

MoTex Motorized Beam Expander

User Manual



Altechna

Contents

1.	Introduction	3
2.	Application	3
3.	Technical information	4
3.1	Main features	4
3.3	Possible configurations	5
3.4	Optical Design	5
3.5	Mechanical Design	5
3.6	Packaging contents	5
4.	Hardware installation	6
5.	MoTex usage with Windows PC	6
5.1	Computer requirements	6
5.2	Software installation	6
5.3	“MoTex” software description	8
5.4	“MoTex Selector” window overview	9
5.5	Control window description: “Zoom control” mode	9
5.6	Control window description: “Output control” mode	10
5.7	Control window description: “Settings” tab	11
6.	Motex usage with PC advanced users	13
6.1	Virtual serial port	13
6.1	Unix-like operating system	14
6.2	MoTex serial command summary	14
6.2.1	Identifying serial port name	14
6.2.2	Serial port parameters	14
6.2.3	Serial commands and protocol	15
6.2.4	Software recommendations	18
7.	Frequently asked questions	19
8.	Troubleshooting	19
9.	Customer support and warranty	20

1.Introduction

Standard models of MoTex have expansion rate is 2.5X-12X, but non-standard expansion rates 2x-8x and 2x-5x are also available, please refer to your model. Although it has wide expansion rate all optical distortions are kept as low as possible due to optimized lens design. Zooming is realized by sliding lens design that is driven by the stepper motor. All electronics that control the stepper motor are integrated into the main housing.

Beam expander can be remotely controlled by software or can be driven by two physical buttons on top of the housing. Using the software user is allowed to select the magnification from the calibrated values by moving a magnification slider or select „user calibration“ to calibrate the device to the desired values. Optional functionality can be realized upon request.

2.Application

- Laser beam size control
- Automatic control of focusing parameters (Numerical Aperture)
- Hands free operation in remote machinery places and hazardous conditions

3. Technical information

3.1 Main features

- Aberration minimized design (special aberration compensation layout)
- Controller embedded in the same housing
- Suitable for usage with ultrafast picosecond and femtosecond lasers
- Reduced setup time by automatic magnification adjustment
- Manual magnification control

3.2 Specifications

Continuously variable magnification	2.5x-12x
Wavelengths	1020 – 1070 nm 510 – 540 nm 340 – 360 nm
Material	fused silica
Control interfaces	USB 1.1/2.0/3.0 “Virtual serial (COM) port” and RS232
Software platform	Control software works in Windows OS: XP/2003/Vista/7/8/10. Linux and MAC users can control device with low level commands (drivers are not necessary), sent through USB virtual serial (COM) port and RS232.
Entrance beam diameter	up to 10 mm
Output beam diameter up to	48 mm
Overall transmission	>98.5 %
LIDT	>7 J/cm ² for 10 ns pulses @ 1064 nm
Weight	<1 Kg
Positioning	for easier alignment input and output covers have removable aperture caps

3.3 Possible configurations

Wavelength and anti-reflective coating (if required) can be selected by customer. Magnification range and output aperture can be selected by the user. Mount has to be ordered separately. Lens covers with alignment holes are included as basic components.

3.4 Optical Design

MoTex optical design for best performance and stability is based on one moving lens design. No lens is rotating when changing the zoom level.

3.5 Mechanical Design

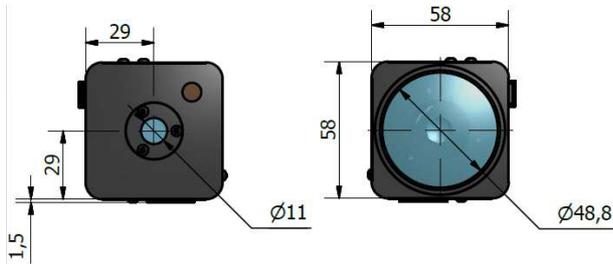


Figure 1. MoTex front view.

Figure 2. MoTex back view.

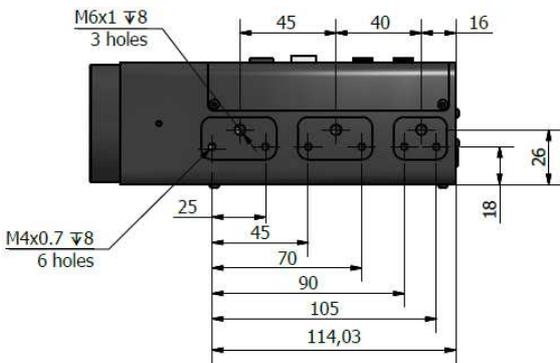


Figure 3. MoTex right side view. All dimensions in millimeters.

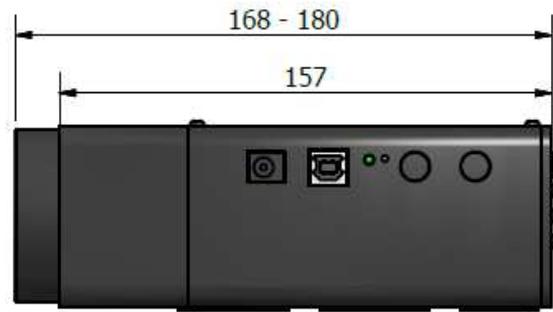


Figure 4. MoTex top view. All dimensions in millimeters.

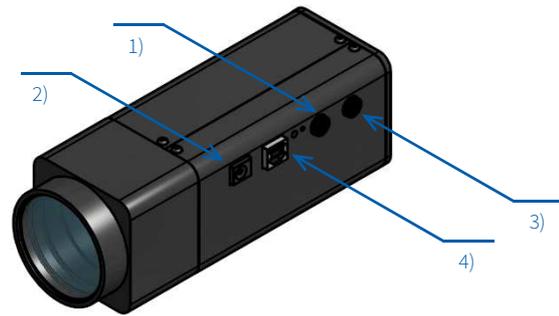


Figure 5. Motex exterior. 1) Increase beam diameter button; 2) 12V power supply; 3) Decrease beam diameter button; 4) USB-B (or RS232) connection.

3.6 Packaging contents

- MoTex beam expander with lens covers
- USB cable (2m length recommended but no longer than 3m)
- 12V power supply cable (optional)
- Software installation instructions

4. Hardware installation



Figure 5. MoTex comes with safety caps that have holes for easy alignment.

