



Mechatronic Solutions

INNOVATE. INTEGRATE. INSPIRE.

Motors with controller

Intelligent compact drives combine motor, controller and singleturn or multiturn encoder in a space-saving package. The new **PD6** series includes a PWM brake output and supports external incremental encoders. With its 80 mm flange and a rated power of 942 W, the **PD6-EB** is the most powerful brushless DC motor of this product family. The **PD6-E** is a stepper motor with a holding torque of up to 10 Nm and an 86 mm flange (NEMA 34).



PD6-EB



PD6-E

CANopen

EtherCAT

PROFINET

EtherNet/IP

Modbus

	PD6-EB (Brushless DC motor)	PD6-E (Stepper motor)
Size	80 mm	86 mm
Rated power	283 - 940 W	-
Holding torque	-	320 - 933 Ncm
Rated torque	90 - 300 Ncm	-
Rated speed	3,000 rpm	-
Operating voltage	12 - 58 V	12 - 58 V
Digital inputs	6 (5 / 24 V switchable)	6 (5 / 24 V switchable)
Analog input	0 - 20 mA / 0 - 10 V switchable	0 - 20 mA / 0 - 10 V switchable
STO	Available soon	Available soon
Digital outputs	2 (open-drain)	2 (open-drain)
Encoder	Single-turn absolute (multi-turn optional)	Single-turn absolute (multi-turn optional)
Encoder resolution	1,024 PPR / 4,096 CPR	1,024 PPR / 4,096 CPR
Interface	USB	USB

Motors with controller

The **PD1-C** stepper motor is the newest and smallest addition to Nanotec's family of smart servos. The motor controller and encoder are already integrated. Two motor versions are available in each of the two lengths: One with protection class IP20, and one with protection class IP65.

- | Controlled by fieldbus, clock & direction or analog / digital inputs
- | Easy to parameterize via CANopen or Modbus RTU
- | Simple programming with Plug & Drive Studio
- | Closed loop with singleturn absolute encoder
- | Precise and smooth operation



IP20

IP65

	PD1-C
Motor type	Stepper motor
Size	28 mm
Holding torque	9 - 18 Ncm
Operating voltage	12 - 30 V
Digital inputs	IP65: 1, IP20: 4 (5 / 24 V switchable)
Analog input	0 - 30 V / 12 Bit
Digital outputs	IP65: 1, IP20: 2 (push-pull)
Encoder	Singleturn absolute
Encoder resolution	4,096 PPR / 16,384 CPR
Fieldbus	CANopen / Modbus RTU

High flexibility

To meet individual requirements, the **PD1-C** is also available upon request in a modular version with an open housing, which can be modified for applications with custom connectors.



CANopen

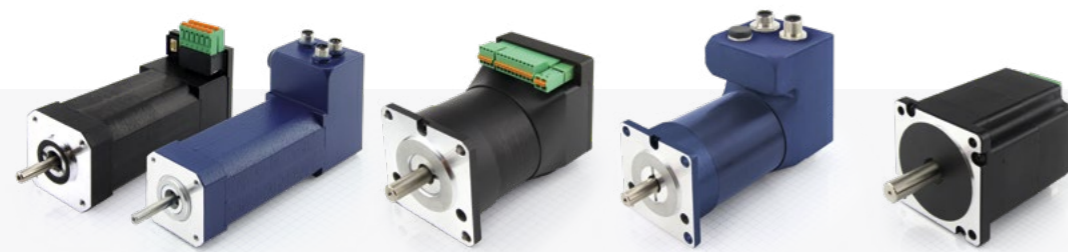
Modbus

Motors with controller

- Precise position, speed, and velocity control
- Magnetic singleturn absolute encoder
- Optionally with battery-free multiturn absolute encoder
- Simple programming with Plug & Drive Studio
- Controlled by fieldbus, clock & direction or analog input
- Fast commissioning



Stepper motors	PD2-C	PD4-C	PD4-E	PD6-C
Size	42 mm	56 / 60 mm	56 / 60 mm	86 mm
Holding torque	50 Ncm	53.7 - 354 Ncm	187 - 354 Ncm	360 - 933 Ncm
Interface	USB	USB	USB	USB
Fieldbus	CANopen	CANopen	CANopen EtherCAT EtherNet/IP Modbus TCP Modbus RTU	CANopen

