maxon motor

maxon motor control	EPOS Positioning Controller
Cable Starting Set	**Edition October 2006**

EPOS 24/5

Positioning Controller

Documentation

Cable Starting Set

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3   Introduction

This documentation "Cable Starting Set" provides the wiring details from each EPOS cable.
It contains pictures, drawings, cable specification, pin assignment and detailed connector information.
The included "Cable selector" helps to choose the correct cable.

The latest edition of these "Cable Starting Set", additional documentation and software for EPOS positioning controller may also be found in the internet under http://www.maxonmotor.com category <Service>, subdirectory <Downloads>.

4   How to use this guide

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Getting Started

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- Graphical User Interface

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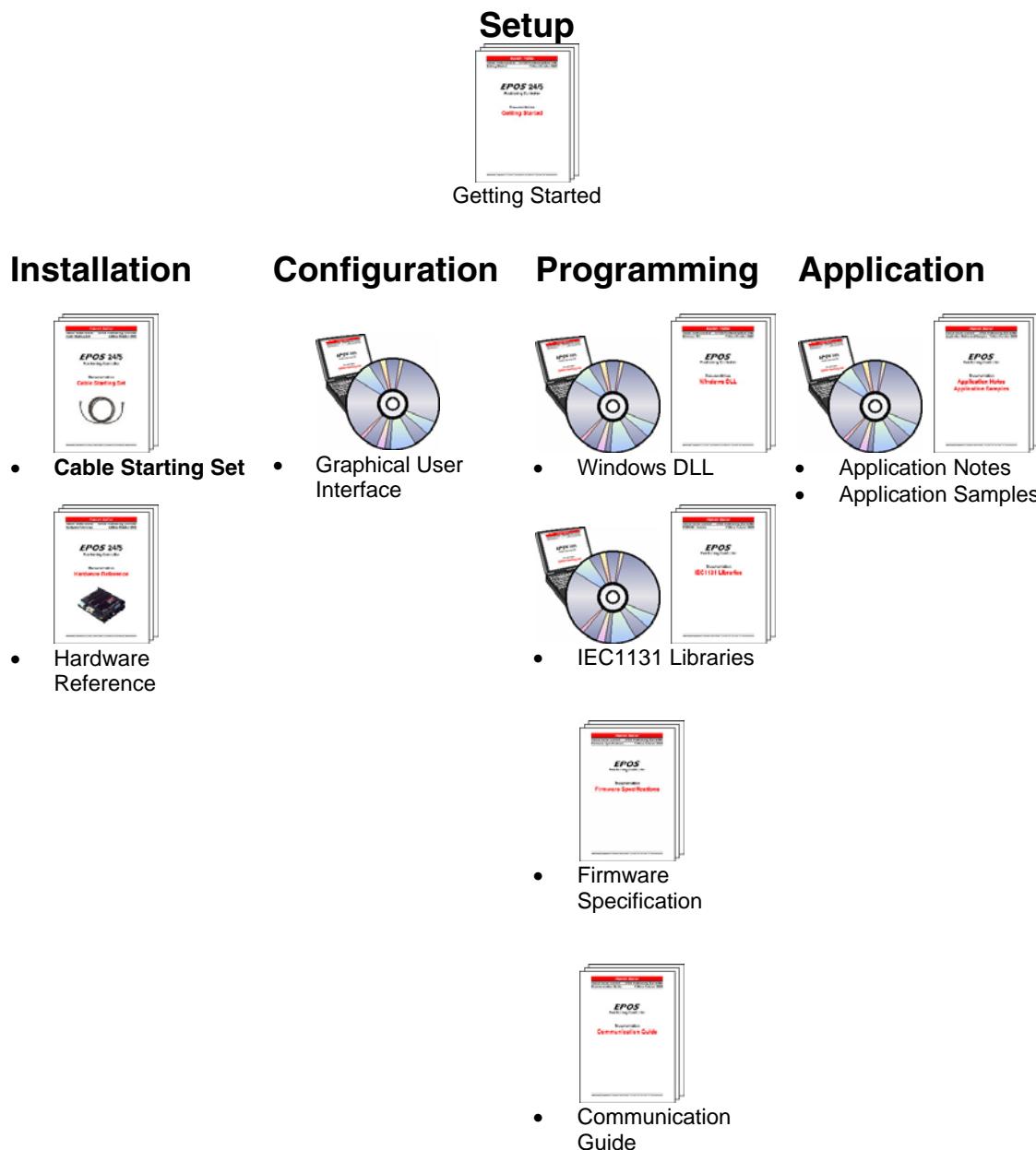
Figure 1: EPOS documentation hierarchy

