

1 Selection tool

1.4 Synchronous servo motors



Product chapter

EZM

EZS

Chapter number

[10]

[11]

Technical data

F_{ax}	751 – 21375 N	760 – 31271 N
Shaft design		
Direct drive of the threaded nut	✓	
Direct drive of the threaded spindle		✓
Encoder		
EnDat 2.2	✓	✓
EnDat 2.1	✓	✓
HIPERFACE DSL One Cable Solution (OCS)		✓
Resolver		✓
Cooling		
Convection cooling	✓	✓
Forced ventilation		✓
Brake		
Permanent magnet holding brake	✓	✓
Marks and test symbols		
CE	✓	✓
cURus	✓	✓

2 MC6 motion controllers

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2 Motion controllers

MC6

2.1 Overview

The highest level of flexibility for industrial automation

Features

- MC6 motion controller based on CODESYS V3
- AutomationControlSuite development environment for convenient program creation
- Up to 100 axes in synchronous operating mode
- IEC 61131-3-compliant programming with ST, SFC, CFC, FBD, LD, IL
- Cam disk and cam functionality
- 3D CNC editor (dynamic G code)
- Robotics and transformations
- EtherCAT, CANopen, serial RS-232, TCP/IP, USB
- Different hardware versions
- Optional with touch panel

2.1.1 Features

MC6 – Complex motion sequences, high dynamics and precision

The centralization of all control system-related drive functions into one program sequence makes it easier to program multiple axes in many cases.

The use of one or more motion controllers is a requirement for complex interacting functions with high positioning accuracy.

For complex functions in particular, the motion control architecture also facilitates commissioning and, where necessary, service in the event of a fault.

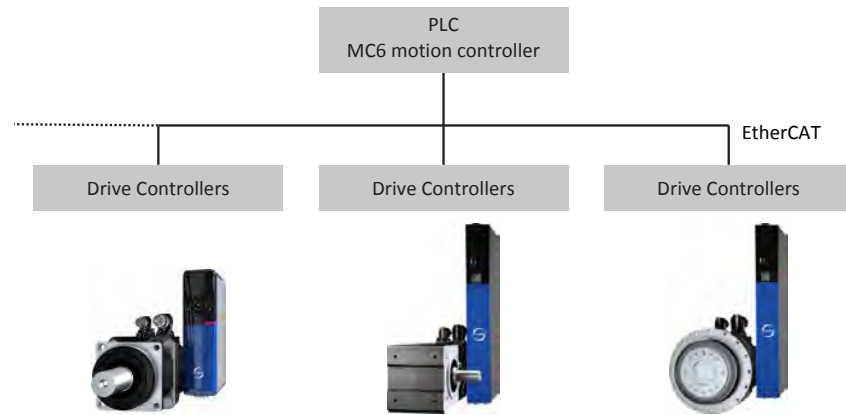
The program can be managed centrally on a motion controller.



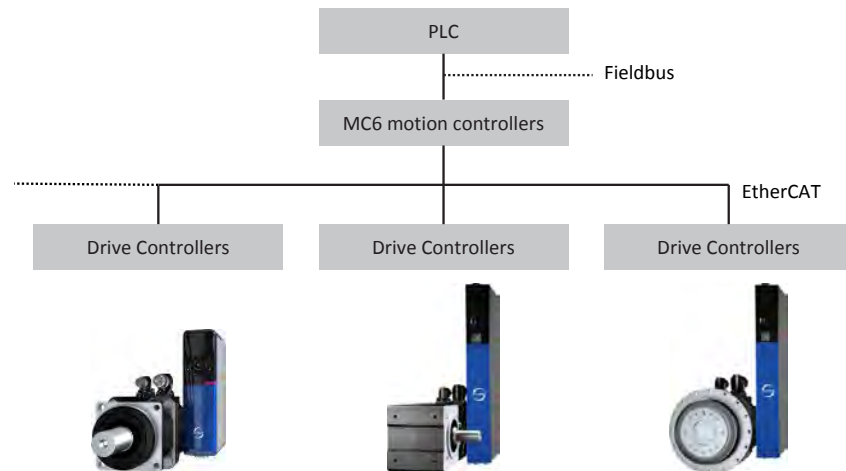
No special user interface (HMI) is required in the MC6 motion controller version with touch panel.

Also suitable for PLC solutions

The motion controller is suitable for use as a programmable logic controller (PLC).



