

Motion Controller

4-Quadrant PWM
with RS232 or CAN interface

For combination with:
Linear DC-Servomotors
with Hall sensors

Series MCLM 3006 S/C

		MCLM 3006 S/C	
Power supply	U_B	12 ... 30	V DC
PWM switching frequency	f_{PWM}	78,12	kHz
Efficiency	η	95	%
Max. continuous output current ¹⁾	I_{dauer}	6	A
Max. peak output current	I_{max}	10	A
Total standby current	I_{el}	0,06	A
Speed range ²⁾		2 ... 10 000	mm/s
Scanning rate	N	100	μ s
Encoder resolution with Hall Sensors ³⁾		$\leq 3\ 000$	inc./ τ_m
Resolution with external encoder ³⁾		$\leq 65\ 535$	inc./mm
Input/output (partially free configurable)		3	
Program memory:			
– memory size		3,3	kWord
– Number of instructions		approx. 1 000	instructions
Operating temperature range		0 ... + 70	$^{\circ}$ C
Storage temperature		- 25 ... + 85	$^{\circ}$ C
Housing material		zinc, black coated	
Weight		160	g

¹⁾ at 22 $^{\circ}$ C ambient temperature

²⁾ Speed in the range 1 ... 5 mm/s may have fluctuations due to the motor type, load characteristics and controller parameters

³⁾ τ_m is the magnetic pitch of the linear motor

Connection information

Connection communication:			
Interface		RS232 / CAN	
Communication profile		Faulhaber - ASCII / CAN	
Max. transfer speed rate RS232		115 200	baud
Max. transfer speed rate CAN		1	Mbit/s
Connection "AGND":			
– analog ground		analog GND	
– digital input	external encoder	channel B	
	R_{in}	10	k Ω
	f	≤ 400	kHz
Connection "Fault":			
– digital input	R_{in}	100	k Ω
– digital output (open collector)	U	$\leq U_B$	V
	I	≤ 30	mA
	clear	switched to GND	
	set	high-impedance	
	fault output	no error	
		error	
	signal output	switched to GND	
		high-impedance	
	f	≤ 2	kHz
	resolution	1...255	inc./ τ_m
Connection "AnIn":			
– analog input	set position value	"AGND" as GND	
– digital input	external encoder	channel A	
	f	≤ 400	kHz
	step frequency input	≤ 400	kHz
	R_{in}	5	k Ω
Connection "+24V":			
	U_B	12 ... 30	V DC
Connection "GND":			
		ground	
Connection "3. In":			
– digital input	R_{in}	22	k Ω
– electronic supply voltage ⁴⁾	U_B	12 ... 30	V DC

⁴⁾ Separate supply is optionally available (Option no. 2993).

Connection information
Phase connection "A", "B", "C":

A	Phase A	brown ¹⁾	
B	Phase B	orange ¹⁾	
C	Phase C	yellow ¹⁾	
PWM switching frequency	U_{Out} f_{PWM}	0 ... U_B 78,12	V kHz

Hall Sensor connection "A", "B", "C":

A	Hall Sensor A	green ¹⁾	
B	Hall Sensor B	blue ¹⁾	
C	Hall Sensor C	grey ¹⁾	
	U_{In}	≤ 5	V

Connection "SGND":

Signal GND		Signal ground	black ¹⁾	
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Connection "+5V":

Output voltage for external use ²⁾	U_{Out}	5	red ¹⁾	V DC
Load current	I_{Out}	≤ 60		mA

