

INTEGRATED BLDC MOTORS



Powered by :



- SMART BRUSHLESS SERVOS
- MOTOR CONTROLLERS/DRIVES
- BRUSHLESS DC MOTORS
- STEPPER MOTORS
- LINEAR ACTUATORS
- THREADED SCREWS & NUTS
- ENCODERS / GEARBOXES / BRAKES

PRODUCT CATALOG

## About Nanotec



Bohez concept & support presents to you the company Nanotec Electronic GmbH & Co. KG, headquartered in Feldkirchen near Munich. It is among the world's leading manufacturers of motors and motor controllers for high-quality drive solutions. The company has been developing and marketing a broad range of products since 1991. Nanotec technology is primarily used in automation systems, automatic laboratory equipment and medical devices.

In 1996, Nanotec came out with the first Plug & Drive motor with an integrated controller, setting a cornerstone that would ultimately be central to the company's growth.

Still today, Nanotec focuses heavily on research and development to create drive solutions that closely meet the needs and requirements of our customers.

Together with subsidiaries in Changzhou, China, and Stoneham (Massachusetts), USA, and more than 20 sales partners, like Bohez in Belgium and France, we provide Nanotec drive solutions and expert technical support to customers all over the world.



## Standard and custom solutions for optimum drives

When drive systems with high precision, reliability and extensive functionality are required to fit in small spaces, Nanotec supplies the necessary technology – either as standard solutions or individualized designs. With prototype construction and the production of customized assemblies located in Germany, and due to our policy of extensive warehousing, we are able to respond quickly and flexibly to customer needs.

Our linear actuators, brushless DC and stepper motors, in sizes beginning at 10 mm, together with a variety of gears and encoders, combine into a modular system with over 100,000 possible combinations. In addition, you can choose from a range of shaft, flange and connector types that rapidly and reliably connect to existing device architecture.

The performance and resonance behavior of Nanotec motors is optimized by intelligent motor controllers that meet the latest technology standards.



Our products are manufactured at two Nanotec plants in China. Fully trained employees and high-quality machinery ensure stable processes and a high in-house production depth. Both production facilities in China operate according to German quality standards and are ISO certified.

By controlling and monitoring all stages of manufacture – from prototype construction to pre-series and final production – Nanotec is able to quickly and efficiently produce customized solutions in series production.



## Integrated management system



Nanotec relies on an integrated management system that takes effect in the areas of quality, environment, occupational health and safety, risk management and data protection.

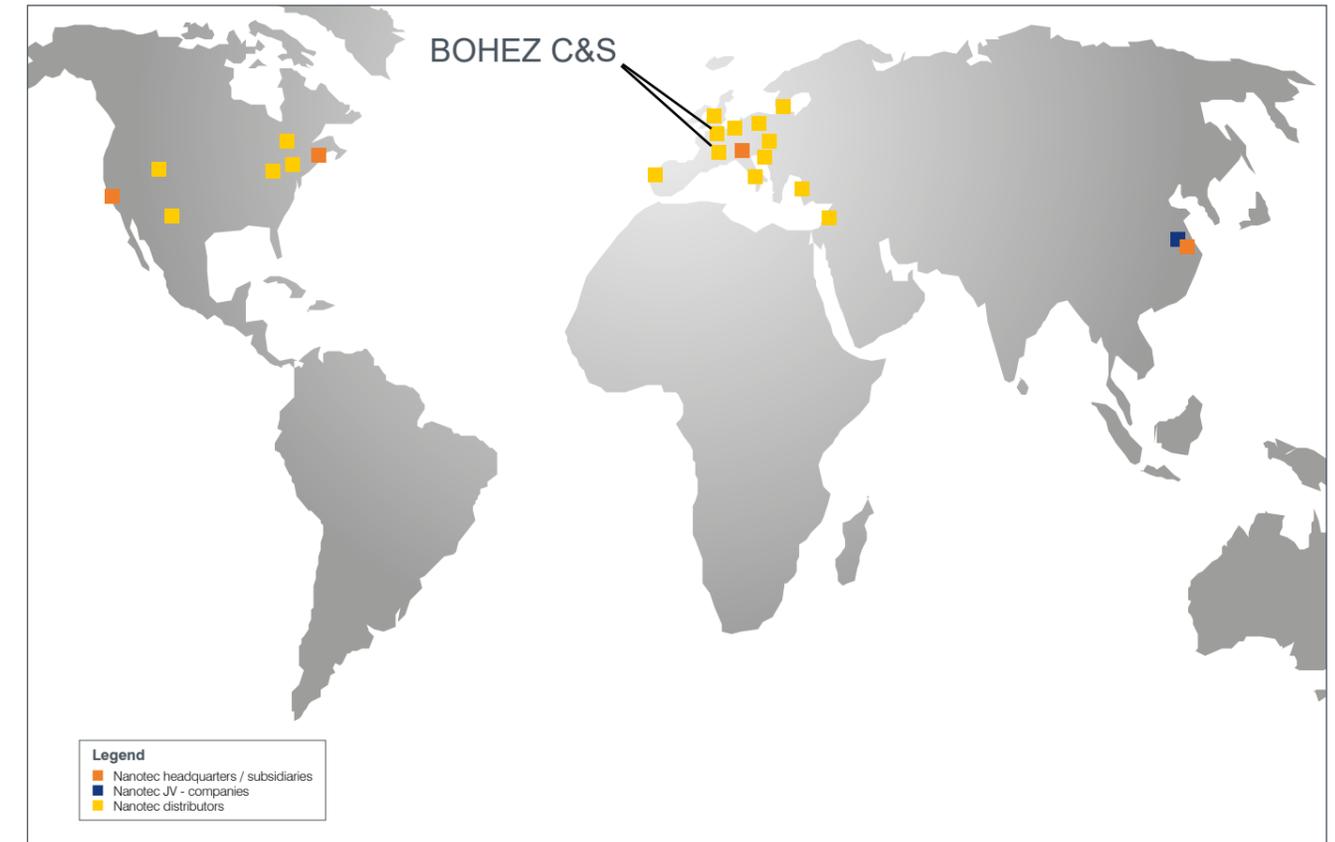
This system is designed to secure the continuing success of the company by guaranteeing our ability to promptly and efficiently meet customer needs and expectations while keeping our environmental impact to a minimum. By doing so, it lays the foundation for high quality standards and continuous improvement.

Nanotec quality assurance and environmental protection policies are in line with ISO 9001:2015 and ISO 14001:2015. Our occupational health and safety standards are designed according to the OHRIS concept and have been certified since 2014.

As part of our corporate policies and guidelines, we consider it our duty to ensure the viability of our company over the long term. Well-trained and responsible employees, a forward-looking personnel policy and a positive corporate culture all contribute to this aim. We adhere to pertinent national and international quality standards, integrate suppliers and customers in decision-making processes, detect and assess errors and risks at an early stage, and regularly reevaluate and update our goals.



## Worldwide sales network

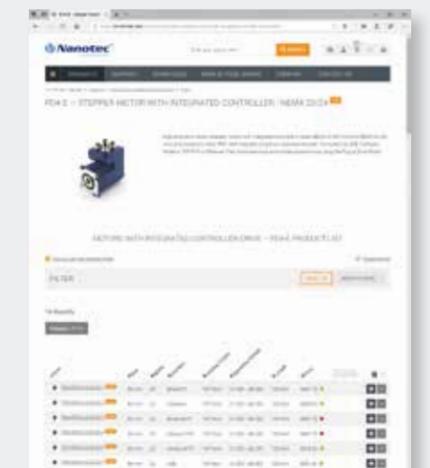


Nanotec products are available via a worldwide network of sales partners. A list of our sales partners can be found on our website.

