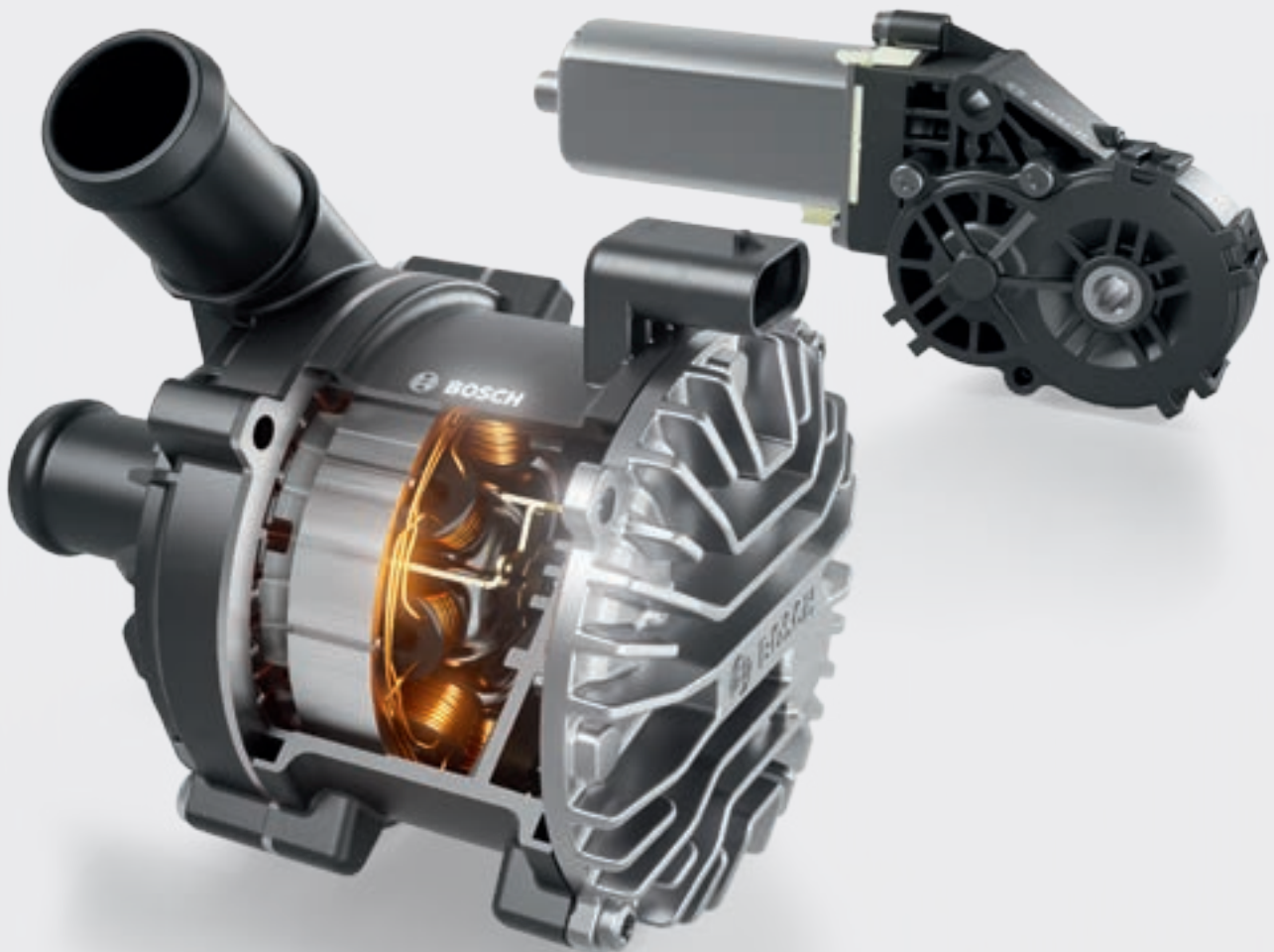


Invented for life

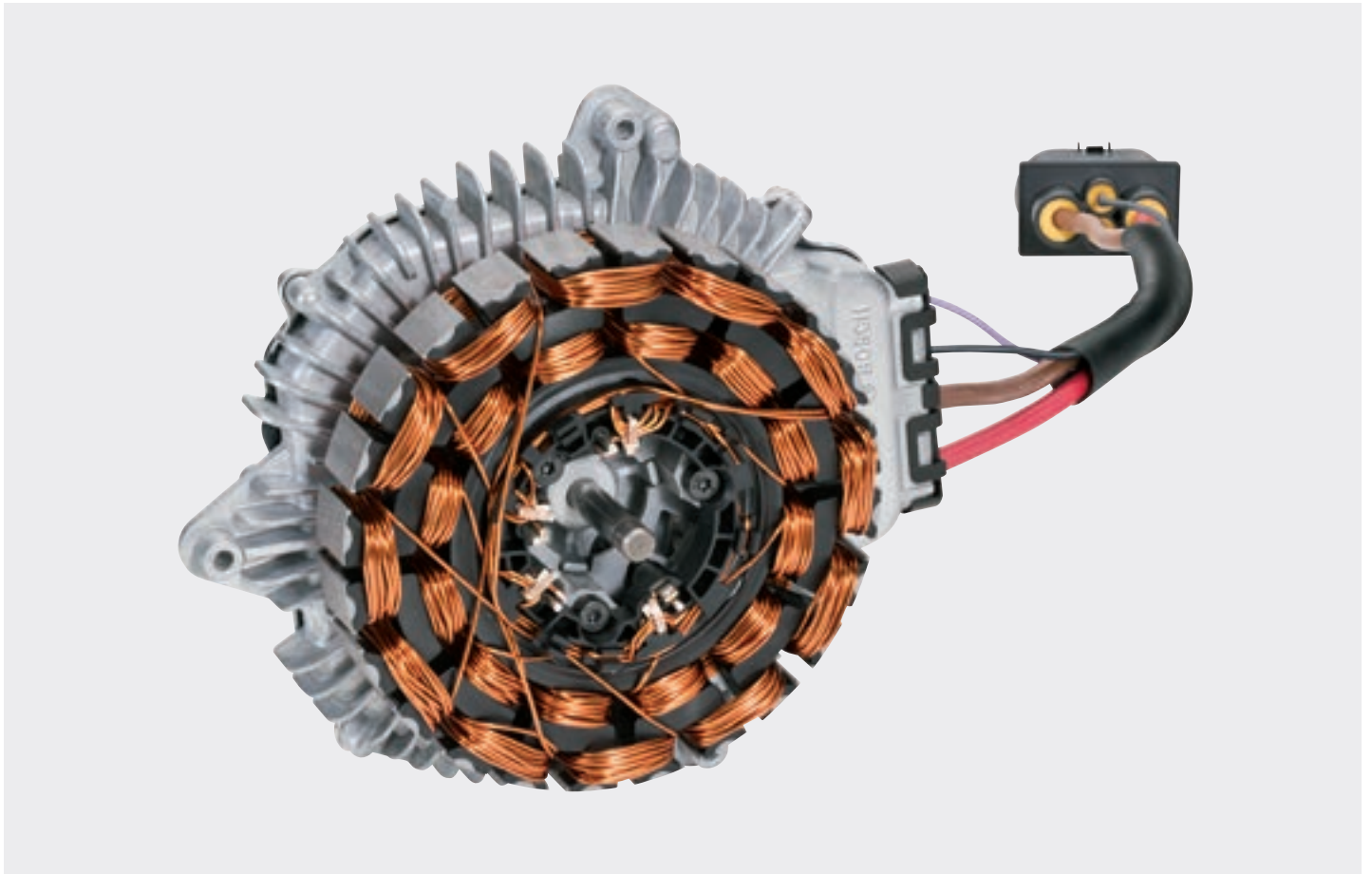


# Electric drives and thermal management components

2023 | 2024



# The right drive for your projects – **Bosch electric motors**



## **Electric motors from Bosch encourage movement in product development**

With its competence, Bosch, as one of 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 competitive 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](http://bosch-ibusiness.com)**



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### Notes

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

We highly 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



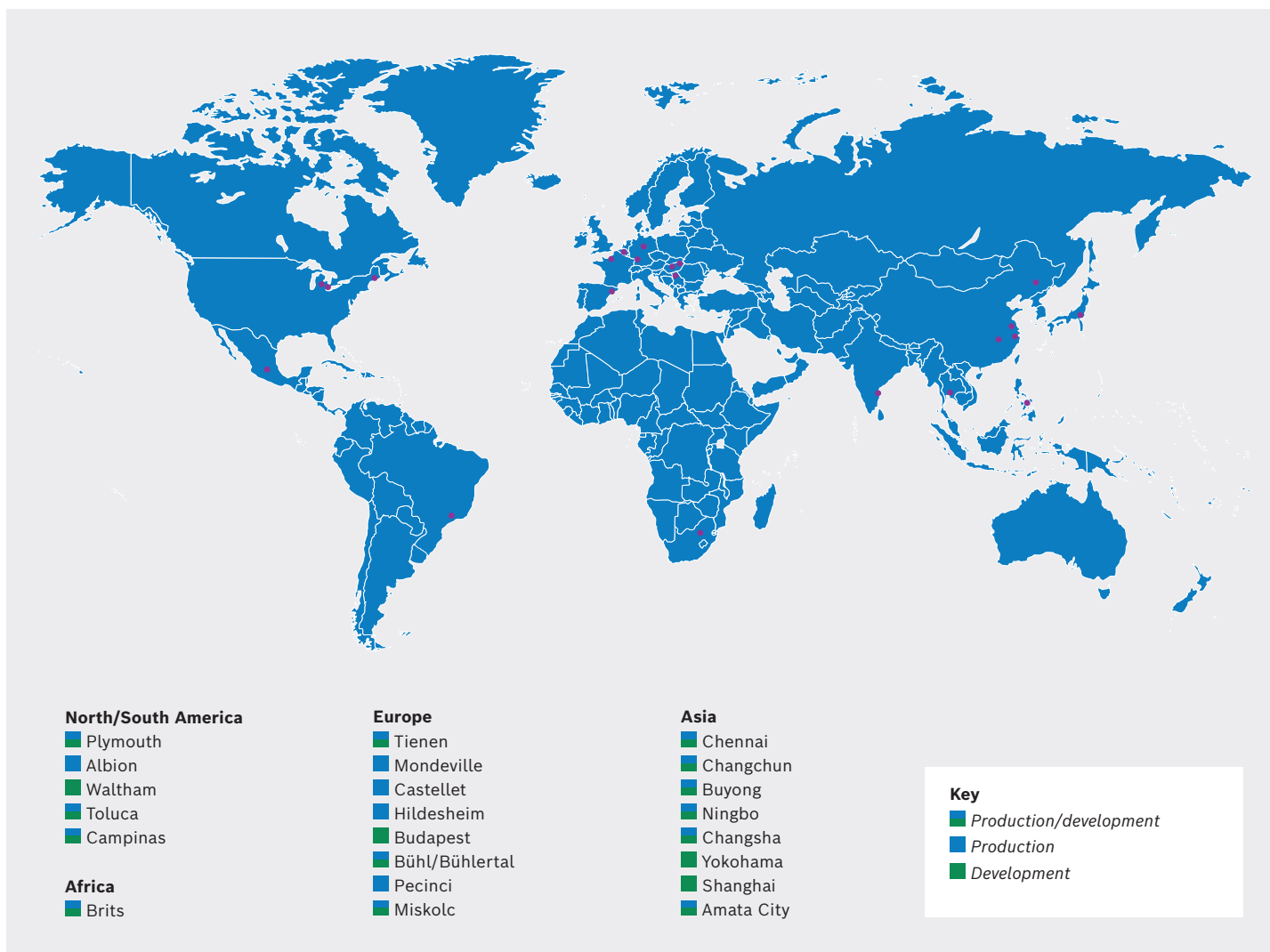
### The worldwide competent partner for industrial applications

As one of 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 characterized by features such as low noise volume and robustness (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.



## 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 are well known for reliability –**  
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 –**  
Bosch offers competitive prices due to high volume production and continuous technical improvements

### 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
- **technical information –**  
Comprehensive information on Bosch electric motors is available in our catalogue. Apart from this, you can find more technical details online at [www.bosch-ibusiness.com](http://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  $\text{min}^{-1}$

### Efficiency $\eta$

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  $P_1$ :

$$P_1 = U_N \cdot I_N; P_1 = 24 \text{ V} \cdot 35 \text{ A}; P_1 = 840 \text{ W}.$$

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  $\eta$ :

$$\eta = \frac{P_{2N}}{P_1} = \frac{636 \text{ W}}{840 \text{ W}} = 0,76 = 76\%$$

### 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  $\text{min}^{-1}$

### 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  $I_{\text{max}}$ .

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

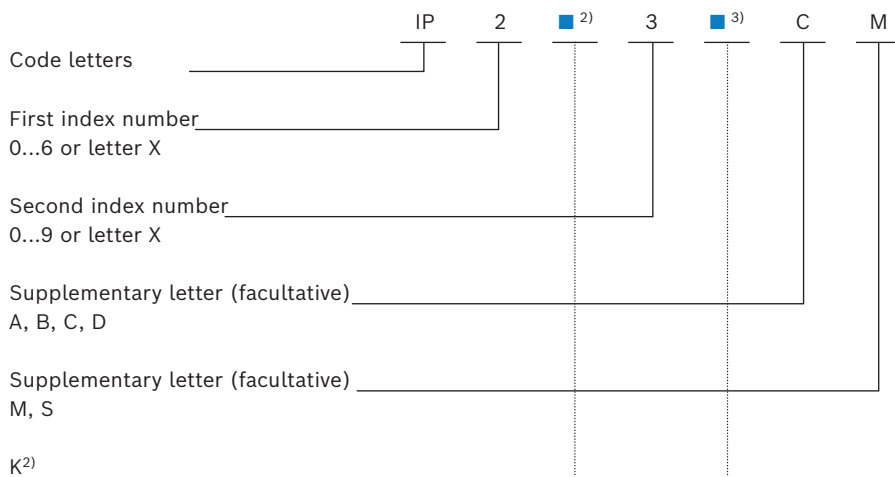
## Fastening

- 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:

<sup>2)</sup> 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.

<sup>3)</sup> 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 <sup>3)</sup>
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 <sup>3)</sup>
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
- $\vartheta$  Temperature
- $\vartheta_{max}$  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**

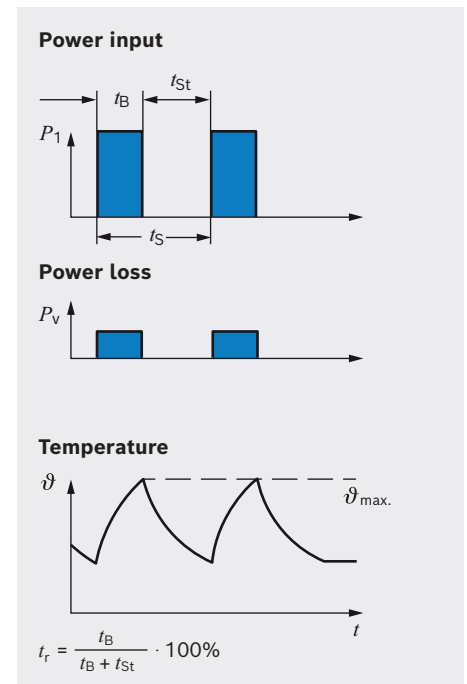
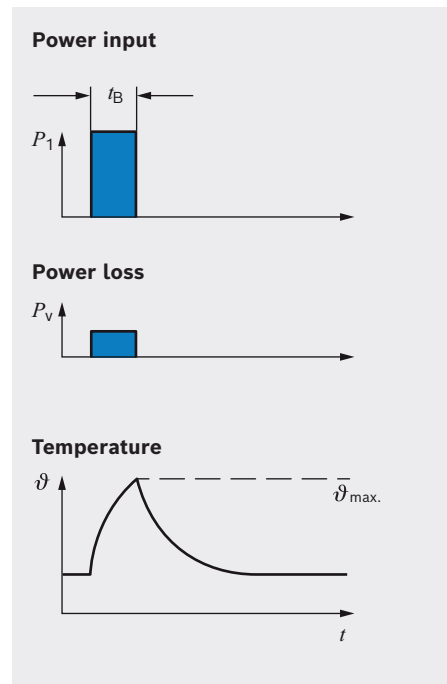
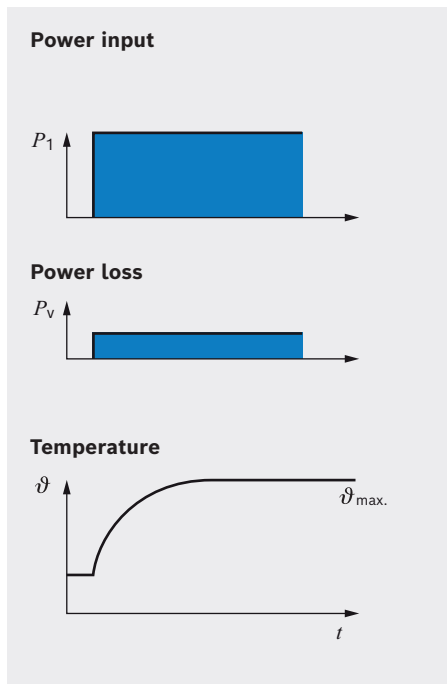
Operation with constant load condition, which does not last long enough however to enable the thermal steady-state condition to be reached, and a subsequent pause, which lasts long enough for the motor temperature not to deviate more than 2 K from the coolant temperature.

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**

Permanent- (magnet) excited D.C. motor		Varistor disk		Varistor (voltage-dependent resistor)	
Interference- suppression component Throttle		Resistance		Bridge rectifier	
Interference- suppression component Capacitor		Thermoswitch			
		Limit shutoff			



## 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

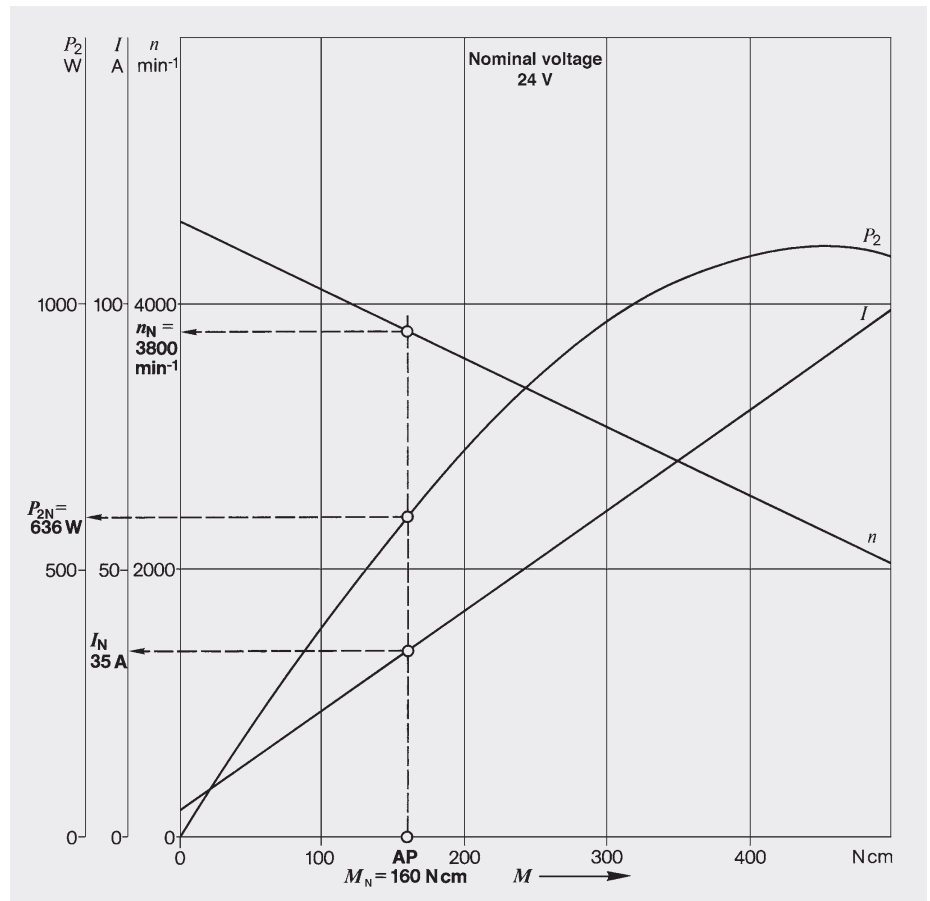
$n$  Rotational speed

Example:

Given:  $M_N = 160$  Ncm

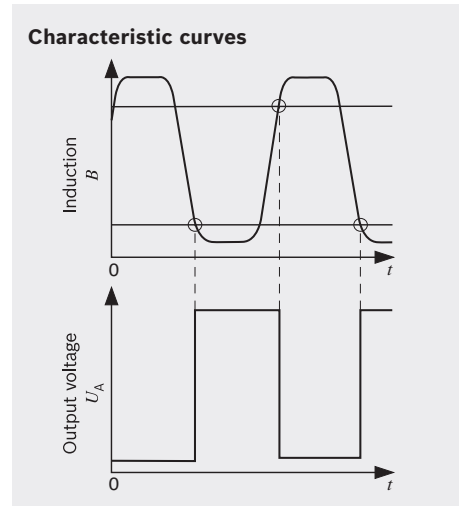
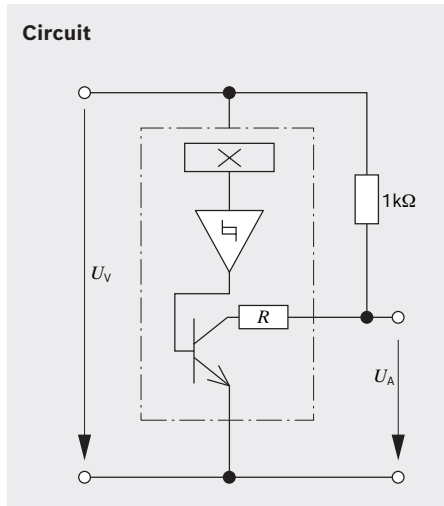
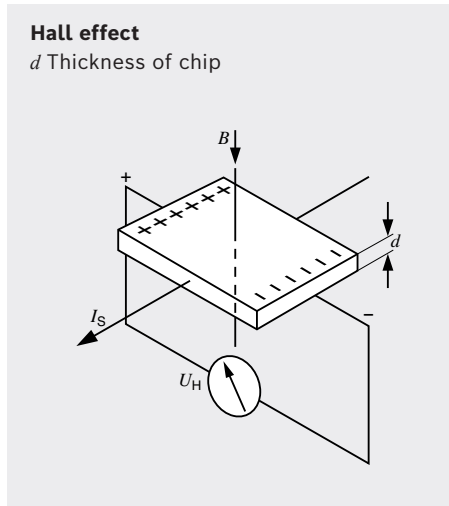
Found:  $n_N = 3.800$  rpm ( $\text{min}^{-1}$ )

$P_{2N} = 636$  W and  $I_N = 35$  A



# Motors with Hall sensor

## Hall effect



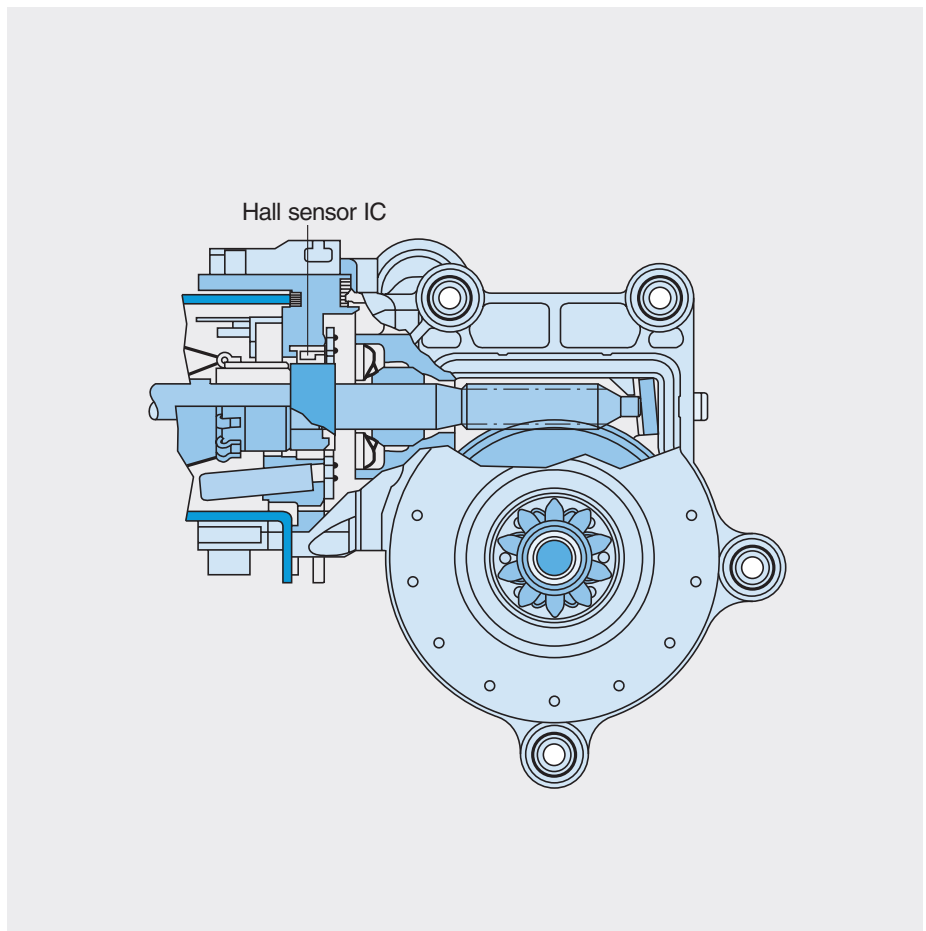
If a current  $I_s$  flows through a chip, a Hall voltage  $U_H$  is generated transverse to the direction of the current, the size of which is proportional to the magnetic induction  $B$  (vertical to  $I_s$ ) and the current  $I_s$ . The Hall voltage  $U_H$  is made up of:

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

$R_H$  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.

