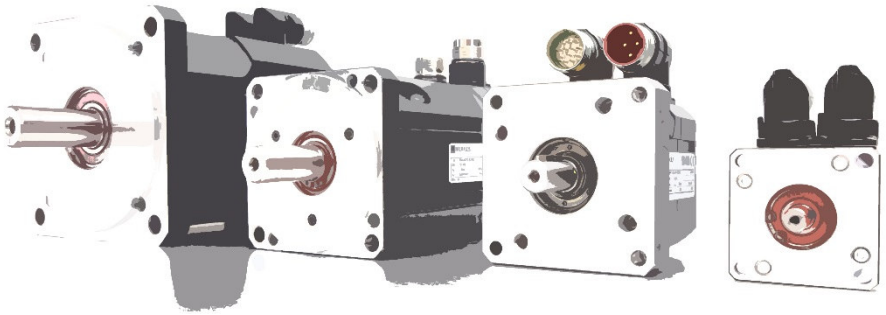
MERKES
SMALL MOTORS

# Synchronous Servomotors

## Series MN



## Our range of synchronous servomotors

| Motor type | Flange | Continuous stall torque ( Mo [Nm] ) | | | |
|---|---|---|---|---|---|
| **MN2-0028-0054-0075-0095** | 55 mm | 0,28 | 0,54 | 0,75 | 0,95 |
| **MN3-0115-0205-0350-0480** | 86 mm | 1,15 | 2,05 | 3,5 | 4,8 |
| **MN4-0510-0750-0960-1130** | 98mm | 5,1 | 7,5 | 9,6 | 11,3 |
| **MN5-1200-1600-2000-2400** | 142 mm | 12,0 | 16,0 | 20,0 | 24,0 |
| **MN6-1800-2400-3000-3800** | 190 mm | 18,0 | 24,0 | 30,0 | 38,0 |
| **MN7-3000-4000-5000-6000** | 190 mm | 30,0 | 40,0 | 50,0 | 60,0 |

## Legend of the present manual

| Version | Reason |
|---|---|
| I/16 | 4.6. Type codes for servomotors MN – repeal of option thermo protection KTY |
| I/18 | 4.3.4. Thermal protection – Note relating flange temperature at rated data |
| I/21 | 10. Series MN5 / 12. Series MN7 – Correction motor length |
| I/22 | 14.2. Maintenance run-in of the brakes – new title |

**Improvement of motors subject to technical alterations.**

# 1. Table of Contents



## 2. Safety Advices

- All operations on transport, assembly, start-up and maintenance have to be done by skilled and qualified personnel only. The qualified personnel must know and observe the following standards and guidelines:
  **DIN VDE 0105, IEC 364 accident prevention regulations**
  Deviant behaviour may cause serious injury to persons and may lead to damages.

- Before mounting and start-up carefully read the documents on hand. Follow the instructions for power supply (motor label and manual) and go by the rules of the technical data.

- Ensure a proper, low-impedance grounding of the motor housing with the PE-reference potential inside the switch cabinet, as otherwise personal safety is not assured.

- Take suitable steps, that unexpected false move will not lead to injury or damage.

- Power connection can also lead current, when motor is not rotating. Do not remove or pull off plugs during operation or power supply. This can lead to electric arcs which may hurt people or damage contacts.

- Surface temperatures of more than 100°C can arise on the motors. Take care do not stick or fasten any temperature sensitive parts to it. Possibly make provisions for precautions against touch.

### Symbols used in this manual

| | |
|---|---|
|  **General warning** |  **Danger by electricity** |
| **Significance:** actual bodily harm and damage may occur if the respektive precautions will not be taken. | **Significance:** death, grievous bodily harm or considerable damage may occur, if the respective precautions will not be taken. |

# 3. Important Notes

- Synchronous servomotors are precision motors. They are not intended to be connected directly to a rotary current power supply system. They have to be operated only by a particular electronic power stage. A direct connection to main supply will lead to the destruction of the motor.

- To fit zero backlash drive elements strictly use the intended thread at the motor shaft and if possible warm up the drive elements. Only use suitable tools to fit the drive elements.

- Avoid strong punches to the motor flange and the motor shaft.

- Take care that the coupling is correctly aligned. Follow the advices of the coupling manufacturer. An eccentric weight produces intolerable vibrations and leads to the destruction of ball bearings and coupling.

- Take care that the coupling is correctly aligned. Follow the advices of the coupling manufacturer. A mismatch produces intolerable vibrations and leads to the destruction of ball bearings and coupling.

- Tuning in the correct number of motor- and resolver poles in the inverter is absolutely necessary. A wrong setting can lead to the destruction of the motor and to overheating.

| Motor Series | Number of motor poles | Number of resolver poles |
|---|---|---|
| **MN2** | 6 | 2 |
| **MN3-MN7** | 10 | 2 |

- All torque data of the motors are measured with heat sink. Calculation of the 3,5 mm thick heat sink is based on the following formula:

**Heat sink length in mm = 2,5 x size of flange in mm**

- Example: heat sink for MN2-motor = 2,5 x 55mm = 137,5mm. Result for the MN2-motor series is a heat sink of 137,5mm x 137,5mm x 3,5mm.

# 4. In General

## 4.1. About this manual

This manual describes the synchronous servomotors of the MN range and it is directed towards specialized staff having knowledge of electrical and mechanical engineering.

The servomotors are operated together with the corresponding servo drives. Therefore absolutely follow the documentation of the servo drive too.

If not stated in other unit all dimension to be understood in millimetre (mm).

## 4.2. Provisionary use

Synchronous-servomotors are specially designed to run machines with high requirements to dynamics.

It is only allowed to operate the motors taking into consideration the environmental conditions described in this documentation.

The servomotors of the MN range are **exclusively** designed to be operated speed and / or torque controlled by suitable inverters.

The motors are used as components built into machines and may only be put into operation as integrated part of the system.

If existing, a thermo-protective element fitted inside the motor winding has to be analysed and monitored.

## 4.3. Motor Construction

The synchronous servomotors of the MH range are brushless ***permanent magnet*** synchronous motors with sinusoidal back EMF.
In connection with the corresponding inverters they are particularly suitable for high–quality servo applications for example positioning demanding high standards of dynamics and stableness.

The servomotors have Neodymium – permanent magnets at the rotor. A three-phase winding is put inside the stator, which in star connection is wired to an internal neutral point and which is being supplied by the inverter. The motor has no brushes, the sinusoidal commutation is electronically done by the corresponding inverter.

The motors have a 2-pole resolver as a standard feedback.

In case of **other feedback system** than resolver the length of the motor stated in this manual can change.

The motors are available without or with brake installed. Refitting of brakes is not possible.

### 4.3.1. Shaft A-side

The power transmission is effected by the cylindrical shaft-A end. Please take into consideration that high radial forces will occur when motors are driven via pinions or toothed belts. The values permitted at the shaft end depend on the speed.

The peak value at 3000 rpm is shown in the table on page 8. In case of acting force at the middle of the free shaft end, FR can be 10% higher.

Double conical gripping collets, probably combined with metal bellows couplings proved to be ideal coupling elements.

## Maximum rated bearing load at shaft A-side (Basis $N_n$ 3.000 rpm)

| Motortyp | FRmax [N] | FAmax [N] |
|---|---|---|
| | | |
| **- without holding brake -** | | |
| **MN2-0028** | 216 | 41 |
| **MN2-0054** | 234 | 45 |
| **MN2-0075** | 246 | 47 |
| **MN2-0095** | 254 | 48 |
| **MN3-0115** | 283 | 54 |
| **MN3-0205** | 327 | 62 |
| **MN3-0350** | 356 | 68 |
| **MN3-0480** | 392 | 75 |
| **MN4-0510** | 595 | 113 |
| **MN4-0750** | 653 | 124 |
| **MN4-0960** | 689 | 131 |
| **MN4-1130** | 713 | 135 |
| **MN5-1200** | 665 | 126 |
| **MN5-1600** | 713 | 136 |
| **MN5-2000** | 746 | 142 |
| **MN5-2400** | 770 | 146 |
| **MN6-1800** | 637 | 121 |
| **MN6-2400** | 684 | 130 |
| **MN6-3000** | 717 | 136 |
| **MN6-3800** | 741 | 141 |
| **MN7-3000** | 1214 | 231 |
| **MN7-4000** | 1291 | 245 |
| **MN7-5000** | 1346 | 256 |
| **MN7-6000** | 1388 | 264 |
| | | |
| **- with holding brake -** | | |
| **MN2-0028** | 247 | 47 |
| **MN2-0054** | 254 | 48 |
| **MN2-0075** | 260 | 49 |
| **MN2-0095** | 264 | 50 |
| **MN3-0115** | 299 | 57 |
| **MN3-0205** | 335 | 64 |
| **MN3-0350** | 360 | 68 |
| **MN3-0480** | 393 | 75 |
| **MN4-0510** | 611 | 116 |
| **MN4-0750** | 660 | 125 |
| **MN4-0960** | 691 | 131 |
| **MN4-1130** | 713 | 135 |
| **MN5-1200** | 681 | 129 |
| **MN5-1600** | 724 | 138 |
| **MN5-2000** | 754 | 143 |
| **MN5-2400** | 775 | 147 |
| **MN6-1800** | 699 | 133 |
| **MN6-2400** | 718 | 136 |
| **MN6-3000** | 733 | 139 |
| **MN6-3800** | 745 | 142 |
| **MN7-3000** | 1342 | 255 |
| **MN7-4000** | 1384 | 263 |
| **MN7-5000** | 1417 | 269 |
| **MN7-6000** | 1443 | 274 |
| | | |

#### 4.3.2. Flange

Flange sizes according to IEC-standards, fit j6, accuracy as per DIN 42955
Tolerance grade: **R**

#### 4.3.3. Degree of protection (without oil seal)

Standard protection is:

| | |
|---|---|
| **MN2 - MN7** | IP65 |

#### 4.3.4. Thermal protection

The motors of series MN are fitted with a PTC. The thermal protection must be integrated in the control system of the inverter. Operation with rated data and a flange temperature higher than 65°C is only allowed in exception. For that contact the manufacturer.

#### 4.3.5. Connections

| Motor series | Signal | Power | Standard |
|---|---|---|---|
| **MN2 – MN7** | Connector | Connector | straight, 1" |

#### 4.3.6. Holding Brake

The motors have the option of an installed brake. The permanent-magnet brake is operated by 24 VDC and blocks the rotor when being without voltage.

**The brake is to be understood as a holding brake** and it is not to be used for permanent slowdowns during production.
When the brake is detached the rotor can operate without residual torque, the functioning is free from backlash.
The brakes can be operated directly by the inverter (no personnel safety!).
In this case the reset of the brake winding is effected without additional external wiring.

If the brake is not directly operated by the inverter an additional wiring (for example varistor) has to be carried out.
A personnel-safe application of the brake needs an additional contact within the brake circuit and then also a release device for the brake (for example varistor).

### 4.4. Selection criterion

- Stall torque $M_0$ [Nm]
- Rated speed at rated supply voltage $n_n$ [$min^{-1}$]
- Inertia of motor and load J [$kgcm^2$]
- Effective moment (calculated) $M_{rms}$ [Nm]

When calculating the required motors and power stages the static load **and** the dynamic load
( accelaration / deceleration ) have to be taken into consideration.

