Innovative drives for your projects

D.C. motors with and without transmissions, blowers, pumps and valves

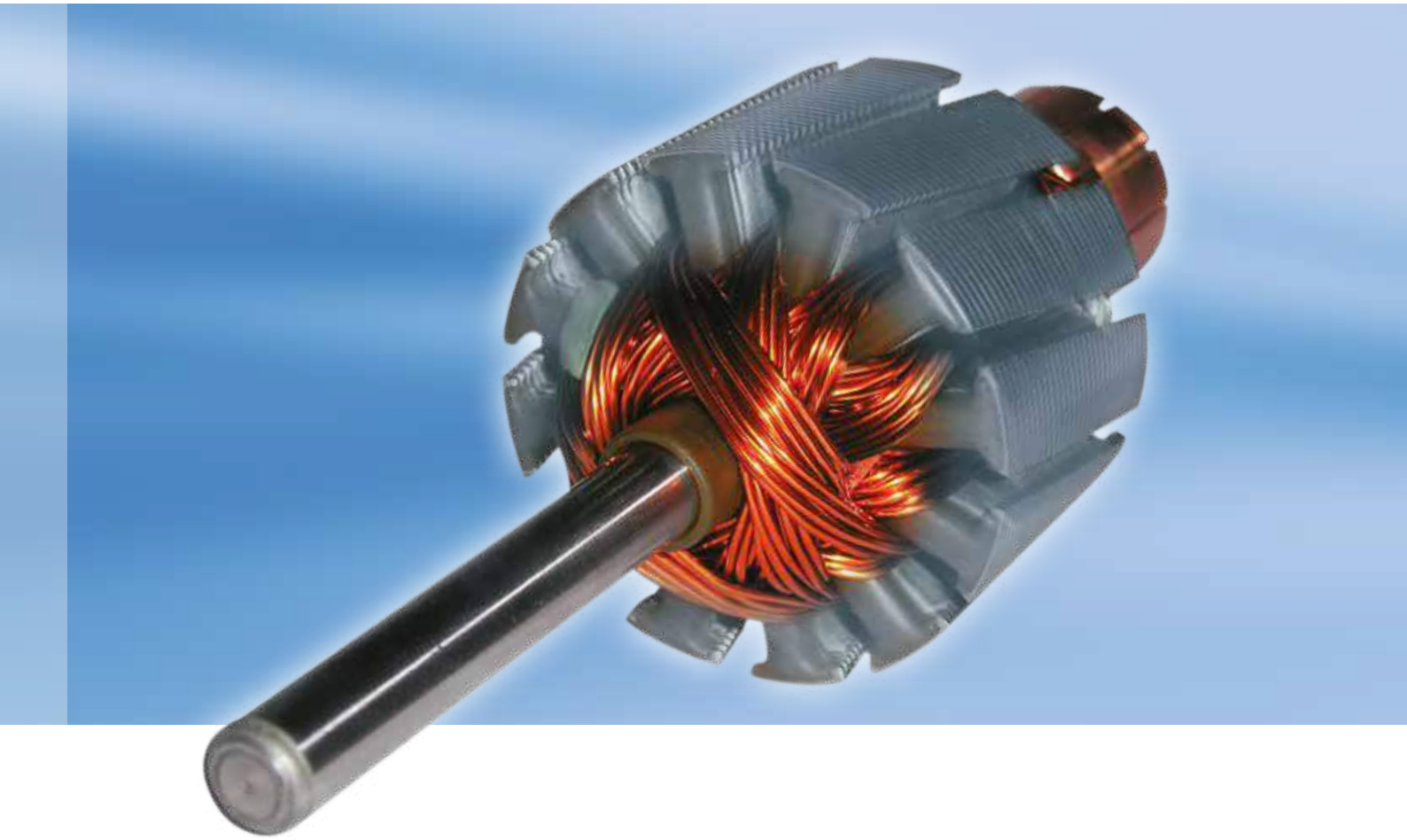
Electric motors

2017 | 2018

BOSCH

bosch-ibusiness.com

The right drive for your projects
– Bosch electric motors



Electric motors from Bosch encourage movement in product development

With its competence, Bosch, as the leading global developer and manufacturer of automotive technology, has proved itself millions of times over in mobile applications. As a development partner to various industrial branches, Bosch is aligned to the requirements of its customers. Thus, Bosch electric motors are also the ideal solution for many applications outside of the automobile. The total of its advantages are immediately obvious, where quality, reliability and inexpensive prices through high-volume production are called for.

Industrial customers in particular, expect to have competent contact partners at their suppliers. To this end, an independent engineering team has been set up. Bosch engineers will advise and support you in the application engineering for D.C. motors, blowers and pumps.

Your personal contact for consulting you can find on our website.

bosch-ibusiness.com

Content

Notes

This catalogue lists the standard parts supplied with all the technical information usually required by design engineers to select the best motor for their particular requirements. These motors were originally designed for use in motor vehicles.

We recommend that Bosch be consulted first before you use motors for any applications other than those specified, particularly in the case of other requirements, loads, or environmental conditions.

Subject to change.
Product pictures shown in this catalogue are generic and examples for specific product families. The offer drawings for quoted products shall prevail.

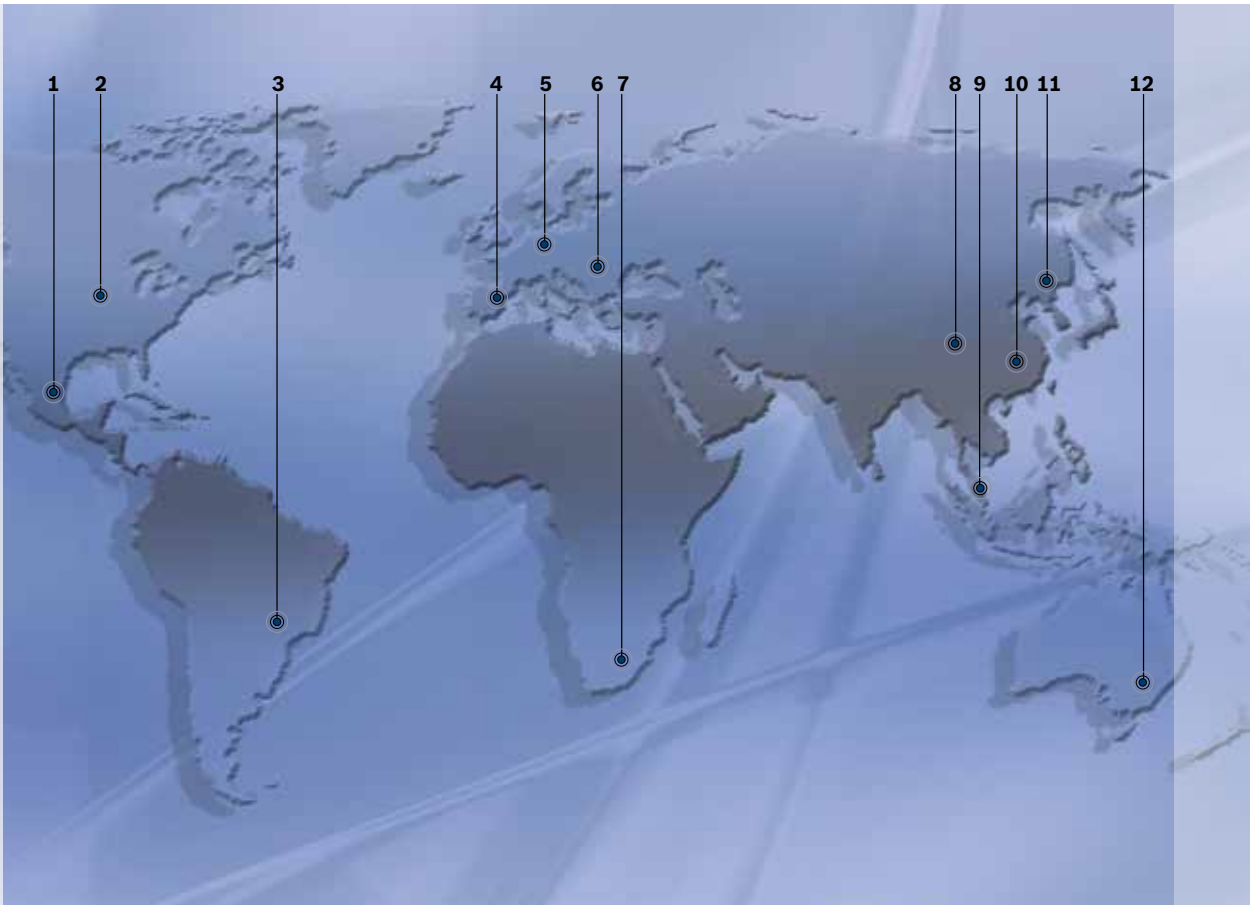
Unlimited service – Bosch electric motors

The worldwide competent partner for industrial applications

As the largest manufacturer of electric motors in Europe, Bosch provides its customers with a comprehensive range of products including brushless D.C. motors and brush-type D.C. motors.
Bosch electric motors are developed for the automotive industry and installed into automobiles and commercial vehicles as drives for wiping systems, engine cooling and passenger compartment air-conditioning as well as for the adjustment of windows, sliding roofs and seats.
The Bosch electric motors referred to here are permanent-magnet-excited D.C. motors. They excel on account of an excellent power/weight ratio, a broad working range and through outstanding flexibility for adaptation to different requirements and installation situations. In addition to this they are extremely quiet and very robust (see D.C. motors without transmission).
Bosch plants around the globe operate according to the stringent, internationally-binding Bosch quality guidelines, which only permit products for series production that have been well-proven in tough endurance tests. Profit from the strongly competitive products of mass production.

Production sites:

1. **Toluca, Mexico**
2. **Albion, USA**
3. **Campinas, Brazil**
4. **Castellet, Spain**
5. **Bühl, Germany**
6. **Miskolc, Hungary**
7. **Brits, South Africa**
8. **Changsha, China**
9. **Penang, Malaysia**
10. **Suzhou, China**
11. **Buyong, Korea**
12. **Clayton, Australia**



Customer orientation in development, production and sales

Innovative technology from the automotive industry

- **Many million times well proven and reliable Bosch quality –** As a leading developer and manufacturer of automotive technology Bosch is also experienced in various applications beside the automotive industry.
- **Bosch electric motors operate absolutely reliable –** They are available in a light and compact design, and provide a high power density and long service life.
- **Price and performance, that match up –** High-volume production results in inexpensive prices.

Individual solutions for your application

- **The right solution for every requirement –** Due to a variety of different designs and sizes, the Bosch range of electric motors provides a great deal of flexibility for installation and use. Bosch electric motors operate in a D.C. voltage range of 12 to 24 Volt. They are also optionally available with and without Hall elements.
- **Successful application examples –** Power-operated hospital beds, wheel chairs, garage-door drives, lawnmowers, locking systems and output systems, electric mopeds and lots more.

Professional customer service

- **All-encompassing customer orientation –** Right from the very start, Bosch engineers provide their support and advice in the application engineering for D.C. motors, blowers or pumps.
- **Global Bosch Standards –** Bosch guarantees worldwide uniform production and quality standards, and availability of its products.
- **Technical information –** Comprehensive information on Bosch electric motors is available in our catalogue. Apart from this, you can also find all technical details online at www.bosch-ibusiness.com.

Parameter explanation

Nominal values

Nominal value
Value of a variable (e.g. voltage, current, resistance ...) according to which a motor, blower, or pump, or its characteristics and parts are specified or according to which they are designated.

Power consumption P_1

$$P_1 = U \cdot I$$

P_1 Power consumption in W
U Voltage in V
I Current in A

Output power P_2
For motors the output power P_2 is always given.

$$P_2 = 2\,\frac{\pi}{60} \cdot M \cdot n$$

P_2 Output power in W
M Torque in Nm
n Rotational speed in min^{-1}

Efficiency η
Efficiency refers to the relationship between mechanical output P_2 and electrical power input P_1.

$$\eta_2 = \frac{P_2}{P_1}$$

Example
Theoretically, a nominal voltage of 24 V and a rated current of 35 A result in a power input of P_1:
$P_1 = U_N \cdot I_N$; P_1 = 24 V · 35 A; P_1 = 840 W.
This power consumption P_1 and the output P_{2N} (see Fig. page 7) determined from the characteristic-curves chart are used to calculate the efficiency η:

$$\eta = \frac{P_{2N}}{P_1} = \frac{600\ W}{840\ W} = 0{,}71 = 71\%$$

Rated torque M_N
The motor's rated torque is calculated from:

$$M_N = \frac{60}{2\pi} \cdot \frac{P_{2N}}{n_N}$$

M_N Rated torque in Nm
P_{2N} Rated power output in W
n_N Rated speed in min^{-1}

Rated speed n_N
Rated speed refers to the speed of a motor supplied with rated voltage and driven at a rated output.

Direction of rotation
When looking at the motor's shaft end, clockwise operation is deemed to be right-handed rotation.
For motors with two shaft ends, the shaft end opposite the commutator determines the direction of rotation.

Short-circuit values
The current consumed by the motor in case of short-circuit (when armature is braked to standstill), is the maximum current I_{max}.
When a short circuit occurs, the maximum torque M_A (breakaway torque) is effective.

IP degrees of protection

Valid for electrical equipment of road vehicles as under IEC 60529 and DIN 40050, Part 9.

- Protection of electrical equipment within housing against influence of solid foreign bodies including dust.
- Protection of electrical equipment within housing against ingress of water.
- Protection of people against touching of moving mechanical parts within housing.

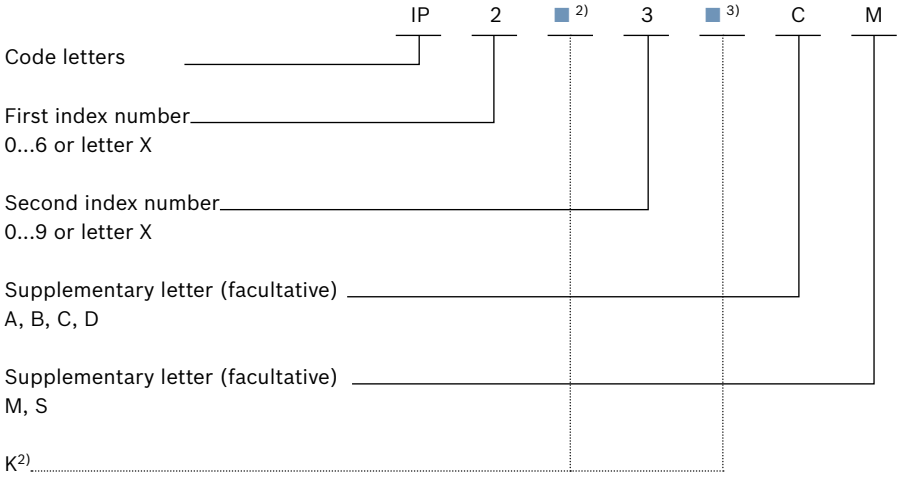
Fastening

- Housing fastening: By means of screws on the motor or transmission housing. Blowers are fastened in a similar manner, either to the drive motor or the air shroud.
- Flange mounting: The motor's drive-end support has a two or three-hole flange, or the front side contains three or four threaded holes for fastening.

Cooling

- Internal natural cooling: open-type design, without fan.
- Internal natural cooling: open-type design, with separate fan.
- Internal forced-air cooling: open-type design, with externally-driven fan.
- Surface natural cooling: closed design, without fan.
- Surface natural cooling: closed design, with separate fan.

IP-code structure



If an index number is not given, then the letter "X" must be substituted (i.e. "XX", if both index numbers are missing).
Additional and/or supplementary letters can be omitted without any substitution:

[2] The supplementary letter "K" is placed either immediately after the first index numbers 5 and 6 or immediately after the second index numbers 4, 6 and 9.

[3] During the water test for example: IP16KB protection against ingress of solid foreign bodies with a diameter ≥ 50 mm, protection against powerful spray water at high pressure, protection against being touched by fingers.

Explanations of IP code

1. Index number and supplementary letter K	Protection of electrical equipment against ingress of foreign bodies	People	2. Index number and supplementary letter K	Protection of electrical equipment against ingress of water	Letter (facultative)	Protection of people in event of contact with hazardous parts	Letter (facultative)	
0	Not protected	Not protected	0	Not protected	A	Protection against contact with back of hand	M	Motion of moving parts Teile [3]
1	Protection against foreign bodies Ø ≥ 50 mm	Protection against contact with back of hand	1	Protection against vertical droplets	B	Protection against contact with fingers	S	Standstill of moving parts Teile [3]
2	Protection against foreign bodies Ø ≥ 12.5 mm	Protection against contact with fingers	2	Protection against droplets, 15° Inclination	C	Protection against contact with tools		
3	Protection against foreign bodies Ø ≥ 2.5 mm	Protection against contact with tools	3	Protection against spray water	D	Protection against contact with wire		
4	Protection against foreign bodies Ø ≥ 1.0 mm	Protection against contact with wire	4	Protection against spray water				
5K	Dust-protected	Protection against contact with wire	4K	Protection against spray water with increased pressure				
6K	Dust-proof	Protection against contact with wire	5	Protection against spray water				
			6	Protection against powerful spray water				
			6K	Protection against powerful spray water with increased pressure				
			7	Protection against temporary immersion				
			8	Protection against permanent immersion				
			9K	Protection against high pressure/vapor pressure cleaning				

Operating modes (VDE 0530)

Continuous operation S 1
Operation with constant load condition, the duration of which is sufficient to reach the thermal steady-state condition.

Parameters for curve inspection

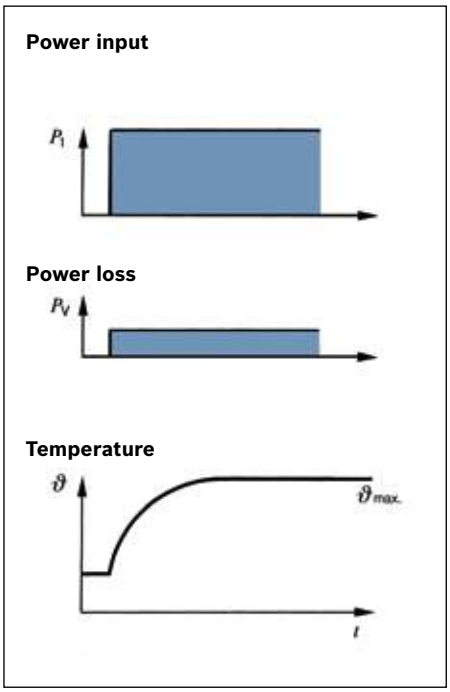
P_1	Power input
P_V	Power loss
ϑ	Temperature
ϑ_{max}	Highest temperature
t_B	Load period
t_r	Relative on period (as percentage)
t_S	Duration
t_{St}	Standstill period

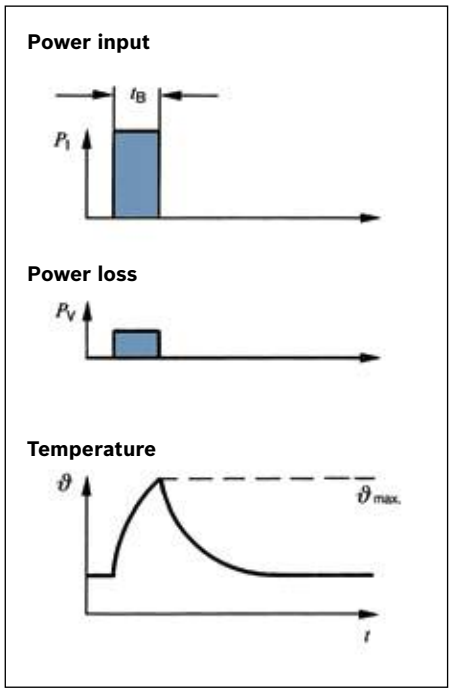
Short-term operation S 2
Operation with constant load condition, which does not last long enough however to enable the thermal steady-state condition to be reached, and a subsequent pause, which lasts long enough for the motor temperature not to deviate more than 2 K from the coolant temperature.

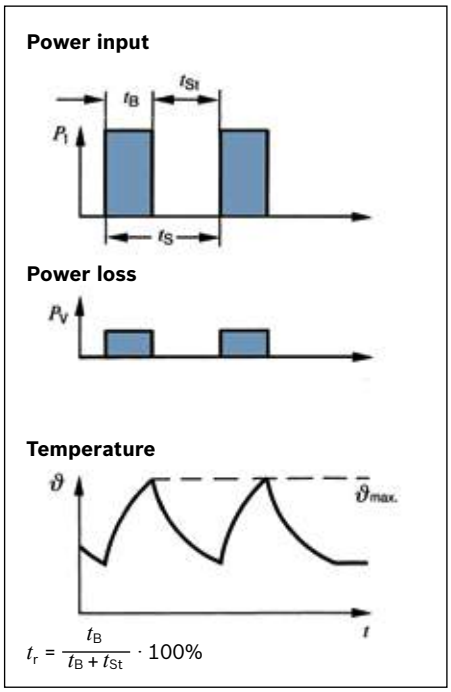
Example: S 2 – 60 min
(The stated time refers to 60 minutes of operation at normal rating)

Intermittent operation S 3
Operation, comprised of a sequence of similar cycles, each of which encompasses a time with constant load and a pause, whereby the startup current does not exert any perceptible influence on heating.

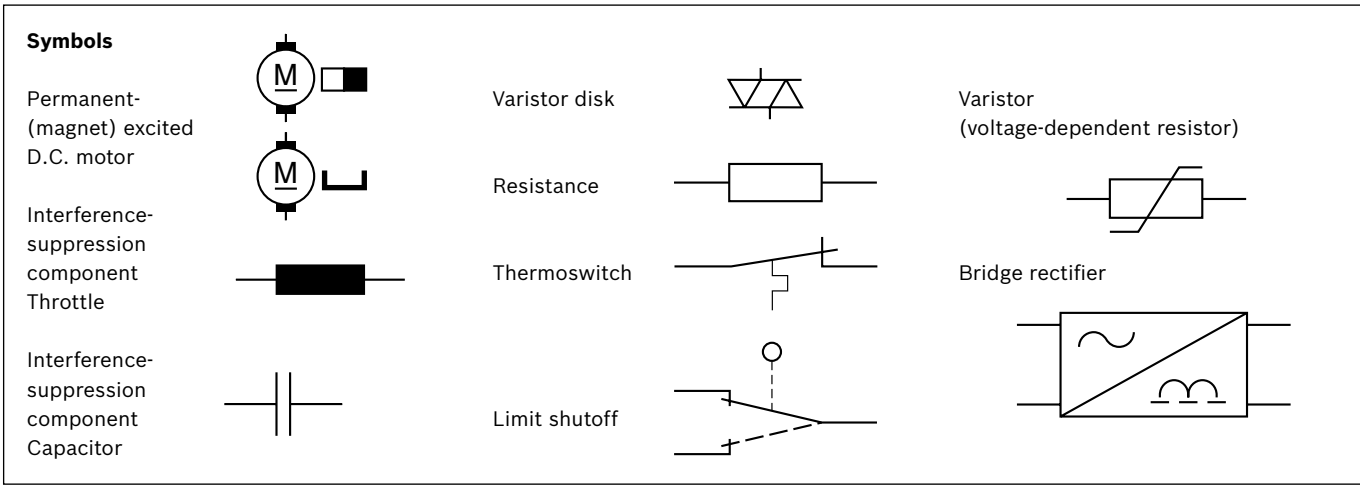
Example: S 3 – 10%
(Stated percentage refers to on period)







Symbols

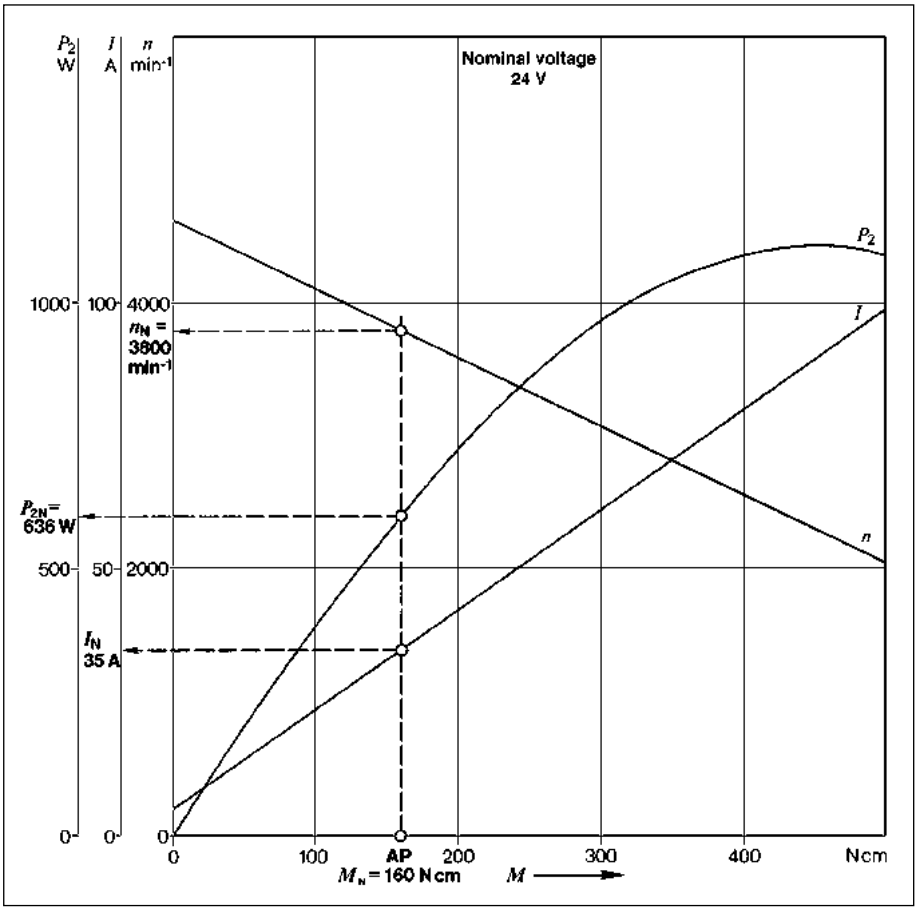


Characteristic curves

With a specified working point of 160 Ncm one plots a vertical line to the torque axis. The intersecting points of these vertical lines with the various characteristic curves result in the operating data for the rated speed n_N, rated current I_N and mechanical output P_{2N}.

Explanation of characteristic curve evaluation
AP Working point
M Torque
P_2 Power output
I Current
n Rotational speed

Example:
Given: M_N = 160 Ncm.
Found: n_N = 3.800 rpn (min^{-1}).
P_{2N} = 636 W and I_N = 35 A.



CE-Identification and manufacturer declaration in accordance with EU directive

As under the EU Directive all electrically-powered machines, devices and systems, which are manufactured, imported and sold within the borders of the European Union must have a CE-label attached to them.
The EU Directive also includes the following individual guidelines, which are of significance for motor users.

1. Machine Directive
It is valid for self-contained operational machines or any interlinking of machines to form integral systems.
It is not valid for machine components however, such as, for example, electrical control systems or electric motors which have no independent function.
The entire machine or system must always comply with the Directive.

2. Low-voltage Directive
It is valid and is to be applied for all electric motors as from a low-voltage limit of 75 V for D.C. voltage and 50 V for A.C. voltage and higher.
Because the electric motors listed in this catalogue are designed for rated voltages of up to maximum 24 V, they are not governed by this Directive.

