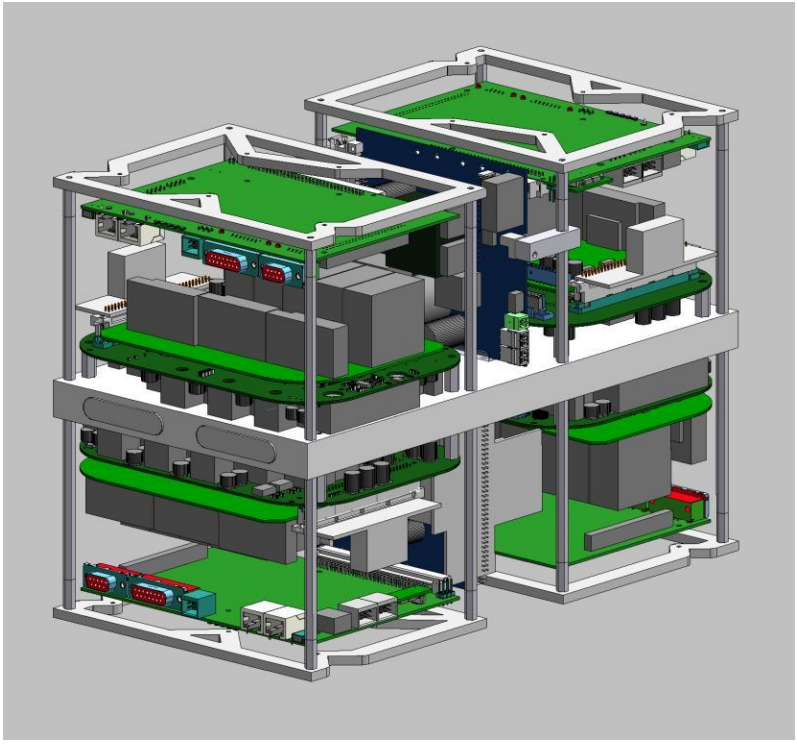

AMK
FSE compact inverter
4-wheel drive
"Formula Student"
KW26-S5-FSE-4Q

Version: 2014/46
Part-no.: 205481
Translation of the "Original Dokumentation"

Imprint

Name: PDK_205481_KW26-S5-FSE-4Q

Version:

Version: 2014/46		
Chapter / Topic	**Change**	**Initials**
First edition		LeS

Privious version: -

Product version:

Product (AMK part no.)	Firmware version (AMK part no.)	Hardware version (AMK part no.)
KW26-S5-FSE-4Q (47541)		Rev. 1.00

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

Publisher: AMK Arnold Müller GmbH & Co. KG
Gaußstraße 37 - 39
D-73230 Kirchheim/Teck
Germany
Phone: 0049/(0)7021/5005-0
Fax: 0049/(0)7021/5005-176
E-mail: info@amk-antriebe.de

Personally liable shareholder: AMK Verwaltungsgesellschaft mbH, Kirchheim/Teck
Managing directors: Dr. Thomas Lützenrath, Jochen Breßmer
Registration court: Stuttgart HRB 231283; HRA 230681

Service: Phone: 0049/(0)7021/5005-190, Fax -193

Office hours:

Mon. - Thu.	7:30 am - 12:00 pm and 1:00 pm - 4:30 pm
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For fast and reliable troubleshooting, you can help us by informing our Customer Service about the following:

- Type plate data for each unit
- Software version
- Device configuration and application
- Type of fault/problem and suspected cause
- Diagnostic messages (error messages)

