

Multi Switch

Control multiple outputs with one input



Multi Switch (P014-40)

Multi Switch Proximity sensors (P014-41)

Contact & Product

mo-Vis bvba



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Hand Warmer User & Installation manual

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Important information about this Manual

Congratulations for choosing a mo-Vis product! If you would like to learn more about mo-Vis and its products, we invite you to visit our website: www.mo-vis.com.

Before you install or begin using this product, it is important that you read and understand the content of these installation and operating instructions, the safety instructions in particular.

The installation instructions will guide you as an installer through the options and possibilities with the mo-Vis product. The mo-Vis product should be adjusted with the mo-Vis Configurator software.

The operating instructions are primarily intended to acquaint you with the functions and characteristics of the mo-Vis product and how you can use it in the best manner possible. They also contain important safety and maintenance information, as well as describe possible problems that can arise during use.

Always keep the operating instructions handy in connection with your device, since the need for important information can arise concerning its use, safety and maintenance.

All information, pictures, illustrations and specifications are based on the product information that was available at the time of printing. Pictures and illustrations shown in these instructions are representative examples and are not intended to be exact depictions of the various parts of the product.

We reserve the right to make changes to the product without prior notice.

Ordering documentation

You can download additional copies of this User & Installation manual on the mo-Vis website: www.mo-vis.com.

Support, scrapping and spare parts

Technical support

In case of technical problems, we advise you to contact your dealer. If the dealer is not available, or unknown, please contact mo-Vis bvba by email support@mo-vis.com or by phone +32 9 335 28 60. Always state the device serial number when contacting mo-Vis. This ensures you are provided with the correct information.

Spare parts and accessories

Spare parts and accessories must be ordered by the dealer at mo-Vis bvba.

Scrapping & recycling

For scrapping, adhere to your local waste legislation. Dispose of obsolete electronic parts responsibly in accordance with local recycling regulations.

Warranty

mo-Vis bvba warrants the Multi Switch and Multi Switch Proximity Set to be free from defects in material and workmanship for a period of 2 years under proper use, care and service.

All warranties only cover parts and do not extend beyond the initial purchaser from an authorized mo-Vis dealer.

Start of the warranty period

Each warranty shall begin on the date the product is first delivered to the customer.

Repair and replacement

For warranty service, we advise you to contact the dealer from whom the product was purchased. In the event of a defect in material or workmanship, the dealer must obtain a return authorisation (RA) number from mo-Vis and the product must be shipped to a service centre designated by mo-Vis. mo-Vis will repair or, at mo-Vis' option, replace any product covered by the warranty.

Disclaimer and Limitations of Remedies

The express warranties set forth in this agreement are in lieu of all other warranties of merchantability or fitness of purpose. In no event shall mo-Vis be liable for any direct, indirect, incidental or consequential damages resulting from any defect in this product.

Warranty of parts subject to “normal wear and tear” (e.g. pads, joystick balls, batteries ...) are not covered in the warranty except as it applies to defects in material or construction.

Amendments

No person is authorised to alter, extend or waive the warranties of mo-Vis.

Voiding of warranties

The foregoing warranties are contingent upon the proper installation, use, maintenance and care of the product. The warranty will be void if the product has been installed or used improperly, or if it has been repaired or any part replaced by persons other than mo-Vis or an authorised dealer. The Multi Switch unit and Multi Switch proximity sensors are considered as non-serviceable parts.

The addition of equipment or features that are not manufactured or recommended by mo-Vis could affect the intended function of the mo-Vis product and may invalidate the warranty.

Understanding usage

The health care professional (authorised installer) is responsible for understanding the intended use of the mo-Vis equipment, the specifications and its programming parameters. mo-Vis cannot be held responsible for damage caused by incorrect installation or incorrect use of the product. Misuse, mishandling or storage is not covered by this warranty.

Safety precautions

General

Multi Switch is intended to control multiple devices/technical aids with one input device (switch).

Incorrect use or installation may lead to risk of injury to the user and damage to the connected device or other property.

In order to reduce these risks, you should carefully read this instruction manual, paying particular attention to the safety instructions and warning texts.

Any unauthorised use of the product may lead to increased risk of accident. Carefully follow the recommendations in this manual in order to prevent accidents from use.

