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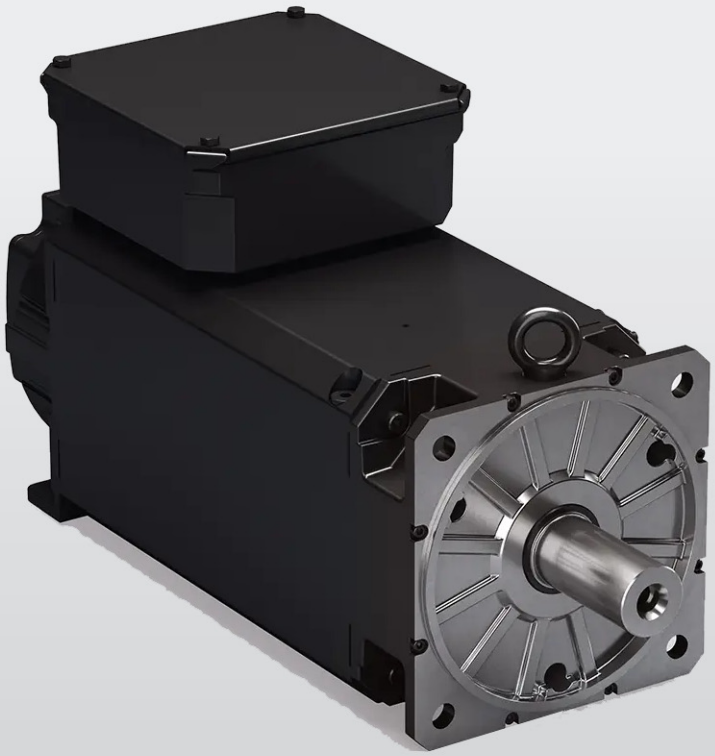

# DS4-132

Technical documentation
Three-phase synchonous motor

E 5.25016T.02

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# GENERAL

## 1.1 Safety

The standard version of the motors is not suitable for operation in salty or aggressive atmospheres or for outdoor installation. If the ambient air of ventilated motors is contaminated with dust particles or similar substances that cannot be reliably separated by the filter elements used, consult the manufacturer to find a solution.

Before commissioning the motor, appropriate measures must be taken to reduce bearing currents depending on the application and system. The motor manufacturer must be consulted in this regard.

**NOTE**

The assignment of the motor to a specific protection class is based on a standardized, short-term test procedure. This may differ significantly from the actual environmental conditions at the place of use. Depending on the environmental conditions, such as the chemical composition of the dust or the cooling media used at the place of use, it is only possible to assess the suitability of the motor on the basis of the protection class to a limited extent (e.g., electrically conductive dust or aggressive coolant vapors or liquids). In these cases, the motor must be additionally protected on the machine side by appropriate measures.

## 1.2 Instruction handbook

For commissioning, please use our instruction handbook for the **DS4-132**, doc. no. 5.25016.

Download at:

https://www.baumueller.com/en/download

## 1.3 Customer service

Our customer service is available to provide you with information. Info on the responsible contact persons is available at all times via telephone, fax, mail or the Internet.

# 2

# DESIGN AND OPERATION

This chapter describes the **DS4-132** motors and explains the type code of this motor.

## 2.1 Description of the product

The three-phase synchronous motors type **DS4-132** are water-cooled with permanent magnets.

Because of a very high power density, a very high power factor and high dynamic movement, the motors are developed for high level machines. Additionally a high overload is provided. The robust and compact motors are almost maintenance-free, this is an advantage for a economic operation.

The water-cooling provides a very compact construction and reduces the noise emission.

## 2.2 Type plate

The type plate is the identifier for each Baumüller motor. Especially, the accordant motor number is distinctive for each electric motor – this number is essential to make a back-tracking in our company possible. Therefore the type plate always must be readable. Never remove the type plate from your motor.

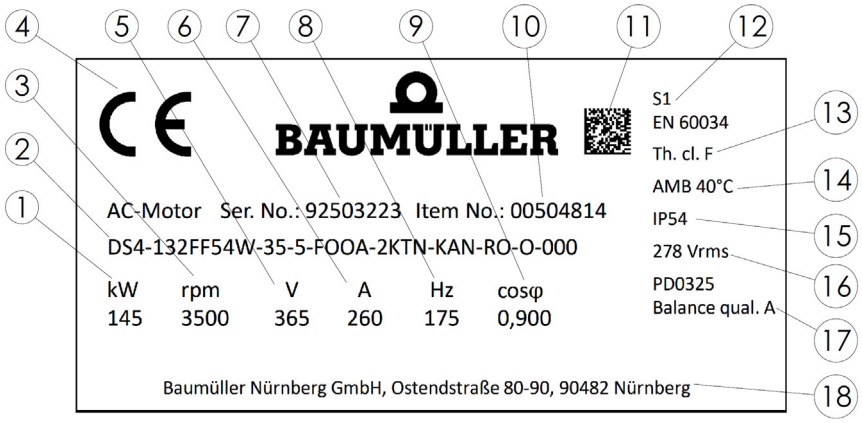



Figure 1: Type plate

| | |
|---|---|
| **1** | Rated power $P_N$ |
| **2** | Motor type |
| **3** | Rated speed $n_N$ |
| **4** | Standards and approvals |
| **5** | Rated voltage $U_N$ |
| **6** | Rated current $I_N$ |
| **7** | Motor number |
| **8** | Rated frequency |
| **9** | Power factor |
| **10** | Part No. |
| **11** | 2D code |
| **12** | Motor operation mode |
| **13** | Temperature class |
| **14** | Ambient temperature |
| **15** | Type of protection |
| **16** | Induced voltage at nominal speed |
| **17** | Vibration resistance |
| **18** | Manufacturer address |

## 2.3 Type code

| | |
|---|---|
| **DS4**-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX | Type |
| DS4-**XXX**XXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX | Size<br>132 |
| DS4-XXX**XX**XXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX | Length<br>AA<br>BB<br>CC<br>DD<br>EE<br>FF |
| DS4-XXXXX**XX**X-XX-X-XXXX-XXXX-XXX-XX-X-XXX | Type of protection<br>54 - IP54 |
| DS4-XXXXXXX**X**-XX-X-XXXX-XXXX-XXX-XX-X-XXX | Cooling<br>W - Water-cooling |
| DS4-XXXXXXXX-**XX**-X-XXXX-XXXX-XXX-XX-X-XXX | Nominal speed class<br>10 - 1000 $min^{-1}$<br>15 1500 $min^{-1}$<br>20 2000 $min^{-1}$<br>25 - 2500 $min^{-1}$<br>30 3000 $min^{-1}$<br>35 3500 $min^{-1}$<br>40 4000 $min^{-1}$<br>45 4500 $min^{-1}$<br>50 5000 $min^{-1}$ |
| DS4-XXXXXXXX-XX-**X**-XXXX-XXXX-XXX-XX-X-XXX | $U_{DC\ link}$ - DC<br>5 - 540 V |

| | |
|---|---|
| DS4-XXXXXXXX-XX-X-**X**XXX-XXXX-XXX-XX-X-XXX | Encoder type<br>O - Without encoder *<br>A - Resolver<br>D - SRS50<br>E - SRM50<br>F - ECN1313<br>G - EQN1325<br>H - ECN1325<br>I - EQN1337<br>L - SEK37<br>M - SEL37<br>Y - ECI1319<br>X - EQI1331<br>* On request |
| DS4-XXXXXXXX-XX-X-X**X**XX-XXXX-XXX-XX-X-XXX | Encoder option<br>O - Without Option<br>E - With electronic Baumüller type plate<br>S - Safety<br>T - With electronic Baumüller type plate + safety |
| DS4-XXXXXXXX-XX-X-XX**X**X-XXXX-XXX-XX-X-XXX | Brake<br>O - Without brake<br>B - With spring brake |
| DS4-XXXXXXXX-XX-X-XXX**X**-XXXX-XXX-XX-X-XXX | Shaft option<br>A - Smooth shaft<br>B - With featherkey |
| DS4-XXXXXXXX-XX-X-XXXX-**X**XXX-XXX-XX-X-XXX | Construction type<br>1 - IM B3<br>2 - IM B5 |
| DS4-XXXXXXXX-XX-X-XXXX-X**X**XX-XXX-XX-X-XXX | Type of main connection<br>K - Terminal box (with PT1000)<br>N - Terminal box (PT1000 on encoder connector) |
| DS4-XXXXXXXX-XX-X-XXXX-XX**X**X-XXX-XX-X-XXX | Position main connection<br>T - Top |
| DS4-XXXXXXXX-XX-X-XXXX-XXX**X**-XXX-XX-X-XXX | Outlet main connection<br>T - Top<br>L - Left with view DE to shaft end<br>R - Right with view DE to shaft end<br>N - NDE |
| DS4-XXXXXXXX-XX-X-XXXX-XXXX-**X**XX-XX-X-XXX | Bearing<br>K - Ball bearings A/B (standard: single-row deep groove ball bearings)<br>R - Roller bearings on DE |

| | |
|---|---|
| DS4-XXXXXXXX-XX-X-XXXX-XXXX-X**X**X-XX-X-XXX | Vibration resistance<br>A - Vibration resistance A<br>B - Vibration resistance B |
| DS4-XXXXXXXX-XX-X-XXXX-XXXX-XX**X**-XX-X-XXX | Concentricity<br>N - Normal<br>R - Reduced |
| DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-**X**X-X-XXX | Position cooling<br>T - Top<br>B - Bottom<br>L - Left with view DE, foot bottom<br>R - Right with view DE, foot bottom |
| DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-X**X**-X-XXX | Option cooling<br>O - Without cooling option |
| DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-**X**-XXX | Gear / pump mounting<br>O - Without gear and without pump mounting |
| DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-**XXX** | Special version<br>000 - No special version |

3

# TECHNICAL DATA

**NOTICE!**

If the delivered motor does not correspond to the standard version according to the technical list or if special agreements have been made in the contract, technical deviations may occur.

In this case, request the corresponding technical additions.

| | | |
|---|---|---|
| **Construction type** | B3 | Foot-mounted design |
| | B5 | Flange-mounted design |
| **Type of protection (EN 60034-5)** | IP 54 | |

**NOTICE!**

All mentioned degrees of protection are reached only, if the plug connectors are mounted completely and the terminal box is completely closed.

| | | | |
|---|---|---|---|
| **Methods of cooling (EN 60034-6)** | IC3W7 | | |
| **Coolant inlet temperature** | 10°C to 25 °C | max. 5 K lower than ambient temperature | |
| | Observe derating for higher coolant inlet temperatures. | | |
| **Terminal box** | NDE | Top | |
| **Water connection** | DE | Side | |
| **Main connection** | Terminal box: | U V W + temperature sensor | |
| **Encoder connection** | Connector socket | | 12- or 17-pin |
| | Plug | Endat 2.2 | 9-pin |

| | | | |
|---|---|---|---|
| **Thermal motor protection (EN 60034-11)** | Temperature sensor 2 x PT1000 (1 x active + 1 x substitute) in stator winding | | |
| **Winding insulation (EN 60034-1)** | Insulation class F ($\vartheta$ = 155 °C) | | |
| **Surface** | Matte black | | RAL 9005 |
| **Bearings** | DE: | Standard:<br>Option : | Floating bearing: Ball bearing<br>Roller bearing |
| | NDE: | | Fixed bearing: Ball bearing |
| **Service life of bearing** | L10H 20.000 h, guide value,<br>rolling bearings with long-term grease lubrication | | |
| **Vibration resistance (EN 60034-14)** | A | Standard | |
| | B | Option, ball bearing only | |
| **Concentricity (DIN 42955)** | N | Standard | |
| | R | Option, ball bearing only | |
| **Vibration resistance** | See ▹ Vibrations and resistance to vibrations | | |
| **Flange** | FF flange according IEC standard | | |
| **Shaft end** | Cylindrical | According DIN 748, centering with inside thread, according to DIN 332 form D,<br>option: with featherkey according to DIN 6885 | |
| **Weight** | Standard types: 82 - 160 kg | | |
| **Approvals** | CE, cURus | | |

## 3.1 Winding insulation

The motors are designed for operation with converters with a DC link voltage of up to 640 V. The motors can be operated at higher DC link voltages.

At higher DC link voltages, ensure that voltage peaks of >1200 V at the motor terminals are prevented by taking appropriate measures. This can be achieved, for example, by installing suitable filters in the motor supply cable. When operating braked applications, it must also be ensured during the braking process that the voltage at the motor terminals never exceeds 1200 V.

This ensures that the winding insulation is not damaged, thus preventing short circuits.

## 3.2 Installation conditions

**Environment**

The motor can be installed in roofed rooms complying with the degree of protection in dusty or damp environment and under normal climatic conditions.

Unless different arrangements have been made, the motor is designed by default for the following climatic conditions:

- Ambient temperature 0 °C bis 40 °C
- Installation height ≤1000 m above sea level
- Relative humidity 5 % to 85 %
- Absolute humidity from 1 g/m² to 25 g/m²

All other allowed application conditions have to correspond to DIN EN 60721-3-3 (class 3K3/3Z12).

It is absolutely imperative to comply with these climatic conditions when installing the motor.

Aggressive, corrosive, abrasive and plastic-dissolving solutions should be kept well away from the motor and the air that is used to cool it.

Consultation with the motor manufacturer is essential in the case of installation outdoors.

## 3.3 Specifications for water-cooling

### 3.3.1 Specifications referring to the required cooling flows

| Motor type | Volume current [l/min] | Pressure drop ± 15% [bar] | Heating [K] | Max. coolant pressure [bar] | Connection (G–inside thread) |
|---|---|---|---|---|---|
| DS4-132**AA** | 9 | 0.25 | 5 | 6 | 2 x G ½" 1x inlet 1x outlet |
| DS4-132**BB** | | | 6 | | |
| DS4-132**CC** | | | 7 | | |
| DS4-132**DD** | | | 8 | | |
| DS4-132**EE** | | | 9 | | |
| DS4-132**FF** | | | 10 | | |

### 3.3.2 Media-contacting materials in the motor

The following media-contacting materials are used in the motor:

- Cooling system: Aluminum, KTL coated
- Connection: Steel zinc-plated
- Seals: NBR

### 3.3.3 Motor cooling

Additions of corrosion and nucleation protections may be used in closed cooling systems performed accordingly to the coolant's characteristic complying with ▷ Specification of cooling water ◁ on page 16). Type and quantity is based upon the accordant recommendations of the manufacturer and of the prevailing environmental conditions.

### 3.3.4 Cooling circuits

Reduction factors for water as a coolant, refer to ▷ Definition of performance for water-cooled machines ◁ on page 19.

**Closed cooling circuit**

In the closed cooling circuit (see figure below), the cooling water tank is closed and thus no oxygen can enter the circuit.

This ensures very low water consumption and stable water quality.

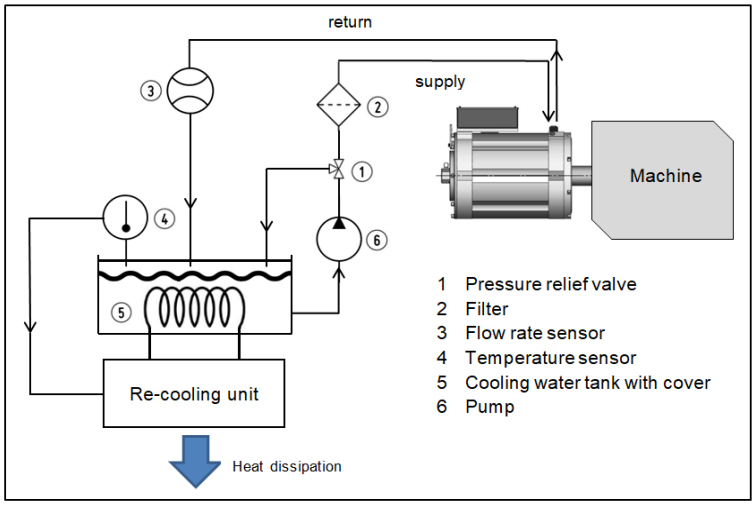



Figure 2: Example of a closed cooling circuit

**Semi-open cooling circuit**

The semi-open cooling circuit (see figure below) has an open cooling water tank and is otherwise constructed like the closed cooling circuit.

This prevents the accumulation of corrosion products in the circuit.

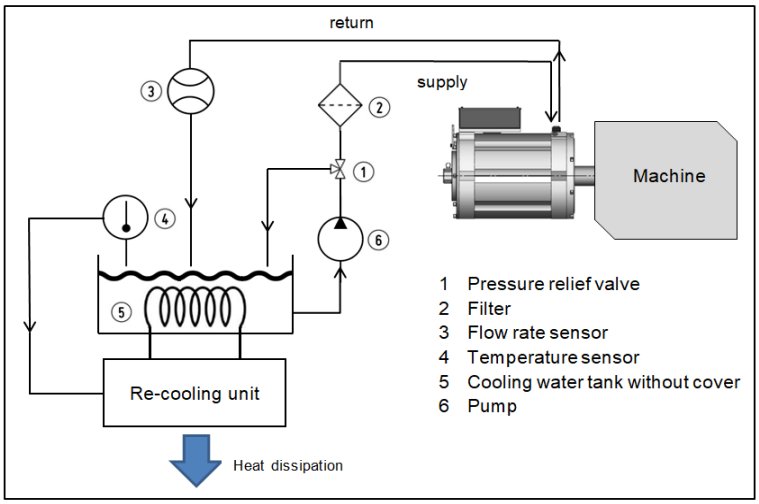



Figure 3: Example of a semi-open cooling circuit

**Overview of refrigeration unit manufacturers**

| | |
|---|---|
| ait-deutschland GmbH | www.kkt-chillers.com |
| BKW Kälte-Wärme-Versorgungstechnik GmbH | www.bkw-kuema.de |
| DELTATRHERM Hirmer GmbH | www.deltatherm.de |
| Glen Dimplex Deutschland GmbH | www.riedel-cooling.com |
| Helmut Schimpke und Team Industriekühlanlagen | www.schimpke.org |
| Hydac System GmbH | www.hydac.com |
| Hyfra Industriekühlanlagen GmbH | www.hyfra.de |
| Parker Hannifin GmbH | www.ph.parker.com |
| Pfannenberg GmbH | www.pfannenberg.com |
| Technotrans SE | www.technotrans.de |

**NOTE!**

You can also use equivalent cooling units from other manufacturers.