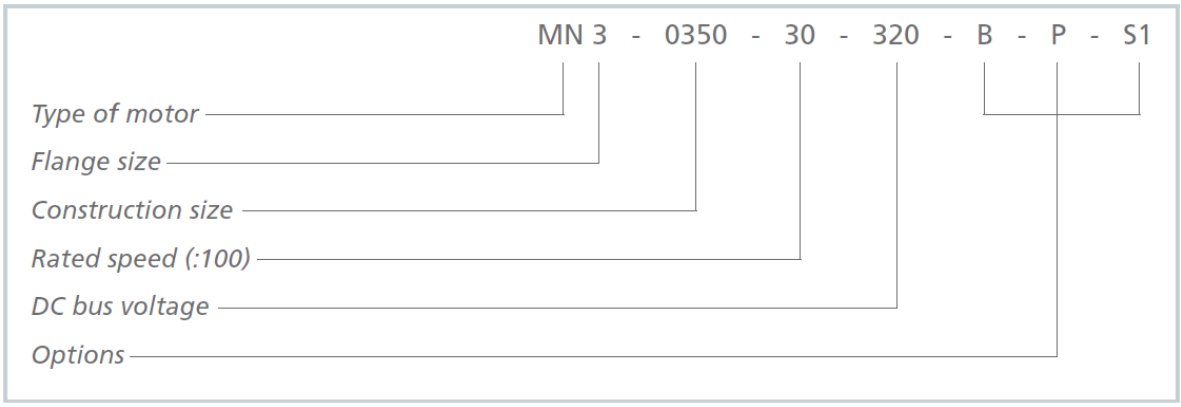
### 4.5. Supply Voltage $U_{dc}$

This voltage defines the DC intermediate circuit voltage. The following standard windings are available:

| | |
|---|---|
| **MN2 – MN7** | 320 VDC / 560 VDC |

Other windings are available on request.

## 4.6. Type codes for servomotors MN




**Options:**

| | | |
|---|---|---|
| B | = | holding brake 24 VDC |
| P | = | keyway according to DIN 6885 |
| W | = | oil seal at protection class IP65 |
| U | = | UL Certification (flange size 2-7) |
| S1 | = | angled connector, directed to A-side |
| S2 | = | angled connector, directed to B-side |
| S4 | = | angled connector, turnable |
| K | = | cable 1,0m with PG glands |
| X | = | special options to be specified in plaintext for example |

- special shaft
- special flange
- exact encoder description
- other thermo protection
- protection class IP67
- …

**Standard configuration:**

- 2-pole resolver feedback
- connectors, straight, 1"
- flange design B5
- thermo protection PTC
- protection class IP65
- plain shaft
- RAL 9005

## 4.7. Further options and equipment

Further options and equipment are available on request. Maybe options and non-standard equipment can have an effect on the dimensions of the motors. We therefore recommend to consult about it with us before ordering.

# 5. Installation / Start-up

## 5.1. Important notes

- Check the assignment between inverter and motor. Compare rated voltage and rated current of the devices. The wiring has to be carried out in accordance to the circuit diagram shown in the installation/operation manual of the inverter.
- Pay attention to proper grounding of inverter and motor.
- Place power and signal cables separately from each other. When using motor power cables with integrated brake wires, the brake wires should be shielded. The shielding braid has to be applied both-sided.
- Lay all circuits with sufficient cross section. Shields to be applied in great circle (low-resistance) via metalized connector housings resp. EMV – approved cable glands.

- Check the compliance with the permitted radial and axial load $F_R$ and $F_A$. Using a toothed belt drive the minimum permitted diameter of the pinion for example results from the equation: $d_{min} \geq M_0/F_R \times 2$.
- Assure sufficient heat removal in the surroundings and at the flange of the motor to not exceed the maximum permitted flange temperature of $65^0$C in S1-operation. If necessary reduce the motor rating.

**Caution!**
**Never remove the electric connections of the motor during power supply.**
**Residual charges inside the capacitor of the inverter can still exist up to 5 minutes after the disconnection of the main supply.**
**Power and signal connections can lead voltage even if the motor stands idle.**

## 5.2. In general

Before start-up respectively before mounting check the motors regarding damage in transit. Damages of any part of the motor as well as corrosion at the shaft or flange have to be reported immediately to us.
The rotor should be easily rotating by hand. Existing brakes to be electrically let off in advance.

## 5.3. Environmental conditions

With regard to the installation site of the motor please take into consideration the environmental conditions like ambient temperature: -20°C - +40°C, maximum mounting height: 1000m above sea level, relative humidity: 15% - 85% non-condensing.

A power reduction might possibly be necessary in case of tolerances to the a.m. environmental conditions.
The motors are not suitable for outdoor installation or installation within aggressive or foreign substance afflicted atmosphere.

## 5.4. Drive elements

The rotor of the motor has been electronically counterbalanced with half keyway during production. Before fitting your drive elements onto the shaft end, please remove the corrosion prevention (if existing).
Strictly use suitable tools for fitting or removing the drive elements and follow the advices of the drive element manufacturer to avoid damages.

***Our recommendation:*** *Use double conical tensioning devices.*

**Absolutely avoid strong pushes to the motor flange and the motor shaft during fitting or removing. This might lead to damages of the ball bearing or shaft**

## 5.5. Power connection

The power connections have to be carried out by skilled electricians only. Before starting work make sure that the systems actually is and remains without current during the installation time.

**Follow the safety rules according to DIN VDE 0105.**

The cross-sectional area of the cable has to be layed out in accordance to the rated power of the motor. The environmental conditions, the way of laying and the local legal requirements have to be taken into consideration.

**Strictly follow the advices of the inverter manufacturer to fulfil EMV-wiring conditions.**

When using shielded cables take care of a great circle metallic shield connection on both sides of the cable.

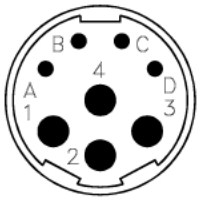
 

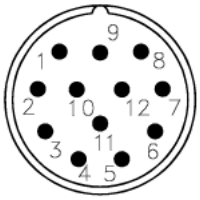
# 6. Terminal Assignment

## 6.1. Motor MN – with resolver

**Resolver connector** = Intercontec Series 623, 1", 12 poles
**Power connector** = Intercontec Series 923, 1", 4 + 4 poles

| Power Connector | | | | Resolver Connector | | | |
|---|---|---|---|---|---|---|---|
| | Pin | | Description | | Pin | | Description |
| | 1 | = | Phase U | | 3 | = | Cos + (S4) |
| | 4 | = | Phase V | | 7 | = | Cos - (S2) |
| | 3 | = | Phase W | | 4 | = | Sin + (S1) |
| | 2 | = | Earth / SL | | 8 | = | Sin - (S3) |
| | C | = | Brake + | | 5 | = | Ref + (R2) |
| | D | = | Brake - | | 9 | = | Ref - (R1) |
| | A | = | nc / Reserve | | 2 | = | Therm / PTC + |
| | B | = | nc / Reserve | | 6 | = | Therm / PTC - |



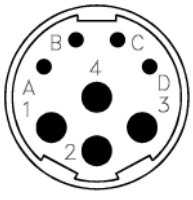



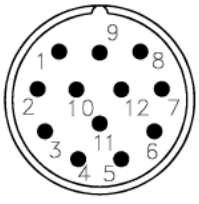

## 6.2. Motor MN - with SinCos Encoder with Hiperface Interface

**Encoder connector** = Intercontec Series 623, 1", 12 poles
**Power connector** = Intercontec Series 923, 1", 4 + 4 poles

| Power Connector | | | | Encoder Connector | | | |
|---|---|---|---|---|---|---|---|
| Wire | Pin | | Description | | Pin | | Description |
| 1 | 1 | = | Phase U | | 1 | = | Us |
| 2 | 4 | = | Phase V | | 2 | = | Earth |
| 3 | 3 | = | Phase W | | 3 | = | Ref Sin |
| gn/ye | 2 | = | Earth / SL | | 4 | = | Ref Cos |
| 5 | C | = | Brake + | | 5 | = | Data + |
| 6 | D | = | Brake - | | 6 | = | Data - |
| 7 | A | = | nc / Reserve | | 7 | = | Sin + |
| 8 | B | = | nc / Reserve | | 8 | = | Cos + |
| | | | | | 9 | = | Therm + |
| | | | | | 10 | = | Therm – |

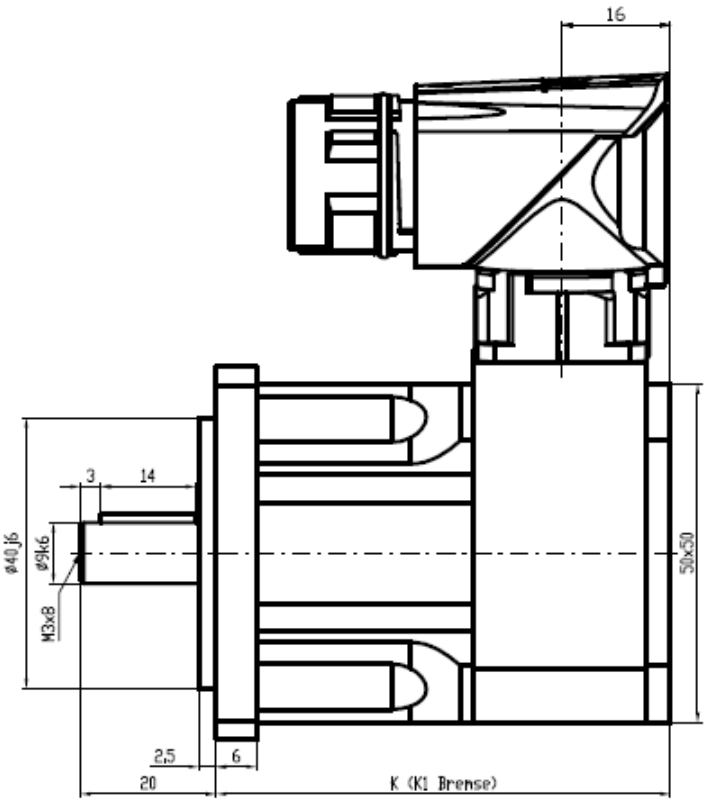
.

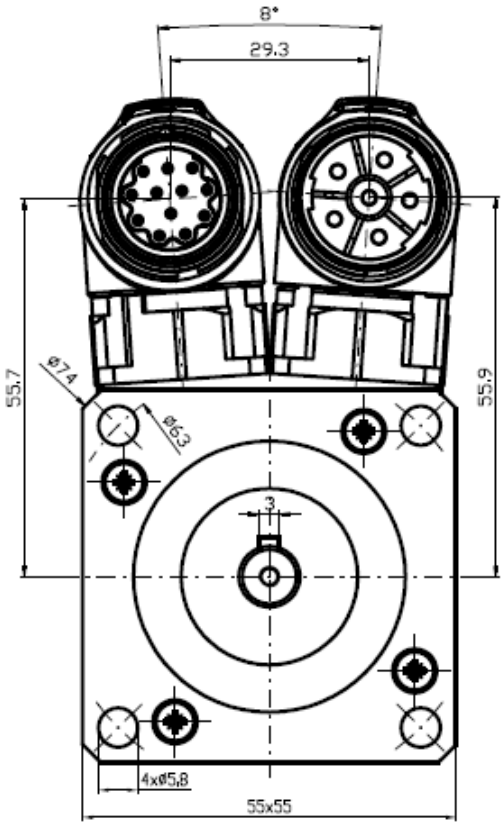


# 7. Series MN2

## [ Udc 320 V / 560 V ]




| Dimension (mm) | K | K1 (Brake) |
|---|---|---|
| **MN2-0028** | 67 | 105 |
| **MN2-0054** | 82 | 120 |
| **MN2-0075** | 97 | 135 |
| **MN2-0095** | 112 | 150 |

**Standard configuration**

- 2-pole resolver feedback
- connectors, straight, 1"
- flange design B5
- thermo protection PTC
- protection class IP65
- plain shaft
- RAL 9005

### Options contained in above drawing

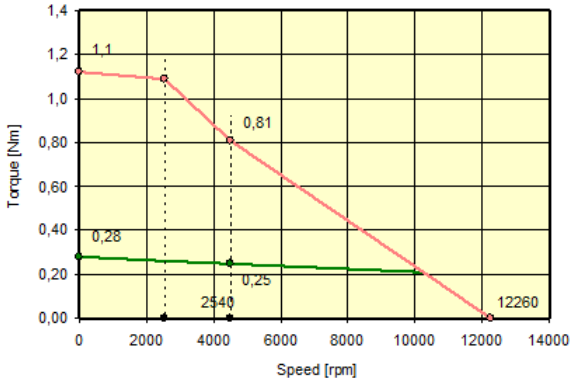
- Angled connector, turnable (option code „S4“)
- Keyway (option code “P”)

