*phy*LOGIC™Control

Operating Software for the Terminal or Tablet Operation of the *phy*MOTION™ Stepper Motor Controller

MANUAL 1299-A002 EN

phytron
Extreme. Precision. Positioning.

*phy*LOGIC™ Control

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TRANSLATION OF THE GERMAN ORIGINAL MANUAL

1/2016

Manual MA 1299-A002 EN

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In this manual you will find the descriptions of the features and specifications of the *phy***LOGIC™ Control**.

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.

Email address: doku@phytron.de

Questions about the use of the product described in the manual that you cannot find answered here, please contact your representative of Phytron (http://www.phytron.de/) in your local agencies.

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 Instruction

CAUTION – Possible damage!

When you use an Android-based consumer tablet instead of an industrial terminal, please note that the system based toolbar is displayed and can also be operated. Interventions during an application process can lead to damage of the system (motor...).

- Never affect the program flow through this toolbar.

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*CONTROL™

*phy***LOGIC**™ **Control** is an ANDROID based application for operating and programming the Phytron stepper motor controller *phy***MOTION**™ via industrial terminal or tablet (min. 7“ screen).

The data exchange between the terminal/tablet and the controller is quickly possible with *phy***LOGIC**™ **Control** after a short training period by the self-explaining ICONS.

The controller and the terminal/tablet are connected via Ethernet interface, via Bluetooth or via the integrated RS display interface.

Easy to *phy***LOGIC**™ **Control**:

- Programming in *phy***LOGIC**™ syntax
- Management of programs, parameter and register lists
- Display of status and graphical presentation of a current XY position
- Motor driving
- Module selection by graphs

3 Content

4 System Requirements

*phy***LOGIC**™ **Control** can be used with the following hardware:

- Android-based integrated touch terminal with 800 x 480 pixel TFT display
- Android-based tablet from 800 x 480 pixel (from 7“-TFT display)
- Industry operator terminal TPE

Connection	**Interface**
Android-based tablet	Bluetooth via MCM module or router (WLAN)
Industrial operator terminal	Ethernet interface at the MCM module
Android-based integrated touch terminal	RS interface

Please note when using an external Android-based tablet:

i

For rooted tablets:

The *phy***LOGIC**™ **Control** App cannot be left during the program execution, i.e. all system software buttons must be deactivated.

If the AUTOSTART is set to OFF by ‚Settings system/Autostart‘, the system software buttons of the tablets are activated after restarting.

5 Program installation

*phy***LOGIC**™ **Control** has already been installed for *phy***MOTION**™ controllers with integrated Touch terminal or industrial operator pane at delivery.

When using an external Android-based tablet (from 7“-TFT display) the *phy***LOGIC**™ **Control** must be installed.

Installation files of Android Apps have the file extension *.apk (**A**ndroid **P**ackage **F**ile). These archives contain all data and charts of the APP.

5.1 APK Installation from the FTP Server or an Ext. Memory Source

Download the APK file either from an external memory source or via phytron ftp server with a PC in the download folder of the tablet.

The Android system doesn't allow any access to the ftp server.

- The APK must be downloaded from the phytron ftp server by a PC.

5.1.1 Requirements

For installing the Android APKs you should activate the setting »Unknown sources« in the system settings:

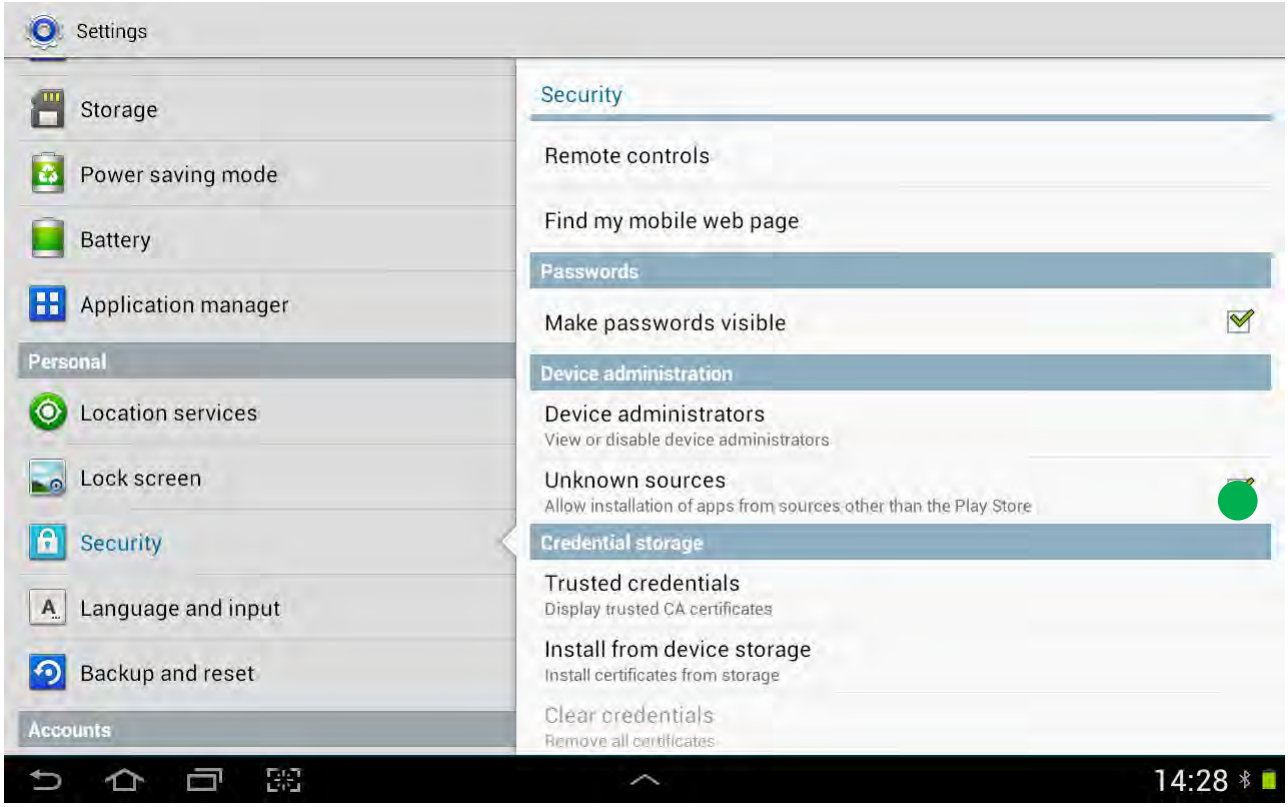


Fig.1 Allow unknown sources (activated)

5.1.2 APK-Download

Download the app-release.apk by tapping:

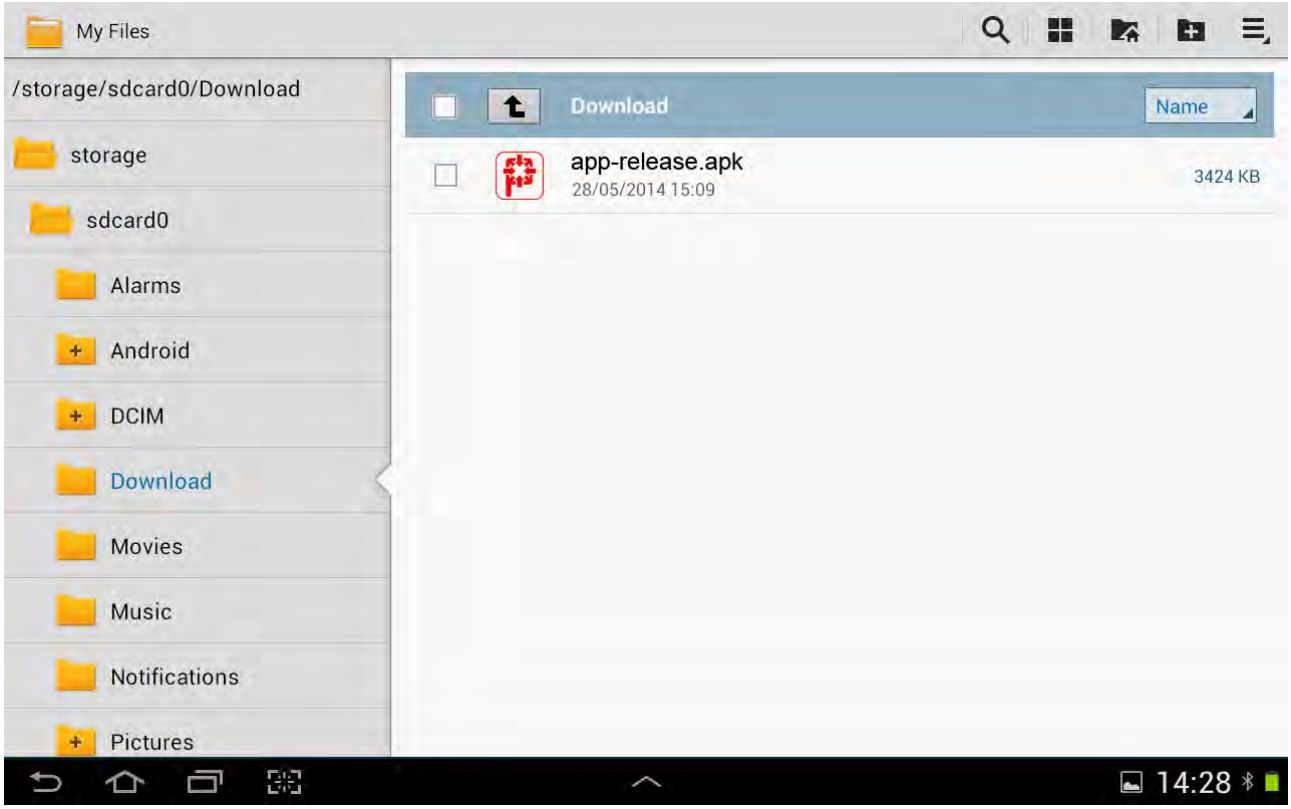


Fig.2 Download APK file

5.1.3 APK Installation

The installation starts with an Android typical installation routine. By clicking on »Install« you grant the specified rights to the App and start the installation:

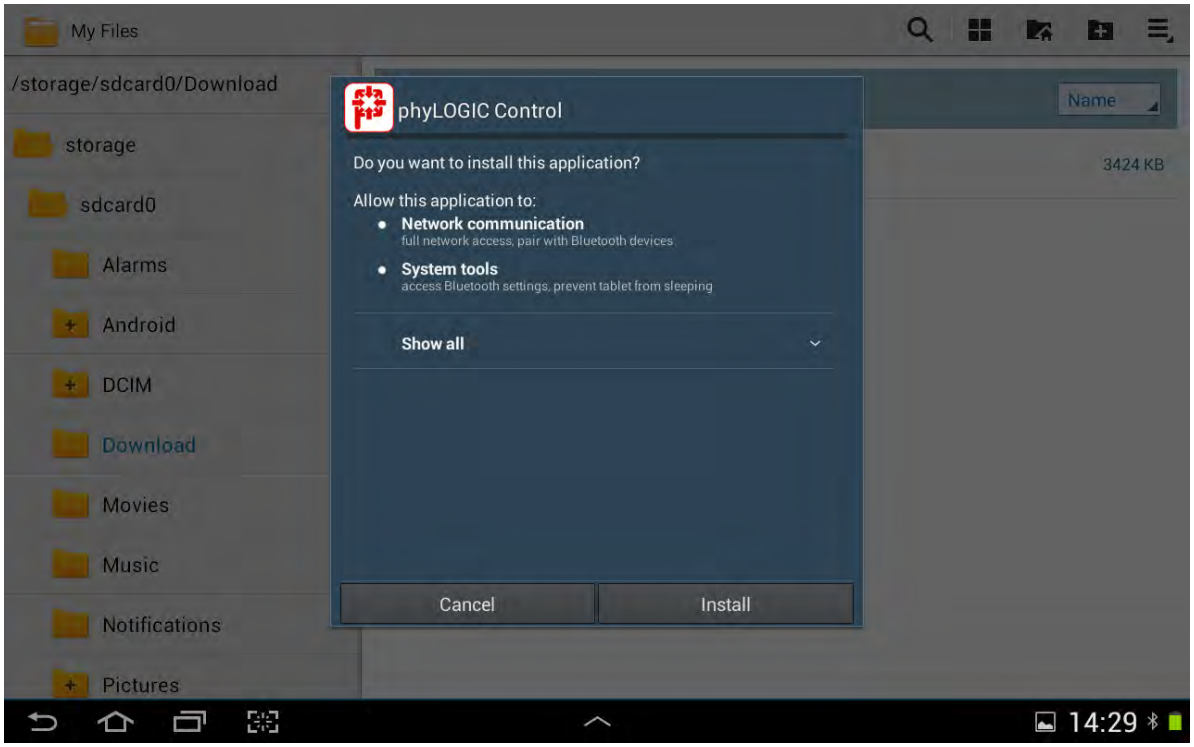
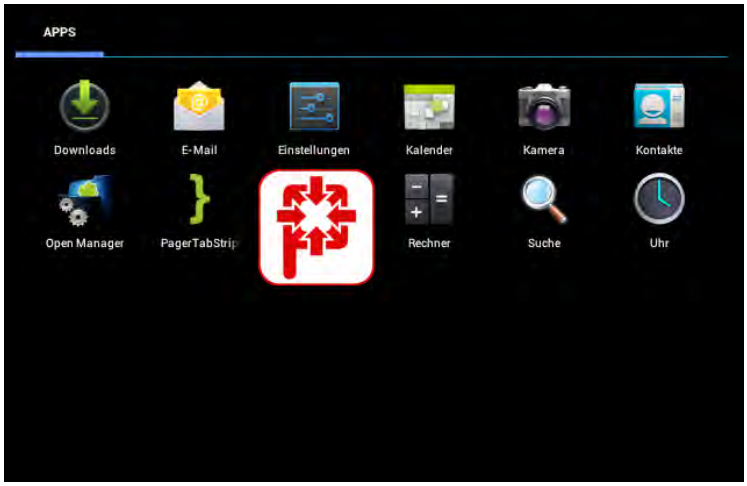


Fig.3 APK file installation

The installation will only take a few seconds and in a smoothly way.

Now, you can directly open the installed App:



5.2 Update of the *phy*CONTROL™

After the existing apk version is overwritten, the new *phy*LOGIC™ **Control** version is installed.

6 The *phy*LOGIC™ Control Application

The working area of the *phy*LOGIC™ **Control** application, like in the following figure, forms the elements for programming and operating of the *phy*MOTION™ controller with various icons and buttons.

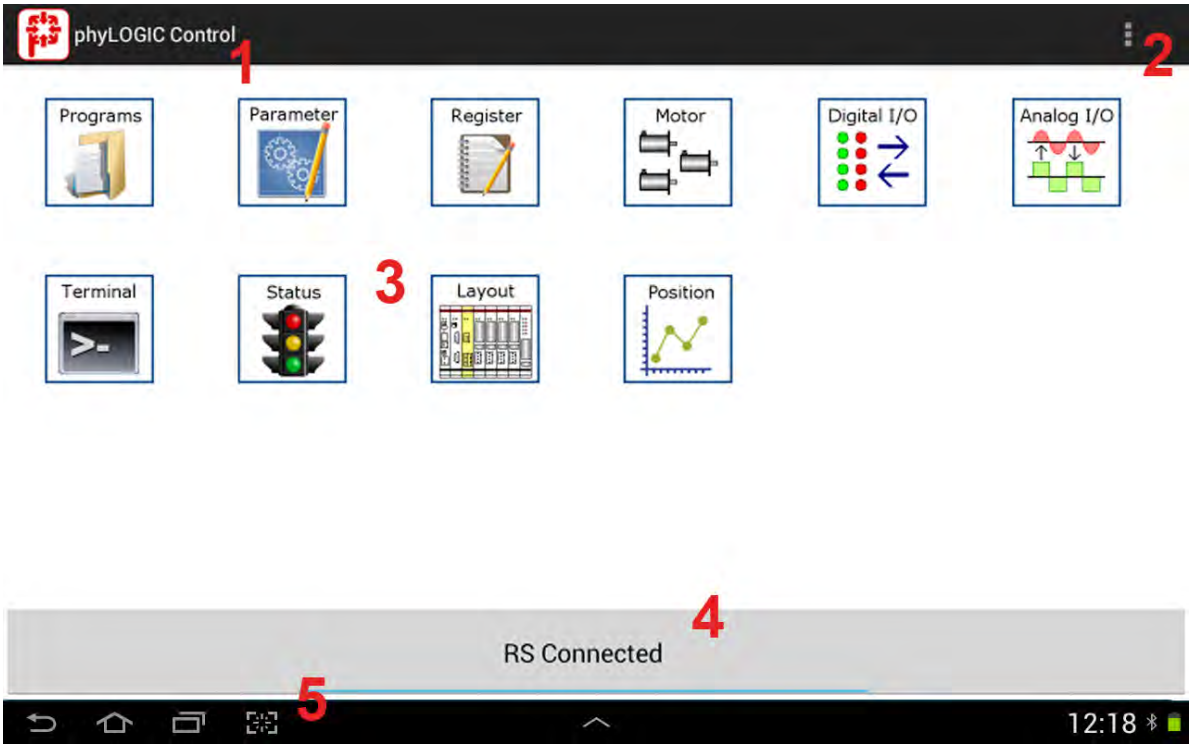


Fig.4 Working environment after program start

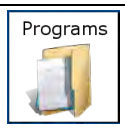
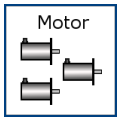
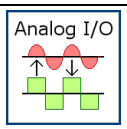
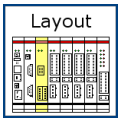
The working environment consists of several main components:

1. Menu function
2. Program settings. start by touching the ⋮
3. Application programs: start by touching the icons
4. Button for activating an action (i.e. connecting to the interface, program transfer,…)
5. For Android-based consumer tablet only: system bar

6.1 Communication Bar

Menu bar	
System bar (only for Android-based consumer tablet)	 (Example)

6.2 Operating Icons

Icon	Description of the icons
	Edit, start, delete program, set autostart
	Write, edit, save parameters
	Write, edit, save registers
	Axes: operation, joystick, current setting, status
	Digital I/O: read the inputs / set the outputs
	Analog I/O: read the inputs / set the outputs
	Terminal (control panel): Direct mode
	Status: status reading
	Layout: device configuration, overview of the modules
	Show position: Graphical display of the current X-Y position

6.3 More ‚Switches‘

Icon	Description of the icons
	< Step back
	Dropdown field
	Action switch: starts a action by pressing
	Active function is marked blue (here: axis 1 is active/selected)
	*phy***LOGIC**™ Control menu items

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“

6.4 Start and Exit *phy*LOGIC™ Control

Press on the *phy***LOGIC**™ **Control** icon briefly to start the program.

*phy***LOGIC**™ **Control** ***cannot*** *be stopped with the industrial terminal or the integrated touch terminal TPM01.*

CAUTION – Possible damage!

The application can be terminated for non rooted consumer tablets.

- To prevent damage by stopping the application, the user should avoid a sudden exit.

6.5 Language

If you are using the phytron integrated touch panel (TPM01) or the operator touch panel (TPE01) or a tablet with Android system up to version 4.2 see chapter 7.2.4.

For Android tablets with a higher version than 4.2:
*phy***LOGIC**™ **Control** adjusts the dialog language in dependence of the system language either in German or English.

7 System Settings via Menu Icon

A selection of system setting options opens by touching the ⋮ symbol on the right upper desktop side:

7.1 Communication Settings

The available interfaces can be selected like e.g.

Ethernet TCP/IP, Serial interface or Bluetooth.

