INDUSTRIAL

*phy*MOTION™

Modular multi-axes controller for stepper motors

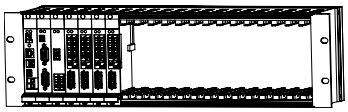
The *phy***MOTION**™ combines PLC and motion control functions into a flexible and convenient framework for multi axis stepper motor applications. The free software *phy***LOGIC**™ Toolbox, the LabVIEW interface, the Android-based touch interface (internal/external) and the open protocol for controller drive and parameterising create additional scope for development. The integrated, high resolution power stages up to 15 A_{Peak} at 120 V_{DC} simplify the wiring significantly.

Designed for Industry 4.0

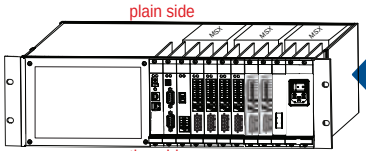
The *phy***MOTION**™ can be operated below existing PLC systems as a slave system, as distributed intelligence or as a stand-alone motion control solution. Online parameterising and -diagnostics are also standard feature as limit switch/reference switch inputs per axis. Each axis can be expanded with encoder (Endat, SSI- /Quadrature) and temperature evaluation. Besides standard PLC functions such as analogue and digital I/Os, a variety of interfaces (Ethernet, Profibus, Profinet, RS232/485, USB, Bluetooth) the *phy***MOTION**™ also provides linear and circular interpolation.

In 4 steps to your stepper motor controller

1 Choose the *phy*MOTION™ type



Housing depth s



Housing depth p

	Supply / Mains connection	Housing width	Touch Panel	Type of mounting	Supply
ext	**external**	6SL-s, 8SL-s, 10SL-s or 21SL-s	integrated external	Rack,wall, rail mounting or bench	POWM01+MCM01 or MCM02
int	**internal** 230 V_{AC} or 115 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:

CAN, Ethernet, ProfiBus/ProfiNet, RS 485, RS 232, RS 422, Bluetooth

3 Select the modules

4 Order and receive the fully assembled *phy*MOTION™

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

Module selection for your *phy*MOTION™

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 *phy*MOTION™ 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 *phy*MOTION™

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 frequeny 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 frequeny 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

available from the 4th quarter of 2016

ENC * Option selectable encoder evaluation

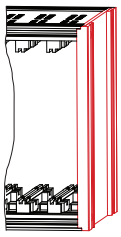
Encoder type	supply	resolution	supported types	option (submodule)			
				ECAS01	ECES01	ECBS01	ECMS01
differentiell	5 V / 5.5 V 500 mA	2^{32}	Quadrature with zero track	✓	✓	✓	
SSI	5 V / 5.5 V 500 mA	2^{31}	SSI	✓	✓	✓	
BiSS	5 V / 5.5 V 500 mA	2^{31}	BiSS-C BiSS-B			✓	
EnDat	5 V / 5.5 V 500 mA	2^{31}	Endat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

TEMP * Option selectable motor temperature evaluation

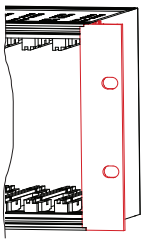
- with KTS01 submodule: the stepper motor temperature is evaluated with the metall thermocouple type K by comparison measurement
- with PTS01 submodule: the stepper motor temperature mesurement with the Pt resistor sensors

1 Housing and Supply

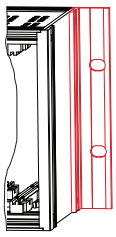
Housing types of the *phy*MOTION™:



Bench or
rail mounting



Rack mounting
(connection side is the
front)

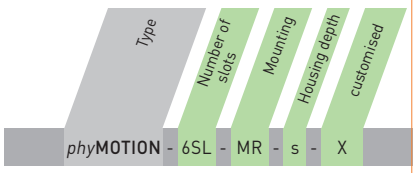


Wall mounting or
rack-inverse (like rack mounting,
but connection side is back)

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

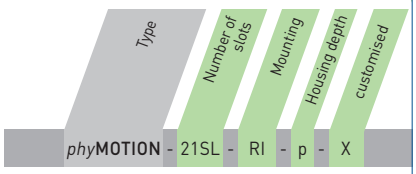
dimensions in mm
Mounting bracket for rack, rack-inverse or wall mounting: +40.6 mm