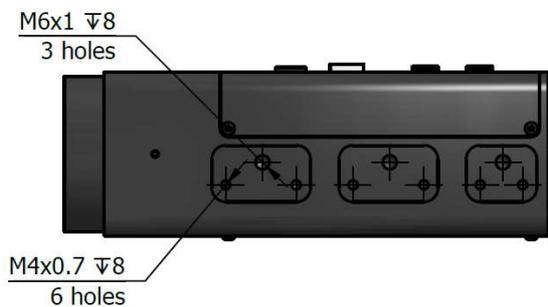


Figure 3. On one side of MoTex there are three groups of mounting points. On each group there are two M4 threads and one M6 thread. MoTex can be mounted using these threads.

5. MoTex usage with Windows PC

5.1 Computer requirements

- Free USB port. MoTex is compatible with USB 1.1, USB 2.0 and USB 3.0
- Computer administrator rights (installation only)
- Windows XP sp3 (32-bit)
- Windows Server 2003 sp2 (32-bit)
- Windows Vista sp1 (32/64-bit)
- Windows Server 2008 (32/64-bit)
- Windows 7 (32/64-bit)
- Windows 8/8.1 (32/64-bit)
- Windows 10 (32/64-bit)
- Microsoft .Net framework 4.0 redistributable (installs automatically)

5.2 Software installation

- 5 Check for and download only latest “MoTex” software installer package from http://www.altechna.com/product_details.php?id=1142
- 6 Run the downloaded “Software” installation file. In case you are installing on operating system that does not meet requirements for “MoTex” software, only USB drivers will be installed.

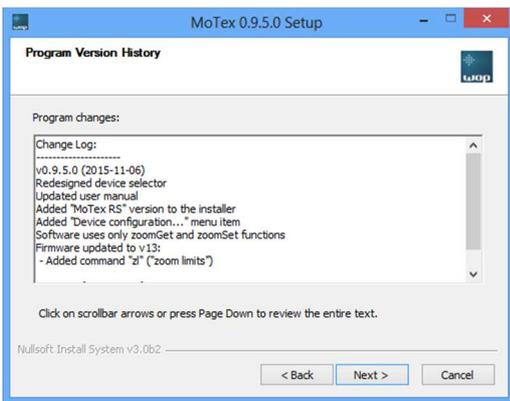


- 7 Click “Yes” to continue.

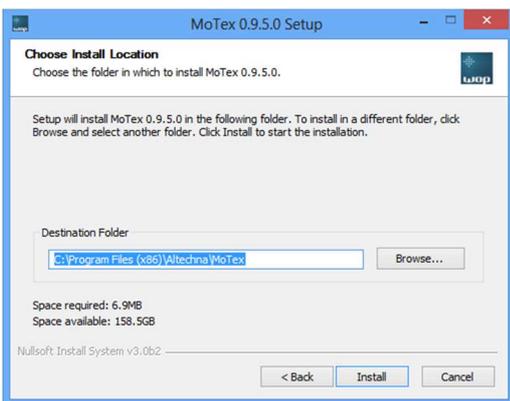
8 Installation window will appear, click “Next” to continue:



9 Review Program version history and click “Next” to continue



10 Select installation directory and click “Next” to begin installation:



11 If you are using WIN 7 and later operation system, please skip to STEP 11, otherwise please proceed. “MoTex” software requires “Microsoft .NET Framework 4 Client Profile” or higher version to be installed. Otherwise you will only install “MoTex” software Setup will offer to download it, choose “Yes”

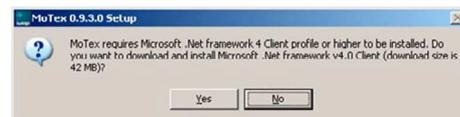
if you have active internet connection, otherwise choose no and download it manually from:

<https://www.microsoft.com/en-us/download/details.aspx?id=17851>

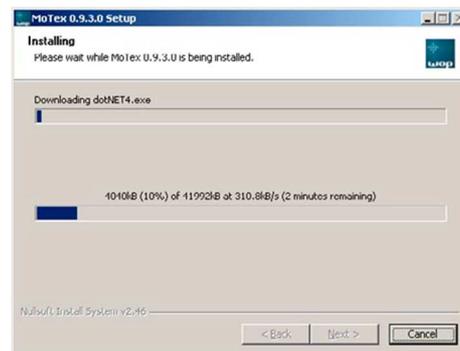
It is advised choose “No” in two occasions:

Fist – if you wish to install newer version than NET Framework 4,

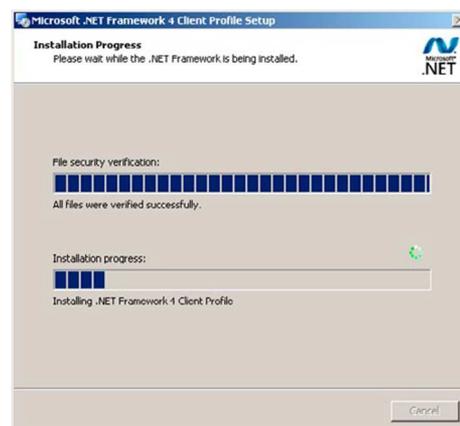
Second – you do not have a working internet connection. This dialog will not appear if framework is already installed.



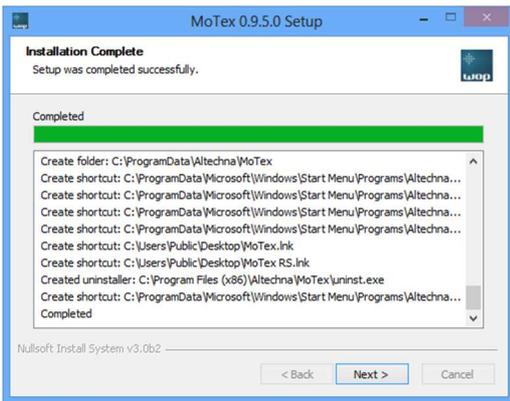
12 Setup will download “Microsoft .NET Framework 4 Client Profile”.