¹⁾ Colour identification for linear DC-Servomotor

²⁾ E.g. Hall sensor


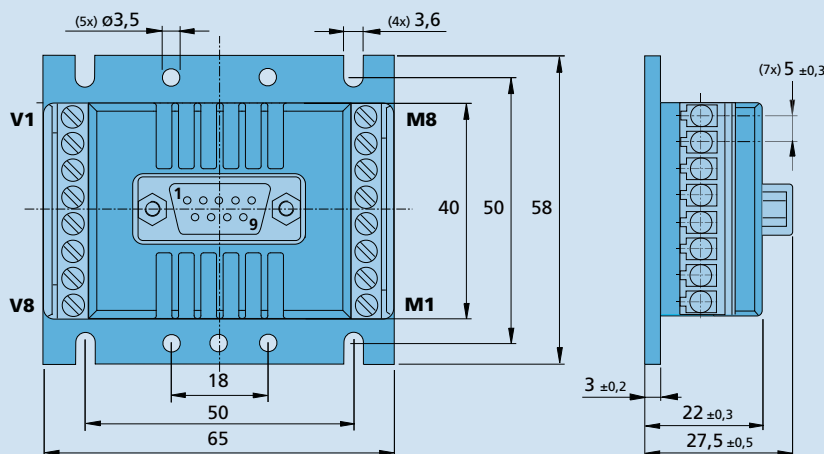
D-SUB-connector information

	MCLM 3006 S	MCLM 3006 C
Connection D-SUB-connector:	RS232	CAN
Pin 2	RxD	CAN-L
Pin 3	TxD	GND
Pin 5	GND	-
Pin 7	-	CAN-H

Digital inputs general information

- PLC, default	high	12,5 ... U_B	V
	low	0 ... 7	V
- TTL	high	3,5 ... U_B	V
	low	0 ... 0,5	V

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see instruction manual).

Dimensional drawing and connection information for MCLM 3006 S/C
 Scale reduced

Motor connection

No.	Function
M1	Ph C
M2	Hall A
M3	+ 5V
M4	SGND
M5	Hall B
M6	Hall C
M7	Ph B
M8	Ph A

Supply connection

No.	Function
V1	TxD / CAN_H
V2	RxD / CAN_L
V3	AGND
V4	Fault
V5	AnIn
V6	+ 24V
V7	GND
V8	3. In

MC Function / RS232

General description

FAULHABER Motion Controllers are available as external electronic controls to be used in combination with DC-Micromotors, Brushless DC-Servomotors and Linear DC-Servomotors or, if already integrated, with Brushless DC-Servomotors in the form of motion control systems. Motion control is thus possible for the majority of motors from a diameter of 6 mm upward. The integrated systems reduce the amount of space required. At the same time, their wiring requirements are minimal, which helps to simplify installation.

Operating modes

- **Speed control**
PI speed control, even for demanding synchronization requirements
- **Positioning**
For moving to defined positions with a high level of resolution. With a PD Controller, the dynamic response can be adjusted to suit the application. Reference and limit switches are evaluated by means of various homing modes.
- **Speed profiles**
Acceleration ramps, deceleration ramps and maximum velocity can also be defined for each section. As a result, even complex profiles can be implemented quickly and effectively.
- **Current control**
Protects the drive by limiting the motor current to the set peak current. The current is limited to the continuous current by the integrated I²t monitoring if required.
- **Protective functions**
 - Protection against ESD
 - Overload protection for the electronic circuitry and the motor
 - Self-protection against overheating
 - Overvoltage protection in generator mode
- **Extended operating modes**
 - Stepper motor mode
 - Gearing mode
 - Position control to analog set point
 - Operation as servo amplifier in voltage adjuster mode
 - Torque/force controller using variable set current input

Interfaces - Discrete I/O

- **Setpoint input**
Depending on the operating mode, setpoints can be input via the serial port, via an analog voltage value, a PWM signal or a quadrature signal.
- **Error output (Open Collector)**
This can also be used as a digital input for the evaluation of reference switches or for specifying direction of rotation.
- **RS232 interface**
For connection to a PC with a transmission rate of up to 115 kbaud. The information can be stored in the integrated memory (FLASH).

The interface also offers the option of querying online operating data and values. The RS232 interface also allows the operation of several networked drives on one control.

Sensor interfaces (position and speed sensors, depending on motor type)

- **Analog Hall signals**
Three analog Hall signals, offset by 120°, for motor position and speed in the case of Brushless DC-Motors and Linear DC-Servomotors
- **Incremental encoders**
Incremental encoders for motor position and speed in the case of DC-Micromotors and as additional sensors for Brushless DC-Motors
- **Absolute encoders**
Serial SSI port for motor position and speed matching Brushless DC-Servomotors with an AES Encoder

RS232 Programming / Configuration

An extensive ASCII command set is available for programming and operation. This can be preset from the PC, e.g. via any Windows terminal program or via any other control computer.

In addition, even complex processes can be created from these commands and stored in the drive. Once programmed as a stepper motor, electronic gear or as a speed or position controller via the analogue input, the drive can be operated independently of the RS232 interface.

"Faulhaber Motion Manager" software is available for Windows operating systems. It considerably simplifies operation and configuration and also enables graphic online analysis of the operating data.

