MELSEC A/Q series

Programmable logical controller

User`s Manual

MC Modules
AS-Interface Slave I/O Modules

MITSUBISHI ELECTRIC INDUSTRIAL AUTOMATION

About this Manual

The texts, illustrations, diagrams and examples in this manual are only intended as aids to help explain the functioning, operation, use and programming of the slave I/O modules of the MC-ASI series.

If you have any questions regarding the installation and operation of the equipment described in this manual, please do not hesitate to contact your sales office or one of your Mitsubishi distribution partners (see cover page). You can also obtain information updates and answers to frequently asked questions from our Internet website:

http://www.mitsubishi-automation.com

User's Manual Slave I/O Modules of the MC-ASI Series Article No.: 144181	
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Safety Information

For qualified staff only

This manual is only intended for use by properly trained and qualified electrical technicians who are fully acquainted with automation technology safety standards. All work with the hardware described, including system design, installation, setup, maintenance, service and testing, may only be performed by trained electrical technicians with approved qualifications who are fully acquainted with the applicable automation technology safety standards and regulations. Any operations or modifications of the hardware and/or software of our products not specifically described in this manual may only be performed by authorised Mitsubishi staff.

Proper use of equipment

The MC-ASI modules are only intended for the specific applications explicitly described in this manual. Please take care to observe all the installation and operating parameters specified in the manual. The design, manufacturing, testing and documentation of these products have all been carried out in strict accordance with the relevant safety standards. Under normal circumstances the products described here do not constitute a potential source of injury to persons or property provided that you precisely observe the instructions and safety information provided for proper system design, installation and operation. However, unqualified modification of the hardware or software or failure to observe the warnings on the product and in this manual can result in serious personal injury and/or damage to property. Never use any peripheral or expansion equipment with the MC-ASI modules other than that specifically approved and recommended by Mitsubishi Electric.

Any other use or application of the products is deemed to be improper.

Relevant safety regulations

All safety and accident prevention regulations relevant to your specific application must be observed in the system design, installation, setup, maintenance, servicing and testing of these products.

The regulations listed below are particularly important. This list does not claim to be complete; however, you are responsible for knowing and applying the regulations applicable to you.

● VDE Standards

  – VDE 0100 (regulations for electrical installations with rated voltages up to 1000 V)

  – VDE 0105 (operation of electrical installations)

  – VDE 0113 (electrical systems with electronic equipment)

  – VDE 0160 (configuration of electrical systems and electrical equipment)

  – VDE 0550/0551 (regulations for transformers)

  – VDE 0700 (safety of electrical appliances for household use and similar applications)

  – VDE 0860 (safety regulations for mains-powered electronic appliances and their accessories for household use and similar applications)

● Fire prevention regulations

● Accident prevention regulations

  – VBG No. 4 (electrical systems and equipment)

Safety warnings in this manual

In this manual special warnings that are important for the proper and safe use of the products are clearly identified as follows:

P

DANGER:

Personnel health and injury warnings. Failure to observe the precautions described here can result in serious health and injury hazards.

E

CAUTION:

Equipment and property damage warnings. Failure to observe the precautions described here can result in serious damage to the equipment or other property.

General safety information and precautions

The following safety precautions are intended as a general guideline for using the MC-ASI modules together with other equipment. These precautions must always be observed in the design, installation and operation of all control systems.

P

DANGER:

- *Observe all safety and accident prevention regulations applicable to your specific application. Installation, wiring and opening of the assemblies, components and devices may only be performed with all power supplies disconnected.*

- *Assemblies, components and devices must always be installed in a shockproof housing fitted with a proper cover and protective equipment.*

- *Devices with a permanent connection to the mains power supply must be integrated in the building installations with an all-pole disconnection switch and a suitable fuse.*

- *Check power cables and lines connected to the equipment regularly for breaks and insulation damage. If cable damage is found, immediately disconnect the equipment and the cables from the power supply and replace the defective cabling.*

- *Before using the equipment for the first time check that the power supply rating matches that of the local mains power.*

- *You are responsible for taking the necessary precautions to ensure that programs interrupted by brownouts and power failures can be restarted properly and safely. In particular, you must ensure that dangerous conditions cannot occur under any circumstances, even for brief periods. If necessary you must make provision for forcing an EMERGENCY OFF condition to prevent such conditions.*

- *EMERGENCY OFF facilities pursuant to EN 60204/IEC 204 VDE 0113 must remain fully operative at all times and in all control system operating modes. The EMERGENCY OFF facility reset function must be designed so that it cannot cause an uncontrolled or undefined restart.*

- *You must also implement hardware and software safety precautions to prevent the possibility of undefined control system states caused by signal line cable or core breaks.*

Typographic conventions

Important information

Notes containing important information are clearly identified as follows:

| Note text

Numbering in figures and illustrations

Reference numbers in figures and illustrations are shown with white numbers in a black circle and the corresponding explanations shown beneath the illustrations are identified with the same numbers, like this:

❶❷❸❹

Procedures

In some cases the setup, operation, maintenance and other instructions are explained with numbered procedures. The individual steps of these procedures are numbered in ascending order with black numbers in a white circle, and they must be performed in the exact order shown:

① Text

② Text

③ Text

Footnotes in tables

Footnote characters in tables are printed in superscript and the corresponding footnotes shown beneath the table are identified by the same characters, also in superscript.

If a table contains more than one footnote, they are all listed below the table and numbered in ascending order with black numbers in a white circle, like this:

① Text
② Text
③ Text

Contents

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1   Introduction

1.1   Introduction

This manual describes the MC-ASI modules (Input/output modules according to IP67 for Actor-Sensor-Interface).

The MC-ASI modules act as slaves in a network according to the standards AS-Interface 2.04 (1997) and CENELEC EN 50295.

It also meets the standards IEC 947-5-2: 1992 and IEC 1131-2: 1992.

The AS-Interface is an international standard for the lowest field bus level. The network suits versatile demands, is very flexible, and easy to install. Controlled are sensors, actors, I/O units, and gateways.

The MC-ASI modules process the signals of digital inputs and outputs. Because of the high protection rating IP67 the modules can be mounted directly within a plant or on a machine. For labelling the inputs and outputs the modules provide labelling fields for labelling the inputs or outputs individually.

The slave station numbers are assigned to the MC-ASI modules across the AS-Interface via the masters QJ71AS92, A1SJ71AS92 and FX2N-32ASI-M or directly via an optional programming unit.

Of course, the MC-ASI modules can be used in combination with third party manufacturers.

2   Basics

2.1   Features of the MC-ASI series   2 – 1

The MC-ASI series includes the following modules with M12 circular connectors:

Article	Item	Description
Digital input module	MC-ASI X4M12	Digital input module with 4 inputs
	MC-ASI X8M12	Digital input module with 8 inputs
Digital output module	MC-ASI Y4M12-05	Digital output module with 4 outputs
	MC-ASI Y4M12-2	Digital output module with 4 outputs
	MC-ASI Y8M12	Digital output module with 8 outputs
Digital input/output module	MC-ASI X2Y2M12	Digital input/output module with 2 inputs and 2 outputs
	MC-ASI X4Y4M12	Digital input/output module with 4 inputs and 4 outputs
Accessories	MC-ASI PS	AS-I bus power supply module
	IP67-M12_CAP	Black (4 pieces) M12 blind plugs

Tab. 2-1:   Overview of the MC-ASI modules and accessories

2.1.1   Mounting

Due to the high protection rating IP67 the MC-ASI modules can be mounted via a mounting plate directly on any mounting panel or machine. The mounting plate has to be screwed onto the mounting surface and the module can be hung and screwed onto to the mounting plate.

2.1.2   Connection of the modules

The module is connected to the AS-Interface via profile-coded flat cable. The flat cable is laid through the mounting plate. By hanging the the module onto the mounting plate the electrical contact is established. Terminating resistors are not required.

The sensors and actors are directly connected to M12 circular connectors.

For the AS-Interface a special ASI power supply unit is available for the power supply of the network.

2.1.3   Addressing

The module is addressed via the bus system by the bus master or via an adress socket by an addressing unit.

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3   System Configuration

3.1   AS-Interface

In the following the main characteristics of the AS-Interface network are described.

3.1.1   Data exchange

The AS-Interface is an international standard for the lowest field bus level. The network suits versatile demands, is very flexible, and easy to install.

Controlled in master-slave configuration are:

● Actors

● Sensors

● I/O units

● Gateways
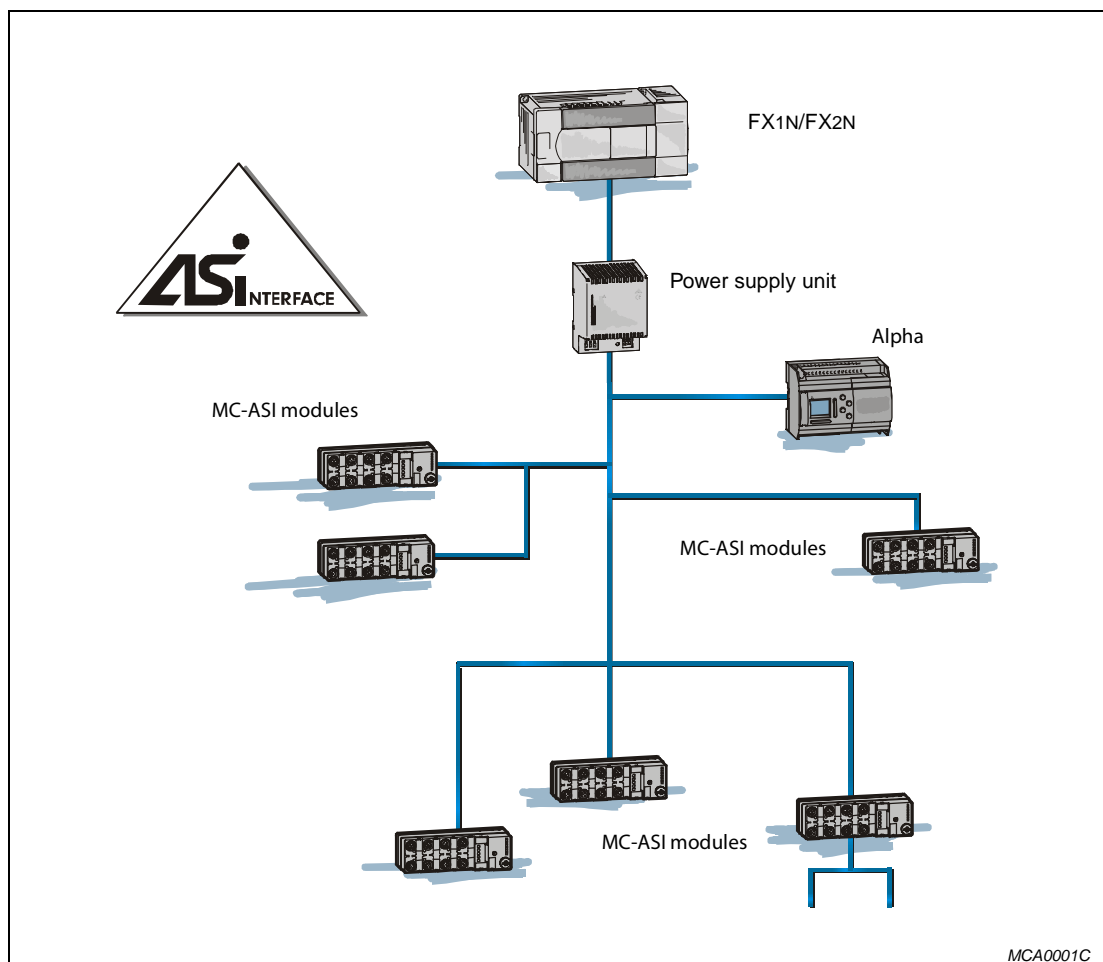
Abb. 3-1: *System configuration AS-Interface*

3.1.2   Structure
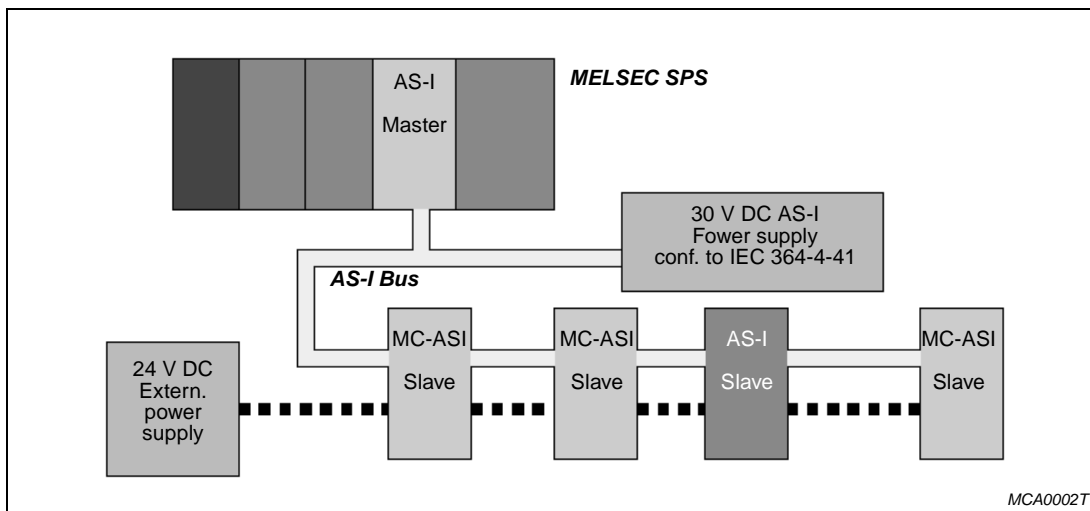
Abb. 3-2: *AS-I network structure*

AS-Interface networks can be set up in any random tree structure.

The maximum extension without repeaters is 100 m and with 2 repeaters 300 m. Terminating resistors are not required. One master can control up to 31 slave adresses. Per slave address up to 4 inputs and 4 outputs can be controlled (A slave module with 8 inputs or 8 outputs occupies two slave address).

The slave modules and sensors are supplied with power via the AS-I flat cable (yellow, 30 V DC) of the ASI bus. For this purpose an AS-I power supply unit is available designated ASI-PS-2,8. The actors are supplied with power via AS-I flat cable (black, 24 V DC) by an external power supply.

The table below shows the specifications of the AS-Interface network for the ASI masters QJ71AS92, A1SJ71AS92, and FX2N-32ASI-M:

Item	Master QJ71AS92	Master A1SJ71AS92	Master FX2N-32ASI-M
Application range	System Q	AnS(H)/QnAS series	FX1N and FX2N series
Cable type	AS-I flat cable conforming to IEC 62026-2		
Max. total distance	100 m without repeater, 300 m with 2 repeaters		
Communication protocol	ASI standard V2.11	ASI standard 2.04, EN 50295	
Communication method	APM (Alternating Pulse Modulation)		
Error handling	Parity check		
Data transfer rate	167 kbit/s		
I/O refresh time	5 ms (digital I/Os); 35 ms (analog I/O slaves)	Max. 5 ms	
Slaves per master	62 (2 channels x 31)		31
Assignable I/O points	248 digital I/Os, 124 analog I/Os	2 x 124 inputs, 2 x 124 outputs	256
I/O points per slave	Max. 4 inputs and 4 outputs		
Occupied I/O points	32		8

Tab. 3-1: *Specifications of the ASI master modules*

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3.1.3   Cable types

For the data transfer a special 2-core AS-I flat cable or a circular cable is used. When using the flat cable the modules can easily be connected via vampire connection. The profile coding of the flat cable ensures a polarity protection.