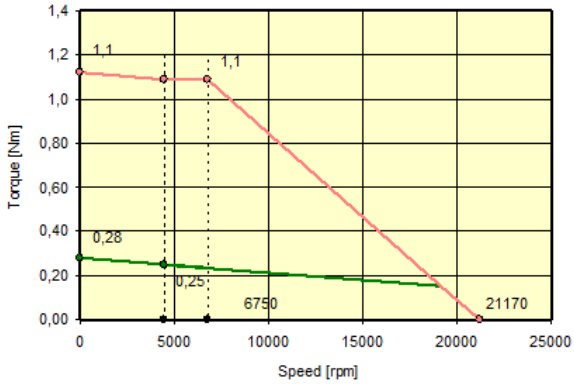
| Winding Datas | | | MN2-0028 | | MN2-0054 | | MN2-0075 | | MN2-0095 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 320 V. | 560 V. | 320 V. | 560 V. | 320 V. | 560 V. | 320 V. | 560 V. |
| Rated Speed | $n_n$ | $min^{-1}$ | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 | 4500 |
| DC Bus Voltage | $U_{dc}$ | V | 320 | 560 | 320 | 560 | 320 | 560 | 320 | 560 |
| Nominal AC Voltage | $U_n$ | V | 230 | 400 | 230 | 400 | 230 | 400 | 230 | 400 |
| | | | | | | | | | | |
| Rated Torque | $M_n$ | Nm | 0,25 | 0,25 | 0,48 | 0,48 | 0,68 | 0,68 | 0,85 | 0,85 |
| Rated AC Current | $I_n$ | A | 0,96 | 0,96 | 1,12 | 0,90 | 1,48 | 0,83 | 1,70 | 1,07 |
| Stall Torque | $M_o$ | Nm | 0,28 | 0,28 | 0,54 | 0,54 | 0,75 | 0,75 | 0,95 | 0,95 |
| Stall AC Current | $I_o$ | A | 0,97 | 0,97 | 1,17 | 0,93 | 1,54 | 0,86 | 1,82 | 1,15 |
| Peak Torque | $M_{max}$ | Nm | 1,1 | 1,1 | 2,2 | 2,2 | 3,0 | 3,0 | 3,8 | 3,8 |
| Peak Current | $I_{max}$ | A | 4,4 | 4,4 | 5,4 | 4,3 | 7,1 | 3,9 | 8,4 | 5,3 |
| Max. Speed | $n_{max}$ | $min^{-1}$ | 12000 | 12000 | 12000 | 12000 | 12000 | 12000 | 12000 | 12000 |
| EMF Constant | $K_E$ | V/1000 | 17,5 | 17,5 | 28,0 | 35,0 | 29,5 | 53,0 | 31,5 | 50,0 |
| Torque Constant | $K_T$ | Nm/A | 0,29 | 0,29 | 0,46 | 0,58 | 0,49 | 0,88 | 0,52 | 0,83 |
| Therminal Resistance Ph-Ph | $R_{2ph}$ | Ω | 28,3 | 28,3 | 25,9 | 41,1 | 17,0 | 54 | 13,1 | 33,6 |
| Therminal Inductance Ph-Ph | $L_{2ph}$ | mH | 28,4 | 28,4 | 32,3 | 51 | 22,7 | 72 | 19,0 | 48,5 |
| Number of poles motor | 2p | | 6 | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| Number of poles resolv. | Pres | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Rated Power | $P_n$ | W | 118 | 118 | 226 | 226 | 320 | 320 | 400 | 400 |
| Torque at $I_{max}/U_n$ | $M_z$ | Nm | 1,1 | 1,1 | 2,1 | 2,1 | 3,0 | 3,0 | 3,8 | 3,8 |
| Speed at $I_{max}/U_n$ | $n_z$ | $min^{-1}$ | 2540 | 6750 | 1520 | 3530 | 2050 | 1860 | 2230 | 2590 |
| Max. Torque at $n_n$ | $M_x$ | Nm | 0,81 | 1,1 | 1,1 | 1,8 | 1,6 | 1,5 | 2,0 | 2,4 |
| | | | | | | | | | | |
| El. Time Constant | $T_{el}$ | ms | 1,0 | 1,0 | 1,2 | 1,2 | 1,3 | 1,3 | 1,5 | 1,4 |
| Mech. Time Constant | $T_{mech}$ | ms | 2,9 | 2,9 | 1,5 | 1,5 | 1,1 | 1,1 | 0,92 | 0,93 |
| Therm. Time Constand | $T_{th}$ | min | 10,0 | 10,0 | 12,0 | 12,0 | 12,0 | 12,0 | 18,0 | 18,0 |
| Rotor Inertia | J | $kgcm^2$ | 0,05 | 0,05 | 0,07 | 0,07 | 0,09 | 0,09 | 0,11 | 0,11 |
| Winding no. | | | 757 | 887 | 815 | 776 | 792 | 811 | 745 | 787 |
| Weight without brake | | Kg | 0,74 | 0,74 | 0,93 | 0,93 | 1,12 | 1,12 | 1,31 | 1,31 |
| Weight with brake | | Kg | 0,99 | 0,99 | 1,18 | 1,18 | 1,37 | 1,37 | 1,56 | 1,56 |

10% tolerance at Mo, Mn and Nn, values ascertained with heat sink.

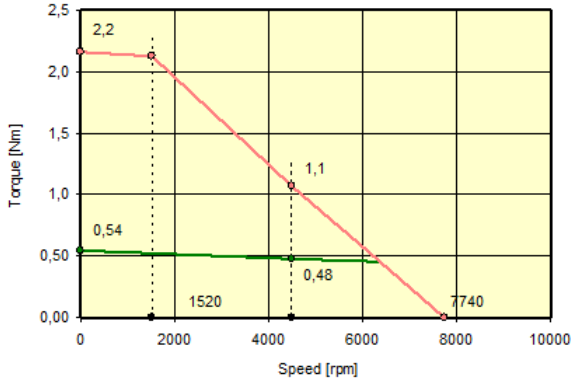
MN2-0028-45-320



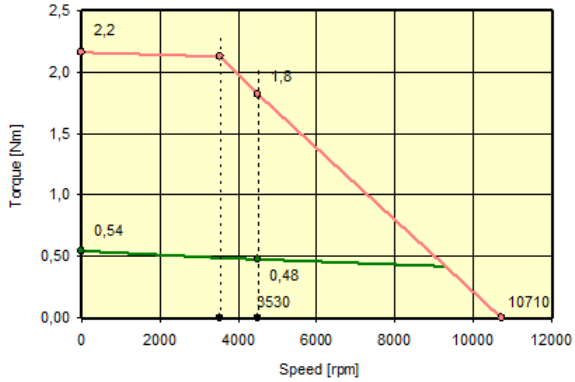

MN2-0028-45-560



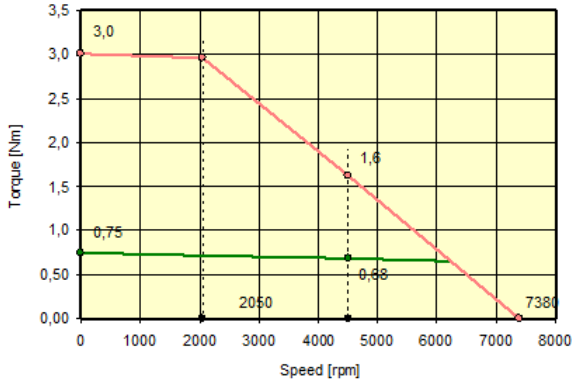

MN2-0054-45-320



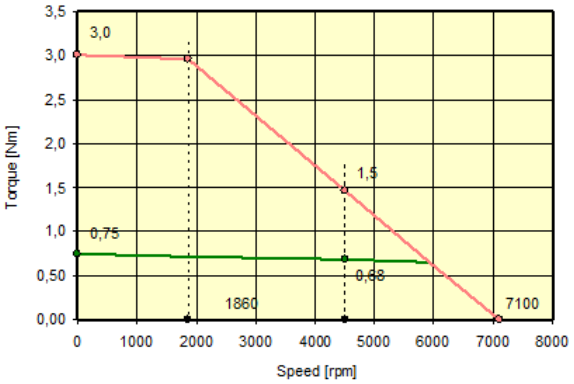

MN2-0054-45-560



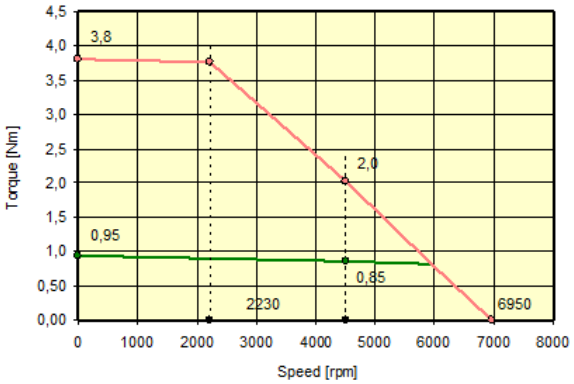

MN2-0075-45-320



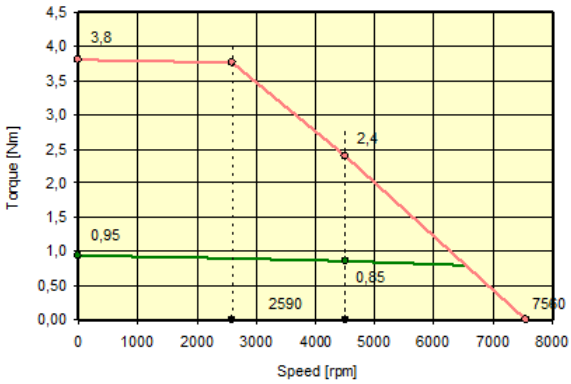

MN2-0075-45-560




MN2-0095-45-320



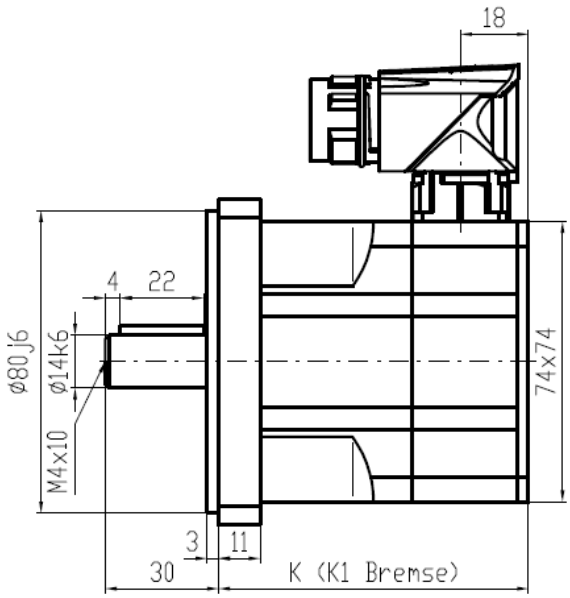

MN2-0095-45-560

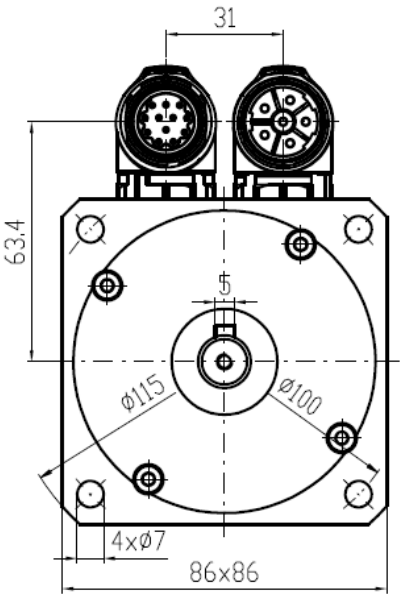


# 8. Series MN3

## [ Udc 320 V / 560 V ]




| Dimension (mm) | K | K1 (Brake) |
|---|---|---|
| **MN3-0115** | 82 | 120 |
| **MN3-0205** | 100 | 138 |
| **MN3-0350** | 136 | 174 |
| **MN3-0480** | 172 | 210 |

