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# CATALOGUE STEPPER MOTORS ELECTRONICS

## CONTROL for all Dimensions



phyMOTION™



MCC-2



MSX



1-STEP-DRIVE



SPH  
240 / 500 / 1013



USB-485  
Converter



phyLOGIC™  
ToolBox

# Phytron GmbH

## Stepper motor technology for special requirements:

Stepper motor technology is particularly suitable for precision applications under extreme environmental conditions. Whether vacuum, cryo environment, high temperature or under the influence of radioactivity - the phytron **motor series** are tough and do precision work, because stepper motors can position very accurately without a fragile feedback encoder.

Our **control units** perform, especially in applications that rely on very precise and smooth running behaviour. We control motors in electron microscopes, accelerator experiments or also in paper production machines - with up to 1/512 step (102 400 positions per revolution with a 200 step motor). From the power amplifier to the modular, cost-effective multi-axis system we offer the right control concept for your requirements. You remain flexible with phytron, because we supplement the interest in and the ability of our customised products by developing them further. Customers from different industry sectors rely on our decades of experience in highly demanding application fields.


## Why buying a phytron product is always a good decision:

We are a customer-oriented high-technology company certified to ISO 9001 and EN13485. We have the process know-how of more than 300 stepper motors in space operations for the successful development of your demanding application!

We offer best service we also ask the right questions at the right time. Our Competence Center guarantees targeted consultation and therefore the early identification of requirements and any potential problems.

Based on our proven products used in the series, we develop solutions that provide precision work for our customers with extreme reliability. Whether for extreme environmental conditions or as a perfect fit for your particular application - phytron motors are always a good choice!

phytron combines the flexibility and client-specific consulting from a niche player with the efficiency and standardised quality assurance processes of series production. As quality conscious business we produce in Gröbenzell near Munich.



General Manager



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**phyMOTION™**  
Free programmable, modular multi axes controller for stepper motors



**MCC-2 LIN**  
Free programmable controller for two axes with linear power stages



**MCC-2**  
Free programmable controller for two axes



**MCC-1**  
Free programmable controller for one axis

DRIVES

POWER SUPPLY CPU INDEX POWER STAGE

Drives contain so-called indexers and power stages. You put instructions in a programming language to control signals, which boosts the internal power stage.



**1-STEP-DRIVE-5A-48V**  
Stepper motor module with integrated power stage for the SIMATIC ET 200®S

POWER STAGES

POWER SUPPLY CPU INDEX POWER STAGE

Stepper motor power stages are reinforced Control pulses/Motor direction or SIN/COS signals and directly control the stepper motor.



**APS**  
High performance stepper motor power stage module



**MSX**  
19" stepper motor power stage module for high performance



**ZMX+**  
19" stepper motor power stage module with ServiceBus



**SLS**  
19" sub-rack with plug-in stepper motor power stage modules



**MCD+**  
Compact stepper motor power stage with ServiceBus

POWER SUPPLIES

POWER  
SUPPLY

CPU

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POWER  
STAGE



**SPH 240 / 500 / 1013**

Power supply for stepper motor power stages and -controllers

ACCESSORIES



**USB-485 Converter**

Interface converter as stick for Phytron stepper motor controllers and power stage

SOFTWARE

Our free WINDOWS® programs allow to program, to monitor and to adjust power stages and controllers comfortable and clear via PC.



**phyLOGIC™ ToolBox**

Development environment for the phyMOTION™ stepper motor controller



**ServiceBus-Comm™**

Communication software for stepper motor power stages

**Phytron GmbH**

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T +49-8142-503-0 F +49-8142-503-190

# STAND-ALONE UNITS

Stand-alone Units are stepper motor controllers with an intelligent processor. You can execute sequential programs and the unit can operate via Host interface or also stand-alone.

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POWER  
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*phyMOTION™*

Free programmable, modular multi axes controller for stepper motors



MCC-2

Free programmable controller for two axes



MCC-2 LIN

Free programmable, linear controller for two axes



MCC-1

Free programmable controller for one axis





ENG [www.phytron.eu/phyMOTION](http://www.phytron.eu/phyMOTION)

# phyMOTION™

## Modular multi-axes controller for stepper motors

The *phyMOTION™* combines PLC and motion control functions into a flexible and convenient framework for multi axis stepper motor applications. The free software *phyLOGIC™* Toolbox, the LabVIEW interface, the Android-based touch interface (internal/external) and the open protocol for controller drive and parameterising create additional scope for development. The integra-

ted, high resolution power stages up to 15 A<sub>Peak</sub> at 120 V<sub>DC</sub> simplify the wiring significantly.

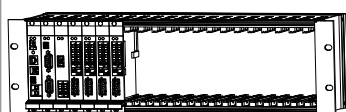
### Designed for Industry 4.0

The *phyMOTION™* can be operated below existing PLC systems as a slave system, as distributed intelligence or as a stand-alone motion control solution. Online parameterising and -diag-

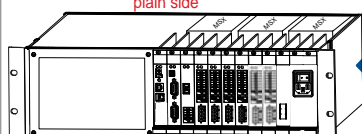
nostics are also standard feature as limit switch/reference switch inputs per axis. Each axis can be expanded with encoder (Endat, SSI- /Quadrature) and temperature evaluation. Besides standard PLC functions such as analogue and digital I/Os, a variety of interfaces (Ethernet, Profibus, Profinet, RS232/485, USB, Bluetooth) the *phyMOTION™* also provides linear and circular interpolation.

### In 4 steps to your stepper motor controller

#### 1 Choose the *phyMOTION™* type



Housing depth s



connection side

Housing depth p

Supply / Mains connection	Housing width	Touch Panel	Type of mounting	Supply
<b>external</b>	6SL-s, 8SL-s, 10SL-s or 21SL-s	integrated external	Rack, wall, rail mounting or bench	POWM01+MCM01 or MCM02
<b>internal</b> 230 V <sub>AC</sub> or 115 V <sub>AC</sub> Definition of the motor voltages*)	21SL-p	integrated external	Bench, rack or rack-inverse	POWM03+MCM01 or MCM03

\*) 3 supply modules 500 W each can be combined; also with different motor voltages (48 V, 70 V, 120 V).

2 Define host interface: CAN, Ethernet, ProfiBus/ProfiNet, RS 485, RS 232, RS 422, Bluetooth

3 Select the modules

4 Order and receive the fully assembled *phyMOTION™*

Any questions? Please call us! Together we will find your desired configuration: 0049-8142-503250



# Industrial

## Module selection for your phyMOTION™

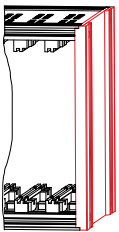
To make the module selection as comfortable as possible, we coded the modules by main and auxiliary functions.

- CPU** This main function is included in the respective module.
- CPU** The main function is not available in the respective module.
- I/O D** Auxiliary functions are shown only if the module supports them.
- POWER STAGE** \* means the main or auxiliary function is selectable as option.
- ENC \***

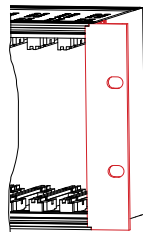
Main functions	<b>POWER SUPPLY</b>	The POWER SUPPLY function is marked when there is a power supply in the module (power supply unit).		
	<b>CPU</b>	Modules with CPU contain intelligent processors and can execute the total sequential programs and enable the phyMOTION™ to drive in stand-alone mode.		
	<b>INDEX</b>	The INDEXER represents the functionality to generate signals from commands of a programming language, which the power stage can amplify. Normally, the signal is control pulses/direction or SIN/COS.		
	<b>POWER STAGE</b>	POWER STAGE represents a stepper motor amplifier. Incoming control pulses/direction or SIN/COS signals are amplified and output to the motor..		
Auxiliary functions	<b>ENC</b>	Encoder evaluation	<b>POW IN</b>	Power distribution
	<b>TEMP</b>	Motor temperature evaluation	<b>COM</b>	Host interface
	<b>I/O D</b>	Digital inputs and/or outputs	<b>SAFETY</b>	Safe Torque Off
	<b>I/O A</b>	Analogue inputs and/or outputs		
	<b>...</b>			

## 1 Housing and Supply

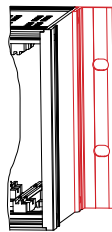
### Housing types of the phyMOTION™:



Bench or rail mounting



Rack mounting (connection side is the front)

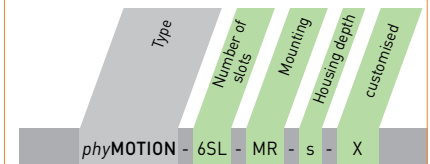


Wall mounting or rack-inverse (like rack mounting, but connection side is back)

Type / current supply	Slots	U	Width	Height	Depth	Mounting
s / external	6	24	137	132.5	121	R/W/MR/D
	8	32	177.6			
	10	40	218.3			
	21	84	442.4			
p / internal	21	84	442.4	132.5	360	R/RI/D

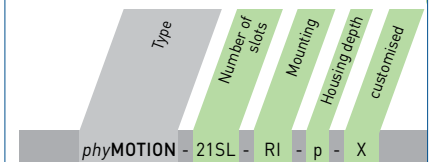
dimensions in mm  
Mounting bracket for rack, rack-inverse or wall mounting: +40.6 mm

### Ordering code "ext"



Options		
number of slots	6SL 8SL 10SL 21SL	6 slots 8 slots 10 slots 21 slots (=19")
mounting	W MR R D	wall mounting rail 19" sub rack bench
housing depth	s	small
customised	X	customer demand

### Ordering code "int"



Options		
number of slots	21SL	21 slots (=19")
mounting	R RI D	19" sub rack rack-inverse bench
housing depth	p	power
customised	X	customer demand

ext

### Main Supply (POWM01)

**The beginning of each phyMOTION™**

- Main supply:
  - 24 to 70 V<sub>DC</sub> supply voltage (for motors and generates internally the logic voltages) – max. 20 A
  - Electrically isolated 24 V<sub>DC</sub> for inputs/outputs, limit and reference switches
- Configuration
  - USB interface for programming and diagnostics
  - Device address switch
  - Reset key
  - Connection of an external phytron touch panel
- The external supply must be designed for the required current (e.g. by the PS5-48 power supply unit).

### Ordering Code

Mating connectors are included in delivery.

ext

### Intermediate Supply (POWM02)

**Maximum 20 A per supply**

- 24 to 70 V<sub>DC</sub> supply voltage (for motors and generates internally the logic voltages) – max. 20 A
- Electrically isolated 24 V<sub>DC</sub> for inputs and outputs, limit and reference switches
- The external supply must be designed for the required current (e.g. by the PS5-48 power supply unit).

### Ordering Code

Mating connectors are included in delivery.

ext

### External Power Supply Unit (SPH)

**Compatible Power Supply Unit (5 to 20 A)**

- Mains supply voltage 115 / 230 V<sub>AC</sub>
- Internally fused mains input
- Output voltage
  - 24 V<sub>DC</sub> (10 A / 20 A), 48 V<sub>DC</sub> (5 A / 10 A / 20 A), 72 V<sub>DC</sub> (6.7 A / 13.5 A)
- Permanently short circuit-proof output
- Overvoltage protection primary and secondary side
- Overtemperature protection
- Integrated fan
- Dimensions (WxHxD)
  - SPH240: 45 x 125 x 121
  - SPH500: 82 x 125 x 121
  - SPH1013: 66 x 230 x 183
- DIN rail or wall

### Ordering Code

Options		
Output power - Output	240-2410	24 V <sub>DC</sub> / 10 A
	240-4805	48 V <sub>DC</sub> / 5 A
	500-2420	24 V <sub>DC</sub> / 20 A
	500-4810	48 V <sub>DC</sub> / 10 A
	500-7207	72 V <sub>DC</sub> / 6.7 A
	1013-4821	48 V <sub>DC</sub> / 20 A
	1013-7214	72 V <sub>DC</sub> / 13.5 A
Mounting	H	Rear DIN rail
	W	Rear wall

Mating connectors are included in delivery.

Industrial

int

### Main Supply (POWM03)

**The main supply of the phyMOTION™**

- Configuration
  - USB interface for programming and diagnostics
  - Device address switch
  - Reset key
  - Connection of the external phytron touch terminal (TPE)
  - 24 V<sub>DC</sub> output (for e.g. sensors)

### Ordering Code

Type  
POWM03

Mating connectors are included in delivery.

int

### Intermediate Supply (POWM04)

**Maximum 20 A for subsequent power stages (except MSX)**

- 48 to 70 V<sub>DC</sub> Power supply (for motors and generates internally the logic voltages) – max. 20 A
- 24 V<sub>DC</sub> output (for e.g. sensors)

### Ordering Code

Type  
POWM04

Mating connectors are included in delivery.

int

### 230 V (115 V) Power Supply (NETM01)

**External mains voltage (230 V / 115 V)**

- Mains switch
- 230 V / 115 V mains voltage
- internal supply of the phyMOTION™ with motor and logic voltage
- per 500 W defined motor voltage (max. 3)
- additional grounding connection if motor voltage >70 V

### Ordering Code

Type  
Mains  
Motor voltage 1  
Motor voltage 2  
Motor voltage 3  
NETM01 - 230V - 70V - 70V - 48V

Options		
Mains	230 V 115 V	
Motor voltage	48 V 70 V 120 V	500 W each defined motor voltage (max. 3)

## 2 Host Interface

POWER SUPPLY

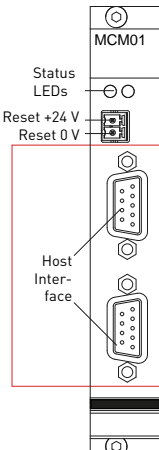
CPU

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POWER STAGE

COM

### Main Controller (MCM01)



**Intelligent CPU and bus:**

- Main CPU:
  - Controls and administers up to 64 modules
  - Program and register memory up to 4 MB
  - Internal memory expandable with future memory modules
  - Script program administration
  - Firmware administration
  - Elegant programming with *phyLOGIC*™ and G-Code
- Selectable communication interface:
  - CAN
  - Ethernet
  - ProfiBus/ProfiNet
  - RS 485, RS 232, RS 422
  - Bluetooth

### Ordering Code

Type	Host communication
MCM01	RSS01

Options		
Host communication	CANS01 ETHS01 PBS01 PNS01 RSS01 BTS01 NNS01	CAN-Bus Ethernet ProfiBus ProfiNet RS 232 or RS 485/422 Bluetooth no interface

Mating connectors are included in delivery.

POWER SUPPLY

CPU

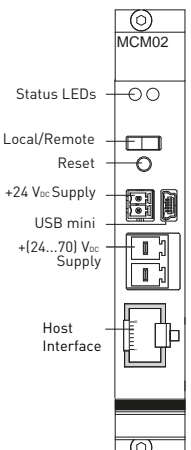
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POWER STAGE

COM

POW IN

### Main Controller (MCM02)



**Intelligent CPU, bus and supply:**

- Main CPU:
  - Controls and administers up to 64 modules
  - 24 to 70 V<sub>DC</sub> supply voltage
  - Mini USB interface
  - Program and register memory up to 4 MB
  - Internal memory expandable with future memory modules
  - Script program administration
  - Firmware administration
  - Elegant programming with *phyLOGIC*™
- Selectable communication interface:
  - Ethernet
  - ProfiBus/ProfiNet
  - Bluetooth

### Ordering Code

Type	Host communication
MCM02	PBS01

Options		
Host communication	ETHS01 PBS01 PNS01 BTS01 NNS01	Ethernet ProfiBus ProfiNet Bluetooth no interface

Mating connectors are included in delivery.

POWER SUPPLY

CPU

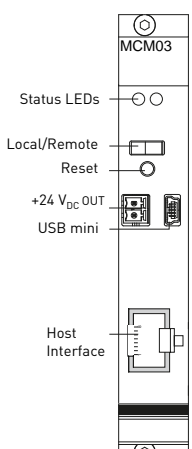
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POWER STAGE

COM

POW IN

### Main Controller and Supply (MCM03)



**Intelligent CPU, bus and for internal supply:**

- Main CPU:
  - Controls and administers up to 64 modules
  - Program and register memory up to 4 MB
  - Internal memory expandable with future memory modules
  - Script program administration
  - Firmware administration
  - Elegant programming with *phyLOGIC*™
- Selectable communication interface:
  - Ethernet, ProfiBus/ProfiNet, Bluetooth
- 24 V<sub>DC</sub> output (for e.g. sensors)

### Ordering Code

Type	Host communication
MCM03	PBS01

Options		
Host communication	ETHS01 PBS01 PNS01 BTS01 NNS01	Ethernet ProfiBus ProfiNet Bluetooth no interface

Mating connectors are included in delivery.

Industrial

3 Power Stages, Indexer, I/Os (analog/digital) & HMI

POWER SUPPLY

CPU

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POWER STAGE

ENC \*

TEMP \*

### 1 Axis Stepper Motor Drive (I1AM01)

int

#### Indexer with integrated 3.5 A power stage

- Integrated indexer for standard functions:
  - Relative and absolute positioning
  - Reference movements/speed mode
  - Step frequency to 40,000 steps/second
- Integrated 3.5 A power stage
  - 3.5 A<sub>PEAK</sub> at 24 to 48 V<sub>DC</sub> (derating dep. on application)
  - Selectable step resolution up to 1/256 step
  - Online power stage parameterisation and diagnostics
- 3 limit/reference switches
- Optional encoder evaluation
  - SSI/ Quadratic Incremental (ECAS01) or Endat (ECES01); Resolver (ECMS01)
- Optional motor temperature evaluation
  - for Pt100 sensors (PTS01) or K types (KTS01)

Ordering Code

Options		
Encoder evaluation	ECES01 ECAS01 ECMS01	ENDAT encoder SSI/QUADR. encoder Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

POWER SUPPLY

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\* POWER STAGE

ENC \*

TEMP \*

### 1 Axis Stepper Motor Drive (I1AM02)

#### Indexer with selectable APS power stage

- Integrated indexer for standard functions:
  - Relative and absolute positioning
  - Reference movements/speed mode
  - Step frequency to 40,000 steps/second
  - Up to 5 A<sub>PEAK</sub> at 24 to 70 V<sub>DC</sub> (derating dep. on application)
  - Selectable step resolution up to 1/256 step
  - Online power stage parameterisation and diagnostics
- 3 limit/reference switches
- Optional encoder evaluation
  - SSI/ Quadratic Incremental (ECAS01) or Endat (ECES01); Resolver (ECMS01)
- Optional motor temperature evaluation
  - for Pt100 sensors (PTS01) or K types (KTS01)

Ordering Code

Options		
Power stage	APS01	Int. power stage 5A/70V
Encoder evaluation	ECES01 ECAS01 ECMS01	Integr. ENDAT encoder SSI/QUADR. encoder Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

POWER SUPPLY

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POWER STAGE

### 4 Axes High End Indexer (I4XM01)

#### Indexer module

- 1, 2, 3 and 4 axes stepper motor indexer
- Circular interpolation for 2 any axes
- Linear interpolation for 4 axes (also for reduction gears axes)
- Additional Control Pulses/Direction input and output for "electronic wave"
- Expanded indexer functions:
  - Velocity/end position during the movement changeable
  - Variable, short ramps; high velocities
  - Interpolation also for gear axes
  - High speed: up to 500,000 steps/second
  - ...

Ordering Code

Mating connectors are included in delivery.

\* see page 2

POWER SUPPLY

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\* POWER STAGE

ENC \*

TEMP \*

### 1 Axis Carrier Module for APS Power Stage (INAM01)

#### APS, encoder and temperature

- Requires an upstream installed indexer for interpolation (i.e. I4XM01)
- Currently the high end power stage APS01 can be selected
  - Up to 5 A<sub>peak</sub> for 24 to 70 V<sub>DC</sub> (derating dep. on application)
  - Precision up to 1/512 step resolution
  - Online parameterisation and diagnostics
- 3 limit/reference switches
- Optional encoder evaluation
  - SSI/ Quadratic Incremental (ECAS01); Endat (ECES01); Resolver (ECMS01)
- Optional motor temperature evaluation
  - For Pt100 sensors (PTS01)
  - K types (KTS01)

### Ordering Code

Type    Power stage    Encoder evaluation    Temperature evaluation

INAM01 - APS01 - ECAS01 - PTS01

Options		
Power stage	APS01	Int. power stage 5A/70V
Encoder evaluation	ECES01 ECAS01 ECMS01	ENDAT encoder SSI/QUADR. encoder Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

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\* POWER STAGE

ENC \*

SAFETY

### Power Stage Module with Safe Torque Off (INSM01)

#### APS, STO and Encoder

- with Safe Torque Off function SIL3/PlE
- Currently the high end power stage APS01 can be selected
  - Up to 5 A<sub>peak</sub> for 24 to 70 V<sub>DC</sub> (derating dep. on application)
  - Precision up to 1/512 step resolution
  - Online parameterisation and diagnostics
- 3 limit/reference switches
- Optional encoder evaluation
  - SSI/ Quadratic Incremental (ECAS01); Endat (ECES01); Resolver (ECMS01)

**NEW**

### Ordering Code

Type    Power stage    Encoder evaluation

INSM01 - APS01 - ECAS01

Options		
Power stage	APS01	Int. power stage 5A/70V
Encoder evaluation	ECES01 ECAS01 ECMS01	ENDAT encoder SSI/QUADR. encoder Resolver no encoder module

Mating connectors are included in delivery.

POWER SUPPLY

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\* POWER STAGE

ENC \*

TEMP \*

### 1 Axis Module for integrated MSX Power Stage (INAM02)

#### MSX Power stage, encoder and temperature

- Requires an upstream installed indexer for interpolation (i.e. I4XM01)
- Currently the high end power stage MSX can be selected
  - Up to 15 A<sub>PEAK</sub> for up to 120 V<sub>DC</sub>
  - Precision up to 1/20 step resolution
- 3 limit/reference switches
- Optional encoder evaluation
  - SSI/Quadratic Incremental (ECAS01) or Endat (ECES01); Resolver (ECMS01)
- Optional motor temperature evaluation
  - For Pt100 sensors (PTS01)
  - K-types (KTS01)
- additional grounding if motor voltage >70 V (PEM01) via NETM01

**int**

### Ordering Code

Type    Power stage    Encoder evaluation    Temperature evaluation

INAM02 - MSX - ECAS01 - PTS01

Options		
Power stage	MSX	Power stage up to 15 A/70 V
Encoder evaluation	ECES01 ECAS01 ECMS01	ENDAT encoder SSI/QUADR. encoder Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

\* see page 2

Industrial

POWER SUPPLY

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POWER STAGE

ENC \*

TEMP \*

### Indexer Interface (EXAM01) for External Power Stage

#### Interface between indexer and external power stages

- Requires an upstream installed indexer (i.e. I4XM01)
- Outputs Control pulses/Direction/Boost and Enable to an external power stage
- External power stages with ServiceBus can be parameterised online by the interface on the indexer module (i.e. I4XM01) and be diagnosed.
- 3 limit/reference switches
- Optional encoder evaluation
  - SSI/ Quadratic Incremental (ECAS01) or Endat (ECES01); Resolver (ECMS01)
- Optional motor temperature evaluation
  - for Pt100 sensors (PTS01) or K types (KTS01)

### Ordering Code

EXAM01 - ECES01 - PTS01

Options		
Encoder evaluation	ECES01 ECAS01 ECMS01	ENDAT encoder SSI/QUADR. encoder Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

POWER SUPPLY

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POWER STAGE

I/O D  
POW IN

### Digital I/Os (DIOM01)

#### Digital I/O module

- 8 digital inputs 24 V<sub>DC</sub>
- 8 digital outputs 24 V<sub>DC</sub>, max. 1 A
- 24 V supply of the inputs and outputs is centrally delivered either by the power modules or directly at the DIOM01.
- DIOM01 can also be used as a single channel counter module.