## Our complete range of products can be found at [www.nanotec.com](http://www.nanotec.com)

Quick and easy online shopping for the right product:

- Order quantities of up to 25 pieces directly on our website
- Our product finder will help you find a suitable motor
- Product configurator: Just a few clicks to configure your individual motor combination with encoder, brake and gear
- Free access to datasheets and 3D-data
- Display of torque curves at different operating voltages and control modes



# Contents

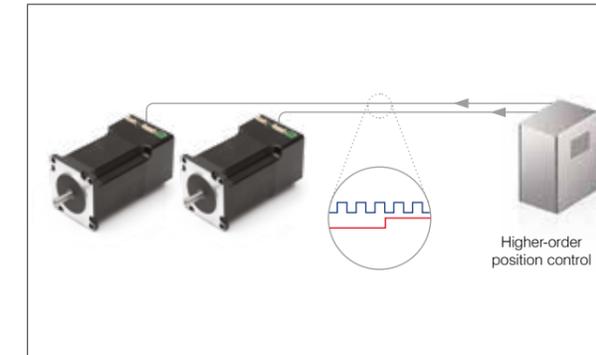
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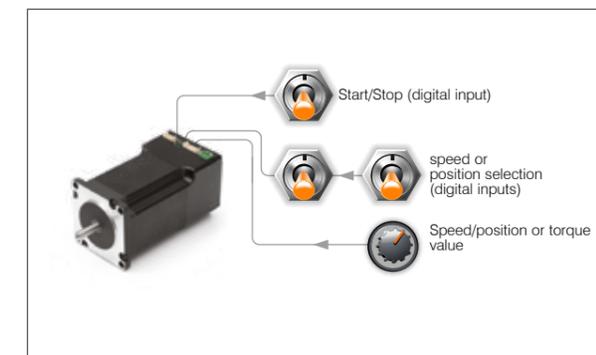
## CONTROL OPTIONS FOR MOTORS WITH CONTROLLER AND CONTROLLERS/DRIVES

Just as our controllers/drives, our brushless DC motors with integrated controller/drive, can be controlled via a wide variety of methods. Dip switches, configuration files or software enable the user to switch between the different methods. Information on which control version can be used in each case is provided in the data sheets.



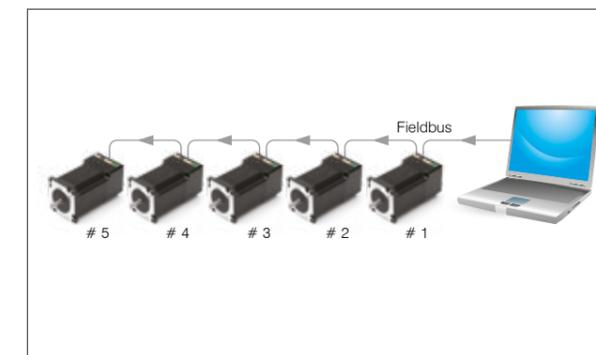
### Clock & direction

- Microstep to one 64th of a step
- Step multiplication/microstep emulation so that the smooth running of the microstep can also be used with older higher-level controllers that only output full or half steps.



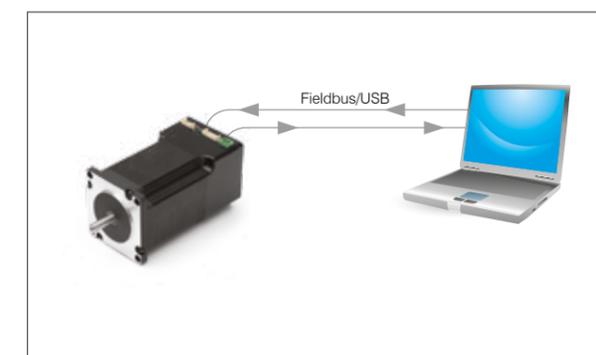
### Control via digital and analog inputs

- Controllers/drives that are programmable with NanoJ V2: digital and analog I/Os can be read out every millisecond and processed in a sequence program.



### Control via fieldbus

- Diverse fieldbus options with NanoJ V2:



### Sequence control with NanoJ/NanoJ V2

- C-based programming language; these programs run autonomously (without a connected PC or master) directly on the motor controller or motor
- Access to all controller parameters and inputs/outputs
- Variables, branches, loops, logical and mathematical functions
- Programs can be stored in the motor controller via fieldbus/USB

Closed loop-capable stepper motors merge the benefits of stepper and servo motor technology. They are smooth-running with less resonance than stepper motors. They offer position feedback and control, short settling and release times and no longer exhibit step loss. They are an alternative to a stepper motor if energy efficiency, smooth running and load tolerance are required. Compared to servo motors, they have advantages due to high torque at low speeds, short settling times and correct positioning without back swing.

### What is closed loop?

Sinusoidal commutation via encoder with field-oriented control is referred to as closed-loop process. The rotor position is detected using the encoder's signals and sinusoidal phase currents are generated in the motor windings. Controlling the vector of the magnetic field ensures that the stator magnetic field is vertical relative to the rotor magnetic field and the field strength corresponds exactly to the desired torque. The controlled current level in the windings provides uniform motor force and leads to a particularly quiet-running motor that can be controlled precisely.

### True/pseudo closed loop

There are stepper motors that dress themselves up as being closed loops and work with encoders but do not provide any field-oriented control with sinusoidally commutated current control. They only check the step position, and cannot correct step losses during operation. True closed loop with field-oriented control compensates step losses during the run or prevents them from occurring by increasing the motor current.

### Advantages over standard stepper motors

A stepper motor is used wherever movement to defined positions is required. The classic stepper motor transfers electric energy into precise mechanical movements as long as the motor's torque is not exceeded. Since there is no position feedback or control, the motor loses steps if unexpected load jumps or resonance occurs and it no longer moves to the desired position. A closed-loop stepper motor will readjust in those instances and reach the specified position reliably. Using an open loop, a standard stepper motor is always operated with the same current regardless of the load and it therefore becomes relatively hot in many applications. By controlling current in a closed loop, the current level can be adjusted to the required torque; less heat is generated and energy consumption drops accordingly.

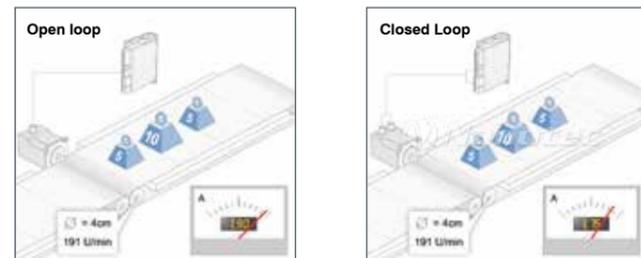
### Advantages over servo motors

In many cases, closed-loop stepper motors from Nanotec are an alternative to servo drives, such as in winding applications or belt drives. The speed and position, and even the torque, can be controlled with precision. This not only achieves the highest maximum torque, the best efficiency and the best dynamics, it also results in the lowest torque ripple and excellent running smoothness.

### Applications for closed loop systems:

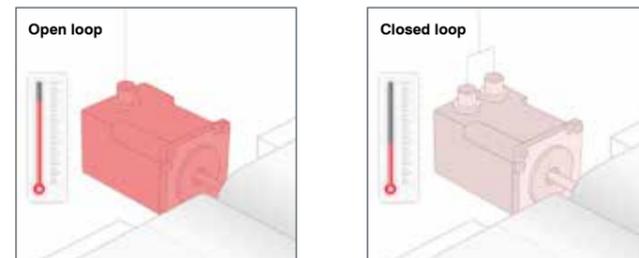
Dosing pumps, filler systems, semi-conductor mounting, wafer production, industrial sewing machines, textile machines, robotics, test and optical inspection systems, tape and belt drives, general multi-axis applications and applications requiring smooth operation, short settling times or accurate positioning.

### Energy efficiency



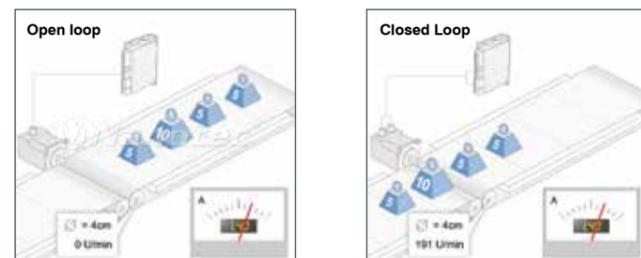
In an open loop, the stepper motor is dimensioned such that it is certain to move the maximum required load. For this reason, normally a safety factor of 20% is calculated, which causes wasted energy in the application. When the load is reduced, the open loop motor cannot react and wastes even more energy.

### Service life



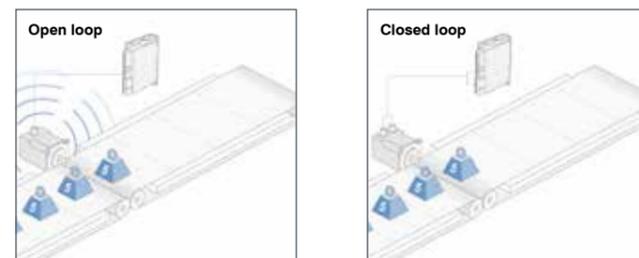
Efficient power regulation generates less heat in the motor, which stays significantly cooler. Reduced heating protects the motor bearings.

