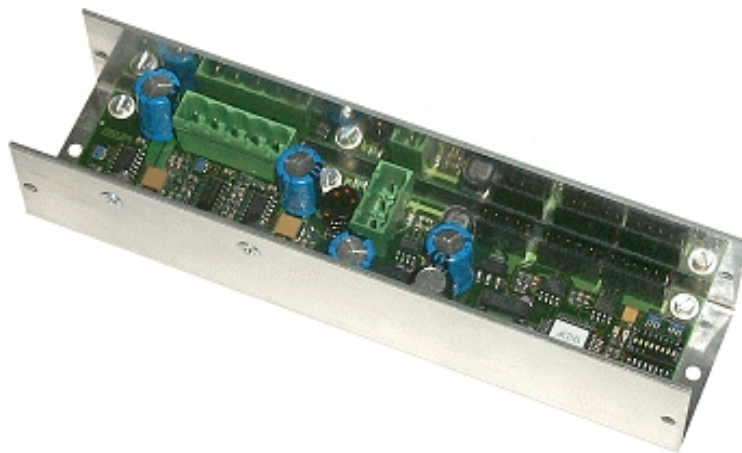


CAN-STEPCON-1H

High Current Stepper Controller



Hardware Manual

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Changes in the chapters

The changes listed below affect changes in the **hardware** as well as changes in the **description** of facts only.

Chapter	Changes versus previous version
4.1.3 - 4.1.5	Correction: Order No. of the crimp snap-in

Technical details are subject to change without further notice.

NOTE

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1. Overview

1.1 Module Description

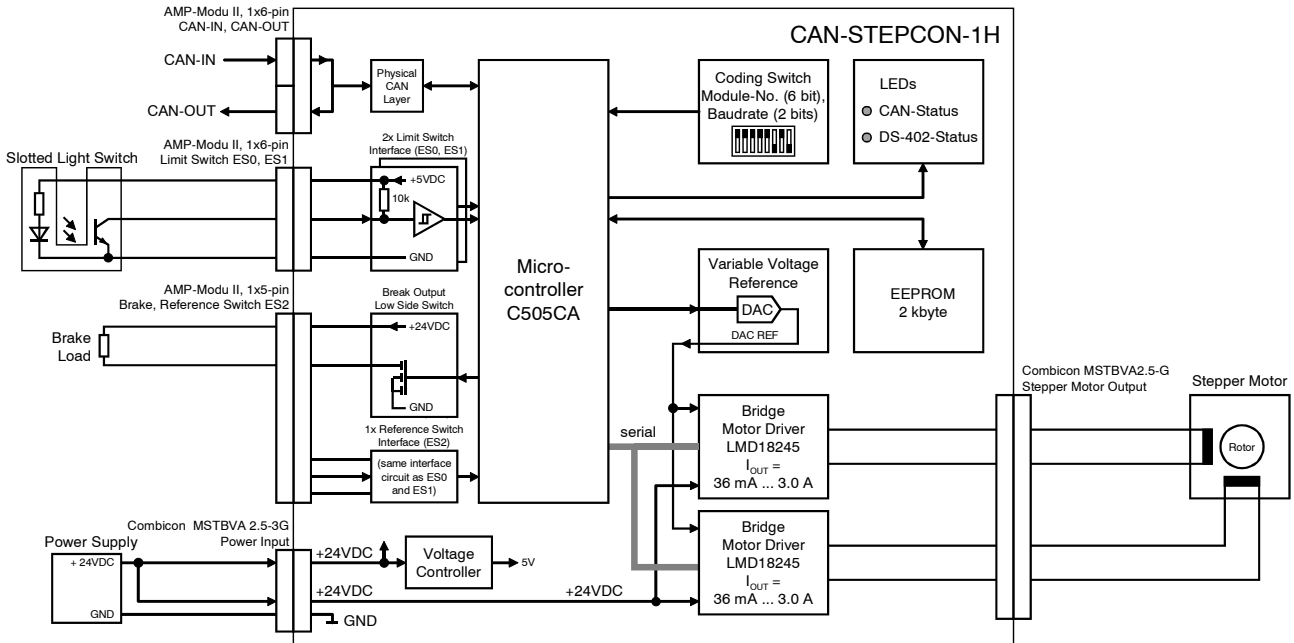


Fig. 1.1: Block circuit diagram

The module offers full control for one high current stepper motor channel by CiA DS-402 commands. It is equipped with two motor driver bridges that support up to ± 3 A output current. The three limit switch inputs are designed for slotted light switches. The brake output is equipped with a low side switch.