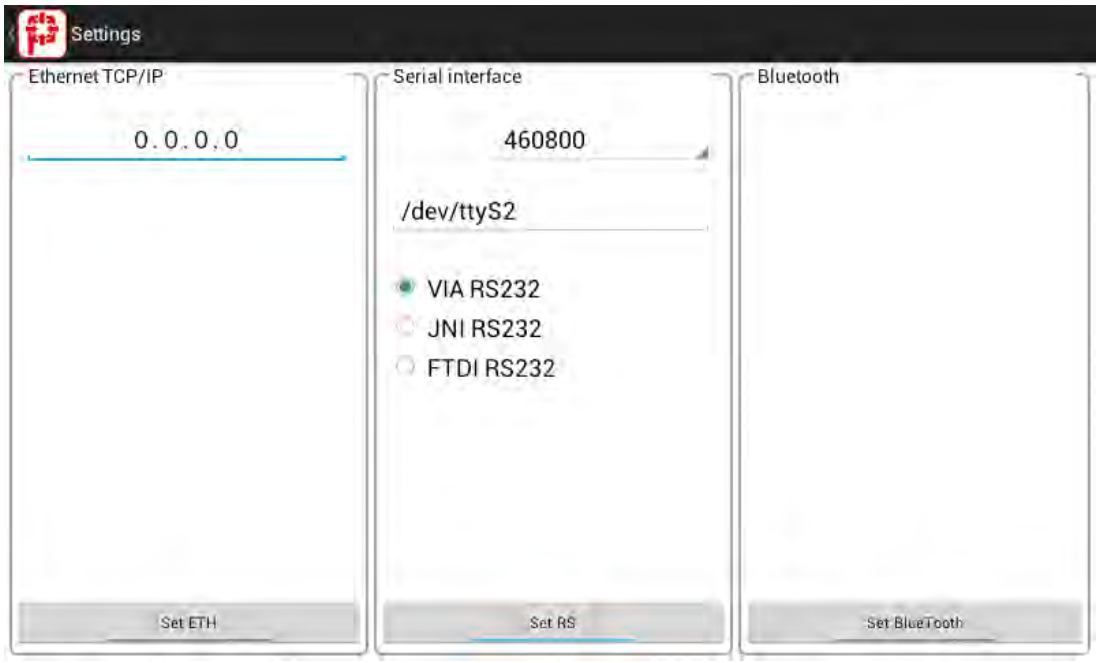


Fig.5 Interface settings

The RS interface can be selected, as follows:

VIA RS232	for the internal terminal (TPM01)
JNI RS232	interface for devices with RS interface
FTDI RS232	for devices with connected FTDI converter (USB-RS converter)

The baud rate must always be set to 115200.

7.2 System Settings

7.2.1 Display

You can select between

- darken the display or
- display light

*Only the **external** display can be set.*

7.2.2 Autostart

Autostart ON: The *phy***LOGIC**™ **Control** application starts automatically during switching on. All system settings are applied.

Autostart OFF: Die *phy***LOGIC**™ **Control** application must be activated by ‚Program/Start'.

7.2.3 Version

'Version' gives important information about the program, copyright and phytron's firm data:

Fig.6 Information about *phy***LOGIC**™ **Control**

7.2.4 Language

If you are using the phytron integrated touch panel (TPM01) or the operator touch panel (TPE01) or a tablet with Android system up to version 4.2 then the dialog language is set as follows: By selecting Systemeinstellungen/Sprache or System settings/Language the following window will open:

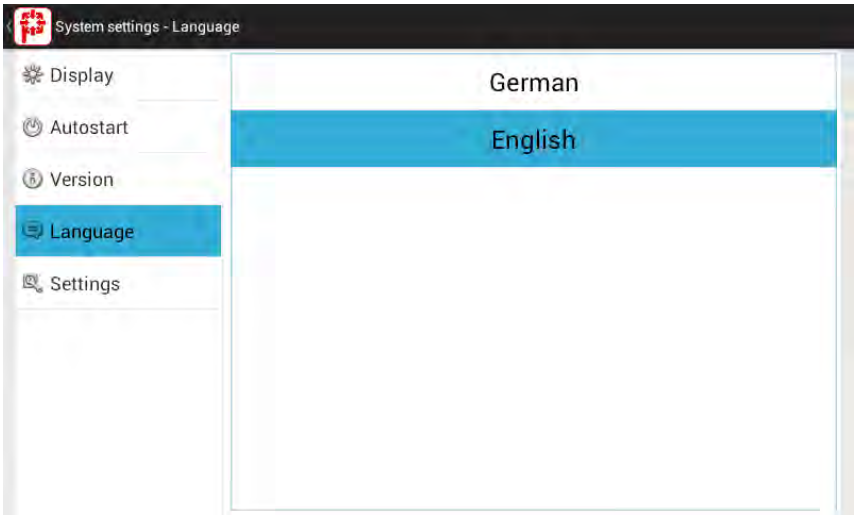


Fig.7 Language

For Android tablets with a higher version than 4.2 this menu item isn't active: *phy***LOGIC**™ **Control** adjusts the dialog language in dependence of the system language either in German or English.

7.2.5 Settings

Here you can set the IP-address and the serial interfaces:

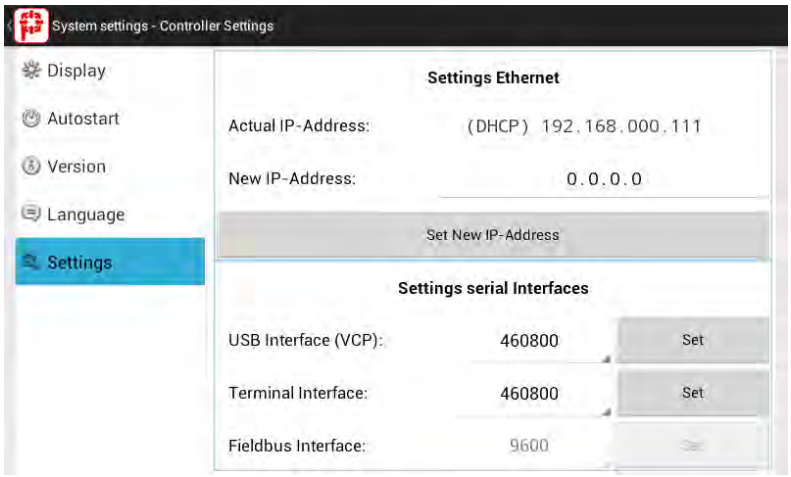


Fig.8 Settings

8 Applications

The *phy*MOTION™ can be operated with the following application programs for configuration, service and diagnosis:

8.1 Programs

Programs can be created in the *phy*LOGIC™ syntax for communication to the *phy*MOTION™ controller.

The Android editor edits program- , parameter- or register files for the *phy*MOTION™ controller.

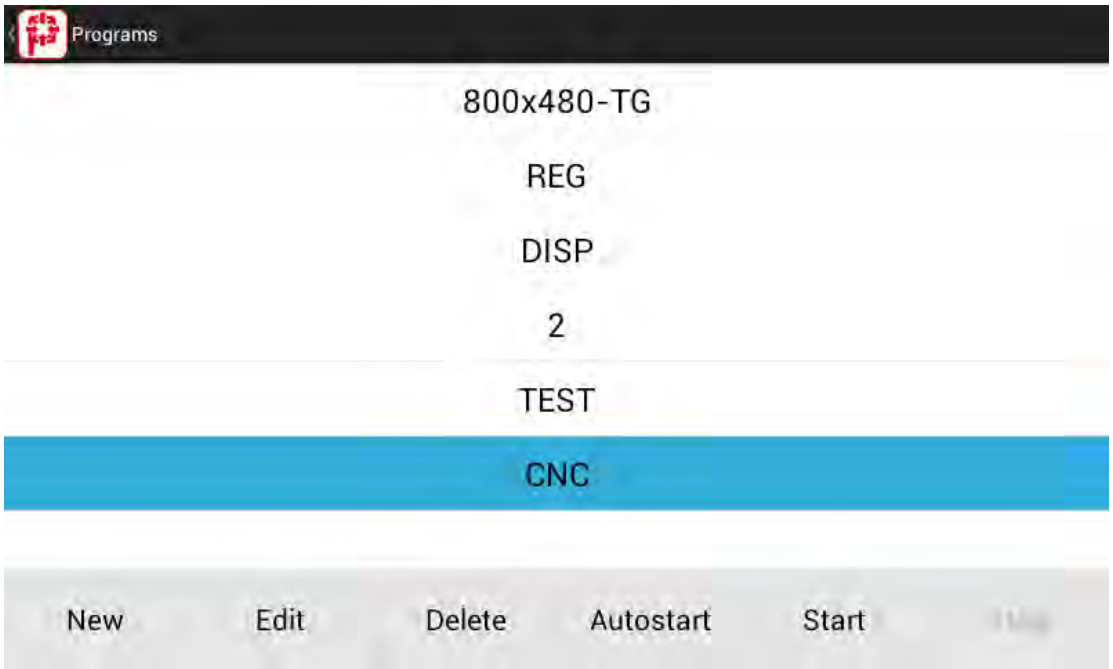


Fig.9 Overview ‚Programs‘

8.1.1 New

Here, the editor window opens for creating a new program for the *phy*MOTION™ controller.

8.1.2 Edit

The system editor opens for changing programming texts in the *phy***LOGIC**™ syntax. The ‚Transmit Program' button saves the changed program into the controller.

