

BRUSHLESS MOTORS WITH INTEGRAL CONTROL

dcmind
BRUSHLESS
MOTORS



ABOUT CROUZET

The Motion product line provides innovative engineering expertise, high quality service and a complete offer of standard direct drives, geared motors and motion control solutions for applications where performance is key. Our ability to customize solutions as per virtually any customers' request makes us the right partner to tackle the most demanding projects.

Crouzet is a brand of InnoVista Sensors™.

With a long-term commitment to technological excellence, the engineering teams have mastered the following core technologies and know-how:

- › Electromagnetism
- › Thermal dynamics
- › Electromechanical systems
- › Electronic drives

Covering the power range from 1 to 1000 W peak (1/100 to 1HP+) and available with spur, worm or planetary gearboxes, plus adapted controllers, our offer is specifically designed for access control systems, pumps and valves, railway applications, electrical equipment, medical equipment and the industry.

INNOVISTA SENSORS

InnoVista Sensors™ is a worldwide industrial specialist of sensors, controllers and actuators for automated systems.

Through its brands, Crouzet and Systron Donner Inertial, InnoVista Sensors™ offers a wide range of reliable, efficient and customizable components dedicated to the Aerospace & Defense, Transportation and Industrial markets and segments.

Thanks to the recognized expertise of its teams and a strong innovation policy, InnoVista Sensors™ brings performance enhancing solutions to its customers worldwide.

InnoVista Sensors™: your trusted partner of choice to face industrial challenges of today and tomorrow.

www.innovistasensors.com

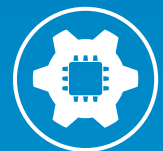
Designs & Manufactures



Sensors



Controls



Actuators

For



Aerospace
& Defense



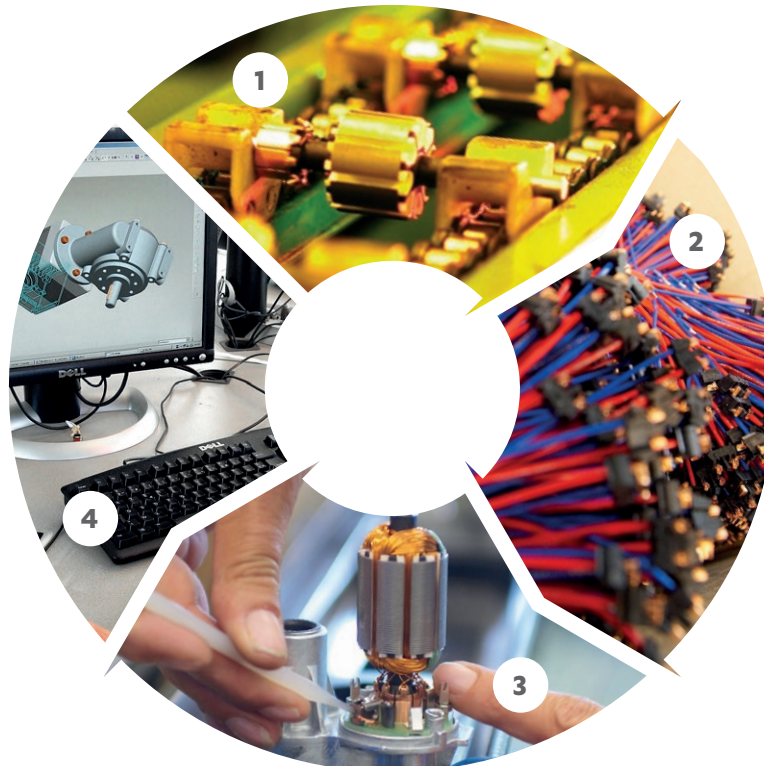
Transportation



Industry

ADAPTATION WHEEL

To meet market expectations and provide customers with the right solutions within the shortest timeframes, Crouzet has structured its processes around the different types of product available: standard products, adapted products or products specially developed for a customer.
Introducing the adaptation wheel...



1 STANDARD PRODUCTS

Sales service

A full range of motors, geared motors and associated controllers. You can create your automation control applications as quickly as possible

2 PRODUCTS WITH ADDED VALUE

Customer Adaptation Centre

All our standard products can have additional factory-mounted auxiliaries or accessories: connectors, leads, special terminals, customized shafts, adaptor plates, etc. Seamless integration in your equipment means you benefit from simpler logistics and optimum installation reliability.

3 ADAPTED PRODUCTS

Customer Adaptation Centre

Defined in coordination between your project teams and our specialists, these adapted products have exactly the right levels of performance and functionality you need for your applications.

4 SPECIAL PRODUCTS

Engineers and teams Dedicated project

From the very start of a project, Crouzet' experts work closely with your teams to develop the specification. All our design, industrialization and approval expertise goes into developing Motion Control solutions that are tailored to your requirements.

DCmind BRUSHLESS

Crouzet, a specialist in customized motorization solutions, now presents its latest generation of High Performance Brushless motors with integrated electronics TNi21 and SMi21.

A pioneer on the European market in 2002 with the Motomate, a Brushless motor with integrated electronics incorporating an intuitive visual programming interface, Crouzet is blazing a new trail for compact standalone applications.

Crouzet, a company continually evolving to meet customer needs, has upgraded its ranges with accessories, gearboxes, part numbers and now, thanks to these electronic devices, has enhanced the performance of its products with:

- › more power
- › more accuracy
- › more functions
- › simplicity of use and ease of integration.

TWO ELECTRONIC PILOT CONTROL DEVICES

- › The TNi21 for simpler applications, dedicated to speed and torque control.
- › The SMi21, dedicated to motion control for applications that require accuracy. Thanks to a 4096-point encoder, it offers all the following control functions: position, torque, speed, direction, braking, etc.

THE MOTOR'S INTEGRATED ELECTRONICS ALLOW YOU TO:

PRODUCT ADVANTAGES

- › **Easy and accurate** control thanks to an optimized control loop
- › Improved **safety** with internal thermal protection
- › **Safe, reliable operation** as a result of its excellent EMC characteristics, due to the shortest possible wiring and shielding with a metal cover

USER ADVANTAGES

- › **Save time and improve reliability** due to less wiring and fewer connections.
- › **Control the logistic problem** better with fewer part numbers to manage
- › **Save space** thanks to a more compact solution

BRAKING AND HOLDING

With or without failsafe holding brake (active braking is performed by the motor electronics).

CONTROL

- › TNi21: 4 inputs and 3 outputs, torque and speed control on analog inputs with 10-bit resolution.
- › SMi21: 6 inputs and 4 outputs, the motor has a wide selection of programs which can be set via a PC (position, speed and torque) and can reach as many as 65,000 positions.

POWER SUPPLY

Single supply voltage needed across the whole voltage range:

- › TNi21 (10 - 36 VDC)
- › SMi21 (9 - 56 VDC)

COMMUNICATING

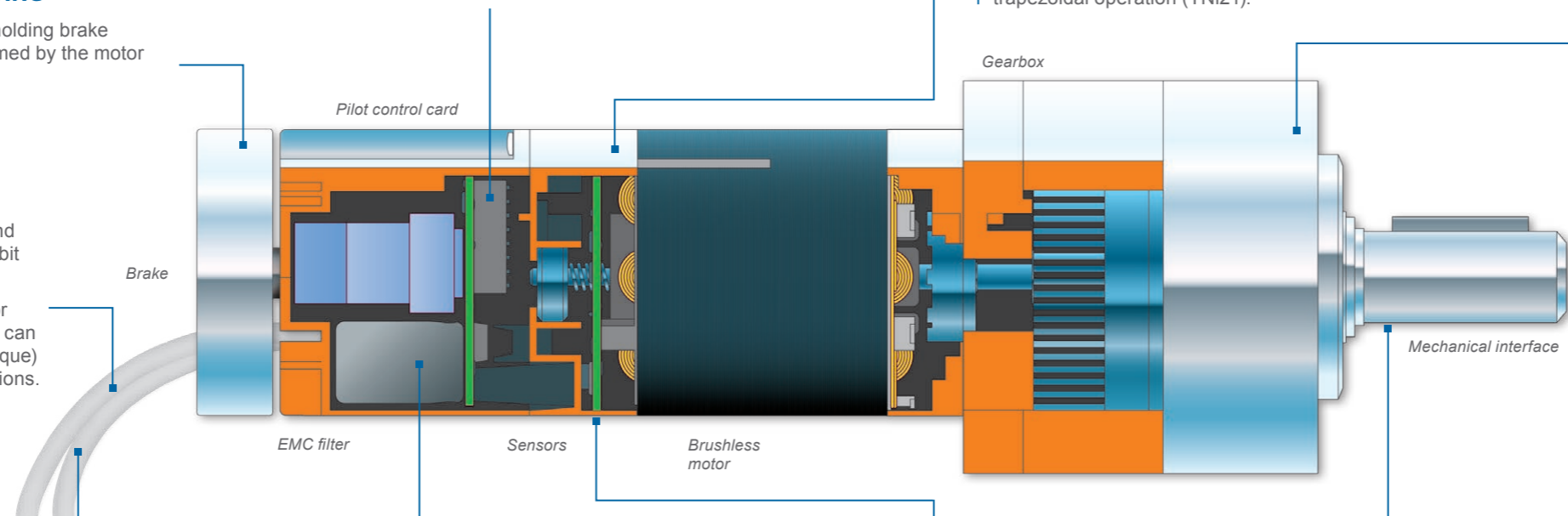
- › A micro-USB socket on the motor (SMi21) can be used to link this directly to a PC.
- › Option CANopen in addition available.

PILOT CONTROL

Motor pilot control card for operation in 4 quadrants, sine operation (SMi21) or trapezoidal operation (TNi21).

GEARBOXES

Using Crouzet gearboxes, the motor speed and torque can be adapted to your applications from 0.01 to 4000 rpm and 0.1 to 120 Nm (0.9 to 1062 in-lbs).



FILTERING AND PROTECTING

- › Short-circuits, undervoltages
- › EMC (received and transmitted)
- › Temperature
- › Mechanical (vibrations, shocks, etc.)

