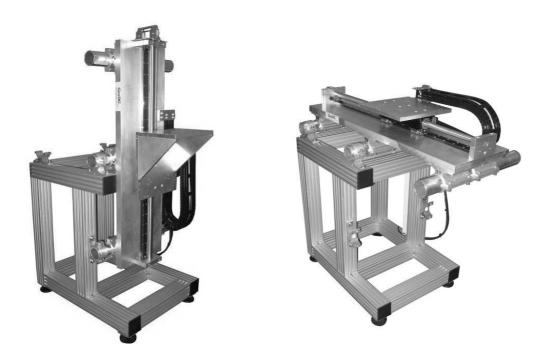


GSK-166 Uniaxial Linear Shaking Table User Manual



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Introduction

IF 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

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

12 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

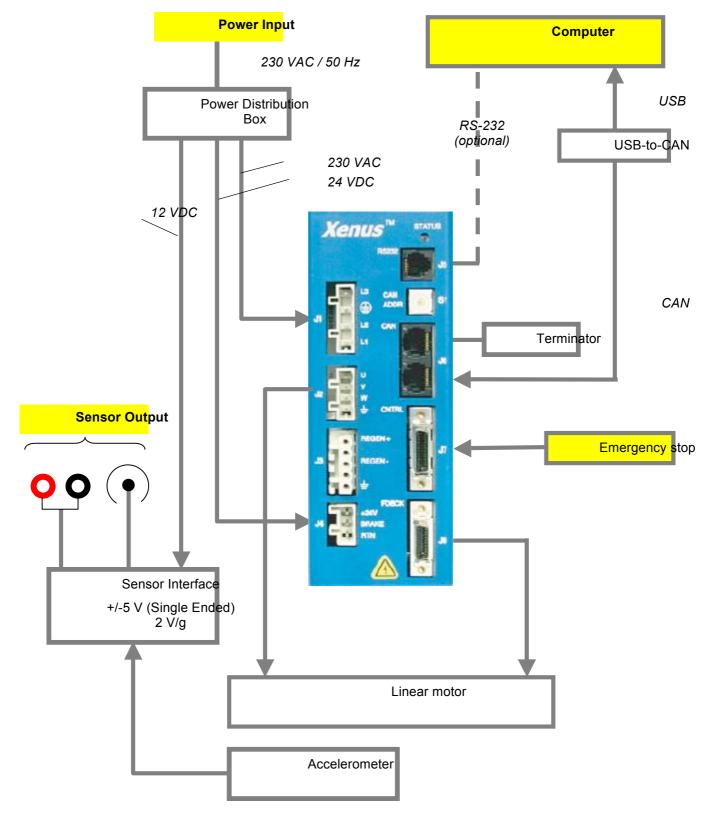


Figure 1. Cabling overview



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.