5   Cable selector

5.1   EPOS with maxon DC motor with separated motor and encoder cable

EPOS power cable (Connector J1)……………………………………………….. order number 275829
EPOS motor cable (Connector J2)………………………………………………… order number 275851
EPOS encoder cable (Connector J4)…………………………………………….. order number 275934

Optional:
EPOS signal cable (Connector J5)……………………………………………….. order number 275932

5.2   EPOS with maxon DC motor with integrated motor/encoder ribbon cable

EPOS power cable (Connector J1)……………………………………………….. order number 275829
EPOS encoder cable (Connector J4)…………………………………………….. order number 275934

Optional:
EPOS signal cable (Connector J5)……………………………………………….. order number 275932

5.3   EPOS with maxon EC motor with separated motor and encoder cable

EPOS power cable (Connector J1)……………………………………………….. order number 275829
EPOS motor cable (Connector J2)………………………………………………… order number 275851
EPOS Hall sensor cable (Connector J3)…………………………………………… order number 275878
EPOS encoder cable (Connector J4)…………………………………………….. order number 275934

Optional:
EPOS signal cable (Connector J5)……………………………………………….. order number 275932

5.4   RS-232 Communication

EPOS RS232-COM cable (Connector J6)……………………………………….. order number 275900

5.5   CAN Communication

EPOS CAN-COM cable (Connector J7 or J8)…………………………………… order number 275908
EPOS CAN termination plug (Connector J7 or J8)…………………………… order number 275937

Optional:
EPOS CAN-CAN cable (Connector J7 or J8)…………………………………… order number 275926

6   EPOS power cable (Connector J1)

Order number: EPOS power cable   **275829**

Figure 2: EPOS power cable 275829

Technical data: The "EPOS power cable" is a 2 x 0.75 mm^2, 3 m length cable.

Figure 3: EPOS power cable head A

The used Molex Mini-Fit Jr.^{TM} connector fits to
EPOS 24/5 connector "J1 Power Supply "
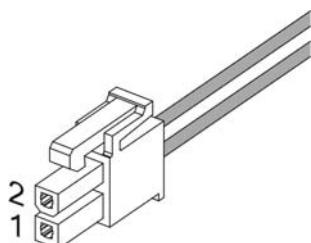
Figure 4: Pin assignment EPOS power cable head A

Pin No.	Color	Twisted wire	Signal	Description
1	Black "1"		Power_Gnd	Ground of supply voltage
2	Black "2"		+V$_{CC}$	Supply voltage +11 ... +24 VDC

Connector: Molex Mini-Fit Jr.^{TM} 2 poles (39-01-2020)
Crimp terminals: Molex Mini-Fit Jr.^{TM} female crimp terminals (444-76-1112)
Hand crimper: Molex hand crimper (Europe: 69008-0724; America: 11-01-0197)

Figure 5: EPOS power cable head B

Connect this cable end to the power supply (+11 … +24 VDC)

Pin No.	Color	Twisted wire	Signal	Description
1	Black "- "		Power_Gnd	Ground of supply voltage
2	Black "+ "		$+V_{CC}$	Supply voltage +11 … +24 VDC

Cable end sleeve: 0.75 mm^2

7   EPOS motor cable (Connector J2)

Order number: EPOS motor cable   **275851**

Figure 6: EPOS motor cable 275851

The "EPOS motor cable" is a 3 x 0.75 mm^2, shielded, 3 m length cable.