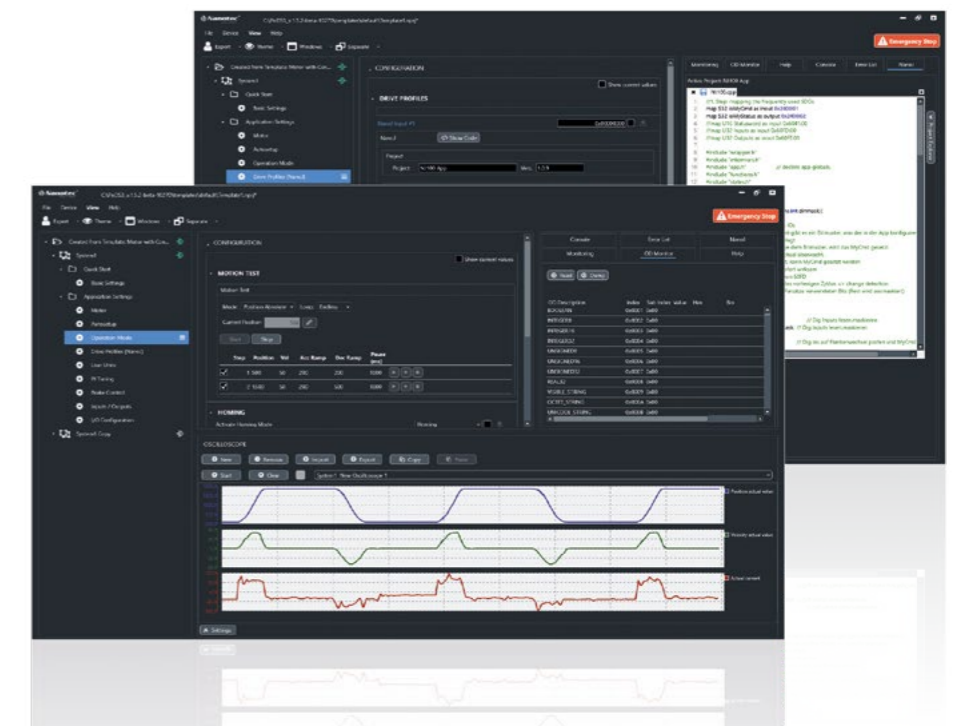


BLDC motors	PD2-CB	PD4-CB	PD4-EB	PD6-CB
Size	42 mm	56 mm	56 mm	80 / 86 mm
Rated power	105 W	135 W	220 W	534 / 220 W
Rated speed	4,000 rpm	3,500 rpm	3,500 rpm	3,000 rpm
Peak torque	up to 75 Ncm	up to 92 Ncm	up to 180 Ncm	up to 500 Ncm
Interface	-	USB	USB	USB
Fieldbus	CANopen	CANopen	CANopen EtherCAT EtherNet/IP Modbus TCP Modbus RTU	CANopen

Plug & Drive Studio

Plug & Drive Studio 3 is a free software to commission and program Nanotec's motor controllers. It features an integrated UI Designer which enables users to adapt the interface to different types of applications and user groups.

- Intuitive operating concept and user guidance
- User-friendly motor tuning through oscilloscope functions
- Quick configuration of application-specific parameters
- Effective analysis of the operating states
- Easy creation of sequence programs using the new app generator
- Integrated programming environment for NanoJ (C++ based programming)
- Supports CANopen, EtherCAT, PROFINET, Modbus RTU & TCP, and Ethernet (REST)



NanoLib – Software integration for motor controllers

The **NanoLib** software library facilitates the integration of Nanotec's motor controllers into existing software applications. It is ready to use and contains all functionalities to communicate with controllers via CANopen, EtherCAT, PROFINET, Modbus RTU & TCP, and the Ethernet (REST) protocol. NanoLib helps to control motors, update the firmware and upload NanoJ programs. The library supports the programming languages C++, C#, and Python.



High-performance controllers

The **N6** motor controller is highly versatile and available in both low-current and high-current versions. It can be easily configured via CANopen, EtherCAT, Ethernet, EtherNet/IP, Modbus RTU & TCP, and PROFINET. For applications that require the highest safety standards, all versions will soon be offered with STO and UL certification.

- | Low current: 12 - 57.6 V, 6 A rated current / 6 A peak current
- | High current: 12 - 48 V, 6 A rated current / 18 A peak current
- | Controlled by fieldbus, clock & direction or analog / digital inputs
- | Intuitive programming with Plug & Drive Studio
- | Standalone operation possible
- | Closed loop with encoder



N6	
Operating voltage	12 – 57.6 V (high und low current)
Rated current	6 A (high und low current)
Peak current	6 A (low current) 18 A (high current)
Interface	USB
Fieldbus	CANopen, EtherCAT*, EtherNet/IP*, Modbus TCP* & RTU*, PROFINET*
Inputs / outputs	6 digital inputs 3 analog inputs 3 digital outputs 3 encoder inputs (Hall, QEI, SSI) 1 brake output STO*

*coming soon

High-performance controllers



	N5	C5	C5-E
Operating voltage	12 - 72 V (low current) 12 - 48 V (high current)	12 - 48 V	12 - 48 V
Rated current	10 A (low current) 18 A (high current)	6 A	6 A (low current) 10 A (high current)
Peak current	10 A (low current) 40 A (high current)	6 A	6 A (low current) 30 A (high current)
Interface	-	USB	USB
Fieldbus	CANopen, EtherCAT, EtherNet/IP, Modbus RTU (RS485), Modbus TCP	-	CANopen, EtherCAT, EtherNet/IP, Modbus RTU (RS485), Modbus TCP
Inputs / outputs	6 digital inputs 2 analog inputs 2 digital outputs 1 encoder input 1 brake output	6 digital inputs 1 analog input 2 digital outputs	5 digital inputs 2 analog inputs 3 digital outputs 1 encoder input 1 brake output

