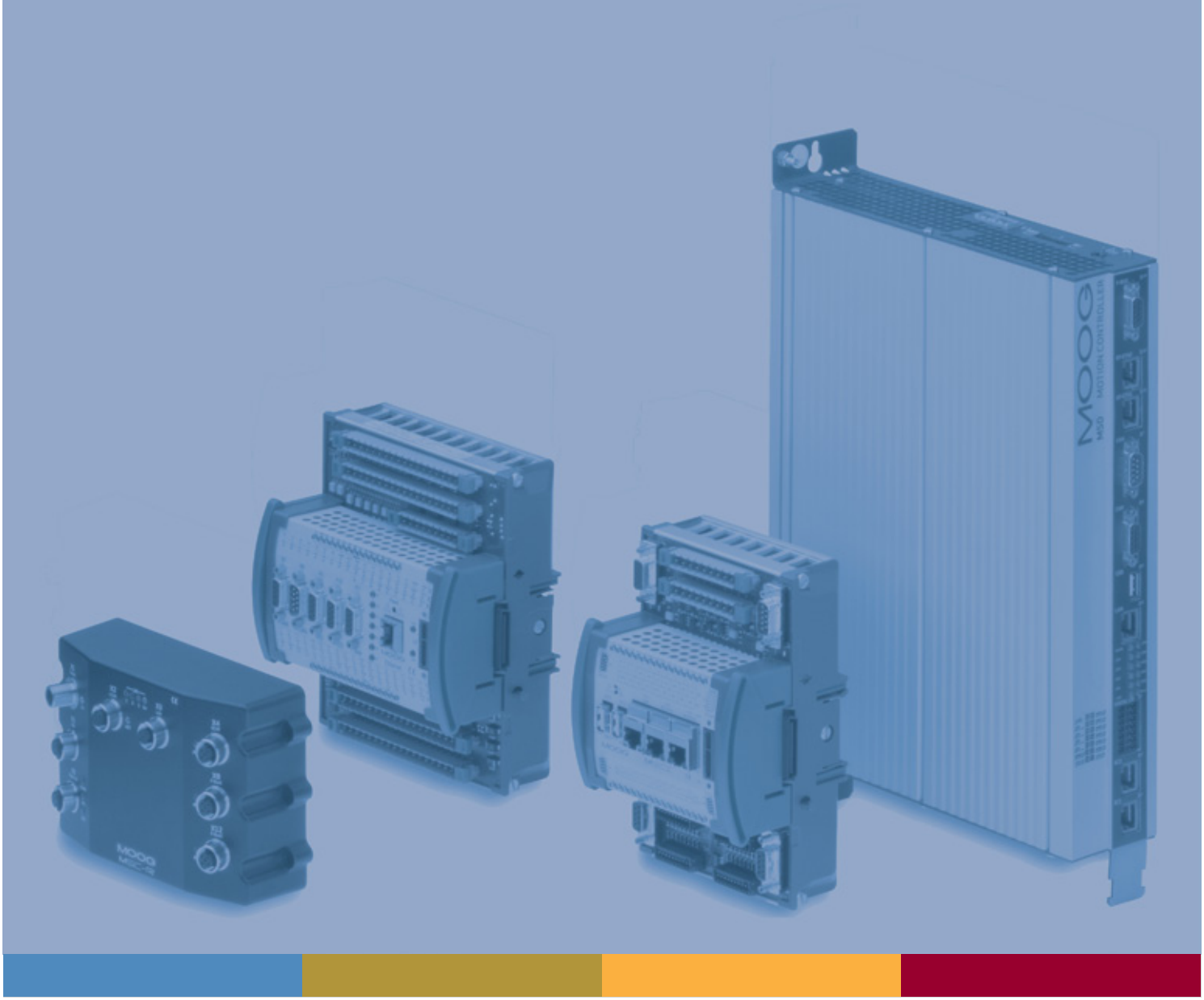
MOTION CONTROLLERS



Rev. B, September 2013

OFFERING HIGH PERFORMANCE MOTION CONTROL FOR DEMANDING ELECTRIC AND HYDRAULIC APPLICATIONS

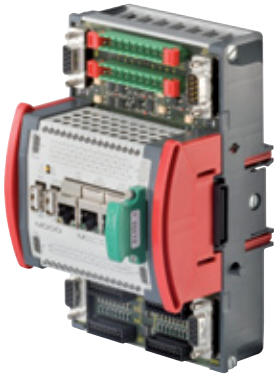
WHAT MOVES YOUR WORLD

MOOG

Whenever the highest levels of motion control performance and design flexibility are required, you'll find Moog expertise at work. Through collaboration, creativity and world-class technological solutions, we help you overcome your toughest engineering obstacles. Enhance your machine's performance. And help take your thinking further than you ever thought possible.

PRODUCT OVERVIEW

MSC I Motion Controller



MSC II Motion Controller

Ruggedized Motion Controller

Moog offers a variety of freely programmable Motion Controllers, each of them designed with specialized functionality to meet a range of customer requirements. Regardless of your application, we have a Motion Controller that will meet your requirements.

MSC I and MSC II Motion Controllers

The MSC I and MSC II Motion Controllers are high performance motion controllers with PLC functionality that are ideal for complex centralized and decentralized applications. The modules are desigend for similar kinds of tasks, just the interfaces and performance are different.

These Motion Controllers have a IP20 protection built in and are fitted on DIN rails in an electronic cabinet.

The MSC I Motion Controller offers high resolution analog inputs/outputs and position sensor interfaces. It is designed for fast and accurate closed-loop control of two axes. MSC I Motion Controller is best suited for applications where one or two actuators need to be controlled via an analog interface.

The MSC II Motion Controller has several fieldbus interfaces and four position transducer interfaces. It is designed for closed-loop control with or without profile generation of multiple electric or hydraulic axes.

The comprehensive functions of MSC I and MSC II Motion Controllers can be extended by additional high resolution analog and digital I/O and communication modules. The extension modules are clipped on the side of the Motion Controller and are electronically connected by the internal Extension bus (E-Bus).

To control complex decentralized applications two CAN bus interfaces are included.

Ruggedized Motion Controller

The Ruggedized Motion Controller (MSC-R) is a freely programmable motion controller designed for harsh environments. It is suitable for use with both electric and hydraulic motion control.

The Ruggedized Motion Controller is offered in addition to MSC I and MSC II Motion Controllers to enable high speed control under demanding industrial environmental conditions. The computing power is the same as the MSC II Motion Controller.

The Ruggedized Motion Controller can be mounted directly at the machine without the need for an additional electronic cabinet. The innovative combination of ruggedized design with IP67 protection, computing power and fieldbus support makes the Ruggedized Motion Controller an excellent choice for high performance embedded control solutions.

PRODUCT OVERVIEW

MSD Motion Controller

MSD Motion Controller

The MSD Motion Controller is part of the Programmable Multi-Axis (MSD) Servo Drive System and is best used in combination with Moog Servo Drives.

The MSD Motion Controller coordinates and synchronizes axes, and communicates with host computers and other PLCs via multiple fieldbus protocols. With its PLC functionality, the MSD Motion Controller can control processes of the machine.

It is designed for closed-loop control of velocity and position for up to 30 axes.

The MSD Servo Drives are described in detail in the Programmable Multi-Axis Servo Drives catalog.

Moog Axis Control Software

All Moog Motion Controllers can be programmed using Moog Axis Control Software (MACS), the standard development environment based on CODESYS.

The use of only one software development environment simplifies the creation of applications with different Motion Controllers. Libraries with special functions dedicated to a variety of application requirements support the program development.

	MSC I		**MSC II**				**MSC-R**			**MSD**		
Ordering number	D136-001-		D136-002-				D136-003-			G391-001-		
	007	008	002	003	004	005	001	002	004	001	002	003
Integrated interfaces												
Ethernet	1		1				1			1		
EtherCAT master	-		-	2	-	1	1	1	1	2		
EtherCAT slave	-		-	-	1	-	-	-	1	-	-	1
USB 1.1 host	-		2				1			1		
CAN/CANopen	2		-				2	2	1	1	1	1
PROFIBUS-DP slave	1	-	-	-	-	1	1	-	-	-	1	-
Position transducer	2		4				-			-		
Analog I/O												
Inputs	8		-				-			-		
Outputs	2		-				-			-		
Digital I/O	8		4				2			2		
Sensor interfaces	2		4									
Degree of protection	IP20		IP20				IP67			IP20		
Processor	PowerPC Processor, 32 Bit, RISC architecture with floating point unit											
Special features	Multiple extension modules available to be connected via E-Bus or remote CAN bus						Designed for harsh environments			To be combined with Moog Servo Drives		

FEATURES AND BENEFITS

Feature	**Benefit**
Short cycle times	Higher machine productivity
Easy-to-use software and flexible hardware	Fast start-up commissioning
Support of user-defined open control structures	Maximum flexibility
Special Moog libraries of pre-programmed function blocks	Solve advanced control problems quickly
Multiple connectivity options	Quick integration
Remote servicing and debugging	Convenience

MSC I MOTION CONTROLLER

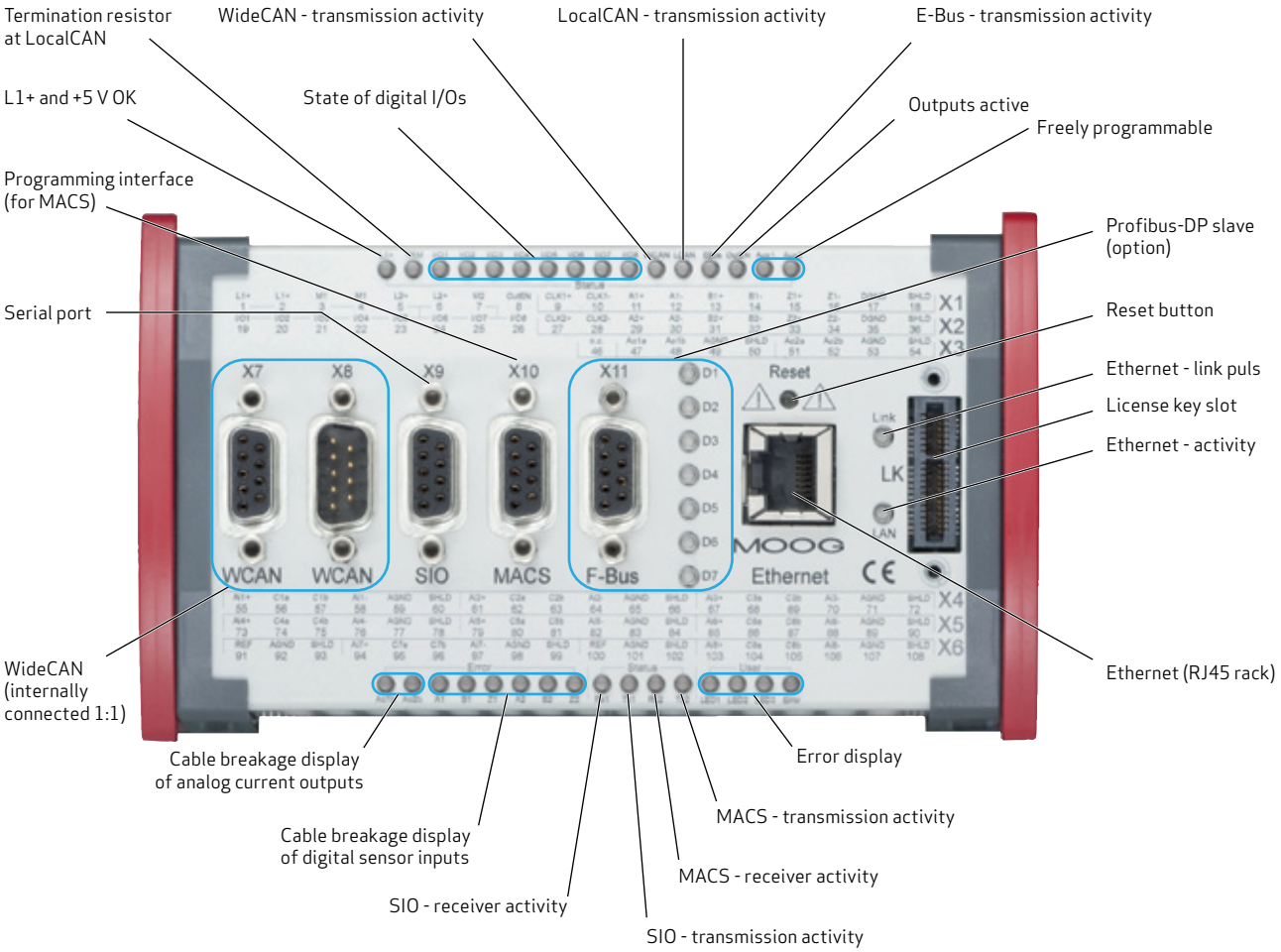
Overview

The MSC I Motion Controller is a freely programmable multi-axis controller suitable for electric and hydraulic motion control. It provides fast and precise control for position, speed and force and features an integrated PLC functionality.

The Moog Axis Control Software (MACS) offers a modern and powerful IEC 61131 development environment. The hardware functionality can be parameterized via MACS.

The MSC I Motion Controller allows freely definable controller structures with cycle times of 400 µs.

Interfaces



MSC I MOTION CONTROLLER

Technical Data

Ordering number	**D136-001-007**	**D136-001-008**
Integrated interfaces		
Ethernet	1	1
CAN	2	2
PROFIBUS-DP slave	1	-
Position transducer	2	2
Processor		
Type	PowerPC Processor, 32 Bit, RISC architecture with floating point unit	
Flash EEPROM	4 MB	
Data retention	Typically 10 years	
General technical data		
Connection technique	Plug-in terminal strips for screwing or clamping	
Mounting	NS 35/7.5 mounting rail according to EN 50022 (DIN rail)	
Dimensions W x D x H	160 x 170 x 85.5 mm (6.30 x 6.69 x 3.36 in)	
Attachment dimensions	W = 149/154.5 mm (5.87/6.08 in)	
Operating temperature range	+5 to +55 °C (+41 to +131 °F)	
Storage temperature range	-25 to +70 °C (-13 to 158 °F)	
Maximum mean temperature in operation for 24 hours	+50 °C (+122 °F)	
Relative air humidity	10 to 95 % (non-condensing)	
Maximum operation height	2,000 m (6,500 ft)	
Maximum storage height	3,000 m (9,800 ft)	
Maximum transport height	3,000 m (9,800 ft)	
Protection class	III	
Degree of protection	IP20	
Standards		
Operating equipment demands and examinations	IEC 61131-2	
Interference emission	EN 61000-6-4	
Interference immunity	EN 61000-6-2, industrial part	
Shock resistance	IEC 60068-2-27	
Vibration resistance	IEC 60068-2-6	
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}	
Power supply		
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1	
Current consumption of module electronics		
Idling	0.5 A	
Full load	2 A	
Potential separation	Separate potentials for: • Module electronics • 24-V supply • Digital inputs/outputs • Ethernet	

MSC I MOTION CONTROLLER

Ordering number	**D136-001-007**	**D136-001-008**
Internal voltages	Generated via internal DC/DC converters	
Behavior at voltage failure/cut-off of supply voltage	Necessary data is permanently stored. If the supply voltage fails (<18 V), buffer capacitors provide the necessary energy.	
Interfaces		
Ethernet	10 MBit/s with 8-pole RJ45 connector (10Base-T)	
CAN	Two independent CAN interfaces, transmission rate adjustable from 10 kBit/s to 1 MBit/s: • WideCAN: 2 x D-Sub WCAN connectors on the front cover (connected internally 1:1) • LocalCAN: For communication with other Motion Controller via the side Q-connectors or with the QEBUS module to further devices	
PROFIBUS-DP slave	12 MBit/s	–
Serial port	2 x EIA-232: • "MACS" on the front cover for communication with the MACS software on a PC • "SIO" on the front cover for free use in the application program	
Extension bus (E-Bus)	Q-connectors on the right and left side of the module for connecting up to 7 additional modules. Contains a serial bus (5 to 10 MBit/s) and the LocalCAN bus.	
Digital inputs/outputs		
Type of digital inputs	Type 1 (current consuming) according to IEC 61131-2	
Number of digital inputs/outputs	8	
Configuration	Individually configurable as input or output in the MACS software	
Voltage supply	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1	
Maximum current consumption of single output	0.5 A	
Protection		
Sustained short-circuit	Yes	
Thermal overload	Yes	
Overvoltage	Up to ±36 V	

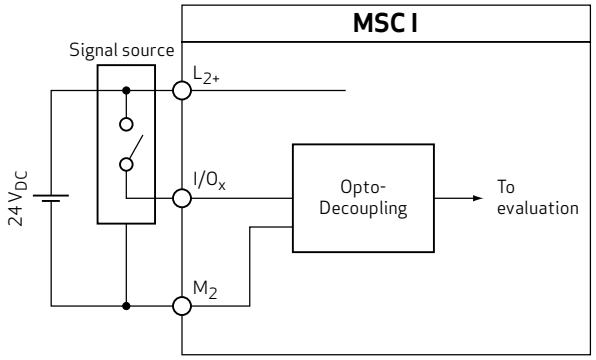
MSC I MOTION CONTROLLER

Ordering number	**D136-001-007**	**D136-001-008**
Analog inputs/outputs		
Voltage supply	Via internal DC/DC converter	
Analog inputs		
Type	Each analog input is configurable in the MACS software as ±10 V, ±10 mA or 4 to 20 mA.	
Number	8	
Resolution	16 Bit	
Overvoltage protection	Up to ±36 V	
Analog outputs		
Type	Voltage output ±10 V. Each analog output is additionally configurable in the MACS software as ±10 mA, ±50 mA or 4 to 20 mA.	
Number	2	
Resolution	16 Bit	
Protection		
Short-circuit	Yes	
Overvoltage	Up to ±36 V	
Reference voltage outputs		
Reference output voltage	+10 V_{DC}	
Maximum current	5 mA	
Protection		
Short-circuit	Yes	
Overvoltage	Up to ±36 V	
Sensor interfaces		
Number of sensor interfaces	2	
Type of signal	Corresponding to EIA-422	
Wire fault monitoring	Inputs	
Configuration	Each sensor configurable as incremental encoder or SSI	
Incremental encoder interface		
Maximum pulse frequency	8 MHz	
Edge evaluation	4-edge evaluation	
SSI interface		
SSI sensor master or slave data format	Gray or binary	
Data bits	8 to 32 Bit	
Transmission frequency	78 kHz to 5 MHz	
Diagnostics		
Watchdog output: Outputs enabled signal	Analog and digital outputs in operation. In the event of a fault, the watchdog output goes to a high impedance state.	

