NEW

FAULHABER

# Motion Controller

V3.0, 4-Quadrant PWM
with RS232, CANopen or EtherCAT interface

## Series MC 5004

| Values at 22°C and nominal voltage | | | MC 5004 P | |
|---|---|---|---|---|
| Power supply for electronics | $U_p$ | | 12 ... 50 | V |
| Power supply for motor | $U_{mot}$ | | 0 ... 50 | V |
| PWM switching frequency | $f_{PWM}$ | | 100 | kHz |
| Efficiency, electronics | $\eta$ | | 95 | % |
| Max. continuous output current | $I_{dauer}$ | | 4 | A |
| Max. peak output current [1] | $I_{max}$ | | 12 | A |
| Total standby current (at 24V) | $I_{el}$ | | RS / CO: 0,06 ET: 0,07 | A |
| Operating temperature range | | – 40 ... + 85 | | °C |
| Mass | | RS / CO: 22 ET: 47 | | g |

[1] S2 mode for max. 1s

| Interface | MC 5004 P RS/CO | MC 5004 P ET |
|---|---|---|
| Configuration with Motion Manager 6.0 | RS232 / USB | RS232 / USB |
| Fieldbus | RS 232 / CANopen | EtherCAT |

### Basic features

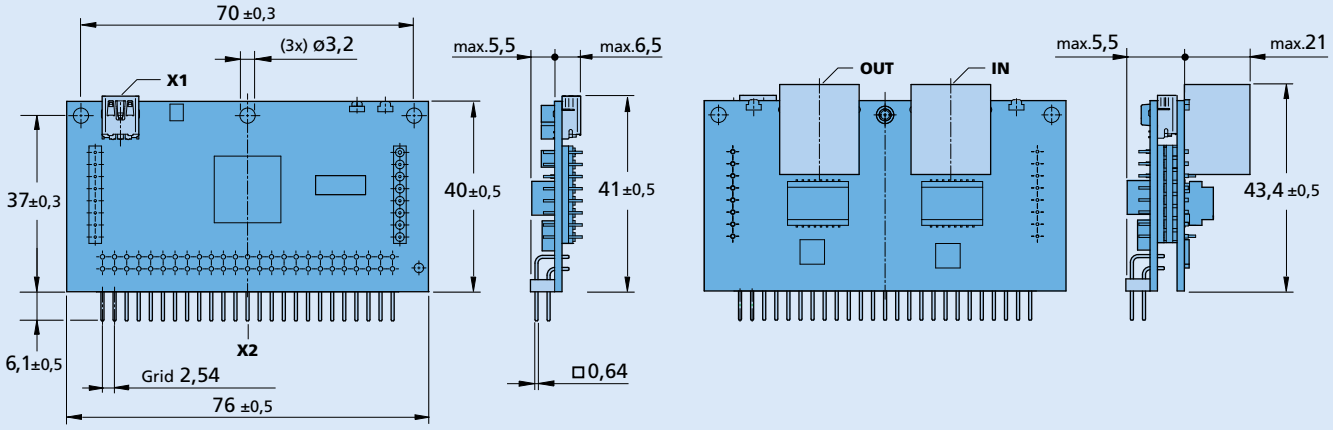
- Control of brushless, DC- and linear motors
- Supported sensor systems: absolute encoders (AES or SSI), incremental encoders (optical or magnetic), Hall sensors (digital or analog), tachometers.
- Position resolution when using analog Hall sensors as position encoders: 4096 increments per revolution.
- 8 digital inputs, 3 digital outputs, 2 analog inputs, flexible configuration.
- Setpoint specification via fieldbus, quadrature signal, pulse and direction or analog inputs.
- Optional stand-alone operation via application programs in all interface versions

| Range of functions | MC 5004 P |
|---|---|
| Operating modes | PP, PV, PT, CSP, CSV, CST and homing acc. to IEC 61800-7-201 or IEC 61800-7-301 as well as position-, speed- and torque control via analog setpoint or voltage controller |
| Speed range for brushless motors | 0 $min^{-1}$ … 30,000 $min^{-1}$ with sinusoidal commutation (optionally to 60,000 $min^{-1}$ with block commutation) |
| Application programs | Max. 8 application programs (BASIC), one of which is an autostart function |
| Additional functions | Touch-probe input, connection of a second incremental encoder, control of a holding brake |
| Indicator | 2 LEDs for displaying the operating state<br>Trace as recorder (scope function) or logger |
| Motor types | DC, BL- and linear motors |

For notes on technical data and lifetime performance refer to “Technical Information”.

## Dimensional drawing

Scale reduced




**MC 5004 P RS / CO**

**MC 5004 P ET**

## Option, cable and connection information

Example product designation: **MC 5004 P ET**

| Option | Type | Description |
|---|---|---|

### Connection

| Name | Function | Description |
|---|---|---|
| **X1** | USB configuration interface | USB |
| **X2** | Pin Header | Analog and digital input/output, motor and eletronic power supply, fieldbus, motor phases, sensors |
| **IN** | Fieldbus | EtherCAT IN |
| **OUT** | Fieldbus | EtherCAT OUT |

**Note:** For details on the connection assignment, see device manual for the MC 5004.

## Product Combinations

| DC-Motors | Brushless DC-Motors | Linear DC-Servomotors |
|---|---|---|
| 1319 ... SR | 1218 ... B | LM 1247 ... 11 |
| 1331 ... SR | 1226 ... B | LM 2070 ... 11 |
| 1516 ... SR | 1628 ... B | |
| 1524 ... SR | 2036 ... B | |
| 1717 ... SR | 2057 ... B | |
| 1724 ... SR | 2057 ... BHS | |
| 2224 ... SR | 2444 ... B | |
| 2232 ... SR | 3056 ... B | |
| 1336 ... CXR | 2232 ... BX4 | |
| 1727 ... CXR | 2250 ... BX4 | |
| 1741 ... CXR | 3242 ... BX4 | |
| 2237 ... CXR | 3268 ... BX4 | |
| 2642 ... CXR | | |
| 2657 ... CXR | | |
| 2342 ... CR | | |
| 2642 ... CR | | |
| 2657 ... CR | | |
| 2668 ... CR | | |

### Cables / Accessories

An extensive range of accessories is available for the products of the MC 5004 controller series.

A motherboard is available that can be used to operate up to four controllers in multi-axis operation (slave).

Furthermore, connection cables are available for controller and motor supply, sensors and interfaces as well as connector sets for the motor and supply side.

**Note:** Detailed information about the accessories can be found in the accessory manual, which is available for download on our homepage at www.faulhaber.com.

NEW

FAULHABER

# Motion Controller

V3.0, 4-Quadrant PWM
with RS232, CANopen or EtherCAT interface

## Series MC 5005

| Values at 22°C and nominal voltage | | MC 5005 S | |
|---|---|---|---|
| Power supply for electronics | $U_p$ | 12 ... 50 | V |
| Power supply for motor | $U_{mot}$ | 0 ... 50 | V |
| PWM switching frequency | $f_{PWM}$ | 100 | kHz |
| Efficiency, electronics | $\eta$ | 97 | % |
| Max. continuous output current | $I_{dauer}$ | 5 | A |
| Max. peak output current [1] | $I_{max}$ | 15 | A |
| Total standby current (at 24V) | $I_{el}$ | RS / CO: 0,06 ET: 0,07 | A |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | aluminium, powder-coated | |
| Mass | | RS / CO: 230 ET: 270 | g |

[1] S2 mode for max. 60s

| Interface | MC 5005 S RS | MC 5005 S CO | MC 5005 S ET |
|---|---|---|---|
| Configuration with Motion Manager 6.0 | RS232 / USB | CANopen / USB | RS232 / USB |
| Fieldbus | RS232 | CANopen | EtherCAT |

### Basic features

- Operation of brushless, DC- and linear motors
- Supported sensor systems: absolute encoders (AES or SSI), incremental encoders (optical or magnetic), Hall sensors (digital or analog), tachometers.
- Position resolution when using analog Hall sensors as position encoders: 4096 increments per revolution.
- 3 digital inputs, 2 digital outputs, 2 analog inputs, flexible configuration.
- Setpoint specification via fieldbus, quadrature signal, pulse and direction or analog inputs.
- Optional stand-alone operation via application programs in all interface versions

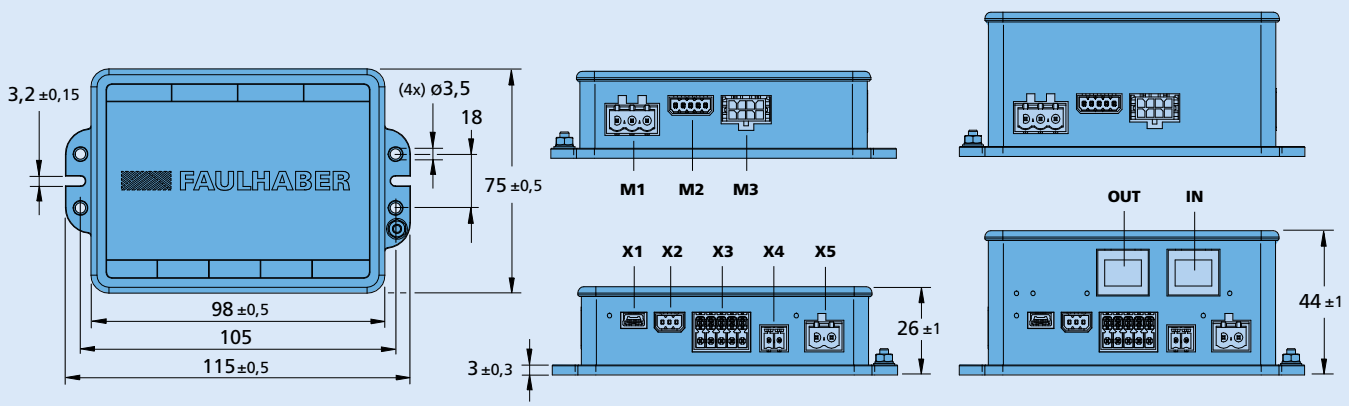
| Range of functions | MC 5005 S |
|---|---|
| Operating modes | PP, PV, PT, CSP, CSV, CST and homing acc. to IEC 61800-7-201 or IEC 61800-7-301 as well as position-, speed- and torque control via analog setpoint or voltage controller |
| Speed range for brushless motors | 0 $min^{-1}$ … 30,000 $min^{-1}$ with sinusoidal commutation (optionally to 60,000 $min^{-1}$ with block commutation) |
| Application programs | Max. 8 application programs (BASIC), one of which is an autostart function |
| Additional functions | Touch-probe input, connection of a second incremental encoder, control of a holding brake |
| Indicator | LEDs for displaying the operating state<br>Trace as recorder (scope function) or logger |
| Motor types | DC, BL- and linear motors |

For notes on technical data and lifetime performance refer to “Technical Information”.

