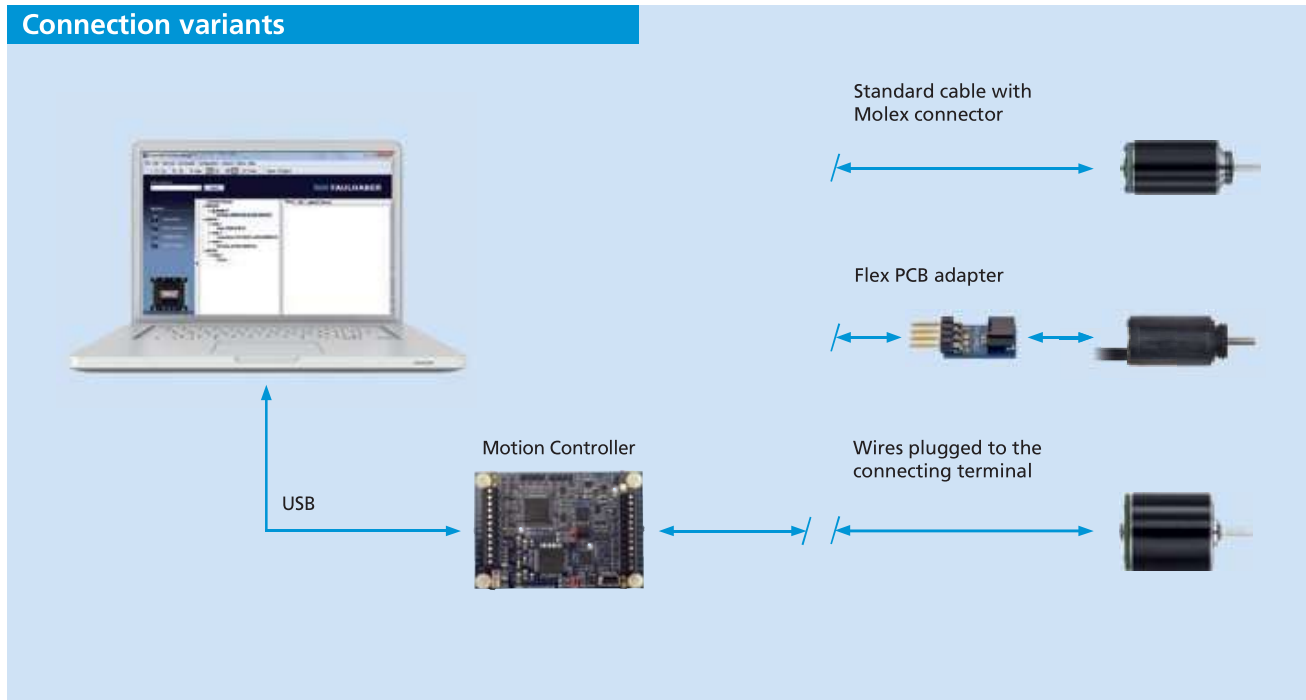


Stepper motors Motion Controller

Technical Information

Connection variants



Features

FAULHABER stepper motor motion controllers are highly dynamic positioning systems tailored specifically to the requirements of micro stepper motor operations.

In addition to be able to control the whole FAULHABER stepper motor range, the controllers are capable of managing three axes positioning (requires 2 additional boards). Reference search and encoder management functions are part of the numerous features offered by the controllers.

A complete IDE is included, allowing the user to benefit from the full range of functionalities, through a very comprehensive and user friendly interface.

The integrated systems require less space, as well as making installation much simpler thanks to their reduced wiring.

Benefits

- Fully programmable via software (Graphic User Interface)
- USB interface
- 9V...36VDC / 50mA to 1.1A
- Microstepping up to 1/256
- 4 GPI and 7 GPO
- Can be used as step/direction driver only
- Reference input (for homing functions)
- Compatible with LabView
- Board size: 68mm x 47.5mm

Product Code



MC	Motion Controller
ST	Stepper Motor
36	Max. supply voltage (36V)
01	Max. continuous output current (1A)

MC ST 36 01

Stepper motors Motion Controller

Technical Information

Main characteristics

Motion controller

- Motion profile calculation in real-time
- On the fly alteration of motor parameters (e.g. position, velocity, acceleration)
- High performance microcontroller for overall system control and serial communication protocol handling

Bipolar stepper motor driver

- Up to 256 microsteps per full step
- High-efficient operation, low power dissipation
- Dynamic current control
- Integrated protection

Software

- TMCL™: standalone operation or remote controlled operation
- PC-based application development software TMCL™ – IDE available for free.