### Overload



With a 20% safety reserve and a design for a continuous load of 20 kg, an additional load of only 5 kg exceeds the power reserve and the open-loop drive stops without an error message. By contrast, with its overload reserve the closed loop stepper motor will handle this load increase easily.

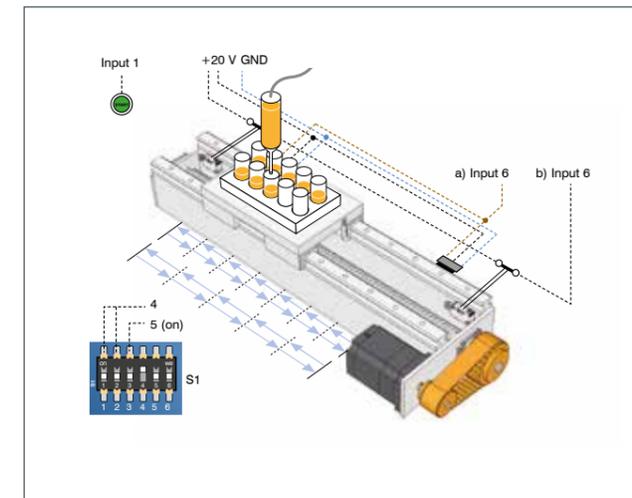
### Resonances



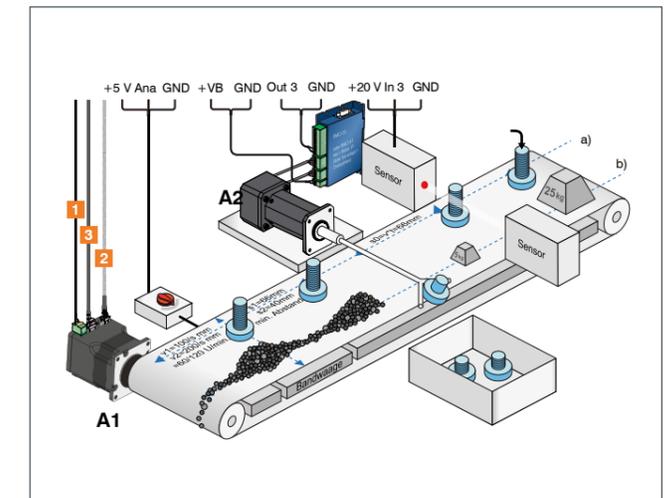
Resonance frequencies occurring in the open loop depend on external loads (the greater the torque reserve, the greater is the resonance stimulation) and can bring the motor to a stop. In closed loop mode, the motor receives only as much energy as needed for the external load; the torque reserve and its resonance stimulation do not exist, so there is practically no resonance behavior.

- Multi-axis applications (CANopen, EtherCAT, Modbus RTU/TCP, Ethernet/IP)
- Positioning tasks with load changes
- Windings
- Belt drives (start/stop, positioning)
- Dosing pumps, filler systems
- Semi-conductor mounting
- Wafer production
- Textile machines, industrial sewing machines
- Robotics
- Testing and inspection systems
- Applications that require smooth operation, short settling times and precision positioning

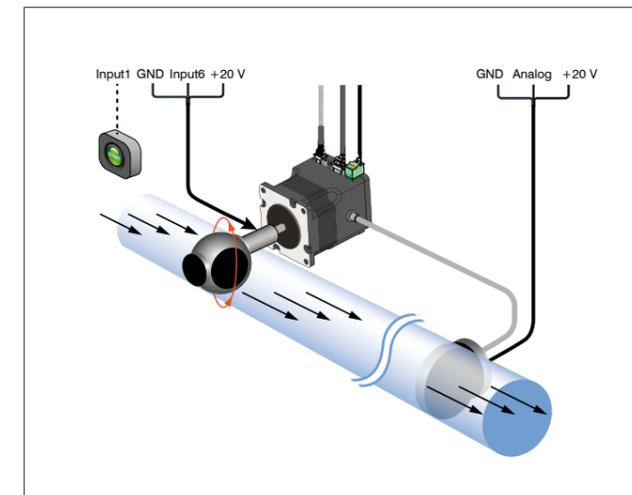
### Linear axes (for processing, assembling, etc.)



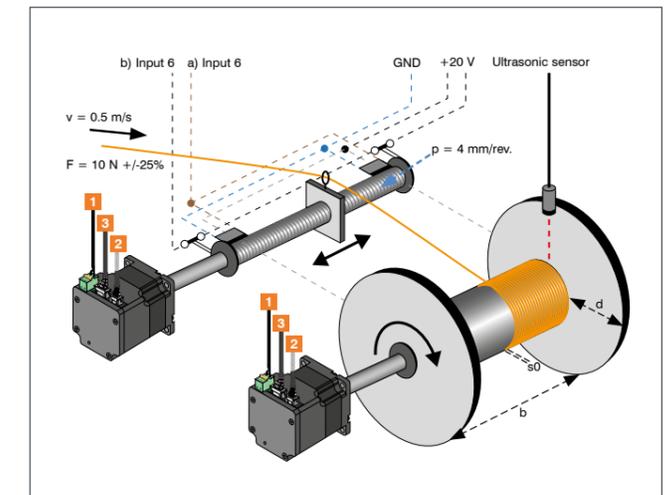
### Conveyor belts



### Decentralized flow control



### Winding and laying





# PD2-CB

Brushless DC Motor with Integrated Controller - NEMA 17



## OPTIONS



## SOFTWARE



## TECHNICAL DATA

Operating Voltage	12 VDC - 48 VDC
Number of Digital Inputs	4 - 6
Type of Digital Inputs	24 V, 5/24 V switchable
Number of Analog Inputs	1
Type of Analog Input	0-20 mA/0-10 V switchable
Digital Outputs	2 - 3
Type of Digital Output	open-drain (max. 24 V/100 mA)
Encoder	✓
Encoder Type	single-turn absolute
Encoder Resolution	1024 CPR

## VERSIONS

Type	Rated Power W	Rated Torque Ncm	Rated Current (RMS) A	Peak Current (RMS) A	Rated Speed rpm	Interface	Length mm	Weight kg
PD2-CB42C048040	105	25	3.3	10	4000	USB, IO (clock direction; analog), CANopen	123.4	0.85
PD2-CB42M024040	52.5	12.5	3.47	10.6	4000	USB, IO (clock direction; analog), CANopen	83.4	0.85

## ORDER IDENTIFIER

**PD2-CB42C048040-E-**  
 01 = USB,IO (clock direction; analog)  
 08 = CANopen



## ACCESSORIES

**ZK-MICROUSB**  
 Micro USB Cable 1.5 m  
**ZK-PD4-C-CAN-4-500-S**  
 CAN in/out Bridge 0.5m  
**Z-K4700/50** Charging Capacitor