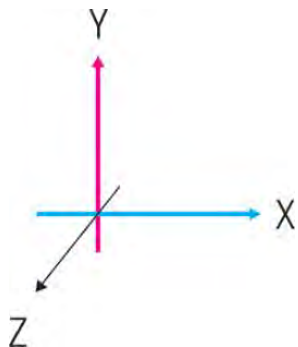
Controllers from third-party manufacturers can also be connected.



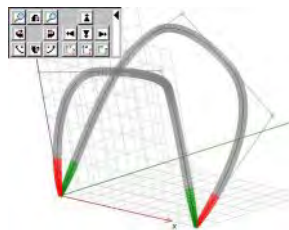
Travel path and robotic function

Motion controllers are capable of interpolating the travel paths of multiple axes and performing robotic functions.

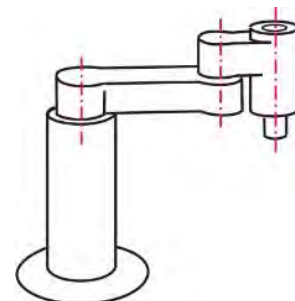
The robotic function consists of coordinate transformations, which are required if the motor axes do not correspond to spatial axes.



Travel path with interpolation of several axes



CNC function: easy creation of 3D trajectories



SCARA robot: coordinate transformation (spatial axes)

MC6 in the control cabinet PC design

In this version, the MC6 motion controller is ideal for use as both a programmable logic controller (PLC) and as a motion controller for subareas of complex systems with a higher level PLC.

The technical equipment features the following details: No fan is needed thanks to efficient convection cooling. A quick-change CFast card with very high read/write speeds is used as the storage medium. This equipment makes it possible to avoid having any rotating elements.

No data is lost if the 24 V_{DC} supply fails.

The Windows operating system can be used for installing separate software.

HMI panels from third-party manufacturers can be connected.



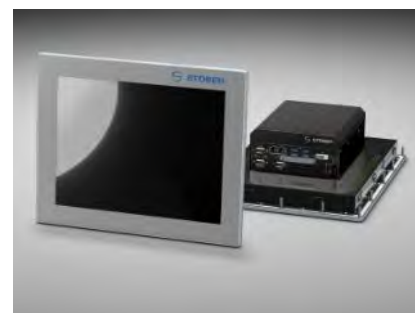
MC6 motion controller in a control cabinet PC design for easy top-hat rail mounting

MC6 with touch panel for installation in the operating area

The touch panel version makes the MC6 motion controller especially well-suited as a controller for complete machines or systems without a higher level PLC.

The panel version supports convenient interaction for applications with parameterization requirements.

The other technical functions match the motion controller in the control cabinet PC design.



MC6 motion controller with touch panel for installation in the operating area

Communication interfaces

- EtherCAT, CANopen, serial RS-232, TCP/IP, USB
- Open for all other bus systems

Computing power

- Up to 20 axes with extensive robotic functions (track control)
- Up to 100 axes for cyclic cam discs

Human-machine interface (HMI)

- Large selection of ready-made visualization elements
- Generation of human-machine interfaces in the integrated visualization editor
- Re-use of complete human-machine interfaces as an individualized visualization element
- Complex visualization elements can be instantiated by an interface for parameter transfer
- Multi-lingual visualization capability with integrated editor for text lists
- Access to machine visualization using a web browser

2.1.2 Development environment

AS6 – the multi-axis controller for the MC6 motion controller

The AutomationControlSuite development environment covers all functions included in CODESYS 3.5 for motion control (PLCopen, DIN 66025) and for PLCs (programmable logic controllers) (IEC 61131-3). In addition, function blocks specially developed by STOBBER have been developed from real-world drive operation and are marked as such. High-performance Drive&Motion libraries are available for program creation. The focus was furthermore on convenient, quick commissioning, without any programming effort and in just a few minutes.

**Advantageous for CODESYS users**

If you are familiar with CODESYS, you can readily program an application for the MC6 motion controller yourself.

Integrated system solutions

Control and drive technology is nearly always a major focus in the desired solution for modern machines and automation systems. Here it is helpful to know a partner with extensive expertise and a complete product program in order to make it possible to stay on target when implementing new projects. As a system manufacturer with detailed drive-related experience, STOBBER can offer solutions without system interruptions.