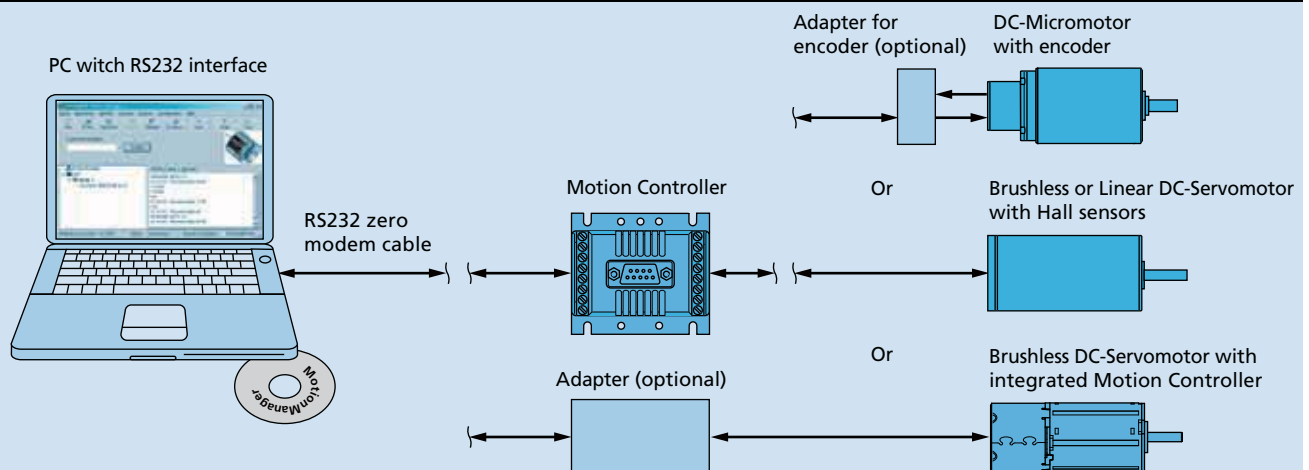
Options

Separate supply of power to the motor and electronic actuator is optional (important for safety-relevant applications), in which case no third input is required. Depending on the controller, additional programming adaptors and connection aids are available. The modes and parameters can be specially preconfigured on request

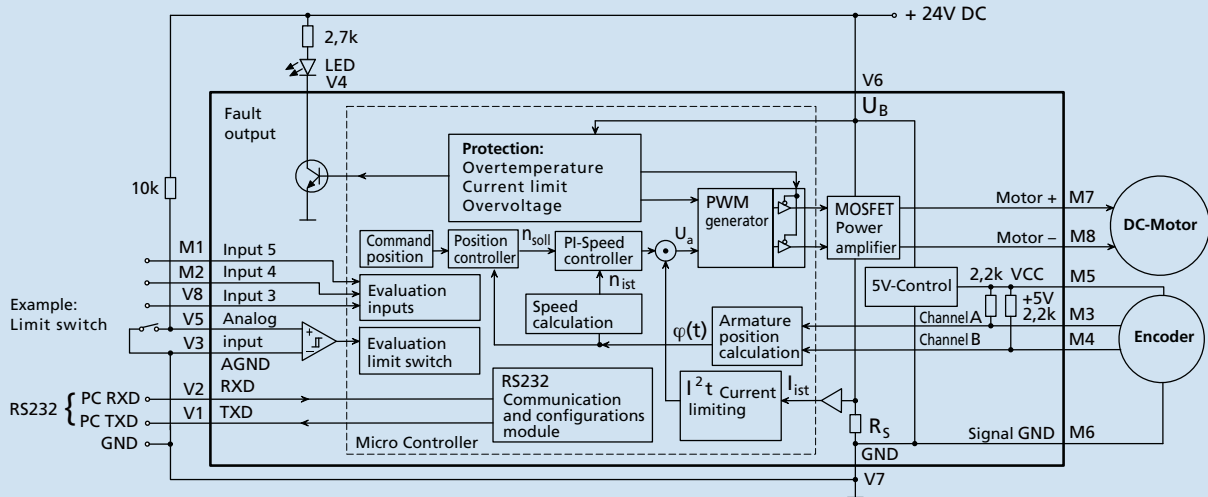
Notes

Motion Controllers and Motion Control Systems are accompanied by a **device manual** for installation and putting into operation. A communication and function manual and the "**Faulhaber Motion Manager**" software are available on request and on the Internet at www.faulhaber.com.