### Ordering Code

DIOM01

Mating connectors are included in delivery.

POWER SUPPLY

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POWER STAGE

I/O A

### Analogue Inputs (AIM01)

#### Analogue input module

4 analogue inputs: ± 10 V bipolar, 0...10 V, 0...20 mA

Resolution: 14 Bit

Sample rate: 416 Hz

Electrically isolated

### Ordering Code

AIM01

Mating connectors are included in delivery.

\* see page 2



POWER SUPPLY

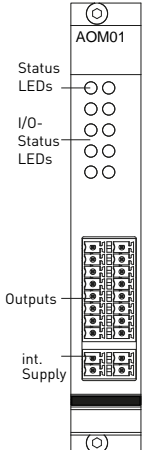
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POWER STAGE

I/O A

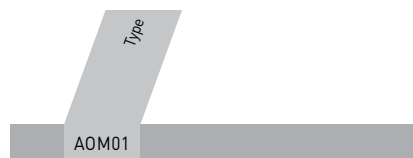
### Analogue Outputs (AOM01)



**Analogue output module**

- 4 analogue outputs
- Max. output current: 16 mA
- Electrically isolated
- Resolution: 16 Bit
- Short-circuit proof
- Thermal overload protection

Ordering Code



Mating connectors are included in delivery.

POWER SUPPLY

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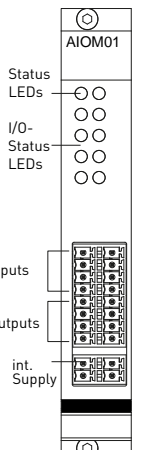
POWER STAGE

I/O A

TEMP

ENC

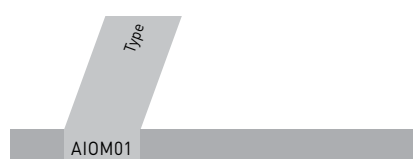
### Analogue Inputs and Outputs (AIOM01)



**Analogue input and output module**

- 4 analogue inputs and outputs included
- Inputs:  $\pm 10$  V bipolar, 0...10 V, 0...20 mA
- Resolution: 14 Bit
- Outputs: Max. output current: 16 mA
- Resolution: 16 Bit
- Short-circuit proof
- Thermal overload protection
- Electrically isolated

Ordering Code



Mating connectors are included in delivery.

POWER SUPPLY

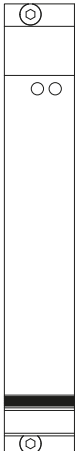
CPU

INDEX

POWER STAGE

I/O A

### Customised Modules



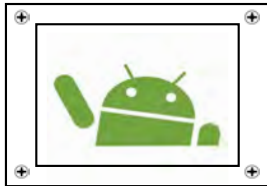
**On demand**

Customised modules can be realised on demand.

Industrial

HMI-Interfaces

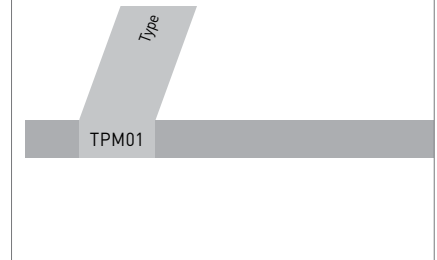
Android-based integrated Touch Panel (TPM01)



Integrated human-machine interface

- 800 x 480 px – TFT display
- Integrated in the phyMOTION™ housing
- Touch functionality
- As user interface i.e. for parameter selection
- For support, parameterisation and diagnostics

Ordering Code



Control via Android-based Tablets (from version V 4.0)



External human-machine interface

- from 480 x 800 px (recommended: 7"-display) – TFT display
- For connection to the POWM01 main power module (Ethernet or WLAN) or to the MCM01/MCM02 module (Bluetooth)
- Touch functionality
- As user interface i.e. for parameter selection
- For support, parameterisation and diagnostics

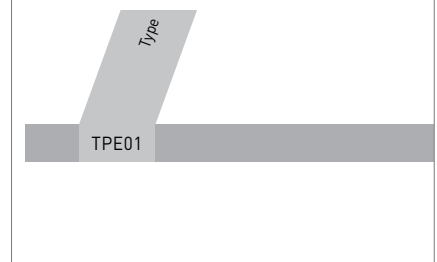
Control with Operator Touch Panel (TPE01)



External human-machine interface

- For connection to the POWM01 main power module (terminal interface)
- 800 x 480 px – TFT display
- Touch functionality
- For configuration, service and diagnostics
- Housing:
  - Rear cover: galvanised steel BTK
  - housing frame: PC UL 94 V0 BTA
  - front frame: aluminium anodised
- up to IP 65/DIN EN 60529

Ordering Code



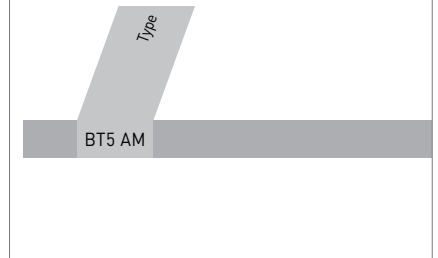
## Control with Operator Panel BT5 AM



### External human-machine interface

- For connection to the POWM01 main power module (terminal interface)
- For support, parameterisation and diagnostics
- Status display, operating mode
- Parameter reading
- Function keys
- Remote or Local mode

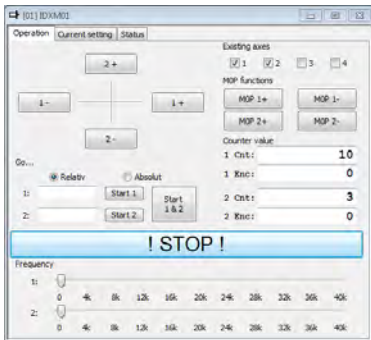
### Ordering Code



Industrial

Software

phyLOGIC™ ToolBox



Free of charge development environment

- Operating software and development environment for the phyMOTION™ phytron controller
- Easy to program: Drawing and converting of 2D contours in phyLOGIC™ commands (Motion Creator)
- 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

phyLOGIC™ Control



Free of charge App for tablets and mobile phones

- Operating software for tablets connected to the phyMOTION™ phytron controller
- Direct mode, operating mode, I/O monitor, configuration of the controller
- Status display and parameter reading

LabVIEW®-VI



VIs for phyMOTION™

- Simulation software with a graphical style
- Use the VIs (Virtual Instruments) generated by Phytron and integrate them in your LabVIEW® project. So you can easily control the phytron controller phyMOTION™ from your usual programming environment.

## EPICS Motor Module



### Software environment for large-scale experiments

- Software environment to develop and realise distributed control systems for large-scale experiments such as telescopes and accelerators. EPICS provides the SCADA support.
- Download of the driver at: <http://www.aps.anl.gov/bcda/synApps/motor/tar/motorR6-9.tar.gz> to integrate the phytron controller *phyMOTION™* into the EPICS environment.
- Also in multi-axis operation: positioning, limit switches, encoder evaluation

Industrial

Equipment

Motor Shield Clamp



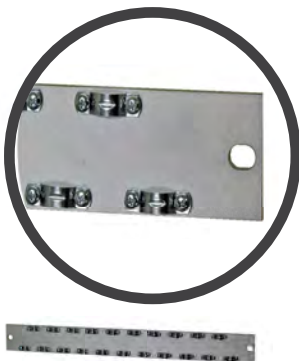
Shielding for motor connection

- Easy to go
- Plug-in connection for motor shielding of the following modules of the phytron controller *phyMOTION™*: INAM-, EXAM-, I1AM01- or I1AM02-module
- On delivery: shielded clamp with cableties and screws
- The motor connectors are included in the package of your *phyMOTION™* controller.

Ordering ID

# 10015002

Strain Relief for Motor cable



Mountable rail for strain relief of the motor cables

- Dimension: (482.6 x 44.5 x 8) mm
- Material: Aluminium
- 21 cable clamps
- Mountable at the 19"-switching cabinet with two M3 screws

Ordering ID

# 10019310

Carrying and Assembly Handle



For 19"-Housing

- Shapely and universal
- Grip adjustment by pushbutton by 30°
- Material:  
handle profile: extruded aluminium  
handle bar, housing adapter:  
zinc die cast
- Surface:  
handle bar: RAL 9011 graphite black  
pushbutton, screw lens:  
black plastic
- Carrying capacity: 50 kg

int

Ordering ID

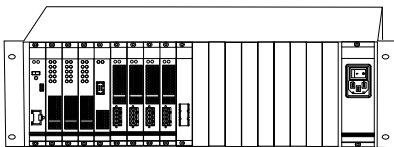
# 10019311

## 4 Order and Receive the Fully Assembled phyMOTION™

### Configuration Example

#### phyMOTION™ with internal supply

int



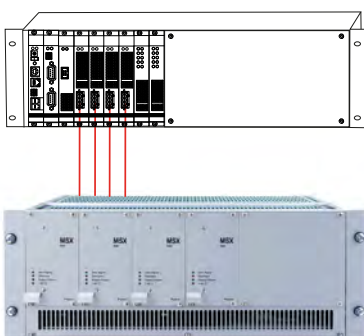
Ordering code example:

	Ordering code	Description
Housing	phyMOTION-21SL-R-p	19" subrack housing, housing depth 360 mm

Modules	Ordering code	Description
Slot 1	MCM03-ETHS01	Main controller with Ethernet interface, internal supply
Slot 2	DIOM01	Digital I/O module
Slot 3	DIOM01	Digital I/O module
Slot 4	DIOM01	Digital I/O module
Slot 5	I4XM01	4 axes indexer module
Slot 6	INAM02-MSX-ECAS01	MSX power stage with Quadratic encoder evaluation
Slot 7	INAM02-MSX-ECES01	MSX power stage with Endat encoder evaluation
Slot 8	INAM02-MSX-ECAS01	MSX power stage with Quadratic encoder evaluation
Slot 9	INAM01-APS01-ECES01-KTS	Internal 5 A power stage with Endat-Enc./Motor temp.-evaluation
Slot 10 -19	-	blank front panels
Slot 20	NETM01-230V-120V-120V-120V	Ext. mains voltage 230 V, 3 x 500 W for 120 V

#### phyMOTION™ with SLS

ext



Ordering Code Example:

	Ordering code	Description
Housing	phyMOTION-21SL-R-p	19" subrack housing, housing depth 360 mm

Modules	Ordering code	Description
Slot 1	POWM01	Main supply module
Slot 2	MCM01-RSS485	Main controller with RS 485 interface
Slot 3	I4XM01	4 axes indexer module
Slot 4	EXAM01-ECAS01	Indexer interface for MSX power stage with Quadr.-encoder eval.
Slot 5	EXAM01-ECAS01	Indexer interface for MSX power stage with Quadr.-encoder eval
Slot 6	EXAM01-ECAS01	Indexer interface for MSX power stage with Quadr.-encoder eval
Slot 7	EXAM01-ECES01-KTS	Indexer interface for MSX power stage with Endat-encoder-/Motor temp. evaluation
Slot 8	DIOM01	Digital I/O module
Slot 9	DIOM01	Digital I/O module



# APPLICATION in SCIENCE



## Use for Vacuum Chambers



Vacuum chambers are the core of many modern research and production plants.

The *phyMOTION™* offers additional functions for the control of also complex machines from outside the vacuum chamber such as temperature monitoring, encoder and resolver evaluation as well as linear and circular interpolation for high-precision positioning. The heating of the motors is minimised in the application by the high-quality power stage design.

The *phyMOTION™* with integrated power stages close to the vacuum chamber allows a low-noise monitoring of the temperature sensors and a direct motor cable connection.

For large systems make sure that the automation for the vacuum actuators can be seamlessly integrated into the existing PLC world despite the special requirements.

The integrated power stages can be optionally provided with temperature monitoring and encoder evaluation.

The integrated field bus interface allows both the control out of a PLC system SPS-System and the operation via supplied software, LabView interface or touch panel.



The *phyMOTION™* is also successfully used in the research plant Max Planck Institute for Extraterrestrial Physics, Neuried for aligning optical systems in a vacuum.

The controller is controlled via Ethernet and LabView.



Configuration:

*phyMOTION™* with external supply:

MCM01, POWM01, POWM02, 2 x I4XM01, 6 x I1AM01, 2 x DIOM01

# APPLICATION in FOOD



## XY Alignment for Cutting Baked Wafer Blanks



The *phyMOTION*™ is part of the circular cutting machine for wafers. Here, the baking wafers are cut with a rotating circular blade out of the baked blanks



The radius-dependent, area optimisation XY positioning of the semi-finished goods under the punching knife is controlled by the *phyMOTION*™. The external touch panel allows a comfortable operation.



Configuration:

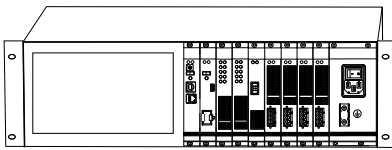
*phyMOTION*™ in combination with a plug-in power stage unit SLS with internal power supply: MCM02 with ETHS01, I4XM01, 2x INAM02, 1x DIOM01, 2x MSX152 power stages, external touch operator panel

Industrial

Configuration Example

ext

19" rack housing with internal supply and integrated touch panel: 4 axes with indexer and I/Os



Ordering Code Example:

	Ordering Code	Description
Housing	phyMOTION-21SL-p	19" rack mounting housing with 10 slots, integrated touch panel and depth 360 mm

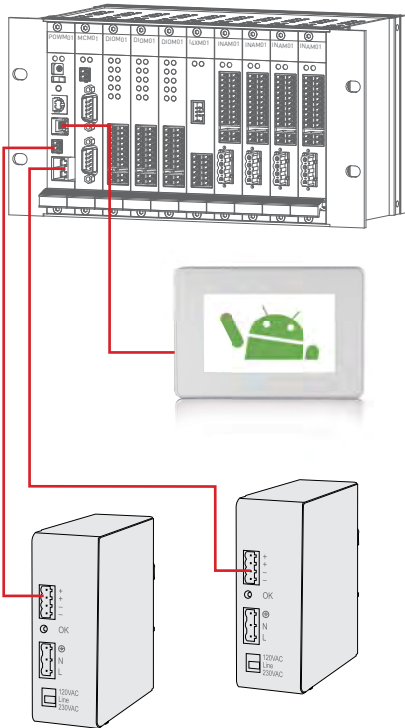
Module	Ordering Code	Description
TPM01	TPM01	Android-based integrated touch panel
Slot 1	POWM03	Main power supply
Slot 2	MCM03-PBS01	Main controller with ProfiBus interface
Slot 3	DIOM01	Digital I/O module
Slot 4	DIOM01	Digital I/O module
Slot 5	I4XM01	4 axes indexer module
Slot 6	INAM01-APS01-ECAS01	Internal 5 A power stage with Quadratic encoder evaluation
Slot 7	INAM02-MSX-ECMS01	1 axis module for integrated MSX power stage with resolver
Slot 8	INAM02-MSX-ECMS01	1 axis module for integrated MSX power stage with resolver
Slot 9	INAM02-MSX-ECMS01	1 axis module for integrated MSX power stage with resolver
Slot 10	NETM01	230 V [115 V] supply with grounding connection if motor voltage >70 V

Industrial

Configuration Example

10-Slot housing for rack mounting: 4 axes with indexer and I/Os

ext



Ordering Code Example:

	Ordering Code	Description
Housing	phyMOTION-10SL-R-s	Rack mounting housing with 10 slots and depth 120 mm
<b>Module</b>		
Module	Ordering Code	Description
Slot 1	POWM01	Main power supply
Slot 2	MCM01-RSS01	Main controller with RS 485 interface
Slot 3	DIOM01	Digital I/O module
Slot 4	DIOM01	Digital I/O module
Slot 5	DIOM01	Digital I/O module
Slot 6	I4XM01	4 axes indexer module
Slot 7	INAM01-APS01-ECAS01	Internal 5 A power stage with Quadratic encoder evaluation
Slot 8	INAM01-APS01-ECES01	Internal 5 A power stage with ENDAT encoder evaluation
Slot 9	INAM01-APS01-ECAS01-PTS	Internal 5 A power stage with Quadratic encoder- and motor temperature evaluation with PT sensor
Slot 10	INAM01-APS01-ECES01-KTS	Internal 5 A power stage with ENDAT encoder- and motor temperature evaluation with K types
<b>Power supply</b>		
Power supply	SPH240-2410-W	External power supply unit with 240 W, 24 V <sub>DC</sub> output voltage and 10 A for rear wall
Power supply	SPH240-4805-W	External power supply unit with 240 W, 48 V <sub>DC</sub> output voltage and 5 A for rear wall
TPE	TPE	External Operator Touch Panel

All illustrations, descriptions and technical specifications are subject to modifications, no responsibility is accepted for the accuracy of this information.

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ENG [www.phytion.eu/MCC-2](http://www.phytion.eu/MCC-2)

## MCC-2

### Programmable controller for two axes

The MCC-2, phytion's freely programmable dual axis stepper motor controller, is a compact stand-alone unit (CPU, Indexer and power stage) for 2 phase stepper motors providing up to 3.5 A<sub>PEAK</sub> phase current.

Controllers in the MCC series have many inputs and outputs (digital and analog) and encoder inputs for step position monitoring plus possibilities to connect limit switches all as standard.

Due to the variety of available host interfaces (Ethernet, Profibus, USB etc.), the MCC can

be quickly and easily integrated into existing applications.

This controller is easy to program and can operate either directly (remote) via its host interface or stand-alone (local) with the program routines stored within.

#### Applications

As a compact stand-alone device, it convinces especially in small experimental setups, machines and equipment, which can be dispensed in a PLC.

#### In Focus



Stand-alone



Integrated Driver



Digital



Analogue



El. Isolated

- 2 axes stepper motor control unit with integrated power stages
- Bipolar control of 2 phase stepper motors
- Phase currents up to 3.5 A<sub>PEAK</sub>
- Power supply 24 to 48 V<sub>DC</sub>
- Step resolution 1/1 up to 1/256 step
- Host interfaces: Ethernet, USB, Profibus, RS 485 or RS 232
- Interfaces:
  - 2 encoders
  - 2 analogue inputs
  - 8 digital inputs and 8 outputs
  - 4 limit switches
  - 2 redundant designed enable inputs
- Programming in well-tried MiniLog format, acc. to DIN 66025 or in LabVIEW®
- LabVIEW® driver for including the MCC in your LabVIEW® project
- Remote or local mode

#### Highlights



LabVIEW®

#### LabVIEW®

LabVIEW® is a simulation software with a graphical interface. Use the VIs (Virtual Instruments) generated by phytion and integrate them in your LabVIEW® project. So you can easily control the MCC from your usual programming environment.

#### MiniLog-Comm®

MiniLog-Comm® is phytion's communication software running under Windows® to facilitate programming of the stepper motor controller. It provides quick and easy generation of sequential programs.

MiniLog-Comm® software is delivered free with phytion controllers and offers additional functions for test mode, step by step control or single sequence command execution of a motor move, a motor status window and even a Motion Creator.

#### Stand-alone



Stand-alone

Once programmed the MCC-2 can work without additional PC/controller.

#### PROFI®BUS



PROFI®BUS

As suggested by our customers now with optional Profibus interface!