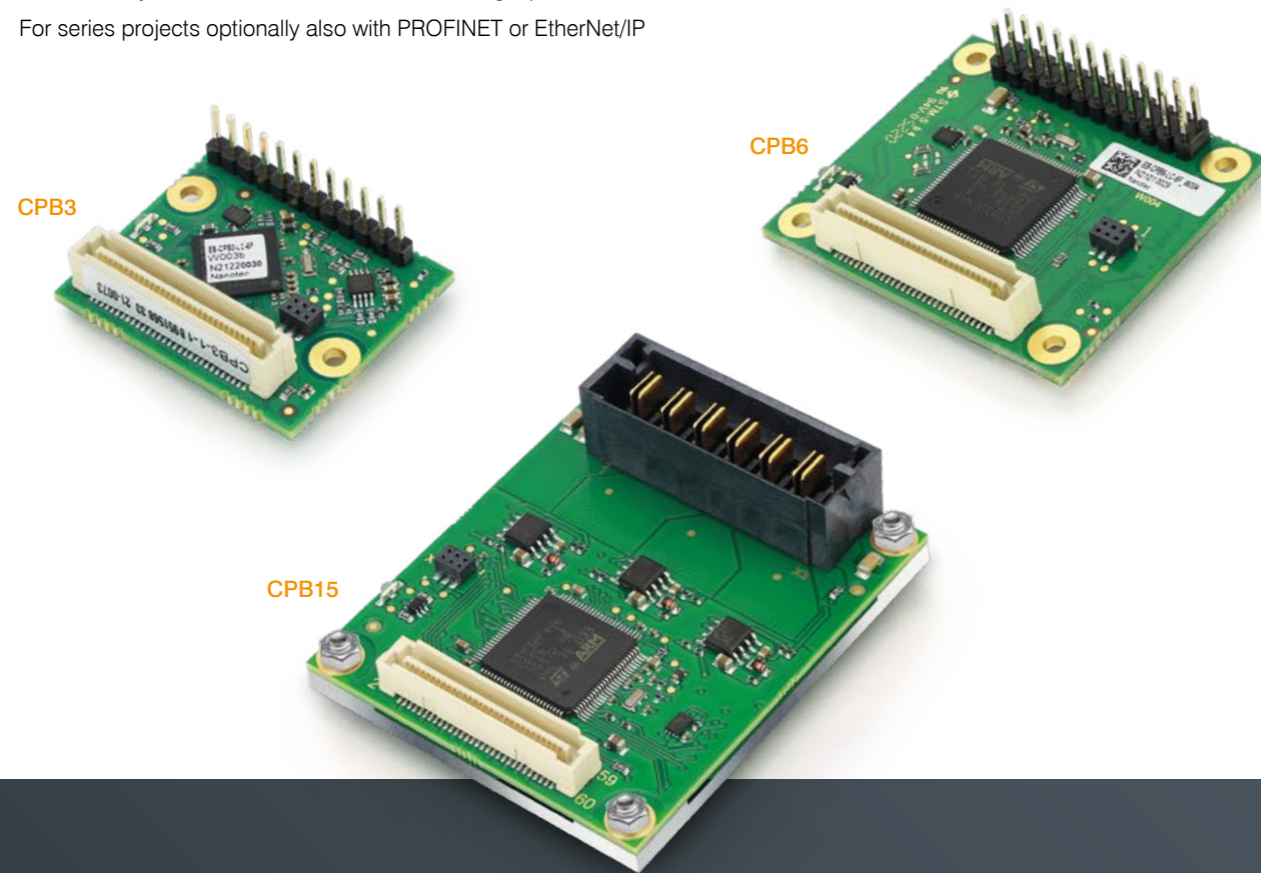


	CL3-E	CL4-E	CM-CPB3-44 (4 axes)
Operating voltage	12 - 24 V	12 - 58 V	12 - 58 V
Rated current	3 A	3 A (low current) 6 A (high current)	3 A
Peak current	3 A (low current) 6 A (high current)	6 A (low current) 18 A (high current)	3 A (low current) 9 A (high current)
Interface	USB	USB	USB
Fieldbus	CANopen, Modbus RTU (RS485, RS232)	CANopen, Modbus RTU (RS485)	EtherCAT
Inputs / outputs	5 digital inputs 2 analog inputs 3 digital outputs 1 encoder input	4 digital inputs 1 analog input 2 digital outputs 1 encoder input	4 digital inputs (per axis) 2 digital outputs (per axis) 1 analog input (per axis) 1 brake output (per axis) 2 encoder inputs (per axis)

Plug-in controllers

The **CPB** motor controllers are designed for integration in customer applications and customized boards produced in medium and high quantities. The plug-in controllers significantly reduce space and cabling requirements – an advantage that comes into full effect in multi-axis applications.

- | For brushless DC and stepper motors
- | Field-oriented control with encoder, Hall sensors or sensorless
- | Precise position, speed, and velocity control
- | CANopen, EtherCAT, EtherNet/IP, Modbus TCP, Modbus RTU (RS485)
- | Simple configuration and programming with NanoJ V2
- | Controlled by fieldbus, clock & direction or analog input
- | For series projects optionally also with PROFINET or EtherNet/IP