Edition 2016 Apr. 01

## Dimensional drawing

Scale reduced




**MC 5005 S** | **MC 5005 S RS / CO** | **MC 5005 S ET**

## Option, cable and connection information

Example product designation: **MC 5005 S RS**

| Option | Type | Description |
|---|---|---|
| | | |

### Connection

| Name | Function | Input/Output | Description |
|---|---|---|---|
| **X1** | Configuration interface | | USB |
| **X2** | Fieldbus | | RS: RS232<br>CO: CANOpen |
| **X3** | Input/Output | DigIn1, DigIn2, DigIn3<br>DigOut1, DigOut2<br>AnIn1, AnIn2<br>$U_{out}$ / GND | TTL or PLC level<br>max. 0,7A cont. current<br>± 10V against AnGND<br>5V |
| **X4** | Electronic power supply | | |
| **X5** | Motor power supply | | |
| **M1** | Motor phases | A, B, C | |
| **M2** | Hall sensors | A, B, C<br>$U_{out}$ / GND | digital or analog<br>5V |
| **M3** | Encoder | A, $\overline{A}$, B, $\overline{B}$, I, $\overline{I}$<br>EN, $\overline{EN}$, CLOCK, $\overline{CLOCK}$, DATA, $\overline{DATA}$<br>$U_{out}$ / GND | max. 5MHz<br>AES or SSI<br>5V |
| **IN** | Fieldbus | | EtherCAT IN |
| **OUT** | Fieldbus | | EtherCAT OUT |

**Note:** For details on the connection assignment, see device manual for the MC 5005.

## Product Combinations

| DC-Motors | Brushless DC-Motors | Linear DC-Servomotors |
|---|---|---|
| 2237 ... CXR | 2036 ... B | LM 1247 ... 11 |
| 2642 ... CXR | 2057 ... B | LM 2070 ... 11 |
| 2657 ... CXR | 2057 ... BHS | |
| 2342 ... CR | 2444 ... B | |
| 2642 ... CR | 3056 ... B | |
| 2657 ... CR | 3564 ... B | |
| 3242 ... CR | 2232 ... BX4 | |
| 3257 ... CR | 2250 ... BX4 | |
| 3272 ... CR | 3242 ... BX4 | |
| | 3268 ... BX4 | |

### Cables / Accessories

An extensive range of accessories is available for the products of the MC 5010 and 5005 controller series.

Included here are connection cables for controller and motor supply, sensors and interfaces, connector sets for motor- and supply side as well as mechanical components for optional top hat rail mounting.

**Note:** Detailed information about the accessories can be found in the accessory manual, which is available for download on our homepage at www.faulhaber.com.

NEW

FAULHABER

# Motion Controller

V3.0, 4-Quadrant PWM
with RS232, CANopen or EtherCAT interface

## Series MC 5010

| Values at 22°C and nominal voltage | | | MC 5010 S | |
|---|---|---|---|---|
| Power supply for electronics | $U_P$ | | 12 ... 50 | V |
| Power supply for motor | $U_{mot}$ | | 0 ... 50 | V |
| PWM switching frequency | $f_{PWM}$ | | 100 | kHz |
| Efficiency, electronics | $\eta$ | | 97 | % |
| Max. continuous output current | $I_{dauer}$ | | 10 | A |
| Max. peak output current [1] | $I_{max}$ | | 30 | A |
| Total standby current (at 24V) | $I_{el}$ | | RS / CO: 0,06 ET: 0,07 | A |
| Operating temperature range | | – 40 ... + 85 | | °C |
| Housing material | | aluminium, powder-coated | | |
| Mass | | RS / CO: 230 ET: 270 | | g |

[1] S2 mode for max. 3s

| Interface | MC 5010 S RS | MC 5010 S CO | MC 5010 S ET |
|---|---|---|---|
| Configuration with Motion Manager 6.0 | RS232 / USB | CANopen / USB | RS232 / USB |
| Fieldbus | RS232 | CANopen | EtherCAT |

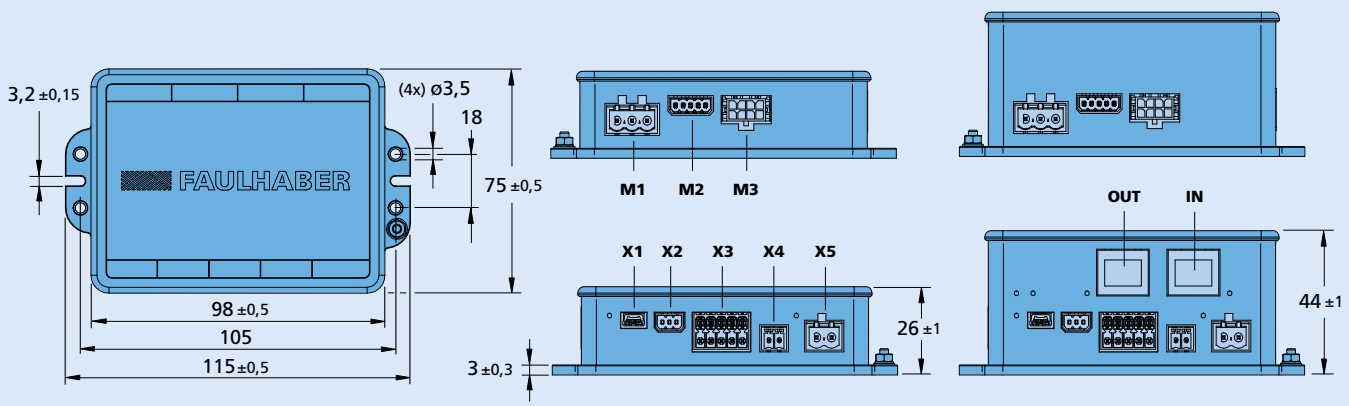
### Basic features

- Operation of brushless, DC- and linear motors
- Supported sensor systems: absolute encoders (AES or SSI), incremental encoders (optical or magnetic), Hall sensors (digital or analog), tachometers.
- Position resolution when using analog Hall sensors as position encoders: 4096 increments per revolution.
- 3 digital inputs, 2 digital outputs, 2 analog inputs, flexible configuration.
- Setpoint specification via fieldbus, quadrature signal, pulse and direction or analog inputs.
- Optional stand-alone operation via application programs in all interface versions

| Range of functions | MC 5010 S |
|---|---|
| Operating modes | PP, PV, PT, CSP, CSV, CST and homing acc. to IEC 61800-7-201 or IEC 61800-7-301 as well as position-, speed- and torque control via analog setpoint or voltage controller |
| Speed range for brushless motors | 0 $min^{-1}$ … 30,000 $min^{-1}$ (with sinusoidal commutation) |
| Application programs | Max. 8 application programs (BASIC), one of which is an autostart function |
| Additional functions | Touch-probe input, connection of a second incremental encoder, control of a holding brake |
| Indicator | 2 LEDs for displaying the operating state<br>Trace as recorder (scope function) or logger |
| Motor types | DC, BL- and linear motors |

## Dimensional drawing

Scale reduced




**MC 5010 S** | **MC 5010 S RS / CO** | **MC 5010 S ET**

## Option, cable and connection information

Example product designation: **MC 5010 S RS**

| Option | Type | Description |
|---|---|---|
| | | |

### Connection

| Name | Function | Input/Output | Description |
|---|---|---|---|
| **X1** | Configuration interface | | USB |
| **X2** | Fieldbus | | RS: RS232<br>CO: CANOpen |
| **X3** | Input/Output | DigIn1, DigIn2, DigIn3<br>DigOut1, DigOut2<br>AnIn1, AnIn2<br>$U_{out}$ / GND | TTL or PLC level<br>max. 0,7A cont. current<br>± 10V against AnGND<br>5V |
| **X4** | Electronic power supply | | |
| **X5** | Motor power supply | | |
| **M1** | Motor phases | A, B, C | |
| **M2** | Hall sensors | A, B, C<br>$U_{out}$ / GND | digital or analog<br>5V |
| **M3** | Encoder | A, $\overline{A}$, B, $\overline{B}$, I, $\overline{I}$<br>EN, $\overline{EN}$, CLOCK, $\overline{CLOCK}$, DATA, $\overline{DATA}$<br>$U_{out}$ / GND | max. 5MHz<br>AES or SSI<br>5V |
| **IN** | Fieldbus | | EtherCAT IN |
| **OUT** | Fieldbus | | EtherCAT OUT |

**Note:** For details on the connection assignment, see device manual for the MC 5010.

## Product Combination

| DC-Motors | Brushless DC-Motors | Linear DC-Servomotors |
|---|---|---|
| 3242 ... CR<br>3257 ... CR<br>3272 ... CR<br>3863 ... CR<br>3890 ... CR | 3242 ... BX4<br>3268 ... BX4<br>3274 ... BP4<br>3564 ... B<br>4490 ... B<br>4490 ... BS | |

### Cables / Accessories

An extensive range of accessories is available for the products of the MC 5010 and 5005 controller series.

Included here are connection cables for controller and motor supply, sensors and interfaces, connector sets for motor- and supply side as well as mechanical components for optional DIN rail mounting.

**Note:** Detailed information about the accessories can be found in the accessory manual, which is available for download on our homepage at www.faulhaber.com.

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
DC-Micromotors

## Series MCDC 3002

| | | MCDC 3002 P | MCDC 3002 F | MCDC 3002 S | |
|---|---|---|---|---|---|
| Power supply | $U_B$ | 5 ... 30 | 5 ... 30 | 5 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | 78,12 | 78,12 | kHz |
| Efficiency | $\eta$ | 95 | 95 | 95 | % |
| Max. continuous output current [1] | $I_{dauer}$ | 2 | 2 | 2 | A |
| Max. peak output current | $I_{max}$ | 3 | 3 | 3 | A |
| Total standby current | $I_{el}$ | 0,04 | 0,04 | 0,04 | A |
| Speed range | | 5 ... 30 000 | 5 ... 30 000 | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 100 | 100 | 100 | µs |
| | | | | | |
| External encoder resolution | | ≤ 65 535 | ≤ 65 535 | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 5 | 5 | 5 | |
| | | | | | |
| Program memory: [2] | | | | | |
| – memory size | | 3,3 | 3,3 | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | ca. 1 000 | ca. 1 000 | instructions |
| | | | | | |
| Operating temperature range | | – 25 ... + 85 | – 25 ... + 85 | – 25 ... + 85 | °C |
| Weight | | 7 | 13 | 16 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | | |
| | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 5 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 5 ... 30 | | V DC |
| | | | | | |
| **Connection 16 "5. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| | | | | | |
| **Connection 9 "4. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |

## Connection information

| | | | | |
|---|---|---|---|---|
| **Connection 10-11 “Ch A”, “Ch B”:** | | | | |
| Encoder input | CH A | | encoder channel A | |
| | CH B | | encoder channel B | |
| Integrated pullup resistance + 5V | | $R$ | 2,2 | kΩ |
| | | $f$ | ≤ 400 | kHz |
| | | | | |
| **Connection 12 “Ucc”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| | | | | |
| **Connection 13 “SGND”:** | | | | |
| Signal GND | | | signal ground | |
| | | | | |
| **Connection 14-15 “Mot +”, “Mot -”:** | | | | |
| Motor connection | Mot + | | Motor + | |
| | Mot – | | Motor – | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. encoder

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...4,5V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 2,5V... $U_B$

**Options**

- Separate power supply (Option no.: 3085)

**Full product description**

- Example:

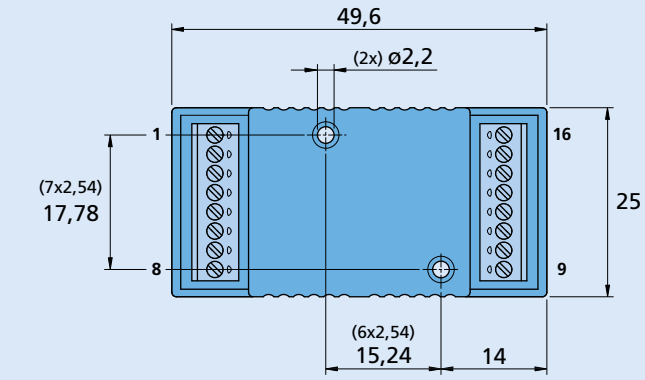
  **MCDC 3002 S RS** (RS232)
  **MCDC 3002 F CF** (CANopen with FAULHABER CAN)
  **MCDC 3002 P CO** (CANopen CiA)

## Accessories

| | | Motor Type | Part No. for MCDC 3002 S |
|---|---|---|---|
| **Encoder adapter** | **IE2** | DC | **6501.00143** |
| | **PA2-50 / PA2-100** | DC | **6501.00144** |
| | **HEM3-256** [1] | DC | **6501.00146** |
| | **HXM3-64** | DC | **6501.00145** |
| | | | for MCDC 3002 S, F |
| **Programming adapter** | **RS232/CAN** | DC | **6501.00121** |

[1] Only for $U_{DD\ Enc}$ = 5V

## Dimensional drawing and connection information MCDC 3002 S




**MCDC 3002 S**

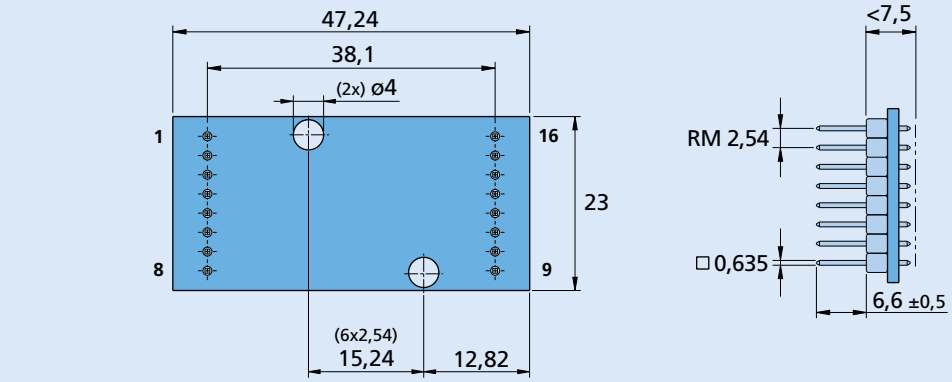
### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | 4. In |
| 10 | Ch A |
| 11 | CH B |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Mot + |
| 15 | Mot - |
| 16 | 5. In |

## Dimensional drawing and connection information MCDC 3002 P




**MCDC 3002 P**

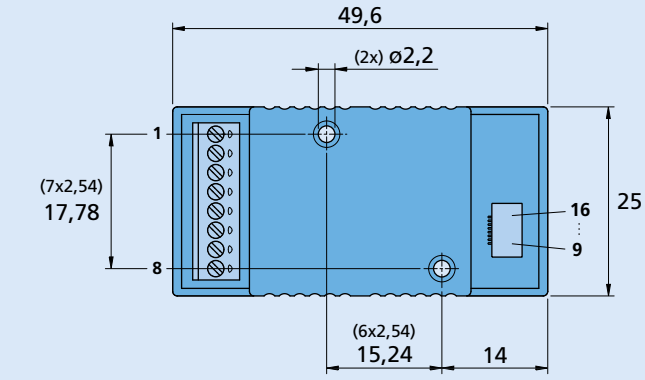
### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | 4. In |
| 10 | Ch A |
| 11 | CH B |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Mot + |
| 15 | Mot - |
| 16 | 5. In |

## Dimensional drawing and connection information MCDC 3002 F




**MCDC 3002 F**

**Connector Information**
LIF-Connector 8-pole

### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | 4. In |
| 10 | Ch A |
| 11 | CH B |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Mot + |
| 15 | Mot - |
| 16 | 5. In |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
DC-Micromotors

## Series MCDC 3003

| | | MCDC 3003 P | |
|---|---|---|---|
| Power supply | $U_B$ | 12 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | kHz |
| Efficiency | $\eta$ | 95 | % |
| Max. continuous output current [1] | $I_{dauer}$ | 3 | A |
| Max. peak output current | $I_{max}$ | 10 | A |
| Total standby current | $I_{el}$ | 0,06 | A |
| Speed range | | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 100 | µs |
| | | | |
| External encoder resolution | | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 5 | |
| | | | |
| Program memory: [2] | | | |
| – memory size | | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | instructions |
| | | | |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | without housing | |
| Weight | | 18 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | | |
| | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 12 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 12 ... 30 | | V DC |
| | | | | | |
| **Connection 9 "5. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| | | | | | |
| **Connection 10 "4. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |

For notes on technical data and lifetime performance refer to "Technical Information".
**Edition 2016**

| Connection information | | | | |
|---|---|---|---|---|
| **Connection 11-12 “Ch A”, “Ch B”:** | | | | |
| Encoder input | CH A | | encoder channel A | |
| | CH B | | encoder channel B | |
| Integrated pullup resistance + 5V | | $R$ | 2,2 | kΩ |
| | | $f$ | ≤ 400 | kHz |
| **Connection 13 “$U_{CC}$”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| **Connection 14 “SGND”:** | | | | |
| Signal GND | | | signal ground | |
| **Connection 15-16 “Mot +”, “Mot -”:** | | | | |
| Motor connection | Mot + | | Motor + | |
| | Mot – | | Motor – | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. encoder

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...7V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 3,5V... $U_B$

**Options**

- Separate power supply (Option no.: 3085)

**Full product description**

- Example:

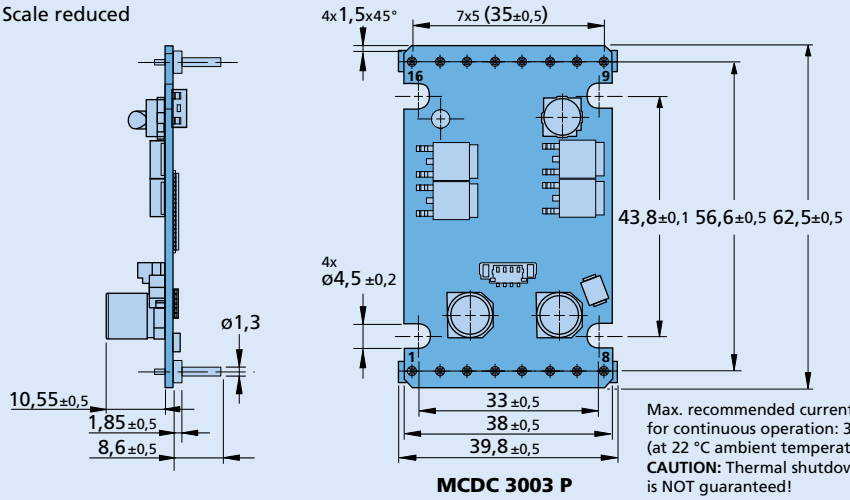
  **MCDC 3003 P RS** (RS232)

  **MCDC 3003 P CF** (CANopen with FAULHABER CAN)

  **MCDC 3003 P CO** (CANopen CiA)

## Dimensional drawing and connection information MCDC 3003 P

Scale reduced




**MCDC 3003 P**

Max. recommended current for continuous operation: 3A (at 22 °C ambient temperature)
**CAUTION:** Thermal shutdown is NOT guaranteed!

**Connection**

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |
| 9 | 5. In |
| 10 | 4. In |
| 11 | Ch A |
| 12 | Ch B |
| 13 | $U_{CC}$ |
| 14 | SGND |
| 15 | Mot + |
| 16 | Mot – |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
DC-Micromotors

## Series MCDC 3006

| | | MCDC 3006 S | |
|---|---|---|---|
| Power supply | $U_B$ | 12 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | kHz |
| Efficiency | $\eta$ | 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 | | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 100 | µs |
| | | | |
| External encoder resolution | | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 5 | |
| | | | |
| Program memory: [2] | | | |
| – memory size | | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | instructions |
| | | | |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | zinc, black coated | |
| Weight | | 160 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | |
|---|---|---|---|---|
| **Connection communication:** | | | | |
| Interface | | RS232 | CAN | |
| Communication profile | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | 1 | Mbit/s |
| | | | | |
| **Connection 3 “AGND”:** | | | | |
| – analog ground | | analog GND | | |
| – digital input | external encoder | channel B | | |
| | $R_{In}$ | 10 | | kΩ |
| | $f$ | ≤ 400 | | kHz |
| **Connection 4 “Fault”:** | | | | |
| – digital input | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | $U$ | ≤ $U_B$ | | V |
| | $I$ | ≤ 30 | | mA |
| | clear | switched to GND | | |
| | set | high-impedance | | |
| | fault output | no error | switched to GND | |
| | | error | high-impedance | |
| | | | | |
| **Connection 5 “AnIn”:** | | “AGND” as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | |
| | external encoder | | channel A | |
| | | $f$ | ≤ 400 | kHz |
| | step frequency input | $f$ | ≤ 400 | kHz |
| | | $R_{In}$ | 5 | kΩ |
| | | | | |
| **Connection 6 “$U_B$”:** | $U_B$ | 12 ... 30 | | V DC |
| | | | | |
| **Connection 7 “GND”:** | | ground | | |
| | | | | |
| **Connection 8 “3. In”:** | | | | |
| – digital input | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | $U_{EL}$ | 12 ... 30 | | V DC |
| | | | | |
| **Connection 9 “5. In”:** | | | | |
| – digital input | $R_{In}$ | 22 | | kΩ |
| | | | | |
| **Connection 10 “4. In”:** | | | | |
| – digital input | $R_{In}$ | 22 | | kΩ |

For notes on technical data and lifetime performance refer to “Technical Information”.
**Edition 2016**

| Connection information | | | | |
|---|---|---|---|---|
| **Connection 11-12 “Ch A”, “Ch B”:** | | | | |
| Encoder input | CH A | | encoder channel A | |
| | CH B | | encoder channel B | |
| Integrated pullup resistance + 5V | | $R$ | 2,2 | kΩ |
| | | $f$ | ≤ 400 | kHz |
| | | | | |
| **Connection 13 “Ucc”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| | | | | |
| **Connection 14 “SGND”:** | | | | |
| Signal GND | | | signal ground | |
| | | | | |
| **Connection 15-16 “Mot +”, “Mot -”:** | | | | |
| Motor connection | Mot + | | Motor + | |
| | Mot – | | Motor – | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. encoder
The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...7V / High 12,5V...$U_B$, TTL: Low 0...0,5V / High 3,5V...$U_B$

| D-SUB-connector information | | |
|---|---|---|
| **Connection D-SUB-connector:** | **RS232** | **CAN** |
| Pin 2 | RxD | CAN-L |
| Pin 3 | TxD | GND |
| Pin 5 | GND | - |
| Pin 7 | - | CAN-H |

**Options**

- Separate power supply (Option no.: 3085)

