8CVI045E1HCS0.00-1

1 General information

The inverter module is equipped with a serial RS485 interface and an interface for evaluation of sine formed output signals.

The following functions and protocols can be chosen by parameter setting (via a host controller):

- SSI, serial
- SSI SinCos, serial with evaluation of sine formed output signals
- EnDat 2.1, serial with evaluation of sine formed output signals
- Biss (MODE C), serial [1)]

The input signals are monitored, making it possible to detect open or shorted lines as well as encoder supply failures. [2)]

2 Order data

Model number	Short description	Figure
	ACOPOSmulti65 inverter modules	
8CVI045E1HCS0.00-1	ACOPOSremote ACOPOSmulti65 inverter module, 4.5 A, HV, IP65, 1x SinCos EnDat 2.1/SSI/BiSS encoder interface, cold plate mounting	
	Optional accessories	
	1.5 mm² motor cables	
8CCM0003.11110-0	ACOPOSremote motor cable, length 3 m, 4x 1.5 mm² + 2x 2x 0.75 mm², 8-pin female speedtec circular connector size 1, 8-pin male speedtec circular connector, can be used in cable drag chains	
8CCM0005.11110-0	ACOPOSremote motor cable, length 5 m, 4x 1.5 mm² + 2x 2x 0.75 mm², 8-pin female speedtec circular connector size 1, 8-pin male speedtec circular connector, can be used in cable drag chains	
8CCM0010.11110-0	ACOPOSremote motor cable, length 10 m, 4x 1.5 mm² + 2x 2x 0.75 mm², 8-pin female speedtec circular connector size 1, 8-pin male speedtec circular connector, can be used in cable drag chains	
8CCM0015.11110-0	ACOPOSremote motor cable, length 15 m, 4x 1.5 mm² + 2x 2x 0.75 mm², 8-pin female speedtec circular connector size 1, 8-pin male speedtec circular connector, can be used in cable drag chains	
	8BVE / 8CVI connection cables	
8CCH0005.11120-1	Hybrid cable for connecting 8BVE to 8CVI or 8DI, length 5 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
8CCH0007.11120-1	Hybrid cable for connecting 8BVE to 8CVI or 8DI, length 7 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
8CCH0010.11120-1	Hybrid cable for connecting 8BVE to 8CVI or 8DI, length 10 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
	Accessory sets	
8CXC000.0000-00	Accessory set: 1x slot cover for male hybrid connector	
8CXM000.0000-00	ACOPOSremote accessory set: 4x M6x80 mm hex socket head screw for 8CVI power inverter modules	
	EnDat 2.1 cables	
8CCE0003.11210-0	ACOPOSremote EnDat 2.1 cable, length 3 m, 10x 0.14 mm² + 2x 0.5 mm², 17-pin female speedtec motor connector, 15-pin male springtec servo connector, can be used in cable drag chains,	
8CCE0005.11210-0	ACOPOSremote EnDat 2.1 cable, length 5 m, 10x 0.14 mm² + 2x 0.5 mm², 17-pin female speedtec motor connector, 15-pin male springtec servo connector, can be used in cable drag chains,	
	Hybrid cables	

Table 1: 8CVI045E1HCS0.00-1 - Order data

1) ACP10 Firmware V 2.390 and higher.
2) Not available for SSI functionality.

