

**Commissioning  
and Maintenance Instructions**

**be in motion be in motion**

**TAM00721\_eng**

**DSD-028/DSD-036**

**DSD2-028/DSD2-036**

Three-phase-synchronous motor

**Version: 04/2013**

**English**

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BAUMÜLLER DirectMotion GmbH  
D-37581 Bad Gandersheim  
[www.baumueller.de](http://www.baumueller.de)

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# 1 General safety instructions

## 1.1 Safety

This electric motor has been constructed in accordance with the relevant safety standards and underwent an operational safety check before leaving our factory.

To make sure that the machine is commissioned correctly and used safely, please read the following:

- These Commissioning and Maintenance Instructions and their attached appendices
- The safety and commissioning notes
- The technical documentation that accompanies the product
- The commissioning and safety notes provided by the manufacturer of the converter
- The national, local, and system-specific regulations concerning your finished product
- The technical instruction of TABG 30026 for use in safety-oriented applications

We draw your attention to the following hazards when using the product:

- Hazards resulting from
- Lifting and transport
  - Electrical power
  - Moving parts
  - Hot surfaces
  - EMC interference
  - Mechanical overload
  - Thermal overload

To avoid injury to people and damage to property and to minimise residual risks, please read all the safety instructions and, in particular, those which are marked with a symbol.



### **Risk of fatality due to electric shock**

Failure to observe can lead to fatal or serious injuries.



### **Warning about general dangers**

Failure to observe can lead to serious injury.



### **Warning about a dangerous situation**

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



### **Touching prohibited**

Failure to observe can lead to serious injury.



### **Improper handling prohibited**

Failure to observe can lead to serious injury.



### **Warning about a hot surface**



### **Electrostatically sensitive components**

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

## 1.2 Designated purpose

The electric motor must only be used for its designated purpose. In this context, the electric motor must only be used for the applications described in the technical documentation under strict observance of all the notes in these Commissioning and Maintenance Instructions.

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 behaviour can result in serious **injury** and **damage** to property.

The **electric 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 60034-7, EN 60034-9, EN 60034-11,  
EN 60034-14, EN 60204-1

### Low Voltage Directive EC

The electric motors in this series fully comply with the requirements of the Low Voltage Directive EC (conformity).

### Machinery Directive EC

Electric 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").

### EMC Directive EC

When the electric motor is used as intended, its operation must comply with the safety requirements laid down in the EMC Directive EC. 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.

**All national, local, and system-specific regulations must also be observed!**

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

- Ambient temperature: 0 °C to +40 °C
- Altitude: ≤ 1000 m above sea level
- Relative humidity: 5 % to 85 %

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




Use in areas with potentially explosive atmospheres is **prohibited** unless the unit is expressly designed for this purpose (refer to additional notes). Furthermore, the area surrounding the electric motor must be free of inflammable gas mixtures and hazardous concentrations of dust.


Live and hot motor parts are inflammable and may cause serious injury and damage to property.

If, in special cases (for utilization in non-industrial applications), more stringent requirements are in place, e. g., protection against contact with a child's fingers, these conditions must be met by the customer when installing the system.


### Motor design with rare earth magnets:

|   |  |
|---|--|
|  | <p>Please be aware of the following risks in the vicinity of a retracted or exposed rotor with a strong magnetic field:</p> <ul style="list-style-type: none"><li>• People with electronic or metallic implants (e. g. cardiac pacemakers, hearing aids, plates or pins) are at risk, if the distance between the implant and the magnetic pole is less than 0.5 m.</li><li>• Due to the strong attraction forces exerted on ferromagnetic parts there is a risk of:<ul style="list-style-type: none"><li>○ Crushing injuries</li><li>○ Damage to measuring and assembly tools, credit cards, watches etc.</li><li>○ Contamination of the rotor assembly due to attracting metal debris or powder.</li></ul></li></ul> |
|---|--|

### Thermal hazard:

|   |  |
|---|--|
|  | <p>Caution, risk of burns!</p> <p>The <b>surface temperatures</b> on the motors may <b>exceed 70 °C</b>. If necessary, fit guards!</p> <p>Temperature-sensitive parts, e.g., normal cables or electronic components, must not be placed on or fixed to the hot surfaces.</p> <p>Thermal overloading can destroy the winding and the bearing and can cause demagnetisation of the rare-earth magnets. A thermal sensor should be used to monitor the temperature.</p> |
|---|--|

### 1.3 Prohibition of unauthorized modifications and changes

|   |  |
|---|--|
|  | <p>For safety reasons, unauthorized modifications and changes to the electric motor are not permitted. If such modifications/changes are necessary, please contact the motor manufacturer.</p> <p>No safety devices may be dismantled or decommissioned when operating the electric motor.</p> |
|---|--|

## 2 Operating conditions

### 2.1 Product description

The "DSD" and "DSD2" series electric motors are 8-pole three-phase synchronous motors with rare-earth magnets. These motors are capable of excellent acceleration performance thanks to the low inertia of the rotor.

When operated in conjunction with a motor-controlled pulse converter, these motors respond extremely well to speed and position control and are highly dynamic. Therefore, they are ideal for applications associated with machine tools and production machines (e. g. printing, packaging, textile machinery), as well as handling devices and robots.

### 2.2 Items supplied

The delivery is put together on an order-specific basis.