**Accessories**

- 6501.00128: USB-CAN-Adapter
  (only for version with CAN interface)
- 6501.00131: USB-RS232 Adapter
  (only for version with serial interface)
- 6501.00063: Adapter for motors with IE2 Encoder
- 6501.00064: Adapter for motors with HEDL Encoder

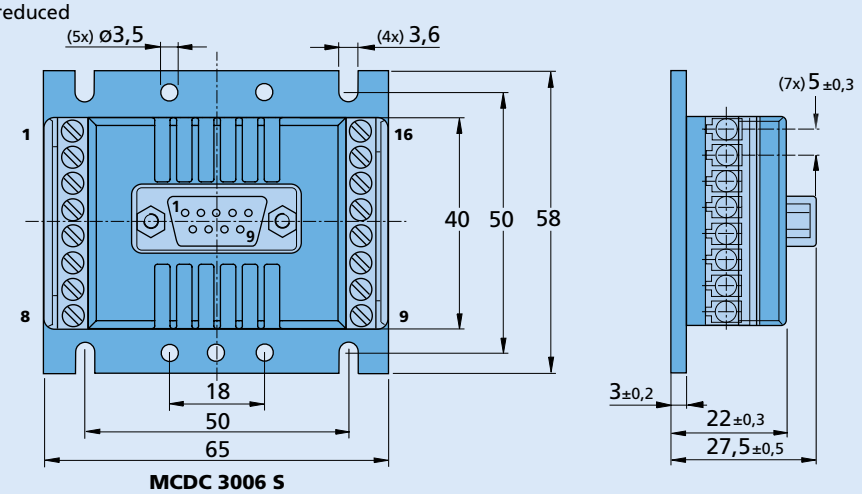
**Full product description**

- Example:

  **MCDC 3006 S RS** (RS232)
  **MCDC 3006 S CF** (CANopen with FAULHABER CAN)
  **MCDC 3006 S CO** (CANopen CiA)

## Dimensional drawing and connection information MCDC 3006 S

Scale reduced




MCDC 3006 S

**Supply connection**

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

**Motor connection**

| No. | Function |
|---|---|
| 9 | 5. In |
| 10 | 4. In |
| 11 | Ch A |
| 12 | Ch B |
| 13 | Ucc |
| 14 | SGND |
| 15 | Mot + |
| 16 | Mot – |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Brushless DC-Servomotors
with analog Hall sensors

## Series MCBL 3002

| | | MCBL 3002 P | MCBL 3002 F | MCBL 3002 S | |
|---|---|---|---|---|---|
| Power supply | $U_B$ | 5 ... 30 | 5 ... 30 | 5 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | 78,12 | 78,12 | kHz |
| Efficiency | $\eta$ | 95 | 95 | 95 | % |
| Max. continuous output current [1] | $I_{dauer}$ | 2 | 2 | 2 | A |
| Max. peak output current | $I_{max}$ | 3 | 3 | 3 | A |
| Total standby current | $I_{el}$ | 0,04 | 0,04 | 0,04 | A |
| Speed range | | 5 ... 30 000 | 5 ... 30 000 | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 200 | 200 | 200 | µs |
| | | | | | |
| Encoder resolution with linear Hall Sensors | | 3 000 | 3 000 | 3 000 | inc./rev. |
| Resolution with external encoder | | ≤ 65 535 | ≤ 65 535 | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 3 | 3 | 3 | |
| | | | | | |
| Program memory: [2] | | | | | |
| – memory size | | 3,3 | 3,3 | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | ca. 1 000 | ca. 1 000 | instructions |
| | | | | | |
| Operating temperature range | | – 25 ... + 85 | – 25 ... + 85 | – 25 ... + 85 | °C |
| Weight | | 7 | 13 | 16 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | signal output | $f$ | ≤ 2 | | kHz |
| | | resolution | 1...255 | | inc./rev. |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | | |
| | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 5 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 5 ... 30 | | V DC |

For notes on technical data and lifetime performance refer to "Technical Information".
**Edition 2016**

## Connection information

| | | | | |
|---|---|---|---|---|
| **Connection 9-11 „Sensor A, B, C“:** | | | | |
| Hall sensor input | Sensor A | | Hall Sensor A | |
| | Sensor B | | Hall Sensor B | |
| | Sensor C | | Hall Sensor C | |
| | | $U_{In}$ | ≤ 5 | V |
| **Connection 12 “Ucc”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| **Connection 13 “SGND”:** | | | | |
| Signal GND | | | Signal masse | |
| **Connection 14-16 „Motor A, B, C“:** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. Hall sensor

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...4,5V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 2,5V... $U_B$

**Options**

- Separate power supply (Option no.: 3085)

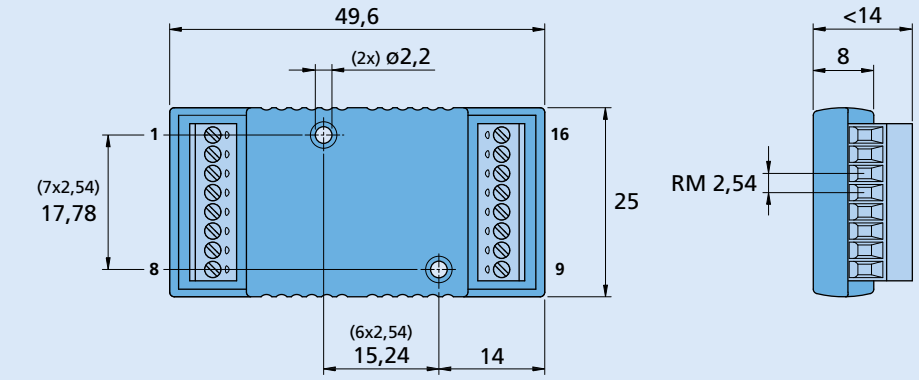
**Full product description**

- Example:
  **MCBL 3002 S RS** (RS232)
  **MCBL 3002 F CF** (CANopen with FAULHABER CAN)
  **MCBL 3002 P CO** (CANopen CiA)

## Accessories

| | | Motor Type | Part No. for MCBL 3002 S |
|---|---|---|---|
| **Motor connector adapter** | **0620 ... B** | BL | **6501.00083** |
| | | | for MCBL 3002 S, F |
| **Programming adapter** | **RS232/CAN** | BL | **6501.00121** |

## Dimensional drawing and connection information MCBL 3002 S




**MCBL 3002 S**

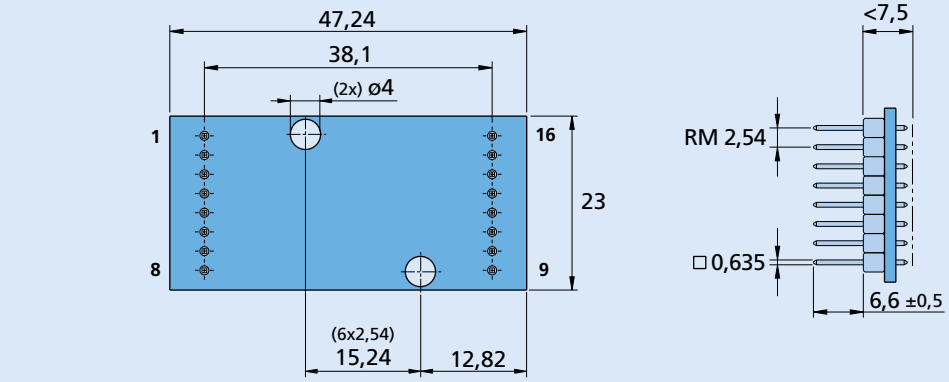
### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

## Dimensional drawing and connection information MCBL 3002 P




**MCBL 3002 P**

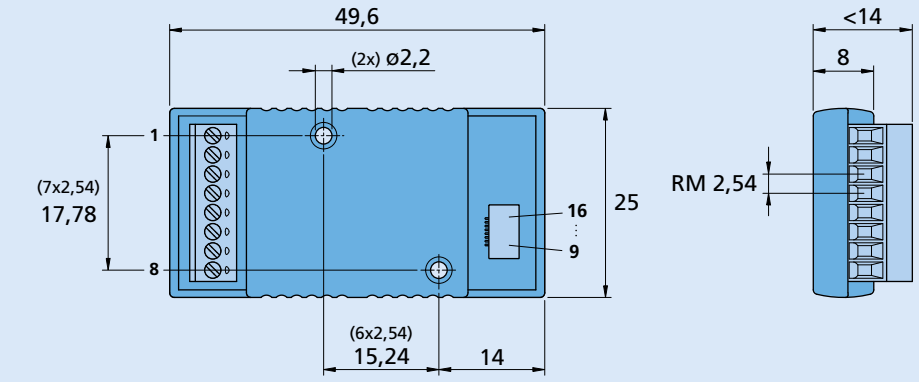
### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

## Dimensional drawing and connection information MCBL 3002 F




**MCBL 3002 F**

### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

**Connector Information**
LIF-Connector 8-pole

For notes on technical data and lifetime performance refer to “Technical Information”.

**Edition 2016**

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Brushless DC-Servomotors
with analog Hall sensors

## Series MCBL 3003

| | | MCBL 3003 P | |
|---|---|---|---|
| Power supply | $U_B$ | 12 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | kHz |
| Efficiency | $\eta$ | 95 | % |
| Max. continuous output current [1] | $I_{dauer}$ | 3 | A |
| Max. peak output current | $I_{max}$ | 10 | A |
| Total standby current | $I_{el}$ | 0,06 | A |
| Speed range | | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 200 | µs |
| | | | |
| Encoder resolution with linear Hall Sensors | | ≤ 3 000 | inc./rev. |
| Resolution with external encoder | | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 3 | |
| | | | |
| Program memory: [2] | | | |
| – memory size | | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | instructions |
| | | | |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | without housing | |
| Weight | | 18 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | signal output | $f$ | ≤ 2 | | kHz |
| | | resolution | 1...255 | | inc./rev. |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | | |
| | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 12 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 12 ... 30 | | V DC |

For notes on technical data and lifetime performance refer to "Technical Information".
**Edition 2016**

## Connection information

| | | | | |
|---|---|---|---|---|
| **Connection 9-11 „Sensor A, B, C“:** | | | | |
| Hall sensor input | Sensor A | | Hall sensor A | |
| | Sensor B | | Hall sensor B | |
| | Sensor C | | Hall sensor C | |
| | | $U_{In}$ | ≤ 5 | V |
| **Connection 12 “Ucc”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V DC |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| **Connection 13 “SGND”:** | | | | |
| Signal GND | | | Signal ground | |
| **Connection 14-16 „Motor A, B, C“:** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 … $U_B$ | V |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. Hall sensor

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...7V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 3,5V... $U_B$

### Options

- Separate power supply (Option no.: 3085)

### Full product description

- Example:

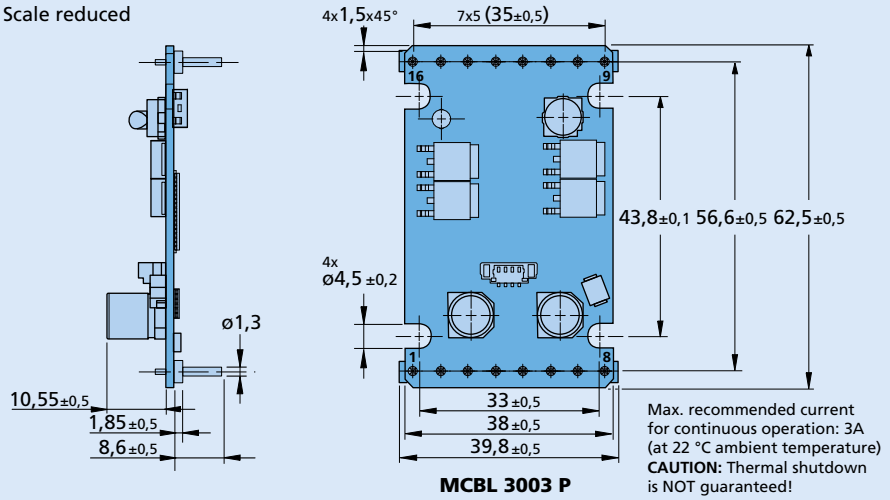
  **MCBL 3003 P RS** (RS232)

  **MCBL 3003 P CF** (CANopen with FAULHABER CAN)

  **MCBL 3003 P CO** (CANopen CiA)

## Dimensional drawing and connection information for MCBL 3003 P

Scale reduced




**MCBL 3003 P**

Max. recommended current for continuous operation: 3A (at 22 °C ambient temperature)
**CAUTION:** Thermal shutdown is NOT guaranteed!

### Connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | Ucc |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Brushless DC-Servomotors
with analog Hall sensors

## Series MCBL 3006

| | | MCBL 3006 S | |
|---|---|---|---|
| Power supply | $U_B$ | 12 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | kHz |
| Efficiency | $\eta$ | 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 | | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 200 | µs |
| | | | |
| Encoder resolution with linear Hall Sensors | | ≤ 3 000 | inc./rev. |
| Resolution with external encoder | | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 3 | |
| | | | |
| Program memory: [2] | | | |
| – memory size | | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | instructions |
| | | | |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | zinc, black coated | |
| Weight | | 160 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | signal output | $f$ | ≤ 2 | | kHz |
| | | resolution | 1...255 | | inc./rev. |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | | |
| | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 12 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 12 ... 30 | | V DC |

| Connection information | | | | |
|---|---|---|---|---|
| **Connection 9-11 „Sensor A, B, C“:** | | | | |
| Hall sensor input | Sensor A | | Hall Sensor A | |
| | Sensor B | | Hall Sensor B | |
| | Sensor C | | Hall Sensor C | |
| | | $U_{In}$ | ≤ 5 | V |
| **Connection 12 “Ucc”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| | | | | |
| **Connection 13 “SGND”:** | | | | |
| Signal GND | | | Signal masse | |
| | | | | |
| **Connection 14-16 „Motor A, B, C“:** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. Hall sensor

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...7V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 3,5V... $U_B$

| D-SUB-connector information | | |
|---|---|---|
| **Connection D-SUB-connector:** | **RS232** | **CAN** |
| Pin 2 | RxD | CAN-L |
| Pin 3 | TxD | GND |
| Pin 5 | GND | - |
| Pin 7 | - | CAN-H |

**Options**

- Separate power supply (Option no.: 3085)

**Accessories**

- 6501.00128: USB-CAN-Adapter
  (only for version with CAN interface)
- 6501.00131: USB-RS232 Adapter
  (only for version with serial interface)
- 6501.00086: Adapter for BX4 Motors with connector

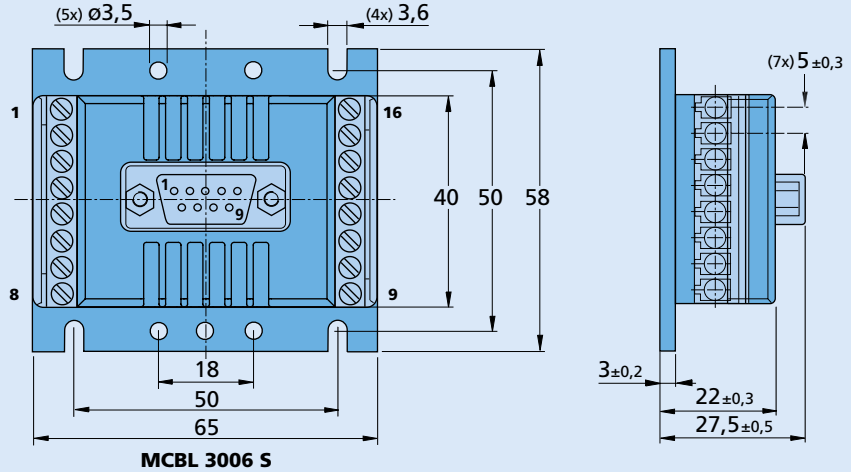
**Full product description**

- Example:

  **MCBL 3006 S RS** (RS232)
  **MCBL 3006 S CF** (CANopen with FAULHABER CAN)
  **MCBL 3006 S CO** (CANopen CiA)

## Dimensional drawing and connection information MCBL 3006 S

Scale reduced




MCBL 3006 S

**Supply connection**

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

**Motor connection**

| No. | Function |
|---|---|
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | Ucc |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Brushless DC-Servomotors
with absolute encoder

## Series MCBL 3002 AES

| | | MCBL 3002 P AES | MCBL 3002 F AES | MCBL 3002 S AES | |
|---|---|---|---|---|---|
| Power supply | $U_B$ | 5 ... 30 | 5 ... 30 | 5 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | 78,12 | 78,12 | kHz |
| Efficiency | $\eta$ | 95 | 95 | 95 | % |
| Max. continuous output current [1] | $I_{dauer}$ | 2 | 2 | 2 | A |
| Max. peak output current | $I_{max}$ | 3 | 3 | 3 | A |
| Total standby current | $I_{el}$ | 0,04 | 0,04 | 0,04 | A |
| Speed range | | 5 ... 30 000 | 5 ... 30 000 | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 100 | 100 | 100 | µs |
| | | | | | |
| Encoder resolution with AES encoder | | ≤ 4 096 | ≤ 4 096 | ≤ 4 096 | inc./rev. |
| Resolution with external encoder | | ≤ 65 535 | ≤ 65 535 | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 3 | 3 | 3 | |
| | | | | | |
| Program memory: [2] | | | | | |
| – memory size | | 3,3 | 3,3 | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | ca. 1 000 | ca. 1 000 | instructions |
| | | | | | |
| Operating temperature range | | – 25 ... + 85 | – 25 ... + 85 | – 25 ... + 85 | °C |
| Weight | | 7 | 13 | 16 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | signal output | $f$ | ≤ 2 | | kHz |
| | | resolution | 1...32 | | inc./rev. |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | | |
| | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 5 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 5 ... 30 | | V DC |

For notes on technical data and lifetime performance refer to "Technical Information".
**Edition 2016**

| Connection information | | | | |
|---|---|---|---|---|
| **Connection 9-11 „DATA, CS, CLK ":** | | | | |
| | DATA | $U_{In}$ | ≤ 5 | V |
| | $\overline{CS}$ | $U_{Out}$ | 0 ... 5 | V |
| | CLK | $U_{Out}$ | 0 ... 5 | |
| **Connection 12 "Ucc":** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| **Connection 13 "SGND":** | | | | |
| Signal GND | | | Signal ground | |
| **Connection 14-16 „Motor A, B, C":** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. encoder

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...4,5V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 2,5V... $U_B$

**Options**

- Separate power supply (Option no.: 3085)

**Full product description**

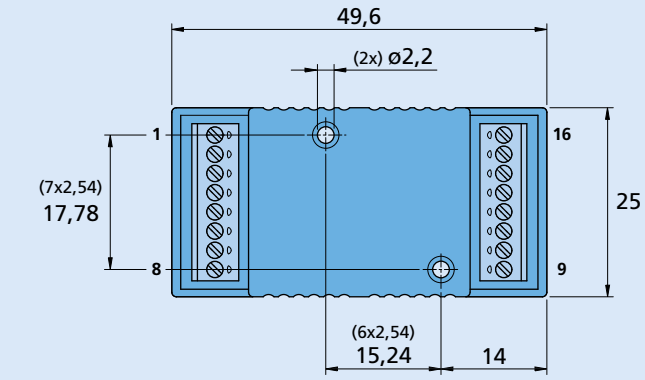
- Example:

  **MCBL 3002 S AES RS** (RS232)
  **MCBL 3002 F AES CF** (CANopen with FAULHABER CAN)
  **MCBL 3002 P AES CO** (CANopen CiA)

**Accessories**

| | | Motor Type | Part No. for MCBL 3002 S AES, F AES |
|---|---|---|---|
| **Programming adapter** | **RS232/CAN** | BL | **6501.00121** |

## Dimensional drawing and connection information MCBL 3002 S AES




**MCBL 3002 S AES**

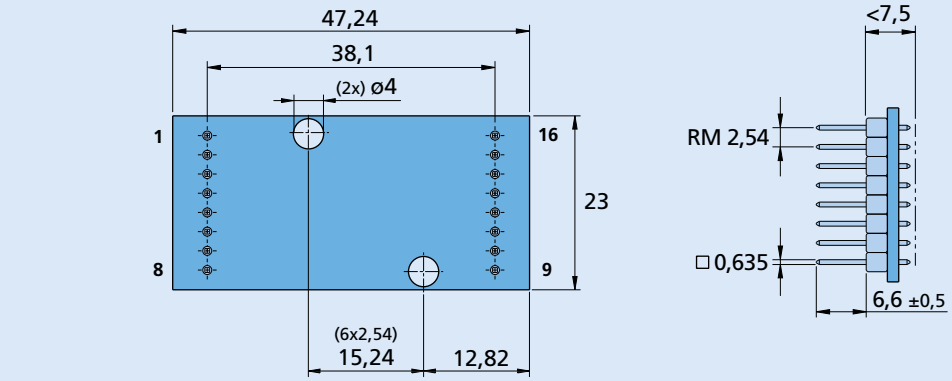
### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A / DATA |
| 10 | Sensor B / $\overline{CS}$ |
| 11 | Sensor C / CLK |
| 12 | UCC |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

## Dimensional drawing and connection information MCBL 3002 P AES




**MCBL 3002 P AES**

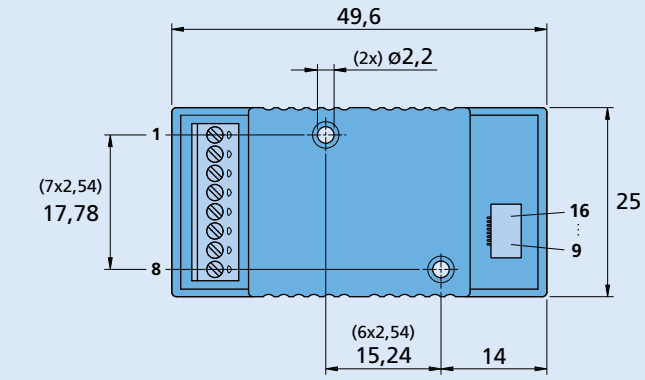
### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A / DATA |
| 10 | Sensor B / $\overline{CS}$ |
| 11 | Sensor C / CLK |
| 12 | UCC |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

