

Installation

Dynamic Line I Dynamic Line II Dynamic Line III Baseline TA Motor



Safety and start-up of three-phase motors

Mat.No.	Rev.
00SMNEM-7000	1B



Information on safety and commissioning for three-phase motors

(in accordance with low-voltage directive 2014/35/EG)

1. General

The use of our units in the target products is outside of our control and therefore lies exclusively in the area of responsibility of the machine manufacturer.


The information contained in the technical documentation, as well as any user-specific advice in spoken and written and through tests, are made to best of our knowledge and information about the application. However, they are considered for information only without responsibility. This also applies to any violation of industrial property rights of a third-party. Selection of our units in view of their suitability for the intended use must be done generally by the user.

Tests can only be done by the machine manufacturer in combination with the application. They must be repeated, even if only parts of hardware, software or the unit adjustment are modified.

Unauthorised opening and tampering may lead to bodily injury and property damage and may entail the loss of warranty rights. Original spare parts and authorized accessories by the manufacturer serve as security. The use of other parts excludes liability for the consequences arising out of.

The suspension of liability is also valid especially for operation interruption damages, loss of profit, data loss or other damages. This is also valid, if we referred first to the possibility of such damages.




If individual regulations should be futile, not effective or impracticable, then the effectivity of all other regulations or agreements is not affected by this.

	<p>Qualified personnel</p>	<p>Three-phase motors have dangerous, live parts and rotating components as well as surfaces that may become hot. Improper assembly, installation, start-up, operation and maintenance as well as unauthorized removal of covers and other protective measures may result in serious injury and damage to property. Only qualified personnel are allowed to perform any planning, installation or maintenance work (observe EN 50110-1, DIN VDE 0105-100, IEC 364). The personnel must be trained for the job and must be familiar with the installation, assembly, start-up and operation of the product. The applicable national, local and works regulations and requirements must be complied with. The instructions given in the manual or any other documentation must always be observed. Improper operation can cause damages to personnel and equipment.</p>
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Non-observance of the safety instructions leads to the loss of any liability claims. This list is not exhaustive.

2. Intended use

Three-phase motors are intended for industrial systems. They comply with the harmonized standards of the series EN 60034 (VDE 0530). Utilization in areas subject to explosion hazard is not permitted, unless expressly intended for this purpose. If requirements are more strict it is the responsibility of the customer to ensure compliance on installing the equipment. The conditions on site must correspond to all rating plate specifications respectively information in the instruction manual. This applies particularly to the degree of protection, ambient temperature and site altitude.

	<p>Components for installation</p>	<p>Low voltage motors are components for installation in machinery in terms of the machine directive 2006/42/EC. Commissioning must not take place until it has been provided that the end product conforms with this guideline (please note EN 60204-1).</p>
	<p>No mains operation</p>	<p>The motors are not designed for direct connection to the three-phase system but are to be operated via an electronic power inverter. Direct connection to the system may destroy the motor.</p>
	<p>Download INSTRUCTION MANUAL</p>	<p>This installation manual contains only an excerpt from the instruction manual. The instruction manual is available for download on our homepage „www.keb.de“.</p>

3. Transport and storage

Transport

- Any damage detected after delivery should be reported immediately to the transport company.
- Damaged products may not be set into operation.
- The eyebolts are designed for the weight of the motor only therefore do not attach any additional loads.
- Do not transport machines on the fan cover.
- If necessary, use suitable, adequately dimensioned transporting equipment (e.g. rope guides).

Storage

- Storage only in dry and dust-free rooms, protected against mechanical damage and vibration ($v_{\text{eff}} \leq 0.2$ mm/s) (bearing standstill damage).
- Do not store machines on the fan cover!
- On long-term storage, the grease interval of the bearings is reduced. Checking of bearing grease must be carry out when motors are longer than 12 months stored. When storage conditions are the cause of grease depreciation (ingress of condensate, consistency change) the grease must be exchanged. Grease exchanging must be carry out no later than in three year interval.


