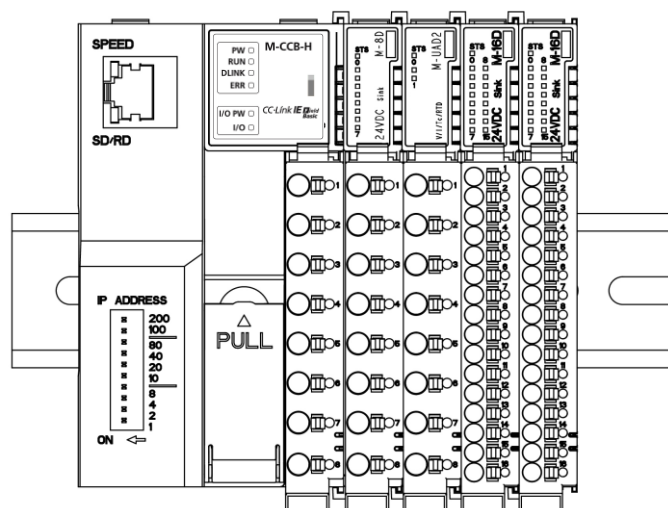


Modular IO User Manual

Document No. N16001AAMH

Revision No. V1.12

Published On: August 2019



Revision:

Version	Date	Revised Contents
1.1	May 2018	Added wiring section for wiring details, precautions and recommendations for Header as well as for IO modules. Updated sub-section "IO data" under Header M-CCB-H and M-MT-H. Added number of variants under digital IO, Analog IO modules and System modules
1.2	June 2018	Added ordering information and current consumption for available modules. Added sub-section "Parameter setting and IO data Monitoring" for explaining special features under Modular IO Configurator.
1.3	July 2018	Added list of "CC-Link IE Field Basic network specific diagnostics" and "Modbus TCP network specific diagnostics" under respective Header sections.
1.4	August 2018	Added wiring description (label) under individual module section "Connection diagram". Added section "Troubleshooting"
1.5	October 2018	Added section 9. Special Function Modules → 2 CH serial COM Module [M-2R2] Updated sections for SD memory card (SDHC) support. 2. Installation 4. Modular IO Configurator and 5. Header Modules
1.6	October 2018	Added feature "Enquiry" in Modular IO Configurator section.
1.7	November 2018	Added information of module (M-AD4) (4 Ch. V/ I Analog Input Module)
1.8	January 2019	Added information of module (M-1R2) (1 Ch. Serial COM (RS232) Module)
1.9	January 2019	Added information of Header module M-EIP-H (Ethernet/ IP Header module)
1.10	June 2019	Added information of module (M-ADV8) (8 Ch. Analog Voltage Input Module) Added information of module (M-ADI8) (8 Ch. Analog Current Input Module) Added "Special Features → Module Versions" in chapter 4. Modular IO Configurator.
1.11	July 2019	Added ODVA conformance information for M-EIP-H (Ethernet/IP™ Header module). Added CE approval specification.
1.12	August 2019	Added "Special Features → Unknown Module" in chapter 4. Modular IO Configurator. In 9.1 M-2R2 and 9.2 M-1R2, added firmware and configurator tool version support note.

Intended audience of this manual

Thank you for choosing the Mitsubishi product.

Do not use this product until you have full knowledge of the equipment. Please forward this manual to end user.

This manual is intended to the following personnel,

- Managing in charge.
- Designing or developing personnel.
- Commissioning and maintaining personnel.
- Supervising personnel.
- Operating personnel.

Scope of manual

This user manual provides the following details of Modular IO product.

- List of Header modules, IO modules, system modules and special function modules.
- Guideline for installation and wiring.
- Features and specifications of all types of modules.
- Configuration details.
- Status and diagnostic information.
- Maintenance and troubleshooting.

Important information for user





Read and understand the manual carefully before using Modular IO product, to avoid any damages to persons, properties or environment. Ensure safe and proper usage of this Modular IO product.

Do not modify, dismantle, re-construct and repair the electronic modules. For repair, contact nearest authorized sales office or technical support team.

Qualified and properly trained personnel should only install the Modular IO product. The personnel should be aware of all the safety aspects of automated products and completely familiar with all associated documentation for the said Modular IO product.

Protect Modular IO product from conductive dust, corrosive gases, wire debris, flammable gases, rain and fluid entering into the Modular IO product through ventilation slits, this may cause malfunctioning, damage, fire, electric shock and deterioration.

List of Symbols

	This symbol indicates that the specified operation/s is/are mandatory or must to do or the precautions are mandatory.
	This symbol indicates warnings, specifically related to the electric shocks and hazards.
	This symbol indicates cautions for critical situations, which may cause accidents or serious injury or may be severe property damage. This covers general warnings as well as cautions.
	This symbol indicates or covers operations that user must to avoid. This is specifically related to disassembly of product.
NOTE	This symbol indicates points to note or to consider during usage of said product. Also, indicates summary of individual sections covered in this manual.

Terms and Conditions

- Mitsubishi Electric India Pvt. Ltd. shall have no responsibility or liability for any personnel injury or death, or loss or damage to the property caused by said product, if used or operated in applications which are not intended or excluded by instructions, precautions or warnings provided in this document for the said product.
- Specifications are subject to change without prior notice.
- The reproduction or transmission of this document or its contents in full or part is not allowed without written permission from the authority.

Precautions for safe use of product

- Disconnect all power supplies before performing installation and wiring work.
- For mains power supply connections, confirm suitable fuse is used.
- Do not touch the conductive part directly. This may cause malfunctioning of product or electric shock.
- Do not bundle IO wires, 24 Vdc wires with main control panel wiring together.
- Consider maximum rated current and inrush current of power supply module while selecting 24 Vdc power supply source. Ensure that external breaker or fuse used in series with 24 Vdc.
- Confirm that the source of voltages and currents are within specified ranges.
- Connect functional earth terminal properly. If not, product may be susceptible to the noise.
- Connect protective earth terminal to a good quality earth. If not, it may result in electric shock or erroneous operation.
- If this product emits smoke or an unusual odor or unusual sound or unusual operation, immediately switch OFF the power to the product. This may result in fire and damage the product. In such cases, contact the nearest authorized sales or service support team.

Disposal precaution

- Treat the said product/s as an industrial E-waste.
For environmentally compliant recycling and disposal of your electronic waste, please contact to certified agency.

Recommendations for safe use of product

- It is always recommended to route cables carrying low level signals e.g. analog IO signals, serial communication signals, Ethernet communication cables separately and away from cables carrying high voltage and large current signals.
- It is recommended to connect cable shield to the ground terminal at the IO module end and leave it unconnected at the device (sensor/actuator) end.

