Nanotec®
PLUG & DRIVE

New Products 2018/2019

INTELLIGENT COMPACTDRIVES

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Motors with integrated controller

For applications that require precise position, speed, and torque control, Nanotec offers motors with integrated controller in three different sizes. Both the brushless DC motors and the stepper motors feature field-oriented control (FOC) by means of a magnetic, single-turn absolute encoder and can be controlled via fieldbus, I/O, clock/direction or analog input. Integration and set-up are simplified by the *Plug & Drive Studio* – a software made available by Nanotec free of charge.

Stepper motors	**PD2-C**	**PD4-C**	**PD6-C**
Size	42 mm	56/60 mm	86 mm
Operating voltage	12 - 48 V	12 - 48 V	12 - 48 V
Holding torque	Up to 0.5 Nm	1 - 3.5 Nm	Up to 8.8 Nm
Interfaces	CANopen, USB	CANopen, USB	CANopen, USB

Brushless DC motors	**PD2-CB**	**PD4-CB**	**PD6-CB87S/CB80M**
Size	42 mm	56 mm	86/80 mm
Operating voltage	12 - 48 V	12 - 24 V	12 - 48 V
Holding torque	105 W	135 W	220 W/534 W
Interfaces	CANopen, USB	CANopen, USB	CANopen, USB

More options, more flexibility: PD4-E/EB

Motor	■ Stepper motor with flange size 56 or 60 mm, rated torque of up to 3.5 Nm ■ Brushless DC motor with flange size 56 mm, rated power of up to 220 W
Encoder	■ Magnetic, single-turn absolute encoder with 12-bit resolution ■ Optional battery-free, multi-turn absolute encoder with 12-bit single-turn and 18-bit multi-turn resolution
Fieldbuses	■ CANopen, EtherCAT, Ethernet/IP, Modbus RTU, Modbus TCP, USB
Brake	■ Optional integrated holding brake
Inputs and outputs	■ 6 digital inputs, switchable 5/24 V, 1 analog input, switchable 0 - 10 V/0 - 20 mA ■ 3 digital outputs

CANopen EtherCAT EtherNet/IP Modbus USB

Programmable motor controllers/drives

- For brushless DC and stepper motors
- Field-oriented control with encoder, Hall sensors or sensorless
- Precise position, velocity, and torque control
- Quick parameterization and easy to program with *Plug & Drive Studio*
- Controlled by fieldbus, step & direction or analog input

	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)
Encoder input	✓	-	✓
Brake output	✓	-	✓
Interfaces	CANopen, EtherCAT, Ethernet/IP, Modbus RTU	USB	CANopen, EtherCAT, Ethernet/IP, Modbus RTU (RS485), Modbus TCP, USB
Inputs/outputs	6 digital inputs 2 analog inputs 2 digital outputs	3 differential inputs 3 digital inputs 1 analog input 2 digital outputs	5 digital inputs 2 analog inputs 3 digital outputs

	CL3-E	**CL4-E**	**NP5**
Operating voltage	12 - 24 V	12 - 58 V	12 - 48 V
Rated current	3 A	3 A (low current) 6 A (high current)	6 A
Peak current	3 A (low current) 6 A (high current)	6 A (low current) 18 A (high current)	10 A
Encoder input	✓	✓	✓
Interfaces	CANopen, Modbus RTU (RS485, RS232), USB	CANopen, Modbus RTU, USB	1x12C, 2x SPI, CANopen, EtherCAT, Modbus RTU, (external wiring required)
Inputs/outputs	5 digital inputs 2 analog inputs 3 digital outputs	1 encoder output 4 digital inputs 1 analog input 2 digital outputs	2 encoder inputs 7 digital inputs/outputs 2 A/D converters 1 brake output