4. Installation

- Remove existing shipping braces and reuse for subsequent transport.
- Measure insulating resistance before commissioning (for values $\leq 1\text{k}\Omega/\text{V}$ rated voltage dry winding).
- Remove rust-proofing of the output shaft before assembly and grease joining area
- Ensure an even underlying surface, good foot or flange fixing and precise alignment for direct coupling.
- Observe maximum length of the used flange fixing screws! Observe preset screw tightening torque at the assembly of shrink discs.
- Components to be assembled on the motor shaft end must be balanced dynamically. Rotors are balanced ex factory with half feather key. The balancing type is specified on the shaft end face or rating plate (H = half-, F = full-key balancing).
- Couplings or other transmission elements may be mounted only with the help of the helical threaded hole in the output shaft. Avoid shocks and impacts during installation of transmission elements (possibly warm-up). Coupling elements must be covered during operating.
- Avoid resonances with the rotary frequency and double mains frequency.
- Do not obstruct ventilation, observe minimum distances to the cooling air supply. Avoid re-suctioning of the heated cooling air.
- Prevent falling from foreign bodies for construction types with vertical motor assembly.
- Turn rotor by hand, pay attention to unusual slipping noises. Check direction of rotation in decoupling state
- Avoid resonances with the rotary frequency and double mains frequency.
- Damage can be caused for motors with cylinder roller bearing for increased radial load by the operation with smaller than the minimum radial load. The radial load should be at least 30% of the maximum permissible radial load during operation. Avoid inadmissible belt tensions!
- No foreign bodies, dirt and moisture may be in the terminal box. Close non-required cable entry-holes and the box itself dust and waterproof.


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5. Electrical connection

	<p>Dangerous voltage</p>	<p>During the operation (even at zero speed) the motors possess dangerous live parts. In the case of synchronous motors with rotating rotor a high voltage is applied onto the motor connections. All work may be carried out only by qualified technical personnel on the motor at rest in de-energized status and secured against restarting. This also applies to auxiliary circuits (e.g. separately-driven fan). The isolation from supply must be checked.</p>
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- If the permissible tolerance limits are exceeded that are specified in EN60034-1/ IEC 34-1 (voltage $\pm 5\%$, frequency $\pm 2\%$, shape of curve and symmetry) the heating effect is increased and the electromagnetic compatibility is affected.
- Please note the specifications on the rating plate and the connection diagram in the terminal box.
- The following minimum clearances must be observed in the terminal box (prevent protruding wire ends):
UN $\leq 550\text{V}$ = 8 mm
UN $\leq 725\text{V}$ = 10 mm
- The thermistor fitted in the winding is to be connected and evaluated by a suitable wiring, for the protection of the motor against thermal overload in case of slow changes.
Attention: The temperature switch offers no comprehensive protection of the winding. Suitable measures in the controller electronic are required to protect the motor against thermal overload in case of fast changes.
- Absolutely observe the direction of rotation in case of separate ventilation!
- Secure feather key for the test run without output components.
- A varistor should be connected parallel to the brake coil of the holding brake.

	<p>Degree of protection</p>	<p>The connection must be carried out in such a way that a permanently safe, electrical connection is maintained. Pay attention to a safe protective conductor connection. In the case of improper execution of the work the type of protection IP65 is no longer warranted. If connector systems are used, then the type of protection IP65 is only achieved with correctly wired and firmly tightened mating connector.</p>
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5.1 Motor connection

Assignment of the motor cable

	Motor				Brake*		Temperature sensor	
Description	U	V	W	PE	+	-	T1 (+)	T2 (-)
Marking at the cable	1	2	3	green-yellow	5	6	7	8

* Optional (supply via external braking power supply unit)

(in accordance with low-voltage directive 2014/35/EG)

Connector assignment at the motor

Motor size	Terminal assignment		Connector motor side size 1,0
Ax...DxSM5xx-xxxx Ax...ExSM0xx-xxxx TA2x...TA5xxx-xxxx 2x...7xSM2xx-xxxx	1	Motor phase U	
		Protective earth	
	3	Motor phase W	
	4	Motor phase V	
	A	Brake +	
	B	Brake -	
	C	Temperature sensor +	
	GB	Temperature sensor -	
Motor size	Terminal assignment		Connector motor side size 1.5
ExSM5xx-xxxx FxSM0xx-xxxx TA6xxx-xxxx 8xSM2xx-xxxx	U	Motor phase U	
	V	Motor phase V	
	W	Motor phase W	
		Protective earth	
	+	Brake +	
	-	Brake -	
	1	Temperature sensor +	
	2	Temperature sensor -	

5.2 Encoder connection

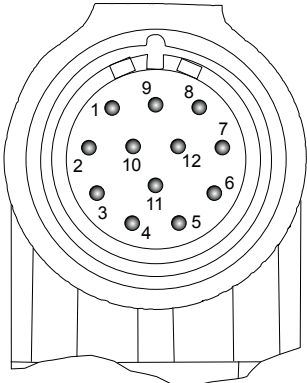
Resolver

Resolver plug	View	No.	Signal	Color
<ul style="list-style-type: none"> • Angle socket • rotatable • 12-pole • Connector 		1	SIN-	red
		2	COS-	pink
		5	REF-	yellow
		7	REF+	green
		10	SIN+	blue
View of the connector pins at the motor		11	COS+	gray
		All other contacts are not assigned.		
Encoder cable	A-Servo 00F50C1-0yyy	F5-Multi 00F50C1-1yyy		
ready-made, shielded, trailing capable, yyy - line length [m]				

