GeoSIG
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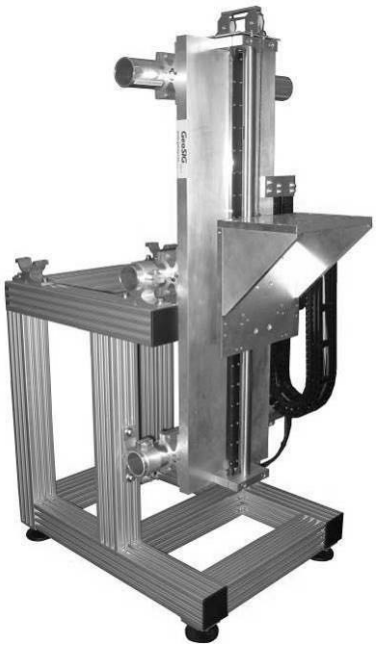
GSK-166 Uniaxial Linear Shaking Table
User Manual



GeoSIG Ltd, Wiesenstrasse 39, 8952 Schlieren, Switzerland
Phone: + 41 44 810 2150, Fax: + 41 44 810 2350
info@geosig.com, www.geosig.com

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Author	Stephen Trowbridge / Markus Epp
Checked	Markus Epp
Approved	Serge Rudaz

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Introduction

Dear Valued GeoSIG Customer, thank you for purchasing this product.

These Instruments have been optimised to meet the requirements of the majority of customers out of the box and may have even be delivered tailored to your needs. In any case, to be able to get the most out of our product, please carefully study this manual, its appendices and referenced manuals, as well as any other documents delivered with it.

This is a reliable and easy to use device, and at the same time a sophisticated product, which requires care, attention and know-how in configuring, installing, operating and maintenance.

Warnings and Safety

The Shaking Table should be operated by trained people only. Ignoring the warnings in this manual can destroy the Shaking Table or even lead to serious injury or loss of life.

The Shaking Table must be properly fixated on the floor, against a wall or any other strong structure.

Always turn off the Shaking Table with the Emergency Stop Button before going closer than 1 meter. The Emergency Stop Button must be easily reachable by the operator at any time.

Make sure that the Shaking Table stands clear from any objects by minimum 1 meter. The working space of the controller must be away from the Shaking Table by minimum 1.5 meter

Do not put credit cards, mobile phones or any electronic devices close to the magnet.

Do not plug in any cable to the computer or the Shaking Table before carefully studying this manual. Drivers must be installed before connecting the USB-to-CAN-Converter

1. Hardware Setup

1.1. Cabling Overview

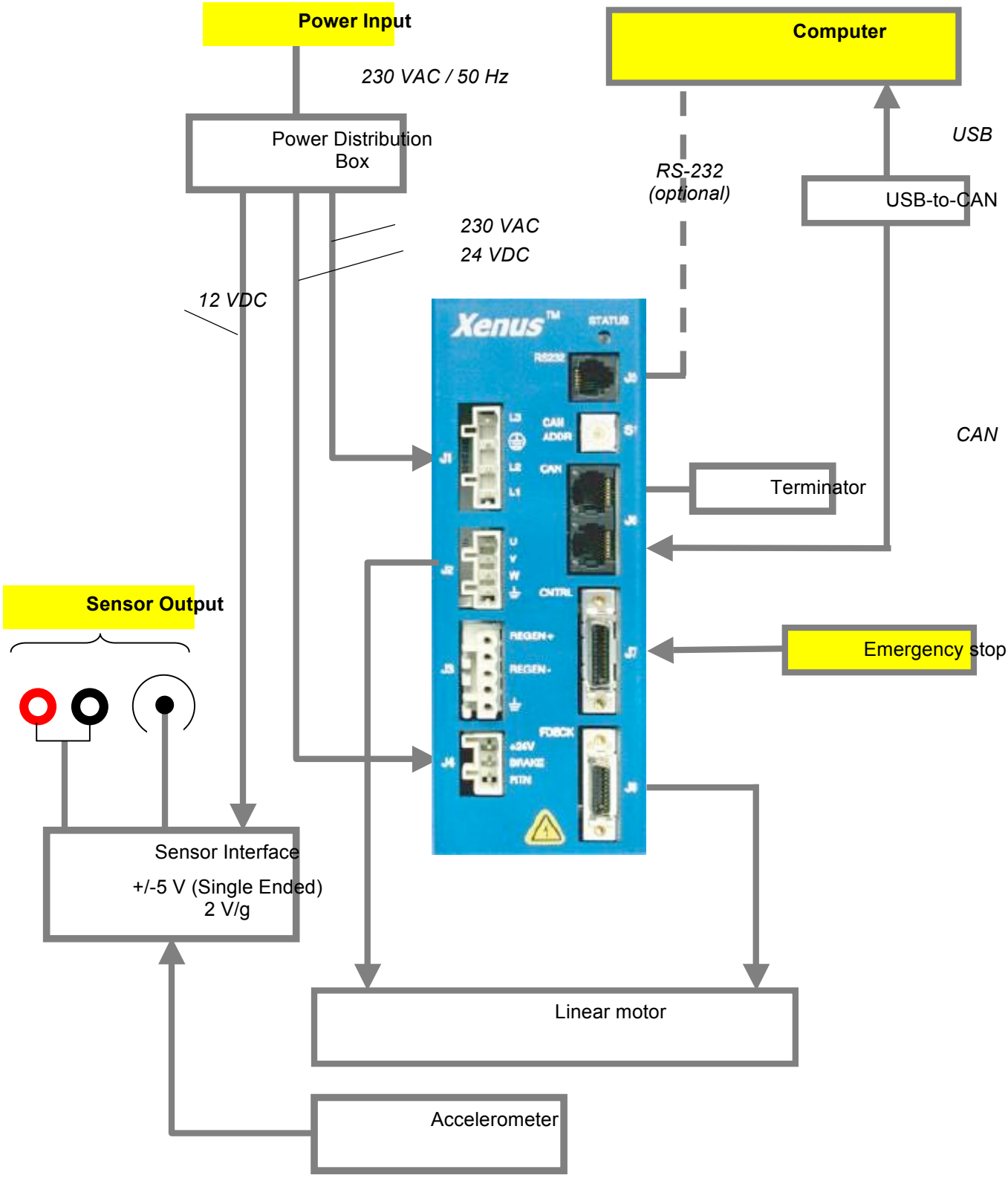


Figure 1. Cabling overview

1.2. Power Distribution Box

The Shaking Table needs 230 VAC for operation. Connect a cable with Phase (Brown), Neutral (Blue) and Protection GND (Yellow/Green) to the terminal block on the right side. The cables are connected by clamps, not by screws. Therefore simply push with a small screwdriver (No 00) in the hole as shown in the right bottom picture of Figure 2 to release the existing cables or mount new ones.

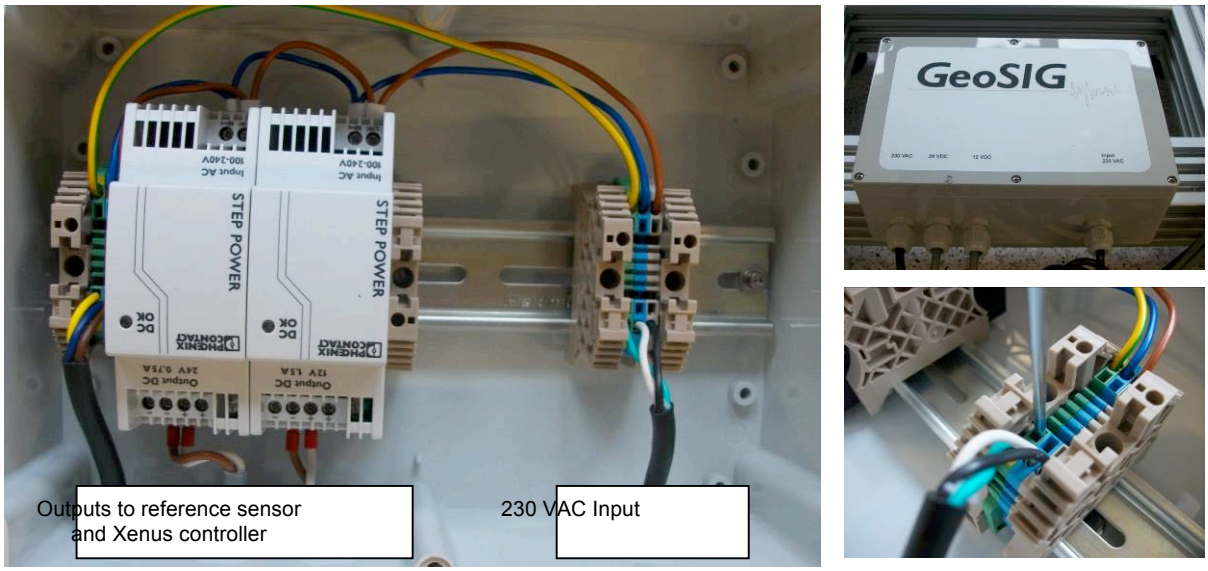


Figure 2, Power Distribution Box

1.3. Xenus Controller

All cables to and from the Xenus controller are already pre-manufactured and installed. Therefore no modifications are needed for the start-up of the Shaking Table.

Connector J1 – 230 VAC

4	Main Input L3
3	Protective Ground
2	Main Input L2
1	Main Input L1

Connector J2 – Motor Output

4	Motor Phase U
3	Motor Phase V
2	Motor Phase W
1	Cable Shield

Connector J4 – 24 VDC

3	+24 VDC
2	n/c
1	GND

Connector J5 – RS-232

6	n/c
5	TxD Output
4	GND
3	GND
2	RxD Input
1	n/c

Connector J6 – Can Bus
The upper connector is connected the termination adapter
The lower connector is connected to the USB-to-CAN converter

Connector J7 – Emergency Stop
This connector is used for the emergency stop.

For your safety the Shaking Table is disabled if the emergency stop button is not connected.

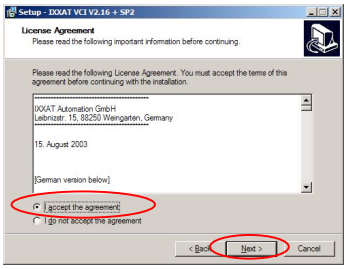
2. Installation of the Drivers and Software

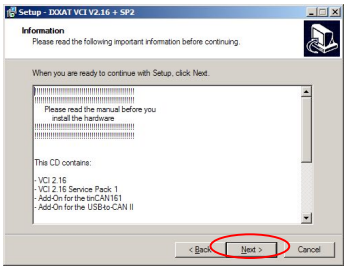
2.1. Drivers

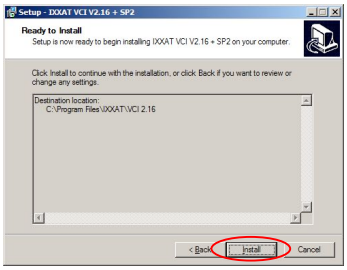
Keep your USB-to-CAN converter unplugged until you have installed all the driver and software

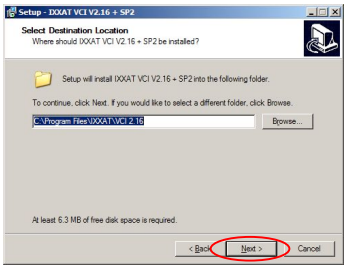
2.1.1. USB to CAN

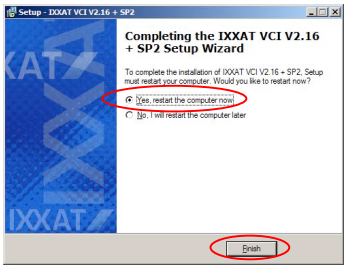
To be able to use the shaker, the first thing is to install the drivers. If you use the standard delivered converter (USB-to-CAN compact from IXXAT) you should install the VCI 2.16. This driver you can find on the CD provided by GeoSIG, if you don't have this CD, please contact GeoSIG. Please run the application named ***vci216+sp2.exe*** in the folder *Software_And_Drivers* and follow the instructions of the setup, then ***restart*** your computer. If there are any problems, contact GeoSIG or use the manual from the provided GeoSIG CD under *Manuals_And_Guides\vci31_Users_Guide.pdf*





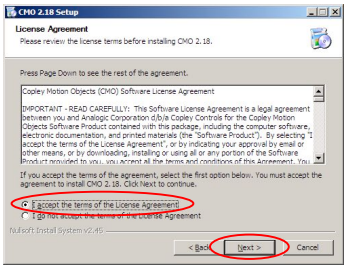


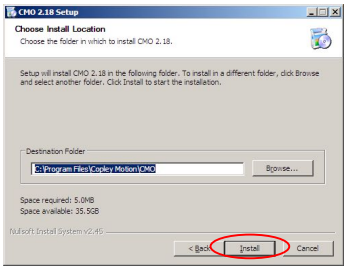


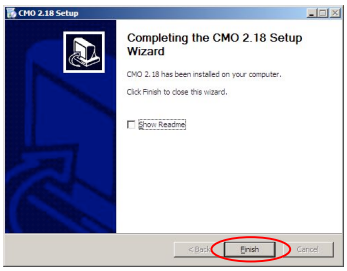


2.1.2. CMO (GeoDAS Communication Driver)

To be able to use the shaker with GeoDAS, the CMO driver must be installed. Please install the driver from the provided GeoSIG CD by unpacking the file ***CMO.zip*** in the folder *Software_And_Drivers* and run ***Setup.exe***.