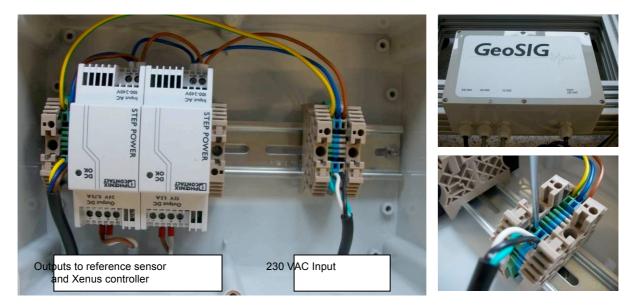


Figure 2, Power Distribution Box

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*



Setup - DXAT VCI V2.1	6 + SP2	tê	Setup - IXXAT VCI V2.16 + SP2		📳 Setup - IXXAT VCI V2.16 + SP2	
	Welcome to the IXXAT VCI V2.16 + SP2 Setup Wizard		License Agreement Please read the following important information before continuing.		Information Please read the following important information before of	continuing.
(AD-	This will install IXXAT VCI V2.16 + SP2 on your computer.		Please read the following License Agreement. You must accept the terms of t agreement before continuing with the installation.	his	When you are ready to continue with Setup, click Next	L
	It is recommended that you close all other applications before continuing.		DXAT Automation GmbH	-	Please read the manual before you	-
	Click Next to continue, or Cancel to exit Setup.		Leibnizztr. 15, 88250 Weingarten, Germany		install the hardware	
			15. August 2003		This CD contains:	
			[German version below]	-1	VCI 2.16 VCI 2.16 Service Pack 1	
			C accept the agreement		Add-On for the tinCAN161 Add-On for the USB to CAN II	
		_	C Igo not accept the agreement			
	Next > Cancel		< <u>Back</u> <u>Next</u> >	Cancel	< Bac	K Next > Cancel
		_				
Beady to Install		12	Setup - DOXAT VCI V2.16 + SP2 Select Destination Location		Setup - DOXAT VCI V2.16 + SP2	
Setup is now ready to it	begin installing IXXAT VCI V2.16 + SP2 on your computer.		Where should DOXAT VCI V2.16 + SP2 be installed?		+ SP2 Setup V	e IXXAT VCI V2.16 Wizard
Click Install to continue change any settings.	with the installation, or click Back if you want to review or		Setup will install IXXAT VCI V2.16 + SP2 into the following folder.		To complete the installation must restart your computer	on of IXXAT VCI V2.16 + SP2, Setup r. Would you like to restart now?
Destination location: C:\Program Files\J	XXAT\VCI 2.16		To continue, click Next. If you would like to select a different folder, click Bro	wae.	Yes, restart the compute C No. I will restart the co	
			CNProgram Files/XXXAT/VCI 2.16	owse	C go, I will restart the co	mputeriater
					and the second	
					37	
त	× >		At least 6.3 MB of free disk space is required.		IXYAT	
			< Back Next >	Cancel		Doub
	< Back Install Cancel		(Dan Tuer)	Carne		Tunn.

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**.

In xi



Please review the license terms b	efore installing CMO 2.18.	
Press Page Down to see the rest	of the agreement.	
Copley Motion Objects (CMO) Si	oftware License Agreement	<u> </u>
between you and Analogic Corp Objects Software Product conta electronic documentation, and p accept the terms of the License other means, or by downloading	: This Software License Agreemen pration (b)a Capley Controls for thin ed with this package, including this inited materials (the "Software Pro Agreement", or by indicating your i , installing or using all or any portio rent all the terms and conditions of	he Copley Motion le computer software, duct"). By selecting "I approval by email or in of the Software
If you accept the terms of the ap agreement to install CMO 2, 18, 0	reement, select the first option be lick Next to continue.	low. You must accept the
Eacopt the terms of the Lio C I do not accept the terms of soft Instal System v2.45		

5 CMO 2.18 Setup	
Choose Install Location	=3
Choose the folder in which to install CMO 2.18.	
Setup will install CMO 2.18 in the following folder. To install in a and select another folder. Click Install to start the installation.	different folder, dick Browse
- Destination Folder	
C:\Program Files\Copley Motion\CMO	Browse
Space required: 5.0MB	
Space available: 35.5GB	
Nulsoft Install System v2.45	
Vulsoft Instal System v2.45	Instal Cancel

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: <u>http://www.copleycontrols.com/</u>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: <u>http://www.geosig.com/Downloads-pg66.html</u>. 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 >

Hardware Update Wizard	
	This wizard helps you install software for: VCI3 USB-to-CAN compact
	If your hardware came with an installation CD or floppy disk, insert it now.
	What do you want the wizard to do?
-	Click Next to continue.
	< Back Next > Cancel

Figure 4, step 2

The following window will appear.

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

'lease cho	ose your search and installation options.
C Sear	ch for the best driver in these locations.
	ne check boxes below to limit or expand the default search, which includes local and removable media. The best driver found will be installed.
V	Search removable media (floppy, CD-ROM)
Г	Include this location in the search:
	D:\CDM 2.02.04 WHQL Certified Browse
Don'il	search. I will choose the driver to install.
	e this option to select the device driver from a list. Windows does not guaranter iver you choose will be the best match for your hardware.
the di	ver you choose will be the best indication your hardware.