The Multi Switch unit and Multi Switch proximity sensors are non-serviceable parts.

In case of doubt for alterations and adjustments, always contact a qualified service engineer.

Warning labels

This manual contains the following warning labels, which are intended to draw attention to situations that could lead to unwanted problems, e.g. personal injury or damage to properties.

**CAUTION!**

Please use caution where the symbol appears.

**WARNING!**

Please use extreme caution where the symbol appears. Failure to observe warnings can lead to personal injury or property damage.

**CAUTION!*****Limited liability***

mo-Vis accepts no liability for personal injury or damage to property that may arise from the failure of the user or other persons to follow the recommendations, warnings and instructions in this manual.

**CAUTION!*****EMC Requirements***

The electronics of the Multi Switch can be affected by external electromagnetic fields (for example from mobile telephones). Similarly, the electronics of the Multi Switch themselves can also emit electromagnetic fields that can affect the immediate surroundings (for example certain alarm systems in businesses).

The limit values for Electromagnetic Compatibility (EMC) with respect to this type of devices are set in the harmonised standards for the EU in the Medical Devices Directive, No. 93/42/EEC. The Multi Switch unit and Multi Switch proximity sensors comply with these limit values.



WARNING!

Assembly

Multi Switch should only be installed or adjusted by a qualified service engineer or someone with adequate knowledge to perform the adjustment in an expert manner.

Maintenance and service

Carry out only the service and maintenance activities specified in this manual, as long as you comply with the demands stated in this manual for a specific action. All other service, alterations to and interventions on the Multi Switch unit and Multi Switch proximity sensors must be carried out by a qualified service engineer or someone with adequate knowledge to perform the adjustment in an expert manner. In case of doubt, contact a qualified service engineer or mo-Vis.

Use only spare parts or accessories approved or recommended by mo-Vis. All other use could lead to changes which might impair the function and safety of the product. It could also lead to the warranty becoming void.



CAUTION!

Testing

Multi Switch should always be tested in a safe surrounding after the physical installation of the Multi Switch unit and/or a Multi Switch proximity sensor or adjustment of the parameters.

Design and function of the Multi Switch

Purpose

The Multi Switch unit main functionality is to allow the use of a single input device to control up to four outputs. This offers more operating options to the user by only using a single input.

The Multi Switch proximity sensors are to be used as an input device, where no force or clicking is required, compared to a regular button. This increases the comfort of the user and its ability to control the input device.

General

The Multi Switch unit is USB-powered, and contains its own control electronics.


- One 3.5 mm stereo input jack allow to connect a mechanical switch or a mo-Vis proximity sensor as input device.
- Two 3.5 mm stereo jacks allow to connect up to four separate outputs.
- Every output channel has its own LED that indicates its status and activity.
- Every activity of the user may be accompanied by an auditive signal, adding additional control for the user.
- With the mo-Vis Configurator software, all parameters of the input and outputs can be fully adjusted.

The Multi Switch Proximity sensors consists of two different proximity sensors.

- The small 12 mm sensor allows installation on a very limited space.
- The regular 24 mm sensor offers a more sensitive activation, thanks to a larger sensor surface.
- The sensitivity of both sensors is fully adjustable with the mo-Vis Configurator software.



Multi Switch

A Multi Switch (P014-40) consists of the following parts:

	Product description	Product code
	Multi Switch unit	P012-40
	USB connection lead A to B micro (100 cm)	PM CAB-00031
	Multi Switch manual, with Serial number sticker	D-P014-40- 70

Multi Switch Proximity sensors

The Multi Switch Proximity sensors set (P014-41) consists of the following parts:

	Product description	Product code
	Multi Switch proximity sensor 12 mm	P014-20
	Multi Switch proximity sensor 24 mm	P014-23

Optional: Splitter cable

To connect multiple output devices, a 3.5 mm stereo jack splitter to 3.5 mm mono jack cable is required.

Contact your dealer or mo-Vis for ordering.



USB power supply

The device is equipped with a micro USB connection.

When the device is connected to an USB power source (e.g. USB charger, power bank, laptop, tablet,...) the device will be powered and operational.

The Multi Switch only requires a minimal amount of energy. As most standard power sources are not designed to deliver minimal current over a longer period of time, proper functioning is not guaranteed with any power source.

