

**Commissioning
and Maintenance Instructions**

be in motion be in motion

TAM00720_eng

DSM1

Three-phase-synchronous motor

Version: 10/2015

English

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1 **General safety instructions**

1.1 **Safety**

This electric motor was built complying with the state of safety engineering and the operational safety was checked prior to leaving the company.

Please, pay attention to the following in order to ensure a proper commissioning and its safe use:

- The present commissioning- and maintenance instructions and attached supplementary parts, if required.
- The attached safety- and commissioning notes.
- The technical product documentation.
- The commissioning- and safety notes of the inverter's manufacturer.
- The national, local and plant-specific regulations regarding the final product.
- The motor must be operated with appropriate inverters, only.
- All components related to the motor must comply with the application rules.

In dealing with this product the following dangers are pointed out:

Dangers due to

- lifting operations and transport processes
- electric current
- moving parts
- hot surfaces
- EMC interferences
- Mechanical overload
- thermal overload

Please, pay attention to all safety notes - especially those, which are marked by symbols, in order to avoid danger to persons and material assets or to minimize existing residual risks.



Risk of fatal injury from electrical current

The symbol indicates that injuries, which result in death or serious injuries could occur, if not avoided.



Warning of general dangers

The symbol indicates that severe personal injuries or property damage could result, if not avoided.



Warning of dangerous situations

The symbol indicates that the installation or work environment could be damaged, if not avoided.



Do not touch

The symbol indicates that severe injuries could result, if not avoided.



Unauthorized action

The symbol indicates that severe injuries could result, if not avoided.



Warning of hot surfaces

The symbol indicates that, if not avoided, could result in severe injuries.



Electrostatic sensitive devices

The symbol indicates that the installation or work environment could be damaged, if not avoided.

1.2 Intended use

The use of an electric motor is permitted within its intended use, only. In this connection the electric motor must exclusively be used by considering all specified cases of application within the technical data of this commissioning- and maintenance guide.

All works referring to mounting, commissioning, maintenance as well as during operation must be carried out by qualified personnel, only.

Within the scope of the mentioned safety instructions, the term „qualified personnel“ is to be understood a person, who was skilled and authorized to a special subject area. This person is authorized to install, mount, commission and operate devices, systems and current circuits by complying with the valid safety standards (EN 50110-1).

Improper handling can cause severe personal injuries and property damages.

This **electric motor** is intended for the **use** within **industrial systems** and is subject to the following **standards** and **guidelines**:

Standards

EN 60034-1, EN 60034-5, EN 60034-6, EN 60034-7, EN 60034-9, EN 60034-11, EN 60034-14 EN 60204-1

EU Low-Voltage Directive (LVD)

Electric motors of this series meet the requirements of the low-voltage directive (conformity).

EU Machinery Directive

Electric motors are components, which are to be built into machines complying with the Machinery Directive. The conformity of the final product with this directive must be approved prior to being commissioned (consider EN 60204-1 “Electrical equipment of machines”).

EU EMC Directive

The operation of the electric motor must meet the protection requirements of the EMC Directive 2004/108/EG. The proper installation (e.g. physical separation of signal lines and power cables, shielded lines and cables and so on) is within the responsibility of the installation contractor and the system provider. During the operation with the power inverter, the EMC notes of the manufacturer of the power inverter, the encoder and the brakes must be considered, also.

Furthermore, consider the binding national, local and system-specific specifications!

The electric motor is designed for the following **environmental conditions**:

- Environmental temperature: 0 °C bis +40 °C
- Installation altitude: ≤1000 m above sea level
- Relative air humidity: 5 % to 85%


Pay attention to differing data on the rating plate as well as to the data of the technical documents. The conditions at the operating site must comply with all information on the rating plate.




The use within hazardous areas is **prohibited** provided that it was designed for this purpose (consider additional information). Furthermore, neither flammable gas mixtures nor dangerous dust concentrations may exist within the environment of the electric motor. Motor parts under tension and parts, which are hot could catch fire and cause severe injuries and property damages.

If higher requirements are demanded in special cases as e.g. in use within non-industrial systems, these requirements must be ensured during installation (e.g. touch protection against children's fingers).