SENSING

3 Hall effects for identifying the rotor position.
SMi21: plus 1 encoder (4096 pulses per motor revolution) for precision of regulation and sinusoidal power supply to the coils.

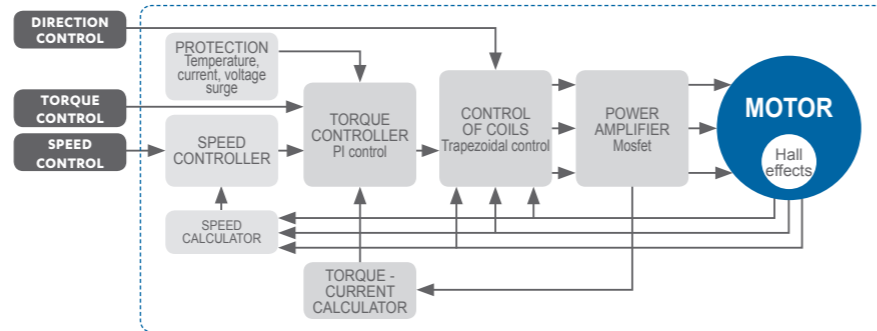
INTEGRATION

Crouzet adapts the mechanical interfaces of its solutions for perfect integration in your equipment: fixing plate, transmission shafts, special pinions.

INTEGRATED ELECTRONICS

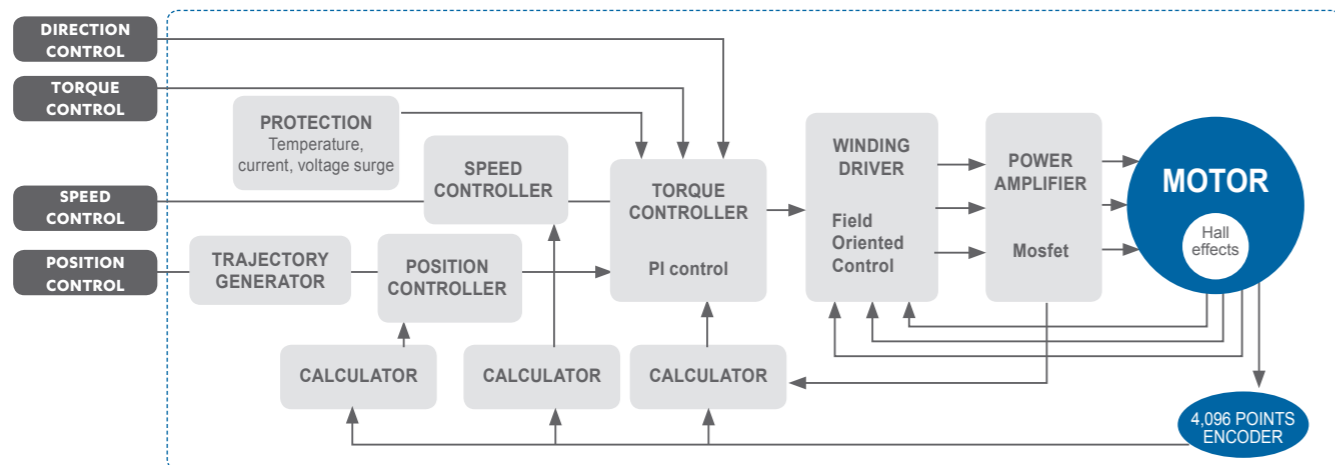
TNi21 SPEED AND TORQUE CONTROL:

- › 4 inputs, 3 outputs.
- › 2 x 10-bit analog inputs for fine-tuned speed and torque control.
- › 4 rejective quadrants.
- › Use on its own or in combination with other motors or controlled by a PLC.
- › Can be used in production immediately (without setup stage).
- › Also suitable for a 12 V or 24 V battery power supply (voltage range between 10 and 36 volts).



SMi21 POSITION, SPEED AND TORQUE CONTROL:

- › 6 inputs and 4 outputs, 2 of which are 10-bit analog inputs.
- › Intuitive, easy-to-use setup software - with application mode for quick start-up.
- › Very flexible thanks to the various programs on offer. All the parameters are adjustable and can be used to optimise application operation.
- › Also suitable for a 12 V, 24 V or 48 V battery power supply (voltage range between 9 and 56 volts).
- › Low power consumption when idling (1 W).
- › Rotor position controlled with 4096-point encoder and use of sinusoidal vector control.
- › Reprogramming and re-use of motors as required by changing the application program or by modifying the configuration.
- › Firmware updating made easier with the "bootloader" function.
- › Use on its own, in combination with other motors or controlled by a PLC.
- › Also available with CANopen communication bus.



THE RANGE

| MOTOR TYPE | Nominal usable power at 24 VDC | Max. usable power | TYPE OF GEARBOX | | | | |
|------------|--------------------------------|-------------------|-------------------|-------------------|--------------------|---------------------|--------------|
| | | | P52 25 Nm max. | P62 50 Nm max. | P81 120 Nm max. | RAD10 10 Nm max. | |
| 80140 | TNi21 | 77 W | 150 W | 801495 TNi21 | 801496 TNi21 | - | 801410 TNi21 |
| | SMi21 | 92 W | 184 W | 801495 SMi21 | 801496 SMi21 | - | 801410 SMi21 |
| | SMi21 CANOPEN | 92 W | 184 W | * | * | - | * |
| 80180 | TNi21 | 100 W | 211 W | - | 801896 TNi21 | 801897 TNi21 | 801810 TNi21 |
| | SMi21 | 105 W | 314 W | - | 801896 SMi21 | 801897 SMi21 | 801810 SMi21 |
| | SMi21 CANOPEN | 105 W | 314 W | - | * | * | * |
| 80280 | TNi21 | 133 W | 251 W | - | - | 802897 TNi21 | 802810 TNi21 |
| | SMi21 | 170 W | 419 W | - | - | 802897 SMi21 | 802810 SMi21 |
| | SMi21 CANOPEN | 170 W | 419 W | - | - | * | * |

*On request

Nominal power ratings may vary according to the supply voltage. Maximum power ratings are given for the maximum permissible motor voltage. Example: the 80 280 SMi21 motor develops peak mechanical power of 419 W at 48 VDC.

OPTIONS AND ACCESSORIES

TNi21

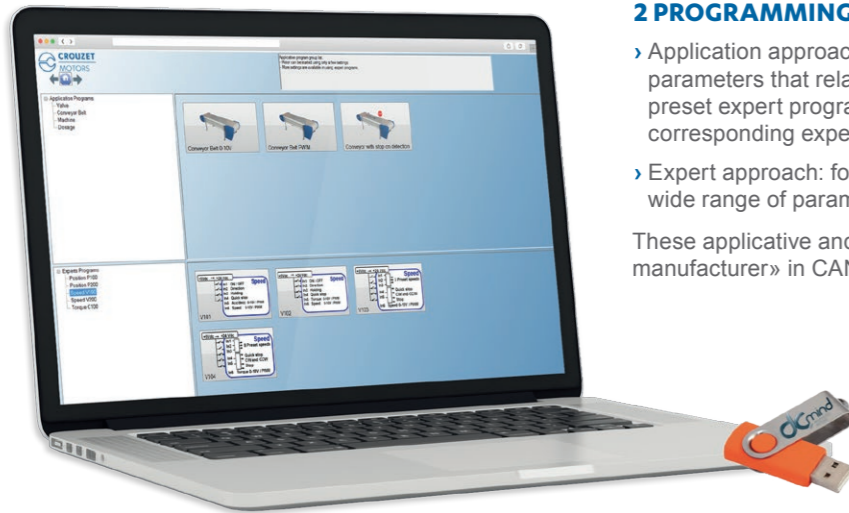
- › Motors available with or without mechanical brake for holding at breaking current.
- › Supplied with 1 control cable and a power supply cable or with a M16 12-pin connector output including all the connections (motors 80140 and 80180).
- › Accessory, shielded cable and 12-pin M16 connector.

SMi21

- › Motors available with or without mechanical brake for holding at breaking current.
- › Requires a standard commercially-available USB/ micro-USB cable and the setup software. This can be downloaded free of charge from the Crouzet website or ordered in the form of a "starter kit".

SMi21: DCmind SOFT SIMPLIFIED PROGRAMMING

www.crouzet-motors.com



SIMPLE AND INTUITIVE SOFTWARE

Available in several languages, with multiple possible uses, at any level of performance.

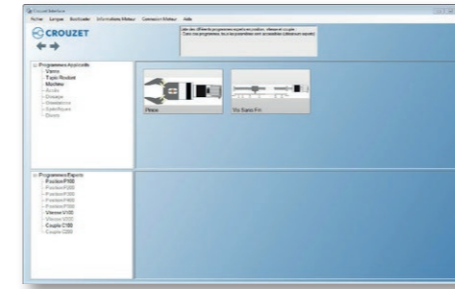
2 PROGRAMMING MODES

- › Application approach: Select an application template, then set only those parameters that relate directly to your application. These programs use preset expert programs. You can fine-tune these settings by calling up the corresponding expert program.
- › Expert approach: for automation system programs and settings covering a wide range of parameters.

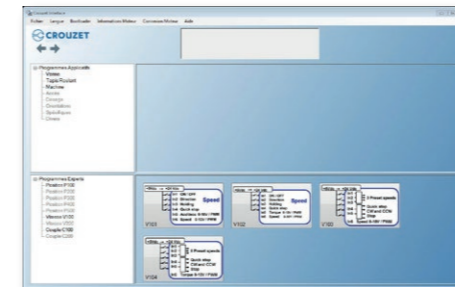
These applicative and expert programs are also available as «program manufacturer» in CANopen.

DCmind SOFT & DCmind SOFT + CANopen

Available on our website www.crouzet-motors.com, or can be supplied on a USB stick in the "starter kits".



"Application" menu



"Expert" menu



"Parameter definition" mode

CHARACTERISTICS

3 languages:

English, French, German. (English for CANopen)

Operating system:

XP Family, XP Pro, Vista, Windows 7.