The CAN-STEPCON-1H module is equipped with a C505CA-microcontroller with an integrated CAN interface. 2 kbyte EEPROM is used to store module configuration data.

The status LEDs display the CAN status of the module. The coding switch is used to set the bit rate (2 bits) and the Node-ID (6 bits).

The module is operating with CANopen according to CiA-DS-301 and DS-402.

1.2 Summary of Technical Data

1.2.1 General

Temperature range	max. permissible ambient temperature: 0...50 °C
Humidity	max. 90%, non-condensing
Board dimensions	146.69 mm x 32.0 mm
Case	U-shaped aluminium profile, 160 x 40 x 35 mm
Protection class	IP10
Weight	ca. 120 g
Voltage supply input	$U_{VCC_Nom} = 24 \text{ V DC}$ $U_{VCC_max} = 40 \text{ V DC}$ (absolute maximum value) $I \approx 30 \text{ mA}$ (typical, at 24VDC and 20 °C, outputs off-load) connector X300: MSTBVA2.5-3G (plug connector at PCB)

1.2.2 Microcontroller

Microcontroller	C505CA
EEPROM	2 kbyte (e.g. CAT24WC08)
RAM	1 k + 256 byte
OTP	32 k

1.2.3 CAN-Interface

Number	1
CAN-controller	Microcontroller C505CA
CAN-protocol	Basic-CAN 2.0A
Physical interface	Physical Layer in accordance with ISO 11898, transmission rate can be set by coding switch from 125 kbit/s to 1 Mbit/s
Bus termination	has to be set externally
Connector at PCB	X320 AMP-Modu II, 1x6 (single row), pin strip with shroud, straight design, coded, 1-3 fed through to 4-6

1.2.4 Position Switch Inputs

Number	3
Circuit	suitable for slotted light switch EESX1103, connection for switch to GND: 4.7 kOhm pull-up at XOR-gate input (74HC86)
Switching thresholds	CMOS
Input current	CMOS
Input low pass	none
LED-display	none
Electrical insulation	none
Connectors at PCB	ES0, ES1: X310, AMP Modu II, 1x6 (single row), pin strip with shroud, straight design, coded ES2: X330, AMP Modu II, 1x5 (single row), pin strip with shroud, straight design, coded

1.2.5 Brake Output

Number	1
Driver	BSP76
Circuit	Low Side Switch
Supply voltage	nominal : $U_{VCC} = 24 \text{ VDC}$
Capacity	nominal current/channel (24 V): $I_{NOM} = 1.4 \text{ A}$
Automatic circuit breakers	short-circuit resistant
Electrical insulation	none
Connector at PCB	X330 AMP-Modu II, 1x5, single row, straight design, coded

1.2.6 Stepper Output

Output	2 motor driver controllers for one stepper motor (1 driver per winding)
Driver	LMD 18245, H-Bridge
Supply voltage of output circuit	permissible voltage range: $U_{VCC} = 12 \text{ VDC} \dots 55 \text{ VDC}$ ($U_{VCC} = 55 \text{ VDC}$ is only permitted, if resistor RX300 is not equipped, (see page 14), otherwise absolute maximum value is $U_{VCC} = 40 \text{ VDC}$!) nominal value: $U_{VCC} = 24 \text{ VDC}$ (separate pin in connector X300)
Signal level of outputs	dynamic current control $I = \pm 3 \text{ A}_{MAX}$
Capacity	nominal current/channel (24 V/50°C): $I_{NOM} = 3 \text{ A}$
Chopping frequency	ca. 22 kHz
Automatic circuit breakers	inverse diodes connected to power supply and GND, disconnection in case of thermal overload and over current ($I = 12 \text{ A}$ for $t = 12 \mu\text{s}$ will shut off the output) with automatic reconnection
Connector at PCB	X200 Combicon, MSTBVA2.5-5G