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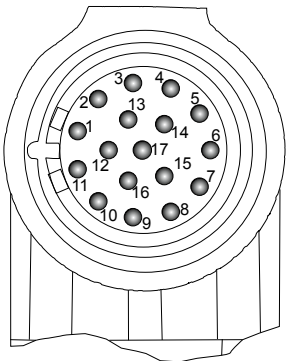
(in accordance with low-voltage directive 2014/35/EG)

Hiperface

Hiperface connector	View	No.	Signal	Color	
• Angle socket		4	REF_SIN-	red	
• rotatable		5	REF_COS-	yellow	
• 12-pole		6	Data+	gray	
• Connector		7	Data-	pink	
View of the connector pins at the motor		8	SIN+	blue	
		9	COS+	green	
		10	+7.5V	brown	
		11	COM	white	
		All other contacts are not assigned.			

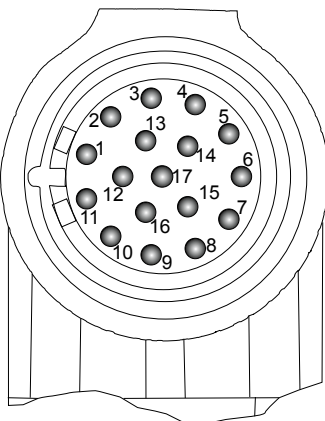
Encoder cable	F5-Multi 00S4809-yyyy
ready-made, shielded, trailing capable, yyyy - line length [m]	

EnDat

EnDat-connector	View	No.	Signal	Color
• Angle socket		7	+5V	white
• rotatable		8	Clock+	black
• 17-pole		9	Clock-	purple
• Connector		10	COM	brown
View of the connector pins at the motor		12	B+	blue
		13	B-	red
		14	Data+	gray
		15	A+	green
		16	A-	yellow
		17	Data-	pink
	All other contacts are not assigned.			

Encoder cable	00F50C1-4yyy
ready-made, shielded, trailing capable, yyyy - line length [m]	

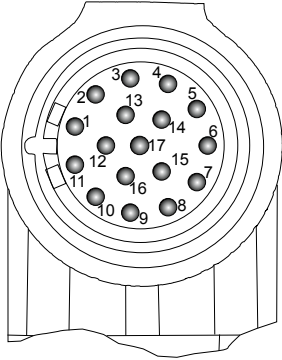
SIN/COS

SIN/COS-connector	View	No.	Signal	Color	
• Angle socket		1	A+	green	
• rotatable		2	A-	yellow	
• 17-pole		3	R+	gray	
• Connector		4	D-	purple	
View of the connector pins at the motor		5	C+	white	
		6	C-	brown	
		7	COM	white/green	
		10	+5V	gray/pink	
		11	B+	blue	
		12	B-	red	
		13	R-	pink	
		14	D+	black	
		All other contacts are not assigned.			

Encoder cable	00S4209-yyyy
ready-made, shielded, trailing capable, yyyy - line length [m]	

(in accordance with low-voltage directive 2014/35/EG)

BiSS

BiSS connector		View	No.	Signal	Color
•	Angle socket		15	A+	green
•	rotatable		16	A-	yellow
•	12-pole		12	B+	blue
•	Connector		13	B-	red
View of the connector pins at the motor			14	DATA+	gray
			17	DATA-	pink
			8	CLOCK+	black
			9	CLOCK-	purple
			10	COM	white
			7	+5,25V	brown
			All other contacts are not assigned.		
Encoder cable			00.F5.0C1-V0yy		
ready-made, shielded, trailing capable, yyyy - line length [m]					

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5.3 Separate ventilator connection

Separate ventilator connection	Cx...DxSM5xx-xxxx Cx...ExSM0xx-xxxx				ExSM5xx-xxxx FxSM0xx-xxxx TAxxxxx-xxxx			
View of the connector pins at the motor								
Terminal assignment	1	L1	1 x 230 Vac	0.12A	1	U	3 x 400 Vac	0.15A
	2	N		0.30A	2	V		
					3	W		
		PE	Protective earth			PE	Protective earth	