Figure 7: EPOS motor cable head A

The used Molex Mini-Fit Jr.^{TM} connector fits to
EPOS 24/5 connector "J2 Motor"
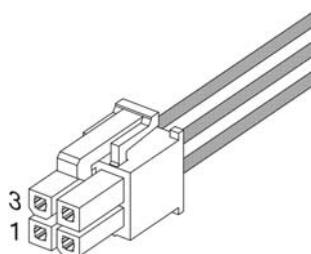
Figure 8: Pin assignment EPOS motor cable head A

Pin No.	Color	Twisted wire	Signal	Description
1	White		Motor winding 1 (+M)	EC motor: Winding 1 DC motor: Motor +
2	Brown		Motor winding 2 (-M)	EC motor: Winding 2 DC motor: Motor -
3	Green		Motor winding 3	EC motor: Winding 3
4	Black		Motor shield	Cable shield

Connector: Molex Mini-Fit Jr.^{TM} 4 poles (39-01-2040)
Crimp terminals: Molex Mini-Fit Jr.^{TM} female crimp terminals (444-76-1112)
Hand crimper: Molex hand crimper (Europe: 69008-0724; America: 11-01-0197)

Figure 9: EPOS motor cable head B

Connect this cable end to the motor windings.

Pin No.	Color	Twisted wire	Signal	Description
	White		Motor winding 1 (+M)	EC motor: Winding 1 DC motor: Motor +
	Brown		Motor winding 2 (-M)	EC motor: Winding 2 DC motor: Motor -
	Green		Motor winding 3	EC motor: Winding 3
	Black		Motor shield	Cable shield

Cable end sleeve: 0.75 mm^2

Note:
For EMC-compliant installation the cable shield should be connected to the motor housing.

8   EPOS Hall sensor cable (Connector J3)

Order number: EPOS Hall sensor cable   **275878**

Figure 10: EPOS Hall sensor cable 275878

The "EPOS Hall sensor cable" is a 5 x 0.14 mm^2, shielded, 3 m length cable.

Figure 11: EPOS Hall sensor cable head A

The used Molex Micro-Fit 3.0.^{TM} connector fits to
EPOS 24/5 connector "J3 Hall sensor "
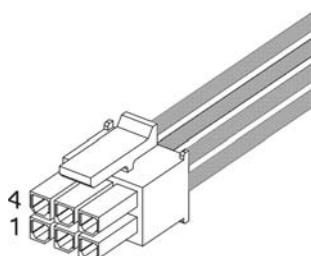
Figure 12: Pin assignment EPOS Hall sensor cable head A

Pin No.	Color	Twisted wire	Signal	Description
1	Green		Hall sensor 1	Hall sensor 1 Input
2	Brown		Hall sensor 2	Hall sensor 2 Input
3	White		Hall sensor 3	Hall sensor 3 Input
4	Yellow		GND	Ground of Hall supply
5	Grey		+V$_{Hall}$	Hall sensor supply voltage +5 VDC / 30 mA
6	Black		Hall shield	Cable shield

Connector: Molex Micro-Fit 3.0.^{TM} 6 poles (430-25-0600)
Crimp terminals: Molex Micro-Fit 3.0^{TM} female crimp terminals (430-30-0010)
Hand crimper: Molex hand crimper (Europe: 69008-0983; America: 63811-2800)

Figure 13: EPOS Hall sensor cable head B

Connect this cable end to the Hall sensor

Pin No.	Color	Twisted wire	Signal	Description
	Green		Hall sensor 1	Hall sensor 1 Input
	Brown		Hall sensor 2	Hall sensor 2 Input
	White		Hall sensor 3	Hall sensor 3 Input
	Yellow		GND	Ground of Hall supply
	Grey		+V_{Hall}	Hall sensor supply voltage +5 VDC / 30 mA
	Black		Hall shield	Cable shield

Cable end sleeve: 0.14 mm^2

Note:
For EMC-compliant installation the cable shield should be connected to the motor housing.

9   EPOS encoder cable (Connector J4)

Order number: EPOS encoder cable   **275934**

Figure 14: EPOS encoder cable 275934

The "EPOS encoder cable" is a 10 x AWG28, round-jacket, twisted pair flat cable, pitch 1.27 mm, 3.20 m
length cable.