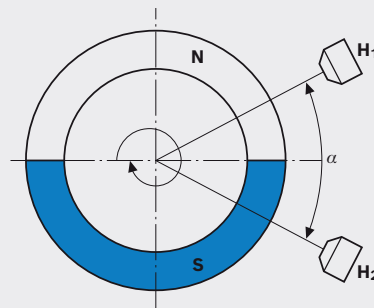
Permanently connected to the armature shaft is a magnetic ring, the magnetic field of which permeates the Hall element. When the armature shaft rotates, the magneto-motive-force direction in the Hall element changes. The output transistor is then either switched through or open.



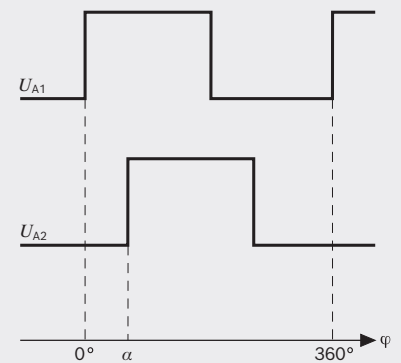
### Hall-effect applications in D.C. motors

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  $\alpha$  in a motor, then the direction of rotation can also be determined.

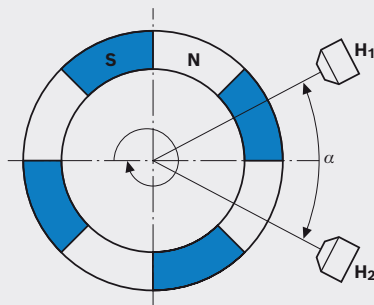
**Basic arrangement in motor with 2-pole ring magnet**



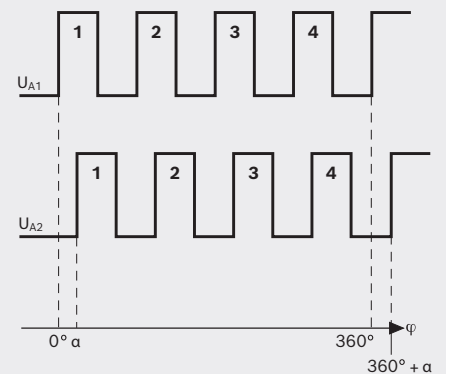
**Output signals, 1 armature rotation**



**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
$\alpha$	Angle between the two Hall generators

### Output signals

$U_{A1}$	Output voltage of first Hall generator
$U_{A2}$	Output voltage of second Hall generator
$\alpha$	Angle between the two Hall generators
$\varphi$	Rotational angle

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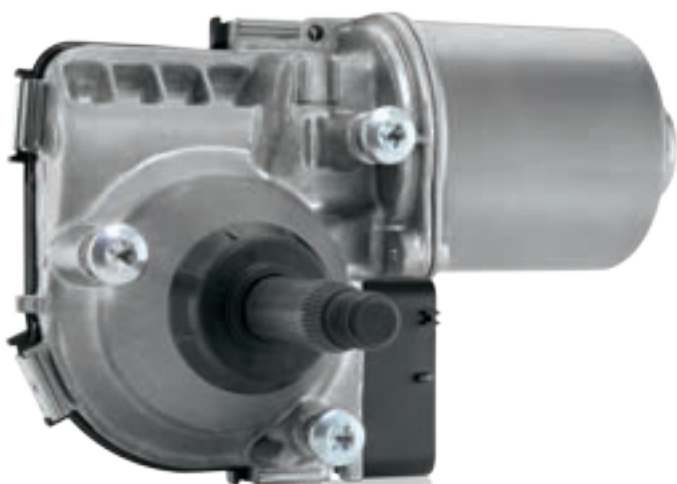
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# DC motors with transmission

Decades of experience in manufacturing of electric motors have led to the current design. The smart Bosch geared motors in 12V and 24V are suitable for a wide range of intelligent applications. They stand for reliable performance, robustness and broad variety of speed/torque. Depending on the model, the rotating speed, rotating angle, position and the torque can be parameterized according to the design.



## Product features

- models with integrated electronics: for bus communication digital/LIN/CAN as well as teach-in functions
- rotation in both directions: for using the motor as a drive or as an actuator
- available with potentiometers and hall IC in different resolutions: for position feedback within the control loop
- compact actuators with non reversible gear: to keep the position fixed while not energized

## 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, flap actuation in heating and ventilation system

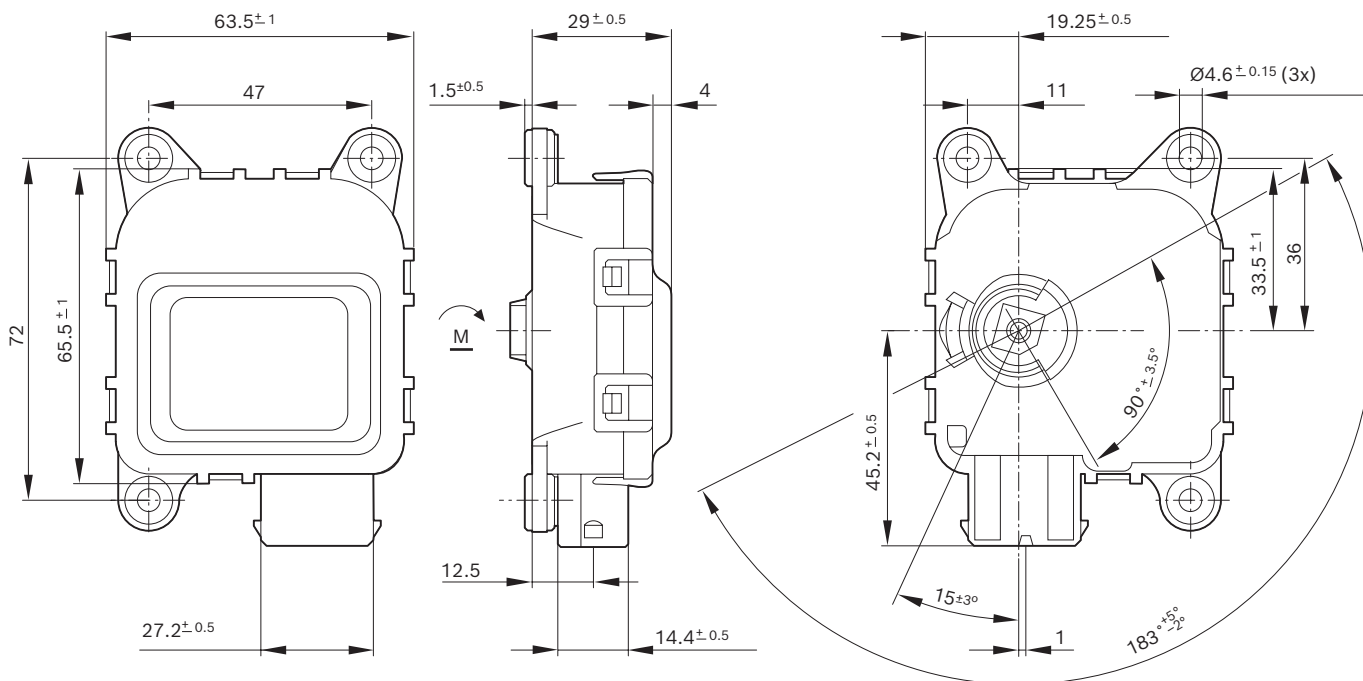
# VMC



## Family features:

- with and without potentiometer
- operation mode: S2
- direction of rotation: CCW/CW
- compact and robust design

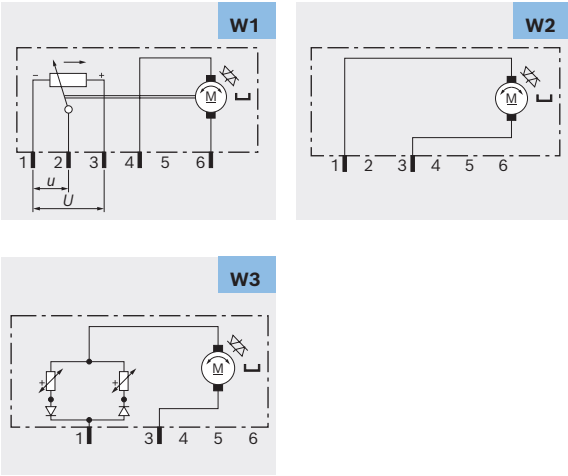
Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Direction of rotation	Degree of protection	Signal Poti	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
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
12 V	0 132 801 169	0.2	0.15	4.5	0.4	0.9	405:1	CW/CCW	IP 40	Yes	W1	S3	C1	P5
12 V	0 132 801 156	0.2	0.13	6.5	0.3	0.9	310:1	CW/CCW	IP 40	No	W2	S4	C1	P4
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
24 V	0 132 801 141	0.3	0.10	6	0.4	0.9	405:1	CCW/CW	IP 54	Yes	W1	S2	C1	P1



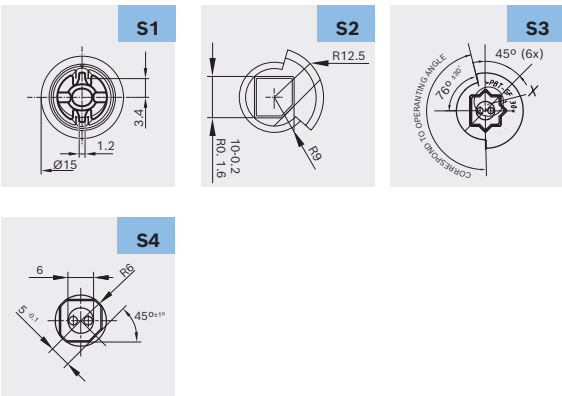
D1

# VMC

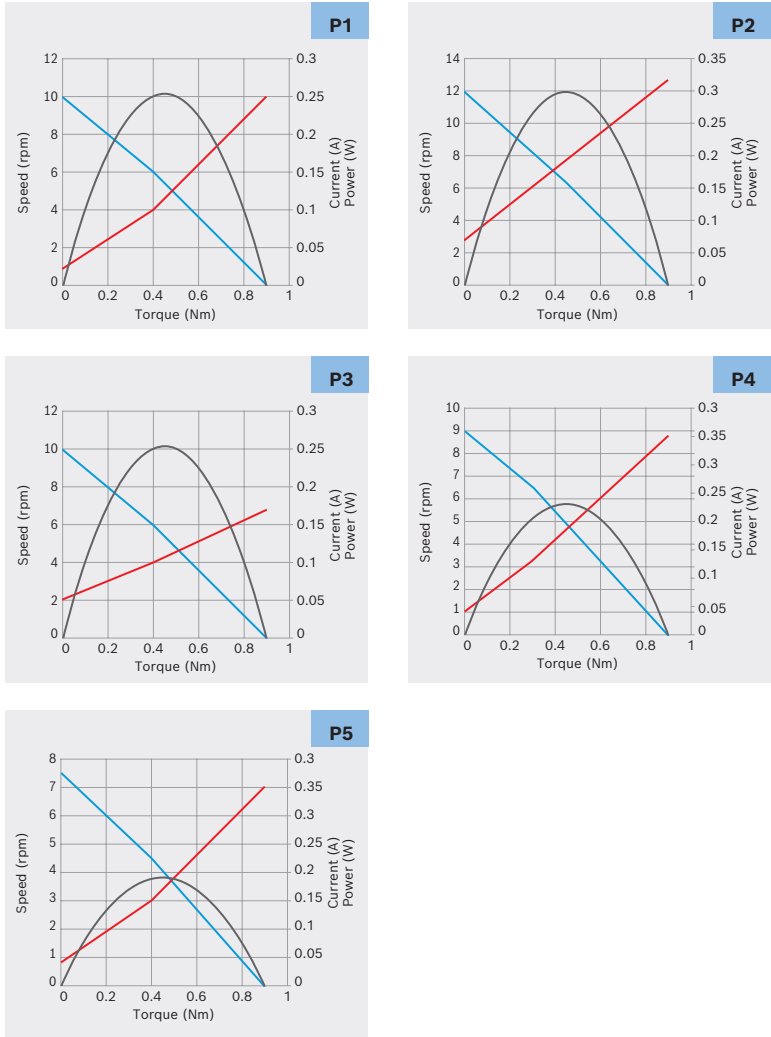
## Wiring diagram (W)



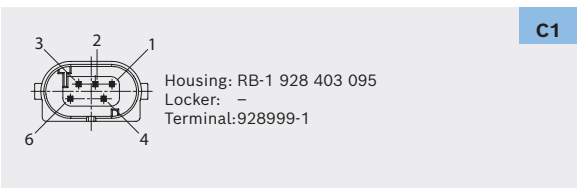
## Drive end (S)



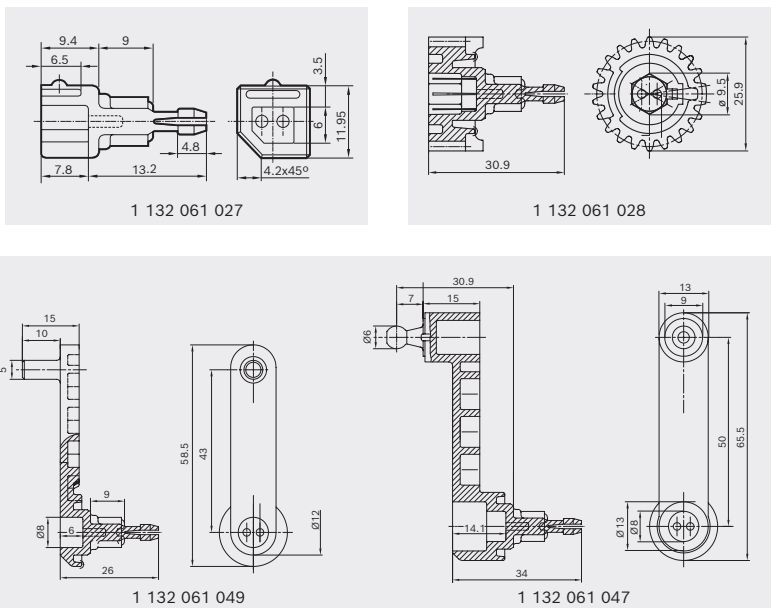
## Performance curve (P)



## Mating connector (C)



## Accessories



# AHC1

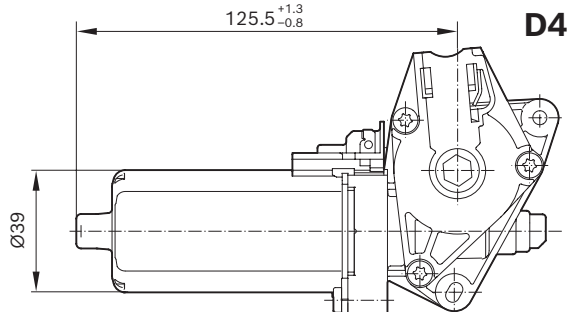
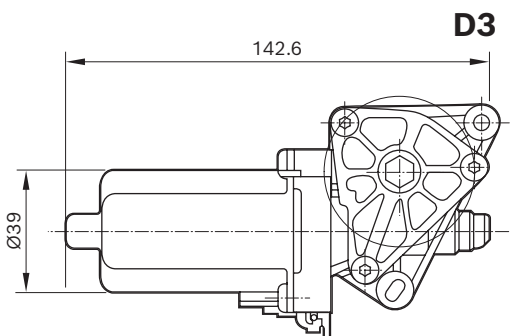
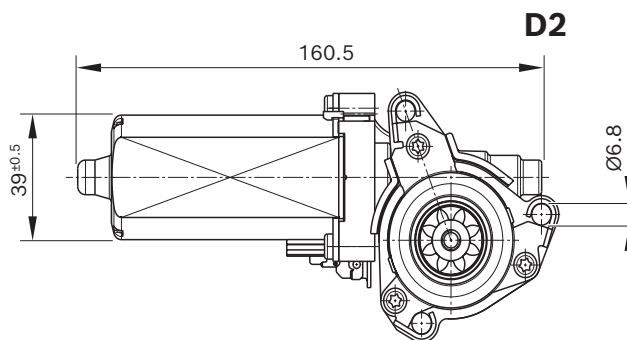
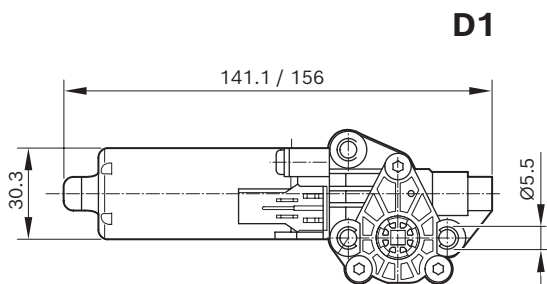


## Family features:

- with and without hall sensor
- degree of protection: IP 50
- operation mode: S2
- hollow shaft
- direction of rotation: CCW/CW

Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Signal Hall	Side**	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 390 201 912	8.8	5	845	0.1	1.05	27:4	No	L	D1	W1	S1	C1	P1
12 V	0 390 201 914	8.8	5	845	0.1	1.05	27:4	Yes	L	D1	W2	S1	C2	P1
12 V	0 390 203 371	12.9	4	411	0.3	1.5	27:4	Yes	L	D1	W2	S2	C2	P6
12 V	0 390 201 903	8.6	5	820	0.1	1.5	27:4	Yes	R	D1	W2	S1	C2	P2
12 V	0 390 201 915	8.6	5	820	0.1	1.5	27:4	Yes	L	D1	W2	S1	C2	P2
12 V	0 390 203 370	6.6	3.8	210	0.3	2.8	28:2	Yes	L	D1	W4	S2	C2	P7
12 V	0 390 203 431	13.2	7	63	2	5.8	50:1	Yes	L	D3	W3	S3	C2	P3
12 V	0 390 203 389	2.4	2	75	0.3	1.8	29:1	Yes	L	D1	W6	S2	C2	P8
12 V	0 390 203 045	1.3	4.2	6.4	2	27.5	506:1	Yes	L	D2	W6	S4	C2	P9
12 V	0 390 203 046	1.3	4.2	6.4	2	27.5	506:1	Yes	R	D2	W6	S4	C2	P9
24 V	0 390 203 316	8.8	3.2	841	0.1	1.85	27:4	Yes	R	D1	W3	S2	C2	P4
24 V	0 390 203 317	8.8	3.2	841	0.1	1.85	27:4	Yes	L	D1	W3	S2	C2	P4
24 V	0 390 203 386	15.6	4.8	99.5	1.5	11	50:1	2x Hall*	L	D4	W5	S3	C1	P5

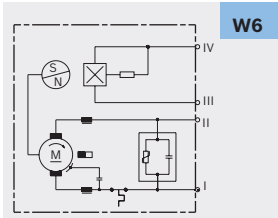
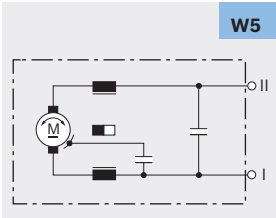
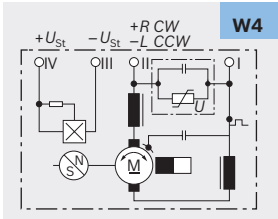
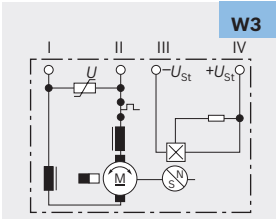
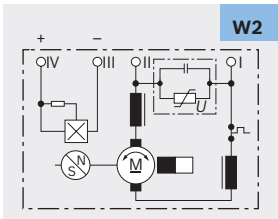
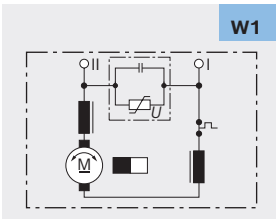
\* Optional (0 986 196 002) / \*\*gear housing left: L, gear housing right: R



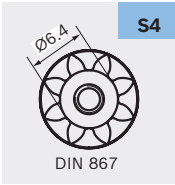
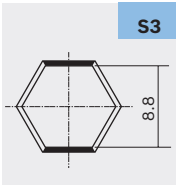
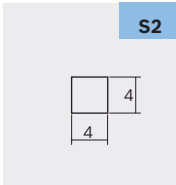
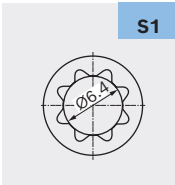