Ordering code "ext"



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

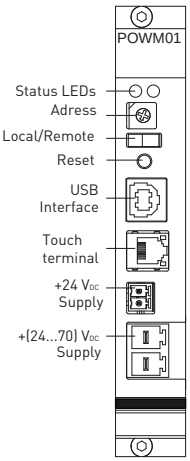
Ordering code "int"



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

Main Supply (POWM01)

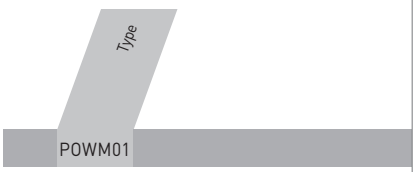
ext



The beginning of each *phy*MOTION™

- 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).

Ordering Code



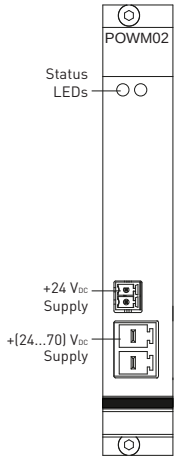
Mating connectors are included in delivery.

Industrial

Intermediate Supply (POWM02)

ext

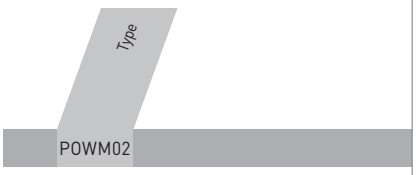
POWER SUPPLY
CPU
INDEX
POWER STAGE
POW IN



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).

Ordering Code

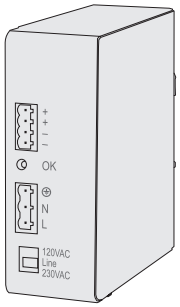


Mating connectors are included in delivery.

External Power Supply Unit (SPH)

ext

POWER SUPPLY
CPU
INDEX
POWER STAGE



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

Ordering Code

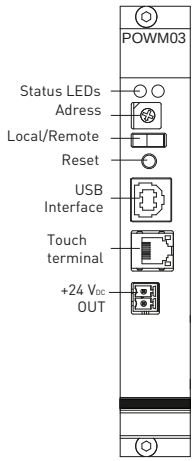
Options		
Output power - Output	240-2410 240-4805 500-2420 500-4810 500-7207 1013-4821 1013-7214	24 V_{DC} / 10 A 48 V_{DC} / 5 A 24 V_{DC} / 20 A 48 V_{DC} / 10 A 72 V_{DC} / 6.7 A 48 V_{DC} / 20 A 72 V_{DC} / 13.5 A
Mounting	H W	Rear DIN rail Rear wall

Mating connectors are included in delivery.

Main Supply (POWM03)

int

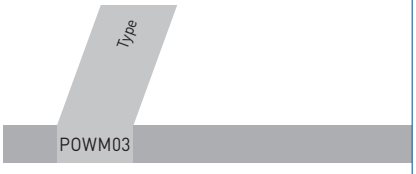
POWER SUPPLY
CPU
INDEX
POWER STAGE
POW IN
COM



The main supply of the *phy*MOTION™

- Configuration
  - USB interface for programming and diagnostics
  - Device addres switch
  - Reset key
  - Connection of the external phytron touch terminal (TPE)
  - 24 V_{DC} output (for e.g. sensors)

Ordering Code

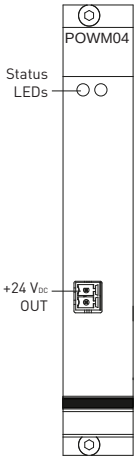


Mating connectors are included in delivery.

POWER SUPPLY
CPU
INDEX
POWER STAGE
POW IN

Intermediate Supply (POWM04)

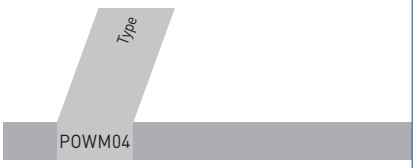
int



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)

Ordering Code

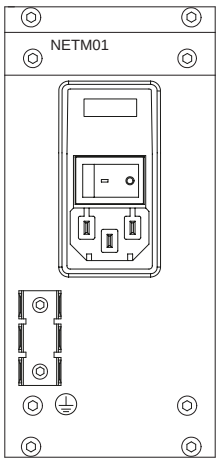


Mating connectors are included in delivery.