Application programs:

Valve, conveyor belt, clamp, format adjustment, peristaltic pump, etc.

Expert programs:

Position, speed, torque with digital and analog inputs.

› Numerous programs are available, offering:

- 65,000 proportional positions which can be selected by two 0/10V inputs
- 30 independent positions which can be selected by digital encoding
- A variety of outputs which can be selected to suit your requirements
- The option of setting inverted inputs, selecting 0/10V or PWM operation on the analog inputs, and even setting their operating limit stops
- The option of modifying the control loop PID parameters for difficult applications
- Automatic detection of the reference position for position control ("homing" function)

› Special programs created on request, firmware updating made easier with the "Bootloader" function

› Loading programs simplified with a USB connection

› Other programs to come, please visit our website

SOME EXAMPLES OF APPLICATIONS

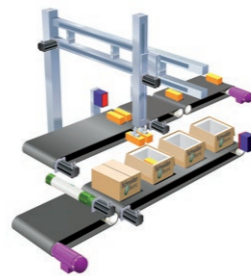
Format adjustment, automatic feed, synchronization, flow control, accurate dosage.

APPLICATIONS

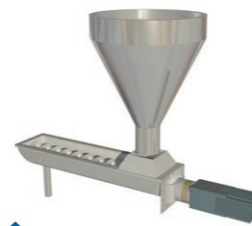
Varied applications where position control, repeated movement and accuracy are key factors.



Stepper operation, detection of thrust and proportional adjustment of forces.



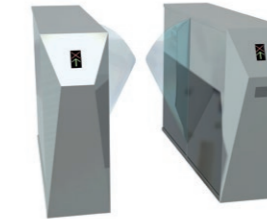
Performing cyclical operation, adjustment of speed and forces. Set to safety mode in the event of a fault.



Several motors combined, operation without a PLC, ease of assembly.



Operation on 12 V battery, low consumption.



S curve pilot control and operation on 12 V backup battery.



Speed pilot control

DCmind: BRUSHLESS MOTORS

Motors 38 to 145 W nominal output power range with TNi21 Speed and Torque Control



- › For control speed and torque applications
- › Very high power density
- › 4 inputs (where 2 of them analog) / 3 outputs integrated electronic controls
- › Holding torque function
- › Battery supply compatible 12 V and 24 V

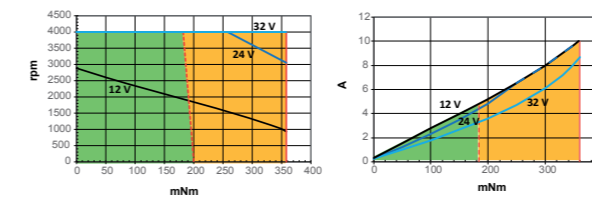
Part numbers

| Type | 38 to 75 W | 45 to 102 W | 72 to 145 W |
|---|--|--|--|
| Part numbers | 80140 TNi21 | 80180 TNi21 | 80280 TNi21 |
| PWM speed mode, cable output | 80140059 | 80180056 | 80280013 |
| 0-10 V speed mode, cable output | 80140051 | 80180050 | 80280007 |
| PWM speed mode, connector M16 - 12 pins | 80140079 | 80180072 | |
| 0-10 V speed mode, connector M16 - 12 pins | 80140071 | 80180066 | |
| Nominal power supply range (V _{DC}) | 12 - 32 | 12 - 32 | 12 - 32 |
| Min. max. power supply (V _{DC}) | 10 - 36 | 10 - 36 | 10 - 36 |
| No-load characteristics | 12 V _{DC} 24 V _{DC} 32 V _{DC} | 12 V _{DC} 24 V _{DC} 32 V _{DC} | 12 V _{DC} 24 V _{DC} 32 V _{DC} |
| Speed of rotation (rpm) | 2900 4000 4000 | 2100 4000 3950 | 2000 3950 3950 |
| Absorbed current (A) | 0.34 0.29 0.27 | 0.35 0.39 0.34 | 0.5 0.7 0.6 |
| Nominal characteristics | 12 V _{DC} 24 V _{DC} 32 V _{DC} | 12 V _{DC} 24 V _{DC} 32 V _{DC} | 12 V _{DC} 24 V _{DC} 32 V _{DC} |
| Speed (rpm) | 1900 4000 4000 | 1250 3350 3900 | 1400 3250 3900 |
| Absorbed current (A) | 5.2 4.4 3.2 | 6.7 5.4 4 | 8.5 6.9 6 |
| Torque (mNm) | 193 184 178 | 340 285 250 | 490 390 355 |
| Output power (W) | 38 77 75 | 45 100 102 | 72 133 145 |
| Maximal characteristics | 12 V _{DC} 24 V _{DC} 32 V _{DC} | 12 V _{DC} 24 V _{DC} 32 V _{DC} | 12 V _{DC} 24 V _{DC} 32 V _{DC} |
| Speed (rpm) | 1600 3050 4000 | 1040 2160 3100 | 800 1900 2400 |
| Absorbed current (A) | 6.5 10 10 | 7.2 11 12 | 15 15 12.5 |
| Torque (mNm) | 250 358 358 | 400 600 650 | 1000 1000 1000 |
| Output power (W) | 42 114 150 | 44 136 211 | 84 199 251 |
| General characteristics | | | |
| Regulation (quadrants) | 4 | 4 | 4 |
| Conformity to EMC Directive in accordance with (EN 55022) | Class B | Class B | Class B |
| Insulation conforming to IEC60085 | Class E | Class E | Class B |
| Thermal time constant (mn) | 20 | 30 | 30 |
| Noise level (dBA) | 40 | 40 | 50 |
| Inertia (g.cm ²) | 75 | 115 | 120 |
| Number of rotor poles | 4 | 4 | 8 |
| Ambient operating temperature (°C) | -30 +70 | -30 +70 | -30 +70 |
| Service life (h) | 20000 | 20000 | 20000 |
| Ball bearing | | | |
| Weight (kg) | 0.95 | 1.34 | 1.44 |
| 0-10 V or PWM Speed input characteristics | | | |
| Input impedance (kΩ) | 69 | 69 | 69 |
| Speed control (rpm) | 120 4000 | 120 4000 | 120 4000 |
| Level 0 input voltage (V) | 0 2 | 0 2 | 0 2 |
| Level 1 input voltage (V) | 7.5 39 | 7.5 39 | 7.5 39 |
| Frequency range (Hz) | 100 2000 | 100 2000 | 100 2000 |
| 0-10 V or PWM Torque input characteristics | | | |
| Input impedance (kΩ) | 69 | 69 | 69 |
| Torque limit (mNm) | 360 35 | 700 30 | 1000 40 |
| Holding limit (mNm) | 150 35 | 230 30 | 310 40 |
| Level 0 input voltage (V) | 0 2 | 0 2 | 0 2 |
| Level 1 input voltage (V) | 7.5 39 | 7.5 39 | 7.5 39 |
| Frequency range (Hz) | 100 2000 | 100 2000 | 100 2000 |
| On/Off and Direction digital input characteristics | | | |
| Input impedance (kΩ) | 57 | 57 | 57 |
| Level 0 input voltage (V _{DC}) | 0 2 | 0 2 | 0 2 |
| Level 1 input voltage (V _{DC}) | 4 39 | 4 39 | 4 39 |
| Torque alarm, Encoder and Direction output characteristics | | | |
| Type of output-Maximum admissible current (mA) | PNP | PNP | PNP |
| Maximum admissible current (mA) | 50 | 50 | 50 |
| IP65 over the whole motor apart from the shaft output. Versions with brake are IP20 | | | |
| Accessory | | | 15275008 |
| 2 metre shielded cable with 12-pin female M16 connector | | | |

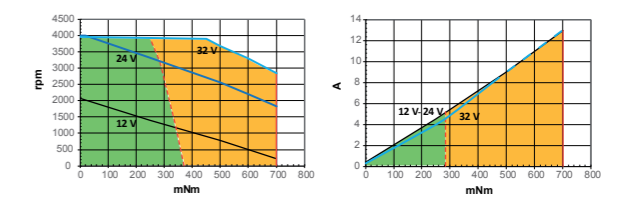
Product made to order

Curves

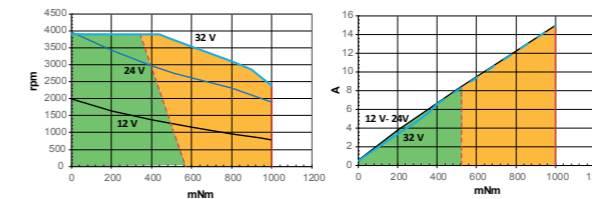
Speed / Torque 80140 TNi21 - Current / Torque 80140 TNi21



Speed / Torque 80180 TNi21 - Current / Torque 80180 TNi21



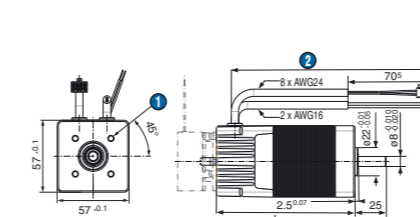
Speed / Torque 80280 TNi21 - Current / Torque 80280 TNi21



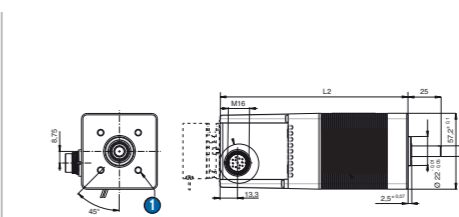
- Continuous running area
- Cycling running area
- Maximum continuous torque
- Maximum peak torque

Dimensions (mm)

Cable output versions



M16 connector version - 12 pins



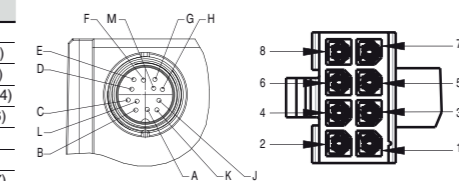
L: 80140: 92 max
L: 80180 / 80280: 112 max

L2: 80140: 123 max
L2: 80180 / 80280: 143 max

More information: see page 16

Connections

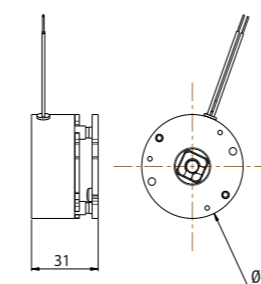
| | Connector M16 | Cable color |
|------------------------------|---------------|------------------|
| Power ground | G+M | AWG16 Blue |
| Power supply +12 to +32 V DC | E+F | AWG16 Brown |
| Logic ground | H | AWG24 Black (5) |
| Input 1: On/Off | C | AWG24 Green (1) |
| Input 2: Direction | B | AWG24 Yellow (2) |
| Input 3: Speed | J | AWG24 Orange (4) |
| Output 1: Tachometer* | A | AWG24 Brown (6) |
| Output 2: Real direction | L | AWG24 Red (8) |
| Input 4: Torque | D | AWG24 Blue (3) |
| Output 3: Torque at max. | K | AWG24 Purple (7) |



* 12 p/rev. and 24 for 80280 motor

Options

Holding brake 0.5 Nm - 24 V_{DC}



- › Shaft, pinion, pulley dimensions
- › Cable wire length
- › Powerful controlled brake (directed)
- › Programs evolution

User information

Notice available on website, please read it before use.

