

*phy*MOTION™

Digital I/O Module

DIOM01.1 / DIOM0a.1

Firmware Version:

V1.0.0 (Loader)	V1.0.0 (Loader)
V1.0.0 (System)	V1.0.0 (System)

TRANSLATION OF THE ORIGINAL GERMAN MANUAL

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Intention of the manual:

In this manual you will find descriptions and specifications of the *phyMOTION*TM module: Digital Input and Output Module DIOM01/DIOM0a.

This manual is a supplementary volume to the operating instructions *phyMOTION*TM *Modular Multi-axis Controller for Stepper Motors*

In the manual *phyMOTION*TM *Modular Multi-axis Controller for Stepper Motors* (<http://www.phytron.de/phyMOTION>) are the descriptions of the features and specifications for the *phyMOTION*TM stepper motor controller.

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

We appreciate suggestions and criticisms for further improvement.

Email address: doku@phytron.de

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

1 Legal Instructions



This manual:

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

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

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

Observe the following safety instructions!

Qualified personnel



WARNING – Serious injury possible!

Serious personal injury or serious damage to the machine and drives could be caused by insufficiently trained personnel!

Without proper training and qualifications damage to devices and injury might result!

- Design, installation and operation of systems may only be performed by qualified and trained personnel.
- These persons should be able to recognize and handle risks emerging from electrical, mechanical or electronic system parts.
- The qualified personnel must know the content of this manual and be able to understand all documents belonging to the product. Safety instructions are to be provided.
- The trained personnel must know all valid standards, regulations and rules for the prevention of accidents, which are necessary for working with the product.

Safety Instructions



Further Manual

This manual is in addition to the following main manual:

“**phyMOTION™** Modular Multi-axis Controller for Stepper Motors”

- First, read the main manual and then continue with this manual.



Intended use:

*The **phyMOTION™** is designed for operating in a drive system.*

- An installation is allowed only if the requirements of the EC Machinery and EMC Directives are conformed with.



Part of a machine:

This product is used as a part of a complete system, therefore risk evaluations concerning the specific application must be made before using the product.

- Safety measures have to be taken according to the results and be verified.
- Personnel safety must be ensured by the concept of this overall system (e.g. machine concept).



WARNING – Serious injury from electric shock!

*If the **phyMOTION™** is not operated with SELV/PELV voltages, the risk of dangerous voltages may be on the device. Touching these components carrying high voltages can cause serious injury or death from electric shock:*

- Always observe the safety concept SELV / PELV to ensure safe isolation and separation of low voltage supplies from the mains.



WARNING – Serious injury from electric shock!

During electrical installation cables, connectors, etc. can be live.

- Before starting wiring, make sure that none of the power supplies are connected to the primary side of the mains supply. Isolate the power supplies from the mains or remove the appropriate fuses.
- All modules must be inserted and screwed into the **phyMOTION™** housing before powering up. If necessary, unoccupied module slots must be covered with the supplied blank front plates. Never operate the equipment when open.
- Do not plug or unplug the modules while powered.
- Do not plug or unplug the connectors while powered.
- If the equipment was energised, wait 3 minutes after power off to allow the capacitors to discharge and ensure that there are no residual charges on cables, connectors and boards.

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3 DIOM01/DIOM0a Module Overview

DIOM stands for “Digital Input Output Module” and is set for the application of the modular stepper motor control unit *phyMOTION*™. The DIOM01/DIOM0a module is activated by the main controller module (MCM01) and has 8 digital, electrically isolated inputs and outputs.

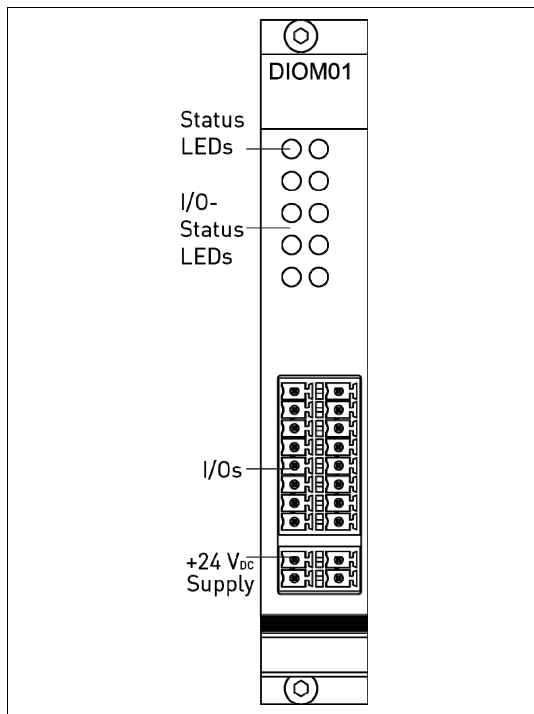


Fig. 1: DIOM01/DIOM0a Front view of the panel

Digital inputs and outputs:

- 8 digital inputs 24 V_{DC} .
- 8 digital outputs $24 - 30\text{ V}_{\text{DC}}$, at 1 A max., 2 A max. per module. Up to 4 A per module is possible with a direct power supply.
- Internal 24 V_{DC} power supplies to the inputs and outputs when centrally delivered from the supply modules POWM01 or POWM02.
- External $24 - 30\text{ V}_{\text{DC}}$ power supply of the inputs and outputs when delivered directly to the DIOM01/DIOM0a. Condition: external power supply = internal power supply + 1 V.
- The DIOM01/DIOM0a can also be used as a 1-fold counter module.

4 Technical Data

4.1 Declaration of Conformity



Declaration of Conformity
according to EC directive 2004/108/EC (EMC-Directive)

Name and address of the manufacturer:
Phytron-Elektronik GmbH,
Industriestr. 12
82194 Gröbenzell

We declare that the following product is in conformity with the EC Directives 2004/108/EC relating to EMC.

Product denomination

Part-No.	Title	
10015052	DIOM01.1	Digital I/O Module

From serial number 1205xxxxx

Applied harmonized standards

- EN 61000-6-1: 2007-01 Electromagnetic Compatibility (EMC) - Immunity for residential, commercial and light-industrial environmental
- EN 61000-6-2: 2005-08 Electromagnetic compatibility (EMC) - Immunity for industrial environments
- EN 61000-6-3: 2007-01 Electromagnetic compatibility (EMC) - Emission standard for residential, commercial and light-industrial environments
- EN 61000-6-4: 2007-01 Electromagnetic compatibility (EMC) - Emission standard for industrial environments

Comment:

This declaration of conformity is valid only if the device is built in a suitable casing e.g. phyMOTION-6SL-MR-s.

Gröbenzell, 2012-05-10


Johannes Schmid
Technical Director

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CE 7032 Rev. 1

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4.2 Mechanical Data

Dimension	100 x 100 mm without front panel
Weight	56 g without and 79 g with front panel
Mounting	Plug-in module into the modular stepper motor controller <i>phyMOTION</i> TM
Mounting position	Vertical

4.3 Features

Features	
Main controller	Modular controller <i>phyMOTION</i> ™
Power supply	<ul style="list-style-type: none"> - 24 V_{DC} internal via central entry point from the POWM01 or POWM02 module - Or 24V_{DC} external directly to the DIOM01/DIOM0a module - 5 V_{DC} internal
Current consumption (max.)	<ul style="list-style-type: none"> - 2 A for the complete DIOM01/DIOM0a module if it is supplied via the central entry point for the POWM01 or POWM02. - 4 A for the complete DIOM01/DIOM0a module if it is supplied directly to the DIOM01/DIOM0a module. <p>Each output is designed for a maximum of 1 A.</p>
Power consumption	<p>75 mA for the internal 5 V_{DC}</p> <p>Power consumption of the I/Os 5 mA for 24 V_{DC}</p>
Cable length – digital inputs	30 m; if longer (100 m max.) use shielded cable and contact shield close to the controller.
Status LEDs	See chapter 6.1

Interfaces	
8 digital outputs	<p>O1 to O8</p> <p>Output level: 24 V_{DC} for internal power supply / 30 V_{DC} for external power supply</p> <p>Output current max.: 1 A per output</p> <p>Total output current:</p> <ul style="list-style-type: none"> • 2 A for internal power supply • 4 A for external power supply <p>Short circuit proof</p> <p>Thermal overload protection</p> <p>Switching frequency max.: 1 kHz</p>