6. Start-up/operation

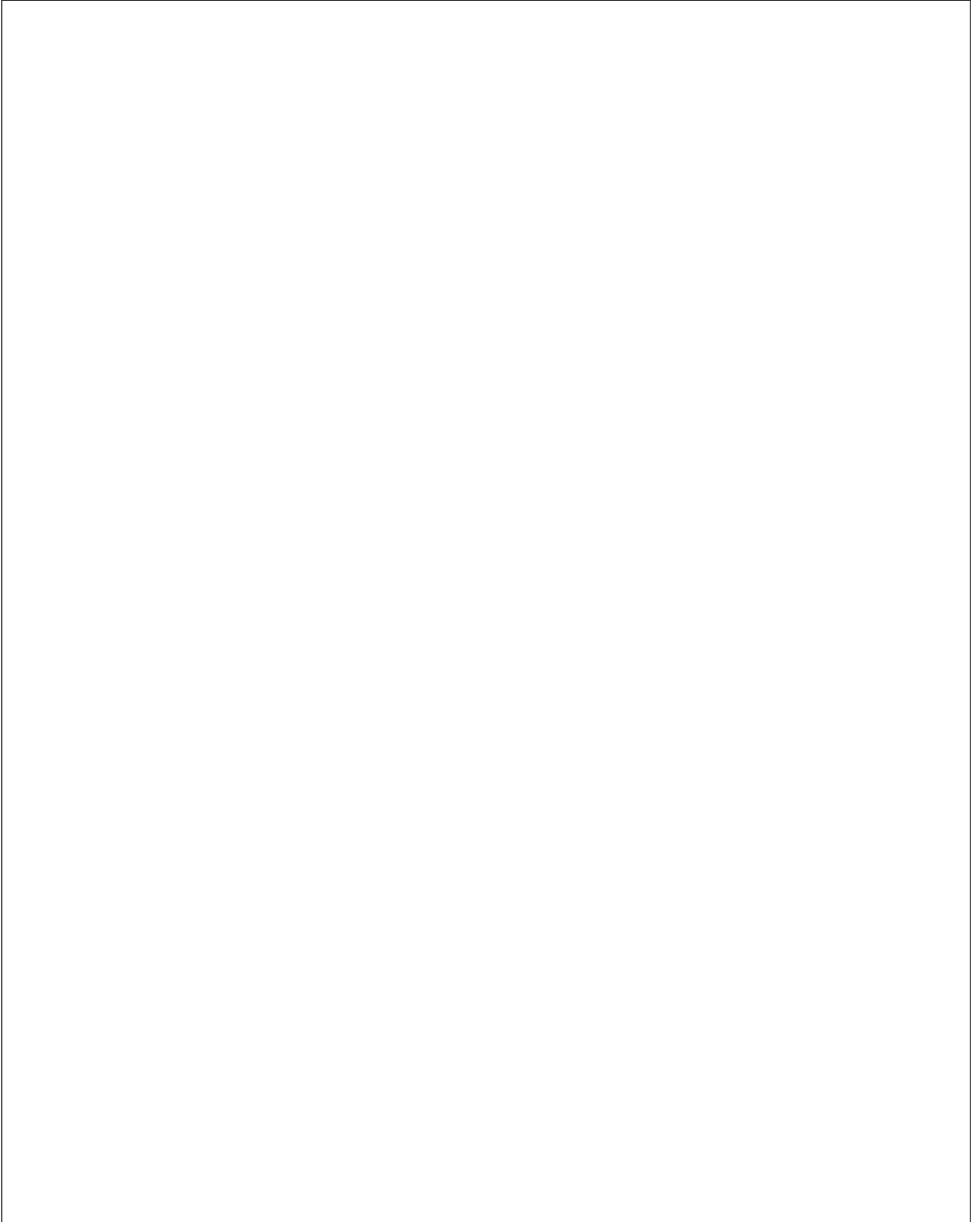
- For motors with brakes, check that the brakes are operating perfectly before start-up.
- Secure the feather key on the test operation of the motor without coupling elements!
- In the case of motors with separate ventilation, the separately-driven fan must be switched on throughout motor operation.
- Do not disconnect protective equipment, even under test operation.
- Operate drive temporarily idle and check for irregularities.
- Pay attention to temperatures, noise, vibrations. In case of doubt, switch off the motor.
- Switch load - vibration levels of $v_{eff} \leq 3.5 \text{ mm/s}$ ($P_N \leq 15 \text{ kW}$) and 4.5 mm/s ($P_N \geq 15 \text{ kW}$) are quite acceptable in the coupled mode.
- Check the current input at load.
- If deviations from normal operation occur (vibration, noises) or increased temperatures determine the causes and contact the manufacturer if necessary.
- Under dirty operating condition, clean the air channels regularly.
- Check occasionally the air gap at mounted brake. Adjustment, if the air gap has reached the level Xn (see type plate).

7. EC Manufacturer's Declaration

CE marked motors were developed and manufactured to comply with the regulations of the Low-Voltage Directive 2006/95/EC. The motors must not be started until it is determined that the installation complies with the machine directive (2006/42/EC) as well as the EC EMC Directive (2004/108/EC). If necessary, a manufacturer's declaration is available at KEB.

8. Further information

Information provided about any additional equipment must be observed! These notes on safety and commissioning must be retained for future reference! For more details please refer to our detailed instruction manual and maintenance guide.

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