*phy*LOGIC™ToolBox

Communication Software for Stepper Motor Control Units *phy*MOTION™, MCC and OMC/TMC

TRANSLATION OF THE GERMAN ORIGINAL MANUAL

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Every possible care has been taken to ensure the accuracy of this technical manual. All information contained in this manual is correct to the best of our knowledge and belief but cannot be guaranteed. Furthermore we reserve the right to make improvements and enhancements to the manual and / or the devices described herein without prior notification.

We appreciate suggestions and criticisms for further improvement. Please send your comments to the following address: doku@phytron.de

1 Information

This manual:

Read this manual very carefully before mounting, installing and operating the device and if necessary further manuals related to this product.

- Please pay special attention to instructions that are marked as follows:

DANGER – Serious injury!	*Indicates a high risk of serious injury or death!*
DANGER – Serious injury from electric shock!	*Indicates a high risk of serious injury or death from electric shock!*
WARNING – Serious injury possible!	*Indicates a possible risk of serious injury or death!*
WARNING – Serious injury from electric shock!	*Indicates a possible risk of serious injury or death from electric shock!*
CAUTION – Possible injury!	*Indicates a possible risk of personal injury.*
CAUTION – Possible damage!	*Indicates a possible risk of damage to equipment.*
CAUTION – Possible damage due to ESD!	*Refers to a possible risk of equipment damage from electrostatic discharge.*
”Any heading“	*Refers to an important paragraph in the manual.*

Observe the following safety instructions!

Safety Instructions

CAUTION – Possible damage!

Malfunctions are possible while programming the instruction codes – e.g. sudden running of a connected motor, braking etc.

- Please test the program flow step by step.

CAUTION – Possible damage!

For each application, the functional reliability of software products by external factors such as voltage differences or hardware failure, etc. is affected.

- To prevent damage due to system error, the user should take appropriate safety measures. These include back-up and shut-down mechanisms.

CAUTION – Possible damage!

Each end user system is customised and differs from the testing platform. Therefore the user or application designer is responsible for verifying and validating the suitability of the application.

- The suitability of the device's use must be tested and validated.

CAUTION – Possible damage!

Some modules are set to a default value on delivery. So, e.g., the motor current must be set to the corresponding value (see the motor data from the motor manufacturer). Connected components like motors can be damaged by incorrectly set values.

- Please check before starting, if the parameters are correct.

2 Overview of the *phy***LOGIC**™ToolBox

*phy***LOGIC**™ is phytron's new programming language for stepper motor controllers. It is a consequent development of our well trained MiniLog language. It supports both our established product lines MCC, OMC/TMC and our new modular controller system *phy***MOTION**™.

The exposed *phy***LOGIC**™ instruction set can be used without licensing fees and easily integrated into customer applications.

The *phy***LOGIC**™ instruction set has not been changed, some of the instructions however differ in their syntax between Minilog and *phy***LOGIC**™. *phy***LOGIC**™ based on the Minilog instruction set was extended by commands that support complex multi-axis applications in particular. The syntax used for the application exclusively depends on your controller:

- If you use a controller of the MCC, OMC or TMC series, continue to use the familiar Minilog syntax of the corresponding commands.
- If you use a *phy***MOTION**™, use the new *phy***LOGIC**™ syntax.

„Minilog-Comm" is now called „*phy***LOGIC**™ ToolBox"

- Minilog-Comm only knows the Minilog syntax. The new software *phy***LOGIC**™ ToolBox controls both the old Minilog syntax and the new *phy***LOGIC**™ syntax.
- So you can use any of your previous Minilog program for MCC, OMC and TMC with the new *phy***LOGIC**™ ToolBox.

Operating software and development environment for the phytron's *phy***MOTION**™, MCC und OMC/TMC controllers

Easy to programm :

- Drawing and converting of 2D contours in *phy***LOGIC**™ commands (Motion Creator) (planned for 2013)
- Parameterising, programming, editing, debugging
- Support in the commissioning phase i.e. by test functions
- Display of status and graphical presentation of a current XY position
- Archiving of parameter sets and programs
- Existing *phy***LOGIC**™ programs easily portable

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4 System Requirements

*phy***LOGIC**™ ToolBox can be used on PCs with the following minimum features:

- 1 GHz Processor
- Operating system Windows® XP, Vista or 7
- 512 MB RAM free memory minimum
- CD-ROM drive, if program is installed from CD
- The following interfaces are necessary for controller connection:

OMC/TMC	RS 232
MCC-1/MCC-2/MCC-2-LIN	RS 232, RS 422 / RS 485 (4-wire), USB or Ethernet
*phy***MOTION**™	USB at POWM01 module, Ethernet

5 Program installation

The following folders are saved on the CD:

German	Includes the files for a setup in German
English	Includes the files for a setup in English

5.1 How to Install the Program

1. Put the program CD into the CD-ROM drive.
2. Start the *phy***LOGIC**™ToolBox installation program by clicking on setup.exe.
3. The screen shows the following information:

Fig. 1: Setup program for *phy***LOGIC**™ToolBox

4. Please click on **Next>** and the following information is on screen:

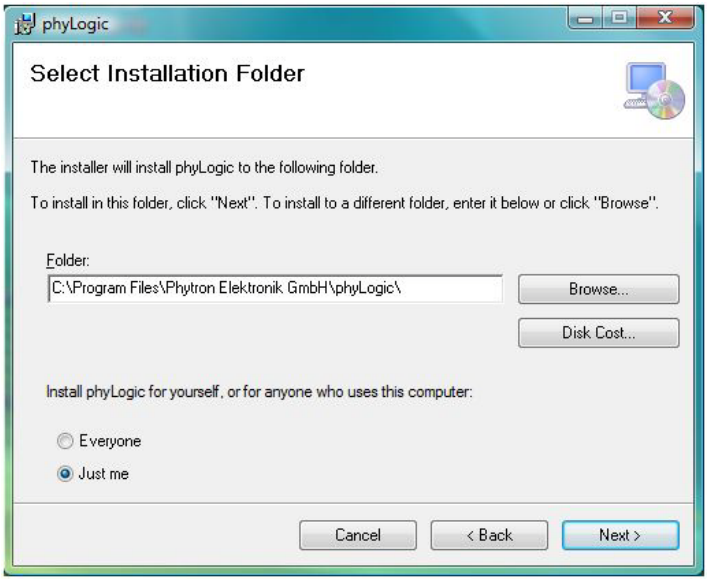


Fig. 2: Setup start for *phy***LOGIC**™ToolBox

5. Another directory can be selected with **Browse**. Click on **Next>** to start the installation.

6. The files will be stored into the defined directory; some files will be stored into the Windows directory.
7. When the message ‚*phy***LOGIC**^{TM}*ToolBo*x *successfully finished* is on desktop, the installation has been successfully finished. Finish by Close.
8. Remove the CD from the CD-ROM drive.
9. Start the *phy***LOGIC**^{TM}ToolBox by selection of the program list.

Remark:
If you have got the *phy*LOGIC^{TM}ToolBox **files on another way (e. g. E-mail), the program installation can be done like in chapter 3.1 (beginning at item 2). Instead of CD-ROM drive select the corresponding directory, on which the file SETUP.exe is stored.**

5.2 File Names

After installation the following files are stored in the directory:

phyLOGIC.exe	Program *phy***LOGIC**™ToolBox
MiniLogComm-Help.chm	Help file
Folder Parameter	for *phy***MOTION**™ : D_MCM.par : Parameter file in German E_MCM.par : Parameter file in English for MCC: D_MCC.par : Parameter file in German E_MCC.par : Parameter file in English For OMC and TMC : D_OMC.par : Parameter file in German E_OMC.par : Parameter file in English
SciLexer.dll	Editor

5.3 Update of *phy***LOGIC**™ToolBox

If you want to install an update of a *phy***LOGIC**™ToolBox copy, the installation program automatically deletes the old version before installing the new.

5.4 USB Driver

When the controller is connected to the PC by USB-interface, the USB drivers of the phytron-CD have to be installed on the PC (see *phy***LOGIC**™ manual).

6 The Working Environment Used by *phy*LOGIC™ToolBox

After the successful program start of *phy*LOGIC™ToolBox, the desktop will show up like in Fig. 3:

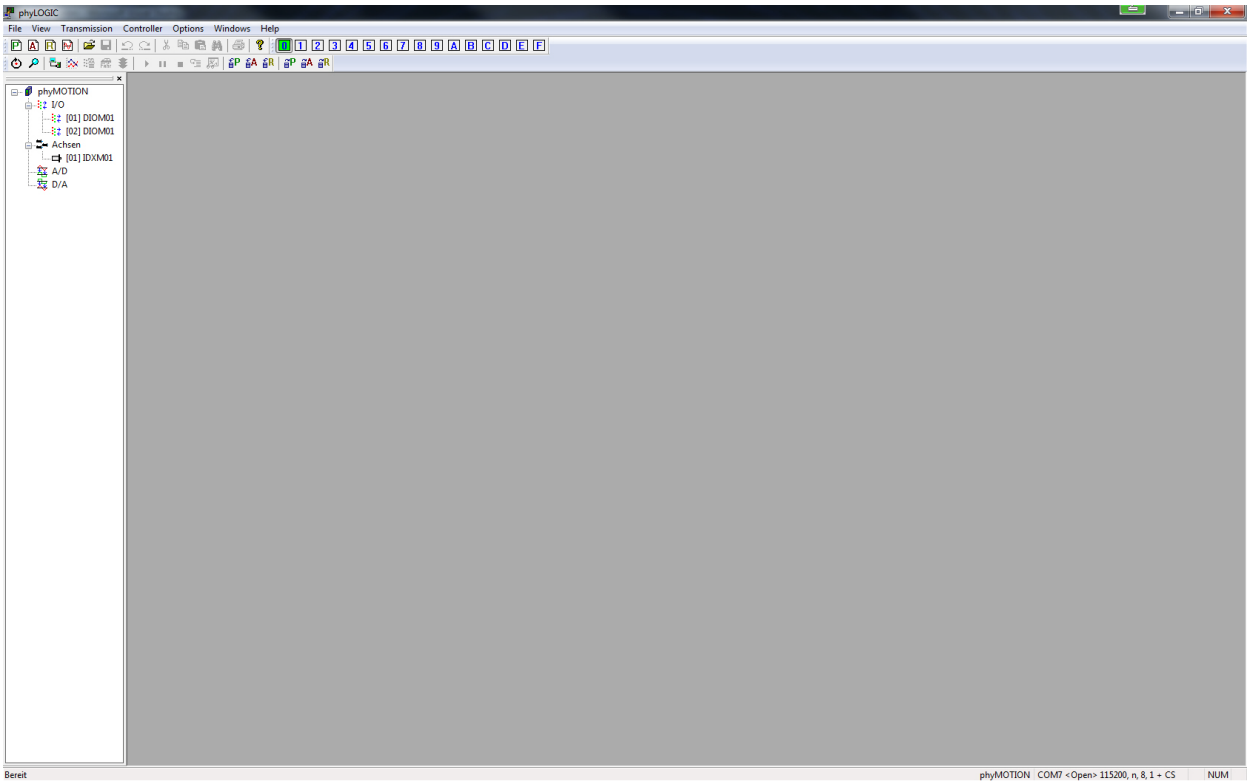


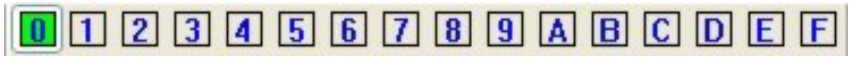
Fig. 3: Desktop after program start

The working environment of *phy*LOGIC™ToolBox consists of several main components:

1. The selection menu in the top line on the desktop:
   File, View, Transmission, Controller, Options, Help
2. Toolbars: Selection of some instructions and device address (0 to 9 and A to F) with icons (see table)
3. The working area
4. Display of the open modules/axes on the TreeView
5. The status bar line at the bottom of the desktop: Interface parameters (COM port, baud rate) and controller type

6.1 Symbol and Status Bar

In ***View*** menu the display of the bars is defined.
The displayed bars are marked by✓.

Toolbar	
Status bar	
Address bar	
Communication bar	
Special Toolbar	

The ***View / Font*** submenu is only displayed, if the program files are open. Program text can be defined by font, face and size.

6.2 Symbol bar

Icon	Description of the icons	View
	Write new program	Toolbar
	Write new register	Toolbar
	Write new parameters	Toolbar
	Write new Motion Creator	Toolbar
	Send program	Communication bar
	Receive program	Communication bar
	Send register	Communication bar
	Receive register	Communication bar
	Send parameter	Communication bar
	Receive parameter	Communication bar
	Open program file	Toolbar
	Save file	Toolbar
	Print file	Toolbar
	Cut	Toolbar
	Copy	Toolbar
	Insert	Toolbar
	Search	Toolbar
	Open Help menu	Toolbar
	Undo the last instruction	Toolbar
	Redo the last instruction	Toolbar
	Dialogue Open Direct mode	Communication bar
	Dialogue Open Operation	Communication bar
	Dialogue Open IO-Monitor	Communication bar
	Dialogue Open Status monitor	Communication bar
	Show current x-y position	Communication bar
	Start Single step mode of controller program	Communication bar
	Start controller program	Communication bar
	Interrupt controller program	Communication bar
	Stop controller program	Communication bar
	Query of variables during program	Communication bar

	sequence	
	Controller Reset	Communication bar
	Search controller	Communication bar
	Choose an object (line, segment)	Special toolbar
	Zoom the desktop	Special toolbar
	Move the desktop	Special toolbar
	Draw a line from the last data point to the mouse cursor.	Special toolbar
	Draw a 90° segment clockwise, which can be parameterized afterwards.	Special toolbar
	Draw a 90° segment counterclockwise, which can be parameterized afterwards.	Special toolbar
	Insert a line in a present object.	Special toolbar
	Insert a curve (90° segment) clockwise, which can be parameterized.	Special toolbar
	Insert a curve (90° segment) counterclockwise, which can be parameterized.	Special toolbar

Further manual

Detailed information on this subject is in a supporting manual:

“*phy***LOGIC**™ Command Reference for the *phy***MOTION**™ Controller”

Further Manual

An overview of axis commands and associated parameters, as well as schematic representations of the driving parameters can be found in the following manual:

„Principles of Positioning for Stepper Motor Controllers“

6.3 Start and Exit *phy*LOGIC™ToolBox

Select ***Start / Programs / Phytron GmbH /*** *phy***LOGIC** to start the program by click on the left mouse button.

Use the menu instruction ***File / Exit*** to leave *phy***LOGIC™**ToolBox. *phy***LOGIC™**ToolBox displays a warning message if there are unsaved data.

6.4 The *Windows* Menu

Windows menu arranges optically the displayed axis windows. The directories of all files are listed after click on ***Windows***. The active window is selected on screen by mouse click. The displayed open window is marked by✓.