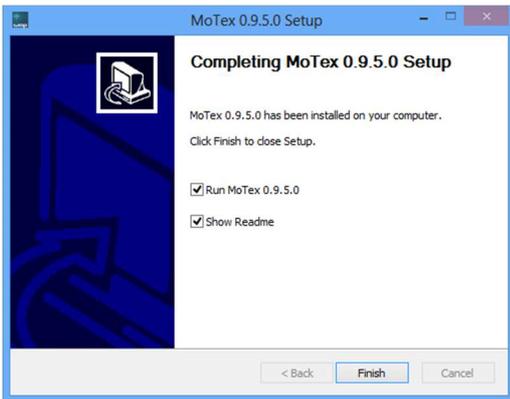
13 After download is finished, “Microsoft .NET Framework 4 Client Profile” will be installed, wait for it to complete. This can take more than 10 minutes on slower computers.



14 Setup will finish by installing drivers. Click “Next” to continue:



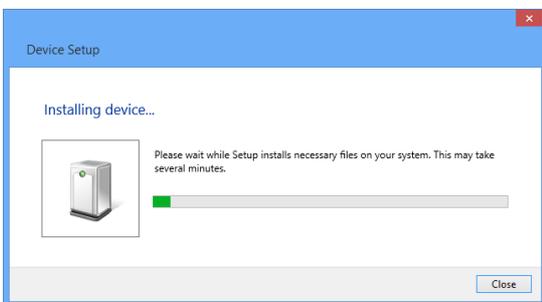
15 Press “Finish” to end installation. Program cannot be opened if only drivers were installed (see step 2 for details). “MoTex” software icon will be created on “All Users” desktop and “All Users” start menu.



16 Connect MoTex and PC via USB cable.

17 Plug in MoTex power supply jack and AC adaptor to wall outlet.

18 Windows will detect new hardware. Wait until windows configures new device.



19 Device installation is now complete.

5.3 “MoTex” software description

If your operating system version meets requirements for “MoTex” software, as shown in Table 1, you will be able to use fully functional MoTex control application. Otherwise, go to section “MoTex serial command summary” on page 13 and read how to use this device with serial port and commands.

“MoTex” program can be started by one of the icons, located on desktop or in start under “All programs/Altechna/MoTex”:



MoTex - stars software to work with MoTex connected via USB.

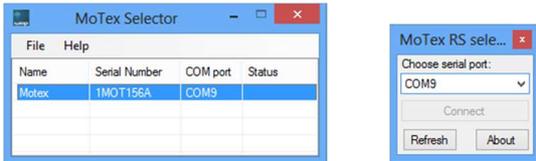


MoTex RS - stars software to work with MoTex connected via RS232.

“MoTex” software consists of two windows: “MoTex Selector” window fig. 8 and “MoTex control” window fig. 9.

5.4 “MoTex Selector” window overview

“MoTex Selector” contains a device list table where currently connected and powered beam expanders are displayed. Functions of this window are described below.



(a)

(b)

Figure 8. “MoTex Selector” window. This window is used to choose which device to control if there are more MoTex'es connected to computer. MoTex Selector for USB interface is shown as (a) while RS232 MoTex selector is shown as (b).

MoTex Selector “**File**” tab gives a list of commands:

- “**Connect**” - connects to the device highlighted in the Device list table (same function as double-clicking) and “MoTex control” window will appear. If only one MoTex is connected on program startup, control window will be opened automatically.
- “**Search for devices**” - refreshes the list of connected devices.
- “**Close this window**” – closed MoTex Selector window.
- “**Exit**” – Closes all windows of the program.

MoTex Selector “**Help**” tab allows to open user manual and give “**About**” command which gives software version information.

Device list table column description:

- “**Name**” column: it is convenient to give meaningful titles for each MoTex device that will be recognized by the system.
- “**S\n**” column: abbreviation “S\n” means “serial number”. This column shows unique MoTex hardware serial number. It is used to distinguish particular devices, because factory names for each device are equal. Despite this, user can change name for each device, which is also saved into hardware.

- “**COM**” column: this column shows USB serial port name assigned by Windows. Each MoTex gets unique serial port name after first enumeration with computer. Serial port name is necessary to know for users who want to use serial commands in their applications. See chapter “MoTex serial command summary” on page 13 for more details on this.

MoTex RS selector is simplified window that contains the same, but fewer functions as Motex selector window.

5.5 Control window description: “Zoom control” mode

First run “MoTex control” window with factory settings (except name) is shown in the picture below; MoTex is set to 250% (2.5x) of magnification. MoTex zooming level can be changed in 0.1% steps. Minimum zoom level is 250% and maximum is 1200%. Enter any number of this range into the upper text field. Decimal point is represented by symbol “.” (dot), not comma: for example “600.5” is a valid value, but “600,5” is not. Click “Go” button to apply new zoom value. Lower slider will jump to position representing zoom level of 600.5%. Upper slider will begin to move towards the same position as well. Lower slider reflects percentage entered into textbox, and upper slider shows MoTex position in real time. You can move lower slider to change text box value and vice versa.

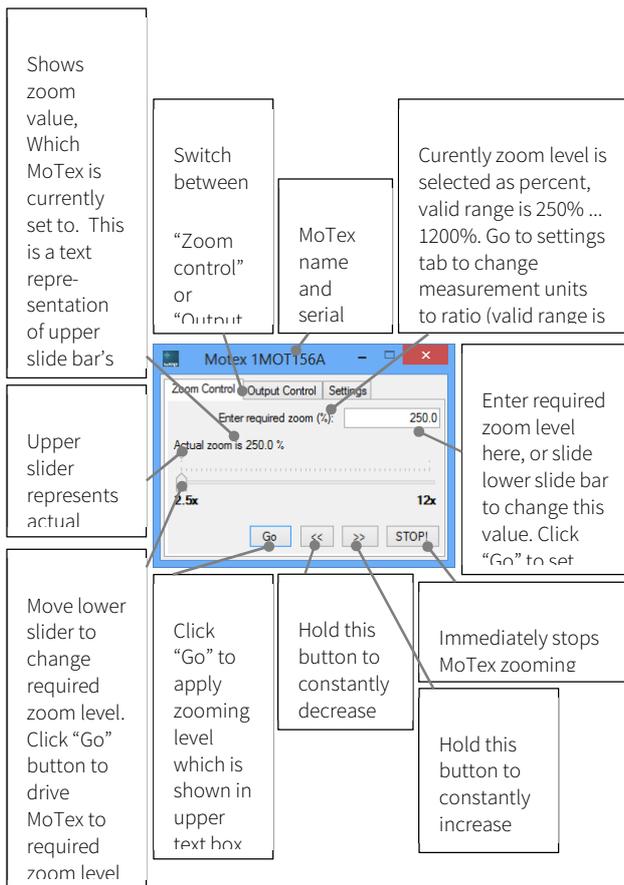


Figure 9. “MoTex control” window in “Zoom control” mode. This window is used to control zooming level if input beam diameter is unknown.