DCmind: BRUSHLESS MOTORS

Motors 34 to 192 W nominal output power range with SMI21 Position, Speed and Torque Control

- > Servomotor for position, speed and torque control applications
- > Large voltage supply range
- > Very high power density
- > Built-in electronics with 6 inputs (2 of which are analog) and 4 outputs
- > Built-in 4096-pulse encoder
- > With application programs already preset and saved in the motor
- > Expert programs can be used to adapt to the requirements of difficult applications
- > Parameters set on the PC via USB connection
- > Integrated bootloader for embedding special customer firmware



Parts number

| | 34 to 94 W | | | 40 to 145 W | | | 82 to 192 W | | |
|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Type | 80140 SMI21 | | | 80180 SMI21 | | | 80280 SMI21 | | |
| Part numbers | | | | | | | | | |
| IP65 option | 80140043 | | | 80180044 | | | 80280001 | | |
| Holding torque brake 0.5 Nm option | 80140044 | | | 80180045 | | | 80280002 | | |
| Nominal operating range (V _{DC}) | 12 - 48 | | | 12 - 48 | | | 12 - 48 | | |
| Min. max. operating range (V _{DC}) | 9 - 75 | | | 9 - 75 | | | 9 - 75 | | |
| No-load characteristics | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} |
| Speed of rotation (rpm) | 2400 | 4000 | 4000 | 1700 | 3500 | 4000 | 1500 | 3050 | 4000 |
| Absorbed current (A) | 0.3 | 0.3 | 0.2 | 0.3 | 0.33 | 0.2 | 0.38 | 0.44 | 0.35 |
| Nominal characteristics | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} |
| Speed (rpm) | 1460 | 3900 | 4000 | 1100 | 2900 | 4000 | 1100 | 2863 | 4000 |
| Torque (mNm) | 225 | 225 | 225 | 350 | 350 | 350 | 685 | 565 | 460 |
| Absorbed current (A) | 5.2 | 5.2 | 2.6 | 5.65 | 5.40 | 3.65 | 10 | 8 | 5 |
| Output power (W) | 34 | 92 | 94 | 40 | 105 | 145 | 82 | 170 | 192 |
| Maximal characteristics | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} | 12 V _{DC} | 24 V _{DC} | 48 V _{DC} |
| Speed of rotation (rpm) | 1100 | 3000 | 4000 | 1000 | 2400 | 4000 | 740 | 2250 | 4000 |
| Torque (mNm) | 300 | 400 | 440 | 400 | 600 | 750 | 1000 | 1000 | 1000 |
| Absorbed current (A) | 7 | 9.5 | 6.1 | 6.4 | 10 | 10.1 | 14 | 14 | 11.5 |
| Output power (W) | 34 | 125 | 184 | 42 | 151 | 314 | 77 | 235 | 419 |
| General characteristics | | | | | | | | | |
| Rotor inertia (gcm ²) | 75 | | | 115 | | | 120 | | |
| Number of rotor poles | 4 | | | 4 | | | 8 | | |
| Ambient operating temperature (°C) | -30 +70 | | | -30 70 | | | -30 +70 | | |
| Service life (h) | 20000 | | | 20000 | | | 20000 | | |
| Ball bearing | | | | | | | | | |
| Weight (kg) | 1.17 | | | 1.52 | | | 1.62 | | |
| Integrated software | | | | | | | | | |
| Applications software | | | | | | | | | |
| Positioning mode | | | | | | | | | |
| Speed mode | | | | | | | | | |
| Torque mode | | | | | | | | | |
| Inputs / Outputs | | | | | | | | | |
| Analog inputs (PWM and 0-10 V) | 2 | | | 2 | | | 2 | | |
| Digital inputs | 4 | | | 4 | | | 4 | | |
| (PWM) output | 2 | | | 2 | | | 2 | | |
| Digital output | 2 | | | 2 | | | 2 | | |
| IP65 over the whole motor apart from the shaft output. Versions with brake are IP20 | | | | | | | | | |
| Accessory | | | | | | | | | |
| Starter kit, DCmind soft program and USB cable | | | | | | | 79298008 | | |

Product adaptations

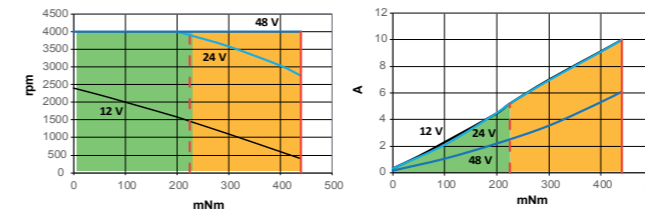


- > Other specific applications software
- > Specific PC interface
- > Special cable length
- > Special shaft
- > Other connectors

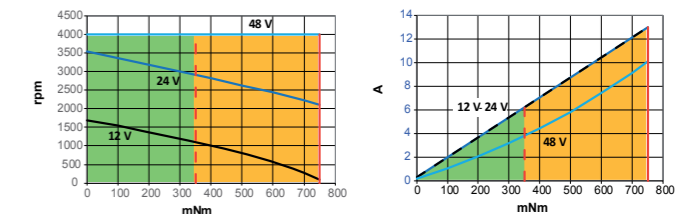
Product made to order

Curves

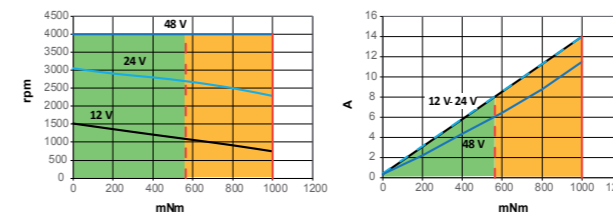
Speed / Torque 80140 SMI21 - Current / Torque 80140 SMI21



Speed / Torque 80180 SMI21 - Current / Torque 80180 SMI21



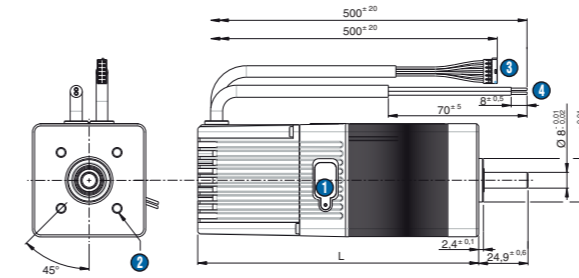
Speed / Torque 80280 SMI21 - Current / Torque 80280 SMI21



- Continuous running area
- Cycling running area
- Maximum continuous torque
- Maximum peak torque

Dimensions (mm)

80140 - 80180 - 80280 SMI21



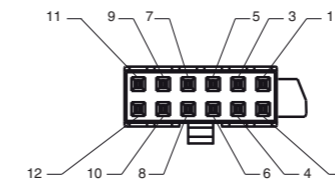
- 1 USB connection type B
- 2 4 x M5 over Ø 40 depth 4.5
- 3 Command cable 12 x AWG26
- 4 Power cable 2 x AWG16

L: 80140: 123 max
L: 80180 / 80280: 143 max

More information: see page 16

Connection

Connector (Molex 0430251200)



| Pin | Logic cable | | Power cable | |
|-----|-------------------|-------------|--|-------------|
| | Description | Wires color | Description | Wires color |
| 1 | Input 1 - logic | Green | +12 V _{DC} → 48 V _{DC} | Brown |
| 2 | Input 2 - logic | Yellow | 0 V _{DC} | Blue |
| 3 | Input 3 - logic | White | | |
| 4 | Input 4 - logic | White-brown | | |
| 5 | Input 5 - analog | Blue | | |
| 6 | Input 6 - analog | Orange | | |
| 7 | 0 V _{DC} | Black | | |
| 8 | 0 V _{DC} | White-black | | |
| 9 | Output 1 - PWM | Brown | | |
| 10 | Output 2 - PWM | Purple | | |
| 11 | Output 3 - logic | Red | | |
| 12 | Output 4 - logic | Grey | | |

User information

Notice available on website, please read it before use.