E-mail: service@amk-antriebe.de

Internet address: www.amk-antriebe.de

Content

1 Product overview

1.1 Product name and ordering data

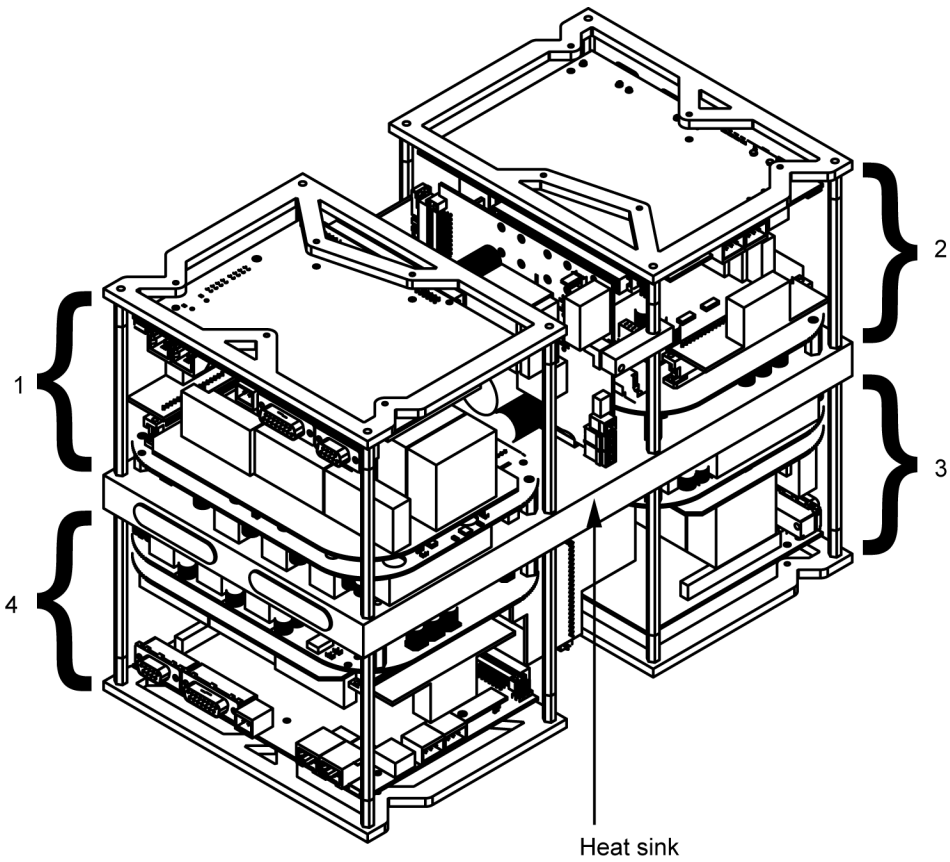
Product name	Order number
KW26-S5-FSE-4Q	47541

1.2 Product description

The 4-times inverter with its integrated drive controller controls synchronous and asynchronous motors in motor or generator (recuperative) operation mode. The inverter provides the following functions:

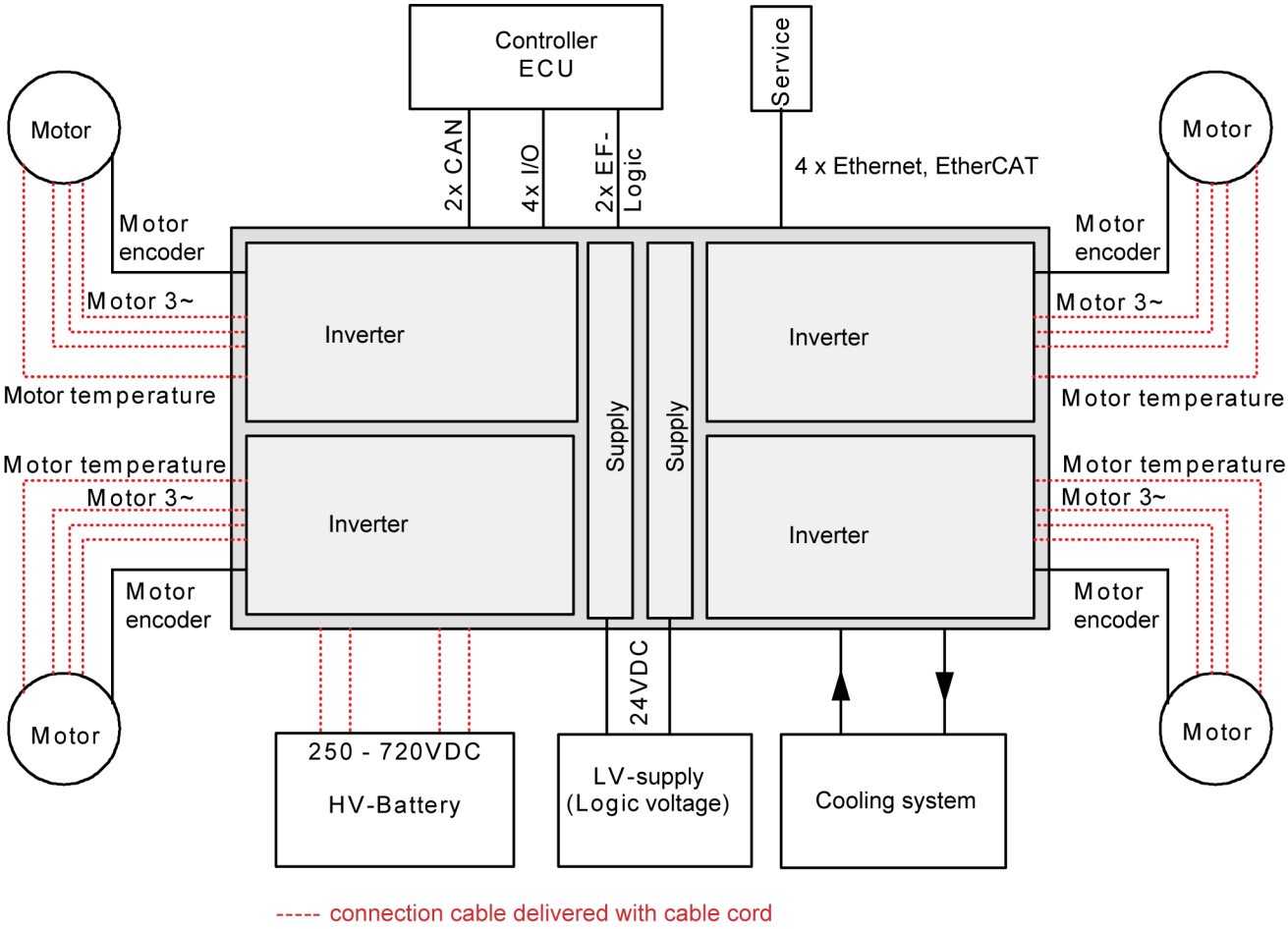
- Field oriented control for permanent-magnet synchronous or asynchronous motors
- Torque control for motor or recuperative operation mode
- Speed control
- Temperature monitoring for motor and inverter
- Interfaces: CAN bus (CANopen DS301 V4.01), EtherCAT (SoE)
- I/O-interface
- Service interface