# AHC1

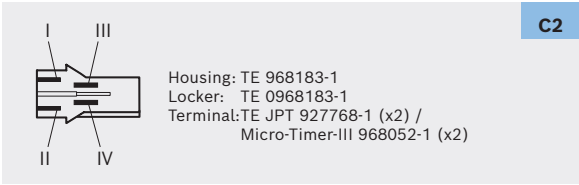
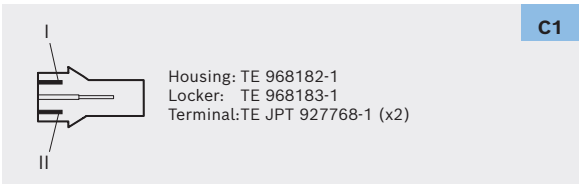
## Wiring diagram (W)



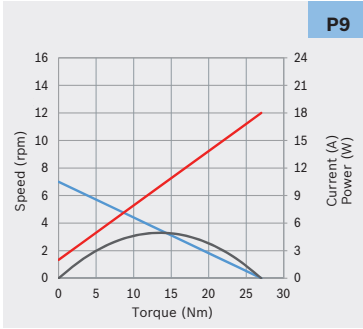
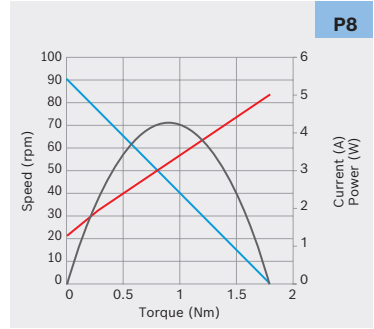
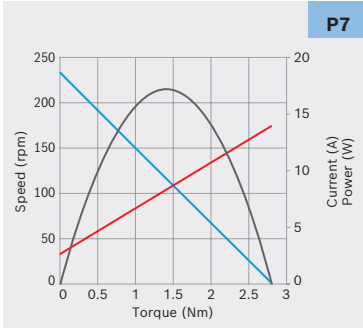
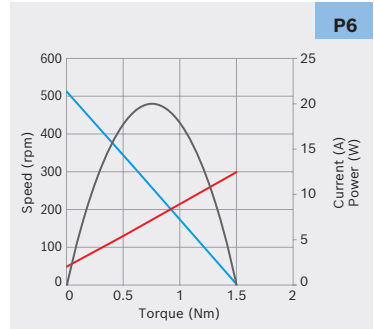
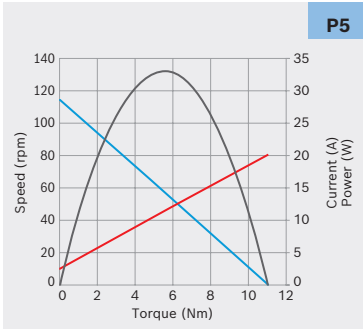
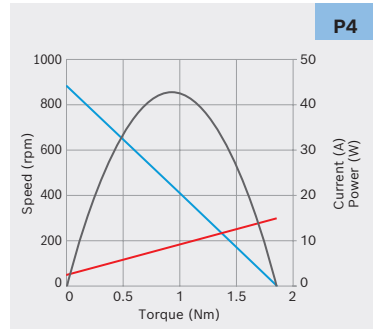
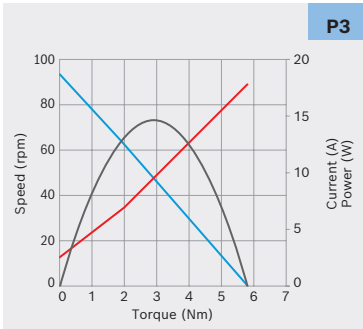
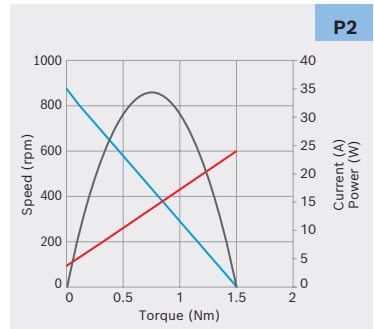
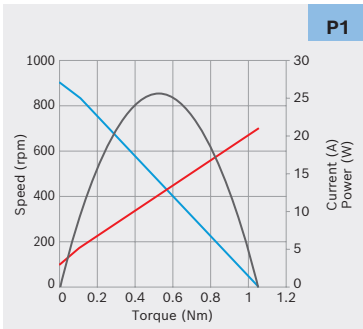
## Drive end (S)



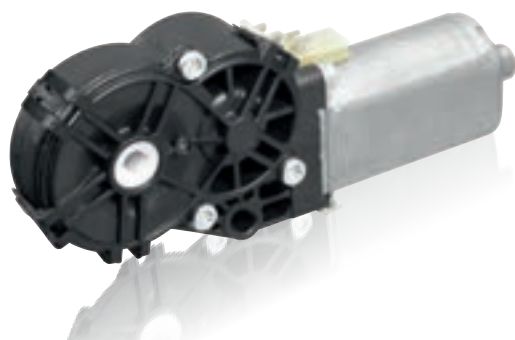
## Mating connector (C)



## Performance curve (P)



# AHC2

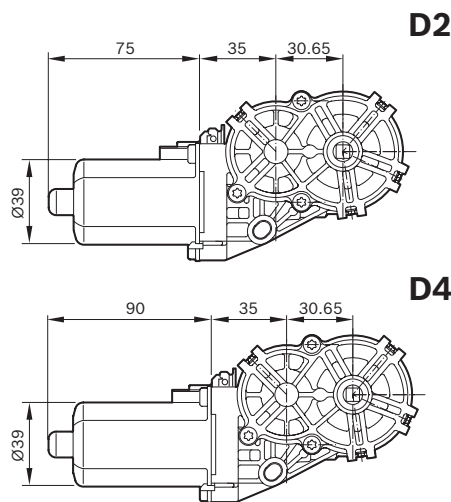
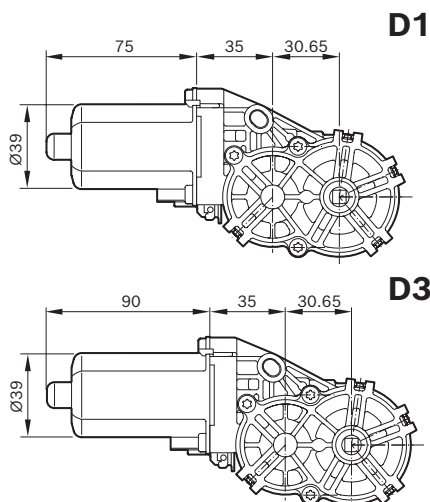


## Family features:

- with and without hall sensor
- degree of protection: IP 50
- operation mode: S2
- direction of rotation: CCW/CW

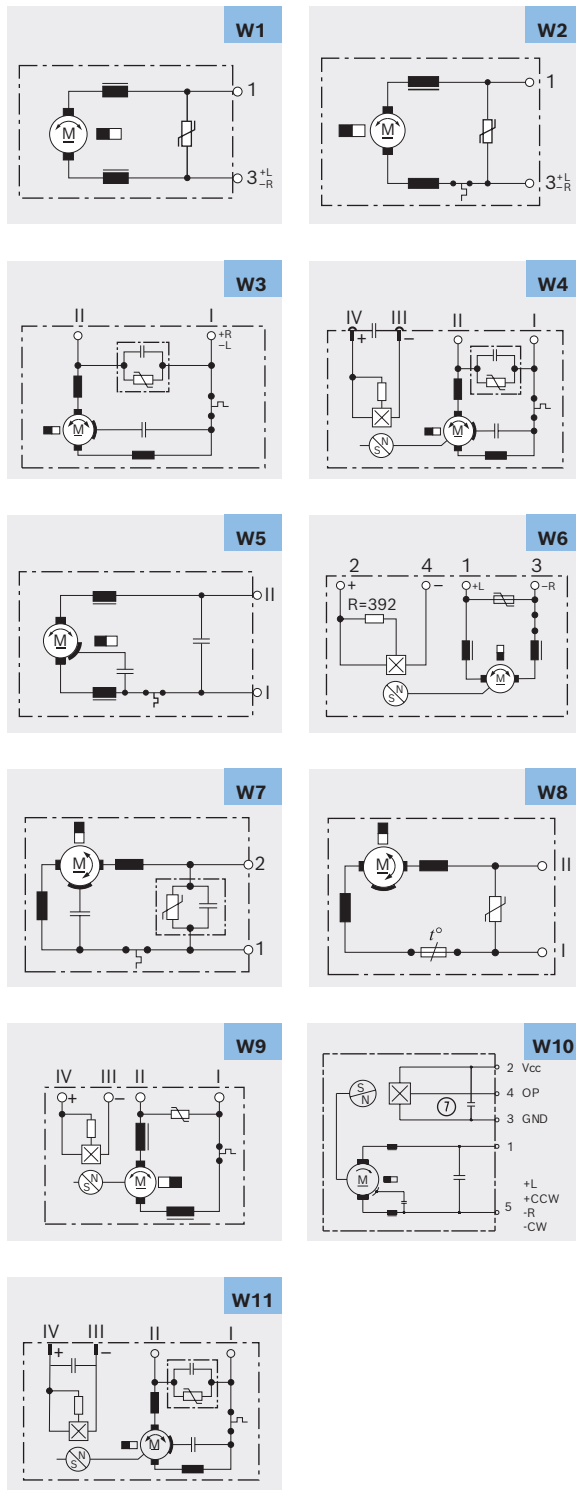
Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Signal Hall	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 390 203 228	3.9	2.8	37.3	1	10.35	182:2	No	R	D1	W5	S1	C1	P3
12 V	0 390 201 972	4.7	4	22.5	2	19	185.5:1	Yes	R	D3	W6	S1	C2	P2
12 V	0 390 201 973	4.7	4	22.5	2	19	185.5:1	No	R	D3	W1	S1	C2	P2
12 V	0 390 201 944	6	6	28.5	2	20	185.5:1	No	R	D1	W7	S4	C1	P1
12 V	0 390 201 999	4.7	4	22.5	2	19	185.5:1	No	R	D3	W2	S1	C2	P2
12 V	0 390 203 224	3.9	3.7	18.65	2	21.5	217:1	No	R	D3	W3	S2	C1	P7
12 V	0 390 203 225	3.9	3.7	18.65	2	21.5	217:1	No	L	D4	W3	S2	C1	P7
12 V	0 390 203 226	3.9	3.7	18.65	2	21.5	217:1	Yes	R	D3	W4	S2	C3	P7
12 V	0 390 203 227	3.9	3.7	18.65	2	21.5	217:1	Yes	L	D4	W4	S2	C3	P7
12 V	0 390 201 950	6.1	6	29	2	20.5	185.5:1	No	R	D1	W3	S3	C1	P1
12 V	0 390 203 266	3.5	4.2	22.25	1.5	23	185.5:1	No	R	D1	W3	S1	C1	P4
12 V	0 390 201 949	2.5	3.6	23.6	1	14.5	185.5:1	No	R	D1	W3	S1	C1	P6
12 V	0 390 203 306	3.9	3.7	18.65	2	23.9	217:1	No	R	D3	W3	S5	C1	P7
12 V	0 390 203 307	3.9	3.7	18.65	2	23.9	217:1	No	L	D4	W3	S5	C1	P7
12 V	0 390 203 308	3.9	3.7	18.65	2	23.9	217:1	Yes	R	D3	W4	S5	C3	P7
12 V	0 390 203 309	3.9	3.7	18.65	2	23.9	217:1	Yes	L	D4	W4	S5	C3	P7
12 V	0 390 203 372	1.5	1.8	14.1	1	27.5	217:1	Yes	R	D3	W10	S2	C4	P8
12 V	0 390 203 407	9.1	5.4	43.8	2	20	91:1	Yes	R	D3	W11	S2	C3	P9
24 V	0 390 203 310	3.5	2	16.9	2	23.3	217:1	No	R	D3	W8	S3	C1	P5
24 V	0 390 203 311	3.5	2	16.9	2	23.3	217:1	No	L	D4	W8	S3	C1	P5
24 V	0 390 203 312	3.5	2	16.9	2	23.3	217:1	Yes	R	D3	W9	S3	C3	P5
24 V	0 390 203 313	3.5	2	16.9	2	23.3	217:1	Yes	L	D4	W9	S3	C3	P5

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

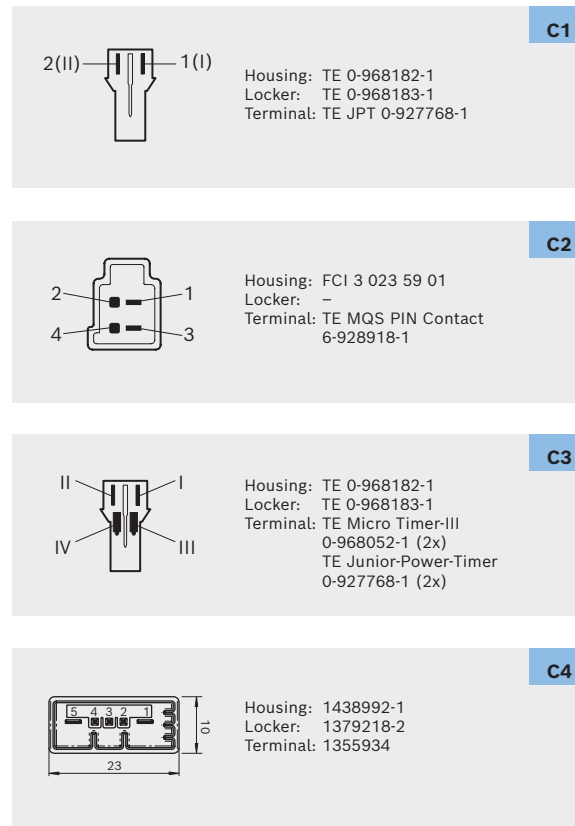


# AHC2

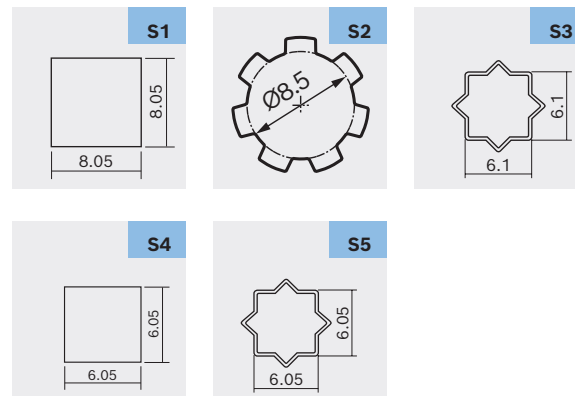
## Wiring diagram (W)



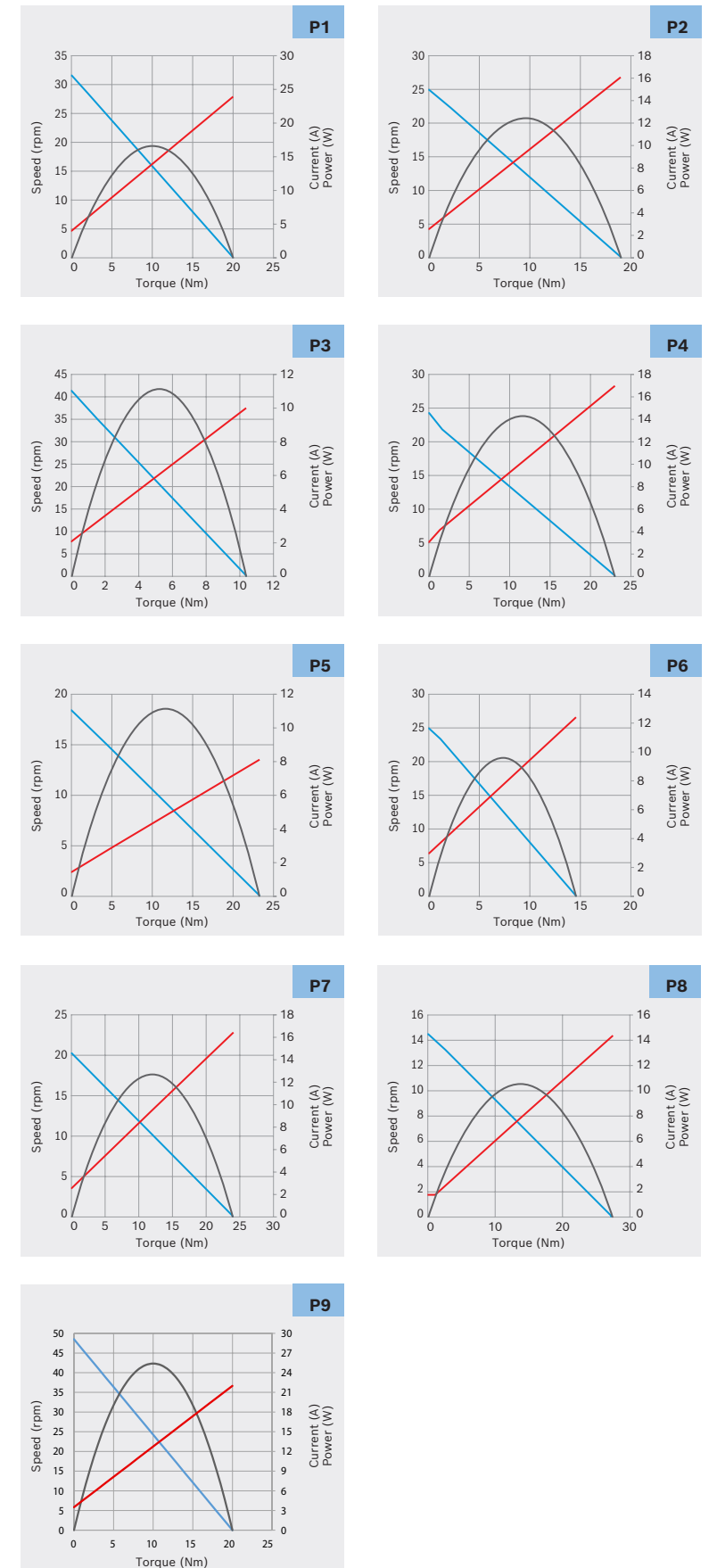
## Mating connector (C)



## Drive end (S)



## Performance curve (P)



## AHC-RS



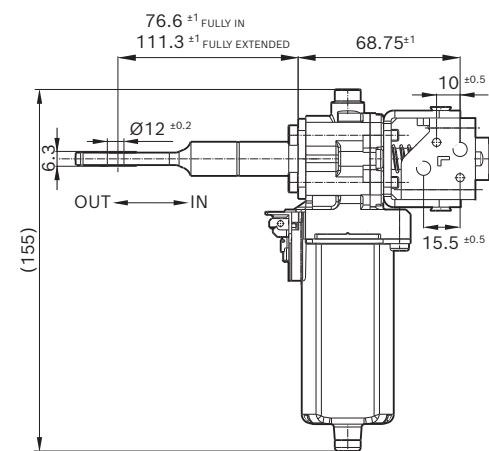
### Family features:

- hall Sensor available
- degree of protection: IP 50
- operation mode: S2 - S3
- linear movement

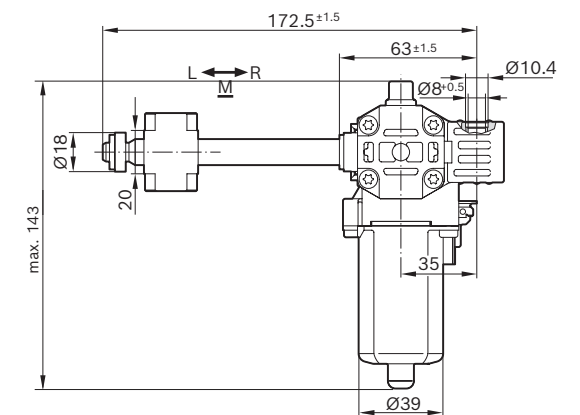
Voltage	Part number	In (Nominal current) A	F <sub>n</sub> (Nominal force) kN	F <sub>max</sub> Maximum force kN	Adjustment speed mm/s	Stroke mm	Signal Hall	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
12 V	0 390 203 229	9	0.5	3	13	81.6	Yes	D3	W1	C3	P3
12 V	6 004 RA3 645	5	0.3	3.2	9.0	34.7	Yes	D1	W2	C1	P1
12 V	0 390 201 941*	3.9	0.5	4.5	7.2	75	No	D2	W3	C2	P2
12 V	0 390 201 989	6	0.5	4.25	7	58.5	Yes	D4	W1	C3	P4

\* limited availability

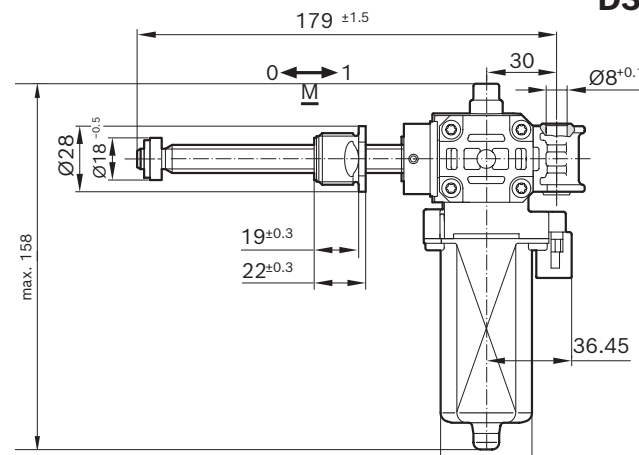
**D1**



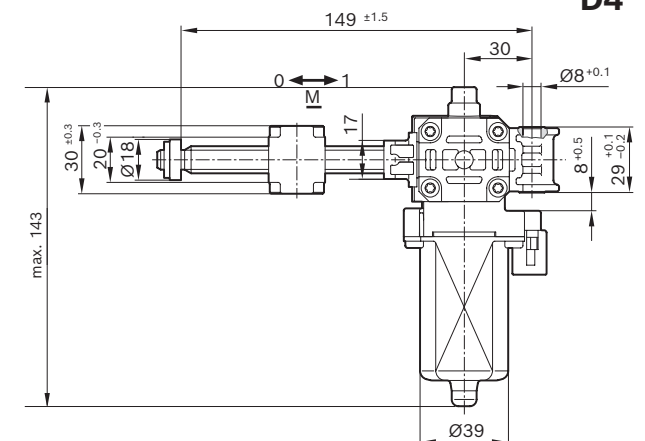
**D2**



**D3**

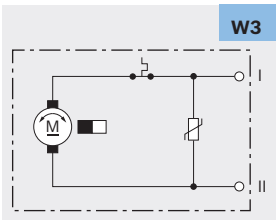
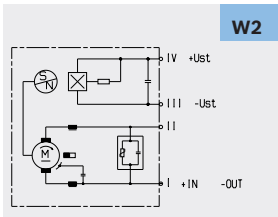
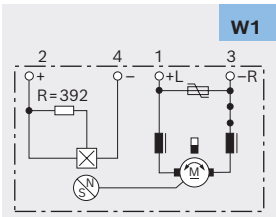


**D4**



# AHC-RS

## Wiring diagram (W)



## Mating connector (C)

**C1**

Housing: TE 968182-1  
 Locker: TE 968183-1  
 Terminal: TE JPT 927768-1 (x2)  
 TE MT III 968052-1 (x2)