Programming languages

The following programming languages are supported:

- Structured text (ST)
- Sequential function chart (SFC)
- Continuous function chart (CFC)
- Function block diagram (FBD)
- Ladder diagram (LD)
- Instruction list (IL)

Extensive simulation options are possible on a PC at the programming level.

Simulation mode

Using virtual axes, it is possible to check the complete functionality even without the available machine in simulation mode.

MC6-Data-Link software development kit

Convenient application programming interface (API) for communicating between an MC6 motion controller and client systems such as external visualizations, operating devices, service devices or diagnostics devices. Access by client to IEC 61131-3 variables and the online services of the controller. MC6-Data-Link is implemented as a C, C++ and C# class and is delivered in a software development kit (SDK). The SDK includes an additional C interface, platform-specific files for Windows and source code for demo clients.

Scope of functions:

- Connection set-up and disconnection for the controller; automatic connection set-up after connection termination
- Synchronous/cyclic exchange of variable values with the controller (read/write)
- Instantiation capability for simultaneous communication with several controllers
- Transfer of files to and from the controller

2.1.3 Application training

Establish specific CODESYS expertise. STOBBER offers a multi-level training program that focuses essentially on application programming of the MC6 motion controller, SI6 or SD6 drive controller and SDS 5000 inverter.

MC6 Basic

Training content: PLC programming in accordance with IEC 61131-3. Data types, operators, instructions and pointers. The ST, CFC, SFC, IL, FBD and LD programming languages. Creation of programs, function blocks and functions with passed parameters. Using the trace, debug, watchlist and force functions. Creation of a visualization for operation. General basic knowledge about CODESYS SoftMotion. Parameterization of drives. Configuration of STOBBER drives. Use of real and virtual axes and encoders with PLCopen blocks. Use of a master/slave coupling. Disc cam applications with cam function. Practical exercises on training topics. Application of STOBBER Drive&Motion library blocks.

Used software: AutomationControlSuite.

MC6 Advanced CNC

Training content: General basic knowledge about CNC track control. Creation of CNC programs in the editor in accordance with DIN 66025 in G code. Integration of the NC decoder and CNC interpolator blocks. Application of path preprocessing objects. 15 different transformation blocks with the associated visualization elements. Practical exercises on training topics. Application of STOBBER Drive&Motion library blocks.

MC6 Advanced Robotics

Training content: General basic knowledge about robotics. Creation of programs in an editor in accordance with the PLCopen Motion Part 4 definition. Parameterization of axis groups for predefined kinematics such as gantry robots (2/3/5 axes), bipod/tripod robots, SCARA robots and additional tool kinematics. Integrated motion planning with coordinate values for robot positions in different coordinate systems. Practical exercises on training topics. Application of STOBBER Drive&Motion library blocks.

2.2 Technical data

Technical data for the MC6 motion controller can be found in the following chapters.

2.2.1 Type designation

MC	6	C	0	1	C	T
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Tab. 1: Example code for the MC6 type designation

Code	Designation	Design
MC	Series	MotionControl
6	Generation	Generation 6
C, D	Software version	Version of the image
0	Design	As control cabinet PC
1		With 15" touch panel
2		With 8.4" touch panel
1	Hardware version	Atom Dual-Core
5		Core i3 Dual-Core
N	Motion software option	Control
S		Control + SoftMotion
C		Control + SoftMotion CNC/Robotics
N	Visu software option	None
T		Target Visu
W		Web Visu
A		Target Visu + Web Visu

Tab. 2: Meaning of the MC6 example codes

2.2.2 MC6 versions

The following MC6 versions are currently available.

Type	ID No.	Description
MC6C01CT	56564	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.9.30: <ul style="list-style-type: none"> SoftMotion CNC/Robotics Target Visu
MC6C11CT	56565	MC6 Atom dual-core motion controller (HW 1) with 15" touch panel and software version 3.5.9.30: <ul style="list-style-type: none"> SoftMotion CNC/Robotics Target Visu
MC6C01NT	56568	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.9.30: <ul style="list-style-type: none"> Target Visu
MC6C05CA	56566	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.6.40: <ul style="list-style-type: none"> SoftMotion CNC/Robotics Target Visu + Web Visu
MC6C15CA	56567	MC6 Core i3 dual-core motion controller (HW 5) with 15" touch panel and software version 3.5.6.40: <ul style="list-style-type: none"> SoftMotion CNC/Robotics Target Visu + Web Visu

