M-CNC
Three-dimensional Motions

Complex motions in Cartesian three-dimensional space are mainly implemented with CNC systems. Therefore, a defined path of a tool center point (TCP) is of particular interest. The path of movement is set in accordance with DIN 66025. The CNC system uses these settings to calculate corresponding path profiles for all three driven axes. Therefore, maximum speed, acceleration and deceleration of each individual axis have to be considered, since these parameters are essential for gaining the exact demanded path of movement.

- Software module for path of movement in three-dimensional space utilizing Cartesian 3-axis system
- Full interpolation in all three dimensions
- Path definition according to DIN 66025
- Configuration and diagnostic via the SolutionCenter
- Commissioning user interface (CNC-Monitor)
- Library for IEC 61131-3 PLC programsv

Item	Item-No.
M-CNC Download	00016377-90
M-CNC RT	00016377-63

Ready-to-use CNC-Lösung

This means the first CNC application is only three steps away.

1. Configuration of 3 motion axes and definition of movement ranges
2. Setting target position via CNC-Monitor or loading CNC-program
3. Starting the movement

The initial commissioning is thus carried out without having to program a single line of code.

Motions in 3D space

• Component milling
• Applying adhesives
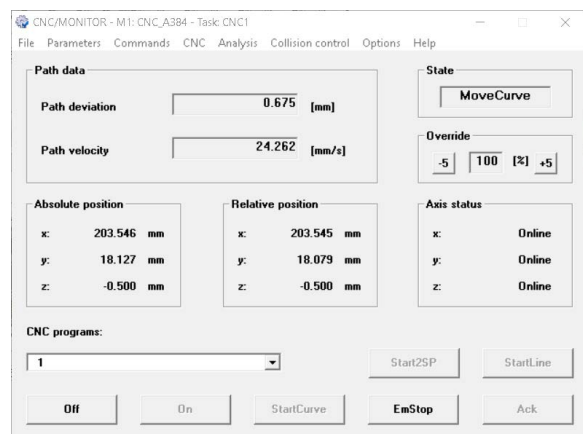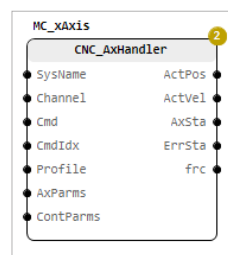• Positioning laser cutters

All these applications have one thing in common: Their programs define a motion path in three-dimensional space. Already programmed path of movements can also be rotated around an angle or axis at a later time. Therefore, path correction for not correct aligned clamped workpieces can be carried out easily.
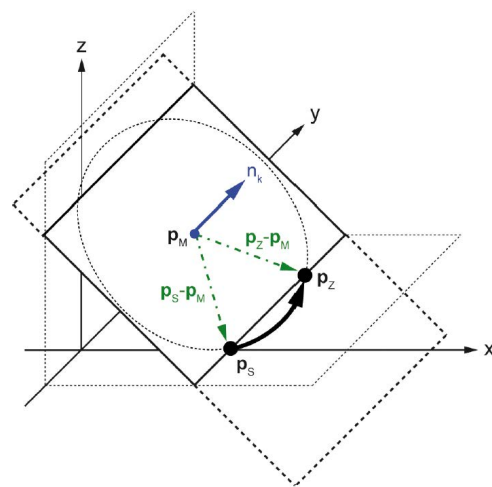
Application programming

A higher-level sequence program coordinates the job acceptance, the material feed as well as the subsequent processing of the CNC program. The interaction with the M-CNC system is easily implemented via the available IEC 61131-3 library.

The CNC-Monitor commissioning user interface enables the complete parameter assignment and manual operation of the M-CNC software module. The Scope 3 software oscilloscope even records highly dynamic motions directly on the controller and enables comprehensive analysis on the engineering PC. In this way, a complete overview is always ensured. This not only shortens the time required for the initial commissioning, but also enables fast troubleshooting during operation.

M-CNC

General

Controller representation	Software module on the M1 controller
Configuration	SolutionCenter
Parameterization	CNC-Monitor
Operation	CNC-Monitor Application integration via library for IEC 61131-3

Product Features

Number of interpolated axes	3 axes – fully interpolated
Number of CNC modules on one M1 controller	20
Sampling time	200 µs to 20 ms

Motion Profile

Motion path	• Setting according to DIN 66025 • Circular arcs and straight lines selectable in 3D space
Approach to a target position	• Circle interpolation (clockwise and anticlockwise) • Straight line interpolation • Point to point control (PTP movement)
Dwell times	Predefinable

Functions

Position specification / Position control	Depending on the motion axis M-CNC performs various tasks: • M-CNC performs the calculation of the set position including position control • M-CNC performs the calculation of the set position, position control is performed in the drive
Definition of the workpiece zero point	Definable offset to the machine axis zero point
Correction of the tool path	Path correction is carried out on the basis of defined tool dimensions
Rotation of set motion path	Motion path can still be rotated around an angle and around an axis at a later time.
Monitoring of the movement range	Checking with reference to machine zero point, with/without consideration of the tool
Referencing of the axes	Various methods are available depending on the drive, sensor and encoder used.
Handwheel mode	The travel speed or travel position along the set motion path is defined by means of a handwheel.
Additional motion axes	Additional axes are configured in the SolutionCenter and integrated in the higher-level sequence program. This makes it possible to integrate spindle drives, lubrication pumps or material feeds.
Diagnostics	• CNC-Monitor commissioning user interface • Software oscilloscope Scope 3

M-CNC	
Special Functions	
Collision monitoring	Acts for two CNC systems moving in the identical XY plane. Continuously monitors whether the target point of the next path segment is not blocked by the second CNC system.
Single axis movement	The axes can be moved individually via CNC-Monitor or the application program.
Manual target point approach in the space	A target point is defined as required via CNC-Monitor and approached with straight line interpolation.
Machine commands in CNC programs	Communication with additional application programs (e.g. for tool changing) by setting digital or analog signals as well as SVI variables from the CNC program.
Drive Interface	
Analog	Via Bachmann hardware modules (e.g. ISI222, GIO212)
Fieldbus	By means of DriveMiddleware or another user-specific drive integration
Position Detection	
From M1 via rotary encoder	The actual position is determined with Bachmann hardware modules (e.g. ISI222, CNT204).
By the drive via rotary encoder	The actual position is determined in the drive and transferred to M-CNC via the fieldbus.
Software Interfaces	
Process communication	Internal values are provided as SVI variables and are directly available for other applications or the visualization.
Application interface	IEC 61131-3 library for parameter assignment, operation and diagnostics of the M-CMC software module
Installation	
Installation medium for engineering PC	Installer, available by download
License protection on the M1 controller	Hardware-dependent license file
System Requirements	
Engineering PC	Microsoft Windows 7, 8.1, 10, hard disk 200 MB free memory
M1 real-time system	Bachmann M1 processor modules of the series MH, MC, MX; M-Base from V3.85R

Order Codes M-CNC		
Item	**Item-No.**	**Description**
M-CNC Download	00016377-90	Software, PLC library, commissioning tool and user documentation for M-CNC. Requires M-Base.
M-CNC RT	00016377-63	License file to operate the M-CNC software module on a M1 controller