The responsibility for the quality of third-party products lies with the plant manufacturer.

### 3.3.5 Specification of cooling water

The cooling water must comply with the following requirements:

| | Unit | Value |
|---|---|---|
| Permitted system pressure at maximum | bar | 6 |
| Temperature of coolant for motor | °C | 10 to 25 |
| pH value (at 20 °C) | --- | 6,5 to 9 |
| Total hardness | mmol / l | 1.43 to 2.5 |
| Chloride - Cl | mg / l | < 200 |
| Sulfate - $SO_4^{2}$ | mg / l | < 200 |
| Oil | mg / l | < 1 |
| Permissible particle size, solid bodies, particles (e.g. sand) | mm | < 0.1 |

Clear water free of suspended particles and dirt must be used as the coolant.

Sufficient additives must be added for corrosion protection and germ protection. The type and amount of additives to be added depends on the respective recommendations of the manufacturers of these additives and the respective environmental conditions.

### 3.3.6 Minimum coolant temperature in dependence of the environmental conditions.

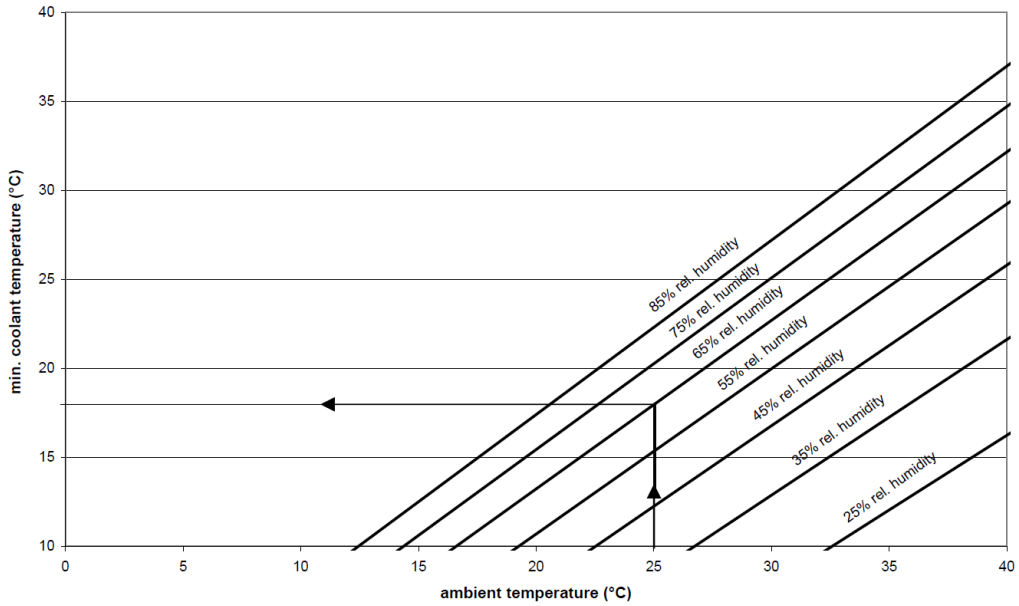



Figure 4: Evaluation of coolant temperature

The permitted temperature of the coolant is dependent of the relative humidity during the operation and the ambient temperature. For example a minimum coolant inlet temperature of 18 °C is permitted at an ambient temperature of 25°C and a relative humidity of 65 %. The presented characteristics in the diagrams are limit characteristics. Therefore, in the example a coolant inlet temperature of greater 18°C should be selected.

If the minimum permitted coolant entry temperature is fallen below, the 2-point controller of the Baumüller drive electronics must be used, to avoid condensation

**NOTE!**

At a longer standstill of the motor the coolant supply must be interrupted (avoidance of condensation).

At a longer standstill ambient temperatures <3 °C can occur, the coolant is to be drained as a precautionary measure (Avoidance of frost damage).

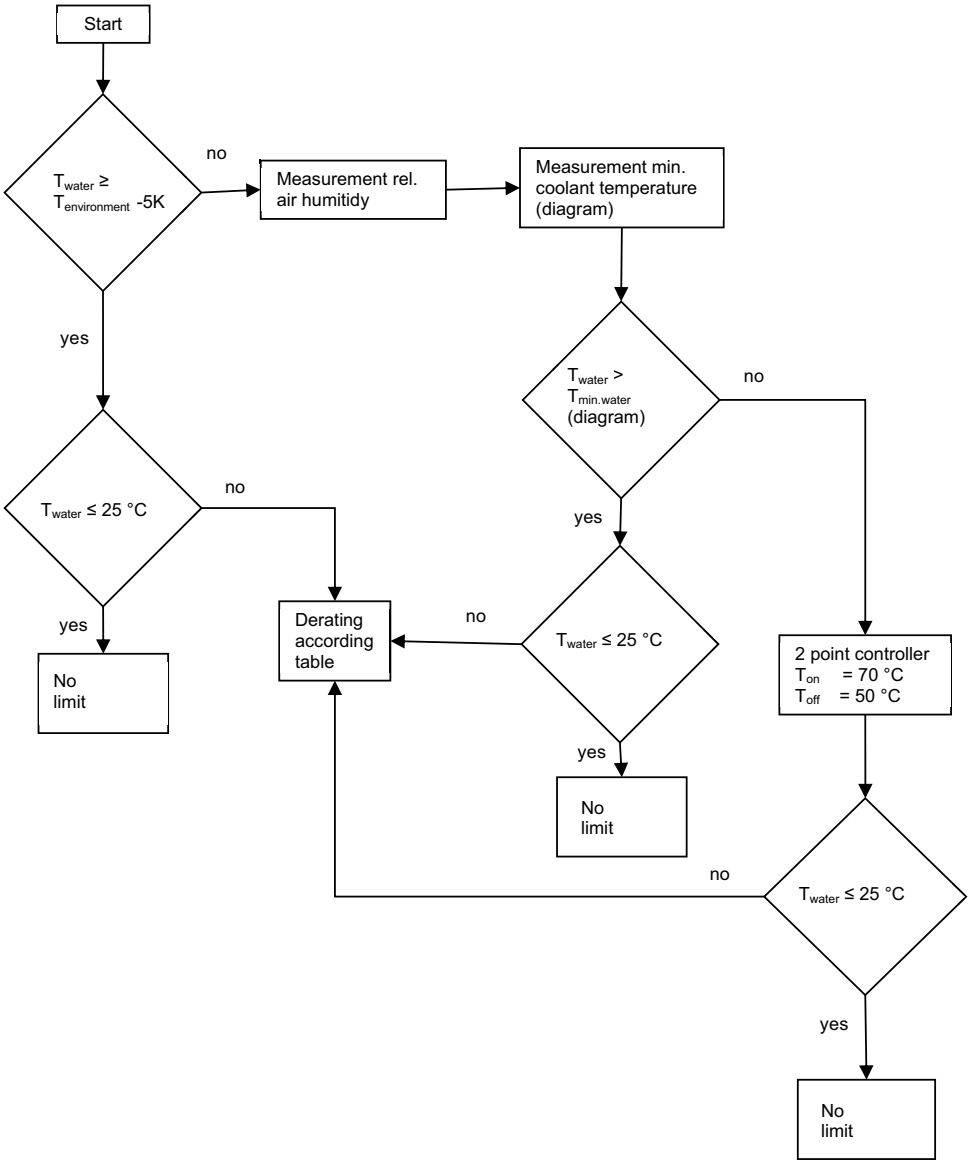



Figure 5: Function chart coolant entry temperature

## 3.4 Definition of performance for water-cooled machines

The mentioned performances (torques) apply to the continuous operation S1 with rated speed as long as the demands to the cooling system for water-cooled motors are complied with!

During the operation of the motors with higher coolant inlet temperatures the reduction factors below must be considered:

| Coolant supply temperature | 25 °C | 30 °C | 35 °C | 40 °C | 45 °C |
|---|---|---|---|---|---|
| Percentage of power (torque) | 100 % | 97 % | 95 % | 92 % | 89 % |

## 3.5 Motor data

**Explanation of motor data**

| | |
|---|---|
| $n_N$ | Rated speed [$min^{-1}$] |
| $M_0$ | Standstill torque [Nm] at speed ≥ 1 $min^{-1}$ zor an unlimited period of time |
| $I_0$ | Standstill rms current [A] at $M_0$ |
| $M_{0,max}$ | Maximum standstill torque [Nm]<br>at maximum current [A] and speed = 0, for a short time |
| $I_{0,max}$ | Standstill current [A] at $M_{0,max}$; $I_{0,max}$ is rms value |
| $P_N$ | Rated poser [kW] at $M_N$ and $n_N$ (see power definition) |
| $M_N$ | Rated torque [Nm] |
| $I_N$ | Rated rms current [A] |
| $K_{E/KALT}$ | Voltage constant (EMK) [V/1000 $min^{-1}$] |
| $f_N$ | Rated frequency [Hz] |
| J | Rotor moment of inertia [kgcm²] |
| m | Motor mass [kg] |

The specified rated power and torque at rated speed are achieved during converter operation with a clock frequency in the power section of ≥ 4 kHz.
A clock frequency of > 6 kHz is recommended.

The possibility of field weakening is assumed for the converters to be used.
The **size maXX** drive configurator at www.baumueller.com is available for designing the motors and the entire drive system.

**DS4-132..54W** Mains voltage 3 x 400$V_{AC}$ for converters with unregulated supply

| Motor | n $min^{-1}$ | $M_0$ Nm | $I_0$ A | $M_{0,max}$ Nm | $I_{0,max}$ A | $P_N$ kW | $M_N$ Nm | $I_N$ A | $K_{E/cold}$ V/1000 $min^{-1}$ | $f_N$ Hz | J $kgm^2$ | m kg | KSK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DS4-132AA54W-10 | 1000 | 190 | 39,3 | 350 | 79 | 19,3 | 185 | 38,6 | 282 | 50 | 0.041 | 86 | 24 |
| DS4-132BB54W-10 | | 250 | 51 | 465 | 103 | 26 | 245 | 50 | 287 | | 0.053 | 103 | 24 |
| DS4-132CC54W-10 | | 315 | 61 | 585 | 122 | 32 | 305 | 60 | 301 | | 0.065 | 119 | 24 |
| DS4-132DD54W-10 | | 380 | 74 | 700 | 147 | 39 | 370 | 73 | 301 | | 0.077 | 136 | 24 |
| DS4-132EE54W-10 | | 435 | 85 | 815 | 170 | 44 | 425 | 83 | 303 | | 0.089 | 150 | 24 |
| DS4-132FF54W-10 | | 495 | 98 | 935 | 200 | 51 | 485 | 96 | 299 | | 0.101 | 165 | 24 |
| DS4-132AA54W-15 | 1500 | 190 | 57 | 350 | 115 | 28 | 180 | 55 | 193 | 75 | 0.041 | 86 | 24 |
| DS4-132BB54W-15 | | 250 | 74 | 465 | 147 | 38 | 240 | 71 | 201 | | 0.053 | 103 | 24 |
| DS4-132CC54W-15 | | 315 | 89 | 585 | 175 | 47 | 300 | 86 | 207 | | 0.065 | 119 | 24 |
| DS4-132DD54W-15 | | 380 | 113 | 700 | 225 | 57 | 365 | 108 | 197 | | 0.077 | 136 | 24 |
| DS4-132EE54W-15 | | 435 | 128 | 815 | 260 | 65 | 415 | 122 | 201 | | 0.089 | 150 | 24 |
| DS4-132FF54W-15 | | 495 | 142 | 935 | 285 | 74 | 470 | 136 | 206 | | 0.101 | 165 | 24 |
| DS4-132AA54W-20 | 2000 | 190 | 73 | 350 | 147 | 37 | 175 | 69 | 152 | 100 | 0.041 | 86 | 24 |
| DS4-132BB54W-20 | | 250 | 89 | 465 | 175 | 47 | 225 | 83 | 166 | | 0.053 | 103 | 24 |
| DS4-132CC54W-20 | | 315 | 118 | 585 | 235 | 61 | 290 | 111 | 157 | | 0.065 | 119 | 24 |
| DS4-132DD54W-20 | | 380 | 145 | 700 | 285 | 74 | 350 | 136 | 154 | | 0.077 | 136 | 24 |
| DS4-132EE54W-20 | | 445 | 165 | 820 | 325 | 85 | 410 | 155 | 160 | | 0.089 | 150 | 24 |
| DS4-132FF54W-20 | | 505 | 185 | 935 | 370 | 98 | 465 | 175 | 160 | | 0.101 | 165 | 24 |
| DS4-132AA54W-25 | 2500 | 190 | 88 | 350 | 175 | 44 | 170 | 80 | 125 | 125 | 0.041 | 86 | 24 |
| DS4-132BB54W-25 | | 250 | 112 | 465 | 225 | 58 | 220 | 102 | 131 | | 0.053 | 103 | 24 |
| DS4-132CC54W-25 | | 315 | 144 | 585 | 285 | 73 | 280 | 131 | 128 | | 0.065 | 119 | 24 |
| DS4-132DD54W-25 | | 380 | 175 | 700 | 345 | 88 | 340 | 160 | 128 | | 0.077 | 136 | 26 |
| DS4-132EE54W-25 | | 445 | 200 | 820 | 400 | 102 | 390 | 180 | 130 | | 0.089 | 150 | 26 |
| DS4-132FF54W-25 | | 505 | 240 | 935 | 475 | 118 | 450 | 215 | 125 | | 0.101 | 165 | 26 |
| DS4-132AA54W-30 | 3000 | 190 | 99 | 350 | 200 | 49 | 155 | 86 | 112 | 150 | 0.041 | 86 | 24 |
| DS4-132BB54W-30 | | 250 | 129 | 465 | 260 | 65 | 210 | 113 | 114 | | 0.053 | 103 | 24 |
| DS4-132CC54W-30 | | 315 | 175 | 585 | 345 | 85 | 270 | 150 | 106 | | 0.065 | 119 | 26 |
| DS4-132DD54W-30 | | 380 | 200 | 700 | 400 | 101 | 320 | 175 | 110 | | 0.077 | 136 | 26 |
| DS4-132EE54W-30 | | 445 | 240 | 820 | 475 | 116 | 370 | 205 | 109 | | 0.089 | 150 | 26 |
| DS4-132FF54W-30 | | 505 | 265 | 935 | 525 | 130 | 415 | 225 | 113 | | 0.101 | 165 | 27 |
| DS4-132AA54W-35 | 3500 | 190 | 123 | 350 | 245 | 56 | 155 | 102 | 90.5 | 175 | 0.041 | 86 | 24 |
| DS4-132BB54W-35 | | 250 | 155 | 465 | 305 | 73 | 200 | 126 | 96.7 | | 0.053 | 103 | 24 |
| DS4-132CC54W-35 | | 315 | 200 | 585 | 400 | 94 | 255 | 165 | 92 | | 0.065 | 119 | 26 |
| DS4-132DD54W-35 | | 380 | 240 | 700 | 475 | 113 | 310 | 200 | 93.1 | | 0.077 | 136 | 26 |
| DS4-132EE54W-35 | | 445 | 265 | 820 | 525 | 123 | 335 | 210 | 99.2 | | 0.089 | 150 | 27 |
| DS4-132FF54W-35 | | 505 | 330 | 935 | 660 | 145 | 395 | 260 | 90.1 | | 0.101 | 165 | 28 |

| Motor | n $min^{-1}$ | $M_0$ Nm | $I_0$ A | $M_{0,max}$ Nm | $I_{0,max}$ A | $P_N$ kW | $M_N$ Nm | $I_N$ A | $K_{E/cold}$ V/1000 $min^{-1}$ | $f_N$ Hz | J $kgm^2$ | m kg | KSK |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DS4-132AA54W-40 | 4000 | 190 | 143 | 350 | 285 | 61 | 145 | 112 | 77.4 | 200 | 0.041 | 86 | 24 |
| DS4-132BB54W-40 | | 250 | 175 | 465 | 345 | 79 | 190 | 135 | 85.1 | | 0.053 | 103 | 26 |
| DS4-132CC54W-40 | | 315 | 220 | 585 | 435 | 99 | 235 | 170 | 84.8 | | 0.065 | 119 | 26 |
| DS4-132DD54W-40 | | 380 | 265 | 700 | 525 | 119 | 285 | 205 | 84.4 | | 0.077 | 136 | 27 |
| DS4-132EE54W-40 | | 445 | 295 | 820 | 585 | 127 | 305 | 215 | 89 | | 0.089 | 150 | 27 |
| DS4-132AA54W-45 | 4500 | 190 | 150 | 350 | 305 | 62 | 130 | 110 | 73 | 225 | 0.041 | 86 | 24 |
| DS4-132BB54W-45 | | 250 | 200 | 465 | 400 | 84 | 175 | 145 | 73.6 | | 0.053 | 103 | 26 |
| DS4-132CC54W-45 | | 315 | 265 | 585 | 525 | 105 | 225 | 190 | 70.3 | | 0.065 | 119 | 27 |
| DS4-132DD54W-45 | | 380 | 295 | 700 | 585 | 125 | 265 | 215 | 75.7 | | 0.077 | 136 | 27 |
| DS4-132EE54W-45 | | 445 | 330 | 820 | 660 | 130 | 275 | 220 | 78.9 | | 0.089 | 150 | 28 |
| DS4-132AA54W-50 | 5000 | 190 | 160 | 350 | 325 | 62 | 120 | 107 | 68.7 | 250 | 0.041 | 86 | 24 |
| DS4-132BB54W-50 | | 250 | 220 | 465 | 435 | 85 | 160 | 145 | 67.8 | | 0.053 | 103 | 26 |
| DS4-132CC54W-50 | | 315 | 295 | 585 | 585 | 105 | 200 | 190 | 63.1 | | 0.065 | 119 | 27 |
| DS4-132DD54W-50 | | 380 | 330 | 700 | 660 | 124 | 235 | 215 | 67.1 | | 0.077 | 136 | 28 |

## 3.6 Temperature sensor

The motors are equipped with a temperature sensor in the stator winding as standard. This allows the motor controller to monitor the temperature. The sensor is connected via the terminal box.