3.1.4   Slave addressing

Each slave within the bus system must be assigned an individual address in the range of 1–31. The slave address can either be changed via an addressing unit on the address socket of the slave or via the master module in the bus system.

The slave address resides in the slave memory. Each slave can be re-addressed at least 14 times.

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4   Description of the Modules

The MC-ASI series comprises digital input, output, and combined input/output modules conforming to IP 67 with M12 connectors.

The sensors are supplied by the ASI bus (ASI flat cable, yellow). The actors are supplied via an external power supply (ASI flat cable, black).

Modules providing 4 inputs or 4 outputs occupy one slave address. Modules providing 8 inputs or 8 outputs include two independent slaves and occupy two slave addresses. Combined modules providing maximum 4 inputs and 4 outputs occupy one slave address (multiplex operation).

4.1   Module overview

4.1.1   Input modules

Module	Inputs	Occupied slave addresses
MC-ASI X4M12	4	1
MC-ASI X8M12	8	2

Tab. 4-1:   *Input modules of the MC-ASI series*

4.1.2   Output modules

Module	Outputs	Occupied slave addresses
MC-ASI Y4M12-05	4	1
MC-ASI Y4M12-2	4	1
MC-ASI Y8M12	8	2

Tab. 4-2:   *Output modules of the MC-ASI series*

4.1.3   Combined input/output modules

Modulu	Inputs	Outputs	Occupied slave addresses
MC-ASI X2Y2M12	2	2	1
MC-ASI X4Y4M12	4	4	1

Tab. 4-3:   *Combined input/output modules of the MC-ASI series*

4.2　　　Digital input module MC-ASI X4M12

The module MC-ASI X4M12 provides 4 digital inputs. It occupies one slave address.

4.2.1　　　Operating items

The figure below shows the operating items of the module.
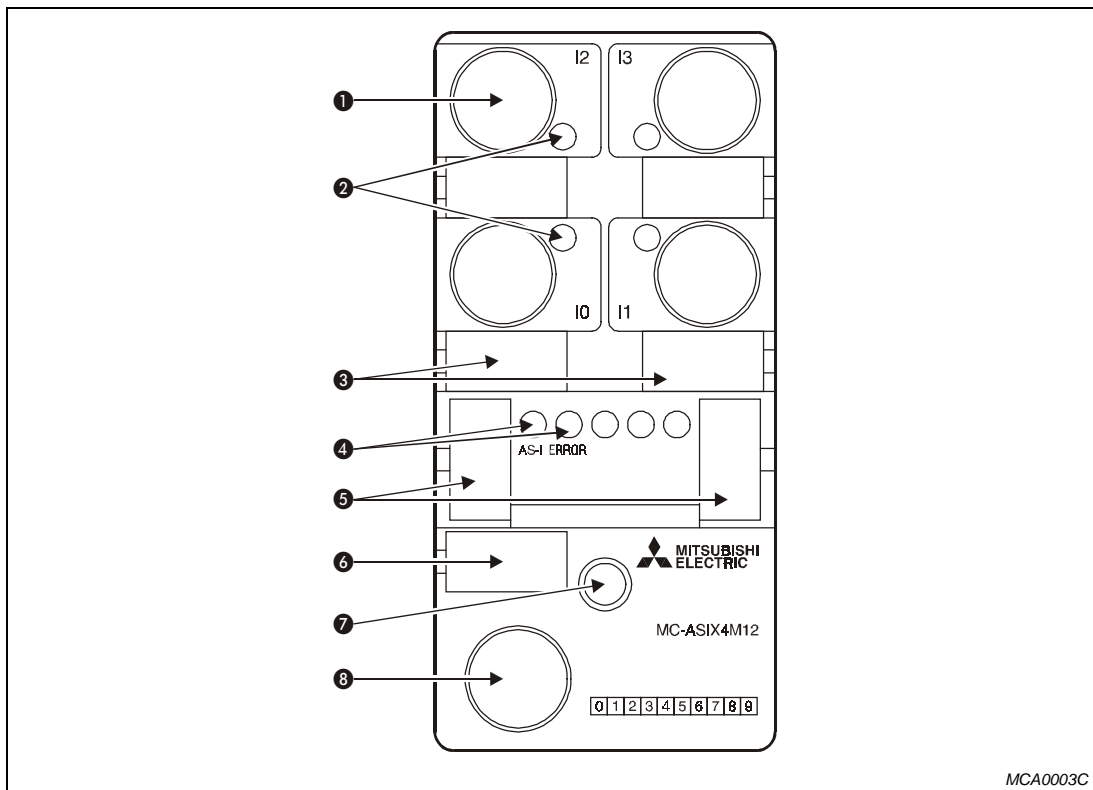
Abb. 4-1:　*Digital input module MC-ASI X4M12*

Key to the figure above

Number	Item	Description
❶	M12 circular connectors	Connection of the sensors
❷	Status indication LED	Status indication of the inputs
❸	Labelling field input	Labelling of the inputs
❹	Diagnostics LED	Indication of the operating status of the module
❺	Labelling field slave	Labelling of the slave address
❻	Labelling field module	Labelling of the module
❼	Central screw	Fixing the module on the mounting plate
❽	Address socket	Connection of a programming unit to re-address the slave.

Tab. 4-4:　*Operating items MC-ASI X4M12*

4.2.2   Indicators

The module provides indicators that indicate the operating status and the input status of the module.

Indication of operating status

ERR (red)	ASI (green)	Operating status
Off	Off	No power supply ASI
On	Off	No data transfer
Off	On	Module OK
On	Flashing	Slave address is 0
Flashing	Off	Sensor supply: Short-circuit or overload

Tab. 4-5: *Diagnostics LEDs*

Indication of input status

LED (yellow)	Input status
Off	Input not active
On	Input active

Tab. 4-6: *Status indication LEDs*

NOTE	If a short-circuit or overload of the sensor supply occurs a reset will be triggered. The slave is decoupled from the network and the error is signalled to the master.

4.2.3 Pin assignment of the M12 circular connectors

The sensors are directly connected to the M12 circular connectors.

Abb. 4-2:
Pin assignment M12 circular connectors

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M12 circular connector	Pin	Assingment
I0, I2 Digital inpus	1	Sensor supply +
	2	DI1, DI3
	3	Sensor supply -
	4	DI0, DI2
	5	PE
I1, I3 Digital outputs	1	Sensor supply +
	2	Not assigned
	3	Sensorversorgung -
	4	DI1, DI3
	5	PE

Tab. 4-7: *Pin assignment M12 circular connectors*

The inputs DI1 and DI3 are bridged to pin 2 of the M12 circular connectors of the inputs DI0 and DI2 respectively. Therefore, Y- or T-connectors can be connected to DI0 and DI1.

NOTE	To maintain the protection rating IP67 M12 blind plugs have to be screwed on unused M12 circular connectors.

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4.2.4 Connection of the ASI bus

The module is connected to the ASI bus via ASI bus flat cable (yellow). The flat cable is laid through the cable guide "ASI" of the mounting plate. The sensors are supplied via the ASI bus.

NOTE	The module provides a bus branching feature. Do not connect the external power supply (ASI flat cable, black).
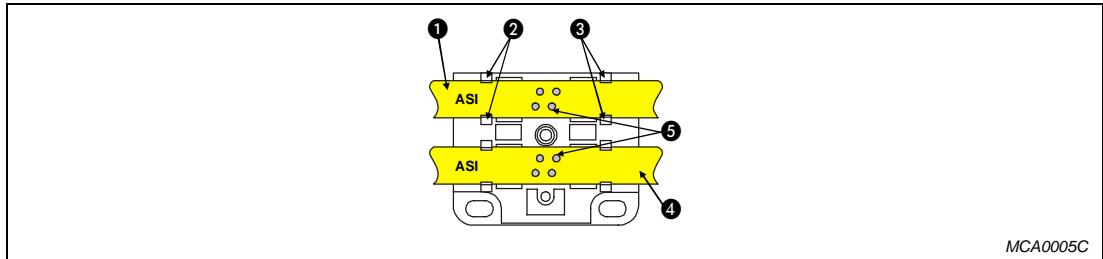
Abb. 4-3: *Connection of the ASI bus*

Number	Item
❶, ❹	ASI bus flat cable (yellow)
❷, ❸	Cable guide
❺	ASI contact (internal connection)

Tab. 4-8:

Connection of the ASI bus

4.3   Digital input module MC-ASI X8M12

The module MC-ASI X8M12 provides 8 digital inputs. It occupies two slave addresses.

4.3.1   Operating items

The figure below shows the operating items of the module.

Abb. 4-4: *Digital input module MC-ASI X8M12*

Key to the figure above

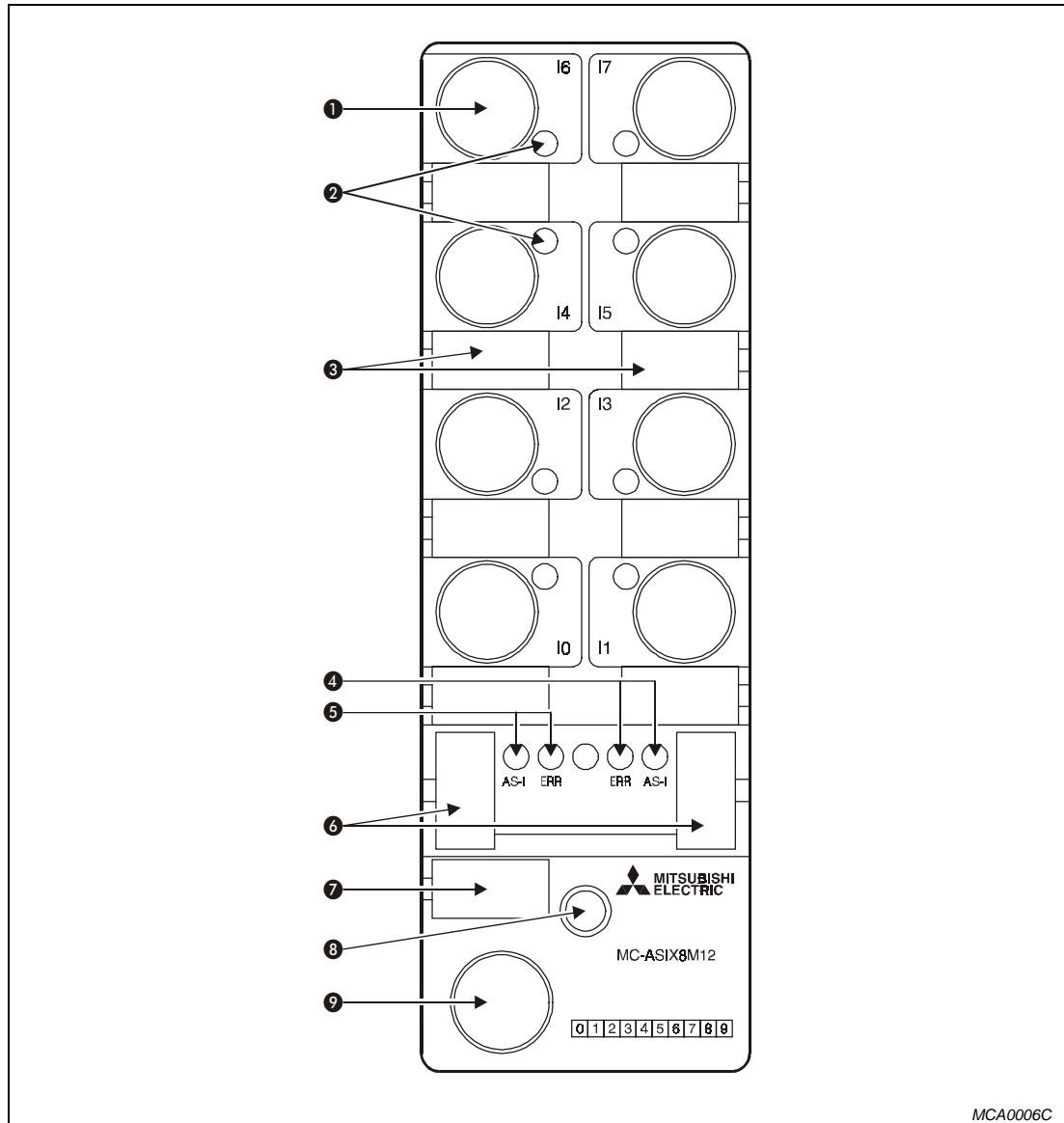| Number	Item	Description
❶	M12 circular connectors	Connection of the sensors
❷	Status indication LED	Status indication of the inputs
❸	Labelling field input	Labelling of the inputs
❹	Diagnostics LED (I4–I7)	Indication of the operating status of the module
❺	Diagnostics LED (I0–I3)	Indication of the operating status of the module
❻	Labelling field slave	Labelling of the slave address
❼	Labelling field module	Labelling of the module
❽	Central screw	Fixing the module on the mounting plate
❾	Address socket	Connection of a programming unit to re-address the slave.

Tab. 4-9: *Operating items MC-ASI X8M12*

4.3.2   Indicators

The module provides indicators that indicate the operating status and the input status of the module.

Indication of the operating status

ERR (red)	ASI (green)	Operating status
Off	Off	No power supply ASI
On	Off	No data transfer
Off	On	Module OK
On	Flashing	Slave address is 0
Flashing	Off	Sensor supply: Short-circuit or overload

Tab. 4-10: *Diagnostics LEDs*

Indication of input status

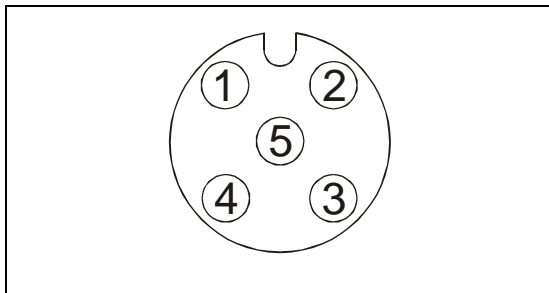| LED (yellow)	Input status
Off	Input not active
On	Input active

Tab. 4-11: *Status indication LEDs*

NOTE	If a short-circuit or overload of the sensor supply occurs a reset will be triggered. The slave is decoupled from the network and the error is signalled to the master.

4.3.3 Pin assignment of the M12 circular connectors

The sensors are directly connected to the M12 circular connectors.

Abb. 4-5:
Pin assignment M12 circular connectors

MCA0004C

M12 circular connector	Pin	Assingment
I0, I2, I4, I6 Digital inputs	1	Sensor supply +
	2	DI1, DI3, DI5, DI7
	3	Sensor supply -
	4	DI0, DI2, DI4, DI6
	5	PE
I1, I3 Digital inputs	1	Sensor supply +
	2	Not assigned
	3	Sensor supply -
	4	DI1, DI3, DI5, DI7
	5	PE

Tab. 4-12: *Pin assignment M12 circular connectors*

The inputs DI1, DI3, DI5, and DI7 are bridged to pin 2 of the M12 circular connectors of the inputs DI0, DI2, DI4, and DI6 respectively. Therefore, Y- or T-connectors can be connected to DI0, DI2, DI4, and DI6.