DCmind: BRUSHLESS MOTORS

Motors 34 to 192 W nominal output power range with SMi21 Position, Speed and Torque Control with CANopen

- > Servomotor for position, speed and torque control applications
- > Large voltage supply range
- > Very high power density
- > Built-in electronics with 6 inputs (2 of which are analog) and 4 outputs
- > Built-in 4096-pulse encoder
- > With application programs already preset and saved in the motor
- > Expert programs can be used to adapt to the requirements of difficult applications
- > Parameters set on the PC via USB and CANopen connections
- > Integrated bootloader for embedding special customer firmware
- > CANopen and USB work together



Parts number

| | 34 to 94 W | 40 to 145 W | 82 to 192 W |
|---|--|--|--|
| Type | 80140 SMi21 CAN | 80180 SMi21 CAN | 80280 SMi21CAN |
| Part numbers | 80140301 | 80180301 | 80280302 |
| IP65 option | | | |
| Nominal operating range (V _{DC}) | 12 - 48 | 12 - 48 | 12 - 48 |
| Min. max. operating range (V _{DC}) | 9 - 75 | 9 - 75 | 9 - 75 |
| No-load characteristics | 12 V _{DC} 24 V _{DC} 48 V _{DC} | 12 V _{DC} 24 V _{DC} 48 V _{DC} | 12 V _{DC} 24 V _{DC} 48 V _{DC} |
| Speed of rotation (rpm) | 2400 4000 4000 | 1700 3500 4000 | 1500 3050 4000 |
| Absorbed current (A) | 0.3 0.3 0.2 | 0.3 0.33 0.2 | 0.38 0.44 0.35 |
| Nominal characteristics | 12 V _{DC} 24 V _{DC} 48 V _{DC} | 12 V _{DC} 24 V _{DC} 48 V _{DC} | 12 V _{DC} 24 V _{DC} 48 V _{DC} |
| Speed (rpm) | 1460 3900 4000 | 1100 2900 4000 | 1100 2863 4000 |
| Torque (mNm) | 225 225 225 | 350 350 350 | 685 565 460 |
| Absorbed current (A) | 5.2 5.2 2.6 | 5.65 5.40 3.65 | 10 8 5 |
| Output power (W) | 34 92 94 | 40 105 145 | 82 170 192 |
| Maximal characteristics | 12 V _{DC} 24 V _{DC} 48 V _{DC} | 12 V _{DC} 24 V _{DC} 48 V _{DC} | 12 V _{DC} 24 V _{DC} 48 V _{DC} |
| Speed of rotation (rpm) | 1100 3000 4000 | 1000 2400 4000 | 740 2250 4000 |
| Torque (mNm) | 300 400 440 | 400 600 750 | 1000 1000 1000 |
| Absorbed current (A) | 7 9.5 6.1 | 6.4 10 10.1 | 14 14 11.5 |
| Output power (W) | 34 125 184 | 42 151 314 | 77 235 419 |
| General characteristics | | | |
| Rotor inertia (gcm ²) | 75 | 115 | 120 |
| Number of rotor poles | 4 | 4 | 8 |
| Ambient operating temperature (°C) | -30 +70 | -30 70 | -30 +70 |
| Service life (h) | 20000 | 20000 | 20000 |
| Ball bearing | | | |
| Weight (kg) | 1.17 | 1.52 | 1.62 |
| Integrated software | | | |
| Applications software | | | |
| Positioning mode | | | |
| Speed mode | | | |
| Torque mode | | | |
| Inputs / Outputs | | | |
| Analog inputs (PWM and 0-10 V) | 2 | 2 | 2 |
| Digital inputs | 4 | 4 | 4 |
| (PWM) output | 2 | 2 | 2 |
| Digital output | 2 | 2 | 2 |
| IP65 over the whole motor apart from the shaft output. Versions with brake are IP20 | | | |
| Accessory | | | 79298662 |
| Starter kit : DCmind Soft+CAN / USB-CAN converter / cables / CAN accessories | | | |

Product adaptations

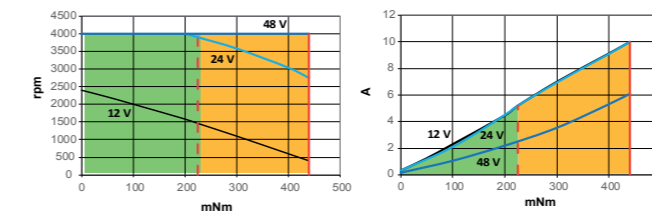


- > Other specific applications software
- > Specific PC interface
- > Special cable length
- > Special shaft
- > Other connectors
- > STO inputs
- > Logic's power backup

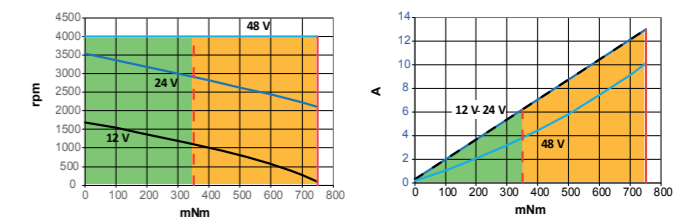
Product made to order

Curves

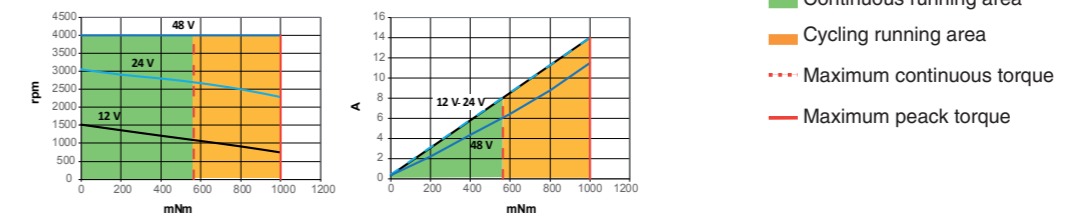
80140 SMi21 CAN: Speed Torque - Current / Torque



80180 SMi21 CAN: Speed Torque - Current / Torque

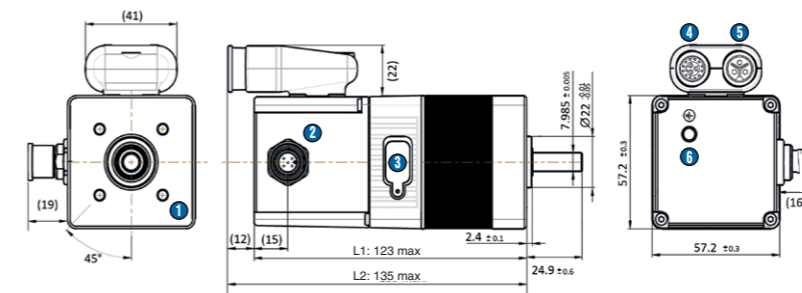


80280 SMi21 CAN: Speed Torque - Current / Torque



Dimensions (mm)

80140 - 80180 - 80280 SMi21 CAN

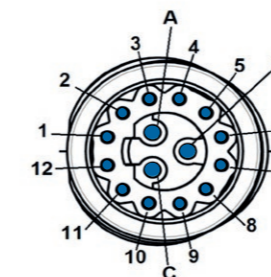


- 4 x M5 threaded holes on 40mm diameter, 4,5 mm thread depth
- CAN connector - M12
- Micro-USB B connector
- Input/output connector - M16 - Hummel 7.003.985.101
- Voltage supply connector - M16 - Hummel 7.003.983.101
- Earth: M6 threaded hole - 10mm thread depth

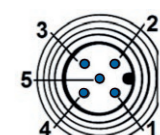
L1: 80140: 123 max L1: 80180 / 80280: 143 max
L2: 80140: 135 max L2: 80140 / 80280: 154 max

More information: see page 16

Connection



| Pin | Input / Output M16 - 15 pins | Description | Pin | Power supply M16 - 3 pins | Description |
|-----------|------------------------------|-------------|-----|---------------------------|-------------|
| 1 | Input 1 (digital) | | 1 | Not connected | |
| 2 | Input 2 (digital) | | 2 | +12 Vc → 48 Vc | |
| 3 | Input 3 (digital) | | 3 | 0V | |
| 4 | Input 4 (digital) | | | | |
| 5 | Input 5 (analogic) | | | | |
| 6 | Input 6 (analogic) | | | | |
| 7 | 0V | | | | |
| 8 | Output 1 (digital - PWM) | | | | |
| 9 | Output 2 (digital - PWM) | | | | |
| 10 | Output 3 (digital) | | | | |
| 11 | Output 4 (digital) | | | | |
| 12 | Not connected | | | | |
| A - B - C | Not connected | | | | |



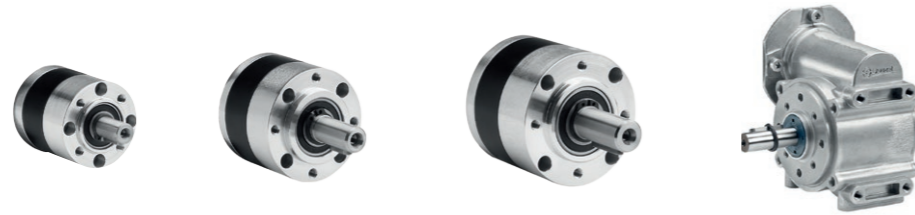
User information

Notice available on website, please read it before use.

GEARBOXES FOR DCmind BRUSHLESS RANGE

4 to 120 Nm

- › Planetary and worm gearboxes
- › Shafts on ball bearings
- › Long service life
- › IP65