- The carrier must be immediately notified of any damage caused during transit.
- On receipt of delivery, please make sure that the ratings and motor type agree with the order data. In the event of apparent defects or incomplete delivery, the appropriate Baumüller office or the Baumüller head office in Nuremberg should be notified immediately.

In both of the above cases, commissioning must not take place until the error has been rectified by a specialist.

## 2.3 Nameplate

The nameplate is used to identify each electric motor. The unique motor number is clearly shown on each nameplate and is essential for internal tracking procedures. It must be possible to read the nameplate at all times. Never remove the nameplate from your motor.

Nameplate data:

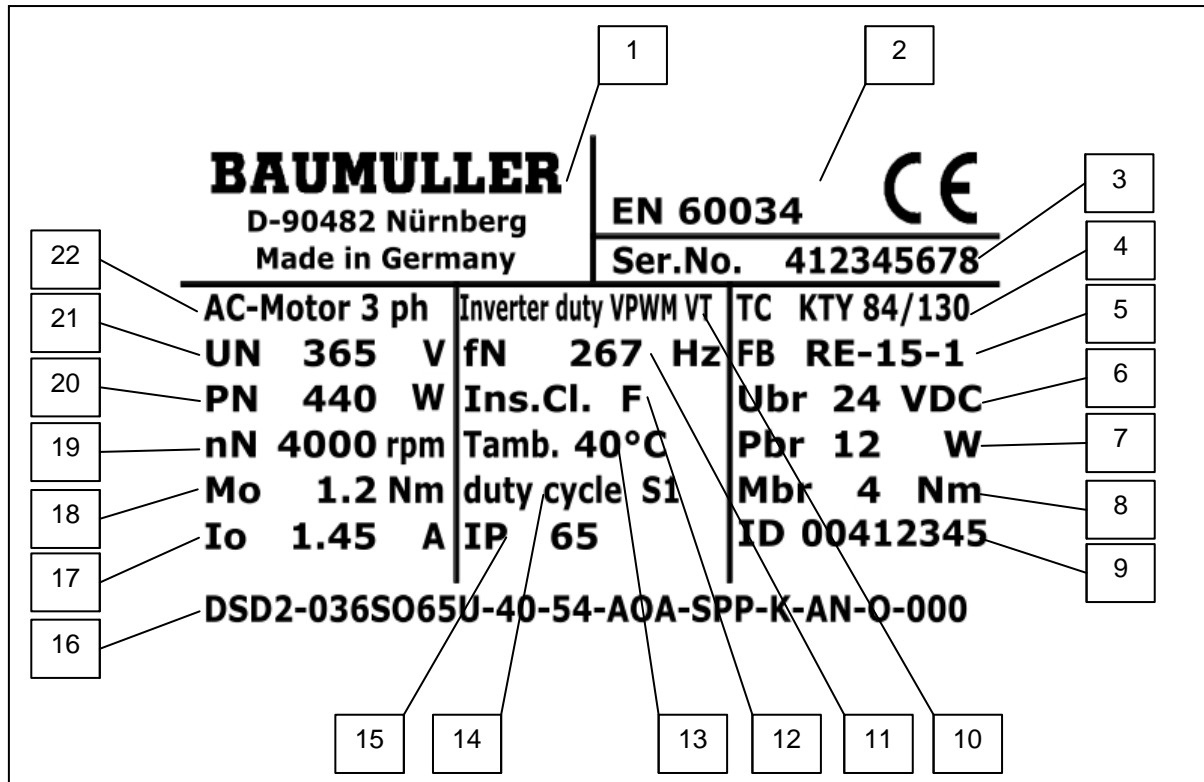


Figure 1: Nameplate

- |    |                                   |    |                                      |
|----|-----------------------------------|----|--------------------------------------|
| 1  | Manufacturer                      | 12 | Thermal class (VDE insulation class) |
| 2  | Standards and approvals           | 13 | Permissible ambient temperature      |
| 3  | Thermal sensor                    | 14 | Motor operating mode                 |
| 4  | Feedback / encoder                | 15 | Motor protection type                |
| 5  | (optional) brake - voltage        | 16 | Motor type/designation               |
| 6  | (optional) brake - power          | 17 | Standstill current $I_0$             |
| 7  | (optional) brake - holding torque | 18 | Standstill torque $M_0$              |
| 8  | Motor number                      | 19 | Rated speed $n_N$                    |
| 9  | Article number ID                 | 20 | Rated power $P_N$                    |
| 10 | Motor is run with a converter     | 21 | Rated voltage $U_N$                  |
| 11 | Rated frequency $f_N$             | 22 | Motor type: 3 phase motor            |

