



DS4-132

Instruction handbook
Three-phase synchronous motor

E

5.25016.01

**Read the Instruction handbook
before starting any work!**

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GENERAL

1.1 Safety

This electric motor was built referring to the current state of the art of safety technology and was checked on its operational safety before it left the company.

Please, consider the following to ensure a proper commissioning as well as the safe use:

- The present commissioning and maintenance instruction and its enclosed additional parts
- The enclosed safety and commissioning instructions
- The technical documents of the product
- The commissioning and safety notes of the manufacturer of the converter
- The national, local and plant-specific regulations related to the finished product
- The technical instruction TAM 00697 when using the safety-related applications

When using this product the following dangers must be considered:

Dangers due to

- Lifting and transport processes
- Electrical current
- Moving parts
- Hot surfaces
- EMC interferences
- Mechanical overload
- Thermal overload

1.2 Key to symbols

In order to avoid dangers against persons and material assets or to minimize existing risks please regard all safety notes especially those which are marked by symbols.

**DANGER!**

...points out an immediately dangerous situation that will lead to severe injuries or death if not avoided.

**DANGER DUE TO ELECTRICAL CURRENT!**

...points out a directly dangerous situation caused by electrical current that will lead to severe injuries or death, if not avoided.

**Prohibition of action likely to increase or cause danger!**

...failure to comply can cause serious injuries.

**WARNING!**

...points out a potentially dangerous situation that could lead to severe injuries or death if not avoided.

**CAUTION!**

...points out a potentially dangerous situation that can lead to minor or slight injuries, if not avoided.

**NOTICE!**

...points out a potentially dangerous situation, that can lead to material damage, if not avoided.

**Hot surface warning!**

Failure to observe can lead to severe injuries.

**Magnetic field warning!**

Failure to observe can lead to severe injuries or damage to property.

**Electrostatically sensitive components!**

Failure to observe can lead to damage to the system or peripheral equipment.

Recommendations**NOTE!**

...highlights useful hints and recommendations, as well as information for the efficient and trouble-free use.

1.3 Appropriate use

The motor must only be used appropriately. In this context, the motor must only be used for the applications described in the technical documentation under strict observance of all the notes in these instruction handbook.

All assembly, commissioning, maintenance, and operating tasks must be carried out by **qualified personnel** only.

Within the context of these safety instructions, qualified personnel refers to persons who are trained and authorized in the specialized area, who are authorized to set up, assemble, commission, and operate units, systems, and circuits under application of the applicable safety standards (EN 50110-1).

Inappropriate behavior can result in **serious injury** and **damage** to property.

The **motor** is designed to be **used for industrial applications** and is subject to a number of **standards** and **directives**, including the following:

Standards	EN 60034-1, EN 60034-5, EN 60034-6, EN 60034-9, EN 60034-14, EN 61800-5 EN 60204-1
EU Low Voltage Directive	The motors in this series fully comply with the requirements of the Low Voltage Directive EU 2014/35/EU (conformity).
EU Machinery Directive	Motors are components which are intended to be installed in machines as described in the Machinery Directive. Commissioning is not permitted until such time as the conformity of the finished product with this directive has been established (refer to EN 60204-1 „Electrical Equipment of Machines“).
EU EMC Directive	When the motor is used as intended, its operation must comply with the safety requirements laid down in the EMC Directive 2014/30/EU. Proper installation (e. g. physical isolation of signal and power cables, shielded wiring and cable etc.) is the responsibility of the system installer and system vendor. With systems which have converters, the EMC notes from the manufacturers of the converter-, encoder- and brake-manufacturer must be observed.

Furthermore, all the national, local, and system-specific regulations must be observed!

Motor design with rare earth magnets:



Please be aware of the following risks in the vicinity of a retracted or exposed rotor with a strong magnetic field:

- People with electronic or metallic implants (such as cardiac pacemakers, hearing aids, plates or pins) are at risk, if the distance between the implant and the magnetic pin is less than 0.5 m.
- Due to the strong attraction forces exerted on ferromagnetic parts there is a risk of:
 - Bruises
 - Damage to measuring and assembly tools, credit cards, watches etc.
 - Contamination of the Rotor assembly due to attracting metal debris or powder.



Beware of risk of burns!

The surface temperatures on the motors can exceed 70 °C. If necessary, provide guards!

Temperature-sensitive parts, such as normal cables or electronic components, must not be placed on or fixed to the hot surfaces.

Thermal overloading can destroy the winding and the bearing and can cause demagnetization of the rare-earth magnets. A thermal sensor should be used to monitor the temperature.

1.4 Prohibition of unauthorized modifications and changes



For safety reasons, unauthorized modifications and changes to the motor are not permitted. If such modifications/changes are necessary, please contact the motor manufacturer.

No safety devices may be dismantled or decommissioned when operating the motor.

1.5 Signs and labels



WARNING!

Risk of injury due to illegible symbols!

- Over the course of time, stickers and symbols on the device can become dirty or otherwise unrecognizable.

Therefore:

Maintain all safety, warning and operating labels on the device in easily readable condition.



CAUTION!

Risk of injury due to hot surface!

When in operation, the top of the device can heat up to temperatures $> 70\text{ °C}$!

Therefore:

- Wear safety gloves



- It is not allowed that temperature sensitive parts, e. g. standard cables or electronic parts are touch or be mounted to hot surfaces.
- A thermal overload of the motors can lead to damage of the winding, the bearing and to the demagnetization of the rare-earth magnets.



Electrical voltage

Only qualified personnel may work in work areas that identified with this.

Unauthorized persons may not touch working materials marked correspondingly.

1.6 Limitation of liability

All specifications and notes in these instruction handbook were compiled taking into account the applicable standards and regulations, the state of the art and our knowledge and experience of many years.

The manufacturer assumes no liability for damages due to:

- Noncompliance with the instruction handbook
- Usage for other than the intended purpose
- Usage by untrained personnel

The actual scope of delivery can vary in case of optional equipment, laying claim to additional order options, or on account of the latest technical changes to the explanations and representations described herein.

The user bears the responsibility for performing service and initial operation in accordance with the safety regulations of the applicable standards and all other relevant governmental or local regulations concerning the dimensioning and protection of conductors, grounding, disconnectors, overcurrent protection, etc.

The person who carried out the mounting or installation is liable for any damage incurred when assembling or connecting the device.

1.7 Copyright protection

The instruction handbook must be treated confidentially. It is to be used exclusively by personnel who work with the device. The consignment of the instruction handbook to third persons without the written permission of the manufacturer is prohibited.



NOTE!

The specific contents, text, drawings, images and other representations are copyrighted and subject to industrial property rights. Any prohibited usage is punishable by law.

EnDat[®] is a registered trademark of Dr. Johannes Heidenhain GmbH,
83301 Traunreut, Germany

Hiperface[®]
SinCos[®] is a registered trademark of SICK AG,
79183 Waldkirch, Germany



NOTE!

Please note, that BAUMÜLLER is not responsible to examine whether any (industrial property) rights of third parties are infringed by the application-specific use of the BAUMÜLLER products/components or the execution.

1.8 Spare parts

**WARNING!**

False or flawed spare parts can lead to damage, malfunction or complete failure, thus endangering safety.

Therefore:

- Only use original spare parts of the manufacturer.

Procure spare parts through an authorized dealer or directly from the manufacturer.

1.9 Disposal

Insofar as no take-back or disposal agreement has been made, please disassemble units correctly and properly recycle the constituent parts.

Refer to [▶Demounting and Disposal◀](#) on page 62.

1.10 Guarantee provisions

The guarantee provisions are stated in a separate document of the sales documents. The devices described herein may only be operated in accordance with the stipulated methods, procedures and conditions. Anything else not presented here, including the operation in other mounted positions, is not permitted and must be cleared. If the devices are operated in any other manner than as described within these instruction handbook, then all guarantee and warranty rights are rendered null and void.

1.11 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.

TECHNICAL DATA



NOTICE!

If the electric motor supplied does not correspond to the standard type according to the technical list or if special contractual agreements have been made, there may be technical deviations from these instruction handbook.

In this case, please request the relevant technical supplements.

2.1 Motor specification

Construction type B3 Foot-mounted design
 B5 Flange-mounted design

Type of protection IP 54
 (EN 60034-5)



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 IC3W7
 (EN 60034-6)

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 PT1000 in stator winding	
Winding insulation (EN 60034-1)	Insulation class F ($\vartheta = 155\text{ °C}$)	
Surface	Matt black	RAL 9005
Bearings	DE:	Standard: Floating bearing: Ball bearing Option : Roller bearing
	NDE:	Fixed bearing: Ball bearing
Service life of bearing	L10H 20.000 h, guide value, 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< from page 38	
Flange	FF flange according IEC standard	
Shaft end	Cylindrical	According DIN 748, centering with inside thread, according to DIN 332 form D, option: with featherkey according to DIN 6885
Weight	Standard types: 82 - 160 kg	
Approvals	CE, cURus	

Further characteristic values can be found in our technical documentation.
If necessary, please request the relevant documents.

2.2 Installation conditions

Environment



WARNING!

The use in hazardous areas is forbidden, unless explicitly provided for this purpose (regard additional notes). Furthermore, there may not be flammable gas mixes and dangerous dust concentrations in the vicinity of the electric motor. Voltage-carrying and hot motor parts could cause fire and severe injuries and material damages.

