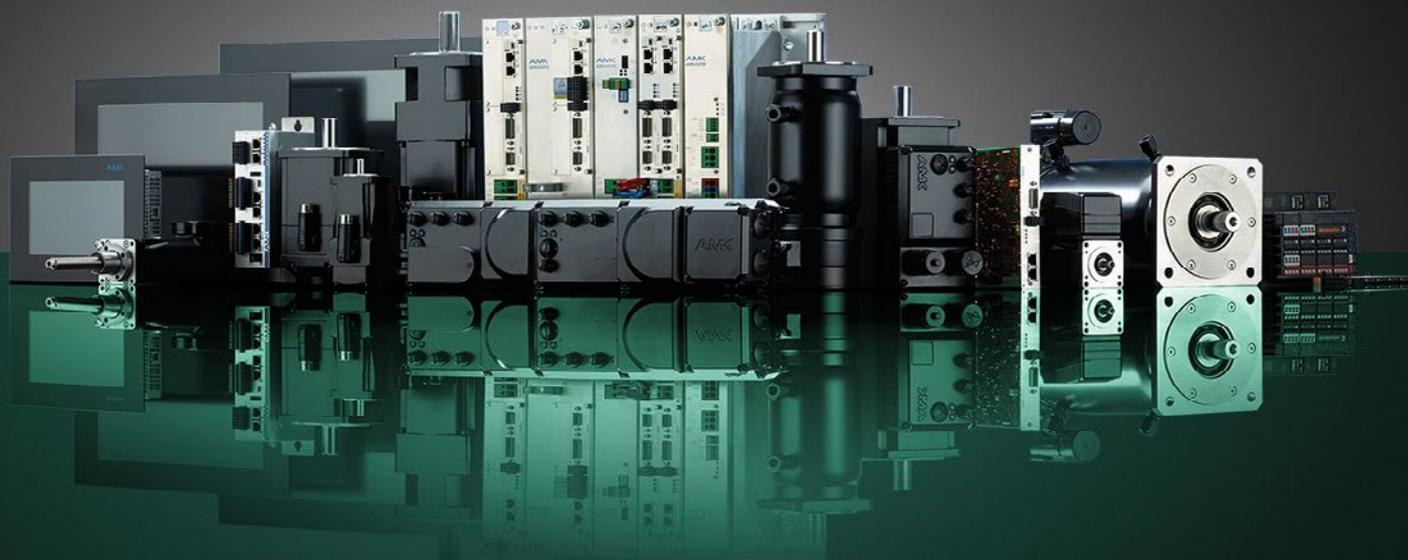# HARKOTEK
Control the Motion

AMK*motion*
MEMBER OF THE ARBURG FAMILY

Hybrid Automation Solutions
Centralized, Decentralized, Individualized

Flexible & Combinable

Due to the modularization in machine building, processes are being functionally and spatially divided into subprocesses. As a result, drives are moving ever closer to where the action takes place. A perfect environment for decentralized drive concepts.

But then there are obviously also power-intensive processes that require an automation solution with a centralized configuration.
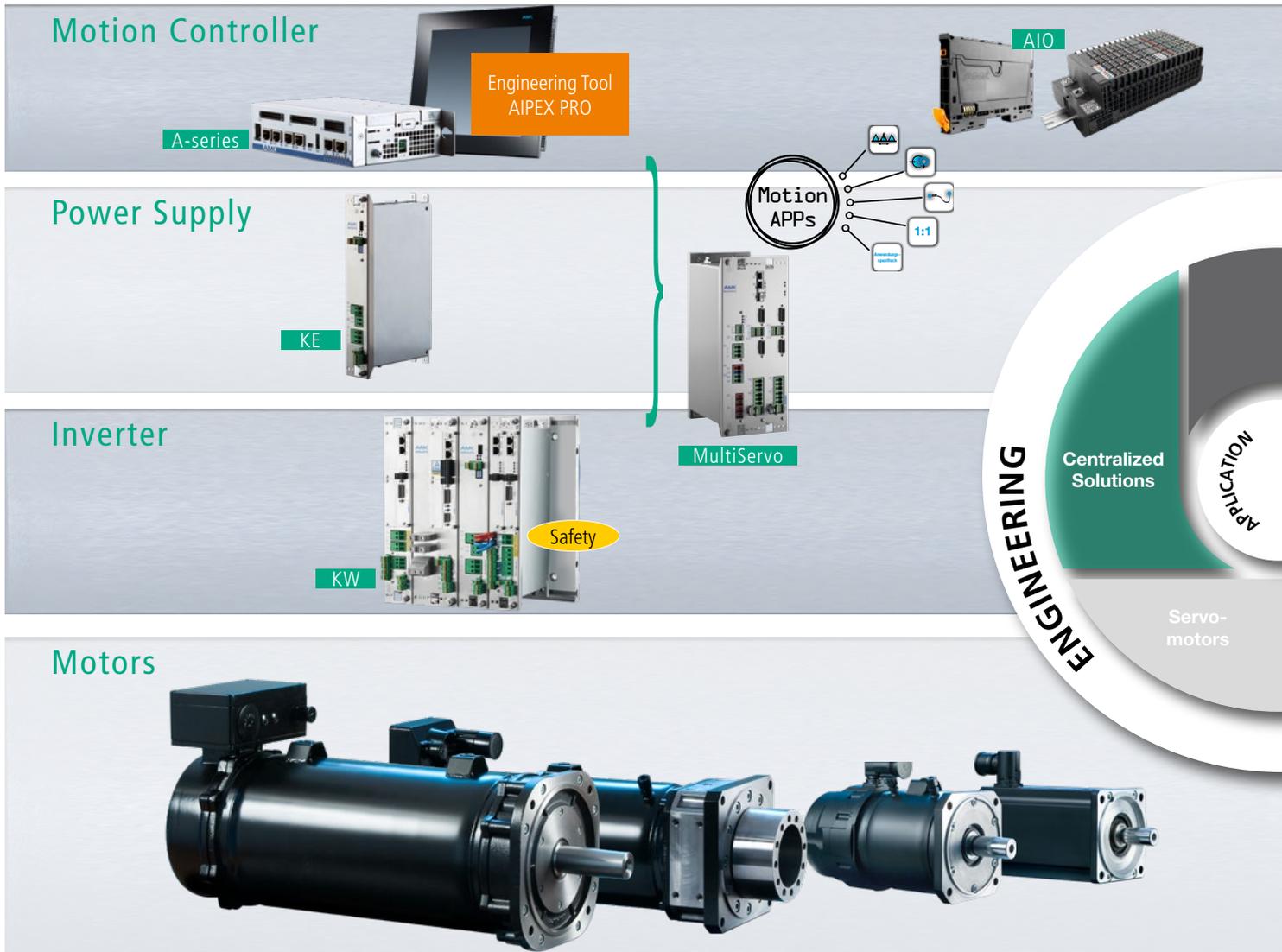
Conventional drives with power supply and inverter inside a control cabinet remain an essential automation solution.

In contrast. Regardless of the locations where computing and controlling take place, the surefire recipe for efficiency gains is to combine both solution approaches. The benefits of each approach can then be combined.

That is why AMK relies on the flexibilization of automation technology and, in particular, on the combinability of the various system architectures.

These hybrid automation solutions offer unforeseen opportunities for machine design and become the standard in automation technology.

Centralized

Motion Controller

Engineering Tool AIPEX PRO

A-series

AIO

Motion APPs

Power Supply

KE

MultiServo

Inverter

Safety

KW

ENGINEERING

Centralized Solutions

APPLICATION

Servomotors

Motors

AMKmotion

MEMBER OF THE ARBURG FAMILY

AMKmotion GmbH + Co KG

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73221 Kirchheim/Teck

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www.amk-motion.com

AMKASMART ihXT

Decentralised drive technology
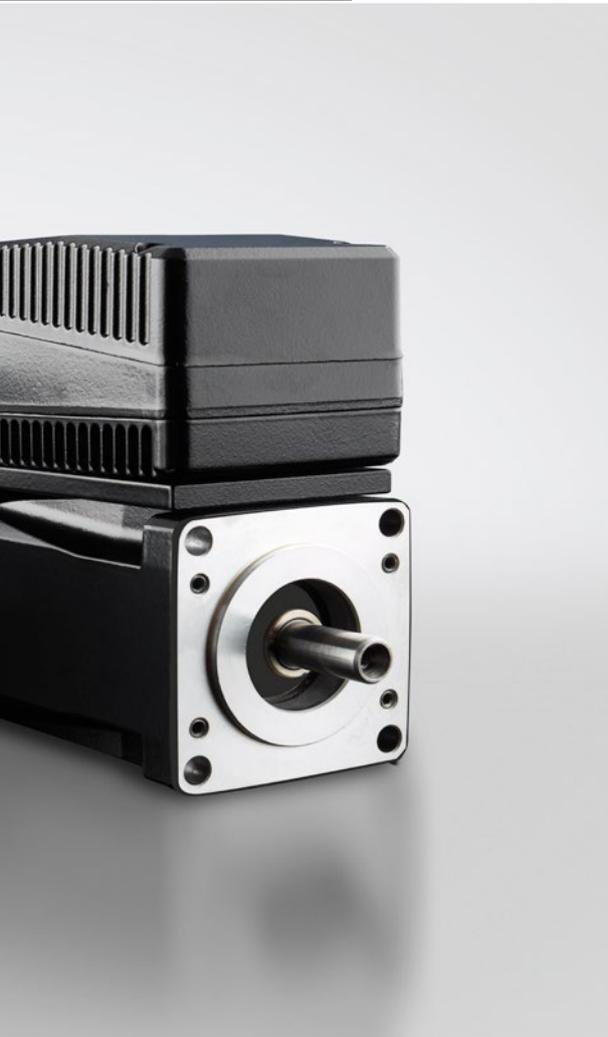with intelligent cabling

S M A R T

ADVANTAGES

- **Decentralised mounting in the machine**
- **Easy cabling**
- **Hybrid cable**
- **Protection class: IP54 optional IP65**
- **Up to 90% savings in cable costs**
- **Reduction of connector costs**

AMKASMART ihXT
Decentralised - Intelligent - Efficient

The newly developed ihXT series extends the AMKASMART decentralised product family with a comprehensive servo drive in the power range from 150 to 450 watts. These drives have everything that is required for precise servo control. AMKmotion consistently focused on the most essential aspects during product development.

In terms of function, the ihXT is a combination of synchronous servo motor and servo inverter. The decentralised ihXT servo drives are equipped with hybrid cables to make installation as easy and space-saving as possible. Featuring convenient loop-through options: Forwarded via DC bus together with real-time Ethernet communication via the hybrid cable from one drive to the other. This allows up to 40 axes to be connected in series on one line.

The benefits are significant: Compact dimensions, the elimination of expensive plugs and an installation requirement cut in half thanks to hybrid cables, allow for a saving of up to 90% on cable costs. Using the intelligent plug-in terminal connection in IP65, the plug costs can also be reduced by a further two-thirds.

As a result, energy efficiency, fast commissioning and low installation costs are effectively and efficiently combined.

ihXT connection technology

Simply smart:
Plug-in terminal connection from AMKmotion

AMKmotion has developed an intelligent connection system with plug-in terminals to ensure that savings made when using the ihXT are not used to pay for expensive connectors elsewhere. This not only makes the cabling significantly more economical, but also saves space. Since the system connectors in this power range often account for around one third of the costs of the overall drive, it is possible to make significant savings when using the connection technology from AMKmotion. IP65 protection is, of course, guaranteed.
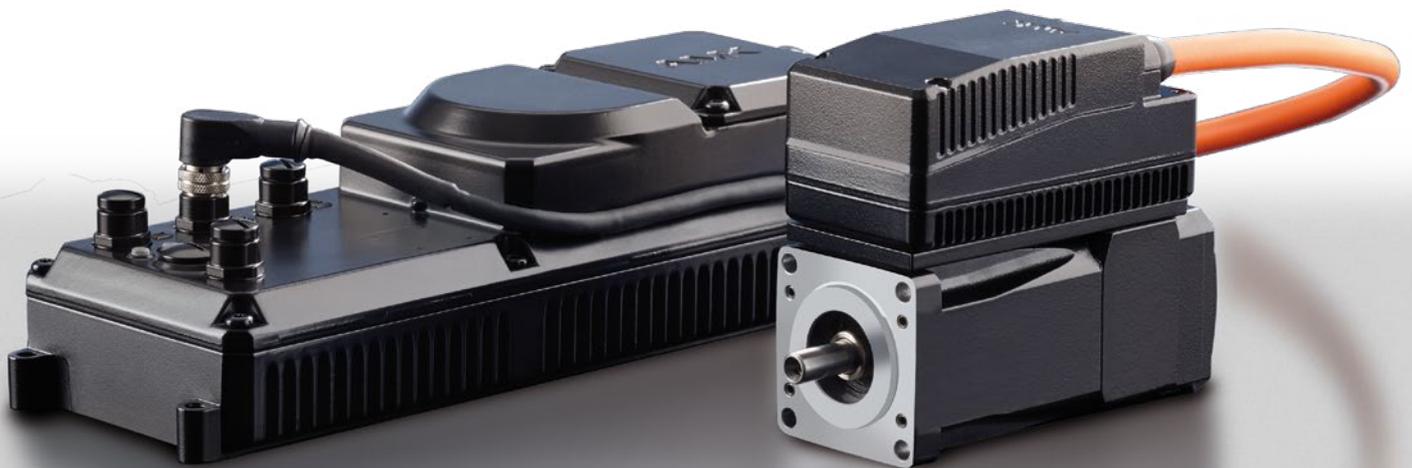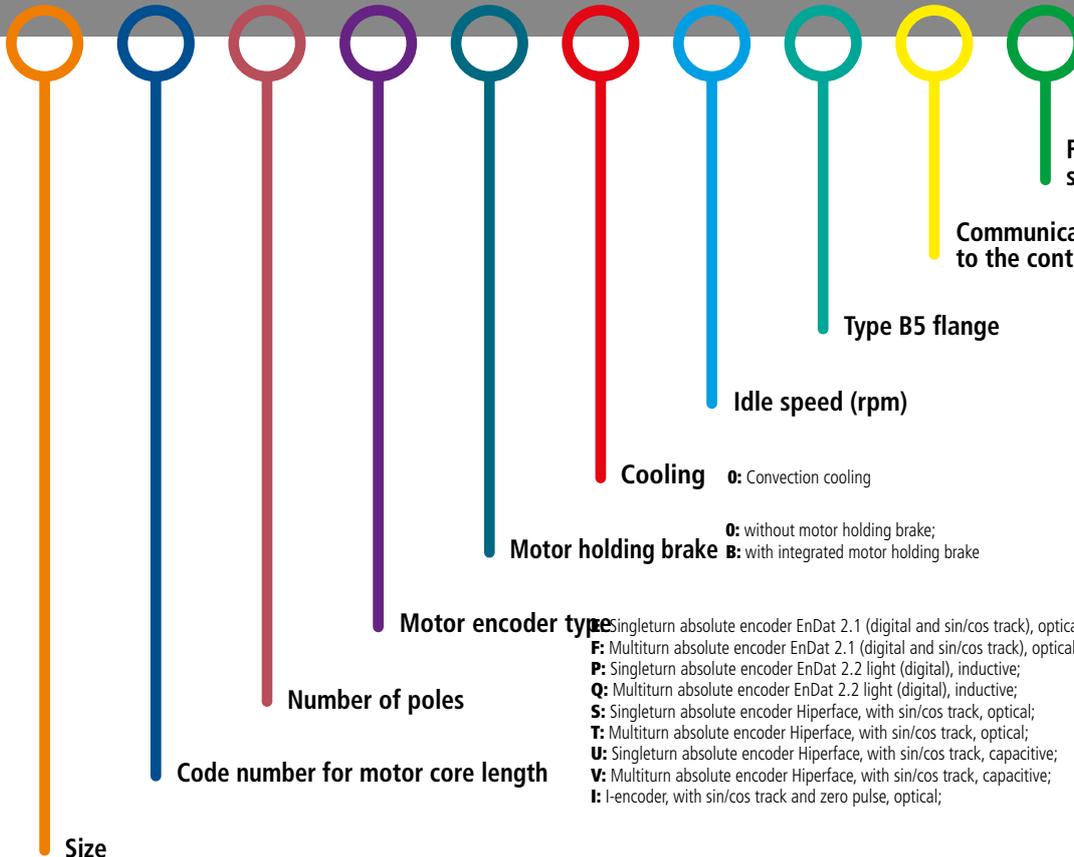
Interfaces
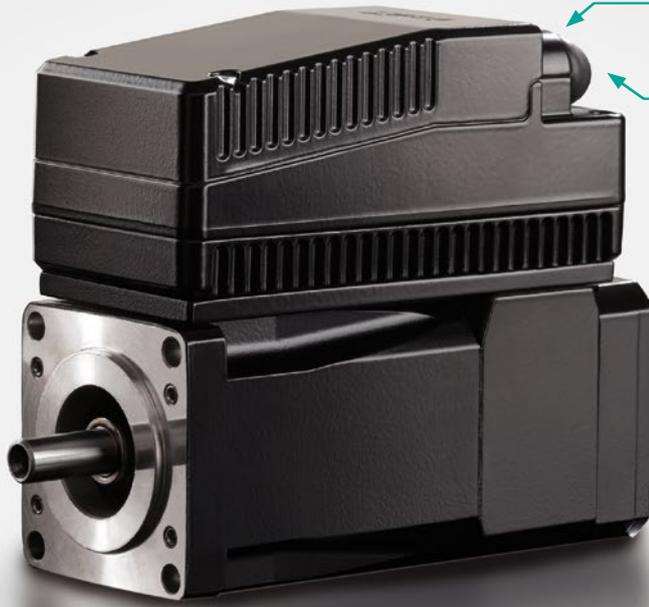
Forwarding DC link
Forwarding supply voltage 24 VDC
Electronics and motor brake, STO
Power connection DC link
Supply voltage 24 VDC:
Electronics and motor brake, STO

Type code

ihXT   3   X   X   X   X   0   XXXX   XX   X   X

Functional safety
(in progress)
0: not integrated;
S: integrated

Communication to the controller
**E:** EtherCAT (SoE); **C:** CAN (DS402);
V: VARAN (SoV); **S:** SERCOS III

Type B5 flange

Idle speed (rpm)

Cooling **0:** Convection cooling

Motor holding brake **0:** without motor holding brake;
B: with integrated motor holding brake

Motor encoder type **E:** Singleturn absolute encoder EnDat 2.1 (digital and sin/cos track), optical;
F: Multiturn absolute encoder EnDat 2.1 (digital and sin/cos track), optical;
P: Singleturn absolute encoder EnDat 2.2 light (digital), inductive;
Q: Multiturn absolute encoder EnDat 2.2 light (digital), inductive;
S: Singleturn absolute encoder Hiperface, with sin/cos track, optical;
T: Multiturn absolute encoder Hiperface, with sin/cos track, optical;
U: Singleturn absolute encoder Hiperface, with sin/cos track, capacitive;
V: Multiturn absolute encoder Hiperface, with sin/cos track, capacitive;
I: I-encoder, with sin/cos track and zero pulse, optical;

Number of poles

Code number for motor core length

Size

AMKASMART ihXT

Decentralised drive solution with and without control cabinet

Automation without control cabinet

This example shows an entirely decentralised automation solution. Power is supplied via the iSA decentralised controller which integrates a 24 V supply and DC power supply. As a result, automation without a control cabinet is possible.

3x400-480 VAC

Hybrid cable (DC bus, 24 VDC, STO, real-time Ethernet)

iSA

ihXT   ihXT   ihXT
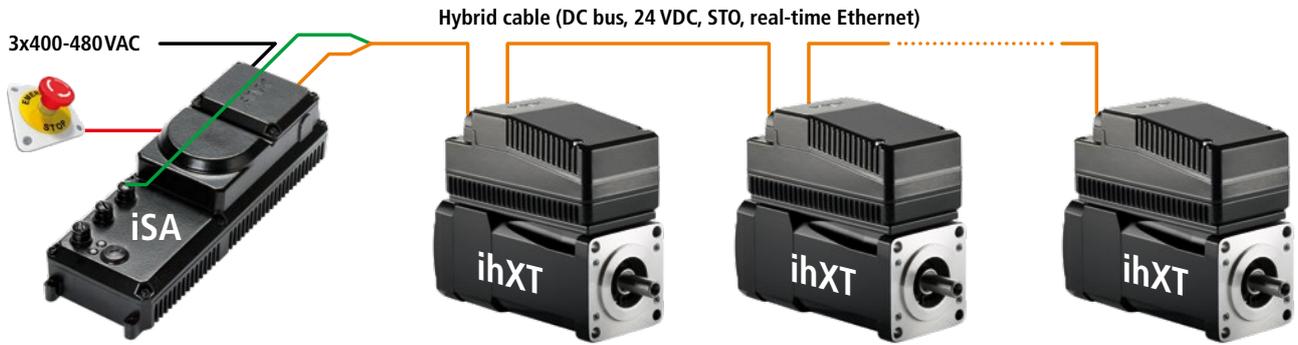
Power supply unit in the control cabinet

The installation of the ihXT drives is decentralised. The hybrid cable is connected to the power supply unit in the control cabinet (as shown here) and looped from ihXT to ihXT.