If you do not want to operate with percent, go to “Settings” tab and change measurement units to “Ratio...”, as shown in fig. 12. Previously used 600.5% will be rounded to 6.01x. With this option enabled user can enter zoom in range of 2.5x-12x in steps of 0.01. Control window with new zoom applied (6.01x) is shown in fig. 10. At the output of MoTex the resulting beam diameter will be 6x larger than input, but not wider than 48 mm.

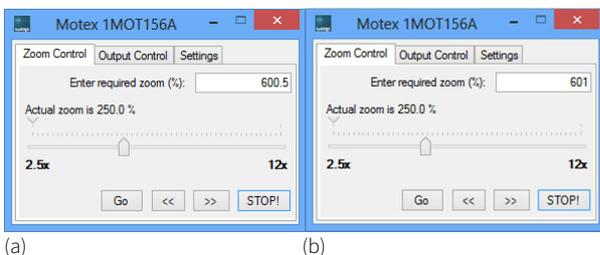


Figure 10. “Zoom control” window when “Measurement units” found in “Settings” tab is set to “Percentage (200%)” – (a), and “Ratio (2x)” – (b).

- **Button “Go”:** click this button to apply zoom level value entered in “Enter required zoom” text field.
- **Button “<<”:** keep pressing this button to continuously decrease output beam diameter. Releasing it will stop MoTex. This button acts the same way as a pushbutton on top of MoTex body, marked as “-” symbol. Device status LED will begin to blink once a second if minimum zoom is reached.
- **Button “>>”:** keep pressing this button to continuously increase output beam diameter. Releasing it will stop MoTex. This button acts the same way as a pushbutton on top of MoTex body, marked as “+” symbol. Device status LED will begin to blink two times in a second if maximum zoom is reached.
- **“STOP!” button:** click this button to cancel zooming operation.

5.6 Control window description: “Output control” mode

Users, that know input beam diameter, should switch to “Output control” mode of operation by clicking on “Output control” tab fig. 11. “MoTex control” window with factory settings (except name) is shown in the picture below; MoTex is set to 250% (2.5x) of magnification. User should measure laser beam diameter (measurement units are millimeters) and enter it in upper text box (“Enter Input Beam Diameter (mm)”). According to it, possible output beam diameter values are recalculated, minimum and maximum values are updated on the ends of lower track bar. For example, if input beam diameter is set to 5 mm, user will be able to enter output beam diameter in range from 12.5 mm (5x2.5 – input beam times minimal zoom) to 48 mm (absolute maximum).

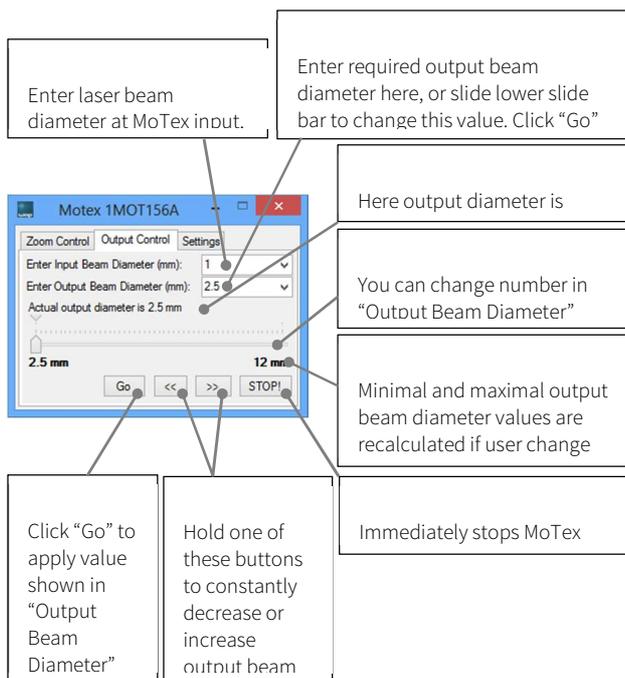


Figure 11. “MoTex control” window in “Output control” mode. This window should be used to control output beam diameter if input beam diameter is known.

5.7 Control window description: “Settings” tab

“Measurement Units” setting is used in “Zoom control” mode to scale percentage value to shorter form. Select “Percentage (200%..)” in order to enter zoom value in range of [250 .. 1200] % or select “Ratio (2x..)” in order to enter zoom value in range of [2.50 .. 12.00].

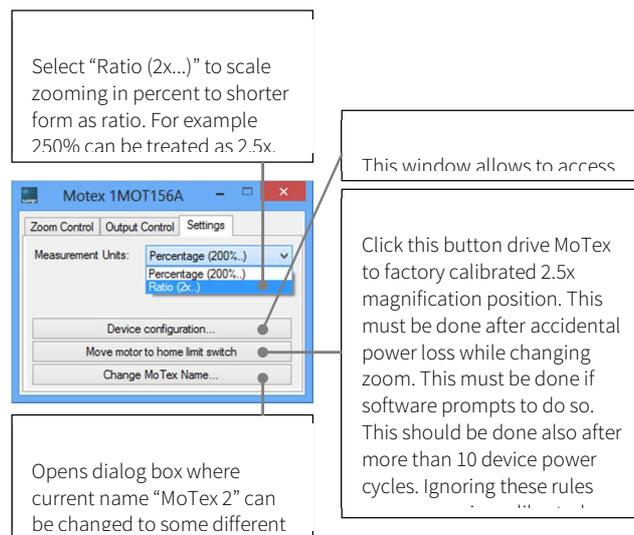


Figure 11. “MoTex control” window in “Output control” mode. This window should be used to control output beam diameter if input beam diameter is known.

Button “Move motor to home limit switch”. MoTex is driven by a stepper motor. Each zooming value corresponds to exact motor position. Hardware memorizes motor location after each zoom value change, so if there is any sort of disruption during magnification move, for instance – power supply loss,

MoTex won’t save correct motor position. In such case, device will report false zoom value on next start, motor position will have an offset with actual zoom value. If user will try to set minimum or maximum magnification, motor will reach internal limit switches. Program is tracking limit switch activity and once limit switch is reached, a message box with a warning message will appear, urging to press this button:

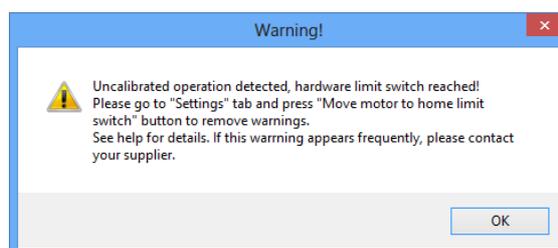


Figure 13. Message box saying that user should home MoTex.