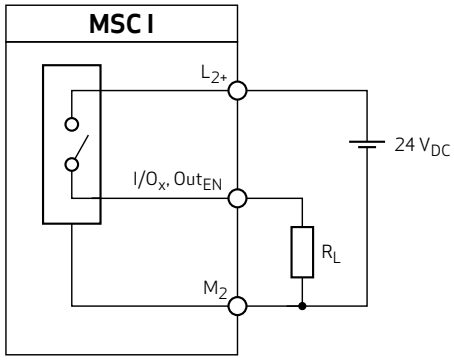
MSC I MOTION CONTROLLER

Circuit Diagrams - inputs/outputs

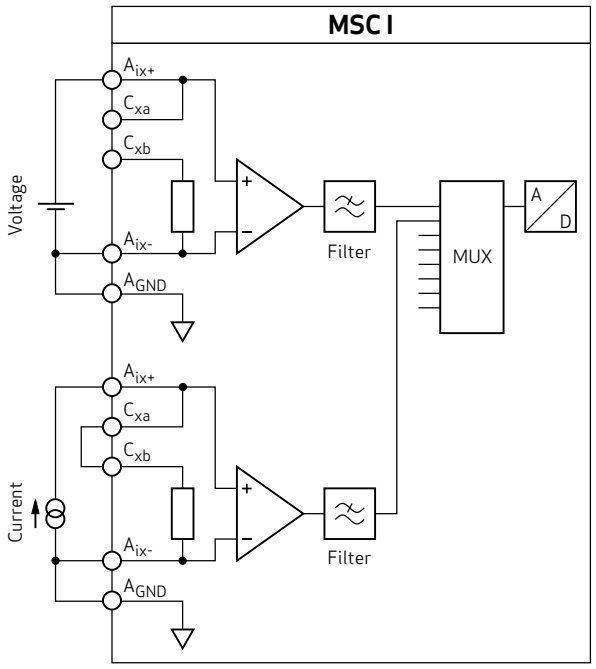
Digital input



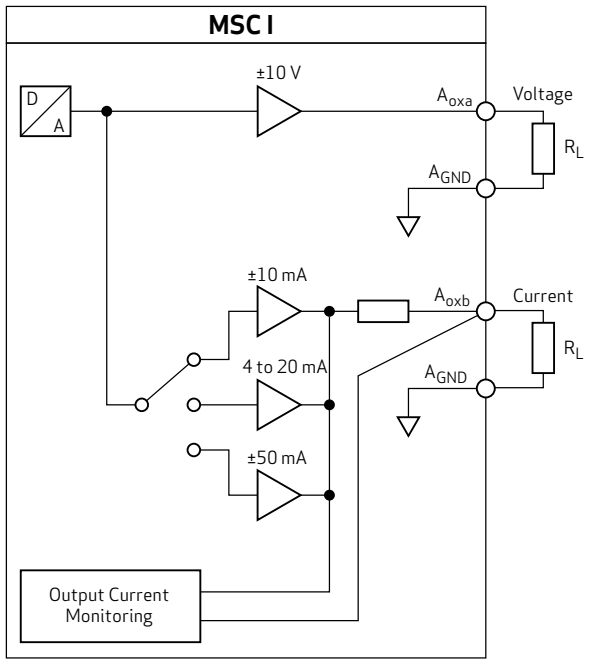
Digital output



Analog input



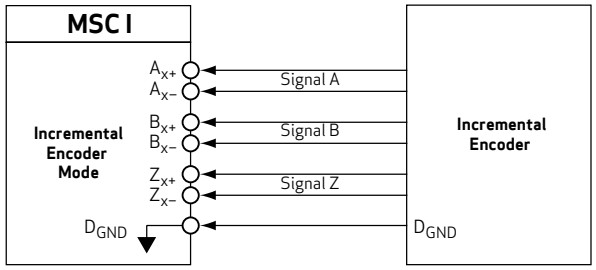
Analog output



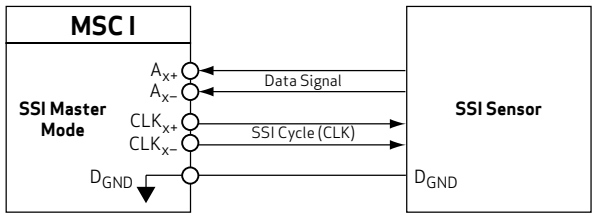
MSC I MOTION CONTROLLER

Circuit Diagrams - Sensor Interfaces

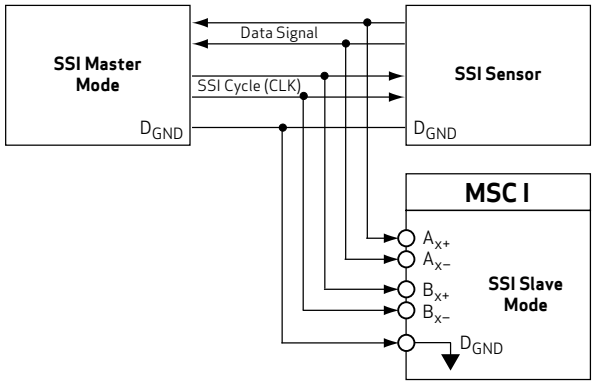
Incremental encoder



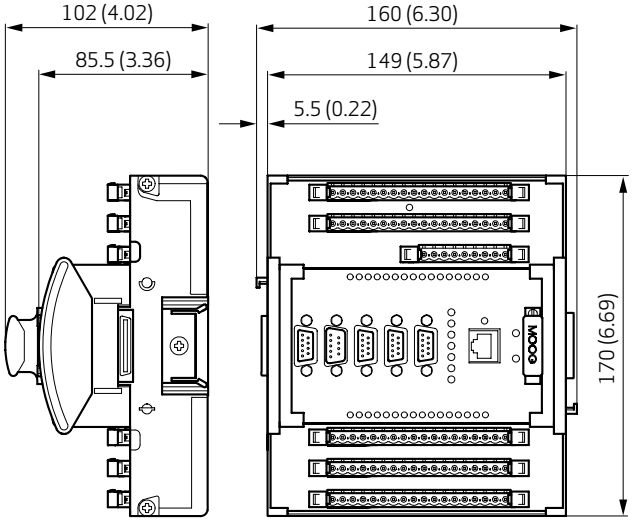
SSI master



SSI slave



Dimensional Drawing [mm (in)]



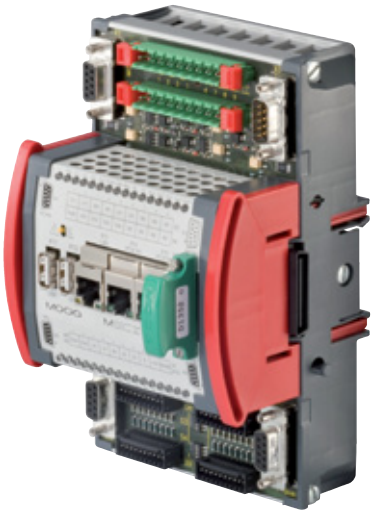
MSC II MOTION CONTROLLER

Overview

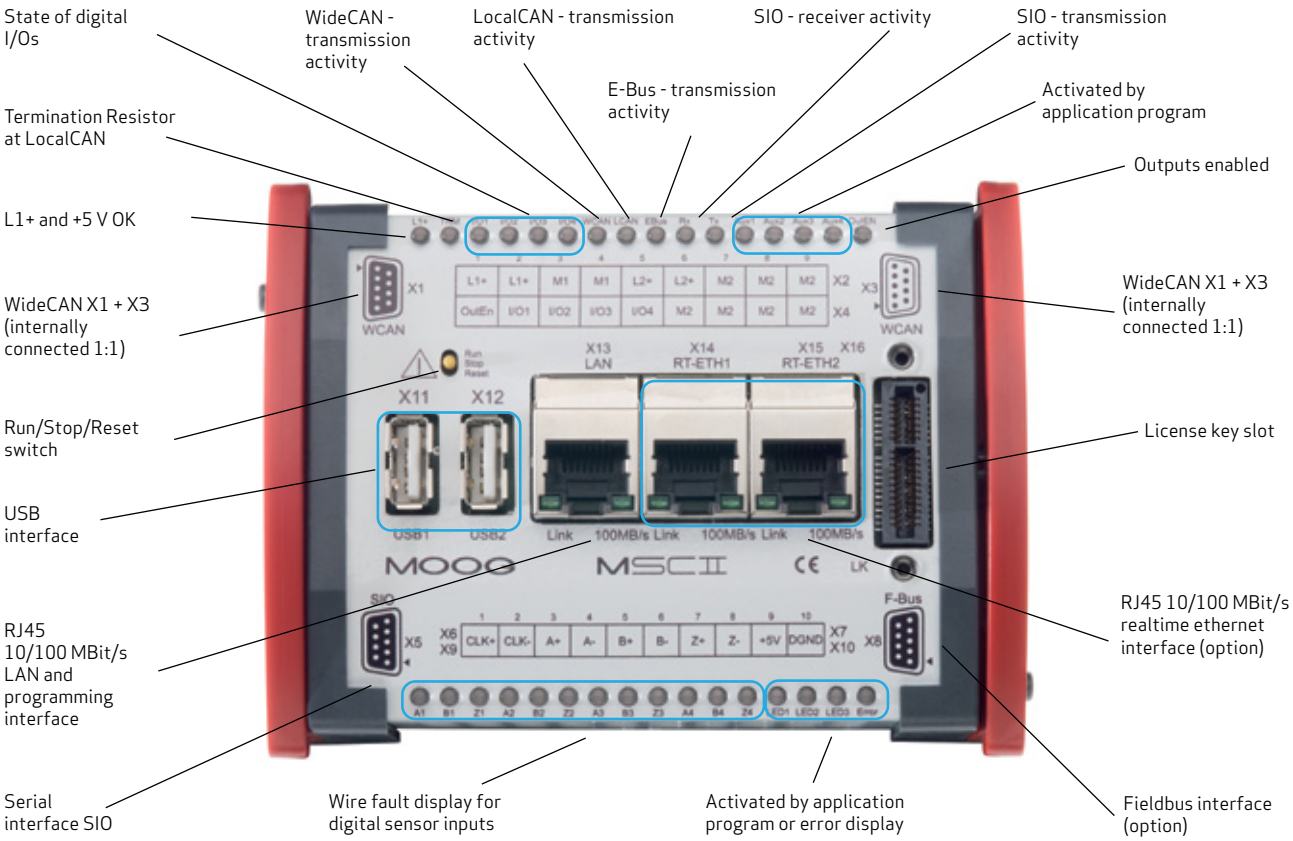
The MSC II Motion Controller is a freely programmable multi-axis motion controller that facilitates rapid and precise control of process variables such as position, speed, and force. It is suitable for use with both electric and hydraulic motion control.

Compared to the MSC I Motion Controller, the MSC II Motion Controller offers higher computation power, shorter cycle times and additional fieldbus options, such as EtherCAT.

The MSC II Motion Controller does not include analog inputs and outputs. The analog extension modules QAIO 16/4 or QAIO 2/2 are recommended for applications where analog inputs and outputs are required.



Interfaces



MSC II MOTION CONTROLLER

Technical Data

Ordering number	D136-002-002	D136-002-003	D136-002-004	D136-002-005
Integrated interfaces				
Ethernet	1	1	1	1
USB	2	2	2	2
EtherCAT master	-	2	-	1
EtherCAT slave	-	-	1	-
PROFIBUS-DP slave	-	-	-	1
CAN/CANopen	2	2	2	2
Position transducer	4	4	4	4
Processor				
Type	PowerPC Processor, 32 Bit, RISC architecture with floating point unit			
RAM	128 MB			
Flash EEPROM	32 MB			
Data retention	Typically 10 years			
General technical data				
Connection technique	Plug-in terminal strips for screwing or clamping			
Mounting	NS 35/7.5 mounting rail according to EN 50022 (DIN rail)			
Dimensions W x D x H	124 x 170 x 85.5 mm (4.88 x 6.69 x 3.36 in)			
Attachment Dimensions	W = 113/118.5 mm (4.45/4.66 in)			
Operating temperature range	+5 to +55 °C (+41 to +131 °F)			
Storage temperature range	-25 to +70 °C (-13 to 158 °F)			
Maximum mean temperature in operation for 24 hours	+50 °C (+122 °F)			
Relative air humidity	10 to 95 % (non-condensing)			
Maximum operation height	2,000 m (6,500 ft)			
Maxmimum storage height	3,000 m (9,800 ft)			
Maximum transport height	3,000 m (9,800 ft)			
Protection class	III			
Degree of protection	IP20			
Standards				
Operating equipment demands and examinations	IEC 61131-2			
Interference emission	EN 61000-6-4			
Interference immunity	EN 61000-6-2, industrial part			
Shock resistance	IEC 60068-2-27			
Vibration resistance	IEC 60068-2-6			
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}			

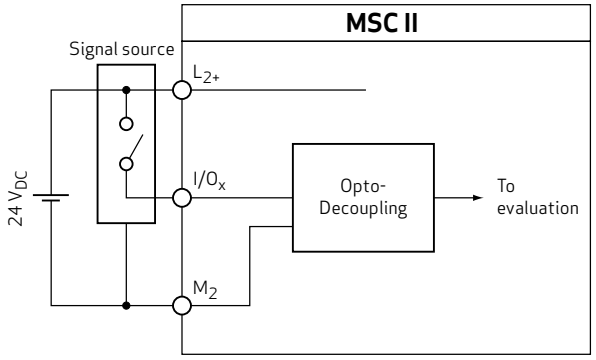
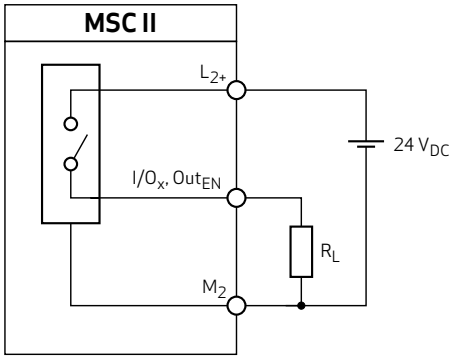
MSC II MOTION CONTROLLER

Ordering number	**D136-002-002**	**D136-002-003**	**D136-002-004**	**D136-002-005**
Power supply				
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1			
Current consumption of module electronics				
Idling	0.3 A			
Full load	0.8 A			
Potential separation	Separate potentials for: • Module electronics • 24-V supply • Digital inputs/outputs • Ethernet			
Internal voltages	Generated via internal DC/DC converters			
Behavior at voltage failure/cut-off of supply voltage	Necessary data is permanently stored. If the supply voltage fails (<18 V), buffer capacitors provide the necessary energy.			
Interfaces				
Ethernet	10/100 MBit/s with 8-pole RJ45 connector (100Base-T)			
CAN	Two independent CAN interfaces, transmission rate adjustable from 10 kBit/s to 1 MBit/s: • WideCAN: 2 x D-Sub WCAN connectors on the front cover (connected internally 1:1) • LocalCAN: For communication with other Motion Controller via the side Q-connectors or with the QEBUS module to further devices			
EtherCAT master	–	100 MBit/s	–	100 MBit/s
EtherCAT slave	–	–	100 MBit/s	–
PROFIBUS-DP slave	–	–	–	12 MBit/s
USB	USB 1.1 host, USB-A connectors			
E-Bus	Q-connectors on the right and left side of the module for connecting up to 7 additional modules. Contains a serial bus (5 to 10 MBit/s) and the LocalCAN bus.			
Digital inputs/outputs				
Type of digital inputs	Type 1 (current consuming) according to IEC 61131-2			
Number of digital inputs/outputs	4			
Configuration	Individually configurable as input or output in the MACS software			
Voltage supply	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1			
Maximum current consumption of single output	0.5 A			
Protection				
Sustained short-circuit	Yes			
Thermal overload	Yes			

MSC II MOTION CONTROLLER

Ordering number	**D136-002-002**	**D136-002-003**	**D136-002-004**	**D136-002-005**
Sensor interfaces				
Number of sensor interfaces	4			
Type of signal	Corresponding to EIA-422 with protection against 24 V			
Wire fault monitoring	Inputs			
Configuration	Each sensor configurable as incremental encoder or SSI			
Incremental encoder interface				
Maximum pulse frequency	8 MHz			
Edge evaluation	4-edge evaluation			
SSI interface				
SSI sensor master or slave data format	Gray or binary			
Data bits	8 to 32 Bit			
Transmission frequency	78 kHz to 5 MHz			
Diagnostics				
Watchdog output: Outputs enabled signal	Digital outputs in operation. In the event of a fault, the watchdog output switches to a high impedance state.			

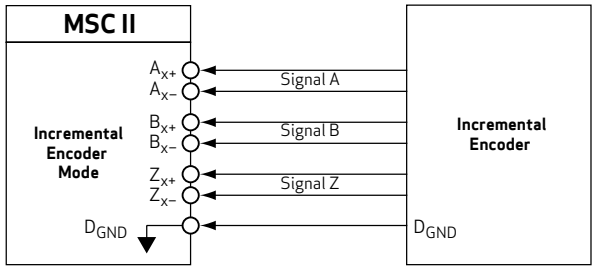
Circuit Diagrams - inputs/outputs

Digital input	Digital output
	

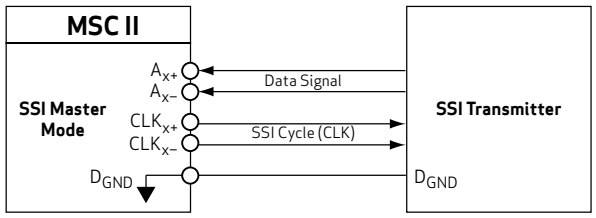
MSC II MOTION CONTROLLER

Circuit Diagrams - Sensor Interfaces

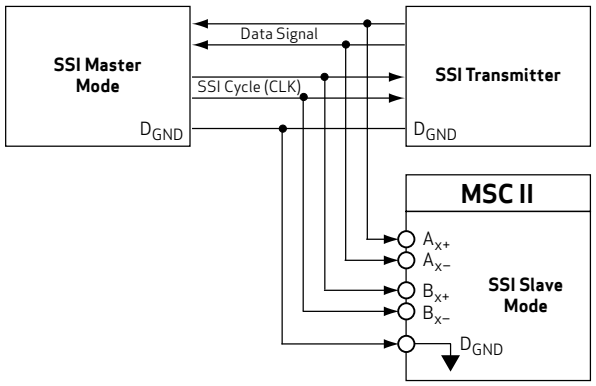
Incremental encoder



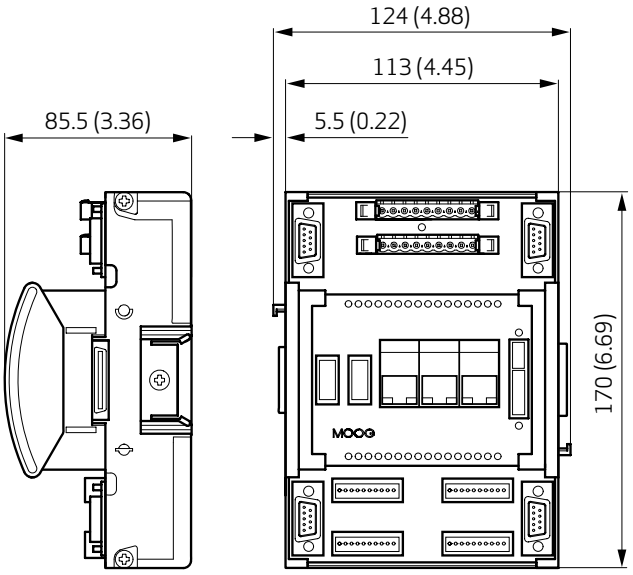
SSI master



SSI slave



Dimensional Drawing [mm (in)]



RUGGEDIZED MOTION CONTROLLER

Overview

The Ruggedized Motion Controller (MSC-R) is a freely programmable motion controller designed for harsh environments. It is suitable for use with both electric and hydraulic motion control.

The Ruggedized Motion Controller has similar computing power as the MSC II Motion Controller but can be mounted directly at the machine without the need for an additional electronic cabinet.