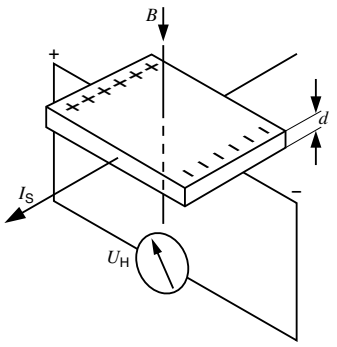
3. EMC Directive
This Directive is valid for all electrical and electronic devices, installations and systems. However, this Directive is also valid for complex components such as, e.g. electric motors, although this only applies where they are openly available for purchase by the public. The electric motors listed in this catalogue are solely shipped as supplied parts or replacement parts, and are not subject to § 5 paragraph 5 of the EMC Act regarding a mandatory CE label.
The limits for the relaying and the radiation of high-frequency interference are specified in EN 55014 of the EMC Act.
Because of the previously-mentioned reasons, Bosch electric motors are on no account subject to mandatory CE labeling.

We will gladly assist you with information in all matters relating to the acceptance of your application.

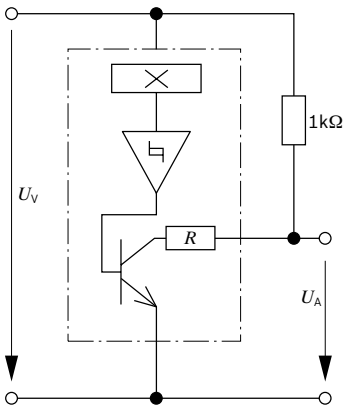
Motors with Hall sensor

Hall effect

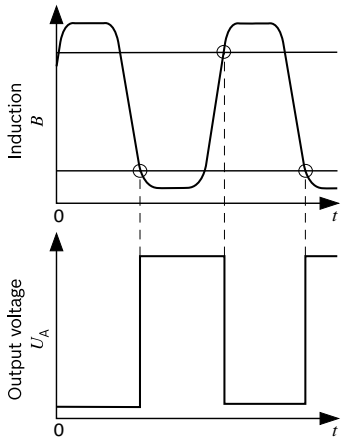
Hall effect
d Thickness of chip



Circuit



Characteristic curves



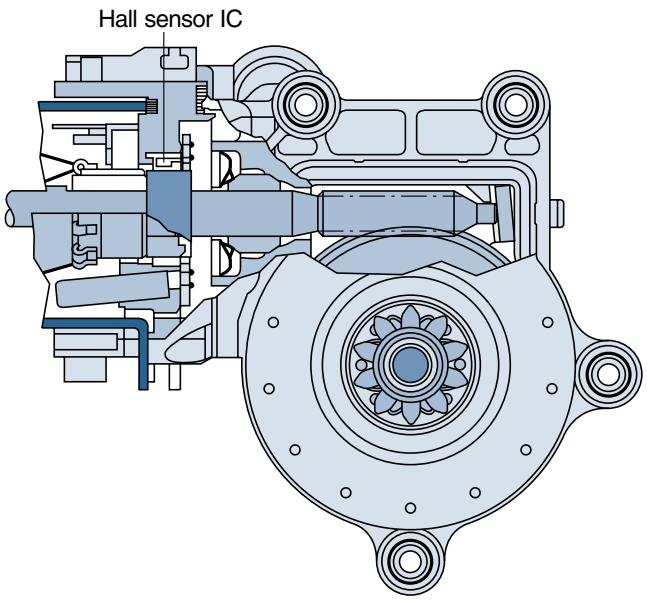
If a current I_S flows through a chip, a Hall voltage U_H is generated transverse to the direction of the current, the size of which is proportional to the magnetic induction B (vertical to I_S) and the current I_S.
The Hall voltage U_H is made up of:

$$U_H = R_H \cdot \frac{I_S \cdot B}{d}$$

R_H Hall-constant factor

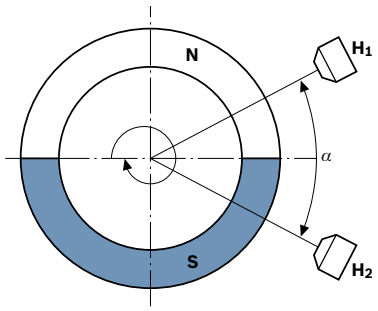
Since the resulting Hall voltages are extremely small, they are amplified.
When using silicon Hall elements, the circuit for signal processing (e.g. a Schmitt trigger with subsequent driver) are integrated directly onto the same chip. This component is then designated a Hall-IC. The output is a transistor with open collector, with which a switching function is realized.

Permanently connected to the armature shaft is a magnetic ring, the magnetic field of which permeates the Hall element. When the armature shaft rotates, the magneto-motive-force direction in the Hall element changes. The output transistor is then either switched through or open.

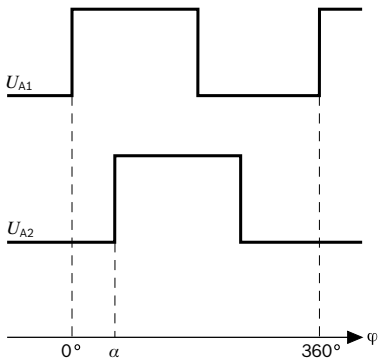


Hall-effect applications in D.C. motors
By counting the generated output-voltage pulses, one can determine the number of rotations and thus the speed. If the rotational motion is converted into a linear motion, it then becomes possible to monitor the adjustment travel exactly. If there are two Hall generators installed offset to each other at a specific angle α in a motor, then the direction of rotation can also be determined.

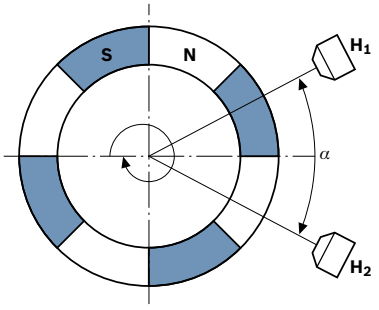
Basic arrangement in motor with 2-pole ring magnet



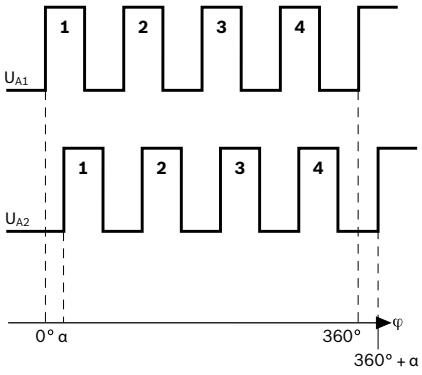
Output signals, 1 armature rotation



Basic arrangement in motor with 8-pole ring magnet



Output signals, 1 armature rotation



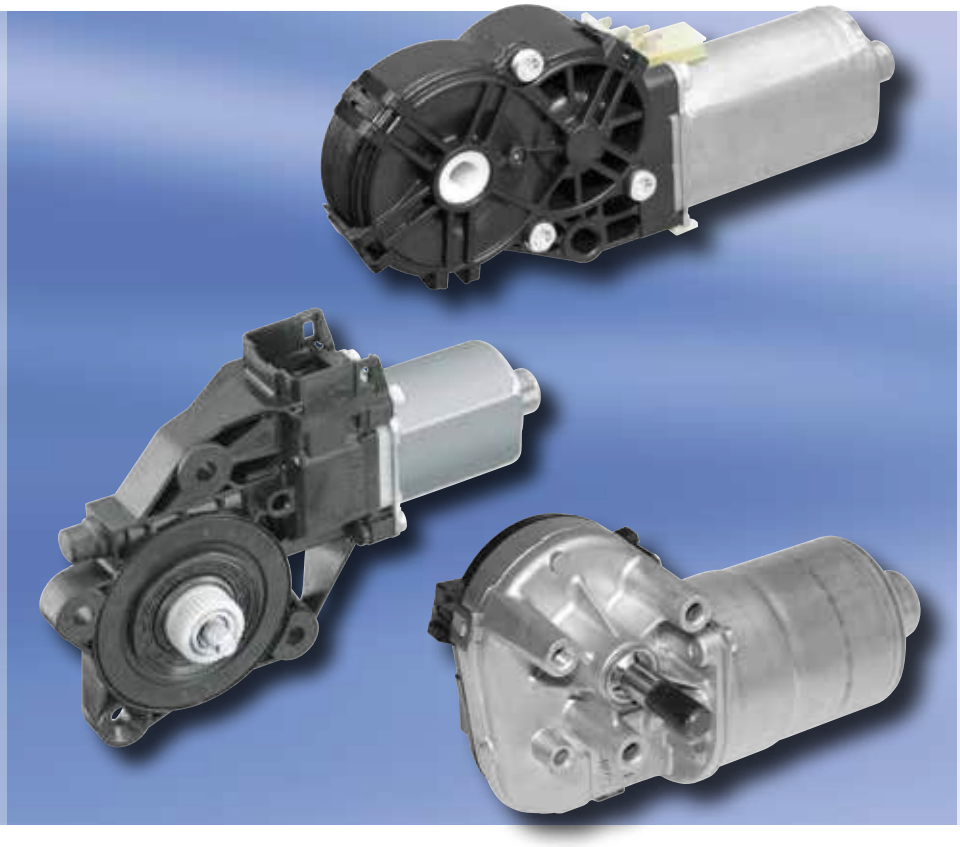
Basic arrangement in motor

H_1, H_2	Hall generator
N	North pole
S	South pole
α	Angle between the two Hall generators

Output signals

U_{A1}	Output voltage of first Hall generator
U_{A2}	Output voltage of second Hall generator
α	Angle between the two Hall generators
φ	Rotational angle

D.C. motors with transmission



Product features

- Wide range of permanently-excited motor-and-gear assemblies
- D.C. voltage range from 12 to 24 Volt
- Available with and without self-locking feature

Advantages for your application

- A multitude of different sizes and designs for greater flexibility
- Robust and reliable quality, well-proven millions of times over in automobiles
- High reliability
- Favorable price/performance ratio

Bosch electric motors with transmission provide suitable solutions for almost every application. They provide a wide range of performance and are highly versatile in their application. The new generation of Bosch adjustment motors have a compact design and have been optimized in terms of installation space and weight. In addition to this, they are exceptionally quiet and highly robust.
The desired speed can easily be regulated by changing the voltage. The direction of rotation can be inverted by changing over +/–. Maximum torque is available during the startup phase.

Application examples

Automotive technology:
Flap positioning for climate control, air proportioning and distribution, wiper motors, power-window motors, seat-adjustment motors, adjustment motors

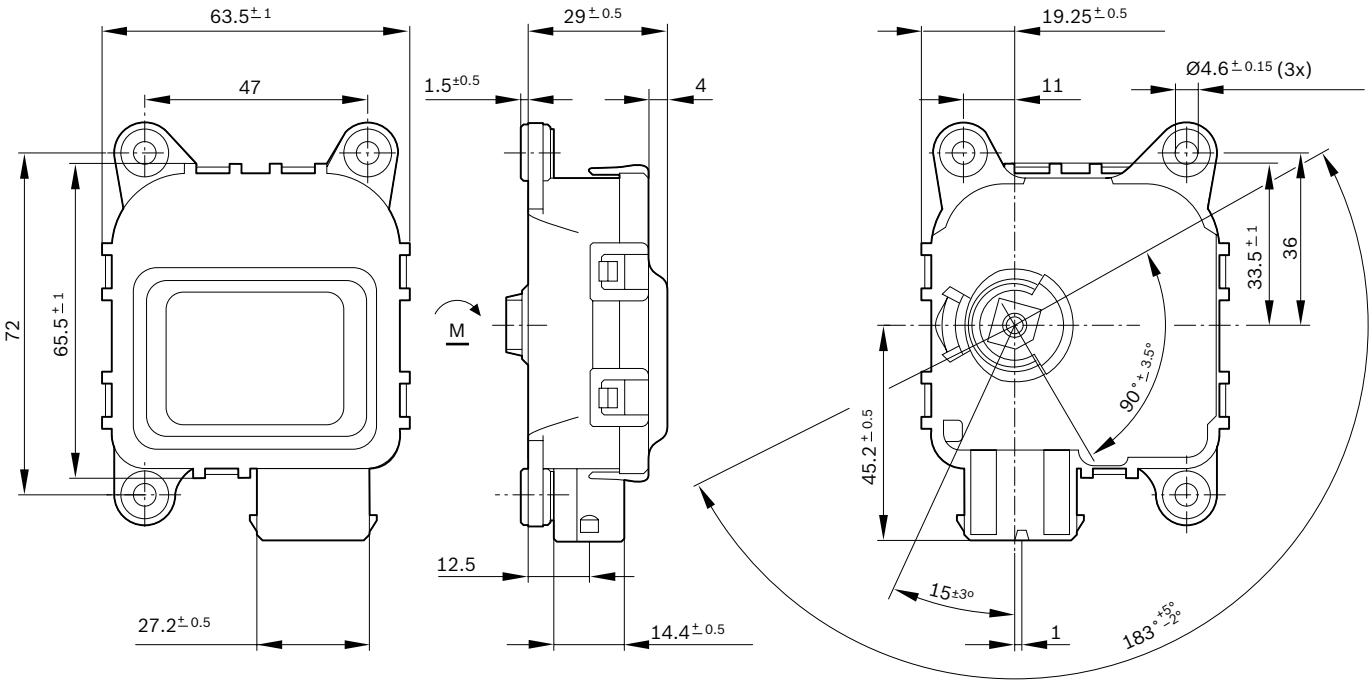
Industrial applications:
Control motors, garage-door drives, locking systems, furniture, medical technology etc.

VMC

Family features:

- With and without potentiometer
- Degree of protection: IP 40
- Operation mode: S2
- Direction of rotation: CCW/CW

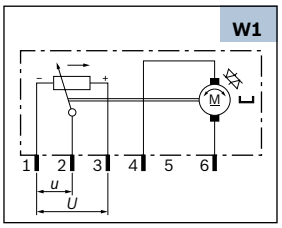
Voltage	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Direction of rotation	Degree of protection	Signal	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm				Poti				
12 V	0 132 801 142	0.3	0.18	7	0.4	0.9	310:1	CCW/CW	IP 40	No	W2	S1	C1	P2
24 V	0 132 801 143	0.3	0.10	6	0.4	0.9	405:1	CCW/CW	IP 40	No	W3	S1	C1	P3
	0 132 801 141	0.3	0.10	6	0.4	0.9	405:1	CCW/CW	IP 54	Yes	W1	S2	C1	P1



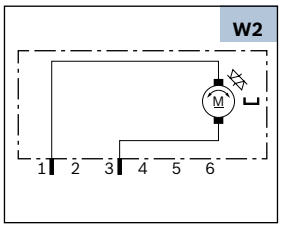
VMC

Wiring diagram (W)

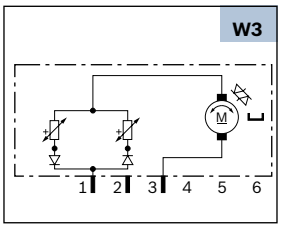
W1



W2

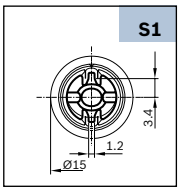


W3

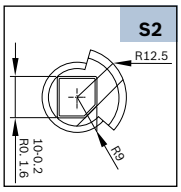


Drive end (S)

S1

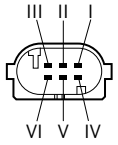


S2



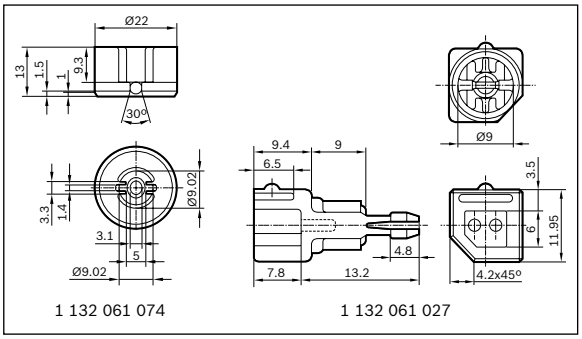
Mating connector (C)

C1



Housing: RB-1 928 403 095
Locker: –
Terminal: TE 5-928999-1

Accessories

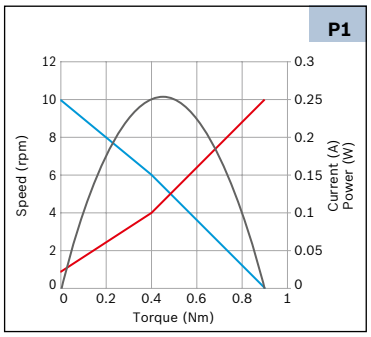


1 132 061 074

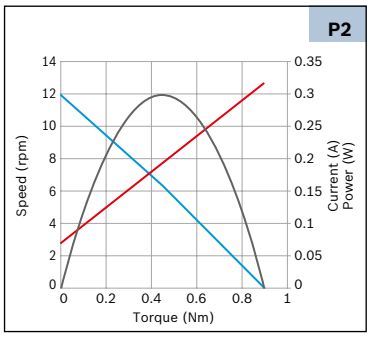
1 132 061 027

Performance curve (P)

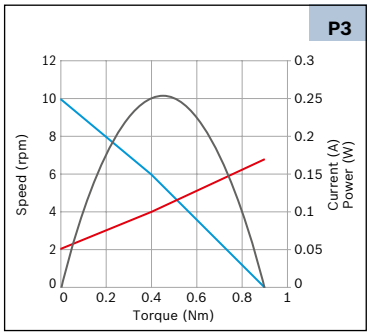
P1



P2



P3



AHC1

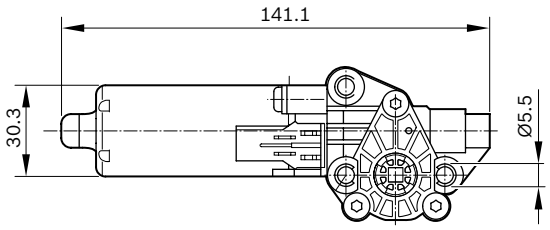
Family features:

- With and without hall sensor
- Degree of protection: IP 50
- Operation mode: S2
- Hollow shaft

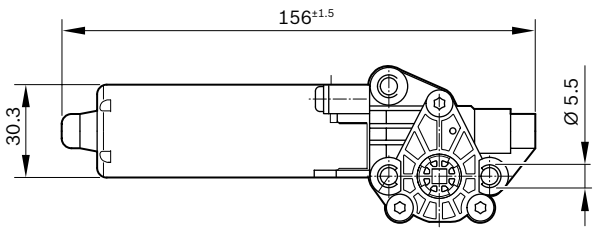
Voltage	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Signal	Side**	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm		Hall						
12 V	0 390 201 900	8,8	5	845	0.1	1.05	27:4	No	R	D1	W1	S1	C1	P1
	0 390 201 912	8,8	5	845	0.1	1.05	27:4	No	L	D1	W1	S1	C1	P1
	0 390 201 902	8,8	5	845	0.1	1.05	27:4	Yes	R	D1	W2	S1	C2	P1
	0 390 201 914	8,8	5	845	0.1	1.05	27:4	Yes	L	D1	W2	S1	C2	P1
	0 390 203 371	12.9	4	411	0.3	1.5	27:4	Yes	L	D2	W2	S2	C2	P6
	0 390 201 901	8.6	5	820	0.1	1.5	27:4	No	R	D2	W1	S1	C1	P2
	0 390 201 903	8,6	5	820	0.1	1.5	27:4	Yes	R	D2	W2	S1	C2	P2
	0 390 201 913	8.6	5	820	0.1	1.5	27:4	No	L	D2	W1	S1	C1	P2
	0 390 201 915	8.6	5	820	0.1	1.5	27:4	Yes	L	D2	W2	S1	C2	P2
	0 390 203 370	6.6	3.8	210	0.3	2.8	31:2	Yes	L	D2	W5	S2	C2	P7
	0 390 203 431	13.2	7	63	2	5.8	50:1	Yes	L	D3	W3	S3	C2	P3
24 V	0 390 203 314	8.8	3.2	841	0.1	1.85	27:4	No	R	D2	W4	S2	C1	P4
	0 390 203 315	8.8	3.2	841	0.1	1.85	27:4	No	L	D2	W4	S2	C1	P4
	0 390 203 316	8.8	3.2	841	0.1	1.85	27:4	Yes	R	D2	W3	S2	C2	P4
	0 390 203 317	8.8	3.2	841	0.1	1.85	27:4	Yes	L	D2	W3	S2	C2	P4
	0 390 203 386	15.6	4.8	99.5	1.5	11	50:1	2x Hall*	L	D4	W6	S3	C1	P5

* Optional (0 986 196 002) / **gear housing left: L, gear housing right: R

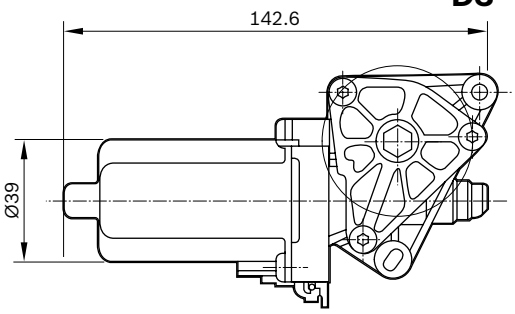
D1



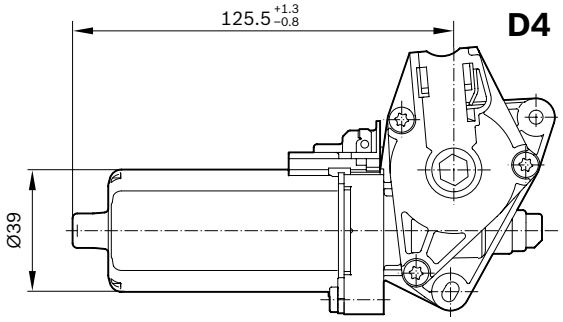
D2



D3



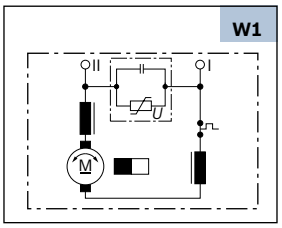
D4



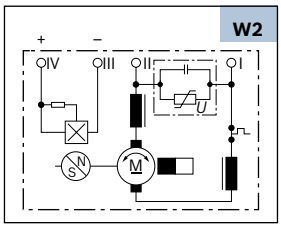
AHC1

Wiring diagram (W)

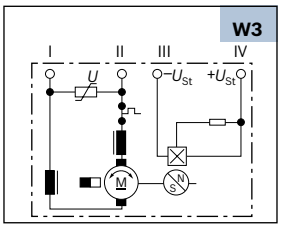
W1



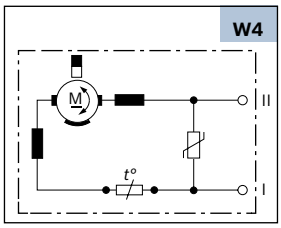
W2



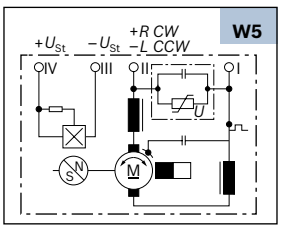
W3



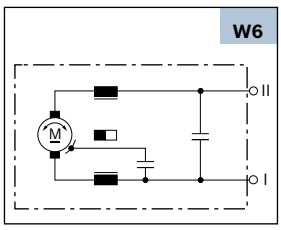
W4



W5

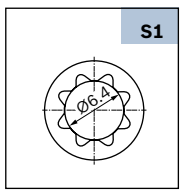


W6

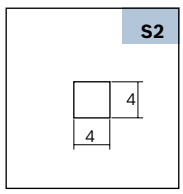


Drive end (S)

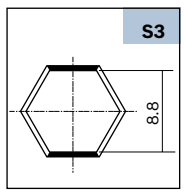
S1



S2

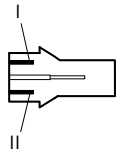


S3



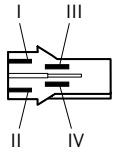
Mating connector (C)

C1



Housing: TE 968182-1
Locker: TE 0-9868183-1
Terminal: TE JPT 0-9827768-1 (x2) / Micro-Timer III

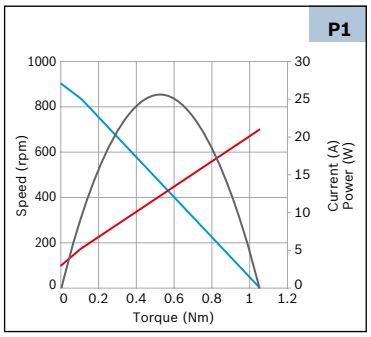
C2



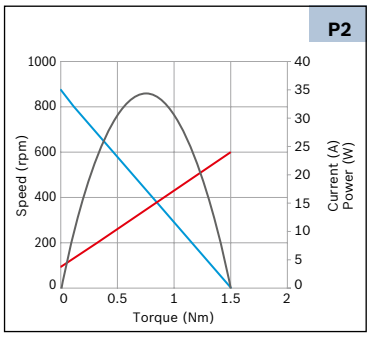
Housing: FCI 3 023 59 01
Locker: TE-0968183-1
Terminal: TE JPT 0-9827768-1 (x2) / Micro-Timer III

Performance curve (P)

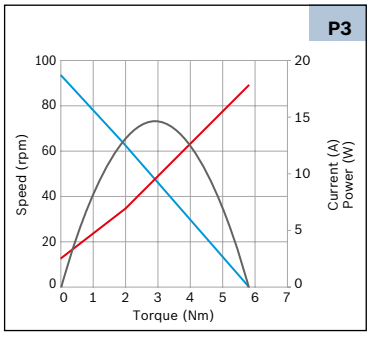
P1



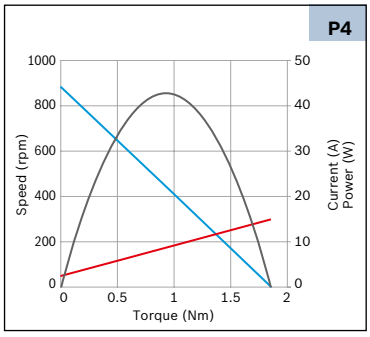
P2



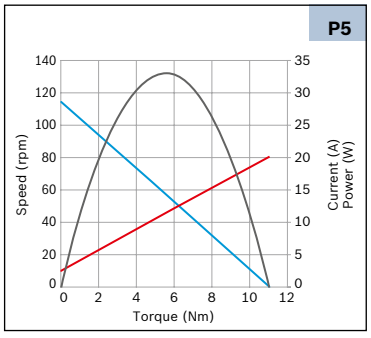
P3



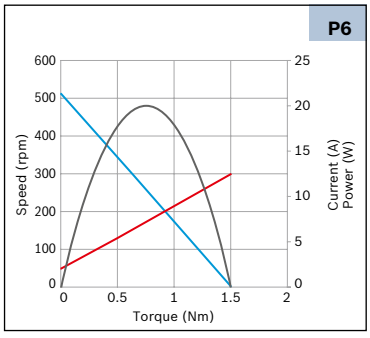
P4



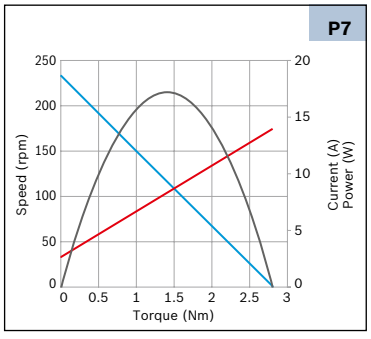
P5



P6



P7



AHC2

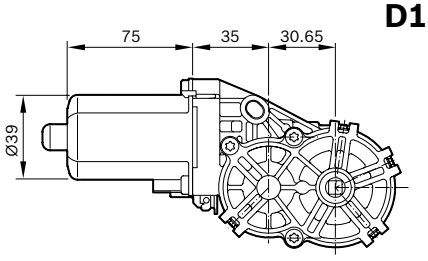
Family features:

- With and without hall sensor
- Degree of protection: IP 50
- Operation mode: S2
- Direction of rotation: CCW/CW

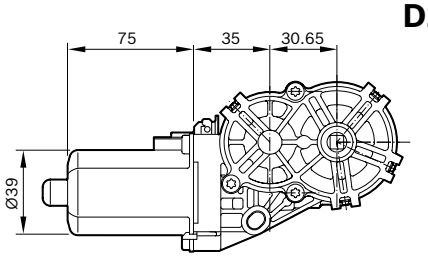
Voltage	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Direction of rotation	Signal	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm			Hall						
12 V	0 390 203 228	3.9	2.8	37.3	1	10.35	182:2	CCW/CW	No	R	D1	W5	S1	C1	P4
	0 390 201 972	4.7	4	22.5	2	19	185.5:1	CCW/CW	Yes	R	D3	W6	S1	C2	P2
	0 390 201 973	4.7	4	22.5	2	19	185.5:1	CCW/CW	No	R	D3	W1	S1	C2	P2
	0 390 201 944	6	6	28.5	2	20	185.5:1	CCW/CW	No	R	D1	W7	S4	C1	P1
	0 390 201 999	4.7	4	22.5	2	19	185.5:1	CCW/CW	No	R	D3	W2	S1	C2	P2
	0 390 203 224	3.9	3.7	18.65	2	21.5	217:1	CCW/CW	No	R	D3	W3	S2	C1	P3
	0 390 203 225	3.9	3.7	18.65	2	21.5	217:1	CCW/CW	No	L	D4	W3	S2	C1	P3
	0 390 203 226	3.9	3.7	18.65	2	21.5	217:1	CCW/CW	Yes	R	D3	W4	S2	C3	P3
	0 390 203 227	3.9	3.7	18.65	2	21.5	217:1	CCW/CW	Yes	L	D4	W4	S2	C3	P3
	0 390 201 950	6.1	6	29	2	20.5	185.5:1	CCW/CW	No	R	D1	W3	S3	C1	P1
	0 390 203 266	3.5	4.2	22.25	1.5	23	185.5:1	CCW/CW	No	R	D1	W3	S1	C1	P5
	0 390 201 949	2.5	3.6	23.6	1	14.5	185.5:1	CCW/CW	No	R	D1	W3	S1	C1	P7
	0 390 203 306	3.9	3.7	18.65	2	23.9	217:1	CCW/CW	No	R	D3	W3	S5	C1	P8
	0 390 203 307	3.9	3.7	18.65	2	23.9	217:1	CCW/CW	No	L	D4	W3	S5	C1	P3
	0 390 203 308	3.9	3.7	18.65	2	23.9	217:1	CCW/CW	Yes	R	D3	W4	S5	C3	P3
	0 390 203 309	3.9	3.7	18.65	2	23.9	217:1	CCW/CW	Yes	L	D4	W4	S5	C3	P3
24 V	0 390 203 310	3.5	2	16.9	2	23.3	217:1	CCW/CW	No	R	D3	W8	S3	C1	P6
	0 390 203 311	3.5	2	16.9	2	23.3	217:1	CCW/CW	No	L	D4	W8	S3	C1	P6
	0 390 203 312	3.5	2	16.9	2	23.3	217:1	CCW/CW	Yes	R	D3	W9	S3	C3	P6
	0 390 203 313	3.5	2	16.9	2	23.3	217:1	CCW/CW	Yes	L	D4	W9	S3	C3	P6

*Gear housing left: L, gear housing right: R

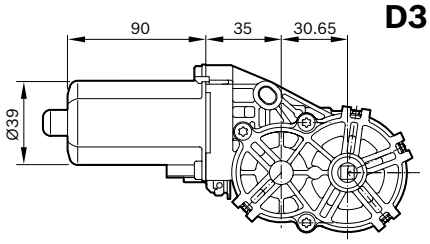
D1



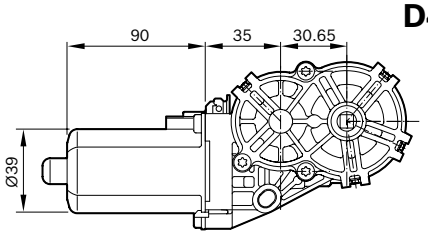
D2



D3



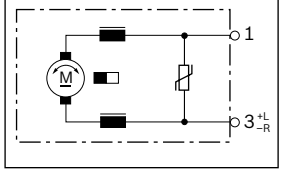
D4



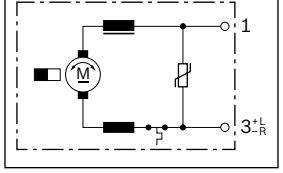
AHC2

Wiring diagram (W)

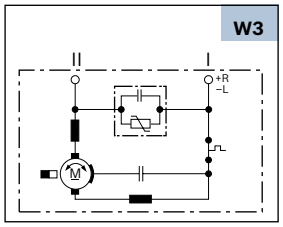
W1



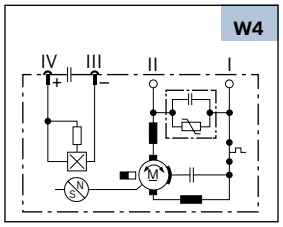
W2



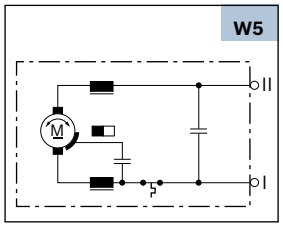
W3



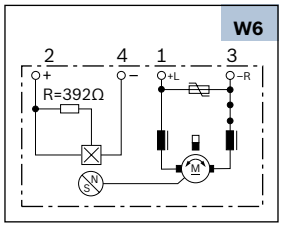
W4



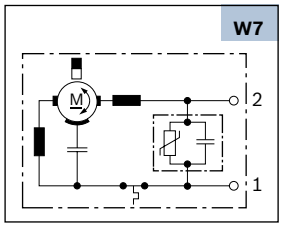
W5



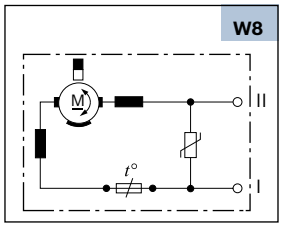
W6



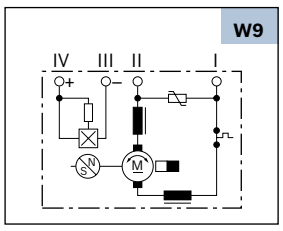
W7



W8

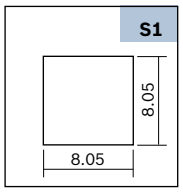


W9

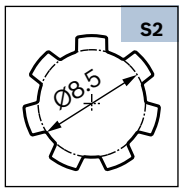


Drive end (S)

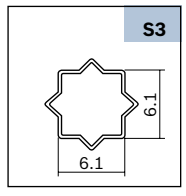
S1



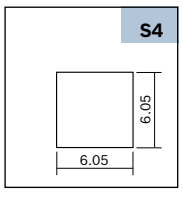
S2



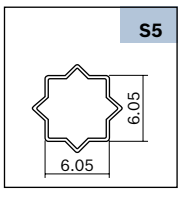
S3



S4

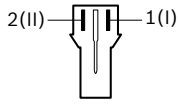


S5



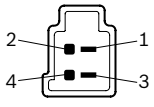
Mating connector (C)

C1



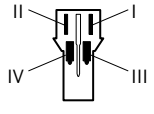
Housing: TE 0-968182-1
Locker: TE 0-968183-1
Terminal: TE JPT 0-927768-1 (x2)

C2



Housing: FCI 3 023 59 01
Locker: –
Terminal: TE MQS PIN Contact 6-928918-1

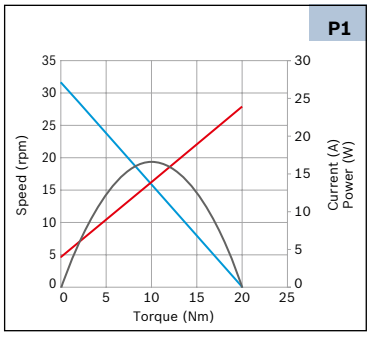
C3



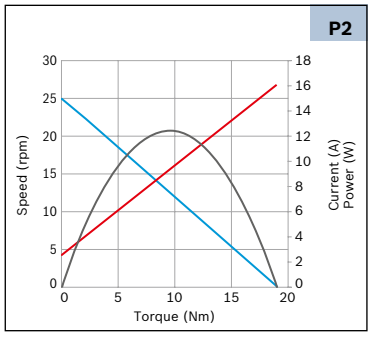
Housing: AMP-NR 968182-1
Locker: AMP-NR 968183-1
Terminal: AMP JPT 0-9277681-2 (x2)

Performance curve (P)

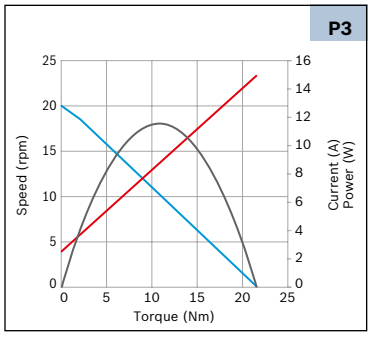
P1



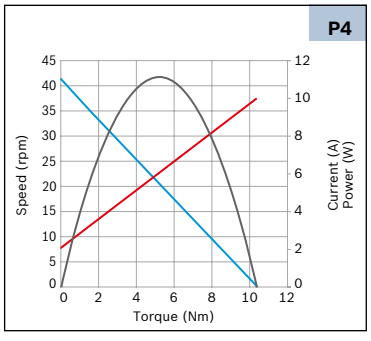
P2



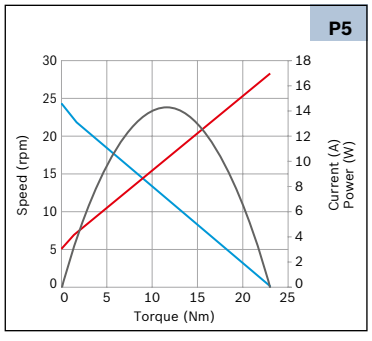
P3



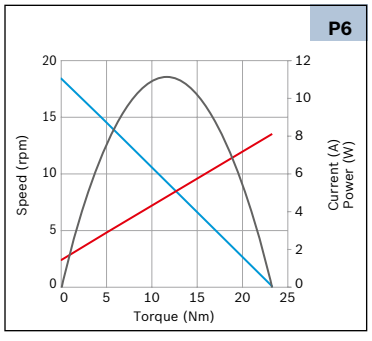
P4



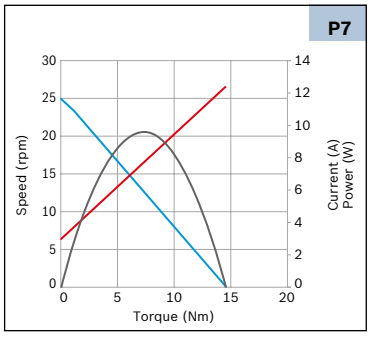
P5



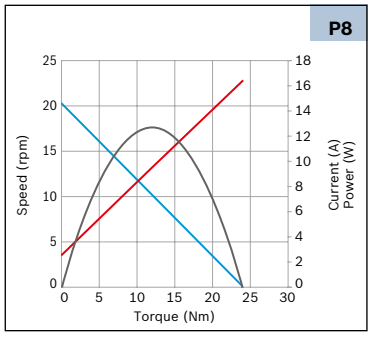
P6



P7



P8



AHC-P2

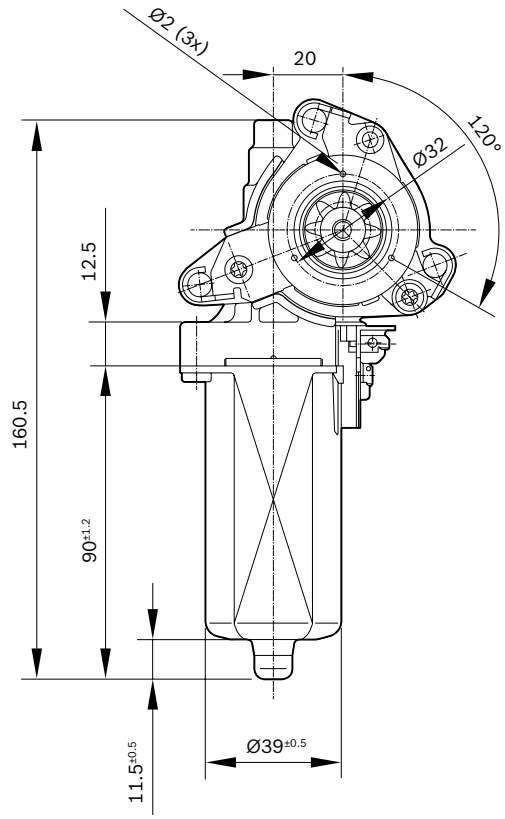
Family features:

- With and without hall sensor
- Degree of protection: IP 20
- Operation mode: S2
- Direction of rotation: CCW/CW

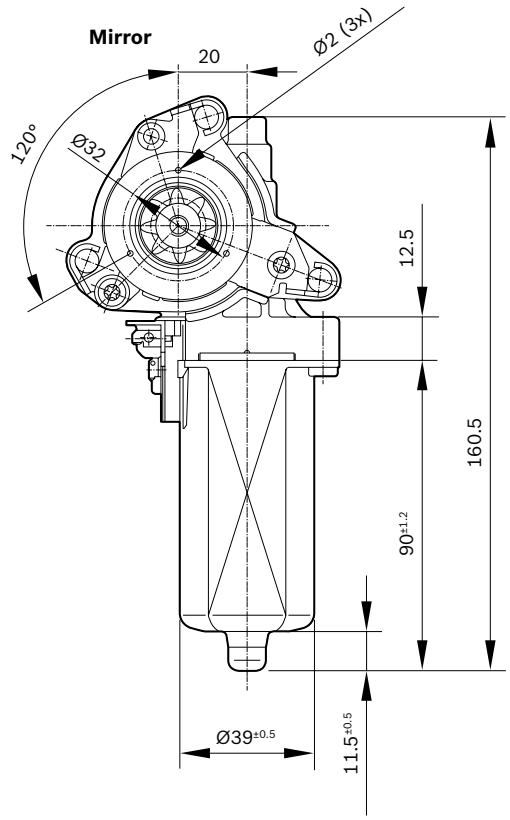
	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Signal	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm		Hall						
12 V	0 390 203 045	1.3	4.2	6.4	2	27.5	506:1	Yes	L	D2	W1	S1	C1	P1
	0 390 203 046	1.3	4.2	6.4	2	27.5	506:1	Yes	R	D1	W1	S1	C1	P1

*Gear housing left: L, gear housing right: R

D1



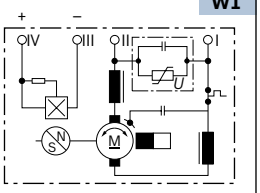
D2



AHC-P2

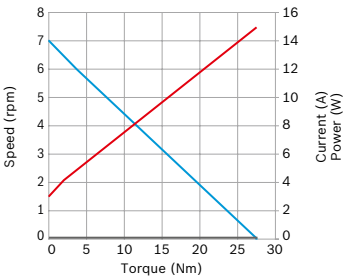
Wiring diagram (W)

W1



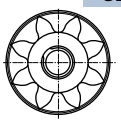
Performance curve (P)

P1



Drive end (S)

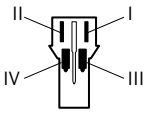
S1



DIN-867 8 teeth

Mating connector (C)

C1



Housing: TE 968182-1
Locker: TE 0-968183-1
Terminal: TE JPT 0-927768-1 / MTIII 0-968052-1 (x2)

FPG2

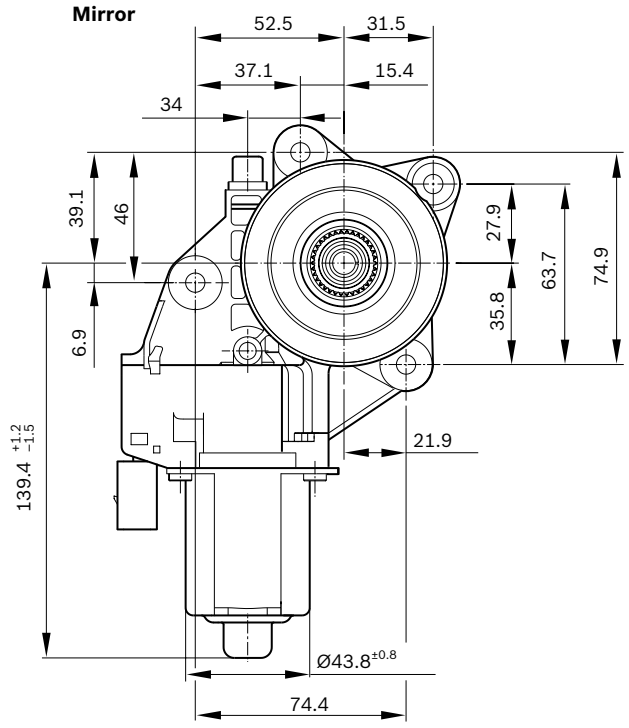
Family features:

- Double-hall sensor available
- Degree of protection: IP 53
- Operating mode: S2
- Direction of rotation: CCW/CW

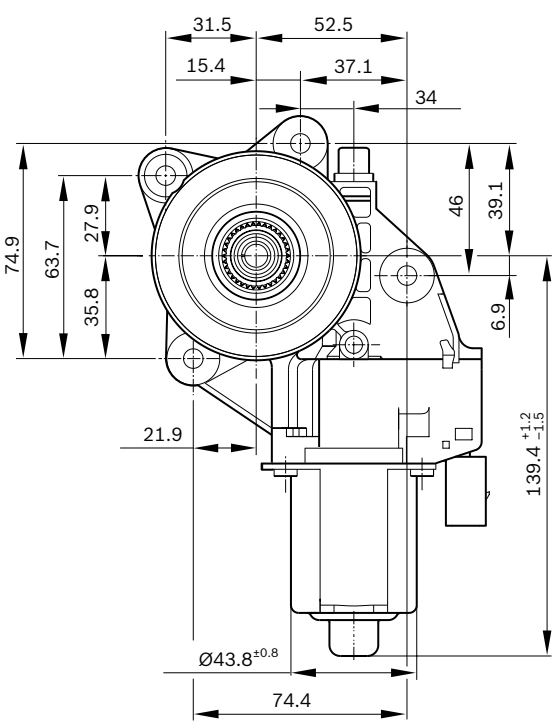
	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Signal	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm		Hall						
12 V	0 130 822 488	7.8	6	74.5	1	13.7	73:1	No	R	D1	W1	S1	C1	P1
	0 130 822 489	7.8	6	74.5	1	13.7	73:1	No	L	D2	W1	S1	C1	P1
	0 130 822 492	7.8	6	74.5	1	13	73:1	2x	R	D1	W1 + W3	S1	C2	P3
	0 130 822 493	7.8	6	74.5	1	13	73:1	2x	L	D2	W1 + W3	S1	C2	P3
24 V	0 130 822 490	8.2	3	78.5	1	13.7	73:1	No	R	D1	W2	S1	C1	P2
	0 130 822 491	8.2	3	78.5	1	13.7	73:1	No	L	D2	W2	S1	C1	P2
	0 130 822 494	8.2	3	78.5	1	13.7	73:1	2x	R	D1	W3	S1	C2	P2
	0 130 822 495	8.2	3	78.5	1	13.7	73:1	2x	L	D2	W3	S1	C2	P2

*Gear housing left: L, gear housing right: R

D1



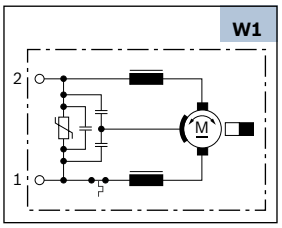
D2



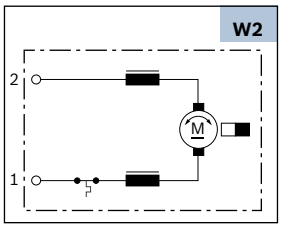
FPG2

Wiring diagram (W)

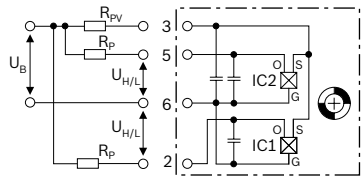
W1



W2



W3



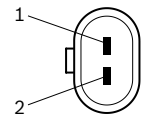
Drive end (S)

S1

DIN5481 - 21x24

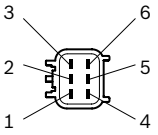
Mating connector (C)

C1



Housing: Lear 16694.627.626 / TE 493989-1
Locker: –
Terminal: LEAR MDK 3 PLUS 26628.331.179

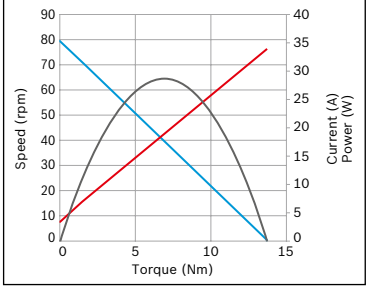
C2



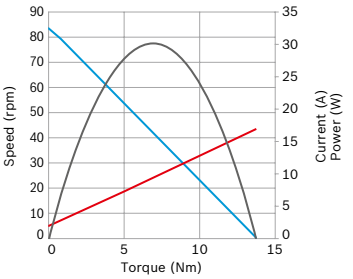
Housing: Yazaki 7287-1116-30
Locker: –
Terminal: LEAR MDK 3 PLUS 26628.331.179

Performance curve (P)

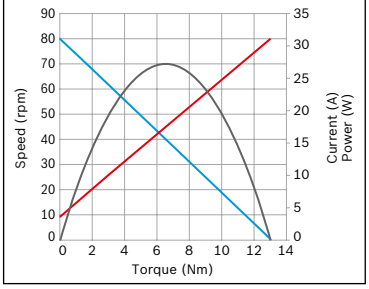
P1



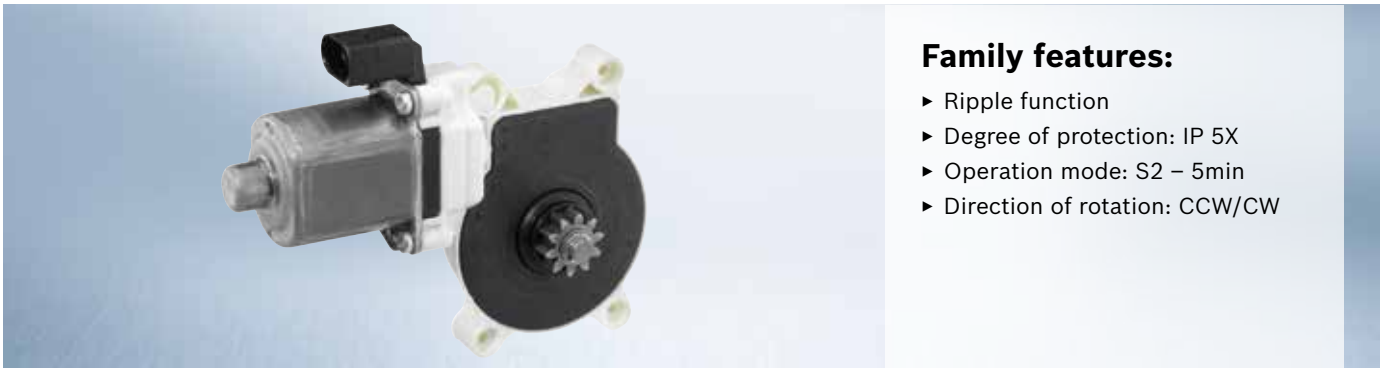
P2



P3



FPG EVO



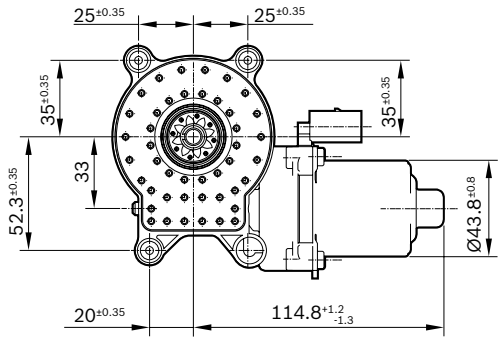
Family features:

- Ripple function
- Degree of protection: IP 5X
- Operation mode: S2 – 5min
- Direction of rotation: CCW/CW

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Signal	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm		ripple						
12 V	F 006 B49 702	8.6	6	82	1	10	73:1	Yes	R	D1	W1	S1	C1	P1
	F 006 B49 703	8.6	6	82	1	10	73:1	Yes	L	D2	W1	S1	C1	P1
	F 006 B49 680	8.6	6	82	1	10	73:1	Yes	R	D1	W2	S2	C1	P1
	F 006 B49 681	8.6	6	82	1	10	73:1	Yes	L	D2	W2	S2	C1	P1
	F 006 B49 682	8.6	6	82	1	10	73:1	Yes	R	D3	W2	S3	C1	P1
	F 006 B49 683	8.6	6	82	1	10	73:1	Yes	L	D4	W2	S3	C1	P1
	F 006 B49 780	8.6	6	82	1	10	73:1	Yes	R	D1	W2	S4	C1	P1
	F 006 B49 781	8.6	6	82	1	10	73:1	Yes	L	D2	W2	S4	C1	P1

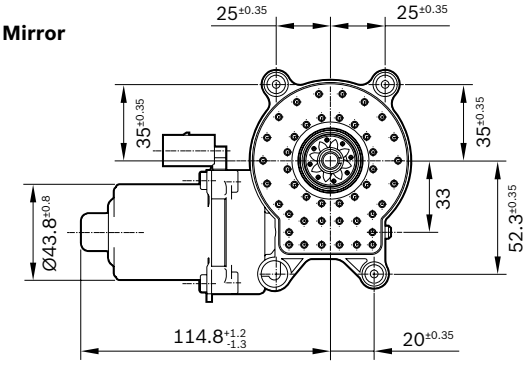
*Gear housing left: L, gear housing right: R