POWER SUPPLY
CPU
INDEX
POWER STAGE

230 V (115 V) Power Supply (NETM01)

int



External mains voltage (230 V / 115 V)

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

Ordering Code

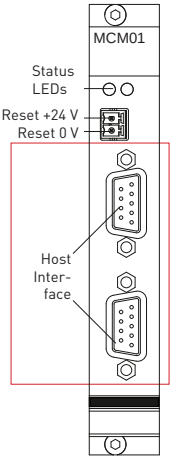
Options		
Mains	230 V 115 V	
Motor voltage	48 V 70 V 120 V	500 W each defined motor voltage (max. 3)

Industrial

2 Host Interface

POWER SUPPLY | CPU | INDEX | POWER STAGE | COM

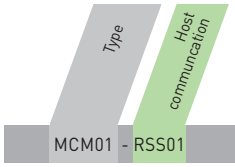
Main Controller (MCM01)



Intelligent CPU and bus:

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

Ordering Code



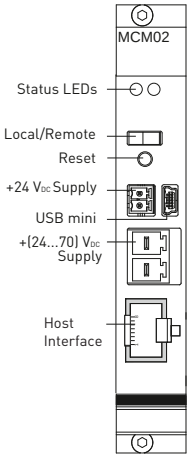
Options		
Host communi-cation	CANS01	CAN-Bus
	ETHS01	Ethernet
	PBS01	ProfiBus
	PNS01	ProfiNet
	RSS01	RS 232 or RS 485/422
	BTS01	Bluetooth
	NNS01	no interface

Mating connectors are included in delivery.

POWER SUPPLY | CPU | INDEX | POWER STAGE | COM | POW IN

Main Controller (MCM02)

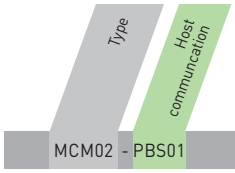
ext



Intelligent CPU, bus 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 *phy*LOGIC™
- Selectable communication interface:
  - Ethernet
  - ProfiBus/ProfiNet
  - Bluetooth

Ordering Code



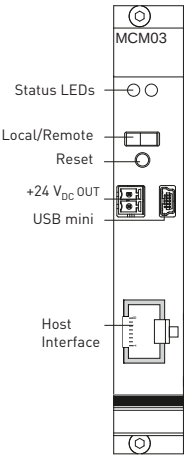
Options		
Host communi-cation	ETHS01	Ethernet
	PBS01	ProfiBus
	PNS01	ProfiNet
	BTS01	Bluetooth
	NNS01	no interface

Mating connectors are included in delivery.

POWER SUPPLY | CPU | INDEX | POWER STAGE | COM | POW IN

Main Controller and Supply (MCM03)

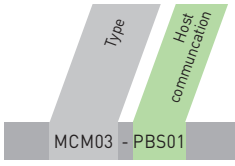
int



Intelligent CPU, bus and for internal supply:

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

Ordering Code



Options		
Host communi-cation	ETHS01	Ethernet
	PBS01	ProfiBus
	PNS01	ProfiNet
	BTS01	Bluetooth
	NNS01	no interface

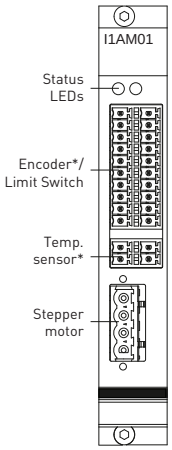
Mating connectors are included in delivery.

