AMKASYN
AC Servo and Main Spindle Motors
General technical data

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About this documentation

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What has changed:

Version	Change	Subject	Letter symbol
2002/22			
2015/43	drawing motor encoder connection new	ZCH_Motoren_Einbausteckdose_Motorgeber in the topic ‘motor encoder‘	LeS

Reservation: We reserve the right to modify the content of the documentation as well as to the delivery options for the product.

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- the software version
- the device setup and application
- the type of malfunction, suspected cause of failure
- the diagnostic messages (error messages)

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Content

1 AMKASYN Motor Series DS, DV, DH and DW

1.1 Short description

The AMKASYN series of motors consits of the compact, highly dynamic AC-servo motor types DS and DV as well as the heavy-duty AC main spindle motor types DH and DW with high power density and precision balanced rotors.

The AMKASYN motors are optimally tuned to be used with the AMKASYN digital AC-servo inverters for multi-motor applications in the power range of 1.3 to 75 kVA and with the AMKASYN digital compact servo drive in the power range of 0.7 to 50 kVA. Together the motors and inverters form an intelligent, digital drive system for servo and main spindle applications, which satisfies every demand.

Advantages of the AMKASYN motor series

- Maintenance-free
- Sturdy
- Powerful
- Compact
- High efficiency
- Optimum power to weight ratio
- highly dynamic response
- High overload capacity
- Winding temperature sensors as protection against overload
- Integrated encoder for speed and position control

Areas of application

The AMKASYN motors are especially suitable for use as servo and main drive motors in:

- Plant constrution
- Elevator technology
- Printing machines
- Woodworking machines
- Plastic processing machines
- Warehousing and conveyor technology
- Test stands
- Process engineering
- Textile machines
- Packaging machines
- Machine tools

2 General technical data

Ambient temperature:	+5 ... +40°C / 94°F. At higher ambient temperatures up to maximum 60°C / 140°F the rating data must be reduced by 1% per 1° Kelvin temperature rise.
Installation altitude:	Up to 1000m / 3281ft above sea level. In operation above 1000m / 3281ft altitude, ambient temperatures corresponding to DIN VDE 0530 table 4 shall be used as basis.
Humidity:	Maximum 85% relative humidity, non-condensating.
Degree of protection:	IP 54. Higher degree of protection on request. The stated maximum speeds apply for the IP 54 version with seal ring.
Rating data:	Refer to 100 Kelvin temperature rise in the windings. The test motor is mounted using a thermally insulating flange.
Insulating material class:	F according to DIN VDE 0530.
Thermal protection:	PTC resistor, cold resistance approx. 150-800 Ω.
Bearings:	Ball bearings, lifetime lubricated.
Axial eccentricity run-out:	N according to DIN 42955.
Balancing grade:	G 2,5 corresponding to VDI 2056.
Vibrational grade:	N according to DIN ISO 2373.
Painting:	RAL 9005, flatt black.
Cooling:	Non-ventilated or fan-cooled; airflow toward output shaft. Reverse airflow as option.

3 Technical Data Holding brake and External fan

3.1 Holding brake

The motors can be equipped optionally with holding brakes. These are not suitable as service brakes. The brakes are lifted with 24V DC input. In the case of changed operating conditions, the operating instructions of the brake manufacturer must be observed.

For the maximum speed of the motor the maximum speed of the brake must also be considered.

Motor type	**Holding brake data**					
	M_{BR} [Nm]	U_{BR} [V]	I_{BR} [A]	J_{BR} $*10^{-3}[kgm^2]$	n_{maxBR} [1/min]	m_{BR} [kg]
DV 4, DS 4	1,2	24≅	0,35	0,007	12000	0,5
DV 5, DS 5	2,5	24≅	0,5	0,04	10000	1
DV 7 mit $M_N \leq 6\ N_m$	5	24≅	0,55	0,1	10000	1,5
DS 7 DV 7 mit $M_N \geq 6\ N_m$	11	24≅	0,55	0,1	10000	1,5
DH 16	130	24≅	3,2	3,8	3500	23