6.4.1 Cascading Windows

Several open axes files are arranged in a cascading mode by click on ***Cascading***.

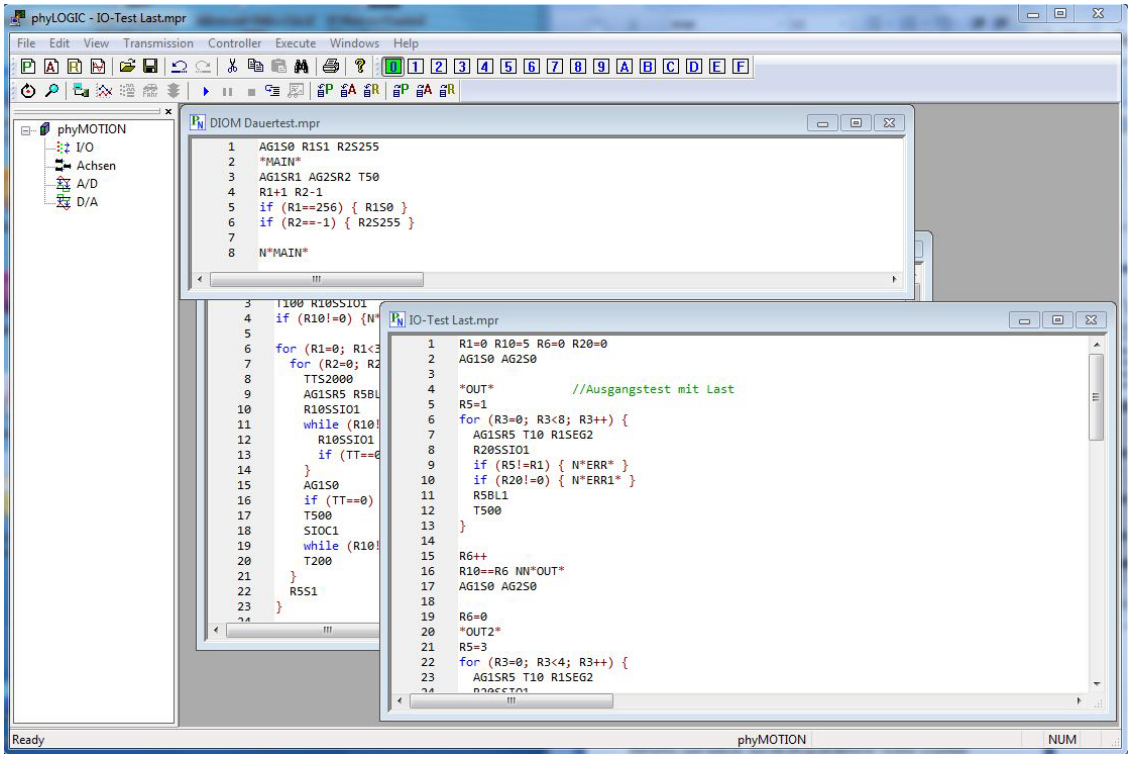


Fig. 4: Before

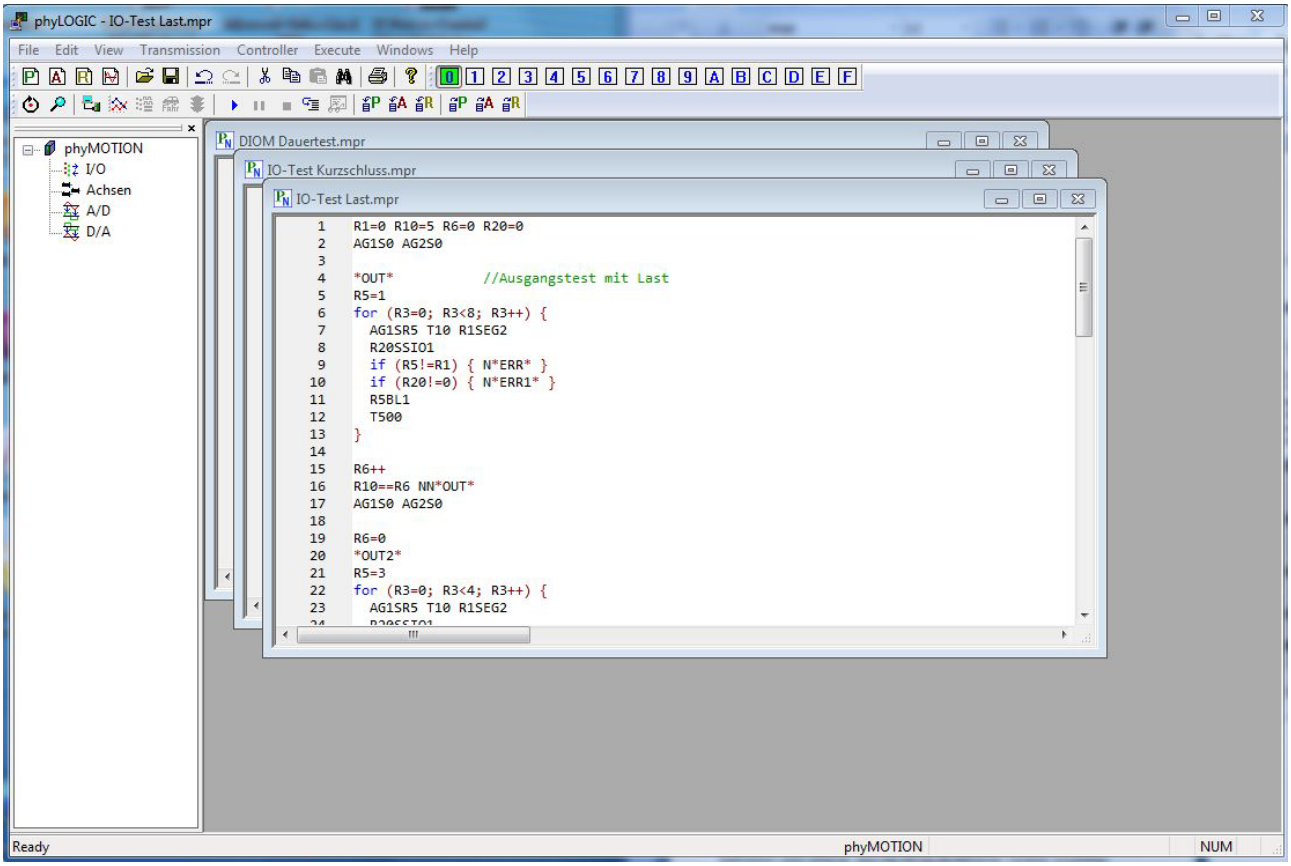


Fig. 5: Afterwards

6.4.2 Tile Windows

The open axes files are placed horizontally by click on ***Tile Windows***:

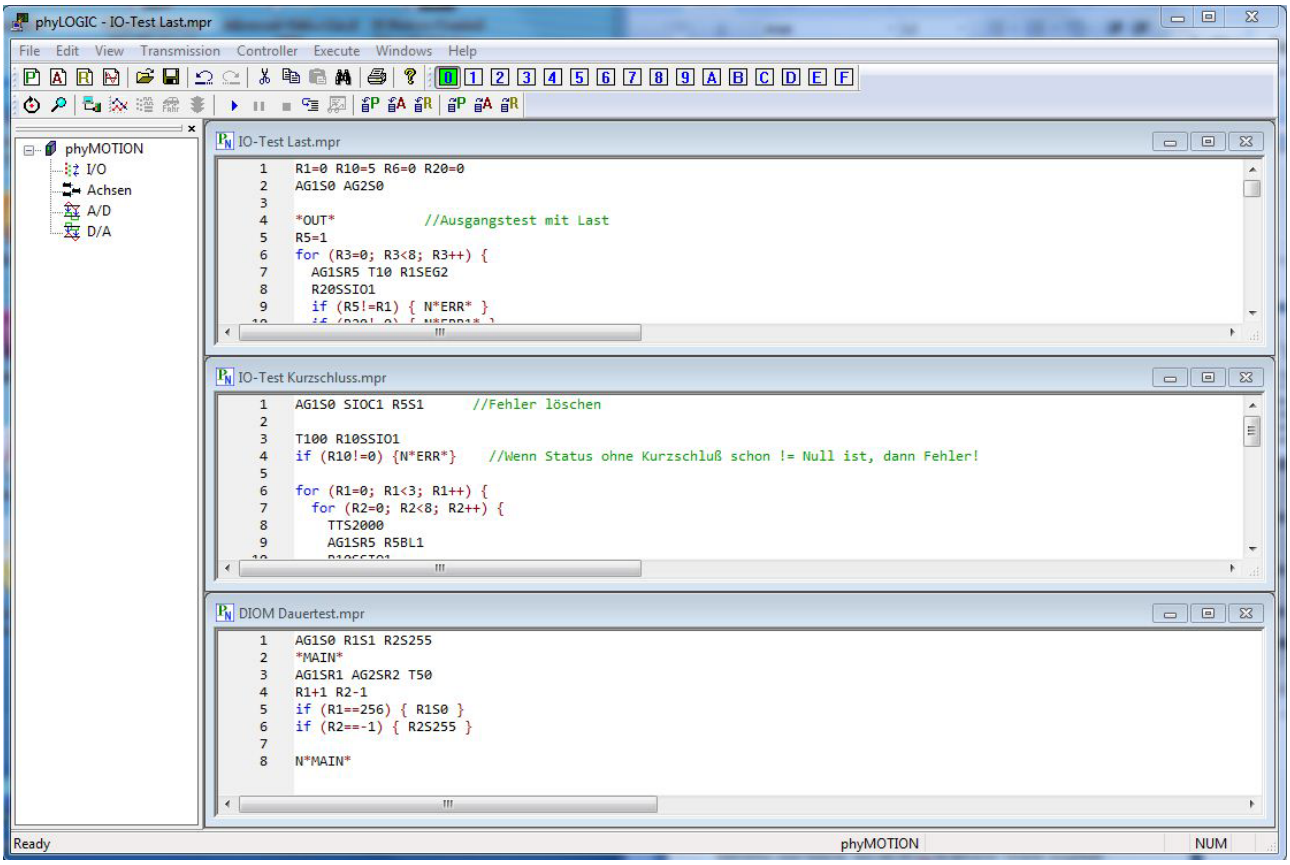


Fig. 6: Window: side by side

6.4.3 Place Symbols

The downsized program windows on the lower screen edge are placed in a row side by side.

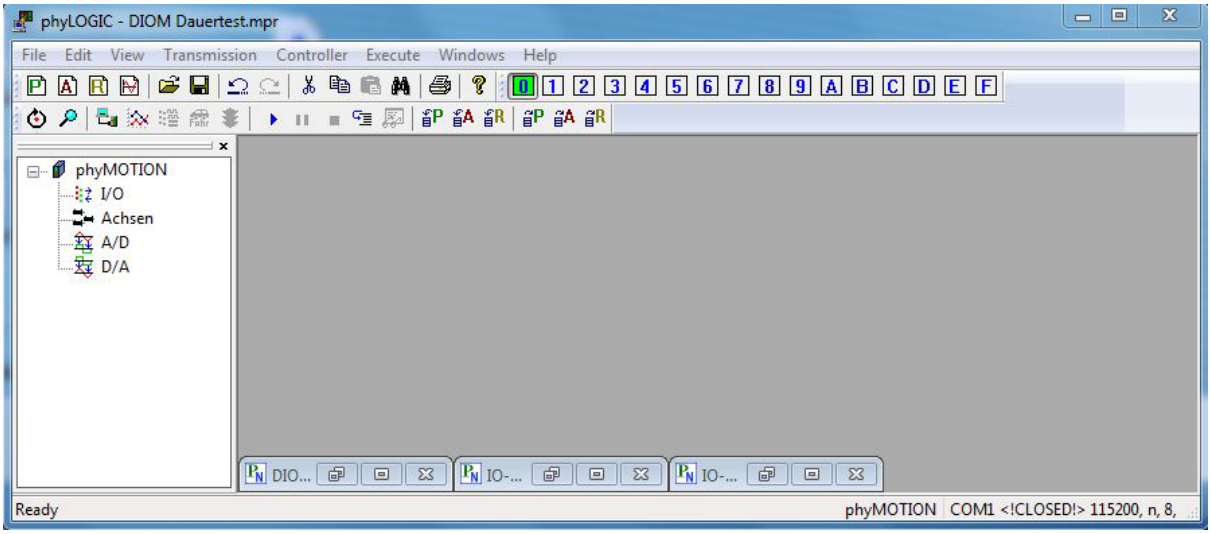


Fig. 7: Window: place symbols

6.4.4 Save/Load Position

The order of the open menu windows (only Direct mode, Operation, IO Monitor, Status monitor and Show position) is saved by click on **Save window position**.

With **Load window position** the saved order is displayed on the desktop.

6.5 Language

Options / Language selects the output of the program dialog in German or English.

6.6 About *phy*LOGIC™ToolBox

Options / About gives important information about the program version of *phy*LOGIC™ToolBox , copyright and phytron's firm data (fig 8)

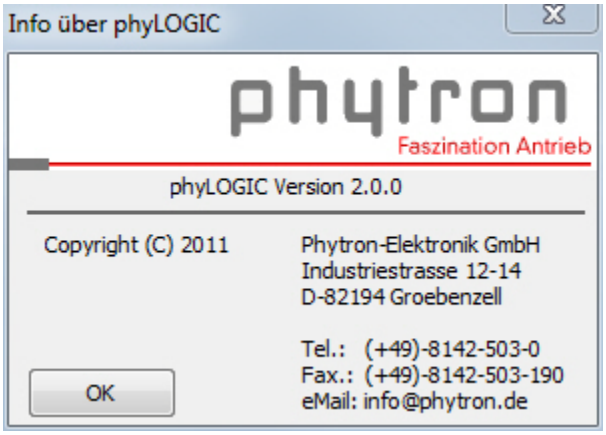


Fig. 8: Information about *phy*LOGIC™ToolBox

7 The Programming (Programs, Registers, Parameters)

The program-, parameter- or register files are created for the controller by a corresponding editor.

File / New submenu selects the editor type, if you want to create a new window on the desktop.

*phy***LOGIC**™ToolBox fixes the names: program editor ‘Programxx.apr’, parameter editor Parameterxx.apa or register editor ‘Registerxx.are’ (xx stands for a number from 1 to 99). The files *.apr, *apa and *are are only temporary. The program asks you for a new file name in order to save the data.
We don’t recommend using ‚Program’, ‚Parameter’ or ‚Register’ as a definitive file name.

The program editor opens and creates programs for the controller (*.apr).
A new program can be created via the icon or the menu **File / New / Program**.

If you use a controller of the MCC, OMC or TMC series, continue to use the familiar Minilog syntax of the corresponding commands.