INDEX

- | | |
|-----------|--|
| 1 | Overview |
| 2 | Installation |
| 3 | Wiring |
| 4 | Modular IO Configurator |
| 5 | Header modules |
| 6 | Digital IO modules |
| 7 | Analog IO modules |
| 8 | System modules |
| 9 | Special Function Modules |
| 10 | Troubleshooting |
-

[Back To Index Page](#)

1 Overview

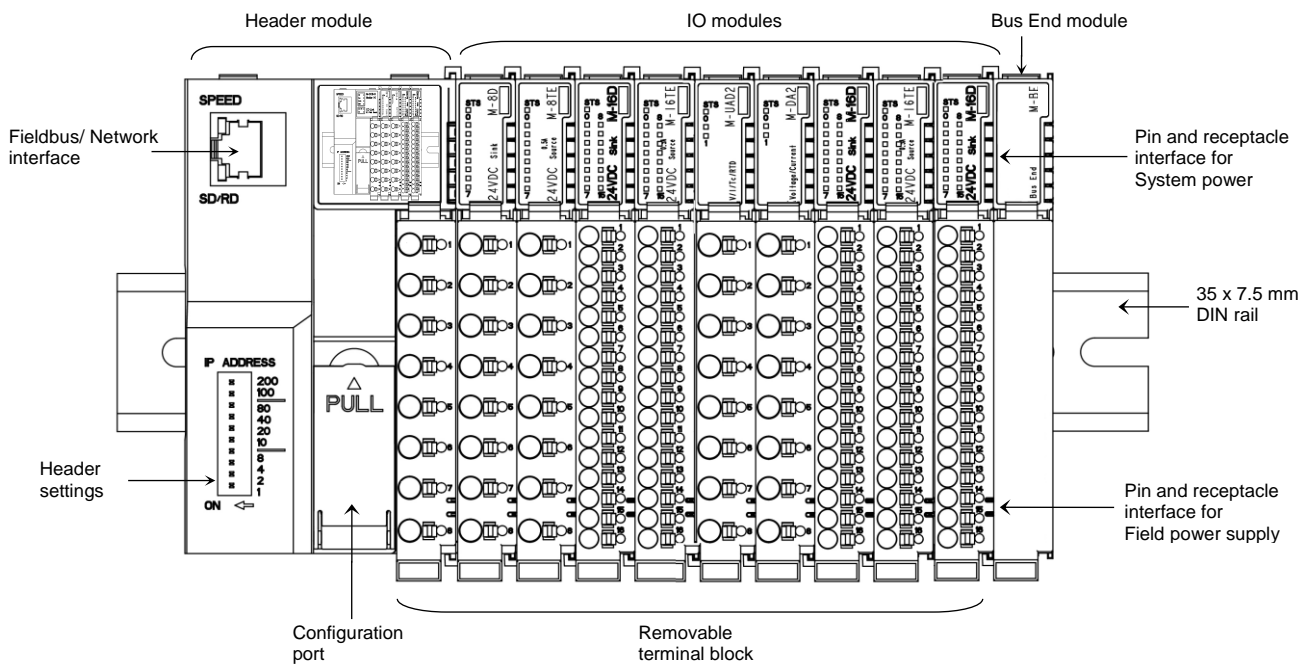
[Modular IO station Description](#)[Nomenclature](#)[Ordering Information](#)[Environmental Specifications](#)

Modular IO station Description

Modular IO station consists of a Header module with one or more IO modules and system modules attached to it as per the application requirement and station requirement. Modular IO station is a fieldbus/network slave station and Header module acts as an interface between fieldbus/network master and the IO modules attached to it self.

There is no separate backplane rack to mount the modules. Standard DIN rail (35 x 7.5 mm) is a basic element of the modular IO station on which all the modules are directly mounted. When IO modules are attached to a Header module on a DIN rail, backplane interface (along with system power supply and field power supply) is formed by pins and receptacles interface between the modules. Hot swapping is not supported because removal of any intermediate module discontinues backplane interface for modules on its right side.

Variety of digital IO modules, analog IO modules, system modules and special function modules are available to choose from. PC based “Modular IO Configurator” is used to configure modular IO station. The figure below shows modular IO station.



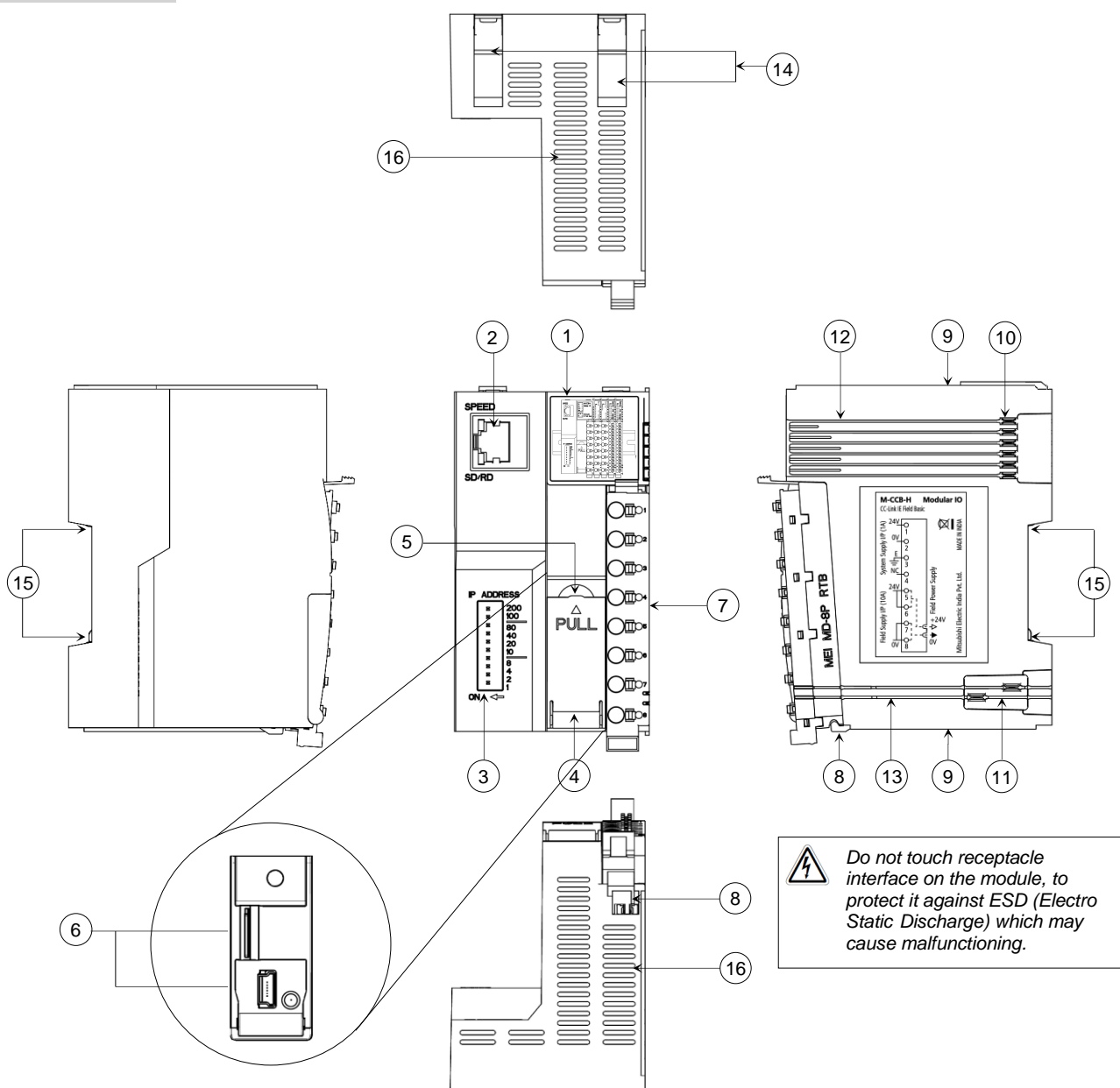
This user manual provides nomenclature and dimensional details of all the modules, installation and wiring along with general and module specifications.

Additionally, it provides the procedure to configure the modules and to monitor its diagnostics using PC based Modular IO Configurator.