## 2.4 Technical Data

|  |  |  |
|--|--|--|
| Type of drive                                    | permanent magnet three phase synchronous motor   |  |
| Designs (EN 60034-7)                             | IM B5  | Horizontal installation position               |
|  | IM V1  | Vertical installation position, shaft end down |
|  | IM V3  | Vertical installation position, shaft end up   |
| <b>Note:</b>                                     | For installation acc. to IM V3 combined with IP 44 ensure protection against the penetration of water and dirt.                          |  |
| Degree of protection (EN 60034-5)                | <b>with consideration of the shaft duct</b>  |  |
|  | IP 44  | Standard: without shaft sealing ring           |
|  | IP 65  | Optional: with shaft sealing ring              |
|  | <b>without consideration of the shaft duct</b>   |  |
|  | IP 65  | Standard: without shaft sealing ring           |
| <b>Caution:</b>                                  | All specified protection classes are only achieved in the event of completely assembled plug connectors (mains and control connections). |  |
| Cooling method (EN 60034-6)                      | IC 410   | Standard: self-surface-cooled; <b>no</b> fan   |
| Electrical connections (comp. <b>Chapter 7</b> ) | via angled (3x90°) pivotable mounting boxes.   |  |
| Alignment  | Standard: axial, to N-side   |  |
|  | Optional: on request   |  |
| Main connection                                  | 8-pin connector  |  |
|  | Standard: U V W + thermal sensor   |  |
|  | Optional: brake  |  |
| Control connection                               | 12-pin   | Standard: Resolver                             |
|  |  | Option: absolute encoder                       |
|  |  | Option: encoder + thermal sensor               |
|  |  | Option: Hiperface-port                         |
|  | 17-pin   | Option: Endat 2.1                              |
|  | 8 / 9-pin  | Option: Endat 2.2                              |
| Thermal motor protection (EN 60034-11)           | Thermal sensor KTY84/130 in stator winding   |  |
| Winding insulation (EN 60034-1)                  | Thermal class F ( $\Delta\theta = 105$ K)  |  |
| Ambient temperature                              | 0 °C to +40 °C (standard)  |  |
| Altitude (EN 60034-1)                            | ≤ 1.000 m above sea level (standard)   |  |
| Rolling-contact bearings                         | Standard: Ball bearing with long-term grease lubrication   |  |
| Calculated bearing life                          | $L_{H10}$ 20.000 h (approximate value)   |  |
| Vibration severity (EN 60034-14)                 | standard: level A  |  |
|  | on request: level  |  |
| True running (DIN 42955)                         | standard: N  |  |
|  | on request: R (reduced)  |  |
| Shake proof (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        |
| Holding brake                                    | Option   |  |
| Speed actual value encoder                       | Standard: 2-pole resolver (higher quality version on request)  |  |
|  | Option: absolute encoder with Hiperface-port   |  |
|  | Option: absolute encoder with EnDat-port   |  |

For further technical data, refer to our technical product list online at: [www.baumueller.com](http://www.baumueller.com) under Download and Technical documentation. If necessary, you can request the corresponding documentation.


### Attention!

If the electric motor supplied is not a standard type as per the technical documentation or if special contractual arrangements have been made, there may be technical differences to these Commissioning and Maintenance Instructions. In this case request the related technical supplements.



## 2.5 Transport, bearing lock, intermediate storage

### Transport:

|   |   |
|---|---|
|  | <p>The permitted environmental conditions which affect the motor during the transport must be taken from DIN EN 60721-3-2 (class 2K2/2M1). Contrary to the DIN, a reduced temperature range of – 15 °C to + 60 °C is permitted.</p> <p>Suitable lifting tackle must be used, e. g. belt webbing, loop belts etc. If provided, the lifting lugs of the motor can be used for lifting.</p> <p>The motor connectors are not allowed to be used for securing for transport or as lifting eyes.</p> <p>The regulations of the respective countries must be adhered to during transport. Lifting devices and transport and load suspending devices must comply with the relevant regulations.</p> |
|---|---|

For information on weight of the single motors, please refer to the technical documentation that accompanies the product.

The motor shaft and the connection surfaces must be protected against corrosion. The motor may only be transported with a shaft protection cover; damage to the motor shaft must be avoided.

### 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 electric motors should be stored at as uniform a temperature as possible, not outside of the temperature range -15 to +60 °C, for no more than two years. 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 ageing 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 be kept to a minimum.

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

## 2.6 Installation conditions, cooling details

### Surroundings:

The motor can be installed in roofed rooms in dusty or damp environment and under normal climatic conditions.

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

- Ambient temperature 0 °C to 40 °C
- Installation height  $\leq 1000$  m above sea level
- Relative humidity 5 % to 85 %

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 unit.

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.

### Air cooling:

For ambient conditions, see **Section 2.4** and the technical documentation that accompanies the product.  
Cooling method IC 410 – Self-cooling **without** a fan.

The following must be observed:

- The installation conditions must not impair thermal convection and radiation.
- The cooling air used for forced ventilation must be able to flow in freely and the hot air must be able to flow out freely. The hot exhaust air must not be sucked back in.
- A clearance of at least 100 mm must be observed in relation to neighboring machine parts.
- If installed in very dirty locations, the housing surface and airways must be cleaned regularly.

### flange connection:


By connecting the motor to the mounting surface, a part of the motor loss performance is lead away via the flange. The dimensions of the mounting surface based on their axis height are listed in table 1. This information provides minimum values for the safe heat dissipation via the motor flange surfaces.

| Axis height | Steel plate, width x height x thickness<br>in mm | Mounting surface<br>in m <sup>2</sup> |
|-------------|--|---------------------------------------|
| DSD-028     | 250 x 250 x 10                                   | 0,0625                                |
| DSD-036     | 250 x 250 x 10                                   | 0,0625                                |
| DSD2-028    | 250 x 250 x 10                                   | 0,0625                                |
| DSD2-036    | 250 x 250 x 10                                   | 0,0625                                |

Table 1: Mounting surfaces

The heat dissipation conditions approve on larger mounting surfaces. An insulated mounting of the motors is not permitted.