If you use a *phy***MOTION**™, use the new *phy***LOGIC**™ syntax.

7.1 Program Editor

7.1.1 For MCC and OMC/TMC Controllers

The editor in table form has three columns:

Line number	Program code	Comment

Insert the text in the appropriate cell, an already existing text will be overwritten.

Shortcut	**Meaning**
[ENTER] or left mouse button	Edit the marked cell (edit mode)
[ENTER] in the last program line	Add a new line
[ESC] in the edit mode	Cancel the input
[STRG]+[ENTER]+marked line	Insert a new line above the marked one
[STRG]+[Y]	Delete the marked line
[TAB] or [STRG]+arrow keys or click to another cell	Jump into the next or the selected column

Comment column:
It´s possible to enter several lines in the comment column.
The size of the cell is automatically adapted to the text content.

Shortcut	**Meaning**
[ENTER]	Jump into the next line of the input field
[TAB] or [STRG]+arrow keys or click to another cell	Leave the comment line
[STRG]+[ENTER]	Move the comment one line downwards **Remark:** No program lines are added. If a comment is in the last line it will be deleted!
[STRG]+[Y]	Delete the comment (has no influence to the program)

7.1.2 For *phy*MOTION™ Controller

An editor opens to create the programming texts with the known Windows™ functions (like CTRL C, V, X or Z).

Demo MCM.mpr

```
1.1P14S12000 1.2P14S12000 1.3P14S12000 1.4P14S12000

R2S1
while (R2==1) {

  AG1S255 AG2S15
  1.1R+ T500 1.2R+ T500 1.3R+ T500 1.4R+
  T3000
  A1.1R T1000 A1.1S
  A1.4R T1000 A1.4S
  A1.7R T1000 A1.7S
  A2.2R T1000 A2.2S
  H

  1.1+4800 H 1.2+4800 H 1.3+4800 H 1.4+4800 H
  1.1-4800 H 1.2-4800 H 1.3-4800 H 1.4-4800 H

  T2000

  for (R1S0; R1<10; R1++) {
    1.1+1600
    1.2+1600
    1.3+1600
    1.4+1600 H
  }

  for (R1S0; R1<10; R1++) {
    1.1-1600
    1.2-1600
    1.3-1600
    1.4-1600 H
  }

  R10S1
  AG1S0 AG2S0
  for (R1S0; R1<8; R1++) {
    AG1SR10
    R10BL1
    T100
```

Fig. 9: Program example

7.2 Parameter-Editor

The program editor opens and creates programs for the controller.
A new program can be created via the icon or the menu **File / New / Parameter**.

If you create a new parameter editor window, the parameters for one axis are automatically set using the default parameter file. These values can easily be changed.
A new parameter editor for another axis is created with **Edit / Add Parameter set** or the “right mouse button” in the context menu. The parameter editor can include parameter sets for maximum 8 axes.
Edit / Remove Parameter set or the “right mouse button” in the context menu deletes the parameter set.
The first parameter set (axis 1) can´t be deleted, because minimum one axis must exist.

7.3 Register-Editor

The register editor shows the registers of a controller or an open file.
It is started by the icon or via menu **File / New / Register**. The functionality is similar to the program editor.

Also lines can be inserted or deleted by the shortcuts. Unlike to the program editor only **one** comment line can be inserted.

Important: The editor can create a random number of registers, but the controllers have limited numbers. All registers above the numbers of the controller register are not transmitted.
You´ll find the exact number of your controller registers in the controller´s manual.

7.4 Manage Files

7.4.1 Open

File / Open submenu opens a dialog box to select a file. First, you are asked to select the file type:

*.apr	Program files	Program files on the data medium.
*.apa	Parameter files	Parameter files on the data medium.
*.are	Register files	Register files on the data medium.
*.mcf	Motion Creator files	Motion Creator files on the data medium
*.mpr	Program files	Program file of the *phy***MOTION**™ editor
*.mpm	Parameter files	Parameter file of the *phy***MOTION**™ editor

*phy***LOGIC**™ToolBox selects automatically the right editor during file opening (program, parameter or register).

7.4.2 Save

File / Save stores the data from the active editor window into a file

7.4.3 Save as

File / Save as defines a new file name for the data that is edited in the current editor window, or stores the data with the same file name but into another directory or drive.

7.4.4 Close

The file in the active editor is closed with ***File / Close***. If files aren't saved you will be asked to save them. *phy***LOGIC**™ToolBox remains open.

7.4.5 Print

File / Print opens the specific Windows print submenu where the printer type and the print properties are selected.

7.4.6 Side View

File / Side View shows the print preview.

7.4.7 Print Installation

File / Print Installation enables you to set the different print parameters (e.g. panel-/ landscape format…).

7.4.8 Exit

File / Exit: *phy***LOGIC**^{TM}ToolBox is finished. If there are still unsaved files, you will be asked to save them by *phy***LOGIC**^{TM}ToolBox.

7.5 The *Edit* Menu

The ***Edit*** menu is a program editor to change the open file. The edit functions depend on the file type:

Program and register files	Cut, delete, copy or insert and cancel
Parameter files	Add and delete parameter set.

The ***Search*** menu starts from the top of the text and searches for the input text in program or comment lines. The corresponding word is marked in bold highlighted after a successful search.

If you click on **Search** again, the search of the input text is repeated throughout the program or comment lines. Click on **Replace** to replace the text.

Important:

You can insert program lines in the program editor by pressing STRG **[ENTER]**. To insert comment lines press **[ENTER]**. Quit these lines by pressing TAB.

7.6 Send Files

Transmission / Send opens a submenu with the items Program, Parameters and Registers.

Send program

Transmission / Send / Program transfers complete programs to the connected controller. If a program editor is open, this program will be selected. If no editor is open or no program editor is in the foreground, a dialog box is displayed with the existing programs.

*phy***LOGIC**^{TM}ToolBox asks for the program you want to send and gives a selection list of all stored programs. Select the program by double click on the left mouse button. You will be asked if the program does already exist and you want to overwrite it. If you press ‘yes’, all programs on the controller are overwritten. This instruction can´t be canceled.

Important for controller MCC:
*phy***LOGIC**^{TM}ToolBox receives all programs and deletes the whole controller memory. After that, the programs still required, are remitted to the MCC.
Please avoid to power off the controller or to disconnect the cable during transmission. Danger of data loss!

i	*Every command that is executed in this menu may result in an interface error. In this case, the command canceled with an error message.* *Explanations of the error messages and troubleshooting procedures are listed in Chapter 15.*

Send parameter

Transmission / Send / Parameter overwrites the parameters of the connected controller. The selected parameter files in the parameter editor are transmitted.

Send register

Transmission / Send / Register overwrites the registers of the connected controller. The selected register files in the register editor are transmitted.

During transmission a progress bar will inform you about the actual transmission status.

i	*Every command that is executed in this menu may result in an interface error. In this case, the command canceled with an error message.* *Explanations of the error messages and troubleshooting procedures are listed in Chapter 15.*

7.7 Receive Files

Transmission / Receive opens a submenu with the items Program, Parameters and Registers.

Transmission / Program
*phy***LOGIC**™ToolBox asks you, which program you want to read. Select a program of the controller programs list by click on the left mouse button. The selected programs are received then and displayed in *phy***LOGIC**™ToolBox.
Please note that the programs aren't saved at that moment. *phy***LOGIC**™ToolBox will ask to save them.

Transmission / Parameter
Transmission / Receive / Parameter reads the parameter set out of the controller. Like in Transmission / Program: the parameters are displayed in the editor and can be saved afterwards.

Transmission / Register
Like in Transmission / Receive / Parameter: the received register set are displayed in the editor and can be saved afterwards.

i	*Every command that is executed in this menu may result in an interface error. In this case, the command canceled with an error message.* *Explanations of the error messages and troubleshooting procedures are listed in Chapter 15.*

7.7.1 Delete Files

Transmission / Delete opens a submenu with the items Program and Registers.

Delete program

Transmission / Delete / Program deletes single programs in the connected controller. *phy***LOGIC**^{TM}ToolBox shows a selection list with all programs in the controller memory.

Before the program is really deleted, *phy***LOGIC**^{TM}ToolBox requires **OK**. The program is aborted with **Cancel**.

Important for controller MCC:
*phy***LOGIC**^{TM}ToolBox receives all programs and deletes the whole controller memory. The programs still required are transmitted to the MCC again. Please avoid to power off the controller or to disconnect the cable during transmission. Danger of data loss!

Delete registers

Transmission / Delete / Registers sets all registers in the controller to zero. *phy***LOGIC**^{TM}ToolBox asks for acknowledge before deletion.

CAUTION – Possible damage!

Deleted programs or registers by mistake cannot be recovered.

Delete therefore wisely and cautiously p.

7.8 Autostart Program

Controller/Autostart Program displays a list of programs stored in the controller. A program for the auto start register is selected by mouse click, which is started automatically in the LOCAL mode.

8 Test Program

The ***Execute*** menu helps for tests of the controller's program flow step by step.

The controller's program is started by ***Start*** and runs until it is stopped by ***Stop***. The program begins at the beginning by ***Start***.

The controller's program runs instruction by instruction by ***Single step***. The controller's program can be stopped during run by ***Pause*** and continues running by ***Start*** at the stop position.

The program run is finished by ***Stop***.

	Start the single step mode for controller's program
	Start the controller's program
	Interrupt the controller's program
	Stop the controller's program
	Monitoring: Query of variables in a controller’s program

8.1 Debug (Read Variables)

*phy***LOGIC**™ variables are monitored and displayed during program run by ***Monitoring***.

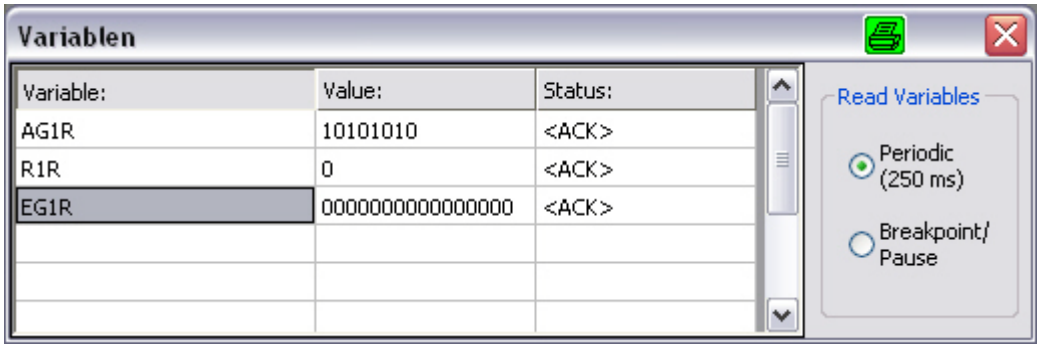


Fig. 10: Defined variables for program flow

Periodic (250 ms): The defined variables are read every 250 msec.

Breakpoint/Pause: The variables are read out at the breakpoints or in the single step mode.

8.2 Break point setting

8.2.1 OMC/TMC and MCC

10 break points can be set to interrupt the controller's program in defined lines. This break point is set by click on the program line number with the mouse. The line number is marked red.

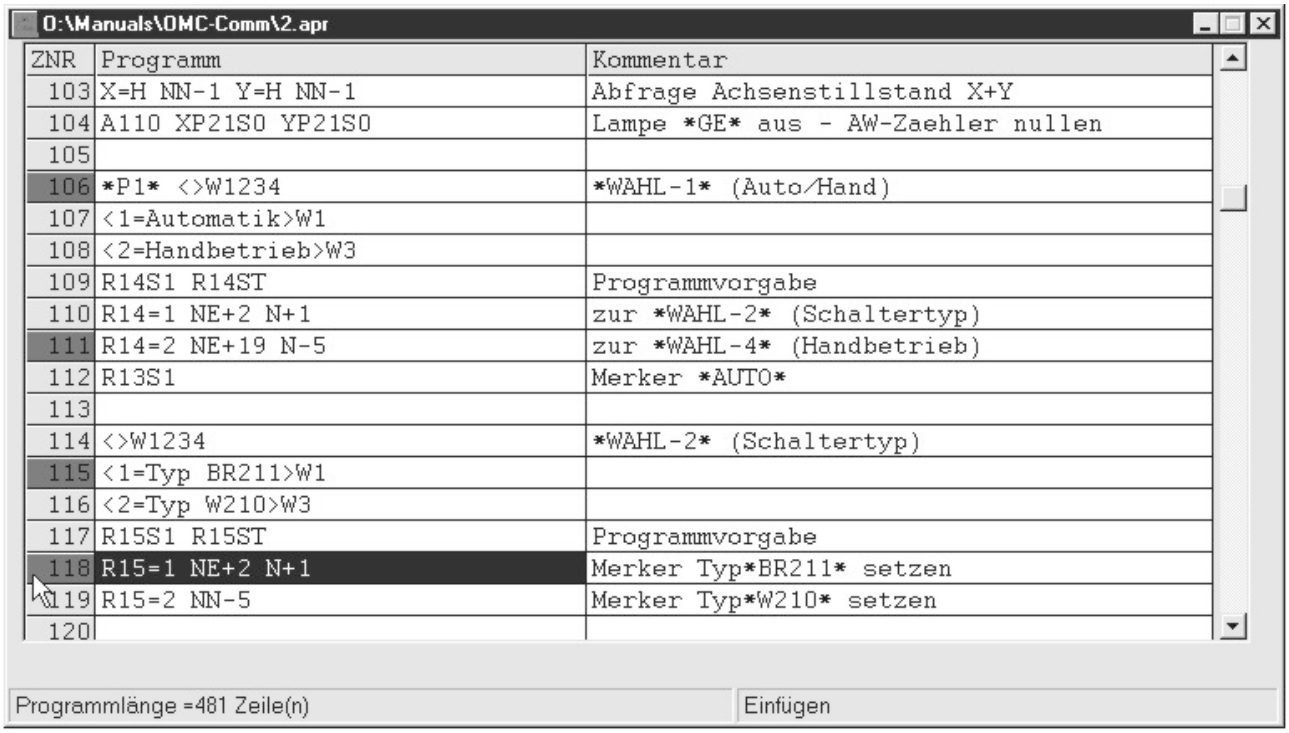


Fig. 11: Break points in lines 106, 111, 115, 118 (only available in German)

8.2.2 *phy*MOTION™

10 break points can be set to interrupt the controller's program in defined lines. This break point is set by click on the program line number with the mouse. The line number is marked red.

Keeps the program at a breakpoint, a blue arrow above the red dot appears.