Model number	Short description	Figure
8CCH0003.11110-1	Hybrid cable, length 3 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 2x 15-pin female TYCO connector, can be used in cable drag chains	
8CCH0003.11130-1	Hybrid cable, length 3 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 2x 15-pin female TYCO connector, 1x connector insert rotated 180°, can be used in cable drag chains	
8CCH0005.11110-1	Hybrid cable, length 5 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 2x 15-pin female TYCO connector, can be used in cable drag chains	
8CCH0010.11110-1	Hybrid cable, length 10 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 2x 15-pin female TYCO connector, can be used in cable drag chains	
8CCH0015.11110-1	Hybrid cable, length 15 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 2x 15-pin female TYCO connector, can be used in cable drag chains	
8CCH0020.11110-1	Hybrid cable, length 20 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 2x 15-pin female TYCO connector, can be used in cable drag chains	
	One-sided hybrid cables	
8CCH0005.11150-1	Hybrid cable for connecting 8EI to 8CVI or 8DI, length 5 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
8CCH0007.11150-1	Hybrid cable for connecting 8EI to 8CVI or 8DI, length 7 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
8CCH0010.11150-1	Hybrid cable for connecting 8EI to 8CVI or 8DI, length 10 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
8CCH0015.11150-1	Hybrid cable for connecting 8EI to 8CVI or 8DI, length 15 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
8CCH0020.11150-1	Hybrid cable for connecting 8EI to 8CVI or 8DI, length 20 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
8CCH0025.11150-1	Hybrid cable for connecting 8EI to 8CVI or 8DI, length 25 m, 2x 2x 0.34 mm² + 4x 0.75 mm² + 5x 2.5 mm², 1x 15-pin female TYCO connector, 1x RJ45 connector, integrated shield fixing, can be used in cable drag chains	
	Threaded caps	
X67AC0M08	X67 M8 threaded caps, 50 pcs.	
X67AC0M12	X67 M12 threaded caps, 50 pcs.	

Table 1: 8CVI045E1HCS0.00-1 - Order data

3 Technical data

Model number	8CVI045E1HCS0.00-1
General information	
Module type	ACOPOSremote module
B&R ID code	0xC1B0
Current-carrying capacity of 15-pin TYCO connector	
Power contacts	Max. 20 A at 40°C
Cooling and mounting type	Cold plate mounting
Certifications	
CE	Yes
KC	Yes
UL	cULus E225616 Power conversion equipment
Functional safety[1)]	Yes
DC bus connection	
Voltage	
Nominal	750 VDC
Continuous power consumption [2)]	In preparation
Power dissipation depending on switching frequency	
Switching frequency 5 kHz	$[0.16 * I_M^2 + 5.6 * I_M + 55 + (P_{out}/750)^2 * 0.25]$ W
Switching frequency 10 kHz	$[0.49 * I_M^2 + 4.7 * I_M + 95 + (P_{out}/750)^2 * 0.25]$ W
Switching frequency 20 kHz	$[0.87 * I_M^2 + 10 * I_M + 200 + (P_{out}/750)^2 * 0.25]$ W
DC bus capacitance	35 µF
Variant	15-pin male TYCO connector [3)]

Table 2: 8CVI045E1HCS0.00-1 - Technical data

Model number	8CVI045E1HCS0.00-1
Line length	
Maximum	30 m
24 VDC power supply	
Input voltage	24 VDC +20% / -25%
Input capacitance	In preparation
Max. power consumption	10 W + $P_{24\ V\ Out}$ + $P_{Holding\ brake}$ + $P_{Trigger}$ [4]
Variant	15-pin male TYCO connector [3]
Line length	
Maximum	30 m
24 VDC output	
Quantity	1
Output voltage	Depends on the 24 VDC power supply
Continuous current	Max. 8 A (max. 4 A per pin)
Fuse protection	Electronic (per pin)
Variant	
24 VDC, COM	M8 connector
Motor connection	
Quantity	1
Continuous power per motor connection [2]	1.5 kW
Continuous current per motor connection [2]	4.5 A_{eff}
Reduction of continuous current depending on switching frequency [5]	
Switching frequency 5 kHz	No reduction [6]
Switching frequency 10 kHz	No reduction
Switching frequency 20 kHz	No reduction
Reduction of continuous current depending on installation elevation	
Starting at 500 m above sea level	0.45 A per 1,000 m
Peak current	13.5 A_{eff}
Nominal switching frequency	5 kHz
Possible switching frequencies [7]	5 / 10 / 20 kHz
Electrical stress of connected motor per IEC TS 60034-25 [8]	Limit value curve A
Protective measures	
Overload protection	Yes
Short circuit and ground fault protection	Yes
Max. output frequency	598 Hz [9]
Variant	
U, V, W, PE	8-pin speedtec connector, size 1
Shield connection	Yes (via connector housing)
Max. motor line length depending on switching frequency	
Switching frequency 5 kHz	10 m
Switching frequency 10 kHz	5 m
Switching frequency 20 kHz	5 m
Motor holding brake connection	
Quantity	1
Output voltage [10]	24 VDC +5.8% / -0%
Continuous current	1.1 A
Max. internal resistance	In preparation
Extinction potential	Approx. 30 V
Max. extinction energy per switching operation	1.5 Ws
Max. switching frequency	0.5 Hz
Protective measures	
Overload and short-circuit protection	Yes
Open circuit monitoring	Yes
Undervoltage monitoring	Yes
Response threshold for open circuit monitoring	Approx. 0.25 A
Response threshold for undervoltage monitoring	24 VDC +0% / -4%
Fieldbus	
Type	POWERLINK (V1/V2) 100BASE-T (ANSI/IEE 802.3)
Variant	Internal 3-port hub, 2x male 15-pin TYCO connector, 1x M12 connector
Line length	Max. 100 m between two stations (segment length) [11]
Transfer rate	100 Mbit/s
Encoder inputs	
Quantity	1
Type	EnDat 2.1
Module-side connection	15-pin female springtec connector
Status indicators	UP/DN LEDs
Electrical isolation	
Encoder - ACOPOSremote	No
Encoder monitoring	Yes
Max. encoder cable length	10 m