Tab. 3: MC6, software variant C

Type	Description
MC6D01NT	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control • Target Visu
MC6D01ST	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion • Target Visu
MC6D01CT	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu
MC6D01CA	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu + Web Visu
MC6D05NT	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control • Target Visu
MC6D05ST	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion • Target Visu
MC6D05CT	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu
MC6D05CA	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu + Web Visu

Tab. 4: MC6, software version D, control cabinet PC

Type	Description
MC6D21NT	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control • Target Visu
MC6D21ST	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion • Target Visu
MC6D21CT	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu
MC6D21CA	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu + Web Visu

Tab. 5: MC6, software version D, 8.4" touch panel

Type	Description
MC6D11NT	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control • Target Visu
MC6D11ST	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion • Target Visu
MC6D11CT	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu
MC6D11CA	MC6 Atom dual-core motion controller (HW 1) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu + Web Visu
MC6D15NT	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control • Target Visu
MC6D15ST	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion • Target Visu
MC6D15CT	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu
MC6D15CA	MC6 Core i3 dual-core motion controller (HW 5) with software version 3.5.11.50: <ul style="list-style-type: none"> • Control + SoftMotion CNC/Robotics • Target Visu + Web Visu

Tab. 6: MC6, software version D, 15" touch panel

If you need another variant that is not included in the list but matches the type designation, please contact the Sales department of

STÖBER Antriebstechnik GmbH + Co. KG:

Phone: +49 7231 582-1165

Fax: +49 7231 582-4165

sales@stoerber.de

2.2.3 Motion software option

Three versions of the Motion software option are available with different functions.

Control (N) license

The Control license (N code) is a basic license that is included in the scope of delivery of the MC6 motion controller as standard. It enables flexible programming in accordance with IEC 61131-3 and supports the following languages:

- Structured Text (ST)
- Sequential Function Chart (SFC)
- Continuous Function Chart (CFC)
- Function Block Diagram (FBD)
- Ladder Diagram (LD)
- Instruction List (IL)

SoftMotion (S) license

The SoftMotion license (S code) is based on the Control license and also enables motion programming with PLCopen-compliant blocks.

The integrated disk cam editor can be used online in the target system and/or offline in the programming system. Cams can be directly connected to cam disks. In addition, any number of couplings is possible between virtual and real axes using a cam disk or electronic gear unit.

This license also supports a cam disk change on the fly. Cam data can be an integral part of the project or be reloaded at run time of the machine.

SoftMotion CNC/Robotics (C) license

The SoftMotion CNC/Robotics license (C code) is based on the SoftMotion license and enables numerous coordinate transformations for typical mechanical systems as well, such as:

- 6 different gantry drives
- H portal (wrap-around belt)
- T portal (wrap-around belt)
- SCARA drive, 2 articulation points
- SCARA drive, 3 articulation points
- Bipod drive
- 2 different tripods
- 5-axis palletizing robot
- 6-axis articulated robot

There is support for creating your own transformations as well.

The SoftMotion CNC/Robotics license also provides a 3D CNC editor in accordance with DIN 66025 (G-code, dynamic). Cam and CNC data can be an integral part of the project. The PLC program can dynamically influence the CNC trajectory at run time.

You also have the option of applying CNC data from 3D design programs. Furthermore, complex 3D trajectories can be created independent from the mechanical systems.

2.2.4 Visu software option

Three versions of the Visu software option are available with different functions.

Target Visu (T) license

The Target Visu license (T option) supports options for visualizing the target system.

The license offers a wide selection of pre-defined visualization elements. For example, you can generate human-machine interfaces in the visualization editor or reuse completed human-machine interfaces as individualized visualization elements. Complex visualization elements can be instantiated using an interface for transferring parameters.

Visualization is possible in multiple languages thanks to an integrated text list editor. The Target Visu license can be attached to the integrated touch panel or an optionally connected DVI monitor for display.

Web Visu (W) license

The Web Visu license (W option) supports the same visualization options as the Target Visu license.

However, it is not accessed by means of a visualization on the target system, but over the network using HTML5 and a network-compatible panel, PC or tablet.

Target Visu and Web Visu (A) license

This license (A option) combines both the Target Visu and Web Visu licenses.