The innovative combination of ruggedized design, computing power and fieldbus support (CAN, Ethernet, EtherCAT, PROFIBUS-DP) makes the Ruggedized Motion Controller an excellent choice for high performance embedded control solutions.

Interfaces

RUGGEDIZED MOTION CONTROLLER

Technical Data

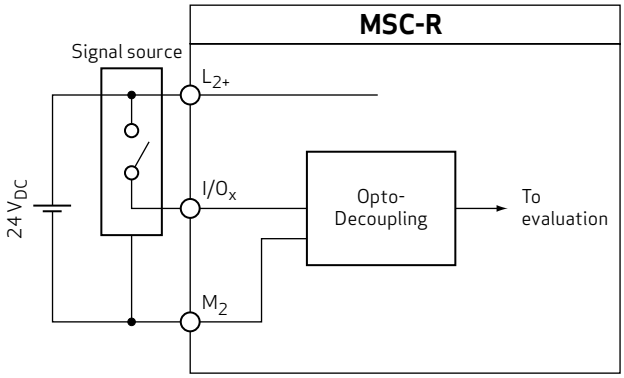
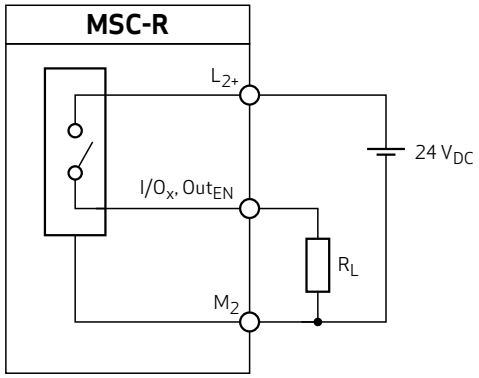
Ordering number	D136-003-001	D136-003-002	D136-003-004
Integrated interfaces			
Ethernet	1	1	1
USB	1	1	1
EtherCAT master	1	1	1
EtherCAT slave	-	-	1
CAN/CANopen	2	2	1
PROFIBUS-DP slave	1	-	-
Processor			
Type	PowerPC Processor, 32 Bit, RISC architecture with floating point unit		
RAM	128 MB		
Flash EEPROM	32 MB		
Data retention	Typically 10 years		
General technical data			
Connection technique	M12 connectors		
Mounting	Powder-coated aluminum housing, mounting on a backing plate		
Dimensions W x D x H	161 x 105 x 57.7 mm (6.34 x 4.13 x 2.27 in)		
Operating temperature range	-40 to +70 °C (-40 to +158 °F)		
Storage temperature range	-40 to +80 °C (-13 to +176 °F)		
Relative air humidity	>10 %		
Maximum operation height	2,000 m (6,500 ft)		
Maximum storage height	3,000 m (9,800 ft)		
Maximum transport height	3,000 m (9,800 ft)		
Protection class	III		
Degree of protection	IP67 (with mounted connectors/cover caps)		
Shock resistance	50 g, 6 directions, 3 ms		
Vibration resistance	30 g, 3 axes, 10 Hz to 2kHz, 10 sweeps		
Standards			
Operating equipment demands and examinations	IEC 61131-2		
Interference emission	EN 61000-6-4		
Interference immunity	EN 61000-6-2, industrial part		
Shock resistance	IEC 60068-2-27		
Vibration resistance	IEC 60068-2-6		
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}		

RUGGEDIZED MOTION CONTROLLER

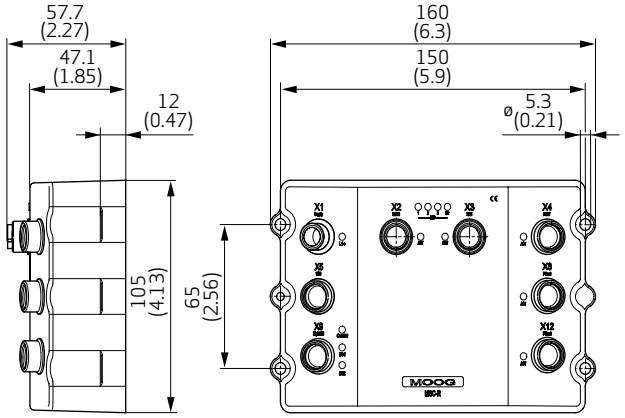
Ordering number	**D136-003-001**	**D136-003-002**	**D136-003-004**
Power supply			
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1		
Current consumption of module electronics			
Idling	0.3 A		
Full load	0.8 A		
Internal voltages	Generated via internal DC/DC converters		
Behavior at voltage failure/cut-off of supply voltage	Necessary data is permanently stored. If the supply voltage fails (<18 V), buffer capacitors provide the necessary energy.		
Interfaces			
Ethernet	10/100 MBit/s with 8-pole RJ45 connector (100Base-T)		
CAN	Transmission rate adjustable from 10 kBit/s to 1 MBit/s, 24 V proof, non-isolated. LocalCAN: M12 connector on the front cover.		
EtherCAT master	100 MBit/s		
EtherCAT slave	–	–	100 MBit/s
PROFIBUS-DP slave	12 MBit/s	–	–
USB	USB 1.1 host, USB-A connectors		
Digital inputs/outputs			
Type of digital inputs	Type 1 (current consuming) according to IEC 61131-2		
Number of digital inputs/outputs	2		
Configuration	Individually configurable as input or output in the MACS software		
Voltage supply	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1		
Maximum current consumption of single output	0.5 A		
Current consumption all digital outputs active	<4 A (L2 fuse)		
Protection			
Sustained short-circuit	Yes		
Thermal overload	Yes		
Diagnostics			
Watchdog output: Outputs enabled signal	Digital outputs in operation. In the event of a fault, the watchdog output goes to a high impedance state.		

RUGGEDIZED MOTION CONTROLLER

Circuit Diagrams - inputs/outputs

Digital input	Digital output
	

Dimensional Drawing [mm (in)]



MSD MOTION CONTROLLER

Overview

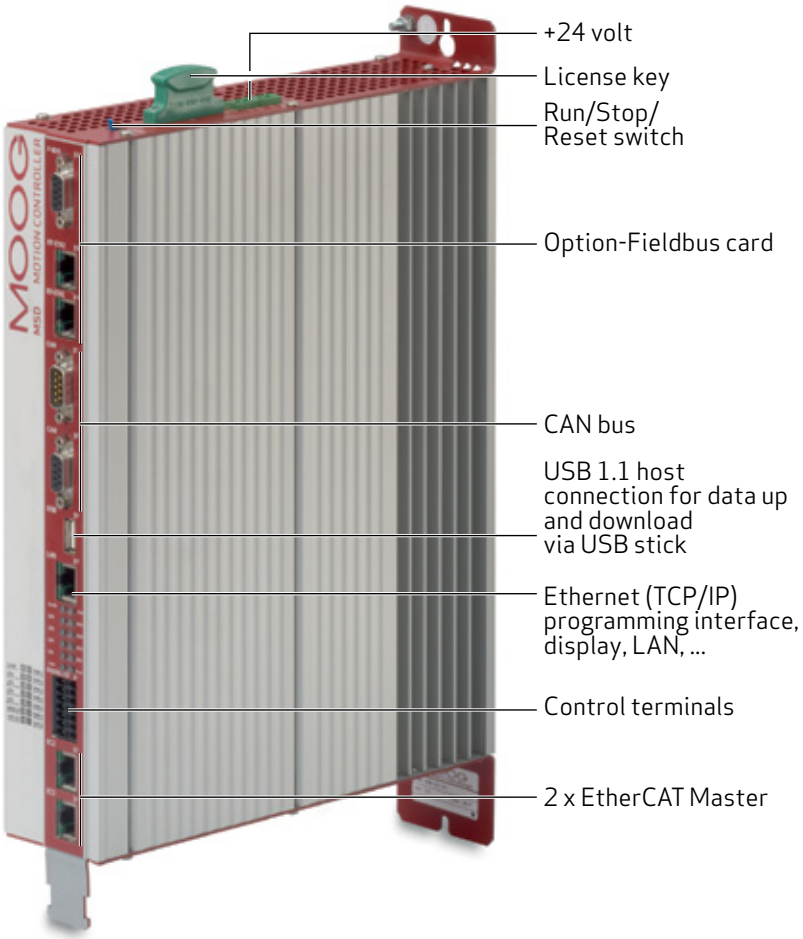
The MSD Motion Controller is based on a 32-bit microprocessor. The MSD Motion Controller coordinates and synchronizes axes, and communicates with host computers and other PLCs via multiple fieldbus protocols. With its PLC functionality, the MSD can control processes of the machine.

It is designed for closed-loop control of velocity and position for up to 30 axes. Additionally, it is able to control input and visualization devices. It supports various communication protocols such as EtherCAT, CANopen and PROFIBUS-DP to any host controller.

The MSD Motion Controller includes 2 EtherCAT master interfaces for fast real time communication with the Servo Drives.

Based on the IEC 61131 development standard, Moog Axis Control Software, with specialized motion libraries is provided to program the MSD Motion Controller.

Interfaces



MSD MOTION CONTROLLER

Technical Data

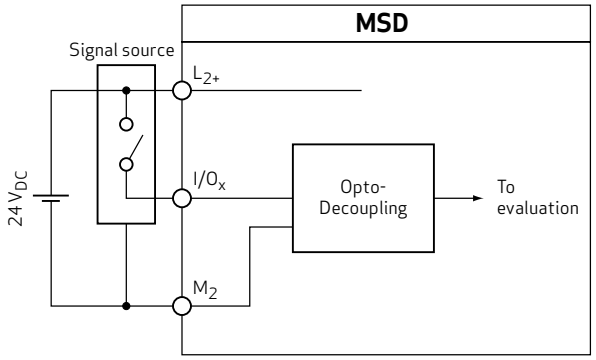
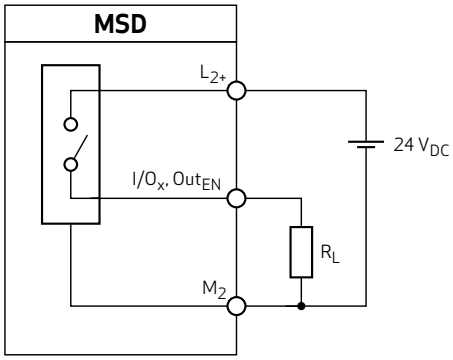
Ordering number	G391-001-001	G391-001-002	G391-001-003
Integrated interfaces			
Ethernet	1	1	1
USB	1	1	1
EtherCAT master	2	2	2
CAN/CANopen	1	1	1
Optional interfaces			
EtherCAT slave	-	-	1
PROFIBUS-DP slave	-	1	-
Processor			
Type	PowerPC Processor, 32 Bit, RISC architecture with floating point unit		
RAM	128 MB		
Flash EEPROM	32 MB		
Data maintenance	Typically 10 years		
General technical data			
Connection technique	Plug-in terminal strips		
Mounting	On a backing plate		
Dimensions W x D x H	58.5 x 355 x 224 mm (2.30 x 13.97 x 8.81 in)		
Operating temperature range	-20 to +55 °C (-4 to +131 °F)		
Storage temperature range	-40 to +80 °C (-40 to +176 °F)		
Maximum mean temperature in operation for 24 hours	+50 °C (+122 °F)		
Relative air humidity	10 to 95 % (non-condensing)		
Maximum operation height	2,000 m (6,500 ft)		
Maximum storage height	3,000 m (9,800 ft)		
Maximum transport height	3,000 m (9,800 ft)		
Protection class	III		
Degree of protection	IP20		
Standards			
Operating equipment demands and examinations	IEC 61131-2		
Interference emission	EN 61000-6-4		
Interference immunity	EN 61000-6-2, industrial part		
Shock resistance	IEC 60068-2-27		
Vibration resistance	IEC 60068-2-6		
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}		

MSD MOTION CONTROLLER

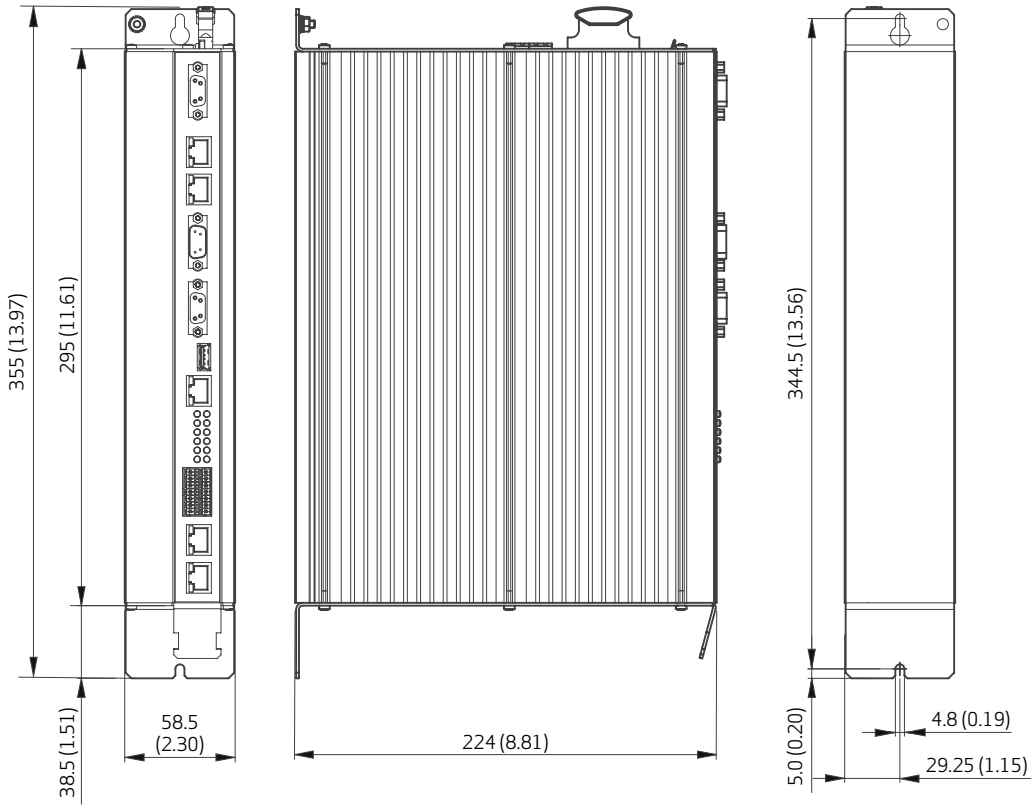
Ordering number	**G391-001-001**	**G391-001-002**	**G391-001-003**
Power supply			
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1		
Current consumption of module electronics			
Idling	0.3 A		
Full load	0.8 A		
Potential separation	Separate potentials for: • Module electronics • 24-V supply • Digital inputs/outputs • Ethernet		
Internal voltages	Generated via internal DC/DC converters		
Behavior at voltage failure/cut-off of supply voltage	Necessary data is permanently stored. If the supply voltage fails (<18 V), buffer capacitors provide the necessary energy.		
Interfaces			
Ethernet	10/100 MBit/s with 8-pole RJ45 connector (100Base-T)		
CAN	Connectors on the front cover, connected internally 1:1. Transmission rate adjustable from 10 kBit/s to 1 MBit/s.		
EtherCAT master	100 MBit/s		
EtherCAT slave	–	–	100 MBit/s
PROFIBUS-DP slave	–	12 MBit/s	–
USB	USB 1.1 host, USB-A connectors		
Digital inputs/outputs			
Type of digital inputs	Type 2 (current consuming) according to IEC 61131-2		
Number of digital inputs/outputs	4		
Configuration	Individually configurable as input or output in the MACS software		
Voltage supply	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1		
Maximum current consumption of single output	0.5 A		
Protection			
Sustained short-circuit	Yes		
Thermal overload	Yes		
Diagnostics			
Watchdog output: Outputs enabled signal	Digital outputs in operation. In the event of a fault, the watchdog output goes to a high impedance state.		

MSD MOTION CONTROLLER

Circuit Diagrams - inputs/outputs

Digital input	Digital output
	

Dimensional Drawing [mm (in)]



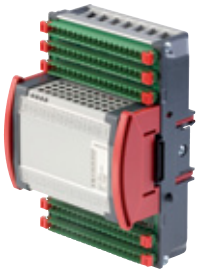
OVERVIEW EXTENSION MODULES FOR MSC I, MSC II AND MSC-R

QAIO 2/2 Analog Module

- 2 analog inputs
- 2 analog outputs
- Voltage and current range configurable
- 16 Bit resolution

See page 26

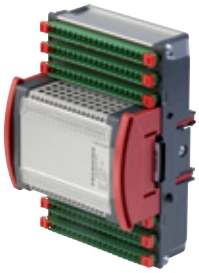
QAIO 16/4 Analog Module



- 16 analog inputs
- 4 analog outputs
- 12 Bit resolution

See page 29

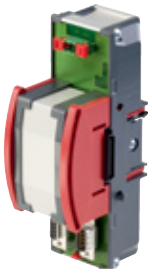
QDIO 16/16 Digital Module



- 16 digital inputs
- 16 digital I/O, each configurable as input or output

See page 32

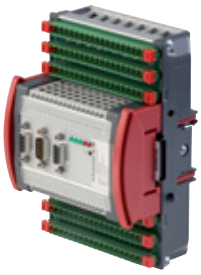
QEBUS-CAN Module



- Connection to second CAN controller

See page 35

RDIO 16/16 Digital Module



- Remote module to connect a Motion Controller via CANopen interface.
- 16 digital inputs
- 16 digital I/O, each configurable as input or output

See page 38

MSC-R-IO 16/8 Digital and PT100 Module

- 16 digital inputs
- 8 digital outputs
- A PT100 temperature sensor interface

See page 41

QAIO 2/2 ANALOG MODULE

Overview

The QAIO 2/2 analog module is used for local extension of the inputs and outputs (I/O) of the MSC I or MSC II Motion Controller. The module is mounted on a DIN rail and directly connected to an MSC I or MSC II Motion Controller via the internal Extension bus (E-Bus).

The QAIO 2/2 has the following inputs and outputs:

- 2 analog inputs, each configurable in the Moog Axis Control Software (MACS) development environment as ±10 V, ±10 mA or 4 to 20 mA. The inputs are converted in multiplex operation
- 1 reference voltage output: The reference voltage source provides a short circuit protected voltage of +10 V
- 2 analog outputs, each ±10 V, additionally individually configurable in the MACS software as ±10 mA, ±50 mA or 4 to20 mA with wire fault monitoring
- 1 pulse input 24 V useable as counter input or frequency measurement input

On the front, 4 LEDs provide information about the status of important module functions.

The configuration of the analog I/O is carried out per software via the central control configuration in the MACS development environment. Either the two analog inputs or the pulse input can be used.

The I/O of the analog extension module is actuated directly from an MSC I or MSC II Motion Controller via the E-Bus. All input- and output-data is transferred within one cycle of the E-Bus.

One MSC I or MSC II Motion Controller can be extended with a maximum of 7 QAIO 2/2-AV modules. It is not possible to combine it with QAIO 16/4 on one E-Bus segment.