CANopen EtherCAT EtherNet/IP Modbus USB

Easy and quick programming

Plug&Drive Studio

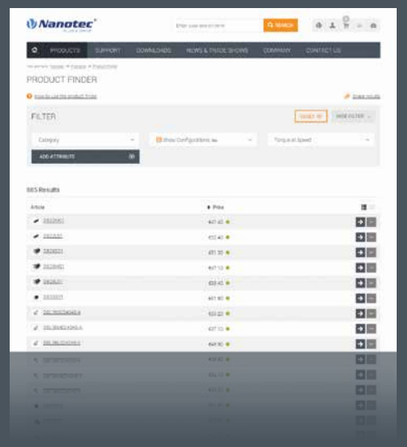
For setting up and programming its motor controllers, Nanotec offers the *Plug & Drive Studio*. Setup is made easy thanks to several operating modes. The user can select and configure a mode using tabs. Intuitive menu navigation reduces the number of entries required by the user to just a few parameters, resulting in short setup times. At the same time, the controller can be configured via the object directory. Predefined filters can be used to display parts of the complete CiA 402 objects specific to a given task.

An integrated oscilloscope, which can be used to simultaneously display up to eight different objects with a resolution of up to one millisecond, is available for tuning the control parameters. Oscilloscope settings are predefined for standard tuning. Because all functions of the *Plug & Drive Studio* can run simultaneously, the object dictionary and the oscilloscope can be used to understand the behavior of the controller during program execution. As a result, customer-specific functions can be programmed easily and quickly.

For the programming of our controllers, we developed *NanoJ V2*, a C++ based programming language in which the user program runs in a so-called “sandbox”, which is executed in a fixed cycle of 1 ms. The settings and state values of the controller can thereby be read after every cycle. Therefore the user can not only respond to changes with a just few lines of code, but can also solve complex technical requirements. Because operation is possible in parallel with fieldbus communication, time-critical tasks can also be processed directly in the controller.

An integrated development environment is available for programming, consisting of a source editor with automatic code completion, compiler and debugger. The debugger supports the setting of breakpoints in the program and allows the content of variables to be read out at these breakpoints.

The firmware can be updated via CAN, USB and Ethernet. In addition, fieldbus communication can be logged directly, simplifying troubleshooting.



Find the right product

Whether a standard product or customer-specific solution, at Nanotec you’ll find a drive system perfectly matched to your application. Our motors, controllers, linear actuators, gearboxes, brakes and encoders form a modular system with more than 100,000 possible combinations.

The Product Finder at www.nanotec.com will help you to quickly and easily find the right product for your application. Simply select a product category, set the necessary technical data, and a selection of all suitable products is displayed – if desired in combination with encoders, brakes or gearboxes.

AGV drive platform NATHAN

Tailored to the requirements of service robotics, Nanotec offers wheel drives with fieldbus interface as well as a modular drive platform for automated guided vehicles (AGVs) that is ideally suited for the prototyping of autonomous mobile systems. All robotics components from Nanotec are designed for simple integration and can be expanded as required.

- Expandable, upgradable, highly flexible
- Max. load capacity of up to 100 kg
- Max. speed of 1 m/s²
- Differential drive with two wheel drives
- Communication via Ethernet and CANopen (master)
- Rated voltage of 24 V DC

Controller

The freely programmable controller EM5 with CANopen master serves as an interface to ROS and Ethernet. Diagnostic information, such as the battery level or the debugging output, can be called up via the touch screen.

Wheel drive

The wheel drive consists of the brushless DC motor PD4-E with integrated controller and CANopen interface, a GPLEP70 planetary gearbox and a mounting flange. The motors are connected to the CANopen master of the EM5 and are controlled in real time.

New gearboxes

Nanotec has developed two new series of versatile planetary gearboxes in the sizes 42 and 56 mm to replace the GPLL economy gearboxes. Both the GP42 as well as the GP56 gearbox are offered in one- and two-stage versions as well as with mounting flanges for all compatible motor series from Nanotec. Through the simulation-based toothing design, a significantly higher torque is achieved than with gearboxes of comparable design. Due to their modular design, they can be quickly and easily adapted to individual customer requirements. In addition to the standard variant with 12 mm shaft, the GP56 series is also available in a variant with 14 mm shaft diameter. To increase the efficiency and service life under increased axial and radial loads, both gearboxes are also available with reinforced output bearings as well as planetary gears on needle bearings.