8 digital inputs	<p>I1 to I8</p> <p>Input level: 24 V_{DC}</p> <p>Switching threshold: DIOM01: 2.4 V_{DC} / DIOM0a: 11 V</p> <p>Electrical isolation via optocoupler</p> <p>Switching frequency max.: 50 kHz</p> <p>Protected against over voltage up to 35 V_{DC}</p>
I/O supply	<p>24 V_{DC} internal and 2A max. at the central supply via the delivering modules POWM01 or POWM02.</p> <p>30 V_{DC} external and 4 A max. when delivered directly to the DIOM01/DIOM0a module. The external power supply must always be higher than the internal power supply.</p>
Rear bus connection	Proprietary phytron bus
Communication and Programming	
Programming	Via phytron's programming environment <i>phyLOGIC</i> [™] ToolBox
Communication	Master slave communication from the MCM01 to the DIOM01/DIOM0a

4.4 Functional Description

Digital inputs and outputs:

- 8 digital inputs 24 V_{DC}
- 8 digital outputs $24 - 30\text{ V}_{\text{DC}}$, at 1 A max., 2 A max. per module. Up to 4 A per module is possible with a direct power supply.
- Internal 24 V_{DC} power supplies to the inputs and outputs when centrally delivered from the supply modules POWM01 or POWM02.
- External $24 - 30\text{ V}_{\text{DC}}$ power supply of the inputs and outputs when delivered directly to the DIOM01/DIOM0a. Condition: external power supply = internal power supply + 1 V.

Counting function:

- The DIOM01/DIOM0a can also be used as a 1-fold counter module.
- The counting function is at input 1.

5 Installation

5.1 Mechanical Installation of the DIOM01/DIOM0a Modules

phytron always delivers the *phyMOTION*TM completely assembled in order to make sure you can start with the installation and the wiring right way.



Further Manual

Detailed information on this subject is in a supporting manual:

*“*phyMOTION*TM Modular Multi-axis Controller for Stepper Motors”*

The DIOM01/DIOM0a is delivered as a single module card if sent after service or repair or when an expansion card was ordered.

In case you receive an individually packed DIOM01/DIOM0a as an expansion module or after repair or service unpack the module in ESD protected area only.



CAUTION – Possible damage by ESD!

*The modules of the *phyMOTION*TM consist of sensitive electronic components that can be destroyed by electrostatic discharge voltages.*

- Always store and transport single modules in ESD protective packaging.
- Always handle the components in compliance with the ESD protection measures.
- No liability is accepted for any consequences resulting from improper handling or non-ESD-friendly packaging.

Identify the correct slot position for the DIOM01/DIOM0a referring to your order and documentation. The DIOM01/DIOM0a needs at least a POWM01 module and a MCM01 module on somewhere its left side.

Before you install or replace modules, make sure that the *phyMOTION*TM is unplugged.



WARNING – Serious injury from electric shock!

During electrical installation cables, connectors, etc. can be live.

- Before starting wiring, make sure that none of the power supplies are connected to the primary side of the mains supply. Isolate the power supplies from the mains or remove the appropriate fuses.
- All modules must be inserted and screwed into the *phyMOTION*TM housing before powering up. If necessary, unoccupied module slots must be covered with the supplied blank front plates. Never operate the equipment when open.
- Do not plug or unplug the modules while powered.
- Do not plug or unplug the connectors while powered.
- If the equipment was energised, wait 3 minutes after power off to allow the capacitors to discharge and ensure that there are no residual charges on cables, connectors and boards.

Make sure not to leave free slots in between modules so the module addressing sequence can work correctly.

Push the module card carefully into the guide rail until the rear contacts the housing's frame of the *phyMOTION*TM.

In the last few millimetres the module's plug has to match with the backplane's socket. You should be able to push in the module with light pressure. In case you experience problems move the module's front plate slightly to the left and to the right while pushing in the module, so that the plug's pins can slide into the backplane's socket.

As soon as the module's front plate contacts the housing's frame the module is integrated properly and can be fixed with two electro-conductive bolts.

Now you can start with the electrical installation.

5.2 Electrical Installation

Ensure sufficient bending radius of the cables during installation. Do not lay the cables in tension or bend them.

We recommend labelling the mating connectors to prevent interchanging the connectors. If all the connections are made, the last step is to plug in the power supply to the mains.

5.2.1 Connectors - Overview

Connector	Number of pins	Connector on the module (Phoenix)	Mating connector (Phoenix)	Mating connector ID number
I/Os	2x8	MCDN1,5/8-G1-3,5P26	FMC1,5/8-ST-3,5	10005881
Power supply	2x2	MCDN1,5/2-G1-3,5P26	FMC1,5/2-ST-3,5	10007077

The mating connector is included in delivery of the module and is usually plugged into the module at the factory.

