



Phytion Electronics – Precision for challenging applications

Precision and innovation for challenging applications

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 EN 9100. We have the process know-how of more than 1000 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 a quality conscious business we produce in Gröbenzell near Munich.



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POSITIONING CONTROLLERS

Positioning controllers 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.



phyMOTION®

Free programmable, modular multi axes controller for stepper motors



MCC-2

Free programmable controller for two axes



MCC-1

Free programmable controller for one axis



ENG 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_{Peak} at 120 V_{DC} 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) the *phyMOTION™* also provides linear and circular interpolation.

In 4 steps to your stepper motor controller

1 Choose the *phyMOTION™* type

<p>Housing depth s</p>	external 6SL-s, 8SL-s, 10SL-s or 21SL-s	integrated		Rack, wall, rail mounting or bench	POWM01+MCM01 or MCM02
	internal 115 V _{AC} to 230 V _{AC}	external			
	Supply / Mains connection	Housing width	Touch Panel	Type of mounting	Supply
<p>Housing depth p</p>	internal 115 V _{AC} to 230 V _{AC} Definition of the motor voltages*)	21SL-p integrated external	Definition of the fitting position • connection side • plain side	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: Ethernet, ProfiBus/ProfiNet, RS 485, RS 232, RS 422

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

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

Options for your phyMOTION™

Options are available for the main or auxiliary functions. The following overview will make the option selection as easy as possible:

*** POWER STAGE**

Option selectable power stage

- **APS power stage (APS01):**
 - step frequency up to 500.000 steps/sec.
 - up to 5 A_{PEAK} at 24 to 70 V_{DC} (Derating dep.on application)
 - precision up to 1/512 step resolution
 - Sinusoidal current curve
 - Overdrive function (a motor independent compensation of the phase current decrease in the upper speed range)
- **LPS power stage (LPS01):**
 - step frequency up to 250.000 steps/sec.
 - up to 9 A_{PEAK} at 24 to 70 V_{DC} (Derating dep.on application)
 - precision up to 1/256 step resolution
 - Sinusoidal-like current curve

ENC *

Option selectable encoder evaluation

Encoder type	supply	resolution	supported types	option (submodule)			
				ECAS01	ECES01	ECBS01	ECMS01
differential	5 V / 5.5 V 500 mA	2 ³²	Quadrature with zero track	✓	✓	✓	
SSI	5 V / 5.5 V 500 mA	2 ³¹	SSI	✓	✓	✓	
BiSS	5 V / 5.5 V 500 mA	2 ³¹	BiSS-C BiSS-B			✓	
EnDat	5 V / 5.5 V 500 mA	2 ³¹	Endat 01 02 21 22 T		✓		
Resolver	5 to 10 V _{rms} 1 to 10 kHz	2 ¹²	Resolver 6-wire LVDT / RVDT 4-/5-/6-wire				✓

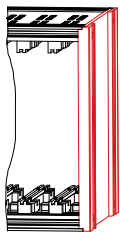
TEMP *

Option selectable motor temperature evaluation

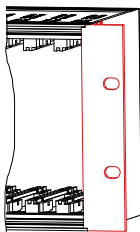
- with KTS01 submodule: the stepper motor temperature is evaluated with the metall thermocouple type K by comparison measurement
- with PTS01 submodule: the stepper motor temperature measurement with the Pt resistor sensors

1 Housing and Supply

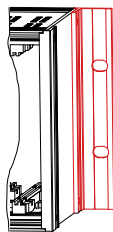
Housing types of the *phyMOTION™*:



Bench or rail mounting



Rack mounting (connection side is the front)



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

Housing depth / current supply	Slots	U	Width	Height	Depth	Mounting
s / external or s / internal	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 s / „ext“

Type	Number of slots	Mounting	Housing dep.	customised
phyMOTION - 6SL - MR - s - X				
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 p / „int“

Type	Number of slots	Mounting	Housing dep.	customised
phyMOTION - 21SL - RI - p - X				
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		

Ordering code s / „int“

Type	Number of slots	Mounting	Housing dep.	customised
phyMOTION - 21SL - W - s - X				
Options				
number of slots	8SL 10SL 21SL	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

Type
POWM01

Mating connectors are included in delivery.

POWER SUPPLY

CPU

INDEX

POWER STAGE

POW IN

COM

Main Supply (POWM01) ext

The beginning of each *phyMOTION™*

- Main supply:**
 - 24 to 70 V_{DC} supply voltage (for motors and generates internally the logic voltages) – max. 20 A
 - Electrically isolated 24 V_{DC} 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).**

Intermediate Supply (POWM02)

Maximum 20 A per supply

- 24 to 70 V_{DC} supply voltage (for motors and generates internally the logic voltages) – max. 20 A
- Electrically isolated 24 V_{DC} 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).

ext

Ordering Code

Type

POWM02

Mating connectors are included in delivery.

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_{DC} output (for e.g. sensors)

int

Ordering Code

Type

POWM03

Mating connectors are included in delivery.

Intermediate Supply (POWM04)

Maximum 20 A for subsequent power stages (except MSX)

- 48 to 70 V_{DC} Power supply (for motors and generates internally the logic voltages) – max. 20 A
- 24 V_{DC} output (for e.g. sensors)

int

Ordering Code

Type

POWM04

Mating connectors are included in delivery.

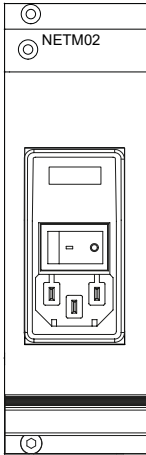
POWER SUPPLY

CPU

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POWER STAGE

115 to 230 V Power Supply (NETM02)



External mains voltage (115 V to 230 V)

- Mains switch
- 115 V to 230 V mains voltage
- internal supply of the *phyMOTION*™ with motor and logic voltage
- per 500 W defined motor voltage (max. 3)

int
s/p

Ordering Code

Type	Motor voltage 1	Motor voltage 2	Motor voltage 3
NETM02 - 70V - 70V - 48V			

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

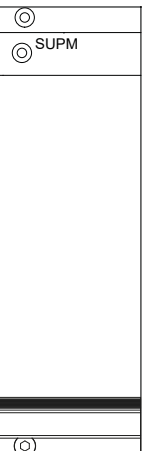
POWER SUPPLY

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POWER STAGE

Supply of the Intermediate Circuit Voltage (SUPM)



Power supply for intermediate circuit voltage (24, 48, 70 and 120 V_{DC})

- generates the internal supply of the *phyMOTION*™ with motor and logic voltage from the mains voltage
- Options depend on housing depth:
 - SUPM02, 04 and 07 (with front panel) with housing depth s
 - SUPM08 and 12 (without front panel) with housing depth p

int
s/p

Ordering Code

Type	intermediate circuit voltage
SUPM 02	

Options		
intermediate circuit voltage	02 04 07	24 V housing s 48 V housing s 70 V housing s
	08 12	70 V housing p 120 V housing p

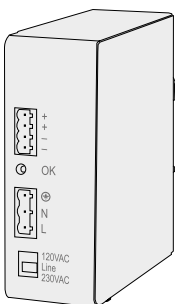
POWER SUPPLY

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POWER STAGE

External Power Supply Unit (SPH)



Compatible Power Supply Unit (5 to 20 A)

- Mains supply voltage 115 / 230 V_{AC}
- Internally fused mains input
- Output voltage 24 V_{DC} (10 A / 20 A), 48 V_{DC} (5 A / 10 A / 20 A), 72 V_{DC} (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

ext
s

Ordering Code

Type	Output power	Output	Mounting
SPH1013-4821 - W			

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

Mating connectors are included in delivery.

2 Host Interface

POWER SUPPLY

CPU

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POWER STAGE

COM

Main Controller (MCM01)

CPU with host interface:

- 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:
 - Ethernet
 - ProfiBus/ProfiNet
 - RS 485, RS 232, RS 422

s/p

Ordering Code

Type

-

Host communication

MCM01 - RSS01

Options		
Host communication	ETHS01 PBS01 PNS01 RSS01 NNS01	Ethernet ProfiBus ProfiNet RS 232 or RS 485/422 no interface

Mating connectors are included in delivery.

POWER SUPPLY

CPU

INDEX

POWER STAGE

COM

POW IN

Main Controller and Supply (MCM02)

CPU with host interface and supply:

- Main CPU:
 - Controls and administers up to 64 modules
 - 24 to 70 V_{DC} 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

ext

Ordering Code

Type

-

Host communication

MCM02 - PBS01

Options		
Host communication	ETHS01 PBS01 PNS01 NNS01	Ethernet ProfiBus ProfiNet 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)

CPU with host interface 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
- 24 V_{DC} output (for e.g. sensors)

int

Ordering Code

Type

-

Host communication

MCM03 - PBS01

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

Mating connectors are included in delivery.

3 Power Stages and Indexer

1 Axis Stepper Motor Drive I1AM01 or I1AM02

Indexer with integrated 3.5 A power stage (I1AM01) or selectable power stage (I1AM02)*¹

- Integrated indexer for standard functions:
 - Relative and absolute positioning
 - Reference movements/speed mode
 - Step frequency to 40,000 steps/second
- I1AM01: Integrated 3.5 A power stage
 - 3.5 A_{PEAK} at 24 to 48 V_{DC} (derating dep. on application)
 - Selectable step resolution up to 1/256 step
 - Online power stage parameterisation and diagnostics
- I1AM02: with selectable power stage*¹
- 3 limit/reference switches
- Optional encoder evaluation*¹
 - SSI, differential, BiSS or Endat; Resolver
- Optional motor temperature evaluation
 - for Pt100 sensors (PTS01) or K types (KTS01)

1 Axis Stepper Motor Drive (I1EM02)

Indexer for external power stage

- Integrated indexer for standard functions:
 - Relative and absolute positioning
 - Reference movements/speed mode
 - Online power stage parameterisation and diagnostics
- Outputs Control pulses/Direction/Boost and Enable to an external power stage
- 3 limit/reference switches
- Optional encoder evaluation*¹
 - SSI, differential, BiSS or Endat; Resolver

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
 - ...

* refer to page 2

Ordering Code

Type / Power stage / Encoder evaluation / Temperature evaluation

I1AM02 - APS01 - ECAS01 - PTS01

Options		
1 Axis drive type	I1AM01 I1AM02	with int. 3.5 A power stage with select. power stage
Power stage	APS01 LPS01	with power stage 5 A / 70 V with power stage 9 A / 70 V with power stage 3.5 A / 48 V (I1AM01)
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

Ordering Code

Type / Encoder evaluation

I1EM02 - ECAS01

Options		
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module

Mating connectors are included in delivery.

Ordering Code

Type

I4XM01

Mating connectors are included in delivery.

1 Axis Carrier Module for APS-/LPS Power Stage (INAM01)

POWER SUPPLY
CPU
INDEX
* **POWER STAGE**
ENC *
TEMP *

Status LEDs
Encoder*/ Limit Switch
Temp. sensor*
Stepper motor

APS/LPS, encoder and temperature

- Requires an upstream installed indexer for interpolation (i.e. I4XM01)
- Selectable high end power stage^{*)}
- 3 limit/reference switches
- Optional encoder evaluation^{*)}
 - SSI, differential, BiSS or Endat; Resolver
- Optional motor temperature evaluation
 - For Pt100 sensors (PTS01)
 - K types (KTS01)

Ordering Code

INAM01 - APS01 - ECAS01 - PTS01

Options		
Power stage	APS01 LPS01	Int. power stage 5A/70V Int. power stage 9A/70V
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

Power Stage Module with Safe Torque Off (INSM01)

POWER SUPPLY
CPU
INDEX
* **POWER STAGE**
ENC *
SAFETY

Status LEDs
Encoder*/ Limit Switch
ST0 Input
Stepper Motor

APS, STO and Encoder

- with Safe Torque Off function SIL3/Plc
- Currently the high end power stage APS01 can be selected
 - Up to 5 A_{peak} for 24 to 70 V_{DC} (derating dep. on application)
 - Precision up to 1/512 step resolution
 - Online parameterisation and diagnostics
- 3 limit/reference switches
- Optional encoder evaluation^{*)}
 - SSI, differential, BiSS or Endat; Resolver (refer to page 2)

Ordering Code

INSM01 - APS01 - ECAS01

Options		
Power stage	APS01	Int. power stage 5A/70V
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module

Mating connectors are included in delivery.

1 Axis Module for integrated MSX⁺ Power Stage (INAM03)

POWER SUPPLY
CPU
INDEX
* **POWER STAGE**
ENC *
TEMP *

Status LEDs
Encoder*/ Limit Switch
Temp. sensor*
Stepper motor

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_{PEAK} for up to 120 V_{DC}
 - Precision up to 1/20 step resolution
- (5+1) pin motor connector with PE^{*)}
- 3 limit/reference switches
- Optional encoder evaluation^{*)}
 - SSI, differential, BiSS or Endat; Resolver
- Optional motor temperature evaluation
 - For Pt100 sensors (PTS01)
 - K-types (KTS01)

^{*) on request: 5-pin Phoenix connector for the motor connection}

Ordering Code

INAM03 - MSX⁺ - ECAS01 - PTS01

Options		
Power stage	MSX ⁺	Power stage up to 15 A/70 V
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

* refer to page 2

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*¹
 - SSI, differential, BiSS or Endat; Resolver
- Optional motor temperature evaluation
 - for Pt100 sensors (PTS01) or K types (KTS01)

POWER SUPPLY
CPU
INDEX
POWER STAGE
ENC *
TEMP *

Ordering Code

EXAM01 - ECES01 - PTS01

Options		
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

I/Os (analogue/digital)

PID Regulation Module (PIDM01)

Proportional, Integral, Derivative Regulation Module

- 4 analogue measuring inputs i.e. for Pt100 sensors and K types
- 4 digital inputs 24 V
- 4 digital outputs 24 V, max. 1 A
- 24 V supply of the I/O is centrally delivered either by the power modules or directly at the PIDM01
- 4 independent PID controllers with PWM output

POWER SUPPLY
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INDEX
POWER STAGE
I/O D
I/O A
TEMP *
POW IN

Ordering Code

PIDM01 - PTS01 - PTS01 - PTS01 - KTS01

Options		
Measuring input 1	PTS01 KTS01	Pt sensor K type
Measuring input 2	PTS01 KTS01	Pt sensor K type
Measuring input 3	PTS01 KTS01	Pt sensor K type
Measuring input 4	PTS01 KTS01	Pt sensor K type

Mating connectors are included in delivery.

Digital I/Os (DIOM01)

Digital I/O module

- 8 digital inputs 24 V_{DC}
- 8 digital outputs 24 V_{DC}, 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.

POWER SUPPLY
CPU
INDEX
POWER STAGE
I/O D
POW IN

Ordering Code

DIOM01

Mating connectors are included in delivery.

* see page 2

POWER SUPPLY

CPU

INDEX

POWER STAGE

I/O A

TEMP

ENC

Analogue Inputs and Outputs (AIOM01)

AOM01

Status LEDs

I/O-Status LEDs

Outputs

int. Supply

Analogue input and output module

4 analogue inputs and outputs included

Inputs: ± 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

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POWER STAGE

I/O A

Customised Modules

On demand

Customised modules can be realised on demand.

HMI-Interfaces

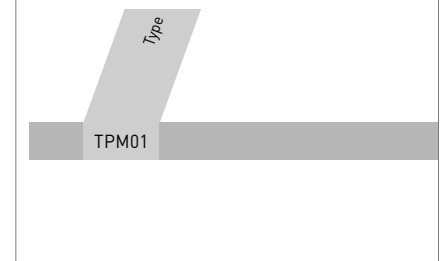
Android-based integrated Touch Panel (TPM01)



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)
- Touch functionality
- As user interface i.e. for parameter selection
- For support, parameterisation and diagnostics

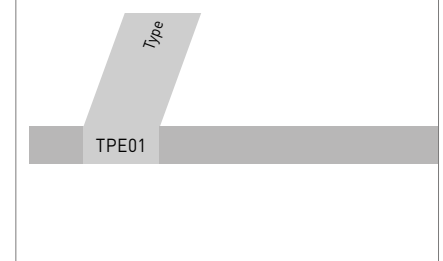
Control with Operator Touch Panel (TPE01)



External human-machine interface

- For connectio to the POWM01 main power module (terminal interface)
- 800 x 480 px – TFT display
- Touch functionality
- For configuration, service snd 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



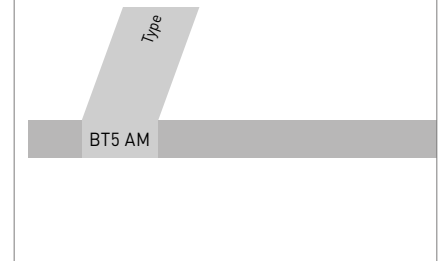
Control with Operator Panel BT5 AM



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



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

Equipment

Motor Shield Clamp



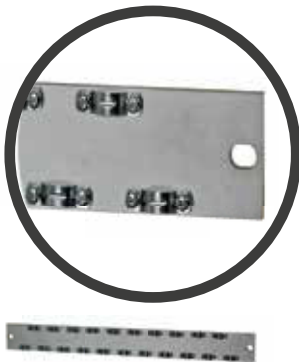
Shielding for motor connection

- 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

Ordering ID

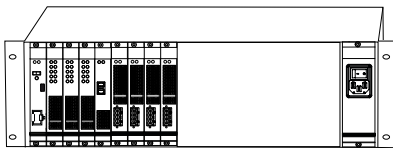
10019311

4 Order and Receive the Fully Assembled *phyMOTION™*

Configuration Example

int

phyMOTION™ with internal supply and housing depth p



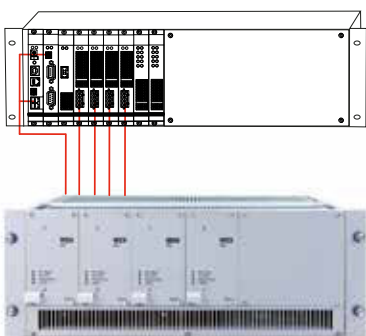
Ordering code example:

	Ordering code	Description
Housing	<i>phyMOTION</i> -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	<i>phyMOTION</i> -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*TM 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*TM 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*TM 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*TM 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.