## Industrial

## Specification

## Mechanical

Dimensions (W x H x D)	72 x 127 x 110 mm; 90 x 127 x 110 mm with attached USB converter or terminal adaptor
Weight	Approx. 950 g
Mounting	Wall- or rail mounting

## Features

Stepper motors	Suitable for the control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Supply voltage	Controller and motor: 24 to 48 V <sub>DC</sub> ; Limit switches and outputs: 24 V <sub>DC</sub>
Phase current	Up to 3.5 A <sub>PEAK</sub>
Step resolution	1/1, 1/2, 1/4, 1/5, 1/8, 1/10, 1/20; for smoother motor rotation: 1/32, 1/64, 1/128 up to 1/256 step of a full step
Step frequency	40,000 steps/sec
Hardware error detection	<ul style="list-style-type: none"> <li>• Short circuit (between phase and power supply; between both phases; within a motor against ground))</li> <li>• Over temperature</li> <li>• Under voltage</li> </ul>
Cable length	Motor: shielded: 50 m max. Signal: shielded: 100 m max.
Diagnostic LEDs	Ready, busy, error
Operating mode	"Remote" - via bus; "Local" - stand-alone mode with sequence program

## Interfaces

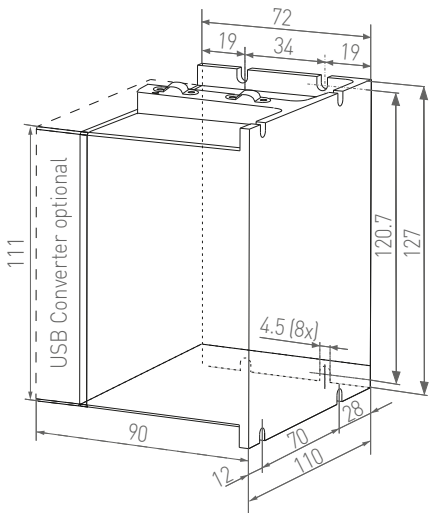
Analogue outputs	2 x (A, B, C, D) for two 2 phase stepper motors
Digital outputs	8 digital outputs, overload-proof, each electrically isolated from power supply / 24 V power supply fed separately; the maximum load is 1 A on each output; 4 A for all outputs
Host interface	Optional: Ethernet, USB, Profibus, RS 485, RS 232
Analogue inputs	2 x 10 Bit AD converter e. g. for a joystick. The joystick power (5 V <sub>DC</sub> ; 100 mA max.) is provided by the controller
Digital inputs	<ul style="list-style-type: none"> <li>• 8 digital inputs, electrically isolated, 24 V input level</li> <li>• 4 limit switches: type PNP NCC or NOC</li> <li>• 2 encoders for optional differential incremental encoder or SSI absolute encoder; provided by the controller (5.3 V<sub>DC</sub>, max. 200 mA)</li> <li>• 2 Motor Enable</li> </ul>

## Communication and Programming

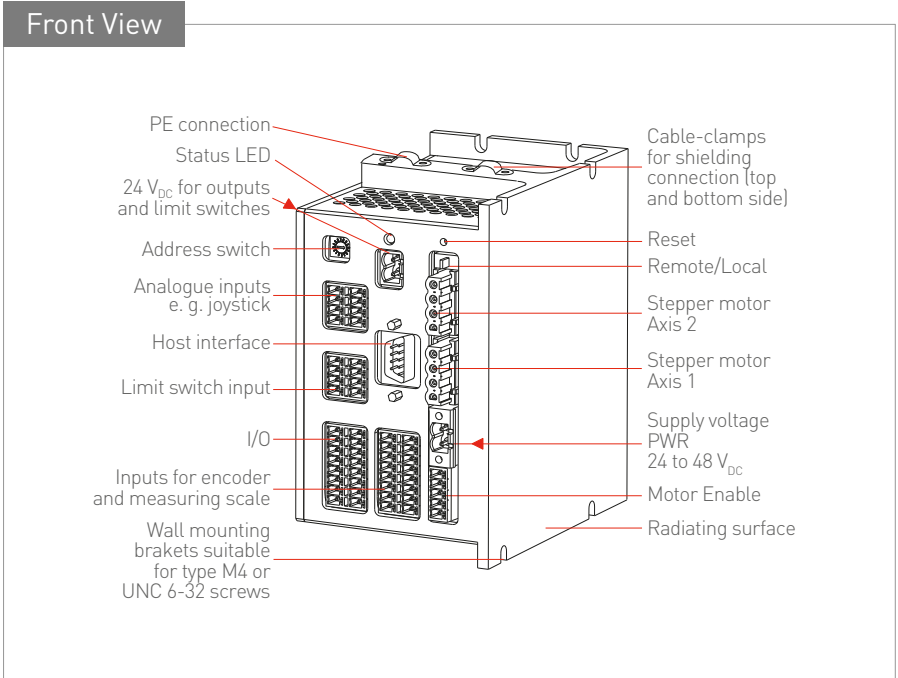
Programming	MiniLog format acc. to DIN 66025 – MiniLog-Comm® (included in delivery) – LabVIEW® VIs (included in delivery)
Memory	128 kB program memory

## Operating Conditions

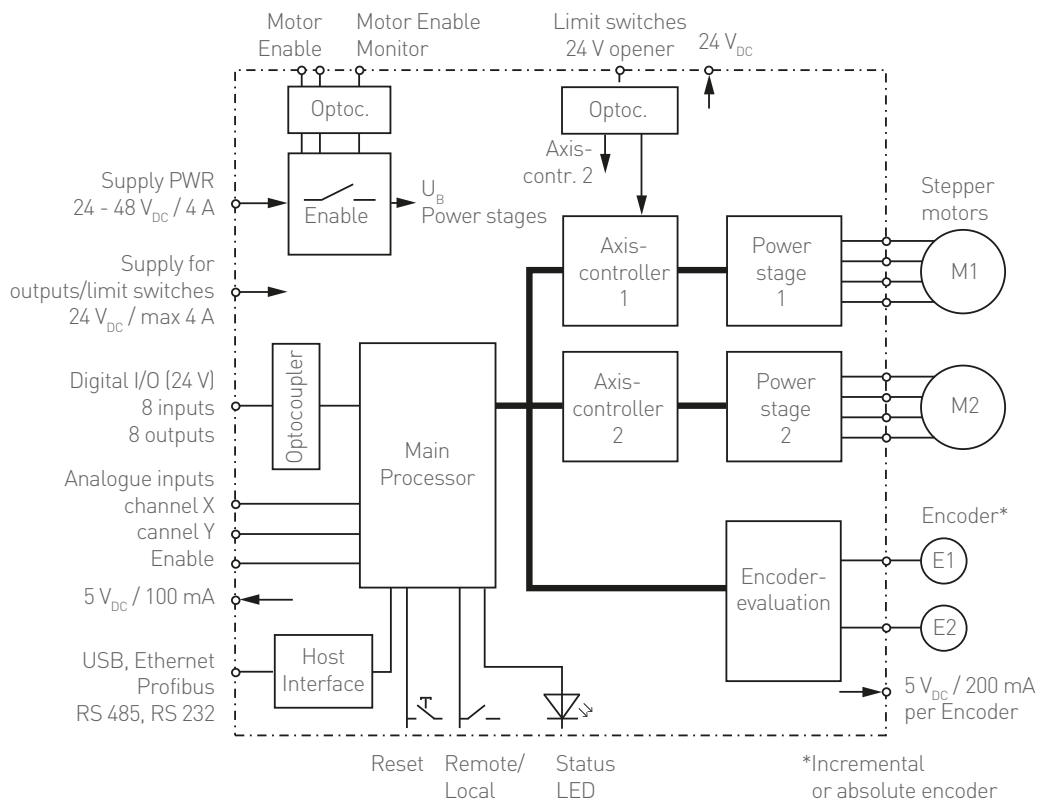
Temperatures	Operation: +5 to +50 °C; storage and transport: -10 to +85 °C
Degree of pollution	Level 2
Relative humidity	5 to 85 %, class 3K3 non-condensing
Protection class	IP 20
EMC immunity/ EMC emission	Acc. EN 61000-3-2 Acc. EN 61000-6-1, -3, -4 Acc. EN 6100-4-2...6, -11
Approval	CE



Dimensions in mm



### Block Diagram

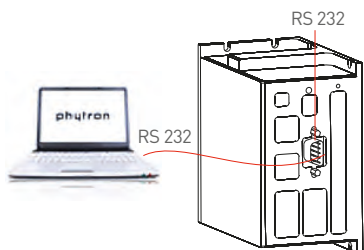




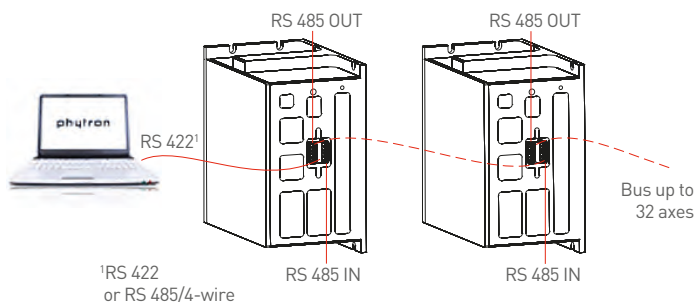
Industrial

Configurations

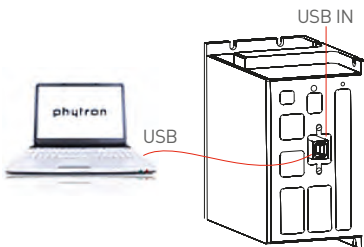
MCC-2 with RS 232 Port



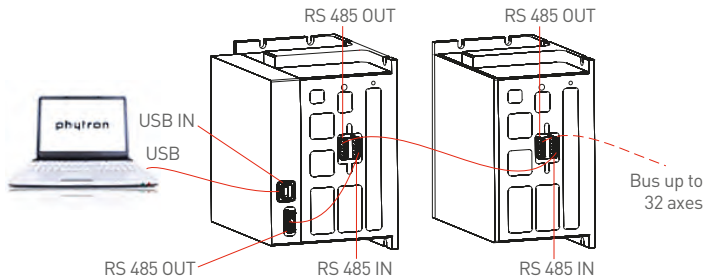
MCC-2 with RS 485 Port / Stand-alone Mode / Bus Mode



MCC-2 with USB Port



MCC-2 with attached USB Converter and RS 485 Port / Bus Mode



Ordering Code

The variable elements of the product are displayed in colour.

Type	Current / Chopper	Motor voltage	Step resolution	Host interface	Mounting	Terminal adaptor
MCC-2	32	48	MINI	USB	W	B

Ordering code MCC-2 - 32 - 48 - MINI - USB - W - B

Options

Host interface	ETH USB RS 485 RS 485-USB RS 232 PB	Ethernet port USB port RS 485/4-wire port RS 485/4-wire + USB converter RS 232 port Profibus port
Mounting	W H	Wall mounting With attached clip for DIN rail mounting
Adaptor	B	RS 232 adaptor for BT 5 operator terminal

Windows® is a trade mark of Microsoft.  
 LabVIEW® is a trade mark of National Instruments Corporation.  
 MiniLog-Comm® is a trade mark of Phytron GmbH.  
 PROFIBUS is a standard of the PROFIBUS fieldbus organisation. (PI).

Extent of Supply

- A CD-ROM with MiniLog-Comm® software, LabVIEW® VIs and USB driver
- Connector set
- Mini USB-RS 485 converter

Optional Accessories

- Cable assembly
- Power supply unit SPH 240-4805
- BT 5 operator terminal
- Mini USB-RS 485 converter

Phytron GmbH

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ENG [www.phytion.eu/MCC-2lin](http://www.phytion.eu/MCC-2lin)

## MCC-2 LIN

### Linear controller for two axes

The MCC-2 LIN, phytion's freely programmable dual axis stepper motor controller, is a compact stand-alone unit (CPU, Indexer and power stage) for 2 phase stepper motors providing up to 1.7 A<sub>PEAK</sub> phase current.

Controllers in the MCC series have many inputs and outputs (digital and analogue) and encoder inputs for step position monitoring plus possibilities to connect limit switches all as standard.

Due to the variety of available host interfaces

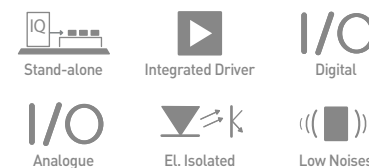
(USB, Ethernet etc.), the MCC can be quickly and easily integrated into existing applications.

This controller is easy to program and can operate either directly (remote) via its bus or stand alone (local) with the program routines stored within.

#### Application

As a compact stand-alone device, it convinces especially in small experimental setups, machines and equipment, which can be dispensed in a PLC.

#### In Focus



- 2 axes stepper motor control unit with integrated power stages
- Use in EMC-sensitive applications possible
- Phase currents up to 1.7 A<sub>PEAK</sub>
- Power supply 24 to 48 V<sub>DC</sub>
- Step resolution 1/1 up to 1/256 step
- Host interfaces: USB, Ethernet, RS 485 or RS 232
- Interfaces:
  - 2 encoders
  - 2 analog inputs
  - 8 digital inputs and 8 outputs
  - 4 limit switches
  - 2 redundant designed enable inputs
- Programming in well-tried MiniLog format, acc. to DIN 66025 or in LabVIEW®
- LabVIEW® drivers for including the MCC in your LabVIEW® project
- Remote or local mode

#### Highlights



LabVIEW®



Stand-alone

#### Stand-alone

Once programmed the MCC-2 LIN can work without additional PC/controller.



Low Noises

#### Low Noises

Low noises operation for sensitive applications for medical and scientific applications.

#### LabVIEW®

LabVIEW® is a simulation software with a graphical interface. Use the VIs (Virtual Instruments) generated by phytion and integrate them in your LabVIEW® project. So you can easily control the MCC from your usual programming environment.

#### MiniLog-Comm®

MiniLog-Comm® is phytion's communication software running under WINDOWS® to facilitate programming of the stepper motor controller. It provides quick and easy generation of sequential programs.

MiniLog-Comm® software is delivered free with phytion controllers and offers additional functions for test mode, step by step control or single sequence command execution of a motor move, a motor status window and even a Motion Creator.

## Industrial

## Specification

## Mechanical

Dimensions (W x H x D)	108 x 127 x 110 mm; 126 x 127 x 110 mm with attached USB converter or terminal adaptor
Weight	Approx. 1350 g
Mounting	Wall or rail mounting

## Features

Stepper motors	Suitable for the control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Supply voltage	Controller and motor: 24 to 48 V <sub>DC</sub> ; Limit switches and outputs: 24 V <sub>DC</sub>
Phase current	Up to 1.7 A <sub>PEAK</sub>
Step resolution	1/1, 1/2, 1/4, 1/5, 1/8, 1/10, 1/20; for smoother motor rotation: 1/32, 1/64, 1/128 up to 1/256 step of a full step
Step frequency	40,000 steps/sec
Physical resolution	Approx. 51,200 positions per revolution (0.007°/step) with a 200 step motor. An encoder with a counter should be considered for very fine positioning.
Hardware error detection	<ul style="list-style-type: none"> <li>• Short circuit (between phase and power supply; between both phases; within a motor against ground))</li> <li>• Over temperature</li> <li>• Under voltage</li> </ul>
Cable length	Motor: shielded: 50 m max. Signal: shielded: 100 m max.
Diagnostic LEDs	Ready, busy, ERROR
Operating mode	"Remote" - via bus; "Local" - stand-alone mode with sequence program

## Interfaces

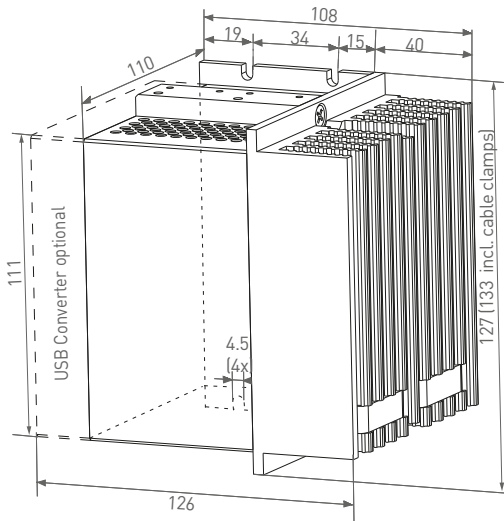
Analog outputs	2 x (A, B, C, D) for two 2 phase stepper motors
Digital outputs	8 digital outputs, overload-proof, each electrically isolated from power supply / 24 V power supply fed separately; the maximum load is 1 A on each output; 4 A for all outputs
Host interfaces	Optional: USB, Ethernet, RS 485, RS 232
Analog inputs	2 x 10 Bit AD converter e. g. for a joystick. The joystick power (5 V <sub>DC</sub> ; 100 mA max.) is provided by the controller
Digital inputs	<ul style="list-style-type: none"> <li>• 8 digital inputs, electrically isolated, 24 V input level</li> <li>• 4 limit switches: type PNP NCC or NOC</li> <li>• 2 encoders for optional differential incremental encoder or SSI absolute encoder; provided by the controller (5.3 V<sub>DC</sub>, max. 200 mA)</li> <li>• 2 Motor Enable</li> </ul>

## Communication and Programming

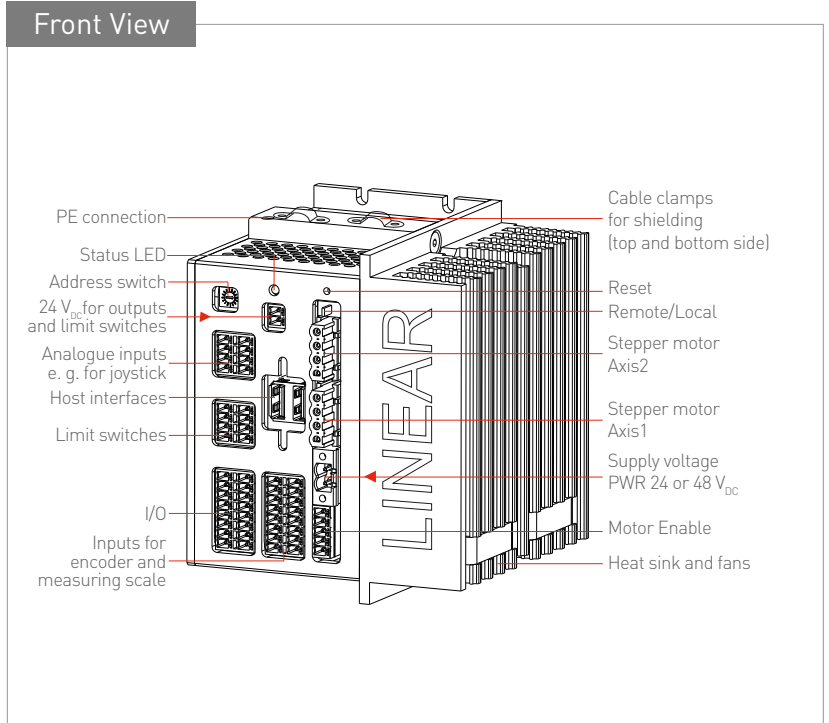
Programming	MiniLog format acc. to DIN 66025 – MiniLog-Comm® (included in delivery) – LabVIEW® VIs (included in delivery)
Memory	128 kB program memory

## Operating Conditions

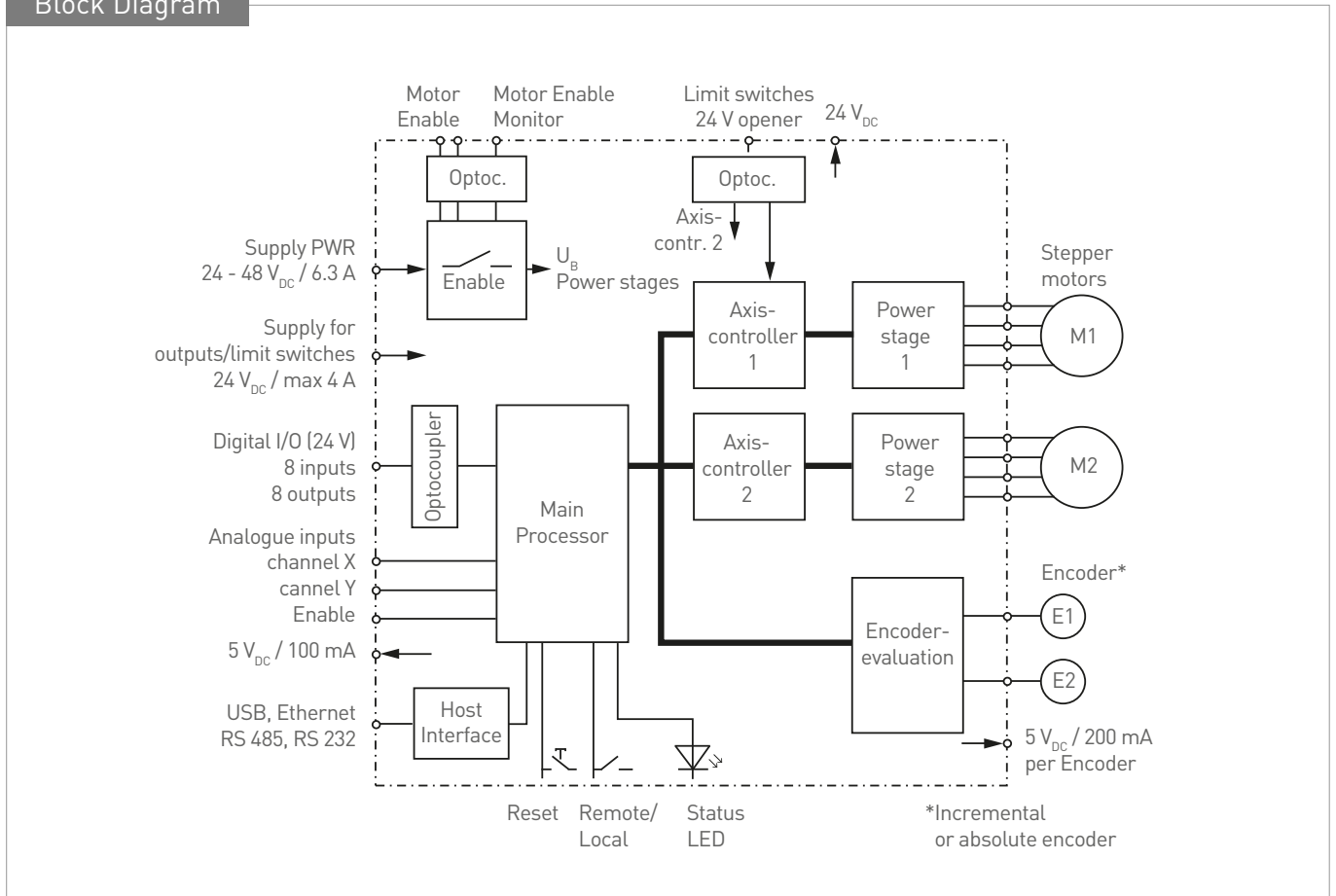
Temperatures	Operation: 5 to 50 °C; storage and transport: -10 to +85 °C
Degree of pollution	Level 2
Relative humidity	5 to 85 %, class 3K3 non-condensing
Protection class	IP 20
EMC immunity/ EMC emission	Acc. EN 61000-3-2 Acc. EN 61000-6-1, -3, -4 Acc. EN 6100-4-2...6, -11
Approval	CE



Dimensions in mm

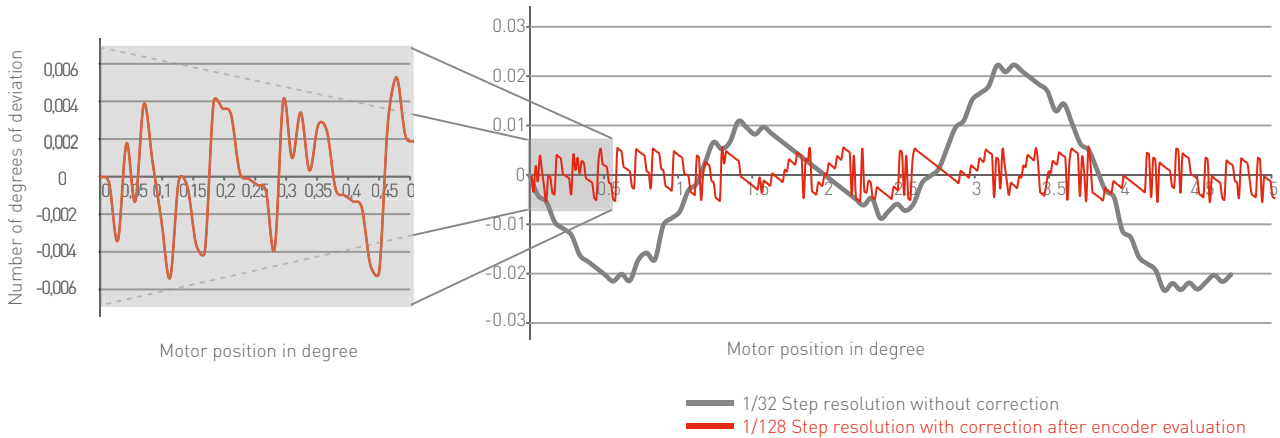


### Block Diagram



Industrial

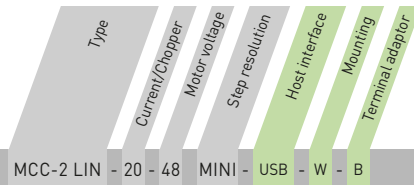
Positioning Accuracy



Extract at 1/128 step resolution

Ordering Code

The variable elements of the product are displayed in colour.