NOTE   To maintain the protection rating IP67 M12 blind plugs have to be screwed on unused M12 circular connectors.

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4.3.4   Connection of the ASI bus

The module is connected to the ASI bus via ASI bus flat cable (yellow). The flat cable is laid through the cable guide "ASI" of the mounting plate. The sensors are supplied via the ASI bus.

NOTE	The module provides a bus branching feature. Do not connect the external power supply (ASI flat cable, black).
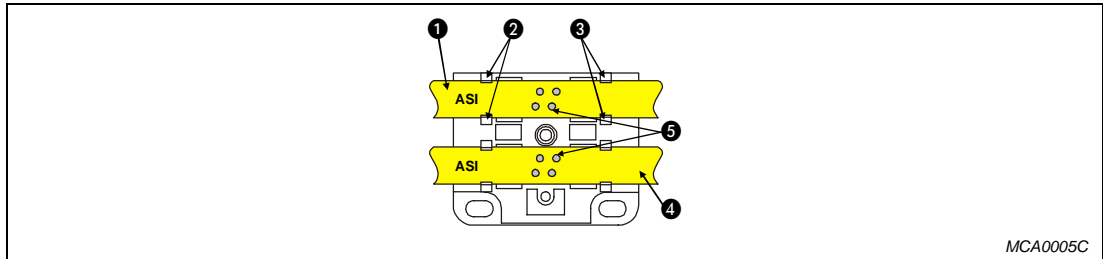
Abb. 4-6: *Connection of the ASI bus*

Number	Item
❶, ❹	ASI bus flat cable (yellow)
❷, ❸	cable guide
❺	ASI contact (internal connection)

Tab. 4-13:

Connection of the ASI bus

4.3.5   Addressing

The module includes two independent slaves that have to be addressed individually.

As long as the first ASI slave (ASI1) is addressed to 0 the second slave can not be accessed.

At default settings the slave addresses can not be changed via the auto configuration mode. When replacing a module at least one slave has to be pre-assigned an address (default setting: 2 x adress "0").

4.4   Digital output module MC-ASI Y4M12-05

The module MC-ASI Y4M12-05 provides 4 digital outputs. It occupies one slave address.

4.4.1   Operating items

The figure below shows the operating items of the module.
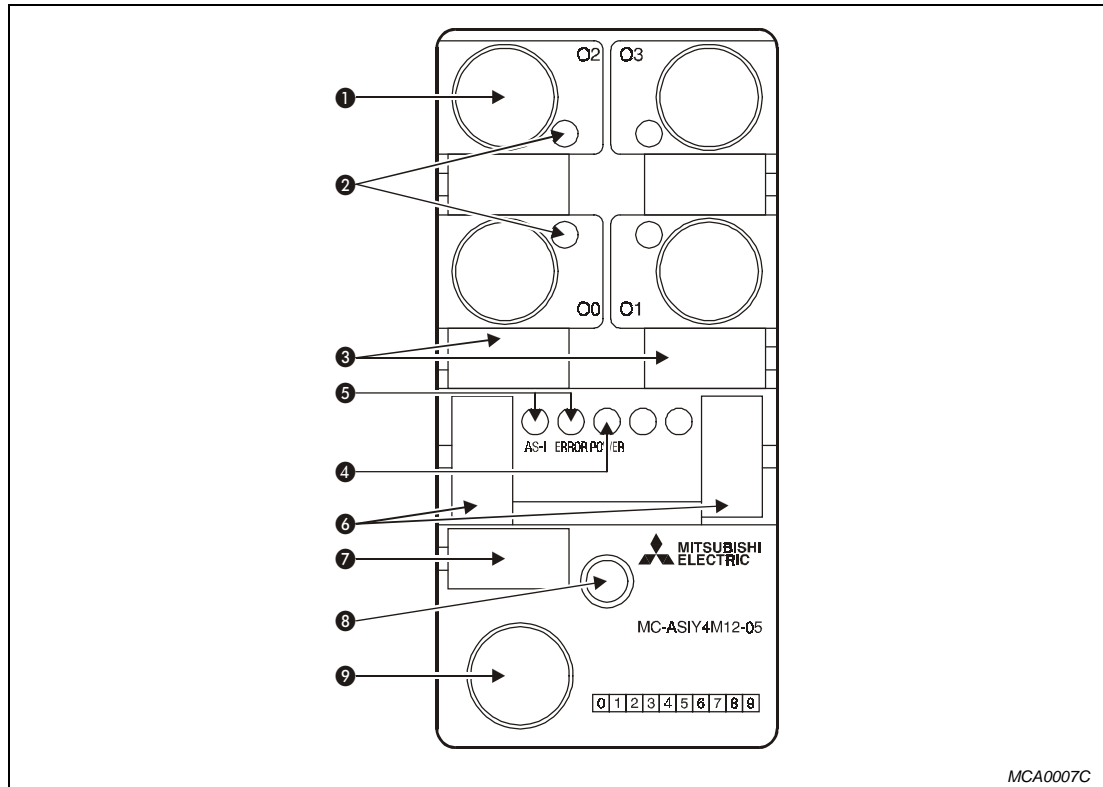
Abb. 4-7: *Digital output module MC-ASI Y4M12-05*

Key to the figure above

Number	Item	Description
❶	M12 circular connectors	Connection of the actors
❷	Status indication LED	Status indication of the actors
❸	Labelling field output	Labelling of the outputs
❹	Power supply LED	Indication of the external power supply
❺	Diagnostics LED	Indication of the operating status of the module
❻	Labelling field slave	Labelling of the slave address
❼	Labelling field module	Labelling of the module
❽	Central screw	Fixing the module on the mounting plate
❾	Address socket	Connection of a programming unit to re-address the slave.

Tab. 4-14: *Operating items MC-ASI Y4M12-05*

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4.4.2   Indicators

The module provides indicators that indicate the operating status, the external power supply, and the output status of the module.

Indication of the operating status

ERROR (red)	ASI (green)	Operating status
Off	Off	No power supply ASI
On	Off	No data transfer
Off	On	Module OK
On	Flashing	Slave address is 0
Flashing	Off	Actor supply: Short-circuit or overload

Tab. 4-15: *Diagnostics LEDs*

Indication of the external power supply

POWER (green)	External power supply
Off	No external power supply
On	External power supply OK

Tab. 4-16:
External power supply LED

Indication of the output status

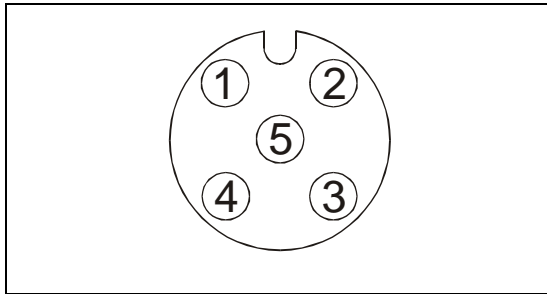| LED (yellow)	Output status
Off	Output not active
On	Output active

Tab. 4-17:
Status indication LEDs

NOTE	If a short-circuit or overload of the actor supply occurs a reset will be triggered. The slave is decoupled from the network and the error is signalled to the master.

4.4.3 Pin assignment of the M12 circular connectors

The actors are directly connected to the M12 circular connectors.

Abb. 4-8:
Pin assignment M12 circular connectors

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M12 circular connector	Pin	Assingment
O0, O2 Digital outputs	1	Not assigned
	2	DO1, DO3
	3	0 V
	4	DO0, DO2
	5	PE
O1, O3 Digitale Outputs	1	Not assigned
	2	Not assigned
	3	0 V
	4	DO1, DO3
	5	PE

Tab. 4-18: Pin assignment M12 circular connectors

The outputs DO1 and DO3 are bridged to pin 2 of the M12 circular connectors of the outputs DO0 and DO2 respectively. Therefore, Y- or T-connectors can be connected to DO0 and DO2.

NOTE	To maintain the protection rating IP67 M12 blind plugs have to be screwed on unused M12 circular connectors.

4.4.4   Connection of the ASI bus

The module is connected to the ASI bus via ASI bus flat cable (yellow). The flat cable is laid through the cable guide "ASI" of the mounting plate.

4.4.5   Connection of the power supply

The module is connected to the external power supply via ASI flat cable (black). The flat cable is laid through the cable guide "ext Pow." of the mounting plate. The actors are supplied via the external power supply.
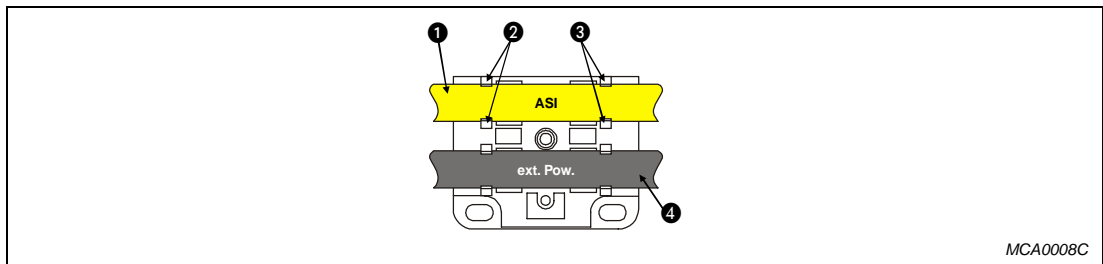
Abb. 4-9: *Connection of ASI bus and external power supply*

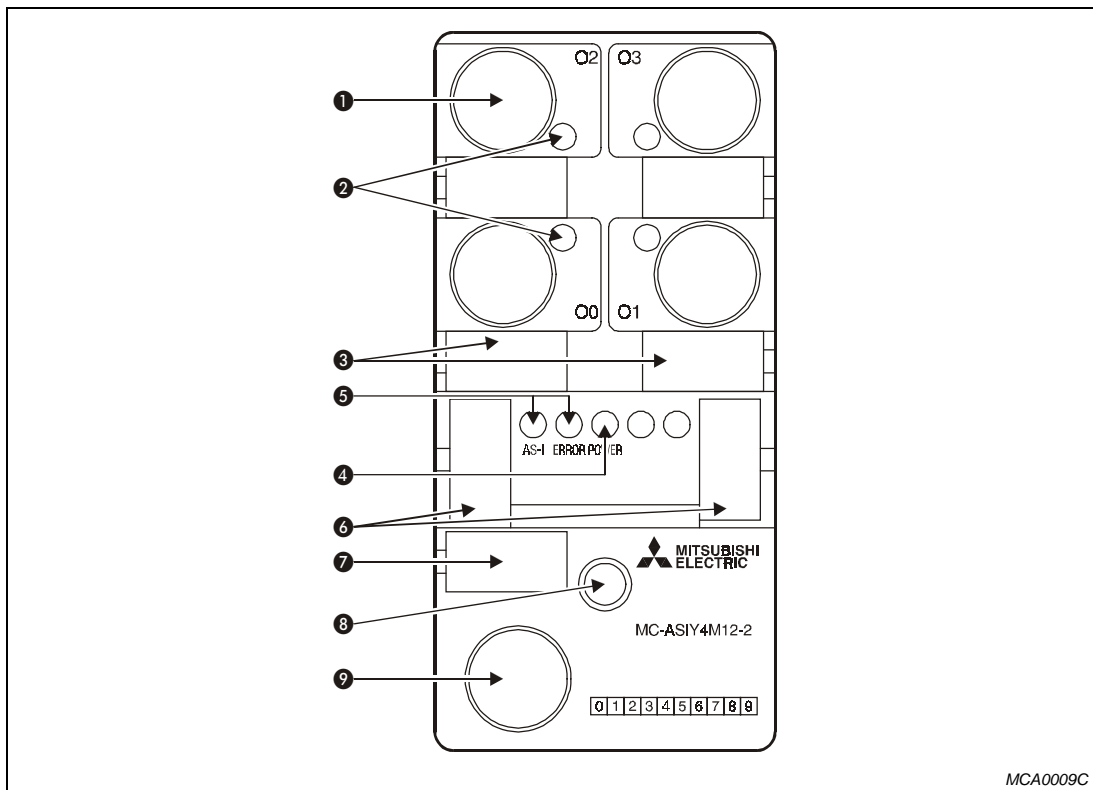| Number	Item
❶	ASI bus flat cable (yellow)
❷, ❸	Cable guide
❹	ASI flat cable (black) external power supply

Tab. 4-19:

Connection of ASI bus and external power supply

4.5   Digital output module MC-ASI Y4M12-2

The module MC-ASI Y4M12-2 provides 4 digital outputs. It occupies one slave address.

4.5.1   Operating items

The figure below shows the operating items of the module.

Abb. 4-10: *Digital output module MC-ASI Y4M12-2*

Key to the figure above

Number	Item	Description
❶	M12 circular connectors	Connection of the actors
❷	Status indication LED	Status indication of the actors
❸	Labelling field output	Labelling of the outputs
❹	Power supply LED	Indication of the external power supply
❺	Diagnostics LED	Indication of the operating status of the module
❻	Labelling field slave	Labelling of the slave address
❼	Labelling field module	Labelling of the module
❽	Central screw	Fixing the module on the mounting plate
❾	Address socket	Connection of a programming unit to re-address the slave.

Tab. 4-20: *Operating items MC-ASI Y4M12-2*

4.5.2   Indicators

The module provides indicators that indicate the operating status, the external power supply, and the output status of the module.

Indication of the operating status

ERROR (red)	ASI (green)	Operating status
Off	Off	No power supply ASI
On	Off	No data transfer
Off	On	Module OK
On	Flashing	Slave address is 0
Flashing	Off	Actor supply: Short-circuit or overload

Tab. 4-21: *Diagnostics LEDs*

Indication of the external power supply

POWER (green)	External power supply
Off	No external power supply
On	External power supply OK

Tab. 4-22:
External power supply LED

Indication of the output status

| LED (yellow)	Output status
Off	Output not active
On	Output active

Tab. 4-23:
Status indication LEDs

NOTE	If a short-circuit or overload of the actor supply occurs a reset will be triggered. The slave is decoupled from the network and the error is signalled to the master.