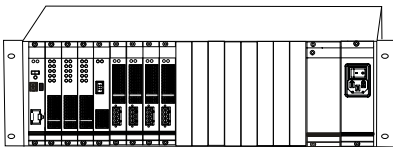
Configuration:

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

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

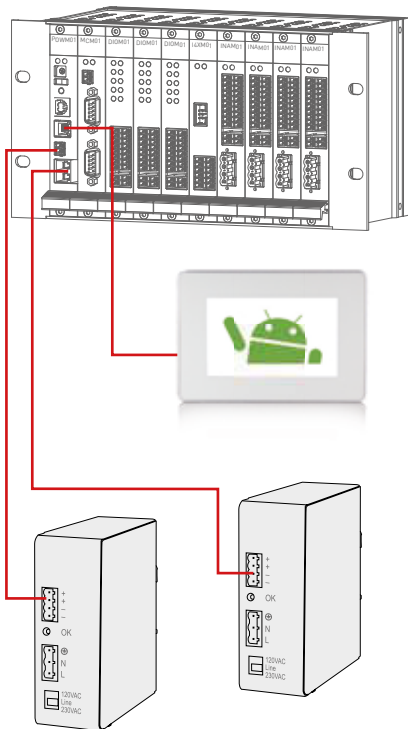
Module	Ordering Code	Description
TPM01	TPM01	Android-based integrated touch panel
Slot 1	POWM03	Main power supply
Slot 2	MCM03-PBS01	Main controller with ProfiBus interface
Slot 3	DIOM01	Digital I/O module
Slot 4	DIOM01	Digital I/O module
Slot 5	I4XM01	4 axes indexer module
Slot 6	INAM01-APS01-ECAS01	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

P

ext

Configuration Example

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



Ordering Code Example:		
	Ordering Code	Description
Housing	phyMOTION-10SL-R-s	Rack mounting housing with 10 slots and depth 120 mm
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
Power supply	SPH240-2410-W	External power supply unit with 240 W, 24 V _{DC} output voltage and 10 A for rear wall
Power supply	SPH240-4805-W	External power supply unit with 240 W, 48 V _{DC} output voltage and 5 A for rear wall
TPE	TPE	External Operator Touch Panel

5

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

You will find all relevant performance data, dimensions and key figures under the following QR code. We will happily advise you!



Phytron GmbH
 Tel.: +49 8142 503-0
 E-Mail info@phytron.de



www.phytron.de/MCC-2

MCC-2

Programmable controller for two axes

The MCC-2, Phytron'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_{PEAK} 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, 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



Analog



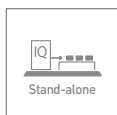
eL. isolated

- 2 axes stepper motor control unit with integrated power stages
- Bipolar control of 2 phase stepper motors
- Phase currents up to 3.5 A_{PEAK}
- Power supply 24 to 48 V_{DC}
- Step resolution 1/1 up to 1/256 step
- Host interfaces: Ethernet, USB, 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
- MCC-2 standard in the sheet housing MCC-2 with adapter or operator terminal in the aluminum housing
- 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®



Stand-alone

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

LabVIEW®

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

MiniLog-Comm®

MiniLog-Comm® is Phytron'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 Phytron 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.

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. 750 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 _{DC} ; Limit switches and outputs: 24 V _{DC}
Phase current	up to 3.5 A _{PEAK}
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"> • Short circuit (between phase and power supply; between both phases; within a motor against ground)) • Over temperature • Under voltage
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

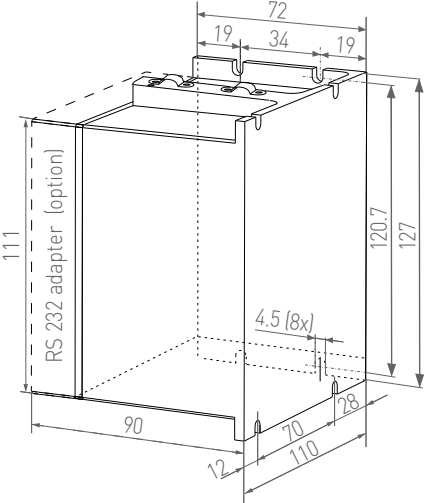
Analogue outputs	2 x (A, B, C, D) for two 2 phase stepper motors
Digital outputs	8 digital outputs, overload-proof, each electrically isolated from power supply / 24 V power supply fed separately; the maximum load is 1 A on each output; 4 A for all outputs
Host interface	Optional: Ethernet, USB, RS 485,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

Communication and Programming

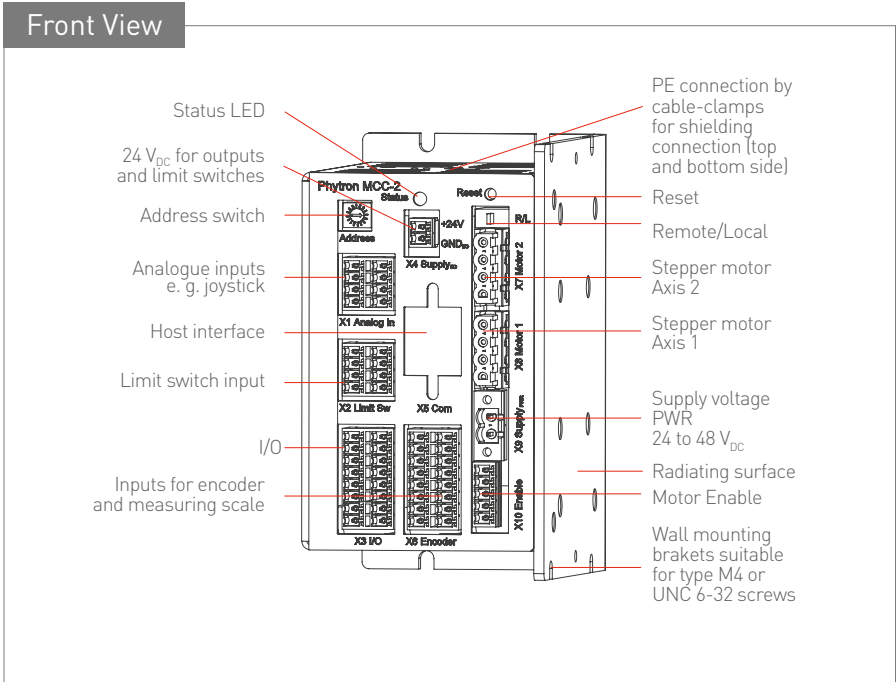
Programming	MiniLog format acc. to DIN 66025 – MiniLog-Comm [®] (included in delivery) – LabVIEW [®] VIs (included in delivery)
Memory	128 kB program memory

Operating Conditions

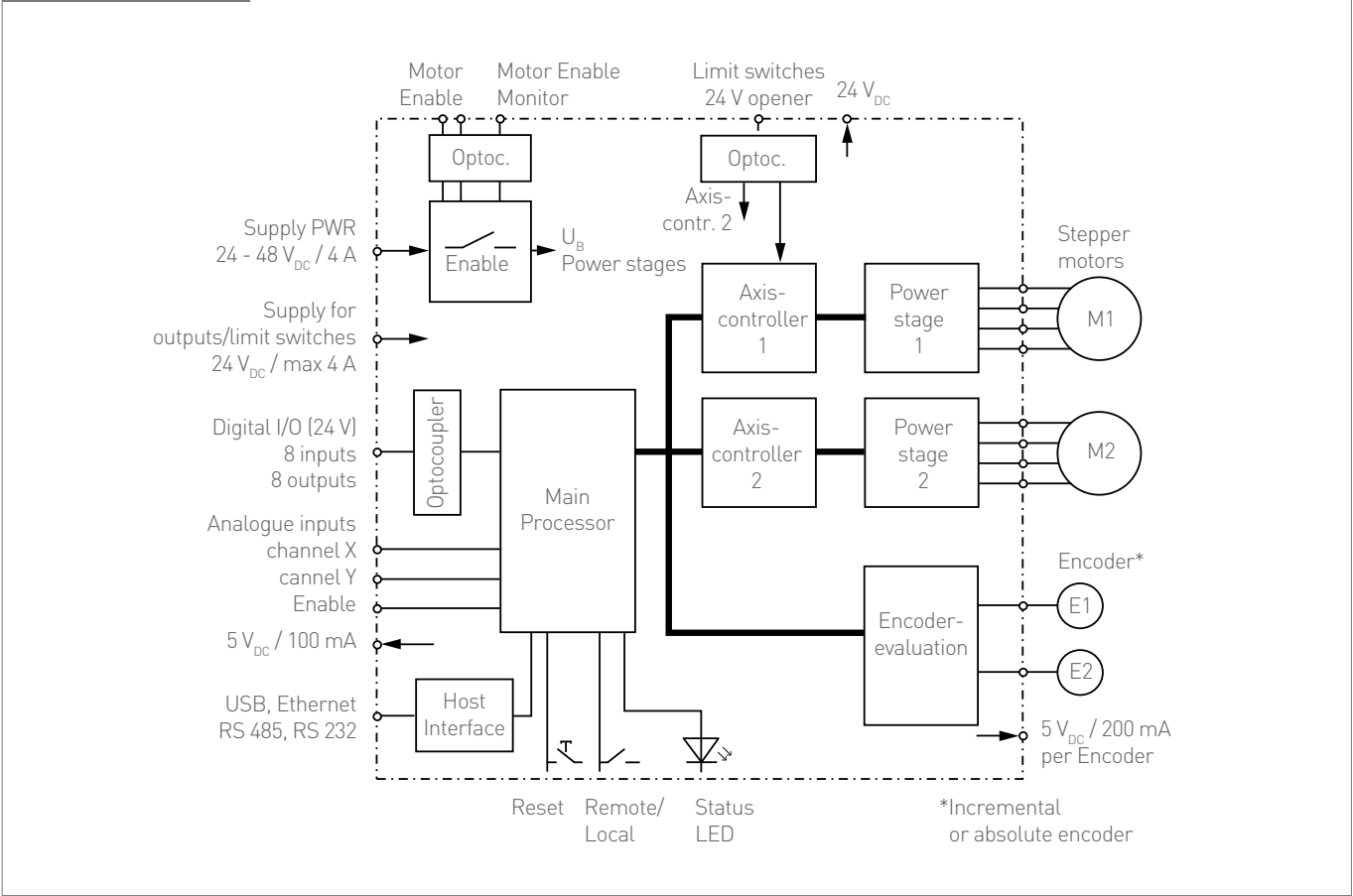
Temperatures	Operation: +5 to +50 °C; storage and transport: -10 to +85 °C
Degree of pollution	Level 2
Relative humidity	5 to 85 %, class 3K3 non-condensing
Protection class	IP 20
EMC immunity/ EMC emission	Acc. EN 61000-3-2 Acc. EN 61000-6-1, -3, -4 Acc. EN 6100-4-2...6, -11
Approval	CE



Dimensions in mm

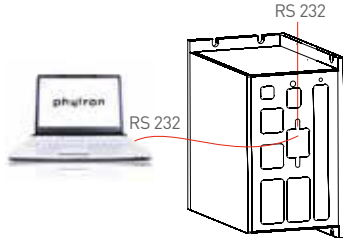


Block Diagram

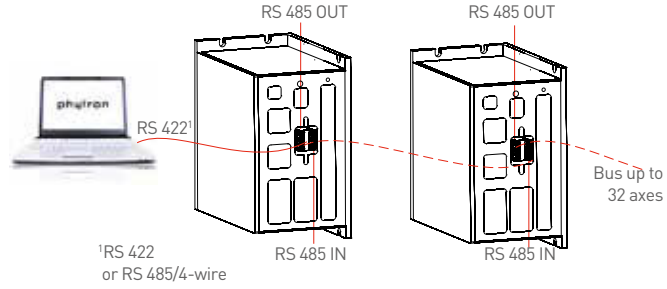


Configurations

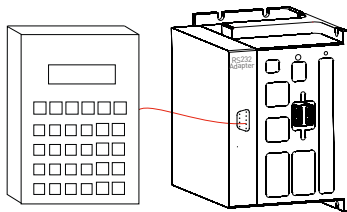
MCC-2 with RS 232 or USB Port



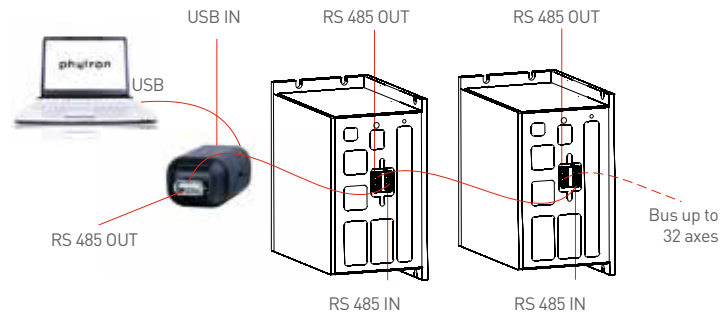
MCC-2 with RS 485 Port / Stand-alone Mode / Bus Mode



MCC-2 with operator terminal

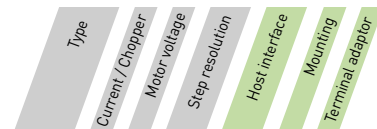


MCC-2 with RS 485 Port and Mini USB Converter / Bus Mode



Ordering Code

The variable elements of the product are displayed in colour.



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

Options		
Host interface	ETH USB RS 485 RS 232	Ethernet port USB port RS 485/4-wire port 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

- Connector set

Optional Accessories

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

You will find all relevant performance data, dimensions and key figures under the following QR code. We will happily advise you!



Phytron GmbH
 Tel.: +49 8142 503-0
 E-Mail info@phytron.de



ENG www.phytron.eu/MCC-1

MCC-1

Programmable controller for one axis

The MCC-1, Phytron'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_{PEAK} 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



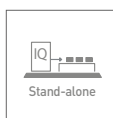
eL. isolated

- 1 axis stepper motor control unit with integrated power stages
- Bipolar control of 2 phase stepper motors
- Phase currents up to 3.5 A_{PEAK}
- Power supply 24 to 48 V_{DC}
- 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-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®



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

LabVIEW®

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

MiniLog-Comm®

MiniLog-Comm® is Phytron'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 Phytron 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.