3x400-480 VAC

CONTROL CABINET

KW

KE(S) Power supply

Filter/ throttle

Hybrid collector

24V
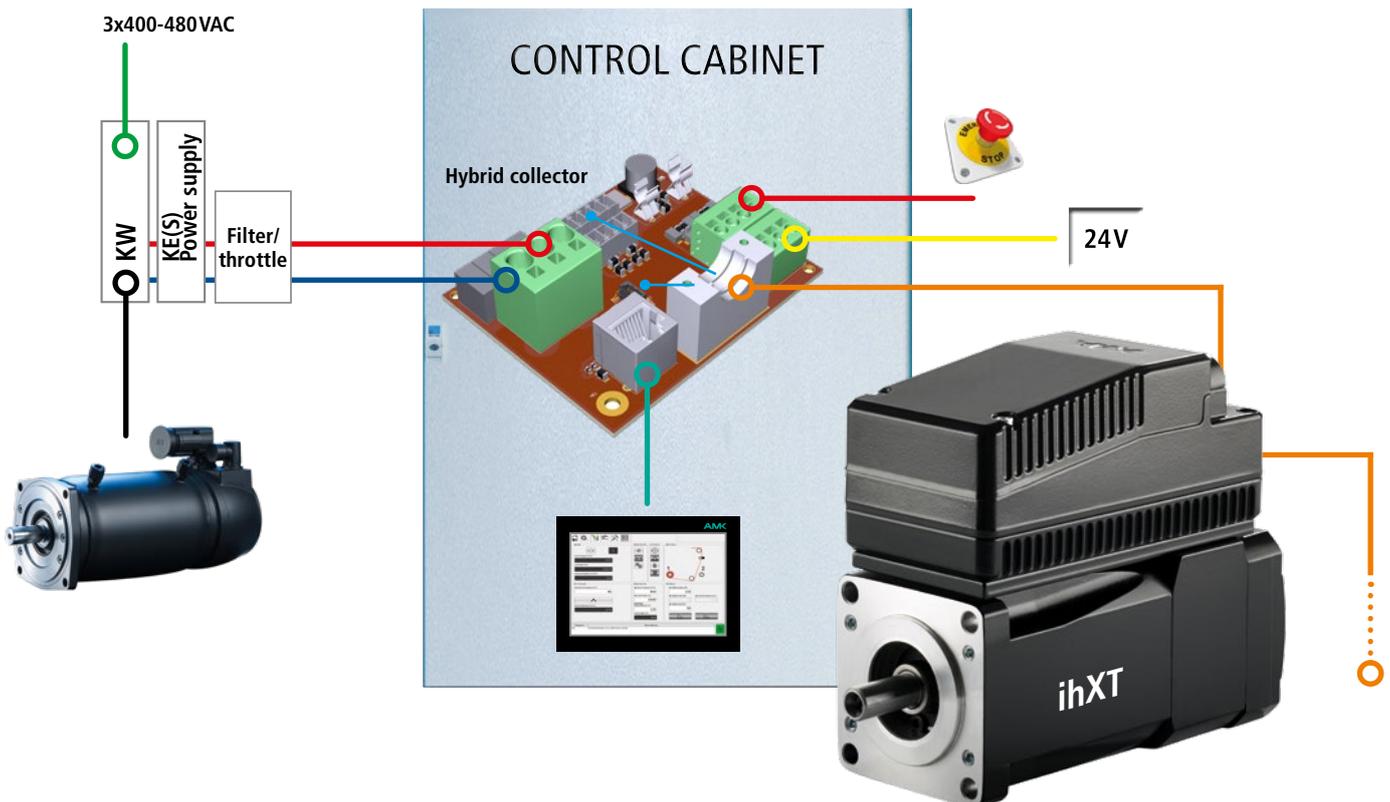
ihXT

Decentralised in the system network

Star wiring of individual drives from the control cabinet is now a thing of the past. As the figure illustrates, up to 40 ihXTs can be connected in series on one line in larger machines and systems. The potential for savings in the area of cabling is then quite clear. Up to 90% of the cabling costs can be saved here, depending on the application.
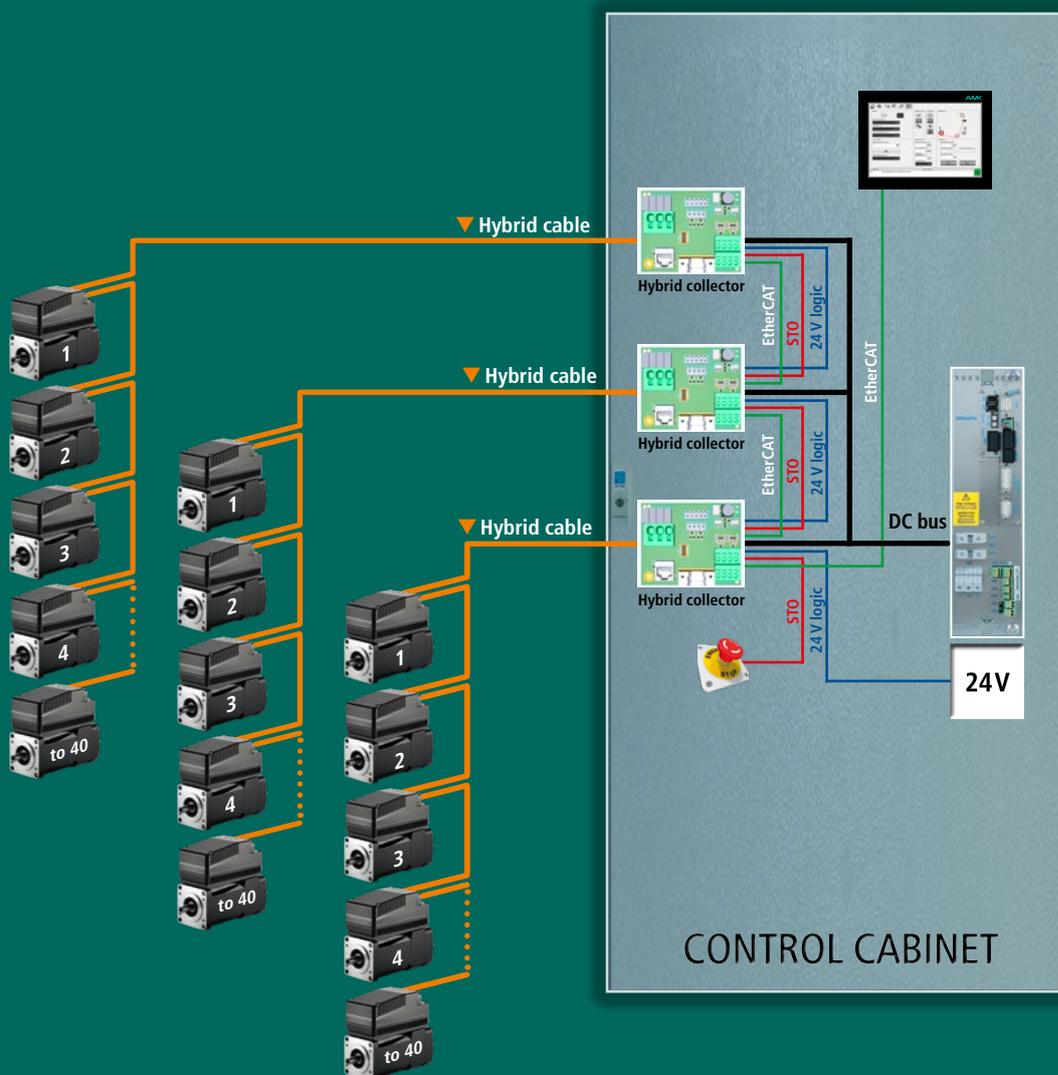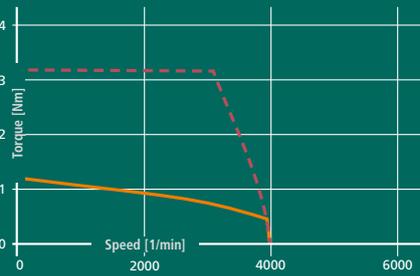
AMKASMART ihXT3
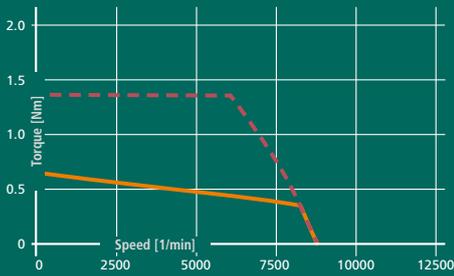
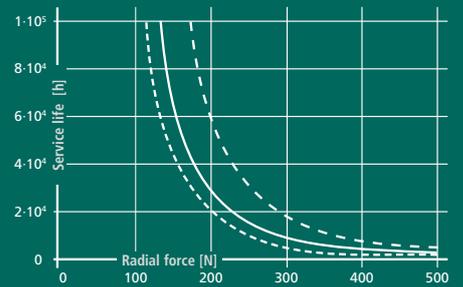## Characteristic curves

ihXT 3-0,5

ihXT 3-1

Bearing service life (L10h) Characteristic curve

- - - Maximum moment   Continuous thermal moment

Bearing service life: - - - 2 x n_N n_N - - - 0.5 x n_N

Technical data

Motor type	M_{max} [Nm]	I_{max} [Arms]	M_O [Nm]	I_O [Arms]	M_N [Nm]	I_N [Arms]	n_N [1/min]	P_N [W]	J [kgcm2]	L [mm]	L_{BR} [mm]	m [kg]	m_{BR} [kg]
ihXT3-0.5-10-xxO	1.39	2.28	0.64	1.0	0.44	0.77	6 000	280	0.09	126	156	1.6	1.9
ihXT3-1-10-xxO	3.1	2.28	1.18	0.9	0.74	0.59	3 000	230	0.27	186	216	2.4	2.7

Explanation of parameters: M_{max} Maximum torque· I_{max} Maximum current · M_O Continuous stall torque· I_O Continuous stall current · M_N Rated torque · I_N Rated current n_N Rated speed · P_N Rated power · J Motor moment of inertia · L Motor length · L_{BR} Motor length with brake · m Weight m_{BR} Weight with brake

Dimensions

ihXT3 convection-cooled

AMKASMART ihXT4

Characteristic curves
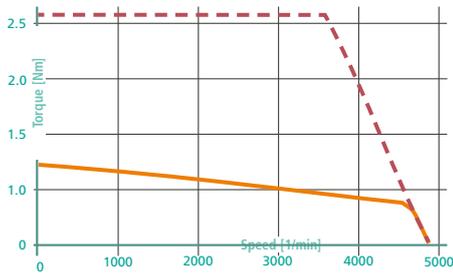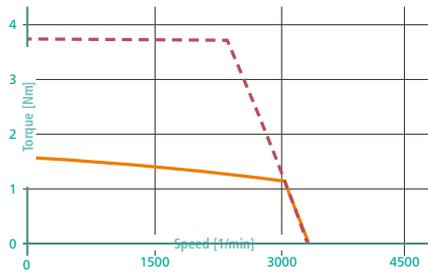
ihXT 4-1	ihXT 4-2	Bearing service life (L10h) Characteristic curve

- - - - Maximum moment   Continuous thermal moment   Bearing service life: - - - 2 x n_N n_N - - - 0.5 x n_N
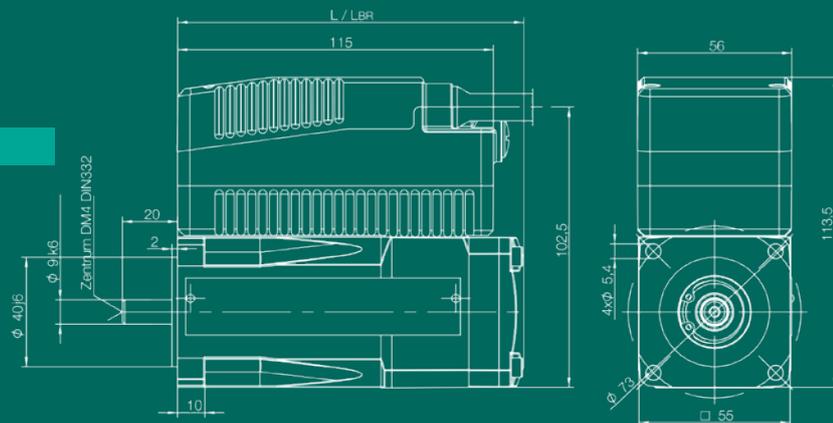
Technical data

Motor type	M_{max} [Nm]	I_{max} [Arms]	M_O [Nm]	I_O [Arms]	M_N [Nm]	I_N [Arms]	n_N [1/min]	P_N [W]	J [kgcm2]	L [mm]	L_{BR} [mm]	m [kg]	m_{BR} [kg]
ihXT4-1-10-xxO	2.6	2.28	1.19	1.1	0.93	0.86	4 000	390	0.32	132	165	2.1	2.4
ihXT4-2-10-xxO	3.7	2.28	1.65	1.0	1.25	0.82	3 000	390	0.71	163	196	2.6	3.0

Explanation of parameters: M_{max} Maximum torque· I_{max} Maximum current · M_O Continuous stall torque· I_O Continuous stall current · M_N Rated torque · I_N Rated current n_N Rated speed · P_N Rated power · J Motor moment of inertia · L Motor length · L_{BR} Motor length with brake · m Weight m_{BR} Weight with brake
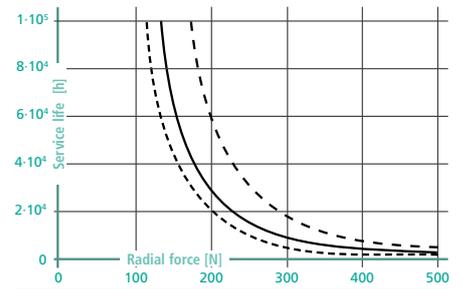
Dimensions

ihXT4 convection-cooled
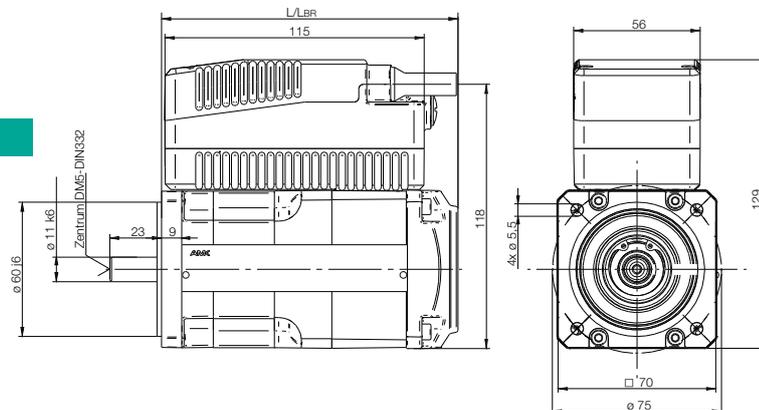
Safety
Integrated, functional, safe

Machines and plants can pose potential risks to people, the environment and property as a result of dangerous failures and malfunctions. Consequently, it must be ensured that plants and machines can be operated safely. With AMKASMART decentralised drive technology, the STO function can be implemented as standard in PL d in accordance with EN ISO 13849-1.
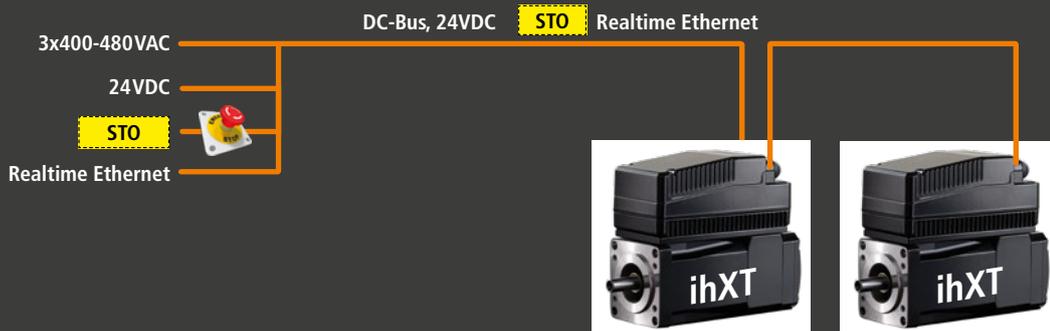
STO (Safe Torque Off)

3x400-480VAC
24VDC
STO
Realtime Ethernet

DC-Bus, 24VDC   STO   Realtime Ethernet

Interfaces and connections

Hybrid collector

The hybrid collector is the interface between the central control cabinet system and the decentralised drives. The DC link, 24V supply, STO and real-time Ethernet are fed in on the top-hat rail module and then connected to the hybrid cable connectors of the decentralised drives.

X07 Connection of the supply voltage for 24 VDC electronics and motor holding brake, signal STO and STO_GND

X02
DC link connection to the hybrid cable

X01

DC link connection
UZP, UZN and PE

X87;
Fieldbus outlet for hybrid cable

F1
Fine-wire fuse 24 VDC for electronics and motor holding brake

X08 / X09
Connection of supply voltage for 24 VDC electronics and motor holding brake, safety STO and forwarding to next hybrid collector

X85
Connection real-time Ethernet

Interfaces	Function
X01	Connection of DC link UZP, UZN and PE
X08/X09	Connection of supply voltage for 24 VDC electronics and motor holding brake, safety STO and forwarding to next hybrid collector
X85/X86	Connection real-time Ethernet and forwarding to the next hybrid collector
S1	Bus termination
X02	Connection DC link to the hybrid cable (part no. 47774) to supply the drive
X07	Connection of the supply voltage for 24 VDC electronics and motor holding brake, signal STO and STO_GND to the hybrid cable. (part no. 47774) to supply the drive
X87	Connection real-time Ethernet IN/OUT to the hybrid cable (part no. 47774) to supply the drive
F1	Fine-wire fuse 24 VDC for electronics and motor holding brake
F2	Resettable thermal fuse 24 VDC for signal STO
LED STO & 24 V	LEDs for status indication

Power connection ihXT (DC link)

PIN	Signal	Meaning
1	UZN	DC link power supply -
2	–	
3	PE	Protective earth
4	–	
5	UZP	DC link power supply +
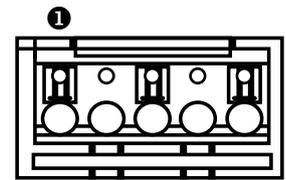
Supply voltage ihXT (24 VDC and STO)

PIN	Signal	Meaning
1	24VDC	Supply voltage 24 VDC Motor holding brake
2	0VDC	Reference potential for 24 VDC
3	STO	STO (Safe torque off)
4	STO_GDN	Reference potential for STO
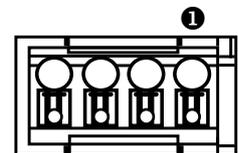
Real-time Ethernet connection ihXT (contact assignment)

PIN	Signal	Meaning
1	TX+	Transmission Data +
2	TX-	Transmission Data -
3	RX+	Receive Data +
4	RX-	Receive Data -

AMKmotion

MEMBER OF THE ARBURG FAMILY

- **AMKAMAC**
  Control technology

- **AMKASMART**
  Decentralised
  drive technology

- **AMKASYN**
  Servo inverter

- **DYNASYN**
  Servo motors

- **SPINDASYN**
  Linear drives

The information in this brochure is intended solely as a series product description. Deviations are possible due to specific products and continuous further developments. Before using data for calculations or designs, please check in advance the latest status and request product-specific dimension and data sheets.
We reserve the right to make technical changes. 10/2021

AMKASYN
KE/KW SERVO INVERTER

Compact, powerful, modular

AMK*motion*

MEMBER OF THE ARBURG FAMILY

SERVO

CONTENTS

AMKASYN
KE/KW servo inverter

Make use of your space-saving potential!
With the most compact of servo inverters

The most compact way to demonstrate your expertise

Discover the added value of "power density". The intelligent servo inverter KE/KW enables efficient use to be made of valuable installation space. AMK's sophisticated cooling technology ensures optimum heat dissipation and increases service life. This allows a saving of up to 50% by volume. The unrestricted positioning of the modules also provides the freedom you need for ergonomic machine design.