Contact your dealer or mo-Vis for more information and assistance on choosing the right power source, e.g. power bank.

Technical description of the Multi Switch

Input

The input is a stereo 3.5 mm jack (red). It accepts two types of switches.

Type	Connection	Input
Mechanical	Switch connected between Tip and Sleeve, Ring continuous connected to Sleeve.	Use a switch equipped with a mono jack 3.5 mm.
Proximity	Tip is the sensing input, Ring is the Shield (Sleeve is open).	Use the special proximity sensors supplied by mo-Vis.

Outputs

The outputs are potential free and fully isolated from the rest of the Multi Switch.

The four outputs are arranged as two groups of two. Each group is connected to a stereo 3.5 mm jack.

- The first output of the group is connected to the TIP.

- The second output is connected to the ring and the sleeve is common for both outputs.

Output	Location
1	Green tip
2	Green ring
3	Yellow tip
4	Yellow ring

Output LEDs

Four green LEDs at the front show the output.

The LEDs indicate the current selected channel, and eases to select the desired channel.

Status LED

A separate green LED at the front indicates the device status:

Status	LED
Active	Short on, long off
Fault	Number of flashes, long off

Parameter configuration

The device is equally equipped with an isolated micro USB connection at the right side. Use this connection to connect the

device to a PC to interact with the mo-Vis Configurator software. See the configurator manual for more information.

Operation and level selection

At the front of the device a push button is provided. (to learn more about the function of the push button see p.22 : Calibration mode – Manual)

At the right side, a jack connection is provided to connect a mechanical switch or proximity sensor.

Pressing the connected switch or proximity sensor cycles you through the output channels of the device. You can adjust the number of channels using the mo-Vis Configurator software to alter the parameters.

Technical description of the Multi Switch Proximity sensors

Operating conditions

- This type of Proximity sensor is based on the principle of capacitive sensing. It is capable of measuring conductive objects (e.g. a finger or a metal stick) that approaches the sensor.

CAUTION

Moisture (e.g. rain) is also a conductive substance. A few drops of rain will not cause issues, but a water film can cause the sensor to be activated all the time.

- The bigger the surface of the sensor the more sensitive it will be. The 24 mm version is the most sensitive one.
- The sensor is most sensitive at the front side in the centre. At the sides it is slightly sensitive and at the underside it is immune.
- A test finger has been used to determine the distance versus the sensitivity parameter setting.
Know that this is not an exact relationship and sensitivity may vary depending on the size/shape of the finger.

Sensitivity	Distance 24 mm (in mm)	Distance 12 mm (in mm)
100%	10.00	3.00
90%	8.50	2.00
80%	7.00	1.25
70%	5.00	0.50
60%	3.00	0.20
50%	2.00	0.10
40%	1.50	0.05

30%	1.00	<0.05
20%	0.50	<0.05
10%	0.25	<0.05
5%	0.05	<0.05

mo-Vis Configurator software

With the Configurator software it is possible to adjust the working of the Multi Switch according to the users' needs.

Almost all settings are fully adjustable.

Consult the adjustable settings in the parameters list.

Software download

- You can download the software on the mo-Vis website:
www.mo-vis.com.
- For all details on how to install and use the software, we advise you to consult the manual of the mo-Vis Configurator software (included in the software download).

User profiles

Depending on your profile (user, attendant, dealer, OEM), you will be able to configure a number of parameters for the Multi Switch.

- For a user profile, no password is required.
- Attendant, Dealer and OEM profiles require a password.

Installation instructions

Safety precautions



CAUTION

The Multi Switch is not waterproof. Mount the device in such a way that no water (rain) can enter the device. Some drops of water will not cause problems, excess water must be avoided.



CAUTION

The Multi Switch Proximity sensors may be influenced by Moisture. Moisture (e.g. rain) is a conductive substance. A few single drops of rain will not cause issues, but a water film can cause the sensor to be activated all the time.



CAUTION

Keep radio transmitters (e.g. mobile phone) away (at least 30 cm) from the sensor and its connecting cable.



CAUTION

In case high sensitivities are used (>70%) make sure the sensor is well fixed and the cables are well routed. Moving the sensor/cable can have an influence on the sensitivity or even produce false contacts.

**CAUTION**

The Multi Switch should not be used in conditions where malfunctioning of the device can cause potential risk situations.