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 _{DC} ; Limit switches and outputs: 24 V _{DC}
Phase current	Up to 3.5 A _{PEAK}
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"> • Short circuit (between phase and power supply; between both phases; within a motor against ground)) • Over temperature • Under voltage
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

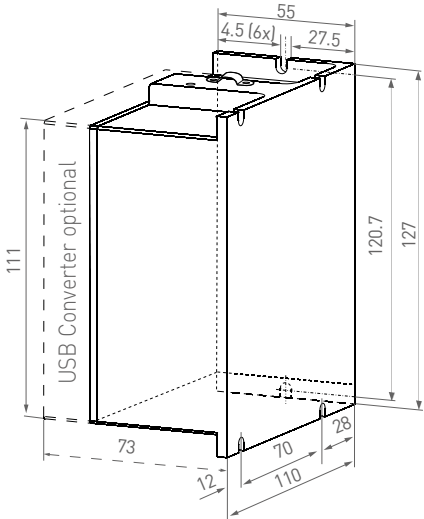
Analog outputs	A, B, C, D for a 2 phase stepper motor
Digital outputs	8 digital I/Os - programmable as in- or output - overload-proof, each electrically isolated from power supply / 24 V power supply fed separately; the maximum load is 1 A on each output; 4 A for all outputs
Host interfaces	Optional: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

Communication and Programming

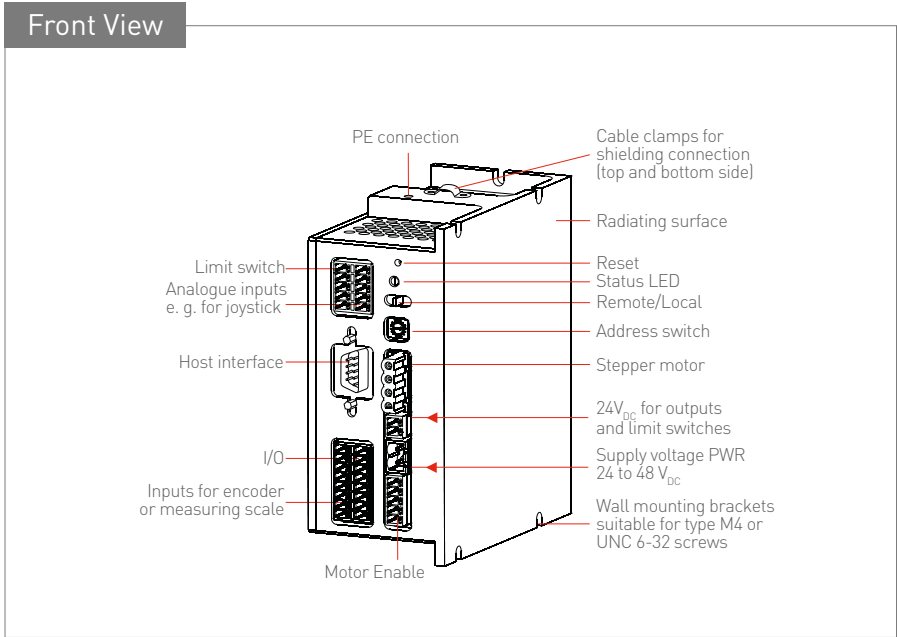
Programming	MiniLog format acc. to DIN 66025 - MiniLog-Comm® (included in delivery) - LabVIEW® VIs (included in delivery)
Memory	128 kB program memory

Operating Conditions

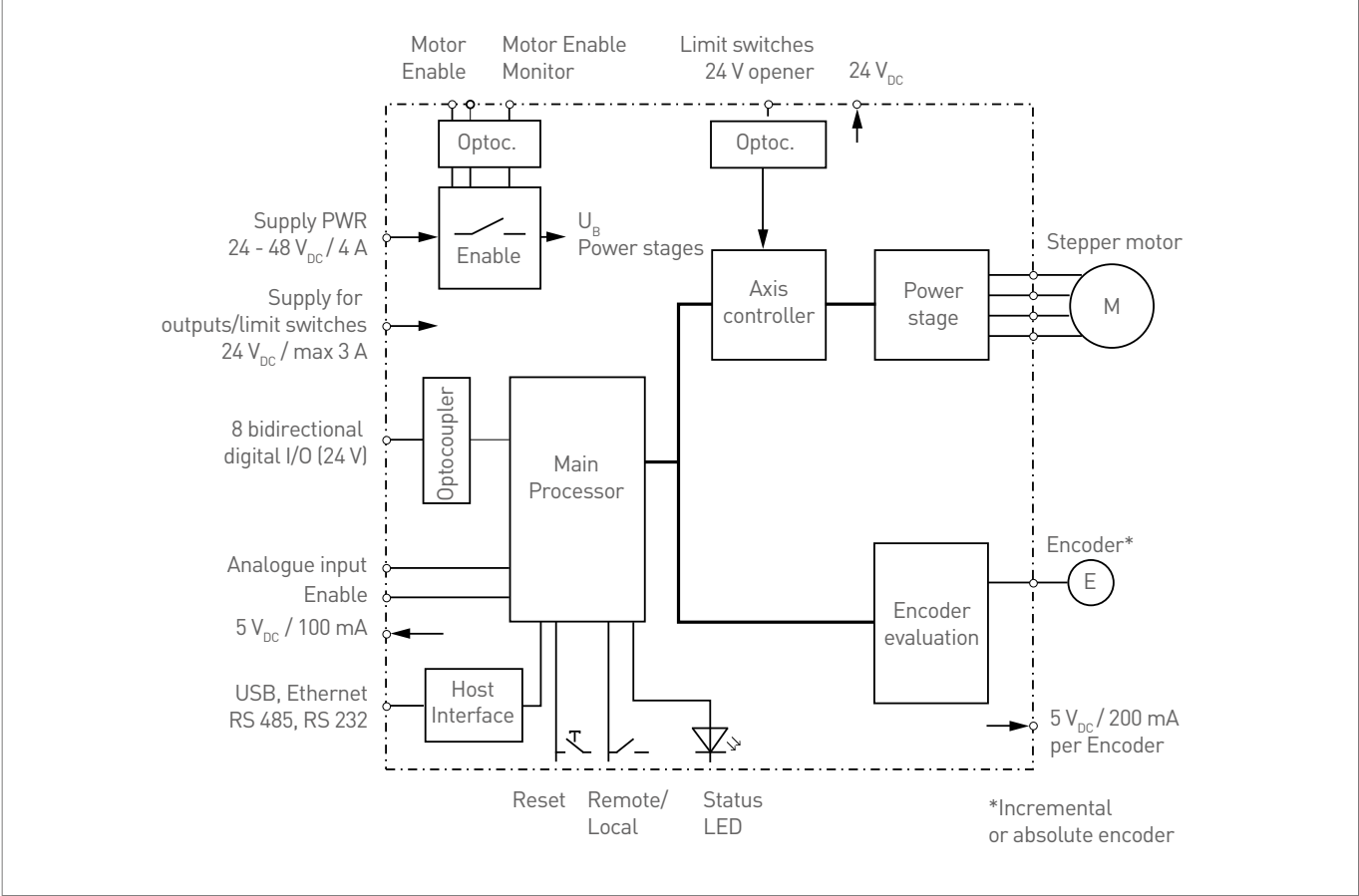
Temperatures	Operation: +5 to +50 °C; storage and transport: -10 to +60 °C
Degree of pollution	Level 2
Relative humidity	5 to 85 %, class 3K3 non-condensing
Protection class	IP 20
EMC immunity/ EMC emission	Acc. EN 61000-3-2 EMC Acc. EN 61000-6-1, -3, -4 EMC and RFI immunity Acc. EN 6100-4-2...6, -11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



Dimensions in mm

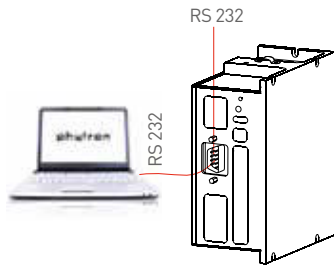


Block Diagram

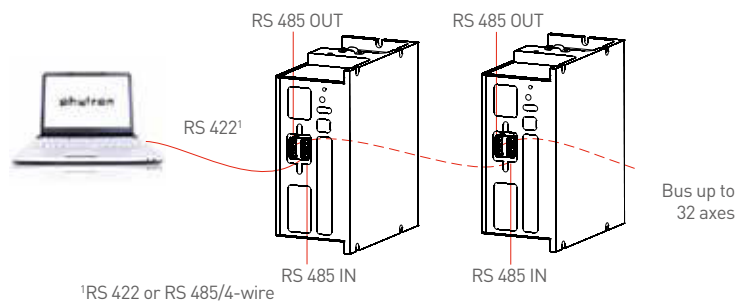


Configurations

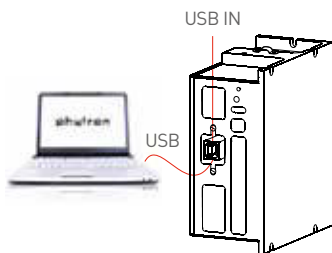
MCC-1 with RS 232 Port



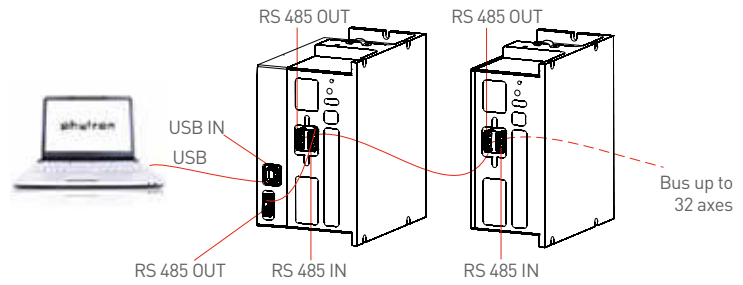
MCC-1 with RS 485 Port / Stand-alone Mode / Bus Mode



MCC-1 with USB Port

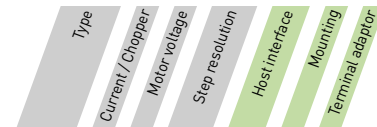


MCC-1 with attached USB Converter and RS 485 Port / Bus Mode



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

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

- Connector set

Optional Accessories

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

CONFIGURATION AND OTHER DATA

You will find all relevant performance data, dimensions and key figures under the following QR code.

Additionally, we offer the suitable software (phylogic, Labview) for our drivers, as well as individual customizations.

We will happily advise you!



Phytron GmbH
 Tel.: +49 8142 503-0
 E-Mail info@phytron.de

SIMATIC® MODULE

Fully integrated stepper motor modules for the ET 200®S and ET 200®SP SIMATIC® controllers with integrated power stages.



1-STEP-DRIVE

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



TM StepDrive

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



ENG www.phytron.eu/1-step-drive

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 or TIA Portal® 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 Phytron power stages are eminently suitable for not only setting the basic parameters via interface bus, but also the technological parameters found in the application.

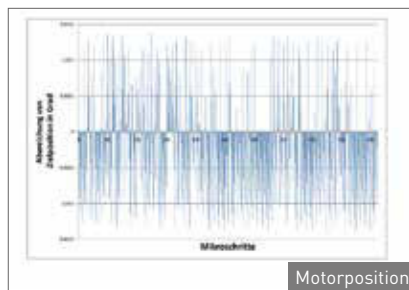
The power stage can be optimised for the requirements of the drive system during commissioning. Furthermore it is possible to adjust the power stage during 'CPU RUN', particularly for the next program sequence.

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

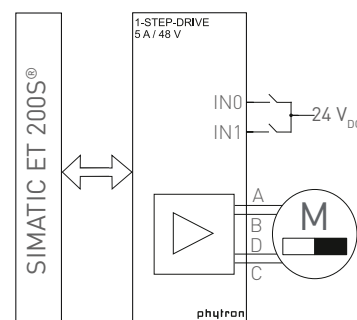
certain micro step positions cannot often be reached because of a lack of fine current settings and the motor may not reach the desired position. The 1-STEP-DRIVE technology guarantees a high-precision current



Motorposition

adjustment and enables fine positioning up to 1/512 step. The diagram above shows that a Phytron 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_{PEAK} at 24 to 48 V_{DC}
- Up to 1/512 microsteps
- Online controller parameterisation and diagnostics
- Programming via STEP®7 or TIA Portal®, functional block for TIA Portal®V14 included



Overview

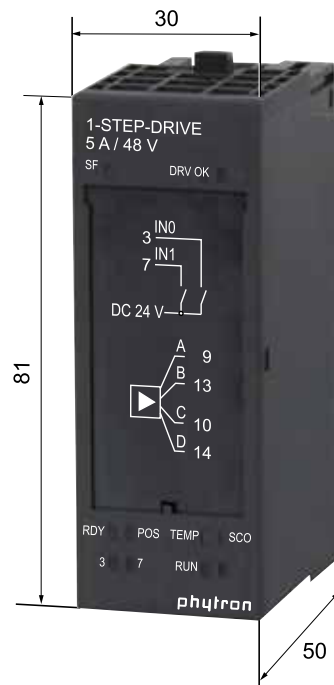
Specification

Mechanical

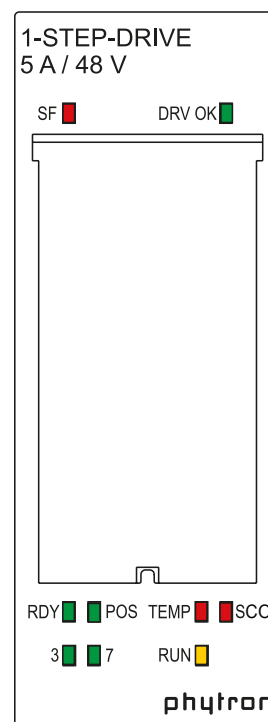
Design	SIMATIC ET 200®S plastic housing
Dimensions (W x H x D)	30 x 81 x 50 mm
Weight	80 g
Mounting position	Optional
Mounting	Plug-in in SIMATIC ET 200®S terminal modules

Features

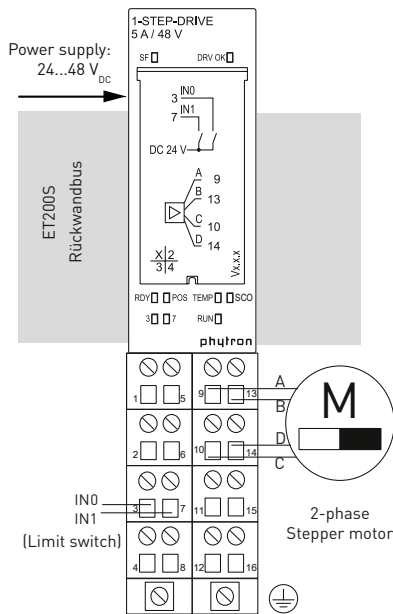
Stepper motors	Suitable for bipolar control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Superior main station	SIMATIC ET 200®S
Power supply	24 to 48 V _{DC}
Reverse polarity protection	Yes
Phase current	5 A _{PEAK} (short circuit-proof, overload protected)
Motor current adjustment	20 mA increments
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 _{DC} at 5 A _{PEAK}
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"> • SF (group error) • DRV OK (power stage ready) • RDY (module ready) • POS (driving instruction is running) • 3 (digital input IN0 active) • 7 (digital input IN1 active) • TEMP (over temperature > 85 °C) • SCO (over current > 10 A) • RUN (motor is running)
Controller modes	<ul style="list-style-type: none"> • Relative positioning • Move to a reference point • Absolute positioning • Revolution mode • Reference setting
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	Synchronous: Control interface, feedback interface Asynchronous: 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"> Over current, short circuit >10 A spike at the controller Over temperature at the power stage $T > 85\text{ °C}$
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>IN0:</p> <ul style="list-style-type: none"> External release of momentum External stop Limit switch towards forward / reverse <p>IN1:</p> <ul style="list-style-type: none"> Reference switch and also limit switch towards forward / reverse Limit switch configurable to open / close 															
Backplane bus and module supply	Backplane bus of the ET 200®S Module supply via ET 200®S power module															
Compatible SIEMENS terminal modules for the 1-STEP-DRIVE	<table border="1"> <thead> <tr> <th>Terminal module</th> <th>Order number</th> <th>Terminals</th> </tr> </thead> <tbody> <tr> <td>TM-E30S46-A1</td> <td>6ES7193-4CF40-0AA0</td> <td>screw with AUX</td> </tr> <tr> <td>TM-E30C46-A1</td> <td>6ES7193-4CF50-0AA0</td> <td>spring with AUX</td> </tr> <tr> <td>TM-E30S44-01</td> <td>6ES7193-4CG20-0AA0</td> <td>screw without AUX</td> </tr> <tr> <td>TM-E30C44-01</td> <td>6ES7193-4CG30-0AA0</td> <td>spring without AUX</td> </tr> </tbody> </table>	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
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TM-E30C44-01	6ES7193-4CG30-0AA0	spring without AUX														
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Communication and Programming

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

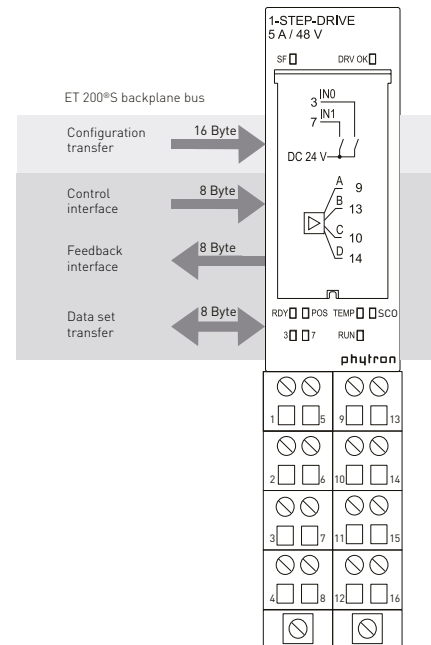
Specification

Communication and Programming (continued)

Data set transfer to the 1-STEP-DRIVE (asynchronous while CPU RUN)	Parameterising the 1-STEP-DRIVE power stage <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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

Ordering code: 1-STEP-DRIVE - 5 A - 48 V

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

Extent of Supply

- 1-STEP-DRIVE module
- Download of the configuration file (HSP), Function block for TIA Portal® V14, application example and PDF manual from the Phytron or Siemens website

Optional Accessories

Manual as printout (ID No.: 10013573)

You will find all relevant performance data, dimensions and key figures under the following QR code. We will happily advise you!