The drive system for excellent dynamic performance in positioning tasks

The controller platform in the AMK KE/KW drive system opens up completely new possibilities for higher performance using the latest processor technology. Real-time Ethernet (RTE) via EtherCAT or VARAN provides powerful system communication for machine automation. Using only the modules actually needed with the desired range of functions delivers an extremely favourable price/performance ratio. All types of synchronous or asynchronous servo, high torque or linear motors coupled with a wide variety of encoder systems can be operated in a highly dynamic and precise manner.

Be on the safe side

The units have the highest safety standard. The KW inverters are available with the integrated OSE safety function:

 TÜV-certified against re-start for systems up to PLe in accordance with ISO 13849-1 (analogous to STO). Functional safety, also up to PLe in accordance with ISO 13849-1, can be implemented with the safe controller cards.

Sustainability through maximum energy efficiency

The power supply is regenerative and therefore particularly energy-efficient. This saves energy costs. The units in the KES product series feed the energy generated during regenerative braking back into the energy grid in a sinusoidal form and with the highest possible efficiency. A regulated DC link voltage also provides higher speeds and power for the drives. The line currents are limited to within their peaks and a power factor of almost 1 is achieved. Heat recovered by the cold plate technology enables systemic power losses to be used to power other processes.

ADVANTAGES

- **Safety inside**
- **Motion control**
- **Up to 50% less control cabinet volume**
- **Energy saving**
- **Cold plate / heat recovery**
- **Control performance**

System overview
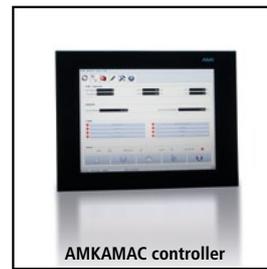
OPC UA
AIPEX PRO
Remote maintenance
Development environment

AMKAMAC controller

Fieldbus communication

EtherCAT®
Technology Group

SERCOS
interface

VARAN

KE   KW   KWD

DYNASYN servo motors

KE   Compact power supply KE(S)
KW   KW inverter

Compact power supply

Compact power supply, optionally with or without regenerative power recovery. Units with regenerative power recovery in versions with block commutated regenerative power recovery or with sinusoidal infeed and regenerative power recovery.

Compact inverters

Central inverters in scalable module widths depending on the power classes for units as single or double inverters with plug-in controller cards.

Controller cards

The controller cards are inserted into a slot in the compact inverter. A suitable variant is available for the particular bus system and performance in question.

Trendsetting cooling technology

Their efficient heat dissipation has resulted in AMK inverters leading the market in terms of compactness and power density for many years. The cold plate design modules are simply mounted on a liquid-cooled or air-cooled plate. The liquid-cooled cold plate offers significant benefits, especially for large power ratings. The units can be installed very easily without interrupting the cooling circuit. The dissipation of heat via the liquid-cooled plate considerably reduces the need for cooling the interior of the enclosure. Modules with integrated air cooling offer a cost-effective alternative for smaller power ratings.

Communication

Fieldbuses:

* EtherCAT
* SERCOS III
* Varan

Multifunctional I/O

* Digital inputs and outputs
* Analogue input
* Measurement input
* Pulse output

Standard functions

* Torque control
* Speed control
* Position control
* Positioning function
* Reference point run in many variants
* Synchronous control
* Electronic gearbox
* Brake control
* Protective functions

Functional safety

KW units with integrated OSE safety function: TÜV-certified against re-start for systems up to PLe ISO 13849-1 (analogous to STO).

Design

Ultra-compact size. The system can be ideally adapted to any machine ergonomics with space savings of up to 50 %. The absence of busbar connections for module cabling allows flexible installation in the control cabinet

Sustainable energy management

High degree of efficiency and regenerative capability reduce energy consumption and costs.

ADVANTAGES

* **Functional safety**
* **Reduction of the required control cabinet space by up to 50%**
* **Opportunity to save costs by integrating the control cabinet into the machine**
* **Cost-optimised solutions provided by modular system design**
* **Setup of complex, networked machines through precise synchronisation in real time**
* **Application-specific cooling technology**

ACC bus connection

LED

Digital inputs/outputs

Fieldbus configuration

Charging circuit Mains 400...480VAC - 50/60Hz

Main contactor controller

DC link voltage

Mains connection 400...480VAC

Braking resistor connection

PTC thermistor

24 VDC supply,
Power loop-through 24VDC

AMKASYN

High Voltage!
remains for 5 min. after
turn off power supply

Gefährliche
Spannung
bleibt nach Netz-
Abschaltung bis zu
5 Minuten erhalten

X236
X237

X23

H1

X22 X21

S1

X20

L1
L2
L3
EH1
EH2

UZP

X02

UZN

X01   X03

L1.1   L2.1   L3.1   RBP   RBN

X09

X08

X25

KE 20

KE compact power supply
High performance in the smallest space

The KE compact power supply generates the DC link voltage for the connected inverters and is available in the following variants:

KEN:
Power supply (no regeneration).

KE:
Block commutated power supply and regeneration. ACC bus or EtherCAT communication interfaces with the control voltage UPS.

KES:
Sinusoidal power supply/regeneration. The KES product series with sinusoidal power supply and regeneration generates a regulated DC link voltage. This makes the unit robust against mains fluctuations and disturbances regardless of the mains voltage. The voltage boost in the DC link enables an increased speed and performance of the drives. Communication interfaces ACC bus or EtherCAT with the control voltage UPS

Features:

- Power range up to 180 kW
- Cooling using cold plate technology
- Optional (block or sinusoidal) power regeneration
  - ✔ Integrated monitoring
  - ✔ Overtemperature
  - ✔ Mains failure
  - ✔ Mains current
  - ✔ Braking resistor short circuit
  - ✔ Overvoltage intermediate circuit
  - ✔ Main contactor controller

ADVANTAGES

- **High power density**
- **High degree of efficiency**
- **Supports sustainability through regenerative capability.**
- **KES: Reduced mains regeneration**
- **KES: Limit value for harmonic currents15 g for 11 ms according to EN 61000-3-12**

Technical data

Type		KEN 5	KEN 10	KEN 20	KEN 120	KE 20	KE 40	KE 60	KE 120	KE 180	KES 20	KES 60	KES 120	KES 180
Rated input voltage	VAC	3 x 400 ... 480 ± 10 %												
Line frequency	Hz	47... 63												
Input current	A	13	15		180	30	60	90	180	270	30	90	180	270
Rated output power	kW	5	10		120	20	40	60	120	180	20	60	120	180
Maximum output power (for 60s)	kW	10	20		200 [1]	40	80	120	200	320	40 [2]	120 [2]	200 [2]	320 [2]
Efficiency	%	approx.99									approx.98			
Power factor		0.55	> 0.9								> 0.98			
Cooling		Cold plate design												
Power regeneration		No				Yes					Yes, sinusoidal			
Ext. Brake resistor (Option) min.	Ω	47	47		2x8	20	8	8	8	5.4	20	8	8	5.4
Protective function		Mains failure, overcurrent device and brake resistor, overtemperature device and brake resistor												
Line filter		Integrated		External	External	Integrated					External			
Weight	kg	3	3		16	4.2	8	8	16	20	4.2	8	16	20
Unit width		55	55	55	255	85	170	170	255	425	85	170	255	425

[1] Power supply via braking resistor max. 160 kW for 2.5 s   [2] for max. 10s

Option card 1

Controller card

Option card 2

DC bus DC link voltage and
loop-through

Motor connection

Output stage enable OSE

Motor PTC thermistor

24 VDC supply, loop-through

X132
X141
X137
X23

H5
X86
H4
X85

H5
H4
H3
H2

X131

KW-F06

X130

UZP
UZP
X05
UZN
UZN

Danger! High Voltage
remains for 5 min. after turn off

X04 U,V,W   03.23

47108-1038-1246338

KW 2

X10
X09
X08

X16
X15
X14
X13

KW compact inverter
Dynamics and precision. With safety.

The digitally operating KW compact inverters control the drives in 4-quadrant operation precisely and with high dynamic performance. They can be multi-functionally networked to the higher-level controller via various fieldbuses.

Features:

- Power range up to 200 kVA
- Cooling using cold plate technology
- Integrated OSE safety function: TÜV-certified against re-start for systems up to PLe ISO 13849-1 (analogous to STO).
- Accommodates 1 KW-Rxx controller card (see p. 14). Controller cards must be ordered separately

ADVANTAGES

- **Integrated OSE safety function**
- **New dimensions in power density**
- **Effective heat dissipation and long service life using**

  cold plate technology
- **High degree of efficiency**
- **Compact machine design**

Technical data

Type		KW 2	KW 3	KW 5	KW 8	KW 10	KW 20	KW 40	KW 60	KW 100	KW 150	KW 200
Input voltage	VAC	540 ... 650										
Shut-off threshold	VDC	850										
Input current	A	3.8	5.6	9.3	15	18.5	37	74	112	187	280	37
Rated output voltage	VAC	3 x 350 for sinusoidal currents										
Output frequency	Hz	0…599 [1]										
Rated output power	kVA	2	3	5	8	10	20	40	60	100	150	200
Maximum output power	kVA	4	6	10	16	20	40	80	120	165 [2]	300	340
Rated output current	A	3.3	5	8.2	13.2	16.5	33	66	99	165	247	330
Maximum output current (for 10s)	A	6.6	10	16.5	26.4	33	66	132	198	247 [3]	495	561 [4]
Efficiency	%	>98										
Cooling		Cold plate design										
Protective function		Motor overcurrent, short circuit, earth fault, device and motor overtemperature,I^2T monitoring										
Switching frequency	kHz	8 (4)										
Weight	kg	3	3	3	3	4.2	4.2	8	8	16	20	25
Unit width	mm	55	55	55	55	85	85	170	170	255	425	425

[1] 0…400 at4 kHz PWM   [2] at 8 kHz PWM, 200 kVA at 4 kHz PWM   [3] at 8 kHz PWM, 330 A at 4 kHz PWM   [4] for max. 7 s

Controller card 1

Controller card 2

DC bus DC link and loop-through

Motor A

Output stage enable OSE

Motor B

Motor A/B PTC thermistor

24 VDC supply,
loop-through

KWD double inverters
Two inverters in one housing.

The KWD compact inverter contains two independent KW inverters inside one housing. It represents an economic and extremely compact solution for servo drives with low power ratings.

Features:

- Power range up to 2 x 5 kVA
- Very compact dimensions
- Cooling using cold plate technology
- Integrated OSE safety function: TÜV-certified against re-start for systems up to PLe ISO 13849-1 (analogous to STO).
- Accommodates 2 controller cards KW-Rxx (see p. 14), controller cards must be ordered separately

ADVANTAGES

- **Economic and extremely compact solution for servo drives with low power ratings.**
- **Integrated OSE safety function**
- **High degree of efficiency**
- **Enhanced compact machine design**

Technical data

Type		KWD 1	KWD 2	KWD 5
Input voltage	VAC	540... 650		
Shut-off threshold	VDC	850		
Input current	A	3.8	7.6	19
Rated output voltage	VAC	3 x 350 for sinusoidal currents		
Output frequency	Hz	0…599 [1]		
Rated output power	kVA	2 x 1	2 x 2	2 x 5
Maximum output power	kVA	2 x 2	2 x 4	2 x 10
Rated output current	A	2 x 1.65	2 x 3.3	2 x 8.3
Maximum output current (for 10s)	A	2 x 3.3	2 x 6.6	2 x 16.5
Efficiency	%	approx.98		
Cooling		Cold plate design		
Protective function		Motor overcurrent, short circuit, earth fault, device and motor overtemperature, I^2T monitoring		
Switching frequency	kHz	8 (4)		
Weight	kg	3	3	3
Unit width	mm	55	55	55
		[1] 0…400 at 4 kHz PWM		

11

Controller card
Functionality as a variable

The controller cards for the AMKASYN KE/KW central inverter system enable a cost and function optimised selection to match your specific application.

As a result, we are able to offer you a varied selection with numerous functionalities.

Functions	KW-R06	KW-R16	KW-R07
Drive control			
Minimum fieldbus cycle time	250 µs	250 µs	250 µs
Resolver	✔	–	✔
Sinusoidal encoder	✔	✔	✔
EnDat 2.1 / 2.2 light	✔	✔	✔
Hiperface	✔	✔	✔
Hiperface DSL*	–	–	–
Hall sensor (via resolver input)	✔	–	✔
Square wave signals (input/forwarding)	✔	–	✔
2nd encoder connection, e.g. load encoder	✔	–	✔
Encoderless U/F operation	✔	✔	✔
I/O interfaces			
Analogue inputs ±10 V (resolution)	2 (12 Bit)	2 (12 Bit)	2 (12 Bit)
Local digital inputs	3	3	3
Local digital outputs	3	3	3
Square pulse output/SIWL, fmax	2 MHz	–	2 MHz
Fieldbus interfaces			
Real-time bus ACC (CANopen)	Master	–	Master
EtherCAT (SoE)	Slave		
Service			
Service Port	USB 1.1		
AIPEX PRO connection	USB/EtherCAT		
Functional safety	–	–	✔

KW-R17	KW-R24	KW-R25	KW-R26
250 µs	250 µs	250 µs	250 µs
–	–	–	–
✔	–	✔	✔
✔	–	✔	✔
✔	–	✔	✔
–	–	–	✔
–	–	–	–
–	–	–	–
–	–	–	–
✔	✔	✔	✔
2 (12 Bit)	–	–	–
3	3	3	3
3	3	3	3
–	–	–	–
–	–	–	–
Slave	✔	✔	✔
USB 1.1	✔	✔	✔
USB/EtherCAT	✔	✔	✔
✔	–	–	–

* Single cable solution/hybrid cable

Drive related functional safety

Compliance with the Machinery Directive is mandatory for every machine manufacturer in the European Economic Area. This means that machine manufacturers are legally bound to build safe machines.

The decisive question is how this safety is achieved. Effort and costs naturally play a major role here.

Ideally, safety functions are integrated into the drive. This not only saves time and money, but is also a much simpler solution.

AMK offer drives with integrated functional safety features certified by TÜV for systems ranging from PLe (ISO 13849-1.2008) and up to SIL 3 (IEC 62061).

Depending on the unit in question safety functions can be commanded either by local safety inputs or by the FSoE protocol.

ADVANTAGES

- **Functional safety at unit level**
- **A simple and most economical solution**
- **Everything from one source**
- **Functional safety can be commanded via local I/Os or the FSoE protocol**
- **Standard versions with OSE (analogue STO)**
- **TÜV-certified for systems up to PLe (ISO 13849-1.2008) and up to SIL 3 (IEC 62061)**

Products with safety

Central inverters

- KW units with an integrated OSE safety function:
  Certified against restart analogous to STO
- for systems up to PLe

Controller cards KW-R07

and KW-R17 for central

inverters

- Functional safety
  - ✔ Safe normal operation
  - ✔ Safe operating modes
  - ✔ Safe stop functions
- TÜV-certified for systems up to PLe (ISO 13849-1) and up to SIL 3 (IEC 62061)
- Command via FSoE protocol
- Command via safe I/Os
- Parameterisation using Safety Editor

Safety functions

Safety in normal operation
- Safe Encoder Monitoring (SEM)
- Safe Maximum Speed (SMS)

Safe operating modes
- Safe Operating Stop (SOS)
- Safe Speed Range (SSR)
- Safely Limited Speed (SLS)
- Safe Direction (SDI)
- Safely Limited Increment (SLI)

Safe stop functions
- Safe Torque Off (STO)
- Safe Stop 1 (SS1)
- Safe Stop 2 (SS2)

AIPEX PRO

ENGINEERING TOOL
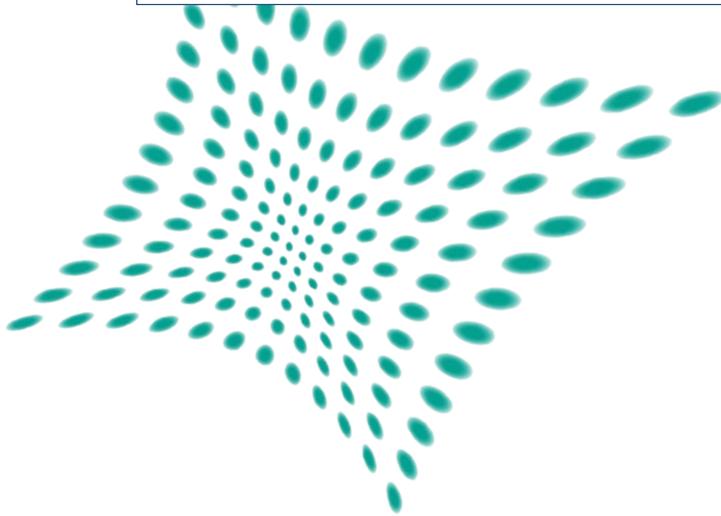
- PLC programming
- Visualisation
- Motion control
- Technology functions
- Automatic fieldbus configuration
- Machine setup
- Diagnosis and remote maintenance
- Safety

New:

- Object-oriented programming
- Editor for functional safety parameters
- Autotuning

Engineering and application using AIPEX PRO

Configuration

The hardware configuration function is used to compile all of the drive system components from a database (motor, inverter, controller module, option cards, controllers, I/O modules).

- **Automatic fieldbus configuration**
- **Parameterisation**
- **Commissioning**

Programming

AIPEX PRO integrates the internationally renowned CoDeSys V2 programming platform and CODESYS for object-oriented programming. All programming languages according to IEC 61131-3 are supported and can even be combined within a project. Program in your preferred language.

Modules for programming are available in numerous libraries.

The development environment contains the visualisation and the basic library and is used as the cornerstone for the automation solution. The basic library contains extensive basic components, such as mathematical functions and logic components (timers, counters, etc.).

Visualisation

Create your machine visualisation with the graphic functions of the integrated visualisation editor and also make use of prefabricated visualisation modules. The web visualisation in the AMK controllers can be accessed from anywhere in the world.

ADVANTAGES

AIPEX PRO integrates all of the engineering tools required over the lifecycle of a machine, e.g. programming, parameterisation, commissioning, optimisation and diagnostics. This saves time-consuming coordination, such as between the PLC program and the drive parameters and the configuration of the user data exchange via the fieldbus.

AIPEX PRO works fully automatically in this respect and releases you from everything that is not directly related to your application. You are free to concentrate on the really important things regarding the application.

CODESYS

- All programming languages according to IEC 61131-3
- Economical creation of your machine software
- Shortening the time-to-market of your machine
- Implement innovative machine concepts via drag & drop
- Extensive pre-programmed AMK technology functions
- Integrated web visualisation accessible worldwide

Libraries
This tool provides extensive pre-programmed motion control and technology functions.

Motion control libraries
These modules contain the basic machine control functions, such as the electronic cam controller and cam function.

Technology functions
Engineering processes are further simplified using the technology functions provided, such as the form/fill/seal, register mark control, winder and cross-cutter functions.

Remote maintenance and diagnostics
The machine control and drives can be accessed from any location.

Firmware updates can be incorporated quickly and easily using the update tool included in AIPEX PRO

Safety Editor
AMK's safe drives can be parametrised using the certified Safety Editor. The selected safety functions are logged and output in PDF format. This enables the safety information to be printed out and kept with the machine.

Automatic fieldbus configuration

The revolutionary coupling of component configuration and programming environment has made fieldbus configuration foolproof. AIPEX PRO identifies all of the data to be transmitted and automatically creates the configuration of the fieldbus. Data is made available either synchronously or asynchronously, depending on its intended use in the PLC program. Fully automatic and reliable.

The programmer is relieved of a cumbersome task and can devote their full attention to the more important parts of machine control.

Both drive data and I/O data are configured fully automatically.

Simple drive parameterisation

The drive system consists of servo inverters and motors that must perform the given task to the optimum.

Wizzards help with the parameterisation of standard drive functions. The parameter explorer gives access to all parameters in the system. Adjustment and optimisation can also be performed during ongoing operation. The temporary changes are implemented directly.

AIPEX PRO has access to all participants in the fieldbus network. All parameters and configuration data can be both read and written from one central point.

Central access with AIPEX PRO makes troubleshooting easier. As soon as a message is generated it is displayed in plain text with further information.