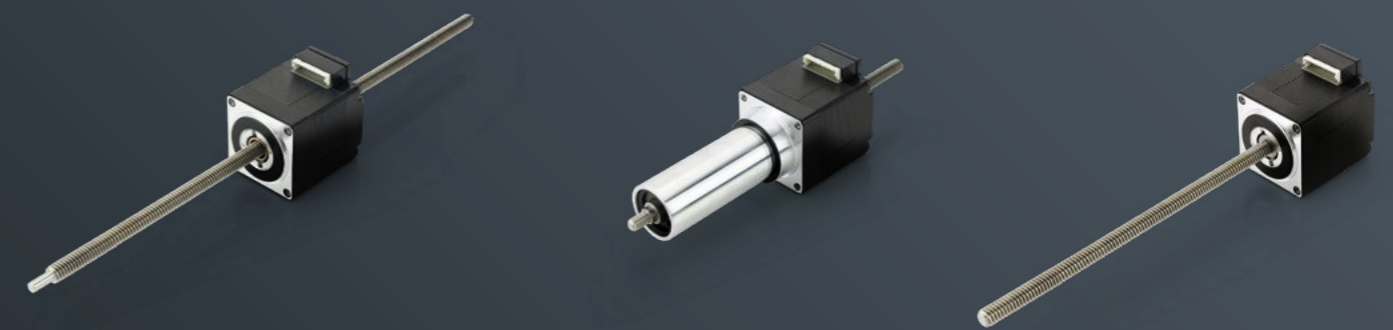


	CPB3	CPB6	CPB15
Motor type	BLDC and stepper motors	BLDC and stepper motors	BLDC motors
Operating voltage	12 - 58 V	12 - 58 V	12 - 58 V
Rated current	3 A	6 A	15 A
Peak current	9 A	18 A	45 A
Fieldbus (with external wiring)	CANopen, EtherCAT, Modbus RTU & TCP	CANopen, EtherCAT, Modbus RTU & TCP	CANopen, EtherCAT, Modbus RTU & TCP
Inputs / outputs (with external wiring)	11 digital inputs / outputs 2 analog inputs 1 brake output 2 encoder inputs	11 digital inputs / outputs 2 analog inputs 1 brake output 2 encoder inputs	11 digital inputs / outputs 2 analog inputs 1 brake output 2 encoder inputs
Dimensions	30 x 36 mm	40 x 45 mm	50 x 60 mm

Linear actuators

Nanotec's product range includes stepper motor linear actuators in three versions and six sizes. Thanks to their special stator geometry and optimized magnetic materials, the actuators generate considerably more force than comparable drives. They are complemented by matching lead screws with a large selection of leads, diameters and lengths – in standard as well as customized versions. For applications with extremely high demands in terms of service life, all lead screws are also available with DLC coating. It is made of carbon material and improves the friction characteristics, and thus increases the service life of the nuts by approx. 100%.

- | Force of up to 1,000 N
- | Max. speed of up to 244 mm/s
- | Standard leads of 0.4 to 10.16 mm
- | Different types of nuts



LA – non-captive

- | NEMA 8 to 23
- | Force: up to 1,000 N
- | Speed: up to 244 mm/s
- | Lead screw available separately

LGA – captive

- | NEMA 8 to 23
- | Stroke length: 12.7 - 63.5 mm
- | Force: up to 1,000 N
- | Speed: up to 244 mm/s

LSA – external

- | NEMA 6 to 23
- | Force: up to 1,000 N
- | Speed: up to 244 mm/s
- | Nut available separately

Mini linear actuator

The **LSA14** has a flange size of just 14 mm, making it Nanotec's smallest stepper motor linear actuator. With a resolution of up to 5 μm per step, it ensures highly precise positioning. When combined with an anti-backlash nut, backlash is completely eliminated. Capable of delivering a maximum force of 15 N, it is primarily used in medical engineering, laboratory automation, and optical technology.

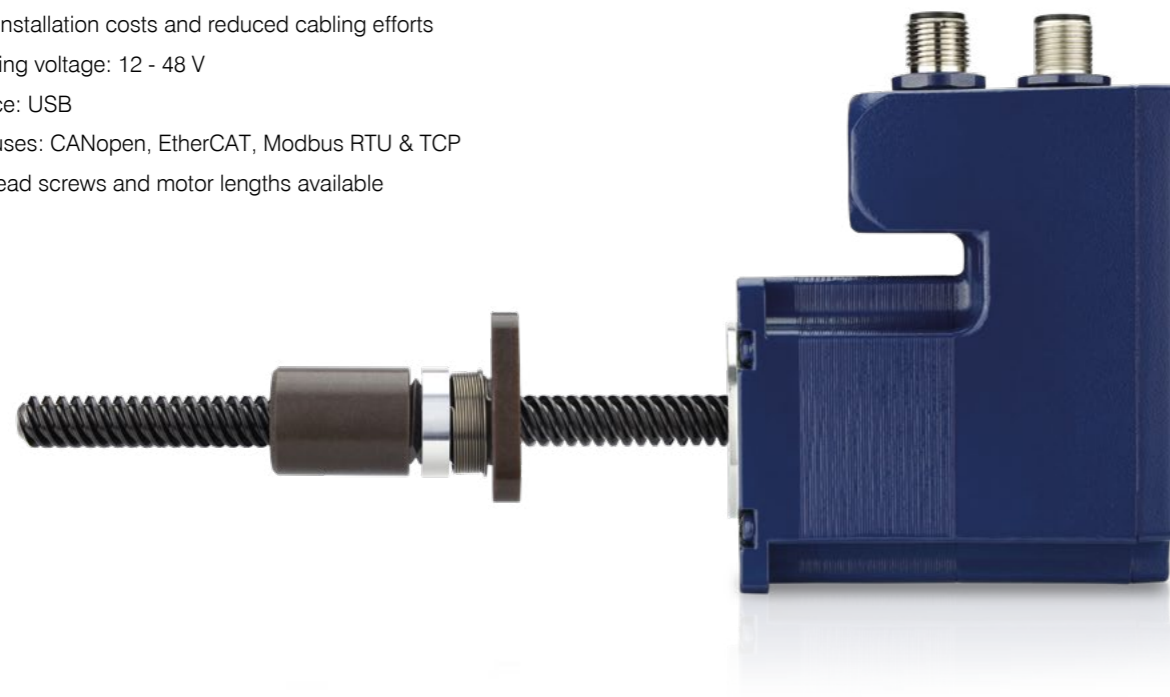
- | Extremely compact: NEMA 6
- | 3.5 mm thread diameter
- | With 1 mm or 2 mm lead
- | 1.8° step angle



Linear actuator with controller

The **PSA56** combines Nanotec's LSA56 hybrid linear actuator and the intelligent controllers of the PD4-E series. It is specially designed for demanding applications that require high repeatability. With a resolution of 1,024 PPR, the integrated magnetic singleturn absolute encoder supports field-oriented control. The lead screw is coated with carbon material to improve friction characteristics and increase the service life of the nuts.