3.2 External fan

Motor type	**External fan data**		
	U_F [V]	I_F [A]	The external fans on the motors must be connected to a separate supply voltage. Up to motor size 10 the external fans are driven by single-phase 230V, 50/60 Hz AC-motors, from motor size 13 they are driven by three-phase 400V, 50/60 Hz motors (see table). The air flow is in the direction of the output shaft in the DS and DV motors. The DH motors can be designed either for air flow in the direction of the output shaft (standard) or reverse (optional). With reverse air flow the stated performance data must be reduced by approx. 15%. Please inquire for accurate data. Sufficient clearance for the air supply or discharge is required.
DV 5	1 x 230	0, 25	
DV 7 DS 7	1 x 230	0,1	
DV 10 DS 10 DH 10	1 x 230	0,6	
DH 13	3 x400	0,5	
DH 16	3 x 400	0,7	

4 Motor connection

DV, DH and DW motors feature terminal box connections for motor leads, fan and holding brake. The motors of the DS series and optionally of the DV series feature plug-style connectors. Connection cables with the corresponding cross-sections can be purchased preassembled.

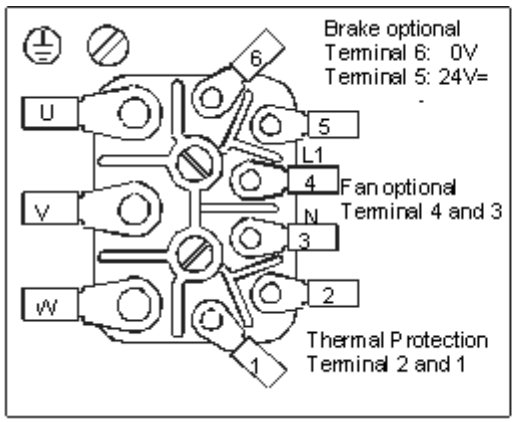
Shielded cables must be used for EMC reasons.

4.1 Terminal box types and terminal block wiring

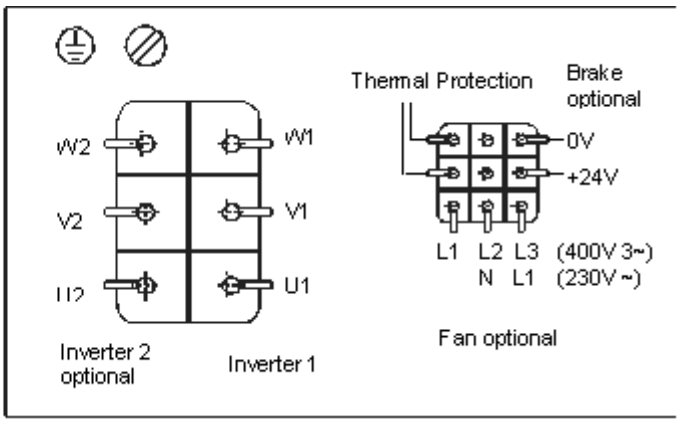
Motor type	Terminal box size	Terminal block components	Cable strain relief (Cable- Ø in mm)	Wire size [mm²] (AWG)	I_L * [A]
DV 5/ DV 7	KG 1	3 x M6 6 x M4	1 x PG13,5 (5-12) 2 x PG11 (5-10)	4 x 1	9,6
DV 10/ DH 10	KG 3	3 x M6 6 x M4	1 x PG21 (11-17,5) 2 x PG11 (5-10)	4 x 1,5 4 x 2,5 4 x 4	12,2 16,5 23
DH 13	KG 4	6 x M6 9 x M4	1 x PG29 (18-25) 2 x PG11 (5-10)	4 x 6 4 x 10	29 40
DH 16	KG 5	6 x M10 9 x M4	1 x PG29 (18-25) 2 x PG11 (5-10)	4 x 16	53

* The current values IL for the connection cable refer to applications according to EN 60204-1:1992 in the cable laying type B2, or according to DIN 46200 for connection bolts.