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 Tel.: +49 8142 503-0
 E-Mail info@phytron.de



ENG www.phytron.eu/TMStepDrive

TM StepDrive 1x24..48V/5A

Stepper Motor Module for the SIMATIC®ET 200®SP

In coordination with Siemens

TM StepDrive 24-48V/5A is a stepper motor controller with integrated power stage. It is specially developed for application in the decentralised SIMATIC®ET 200®SP peripheral system.

This TM StepDrive 24-48V/5A module is configured via mouse click with the STEP®7 or TIA Portal® by using the downloaded configuration files and then parameterised. The module is ready for use

in a very short time and supplements the SIMATIC®ET 200®SP with a fully integrated, powerful and high-precision positioning controller for 2 phase stepper motors.

Application

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

In Focus



Integrated Driver



Digital

The TM StepDrive 1x24..48V/5A module successfully completed the system compliance test performed by Siemens.

- stepper motor controller with an integrated power stage for SIMATIC®ET 200®SP
- for 2 phase stepper motors
- 5 A_{PEAK} at 24 to 48 V_{DC}
- up to 1/256 microsteps
- two operating modes and connection types
- programming via TIA Portal® (from V15) or via GSD(ML) file
- controller via application program or Simatic Technology Object

Highlights

Online parameterisation

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

he 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.

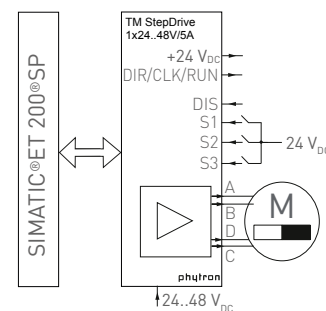
For example, raise the stop current when the motor is holding a load and then reduce it as soon as the system comes to a standstill without the load to minimize the power requirement and motor heating. Using these functions combined with additional parameters bring out the best in your system.

Two connection types

The function of the TM StepDrive module can be defined differently with the two connection types.

Connection type „power stage“: The integrated power stage is used to supply a stepper motor as a fully stepper motor control.

Connection type „indexer“: The TM module provides the control signals control pulses and direction for a separate external power stage. This enables the operation of more powerful motors.



overview

Specification

Mechanical

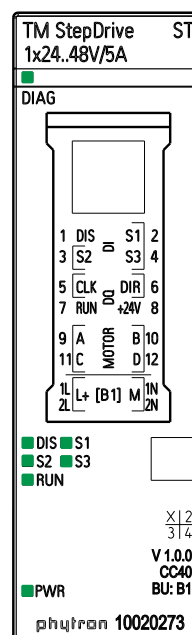
design	SIMATIC®ET 200®SP plastic housing
dimensions (W x H x D)	20 x 73 x 58 mm
weight	62 g
mounting position	any (vertical recommended)
mounting	plug-in in SIMATIC®ET 200®SP

Features

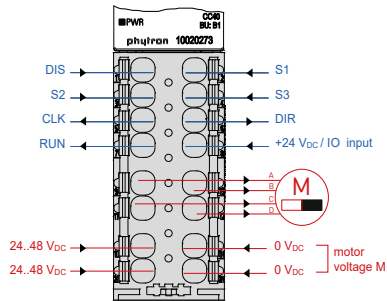
stepper motors	suitable for bipolar control of 2 phase stepper motors with 4, (6) or 8 lead wiring
superior main station	SIMATIC®ET 200®SP
power supply	24 to 48 V _{DC}
reverse polarity protection	yes
phase current	5 A _{PEAK} (short circuit-proof, overload protected)
motor current adjustment	100 mA steps
step resolution	full step, half step, 1/4, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256 microstep
maximum step frequency	250.000 steps/s
physical resolution	approx. 51,200 positions per revolution (0,0070°/step) with a 200 step motor. An encoder with a counter should be considered for very fine positioning
current consumption (max.)	3 A _{DC} at 5 A _{PEAK}
mechanical output power	up to the 200 W range
cable length - motor	shielded: 50 m max.
cable length - digital inputs	3 m max.
diagnostic LEDs	<ul style="list-style-type: none"> • DIAG (group error) • PWR (power supply voltage) • DIS (power stage is deactivated) • S1/S2/S3 (digital input switch 1/2/3 active) • RUN (motor is running)
controller modes	<ul style="list-style-type: none"> • positioning mode (PM mode) for linear and rotary axis: <ul style="list-style-type: none"> - relative positioning - move to a reference point - absolute positioning - free run with variable speed - position setting - motor stop - emergency stop • technology object mode (TO mode): control by a technology object of the SIMATIC® S7-1500 CPU
connection types	<ul style="list-style-type: none"> • power stage • indexer
safety modes	safety modes, such as e. g. Safe Torque Off (STO) from IEC 61508-2 are compatible with external components.
mechanism of the communication via backplane bus	<ul style="list-style-type: none"> • synchronous: control interface, feedback interface • asynchronous – PLC in STOP mode: base parameterising • asynchronous – PLC in RUN mode: parameterising with data record
hardware error detection	over temperature at the power stage T > 105 °C
refresh rate	1 ms



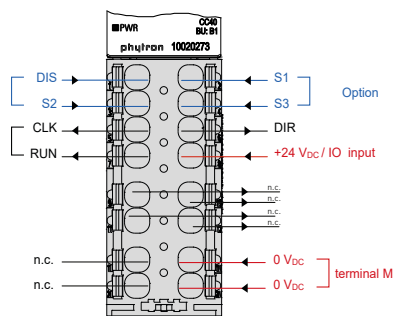
dimensions



diagnostic LEDs



Connection type „Power stage“



Connection type „Indexer“

Specification

Interfaces

analogue outputs	A, B, C, D - for a 2 phase stepper motor						
digital inputs	3 configurable digital inputs S1/S2/S3: 0 signal: 0 ... 1 V with max. 2 mA 1 signal: 2.3 V ... 30 V with typ. 5 mA DIS: <ul style="list-style-type: none"> power stage activation/deactivation S1/S2/S3: <ul style="list-style-type: none"> for PM mode: reference switch and at the same time limit switch in forward / reverse direction for TO mode: one of the inputs can be configured as reference switch 						
digital outputs	DIR: <ul style="list-style-type: none"> direction of rotation of the motor CLK: <ul style="list-style-type: none"> control pulses signal via indexer control pulses frequency max.: 250 kHz RUN: <ul style="list-style-type: none"> motor is running 						
DC Eingang	+24 V_{DC}: <ul style="list-style-type: none"> power supply +24 Vdc for the digital outputs 						
backplane bus and module supply	backplane bus of the ET 200®SP module supply via external power module						
compatible Siemens BaseUnit for the TM StepDrive 24..48V/5A	<table border="1"> <thead> <tr> <th>module</th> <th>order number</th> <th>terminal</th> </tr> </thead> <tbody> <tr> <td>BU20-P12+A0+4B</td> <td>6ES7193-6BP20-0BB1</td> <td>type B1</td> </tr> </tbody> </table>	module	order number	terminal	BU20-P12+A0+4B	6ES7193-6BP20-0BB1	type B1
module	order number	terminal					
BU20-P12+A0+4B	6ES7193-6BP20-0BB1	type B1					

Communication and Parameterising

basic parameterising	via TIA Portal® (from V15) or GSD / GSDML
control interface (synchronous)	specifications in positioning mode: <ul style="list-style-type: none"> target position with absolute positioning number of steps for relative positioning frequency at free run offset during reference run use of the reference sensor during reference travel traversing job <ul style="list-style-type: none"> moving to absolute position moving by relative distance reference point run free run with variable velocity set position motor stop emergency stop required parameters for operation with technology object: <ul style="list-style-type: none"> control word velocity reference value
feedback interface (synchronous)	configurable in positioning mode <ul style="list-style-type: none"> residual path velocity also included in the feedback <ul style="list-style-type: none"> absolute position status bits feedback when operating with technology object: <ul style="list-style-type: none"> status word actual velocity value counted pulses as actual position

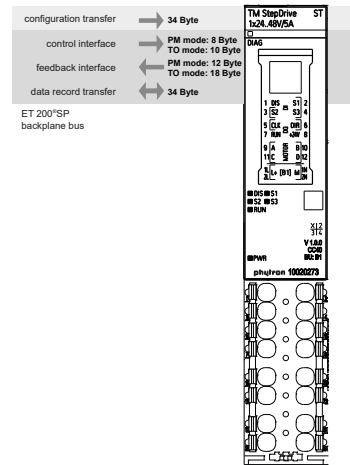
Specification

Communication and Parameterising (continued)

data record transfer to the TM StepDrive (asynchronous while CPU RUN)	<p>parameterising of the power stage</p> <ul style="list-style-type: none"> • step resolution (1/1, 1/2 up to 1/256) • run current (100 mA increments) • stop current (100 mA increments) • boost current (100 mA increments) • current delay time 1 up to 1000 ms • reaction to CPU stop
data record transfer from the TM StepDrive (asynchronous)	<p>diagnostics</p> <p>feedback of the following driver parameters to the main station</p> <ul style="list-style-type: none"> • Reverse reading controller parameter • Error (over temperature, parameterising error, DIS input)

Operating Conditions

operating temperature	0 to +60 °C
storage and transport temperatures	-40 to +70 °C
relative humidity	max. 95 % non-condensing
degree of pollution	level 2
protection class	IP 20
EMC tests	according to EN 55011 according to EN 61000-2,3,4,5,6
approval	CE



communication mechanism

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

Ordering Code

	Type	Power supply	Max. phase current
Ordering code	TM StepDrive	- 24..48V -	5 A

SIMATIC®, ET 200®, STEP®7 and TIA Portal® are trademarks of Siemens AG.

You will find all relevant performance data, dimensions and key figures under the following QR code. We will happily advise you!



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Extent of Supply

- TM StepDrive module
- Download of the configuration file (HSP or GSD(ML)), application example and PDF manual from the Phytron or Siemens website

Optional Accessories

- manual as printout (ID no. 10019960)
- CD-ROM with HSP configuration file, application example and PDF manual (ID no. 10021984)
- EMC filter (ID 10022069)

POWER STAGES

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



APS

High performance stepper motor power stage module



ZMX+

19" stepper motor power stage module with ServiceBus



MCD+

Compact stepper motor power stage with ServiceBus



MSX

19" stepper motor power stage module for high performance



MSX+


19" stepper motor power stage module for high performance with ServiceBus



MSD2+

Stepper motor power stage with power supply and ServiceBus




www.phytron.eu/APS

POWER STAGES

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} (APS05) or up to 9 A_{PEAK} (APS09) at 24 to 70 V_{DC} with a shaft power up to 250 or 460 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 available 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).

In Focus

- OEM power stage module with control pulses/direction or sin/cos presetting via SPI
- For 2 phase stepper motors
- APS05: up to 5 A_{PEAK} or APS09: up to 9 A_{PEAK} at 24 to 70 V_{DC}
- 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™
- Development environment for industry: EVA-APS board

Specification

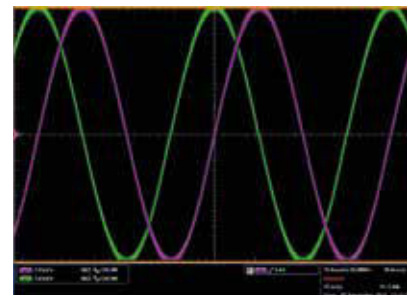
Mechanical

Design	Plug-in power stage module also as OEM module
Dimensions (W x H)	60 x 40 mm
Weight	16 g / 20 g

Features

Stepper motors	Suitable for bipolar control of 2 phase stepper motors with 4-, (6-) or 8 lead wiring
Phase current	APS05: up to 5 A_{PEAK} or APS09: up to 9 A_{PEAK} (short circuit-proof, overload protected)
Power supply	24 to 70 V_{DC}

Specification - continuation box next side



Violet = Phase current 1
Green = Phase current 2
1/128-Ministep, 3.5 A_{RMS} (approx. 5.0 A_{PEAK}),
 $U_B = 60 V$

Specification

Features (continued)

Reverse polarity protection	No
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.)	APS05: 3.6 A _{DC} at 5 A _{PEAK} APS09: 6.6 A _{DC} at 9 A _{PEAK}
Mechanical output power	APS05: up to the 250 W range APS09: up to the 460 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"> • Overcurrent, short circuit > 10 A • Overtemperature T > 85 °C

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"> • digital sin/cos presetting (alternative to Control pulses/Motor direction) • online parameterisation and diagnostic

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
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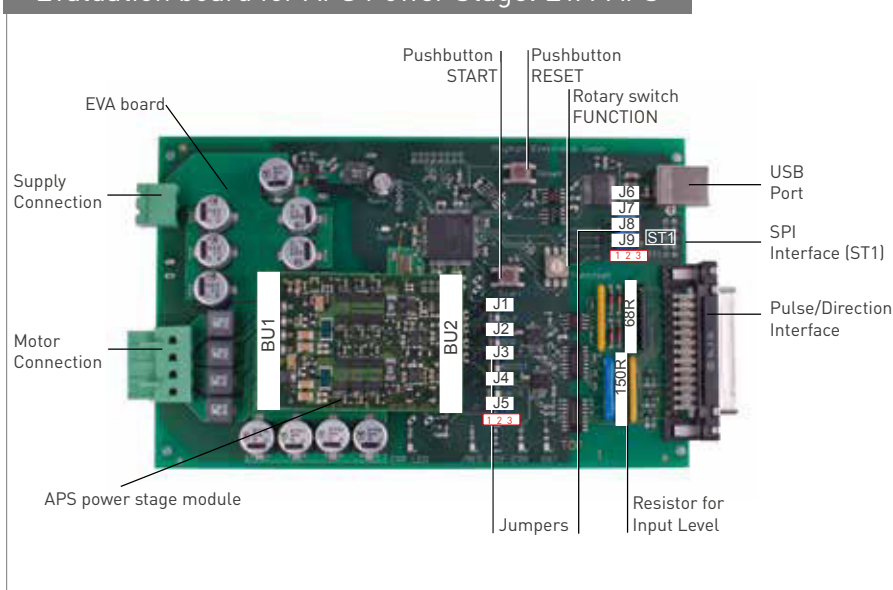
Ordering Code

Ordering code	APS05
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Ordering Code

Ordering code	APS09
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Evaluation board for APS Power Stage: EVA-APS



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 _{DC} to 70 V _{DC} 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

	<i>Type</i>
Ordering code	EVA-APS (incl. APS)

CONFIGURATION AND OTHER DATA

You will find all relevant performance data, dimensions and key figures under the following QR code.

Additionally, we offer the suitable software (phylogic, Labview) for our drivers, as well as individual customize-options.

We will happily advise you!



Phytron GmbH
Tel.: +49 8142 503-0
E-Mail info@phytron.de

CUSTOMISING

Efficient Customising – combining standard components, modifications and custom-made products efficiently and in a tailor-made manner.

We have already implemented a large number of customer-specific projects based on the VSS/VSH series. Performance features, housing, flanges, materials, shaft machining - in a joint coordination/specification process, the VSS/VSH platform can also be optimally adapted to your project. Thanks to our high level of vertical integration, we aren't just very flexible in terms of technology, we also manufacture small quantities for you - whether it is a customized outer contour, a special degree of protection, increased load capacity or radiation resistance. On the basis of our motor series, we also solve unusual requirements through „Efficient Customi-

sing“. We fully dedicate ourselves to your project specifications. Specific adjustments to the design and individual components (individual adjustment of the drive shaft, second shaft, etc.), the electronics (winding variants, different operating voltages, etc.) and the material (stainless steel, titanium) can be freely selected. Should your project present even more sophisticated requirements in terms of durability and load limits, we can offer you targeted solutions (e.g. reinforced bearing designs, variation of lubrication coated / grease-lubricated ball bearings). Test us - we are looking forward to your inquiry.

Our
+ PLUS
for you!

Special challenges require special solutions. We specifically tailor our motors according to the challenges of your project. Many years of experience and our high level of vertical integration allow us to offer a large number of customization options.