Part numbers

| Gearboxes | Planetary Ø 52 | | | Planetary Ø 62 | | | Planetary Ø 81 | | | Worm |
|-------------------------------|------------------|------|-----|------------------|-----|-----|------------------|-----|-----|-----------------------|
| Type | 810495 | | | 810496 | | | 810497 | | | 810410 |
| Associated motors | Part number | | | Part number | | | Part number | | | Part number |
| 80140 TNi21 | 801495 TNi21 | | | 801496 TNi21 | | | 801897 TNi21 | | | 801410 TNi21 |
| 80180 TNi21 | | | | 801896 TNi21 | | | 802897 TNi21 | | | 801810 TNi21 |
| 80280 TNi21 | | | | | | | | | | 802810 TNi21 |
| 80140 SMi21 | 801495 SMi21 | | | 801496 SMi21 | | | 801897 SMi21 | | | 801410 SMi21 |
| 80180 SMi21 | | | | 801896 SMi21 | | | 802897 SMi21 | | | 801810 SMi21 |
| 80280 SMi21 | | | | | | | | | | 802810 SMi21 |
| 80140 SMi21 CAN | 801495 SMi21 CAN | | | 801496 SMi21 CAN | | | 801897 SMi21 CAN | | | 801410 SMi21 CAN |
| 80180 SMi21 CAN | | | | 801896 SMi21 CAN | | | 802897 SMi21 CAN | | | 801810 SMi21 CAN |
| 80280 SMi21 CAN | | | | | | | | | | 802810 SMi21 CAN |
| Gearbox characteristics | | | | | | | | | | |
| Number of stages | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 |
| Maximum permitted torque (Nm) | 4 | 12 | 25 | 8 | 25 | 50 | 20 | 60 | 120 | 10 |
| Efficiency | 0.8 | 0.75 | 0.7 | 0.9 | 0.8 | 0.7 | 0.9 | 0.8 | 0.7 | 0.6 → 0.3 |
| Axial dynamic load (daN) | 6 | 10 | 15 | 7 | 10 | 15 | 8 | 12 | 20 | 10 |
| Radial dynamic load (daN) | 20 | 32 | 45 | 24 | 36 | 52 | 40 | 60 | 100 | 15 |
| Operating temperature | -20 → +70°C | | | -20 → +70°C | | | -20 → +70°C | | | -20 → +70°C |
| Weight (kg) | 0.7 | 0.8 | 1.1 | 0.8 | 1.2 | 1.6 | 1.8 | 2.5 | 3.2 | 0.7 |
| Standard reduction ratios | 6.75 | 25 | 93 | 5.16 | 19 | 100 | 5 | 19 | 100 | 5 - 10 - 20 - 30 - 50 |
| | | 46 | 169 | 6.75 | 27 | 139 | | 27 | 139 | |
| | | | 308 | | 46 | 236 | | | 236 | |
| Other ratios possible | | | | | | | | | | 15 - 100 |

Comments

Ø 52 planetary gearbox: Metal gears on all stages. IP65 apart from the output shaft.

Ø 62 planetary gearbox: On the first stage, the planet gears are made of composite materials which improve efficiency and service life. On the other stages, the metal gears turn on needle bearings. IP65 apart from the output shaft.

Ø 81 planetary gearbox: All gears are metal and turn on needle bearings, resulting in excellent robustness and a very long service life. IP65 apart from the output shaft.

Worm gearbox: This gearbox combines a tempered steel worm and a hard bronze helical gear wheel, thus ensuring a long service life. The wheel is coated with grease, ensuring an excellent slip coefficient and good heat dissipation. O-rings and lipseals are used in combination with a compression spring to create a tight seal at the gearbox output shaft and the motor input shaft. IP65 gearbox.

The casing is made of aluminium to maximise heat exchanges with its supporting surface on the machine.

However, due to the high power that can be transmitted by this gearbox and the low efficiency inherent in large worm gearbox reduction ratios, make sure that the gearbox casing temperature does not exceed 75°C during operation.

The output shaft can be placed on the right or left, or can be a double shaft (shaft output on both sides).

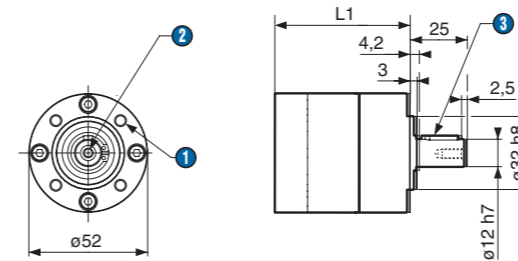
Made to order products, available on request

- › Special shafts
- › Other reduction ratios
- › Other fixing holes
- › Special mounting flange

Product made to order

Dimensions (mm)

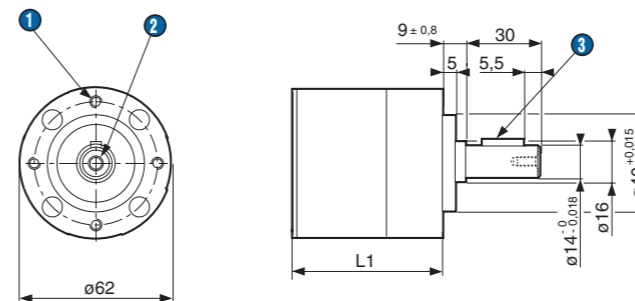
Planetary gearbox Ø 52 (810495)



- 1 4 x M5 at 90°, depth 10 over Ø 40
- 2 M4 x 10
- 3 Parallel key 4 x 4 x 16 DIN 6885 A

L1 1 stage: 55.3 ± 0.5
L1 2 stages: 69.5 ± 0.5
L1 3 stages: 83.7 ± 0.5

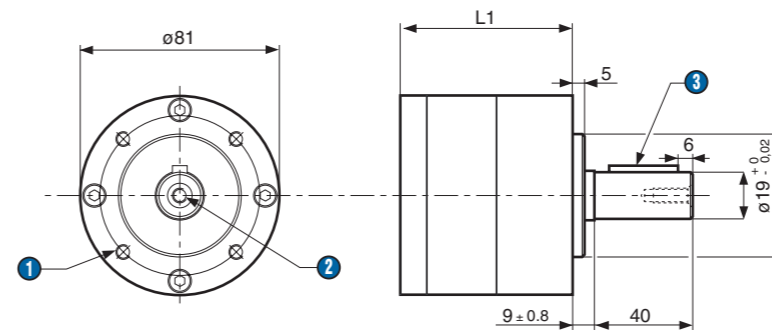
Planetary gearbox Ø 62 (810496)



- 1 4 x M5 at 90°, depth 10 over Ø 52
- 2 M5, depth 12.5
- 3 Parallel key 5 x 5 x 18 DIN 6885 A

L1 1 stage: 52.1 ± 0.7
L1 2 stages: 67.9 ± 0.7
L1 3 stages: 83.8 ± 0.7

Planetary gearbox Ø 81 (810497)

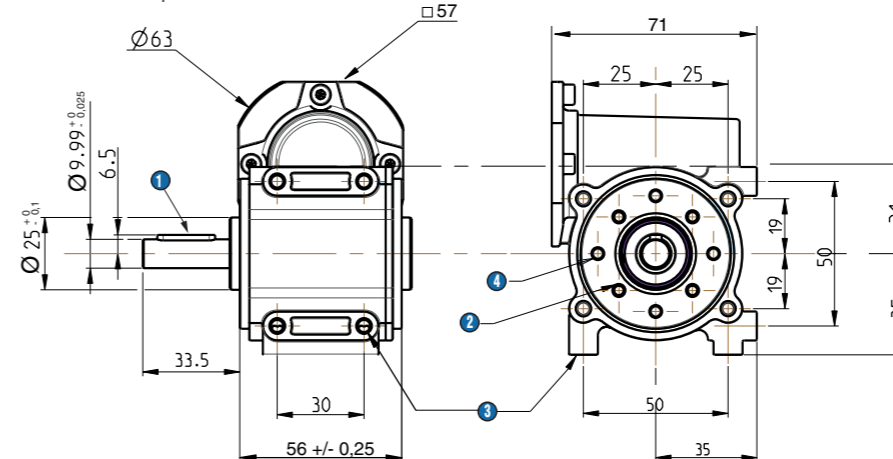


- 1 4 x M6, depth 12 over Ø 65
- 2 M6 x 16
- 3 Parallel key 6 x 6 x 28 DIN 6885 A

L1 1 stage: 70.5 ± 0.6
L1 2 stages: 92.2 ± 0.6
L1 3 stages: 113.8 ± 0.6

Worm gearbox RAD10 (810410)

Version with output shaft on left



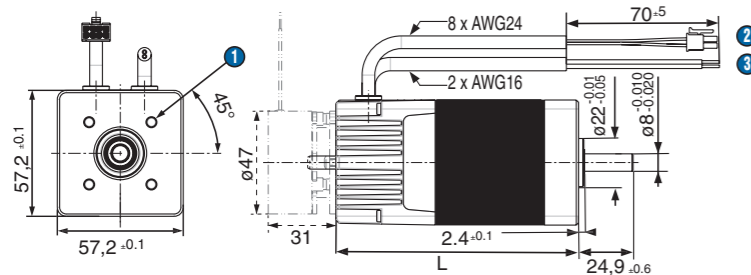
- 1 Parallel key 4 x 4 x 20 DIN6885
- 2 4 x M4, depth 8 over Ø 36
- 3 8 x M5, depth 8
- 4 4 x Ø 3.8 depth 10 over Ø 40

The left-hand and right-hand sides of the gearbox are identical.

DCmind BRUSHLESS DIRECT MOTOR TNi21 & SMi21 CABLE OUTPUT OR WITH CONNECTOR

Dimensions (mm)

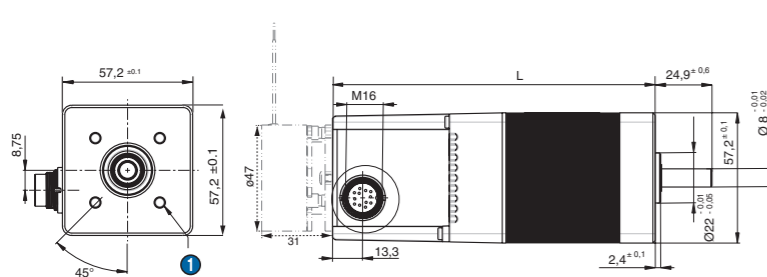
80140 - 80180 - 80280 - TNi21 version output cable with or without brake



L 80140: 92 max.
L 80180: 112 max.
L 80280: 112 max.

- 1 4 x M5 at 90°, depth 6 over Ø 40
- 2 Command cable 8 x AWG24 / 500 mm
- 3 Power cable 2 x AWG16 / 500 mm

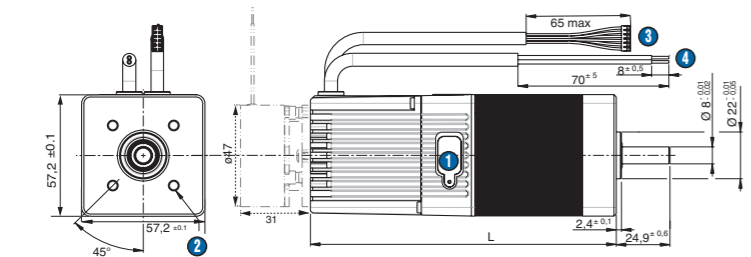
80140 - 80180 - TNi21 version connector M16 - 12 pins with or without brake



L 80140: 123 max.
L 80180: 143 max.