KG 1and KG 3



KG 4 and KG 5



Picture name: ZCH_Motoren_Klemmkasten

4.2 Connector types

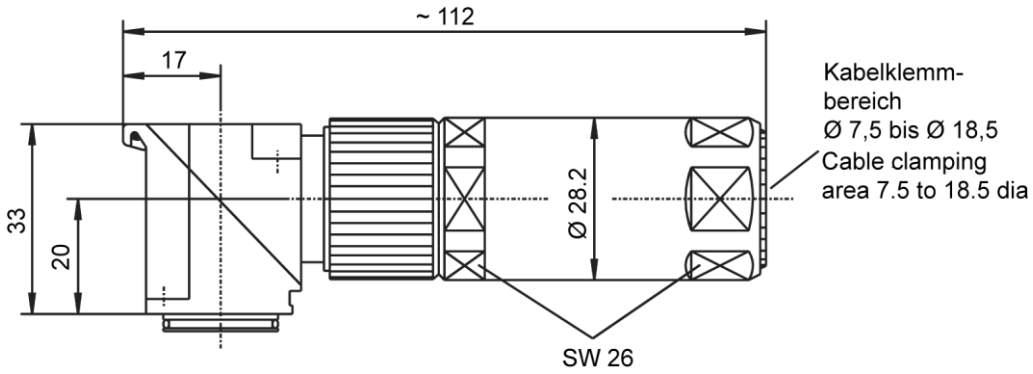
Motor size	Connector size (Cable- Ø in mm)	Wire size [mm²]	I_L* [A]
DS 3 ... DS 10 DV 4 ... DV 10	BG 1 (7,5-18,5)	4 x 1,5 + 4 x 0,25	12,2
DS 10 DV 10	BG 1,5 (9-25)	4 x 4,0 + 4 x 0,75	23
DS 10 DV 10	BG 1,5 (9-25)	4 x 6,0 + 4 x 0,75	29

* The current values IL for the connection cable refer to applications according to EN 60204-1: 1992 in the cable laying type B2

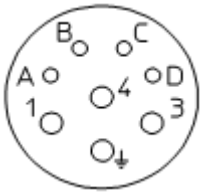
4.3 Dimensions of the motor connector and connection wiring

Connector pin designation is true for view on to the motor connector socket in each case.

Power connection size BG 1



picture name: ZCH_Motoren_Leistungsstecker1.0



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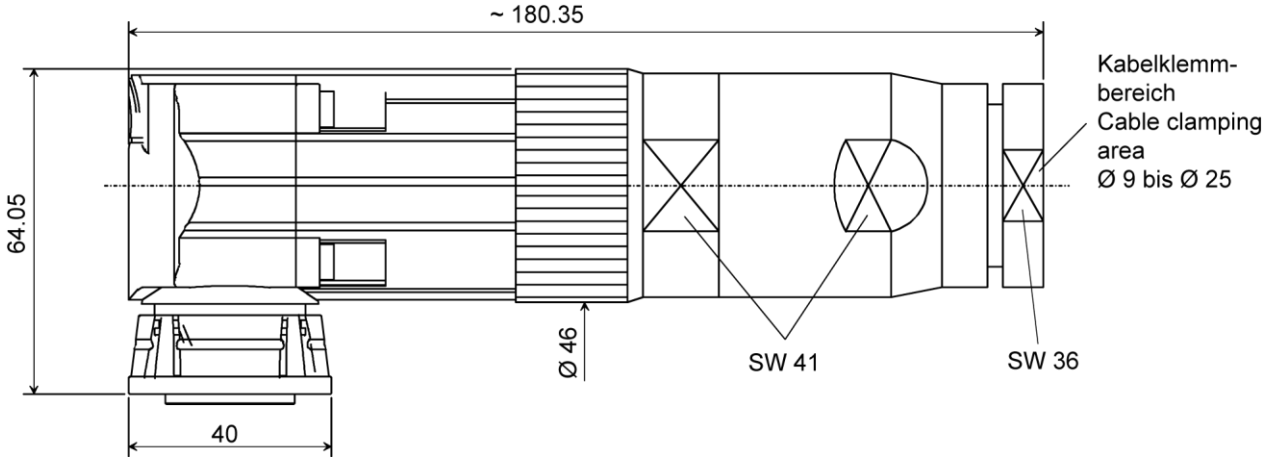
Des.	Connection	Wire No. / Colour
A	Temperature sensor (TH)	white / 5
B	Temperature sensor (TH)	brown / 6
C	Brake + (BR+)	green / 7
D	Brake 0 Volt (BR0V)	yellow / 8
1	Motor phase u	1
3	Motor phase w	3
4	Motor phase v	2
	PE ground (PE)	green / yellow