Figure 5, step 3

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



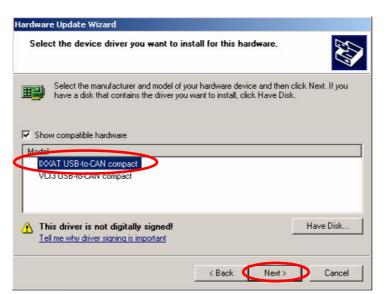


Figure 6, step 4 – Select the driver *IXXAT USB-to-CAN compact*



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

CME 2 V4.1			- 🗆 ×
File Amplifier Tools Help			,
ir			
Copley Neighborhood	Scan Progress	×	
	Scanning for Copley amplifiers on the CAN network. Scanning Node:		
	Found:		
			F12 To Disable

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 >



CME 2 V6.0		_02
Ele Amplifier Iools Help		
Copley Neighborhood	Communications Wizard Select device: Call Borts C CAN Network C EgyerCAT	
		F12To Disable

Figure 11, Select CAN Network

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

Commu	nications Wizard	×
Configur	e CAN Network	
C <u>A</u> N Card:	IXXAT	•
C <u>h</u> annel:	0	
Bit <u>R</u> ate:	500kbit/s	
< <u>B</u> ack	Einish	Cancel

Figure 12, CAN Network parameters

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

CME 2 V6.0 (XSL-230-18 G5_Shaker)	
<u>ijle Amplifier T</u> ools <u>H</u> elp	
⁴ 7 📾 🖾 🔢 📖 🗒 🗧 🖓 🖓 🦏	
Configure Faults	
Sine Commutation Linear Motor F12 To Deable	

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.

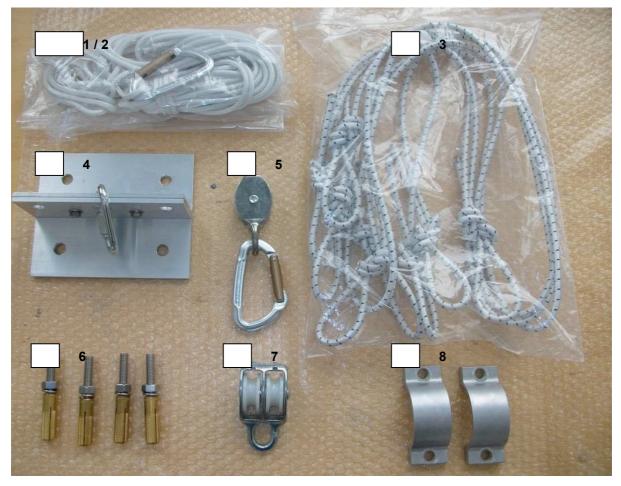


Figure 14, Material for vertical Shaking Table

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.

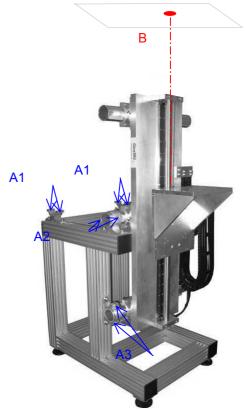


Figure 15, Vertically oriented Shaker

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.

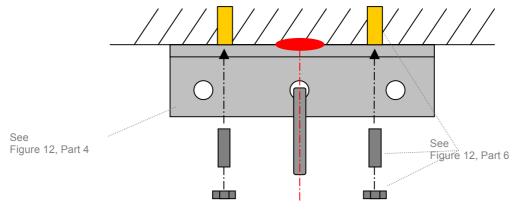


Figure 16, Fixation Point on the Roof



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

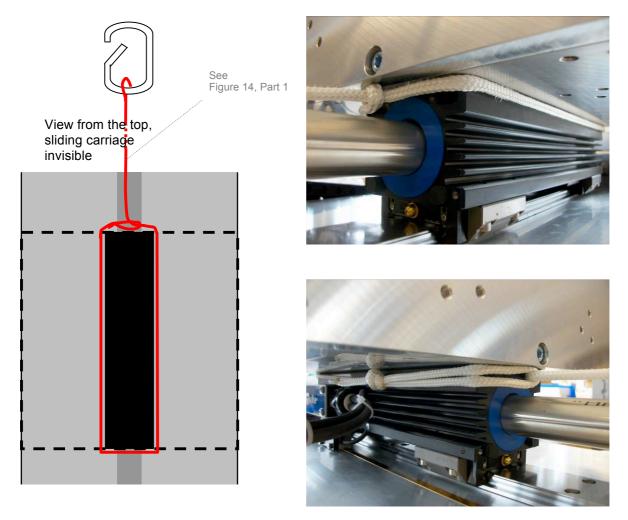


Figure 17, Fixation rope on the sliding carriage



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.