Nomenclature

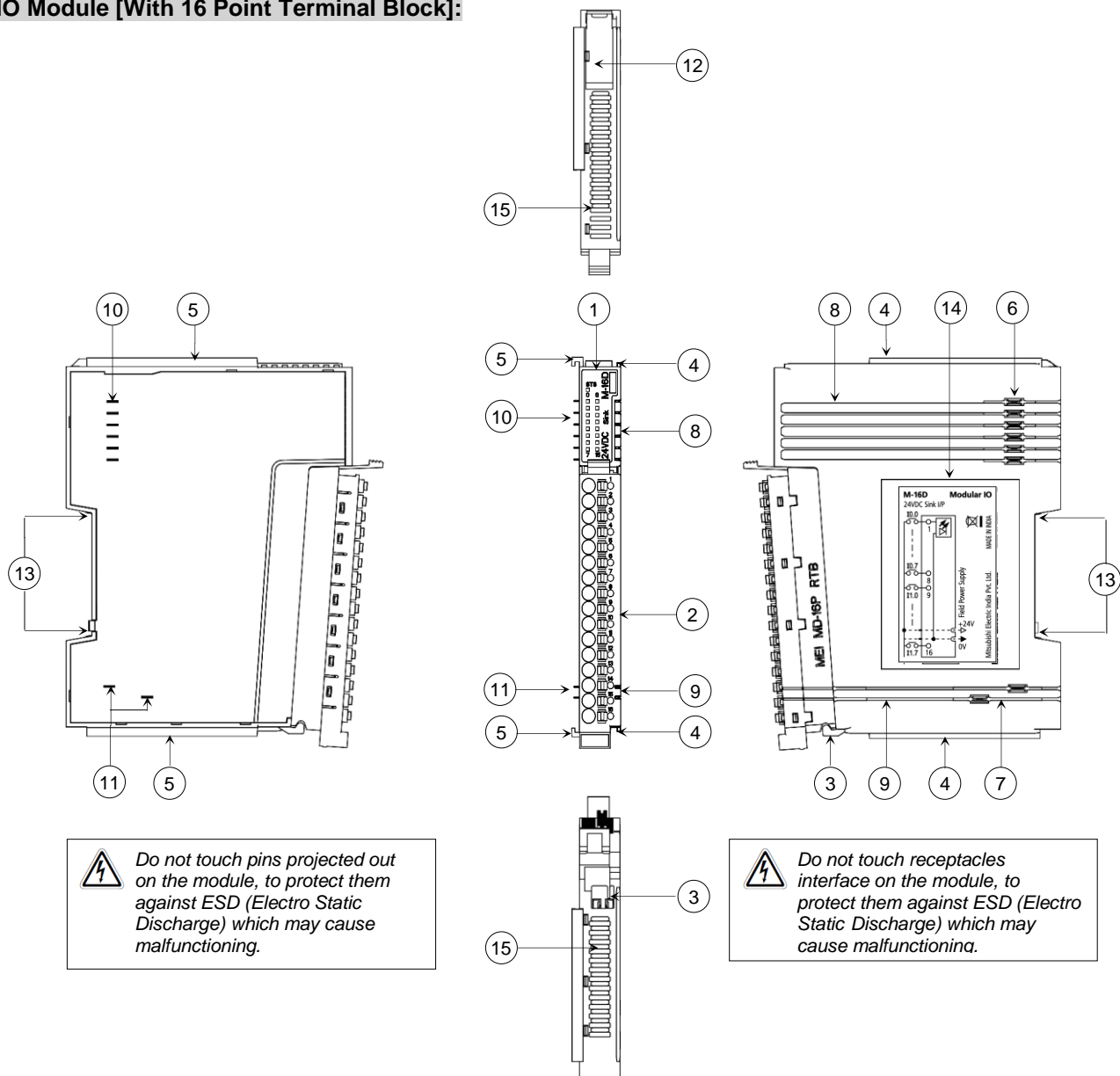
This section provides nomenclature details for Header module, IO module and terminal block.

Header module:



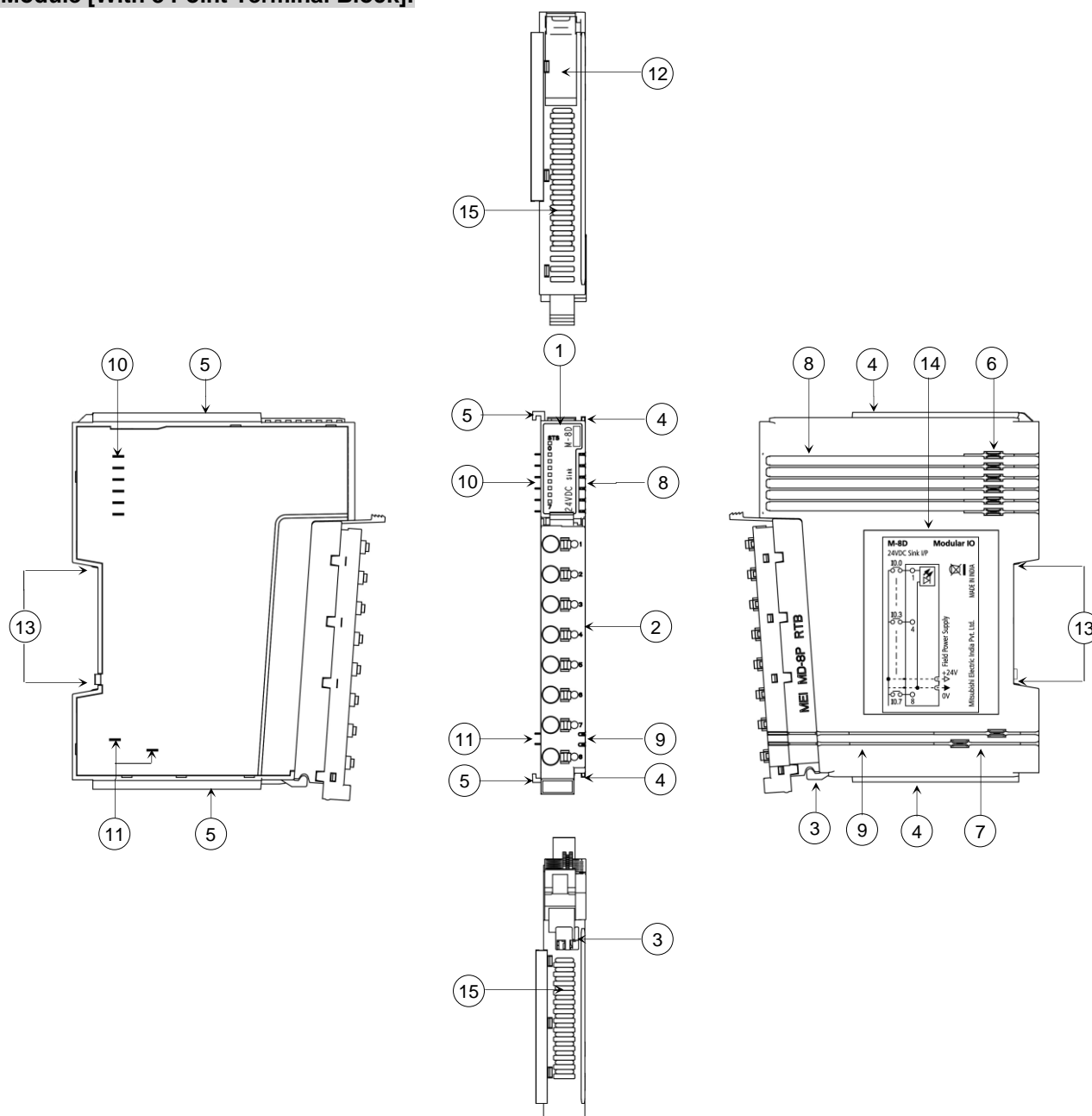
No.	Description	No.	Description
1	LED indications	9	Guide at top and bottom side for IO module attachment in next slot
2	Fieldbus/ Network interface	10	6 Receptacles for System power supply interface
3	Header setting	11	2 Receptacles for Field power supply interface
4	Door with hinge for USB Interface	12	Grooves for System power supply interface
5	Notch to open the door	13	Grooves for Field power supply interface
6	SD card slot push button and USB interface	14	2 DIN clamp levers
7	8 Point terminal block *	15	4 DIN clamp holders
8	Hinge support for terminal block	16	Air vents at top and bottom side

*Refer section "[8 and 16 Point terminal Block](#)" for nomenclature for terminal block.