+ CONDITIONS OF USE

+ ELECTRONICS

+ MATERIALS

+ GEAR

+ RADIATION

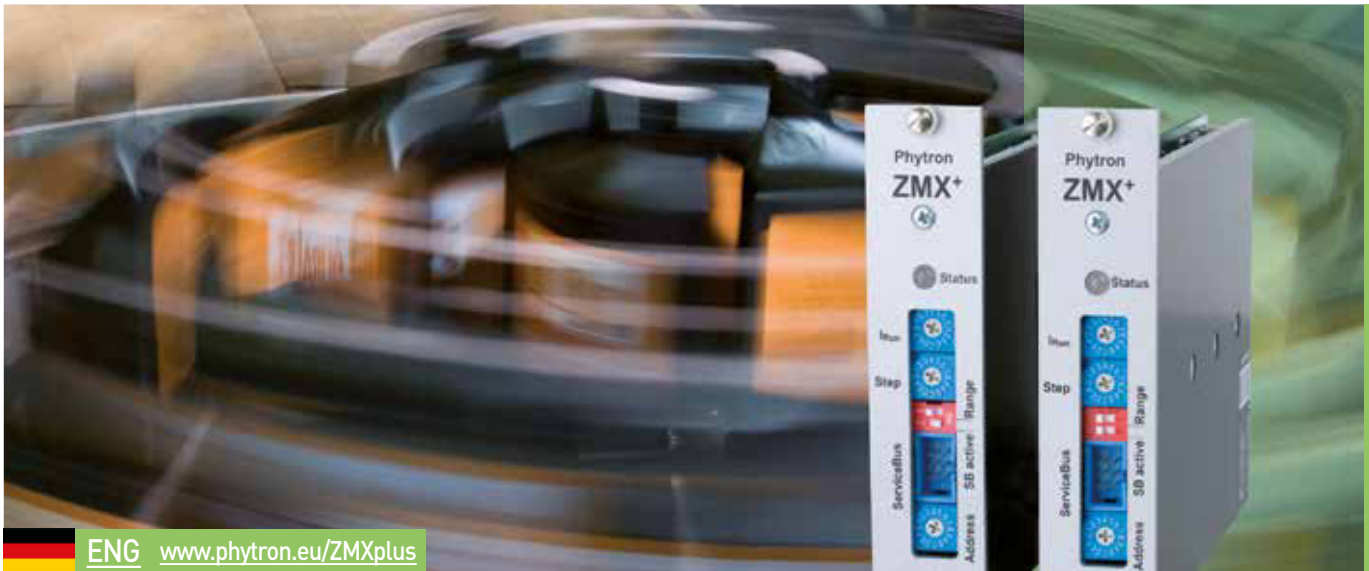
+ TEMPERATURE MANAGEMENT

+ SPECIFIC DESIGNS

+ VACUUM CLASSES



VSS/VSH



ENG 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_{PEAK}.

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



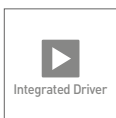
- 19" sub-rack power stage for bipolar control of 2 phase stepper motors
- Up to 9 A_{PEAK} at 24 - 70 V_{DC}
- Up to 1/512 microsteps
- Parametrising and diagnostic online via ServiceBus – switches for basic adjustment
- Options:
 - 32/48 pin connector
 - With/without electrical isolation
 - With/without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



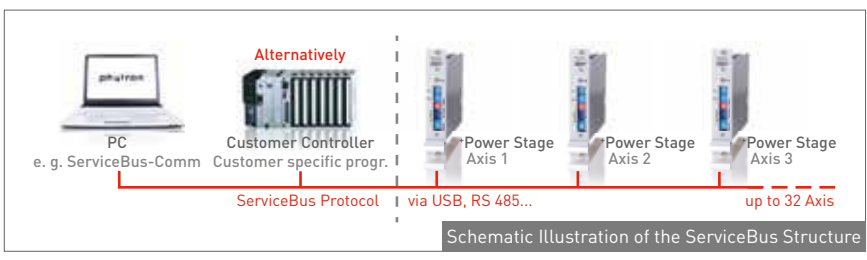
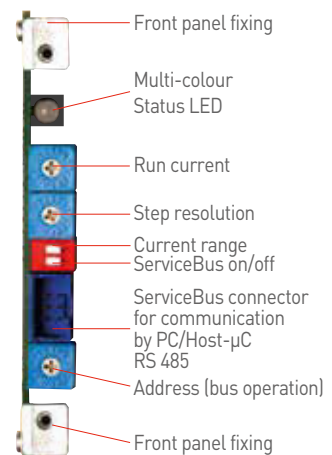
Electrical Isolation

with and without electrical isolation of the motor circuit

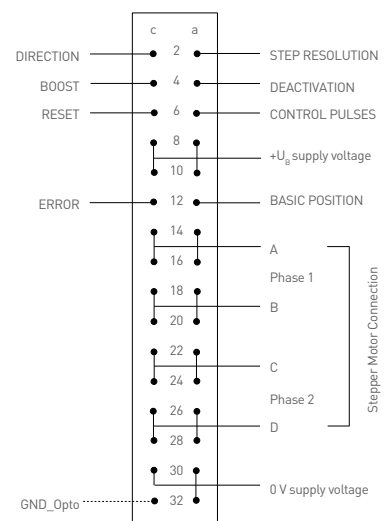
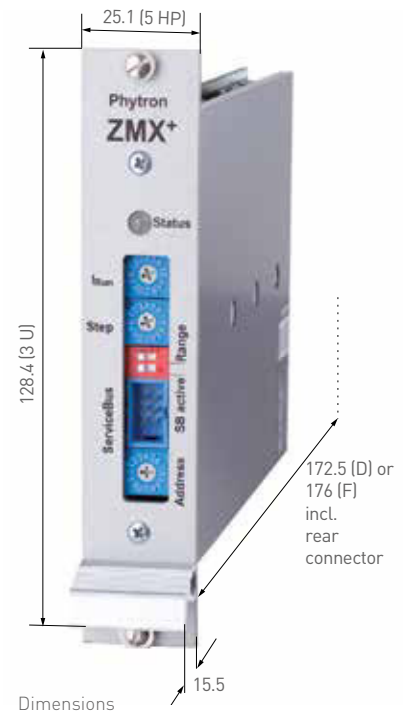
ServiceBus-Comm®

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.

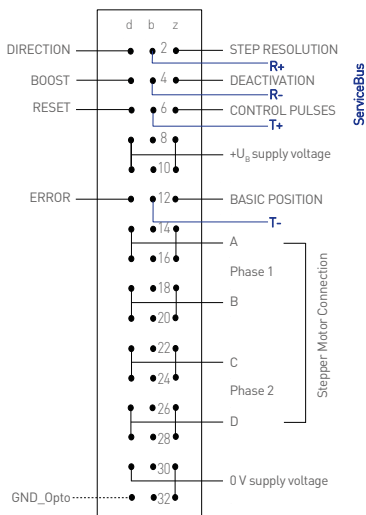
Our free Windows® software ServiceBus-Comm® allows to monitor and to adjust up to 32 axes while providing a comfortable and easy to use graphical interface.



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 _{DC}
Phase current	2 x 9 A _{PEAK}
Adjustable current steps	Rotary switch mode 2 currents are selectable: 0 – 1.5 A _{PEAK} or 0 – 9 A _{PEAK} Run current is adjustable in 15 current steps, stop current is 50 %, boost current is 130 % of run current ServiceBus mode (optional) Run, stop and boost current from 0 – 9 A _{PEAK} in 100 mA stages
Adjustable step resolution	Rotary switch mode Full step, 1/2, 1/2.5, 1/4, 1/5, 1/8, 1/10, 1/20 ServiceBus mode (optional) 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:	Without encoder: Approx. 25,600 positions per revolution (in typical applications) With encoder: 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)



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 [®] for Windows [®]

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⁺



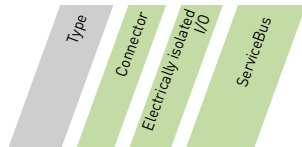
phytron delivers also fully assembled 19" sub-rack modules with integrated power supply.

Up to 8 ZMX⁺ power stages are possible.

For more information look up www.phytron.eu/SLS

Ordering Code

The variable elements of the product are displayed in colour.



Ordering code ZMX+ - 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® is a trade mark of Microsoft.
ServiceBus-Comm® is a trade mark of Phytron GmbH.

Optional Accessories

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

CONFIGURATION AND OTHER DATA

You will find all relevant performance data, dimensions and key figures under the following QR code.

Additionally, we offer the suitable software (phylogic, Labview) for our drivers, as well as individual customization options.

We will happily advise you!



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Tel.: +49 8142 503-0
E-Mail info@phytron.de



 www.phytron.de/MCDplus

MCD⁺

Compact stepper motor power stage with ServiceBus

The MCD⁺ 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⁺ is designed for power supplies from 24 to 70 V_{DC}.


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⁺ offers 3 terminals for each signal input. Thus separate input terminals for 5 V and 24 V are available.


Application

The MCD⁺ 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⁺ 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_{PEAK} at 24 to 70 V_{DC}
- 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[®]

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_{PEAK}. 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[®] for Windows[®].

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[®]

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 _{DC}
Phase currents	Up to 9 A _{PEAK} Rotary switch mode: Current range selectable by rotary switch: Rotary switch position: I: 0.4 to 3 A _{PEAK} , II: 1.1 to 9 A _{PEAK} ServiceBus mode: Programmable values: 0.1 to 9 A _{PEAK}
Step resolution	Rotary switch mode: 1/1, 1/2, 1/4, 1/8, 1/10, 1/20 of a full step ServiceBus mode: 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 _{DC} or > 85 V _{DC}), overtemperature (T > 85 °C), overcurrent, short circuit

Interfaces

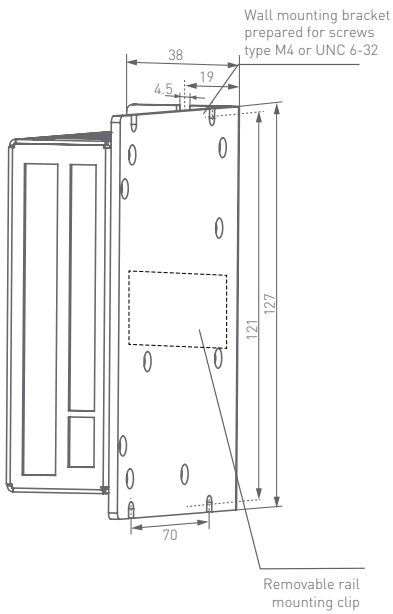
Analogue outputs	A, B, C, D for a 2 phase stepper motor
Digital outputs	Optically insulated from the motor voltage, type Open-Collector I _{max} = 20 mA, U _{max} = 30 V, P _{total} = 300 mW, U _{CE sat} at 20 mA < 1 V Error: short circuit, overvoltage, overtemperature, undervoltage, overcurrent
Connection	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

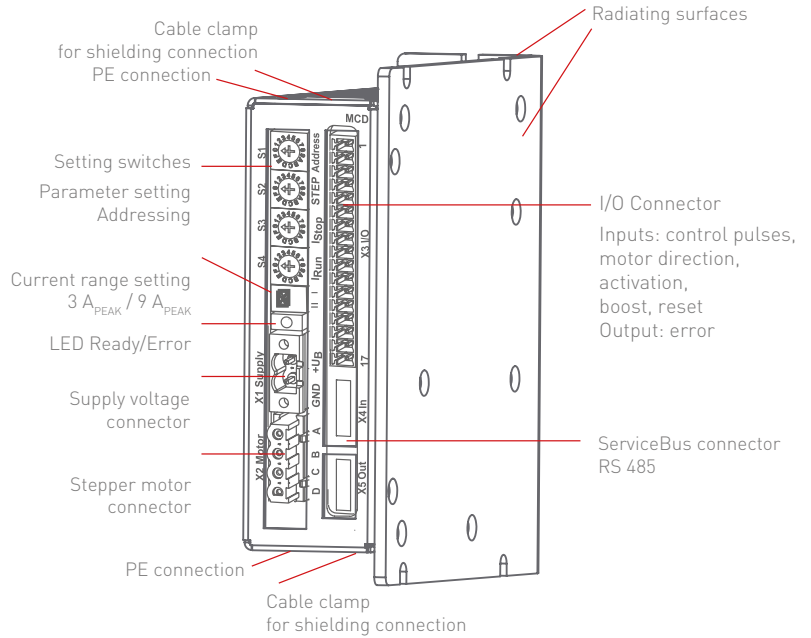
Operating Conditions

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

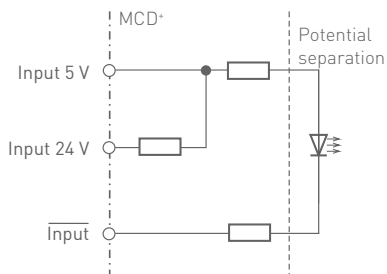


Dimensions in mm

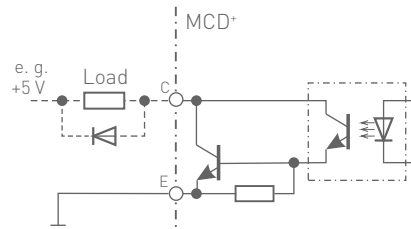
Front View



Input Wiring



Output Wiring



In case of connection of highly inductive equipment (e. g. relay, motor brake), a protective diode must be wired to each output.

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+)

Ordering Code

The variable elements of the product are displayed in colour.

	Type	Peak current / Current regulation	Motor voltage	Step resolution	Mounting
Ordering code	MCD+	93	- 70	MINI	W

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

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

CONFIGURATION
AND OTHER DATA

You will find all relevant performance data, dimensions and key figures under the following QR code.

Additionally, we offer the suitable software (phylogic, Labview) for our drivers, as well as individual customization options.

We will happily advise you!



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ENG 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 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



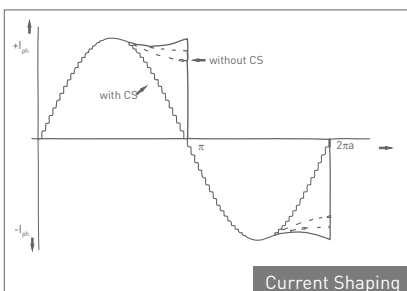
El. Isolated

- Stepper motor power stage for bipolar control of 2 phase stepper motors
- up to 15 A_{PEAK} phase current
- 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

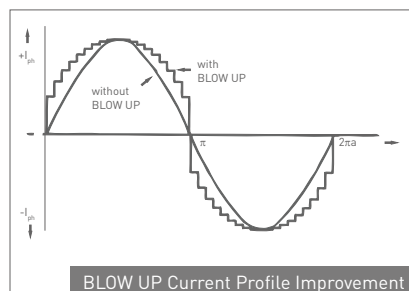
Current Shaping

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.



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
Phase current	max. 15.4 A _{PEAK}
Supply voltage	60 to 120 V _{DC} (permissible range 40 to 160 V _{DC})
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 _{DC} or > 160 V _{DC}), 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 _{max} = 20 mA, U _{max} = 45 V, U _{CEsat} 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, <u>Boost</u> , <u>Activation</u> , <u>Reset</u> (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

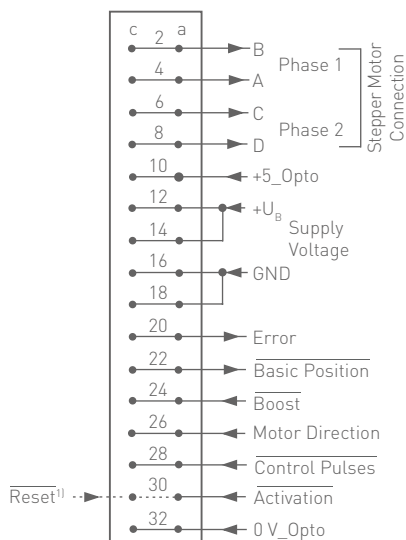
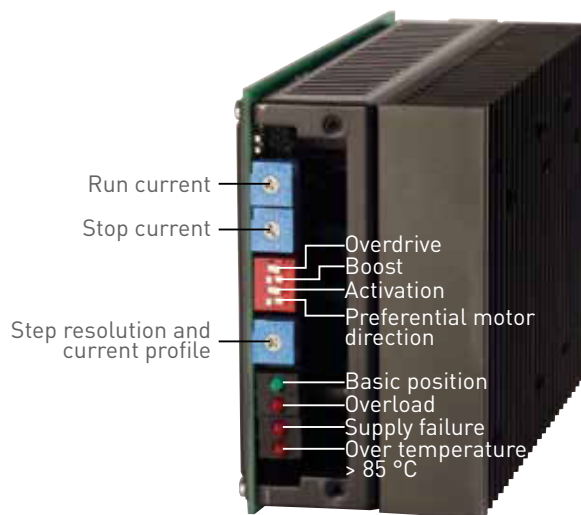
Temperature	Operation: +4 to +40 °C (we suggest additional cooling with higher operating temperatures) Storage: -25 to +55 °C Transport: -25 to +85 °C
Degree of pollution	Level 2 acc. to EN 50178
Relative humidity	5 – 85 % class 3K3 non condensing
Protection class	IP 20
EMC immunity / EMC emission	Acc.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

Front View



¹⁾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

Power Supply Unit SLS-MSX



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.