1.2.7 Order Information

Type	Features	Order No.
CAN-STEPCON-1H	Stepper-Motor Controller	C.2090.01
CAN-STEPCON-1H-Con	1 Set Line Plug Connectors: X300: supply voltage, double pole (2 x 2,5 mm ² each) X200: stepper output (2,5mm ²) X310-X330: 3 receptacle housings with 17 crimp snap-ins (crimp-tool required)	C.2090.10
CAN-STEPCON-1H-ME	Hardware manual in English ^{1*)} (this manual plus software manual)	C.2090.21
CAN-STEPCON-1H-ENG	Engineering manual in English ^{2*)} Content: circuit diagrams, PCB top overlay drawing, data sheets of significant components	C.2090.25

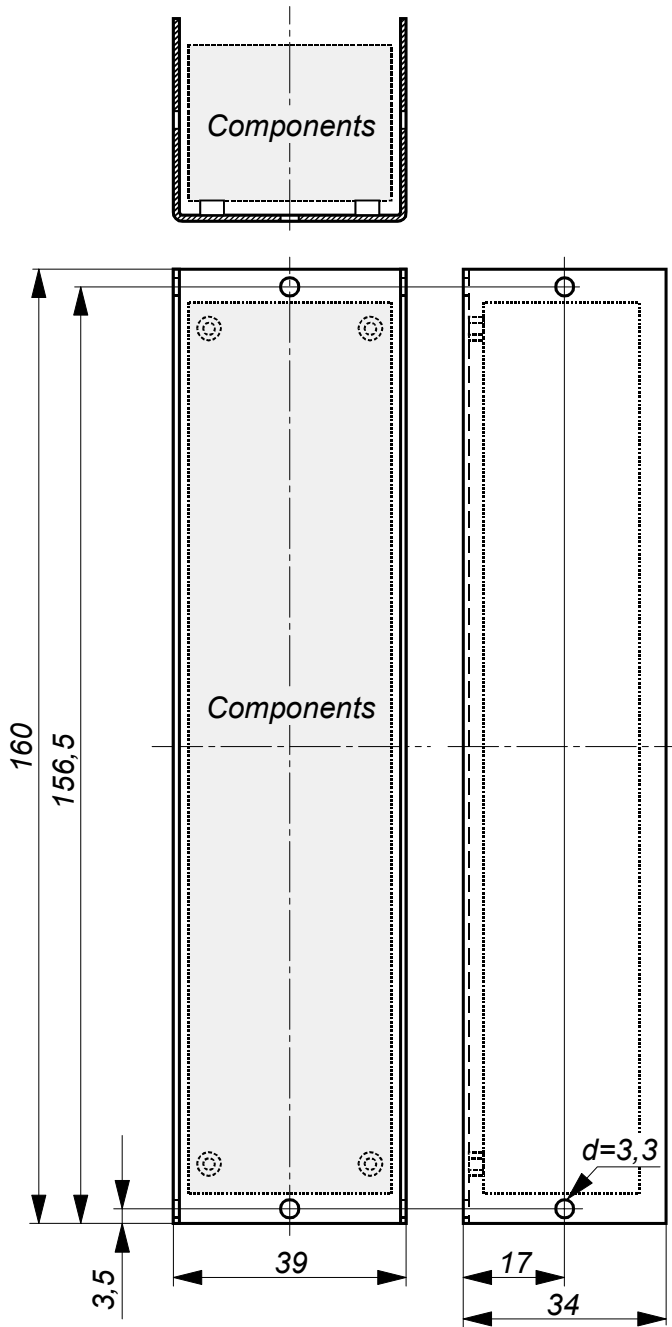
1 *) If module and manual are ordered together, the manual is free of charge.

2 *) This manual is liable for costs, please contact our support.

2. Dimensions and Mounting

The board of the module is mounted in a u-shaped aluminium profile. A comfortable access to the connectors and an optimal cooling are made possible through the three open sides of the profile. Three holes are located at each end of the case. They are suitable for the fastening with M3 metric thread screws for example.

Because the profile is open to three sides, it has to be mounted in a way that the components are protected against mechanical damage!