## 2.7 Balancing, output elements, vibration

|   |  |
|---|--|
|  | <p>Do not subject the shaft or bearings to impacts!</p> <p>On mounting and dismounting output elements, it is not permitted for any axial forces to be applied to the motor.</p> <p>The generally applicable measures for the protection of output elements against physical contact are to be followed.</p> <p>If a motor is to be commissioned without output elements, measures must be taken to ensure the key is not flung out.</p> |
|---|--|

### Balancing

In the optional design, the rotors are dynamically balanced with a half key (in accordance with DIN EN 60034-14 / ISO 8821 / ISO 1940).

### Output elements:

On mounting the output element, pay attention to the related type of balancing. The output elements must themselves be balanced in accordance with ISO 1940.

Suitable jigs are always to be used for fitting or removing output elements (e.g. clutch disk, gear, pulley).

- Use the threaded hole in the end of the shaft.
- When pulling, use intermediate washers to provide the shaft with mechanical protection.
- When hoisting heat up the drive elements if required (max. permissible temperature at shaft end 150°C).

**Attention:**

- On shaft versions without a key, the output elements are to be fastened to the output shaft **with the aid of suitable clamping sets**.
- On shaft versions with a key, it must be ensured that **the output elements rest on the shaft shoulder**. *Note:* The chamfer or radius on the output element and the shaft radius on the shoulder must be matched.
- Is the tapped hole in the end of the shaft used for axial securing of output elements (e. g. belt pulley), the maximum tightening torque acc. to following table 2 must not be exceeded.

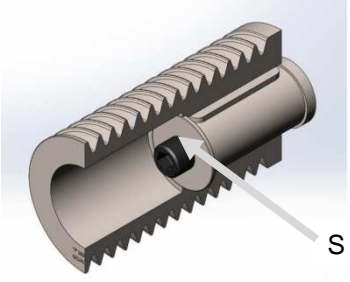

|  | thread | tightening torque<br>in Nm |
|---|--------|----------------------------|
|   | M5     | 2,2                        |
|   | M8     | 10,0                       |
|   | M10    | 19,0                       |
|   | M12    | 33,0                       |

Table 2: Tightening torque for safety screw S of a belt pulley

appropriate measures for securing screw must be applied


**Vibration:**

|   |  |
|---|--|
|  | <p>The site vibration response of the system, which is determined by the output elements, the mounting conditions, the alignment, the installation, and the effects of external vibrations, may cause the vibration values at the motor to increase.</p> <p>In the interest of reliable motor operation and a long bearing service life, the permitted vibration values in accordance with EN 60034-14 should not be exceeded. Under certain circumstances, the rotor may need to be fully balanced with the output element (in accordance with ISO 140).</p> <p>The vibration value after mounting must not exceed the permitted rates of acceleration (comp. <b>Section 2.4</b>)</p> <p>Where there are deviations from normal operation – e. g., rise in temperature, noises, vibration – switch off the motor. Identify the cause and, if necessary, contact the manufacturer.</p> |
|---|--|


## 3 Mounting

### 3.1 Safety instructions

#### Before mounting:

|   |  |
|---|--|
|  | <p>Never mount or commission a damaged electric motor.<br/>Never install the electric motor in a damaged machine.<br/>Before mounting the electric motor, make sure it is suitable for your machine.</p> |
|---|--|

#### During mounting:

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

### 3.2 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 for the designated purpose (comp. **Section 1.2, Section 2.4**).  
*Observe nameplate 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 (comp. **Section 2.4**).
- the compartment in the machine is suitable for the cooling method employed for the electric motor.  
*The motor has to be mounted in such a way as to guarantee sufficient waste heat removal via the housing and motor flange surfaces (comp. **Section 2.6**).*
- the motor can be mounted and operated with the connection data and fastening features provided.  
*The mounting dimensions of the motor and the tolerance details are provided in the technical documentation.  
When mounting the flanges on the motor, make sure that the flange surface is in good, even contact. The supports and bearing surfaces must be clean and undamaged. They must be precisely aligned with the connecting shafts to prevent exposure of the bearings, shafts and housing to damaging loads through misalignment. When tightening the flange mounting screws (**min. strength class 8.8**), make sure that the flange connection is not distorted.*
- no liquid can penetrate the upper bearing when installing vertically with the shaft end facing upwards.
- the permitted radial forces according to the operating characteristics in the technical documentation that accompanies the product are not exceeded (if necessary, contact Baumüller for clarification).  
*The motor manufacturer must always be contacted if axial forces occur.*
- the brake (optional) can be released once the operating voltage has been applied (audible operating noise).
- the rotor rotates smoothly without a scraping sound.  
*On motors with a brake fitted, release the brake beforehand.*
- the design of the motor and encoder cables complies with the details in the technical documentation that accompanies the product.

- the output and input elements are secured.
- the complete cooling circuit is fully functional.
- the surface of the motor is free from pollution.