Technical Data

Designation	**QAIO 2/2-AV**
Ordering number	D137-001-011
Connection to MSC I/MSC II Motion Controller	Via E-Bus (10 MHz)
General technical data	
Connection technique	Plug-in terminal strips for screwing or clamping
Mounting	NS 35/7.5 mounting rail according to EN 50022 (DIN rail)
Dimensions W x D x H	124 x 170 x 85.5 mm (4.88 x 6.69 x 3.36 in)
Attachment dimensions	W = 113/118.5 mm (4.45/4.66 in)
Operating temperature range	+5 to +55 °C (+41 to +131 °F)
Storage temperature range	-25 to +70 °C (-13 to 158 °F)
Maximum mean temperature in operation for 24 hours	+50 °C (+122 °F)
Relative air humidity	10 to 95 % (non-condensing)
Maximum operation height	2,000 m (6,500 ft)
Maxmimum storage height	3,000 m (9,800 ft)
Maximum transport height	3,000 m (9,800 ft)
Protection class	III
Degree of protection	IP20

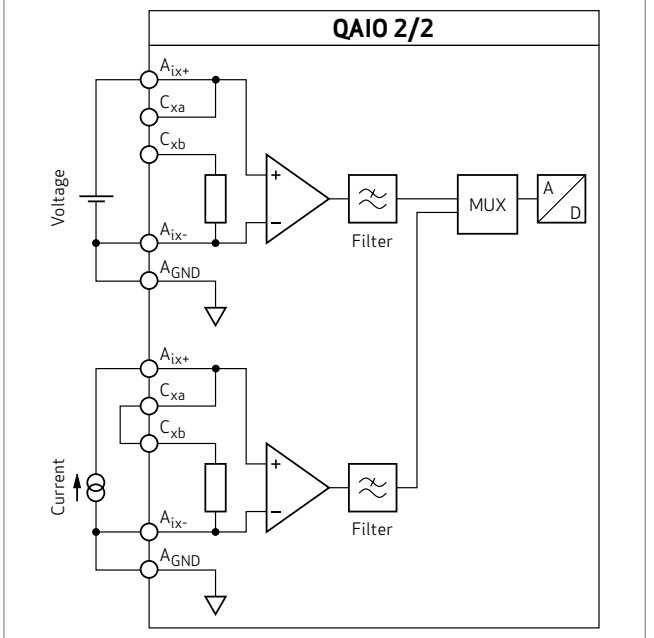
QAIO 2/2 ANALOG MODULE

Designation	**QAIO 2/2-AV**
Standards	
Operating equipment demands and examinations	IEC 61131-2
Interference emission	EN 61000-6-4
Interference immunity	EN 61000-6-2, industrial part
Shock resistance	IEC 60068-2-27
Vibration resistance	IEC 60068-2-6
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}
Power supply	
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1
Maximum current consumption of module electronics	0.25 mA
Potential separation	Separate potentials for: • Module electronics • 24-V supply • Pulse input
Internal voltages	Generated via internal DC/DC converters
Protection against reverse polarity	Yes
Analog inputs	
Type	Each analog input is configurable in the MACS software as ±10 V, ±10 mA or 4 to 20 mA.
Number	2
Resolution	16 Bit
Overvoltage protection	Up to ±36 V
Analog outputs	
Type	Voltage output ±10 V. Each analog output additionally configurable in the MACS software as ±10 mA, ±50 mA or 4 to 20 mA.
Number	2
Resolution	16 Bit
Short-circuit protection	Yes
Overvoltage protection	Up to ±36 V
Maximum output current of voltage output	10 mA
Reference voltage outputs	
Reference output voltage	+10 V
Maximum current	5 mA
Short-circuit protection	Yes
Overvoltage protection	Up to ±36 V
Pulse input	24 V digital input Can be used as input according to IEC 61131-2 type 1; positive switching (input OE) or ground switching (input OC)

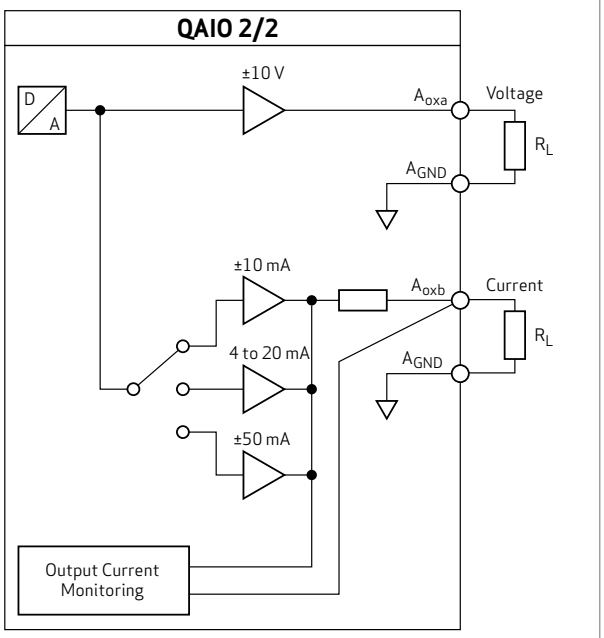
QAIO 2/2 ANALOG MODULE

Circuit Diagrams - inputs/outputs

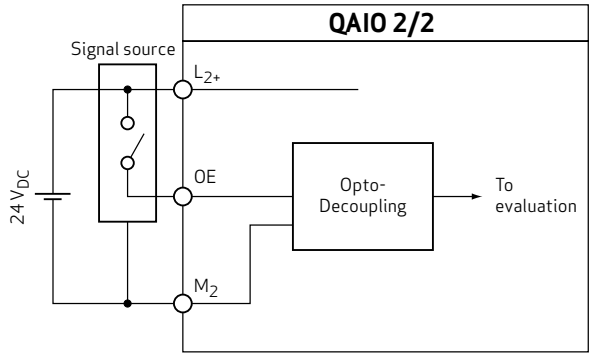
Analog input



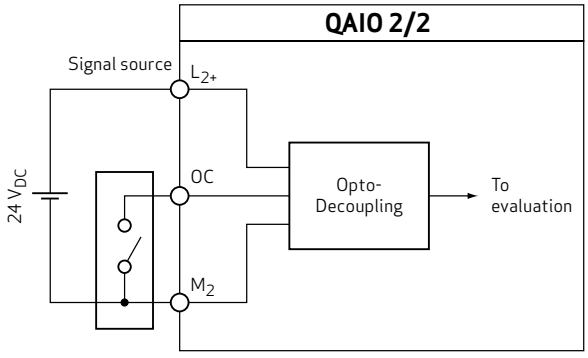
Analog output



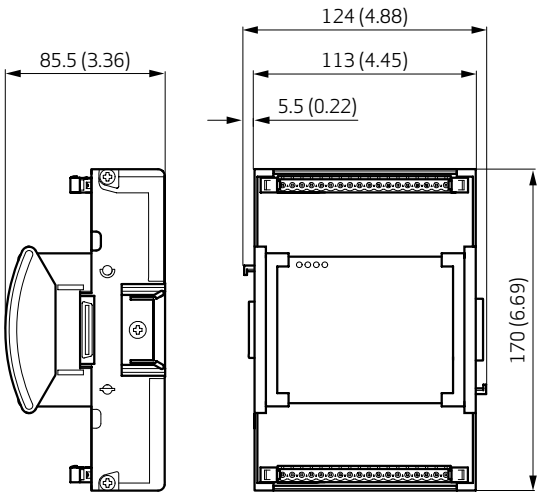
Pulse input - positive switching



Pulse input - ground switching



Dimensional Drawing [mm (in)]



QAIO 16/4 ANALOG MODULE

Overview

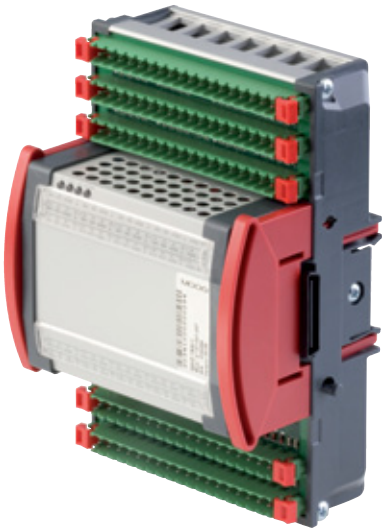
The QAIO 16/4 analog module is used for local extension of the inputs and outputs (I/O) of the MSC I or MSC II Motion Controller. The module is mounted on a DIN rail and directly connected to an MSC I or MSC II Motion Controller via the internal extension bus (E-Bus).

The QAIO 16/4 has the following inputs and outputs:

- 16 voltage or current inputs: The input channels are converted in multiplex operation. The measurement range is ±10 V (QAIO 16/4-V) or ±20 mA (QAIO 16/4-A)
- 1 reference voltage output: The reference voltage source provides a short circuit protected voltage of +10 V
- 4 voltage outputs: The output channels provide a voltage signal in the range of ±10 V. The maximum output current is 5 mA (overload protection)

The configuration of the analog I/O is carried out per software via the central control configuration in the Moog Axis Control Software (MACS) development environment.

On the front, 4 LEDs provide information about the status of important module functions



The I/O of the analog extension module is actuated directly from an MSC I or MSC II Motion Controller via the extension bus (E-Bus).

It is not possible to combine it with a QAIO 2/2 on one E-Bus segment.

Technical Data

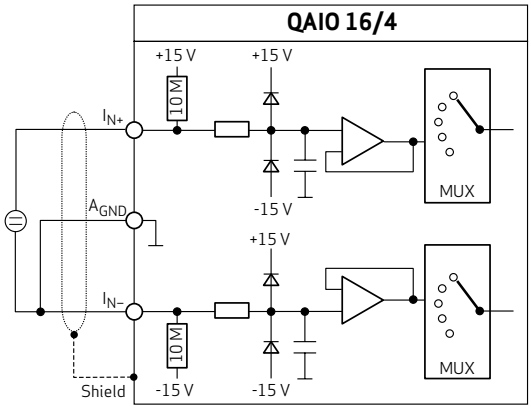
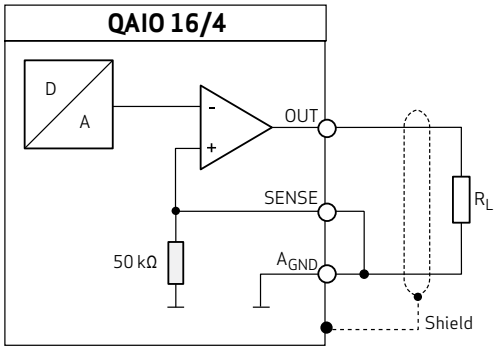
Designation	**QAIO 16/4-A**	**QAIO 16/4-V**
Ordering number	D137-001-006	D137-001-007
Connection to MSC I/MSC II Motion Controller	Via E-Bus (5 MHz)	
General technical data		
Connection technique	Plug-in terminal strips for screwing or clamping	
Mounting	NS 35/7.5 mounting rail according to EN 50022 (DIN rail)	
Dimensions W x D x H	124 x 170 x 85.5 mm (4.88 x 6.69 x 3.36 in)	
Attachment dimensions	W = 113/118.5 mm (4.45/4.66 in)	
Operating temperature range	+5 to +50 °C (+41 to +122 °F)	
Storage temperature range	-25 to +70 °C (-13 to 158 °F)	
Relative air humidity	10 to 95 % (non-condensing)	
Maximum operation height	2,000 m (6,500 ft)	
Maximum storage height	3,000 m (9,800 ft)	
Maximum transport height	3,000 m (9,800 ft)	
Protection class	III	
Degree of protection	IP20	

QAIO 16/4 ANALOG MODULE

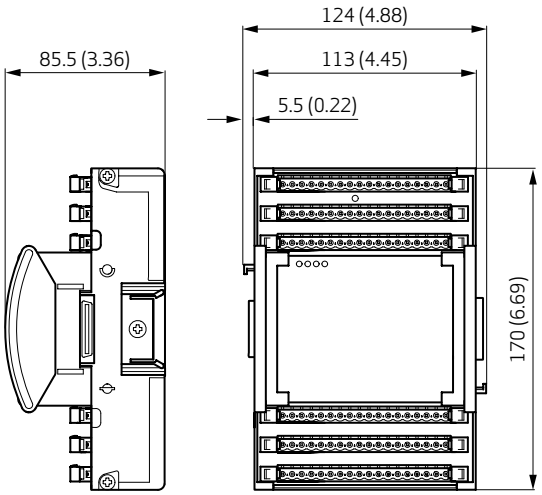
Designation	**QAIO 16/4-A**	**QAIO 16/4-V**
Standards		
Operating equipment demands and examinations	IEC 61131-2	
Interference emission	EN 61000-6-4	
Interference immunity	EN 61000-6-2, industrial part	
Shock resistance	IEC 60068-2-27	
Vibration resistance	IEC 60068-2-6	
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}	
Power supply		
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1	
Maximum current consumption of module electronics	0.3 mA	
Potential separation	Yes, opto-decoupled towards E-Bus. No separation between power supply and analog channels.	
Internal voltages	Generated via internal DC/DC converters	
Protection against reverse polarity	Yes	
Analog inputs		
Type	±20 mA	±10 V
Number	16	
Resolution	12 Bit (multiplex operation)	
Overvoltage/current protection	Up to 50 mA	Up to ±36 V
Analog outputs		
Type	Voltage output ±10 V	
Number	4	
Resolution	12 Bit	
Short-circuit protection	Yes	
Overvoltage protection	Up to ±36 V	
Maximum output current of voltage output	5 mA	
Reference voltage outputs		
Reference output voltage	+10 V_{DC}	
Maximum current	5 mA	
Short-circuit protection	Yes	
Overvoltage protection	Up to ±36 V	

QAIO 16/4 ANALOG MODULE

Circuit Diagrams - inputs/outputs

Analog input	Analog output
	

Dimensional Drawing [mm (in)]



QDIO 16/16 DIGITAL MODULE

Overview

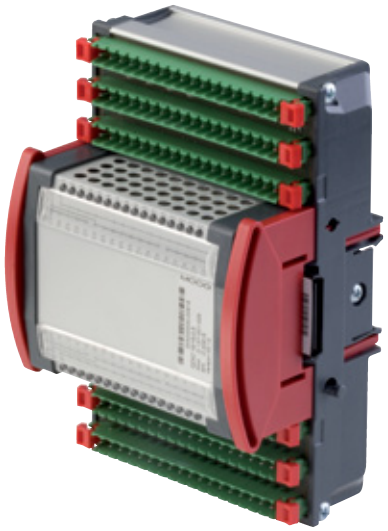
The QDIO 16/16 digital module is used for extension of the local inputs and outputs (I/O) of the MSC I or MSC II Motion Controller. The module is mounted on a DIN rail and directly connected to an MSC I or MSC II Motion Controller, or a remote digital I/O module (RDIO) via the internal Extension bus (E-Bus).

The configuration of the digital I/O is carried out per software via the central control configuration in the Moog Axis Control Software development environment.

LEDs on the front provide information about the status of the I/O. The arrangement of the LEDs corresponds to the I/O connections.

The I/O of the digital extension module are actuated directly from an MSC I , MSC II Motion Controller or RDIO via the E-Bus.

A MSC I or MSC II Motion Controller can be extended with a maximum of 7 modules (e.g. QDIO or QAIO). Further digital I/O can be actuated via RDIO modules, which are connected with an MSC I or MSC II Motion Controller via CANopen.



Technical Data

Designation	**QDIO 16/16-0.5**	**QDIO 16/16-0.5N**
Ordering number	D137-001-005	D137-001-004
Connection to MSC I / MSC II	Via E-Bus (10 MHz)	
General technical data		
Connection technique	Plug-in terminal strips for screwing or clamping	
Connecting of the I/O	3-conductor front wiring	
Mounting	NS 35/7.5 mounting rail according to EN 50022 (DIN rail)	
Dimensions W x D x H	124 x 170 x 85.5 mm (4.88 x 6.69 x 3.36 in)	
Attachment dimensions	W = 113/118.5 mm (4.45/4.66 in)	
Operating temperature range	+5 to +50 °C (+41 to +122 °F)	
Storage temperature range	-25 to +70 °C (-13 to +158 °F)	
Relative air humidity	10 to 95 % (non-condensing)	
Maximum operation height	2,000 m (6,500 ft)	
Maxmimum storage height	3,000 m (9,800 ft)	
Maximum transport height	3,000 m (9,800 ft)	
Protection class	III	
Degree of protection	IP20	

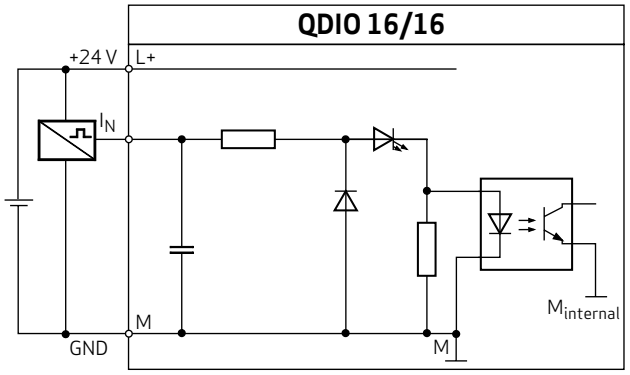
QDIO 16/16 DIGITAL MODULE

Designation	**QDIO 16/16-0.5**	**QDIO 16/16-0.5N**
Standards		
Operating equipment demands and examinations	IEC 61131-2	
Interference emission	EN 61000-6-4	
Interference immunity	EN 61000-6-2, industrial part	
Shock resistance	IEC 60068-2-27	
Vibration resistance	IEC 60068-2-6	
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}	
Power supply		
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1	
Maximum current consumption of module electronics	0.15 A	
Potential separation	Yes, between E-Bus and digital I/O	
Protection against reverse polarity	Yes	
Digital inputs/outputs		
Type	Plus switching	Zero switching
Number	• 16 digital inputs • 16 I/O, each useable as input and output	
Voltage supply	24V_{DC} (SELV), divided into 6 I/O groups	
Maximum output current	0.5 A	
Short-circuit protection	Yes	
Reverse polarity protection	Yes, all digital outputs	