Beside this message box, user will see red-highlighted text “Calibrate!” in the upper right corner of the window in fig. 14. “Move motor to home limit switch” button must be pressed to remove this reminder. This process cannot be automated by program itself, because MoTex

will change zoom value when homing and such behavior would be inappropriate to user.

This button should also be pressed if MoTex is power supply cycled more than 10 times. Almost every power cycle induces a minute stepper motor motion, because it loses its holding torque and comes to most stable position. These movements tend to occur in random directions and mostly cancel themselves, we advise to home MoTex frequently depending on individual usage. Such accidental motor movement induces 0.1% in zooming error, 10 such errors could lead to 1% of zoom accuracy in worst case scenario.

Button “Change MoTex Name” will open window where user can rename MoTex device (). Name will be updated and visible in “Control” window title bar and in “MoTex” selector list. Name must be up to 20 characters in length.

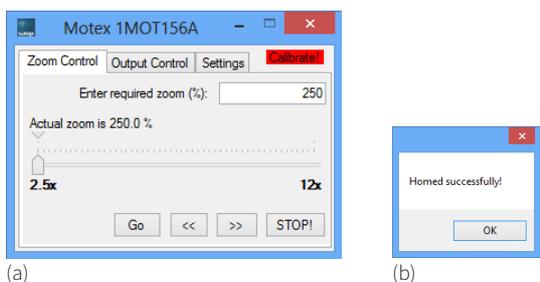


Figure 14. Red warning reminding that user should home MoTex (a). The message will appear after successful MoTex home operation (b).

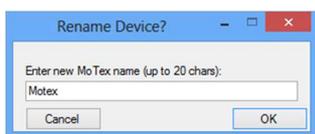


Figure 15. Red warning reminding that user should home MoTex (a). The message will appear after successful MoTex home operation (b).

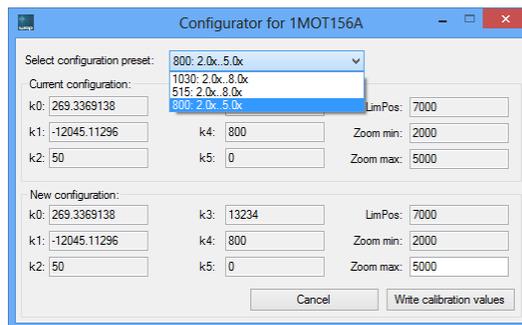


Figure 16. Device configurator window allows to choose between pre-defined MoTex configurations.

Every MoTex is dedicated for certain magnification range at particular wavelength. This is realized by optical design of the beam expander and embedded mathematics in software, which calculates the lens movement distance. Device configurator allows to choose from pre-defined magnification ranges at particular wavelengths. Selection the configuration preset changes configuration variables k0/k1/k2/k3/k4/k5/LinPos/Zoom min in the “New configuration:” fields. After desired preset is selected, press “Write calibration values” button to save the preset.

6. Motex usage with PC advanced users

6.1 Virtual serial port

When MoTex is attached to the computer, it appears as “Virtual serial port” or “COM port” under computer devices list. Such ports are used to send and receive alphanumeric or binary data to variety of devices; traditionally it is used to control GSM modems and mobile phones. MoTex receives commands that are sent to that port and changes zoom level accordingly. MoTex can be controlled by opening this port with any kind of terminal software (for example “Hyper terminal”, which is preinstalled in Windows XP), and manually entering dedicated commands (see “MoTex serial command summary” on page 13). Another option to use MoTex is to write scripts or software that automates command management. This possibility should be interesting to laboratory users, working with telemetry or scientific software packages, for example National Instruments “LabView”, which has support for serial port communication. “Altechna R&D” supplies fully functional MoTex control software for users running most of Windows Operating system versions.

USB drivers and/or “MoTex” software should be installed before connecting MoTex to computer. Follow section “Software installation” on page 6 to install it. MoTex virtual serial port driver and “MoTex” software compatibility with Microsoft operating systems is described in the table 1 below. Note that serial port driver is available for more systems than “MoTex” software. For example, you can send MoTex commands via serial port from Windows XP Service Pack 1, because driver is available, but “MoTex” software will not run unless Service Pack 3 is installed.

Table 1. MoTex supported Microsoft operating systems.

Operating system support?	Has “serial port” driver	Has “Motex” software support
Prior to Windows 2000	No	No
Windows 2000 (32-bit)	Yes	No
Windows XP (32-bit)	Yes	Yes, with Service pack 3 installed
Windows Server 2003 (32-bit)	Yes	Yes, with Service pack 2 installed
Windows Vista (32/64-bit)	Yes	Yes, with Service pack 1 installed
Windows Server 2008 (32/64-bit)	Yes	Yes
Windows 7 (32/64-bit)	Yes	Yes
Windows 8/8.1 (32/64-bit)	Yes	Yes
Windows 10 (32/64-bit)	Yes	Yes

6.1 Unix-like operating system

There is no need to install any drivers on modern UNIX-like (Linux “Ubuntu”, “Slackware”, MAC OSX) operating systems. MoTex is automatically recognized and installed as “ttyUSB” device after connecting it to computer. Serial port called „ttyUSB0” is assigned to MoTex controller automatically by OS. You can check which serial port is assigned in your computer with „sudo |dmesg | grep cp210x” command. We communicated with controller by using „CuteCom” program.

6.2 MoTex serial command summary

6.2.1 Identifying serial port name

First step to control MoTex using serial port and commands would be to find which serial port is assigned for device. This can be seen in “MoTex Selector” list – see section “MoTex Selector” window overview on page 9.

In case if only drivers were installed (no “MoTex” software itself – see Table 1 on page 12) serial port name could be checked in Windows “Computer manager”. Right click on “My Computer” (1), select “Manage” (2). “Computer manager” window will appear. Click on “Device Manager” under “Computer Management” tree (3) and look for “Ports (COM and LPT)” (4). Each connected and powered on MoTex appears as “Silicon Labs CP210x USB to UART Bridge (Serial port name)”. Serial port name is shown in parentheses fig. 16.