Table 2: 8CVI045E1HCS0.00-1 - Technical data

Model number	8CVI045E1HCS0.00-1
Encoder power supply	
Output voltage	5 V ±5%
Load capacity	250 mA [12)]
Sense lines	2, compensation of max. 2x 0.7 V
Protective measures	
Overload-proof	Yes
Short-circuit proof	Yes
Sine/Cosine inputs	
Signal transmission	Differential signals, symmetrical
Signal frequency (-3 dB)	DC up to 300 kHz
Signal frequency (-5 dB)	DC up to 400 kHz
Differential voltage	0.5 to 1.25 V_{ss}
Common-mode voltage	Max. ±7 V
Terminating resistor	120 Ω
Resolution	12-bit
Reference input	
Signal transmission	Differential signal, symmetrical
Differential voltage for low	≤-0.2 V
Differential voltage for high	≥0.2 V
Common-mode voltage	Max. ±7 V
Terminating resistor	120 Ω
Position	
Resolution @ 1 V_{SS} [13)]	Number of encoder lines * 5700
Accuracy [14)]	-
Noise [14)]	-
Synchronous serial interface	
Signal transmission	RS485
Data transfer rate	Depends on the configured functionality [15)]
Enable inputs	
Quantity	2
Circuit	Sink
Electrical isolation	
Input - Inverter module	Yes
Input - Input	Yes
Input voltage	
Nominal	24 VDC
Maximum	30 VDC
Input current at nominal voltage	Approx. 30 mA
Switching threshold	
Low	<5 V
High	>15 V
Switching delay at nominal input voltage	
Enable 1 → 0, PWM off	Max. 20.5 ms
Enable 0 → 1, ready for PWM	Max. 100 µs
Modulation compared to ground potential	Max. ±38 V
OSSD signal connections [16)]	Permissible Max. test pulse length: 500 µs
Variant	15-pin male TYCO connector [3)]
Trigger inputs	
Quantity	2
Circuit	Sink
Electrical isolation	
Input - Inverter module	No
Input - Input	No
Input voltage	
Nominal	24 VDC
Maximum	30 VDC
Switching threshold	
Low	<5 V
High	>15 V
Input current at nominal voltage	In preparation
Switching delay	
Rising edge	In preparation
Falling edge	In preparation
Modulation compared to ground potential	In preparation
Max. line length	30 m
Variant	M8 connector
Support	
Software	
ACP10	V2.35.1 and higher
Electrical properties	
Discharge capacitance	0.1 µF