IO Module [With 16 Point Terminal Block]:

No.	Description	No.	Description
1	LED indications	9	Grooves for Field power supply interface
2	16 Point terminal block *	10	6 Pins for System power supply interface
3	Hinge support for terminal block	11	2 Pins for Field power supply interface
4	Guide at top and bottom side for module attachment in next slot	12	1 DIN clamp levers
5	C slot at top and bottom side for module attachment in previous slot.	13	2 DIN clamp holders
6	6 Receptacles for System power supply interface	14	Wiring description of module
7	2 Receptacles for Field power supply interface	15	Air vents at top and bottom side
8	Grooves for System power supply interface		

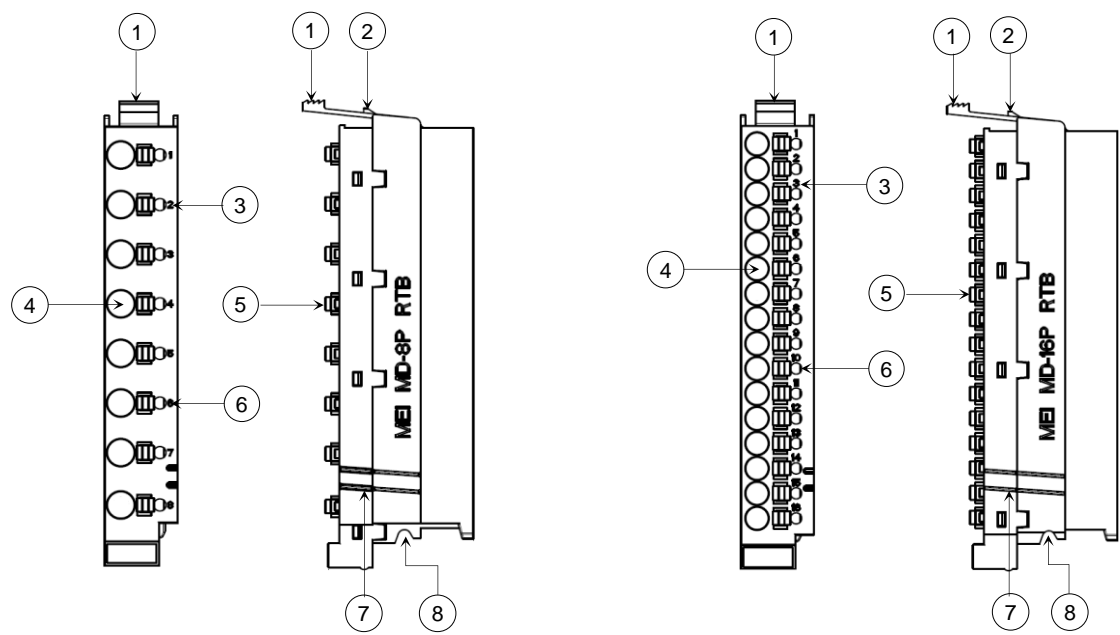
*Refer section "[8 and 16 Point terminal Block](#)" for nomenclature for terminal block.

IO Module [With 8 Point Terminal Block]:

No.	Description	No.	Description
1	LED indications	9	Grooves for Field power supply interface
2	8 Point terminal block *	10	6 Pins for System power supply interface
3	Hinge support for terminal block	11	2 Pins for Field power supply interface
4	Guide at top and bottom side for module attachment in next slot	12	1 DIN clamp levers
5	C slot at top and bottom side for module attachment in previous slot.	13	2 DIN clamp holders
6	6 Receptacles for System power supply interface	14	Wiring description of module
7	2 Receptacles for Field power supply interface	15	Air vents at top and bottom side
8	Grooves for System power supply interface		

*Refer section "[8 and 16 Point terminal Block](#)" for nomenclature for terminal block.

8 and 16 Point terminal block:



No.	Description	No.	Description
1	Latch	5	Push Buttons
2	Notch for locking with module enclosure	6	Test points for signal voltage measurement
3	Terminal Number	7	Grooves for Field power supply interface
4	Wire insertion points	8	Round groove to align with hinge support on module




















NOTE





Current carrying capacity of 8 point and 16-point terminal block is 5 A and 2 A respectively

Terminal block complies for the Pull-out test according to IEC/EN 60947-7-1, IEC/EN 60998-2-2, IEC/EN 60999-1.

Ordering Information

This section provides list of available modules along with ordering information and current consumption details.

Ordering Information	Ordering Code	Colour Identification ^[*1]	Current Consumption (in mA)
Header			
CC Link IE Field Basic Header Module	M-CCB-H		2000 ^[*2]
Modbus TCP Header Module	M-MT-H		2000 ^[*2]
Ethernet/ IP Header Module	M-EIP-H		2000 ^[*2]
Digital Input			
4 Digital Input, 24 VDC, Sink Type Module (Negative Common)	M-4D		40
8 Digital Input, 24 VDC, Sink Type Module (Negative Common)	M-8D		45
16 Digital Input, 24 VDC, Sink Type Module (Negative Common)	M-16D		65
4 Digital Input, 24 VDC, Source Type Module (Positive Common)	M-4DE		40
8 Digital Input, 24 VDC, Source Type Module (Positive Common)	M-8DE		45
16 Digital Input, 24 VDC, Source Type Module (Positive Common)	M-16DE		65
Digital Output			
4 Digital Output, 24 VDC, Source Type Module	M-4TE		90
8 Digital Output, 24 VDC, Source Type Module	M-8TE		105
16 Digital Output, 24 VDC, Source Type Module	M-16TE		130
Analog Input			
2 Channel Universal Analog Input Module	M-UAD2		100
4 Channel Analog Voltage/ Current Input Module	M-AD4		100
8 Channel Analog Voltage Input Module	M-ADV8		100
8 Channel Analog Current Input Module	M-ADI8		100
Analog Output			
2 Channel Analog Voltage/ Current Output Module	M-DA2		95
Special Functions			
2 Channel Serial COM (RS232) Module	M-2R2		50
1 Channel Serial COM (RS232) Module	M-1R2		50

System Functions			
System Power Extension Module	M-SPE		2000 ^{*2}
Field Power Distribution Module	M-FPD		--
Field Power Isolator Module	M-FPI		--
Shield Termination Module	M-ST		--
Bus End Module	M-BE	--	--

^{*1} Color code is provided on LED label and at bottom side of terminal block. User should always ensure that color code of LED label and terminal block is identical.