Design Versions

The MSX (120 V type) replaces the following well-tried phytron power stages:

MSX 152 (5 V)	Standard, replacement for MSO and MSO _{MINI}
MSX 152 (24 V)	Replacement for SMD
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	152	- 120	MINI	
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Options

Optional	Reset 24 V	Standard MSX (5 V): without additional designation Reset input activated, 5 V input level 24 V input level
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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 (#02000748)
- Damping SB 234 module for 120 V (#02002165)

CONFIGURATION AND OTHER DATA

You will find all relevant performance data, dimensions and key figures under the following QR code.

Additionally, we offer the suitable software (phylogic, Labview) for our drivers, as well as individual customization options.

We will happily advise you!



Phytron GmbH
 Tel.: +49 8142 503-0
 E-Mail info@phytron.de



ENG www.phytron.eu/MSXplus

MSX⁺

Stepper motor power stage with ServiceBus

The MSX⁺ is a plug-in power stage for bipolar control of 2 phase stepper motors. It is available up to 15 A_{PEAK} maximum phase current.

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

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

The power stage is set via ServiceBus:

- Power stage parameter programming: run and boost current, step resolution,

preferential motor direction and current delay time, etc.

- Configuration by software via 4-wire- or 2-wire-RS 485 bus
- Parameter memory to hold data safely in the power stage EPROM

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

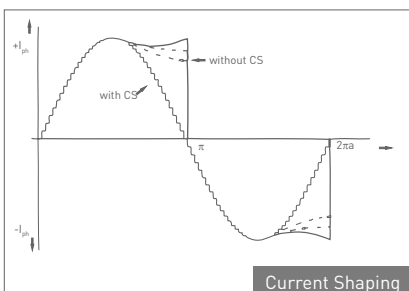


- plug-in stepper motor power stage for bipolar control of 2 phase stepper motors
- up to 15 A_{PEAK} maximum phase current
- supply voltage 60 to 120 V_{DC} (permissible range 40 to 160 V_{DC})
- step resolution from full step to 1/20 step
- ServiceBus operation
 - the ServiceBus is connected via connector on the front or via backplane in a sub rack
 - parameterising and diagnostics online with ServiceBus-Comm™
- options:
 - Reset input is activated
 - 5 V input level
 - 24 V input level

Highlights

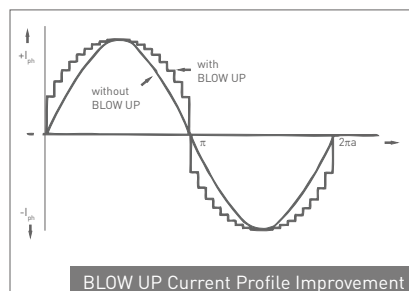
Current Shaping

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.



Specification

Mechanical

Dimensions (W x H x D)	59 x 100 x 175 mm
Weight	Approx. 940 g
Mounting	Designed for installation into 19"/3U sub-rack, 48 pin connector acc. to DIN 41612, version F

Features

Stepper motors	Suitable for the control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Phase current	15.4 A _{PEAK} maximum
Supply voltage	60 to 120 V _{DC} (permissible range 40 to 160 V _{DC})
Adjustable step resolution	Full step, half step, 1/4, 1/10, 1/20 of a full step
Cable length	Motor : shielded: 50 m max. Signal: shielded: 100 m max.
Diagnosable errors	Over-/undervoltage (< 40 V _{DC} or > 160 V _{DC}), 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 Darlington; I _{max} = 20 mA, U _{max} = 45 V, U _{CEsat} 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 pulses, Motor direction, Boost, Activation, Reset (can be enabled by a jumper)
Connectors	Signal I/O: 48 pin connector acc. to DIN 41 612, version F ServiceBus: 6 pin connector, type Tyco Electronics 2-1761605-1/609-0607

Communication and Programming

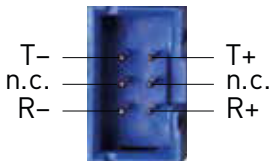
Parameterisation interface via ServiceBus	Run-, stop-, Boost current, step resolution, current delay time, pref. direction, Reset, deactivation
Diagnostics interface via ServiceBus	Current setting, power stage temperature, power stage status, error inquiry
Operating software	Phytron ServiceBus-Comm™ for Windows®

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

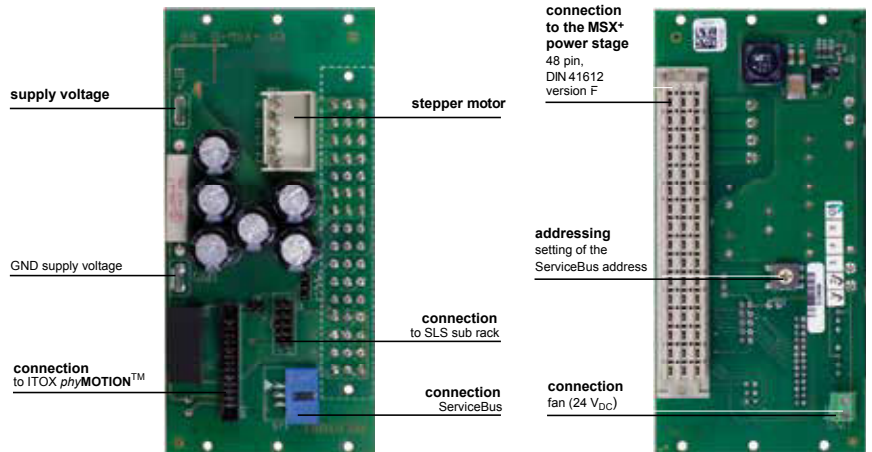


Dimensions in mm



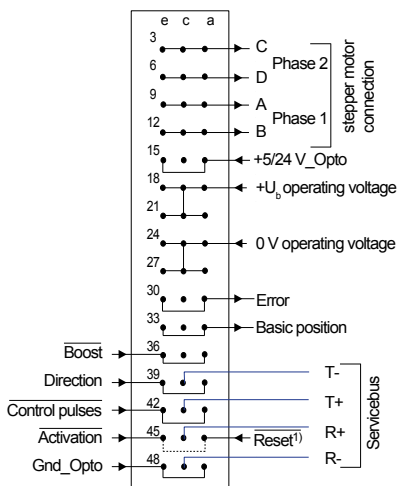
ServiceBus connector

G-MSX+ adapter board



The MSX⁺ power stage can be plugged directly onto the adapter board G-MSX⁺. There are plug connections for motor cables, signal cables and power supply on the board.

Operating with ServiceBus-Comm™



¹⁾ standard version: MSX⁺ (5 V)
signal activation: pin 45a and e

MSX⁺ (5 V-Reset) version
with Reset input
activation: pin 45e / Reset: pin 45a

Pin assignment

Integrated in the *phyMOTION™*



phytron delivers also fully assembled 19" sub racks with integrated controller and power supply.

Up to three MSX+ power stages can be installed.

SLS-MSX+ sub rack



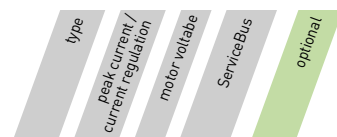
phytron delivers also fully assembled 19" sub racks with integrated power supply.

Up to four MSX+ power stages can be installed.

You'll find more information about the SLS sub rack at www.phytron.de/SLS

Ordering Code

The variable elements of the product are displayed in colour.



Ordering code MSX+ - 152 - 120 - RS485 - Reset

Options

Optional	Reset 24 V	Standard MSX+ (5 V): without additional information Reset input activated, 5 V input level 24 V input level
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Optional Accessories

- ServiceBus cable
- USB-RS485 converter as stick (#10012295)
- Mating connector with 48 pin connector
- G-MSX+ adapter board for easy mounting the MSX+, with connectors for motor cable, signal leads and supply voltage (#100018387)
- Damping SB 234 module for 90 V (#02000748)
- Damping SB 234 module for 120 V (#02002165)



ENG www.phytron.eu/MSD2plus



MSD2+

Stepper motor power stage with power supply and ServiceBus

MSD2+ is a power stage for bipolar control of 2-phase stepper motors. It is available up to 15 A_{PEAK} maximum phase current.

Besides full and half step the MSD2+ provides a resolution up to 1/20 MINI Step.

Depending on the MSD2+ option (operating mode), the power stage parameters are set via the ServiceBus or with the rotary switches.

In addition, the MSD2+ enables the control of an attached (permanent magnet) motor brake.

The current regulation by the patented SYNCHROCHOP principle ensures a smooth

operation of the stepper motor and the torque for optimum use as well as the Overdrive and Boost functions.

Optimum interference suppression between control and power circuit is obtained by opto-couplers for electrical isolation of the push-pull inputs from the supply voltage.

Application

As a powerful stepper motor power stage the MSD2+ is suitable for up to 800 W 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

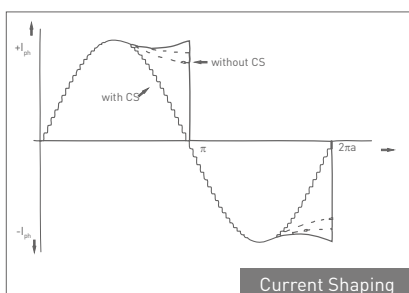


- Stepper motor power stage for bipolar control of 2 phase stepper motors
- Integrated power supply with operating voltage from 115 to 230 V_{AC}
- up to 15 A_{PEAK} max. phase current
- Motor voltage 120 V_{DC}
- Step resolution 1/1 to 1/20 step
- Brake control
- ServiceBus: parameterising and diagnostics online with ServiceBus-Comm™
- Options:
 - ServiceBus mode
 - Rotary switch mode
 - Rack mounting
 - Wall mounting

Highlights

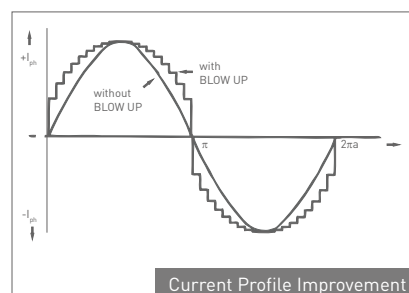
Current Shaping

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



BLOW UP

viour can be achieved - dependent on the motor type - by the current shape optimising BLOW UP function.



Specification

Mechanical

Dimensions (W x H x D)	91,2 (14HP) x 280 (6U) x 230 mm
Weight	approx. 3 kg
Mounting	designed for installation into 19"/6U sub-rack or wall mounting

Features

Stepper motors	suitable for the control of 2 phase stepper motors with 4, (6) or 8 lead wiring
Power range, Phase currents	max. 15.4 A _{PEAK}
Supply voltage	120 V _{DC} (motor voltage) (mains) are generated internally from 115 to 250 V _{AC}
Adjustable step resolution	full step, half step, 1/4, 1/10, 1/20 of a full step
Cable length	motor : shielded: 50 m max. signal: shielded: 30 m max.
Diagnosable errors	over-/undervoltage (< 40 V _{DC} or > 160 V _{DC}), 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 Darlington; I _{max} = 50 mA, U _{max} = 24 V, U _{CEsat} at 50 mA < 0.3 V Error
Inputs	all inputs are designed for push-pull driver with 5 V level or Open-Collector : Control pulses, Motor direction, Boost, Deactivation, Reset, Brake

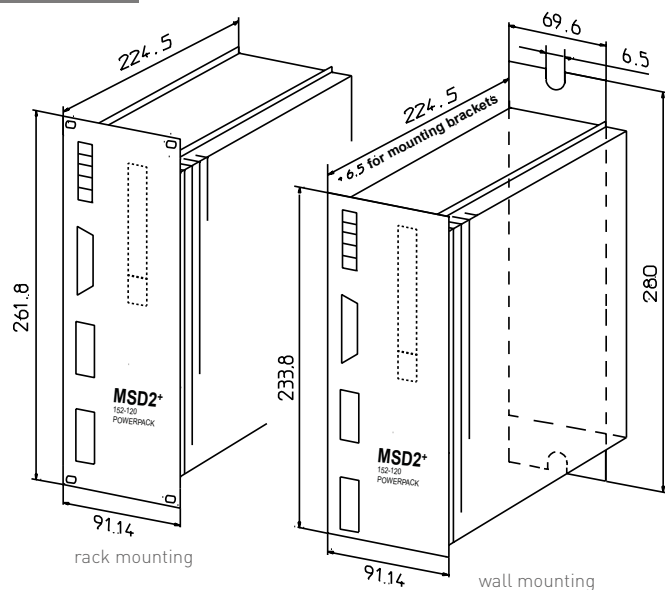
Communication and Programming

Parameterisation interface via ServiceBus	run-, stop-, Boost current, step resolution, current delay time, current shaping, pref. direction
Diagnostics interface via ServiceBus	current setting, power stage temperature, power stage status, error inquiry
Operating software	Phytron ServiceBus-Comm™ for Windows®

Operating Conditions

Temperature	operation: +4 to +40 °C (integrated fan) 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

Dimensions



Dimensions in mm

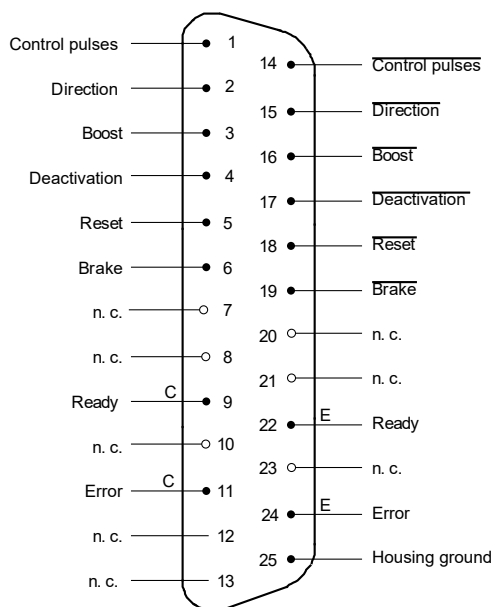
Brake Control

MSD2+ supports the operation of stepper motors with a 24 V / max. 1 A_{DC} permanent magnet motor brake.

The braking effect of the motor brake is controlled via the brake input (I/O-Signal). If this input „Brake“ (connector) is activated the brake is supplied with current and the braking effect is suppressed.

If an error signal occurs or the „Deactivation“ input is active, the brake supply is interrupted, i.e. the brake activated.

The brake has to be connected to the motor connector Brake. The brake is supplied by the screw terminals U_{Br} and 0 V.



pin assignment

Operating with ServiceBus-Comm™



USB-RS485 Converter

- 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)

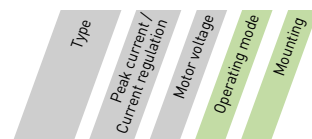


10012295

- Extent of Supply (included):
- connector cable: Type USB A-A, 180 cm (connection RS485 to MSD2+)

Ordering Code

The variable elements of the product are displayed in colour.



Ordering code MSD2* - 152 - 120 - SB - W

Options

Operating mode	SB KS	MSD2* with ServiceBus mode MSD2* with rotary switch mode
Mounting	W R	MSD2* for wall mounting MSD2* for rack mounting

Windows® is a trade mark of Microsoft.

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

Extent of Supply

- Connector set

Optional Accessories

- ServiceBus-Comm™ software and USB driver can be downloaded from the Phytron website
- ServiceBus cable
- USB cable
- USB-RS 485 converter #10012295
- Assembled cables on request

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

CONFIGURATION AND OTHER DATA

You will find all relevant performance data, dimensions and key figures under the following QR code.

Additionally, we offer the suitable software (phylogic, Labview) for our drivers, as well as individual customize-options.

We will happily advise you!



Phytron GmbH
Tel.: +49 8142 503-0
E-Mail info@phytron.de

19" SUB RACKS

Stepper motor power stages with integrated power supply



SLS

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



ENG www.phytron.eu/SLS

SLS

19" sub rack for stepper motor controllers

Phytron's SLS housings are for up to 8 ZMX⁺ 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⁺ 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_{PEAK} 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*TM 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_{AC}, 230 V_{AC} or 400 V_{AC}
- Integrated housing fan and fuses
- Stepper motor power stages:
ZMX⁺ 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
 - 24 V_{DC} supply voltage for a higher-level *phyMOTION*TM

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⁺ power stages and ServiceBus

Online parameterisation of the ZMX⁺ power stage during the operation via RS 485.

SLS with MSX high power stages

Phase currents 5 / 10 / 15 A_{PEAK} at 60 to 120 V_{DC} bus voltage.