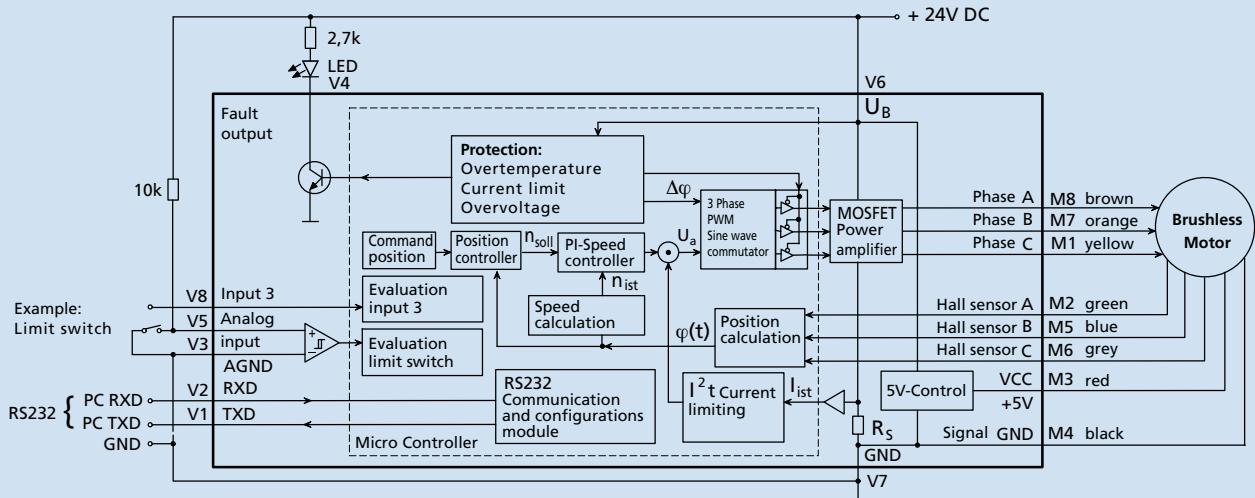
Connection diagram



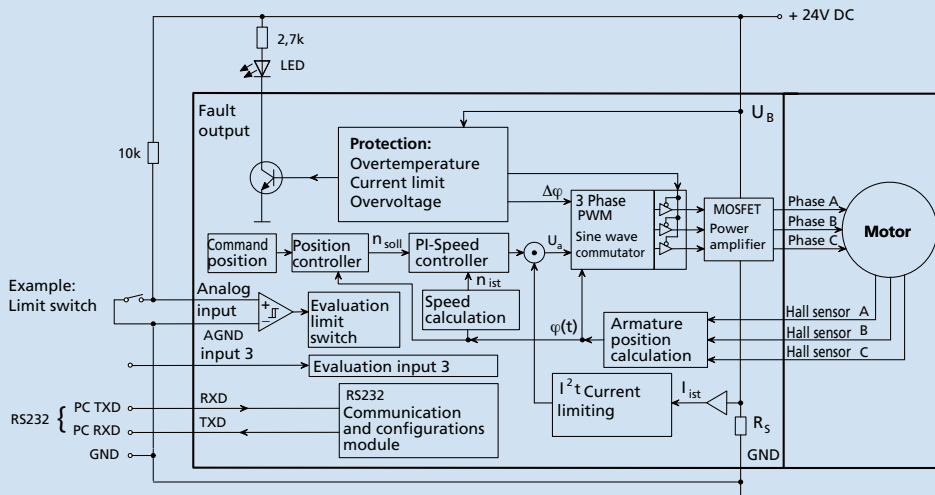
Position control DC-Micromotor with encoder



Position control Brushless DC-Servomotor with Hall sensors



Position control Brushless DC-Servomotor with integrated Motion Controller



MC Function / CAN

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PI speed control, even for demanding synchronization requirements
- **Positioning**
For moving to defined positions with a high level of resolution. With a PD Controller, the dynamic response can be adjusted to suit the application. Reference and limit switches are evaluated by means of various homing modes.
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Acceleration ramps, deceleration ramps and maximum velocity can also be defined for each section. As a result, even complex profiles can be implemented quickly and effectively.
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Interfaces - Discrete I/O

- **Setpoint input**
Depending on the operating mode, setpoints can be input via the serial port, via an analog voltage value, a PWM signal or a quadrature signal.
- **Error output (Open Collector)**
This can also be used as a digital input for the evaluation of reference switches or for specifying direction of rotation.
- **CANopen interface**
For integration into a CAN network with transfer rates of up to 1 Mbit/s. Via the CAN interface a number of drives can be networked and operated on a higher-level control.