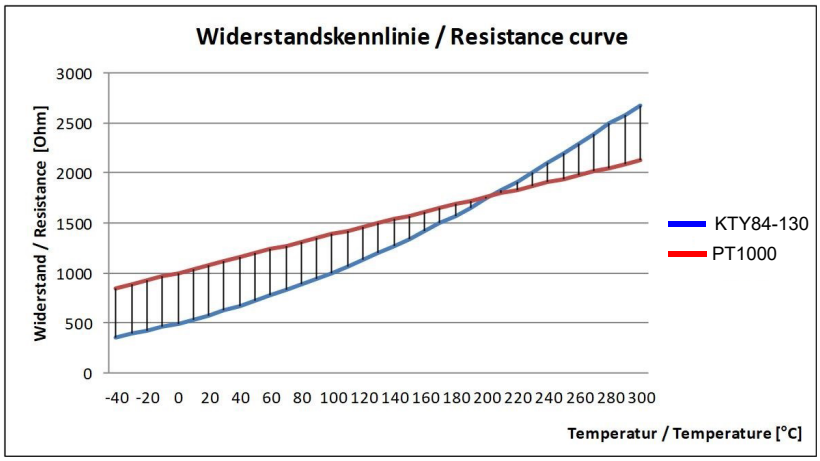



Figure 6: Resistance curve temperature sensor

The temperature sensor PT1000 continuously monitors the motor temperature. If the sensor is supplied with a measured current of 2 mA the above shown resistance curve results.

Additional PTCs or thermal switches can be installed upon request.

## 3.7 Balancing, output elements and vibrations

**Balancing**

In the standard version with featherkey the rotor is dynamically balanced with a half featherkey (accordant to EN 60034-14 / ISO 8821 / ISO 21940).

**Output elements**

When mounting the output elements the accordant balancing must be considered. The output elements must be balanced complying with ISO 21940.

When fitting and removing the output elements (e.g. coupling disks, rack-wheels, pulley wheels) adequate facilities must be used.

- Use thread hole in the end of the shaft.
- During removal use spacing washers to mechanically protect the shaft.
- If required before fitting warm up the output elements (max. permitted temperature at the shaft end is 150 °C for a short time).

**Vibrations**

Notice!

The system's vibration response at the location caused by output elements, installation options, alignment and setup as well as influences of external vibrations can cause an increase of vibration values at the motor.

Considering a correct functioning of the motor and a long bearing service life the permitted vibration values accordant to EN 60034-14 may not be exceeded. It may be necessary to balance the complete rotor with the drive element (according to ISO 21940).

The limited vibration loads and accelerations after mounting are not to be exceeded, see ▹ Vibrations and resistance to vibrations ◃.

At changes compared with the normal operation – e.g. increased temperatures, noises, vibrations – the motor is to be switched off in case of doubt, the cause is to be evaluated and the manufacturer is to be contacted if required.

## 3.8 Bearing and shaft load

All machines are equipped with rolling bearings. Normally, the drive end DE is fitted with a loose bearing (ball bearing) and the non-drive end NDE with a fixed bearing (ball bearing).

For applications where increased radial forces may occur—for example, when using pulleys—the machines are available with roller bearings on the DE.
Please specify the radial forces when ordering.

Bearing standard:

| Size | DE | NDE |
|---|---|---|
| 132 | 6312 2ZRC3 | 6310 2ZRC3 |

Bearing option roller bearing DE:

| Size | DE |
|---|---|
| 132 | NU 312E |

**NOTE!**

For the “Roller bearing DE” option, the rotor is secured with a transport lock by default. The transport lock must remain in place during transport and may not be removed until immediately before an output element is mounted.

If the machine is transported after an output element has been mounted, appropriate measures must be taken to secure the rotor axially and radially.

### Calculation of radial forces $F_R$

When using pulleys, the radial load is calculated as follows:

$$F_R = k \frac{2 \cdot 10^7 \cdot P_N}{n \cdot D}$$

$P_N$ = Nominal power in kW
n = Nominal speed in $min^{-1}$
D = Disc diameter in mm

The belt tension factor k is approximately:
k = 1.8...2.5 for V-belts
k = 2.2...3.5 for flat belts
k = 1.1 … 1.5 for tooth belts
(Follow the belt manufacturers' specifications!)

To ensure reliable torque transmission, it is necessary to utilize the entire effective length of the key. Failure to do so may result in excessive contact pressure on the key, which could cause the motor to fail. The pulley must be mounted all the way onto the shaft collar and may be axially secured using the following maximum tightening torques.

| Screw | M5 | M6 | M8 | M10 | M12 | M16 | M20 |
|---|---|---|---|---|---|---|---|
| Tightening torque | 2,2 Nm | 4 Nm | 10 Nm | 19 Nm | 33 Nm | 80 Nm | 160 Nm |

## 3.9 Radial force diagrams

All bearings are designed for a service life of 20,000 h $L_{10h}$. The load values specified below may thereby not be exceeded. The permissible radial forces $F_r$ are valid only for the horizontal installation of the motor without

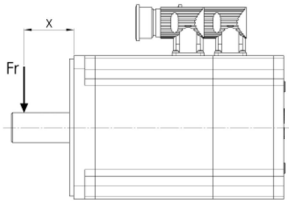
additional axial forces.

Furthermore, the specified average speeds must be adhered to reach the grease consumption period of 20,000 h under the following conditions:

- Low-vibration applications
- Horizontal installation
- Oscillatory bearing motion in which at least one pivot angle of 180° is performed
- Continuous bearing temperatures <120° C.

Axial loading on the motor shaft is generally not permitted. No axial forces may develop when mounting clutches, pulleys, etc. on the motor shaft!

### Sample diagram




Force application x = 30 mm from the shaft shoulder
Bearing service life 20000 h

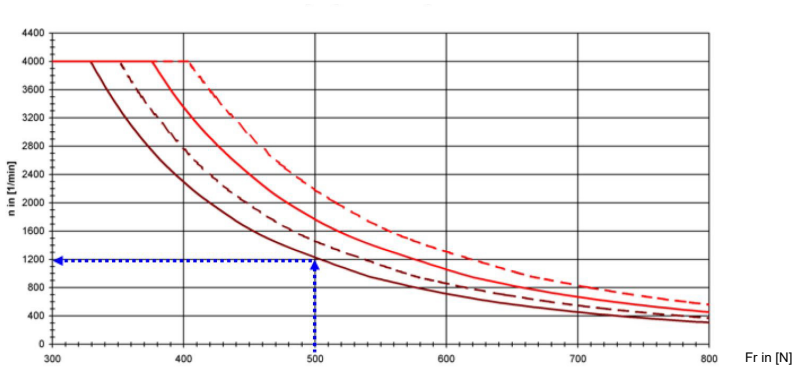



Figure 7: Sample diagram radial force ball bearing

The potential maximum speed of the bearing can be calculated via radial force $F_r$ of the application in characteristic "ball bearing".
At a radial force of 500 N with a force application point of x = 30 mm from the shaft shoulder, a maximum speed of 1200 rpm results.

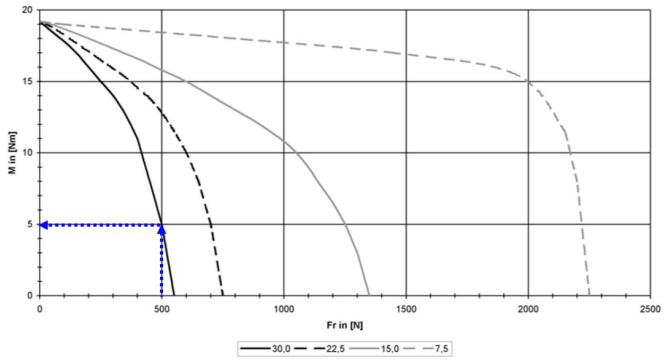



Figure 8: Sample diagram radial force shaft

The maximum torque to be still transmitted results from the characteristic "shaft". At a centrifugal force of 500 N with a driving force point of x = 30 mm from the shaft shoulder, a torque to be still transmitted of 5 Nm results.

## Ball bearing

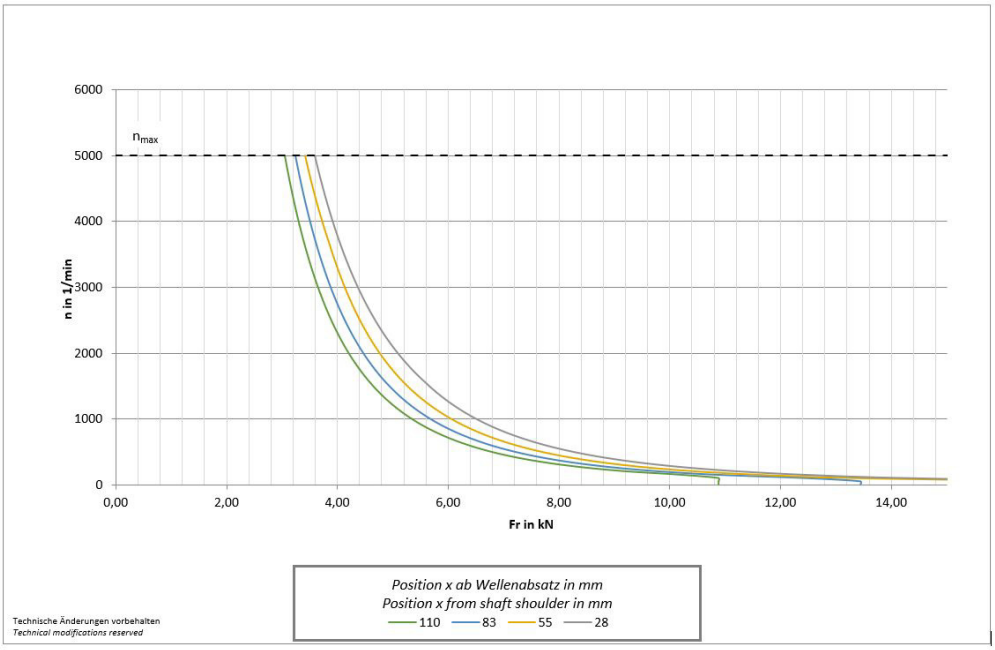



Figure 9: Radial force diagram ball bearing

## Roller bearing

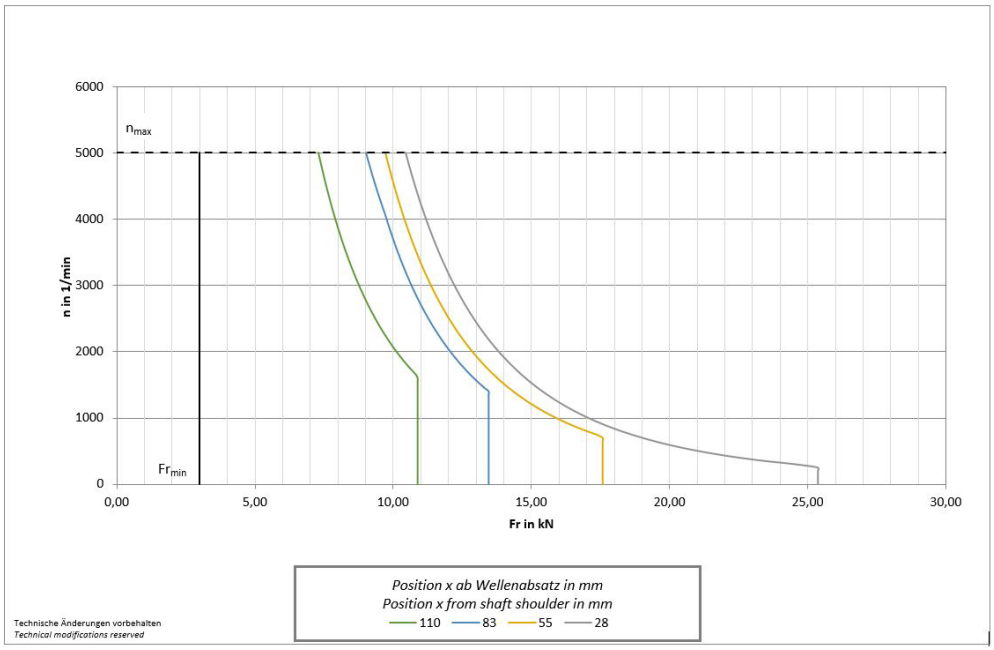



Figure 10: Radial force diagram roller bearing

## Shaft

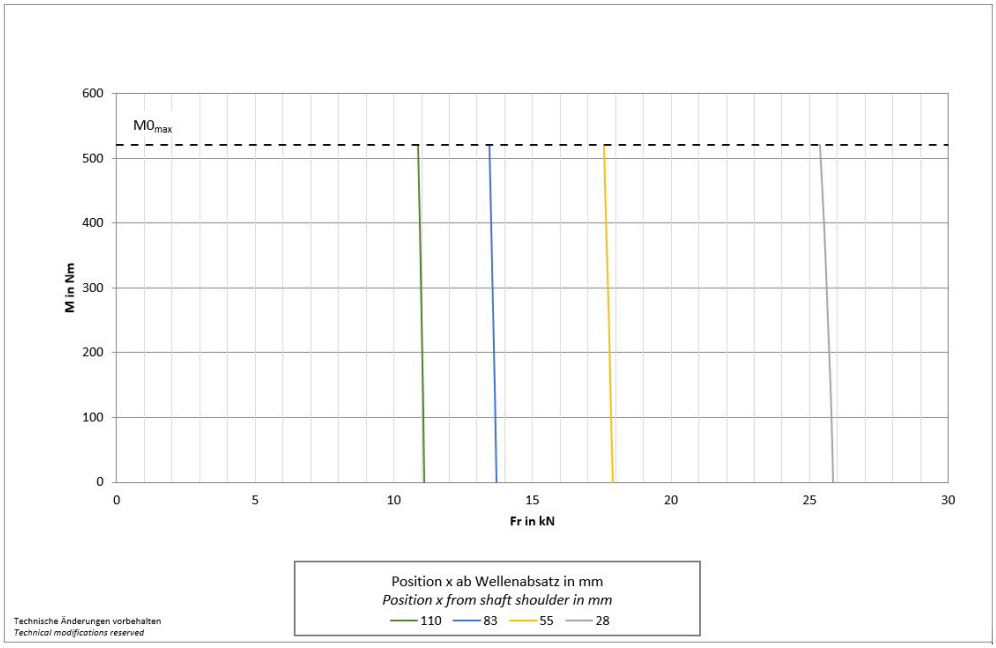



Figure 11: Radial force diagram shaft

## 3.10 Holding brake

The motors can be optionally equipped with a holding brake. The holding brake is a backlash-free permanent magnetic brake. The brakes work according to the closed current principle, i.e. the brake is applied when switched off (or at a failure of the operating voltage). The brakes are designed for an operating voltage of 24 $V_{DC}$. The specifications by the brake manufacturer apply at room temperature.

The motors are available with the following holding brakes:

| Motor | Brake type | Brake torque $M_B$ [Nm] | Input power [W] | Current at 24 $V_{DC}$ [A] | Max. perm. switching work per switch $W_{per}$ [kJ] | Applying time [s] | Release time [s] | Moment of inertia [kgm²] | Max. perm. speed [$min^{-1}$] | Weigth [kg] |
|---|---|---|---|---|---|---|---|---|---|---|
| **DS4-132** | SB 200 | 200 | 170 | 6.5 | 20 | 0.225 | 0.3 | 0.0040 | 3000 | 13 |

When using the **holding brake**, please note the following:

- A maximum of **3 emergency stops** (individual braking operations) per hour are possible when evenly distributed
- The values for the switching times apply to AC-side switching, in a cold state, with the standard air gap and holding brake
- Applying time - time until the braking torque is reached
- Release time - time until the brake is fully released (brake without torque)
- All specifications apply to installation on a horizontal shaft
- For vertical operation, consult the supplier
- Requirements differing from this overview are available upon request

**Braking time/ switching work**

It is necessary to check the brake for its intended application. To do this, the shift effort must be determined.