4.5.3   Pin assignment of the M12 circular connectors

The actors are directly connected to the M12 circular connectors.
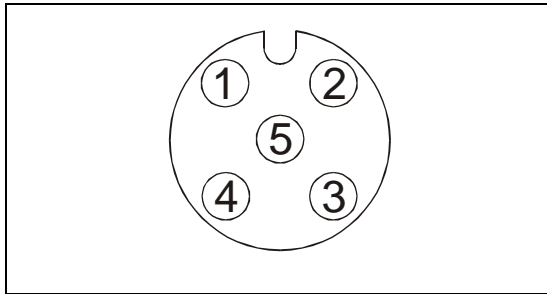
Abb. 4-11:
Pin assignment M12 circular connectors

MCA0004C

M12 circular connector	Pin	Assingment
O0, O2 Digital outputs	1	Not assigned
	2	DO1, DO3
	3	0 V
	4	DO0, DO2
	5	PE
O1, O3 Digitale Outputs	1	Not assigned
	2	Not assigned
	3	0 V
	4	DO1, DO3
	5	PE

Tab. 4-24: *Pin assignment M12 circular connectors*

The outputs DO1 and DO3 are bridged to pin 2 of the M12 circular connectors of the outputs DO0 and DO2 respectively. Therefore, Y- or T-connectors can be connected to DO0 and DO2.
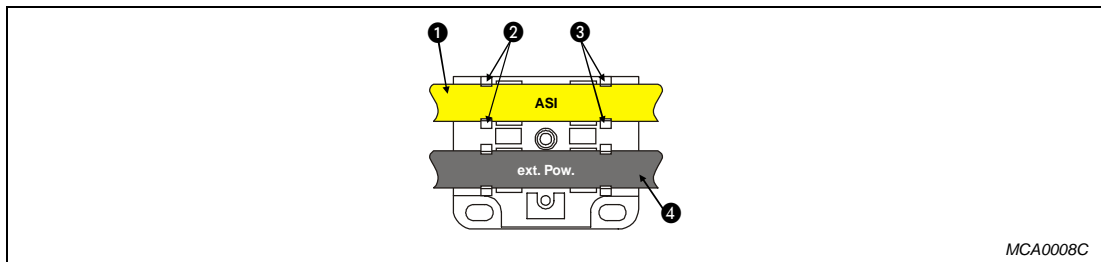
NOTE   To maintain the protection rating IP67 M12 blind plugs have to be screwed on unused M12 circular connectors.

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4.5.4   Connection of the ASI bus

The module is connected to the ASI bus via ASI bus flat cable (yellow). The flat cable is laid through the cable guide "ASI" of the mounting plate.

4.5.5   Connection of the power supply

The module is connected to the external power supply via ASI flat cable (black). The flat cable is laid through the cable guide "ext Pow." of the mounting plate. The actors are supplied via the external power supply.

Abb. 4-12: *Connection of ASI bus and external power supply*

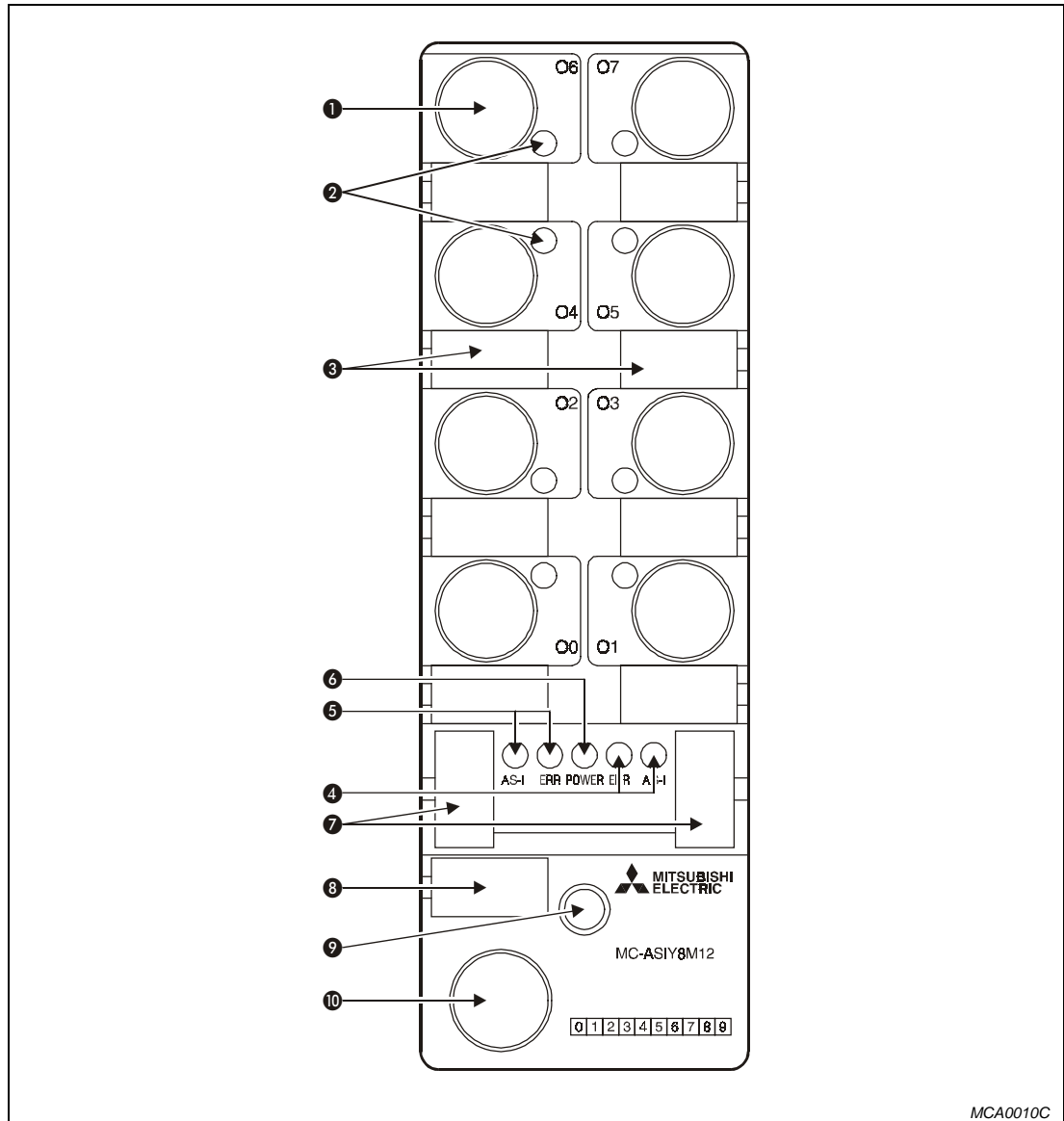| Number	Item
❶	ASI bus flat cable (yellow)
❷, ❸	Cable guide
❹	ASI flat cable (black) external power supply

Tab. 4-25:

Connection of ASI bus and external power supply

4.6 Digital output module MC-ASI Y8M12

The module MC-ASI Y8M12 provides 8 digital outputs. It occupies two slave addresses.

4.6.1 Operating items

The figure below shows the operating items of the module.

Abb. 4-13: Digital output module MC-ASI Y8M12

Key to the figure above

Number	Item	Description
❶	M12 circular connectors	Connection of the actors
❷	Status indication LED	Status indication of the actors
❸	Labelling field output	Labelling of the outputs
❹	Diagnostics LED (O4–O7)	Indication of the operating status of the module
❺	Diagnostics LED (O0–O3)	Indication of the operating status of the module
❻	Power supply LED	Indication of the external power supply
❼	Labelling field slave	Labelling of the slave address
❽	Labelling field module	Labelling of the module
❾	Central screw	Fixing the module on the mounting plate
❿	Address socket	Connection of a programming unit to re-address the slave.

Tab. 4-26: *Operating items MC-ASI Y8M12*

4.6.2 Indicators

The module provides indicators that indicate the operating status, the external power supply, and the output status of the module.

Indication of the operating status

ERROR (red)	ASI (green)	Operating status
Off	Off	No power supply ASI
On	Off	No data transfer
Off	On	Module OK
On	Flashing	Slave address is 0
Flashing	Off	Actor supply: Short-circuit or overload

Tab. 4-27: *Diagnostics LEDs*

Indication of the external power supply

POWER (green)	External power supply
Off	No external power supply
On	External power supply OK

Tab. 4-28:
External power supply LED

Indication of the output status

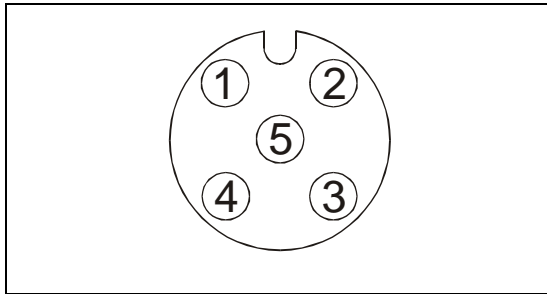| LED (yellow)	Output status
Off	Output not active
On	Output active

Tab. 4-29:
Status indication LEDs

NOTE   If a short-circuit or overload of the actor supply occurs a reset will be triggered. The slave is decoupled from the network and the error is signalled to the master.

4.6.3 Pin assignment of the M12 circular connectors

The actors are directly connected to the M12 circular connectors.

Abb. 4-14:
Pin assignment M12 circular connectors

MCA0004C

M12 circular connector	Pin	Assingment
O0, O2, O4, O6 Digital outputs	1	Not assigned
	2	DO1, DO3, DO5, DO7
	3	0 V
	4	DO0, DO2, DO4, DO6
	5	PE
O1, O3, O5, O7 Digital outputs	1	Not assigned
	2	Not assigned
	3	0 V
	4	DO1, DO3, DO5, DO7
	5	PE

Tab. 4-30: *Pin assignment M12 circular connectors*

The outputs DO1, DO3, DO5, and DO7 are bridged to pin 2 of the M12 circular connectors of the outputs DO0, DO2, DO4, and DO6 respectively. Therefore, Y- or T-connectors can be connected to DO0, DO2, DO4, and DO6 .
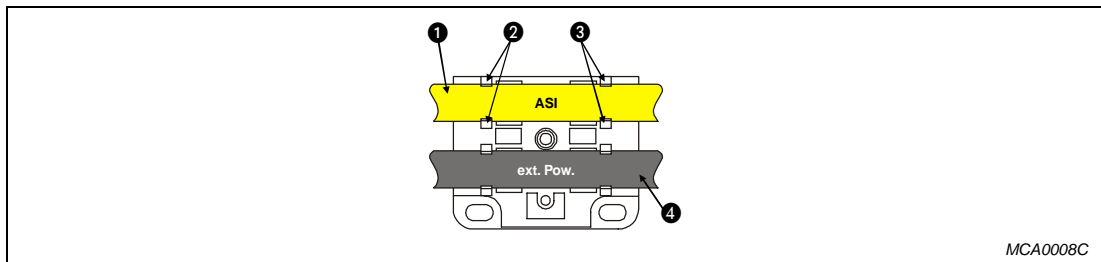
| **NOTE** | To maintain the protection rating IP67 M12 blind plugs have to be screwed on unused M12 circular connectors. |

4.6.4 Connection of the ASI-Bus

The module is connected to the ASI bus via ASI bus flat cable (yellow). The flat cable is laid through the cable guide "ASI" of the mounting plate.

4.6.5 Connection of the power supply

The module is connected to the external power supply via ASI flat cable (black). The flat cable is laid through the cable guide "ext Pow." of the mounting plate. The actors are supplied via the external power supply.

Abb. 4-15: *Connection of ASI bus and external power supply*

Number	Item
❶	ASI bus flat cable (yellow)
❷, ❸	Cable guide
❹	ASI flat cable (black) external power supply

Tab. 4-31:

Connection of ASI bus and external power supply

4.6.6 Addressing

The module includes two independent slaves that have to be addressed individually.

As long as the first ASI slave (ASI1) is addressed to 0 the second slave can not be accessed.

At default settings the slave addresses can not be changed via the auto configuration mode. When replacing a module at least one slave has to be pre-assigned an address (default setting: 2 x adress "0").

4.7 Digital input/output module MC-ASI X2Y2M12

The module MC-ASI X2Y2M12 provides 2 digital inputs and 2 digital outputs. It occupies one slave address.

4.7.1 Operating items

The figure below shows the operating items of the module.
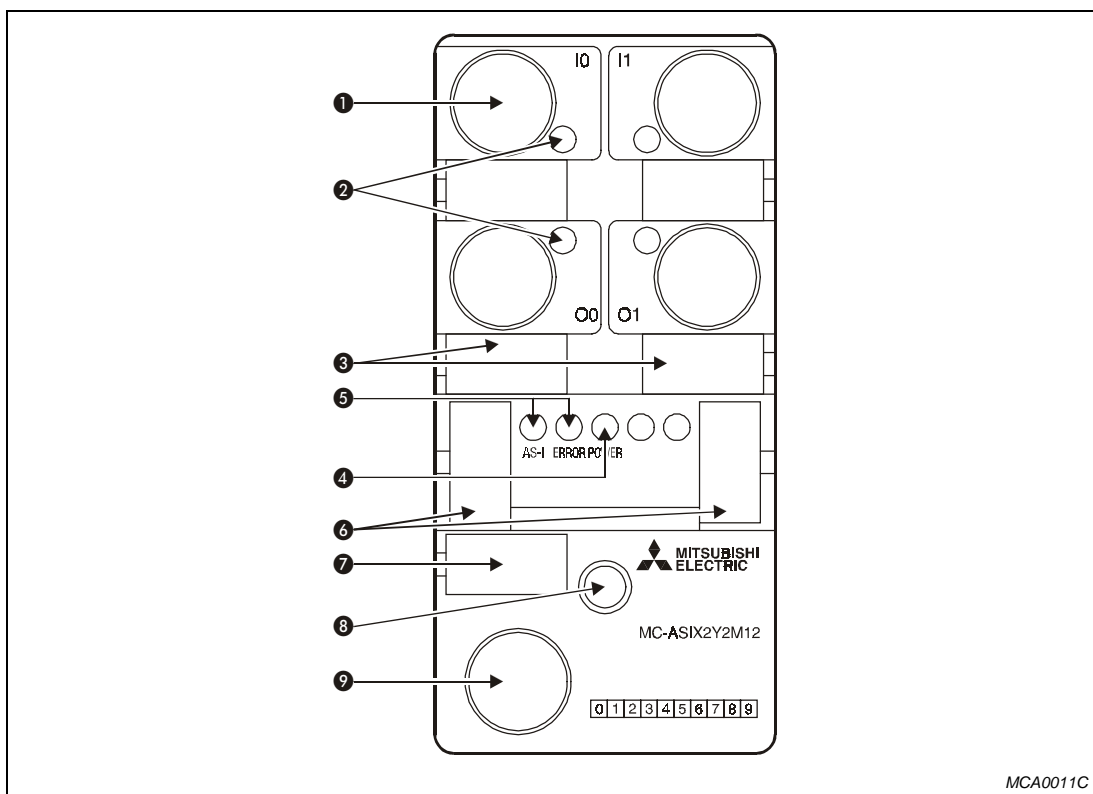
Abb. 4-16: Digital input/output module MC-ASI X2Y2M12

Key to the figure above

Number	Item	Description
❶	M12 circular connectors	Connection of the sensors or actors
❷	Status indication LED	Status indication of the inputs or outputs
❸	Labelling field input or output	Labelling of the inputs or outputs
❹	Power supply LED	Indication of the external power supply
❺	Diagnostics LED	Indication of the operating status of the module
❻	Labelling field slave	Labelling of the slave address
❼	Labelling field module	Labelling of the module
❽	Central screw	Fixing the module on the mounting plate
❾	Address socket	Connection of a programming unit to re-address the slave.

Tab. 4-32: Operating items MC-ASI X2Y2M12

4.7.2   Indicators

The module provides indicators that indicate the operating status, the external power supply, and the input/output status of the module.