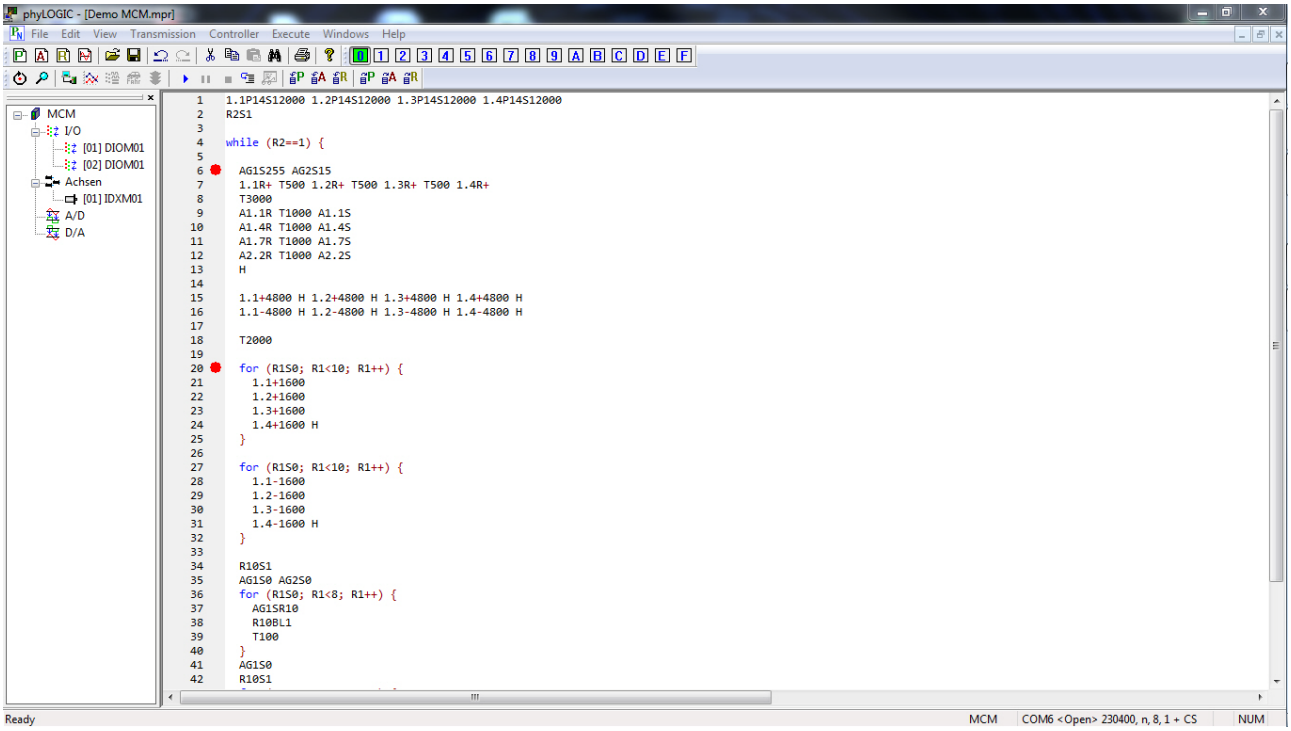


Fig. 12: Breakpoints in the lines 6 and 20

9 Motion Creator (planned for 2013)

The submenu **File / New / Motion Creator** is used to create two-dimensional movement diagrams by drawing lines or circles without any programming effort.

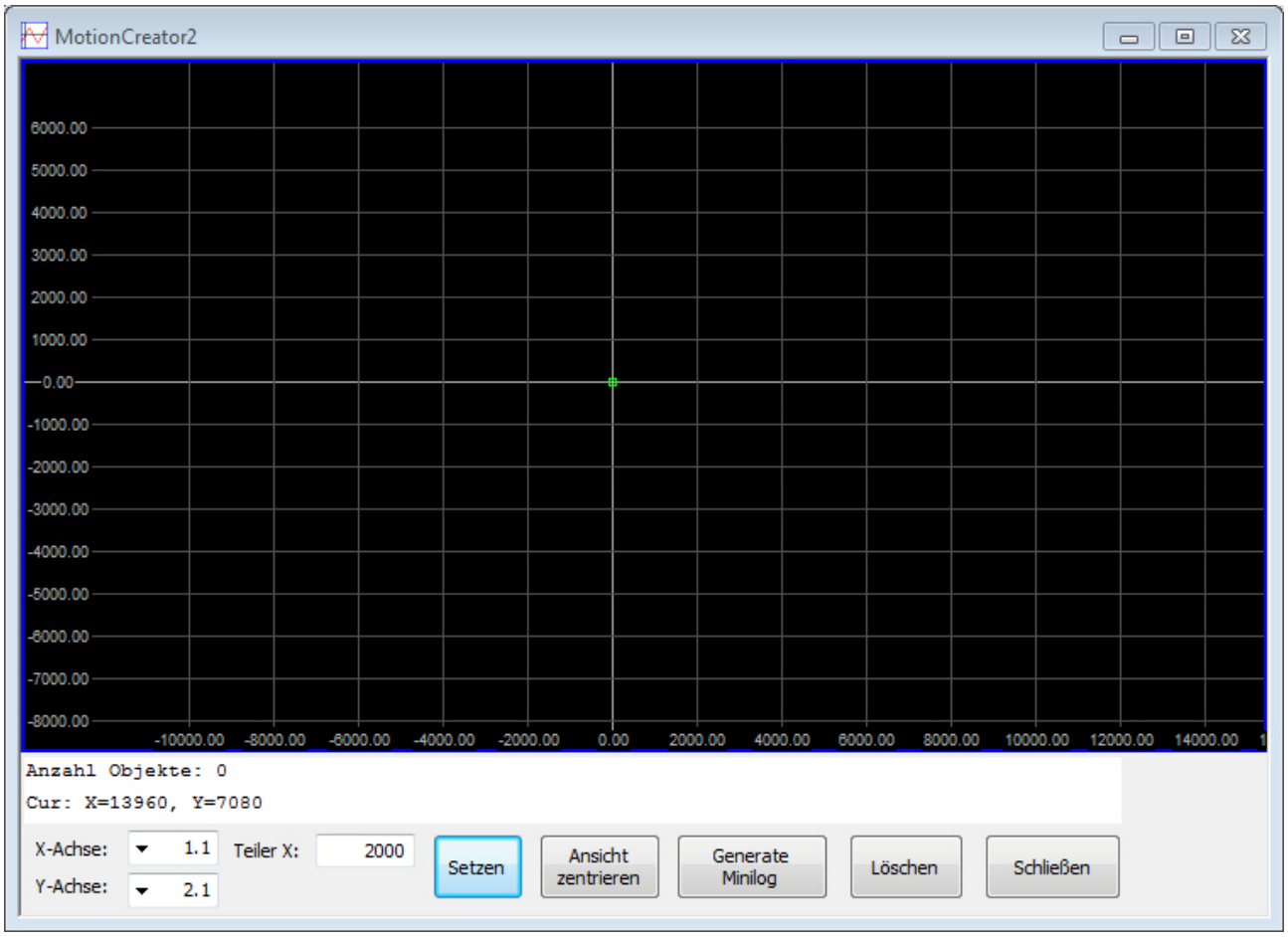


Fig. 13: Motion Creator

The green square shows the present position of the axis. In the example above the counter of the x and the y axis is zero. This is the bench mark of the first drawing function.

Function of the buttons:

	Assignment of the X- or. Y-axis. In the example: X-axis is assigned to axis 1 of the module 1; y-axis is assigned to axis 1 of the module 2.
	The X axis is divided into grid points with the specified value. The divisor for the Y axis is calculated automatically by ½ X. E. g.: if the divisor X=1000, the graticule of the Y axis is 500 (see also Fig. 4).
	The changes entered at divisor X are accepted and shown.
	X and Y zero lines are centered for the view.
	The *phy***LOGIC**™ code is generated from the graphic. An editor opens, where the code can be edited, stored and transmitted to a controller.
	The total graphics are deleted!
	The window is closed. If the graphics have been changed, you are asked for saving.

9.1 Functions of the Motion Creator

The Motion Creator has the following functions in the ***Draw*** menu:

Icon	Function	Meaning
	Selection	Choose an object (line, segment).
	Zoom	Zoom the desktop.
	Move	Move the desktop.
	Draw line	Draw a line from the last data point to the mouse cursor.
	Draw CW curve	Draw a 90° segment clockwise, which can be parameterized afterwards.
	Draw CCW curve	Draw a 90° segment counterclockwise, which can be parameterized afterwards.
	Insert line	Insert a line in a present object.
	Insert CW curve	Insert a curve (90° segment) clockwise, which can be parameterized.
	Insert CCW curve	Insert a curve (90° segment) counterclockwise, which can be parameterized.

9.1.1 Drawing and Manipulating Objects

Select the suitable object via special toolbar for object drawing. Different functions are available dependent of the controller (see controller manual).

The beginning of a curve/line is marked by a green, the end by a red cross. This indicates the driving direction (from green to red), in which the curve/line is traced by the controller.

All circular motions have the following definition:

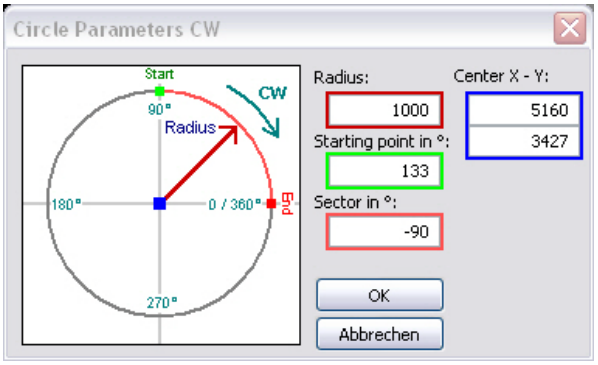


Fig. 14: clockwise (CW)

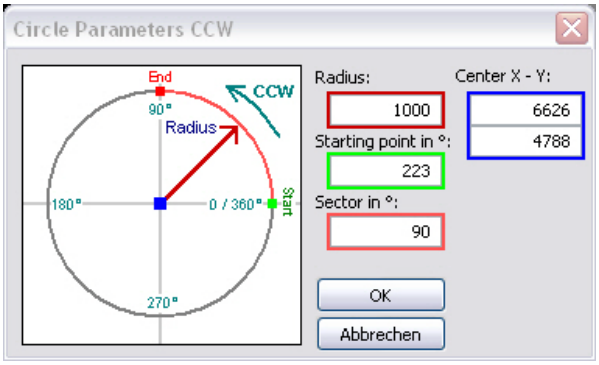
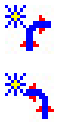


Fig. 15: counter clockwise (CCW)

	This function marks the object by clicking the object (line or circle). Different functions are available: - move an object, - insert new objects at the starting and final point, - parameterise the object with a double click on the object and start the parameter dialog. Different dialogs are opened dependent on the object (line or circle).
	You can draw a line from the final point of the last object up to the mouse cursor by clicking the left mouse button. Releasing the mouse button creates the object. Holding the mouse button can move the final point of the line to a determined position.
	This button creates a 90° segment which is driven clockwise. The radius of the segment has the default value of the Y scale. The starting point of the circle depends on the previous object.
	A 90° segment counterclockwise is created, see above.
	A line at the starting or final point of a circle or split up a line is inserted. <u>Procedure:</u> Mark the object to be inserted. **Insert a line to a circle:** click on the start or end of the marked circle. **Split up a line:** mark the line and click to the point, where the new line starts. The old line is splitted up and the red marker can be moved by the mouse.

	Insert a 90° segment by selecting one of these buttons. Procedure: Mark the object, where the circle should be added. A click on or and on the start or limit mark of the object inserts a 90° segment.
Delete single objects	Mark the object. The button **[Remove]** deletes the selected object. The starting point of the followed object is the final point of the previous object. The selected object is deleted from the internal object table of the program.

9.1.2 Parameter Line

Double click to a line opens this dialog:

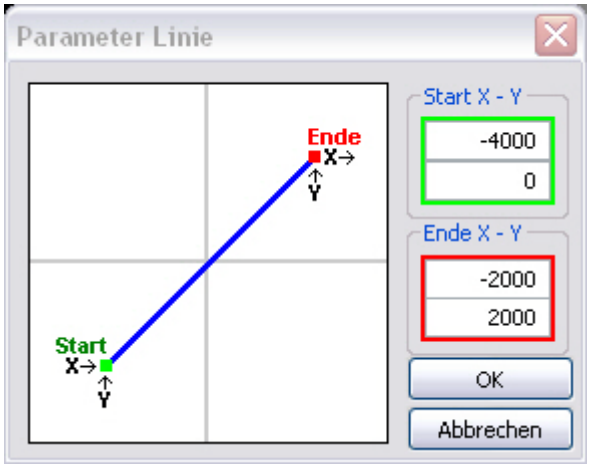


Fig. 16: X- and Y-parameter of a line

You can enter the X and Y parameters of a line – start and end position – by hand for accurate positioning.

9.1.3 Parameter Circle

This dialog is used to position all circle parameters like radius, sector, starting point and center.
If a circle object is inserted, only a 90° segment with defined start, center and end point is created.

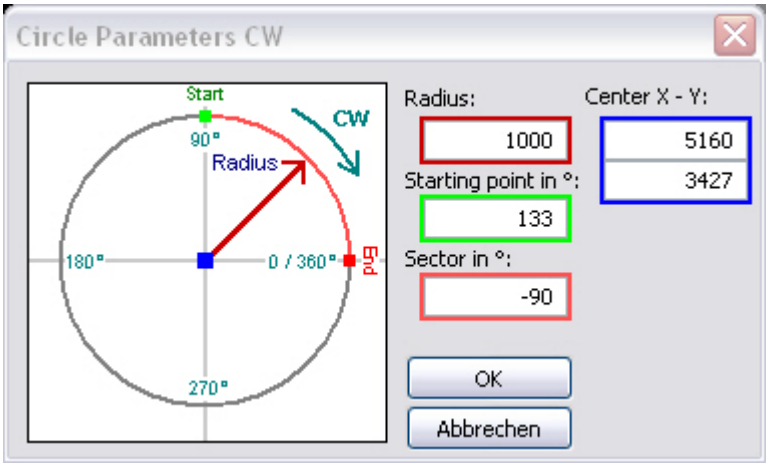


Fig. 17: Setting of all circle parameters

Shift the circle by:

- Click on the middle marker. Notice that all previous and followed circles are moved, which are directly cohered.
- Insert a new center point.

Also you can specify the sector, the radius and the starting point.

9.1.4 Desktop Functions

	The zoom function changes the scale and the position of the desktop. The range of the desktop can be increased by click and drag. A larger scale can be specified in the **text field divisor**. The **Center View** button centers the zero line of the drawing area.
	Move the desktop by mouse click and drag. This is useful, if the drawing figure is too large for the desktop. The **Center View** button centers the zero line.

