

The modular MMC PLC

MMC, the modular PLC for mobile work machines, is a control unit consisting of a basic controller and extension modules. The size of the control unit can easily be scaled individually. Depending on the inputs and outputs required, the number of modules in the system can be varied.

At the same time, the MMC acts externally in the control environment like one single controller. The extension modules are connected at operating system level therefore making connection especially easy: the system identifies new modules automatically via their connector coding.



MMC modular PLC - performance features

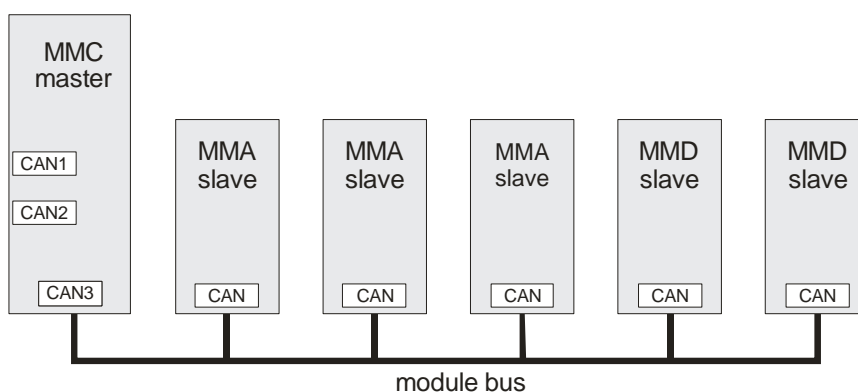
The modular MMC controller provides one master and three different types of extension (slaves):

MMA analogue slave primarily with analogue inputs and outputs

MMD digital slave with digital inputs and outputs

MMC slave with a mix of inputs and outputs

A maximum of three type MMA, three type MMD and one type MMC extensions are allowed in one system. The largest possible stage of extension for the MMC controller consists of one master and five slaves. The modular PLC communicates via a CAN bus and can be freely programmed according to IEC 61131-3 or in C.



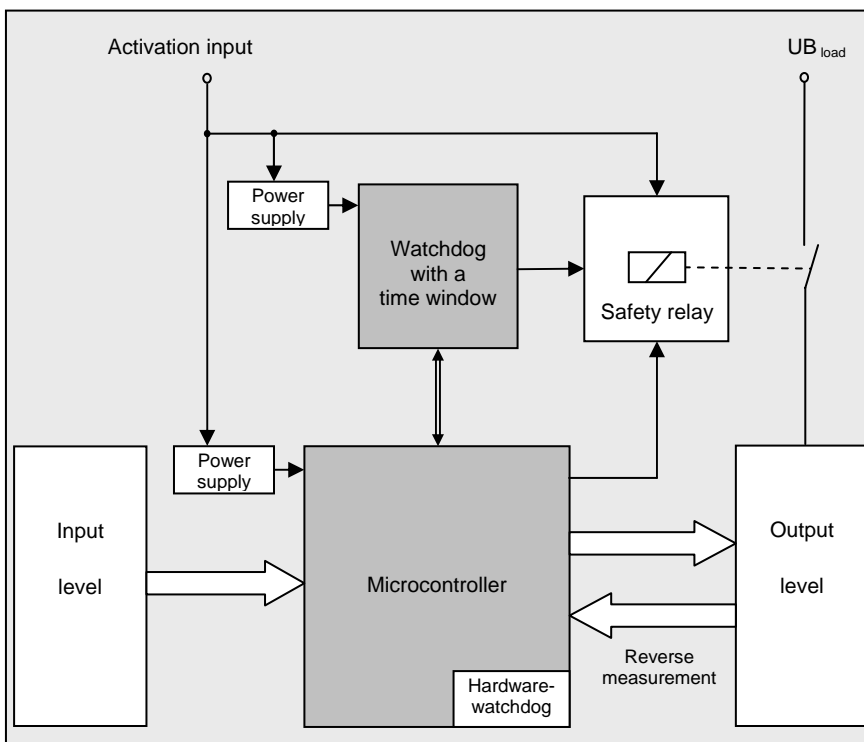
MMC modular PLC - usable inputs and outputs