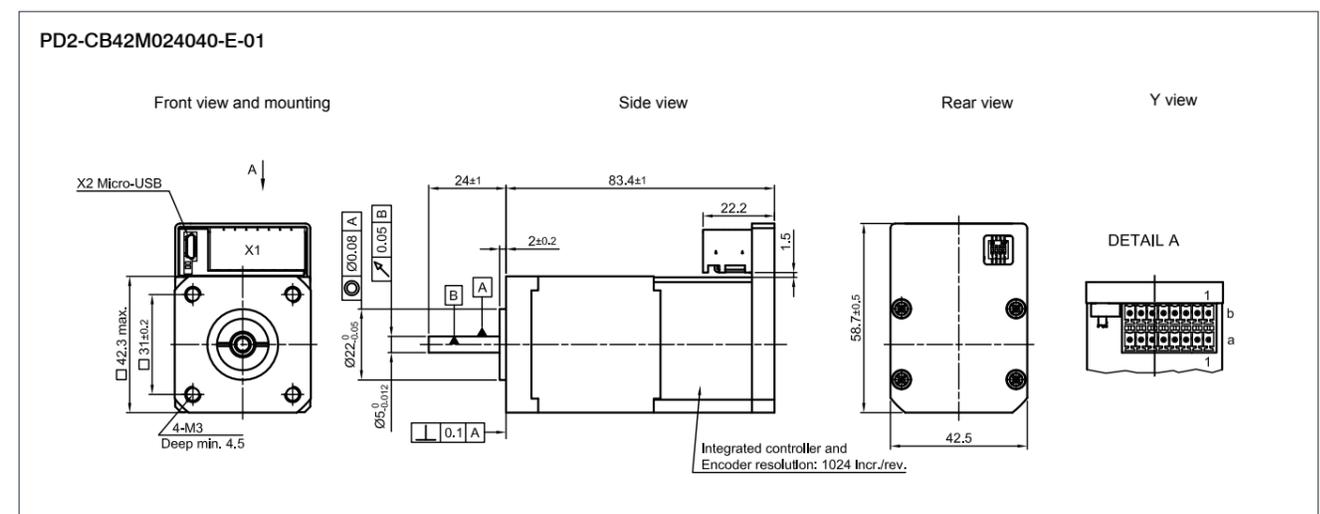
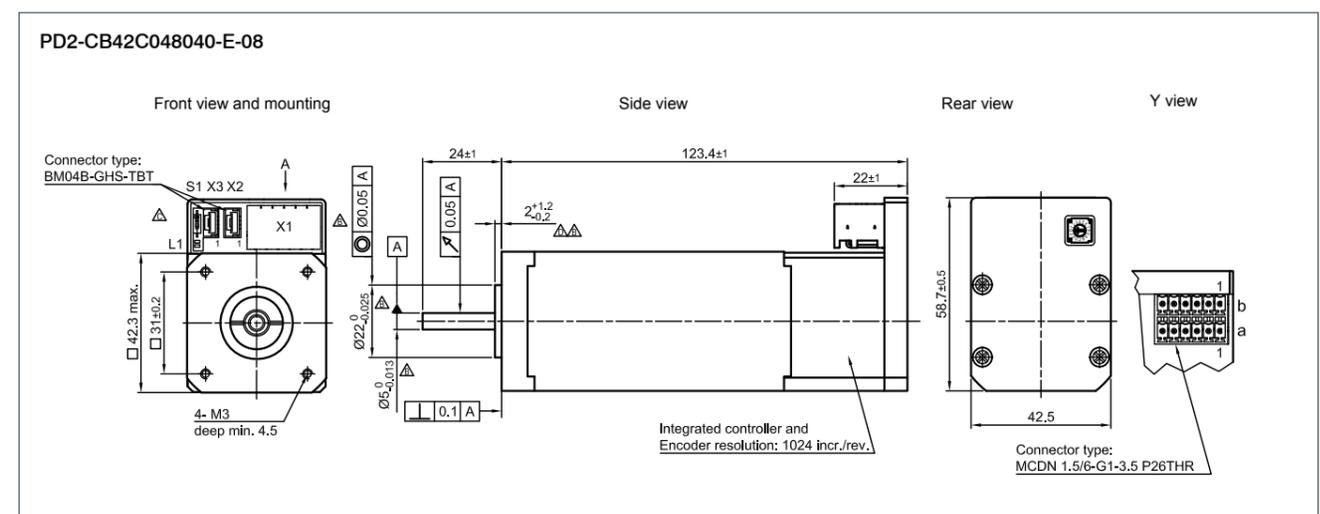
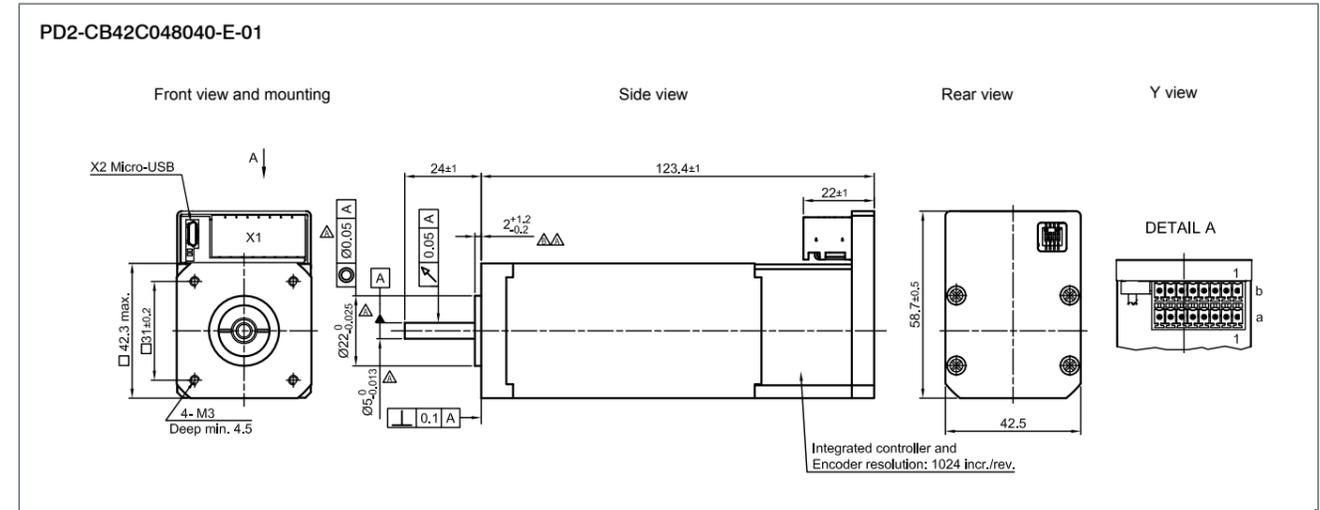
## CAUTION

We recommend using a charging capacitor of sufficient size to stabilize the operating voltage.

# PD2-CB

Brushless DC Motor with Integrated Controller - NEMA 17

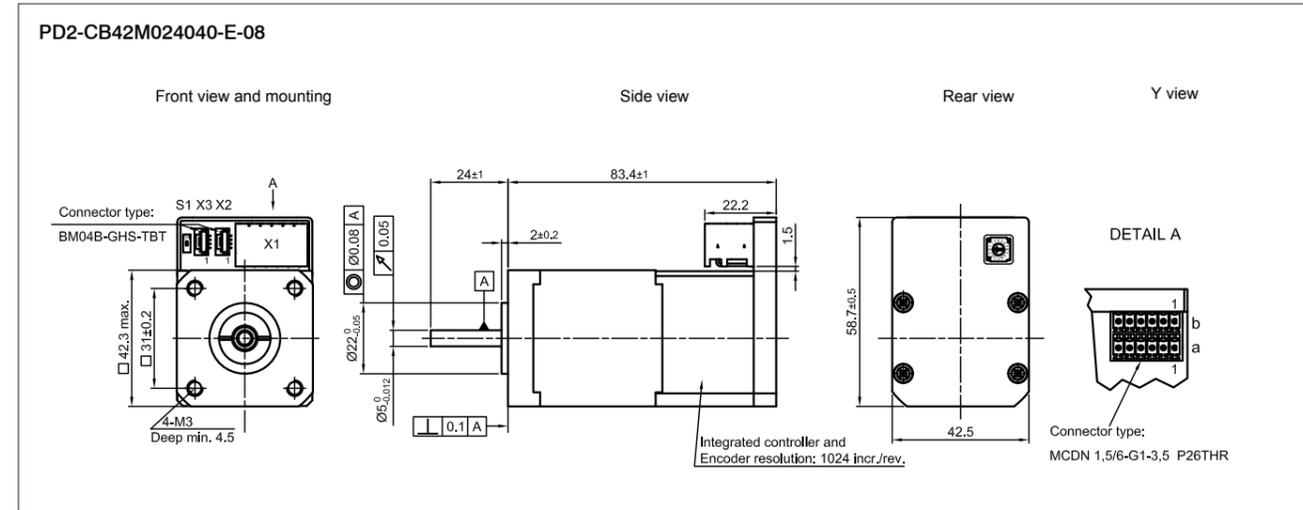
## DIMENSIONS (IN MM)



# PD2-CB

Brushless DC Motor with Integrated Controller - NEMA 17

## DIMENSIONS (IN MM)



# Notes

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# PD2-CB-IP

Brushless DC Motor with Integrated Controller in Protection Class IP65 - NEMA 17



## OPTIONS



## SOFTWARE



## TECHNICAL DATA

Operating Voltage	12 VDC - 48 VDC
Number of Digital Inputs	4 - 5
Type of Digital Inputs	24 V, 5/24 V switchable
Number of Analog Inputs	1
Type of Analog Input	0-20 mA/0-10 V switchable
Digital Outputs	2
Type of Digital Output	open-drain (max. 24 V/100 mA)
Encoder	✓
Encoder Type	single-turn absolute
Encoder Resolution	1024 CPR

## VERSIONS

Type	Rated Power W	Rated Torque Ncm	Rated Current (RMS) A	Peak Current (RMS) A	Rated Speed rpm	Interface	Length mm	Weight kg
PD2-CB42CD-E-65	105	25	3.3	10	4000	USB, IO (clock direction; analog), CANopen	123.9	0.9