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

POWER SUPPLY
CPU
INDEX
POWER STAGE
ENC *
TEMP *

1 Axis Stepper Motor Drive (I1AM01)

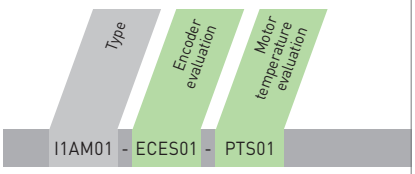
int



Indexer with integrated 3.5 A power stage

- Integrated indexer for standard functions:
  - Relative and absolute positioning
  - Reference movements/speed mode
  - Step frequency to 40,000 steps/second
- Integrated 3.5 A power stage
  - 3.5 A_{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
- 3 limit/reference switches
- Optional encoder evaluation*)
  - SSI, differentiell, BiSS or Endat; Resolver
- Optional motor temperature evaluation
  - for Pt100 sensors (PTS01) or K types (KTS01)

Ordering Code

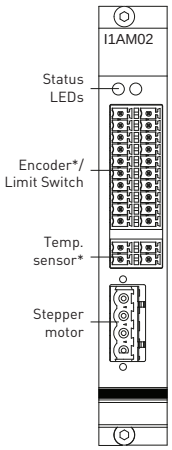


Options		
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

POWER SUPPLY
CPU
INDEX
* POWER STAGE
ENC *
TEMP *

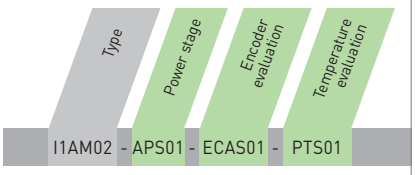
1 Axis Stepper Motor Drive (I1AM02)



Indexer with selectable power stage*)

- Integrated indexer for standard functions:
  - Relative and absolute positioning
  - Reference movements/speed mode
  - Online power stage parameterisation and diagnostics
- 3 limit/reference switches
- Optional encoder evaluation*)
  - SSI, differentiell, BiSS or Endat; Resolver
- Optional motor temperature evaluation
  - for Pt100 sensors (PTS01) or K types (KTS01)

Ordering Code

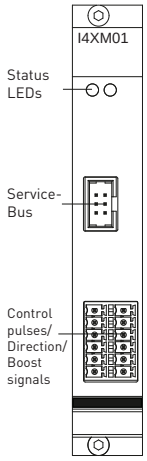


Options		
Power stage	APS01 LPS01	Int. power stage 5A/70V Int. power stage 9A/70V
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

POWER SUPPLY
CPU
INDEX
POWER STAGE

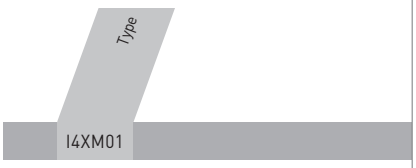
4 Axes High End Indexer (I4XM01)



Indexer module

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

Ordering Code



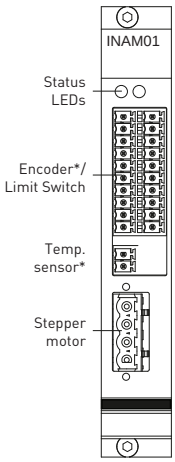
Mating connectors are included in delivery.

* refer to page 2

Industrial

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

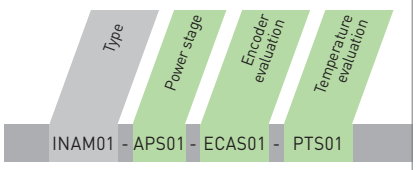
POWER SUPPLY
CPU
INDEX
* POWER STAGE
ENC *
TEMP *



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, differentiell, BiSS or Endat; Resolver
- Optional motor temperature evaluation
  - For Pt100 sensors (PTS01)
  - K types (KTS01)

Ordering Code

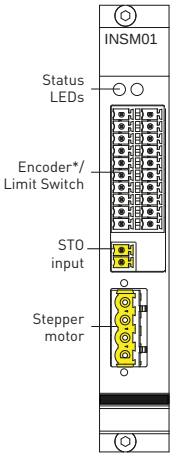


Options		
Power stage	APS01 LPS01	Int. power stage 5A/70V Int. power stage 9A/70V
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

Power Stage Module with Safe Torque Off (INSM01)