Power connection size BG 1,5



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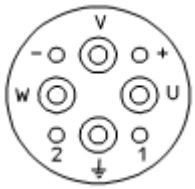
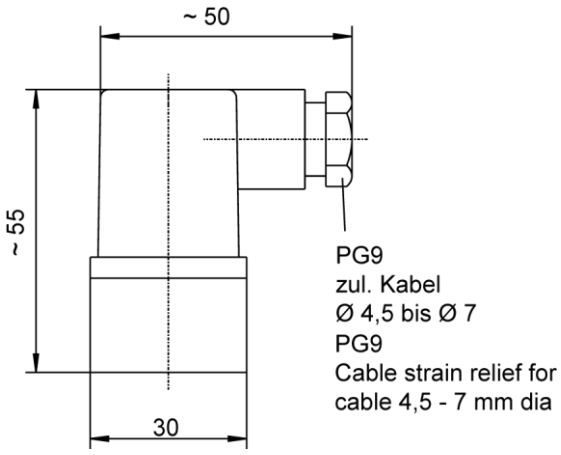


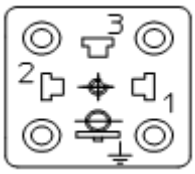
picture name: ZCH_Motoren_Leistungsstecker1.5_quer

Des..	Connection	Wire No.. / Colour
u	Motor phase u	1
v	Motor phase v	2
w	Motor phase w	3
1	Temperature sensor	5
2	Temperature sensor	6
+	Brake + (BR+)	7
-	Brake 0 Volt (BR0)	8
	PE ground	green / yellow

Socket and connector for external fan



picture name: ZCH_Motoren_Einbaudose



picture name: ZCH_Motoren_Anschlussstecker

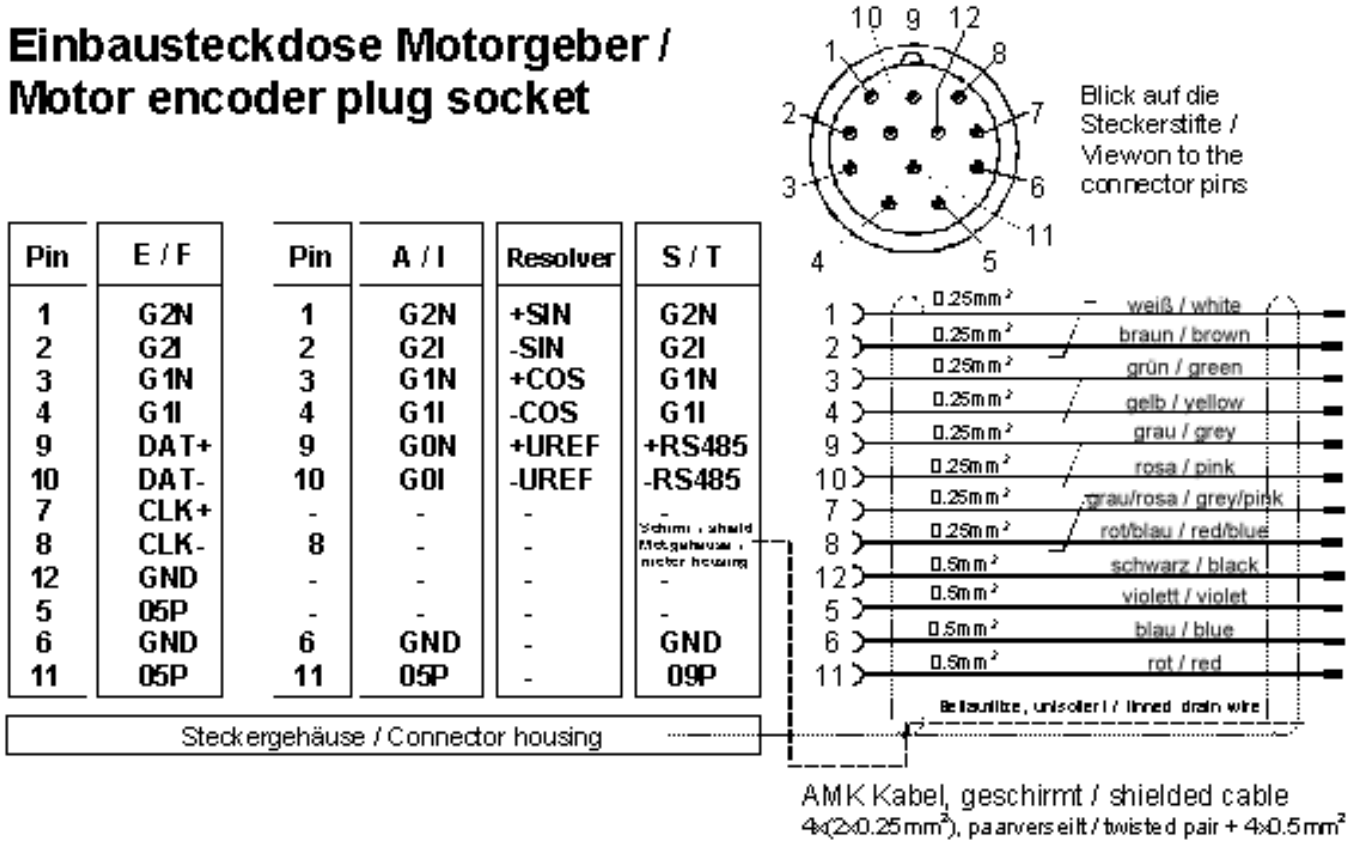
Des.	Connection
1	L1
2	N
3	----------
	PE ground