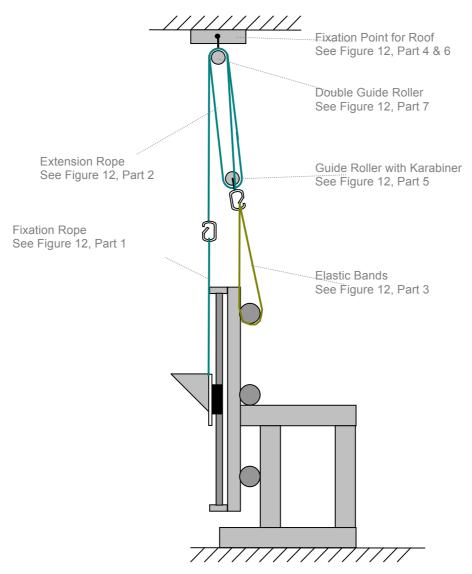


Figure 18, Shaking Table setup for vertical operation

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.



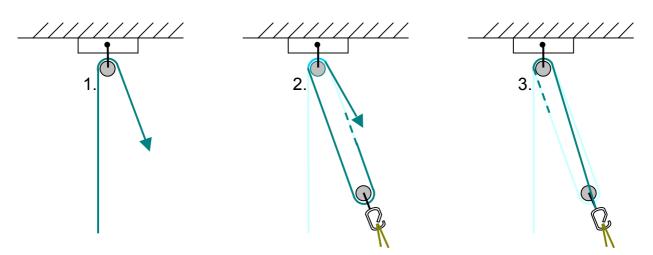


Figure 19. Mounting of the extension rope

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

	100	Command	P1	P2	P3	P4	P5 (Message)	Result	Value	Comm
ommand 802 ADC Cl	annels									
Options										
Port	Value									
Channels Differential	•									
Minimum	Maximum									
Managan av a sammanti	1000									
Message or a comment:										
1										
1	- 1									
Insert Update	Signal Parameters									
Insert Update	Signal Parameters									

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

Command 802	ADC Channels		P1	P2	P3	P4	P5 (Message)	Result	
		 Shaker: Initialise 	1	ixxat0	500 kBit/s				
0.1		Pause					Caution: Stand clear of Shaker		
Options		Shaker: Set Homing	1	330	0	1000	Hardstop Negative		
Port	Value	Shaker: Set Moving Home	1	50	50	100			
E		Shaker: Move	1	330	Home				
Channels D	fferential								
Minimum [
Minimum J	Maximum								
Message or a co	mment:								
1									
	and a second sec								
Insert	Update Signal Parameter	15							
Insert	Update Signal Parameter	15							
Insert	Update Signal Parameter	τ5							

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

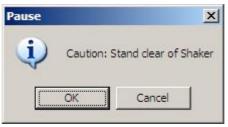


Figure 22, Stand clear of Shaking Table

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.

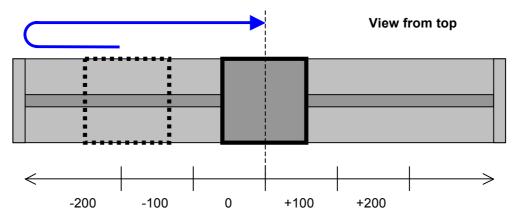


Figure 23. Movement of GS_Shaker_Demo_Homing.csv

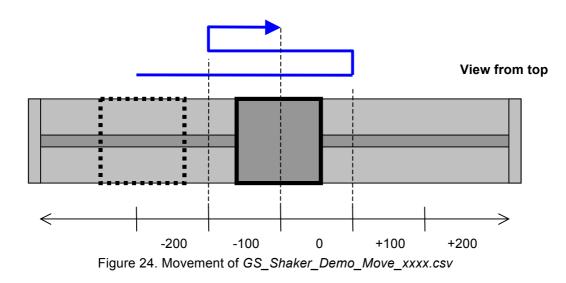
After the shaker has been switched off, the homing procedure must be repeated always before applying any other movements.

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

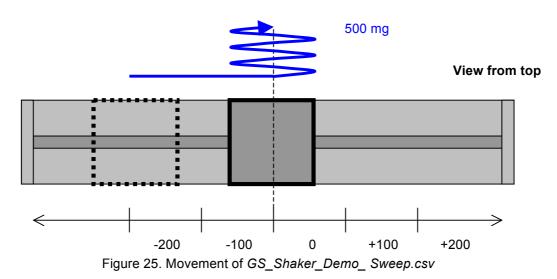
To get a feeling of the functionality of the shaker, several other examples are available on the provided CD. When the Homing is finished and the Shaking Table stands still at its middle position, proceed with the following steps.