Indication of the operating status

ERROR (red)	ASI (green)	Operating status
Off	Off	No power supply ASI
On	Off	No data transfer
Off	On	Module OK
On	Flashing	Slave address is 0
Flashing	Off	Sensor or actor supply: Short-circuit or overload

Tab. 4-33: *Diagnostics LEDs*

Indication of the external power supply

POWER (green)	External power supply
Off	No external power supply
On	External power supply OK

Tab. 4-34:
External power supply LED

Indication of the input/output status

LED (yellow)	Input/output status
Off	Input/output not active
On	Input/output active

Tab. 4-35:
Status indication LEDs

NOTE	If a short-circuit or overload of the sensor or actor supply occurs a reset will be triggered. The slave is decoupled from the network and the error is signalled to the master.

4.7.3   Pin assignment of the M12 circular connectors

The sensors and actors are directly connected to the M12 circular connectors.

Abb. 4-17:
Pin assignment M12 circular connectors

MCA0004C

M12 circular connector	Pin	Assingment
I0, I1 Digital inputs	1	Sensor supply +
	2	On I0 DI1, on I1 not assigned
	3	Sensor supply -
	4	DI0, DI1
	5	PE
O0, O1 Digital outputs	1	Not assigned
	2	On O0 DO1, on O1 not assigned
	3	0 V
	4	DO0, DO1
	5	PE

Tab. 4-36: *Pin assignment M12 circular connectors*

The inputs and outputs DI1 and DO1 are bridged to pin 2 of the M12 circular connectors of the inputs and outputs DI0 and DO0 respectively. Therefore, Y- or T-connectors can be connected to DI0 and DO0 .

NOTE	To maintain the protection rating IP67 M12 blind plugs have to be screwed on unused M12 circular connectors.

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4.7.4   Connection of the ASI-Bus

The module is connected to the ASI bus via ASI bus flat cable (yellow). The flat cable is laid through the cable guide "ASI" of the mounting plate.

4.7.5   Connection of the power supply

The module is connected to the external power supply via ASI flat cable (black). The flat cable is laid through the cable guide "ext Pow." of the mounting plate. The actors are supplied via the external power supply.

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Abb. 4-18: *Connection of ASI bus and external power supply*

Number	Item
❶	ASI bus flat cable (yellow)
❷, ❸	Cable guide
❹	ASI flat cable (black) external power supply

Tab. 4-37:

Connection of ASI bus and external power supply

4.8   Digital input/output module MC-ASI X4Y4M12

The module MC-ASI X4Y4M12 provides 4 digital inputs and 4 digital outputs. It occupies one slave address.

4.8.1   Operating items

The figure below shows the operating items of the module.
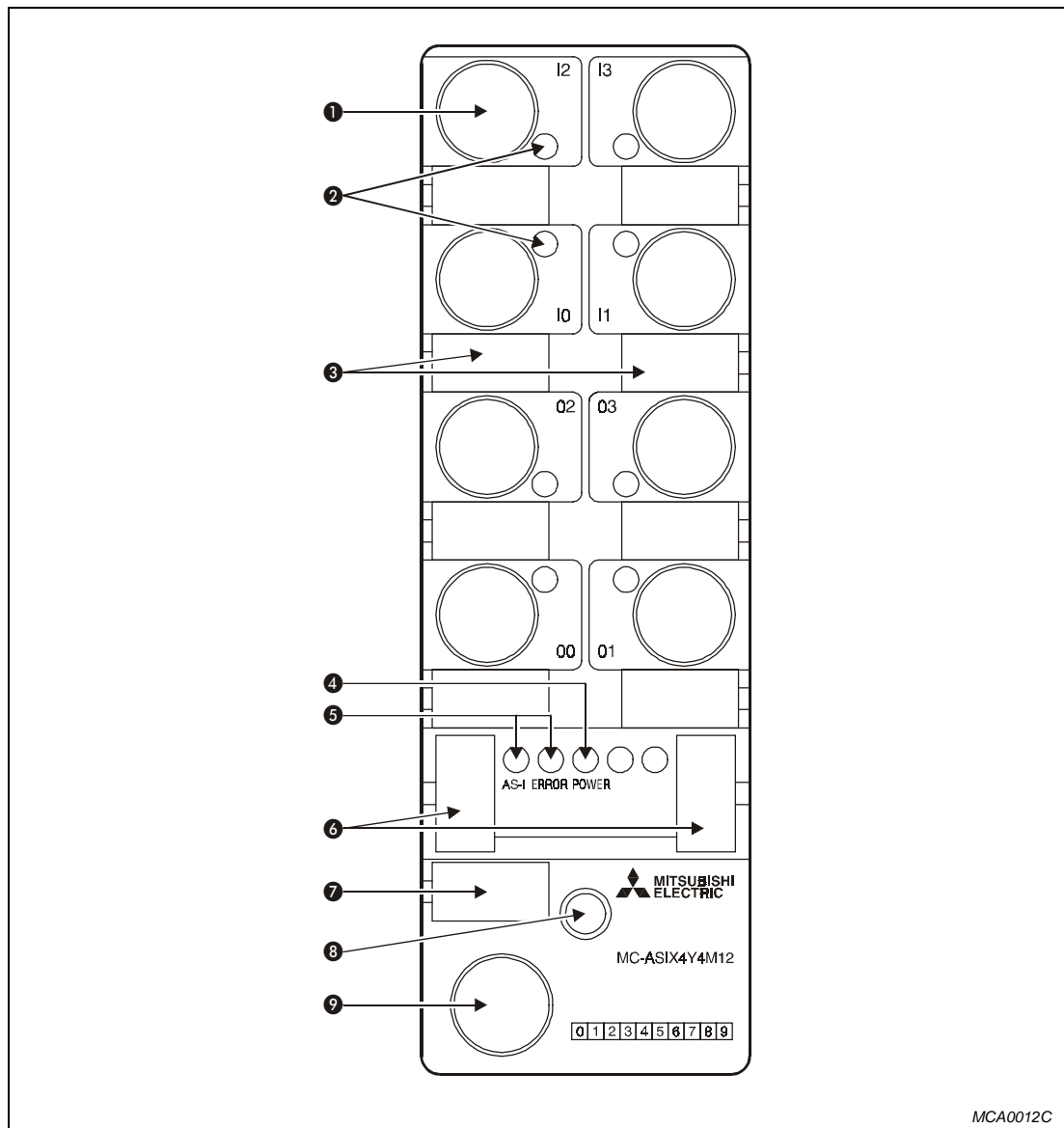
Abb. 4-19: *Digital input/output module MC-ASI X4Y4M12*

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Key to the figure above

Number	Item	Description
❶	M12 circular connectors	Connection of the sensors or actors
❷	Status indication LED	Status indication of the inputs or outputs
❸	Labelling field input or output	Labelling of the inputs or outputs
❹	Power supply LED	Indication of the external power supply
❺	Diagnostics LED	Indication of the operating status of the module
❻	Labelling field slave	Labelling of the slave address
❼	Labelling field module	Labelling of the module
❽	Central screw	Fixing the module on the mounting plate
❾	Address socket	Connection of a programming unit to re-address the slave.

Tab. 4-38: *Operating items MC-ASI X4Y4M12*

4.8.2 Indicators

The module provides indicators that indicate the operating status, the external power supply, and the input/output status of the module.

Indication of the operating status

ERROR (red)	ASI (green)	Operating status
Off	Off	No power supply ASI
On	Off	No data transfer
Off	On	Module OK
On	Flashing	Slave address is 0
Flashing	Off	Sensor or actor supply: Short-circuit or overload

Tab. 4-39: *Diagnostics LEDs*

Indication of the external power supply

POWER (green)	External power supply
Off	No external power supply
On	External power supply OK

Tab. 4-40:
External power supply LED

Indication of the input/output status

LED (yellow)	Input/output status
Off	Input/output not active
On	Input/output active

Tab. 4-41:
Status indication LEDs

NOTE	If a short-circuit or overload of the sensor or actor supply occurs a reset will be triggered. The slave is decoupled from the network and the error is signalled to the master.

4.8.3 Pin assignment of the M12 circular connectors

The sensors and actors are directly connected to the M12 circular connectors.

Abb. 4-20:
Pin assignment M12 circular connectors

MCA0004C

M12 circular connector	Pin	Assingment
I0–I3 Digital inputs	1	Sensor supply +
	2	On I0 DI1, on I1 not assigned, on I2 DI3, on I3 not assigned
	3	Sensor supply -
	4	DI0–DI3
	5	PE
O0–O3 Digital outputs	1	Not assigned
	2	On O0 DO1, on O1 not assigned, on O2 DO3, on O3 not assigned
	3	0 V
	4	DO0–DO3
	5	PE

Tab. 4-42: Pin assignment M12 circular connectors

The inputs DI1 and DI3 are bridged to pin 2 of the M12 circular connectors of the inputs DI0 and DI2 respectively. Therefore, Y- or T-connectors can be connected to DI0 and DI2.

The outputs DO1 and DO3 are bridged to pin 2 of the M12 circular connectors of the outputs DO0 and DO2 respectively. Therefore, Y- or T-connectors can be connected to DO0 and DO2.

NOTE	To maintain the protection rating IP67 M12 blind plugs have to be screwed on unused M12 circular connectors.

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4.8.4 Connection of the ASI-Bus

The module is connected to the ASI bus via ASI bus flat cable (yellow). The flat cable is laid through the cable guide "ASI" of the mounting plate.

4.8.5 Connection of the power supply

The module is connected to the external power supply via ASI flat cable (black). The flat cable is laid through the cable guide "ext Pow." of the mounting plate. The actors are supplied via the external power supply.

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Abb. 4-21: Connection of ASI bus and external power supply

Number	Item
❶	ASI bus flat cable (yellow)
❷, ❸	Cable guide
❹	ASI flat cable (black) external power supply

Tab. 4-43:

Connection of ASI bus and external power supply

5   Installation

5.1   Safety precautions

Observe the safety information in the first part of this manual.

E   **CAUTION:**
        Before mounting the MC-ASI modules always switch off the power supply.

5.2   Ambient conditions

Only expose the MC-ASI modules to the following ambient conditions

E   **CAUTION:**
        Expose the modules only to the operating conditions listed in Sec. 10.1.

        If the module is operated under different conditions, module units might be damaged, and you risk electrical hazards, fire or malfunction.

5.3   Mounting of the MC-ASI modules

E   **CAUTION:**
        To prevent tensions from being generated in the housing, make sure that the mounting surface is even when mounting the modules.

        Do not expose the modules to mechanical loads or strong shocks, since the housing is made of plastics.

        Tighten the central screw for fixing the modules to the mounting plate to a specified torque of 0.4 Nm.

        When installing the modules, ensure that no wires or metal chips get into the housing. Never remove the printed circuit boards from the MC modules.

5.3.1   Mounting the mounting plate

The mounting plate for the module can directly be mounted on a mounting panel or a machine. For this purpose the mounting plate provides several fixing holes (A, B, C) (see also "Dimensions" in appendix). For fixing the mounting plate 3 screws M4x12 are required.
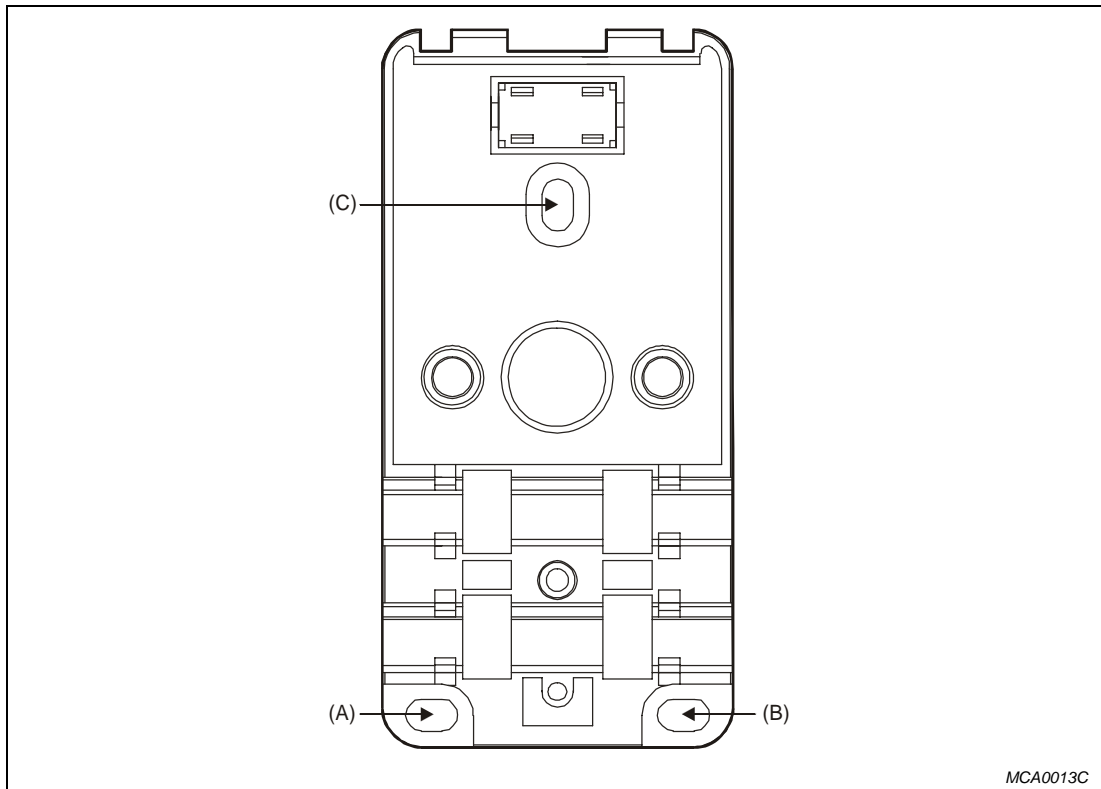
Abb. 5-1: *Mounting plate with fixing holes (A, B, C) for the module mounting*

5.3.2   Earth protection

The module has a low resistance path to earth via the PE earthing plate and the fixing screws of the mounting plate. The PE earthing plate and the fixing screws must be connected lowly resistive to the protective earth of the plant.
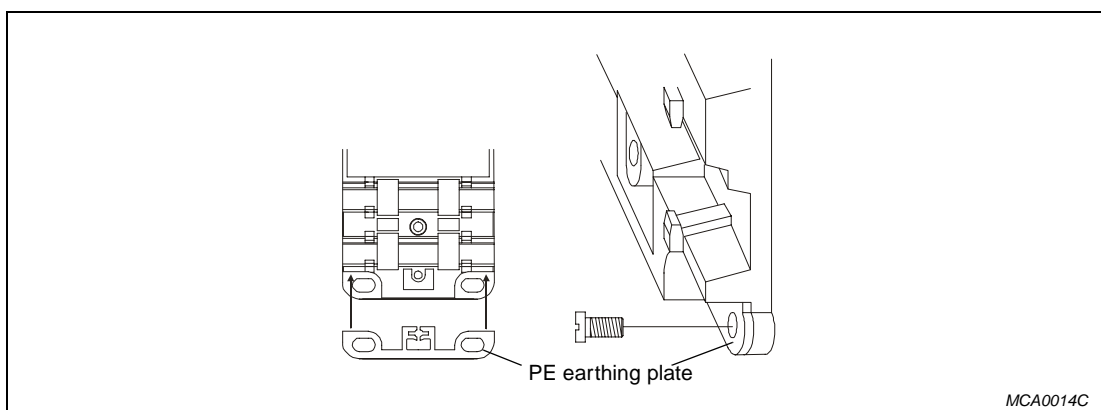
Abb. 5-2: *Connection of the protective earth (PE)*

5.3.3   Connection of the ASI bus

The modules are connected to ASI bus via flat cable (yellow) (see also chapter 4, "Description of the modules). The flat cable is laid through the cable guide "ASI" of the mounting plate. The sensors are supplied with voltage via the ASI bus.