- 1 4 x M5 at 90°, depth 6 over Ø 40

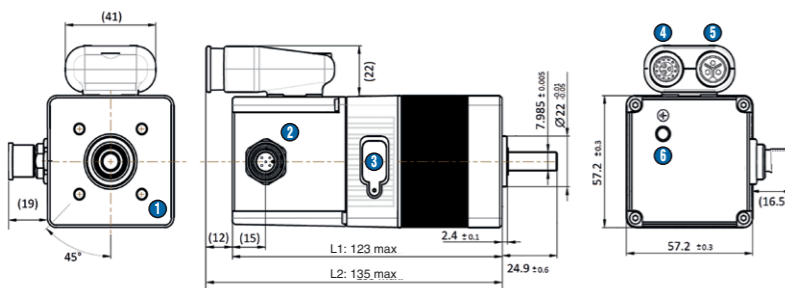
80140 - 80180 - 80280 - SMi21 with or without brake



L 80140: 123 max.
L 80180: 143 max.
L 80280: 143 max.

- 1 USB connection type B
- 2 4 x M5 at 90°, depth 6 over Ø 40
- 3 Command cable 10 x AWG24 / 500 mm
- 4 Power cable 2 x AWG16 / 500 mm

80140 - 80180 - 80280 - SMi21 with CANopen



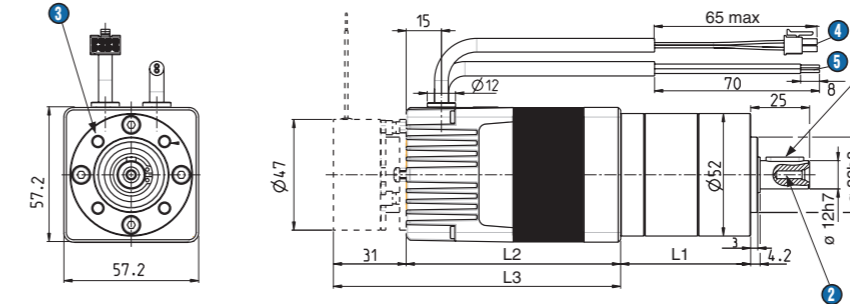
L1: 80140: 123 max
L2: 80140: 135 max
L1: 80180 / 80280: 143 max
L2: 80140 / 80280: 154 max

- 1 4 x M5 threaded holes on 40mm diameter, 4,5 mm thread depth
- 2 CAN connector - M12
- 3 Micro-USB B connector
- 4 Input/output connector - M16 - Hummel 7.003.985.101
- 5 Voltage supply connector - M16 - Hummel 7.003.983.101
- 6 Earth: M6 threaded hole - 10mm thread depth

DCmind BRUSHLESS GEARED MOTOR TNi21 CABLE OUTPUT

Dimensions (mm)

801495 - TNi21 + P52 with or without brake



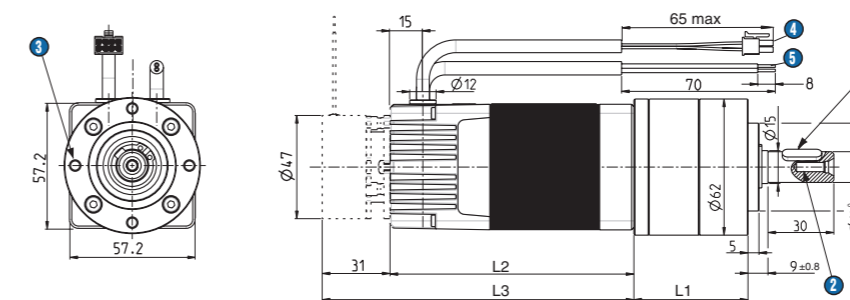
L1 1 stage: 55.3 ±0.5
L1 2 stages: 69.5 ±0.5
L1 3 stages: 83.7 ±0.5

L2 80140: 92 max.

L3 80140: 123 max.

- 1 Parallel key 4 x 4 x 16 DIN 6885 A
- 2 M4 x 10
- 3 4 x M5 at 90°, depth 10 over Ø 40
- 4 Command cable 8 x AWG24 / 500 mm
- 5 Power cable 2 x AWG16 / 500 mm

801496 - 801896 - TNi21 + P62 with or without brake



L1 1 stage: 52.1 ±0.7
L1 2 stages: 67.9 ±0.7
L1 3 stages: 83.8 ±0.7

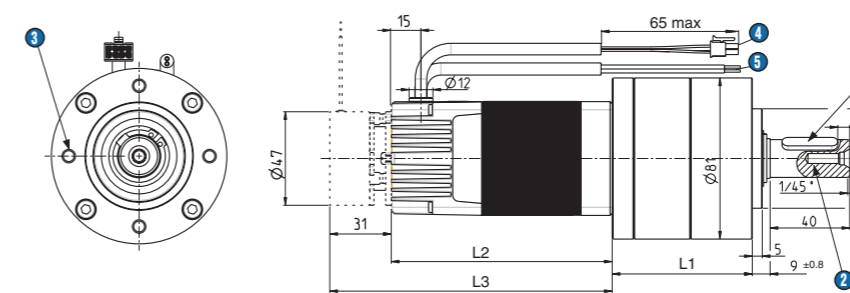
L2 80140: 92 max.

L2 80180: 112 max.

L3 80140: 123 max.

- 1 Parallel key 5 x 5 x 18 DIN 6885 A
- 2 M5 x 12
- 3 4 x M5 at 90°, depth 10 over Ø 52
- 4 Command cable 8 x AWG24 / 500 mm
- 5 Power cable 2 x AWG16 / 500 mm

801897 - 802897 - TNi21 + P81 with or without brake



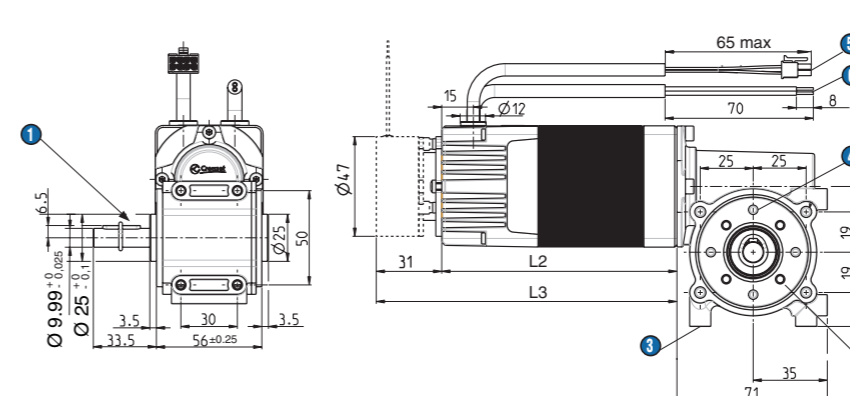
L1 1 stage: 70.5 ±0.6
L1 2 stages: 92.2 ±0.6
L1 3 stages: 113.8 ±0.6

L2 80180-80280: 112 max.

L3 80180-80280: 143 max.

- 1 Parallel key 6 x 6 x 28 DIN 6885 A
- 2 M6 x 16
- 3 4 x M6 at 90°, depth 12 over Ø 65
- 4 Command cable 8 x AWG24 / 500 mm
- 5 Power cable 2 x AWG16 / 500 mm

801410 - 801810 - 802810 - TNi21 + RAD10 with or without brake



L2 80140: 92 max.
L2 80180-80280: 112 max.

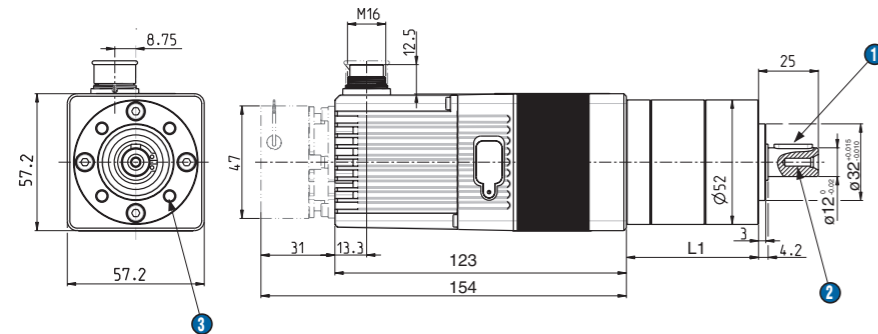
L3 80140: 123 max.
L3 80180-80280: 143 max.