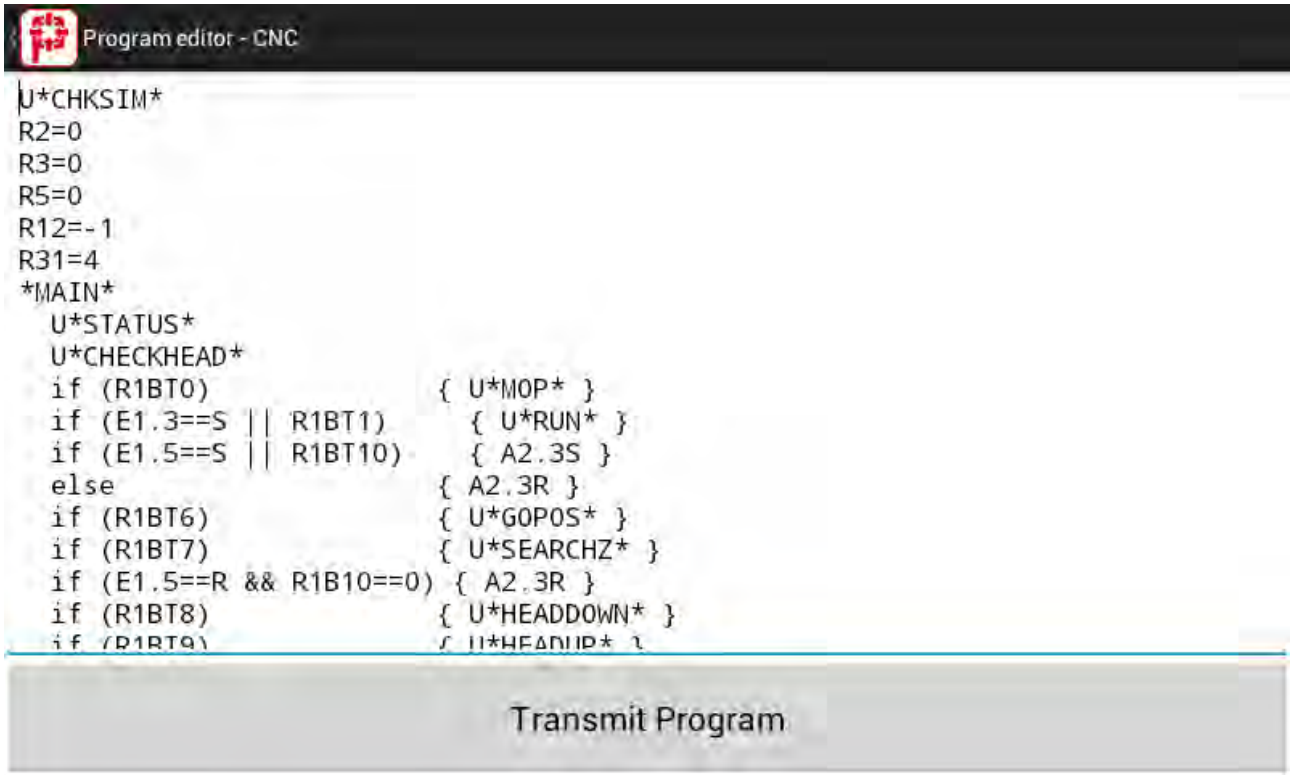


Fig.10 Program example

8.1.3 Delete

Here, the controller program can be deleted by selection of the program list.

You are prompted to confirm before deleting which is final!

8.1.4 Autostart

Here you can select that program from the program list, which starts in the LOCAL mode of the controller automatically.

8.1.5 Start

Here you can select and start a program from the program list of the *phy***MOTION**™ controller.

Starting is only possible in the REMOTE mode.

8.1.6 Exit

Here you can exit the current program.

Exit is only possible in the REMOTE mode.

8.2 Parameter

The parameter editor opens the parameter set list of all axis modules. The preset values can be overwritten.

PhyMotion parameters

Par. No:	Parameter:	Comment:
1.1P1	0	Type of movement 0 = rotational 1 = Hardware limit switch 2 = Software limit switch 3 = HW and SW limit switch
1.1P2	2	Measuring units of movement 1= step 2 = mm 3 = inch 4 = degree
1.1P3	1	Conversion factor for the thread 1 step corresponds to...
1.1P4	400	Start/Stop - frequency Start or stop without ramp I1AM01 always 0
1.1P5	2000	not used
1.1P6	20000	not used

Fig.11 Parameter list extract (example: parameters of the module no. 2 and no. 3)

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"

The parameters are saved into the controller by clicking the menu bar ⋮ and ‘Send parameter’.

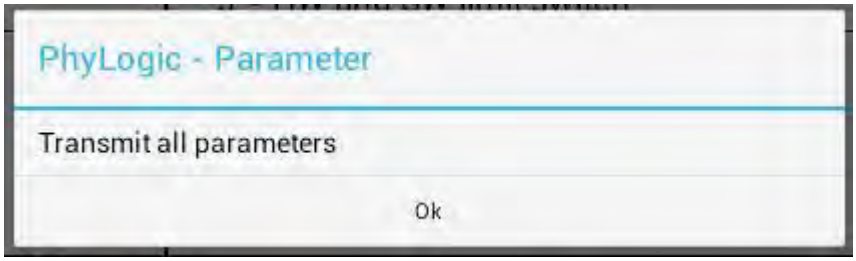
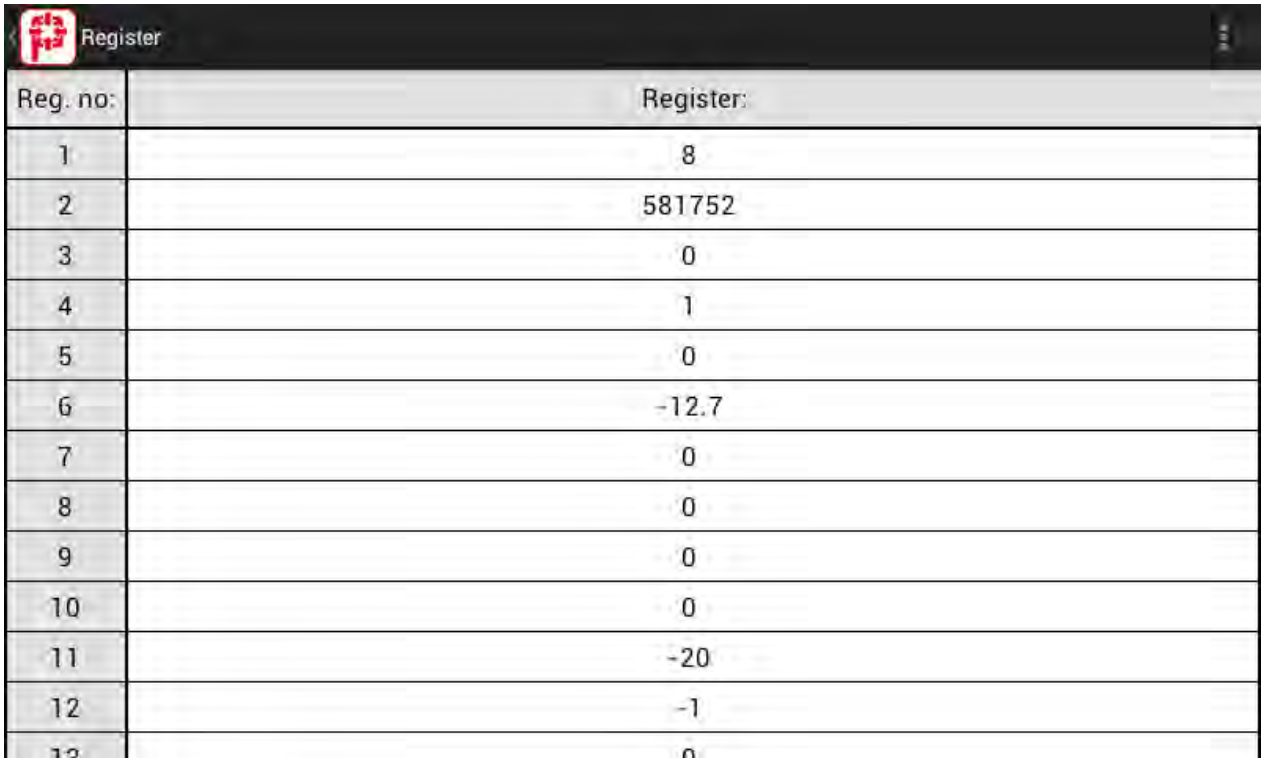


Fig.12 Transmit protocol

8.3 Register

The register editor shows the register list of the controller. It has similar functionality to the program editor. Contrary to the program editor, only **one** comment line can be entered.

Important: The editor can create any number of registers, but the controllers only have a limited number. All registers beyond the control registers are not transferred.
The *phy***MOTION**™ controller allows up to 1000 registers.



Register

Reg. no:	Register:
1	8
2	581752
3	0
4	1
5	0
6	-12.7
7	0
8	0
9	0
10	0
11	-20
12	-1

Fig.13 Extract of the register list

‚Send register' is executed by clicking the menu bar  .

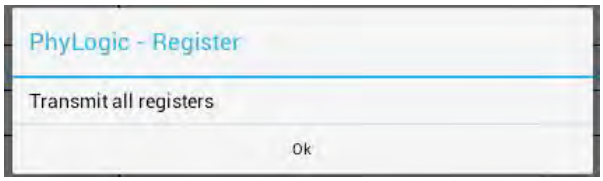


Fig.14 Transmit protocol

8.4 Axes

The following applications are used for current setting and driving the connected motors, in addition, to test the interface and for monitoring the controller status.

8.4.1 Operation

Fig.15 Operation window *phy*MOTION™

The list of the installed axes appears by pressing the ‚module name line‘- here [01] IDXM01 - and the required axis module opens with the axis data:

Axis n	Selection of the axis (of t he selected module) for movement
Go relative	Motor moves from the actual position by x-counter values
Go absolute	Motor moves by the input counter value referred to the zero point
	Axis movement + means: clockwise movement, seen onto the motor axis from outside. – Means: counterclockwise movement, seen onto the motor axis from outside.
Start n	Command ‚Move axis‘ is executed
MOP Start	Command ‚Axis moves to the Initiator‘ starts
! STOP !	The movement is stopped.
MOP-(R-)	Axis initialisation: MOP–(R-): The axis moves to the initiator of the –direction MOP–(R-C): The axis moves to the initiator center via –direction MOP–(RC-): The axis moves to the initiator center via –direction, in which half of the track is damped and the other half is free. MOP–(R+): The axis moves to the initiator of the +direction MOP–(R+C): The axis moves to the initiator center via +direction MOP–(RC+): The axis moves to the initiator center via +direction, in which half of the track is damped and the other half is free.
Position n Cnt	Shows the position counter value of the axis.
n Enc	Shows the encoder counter value of the axis.
Frequency	The run frequencies of the motor can be changed by the slider. The frequency can be set from 1 to 40000 Hz in 100 Hz steps.