D1

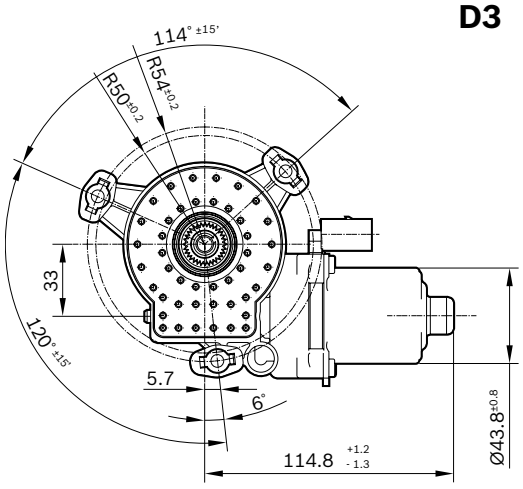


D2

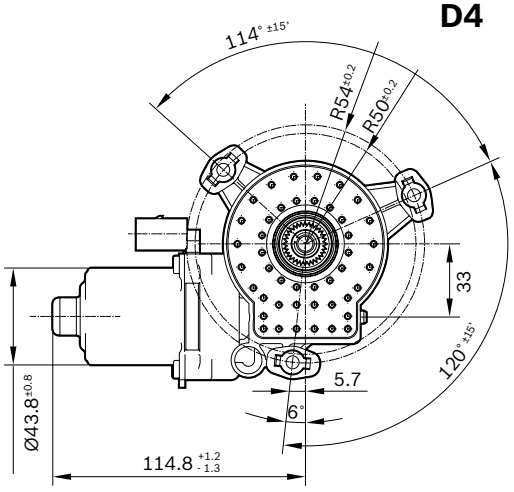
Mirror



D3

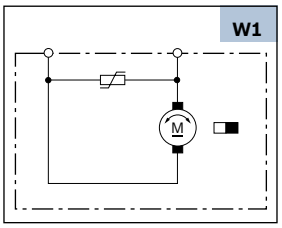


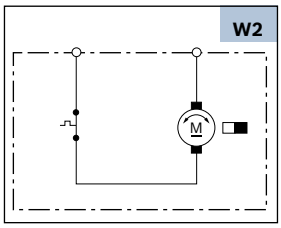
D4



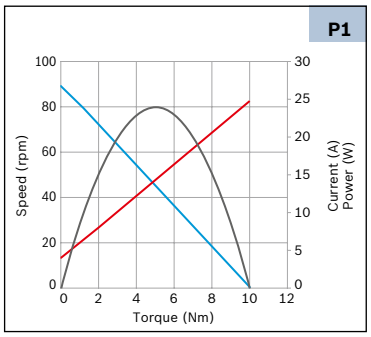
FPG EVO

Wiring diagram (W)

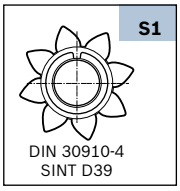


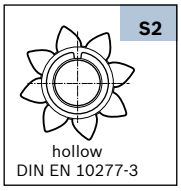


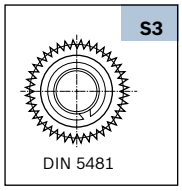
Performance curve (P)

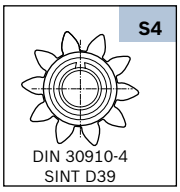


Drive end (S)

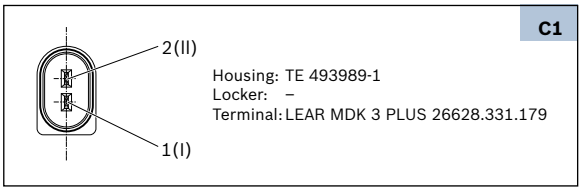




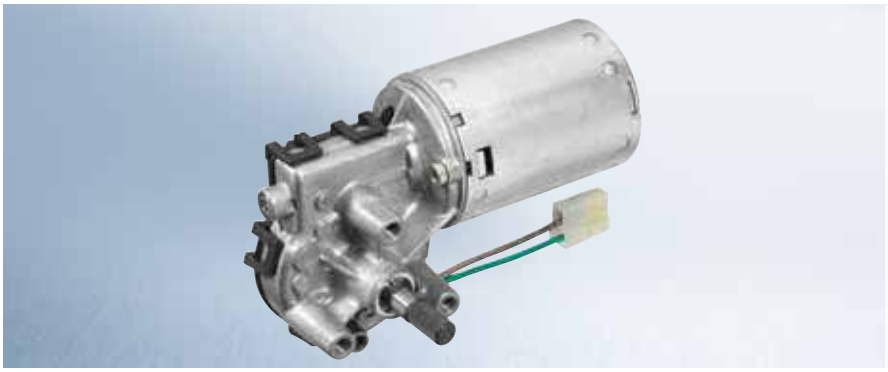




Mating connector (C)



CHP



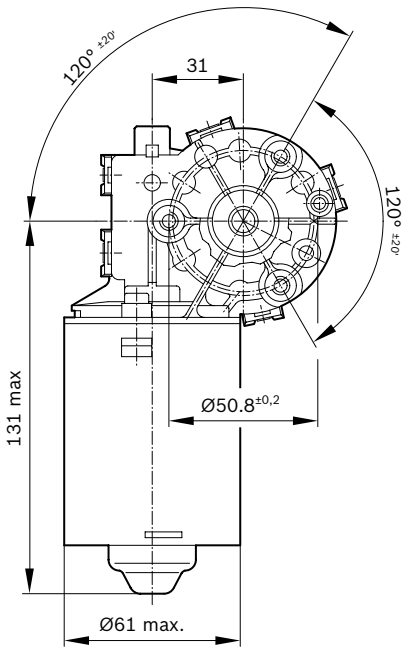
Family features:

- Degree of protetion: IP 23
- Operation mode: S1
- Direction of rotation: CCW/CW

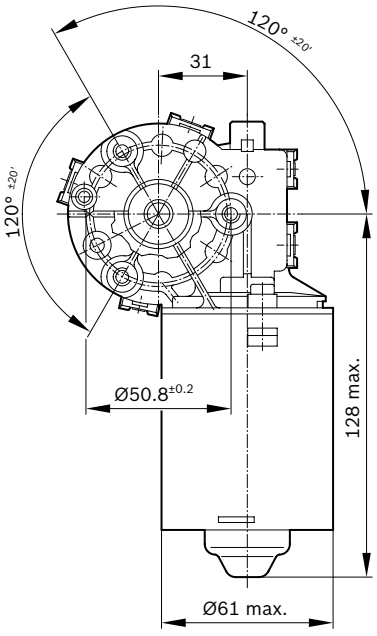
Voltage	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque	Ma (Stall torque)	Gear ratio	Signal	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm		Hall						
12 V	F 006 B20 093	28.1	9	167.5	1.6	16	52:2	No	R	D1	W3	S1	C1	P1
	F 006 B20 092	20.7	4.5	44	4.5	27	69:1	No	L	D2	W2	S2	–	P7
24 V	F 006 B20 103	18.8	3.1	180	1	10	52:2	No	R	D1	W3	S1	C1	P9
	F 006 B20 101	11.3	2	108	1	18	52:2	No	L	D3	W3	S6	C1	P3
	F 006 B20 102	41.9	5.5	160	2.5	12	52:2	No	R	D1	W4	S5	C1	P6
	F 006 B20 099	13.1	2.5	125	1	15	52:2	No	L	D3	W3	S5	C1	P4
	F 006 B20 100	13.1	2.5	125	1	15	52:2	No	R	D1	W3	S5	C1	P4
	F 006 B20 095	7.7	3.5	49	1.5	15	55:1	No	R	D1	W4	S7	–	P5
	F 006 B20 096	9.7	1.5	37	2.5	27	55:1	No	L	D2	W1	S3	C1	P8
	F 006 B20 179	11.3	2	108	1	18	52:2	No	L	D3	W3	S6	C1	P11
	F 006 B20 097	16.7	5.3	66.5	2.4	24	69:1	No	L	D3	W3	S3	–	P2
	F 006 B20 098	13.6	4	54	2.4	24	55:1	No	L	D3	W3	S4	C1	P10

*Gear housing left: L, gear housing right: R

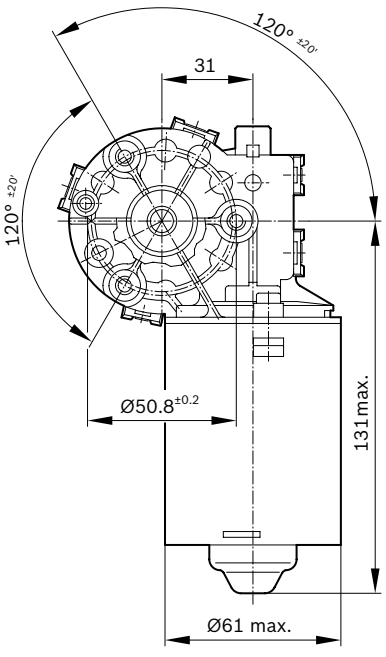
D1



D2



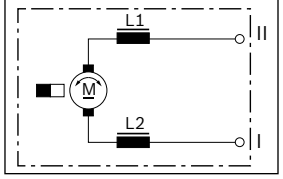
D3



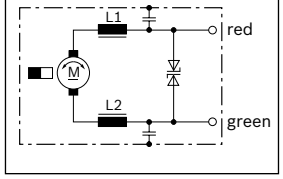
CHP

Wiring diagram (W)

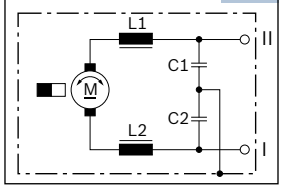
W1



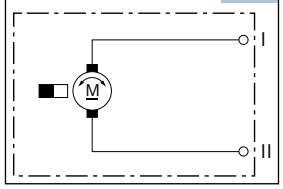
W2



W3



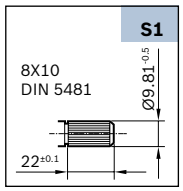
W4



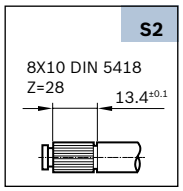
I = green
II = brown or red

Drive end (S)

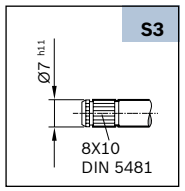
S1



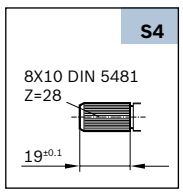
S2



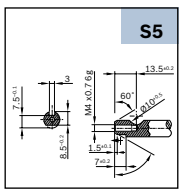
S3



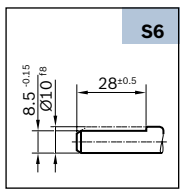
S4



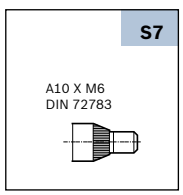
S5



S6

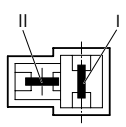


S7



Mating connector (C)

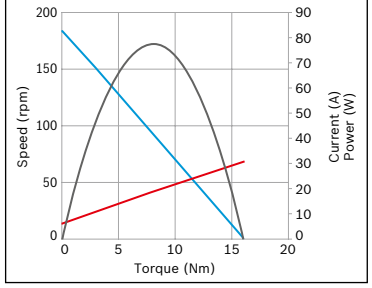
C1



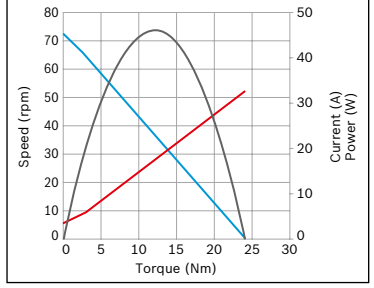
Housing: DIN 46 340 – B6,3-MS
Locker: –
Terminal: TE160859-1
Pins: AMD 180 907 0d.926 474-1

Performance curve (P)

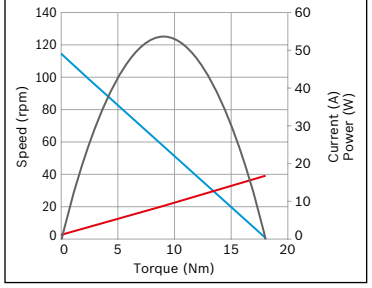
P1



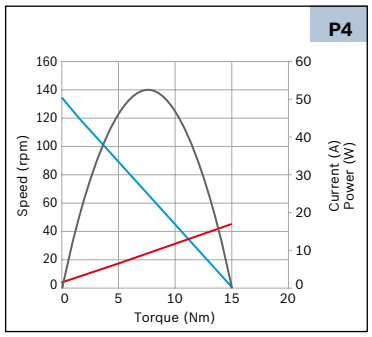
P2



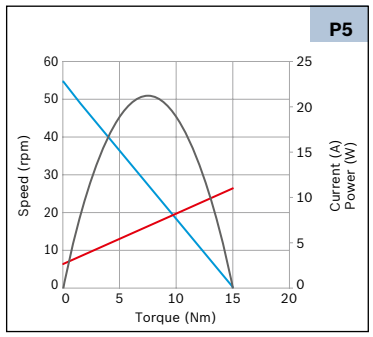
P3



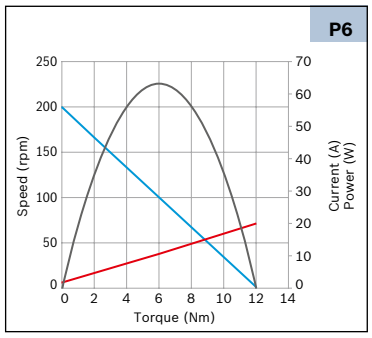
P4



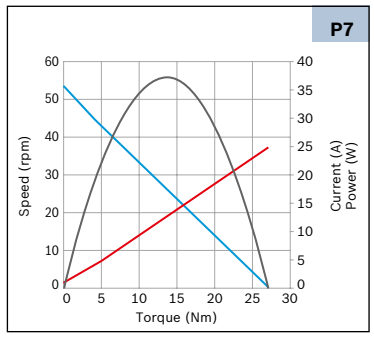
P5



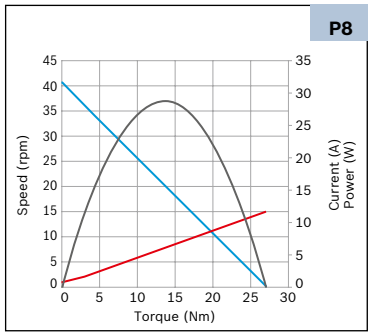
P6



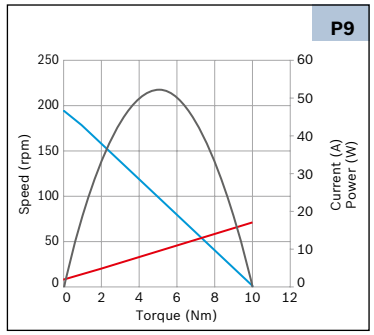
P7



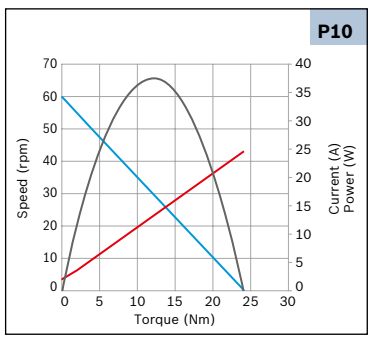
P8



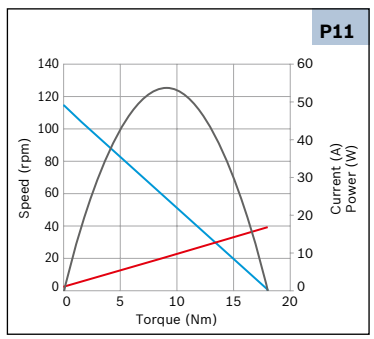
P9



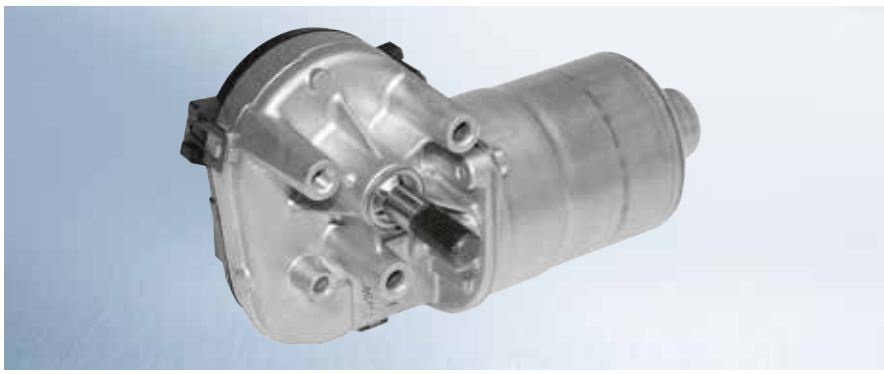
P10



P11



CHP3



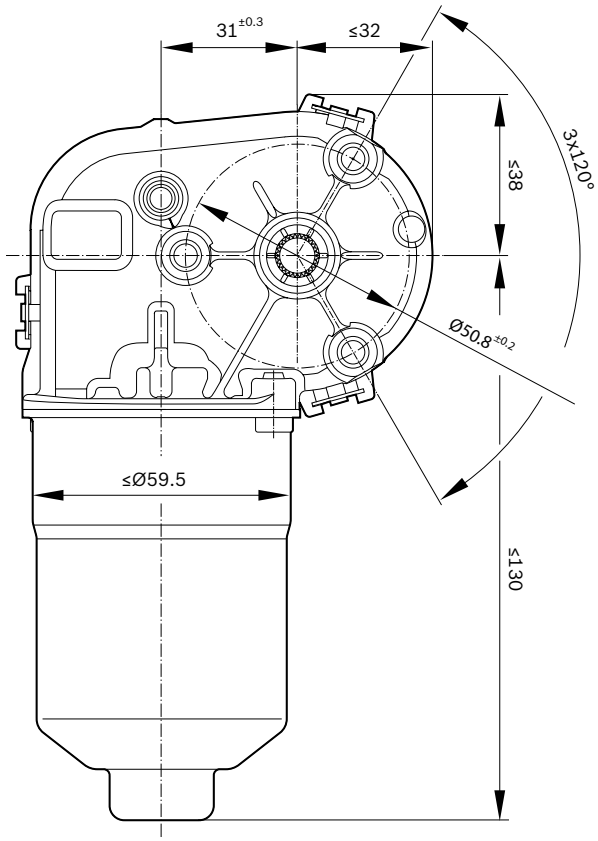
Family features:

- Double-Hall sensor available
- Degree of protection: IP 23
- Operation mode: S2/S3
- Direction of rotation: CCW/CW

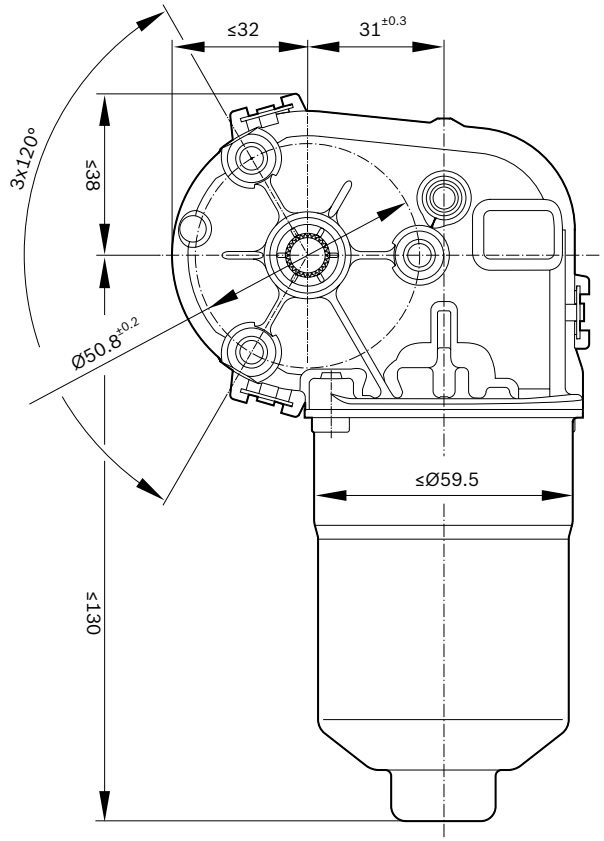
Voltage	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Signal	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm		Hall						
24 V	F 006 B20 410	20.8	3.75	55	5	32	88:1	2x	R	D1	W2	S1	C1	P1
	F 006 B20 411	20.8	3.75	55	5	32	88:1	No	R	D1	W1	S1	C2	P1
	F 006 B20 412	20.8	3.75	55	5	32	88:1	2x	L	D2	W2	S1	C1	P1
	F 006 B20 413	20.8	3.75	55	5	32	88:1	No	L	D2	W1	S1	C2	P1

*Gear housing left: L, gear housing right: R

D1



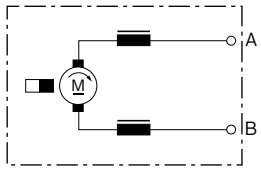
D2



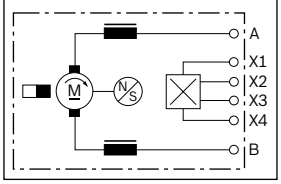
CHP3

Wiring diagram (W)

W1

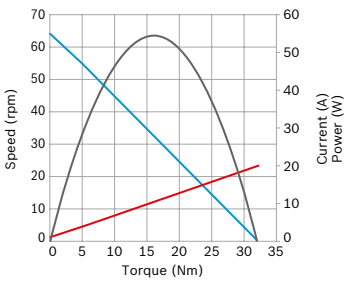


W2



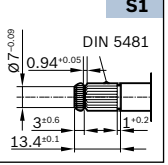
Performance curve (P)

P1



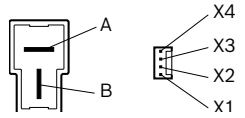
Drive end (S)

S1



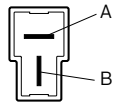
Mating connector (C)

C1



Housing: TE 18098
Locker: –
Terminal: TE160859-1

C2



Housing: TE 18098
Locker: –
Terminal: TE160859-1

CEP

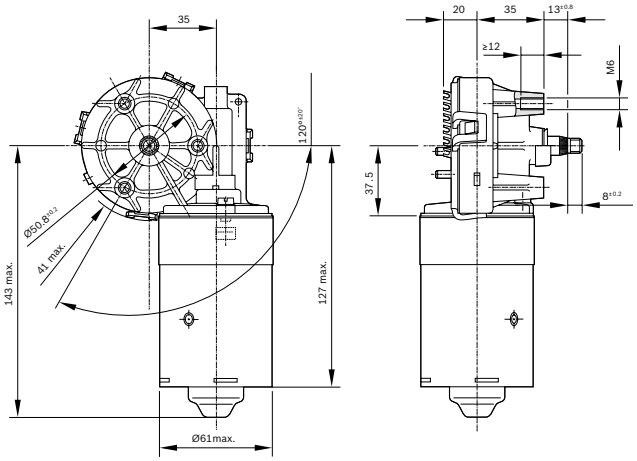
Family features:

- With and without hall sensor
- Degree of protection: IP 53
- Operation mode: S1
- CCW and CCW/CW rotation

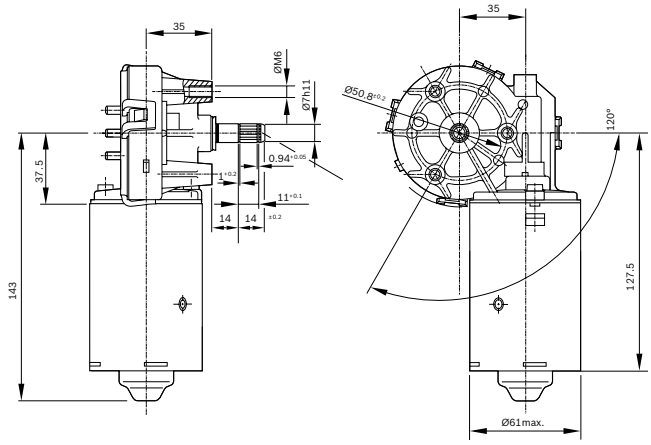
	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Direction of rotation	Signal	Side**	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm			Hall						
12 V	F 006 B20 145*	6.7 ; 10.5	3.5 ; 5.5	32 ; 50	2	23 ; 20	63:1	CCW	No	L	D1	W1	S1	C1	P3
24 V	F 006 B20 048*	6.9 ; 10.7	2 ; 3	33 ; 51	2	30 ; 23	63:1	CCW	No	L	D1	W2	S1	C2	P1
	F 006 B20 064*	6.9 ; 10.7	2 ; 3	33 ; 51	2	30 ; 23	63:1	CCW	No	L	D1	W2	S1	–	P1
	F 006 B20 146*	6.9 ; 10.7	2 ; 3	33 ; 51	2	30 ; 23	63:1	CCW	No	L	D1	W1	S1	C1	P5
	F 006 B20 106	9.8	3.5	47	2	32.5	79:1	CCW/CW	No	L	D2	W3	S3	C3	P2
	F 006 B20 360	16	2.4	51	3	35	63:1	CCW/CW	Yes	R	D3	W5	S2	C4	P4
	F 006 WM0 310	16	2.4	51	3	35	63:1	CCW/CW	No	R	D3	W4	S2	–	P4

* Motors with two speeds / **gear housing left: L, gear housing right: R

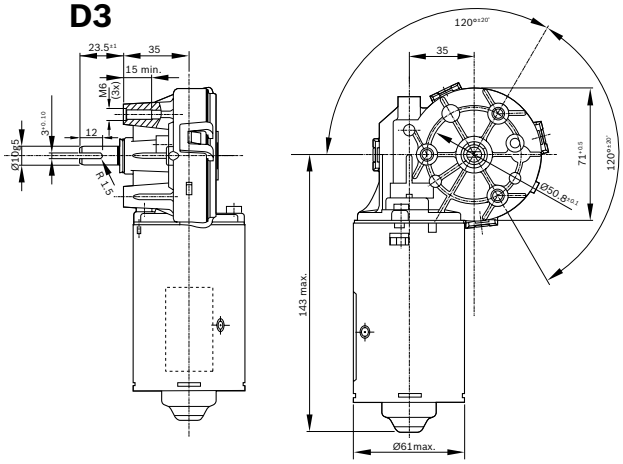
D1



D2



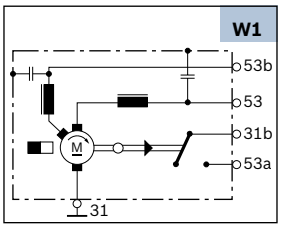
D3



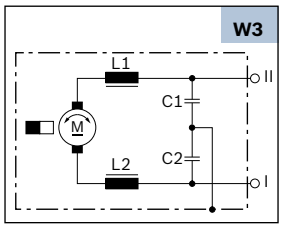
CEP

Wiring diagram (W)

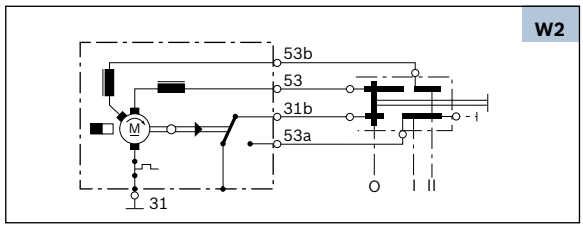
W1



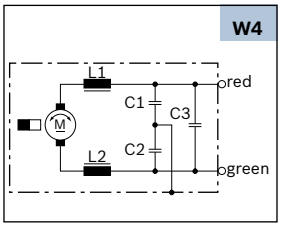
W3



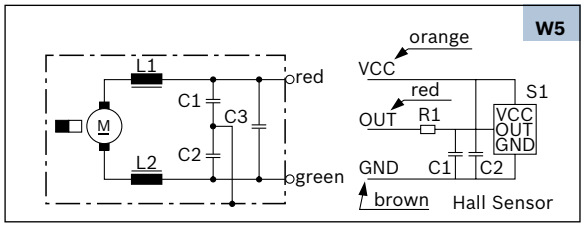
W2



W4

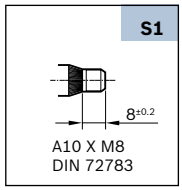


W5

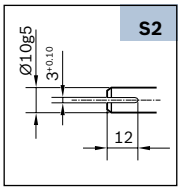


Drive end (S)