## Dimensional drawing and connection information MCBL 3002 F AES




**MCBL 3002 F AES**

**Connector Information**
LIF-Connector 8-pole

### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A / DATA |
| 10 | Sensor B / $\overline{CS}$ |
| 11 | Sensor C / CLK |
| 12 | UCC |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Brushless DC-Servomotors
with absolute encoder

## Series MCBL 3003 AES

| | | MCBL 3003 P AES | |
|---|---|---|---|
| Power supply | $U_B$ | 12 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | kHz |
| Efficiency | $\eta$ | 95 | % |
| Max. continuous output current [1] | $I_{dauer}$ | 3 | A |
| Max. peak output current | $I_{max}$ | 10 | A |
| Total standby current | $I_{el}$ | 0,06 | A |
| Speed range | | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 100 | µs |
| | | | |
| Encoder resolution with AES encoder | | ≤ 4 096 | inc./rev. |
| Resolution with external encoder | | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 3 | |
| | | | |
| Program memory: [2] | | | |
| – memory size | | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | instructions |
| | | | |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | without housing | |
| Weight | | 18 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | signal output | $f$ | ≤ 2 | | kHz |
| | | resolution | 1...32 | | inc./rev. |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | | |
| | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 12 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 12 ... 30 | | V DC |

For notes on technical data and lifetime performance refer to "Technical Information".
**Edition 2016**

## Connection information

| | | | | |
|---|---|---|---|---|
| **Connection 9-11 „DATA, $\overline{CS}$, CLK ":** | | | | |
| | DATA | $U_{In}$ | ≤ 5 | V |
| | $\overline{CS}$ | $U_{Out}$ | 0 ... 5 | V |
| | CLK | $U_{Out}$ | 0 ... 5 | |
| **Connection 12 "$U_{CC}$":** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V DC |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| **Connection 13 "SGND":** | | | | |
| Signal GND | | | Signal ground | |
| **Connection 14-16 „Motor A, B, C":** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 ... $U_B$ | V |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. encoder

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...7V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 3,5V... $U_B$

### Options

- Separate power supply (Option no.: 3085)

### Full product description

- Example:

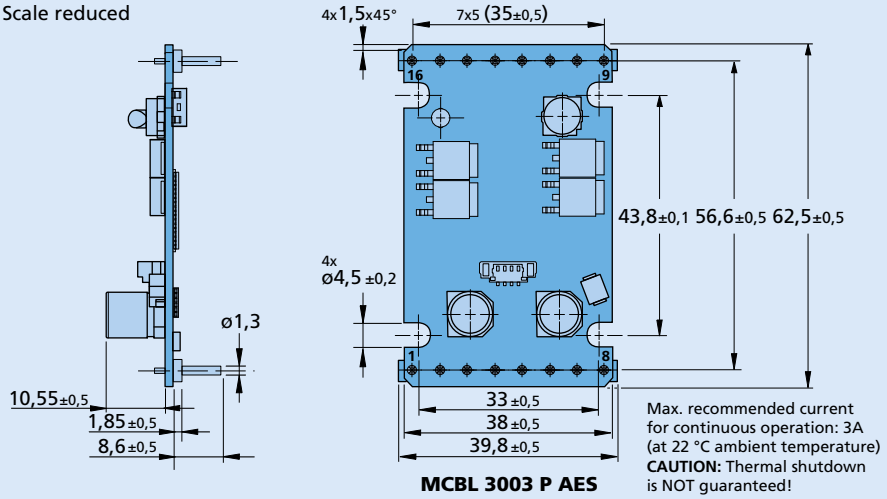
  **MCBL 3003 P AES RS** (RS232)

  **MCBL 3003 P AES CF** (CANopen with FAULHABER CAN)

  **MCBL 3003 P AES CO** (CANopen CiA)

## Dimensional drawing and connection information for MCBL 3003 P AES

Scale reduced




**MCBL 3003 P AES**

Max. recommended current for continuous operation: 3A (at 22 °C ambient temperature)
**CAUTION:** Thermal shutdown is NOT guaranteed!

### Connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Brushless DC-Servomotors
with absolute encoder

## Series MCBL 3006 AES

| | | MCBL 3006 S AES | |
|---|---|---|---|
| Power supply | $U_B$ | 12 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | kHz |
| Efficiency | $\eta$ | 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 | | 5 ... 30 000 | $min^{-1}$ |
| Scanning rate | $N$ | 100 | µs |
| | | | |
| Encoder resolution with AES encoder | | ≤ 4 096 | inc./rev. |
| Resolution with external encoder | | ≤ 65 535 | inc./rev. |
| Input/output (partially free configurable) | | 3 | |
| | | | |
| Program memory: [2] | | | |
| – memory size | | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | instructions |
| | | | |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | zinc, black coated | |
| Weight | | 160 | g |

[1] at 22°C ambient temperature
[2] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | signal output | $f$ | ≤ 2 | | kHz |
| | | resolution | 1...32 | | inc./rev. |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set speed value | $U_{In}$ | ± 10 | | V |
| – digital input | PWM set speed value | $f$ | 100 ... 2 000 | | Hz |
| | | $T$ | 50% ≙ 0 $min^{-1}$ | | |
| | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 12 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 12 ... 30 | | V DC |

## Connection information

| | | | | |
|---|---|---|---|---|
| **Connection 9-11 „DATA, CS, CLK ":** | | | | |
| | DATA | $U_{In}$ | ≤ 5 | V |
| | $\overline{CS}$ | $U_{Out}$ | 0 ... 5 | V |
| | CLK | $U_{Out}$ | 0 ... 5 | |
| **Connection 12 "Ucc":** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| | | | | |
| **Connection 13 "SGND":** | | | | |
| Signal GND | | | Signal ground | |
| | | | | |
| **Connection 14-16 „Motor A, B, C":** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. encoder

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...7V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 3,5V... $U_B$

## D-SUB-connector information

| **Connection D-SUB-connector:** | **RS232** | **CAN** |
|---|---|---|
| Pin 2 | RxD | CAN-L |
| Pin 3 | TxD | GND |
| Pin 5 | GND | - |
| Pin 7 | - | CAN-H |

### Options

- Separate power supply (Option no.: 3085)

### Accessories

- 6501.00128: USB-CAN-Adapter (only for version with CAN interface)
- 6501.00131: USB-RS232 Adapter (only for version with serial interface)
- 6501.00086: Adapter for BX4 Motors with connector

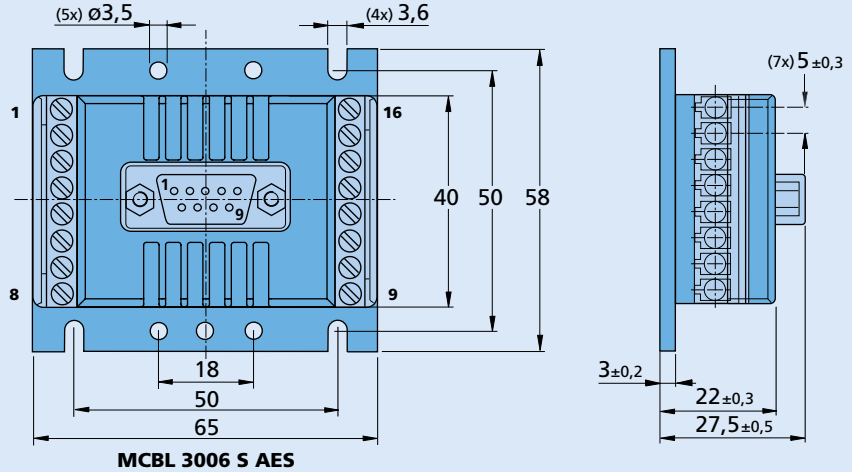
### Full product description

- Example:

  **MCBL 3006 S AES RS** (RS232)
  **MCBL 3006 S AES CF** (CANopen with CAN FAULHABER)
  **MCBL 3006 S AES CO** (CANopen CiA)

## Dimensional drawing and connection information MCBL 3006 S AES

Scale reduced




MCBL 3006 S AES

### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A / DATA |
| 10 | Sensor B / $\overline{CS}$ |
| 11 | Sensor C / CLK |
| 12 | Ucc |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Linear DC-Servomotors
with analog Hall sensors

## Series MCLM 3002

| | | MCLM 3002 P | MCLM 3002 F | MCLM 3002 S | |
|---|---|---|---|---|---|
| Power supply | $U_B$ | 5 ... 30 | 5 ... 30 | 5 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | 78,12 | 78,12 | kHz |
| Efficiency | $\eta$ | 95 | 95 | 95 | % |
| Max. continuous output current [1] | $I_{dauer}$ | 2 | 2 | 2 | A |
| Max. peak output current | $I_{max}$ | 3 | 3 | 3 | A |
| Total standby current | $I_{el}$ | 0,04 | 0,04 | 0,04 | A |
| Speed range [2] | | 2 ... 10 000 | 2 ... 10 000 | 2 ... 10 000 | mm/s |
| Scanning rate | $N$ | 200 | 200 | 200 | µs |
| | | | | | |
| Encoder resolution with linear Hall Sensors [3] | | 3 000 | 3 000 | 3 000 | inc./$\tau_m$ |
| Resolution with external encoder | | ≤ 65 535 | ≤ 65 535 | ≤ 65 535 | inc./mm |
| Input/output (partially free configurable) | | 3 | 3 | 3 | |
| | | | | | |
| Program memory: [4] | | | | | |
| – memory size | | 3,3 | 3,3 | 3,3 | kWord |
| – Number of instructions | | ca. 1 000 | ca. 1 000 | ca. 1 000 | instructions |
| | | | | | |
| Operating temperature range | | – 25 ... + 85 | – 25 ... + 85 | – 25 ... + 85 | °C |
| Weight | | 7 | 13 | 16 | g |

[1] at 22°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] $\tau_m$ is the magnetic pitch of the linear motor
[4] Only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 "AGND":** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | signal output | $f$ | ≤ 2 | | kHz |
| | | resolution | 1...255 | | inc./$\tau_m$ |
| | | | | | |
| **Connection 5 "AnIn":** | | | "AGND" as GND | | |
| – analog input | set position value | $U_{In}$ | ± 10 | | V |
| – digital input | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 "$U_B$":** | | $U_B$ | 5 ... 30 | | V DC |
| | | | | | |
| **Connection 7 "GND":** | | | ground | | |
| | | | | | |
| **Connection 8 "3. In":** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 5 ... 30 | | V DC |

For notes on technical data and lifetime performance refer to "Technical Information".
**Edition 2016**

| Connection information | | | | |
|---|---|---|---|---|
| **Connection 9-11 „Sensor A, B, C“:** | | | | |
| Hall sensor input | Sensor A | | Hall Sensor A | |
| | Sensor B | | Hall Sensor B | |
| | Sensor C | | Hall Sensor C | |
| | | $U_{In}$ | ≤ 5 | V |
| **Connection 12 “Ucc”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| **Connection 13 “SGND”:** | | | | |
| Signal GND | | | Signal masse | |
| **Connection 14-16 „Motor A, B, C“:** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. Hall Sensors

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...4,5V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 2,5V... $U_B$