- 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

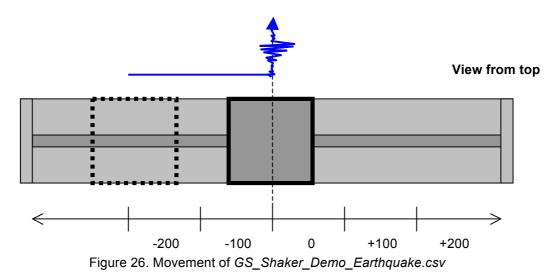
The shaking table will first move to an absolute value of 100 mm, then go back to -100 mm and finally stop at its zero position



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.



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



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

@CME 2 V5.0 (XSL-230-18	unnamed)
Eile Amplifier Tools Help	
Copley Neighborhood Virtual Amplifier CAN1: unnamed	CAN Network: Address: 1 State: Operational
Sine Commutation	Linear Motor Amp Under CAN Control F12 To Disable

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**

atus			Monitor	
	Motor Output: Hardware Enabled:	Not Active Enabled	Actual Current	▼ 0 A
	Software Enabled:	Enabled		
	Positive Limit:	Not Active	Actual Motor Velocity	▼ 0.0183 mm/s
	Negative Limit:	Not Active		
	Software Limits: Motor Phase:	Not Active OK	Actual Motor Position	<u>▼ 334,485</u> mm
Error Log	Motor Phase:	Not Active	Mode: Position, Programme	d
	CVM Control Program:	Not Running		
	Home:	Referenced	Move	
	CAN Status:	OK	Velocity	20 mm/s
ault: Following En	ror			
Introl			Acceleration	4800 mm/s²
Enable	Set Zero Position		Deceleration	4800 mm/s²
Disable	Clear Faults	<u>R</u> eset	F Enable log Move	Nec Dos

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

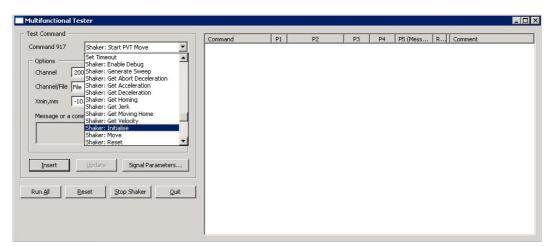


Figure 29, Empty Multifunctional Tester

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

st Command -			Command	P1	P2	P3	P4	P5 (Mess	R	Comment
ommand 900	Shaker: Initialise	•	Shaker: Initialise	1	ixxat0	500				2
Options										
Channel	1 CAN Port	ixxat0								
Bit Rate	500 kBit/s	-								
Xmin,mm	-10.0 Xmax,mm	+10.0								
M										
Message or a	comment:									
1										
Insert	Update Signal	Parameters								
Insert	Update Signal	Parameters,								
Insert	· /									
	Lipdate Signal		_							
	· /		1							
Insert) un <u>A</u> ll _	· /		1							

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.

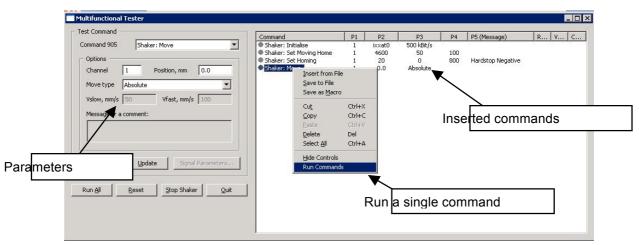


Figure 31, Running a script

5.1. Shaker Commands

If 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.

ChannelThis 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 ixxat0Bit 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.

	GS_GSK-166_Shaker_UserManual_V08.doc / 18.11.2014
Page 26/38	GSK-188 Shaking Table User Manual
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 t	he start frequency is not the same as the end frequency, the linear motor makes some noise.

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)

This is a mechanical behaviour and should be kept at a minimum.