If there should be the special case of the use in systems which are not industrial, higher demands are required (e.g. protection against children's fingers), these conditions must be ensured at installation of the system.

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/m³ to 25 g/m³

Please, take note of any deviating details specified on the type plate or in the technical documentation. The conditions at the place of use must correspond to the details on the rating plate.

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.

2.3 Specifications for water-cooling

2.3.1 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 %

2.3.2 Specifications referring to the required cooling flows

Motor type	Volume current [l/min]	Pressure drop $\pm 15\%$ [bar]	Heating [K]	Max. coolant pressure [bar]	Connection (G–inside thread)
DSC2 -					
DS4-132AA	9	0.25	5	6	2 x G ½" 1x inlet 1x outlet
DS4-132BB			6		
DS4-132CC			7		
DS4-132DD			8		
DS4-132EE			9		
DS4-132FF			10		

2.3.3 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

2.3.4 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 17). Type and quantity is based upon the accordant recommendations of the manufacturer and of the prevailing environmental conditions.



The safety regulations of the accordant corrosion and nucleation protection manufacturer must be observed.

Coolants from operating processes may not be used to cool the motor!

In view of harmful deposits the filling of a closed cooling system should be made in the cooling channels or cables using filtering at all times (filtering resolution < 0,1 mm). At the open cooling system in any case a filtering must be provided



NOTE!

The system manufacturer is responsible for the engineering of the entire cooling system.

Condensation of water must be avoided in any case.



Parts of the cooling system (e.g. sealing) can be overloaded by water surge pressure. The maximal pressure values shown in [►Specifications referring to the required cooling flows◄](#) on page 14 must not be exceeded.

To avoid water surge pressure or reduce their effects, it is recommended:

- Control valve in water supply, placed as far away as possible from the motor
- Use of suitable pressure relief valves (bypass)

2.3.5 Cooling circuits



NOTICE!

Only closed and semi-open cooling circuits are permitted for engines.

Reduction factors for water as a coolant, refer to [►Definition of performance for water-cooled machines◄](#) on page 14.

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.

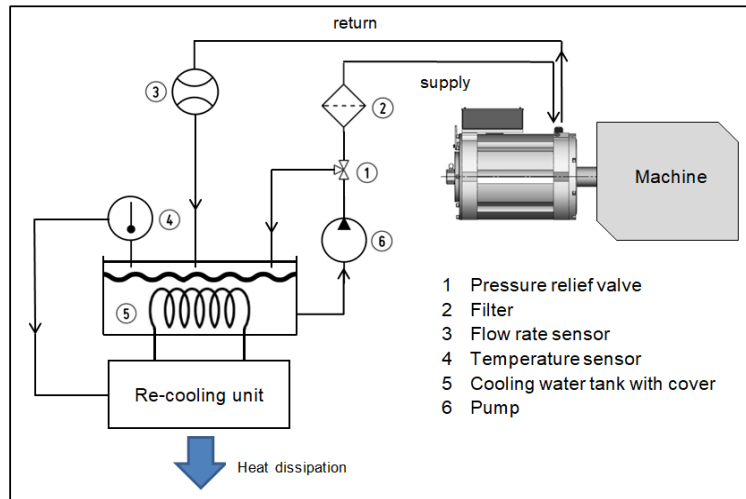


Figure 1: Example of a closed cooling circuit

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.

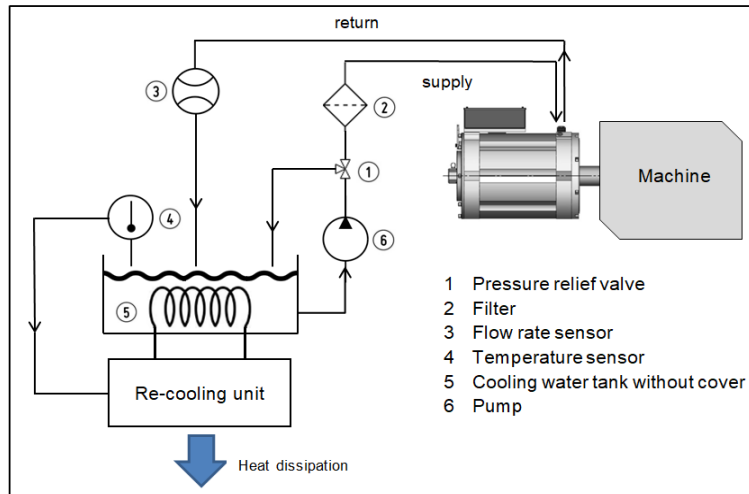



Figure 2: Example of a semi-open cooling circuit

Overview of refrigeration unit manufacturers

-
-
-
-
-
-
-
-
-
-



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.

2.3.6 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

For cooling use water clear and free of suspended solids and free of soiling.

2.3.7 Minimum coolant temperature in dependence of the environmental conditions.

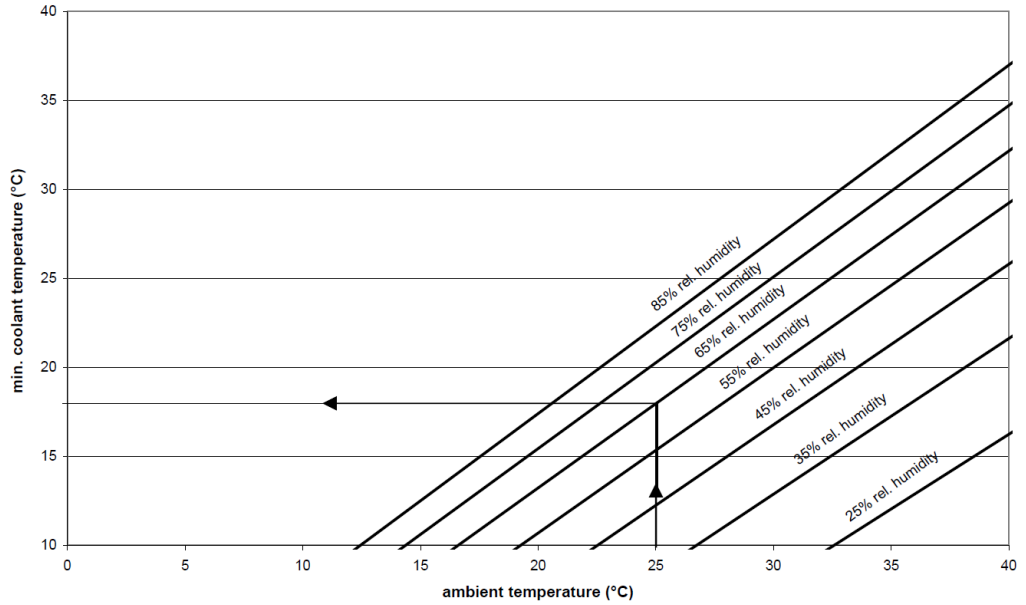


Figure 3: Evaluation of coolant temperature

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).