**Standard configuration**

- 2-pole resolver feedback
- connectors, straight, 1"
- flange design B5
- thermo protection PTC
- protection class IP65
- plain shaft
- RAL 9005

### Options contained in above drawing

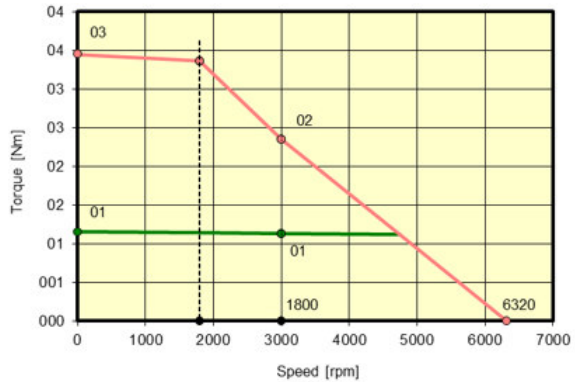
- Angled connector, turnable (option code „S4“)
- Keyway (option code “P”)

| Winding Datas | | | MN3-0115 | | MN3-0205 | | MN3-0350 | | MN3-0480 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 320 V. | 560 V. | 320 V. | 560 V. | 320 V. | 560 V. | 320 V. | 560 V. |
| Rated Speed | $n_n$ | $min^{-1}$ | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 |
| DC Bus Voltage | $U_{dc}$ | V | 320 | 560 | 320 | 560 | 320 | 560 | 320 | 560 |
| Nominal AC Voltage | $U_n$ | V | 230 | 400 | 230 | 400 | 230 | 400 | 230 | 400 |
| | | | | | | | | | | |
| Rated Torque | $M_n$ | Nm | 1,13 | 1,13 | 1,90 | 1,90 | 3,0 | 3,0 | 3,7 | 3,7 |
| Rated AC Current | $I_n$ | A | 2,3 | 1,26 | 3,1 | 1,72 | 4,3 | 2,4 | 4,5 | 2,6 |
| Stall Torque | $M_o$ | Nm | 1,15 | 1,15 | 2,1 | 2,1 | 3,5 | 3,5 | 4,8 | 4,8 |
| Stall AC Current | $I_o$ | A | 2,0 | 1,10 | 2,8 | 1,57 | 4,2 | 2,4 | 4,8 | 2,8 |
| Peak Torque | $M_{max}$ | Nm | 3,5 | 3,5 | 6,2 | 6,2 | 10,5 | 10,5 | 14,4 | 14,4 |
| Peak Current | $I_{max}$ | A | 9,2 | 5,0 | 12,7 | 7,2 | 19,4 | 10,9 | 17,3 | 10,1 |
| Max. Speed | $n_{max}$ | $min^{-1}$ | 12000 | 12000 | 12000 | 12000 | 12000 | 12000 | 12000 | 12000 |
| EMF Constant | $K_E$ | V/1000 | 34,5 | 63,0 | 44,5 | 79,0 | 50,0 | 89,0 | 60,0 | 103,0 |
| Torque Constant | $K_T$ | Nm/A | 0,57 | 1,04 | 0,74 | 1,31 | 0,83 | 1,47 | 0,99 | 1,70 |
| Therminal Resistance Ph-Ph | $R_{2ph}$ | Ω | 8,4 | 27,8 | 5,4 | 17,3 | 2,8 | 8,9 | 2,5 | 7,5 |
| Therminal Inductance Ph-Ph | $L_{2ph}$ | mH | 18,0 | 59 | 13,3 | 42,4 | 8,1 | 25,5 | 7,5 | 22,7 |
| Number of poles motor | 2p | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Number of poles resolv. | Pres | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Rated Power | $P_n$ | W | 345 | 345 | 597 | 597 | 942 | 942 | 1162 | 1162 |
| Torque at $I_{max}/U_n$ | $M_z$ | Nm | 3,4 | 3,4 | 6,0 | 6,0 | 10,4 | 10,4 | 14,2 | 14,2 |
| Speed at $I_{max}/U_n$ | $n_z$ | $min^{-1}$ | 1800 | 1680 | 1720 | 1630 | 1870 | 1800 | 2010 | 1990 |
| Max. Torque at $n_n$ | $M_x$ | Nm | 2,4 | 2,2 | 3,8 | 3,6 | 6,6 | 6,2 | 7,1 | 7,1 |
| | | | | | | | | | | |
| El. Time Constant | $T_{el}$ | ms | 2,1 | 2,1 | 2,5 | 2,5 | 2,9 | 2,9 | 3,0 | 3,0 |
| Mech. Time Constant | $T_{mech}$ | ms | 1,4 | 1,4 | 0,95 | 0,96 | 0,74 | 0,74 | 0,67 | 0,68 |
| Therm. Time Constand | $T_{th}$ | min | 21 | 21 | 23 | 23 | 27 | 27 | 30 | 30 |
| Rotor Inertia | J | $kgcm^2$ | 0,31 | 0,31 | 0,55 | 0,55 | 1,04 | 1,04 | 1,52 | 1,5 |
| Winding no. | | | 702 | 703 | 704 | 705 | 706 | 707 | 807 | 954 |
| Weight without brake | | Kg | 1,5 | 1,5 | 2,0 | 2,0 | 2,9 | 2,9 | 3,8 | 3,8 |
| Weight with brake | | Kg | 2,1 | 2,1 | 2,6 | 2,6 | 3,5 | 3,5 | 4,4 | 4,4 |

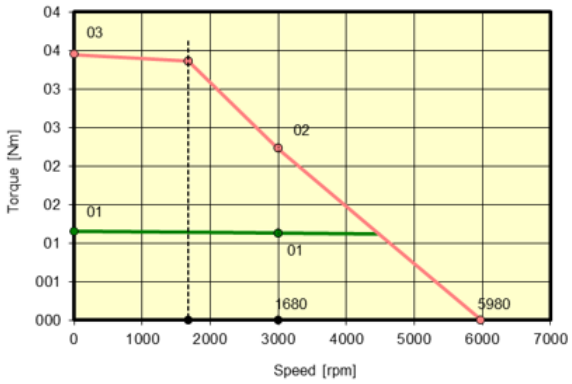
10% tolerance at Mo, Mn and Nn, values ascertained with heat sink.

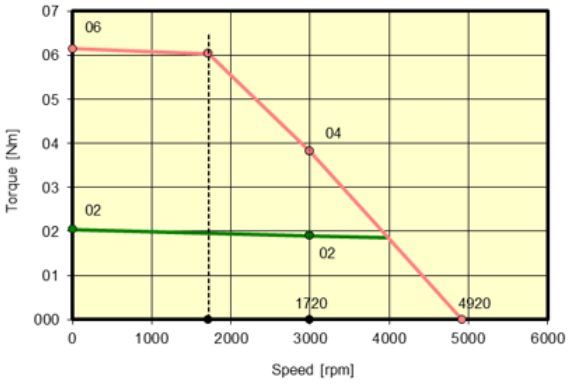
MN3-0115-30-320



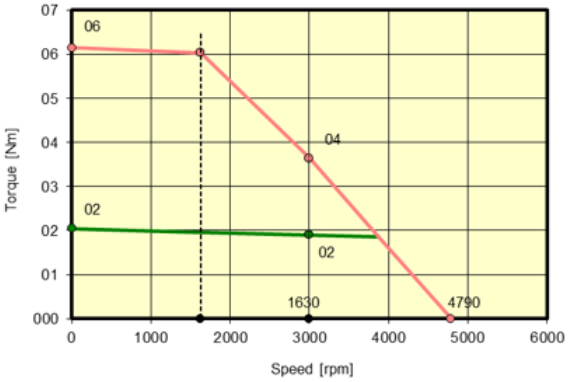

MN3-0115-30-560



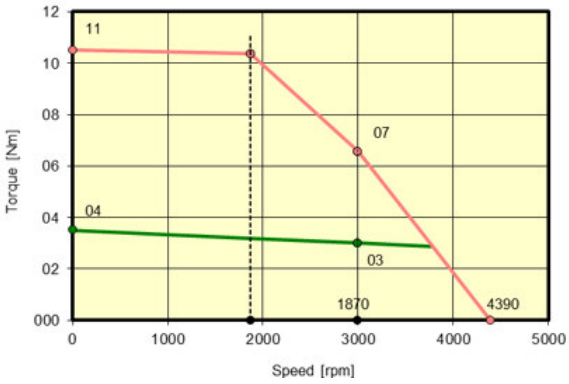

MN3-0205-30-320



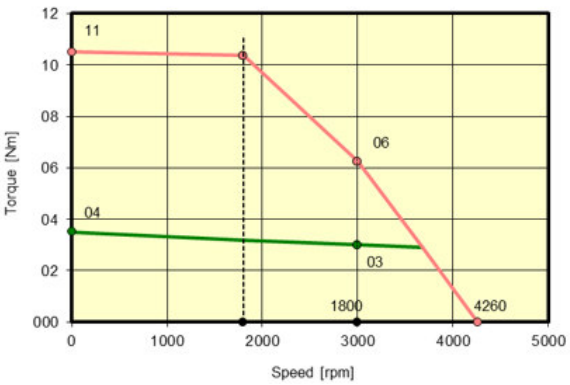

MN3-0205-30-560



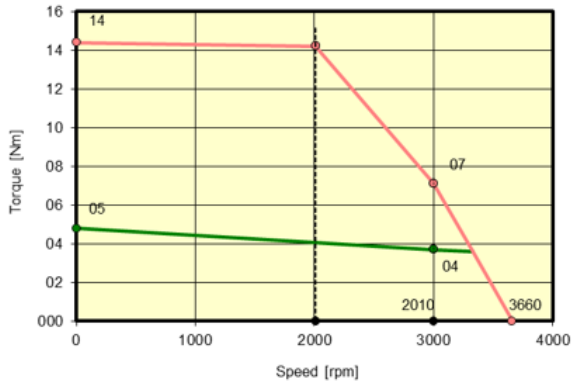

MN3-0350-30-320



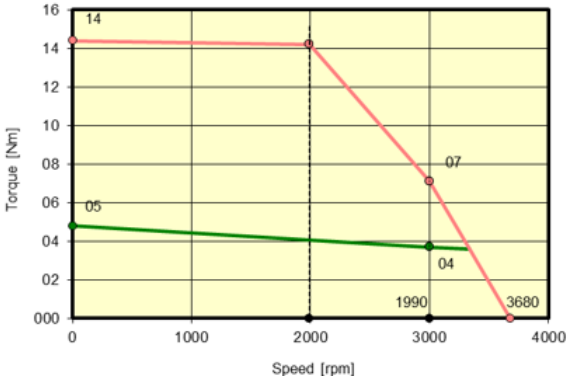

MN3-0350-30-560




MN3-0480-30-320

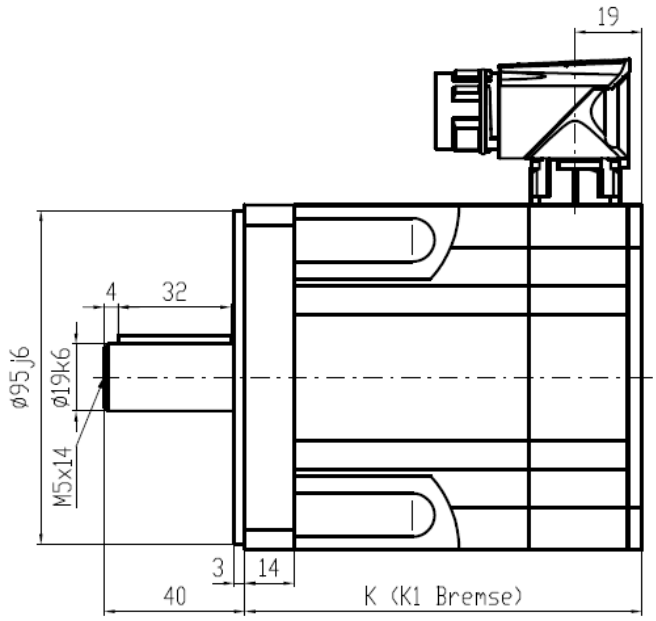


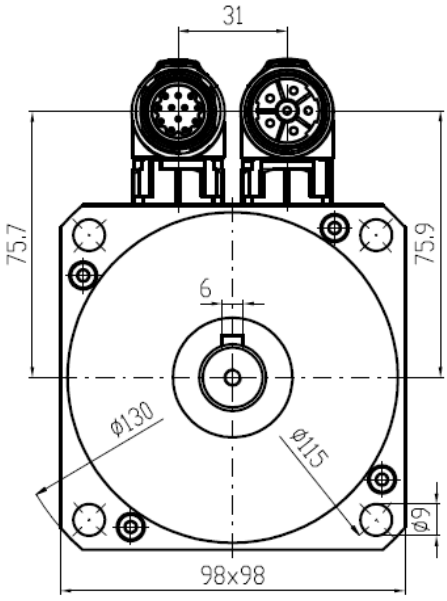

MN3-0480-30-560



# 9. Series MN4

## [ Udc 320 V / 560 V ]




| Dimension (mm) | K | K1 (Brake) |
|---|---|---|
| **MN4-0510** | 113 | 154 |
| **MN4-0750** | 143 | 184 |
| **MN4-0960** | 173 | 214 |
| **MN4-1130** | 203 | 244 |