**Calculation of braking time [$t_B$]**

| | |
|---|---|
| $t_B$ | Braking time |
| $\Sigma J$ | Total moment of inertia in kgm² = $J_{mot}$ + $J_{zus}$ (referred to the motor shaft) |
| $J_{mot}$ | Motor moment of inertia in kgm² |
| $J_{zus}$ | Additional moment of inertia in kgm² (referred to the motor shaft) |
| $\Delta n$ | Motor speed in $min^{-1}$ |
| $M_B$ | Braking torque in Nm |
| $M_L$ | Torque in Nm<br>(calculated as positive if it has a braking effect, and as negative if it has an accelerating effect) |
| $t_0$ | Time in s from the moment the brake is applied until the braking torque is fully developed<br>(response time) |
| I | Number of work cycles per hour |
| $W_{zul}$ | Max. permitted switching work |

$$t_B = \frac{\sum J * \Delta n}{9{,}55 * (M_B \pm M_L)} + t_0 \quad \text{in} \quad s$$

**Calculation of switching work [$W_R$]**

$$W_R = \frac{\sum J \cdot \Delta n^2}{182{,}4} \cdot \frac{M_B}{(M_B \pm M_L)} \quad \text{in} \quad \frac{\text{Joule}}{\text{Switching}}$$

**Calculation of switching power [$P_R$]**

$$P_R = \frac{W_R \cdot i}{1000} \quad \text{in} \quad \frac{kJ}{h}$$

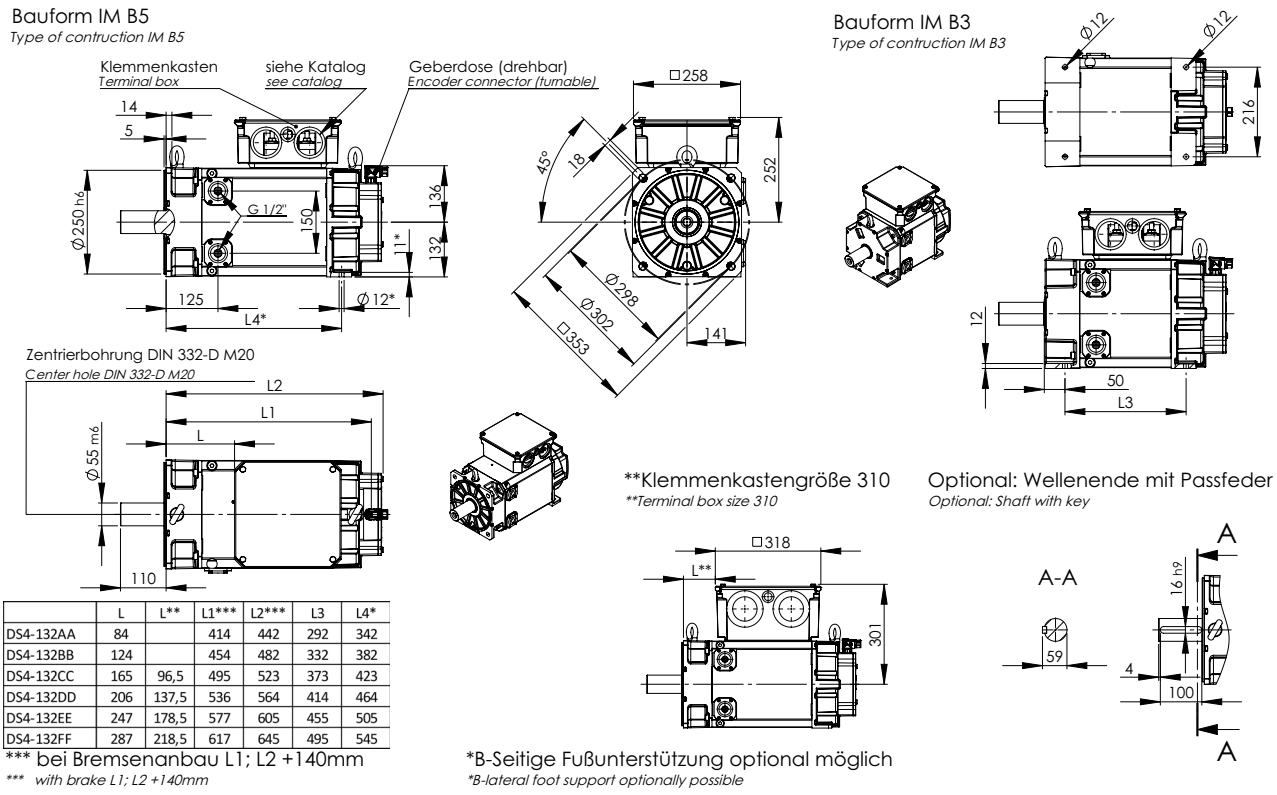
$$W_{permitted} \leq \text{Value from table } \triangleright \text{Motor} \triangleleft$$

In most cases, $t_0$ is negligibly small. If this is not the case and the time $t_0$ needs to be reduced, this can be achieved by interrupting the magnetic circuit on the DC side. However, this measure must be known before the braking motor is designed.

# 4

# MOUNTING

## 4.1 Dimensions




| | L | L** | L1*** | L2*** | L3 | L4* |
|---|---|---|---|---|---|---|
| DS4-132AA | 84 | | 414 | 442 | 292 | 342 |
| DS4-132BB | 124 | | 454 | 482 | 332 | 382 |
| DS4-132CC | 165 | 96,5 | 495 | 523 | 373 | 423 |
| DS4-132DD | 206 | 137,5 | 536 | 564 | 414 | 464 |
| DS4-132EE | 247 | 178,5 | 577 | 605 | 455 | 505 |
| DS4-132FF | 287 | 218,5 | 617 | 645 | 495 | 545 |

*** bei Bremsenanbau L1; L2 +140mm
*** with brake L1; L2 +140mm

*B-Seitige Fußunterstützung optional möglich
*B-lateral foot support optionally possible

Figure 12: Dimensions

### 4.1.1 Terminal box

Terminal box sizes may vary depending on the motor's rated currents.

EMC-compliant screw connections must be used.

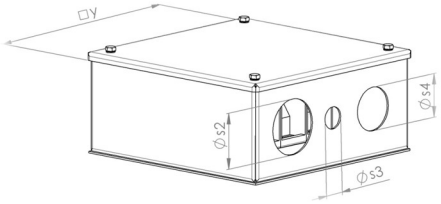



Figure 13: Terminal box

| No. | Cable entry | | Connection | Drilling | |
|---|---|---|---|---|---|
| | y [mm] | g1 [mm] | | s2 [mm] | s3 [mm] |
| 24 | 258 | 250 | 3 x M8 | 2 x M63x1.5 | 1 x M25x1.5 |
| 26 | 258 | 250 | 3 x M10 | 2 x M63x1.5 | 1 x M25x1.5 |
| 27 | 318 | 302 | 3 x M10 | 2 x M75x1.5 | 1 x M25x1.5 |
| 28 | 318 | 302 | 3 x M12 | 2 x M75x1.5 | 1 x M25x1.5 |

### 4.1.2 Location of terminal box and cable outlet directions

The terminal box is located on the NDE.
The terminal box can be installed in the following orientations::

- Terminal box, top
- Terminal box, left (when viewing the shaft end from the DE)
- Terminal box, right (when viewing the shaft end from the DE)

The following output directions for the main terminal connection can be configured depending on the location of the terminal box (see also the product configurator).

**Size 132**

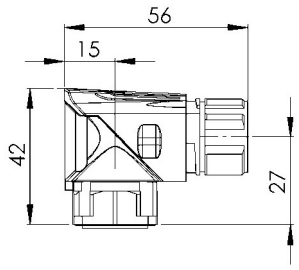
| Cooling type | Position terminal box | Output direction main connection | | | | |
|---|---|---|---|---|---|---|
| | | top | bottom | left [2] | right [2] | NDE |
| Water cooling | top | - | - | ☑ | ☑ [1] | ☑ |

[1] Preferred option

[2] View from DE to shaft end

### 4.1.3 Dimension of encoder connection

Speedtec - Rotary angle socket




Speedtec - Mating connector

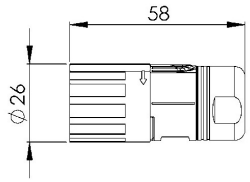
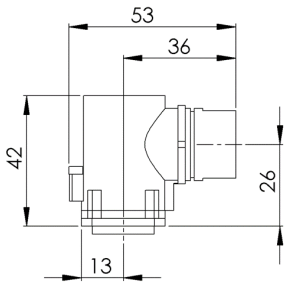



Figure 14: Dimensions of encoder connector

Rotary angle socket for ECN1325/EQN1337




(Mating connector not available separately)

Figure 15: Dimensions of encoder connector ECN1325/EQN1337

## 4.2 Vibrations and resistance to vibrations

The vibration response of the entire system at the installation site, caused by output elements, mounting conditions, alignment and installation as well as by influences of external vibrations, can lead to an increase in the vibration values at the motor. Under certain circumstances a complete balancing of the rotor with the output element becomes necessary.

In order to be able to guarantee perfect function and service life the specified vibration values based on DIN ISO 10816 must not be exceeded at the specified measuring points of the motor (see figure below).

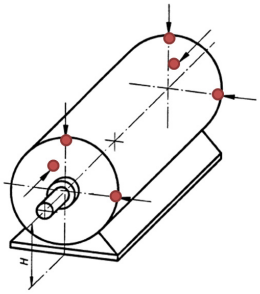


Figure 16: Measuring points for vibration

The specified maximum radial and axial vibration values must be adhered to at the same time. They apply to substructures which can be described as elastic. An elastic substructure is present if the lowest natural frequency of the overall system (machine and base) in the measuring direction is at least 25 % below the essential excitation frequency. All of the other substructures can be described as rigid. In case of rigid substructures, the manufacturer must be consulted.

**Mechanical conditions at the installation site:**

Class 3M12 according DIN EN IEC 60721-3-3:2020

**Maximum radial vibration load:**

| | |
|---|---|
| Peak vibration acceleration 1 g | > 250 Hz |
| Peak vibration displacement £ 0.16 mm | < 6.3 Hz |
| Effective vibration speed ≤ 4.5 mm/s | 6.3 Hz - 250 Hz |

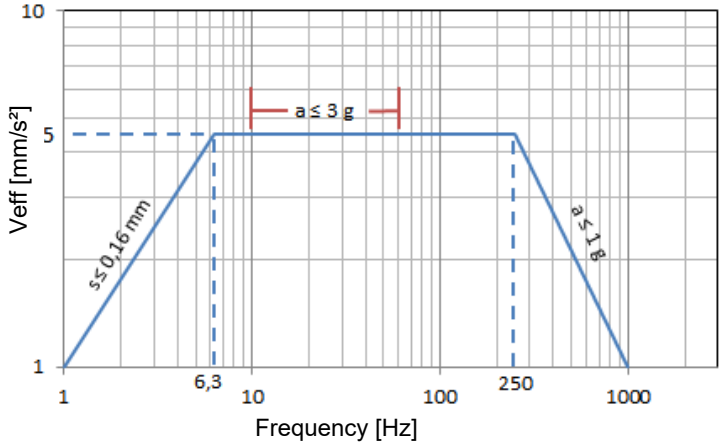



Figure 17: Permitted radial vibration load

**Maximum axial vibration load:**

| | |
|---|---|
| Peak vibration acceleration 0.225 g | > 55 Hz |
| Peak vibration displacement ≤ 0.16 mm | < 6.3 Hz |
| Effective vibration speed ≤ 4.5 mm/s | 6.3 Hz - 55 Hz |

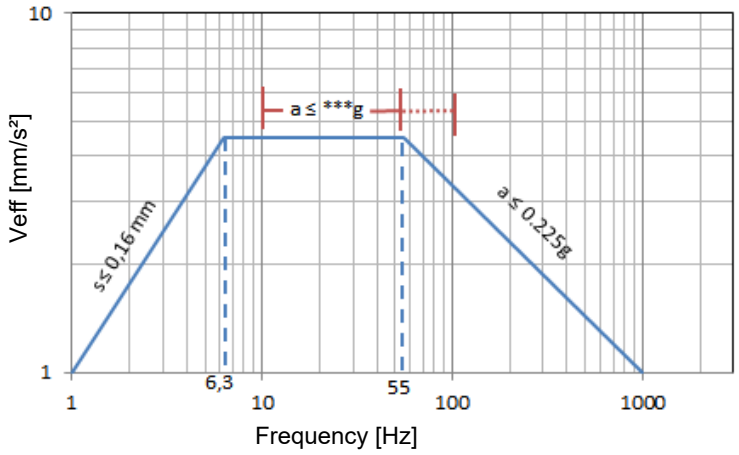



Figure 18: Permitted axial vibration load

**Additional vibration resistance:**

| | |
|---|---|
| 3 g radial and 2 g axial | 10 Hz to 100 Hz |

The specified vibrations are additionally endured by the motor. However, the service life of wear parts (such as bearings) can be reduced.

**Shock load:**

If there are increased vibration loads in the form of shocks, measurements on the installed machine are necessary.
Based on this, constructive revisions and evaluations are carried out with the company Baumüller.

To evaluate the vibration speed, the measuring equipment shall meet the requirements of ISO 2954. The vibration acceleration shall be evaluated in the time range in the frequency band from 10 Hz to 2 kHz.

If significant vibration excitations above 2 kHz are to be expected, such as meshing frequencies, the measuring range must be adapted accordingly. The permissible maximum values thereby do not change.

# 5

# INSTALLATION

## 5.1 Electrical connections

### 5.1.1 Motor cables

The motor cables are highly flexible trailing cables with overall shielding, They comply with VDE, UL, and CSA regulations. The control cables are integrated in star quad formation. The connector for brake control and the temperature sensor is available via main connection.

The cables are particularly suitable for the optimum use of cable racks thanks to their low cross-section, low weight and non-impeding surface. It also allows for an efficient use of the cables in drag chains. It is an EMC uncritical cable because of the overall shielding with > 85 % optical covering.

**Technical data**

- Cable sheath resists to mediums as for coolants and lubricants, machine or gear box oil
- Abrasion resistant surface for cable chains and drag chains
- Cable highly flexible, trailing cable, min. bending radius 12 x D at flexible use
- Sheath surface not blocking, silk mat
- Overall shielding of Cu copper braid > 85 % optical covering
- TPE or polyester wire insulation, sheath PUR - non-halogen cable
- Cable no FCKW and no silicone
- Halogen-free and flame-resistant
- Cable color RAL 1028, melon yellow
- Labeled with Baumüller company logo, VDE, UL and CSA

**Nominal voltage**

- Uo/U 600 / 1000 V (power wires)
- 24 $V_{DC}$ (control wires)

**Wire labeling**

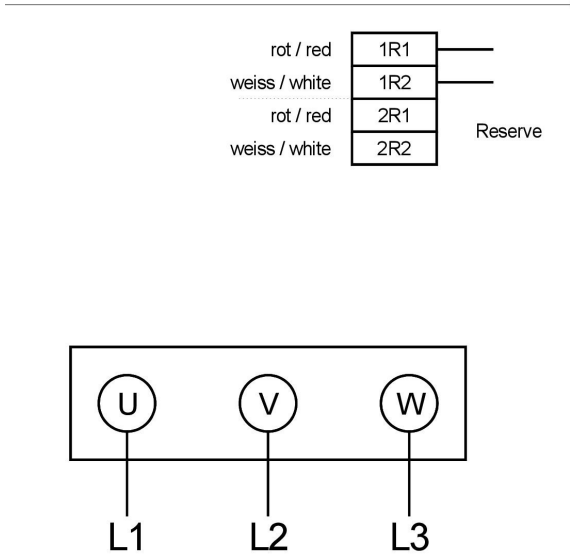
- Power wires U, VV, WWW
- Colored control cable pairs as star quads in red, white, black, yellow

**Assignments of the pairs**

Note polarity!

- red - black (brake)
- white - yellow (temperature sensor)

### 5.1.2 Main connection via terminal box




| U V W | Power connection |
|---|---|
| 1R1/ 1R2<br>2R1/ 2R2 | Temperature sensor PT1000<br>Temperature sensor Reserve |
| ⏚ | Protective earth conductor |

Figure 19: Main connection with terminal box

We recommend to use EMC screw connections at the fittings for the cable entries.

While tightening the clamping screw we recommend to hold up at the conductor to avoid a deformation of the mounting rail and to keep the base of the terminal free of torsional forces.

The following terminal box versions for the terminals are available including the tightening torques which are to be complied with

| Cable entry | Main connection terminals | Tightening torques of main connection terminals [Nm] min. | max. | Protective conductor in the terminal box [1)] | Protective conductor on the housing [1)] |
|---|---|---|---|---|---|
| 2 x Ø40,5 + 1 x Ø25.5 | 3 x M6 | 3 | 6 | 1 x M6 | 1 x M12 |
| 2 x Ø64 + 1 x Ø25.5 | 3 x M10 | 10 | 20 | 1 x M10 | 1 x M12 |
| 2 x Ø76 + 1 x Ø25.5 | 3 x M12 | 14 | 31 | 2 x M12 | 1 x M12 |

[1)] For protective conductor connections in the terminal box and on the housing, the values for aluminum apply, see Instruction handbook chapter ▹Tightening torques◃.

### 5.1.3 Brake supply

| | |
|---|---|
| Standard: | Standard voltage 24 $V_{DC}$;<br>Power supply with transformer and rectifier |
| Option: | Standard voltage 104 $V_{DC}$ and 176 $V_{DC}$;<br>Supply with brake supply unit.<br>The brake power unit must be ordered separately. |

The brakes are equipped with microswitches (normally open). The silver contacts are coated with a layer of gold, allowing for two applications. The gold coating can be irreversibly burned off if the maximum load capacity of the gold coating is exceeded. In this case, the “gold coating” contact material can no longer be used.

**Electrical s specifications of the switches**

| Contact material | Minimum load | Ideal application range | | Max. load |
|---|---|---|---|---|
| Gold coating | 0 mA; 0 V<br>up to 3 million cycles | 0 mA; 0 V<br>up to 3 million cycles | 10 mA; 12 V<br>up to 1 million cycles | 0,1 A; 12 V<br>up to 100.000 cycles |
| Silver | 10 mA; 12 V<br>up to 3 million cycles | 100 mA; 12 V<br>up to 3 million cycles | 5 A; 30 V<br>up to 50.000 cycles | 5 A; 30 V<br>up to 50.000 cycles |

The brakes can be equipped with a manual release and lock as an option.