*all dimensions in [mm]
 all holes for fastening $d = 3,3$ mm
 case material: aluminium
 strength of material: 1,0 mm*

Fig. 2.1: Dimensions and fastening holes of CAN-STEPCON-1H

3. Unit Description

3.1 PCB-View

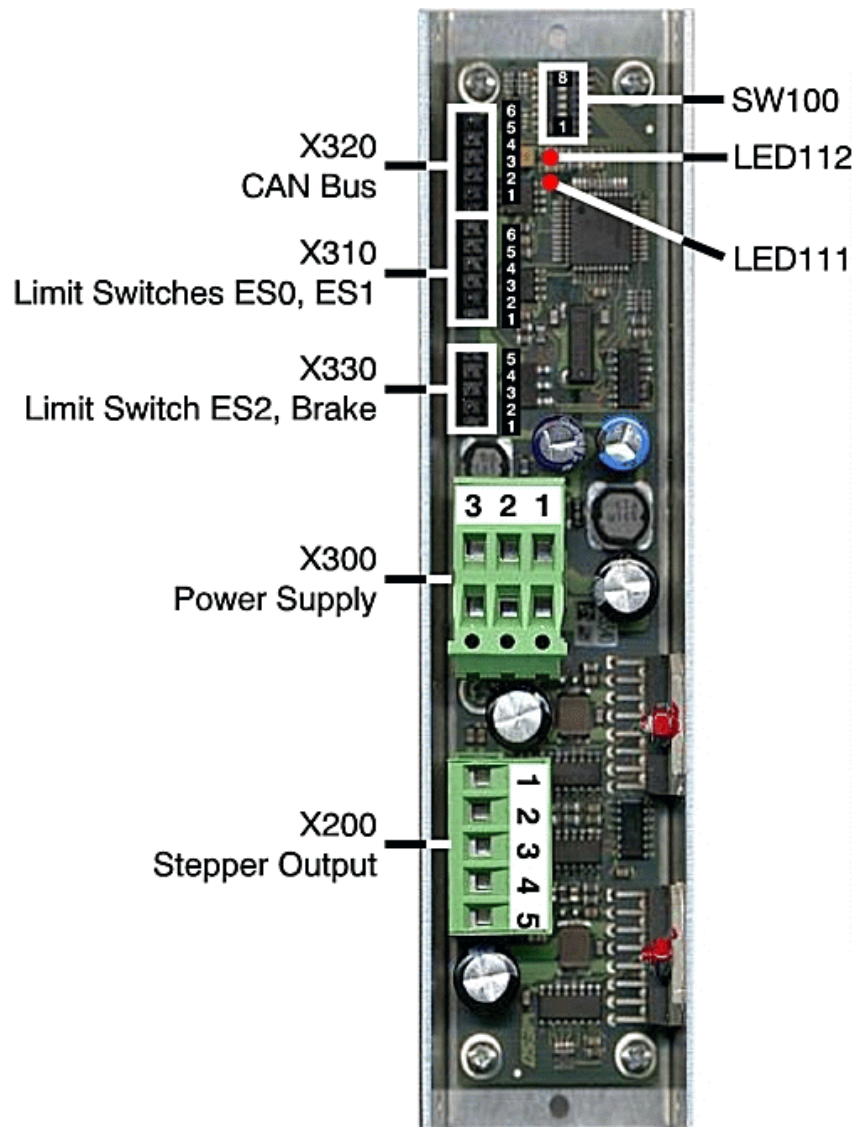


Fig. 3.1.1: PCB-View

Note:

The line plug connectors (X200: MSTB2,5/5ST-5,08 and X300:TMSTBP2,5/3-ST-5,08) shown above are not contained in the extent of supply. They can be ordered together with the line connectors for X310, X320 and X330.

3.2 Coding Switch SW100

Coding switch bit no.	Meaning
8	LSB module-no.
7	
6	
5	
4	
3	MSB
2	CAN bit rate
1	

Table 3.2.1: Assignment of coding switch bits

Coding switch bit no.	Module-no. bit no.	Default setting	
		Switch setting	Module-no. bit value
8	0	ON	1
7	1	OFF	0
6	2	OFF	0
5	3	OFF	0
4	4	OFF	0
3	5	OFF	0

Table 3.2.2: Setting the module-no.