^{*2} These modules are source of system power.

^{*3} Digital and analog IO modules are intelligent modules and provide IO data and diagnostics to Header module. System modules are passive modules. So Header module does not provide any information about system modules.

Environmental Specifications

This section provides environmental specifications of modular IO station.

Specification	Description	
Operating temperature	Operating: 0 to 55 °C	Storage: -40 to 70 °C
Humidity	Operating: 10 to 95 % RH, No condensation	Storage: 10 to 95 % RH, No condensation
Altitude	2000 m or less	
Pollution level	2 maximum. (only non-conductive pollution)	
Operating atmosphere	Corrosive gas must not be present	
IP protection	IP20	
EMC – Immunity: as required by IEC 61131-2, IEC 61000-6-2	Electro Static Discharge (ESD) (IEC 61000-4-2): ±8 KV Air discharge, ±4KV contact discharge	
	Electrical Fast Transient (EFT) (IEC 61000-4-4): Power line: ±2 KV, Digital IO: ±1 KV, Analog and communication IO: ±1 KV	
	Surge (IEC 61000-4-5): Power line: ±0.5 KV, Digital IO : ±1 KV, Analog and communication IO: ±1 KV	
	Power Frequency Magnetic field (IEC 61000-4-8): 30 A/m, 50 /60 Hz	
Over voltage category	II (IEC 60664-1) The surge voltage withstand level for up to the rated voltage of 30V is ±500V	
Vibration, Shock	As required by EN- 61131-2, IEC 60068 -2-6 (test Fc), IEC 60068-2-27 test Ea	
Approvals	CE	

[Back To Index Page](#)

2 Installation

[Dimension Details](#)[Recommendations and Precautions](#)[Mounting of Header Module](#)[Mounting of IO Module](#)[Fixing and removal of terminal block](#)[Insertion and removal of SDHC memory card in Header card slot](#)

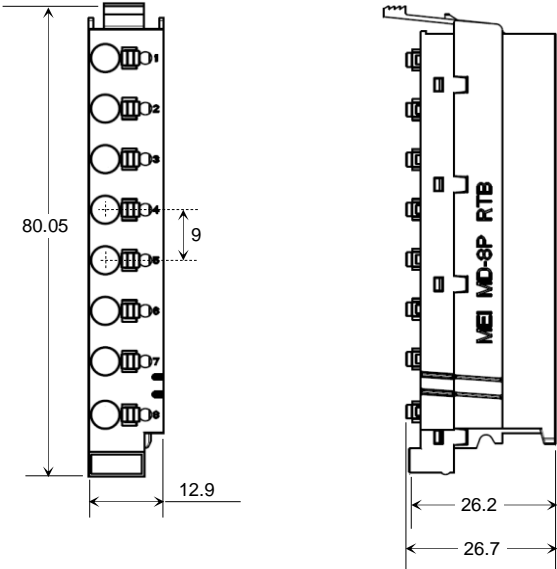
Dimension Details

This section provides dimensional details of terminal block, Header module and IO module.

8 Point Terminal Block:

The figure below shows dimensional details of 8-point terminal block.

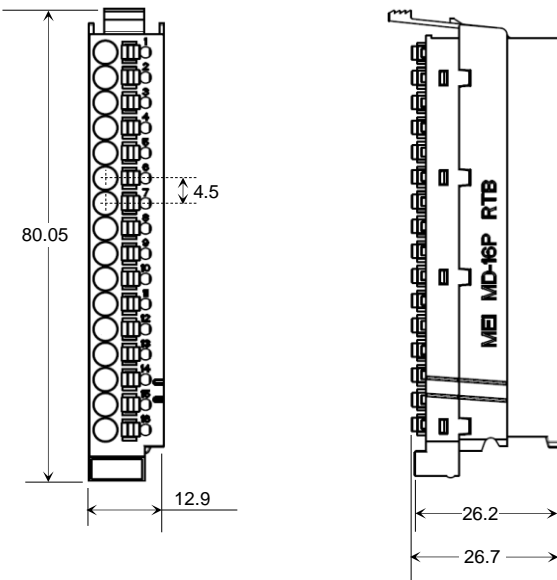
All dimensions are in mm.



16 Point Terminal Block:

The figure below shows dimensional details of 16-point terminal block.

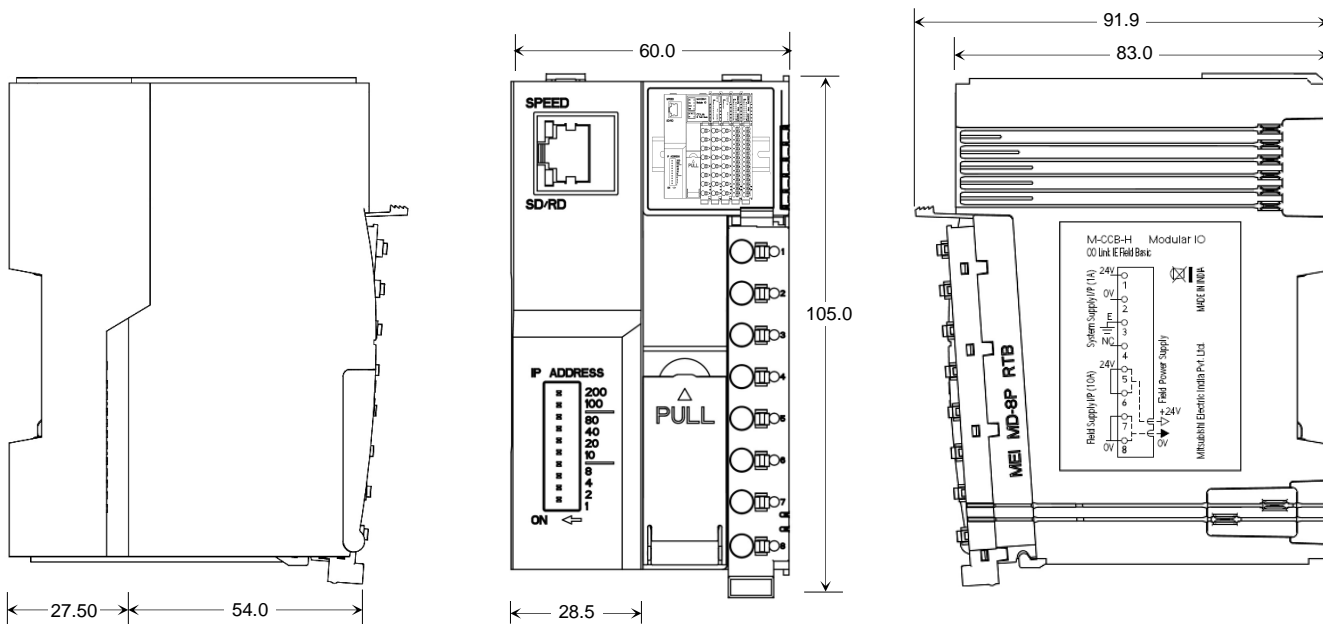
All dimensions are in mm.



Header Module:

The figure below shows dimensional details of Header module.