**Brake connection** **DS4-132** with water cooling

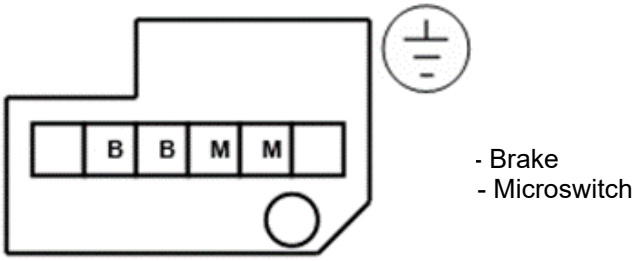



Figure 20: Brake connection

## 5.2 Pin assignment encoders

### 5.2.1 Resolver

| | |
|---|---|
| Pole pair number | 1 |
| Transmission ratio | 0,5 ±0,05 |
| Frequency | 5 kHz |
| Nominal input voltage | 7 $V_{rms}$ |
| Effective input power at no-load speed | 112 mW |
| Current consumption at no-load speed | 50 mA |
| Max. output voltage at no-load speed | 3,5 V ±10 % |
| Stator impedance with short circuit and maximum coupling | 61 mV/° |
| Phase shift | 0° ±3° |
| Zero voltage | 30 mV |
| Angle error in relation to $(\Delta\varphi_{max}+\Delta\varphi_{min})/2$ | ±6’ |
| Shock according to DIN EN 60068-2-27 (11ms) | ≤ 101 g |
| Vibration according to DIN EN 60068-2-6 (55 – 2000Hz) | ≤ 50 g |

View on the contact side
of the mounting socket

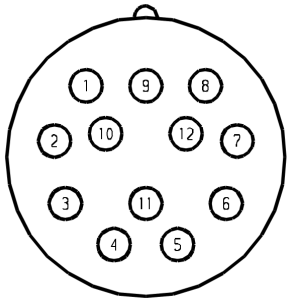



Figure 21: Pin assignment resolver

| Pin | Signal |
|---|---|
| 1 | cos - |
| 2 | |
| 3 | |
| 4 | |
| 5 | sin - |
| 6 | sin + |
| 7 | |
| 8 | cos + |
| 9 | |
| 10 | Ref + |
| 11 | |
| 12 | Ref - |

### 5.2.2 SEK/SEL 37 (SICK)

| | SEK 37 | SEL 37 |
|---|---|---|
| Number of sine, cosine periods per revolution | 16 | |
| Measuring step for the interpolation of the sine, cosine periods such as 12 bi | 20“ | |
| Number of absolute completed revolutions | 1 | 4096 |
| Code type for the absolute value | Binary | |
| Error limits for evaluating the sine, cosine periods, integral non-linearity | ±288" | |
| Non-linearity within a sine, cosine, differential non-linearity at nominal position ±0.1 mm | ±144" | |
| Maximum speed at which the absolute position can be defined | 6000 $min^{-1}$ | |
| Maximum operating speed | 12000 $min^{-1}$ | |
| Output signal | Serial RS 485 asynchronous, half duplex | |
| Power supply range | 7 - 12 V | |
| Max. operating current without Last | 50 mA | |
| Shock according to DIN EN 60068-2-27 (10 ms) | 100 g | |
| Vibration according to DIN EN 60068-2-6 (10-2000 Hz) | 50 g | |
| SEK/SEL37 – with mechanical adaption | The notch position is 0° (identical to SEK/SEL52 encoder) | |

View on the contact side of the mounting socket

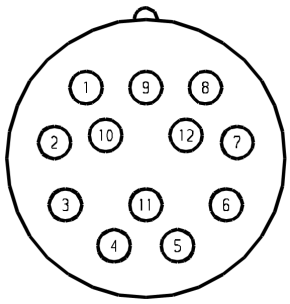



Figure 22: Pin assignment SEK/SEL 37

| Pin | Signal | Option with PT1000 (R1/R2) on encoder socket |
|---|---|---|
| 1 | cos - | cos - |
| 2 | + 485 | + 485 |
| 3 | | R1 |
| 4 | | R2 |
| 5 | sin + | sin + |
| 6 | sin - | sin - |
| 7 | - 485 | - 485 |
| 8 | cos + | cos + |
| 9 | | |
| 10 | GND | GND |
| 11 | | |
| 12 | - U | - U |

NOTE
Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer.

### 5.2.3 SRS/SRM 50 (SICK)

| | SRS 50 | SRM 50 |
|---|---|---|
| Number of sine, cosine periods per revolution | 1024 | |
| Number of increments per revolution | 32768 | |
| Number of absolute completed revolutions | 1 | 4096 |
| Code type for the absolute value | Binary | |
| Output frequency of the sine, cosine signals | 0 - 200 kHz | |
| Fault limits in evaluation of the sine, cosine signals; Integral non-linearity | ±45" | |
| Non-linearity within a sine or cosine period. Differential non-linearity ±0,1mm | ±7" | |
| Maximum speed at which the absolute position can be defined | 6000 $min^{-1}$ | |
| Maximum operating speed | 12000 $min^{-1}$ | |
| Output signals; 2x90° offset sinusoidal signals | 1 $V_{SS}$ | |
| Output signal | Serial RS 485 asynchronous, half duplex | |
| Power supply range | 7 - 12 V | |
| Max. operating current without load | 80 mA | |
| Shock according to DIN EN 60068-2-27 (10 ms) | 100 g | |
| Vibration according to DIN EN 60068-2-6 (10-2000 Hz) | 50 g | |

View on the contact side of the mounting socket

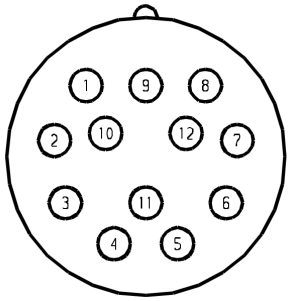



Figure 23: Pin assignment SRS/SRM 50

| Pin | Signal | Option with PT1000 (R1/R2) on encoder socket |
|---|---|---|
| 1 | cos - | cos - |
| 2 | + 485 | + 485 |
| 3 | | R1 |
| 4 | | R2 |
| 5 | sin + | sin + |
| 6 | sin - | sin - |
| 7 | - 485 | - 485 |
| 8 | cos + | cos + |
| 9 | | |
| 10 | GND | GND |
| 11 | | |
| 12 | - U | - U |

NOTE
Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer.

### 5.2.4 SRS/SRM 50 Safety (SICK)

| | SRS 50-S | SRM 50-S |
|---|---|---|
| Safety integrity level | SIL2 (IEC 61508), SILCL2 (IEC 62061) | |
| Category | 3 (EN ISO 13849) | |
| Performance Level | PL d (EN ISO 13849) | |
| Maximum angular acceleration | 200.000 rad/s$^2$ | |
| Number of sine, cosine periods per revolution | 1024 | |
| Number of increments per revolution | 32768 | |
| Number of absolute completed revolutions | 1 | 4096 |
| Code type for the absolute value | Binary | |
| Output frequency of the sine, cosine signals | 0-200 kHz | |
| Fault limits in evaluation of the sine, cosine signals; Integral non-linearity | ±45" | |
| Non-linearity within a sine or cosine period. Differential non-linearity ±0,1mm | ±7" | |
| Maximum speed at which the absolute position can be defined | 6000 min$^{-1}$ | |
| Maximum operating speed | 12000 min$^{-1}$ | |
| Output signals; 2x90° offset sinusoidal signals | 1 $V_{SS}$ | |
| Output signal | Serial RS 485 asynchronous, half duplex | |
| Power supply range | 7 - 12 V | |
| Max. operating current without load | 80 mA | |
| Shock according to DIN EN 60068-2-27 (10 ms) | 100 g | |
| Vibration according to DIN EN 60068-2-6 (10-2000 Hz) | 20 g | |

View on the contact side of the mounting socket

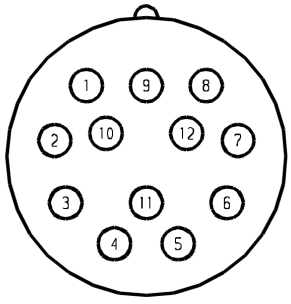



Figure 24: Pin assignment SRS/SRM 50-S

| Pin | Signal | Option with PT1000 (R1/R2) on encoder socket |
|---|---|---|
| 1 | cos - | cos - |
| 2 | + 485 | + 485 |
| 3 | | R1 |
| 4 | | R2 |
| 5 | sin + | sin + |
| 6 | sin - | sin - |
| 7 | - 485 | - 485 |
| 8 | cos + | cos + |
| 9 | | |
| 10 | GND | GND |
| 11 | | |
| 12 | - U | - U |

NOTE
Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer. The technical data is the specifications of the encoder manufacturer. The configuration options for the safety encoders with different engine versions can be found in
the product configurator. The combination SRS/SRM50-S with add-on gearbox is available by request.

### 5.2.5 ECN 1313 / EQN 1325 (Heidenhain)

| | ECN 1313 | EQN 1325 |
|---|---|---|
| Number of sine, cosine periods per revolution | 2048 | |
| System accuracy | ±20“ | |
| Number of absolute completed revolutions | 1 | 4096 (12 bit) |
| Code type for the absolute value | EnDat 2.1 | |
| Sampling limit frequency or limit frequency | 0 - 200 kHz | |
| Position values / revolution | 8192 (13 bit) | |
| Maximum speed at which the absolute position can be defined | 12000 $min^{-1}$ | |
| Maximum operating speed | 12000 $min^{-1}$ | |
| Power supply | 3,6 - 14 V | |
| Current consumption without load | ≤160 mA | |
| Shock according to DIN EN 60068-2-27 (10 ms) | ≤204 g | |
| Vibration according to DIN EN 60068-2-6 (10-2000 Hz) | ≤31 g | |

View on the contact side of the mounting socket

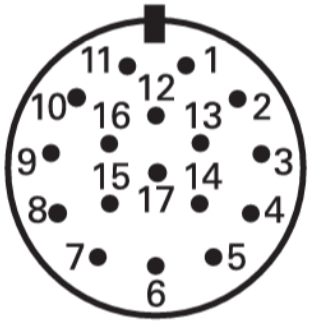



Figure 25: Pin assignment ECN 1313/ EQN 1325

| Pin | Signal | Option with PT1000 (R1/R2) on encoder socket |
|---|---|---|
| 1 | $U_P$ | $U_P$ |
| 2 | | |
| 3 | | |
| 4 | 0V | 0V |
| 5 | | R1 |
| 6 | | R2 |
| 7 | $U_P$ | $U_P$ |
| 8 | Clock | Clock |
| 9 | Clock inv. | Clock inv. |
| 10 | 0V | 0V |
| 11 | | |
| 12 | B+ | B+ |
| 13 | B- | B- |
| 14 | Data | Data |
| 15 | A+ | A+ |
| 16 | A- | A- |
| 17 | Data inv. | Data inv. |

NOTE
Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer.

### 5.2.6 ECI 1319 / EQI 1331 (Heidenhain)

| | ECI 1319 | EQI 1331 |
|---|---|---|
| No. of increments | - | |
| System accuracy | ±65“ | |
| Number of absolute completed revolutions | 1 | 4096 (12 bit) |
| Code type for the absolute value | EnDat 2.2 | |
| Position values / revolution | 524 2882 (19 bit) | |
| Maximum speed at which the absolute position can be defined | 15000 $min^{-1}$ | |
| Maximum operating speed | 15000 $min^{-1}$ | 12000 $min^{-1}$ |
| Power supply | 3,6 - 14 V | |
| Current consumption at 5 V typical, without load | 95 mA | |
| Shock according to DIN EN 60068-2-27 (10 ms) | ≤203 g | |
| Vibration according to DIN EN 60068-2-6 (10-2000 Hz) | ≤40 g | |

View on the contact side
of the mounting socket (M23)

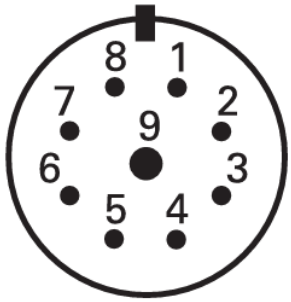



Figure 26: Pin assignment ECI 1319 / EQI 1331

| Pin | Signal |
|---|---|
| 1 | Clock |
| 2 | Clock inv. |
| 3 | Up |
| 4 | 0 V |
| 5 | Data |
| 6 | Data inv. |
| 7 | Sensor Up |
| 8 | Sensor 0 V |
| 9 | - |

NOTE
Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer.

### 5.2.7 ECI 1319 / EQI 1331 Safety (Heidenhain)

| | ECN 1319-S | EQN 1331-S |
|---|---|---|
| Safety integrity level | SIL 2 according to EN 61508 | |
| Category | 3 (EN ISO 13849) | |
| Performance Level | PL d (EN ISO 13849) | |
| Maximum angular acceleration | 100.000 rad/s$^2$ | |
| System accuracy | ±65“ | |
| Number of absolute completed revolutions | 1 | 4096 (12 Bit) |
| Code type for the absolute value | EnDat 2.2 | |
| Position values / revolution | 524.288 (19 Bit) | |
| Maximum speed at which the absolute position can be defined | 12000 min$^{-1}$ | |
| Maximum operating speed | 15 000 min$^{-1}$ | |
| Power supply | 3,6 - 14 V | |
| Current consumption without load | 95 mA | |
| Shock according to DIN EN 60068-2-27 (10 ms) | ≤203 g | |
| Vibration according to DIN EN 60068-2-6 (10-2000 Hz) | ≤40 g | |

View on the contact side
of the mounting socket (M23)

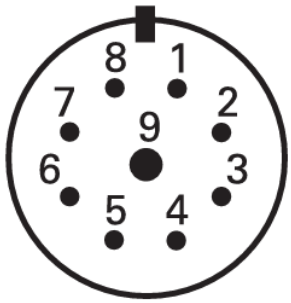



Figure 27: Pin assignment ECN 1325-S / EQN 1337-S

| Pin | Signal |
|---|---|
| 1 | Clock |
| 2 | Clock inv. |
| 3 | Up |
| 4 | 0 V |
| 5 | Data |
| 6 | Data inv. |
| 7 | Sensor Up |
| 8 | Sensor 0 V |
| 9 | - |

NOTE
Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer. Die The configuration options for the safety encoders with different engine versions can be found in the product configurator.

### 5.2.8 ECN 1325 / EQN 1337 (Heidenhain)

| | ECN 1325 | EQN 1337 |
|---|---|---|
| Number of sine, cosine periods per revolution | 2048 | |
| System accuracy | ±20“ | |
| Number of absolute completed revolutions | 1 | 4096 (12 bit) |
| Code type for the absolute value | EnDat 2.2 | |
| Position values / revolution | 33.554.432 (25 bit) | |
| Maximum speed at which the absolute position can be defined | 12000 $min^{-1}$ | |
| Maximum operating speed | 12000 $min^{-1}$ | |
| Power supply | 3,6 - 14 V | |
| Current consumption without load | ≤160 mA | |
| Shock according to DIN EN 60068-2-27 (10 ms) | ≤203 g | |
| Vibration according to DIN EN 60068-2-6 (10-2000 Hz) | ≤30 g | |

View on the contact side
of the mounting socket (M23)

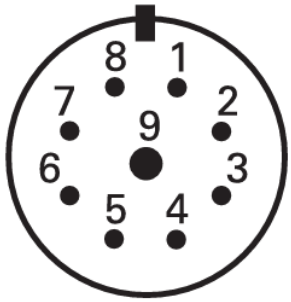



Figure 28: Pin assignment ECN 1325 / EQN 1337

| Pin | Signal |
|---|---|
| 1 | Clock |
| 2 | Clock inv. |
| 3 | Up |
| 4 | 0 V |
| 5 | Data |
| 6 | Data inv. |
| 7 | Sensor Up |
| 8 | Sensor 0 V |
| 9 | - |

NOTE
Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer.

### 5.2.9 ECN 1325/EQN 1337 Safety (Heidenhain)

| | ECN 1325-S | EQN 1337-S |
|---|---|---|
| Safety integrity level | SIL 2 according to EN 61508 | |
| Category | 3 (EN ISO 13849) | |
| Performance Level | PL d (EN ISO 13849) | |
| Maximum angular acceleration | 50.000 rad/s$^2$ | |
| Number of sine, cosine periods per revolution | 2048 | |
| System accuracy | ±20“ | |
| Number of absolute completed revolutions | 1 | 4096 (12 bit) |
| Code type for the absolute value | EnDat 2.2 | |
| Position values / revolution | 33.554.432 (25 bit) | |
| Maximum speed at which the absolute position can be defined | 12000 min$^{-1}$ | |
| Maximum operating speed | 12000 min$^{-1}$ | |
| Power supply | 3,6 - 14 V | |
| Current consumption without load | ≤160 mA | |
| Shock according to DIN EN 60068-2-27 (10 ms) | ≤203 g | |
| Vibration according to DIN EN 60068-2-6 (10-2000 Hz) | ≤30 g | |

View on the contact side
of the mounting socket (M23)

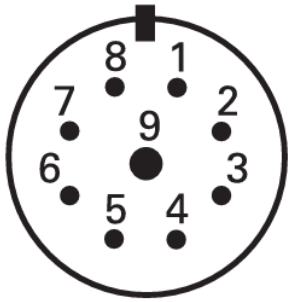



Figure 29: Pin assignment ECN 1325-S / EQN 1337-S

| Pin | Signal |
|---|---|
| 1 | Clock |
| 2 | Clock inv. |
| 3 | Up |
| 4 | 0 V |
| 5 | Data |
| 6 | Data inv. |
| 7 | Sensor Up |
| 8 | Sensor 0 V |
| 9 | - |

NOTE
Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer. Die The configuration options for the safety encoders with different engine versions can be found in the product configurator.