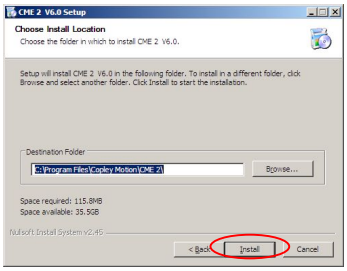


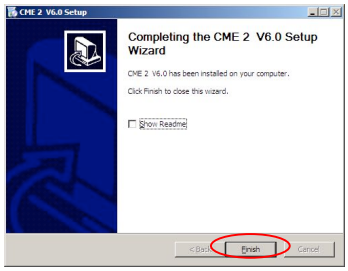


2.2. Software

2.2.1. CME2

CME2 is the software used to change the settings of the motor and its controller. Please install the software from the provided GeoSIG CD by unpacking the file ***CME2.zip*** in the folder *Software_And_Drivers* and run ***Setup.exe.*** Alternatively you can download the latest version here: http://www.copleycontrols.com/Motion/Downloads/index.html





2.2.2. GeoDAS

GeoDAS is the GeoSIG software which is used to control the movement of the shaking table. Please install GeoDAS from the provided CD or download the latest version from here: http://www.geosig.com/Downloads-pg66.html. For details about all its functions please consult the *GeoDAS User Manual*.

2.3. Example Data

Please copy all demo scripts from the provided CD to your computer. To do this please unpack the file *Examples.zip* in the folder *Examples* on the CD to the folder **C:\GeoDAS_DATA\Tester**

2.4. First Connection

2.4.1. USB to CAN Installation

If you have installed all the drivers and software from the previous chapter, restart your computer and plug in all the power cables of the shaker.

As soon as the computer is restarted plug in the USB cable of the USB-to-CAN converter into one of your USB ports. Now Windows should ask you to install the driver.

Figure 3, USB-to-CAN driver installation, step 1

- Select ***No, not this time***
- Press ***Next >***

Now you'll be asked if the computer should search automatically for the driver.

- Select ***Install from a list or specific location (Advanced)***
- Press ***Next >***

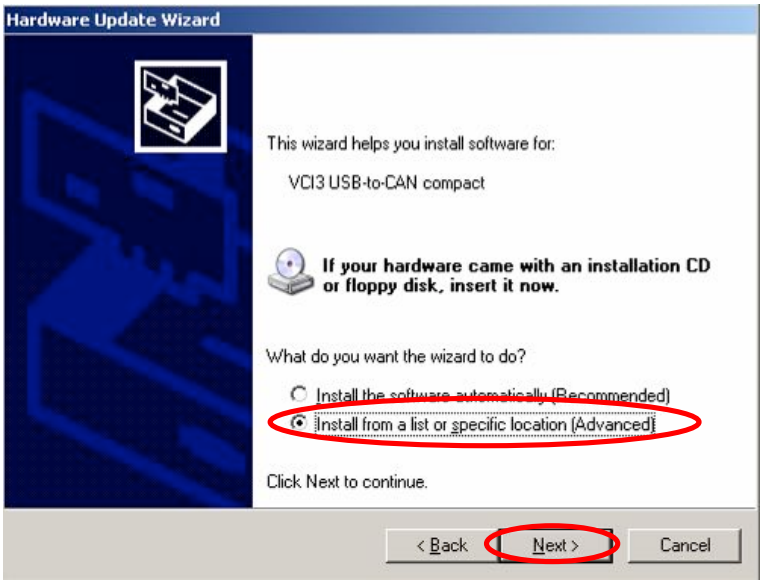


Figure 4, step 2

The following window will appear.

- Select ***Don't search. I will choose the driver to install***
- Press ***Next >***

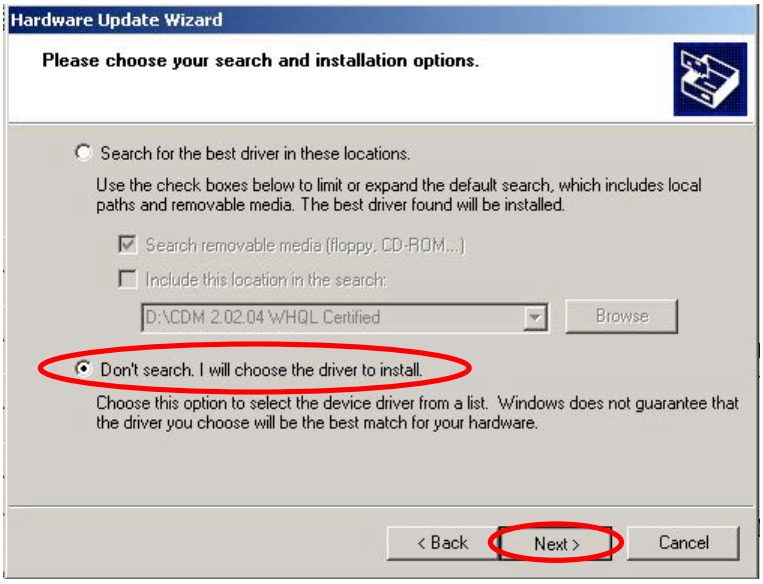


Figure 5, step 3

- Select ***IXXAT USB-to-CAN compact***
- Press ***Next >***

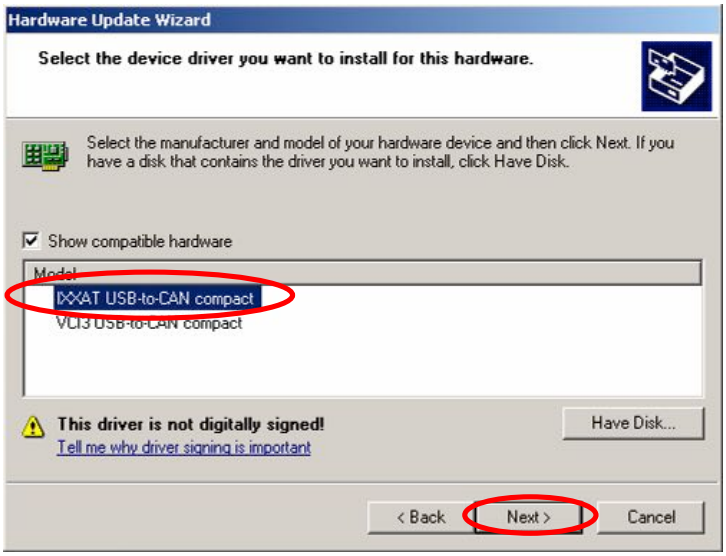


Figure 6, step 4 – Select the driver ***IXXAT USB-to-CAN compact***

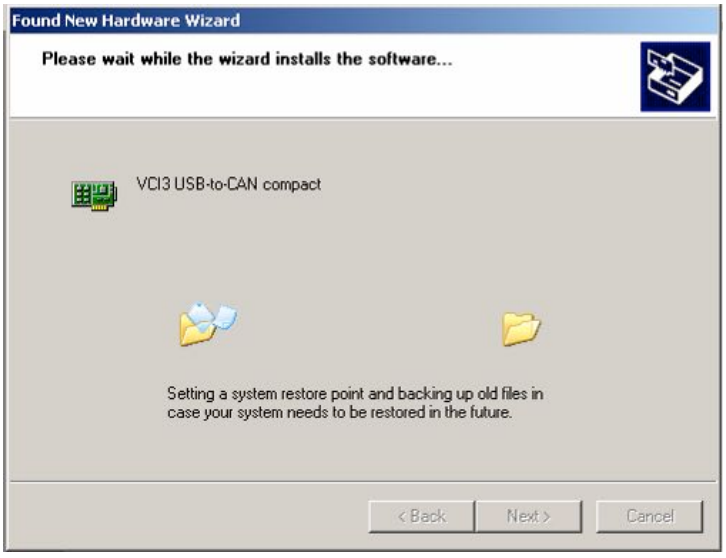


Figure 7, step 5

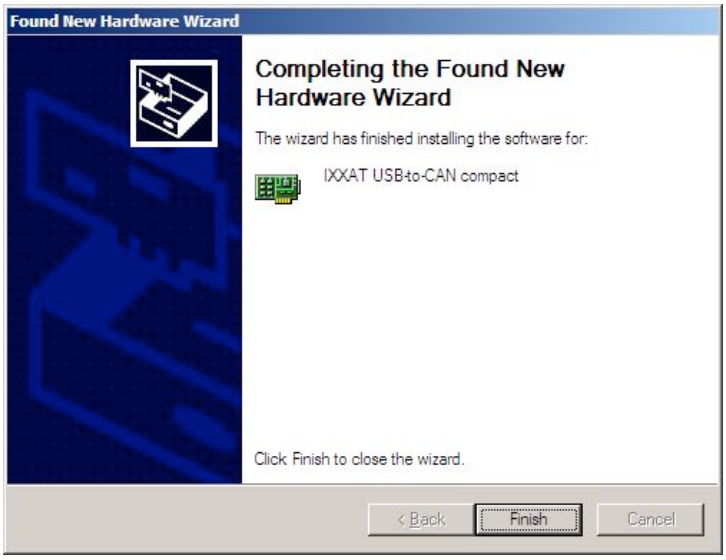


Figure 8, step 6

- Press ***Finish***, then close the window and ***restart*** your computer

2.5. CME2

Switch on the shaker by connecting it to the power.

☞ ***Make sure that the Emergency Stop button is pressed!***

Open the CME2 Software from your Start menu. When the program is opened, you have to confirm the following message

- Press ***OK***

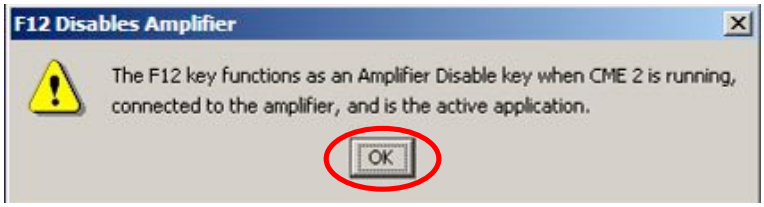


Figure 9, Confirm this message

The program will then search any connected shaker controller. Wait until the CAN port is found

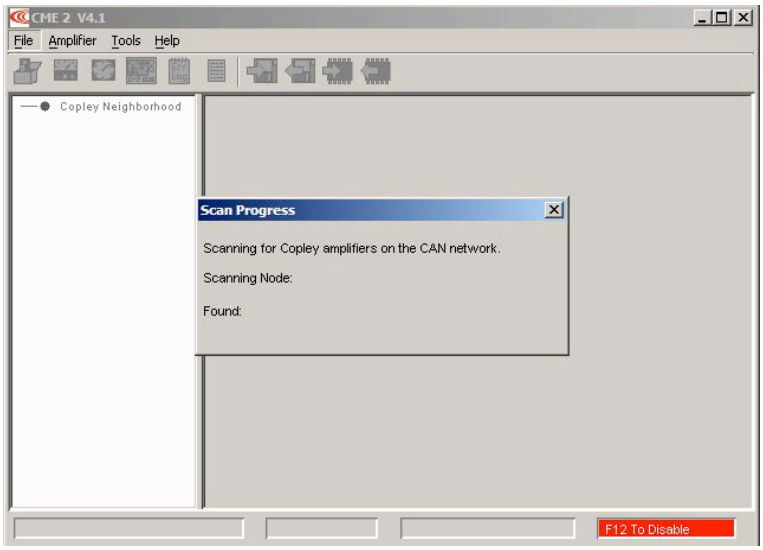


Figure 10, CME2 is scanning for a CAN network

If the shaker is not found (normally on the first start) please do the following steps

- Open Tools → ***Communication Wizards***
- Select ***CAN Network*** and press ***Next >***

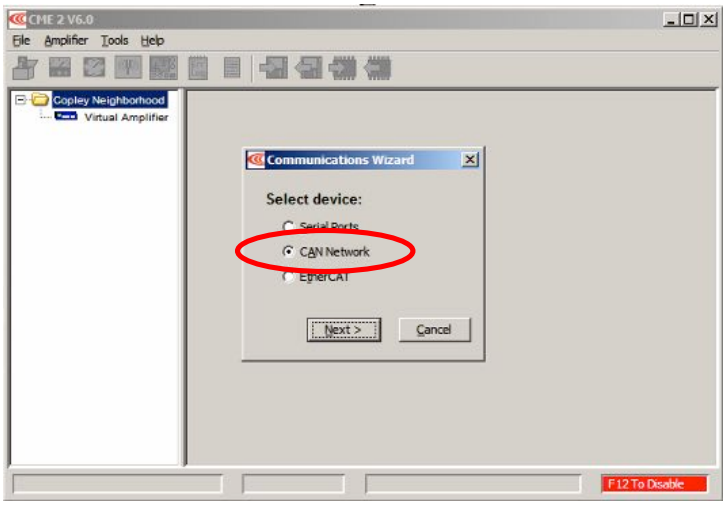


Figure 11, Select CAN Network

- Select a Bit Rate of ***500kbit/s***, then press ***Finish***

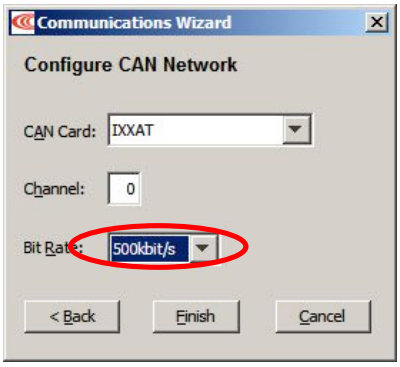


Figure 12, CAN Network parameters

The following window will open, showing all the feedback loops of the amplifier

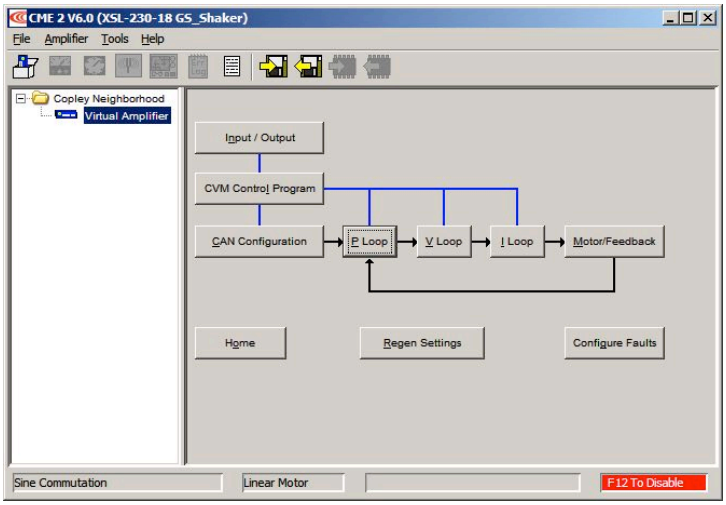


Figure 13, Amplifier Settings

No adjustments need to be done here. The behaviour of the linear motor can be adjusted, but should only be done after the CME2 User Manual is fully understood. The manual is provided on the delivered CD or here: http://www.copleycontrols.com/Motion/Downloads/software.html.