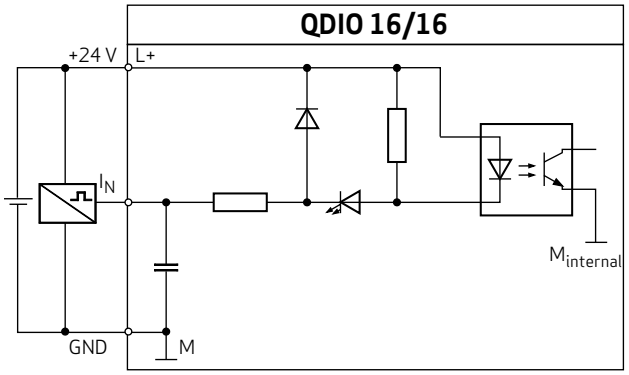
QDIO 16/16 DIGITAL MODULE

Circuit Diagrams - inputs/outputs

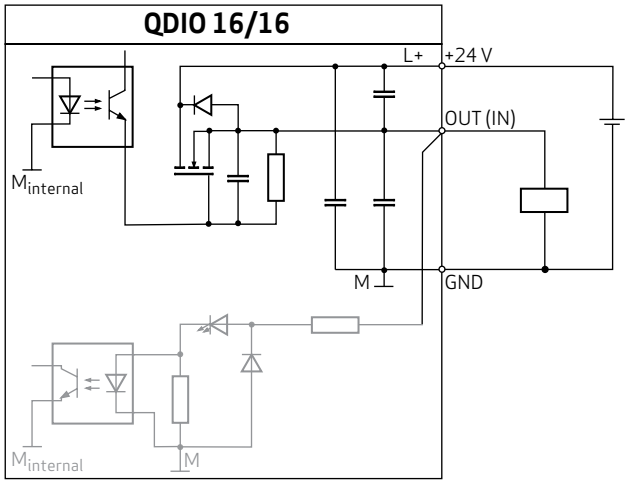
Digital input - plus switching



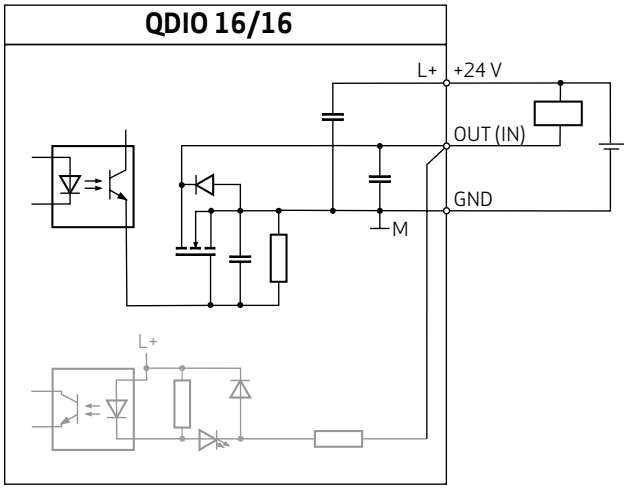
Digital input - zero switching



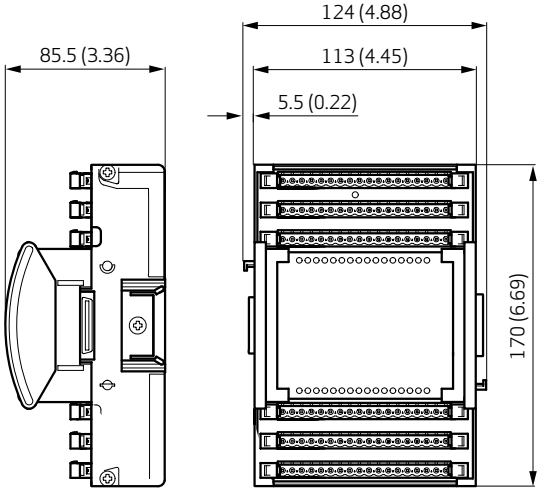
Digital output - plus switching



Digital output - zero switching



Dimensional Drawing [mm (in)]



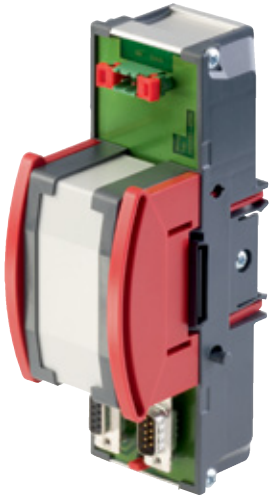
QEBUS-CAN MODULE

Functionality

The QEBUS-CAN module is designed for using the LocalCAN bus for external CAN bus nodes. The LocalCAN bus is integrated in the Extension bus (E-Bus) plug and is accessed via the QEBUS-CAN module by means of two D-Sub mating connectors.

Furthermore, the QEBUS-CAN module offers the option of using a jumper to connect/disconnect a CAN termination resistor.

The module is mounted onto a DIN rail and is directly attached to a MSC I or MSC II Motion Controller or an extension module via the connector at the side of the module.



- The QEBUS-CAN module does not count as an E-Bus node, it can be used in addition to the maximum number of E-Bus modules
- The module can be placed either at the far left or far right in an E-Bus segment
- The module has a smaller width than the QDIO, QAIO and RDIO modules
- The module does not need to be configured
- The E-Bus does not pass through the module
- Both D-Sub mating connectors are identically wired
- The CAN bus can be connected to a power supply via X1

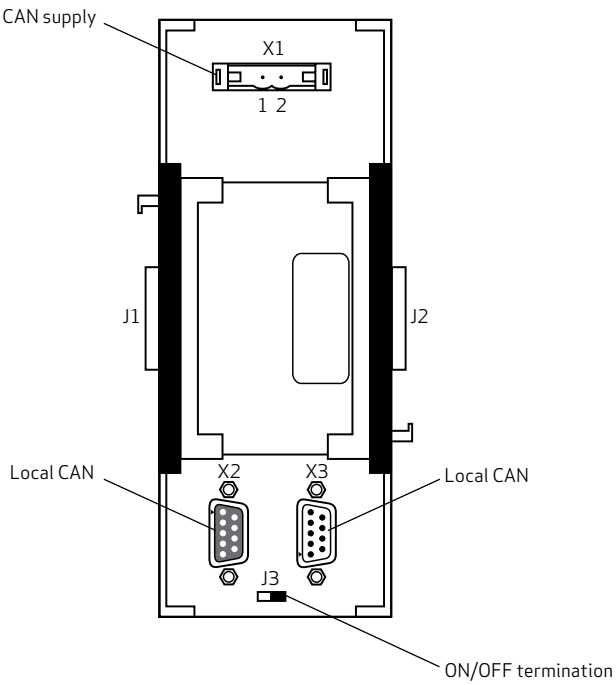
QEBUS-CAN MODULE

Technical Data

Designation	**QEBUS-CAN**
Ordering number	D137-001-010
Connection to MSC I / MSC II	Via Q-connector
General technical data	
Connection technique	Optional CAN power supply: Plug-in Terminal strip for screwing or clamping. CAN bus: 2 x D-Sub connector
Mounting	NS 35/7.5 mounting rail according to EN 50022 (DIN rail)
Dimensions W x D x H	65 x 170 x 85.5 mm (2.56 x 6.69 x 3.36 in)
Attachment dimensions	W = 59.5 mm (2.34 in)
Operating temperature range	+5 to +55 °C (+41 to +131 °F)
Storage temperature range	-25 to +70 °C (-13 to +158 °F)
Relative air humidity	10 to 95 % (non-condensing)
Maximum operation height	2,000 m (6,500 ft)
Maximum storage height	3,000 m (9,800 ft)
Maximum transport height	3,000 m (9,800 ft)
Protection class	III
Degree of protection	IP20
Standards	
Operating equipment demands and examinations	IEC 61131-2
Interference emission	EN 61000-6-4
Interference immunity	EN 61000-6-2, industrial part
Shock resistance	IEC 60068-2-27
Vibration resistance	IEC 60068-2-6
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}
Power supply	
Voltage supply of module electronics	None (passive module)
Interfaces	
LocalCAN	2 x D-Sub, connected 1:1 internallly. 120 Ω termination resistor, can be switch on/off with jumper.
Q-connector	Contains the LocalCAN of the MSC I or MSC II. The E-Bus is not passed through the module.

QEBUS-CAN MODULE

Pin Assignments



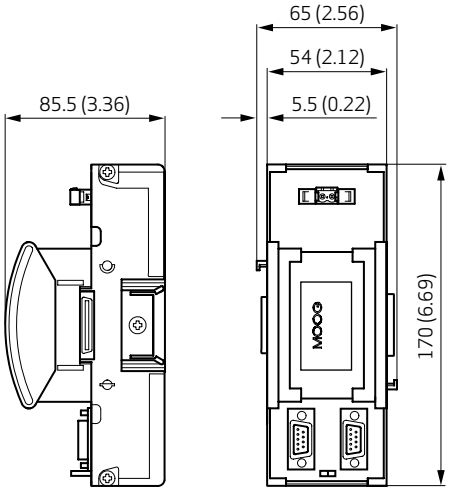
X1 – CAN supply

Pin	Assignment	Connection
1	CAN_V+	CAN supply
2	DGND	Digital ground

X2/X3 – Local CAN bus

Pin	Assignment	Connection
1	–	–
2	CAN-L	CAN–
3	DGND	Digital ground
4	–	–
5	–	–
6	–	–
7	CAN-H	CAN+
8	–	–
9	CAN_V+	CAN supply

Dimensional Drawing [mm (in)]



RDIO 16/16 DIGITAL MODULE

Overview

The RDIO digital module is used as a remote extension of the local inputs and outputs (I/O) of a MSC I or MSC II Motion Controller. The module is mounted on a DIN rail and connected to the Motion Controller via CAN.

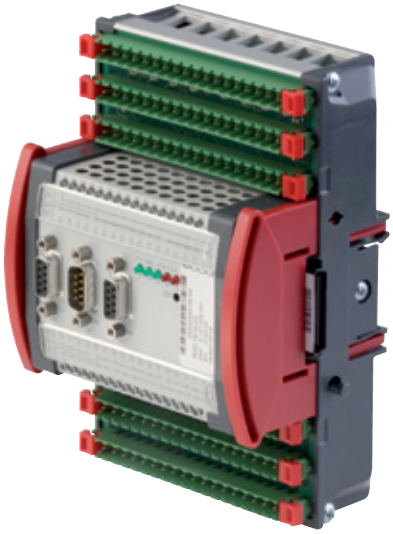
Digital I/O extension module

- 16 digital inputs 24 V
- 16 digital I/O 24 V, individually configurable as an input or an output
- CANopen slave complying with CiA DS 401

The Moog Axis Control Software (MACS) includes a library with function blocks to interface the RDIO via CANopen. This ensures simple integration into Moog Motion Controller applications.

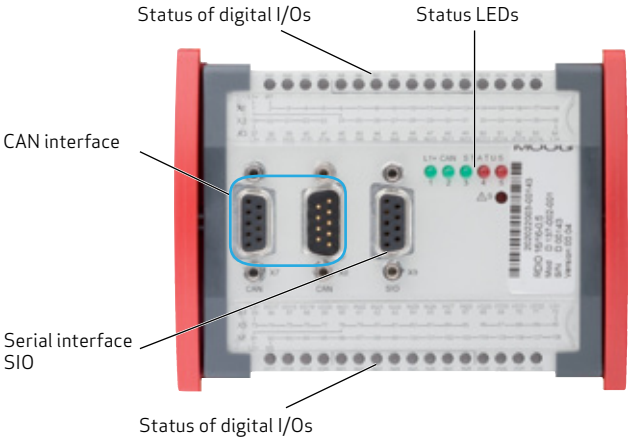
LEDs on the front provide information about the status of each I/O. The arrangement of the LEDs corresponds to the I/O connections.

The I/Os are accessed via CANopen interface. The I/ Os of the QDIO modules are also accessed via CANopen interface of the RDIO.



- No modules shall be connected to the left Extension bus (E-Bus) connector of the module
- The CAN interface is only accessible via the CAN connectors on the front cover
- Up to 6 QDIO modules can be connected to the right E-Bus connector of the module
- Several RDIOs can be connected via CAN connector

Interfaces



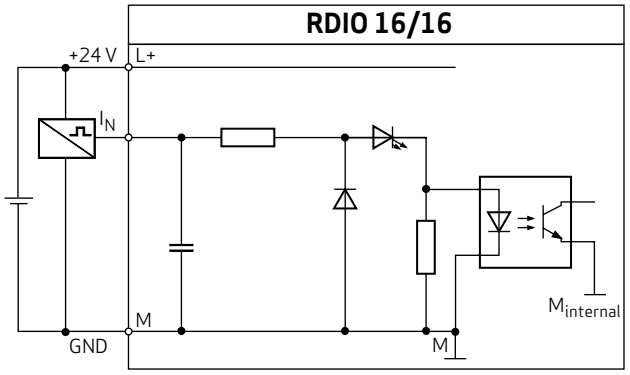
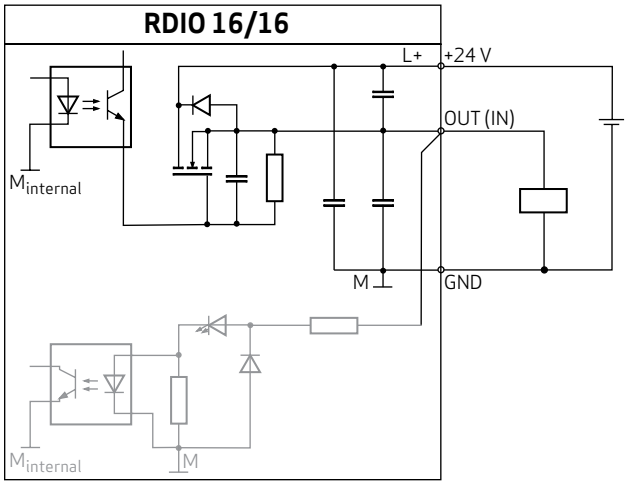
RDIO 16/16 DIGITAL MODULE

Technical Data

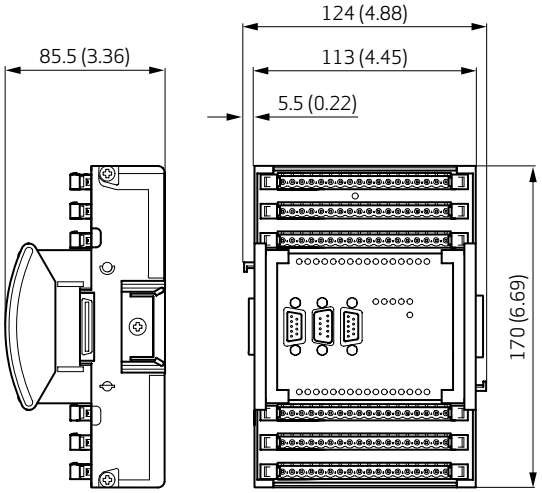
Designation	**RDIO 16/16-0.5**
Ordering number	D137-002-001
Connection to Moog Motion Controller	• CANopen to a Motion Controller • E-Bus to connect up to 6 QDIO modules
Interfaces	CAN
General technical data	
Connection technique	Plug-in terminal strips for screwing or clamping
Connecting of the I/O	3-conductor front wiring
Mounting	NS 35/7.5 mounting rail according to EN 50022 (DIN rail)
Dimensions W x D x H	124 x 170 x 85.5 mm (4.88 x 6.69 x 3.36 in)
Attachment dimensions	W = 113/118.5 mm (4.45/4.66 in)
Operating temperature range	+5 to +50 °C (+41 to +122 °F)
Storage temperature range	-25 to +70 °C (-13 to +158 °F)
Relative air humidity	10 to 95 % (non-condensing)
Maximum operation height	2,000 m (6,500 ft)
Maxmimum storage height	3,000 m (9,800 ft)
Maximum transport height	3,000 m (9,800 ft)
Protection class	III
Degree of protection	IP20
Standards	
Operating equipment demands and examinations	IEC 61131-2
Interference emission	EN 61000-6-4
Interference immunity	EN 61000-6-2, industrial part
Shock resistance	IEC 60068-2-27
Vibration resistance	IEC 60068-2-6
Insulation strength	IEC 61131-2, test voltage 500 V_{DC}
Power supply	
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1
Maximum current consumption of module electronics	0.15 A
Potential separation	Yes, between CAN and digital I/O
Protection against reverse polarity	Yes
Digital inputs/outputs	
Type	Plus switching
Number	• 16 digital inputs • 16 I/O, each useable as input and output
Voltage supply	24V_{DC} (SELV), divided into 6 I/O groups
Maximum output current	0.5 A
Short-circuit protection	Yes
Reverse polarity protection	Yes, all digital outputs

RDIO 16/16 DIGITAL MODULE

Circuit Diagrams - inputs/outputs

Digital input - plus switching	Digital output - plus switching
	

Dimensional Drawing [mm (in)]



MSC-R-IO 16/8 DIGITAL AND PT100 MODULE

Overview

The MSC-R-IO is used as remote extension module for the Ruggedized Motion Controller (MSC-R), MSC II Motion Controller, MSD Motion Controller or other EtherCAT master modules. It includes an EtherCAT slave interface.

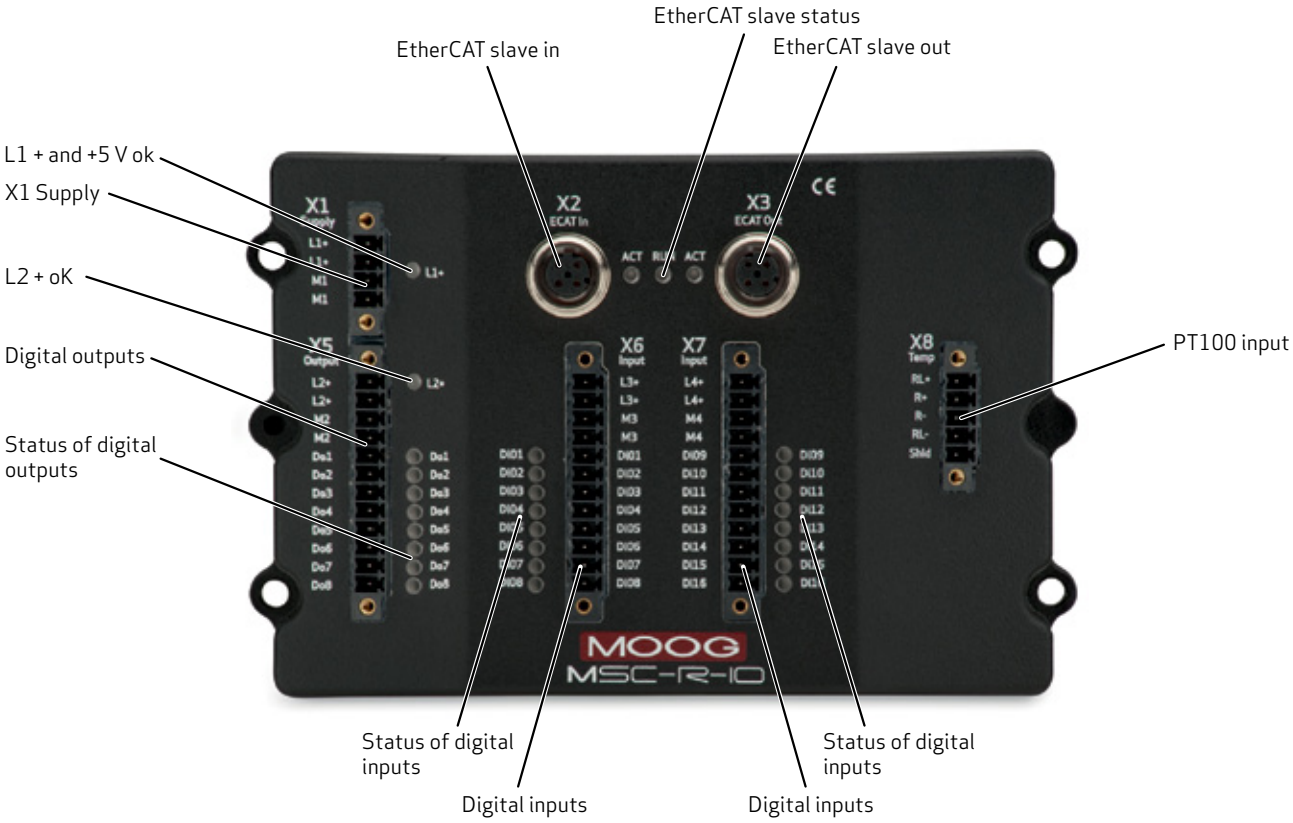
The module offers

- 16 digital inputs
- 8 digital outputs
- A PT100 temperature sensor interface

LEDs on the front provide information about the status of each I/O. The arrangement of the LEDs corresponds to the I/O connections.