5.2.2 Pin Assignment

Here is the pin assignment of the DIOM01/DIOM0a

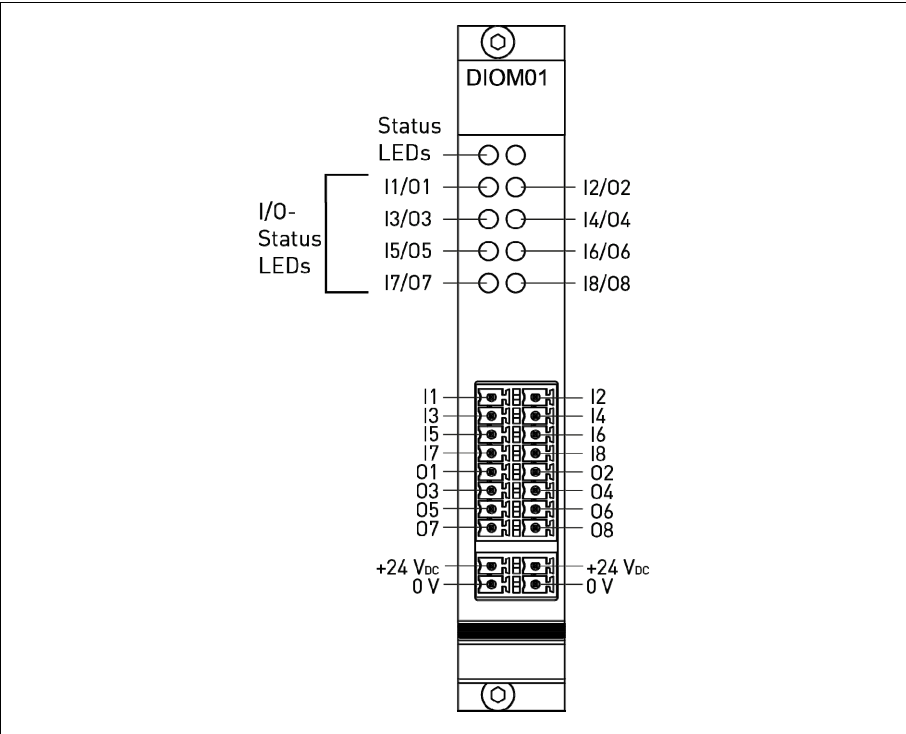


Fig. 2: Pin assignment

For wiring please use the above defined mating connectors.

5.2.3 Input Wiring

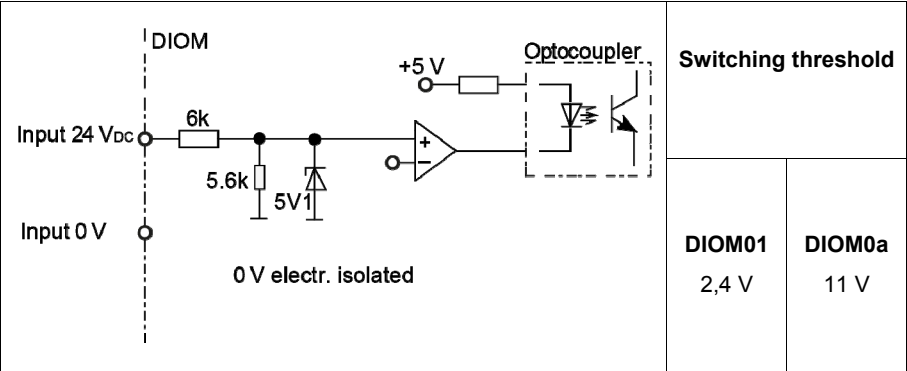


Fig. 3: Input wiring

5.2.4 Output Wiring

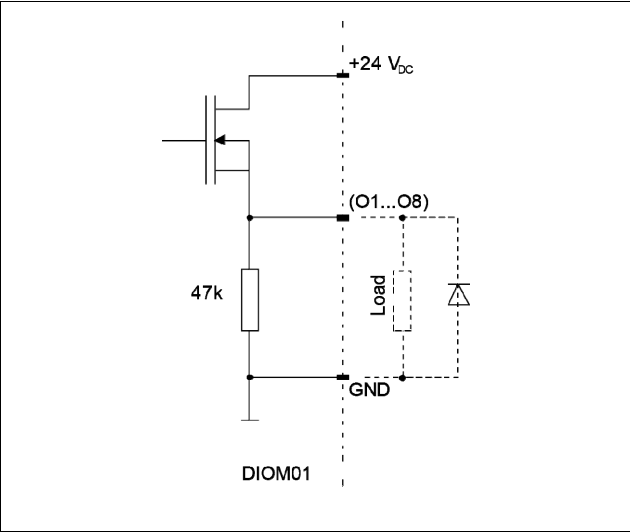


Fig. 4: Output wiring

i CAUTION – Possible damage!
Damage of the module because of incorrect connection.