1.3 Product view



4-times inverter with controller card and power electronic

1.4 System overview (schema)

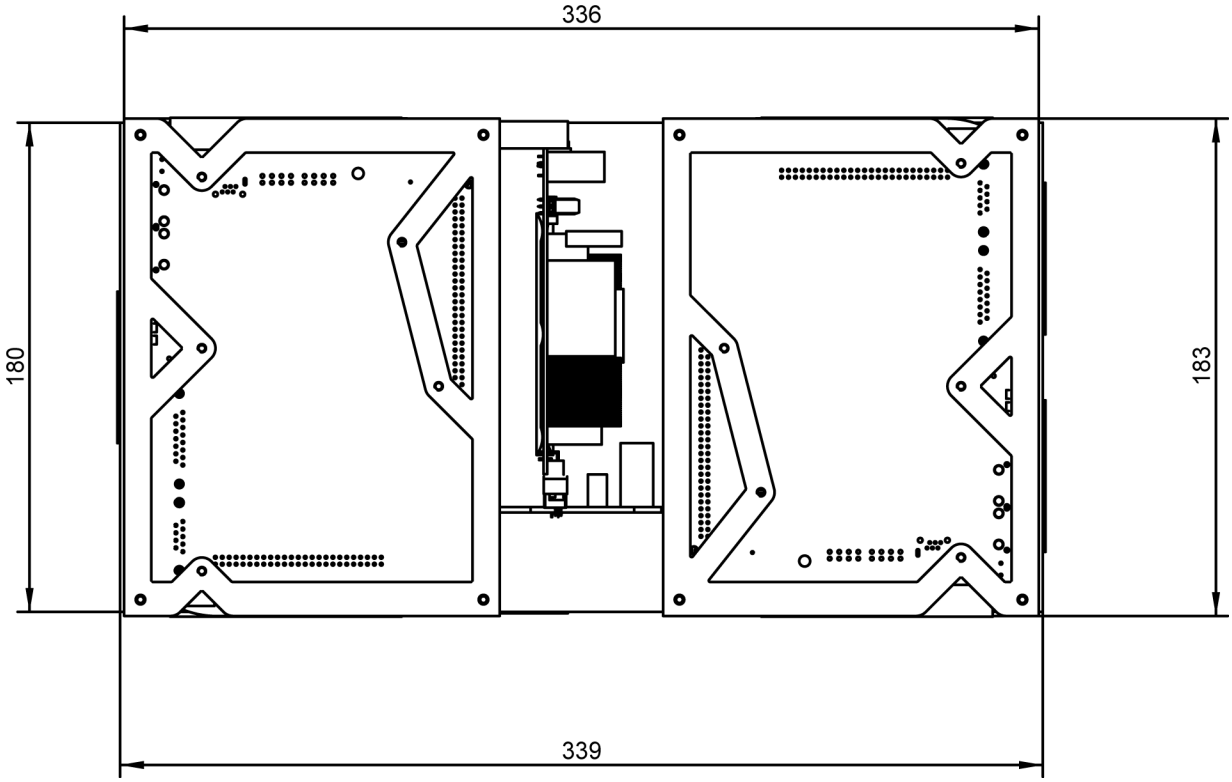


2 Techncal data

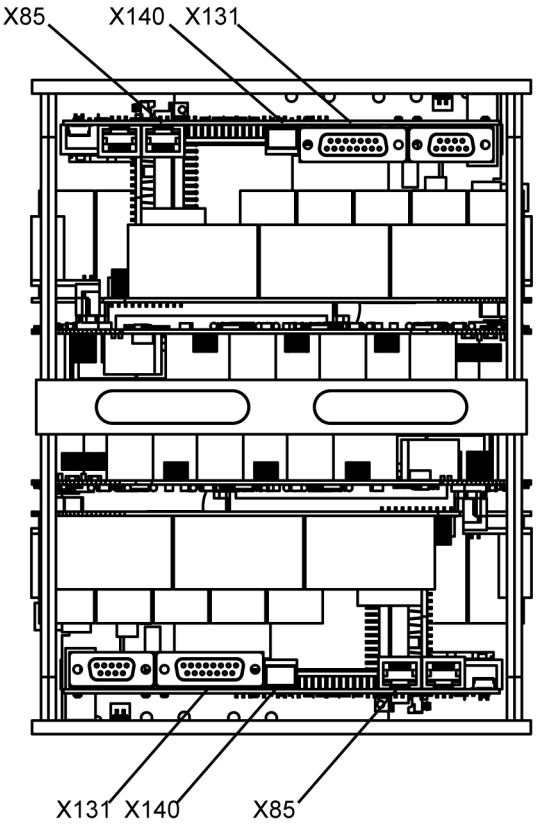
	terminal / connection cord	KW26-S5-FSE-4Q (data per inverter)
Rated input voltage at HV+, HV- power supply	HV+, HV-	540 VDC
Input voltage range		250 VDC - 720 VDC
Input current power supply at HV = 540 VDC		48 A
DC bus capacity		75 µF
Supply voltage LV	X08 (X09)	24 VDC ± 15 %, Connect the 0 V potential to the vehicle mass (vehicle chassis).
Input current LV		≤ 500 mA
Input capacity of the internal switching power supply		1500 µF
Efficiency		ca. 98 %
Reference potential		Vehicle mass (vehicle chassis) The circuit ground of the LV is connected to the frame of the inverter
Control procedure switching frequency		PWM 8 kHz
Output frequency	U, V, W	0 - 599 Hz
Output voltage (at HV = 540 VDC)		350 VAC (sinusoidal Output current)
Output voltage range (at HV = 250 - 720 VDC)		160 - 490 VAC
Rated output power		26 KVA
Rated output current I_N		43 A
Maximal output current I_{max}		105 A
Maximal time for I_{max}		
at output frequency f_{OUT}>1 Hz		10 s
at output frequency f_{OUT}≤1 Hz		1 s
Temperature sensor evaluation	X12	KTY e. g. KTY84-130
Protective / monitoring functions	short-circuit / short to ground / DC bus overvoltage / overtemperature motor and heat sink, overload current according I^2t	
Cooling	liquid cooling	
Rate of flow	1,5 bar / 10 l/min	
Maximal cooling plate and ambient temperatur	40 °C	
Protection class	IP00	
Dimensions (4-times inverter)	241 x 339 x 183 mm	
Weight for 4-times inverter inclusive heat sink	approx. 11 kg	