Front view SLS 4 MSX

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 _{AC} , 230 V _{AC} , 400 V _{AC} +/- 10 %, 48 to 62 Hz
Power stages	1 to 8 ZMX* with phase currents (with Boost) from either 0 to 1.5 A _{PEAK} or 0 to 9 A _{PEAK} 1 to 4 MSX with phase currents (with Boost) from 0 to 15.4 A _{PEAK} 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

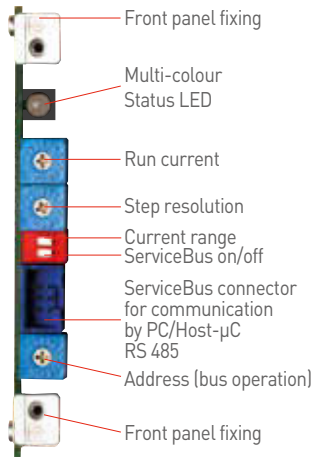
Communication and Programming

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* power stage via ServiceBus interface
Operating software	Phytron ServiceBus-Comm® for Windows®

Operating Conditions

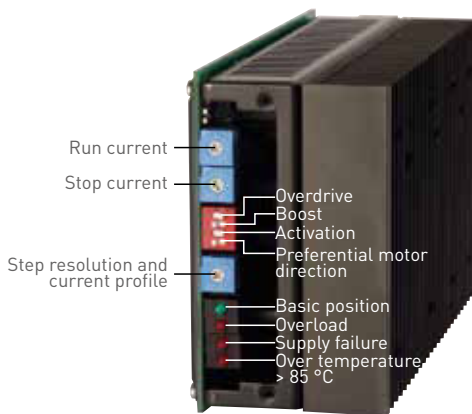
Temperature	Operation: +5 to +40 °C; storage and transport: -25 to +50 °C
Degree of pollution	Level 2
Relative humidity	5 to 85 %, class 2K3 non-condensing
Protection class	IP 20
EMC immunity / EMC emission	Acc. to EN 61000-3-2 Acc. to EN 61000-6-1, -3, -4 Acc. to EN6100-4-2...6, -11
Approval	CE

ZMX+ Power stage



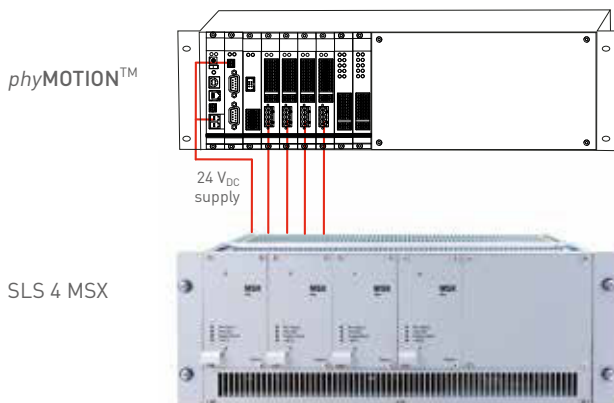
- Stepper motor power stage for bipolar control of 2 phase stepper motors
- Up to 9 A_{PEAK} at 24 - 70 V_{DC}
- Up to 1/512 microsteps
- Switches for basic adjustment
- Parameterising and diagnostic online via ServiceBus
- Inputs: Control pulses, direction, boost, deactivation, reset, step resolution (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_{DC}:
 - MSX 52-120: 5 A_{PEAK} max.
 - MSX 102-120: 10 A_{PEAK} max.
 - MSX 152-120: 15 A_{PEAK} 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™: SLS-P



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

The SLS-P option also has a 24 V_{DC} supply voltage via which the phyMOTION™ can be supplied.

1 Ordering Code Basic Device		
The variable elements of the product are displayed in colour.		
+ 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 ⁺ power stage Motor voltage ZMX ⁺ 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

CONFIGURATION AND OTHER DATA

You will find all relevant performance data, dimensions and key figures under the following QR code.

Additionally, we offer the suitable software (phylogic, Labview) for our drivers, as well as individual customization options.

We will happily advise you!



Phytron GmbH
Tel.: +49 8142 503-0
E-Mail info@phytron.de

Extent of Supply

- SLS- and power stage manual
- Mating connectors

Optional Accessories

- ServiceBus-Comm® software and USB driver can be downloaded from the Phytron website
- Cable assembly
- Mini USB-RS 485 converter

For information about mixed configurations (ZMX⁺ 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.

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 _{PEAK} with SYNCHROCHOP current regulation 10.3 A _{PEAK} with SYNCHROCHOP current regulation 15.4 A _{PEAK} 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⁺**

The variable elements of the product are displayed in colour.

Ordering code: 8 - ZMX⁺ - 32 - GT - RS485

Options:

Number of power stages	1 to 8	Number of installable ZMX ⁺ 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_{PEAK} at 60 to 120 V_{DC} bus voltage.



SLS with 8 ZMX⁺ power stages and ServiceBus

Online parameterisation of the ZMX⁺ power stage during the operation via RS 485.

POWER SUPPLIES



SPH 240 / 500 / 1013

Power supply for
stepper motor
power stages and
-controllers



ENG www.phytron.eu/SPH

POWER SUPPLIES

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_{AC}, 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_{AC}.

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.

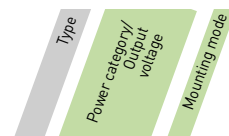
In Focus



- Input voltage range
SPH 240 / 500: 90..132 or 180...264 V_{AC}
SPH 1013: 3 x 340-550 V_{AC}
- Output voltage: 24 / 48 / 72 V_{DC}
- 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

Ordering Code

The variable elements of the product are displayed in colour.



Ordering code SPH 1013-4821 - W

Options

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

Mating connectors are included in delivery.

ACCESSORIES



USB-485- Konverter

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



ENG 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

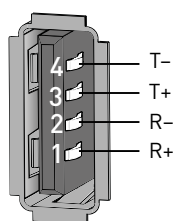
USB-RS485.6: 6-pole connector for rack power stages with ribbon cable connector

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

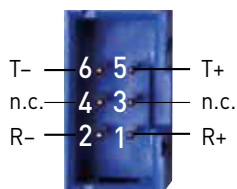
In Focus

- 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
- Download drivers from the Phytron website

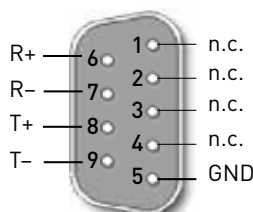
Connector



RS485-USB.4

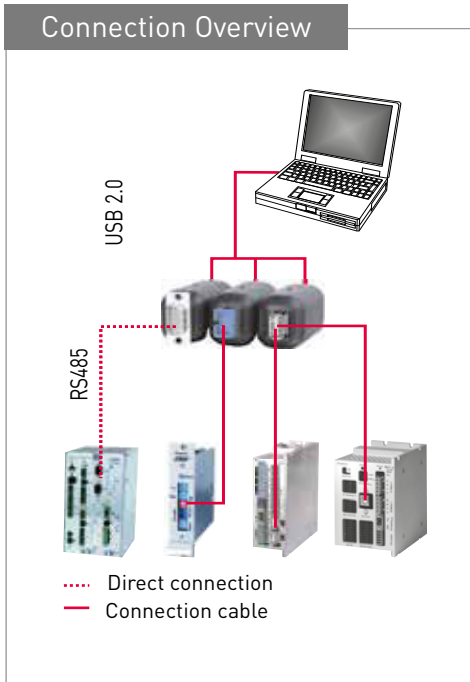


RS485-USB.6



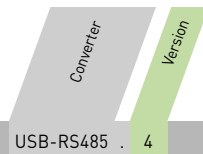
RS485-USB.9

Connection Overview



Ordering Code

The variable elements of the product are displayed in colour.



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

You will find all relevant performance data, dimensions and key figures under the following QR code. We will happily advise you!



Phytron GmbH
 Tel.: +49 8142 503-0
 E-Mail info@phytron.de

Rely on experience and quality – rely on Phytron

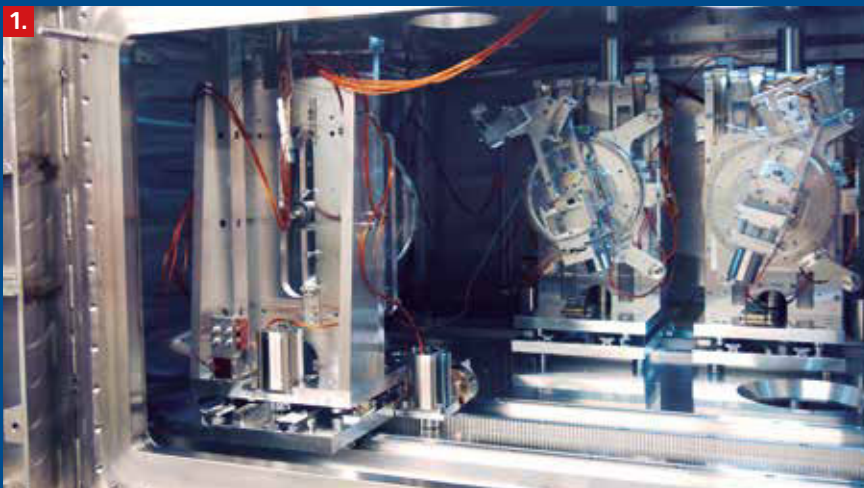
Thanks to over 70 years of market experience and quality „Made in Germany“, our products are the best choice for your project.

Whether in the particle accelerator, when drilling in the Arctic or when using liquid nitrogen - our Extreme series is used wherever environmental conditions are challenging. Robust design, durable and high-quality components combined with our decades of competence and experience have made our motors what they are today - always one step ahead! Extreme environmental conditions such as ultrahigh vacuum, very low temperatures and radiation pose particular challenges to design solutions, tolerances and materials. All of our know-how from over 40 years of space expertise has found its way into the Extreme series. This enables us to ensure the highest levels of reliability and durability for our products, especially under challenging operating conditions. We have set ourselves apart from our competitors with our diverse customising options.

Thanks to a great vertical range of manufacture, we are able to offer customised solutions of high quality at attractive prices, even in small series. Furthermore, our motors can be configured with modular peripheral components, such as encoders, minimum backlash gears or integrated spindles as well as controls and output stages.



Helmholtz
Zentrum Berlin



1. Deutsches Elektronen-Synchrotron (DESY), Hamburg 2. CERN, Meyrin/Schweiz 3. Mars-Rover der NASA 4. Micos Positioniertisch

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

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.

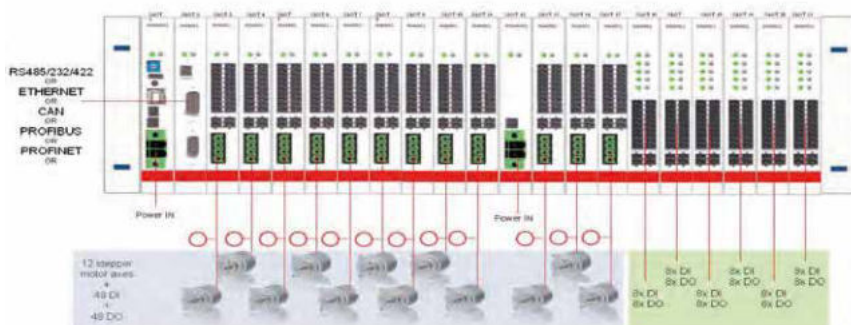
Our ToolBox contains besides the actual programming environment useful tools such as the "Motion Creator" that can easily draw 2D contours and turn them into code, as well as numerous diagnostic, debugging and testing features.

In Focus

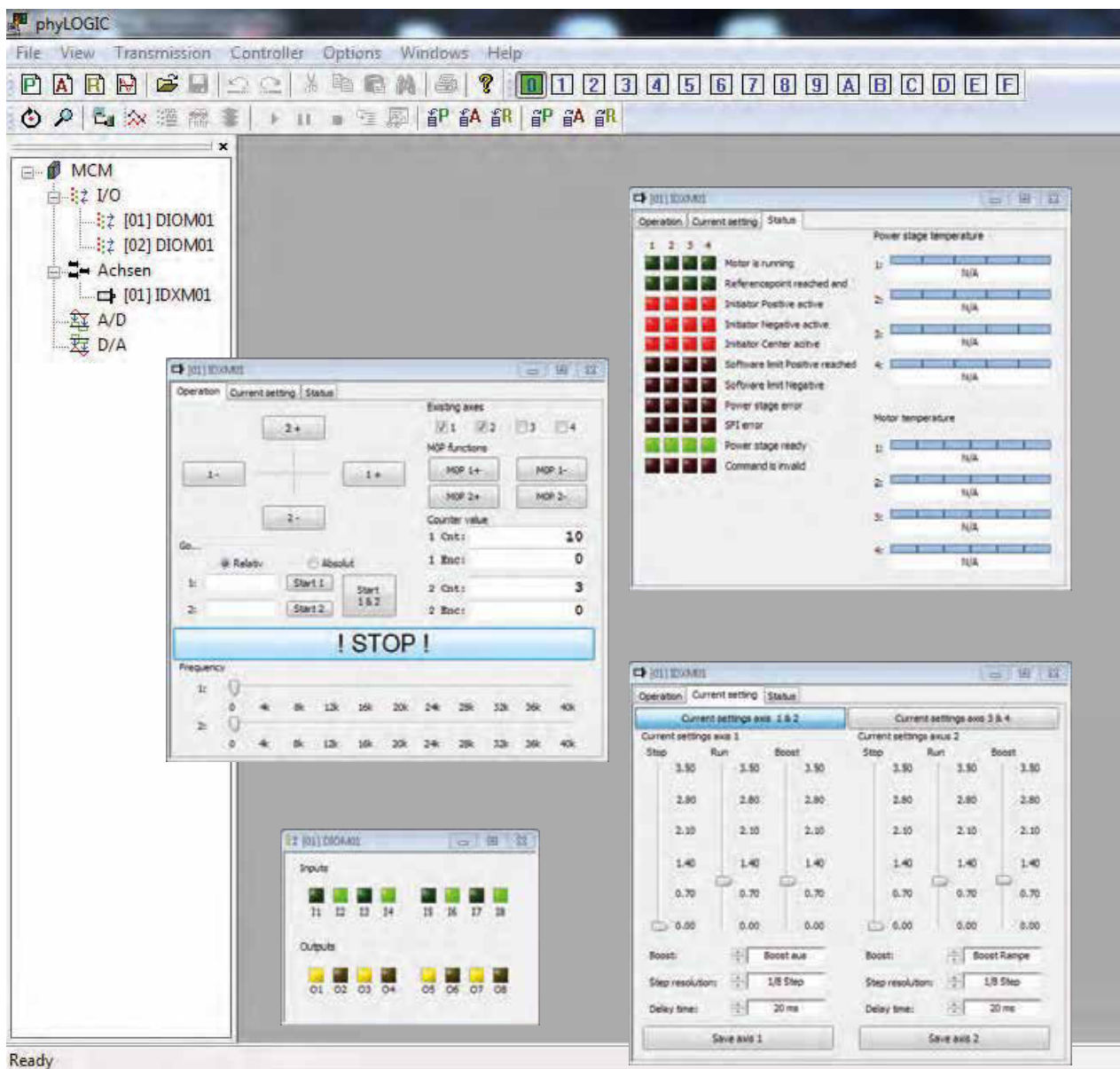
- Operating software and development environment for the phyMOTION™ phytron controller
- Easy to program: Drawing and converting from 2D contours in phyLOGIC™ instructions (Motion Creator)
- Parameterising, creating programs, editing, debugging
- Support in the initiation phase e.g. by test functions
- 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™



Program Window



Ready

Windows® is a trade mark of Microsoft.
 phyLOGIC™ and phyMOTION™ are trade marks of Phytron GmbH.

You will find all relevant performance data, dimensions and key figures under the following QR code. We will happily advise you!



Phytron GmbH
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 E-Mail info@phytron.de



ENG 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 Service-Bus¹ 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™.

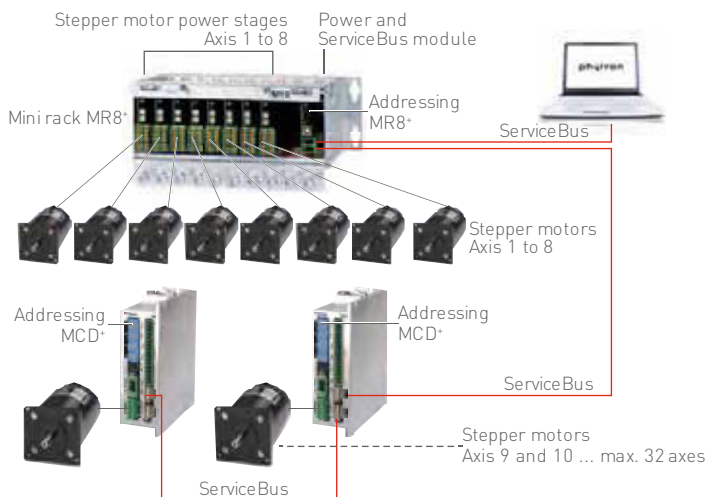
¹ All types of phytron control units with Service-Bus are labeled by the appendix +.