Adjustments of the amplifier settings should be done by trained people only. Wrong settings can destroy the shaking table or even lead to serious injury or loss of life.

3. Installation of the Shaking Table

3.1. Horizontal Operation

Make sure that the Shaking Table is levelled and properly fixated on the floor, against a wall or any other strong structure. Otherwise no specific adjustments are necessary. Proceed directly with chapter 4, Start up of Shaking Table.

3.2. Vertical Operation

If the shaker is vertically operated, the weight of the sliding carriage and the device under test must be compensated to take the load from the motor. Additionally the compensation makes sure that the sliding carriage will not fall down in case the motor will be disabled because of the emergency stop.

3.2.1. Material List

All material which is needed for the vertical weight compensation is shown in Figure 14.

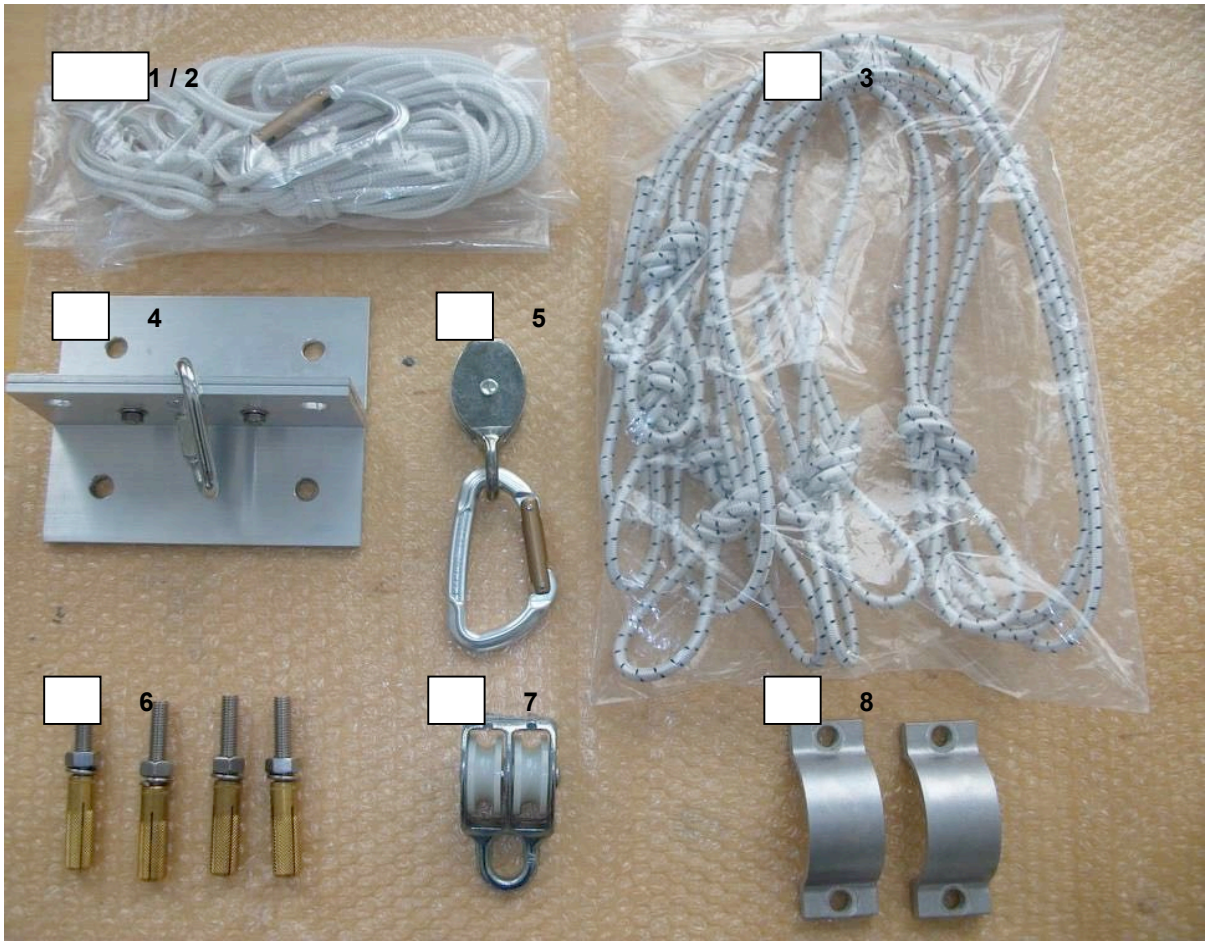


Figure 14, Material for vertical Shaking Table

Explanation:

1. Fixation Rope for Sliding Carriage
2. Extension Rope
3. Elastic Bands
4. Fixation Point for Roof
5. Guide Roller with Karabiner
6. Threads, Nuts and Anchor Bolts
7. Double Guide Roller
8. Fixations for vertical mounting

3.2.2. Turning the Shaking Table

The Shaker can be turned from horizontally to vertically by the following steps:

- Remove the four screws at the back of the shaking table (see **A1** in the Figure 15)
- Slightly loose the four screws on both sides of the rotation axis (**A2**)

Hold the Shaker platform and the sliding carriage when loosening the screws to avoid any uncontrolled change from horizontal to vertical.

- Move the platform from the horizontal to the vertical position as shown in the Figure 15.
- Fixate the table again by tighten all screws on the bottom of the movable part (**A3**, see also Figure 14, Part 8) and the ones on both sides of the rotation axis (**A2**)

- For the first installation, mark the position on the roof (**B**) which is right above the linear motor (Black block below the sliding carriage). This will be used to mount the fixation point.

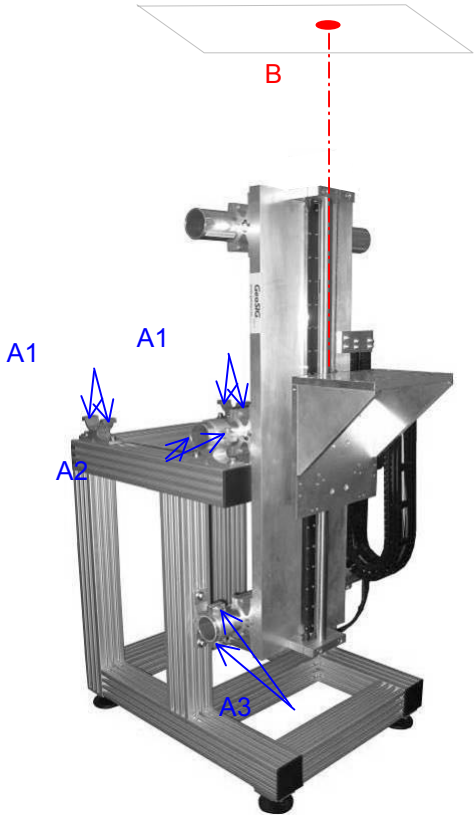


Figure 15, Vertically oriented Shaker

3.2.3. Fixation Point on the Roof

Mount the fixation point on the marked position right above the linear motor of the Shaking Table by using the four provided screws and anchor bolts.

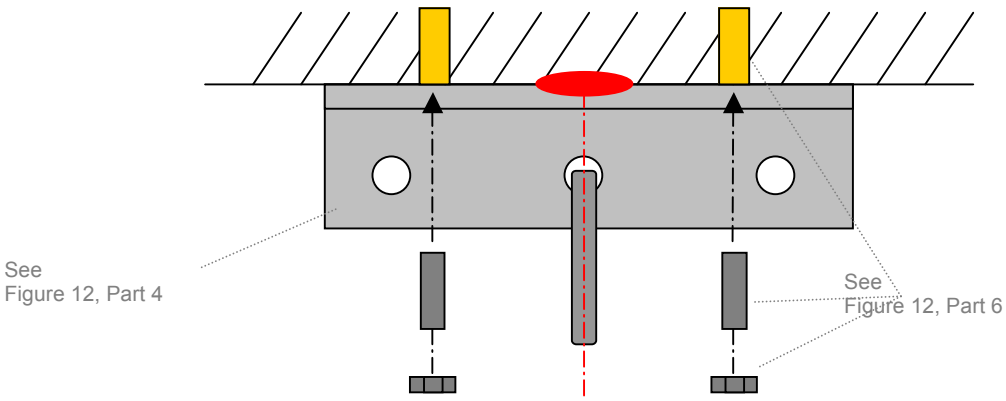


Figure 16, Fixation Point on the Roof

3.2.4. Fixation Point on the Sliding Carriage

A flexible rope is fixated around the linear motor block as shown in the figures below.

Take care that no cables are in between the rope and the motor block. Push the rope towards the platform as much as possible

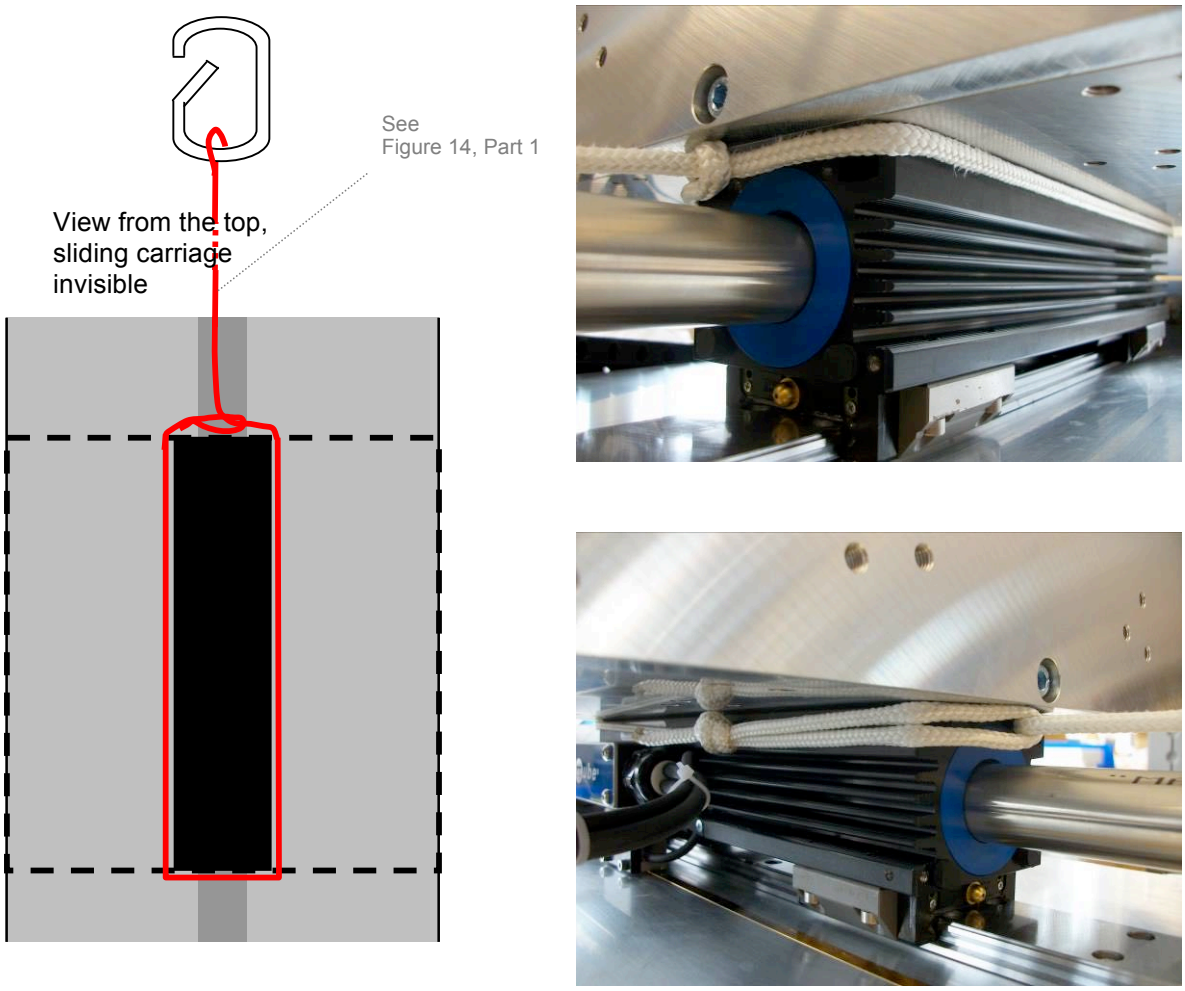


Figure 17, Fixation rope on the sliding carriage

This rope must be removed when the Shaking Table is used in horizontal configuration

.