Operating modes

Standalone

A program is stored in the controller board memory, and starts when the system is powered ON. The software is able to react with external stimulus, such as digital I/Os, encoders, sensors, etc. Standard processor instructions list as well as complete list of motor positioning control functions are available for the programmer.

Direct mode

Using IDE "direct mode" functions, the user is able to send instructions to the board one by one, through USB link. Status information and position/speed values can be read in real time by the user, thanks to dedicated GUI.

Remote software

The controller can be remotely controlled through USB link, by any user developed software. Labview and C++ libraries are available to be used with the controller.

Special functions

Speed profiles

Motors movements are realized using user definable speed profiles. The latter can be setup using a complete parameter calculator interface, helping the user to find the most suited speed values.

StallGuard™

Stall detection feature allows the controller to react in case of step losses, and can also be used to detect any motor hard stop reach.

CoolStep™

Current flowing to the motor is automatically adapted in case of load variation. This feature allows a reduced power consumption of the whole system.

Homing

Reference search process can be done automatically by the controller on startup. The user can setup the way to perform the operation (direction, switches number, origin location, etc.).

Interfaces

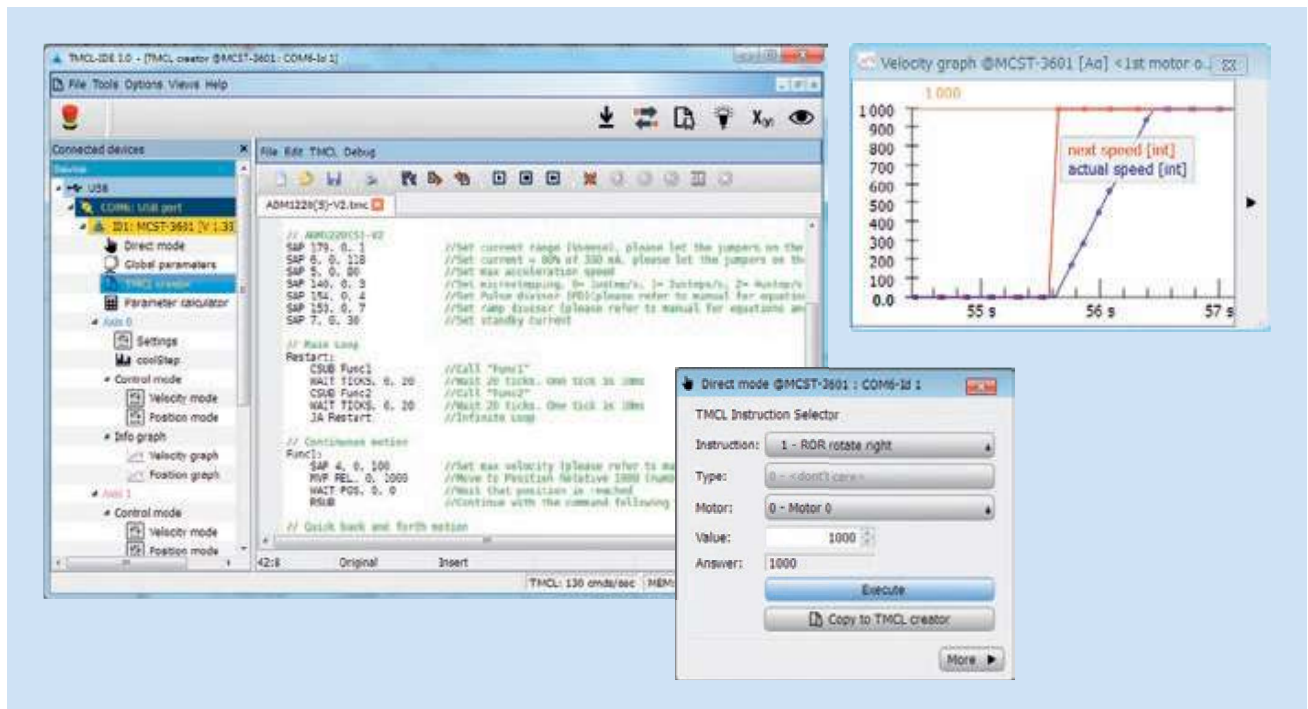
- USB device interface (on-board mini-USB connector)
- 6x open drain outputs (24V compatible)
- REF_L / REF_R / HOME switch inputs (24V compatible with programmable pull-ups)
- 1x S/D input for the on-board driver (on-board motion controller can be deactivated)
- 2x step / direction output for two separate external drivers (in addition to the on-board)
- 1x encoder input for incremental a/b/n encoder
- 3x general purpose digital inputs (24V compatible)
- 1x analog input (0 .. 10V)

Please note: Not all functions are available at the same time as connector pins are shared.