Ordering code MCC-2 LIN - 20 - 48 MINI - USB - W - B

Options

Host interface	USB ETH RS 485 RS 485-USB RS 232	USB port Ethernet port RS 485/4-wire port RS 485/4-wire + USB converter RS 232 port
Mounting	W H	Wall mounting With attached clip for DIN rail mounting
Adaptor	B	RS 232 adaptor for BT 5 operator terminal

Windows® is a trade mark of Microsoft.  
LabVIEW® is a trade mark of National Instruments Corporation.  
MiniLog-Comm® is a trade mark of Phytron GmbH.

Extent of Supply

- A CD-ROM with MiniLog-Comm® software, LabVIEW® VIs and USB driver
- Connector set

Optional Accessories

- Cable assembly
- Power supply unit SPH 240-4805
- BT 5 operator terminal
- Mini USB-RS 485 converter

Phytron GmbH

Industriestraße 12 – 82194 Gröbenzell  
T +49-8142-503-0 F +49-8142-503-190



ENG [www.phyttron.eu/MCC-1](http://www.phyttron.eu/MCC-1)

## MCC-1

### Programmable controller for one axis

The MCC-1, phyttron's freely programmable dual axis stepper motor controller, is a compact stand-alone unit for 2 phase stepper motors providing up to 3.5 A<sub>PEAK</sub> phase current.

Controllers in the MCC series have many inputs and outputs (digital and analogue) and encoder inputs for step position monitoring plus possibilities to connect limit switches all as standard.

Due to the variety of available host interfaces (USB, Ethernet etc.), the MCC can be quickly

and easily integrated into existing applications.

This controller is easy to program and can operate either directly (remote) via its bus or stand-alone (local) with the program routines stored within.

#### Applications

As a compact stand-alone device, it convinces especially in small experimental setups, machines and equipment, which can be dispensed in a PLC.

#### In Focus



Stand-alone



Integrated Driver



Digital



Analogue



El. Isolated

- 1 axis stepper motor control unit with integrated power stages
- Bipolar control of 2 phase stepper motors
- Phase currents up to 3.5 A<sub>PEAK</sub>
- Power supply 24 to 48 V<sub>DC</sub>
- Step resolution 1/1 up to 1/256 step
- Host interfaces: USB, Ethernet, RS 485 or RS 232
- Interfaces:
  - 1 encoder
  - 1 analogue input
  - 8 bidirectional, digital inputs and outputs
  - 2 limit switches
  - 2 redundant designed enable inputs
- Programming in well-tryed MiniLog format, acc. to DIN 66025 or in LabVIEW®
- LabVIEW® driver for including the MCC in your LabVIEW® project
- Remote or local mode

#### Highlights



LabVIEW®

#### LabVIEW®

LabVIEW® is a simulation software with a graphical interface. Use the VIs (Virtual Instruments) generated by phyttron and integrate them in your LabVIEW® project. So you can easily control the MCC from your usual programming environment.

#### MiniLog-Comm®

MiniLog-Comm® is phyttron's communication software running under Windows® to facilitate programming of the stepper motor controller. It provides quick and easy generation of sequential programs.

The MiniLog-Comm® software is delivered free with phyttron controllers and offers additional functions for test mode, step by step control or single sequence command execution of a motor move, a motor status window and even a Motion Creator.



Stand-alone

#### Stand-alone

Once programmed the MCC-1 can work without additional PC/controller.



#### All-in-one solution

A compact device with controller, I/O and power stage by 55 x 127 x 110 mm



## Industrial

## Specification

## Mechanical

Dimensions (W x H x D)	55 x 127 x 110 mm; 73 x 127 x 110 mm with attached USB converter or terminal adaptor
Weight	Approx. 660 g
Mounting	Wall or rail mounting

## Features

Stepper motors	Suitable for the control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Supply voltage	Controller and motor: 24 to 48 V <sub>DC</sub> ; Limit switches and outputs: 24 V <sub>DC</sub>
Phase current	Up to 3.5 A <sub>PEAK</sub>
Step resolution	1/1, 1/2, 1/4, 1/5, 1/8, 1/10, 1/20; for smoother motor rotation: 1/32, 1/64, 1/128 up to 1/256 step of a full step
Step frequency	40,000 steps/sec
Hardware error detection	<ul style="list-style-type: none"> <li>• Short circuit (between phase and power supply; between both phases; within a motor against ground))</li> <li>• Over temperature</li> <li>• Under voltage</li> </ul>
Cable length	Motor: shielded: 50 m max. Signal: shielded: 100 m max.
Diagnostic LEDs	Ready, busy, ERROR
Operating mode	"Remote" - via bus; "Local" - stand-alone mode with sequence program

## Interfaces

Analog outputs	A, B, C, D for a 2 phase stepper motor
Digital outputs	8 digital I/Os - programmable as in- or output - overload-proof, each electrically isolated from power supply / 24 V power supply fed separately; the maximum load is 1 A on each output; 4 A for all outputs
Host interfaces	Optional: USB, Ethernet, RS 485, RS 232
Analog inputs	2 x 10 Bit AD converter e. g. for a joystick. The joystick power (5 V <sub>DC</sub> ; 100 mA max.) is provided by the controller
Digital inputs	<ul style="list-style-type: none"> <li>• 8 digital I/Os - programmable as in- or output - electrically isolated, 24 V input level</li> <li>• 2 limit switches: type PNP NCC or NOC</li> <li>• 1 encoders for optional differential incremental encoder or SSI absolute encoder; provided by the controller (5.3 V<sub>DC</sub>, max. 200 mA)</li> <li>• 2 Motor Enable</li> </ul>

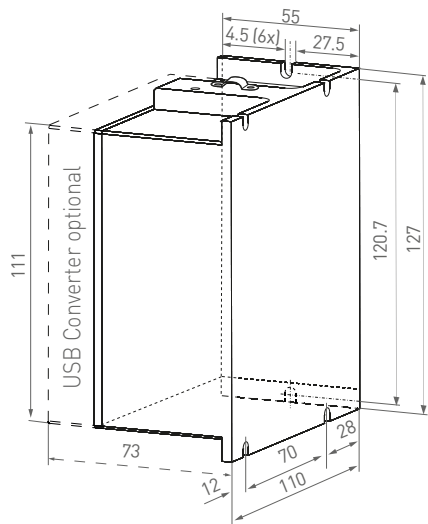
## Communication and Programming

Programming	MiniLog format acc. to DIN 66025 – MiniLog-Comm <sup>®</sup> (included in delivery) – LabVIEW <sup>®</sup> VIs (included in delivery)
Memory	128 kB program memory

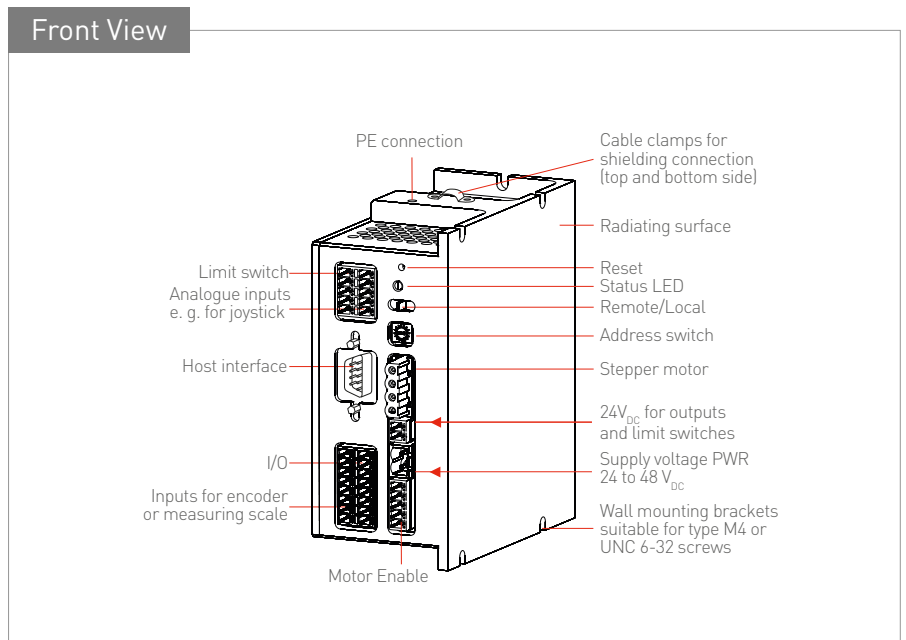
## Operating Conditions

Temperatures	Operation: +5 to +50 °C; storage and transport: -10 to +60 °C
Degree of pollution	Level 2
Relative humidity	5 to 85 %, class 3K3 non-condensing
Protection class	IP 20
EMC immunity/ EMC emission	Acc. EN 61000-3-2 EMC Acc. EN 61000-6-1, -3, -4 EMC and RFI immunity Acc. EN 6100-4-2...6, -11 Immunity testing
Approval	CE

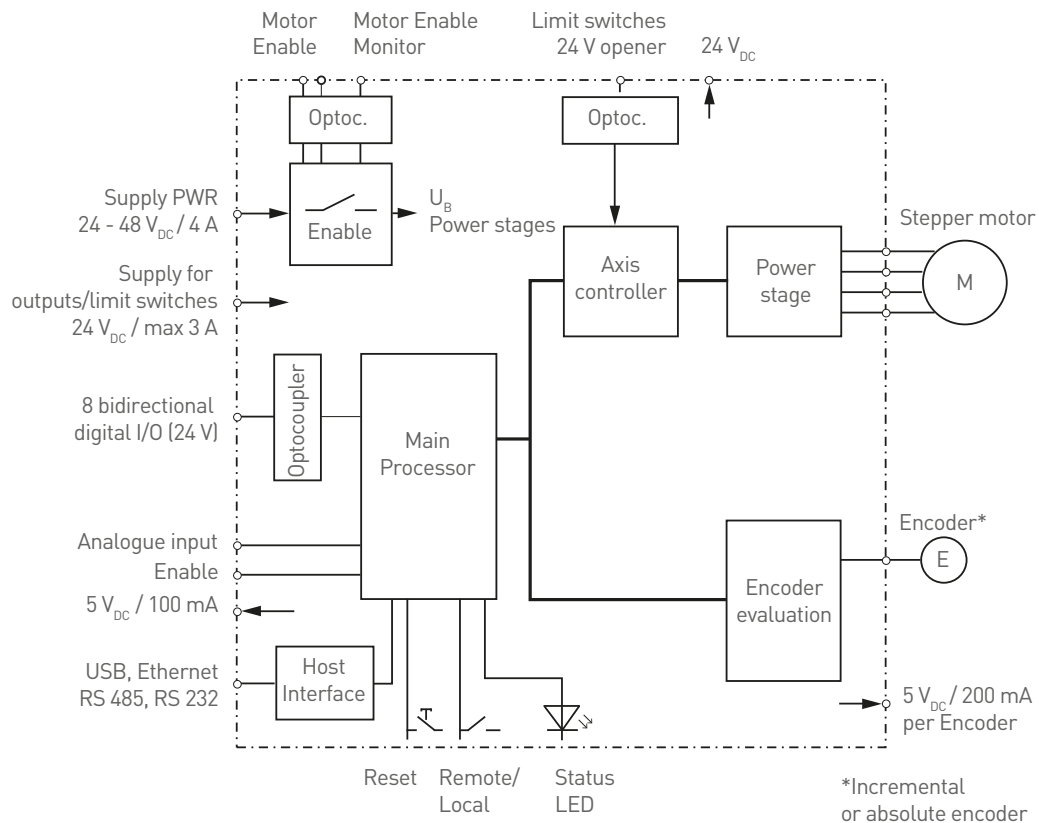




Dimensions in mm



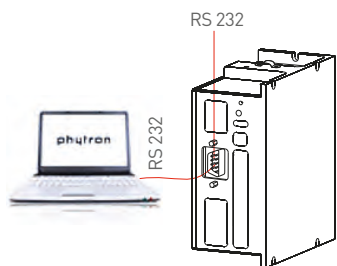
### Block Diagram



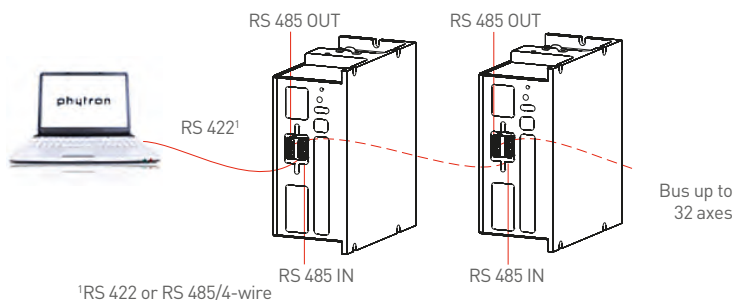
Industrial

Configurations

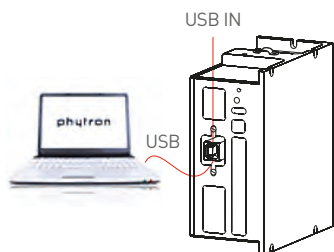
MCC-1 with RS 232 Port



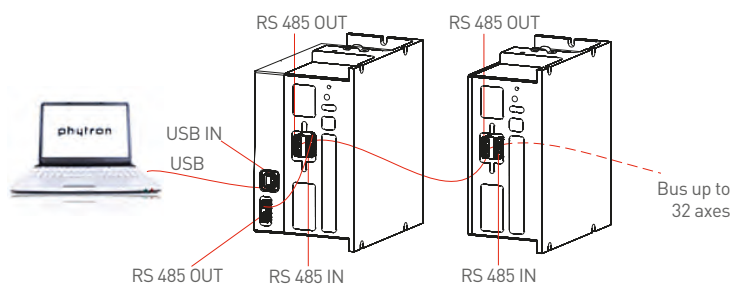
MCC-1 with RS 485 Port / Stand-alone Mode / Bus Mode



MCC-1 with USB Port

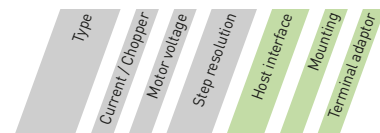


MCC-1 with attached USB Converter and RS 485 Port / Bus Mode



Ordering Code

The variable elements of the product are displayed in colour.



Ordering code

MCC-1 - 32 - 48 MINI - USB - W - B

Options

Host interface	USB ETH RS 485 RS 485-USB RS 232	USB port Ethernet port RS 485/4-wire port RS 485/4-wire + USB converter RS 232 port
Mounting	W H	Wall mounting With attached clip for DIN rail mounting
Adaptor	B	RS 232 adaptor for BT 5 operator terminal

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LabVIEW® is a trade mark of National Instruments Corporation.

MiniLog-Comm® is a trade mark of Phytron GmbH.

Extent of Supply

- A CD-ROM with MiniLog-Comm® software, LabVIEW® VIs and USB driver
- Connector set

Optional Accessories

- Cable assembly
- Power supply unit SPH 240-4805
- BT 5 operator terminal
- Mini USB-RS 485 converter

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# DRIVES

Drives contain so-called indexers and power stages. You put instructions in a programming language to control signals, which boosts the internal power stage.

POWER  
SUPPLY

CPU

INDEX

POWER  
STAGE



## 1-STEP-DRIVE

Stepper motor module with integrated power stage for the SIMATIC ET 200® S



# 1-STEP-DRIVE-5A-48V

## Stepper motor module for the SIMATIC ET 200®S

### In coordination with SIEMENS

The 1-STEP-DRIVE-5A-48V is a stepper motor controller with integrated power stage. It is specially developed for application in the decentralised SIMATIC ET 200®S peripheral system.

This 1-STEP-DRIVE module is configured via mouse click with the STEP®7 by using the provided configuration files and then parameterised. The module is ready for use in a very short time and supplements the

SIMATIC ET 200®S with a fully integrated, powerful and high-precision positioning controller for 2 phase stepper motors.

### Application

Application examples for the 1-STEP-DRIVE module are assembly and transfer lines, building automation, x-y-tables, paper mills, printing and textile machines.

### In Focus



Integrated Driver



Digital

The 1-STEP-DRIVE-5A-48V module successfully completed the system compliance test performed by SIEMENS.

### Highlights

#### Online parameterisation

These Phyttron power stages are eminently suitable for not only setting the basic parameters via interface bus, but also the technological parameters found in the application.

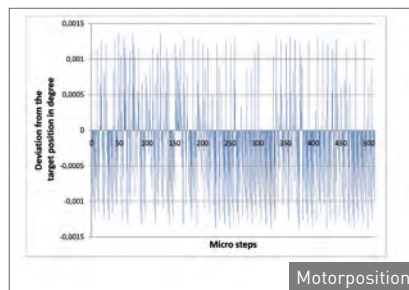
The power stage can be optimised for the requirements of the drive system during commissioning. Furthermore it is possible to adjust the power stage during 'CPU RUN', particularly for the next program sequence.

For example, raise the stop current when the motor is holding a load and then reduce it as soon as the system comes to a standstill without the load to minimize the power requirement and motor heating. Using these functions combined with additional parameters bring out the best in your system.

#### Fine positioning to 1/512 step

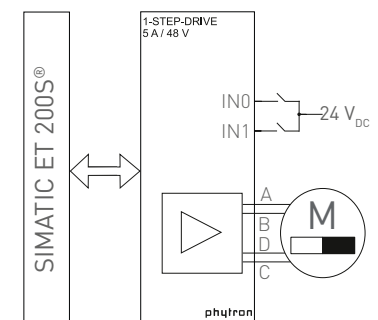
Almost all commercially available stepper motor power stages can be operated in micro step mode. When driving the motor with encoder feedback, it is apparent that

certain micro step positions cannot often be reached because of a lack of fine current settings and the motor may not reach the desired position. The 1-STEP-DRIVE technology guarantees a high-precision current



adjustment and enables fine positioning up to 1/512 step. The diagram above shows that a Phyttron 200 step motor with encoder is able to be at each 1/512 micro step position with an absolute and non-cumulative error of about 0.0015°, typically much less than this.

- Stepper motor controller with an integrated power stage for SIMATIC ET 200®S
- For 2 phase stepper motors
- 5 A<sub>PEAK</sub> at 24 to 48 V<sub>DC</sub>
- Up to 1/512 microsteps
- Online controller parameterisation and diagnostics
- STEP®7 programming



Overview

## Industrial

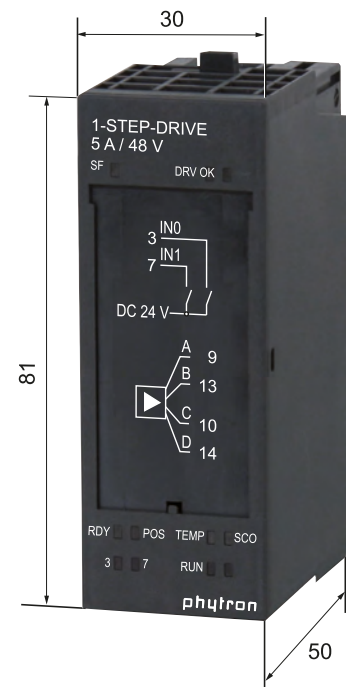
## Specification

## Mechanical

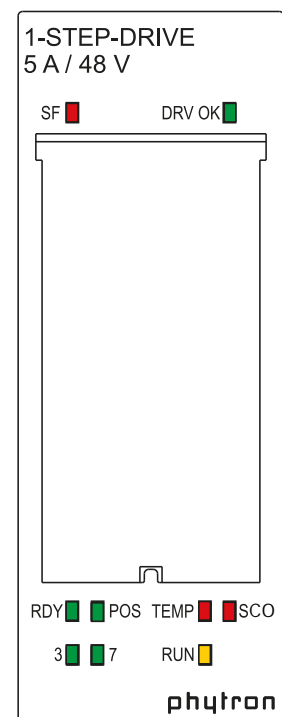
Design	SIMATIC ET 200 <sup>®</sup> S plastic housing
Dimensions (W x H x D)	30 x 81 x 50 mm
Weight	80 g
Mounting position	Optional
Mounting	Plug-in in SIMATIC ET 200 <sup>®</sup> S terminal modules

## Features

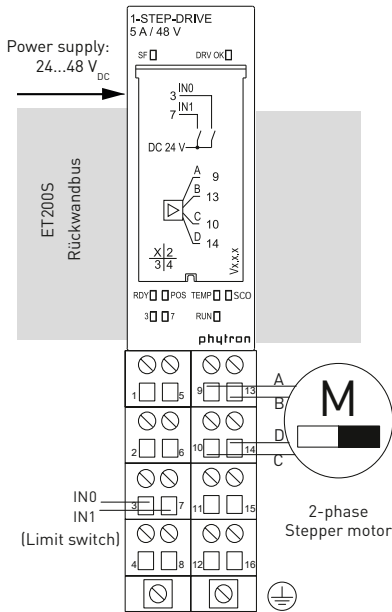
Stepper motors	Suitable for bipolar control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Superior main station	SIMATIC ET 200 <sup>®</sup> S
Power supply	24 to 48 V <sub>DC</sub>
Reverse polarity protection	Yes
Phase current	5 A <sub>PEAK</sub> (short circuit-proof, overload protected)
Motor current adjustment	20 mA increments
Step resolutions	Full step, half step, 1/2.5, 1/4, 1/5, 1/8, 1/10, 1/16, 1/20, 1/32, 1/64, 1/128, 1/256, 1/512 microstep
Maximum step frequency	510,000 steps/s
Physical resolution	Approx. 102,400 positions per revolution (0.0035°/step) with a 200 step motor. An encoder with a counter should be considered for very fine positioning.
Chopper frequency	18, 20, 22 or 25 kHz selectable Patented phytron chopper technology for a minimal heat loss in the motor and smooth rotation.
Current consumption (max.)	3 A <sub>DC</sub> at 5 A <sub>PEAK</sub>
Mechanical output power	Up to the 200 W range
Cable length - motor	Shielded: 50 m max.
Cable length - digital inputs	Shielded: 100 m max.
Diagnostic LEDs	<ul style="list-style-type: none"> <li>• SF (group error)</li> <li>• DRV OK (power stage ready)</li> <li>• RDY (module ready)</li> <li>• POS (driving instruction is running)</li> <li>• 3 (digital input IN0 active)</li> <li>• 7 (digital input IN1 active)</li> <li>• TEMP (over temperature &gt; 85 °C)</li> <li>• SCO (over current &gt; 10 A)</li> <li>• RUN (motor is running)</li> </ul>
Controller modes	<ul style="list-style-type: none"> <li>• Relative positioning</li> <li>• Move to a reference point</li> <li>• Absolute positioning</li> <li>• Revolution mode</li> <li>• Reference setting</li> </ul>
Security modes	Security modes, such as e. g. Safe Torque Off (STO) from IEC 61508-2 are not directly compatible
Mechanism of the communication via backplane bus	<b>Synchronous:</b> Control interface, feedback interface <b>Asynchronous:</b> PLC in CPU STOP mode: basic parameterising PLC in CPU RUN mode: data set transfer