POWER SUPPLY
CPU
INDEX
* POWER STAGE
ENC *
SAFETY

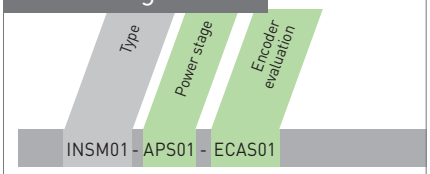


APS, STO and Encoder

- with Safe Torque Off function SIL3/PIe
- 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, differentiell, BiSS or Endat; Resolver (refer to page 2)

available from the 4th quarter of 2016

Ordering Code



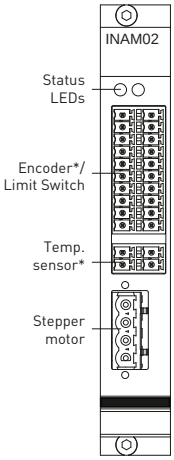
Options		
Power stage	APS01	Int. power stage5A/70V
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module

Mating connectors are included in delivery.

1 Axis Module for integrated MSX Power Stage (INAM02)

int

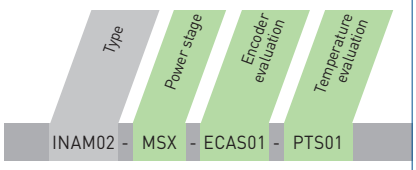
POWER SUPPLY
CPU
INDEX
* POWER STAGE
ENC *
TEMP *



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
- 3 limit/reference switches
- Optional encoder evaluation*)
  - SSI, differentiell, BiSS or Endat; Resolver
- Optional motor temperature evaluation
  - For Pt100 sensors (PTS01)
  - K-types (KTS01)
- additional grounding if motor voltage >70 V (PEM01) via NETM01

Ordering Code



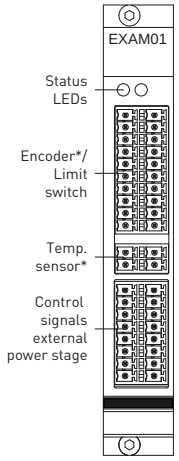
Options		
Power stage	MSX	Power stage up to15 A/70 V
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Tempe-rature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

* refer to page 2

POWER SUPPLY
CPU
INDEX
POWER STAGE
ENC *
TEMP *

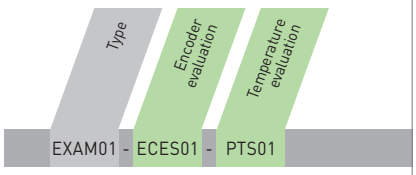
Indexer Interface (EXAM01) for External Power Stage



Interface between indexer and external power stages

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

Ordering Code

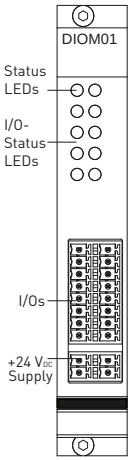


Options		
Encoder evaluation	ECES01 ECAS01 ECBS01 ECMS01	ENDAT encoder SSI/QUADR. encoder BiSS Resolver no encoder module
Temperature evaluation	PTS01 KTS01	Pt sensor K type no temperature module

Mating connectors are included in delivery.

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

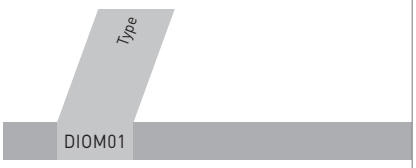
Digital I/Os (DIOM01)



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.

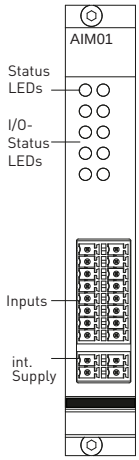
Ordering Code



Mating connectors are included in delivery.

POWER SUPPLY
CPU
INDEX
POWER STAGE
I/O A

Analogue Inputs (AIM01)



Analogue input module

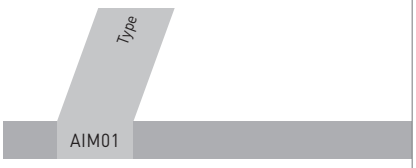
4 analogue inputs: ± 10 V
bipolar, 0...10 V, 0...20 mA

Resolution: 14 Bit

Sample rate: 416 Hz

Electrically isolated

Ordering Code



Mating connectors are included in delivery.