**CAUTION**

The device contains a controller that continuously checks the integrity of the device, whenever a problem is detected the device will be switched off automatically. When this happens check the fault flash code or use the configurator to check why the device stopped.

Preparations

Qualified service engineer

Only a qualified service engineer may install the Multi Switch.

Installation plan

Set up an installation plan before starting the installation. Based on the users' needs this plan should specify:

- Where which part of the Multi Switch should be placed
- How the Multi Switch will be operated
- The Multi Switch parameter settings

Serial number sticker

The additional serial number sticker (included in the package) has to be adhered to the back of this manual.

Installation of the Multi Switch

Configuration

You can adjust the Multi Switch configuration before or after installation of the device.

- 1.** Connect the Multi Switch with the USB connection lead to a PC on which the mo-Vis Configurator software is installed. The device will be powered on automatically and an USB connection will be established allowing to use the mo-Vis configurator.
- 2.** Adjust all settings according to the installation plan.

Mounting

The Multi Switch can be mounted on any location in function of user's needs.

To install the Multi Switch, proceed as follows – according to your installation plan:

- 1.** Define the place and position of the Multi Switch unit / proximity sensors and all cabling.

Make sure that the user has visual contact with indication LEDs at the front of the Multi Switch, to enable him to check the status. Although every action can trigger an auditive signal, it is not advised to have this signal as only available check for the user.

2. Secure all cables with straps or fasteners.



WARNING!

Make sure that cabling is mounted in such a way that excessive wear and tear is avoided.

Usage

Safety precautions



CAUTION

The Multi Switch Proximity sensors may be influenced by Moisture. Moisture (e.g. rain) is a conductive substance. A few single drops of rain will not cause issues, but a water film can cause the sensor to be activated all the time.



CAUTION

Keep radio transmitters (e.g. mobile phone) away (at least 30 cm) from the sensor and its connecting cable.



CAUTION

The Multi Switch should not be used in conditions where malfunctioning of the device can cause potential risk situations.



CAUTION

The device contains a controller that continuously checks the integrity of the device, whenever a problem is detected the device will be switched off automatically.

Dealer assistance

During first time use by the user it is advised that the dealer or service engineer assists and explains the different possibilities to the customer (the user and/or his attendant).

If needed, the dealer can make final adjustments.

User testing

It is important that the customer is fully aware of the installation, how to use it and what can be adjusted to optimise his experience.

As a dealer, proceed as follows:

1. Explain and show the customer how you have executed the installation, and explain the function of every (new) button.
2. Have the user test the position of the Multi Switch:
 - Is the Multi Switch positioned in such a way the user gets visual and/or auditive feedback?
 - Does the Multi Switch and its cabling not hinder the user?
3. Have the user test all possibilities of the button/proximity sensor:
 - Are they well positioned for the users' needs?
 - Can the user safely operate them with the least effort?
4. Has the user tested all possible uses of the switch:

- Is every function accessed by the switch understood by the user?
 - Is every function accessed by the switch functioning providing the least effort for the user?
5. If needed, adjust the Multi Switch (with the mo-Vis Configurator software if required) and retest till optimal position and functioning.
 6. Explain to the customer possible problems and how to address them (see Troubleshooting).

User adjustments



WARNING!

Changes in parameter settings may cause damage to devices or may cause injuries to persons.

As a user or attendant, you can make a limited number of parameter adjustments yourself with the mo-Vis Configurator software.

Although the number of parameters you can change as a user or attendant is limited, we advise changing only parameters you completely understand.

- For a list of parameter settings, see Parameter settings.

Operation modes

Note: When power is removed from the Multi Switch all outputs will return to their open condition.

Select Modes

The select mode is used to select one of the active outputs.

If only one active output is selected, the select modes have no meaning because there is nothing to select. In that case, output 1 (Green Tip) will be controlled.

Click

To generate one or more short clicks (quickly open-close of the input). The period between the clicks needs to be shorter than 'Action Delay' time.

After the clicks are given the output will react depending on the output's 'Lock' setting:

- the output will be closed for a set time, or
- the selected output is locked until released.

Start/Scan

A short click will start the scanning of the active outputs.

- A corresponding number of beeps is generated.
- The selection LEDs are activated.