9.1.5 Example

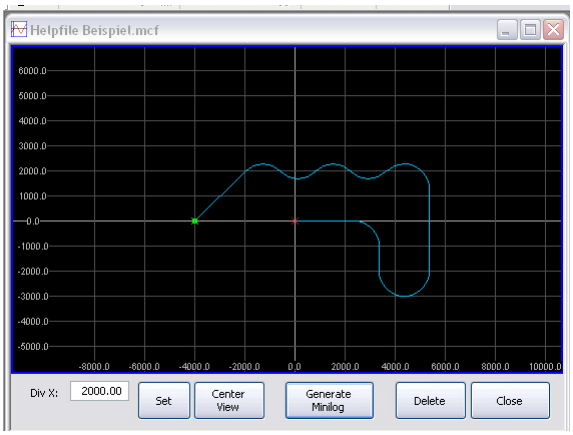


Fig. 18: A figure ´drawn´ by the Motion Creator (way)

The marked segment shows the three marking points of a circle: start, end and center

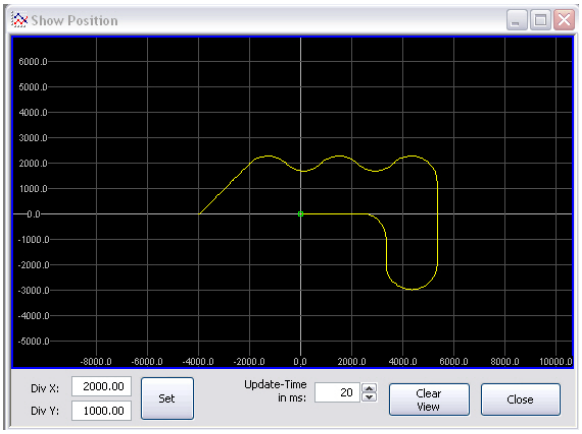


Fig. 19: Retraced figure in the Show Position (way)

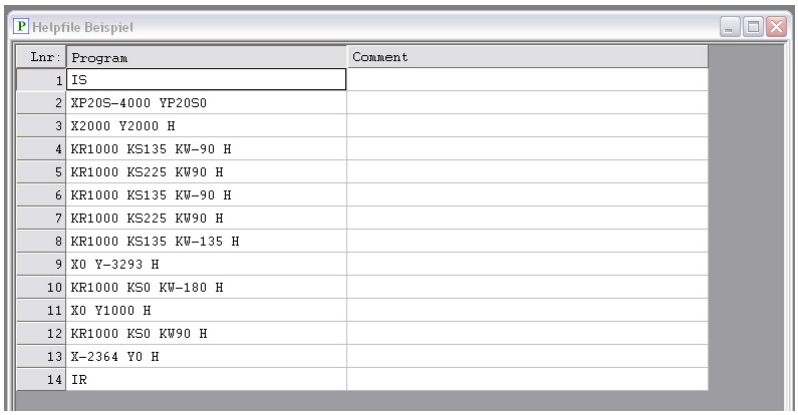


Fig. 20: The generated *phy*LOGIC™-Code

9.2 Show Position

Transmission / Show Position opens a window where the current X-Y position of the figure (yellow line) is displayed:

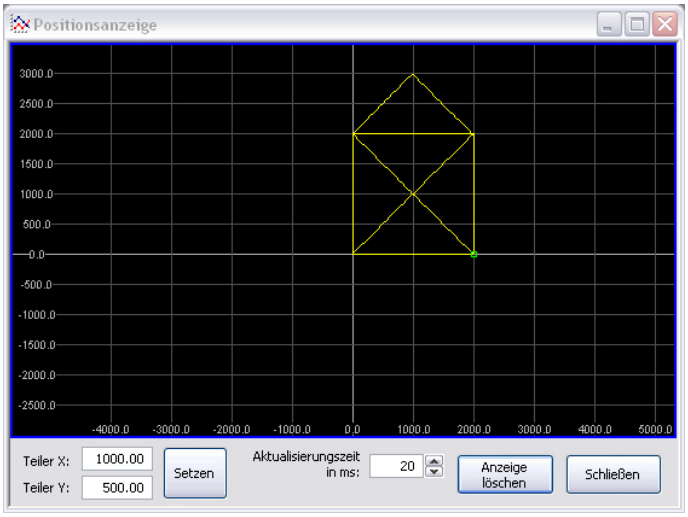


Fig. 21: Show Position

Function of the buttons:

X-Achse: 1.1 Y-Achse: 2.1	Assignment of the X- or. Y-axis. In the example: X-axis is assigned to axis 1 of the module 1; y-axis is assigned to axis 1 of the module 2.
Div X: 1000.00	The X axis is divided into grid points with the specified value.
Div Y: 500.00	Usually the divisor of the Y axis is computed as ½ X (see also Fig.19). Other conversion factors can also be specified by hand.
Set	The changes entered at divisor X are accepted and shown.
Update-Time in ms: 150	Indicates the period the position is read in. The smaller the update-time the more detailed is the screen display.
Clear View	Deletes the screen display!
Close	The window is closed. If the graphic has been changed, you are asked for saving.

10 How to manage the stepper motor controller

10.1 Controller Type

Options / Controller type selects the type of the connected controller. The MCC, OMC/TMC and *phy***MOTION**™ controller types are available. The *phy***LOGIC**™ software is continually adapted to new phytron controller types, which are also programmed in *phy***LOGIC**™ language.

10.2 Search Controller

Search Controller searches the connected controller. The COM port which is set in the interface parameters is scanned in all addresses and adjustable baud rates. If a controller is found, the COM port, baud rate and version are displayed. If no controller is found, an error message follows. A progress bar informs about the search progress. The search can be interrupted by **Cancel**.

10.3 Reset

Reset resets the controller.

Attention: This menu item has the same function as Reset push-button on the controller. Running programs are interrupted and all outputs are reset.

If the controller is in Local mode, the program starts in line 1, which is entered in the auto start register.

10.4 Firmware Information

This submenu reads the firmware version of the controller (OMC/TMC and MCC) and displays it.

You'll receive the firmware versions of the controller *phy***MOTION**™'s module by double click on ‚*phy***MOTION**' in the TreeView. By clicking on the button ‚Save version information you'll save the information as txt-file and open it with an editor for reading.

10.5 Firmware Update

This dialog is only available, if no other window is open. The ***Controller/ Firmware Update*** menu makes is possible to update the firmware in the controller.

Important: There are different firmware files for the controllers OMC/TMC or MCC. The update of a wrong file makes the controller inoperable! Please check the right selected files before the update.

Important: Save all controller files like programs, parameters and registers before the update.

The **Control lamp** shows the state of update:

Control lamp	Display	Status
●	???	no action
●	deleted	Firmware or system deleted
●	OK!	Successful firmware update
●	Error	Error during Update

The update of a wrong file makes the controller inoperable!

10.5.1 Controller MCC

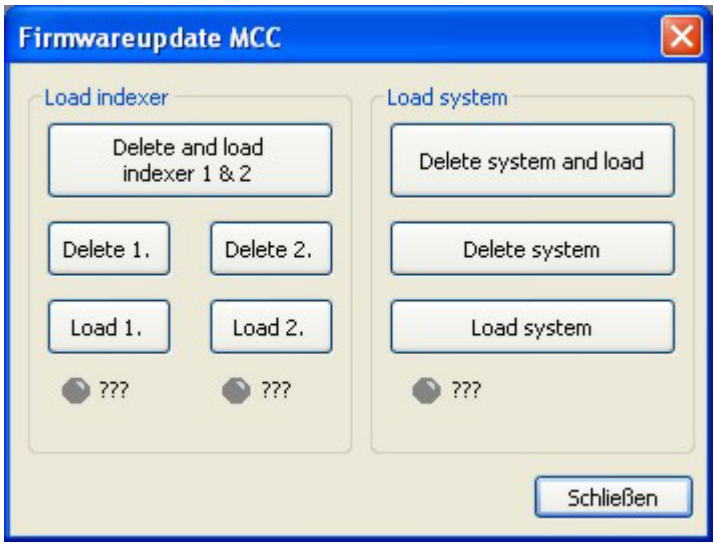


Fig. 22: Firmware update MCC menu

Load Indexer:

The controller MCC offers the possibility to update both the indexer and the system of the controller. There are two different files: IndexerVX.hex for indexer and MCC_System_VX.hex for system files.

Click on **Delete and load indexer 1&2** to load the indexer firmware. A dialog is opened to select the file for loading. Select the IndexerVX.hex and acknowledge by **OK**. First, the software on the controller is deleted. After that, you are asked to press the Reset push-button on the controller.

Important: Acknowledge this message only after the reset push-button has been pressed! After that the upload of the new firmware starts. The update takes a few minutes, a progress bar informs about the actual state.

Click on **Delete 1.** and on **Load 1.** to delete and update the indexer firmware for axis 1, click on **Delete 2.** and on **Load 2.** to delete and update for axis 2.

Load System allows deleting and loading the system software of the controller. The system update procedure is like the indexer or BIOS update. After click on **Delete system and load** the firmware file can be selected. Then the controller upload begins. A progress bar informs about the actual state.

Important: Please avoid to power off the controller or to disconnect the cable during the controller update. Danger of data loss!

10.5.2 *phy*MOTION™ Controller

The firmware of the modules in the *phy***MOTION**™ controller can be updated.

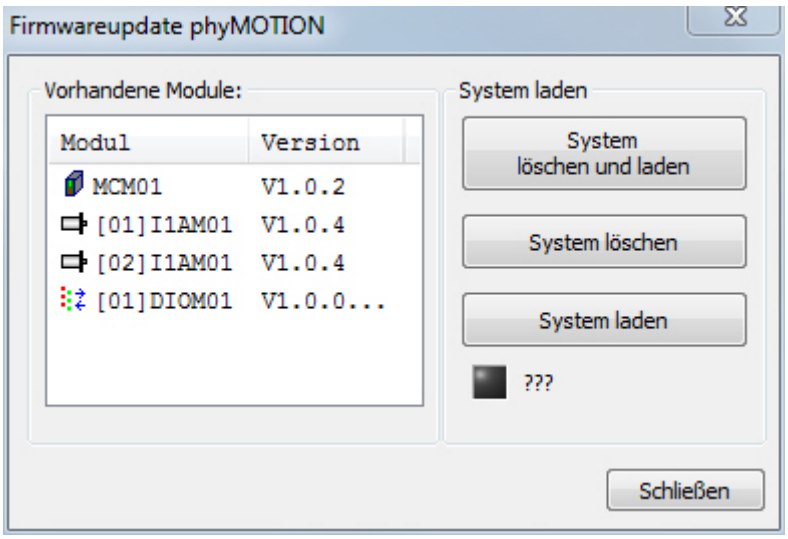


Fig. 23: Window: Firmware update *phy***MOTION**™

Select the module by clicking on the corresponding module (blue mark).

Press **Delete BIOS and load**. The dialog for file selection opens. Then the controller upload begins. A progress bar informs about the BIOS file transmission.

Important:

- Pay attention to the correct baud rate observed!
- Please avoid to power off the controller or to disconnect the cable during the controller update. Danger of data loss!
- If there isn't any system, the MCM module is found nevertheless → wait for the timeout → select the module and reload

10.5.3 OMC/TMC Controller

The BIOS of the controller OMC/TMC can be updated.

Important: After the update the system is deleted on the controller. Please make sure that a system file exists for the controller which has to be loaded after the BIOS update.

Important: The BIOS file can only be loaded via interface X9 on the controller.

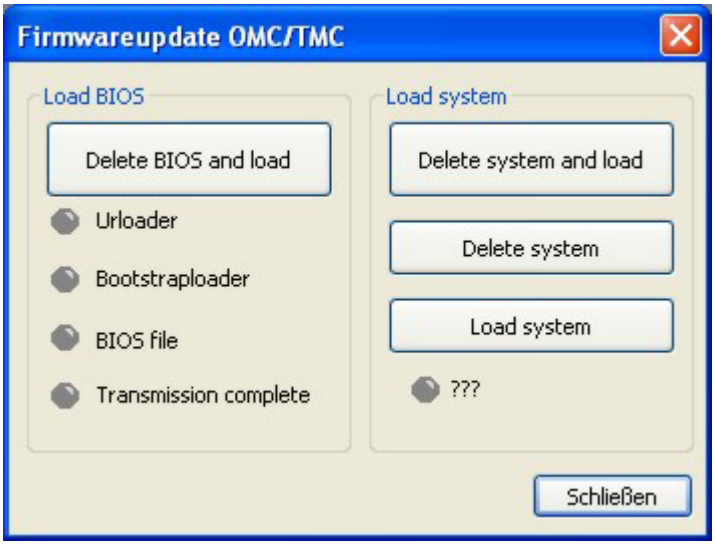


Fig. 24: Firmware update OMC/TMC menu

Before the new BIOS file can be loaded to the controller, the controller processor **must** be switched to the **Loader Mode**.

The following order should be observed:

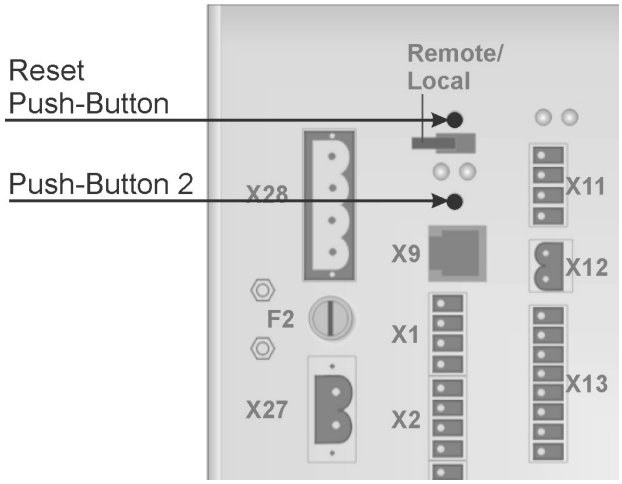


Fig. 25: The OMC/TMC push-buttons

- First press **and** keep push-button 2 above the interface X9.
- Then press and release the reset push-button (above the R/L switch).

- Only now release push-button 2.
- Afterwards press **Delete BIOS and load**. The dialog for file selection opens.
- Select the new BIOS file to transmit to the controller.
  Important: The update of a wrong firmware file makes the controller inoperable! However, the right BIOS file can be reloaded anytime.
- The control lamps show the update progress: ‚Urloader', ‚Bootstraploader', ‚BIOS file', ‚Transmission complete' shine one after another. A progress bar informs about the BIOS file transmission. If all control lamps shine green, the update is successfully finished. If one of the control lamps shines red, the upload has failed. In this case repeat the steps above after a file and interface cable check.
- Continue the update after a successful BIOS update by **Load System**.

Load System allows deleting and loading the system software of the controller. The system update procedure is like the indexer or BIOS update. After click on **Delete system and load** the firmware file can be selected. Then the controller upload begins. A progress bar informs about the actual state.