3.2.5. Mount the Compensation Rope

Now everything can be assembled together as shown in Figure 18. The number of *Elastic Bands* can be adjusted depending on the weight of the device under test. For the empty sliding carriage including the mounting angle normally two elastic bands are needed.

The length of the *Extension Rope* can be adjusted according to the roof height during the first installation.

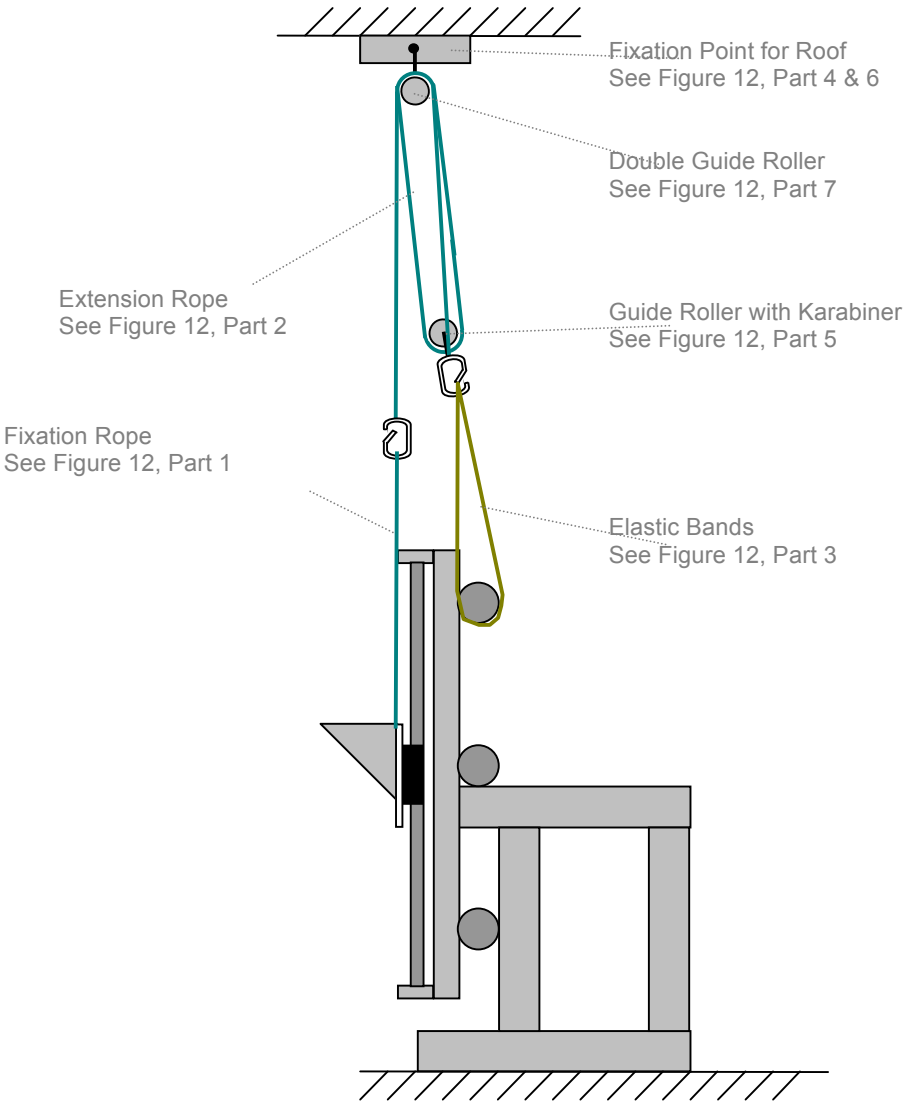


Figure 18, Shaking Table setup for vertical operation

To mount the *Extension Rope*, following steps must be done (see Figure 19):

1. From the karabiner of the *Extension Rope* go up with the *Fixation Rope* to the *Double Guide Roller* and down again.
2. Go with the *Extension Rope* through the *Guide Roller with the Karabiner* and up again through the second Roll of the *Double Guide Roller*.
3. Cut the *Extension Rope* at the correct length and tie it on the karabiner.

The Extension Rope has the correct length when two Elastic Bands can hold the sliding carriage in the middle of the Shaking Table without external help.

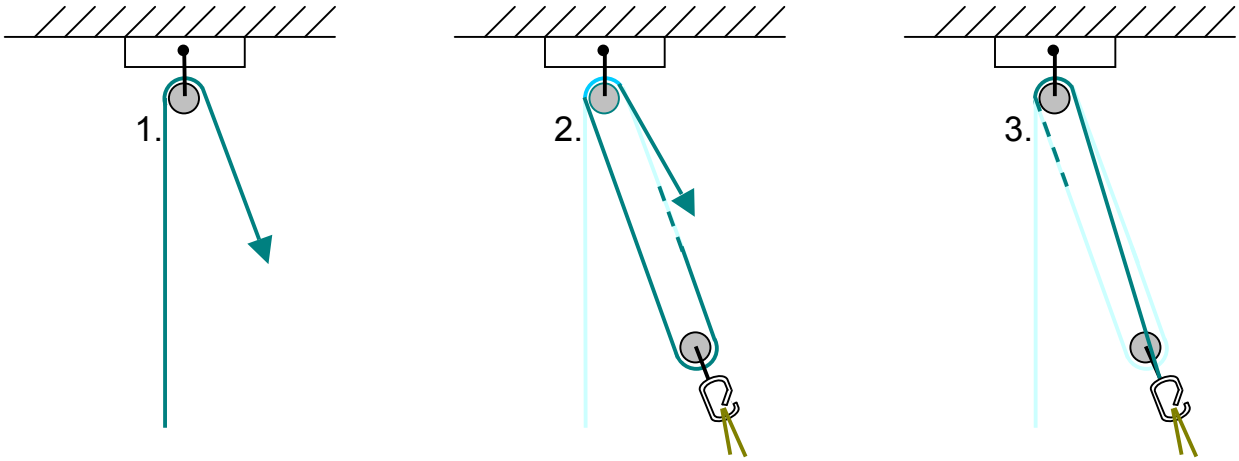


Figure 19. Mounting of the extension rope

4. Start up of Shaking Table

If the shaker is installed, then the start up can be done as described in the following chapters.

The following step-by-step procedure should be done first in the horizontal mode of the Shaking Table.

- Please open ***GeoDAS*** and go to Tools → ***Multifunctional Tester***

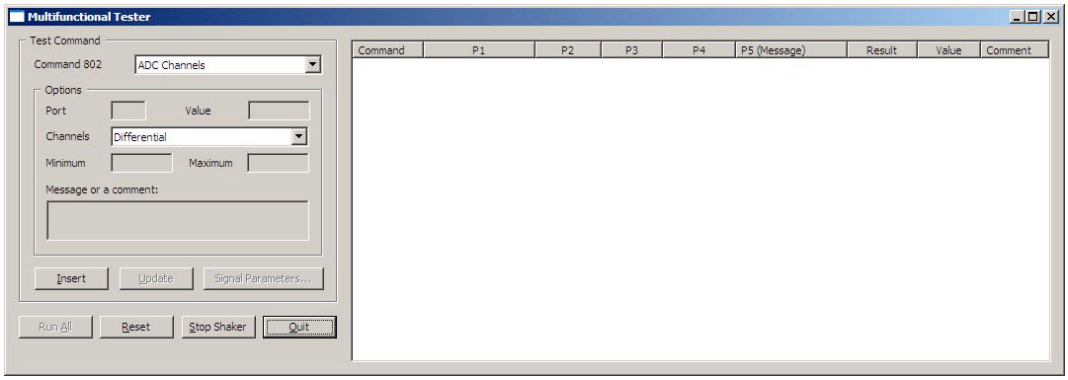


Figure 20, Empty Multifunctional Tester window

- Make a ***right click*** in the white area and select ***Insert from File***
- Select the file *GS_Shaker_Demo_Homing.csv* and press ***Open***

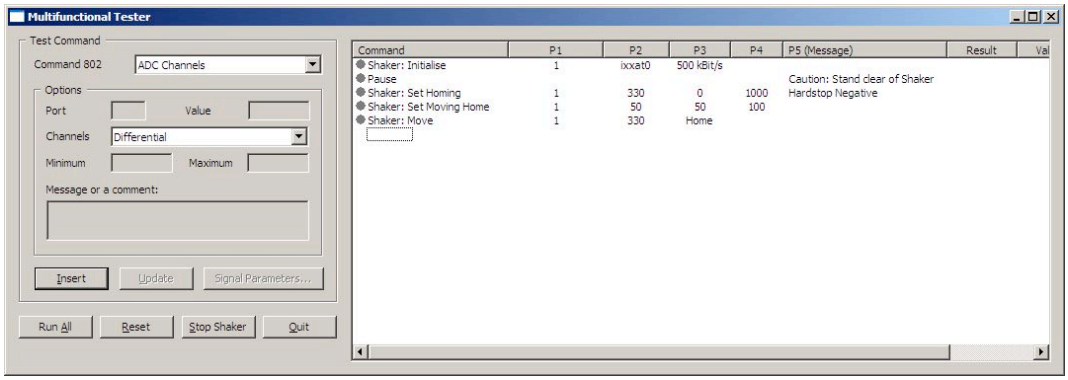


Figure 21, Multifunctional Tester window with loaded script

- Disable the *Emergency Stop Button* by turning the red knob.

- Press ***Run All***
- Make sure that nobody is within 1.5 m of the Shaking Table and confirm by ***OK***

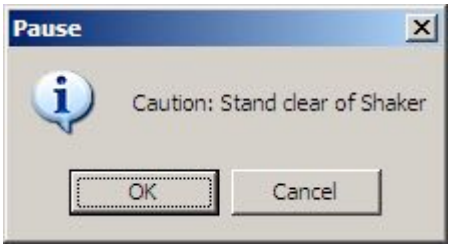


Figure 22, Stand clear of Shaking Table

The Shaking Table will then define his zero position by moving slowly to one end and then fix the zero position with an offset of 330 mm from this end.

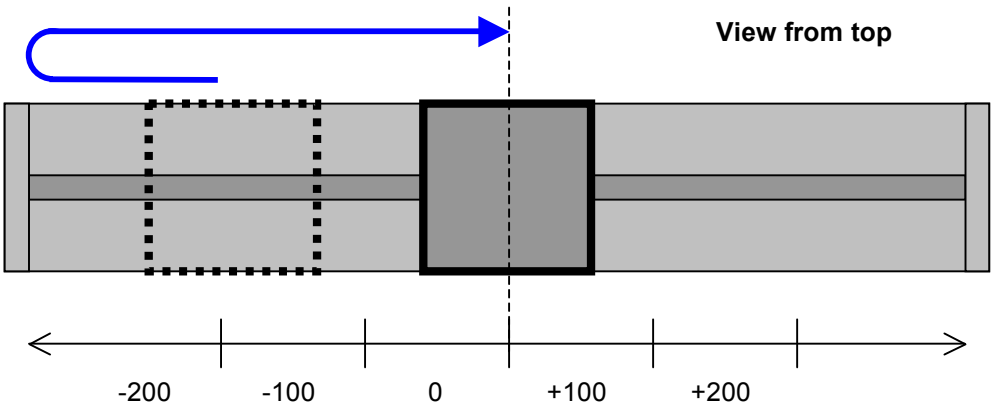


Figure 23. Movement of *GS_Shaker_Demo_Homing.csv*

After the shaker has been switched off, the homing procedure must be repeated always before applying any other movements.

The homing procedure can not be done in vertical mode. Please referee to chapter 4.1 for details.

To get a feeling of the functionality of the shaker, several other examples are available on the provided CD. When the Homing is finished and the Shaking Table stands still at its middle position, proceed with the following steps.

- Make a right click in the command window, press ***Select All*** and then ***<Delete>***.
- Make a ***right click*** again in the white area and select ***insert from file***
- Select the file *GS_Shaker_Demo_Move_Soft.csv* and press ***Open***
- Press ***Run All***

The shaking table will first move to an absolute value of 100 mm, then go back to -100 mm and finally stop at its zero position

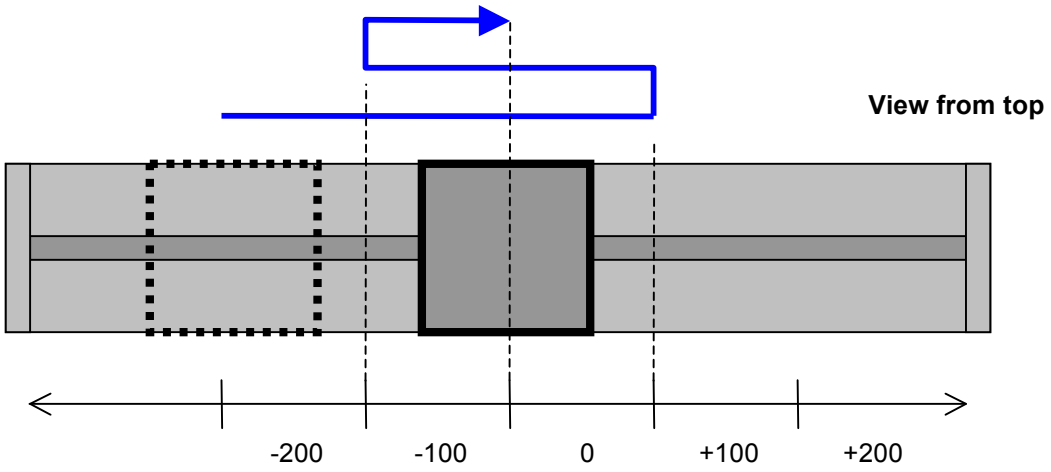


Figure 24. Movement of *GS_Shaker_Demo_Move_xxxx.csv*

The script *GS_Shaker_Demo_Move_Hard.csv* will do exactly the same movement, but much faster. Loading the scipt *GS_Shaker_Demo_Sweep.csv* will create a sinus with a peak acceleration of 500 mg.