## ORDER IDENTIFIER

**PD2-CB42CD-E-65-**  
01 = USB,IO (clock direction; analog)  
08 = CANopen

## ACCESSORIES

**ZK-USB** Mini USB Cable 1.5 m  
**ZK-M8-3-2M-1-AFF**  
Brake Cable straight 2m  
**ZK-M8-8-2M-1-PUR-S** IO straight 2m  
**ZK-M8-5-2M-1-PUR-S-F**  
CAN in straight 2 m  
**ZK-M8-5-2M-1-PUR-S-M**  
CAN out straight 2m  
**ZK-M12F-M8M-5-200-S**  
CAN out straight 0.2m  
**ZK-M12M-M8F-5-200-S**  
CAN in straight 0.2m  
**Z-K4700/50** Charging Capacitor

## CAUTION

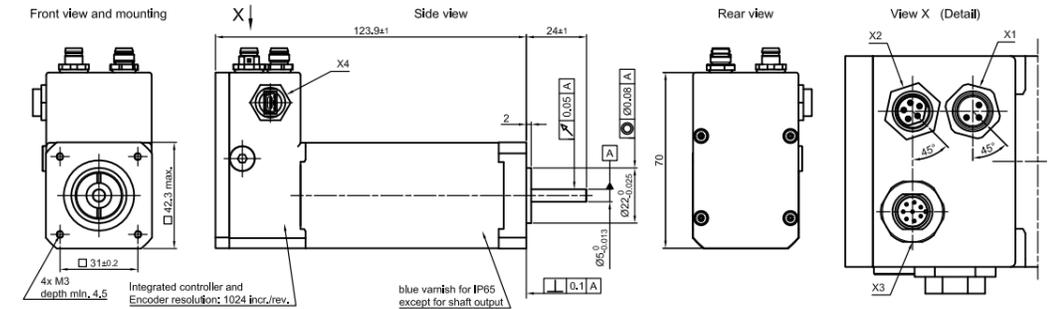
We recommend using a charging capacitor of sufficient size to stabilize the operating voltage.

# PD2-CB-IP

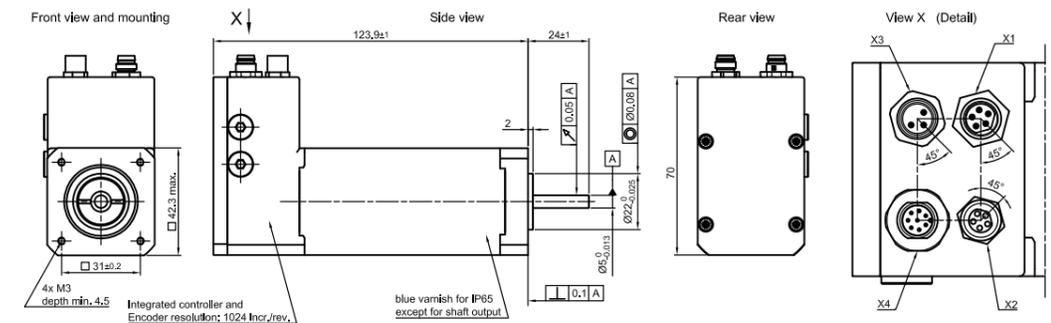
Brushless DC Motor with Integrated Controller in Protection Class IP65 - NEMA 17

## DIMENSIONS (IN MM)

### PD2-CB42CD-E-65-01



### PD2-CB42CD-E-65-08



# PD4-CB

Brushless DC Motor with Integrated Controller - NEMA 23



## OPTIONS



## SOFTWARE



## TECHNICAL DATA

Operating Voltage	12 VDC - 24 VDC
Number of Digital Inputs	4 - 6
Type of Digital Inputs	24 V, 5/24 V switchable
Number of Analog Inputs	1
Type of Analog Input	0-10 V
Digital Outputs	1 - 2
Type of Digital Output	open-drain (max. 24 V/100 mA)
Encoder	✓
Encoder Type	single-turn absolute
Encoder Resolution	1024 CPR

## VERSIONS

Type	Rated Power W	Rated Torque Ncm	Rated Current (RMS) A	Peak Current (RMS) A	Rated Speed rpm	Interface	Length mm	Weight kg
PD4-CB59M024035-E	135	37	8	20	3500	USB, IO (clock direction; analog), CANopen	95	0.9

# PD4-CB

Brushless DC Motor with Integrated Controller - NEMA 23

## ORDER IDENTIFIER

**PD4-CB59M024035-E-**  
01 = USB,IO (clock direction; analog)  
08 = CANopen

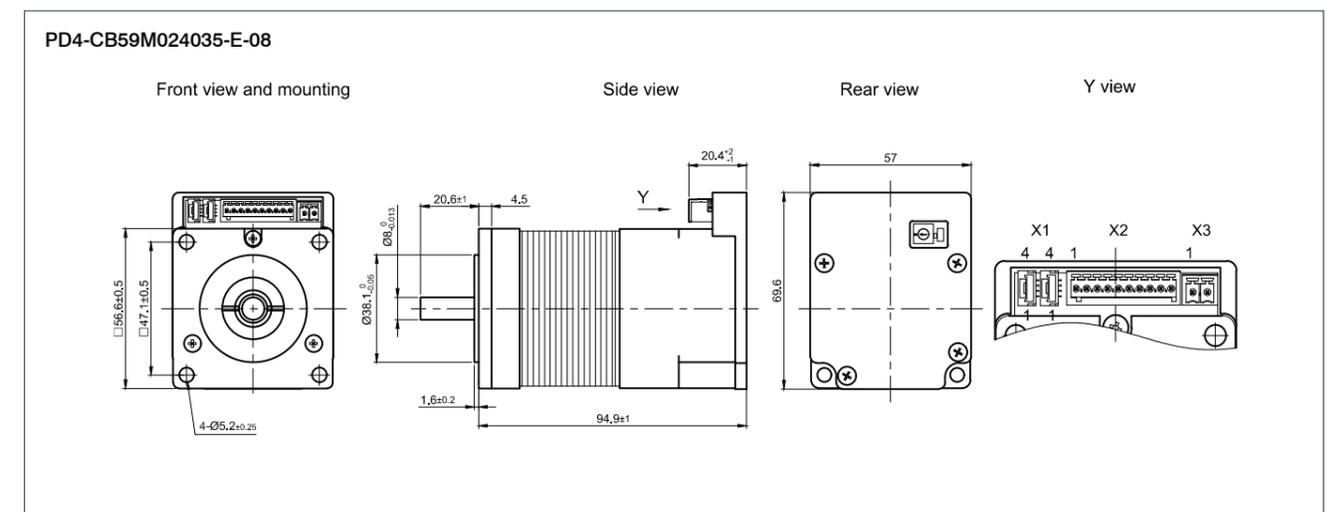
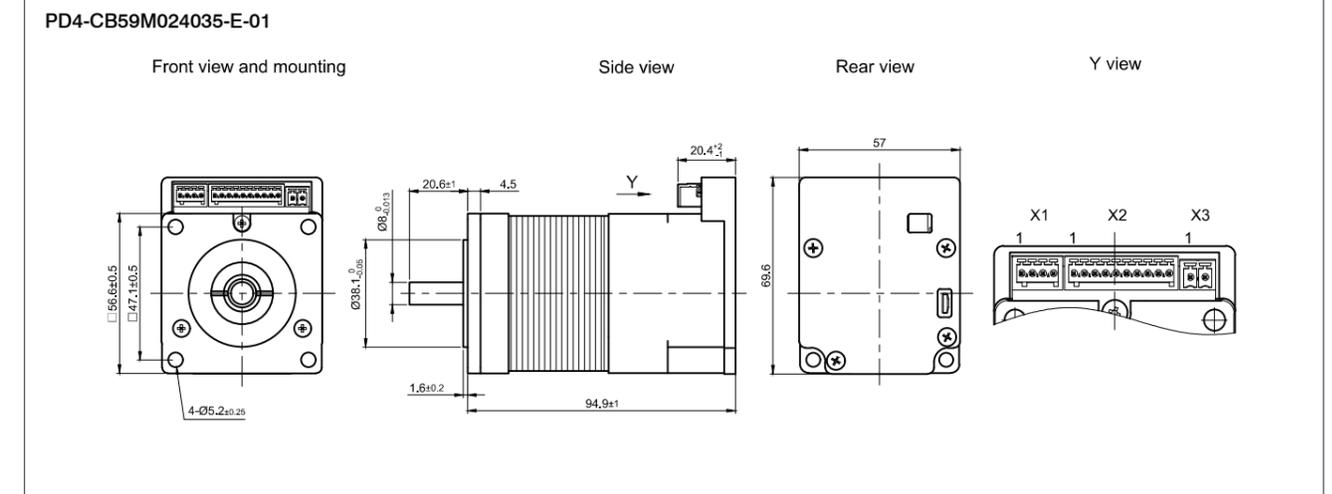
## ACCESSORIES

**ZK-MICROUSB** Micro USB Cable 1.5 m  
**ZK-PD4-C-CAN-4-500-S**  
CAN in/out Bridge 0.5m  
**Z-K4700/50** Charging Capacitor  
**IO-PD4-C-01** IO Board for PD4-C-01

## CAUTION

We recommend using a charging capacitor of sufficient size to stabilize the operating voltage.