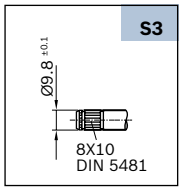
S1



S2

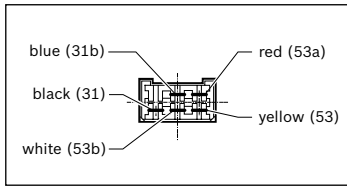


S3



Mating connector (C)

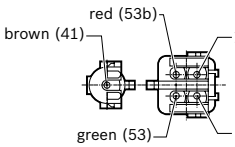
C1



Housing: TE 180904-0
Locker: –
Terminal: TE 160859-1

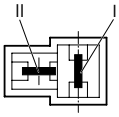
Mating connector (C)

C2



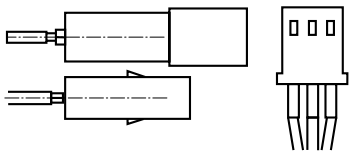
Housing: Delphi 12010996

C3



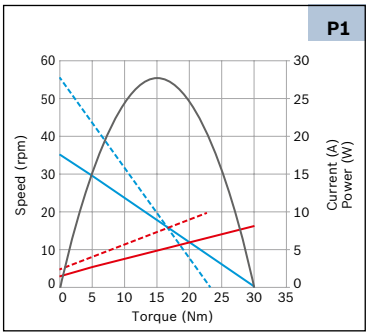
Housing: DIN 46 340 – B6,3-MS
Locker: –
Terminal: TE160859-1
Pins: AMD 180 907 0d.926 474-1

C4

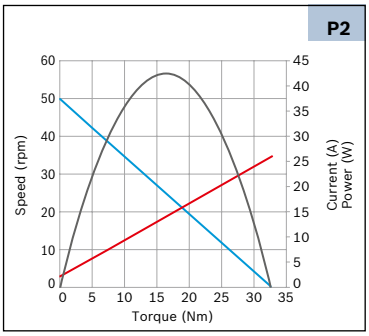


Performance curve (P)

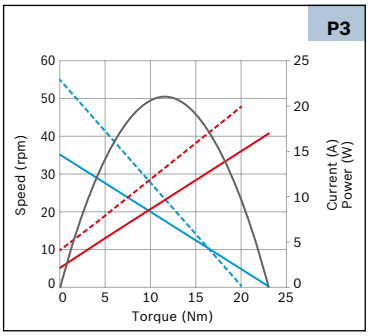
P1



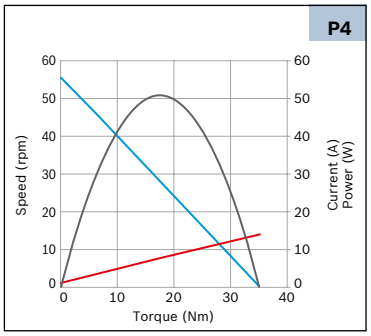
P2



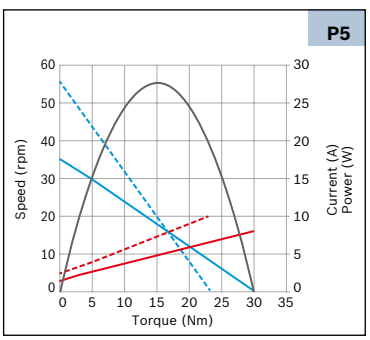
P3



P4



P5



CDP

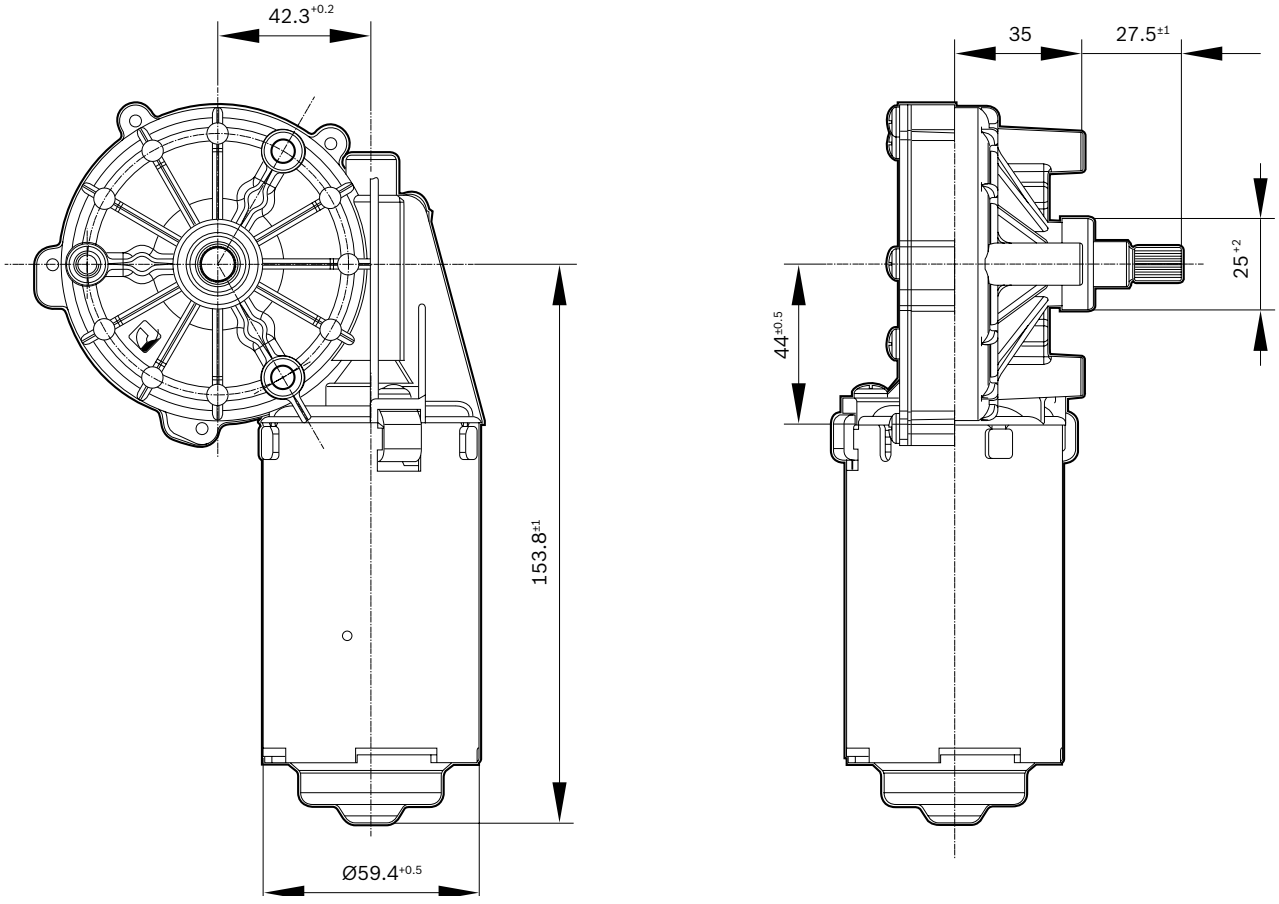
Family features:

- Also with wiper function available
- Hall sensor available
- Degree of protection: IP 50
- Operation mode: S1
- Direction of rotation: CCW/CW

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Direction of rotation	Signal	Side**	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm			Hall						
12 V	0 986 337 225*	14.7 ; 20.9	5.5 ; 8	35 ; 50	4	51 ; 39	2:108	CCW	–	L	D1	W1	S1	C1	P4
	0 986 337 270	50.2	6	80	6	45	2:108	CCW/CW	2x	L	D1	W2	S2	C2	P5
	0 986 337 280	38.7	8.5	37	10	40	1:78	CCW/CW	2x	L	D1	W2	S3	C2	P1
24 V	0 986 337 200*	8.5 ; 13.8	2.75 ; 3.75	27 ; 44	3	50 ; 46	1:78	CCW	–	L	D1	W1	S3	C1	P6
	0 986 337 201	20.9	3.5	40	5	30	2:108	CCW/CW	–	L	D1	W3	S2	–	P7
	0 986 337 209*	8.8 ; 14.4	3 ; 4	28 ; 46	3	50 ; 41	1:78	CCW	–	L	D1	W1	S1	C3	P3
	0 986 337 250	50.2	6	80	6	45	2:108	CCW/CW	2x	L	D1	W2	S2	C2	P2

* Motors with two speeds / **gear housing left: L, gear housing right: R

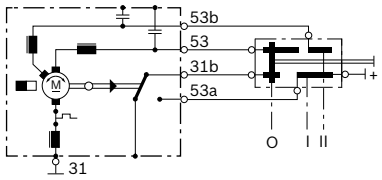
D1



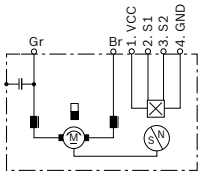
CDP

Wiring diagram (W)

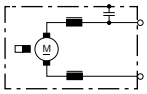
W1



W2

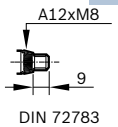


W3



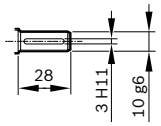
Drive end (S)

S1

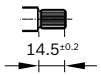


DIN 72783

S2



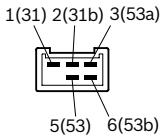
S3



DIN 5481

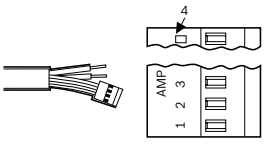
Mating connector (C)

C1



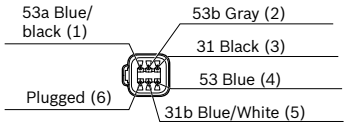
Housing: TE 180904-0
Locker: –
Terminal: TE 160927-2 for 1.5 - 2.5 mm² c

C2



Tyco 3-640441-4

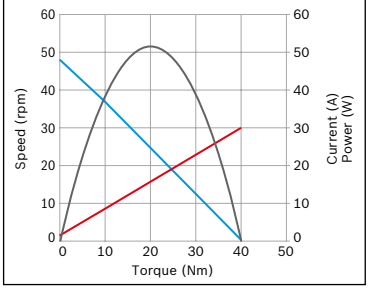
C3



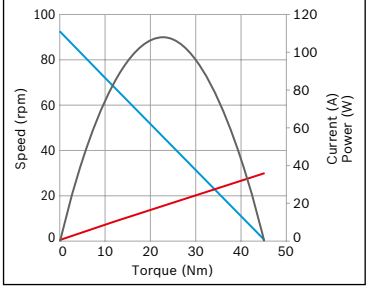
Junction block: DT04-6P

Performance curve (P)

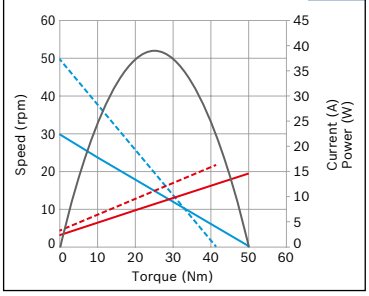
P1



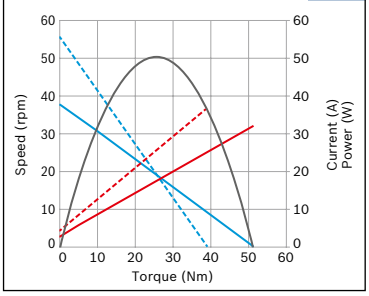
P2



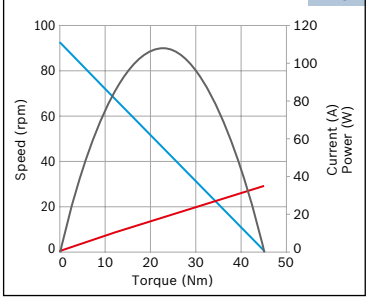
P3



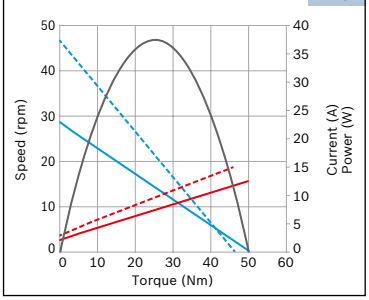
P4



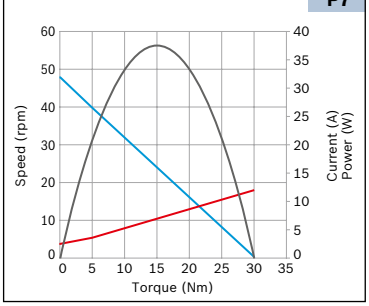
P5



P6



P7



EFP

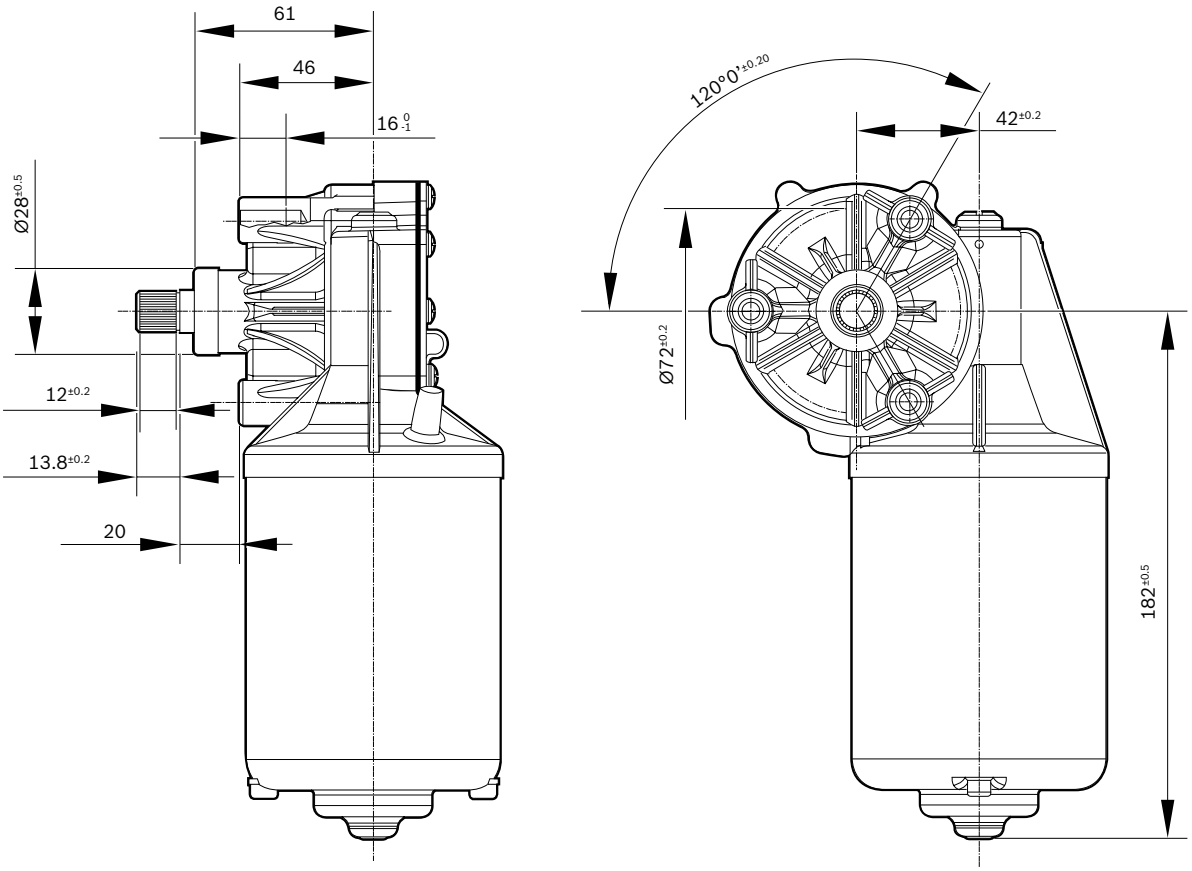
Family features:

- Also with wiper function available
- Degree of protection: IP 23
- Operating mode: S1
- Direction of rotation: CCW and CCW/CW

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Direction of rotation	Signal	Side**	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm			Hall						
12 V	0 986 337 400*	8.4 ; 12.6	4.5 ; 6	32 ; 48	2.5	45 ; 40	80:2	CCW	No	L	D1	W1	S1	C1	P4
	0 986 337 411	20.4	5	39	5	70	65:1	CCW/CW	No	L	D1	W2	S1	C1	P6
24 V	0 986 337 401*	9.7 ; 16.3	1.75 ; 2	31 ; 52	3	60 ; 50	80:2	CCW	No	L	D1	W1	S1	C1	P1
	0 986 337 402*	11.3 ; 18.4	2.25 ; 2.75	27 ; 44	4	70 ; 60	65:1	CCW	No	L	D1	W1	S1	C1	P3
	0 986 337 409	65.9	6	63	10	60	80:2	CCW/CW	No	L	D1	W2	S2	C1	P2
	0 986 337 410	73.3	7	70	10	60	80:2	CCW/CW	No	L	D1	W2	S2	C1	P5

* Motors with two speeds / **gear housing left: L, gear housing right: R

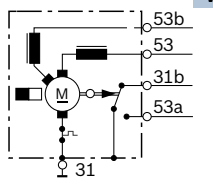
D1



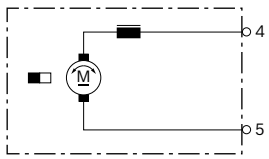
EFP

Wiring diagram (W)

W1

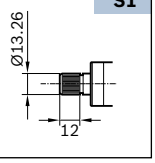


W2

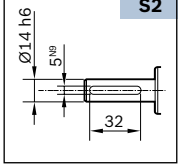


Drive end (S)

S1

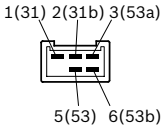


S2



Mating connector (C)

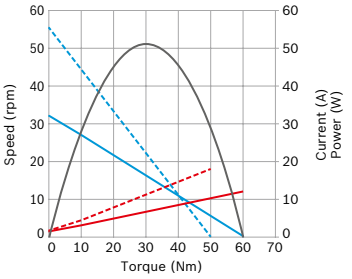
C1



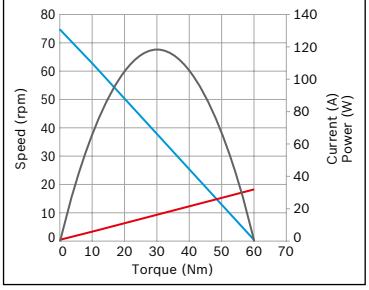
Housing: TE 180904-0
Locker: –
Terminal: TE 160927-2 for 1.5 - 2.5 mm² c

Performance curve (P)

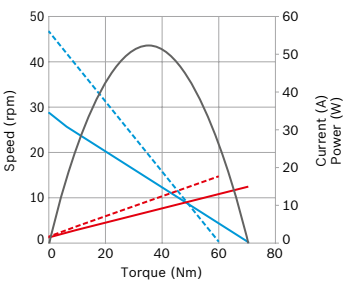
P1



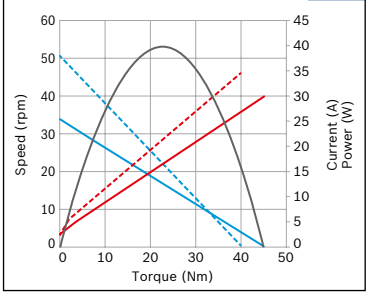
P2



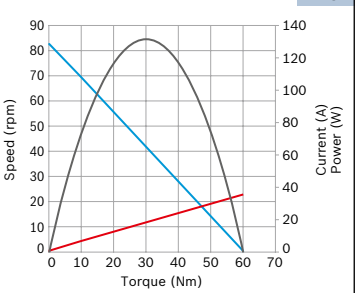
P3



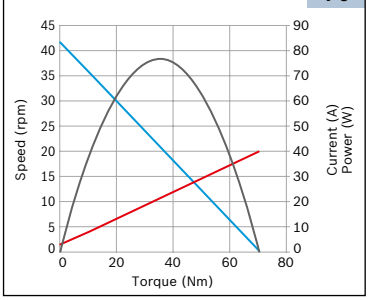
P4



P5



P6



EDP

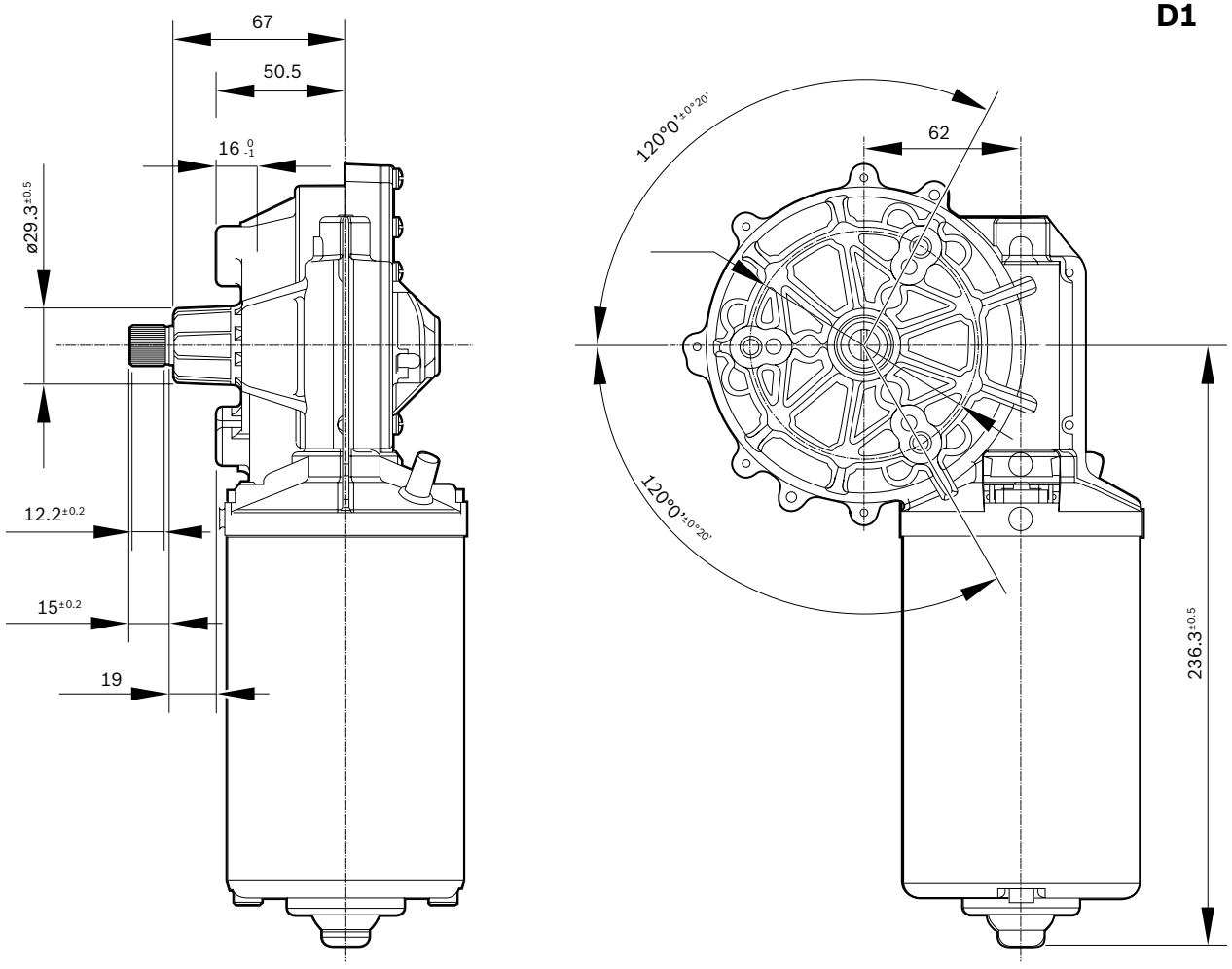
Family features:

- Powerful 2-speed motor
- Degree of protection: IP 23
- Operating mode: S1
- Direction of rotation: CCW

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Direction of rotation	Signal	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm			Hall						
24 V	0 986 337 451	19.3 ; 33.5	3.5 ; 6	23 ; 40	8	120 ; 76	96:2	CCW	No	L	D1	W1	S1	C1	P1

*Gear housing left: L, gear housing right: R

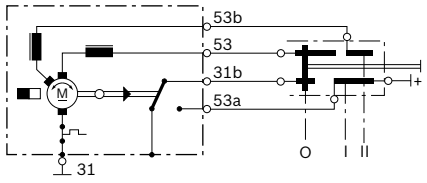
D1



EDP

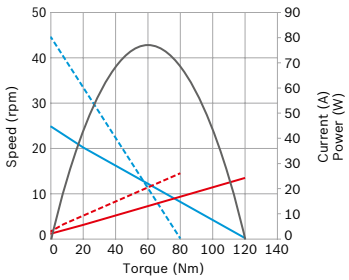
Wiring diagram (W)

W1



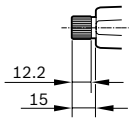
Performance curve (P)

P1



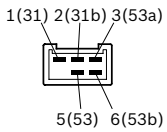
Drive end (S)

S1



Mating connector (C)

C1



Housing: TE 180904-0
Locker: –
Terminal: TE 160927-2 for 1.5 - 2.5 mm² c

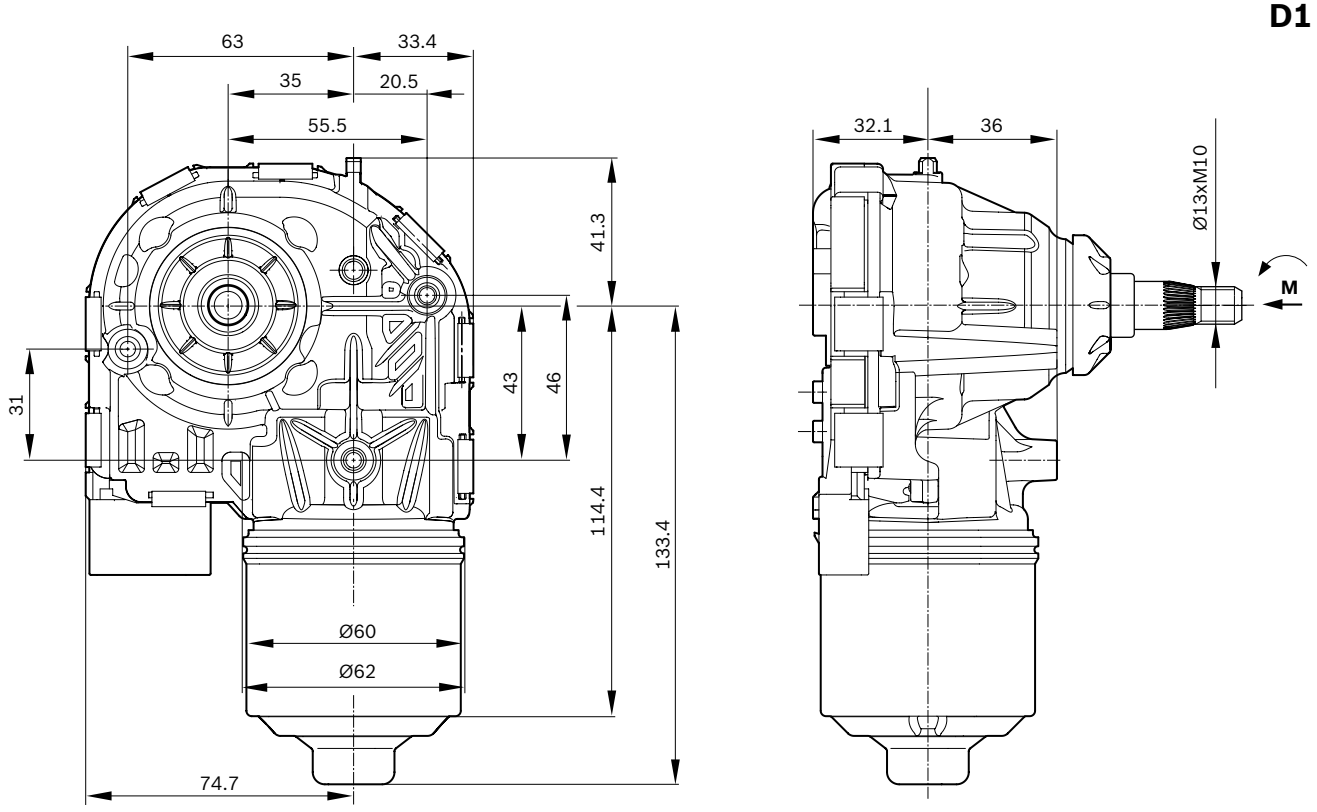
WDD

Family features:

- Motor with integrated electronics
- Degree of protection: IP 6K7
- Operating mode: S1
- Direction of rotation: CCW/CW
- LIN Communication

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Gear ratio	Signal	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Nm	Nm		LIN					
12 V	0 390 248 015	30	4.5	40	5.7	38	76:1	Yes	D1	W1	S1	C1	P1
	0 390 248 016	30	4.5	50	5.7	38	76:1	Yes	D1	W1	S2	C1	P1

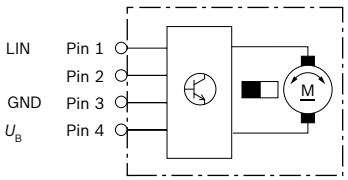
D1



WDD

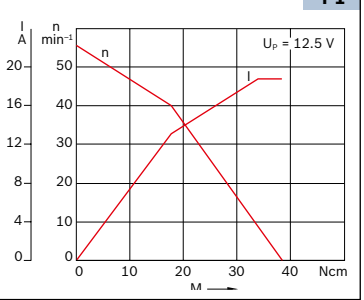
Wiring diagram (W)

W1



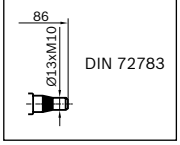
Performance curve (P)

P1

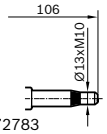


Drive end (S)

S1

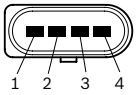


S2



Mating connector (C)

C1



Housing: TE 180904-0
Locker: –
Terminal: TE 160927-2 for 1.5 - 2.5 mm² c

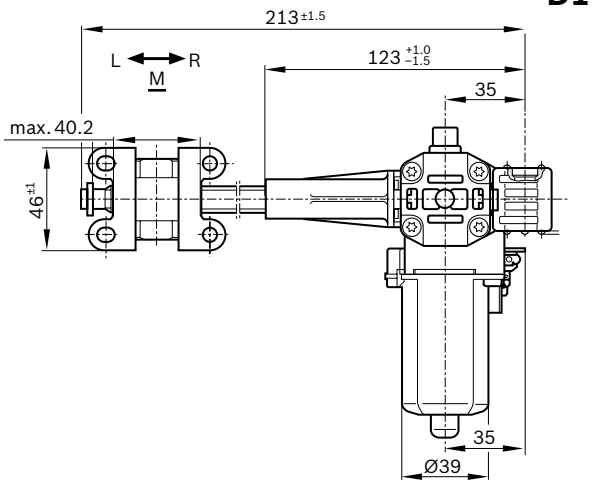
AHC-RS

Family features:

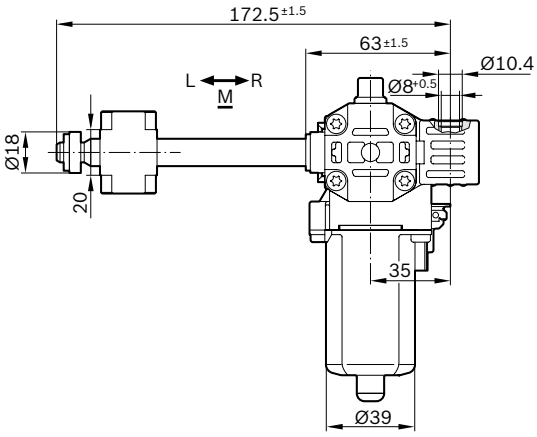
- Hall Sensor available
- Degree of protection: IP 50
- Operation mode: S2 - S3
- Linear movement

	Part number	In (Nominal current)	Fn (Nominal force)	Fmax Maximun force	Adjustment speed	Stroke	Signal	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
		A	kN	kN	mm/s	mm	Hall				
12 V	0 390 203 229	9	0.5	3	13	81.6	Yes	D3	W1	C3	P3
	0 390 201 927	3	0.5	3.4	5.2	58.5	Yes	D1	W2	C1	P1
	0 390 201 941	3.9	0.5	4.5	7.2	75	No	D2	W3	C2	P2
	0 390 203 232	8.5	0.5	3.7	13.5	81.6	No	D3	W4	C4	P5
	0 390 201 989	6	0.5	4.25	7	58.5	Yes	D4	W1	C3	P4

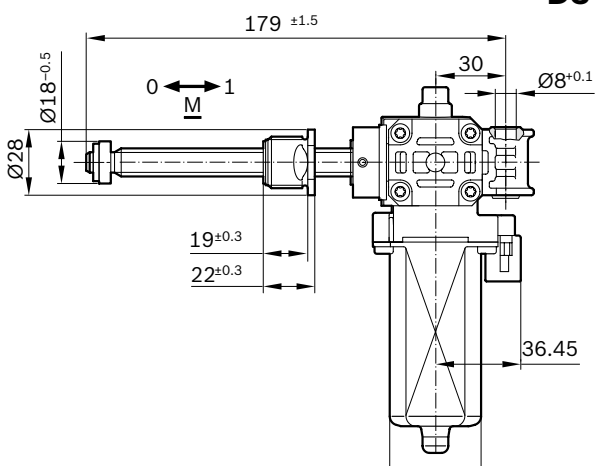
D1



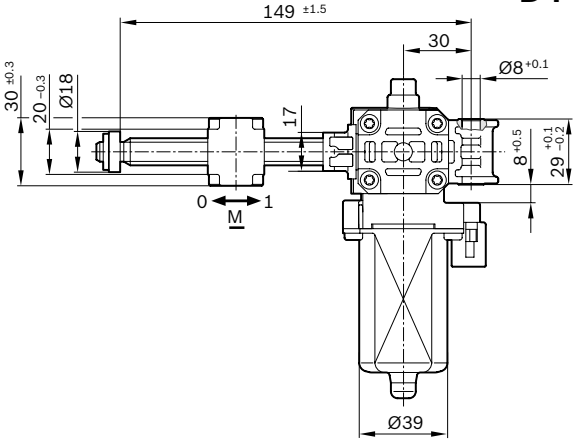
D2



D3



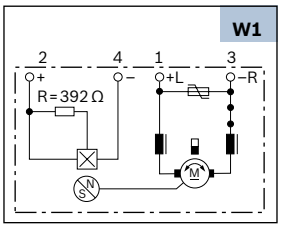
D4



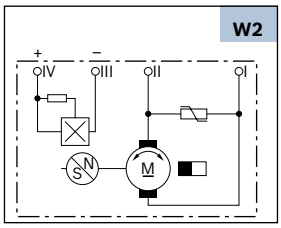
AHC-RS

Wiring diagram (W)

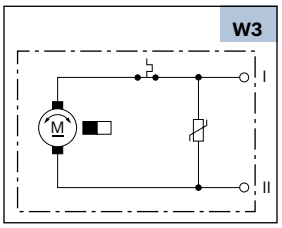
W1



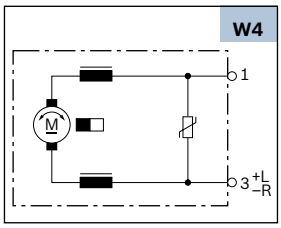
W2



W3

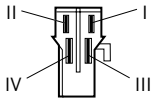


W4



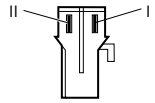
Mating connector (C)

C1



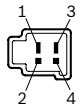
Housing: TE 968182-1
Locker: TE 0-968183-1
Terminal: TE JPT 0-927768-1 / MTIII 0-968052-1 (x2)

C2



Housing: TE 968182-1
Locker: TE 0-968183-1
Terminal: TE JPT 0-927768-1 (x2)

C3

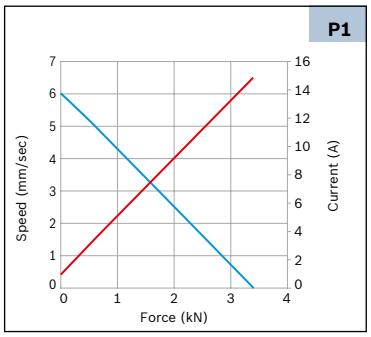


Housing: FCI 3 023 59 01
Locker: –
Terminal: TE MQS PIN Contact 6-928918-1
Pin 0.63 x 0.63 mm / TE MPQ
Pin 2.8 x 0.63 968137-2 2.80 mm

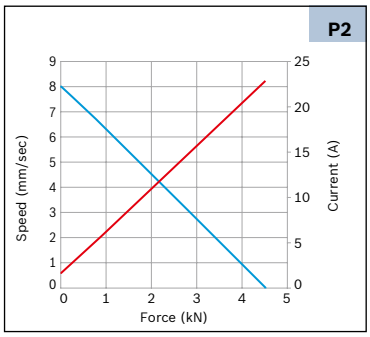
C4

Performance curve (P)

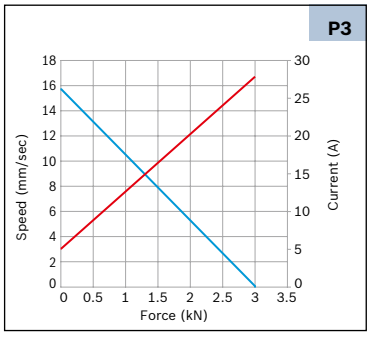
P1



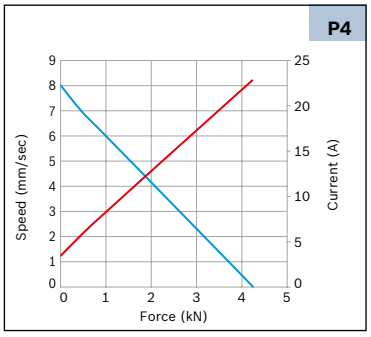
P2



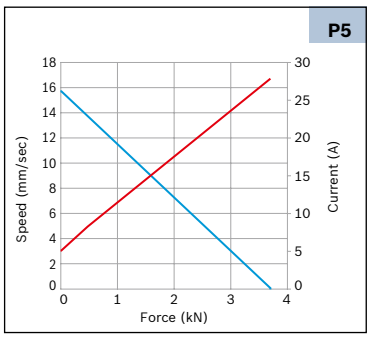
P3



P4



P5



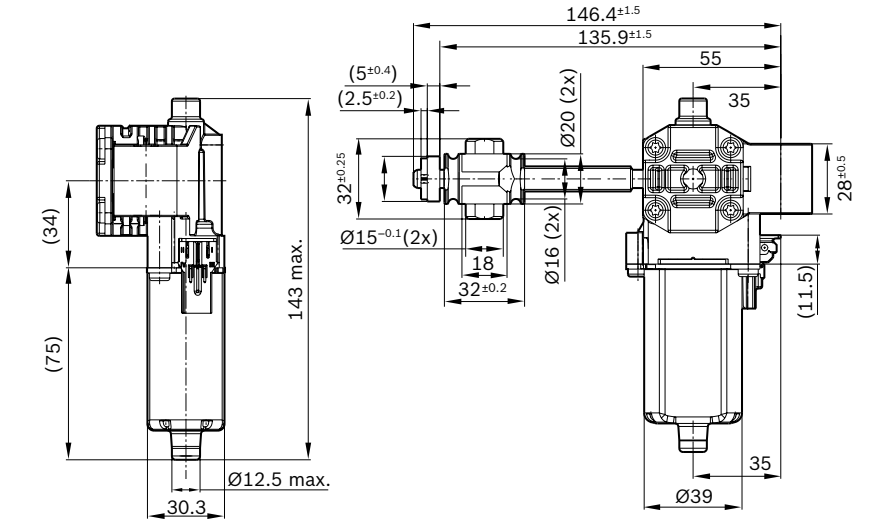
AHC-RS2

Family features:

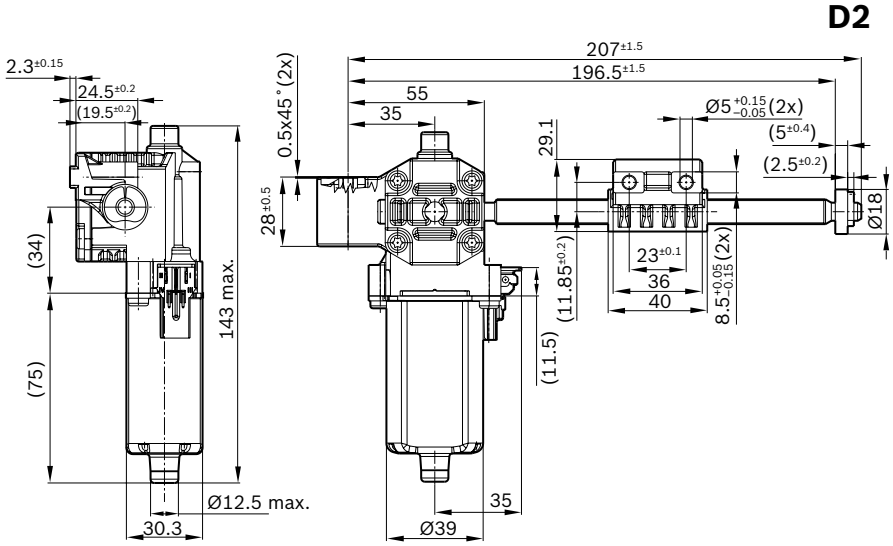
- Hall Sensor available
- Degree of protection: IP 50
- Operation mode: S2 - S3
- Linear movement

	Part number	In (Nominal current)	Fn (Nominal force)	Fmax Maximun force	Adjustment speed	Stroke	Signal	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
		A	kN	kN	mm/s	mm	Hall				
12 V	0 390 203 693	10	0.4	1.95	15	48.9	Yes	D1	W1	C1	P1
	0 390 203 694	8	0.4	2.07	13	101.5	Yes	D2	W1	C1	P2

D1



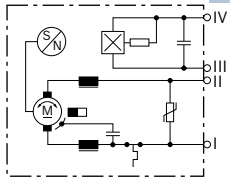
D2



AHC-RS2

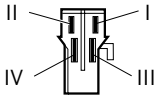
Wiring diagram (W)

W1



Mating connector (C)

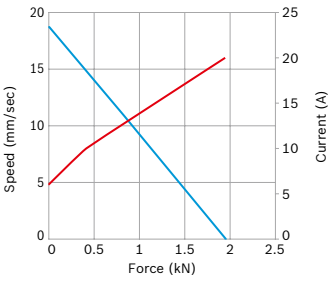
C1



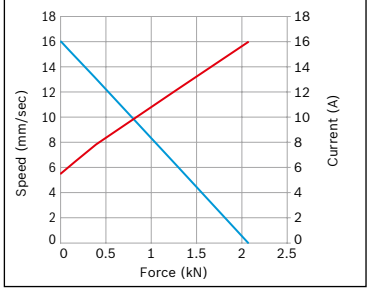
Housing: TE 968182-1
Locker: TE 0-968183-1
Terminal: TE JPT 0-927768-1 / MTIII
0-968052-1 (x2)

Performance curve (P)

P1



P2



D.C. motors without transmission

Product features

- Wide range of permanent-magnet D.C. motor products
- D.C. voltage range from 12 to 24 Volt

Advantages for your application

- Robust and reliable quality, well-proven in many millions of motor vehicles
- High reliability and service life
- A multitude of different sizes and designs for greater flexibility
- Favorable price/performance ratio

The Bosch D.C. motors without transmission referred to here are permanent-magnet D.C. motors developed for use in motor vehicles. They excel on account of an excellent power/weight ratio, and a broad working range in different requirements and installation situations.

Bosch electric motors without transmission are typically used in motor vehicles as a motor for heater or air-conditioning devices or for power-seat adjustment. The installation position can vary arbitrarily from horizontal to vertical. Bosch electric motors without transmission, are also the suitable solution for many applications outside the automobile.

Application examples

Automotive technology:
Heater and air-conditioning blowers, engine cooling, power-seat adjustment

Industrial applications:
Electric mopeds, house ventilation, household appliances, sweeping machines and lots more

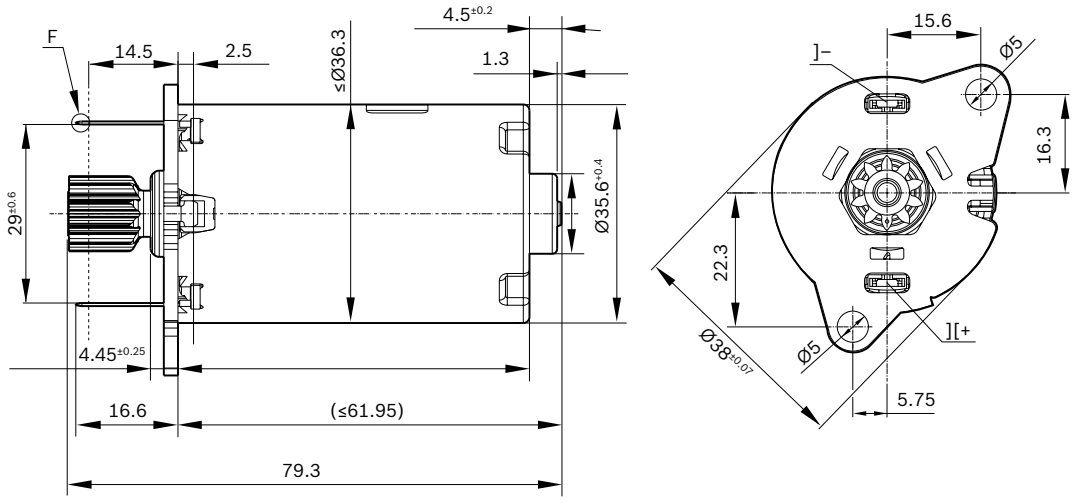
APM

Family features:

- Extended temperature range
- Operation mode: S1/S2
- Direction of rotation: CCW/CW
- Degree of protection: IP 40

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Signal	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Ncm	Ncm	Hall					
12 V	0 130 001 001	16.7	2.4	4000	4	19	No	D1	W1	S1	C1	P1

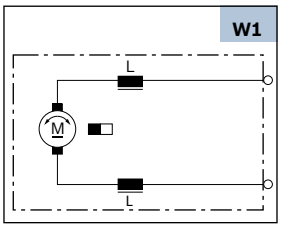
D1



APM

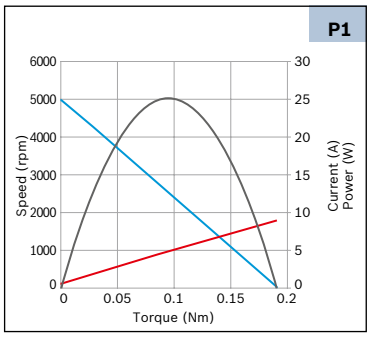
Wiring diagram (W)

W1



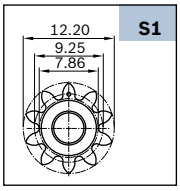
Performance curve (P)

P1



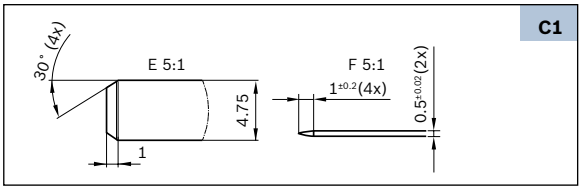
Drive end (S)

S1



Mating connector (C)

C1



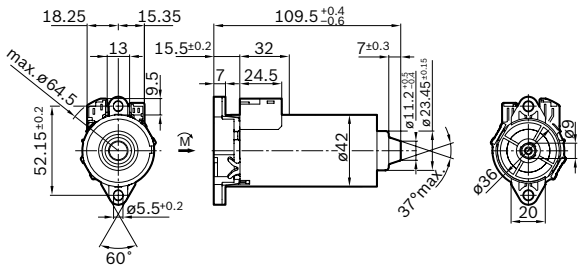
API

Family features:

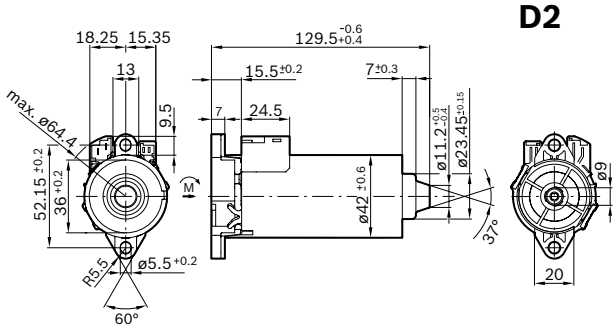
- With and without hallsensor
- Degree of protection: IP 50 A
- Operation mode: S3
- Direction of rotation: CCW/CW

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Signal	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Ncm	Ncm	Hall					
12 V	0 130 002 632	20.2	4.8	3860	5	50	Yes	D1	W1	S1	C1	P2
	0 130 002 633	20.2	4.8	3860	5	50	No	D1	W2	S1	C1	P2
	0 130 002 613	16	4.5	3065	5	69	Yes	D2	W1	S1	C1	P6
	0 130 002 634	20	4.6	3820	5	62	Yes	D3	W1	S1	C1	P5
	0 130 002 636	16	4.5	3065	5	69	No	D2	W2	S1	C1	P6
24 V	0 130 002 681	39.5	4.5	7540	5	61	Yes	D1	W1	S1	C1	P1
	0 130 002 672	15.3	2.1	3660	4	65	Yes	D4	W3	S1	C2	P3
	0 130 002 673	16	1.9	3050	5	65	Yes	D2	W3	S1	C1	P4
	0 130 002 674	16	1.9	3050	5	65	No	D2	W4	S1	C1	P4

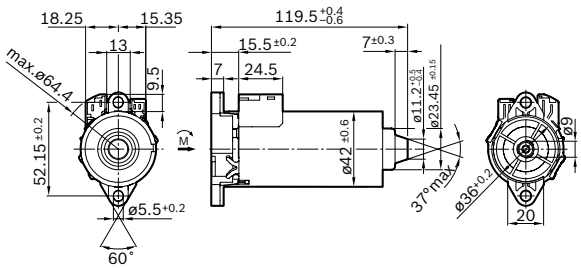
D1



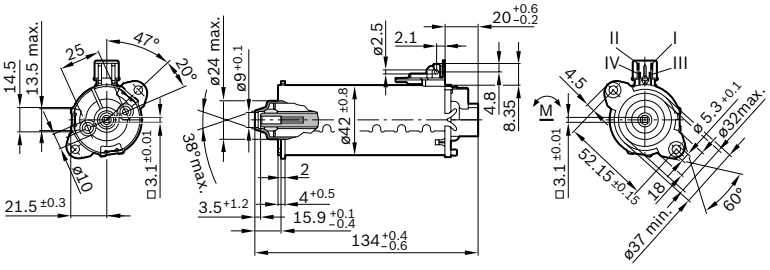
D2



D3



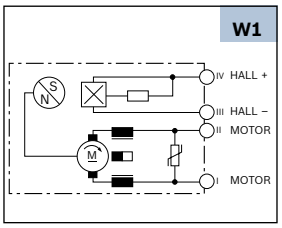
D4



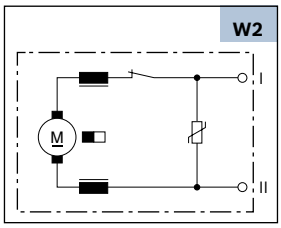
API

Wiring diagram (W)

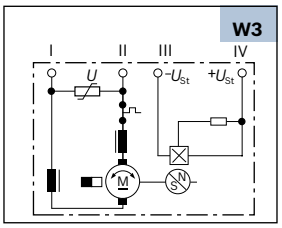
W1



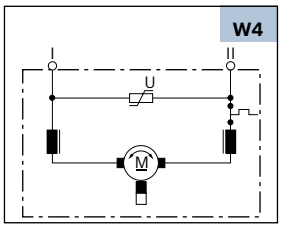
W2



W3

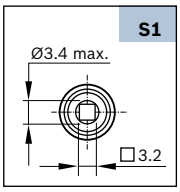


W4



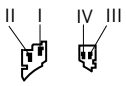
Drive end (S)

S1



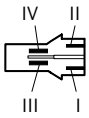
Mating connector (C)

C1



Housing: Sumitomo 6098-3438

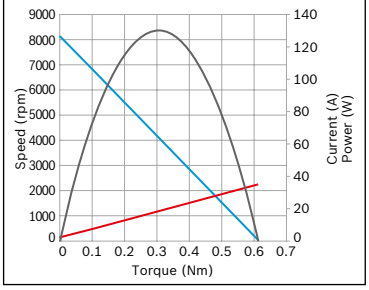
C2



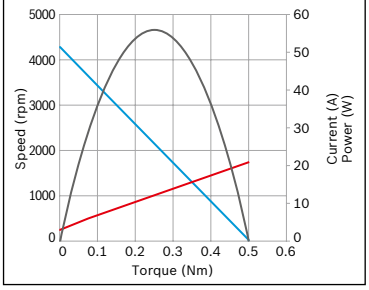
Housing: TE 968182-1
Locker: TE 0-968183-1
Terminal: TE JPT 0-927768-1 / MTIII 0-968052-1 (x2)

Performance curve (P)

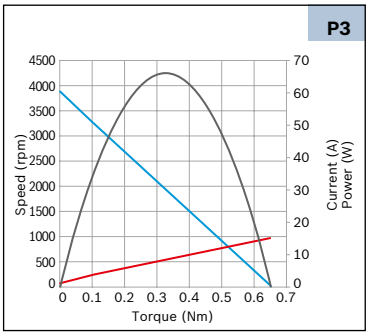
P1



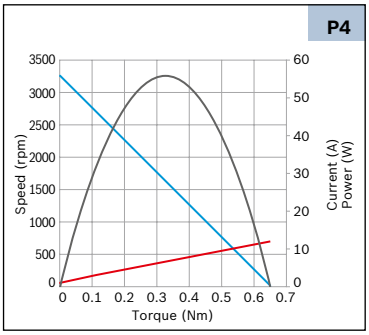
P2



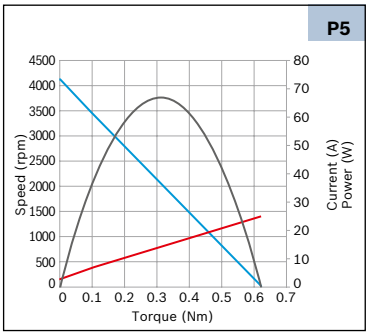
P3



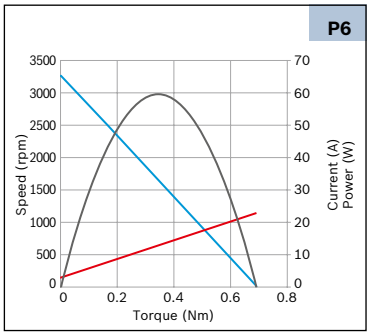
P4



P5



P6



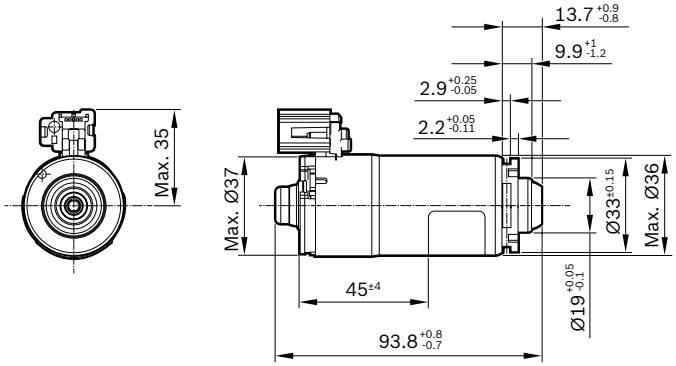
NSA-I

Family features:

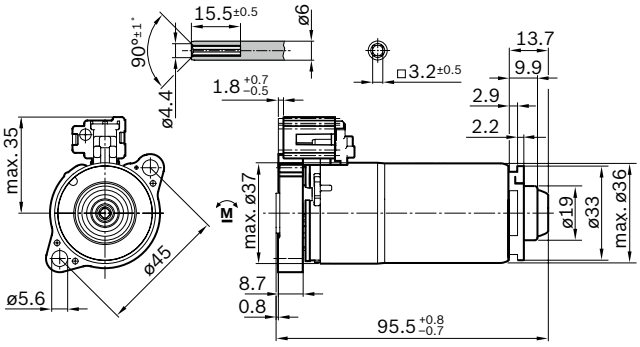
- Hall Sensor
- Degree of protection: IP 50
- Opration mode: S3
- Direction of rotation: CCW/CW
- Fit for flexi-shaft
- 2-end output

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Signal	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Ncm	Ncm	Hall					
12 V	0 390 204 092	12.6	2.5	2400	5	43	Yes	D2	W3	S1	C1	P1
	0 390 204 118	37.7	9	7200	5	48	Yes	D3	W2	S1	C1	P3
	0 390 204 166	10.4	3	3550	2.8	69	Yes	D1	W1	S1	C1	P2

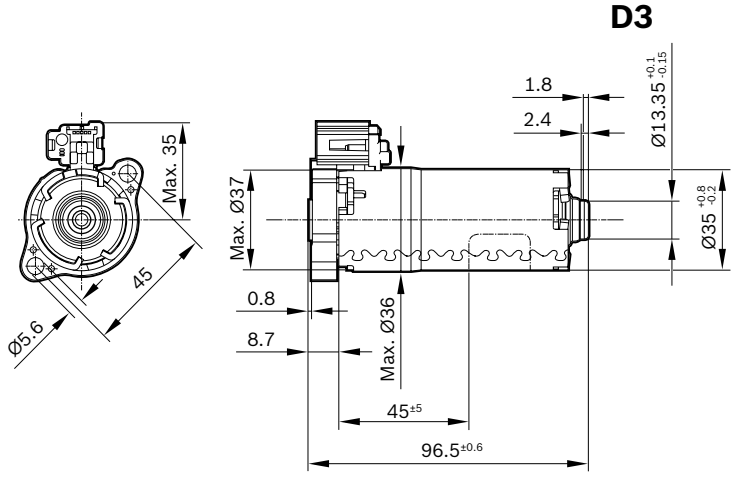
D1



D2



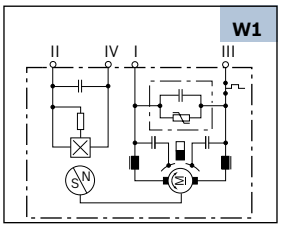
D3



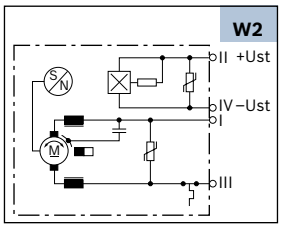
NSA-I

Wiring diagram (W)

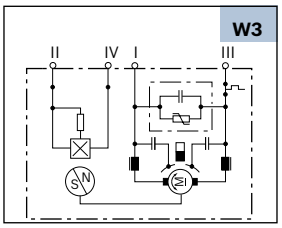
W1



W2

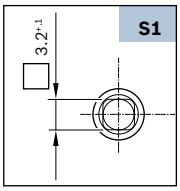


W3



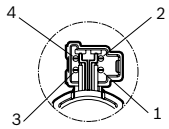
Drive end (S)

S1



Mating connector (C)

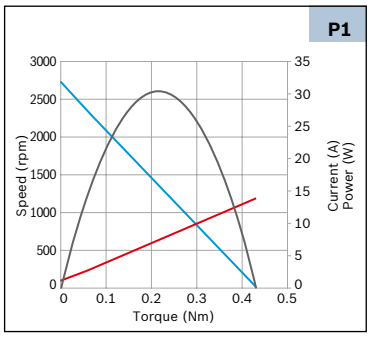
C1



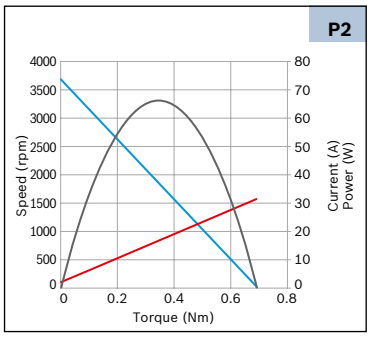
Sumitomo 4-way 6098 -2830
NBS4F – SEAT - F

Performance curve (P)

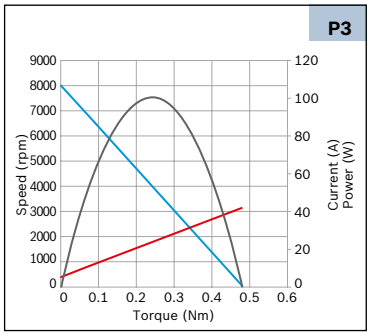
P1



P2



P3

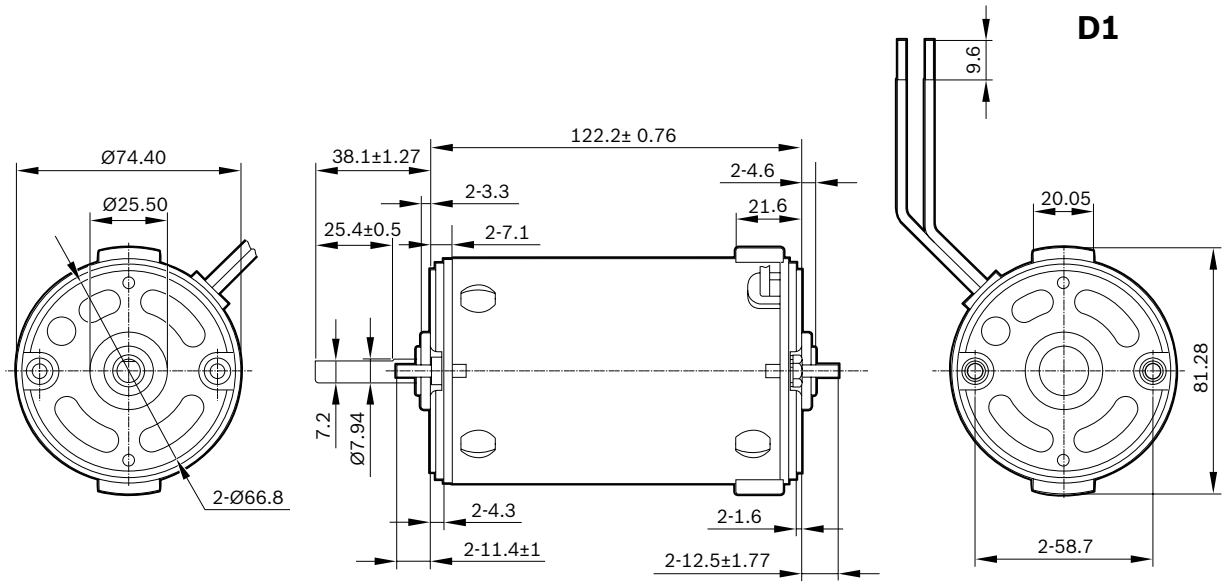


DBM

Family features:

- Long life
- Degree of protection: IP 10
- Operation mode: S1
- Direction of rotation: CCW/CW

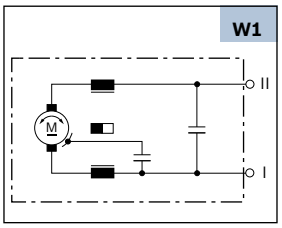
	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Signal	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Performance curve (P)
		W	A	rpm	Ncm	Ncm	Hall				
24 V	F 042 820 389	55	3.5	1500	35	180	No	D1	W1	S1	P1



DBM

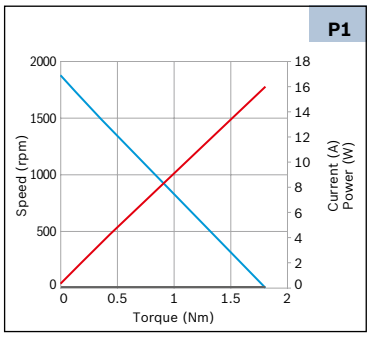
Wiring diagram (W)

W1



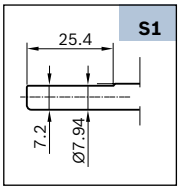
Performance curve (P)

P1



Drive end (S)

S1



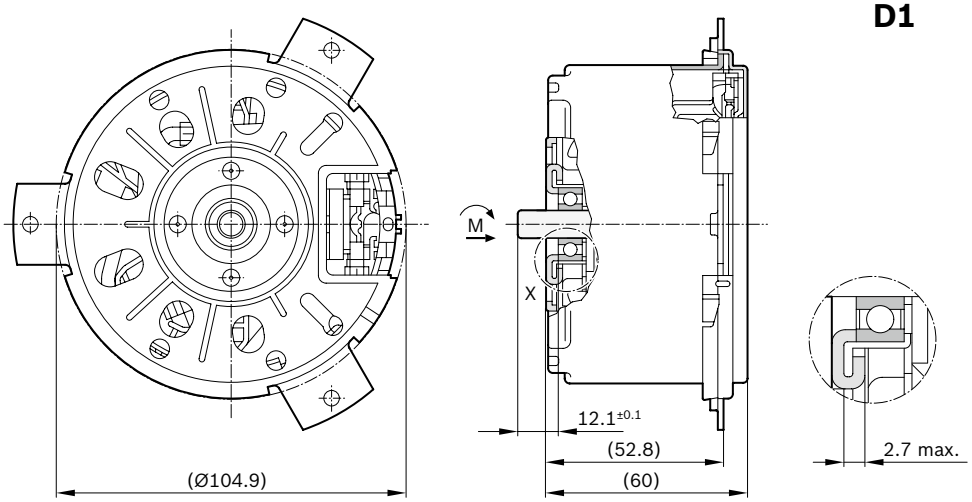
GPG-M

Family features:

- High durability and efficiency
- Degree of protection: IP 10
- Operation mode: S1
- Direction of rotation: CW

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Signal	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Perfomrance curve (P)
		W	A	rpm	Ncm	Ncm	Hall				
12 V	3 137 230 005	113	13	2700	40	330	No	D1	W1	S1	P1
	3 137 230 006	134	15	3200	40	350	No	D1	W1	S1	P2

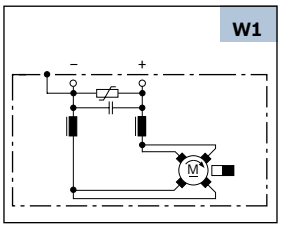
D1



GPG-M

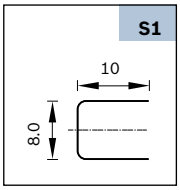
Wiring diagram (W)

W1



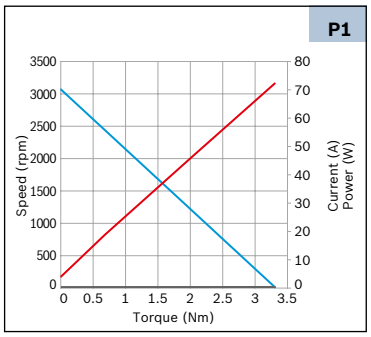
Drive end (S)

S1

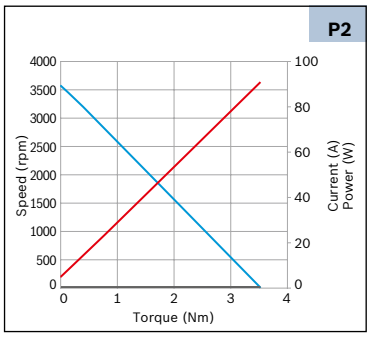


Performance curve (P)

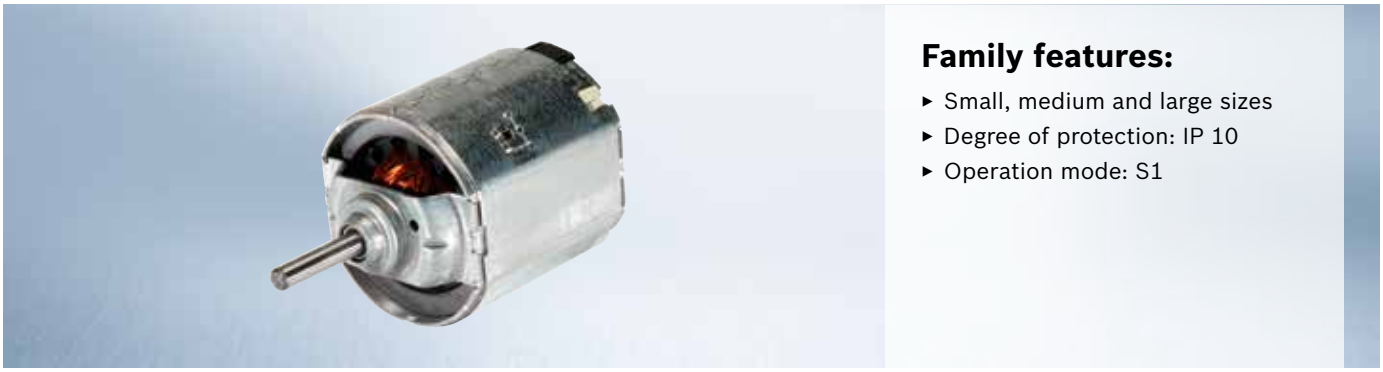
P1



P2



GBM

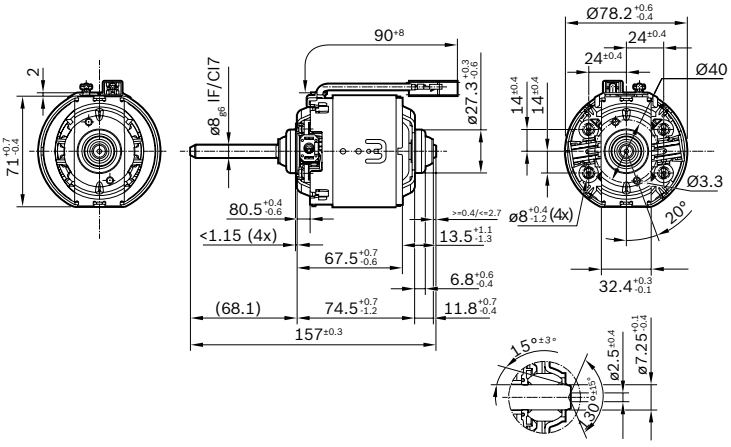


Family features:

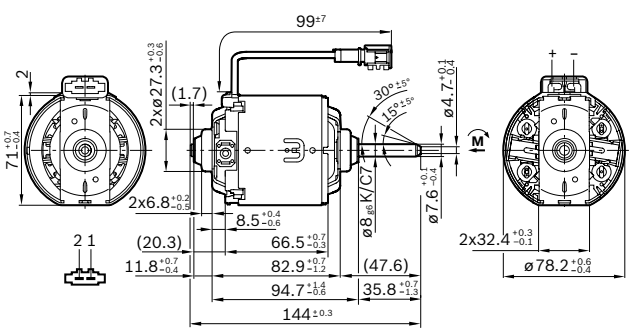
- Small, medium and large sizes
- Degree of protection: IP 10
- Operation mode: S1

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Direction of rotation	Signal	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
		W	A	rpm	Ncm	Ncm		Hall					
12 V	0 130 115 154	217.2	25	4150	50	225	CW	No	D2	W1	S1	C1	P2
	0 130 115 352	247.5	26	4300	55	300	CW	No	D3	W1	S2	C2	P3
	0 130 115 017	122.5	15	3900	30	180	CCW	No	D4	W1	S1	C2	P1
	0 130 115 008	79.5	11	3800	20	105	CCW	No	D1	W1	S3	C3	P4

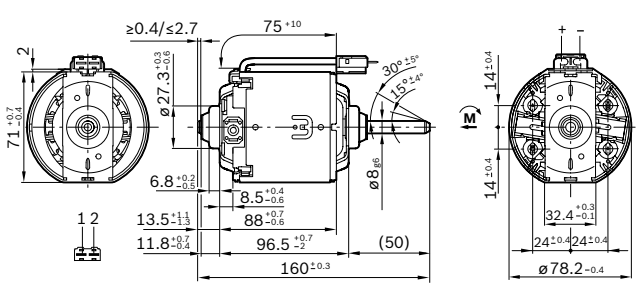
D1



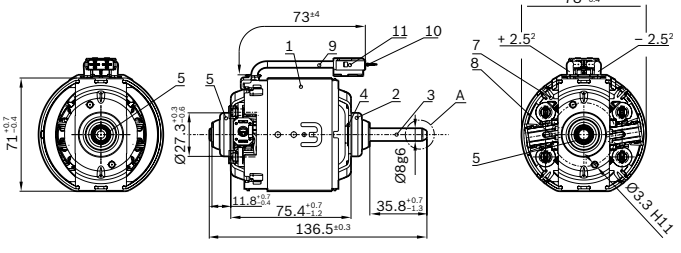
D2



D3



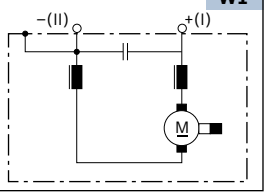
D4



GBM

Wiring diagram (W)

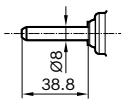
W1



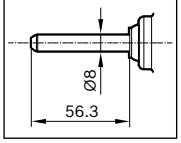
Drive end (S)

S1

S2

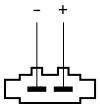


S3



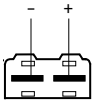
Mating connector (C)

C1



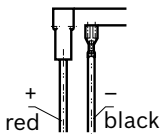
Housing: Tyco 2 -160915-0
Locker: –
Terminal: Tyco 928947-2 / HS 56.325.121

C2



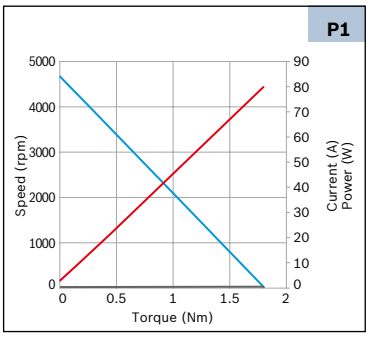
Housing: Lisi F513A
Locker: –
Terminal: Tyco 964 308-1

C3

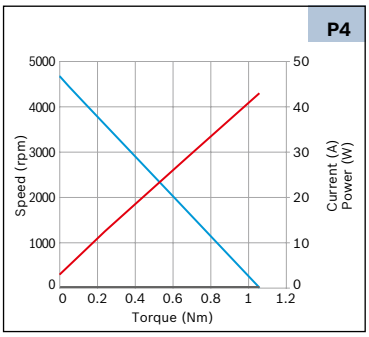


Performance curve (P)

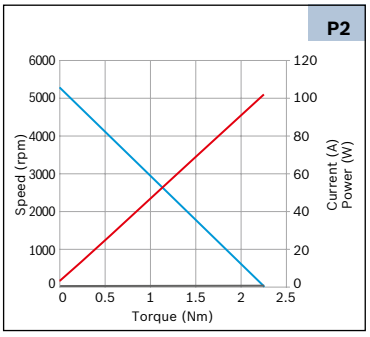
P1



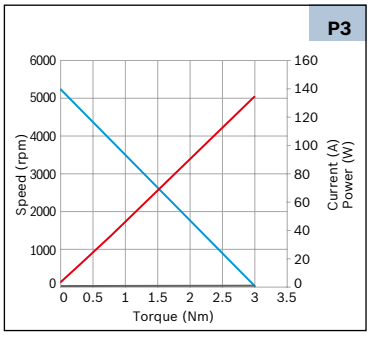
P4



P2



P3



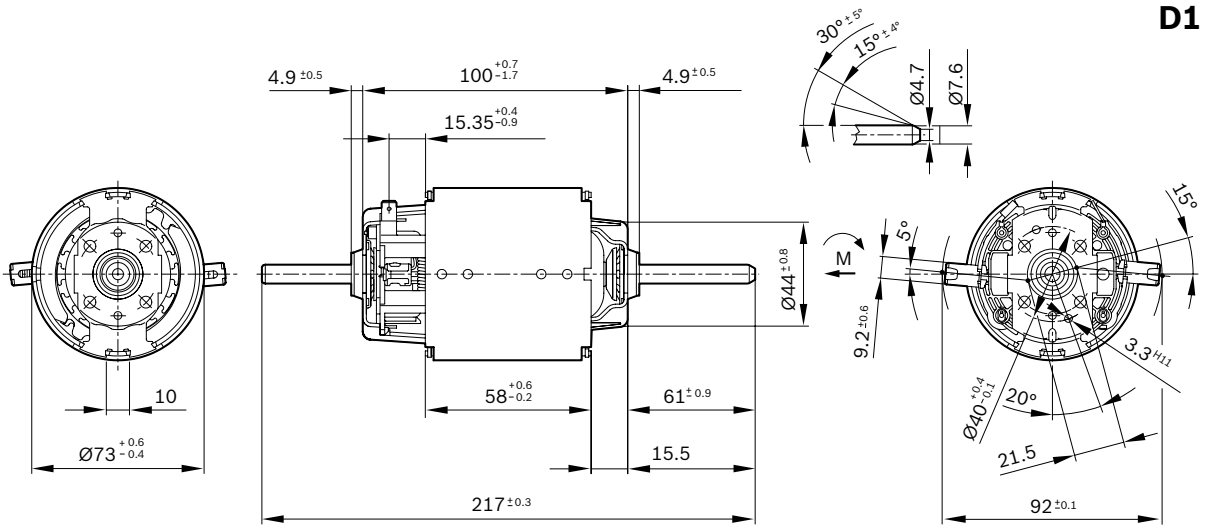
DPO-K

Family features:

- Long life brushes
- Fast and powerful 24 V motor
- Degree of protection: IP 10
- Operation mode: S1
- Direction of rotation: CW

	Part number	Pn (Nominal power)	In (Nominal current)	nn (Nominal speed)	Mn (Nominal torque)	Ma (Stall torque)	Signal	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Performance curve (P)
		W	A	rpm	Ncm	Ncm	Hall				
24 V	0 130 101 616	180	12	4300	40	210	No	D1	W1	S1	P1

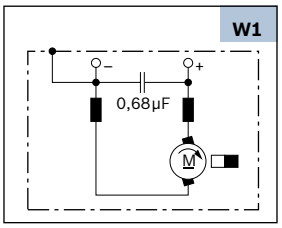
D1



DPO-K

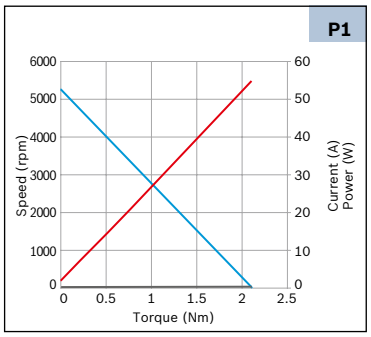
Wiring diagram (W)

W1



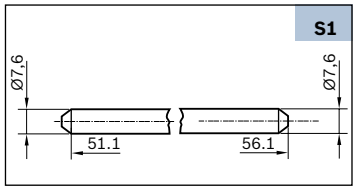
Performance curve (P)

P1



Drive end (S)

S1



Blowers and Fans with D.C. motors

Product features

- Wide range of blowers and fans
- D.C. voltage range 12 V / 24 V
- Axial and radial-type blowers available
- RPM control

Advantages for your application

- Low noise development
- High efficiency
- Low weight
- Favorable price/performance ratio

As the largest manufacturer of electric motors in Europe, Bosch provides a comprehensive range of blower and engine-cooling products for every output range. Our blower range consists of single or multiple-stage suction or pressure blowers. The delivery range encompasses radial and axial-type blowers for 12 V and 24 V.
The blowers are designed for operating mode S1 (continuous operation). The modules are available with brush-type motors or as brushless drives.
The compact design of the modules means that they can be easily installed in areas where space is at a premium.