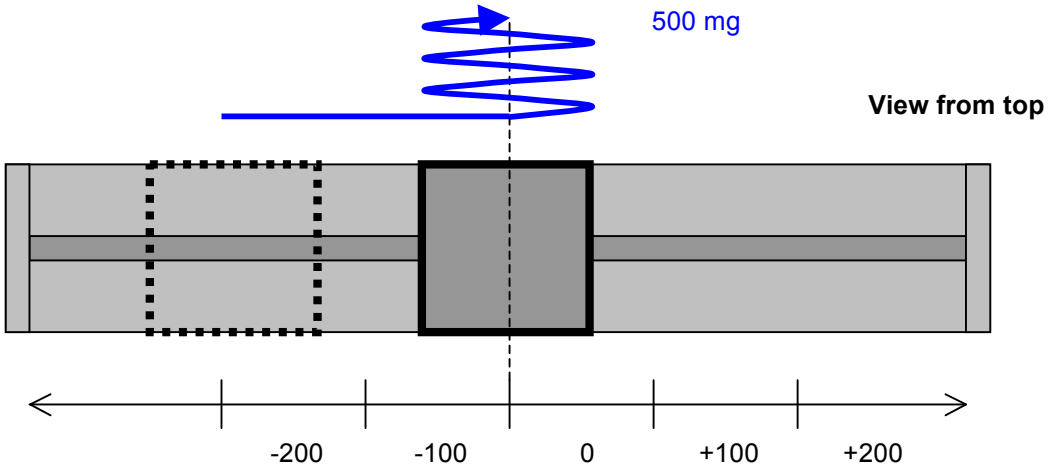


Figure 25. Movement of *GS_Shaker_Demo_ Sweep.csv*

The script *GS_Shaker_Demo_Earthquake.csv* will simulate the movement of an earlier recorded earthquake (X-channel)

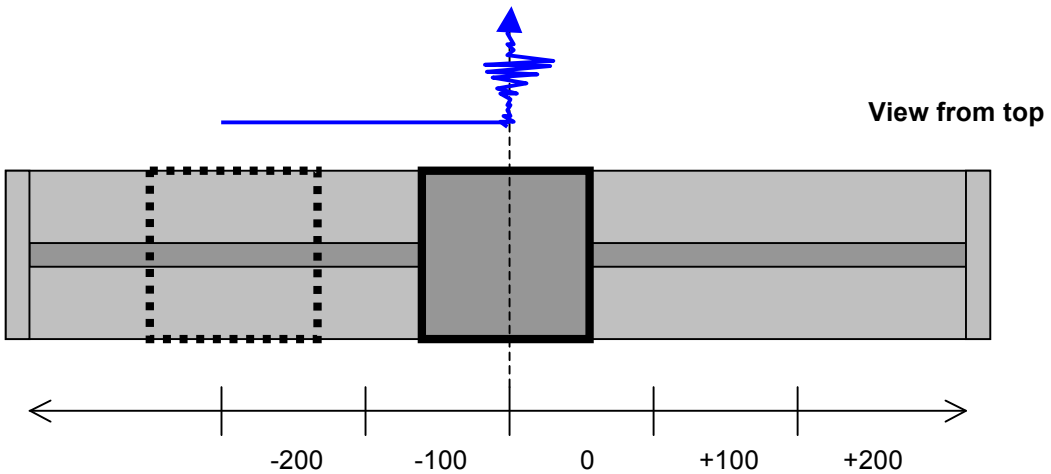


Figure 26. Movement of *GS_Shaker_Demo_Earthquake.csv*

4.1. Initial Homing in Vertical Operation Mode

In the vertical operation mode the Home of the Shaking Table must be set to zero always AFTER the device under test has been installed on the sliding carriage. So therefore make sure that the device under test is installed and adjust the number of *Elastic Bands* that the sliding carriage is approximately in the middle of the Shaking Table. Then proceed with the following steps.

- Close ***GeoDAS*** and open the program ***CME2***
- Click on the symbol ***Control panel***

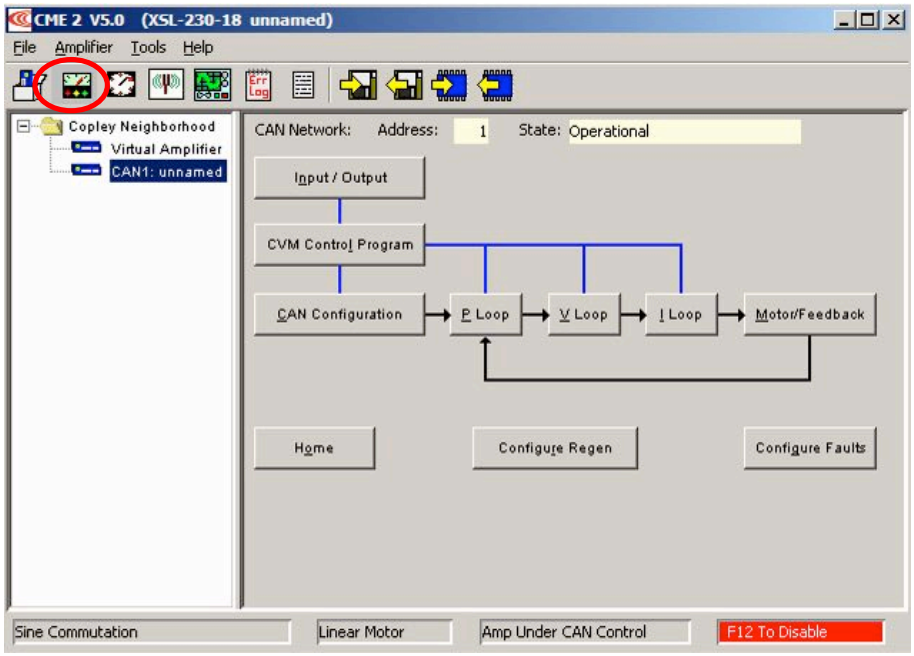


Figure 27, CME2 error

- Press ***Set Zero Position*** and make sure that the ***Actual Motor Position*** on the right side of the window shows **0 mm**

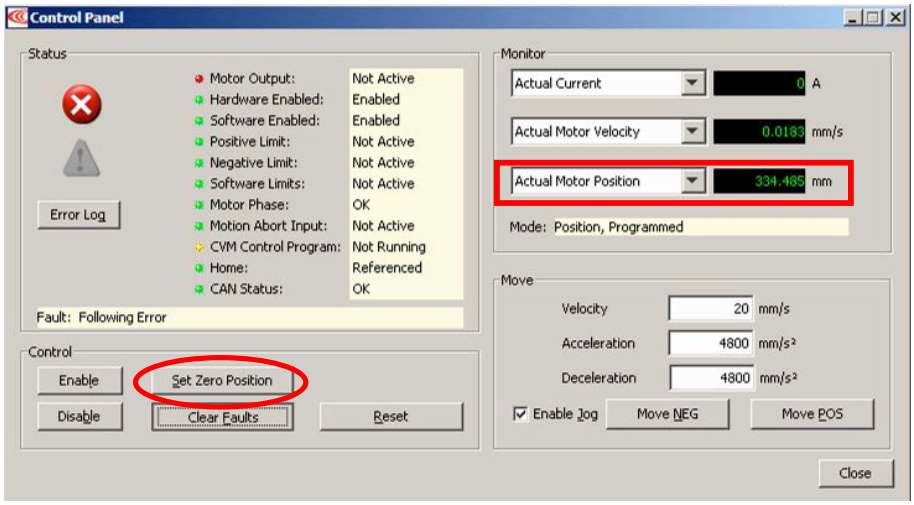


Figure 28, CME2 error

- Press ***Close*** and ***quit the CME2***
- Start ***GeoDAS → Tools → Multifunctional Tester*** to start your simulations

When stopping the simulation for more than 3 minutes, switch off the Shaking Table with the Emergency Stop Button to avoid any overheating of the linear motor.

5. Make your own Script

In GeoDAS it's possible to make fully customised user scripts and save/reload them easily to/from a file.

*It's important that the first command is always the **Shaker: Initialise** command, otherwise the controller will not be initialised and no movement will be executed.*

- To build your own script, select a command in the box, for example ***Shaker: Initialise***

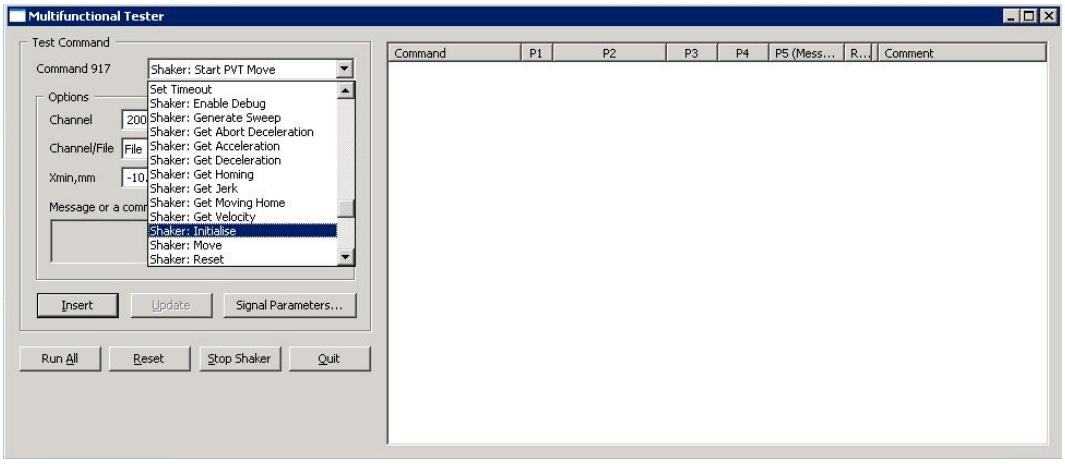


Figure 29, Empty Multifunctional Tester

- If required, the settings can now be adjusted. For the *Shaker: Initialise* command no adjustments are needed.
- Press ***Insert***

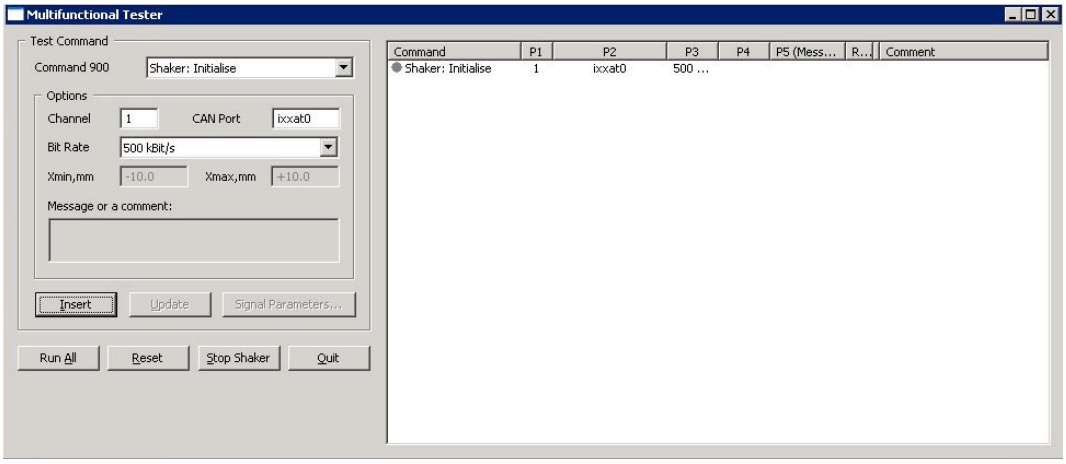


Figure 30, Building a script

The command is now inserted in the main window.

- Now add any other commands from the list described in chapter 5.1 and press ***Insert***

If you want to change an already inserted command, please do the following steps:

- Select the command in the main window, its parameters will appear on the left side
- Change the parameters as required
- Press ***Update***

It's possible to insert as many commands as wish. As soon you are finished, there are two ways how to run the commands on the shaker

1. Run all the commands together by pressing ***Run all***
2. Run a single command by right click on the command and then ***Run Commands***, only the selected commands will be executed.

