break into the object using tools applied with much power, or even explosives. This detector senses momentary high amplitude vibrations. It includes a programmable event counter which makes the detector trip an alarm once the pre-programmed number of events (1, 2, 3 or 4) have occurred. Still the detection of an explosion trips an alarm regardless of the number of the counted events.

The CD 500 mounts on elastic, multi-element structures (e.g. window / door frames and casings), on brick walls one might attempt to penetrate using a blunt instrument applied with much power.

For mounting on concrete or concrete-like surfaces use preferably the special MP 500 mounting plate. When installing outdoors or in cold rooms use the WH 500 housing protecting against severe weather conditions.

The CD 500 is based on an advanced signal processing algorithm microcontroller offering digital processing of the recorded events which translates into operation reliability and immunity to ambient interferences.

The desired sensitivity of the CD 500 is selected by DIP switch setting. The effective adjustment can be verified with the CT 400 which simulates real attack vibrations. The impact power it uses remains always at the same level.

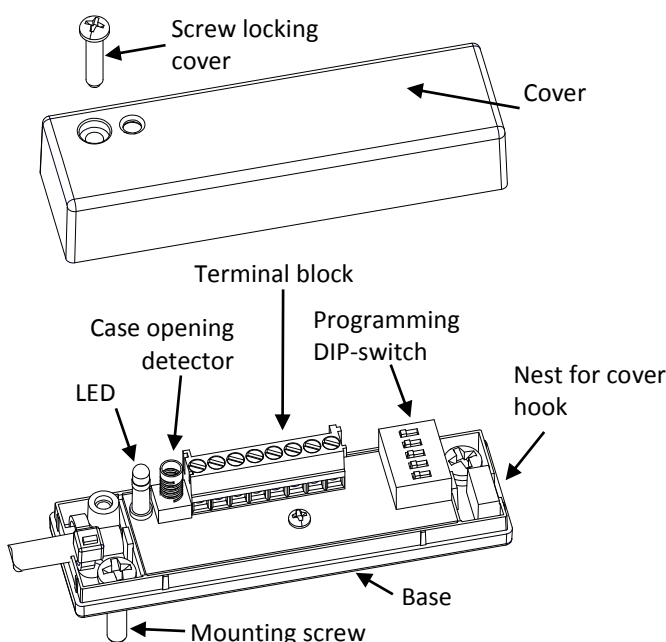
FEATURES

- Detection of vibrations from attacks on the protected surface
- Advanced DSP system based on a microcontroller
- Noise filtering system providing high immunity to environmental noise
- Detection of momentary high amplitude shock waves
- Programmable level of mid-energy attacks
- Quick sensitivity adjustment using a DIP switch
- Programmable number of shocks triggering alarm (1 to 4)
- Alarm relay triggering mode programmable: latched or auto-reset
- Built-in LED as alarm indicator
- Anti-tamper protection
- Low-voltage indication
- Built-in events log (“black-box”)
- Small dimensions simplifying mounting in tight places
- Built-in reed magnetic contact with separate alarm loop in models CD500-R and CD500-RI
- Built-in PC interface to monitoring software in models CD500-I and CD500-RI
- Approved by VdS, Techom and other European certification bureaus (pending)

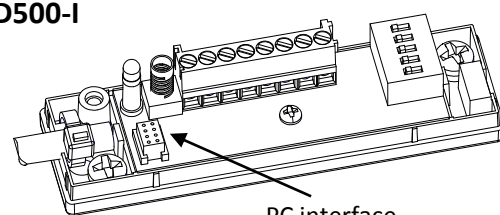
VERSIONS

Version PN	Magnetic contact	Interface to PC
CD500		
CD500-R	✓	
CD500-I		✓
CD500-RI	✓	✓

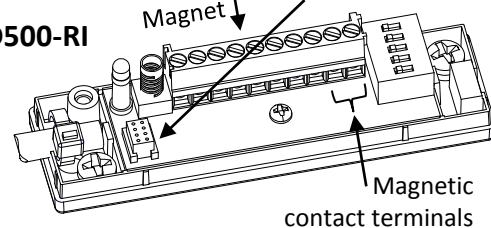
CD500



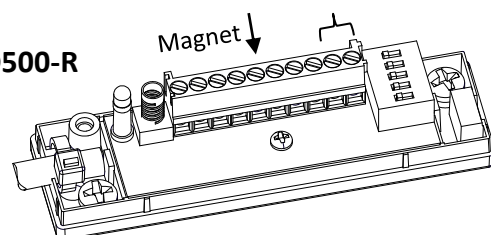
CD500-I



CD500-RI



CD500-R



APPLICATION

The unit can be mounted on any stable surface where an intrusion attempt might occur. However, the following must be taken in to account:

1. The design and construction of the protected surface and its material.
2. The detector location in relations to studs, joints, door/window hinges etc.
3. Background disturbances that can influence the detector.