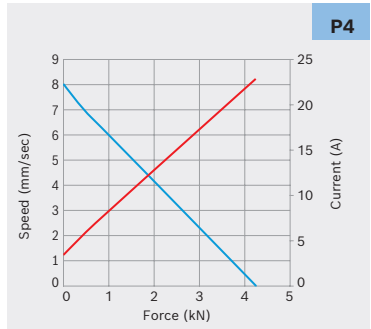
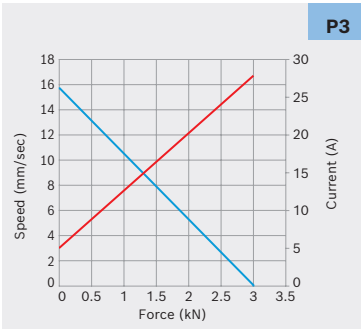
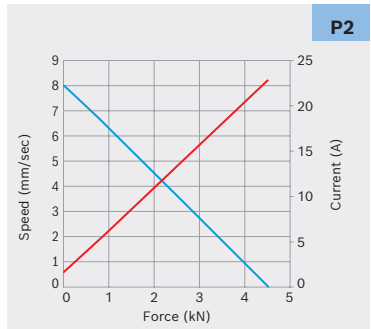
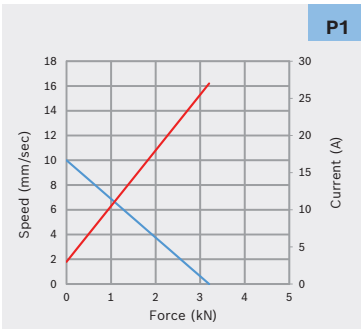
**C2**

Housing: TE 968182-1  
 Locker: TE 968183-1  
 Terminal: TE JPT 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

## Performance curve (P)



# AHC-RS2

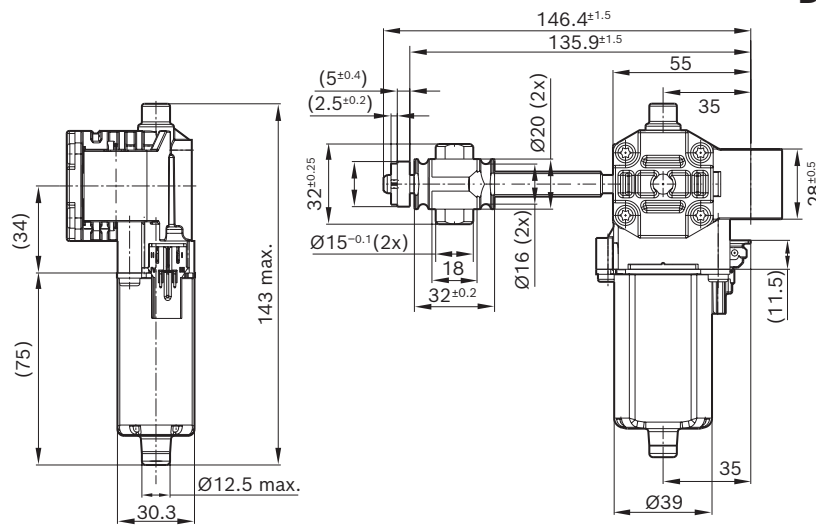


## Family features:

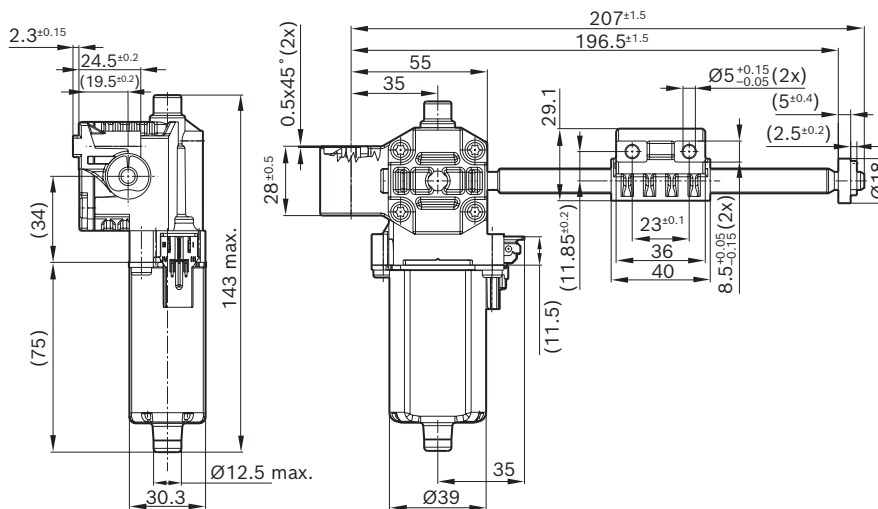
- hall Sensor available
- degree of protection: IP 50
- operation mode: S2 - S3
- linear movement

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

**D1**

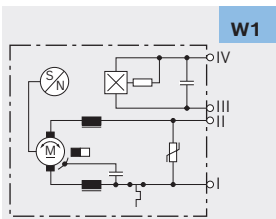


**D2**



# AHC-RS2

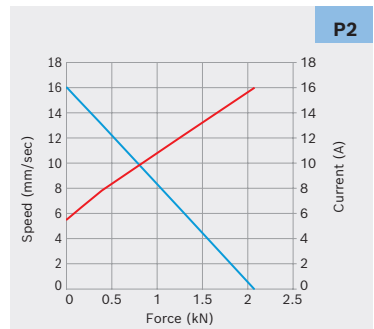
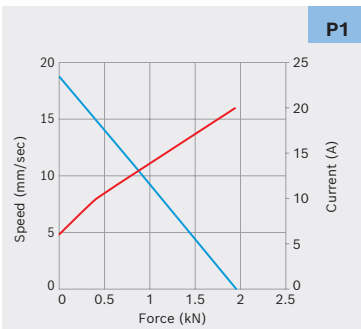
## Wiring diagram (W)



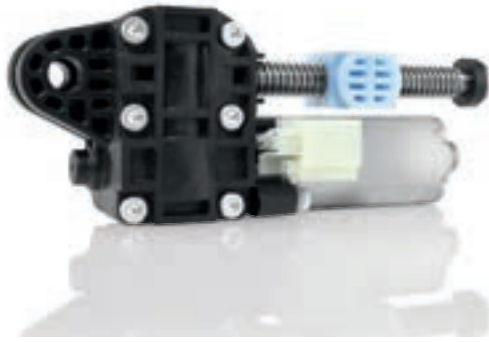
## Mating connector (C)



## Performance curve (P)



# AHC-D



## Family features:

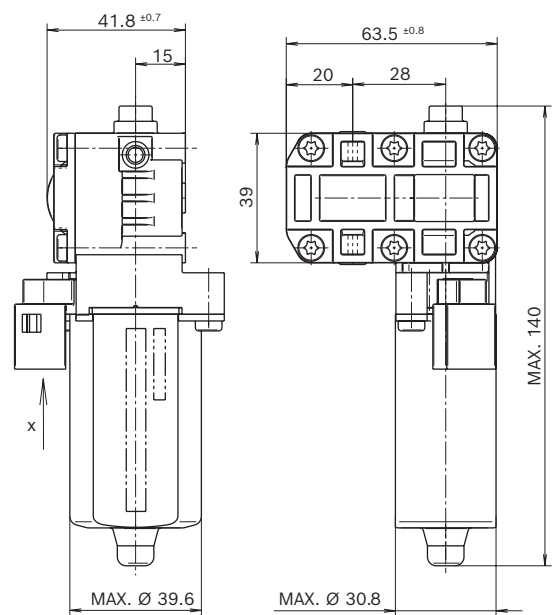
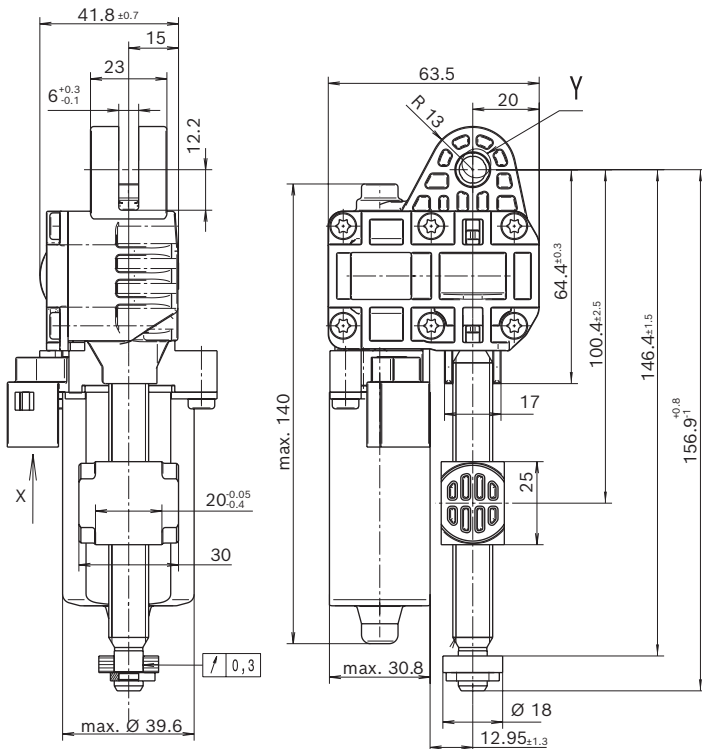
- hall Sensor available
- degree of protection: IP 50
- operation mode: S2 - S3
- linear movement

Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	Gear ratio	Signal Hall	Direction of rotation mm	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
12 V	0 390 203 428	7.6	4.5	145	0.5	18:1	Yes	CW/CCW	D2	W1	C1	P2

Voltage	Part number	I <sub>n</sub> (Nominal current) A	F <sub>n</sub> (Nominal force) kN	F <sub>max</sub> Maximum force kN	Adjustment speed mm/s	Stroke mm	Signal Hall	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
12 V	0 390 203 399	3.3	0.5	2	9	82.0	Yes	D1	W1	C1	P1

D1

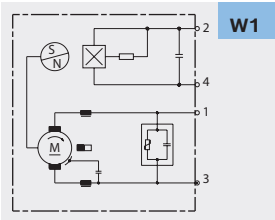
D2



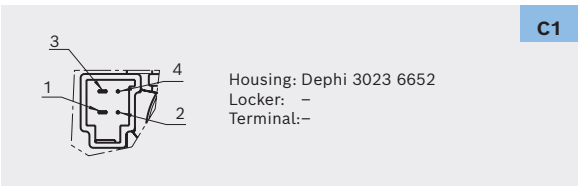


# AHC-D

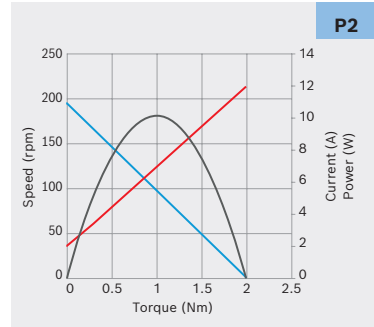
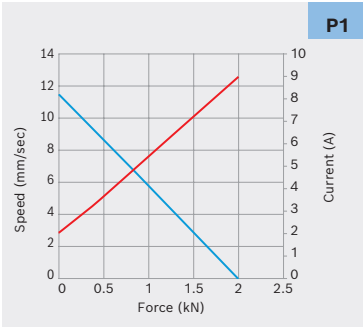
## Wiring diagram (W)



## Mating connector (C)



## Performance curve (P)



# FPG2

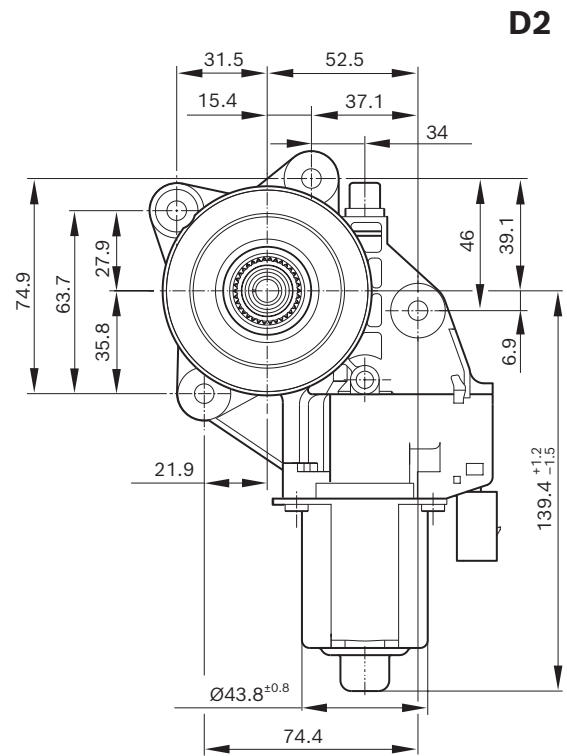
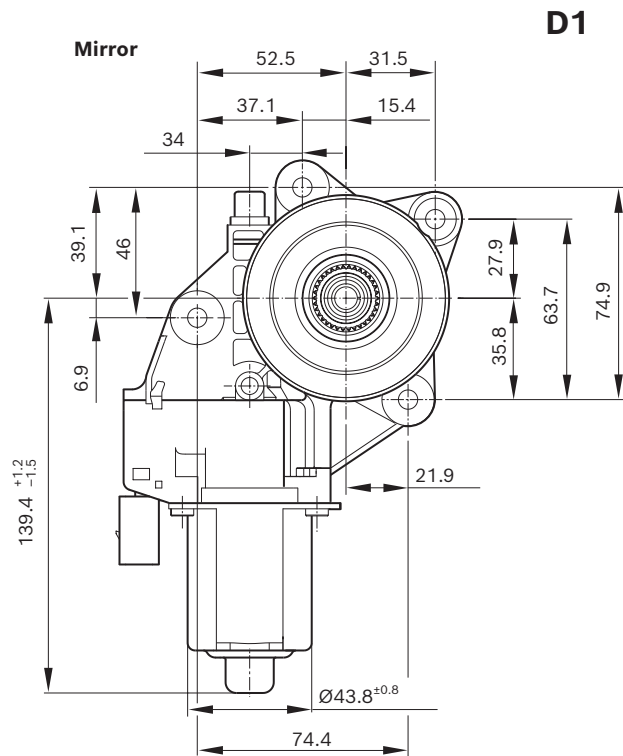


## Family features:

- double-hall sensor available
- degree of protection: IP 54
- operating mode: S2
- direction of rotation: CCW/CW

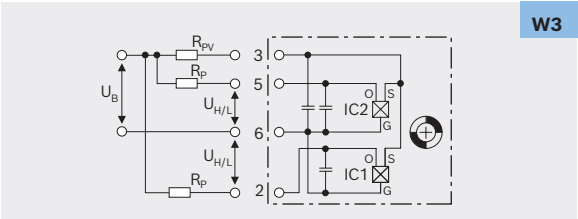
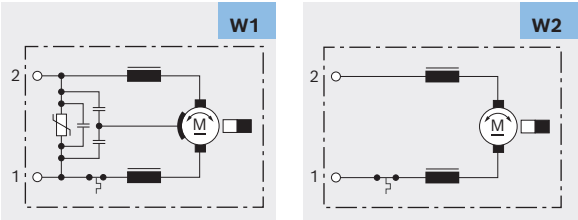
Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Signal Hall	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 130 822 488	7.8	6	74.5	1	13.7	73:1	No	R	D1	W1	S1	C1	P1
12 V	0 130 822 489	7.8	6	74.5	1	13.7	73:1	No	L	D2	W1	S1	C1	P1
12 V	0 130 822 492	7.8	6	74.5	1	13	73:1	2x	R	D1	W1 + W3	S1	C2	P3
12 V	0 130 822 493	7.8	6	74.5	1	13	73:1	2x	L	D2	W1 + W3	S1	C2	P3
24 V	0 130 822 494	8.2	3	78.5	1	13.7	73:1	2x	R	D1	W3	S1	C2	P2
24 V	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



# FPG2

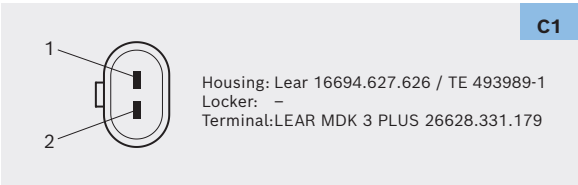
## Wiring diagram (W)



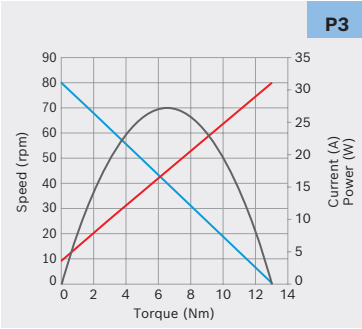
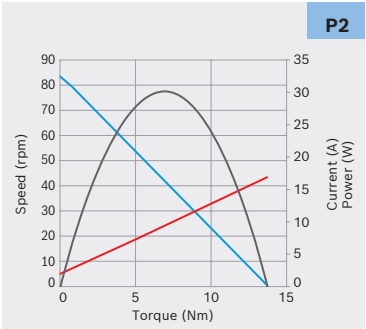
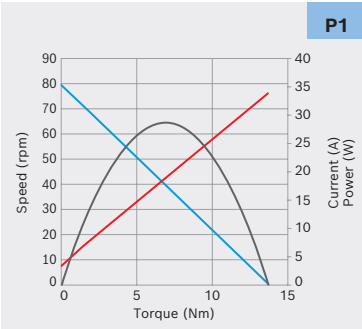
## Drive end (S)



## Mating connector (C)



## Performance curve (P)



# FPG EVO

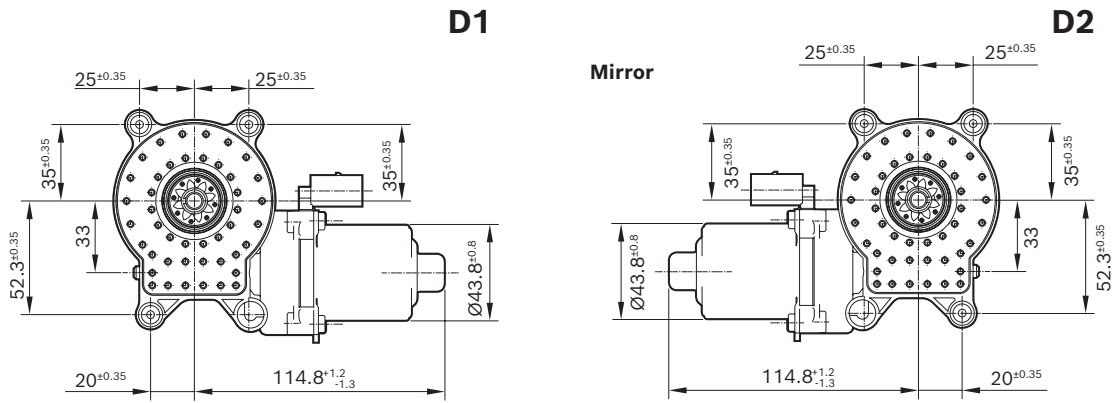


## Family features:

- ripple function
- degree of protection: IP 5X
- operation mode: S2 – 5min
- direction of rotation: CCW/CW

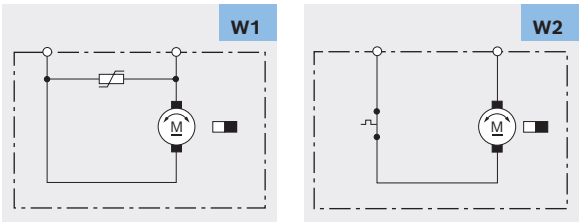
Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Signal ripple	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	F 006 B40 702	8.6	6	82	1	10	73:1	Yes	R	D1	W1	S1	C1	P1
12 V	F 006 B40 703	8.6	6	82	1	10	73:1	Yes	L	D2	W1	S1	C1	P1
12 V	F 006 B49 680	8.6	6	82	1	10	73:1	Yes	R	D1	W2	S2	C1	P1
12 V	F 006 B49 681	8.6	6	82	1	10	73:1	Yes	L	D2	W2	S2	C1	P1
12 V	F 006 B49 780	8.6	6	82	1	10	73:1	Yes	R	D1	W2	S3	C1	P1
12 V	F 006 B49 781	8.6	6	82	1	10	73:1	Yes	L	D2	W2	S3	C1	P1

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

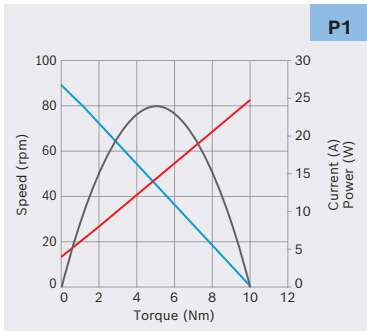


# FPG EVO

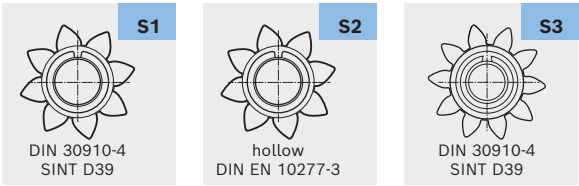
## Wiring diagram (W)



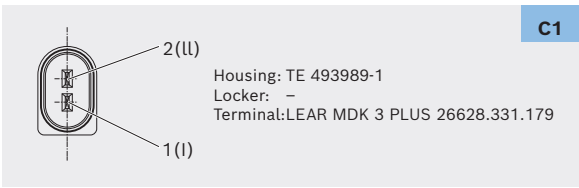
## Performance curve (P)



## Drive end (S)



## Mating connector (C)



# CHP3



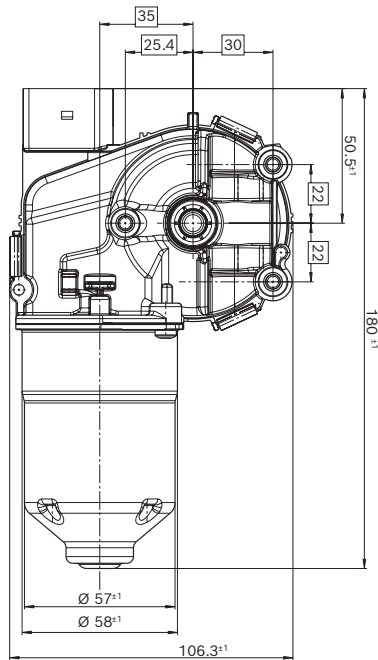
## Family features:

- degree of protection: IP 23
- operation mode: S2/S3
- dual-speed motors available

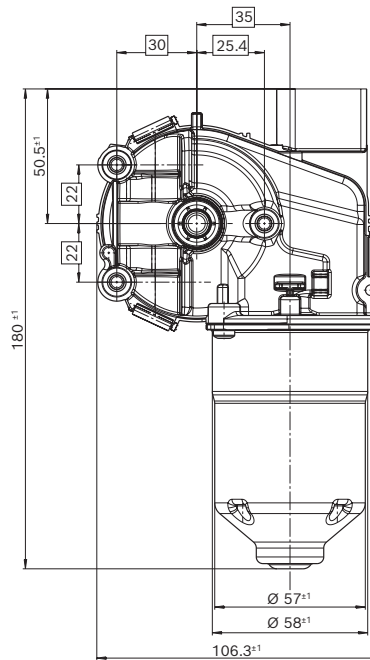
Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Min stall torque) Nm	Gear ratio	Direction of rotation	Signal Hall	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 390 243 685	12.8 / 8.5	4.5 / 3.5	61 / 41	2	25 / 28	76:1	CW	No	R	D1	W1	S1	C1	P1
12 V	0 390 243 686	12.8 / 8.5	4.5 / 3.5	61 / 41	2	25 / 28	76:1	CCW	No	L	D2	W1	S1	C1	P1