Commissioning

- Internal setpoint generator with sine, triangle, trapezoidal and step function generator for torque, speed and position setpoints.
- Temporary parameter access for online tuning of all control parameters
- Integrated oscilloscope
  - ✔ Measurement of all internal data such as position, speed, currents, torques, digital I/O voltages, etc.
  - ✔ up to 8 variables can be recorded per unit
  - ✔ - Various triggers (edge, event, level)
  - ✔ - Cursor measurement function (time, absolute values, difference)
  - ✔ - Hold function of the measured values
  - ✔ - 4 different views possible per unit
  - ✔ - Storage and export of measured values for evaluation

Safety Editor

A new certified Editor has been introduced in AIPEX PRO, which offers the functionality to create and manage safety-relevant parameters:
- Parameterisation of AMK's safe drives
- Logging of the safety functions
- Automatic documentation in PDF format

Automatic controller optimisation

- Connected AMK drive systems are automatically recognised and identified. All relevant values for motor, motor encoder and gearbox are displayed.
- Determination and setting of parameter values for current, speed and position controllers
- Recording and graphical display of the measured control response to a setpoint step.
- Capable of application-specific adaptation of the controller settings
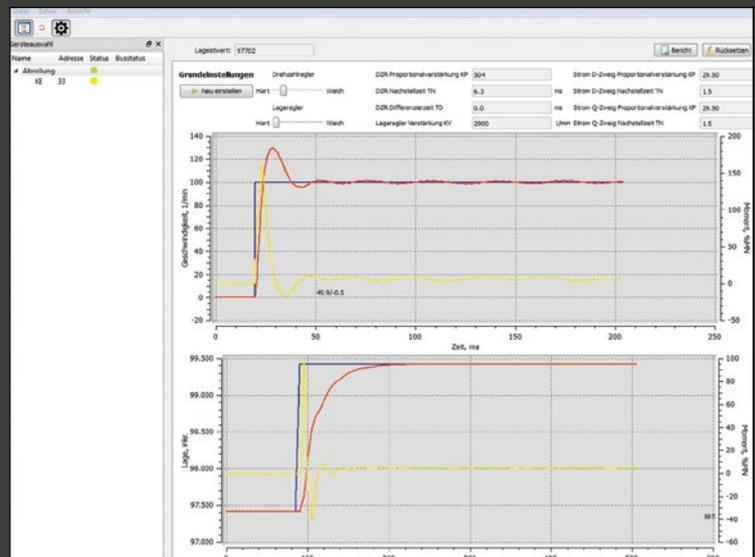
Accessories

Designation	Product information
KE/KW cold plate with cooling connection on the side for devices in cold plate design	
KW-CP340	L=340 mm
KW-CP510	L=510 mm
KW-CP680	L=680 mm
KW-CP680-V	L=680 mm, stainless steel tubes
KE/KW cold plate with cooling connection on the back for devices in cold plate design	
KW-CP340R	L=340 mm
KW-CP420R	L=420 mm
KW-CP510R	L=510 mm
KW-CP680R	L=680 mm
KW-CP680R-V	L=680 mm, stainless steel tubes
KW-CP1035R	L=1035 mm
KE/KW cold plate with fan for devices in cold plate design	
KW-LK110	110 x 418 x 46 (cooling surface)
KW-LK250	250 x 465 x 84 (cooling surface)
KW-LK400	400 x 465 x 84 (cooling surface)
KW-LK500	500 x 465 x 84 (cooling surface)
Brake resistors	
AR 45	All power supplies
AR 80-20-0	KE 20
AR 140	KEN 5, KEN 10
AR 1000-50-F	All power supplies
AR 4000-8-F	KE 40, KE 60, KE (N/S) 120
AR 4000-8-O	KE 40, KE 60
AR 4000-20-F	KE 20
AR 4000-20-O	KE 20
AR 4000-40-F	KE 10
Line contactors	
	For KE 20, KES 20, coil 24 V
	For KE 40, coil 24 V
	For KE 60, KES 60, coil 24 V
	For KE 120, KES 120, coil 24 V
Line filter	
AF 90	KE 60, 3 x 480 VAC, 90 A
AF 180	KE 120, KEN 120, 3 x 480 V, 180 A
AF 90-S	KES 60, 3 x 480 V, 90 A
AF 180-S	KES 120, 3 x 480 V, 180 A
AF 300	KE 180, 3 x 480 V, 300 A
AMKASYN line reactors	
ALN 12	For KEN 5-ON without fieldbus
ALN 17	For KEN 10
ALN 30-S	KES 20, 30 A/continuous operation
ALN 36/1000	For KE 20, 36 A
ALN 63	For KE 40, 63 A
ALN 85	For KE 60, 85 A
ALN 180	For KE 120, KEN 120
ALN 15-SI	For KES 20, 15 A/pulse loading
ALN 45-SI	For KES 60, 45 A/pulse loading
ALN 60-SI	For KES 120, 60 A/pulse loading
ALN 90-S	For KES 60, 90 A/continuous operation
ALN 150-I	KE 180, 150 A/pulse operation
ALN 180-S	For KES 120, 180 A/continuous operation

Designation	Product information
AMKASYN line series reactors	
ALNV 15-SI	For KES 20, 15/60 A
ALNV 30-S	KES 20, 30 A/continuous operation
ALNV 90-S	For KES 60, 90/180 A
ALNV 180-S	For KES 120, 180/300 A
DC link cable sets blue/red	
KW-UZ55	L=180mm,10mm^2
KW-UZ85	L=45mm, 10mm^2
KE-UZ170	L=117mm, 10mm^2
KW-UZ170	L=114mm, 25mm^2
KW-UZ255	L=380mm, 50mm^2
KE-UZ255	L=350mm, 25mm^2
ACC bus cable	
KW-ACC140	L=140 mm
KW-ACC210	L=210 mm
KW-ACC300	L=300 mm
KW-ACC1000	L=1000 mm
KW-ACC1800	L=1800 mm
KW-ACC5000	L=5000 mm
KW-ACC10000	L=10000 mm
KW-ACCT	Terminating connector
EC bus cable	
Cable RJ45 0.2 m	L=200 mm
Cable RJ45 0.3 m	L=300 mm
Cable RJ45 0.4 m	L=400 mm
Cable RJ45 1.0 m	L=1000 mm
Cable RJ45 2.0 m	L=2000 mm
Cable RJ45 5.0 m	L=5000 mm
Cable RJ45 10.0 m	L=10000 mm
Additional accessories	
AP-CI3	Adapter ACC to Wago
AP-CI4	Adapter ACC general CAN connection
AP-CI6	Adapter ACC for general CAN connection

Device dimensions in cold plate design
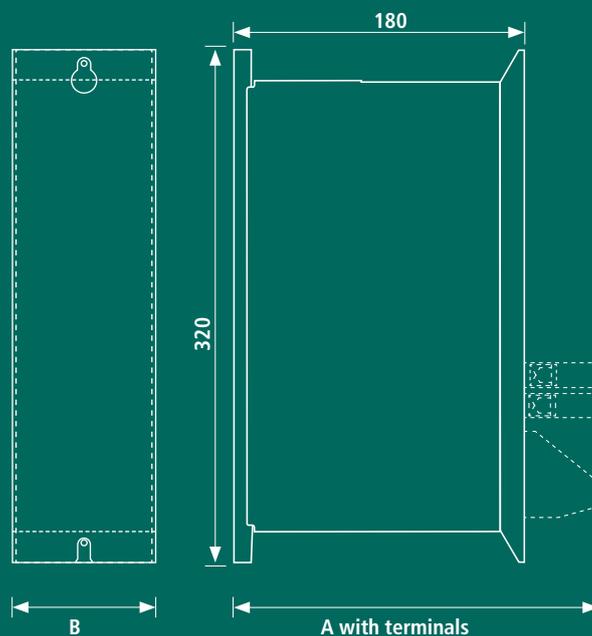
Module	B (module width in mm)	A (module depth in mm)
KEN 5, KEN 10, KEN 20, KW 2, KW 3, KW 5, KW 8, KWD 1, KWD 2, KWD 5	55	205
KE 20, KES 20, KW 10, KW 20	85	212
KE 40, KE 60, KES 60, KW 40, KW 60	170	235
KE 120, KEN 120, KES 120, KW 100	255	259
KE 180, KES 180, KW 150, KW 200	425	228

Industry solutions
Economical, modular and extremely efficient

AMK's innovative drive and control solutions have precisely the right products
for your machines and plants:

- Printing industry
- Paper processing
- Machine tool industry
- Textile industry
- Plastics industry
- Packaging industry
- Food industry

ADVANTAGES

- **Complete drive and control system from a single source**
- **Extensive industry expertise for innovative machine concepts**
- **AMK technology library with motion control function blocks for every application**

No matter which industry sector you are in, our application engineers have a wide range of theoretical and practical knowledge and will be happy to work out a customised solution for you.

Printing industry
Highest precision and dynamic performance 1000 axes, 18 metres per second

Paper decoiler
Flying changeover at full production speed.
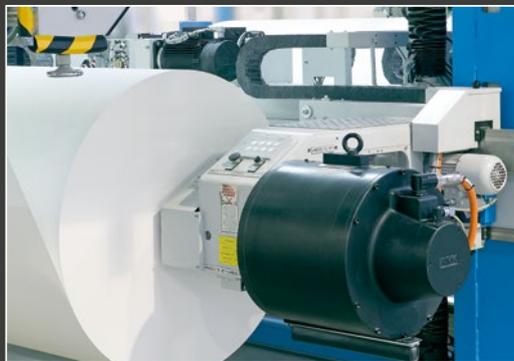
Food industry
Rotary labellers for the flexible use of a wide range of bottle formats.

Plastics industry
Cycle times of 1.6 seconds. Highest demands on precision and reproducibility.

Paper processing
2x2 mm print marks are detected with an accuracy of +/- 30 μm at processing speeds of 10 m/s.

Packaging industry
Bag forming, filling, and sealing machines, inserters, blister machines and film packaging machines or palletises.

Service, training and consulting
Our expertise at your service

Service

Comprehensive service is our second nature. Our "Technical Support" specialists are there for you whenever you need assistance - from planning, design, installation and commissioning through programming and operating a plant to the possible replacement of system components.

Consulting

We also provide you with individual and project-related advice on all aspects of your drives and controls.

You will receive precisely the information you require, entirely tailored to your specific needs.

Training

Our comprehensive training programme covering the theory and practice of drive and control technology includes various training options, either in our training centre or on-site at your premises.

The courses range from basic training to expert workshops. On request, we can also provide individual project-optimised training.

General technical data

Directives and standards

- Low voltage directive 3/23/EEC and 93/68/EEC
- EN 50178 "Electronic equipment for use in power installations".
- EN 61800-2 "Adjustable speed electrical power drive systems, General requirements"
- EN 61800-3 "Adjustable speed electrical power drive systems, EMC product standard"
- UL 508C "Power Conversion Equipment"
- CSA C22.2 "Industrial Control Equipment"

Machine standards:
- Machinery directive 89/392/EEC
- EMC directive 89/336/EEC
- EN60204 "Electrical equipment of machines"

KE: incoming supply
3 x 400 V...480 V ± 10%, 47... 63Hz Line-powered operation conditions according to EN61800-2 Section 4.1.1 or EN60204-1 Section 4.3
- Symmetrical three-phase line, max. permissible voltage unsymmetry 3% TN or TT system, neutral point grounded
- Suitable for IT systems

Reference potential:
PE, circuit GND of the low voltage circuit is connected internally to the housing ground

Power unit for supply voltage
24VDC ± 15%, max. 5% ripple, with integrated inrush-current limiting

Limit values for radio interference voltage according to EN 61800-3: (2000)
in accordance with Section 6.3.2 Tab. 11 and Tab.12 (external filter required from KE 60 onwards)

Ambient conditions

Protection class according to EN 60529:
IP20, degree of pollution 2

Storage/transport temperature:
-25°C to +75°C

Ambient temperature:
+5°C to +40°C

Cold plate temperature with liquid cooling:
max. 40°C

Relative humidity:
5% to 85%, without condensation

Installation altitude:
Up to 1000m above sea level For installation altitudes above 1000 m up to max. 2000 m, the nominal data must be reduced by 1% per 100 m.
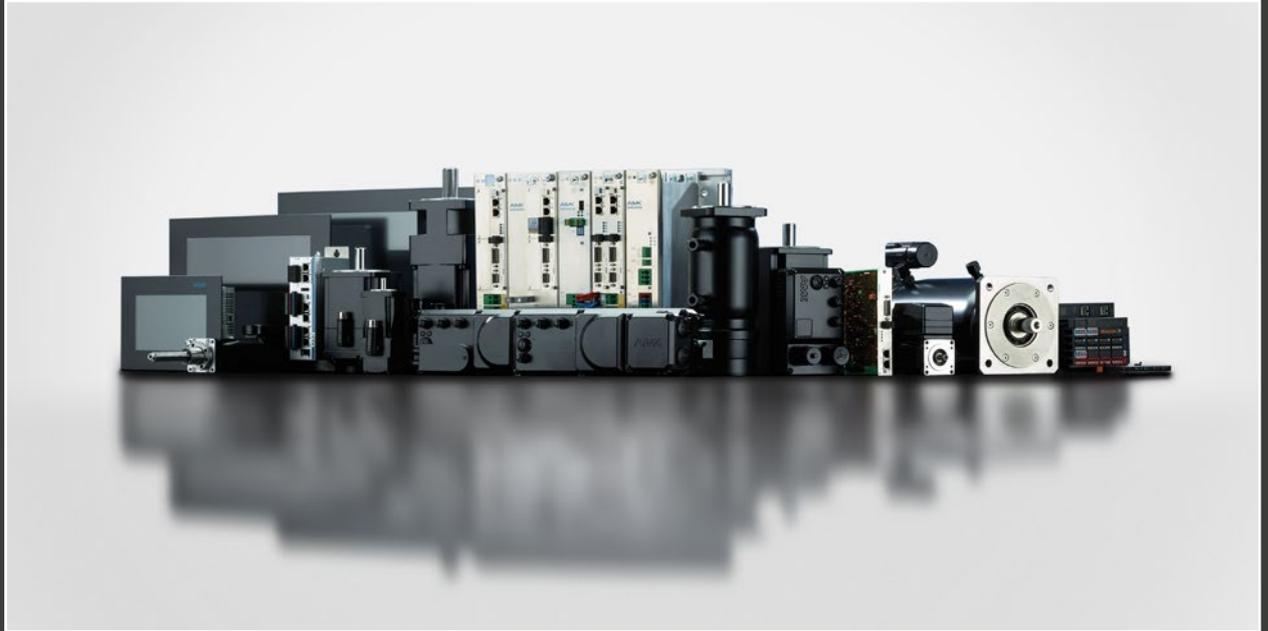
Shock resistance:
15 g for 11 ms according to EN 60068-2-27

Vibration stress:
1g at 10...150Hz according to EN 60068-2-6

Control your Motion

- **AMKAMAC**
  Control technology

- **AMKASMART**
  Decentralised
  drive technology

- **AMKASYN**
  Servo inverter

- **DYNASYN**
  Servo motors

- **SPINDASYN**
  Linear drives

The information in this brochure is intended solely as a series product description. Deviations are possible due to specific products and continuous further developments. Before using data for calculations or designs, please check in advance the latest status and request product-specific dimension and data sheets.
We reserve the right to make technical changes. 10/2021

SPINDASYN
HOLLOW SHAFT MOTORS

with integrated heavy duty bearing

LINEAR

CONTENTS

SPINDASYN
Hollow shaft motors with integrated axial bearing for high forces:

SPINDASYN hollow shaft motors from AMK are the perfect choice for applications requiring high forces and extremely accurate linear positioning.

SPINDASYN is a pre-assembled turnkey solution. and consists of a powerful servo motor with an axial bearing and an integrated multiturn absolute encoder. Appropriate adapter flanges are available for mounting different screw and nut systems. Adaptation to match the application in question is accomplished through the selection of the motor and bearing from the SPINDASYN modular system and the pitch of the screw. The resulting mechatronic unit is ideally adapted to speed and force in each application.

The choice of motor design variants offering blind hollow shafts or hollow through shafts enables a cost-effective adaptation to your process. Motors with a blind hollow shaft are the perfect solution for applications requiring short strokes. Unlimited stroke lengths are possible in motors with hollow through-shafts. Hollow through-shaft motors also offer the possibility of routing energy or compressed air supply through the moving axis.
SPINDASYN motors are available with convection or liquid cooling. The liq-

uid-cooled model enables technical solutions that achieve extremely short cycle times, something that is only possible with hydraulic and pneumatic systems at considerable expense. Very precise reproducible processes are made possible by the extremely dynamic position control.

The combined application of SKT motors and screw and nut systems is an economically superior alternative to hydraulic and linear motors in applications with high forces and varying speeds. The SKT solution enables construction and ongoing operating costs to be significantly reduced.

Our expertise – your benefit

Flexibility through a modular concept

The modular design of the SPINDASYN linear drives with regard to power range, spindle diameter and axial force allows specific adaptation to suit a variety of applications. There is also a model with the option of a hollow through-shaft or hollow shaft closed on one-side, for an unlimited or limited stroke.

Energy efficiency

The system offers significantly higher efficiencies compared to hydraulic systems and linear direct drives and as a result consistently achieves higher energy efficiency.

Compact design

The integrated screw enables the entire linear drive to be built with the most minimum dimensions. All of the functional elements such as the servo motor, bearings, DIN mounting for the screw nut, holding brake and encoder system are concentrated in a common housing as one compact unit.

High rigidity

The integrated bearing eliminates the need for shaft couplings and significantly reduces the required number of bearing points. The inherently rigid housing design and the substantial dimensioning of all power train components provides the entire system with extremely high rigidity.

High dynamic performance

The extremely compact design results in a correspondingly low mass moment of inertia. The servo motor achieves high power and acceleration ratings together with significant overload capacity. The rigid torsional connection to the screw nut allows very dynamic controller settings to be used.

Reduced design complexity

The ready-to-install unit consists of a servo motor, high duty bearing and multiturn absolute encoder. The encoder is prepared for direct connection to the screw nut.

IP54 protection rating

The IP54 protection rating makes these motors suitable for harsh environmental conditions.

Installation in any orientation.

The bearing seal design enables the unit to be mounted in any orientation. It may be necessary to re-lubricate the bearings depending on customer applications.

Maintenance-free operation

The use of high-torque motors and the sealed mechanical design ensure virtually maintenance-free operation and high availability. Integrated temperature sensors protect the motors from thermal overload. The permanently lubricated angular contact ball bearings and tapered roller bearings

Suitable for heavy-duty applications and high speeds

SPINDASYN hollow shaft motors are a more efficient alternative to existing hydraulic solutions or to linear drives when high loads have to be moved at varying speeds.

Highest power density provided by liquid cooling (optional)

Liquid-cooled motors are of a more compact design and offer higher dynamic performance due to less moving mass. This also makes the motors easier to handle during installation.

ADVANTAGES

- **Highest productivity**
- **Excellent process control**
- **High degree of accuracy**
- **Very high degree of efficiency**
- **Low energy consumption**

High performance and productivity for:

- Injection moulding machines
- Blow moulding machines
- Extruders
- Presses
- Tube bending machines
- Punching
- Assembly and joining presses
- Injection/dosing
- Pumps

Functional principle, application notes

Motor bearing sizing for SKT motors

A bearing service life curve is available for each motor type to aid selecting the correct size of motor. The example shows how the bearing life can be calculated for a particular application.

Example of an electric press:

Press force: F_p = 25kN

Stroke: S_v = 0.5m

Press stroke: S_p = 0.1m

Screw pitch: h = 20mm

Press cycle: t = 2s

Number of revolutions over

the pressing stroke:

$A = S_p/h$

$A = 0.1m/0.02m$

$A = 5$ revolutions

From the diagram:

L10 = 380 million revolutions at 25kN

Number of cycles: $Z = L10/A$

$Z = 380$ million/5

$Z = 76$ million cycles

Service life: $L10h = t * Z$

$L10h = 2s * 76$ million

$L10h = 152$ million s

$L10h = 42222h$
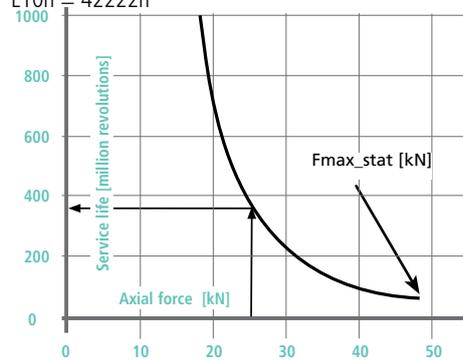
Bearing life of A-bearing (L10) with different axial force Fa in [kN].
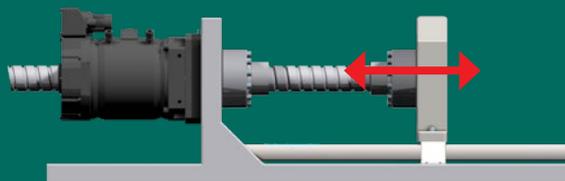
Horizontal arrangement. Hollow through-shaft, no limitation in stroke
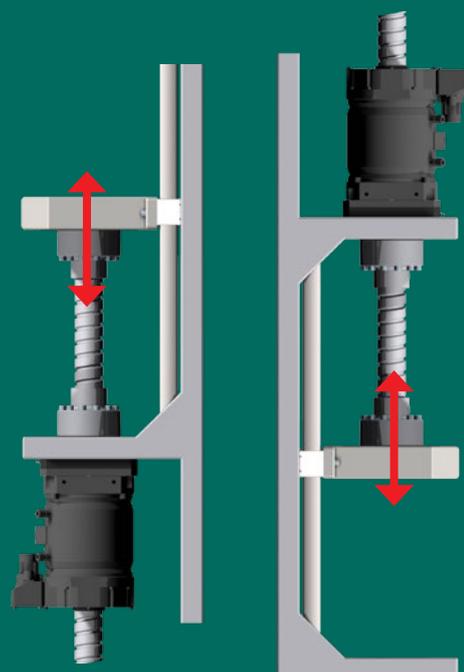
Vertical arrangement e.g. lifting unit, press

Direction of force

SPINDASYN hollow shaft motors are designed for very high axial loads. With standard load bearings the force can act on the hollow motor shaft either as compressive or tensile forces. With heavy-duty bearings, there are bearings for both directions of force and bearings for which the direction of force must be observed. The full axial force can then only be applied in the specified direction D or Z. The direction of force is shown in the type code.