Coding switch bit		Bit rate
2	1	
OFF	OFF	1 Mbit/s (default setting)
OFF	ON	500 kbit/s
ON	OFF	250 kbit/s
ON	ON	125 kbit/s

Table 3.2.3: Setting the bit rate

3.3 LED-Displays

LED 111 'DS402-STATUS' (red)	
LED-status	DS-402-status
off	'Switch On Disabled' or 'Ready to Switch On' or 'Switched On'
flashing	'Operation Enable' and no drive command active
LED on constantly	'Operation Enable' and drive command active

LED 112 'CAN-STATUS' (red)	
LED-status	Meaning
off	no power supply, fatal error
flashing, ca. 3 Hz	module is 'Preoperational'
flashing, ca. 20 Hz	CAN-error
LED on constantly	module is 'Operational'

Table 3.3.1: Meaning of LED-status

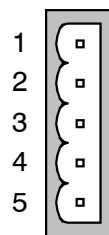
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4. Appendix

4.1 Connector Assignments

4.1.1 Stepper Driver Output (X200, Combicon style)

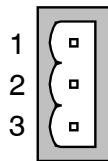
Connector (PCB): Phoenix Combicon with male contacts, 5-pin, MSTBVA2.5-5G
Connector (line): Phoenix Combicon socket, 5-pole, MSTB2,5/5-ST-5,08

Pin Position:**Pin Assignment:**

Pin	Signal
1	OUT11
2	OUT12
3	n.c.
4	OUT21
5	OUT22

4.1.2 Power Supply (X300, Combicon style)

Connector (PCB): Phoenix Combicon with male contacts, 3-pin, MSTBVA2.5-3G
Connector (line): Phoenix Combicon socket, 3-pole, MSTB2,5/3-ST-5,08
or
Phoenix Combicon socket, 3-pole, TMSTBP2,5/3-ST-5,08 (double supply line)

Pin Position:**Pin Assignment:**

Pin	Signal
1	GND
2	+24V motor
3	+24V μ C

24V μ C power supply for all units except motor driver
24V motor power supply for motor driver

Note:

The signals +24V μ C and +24V motor are connected via the 0 Ohm resistor RX300 on board (default equipment), therefore it may be possible to connect only one power supply line. If the resistor is removed, it is always necessary to connect both power supply lines.

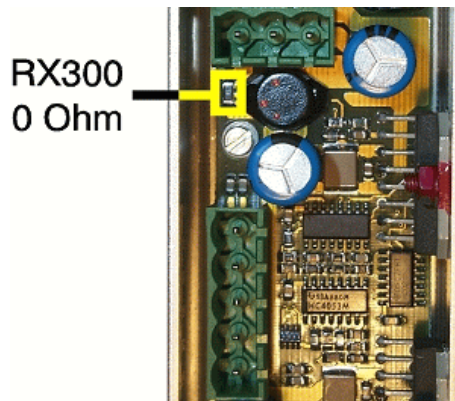


Fig. 3.1.1: Position of resistor RX300

4.1.3 Position Switch ES0, ES1 (X310, AMP-Modu II)

Connector (PCB): AMP Modu II, male contacts, 6-pin, AMP-Nr. 826467-6
 Connector (line): AMP Modu II, socket, 6-pole,
 housing: AMP-Nr. 926475-6
 crimp snap-in: AMP-Nr. 87667-5
 retention plug: AMP-Nr. 926477-1

Pin	Signal
1	VCC
2	ESI0 (ES Lower)
3	GND
4	VCC
5	ESI1 (ES Upper)
6	GND

4.1.4 Position Switch ES2, Brake (X330, AMP-Modu II)

Connector (PCB): AMP Modu II, male contacts, 5-pin, AMP-Nr. 826467-5
 Connector (Line): AMP Modu II, socket, 5-pole,
 housing: AMP-Nr. 926475-5
 crimp snap-in: AMP-Nr. 87667-5
 retention plug: AMP-Nr. 926477-1

Pin	Signal
1	M-BRKO+ (+24V μ C, output)
2	M-BRKO-
3	VCC
4	ESI2 (reference)
5	GND

4.1.5 CAN (X320, AMP-Modu II)

Connector (PCB): AMP Modu II, male contacts, 6-pin, AMP-Nr. 826467-6
Connector (line): AMP Modu II, socket, 6-pole,
housing: AMP-Nr. 926475-6
crimp snap-in: AMP-Nr. 87667-5
retention plugs: AMP-Nr. 926477-1

Pin	Signal
1	CAN_H
2	CAN_L
3	GND
4	GND
5	CAN_L
6	CAN_H