8.4.2 Joystick

Here, the motor of the selected axis can be moved by pressing and sliding the blue point – like with a joystick.

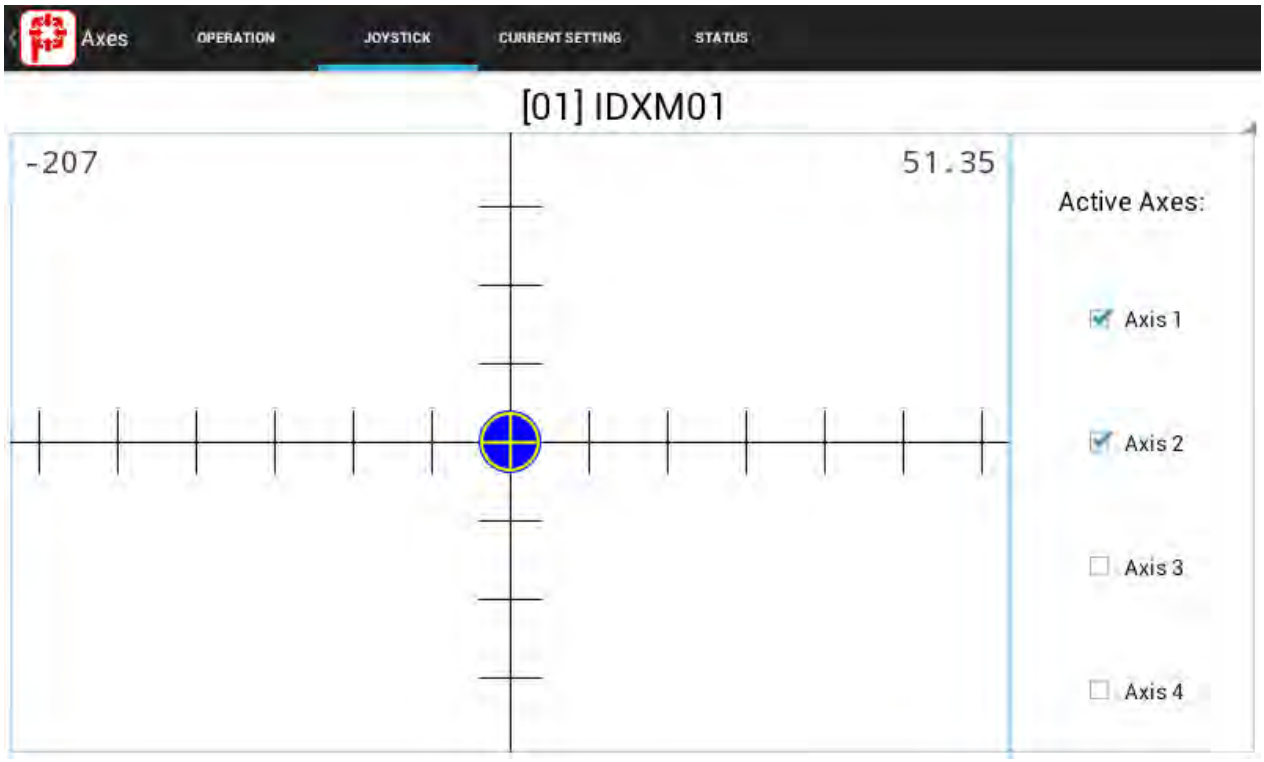


Fig.16 Joystick

8.4.3 Current Setting

Here you can set stop-, run- and boost current as well as run current delay time, step resolution, boost, pref. Direction and power stage monitoring for the selected axis.

The dialog accesses the parameters of the controller.

The changed data are saved by Save Axis n into the parameters.

CAUTION – Possible damage!

If the motor current is too high, the motor may be destroyed.

- Please check the motors plate.

Further Manual

An overview about the axes commands and the corresponding parameters you'll find in the corresponding module manual: e.*g. I1AM, INAM, ...*

Fig.17 Current setting

8.4.4 Status

Colour	Axis status
	Not active/ error-free
	Axis active
	Attention! Initiator is active, waiting for synchronisation, software limit switch reached
	Error

Here the status of an axis of the *phy***MOTION**™ is displayed:

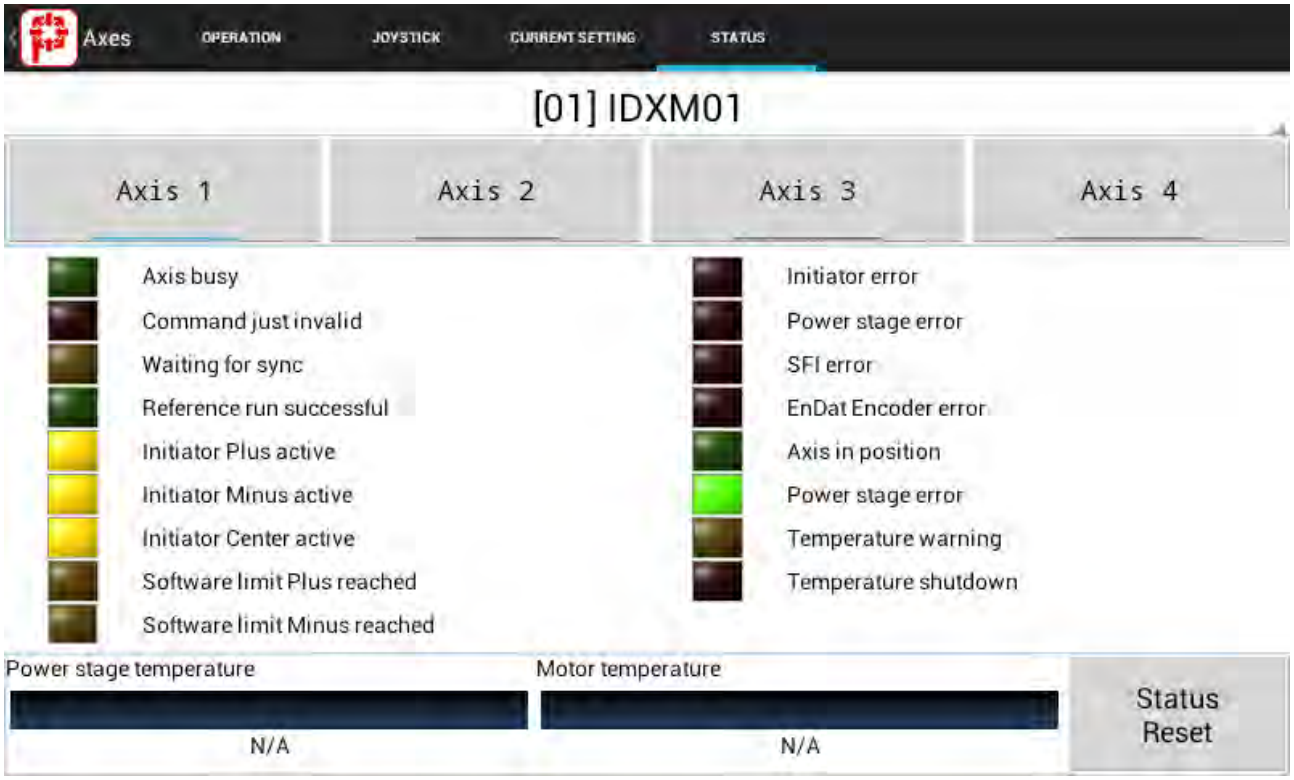


Fig.18 Axis status

The axis status is reset by Status Reset.

When a sub module KTS01 or PTS01 is integrated into the power stage module, the motor temperature is continuously measured.

8.5 Digital I/O – IO-Monitor

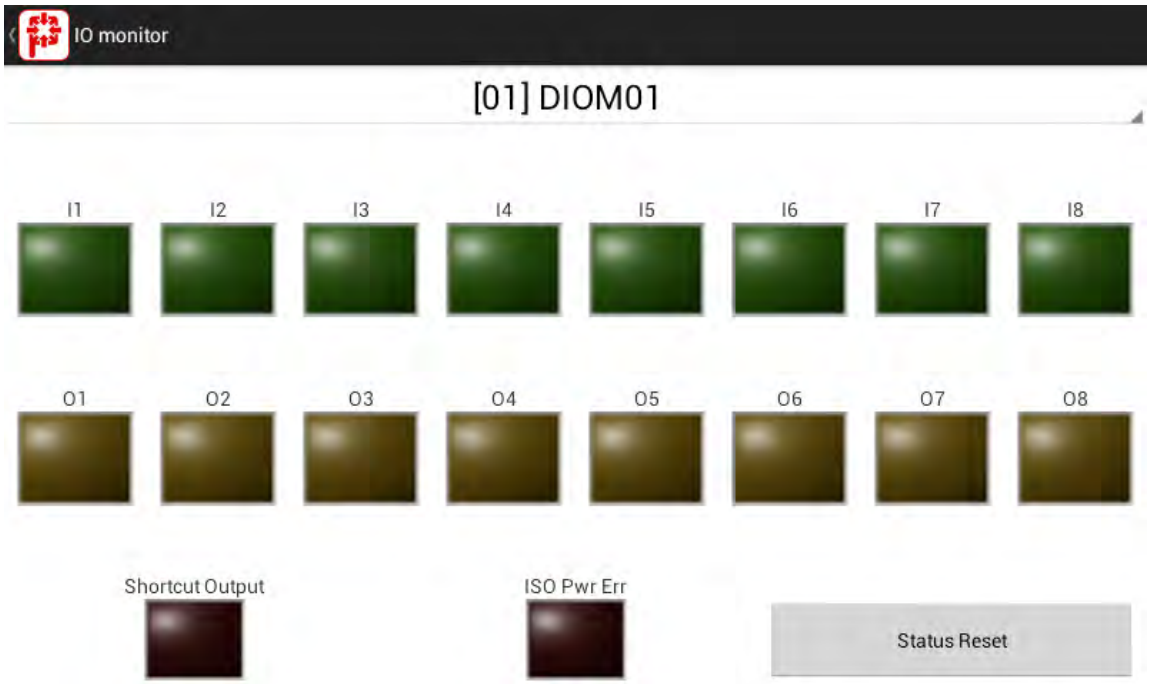


Fig.19 Digital I/Os

I1 to I8 shows the controller's inputs:

	Input activated
	Input deactivated

O1 to O8 shows the energized controller's outputs:

	Output energized
	Output reset

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

Further Manual

You'll find an overview of the DIOM module in the corresponding module manual DIOM.