Input modules provide a bus branching feature. This feature branches the ASI bus via the second (lower) cable guide "ASI" to another ASI flat cable (yellow).
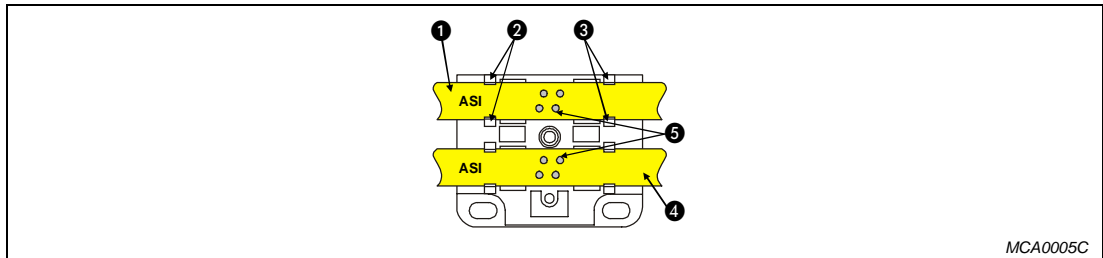
Abb. 5-3: *Connection of the ASI bus on the mounting plate (here showing the bus branching)*

Number	Item
❶, ❹	ASI bus flat cable (yellow)
❷, ❸	Cable guide
❺	ASI contact (internal connection)

Tab. 5-1:

Connection of the ASI bus

NOTE   Input modules provide a bus branching feature. The external power supply (ASI flat cable, black) must **not** be connected.

5.3.4   Connection of the external power supply

Output modules and combined input/output modules are connected to an external power supply (24 V DC) via ASI flat cable (black) (see also chapter 4, "Description of the modules). The flat cable is laid through the cable guide "ext Pow." of the mounting plate. The actors are supplied with voltage via the external power supply.
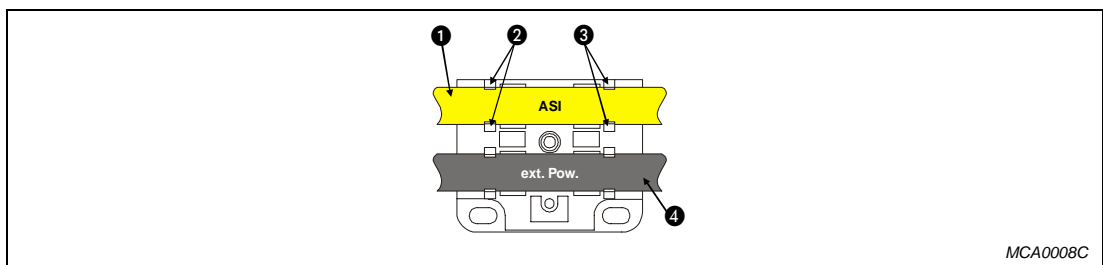
Abb. 5-4: *Connection of the external power supply on the mounting plate*

Number	Item
❶	ASI bus flat cable (yellow)
❷, ❸	Cable guide
❹	ASI flat cable (black) external power supply

Tab. 5-2:

Connection of ASI bus and external power supply

NOTE   The inputs are galvanically coupled with the ASI bus. They must **not** be connected to the external power supply (ASI flat cable, black).
The external power supply should be galvanically isolated twice from the ASI bus voltage.

5.3.5   Cable preparation

Leading through

ASI flat cable that is lead through a module does not need any cable preparation. It is laid into the respective cable guide.

Cable end

ASI flat cable that begins or ends in a module has to be prepared as follows:

① Cut off the flat cable straight

② Fit the plug cap

③ Lay the flat cable entry into the cable guide and the flat cable end with plug cap into the plug cap holder.

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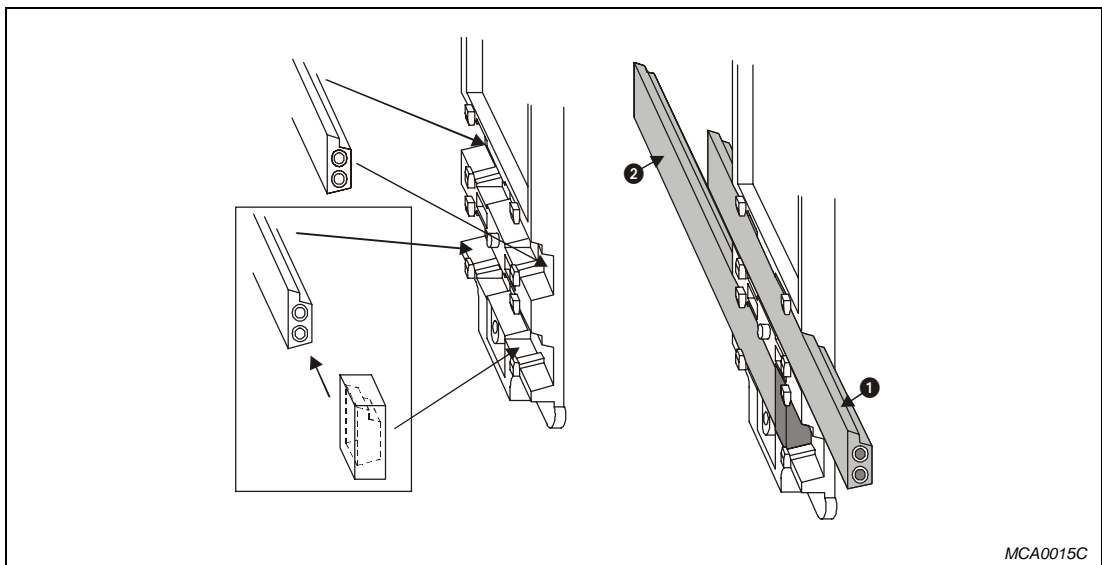
Abb. 5-5: *Cable preparation for leading through (1) or cable end (2)*

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5.3.6   Mounting the module to the mounting plate

Hang the MC-ASI module onto the mounting plate and fix it with the central screw. This also establishes the electrical contacts to the ASI flat cables.
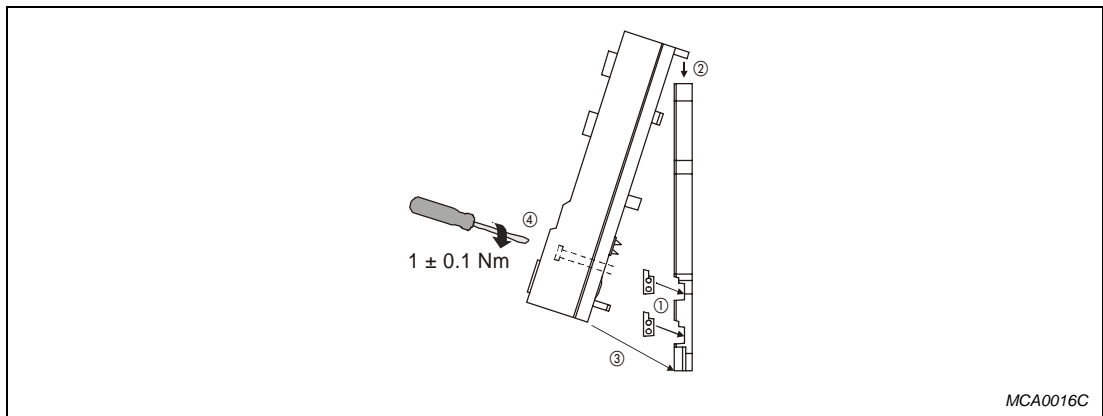
Abb. 5-6: *Mounting the module to the mounting plate*

5.3.7   Connection of the sensors and actors

The sensors and actors are directly connected to the M12 circular connectors.
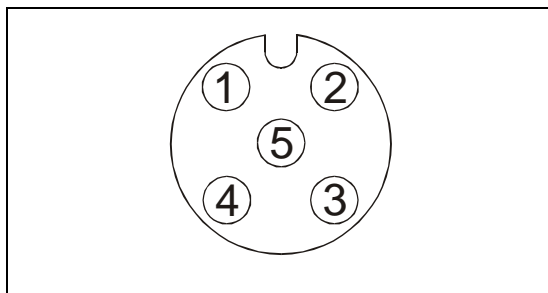
Abb. 5-7:
M12 circular connector

Refer to chapter 4, "Description of the modules" for the pin assignments of the different MC-ASI modules.

| NOTE | To maintain the protection rating IP67 M12 blind plugs have to be screwed on unused M12 circular connectors. |

5.4   Wiring (general)

E	**CAUTION:** ***Ensure a proper earthing. Earth all equipment before connecting the power and control circuits.***

For the wiring keep the EMC directive and the European norm EN 60204.

For keeping the EMC directive there are several basic measures that are described more detailed in the following sections:

● Install equipment in a closed, earthed metal cabinet (Reduces the radiated emissions)

● Use a supply filter (Reduces the mains conducted emissions)

● Ensure good earthing (No antenna effect)

● Use shielded wire (Reduces the radiated emissions)

● Keep sensitive equipment away from sources of disturbances or install the source in a separate cabinet (Reduces coupling)

5.4.1   EMC conforming installation in cabinet

Cabinet design and layout is very important for controlling EMC. Take the following recommendations as a guideline:

● Use an earthed metal cabinet.

● Use shield gasket or other conductive material between the cabinet cover or door and cabinet. Also use short and thick wire (preferably braided) to connect the cover and cabinet.

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Shield gasket

Conductive packing

Cover

Metal cabinet

The part of the cabinet that the shielded gasket touches should be conductive (i.e. no paint).

Short thick braided cable
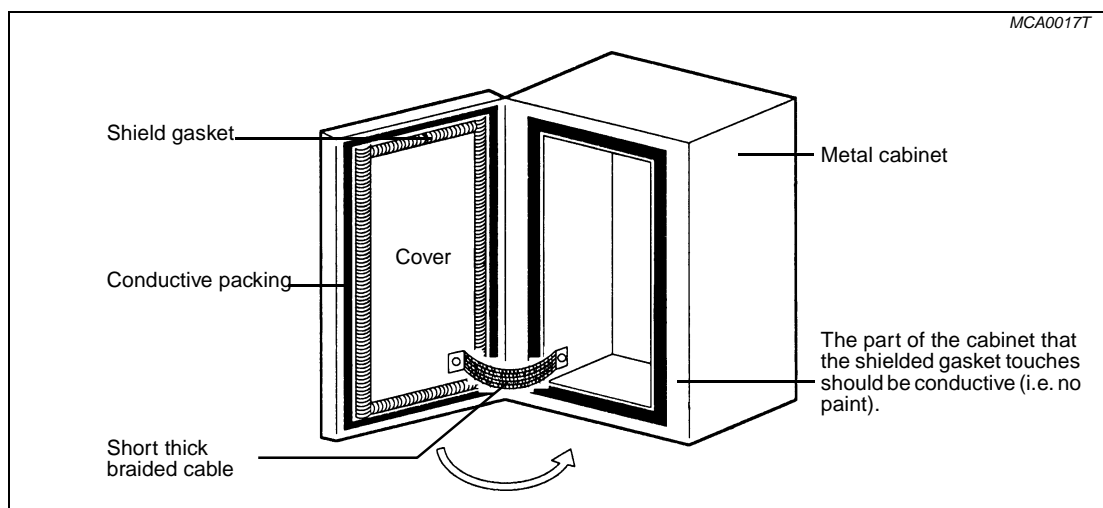
Abb. 5-8: *Recommended design of a cabinet*

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● When fitting a mains filter mask or remove the paint or plating from the cabinet to make a good electrical connection between filter and cabinet. Confirm that the equipment mounting panel is also electrically earthed to the cabinet chassis.

● Weld or screw all cabinet plates at a maximum of 10 cm intervals. Also, the maximum dimension of holes in the cabinet should be less than 10 cm. If there is an interval (space), the shielding effect may be lost. Holes larger than this should be covered with a wire mesh, electrically connected to the cabinet. No part of the enclosure should be electrically "floating". Where insulating connections like painted metal are used, remove the paint to create good contact.
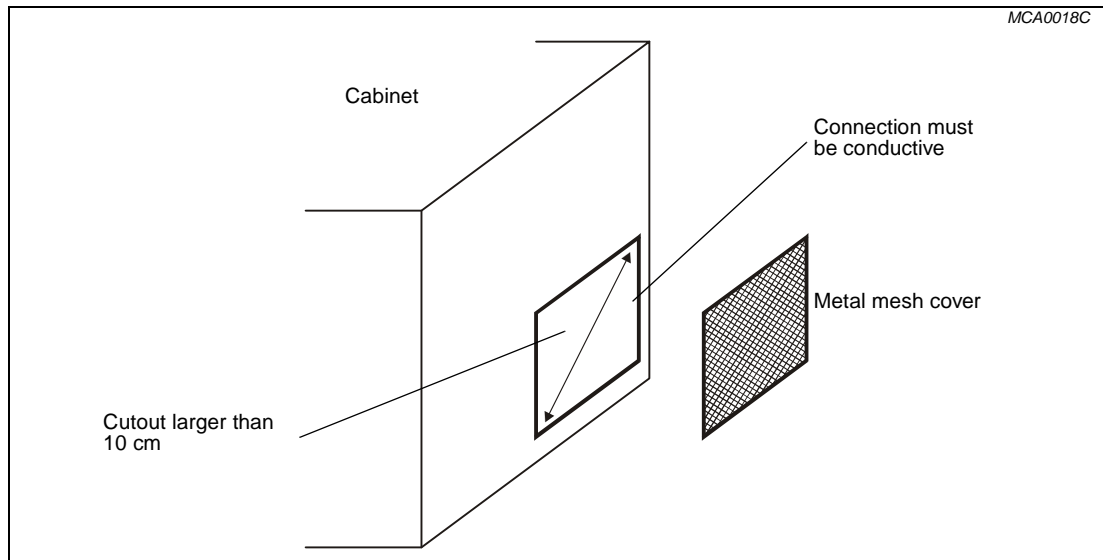
Abb. 5-9: *Beispiel für Metallgitterabdeckung*

5.4.2   EMC conforming cable routing and shielding

● Use shielded cable or route the cable in a metal conduit.