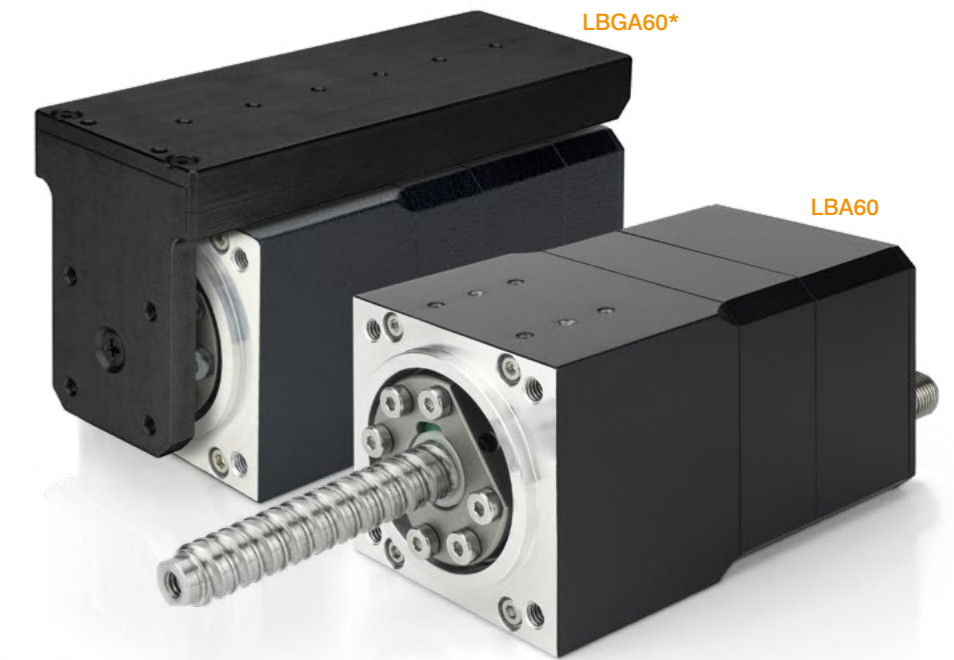
- | Easy to program
- | Robust design, protection class IP65
- | Lower installation costs and reduced cabling efforts
- | Operating voltage: 12 - 48 V
- | Interface: USB
- | Fieldbuses: CANopen, EtherCAT, Modbus RTU & TCP
- | Many lead screws and motor lengths available



BLDC linear actuators

The **LBA60** short-stroke actuator is ideal for use in adjustment units of linear systems or for controlling valves. The integrated ball screw extends the motor's service life – even when run at high speeds and loads. With a nominal voltage of 48 V, this compact linear actuator reaches a top speed of 292 mm/s. The built-in encoder ensures accurate positioning.

- | 60 mm flange
- | Nominal / max. force: 500 N / 1,500 N
- | Nominal / max. voltage: 6.2 A / 17.7 A
- | Stroke length: 55 mm
- | Encoder resolution incremental: 4,096 PPR / 16,384 CPR
- | Encoder resolution SSI: 17 Bit
- | Optionally with integrated brake



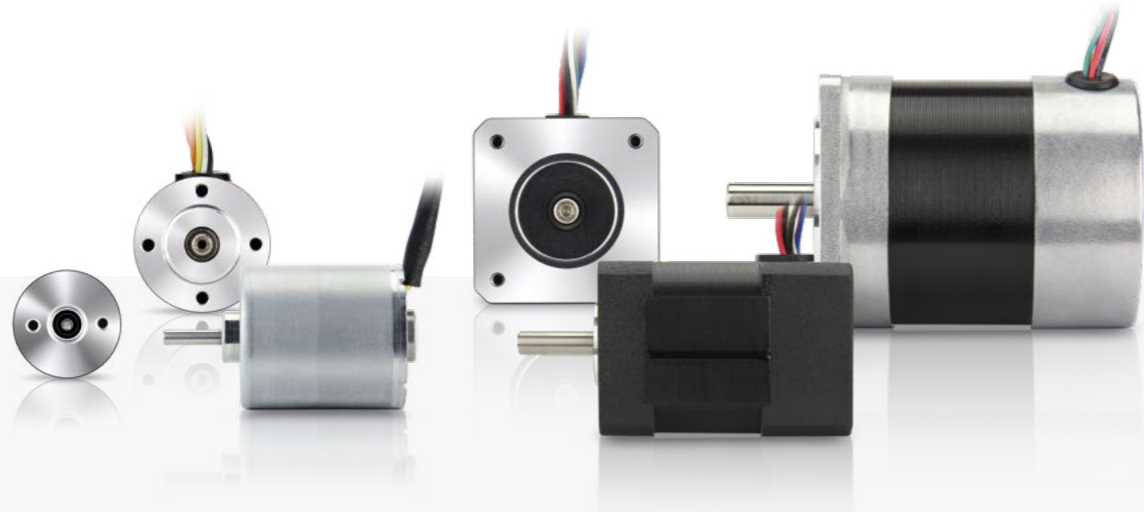
*Coming soon

Threaded nuts

Providing quiet operation and a long service life, Nanotec's standard and anti-backlash nuts are an ideal choice for high-performance motion control applications.