* see page 2

Industrial

POWER SUPPLY
CPU
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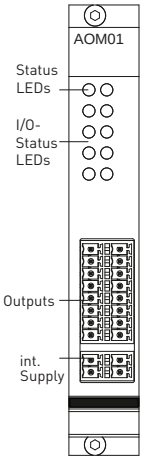
POWER STAGE
I/O A

Analogue Outputs (AOM01)



Analogue output module

4 analogue outputs

Max. output current: 16 mA

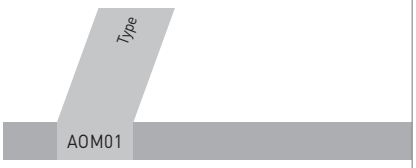
Electrically isolated

Resolution: 16 Bit

Short-circuit proof

Thermal overload protection

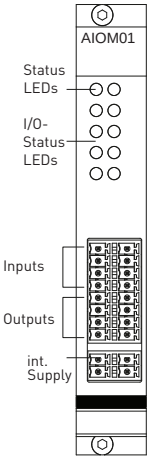
Ordering Code



Mating connectors are included in delivery.

POWER SUPPLY
CPU
INDEX
POWER STAGE
I/O A
TEMP
ENC

Analogue Inputs and Outputs (AIOM01)



Analogue input and output module

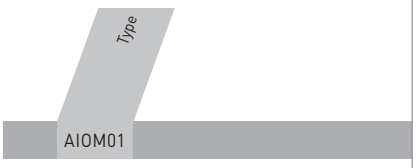
4 analogue inputs and outputs included

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

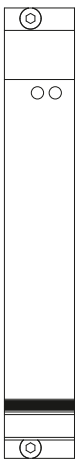
Ordering Code



Mating connectors are included in delivery.

POWER SUPPLY
CPU
INDEX
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 *phy*MOTION™ housing
- Touch functionality
- As user interface i.e. for parameter selection
- For support, parameterisation and diagnostics

Ordering Code

Type
TPM01

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

External human-machine interface

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

Control with Operator Touch Panel (TPE01)

External human-machine interface

- For 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

Type
TPE01

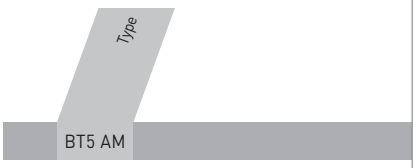
Industrial

Control with Operator Panel BT5 AM

External human-machine interface

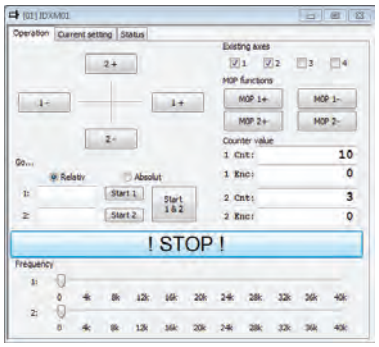
- For connection to the POWM01 main power module (terminal interface)
- For support, parameterisation and diagnostics
- Status display, operating mode
- Parameter reading
- Function keys
- Remote or Local mode

Ordering Code



Software

*phy*LOGIC™ ToolBox



Free of charge development environment

- Operating software and development environment for the *phy*MOTION™ phytron controller
- Easy to program: Drawing and converting of 2D contours in *phy*LOGIC™ 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

*phy*LOGIC™ Control

Free of charge App for tablets and mobile phones

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

LabVIEW®-VI

VIs for *phy*MOTION™

- 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 *phy*MOTION™ 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 *phy***MOTION**™ 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 *phy*MOTION™: INAM-, EXAM-, I1AM01- or I1AM02-module
- On delivery: shielded clamp with cableties and screws
- The motor connectors are included in the package of your *phy*MOTION™ 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

int

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, srew lens: black plastic
- Carrying capacity: 50 kg

Ordering ID

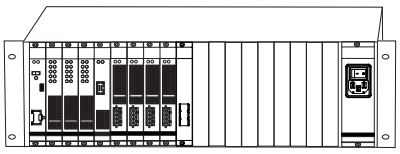
10019311

4 Order and Receive the Fully Assembled *phy*MOTION™

Configuration Example

int

*phy*MOTION™ with internal supply



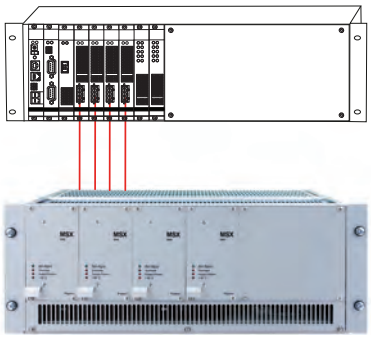
Ordering code example:

	Ordering code	Description
Housing	*phy*MOTION-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

ext

*phy*MOTION™ with SLS



Ordering Code Example:

	Ordering code	Description
Housing	*phy*MOTION-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.