**NOTE!**

Refer to the details on the wiring diagrams and technical documentation in case the encoder used is not described above or the temperature sensor is provided at the encoder cable.

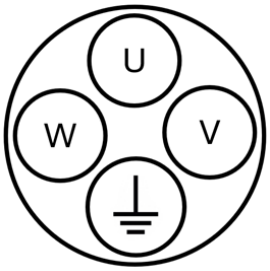
# 6

# SPARE PARTS

## 6.1 Main connection cables for terminal box

The terminal boxes on our motors are designed for use with asymmetrical connection cables.

**Asymmetric connection cable**:




**Symmetric connection cable**:

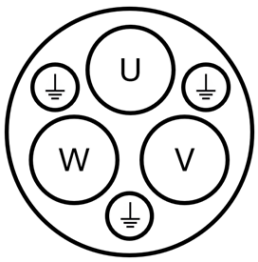



Figure 30: Asymmetric/symmetric connection cable

Symmetrical connection cables are possible on request.

## 6.2 Encoder cables for b maXX 5000/6000

A prefabricated encoder cable is used for all encoder systems.

The connection at the motor end consists of a 12-pole circular signal connector on resolvers and Hiperface® encoder, a 17-pole circular signal connector on ECN1313/EQN1325.

The connection at the controller side consists of a 26-pole D-Sub connector. Alternatively, the signal connector on the motor side is available in a Speedtec version.

**Technical data**

**Dragable for resolver**

- Li9YC, 1x(2x0.25)+Li9Y, 2x(2x0.25)+Li9YC11Y, 1x(2x0.34), copper strand, twisted pairs
- PUR sheat, green; inscription with Baumüller Nürnberg and encoder cable resolver
- 1st side: 12-pole circular signal plug connector with 12 socket contacts
- 2nd side: 26-pole Sub-D plug connector with pin contacts and locking screws 4-40UNC
- Outer diameter 7.3 mm (+/- 0.3 mm)
- Bending radius: r ≥ 4 x D (fixed routing), r ≥ 10 x D (flexible use)

**Dragable for SinCos Hiperface® interface and SinCos - and TTL incremental encoders**

- Li9YC, 3x(2x0.25)+Li9Y, 3x(2x0.25)+Li9YC11Y, 1x(2x0.34), copper strand, twisted pairs
- PUR sheat, green; inscription with Baumüller Nürnberg and encoder cable Hiperface or Incremental
- 1st side: 12-pole circular signal plug connector with 12 socket contacts
- 2nd side: 26-pole Sub-D plug connector with pin contacts and locking screws 4-40UNC
- Outer diameter 9.6 mm (+/- 0.3 mm)
- Bending radius: r ≥ 4 x D (fixed routing), r ≥ 10 x D (flexible use)

**Dragable for EnDat® 2.1 interface**

- Li9YC, 3x(2x0.25)+Li9Y, 3x(2x0.25)+Li9YC11Y, 1x(2x0.34), copper strand, twisted pairs
- PUR sheat, green; inscription with Baumüller Nürnberg and encoder cable Endat 2.1
- 1st side: 17-pole circular signal plug connector with 17 socket contacts
- 2nd side: 26-pole Sub-D plug connector with pin contacts and locking screws 4-40UNC
- Outer diameter 9.6 mm (+/- 0.3mm)
- Bending radius: r ≥ 4 x D (fixed routing), r ≥ 10 x D (flexible use)

**Dragable hybrid cable for Hiperface DSL®**

- Hybrid cable
- Shielding braid Copper wires, tinned
- PUR sheath, orange, flame-retardant, self-extinguishing
- 1st side:
  metal round plug Speedtec M23 hybrid socket 8-pole for wire with 4G1.5 and 4G2.5
  metal round plug Speedtec M40 hybrid socket 5+4-pole + 2 -pole insulating body for wire with 4G2.5, 4G4 and 4G6
- 2nd side: Metal 45°-D-Sub plug, 26-pole with electronics

**Application references**

- Operating temperature of encoder cable resolver; SinCos Hiperface® interface; EnDat® 2.1 interface and SinCos- and TTL incremental encoders

| | |
|---|---|
| Limit temperature | on the surface |
| Storage temperature | - 40 °C to + 80 °C |
| Permanent movement | - 20 °C to + 60 °C |

- Routing of cable on motor

The cables must not touch the surface of the motor.

**Order information for encoder cables**

Encoder cable - prefabricated with plug

| **For Resolver** | |
|---|---|
| Length [m] | Part No. (Speedtec) |
| 1 | 448746 |
| 2 | 448747 |
| 3 | 448748 |
| 5 | 448749 |
| 7 | 448750 |
| 10 | 448751 |
| 15 | 448752 |
| 20 | 448753 |
| 25 | 448754 |
| 30 | 448755 |
| 35 | 448756 |
| 40 | 448757 |
| 50 | 448758 |
| 75 | 448759 |

| **For SinCos Hiperface® interface** | |
|---|---|
| Length [m] | Part No. (Speedtec) |
| 1 | 448761 |
| 2 | 448762 |
| 3 | 448763 |
| 5 | 448764 |
| 7 | 448765 |
| 10 | 448766 |
| 15 | 448767 |
| 20 | 448768 |
| 25 | 448769 |
| 30 | 448770 |
| 35 | 448772 |
| 40 | 448773 |
| 50 | 448774 |
| 75 | 448775 |

| **For SinCos - and TTL- incremental encoders** | |
|---|---|
| Length [m] | Part No. (Speedtec) |
| 1 | 448777 |
| 2 | 448778 |
| 3 | 448779 |
| 5 | 448780 |
| 7 | 448781 |
| 10 | 448782 |
| 15 | 448783 |
| 20 | 448784 |
| 25 | 448785 |
| 30 | 448786 |
| 35 | 448787 |
| 40 | 448788 |
| 50 | 448789 |
| 75 | 448790 |

| **For SinCos EnDat® 2.1 interface** | |
|---|---|
| Length [m] | Part No. (Speedtec) |
| 1 | 448796 |
| 2 | 448797 |
| 3 | 448798 |
| 5 | 448799 |
| 7 | 448800 |
| 10 | 448801 |
| 15 | 448802 |
| 20 | 448803 |
| 25 | 448804 |
| 30 | 448805 |
| 35 | 448806 |
| 40 | 448807 |
| 50 | 448808 |
| 75 | 448809 |

# APPENDIX A - MOTOR CHARACTERISTIC CURVES

**Definition**

Cold motor = Environmental temperature (0 °C bis 40 °C)

Motor at operating temperature = Continuous operation (S1) with nominal data of the motor or cyclical operation with corresponding effective output

⇒ Environmental temperature + Delta temperature rise (105 K)