Third way to identify MoTex is to open each serial port and send “GetSerialNumber” command. If MoTex is present on that port, it will send back string starting with

“1MOT” or “1MRS” (for RS232 version) which is a part of serial number and is constant for all MoTex devices. If MoTex is not present, no bytes will be received or received string will not begin with “1MOT” or “1MRS”. Serial port read timeout can be set to 50 ms to speed up scanning process. This method is universal and can be used with any operating system. Read next chapters about serial port parameters and command list.

Linux users can find MoTex port by executing command “root |dmesg | grep cp210x”: l

In the **Figure 17** we can see that one MoTex (cp210x) device is assigned to “ttyUSB0” port. There is also shown installation command for “CuteCom” package, which is easy to use terminal application with GUI.

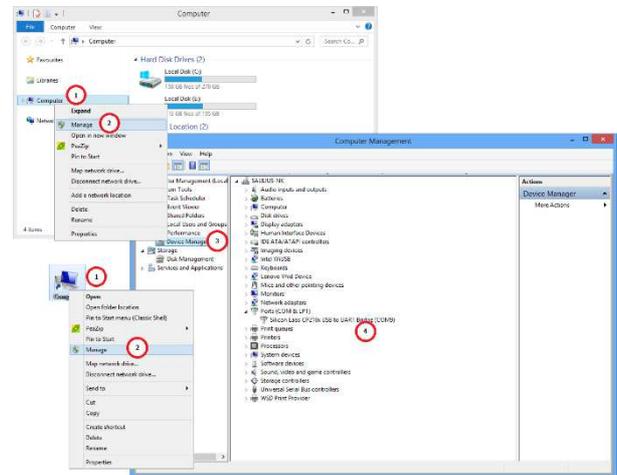


Figure 16. Finding MoTex serial port name using Windows “Computer Manager”.

6.2.2 Serial port parameters

Serial port parameters to be used are shown in a table below.

Table 2. Serial port parameters.

Baud rate	38400
Parity	None
Handshaking	No
Stop bits	1

6.2.3 Serial commands and protocol

MoTex is a slave device according to computer and computer is a master device. That means that PC sends data requests to MoTex, and MoTex must respond. MoTex itself will never send data to computer without request.

MoTex writes all received bytes to internal buffer. If it receives “carriage return” symbol (or “\r” in C++ denotation, 13'th symbol in ASCII table, or 0x0D in hex), device will try to parse received bytes as a command string and will execute it if no errors was found. MoTex echoes back every byte it receives back to computer except for “\r”. Symbol echoing is essential for users who literally type commands in terminal window. This enables user to see what data is sent to device, because not all terminal programs has a text field where sent symbols are shown.

MoTex will respond to byte “\r” by sending additional data (if command requires it) and acknowledge (ACK) or not acknowledge (NACK) string. ACK string (4 bytes) is “>\r\n” (or 0x20, 0x3E, 0x0D, 0x0A in hex); NACK string is “?\r\n” (or 0x20, 0x3F, 0x0D, 0x0A in hex), first symbol is “space”. If MoTex response ends with ACK string, it means that received bytes were parsed successfully and device is ready to receive next command. If response ends with NACK, it means that receive buffer had no valid command, command was ignored and device is ready to receive next command. Termination symbols “\r\n” are essential for users who literally type commands in terminal window. These symbols are not visible, but they format “received data” window text so it looks organized.

```
root@Alvaras: /home/Alvaras# installpkg Downloads/cutecom-0.22.0-1486-las.tgz
Verifying package cutecom-0.22.0-1486-las.tgz.
Installing package cutecom-0.22.0-1486-las.tgz:
PACKAGE DESCRIPTION:
# Cutecom (A graphical serial terminal, like minicom)
#
# It is aimed mainly at hardware developers or other people who need a
# terminal to talk to their devices. It is free software and distributed
# under the GNU General Public License Version 2, which can find in the
# file COPYING.
# Cutecom is heavily inspired by Bray++ for Windows
#
#
Package cutecom-0.22.0-1486-las.tgz installed.

root@Alvaras: /home/Alvaras# cutecom
No protocol specified
cutecom: cannot connect to X server :0
root@Alvaras: /home/Alvaras# dmesg | grep cp210x
[ 515.118805] USB Serial support registered for cp210x
[ 515.118847] cp210x 5-1:1.0: cp210x converter detected
[ 515.355645] usb 5-1: cp210x converter now attached to ttyUSB0
[ 515.355685] usbcore: registered new interface driver cp210x
[ 515.355691] cp210x: v0.09:Silicon Labs CP210x RS232 serial adaptor driver
[ 1196.500459] cp210x ttyUSB0: cp210x converter now disconnected from ttyUSB0
[ 1196.500493] cp210x 5-1:1.0: device disconnected
[ 1202.112687] cp210x 5-1:1.0: cp210x converter detected
[ 1202.349780] usb 5-1: cp210x converter now attached to ttyUSB0
root@Alvaras: /home/Alvaras#
```

Figure 16. Finding MoTex serial port under Linux. Screenshot is taken on Slackware Linux 13.37 32 bit OS.

From computers perspective each command is ended by byte “\r”. “Enter” key press usually sends this symbol in most of terminal programs. Command and command parameter is separated by space symbol (0x20). For example, typing such string “zs 3000” in terminal application and pressing enter key on the keyboard will set MoTex zoom to 300.0%. Here “zs” (0x7A, 0x73) is a command, space (0x20) is a separator, and “3000” (0x33, 0x30, 0x30, 0x30) is a command parameter that corresponds to 300.0%. All sent bytes in hexadecimal will be (0x7A, 0x73, 0x20, 0x33, 0x30, 0x30, 0x30, 0x0D), including command end symbol “\r”, or “Enter” key press. New command can be sent only after ACK or NACK received, otherwise command misinterpretation can occur. See table below for more commands.

Table 3. Serial commands description.

Command name:

Zoom set
zs x

Description:

For 2.5x-12x magnification model sets zoom value in range of 250.0%-1200.0%, in 0.1% steps. For customized zoom options, please contact manufacturer for details.

Parameter x:

Integer number in range 2500-12000. Last digit equals to 0.1%. This command can be used in polling mode. Polling interval can be 30 ms or more.