Diagnostic: EtherCAT status LED	
RUN LED status	**EtherCAT state**
Off	Init
Blinking	Pre-Operational
Single Flash	Safe-Operational
Flashes	Initialization or Bootstrap
On	Operational

Interfaces



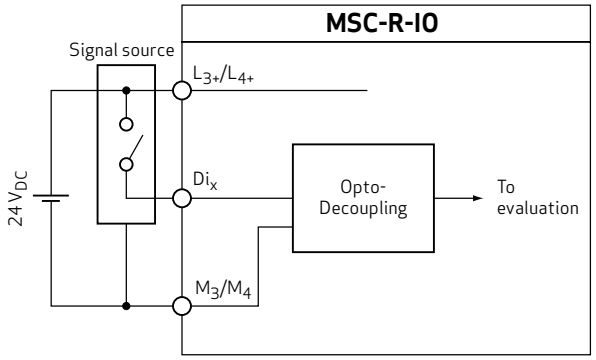
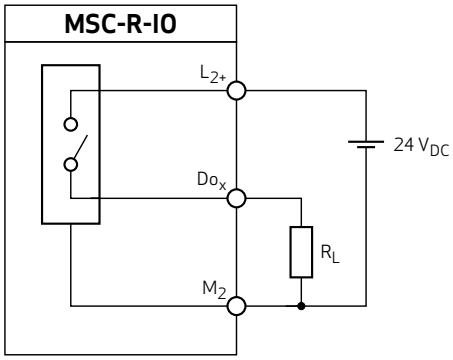
MSC-R-IO 16/8 DIGITAL AND PT100 MODULE

Technical Data

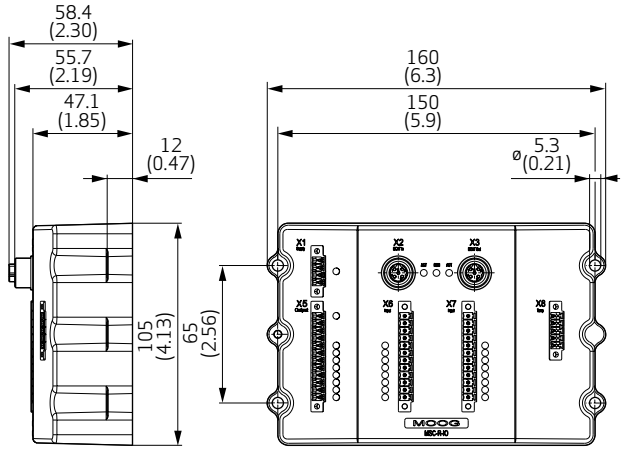
Designation	
Ordering number	D136-006-001
Fieldbus interface	EtherCAT slave interface
General technical data	
Connection technique	EtherCAT slave interface : M12 connectors, power supply and I/Os: Terminal strips
Mounting	Powder-coated aluminium housing, mounting on a backing plate
Dimensions W x D x H	161 x 105 x 57.7 mm (6.34 x 4.13 x 2.27 in)
Operating temperature range	-40 to +70 °C (-40 to +158 °F)
Storage temperature range	-40 to +80 °C (-13 to +176 °F)
Relative air humidity	>10 %
Maximum operation height	2,000 m (6,500 ft)
Maximum storage height	3,000 m (9,800 ft)
Maximum transport height	3,000 m (9,800 ft)
Protection class	III
Degree of protection	IP20
Shock resistance	50 g, 6 directions, 3 ms
Vibration resistance	30 g, 3 axes, 10 Hz to 2 kHz, 10 sweeps
Standards	
Operating equipment demands and examinations	IEC 61131-2
Interference emission	EN 61000-6-4
Interference immunity	EN 61000-6-2, industrial part
Shock resistance	IEC 60068-2-27
Vibration resistance	IEC 60068-2-6
Insulation strength	IEC 61131-2, test voltage 500 VDC
Power supply	
Voltage supply of module electronics	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1
Maximum current consumption of module electronics	0.3 A
Potential separation	Between module electronics and supply for digital I/Os
Protection against reverse polarity	Yes
Digital inputs/outputs	
Type of digital inputs	Type 1 (current consuming) according to IEC 61131-2
Number of digital inputs/outputs	16 digital inputs, 8 digital outputs
Voltage supply	24 V_{DC} (18 to 36 V), SELV according to EN 60950-1
Maximum output current of a single output	0.5 A
Current consumption all digital outputs active	8 outputs: <4 A (L2 fuse)
Protection	
Sustained short-circuit	Yes
Thermal overload	Yes
Temperature sensor interface	
Sensor type	1 channel PT100
Resolution	8 bit value representing -50 to +205 °C (-58 to +401 °F)
Wiring configuration	Four-wire configuration

MSC-R-IO 16/8 DIGITAL AND PT100 MODULE

Circuit Diagrams - inputs/outputs

Digital input	Digital output
	

Dimensional Drawing [mm (in)]



DISPLAYS

RDISP 22 Operator Panel

Operator Panel for supervision and control of machines and processes.

See page 45.

Dialog Controller

Freely programmable Dialog Controller to create visualization screens available in 3 sizes with 5.7", 10.4" or 12.1" .

See page 47.

RDISP 22 OPERATOR PANEL

Overview

The RDISP 22 Operator Panel is designed for supervision and control of machines and processes. Its main advantage is the easy and fast creation of visualization screens with text and graphical elements as well as visualization structures.

- LCD display for text and graphics with 240 x 64 points and LED background lighting
- 8 function keys and 8 LEDs for signal display
- Numeric keypad for value input
- 22 keys

The LCD display with graphics capabilities permits optimum graphical display of your visualization solution. Up to 8 x 40, 4 x 20, 2 x 10 characters per page and any combination of these, pictograms and graphical display images in BMP format can be displayed. Contrast and brightness can be adjusted via the program or keys.

The keys are built as push buttons. They are covered by a robust foil to withstand high push forces.

RDISP 22 has interfaces for CAN, CANopen, EIA-232.

The RDISP 22 offers the display types 'images' and 'messages'. They can be activated independently.

Images are graphical elements (pictograms, BMP files), in which text and variables are displayed both numerically and graphically or as bar charts or as X/Y charts. A visual menu structure can be defined by the programmer. An image can be selected by an image number or via a menu structure by using keys.

Messages can be inserted into a page as well as text with variables. Messages are activated by using the message number.

Parameters, images and messages are stored in the maintenance-free flash memory.

The Moog Axis Control Software (MACS) includes a library with function blocks to interface the RDISP via CANopen. This ensures simple integration into the Moog Motion Controller applications.

The function keys can be labeled freely. This is done by using strips of paper and inserting them between the keys and the front cover.

Programming is carried out on the PC via an user-friendly editor. Programming of menus, menu structures, message texts and multi-language display is easy to achieve with the PC editor ITE Designer.

Technical Data

Designation	**RDISP 22**
Ordering number	D137-004-003
General Technical Data	
Housing	Integrated case
Dimensions W x D x H (front with plug)	196 x 129 x 53 mm (7.72 x 5.08 x 2.09 in)
Mounting dimensions W x D	187 x 120 mm (7.36/4.72 in)
Operating temperature range	-10 to +60 °C (+14 to +140 °F)
Relative air humidity	10 to 95 % (non-condensing)
Protection class	III
Degree of protection	IP65 front side, IP20 rear side
Weight	1.4 kg (3.08 lbs)

RDISP 22 OPERATOR PANEL

Designation	**RDISP 22**
Standards	
Interference emission	EN 61000-6-4
Interference immunity	EN 61000-6-2, industrial part
Shock resistance	IEC 60068-2-27
Vibration resistance	IEC 60068-2-6
Power supply	
Voltage supply of module electronics	24 V_{DC} (17 to 36 V_{DC}), SELV with reverse voltage protection
Current consumption at 24V_{DC}	0.5 A, depending on display brightness
Fuse	Electronic fuse with automatic reset
Connection to power supply	6-pole AMP crimp connector
Display	
Type	LCD Superwist 240 x 64 points, LED background lighting
Number of characters per line (minimum/maximum)	10/40
Line height	2 lines: 14 mm (0.55 in) 4 lines: 7 mm (0.28 in) 8 lines: 4 mm (0.16 in)
Standard character set	IBM set 2 and Cyrillic, other character sets possible
Keys	
Type	Push buttons
Number	22 (including numeric keypad)
Key top	Aluminum disc behind polyester cover; secured against vandalism
Rear	Galvanized steel plate with clamping lid
Functions	
Menu structures	Tree structure or other structure
Contrast and brightness	Adjustable, using keys and program
Character attributes	Flashing, normal, and inverse display
Programming	With PC and ITE Designer editor
Value entry	Numeric keyboard
Variables	Up to 104 per page, number of pages typically > 700, only limited by memory size
Memory	Flash EEPROM to store texts, images, messages, operating system etc.
Interface to PC editor (ITE Designer)	CAN or EIA-232, EIA-232 recommended
Interface to controller (e.g. MSC I, MSC II)	CAN or EIA-232, CANopen recommended
Interfaces	
CAN	Galvanic insulation, termination switchable with DIP switch, 9-pin D-Sub connector
EIA-232	D-Sub connector

DIALOG CONTROLLER

Overview

The Dialog Controller is a freely programmable, real-time controller with the Moog Axis Control Software (MACS) development environment.

The Dialog Controller is available in 3 sizes with 5.7", 10.4" or 12.1" color TFT touch screens for brilliant colors. With IP65 protection at the front (IP20 at the rear), the Dialog Controller is designed for harsh industrial environments.

It is equipped with interfaces for USB, Ethernet, CAN bus, EIA-232 and EIA-485. Data can be stored on MMC/SD memory cards.

The user can define and examine device and communication parameters as well as device states. It offers diagnostics functions which support service and commissioning tasks.

The predefined elements such as buttons, bar graphs, meters, tables and histograms make it easy to create visualization screens.

- Programmable with MACS/CODESYS, no additional editor tool required
- TFT technology for brilliant colors
- Fanless operation
- Communication to Moog Motion Controllers via Ethernet

DIALOG CONTROLLER

Technical Data

Designation	**Dialog Controller**		
Size	5.7"	10.4"	12.1"
Ordering number	D137-004-004	D137-004-005	D137-004-006
General technical data			
Dimensions W x D x H	194 x 172 x 52 mm (7.6 x 6.8 x 2.0 in)	360 x 260 x 77 mm (14.2 x 10.2 x 3.0 in)	440 x 300 x 77 mm (17.3 x 11.8 x 3.0 in)
Operating temperature range	0 to +50 °C (+32 to +112 °F), fanless technology		
Storage temperature range	-20 to +70°C (-4 to +158 °F)		
Transport temperature range	-20 to +70°C (-4 to +158 °F)		
Maximum operation height	2,000 m (6,500 ft)		
Maximum storage height	3,000 m (9,800 ft)		
Maximum transport height	3,000 m (9,800 ft)		
Maximum relative air humidity	85 % (non-condensing)	90 % (non-condensing)	
Protection class	III		
Degree of protection	IP65 front side, IP20 rear side		
Weight (approximately)	1.5 kg (3.3 lbs)	5 kg (11 lbs)	6 kg (13.2 lbs)
Standards			
Interference emission	EN 61000-6-4		
Interference immunity	EN 61000-6-2, industrial part		
Shock resistance	IEC 60068-2-27		
Vibration resistance	IEC 60068-2-6		
Insulation strength	IEC 61131-2; test voltage 500 V_{DC}		
Power supply			
Voltage supply of module electronics	24 V_{DC} (-15/+20 %), SELV according to EN 60950-1		
Current consumption (typical/ maximum	1 A/2 A		
Display			
Type	TFT touch screen display		
Resolution	320 x 240 pixels	640 x 480 pixels	800 x 600 pixels
Processor	PowerPC Processor, 32 Bit, RISC architecture with floating point unit		
RAM	128 MB (96 MB for application)		
Flash memory	32 MB (24 MB for application)		
Retain memory	16 kB		
Real-time clock	Yes, battery-buffered		
Development environment	MACS / CoDesSys 2.3		
Runtime software	CODESYS 2.3 with target visualization, real-time operating system with multitasking		
Interfaces			
Ethernet	100Base-T, 10/100 MBit/s, 8-pole RJ45 connection (recommended as interface to Moog Motion Controllers)		
USB	2 x USB host 1.1 (1 x on front, 1 x on rear)		
CAN	Transmission rate adjustable between 10 kBit/s and 1 MBit/s		
Serial port	2 x EIA-232, 1 x EIA-485		

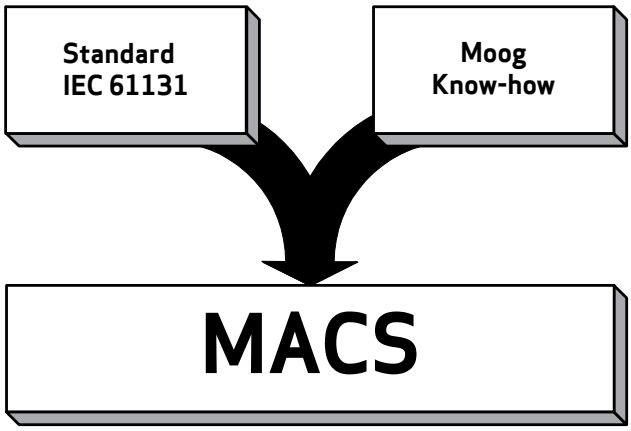
MOOG AXIS CONTROL SOFTWARE

General

The Moog Axis Control Software (MACS) offers a state-of-the-art development environment for implementing demanding motion control functions using the IEC 61131 standard for development.

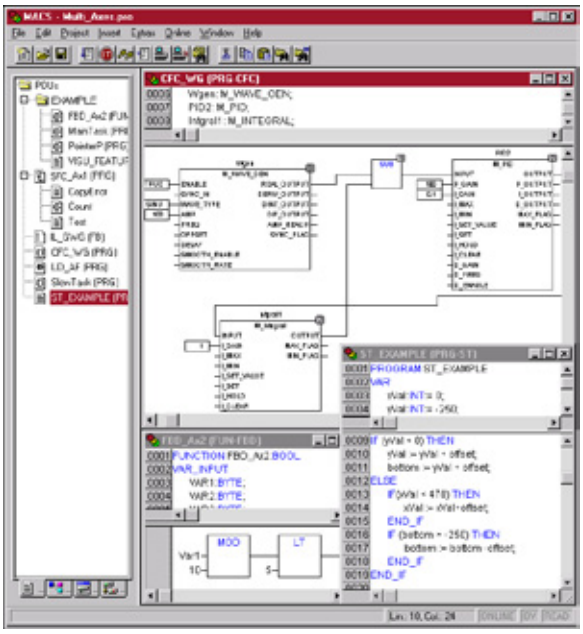
MACS includes tools for:

- Programming
- Testing and optimizing
- Debugging
- Documentation
- Visualization
- Configuration



Features

- Extensive libraries with Moog function blocks, based on 50 years of experience in electric and hydraulic motion control
- Freely programmable controller structures
- Maximum flexibility by offering a complete scope of functions in all IEC 61131 programming languages
- Simultaneous realization of control, regulation and PLC applications in one application program
- Open standard interfaces for communication on machine and process levels
- Motion control functions corresponding to PLCopen standard



Interfaces

Process guidance level:

- OPC server
- DDE interface

Machine level:

- CAN
- CANopen
- Ethernet TCP/IP
- PROFIBUS DP
- EIA-232
- EtherCAT

Benefits

- Quick project realization
- Low programming efforts
- One tool for programming, visualizing and documentation

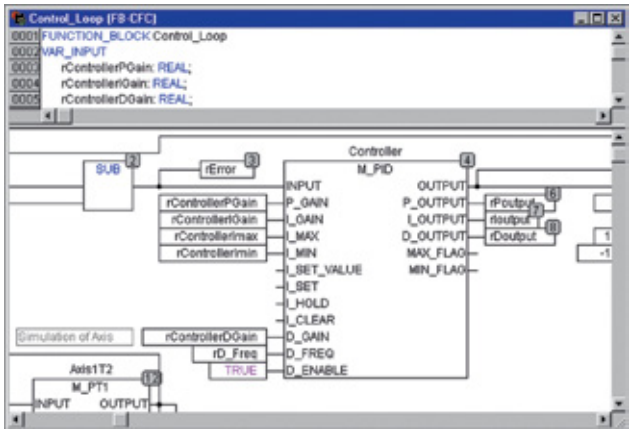
MOOG AXIS CONTROL SOFTWARE

Programming Languages

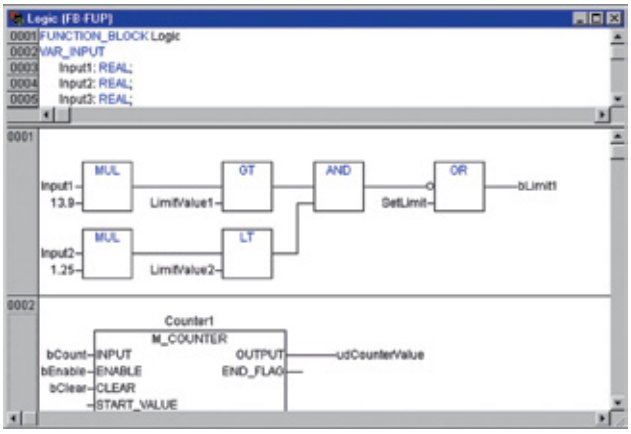
- All IEC 61131 programming languages and CFC (Continuous Function Chart)
- Full scope of functionality in all programming languages, provides maximum flexibility in creation of user programs
- Each module can sequence other modules regardless of their programming language

Editors

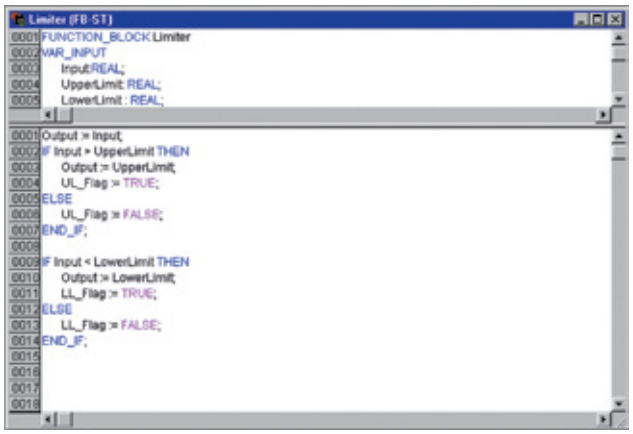
- Context-sensitive input help
- Automatic formatting
- Context menus in all editors
- Syntax coloring
- Multi-level undo/redo
- Display of the current values of all variables in online operation



Continuous Function Chart (CFC)

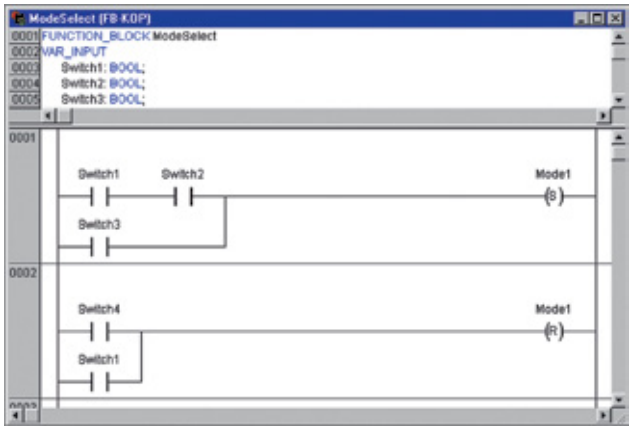


Function Block Diagram (FBD)