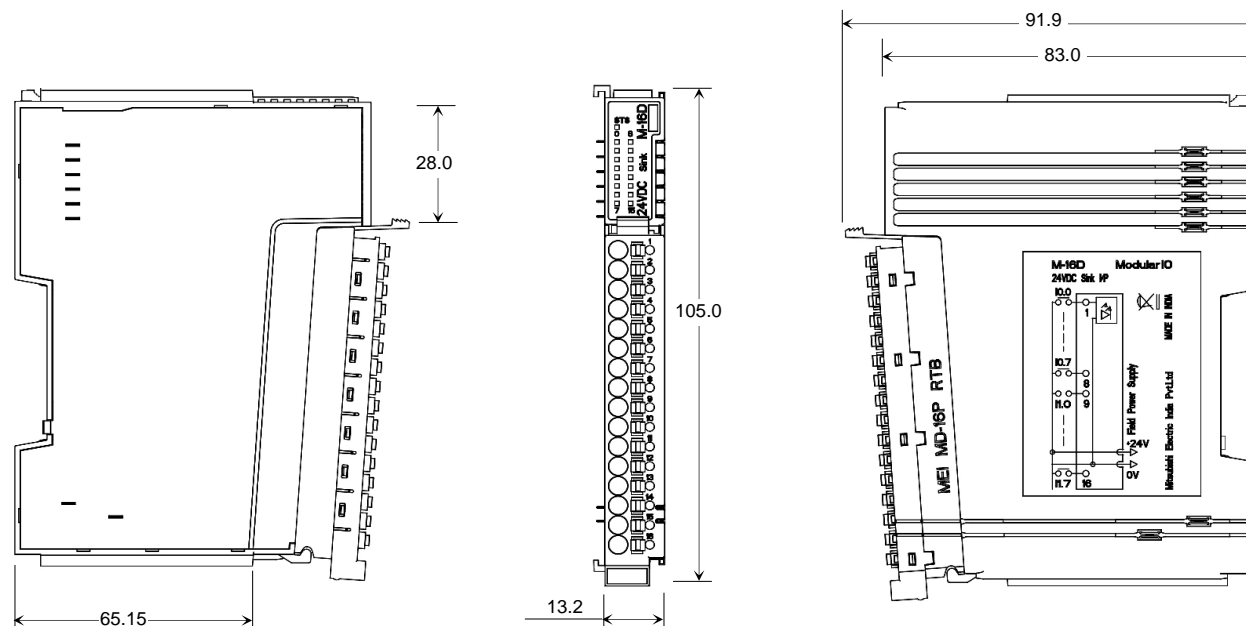
All dimensions are in mm



IO Module:

The figure below shows dimensional details of IO module.

All dimensions are in mm.



* Dimensional details of modules with 8-point terminal block and 16 point terminal block are identical.

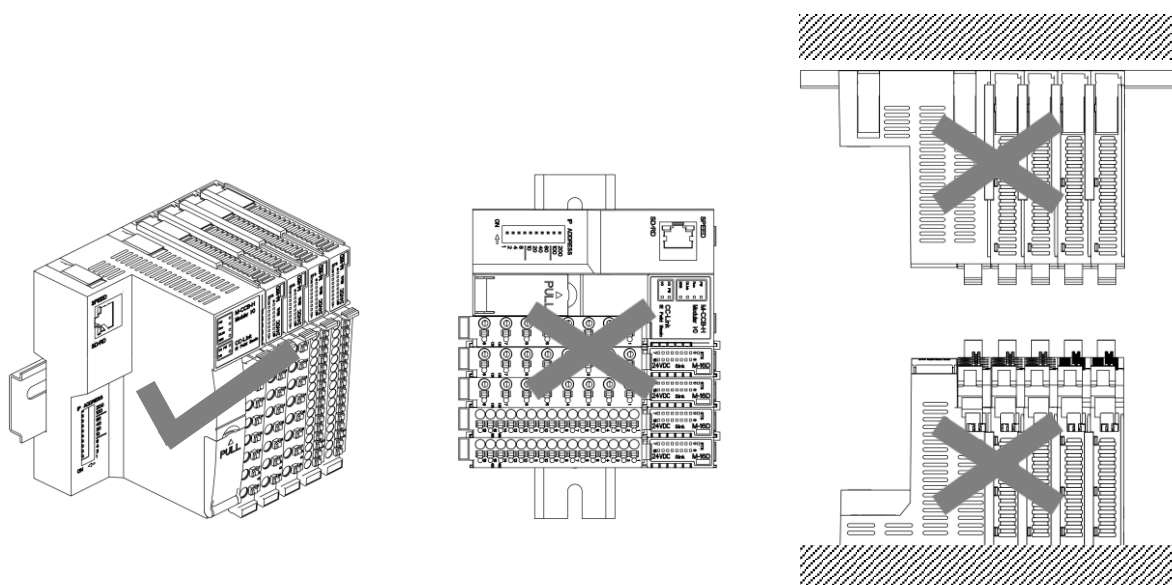
Recommendations and Precautions

This section provides list of instructions, recommendations and precautions to be observed during installation of modular IO station.

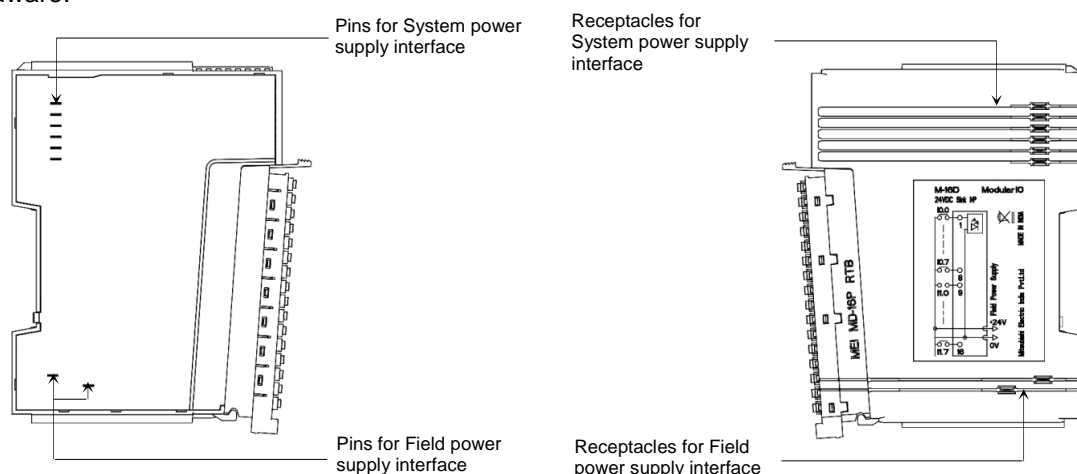
! Instructions:

1. During installation, ensure that the power supply to the station and to the control panel is cut off.
2. Install modular IO station, horizontally only on firm, plane and conducting surface to facilitate heat transfer through module by natural convection.

To maintain the cooling, it is important to install the modular IO station with recommended orientation such that the natural flow of hot air will not be obstructed. Installation in orientation other than recommended one, may cause overheating and subsequently malfunctioning of the station.



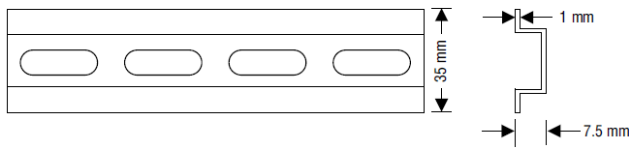
3. Install Header module at the leftmost side and IO modules on its right side.
4. Do not touch pins and receptacles (which are conductive parts) interface of System power supply and Field power supply, to protect them against ESD (Electro Static Discharge) which may cause damage to electronic hardware.