Important: Please avoid to power off the controller or to disconnect the cable during the controller update. Danger of data loss!

10.6 Password

In this submenu a password protection for the all controller types access can be set:

- **Send PW**: Enable controller by initialization without a password input or with the password already defined
- Select program, parameter or register by ✔ and **Set Enable**.
- Set/change password by password input and clicking on **Change PW**.
- **Delete PW**: Delete the password.

Control lamp	Controller **disabled**	Access enabled with correct password	Access refused, because no or a wrong password was entered.

The password protection is activated by a RESET or a controller's switching on/off.

Fig. 26: Initial state

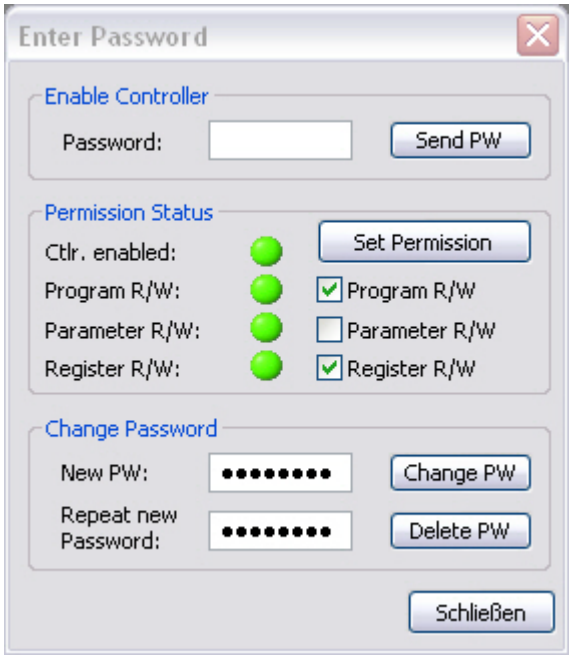


Fig. 27: Password enabled

11 Function ‚Axes‘

The following windows are used for current setting and driving the connected motors:

- Testing the interface and
- Monitoring of the controller status.

Only for the *phy***MOTION**™ controller:

The axis window opens by double clicking in the TreeView (s. chap. 6) on the required axis module: Operation/Current setting/Status.

11.1 Direct Mode

i	**Command reference**	The commands for MCC or OMC/TMC insignificantly differ from the commands for the *phy***MOTION**™. Consider the command and parameter reference of the corresponding device.

Transmission / Direct Mode opens a dialog box which allows sending instructions directly to the stepper motor controller. *phy***LOGIC**™ToolBox automatically generates the complete protocol.

Select first the input box to send an instruction to the controller. Now enter the *phy***LOGIC** instruction, *e.g.* 1.1*P14R, which means: read parameter 14 from the first module axis*, see below:

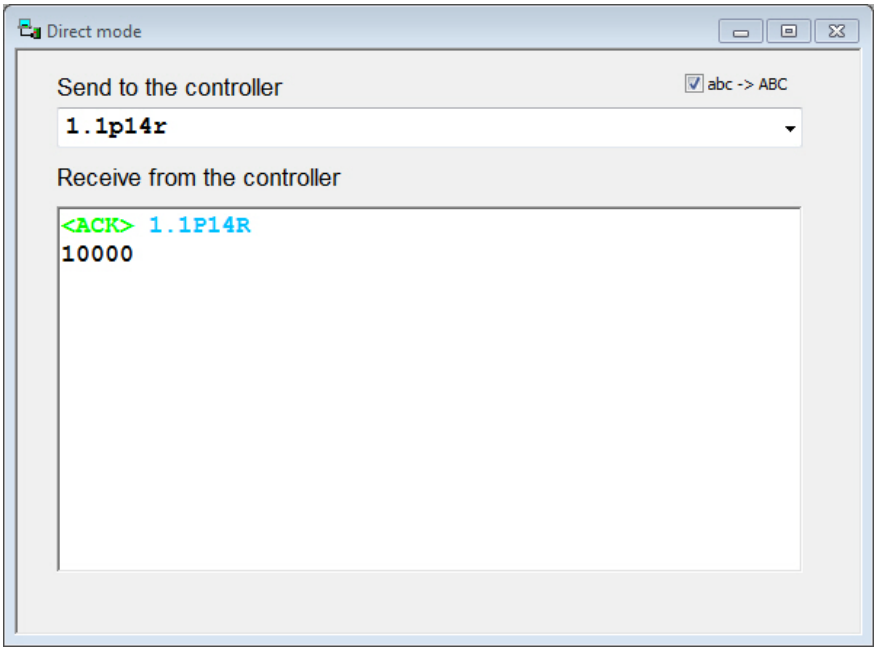


Fig. 28: Direct mode

The instruction is sent to the controller by pressing the **[ENTER]**-key.

The controller answer is shown in the response box, e.g. *<ACK> 1.1P14R* 10000: the value of the parameter 14 of module axis 1 is 10000.

A history list of used instructions can be opened by the Dropdown key **[9]**

Remark:

Phytron controller's answer is a <NAK> if an invalid instruction is used.

Nearly all ***phy*LOGIC** instructions can be written without consideration of the capital and small letters. The button abc --> ABC shifts the instruction.

Important:
In case of or-logic operations (e. g. Ev011) and d0 or d1 display instructions click on button Abc --> Abc to keep the capital and small letters.

11.2 Operation

11.2.1 MCC and OMC/TMC

Transmission / Operation opens the window to move the motor directly by mouse click:

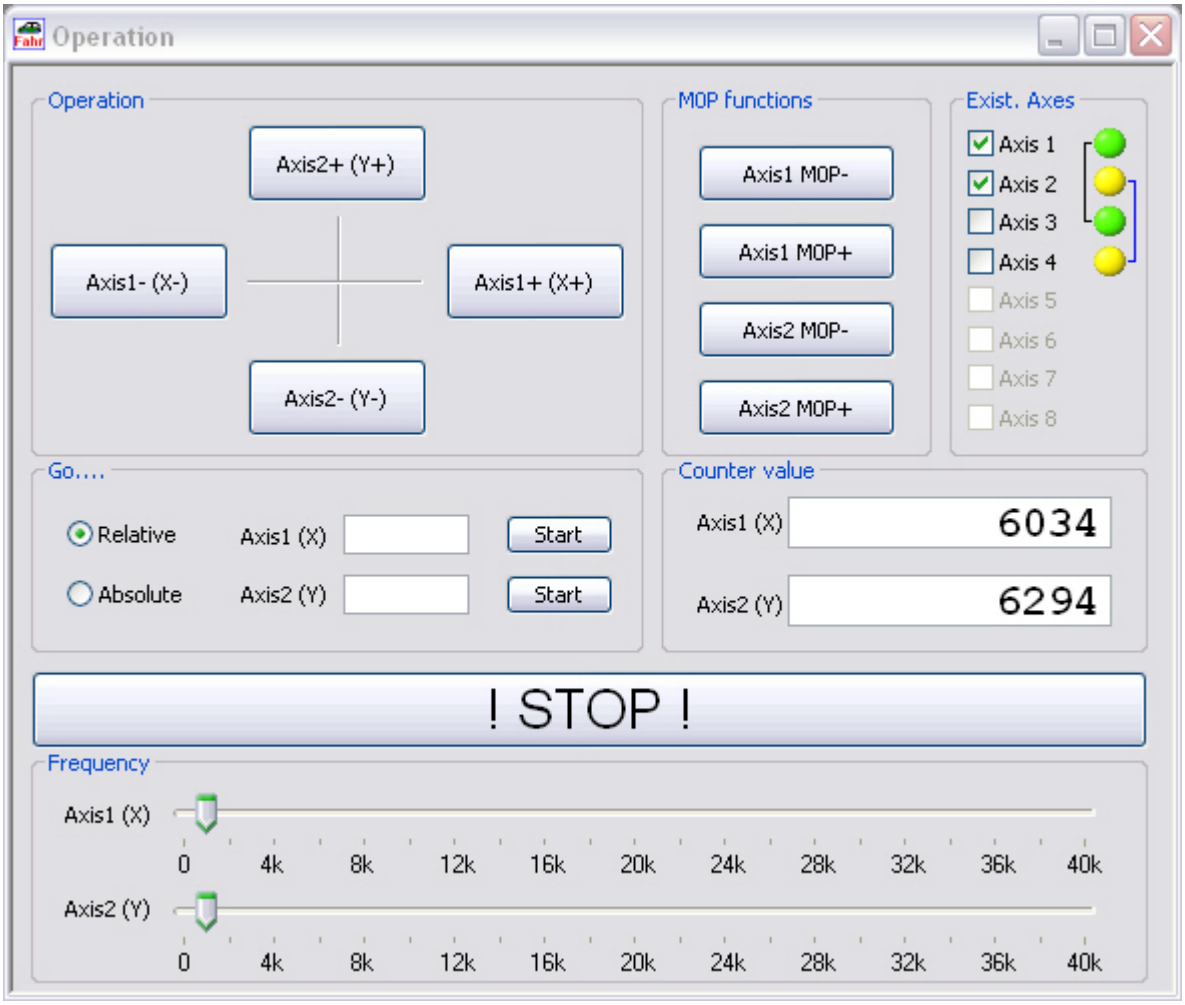


Fig. 29: Operation: MCC or OMC/TMC

Simply click on **Axis1–** to **Axis2+**. Direction+ means clockwise movement, seen onto the motor axis from outside.

Drive instructions for both axes can be entered in **Go….**.
The symbol + or – before the entered number of steps defines the direction.
Go Relative: move from the actual position by x-counter values.
Go Absolute: the input counter value is referred to the zero point.

The instruction will be executed by click on **Start**. The movement is stopped by **! STOP !** if required.

The drive frequencies of both motors can be changed by two slider controls at the bottom of the window. The frequency can be set from 1 to 40000 Hz in 100 Hz steps.

Each axis can be initialized by **Axis1 M0P–** to **Axis2 M0P+** and stopped by **! STOP !**.

The connected axes are displayed in **Exist. Axes**. up to 2 axes can be selected to move.

In **Exist. Axes** you can implement a so-called "electrical wave" by the „LEDS“ among the existing axes selection. This means that two or more axes can be driven quasi parallel by clicking on **Axis Z +/–** or by an input of a range.

In fig.15 you can see the link of axes 1 with 3 and 2 with 4 as an example. Naturally three and more axes can be interconnected with one another, too.

Function:

First, the axes which are to run with one another must be selected by clicking on the respective LEDs of the axes. Simple click marks green, double click yellow.

All green and all yellow axes drive together, i.e. by clicking on **Axis1+** the axes drive into positive direction.

By clicking on **Axis 4+** the axes 3 and 4 drive into positive direction.

By clicking on the LEDs again the allocation is canceled, the LEDs now are grey.

11.2.2 *phy*MOTION™

The axis window opens by double clicking in the TreeView (s. chap. 6) on the required axis module: **Operation**/Current setting/Status:

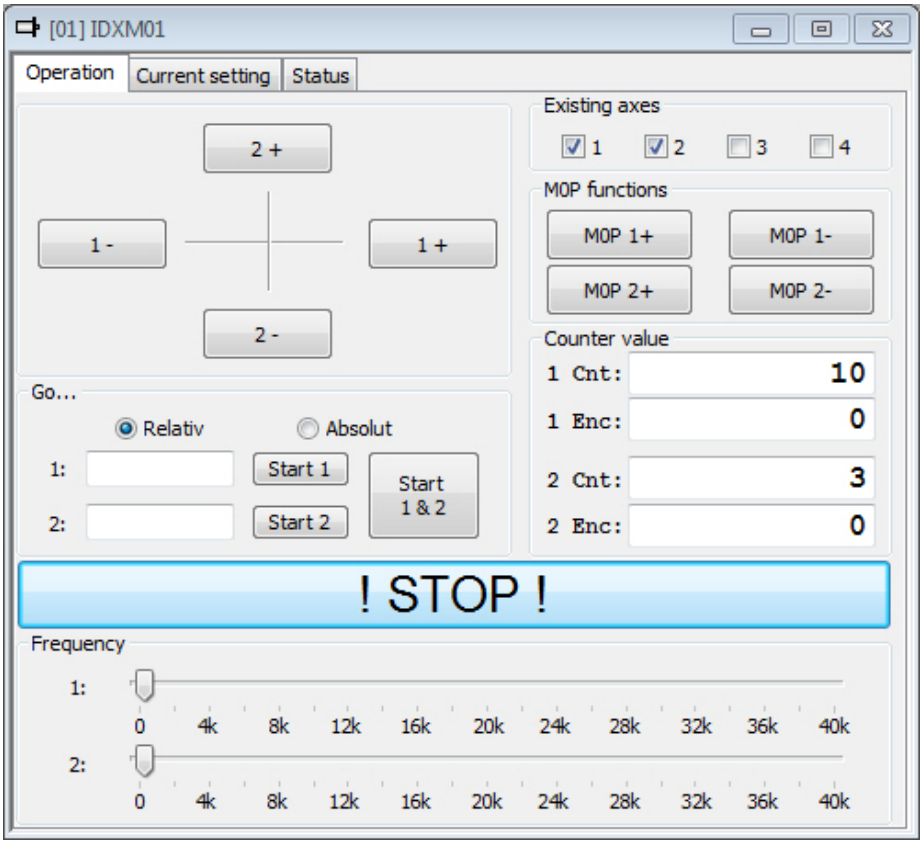


Fig. 30: Operation *phy*MOTION™

Select two axes on **Exist. Axes**:

Simply click on **1–** to **2+** Direction + means clockwise movement, seen onto the motor axis from outside.

Drive instructions for both axes can be entered in **Go….**
The symbol + or – before the entered number of steps defines the direction.
Go Relative: move from the actual position by x-counter values.
Go Absolute: the input counter value is referred to the zero point.

The instruction will be executed by click on **Start x&y**. The movement is stopped by **! STOP !** if required.

The drive frequencies of both motors can be changed by two slider controls at the bottom of the window. The frequency can be set from 1 to 40000 Hz in 100 Hz steps.

Each axis can be initialized by **M0P 1–** to **M0P 2+** and stopped by **! STOP !**.

11.3 Current Settings

11.3.1 OMC/TMC and MCC

The submenu ***Controller / Current settings*** opens the current setting.

***phy*MOTION™:** The axis window opens by double clicking in the TreeView (s. chap. 6) on the required axis module: Operation/**Current setting**/Status.

Here you can set some axis parameter values like stop current, run current and boost current also step resolution and current delay time of the selected axis.