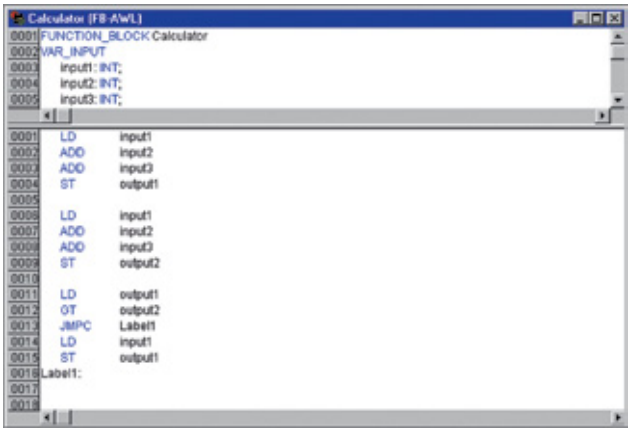


Structured Text (ST)

Sequence Function Chart (SFC)



Ladder Diagram (LD)



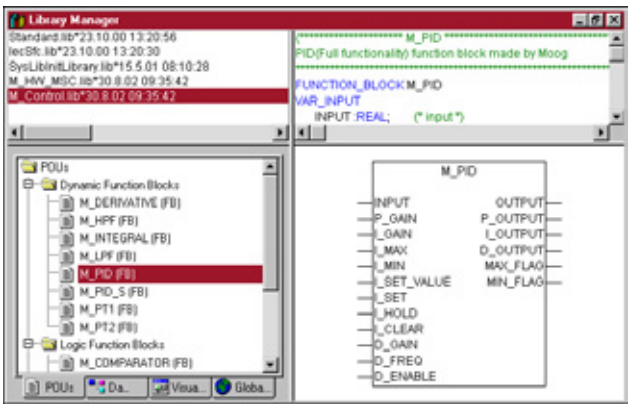
Instruction List (IL)

MOOG AXIS CONTROL SOFTWARE

Functionality of MACS

MACS is based on CODESYS which is the standard for IEC 61131 programming. It has been enhanced by Moog by adding motion control functionality. In this way, even complex automation projects can be simplified. MACS includes the following functionality:

Functionality included with license key	Controls	Motion	Professional
Motion control technology Function block library including: • Controller: I, D, PID standard/extended • Filter: High-pass, low-pass • Non-linear functions: Dead band, non-linear, dual-gain, look-up table • Simulation of the process: PT1, PT2 • Function generator • Signal delay • Counter • Timer	x		
• Transfer functions: Continuous, time discrete		x	
Matlab/Simulink integration: Execution of Matlab/Simulink models inside the IEC 61131 application program		x	
Generating motion profiles PLCopen function blocks according to the specification "Function Blocks for Motion Control" for single and multi-axis applications: • Absolute and relative position • Velocity functions • Homing Moog Motion Control Function Blocks: Function blocks similar to PLCopen function blocks but with additional "Time" parameter to allow smoother movements if the required movement can be executed in the given time without reaching the limits of acceleration/ decelerations and velocity.		x	
Soft motion • Cam functions with graphical editor to create movement profiles • Gearing functions			x
Communication Graphical configurator for: • PROFIBUS-DP slave • EtherCAT master • EtherCAT slave • CANopen master • CANopen slave		x	



Library management

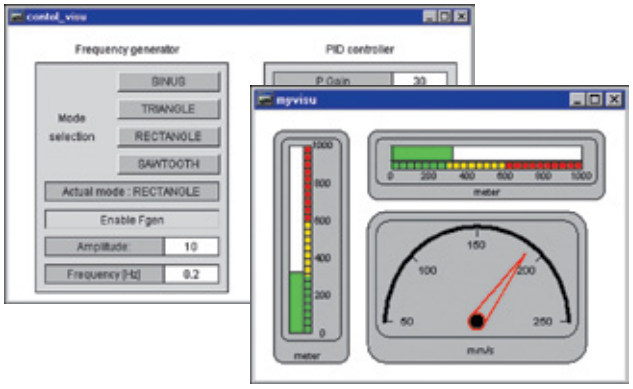
Functionality included with license key	Controls	Motion	Professional
Function block library for initialization and data exchange: • CAN • EIA-232 • Ethernet (TCP/IP and UDP/IP)	x		
Network variables • OPC interface • DDE interface	x		
Hardware Function block library • Signal conditioning for analog inputs/ outputs and position sensors • Diagnostics wire fault, power fault etc. • Time evaluation • Monitoring of temperature • Watchdog	x		
Visualization Web based visualization: MACS visualization pages can be displayed on a web browser		x	
MACS HMI: Package for installation on a PC for full-screen display of visualization pages	x		

MOOG AXIS CONTROL SOFTWARE

Moduls

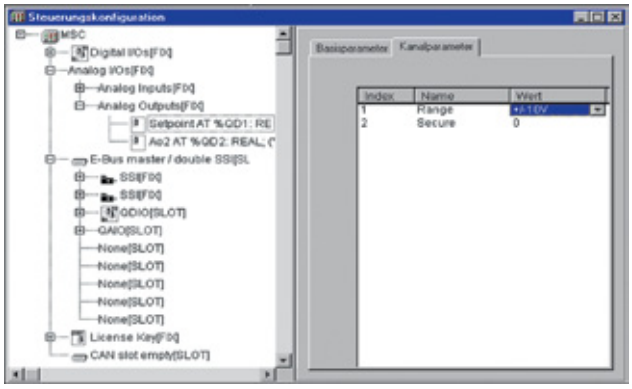
Visualization

- Commissioning tool
- Creation of visualizations for end users



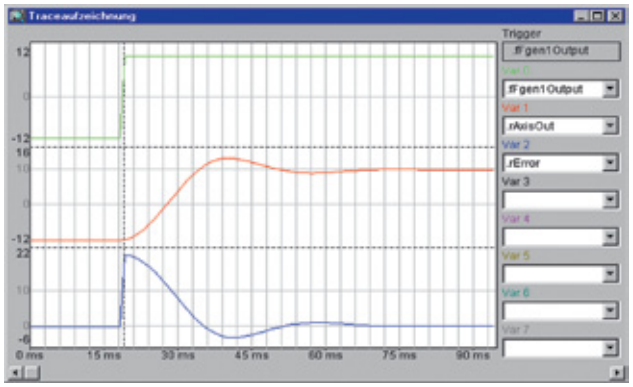
Hardware Configuration

- Configuration of all modules on one screen



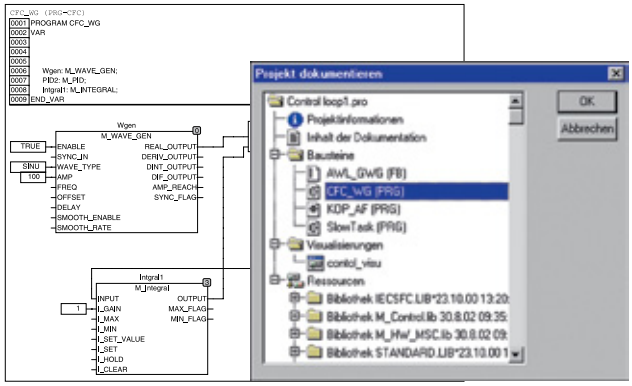
Oscilloscope

- Recording of up to 20 channels
- Various triggering possibilities



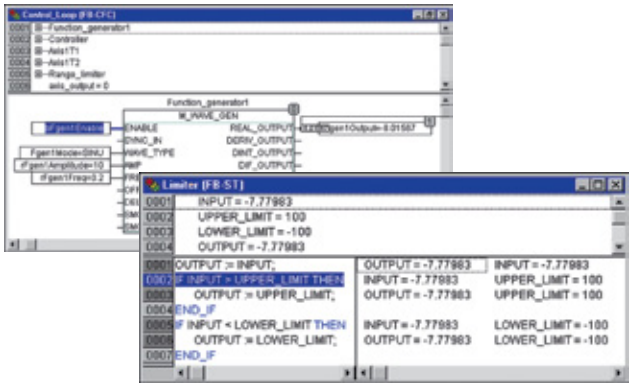
Documentation

- Automatic creation of the project documentation with all components



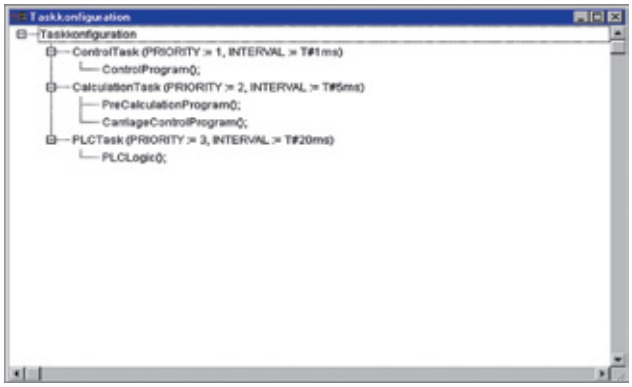
Debugging

- Break points
- Single step/single cycle
- Writing and forcing of variables
- Simulation possible without hardware
- Display of all the current values



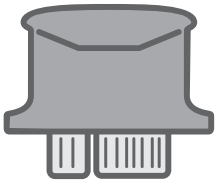
Task Configuration

- Enables division of the application program into a number of tasks
- Schedule tasks optionally time-based (cyclic) or event-triggered
- Priority and time base of each task adjustable



LICENSE KEYS

The license keys contain the runtime license for the Moog Axis Control Software (MACS). According to the license key used, assigned functionality of MACS is enabled for usage.



The license keys contain:

- IP address
- PROFIBUS-DP station address
- CANopen node ID

Designation	Color	Functions	Ordering number
Controls	Gray	MACS runtime license with basic functionality: • Moog control technology library • Communication library: Initialization and data exchange, network variables • Hardware library • Visualization package See section “Functionality of MACS” for details.	D138-002-001
Motion	Green	All functions of Controls license key and additionally: • Motion control technology library: Transfer functions, Matlab/Simulink integration • Generating motion profiles library • Communication library: Graphical configuration • Visualization package: Web based visualization	D138-002-002
Professional	Blue	All functions of Motion license key and additionally: • Generating motion profiles library: Soft motion	D138-002-003
System	Red	Program parts and/or complete application programs, produced specifically upon customer request	Specific to the order

APPLICATION EXAMPLES

We have provided some typical examples of how Motion Controllers can be used in conjunction with hardware and communication interfaces to effectively achieve specific objectives for machine performance.

Applications with MSC I and MSC II Motion Controllers

Up to 7 additional I/O or communication modules can be connected to the right Extension bus (E-Bus) of the MSC I or MSC II Motion Controller. The modules are put together and locked on the DIN rail. In this way, further analog and/or digital I/O modules can be added as required. Analog modules are placed next to the Motion Controller.

The control and signal processing is executed by an MSC I or MSC II Motion Controller. The extension modules connected via E-Bus do not require their own intelligence.

Analog I/O Modules
The QAIO modules are analog I/O modules and are used to extend a MSC I or a MSC II Motion Controller via the E-Bus.

Two different analog modules QAIO 2/2 and QAIO 16/4 are available. They cannot be combined on the same E-Bus segment.

The QAIO modules cannot be connected to a RDIO module.

Digital I/O Modules
The QDIO 16/16 module is a digital I/O module and is used to extend MSC I, MSC II Motion Controller and RDIO 16/16 module via the E-Bus.

RDIO 16/16 Module
The RDIO 16/16 digital module is used as a remote extension of the local inputs and outputs of a MSC I or MSC II Motion Controller.

The CAN interface is only accessible via the CAN connectors on the front cover.

Up to 6 QDIO modules can be connected to the right E-Bus connector of the RDIO 16/16 module. QAIO modules cannot be connected to a RDIO 16/16 modules.

No modules shall be connected to the left E-Bus connector of the RDIO 16/16 module.

Several RDIO modules can be connected via the CAN connector.

QEBUS-CAN Module
The QEBUS-CAN module is designed for using the LocalCAN bus for external CAN bus nodes.

The module does not count as an E-Bus node. It can be used in addition to the maximum number of E-Bus modules.

The E-Bus does not pass through the module. Therefore, the module can be placed either at the far left or far right in an E-Bus segment.

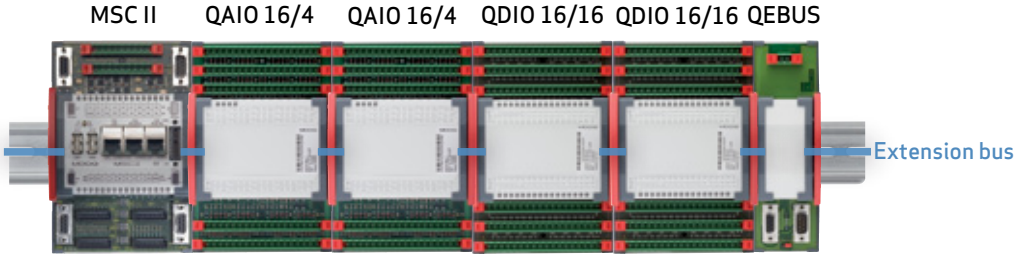
Displays
An operator panel of one size and dialog controllers of three different sizes can be used for MSC I and MSC II applications.

The RDISP 22 Operator Panel is designed for supervision and control of machines and processes.

The Dialog Controller is a freely programmable, real-time controller.

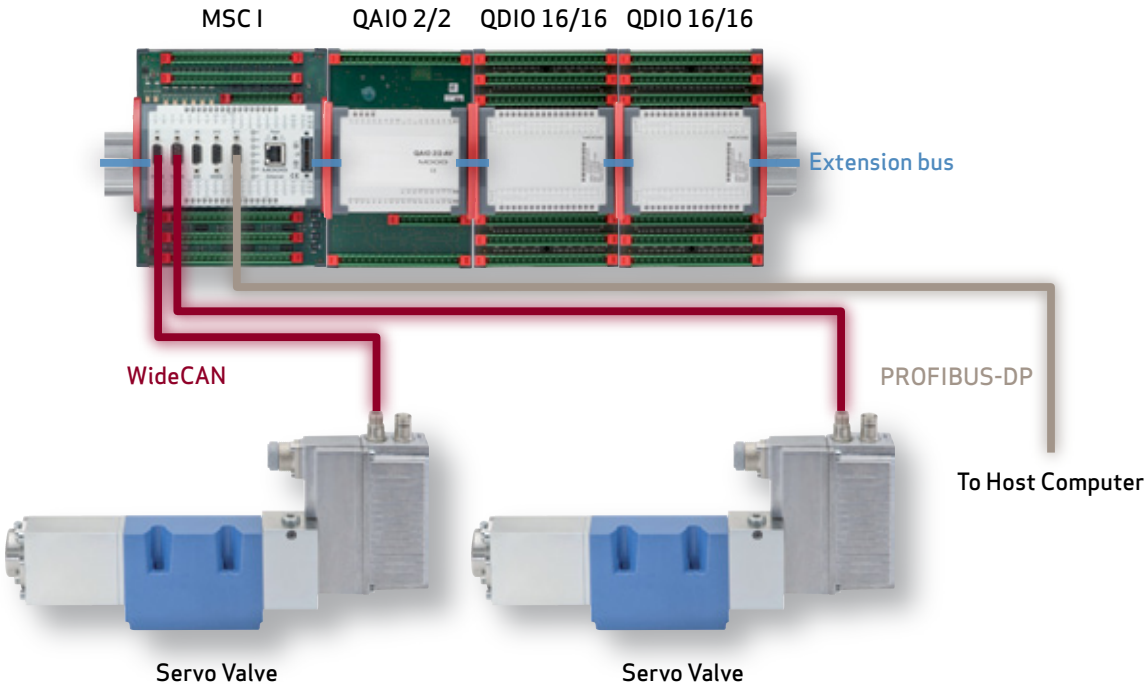
Other Devices
Further components with Ethernet or fieldbus interfaces can be connected with MSC I and MSC II Motion Controller. Moog provides an extensive selection of Servo Drives, Servo Motors, Hydraulic Valves and Radial Piston Pumps.

This enables a flexible set-up of industrial machinery solutions.

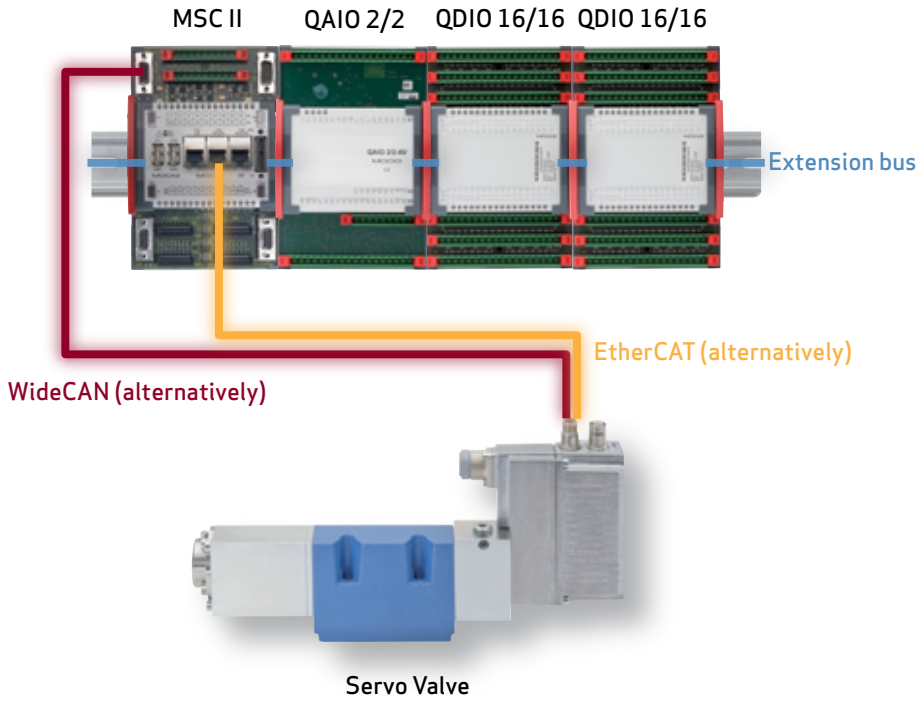


Application with a MSC II and several analog and digital I/O modules

APPLICATION EXAMPLES

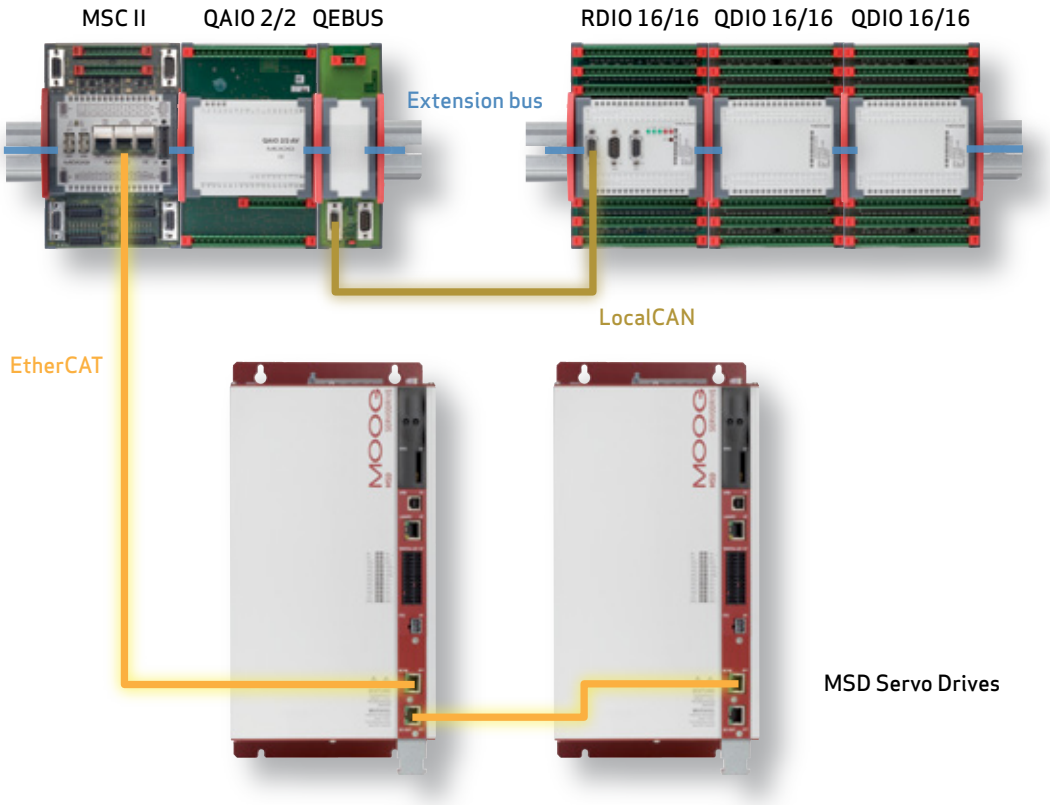


Application with a MSC I Motion Controller, several digital and analog I/O modules and two Servo Valves