Shortcut Output

	Error: output is short-circuited
	Output OK

ISO Power Fail

	Error: no power supply 24 V
	Power supply 24 V is on.

The button Status Reset deletes the status and resets all outputs.

8.6 Analog I/O

DAC Fail

	Error: short-circuit in the analog output or no current flow possible
	Output OK

ISO Power Fail

	Error: no supply voltage
	Power supply 24 V is on.

The button Status Reset triggers a reset of the AD channels.

Further Manual

You'll find an overview of the AIOM module in the corresponding module manual AIOM.

8.6.1 Analog Digital Converter AD

The display of the four channels of the AD converter can be displayed in V / mA or increments:

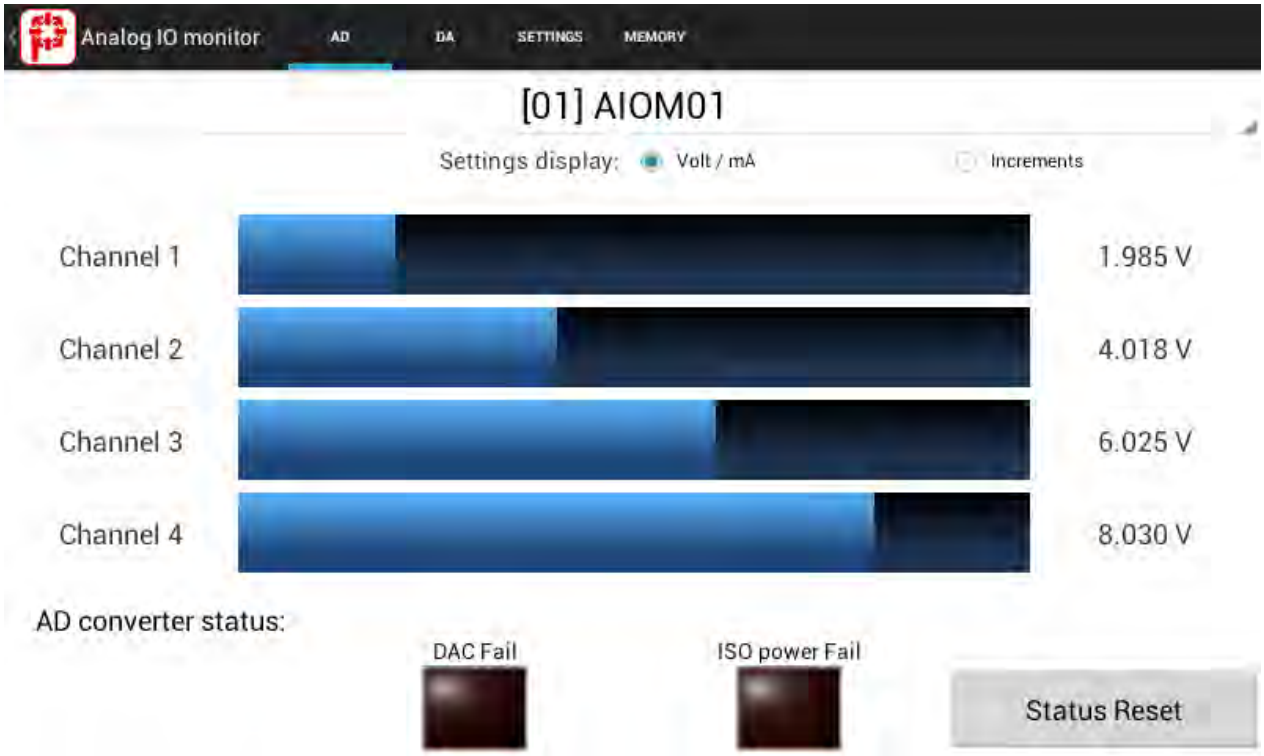


Fig.20 Analog IO monitor AD

8.6.2 Digital Analog Converter DA

The display of the four channels of the DA converter can be displayed in V / mA or increments:

Fig.21 Analog IO monitor DA

8.6.3 Channel Settings

Set the function of the channel x of the AD or DA converter module:

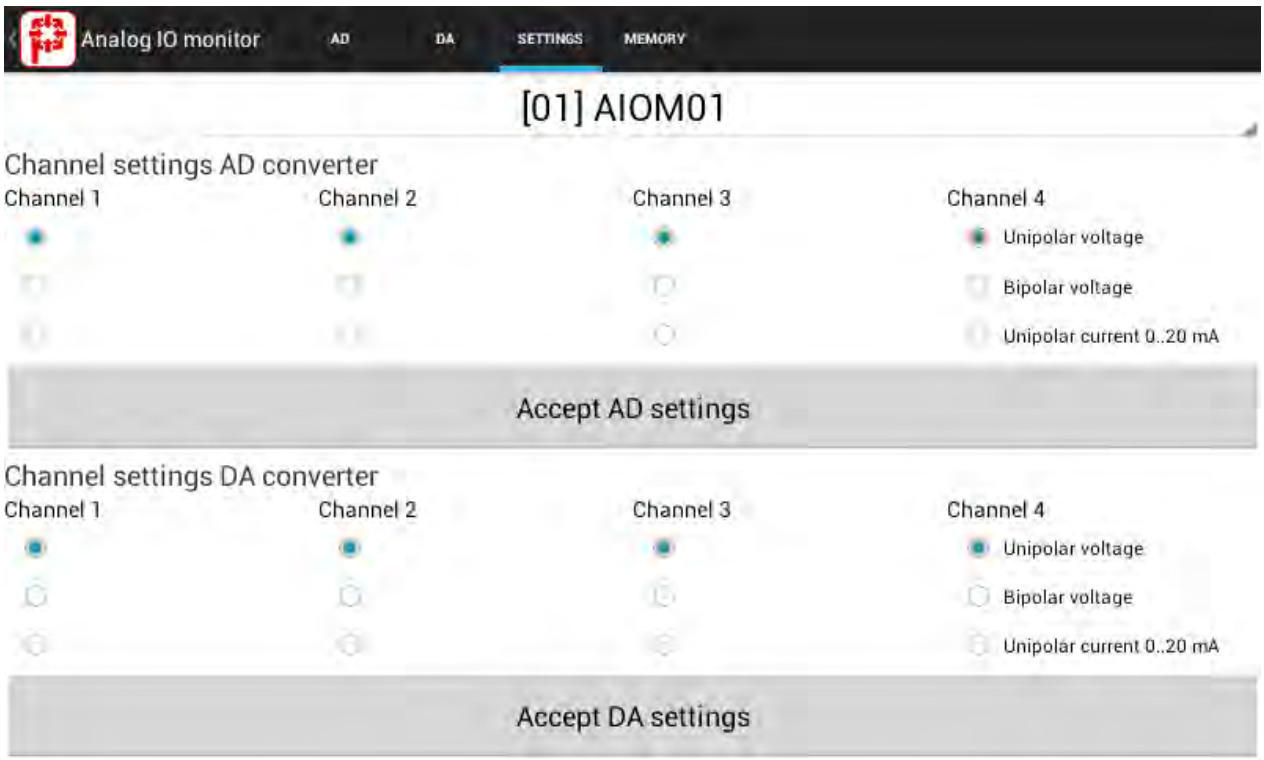


Fig.22 Analog IO monitor settings

Accept AD settings	Save the set function: -voltage unipolar -voltage bipolar -current unipolar
Accept DA settings	

8.6.4 Memory

Graphical display of 8192 measurements max. of AIOM module.