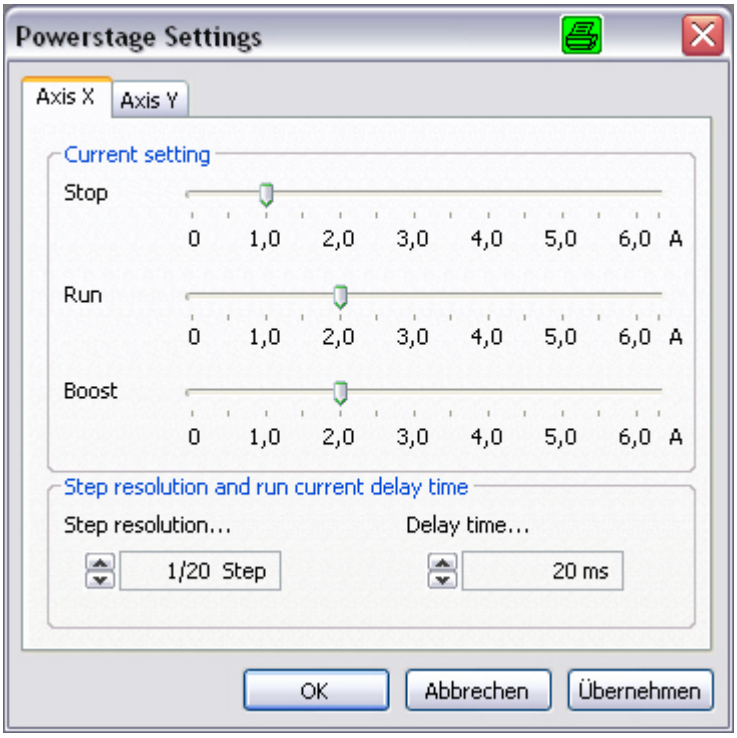


Fig. 31: Current settings OMC/TMC and MCC

The dialog accesses the controller parameters. Changes can be received and saved by a parameter editor.

Important: Please check the motor plate for the current setting!

Axis X, Axis Y changes between the two existing axes.

11.3.2 *phy*MOTION™

The axis window opens by double clicking in the TreeView (s. chap. 6) on the required axis module: Operation/**Current setting**/Status:

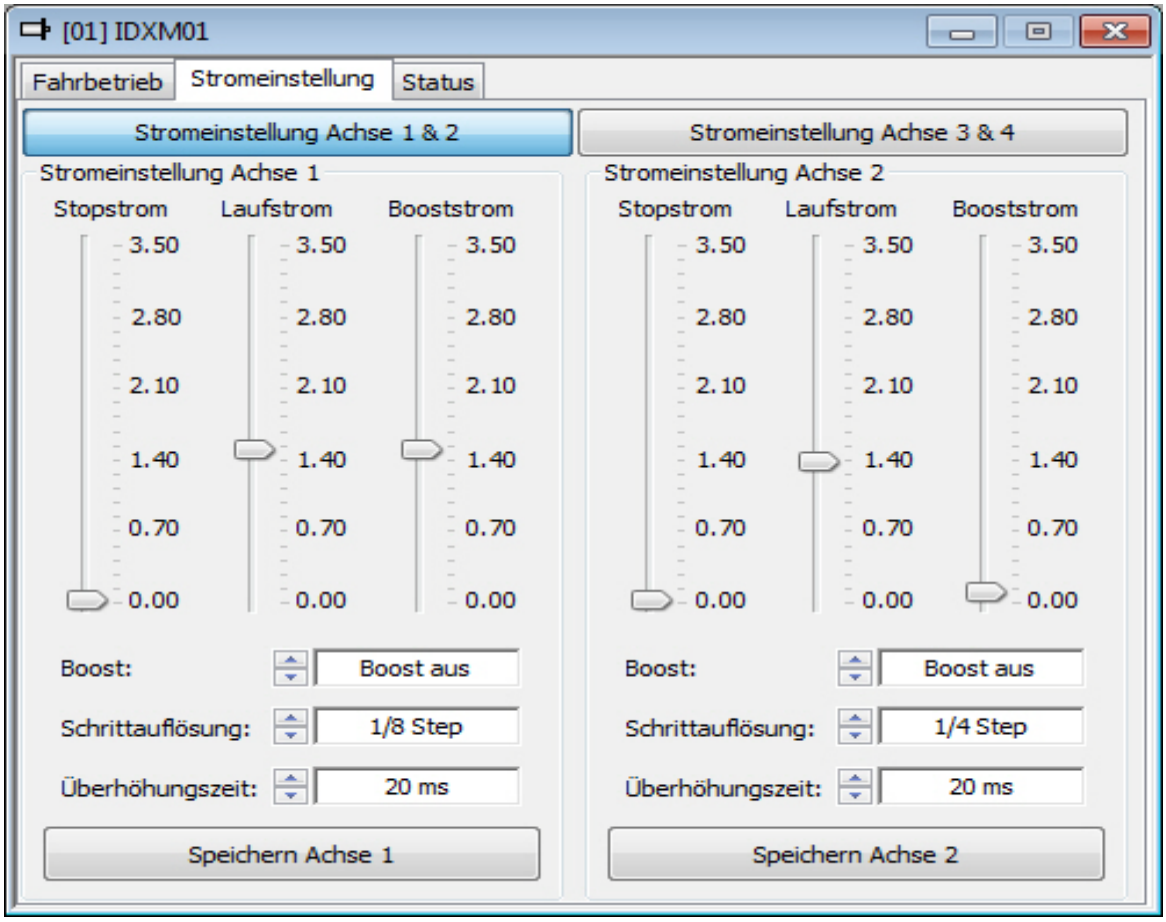


Fig. 32: Current settings *phy*MOTION™

The buttons **‚Current setting Axes 1&2 or Axes 3&4'**changes between two axes of the axis module.

12 Function ‚Monitoring‘

12.1 I/O-Monitor

Transmission / IO Monitor tests the inputs and outputs. IO-Monitor differs between the controllers MCC and OMC/TMC:

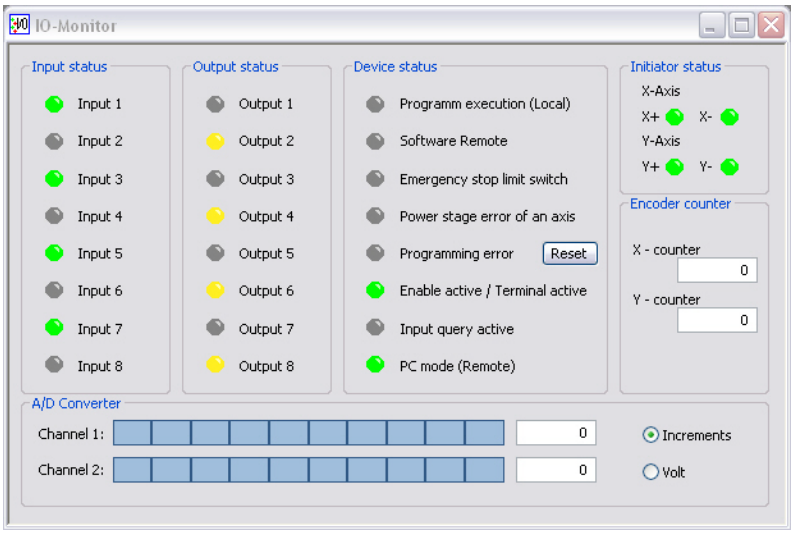


Fig. 33: IO-Monitor for MCC

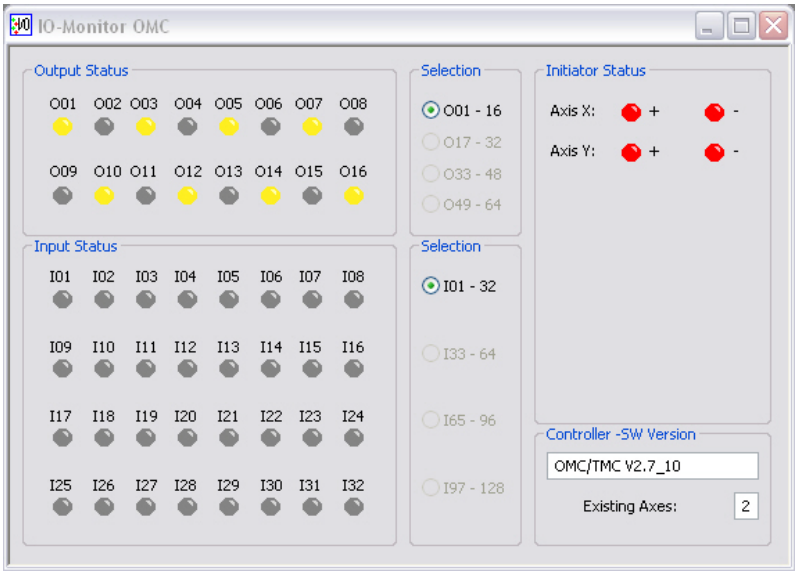


Fig. 34: IO-Monitor for OMC/TMC

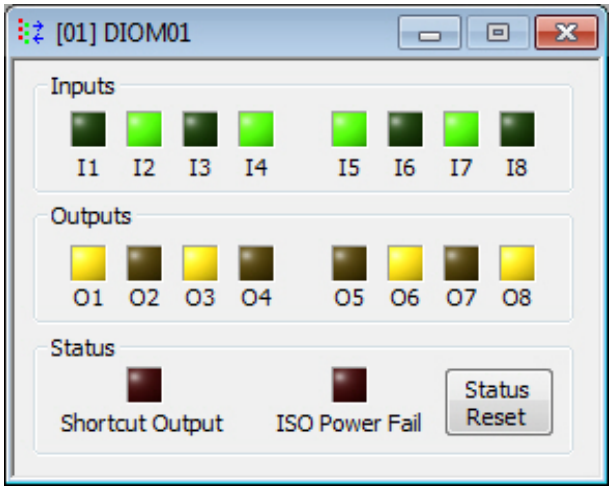


Fig. 35: IO-Monitor for *phy***MOTION**™

Status Reset	Reset of the I/O status

Input status shows the controller's inputs:

LED green	Input activated
LED grey	Input deactivated

Output status shows the energized controller's outputs:

LED yellow	Output energized
LED grey	Output reset

The output state can be changed by click on one of the output LED.

Device status shows the controller's state:

- **Program execution (Local):** The controller executes a saved program. Either the controller is in Local mode or the program is started by an interface instruction.
- **Software Remote**: The controller has been set to the Remote mode by the instruction "IFR". The controller should be changed by the instruction "IFR" to operate the program start by the Remote/Local switch.

- **Emergency stop limit switch of an axis:** The limit switch of an axis is activated. You can get more information about activated limit switches in the IO-Monitor menu (Initiator status) (see chap. 5.6.7).
- **Power stage error of an axis:** The power stage of an axis has got an error, which can be e.g. over temperature, phase short circuit, under or over voltage.
- **Programming error:** An entered instruction was inoperative. The error can be reset by click on **Reset**.
- **Enable active (Power stage activated):** The controller's Enable input is wired, the power stages are activated.
- **Input query active:** The controller is in program flow and waits for an input. Instruction in program e.g.: E01S
- **PC mode (Remote):** The controller is in PC mode (switch setting Remote). The controller can be in PC mode at the same time and anyway, the status ‚Program execution' can be set. In this case the program has been started by the interface.

Initiator status shows the state on the controller's limit switch inputs:

LED green	Initiator is not activated
LED red	Initiator is activated

Encoder counter shows the parameter 22 (count parameter of the encoder input).

A/D Converter displays the state of the controller's A/D converter inputs. The display can be changed between increments (0 –1023, 10Bit A/D converter) or Volt (the voltage of the A/D converter input).

Selection selects an approximate range of the inputs or outputs, which depends on the number of connected device addresses.

Controller software version shows the software version of the controller.

Existing Axes displays the number of axes connected to the controller.

12.2 MCC or OMC/TMC: Status Monitor

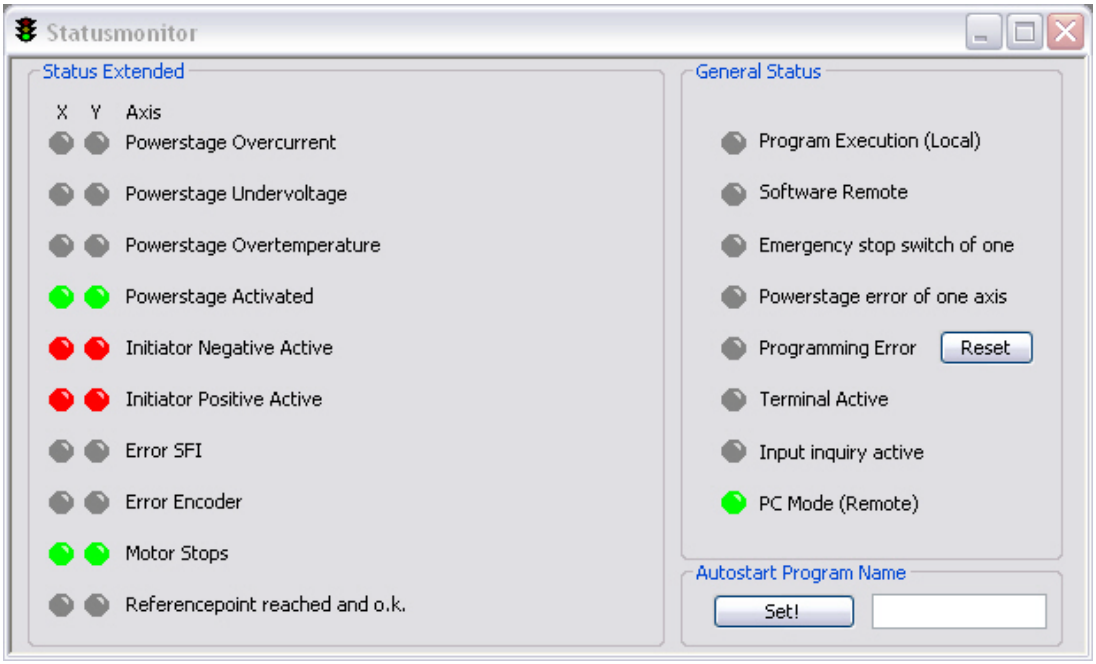


Fig. 36: Status Monitor

General Status describes the general controller states. **Advanced Status** displays other controller states of the corresponding axis (axis 1 to 8).

Auto start program name shows the program name, which starts automatically after change-over the Local/Remote switch. The program name is stored in auto start of the controller by Set!.

Colour	State of the inputs	Initiator status
●	not active or not available	Initiator not available
●	active or OK	Initiator free
●	----------	Initiator activated

Remark: Only these I/O groups, which are supplied, are detected by *phy***LOGIC**™ToolBox!

Important: The menu *Options* is only available, if no other window is open.