Sensor interfaces (position and speed sensors, depending on motor type)

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CAN Programming / Configuration

FAULHABER Motion Controllers support the CANopen communication profile under DS301 V4.02 in accordance with the CiA specification for slave devices with the following services:

- 1 Server SDO
- 3 transmit PDOs, 3 receive PDOs
- Static PDO mapping
- NMT with node guarding
- Emergency Object

The transfer rate and node no. are set via the network in accordance with the LSS protocol conforming to DSP305 V1.11, and automatic baud rate detection is also implemented. In addition, all the functions and parameters of the drive unit can be easily activated via a special FAULHABER PDO channel.

As regards the CiA device profile for Motion Controllers (CiA 402), the following are supported:

- Profile Position Mode and Position Control Function
- Homing Mode
- Profile Velocity Mode

Also, for each Faulhaber command there is an appropriate CAN frame available on the PDO channel, with which the CAN unit can be operated in the same way as the serial variant and the extended operating modes can be supported.

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Options

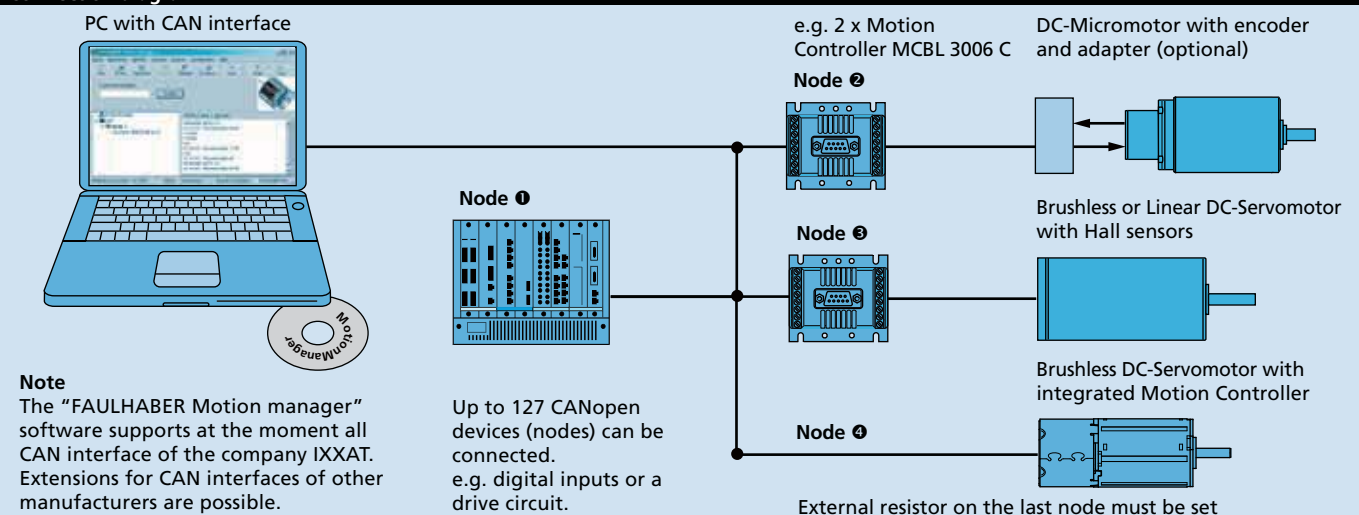
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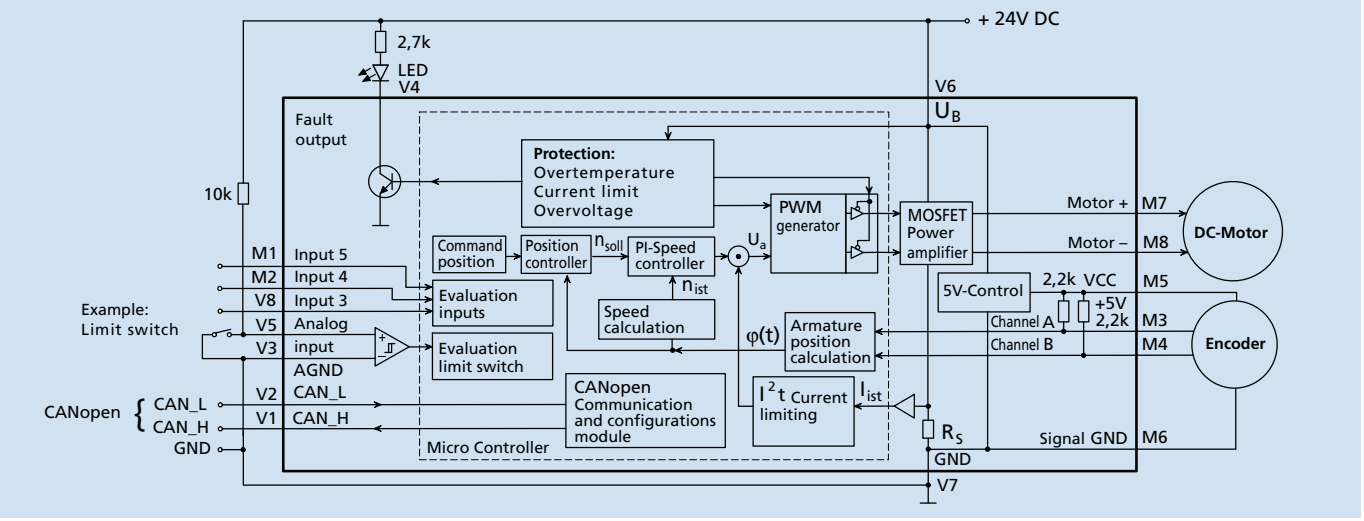
Note