Tensile
On both sides
Compressive
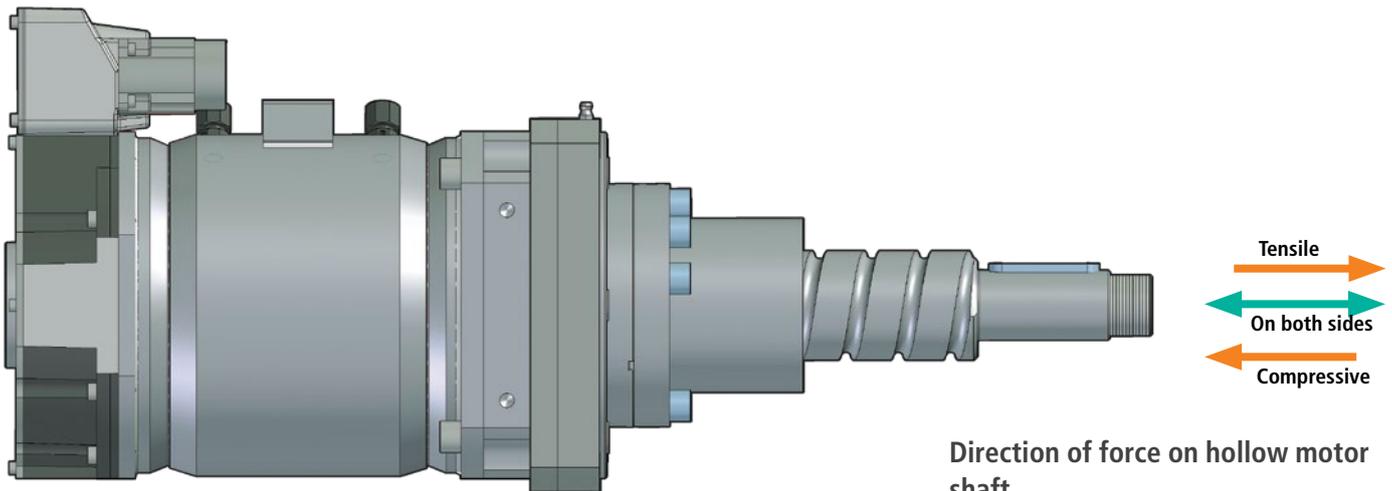
Direction of force on hollow motor shaft

D = Compressive, Z = Tensile, B = Ball bearings on both sides, R = Roller bearings on both sides

The direction of force refers to the hollow motor shaft (screw). It should be noted that the forces on the motor flange act in the opposite direction.

Anti-rotation device

During linear movement, the motor torque acts in the opposite direction at the end of the screw. This torque must be supported by an appropriate linear guide.

Adjacent construction

Radial loads or tilting moments reduce the service life of screw and nut systems. When designing the adjacent construction ensure that the motor is aligned with the screw and nut system and that no radial forces occur.

Screw and nut system

The SKT motors are suitable for screw and nut systems such as roller or ball screws. In general it can be said that roller screws can absorb higher forces on a smaller diameter, while ball screws have better dynamic properties and are more cost-effective.
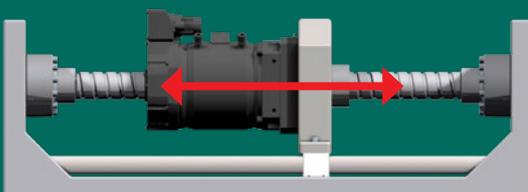
One motor on a fixed screw
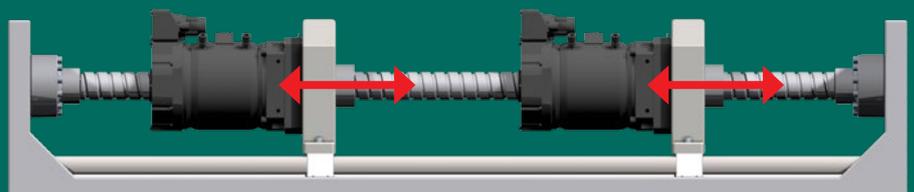
Several motors on one fixed screw, e.g. format adjustment

SPINDASYN hollow shaft motor in conjunction with a screw and nut system.

SKT rotating nut principle

The screw nut is directly connected to the hollow shaft of the motor. The rotary movement of the screw nut is converted into a linear movement of the screw, whereby the screw does not rotate but only moves in a linear direction. The direct drive of the screw nut has many advantages compared to systems using a rotating screw. This enables higher travel speeds to be achieved with the direct drive and the torsionally stiff connection of the screw nut delivers better dynamic performance. The negative effects on dynamic performance, torsional stiffness and accuracy that occur when using transmission components such as belts or couplings do not arise with the SKT principle. The motor bearings directly absorb high forces allowing for heavy duty applications. This enables machine designs to be greatly simplified. The SKT principle also facilitates new solutions such as arranging several SKT motors on a fixed screw.

Motor flange to screw nut interface

The screw nut is mounted to the motor flange via a suitable adapter which must be ordered separately, with the exception of the SKT7 motor where the motor flange fits a flange nut design to DIN69051. The dimensions for selecting the screw nut can be found in the following overview.
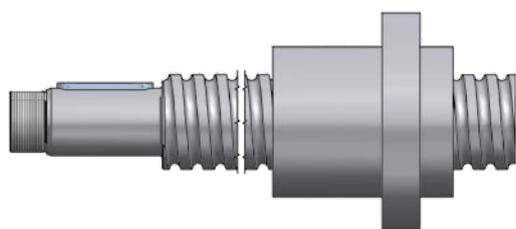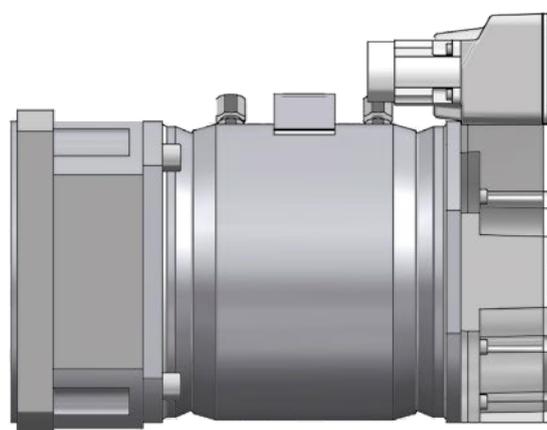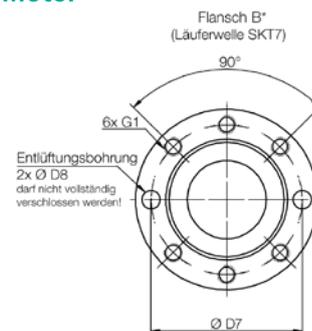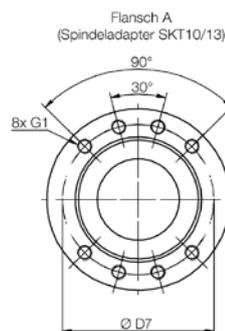

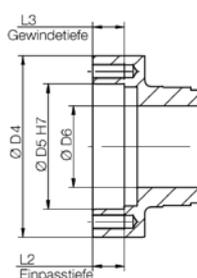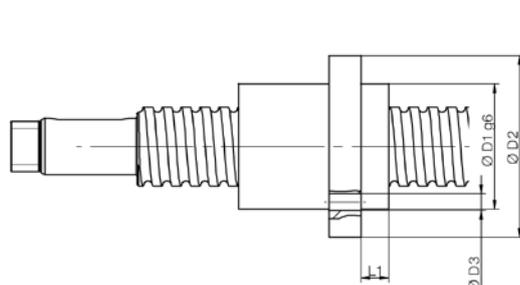**Screw and nut system**   **Adapter**   **Motor**

Motor type		Standard Adapter No.	J* [kgc-m^2]	Screw ø [mm]	Flange	D1=D5 [mm]	L1 [mm]	D2 [mm]	D3 [mm]	D4 [mm]	D6 [mm]	L2 [mm]	D7 [mm]	G1	L3 [mm]
Standard load applications	SKT7	–*	–	32	B*	50	min. 20 max. 49	max. 95	9.5	95	50	50	65	M8	20
	SKT10	AN10-01	103	63	A	95	max. 21	–	13.5	140	65	22	115	M12	20
	SKT13	AN13-01	616	100	A	150	max. 54	–	17.5	212	105	55	176	M16	20
Heavy-duty applications	SKT10	AS10-01	104	63	A	95	max. 24	–	13.5	140	65	25	115	M12	25
	SKT13	AS13-01	766	100	A	150	max. 74	–	17.5	212	105	75	186	M16	25
									* Motor flange SKT7 is suitable for a flange nut to DIN69051, no adapter is necessary.						

Overview for adjusting speed and axial force via the pitch of the screw

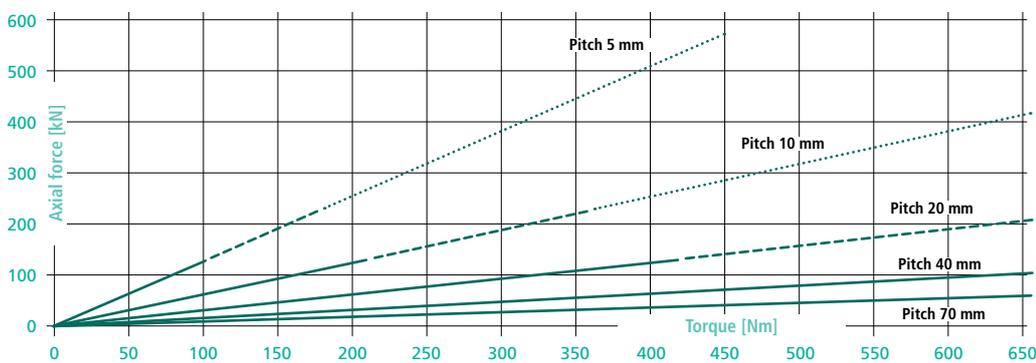## Axial forces SKT7 and SKT10 standard load
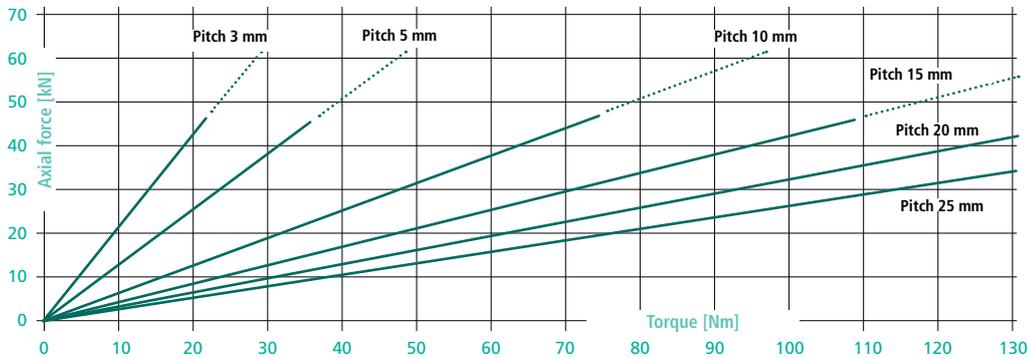
$$F = \frac{M \cdot 2\pi}{h}$$

F = Axial force [kN]
M = Torque [Nm]
h = Screw pitch [mm]

SKT7 and SKT10 ─────
> 48kN only SKT10 ·····

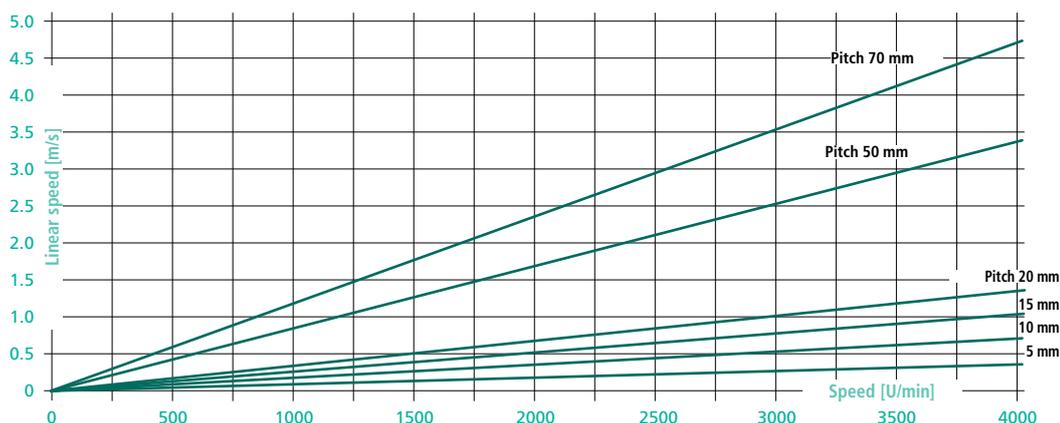## Axial forces SKT10 heavy duty, SKT13 standard and heavy duty

$$F = \frac{M \cdot 2\pi}{h}$$

F = Axial force [kN]
M = Torque [Nm]
h = Screw pitch [mm]

SKT10 heavy-duty and SKT13 ─────
>from 135-216 kN SKT10 heavy-duty and SKT13 heavy-duty ─ ─ ─
> 216kN only SKT13 heavy-duty ·····

Linear speeds at different pitches

$$V = \frac{n \cdot h}{60 \cdot 1000}$$

V = Linear speed [m/s]
n = Speed [U/min]
h = Screw pitch [mm]

The modular design of SPINDASYN hollow shaft motors

The SPINDASYN series is a modular system. The first step is to select the motors from various different sizes. Next adapt the SPINDASYN motor to the required forces, travel speeds, travel distances or cycle times by combining the individual motor components as required.

Motor bearings are selected for tasks that require high dynamic performance or superior power.

The active section of the motor can be convection- or liquid-cooled. The higher power density of liquid-cooled motors achieves faster cycle times.

A continuous hollow shaft at the motor face creates freedom for unlimited screw stroke lengths; this version is also equipped with a multiturn absolute encoder.

Options:

Your SPINDASYN individually configured.
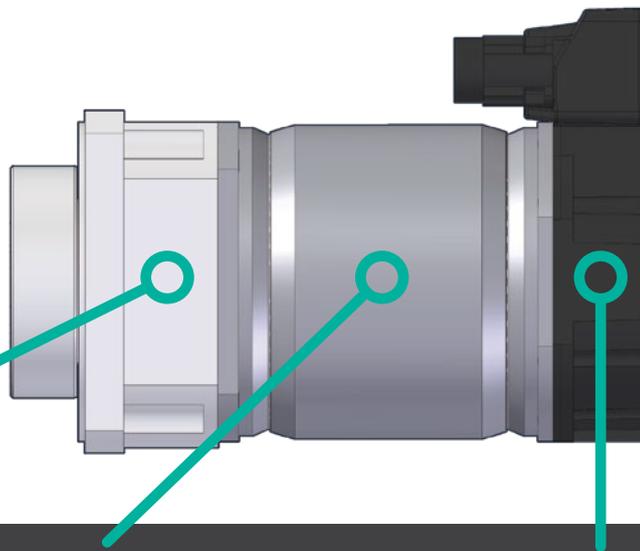
Motor bearing face

Standard load bearing
- Permanently lubricated standard load bearings with application-dependent re-lubrication
- Good acceleration characteristics
- Capable of supporting high axial loads
- For compressive and tensile forces
- Seals on both sides of the bearings provide good protection against the ingress of dirt
- High rigidity and low friction

Heavy duty bearing
- For the highest forces with sizes SKT10 and SKT13
- Permanently lubricated heavy-duty bearings with application-dependent re-lubrication
- Capable of the highest axial loads
- Particularly suitable for high load threaded screws
- Static forces up to 570 kN
- Dynamic forces up to 210 kN
- High rigidity and low friction

Motor active section

Convection-cooled
- Various lengths depending on size
- High dynamic performance
- High maximum torque
- Smooth surface

Liquid-cooled
- Various lengths depending on size
- High dynamic performance
- High maximum torque
- Smooth surface
- Improved continuous torque for shorter cycle times
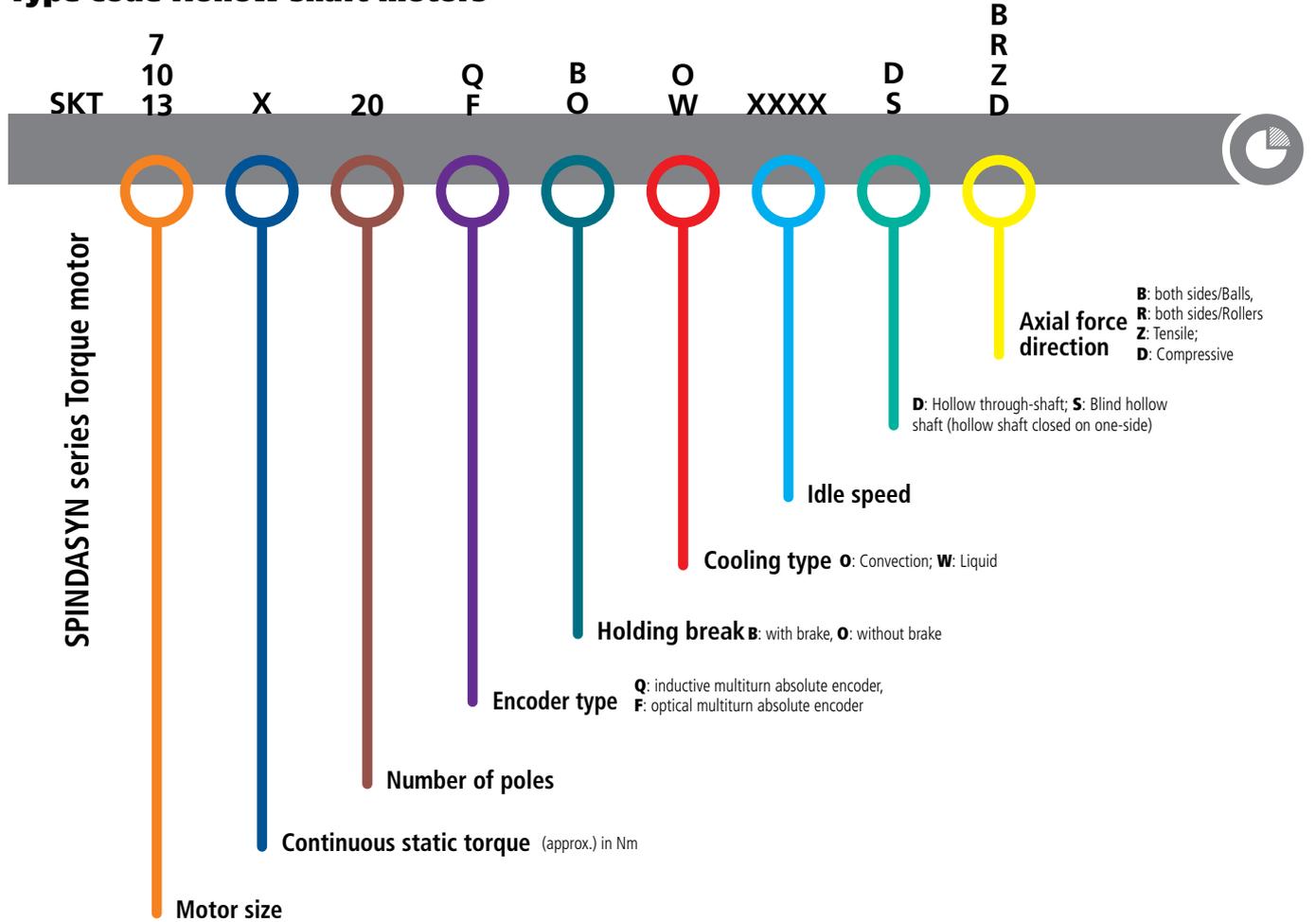- Cooling circuit made from corrosion resistant stainless steel