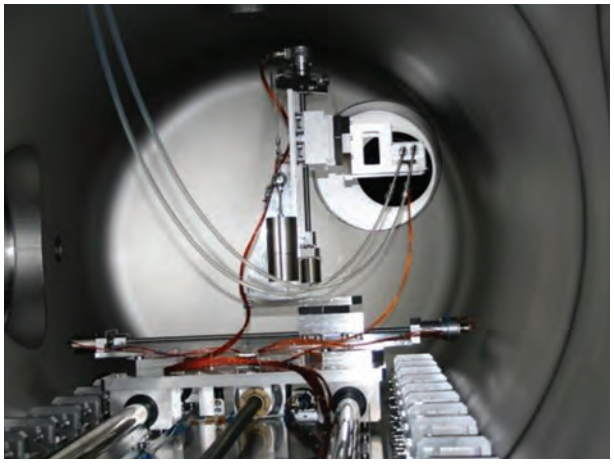
The *phy*MOTION™ offers additional functions for the control of also complex machines from outside the vacuum chamber such as temperature monitoring, encoder and resolver evaluation as well as linear and circular interpolation for high-precision positioning. The heating of the motors is minimised in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

The *phy*MOTION™ with integrated power stages close to the vacuum chamber allows a low-noise monitoring of the temperatur 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 excisting 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 spplied software, LabView interface or touch panel.



The *phy*MOTION™ 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:
*phy*MOTION™ with external supply:
MCM01, POWM01, POWM02, 2 x I4XM01, 6 x I1AM01, 2 x DIOM01

Industrial

APPLICATION in FOOD

XY Alignment for Cutting Baked Wafer Blanks

The *phy*MOTION™ 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 *phy*MOTION™.
The external touch panel allows a comfortable operation.

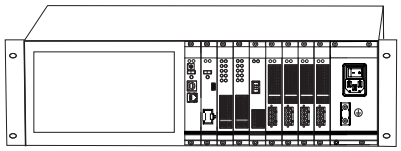
Configuration:

*phy*MOTION™ 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	*phy***MOTION**-21SL-p	19" rack mounting housing with 10 slots, integrated touch panel and depth 360 mm

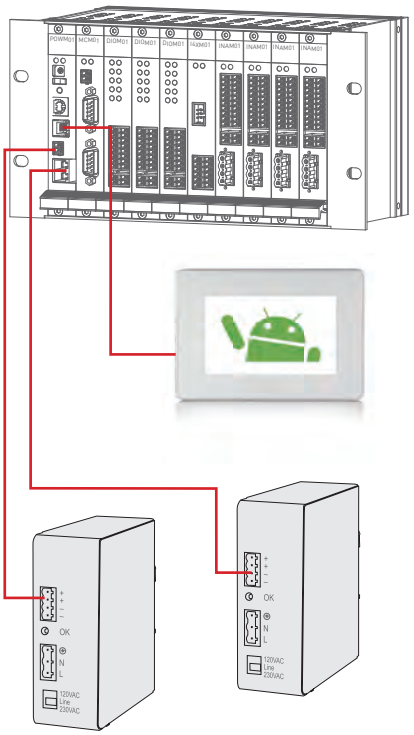
Module	Ordering Code	Description
TPM01	TPM01	Android-based integrated touch panel
Slot 1	POWM03	Main power supply
Slot 2	MCM03-PBS01	Main controller with ProfiBus interface
Slot 3	DIOM01	Digital I/O module
Slot 4	DIOM01	Digital I/O module
Slot 5	I4XM01	4 axes indexer module
Slot 6	INAM01-APS01-ECAS01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

Industrial

Configuration Example

ext

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



Ordering Code Example:		
	Ordering Code	Description
Housing	*phy*MOTION-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

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

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