Return string:

;[1];[2];ACK

[1] – integer. MoTex internal command parser output for parameter x. This value is a copy of parameter x, as MoTex understood it. For instance, user can send erroneous command “zs\r”, that has no parameter at all, only space. MoTex will parse such string as it was “zs 0\r”, in other words no digit means “zero” to MoTex command parser. This return value must always be the same as x parameter for correct operation.

[2] – integer. Error status. Error status value meaning:

0 – OK, no error. Zooming value will be set to value returned as [1];

1/2/3 – Integer. Hard stop error. This means that one of hardware limit switch was activated. User must execute “Go Home” command (see section “setings TAB”). Zooming value will be set to value returned as [1];

4 – Already moving error. Previous “Zoom Set” or “Go Home” command is not completed yet. Wait for it to complete (use “Zoom Get” command to check device status). This command is ignored, MoTex continues movement;

5 – Out of range error. Value [1] is not in the range 2500-12000. This command is ignored, MoTex state did not changed; Usage example: send command “zs 6005\r” [0x7A, 0x73, 0x20, 0x36, 0x30, 0x30, 0x35, 0x0D] to set zoom value to 600.5%. Terminal will receive string: “zs 6005;6005;0; >\r\n” [0x7A, 0x73, 0x20, 0x36, 0x30, 0x30, 0x35, 0x3B, 0x36, 0x30, 0x30, 0x35, 0x3B, 0x30, 0x3B, 0x20, 0x3E, 0x0D, 0x0A].

Echoed back bytes are “zs 6005”. Response is “;6005;0;”. “6005” means that zoom will be set to 600.5%, “0” means zoom changing has begun. If “4” will appear instead of “0”, one must wait till previous operation completes. “2” means that “Go Home” command must be sent for proper operation.

Command name:

Zoom get
zg x

Description:

Get current zoom value. Can be used to update graphical user interface (GUI) with zoom status at real time. Can also be used to check if previous zooming operation has completed. This command can be used in polling mode. Polling interval can be 30 ms or more.

Return string:

[1];[2];[3];ACK

[1] – Integer. Possible values are “0” and “1”. “1” means that currently MoTex is changing zoom value or homing and cannot accept “Zoom Set” command. Monitor this value in order to check if device is ready to execute

“Zoom set” command. “0” means that device is stopped and can execute “Go home” or Zoom Set” commands.

[2] – Integer in range of 2500-12000. Current zoom value. 2500 represents 250%, 12000 equals to 1200%. Monitor this value if application requires refresh MoTex status.

[3] – Integer. Hard stop error status. One of hardware limit switch was activated if this value is not equal to “0”. User must execute “Go Home” command for proper future operation (see section “setings TAB”) [3] –

Integer. Hard stop error status. One of hardware limit switch was activated if this value is not equal to “0”. User must execute “Go Home” command for proper future operation (see section “setings TAB”).

Usage example:

Send command “zg” [0x7A, 0x67, 0x0D]. Terminal will receive string: “zg0;2500;0; > \r \n” [0x7A, 0x67, 0x30, 0x3B, 0x32, 0x35, 0x30, 0x30, 0x3B, 0x30, 0x3B, 0x20, 0x3E, 0x0D, 0x0A]. Echoed back bytes are “zg”, response is “0;2500;0;”. First “0” means that MoTex motor is stopped, “2500” represents current zoom (250.0%). Second “0” means that no hardware errors occurred. If this value becomes “1”, “2” or “3” “Go Home” command must be executed for normal operation.

Command name:

Stop
st

Description:

Stop MoTex lens motion. This command will cancel current zooming operation, use “Zoom Get” command to check and wait for MoTex to stop.

Return string:

ACK

Usage example:

Send command “st\r” [0x73, 0x74, 0x0D]. Terminal will receive string “st >\r\n” [0x73, 0x74, 0x20, 0x3E, 0x0D, 0x0A]. Now keep sending string “zg\r”, and wait until response to this command will become “0;x;x;”, which means motor is stopped.

Command name:

Zoom limits
zl

Description:

Get available zoom range of particular device. Different MoTex configurations have different zooming range. Use this command to check it.

Return string:

[1];[2];ACK

[1] - Integer. Means minimal zoom value.

[2] - Integer. Means maximal zoom value.

Usage example:

Send command "zl" [0x7A, 0x6C, 0x0D]. In case device is standard 2.5x-12x zooming device, terminal will receive string: "zl2500;12000;>\r\n" [0x7A, 0x6C, 0x32, 0x35, 0x30, 0x30, 0x3B, 0x31, 0x32, 0x30, 0x30, 0x30, 0x3B, 0x20, 0x3E, 0x0D, 0x0A]. Echoed back bytes are "zl", response is "2500;12000;". 2500 means that minimal zoom is 250.0% and 12000 means that maximal zoom is 1200.0%.

Command name:

Go Home
zp

Description:

This command drives MoTex to factory calibrated 2.5x magnification position. This command must be sent if "Zoom Set" command returns error code "1", "2" or "3", or if "Zoom Get" commands return value [3] is not equal to "0". These error flags are reset to "0" after issuing this command. Use "Zoom Get" command to check if motion has finished.

Return string:

ACK

Usage example:

Send command "zp\r" [0x7A, 0x70, 0x0D]. Terminal will receive string "zp > \r\n" [0x7A, 0x70, 0x20, 0x3E, 0x0D,

0x0A]. Now keep sending string "zg\r", and wait until response to this command will become "0;x;x;", which means motor is stopped.

Command name:

Show name
pn

Description:

Return MoTex name. Name can be up to 20 characters in length.

Return string:

[char array]ACK

[char array] – up to 20 bytes.

Usage example:

Send string "pn\r" [0x70, 0x6E, 0x0D]. Device will send back string "pnMoTex > \r\n" [0x70, 0x6E, 0x4D, 0x6F, 0x54, 0x65, 0x78, 0x20, 0x3E, 0x0D, 0x0A]. In this case, beam expander name is "MoTex". Use "Save Name" command to rename the device.

Command name:

Save name
sn

Description:

Set new name for MoTex. Name can be up to 20 characters in length. Parameter x: char array, up to 20 characters.