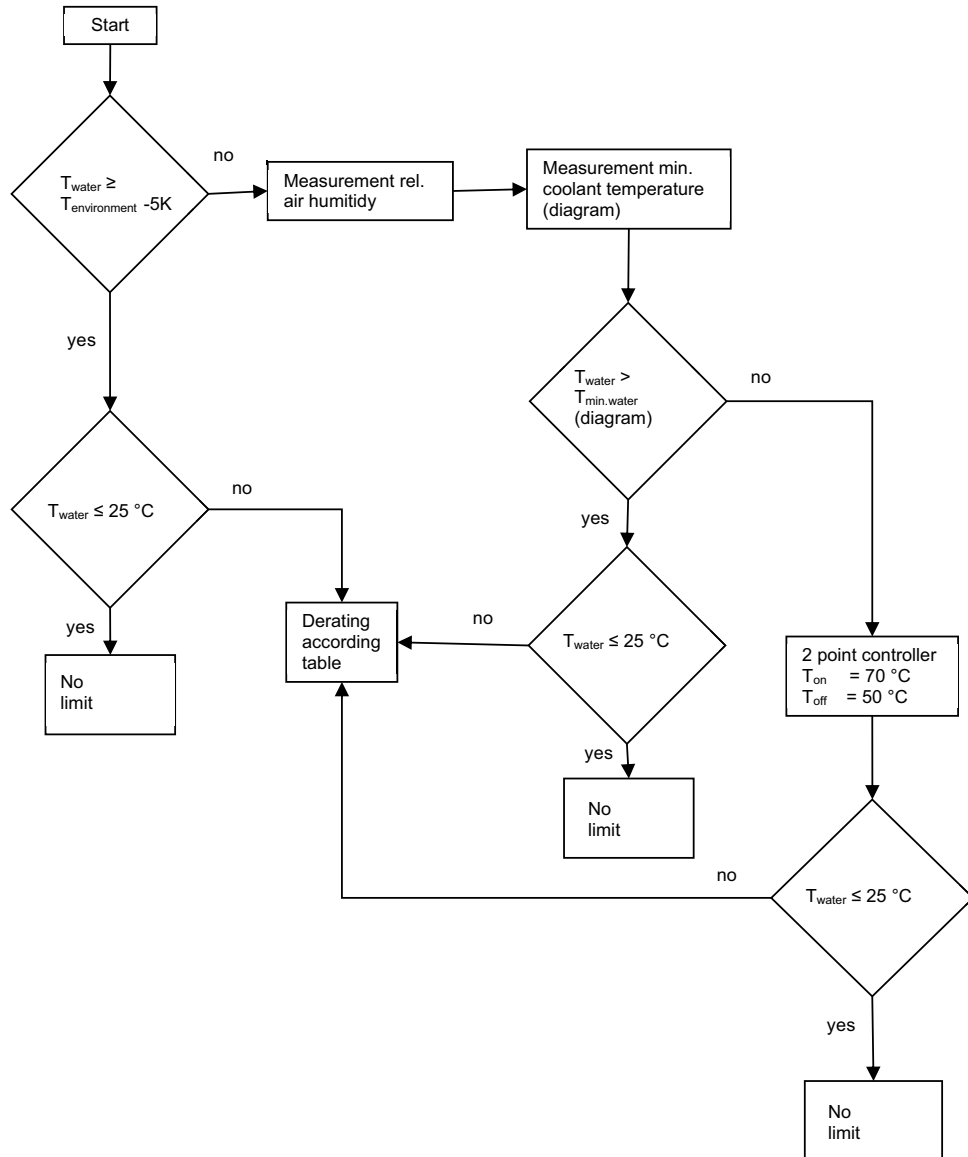


Figure 4: Function chart coolant entry temperature

2.4 Balancing, output elements and vibrations



Don't stress the shaft and the bearings with shocks.
 Axial forces aren't permitted during the mounting and demounting of output elements.
 The required measures referring to the contact protection of the output elements in general must be regarded.
 If a motor is put into operation without output elements then the featherkey must be protected against being ejected.

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).



NOTE!

Regard the identification of the balancing type at the shaft end face:

- H = Balancing with half the featherkey Standard type
 F = Balancing with the complete featherkey Special type

Output elements

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

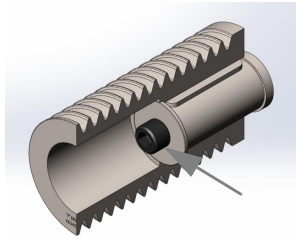
When fitting and removing the output elements (e.g. coupling disks, rack-wheels, pulley wheels) adequate facilities must be used.

- 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).



NOTICE!

- At the shaft version without featherkey the drive elements are to be fixed on the output shaft by means of appropriate clamping sets.
- At shaft versions with featherkey it must be considered that the output elements are applied to the shaft shoulder.
 Note: The bevel and the radius at the output element and the shaft radius towards the shoulder (accordant to DIN748-1) must be compatible.
- If the threaded hole in the shaft end is used to protect the output elements axially (e.g. pulley wheels), the tightening torques in following table may not be exceeded:



Thread	Tightening torque in Nm
M3	1,1
M4	2,6
M5	5,0
M6	9,0
M8	22,0
M10	44,0

Figure 5: Tightening torques using the example of a locking bolt S of a pulley wheel



NOTE!

Appropriate measures are to be used to protect the screws!

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, refer to [▶Vibrations and resistance to vibrations◀](#) on page 38.

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.

2.5 Radial force diagrams

Ball bearing

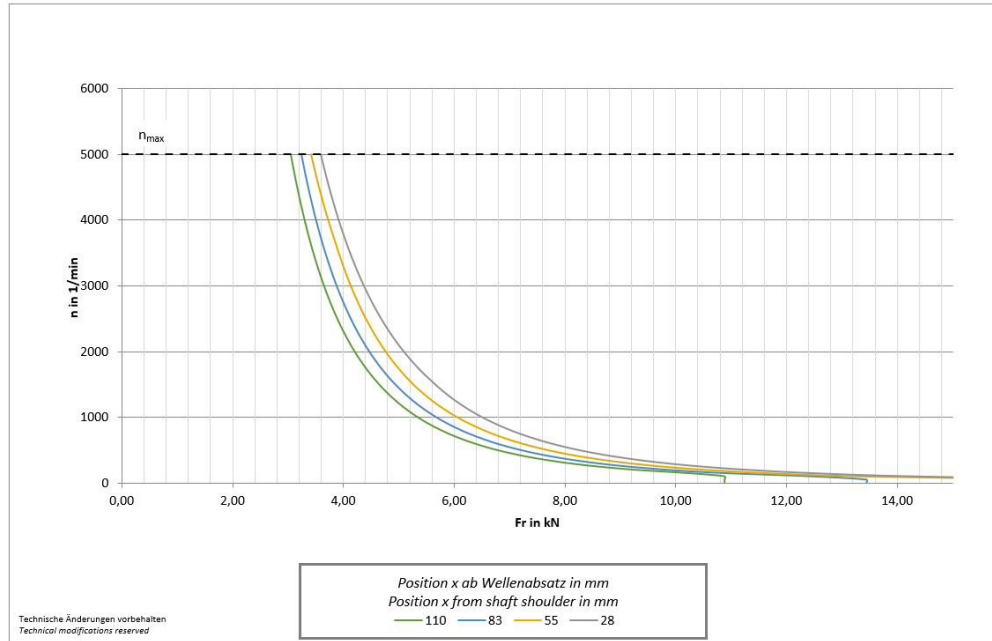


Figure 6: Radial force diagram ball bearing

Roller bearing

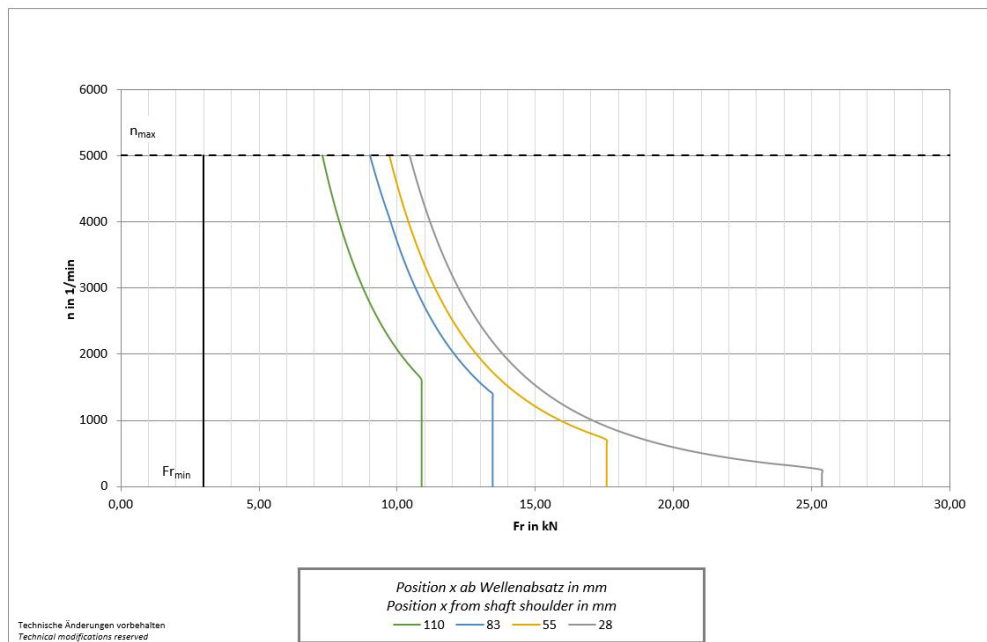


Figure 7: Radial force diagram roller bearing

Shaft

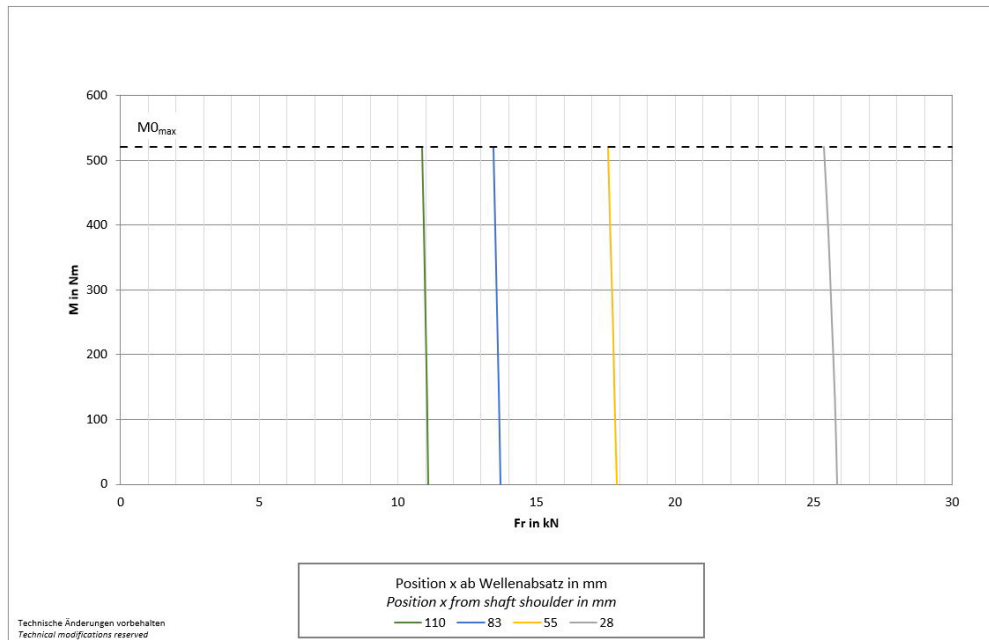


Figure 8: Radial force diagram shaft

3

DESIGN AND OPERATION

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

3.1 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.