5 Motor encoders

The motors are equipped with one of these encoders.

The motor maximum speed can be limited additionally by the encoder !

Type	Description
R	Resolver (n_{Max} =15.000 min^{-1})
I	**Optical sine wave encoder**, 1000 or 1024 Per./rev. (n_{Max} =6.000 min^{-1}) (STEGMANN) **Opt. sine wave enc.**, 1000 (H) or 1024 (H) Per./rev. (n_{Max} =6.000 min^{-1}) (HEIDENHAIN)
A	**Magnetic sine wave encoder**, 50 or 100 Perioden / revolution (n_{Max} =60.000 min^{-1})
T **F**	**Optical Absolutwertgeber (multiturn)**, max. 4096 turns **SINCOS, RS485:** 512 Per./rev. (n_{Max} =12.000 min^{-1}) or 1024 Per./rev. (n_{Max} =6.000 min^{-1}) **EnDat** : 512 Per./rev. (Sin/Cos) (n_{Max} =12.000 min^{-1}) or 2048 Per./rev. (n_{Max} =3.000 min^{-1})
S **E**	**Optical absolute encoder (singleturn)** **SINCOS, RS485:** 512 Per./rev. (n_{Max} =12.000 min^{-1}) or 1024 Per./rev. (n_{Max} =6.000 min^{-1}) **EnDat :** 512 Per./rev. (Sin/Cos) (n_{Max} =12.000 min^{-1}) or 2048 Per./rev. (n_{Max} =3.000 min^{-1})



picture name: ZCH_Motoren_Einbausteckdose_Motorgeber

Signal description

G0N	Reference pulse		+ Cos	Resolver cosine
G0I	Reference pulse inverted		- Cos	Resolver cosine inverted
G1N	Track 1		+ UREF	Resolver excitation signal
G1I	Track 1 inverted		- UREF	Resolver excitation signal inverted
G2N	Track 2		+RS485	T- / S encoder, data channel +
G2I	Track 2 inverted		- RS485	T- / S encoder, data channel -
05P	Supply 5 V =, max. 250 mA		CLK+	E- / F encoder: EnDat, Clock+
09P	Supply 9 V =, max. 150 mA		CLK-	E- / F encoder: EnDat, Clock-
+ Sin	Resolver sine		DAT+	E- / F encoder: EnDat, Data+
- Sin	Resolver sine inverted		DAT-	E- / F encoder: EnDat, Data-

6 Abbreviations

Motor tables

Character	Unit	Description
M_0	Nm	Zero speed torque
M_N	Nm	Rated torque
P_N	kW	Rated power
n_N	1/min	rated speed
n_F	1/min	speed limit for constant rated power
n_{max}	1/min	Maximum speed
U_N	V	Rated voltage
I_N	A	Rated current
J	kgm^2	Rotor inertia
m	kg	Motor weight
kT	Nm/A	torque constant(M=I*kT)
Q	l/min	Rated flow rate
ΔT	K	Temperature rise of the liquid at point of rated operation
L Br	mm	Length of motor including brake
L1 Br	mm	Length of fan cooled motor including brake

Holding brake

Character	Unit	Description
M_{Br}	Nm	Holding torque
n_{maxBR}	1/min	Brake maximum speed
U_{Br}	V	Rated voltage 24V ≅ (unregulated)
I_{Br}	A	Brake rated current
J_{Br}	kgm^2	Brake moment of interia
m_{Br}	kg	Weight of the brake, total motor weight is m + M_{BR}