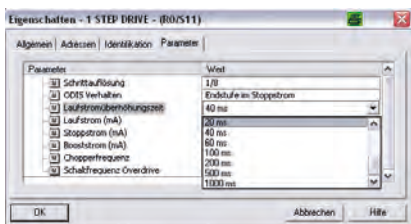
Dimensions in mm



Diagnostic LEDs



Connection diagram



Parameterisation

## Specification

### Features (continued)

Support of linear and modulo axes (rotary axes)	Yes
Hardware error detection	<ul style="list-style-type: none"> <li>Over current, short circuit &gt; 10 A spike at the controller</li> <li>Over temperature at the power stage <math>T &gt; 85\text{ °C}</math></li> </ul>
Refresh rate	2 ms

### Interfaces

Analogue outputs	A, B, C, D - For a 2 phase stepper motor
Digital inputs	<p>2 configurable digital inputs IN0 and IN1:                  0 signal: -30 to 5 V with 2 mA max. (quiescent current)                  1 signal: 11 to 30 V with 9 mA typical                  Input delay: 4 ms</p> <p><b>IN0:</b></p> <ul style="list-style-type: none"> <li>External release of momentum</li> <li>External stop</li> <li>Limit switch towards forward / reverse</li> </ul> <p><b>IN1:</b></p> <ul style="list-style-type: none"> <li>Reference switch and also limit switch towards forward / reverse</li> <li>Limit switch configurable to open / close</li> </ul>
Backplane bus and module supply	Backplane bus of the ET 200 <sup>®</sup> S Module supply via ET 200 <sup>®</sup> S power module

Compatible SIEMENS terminal modules for the 1-STEP-DRIVE	Terminal module	Order number	Terminals
	TM-E30S46-A1	6ES7193-4CF40-0AA0	screw with AUX
	TM-E30C46-A1	6ES7193-4CF50-0AA0	spring with AUX
	TM-E30S44-01	6ES7193-4CG20-0AA0	screw without AUX
	TM-E30C44-01	6ES7193-4CG30-0AA0	spring without AUX
Compatible SIEMENS power modules	Power module for the ET 200 <sup>®</sup> S	Order number	
	DC 24V-48V with diagnostic	6ES7138-4CA50-0AB0	SIMATC DP
	DC 24V-48V, AC 24 - 230 V with diagnostic and protection	6ES7138-4CB11-0AB0	SIMATC DP

### Communication and Programming

Programming	Via STEP <sup>®</sup> 7
Control interface (synchronous)	<p><b>Parameter assignments</b></p> <ul style="list-style-type: none"> <li>Basic frequency <math>F_b</math></li> <li>Multiplier i (ramp)</li> <li>Multiplier n (start-stop)</li> </ul> <p><b>Positioning</b></p> <ul style="list-style-type: none"> <li>Move to a reference point</li> <li>Set home position</li> <li>Relative incremental mode (relative positioning)</li> <li>Absolute incremental mode (absolute positioning)</li> <li>Revolution mode</li> <li>Reference setting</li> </ul>
Feedback interface (synchronous)	<p><b>Configurable</b></p> <ul style="list-style-type: none"> <li>Residual path</li> <li>Absolute positioning</li> <li>Velocity</li> </ul> <p><b>Also included in the feedback</b></p> <ul style="list-style-type: none"> <li>Position reached</li> <li>Parameterization error</li> <li>Power stage error</li> <li>Limit switch causes a stop</li> <li>and other states</li> </ul>

Industrial

Specification

Communication and Programming (continued)

Data set transfer to the 1-STEP-DRIVE (asynchronous while CPU RUN)

Parameterising the 1-STEP-DRIVE power stage

- Step resolution (1/1, 1/2 up to 1/512)
- Preferred direction of rotation
- Run current (20 mA increments)
- Stop current (20 mA increments)
- Boost current (20 mA increments)
- Current delay time 1 up to 1000 ms
- Chopper frequency 18 to 25 kHz
- Switching frequency overdrive 1 to 40 kHz
- ODIS behaviour

Data set transfer from the 1-STEP-DRIVE (asynchronous)

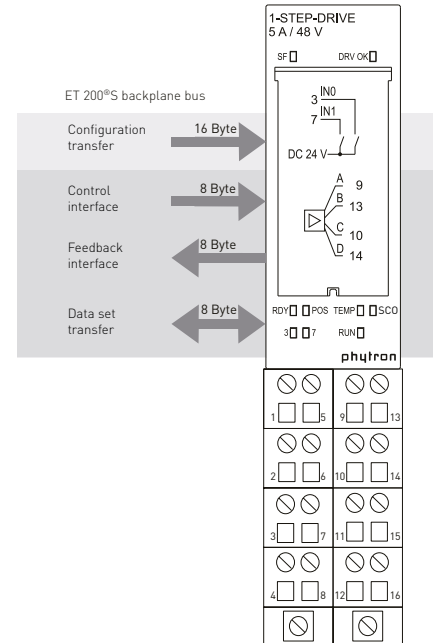
Diagnostics

Feedback of the following driver parameters to the main station

- Reverse reading controller parameter
- Basic position
- Error (short circuit, over temperature, parameterizing error)

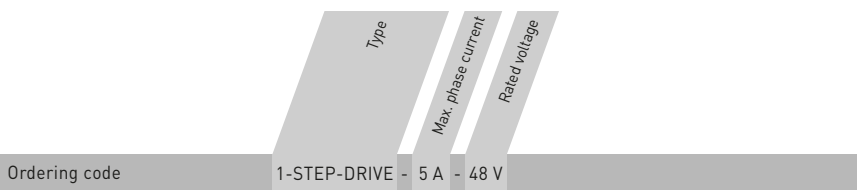
Operating Conditions

Operating temperature	0 to +60 °C
Storage and transport temperatures	-40 to +70 °C
Relative humidity	95 % max. non-condensing
Degree of pollution	Level 2
Protection class	IP 20
Vibration / Shock protection	According to EN 60068-2-6 According to EN 60068-2-27/29
EMC immunity / EMC emission	According to EN 61000-6-2 According to EN 61000-6-4
Approval	CE



Communication mechanism

Ordering Code



SIMATIC®, ET 200® and STEP®7 are trademarks of SIEMENS AG.

Extent of Supply

- 1-STEP-DRIVE module
- CD-ROM incl. configuration file (HSP), application example and PDF manual

Optional Accessories

Manual as printout (ID No.: 10013573)

Phytron GmbH

Industriestraße 12 – 82194 Gröbenzell  
T +49-8142-503-0 F +49-8142-503-190

# POWER STAGES

Stepper motor power stages reinforce Control pulses/Motor direction or SIN/COS signals and directly control the stepper motor.

POWER SUPPLY	CPU	INDEX	POWER STAGE
--------------	-----	-------	-------------



APS

High performance stepper motor power stage module



MSX

19" stepper motor power stage module for high performance



ZMX+

19" stepper motor power stage module with ServiceBus



SLS

19" sub-rack with plug-in stepper motor power stage modules



MCD+

Compact stepper motor power stage with ServiceBus





ENG

[www.phytron.eu/APS](http://www.phytron.eu/APS)

## APS Technology

High performance stepper motor power stage  
Now as OEM module with sin/cos via SPI

The phytron APS module is a high performance power stage for the operation of stepper motors up to  $5 A_{PEAK}$  at 24 - 70 V<sub>DC</sub> with a shaft power up to 250 Watts.

While almost any commercially available stepper motor power stage provides the setting of the so-called microstep operation, the generated current settings are too inaccurate to achieve the individual sub-steps and to approach the actual position.

The APS module positions with an actual step resolution of 1/512 (102,400 positions per revolution with an encoder with a 200 step motor). Based on our parameterisable chopper technology and by the use of premium components with low resistance, the APS triggers with optimal timing. So the APS technology creates a current

shape close to a perfect sine wave with a minimum of heat loss in the controller. Only this highly accurate output signal enables the loss- and low resonance operation of the motor, the fast execution of each sub-step and the approach to each position.

The compact APS is the core of the 1-STEP-DRIVE (for SIMATIC ET 200<sup>®</sup>S) SPS module and as a power stage module of our phyMOTION™ available. The APS can be parameterised (run current, stop current, boost current, current delay time etc.) and diagnosed online by a ServiceBus code and is also open for instructions from the CPU in runtime within a parameterisation cycle.

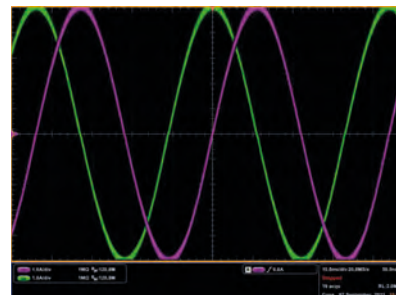
Benefit from our APS power stage technology: EVA-APS board (p.3) or APS-Arduino Shield (p.4).



Now available for  
Arduino !

### In Focus

- OEM power stage module with control pulses/direction or sin/cos presetting via SPI
- For 2 phase stepper motors
- Up to  $5 A_{PEAK}$  at 24 - 70 V<sub>DC</sub>
- Up to 1/512 step resolution
- Up to 500,000 steps/sec
- Online parameterising and diagnostic of the power stage via Serial Peripheral Interface (SPI)
- Control via Control pulses/direction or via digital sin/cos (via SPI)
- Free available parameterisation and diagnosis tool ServiceBus-Comm<sup>®</sup>
- 2 development environments:
  - for industry: EVA-APS board
  - for research: APS-Arduino Shield



Violet = Phase current 1  
Green = Phase current 2  
1/128-Ministep, 3.5 A<sub>RM</sub>S (approx. 5.0 A<sub>PEAK</sub>),  
U<sub>B</sub> = 60 V

### Specification

#### Mechanical

Design	Plug-in power stage module also as OEM module
Dimensions (W x H)	60 x 40 mm
Weight	16 g

#### Features

Stepper motors	Suitable for bipolar control of 2 phase stepper motors with 4-, (6-) or 8 lead wiring
Phase current	Up to $5 A_{PEAK}$ (short circuit-proof, overload protected)
Power supply	24 to 70 V <sub>DC</sub>
Reverse polarity protection	No

Specification - continuation box next side

## Industrial

### Specification

#### Features (continued)

Motor current adjustment	10 mA current resolution
Step resolutions	Full step, half step, 1/2.5, 1/4, 1/5, 1/8, 1/10, 1/16, 1/20, 1/32, 1/64, 1/128, 1/256, 1/512 microstep
Maximum step frequency	500,000 steps/sec
Physical resolution	Approx. 102,400 positions per revolution (0.0035°/step) with a 200 step motor. An encoder with a counter should be considered for very fine positioning.
Chopper frequency	18, 20, 22 or 25 kHz selectable Patented phytron Chopper technology for a minimal heat loss in the motor and smooth rotation.
Current consumption (max.)	3 A <sub>DC</sub> at 5 A <sub>PEAK</sub>
Mechanical output power	Up to the 250 W range
Cable length	Motor: shielded: max. 50 m
Diagnostic LEDs	Opportunity to connect on 2 signal lines with 3.3 V logic level: LED 1 (power stage ready), LED 2 (error)
Hardware error detection	<ul style="list-style-type: none"> <li>• Overcurrent, short circuit &gt; 10 A</li> <li>• Overtemperature T &gt; 85 °C</li> </ul>

#### Interfaces

Analogue outputs	A, B, C, D, for a 2 phase stepper motor Analogue temperature output: 0 to +90 °C at 480 to 1884 mV
Digital inputs	Control pulses, Motor direction, Boost, Deactivation, Reset SPI bus interface: <ul style="list-style-type: none"> <li>• digital sin/cos presetting (alternative to Control pulses/Motor direction)</li> <li>• online parameterisation and diagnostic</li> </ul>

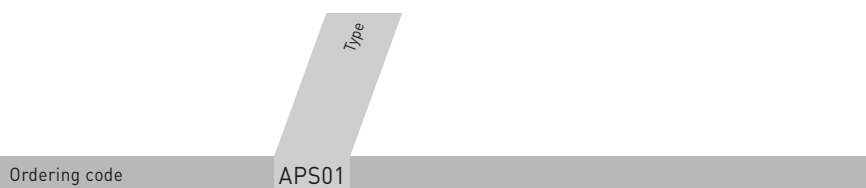
#### Operating Conditions

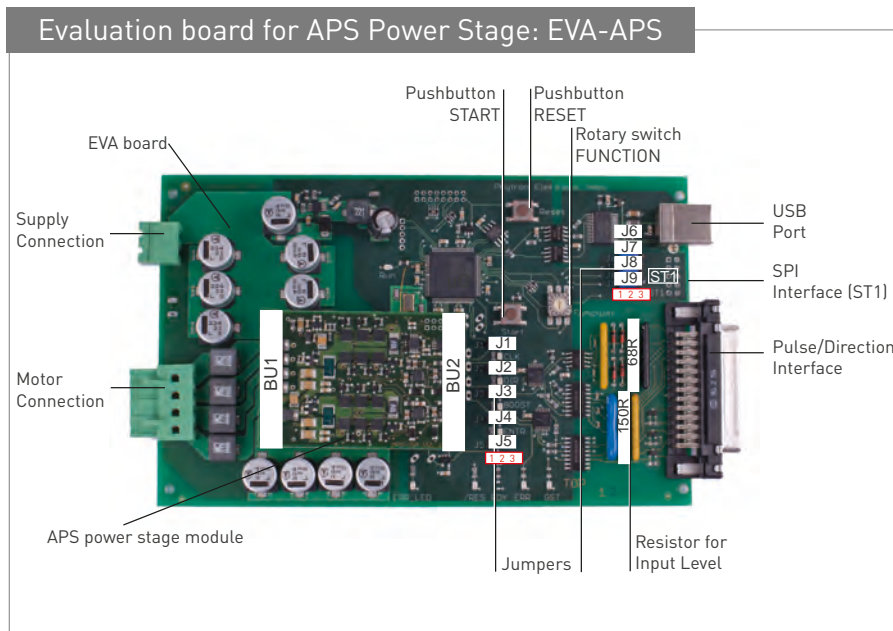
Temperature	Operation: 0 to + 60 °C; storage and transport -40 to +70 °C
Relative humidity	Max. 95 % non-condensing

#### Development Environment

EVA-APS	Evaluation board for industry
APS-Arduino Shield	Application platform for research, hobby and art

### Ordering Code





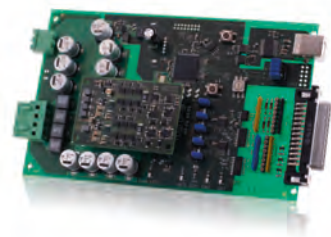
### Functions

EVA-APS is an evaluation board for application development of the APS power stage and can be ordered as a bundle with the APS power stage.

- Online parameterising and diagnostics via USB
- Control via Control Pulses/Direction
- Two operating modes
- Input signals defined by jumpers
- Customised SPI interface
- ServiceBus-Comm software included

### Operation/Connection

Motor voltage supply	24 V <sub>DC</sub> to 70 V <sub>DC</sub> Input range of supply of the power stages and to generate internal logic voltages
USB interface	For parameterising the APS power stage
Analogue outputs (motor)	A, B, C, D for a 2 phase stepper motor
SPI interface (ST1)	10-pole (2x5), pads for mounting a customised connector
Control pulses/direction interface	25-pole SUB-D connector female, opto-decoupled
PCB connectors 2x10 and 2x12 pins	2 mm grid; 0.5 mm pin Pins: 2x10 and 2x12 for APS power stage connection
2 Program pushbuttons	START: for motor running RESET: Reset of the settings
1 Rotary switch (Function)	Setting of the operating mode
9 Jumpers	For input signal specification

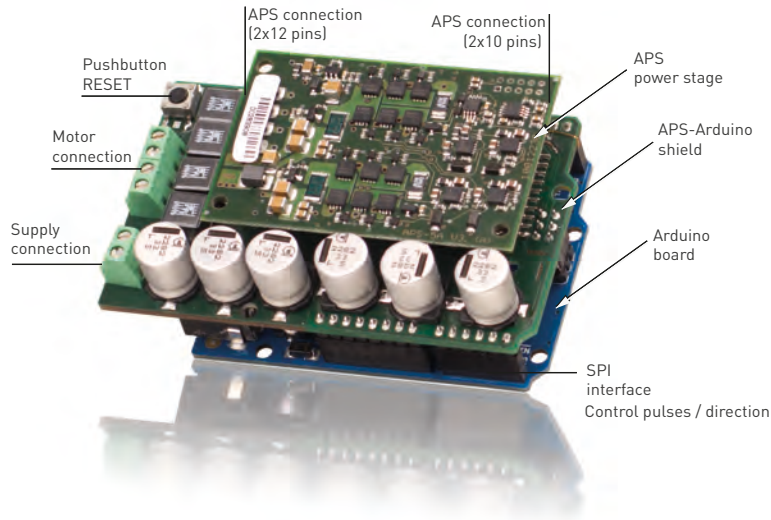


### Ordering Code

Type	
Ordering code	EVA-APS (incl. APS)

Industrial

APS-Arduino Shield



Description

APS-Arduino shield is a development environment for the use of the APS power stage in research, prototyping, model making and art installations.

- APS power stage parameterising and diagnostics via SPI interface
- Control pulses/direction signal comes from the digital pins of the Arduino
- Download of the demo program and description from the phytron website
- Learn more about Arduino: [www.arduino.cc](http://www.arduino.cc)

Operation/Connection

Motor voltage supply	24 V <sub>DC</sub> to 70 V <sub>DC</sub> Input range of supply of the power stage
Analogue outputs (motor)	A, B, C, D for a 2 phase stepper motor
SPI interface	For parameterising and diagnostics of the power stage
Control pulses/direction interface	Control pulses/direction signal from the digital pins of the Arduino
PCB connectors (APS) 2x10 and 2x12 pins	2 mm grid; 0.5 mm pin Pins: 2x10 and 2x12
Pushbutton	Reset of the Arduino

Ordering Code

Ordering Code

APS Shield (incl. APS)

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 SIMATIC ET 200<sup>®</sup>S is a trade mark of SIEMENS AG.  
 ServiceBus-Comm<sup>®</sup> is a trade mark of Phytron GmbH.

Phytron GmbH

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ENG [www.phytron.eu/ZMXplus](http://www.phytron.eu/ZMXplus)

# ZMX+

## Stepper motor power stage with ServiceBus

The ZMX+ is a plug-in stepper motor power stage for 19" sub-racks with ServiceBus for motor currents up to 9 A<sub>PEAK</sub>.

Due to improved design and greatly reduced power dissipation, the ZMX+ provides reliable high-precision performance with minimised heat emission.

Parameters can be manually set by switches. The ServiceBus interface allows several additional adjustments.

### Application

The ZMX+ is used in different fields of application: e.g. in inspection and test applications, labelling or packaging machines, in equipment manufacturing or in beamlines.

The ZMX+ version with a 32 pin VG connector is pin compatible with commercially available power stages. The optional ServiceBus connector is placed at the front.

### In Focus



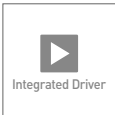
- 19" sub-rack power stage for bipolar control of 2 phase stepper motors
- Up to 9 A<sub>PEAK</sub> at 24 - 70 V<sub>DC</sub>
- Up to 1/512 microsteps
- Parametrising and diagnostic online via ServiceBus — switches for basic adjustment
- Options:
  - 32/48 pin connector
  - With/without electrical isolation
  - With/without ServiceBus

### Highlights



#### ServiceBus Instruction

online setting of parameters during operation via USB, CAN, RS 485...



#### 1/512 Microstep

precise power adjustment and fine positioning up to 1/512 microstep



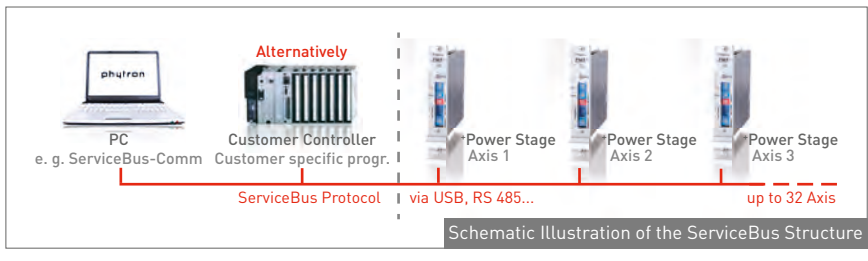
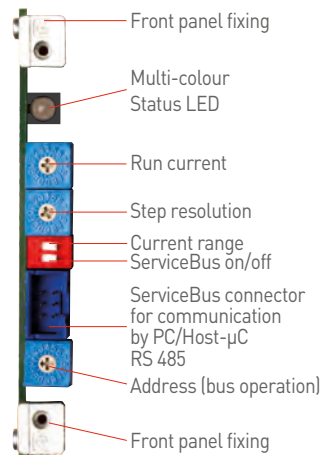
#### Electrical Isolation

with and without electrical isolation of the motor circuit

#### ServiceBus-Comm®

The royalty-free ServiceBus protocol with its extensive command set allows direct communication between phytron power stages and the PC or controller connected — even from a distance. That way not only start, stop and boost current but also parameters like current delay time can be set easily.

Our free Windows® software ServiceBus-Comm® allows to monitor and to adjust up to 32 axes while providing a comfortable and easy to use graphical interface.