## A.1 Characteristic curve DS4-132AA

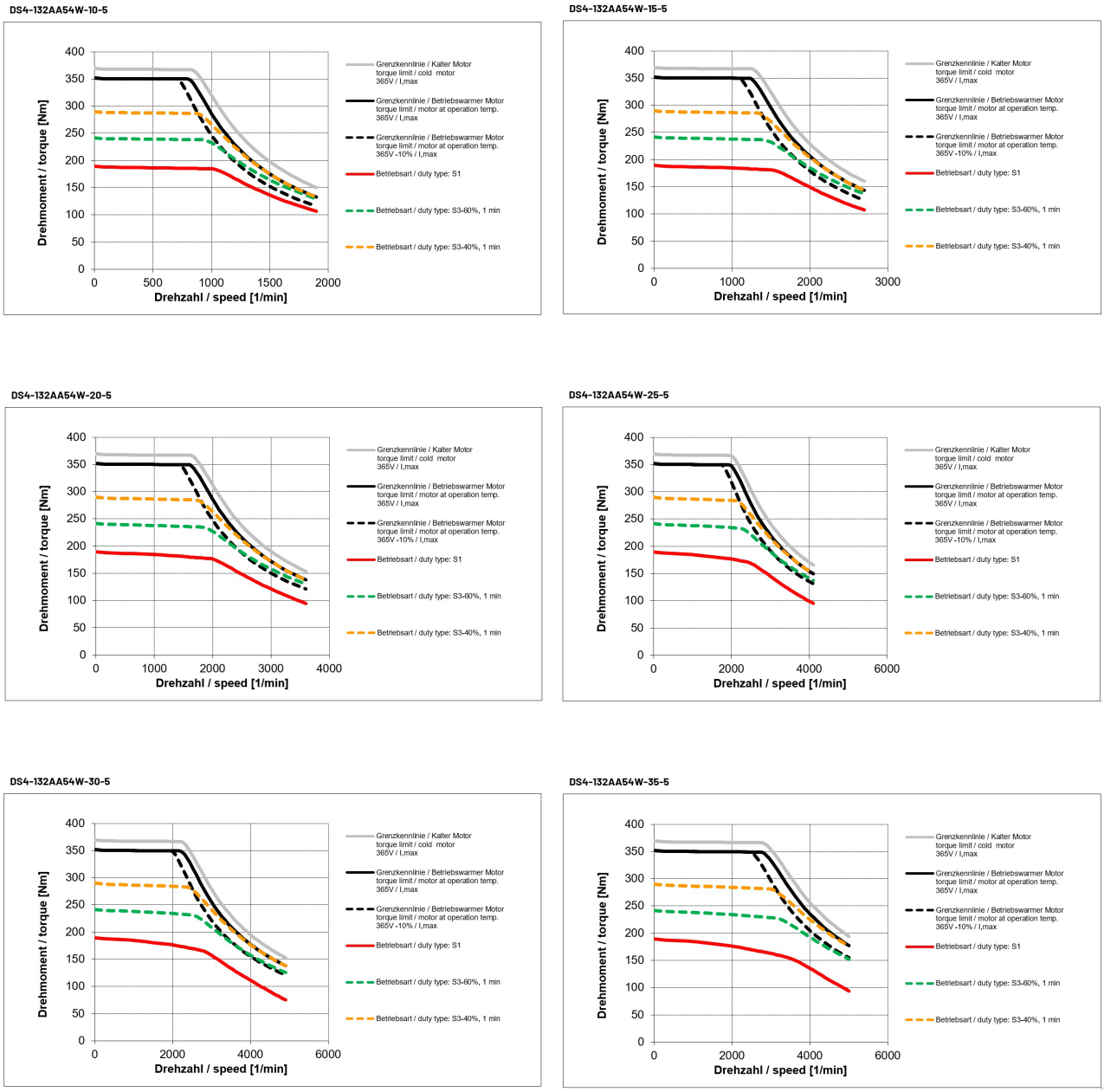



Figure 31: Motor characteristic curve DS4-132AA54W-10 ... DS4-132AA54W-35

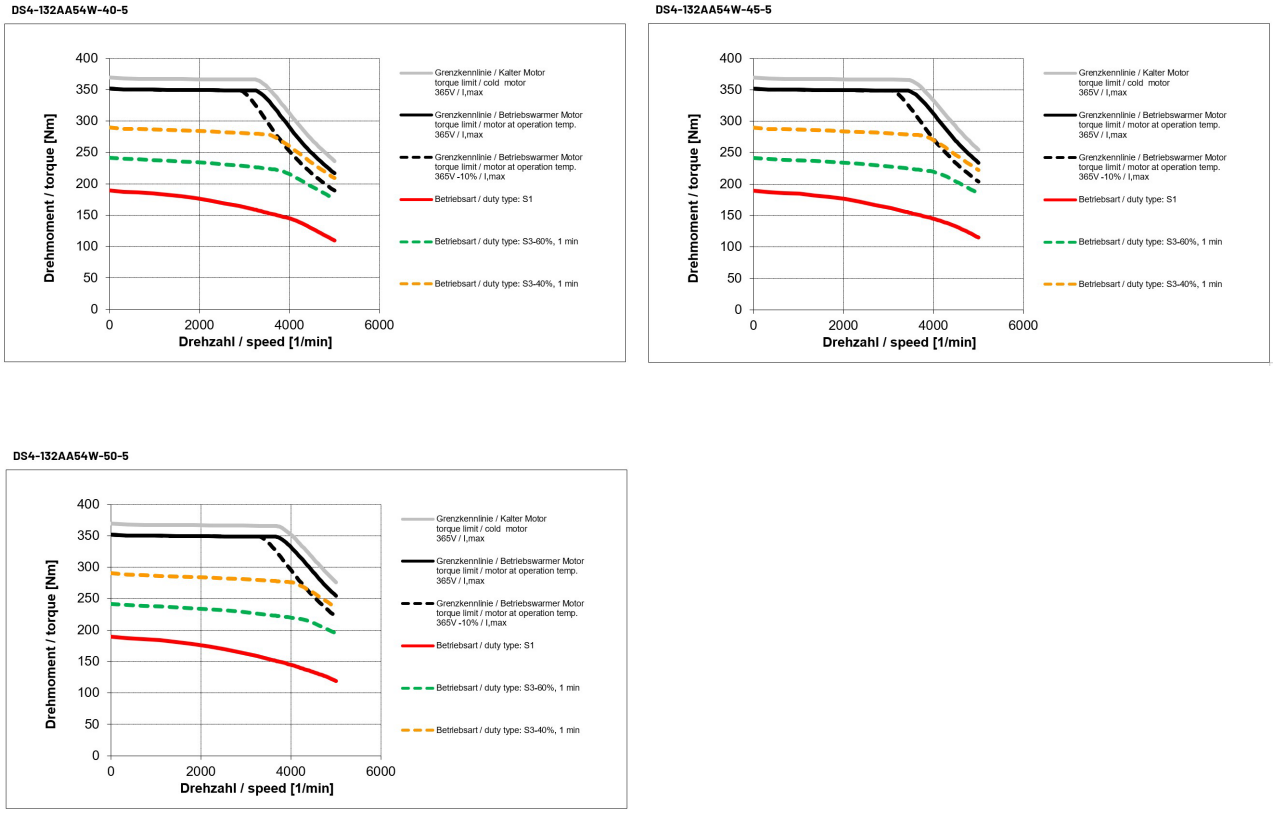



Figure 32: Motor characteristic curve DS4-132AA54W-40 ... DS4-132AA54W-50

## A.1 Characteristic curve DS4-132BB

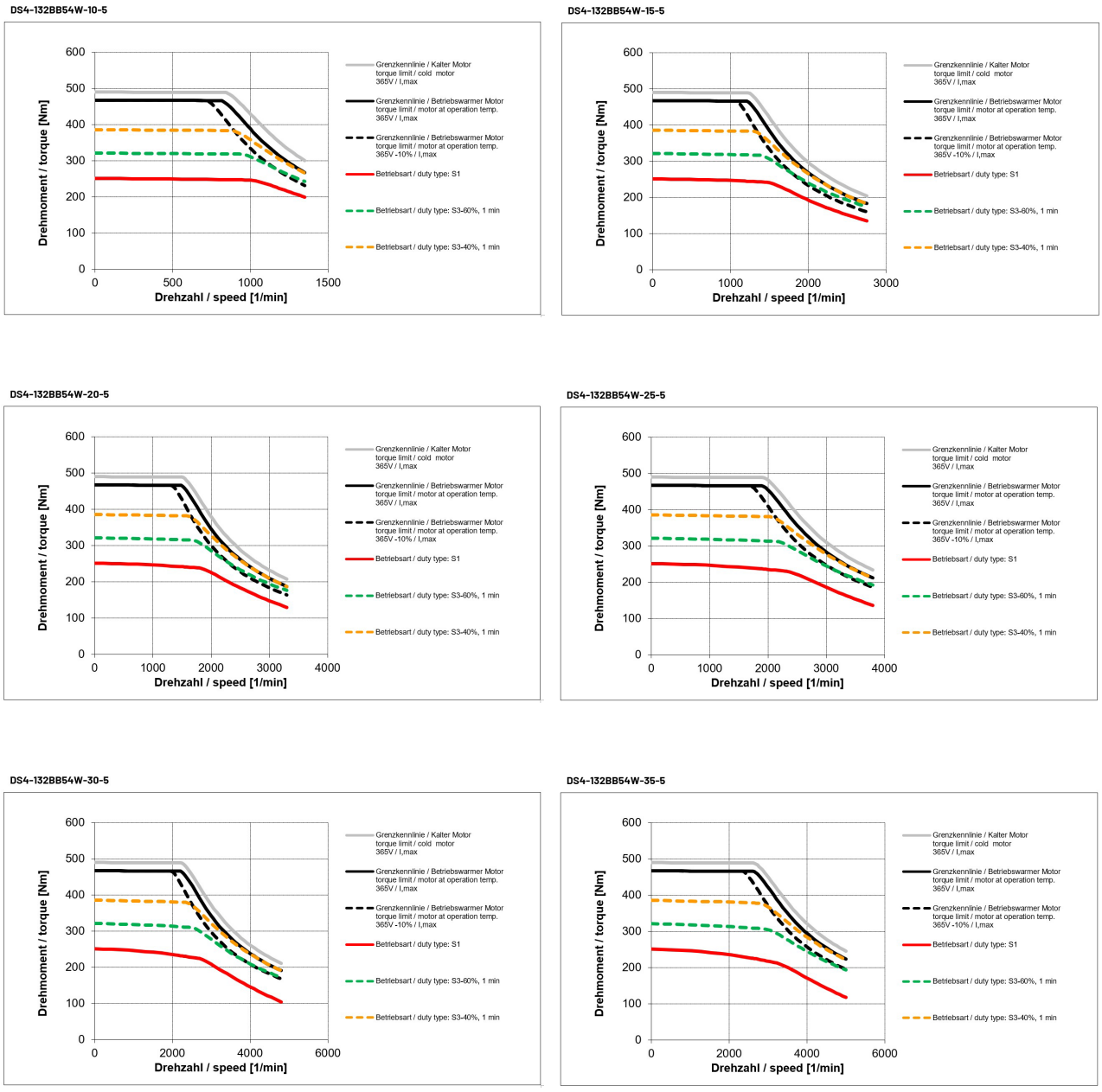



Figure 33: Motor characteristic curve DS4-132BB54W-10 ... DS4-132BB54W-35

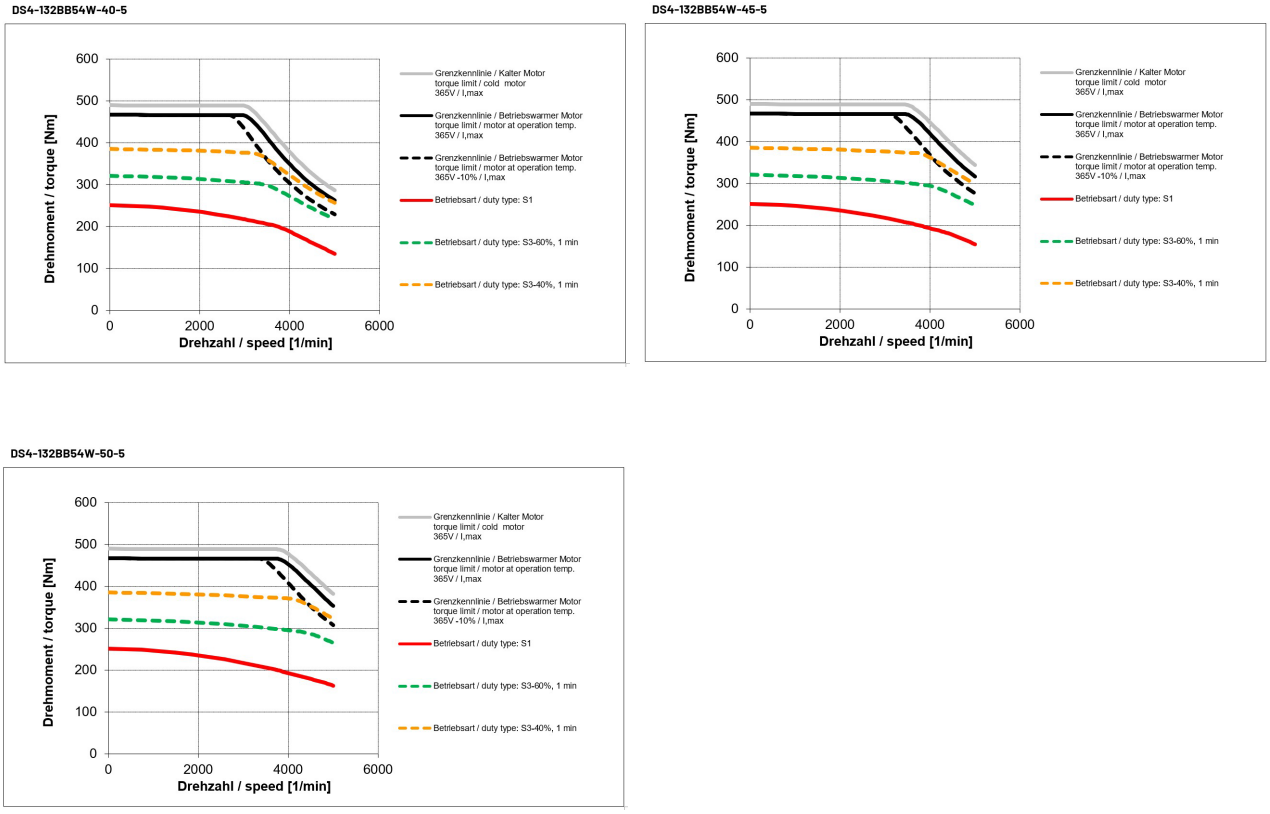



Figure 34: Motor characteristic curve DS4-132BB54W-40 ... DS4-132BB54W-50

## A.2 Characteristic curve DS4-132CC

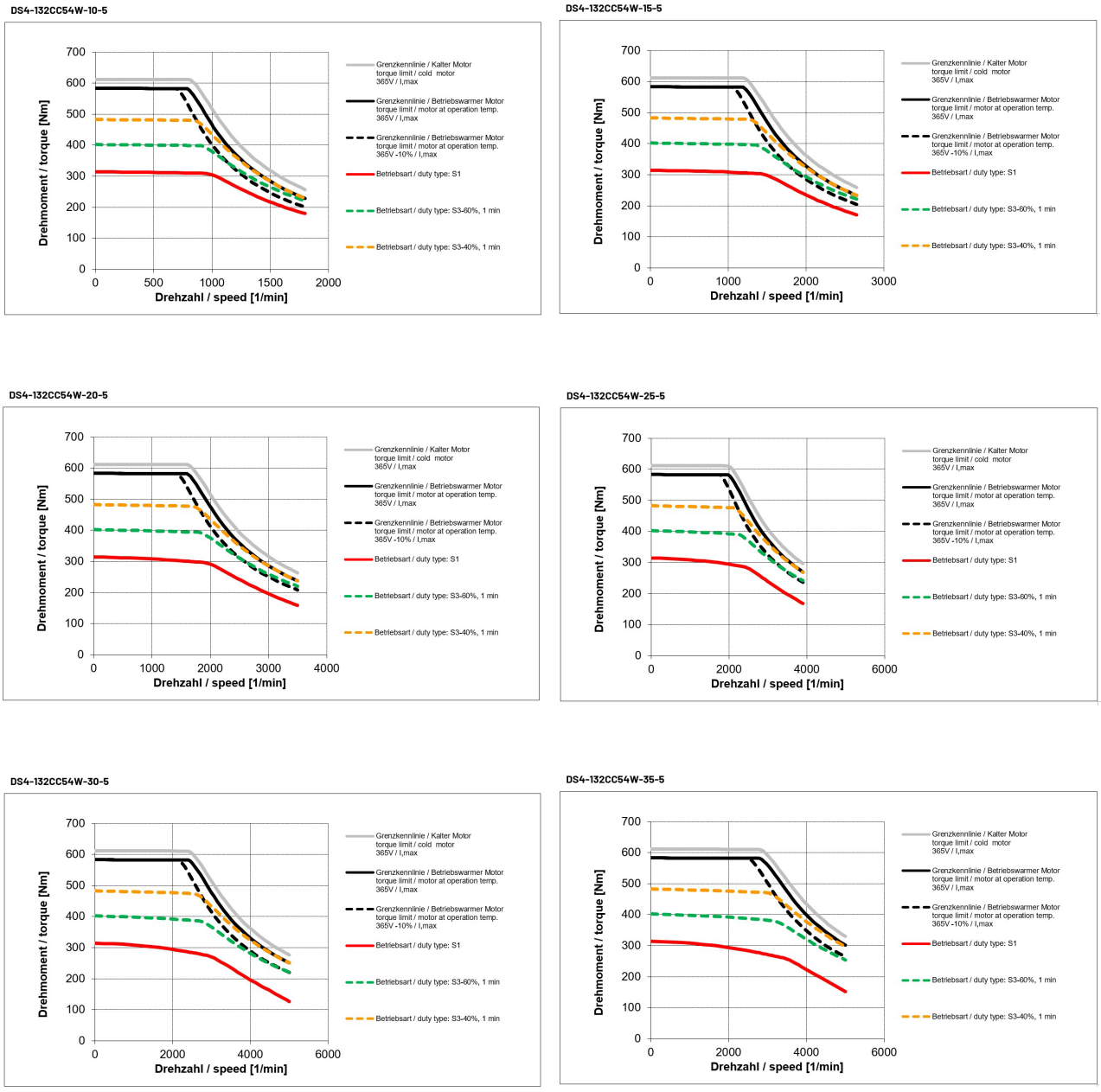



Figure 35: Motor characteristic curve DS4-132CC54W-10 ... DS4-132CC54W-35

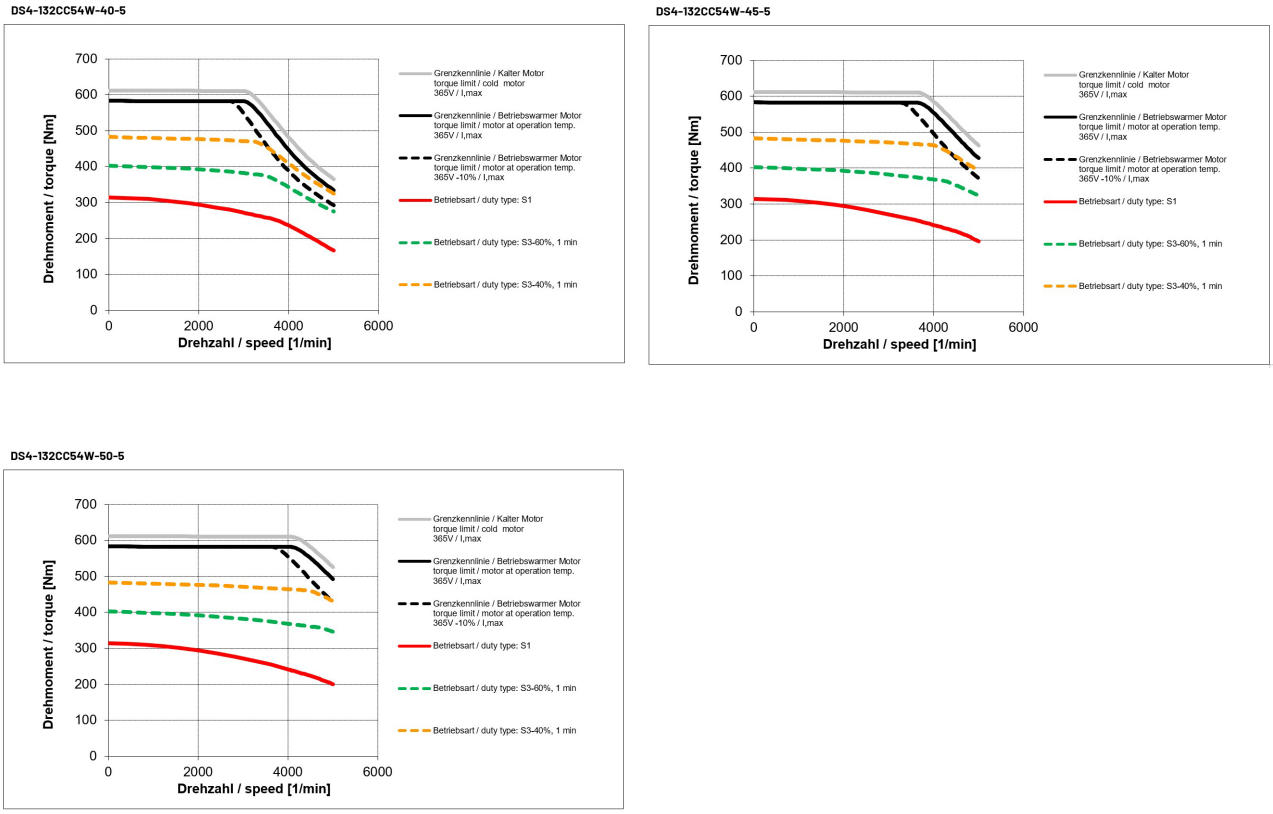



Figure 36: Motor characteristic curve DS4-132CC54W-40 ... DS4-132CC54W-50

## A.3 Characteristic curve DS4-132DD

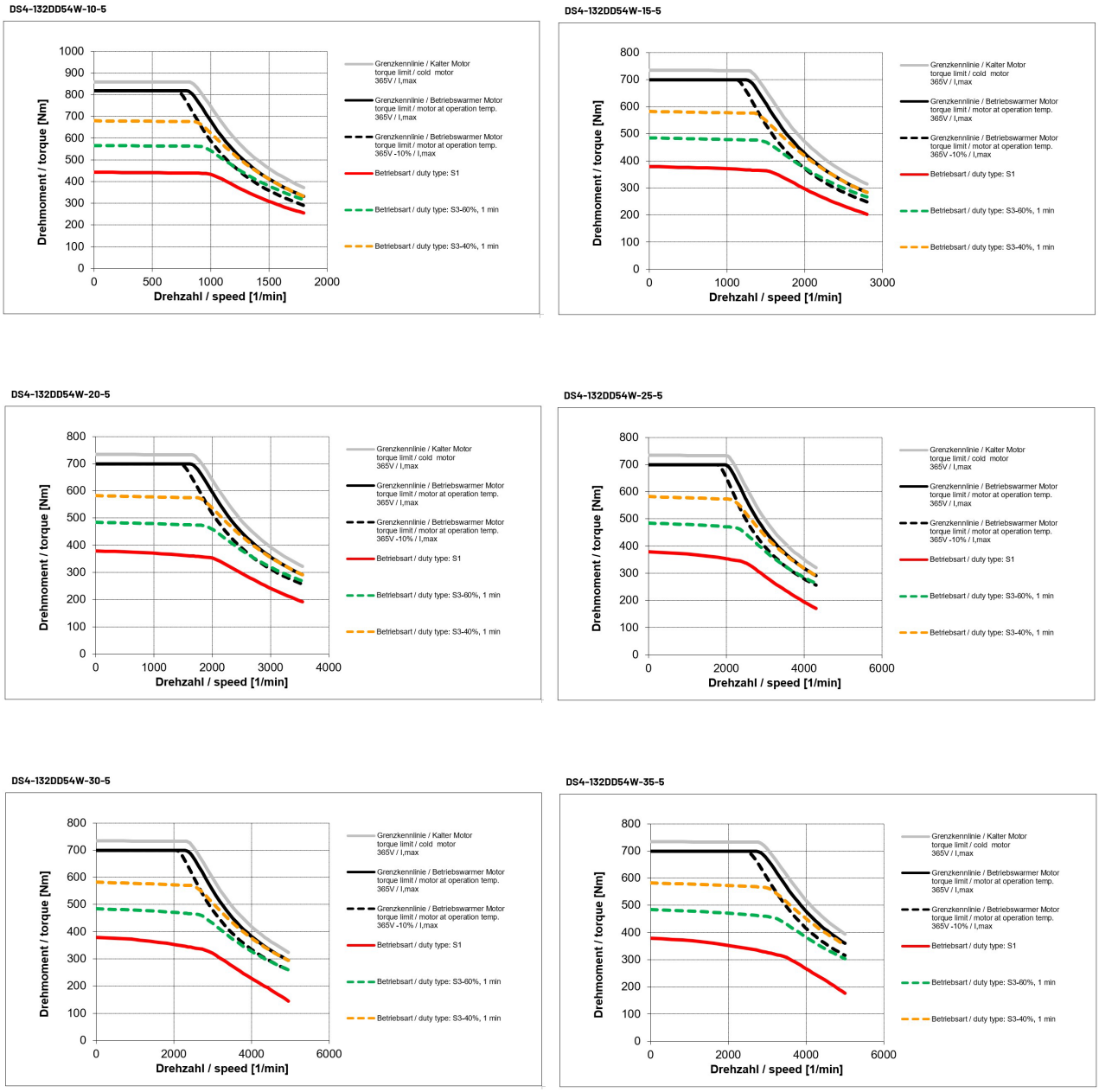



Figure 37: Motor characteristic curve DS4-132DD54W-10 ... DS4-132DD54W-35

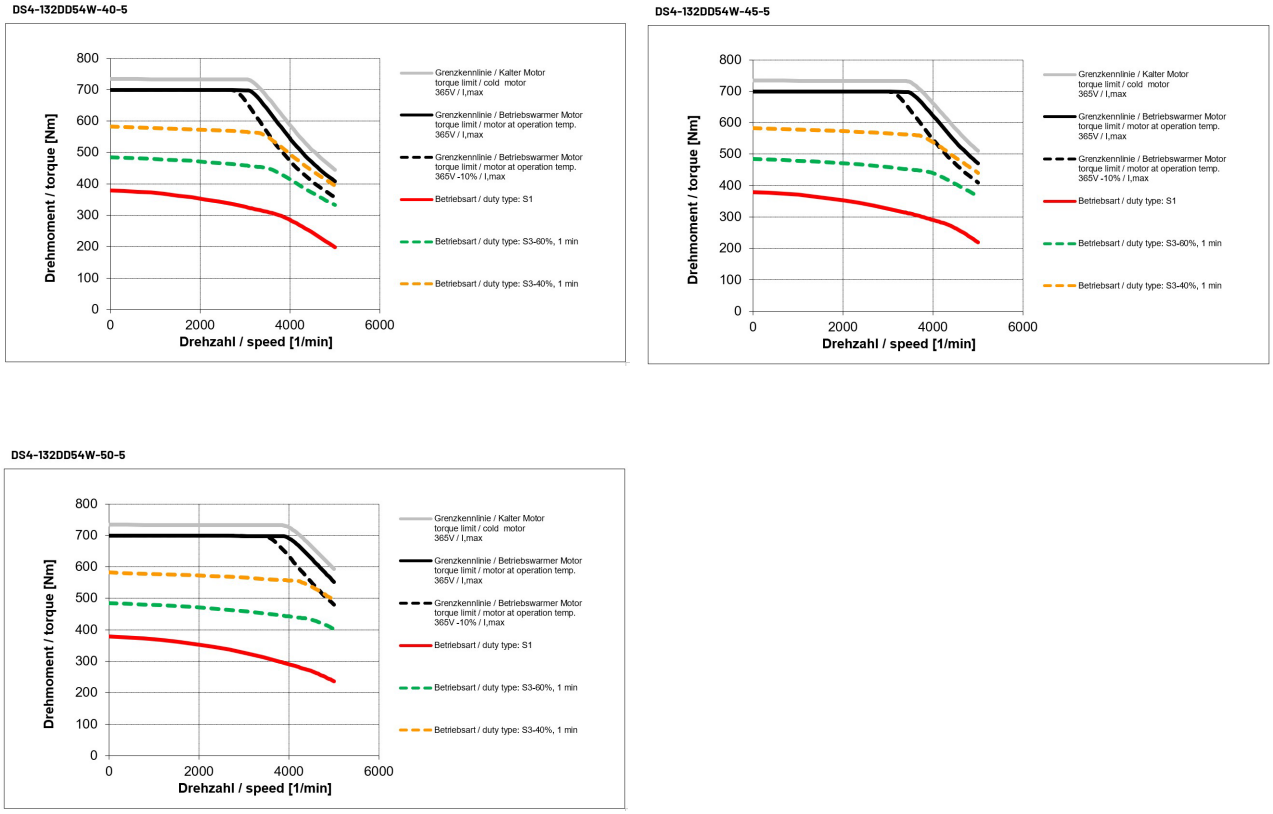



Figure 38: Motor characteristic curve DS4-132DD54W-40 ... DS4-132DD54W-50

## A.2 Characteristic curve DS4-132EE

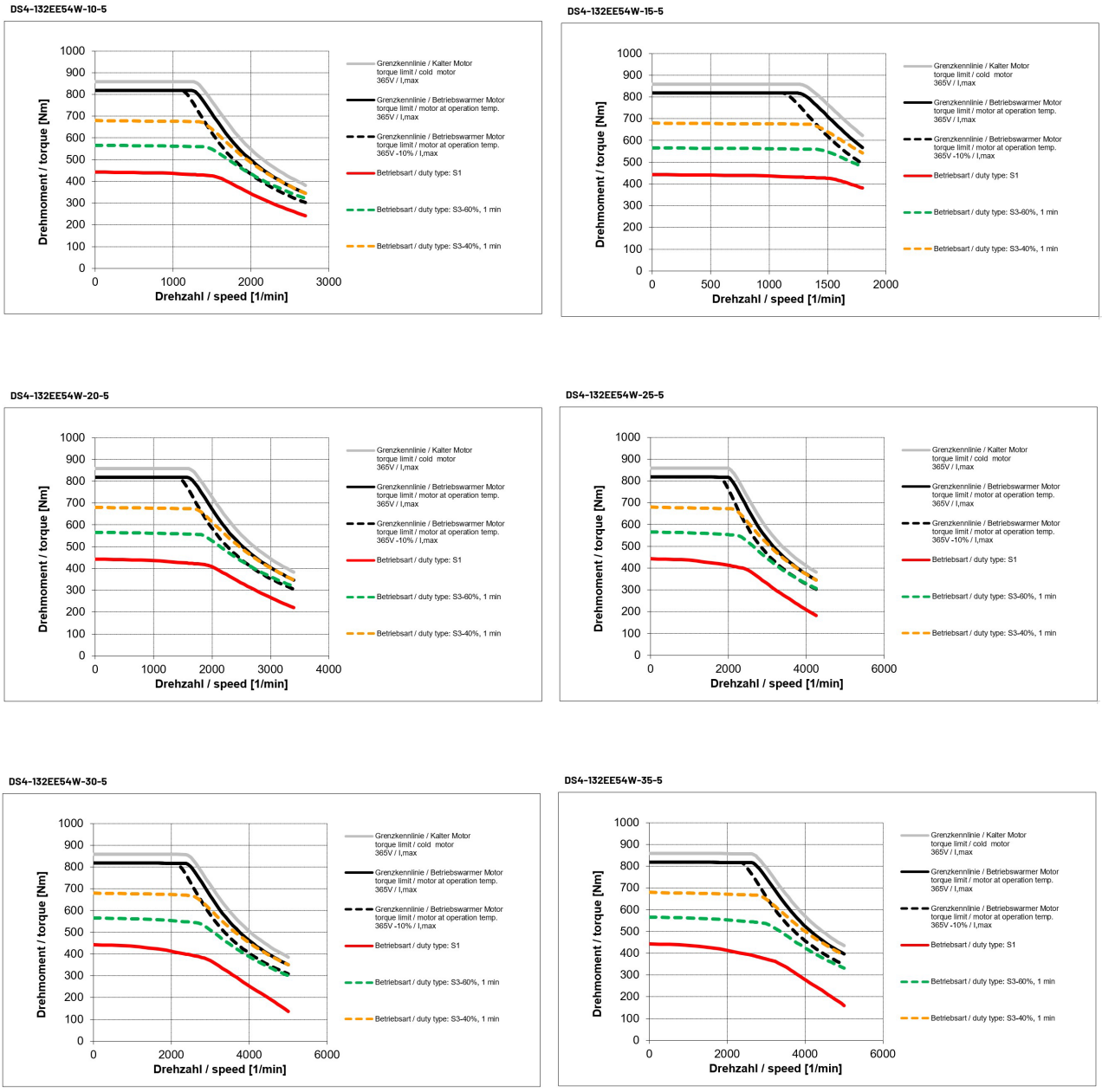



Figure 39: Motor characteristic curve DS4-132EE54W-10 ... DS4-132EE54W-35

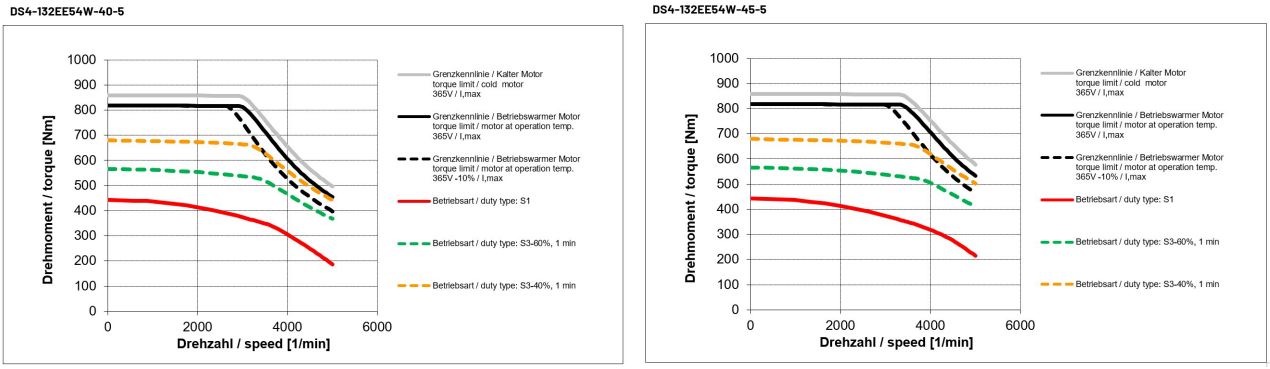



Figure 40: Motor characteristic curve DS4-132DD54W-40 ... DS4-132DD54W-45

## A.4 Characteristic curve DS4-132FF

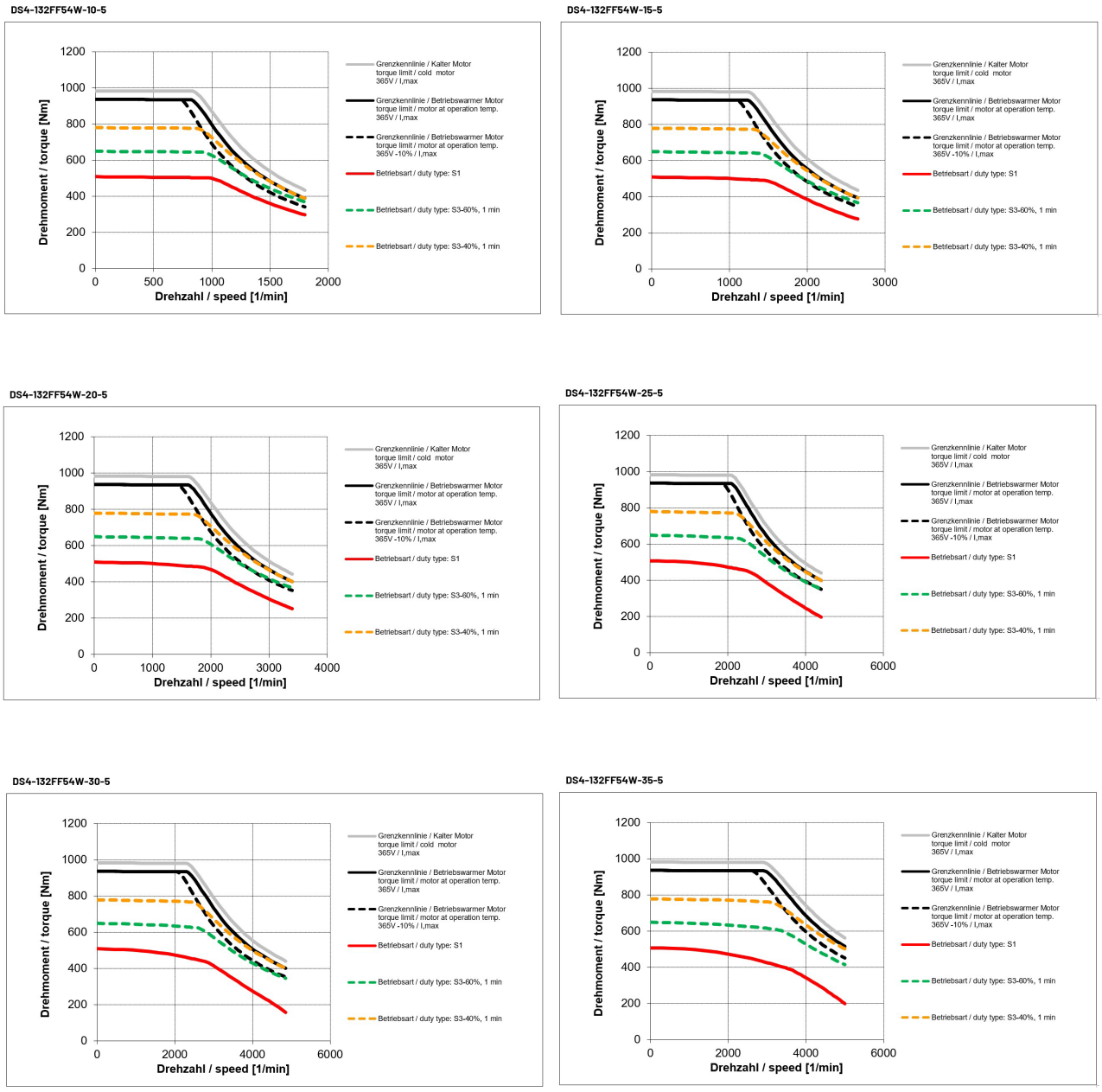



Figure 41: Motor characteristic curve DS4-132FF

B

# APPENDIX B - DECLARATION OF CONFORMITY

CE

BAUMULLER

Baumüller Nürnberg GmbH
Ostendstraße 80-90, 90482 Nürnberg, Phone: +49(0)911 5432-0, Fax: +49(0)911 5432-130, www.baumueller.com

## EU-Konformitätserklärung

gemäß

- **Richtlinie 2014/35/EU (Niederspannungsrichtlinie)**

  **Richtlinie 2014/30/EU (EMV-Richtlinie)**

**Hersteller**

Baumüller Nürnberg GmbH
Ostendstr. 80 - 90
90482 Nürnberg
Deutschland

**Hiermit erklären wir, dass die nachfolgend genannten Produkte aufgrund ihrer Konzeption, Konstruktion und Bauart in der von uns in Verkehr gebrachten Ausführung den Anforderungen der oben genannten Richtlinien einschließlich der zum Zeitpunkt der Erklärung geltenden Änderungen entsprechen.**

*Hinweise:*

*1. Bei Umbau oder Änderungen am Produkt verliert diese Erklärung mit sofortiger Wirkung ihre Gültigkeit.*

*2. Diese Erklärung bescheinigt die Übereinstimmung mit der genannten Richtlinie, stellt aber keine Zusicherung von darüber hinaus gehenden Produkteigenschaften dar.*

*3. Die alleinige Verantwortung für die Erstellung der Konformitätserklärung trägt der Hersteller.*

*4. Diese Motorbaureihe fällt nicht in den Geltungsbereich der Richtlinie 2009/125/EG*

**Angewandte harmonisierte Normen:**

- EN 60034-1:2011-02
  Drehende elektrische Maschinen – Teil 1:
  Bemessung und Betriebsverhalten
- EN 60034-5:2021-05 + AC:2024-06
  Drehende elektrische Maschinen – Teil 5:
  Schutzarten aufgrund der Gesamtkonstruktion von drehenden elektrischen Maschinen (IP-Code) – Einteilung
- EN 60034-6:1996
  Drehende elektrische Maschinen – Teil 6:
  Einteilung der Kühlverfahren (IC-Code)
- EN 60034-9:2021-04
  Drehende elektrische Maschinen – Teil 9:
  Geräuschgrenzwerte

(Wird fortgesetzt auf der nächsten Seite ...)



## EU Declaration of Conformity

according

- **Directive 2014/35/EU (Low Voltage Directive)**

  **Directive 2014/30/EU (EMC Directive)**

**Manufacturer**

Baumüller Nürnberg GmbH
Ostendstr. 80 - 90
90482 Nürnberg
Germany

**We declare, that the products referred to in the following conform in their concept, construction and design as lauched by us to the above mentioned directives and their respective changes which were valid at the point of declaration.**

*Notes:*

*1. By modifying or alternating the device(s) this declaration immediately becomes invalid.*

*2. This declaration confirms the compliance with the directive listed, but it is no covenant of any further product properties.*

*3. This declaration of conformity is issued under the sole responsibility of the manufacturer.*

*4. responsibility of the manufacturer This motor series isn't in scope of guideline 2009/125/EG*