The "FAULHABER Motion manager" software supports at the moment all CAN interface of the company IXXAT. Extensions for CAN interfaces of other manufacturers are possible.

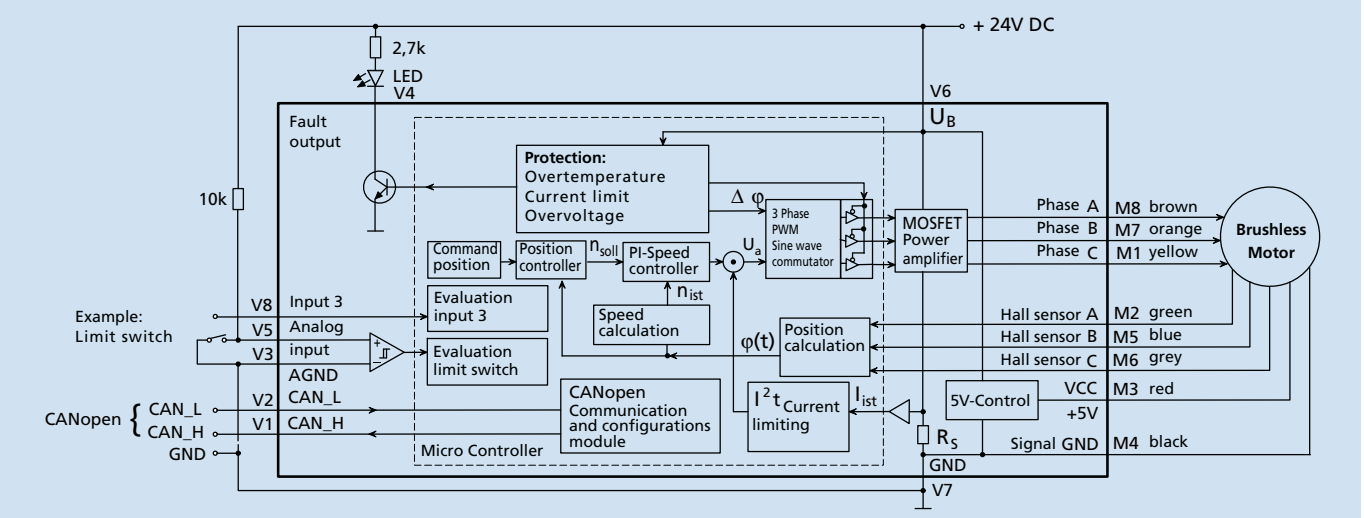
Up to 127 CANopen devices (nodes) can be connected.
e.g. digital inputs or a drive circuit.

External resistor on the last node must be set

Position control DC-Micromotor with encoder



Position control Brushless DC-Servomotor with Hall sensors



Position control Brushless DC-Servomotor with integrated Motion Controller