Motor end face

Hollow through-shaft
- No limitation in spindle stroke
- Compact overall lengths
- No venting of the hollow shaft necessary
- Multiturn absolute encoder
- Hollow shaft brake as an option

Blind hollow shaft
- Closed motor end face
- Ventilation of hollow shaft via A-side
- Multiturn absolute encoder
- Holding brake as an option

Type code Hollow shaft motors

SKT | 7 10 13 | X | 20 | Q F | B O | O W | XXXX | D S | B R Z D

Axial force direction
B: both sides/Balls,
R: both sides/Rollers
Z: Tensile;
D: Compressive

D: Hollow through-shaft; **S**: Blind hollow shaft (hollow shaft closed on one-side)

Idle speed

Cooling type **O**: Convection; **W**: Liquid

Holding break **B**: with brake, **O**: without brake

Encoder type **Q**: inductive multiturn absolute encoder, **F**: optical multiturn absolute encoder

Number of poles

Continuous static torque (approx.) in Nm

Motor size

SPINDASYN series Torque motor

SKT hollow shaft motors

Motor type SKT	Convection cooled	Liquid cooled	Blind hollow shaft	Hollow through-shaft	Ø Hollow shaft	Direction of force B: On both sides Z: Tensile D: Compressive R: On both sides	Bearing axial forces		Static data		Rating data					Maximum data		Mechanical data			
							Fmax stat [kN]	Fmax dyn [kN]	Mo [Nm]	Io [A]	MN [Nm]	PN [kW]	IN [A]	nN [1/min]	kT [Nm/A]	Mmax [Nm]	Imax [A]	nmax [1/min]	J * [kgcm2]	L * [mm]	m * [kg]
Standard load applications																					
SKT7-17-20-xxO-3500	O	–	–	D	35	B	48	18	17	11.3	11.3	2.8	7.2	2,500	1.5	65	50	3,500	64	270	22
SKT7-28-20-xxO-2600	O	–	S	D	35	B	48	18	32	15.2	19	4	9	2,000	2.1	130	75	4,000	90	330	28
SKT7-40-20-xxO-2000	O	–	S	D	35	B	48	18	42	15.2	29	3	10.5	1,000	2.76	210	100	2,000	118	390	34
SKT7-55-20-xxW-4000	–	W	S	D	35	B	48	18	60	40.2	45	12	30	2,500	1.49	116	99	5,000	90	327	34
SKT10-54-20-xxO-1400	O	–	–	D	65	B	61	23	64	16	42	4.5	10.5	1,000	4	194	67	2,000	425	316	48
SKT10-95-20-xxO-1400	O	–	S	D	65	B	61	23	90	23.4	73	6.1	19	800	3.85	360	105	3,000	494	436	67
SKT10-100-20-xxW-3000	–	W	S	D	65	B	61	23	95	54.3	66	11	38	1,500	1.75	160	132	3,000	425	316	48
SKT10-145-20-xxW-2000	–	W	S	D	65	B	61	23	160	66.6	120	18	50	1,500	2.4	310	200	2,500	569	436	65
SKT13-200-20-xxW-2600	–	W	–	D	105	B	135	70	360	145.8	240	45	103	1,800	2.3	640	330	3,300	1,822	520	160
Heavy-duty applications																					
SKT10-100-20-xxW-3000	–	W	–	D	65	D, Z	216	85	95	54.3	66	11	38	1,500	1.75	160	132	3,000	458	357	55
SKT10-145-20-xxW-2000	–	W	S	D	65	D, Z	216	85	160	66.6	120	18	50	1,500	2.4	310	200	2,500	610	477	71
SKT13-200-20-xxW-2600	–	W	–	D	105 / 105	R	Compressive 570 / Tensile 380	210	360	145.8	240	45	103	1,800	2.3	640	330	3,300	2,399	600	191
SKT13-650-20-xxW-1200	–	W	–	D	105 / 105	R	Compressive 570 / Tensile 380	210	660	108.7	600	63	130	1,000	4.6	1,280	330	1,500	3,366	780	240

x-apple-ql-id://3EFD5AFB-F63B-4987-941E-A7D02F2284FC/x-apple-ql-magic/preview0.pdf* Variants with a hollow through-shaft

SKT7 convection-cooled
with hollow through-shaft or blind hollow shaft

Features

- Torque motor with broad, linear current-torque rise
- Speeds matched to screw and nut systems
- Anti-backlash bearing
- Very ridged radial coupling between hollow motor shaft and nut
- Very high axial rigidity
- Customised flanges possible
- Permanently lubricated, sealed bearings
- Suitable for radial and axial loads
- Option of lubrication of screw nut on fixed part
- Direction of force on both sides
- Brake option for vertical axes

Applications
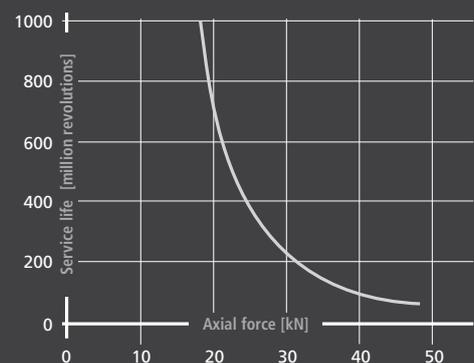
- Standard load
- Short travel or unlimited stroke

Equipment

	Standard	Option
Brake	–	**18 Nm**
Encoder	**Q, multiturn, inductive**	**F, multiturn, optical**

Characteristic curves
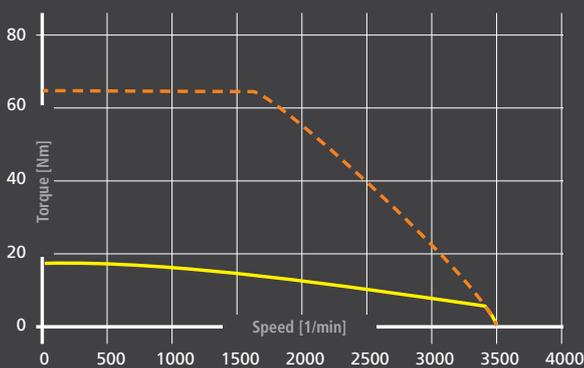
SKT7-17-20-xxO-3500
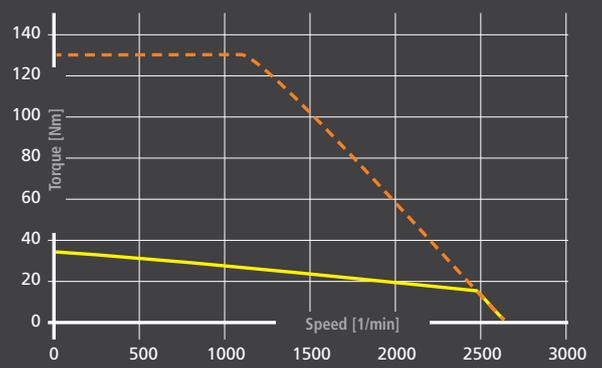
SKT7-28-20-xxO-2600

- - - Maximum moment   —— Continuous thermal moment
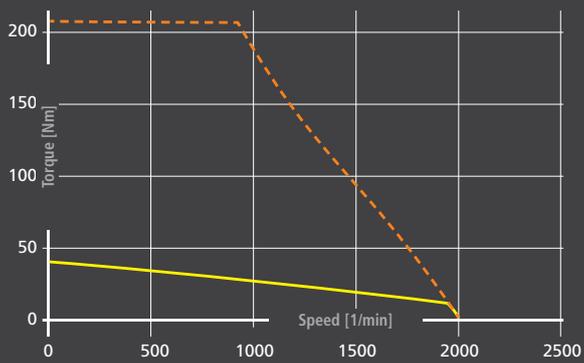
SKT7-40-20-xxO-2000
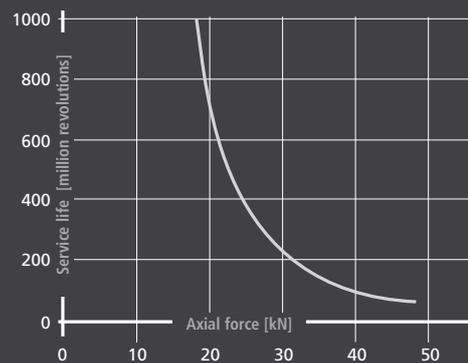
Bearing service life (L10) Characteristic curve

SKT7 liquid-cooled
with hollow through-shaft or blind hollow shaft

Features

- Torque motor with broad, linear current-torque rise
- Speeds matched to screw and nut systems
- Anti-backlash bearing
- Very ridged radial coupling between hollow motor shaft and nut
- Very high axial rigidity
- Customised flanges possible
- Permanently lubricated, sealed bearings
- Suitable for radial and axial loads
- Option of lubrication of screw nut on fixed part
- Direction of force on both sides
- Brake option for vertical axes

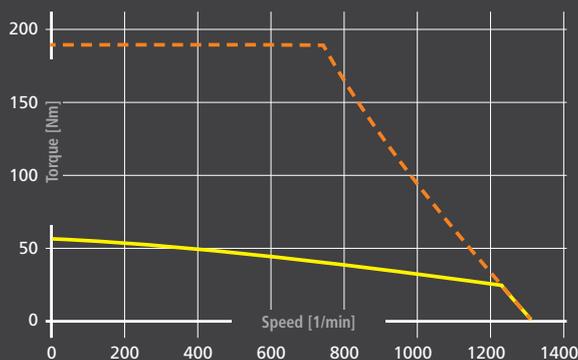## Applications

- Standard load
- Short travel or unlimited stroke

Equipment

	Standard	Option
Brake	–	18/50* Nm * Brake for hollow through-shaft
Encoder	Q, multiturn, inductive	F, multiturn, optical

Characteristic curves
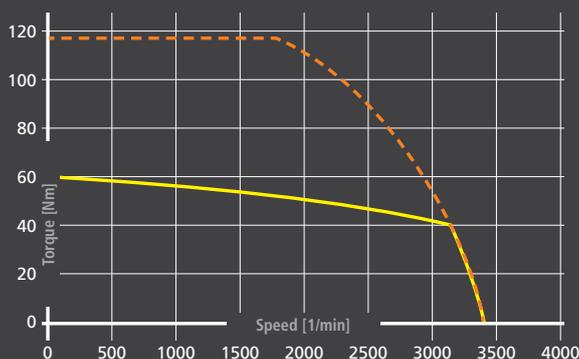
SKT7-55-20-xxW-4000

Bearing service life (L10) Characteristic curve

- - - Maximum moment — Continuous thermal moment

Technical data

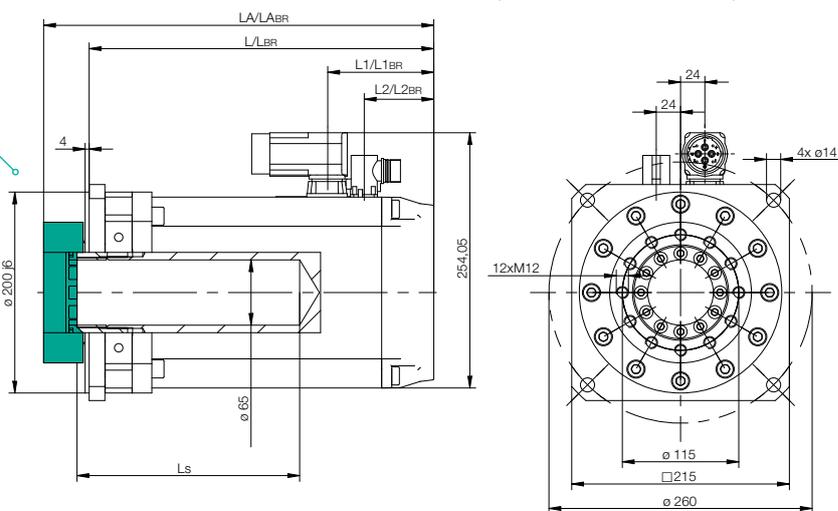	Motor type	Blind hollow shaft	Hollow through-shaft	Bearing axial forces		Static data		Rating data					Maximum data		Mechanical data										
			F_{max} stat [kN]	F_{max} dyn [kN]	M_0 [Nm]	I_0 [A]	M_N [Nm]	P_N [kW]	I_N [A]	n_N [1/min]	k_T [Nm/A]	M_{max} [Nm]	I_{max} [A]	n_{max} [1/min]	J [kgcm²]	L_S [mm]	L [mm]	$L1$ [mm]	$L2$ [mm]	L_{BR} [mm]	$L1_{BR}$ [mm]	$L2_{BR}$ [mm]	m [kg]	m_{BR} [kg]
SKT7-55-20-xxW-4000	S –	– D	48	18	60	40.2	45	12	30	2,500	1.49	116	99	5,000	75 90	210 ∞	362 327	50 86	27 8	393 367	81 126	58 48	34 34	36 38

Dimensions

Flange connection Screw nut see page 8, Legend on page 31, All dimensions in mm.

Motors with hollow through-shaft

Motors with blind hollow shaft

SKT10 convection-cooled
with hollow through-shaft or blind hollow shaft

Features

- Torque motor with broad, linear current-torque rise
- Speeds matched to screw and nut systems
- Anti-backlash bearing
- Very ridged radial coupling between hollow motor shaft and nut
- Very high axial rigidity
- Customised flanges possible
- Sealed bearings with possibility of re-lubrication
- Ball bearing for medium loads and high speeds
- Option of lubrication of screw nut on fixed part
- Direction of force on both sides
- Brake option for vertical axes

Applications

- Standard and medium loads
- Short travel or unlimited stroke

Equipment

	Standard	Option
Brake	–	**120 Nm**
Encoder	**Q, multiturn, inductive**	**F, multiturn, optical**

Characteristic curves

SKT10-54-20-xxO-1400

SKT10-95-20-xxO-1400

- - - - **Maximum moment** —— **Continuous thermal moment**

Technical data

Motor type	Blind hollow shaft	Hollow through-shaft	Bearing axial forces		Static data		Rating data					Maximum data			Mechanical data											
			$F_{max stat}$ [kN]	$F_{max dyn}$ [kN]	M_O [Nm]	I_O [A]	M_N [Nm]	P_N [kW]	I_N [A]	n_N [1/min]	k_T [Nm/A]	M_{max} [Nm]	I_{max} [A]	n_{max} [1/min]	J [kgcm²]	L_S [mm]	L [mm]	LA [mm]	$L1$ [mm]	$L2$ [mm]	L_{BR} [mm]	LA_{BR} [mm]	$L1_{BR}$ [mm]	$L2_{BR}$ [mm]	m [kg]	m_{BR} [kg]
SKT10-54-20-xxO-1400	–	D	61	23	64	16	42	4.5	10.5	1,000	4	194	67	2,000	425	∞	316	361	65	7	402	447	151	93	48	65
SKT10-95-20-xxO-1400	S / –	– / D	61	23	90	23.4	73	6.1	19	800	3.85	360	105	3,000	490 / 494	370 / ∞	460 / 436	505 / 481	106 / 65	69 / 7	521 / 522	566 / 567	167 / 151	130 / 93	67 / 67	76 / 84

Dimensions

*Flange connection Screw nut see page 8, Legend on page 31, All dimensions in mm.

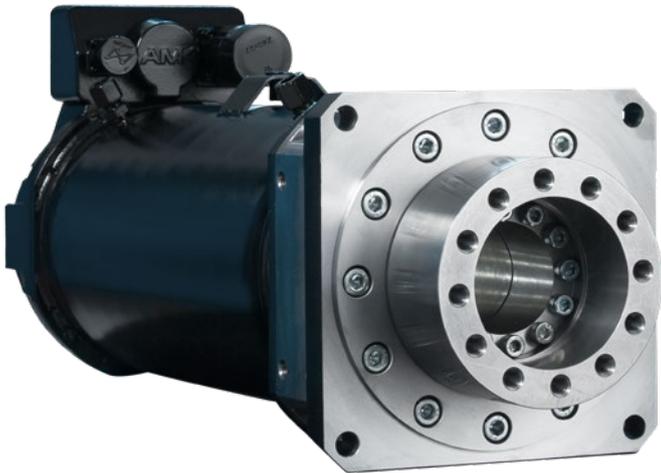*Flange connection

Motors with hollow through-shaft

Motors with blind hollow shaft

Bearing service life (L10) Characteristic curve

SKT10 liquid-cooled
with hollow through-shaft or blind hollow shaft

Features

- Torque motor with broad, linear current-torque rise
- Speeds matched to screw and nut systems
- Anti-backlash bearing
- Very ridged radial coupling between hollow motor shaft and nut
- Very high axial rigidity
- Customised flanges possible
- Sealed bearings with possibility of re-lubrication
- Ball bearing for medium loads and high speeds
- Option of lubrication of screw nut on fixed part
- Direction of force on both sides
- Brake option for vertical axes

Applications

- Standard and medium loads
- Short travel or unlimited stroke

Equipment

	Standard	Option
Brake	–	120 Nm
Encoder	Q, multiturn, inductive	F, multiturn, optical

Characteristic curves

SKT10-100-20-xxW-3000

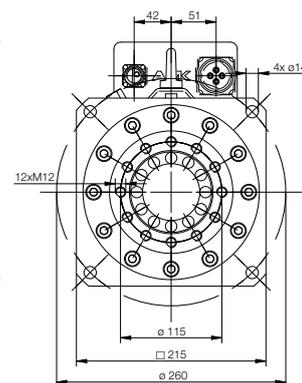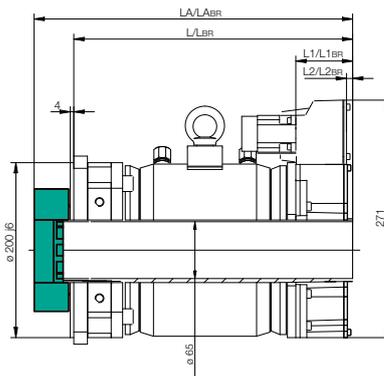SKT10-145-20-xxW-2000

- - - Maximum moment — Continuous thermal moment

Technical data

Motor type	Blind hollow shaft	Hollow through-shaft	Bearing axial forces		Static data		Rating data					Maximum data			Mechanical data											
			F_{max} stat [kN]	F_{max} dyn [kN]	M_O [Nm]	I_O [A]	M_N [Nm]	P_N [kW]	I_N [A]	n_N [1/min]	k_T [Nm/A]	M_{max} [Nm]	I_{max} [A]	n_{max} [1/min]	J [kgcm²]	L_S [mm]	L [mm]	LA [mm]	$L1$ [mm]	$L2$ [mm]	L_{BR} [mm]	LA_{BR} [mm]	$L1_{BR}$ [mm]	$L2_{BR}$ [mm]	m [kg]	m_{BR} [kg]
SKT10-100-20-xxW-3000	–	D	61	23	95	54.3	66	11	38	1,500	1.75	160	132	3,000	340 / 425	250 / ∞	334 / 316	379 / 361	56 / 65	48 / 7	420 / 402	465 / 457	117 / 151	109 / 93	48 / 48	57 / 65
SKT10-145-20-xxW-2000	S / –	– / D	61	23	160	66.6	120	18	50	1,500	2.4	310	200	2,500	490 / 569	370 / ∞	454 / 436	499 / 481	56 / 65	48 / 7	540 / 522	585 / 567	117 / 151	109 / 93	64 / 65	74 / 82

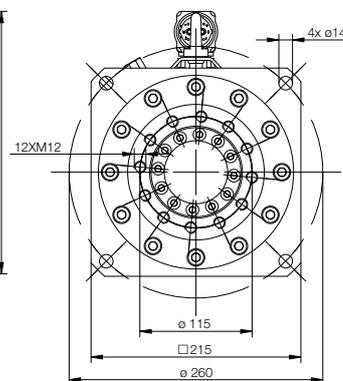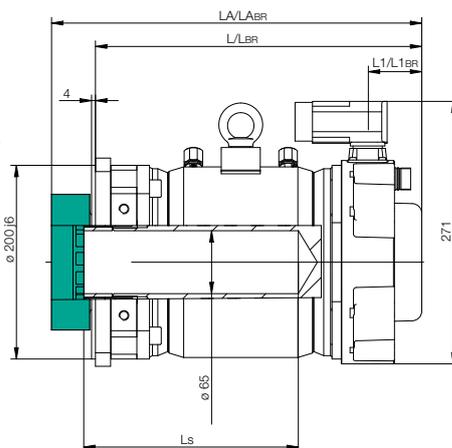# Dimensions