Figure 15: EPOS encoder cable head A

The used DIN 41651 female connector fits to
EPOS 24/5 connector "J4 Encoder"
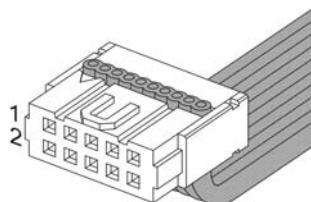
Figure 16: Pin assignment EPOS encoder cable head A

Pin No.	Color	Twisted wire	Signal	Description
1	Brown	Pair 1	Motor +	DC motor: + Motor *)
2	White	Pair 1	+5 VDC / 100 mA	Encoder supply voltage
3	Red	Pair 2	GND	Ground
4	White	Pair 2	Motor -	DC motor: - Motor *)
5	Orange	Pair 3	Channel A\	Channel A complement
6	White	Pair 3	Channel A	Channel A
7	Yellow	Pair 4	Channel B\	Channel B complement
8	White	Pair 4	Channel B	Channel B
9	Green	Pair 5	Channel I\	Index complement
10	White	Pair 5	Channel I	Index

*) only used with maxon DC motors with digital MR-Encoder with Line Driver type S and M

Connector: DIN 41651 female connector, pitch 2.54 mm, 10 poles, plug strain relief

Figure 17: EPOS encoder cable head B

Connect this cable end to the encoder
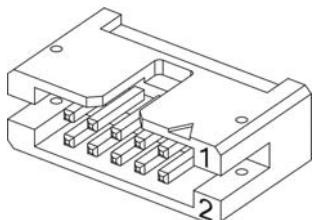
Figure 18: Pin assignment EPOS encoder cable head B

Pin No.	Color	Twisted wire	Signal	Description
1	Brown	Pair 1	Motor +	DC motor: + Motor [*]
2	White	Pair 1	+5 VDC / 100 mA	Encoder supply voltage
3	Red	Pair 2	GND	Ground
4	White	Pair 2	Motor -	DC motor: - Motor [*]
5	Orange	Pair 3	Channel A\	Channel A complement
6	White	Pair 3	Channel A	Channel A
7	Yellow	Pair 4	Channel B\	Channel B complement
8	White	Pair 4	Channel B	Channel B
9	Green	Pair 5	Channel I\	Index complement
10	White	Pair 5	Channel I	Index

*) only used with maxon DC motors with digital MR-Encoder with Line Driver type S and M

Connector: DIN 41651 Plug, pitch 2.54 mm, 10 poles, plug strain relief

Note:
EPOS encoder cable head B, the pin out suits for example:
   - maxon digital MR-Encoder type S, M, ML, L all with Line Driver
   - maxon digital encoder HEDL 55_ with Line Driver RS 422

10 EPOS signal cable (Connector J5)

Order number: EPOS signal cable   **275932**

Figure 19: EPOS signal cable 275932

The "EPOS signal cable" is a 16 x 0.14 mm^2, 3 m length cable.


Figure 20: EPOS signal cable head A
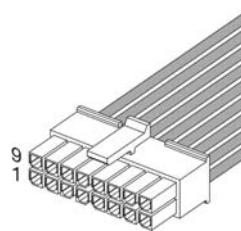
Figure 21: Pin assignment EPOS signal cable head A

The used Molex Micro-Fit 3.0.^{TM} connector fits to
EPOS 24/5 connector "J5 Signal"

Pin No.	Color	Signal	Description
1	White	D_Gnd	Digital signal ground
2	Brown	D_Gnd	Digital signal ground
3	Green	DigIN 6	Digital input 6 "negative limit switch"
4	Yellow	DigIN 5	Digital input 5 "positive limit switch"
5	Grey	DigIN 4	Digital input 4 "Home switch"
6	Pink	DigIN 3	Digital input 3 "general purpose"
7	Blue	DigIN 2	Digital input 2 "general purpose"
8	Red	DigIN 1	Digital input 1 "general purpose"
9[1]	Black	+V$_{OUT}$	Auxiliary supply voltage Output (+11 … +24 VDC)
9[2]	Black	+V$_C$	Logic supply voltage Input (+11 … +24 VDC)
10	Violet	DigOUT 4	Digital output 4 "Brake"
11	Grey-Pink	DigOUT 3	Digital output 3 "general purpose"
12	Red-Blue	DigOUT 2	Digital output 2 "general purpose"
13	White-Green	DigOUT 1	Digital output 1 "general purpose"
14	Brown-Green	A_Gnd	Analogue signal ground
15	White-Yellow	AnIN 2	Analogue input 2
16	Yellow-Brown	AnIN 1	Analogue input 1