Table 2: 8CVI045E1HCS0.00-1 - Technical data

Model number	8CVI045E1HCS0.00-1
Operating conditions	
Permissible mounting orientations	
Hanging vertically	Yes
Horizontal, face up	Yes
Standing horizontally	Yes
Installation elevation above sea level	
Nominal	0 to 500 m
Maximum [17]	4000 m
Pollution degree per EN 61800-5-1	2 (non-conductive pollution)
Overvoltage category per EN 61800-5-1	III
Degree of protection per EN 60529 [18]	IP65
Ambient conditions	
Temperature	
Operation	
Nominal	5 to 40°C [19]
Maximum	60°C
Storage	-25 to 55°C
Transport	-25 to 70°C
Relative humidity	
Operation	5 to 85%, non-condensing
Storage	5 to 95%, non-condensing
Transport	Max. 95% at 40°C
Mechanical properties	
Dimensions [20]	
Width	137 mm
Height	287.2 mm
Depth	131 mm
Weight	4.8 kg

Table 2: 8CVI045E1HCS0.00-1 - Technical data

1) Achievable safety classifications (safety integrity level, safety category, performance level) are documented in the user's manual (section "Safety technology").
2) Valid under the following conditions: 750 VDC DC bus voltage, 5 kHz switching frequency, 40°C ambient temperature, installation elevation <500 m above sea level, no derating due to cooling type.
3) It is important to note that the 15-pin male TYCO connector is designed for max. 20 mating cycles.
4) The power consumption $P_{24\ V\ Out}$ corresponds to the portion of the power that is output on the X31 connector on the module.
5) Valid under the following conditions: 750 VDC DC bus voltage. The temperature specifications refer to the ambient temperature.
6) Value for the nominal switching frequency.
7) B&R recommends operating the module at its nominal switching frequency. Operating the module at a higher switching frequency for application-specific reasons reduces the continuous current and increases the CPU utilization.
8) If necessary, the stress of the motor isolation system can be reduced by an additional externally wired dv/dt choke. For example, the RWK 305 three-phase du/dt choke from Schaffner (www.schaffner.com) can be used. Important: Even when using a dv/dt choke, it is necessary to ensure that an EMC-compatible, low inductance shield connection is used!
9) The module's electrical output frequency (SCTRL_SPEED_ACT * MOTOR_POLEPAIRS) is monitored to protect against dual use in accordance with Council Regulation (EC) 428/2009 | 3A225. If the electrical output frequency of the module exceeds the limit value of 598 Hz uninterrupted for more than 0.5 s, then the current movement is aborted and error 6060 is output ("Power unit: Limit speed exceeded").
10) During configuration, it is necessary to check if the minimum voltage can be maintained on the holding brake with the intended wiring. For the operating voltage range of the holding brake, see the user documentation for the motor being used.
11) Limited to 30 m when using hybrid cables.
12) An additional reserve of 57 mA is available for terminating resistors.
13) This value does not correspond to the encoder resolution that must be configured in Automation Studio (16384 * number of encoder lines).
14) Limited by the encoder in practice.
15) EnDat 2.1 ... 781.25 kbit/s, SSI ... 100 to 400 kbit/s, BiSS ... 1560 kbit/s.
16) OSSD (output signal switching device) signals are used to monitor signal lines for short circuits and cross faults.
17) Continuous operation at an installation elevation of 500 m to 4,000 m above sea level is possible taking the specified reduction of continuous current into account. Requirements that go beyond this must be arranged with B&R.
18) The specified degree of protection is only met if all connectors on the module that are not being used are closed with suitable threaded caps or slot covers! Suitable threaded caps or slot covers are available as optional accessories (X67AC0M08, X67AC0M12, 8CXC000.0000-00). The module is delivered with IP20 protection.
19) The temperature of the module's mounting surface is not permitted to exceed 60°C.
20) The dimensions refer to the actual device dimensions. Make sure to leave additional space above and below the devices for mounting and connections.