12.3 *phy*MOTION™

12.3.1 Controller Status

The axis window opens by double clicking in the TreeView (s. chap. 6) on the required axis module: Operation/Current setting/**Status**:

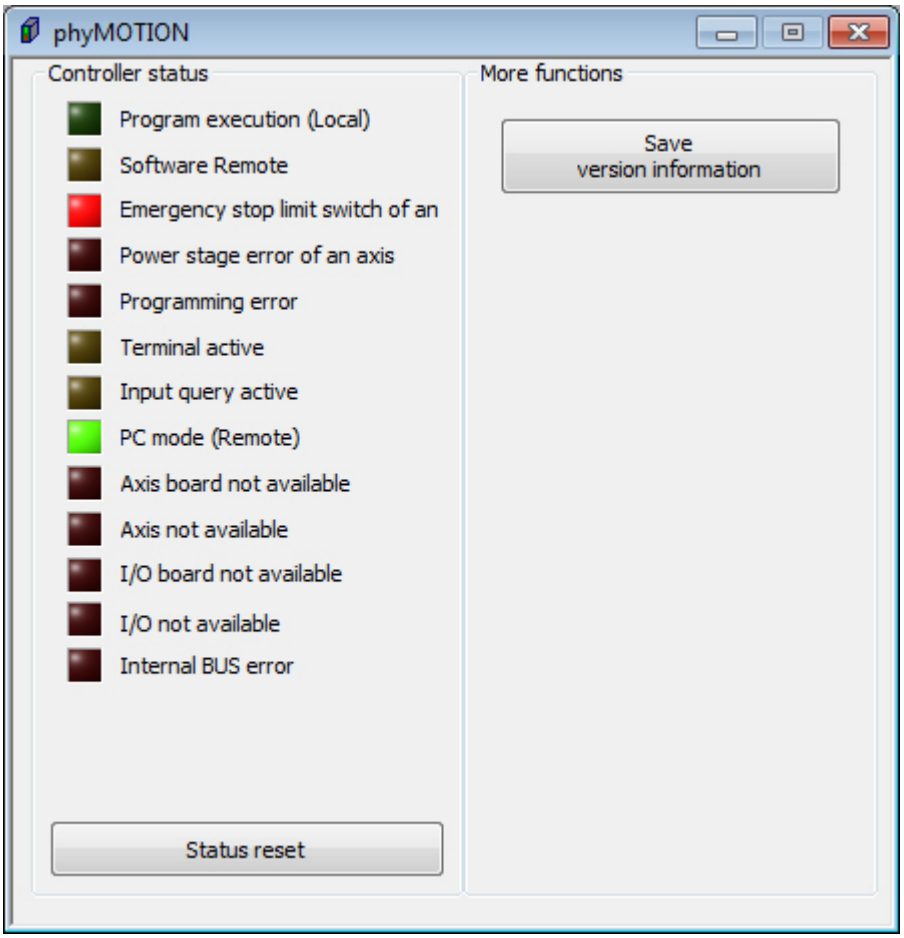


Fig. 37: Controller status *phy*MOTION™

Controller status shows the *phy*MOTION™ state:

- **Terminal active:** Operator terminal is busy
- **Axis card not available**: Module is not available
- **Axis not available:** Axis is not connected
- **I/O card not available:** I/O module is missing
- **I/O not available:** I/O does not exist
- **Internal bus error:** Communication error at the internal bus

Versionsinformation speichern

12.3.2 Status Monitor for Axes

The axis window opens by double clicking in the TreeView (s. chap. 6) on the required axis module: Operation/Current setting/**Status**:

The states of the axes are indicated by LEDs:

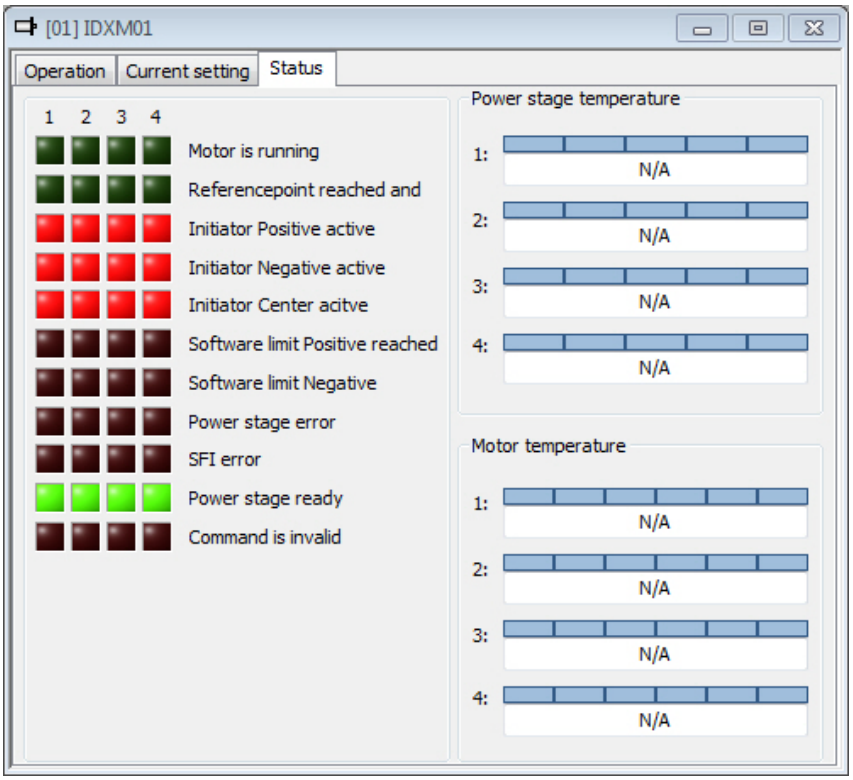


Fig. 38: Status monitor

Colour	State of the axis
dark	not active/no error
	Axis active
	Attention! Initiator active, Waiting for synchronization, software limit switch reached
	Error

13 Function ‚Interfaces‘

13.1 RS232 / RS485

The menu ***Options/Interface parameter*** sets several interface parameter values:

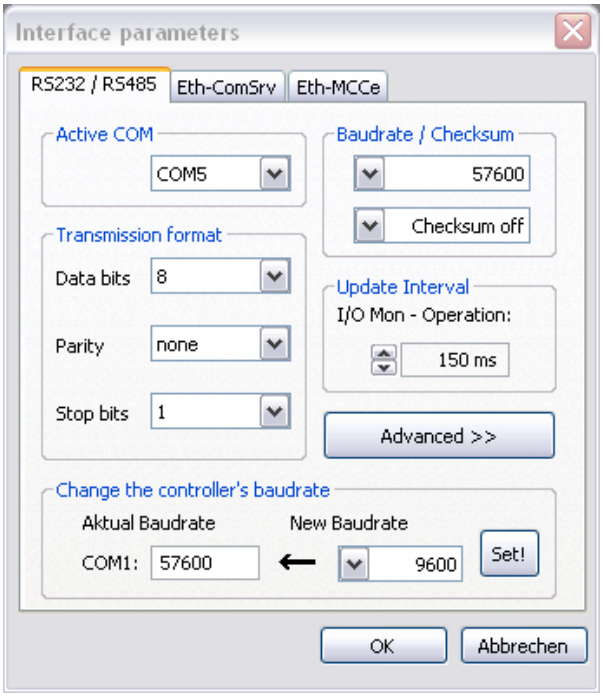


Fig. 39: Dialog interface parameter

Active COM

The interface is set the controller is connected to.
*phy***LOGIC**™ToolBox searches automatically for available PC interfaces (up to 256).
Installed USB --> RS converter interfaces are also found und displayed.

Baud rate / Checksum

The **Baud rate** (data volume per second in KBits) can be selected by click the drop down arrow of the ***Baud rate*** box (values from 9600 to 115200). The value must be compatible to the controller's baud rate.

Remark: We recommend searching the controller via the function **Search controller**, if you don't know the preset baud rate of the controller.

Checksum: (for OMC/TMC and MCC controllers):

Checksum ON: the transmission telegram is monitored with checksum by the controller.
Checksum OFF:the transmission telegram is sent without checksum by the controller.

Transmission format

The transmission format of the interface is set.

Important: These settings must not be changed! They are designed for additional controllers.

Update interval

Update interval is set for the IO-Monitor, Operation mode and all other menus, which poll cyclic data via the interface. Lower baud rates enable slow intervals. If many dialogs are open at the same time, we recommend increasing this time.

The changes are accepted by OK and the interface is initialized with new parameters.
Cancel aborts without changes.

Advanced >> opens the advanced interface dialog. (Fig. 28)

Change of the Controller's Baud rate

The baud rate of the controller can be changed in Advanced >>. The actual baud rate is read in **Actual Baud rate**.

In **New Baud rate** a new baud rate is selected for the controller by Drop-Down. The new baud rate is set in the controller by click on Set! and the baud rate of the PC is set to the new baud rate. This function requires communication to the controller. Therefore, the baud rate and the COM port should be set correctly.

13.2 Eth-ComSrv

Interface parameter/Eth-ComSrv s useful for remote maintenance in the company network by connecting to the receiver with the receiver's IP address.

First, in ***Options / Server*** the controller is integrated via Ethernet into the company network. Thereby a data exchange is enabled as TCP/ IP network protocols between all connected controllers in a local area network.

How to connect:

- PC-1 with connected controller: ***Com Server*** at **IP Address:** the IP address of PC-1 is read.
- The readiness for data receive is enabled by click on **Listen Port**. Keep the window open.

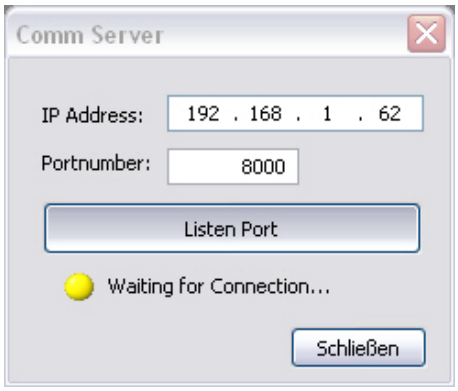


Fig. 40: Example: read data on PC-1

- Enter the IP address of the PC-1 and the port number in ***Interface parameter/Eth-ComSrv*** at **Connect to IP address.**

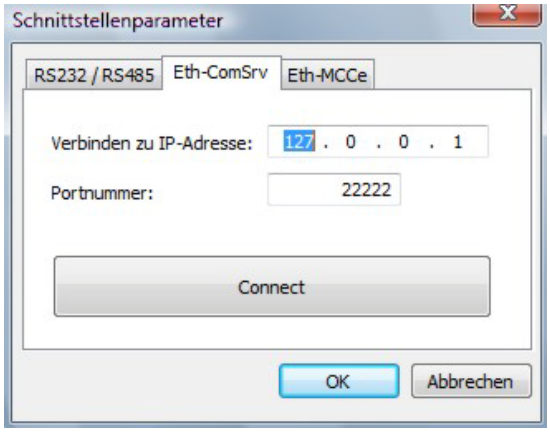


Fig. 41: Example: data enter from PC-1 to PC-2

- Then the PC-2 can set the controller by ***Transmission/...*** menus.

Important: The server (PC-1) must be connected to the controller! Danger of data loss!

13.3 Eth-MCM

A connection to a MCC or *phy***MOTION**™ controller via Ethernet interface:

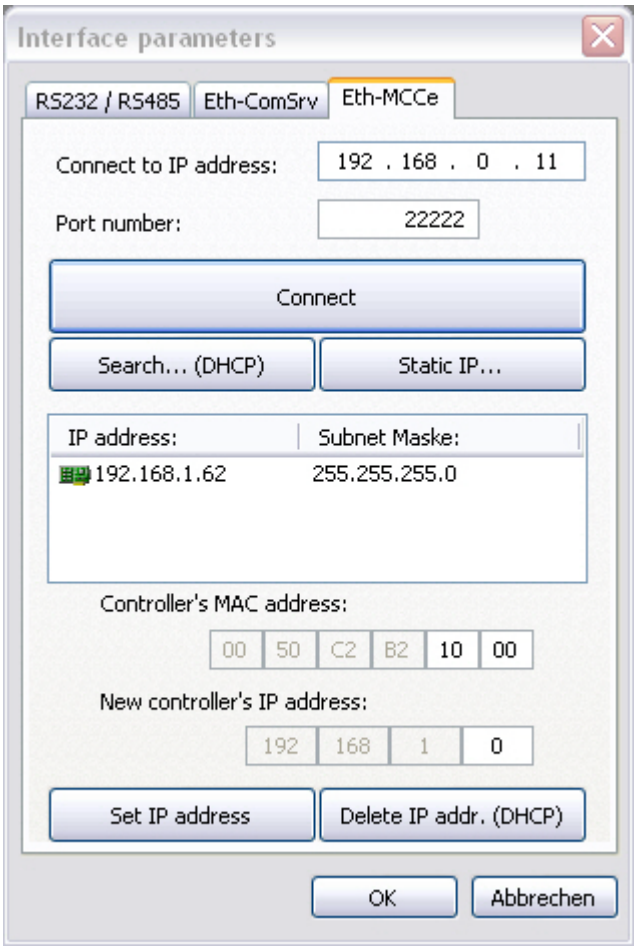


Fig. 42: Connection to the controller

The controller refers its IP address either dynamically over DHCP or in a static way.

Search... (DHCP) :

The IP address of the controller is searched only in the same subnet. This functions only, if the controller obtained a valid IP address over DHCP.

Static IP... :

Installation of the controller's IP address by MAC- and IP address input.

Set IP address... :

- You'll find the controller's MAC address on its type plate. Enter the MAC address in the appropriate input field.
- If the PC is logged-in to more than one network interface card: Select that IP address from the displayed list to which network interface card the controller is connected.
- Enter a new IP address in the input field.
- Setting of the entered IP address by clicking on **Set IP address...**.

Delete IP address (DHCP) :

Delete the IP address and reset the controller to the DHCP mode.

Connect :

Connection to the controller via selected IP address. You'll find the port number in the controller's manual.

OK :

The device is online, which is shown in the status bar line.

14 Help

Options / Help menu opens the help function of *phy***LOGIC**^{TM}ToolBox.

15 Error Messages

In this appendix you will find hints how to handle error messages of *phy***LOGIC**™ToolBox. Messages are not contained in this appendix, which do not need any additional information.

Remark:
Error messages related to problems with any peripheral device are very often caused by trivial facts like: device is not switched on, cables are missing, cable is defect, etc. Please check these items.

Interface Problems

An interface timeout has occurred

Possible reasons for this problem may be:

- The cabling is wrong (RD and TD pins interchanged).
- The controller is not in the REMOTE operation mode (Switch Remote/Local).
- The cabling is defect or interrupted.
- The timeout time selected in *phy***LOGIC**™ToolBox is too short.
- The interface parameters selected in *phy***LOGIC**™ToolBox do not match the controller type used.
- No controller connected

COM Interface already open

Possible reason for this problem may be:

- The COM interface is already used by another program.

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