\*Gear housing left: L, gear housing right: R  
Further models on request

**D1**

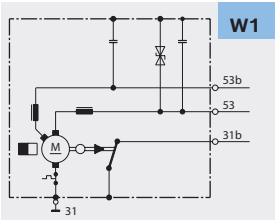


**D2**

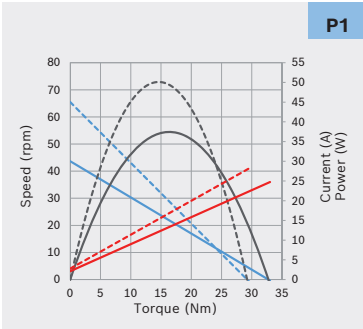


# CHP3

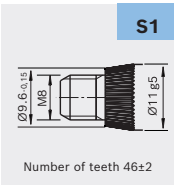
## Wiring diagram (W)



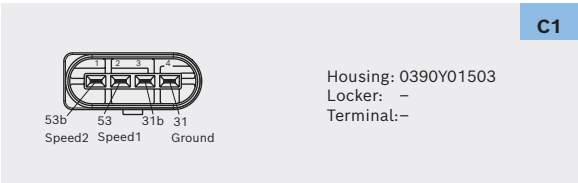
## Performance curve (P)



## Drive end (S)



## Mating connector (C)



# CDP

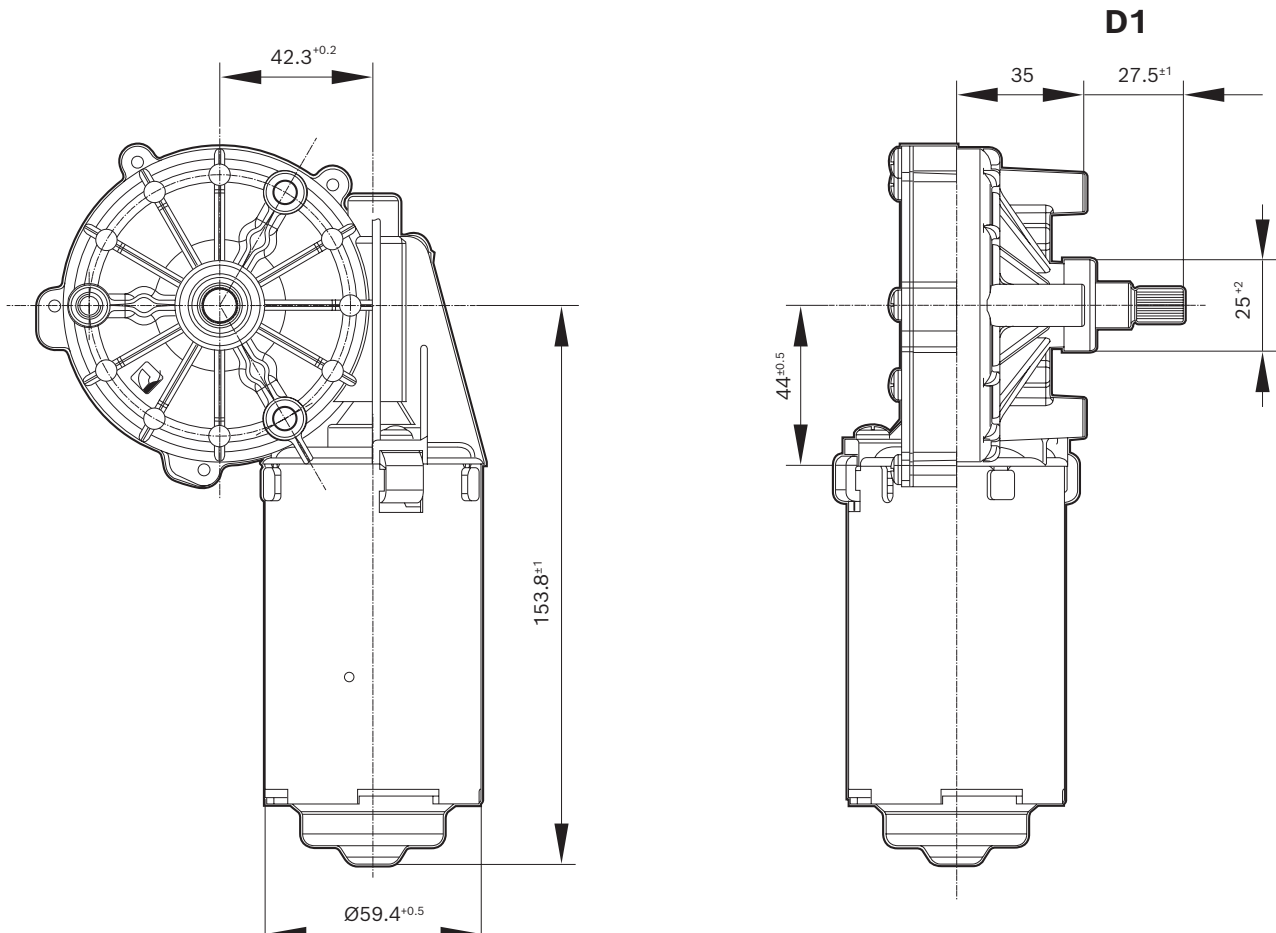


## Family features:

- also with wiper function available
- hall sensor available
- degree of protection: IP 50
- operation mode: S1

Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Direction of rotation	Signal Hall	Side**	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 986 337 270	50.2	10	42	10	45	108:2	CCW/CW	2x	L	D1	W2	S2	C2	P5
12 V	0 986 337 280	38.7	8.5	37	10	40	78:1	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	78:1	CCW	No	L	D1	W1	S3	C1	P6
24 V	0 986 337 201	20.9	3.5	40	5	30	108:2	CCW/CW	No	L	D1	W3	S2	-	P7
24 V	0 986 337 209*	8.8 ; 14.4	3 ; 4	28 ; 46	3	50 ; 41	78:1	CCW	No	L	D1	W1	S1	C3	P3
24 V	0 986 337 250	50.2	6	80	6	45	108:2	CCW/CW	2x	L	D1	W2	S2	C2	P2

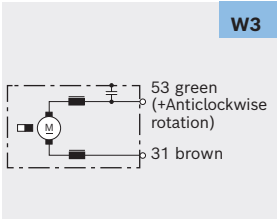
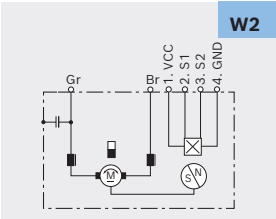
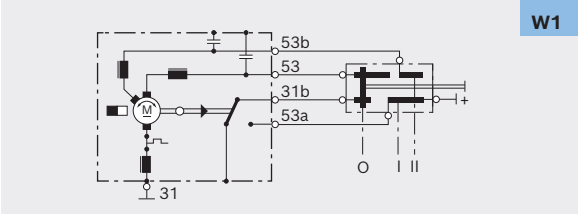
\* Motors with two speeds / \*\*gear housing left: L, gear housing right: R



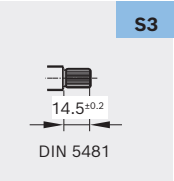
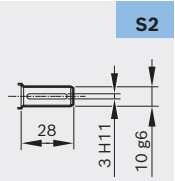
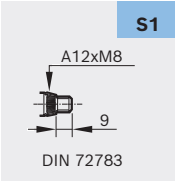


# CDP

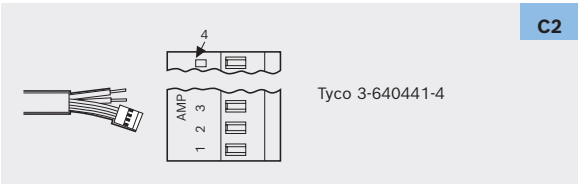
## Wiring diagram (W)



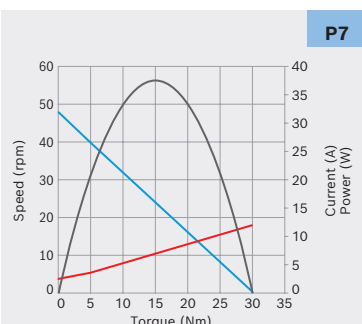
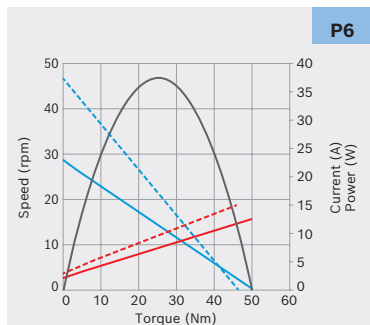
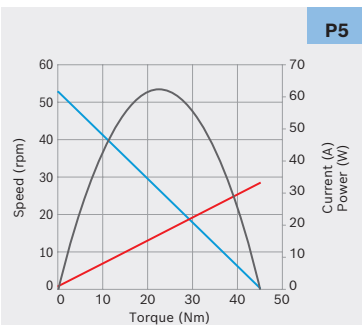
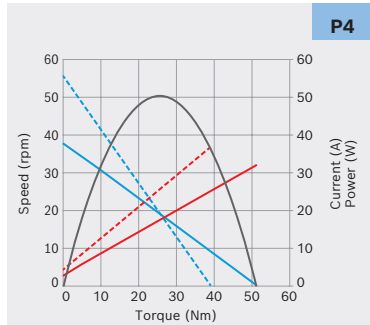
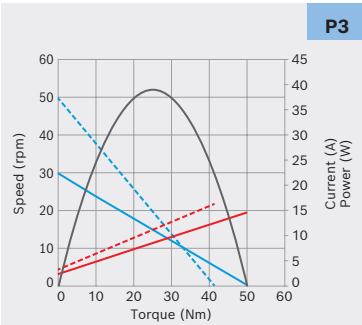
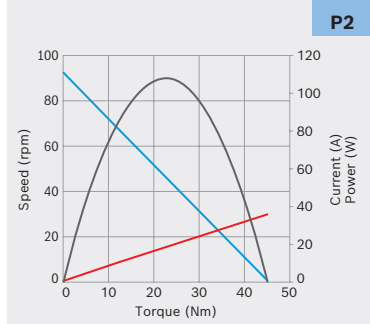
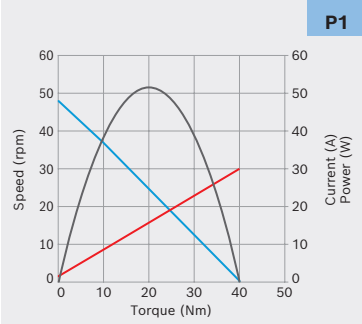
## Drive end (S)



## Mating connector (C)



## Performance curve (P)



# EFP

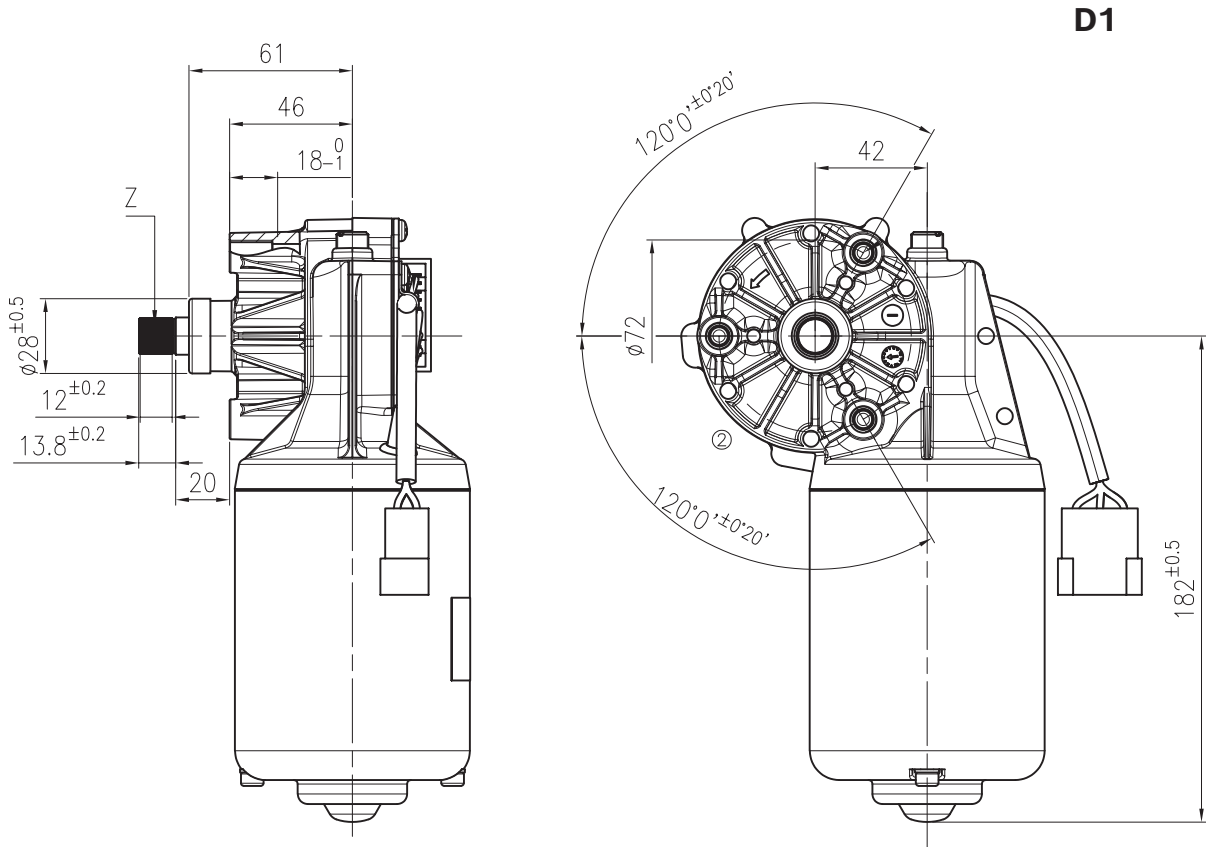


## Family features:

- also with wiper function available
- degree of protection: IP 23
- operating mode: S1

Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Direction of rotation	Signal Hall	Side**	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 986 337 400*	8.4 ; 12.5	4.5 ; 6	32 ; 48	2.5	45 ; 40	80:2	CCW	No	L	D1	W1	S1	C1	P4
12 V	0 986 337 411	20.4	5	39	5	70	65:1	CCW/CW	No	L	D1	W2	S1	C2	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
24 V	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
24 V	0 986 337 409	65.9	6	63	10	60	80:2	CCW/CW	No	L	D1	W2	S2	C2	P2
24 V	0 986 337 410	73.3	7	70	10	60	80:2	CCW/CW	No	L	D1	W2	S2	C2	P5

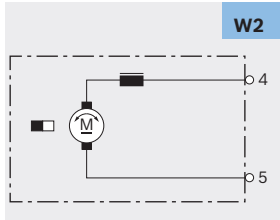
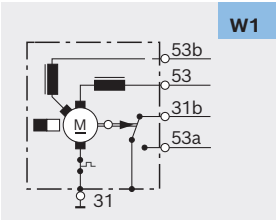
\* Motors with two speeds / \*\*gear housing left: L, gear housing right: R



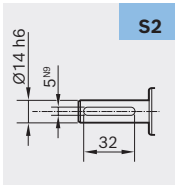
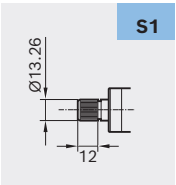
**D1**

# EFP

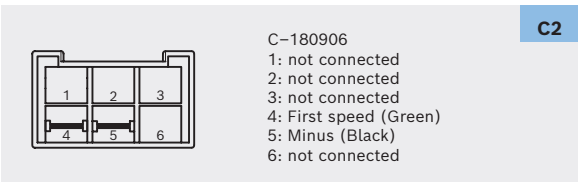
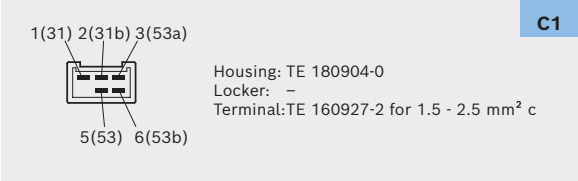
## Wiring diagram (W)



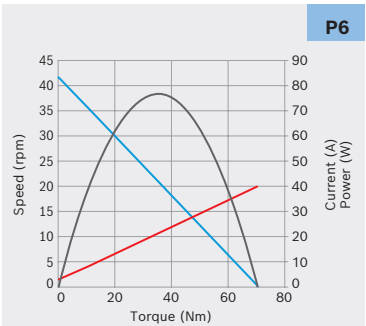
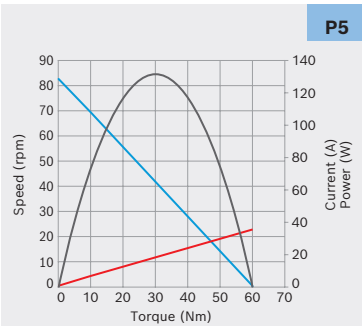
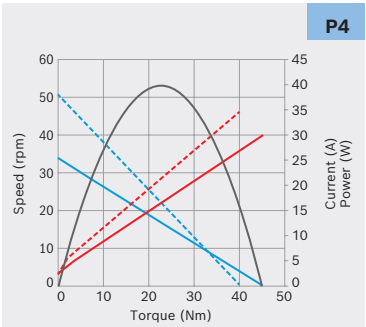
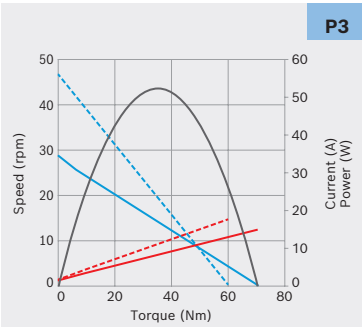
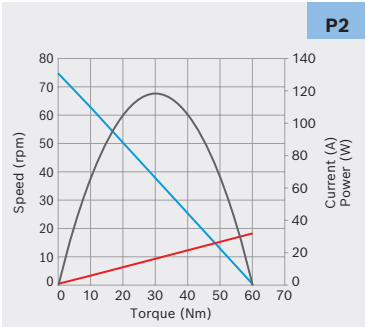
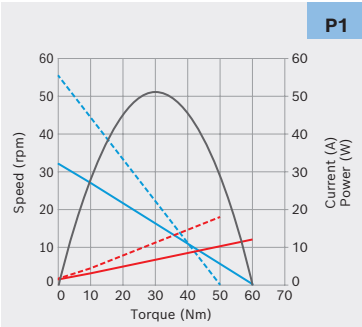
## Drive end (S)



## Mating connector (C)



## Performance curve (P)



# EDP

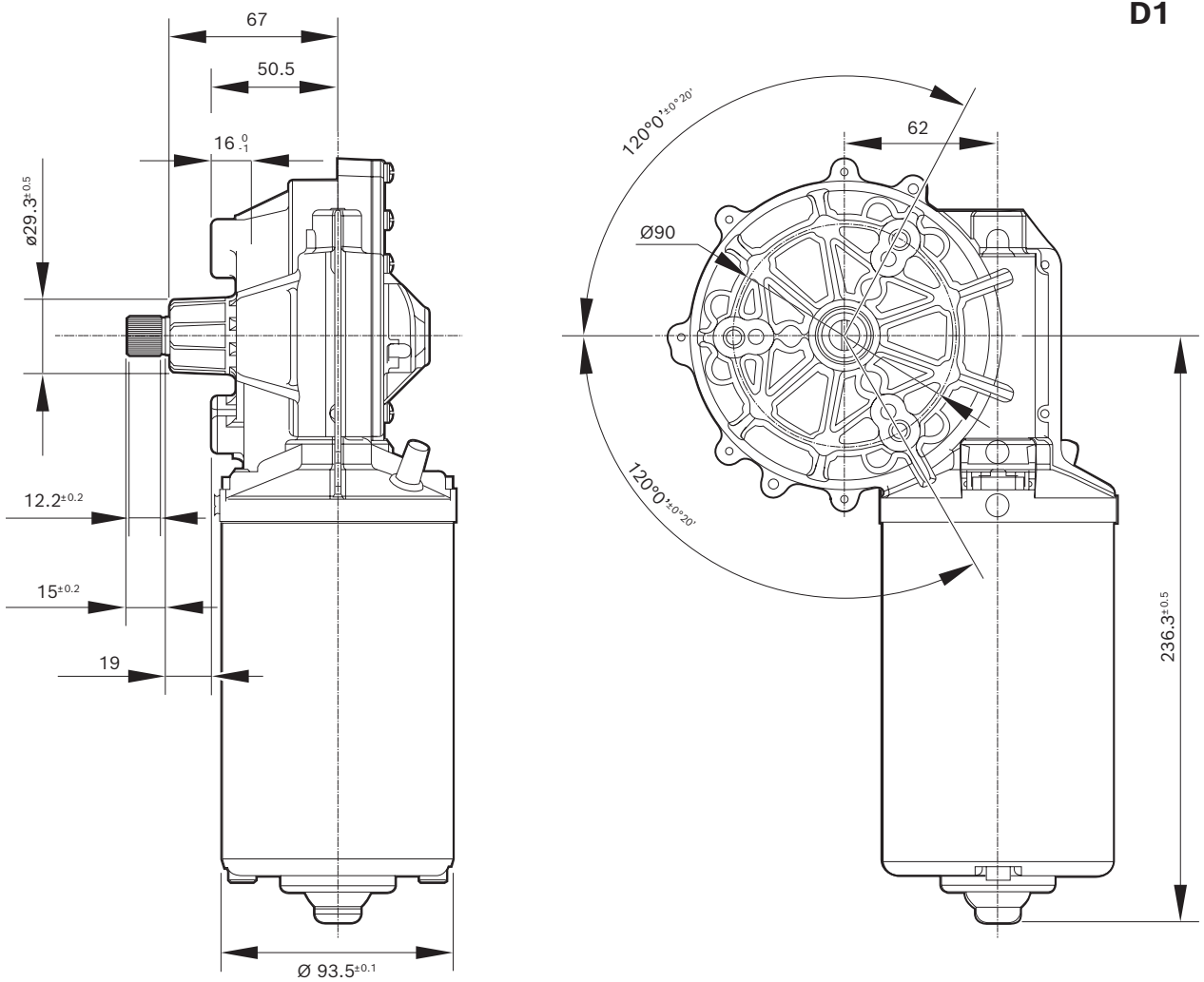


## Family features:

- powerful 2-speed motor
- degree of protection: IP 23
- operating mode: S1
- direction of rotation: CCW

Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Direction of rotation	Signal Hall	Side*	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
24 V	0 986 337 451	19.3 ; 33.5	3.5 ; 6	23 ; 40	8	120 ; 80	96:2	CCW	No	L	D1	W1	S1	C1	P1

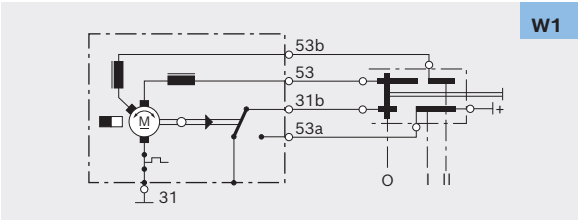
\*Gear housing left: L, gear housing right: R