**Options**

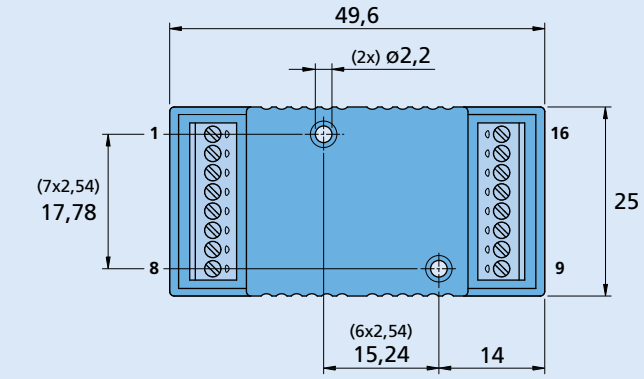
- Separate power supply (Option no.: 3085)

**Full product description**

- Example:
  **MCLM 3002 S RS** (RS232)
  **MCLM 3002 F CF** (CANopen with FAULHABER CAN)
  **MCLM 3002 P CO** (CANopen CiA)

| Accessories | | Motor Type | Part No. |
|---|---|---|---|
| **Programming adapter** | **RS232/CAN** | BL | **6501.00121** |

## Dimensional drawing and connection information MCLM 3002 S




**MCLM 3002 S**

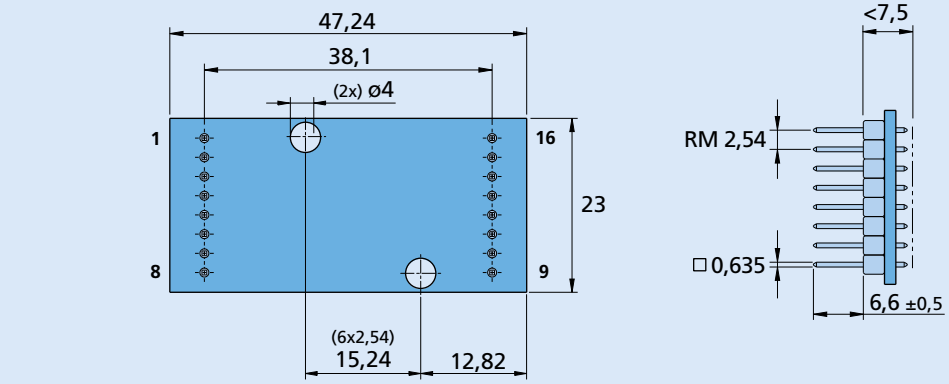
### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

## Dimensional drawing and connection information MCLM 3002 P




**MCLM 3002 P**

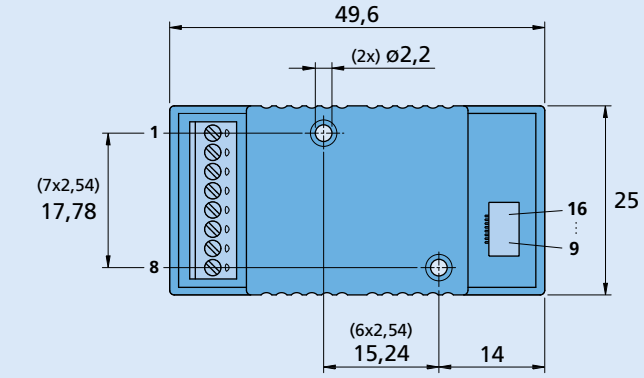
### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

## Dimensional drawing and connection information MCLM 3002 F




**MCLM 3002 F**

**Connector Information**
LIF-Connector 8-pole

### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | $U_{CC}$ |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Linear DC-Servomotors
with analog Hall sensors

## Series MCLM 3003

| | | MCLM 3003 P | |
|---|---|---|---|
| Power supply | $U_B$ | 12 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | kHz |
| Efficiency | $\eta$ | 95 | % |
| Max. continuous output current [1] | $I_{dauer}$ | 3 | 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 | $N$ | 200 | µs |
| | | | |
| Encoder resolution with linear Hall Sensors [3] | | ≤ 3 000 | inc./$\tau_m$ |
| Resolution with external encoder | | ≤ 65 535 | inc./mm |
| Input/output (partially free configurable) | | 3 | |
| | | | |
| Program memory: [4] | | | |
| – memory size | | 3,3 | kWord |
| – Number of instructions | | approx. 1 000 | instructions |
| | | | |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | without housing | |
| Weight | | 18 | g |

[1] at 22°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] $\tau_m$ is the magnetic pitch of the linear motor
[4] only for version with serial interface

| Connection information | | | | | |
|---|---|---|---|---|---|
| **Connection communication:** | | | | | |
| Interface | | | RS232 | CAN | |
| Communication profile | | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | | 1 | Mbit/s |
| | | | | | |
| **Connection 3 “AGND”:** | | | | | |
| – analog ground | | | analog GND | | |
| – digital input | external encoder | | channel B | | |
| | | $R_{In}$ | 10 | | kΩ |
| | | $f$ | ≤ 400 | | kHz |
| **Connection 4 “Fault”:** | | | | | |
| – digital input | | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | | $U$ | ≤ $U_B$ | | V |
| | | $I$ | ≤ 30 | | mA |
| | | clear | switched to GND | | |
| | | set | high-impedance | | |
| | fault output | no error | switched to GND | | |
| | | error | high-impedance | | |
| | signal output | $f$ | ≤ 2 | | kHz |
| | | resolution | 1...255 | | inc./$\tau_m$ |
| | | | | | |
| **Connection 5 “AnIn”:** | | | “AGND” as GND | | |
| – analog input | set position value | $U_{In}$ | ± 10 | | V |
| – digital input | external encoder | | channel A | | |
| | | $f$ | ≤ 400 | | kHz |
| | step frequency input | $f$ | ≤ 400 | | kHz |
| | | $R_{In}$ | 5 | | kΩ |
| | | | | | |
| **Connection 6 “$U_B$”:** | | $U_B$ | 12 ... 30 | | V DC |
| | | | | | |
| **Connection 7 “GND”:** | | | ground | | |
| | | | | | |
| **Connection 8 “3. In”:** | | | | | |
| – digital input | | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | | $U_{EL}$ | 12 ... 30 | | V DC |

## Connection information

| | | | | |
|---|---|---|---|---|
| **Connection 9-11 „Sensor A, B, C“:** | | | | |
| Hall sensor input | Sensor A | | Hall sensor A | |
| | Sensor B | | Hall sensor B | |
| | Sensor C | | Hall sensor C | |
| | | $U_{In}$ | ≤ 5 | V |
| **Connection 12 “Ucc”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V DC |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| **Connection 13 “SGND”:** | | | | |
| Signal GND | | | Signal ground | |
| **Connection 14-16 „Motor A, B, C“:** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 … $U_B$ | V |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. Hall Sensors

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...7V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 3,5V... $U_B$

### Options

- Separate power supply (Option no.: 3085)

### Full product description

- Example:

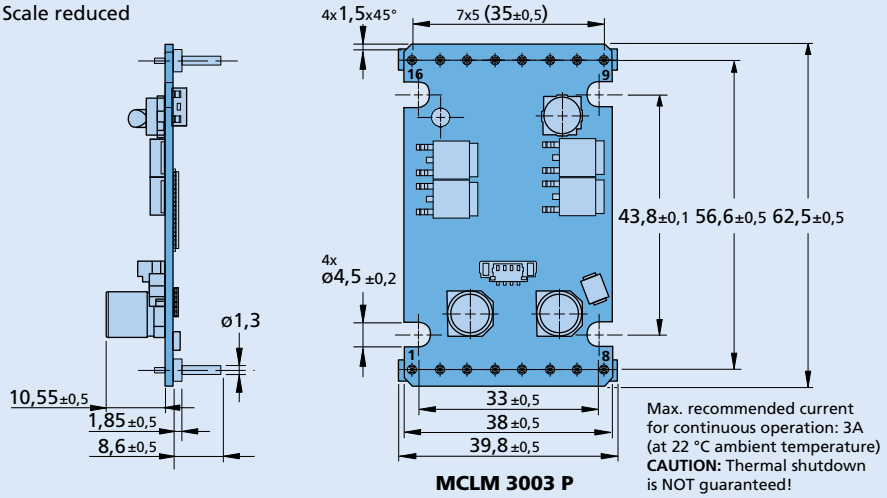
  **MCLM 3003 P RS** (RS232)

  **MCLM 3003 P CF** (CANopen with FAULHABER CAN)

  **MCLM 3003 P CO** (CANopen CiA)

## Dimensional drawing and connection information MCLM 3003 P

Scale reduced




**MCLM 3003 P**

Max. recommended current for continuous operation: 3A (at 22 °C ambient temperature)
**CAUTION:** Thermal shutdown is NOT guaranteed!

### Connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | Ucc |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

# Motion Controller

V2.5, 4-Quadrant PWM
with RS232 or CAN interface

**For combination with:**
Linear DC-Servomotors
with analog Hall sensors

## Series MCLM 3006

| | | MCLM 3006 S | |
|---|---|---|---|
| Power supply | $U_B$ | 12 ... 30 | V DC |
| PWM switching frequency | $f_{PWM}$ | 78,12 | kHz |
| Efficiency | $\eta$ | 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 | $N$ | 200 | µs |
| | | | |
| Encoder resolution with linear Hall Sensors [3] | | ≤ 3 000 | inc./$\tau_m$ |
| Resolution with external encoder | | ≤ 65 535 | inc./mm |
| Input/output (partially free configurable) | | 3 | |
| | | | |
| Program memory: [4] | | | |
| – memory size | | 3,3 | kWord |
| – Number of instructions | | approx. 1 000 | instructions |
| | | | |
| Operating temperature range | | – 40 ... + 85 | °C |
| Housing material | | zinc, black coated | |
| Weight | | 160 | g |

[1] at 22°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] $\tau_m$ is the magnetic pitch of the linear motor
[4] Only for version with serial interface

| **Connection information** | | | | |
|---|---|---|---|---|
| **Connection communication:** | | | | |
| Interface | | RS232 | CAN | |
| Communication profile | | FAULHABER - ASCII | CANopen | |
| Max. transfer speed rate RS232 | | 115 200 | | baud |
| Max. transfer speed rate CAN | | | 1 | Mbit/s |
| | | | | |
| **Connection 3 "AGND":** | | | | |
| – analog ground | | analog GND | | |
| – digital input external encoder | | channel B | | |
| | $R_{In}$ | 10 | | kΩ |
| | $f$ | ≤ 400 | | kHz |
| **Connection 4 "Fault":** | | | | |
| – digital input | $R_{In}$ | 100 | | kΩ |
| – digital output (open collector) | $U$ | ≤ $U_B$ | | V |
| | $I$ | ≤ 30 | | mA |
| | clear | switched to GND | | |
| | set | high-impedance | | |
| fault output | no error | switched to GND | | |
| | error | high-impedance | | |
| signal output | $f$ | ≤ 2 | | kHz |
| | resolution | 1...255 | | inc./$\tau_m$ |
| | | | | |
| **Connection 5 "AnIn":** | | "AGND" as GND | | |
| – analog input set position value | $U_{In}$ | ± 10 | | V |
| – digital input external encoder | | channel A | | |
| | $f$ | ≤ 400 | | kHz |
| step frequency input | $f$ | ≤ 400 | | kHz |
| | $R_{In}$ | 5 | | kΩ |
| | | | | |
| **Connection 6 "$U_B$":** | $U_B$ | 12 ... 30 | | V DC |
| | | | | |
| **Connection 7 "GND":** | | ground | | |
| | | | | |
| **Connection 8 "3. In":** | | | | |
| – digital input | $R_{In}$ | 22 | | kΩ |
| – electronic supply voltage | $U_{EL}$ | 12 ... 30 | | V DC |