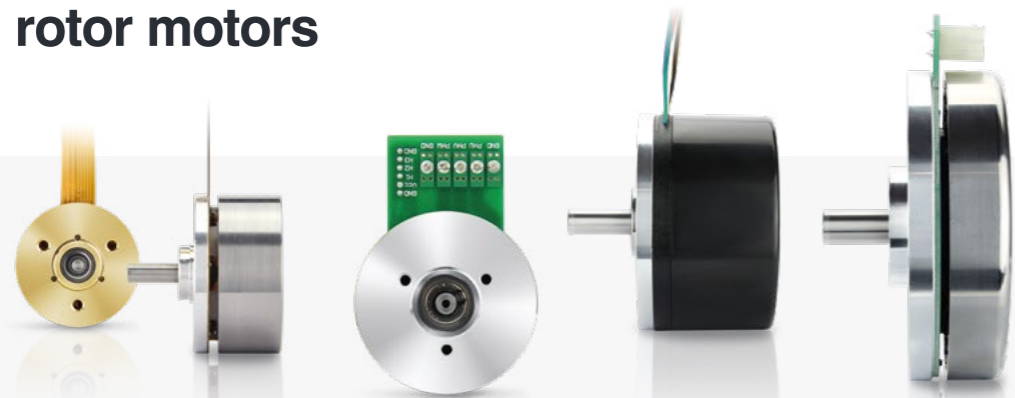


Brushless DC motors



	DB22	DB28	DBL36	DB43	DB59	DB80
Size	Ø 22 mm	Ø 28 mm	Ø 36 mm	42 mm	56 mm	80 mm
Rated voltage	24 V	15 - 24 V	24 V	24 - 48 V	24 - 48 V	48 V
Rated power	4 - 7.7 W	15 - 24 W	7.5 - 33 W	53 - 138 W	84 - 220 W	283 - 942 W
Peak torque	2.4 - 5 Ncm	1.5 - 15 Ncm	4.5 - 21 Ncm	51 - 132 Ncm	69 - 180 Ncm	250 - 850 Ncm
Rated torque	0.8 - 2.2 Ncm	0.5 - 5 Ncm	1.5 - 7 Ncm	17 - 44 Ncm	23 - 60 Ncm	90 - 300 Ncm
Rated speed	3,500 - 4,800 rpm	4,000 - 10,000 rpm	4,500 - 4,800 rpm	3,000 rpm	3,500 rpm	3,000 rpm

External rotor motors



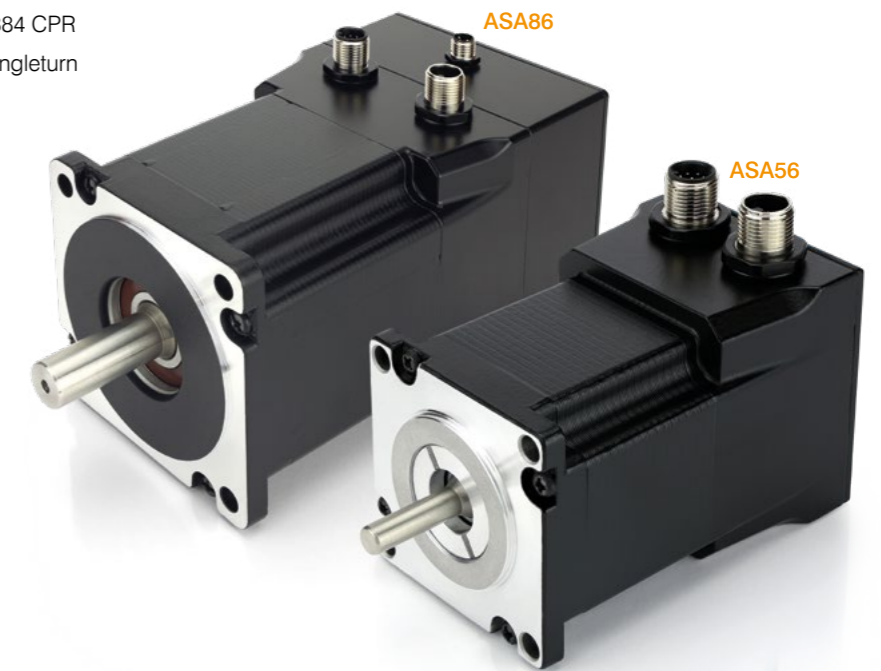
	DF20	DF32	DF45	DFA68	DFA90
Size	Ø 20 mm	Ø 32 mm	Ø 45 mm	Ø 68 mm	Ø 90 mm
Rated voltage	12 V	24 V	24 V	24 V	24 - 48 V
Rated power	5 W	7.4 W	30 - 65 W	106 - 110 W	130 - 170 W
Peak torque	1.9 Ncm	7.65 Ncm	15 - 39 Ncm	87 Ncm	150 - 300 Ncm
Rated torque	0.76 Ncm	2.55 Ncm	5 - 13 Ncm	29 Ncm	45.7 - 96.4 Ncm
Rated speed	5,170 rpm	2,760 rpm	4,840 - 5,260 rpm	3,500 - 3,700 rpm	1,670 - 2,720 rpm

DF45, DFA68 and DFA90 are also available with an integrated 3-channel encoder with a resolution of 4,096 PPR.

Stepper motors

The **ASA56** and **ASA86** are UL- / CSA-certified high-torque stepper motors rated IP65 (IP54 at the shaft output). They demonstrate high electromagnetic compatibility (EMC), making them ideal for demanding applications. The encoder is already integrated – two types are available: multiturn or incremental. Both motor series are offered in two lengths. Larger quantities can also be ordered with an integrated holding brake.