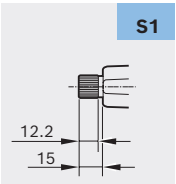
**D1**

# EDP

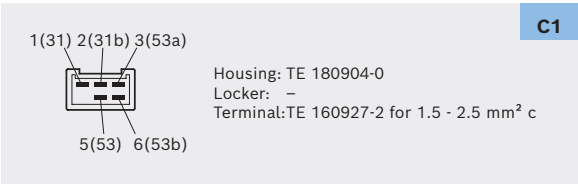
## Wiring diagram (W)



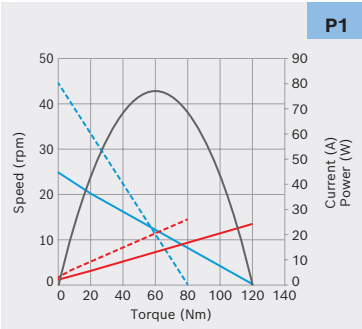
## Drive end (S)



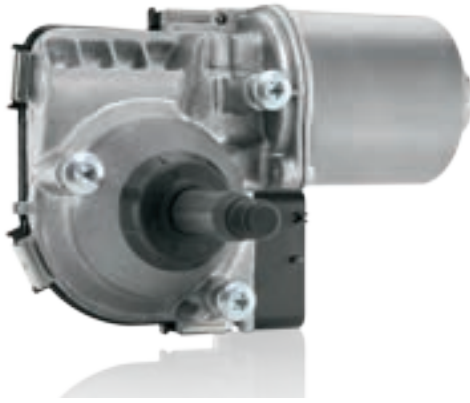
## Mating connector (C)



## Performance curve (P)



## WDD2

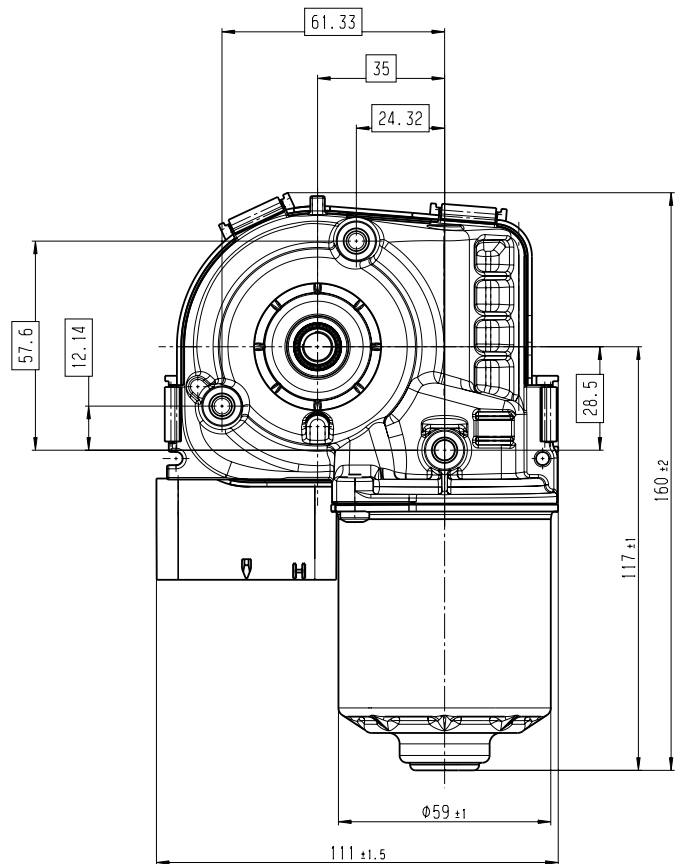
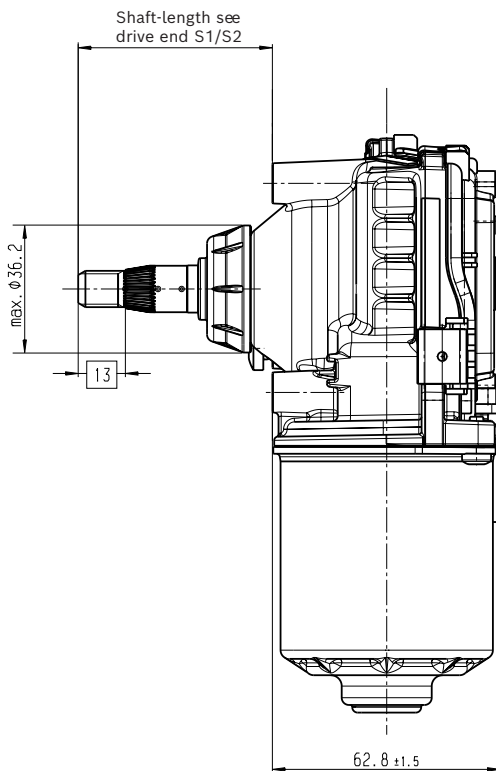


### Family features:

- multi Voltage 12V / 24V
- degree of protection: IP 6K7
- wiping angle up to 350°
- LIN/CAN (2.0)/analog communication
- customizable speed, angle and torque

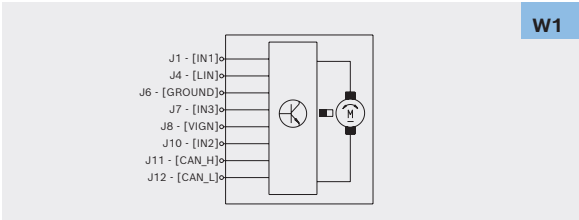
Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Gear ratio	Signal LIN	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 390 249 101	50	8.3	60/40	8/12	34	76:1	LIN	D1	W1	S1	C1	P1
12/24V	0 390 249 102	50	8.3	60/40	8/12	34	76:1	LIN/CAN	D1	W1	S2	C1	P1
12/24V	0 390 249 10A	50	8.3	60/40	8/12	34	76:1	LIN/CAN	D1	W1	S1	C1	P1

### D1

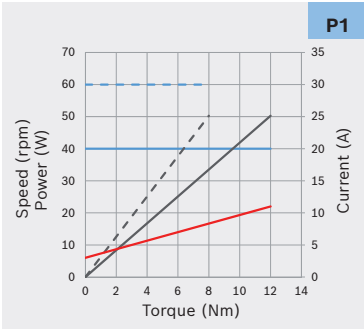


# WDD2

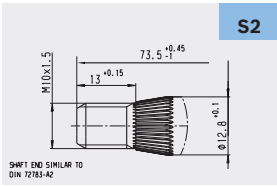
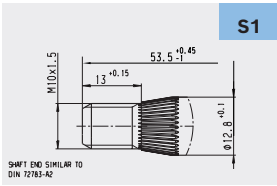
## Wiring diagram (W)



## Performance curve (P)



## Drive end (S)



## Mating connector (C)

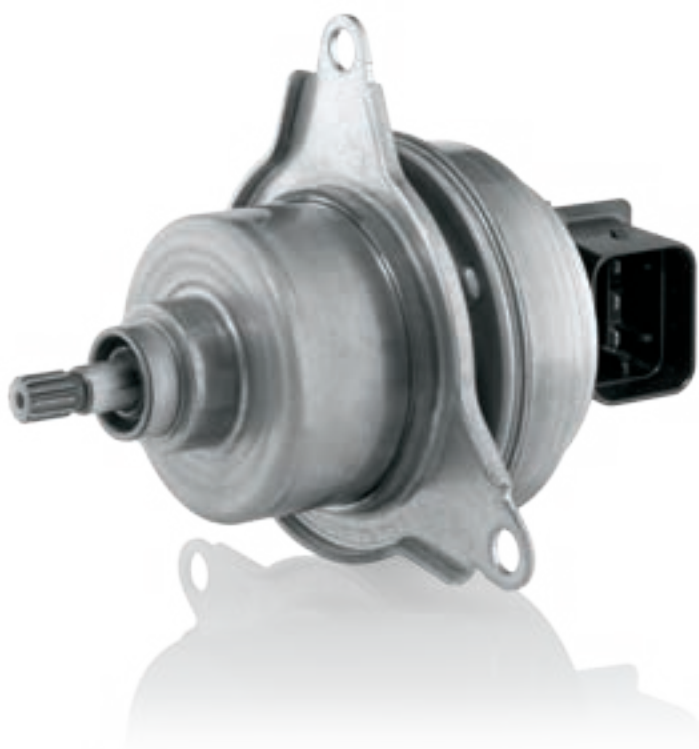






# DC motors without transmission

The Bosch gearless motors excel at durability, robustness and high speeds at the lowest noise levels and ensure a reliable performance in a compact design. Decades of experience in manufacturing of electric motors have led to the latest Bosch gearless motor generation which has proven million fold. They can be used for various industrial applications in 12 or 24V.



## Product features

- different power densities available: To meet customer requirements in terms of efficiency
- high standards in production and testing: For proven quality and a long service life
- available with hall sensor: For positioning or direction of speed feedback

## Application examples

- **Automotive technology:**  
Heater and air-conditioning blowers, engine cooling, power-seat adjustment, gear adjustment, actuation
- **Industrial applications:**  
Electric mopeds, house ventilation, household appliances, sweeping machines and lots more

# NSA-I

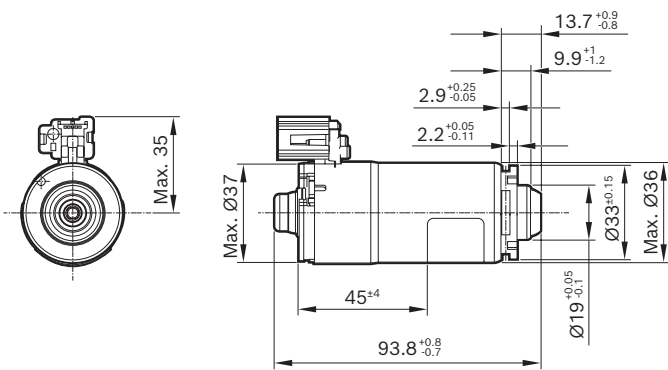


## Family features:

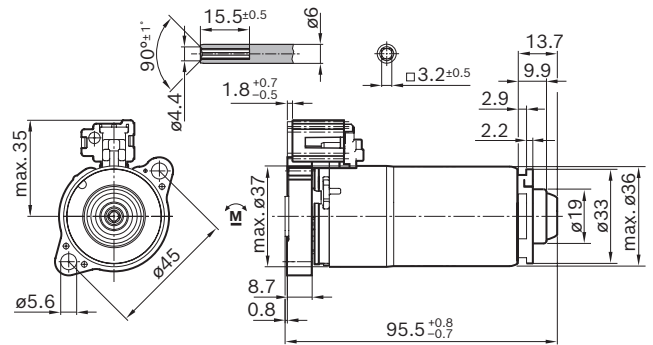
- hall Sensor
- degree of protection: IP 50
- operation mode: S3
- direction of rotation: CCW/CW
- fit for flexi-shaft
- 2-end output

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

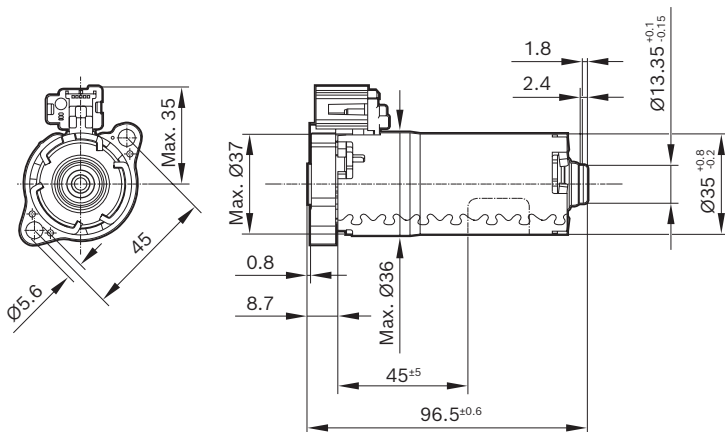
**D1**



**D2**

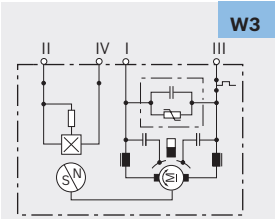
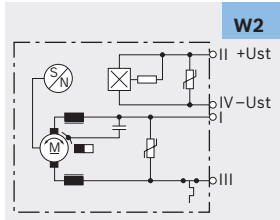
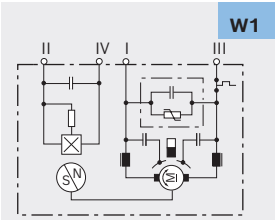


**D3**

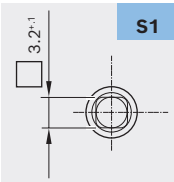


# NSA-I

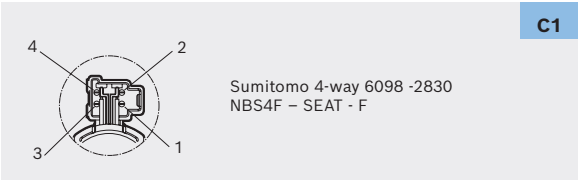
## Wiring diagram (W)



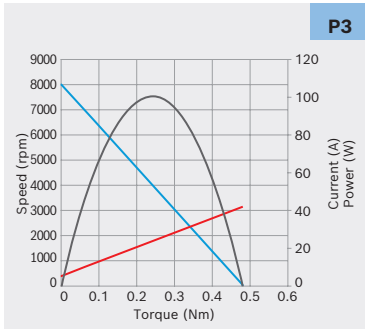
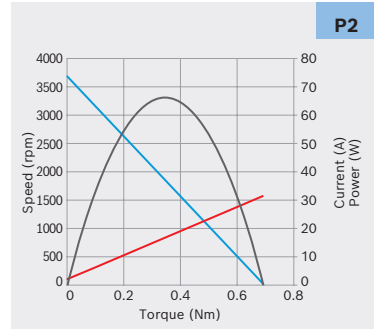
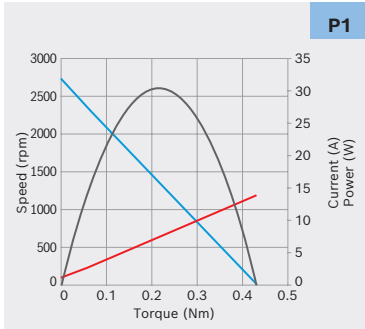
## Drive end (S)



## Mating connector (C)



## Performance curve (P)



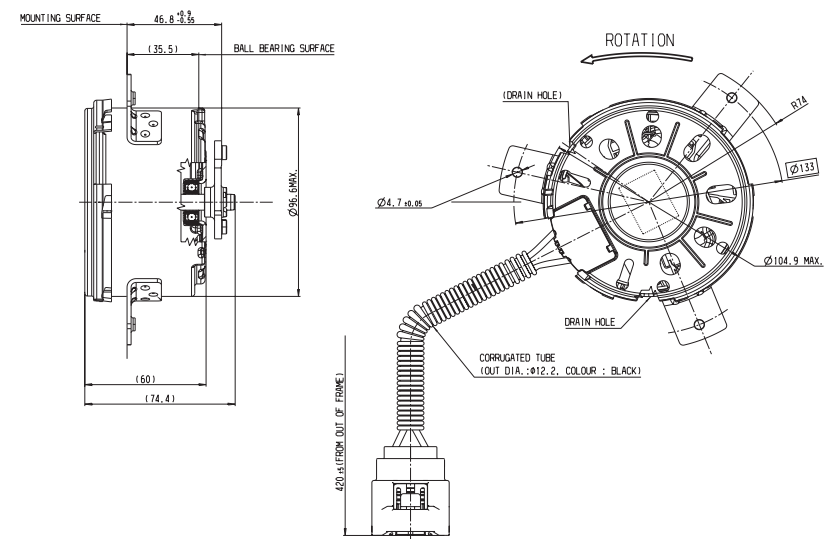
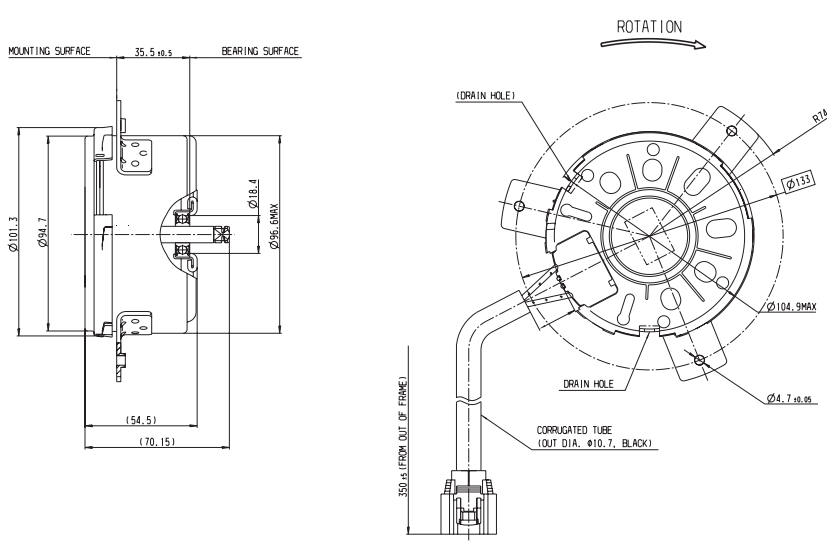
# GPG



## Family features:

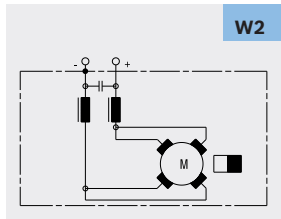
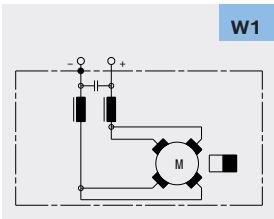
- high durability and efficiency
- degree of protection: IP 10
- operation mode: S1
- direction of rotation: CW

Voltage	Part number	P <sub>n</sub> (Nominal power) W	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	M <sub>n</sub> (Nominal torque) Nm	M <sub>a</sub> (Stall torque) Nm	Signal Hall	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	3 137 230 306	97	11.7	1960	0.47	0.90	No	D1	W1	S1	C1	P1
12 V	3 137 230 308	162	20.8	1940	0.81	1.50	No	D2	W2	S2	C2	P2

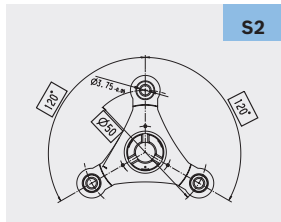
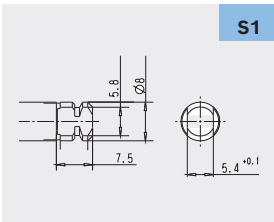


# GPG

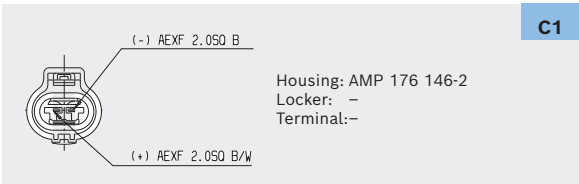
## Wiring diagram (W)



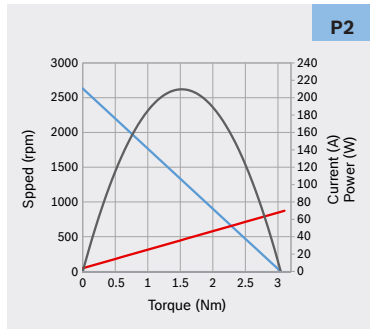
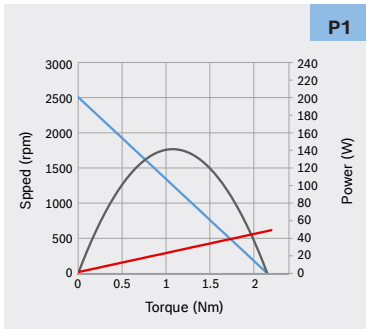
## Drive end (S)



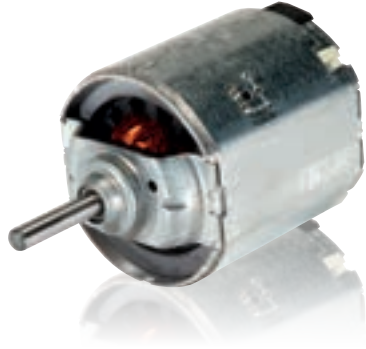
## Mating connector (C)



## Performance curve (P)



# GBM

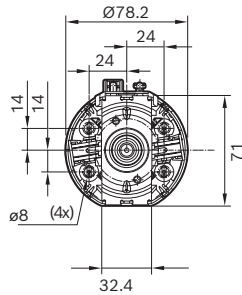
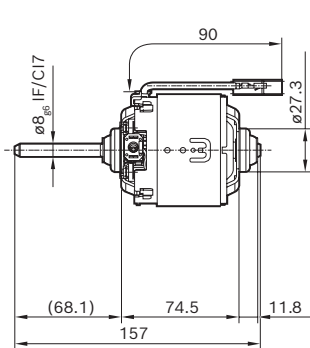


## Family features:

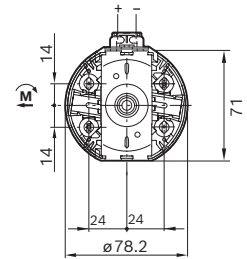
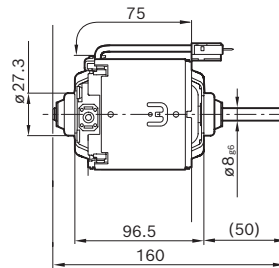
- small, medium and large sizes
- degree of protection: IP 10
- operation mode: S1

Voltage	Part number	Pn (Nominal power) W	In (Nominal current) A	nn (Nominal speed) rpm	Mn (Nominal torque) Nm	Ma (Stall torque) Nm	Direction of rotation	Signal Hall	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 130 115 352	247.5	26	4300	0.55	3.00	CW	No	D2	W1	S2	C1	P2
12 V	0 130 115 017	122.5	15	3900	0.30	1.80	CCW	No	D3	W1	S1	C1	P1
12 V	0 130 115 008	79.5	11	3800	0.20	1.05	CCW	No	D1	W1	S3	C2	P3
12 V	F 006 B10 499	300	9.5	4500	0.33	2.00	CW	No	D4	W2	S4	C3	P4

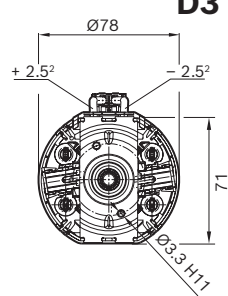
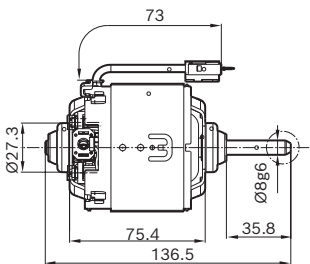
**D1**