	MMC master/slave	MMA analogue slave	MMD digital slave
Analogue inputs	8	4	–
Frequency inputs	6	4	–
Digital switch inputs	12	4	16
Proportional outputs	8	8	–
Switch outputs	8	–	18
CAN interfaces	2	–	–
RS232 interfaces	1	–	–

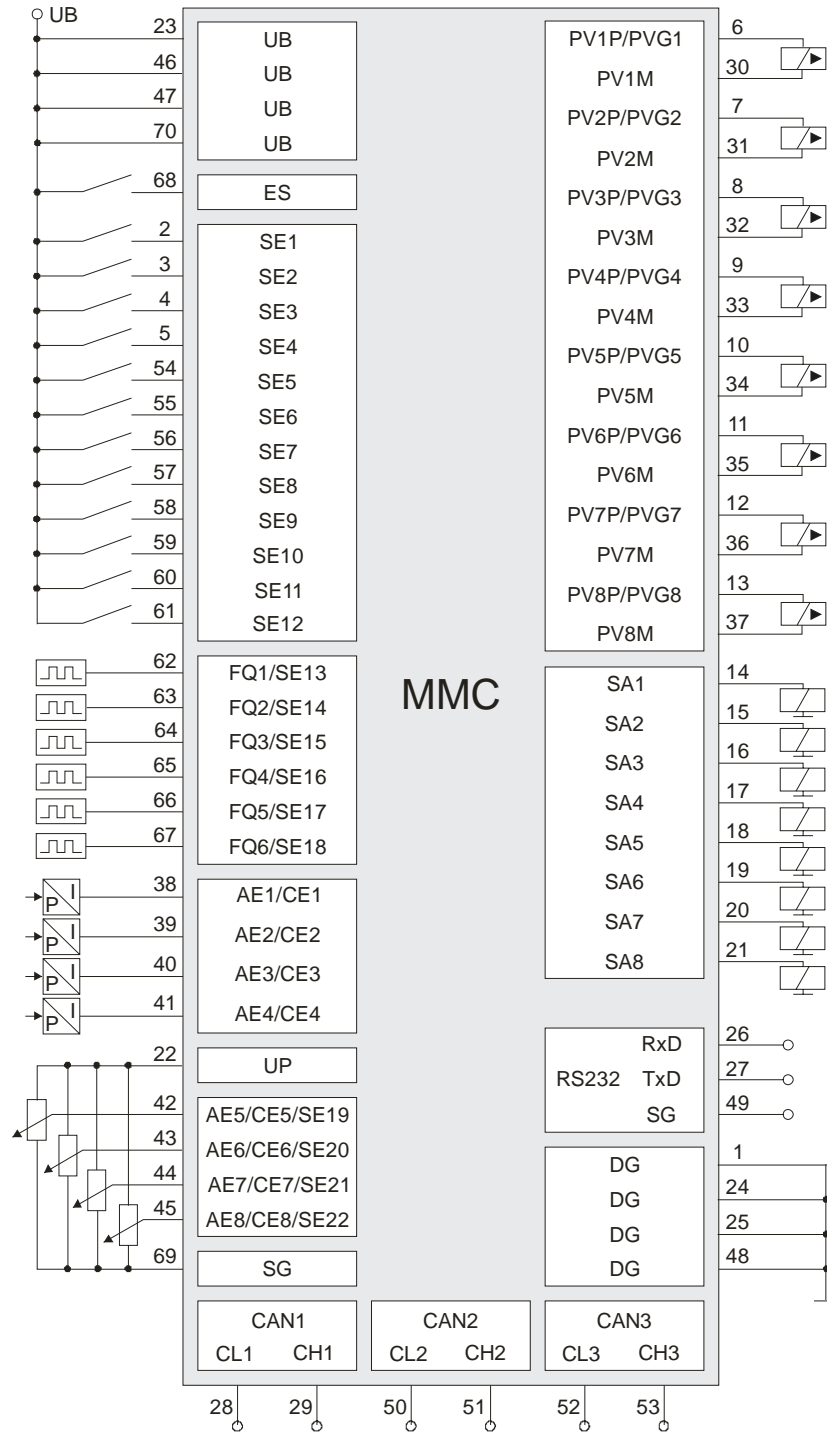
MMC modular PLC - safety structure:

- Microcontroller with an internal watchdog
- Additional external watchdog with a time window
- Microcontroller and external watchdog, each with separate voltage regulation and cycle generation
- Additional means of switching off using a safety relay according to the principle of closed circuit current
- Reverse measurement of all outputs
- Activation input for direct supply and shut-down of the microcontroller, watchdog and safety relay

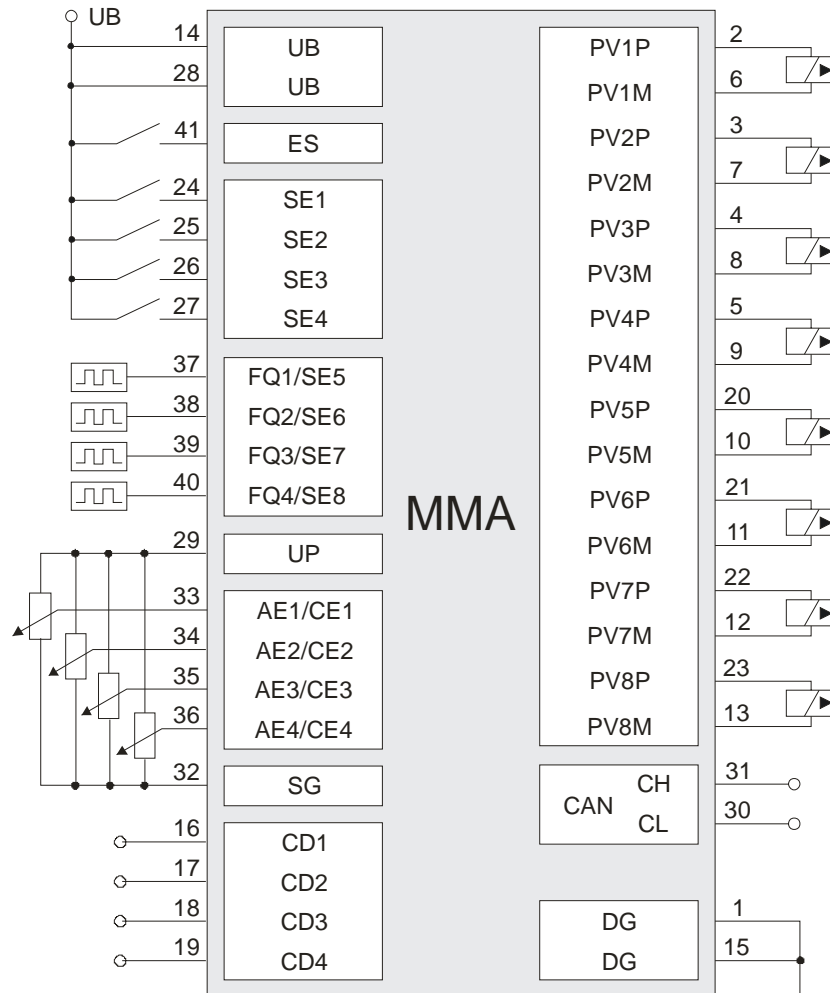
MMC, MMA and MMD structural diagram:



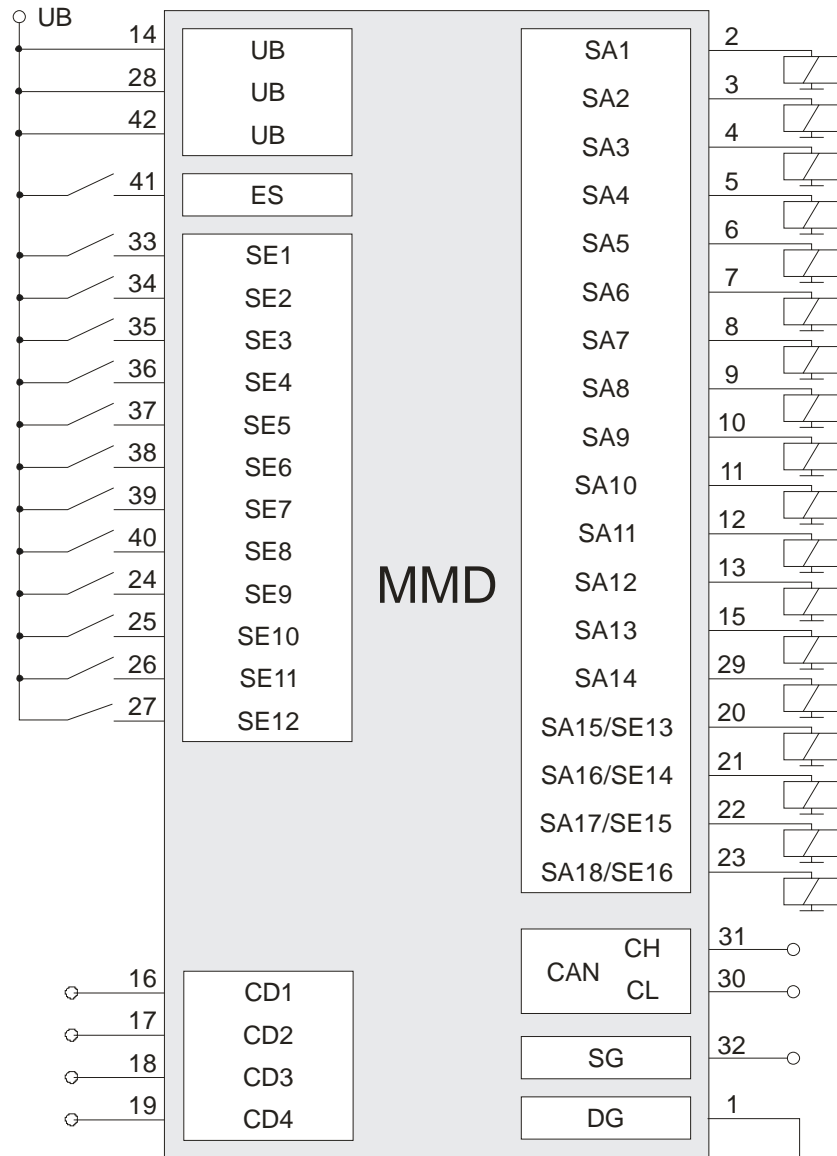
MMC – connection diagram



MMA – connection diagram



MMD – connection diagram



MMC modular PLC – common technical data

Housing	Aluminium housing with a ventilation membrane Protection system IP65, IP69K (DIN 40050, DIN EN 60529)	
Power supply:	UB = 8 ... 32V	
Working temperature range:	-40 ... 85°C (housing temperature)	
Safety:	Microcontroller watchdog, Safety cut-off via an external watchdog and relay No plug-in components Reverse pole protection Ventilation membrane Protection categories IP65 and IP69K	
EMC:	Road vehicles: Directive 72/245/EEC (95/54/EC) ISO 10605, ISO 7637-1, ISO 7637-2, ISO 7637-3 Construction machinery: DIN EN 13309, ISO 7637-3 Agricultural and forestry vehicles: Directive 75/322/EEC, (2001/3/EC) DIN EN ISO 14982, ISO 7637-3 Industrial use: DIN EN 61000-6-2, DIN EN 61000-6-4	
Mechanical, climatic load capacity	Cold:	DIN EN 60068-2-1
	Dry heat:	DIN EN 60068-2-2
	Oscillation:	DIN EN 60068-2-6
	Temperature change:	DIN EN 60068-2-14
	Shock:	DIN EN 60068-2-27
	Permanent shock:	DIN EN 60068-2-29
	Damp heat:	DIN EN 60068-2-30
	Free falling:	DIN EN 60068-2-32