*Flange connection Screw nut see page 8, Legend on page 31, All dimensions in mm.
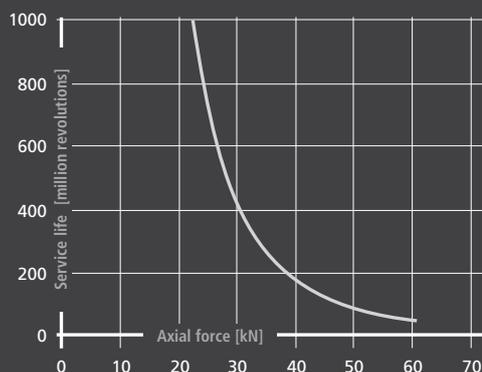
*Flange connection

Motors with hollow through-shaft
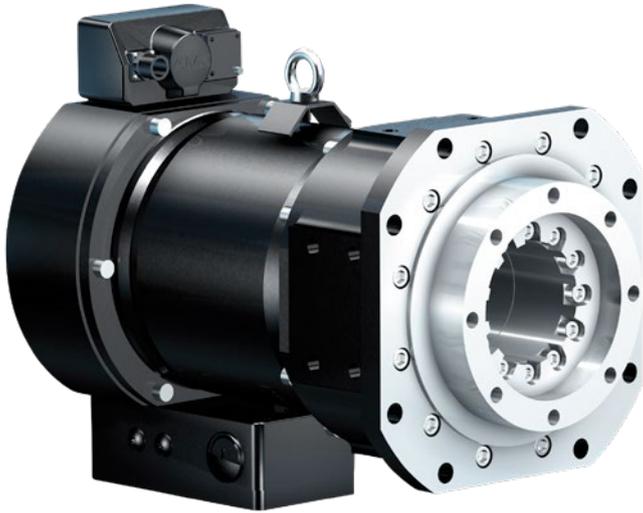
Motors with blind hollow shaft

Bearing service life (L10) Characteristic curve

SKT13 liquid-cooled
with hollow through-shaft

Features

- Torque motor with broad, linear current-torque rise
- Speeds matched to screw and nut systems
- Anti-backlash bearing
- Very ridged radial coupling between hollow motor shaft and nut
- Very high axial rigidity
- Customised flanges possible
- Sealed bearings with possibility of re-lubrication
- Ball bearing for medium loads and high speeds
- Option of lubrication of screw nut on fixed part
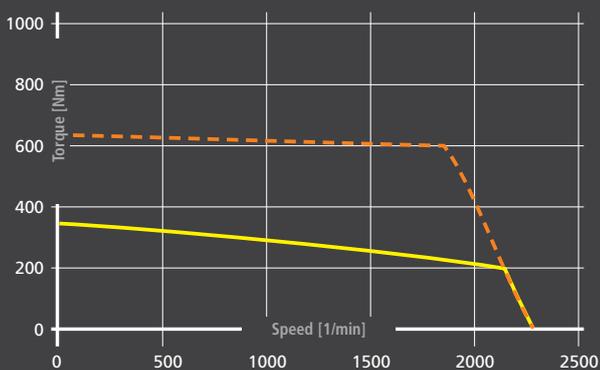- Direction of force on both sides
- Brake option for vertical loads

Applications

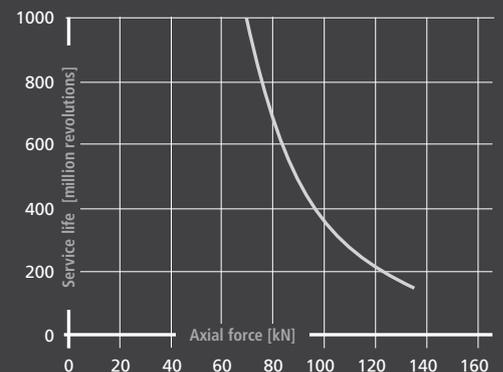- Standard and medium loads
- Short travel or unlimited stroke

Equipment

	Standard	Option
Brake	–	250 Nm
Encoder	Q, multiturn, inductive	F, multiturn, optical

Characteristic curves

SKT13-200-20-xxW-2600


Bearing service life (L10) Characteristic curve

- - - Maximum moment —— Continuous thermal moment

Technical data

Motor type	Hollow through-shaft	Bearing axial forces		Static data		Rating data					Maximum data		Mechanical data											
		F_{max} stat [kN]	F_{max} dyn [kN]	M_0 [Nm]	I_0 [A]	M_N [Nm]	P_N [kW]	I_N [A]	n_N [1/min]	k_T [Nm/A]	M_{max} [Nm]	I_{max} [A]	n_{max} [1/min]	J [kgcm²]	L [mm]	LA [mm]	$L1$ [mm]	$L2$ [mm]	L_{BR} [mm]	LA_{BR} [mm]	$L1_{BR}$ [mm]	$L2_{BR}$ [mm]	m [kg]	m_{BR} [kg]
SKT13-200-20-xxW-2600	D	135	70	360	145.8	240	45	103	1,800	2.3	640	330	3,300	1,822	520	560	85	27	630	670	195	137	160	180

Dimensions

*Flange connection Screw nut see page 8, Legend
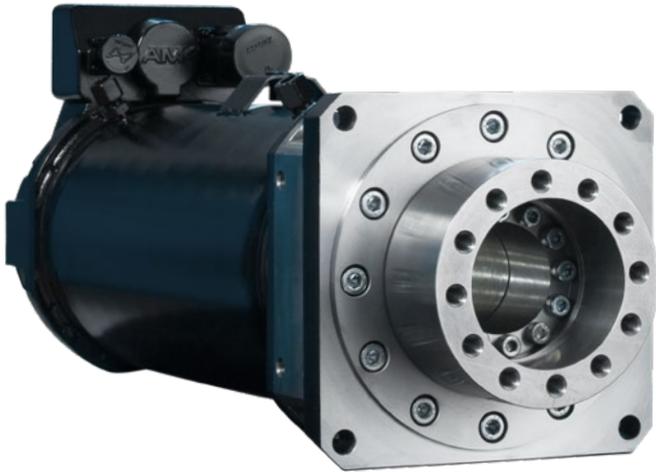on page 31, All dimensions in mm.
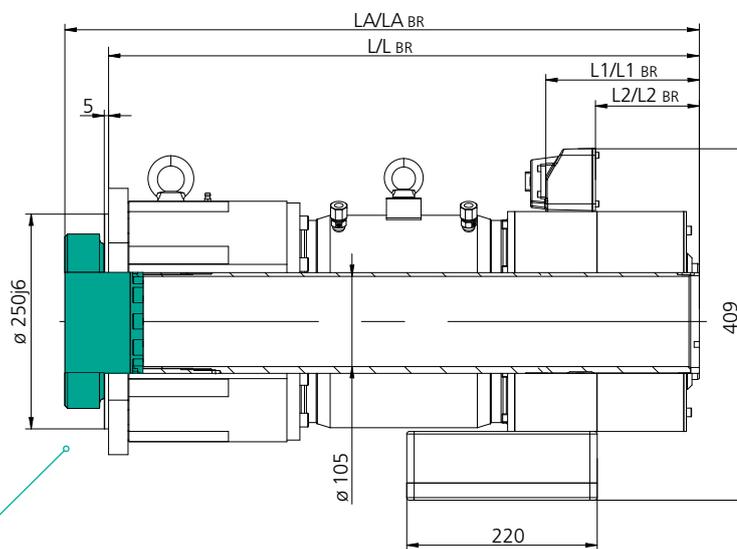
*Flange connection
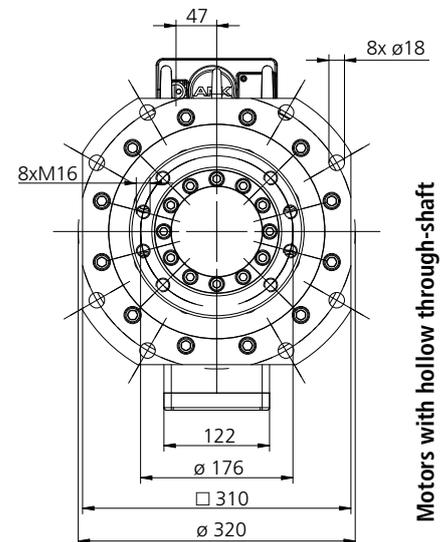
Motors with hollow through-shaft

SKT10 liquid-cooled
with hollow through-shaft or blind hollow shaft

Features

- Torque motor with broad, linear current-torque rise
- Speeds matched to screw and nut systems
- Anti-backlash bearing
- Very ridged radial coupling between hollow motor shaft and nut
- Very high axial rigidity
- Customised flanges possible
- Sealed bearings with possibility of re-lubrication
- Roller bearings for medium loads and high speeds
- Option of lubrication of screw nut on fixed part
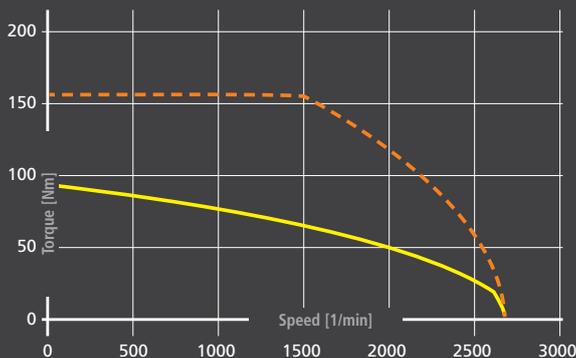- Direction of force tensile or compressive
- Brake option for vertical axes

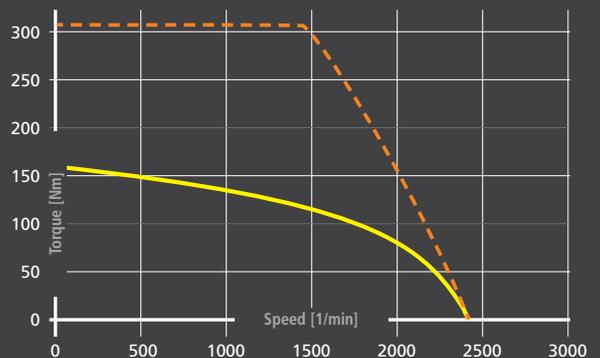## Applications

- Heavy-duty
- Short travel or unlimited stroke

Equipment

	Standard	Option
Brake	–	250 Nm
Encoder	Q, multiturn, inductive	F, multiturn, optical

Characteristic curves

SKT10-100-20-xxW-3000

SKT10-145-20-xxW-2000

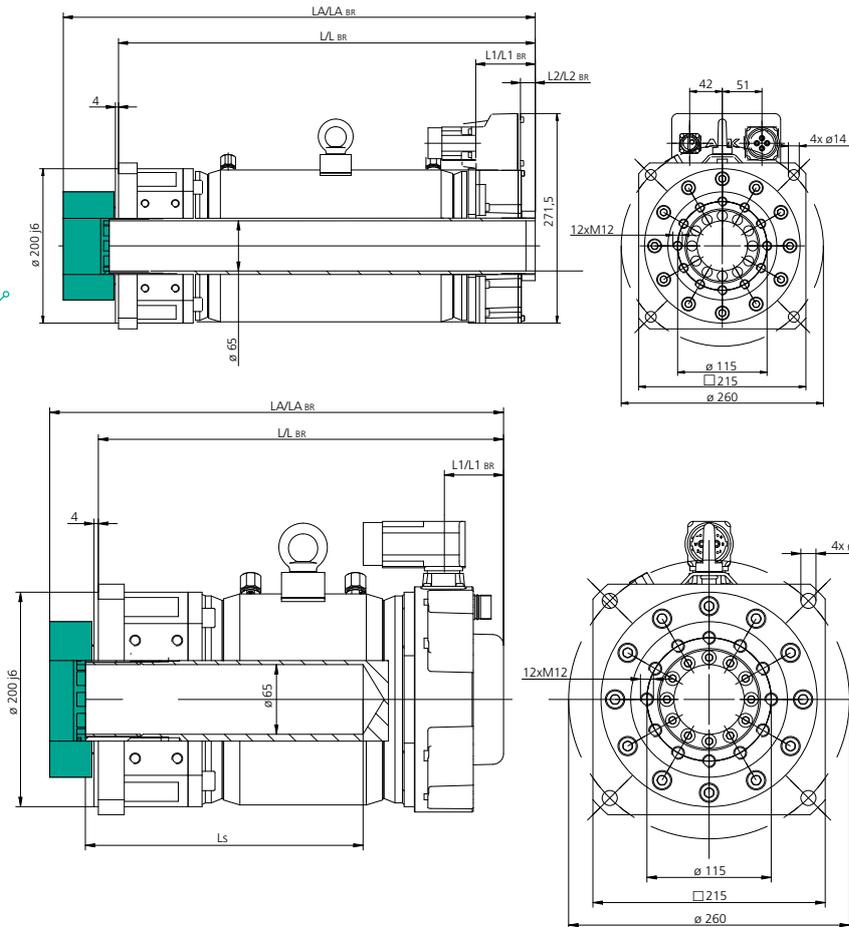- - - Maximum moment —— Continuous thermal moment

Technical data

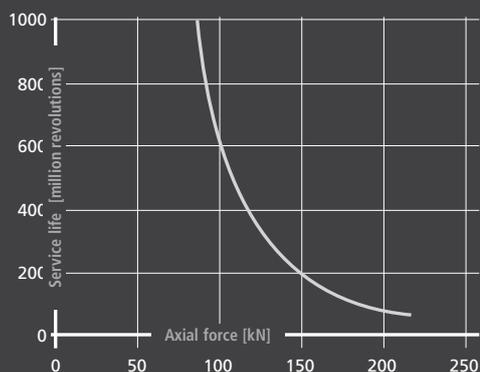| Motor type	Blind hollow shaft	Hollow through-shaft	Bearing axial forces		Static data		Rating data					Maximum data		Mechanical data												
			F_{max} stat [kN]	F_{max} dyn [kN]	M_0 [Nm]	I_0 [A]	M_N [Nm]	P_N [kW]	I_N [A]	n_N [1/min]	k_T [Nm/A]	M_{max} [Nm]	I_{max} [A]	n_{max} [1/min]	J [kgcm²]	L_S [mm]	L [mm]	LA [mm]	$L1$ [mm]	$L2$ [mm]	L_{BR} [mm]	LA_{BR} [mm]	$L1_{BR}$ [mm]	$L2_{BR}$ [mm]	m [kg]	m_{BR} [kg]
SKT10-100-20-xxW-3000	–	D	216	85	95	54.3	66	11	38	1,500	1.75	160	132	3,000	458	∞	357	402	65	7	443	488	151	49	55	70
SKT10-145-20-xxW-2000	S	–	216	85	160	66.6	120	18	50	1,500	2.4	310	200	2,500	499	405	495	540	56	48	557	602	117	68	70	79
	–	D													610	∞	477	522	65	7	563	608	151	67	71	88

Dimensions

*Flange connection Screw nut see page 8, Legend on page 31, All dimensions in mm.

*Flange connection

Motors with hollow through-shaft

Motors with blind hollow shaft

Bearing service life (L10) Characteristic curve

SKT13 liquid-cooled
with hollow through-shaft

Features

- Torque motor with broad, linear current-torque rise
- Speeds matched to screw and nut systems
- Anti-backlash bearing
- Very ridged radial coupling between hollow motor shaft and nut
- Very high axial rigidity
- Customised flanges possible
- Sealed bearings with possibility of re-lubrication
- Roller bearings for medium loads and high speeds
- Option of lubrication of screw nut on fixed part
- Direction of force tensile 380 kN or compressive 570 kN
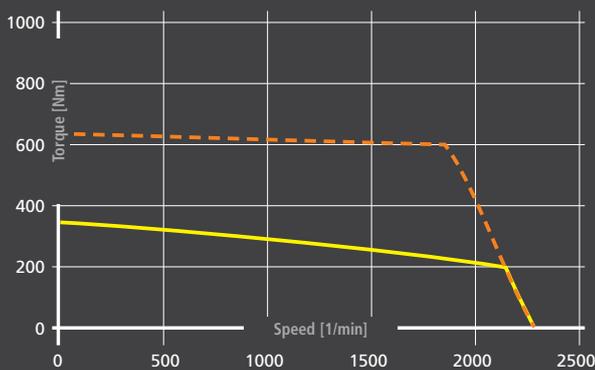- Brake option for vertical axes

Applications

- Heavy-duty
- Short travel or unlimited stroke

Equipment

	Standard	Option
Brake	–	**250 Nm**
Encoder	**Q, multiturn, inductive**	**F, multiturn, optical**

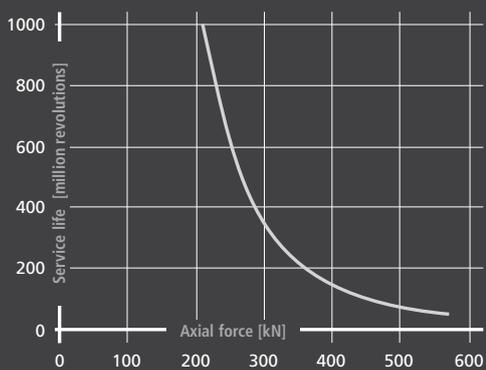## Characteristic curves

SKT13-200-20-xxW-2600
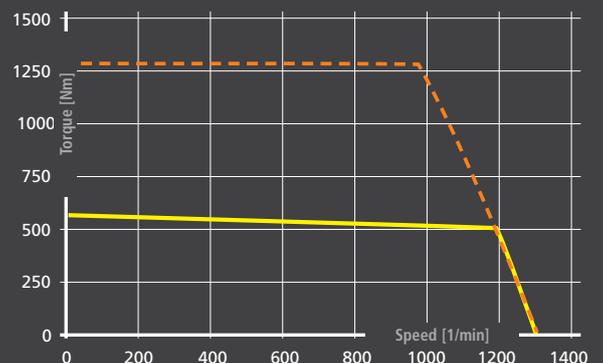
SKT13-650-20-xxW-1200

- - - - **Maximum moment** ——— **Continuous thermal moment**

Bearing service life (L10) Characteristic curve

Position encoder

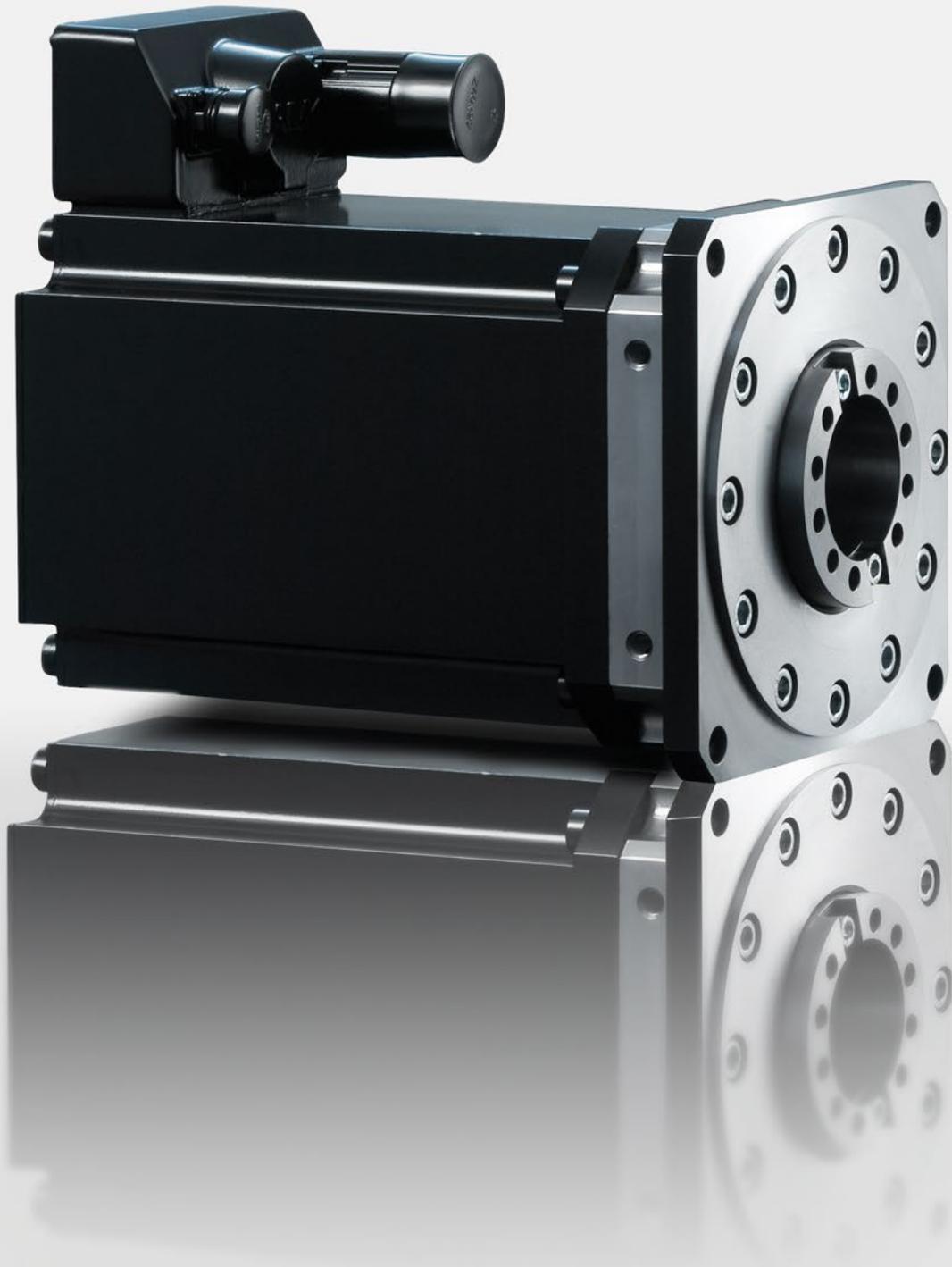
Encoder - Overview

The motors can be equipped with various different position encoders.