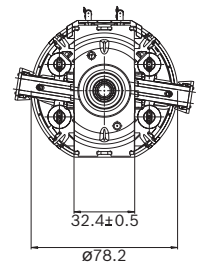
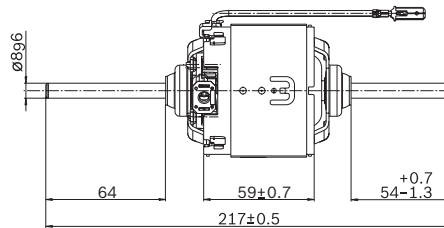
**D2**



**D3**

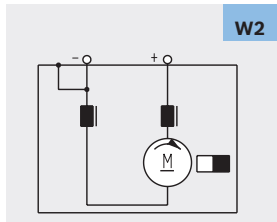
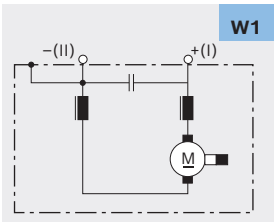


**D4**

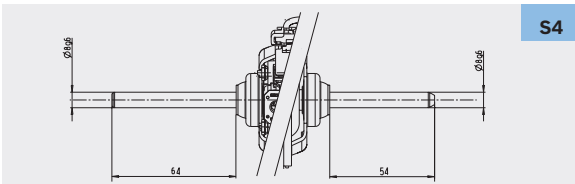
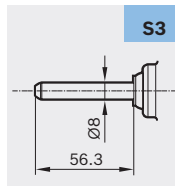
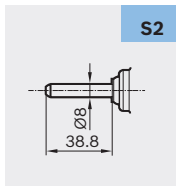
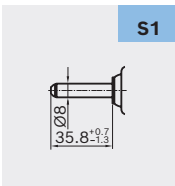


# GBM

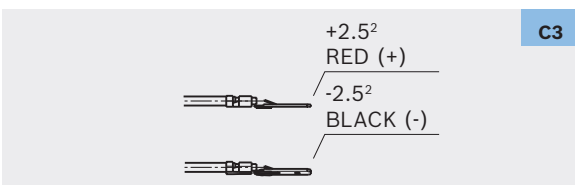
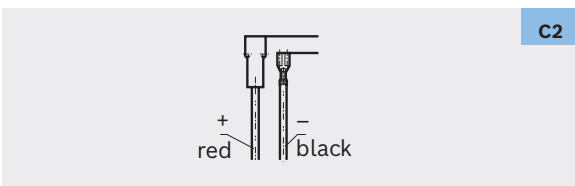
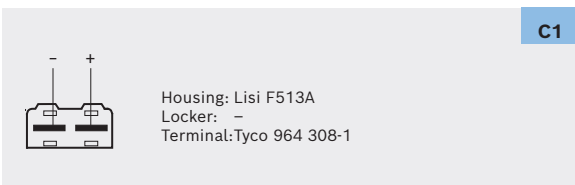
## Wiring diagram (W)



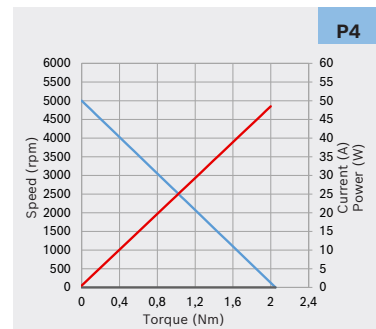
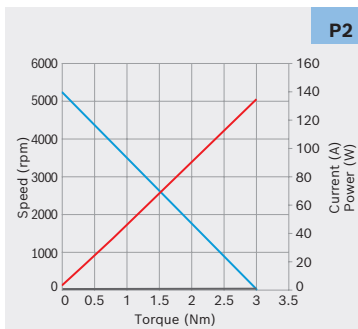
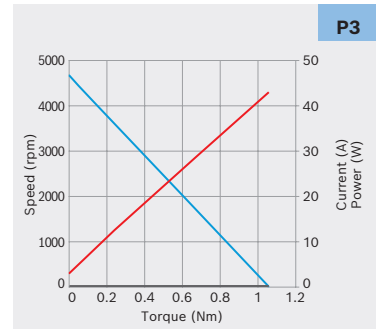
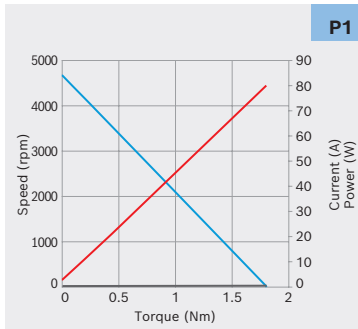
## Drive end (S)



## Mating connector (C)



## Performance curve (P)



# ECA-S2



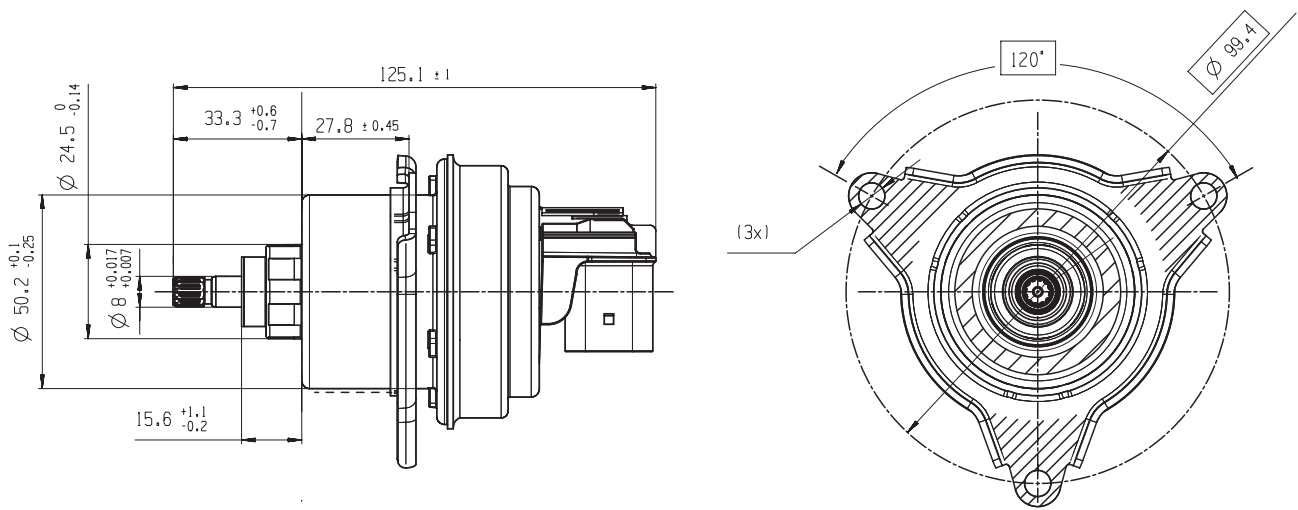
## Family features:

- brushless DC Motor
- best-in-class packaging and weight due to excellent power density
- low torque ripple
- excellent dynamic behavior
- for high temperature applications up to 140°C

Voltage	Part number	Pn (Nominal power) W	In (Nominal current) A	nn (Nominal speed) rpm	Mn (Nominal torque) Nm	Ma (Stall torque) Nm	Direction of rotation	Signal Hall	Dimensional drawing (D)	Wiring diagram (W)	Drive end (S)	Connector (C)	Performance curve (P)
12 V	0 132 805 073*	240	69	5000	0,45	1,3	CW/CCW	Yes	D1	W1	S1	C1	P1

\*External control unit ECU required

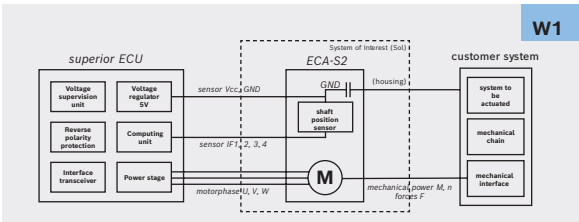
## D1



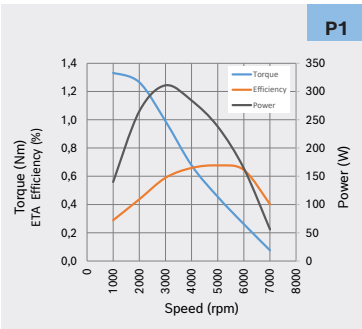


# ECA-S2

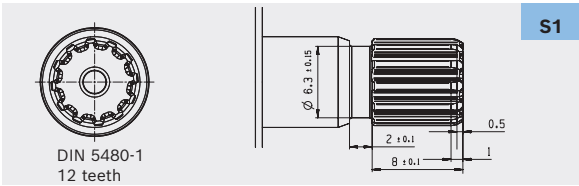
## Wiring diagram (W)



## Performance curve (P)



## Drive end (S)



## Mating connector (C)





# Blowers and Fans with DC motors

Bosch blowers and fans have been developed to achieve the lowest possible noise level and to ensure reliable air flow across the thermal system even at low speeds. They are available worldwide in single and bulk packaging and can be used in 24V and 12V applications, e.g. for heating, ventilation and cooling.



## Product features

- production in accordance with state-of-the-art automotive quality standards: For proven product quality and a long service life
- available with or without PWM technology: To attend different customer requirements
- depending on the model, protective functions such as automatic shutdown in case of obstruction, thermal fuse and reverse polarity protection: Ensure safe operation and high reliability
- operating mode S1: Suitable for continuous operation

## Application examples

- **Automotive applications**  
Heating, ventilation, air-conditioning and engine cooling, cooler blowers in general
- **Industrial applications**  
Ventilation, off-highway, smart home

# GBM-S

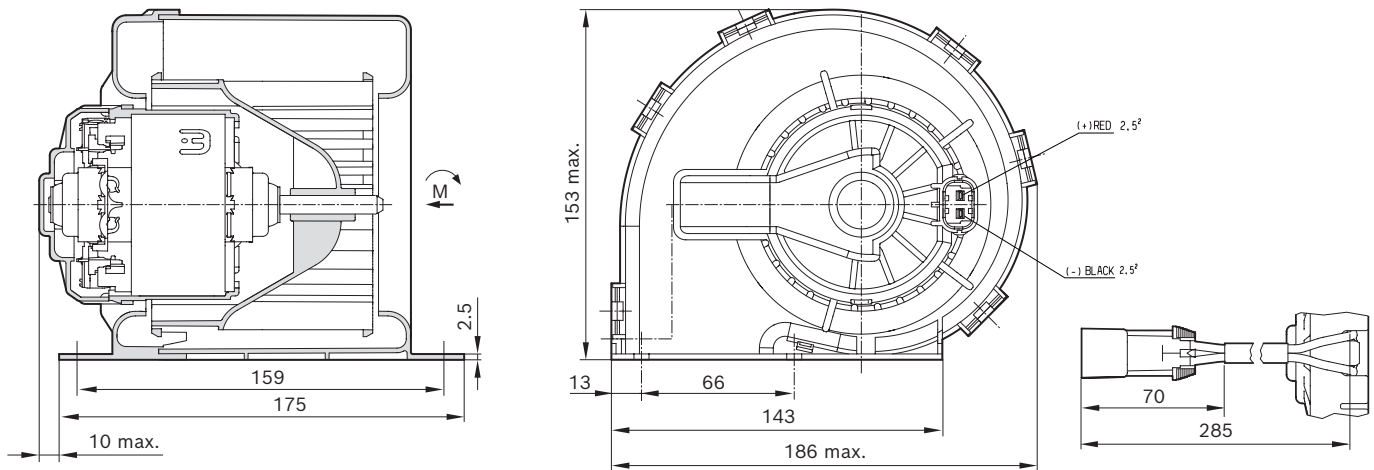


## Family features:

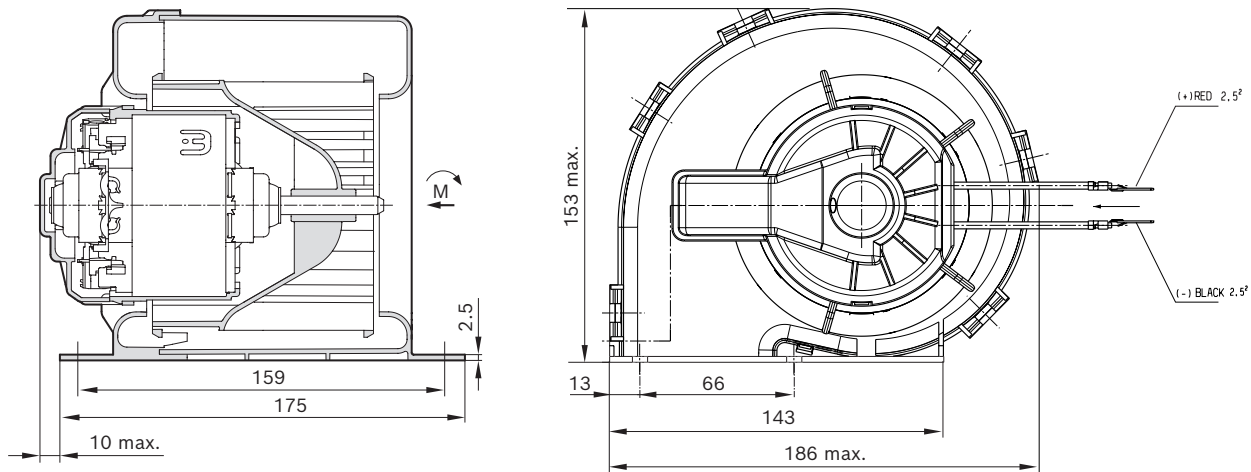
- 12/24 V ventilation module
- optimized noise performance
- high power density
- operation mode: S1
- degree of protection: IP 13

Voltage	Part number	Flow rate m <sup>3</sup> /h	Pressure difference Pa	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	Direction of rotation	Signal Hall	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
12 V	0 130 115 604	400	470	14	4468	CW	No	D1	W1	C1	P1
24 V	0 130 115 753	400	470	8	4468	CW	No	D2	W2	C2	P2

**D1**

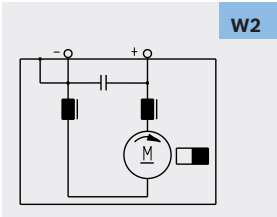
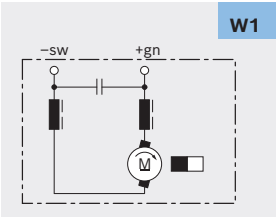


**D2**



# GBM-S

## Wiring diagram (W)



## Mating connector (C)

**C1**

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

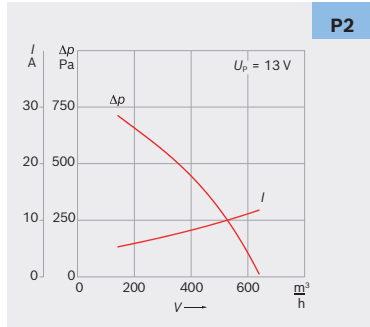
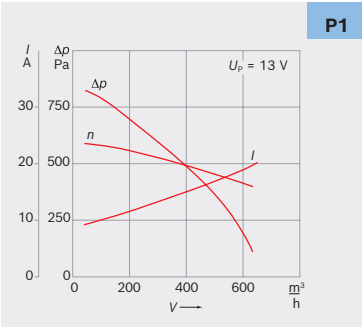
Black (-)    Red (+)

**C2**

Housing: -  
 Locker: -  
 Terminal: -

Black (-)    Red (+)

## Performance curve (P)



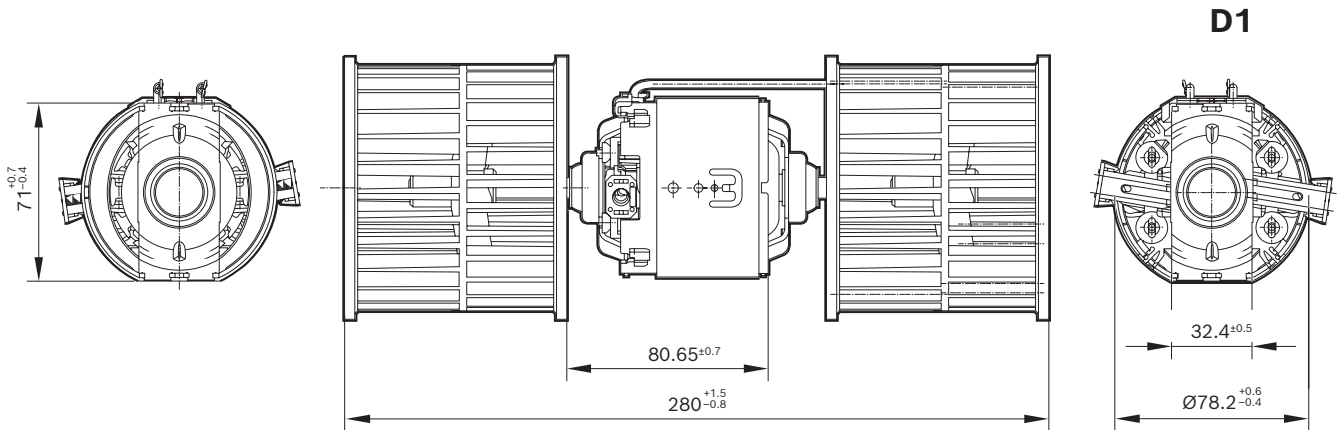
# GBM-M



## Family features:

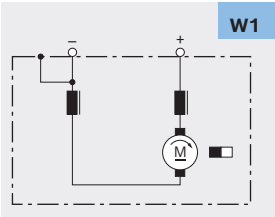
- 24 V double-radial blower
- degree of protection: IP 10
- operation mode: S1

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

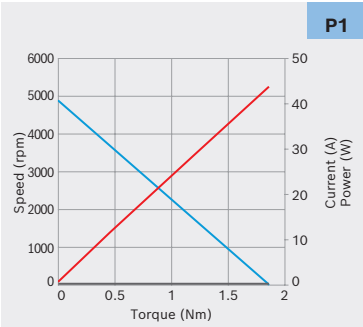


# GBM-M

## Wiring diagram (W)



## Performance curve (P)



# ECF



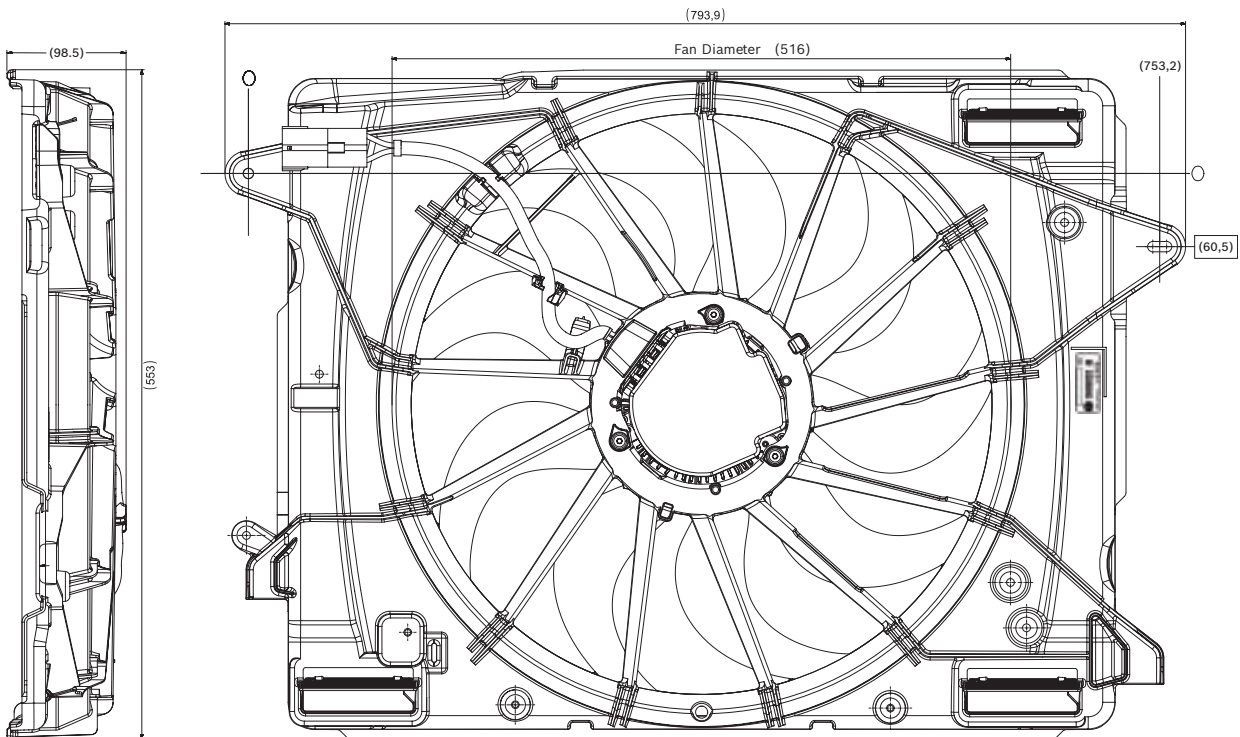
### Family features:

- higher efficiency compared to prior Brush Direct Current motor (70% à 81%)
- 50% durability increase, better EMC, noise, and environmental robustness compared to BDC
- active & passive safety regarding thermal events

Voltage	Part number	Flow rate m <sup>3</sup> /h	Pressure difference Pa	I <sub>n</sub> (Nominal current) A	n <sub>n</sub> (Nominal speed) rpm	Direction of rotation	Control	Dimensional Drawing (D)	Connector (C)	Performance Curve (P)
12V	0 130 708 529	3600*	160	32	2140	CW	PWM	D1	C1	P1*
12V	0 130 707 509	3600*	220	42	2500	CW	PWM	D1	C2	P2*

\*Performance measured at 95%PWM

## D1

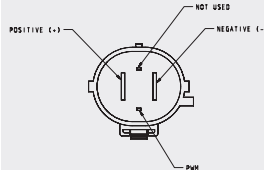




ECF

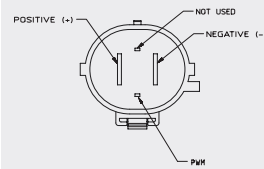
Mating connector (C)

**C1**



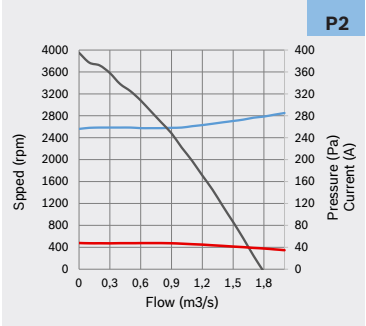
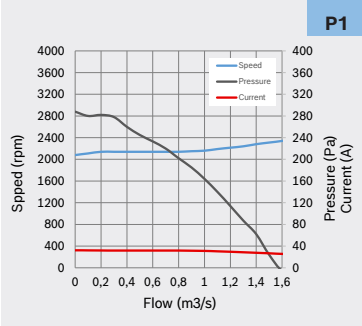
Housing: Yazaki 7283-8496-30  
 Locker: -  
 Terminal: Power 7116-3250  
 Signal 7116-4103-02

**C2**



Housing: Yazaki 7287-1404-10  
 Locker: -  
 Terminal: Power 7116-7473-02  
 Signal 7116-4103-02

Performance curve (P)





# Brushless pumps

The smart Bosch coolant pumps are designed with decades of experience in thermal, liquid and energy circuits. They offer a reliable and efficient support of different thermal circuits. Due to their robustness and design optimized for volume flow, they have proven millions of times worldwide in 24V and 12V applications. This includes heating and cooling applications of electronics or battery cells in electric vehicles.