**Standard configuration**

- 2-pole resolver feedback
- connectors, straight, 1"
- flange design B5
- thermo protection PTC
- protection class IP65
- plain shaft
- RAL 9005

### Options contained in above drawing

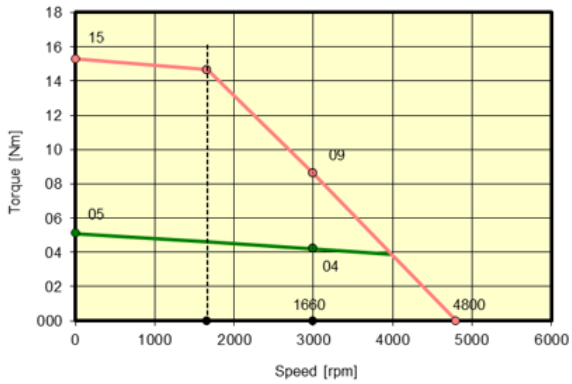
- Angled connector, turnable (option code „S4“)
- Keyway (option code “P”)

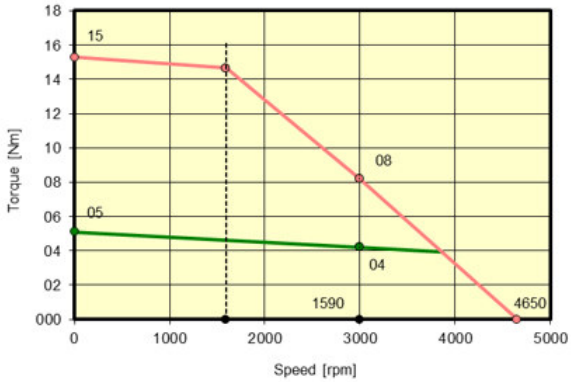
| Winding Datas | | | MN4-0510 | | MN4-0750 | | MN4-0960 | | MN4-1130 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 320 V. | 560 V. | 320 V. | 560 V. | 320 V. | 560 V. | 320 V. | 560 V. |
| Rated Speed | $n_n$ | $min^{-1}$ | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 |
| DC Bus Voltage | $U_{dc}$ | V | 320 | 560 | 320 | 560 | 320 | 560 | 320 | 560 |
| Nominal AC Voltage | $U_n$ | V | 230 | 400 | 230 | 400 | 230 | 400 | 230 | 400 |
| | | | | | | | | | | |
| Rated Torque | $M_n$ | Nm | 4,2 | 4,2 | 6,1 | 6,1 | 7,7 | 7,7 | 8,8 | 8,8 |
| Rated AC Current | $I_n$ | A | 7,0 | 3,9 | 8,8 | 5,1 | 10,8 | 6,0 | 10,7 | 6,9 |
| Stall Torque | $M_o$ | Nm | 5,1 | 5,1 | 7,5 | 7,5 | 9,6 | 9,6 | 11,3 | 11,3 |
| Stall AC Current | $I_o$ | A | 6,8 | 3,8 | 8,9 | 5,2 | 10,7 | 6,0 | 11,0 | 7,1 |
| Peak Torque | $M_{max}$ | Nm | 15,3 | 15,3 | 23 | 23 | 29 | 29 | 34 | 34 |
| Peak Current | $I_{max}$ | A | 31 | 17,4 | 41 | 24 | 49 | 27 | 41 | 27 |
| Max. Speed | $n_{max}$ | $min^{-1}$ | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 |
| EMF Constant | $K_E$ | V/1000 | 45,5 | 81,0 | 51,0 | 87,0 | 54,0 | 97,0 | 62,0 | 96,0 |
| Torque Constant | $K_T$ | Nm/A | 0,75 | 1,34 | 0,84 | 1,44 | 0,89 | 1,60 | 1,03 | 1,59 |
| Therminal Resistance Ph-Ph | $R_{2ph}$ | Ω | 1,24 | 4,0 | 0,79 | 2,3 | 0,62 | 2,0 | 0,61 | 1,49 |
| Therminal Inductance Ph-Ph | $L_{2ph}$ | mH | 6,8 | 21,7 | 4,8 | 13,5 | 3,6 | 11,9 | 3,8 | 9,1 |
| Number of poles motor | 2p | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Number of poles resolv. | Pres | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Rated Power | $P_n$ | W | 1320 | 1320 | 1915 | 1915 | 2418 | 2418 | 2763 | 2763 |
| Torque at $I_{max}/U_n$ | $M_z$ | Nm | 14,7 | 14,7 | 22 | 22 | 28 | 28 | 33 | 33 |
| Speed at $I_{max}/U_n$ | $n_z$ | $min^{-1}$ | 1660 | 1590 | 1740 | 1750 | 1840 | 1750 | 1970 | 2210 |
| Max. Torque at $n_n$ | $M_x$ | Nm | 8,6 | 8,2 | 12,7 | 12,8 | 16,6 | 15,2 | 16,0 | 22 |
| | | | | | | | | | | |
| El. Time Constant | $T_{el}$ | ms | 5,5 | 5,5 | 6,1 | 5,9 | 5,8 | 6,0 | 6,2 | 6,1 |
| Mech. Time Constant | $T_{mech}$ | ms | 0,77 | 0,78 | 0,63 | 0,62 | 0,60 | 0,60 | 0,57 | 0,58 |
| Therm. Time Constand | $T_{th}$ | min | 25 | 25 | 30 | 30 | 35 | 35 | 40 | 40 |
| Rotor Inertia | J | $kgcm^2$ | 2,04 | 2,04 | 3,26 | 3,26 | 4,49 | 4,49 | 5,70 | 5,70 |
| Winding no. | | | 708 | 709 | 710 | 711 | 712 | 713 | 829 | 816 |
| Weight without brake | | Kg | 3,9 | 3,9 | 5,2 | 5,2 | 6,5 | 6,5 | 7,8 | 7,8 |
| Weight with brake | | Kg | 4,9 | 4,9 | 6,2 | 6,2 | 7,5 | 7,5 | 8,8 | 8,8 |

10% tolerance at Mo, Mn and Nn, values ascertained with heat sink.