	GP42-S1	**GP42-S2**	**GP56-S1**	**GP56-S2**
Reductions	4/5/7/9	15/46	3/7/10	11/16/62
Rated torque	1.8 - 8.6 Nm	6.2 - 9.0 Nm	4.3 - 19.8 Nm	17.5 - 23.5 Nm
Max. gear backlash	1°	1°	1°	1°

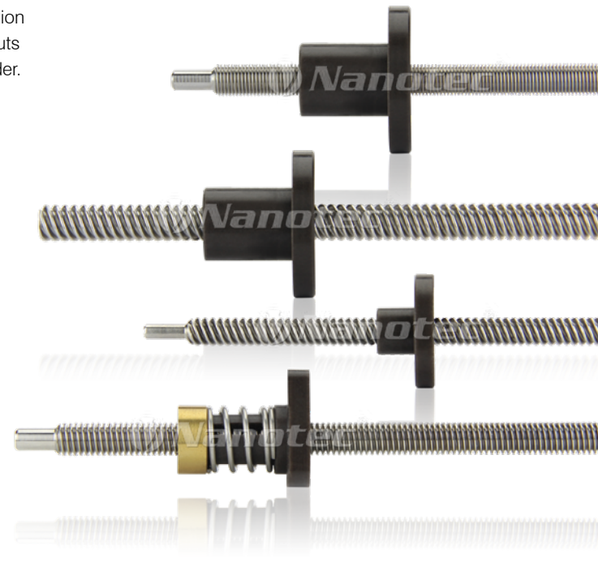
Brushless DC motors

	DF32	**DBL36**	**DF45**	**DB41**	**DB43**	**DB80**
Size	Ø 32 mm	Ø 36 mm	Ø 43 mm	42 mm/NEMA 17	42 mm/NEMA 17	80 x 80 mm
Rated voltage	24 V	24 V	24 V	24 V	24 - 48 V	48 V
Rated power	7.4 W	7.5 - 33 W	30 - 65 W	22 - 113 W	53 - 138 W	283 - 942 W
Peak torque	0.076 Nm	0.045 - 0.21 Nm	0.15 - 0.39 Nm	0.24 - 1.2 Nm	0.51 - 1.32 Nm	2.5 - 8.5 Nm
Rated torque	0.025 Nm	0.015 - 0.70 Nm	0.05 - 0.13 Nm	0.07 - 0.36 Nm	0.17 - 0.44 Nm	0.9 - 3 Nm
Rated speed	2,760 rpm	4,800 rpm	4,840 - 5,260 rpm	3,000 rpm	3,000 rpm	3,000 rpm

Linear actuators

The linear actuators from Nanotec are available in five sizes, from 20 mm to 56 mm (NEMA 8 to NEMA 23) and in three versions: captive, non-captive and as external linear actuator. They are offered with both trapezoidal and ACME thread, in various lengths and with different windings. The electrical connection is made via an integrated connector. The use of optimized plastics for the nuts ensures a long service life. All series are also optionally available with encoder.

- Max. speed of up to 120 mm/s
- Standard and customized lengths
- Lead screw diameter of 3.5 to 10 mm
- Screw leads of 0.61 to 6.35 mm
- Standard and pre-loaded nuts



LA (non-captive)	Size	Thrust	Lead
LA20	20 mm	46 N	1 mm
LA28	28 mm	50 - 210 N	0.635 - 5.08 mm
LA42	42 mm	152 - 258 N	2 - 6.35 mm

LSA (external)			
LSA20	20 mm	46 N	1 mm
LSA28	28 mm	50 - 210 N	0.635 - 5.08 mm
LSA42	42 mm	152 - 369 N	2 - 6.35 mm

LGA (captive)			
LGA20	20 mm	46 N	1 mm
LGA28	28 mm	50 - 210 N	0.635 - 5.08 mm
LGA42	42 mm	152 - 275 N	6.35 mm