- 1 Parallele key 4 x 4 x 20 DIN 6885 A
- 2 4 x M4, depth 8 over Ø 36
- 3 8 x M5 depth 8
- 4 4 x Ø 3,8, depth 10 over Ø 40
- 5 Command cable 8 x AWG24 / 500 mm
- 6 Power cable 2 x AWG16 / 500 mm

DCmind BRUSHLESS GEARED MOTOR TNi21 WITH CONNECTOR

Dimensions (mm)

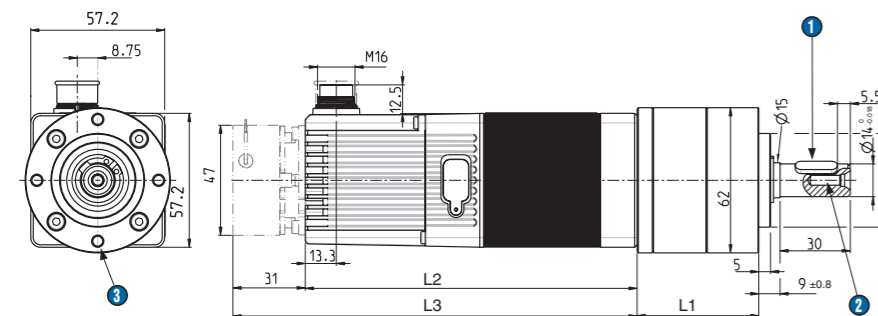
801495 - TNi21 + P52 M16 connector with or without brake



L1 1 stage: 55.3 ±0.5
 L1 2 stages: 69.5 ±0.5
 L1 3 stages: 83.7 ±0.5

- 1 Parallel key 4 x 4 x 16 DIN 6885 A
- 2 M4 x 10
- 3 4 x M5 at 90°, depth 10 over Ø 40

801496 - 801896 - TNi21 + P62 M16 connector with or without brake

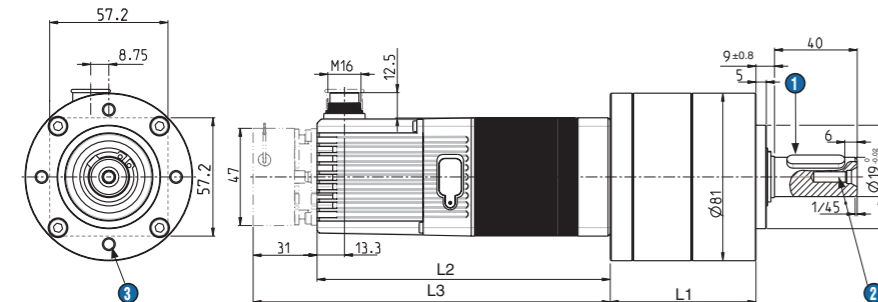


L1 1 stage: 52.1 ±0.7
 L1 2 stages: 67.9 ±0.7
 L1 3 stages: 83.8 ±0.7

L2 80140: 123 max.
 L2 80180: 143 max.
 L3 80140: 154 max.
 L3 80180: 174 max.

- 1 Parallel key 5 x 5 x 18 DIN 6885 A
- 2 M5 x 12
- 3 4 x M5 at 90°, depth 10 over Ø 52

801897 - TNi21 + P81 M16 connector with or without brake

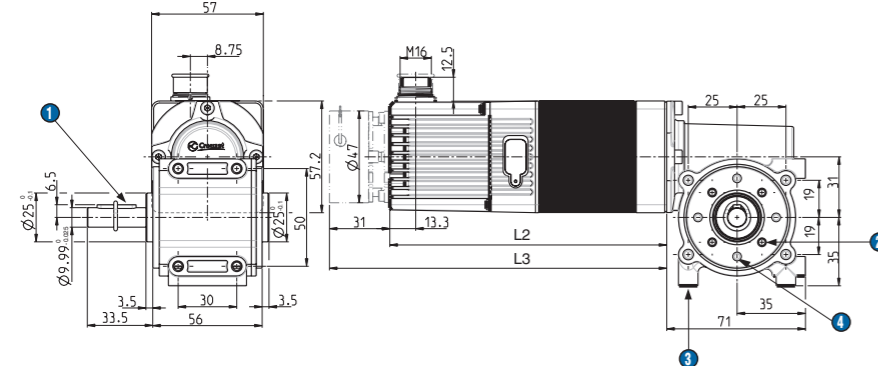


L1 1 stage: 70.5 ±0.6
 L1 2 stages: 92.2 ±0.6
 L1 3 stages: 113.8 ±0.6

L2 80180: 143 max.
 L3 80180: 174 max.

- 1 Parallel key 6 x 6 x 28 DIN 6885 A
- 2 M6 x 16
- 3 4 x M6, depth 12 over Ø 65

801410 - 801810 - TNi21 + RAD10 M16 connector with or without brake



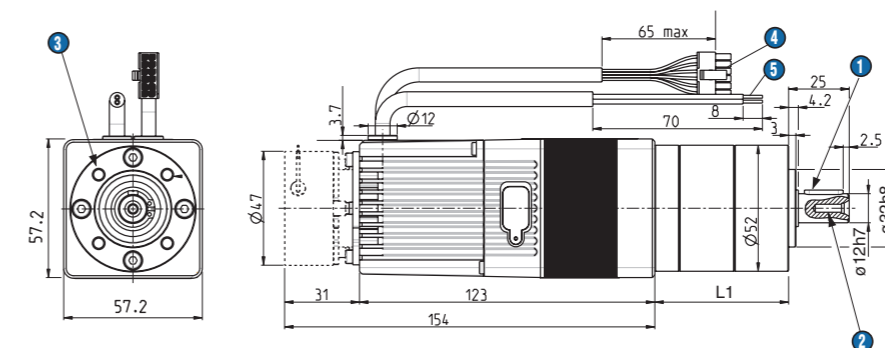
L2 80140: 123 max.
 L2 80180-80280: 143 max.
 L3 80140: 154 max.
 L3 80180-80280: 174 max.

- 1 Parallel key 4 x 4 x 20 DIN 6885 A
- 2 4 x M4, depth 8 over Ø 36
- 3 8 x M5, depth 8
- 4 4 x 3.8, depth 10 over Ø 40

DCmind BRUSHLESS GEARED MOTOR SMi21 CABLE OUTPUT

Dimensions (mm)

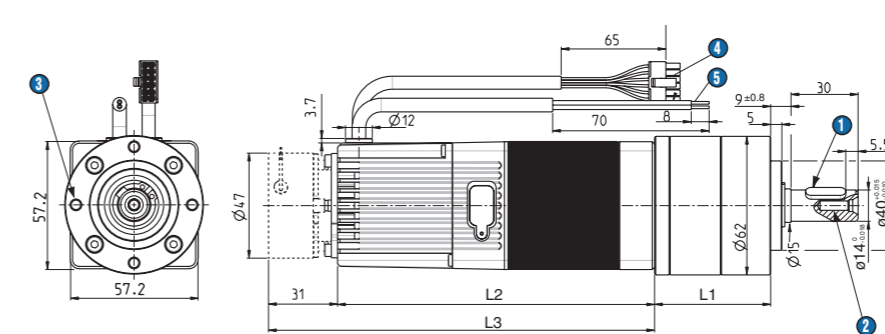
801495 - SMi21 + P52 with or without brake



L1 1 stage: 55.3 ±0.5
 L1 2 stages: 69.5 ±0.5
 L1 3 stages: 83.7 ±0.5

- 1 Parallel key 4 x 4 x 16 DIN 6885 A
- 2 M4 x 10
- 3 4 x M5 at 90°, depth 10 over Ø 40
- 4 Command cable 12 x AWG26 / 500 mm
- 5 Power cable 2 x AWG16 / 500 mm

801496 - 801896 - SMi21 + P62 with or without brake



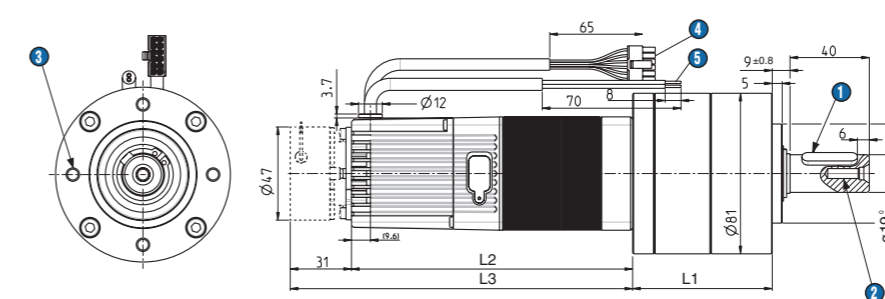
L1 1 stage: 52.1 ±0.7
 L1 2 stages: 67.9 ±0.7
 L1 3 stages: 83.8 ±0.7

L2 80140: 123 max.
 L2 80180: 143 max.

L3 80140: 154 max.
 L3 80180: 174 max.

- 1 Parallel key 5 x 5 x 18 DIN 6885 A
- 2 M5 x 12
- 3 4 x M5 at 90°, depth 10 over Ø 52
- 4 Command cable 12 x AWG26 / 500 mm
- 5 Power cable 2 x AWG16 / 500 mm

801897 - 802897 - SMi21 + P81 with or without brake

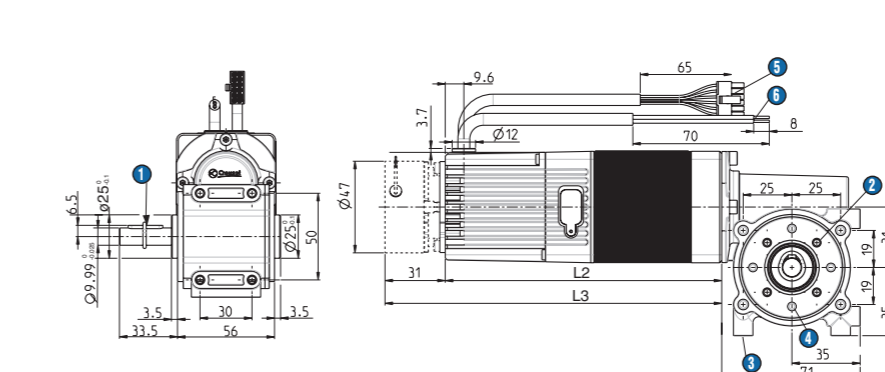


L1 1 stage: 70.5 ±0.6
 L1 2 stages: 92.2 ±0.6
 L1 3 stages: 113.8 ±0.6

L2 80180 - 80280: 143 max.
 L3 80180 - 80280: 174 max.

- 1 Parallel key 6 x 6 x 28 DIN 6885 A
- 2 M6 x 16
- 3 4 x M6 at 90°, depth 12 over Ø 65
- 4 Command cable 12 x AWG26 / 500 mm
- 5 Power cable 2 x AWG16 / 500 mm

801410 - 801810 - 802810 - SMi21 + RAD10 with or without brake



L2 80140: 123 max.
 L2 80180 - 80280: 143 max.
 L3 80140: 154 max.
 L3 80180 - 80280: 174 max.

- 1 Parallel key 4 x 4 x 20 DIN 6885 A
- 2 4 x M4, depth 8 over Ø 36
- 3 8 x M5, depth 8
- 4 4 x Ø 3.8, depth 10 over Ø 40
- 5 Command cable 12 x AWG26 / 500 mm
- 6 Power cable 2 x AWG16 / 500 mm

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