Industrial

Specification

Mechanical

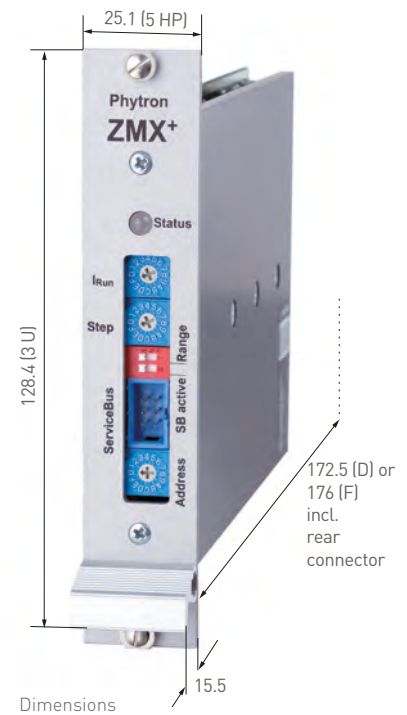
Design	Plug-in board for 19" sub-rack in the format 5HP x 3U x 160 mm
Dimensions (W x H x D)	Option with 32 pin VG connector: 25.1 (5HP) x 128.4 (3U) x 172.5 mm Option with 48 pin VG connector: 25.1 (5HP) x 128.4 (3U) x 176 mm
Weight	Approx. 450 g with front panel

Features

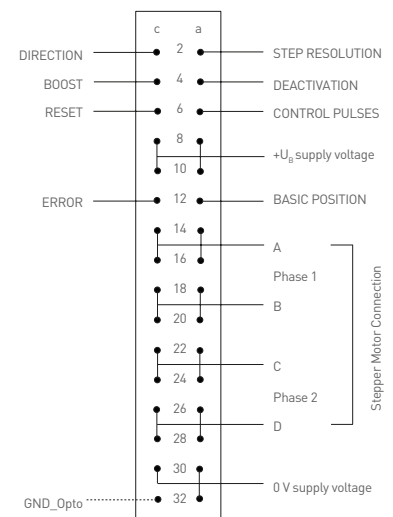
Stepper motors	Suitable for the control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Supply voltage	24 to 70 V <sub>DC</sub>
Phase current	2 x 9 A <sub>PEAK</sub>
Adjustable current steps	<b>Rotary switch mode</b> 2 currents are selectable: 0 – 1.5 A <sub>PEAK</sub> or 0 – 9 A <sub>PEAK</sub> Run current is adjustable in 15 current steps, stop current is 50 %, boost current is 130 % of run current <b>ServiceBus mode (optional)</b> Run, stop and boost current from 0 - 9 A <sub>PEAK</sub> in 100 mA stages
Adjustable step resolution	<b>Rotary switch mode</b> Full step, 1/2, 1/2.5, 1/4, 1/5, 1/8, 1/10, 1/20 <b>ServiceBus mode (optional)</b> Full step, 1/2, 1/2.5, 1/4, 1/5, 1/8, 1/10, 1/16, 1/20, 1/32, 1/64, 1/128, 1/256, 1/512 Microstepping
Maximum step frequency	500,000 Hz control pulse frequency (pulse width > 1 μs)
Physical resolution:	<b>Without encoder:</b> Approx. 25,600 positions per revolution (in typical applications) <b>With encoder:</b> Precision of positioning approx. 102,400 positions per revolution with a 200 step motor depending on the encoder (evaluating by a superior controller required)
Chopper frequency	Patented phytron chopper technology for a minimal heat loss in the motor and smooth rotation. Two chopper frequencies according to the current range: 25 kHz for currents 0 - 9 A 50 kHz for currents 0 - 1.5 A
Cable length	Motor : shielded: 50 m max. Signal: shielded: 100 m max.
Operating modes	Rotary switch mode and ServiceBus mode (optional)
Functional safety	Safety Integrity Levels, such as e. g. Safe Torque Off (STO) from IEC 61508-2 are not directly compatible
Diagnosable errors	Undervoltage error (< 22 V) Overtemperature error (T > 90 °C) Overcurrent and short circuit error (I > 30 A temporary)

Interfaces

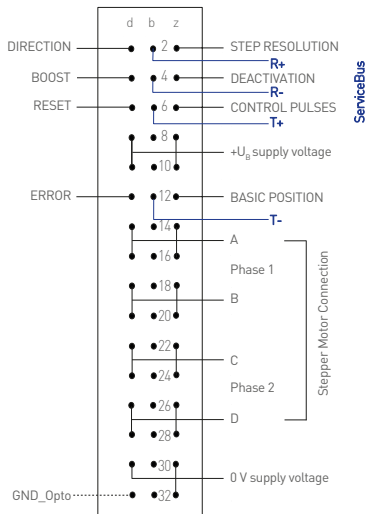
Inputs	Control pulses, direction, boost, deactivation, reset, step resolution (optional: inputs electrically isolated)
Outputs	A, B, C, D for a 2 phase stepper motor, basic position (opto-decoupled optional, type Open-Collector), ERROR (opto-decoupled optional, type Open-Collector)



Dimensions



32 pin VG connector DIN 41612, type D



48 pin VG connector DIN 41612, type F

## Specification

### Interfaces (continued)

Mechanical switches	Rotary switches for addressing up to 16 addresses DIP-switches for current range selection, ServiceBus activation (optional), output logic switch, overdrive activation and input logic switch
ServiceBus (optional)	phytron's power stage interface for parameterisation and diagnostic via RS 485

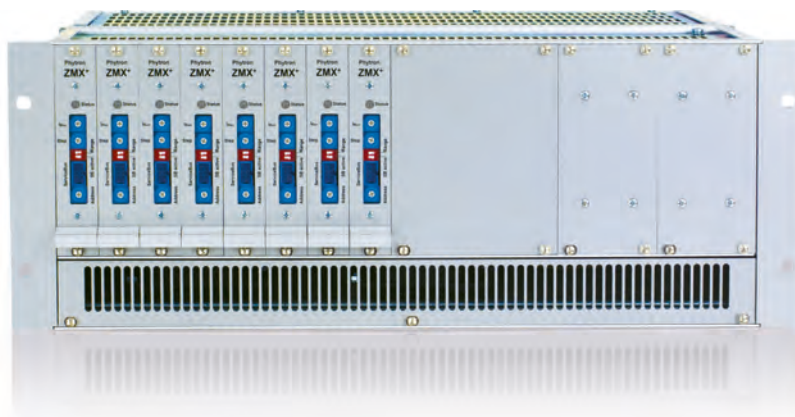
### Communication and Programming

Diagnostic via Status LED	Ready, Busy, Fault, Reset/Disable
Parameter interface via ServiceBus (optional)	Run, stop, boost current, step resolution, current delay time, chopper frequency, define overdrive switch frequency, in- and output logic, preferential direction, reset, deactivation,
Diagnostic interface via ServiceBus (optional)	Basic position, current setting, power stage temperature, power stage status, error check, intermediate circuit voltage
Programming	Phytron's ServiceBus-Comm <sup>®</sup> for Windows <sup>®</sup>

### Operating Conditions

Temperature	Operation: +4 to +40°C, storage and transport: -25 to +85 °C
Relative humidity	85 % maximum non-condensing
Degree of pollution	Level 2
Protection class	IP 20 at operation in 19" rack
Vibration / Shock protection	Acc. to EN 60068-2-6 Acc. to EN 60068-2-27/29
EMC immunity / EMC emission	Acc. to EN 61000-3-2 EMC Acc. to EN 61000-6-1, -3, -4: EMC and RFI immunity Acc. to EN6100-4-2...6, -11 immunity testing
Approval	CE

## Plug-in power stage unit SLS-ZMX<sup>+</sup>



phytron delivers also fully assembled 19" sub-rack modules with integrated power supply.

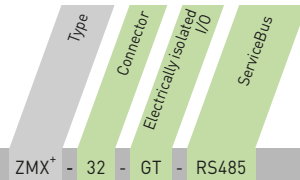
Up to 8 ZMX<sup>+</sup> power stages are possible.

For more information look up [www.phytron.eu/SLS](http://www.phytron.eu/SLS)

## Industrial

## Ordering Code

The variable elements of the product are displayed in colour.



Ordering code ZMX<sup>+</sup> - 32 - GT - RS485

## Options

Connector	32 48	32-pin VG connector DIN 41612 (D) 48-pin VG connector DIN 41612 (F)
Electrically isolated I/O	GT	with electrical isolation without electrical isolation
ServiceBus	RS485	ServiceBus via RS 485 without ServiceBus

Windows<sup>®</sup> is a trade mark of Microsoft.

ServiceBus-Comm<sup>®</sup> is a trade mark of Phytron GmbH.

## Extent of Supply

- Free ServiceBus-Comm<sup>®</sup> software for the ZMX<sup>+</sup> with ServiceBus

## Optional Accessories

- Front panel Al 2.5 mm, with handle
- ServiceBus cable
- Mini USB RS 485 converter

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ENG [www.phytron.eu/MCDplus](http://www.phytron.eu/MCDplus)

## MCD<sup>+</sup>

### Compact stepper motor power stage with ServiceBus

The MCD<sup>+</sup> is a bipolar power stage for driving 2 phase stepper motors. The operation parameters - phase currents, step resolution and preferential motor direction - are programmable by rotary switches or in the ServiceBus mode.

The MCD<sup>+</sup> is designed for power supplies from 24 to 70 V<sub>DC</sub>.

The control pulse, motor direction, boost, activation and reset inputs are compatible with push-pull or open collector signals. The control inputs are electrically insulated from the supply and motor voltage.

A special feature of the MCD<sup>+</sup> offers 3 terminals for each signal input. Thus separate input terminals for 5 V and 24 V are available.

#### Application

The MCD<sup>+</sup> is suitable for up to 450 Watts of shaft power that is ideal for controlling spindle and toothed belt drive systems for mechanical handling or assembly applications. The high step resolution makes the MCD<sup>+</sup> the best solution for applications that have especially high demands on precision, smoothness and durability.

#### In Focus



EL. Isolated



ServiceBus

- Stepper motor power stage for bipolar control of 2 phase stepper motors
- Up to 9 A<sub>PEAK</sub> at 24 tp 70 V<sub>DC</sub>
- Up to 1/512 step resolution
- Online power stage parameterisation and diagnostic via ServiceBus
- Inputs and outputs are electrically separated
- Optional accessories: USB-RS 485 converter
- Free available parameterisation and diagnosis tool ServiceBus-Comm<sup>®</sup>

#### Highlights

##### Rotary switch mode

The run and the stop current can be changed between two ranges by the current range switch. These phase currents can be set in 15 increments up to 9 A<sub>PEAK</sub>. In this operating mode the step resolution can be adjusted from full step up to 1/20 step.



##### Compact design

The complete device plus wall mounting brackets measures only 127 x 37 x 110 mm.



##### ServiceBus instructions

Online parameterisation even during operation via USB, RS485...

##### ServiceBus mode

All settings are entered at the PC, which is easy to do with the free phytron software ServiceBus-Comm<sup>®</sup> for Windows<sup>®</sup>.

In the ServiceBus mode the phase currents can be programmed in 100 mA increments, the step resolution from full step to 1/512 step and the current delay time from 1 to 1000 ms.



ServiceBus-Comm<sup>®</sup>

## Industrial

## Specification

## Mechanical

Dimensions (W x H x D)	38 x 127 x 110 mm
Weight	560 g
Mounting	DIN rail and wall, vertically inside a cabinet is recommended

## Features

Stepper motors	Suitable for the bipolar control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Supply voltage	24 to 70 V <sub>DC</sub>
Phase currents	Up to 9 A <sub>PEAK</sub> <b>Rotary switch mode:</b> Current range selectable by rotary switch: Rotary switch position: I: 0.4 to 3 A <sub>PEAK</sub> , II: 1.1 to 9 A <sub>PEAK</sub> <b>ServiceBus mode:</b> Programmable values: 0.1 to 9 A <sub>PEAK</sub>
Step resolution	<b>Rotary switch mode:</b> 1/1, 1/2, 1/4, 1/8, 1/10, 1/20 of a full step <b>ServiceBus mode:</b> 1/1, 1/2, 1/4, 1/8, 1/10, 1/16, 1/20, 1/32, 1/64, 1/128, 1/256, 1/512 of a full step
Cable length	Motor : shielded: 50 m max. Signal: shielded: 100 m max
Operating modes	Rotary switch mode and ServiceBus mode (optional)
Diagnosable errors	Under-/overvoltage (< 20 V <sub>DC</sub> or > 85 V <sub>DC</sub> ), overtemperature (T > 85 °C), overcurrent, short circuit

## Interfaces

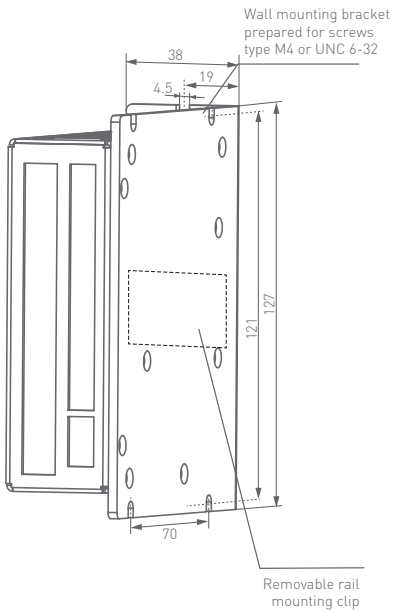
Analogue outputs	A, B, C, D for a 2 phase stepper motor
Digital outputs	Optically insulated from the motor voltage, type Open-Collector $I_{max} = 20 \text{ mA}$ , $U_{max} = 30 \text{ V}$ , $P_{total} = 300 \text{ mW}$ , $U_{CE sat}$ at 20 mA < 1 V Error: short circuit, overvoltage, overtemperature, undervoltage, overcurrent
Connection	ServiceBus: RS 485, USB-RS 485 converter (optional accessories)
Inputs	Optically insulated from the motor voltage; control via push-pull driver or Open Collector; input level 5 V or 24 V: Control pulses, Motor direction, Boost, Activation, Reset

## Communication and Programming

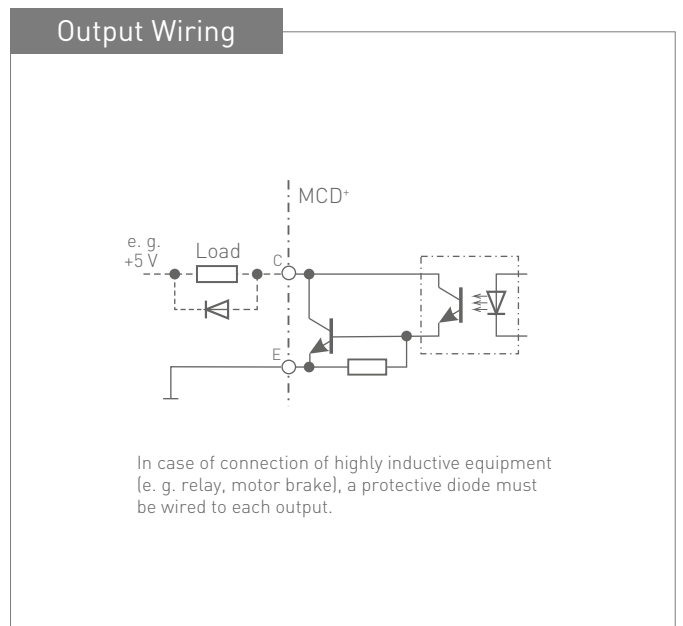
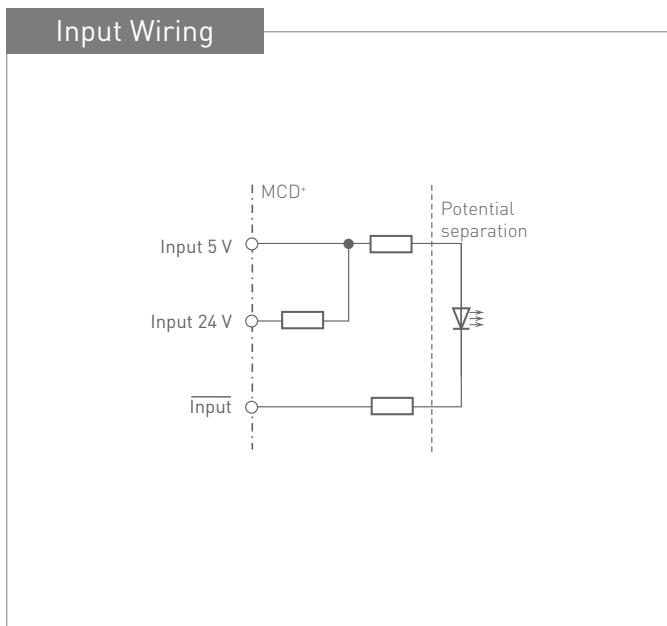
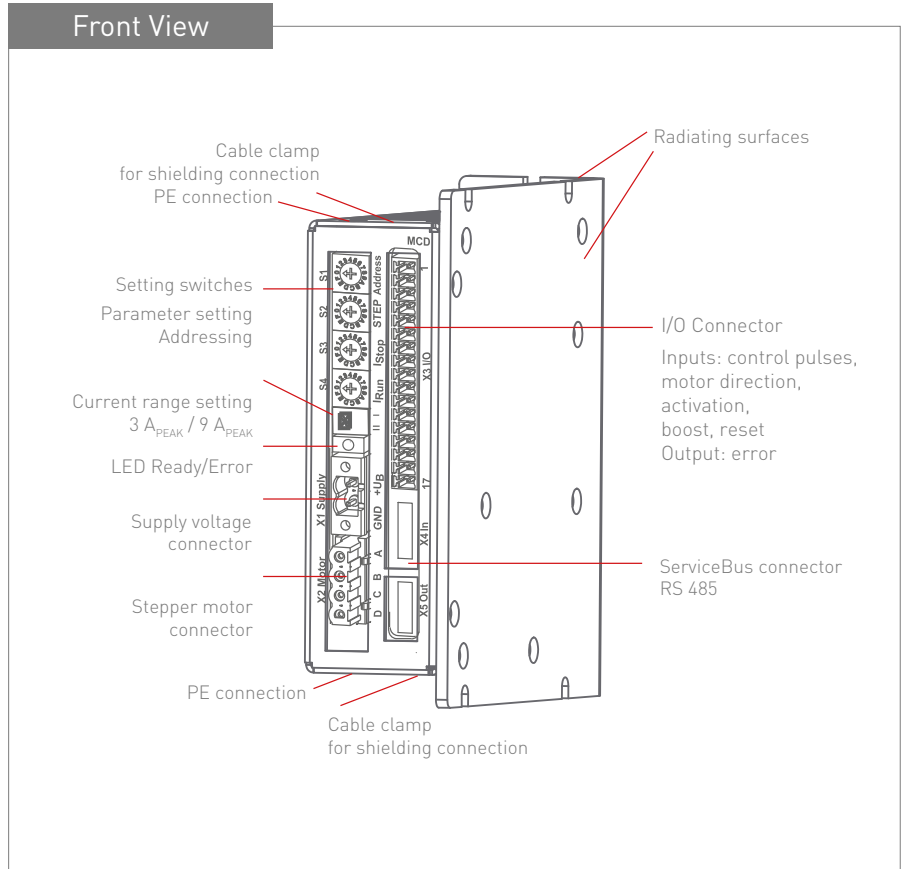
Rotary switch mode	Setting of run and stop current, step resolution and current shape
DIP switches	Setting of overdrive and boost function, activation and preferential motor direction
Diagnostic by LED	Basic position, overload, supply failure, overtemperature

## Operating Conditions

Temperature	Operation: +4 to +40 °C, storage: -25 to +55 °C, transport: -25 to +85 °C
Degree of pollution	Level 2
Relative humidity	5 – 85 % . class 3K3 non condensing
Protection class	IP 20
EMC immunity / EMC emission	Acc. to EN 61000-3-2: EMC Acc. to EN 61000-6-1, 2, 3, 4: EMC and RFI immunity
Approval	CE



Dimensions in mm



## Industrial

## USB-RS485-converter



# 10012292

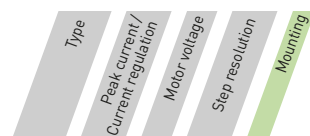
- Dimensions (W x H x D): 55 x 30 x 24 cm (without connector)
- Material: ABS, black
- RS485: 4-wire read-/write up to max. 32 bus participants, length up to 1200 m (with cable termination)
- Data rate: up to 2,5 MBit/s
- Power Supply: 70 mA (via USB interface)

Extent of Supply (included):

- connector cable: Type USB A-B, 200 cm and Type USB A-A, 100 cm (connection RS485 to MCD+)
- Driver CD

## Ordering Code

The variable elements of the product are displayed in colour.



Ordering code	MCD+	93	-	70	MINI	-	W
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## Options

Mounting	W H	Wall mounting With attached DIN rail mounting clip
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Windows® is a trade mark of Microsoft.

ServiceBus-Comm® is a trade mark of Phytron GmbH.

## Extent of Supply

- Connector set
- A CD-ROM with ServiceBus-Comm software and USB driver

## Optional Accessories

- Rail mounting assembly set with rail mounting clip attached to the housing
- ServiceBus cable
- USB cable
- USB-RS 485 converter
- Power supply SPH 240 or 500 for wall- or rail mounting

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ENG [www.phytron.eu/MSX](http://www.phytron.eu/MSX)

## MSX

### Stepper motor power stage for bipolar control

The MSX is a power stage for bipolar control of 2 phase stepper motors. The power stage is available in three power ranges with 5, 10 or 15  $A_{PEAK}$  maximum phase current.

Besides full and half step the MSX provides a resolution up to 1/20 MINI Step.

The setting switch provides several phase current profile settings:

- full step (conventional)
- half step
  - without / with torque compensation
  - without / with Current Shaping
- 1/4 - 1/20 step
  - without / with Current Shaping
  - with Current Shaping and BLOW UP.

The current regulation by the patented SYNCHROCHOP principle ensures a smooth operation of the stepper motor and the torque for optimum use.

The MSX is suitable to replace the well-tried older phytron power stages MS0, MS0 and SMD.

#### Application

As a powerful stepper motor power stage the MSX is suitable for up to 800 Watts shaft power, especially for the handling of discrete components and machine service tasks as well as for high-throughput sorting and assembly machinery.

#### In Focus



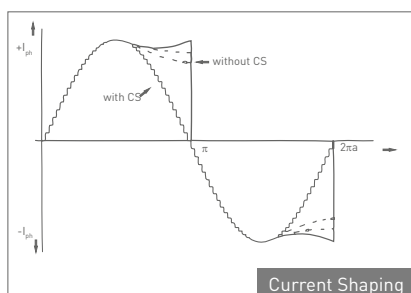
El. Isolated

- Stepper motor power stage for bipolar control of 2 phase stepper motors
- 3 power ranges: 5 / 10 / 15  $A_{PEAK}$
- Supply voltage 60 to 120  $V_{DC}$  (permissible range 40 to 160  $V_{DC}$ )
- DIP switches for Overdrive and Boost functions, Activation and Preferential Motor Direction
- Step resolution from full step to 1/20 step

#### Highlights

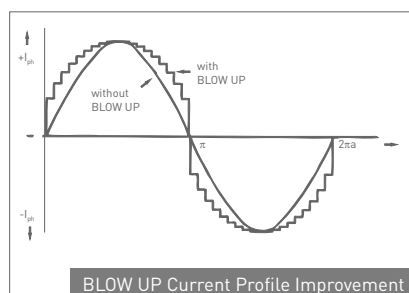
##### Current Shaping

The CS (Current Shaping) function allows adapting the actual current shape to the selected current curve over a wide frequency range.



##### BLOW UP

Improvement of run and acceleration behaviour can be achieved - dependent on the motor type - by the current shape optimising BLOW UP function.