3 Dimension drawings

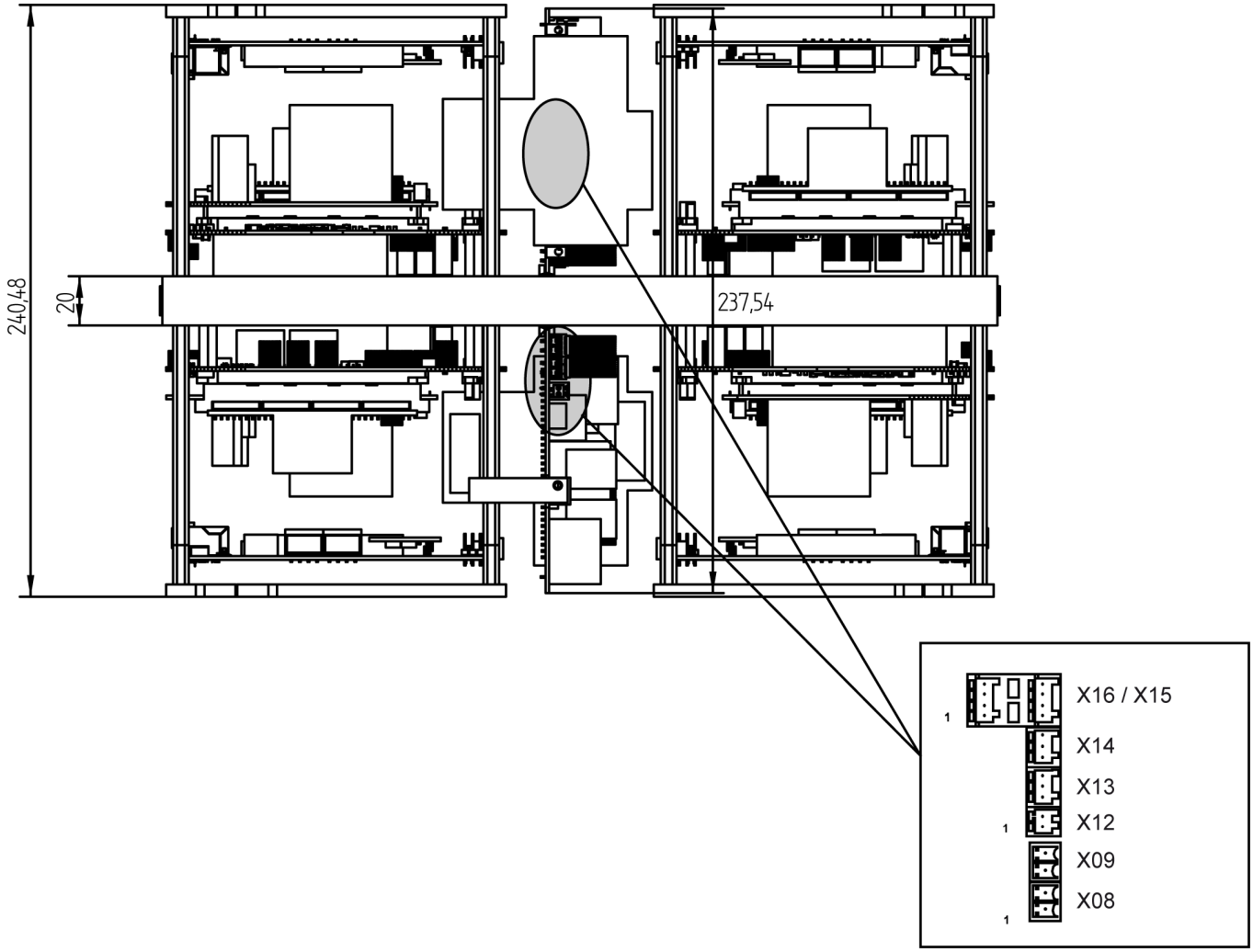
3.1 Top view



3.2 Front view

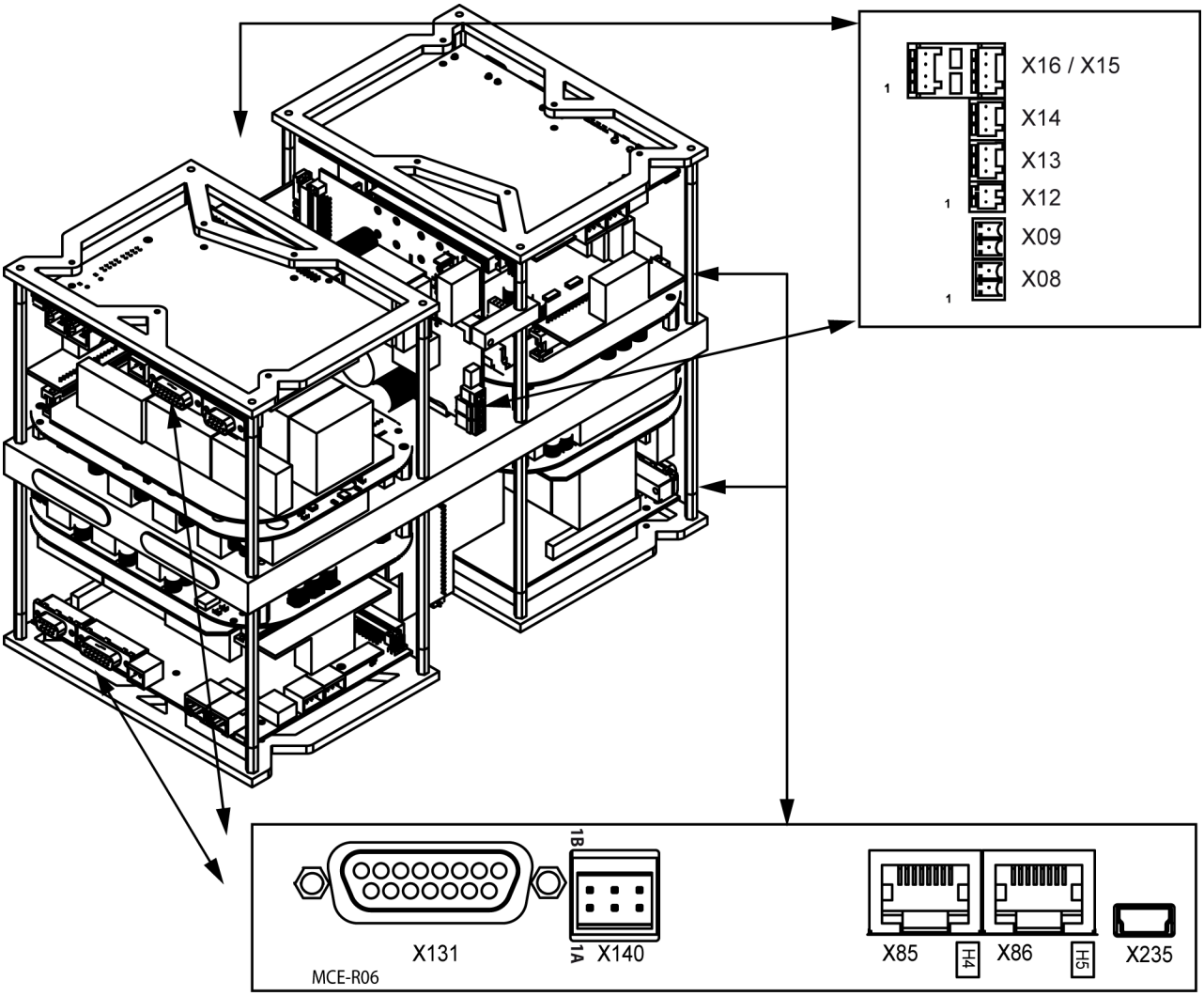


3.3 Side view



4 Connection technology

4.1 Overview system and interfaces



Terminals

Terminal	Number	Function
X08 / X09	2	On-board supply voltage 24 VDC and 24 VDC loop through
X12	4	Temperature monitoring motor
X13	2	Reserved
X14	2	Reserved
X15	2	Output stage enable
X16	2	Reserved
X85	4	Real-time Ethernet IN (PC connection for AMK software AIPEX PRO (startup, diagnosis and configuration) and software ATF (firmware update)
X86	4	Reserved
X131	4	Input motor encoder P-encoder, EnDat 2.1 (digital)
X140	4	Binary inputs, outputs and analog inputs
X235	4	Reserved