MMC master/slave – technical data

Dimensions:	(W/H/D) 188.5mm x 52mm x 140mm
Weight:	Approx. 900g
Plug connections:	70-pin multiple plug, AMP 1-963484-1
Current consumption:	Approx. 160mA at 12V, maximum allowable total current: 25A
Microcontroller:	1x Infineon SAK XC2287 / 80MHz
Program memory:	768 kbytes flash EPROM (microcontroller) 1 Mbyte flash EPROM (external)
Data memory:	83 kbytes RAM (microcontroller) 1 Mbyte RAM (external)
Parameter memory:	8 kbytes EEPROM
Inputs:	<p>12 switch inputs of which four are individually reversible between pull up and pull down and eight fixed with pull down 4.2 kΩ pull down/pull up resistors Adjustable switching thresholds in the range between 0 ... 32V</p> <p>6 frequency inputs, $f_{\max} = 10\text{kHz}$ Switching between pull up and pull down possible in a group of four as well as twice individually. 4.1 kΩ pull down/pull up resistors Two pairs can respectively alternatively be used as one shaft encoder input Commonly adjustable switching thresholds for a group of four as well as twice individually in the $-0.2 \dots +18\text{V}$ range. Can also be used as digital switch inputs with adjustable switching thresholds in the 0 ... 32V range</p> <p>8 analogue inputs 4..20mA electrical inputs with 220Ω load to ground and 10 bit resolution. Over-load-protected Reversible as analogue inputs with voltage range 0..5V or 0 ... 10V with 10 bit resolution and 100kΩ input resistance. 4 of which are reversible as switch inputs with 4.1kΩ pull down</p>
Outputs:	<p>8 proportional solenoid outputs, each current-regulated for a maximum of 3A. Can also be used as switch outputs. Furthermore, they can be individually reversed as PVG-outputs.</p> <p>8 switch outputs</p> <p>1 power supply output for sensors and potentiometers (switchable between 5V, 8V and 10V)</p>
Interfaces:	<p>1 RS232, maximum baud rate: 115kbauds</p> <p>3 CAN 2.0B, maximum baud rate: 1Mbit/s</p>

MMA slave – technical data

Dimensions:	(W/H/D) 152mm x 56mm x 120mm
Weight:	Approx. 600g
Plug connections:	Multiple plug, AMP 1-0967280-1, 42 contacts
Current consumption:	Approx. 150mA at 12V Maximum allowable total current: 25A
Microcontroller:	1x Infineon SAK XC2287 / 80MHz
Program memory:	768 kbytes flash EPROM (microcontroller)
Data memory:	83 kbytes RAM (microcontroller)
Parameter memory:	8 kbytes EEPROM
Inputs:	<p>4 switch inputs Switching between pull up and pull down possible in a group of two as well as twice individually. 4.2 kΩ pull down/pull up resistors Adjustable switching thresholds in the range between 0..32V.</p> <p>4 frequency inputs, $f_{max} = 10\text{kHz}$ Switching between pull up and pull down possible in a group of two as well as twice individually. 4.1 kΩ pull down/pull up resistors Respectively two frequency inputs can be used as a shaft encoder input. Adjustable switching thresholds in the range between -0.2.. 18V Can also be used as digital switch inputs with adjustable switching thresholds in the 0..32V range</p> <p>4 Analogue inputs 4..20mA electrical inputs with 220Ω load to ground and 10 bit resolution. Overload-protected Reversible as analogue inputs with voltage range 0..5V or 0..10V with 10 bit resolution and 100kΩ input resistance.</p> <p>4 Coding inputs Distinguishing 10 device addresses.</p>
Outputs:	<p>8 proportional solenoid outputs, each current-regulated for a maximum of 3A. Can also be used as switch outputs.</p> <p>1 power supply output for sensors and potentiometers (switchable between 5V, 8V and 10V)</p> <p>1 analogue ground for sensor and potentiometer connection</p>
Interfaces:	1 CAN 2.0B, maximum baud rate: 1Mbit/s

MMD slave – technical data

Dimensions:	(W/H/D) 152mm x 56mm x 120mm
Weight:	Approx. 600g
Plug connections:	Multiple plug, AMP 1-0967280-1, 42 contacts
Current consumption:	Approx. 160mA at 12V Maximum allowable total current: 25A
Microcontroller:	1 x XC164CM / 40MHz
Program memory:	128 byte flash EPROM (microcontroller)
Data memory:	8 kbytes RAM (microcontroller)
Parameter memory:	8 kbytes EEPROM
Inputs:	<p>16 switch inputs 4 of which are in a group reversible between pull up and pull down, 8 fixed with pull down and 4 more individually reversible as an alternative to switch outputs. 4.2 kΩ pull down/pull up resistors Adjustable switching thresholds in the range between 0 ... 32V.</p> <p>4 Coding inputs Distinguishing 10 device addresses.</p>
Outputs:	18 Switch outputs, each for a maximum of 4A. 4 of them can be reversed as switch inputs
Interfaces:	1 CAN 2.0B, maximum baud rate: 1Mbit/s

MMC - development accessories

Test box / simulation box

The MMC test and simulation boxes for masters and slaves support the software development. Their integrated sensors and actuators enable testing and optimisation of the input and output functions and the parameterisation like on a real machine. Optionally, external sensors and actuators can be connected. The simulation replaces functional software tests on the machine and leads to fast, convincing results. This considerably reduces actual commissioning time.