## DIMENSIONS (IN MM)



# PD4-EB

Brushless DC Motor with Integrated Controller and Protection Class IP65 - NEMA 23



## OPTIONS



## SOFTWARE



## TECHNICAL DATA

Operating Voltage	12 VDC - 48 VDC
Number of Digital Inputs	6
Type of Digital Inputs	5/24 V switchable
Number of Analog Inputs	1
Type of Analog Input	0-20 mA/0-10 V switchable, 0-10 V
Digital Outputs	2
Type of Digital Output	open-drain (max. 24 V/100 mA)
Encoder	✓
Encoder Type	single-turn absolute, multi-turn absolute
Multiturn Resolution	18 bit
Singleturn Resolution	12 bit

## VERSIONS

Type	Rated Power W	Rated Torque Ncm	Rated Current (RMS) A	Peak Current (RMS) A	Rated Speed rpm	Interface	Length mm	Weight kg
PD4-EB59CD-E	220	60	6	18	3500	EtherCAT, CANopen, EtherNet/IP, Modbus TCP, Modbus RTU, USB, IO (clock direction; analog)	123	1.35
PD4-EB59CD-M	220	60	6	18	3500	EtherCAT, CANopen	146.5	1.45

# PD4-EB

Brushless DC Motor with Integrated Controller and Protection Class IP65 - NEMA 23

## ORDER IDENTIFIER

**PD4-EB59CD-E-65-**  
 1 = EtherCAT  
 2 = CANopen  
 3 = EtherNet/IP  
 4 = Modbus TCP  
 5 = Modbus RTU  
 7 = USB, IO (clock direction; analog)

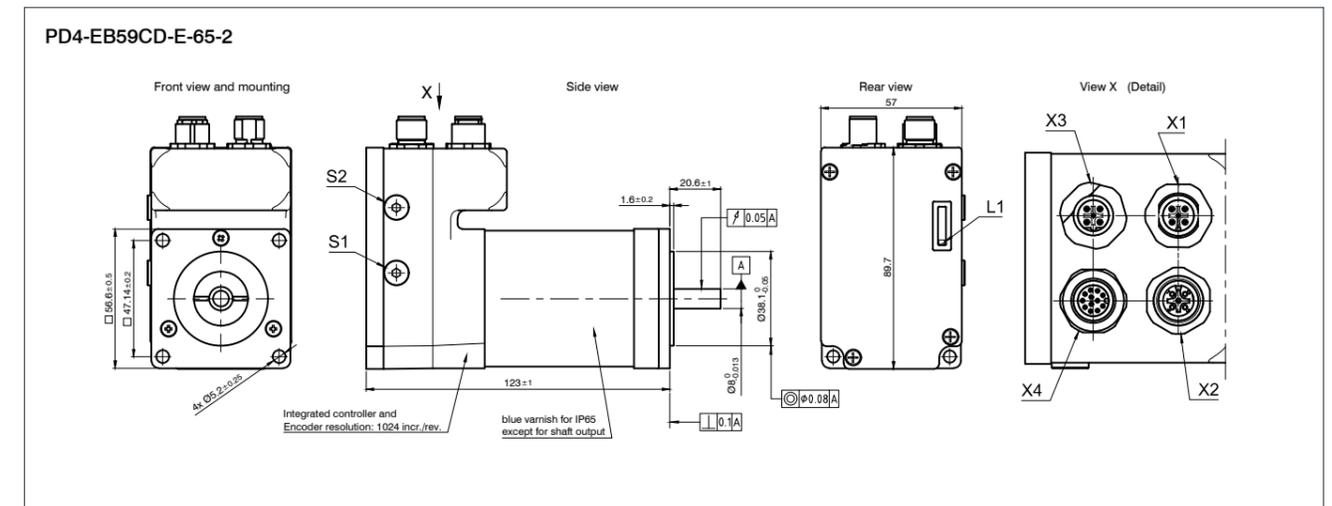
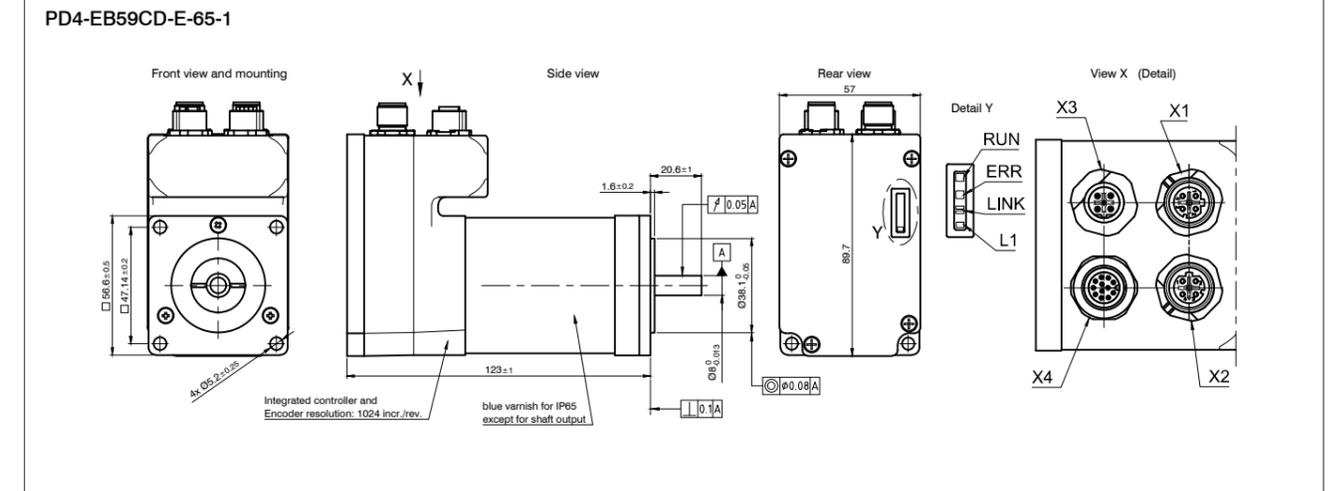
## ACCESSORIES

**ZK-USB** Mini USB Cable 1.5 m  
**ZK-M12-5-2M-1-AFF** CAN in straight 2m  
**ZK-M12-12-2M-1-AFF** IO straight 2m  
**ZK-M12-5-2M-1-B-S** Power straight 2m  
**ZK-M12-5-2M-1-A-S-M** CAN out straight 2m  
**ZK-M12-4-2M-1-D-RJ45** EtherCAT in/out straight 2m  
**ZK-M12F-M8M-5-200-S** CAN in straight 0.2m  
**ZK-M12M-M8F-5-200-S** CAN out straight 0.2m  
**ZK-M12M-M12F-5-500-S** CAN in/out straight 0.5m  
**Z-K4700/50** Charging Capacitor

## CAUTION

We recommend using a charging capacitor of sufficient size to stabilize the operating voltage.