Connector: Molex Micro-Fit 3.0.^{TM} 16 poles (430-25-1600)
Crimp terminals: Molex Micro-Fit 3.0^{TM} female crimp terminals (430-30-0010)
Hand crimper: Molex hand crimper (Europe: 69008-0983; America: 63811-2800)

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[1] Jumper JP4 is set (initial setting).
[2] If jumper JP4 is open, a separate logic supply voltage can be applied.

Figure 22: EPOS signal cable head B

Connect this cable end to any used Interface

Pin No.	Color	Signal	Description
1	White	D_Gnd	Digital signal ground
2	Brown	D_Gnd	Digital signal ground
3	Green	DigIN 6	Digital input 6 "negative limit switch"
4	Yellow	DigIN 5	Digital input 5 "positive limit switch"
5	Grey	DigIN 4	Digital input 4 "Home switch"
6	Pink	DigIN 3	Digital input 3 "general purpose"
7	Blue	DigIN 2	Digital input 2 "general purpose"
8	Red	DigIN 1	Digital input 1 "general purpose"
9[3]	Black	$+V_{OUT}$	Auxiliary supply voltage Output (+11 … +24 VDC)
9[4]	Black	$+V_C$	Logic supply voltage Input (+11 … +24 VDC)
10	Violet	DigOUT 4	Digital output 4 "Brake"
11	Grey-Pink	DigOUT 3	Digital output 3 "general purpose"
12	Red-Blue	DigOUT 2	Digital output 2 "general purpose"
13	White-Green	DigOUT 1	Digital output 1 "general purpose"
14	Brown-Green	A_Gnd	Analogue signal ground
15	White-Yellow	AnIN 2	Analogue input 2
16	Yellow-Brown	AnIN 1	Analogue input 1

Cable end sleeve: 0.14 mm^2

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[3] Jumper JP4 is set (initial setting).
[4] If jumper JP4 is open, a separate logic supply voltage can be applied.

11 EPOS RS232-COM cable (Connector J6)

Order number: EPOS RS232-COM cable   **275900**

Figure 23: EPOS RS232-COM cable 275900

The "RS232-COM" is a 2 x 2 x 0.14 mm^2, twisted pair, shielded, 3 m length cable.

Figure 24: EPOS RS232-COM cable head A

The used Molex Micro-Fit 3.0.^{TM} connector fits to
EPOS 24/5 connector "J6 RS-232 "
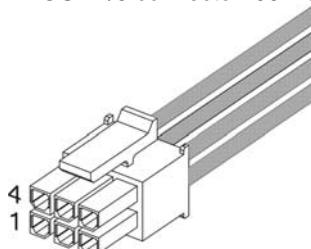
Figure 25: Pin assignment EPOS RS232-COM cable head A

Pin No.	Color	Twisted Wire	Signal	Description
1	Yellow	Pair 1	EPOS RxD	EPOS RS232 receive
2	White	Pair 2	EPOS TxD	EPOS RS232 transmit
3	Not connected			
4	Green	Pair 1	GND	RS232_Ground
5	Brown	Pair 2	GND	RS232_Ground
6	Black		Shield	Cable shield

Connector: Molex Micro-Fit 3.0.^{TM} 6 poles (430-25-0600)
Crimp terminals: Molex Micro-Fit 3.0^{TM} female crimp terminals (430-30-0010)
Hand crimper: Molex hand crimper (Europe: 69008-0983; America: 63811-2800)