- | ASA56: Flange size NEMA 23 (56 mm), holding torque: 140 - 230 Ncm
- | ASA86: Flange size NEMA 34 (86 mm), holding torque 594 - 933 Ncm
- | Incremental resolution: 4,096 PPR / 16,384 CPR
- | SSI resolution: 16-bit multiturn / 17-bit singleturn
- | UL / CSA certification



	NEMA 6	NEMA 8	NEMA 11	NEMA 14	NEMA 17	NEMA 23	NEMA 24	NEMA 34	NEMA 42
Holding torque Ncm	0.62	1.8 - 3.6	6.1 - 18	10 - 32	9 - 80	54 - 295	106 - 400	355 - 1,202	1,170 - 2,500
Length "A" mm	30	33 - 48	31.5 - 70	30 - 56.5	22 - 70.4	41 - 98	47 - 111	65 - 156	99 - 201
Protection class	-	-	IP65	-	IP65	IP65	-	IP65	-

Nanotec stepper motors are available in various sizes and power ratings, including hybrid, flat, and hollow-shaft types, and IP65-rated versions. A wide range of gearboxes, motor controllers, encoders, and brakes offers numerous combination options. Custom modifications are also possible.

Wheel drives

The **WD** wheel drives consist of a wheel, integrated planetary gearbox and bearing in one short unit. The combination of Nanotec's wheel drives and motors results in compact systems that simplify the development and production of self-propelled systems, such as service robots or Automated Guided Vehicles (AGVs).

- | Space-saving design
- | Withstand high radial loads
- | 6 different wheel diameters
- | Few components minimize cabling effort

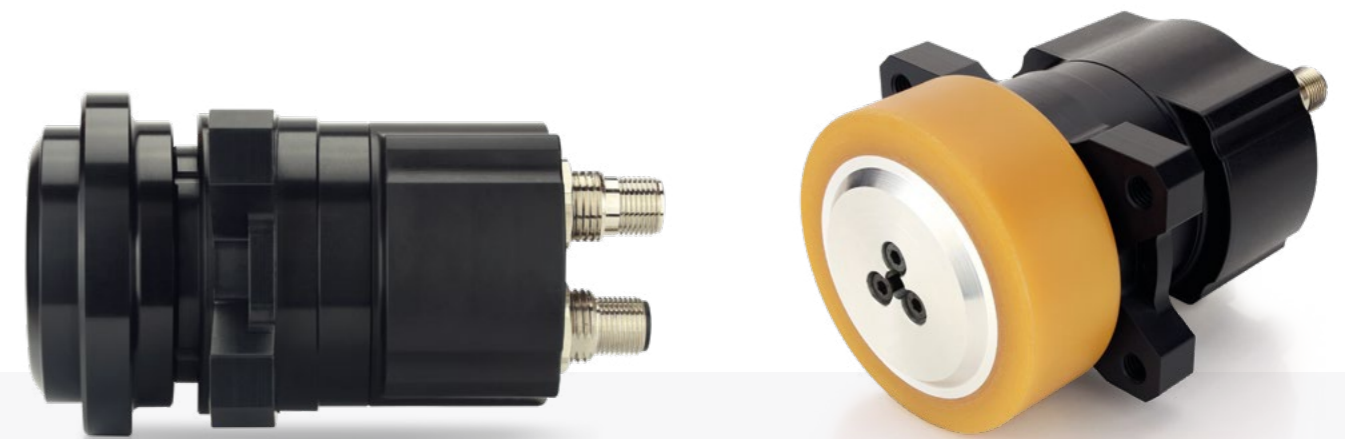
The WD wheel drives are also available with a premounted motor brake for applications that require repeated and dynamic braking.



	Ø (mm)	Height (mm)	Width (mm)	Payload (kg)	Reduction	Rated torque gearbox (Nm)	Matching motors
WD10030	100	105	30	400	16	24.6	NEMA 23/24
WD14050	140	150	50	400	11 / 16 / 20 / 26	19.2 / 24.6 / 28.6 / 29.1	NEMA 23/24 / DB80 / DFA90
WD15050	150	160	50	400	11 / 16 / 20 / 26	19.2 / 24.6 / 28.6 / 29.1	NEMA 23/24 / DB80 / DFA90
WD16050	160	170	50	400	11 / 16 / 20 / 26	19.2 / 24.6 / 28.6 / 29.1	NEMA 23/24 / DB80 / DFA90
WD18050	180	190	50	400	11 / 16 / 20 / 26	19.2 / 24.6 / 28.6 / 29.1	NEMA 23/24 / DB80 / DFA90
WD20050	200	210	50	400	11 / 16 / 20 / 26	19.2 / 24.6 / 28.6 / 29.1	NEMA 23/24 / DB80 / DFA90