- 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

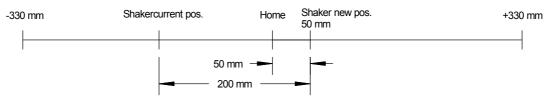


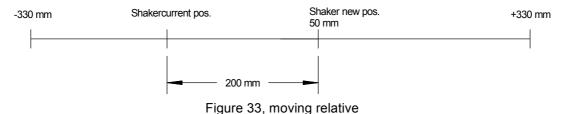
Figure 32, Moving "Absolute"

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.

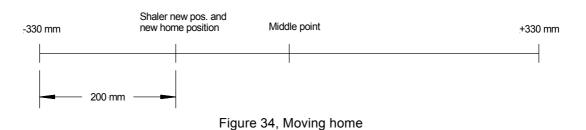


Move,type: Home - This command is used to set the home point of the shaker. Normally the home point is set to the middle, but for example it can also be set to 200 mm offset to the negative side. To do this, the commands "Shaker: Set Homing" and "Shaker: Set moving home" are needed. These two commands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



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
lmax,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/s² 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/s² and Imax: 1600 mA.

Set Sweep Sampling

This command se	ets 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 P2ChannelThe 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 ValueChannelThe 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

CME 2 V5.0 (XSL-230-18	unnamed)
<u>File Amplifier Tools Help</u>	
Canta Amplifier	CAN Network: Address: 1 State: Operational
Sine Commutation	Linear Motor Amp Under CAN Control F12 To Disable

Figure 35, CME2 error

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

us			Warnings	
~	 Motor Output: Hardware Enabled: 	Not Active	Accuai Currenc	▼ 0 A
8	Goftware Enabled: Goftware Enabled:	Enabled		
	Positive Limit:	Not Active	Actual Motor Velocity	▼ 0.0183 mm/s
	Negative Limit:	Not Active	Actual Motor Position	▼ 334,485 mm
	 Software Limits: Motor Phase: 	Not Active OK	Accual Motor Position	
Error Log	Motion Abort Input:	Not Active	Mode: Position, Programme	d
	CVM Control Program:			
	 Home: CAN Status: 	Referenced OK	Move	
ult: Following Er		UK .	Velocity	20 mm/s
JIC: FOILOWING ER	ror		Acceleration	4800 mm/s ²
trol				
Enable	Set Zero Position		Deceleration	4800 mm/s ²
Disable	Clear Faults	<u>R</u> eset	Frable log Move (NEG Move POS

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

	Open
	Browse with Paint Shop Pro 9
	Command Prompt Here
	Explore
	Search
	Manage
	Scan with AVG
	Map Network Drive
	Disconnect Network Drive
	Create Shortcut
	Delete
	Rename
Ĩ	Properties

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**

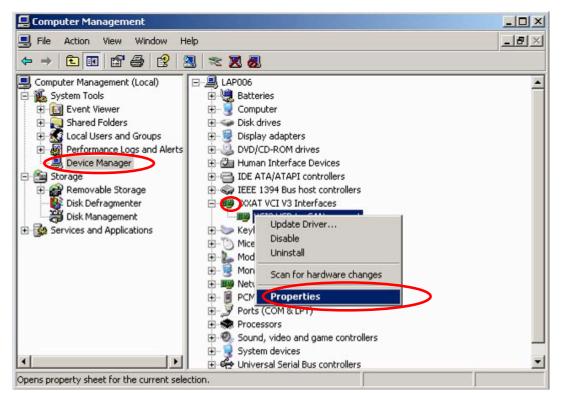


Figure 38, Computer Management



- Select the Driver tab
- Press Update Driver...

CI3 USB-	to-CAN compac	t Properties		? ×
General	Driver Details	1		
田田	VCI3 USB-to-CA	N compact		
	Driver Provider:	IXXAT Automa	ation GmbH	
	Driver Date:	21/11/2007		
	Driver Version:	1.2.0.1784		
	Digital Signer:	Not digitally sig	gned	
Driv	er Details	To view details a	bout the driver files	s.
Upd	ate Driver	To update the dri	iver for this device.	
Roll	Back Driver		after updating the ously installed drive	
l	Jninstall	To uninstall the d	river (Advanced).	
			OK	Cancel

Figure 39, Change driver

A Hardware Update Wizard Window will open

- Select No, not this time
- Press Next >

Hardware Update Wizard	A REAL PROPERTY OF THE OWNER WATER OF THE OWNER OWNER OWNER OWNER OWNE
	Welcome to the Hardware Update Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission). Read our privacy policy
	Can Windows connect to Windows Update to search for software? O Yes, this time only O Yes, now and every time I connect a device (No, not this time
	Click Next to continue.