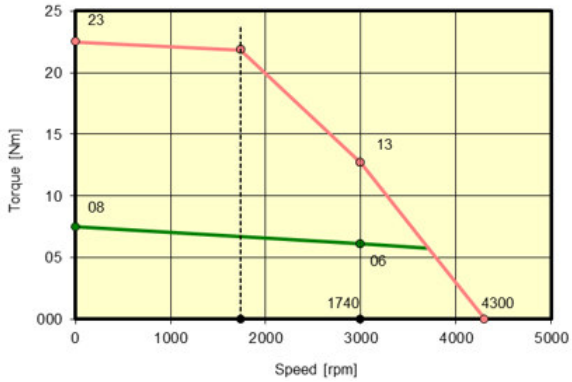
MN4-0510-30-320



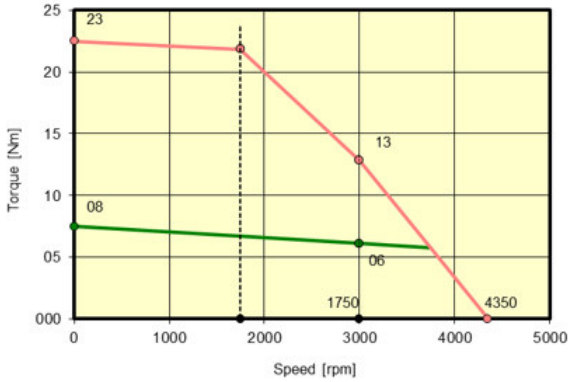

MN4-0510-30-560



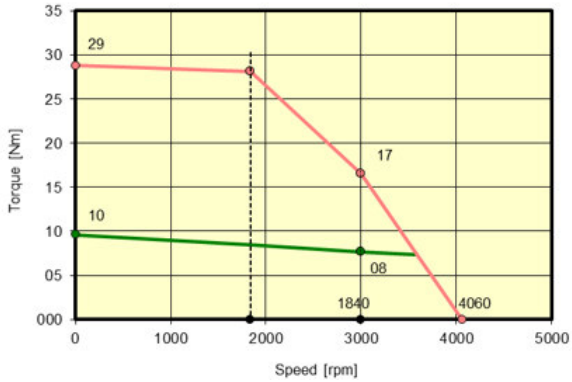

MN4-0750-30-320



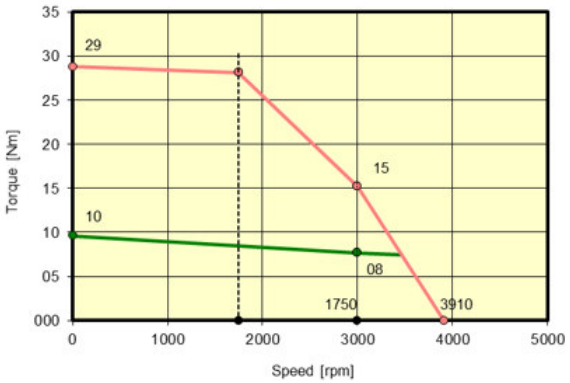

MN4-0750-30-560



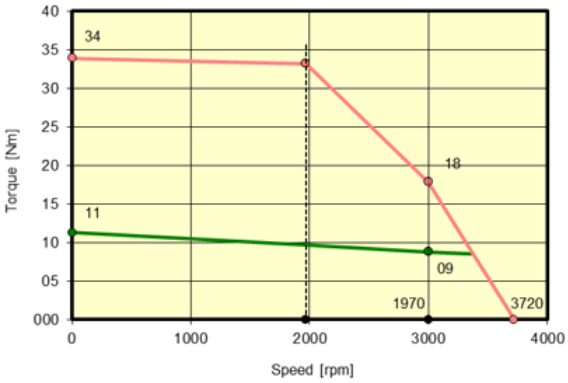

MN4-0960-30-320



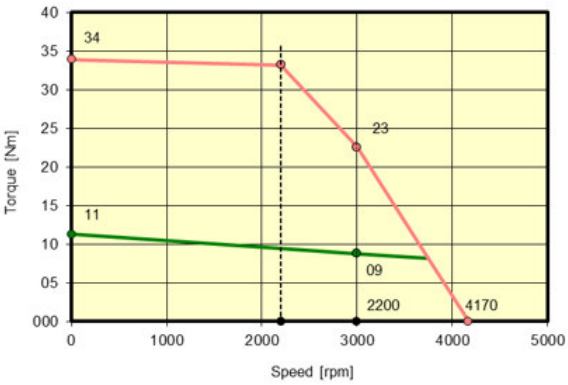

MN4-0960-30-560




MN4-1130-30-320



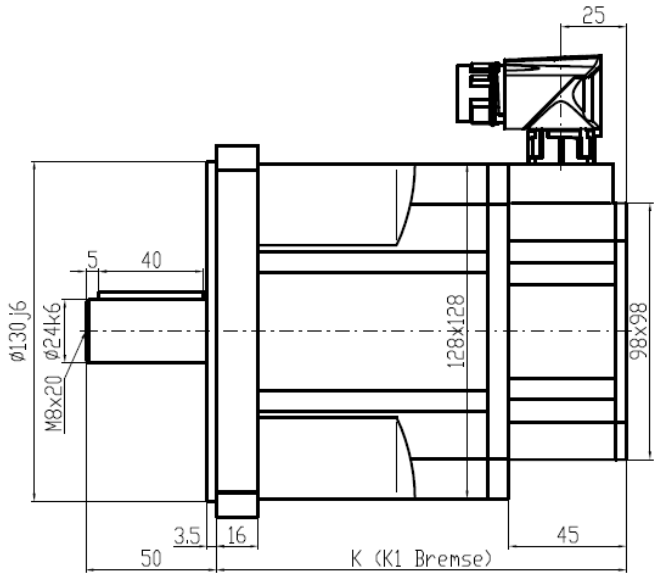

MN4-1130-30-560

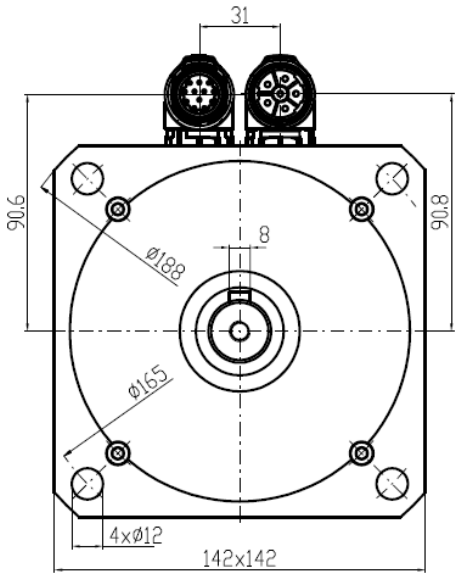


# 10. Series MN5

## [ Udc 320 / 560 V ]




| Dimension (mm) | K | K1 (Brake) |
|---|---|---|
| **MN5-1200** | 143,5 | 193 |
| **MN5-1600** | 173,5 | 223 |
| **MN5-2000** | 203,5 | 253 |
| **MN5-2400** | 233,5 | 283 |

**Standard configuration**

- 2-pole resolver feedback
- connectors, straight, 1"
- flange design B5
- thermo protection PTC
- protection class IP65
- plain shaft
- RAL 9005

### Options contained in above drawing

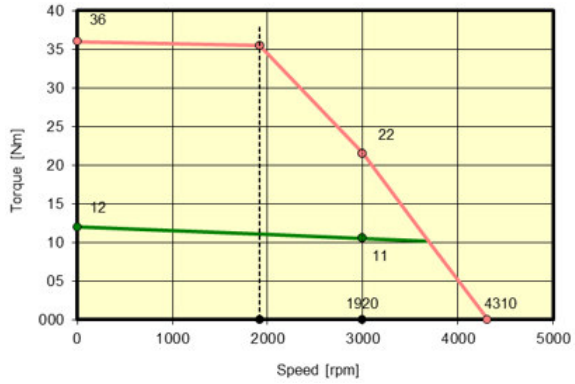
- Angled connector, turnable (option code „S4“)
- Keyway (option code “P”)

| Winding Datas | | | MN5-1200 | | MN5-1600 | | MN5-2000 | | MN5-2400 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 320 V. | 560 V. | 320 V. | 560 V. | 320 V. | 560 V. | 320 V. | 560 V. |
| Rated Speed | $n_n$ | $min^{-1}$ | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 | 3000 |
| DC Bus Voltage | $U_{dc}$ | V | 320 | 560 | 320 | 560 | 320 | 560 | 320 | 560 |
| Nominal AC Voltage | $U_n$ | V | 230 | 400 | 230 | 400 | 230 | 400 | 230 | 400 |
| | | | | | | | | | | |
| Rated Torque | $M_n$ | Nm | 10,5 | 10,5 | 13,8 | 13,8 | 16,0 | 16,0 | 20,0 | 20,0 |
| Rated AC Current | $I_n$ | A | 14,7 | 8,3 | 17,0 | 9,9 | 18,4 | 11,5 | 23,0 | 14,4 |
| Stall Torque | $M_o$ | Nm | 12,0 | 12,0 | 16,0 | 16,0 | 20,0 | 20,0 | 24,0 | 24,0 |
| Stall AC Current | $I_o$ | A | 14,2 | 8,0 | 17,3 | 10,1 | 18,6 | 11,6 | 22,3 | 14,0 |
| Peak Torque | $M_{max}$ | Nm | 36 | 36 | 48 | 48 | 60 | 60 | 72 | 72 |
| Peak Current | $I_{max}$ | A | 53 | 29 | 61 | 36 | 64 | 40 | 77 | 48 |
| Max. Speed | $n_{max}$ | $min^{-1}$ | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 |
| EMF Constant | $K_E$ | V/1000 | 51,0 | 91,0 | 56,0 | 96,0 | 65,0 | 104,0 | 65,0 | 104,0 |
| Torque Constant | $K_T$ | Nm/A | 0,84 | 1,51 | 0,93 | 1,59 | 1,08 | 1,72 | 1,08 | 1,72 |
| Therminal Resistance Ph-Ph | $R_{2ph}$ | Ω | 0,42 | 1,33 | 0,30 | 0,88 | 0,28 | 0,72 | 0,22 | 0,56 |
| Therminal Inductance Ph-Ph | $L_{2ph}$ | mH | 3,4 | 10,9 | 2,5 | 7,5 | 2,4 | 6,3 | 2,0 | 5,0 |
| Number of poles motor | 2p | | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Number of poles resolv. | Pres | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Rated Power | $P_n$ | W | 3297 | 3297 | 4333 | 4333 | 5024 | 5024 | 6279 | 6279 |
| Torque at $I_{max}/U_n$ | $M_z$ | Nm | 36 | 36 | 48 | 48 | 59 | 59 | 71 | 71 |
| Speed at $I_{max}/U_n$ | $n_z$ | $min^{-1}$ | 1920 | 1860 | 2110 | 2120 | 1980 | 2140 | 2030 | 2200 |
| Max. Torque at $n_n$ | $M_x$ | Nm | 22 | 20 | 29 | 29 | 23 | 33 | 29 | 41 |
| | | | | | | | | | | |
| El. Time Constant | $T_{el}$ | ms | 8,1 | 8,2 | 8,3 | 8,5 | 8,7 | 8,8 | 9,1 | 8,9 |
| Mech. Time Constant | $T_{mech}$ | ms | 0,81 | 0,80 | 0,70 | 0,70 | 0,72 | 0,64 | 0,62 | 0,61 |
| Therm. Time Constand | $T_{th}$ | min | 45 | 45 | 55 | 55 | 65 | 65 | 75 | 75 |
| Rotor Inertia | J | $kgcm^2$ | 7,90 | 7,90 | 11,50 | 11,50 | 17,10 | 15,10 | 18,70 | 18,70 |
| Winding no. | | | 728 | 729 | 849 | 731 | 962 | 733 | 977 | 863 |
| Weight without brake | | Kg | 7,4 | 7,4 | 9,5 | 9,5 | 11,6 | 11,6 | 13,7 | 13,7 |
| Weight with brake | | Kg | 9,0 | 9,0 | 11,1 | 11,1 | 13,2 | 13,2 | 15,3 | 15,3 |

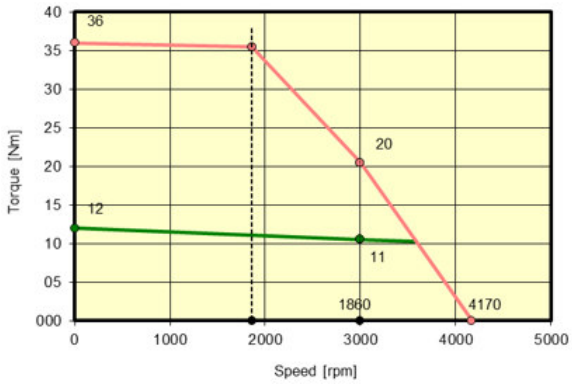
10% tolerance at Mo, Mn and Nn, values ascertained with heat sink.