## Industrial

## Specification

## Mechanical

Dimensions (W x H x D)	70.8 (14HP) x 128.4 (3U) x 188 mm
Weight	Approx. 970 g
Mounting	Designed for installation into 19"/3U sub-racks, 32 pin connector acc. to DIN 41612, version D

## Features

Stepper motors	Suitable for the control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Power range, Phase currents	MSX 52-120: max. 5.1 A <sub>PEAK</sub> MSX 102-120: max. 10.3 A <sub>PEAK</sub> MSX 152-120: max. 15.4 A <sub>PEAK</sub>
Supply voltage	60 to 120 V <sub>DC</sub> (permissible range 40 to 160 V <sub>DC</sub> )
Adjustable step resolution	Full step, half step, 1/4, 1/10, 1/20 of a full step, with and without torque balance
Cable length	Motor : shielded: 50 m max. Signal: shielded: 100 m max.
Diagnosable errors	Over-/undervoltage (< 40 V <sub>DC</sub> or > 160 V <sub>DC</sub> ), overtemperature (T > 85 °C), overcurrent, short circuit

## Interfaces

Analogue outputs	A, B, C, D for a 2 phase stepper motor
Digital outputs	Optically isolated from the motor voltage, type Open-Collector Darlington; I <sub>max</sub> = 20 mA, U <sub>max</sub> = 45 V, U <sub>CEsat</sub> at 20 mA < 0.6 V Basic position, Error
Inputs	All inputs include an optocoupler with series resistors for 5 V or 24 V supply voltage: Control pulse, Motor direction, Boost, Activation, Reset (can be enabled by a jumper)

## Communication and Programming

Rotary switches	Setting of run and stop current, step resolution and current shape
DIP switches	Setting of Overdrive and Boost function, Activation and preferential motor direction
Diagnostic by LED	Basic position, overload, supply failure, overtemperature

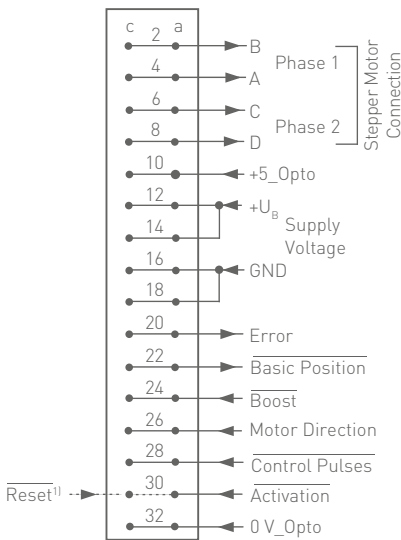
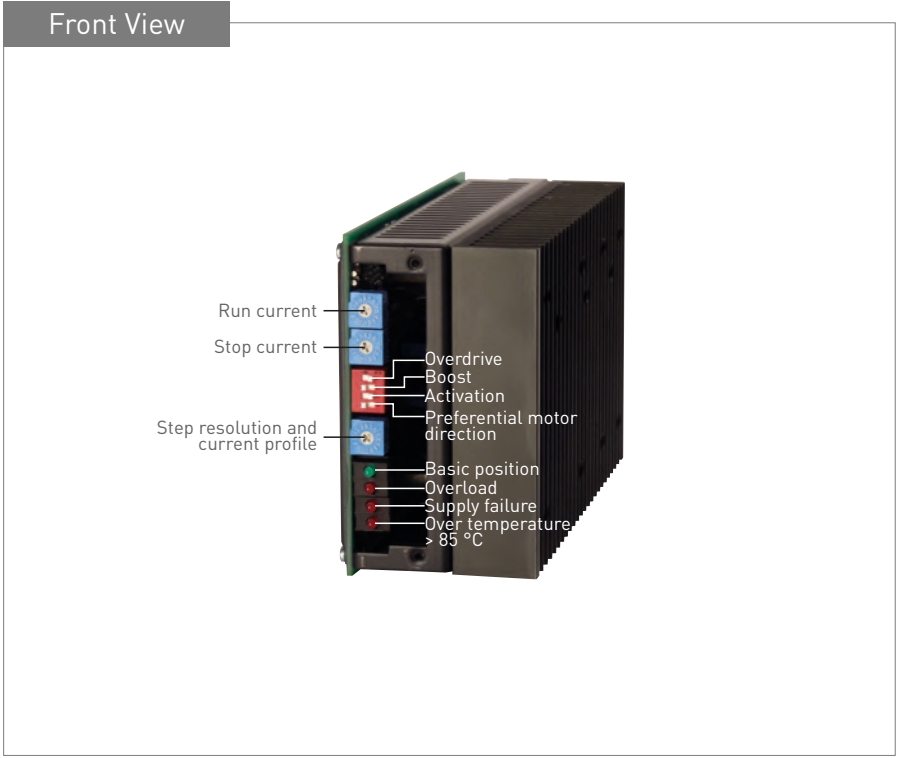
## Operating Conditions

Temperature	Operation: +4 to +40 °C (we suggest additional cooling with higher operating temperatures) Storage: -25 to +55 °C Transport: -25 to +85 °C
Degree of pollution	Level 2 acc. to EN 50178
Relative humidity	5 – 85 % class 3K3 non condensing
Protection class	IP 20
EMC immunity / EMC emission	Acc. to EN 50178: high-voltage current Acc. to EN 61000-6-1, 2, 3, 4: EMC and RFI immunity
Approval	CE



Design: plug-in board for 19" sub-rack Euro-size 100 x 160 mm

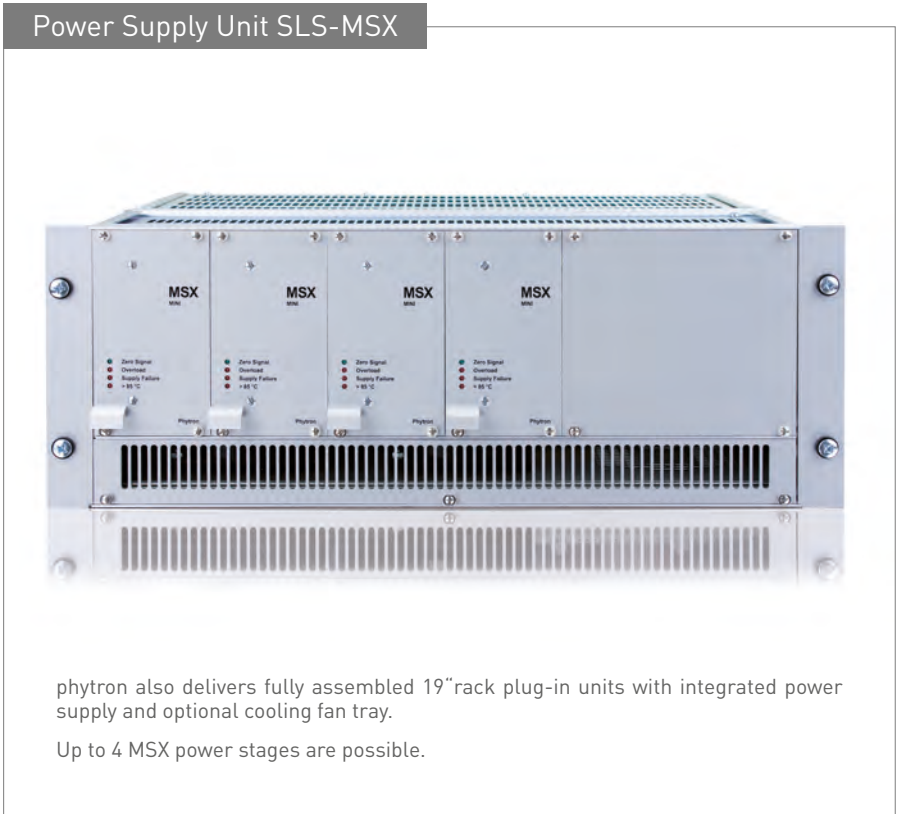
Dimensions in mm



<sup>1)</sup>Standard version MSX (5 V)  
Activation signal: pin 30a and c

Version MSX (5 V-Reset) with Reset input  
Activation: pin 30a / Reset: pin 30c

Pin Assignment



phytron also delivers fully assembled 19" rack plug-in units with integrated power supply and optional cooling fan tray.  
Up to 4 MSX power stages are possible.



## Industrial

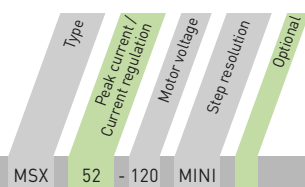
### Design Versions

The MSX (120 V type) is available with different phase currents and replaces the following well-tried phytron power stages:

MSX 52 (5 V) MSX 102 (5 V) MSX 152 (5 V)	Standard, replacement for MSO and MSOMINI
MSX 52 (24 V) MSX 102 (24 V) MSX 152 (24 V)	Replacement for SMD
MSX 52 (5 V Reset) MSX 102 (5 V Reset) MSX 152 (5 V Reset)	Additional Reset input (jumper plugged)

### Ordering Code

The variable elements of the product are displayed in colour.



Ordering code	MSX	52	-	120	MINI
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#### Options

Peak current / Current regulation	52 102 152	Peak current 5.1 A with SYNCHROCHOP current regulation Peak current 10.3 A with SYNCHROCHOP current regulation Peak current 15.4 A with SYNCHROCHOP current regulation
Optional	Reset 24 V	Standard MSX (5 V): without additional designation Reset input activated, 5 V input level 24 V input level

### Optional Accessories

- Front panel (14 HP) with handle
- Mating connector with 32 pin connector
- G-MSX adapter board for easy mounting the MSX, with connectors for motor cable, signal leads and supply voltage
- Damping SB 234 module for 90 V
- Damping SB 234 module for 120 V

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ENG [www.phytron.eu/SLS](http://www.phytron.eu/SLS)

## SLS

### 19" sub rack for stepper motor controllers

Phytron's SLS housings are for up to 8 ZMX<sup>+</sup> or 4 MSX stepper motor power stages with power supply.

Besides the standard designs we also offer individually configured units, which are designed with phytron's ZMX<sup>+</sup> and MSX power stages for different stepper motor types.

#### Application

The SLS was conceived as an all-in-one solution oriented to satisfy the needs of our customers for a 19" format:

Power supply and fans are integrated into the housing according to the requirements in addition to the power stages. With up to 15 A<sub>PEAK</sub> for each axis, the SLS is prewired, ready for connection, and ideal for demanding multi-axis applications like large manipulators, handling tasks, rapid prototyping or scientific experiments for example in the field of particle accelerators.

In addition, the SLS is the ideal extension for existing controller environments like our modular *phyMOTION*<sup>™</sup> controller, the standard PLC systems or the PC cards with pulse outputs.

#### In Focus



ServiceBus



EL. Isolated

- Plug-in 3U power Euromodule with power stages
- Integrated supply unit: 115 V<sub>AC</sub>, 230 V<sub>AC</sub> or 400 V<sub>AC</sub>
- Integrated housing fan and fuses
- Stepper motor power stages: ZMX<sup>+</sup> with 40/70 V motor voltage and ServiceBus  
MSX with 60/120 V motor voltage
- Adjustments of the power stages on the front panel
- Interfaces on the rear:
  - Signal connectors
  - Motor connectors
  - Temperature sensitive switch for monitoring the transformer temperature
  - Communication connector: RS 232 or RS 485
  - Additional connectors according to customer requirements

#### Highlights

##### Individually designed

The requirements for motor control systems are as individual as its applications.

Depending on customer requirements, the power supply unit is designed with modules and assemblies for signal conditioning and distribution.

Also, a selection of sockets and connectors, pin assignments and cabling are available according to requirements.

Additional functions, e.g. processing and transmission of encoder signals, control of motor brakes or the like can be integrated as needed into the SLS.

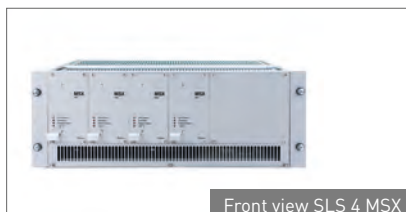
##### Examples

##### SLS with ZMX<sup>+</sup> power stages and ServiceBus

Online parameterisation of the ZMX<sup>+</sup> power stage during the operation via RS 485.

##### SLS with MSX high power stages

Phase currents 5 / 10 / 15 A<sub>PEAK</sub> at 60 to 120 V<sub>DC</sub> bus voltage.



Front view SLS 4 MSX

## Industrial

## Specification

## Mechanical

Dimensions (W x H x D)	19" (482.6 mm) x 4 U (177.1 mm) x 370 mm
Weight	Up to 30 kg , depending on the configuration
Mounting	Rack mounting

## Features

Mains connection	115 V <sub>AC</sub> , 230 V <sub>AC</sub> , 400 V <sub>AC</sub> +/- 10 %, 48 to 62 Hz
Power stages	1 to 8 ZMX <sup>+</sup> with phase currents (with Boost) from either 0 to 1.5 A <sub>PEAK</sub> or 0 to 9 A <sub>PEAK</sub> 1 to 4 MSX with phase currents (with Boost) from 0 to 15.4 A <sub>PEAK</sub> Custom design available
Stepper motors	Suitable for the control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Cable length	Mains: 2 m max. Motor: shielded: 50 m max. Signal: shielded: 100 m max.

## Interfaces

Signal connectors	Standard: 25-pole DSUB Optional: depending on the signal conditioning and distribution
Motor connectors	Standard: 6 pole connectors acc. to DIN 43652 Optional: according to customer specification
Optional connectors	For ServiceBus: RS 485, RS 232 For limit switch or Encoder connection For temperature sensitive switch for monitoring the mains transformer temperature For more customer specific applications

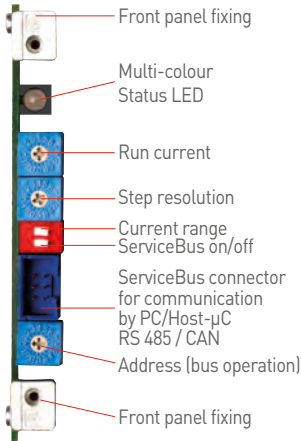
## Communication and Programming

Diagnostics via Status LED of the power stages	Ready, Busy, Reset/Disable, Error diagnostics
Parameterisation via ServiceBus (optional)	Setting of all operating parameters of the ZMX <sup>+</sup> power stage via ServiceBus interface
Operating software	Phytron ServiceBus-Comm <sup>®</sup> for Windows <sup>®</sup>

## Operating Conditions

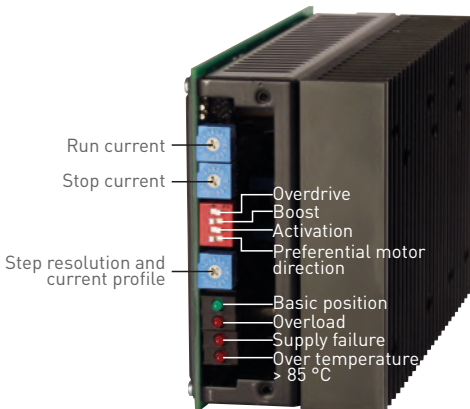
Temperature	Operation: +5 to +40 °C; storage and transport: -25 to +50 °C
Degree of pollution	Level 2
Relative humidity	5 to 85 %, class 2K3 non-condensing
Protection class	IP 20
EMC immunity / EMC emission	Acc. to EN 61000-3-2 Acc. to EN 61000-6-1, -3, -4 Acc. to EN6100-4-2...6, -11
Approval	CE

ZMX+ Power stage



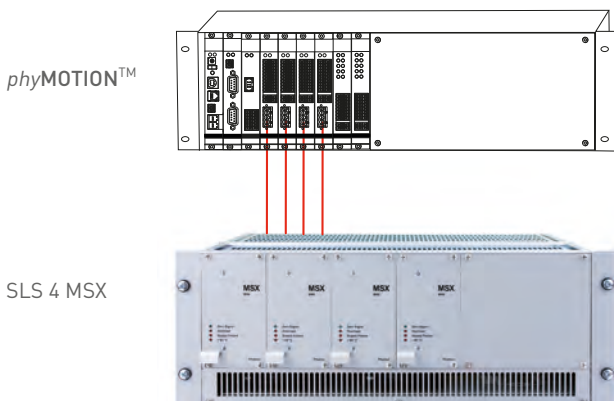
- Stepper motor power stage for bipolar control of 2 phase stepper motors
- Up to 9 A<sub>PEAK</sub> at 24 - 70 V<sub>DC</sub>
- Up to 1/512 microsteps
- Switches for basic adjustment
- Parameterising and diagnostic online via ServiceBus
- Inputs: Control pulses, direction, boost, deactivation, reset, step resolution (optional: electrically isolated)
- Error output
- Options:
  - 32/48 pin connector
  - With/without electrical isolation
  - With/without ServiceBus

MSX Power stage



- Stepper motor power stage for bipolar control of 2 phase stepper motors
- 3 power ranges at 60 to 120 V<sub>DC</sub>:
  - MSX 52-120: 5 A<sub>PEAK</sub> max.
  - MSX 102-120: 10 A<sub>PEAK</sub> max.
  - MSX 152-120: 15 A<sub>PEAK</sub> max.
- Step resolution from full step to 1/20 step
- Run and stop current separately adjustable in 16 increments
- Selectable phase current profile settings: conventional, sinusoidal with Current Shaping or BLOW UP
- All inputs include an optocoupler with series for 5 V or 24 V input level: Control pulses, Motor direction, Boost, Activation, Reset (can be enabled by a jumper)
- Outputs: Basic position, Error

phyMOTION™



The SLS is optimally suited for use with high power stages in combination with the phyMOTION™ modular 19" sub rack mount controller.

## Industrial

## 1 Ordering Code Basic Device

The variable elements of the product are displayed in colour.

Type  
Mains voltage  
Motor voltage  
Options  
+ Power stages 2a / 2b

Ordering code SLS - 115 V - 70 V - X

## Options

Mains voltage	115 V 230 V 400 V	Supply voltage of the SLS
Motor voltage	40 V 70 V 90 V 120 V	Motor voltage ZMX <sup>+</sup> power stage Motor voltage ZMX <sup>+</sup> power stage Motor voltage MSX power stage Motor voltage MSX power stage
Options	A AS P X	Signal connector IXE-A compatible Special signal connector IXE-A compatible Signal connector phyMOTION™ compatible Signal connector customised

## Extent of Supply

- SLS- and power stage manual
- Mating connectors

## Optional Accessories

- For SLS-ZMX<sup>+</sup> with ServiceBus: A CD with ServiceBus-Comm® software, USB driver (included in delivery)
- Cable assembly
- Mini USB-RS 485 converter

For information about mixed configurations (ZMX<sup>+</sup> and MSX) please contact our sales team (sales@phytron.de).

## 2a Ordering Code Assembling with MSX

The variable elements of the product are displayed in colour.

Number of power stages  
Type  
Peak current/  
Current reg.  
Optional

Ordering code 4 - MSX - 52 -

## Options

Number of power stages	1 to 4	Number of installable MSX power stages
Peak current / Current regulation	52 102 152	5.1 A <sub>PEAK</sub> with SYNCHROCHOP current regulation 10.3 A <sub>PEAK</sub> with SYNCHROCHOP current regulation 15.4 A <sub>PEAK</sub> mit SYNCHROCHOP current regulation
Optional	Reset 24 V	Standard MSX (5 V): without additional designation Reset input activated, 5 V input level 24 V input level

2b Ordering Code Assembling with ZMX<sup>+</sup>

The variable elements of the product are displayed in colour.

Number of power stages  
Type  
Connector  
Electrically isolated I/O  
ServiceBus

Ordering code 8 - ZMX<sup>+</sup> - 32 - GT - RS485

## Options

Number of power stages	1 to 8	Number of installable ZMX <sup>+</sup> power stages
Connector	32 48	32-pin VG connector DIN 41612 [D] 48-pin VG connector DIN 41612 [F]
Electrically isolated I/O	GT	with electrical isolation without electrical isolation
ServiceBus	RS485 CAN	ServiceBus via RS 485 ServiceBus via CAN without ServiceBus

## Configuration Examples



## SLS with 4 MSX high power stages

Phase currents 5 / 10 / 15 A<sub>PEAK</sub> at 60 to 120 V<sub>DC</sub> bus voltage.

SLS with 8 ZMX<sup>+</sup> power stages and ServiceBus

Online parameterisation of the ZMX<sup>+</sup> power stage during the operation via RS 485.

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# POWER SUPPLIES

POWER  
SUPPLY

CPU

INDEX

POWER  
STAGE



**SPH 240 /  
500 / 1013**

Power supply for stepper motor power stages and -controllers





ENG [www.phytron.eu/SPH](http://www.phytron.eu/SPH)

## SPH 240 / 500 / 1013

### Power supply units for stepper motor power stages and control units

The power supply units SPH 240 / 500 / 1013 are used to supply e.g. stepper motor power stages or stepper motor controllers. One power supply can supply several devices, depending on the load.

The SPH 240 can be directly connected to 230 or 115 V<sub>AC</sub>, the mains voltage switch is used to change the voltage range. The SPH 500 and SPH 1013 power supply units switch automatically within the wide range input. The three-phase power supply SPH 1013 has an input range of 3 x 340 to 550 V<sub>AC</sub>.

The mains input is internally fused, the output is permanently short circuit-proof. Best operation reliability is ensured by overtemperature protection, overvoltage protection and mains buffering.

A green LED indicates when the 24 V / 48 V or 72 V output voltage is ok.

The built-in fan makes the power supply unit ready for operation in any assembly position.

#### In Focus



- Input voltage range  
SPH 240 / 500: 90...132 or 180...264 V<sub>AC</sub>  
SPH 1013: 3 x 340-550 V<sub>AC</sub>
- Output voltage: 24 / 48 / 72 V<sub>DC</sub>
- Output current: 5 to 20 A
- Power category: 240 / 480 / 960 W
- Internally protected mains input
- Permanently short circuit-proof output
- Overvoltage protection primary and secondary side
- Overtemperature protection
- Integrated fan
- DIN rail or wall mounting
- Any mounting position
- Product data sheets and safety instructions are available on the following website: [www.mgv.de](http://www.mgv.de)

#### Ordering Code

The variable elements of the product are displayed in colour.

Type  
Power category/  
Output  
voltage  
Mounting mode

Ordering code SPH 1013-4821 - W

#### Options

Power category- output voltage	240-2410 240-4805 500-2420 500-4810 500-7207 1013-4821 1013-7214	24 V <sub>DC</sub> / 10 A / 240 W 48 V <sub>DC</sub> / 5 A / 240 W 24 V <sub>DC</sub> / 20 A / 480 W 48 V <sub>DC</sub> / 10 A / 480 W 72 V <sub>DC</sub> / 6.7 A / 480 W 48 V <sub>DC</sub> / 20 A / 960 W 72 V <sub>DC</sub> / 13.5 A / 960 W
Mounting mode	H W	Rear DIN rail Rear wall

Mating connectors are included in delivery.