● Connect the cable shield or conduit to the cabinet using a metal cable gland, a "P"-clip or a "U"-clip to create the shortest earth path.
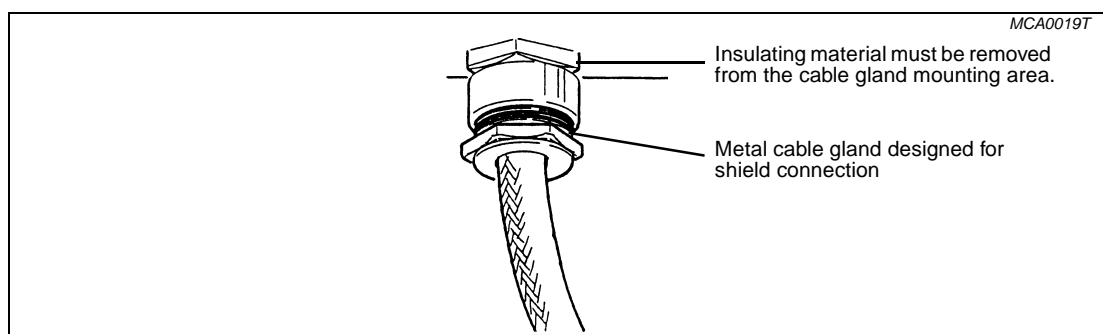
Abb. 5-10: *Cable routing and shielding via metal cable gland*

● The position of the "P"-clip or "U"-clip should be as close a possible to the cable entry point.
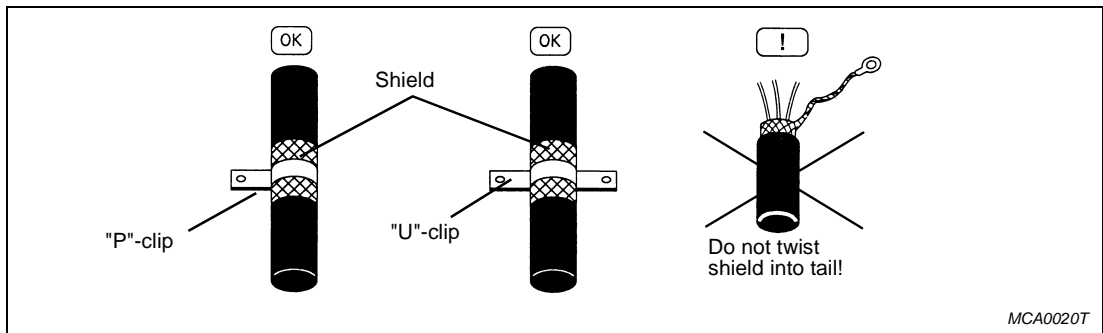
Abb. 5-11: Cable routing and shielding via "P"-clip or "U"-clip

● Separate control signal wires as far as possible (min. 30 cm) from all high voltage or high current cables.

● Do not route control signal wires and high voltage or high current cables in parallel.

5.4.3   Wiring instructions

Connection of the power supply

● If the voltage fluctuation are higher than the stipulated value, a constant-voltage transformer has to be installed.
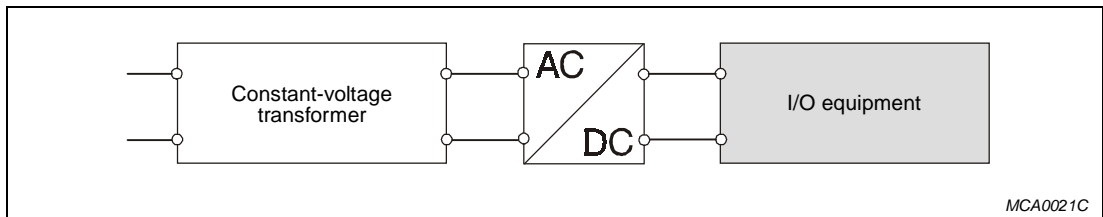
Abb. 5-12: Connection of a constant-voltage transformer

● The power supply unit must not generate noise across wire, the controllers, and ground. If excessive noise is generated an isolating transformer has to be connected.
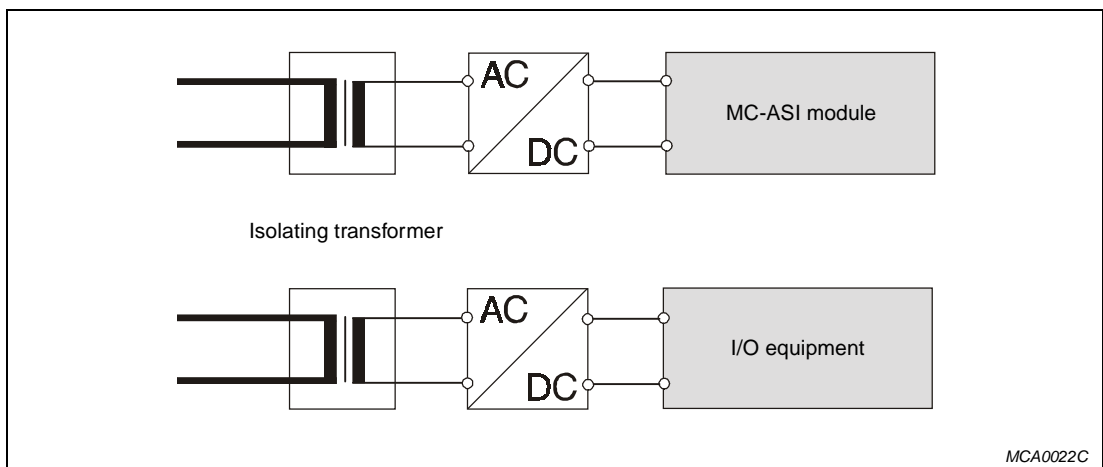
Fig. 5-13: Connection of an isolating transformer

● The main supply and the DC 24 V cables must not be bundled with the main-circuit wires or with the I/O signal lines (high-voltage, large-current). Also, the wires mentioned must not be laid too close together. If possible, provide more than 100 mm distance between them.

Wiring of the external equipment with the inputs and outputs.

● The cross-section of the connecting wires for the input and output terminals is 0,75 to 1,5 mm^2 with end sleeves, and 2,5 mm^2 without end sleeves. However, a cross-section of 0,75 mm^2 is recommended.

● Input and output lines should always be laid separately.

● I/O signal lines have to be laid with a minimum distance of 100 mm to high-voltage and large-current main circuit wires.

● If no sufficient distance beween the I/O signal lines and high-voltage and large-current can be kept, shielded cables have to be used. Preferably, ground the shielding at the modul side.
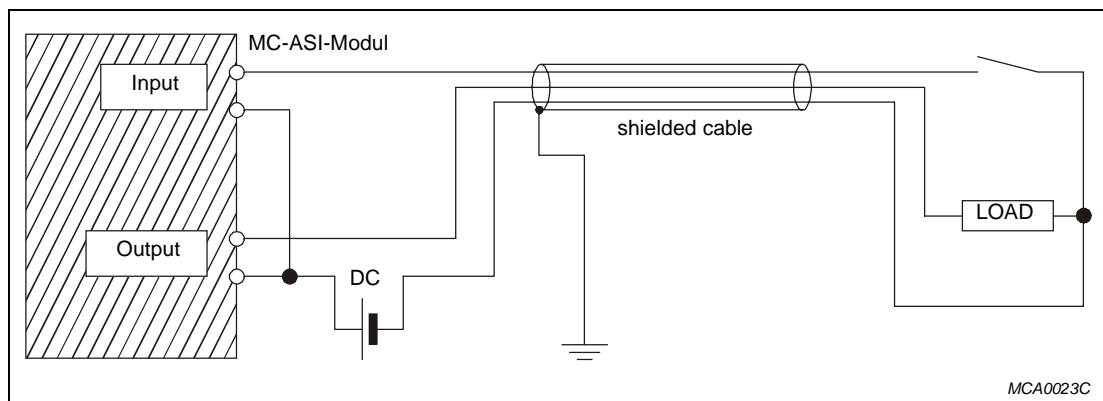
Abb. 5-14: Anschluss und Erdung der E/A-Signalleitung

● If wiring is done with a piping, ground the piping.

● Separate the DC 24 V I/O cables from the AC cables.

Shielding

For the communication of a MELSEC system with peripheral equipment shielded data lines have to be used only. At best, the shielding is made of twisted copper. The density of the braiding determines the effectiveness of the shielding. Make sure to follow the bending instructions of the cable manufacturer, otherwise the shielding might fan out. For longer distances connect the shielding each 20 m to ground.

Digital signal transmission

Follow the specifications of the interface concerning transfer rate and transfer distance, for an error free digital signal transmission.

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6   Configuration

6.1   Addressing

Each slave within the bus system must be assigned an individual address in the range of 1–31. The default setting of the slaves is 0. The slave address can either be changed via an addressing unit on the address socket of the slave or via the master module in the bus system. Instructions for changing the re-addressing the slaves are included in the manuals of the master module or the addressing unit.

The slave address resides in the slave memory. Each slave can be re-addressed at least 14 times.

Modules providing 4 inputs or 4 outputs occupy one slave address. Combined modules providing maximum 4 inputs and 4 outputs occupy one slave address either (multiplex operation).

Modules providing 8 inputs or 8 outputs include two independent slaves and occupy two slave addresses. The independent slaves have to be addressed individually. As long as the first ASI slave (ASI1) is addressed to 0 the second slave (ASI2) can not be accessed.

At default settings the slave addresses can not be changed via the auto configuration mode. When replacing a module at least one slave has to be pre-assigned an address (default setting: 2 x adress "0").

6.2   Slave profile

The slave profile is written by the manufacturer into a non-volatile memory of the slave. It describes the ID code and the I/O range of the ASI slave.

Only modules with the same slave profile can be exchanged.

7 Parametrization (only for experts)

7.1 Parameter bytes for all MC modules

The following table shows the meaning of the parameter bytes:

Byte	Function	Bit position							
		b7	b6	b5	b4	b3	b2	b1	b0
0	User_Def_PRM1	0	0	0	0	EN Sammel Dia	WD Base	0	0
1	Mask for Diaport1								
2	Mask for Diaport2	0	0	0	0	0	0	0	0
3	User_Def_PRM2	0	0	0	0	0	0	0	0
4	User_Def_PRM3	0	0	0	0	0	0	0	0

Tab. 7-1: *Parameter bytes*

Byte 0: User_Def_PRM1

Bit 0,1,4,5,6,7:
These bits are reserved and must be set to 0.

Bit 2:
The WD_Base-Bit specifies the time base for the watchdog
  0 =   Time base 10 ms (status after reset)
  1 =   Time base 1 ms

Bit 3:
The EN_Sammel_Dia-Bit enables the group diagnostic mode:
  0 =   A group diagnostic error will always be returned.
  1 =   A group diagnostic error will only be returned, if an additional channel diagnostic error has occurred.

For input modules EN_Sammel_Dia = 0 must be parametrized.

Byte 1: Mask for Diaport1

This byte contains mask bits for the channel diagnostic byte. The mask bits are assigned to the respective bit positions of the channel diagnostic byte. A "1" at the respective bit position masks the diagnostics, i. e. these bits are masked out. After a reset all masks are cleared.

For input modules the mask byte must be parametrized 00hex.

Byte 2, 3, 4: Mask for Diaport2, User_Def_PRM2, User_Def_PRM3

These mask bytes are not used by the MC modules and must be parametrized 00hex.

Example:

● WD_Base = 1ms

● A group diagnostic error will only be returned, if an additional channel diagnostic error has occurred.

● No short-circuit monitoring for the outputs 1, 2, 6, 8

Byte	Enter the format KH
0	0C A3 00 00 00
10	
20	

Tab. 7-2: *Example for a DP slave parametrizing frame*

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8   Maintenance and Inspection

This chapter describes items for daily and periodic maintenance and inspection to maintain the MC-ASI modules in errorfree and best condition.

8.1   Daily inspection

Check the mounting screws of the modules for proper tightening. Retighten loose mounting screws.

8.2   Periodic inspection

This section describes the inspection items to be checked every six to twelve months. Also check these items, if the system configuration or wiring was changed.

No.	Check Item		Check Method	Judgement	Corrective Action
1	Ambient conditions	Ambient temperature	Check ambient temperature.	0 – 55 °C	If the MC modules are installed in a cabinet, the conditions inside the cabinet are relevant.
2	Condition of the modules	Loose seating of the modules	Check mounting of the modules.	The MC modules must be mounted properly.	Mount MC modules properly.
3	Condition of connections	M12 circular connectors	Check M12 circular connectors for firm seating	M12 circular connectors must be seated firmly on the module	Connect M12 circular connectors firmly

Tab. 0-1:   *Periodic inspection*

9   Troubleshooting

This chapter describes various troubleshooting procedures, as well as corrective actions.

9.1   Basic troubleshooting

The system reliability does not depend only on reliable peripheral devices but also on short down-times in case of trouble. In the following the most important points for troubleshooting are listed.

Visual checks

● Is the power ON or OFF?

● Status of inputs and outputs?

● Condition of wiring (I/O lines, cables)?

● Status of LED indicators (AS-I, ERR, POWER, Status LEDs inputs/outputs)?

Trouble check

Observe any changes of the error during a short switching OFF and ON of the power supply.

9.2   Toubleshooting via LEDs

The modules provide several LEDs supporting the troubleshooting. The status of the LEDs and corresponding diagnostic procedures are described in chapter 4, "Description of the modules".

9.3   Short-circuit handling

If a short-circuit or overload of the sensor or actor supply occurs a reset will be triggered. The slave is decoupled from the network and the error is signalled to the master.

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10   Specifications

10.1   General operating conditions

Operating conditions	Specification	
Ambient conditions		
Operating ambient temperature	0 °C to +55 °C	
Storage ambient temperature	−25 °C to +70 °C	
Air condition	No corrosive gases	
Protection rating DIN 40050	IP 67	
Installation position	Machine	
Mechanical ambient conditions		
Vibration resistance acc. to DIN IEC 68 part 2-6	10 - 58 Hz	const. amplitude 0.35 mm
	58 - 150 Hz	const. acceleration 5 G
Shock resistance	IEC 1131-2	
EMC conformity		
HF-Field, EN 61000-4-3	10 V/m	
HF-Field GSM, ENV 50204	10 V/m	
Burst, EN 61000-4-4	± 1 kV / ± 2 kV	
ESD, EN 61000-4-2	± 4 kV / ± 8 kV	
Interference field strength, EN 50081-1	QP 30 dBμV/m (30 - 230 MHz)	
	QP 37 dBμV/m (230 - 1000 MHz)	

Tab. 10-1: *General operating conditions*

10.2   General specifications

Item	Specification
AS-I connection	
AS-I standard	2.04, EN 50295
AS-I bus voltage	26.5 - 31.6 V DC
Polarity protection	Integrated
Flat cable	AS-I standard profile cable, yellow, 2 x 1.5 mm^2, ASI+, ASI-
External power supply (modules with outputs only)	
Nominal voltage	Ub 20 - 30 V DC (double galvanic isolation from AS-I bus voltage)
Polarity protection	Integrated
Flat cable	AS-I standard profile cable, black, 2 x 1.5 mm^2, 24 V, 0 V
Safe separation distance optocoupler (PEL V condition)	8 mm min., IEC 364-4-41

Tab. 10-2: *General specifications*

10.3   Specifications of the MC-ASI modules

10.3.1   Digital input modules

Item	Specification	
	MC-ASI X4M12	**MC-ASI X8M12**
Connections		
AS-I bus	Vampire connection for profile coded AS-I flat cable, yellow	
AS-I bus branching	Vampire connection for profile coded AS-I flat cable, yellow	
External power supply	No	
Inputs	4 x 5-pin M12 circular connectors	8 x 5-pin M12 circular connectors
Adressing	Address socket	
AS-I connection		
AS-I profile (IO/ID code)	0/0	2 x 0/0
Occupied slave addresses	1	2
Total power consumption	≤ 50 mA	≤ 450 mA
Inputs		
Number of inputs	4	8
Voltage range	0 - 30 V DC acc. to IEC 1131-2	
	Signal 0: Iin ≤ 2 mA, Uin ≤ 5 V	
	Signal 1: Iin ≥ 6 mA, Uin ≥ 11 V	
Input current	≤ 11 mA	
Sensor supply	200 mA max.	400 mA max.
Short-circuit protection	Integrated	
Overload protection	Integrated	
Others		
Dimensions in mm (LxWxH)	105 x 50 x 38	154 x 50 x 38
Weight	Approx. 100 g	Approx. 140 g

Tab. 10-3: *Digital input modules*

NOTE	Input modules provide a bus branching feature. Do not connect the external power supply (ASI flat cable, black).