When the desired output is selected, press again to activate it. The output will react depending on the output's 'Lock' setting:

- the output is closed as long as the input is kept closed, or
- the output is locked until manually deselected.

If waited too long, the selection process will stop and no output will be activated. This is a built-in feature to cancel any unwanted input.

Hold/Scan

Keep the input closed and a scanning of the active outputs will start.

- A corresponding number of beeps is generated.
- The selection LEDs are activated.

When the desired output is selected, release the input device. The output will react depending on the output's 'Lock' setting:

- the output will be closed for a set time, or
- the selected output is locked until released.

If waited too long, the selection process will stop and no output will be activated. This is a built-in feature to cancel any unwanted input.

Momentary/Timed or Switched

Momentary

- The output will be closed as long as the input is closed, or
- The output will be closed for a set time.

Switched

The output will toggle between open and closed. This is useful to switch something on continuously.

Lock Mode

Lock mode is to control a device for a longer time, e.g. communication or environmental device.

When Lock is set to 'Yes' ('No' is the default), it will be locked in the selected output.

To escape this mode (break the lock), the input needs to be closed continuously for a time longer than the 'Quit Time'.

Calibration Mode

Auto

The system will automatically adjust over time. This is only usable when the user of the device is able to keep a distance of at least 30mm from the sensor when not operated.

Manual

Ask the user to go to the position where he would like the input to be open, then press the button on the box, the system will store that position as the open reference.

When the calibration is successful, a continuous beep will sound, if unsuccessful (calibration mode is set to auto or a mechanical switch connected) a number of short beeps will be produced.

The use of the manual operated calibration is necessary when the activating part of the body remains constantly close to the sensor (less than 30 mm). It is therefore appropriate to calibrate manually at regular intervals (every day or after a few days).



WARNING!

The calibration mode is only useful in combination with proximity sensors.

Troubleshooting

Flash codes

When a fault occurs the LED will start to flash. There is a long delay and then a number of flashes with a short delay. Count the number of flashes and look up the according code in the table below.

Flash Count	Reason	Required action
1	-	-
2	-	-
3	Power Supply, Under/Over voltage	Check power connections and power cable
4	Sensor	Replace PCB
5	-	-
6	ADC Internal Analog to Digital Converter	Replace PCB
7	Test Flag failed or diagnostic failed	Redo tests Replace PCB
8	CPU fault	Replace PCB

9	Scheduler fault	Update Software Replace PCB
10	Coding Error	Update Software Replace PCB

If the problem persists after intervening, please contact your local dealer or mo-Vis Service Engineer to attend to the problem.

Error codes

The system maintains a fault log with counters. Each time a specific fault occurs its counter will be incremented by one (the maximum count value is 254).

The fault log can be accessed by the configurator (Dealer Level), it is possible to clear one fault counter or all counters.

Fault	Reason	Required action
CPU Error RAM	CPU consistency check failed.	Replace PCB.
CPU Error FLASH		
CPU Error EEPROM		
Run Error Scheduler	Firmware consistency check failed.	Update Software or Replace PCB
Code Error Framework		
Code Error Application		
MSP Command Corrupt	Corrupt command was received.	Connection with the PC (Configurator program) went wrong, try again.
MSP Command Unknown	Unknown command was received.	Connection with the PC (Configurator program)

MSP Sub Command Unknown	Unknown Sub Command was received.	went wrong. Update Firmware or update Configurator Software. Try again.
MSP Argument Invalid	Invalid argument received.	
MSP Device Not Ready	Device as not ready to receive an MSP command.	
MSP Device Wrong State	The device is not able to receive a command in the current device state.	
PCB Test Failed	Factory test failed.	A fault occurred during factory testing.
Application Test Failed		
Field Test Failed	Field test failed (Calibration).	A fault occurred during field testing (Calibration).
Test Flag Check	One or more test flags not set.	Redo tests and/or replace PCB.
ADC	ADC Conversion error.	Replace cabling/PCB interface

Sensor	The Proximity Sensing Circuit is faulty	Remove dust in device and replace device if not solved.
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Maintenance

Cleaning

Clean all parts of the Multi Switch and the optional Proximity sensors on a regular basis (monthly), or whenever needed.

- Gently remove dust and dirt with a damp cloth.
- Use only non-aggressive disinfectant cleaning agents



WARNING!