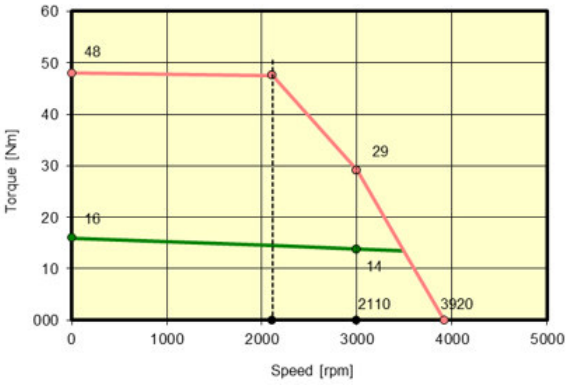
MN5-1200-30-320



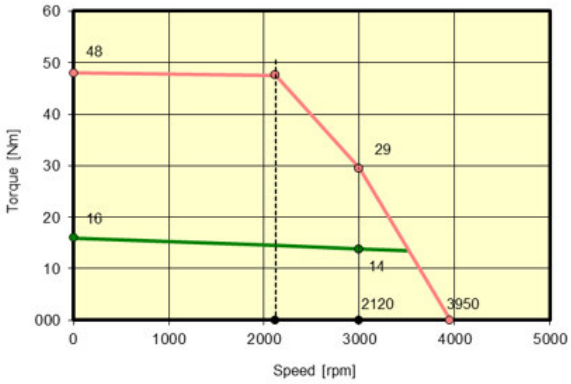

MN5-1200-30-560



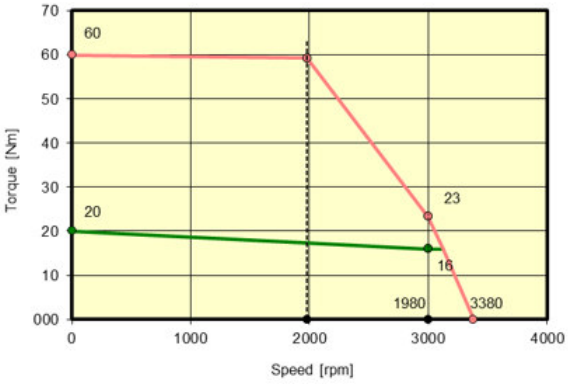

MN5-1600-30-320



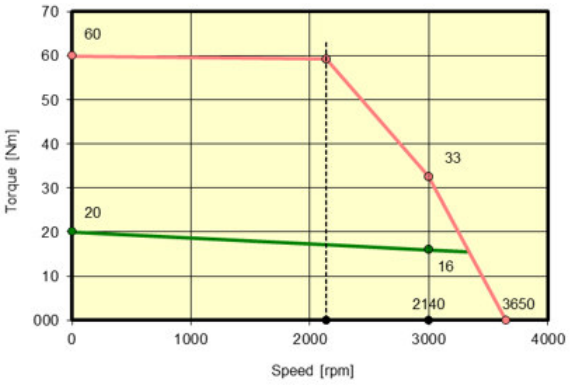

MN5-1600-30-560



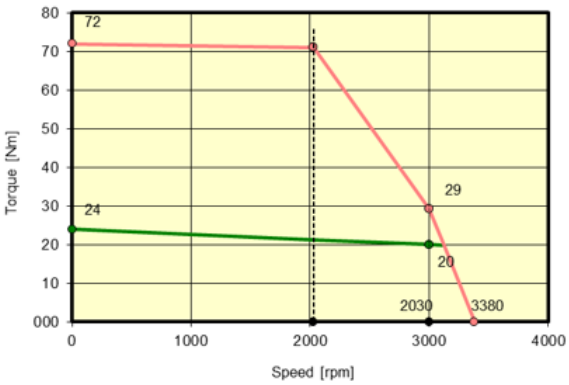

MN5-2000-30-320



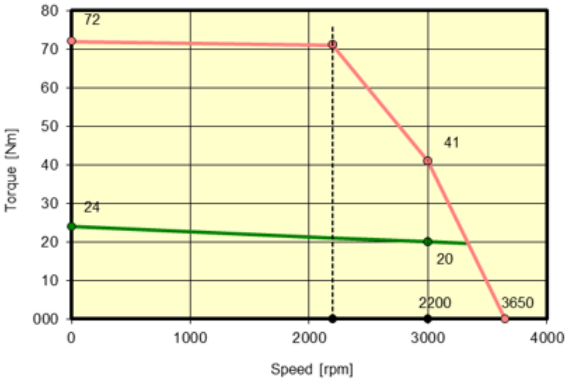

MN5-2000-30-560




MN5-2400-30-320

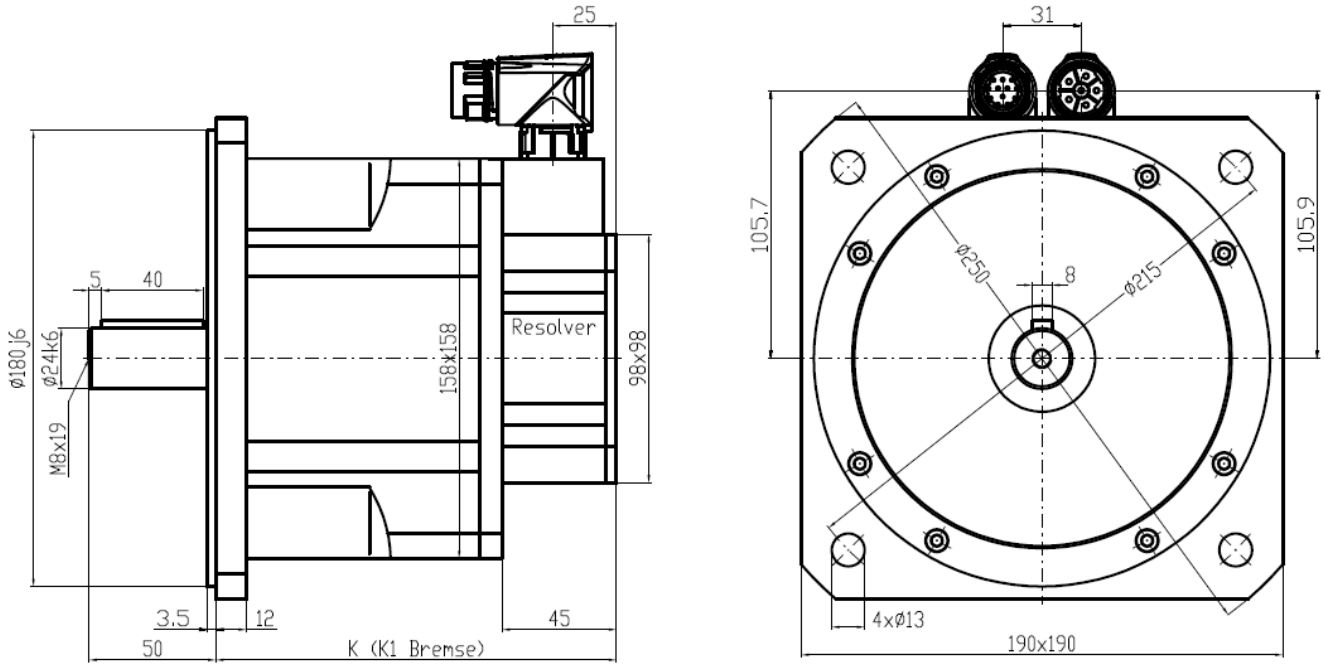



MN5-2400-30-560



# 11. Series MN6

## [ Udc 320 / 560 V ]




| Dimension (mm) | K | K1 (Brake) |
|---|---|---|
| **MN6-1800** | 158 | 222 |
| **MN6-2400** | 183 | 247 |
| **MN6-3000** | 208 | 272 |
| **MN6-3800** | 233 | 297 |

**Standard configuration**

- 2-pole resolver feedback
- connectors, straight, 1"
- flange design B5
- thermo protection PTC
- protection class IP65
- plain shaft
- RAL 9005

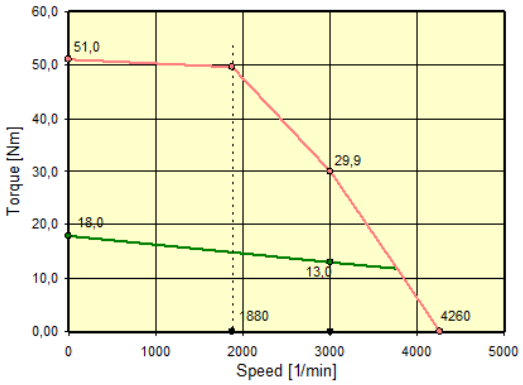
### Options contained in above drawing

- Angled connector, turnable (option code „S4“)
- Keyway (option code “P”)

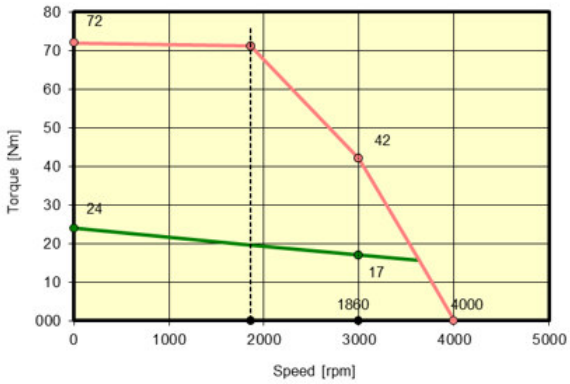
| Winding Datas | | | MN6-1800 | MN6-2400 | MN6-3000 | MN6-3800 |
|---|---|---|---|---|---|---|
| | | | 560 V. | 560 V. | 560 V. | 560 V. |
| Rated Speed | $n_n$ | $min^{-1}$ | 3000 | 3000 | 3000 | 3000 |
| DC Bus Voltage | $U_{dc}$ | V | 560 | 560 | 560 | 560 |
| Nominal AC Voltage | $U_n$ | V | 400 | 400 | 400 | 400 |
| | | | | | | |
| Rated Torque | $M_n$ | Nm | 13,0 | 17,0 | 21,0 | 25,0 |
| Rated AC Current | $I_n$ | A | 11,0 | 13,8 | 16,2 | 19,7 |
| Stall Torque | $M_o$ | Nm | 18,0 | 24,0 | 30,0 | 38,0 |
| Stall AC Current | $I_o$ | A | 12,2 | 15,3 | 17,8 | 23,9 |
| Peak Torque | $M_{max}$ | Nm | 51 | 72 | 90 | 114 |
| Peak Current | $I_{max}$ | A | 45,4 | 60 | 64 | 93 |
| Max. Speed | $n_{max}$ | $min^{-1}$ | 6000 | 6000 | 6000 | 6000 |
| EMF Constant | $K_E$ | V/1000 | 89 | 95 | 102 | 96 |
| Torque Constant | $K_T$ | Nm/A | 1,47 | 1,57 | 1,69 | 1,59 |
| Therminal Resistance Ph-Ph | $R_{2ph}$ | Ω | 0,62 | 0,41 | 0,33 | 0,25 |
| Therminal Inductance Ph-Ph | $L_{2ph}$ | mH | 7,2 | 5,5 | 4,7 | 3,5 |
| Number of poles motor | 2p | | 10 | 10 | 10 | 10 |
| Number of poles resolv. | Pres | | 2 | 2 | 2 | 2 |
| Rated Power | $P_n$ | W | 4816 | 5338 | 6593 | 7849 |
| Torque at $I_{max}/U_n$ | $M_z$ | Nm | 49,7 | 71 | 89 | 112 |
| Speed at $I_{max}/U_n$ | $n_z$ | $min^{-1}$ | 1880 | 1860 | 1950 | 1880 |
| Max. Torque at $n_n$ | $M_x$ | Nm | 29,9 | 42,0 | 46,5 | 64 |
| | | | | | | |
| El. Time Constant | $T_{el}$ | ms | 11,6 | 13,4 | 14,2 | 14,0 |
| Mech. Time Constant | $T_{mech}$ | ms | 0,92 | 0,74 | 0,66 | 0,69 |
| Therm. Time Constand | $T_{th}$ | min | 42,0 | 47,0 | 52 | 57 |
| Rotor Inertia | J | $kgcm^2$ | 18,5 | 25,6 | 32,7 | 39,9 |
| Winding no. | | | auf Anfrage | 932 | 993 | 948 |
| Weight without brake | | Kg | 10,0 | 12,8 | 15,5 | 18,3 |
| Weight with brake | | Kg | 13,2 | 15,9 | 18,6 | 21,4 |

10% tolerance at Mo, Mn and Nn, values ascertained with heat sink.

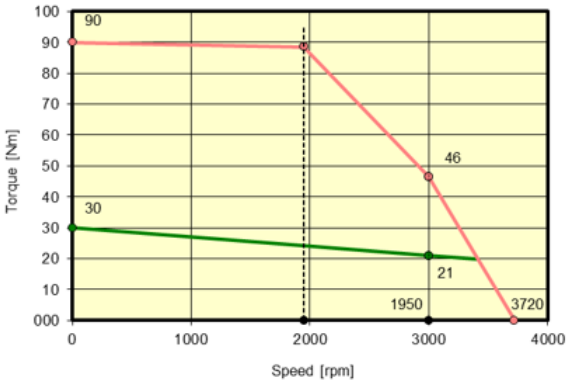
MN6-1800-30-560



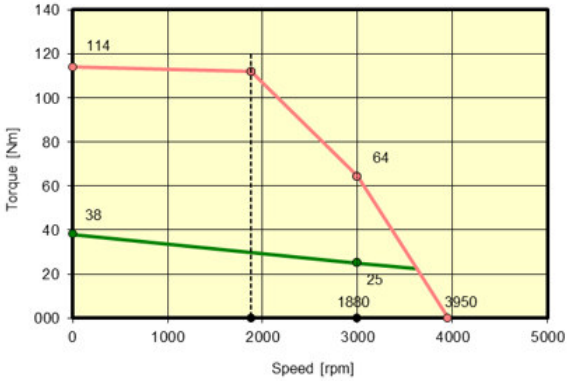

MN6-2400-30-560




MN6-3000-30-560



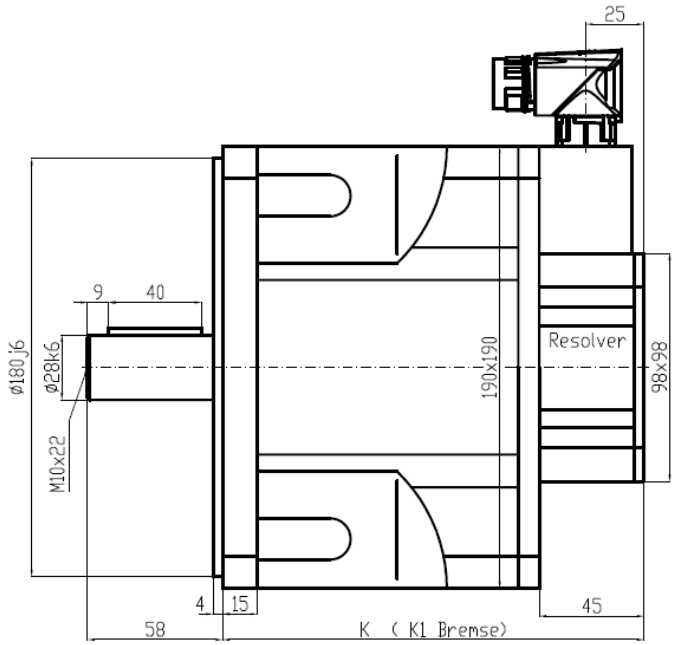

MN6-3800-30-560

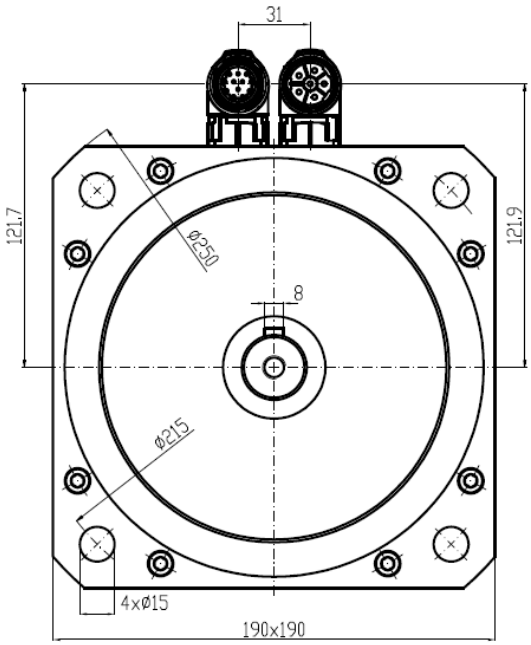


# 12. Series MN7

## [ Udc 320 V / 560 V ]




| Dimension (mm) | K | K1 (Brake) |
|---|---|---|
| **MN7-3000** | 181 | 240 |
| **MN7-4000** | 211 | 270 |
| **MN7-5000** | 241 | 300 |
| **MN7-6000** | 271 | 330 |