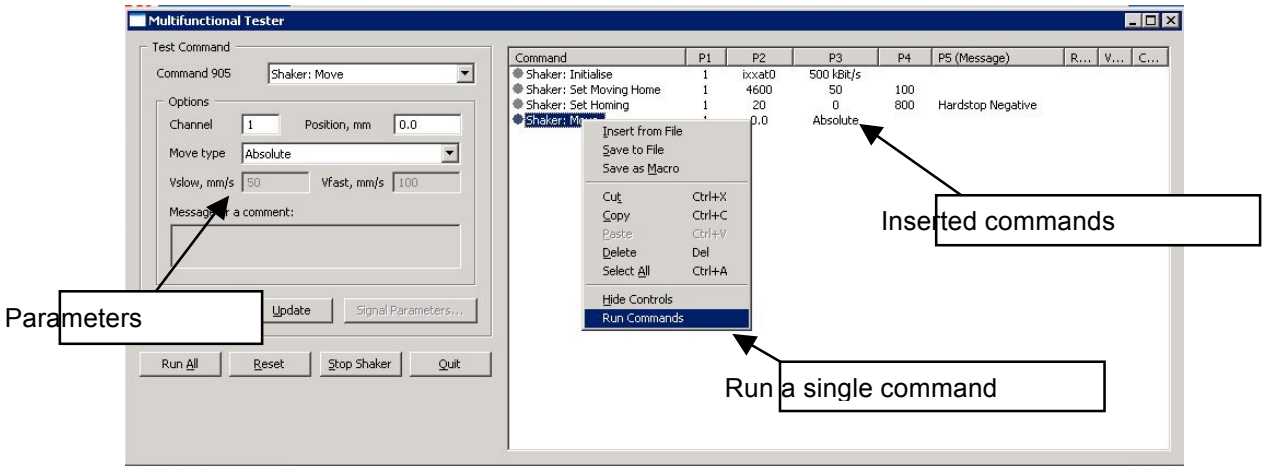


Figure 31, Running a script

5.1. Shaker Commands

*All the commands suitable for the shaker start with "**Shaker:**"*

5.1.1. Initialisation

Initialise

This command initialises the shaker. It must be run after every restart. If this initialisation has not been done, there will be an error.

Channel *This is the channel used to communicate with the shaker (default is 1)*

CAN port: *If the shaker is being steered with the provided USB-to-CAN compact converter from IXXAT, the CAN port must be ixxat0*

Bit Rate: *Bit rate used to communicate with the shaker. The default Bit rate is 500 kBit/s.*

5.1.2. Commands to Shaking Table

Generate Sweep

This function generates a sweep which can be used in three modes:

- Constant Acceleration
- Constant Displacement
- Constant Velocity

The following parameters stay always the same, independent from the mode which is selected:

Duration,sec: *The duration of the sweep in seconds. The duration must be in the range of 1 to 255 seconds.*

Fstart,Hz: *Start frequency.*

Fend,Hz: *End frequency*

.

The following parameters change, depending on the selected constant parameter.

Constant: ***Acceleration*** *– The shakers keeps the acceleration constant during the sweep.*

A,mg: *This is the acceleration of the sweep in mg. The acceleration will be kept constant even if the frequency is changing.*

Constant: ***Displacement*** *– The shakers keeps the amplitude constant during the sweep.*

X,mm: *This is the displacement of the shaking in positive and negative direction. The parameter must be in the range of your shaking table, otherwise the slide will crash in to the sides.*

Constant: ***Velocity*** *– The shakers keeps the velocity constant during the sweep.*

V,mm/s: *This is the velocity of the sweep.*

If the start frequency is not the same as the end frequency, the linear motor makes some noise. This is a mechanical behaviour and should be kept at a minimum.

Move

With this command the shaker can be set to a certain position or the home position (zero point) can be set.

Move type: ***Absolute*** *– This command is used to set the shaker to a certain position. The value in the position box is the distance from the home point (zero point).*

Channel: *This is the channel used to communicate with the shaker (default is 1)*

Position,mm: *The position in mm. The value can be positive or negative and must be in range of your shaker.*

Example: The home position is set to the middle and the shaker has en offset of -150 mm from the home point. Now the shaker gets the order to move absolute 50 mm. The shaker will move 200 mm in the positive direction, to the absolute point +50 mm

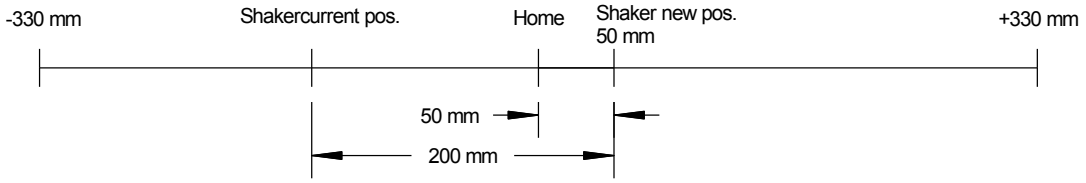


Figure 32, Moving “Absolute”

Move type: ***Relative*** *– This command is used to move the shaker over a certain distance from the actual position. The value in the position box says which distance the shaker moves.*

Channel: *This is the channel used to communicate with the shaker (default is 1)*

Position,mm: *The distance to the new position in mm. The value can be positive or negative and must be in range of your shaker. The shaker will move this distance from the actual position.*

Example: The shaker gets the order to drive relative 200 mm.

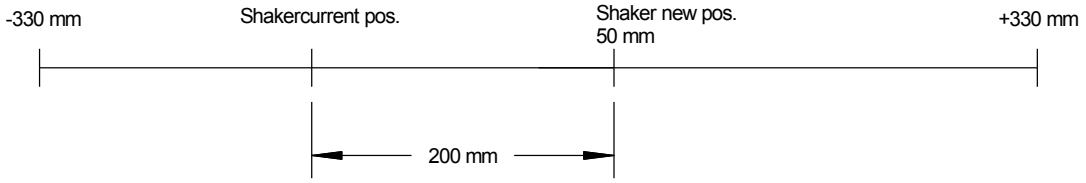


Figure 33, moving relative

Move,type: *Home - This command is used to set the home point of the shaker. Normally the home point is set to the middle, but for example it can also be set to 200 mm offset to the negative side. To do this, the commands "Shaker: Set Homing" and "Shaker: Set moving home" are needed. These two commands are used to set the parameters of the homing command.*

Channel: *This is the channel used to communicate with the shaker (default is 1)*

Position,mm: *This is the offset the home point should have from the side plate*

Example: The position,mm is 200 mm and the mode is negative, the Shaking table will now move to the very outside. And will then drive 200 mm in the positive direction. This point is now the zero point for the shaker.

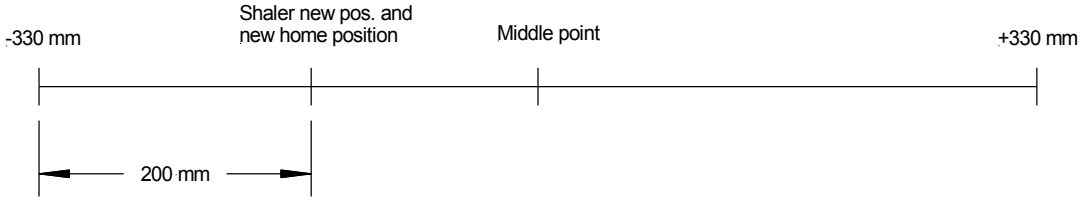


Figure 34, Moving home

Reset

This reset command is to use in case of an error. It will immediately reset all the errors and faults.

Channel: *This is the channel used to communicate with the shaker (default is 1)*

Set Abort Deceleration

This command sets the abort deceleration of the shaker.

Channel: *This is the channel used to communicate with the shaker (default is 1)*

A,mm/s^2: *This is the acceleration when the shaker stops in case of an abort.*

Set Amplifier's State

Sets the state of the shaker, you can choose between Enable, Disable and Reset.

Set Acceleration

This command sets the maximum acceleration of the shaker.

Channel: *This is the channel used to communicate with the shaker (default is 1)*

A,mm/s^2: *This is the maximum acceleration when the shaker starts moving. (default is 45000 mm/s^2)*

Set Deceleration

This command sets the maximum deceleration of the shaker.

Channel: *This is the channel used to communicate with the shaker (default is 1)*

A,mm/s^2: *This is the maximum acceleration when the shaker stops. (default is 45000 mm/s^2)*

Set Velocity

This command sets the maximum velocity of the shaker.

Channel: *This is the channel used to communicate with the shaker (default is 1)*

V,mm/s: *Maximum velocity of the shaker (default is 2000 mm/s)*

Set Homing

This command initialises the way how to find the home position.

Channel: *This is the channel used to communicate with the shaker (default is 1)*

Offset,mm: *This is the offset to the sidewall.*

Method: *This box says on which side the shaker should drive*

Delay: *The delay to drive back from the very outside*

Imax,mA *When the shaker drives to the very outside he presses against the side plate, this makes the current rising. As soon as the here given value has been reached, the shaker stops (default is 1600 mA)*

Set Moving Home

This command sets the velocity of the shaker for the homing process

Channel: *This is the channel used to communicate with the shaker (default is 1)*

A,mm/s^2: *This is the maximum acceleration of the shaker*

Vslow,mm/s: *This is the speed of the shaker while moving to the outside (default is 50 mm/s)*

Vfast,mm/s: *This is the speed of the shaker while moving to the given position (default is 100 mm/s)*

As higher the acceleration is as higher is the current. If the acceleration for example is 4500 mm/s^2 and Imax is 1600 mA, the shaker will reach the current limit with the acceleration and will then move right in to the positive direction without first going to the negative side, so it will crash in to the side plate. So for example a good value are A: 400 mm/s^2 and Imax: 1600 mA.

Set Sweep Sampling

This command sets the SPS (samples per second) of the sweep process

Channel: *This is the channel used to communicate with the shaker (default is 1)*

SPS: *Samples per second*

Start PVT Move

This command reads the data of a file and simulates it. The file must be in a GeoDAS format, an example for such a file is stored on the provided GeoSIG CD, filename “Example_Earthquake.txt”.

Channel: *This is the channel used to communicate with the shaker (default is 1)*

Filename: *The filename of the file that should be simulated. File must be saved under C:\GeoDAS_DATA\Tester\Output*

Xmin,mm: *The relative minimum the shaker can drive (default is -330 mm)*

Xmax,mm: *The relative maximum the shaker can drive(default is 330 mm)*

Stop PVT Move

This command stops the PVT move.

Enable Debug

This function creates a log file on the selected path. GeoDAS will write all the errors and warnings which were produced in the selected log file.

Logfile: *In this box the path of the log file should be written.*

Get Jerk

This command reads the jerk. It will be displayed in the column Value

Channel *The channel used to communicate with the shaker (default is 1)*

5.1.3. Read Data from the Shaking Table

Shaker: Get Abort deceleration

This command reads the deceleration in case of an abort. It will be displayed in the column P2

Channel *The channel used to communicate with the shaker (default is 1)*

Shaker: Get Acceleration

This command reads the acceleration limitation. It will be displayed in the column Value

Channel *The channel used to communicate with the shaker (default is 1)*

Shaker: Get Deceleration

This command reads the deceleration limitation. It will be displayed in the column Value

Channel *The channel used to communicate with the shaker (default is 1)*

Shaker: Get Homing

This command reads the following homing data: method offset, delay and Imax. They will be displayed in the column Comment

Channel *The channel used to communicate with the shaker (default is 1)*

Get Moving Home

This command reads the following homing data: Acceleration, Vslow and Vfast. They will be displayed in the column Comment

Channel *The channel used to communicate with the shaker (default is 1)*

Get Velocity

This command reads the velocity limitation. It will be displayed in the column Value

Channel *The channel used to communicate with the shaker (default is 1)*

6. Errors and Troubleshooting

6.1. Error and Warnings

The shaker has some thresholds which we can set. For example if the true position is not the same as the commanded position (Following Error). The Shaking Table will stop immediately when a warning/error occurs. The type of the warning will be displayed in the Multifunctional Tester from GeoDAS when running a script, or directly in the CME2 Software. To delete the warning one of the two following steps can be done:

1. Press the Emergency Button and release again, or
2. Clear the warning/error in the CME2 by the following steps.

- ***Close GeoDAS*** and ***open the program CME2***
- Click on the symbol ***Control panel***