### 3.3 Electrical connections

#### Important notes:

|   |   |
|---|---|
|  | <p>All work must be carried out by specially trained personnel.</p> <p>Work must only be carried out when the system is electrically isolated and secured against unintentional restarting (also auxiliary circuits).</p> <p>Work must only be carried out once the motor has come to a standstill!<br/> <i>In the case of three-phase synchronous motors with permanent magnet excitation, voltages of &gt; 60 V can occur at the motor contacts with the rotor running.</i></p> <p>Regulations for working in electrical plants must be observed!</p> |
|---|---|

**Attention!** The safety regulations for work on electrotechnical systems in accordance with EN 50110-1 must be followed:

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

|   |   |
|---|---|
|  | <p>The electric motor must be operated via a correspondingly designed converter. A direct connection to the three-phase mains can destroy the motor.</p> <p>Ensure that the phase sequence and the pin assignment are correct!</p> <p>Electrical connections, protective conductor connections, and screen connections (when using screened cables) must be permanently secure!</p> |
|  | <p>Never touch the contacts of the encoder or thermal sensor with your hands or with tools which are or may be electrostatically charged. The encoder and the thermal sensors are electrostatically sensitive components.</p>   |


#### Electrical installation:

- The person setting up the system is responsible for correct electrical installation.
- The motor data on the nameplate 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 employed.
- The motor and the modules (brake, encoder etc.) must be connected in accordance with the details on the wiring diagrams (see **enclosed wiring diagrams** and **Section 7**).
- 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 (see Technical Product List).
- Before connection, the plugs and sockets must be checked for damage, corrosion, dirt and dampness.
- Ensure the connections are made correctly and are tight. Seals and sealing faces on the connectors maintain the type of protection.  
**Note!** Also in the interests of safeguarding the degree of protection, the rotatable junction boxes should not be turned in their direction of connection more than 5 times altogether.
- Connectors must not be exposed to mechanical stress. If necessary, protect against strain, shearing, twisting and kinking.



## 4 Commissioning, operation

### 4.1 Safety instructions


#### Working on the electric motor:

|   |  |
|---|--|
|  | <p>Work must not be carried out on the electric motor until the motor has come to a standstill and is electrically isolated. All connections, such as screw connections, that were loosened when working on the motor must be tightened again prior to commissioning.</p> <p>When carrying out work on the motor, please observe the technical instructions and notes in the respective sections in these Commissioning and Maintenance Instructions.</p> <p><b>Attention:</b> If the optional holding brake is fitted, it must not be used to secure anything while working on the motor (e. g. for retaining loads)!</p> |
|---|--|



#### Risk of fatality due to electric shock:

|  |   |
|--|---|
|   | <p>Make sure that the motor is disconnected and electrically isolated.</p> <p>Never disconnect the motor connections during operation.</p> <p>Only connect measuring instruments when the motor is disconnected from the power supply and electrically isolated.</p> <p>Only commence work on the motor connections when you are sure the motor is electrically isolated and there is no potential.</p> |
|  | <p>When in operation, electric potential can be found at the motor contacts and at the motor windings. Never touch these modules / elements while the motor is in operation.</p>  |

#### Installing and uninstalling safety devices:

|   |  |
|---|--|
|  | <p>The electric motor must not be commissioned without first mounting the safety devices.</p> <p>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.</p> |
|---|--|

#### Danger on physical contact:


|   |  |
|---|--|
|  | <p>Make sure that the electric motor has come to a standstill and is secured against accidental restarting before you touch it.</p> <p>Only touch the output shaft when it is electrically isolated and the motor has come to a standstill. Otherwise there is a risk due to the rotating rotor.</p> |
|  | <p><b>Danger of burns!</b> Never touch the motor housing when the motor is running at rated load. The surface temperatures on the motors may <b>exceed 70 °C</b>.</p>  |

### 4.2 Checks prior to commissioning

- The drive is undamaged and is not located within the danger zone of other equipment.
- The motor is correctly aligned and fastened. All screwed connections are correctly tightened.
- All the appropriate safety devices (mechanical, thermal, and electrical) are mounted.
- The motor connections have been made correctly.
- The protective conductor system is correct and its functionality has been checked.
- The cables are not in contact with the surface of the motor.
- The drive is not blocked (release brake, if present).
- Emergency stop functions have been checked

### 4.3 Commissioning, operation

#### Note on brake function (if present):

|   |  |
|---|--|
|  | The brake is designed as a holding brake with an emergency stop function.<br>(power failure and emergency stop)<br>It must not be used as a working brake. |
|---|--|

Commissioning must be carried out exclusively by qualified personnel.

Please refer to the commissioning instructions for the converter and the cooling system.

#### Checks during commissioning:




- Release the brake, if necessary.
- Have all the modules of the motor such as the brake, encoder, etc. been checked and are they in compliance with the conditions of use?
- Have all electrical connections been made correctly and tightened? (**observe wiring diagrams, see Section 7 and respectively the enclosed wiring diagrams**).
- Have all protection measures which eliminate the possibility of physical contact with live parts, hot surfaces, rotating and moving parts been followed and are these measures fully functional?
- Have all output elements been mounted and adjusted in accordance with the manufacturer's instructions?
- Are measures in place to ensure that the maximum permitted speed  $n_{\max}$  of the motor cannot be exceeded? The maximum permitted speed  $n_{\max}$  is the highest permitted operating speed for short-time duty.