**Applied harmonized standards:**

- EN 60034-1:2011-02
  Rotating electrical machines – Part 1:
  Rating and performance
- EN 60034-5:2021-05 + AC:2024-06
  Rotating electrical machines – Part 5:
  Degree of protection provided by the integral design of rotating electrical machines (IP-Code) – Classification
- EN 60034-6:1996
  Rotating electrical machines – Part 6:
  Methods of cooling (IC-Code)
- EN 60034-9:2021-04
  Rotating electrical machines – Part 9:
  Noise limits

(To be continued on the next page ...)

CE

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(... Fortsetzung von der vorherigen Seite)

- EN IEC 60034-14:2019-04
  Drehende elektrische Maschinen – Teil 14:
  Mechanische Schwingungen von bestimmten Maschinen mit einer Achshöhe von 56 mm und höher – Messung, Bewertung und Grenzwerte der Schwingstärke . Für Rollenlagermotore gelten:
  In Anlehnung an EN 60034-14 oder Angaben gemäß Kundenvereinbarung.
- EN 61800-5-1:2024-11
  Elektrische Leistungsantriebssysteme mit einstellbarer Drehzahl – Teil 5-1:
  Anforderungen an die Sicherheit – Elektrische, thermische und energetische Anforderungen
- EN 60204-1:2019-06
  Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen

**Markenname:** Baumüller
**Produktbezeichnung:** Drehstrommotor

(... continued from the previous page)

- EN IEC 60034-14:2019-04
  Rotating electrical machines – Part 14:
  Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity. The following applies to roller bearing motors :
  Based on EN 60034-14 or requirements according to customer agreement.
- EN 61800-5-1:2024-11
  Adjustable speed electrical power drive systems – Part 5-1:
  Safety requirements – Electrical, thermal and energy
- EN 60204-1:2019-06
  Safety of machinery - Electrical equipment of machines - Part 1: General requirements

**Brand name:** Baumüller
**Product name:** AC motor

| Produkt / Product | Jahr der erstmaligen CE-Kennzeichnung / Year of first CE marking |
|---|---|
| DS4-132XXXXX-XX-XX-XXXX-XXX-XXX-X-XXX | 2025 |

Nürnberg, 27-Oktober-2025

**Dr.-Ing. Michael Wengler**
Geschäftsführer
COO Technology/Production

**i.A. Michael Veeh**
Entwicklungsleiter Motoren
Manager R&D Motors

# Table of Figures

# Revision survey

| Version | Status | Changing |
|---|---|---|
| 5.25016.01 | 13-Apr-2026 | First release |
| 5.25016.01a | 18-May-2026 | Type code changes |
| 5.25016.02 | 23-Jun-2026 | Instruction handbook and Technical documentation from shared files |
| | | |
| | | |

# Warranty and liability

All data/information in this documentation are non-binding customer information, subject to constant further development and are constantly updated by our permanent modification service. Warranty and liability claims against the company Baumüller Nürnberg GmbH are excluded if in particular one or more of the following causes have caused the damage:

- You disregarded instructions in this documentation.
- The system wasn't used for the intended use.
- The system
  - was incorrectly mounted, connected, put into operation, operated as well as not maintained,
  - was mounted, connected, put into operation, and operated and / or maintained by unqualified personnel,
  - is overloaded,
  - is operated with
    - defective safety equipment,
    - not properly fixed or without safety equipment,
    - not functioning safety and protective equipment,
  - is not operated within the specified environmental conditions.

- You modified the system without having a written approval of the company Baumüller Nuremberg.
- You disregarded the instructions referring to the maintenance in the component descriptions.
- You monitored the parts, which are subject to wear, inadequately.
- You performed a repair incorrectly.
- You combined the system incorrectly with products of other manufacturers.
- You combined the drive system with faulty and / or incorrect documented products of other manufacturers.

The latest version of the "Terms and Conditions of Sale and Delivery" of the company Baumüller Nürnberg GmbH applies.

These were provided at the latest upon conclusion of contract.

# HOUSE OF AUTOMATION


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