Type	Design	Max.speed [1/min]
F	Optical absolute encoder EnDAT 2.1, multiturn 512 periods/revolutions 13bit resolution/resolution Multiturn resolution 4096 revolutions ± 25¨ system accuracy	12,000
Q	Inductive absolute encoder EnDAT 2.1, multiturn Hollow through-shaft: 18bit/16 periods/revolutions Blind hollow shaft: 19bit/32 periods/revolutions Multiturn resolution 4096 revolutions ±480¨/280¨ system accuracy	12,000

Connector pin assignment motor side
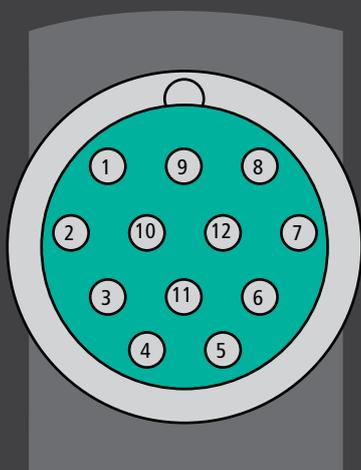
PIN Motor connector	Q/F encoder	
	Signal	Meaning
1	G2N	Channel 2 not inverted
2	G2I	Channel 2 inverted
3	G1N	Channel 1 not inverted
4	G1I	Channel 1 inverted
5	05P	Supply 5 Vdc, max. 250 mA
6	GND	Reference for supply
7	CLK+	EnDat encoder interface
8	CLK-	EnDat encoder interface
9	DAT+	EnDat encoder interface
10	DAT-	EnDat encoder interface
11	05P	Supply 5 Vdc, max. 250 mA
12	GND	Reference for supply
Shield		Connector housing

Control your Motion

- **AMKAMAC**
  Control technology

- **AMKASMART**
  Decentralised
  drive technology

- **AMKASYN**
  Servo inverter

- **DYNASYN**
  Servo motors

- **SPINDASYN**
  Linear drives

The information in this brochure is intended solely as a series product description. Deviations are possible due to specific products and continuous further developments. Before using data for calculations or designs, please check in advance the latest status and request product-specific dimension and data sheets.
We reserve the right to make technical changes. 10/2021

Technical data

	iSA
Processor	ARM11 with 500 MHz
RAM memory	256 MByte
Flash memory	256 MByte
Remanent memory	32 MByte
Ethernet	1 x 10/100 Mbits/s
Feldbus Master	EtherCAT
Feldbus Slave optional	ACC (CAN), EtherCAT, Profinet, Ethernet/IP
I/O s	4 digital I/Os
Programming	IEC 61131-3, CODESYS, optional PLCopen
Performance	50,000 instructions/ms
Visualisation	iSA-VIS for WebVisu or Qt
Protection class	IP65
Ambient temperature	0 - 50°C
Power supply	Integrated power supply unit
Input voltage in network	3 x 230...480 VAC ± 10%, 47...63 Hz
Voltage transmission DC bus	300 - 650 VDC
DC bus switch-off threshold	850 VDC
Rated current DC bus	10 A
Dimensions (LxWxH)	293 x 100 x 75.6 mm
Weight	2.2 kg

- **AMKAMAC**
  Control technology
- **AMKASMART**
  Decentralised
  drive technology
- **AMKASYN**
  Servo inverter
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- **SPINDASYN**
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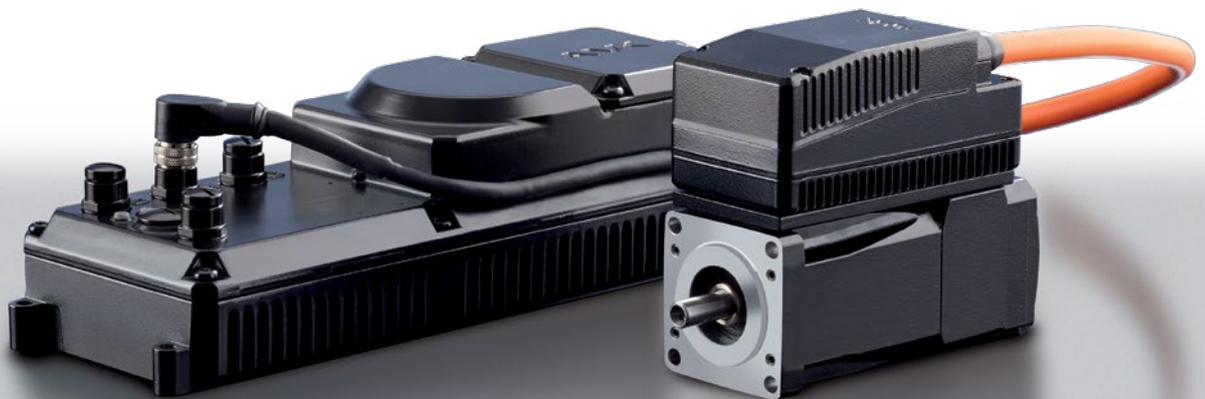
AMKASMART iSA

Decentralised controller with
power supply for automation independent
of control cabinets

SMART

AMKASMART iSA
PLC, power supply and motion control

Everything that is needed for completely decentralised machine automation: Decentralised controller iSA, inverter-integrated servo motor ihXT. Nothing else required.

The new decentralised iSA controller from AMKmotion provides the basis for truly modularising machines, independent of control cabinets.

The AMKASMART iSA includes a three-phase connection and offers both a DC bus supply for servo drives and an integrated 24 V supply and control intelligence. The iSA is a powerful motion controller with a Linux real-time operating system that provides decentralised intelligence. EtherCAT technology is used for cross-communication in master-slave operation and for general gateway functions. There are also optional connection possibilities for CAN, Profinet and Ethernet IP.

The iSA with IP65 protection provides design flexibility and is ideal for modular machine construction, as the subsystems are connected by three-phase current and can be included in the control network via the real-time Ethernet interface.

ADVANTAGES

- **Powerful motion controller**
- **DC power supply 5 kW**
- **24 V / 3 A power supply**
- **Optional gateway functions**
- **PLC programmable according to IEC 61131-3**

Local I/O*   Local I/O*   EtherCAT Master

3 x 400 VAC

DC link

AC/DC

converter

24 VDC
Power supply

PLC,
Motion
controller

IP65 housing

Ethernet, LAN

*optional real-time Ethernet slave

Motion control

Powerful motion control and technology functions for easy programming of machines and plants, e.g:

- Virtual master axis
- Electronic cam
- Print mark control
- NC motion

The internationally renowned CODESYS programming platform enables programming in accordance with IEC 61131-3.

24 V power supply

The 24 V / 3 A power supply for additional modules is generated in the integrated AC/DC converter.

PLC properties

- High-precision synchronisation of many axes with only one controller
- High-precision synchronisation of cross-communication in real time over several levels
- EtherCAT master and slave (option)
- Data exchange with other programs via OPC server, connection to ERP system

- Real-time Linux
- Non-volatile process data memory without battery
- No UPS required

DC power supply

- Power supply 3 x 400 VAC
- DC link output
  Rated current 8 A
- Mains filter
- Integrated braking resistor

Gateway

Gateway functionality for

- Profinet
- Ethernet/IP
- CAN, EtherCAT, CAN DS402

I/Os

4 digital inputs and outputs

Consulting

We support you with individual and project-based consultation on your drives and controls. This saves you valuable engineering resources and cost.

Training

Our extensive training program provides theoretical and practical experience with drives and controls technology and is offered in diverse training options: Either in our training center or at your facility.

The range extends from basic training to expert workshop. By request we also offer project-optimized individual training.

Service

Comprehensive service is natural to us. Whenever you need support our specialists will be there for you – from planning and design to installation and start-up. Including programming and operation of a machine or retrofitting systems.

Decentralized

iSA

Motion Control & APPs

ENGINEERING
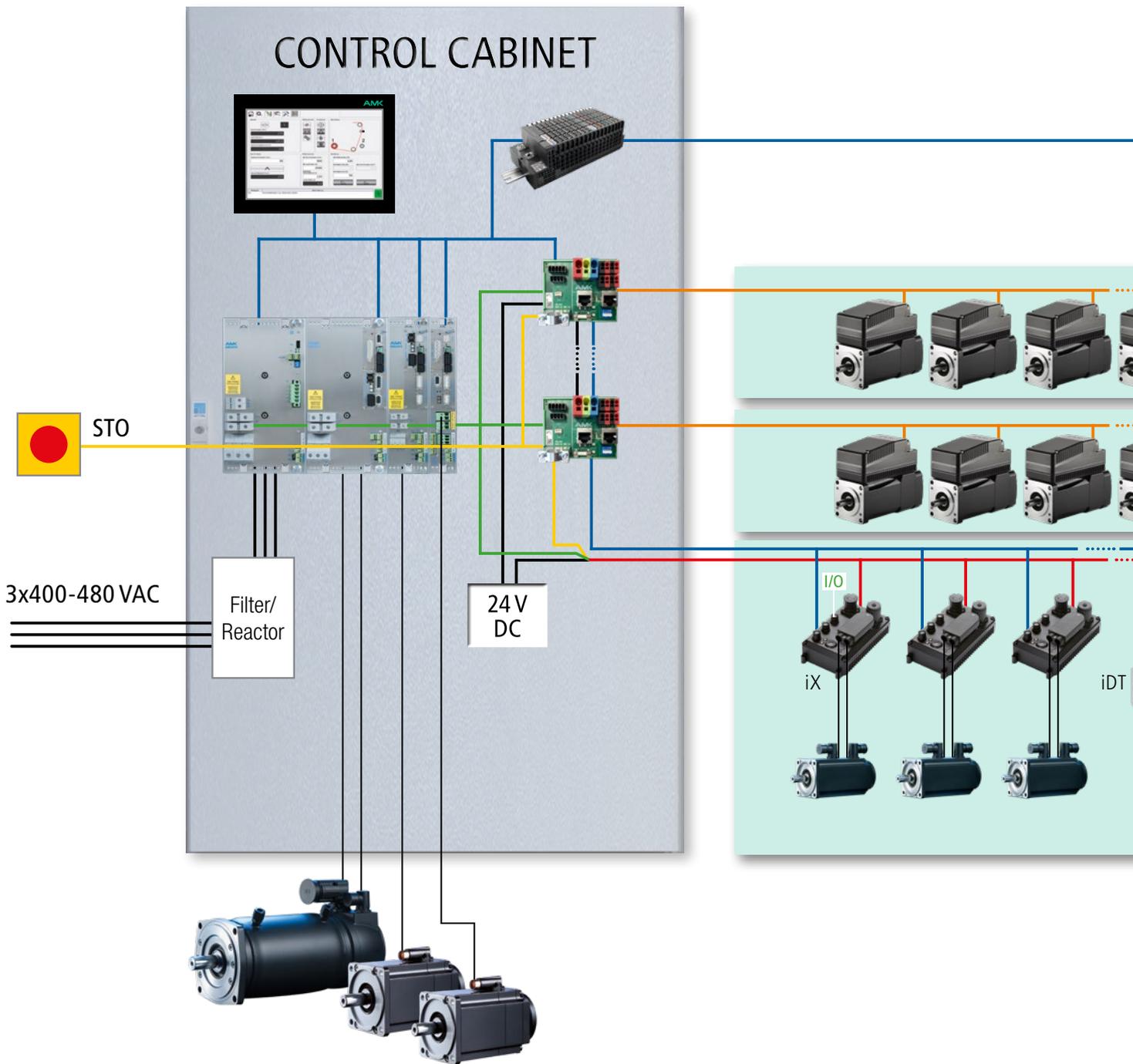
APPLICATION

Decentralized Solutions

iC

Safety

iX

Safety
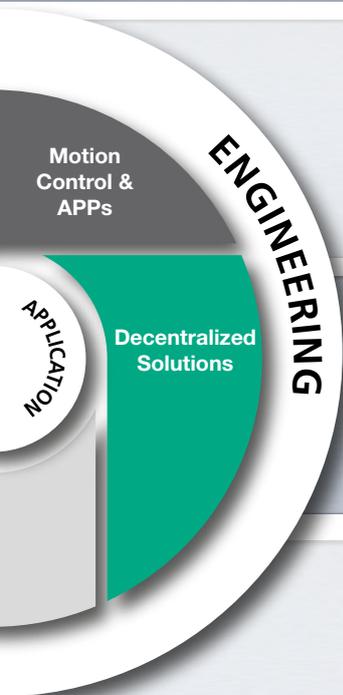
Centralized Automation

Centralized power supply
Centralized motion controller
Centralized inverter

Hybrid Automation Solutio

Centralized power supply
Centralized motion controller
Decentralized inverter

CONTROL CABINET

STO

3x400-480 VAC

Filter/
Reactor

24 V
DC

I/O

iX

iDT

Real-time Ethernet (EtherCAT, VARAN

Decentralized power supply (DC bus,

Central Drive Solutions

A-series motion controller

The **A-series motion controllers** are available as compact control cabinet motion controllers and as complete units with touch display.

In each case they have programming in CODESYS, visualization and motion control rolled into one. With the A-series, a highly accurate synchronization of servo axes – even across multiple levels – is guaranteed.

KE/KW compact power supply & inverter

The **compact KE supplies** generate the DC link and, depending on the design (KES), can feed energy back to the supply system sinusoidally.

The DC link supplies the modular **KW inverters**. The KW series is available in a power range of 1 kVA to 200 kVA. With scalable controller cards, they provide just the right performance and if needed also functional safety for all applications in machine building.

MultiServo

The **MultiServo** is a multi-axes inverter with power supply and motion control in one compact housing. On the hardware level, power of the axes can be a combination of 1, 2, and 4 kVA. There are units that consist of a scalable power supply and 2, 4 or more axes.

Motion control can be integrated through **motion apps**, which allows it to work independently from a higher-level controller. Connection is made via fieldbus interface.

Servo motors up to 150 kW

The **synchronous servo motors** are impressive due to their extremely high power density with efficient cooling methods in forced-ventilation, convection-cooled, and liquid-cooled designs. The different motor series offer motors of various kinds in terms of stall torque, continuous stall torque, and acceleration.

The **SKT hollow shaft motors** are used with a screw-nut system as linear drives. Like the ready-for-installation **SEZ electric cylinders**, they are ideal for linear applications with high forces and high positioning accuracy.

Decentral Drive Solutions

The decentralized drive solutions can be operated in a hybrid manner in connection to a centralized control cabinet or as stand-alone units without a control cabinet:

The decentralized **iSA motion controller** performs the complete control of a machine segment. Furthermore the iSA can be used as a gateway to higher-level controllers. For automation completely free of control cabinets, it has an integrated incoming supply that generates the DC voltage for connected servo axes.

iSA decentralized motion controller

The decentralized **iC converter** powers an axis up to 5KVA. Additionally, it provides a DC-Link for further axis and 24V.

The **iX** is a decentralized **inverter** for installation directly at the motor. It can be supplied with the DC voltage in a decentralized manner or from the central control cabinet.

In the case of the **iDT,** the motor and the inverter are a compact unit. Feedback and motor cable are saved.

iC, iX & iDT decentralized servo drives

The **inverter-integrated ihXT** servo motors are the newest member of the decentralized product family. They are equipped with a hybrid cable that combines the DC bus, real-time Ethernet communication, STO, and 24 V.
With the convenient looping through and an innovative plug-in terminal system (in IP 65), up to 40 axes can be connected in series. Thereby the cost for installation can be reduced by up to 90%.

ihXT decentralized servo drive

For the decentralized drive technology, **synchronous servo motors** are available from AMK's large range of motors in the suitable power range of 150 W to 5 KW.

Servo motors up to 150 kW

Dezentralized Automation

Decentralized power supply
Decentralized motion controller
Decentralized inverter

up to 40 ihXT

up to 40 ihXT

I/O

3x400-480 VAC   iSA

ihXT

ihXT

3x400-480 VAC   iC

I/O   I/O

iDT
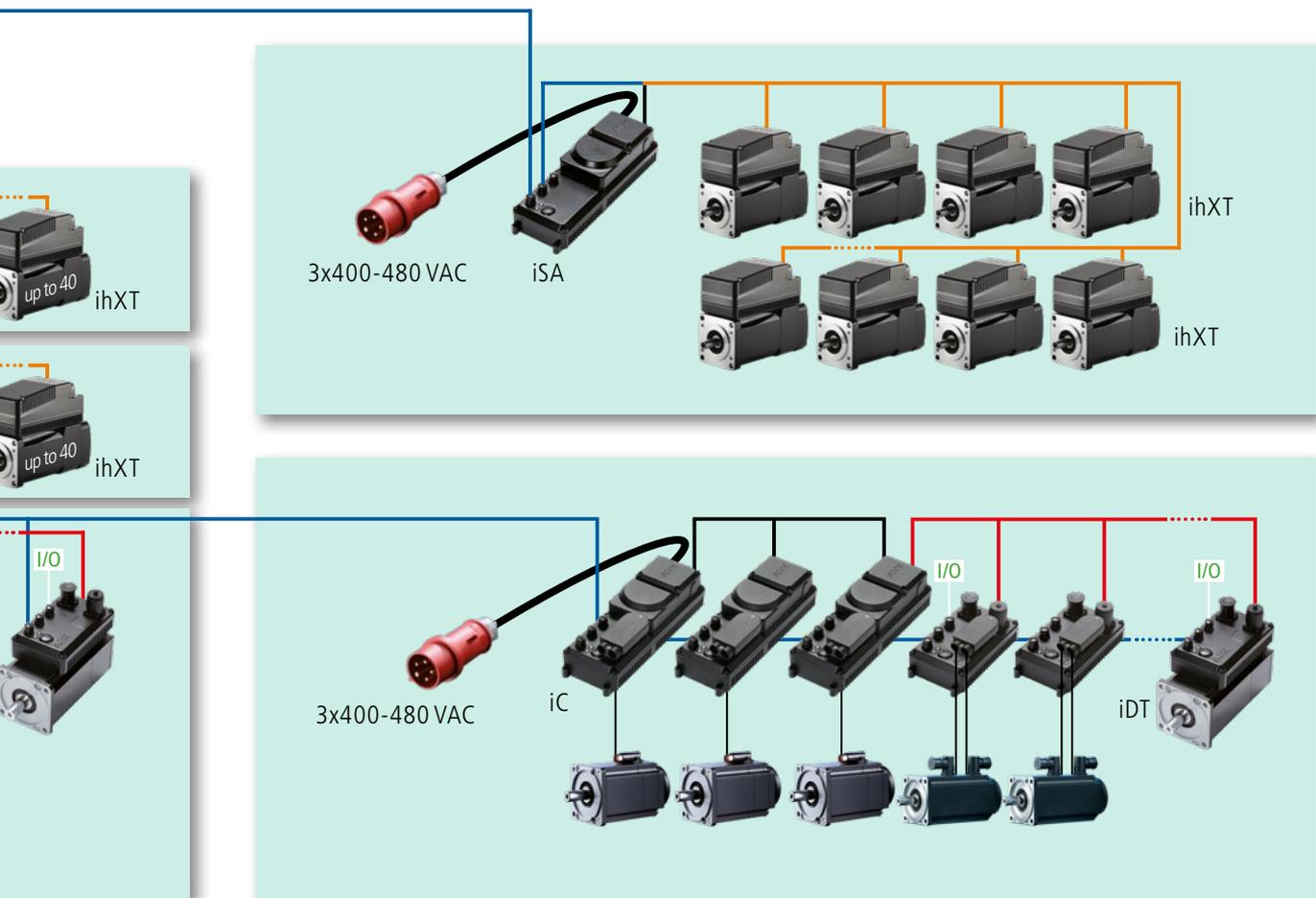
N, Sercos III) as gateway (Ethernet, Profibus, Ethernet/IP)   ⎯⎯ DC bus
24 VDC, STO)   ⎯⎯ Hybrid cable (DC bus, Real-time Ethernet, 24 VDC, STO)