Motor version with rare-earth magnets:

	<p>The following dangers can occur near a drawn or open rotor with a strong magnetic field:</p> <ul style="list-style-type: none"> • Persons with electronic or metallic implants (e.g. pacemakers, hearing aids, plates or nails) are endangered, if the distance between implant and magnetic pole is less than 0.5 m. • Due to strong magnetic forces pulling on ferromagnetical parts the following can occur: <ul style="list-style-type: none"> ○ Risk of injury by crushing ○ Danger of destruction of measuring and mounting tools, cheque cards, watches and so on. ○ Pollution of the rotor core by metal chips or metal powder pulled on by magnetic forces
---	--

Thermal danger:

	<p>Caution: Danger of burning!</p> <p>Surface temperatures of over 70°C can occur at the motors. Safety device measures must be provided when required!</p> <p>Temperature-sensitive parts must not be attached or be in contact with hot surfaces, as e.g. normal cables or electronic parts.</p> <p>A thermal motor overload can cause the destruction of the winding, the bearing and can demagnetize the rare-earth magnets. Use the temperature sensor to control the temperature.</p>
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1.3 Prohibition of unauthorized modification or alteration at the electric motor

	<p>Any unauthorized modifications and alterations at the electric motor are prohibited due to safety reasons. Contact the motor manufacturer in case of need.</p> <p>Generally, never dismount or decommission safety devices to operate the electric motor.</p>
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2 Operating conditions

2.1 Product description

The electric motors of the series **DSM1xx** are 3-phase synchronous motors with rare-earth magnets.

2.2 Scope of supply

The supply is put together order-related.

- If damages incurred during transit are determined at delivery, the transport company immediately must be informed about this.
- Immediately upon receipt you must compare the performance data and the motor type with your ordering data. If visible deficiencies or incomplete delivery are determined the responsible Baumüller subsidiary or the main Baumüller company in Nuremberg must be informed.

In both cases motor commissioning is prohibited until the deficiency was professionally corrected.

Rating plate

The rating plate is the identifier for each electric motor. The motor number, in particular, is uniquely defined and is essential to ensure an in-house traceability. The rating plate must be readable at all times. Never remove the rating plate from the motor.

The rating plate can be customer-specific, also!

Standard rating plate data:

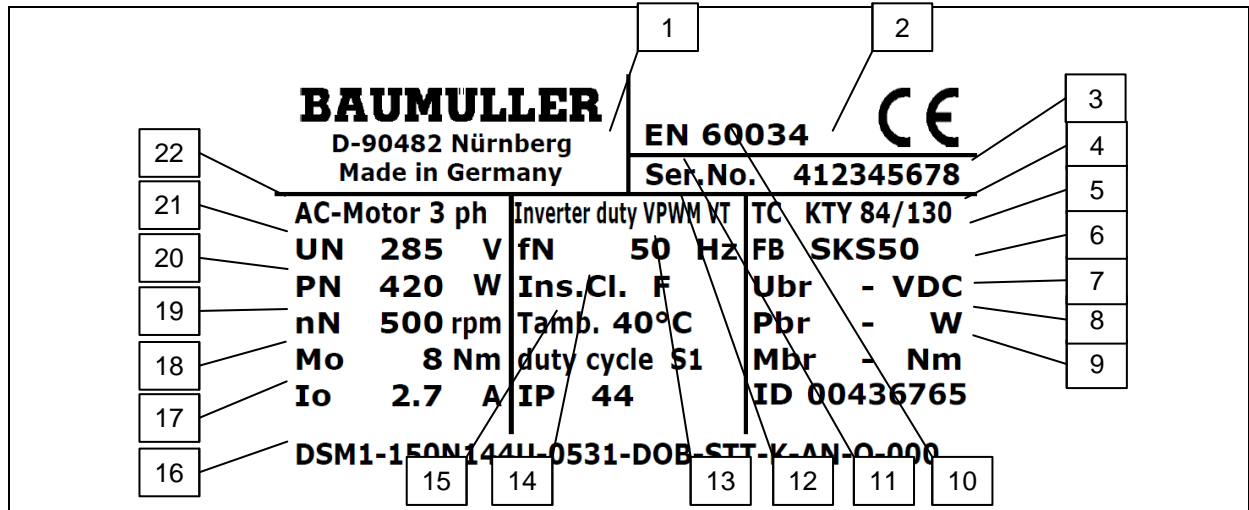


Bild 1: Leistungsschild

- | | | | |
|----|-----------------------------------|----|---------------------------------------|
| 1 | Manufacturer | 12 | Temperature class |
| 2 | Standards and approvals | 13 | Permissible environmental temperature |
| 3 | Motor number | 14 | Operating mode |
| 4 | Temperature sensor | 15 | Type of protection |
| 5 | Feedback / rotary encoder | 16 | Motor type / name |
| 6 | (optional) brake – supply voltage | 17 | Standstill current I_O |
| 7 | (optional) brake - power | 18 | Standstill torque M_O |
| 8 | (optional) brake – holding torque | 19 | Rated speed n_N |
| 9 | Item number ID | 20 | Rated power P_N |
| 10 | Motor is operated with inverter | 21 | Rated voltage U_N |
| 11 | Rated frequency f_N | 22 | Motor type: 3-phase motor |

2.3 Technical data

Type of drive

Permanent-magnet-excited 3-phase synchronous motor

Type of construction (EN 60034-7)

IM B5 Mounting position horizontal

IM V1 Mounting position vertical, shaft end to the bottom

IM V3 Mounting position vertical, shaft end to the top

Please note: At mounting position IM V3 in connection with protection class IP44 the shaft sealing must be protected against entry of water and dirt.