## Product features

- integrated electronics with failure diagnosis signal: For an increased efficiency of the brushless pumps and a control of the volume flow via PWM signal
- extremely robust design: For a high power density, long service life and a motor attachment possible depending on the model
- proven construction in line with the original automotive quality guidelines: For a low noise development and a high temperature range of up to 130°C
- operating mode S1: Suitable for continuous operation

## Application examples

- 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
- cabin heating and cooling
- domestic and Caravaning warm water heating

# PAD

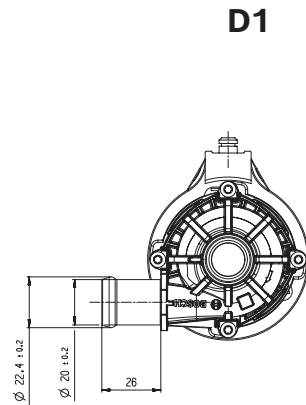
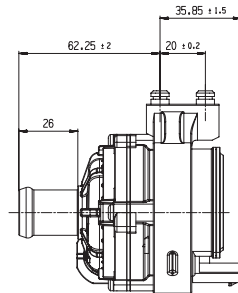
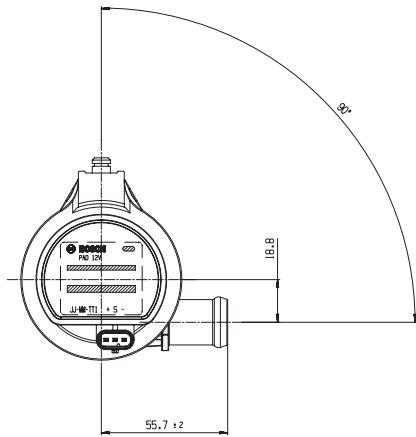


## Family features:

- silent operation
- PWM control available
- extended temperature range available
- extended power range available
- degree of protection: IPX7

Voltage	Part number	Nominal pump pressure bar	Flow rate L/hr	Direction of rotation CW or CCW	Control	Medium	Dimensional drawing (D)	Connector (C)	Performance curve (P)
12 V	0 392 023 43G*	0.2	500	CW	PWM	Water Glycol	D1	C1	P1

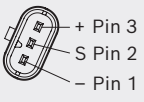
\*Successor of 0 392 023 232



# PAD

## Mating connector (C)

C1



**Housing:**

- TE Connectivity MCON 1.2 1488991-6 (with CPA),...-2 w/o CPA
- KOSTAL MLK order no. 3 21 24 73413 0. Hirschmann SealStar for 0.75mm<sup>2</sup> wires, 1.2mm, keyway B (with CPA) p/n 805-121-522
- Molex MXP120 34900-3102 (or 0349003102)

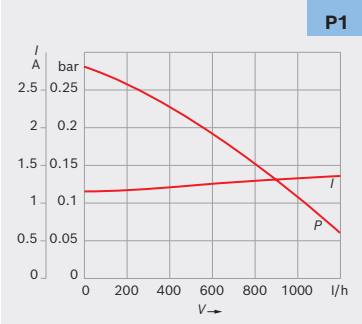
**Terminals:**

- Bosch 1 928 498 811
- Tyco / Molex MCON 1.2 1670146-3 - Ag plated (20awg)
- KOSTAL MLK 1.2 [32124734130]

**Seal:**

- Bosch 1 928 300 936
- TE Connectivity 967067-1 (20 awg)
- KOSTAL 10800507250

## Performance curve (P)



# PCE

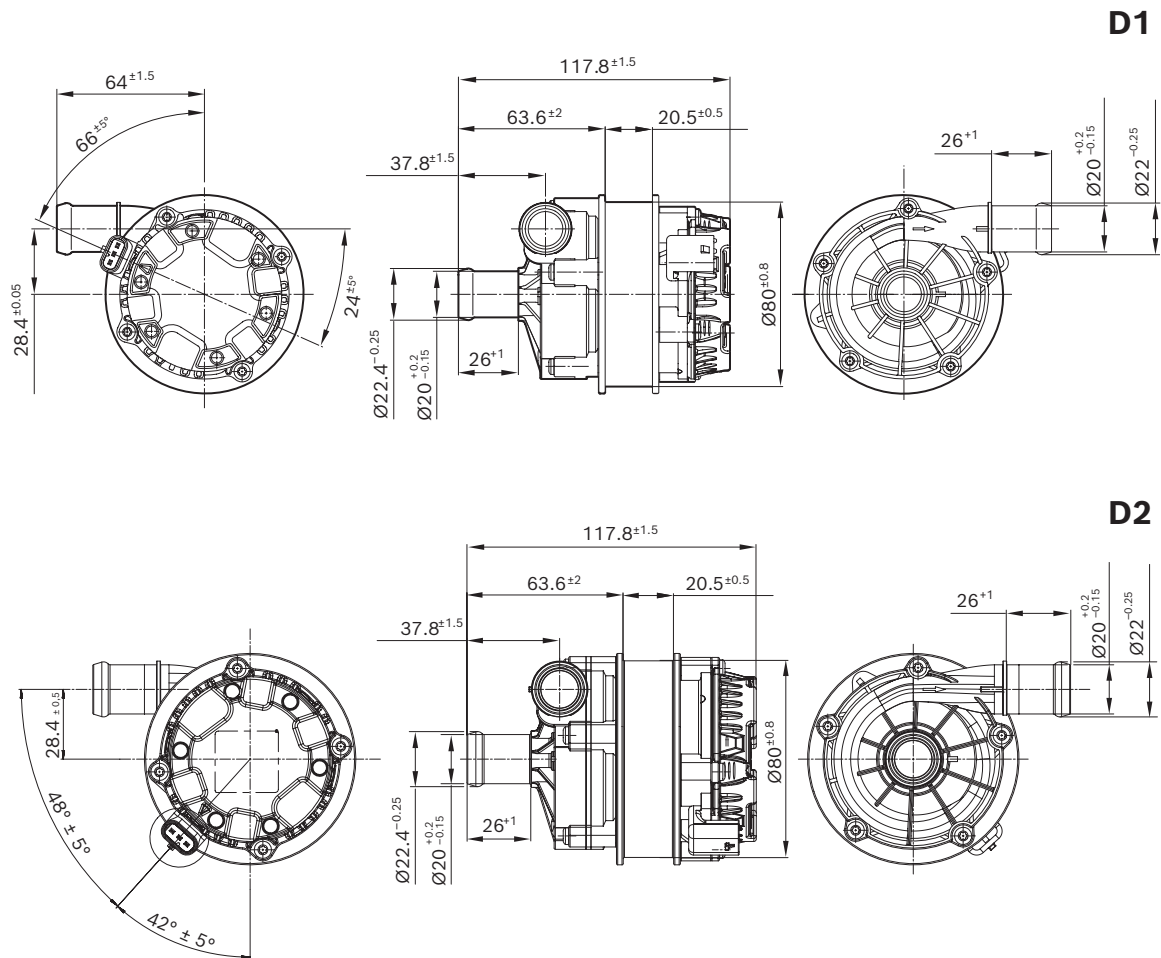


## Family features:

- silent operation
- PWM control available
- extended temperature range available
- extended power range available
- degree of protection: IPX7

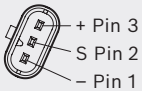
Voltage	Part number	Nominal pump pressure bar	Flow rate L/h	Direction of rotation CW or CCW	Control	Medium	Dimensional drawing (D)	Connector (C)	Performance curve (P)
12 V	0 392 024 058	0.6	1200	CW	PWM	Water Glycol	D1	C1	P1
12 V	0 392 024 078	0.85	1000	CW	PWM	Water Glycol	D1	C1	P2
12 V	0 392 024 900	0.5	950	CW	PWM	Tap Water*	D2	C2	P4
24 V	0 392 024 041	0.6	1200	CW	PWM	Water Glycol	D1	C1	P3

\*No drinking water



# PCE

## Mating connector (C)



**C1**

**Housing:**

- TE Connectivity MCON 1.2 1488991-6 (with CPA),...-2 w/o CPA
- KOSTAL MLK order no. 3 21 24 73413 0.Hirschmann SealStar for 0.75mm<sup>2</sup> wires,1.2mm, keyway B (with CPA) p/n 805-121-522
- Molex MXP120 34900-3102 (or 0349003102)

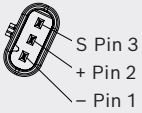
**C2**

**Terminals:**

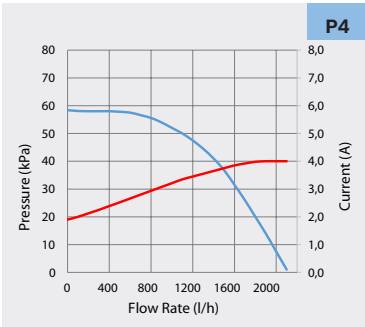
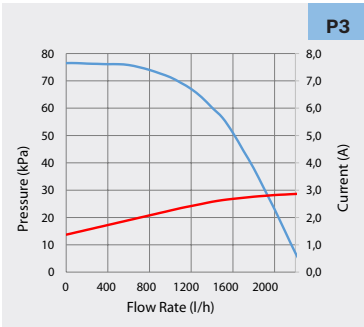
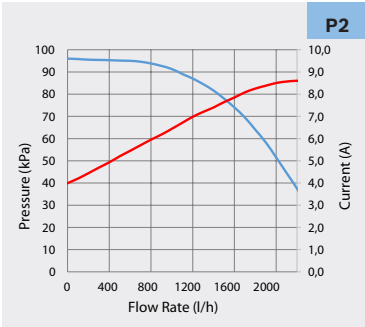
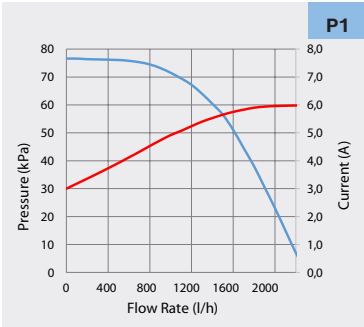
- Bosch 1 928 498 811
- Tyco / Molex MCON 1.2 1670146-3 – Ag plated (20awg)
- KOSTAL MLK 1.2 [32124734130]

**Seal:**

- Bosch 1 928 300 936
- TE Connectivity 967067-1 (20 awg)
- KOSTAL 10800507250



## Performance curve (P)







# Solenoid valves

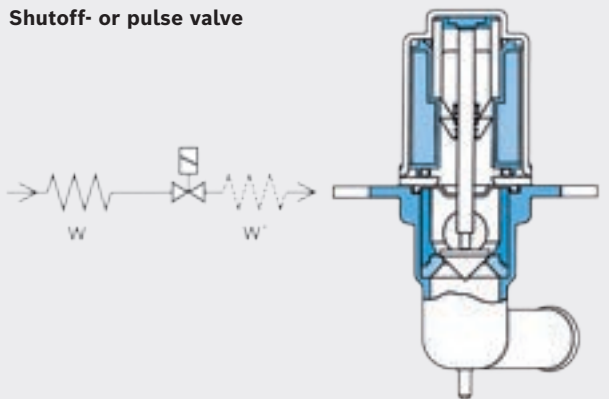
Bosch solenoid valves are designed with decades of experience in thermal, fluid and energy circuits and they stand for reliable control of the coolant flow. Due to their robustness and design optimized for volume flow, they have proven themselves millions of times worldwide in 24V and 12V applications. This includes applications in heating and cooling of electronics or battery cells in electric vehicles.



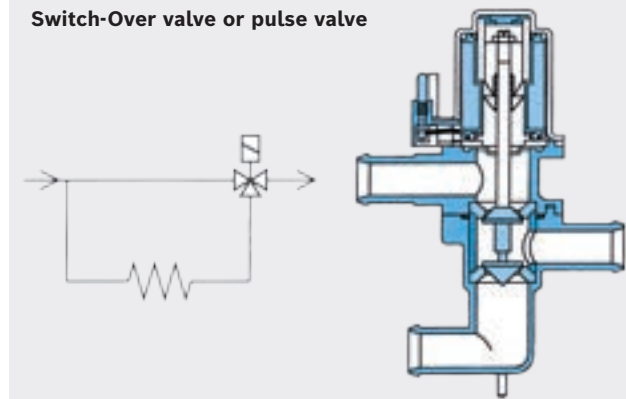
## Product features

- in case of no current opened Fail-safe function: For a long service life with more than 3 million switching cycles
- robust and compact design: For high dirt resistance and leak resistance throughout the entire service life
- production in line with the original automotive quality guidelines: For proven quality and high reliability
- comprehensive range for 12/24-volt applications for switch-over or shut-off circuits: Meeting different requirements

Shutoff- or pulse valve



Switch-Over valve or pulse valve



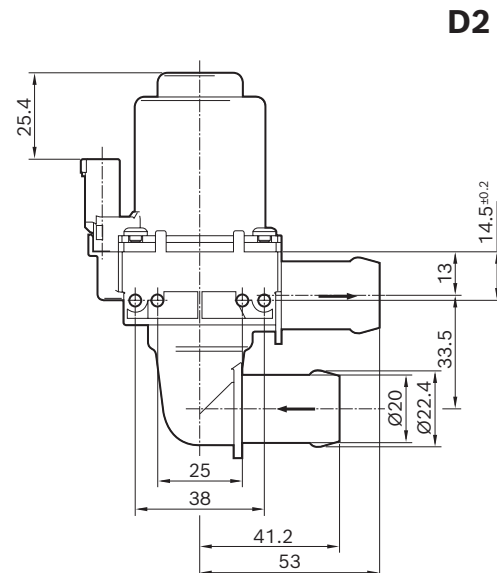
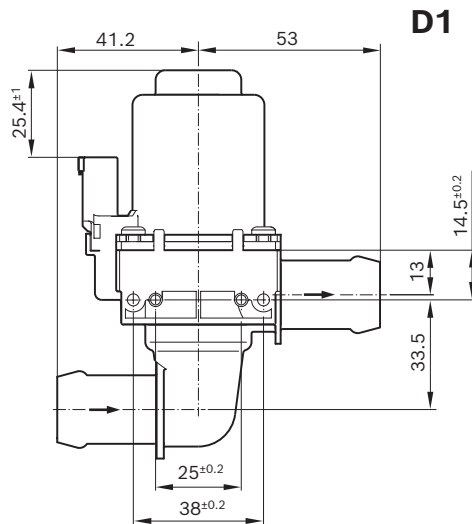
## Switch-off valves



### Family features:

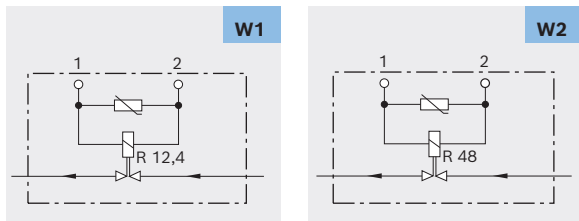
- proportional valve function possible
- degree of protection: IP5K4
- open when de-energized

Voltage	Part number	Maximum Pressure Drop kPa	Flow rate L/hr	Switchable pressure difference kPa	Resistance $\Omega$	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
12 V	1 147 412 208	30	1500	150	12.4	D1	W1	C1	P1
24 V	1 147 412 205	30	1500	150	48	D1	W2	C1	P1
24 V	1 147 412 218	30	1500	150	48	D2	W2	C1	P1

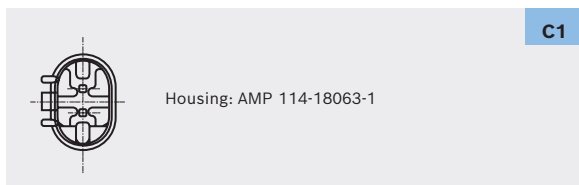


## Switch-off valves

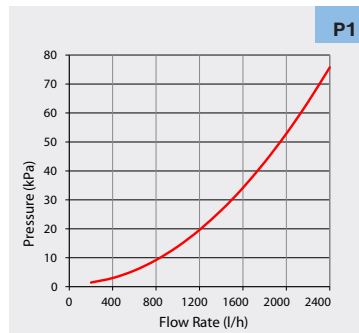
### Wiring diagram (W)



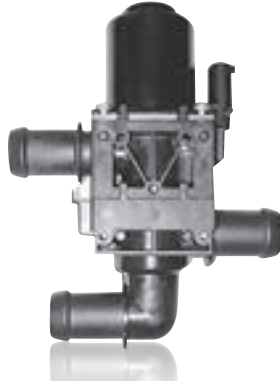
### Mating connector (C)



### Performance curve (P)



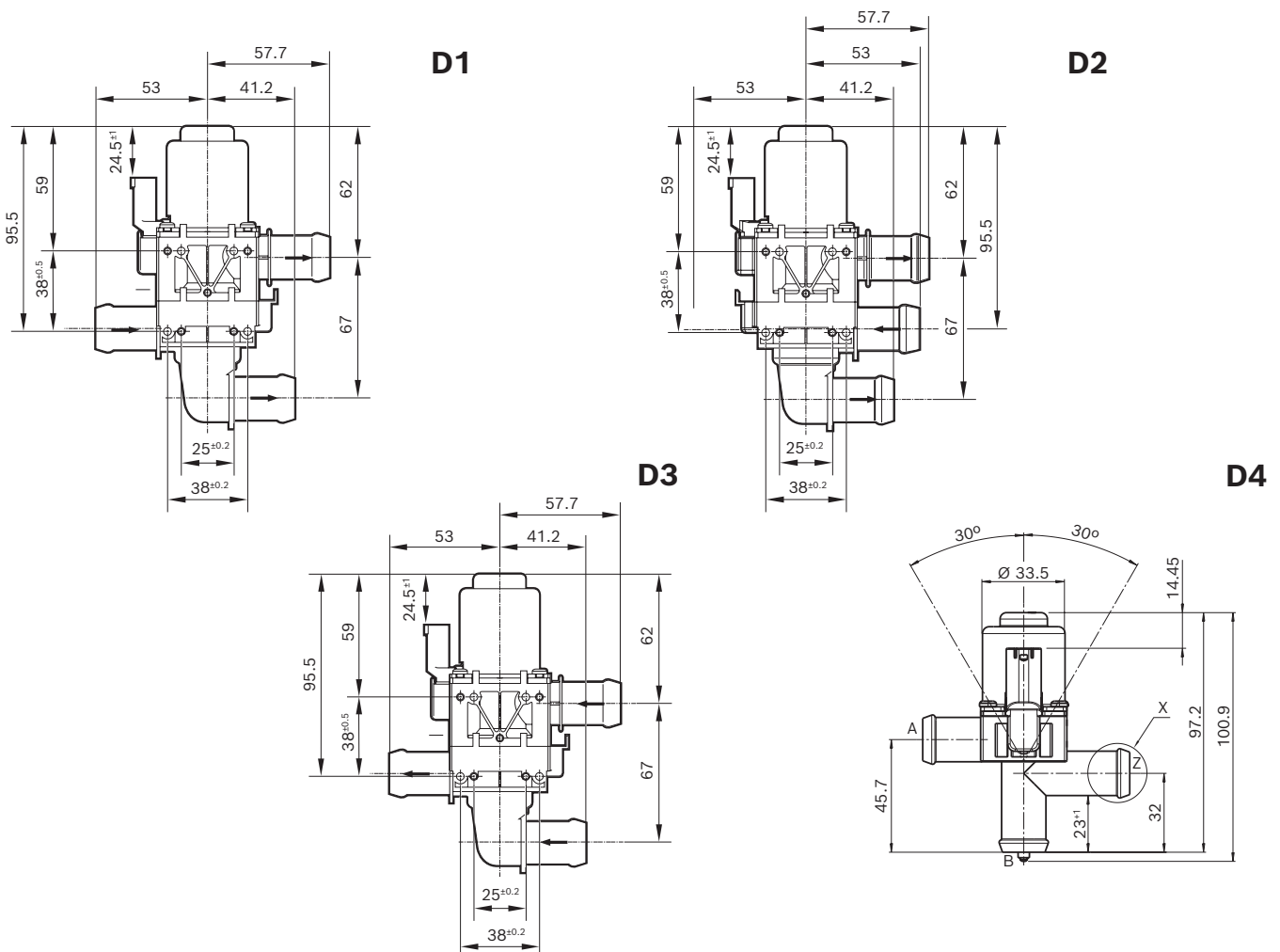
## Switch-over valves



### Family features:

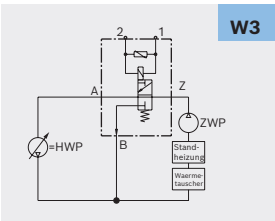
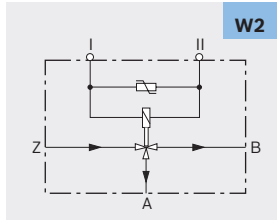
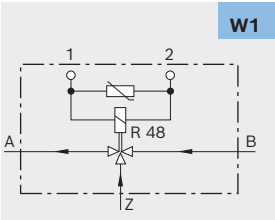
- proportional valve function possible
- degree of protection: IP5K4
- open when de-energized

Voltage	Part number	Maximum Pressure Drop kPa	Flow rate L/hr	Switchable pressure difference kPa	Resistance $\Omega$	Dimensional drawing (D)	Wiring diagram (W)	Connector (C)	Performance curve (P)
12 V	1 147 412 207	30	1500	160	12.4	D3	W1	C1	P1
12 V	1 147 412 211	40	1500	160	12.4	D1	W2	C1	P2
12 V	1 147 412 213	40	1500	160	12.4	D2	W2	C1	P2
12 V	1 147 412 282	35	1500	100	15.3	D4	W3	C1	P3
24 V	1 147 412 202	40	1500	160	48	D1	W2	C1	P2
24 V	1 147 412 204	30	1500	160	48	D3	W1	C1	P1

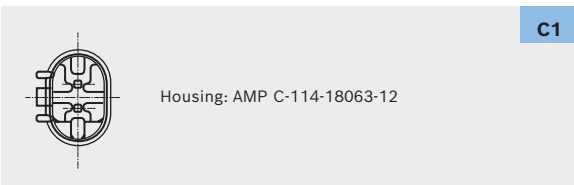


# Switch-over valves

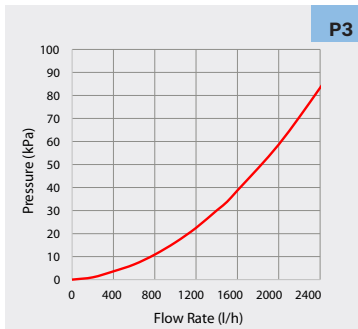
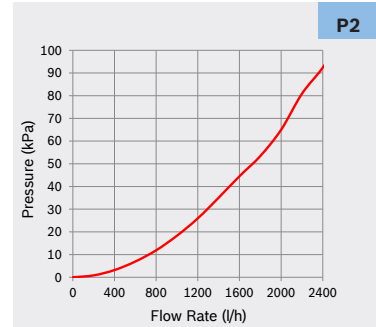
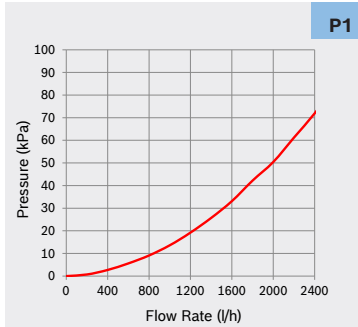
## Wiring diagram (W)



## Mating connector (C)



## Performance curve (P)



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