Application with a MSC II Motion Controller, several digital and analog I/O modules and a Servo Valve

APPLICATION EXAMPLES

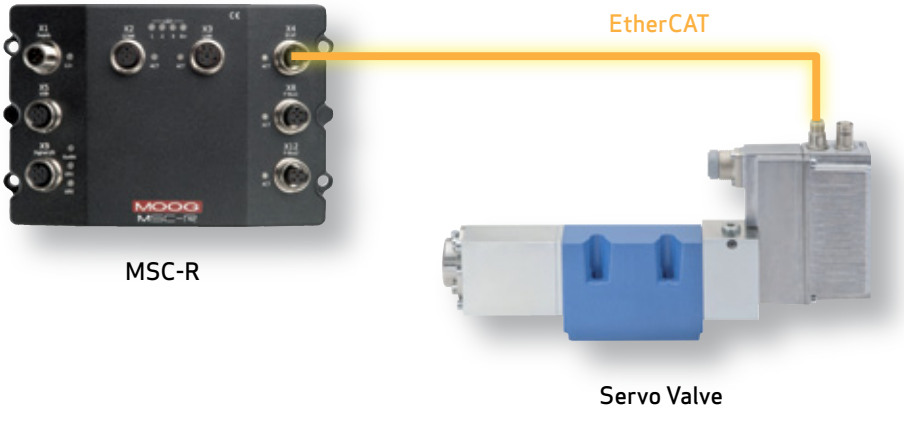


Application with two E-Bus segments and two MSD Servo Drives

Applications with Ruggedized Motion Controller

The Ruggedized Motion Controller has IP67 protection and is designed for harsh industrial environments. It is designed to work in environments that have fluids such as salt water, mineral oil and others.

Other components can be connected to the Ruggedized Motion Controller, e.g. Servo Valves.



Application with Ruggedized Motion Controller and Servo Valve

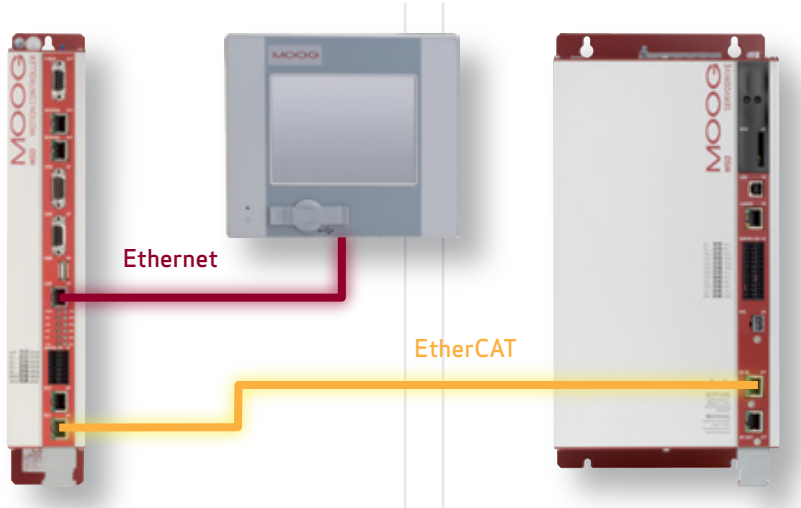
APPLICATION EXAMPLES

Applications with MSD Motion Controller

The MSD Motion Controller is specially designed for the use with Servo Drives from the Moog MSD Series.

For further information about the MSD series refer to the Programmable Multi-axis Servo Drive catalog.

Application with PLC, MSD Motion Controller, Servo Drive and Servo Valve



Application with MSD Motion Controller, Dialog Controller and Servo Drive

ABOUT MOOG

Moog Inc. is a worldwide designer, manufacturer and integrator of precision control components and systems. Moog's Industrial Group designs and manufactures high performance motion control solutions combining electric, hydraulic, and hybrid technologies with expert consultative support in a range of applications including energy production and generation machinery, industrial production machinery and simulation and test equipment. We help performance-driven companies design and develop their next-generation machines. Moog Industrial Group, with fiscal year 2012 sales of USD 634 million and locations in 26 countries, is part of Moog Inc. (NYSE:MOG.A and MOG.B) which has sales of USD 2.47 billion.

Moog maintains facilities in 25 countries around the globe. This vast scope ensures that our engineers remain close to the needs of machine builders and provide flexible design solutions and technical expertise tailored to our customers' toughest challenges.

Moog experts work in close collaboration with machine builders and application engineers to design motion control systems for greater productivity, higher reliability, superior connectivity, less costly maintenance and more effective operations. Our regional presence, industry knowledge and design flexibility ensures Moog motion control solutions are tailored to their environment—from meeting operating regulations and performance standards, to taking machine performance to a higher level.

Products

At the heart of every Moog solution is an array of products engineered for precision, high performance and reliability. For more than five decades, Moog products have been specified for critical machine applications.

Some are developed specifically for unique operating environments. Others are standard equipment on machines across many industries. All are continuously improved to take advantage of the latest technology breakthroughs and advancements.

Moog products include:

- Servo Valves and Proportional Valves
- Servo Motors and Servo Drives
- Controllers and Software
- Radial Piston Pumps
- Actuators
- Integrated Hydraulic Manifold Systems and Cartridge Valves
- Slip Rings
- Motion Bases

Servo Drives

Servo Motors

Servo Valves

Radial Piston Pumps

ABOUT MOOG

Hydraulic Solutions

Since Bill Moog invented the first commercially viable Servo Valve in 1951, Moog has set the standard for world-class hydraulic technology. Today, Moog products are used in a variety of applications - providing high power, enhanced productivity and ever better performance for some of the world's most demanding applications.

Electric Solutions

Clean operation, low noise generation, less maintenance and reduced power consumption make Moog electric solutions ideal for applications worldwide. Moog is the ideal partner for applications where transitioning technologies requires special expertise.

Hybrid Solutions

By incorporating the advantages of existing hydraulic and electric technologies - including modular flexibility, increased efficiency and cleanliness - into innovative hybrid solutions, Moog offers new performance potential in specialized applications.

Moog Global Support

Moog Global Support is our promise to offer world-class Repair and Maintenance Services delivered expertly by our trained technicians. With the reliability only available from a leading manufacturer with facilities around the world, Moog offers you service and expertise you can count on to keep your equipment operating as it should.

This promise offers many benefits to our customers including:

- Reduce your downtime by keeping critical machines running in peak performance
- Protect your investment by ensuring reliability, versatility and long-life of products
- Better plan your maintenance activities and make systematic upgrades
- Leverage our flexible programs to meet the unique service requirements of your facility

Look to Moog for global support including:

- Repair services using OEM parts are performed by trained technicians to the latest specifications
- Stock management of spare parts and products to prevent unplanned downtime
- Flexible programs, tailored to your needs such as upgrades, preventative maintenance and annual/multi-year contracts
- On-site services bring the expertise to you, providing quicker commissioning, set-up and diagnostics
- Access to reliable services that are guaranteed to offer consistent quality anywhere in the world

For more information on Moog Global Support, visit www.moog.com/industrial/service

MOOG GLOBAL SUPPORT®

ORDERING INFORMATION

Motion Controllers

Designation	Interfaces							Ordering number
	Ethernet	EtherCAT master	EtherCAT slave	CAN	PROFIBUS-DP slave	Position transducer	USB 1.1 host	
MSC I Motion Controller								
• To be mounted on DIN rail	1	–	–	2	1	2	–	D136-001-007
• 8 analog inputs, 2 analog outputs	1	–	–	2	–	2	–	D136-001-008
• 8 digital I/O, each configurable as input or output • 2 sensor interfaces • Expandable with extension modules via E-Bus								
MSC II Motion Controller								
• To be mounted on DIN rail	1	–	–	–	–	4	2	D136-002-002
• 4 digital I/O, each configurable as input or output		2	–		–			D136-002-003
• 2 sensor interfaces		–	1		–			D136-002-004
• Expandable with extension modules via E-Bus		1	–		1			D136-002-005
Ruggedized Motion Controller								
• IP67 protection and high vibration resistance for harsh environments	1	1	–	2	1	–	1	D136-003-001
• 2 digital I/O, each configurable as input or output		1	–	2	–			D136-003-002
		1	1	1	–			D136-003-004
MSD Motion Controller								
• Designed for use with Moog MSD Servo Drives	1	2	–	1	–	–	1	G391-001-001
• 4 digital I/O, each configurable as input or output			–	1	1			G391-001-002
			1	1	–			G391-001-003

ORDERING INFORMATION

Extension Modules for MSC I, MSC II and MSC-R

All MSC I and MSC II extension modules are to be mounted on DIN rail.

Designation	Description	Ordering number
Analog I/O modules for E-Bus		
QAIO 2/2-AV	• 2 analog inputs • 2 analog outputs • 1 reference voltage output • 1 pulse input	D137-001-011
QAIO 16/4-A	• 16 current inputs ±20 mA • 4 voltage outputs • 1 reference voltage output	D137-001-006
QAIO 16/4-V	• 16 voltage inputs ±10 V • 4 voltage outputs • 1 reference voltage output	D137-001-007
Digital I/O modules for E-Bus		
QDIO 16/16-0.5N	• 16 digital inputs 24 V • 16 digital I/O 24 V, each configurable as input or output • Zero switching	D137-001-004
QDIO 16/16-0.5	• 16 digital inputs 24 V • 16 digital I/O 24 V, each configurable as input or output • Plus switching	D137-001-005
Connection modules		
QEBUS-CAN	• Extension module for using the LocalCAN bus for external CAN bus nodes	D137-001-010
Digital I/O modules for remote CAN bus		
RDIO 16/16-0,5	• 16 digital inputs 24 V • 16 digital I/O 24 V, each configurable as input or output • Plus switching	D137-002-001

Ruggedized I/O modules can directly be mounted to the machine without the need for an extra electronic cabinet.

Digital I/O modules for EtherCAT master		
MSC-R-IO	• 16 digital inputs 24V • 8 digital outputs 24 V • 1 channel PT100	D136-006-001

ORDERING INFORMATION

Moog Axis Control Software (MACS)

Designation	Description	Ordering number
MACS	Development environment according to IEC 61131; one license per developer necessary	
	1 license Additional license 5 licenses 10 licenses	D138-001-001 D138-001-002 D138-001-005 D138-001-010
MACS HMI	For full-screen display of visualizations which were created with MACS; does not contain development environment; 1 license per machine necessary	
	1 license 10 licenses	D138-003-001 D138-003-010
Software maintenance contract for MACS	Includes support and updates for 1 year	B95914-001

License Keys

Designation	Description	Ordering number
Controls	For a description of the license key functions see section License Key.	D138-002-001
Motion		D138-002-002
Professional		D138-002-003
System		Specific to the order

Operator Panels

Designation	Description	Ordering number
RDISP 22	Operator panel for supervision and control of machines and processes	D137-004-003

Dialog Controllers

Designation	Description	Ordering number
TFT Display 5.7“	Color TFT touch screen display; 320 x 240 pixels resolution	D137-004-004
TFT Display 10.4“	Color TFT touch screen display; 640 x 480 pixels resolution	D137-004-005
TFT Display 12.1“	Color TFT touch screen display; 800 x 600 pixels resolution	D137-004-006

ORDERING INFORMATION

Terminal Strips for MSC I

Number of required connectors	Pole count	Connector name on module	Maximum conductor cross-section	Ordering number
5	18	X1, X2, X4, X5, X6	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-018 (Phoenix Contact: FRONT-MSTB2,5/18-ST-5,08) or Spring power clamp version: B95907-018 (Phoenix Contact: FKC 2,5/18-ST-5,08)
1	9	X3	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-009 (Phoenix Contact: FRONT-MSTB2,5/9-ST-5,08) or Spring power clamp version: B95907-009 (Phoenix Contact: FKC 2,5/9-ST-5,08)

Terminal Strips for MSC II

Number of required connectors	Pole count	Connector name on module	Maximum conductor cross-section	Ordering number
2	9	X2, X4	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-009 (Phoenix Contact: FRONT-MSTB2,5/9-ST-5,08) or Spring power clamp version: B95907-009 (Phoenix Contact: FKC 2,5/9-ST-5,08)
4	10	X6, X7, X9, X10	0.5 mm^2 (20 AWG)	Spring power clamp version: CA45260-010 (Phoenix Contact: FK-MC 0,5/10-ST-2,5)

Terminal Strips for MSD Motion Controller

Spring power clamps for X3, X9 and X10 are included

Terminal Strips for QAIO 2/2

Number of required connectors	Pole count	Connector name on module	Maximum conductor cross-section	Ordering number
2	18	X1, X6	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-018 (Phoenix Contact: FRONT-MSTB2,5/18-ST-5,08) or Spring power clamp version: B95907-018 (Phoenix Contact: FKC 2,5/18-ST-5,08)
1	9	X4	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-009 (Phoenix Contact: FRONT-MSTB2,5/9-ST-5,08) or Spring power clamp version: B95907-009 (Phoenix Contact: FKC 2,5/9-ST-5,08)

ORDERING INFORMATION

Terminal Strips for QAIO 16/4

Number of required connectors	Pole count	Connector name on module	Maximum conductor cross-section	Ordering number
5	18	X1, X2, X3, X5, X6	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-018 (Phoenix Contact: FRONT-MSTB2,5/18-ST-5,08) or Spring power clamp version: B95907-018 (Phoenix Contact: FKC 2,5/18-ST-5,08)

Terminal Strips for QDIO 16/16

Number of required connectors	Pole count	Connector name on module	Maximum conductor cross-section	Ordering number
6	18	X1 to X6	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-018 (Phoenix Contact: FRONT-MSTB2,5/18-ST-5,08) or Spring power clamp version: B95907-018 (Phoenix Contact: FKC 2,5/18-ST-5,08)

Terminal Strips for RDIO 16/16

Number of required connectors	Pole count	Connector name on module	Maximum conductor cross-section	Ordering number
6	18	X1 to X6	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-018 (Phoenix Contact: FRONT-MSTB2,5/18-ST-5,08) or Spring power clamp version: B95907-018 (Phoenix Contact: FKC 2,5/18-ST-5,08)

Terminal Strips for QEBUS-CAN

(only required when the optional 24 V power supply of the CAN bus is used)

Number of required connectors	Pole count	Connector name on module	Maximum conductor cross-section	Ordering number
1	2	X1	2.5 mm^2 (14 AWG)	Screw Terminal version: VK055-002 (Phoenix Contact: FRONT-MSTB2,5/2-ST-5,08) or Spring power clamp version: B95907-002 (Phoenix Contact: FKC 2,5/2-ST-5,08)

ORDERING INFORMATION

Terminal Strips for MSC-R-IO

Number of required connectors	Pole count	Connector name on module	Maximum conductor cross-section	Ordering number
1	4	X1	0.5 mm^2 (20 AWG)	Spring power clamp version: CA96981-004 (Phoenix Contact: FMC 1,5/4-STF-3,5)
3	12	X5, X6, X7	0.5 mm^2 (20 AWG)	Spring power clamp version: CA96981-012 (Phoenix Contact: FMC 1,5/12-STF-3,5)
1	5	X8	0.5 mm^2 (20 AWG)	Spring power clamp version: CA96981-005 (Phoenix Contact: FMC 1,5/5-STF-3,5)

Accessories for MSC-R-IO

Number of required connectors	Designation	Description	Ordering number
2	EtherCAT slave interface	M12 D-coded 4 pin male connector	Not available

CAN Connection Cables

Length	Description	Ordering number
3 m (9.8 ft)	One side: 9-pole D-Sub plug-in connector with pin contacts;	B95863-001
10 m (33 ft)	Other side: 9-pole D-Sub plug-in connector with jack contacts	B95863-002

CAN Termination Resistors

Type	Description	Ordering number
120 Ω	9-pole D-Sub plug-in connector with jack contacts	B95864-001
120 Ω with grounding	9-pole D-Sub plug-in connector with pin contacts; CAN -GND connected to SL/PE	B95865-001

ORDERING INFORMATION

Accessories for Ruggedized Motion Controller

Designation	Description	Ordering number
DIN rail mounting kit	Accessory kit for mounting the Ruggedized Motion Controller modules on a DIN rail. Contents: • DIN rail clip • Mounting plate • Screws	CA94286-001
Cable set	• 1 x CAN bus cable Length 2 m (6.4 ft), M12 A-coded 5-pole pin contacts and D-Sub socket contacts • 1 x PROFIBUS-DP cable Length 2 m (6.4 ft), M12 A-coded 5-pole pin contacts and D-Sub with 1 x socket and 1 x pin connection • 1 x Digital I/O cable Length 1.5 m (4.8 ft), length 2 m, M12 A-coded 5-pole socket and open cable end • 1 x Power supply cable Length 1.5 m (4.8 ft), M12 A-coded 5-pole socket and open cable end • 1 x USB cable Length 0.5 m (1.6 ft), M12 A-coded 5-pole socket and USB-A socket • 2 x LAN cable Length 2 m (6.4 ft), M12 D coded 4-pole pin contacts and RJ45 connector, cable category 5	CB03223-001
USB cable	• 1 x USB cable Length 0.5 m (1.6 ft), M12 A-coded 5-pole socket contacts and USB-A socket	CA98502-001

ORDERING INFORMATION

Documents

Designation	Description	Document number
MSC I Motion Controller	User manual	B95906-001
MSC II Motion Controller	User manual	CA65865-001
Ruggedized Motion Controller	User manual	CB08987-001
MSD Motion Controller	User manual	CA65866-001
QDIO 16/16 Digital I/O module	User manual	C43148-001

Note: Visit www.moog.com/industrial/literature to download the most recent user manuals using the document number in the search. Visit the Motion Controllers and Software web page for online information.

TAKE A CLOSER LOOK.

Moog designs a range of motion control products that complement the performance of those featured in this catalog.
Visit our website for more information and contact the Moog facility nearest you.

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