To set up the test environment, the controller is plugged into the correct simulation box which is connected via the service lines provided and an RS232 connection is made to the PC. Now all inputs and outputs are available for simulation.

MMC with the test box



MMA with the test box



MMD with the test box



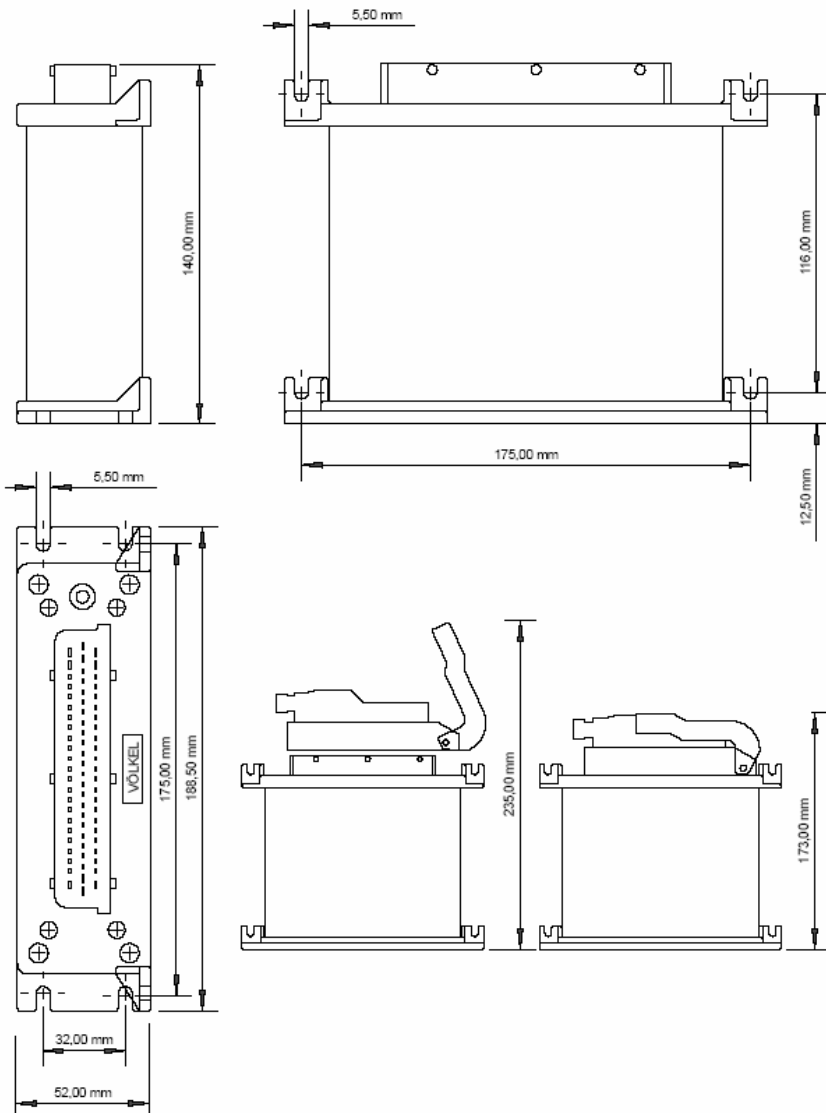
MMC housings and dimensions

The housings are designed for the extreme operating conditions in mobile applications. Safety class IP65 provides effective protection against the penetration of dust and jet water, safety class IP69K provides extensive protection against cleaning with high-pressure cleaners.

The ventilation membrane hinders humidity condensing in the interior of the housing. An LED at the front plate indicates the operating status



Dimensions MMC



Dimensions MMA / MMD