3.2 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.

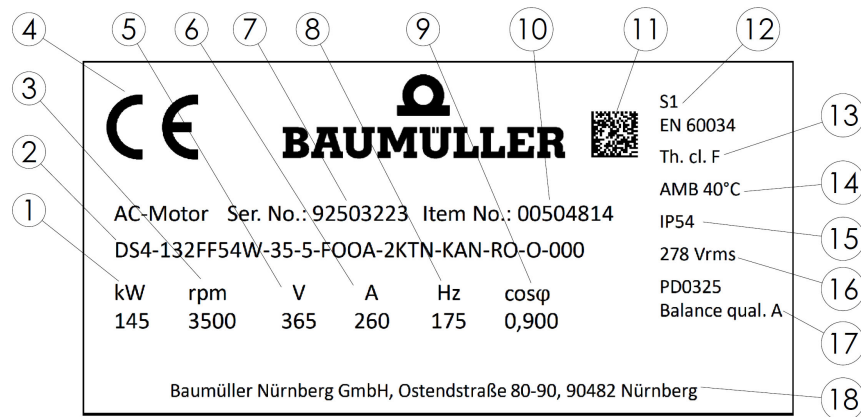


Figure 9: Type plate

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

3.3 Type code

DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	Type
DS4- <u>XXX</u> XXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	Size 132
DS4-XXX <u>XX</u> XXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	Length AA BB CC DD EE FF
DS4-XXXXXX <u>XX</u> -XX-X-XXXX-XXXX-XXX-XX-X-XXX	Type of protection 54 - IP54
DS4-XXXXXXXX <u>X</u> -XX-X-XXXX-XXXX-XXX-XX-X-XXX	Cooling W - Water-cooling
DS4-XXXXXXXX- <u>XX</u> -X-XXXX-XXXX-XXX-XX-X-XXX	nominal speed class 10 - 1000 min ⁻¹ 15 1500 min ⁻¹ 20 2000 min ⁻¹ 25 - 2500 min ⁻¹ 30 3000 min ⁻¹ 35 3500 min ⁻¹ 40 4000 min ⁻¹ 45 4500 min ⁻¹ 50 5000 min ⁻¹
DS4-XXXXXXXX-XX- <u>X</u> -XXXX-XXXX-XXX-XX-X-XXX	U _{DC link} - DC 5 - 540 V 6 - 640 V

DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	<p>Encoder type</p> <ul style="list-style-type: none"> O - Without encoder * A - Resolver D - SRS50 E - SRM50 F - ECN1313 G - EQN1325 H - ECN1325 I - EQN1337 J - EES37 K - EEM37 L - SEK37 M - SEL37 Y - ECI1319 X - EQI1331 <p>* On request</p>
DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	<p>Encoder option</p> <ul style="list-style-type: none"> O - Without Option E - With electronic Baumüller type plate S - Safety T - With electronic Baumüller type plate + safety
DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	<p>Brake</p> <ul style="list-style-type: none"> O - Without brake B - With spring brake
DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	<p>Shaft option</p> <ul style="list-style-type: none"> A - Smooth shaft B - With featherkey
DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	<p>Construction type</p> <ul style="list-style-type: none"> 1 - IM B3 2 - IM B5
DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	<p>Type of main connection</p> <ul style="list-style-type: none"> K - Terminal box (with PT1000) N - Terminal box (PT1000 on encoder connector)
DS4-XXXXXXXX-XX-X-XXXX-XXXX-XXX-XX-X-XXX	<p>Position main connection</p> <ul style="list-style-type: none"> T - Top B - Bottom L - Left with view DE, foot bottom R - Right with view DE, foot bottom

DS4-XXXXXXXX-XX-X-XXXX-XXXX- <u>X</u> -XXX-XX-X-XXX	<p>Outlet main connection</p> <p>T - Top</p> <p>B - Bottom</p> <p>L - Left with view DE to shaft end</p> <p>R - Right with view DE to shaft end</p> <p>D - DE</p> <p>N - NDE</p> <p>P - Pivoted</p>
DS4-XXXXXXXX-XX-X-XXXX-XXXX- <u>X</u> XX-XX-X-XXX	<p>Bearing</p> <p>D - Roller bearing DE (standard: single-row cylindrical roller bearing)</p> <p>K - Ball bearings A/B (standard: single-row deep groove ball bearings)</p> <p>L - Ball bearings A/B (standard: single-row deep groove ball bearings) with relubrication on DE</p> <p>M - Ball bearings A/B (standard: single-row deep groove ball bearings) with relubrication on DE and NDE</p> <p>N - Roller bearings on DE (standard: single-row cylindrical roller bearings) with relubrication on DE and NDE</p> <p>R - Roller bearings on DE</p>
DS4-XXXXXXXX-XX-X-XXXX-XXXX- <u>X</u> X-XX-X-XXX	<p>Vibration resistance</p> <p>A - Vibration resistance A</p> <p>B - Vibration resistance B</p>
DS4-XXXXXXXX-XX-X-XXXX-XXXX- <u>X</u> X-XX-X-XXX	<p>Concentricity</p> <p>N - Normal</p> <p>R - Reduced</p>
DS4-XXXXXXXX-XX-X-XXXX-XXXX- <u>X</u> X-X-XXX	<p>Position cooling</p> <p>T - Top</p> <p>B - Bottom</p> <p>L - Left with view DE, foot bottom</p> <p>R - Right with view DE, foot bottom</p>
DS4-XXXXXXXX-XX-X-XXXX-XXXX- <u>X</u> X-X-XXX	<p>Option cooling</p> <p>O - Without cooling option</p>
DS4-XXXXXXXX-XX-X-XXXX-XXXX- <u>X</u> -XXX	<p>Gear / pump mounting</p> <p>O - Without gear and without pump mounting</p>
DS4-XXXXXXXX-XX-X-XXXX-XXXX- <u>X</u> -X- <u>XXX</u>	<p>Special version</p> <p>000 - No special version</p>

TRANSPORT AND PACKAGING

4.1 Safety notes for transport

**NOTICE!****Damage due to unauthorized transport!**

Transport handled by untrained personnel can lead to a substantial amount of material damage.

Therefore:

- The unloading of the packages upon delivery as well as the in-house transport should only be done by trained personnel.
- Contact Baumüller Nürnberg GmbH sales office if necessary.

**WARNING!****Danger of mechanical hazard!**

Secure devices against falling down.

Therefore:

- Take suitable measures, such as supports, hoists, straps, etc., to ensure that devices cannot fall down.
- Use appropriate handling material.

**NOTICE!****Water-cooled motor!**

In order to avoid frost damage it must be ensured that there is no coolant in the motor during the transport or at a temporary storage at environmental temperatures $< 3\text{ °C}$. The coolant can be purged with compressed air.

4.2 Scope of supply

The supply is compiled order-related.

- Damage that incurred during transit must immediately be reported to the transport company.
- Immediately after receiving the delivery compare the performance data of the delivered motor with your ordering data. If visible defects or insufficient delivery is determined then immediately contact the responsible Baumüller subsidiary or the main Baumüller company in Nuremberg.



WARNING!

The motor must not be commissioned in case of a visible transport damage.

4.3 Transport notes



The permitted environmental conditions that may act on the motor during the transport is to be taken of DIN EN 60721-3-2 (class 2K2/2M1). The permitted temperature range was contrary to the DIN reduced to -15 °C to $+60\text{ °C}$.

Suitable load carrying devices are to be used as for example belt straps, single slings etc. If the motor provides lifting lugs they must be used for lifting.

The terminal boxes and motor connectors may not be used as transport safety or as lifting lugs.

During transport the correspondent country-specific regulations must be complied with. Lifting devices, transport and load bearing devices must comply with the regulations.

The connection areas must be protected against corrosion. The motor have to be transported with the provided protection. Avoid damage of the connection areas.

Bearing lock



NOTICE!

Bearing lock!

On motors with cylinder roller bearings, the runner must be blocked at the end of the shaft in order to prevent damage during transit.

The transport protector **must** be used every time the machine is moved.

If this lock no longer can be used due to mounting of a drive element, other suitable means must be employed for axial fixing of the rotor for transport.

4.4 Intermediate storage

If a motor is not to be commissioned immediately after delivery, it should be stored inside a building in a dry, dust-free and low-vibration room ($V_{\text{eff}} \leq 0.2 \text{ mm/s}$).

The motors should not be stored longer than 2 years at a consistent temperature which is within the temperature range of -15 to +60 °C. Elevated storage temperatures within the framework of the working temperature accelerate the rate at which seals and bearing grease deteriorate and therefore have a negative impact on the service life even before the unit has been commissioned. Direct exposure to incident solar radiation, UV light and ozone also lead to an aging of the gaskets and must be avoided!

Please note that the warranty periods commence from the date of delivery. For this reason, we recommend that storage periods are kept to a minimum.

Should nevertheless a longer storage be necessary, the environmental conditions according to DIN EN 60721-3-1 (class 1K2/1M1) have to be observed. Contrary to the DIN, an extended temperature range of -15 °C to + 60 °C is permitted.



NOTE!

Water-cooled motor

At a transport or intermediate storage temperature $< 3 \text{ °C}$, the coolant has to be drained as a precautionary measure to avoid of frost damage. The cooling water can be blown out with compressed air.