Cords with open ends

Interfaces	Number	Function	Ø [mm²]	Cord color	Signal
HV+	2	+ pole battery connection (rechargeable)	10	Red	-
HV-	2	- pole battery connection (rechargeable)	10	Bue	-
U	4	Motor phase U	6	Brown	-
V	4	Motor phase V	6	Black	-
W	4	Motor phase W	6	Blue	-
T-Mot (at X12)	4	Motor temperature monitoring	2 x 0,34	White	RT1 (+)
				Brown	RT2 (-)
CAN Bus	2	CAN bus CANopen DS301 V4.01	3 x 0,14	White	CAN High
				Brown	CAN Low
				Green	CAN GND

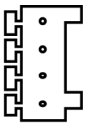
4.2 [X08] / [X09] On-board supply voltage 24 VDC and loop through

[X08] / [X09]	Connection	Signal	Description
front view, device side X09 PIN 2 X09 PIN 1 X08 PIN 2 X08 PIN 1 	1	0 VDC	Connection 0 VDC logic supply
	2	24 VDC	Connection 24 VDC logic supply

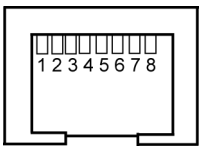
4.3 [X12] Motor thermistor for monitoring the temperature

[X12]	Connection	Signal	Description
front view, device side PIN 2 PIN 1 	1	RT1 (+)	Connection temperature sensor, take care of the polarity at KTY!
	2	RT2 (-)	Connection temperature sensor, take care of the polarity at KTY!

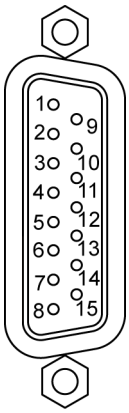
4.4 [X15] Output stage enable (2 channels)

[X15]	Connection	Signal	Description
front view, device side PIN 4 PIN 3 PIN 2 PIN 1 	1	EF2	Power output stage enable EF2
	2,4	EF	Power output stage enable EF
	3	WEF	Reference potential 0 V ext. for the input current to EF / EF2

4.5 [X85] Real-time Ethernet (EtherCAT)

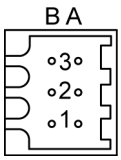
[X85] / [X86]	Pin	Signal	Description
front view, device side 	1	Tx+	Transmit data +
	2	Tx-	Transmit data -
	3	Rx+	Receive data +
	4	-	Reserved
	5	-	Reserved
	6	Rx-	Receive data -
	7	-	Reserved
	8	-	Reserved

4.6 X131 Motor encoder

[X131]	Connection	P-encoder
front view, device side 	1	-
	2	-
	3	-
	4	-
	5	-
	6	-
	7	5 VDC [1)]
	8	GND
	9	-EN_DAT
	10	+EN_DAT
	11	-EN_CLK
	12	+EN_CLK
	13	5 VDC[1)]
	14	GND
	15	-

1) 5 VDC ±5 % max. 350 mA

4.7 [X140] Binary inputs and outputs

[X140]	Connection	Signal	Description
front view, device side 	1A	BA3	Binary output 3, 24 VDC, 2.5 A, potential separated, permanently short-circuit safe .
	1B	BGND	Reference potential 0 V for supply of the binary inputs and outputs
	2A	BGND	Reference potential 0 V for supply of the binary inputs and outputs
	2B	BE2	Binary input 2, 24 VDC ± 15 %, max. 10 mA, potential separated, e.g. probe input, cam
	3A	BVCC	Supply of the binary outputs 24 VDC ± 15 %
	3B	BE1	Binary input 1, 24 VDC ± 15 %, max. 10 mA, potential separated, e.g. RF

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AMK Arnold Müller GmbH & Co. KG
phone : +49 (0) 70 21 / 50 05-0, fax: +49 (0) 70 21 / 50 05-199,
info@amk-antriebe.de
www.amk-antriebe.de