Protection class (EN 60034-5)

IP 44

IP 65

IP 65

considering the shaft sealing

Standard: without shaft sealing ring

Optional: with shaft sealing ring,

without considering the shaft sealing

Standard: without shaft sealing ring

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Attention: The mentioned protection classes only are reached if the connectors were mounted completely (the main and the control connections).

Cooling process (EN 60034-6) IC 410 Standard: Self-surface cooling; cooling without using a fan, but by natural ventilation

Electrical connections (**see chapter 7**).

Receptacle orientation Standard: Radial outgoing
Optional: Others on request

Main connection Receptacle 8-pole
Standard: U, V, W +temperature sensor

Optional: Brake
Control connection 12-pole Standard: Resolver
Optional: Others on request

Thermal motor protection (EN60034-11) Temperature sensor KTY84/130 in the stator winding

Barrier (EN 60034-1) Temperature class F ($\Delta\theta = 105\text{ K}$)

Ambient temperature $0^{\circ}\text{C}... + 40^{\circ}\text{C}$

Installation altitude (EN 60034-1) $\leq 1.000\text{ m}$ above sea level (standard)

Bearing Deep-groove ball bearing with permanent lubrication

Calculated service life of bearing L_{H10} 20.000 h (approximate value)

Service life of shaft seal see chapter 5.2 Maintenance

Vibration quantity step (EN 60034-14) Standard: A
Nonstandard: B

Shakeproof (EN 60068-2-6) radial: 3 g (10 Hz to 100 Hz)
axial: 1 g (10 Hz to 100 Hz), with brake 0,5 g

Concentricity shaft end (DIN 42955) Standard: N
Nonstandard: R (reduced)

Holding brake Optional


Actual speed value encoder Nonstandard: 2-pole resolver
(high-grade version on request)
Optional: Absolute encoder with hipurface interface
Optional: Absolute encoder with Endat interface

Attention!

If the delivered electric motor doesn't correspond to the standard version accordant to the technical list or if special contractual terms were agreed upon, technical deviations referring to this commissioning and maintenance guide can occur. Please, ask for the corresponding technical additions.

2.4 Transport, temporary storage

Transport:

	<p>For the permissible environmental conditions, which may have an effect on the motor during transport, please refer to DIN EN 60721-3-2 (class 2K2/2M1). The permissible temperature range was contrary to the DIN reduced to – 15 °C to + 60 °C.</p> <p>Suitable load carrying devices must be used, as e.g. belt straps, single slings and so on. If lifting lugs are provided at the motor, these also can be used for lifting.</p> <p>Do not use the motor receptacles as transport safety devices or lifting lugs.</p> <p>The particular country-specific rules must be observed during transport. Lifting devices as well as transport and load handling devices must meet the requirements.</p>
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Please, refer to the technical data concerning the declaration of weight of the individual electric motors.

The motor shaft and the connection surfaces must be protected against corrosion. The motor must be transported with a protective cover for the shaft, only. Damages at the motor shaft must be avoided.

Temporary storage:

In case a motor isn't placed in service within a narrow time frame, it must be stored in dry, low-dust as well as vibration-resistant indoor spaces ($V_{\text{eff}} \leq 0,2\text{mm/s}$).

The electric motors should not be stored longer than 2 years within a constant temperature range, which is between -15 and +60 °C. Higher storing temperatures within the scope of the operating temperature accelerate the aging process of the sealings and the bearing greases and therefore affect the service life prior to commissioning. It is absolutely necessary to avoid solar radiation, ultraviolet light and ozone, because these also have a share in the aging of the sealing elements!

Please, consider that the warranty periods are assured from the date of delivery. Therefore, we recommend to limit storage time to a minimum.

However, if a longer storage cannot be avoided, then the environmental conditions (class 1K2/1M1) mentioned in DIN EN 60721-3-1 must be observed. Contrary to the DIN the temperature range may be exceeded from – 15 °C to + 60 °C.

2.5 Installation conditions, cooling specifications

Environment:

The motor can be installed indoor within dusty and humid environments correspondent to its protection class (see rating plate).