4.5 Unpacking

After having received the still packaged device:

- ▶ Avoid transport shocks and hard jolts, e.g. when putting an item down.

If no transport damage is visible:

- ▶ Open the packaging of the device.
- ▶ Verify the delivery scope based on the delivery note.

File a claim with the responsible Baumüller representative if the delivery is incomplete.



NOTE!

Claim each individual deficiency as soon as it has been detected. Damage claims can only be validly asserted within the claim registration period.

4.6 Disposal of the packaging

The packaging consists of cardboard, plastic, metal parts, corrugated cardboard and/or wood.

- ▶ When disposing of the packaging, comply with the national regulations.

MOUNTING

5.1 Safety notes

**NOTE!**

Mounting shall only be performed by employees of the manufacturer or by other qualified personnel.

Qualified personnel are persons who – on account of their occupational training, experience, instruction and knowledge of relevant standards and stipulations, accident prevention regulations and operating conditions – are authorized by the persons responsible for the safety of the facilities to perform the respective activities that are necessary, while at the same time recognizing and preventing any potential risks. The qualifications necessary for working with the device are, for example:

- Occupational training or instruction in accordance with the standards of safety engineering for the care and use of appropriate safety equipment.

**WARNING!**

Danger as a result of incorrect mounting!

The mounting requires qualified personnel with adequate experience. Incorrect mounting can lead to life-threatening situations or substantial material damage.

Therefore:

- Only allow mounting to be performed by employees of the manufacturer or by other qualified personnel.

**WARNING!**

Danger of mechanical impact!
Secure devices against falling down.

- Before mounting

**WARNING!**

Never mount or commission a damaged motor.
Never install the motor in a damaged machine.
Before mounting the motor, make sure it is suitable for your machine.

- During mounting

**WARNING!**

Only mount the motor using the fastening features provided.
The motor should not be exposed to knocks, e. g., with a hammer, or shocks when mounting.
Make sure that all covers and safety devices are mounted. All safety devices must comply with the latest regulations (e. g. EN 60204).

Water-cooling:

In order to avoid damages of the housing screw-in glands with cylindrical internal thread may be used for the water connections (inlet / outlet), only.

From cooling pipes tensile loads, compression loads and torsional loads may not be applied to the motor connections.

The connection may only be executed by specialists. Thereby, the motor must be without current and voltage.

It must be considered that the cooling liquid doesn't reach the motor terminal box when coupling and uncoupling the cooling cables.

5.2 Tightening torques



NOTE!

The tightening torques mentioned below are general specification. Single specifications, e.g. tightening torques in motor specific dimension sheets or data sheets, have to be complied with first.

Tightening torques in Nm, tolerance +/- 10 %

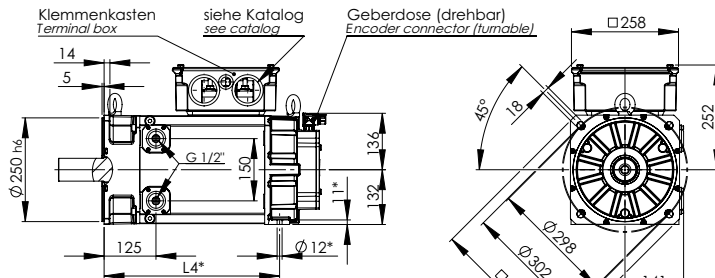
	M4	M5	M6	M8	M10	M12	M16	M20	M24	M30	M36	M42	M48	M56
Torque in Nm ¹⁾	1.3	2.6	4.5	11	22	38	92	180	310	620	1080	1700	2600	4200
Torque in Nm ²⁾	3	5	8	20	40	70	170	340	600	1200	2000	3100	4700	7500

- 1) For screws of strength category 8.8 according to ISO 898-1 in components with lower strength (e. g. aluminum).
- 2) For screws of strength category 8.8 or A4-70 according to ISO 898-1 in components with higher strength (e.g. steel, gray cast iron).

5.3 Dimensions

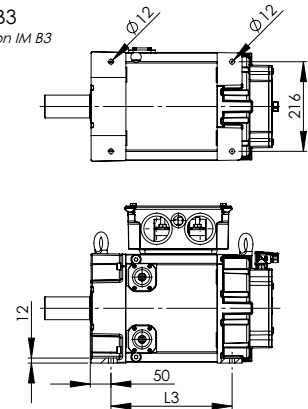
Bauform IM B5

Type of construction IM B5

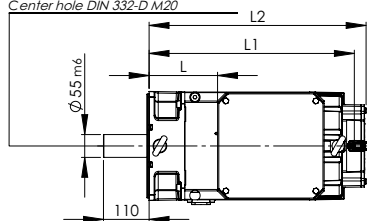


Bauform IM B3

Type of construction IM B3



Zentrierbohrung DIN 332-D M20
Center hole DIN 332-D M20

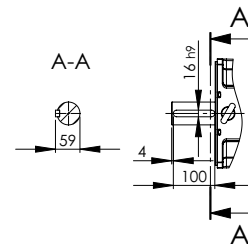
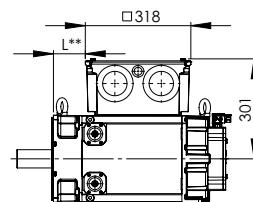


	L	L*	L1***	L2***	L3	L4*
DS4-132AA	84		414	442	292	342
DS4-132BB	124		454	482	332	382
DS4-132CC	165	96,5	495	523	373	423
DS4-132DD	206	137,5	536	564	414	464
DS4-132EE	247	178,5	577	605	455	505
DS4-132FF	287	218,5	617	645	495	545

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

**Klemmenkastengröße 310
**Terminal box size 310

Optional: Wellenende mit Passfeder
Optional: Shaft with key



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

Figure 10: Dimensions

5.4 Installation, mounting

Prior to and during mounting, check that:

- The motor is not damaged (e. g. the shaft sealing ring must not have sustained any damage at all from sharp or pointed objects).
- The motor is not mounted in the danger zone of other equipment.
- The motor is used in accordance with its intended purpose:
Observe type plate details, warning labels, and signs.
- Anti-corrosion agents have been fully removed from the shaft ends.
If a common solvent such as acetone or a cleaning solvent is used, it must not be allowed to wet the shaft sealing ring.
- The motor is designed for the ambient conditions and environmental influences on site (refer to [►Installation conditions◄](#) on page 13).
- The mounting space in the machine is suitable for the cooling method employed for the motor. The space for installing of the cooling connections must be provided.
- In order to connect the motor and to execute inspection and maintenance workings there must be enough space in the machine.
The mounting dimensions of the motor including the tolerance specifications can be taken from [►Dimensions◄](#) on page 35.
- The motor can be mounted and operated with the available fastening options.
When flanging to the motor a good and even contact area must be regarded. The guide fittings and contact areas must be undamaged and clean. They should be in the exact position to the shafts to be connected, to avoid harmful loads due to offset of the bearings, shafts and housings in the entire system. When tightening the flange screws (at least strength class 8.8) avoid distortions at the flange connection.
- At a vertical assembly with the shaft end to the top assure that there is a protection against ingress of liquids onto the upper bearings.
- The permitted radial forces may not exceed the accordant performance characteristics of the technical documents of the product (if required clarify by a Baumüller subsidiary).
If there are axial forces this must be approved by the motor manufacturer.
- The rotor must be able to turn uniformly and without chafing noise. The brake must be released beforehand if the motor has an integrated brake.
- The installation and type of the motor and encoder cables must comply with the operation handbook.
- The output elements as well as the drive elements must be protected.
- The complete cooling system must be sealed and functionally as well as protected against objects which fall into.
- The surface of the motor is unpolluted.

5.5 Mounting notes water-cooling



Cooling system connection:

On the motor connections from the coolant pipes no tensile loads, thrust loads or torsional stress may be applied.

The connection may be executed by qualified personnel only. Thereby the motor must be without current or voltage.

When coupling or decoupling the coolant pipes it must be observed that no cooling liquid gets into the motor terminal box.



Sealing test according EN 50178:

The sealing of the cooling system must be tested before commissioning by a pressure-test with the coolant (water). The testing pressure must be twice the operating pressure (minimum test pressure 1 bar). The used coolant must thereby not be at operating temperature. The pressure must be maintained (minimum testing time 10 minutes).

5.6 Special aspects using pump drives with internal teeth



NOTICE!

Pump drives allow no radial load. Pump drives are for torque transmission.

- Check before mounting, whether the interface between pump and motor is suitable (centering; tothing; fastening).
- During assembly of the servo pump to the motor, it should be noted that:
 - The contact surfaces (plane surface and centering as well as tothing on pump and on motor) must be undamaged and clean.
 - The tothing of servo pump and motor must be lubricated with the appropriate grease before connection.
 - The flange areas of pump and motor must lie flat on each other.
 - When tightening the mounting screws (at least strength class 8.8 or higher) care must be taken to avoid tensions in tothing.

5.7 Vibrations and resistance to vibrations

The vibration response of the entire system at the place of use, 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 (refer to figure below).

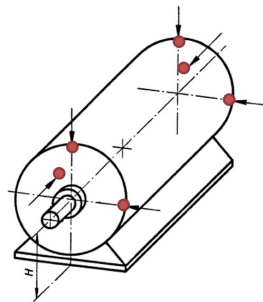


Figure 11: Measuring points for vibration

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.