Do not immerse the unit in water or do not use excessive amounts of liquid.

Monthly check

Monthly, or whenever needed, check whether:

- All bolts and screws are still firmly tightened
- There is no damage to any wiring
- There is no excessive wear to any of the parts

Multi Switch unit maintenance

The Multi Switch unit is maintenance-free. Under regular use circumstances, the Multi Switch unit and different parts do not require additional maintenance.

Parameter settings

With the mo-Vis Configurator Software you can change the parameters of the Multi Switch. Depending on your user profile (user, attendant, dealer, OEM), you will be able to change a number of parameters.

Input Settings

Parameter	Min	Max	Default/ options	Description
Select Mode	-	-	Click	A number of short clicks (short close/ open input) are made to select the output.
			Start & Scan	A Click is made to start scanning of the outputs. The scanning of the outputs is done at an interval of 'Select Time'.
			Hold & Scan	Close the input and wait for the desired output selection, then open the input and this will close the output. The scanning of the outputs

				is done at an interval of 'Select Time'.
Active Outputs	1	4	1	Number of outputs used. If set to '1', the switch will never enter Select mode.
Calibration Method (proximity mode only)	-	-	Auto	The system will automatically adjust over time. Only to be used if the user of the device is able to keep a distance of at least 30 mm from the sensor when not operated.
			Manual	The system will have to be calibrated manually regularly. Press the interface button to execute calibration. Make sure the user is not activating the contact during calibration.
Sensitivity (proximity mode only)	10	100	50	Proximity switch sensitivity. The higher the value, the more sensitive the device becomes. Reduce this value in case of false contacts.

Output Sequence	-	-	Tip-Tip	The Select Sequence is: Green Tip - Yellow Tip - Green Ring - Yellow Ring.
			Tip-Ring	The Select Sequence is: Green Tip - Green Ring - Yellow Tip - Yellow Ring.
Debounce Time	10	2500	50	In mS
Select Time	100	5000	1000	In mS This is also the scan time.
Input beep	-	-	None	No sound (default)
			Short	A short beep
Select beep	-	-	None	No sound
			Medium	A normal (medium) beep (default)
			Long	A long beep
Output beep	-	-	None	No sound
			Short	A short beep (default)
			Medium	A normal (medium) beep
Quit beep	-	-	None	No sound
			Medium	A normal (medium) beep
			Long	A long beep (default)

Output Settings

There are four groups, one group for each output. The parameters for each group are equal.

Parameter	Min	Max	Default/ options	Description
Mode			Momentary / Timed	The output will be closed as long as the input is kept closed, or the output will be closed for a set time.
			Switched	The output will toggle between open and closed.
Close Time	20	5000	200	The time the output will be closed. Only in case of a timed output.
Lock			No	Normal operation, after the output was operated the device will return to selection mode.
			Yes	After entering the output mode, the device will remain in this output mode until the input is kept closed

				for a time longer than the 'Quit Time'.
Quit Time	1000	25000	5000	The time needed to close the input in order to open the Lock. The parameter 'Lock' needs to be set 'Yes' for this output.

Technical data

Product description & code

- Multi Switch Unit (P014-40)
- Multi Switch Proximity Sensors (P014-41)
- Multi Switch Proximity Set (P014-42)
- Multi Switch Sensor 12 mm (P014-20)
- Multi Switch Sensor 24 mm (P014-23)

Dimensions Multi Switch unit

- 36 mm x 40 mm x 17 mm (HxWxD)
- 1.42 in x 1.57 in x 0.67 in (HxWxD)

Voltage supply

- Over micro USB : 5V

Power consumption

- 14 mA

Input

- mechanical switch (Closed max 200 Ohm, Open min 150 kOhm)
- mo-Vis proximity sensor, 12mm or 24mm

Output

- Max : 60V, 75mA,
- Output On resistance : 10 Ohm

Cable length

- Sensor 12 mm : 120 cm (0.49 ft.)
- Sensor 24 mm : 120 cm (5.9 ft.)

Tested According (relevant sections)

EN12182

Installation date: . . . / . . . /



Dealer:

Dealer stamp:

A large, empty rectangular box with a thin green border, intended for a dealer stamp.

Serial number sticker

A large, empty rectangular box with a thin green border, intended for a serial number sticker.