As long as special agreements weren't agreed upon, the drive is designed to the following standardized climatical application conditions:

- Environmental temperature 0 °C to 40 °C
- Installation altitude ≤1000 m above sea level

Relative humidity is 5% to 85%. For the other permissible application conditions refer to DIN EN 60721-3-3 (class 3K3/3Z12).

These climatical conditions must be unconditionally observed at installation.

Generally, it is necessary to keep aggressive, corrosive, abrasive as well as plastic-dissolvent media from the motor and its cooling air.

Contact the motor manufacturer if an outdoor installation must be carried out.

Cooling specifications:

Environmental conditions see **chapter 2.4** and technical product data.

Cooling process IC 410 – Natural cooling without fan.

Basically, the following must be observed:

- The heat convection and the thermal radiation must not be affected by the installation conditions.
- In the case of forced air cooling, the cooling air must be able to freely enter and the hot air must freely exit. Do not draw in the heated exit air anymore.
- The distance to adjacent machine parts should not fall below 100 mm.
- The housing surface and the air in-/outlets must be cleaned regularly, if dirt accumulation is extremely.

Mounting specifications:

By coupling the motor to the installation surface a part of the motor dissipation is diverted via the flange.

The following chart 1 demonstrates the measurings of the installation surfaces dependent of the shaft height. These specifications are lower limiting values regarding safe heat dissipation via the flange surfaces of the motor.


Shaft height	Steel plate, width x height x thickness in mm	Installation surface in m ²
DSM115	250 x 250 x 10	0,0625
DSM117	250 x 250 x 10	0,0625
DSM130	250 x 250 x 10	0,0625
DSM150	350 x 350 x 10	0,12
DSM170	500 x 500 x 10	0,25
DSM190	500 x 500 x 10	0,25

Chart 1: Installation surface

The heat dissipation conditions improve where the installation surfaces are larger.

An isolated installation of the motors is not permitted!

2.6 Balancing, output elements, vibrations

	<p>Don't strain the shaft and the bearing with strokes!</p> <p>During mounting or demounting of output elements the motor must not be affected by axial forces.</p> <p>The generally required measures regarding the protection against contact of the output elements must be considered.</p> <p>The featherkey must be secured against being expelled, if a motor is placed in service without the output element.</p>
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Balancing

At the optional version having a featherkey the rotors are dynamically balanced by half the featherkey (according to EN 60034-14 / ISO 8821 / ISO 1940).

Output elements:

An accordant balancing type must be considered at mounting the output element. The output elements must be balanced in accordance with ISO 1940.

In the case of output elements having to be mounted or removed (e.g. clutch disk, gear wheel, belt pulley), appropriate equipment must be used.

- Use tapped hole within the shaft end.
- At removal use spacing washers for the mechanical protection of the shaft.

Warm up the output elements before mounting them, if required (max. permissible temperature at the shaft end may be 150 °C for a short period). **Attention!**

- At the shaft version without featherkey the drive elements must be fixed on the output shaft **by using appropriate clamping sets.**
- At shaft versions with featherkey **the output elements must fit closely to the shaft shoulder.** Please note: The bevel and accordingly the radius at the output element and the shaft radius to the shoulder must have been phased.
- If the tapped hole in the shaft end is used for the axial fastening of output elements (e.g. belt pulleys), the tightening torques shown in the following chart 2 must not be exceeded:

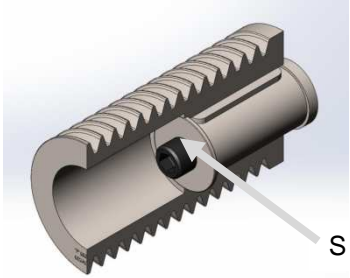

	Thread	Tightening torque in Nm
	M5	2,2
	M8	10
	M10	20

Chart 2: Tightening torques demonstrated with a locking bolt S of a belt pulley

Appropriate measures must be made regarding screw locking!


Vibrations:

	<p>The system vibration behavior at the application site can lead to an increase of the vibration values at the motor due to the output elements, the installation conditions, the alignment and the positioning as well as the influence of external vibrations.</p> <p>The permissible vibration values in accordance with EN 60034-14 must not be exceeded to achieve a correct functioning of the motor and a long bearing service life. In certain circumstances it can be possible that the complete balancing of the rotor together with the output element is required (in accordance with ISO 1940).</p> <p>The simulated vibrations after mounting must not exceed the permissible accelerations (see chapter 2.4 Technical data).</p> <p>If changes compared to the normal operation occur, in case of doubt the motor must be switched off, the cause must be located and perhaps the manufacturer must be contacted.</p>
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3 Installation

3.1 Safety instructions

Previous to the installation:

	<p>Never mount or put into operation a damaged electric motor.</p> <p>Never mount the electric motor into a damaged machine.</p> <p>Prior to mounting make sure that the electric motor is suitable for your machine.</p>
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During installation:

	<p>Mount the motor to the provided mounting options, only.</p> <p>Avoid hammer strokes or prohibited shock loads during the mounting.</p> <p>Attach all covers and safety appliances. All safety appliances must meet the applicable regulations (e.g. EN 60204).</p>
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3.2 Positioning, fastening


Prior to mounting as well as during mounting, check if

- the motor is free of damage (e.g. the shaft sealing must in no way whatsoever be damaged by sharp or pointed objects).
- the motor isn't mounted in the danger zone of other facilities.
- the intended use is complied with. (see **chapter 1.2, chapter 2.4**)
Rating plate specifications, observe warning and instruction plate specifications.
- the anticorrosive at the shaft end was removed residue-free.
Do not wet the shaft sealing, if commercial solvents, as e.g. acetone or petroleum ether are used!
- the motor is in accordance with the local environmental conditions and the environmental influences (see **chapter 2.4**).
- the machine's installation space is suitable for the cooling type of the electric motor (see **chapter 2.6**)
*The motor installation must allow the sufficient dissipation of heat via the housing surface and via the motor flange surface (see **chapter 2.6**).*

- the motor is able to be mounted and operated with the available fastening options and the connection data.
The installation dimensions of the motor together with the tolerance indications are to be found in the technical data of the product. A correct and even surface mounting of the motor must be considered. The guide seats and contact surfaces must be undamaged and clean. They should be in accurate connexional position to the shafts, to avoid damaging loads due to displacement for bearings, shafts and housings within the entire system. During the tightening of the flange fastening screws (strength class 8.8 at least) distortions at the flange connection must be avoided.
- at vertical installation with the shaft end to the top, no liquid can infiltrate the upper bearing.
- the permissible radial forces must not exceed the corresponding operating characteristics of the technical data referring to the product (if need for clearance contact Baumüller subsidiary).
With regard to axial forces clearance is required via the motor manufacturer.
- the brake (optional) is able to be released after applying the operating voltage (there is an audible switching sound).
- the rotor is turning smoothly and without dragging noises.
At a motor with an integrated brake the brake at first must be released.
- the version of the motor and encoder connections comply with the specifications of the technical data of the product.
- the output elements or the drive elements are protected.
- the complete cooling system is functioning.
- the motor surface must be free from soilings.
- Versions, which possess approvals for special application fields (e.g. E1) were mounted in accordance with approval regulations.



3.3 Electrical connection

Important notes:

	<p>The work must be performed by qualified personnel, exclusively!</p> <p>The work must be performed within an installation, which is disconnected and secured against re-connection (also auxiliary current circuits).</p> <p>The work must be performed at motor standstill, only! <i>At 3-phase synchronous motors with permanent-magnet excitation it can happen that voltages of > 60 V occur at rotating rotors at the motor contacts.</i></p> <p>Comply with the regulations while working within electrical installations!</p>
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Attention! The safety instructions for working in electrically installations according to EN 50110-1 must be complied with:

- Activate
- Protect against re-connection
- Verify that the installation is dead
- Carry out earthing and circuiting
- Provide protection against adjacent live parts or provide with barriers

	<p>The electric motor must be operated together with a corresponding configured inverter. The direct connection to the 3-phase system can lead to the destruction of the motor.</p> <p>Consider the correct phase sequence and the terminal assignment!</p> <p>The electrical connection, the protective conductor connections and the shielding connections (using shielded cables) must durably be made safe!</p>
	<p>Never touch the contacts of encoders and temperature sensors with your hands or with tools, which are electrostatically charged or could be electrostatically charged! Encoders and temperature sensors are electrostatically sensitive devices.</p>


Electrical installation:

- The system installer carries the responsibility concerning a proper installation.
- The motor data on the rating plate must be considered.
- Connection cables and connectors regarding the occurring voltages and current ranges must be rated correctly and must apply to the installation type.
- The motor connection including its components (brake, encoder, and so on) must be carried out in accordance with the circuit diagrams (see **attached circuit diagrams** or **chapter 7**).
- To avoid electromagnetical EMC troubles of the motor supply cables and their consequences on the encoder and the control systems shielded power- and encoder cables must be used. For this purpose consider the EMC instruction of the manufacturer of the inverter.
- For reasons of operational safety we recommend to use the assembled connection cables of Baumüller (see technical product list).
- Prior to installation the connector receptacles and connectors must be checked for damages, corrosion, pollution and moisture.
- To guarantee the protection class the correct and solid fit of the plug screw fittings, the sealings and the sealing surfaces of the plugs must be regarded.
- **Note!** In order to guarantee the protection class the turnable sockets shouldn't be changed in their connection direction by turning them more than 5 times, as well.
- Plug connections must not be exposed to any mechanical loads. If required, add anti-rotation, strain, thrust as well as flex reliefs.