**Standard configuration**

- 2-pole resolver feedback
- connectors, straight, 1"
- flange design B5
- thermo protection PTC
- protection class IP65
- plain shaft
- RAL 9005

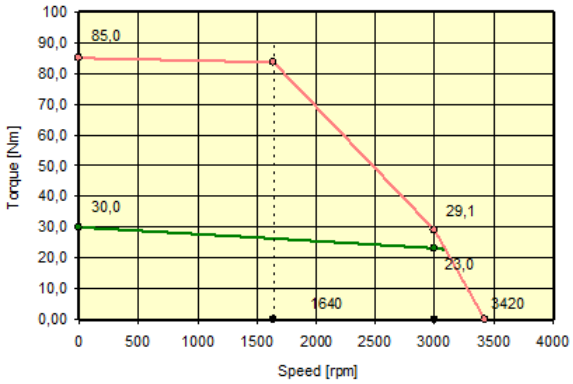
### Options contained in above drawing

- Angled connector, turnable (option code „S4“)
- Keyway (option code “P”)

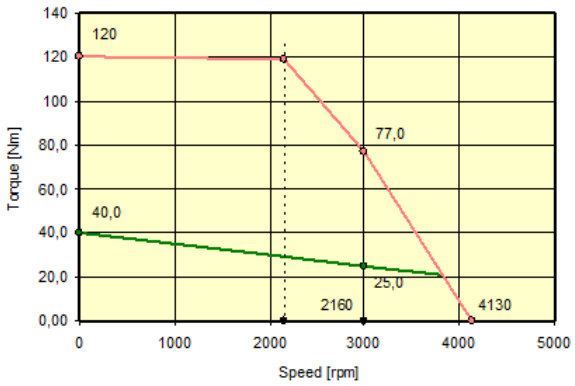
| Winding Datas | | | MN7-3000 | MN7-4000 | MN7-5000 | MN7-6000 |
|---|---|---|---|---|---|---|
| | | | 560 V. | 560 V. | 560 V. | 560 V. |
| Rated Speed | $n_n$ | $min^{-1}$ | 3000 | 3000 | 2000 | 2000 |
| DC Bus Voltage | $U_{dc}$ | V | 560 | 560 | 560 | 560 |
| Nominal AC Voltage | $U_n$ | V | 400 | 400 | 400 | 400 |
| | | | | | | |
| Rated Torque | $M_n$ | Nm | 23,0 | 25,0 | 40,4 | 44,0 |
| Rated AC Current | $I_n$ | A | 15,5 | 20,1 | 21,8 | 19,7 |
| Stall Torque | $M_o$ | Nm | 30,0 | 40,0 | 50,0 | 60,0 |
| Stall AC Current | $I_o$ | A | 16,3 | 26,3 | 22,7 | 24,0 |
| Peak Torque | $M_{max}$ | Nm | 85 | 120 | 150 | 180 |
| Peak Current | $I_{max}$ | A | 58 | 90 | 79 | 82 |
| Max. Speed | $n_{max}$ | $min^{-1}$ | 6000 | 6000 | 6000 | 6000 |
| EMF Constant | $K_E$ | V/1000 | 111 | 92 | 133 | 151 |
| Torque Constant | $K_T$ | Nm/A | 1,84 | 1,52 | 2,2 | 2,5 |
| Therminal Resistance Ph-Ph | $R_{2ph}$ | Ω | 0,41 | 0,17 | 0,25 | 0,24 |
| Therminal Inductance Ph-Ph | $L_{2ph}$ | mH | 6,4 | 3,1 | 4,9 | 5,1 |
| Number of poles motor | 2p | | 10 | 10 | 10 | 10 |
| Number of poles resolv. | Prex | | 2 | 2 | 2 | 2 |
| Rated Power | $P_n$ | W | 7221 | 7849 | 8456 | 9210 |
| Torque at $I_{max}/U_n$ | $M_z$ | Nm | 84 | 119 | 147 | 177 |
| Speed at $I_{max}/U_n$ | $n_z$ | $min^{-1}$ | 1640 | 2160 | 1510 | 1380 |
| Max. Torque at $n_n$ | $M_x$ | Nm | 29,1 | 77 | 104 | 98 |
| | | | | | | |
| El. Time Constant | $T_{el}$ | ms | 15,6 | 18,2 | 19,6 | 21,2 |
| Mech. Time Constant | $T_{mech}$ | ms | 1,04 | 0,88 | 0,79 | 0,71 |
| Therm. Time Constand | $T_{th}$ | min | 80 | 90 | 100 | 108 |
| Rotor Inertia | J | $kgcm^2$ | 49,5 | 69 | 88 | 107 |
| Winding no. | | | 861 | 833 | 1154 | 945 |
| Weight without brake | | Kg | 16,5 | 21,5 | 26,5 | 31,5 |
| Weight with brake | | Kg | 20,1 | 25,1 | 30,1 | 35,1 |

10% tolerance at Mo, Mn and Nn, values ascertained with heat sink.

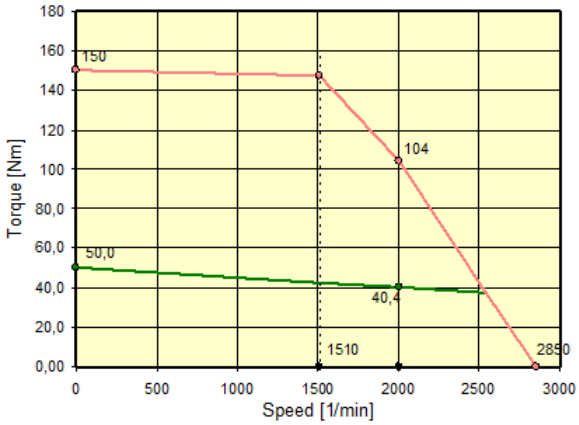
MN7-3000-30-560



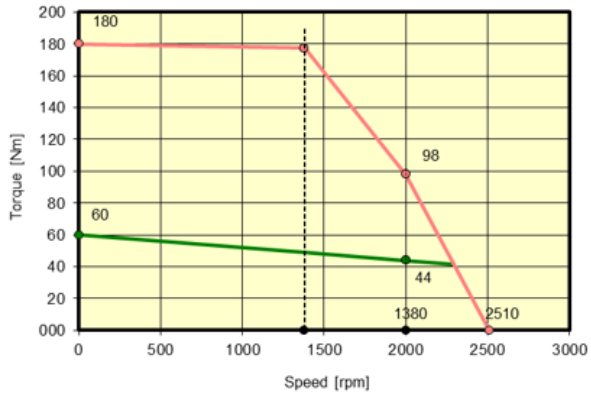

MN7-4000-30-560




MN7-5000-20-560




MN7-6000-20-560



# 13. Technical Data

## 13.1. Definitions

**Continuous stall torque $M_0$ [Nm]**

Thermic max. torque which can be supplied unlimitedly when motor is blocked, n=0 min-1, within nominal environmental conditions and heat sink at A-side.

**Nominal torque $M_n$ [Nm]**

When motor absorbs rated current at rated speed, rated torque can be supplied unlimitedly in S1 operation.

**Stall current $I_0$ [A]**

To supply the continuous stall torque during standstill, the motor takes the stall current. The indications refer to the sinusoidal effective current.

**Nominal current $I_n$ [A]**

At ratedl speed $n_n$ and supply of the rated torque the motor absorbs the rated current The indications refer to the sinusoidal effective current.

**Peak current $I_{max}$ [A]**

The peak current (effective sinusoidal value) is the maximal allowed current for 5 sec. The peak current should not be higher than 3,5 times rated current.

**Torque constant $K_T$ [Nm/A]**

This constant specifies which torque (Nm) the motor delivers at a current of 1 A effective current. ($M = I * K_T$).

**Voltage constant $K_E$ [V/1000min $^{-1}$]**

This voltage constant defines the induced motor EMF, as an effective value between two motor phases per 1000 rpm.

**Moment of Inertia J [kgcm$^2$]**

Moment of inertia of the rotor only with Resolver – Feedback as basic-equipment. Internal or external attachments (such as holding brake, encoder systems, couplings or mechanical load ) can change the mentioned values considerably. For the calculation of the dynamical motor situation it is therefore necessary to consider this moment of inertia in its totality.

# 14. Options Series MN

## 14.1. Permanent Magnet Holding Brake

| Daten | Sym | Unit | MN2 | MN3 | MN4 | MN5 | MN6 | MN7 |
|---|---|---|---|---|---|---|---|---|
| Torque | $M_{Br}$ | Nm | 2 | 4,5 | 9 | 18 | 36 | 36 |
| Power supply | $U_{BR}$ | VDC | 24 ( + 6% - 10% ) | | | | | |
| Nominal power | $P_{BR}$ | W | 11 | 12 | 18 | 24 | 26 | 26 |
| Moment of inertia | $J_{BR}$ | $Kgcm^2$ | 0,068 | 0,18 | 0,54 | 1,66 | 5,56 | 5,56 |
| Weight | M | Kg | 0,440 | 0,590 | 0,820 | 1,080 | 2,860 | 2,860 |

## 14.2. Maintenance run-in of the brakes when operating as holding brake

According to the brake manufacturer's installation instructions a maintenance run-in is recommended every 4 weeks for ordinary industrial applications.

| Motor size | MN2 | MN3 | MN4 | MN5 | MN6 | MN7 |
|---|---|---|---|---|---|---|
| Slip time / s | 0,5 | | | | | |
| Idle time / s | 0,5 | | | | | |
| Speed / $min^{-1}$ | 200 | 100 | 100 | 75 | 50 | 50 |
| Circuits | 5 | 5 | 5 | 5 | 3 | 3 |

## 14.3. Keyway according to DIN 6885

| Motor | MN2 | MN3 | MN4 | MN5 | MN6 | MN7 |
|---|---|---|---|---|---|---|
| Shaft | 9x20 | 14x30 | 19x40 | 24x50 | 24x50 | 28x58 |
| Keyway | 3x3x14 | 5x5x22 | 6x6x32 | 7x8x40 | 7x8x40 | 7x8x40 |

**Degree of protection IP 67**

Protection against contact, penetration of dust. Motor within stated pressure and time conditions beneath water.

**Special Shaft / Special Flange**

On request

**Angled connectors**

Directed to A- or B-side, 90° angled or turnable

**Feedback**

Various systems on request.
In case of **other feedback system** than resolver the length of the motor stated in this manual can change.

**Merkes GmbH**
Holzkamper Weg 19
D-42699 Solingen

Phone: +49 (0) 212 – 880 727 0
Fax: +49 (0) 212 – 880 727 99

Homepage: www.merkes.de

E-Mail: info@merkes.de