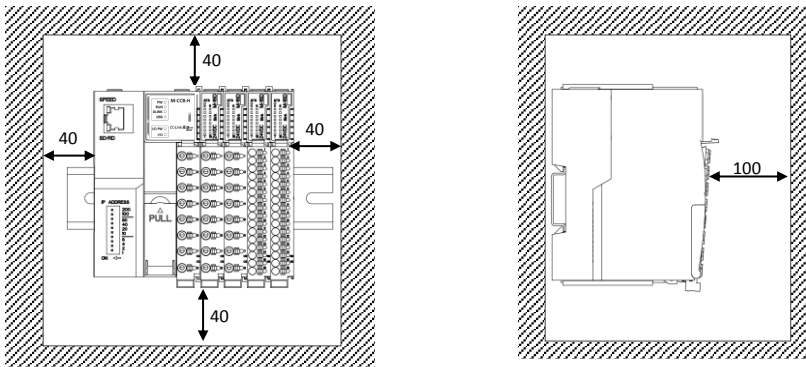
Recommendations:

1. For modular IO station installation, standard DIN rail of type TS 35 mm/ 7.5 mm with thickness of 1 mm is recommended.



2. Before mounting DIN rail, inside the control panel,
 - Ensure that thickness of cabinet wall is 2 mm and more.
 - Ensure that DIN rail orientation is horizontal.
 - Inside panel, the minimum depth of the cabinet should be 200 mm to facilitate easy insertion and removal of the modules, easy insertion and removal of terminal block and wiring of IO modules.
 - Inside the control panel, minimum space around modular IO station should be as shown below, to facilitate air circulation.

All dimensions are in mm



3. Humid environment for long time can reduce component life. So, it is recommended to fix absorbent material inside panel and do not expose modular IO station to humid atmosphere for an extended period.



Precautions:

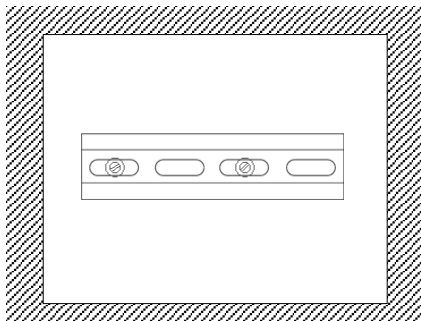
1. Maintain proper thermal distances between Modular IO station and other equipment which produces heat inside control panel.
2. Dust can cause a problem when it accumulates on the electronic components. Sometimes, electrically conductive dust may cause short circuit or other failure.
Proper dust tight control panels, filters, rubber gaskets, etc. should be provided to minimize this problem.
3. The ambient temperature of the installation location should be between 0 to 60°C. Cooling of the electrical and electronic components is accomplished by method of convection.
4. Due to excessive or continuous vibrations or shocks, PCB components, sockets, on-board soldered components etc. may disengage from their counter positions. It is recommended to mount modular IO station on solid, non-vibrating surfaces and should be protected by rubber so that the shock is not felt.
5. During transit or due to excessive and continuous vibrations or shocks, modular IO station may slide horizontally on DIN rail and may dislocate from its position. In such case, it is recommended to fix end clamps at the both sides of modular IO station.

Refer section [Mounting of Header Module](#) and [Mounting of IO Module](#) for more details of installation.

Mounting of Header Module

This section explains how to mount Header module on DIN rail.

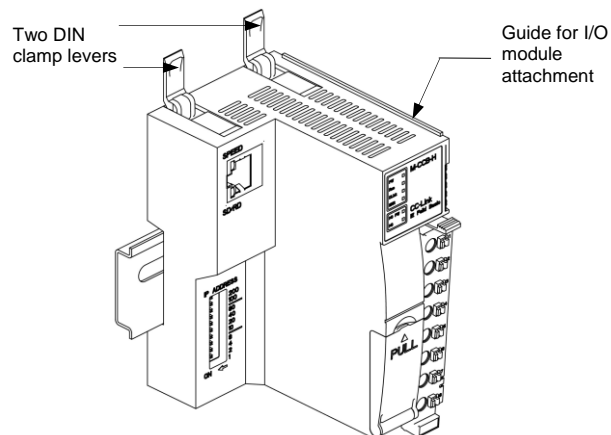
1. For modular IO station installation, use standard DIN rail of type TS 35 mm/ 7.5 mm (± 1 mm) with thickness of 1 mm (± 0.1 mm).



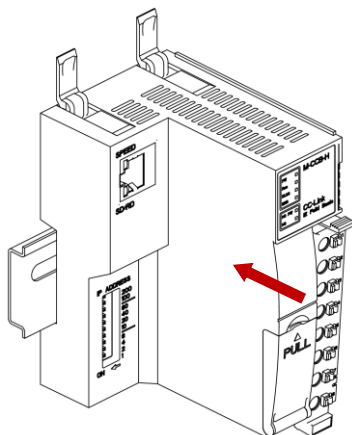
NOTE

Non standard DIN rail will either cause loose fitment of module or not allow module fitment on it.

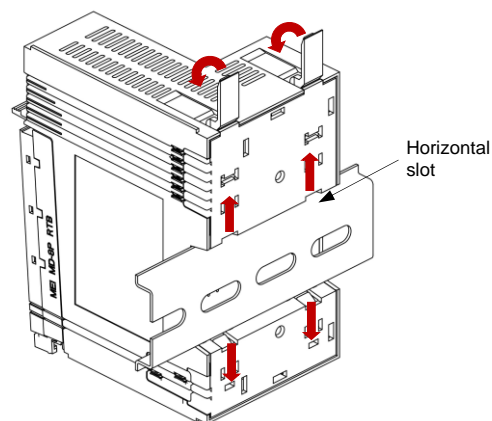
2. Before mounting Header module on DIN rail, ensure that both DIN clamp levers are fully opened.



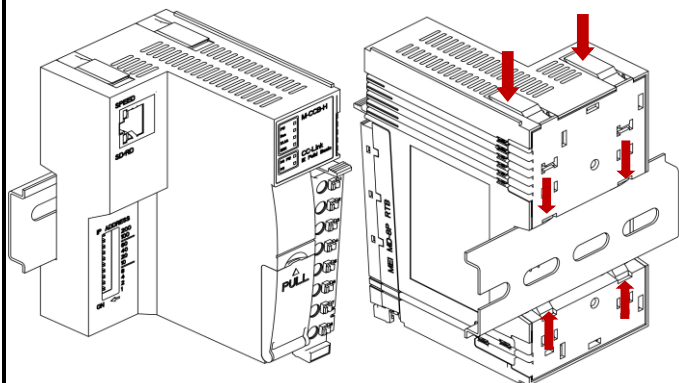
3. Hold Header module in straight orientation (between thumb and fingers) and push towards DIN rail as shown.



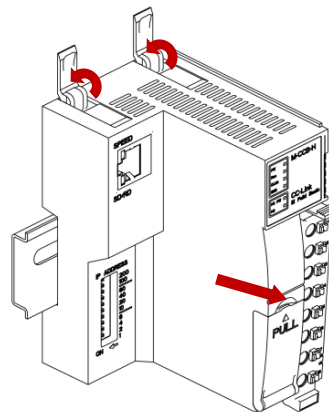
4. When DIN clamp lever is opened, DIN clamp holders reside inside. Align horizontal slot on the back side of module on DIN rail and rest on it.



5. After resting Header module on DIN rail, close DIN clamp levers. When DIN clamp levers are closed, DIN clamp holders come outside to clamp module on DIN rail on its top edge and bottom edge as shown below.