4 Commissioning, operation

4.1 Safety instructions


Operations at the electric motor:

	<p>Operations at the electric motor must be executed only, if the motor is at standstill, under off-circuit conditions and cooled down. All screws a.s.o., which were untightened at the motor must be tightened prior to commissioning, again.</p> <p>The technical instructions in the accordant chapters of this commissioning and maintenance guide must be complied with during all operations.</p> <p>Attention!:</p> <p>During operations at the motor an optional holding brake must not take up a securing position (e.g. the holding of loads)!</p>
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Risk of death by electrical current:

 	<p>Assure, that the electric motor is activated and under off-circuit conditions.</p> <p>Under no circumstances the motor connections may be loosened during operation.</p> <p>Connect the measurement devices in currentless and de-energized state, only.</p> <p>Start operations at the motor connections not until assuring that neither potential nor voltage are present.</p> <p>There is electric potential at the motor contacts and the motor windings. Never touch these components/elements during operation.</p>
---	--

Installation and demounting of safety devices:

	<p>Do not operate the electric motor without installing the safety devices.</p> <p>The motor must be put out of operation to mount and demount components and systems, which are provided to monitor the safe motor operation.</p>
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Danger! Do not touch!


 	<p>Prior to touching the electric motor, assure that the electric motor is at standstill and is protected against unintentional restart.</p> <p>The motor must be at standstill and within a non-energized state before you can touch the output shaft. Otherwise, the rotating rotor causes a hazard.</p> <p>Danger of burning! Never touch the motor housing within rated load operation. Surface temperatures of 70°C and above can occur at the motors.</p>
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4.2 Tests prior to commissioning

- The drive must be free of damage and must be located out of the hazard zone of other installations.
- The motor must be aligned and fixed correctly. Screw fittings must be tightened correctly.
- The associated safety devices (mechanical, thermal, electrical) must be mounted.
- The motor connection must be provided correctly.
- The cables don't touch the motor surface.
- The protective conductor system must be provided correctly and must be tested for correct operation.
- The drive doesn't block (release brake, insofar as available).
- Emergency stop functions must be checked.

4.3 Commissioning, operation

Notes regarding the function of the brake (insofar as available):

	The brake is a holding brake provided with emergency stop functions. (Power failure, emergency stop) . Do not use the holding brake as an operating brake.
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Commissioning must be carried out by qualified personnel, only.

The commissioning instruction of the inverter must absolutely be observed.

Tests during commissioning:




- Release brake, if required.
- Were the motor components, as e.g. brake, encoder etc., tested for correct operation and are the application conditions complied with?
- Were the electric connections and contacts provided and mounted according to instructions (**consider circuit diagrams, see chapter 7 or the attached circuit diagrams**)?
- Were all safety measures met and are they fully functional, regarding the exclusion of contact parts under tension, hot surfaces as well as rotating and moving parts and components?
- Were the output elements mounted and set in accordance with the manufacturer's instructions?
- Was the maximum permissible speed n_{\max} of the motor ensured so that it cannot be exceeded? The maximum permissible speed n_{\max} is the greatest temporary permitted operating speed.

Tests during operation:

- Pay attention to extraordinary noises.
- If streaking and scratching noises, dragging noises or the like occur, immediately put the drive out of operation and detect the cause.
- Motor surface and connecting cables must be checked on dirt (e.g. dust deposits, oil contamination, moisture etc.).
- Maintenance intervals must be observed.

4.4 Failures

Safety instructions:

	Troubleshooting and correction of failures must be executed by qualified personnel, only.
	Do not take safety devices out of operation – not in the test run either. Remove and mount connecting cables off circuit and within a protected state, only. Observe the 5 safety regulations of “Release” (see section 3.3).
	Observe hot surfaces!