In Focus

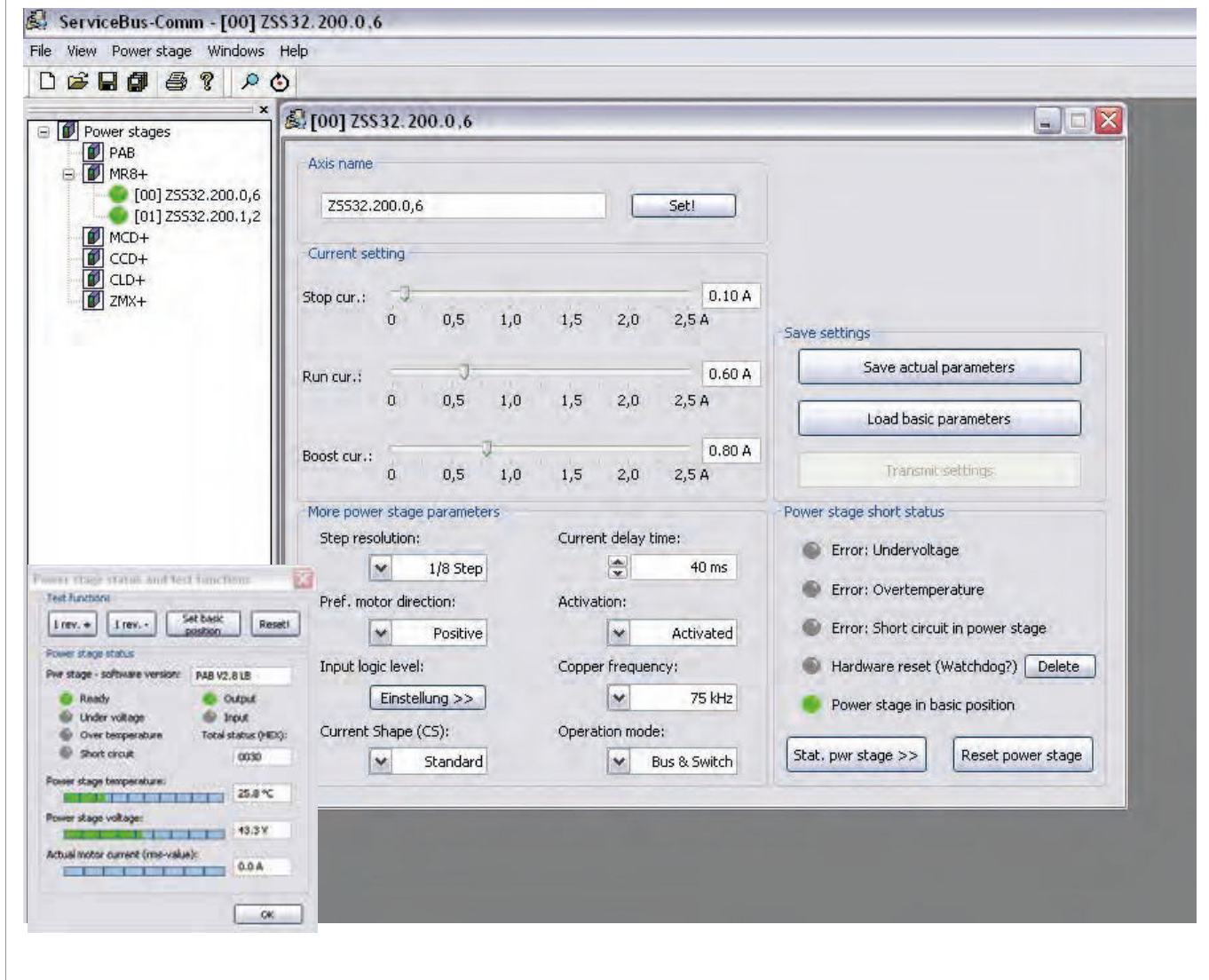
- Communication software for stepper motor power stages with ServiceBus
ServiceBus-Comm™ is a registered trade mark of the Phytron GmbH.
- Putting into operation, configuration and error diagnosis
- Programming power stage parameters
- Online status display for safe operation and easy maintenance
- Parameter 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



Program Windows



phytron products with ServiceBus support:

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

Windows® is a trade mark of Microsoft.

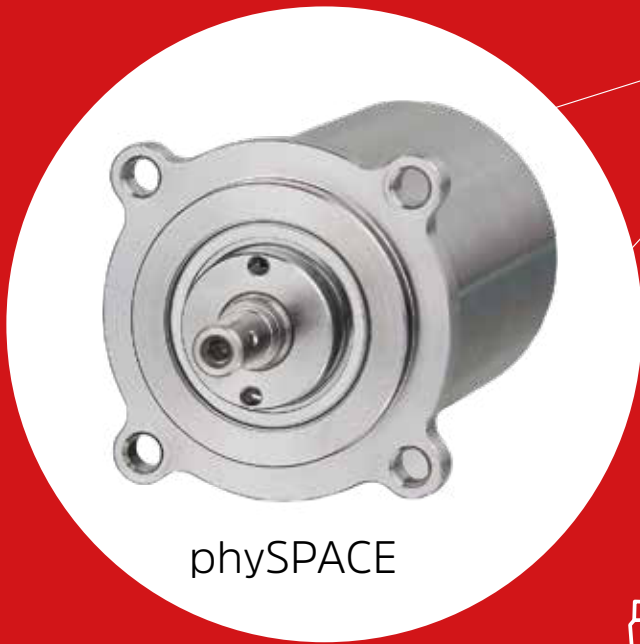
ServiceBus-Comm™ is a trade mark Phytron GmbH.

You will find all relevant performance data, dimensions and key figures under the following QR code. We will happily advise you!

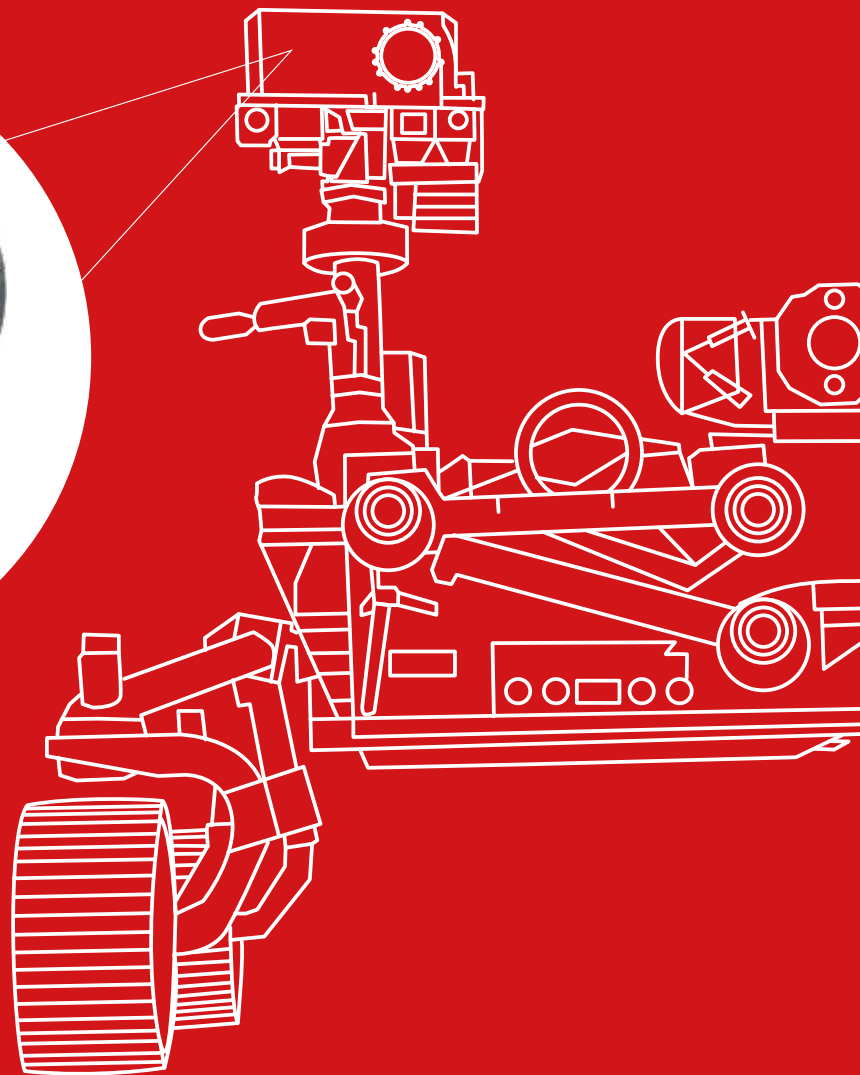


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our **5**th motor is
on duty
on mars.



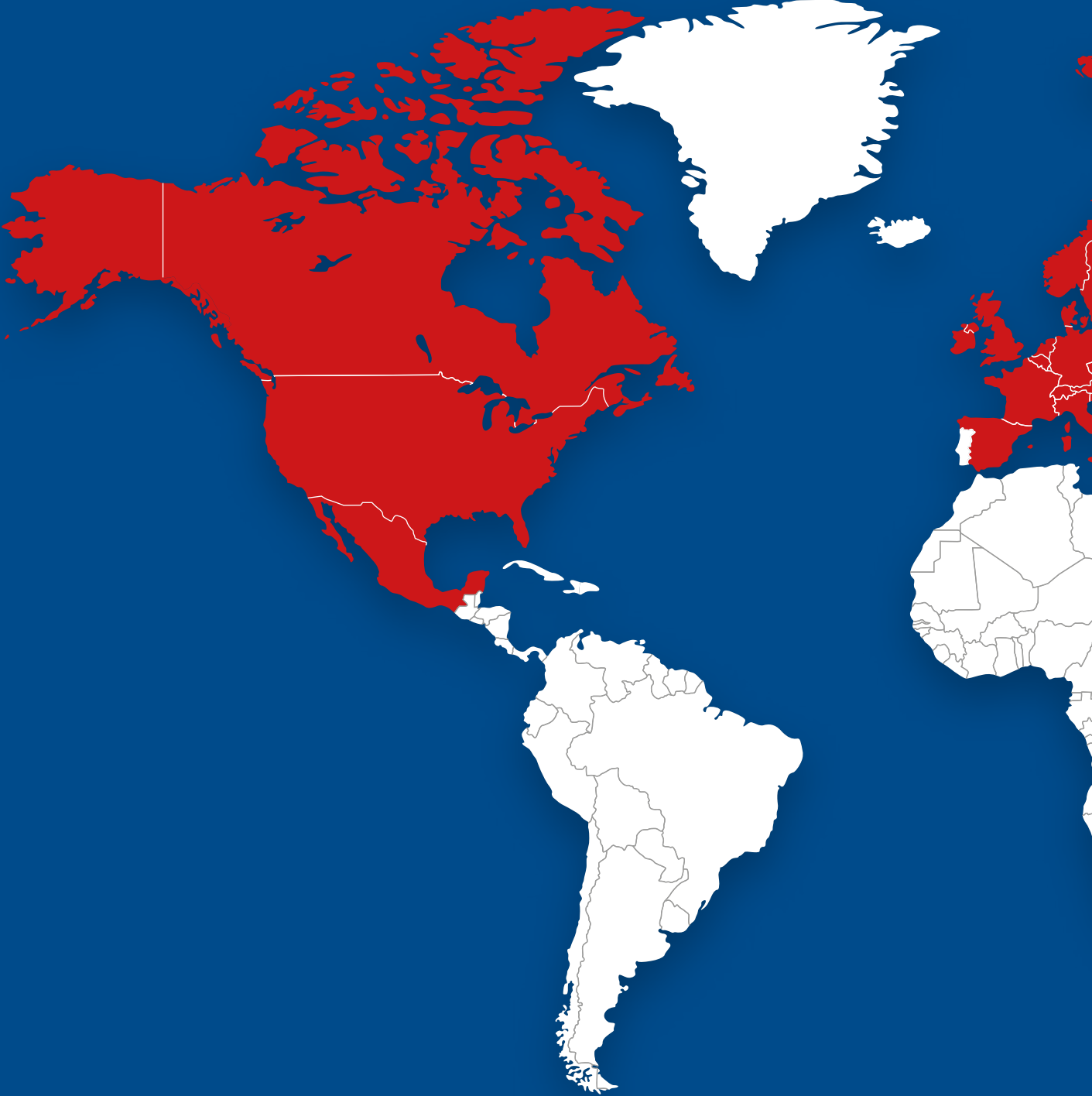
phySPACE

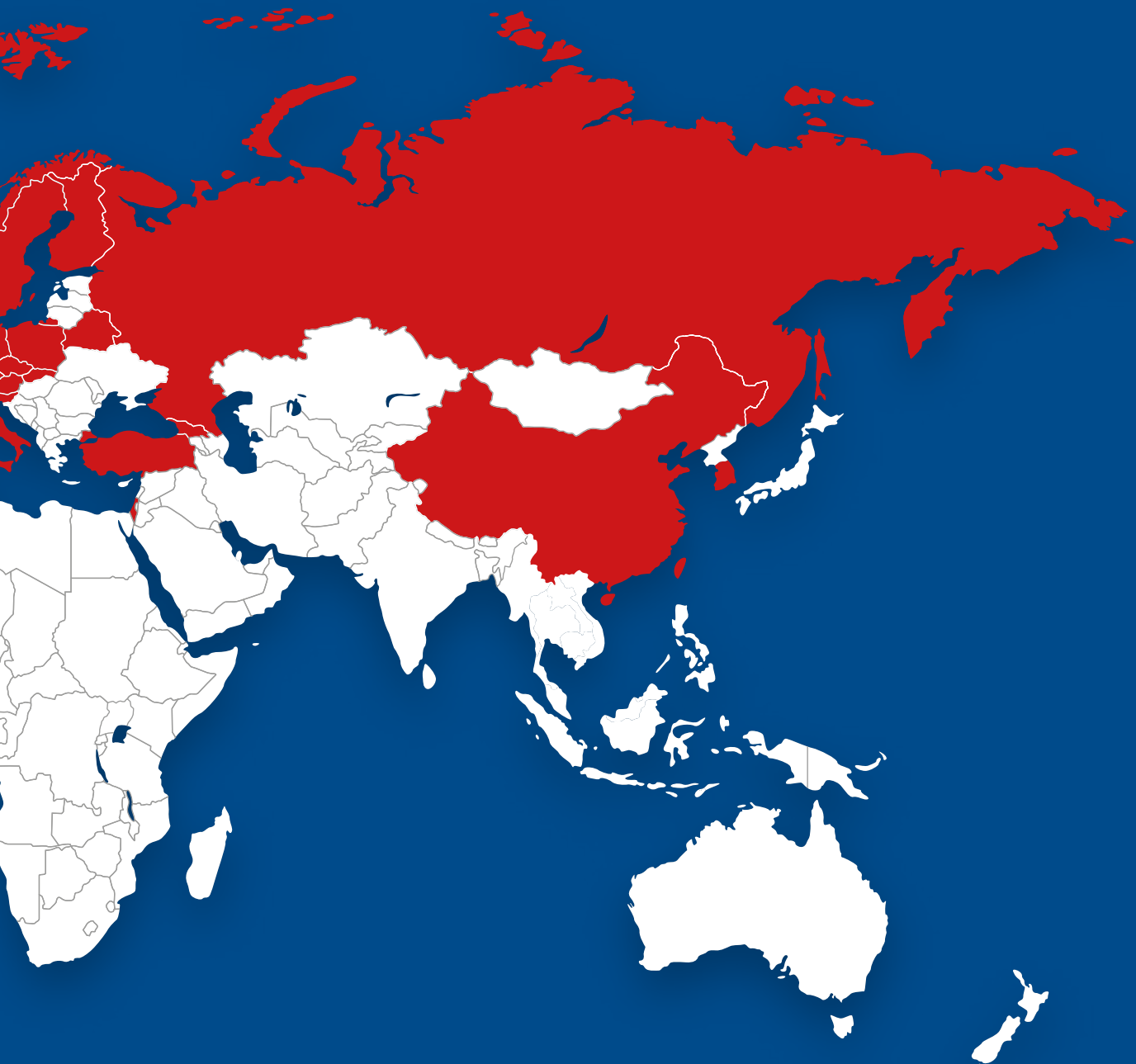


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Mars Rover
Perseverance

Your contact to Phytron

Thanks to our wide network of agencies,
we are available for you in over 20 countries.





Technical support and service

Talk directly to our experienced service technicians to optimally set up your Phytron products or to identify the most suitable service or repair measures:

Support hotline (Mon-Fri 9AM to 5PM CET, landline tariff)

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