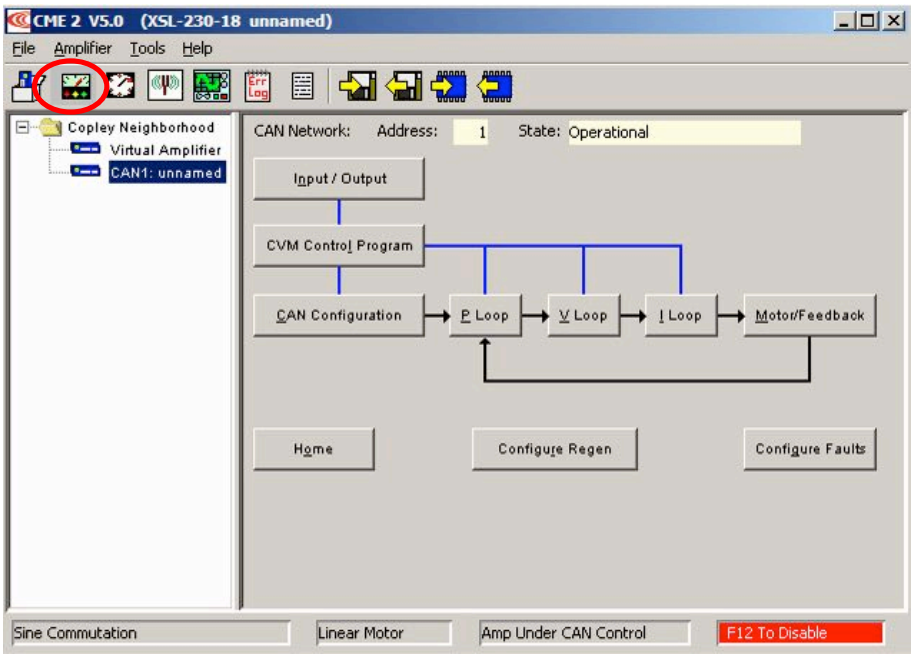


Figure 35, CME2 error

- Press ***Clear Faults*** then the warnings should become green

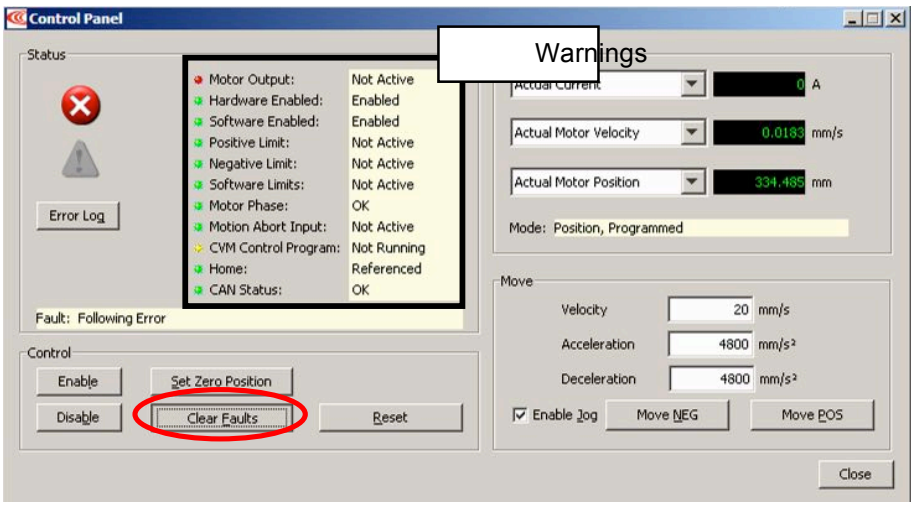


Figure 36, CME2 error

6.2. Wrong Driver for the USB-to-CAN Converter

In case you connected the USB-to-CAN Converter before you installed the drivers it might be that Windows installs a wrong driver. Please do the following steps to change the driver:

- Press right click on the ***My Computer*** icon on your desktop
- Press ***Manage***

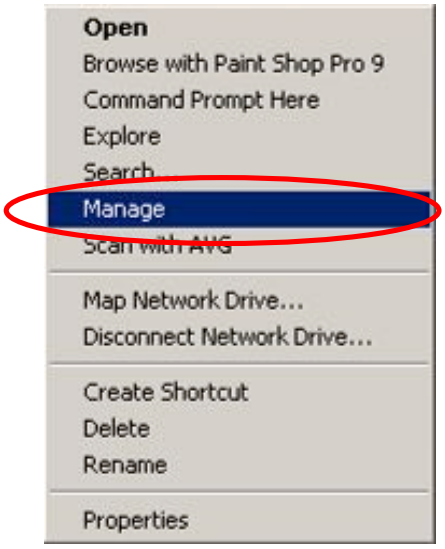


Figure 37, Right click on *My Computer*

The Computer Management window will now open

- Select ***Device Manager***
- Press the small **+** on ***IXXAT VCI V3 Interfaces*** to see the details
- Right click on ***VCI3 USB-to-CAN compact***
- Press ***Properties***

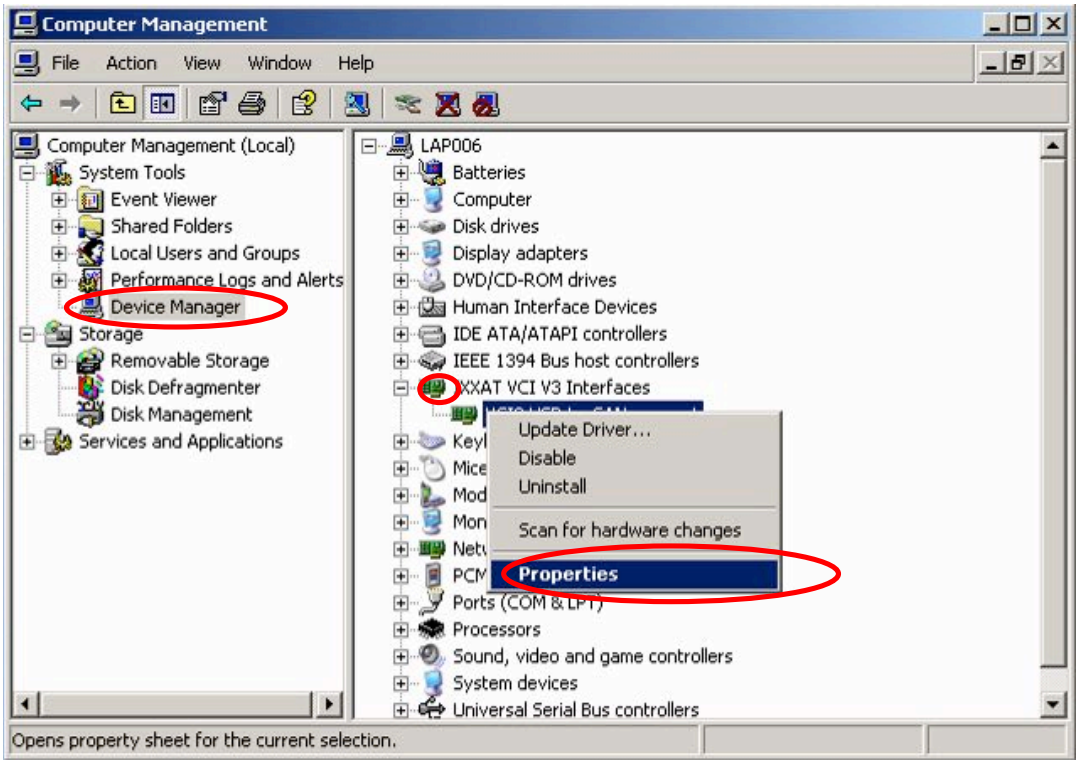


Figure 38, Computer Management

- Select the ***Driver*** tab
- Press ***Update Driver…***

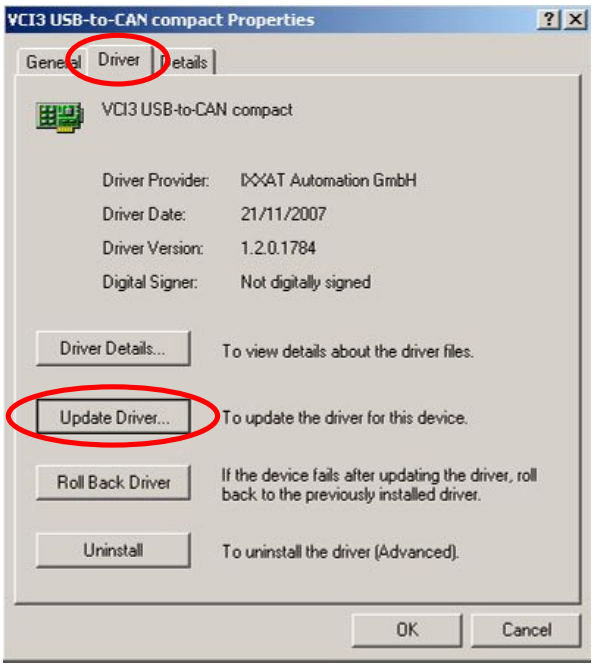


Figure 39, Change driver

A Hardware Update Wizard Window will open

- Select ***No, not this time***
- Press ***Next >***

Figure 40, Update of driver

- Select ***Install from a list or specified location (Advanced)***
- Press ***Next >***

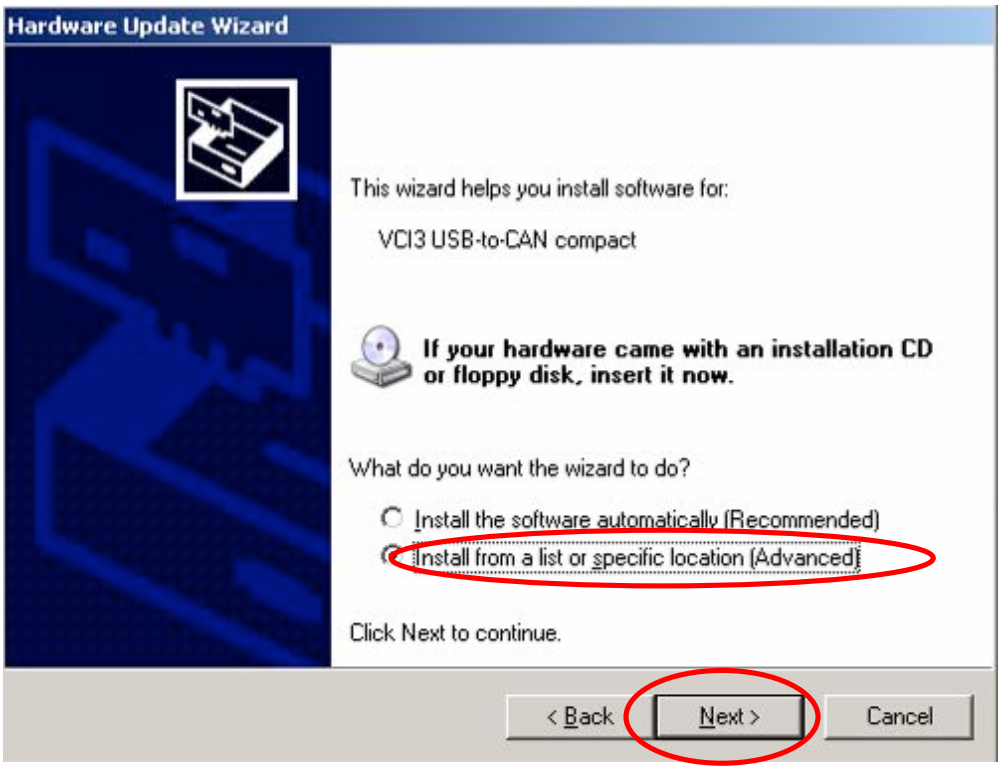


Figure 41, Update of driver

- Select ***Don't search. I will choose the driver to install***
- Press ***Next >***