2.2.5 Device features

Feature	MC6, hardware version 1
Processor	<ul style="list-style-type: none"> Intel Atom Dual-Core E3825, 2 × 1.33 GHz L2 cache, 1 MB
Memory	<ul style="list-style-type: none"> DDR3 RAM, 2 GB 128 kB nvRAM (no battery backup necessary) CFast card, 8 GB
Power supply	<ul style="list-style-type: none"> As control cabinet PC: 9 – 32 V_{DC} With touch panel: 14 – 32 V_{DC}
Power consumption	<ul style="list-style-type: none"> As control cabinet PC: max. 10 W With touch panel: max. 23 W
Front connections	<ul style="list-style-type: none"> Realtek RTL8111 Ethernet controller, 10/100/1000 Mbps Single chip fast Ethernet DM9102D controller, 10/100 Mbps 3 USB 2.0 interfaces, type A, 480 Mbps, with 500 mA current carrying capacity per output Reset button and power LED Serial RS-232 interface (RTS/CTS only): D-sub connector, 9-pole CANopen interface: D-sub connector, 9-pole 2 freely programmable front panel LEDs
Protection class	<ul style="list-style-type: none"> IP20
Other	<ul style="list-style-type: none"> CODESYS IEC61131-3 runtime for SoftMotion CNC environment (note the functional differences between the software licenses) Windows Embedded 7 operating system Real-time clock with battery backup (internal watchdog)

Tab. 7: Device features for MC6, hardware version 1, Atom Dual-Core

Feature	MC6, hardware version 5
Processor	<ul style="list-style-type: none"> Intel Core i3-3120ME, 2 × 2.4 GHz L2 cache, 3 MB
Memory	<ul style="list-style-type: none"> DDR3 RAM, 2 GB 128 kB MRAM (no battery backup necessary) CFast card, 8 GB
Power supply	<ul style="list-style-type: none"> As control cabinet PC: 9 – 32 V_{DC} With touch panel: 14 – 32 V_{DC}
Power consumption	<ul style="list-style-type: none"> As control cabinet PC: max. 29 W With touch panel: max. 34 W
Front connections	<ul style="list-style-type: none"> 2 × Realtek RTL8111 Ethernet Controller, 10/100/1000 Mbps 4 USB 3.0 interfaces, type A, 480 Mbps, with 500 mA current carrying capacity per output Reset button and power LED Serial RS-232 interface (RTS/CTS only): D-sub connector, 9-pole or CANopen DVI monitor connection
Protection class	<ul style="list-style-type: none"> IP20
Other	<ul style="list-style-type: none"> CODESYS IEC61131-3 runtime for SoftMotion CNC environment (note the functional differences between the software licenses) Windows Embedded 7 operating system Real-time clock with battery backup (internal watchdog)

Tab. 8: Device features for MC6, hardware version 5, core i3 Dual-Core

Feature	Version with 8.4" touch panel
Display	<ul style="list-style-type: none"> 8.4" (21.336 cm) SVGA LCD LED backlight Aspect ratio 4:3 (Landscape) Resolution 800 × 600 256,000 colors Contrast rate 500:1 (typical), 370:1 (minimum) Brightness 400 cd/m² (typical), 350 cd/m² (minimum) 160° horizontal and 140° vertical viewing angle 50,000 h MTBF
Touch panel	<ul style="list-style-type: none"> Resistive 4-wire touch panel IP65 protection class

Tab. 9: Additional device features for design with 8.4" touch panel

Feature	Version with 15" touch panel
Display	<ul style="list-style-type: none"> 15.0" (38.1 cm) XGA TFT LCD CCFL backlight 0.297 pixel pitch Display mode: Normal white Resolution 1,024 × 768 16.7 million colors 700:1 (typical) contrast rate, 480:1 (minimum) 450 cd/m² brightness (typical) 160° horizontal and 160° vertical viewing angle 50,000 h MTBF
Touch panel	<ul style="list-style-type: none"> Resistive 4-wire touch panel IP65 protection class

Tab. 10: Additional device features for design with 15" touch panel

2.2.6 Storage and operating conditions

Storage and operating conditions	
Operating temperature	0 – 45 °C
Storage temperature	–20 – 75 °C
Relative humidity	0 – 80%, non-condensing

Tab. 11: MC6 storage and operating conditions

2.2.7 Electrical data

Electrical data	Hardware version 1 as control cabinet PC	Hardware version 1 with touch panel
Power supply	9 – 32 V _{DC}	14 – 32 V _{DC}
Max. power consumption	12 W	25 W