4 Status indicators

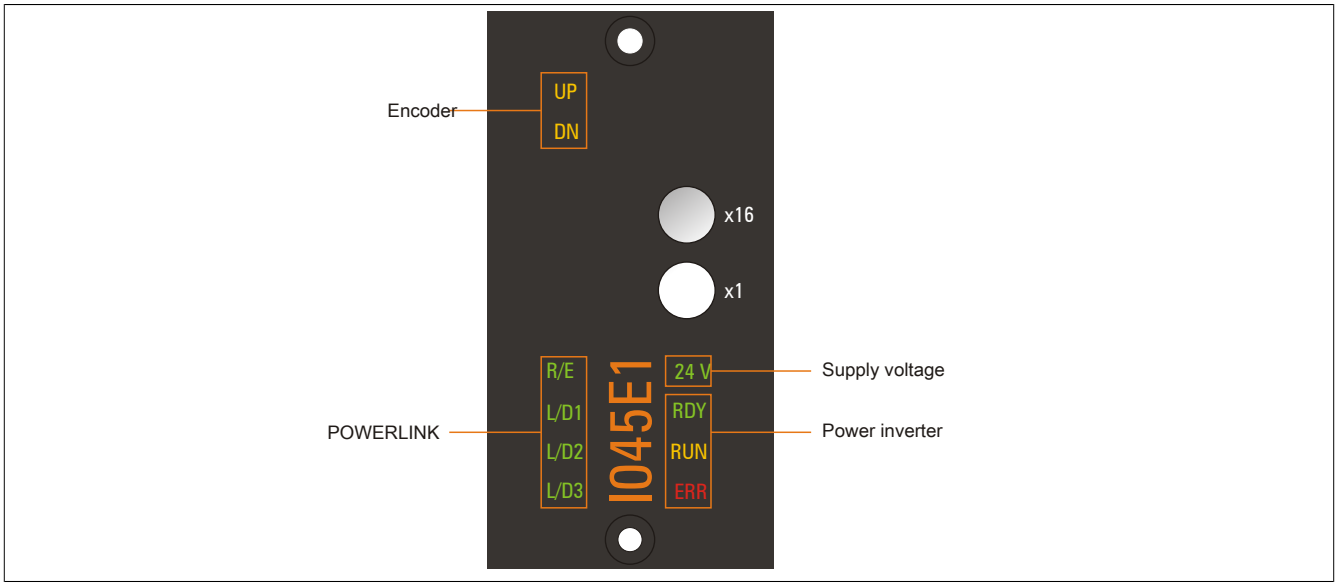


Figure 1: Overview of indicator groups

4.1 LED status indicators

Status indicator group	Label	Color	Function	Description
POWERLINK	R/E	Green/Red	Ready/Error	see Tab. 4 "POWERLINK - LED status indicators" on page 6
	L/D1	Green	Link/Data activity on port 1	
	L/D2	Green	Link/Data activity on port 2	
	L/D3	Green	Link/Data activity on port 3	
Power inverter	RDY	Green	Ready	see Tab. 5 "RDY, RUN, ERR - LED status indicators" on page 7
	RUN	Orange	Run	
	ERR	Red	Error	
Power supply	24 V	Green	24 V OK	24 VDC module voltage supply is within the tolerance range.
Encoder	UP	Orange	Encoder direction of rotation +	Indicates that the position of the connected encoder is changing in the positive direction. The faster the encoder position changes, the brighter the LED is lit.
	DN	Orange	Encoder direction of rotation -	Indicates that the position of the connected encoder is changing in the negative direction. The faster the encoder position changes, the brighter the LED is lit.

Table 3: 8CVI inverter modules - LED status indicators

4.2 POWERLINK - LED status indicators

Label	Color	Function	Description	
R/E	Green/Red	Ready/Error	LED off	The module is not receiving power or initialization of the network interface has failed.
			Solid red	The POWERLINK node number of the module is 0.
			Blinking red/green	The client is in an error state (drops out of cyclic operation).
			Blinking green (1x)	The client detects a valid POWERLINK frame on the network.
			Blinking green (2x)	Cyclic operation on the network is taking place, but the client itself is not yet a participant.
			Blinking green (3x)	Cyclic operation of the client is in preparation.
			Solid green	The client is participating in cyclic operation.
			Flickering green	The client is not participating in cyclic operation and also does not detect any other stations on the network participating in cyclic operation.
L/D1	Green	Link/Data activity on port 1	Solid green	A physical connection has been established to another station on the network.
L/D2	Green	Link/Data activity on port 2	Solid green	A physical connection has been established to another station on the network.
L/D3	Green	Link/Data activity on port 3	Solid green	A physical connection has been established to another station on the network.