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

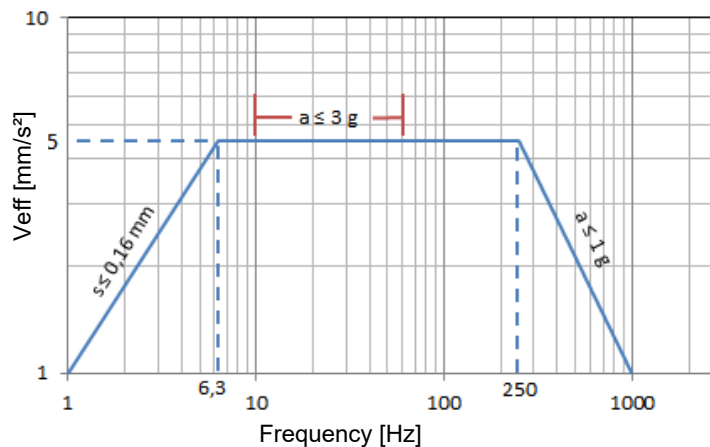


Figure 12: Permitted radial vibration load

Maximum axial vibration load:

Peak vibration acceleration 0.225 g	$> 55 \text{ Hz}$
Peak vibration displacement $\leq 0.16 \text{ mm}$	$< 6.3 \text{ Hz}$
Effective vibration speed $\leq 4.5 \text{ mm/s}$	$6.3 \text{ Hz} - 55 \text{ Hz}$

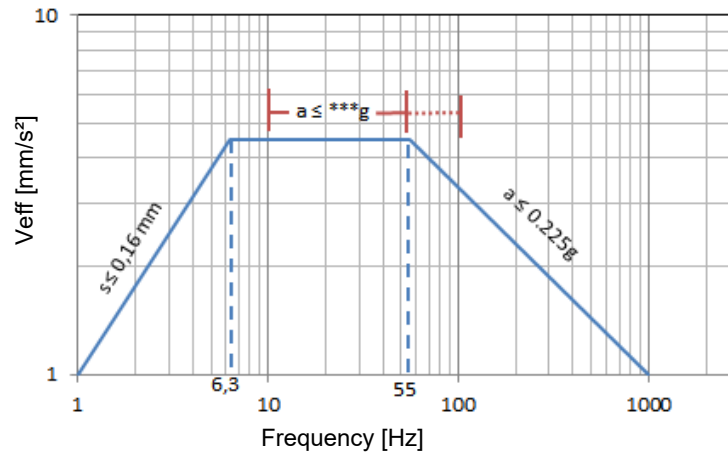


Figure 13: Permitted axial vibration load

Additional vibration resistance:

Shaft height 71	3 g radial	
	0.5 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.

INSTALLATION

6.1 Safety notes



All work must be carried out by specially trained personnel.

Work must only be carried out when the system is electrically isolated and secured against unintentional restarting (also auxiliary circuits).

Work must only be carried out once the motor has come to a standstill.

In the case of three-phase synchronous motors with permanent magnet excitation, voltages of >60 V can occur at the motor contacts with the rotor running.

Regulations for working in electrical plants must be observed!

The safety regulations for work on electro technical systems in accordance with EN 50110-1 must be followed:

- Isolate
- Secure against unintentional restarting
- Verify safe isolation from the supply
- Grounding and short-circuiting
- Safeguard or cover adjacent live parts



The motor must be operated by a correspondingly designed converter. A direct connection to the three-phase power system can destroy the motor.

Ensure that the phase sequence and the pin assignment are correct!

Electrical connections, protective conductor connections, and screen connections (when using screened cables) must be permanently secure!

6.2 Electrical installation

- The person setting up the system is responsible for the correct electrical installation.
- The motor data on the type plate must be observed.
- Connection cables and connectors must be correctly rated for the voltages and currents and must be suitable for the method of installation.
- The motor and its modules (encoder etc.) must be connected in accordance with the details on the wiring diagrams (see enclosed **wiring diagrams** and [▶Pin assignment control connections](#)◀ from page 44).
- Screened power and encoder cables must be used to protect against electromagnetic EMC interference from motor cables and their effects on the encoder and control systems.
Please refer to the EMC notes provided by the supplier of the converter.
- In the interest of ensuring operational safety, we recommend that you use connecting cables assembled by Baumüller.
- Before connection, the plugs, sockets and the terminal boxes must be checked for damage, corrosion, dirt and dampness.
- Connectors and terminal box connections must not be exposed to mechanical stress. If necessary, protect against strain, shearing, twisting and kinking.
- Ensure the connections are made correctly and are tight. Seals and sealing faces on the connectors and the terminal boxes maintain the type of protection.



NOTE!

The turnable connection box should be turned not more than 5 times to ensure the type of protection.

Please, pay attention to the following at the main connection via the terminal box:

- The cable ends must be stripped so far as the isolation nearly reaches the cable lugs and terminals. Protruding wiring ends must be avoided.
- The cable lugs must be matched to the dimension and cross sections of the terminals and cables.
- The screw connections of the electrical connection must be tightened by the specified tightening torque to ensure the type of protection.



NOTE!

All inlets which are not required must be closed with metallic fastening elements. The sealing elements of the terminal box must be fully functional and undamaged.

6.3 Electrical connections

6.3.1 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	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• U_0/U 600 / 1000 V (power wires)• 24 V_{DC} (control wires)
Wire labeling	<ul style="list-style-type: none">• Power wires U, VV, WWW• Colored control cable pairs as star quads in red, white, black, yellow
Assignments of the pairs	<p>Note polarity!</p> <ul style="list-style-type: none">• red - black (brake)• white - yellow (temperature sensor)

6.3.2 Main connection via terminal box

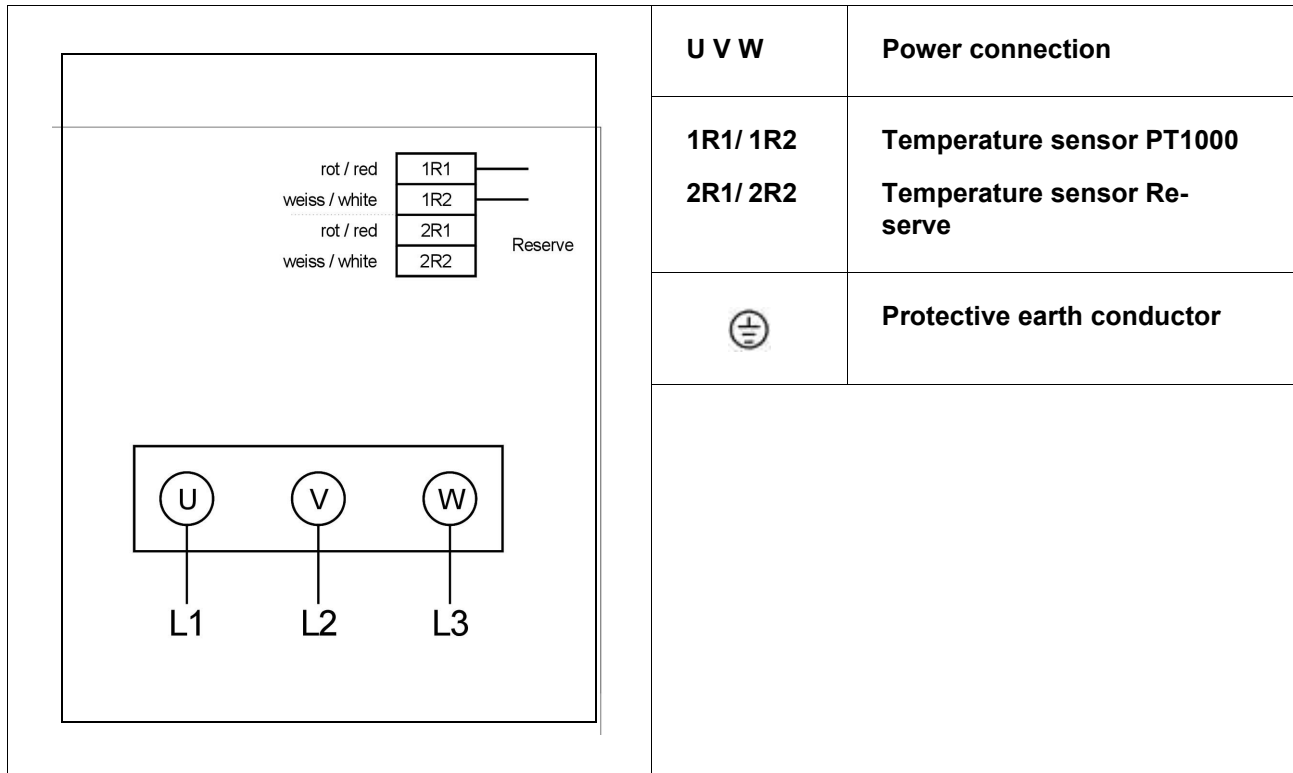


Figure 14: Main connection with terminal box

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]		Protective conductor in the terminal box ¹⁾	Protective conductor on the housing ¹⁾
		min.	max.		
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, refer to [▶Tightening torques◀](#) on page 35.

6.4 Pin assignment control connections

**CAUTION!**

Encoders are sensitive to electrostatic charges.

**NOTE!**

Please, take the pole assignment from the accordingly enclosed connection diagrams or from the technical documents concerning encoder types which were not mentioned here.