External fan

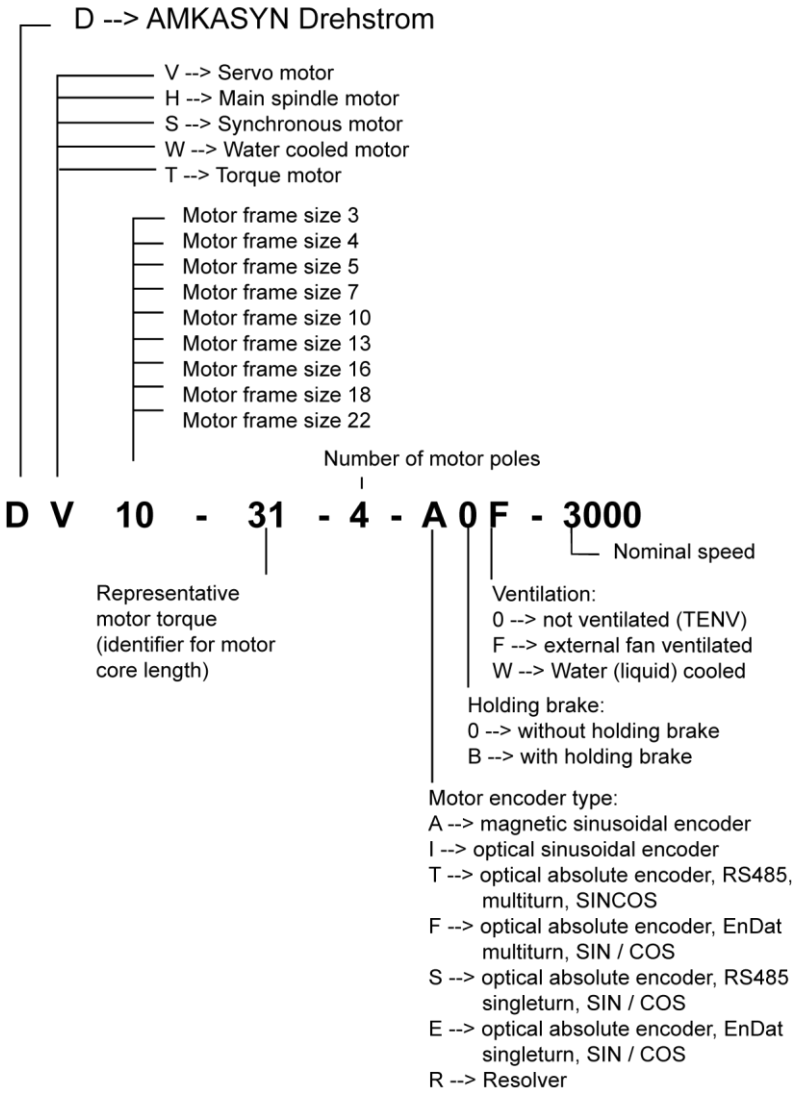
Character	Unit	Description
U_F	V	External fan rated voltage
I_F	A	External fan rated current

7 Important notes

- Motors can reach surface temperatures above 100°C / 212°F during operation. Before touching the motor check the surface temperature to avoid injury.
- In the case of motors with keyways and freely rotating shaft ends, the key must be removed or secured against being thrown off.
- Before opening the terminal box or pulling out or plugging in a connector on the motors, ensure that there is no voltage at the termination end. Voltage can be present a the connections even when the motor is not moving. If not complied with injuries or death may occur.
- A low-resistance connection of the motor housing to the PE ground bus in the control cabinet is required for trouble free and safe operation of the motors.
- Pounding or uncontrolled impact of force onto the motor shaft during transport, storage and installation of the motors in the machine can lead to damage of the bearings and shaft.
- Inadmissible axial and radial loads lead to reduction of the bearing life. Bearing load diagrams are available on request.
- When using couplings, attention to correct assembly of the coupling components has to be observed. Alignment errors or offset of the coupling can lead to premature destruction of bearings and of the coupling.
- All motors listed may not be connected directly to the main power lines. The motors are intended exclusively for operation on AMK inverter systems.

8 AMK Motor type codes

AMKASYN
Motor Type Codes



picture name: ZCH_Motoren_Typenschluessel_DV

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