- Do not swap the 8 pin connector for the 8 inputs with the 8 pin connector for the outputs.

6 Commissioning

Please read the manual for basic commissioning information of the DIOM01/DIOM0a module :



Further manual

Detailed information on this subject is in a supporting manual:

“**phyMOTION™** Modular Multi-axis Controller for Stepper Motors”

The programming environment **phyLOGIC™** ToolBox is explained in the following manual:



Further manual

Detailed information on this subject is in a supporting manual::

“**phyLOGIC™** ToolBox – Communication Software for the **phyMOTION™** Stepper Motor Controller”

For programming the sequential program please read:



Further manual

Detailed information on this subject is in a supporting manual:

“**phyLOGIC™** Command Reference for the **phyMOTION™** Controller”



CAUTION – Possible damage!

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

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

6.1 Diagnostics by the LEDs

The LEDs indicate the status and error of the DIOM01/DIOM0a module by colours and blinking:

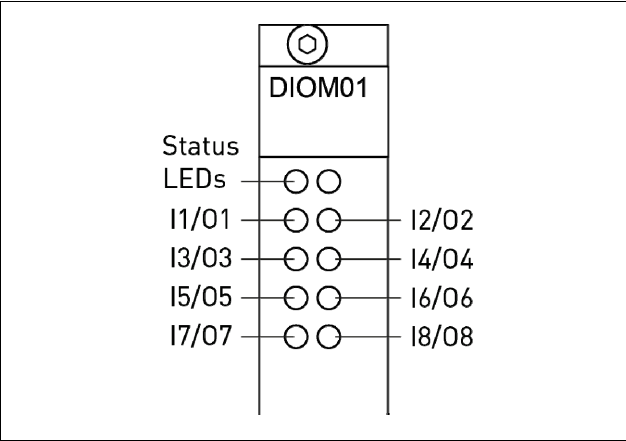


Fig. 5: Status-LEDs

	Status LEDs		I/O LEDs
	top left	top right	
off	No power supply connected		I/Os not active
green	Isolated supply: ok	OK	Output O1 to O8 active
red	–	Flashing slowly (≈ 2 Hz): module is not addressed Flashing fast (≈ 5 Hz): error	Input I1 to I8 active
orange			Input and output I1/O1 to I8/O8 active

6.2 Parameterising of the Modules

No parameterisation for the DIOM01/DIOM0a module is necessary.

7 Service

In case of a service contract, please proceed as follows:

First try to identify the technical problem. Feel free to ask our support team for help. We are pleased to assist you.

Removal of a module:

- Switch off the *phyMOTION*[™]'s supply voltage
- Disconnect the supply voltage
- Loosen the screw on top and the screw on the bottom of the module's front plate
- Pull the card carefully by the handle.
- If you want to use the *phyMOTION*[™] after removing a module, the gap has to be sealed with a blanking plate before power supply is reconnected and switched on.
- To send a module to phytron use ESD packaging only.

8 Warranty, Disclaimer and registered trademarks

8.1 Disclaimer

phytron GmbH has verified the contents of the manual to match with the hardware and software. However, errors and omissions are exempt and phytron GmbH assumes no responsibility for complete compliance. The information contained in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

8.2 Warranty

The *phy***MOTION**TM modules are subject to **legal warranty**. phytron will repair or exchange devices which show a failure due to defects in material or caused by the production process. This warranty does not include damage caused by the customer, for example, not intended use, unauthorized modifications, incorrect handling or wiring.

8.3 Registered trademarks

In this manual several trademarks are used which are no longer explicitly marked as trademarks within the text. The lack of these signs may not be used to draw the conclusion that these products are free from third parties' rights. For example, some product names used herein are:

- *phy***MOTION**TM is a trademark of Phytron-Elektronik GmbH.
- *phy***LOGIC**TM is a trademark of Phytron-Elektronik GmbH.
- Microsoft is a registered trade mark and **WINDOWS**[®] is a trade mark of the Microsoft Corporation in the USA and other countries.

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