The specifications of the technical data were provided by the encoder manufacturer and we assume no liability for its correctness.

6.4.1 Resolver

Pole pair number	A
BM type code indication	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

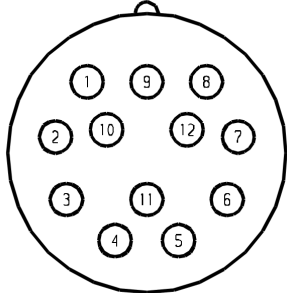
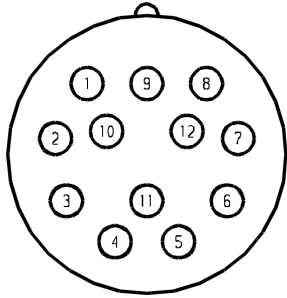
View on the contact side of the mounting socket	Pin	Signal
	1	cos -
	2	
	3	
	4	
	5	sin -
	6	sin +
	7	
	8	cos +
	9	
	10	Ref +
	11	
	12	Ref -

Figure 15: Pin assignment resolver

6.4.2 SEK/SEL 37 (SICK)

	SEK 37	SEL 37
BM type code indication	t	u
Number of sine, cosine periods per revolution	16	
Measuring step for the interpolation of the sine, cosine periods such as 12 bit	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	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.

6.4.3 SRS/SRM 50 (SICK)

	SRS 50	SRM 50
BM type code indication	D	E
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	

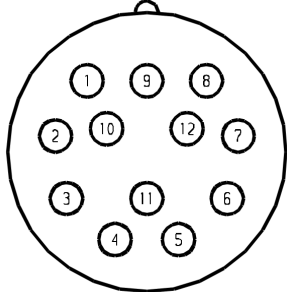
View on the contact side of the mounting socket	Pin	Signal	Option with PT1000 (R1/R2) on encoder socket
	1	cos -	cos -
	2	+ 485	+ 485
	3		R1
	4		R2
	5	sin +	sin +
	6	sin -	sin -
	7	- 485	- 485
	8	cos +	cos +
	9		
	10	GND	GND
	11		
	12	- U	- U

Figure 17: Pin assignment SRS/SRM 50

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

6.4.4 SRS/SRM 50-S (SICK)

	SRS 50-S	SRM 50-S
BM type code indication	N	O
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	

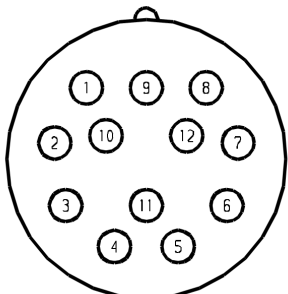
View on the contact side of the mounting socket	Pin	Signal	Option with PT1000 (R1/R2) on encoder socket
	1	cos -	cos -
	2	+ 485	+ 485
	3		R1
	4		R2
	5	sin +	sin +
	6	sin -	sin -
	7	- 485	- 485
	8	cos +	cos +
	9		
	10	GND	GND
	11		
	12	- U	- U

Figure 18: Pin assignment SRS/SRM 50-S

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.

6.4.5 EES 37/EEM 37 Hiperface DSL® (SICK)

	EES 37	EEM 37
BM type code indication	r	s
Number of absolute completed revolutions	1 (15 bit)	4096 (15 bit)
Code type for the absolute value	Binary	
Interface signals	Digital, RS485	
Position values / revolution	32768	
Maximum angular acceleration	500 000 rad/s ²	
Maximum operating speed	12000 min ⁻¹	
Power supply range	7 - 12 V	
Current consumption without load	≤150 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	
Working temperature	-40 °C .. +115 °C	

View on the contact side of the socket, size 1	Pin	Signal
	1	Phase U
		Ground
	3	Phase V
	4	Phase W
	A	B+
	B	B-
	C	DSL+
	D	DSL-

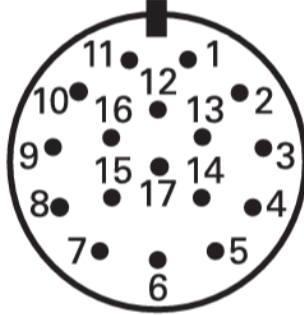
View on the contact side of the socket, size 1,5	Pin	Signal
	U	Phase U
	V	Phase V
	W	Phase W
		Ground
	+	B+
	-	B-
	1	
	2	
	H	+U / DSL+
	L	GND / DSL-

Figure 19: Pin assignment EES 37/ EEM 37

NOTE
 Encoders are ESD sensitive devices. The technical data is specification from the encoder manufacturer. The configuration options of the Hiperface DSL® encoder with various motor versions are to be taken from the product configurator. The encoder can be used up to a cable length of 60 m.

6.4.6 ECN 1313 / EQN 1325 (Heidenhain)

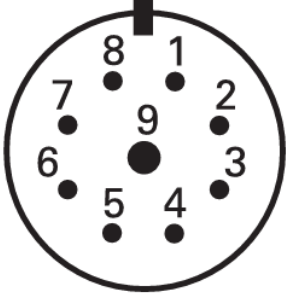
	ECN 1313	EQN 1325
BM type code indication	F	G
Number of sine, cosine periods per revolution	2048	
System accuracy	±20"	
Number of absolute completed revolutions	1	4096 (12 bit)
Code type for the absolute value	EnDat 2.1	
Sampling limit frequency or limit frequency	0 - 200 kHz	
Position values / revolution	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	

	Pin	Signal	Option with PT1000 (R1/R2) on encoder socket
<p>View on the contact side of the mounting socket</p>  <p>Figure 20: Pin assignment ECN 1313/ EQN 1325</p>	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.

6.4.7 ECN 1325 / EQN 1337 (Heidenhain)

	ECN 1325	EQN 1337
BM type code indication	H	I
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)	Pin	Signal
 <p>Figure 21: Pin assignment ECN 1325 / EQN 1337</p>	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.

6.4.8 ECN 1325-S / EQN 1337-S (Heidenhain)

	ECN 1325-S	EQN 1337-S
BM type code indication	5	6
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	

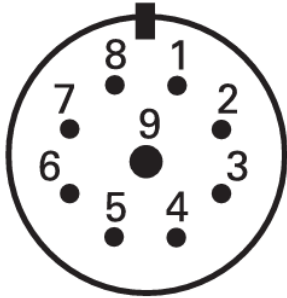
View on the contact side of the mounting socket (M23)	Pin	Signal
		1
2		Clock inv.
3		Up
4		0 V
5		Data
6		Data inv.
7		Sensor Up
8		Sensor 0 V
9		-

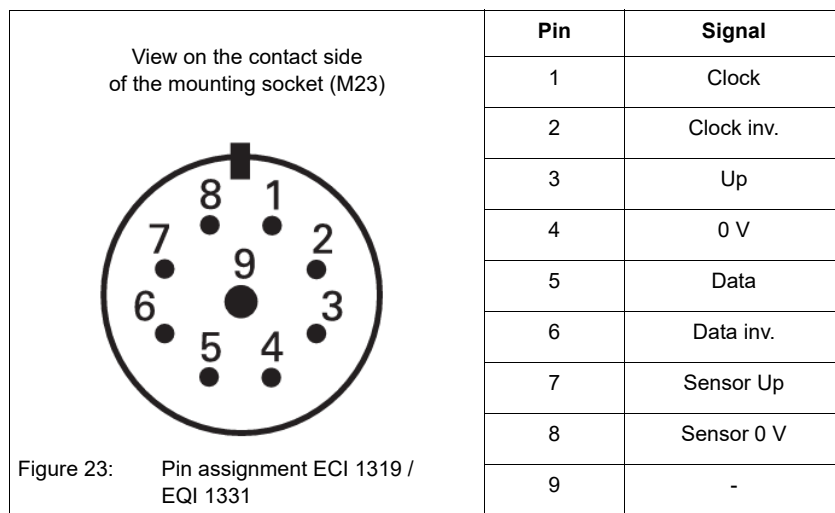
Figure 22: Pin assignment ECN 1325-S / EQN 1337-S

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.

6.4.9 ECI 1319 / EQI 1331 (Heidenhain)

	ECI 1319	EQI 1331
BM type code indication	Y	X
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	



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



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.

COMMISSIONING, OPERATION

7.1 Safety notes

Working on the motor



Work must not be carried out on the motor until the motor has come to a standstill, is electrically isolated and cooled down. All connections, such as screw connections, that were loosened when working on the motor must be tightened again prior to commissioning.

When carrying out work on the motor, please observe the technical instructions and notes in the respective sections in this Instruction handbook.



DANGER!

The (optional) integrated brake functions only as a parking brake, during work on the motor it **must not** have a protective function (e.g. holding loads).

Danger of life due to electric shock



Make sure that the motor is disconnected and electrically isolated.

Never disconnect the motor connections during operation.

Only connect measuring instruments when the motor is disconnected from the power supply and electrically isolated.

Only commence work on the motor connections when you are sure the motor is electrically isolated and there is no potential.



When in operation, electric potential can be found at the motor terminals / contacts and at the motor windings. Never touch these modules / elements while the motor is in operation.

Installing and uninstalling safety devices

The motor may not be commissioned without mounted the safety devices.
The motor must be put out of operation when installing and dismantling components and systems which are provided for monitoring the motor for safe operation.

Danger on physical contact

Make sure that the electric motor has come to a standstill and is secured against accidental restarting before you touch it.