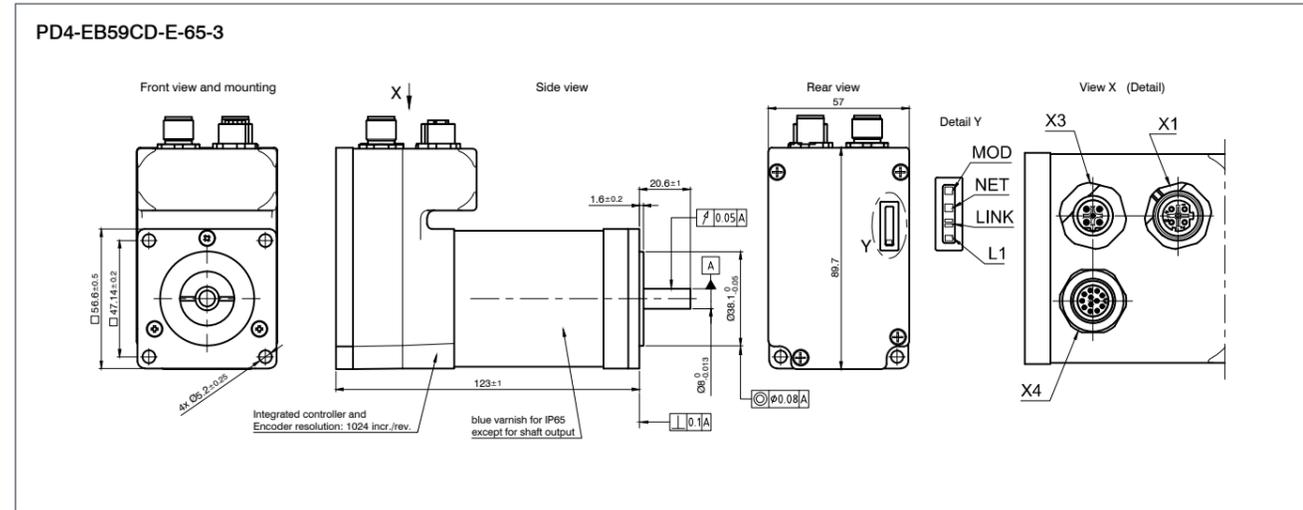
## DIMENSIONS (IN MM)



# PD4-EB

Brushless DC Motor with Integrated Controller and Protection Class IP65 - NEMA 23

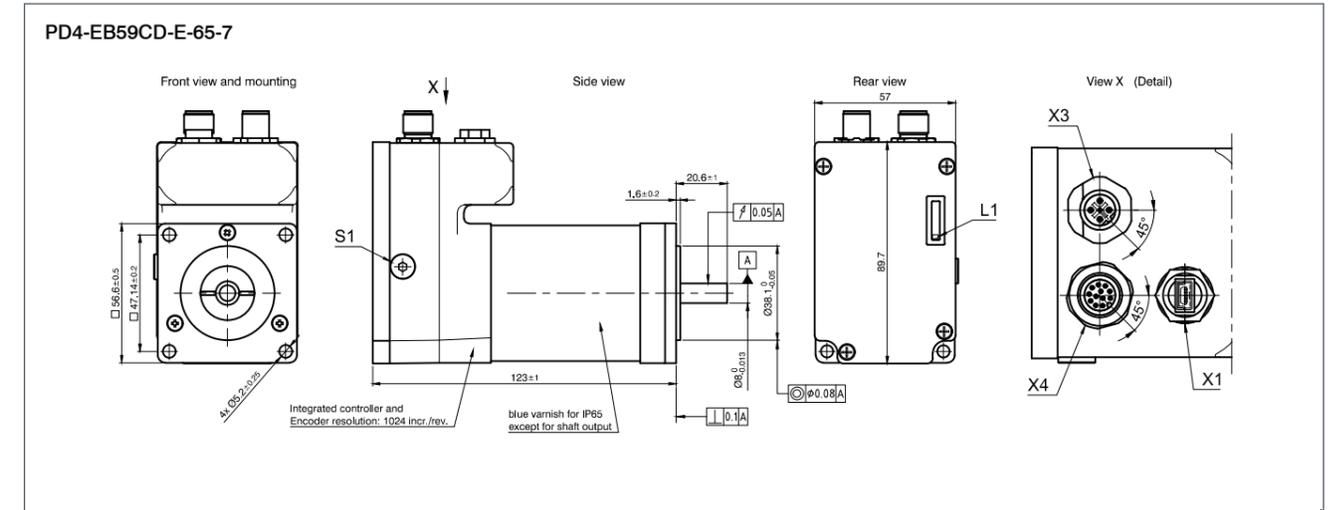
DIMENSIONS (IN MM)



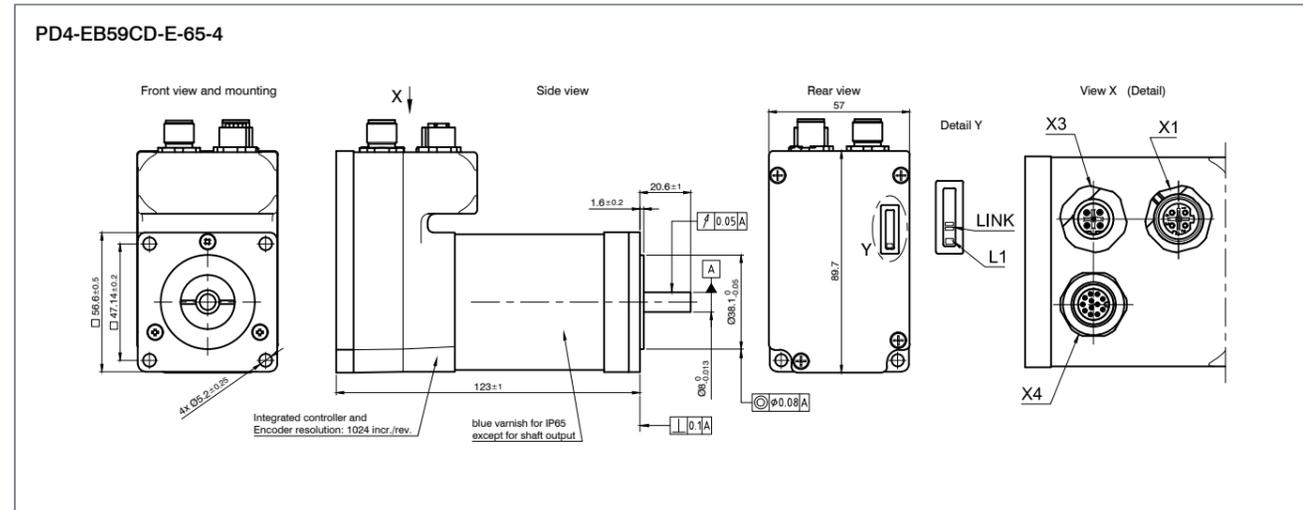
# PD4-EB

Brushless DC Motor with Integrated Controller and Protection Class IP65 - NEMA 23

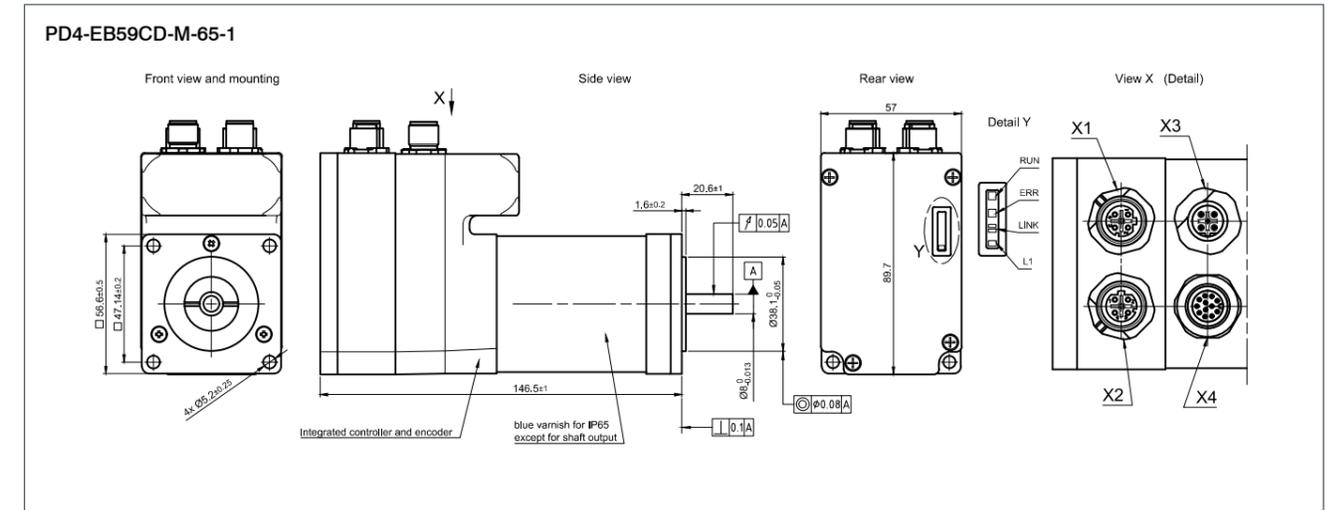
DIMENSIONS (IN MM)