#### Checks during operation:

- Listen out for unusual noises.
- If scraping, scratching, grinding, or other similar noises occur, stop the drive immediately and locate the cause.
- Check the motor surface and connection cables for dirt, e.g. layers of dust, oil deposits, dampness and leaks etc.
- Check the maintenance intervals.

### 4.4 Malfunctions in operation

#### Safety instructions:

|   |  |
|---|--|
|  | Troubleshooting and rectification must only be performed by qualified personnel.<br>Do not disconnect any of the safety devices – even during test runs.         |
|  | Only disconnect and connect electrical cables when electrically isolated and secured.<br>Observe the 5 safety rules for "Isolation" (comp. <b>Section 3.3</b> ). |
|  | Beware of hot surfaces!  |

In case of malfunctions in operation always

- Refer to the operating instructions for the machine/system.
- Refer to the operating instructions for the converter.
- If necessary, contact the manufacturer of the motor or converter.

**Have the following information ready:**

- Nameplate data
- type and scope of the malfunction, situation on occurrence of the malfunction
- application data (torque cycle, speed and forces over time; ambient conditions)

The following selection of possible causes can be helpful in the fault rectification process:


| <b>Malfunction</b>   | <b>Cause</b>   | <b>Remedy</b>  |
|--|--|--|
| Motor does not start   | No controller enable<br>Controller fault, encoder fault<br><br>Brake does not release<br><br>Faulty brake<br><br>No power supply<br><br>Rotating field                   | Activate controller enable<br>Read out fault list on the converter or controller; rectify faults<br>Check control, connections, and power supply<br>Repairs carried out by manufacturer<br><br>Check connections and power supply<br><br>Check phase sequence. If necessary, switch over the connecting cables |
| Uneven running   | Insufficient screening on connecting cables<br>Controller parameters too high  | Check screening connection and grounding<br>Optimise controller parameters   |
| Vibrations   | Coupling element or driven machine poorly balanced<br>Inadequate alignment of the drive train<br>Fixing screws loose   | Rebalance<br><br>Realign machine set<br><br>Check and tighten screwed connections  |
| Running noises   | Foreign bodies in the motor<br><br>Bearing damage  | Repairs carried out by motor manufacturer<br><br>Repairs carried out by motor manufacturer   |
| Temperature rise in the motor<br>Motor temperature monitoring unit trips | Drive overload<br><br>Motor surface/airways dirty<br><br>as been installed in an area that does not allow enough space<br><br>Brake not releasing fully – brake dragging | Check motor load and compare with nameplate<br><br>Clean motor surface/airways<br><br>Check motor has been installed in acc. with <b>Sections 2.6</b> and <b>3.2</b><br><br>Have repaired by motor manufacturer  |
| Current consumption too high, motor torque too low                       | Indexing angle incorrect   | Check indexing angle and adjust if necessary   |

**Table 3: Malfunctions**



## 5 Inspection and maintenance

### Working on the electric motor:

|   |  |
|---|--|
|  | <p>Work must not be carried out on the electric motor until the motor has come to a standstill, is electrically isolated, de-pressurized and has cooled down. All connections, such as screws on the motor that were loosened must be tightened again after the inspection and maintenance work.</p> <p>When carrying out work on the motor, please observe the technical instructions and notes in the respective sections in these Commissioning and Maintenance Instructions.</p> <p>When carrying out maintenance work, observe all safety instructions which also apply to the commissioning of the motor (see <b>Section 4.1</b>).</p> <p><b>Attention!:</b><br/>If the optional holding brake is fitted, this brake must not perform a safety function during work on the motor (e. g., retaining loads)!</p> |
|---|--|

### 5.1 Inspection

Depending on the severity of soiling on site, cleaning will have to be carried out regularly to guarantee the continuous adequate dissipation of heat. The flow rate and the pressure ratio of the cooling system must be checked.

If an optional brake is fitted, wear limits are specified (e. g., maximum permissible operating air gap, maximum number of emergency braking operations). The actual degree of wear on the brake must be checked at regular intervals. When the permissible wear limits have been reached, the brake must be replaced (see **Section 5.2**).

If an optional shaft sealing ring is used, it must be checked at regular intervals to ensure it is functioning correctly (leakage).

### 5.2 Maintenance

The service life of the bearings and sealing elements can differ greatly depending on the operating conditions, (e. g. operating mode, temperature, speed and load).

In the case of trouble-free operation, we generally recommend the following maintenance procedures:

- Replacement of the **bearings** after 20.000 running hours (the bearings are designed for a calculated service life of 20.000 running hours)
- Replacement of the **shaft-sealing ring** after approximately 5.000 running hours, if present and if no leaks have been detected during previous inspections

If an optional **brake** is fitted, it is essential that it is replaced when its wear limits are reached.

The maintenance work is to be undertaken by Baumüller or a specialist organization authorized by Baumüller.

#### Caution!

**The specifications of the technical instructions TABG 30026 must be followed during maintenance and servicing on motors which are used for safety-oriented applications.**

## 6 Disposal

The motor must be disposed of in accordance with the relevant national and local regulations within the framework of the normal recycling process.

The encoder electronics (if provided) must be disposed of in the proper manner as electronic scrap.