Always observe the following at failures:

- The operation manual of the machine/installation
- The operation manual of the inverter
- Contact the manufacturer of the motor or inverter, if required

The following parameters must be kept at hand:

- Rating plate data
- Type and degree of failure; attendant circumstances of the failure
- Application data (speed cycle, speed and power, which exceeded the time, environmental conditions)

The following selection of failure causes can help to detect errors:

Failure	Cause of error	Correction
Motor doesn't start-up	Controller enable is missing Controller error, encoder error Brake doesn't release Brake is defect Voltage supply is missing Rotating field	Activate controller enable Read out the error list at the inverter or the controller, correct the errors Triggering, check connecting and voltage supply Manufacturer must repair Check connecting and voltage supply Check phase sequence, exchange connecting cables, if required
Irregular running	Shielding of the connecting cables are insufficient Controller parameters too high	Check shield connection and grounding Optimize controller parameters
Vibrations	Coupling elements or work machine is badly balanced Nonconform alignment of driveline Fastening screws are loose	Re-balance Realign the machine unit Check and fasten the screwed fastenings


Failure	Cause of error	Correction
Running noises	Foreign particles in the motor	Motor manufacturer must

	Bearing damage	repair Motor manufacturer must repair
Motor gets too warm Motor temperature monitoring responses	Overload of drive The motor surface and the air ducts are dirty The mounting conditions are restricted The brake doesn't release properly – dragging brake	Check the motor load and compare with the power rating plate Clean the motor surface or the air ducts Check motor installation by appropriate sections 2.6 or 3.2 Motor manufacturer must repair
Current input too high, motor speed torque too low	Notch position incorrect	Check notch position and adjust, if required

Chart 3: Failures

5 Inspection and maintenance

Operations at the electric motor:

	<p>Operations at the electric motor must be executed, if the motor is at standstill, off circuit and cooled down. All loosened connections during the works at the motor, as e.g. screws etc., must be fastened after inspection or maintenance again.</p> <p>Regard the technical instruction within the accordant chapters of this commissioning and maintenance manual.</p> <p>By all means while doing maintenance works observe the safety instructions, which apply to the motor commissioning as well (see section 4.1).</p> <p>Attention!</p> <p>The optional holding brake may not take up securing functions during motor works (e.g. holding of loads)!</p>
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5.1 Inspection

The motor must be cleaned regularly depending on the pollution degree, to assure permanent and correct heat loss dissipation.

Wear limits must be specified if a brake was installed optionally (e.g. max. permissible operating air gap, limited number of emergency braking). The current wear degree must be checked regularly. The brake must be replaced if the permissible wear limits were reached (see **section 5.2**).

If a shaft sealing was installed optionally the correct functioning must be checked (leakage) regularly.

5.2 Maintenance

Dependent on the operating conditions (as e.g. operating type, temperature, speed and load) the bearing and sealing elements can have very different service life periods.

We recommend the following general standard values for maintenance with uninterrupted operation.:

- Bearing replacement after approximately 20.000 hours of operation (the bearing was designed to be used for 20.000 operating hours).
- The shaft sealing replacement (if required) must be carried out after about 5.000 operating hours, if no leakages were determined at prior inspections.

An optional brake must be necessarily replaced after it has reached its wear limit.

Maintenance must be carried out by Baumüller or by a specialized company instructed by Baumüller.

Attention!

Motors, which are used within safety-related applications, it is mandatory to observe the specifications of the technical instruction TABG 30026 during maintenance and service.

6 Disposal

The motor must be disposed of within the normal recycling process according to the national and local rules.

The encoder electronics must be correctly disposed of as electronic scrap (if an absolute encoder has been installed).

7 Pole assignments (power and signal connections)

7.1 Resolver – KTY within the power connection

Receptacle: Size 1 – straight, angled or angular turnable

Function		Contact no.	Receptacle	
	Signal			Schematic
Motor	U	1	<u>Power</u> 8-pole pin contacts	
	V	3		
	W	4		
PE	⊕	2		
Brake ⁽¹⁾	+	A		
	-	B		
Temp. sensor	KTY +	C		
	KTY -	D		
Housing		s.c.		
Resolver	COS -	1	<u>Signal</u> 12-pole pin contacts	
	SIN -	5		
	SIN +	6		
	COS +	8		
	REF +	10		
	REF -	12		
Housing		s.c.		

s.c.: Shielding connection

(1) Brake optional, see rating plate

Schematic representation: with view to the connection

7.2 Resolver – KTY within the signal connection

Receptacle: Size 1 - straight, angled or angular turnable

Function		Contact no.	Receptacle	Schematic		
Motor	U	1	<u>Power</u> 8-pole pin contacts			
	V	3				
	W	4				
PE	⊕	2				
Brake ⁽¹⁾	+	A				
	-	B				
Housing		s.c.				
Resolver	COS -	1			<u>Signal</u> 12-pole pin contacts	
	SIN -	5				
	SIN +	6				
	COS +	8				
	REF +	10				
	REF -	12				
Temp. sensor	KTY -	7				
	KTY +	9				
Housing		s.c.				