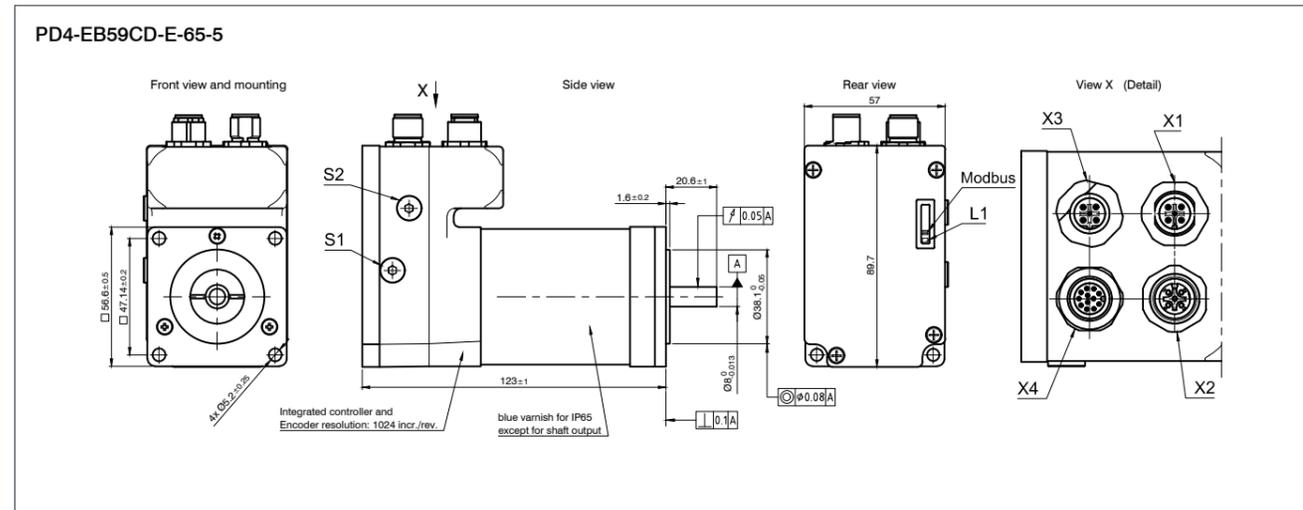
# PD4-EB59CD-E-65-4



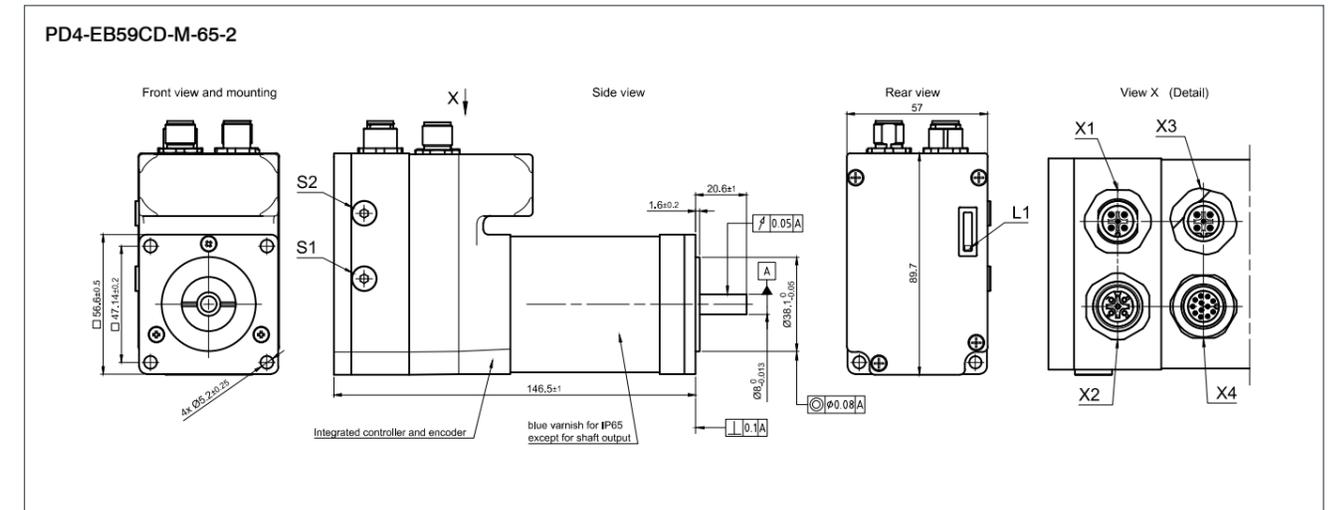
# PD4-EB59CD-M-65-1



# PD4-EB59CD-E-65-5



# PD4-EB59CD-M-65-2



# PD6-CB

Brushless DC Motor with Integrated Controller - NEMA 34 and Flange Size 80 mm



## OPTIONS



## SOFTWARE



## TECHNICAL DATA

Operating Voltage	12 VDC - 48 VDC
Number of Digital Inputs	6
Type of Digital Inputs	5/24 V switchable
Number of Analog Inputs	2
Type of Analog Input	0-20 mA/0-10 V switchable, 0-10 V
Digital Outputs	2
Type of Digital Output	open-drain (max. 24 V/100 mA)
Encoder	✓
Encoder Type	single-turn absolute
Encoder Resolution	1024 CPR

## VERSIONS

Type	Rated Power W	Rated Torque Ncm	Rated Current (RMS) A	Peak Current (RMS) A	Rated Speed rpm	Interface	Length mm	Weight kg
PD6-CB87S048030-E-09	220	70	6.25	17.95	3000	CANopen, USB, IO (clock direction; analog)	96.9	2
PD6-CB80M048030-E-09	534	170	14	40	3000	CANopen, USB, IO (clock direction; analog)	113	1.35

# PD6-CB

Brushless DC Motor with Integrated Controller - NEMA 34 and Flange Size 80 mm

## ORDER IDENTIFIER

**PD6-CB87S048030-E-09** = CANopen, USB, IO (clock direction; analog)

## ACCESSORIES

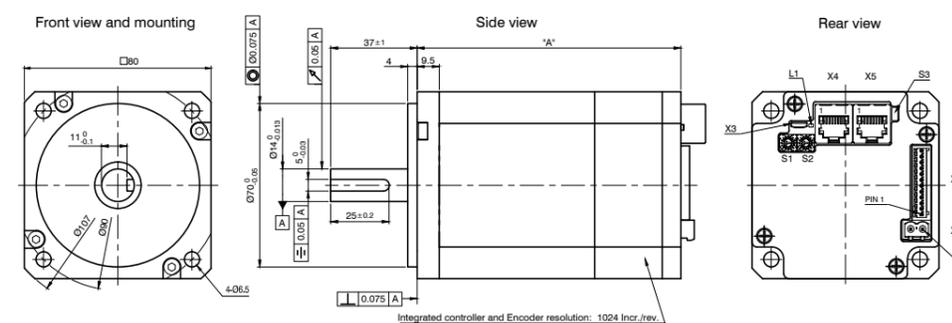
**ZK-MICROUSB** Micro USB Cable 1.5 m  
**Z-K4700/50** Charging Capacitor  
**Z-K10000/100** Charging Capacitor

## CAUTION

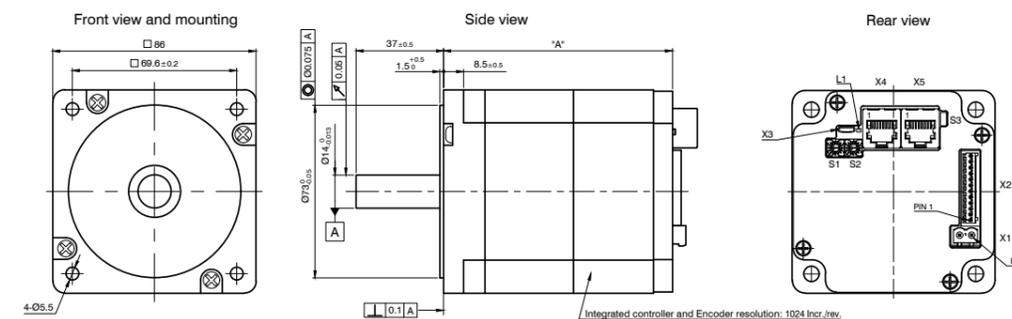
We recommend using a charging capacitor of sufficient size to stabilize the operating voltage.

## DIMENSIONS (IN MM)

### PD6-CB80xx-E-09



### PD6-CB87xx-E-09



BOHEZ concept & support NV  
Boekzitting 10  
9600 Ronse  
Belgium  
+32 55 31 31 70  
info@bohez.com  
www.bohez.com