Table 4: POWERLINK - LED status indicators

4.3 RDY, RUN, ERR - LED status indicators

Label	Color	Function	Description	
RDY	Green	Ready	Solid green	The module is operational and the power stage can be enabled (operating system present and booted, no permanent or temporary errors).
			Blinking green [1]	The module is not ready for operation. Examples: • No signal on one or both enable inputs • DC bus voltage outside the tolerance range • Overtemperature on the motor (temperature sensor) • Motor feedback not connected or defective • Motor temperature sensor not connected or defective • Overtemperature on the module (IGBT junction, heat sink, etc.) • Disturbance on network
RUN	Orange	Run	Solid orange	The module's power stage is enabled.
ERR	Red	Error	Solid red [1]	There is a permanent error on the module. Examples: • Permanent overcurrent • Invalid data in EPROM

Table 5: RDY, RUN, ERR - LED status indicators

1) Firmware V2.130 and later.

5 Pinouts

Danger!

Before performing service work, disconnect the power supply and wait 5 minutes to ensure that the DC bus of the drive system has discharged. Observe regulations!

Warning!

Drive systems can carry high levels of electrical voltage.
Never connect or disconnect the connector when voltage is present!

Information:

To satisfy UL/CSA requirements, components of B&R drive systems are only permitted to be wired with copper wires with a permitted wire temperature of at least 75°C.