Notes

Device manuals for installation and start up, communication and function manuals, and the "TMCL™ – IDE" software are available on request and on the Internet at www.faulhaber.com.

Stepper motors Motion Controller Software



TMCL™ – IDE

The high-performance software solution “TMCL™ – IDE” enables users to control and configure the stepper motors controller, through USB interface.

“TMCL™ – IDE” software and lots of program examples can be downloaded free of charge from www.faulhaber.com.

Startup and configuration

Drivers and libraries are automatically installed together with the TMCL™-IDE software. Connected controller device is immediately detected and recognized by the software. The graphical user interface can be used to read out, change and reload configurations. Individual commands or complete parameter sets and program sequences can be entered and transferred to controller.

Operation of drives is also supported by several wizards, helping user to easily setup all the parameters.

Quickstart, hardware and firmware complete user manuals are also available for the user and can be downloaded free of charge from www.faulhaber.com. Please refer to the Quickstart manual before first use.

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	μ s
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⁾ μ step/full step

Connection information

Connections 1-6 :			
REF_L / DIR_IN	left stop switch input	digital input	
REF_R / EN_IN	right stop switch input	programmable pull-up to +5V or direction input in S/D ⁴⁾ operation mode	
HOME / STEP_IN	home switch input	programmable pull-up to +5V or enable 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 :			
Current range		+5V output 0 ... 100	mA
Connection 8, 13²⁾, 24 :			
Signal ground		GND	
Connection 9-12 :			
Output voltage		motor A+, A-, B+, B- = U_B	VDC
Coil current range		0 ... 1,1	A
(depends on programming and jumper settings)		0 ... 1,6 (Peak)	A
Connection 14³⁾ :			
Supply voltage range		U_B 9 ... 36	VDC
Connection 15-16 :			
Max speed rate transfer		reserved 1	Mbits/s
Max number of nodes		110	
Value of the termination resistors (2x)		120	Ohm
Connections 17-22 :			
Voltage range open drain outputs		digital output = U_B	VDC
Current range open drain outputs		0 ... 100	mA
Connection 23 :			
Voltage range		analog input 0 ... 10	VDC

³⁾ Crossing the connections 13 and 14 may irreversibly damage the controller.

⁴⁾ S/D = step and direction (direct drive) mode.

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 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 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 addressed as step and direction drivers by the master board. MCST3601 can also be converted in one of those step and direction driver.

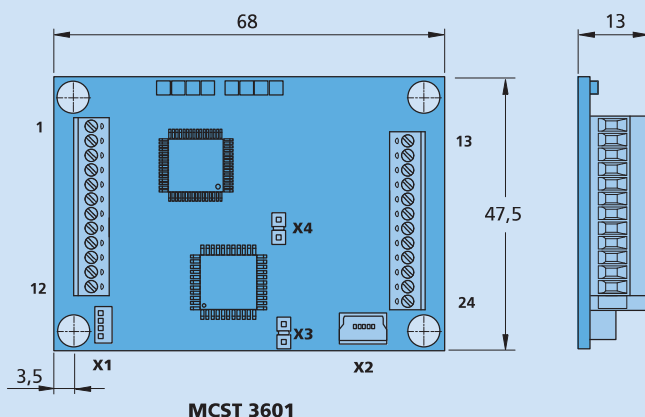
Finally, the MCST3601 has the capability to read and treat an external input signal that may be sent by a sensor or an encoder. This is very useful in the case where a homing function must be made before starting the movement, in other words, when the motor is looking for a reference position before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

Accessories

The MCST3601 is delivered with one USB cable and four spacer bolt.

Dimensional drawing and connection information MCST 3601

 Scale reduced



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_J / IN3
7	+5V _{OUT} / 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	U _B
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