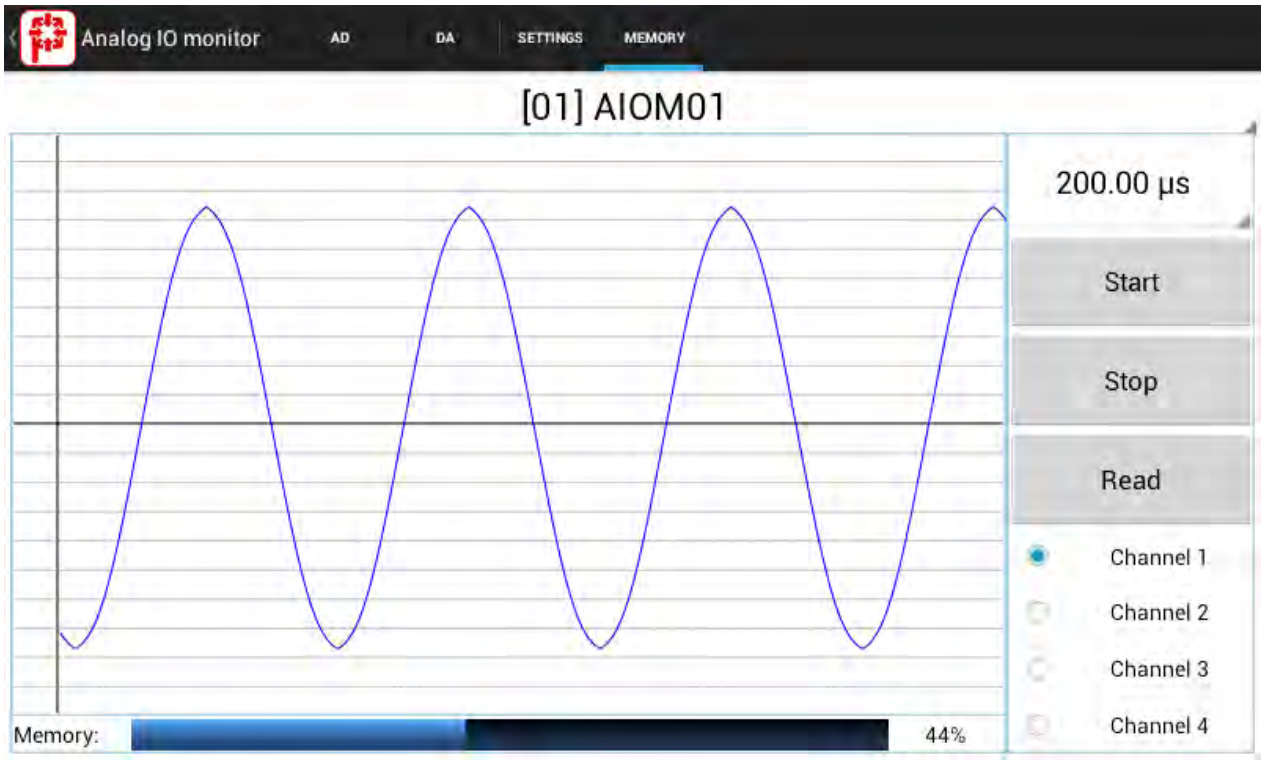


Fig.23 Example of a graphic of the AD

Start	Measurement values of the AIOM module are placed into the memory
Stop	Measurement recording is stopped and the measurement values reading of the AIOM module is stopped
Read	Reading of the whole AIOM memory (is only active, when storing the measured values is completed).
Channel x	X=1…4 Selection of the output channel

The sampling time (Interval time) can be set from 0.033ms to 100 ms.

8.7 Terminal – Direct Mode

i	**Command reference**	Please use "*phy***LOGIC**™ Command Reference for the *phy***MOTION**™ Controller"

A dialog box opens which allows sending instructions directly to the stepper motor controller. *phy***LOGIC**™ **Control** 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:

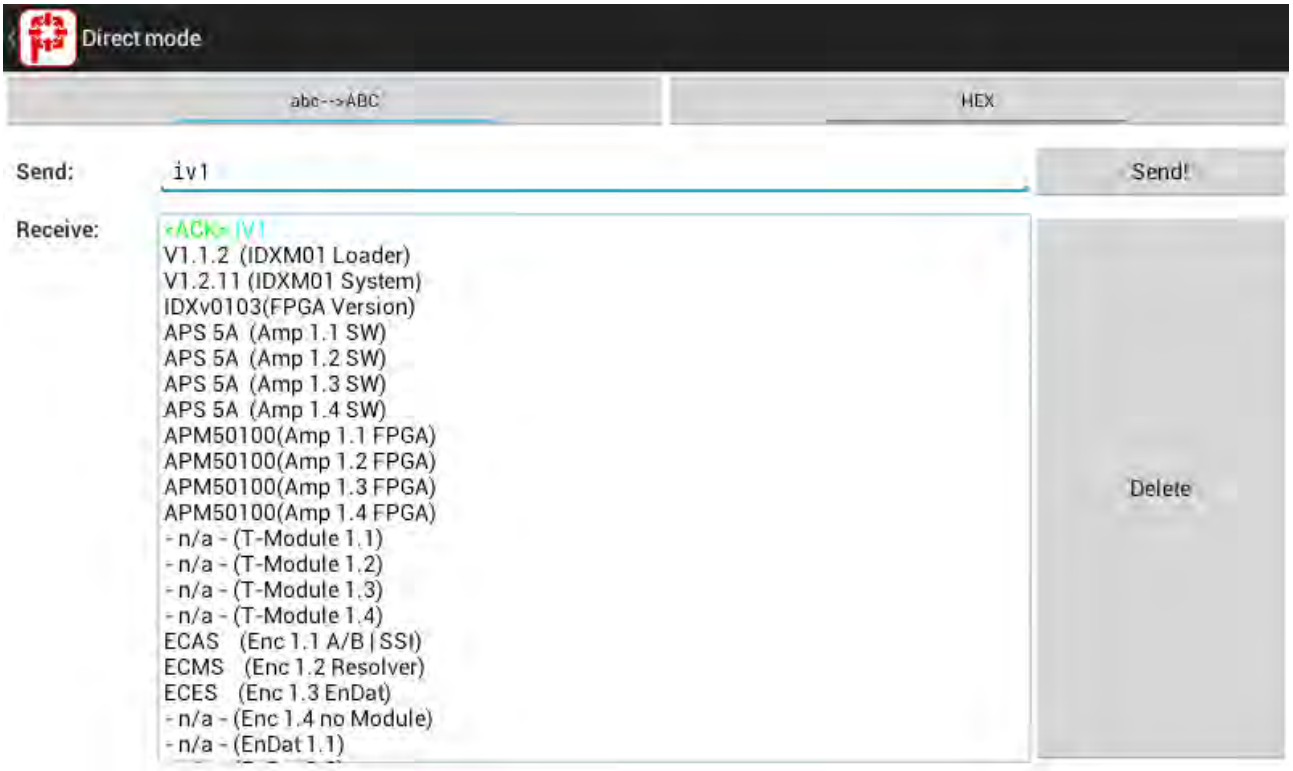


Fig.24 Direct mode

abc --> ABC	Nearly all *phy***LOGIC** instructions can be written without consideration of the capital and small letters. The instruction is changed in capital letters.
HEX	The answer is sent in hexadecimal form.
Send!	The *phy***LOGIC** command is sent to the controller.
Delete	The *phy***LOGIC** command is deleted in the input field.

Remark:

Phytron controller's answer is a <NAK> if an invalid instruction (e.g. STATUS) is used.

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

8.8 Status – Controller Status

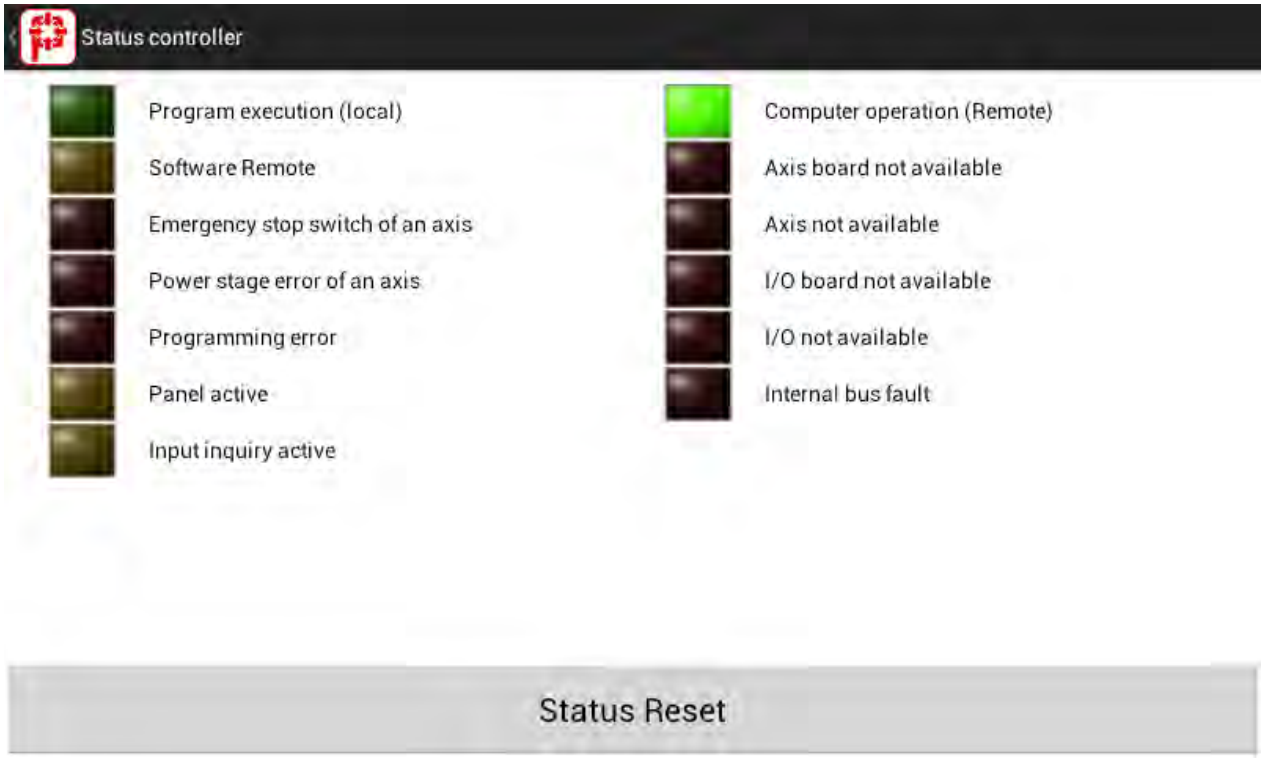


Fig.25 Status of the *phy***MOTION**™ controller

The Status Reset button triggers a reset of the I/O status.

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“

8.9 Layout

Device configuration display as a graphic.