Integrated wheel drives

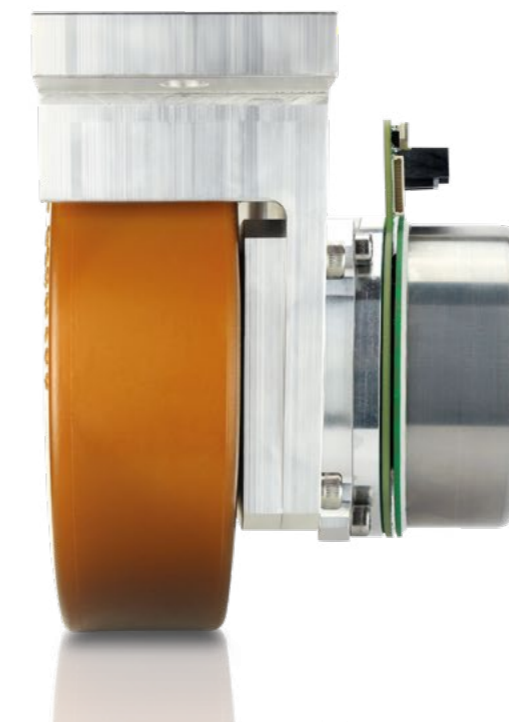
The super-compact **WD42** unit consists of a wheel, gearbox, brushless DC motor, and encoder. By integrating all components directly at the wheel, the drive has an overall length of just 103 mm. Wheel diameters range from 75 to 140 mm. The wheels can be easily changed for maintenance. Upon request, these integrated drives are also available without wheels for custom applications.



	Ø (mm)	Payload (kg)	Reduction	Rated torque (Nm)	Rated speed (m/s)
WD07530-4212	75	200	12	4.9	1.2
WD07530-4215	75	200	15	6.4	0.9
WD07530-4226	75	200	26	10.6	0.5
WD14030-4212	140	200	12	4.9	2.2
WD14030-4215	140	200	15	6.4	1.7
WD14030-4226	140	200	26	10.6	1.0

Modular wheel drives

Nanotec's DFA90 external rotor motor with integrated encoder and the 200 mm **WD** wheel drive are a perfect match. The overall installation length of this combination is 121.5 mm.



Voltage	48 V
Reduction	10.84
Diameter	200 mm
Payload	400 kg
Rated torque	9.8 Nm
Rated power	158 W

Hollow rotary tables

Equipped with a cross-shaft bearing, the **HRTA** hollow-shaft gearboxes offer high positioning accuracy, excellent runout characteristics, and a max. load capacity of 2,000 N. Combining the hollow rotary tables with a stepper motor, results in a rotary actuator that is ideally suited for use with rotary tables, end-of-arm tooling (EOAT) or pick-and-place tools.

- | For stepper motors NEMA 17, 23/24, 34
- | Rated output torque: 3.5 - 50 Nm
- | Lifetime: 20,000 h
- | Max. gear backlash: 1'
- | High efficiency



High-torque planetary gearboxes

The **GP42**, **GP56**, and **GP80** planetary gearboxes are available in one-, two- and three-stage versions with a variety of reduction ratios. They feature straight-cut hardened gears and can be ordered with either square or round flanges. Individual modifications are also possible.

- | For brushless DC and stepper motors
- | Rated torque: 1.8 - 47.85 Nm
- | Max. gear backlash of 1°
- | High efficiency
- | Reductions from 3 to 256



Encoders

Equipped with an SSI interface, the **NMM1** magnetic absolute encoder offers a resolution of 17 Bit singleturn and 16 Bit multiturn. Two shaft diameters are offered.

- | For motors with flange size NEMA 17 - 23
- | Maintenance-free, as no battery or gearbox is required
- | Robust, low-wear and insensitive to dust



The high resolution of the **NME2** encoder allows for very accurate positioning and excellent velocity control at low speeds. It is available for incremental signals as well as with an SSI interface.

- | Incremental resolution: 4,096 PPR / 16,384 CPR
- | SSI resolution: 17 Bit, single-turn absolute
- | For motors with a flange size of 42 mm or larger and a maximum shaft diameter of 15 mm

The compact **NME3** encoder is offered with both an incremental interface, including commutation signals for BLDC motors, and a serial SSI interface. It can be combined with a wide range of brushless DC motors and stepper motors starting from size NEMA 8.

- | Incremental resolution: 500 – 4,096 PPR
- | SSI resolution: 16 Bit
- | Max. speed: 30,000 U / min
- | For shaft diameters 4 mm, 5 mm and 6.35 mm



Brake chopper

The **BC72-50** brake chopper module limits the voltage in an intermediate circuit to a safe level, thus protecting all controllers in the circuit from overvoltage. The energy generated by the decelerating motor first loads the integrated buffer capacitor, then the remaining energy is converted to heat by switching it to a braking resistor.

- | Switching voltage adjustable in 1 V steps
- | Integrated brake resistor
- | Connection of an external resistor possible
- | Rated power: 20 W
- | 12 - 75 V operating voltage



Fieldbus converter

Converters enable Nanotec's motor controllers or brushless DC motors with integrated controller to exchange data with a PC.

The **ZK-USB-CAN-1** sets up a connection between the USB interface of the PC and a CANopen interface. The **ZK-USB-RS485-1** connects the PC and the RS485 communication interface of the controller.



Company



Whether standard or custom solutions, Nanotec offers tailor-made motion control systems for applications that require maximum precision, reliability, and functionality. Since 1991 we have been developing and marketing a broad range of products for automation systems, laboratory automation, medical engineering, the packaging industry, and semiconductor manufacturing.

With the development of our first motor with integrated controller, we set a milestone which played an important role in the company's growth. Still today, Nanotec focuses heavily on research and development to create drive solutions that closely meet the requirements of our business partners.

We support customers all over the world with our facilities in Feldkirchen and ChangZhou, the R&D teams in Germany and Bulgaria and our sales office in Auburn, Massachusetts.

Training at your site

Are you interested in a training program that is exactly tailored to your company? We'd be happy to discuss the learning objectives with you and address your business needs at your site.

Your advantages

- | Flexible – you choose date, location and topic
- | Customized – we tailor the training program to your needs
- | Effective – your staff will be brought up to the same knowledge level
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