## Connection information

| | | | | |
|---|---|---|---|---|
| **Connection 9-11 „Sensor A, B, C“:** | | | | |
| Hall sensor input | Sensor A | | Hall Sensor A | |
| | Sensor B | | Hall Sensor B | |
| | Sensor C | | Hall Sensor C | |
| | | $U_{In}$ | ≤ 5 | V |
| **Connection 12 “Ucc”:** | | | | |
| Output voltage for external use [1] | | $U_{Out}$ | 5 | V |
| Load current | | $I_{Out}$ | ≤ 60 | mA |
| | | | | |
| **Connection 13 “SGND”:** | | | | |
| Signal GND | | | Signal masse | |
| | | | | |
| **Connection 14-16 „Motor A, B, C“:** | | | | |
| Motor connection | Motor A | | Phase A | |
| | Motor B | | Phase B | |
| | Motor C | | Phase C | |
| | | $U_{Out}$ | 0 … $U_B$ | V DC |
| PWM switching frequency | | $f_{PWM}$ | 78,12 | kHz |

[1] E.g. Hall Sensors

The signal level (PLC or TTL) of the digital inputs can be set over the interface (see operating instruction manual).
Standard (PLC): Low 0...7V / High 12,5V... $U_B$, TTL: Low 0...0,5V / High 3,5V... $U_B$

## D-SUB-connector information

| **Connection D-SUB-connector:** | **RS232** | **CAN** |
|---|---|---|
| Pin 2 | RxD | CAN-L |
| Pin 3 | TxD | GND |
| Pin 5 | GND | - |
| Pin 7 | - | CAN-H |

### Options

- Separate power supply (Option no.: 3085)

### Accessories

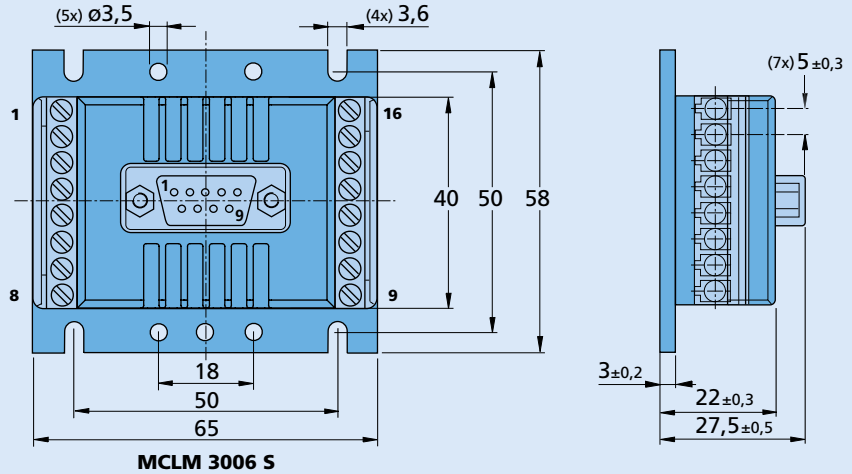
- 6501.00128: USB-CAN-Adapter (only for version with CAN interface)
- 6501.00131: USB-RS232 Adapter (only for version with serial interface)
- 6501.00117: Adapter for LM 0830
- 6501.00118: cable with connector for Adapter LM 0830

### Full product description

- Example:
  **MCLM 3006 S RS** (RS232)
  **MCLM 3006 S CF** (CANopen with FAULHABER CAN)
  **MCLM 3006 S CO** (CANopen CiA)

## Dimensional drawing and connection information for MCLM 3006 S

Scale reduced




**MCLM 3006 S**

### Supply connection

| No. | Function |
|---|---|
| 1 | TxD / CAN_H |
| 2 | RxD / CAN_L |
| 3 | AGND |
| 4 | Fault |
| 5 | AnIn |
| 6 | $U_B$ |
| 7 | GND |
| 8 | 3. In |

### Motor connection

| No. | Function |
|---|---|
| 9 | Sensor A |
| 10 | Sensor B |
| 11 | Sensor C |
| 12 | Ucc |
| 13 | SGND |
| 14 | Motor A |
| 15 | Motor B |
| 16 | Motor C |

# Motion Controller

1-Axis controller with microstepping,
USB interface and GPIO

**For combination with:**
Stepper motors

## Series MCST 3601

| | | MCST 3601 | |
|---|---|---|---|
| Power supply | $U_B$ | 9 ... 36 | V DC |
| PWM switching frequency | $f_{PWM}$ | 16 000 | kHz |
| Max. continuous output current range [1] | $I_{dauer}$ | 0 ... 1,1 | A |
| Max. peak output current | $I_{max}$ | 1,6 | A |
| Max. current resolution | | 5 | mA |
| Microstepping | | up to 256 [2] | |
| Scanning rate (in full step mode) | $N$ | 30 | µs |
| | | | |
| Inputs: | | | |
| – Digital, 24 VDC | | 3 | |
| – Analog, 10 VDC | | 1 | |
| | | | |
| Outputs: | | | |
| – Open drain, 24 VDC | | 6 | |
| – +5 VDC, 100 mA | | 1 | |
| | | | |
| Operating temperature range | | – 30 ... + 70 | °C |
| Mass | | 22 | g |

[1] at 22°C ambient temperature
[2] µstep/full step

| Connection information | | | |
|---|---|---|---|
| **Connections 1-6 :** | | digital input | |
| REF_L / DIR_IN | left stop switch input | programmable pull-up to +5V or direction input in S/D[4] operation mode | |
| REF_R / EN_IN | right stop switch input | programmable pull-up to +5V or enable input in S/D[4] operation mode | |
| HOME / STEP_IN | home switch input | programmable pull-up to +5V or step input in S/D[4] operation mode | |
| ENC_A / IN1 | incremental encoder | channel A input or digital input 1 | |
| ENC_B / IN2 | incremental encoder | channel B input or digital input 2 | |
| ENC_I / IN3 | incremental encoder | index / null channel I input or digital input 3 | |
| | | | |
| **Connection 7 :** | | +5V output | |
| Current range | | 0 ... 100 | mA |
| | | | |
| **Connection 8, 13[2], 24 :** | | GND | |
| Signal ground | | | |
| | | | |
| **Connection 9-12 :** | | motor A+, A-, B+, B- | |
| Output voltage | | = $U_B$ | VDC |
| Coil current range | | 0 ... 1,1 | A |
| (depends on programmation and jumper settings) | | 0 ... 1,6 (Peak) | A |
| | | | |
| **Connection 14[3] :** | | $U_B$ | |
| Supply voltage range | | 9 ... 36 | VDC |
| | | | |
| **Connection 15-16 :** | | reserved | |
| Max speed rate transfer | | 1 | Mbits/s |
| Max number of nodes | | 110 | |
| Value of the termination resistors (2x) | | 120 | Ohm |
| | | | |
| **Connections 17-22 :** | | digital output | |
| Voltage range open drain outputs | | = $U_B$ | VDC |
| Current range open drain outputs | | 0 ... 100 | mA |
| | | | |
| **Connection 23 :** | | analog input | |
| Voltage range | | 0 ... 10 | VDC |

[3] Crossing the connections 13 and 14 may irreversibly damage the controller.
[4] S/D = step and direction (direct drive) mode.

## Accessories

| The MCST3601 is delivered with one USB cable and four spacer bolt. | Motor Type | Part No. |
|---|---|---|
| **Adapter board (for flex board connection)** | **FDM0620 p=0.5mm**<br>**FDM0620 p=1mm** | 0.9500.90.000 |

## Features

The MCST3601 is a stepper motor controller that is mostly intended to be used as an evaluation board.
It has the capability to drive the full range of PRECIstep® stepper motors thanks to a selected current range.

This range must be selected manually through jumpers and programmed with the TMCL-IDE software.

The USB communication makes it fully programmable and the many inputs and outputs enable an external interaction.

Full step or microstepping up to 256 can be managed by programming.

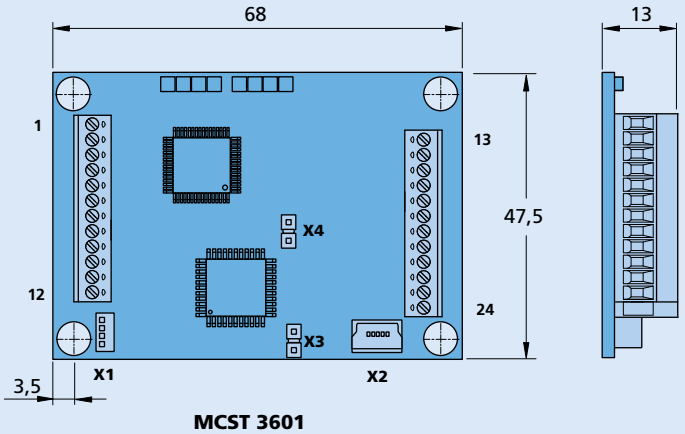
Moreover, the MCST3601 comprises screw terminals for quick setup and a Molex connector compatible with the standard cables solutions offered on PRECIstep® stepper motors.

When controlling several axis, one driver per axis is required but there is a possibility to coordinate the different axis by using the MCST3601 as „Master" and up to two other boards as „Slaves". The slave boards are then adressed as step and direction drivers by the master board. MCST3601 can also be converted in one of those step and direction driver.

Finally, the MCST3601 has the capability to read and treat an external input signal that may be sent by a sensor or an encoder. This is very useful in the case where a homing function must be made before starting the movement, in other words, when the motor is looking for a reference position before starting.
Note that this function is not acting like a closed loop regulator.

## Dimensional drawing and connection information MCST 3601

Scale reduced




MCST 3601

### Motor connection

| No. | Function |
|---|---|
| 1 | REF_L / DIR_IN |
| 2 | REF_R / EN_IN |
| 3 | HOME / STEP_IN |
| 4 | ENC_A / IN1 |
| 5 | ENC_B / IN2 |
| 6 | ENC_I / IN3 |
| 7 | +5VOUT / 100mA |
| 8 | GND |
| 9 | Motor A+ |
| 10 | Motor A- |
| 11 | Motor B+ |
| 12 | Motor B- |

**X1 Motor connector**

Connector housing:
Molex 51021-0400
Contacts: Molex 50079-8000
Wire: AWG 26-28

### Supply connection

| No. | Function |
|---|---|
| 13 | GND |
| 14 | UB |
| 15 | reserved |
| 16 | reserved |
| 17 | OUT0 |
| 18 | OUT1 |
| 19 | OUT2 |
| 20 | OUT3 |
| 21 | OUT4 |
| 22 | OUT5 |
| 23 | IN0 |
| 24 | GND |

**X2 USB 2.0 (12Mbit/s)**

Any standard mini-USB plug compatible with Molex 500075-1517

**X3, X4 Jumpers for current settings**