Only touch the output shaft when the motor is electrically isolated and it has come to a standstill. Otherwise there is a risk due to the rotating rotor.

**Danger of burns!**

Never touch the motor housing when the motor is running at rated load. The surface temperatures on the motors may exceed 70 °C.

**NOTICE!****Environmental conditions that do not meet the requirements.**

Environmental conditions that are non-compliant can lead to property damage.

Therefore:

- Ensure that the environmental conditions are kept compliant during operation (refer to [Installation conditions](#) from page 13).

**WARNING!****Risk of injury due to insufficient qualifications!**

Inevitably, when operating this electrical device, certain parts of this device are energized with hazardous voltage. Improper handling can lead to significant personal injury and material damage.

Therefore:

- Only qualified personnel may work on this device!

7.2 Checks prior to commissioning

- The motor is not damaged and is not within the danger area of another installation.
- The motor has been properly installed and aligned.
All fixing screws, connection elements, and electrical connections have been tightened to the specified tightening torques.
Not used threads are closed.
- All safety devices (mechanic, thermal, electric) are installed.
- The motor connections are installed.
- The cables do not touch the motor surface.
- The protective system is installed and function-checked.
- The drive is not blocked.
- Emergency stop function is checked.
- The cooling lines are installed, the water-cooling is function-checked.

7.3 Commissioning

The commissioning must be done by qualified personnel. The technical documentation of the converter and of the cooling system have to be observed.



WARNING!

- The brake is a holding brake with emergency stop function (Voltage failure ? emergency stop).
- Use as a working brake is prohibited!

Checks during commissioning

- Have all modules of the motor such as the encoder, the cooling and so on been tested on functioning and are all application conditions observed.
- Have all electrical connections and terminals been properly completed and fastened. (refer also to [Installation](#) from page 40 and enclosed connection diagrams)
- Have all protective measures been met and operating correctly preventing the touching of energized parts, hot surfaces, rotating and moving parts and modules.
- Were all output elements mounted and set complying with the specifications of the manufacturer.
- Is ensured that the maximum permitted speed n_{\max} of the motor cannot be exceeded. The maximum permitted speed n_{\max} is the highest short-term permissible operating speed.

7.4 Operation

Checks during operation

- Pay attention to unusual noises.
- If scratching and scraping noises, grinding noises or the like occur shut down the drive immediately and find out the causes.
- Check the motor surface and connection lines for pollutions for example dust deposits, oil pollution, humidity, leakage etc.
- Check the maintenance intervals
- The flow rate and the pressure ratios of the cooling system must be checked at regular cleaning intervals.

7.5 Malfunction



The error detection and the troubleshooting made be executed by qualified personnel only.

Don't take the protective equipment out of operation – neither in the testing operation. Demount the cooling lines in the unpressurized state.



The connection cables must be de-energized and in a safe state before connection or disconnection.

Note the 5 safety regulations for work on electro technical systems (refer to [► Safety notes](#) on page 40).



Pay attention to hot surfaces!

Observe to the following at failures

- Observe the operation instruction of the machine/installation
- Observe the operation instruction of the converter
- If required contact the manufacturer of the motor or converter

Keep the following parameters ready:

- Type plate data
- Type and extent of the failure
- Surrounding circumstances of the failure
- Application data (cycle of torque; speed and forces via the time, environmental conditions)

The following list could help in case of failures:

Failure	Error cause	Troubleshooting
Motor does not turn	Controller release is missing	Activate controller release
	Controller generates message encoder error	Read error list of converter or controller, correct error
	Voltage supply is missing	Check connection and voltage supply
	Rotating field	Check phase sequence and exchange mains connection if needed
Irregular running	Shielding in the connection lines is insufficient	Check shield connection and grounding
	Controller parameter too high	Optimize controller parameters
Vibrations	Coupling elements or driven machines were incorrectly balanced	Balancing
	Incorrect alignment of the powertrain control	Realign machine set
	Fastening screws are loose	Check screw connections and fasten them
Running noises	Foreign particles in the motor	Repair by manufacturer
	Bearing damage	
Motor warms up too much Motor temperature monitoring responds	Drive overload	Check motor load and compare it with the type plate data
	Water-cooling inactive	Check and switch on if required
	Cooling supply insufficient - Filter is very dirty - Deposits in the cooling channels - Failures in the external cooling system	Check water circuit
	Small space	Check Installation conditions from page 13
	Brake does not release - grinding brake	Repair at motor manufacturer
Overpressure in the cooling system	Strongly polluted coolant	Filter coolant
	Cooling channels blocked	Check and clean if required
	Failures in the external cooling system	Refer to notes of the plant manufacturer
Current input too high, motor torque too low	Notch position incorrect	Check notch position and set if required

MAINTENANCE



WARNING!

Risk of injury due to improperly performed maintenance work!

Improper maintenance can lead to severe personal injury and material damage.

Therefore:

- Before beginning work, make sure that there is enough space for mounting.
- Make sure that the mounting area is kept clean and orderly. Parts and tools that are loosely stacked or lying around are a potential accident source.

Working at the motor



Execute the works at the motor only if the motor is at standstill, de-energized and has cooled off. Fasten all loose connections such as screws, cables etc. after the inspection or maintenance again.

Observe the technical notes in the accordant chapters of this commissioning and maintenance instruction (refer to [►Safety notes◄](#) from page 40).

DANGER!

The (optional) integrated brake functions only as a parking brake, during work on the motor it **must not** have a protective function (e.g. holding loads).

8.1 Inspection

Accordant to the local degree of pollution regular cleaning must be made to ensure a permanent adequate dissipation of the heat loss. Thereby, the volume rate and the pressure ratio of the cooling system must be checked.

If, optionally a shaft sealing ring is used check it regularly for its proper functioning (leakage).

8.2 Maintenance

Dependent of the operating conditions (such as operation mode, temperature, speed load, mounting position) very different times of service life can be referring to the lubricants and sealing elements.

We recommend the following maintenance guide values at a fault-free operation:

- Change the **bearing** after the bearing service life, refer to [►Motor specification◄](#) from page 11.
- Check the proper function of the shaft seal regularly because the shaft seal is a wear part.

Brake

The optional brake must be replaced as soon as the wear limit is reached.

Relubrication

Relubrication at opened grease leakage only.

- The service life of bearing and the type of protection can only be guaranteed if the grease leakage is closed with the supplied screw plugs.
- For Relubrication interval and grease quantity refer to an extra label on the motor.



NOTICE!

- Unscrew the two screw plugs G1/2 of the grease discharge opening before starting relubrication.
- Relubricate the bearing when motor is rotating only.
- After relubrication the motor must be operated 2-4 hours (while bearing rotation the used grease is discharged via the grease discharge opening).
- The grease discharge opening must be closed by the screw plugs again.

The maintenance work the operator is responsible for, includes:

- The cleaning of the motor surface and the air ducts. Do not use aggressive cleaning products or high-pressure cleaner in order to avoid damage of surface coating and sealing.
- The replacing or cleaning of filter mats when using dust filter:
 - Dust filter should normally be cleaned or replaced after 100 operating hours. In case of a heavy air pollution the maintenance intervals are to be shortened.
 - Filters with dry dirt can be cleaned by beating, vacuum-cleaning or blowing compressed air through.
 - Filters with wet dirt can be washed in hand-hot water with commercial scouring agents and then dried.

**NOTE!**

- It is recommended to use original replacement filters from the motor manufacturer. The original filters can be ordered from Baumüller (motor No. and part No. required).

The maintenance work should be done by Baumüller or a specialized company authorized by Baumüller.

**DANGER!**

The specifications of the technical instructions TAM 00697 must be followed during maintenance and servicing on motors which are used for safety-oriented applications.

8.3 Repairs

In case of device damage, please inform your sales office or:

Baumüller Nürnberg GmbH

Ostendstr. 80 - 90
90482 Nuremberg
Germany

Tel. +49 9 11 54 32 - 0
Fax: +49 9 11 54 32 - 1 30

Mail: mail@baumueller.com
Internet: www.baumueller.com

DEMOUNTING AND DISPOSAL

9.1 Demounting

Refer to safety notes in chapter mounting (from [▶Page 33◀](#)) and installation (from [▶Page 40◀](#)).

9.2 Disposal

The motor must be disposed in the normal recyclable material process by complying with the national and local regulations.



CAUTION!

The rotor of the **DS4-132** motor contains rare-earth magnets with high magnetic energy density.

The encoder electronics (if an absolute value encoder is built-in) must be disposed as electronic waste.

Disposal facilities/ authorities Ensure that the disposal is handled in compliance with the disposal policies of your company, as well as with all national regulations of the responsible disposal facilities and authorities. In case of doubt, consult the bureau of commerce or environmental protection authority responsible for your company.



APPENDIX A - DECLARATION OF CONFORMITY



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

(Wird fortgesetzt auf der nächsten Seite ...)

Seite 1 von 2

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 launched 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 ...)

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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 Rollenlagernmotore gelten:
 In Anlehnung an EN 60034-14 oder Angaben gemäß
 Kundenvereinbarung.
- EN 61800-5-1:2024-11
 Elektrische Leistungsantriebssysteme mit einstell-
 barer 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
DS4-132XXXX-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



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Revision Survey

Version	Status	Changings
5.25016.01	13-Apr-2026	First release

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



Enabling Industrie 4.0

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