COVERAGE

The typical coverage in various materials is shown in the table below. The ranges are only presented as guidelines, practical tests must always be conducted.

Material	Steel/Wood/Glass	Brick/Gips	Concrete (*)
Range	r=3m	r=2m	r=3m

* – with MP400 mounting set

MOUNTING

1. Loosen the cover screw and remove cover
2. Select a suitable mounting position
3. Use the bottom part as a template and mark the fixing holes
4. Use a 2-2.5 mm drill for self-tapping screws provided

Note! The clean and even surface under the detector will give the best coverage.

CONNECTION OF DETECTOR

Detector has 8 or 10 position terminal block as shown in table below.

Position	Marking	Signal	Detector
1	(-)	Common ground	All versions
2	(+)	Supply voltage +12V nom.	
3	C	Alarm switch	
4	NC		
5	Sp	Spare	
6	T	Tamper switch	
7	T		
8	Sp	Spare	
9	MC	Built-in magnetic contact	CD500-R
10	MC		CD500-RI

CONNECTION OF MAGNETIC CONTACT

Detectors CD500-R and CD500-RI are equipped with built-in magnetic contact with terminals connected to contacts 9 and 10 in terminal block. Reed contact is placed in the centre of longer side of base part. Sensing area is marked with two arrows on bottoms side of detector base and additionally two lines on a side wall. Arrows and lines identify detector side where the corresponding magnet should be mounted.

CONNECTION TO PC

Detectors CD500-I and CD500-RI are equipped with PC interface terminal. Communication can be achieved with the help of additional interface unit USB-link providing also supply of detector from voltage available in USB port. Visualization of detector state, signal and event recording and access to internal detector logger (black-box) is possible with the help of CVDlink software.

PROGRAMMING DIP-SWITCH

One 5-position DIP switch is used to program the following detector functions:

1. Sensitivity – one of four predefined ranges
2. Counter – number of pulses to activate alarm (1 to 4)
3. Operational modes of LED and alarm relay:
 - a. Autoreset – automatic reset after 2s
 - b. Latch – latched after activation, requiring power off for reset

Position	Parameter/DIP-switch setting			
	Low	Mid (-)	Mid (+)	High
1	OFF	OFF	ON	ON
2	OFF	ON	OFF	ON
Counter	1	2	3	4
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	ON
Mode	Autoreset (2s)		Latch	
5	OFF		ON	

On delivery all five DIP switch positions set to OFF resulting in the following setting: low sensitivity, reacts to single impact (pulse), alarm automatically reset after 2 s.

ADJUSTMENT AND SETTING-UP

Adjustment and setting is quite simple. Check if detector mode is set to autoreset (DIP switch pos. 5=OFF). The Led will then indicate activation and the alarm relay will reset for two seconds. If programmed for multiple pulses, each registered impact will be shown by a short flash, the alarm will result in a longer flash.

1. Set-up the highest sensitivity (1=ON, 2=ON).
2. Tap lightly close to the detector and check if each tap is indicated and the alarm relay is working properly after the set number of pulses.
3. Set-up the lowest sensitivity (1=OFF, 2=OFF).
4. Use the tool at the most distant point to be protected and increase the sensitivity until the LED indicates a receive pulse.

TECHNICAL DATA

Supply parameters

Supply voltage	8 – 15 V DC (nom. 12 V)
Max ripple	2 Vpp (at 12V)
Current draw (standby)	8 mA
Current draw (alarm)	10 mA

Alarm signalization

Alarm output	relay, NC, res. < 30 Ω
Alarm response time	2s in automatic reset mode
Relay contact rating	35V/100mA

Tamper signalization

Tamper protection	micro-switch, NC
Switch contact rating	35V/50mA

Dimensions

20 x 23 x 80 mm [HxDxW]

Environmental conditions

Operating temperature	from -10°C to +70°C
Storing temperature	from -40°C to +70°C
Humidity	max. 95% RH
Housing protection cat.	IP 42

Approvals:

CE, RoHS, WEEE, EN 50130-4, EN 50130-5 class II