## 7 Pole assignment (main connection and control port)

### 7.1 Resolver – KTY on power connection

Receptacle: Size 1 - Straight, Angled or Angled Rotatable

| Function             |        | Contact No. | Receptacle                                   |           |
|----------------------|--------|-------------|--|-----------|
|                      | Signal |             |  | Schematic |
| Motor                | U      | 1           | <u>Power</u><br><br>8-Pole<br>Pin Contacts   |           |
|                      | V      | 3           |  |           |
|                      | W      | 4           |  |           |
| PE                   | ⊕      | 2           |  |           |
| Brake <sup>(1)</sup> | +      | A           |  |           |
|                      | -      | B           |  |           |
| Temp.-<br>Sensor     | KTY +  | C           |  |           |
|                      | KTY -  | D           |  |           |
| Housing              |        | s.c.        |  |           |
| Resolver             | COS -  | 1           | <u>Signal</u><br><br>12-Pole<br>Pin Contacts |           |
|                      | SIN -  | 5           |  |           |
|                      | SIN +  | 6           |  |           |
|                      | COS +  | 8           |  |           |
|                      | REF +  | 10          |  |           |
|                      | REF -  | 12          |  |           |
| Housing              |        | s.c.        |  |           |

Figure 2: Resolver-KTY on power connection

s.c.: shield connection

(1) brake optional; see nameplate

Schematic: view of the contact side

## 7.2 Resolver – KTY on signal connection

Receptacle: Size 1 - Straight, Angled or Angled Rotatable

| Function             |        | Contact No. | Receptacle                      |           |
|----------------------|--------|-------------|---------------------------------|-----------|
|                      | Signal |             |                                 | Schematic |
| Motor                | U      | 1           | Power<br>8-Pole<br>Pin Contacts |           |
|                      | V      | 3           |                                 |           |
|                      | W      | 4           |                                 |           |
| PE                   | ⊕      | 2           |                                 |           |
| Brake <sup>(1)</sup> | +      | A           |                                 |           |
|                      | -      | B           |                                 |           |
| Housing              |        | s.c.        |                                 |           |
| Resolver             | COS -  | 1           |                                 |           |
|                      | SIN -  | 5           |                                 |           |
|                      | SIN +  | 6           |                                 |           |
|                      | COS +  | 8           |                                 |           |
|                      | REF +  | 10          |                                 |           |
|                      | REF -  | 12          |                                 |           |
| Temp.-<br>Sensor     | KTY -  | 7           |                                 |           |
|                      | KTY +  | 9           |                                 |           |
| Housing              |        | s.c.        |                                 |           |

Figure 3: Resolver-KTY on signal connection

s.c.: shield connection

(1) brake optional; see nameplate

Schematic: view of the contact side

### 7.3 SRS/SRM50; SKS/SKM36; SEK/SEL37 – KTY on power connection

feedback: Hiperface  
 Receptacle: Size 1 - Straight, Angled or Angled Rotatable

| Function             |         | Contact No. | Receptacle                                   |           |
|----------------------|---------|-------------|--|-----------|
|                      | Signal  |             |  | Schematic |
| Motor                | U       | 1           | <u>Power</u><br><br>8-Pole<br>Pin Contacts   |           |
|                      | V       | 3           |  |           |
|                      | W       | 4           |  |           |
| PE                   | ⊕       | 2           |  |           |
| Brake <sup>(1)</sup> | +       | A           |  |           |
|                      | -       | B           |  |           |
| Temp.-<br>Sensor     | KTY +   | C           |  |           |
|                      | KTY -   | D           |  |           |
| Housing              |         | s.c.        |  |           |
| Hiperface            | REFCOS  | 1           | <u>Signal</u><br><br>12-Pole<br>Pin Contacts |           |
|                      | Daten + | 2           |  |           |
|                      | + SIN   | 5           |  |           |
|                      | REFSIN  | 6           |  |           |
|                      | Daten - | 7           |  |           |
|                      | + COS   | 8           |  |           |
|                      | GND     | 10          |  |           |
|                      | + U     | 12          |  |           |
| Housing              |         | s.c.        |  |           |

Figure 4: Hiperface-port-KTY on power connection

s.c.: shield connection

(1) brake optional; see nameplate

Schematic: view of the contact side

## 7.4 SRS/SRM50; SKS/SKM36; SEK/SEL37 – KTY on signal connection

feedback: Hiperface  
 Receptacle: Size 1 - Straight, Angled or Angled Rotatable

| Function             |         | Contact No. | Receptacle                                 |           |  |  |
|----------------------|---------|-------------|--|-----------|--|--|
|                      | Signal  |             |  | Schematic |  |  |
| Motor                | U       | 1           | <u>Power</u><br><br>8-Pole<br>Pin Contacts |           |  |  |
|                      | V       | 3           |  |           |  |  |
|                      | W       | 4           |  |           |  |  |
| PE                   | ⊕       | 2           |  |           |  |  |
| Brake <sup>(1)</sup> | +       | A           |  |           |  |  |
|                      | -       | B           |  |           |  |  |
| Housing              |         | s.c.        |  |           |  |  |
| Hiperface            | REFCOS  | 1           |  |           | <u>Signal</u><br><br>12-Pole<br>Pin Contacts |  |
|                      | Daten + | 2           |  |           |  |  |
|                      | + SIN   | 5           |  |           |  |  |
|                      | REFSIN  | 6           |  |           |  |  |
|                      | Daten - | 7           |  |           |  |  |
|                      | + COS   | 8           |  |           |  |  |
|                      | GND     | 10          |  |           |  |  |
|                      | + U     | 12          |  |           |  |  |
| Temp.-<br>Sensor     | KTY +   | 3           |  |           |  |  |
|                      | KTY -   | 4           |  |           |  |  |
| Housing              |         | s.c.        |  |           |  |  |