s.c.: Shielding connection

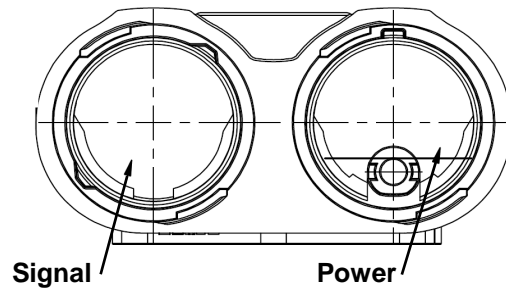
(1) Brake optional, see rating plate

Schematic representation: with view on the connection

Receptacle:

Angular mounting box combination - turnable

With view on the connection



Function		Contact no.	Receptacle	Schematic
	Signal			
Motor	U	A	Power	
	V	B		
	W	C		
PE	\oplus	PE		
Brake ⁽¹⁾	+	1		
	-	2		
	n.c.	3		
	n.c.	4		
	n.c.	5		
Housing		s.c.		
Resolver	COS -	1	Signal	
	SIN -	5		
	SIN +	6		
	COS +	8		
	REF +	10		
	REF -	12		
Temp. sensor	KTY -	7		
	KTY +	9		
	n.c.	2		
	n.c.	3		
	n.c.	4		
	n.c.	11		
Housing		s.c.		

s.c.: Shielding connection

(1) Brake optional, see rating plate

Schematic representation: With view on the connection

7.3 SRS/SRM50; SKS/SKM36 – KTY within the power connection

Feedback: Hiperface
 Receptacle: Size 1 – straight, angled or angular turnable

Function		Contact no.	Receptacle	Schematic
Motor	U	1	<u>Power</u> 8-pole pin contacts	
	V	3		
	W	4		
PE	⊖	2		
Brake ⁽¹⁾	+	A		
	-	B		
Temp. sensor	KTY +	C		
	KTY -	D		
Housing		s.c.		
Hiperface	REFCOS	1	<u>Signal</u> 12-pole pin contacts	
	Data +	2		
	+ SIN	5		
	REFSIN	6		
	Data -	7		
	+ COS	8		
	GND	10		
	+ U	12		
Housing		s.c.		

s.c.: Shielding connection

(1) Brake optional, see rating plate

Schematic representation: With view on the connection

RS/SRM50; SKS/SKM36 – KTY within the signal connection:

Feedback: Hiperface
 Receptacle: Size 1 – straight, angled or angular turnable

Function		Contact no.	Receptacle			
	Signal			Schematic		
Motor	U	1	<u>Power</u> 8-pole pin contacts			
	V	3				
	W	4				
PE	⊕	2				
Brake ⁽¹⁾	+	A				
	-	B				
Housing		s.c.				
Hiperface	REFCOS	1			<u>Signal</u> 12-pole pin contacts	
	Data +	2				
	+ SIN	5				
	REFSIN	6				
	Data -	7				
	+ COS	8				
	GND	10				
	+ U	12				
Temp. sensor	KTY +	3				
	KTY -	4				
Housing		s.c.				

s.c.: Shielding contacts

(1) Brake optional, see rating plate

Schematic representation: With view on connection

Note:

- See the attached circuit diagrams or the technical data regarding the pole assignments of encoder types, which were not mentioned or which possess an optional temperature sensor cable via the encoder cable as well as regarding drives using an integrated servo controller.
- Encoders can be ESD components.

Warranty and liability

All specifications given in this manual are non-binding customer information subject to ongoing further development and continually updated by our revision service. Warranty and liability claims against Baumüller DirectMotion GmbH are excluded, in particular if one or more of the following reasons have caused the damage:

- You disregarded instructions/notes of this manual.
- You didn't use the system in accordance with its intended use.
- The system was
 - incorrectly installed, connected, put into operation, operated or poorly maintained.
 - installed, connected, put into operation, operated and/or maintained by unqualified or by under-qualified personnel.
 - overloaded.
 - operated with
 - defect safety devices
 - safety devices, which were incorrectly installed or installed without safety devices.
 - inoperable safety and protective devices.
 - not operated within the specified environmental conditions.
- You reconstructed the system without having it authorized in written form by Baumüller DirectMotion GmbH.
- You disregarded the instructions in the component descriptions regarding maintenance.
- You failed to monitor the parts, which are subject to wear.
- You carried out a repair incorrectly.
- You combined the system with products of another manufacturer incorrectly.
- You combined the drive system with defective and/or incorrectly documented products of other manufacturers.

As a general rule the latest version of the „General Terms of Sale and Delivery“ of Baumüller DirectMotion GmbH is valid.

The „General Terms of Sale and Delivery“ have been at your disposal since contract conclusion at the latest.