Industrial

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# ACCESSORIES



## USB-485 Converter

Interface converter as stick for Phytron  
stepper motor controllers and power  
stage


 ENG [www.phytron.eu/USB](http://www.phytron.eu/USB)


# USB-485 Converter

## Interface Converter as Stick for Phytron Stepper Motor Controllers and Power Stages

The USB-RS485 stick connects the Phytron RS485 device easily with the standard PC USB-port. The converter is especially designed for the 4-wire RS485 bus (full duplex).

### Connection

The converter is connected to the appropriate controller/power stage directly or by a device-dependent cable.

Before first use the driver must be installed from the Phytron CD.

### Three Versions

The stick is available in three versions, which differ in the interface connector:

**USB-RS485.4:** Connector type USB A for MCC-2, MCC-1 stepper motor controller and MCD+ power stage

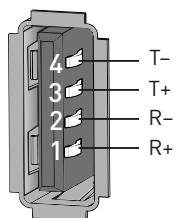
**USB-RS485.6:** 6-pole connector for rack power stages with ribbon cable connector

**USB-RS485.9:** 9-pole D-sub connector for OMC/TMC stepper motor controller

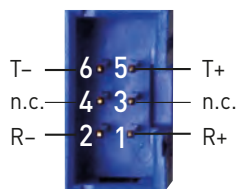
### In Focus

- Interface converter for Phytron stepper power stages and controllers
- Dimensions: 55 x 30 x 24 cm (without connector)
- Material: ABS, black
- RS485: 4-wire read/write mode up to 32 bus participants maximum, up to 1200 m (incl. bus termination)
- Data rate: up to 2.5 MBit/s
- Power supply: 70 mA (via USB interface)
- Operating systems: Windows Vista, 7, 8, 10
- Accessories, included in delivery:
  - Connection cable:
    - Type USB A-B, length of 200 cm for all versions
    - Type USB A-A, length of 100 cm for USB-RS485.4
    - Type 6-pole ribbon cable, length of 20 cm for USB-RS485.6
  - Driver CD

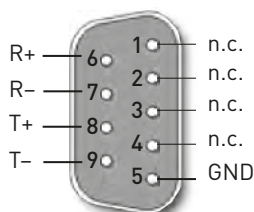
### Connector



RS485-USB.4

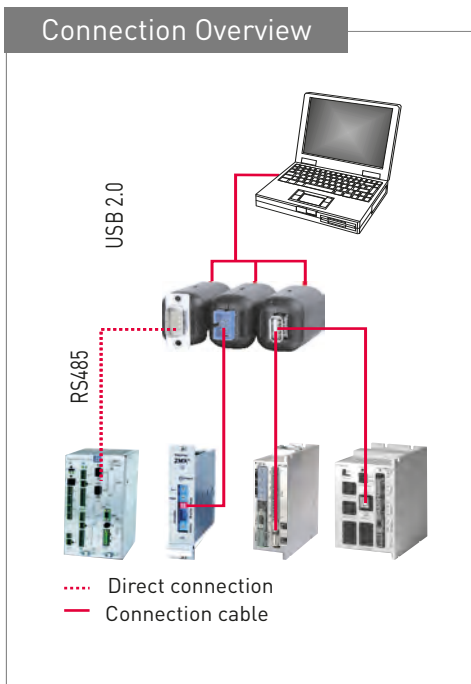


RS485-USB.6



RS485-USB.9

Industrial



**Ordering Code**

The variable elements of the product are displayed in colour.

Converter      Version

Ordering code      USB-RS485 . 4

Options	
4	for controllers of MCC series and MCD* power stage
6	for rack power stages with 6-pole ribbon cable connector
9	for OMC/TMC controllers

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# SOFTWARE

Our free WINDOWS® programs allow to program, to monitor and to adjust power stages and controllers comfortable and clear via PC.



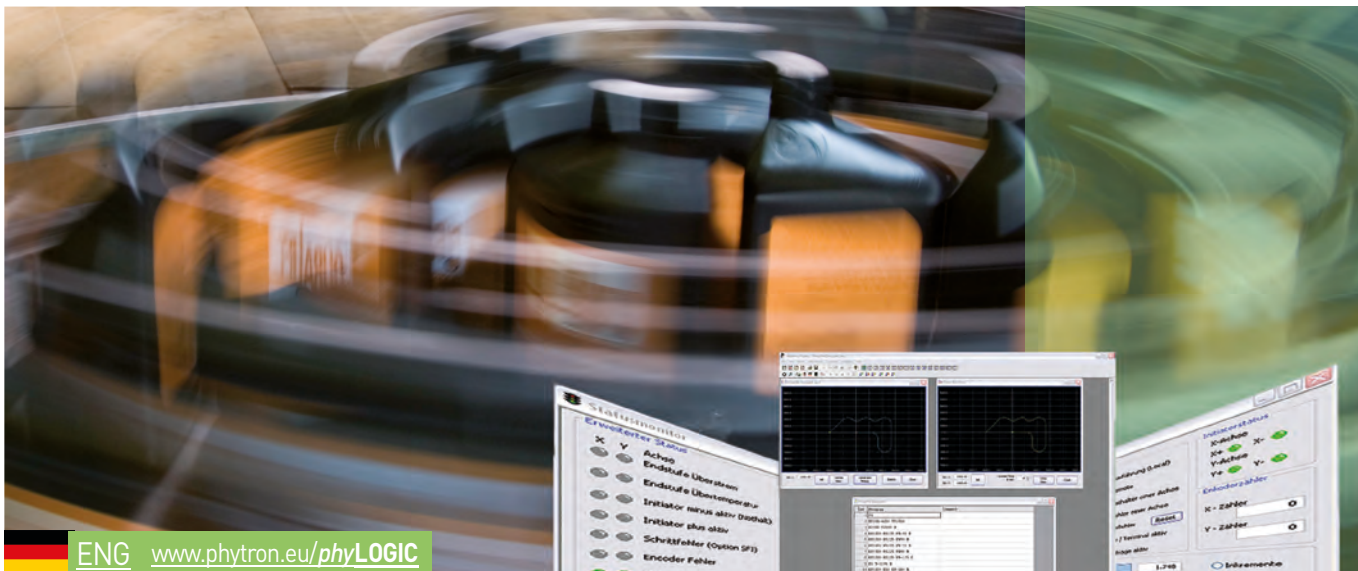
## **phyLOGIC™ Toolbox**

Development environment for the *phyMOTION™* stepper motor controller



## **ServiceBus- Comm®**

Communication software for stepper motor power stages



ENG [www.phytron.eu/phyLOGIC](http://www.phytron.eu/phyLOGIC)

# phyLOGIC™ ToolBox

## Development environment for Stand-alone stepper motor controllers

phyLOGIC™ is our new programming language for stepper motor power stages. It is a consistent further development of our proven MiniLog language. It supports on the one hand our established product lines and on the other hand our new modular controller phyMOTION™.

The disclosed phyLOGIC™ instruction set can be used without license fees and easily integrated into customer applications. With the free development environment phyLOGIC™ ToolBox, we provide a user friendly software, which can integrate, in

addition to its own instruction set, can also integrate the high level C language.

phyLOGIC™ instructions can be sent individually to the phyMOTION™ controller directly via various bus protocols, combined into scripts or are stored locally on the controller.

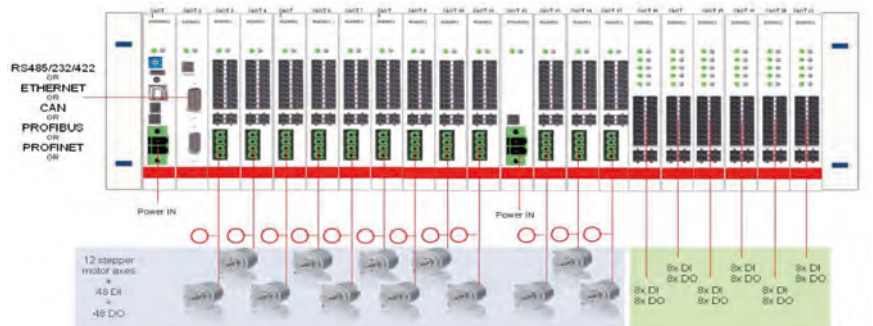
Our ToolBox contains besides the actual programming environment useful tools such as the "Motion Creator" that can easily draw 2D contours and turn them into code, as well as numerous diagnostic, debugging and testing features.

### In Focus

- Operating software and development environment for the phyMOTION™ phytron controller
- Easy to program: Drawing and converting from 2D contours in phyLOGIC™ instructions (Motion Creator)
- Parameterising, creating programs, editing, debugging
- Support in the initiation phase e.g. by test functions
- Display of statuses and graphical representation of a current XY position
- Archiving of parameter sets and programs
- Existing MiniLog programs are ported with minimal changes

### Highlights

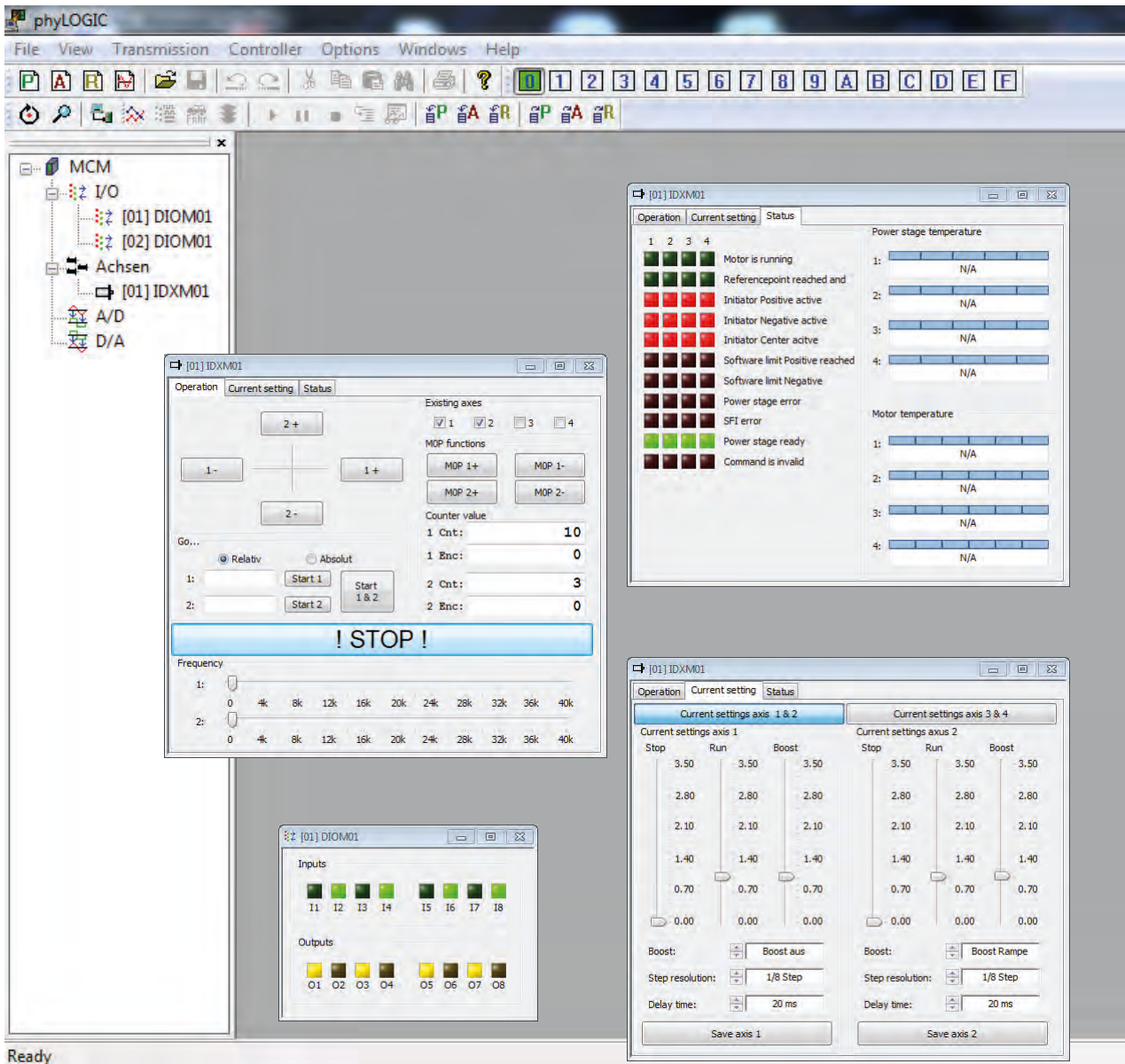
phyLOGIC™ in use:  
Our new modular stepper motor control phyMOTION™





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Program Window



Windows® is a trade mark of Microsoft.

phyLOGIC™ and phyMOTION™ are trade marks of Phytron GmbH.

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ENG [www.phytron.eu/ServiceBus-Comm](http://www.phytron.eu/ServiceBus-Comm)

## ServiceBus-Comm™

### Communication software for parameterising and control of stepper motor power stages

The phytron communication software Service-Bus-Comm™, designed for Windows®, assists the user to program and operate stepper motor power stages – e.g. ZMX+, MCD+, MR8+, CCD+ – equipped with ServiceBus<sup>1</sup> interface.

Operating parameters such as run current, stop current, step resolution, current delay time or other parameters depending on the type of power stage, can be edited by PC, saved and transmitted to each power stage by ServiceBus.

ServiceBus-Comm™ helps to monitor the actual current, the power stage- or the motor

temperature during operation. Status windows report input conditions and make it possible to set outputs or to display detailed error messages.

Optionally, ServiceBus instructions and functions can be handled by individual software. Readable ASCII string instructions are editable e.g. with LabView®, HyperTerminal or C language.

Up to 32 stepper motor axes can be simultaneously distributed by ServiceBus-Comm™.

<sup>1</sup> All types of phytron control units with Service-Bus are labeled by the appendix +.

#### In Focus

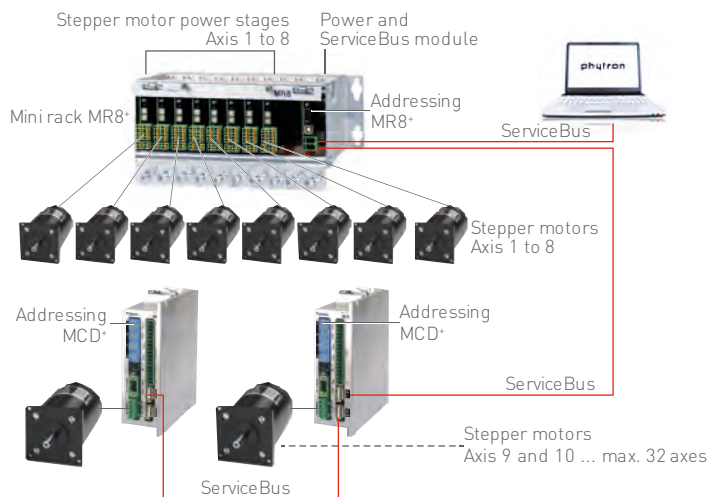
- Communication software for stepper motor power stages with ServiceBus

ServiceBus-Comm™ is a registered trade mark of the Phytron GmbH.

- Putting into operation, configuration and error diagnosis
- Programming power stage parameters
- Online status display for safe operation and easy maintenance
- Parameter memory for data backup
- Designed for PC under Windows® 95, 98, 2000, NT, XP, 7
- Browser independent installation software
- Installation from CD
- RS 485/4-wire connection of the power stages or ServiceBus modules
- Connection to the PC by USB, RS 485/4-wire or RS 422

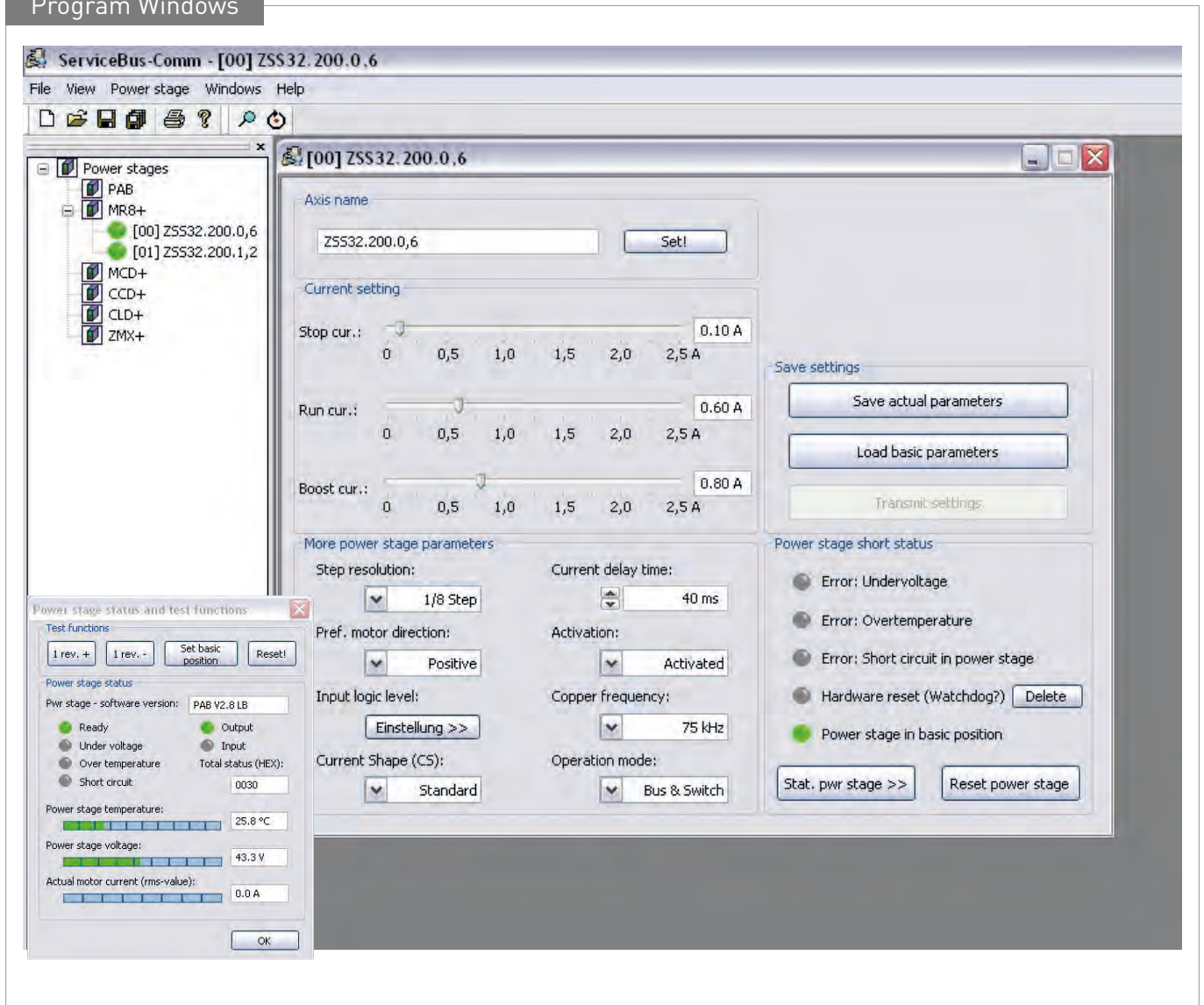
#### Highlights

Example: 10 axes at the ServiceBus



## Industrial

## Program Windows



## phytron products with ServiceBus support:

- MCD+
- MR8+
- ZMX+
- PAB+
- CLD+
- CCD+

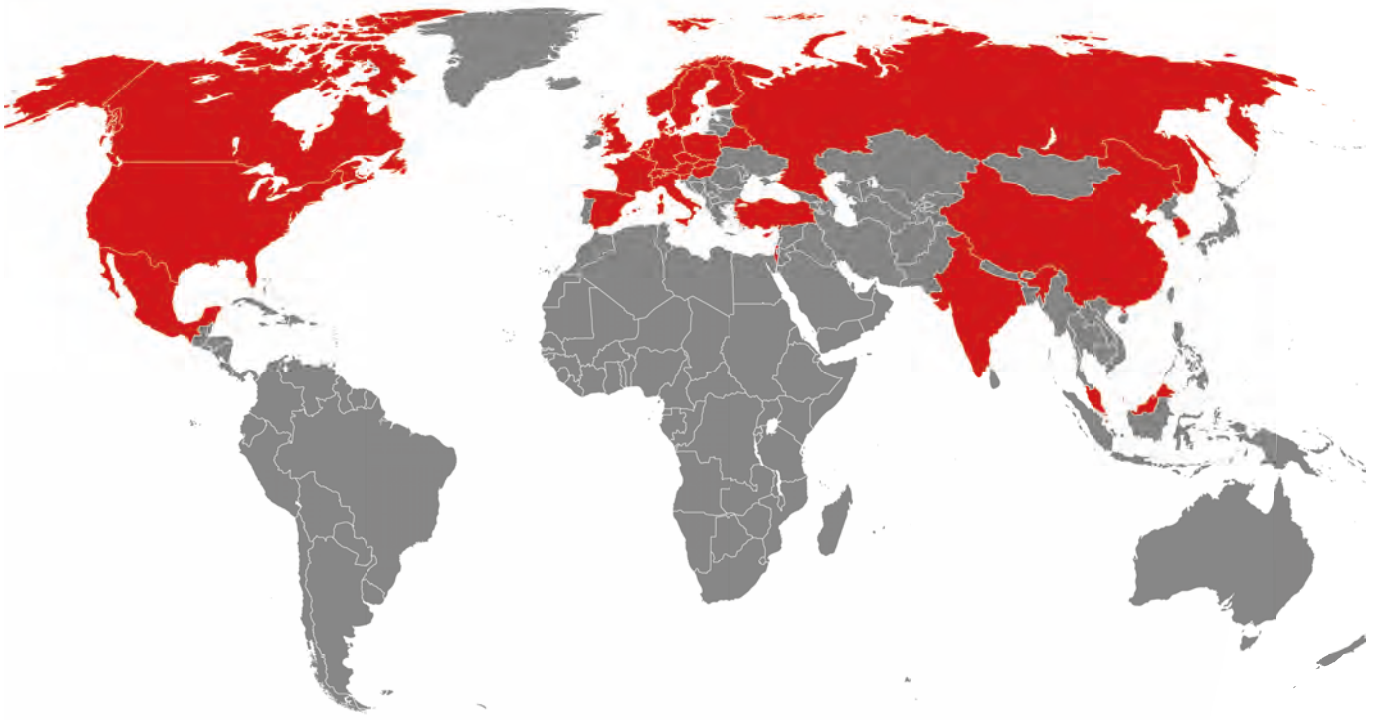
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