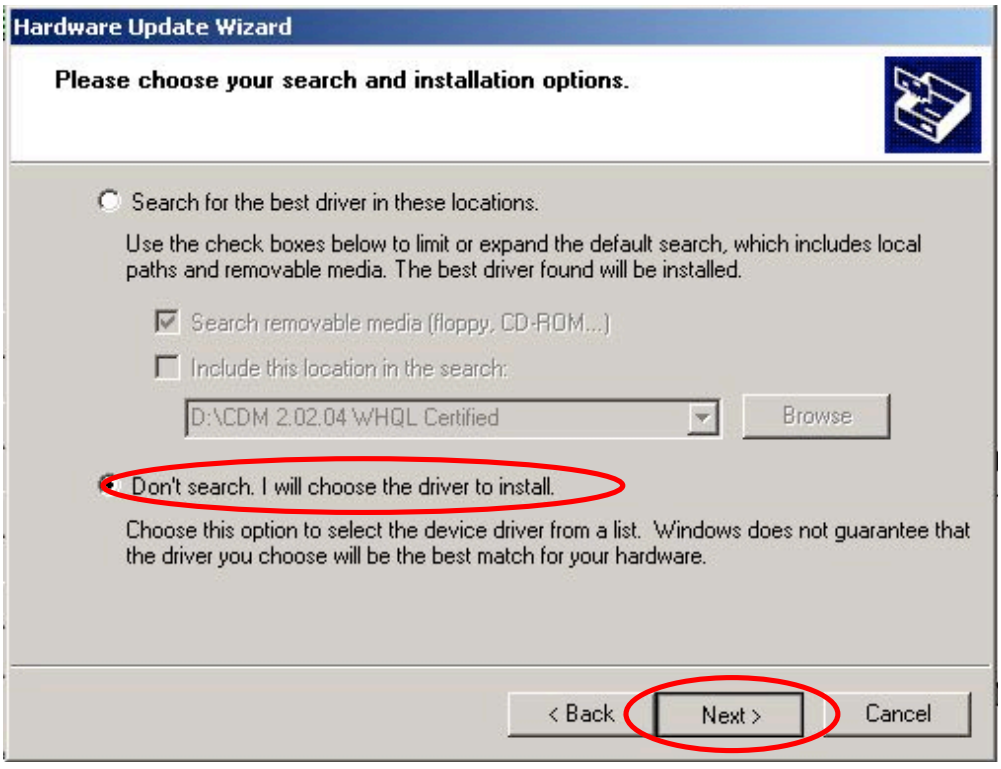


Figure 42, Update of driver

- Select the ***IXXAT USB-to-CAN compact***
- Press ***Next***

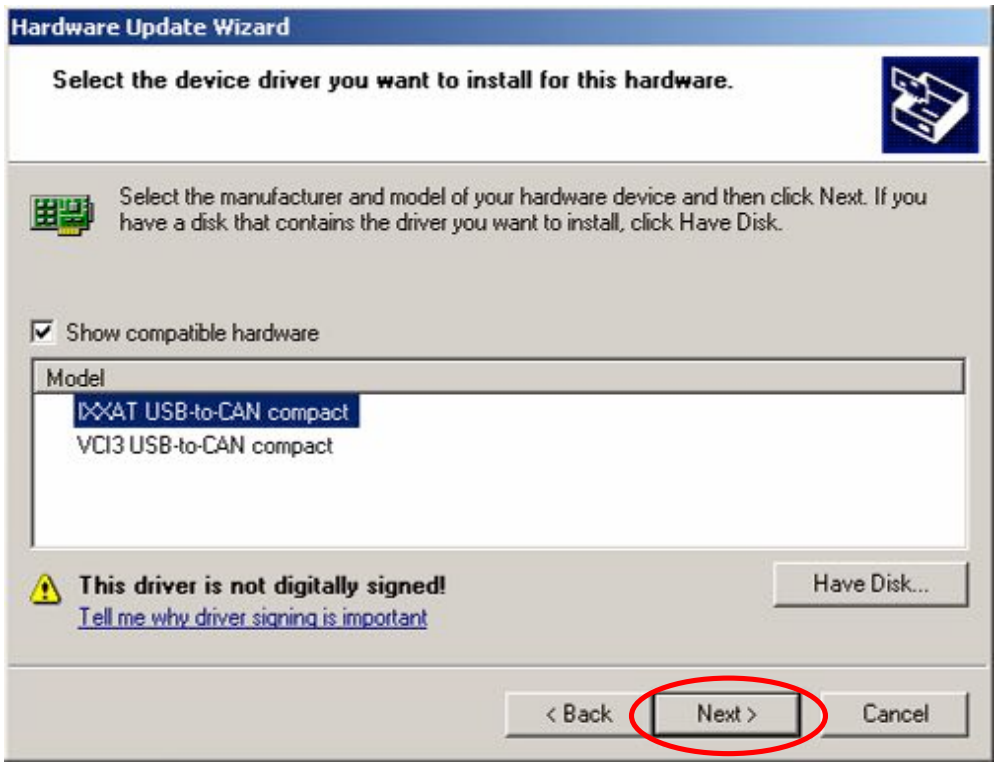


Figure 43, Update of driver

- Press ***Finish***, then close the window and ***restart*** your computer

Figure 44, Update of driver

6.3. Shaking Table is not initialised

If the initialisation of the Shaking Table doesn't work, please check the points listed below:

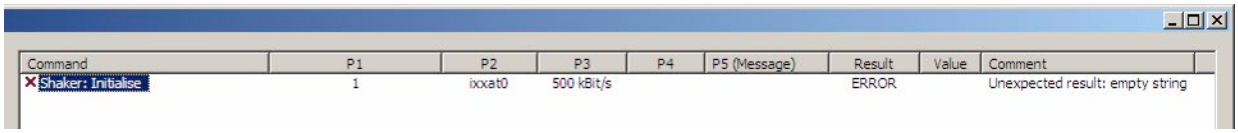


Figure 45, Failed initialisation of Shaking Table

6.3.1. Is the Shaking Table powered?

→ Have a look at the Xenus Controller, the Status LED should blink.

6.3.2. Is the USB to CAN converter attached to your computer and the Xenus controller?

→ If not, attach the USB-to-CAN converter

6.3.3. Are the correct driver installed?

If you have not installed all drivers, please install them now (see chapter 2.1 and 2.2). Check the driver version by following the explanation in chapter 6.2.

6.3.4. Have you restarted your computer after you've installed the drivers?

If not, restart your computer, so that the driver works properly

7. Restore Factory Settings

- ***Open the CME2 Software***
- Press the button ***Restore amplifier Data from Disk***

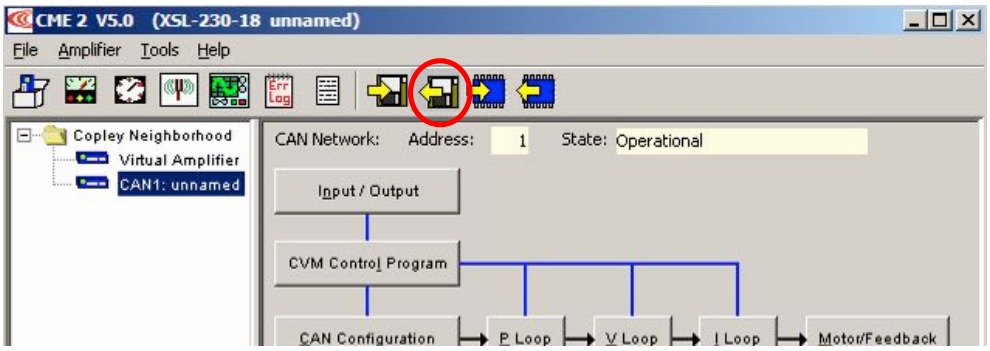


Figure 46, Factory Default

- Brows the provided GeoSIG CD and open the file ***GeoSIG_Standard_AmpData.ccx***

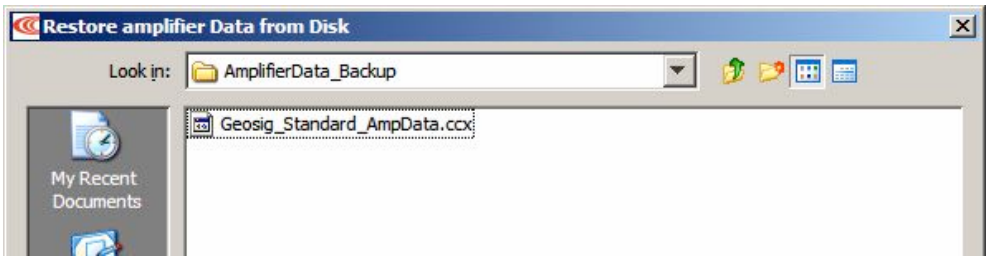


Figure 47, Factory Default

- Press the button ***save amplifier working data to flash***

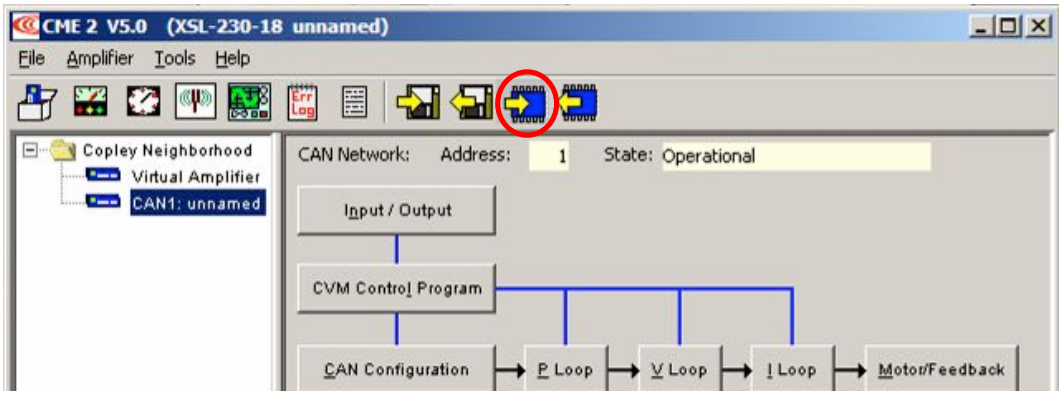


Figure 48, Factory Default

Always perform a Homing of the Shaking Table after the amplifier data has been loaded

8. Maintenance

Even if the Shaking Table is almost maintenance free there are some points to be taken care, especially if the Shaking Table has not been used for a long time.

8.1. Cleaning

The Shaking Table should be held clean of dust any other dirt. Especially all parts related to the linear motor and its feedback sensor:

- The magnet
- The motor rail
- The measuring scale of the feedback sensor

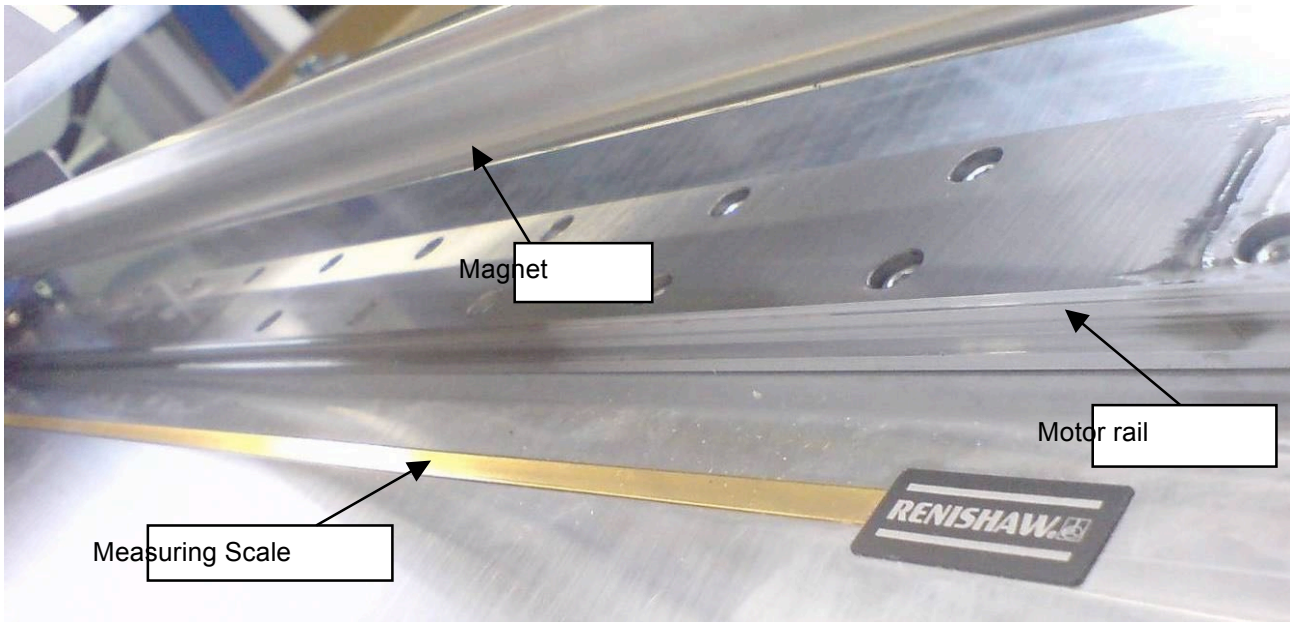


Figure 49, linear motor

Use mild soap only! Do NOT use any Alcohol, Acetone or similar products as this damages the measuring scale of the feedback sensor.

8.2. Grease the moving Parts

Because the sliding carriage is permanently moving on the motor rail, these parts should be greased every six month. For this two lubricating nipple are installed on both side of the linear motor. Use these nipples only, do not put oil directly on the motor rail.

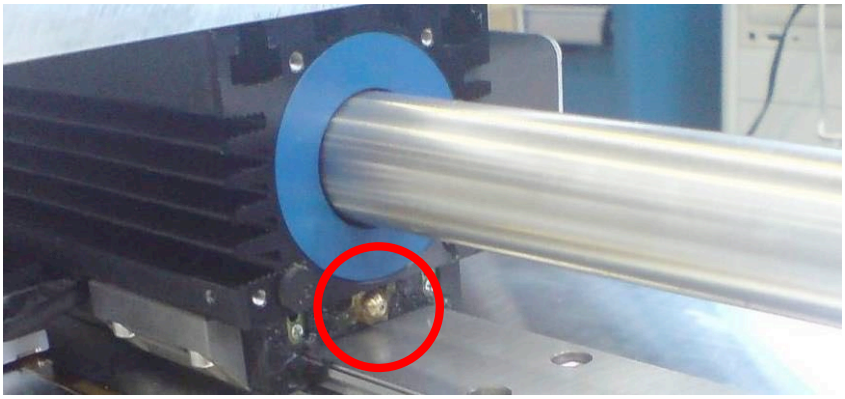


Figure 50, Lubricating nipples

8.3. Check of the Feedback Sensor

The feedback sensor should be checked every six month. There is a LED on the top of the feedback sensor which can have three states:

Green: Everything is okay

Orange: It's probably working but it's not perfect

Red: It's no more working

If the LED is orange or red, the sensor must be adjusted according to the instruction in the manual ***Sensor_Installation_Guide.pdf*** *(P*age 4), found in the folder *Manuals_And_Guides* on the provided CD.

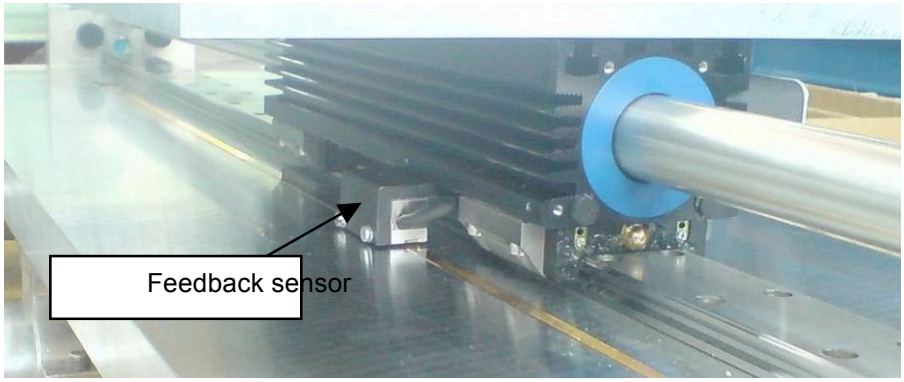


Figure 51, Feedback Sensor