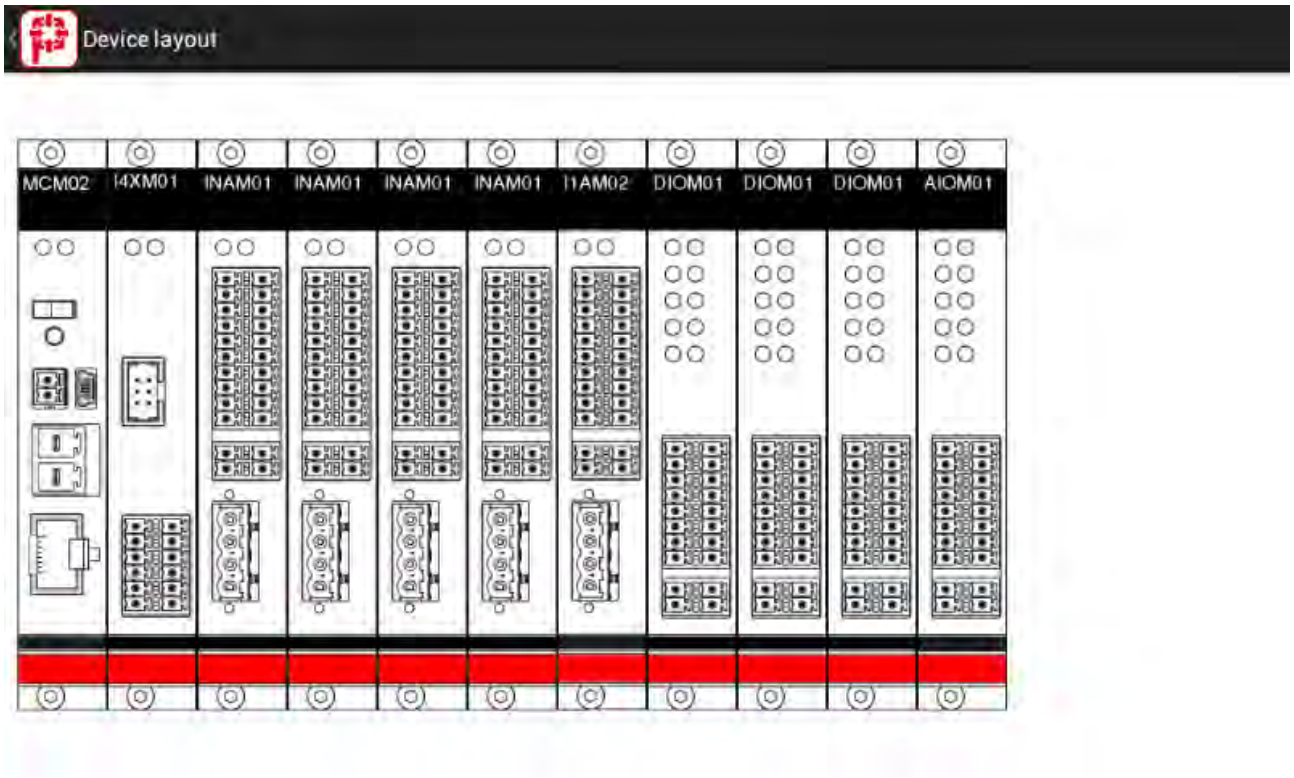


Fig.26 Example of a device configuration

Touching on a module in the device opens a new window. The pin assignment and the firmware version number of the module are displayed.

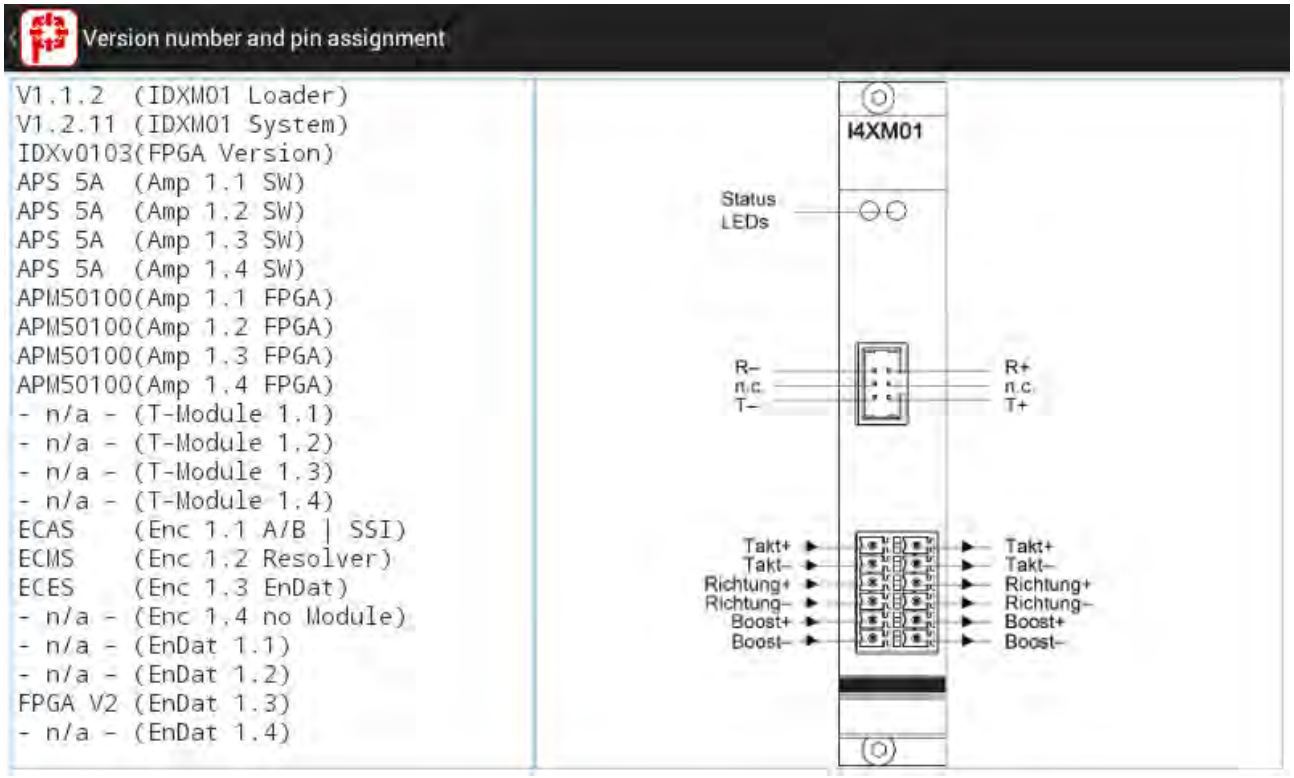


Fig.27 Firmware and pin assignment of a DIOM module (example)

8.10 Show position

Graphical display of the current X-Y position.

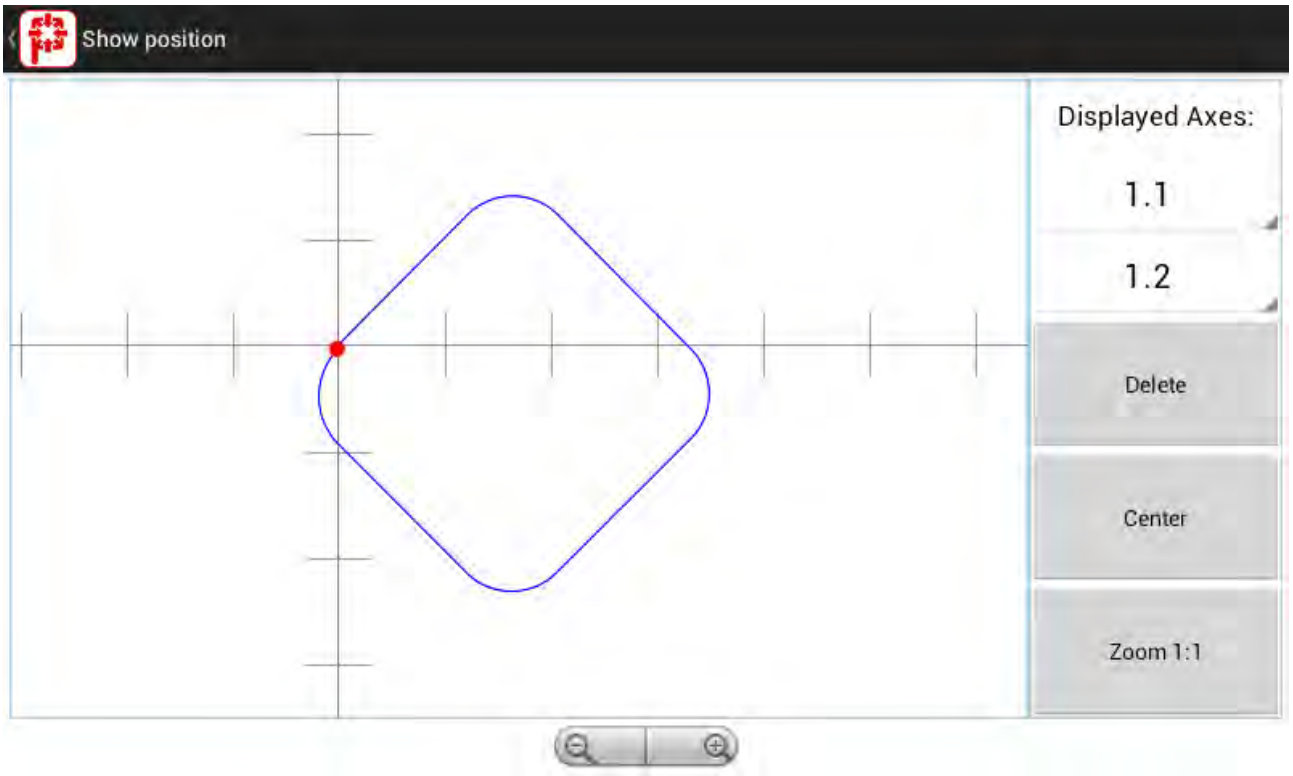
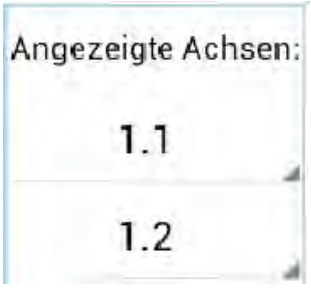


Fig.28 Show position

Function of the Buttons:

	Assigning the X and Y-axis. In the example: X-axis is assigned axis 1 of the module 1; Y-axis is assigned axis 2 of the module 1.
	The screen display is deleted.
	The X-Y display is centrally set in the screen.
	The figure is 100 % displayed.
	The screen display can be zoomed in or out.

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