Figure 5: Hiperface-port-KTY on signal connection

s.c.: shield connection

(1) brake optional; see nameplate

Schematic: view of the contact side

## 7.5 ECN1313 / EQN 1325

(encoder with EnDat 2.1-port from Heidenhain companies; M23, 17-polig)

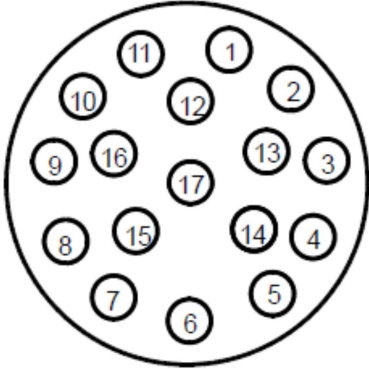
|  | Pin | Signal     |
|--|-----|------------|
|  <p data-bbox="440 869 730 936">Ansicht auf Kontaktseite<br/>der Gerätedose</p> | 1   | Up         |
|  | 2   | -          |
|  | 3   | -          |
|  | 4   | 0V         |
|  | 5   | -          |
|  | 6   | -          |
|  | 7   | Up         |
|  | 8   | Clock      |
|  | 9   | Clock inv. |
|  | 10  | 0V         |
|  | 11  | -          |
|  | 12  | B+         |
|  | 13  | B-         |
|  | 14  | Data       |
|  | 15  | A+         |
|  | 16  | A-         |
|  | 17  | Data inv.  |

Figure 6: pole assignment ECN 1313 / EQN 1325

## 7.6 ECN1325 / EQN 1337

(encoder with EnDat 2.2-port from Heidenhain companies; M12, 8-polig)

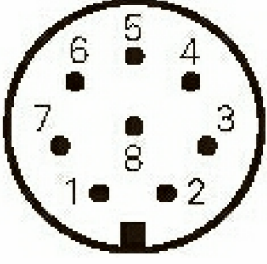
|  | Pin | Signal     |
|--|-----|------------|
|  <p>Ansicht auf Kontaktseite<br/>der Gerätedose</p> | 1   | Sensor 0V  |
|  | 2   | Sensor Up  |
|  | 3   | Data       |
|  | 4   | Data inv.  |
|  | 5   | 0V         |
|  | 6   | Clock inv. |
|  | 7   | Clock      |
|  | 8   | Up         |

Figure 7: pole assignment ECN 1325 / EQN 1337 (M12)

## 7.7 ECN1325 / EQN 1337

(encoder with EnDat 2.2-port from Heidenhain companies; M23, 9-polig)

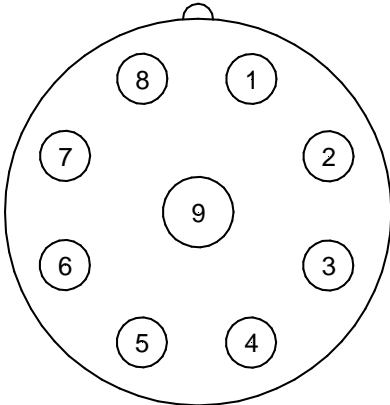
|  | Pin | Signal     |
|--|-----|------------|
|  <p>Ansicht auf Kontaktseite<br/>der Gerätedose</p> | 1   | Clock      |
|  | 2   | Clock inv. |
|  | 3   | Up         |
|  | 4   | 0V         |
|  | 5   | Data       |
|  | 6   | Data inv.  |
|  | 7   | Sensor Up  |
|  | 8   | Sensor 0V  |
|  | 9   | -          |

Figure 8: pole assignment ECN 1325 / EQN 1337 (M23)

### Note:

- For other encoder types and optional lead for the temperature sensor via the encoder cable, see the enclosed wiring diagram or technical documentation for the pin assignment
- The encoder from **Section 7.3 to 7.7** are components susceptible to ESD.

### *Warranty and liability*

All the details in this documentation are non-binding customer information and subject to on going change and will be constantly updated by our editing staff. Warranty and liability claims against Baumüller Nürnberg GmbH are excluded if, in particular, damage is caused by one or more of the following:

- You have not followed the instructions in this documentation.
- You have not used the system for the purpose intended.
- You have
  - installed, connected, started or operated the machine incorrectly or have not maintained it.
  - permitted the system to be mounted, connected, commissioned, operated, and/or maintained by unqualified or insufficiently qualified personnel.
  - overloaded the system.
  - operated the system with
    - faulty safety devices,
    - safety devices that were incorrectly fitted or not fitted,
    - safety devices or protective devices that are not in working order.
  - not operated the system in the stipulated ambient conditions.
- You have modified the system without the written approval of Baumüller Nürnberg GmbH.
- You have not observed the instructions concerning maintenance in the component descriptions.
- You have not monitored parts that are subject to wear sufficiently.
- You have performed a repair incorrectly.
- You have combined the system with products from other manufacturers in an improper manner.
- You have combined the drive system with faulty and/or incorrectly documented products from another manufacturer.

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