5.1 Overview

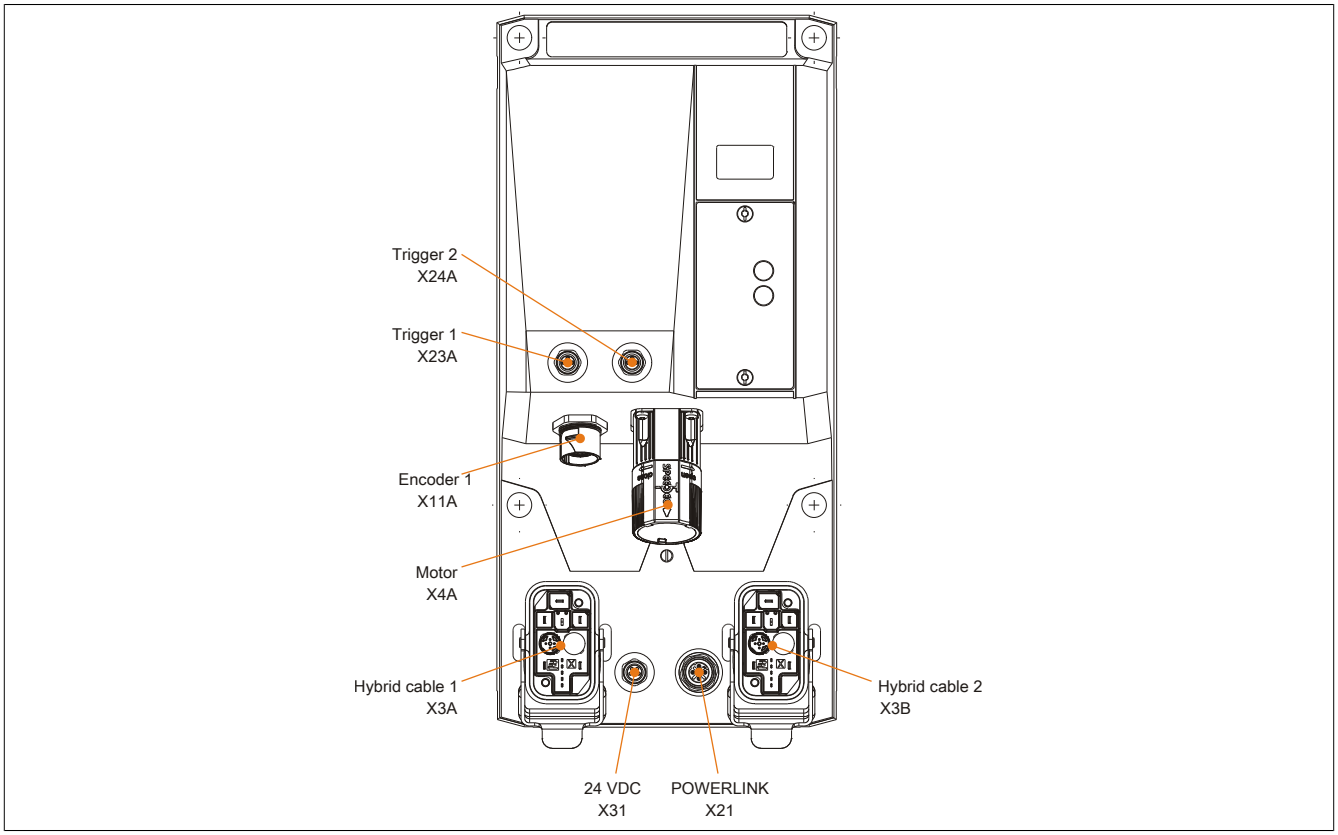


Figure 2: Pinout overview

5.2 X4A (motor connection)

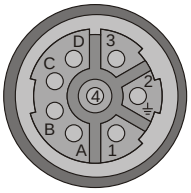
Figure	Pin	Name	Function
	1	U	Motor connection U
	2	PE	Protective ground conductor
	3	W	Motor connection W
	4	V	Motor connection V
	A	T+	Temperature +
	B	T-	Temperature -
	C	B+	Brake +
	D	B-	Brake -

Table 6: X4A connector - Pinout

5.3 X11A (EnDat 2.1 encoder connection)

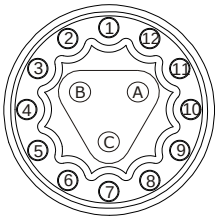
Figure	Pin	Description	Function			
			SSI SinCos	EnDat 2.1	BiSS	SSI
	1	+5 V	Encoder supply +5 V			
	2	D	Data input			
	3	D\	Data input inverted			
	4	T+	Temperature sensor +			
	5	T-	Temperature sensor -			
	6	Sense-	Sense input 0 V			
	7	COM	Encoder supply 0 V			
	8	A	Channel A		---	
	9	A\	Channel A inverted		---	
	10	B	Channel B		---	
	11	B\	Channel B inverted		---	
	12	---	---			
	A	T	Clock output			
	B	T\	Clock output inverted			
	C	Sense+	Sense input +5 V			

Table 7: EnDat 2.1 connector X11A - Pinout

5.4 X21 (POWERLINK)

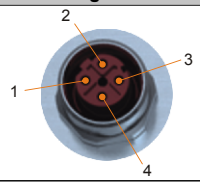
Figure	Pin	Description	Function
	1	TXD	Transmit data
	2	RXD	Receive data
	3	TXD\	Transmit data inverted
	4	RXD\	Receive data inverted

Table 8: Connector X21x/X22x - Pinout

5.5 X23A, X24A (trigger)

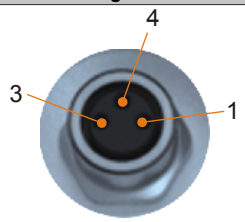
Figure	Pin	Description	Function
	1	+24 V	Sensor/actuator power supply 24 VDC [1)]
	3	GND	GND
	4	Trigger	Trigger input

Table 9: X23A, X24A connector - Pinout

1) Sensors/Actuators are not permitted to be supplied externally.

5.6 X31 (24 VDC routing)

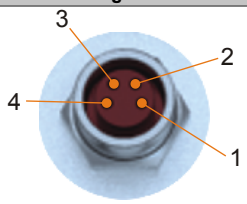
Figure	Pin	Description	Function
	1	24 VDC I/O	24 VDC I/O power supply
	2	24 VDC I/O	24 VDC I/O power supply
	3	GND	24 VDC I/O power supply 0 V
	4	GND	24 VDC I/O power supply 0 V

Table 10: Connector X31x - Pinout