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10.3.2   Digital output modules

Item	Specification		
	MC-ASI Y4M12-05	**MC-ASI Y4M12-2**	**MC-ASI Y8M12**
Connections			
AS-I bus	Vampire connection for profile coded AS-I flat cable, yellow		
AS-I bus branching	No		
External power supply	Vampire connection for profile coded AS-I flat cable, black		
Outputs	4 x 5-pin M12 circular connectors	4 x 5-pin M12 circular connectors	8 x 5-pin M12 circular connectors
Adressing	Address socket		
AS-I connection			
AS-I profile (IO/ID code)	8/0	8/0	2 x 8/0
Occupied slave addresses	1	1	2
Total power consumption	≤ 50 mA		
Outputs			
Number of outputs	4	4	8
Current load per output	IL 0.5 A, 100 % ED	IL 2 A, 100 % ED	IL 0.5 A, 100 % ED
Max. total current	2 A	2 A	4 A
Output voltage	Ub - 0.8 V typical		
Switching frequency	Resistive load: 100 Hz		
	Inductive load: 0.2 Hz		
Short-circuit protection	Integrated		
Overload protection	1 A	2 A	1 A
Others			
Dimensions in mm (LxWxH)	105 x 50 x 38	105 x 50 x 38	154 x 50 x 38
Weight	Approx. 100 g	Approx. 100 g	Approx. 140 g

Tab. 10-4: *Digital output modules*

10.3.3   Digital input/output modules

Item	Specification	
	MC-ASI X2Y2M12	**MC-ASI X4Y4M12**
Connections		
AS-I bus	Vampire connection for profile coded AS-I flat cable, yellow	
AS-I bus branching	No	
External power supply	Vampire connection for profile coded AS-I flat cable, black	
Inputs/outputs	4 x 5-pin M12 circular connectors	8 x 5-pin M12 circular connectors
Adressing	Address socket	
AS-I connection		
AS-I profile (IO/ID code)	3/0	7/0
Occupied slave addresses	1	
Total power consumption	≤ 250 mA	
Inputs		
Number of inputs	2	4
Voltage range	0 - 30 V DC acc. to IEC 1131-2	
	Signal 0: $I_{in} \leq 2$ mA, $U_{in} \leq 5$ V	
	Signal 1: $I_{in} \geq 6$ mA, $U_{in} \geq 11$ V	
Input current	≤ 11 mA	
Sensor supply	200 mA max.	
Short-circuit protection	Integrated	
Overload protection	Integrated	
Outputs		
Number of outputs	2	4
Current load per output	IL 2 A, 100 % ED	IL 0.5 A, 100 % ED
Max. total current	4 A	2 A
Output voltage	Ub - 0.8 V typical	
Switching frequency	Resistive load: 100 Hz	
	Inductive load: 0.2 Hz	
Short-circuit protection	Integrated	
Overload protection	2 A	1 A
Others		
Dimensions in mm (LxWxH)	105 x 50 x 38	154 x 50 x 38
Weight	Approx. 100 g	Approx. 100 g

Tab. 10-5: *Digital input/output modules*

NOTE	The **inputs** are galvanically coupled with the ASI bus. They must **not** be connected to the external power supply (ASI flat cable, black).

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10.3.4   Characteristic curve areas IEC 1131-2, type 2

The following figure defines the input characteristic curve areas according to IEC standard.
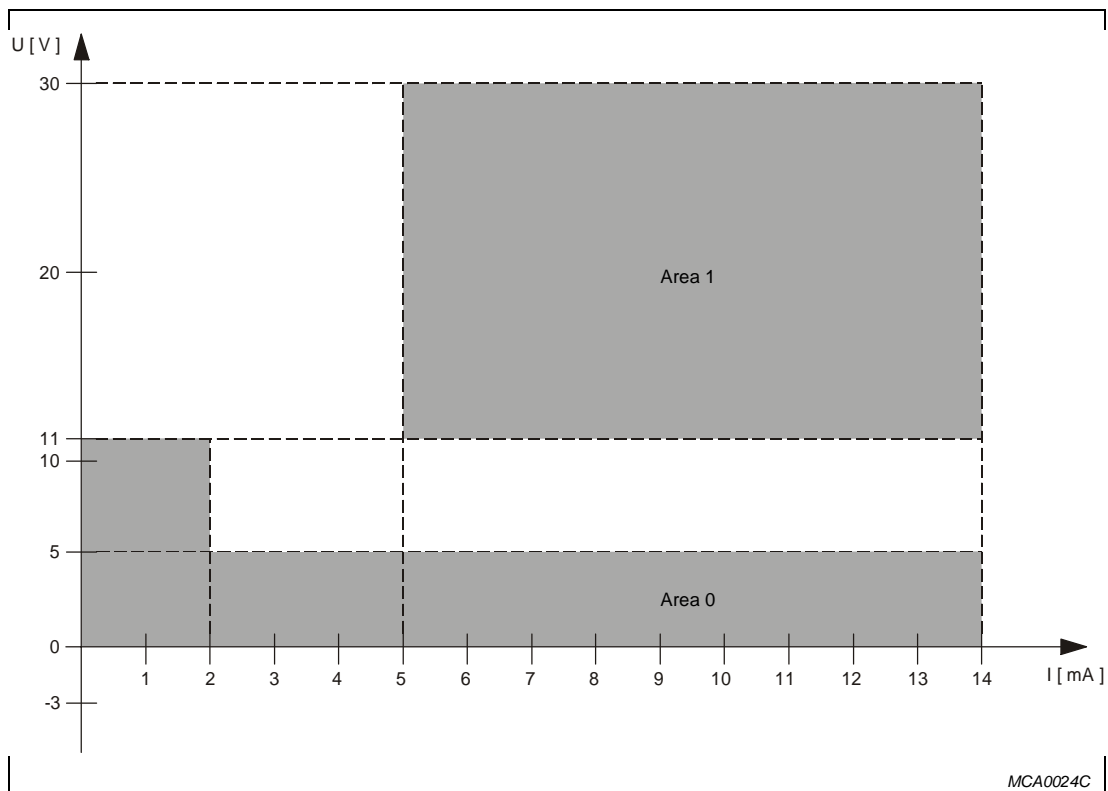
Abb. 10-1: *Characteristic curve areas IEC 1131-2, type 2*

A   Appendix

A.1   Dimensions

A.1.1   Modules with 4 x M12 circular connectors

All measures in mm

MCA0025C
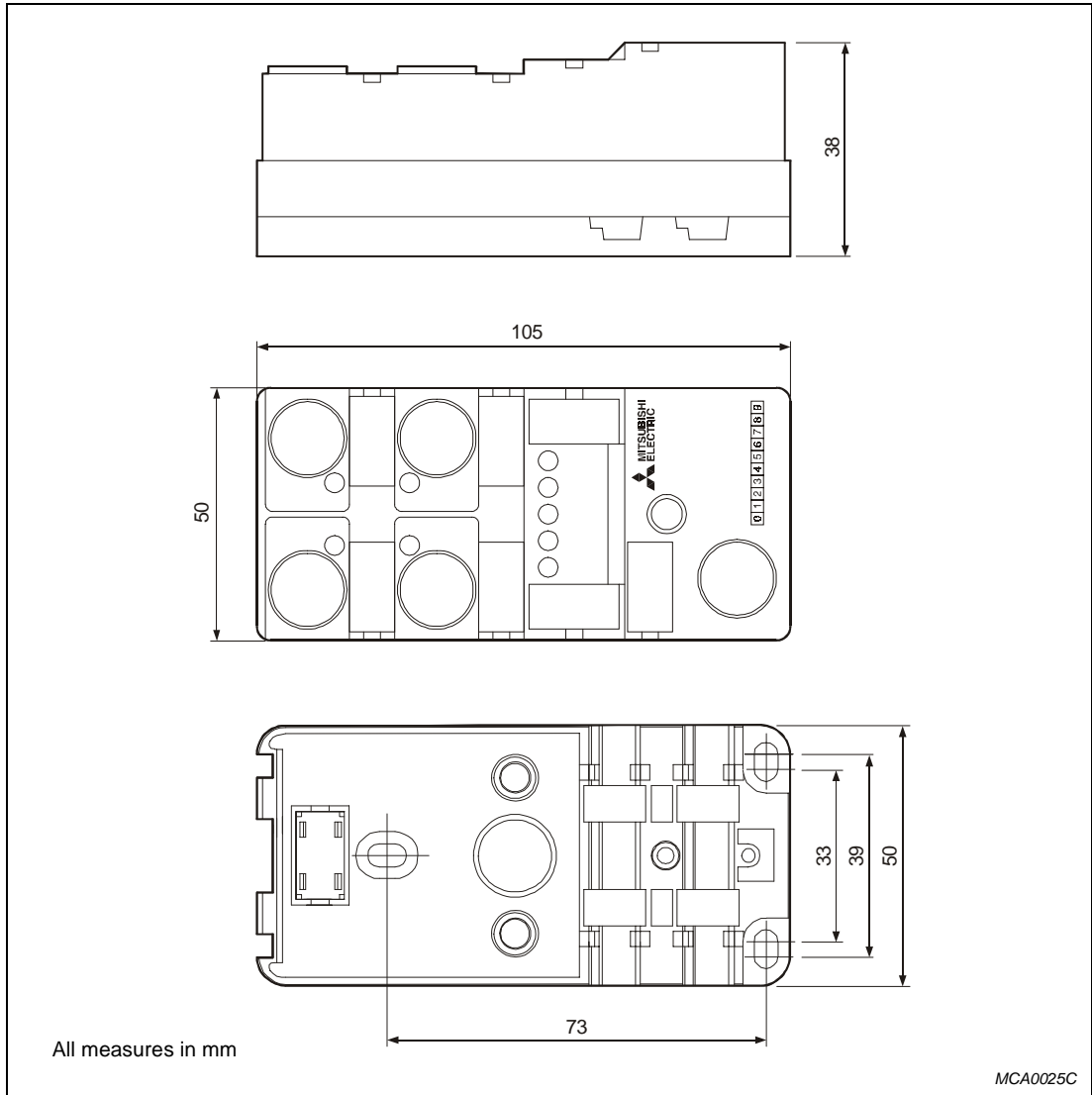
***Abb. A-1:** Dimensions of the MC-ASI modules with 4 x M12 circular connectors*

.A.1.2 Modules with 8 x M12 circular connectors
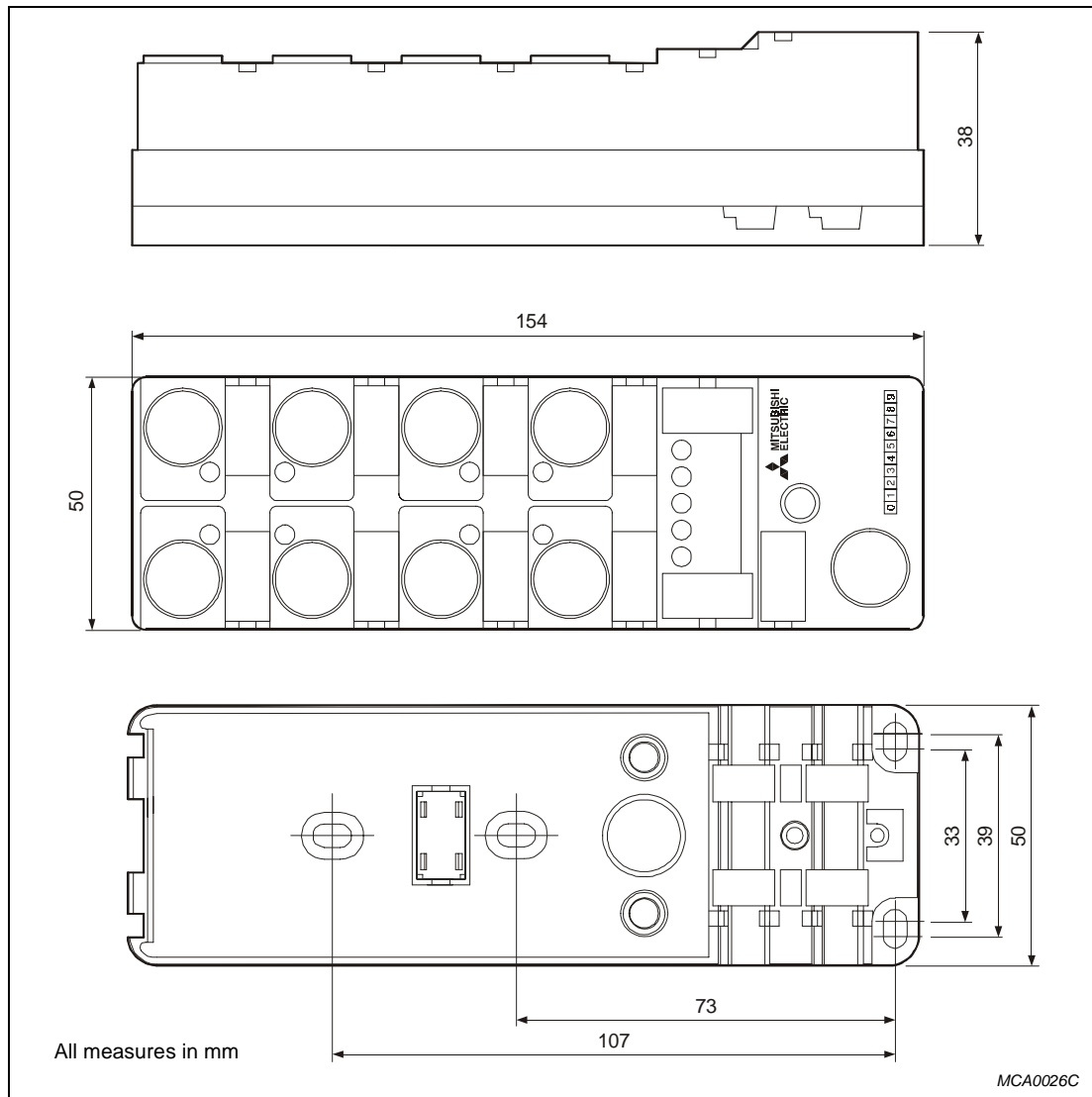
Abb. A-2: *Dimensions of the MC-ASI modules with 8 x M12 circular connectors*

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