Figure 40, Update of driver

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

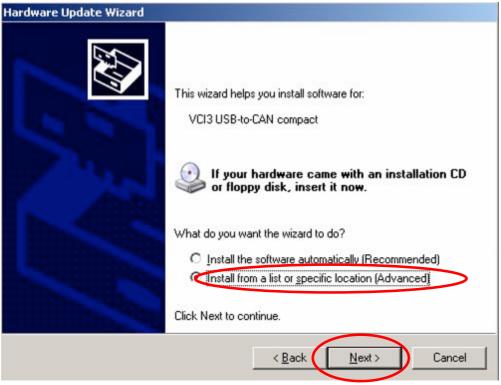


Figure 41, Update of driver

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

ease choose your search	and installation options.
C Search for the best driv	er in these locations.
	low to limit or expand the default search, which includes local dia. The best driver found will be installed.
🔽 Search removabl	e media (floppy, CD-ROM)
📕 Include this locat	on in the search:
D:\CDM 2.02.04	WHQL Certified Browse
C Don't search. I will choo	se the driver to install.
	ect the device driver from a list. Windows does not guarante
the driver you choose w	II be the best match for your hardware.

Figure 42, Update of driver



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

lardware Update Wizard	
Select the device driver you want to install for this	hardware.
Select the manufacturer and model of your hardware d have a disk that contains the driver you want to install,	
Show compatible hardware Model	
VCI3 USB-to-CAN compact	
This driver is not digitally signed! <u>Tell me why driver signing is important</u>	Have Disk
< Back	Next > Cancel

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:

Command	P1	P2	P3	P4	P5 (Message)	Result	Value	Comment
Shaker: Initialise	1	ixxat0	500 kBit/s			ERROR		Unexpected result: empty string

Figure 45, Failed initialisation of Shaking Table

6.3.1. Is the Shaking Table powered?

 \rightarrow 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

CME 2 V5.0 (XSL-230-18	unnamed)	
<u>File Amplifier Tools Help</u>		
💾 🚟 😵 🖤 🗱		
Copley Neighborhood	CAN Network: Address: 1 State: Operational	ok
	Figure 46, Factory Default	

• Brows the provided GeoSIG CD and open the file GeoSIG_Standard_AmpData.ccx

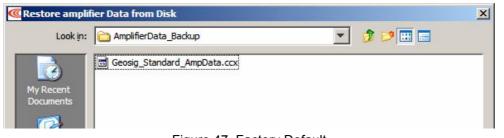


Figure 47, Factory Default

• Press the button save amplifier working data to flash

CME 2 V5.0 (XSL-230-18 unnamed)
Eile Amplifier Iools Help
CAN Network: Address: 1 State: Operational CAN Network: Address: 1 State: Operational Input / Output CVM Control Program CAN Configuration + P Loop + Loop + Loop Motor/Feedback
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

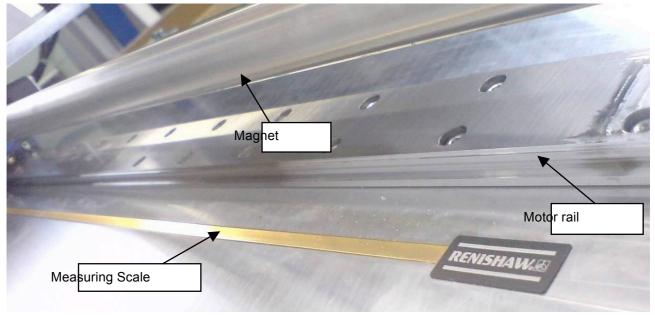


Figure 49, linear motor

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.

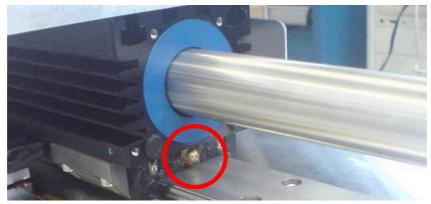


Figure 50, Lubricating nipples



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** (Page 4), found in the folder *Manuals_And_Guides* on the provided CD.



Figure 51, Feedback Sensor