Figure 26: EPOS RS232-COM cable head B

Connect this cable end to your COM interface
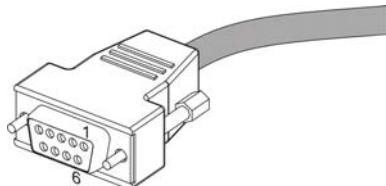
Figure 27: Pin assignment EPOS RS232-COM cable head B

Pin No.	Color	Twisted wire	Signal	Description
1	Not connected			
2	White	Pair 2	RS232 RxD	COM RS232 receive
3	Yellow	Pair 1	RS232 TxD	COM RS232 transmit
4	Not connected			
5	Brown	Pair 2	RS232 GND	COM RS232_Ground
	Green	Pair 1	RS232 GND	COM RS232_Ground
6	Not connected			
7	Not connected			
8	Not connected			
9	Not connected			
x	Shield		Cable shield	Soldered on connector housing

Pin assignment according to RS-232 standard

Connector: Female D-Sub connector DIN 41652, 9 poles, with mounting screws

12 EPOS CAN-COM cable (Connector J7 or J8)

Order number: EPOS CAN-COM cable   **275908**

Figure 28: EPOS CAN-COM cable 275908

The "CAN-COM" is a 2 x 2 x 0.14mm^2, twisted pair, shielded, 3 m length cable.

Figure 29: EPOS CAN-COM cable head A

The used Molex Micro-Fit 3.0.^{TM} connector fits to
EPOS 24/5 connector "J7 CAN and J8 CAN"
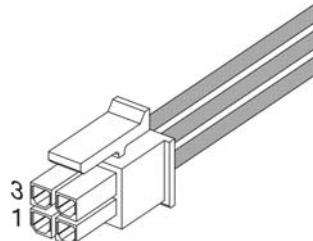
Figure 30: Pin assignment EPOS CAN-COM cable head A

Pin No.	Color	Twisted wire	Signal	Description
1	Yellow	Pair 1	CAN high	CAN high bus line
2	Green	Pair 1	CAN low	CAN low bus line
3	Brown		CAN GND	CAN Ground
4	Black		CAN shield	Cable shield

Connector: Molex Micro-Fit 3.0.^{TM} 4 poles (430-25-0400)
Crimp terminals: Molex Micro-Fit 3.0^{TM} female crimp terminals (430-30-0010)
Hand crimper: Molex hand crimper (Europe: 69008-0983; America: 63811-2800)

Figure 31: EPOS CAN-COM cable head B

Connect this cable end to your CAN Master
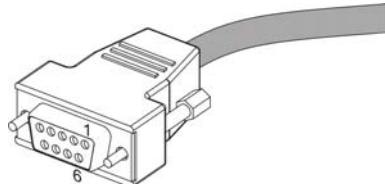
Figure 32: Pin assignment EPOS CAN-COM cable head B

Pin No.	Color	Twisted wire	Signal	Description
1	Not connected			
2	Green	Pair 1	CAN low	CAN low bus line
3	Brown		CAN GND	CAN Ground
4	Not connected			
5	Shield		CAN shield	Cable shield
6	Not connected			
7	Yellow	Pair 1	CAN high	CAN high bus line
8	Not connected			
9	Not connected			

Pin assignment according to CiA DS102-2

Connector: Female D-Sub connector DIN 41652, 9 poles, with mounting screws

13 EPOS CAN-CAN cable (Connector J7 or J8)

Order number: EPOS CAN-CAN cable   **275926**

Figure 33: EPOS CAN-CAN cable 275926

The "CAN-CAN" is a 2 x 2 x 0.14mm^2, twisted pair, shielded, 3 m length cable.

Figure 34: EPOS CAN-CAN cable head A

The used Molex Micro-Fit 3.0.^{TM} connector fits to
EPOS 24/5 connector "J7 CAN and J8 CAN"
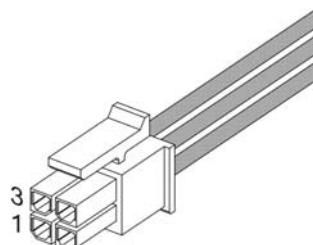
Figure 35: Pin assignment EPOS CAN-CAN cable head A