Return string:

ACK

Usage example:

Send string "sn New Name \r" [0x73, 0x6E, 0x20, 0x4E, 0x65, 0x77, 0x20, 0x4E, 0x61, 0x6D, 0x65, 0x0D] to set MoTex name to "New Name". Device will send back string "sn New Name > \r\n" [0x73, 0x6E, 0x20, 0x4E, 0x65, 0x77, 0x20, 0x4E, 0x61, 0x6D, 0x65, 0x20, 0x3E,

0x0D, 0x0A].

Command name:

Snow serial number
pw

Description:

Show MoTex serial number. This string should be used to distinguish between several devices attached to the same computer. MoTex serial number begins with "1MOT". Rest of the symbols always differs.

Return string:

[char array]ACK

[char array] – up to 16 bytes.

Usage example:

Send string "pw\r" [0x70, 0x77, 0x0D]. Device will send back string "pw1MOT101A > \r\n" [0x70, 0x77, 0x31, 0x4D, 0x4F, 0x54, 0x31, 0x30, 0x31, 0x41, 0x20, 0x3E, 0x0D, 0x0A]. In this case serial number is 1MOT101A. For RS232 type device, serial number begins with "1MRS".

6.2.4 Software recommendations

There are plenty of applications built for serial port communication. Windows XP (and full installations of Windows 7 or Windows 8) has native "hypertrm.exe" terminal application that can be launched by typing "hypertrm" in "Run" dialog (Winkey + R). Linux and OS X users can use free "CuteCom" (<http://cutecom.sourceforge.net>) utility, see Figure 10 on page 10. For Windows OS it is recommended to use free tool "terminal.exe" from <https://sites.google.com/site/terminalbpp>.

Configure "terminal.exe" as follows:

1. Select correct com port number (see Identifying serial port name on page 13);
2. Select correct serial port configuration values (see Table 2 on page 13);
3. Set "Hex" checkbox if received characters should also be shown as hexadecimal values;

4. Click "Connect" button;
5. Type in command and press "Enter" key on keyboard. Command string "pn\r" is sent to device as shown in example picture. Look at the Table 3 on page 14 for available commands;
6. MoTex response is shown in middle pane. Hex representation of all received bytes are shown on the right. MoTex name is set to "New Name", as shown in Figure 18.

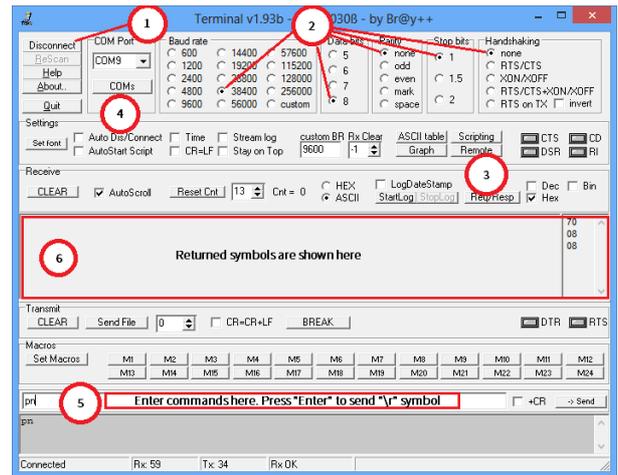


Figure 18. "terminal.exe" window with "Show Name" command sent.

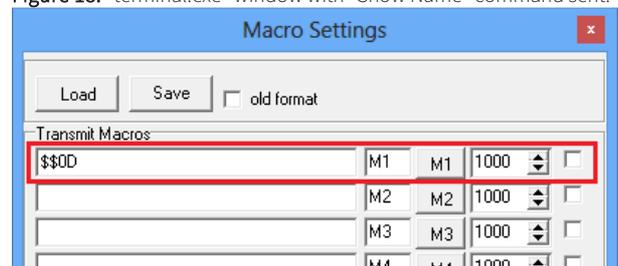


Figure 18. Command string presets can be configured by clicking "Set Macros" button in main "terminal.exe" window.

Presets can be configured for frequently used commands. Click "Set Macros" button, "Macro Settings" window will appear.

Type in string which should be sent, and name of this preset. Hexadecimal values can be entered with "\$" prefix. For example command end symbol "nr" [0x0D] should be entered as "\$0D". "Stop" command definition is shown in example. Click "Save" button to save your presets. "Stop" button will appear in "Macros pane" of main window. Press it to stop MoTex motion.

7. Frequently asked questions

1. Q: Actual zoom level is not what I have set using terminal or “MoTex” software. What should I do?

A: “Go Home” command should be sent MoTex either by issuing “zp\r” command – see Table 3 on page 14, or by pressing “Move motor to home limit switch” button in “MoTex” software “Settings” tab (on page 11).

2. Q: I see “Firmware upgrade” window. What should I do?

A: “MoTex” software always checks firmware version on device, and updates it if needed. This process will take up to one minute and requires that user do not disturb update process. This process is not cancellable. Do not disconnect USB and power supply cables, do not shutdown computer. This window can appear after “MoTex” software is updated, because latest firmware comes with latest MoTex installer file. Upgrading process is indicated by “Firmware Upgrade” window. Confirmation message will appear after process is completed and program will continue as usual.

8. Troubleshooting

Firmware upgrade process was interrupted. I cannot communicate with device anymore.

1. Close “MoTex” software window;
2. Disconnect power supply from MoTex by unplugging power supply plug;
3. There is a 1 mm hole in the left of status LED. Firmware recovery button is located under it. Use not metallic stick and press that button. Keep it pressed and connect power supply;
4. Release this button after plugged in power supply plug;
5. Start “MoTex” software, select device from the list and click “Connect” button. Firmware upgrading process will popup, wait for it to finish. Program will continue as usual.

9. Customer support and warranty

All technical issues during the warranty period, arising from proper use of the system should be solved by Altechna. Any technical issue should be discussed through Skype, phone or email and effort should be made from both sides to solve the problem in a distance through consultations. If remote solving of the problem fails, the nonworking device should be sent back to Altechna through its delivery account. If the device cannot be repaired a new working device will be sent to the client as a replacement. After the warranty period expires, Altechna ensures fee based maintenance. The key components of the device bear one year of warranty as a default. Extension of warranty is possible and can be quoted on request. Optics shall be treated as consumables, therefore only warranty is valid for a period of one month after the installation. If the any components are damaged by the user's fault – warranty will be invalidated and repair cost will be paid by the client.

Tel. +370 527 25 738
Fax +370 527 23 707
sales@altechna.com

Mokslininkų st. 6A
Vilnius, Lithuania

www.altechna.com