Tab. 12: MC6 electrical data, hardware version 1

Electrical data	Hardware version 5 as control cabinet PC	Hardware version 5 with touch panel
Power supply	9 – 32 V _{DC}	14 – 32 V _{DC}
Max. power consumption	29 W	34 W

Tab. 13: MC6 electrical data, hardware version 5

2.2.8 Dimensions

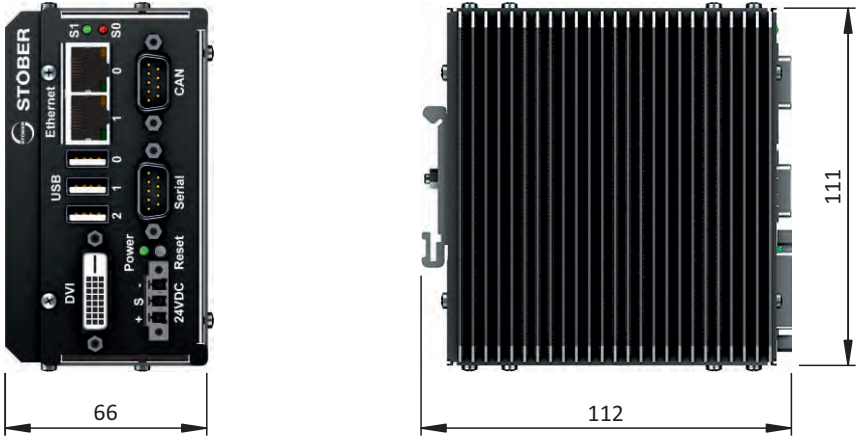


Fig. 1: MC6x01 dimensions, hardware version 1 as control cabinet PC

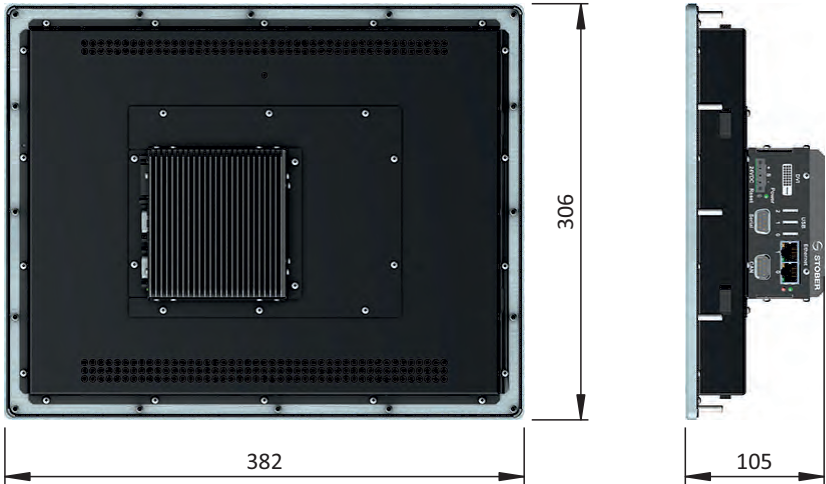


Fig. 2: MC6x11 dimensions, hardware version 1 with 15" touch panel

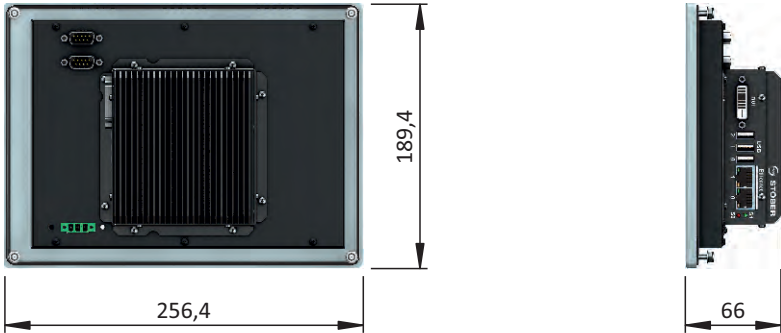


Fig. 3: MC6x21 dimensions, hardware version 1 with 8.4" touch panel

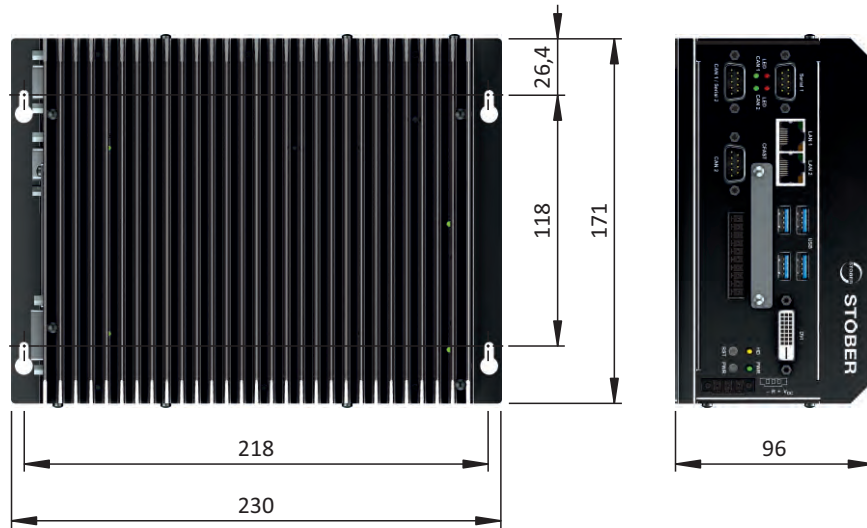


Fig. 4: MC6x05 dimensions, hardware version 5 as control cabinet PC

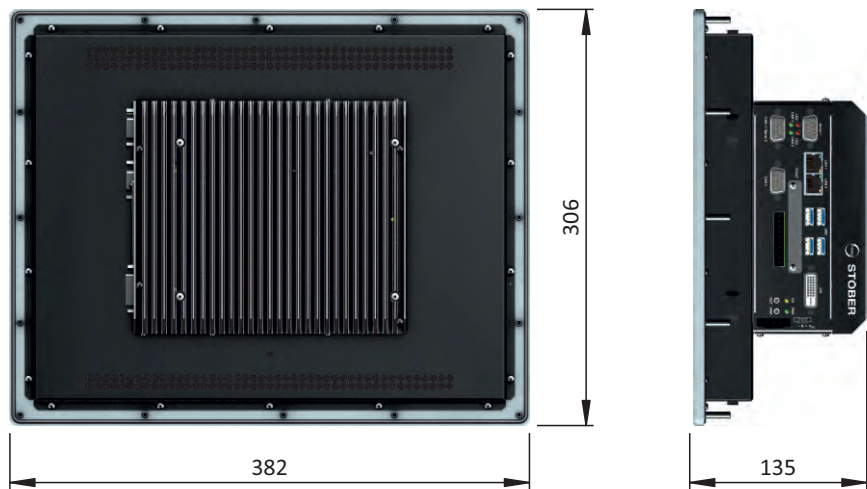


Fig. 5: MC6x15 dimensions, hardware version 5 with 15" touch panel

Type	Height [mm]	Width [mm]	Depth [mm]
MC6x01	111	66	112
MC6x11	306	382	105
MC6x21	189.4	256.4	66
MC6x05	171	230	96
MC6x15	306	382	135

Tab. 14: MC6 dimensions [mm]

2.2.9 Weight

Type	Total weight [kg]
MC6x01	0.8
MC6x11	4.8
MC6x05	1.95
MC6x15	5.95
MC6x21	1.78

Tab. 15: Total weight of the individual MC6 variants

2.3 Accessories

AutomationControlSuite development environment



ID No. AS6_3580

A 30-day test version of AutomationControlSuite is available at <http://www.stoeber.de/en/download>.

Please contact us if you are interested. You can get advice, offers and further information from our sales staff.

MC6-Data-Link software development kit



ID No. MC6DL_3579

Please contact us if you are interested. You can get advice, offers and further information from our sales staff.

2.4 Further information

2.4.1 Directives and standards

The following European directives and standards are relevant for the motion controller:

- Low Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU

2.4.2 Symbols, marks and test symbols



CE mark

Manufacturer's self declaration: The product meets the requirements of EU directives.



Grounding symbol

Grounding symbol in accordance with IEC 60417, symbol 5019.



RoHS lead-free mark

Marking in accordance with RoHS directive 2011-65-EU.

2.4.3 Additional documentation

Additional documentation related to the product can be found at <http://www.stoeber.de/en/download>

Enter the ID of the documentation in the Search... field.

Documentation	ID
MC6 motion controller manual	442461