Pin No.	Color	Twisted wire	Signal	Description
1	Yellow	Pair 1	CAN high	CAN high bus line
2	Green	Pair 1	CAN low	CAN low bus line
3	Brown		CAN GND	CAN Ground
4	Shield		CAN shield	Cable shield

Connector: Molex Micro-Fit 3.0.^{TM} 4 poles (430-25-0400)
Crimp terminals: Molex Micro-Fit 3.0^{TM} female crimp terminals (430-30-0010)
Hand crimper: Molex hand crimper (Europe: 69008-0983; America: 63811-2800)

Figure 36: EPOS CAN-CAN cable head B

The used Molex Micro-Fit 3.0.™ connector fits to
EPOS 24/5 connector "J7 CAN and J8 CAN "
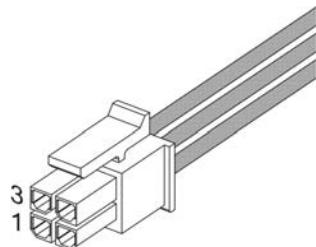
Figure 37: Pin assignment EPOS CAN-CAN cable head B

Pin No.	Color	Twisted Wire	Signal	Description
1	Yellow	Pair 1	CAN high	CAN high bus line
2	Green	Pair 1	CAN low	CAN low bus line
3	Brown		CAN GND	CAN Ground
4	Shield		CAN shield	Cable shield

Connector: Molex Micro-Fit 3.0.™ 4 poles (430-25-0400)
Crimp terminals: Molex Micro-Fit 3.0™ female crimp terminals (430-30-0010)
Hand crimper: Molex hand crimper (Europe: 69008-0983; America: 63811-2800)

14 EPOS CAN termination plug (Connector J7 or J8)

Order number: EPOS CAN termination plug   **275937**

Figure 38: EPOS CAN termination plug 275937

The used Molex Micro-Fit 3.0.^{TM} connector fits to
EPOS 24/5 connector "J7 CAN and J8 CAN "
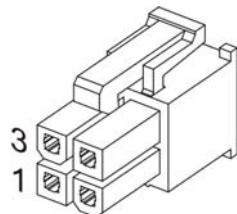
Figure 39: Pin assignment EPOS CAN termination plug

Pin No.	Color	Twisted wire	Signal	Description
1			Resistor terminal 1	120 Ohm bus termination
2			Resistor terminal 2	120 Ohm bus termination
3	Not connected			
4	Not connected			

Connector: Molex Micro-Fit 3.0.^{TM} 4 poles (430-25-0400)
Crimp terminals: Molex Micro-Fit 3.0^{TM} female crimp terminals (430-30-0010)
Hand crimper: Molex hand crimper (Europe: 69008-0983; America: 63811-2800)

15 EPOS connector set

Order number: EPOS connector set   **276248**

Complete connecter set contains:

Connector	Specification	Number
J1, J1A[5]	Molex Mini-Fit Jr.™ 2 poles (39-01-2020)	2
J2	Molex Mini-Fit Jr.™ 4 poles (39-01-2040)	1
J3	Molex Micro-Fit 3.0.™ 6 poles (430-25-0600)	1
J5	Molex Micro-Fit 3.0.™ 16 poles (430-25-1600)	1
J5A[5]	Molex Micro-Fit 3.0.™ 12 poles (430-25-1200)	1
J6	Molex Micro-Fit 3.0.™ 6 poles (430-25-0600)	1
J7	Molex Micro-Fit 3.0.™ 4 poles (430-25-0400)	1
J8	Molex Micro-Fit 3.0.™ 4 poles (430-25-0400)	1
	Molex Mini-Fit Jr.™ female crimp terminals (444-76-1112)	12
	Molex Micro-Fit 3.0™ female crimp terminals (430-30-0010)	52
	Tyco C42334-A421-C42 (right) , encoder clip right	1
	Tyco C42334-A421-C52 (left) , encoder clip left	1

Useful accessories (not available at maxon motor ag):

Hand crimper 1:   Molex hand crimper (Europe: 69008-0724; America: 11-01-0197)
Hand crimper 2:   Molex hand crimper (Europe: 69008-0983; America: 63811-2800)

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[5] Only used for EPOS 70/10