Automotive applications
Heating, ventilation, air-conditioning and engine cooling, cooler blowers in general

Industrial applications
Ventilation, off-highway, smart home

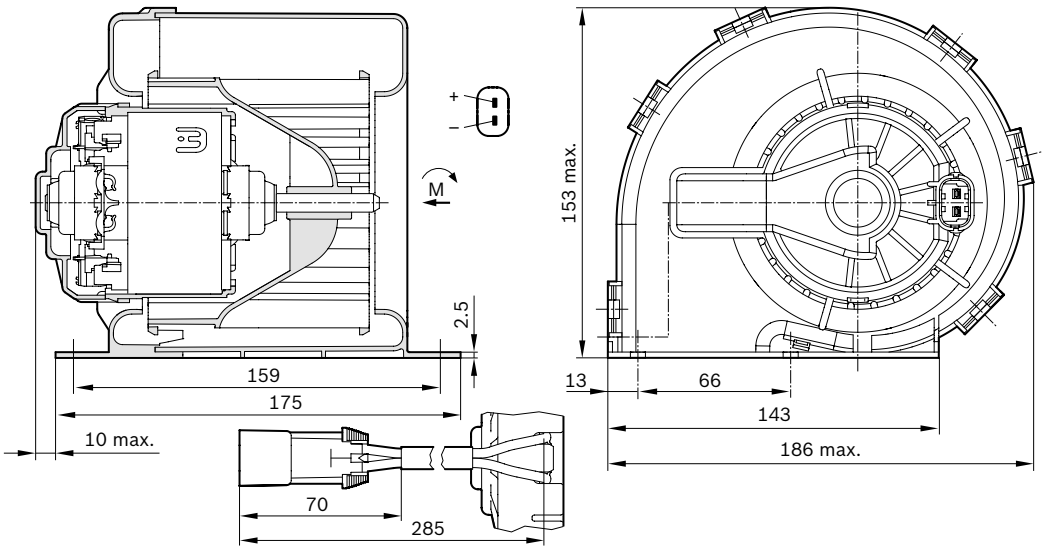
GBM-S

Family features:

- 12 V ventilation module
- Optimized noise performance
- High power density
- Operation mode: S1
- Degree of protection: IP 13

	Part number	Flow rate	Pressure difference	In (Nominal current)	nn (Nominal speed)	Direction of rotation	Signal	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
		m3/h	Pa	A	rpm		Hall				
12 V	0 130 115 604	400	470	14	4468	CW	No	D1	W1	C1	P1

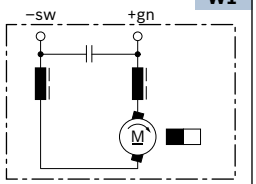
D1



GBM-S

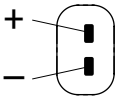
Wiring diagram (W)

W1



Mating connector (C)

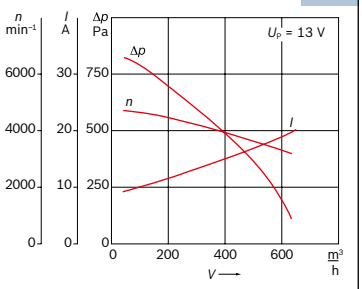
C1



Housing: Lisi F513A
Locker: –
Terminal: TE 964308-1

Performance curve (P)

P1



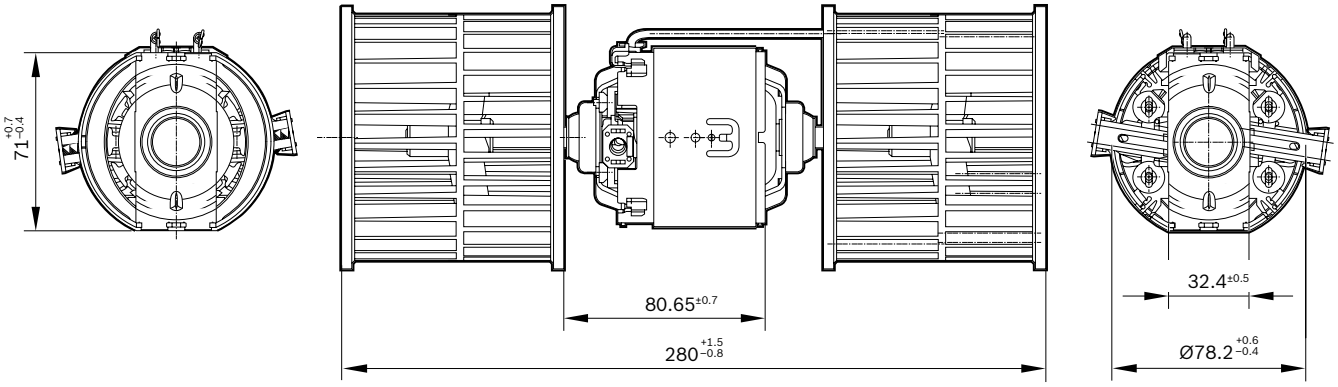
GBM-M

Family features:

- 24 V double-radial blower
- Degree of protection: IP 10
- Operation mode: S1
- Direction of rotation: CW

	Part number	Power	In Nominal current)	nn (Nominal speed)	Direction of rotation	Signal	Dimensional drawing (D)	Wiring diagram (W)	Performance curve (P)
		W	A	rpm		Hall			
24 V	F 006 B10 422	128.7	8	4100	CW	No	D1	W1	P1

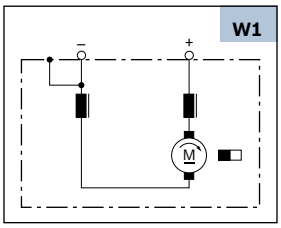
D1



GBM-M

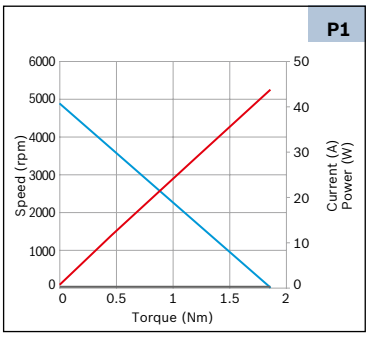
Wiring diagram (W)

W1



Performance curve (P)

P1



Brushless pumps

Advantages for your application

- Compact design
- High delivery rate
- Long service life
- High efficiency
- Silent operation

The stator and electronics are mechanically fully-separated from the rotor in the dry motor housing. The electronics and the stator winding generate an alternating electrical magnetic field, which in turn drives the rotor. The rotor, as part of the pump wheel, is located in the separate pump housing, therefore the coolant cannot come into contact with the electronics.

Application examples

For versatile applications Bosch offers auxiliary water pumps with electronically commutated drive motors:

- Heater circuit
- Auxiliary heater
- Charge-air cooling
- Generator cooling
- Turbocharger cooling
- Fuel cooling
- After-run cooling of combustion engines
- Thermal management of electric vehicles
- Battery and electronic cooling

PAD

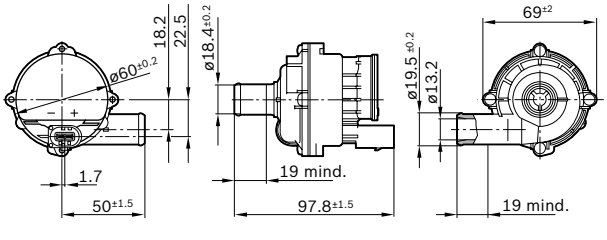
Family features:

- Silent operation
- PWM control available
- Extended temperature range available
- Extended power range available

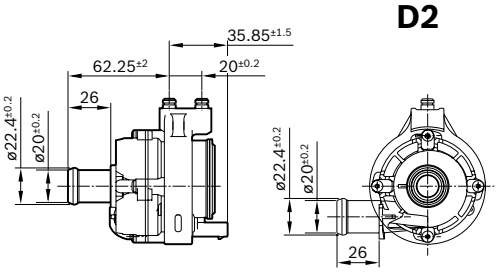
	Part number	Nominal pump pressure	Flow rate	Direction of rotation	Control	Dimensional drawing (D)	Connector (C)	Performance curve (P)
		bar	L/hr	CW or CCW				
12 V	0 392 023 232*	0.2	500	CW	PWM	D2	C2	P1
	0 392 023 004	0.1	900	CW	On / off	D1	C1	P2
	0 392 023 117**	0.1	900	CW	On / off	D3	C1	P3

* Extended power range
** Extended temperature range

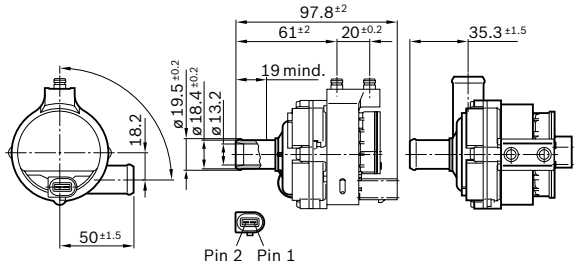
D1



D2



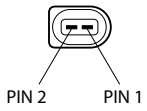
D3



PAD

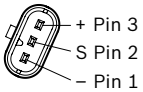
Mating connector (C)

C1



Housing: AMP 1-967412-2

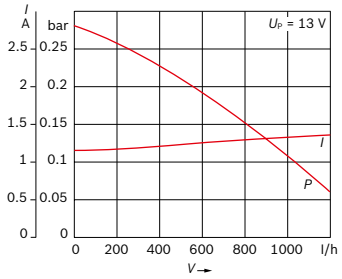
C2



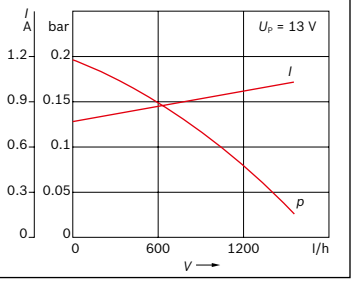
Housing: HIRSCHMAN 805-121-...00

Performance curve (P)

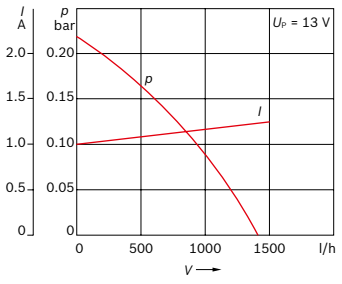
P1



P2



P3



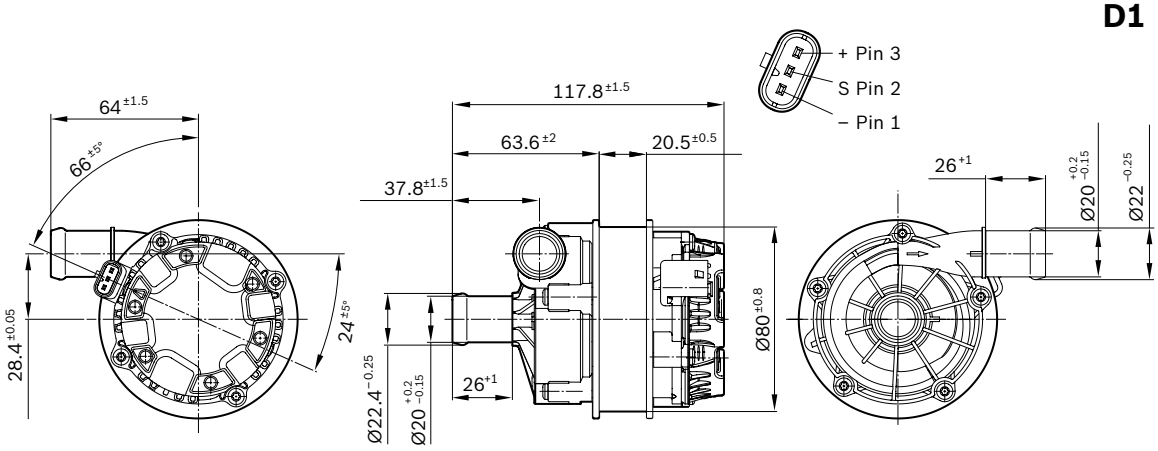
PCE

Family features:

- Silent operation
- PWM control available
- Extended temperature range available
- Extended power range available

	Part number	Nominal pump pressure	Flow rate	Direction of rotation	Control	Dimensional drawing (D)	Connector (C)	Performance curve (P)
		bar	$dm^3 \cdot h^{-1}$	CW or CCW				
12 V	0 392 024 058	0.6	1200	CW	PWM	D1	C1	P1

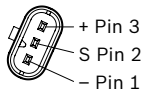
D1



PCE

Mating connector (C)

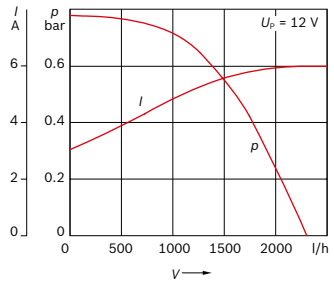
C1



Housing: HIRSCHMAN 805-121-...00

Performance curve (P)

P1



Solenoid valves

Valves for coolant fluids

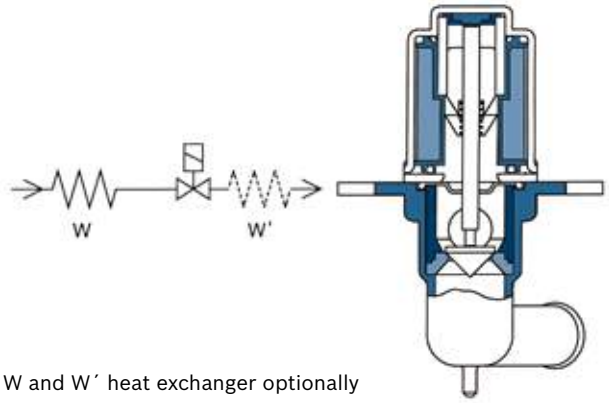
Application

Heater control for passenger cars and commercial vehicles.

Valve models

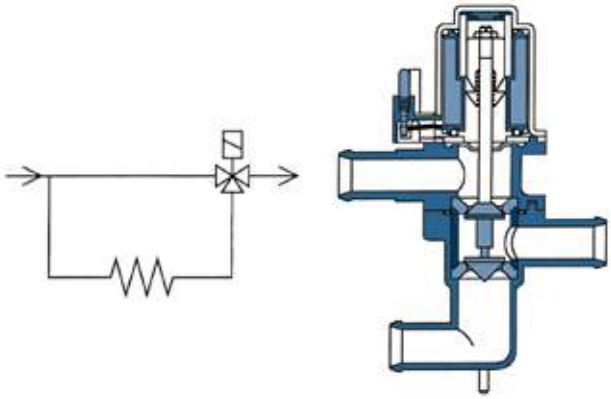
The valves are open when de-energized.

Shutoff- or pulse valve



W and W´ heat exchanger optionally upstream or downstream of valve

Changeover valve or pulse valve



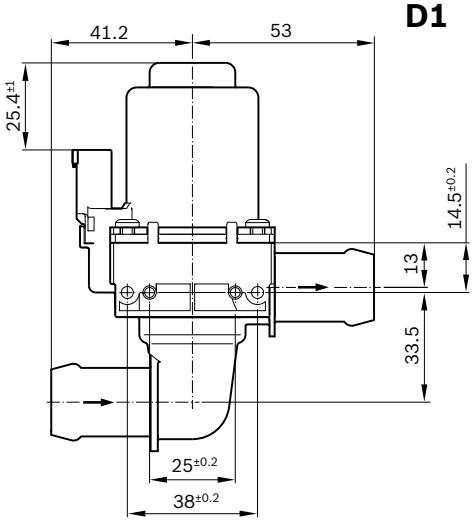
Switch-off valves

Family features:

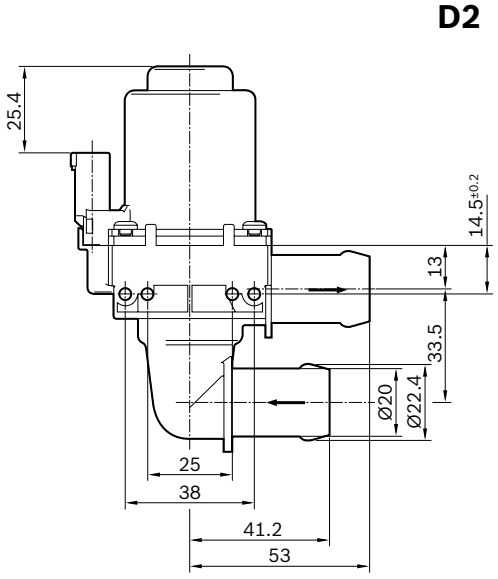
- Proportional valve function possible
- Degree of protection: IP5K4
- Open when de-energized

	Part number	Pressure drop	Flow rate	Switchable pressure difference	Resistance	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
		kPa	L/hr	kPa	Ω				
12 V	1 147 412 208	35	1500	150	12.4	D1	W1	C1	P1
24 V	1 147 412 205	35	1500	150	48	D1	W2	C1	P1
	1 147 412 218	35	2000	160	48	D2	W2	C1	P1

D1



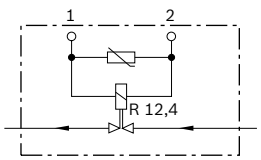
D2



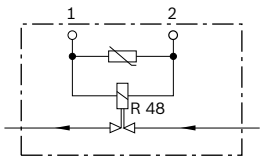
Switch-off valves

Wiring diagram (W)

W1

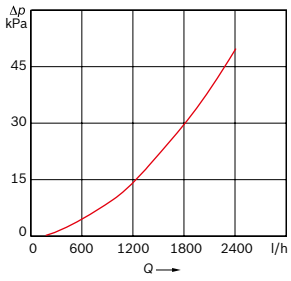


W2



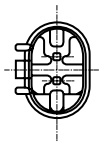
Performance curve (P)

P1



Mating connector (C)

C1



Housing: AMP 114-18063-1

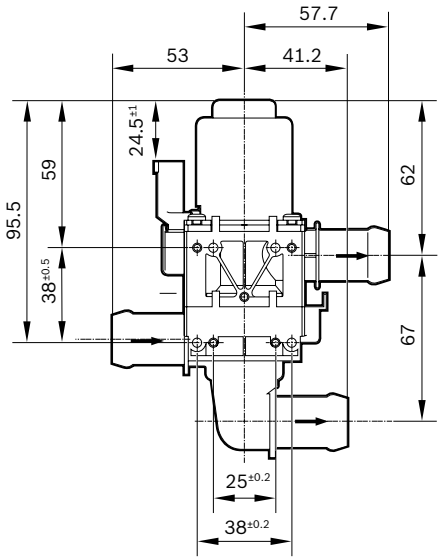
Switch-over valves

Family features:

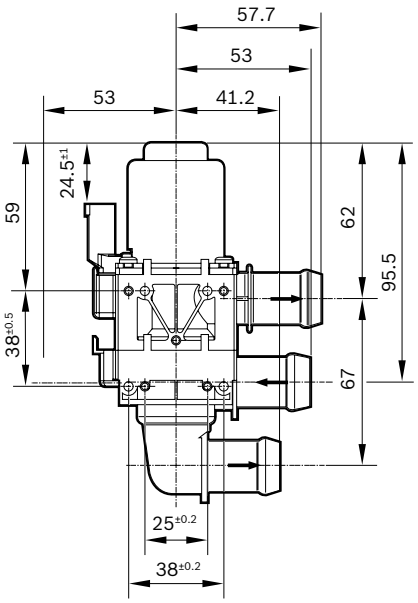
- Proportional valve function possible
- Degree of protection: IP5K4
- Open when de-energized

	Part number	Pressure drop	Flow rate	Switchabe pressure difference	Resistance	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
		kPa	L/hr	kPa	Ω				
12 V	1 147 412 207	45	2000	60	12.4	D3	W1	C1	P1
	1 147 412 211	45	1500	160	12.4	D1	W2	C1	P2
	1 147 412 213	45	1500	160	12.4	D2	W2	C1	P2
24 V	1 147 412 204	45	2000	60	48	D3	W1	C1	P1

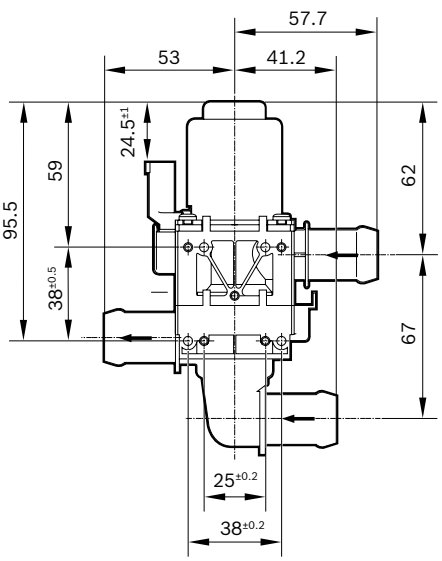
D1



D2



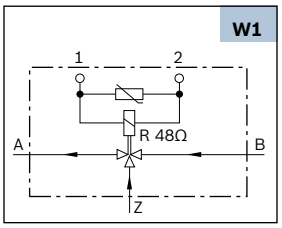
D3



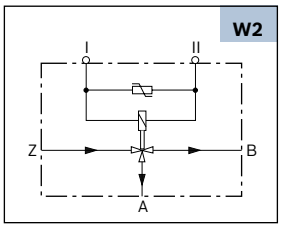
Switch-over valves

Wiring diagram (W)

W1

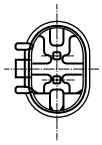


W2



Mating connector (C)

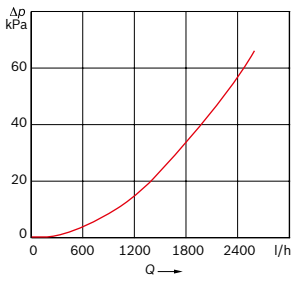
C1



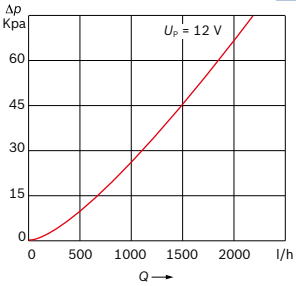
Housing: AMP C-114-18063-12

Performance curve (P)

P1



P2



Bosch contacts worldwide
for sales and advice

Australia
Robert Bosch (Australia) Pty
1555 Centre Road
AU-3169 Victoria

Austria
Robert Bosch AG
Göllnergasse 15 - 17
AT - 1030 Wien

Belgium
Robert Bosch SA/NV
Rue Henri Genessestraat 1
BE - 1070 Bruxelles

Brazil
Robert Bosch Ltda
Rod Anhanguera Km 98
Campinas

Czech Republic
Robert Bosch Odbytova s.r.o.
Pod visnovkou 35
CZ - 140 00 Prague

China
Bosch Trading (Shanghai) Co., Ltd
333 Fuquan (N.) Road
CN-200335 Shanghai

Denmark
Robert Bosch
Telegrafvej 1
DK - 2750 Ballerup

Finland
Robert Bosch Oy
Aeyritie 8 E
01510 Vantaa

France
Bosch France SAS
126, Rue de Stalingrad
FR-93705 Drancy Cedex

Germany
Robert Bosch GmbH
Auf der Breit 4
DE - 76227 Karlsruhe

Great Britain
Robert Bosch Ltd
P.O.Box 98; Broadwater Park; North Orbital Road
UK - UB9 5HJ Denham

Hungary
Robert Bosch Kft
Gyoemroei ut 120.
HU - 1103 Budapest

Israel
Ledico Technologies LTD.
31 Lazarov Str.
IL - 75654 Rishon Le Zion

Italy
Robert Bosch SPA
Via M.A. Colonna, 35
IT - 20149 Milano

Japan
Bosch Corporation
2-3-10 Nishihon-mach Nishi-ku
JP-550-00005 Osaka

Korea
Robert Bosch Korea
298 Bojeong-dong Giheung-gu
KR - 446-913 Yongin-si, Gyeonggi-do

Norway
Robert Bosch AS
Berghagan 1
NO - 1405 Langhus

Poland
Robert Bosch Sp. z.o.o.
Jutrzenki 105
PL-02231 Warszawa

Sweden
Robert Bosch AB
Drakegatan 6
SE-41250 Göteborg

Switzerland
Robert Bosch AG
Industriestrasse 31
CH - 8112 Otelfingen

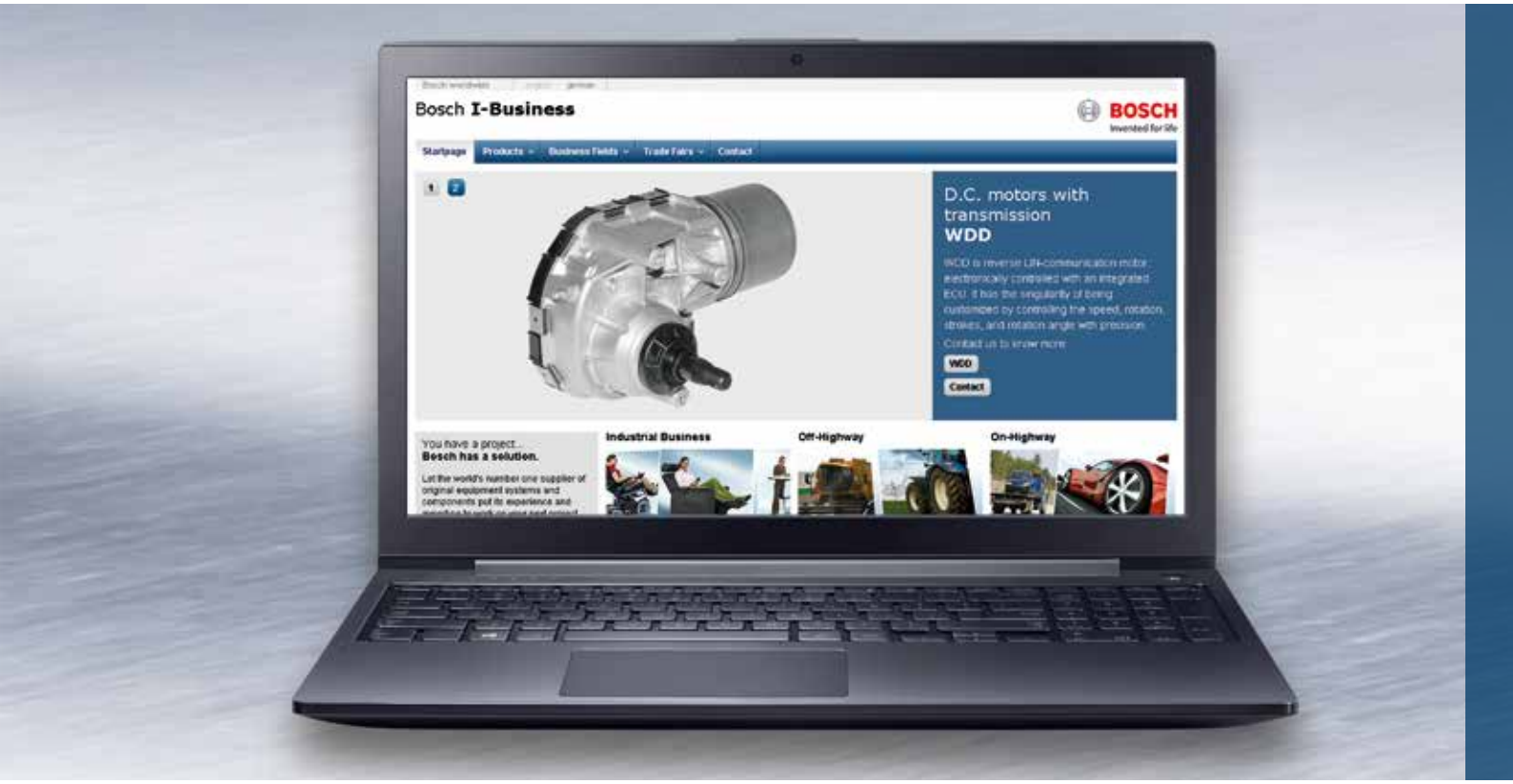
Spain
Robert Bosch Espana S.A.
Hermanos Garcia Noblejas 19
ES - 28037 Madrid

Thailand
Robert Bosch Limited
Liberty Square Bldg. - 11th Fl. 287 Silom Road
TH - 10500 Thailand

Türkey
Bosch San. Ve Tic. A.S.
Maslak Mh.
Ahi Evran Cd. Polaris Plaza No: 21 Kat 22
TR – 34398 Istanbul

USA
Robert Bosch LLC
2800 South 25th Avenue
US - 60155-4594 - Broadview, IL

Professional **Customer Service.**
Benefit from Extensive Bosch Information



Comprehensive Product Range

A great variety of Bosch products are suitable for industrial applications. You will find the whole product range and comprehensive technical information at:
www.bosch-ibusiness.com

- Electric motors
- Blowers
- Solenoid valves
- Water pumps
- Sensors
- Starters
- Alternators
- Connectors
- Industrial spark plugs
- Relays
- Switches
- Lighting technology

Technical Information

You will find detailed information about Bosch electric motors online at: **www.bosch-electricmotors.com**

The motor types are structured clearly. All necessary data and drawings are retrievable.

- Product images
- Technical data
- Characteristics
- Circuit diagrams
- Connection patterns
- Dimension drawings

Support in planning and development

Part number: 1 987 721 540

Part number: 1 987 721 074

Part number: 1 987 721 021

Innovative drives for your projects

Bosch electric motors for industrial applications

Bosch provides a wide range of technically and economically interesting product solutions. Take advantage of our engineers' experience gathered from application in millions of automobiles and from many other industrial uses.

BOSCH

1 987 721 540/2017/18

AA/MKI2 – 10.2016 – En

Automotive Aftermarket
P.O. Box 41 09 60
76225 Karlsruhe, Germany

Token fee: € 5,00

www.bosch-ibusiness.com

Subject to changes without notice!
Please address your queries and information to our agency.
With the publication of this issue all previous issues are rendered invalid.

bosch-ibusiness.com