6. For **REMOVAL** of Header module, first hold it between thumb and finger. Open both DIN clamp levers provided on top side of the module. Then, gently pull the module outside.



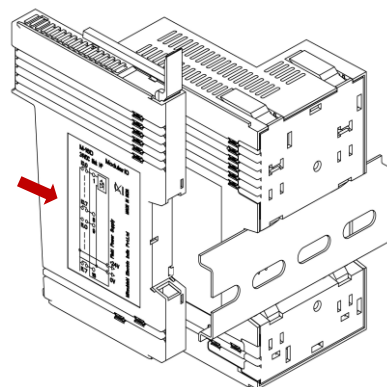
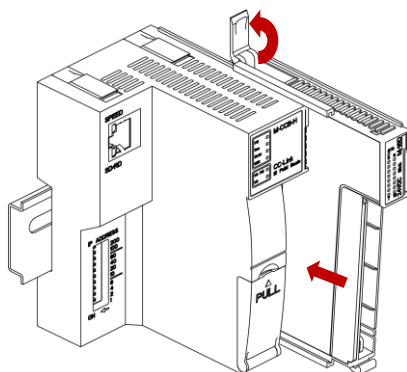
Mounting of IO Module

This section explains how to attach IO module to other module (Header module or other IO modules) and mount on DIN rail.

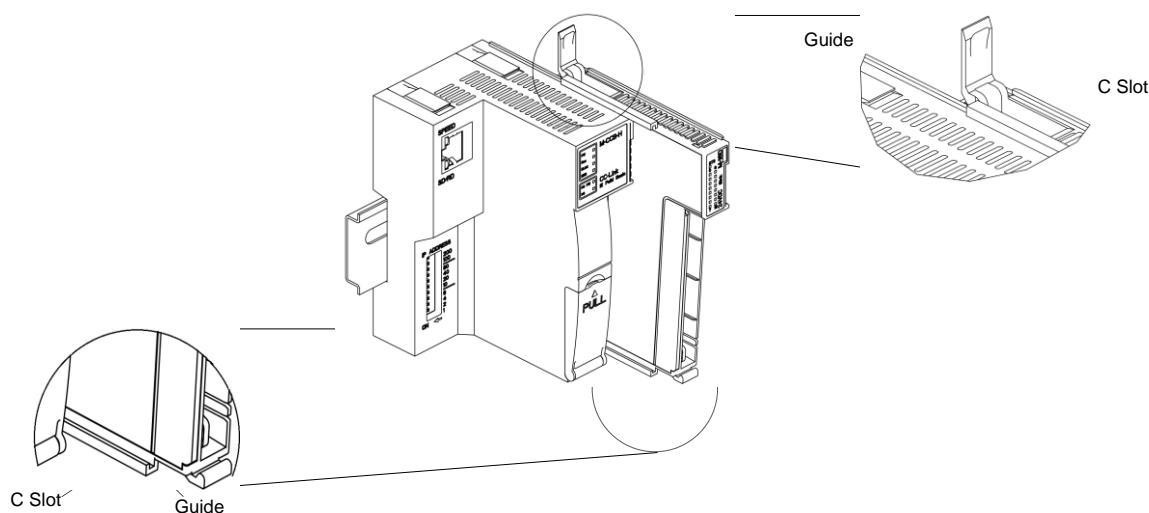
1. Open DIN clamp lever located at top side of the module.

Hold IO module in straight orientation between thumb and finger.

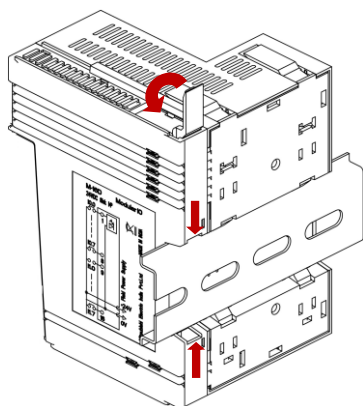
Engage top and bottom guide of Header module (or other IO module) into the top and bottom C slots of IO module to be inserted.



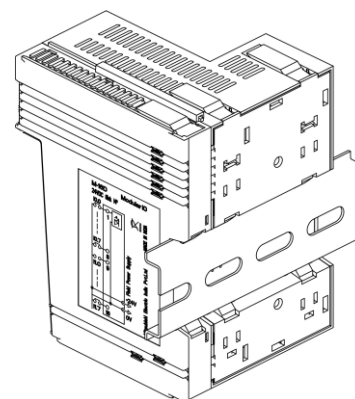
2. Once engaged, slide-in IO module gently till it rests on the DIN rail.



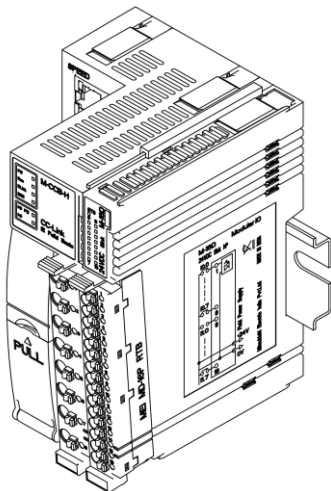
3. Lock IO module on DIN rail by closing DIN clamp lever provided on top of the module.



4. Figure below shows back side of IO module attached to Header module on DIN rail.



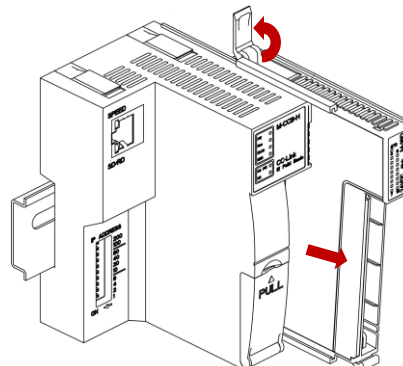
5. Figure below shows IO module attached to Header module on DIN rail and terminal block fixed on it.



Fixing and removal of terminal block is explained in subsequent section.

6. For **Removal** of IO module, first remove terminal block fixed on IO module.

Then, open DIN clamp lever located at top side. T Hold front side of IO module between thumb and finger and pull IO module outside gently as shown.



NOTE

When IO modules are attached to a Header module or other IO module on a DIN rail, backplane interface (along with system power supply and field power supply) is formed by pins and receptacles interface between the modules.

It is possible that IO module is rested on DIN rail but top or bottom C slot is not engaged with the guide of other module on left side. This may cause malfunctioning due to the loose interface of System power supply or Field power supply. In such case, a gap between the modules is visible from the front side. So, it is necessary to ensure proper engagement of IO module on top as well as bottom side before slide-in towards DIN rail. This ensures firm interface between modules.

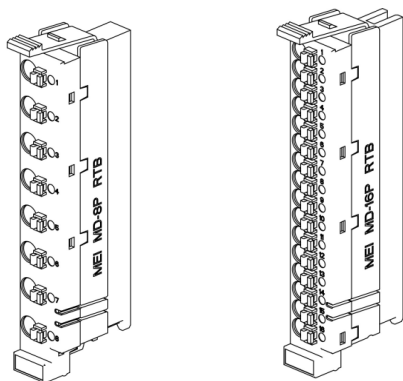
User should attach Bus End module (M-BE) at the last slot position if there are 16 or more IO modules.

Hot swapping is not supported because removal of any intermediate module discontinues backplane interface along with system power supply and field power supply for the modules on its right side.

Fixing and Removal of Terminal Block

This section explains how to fix and remove terminal block on IO module.

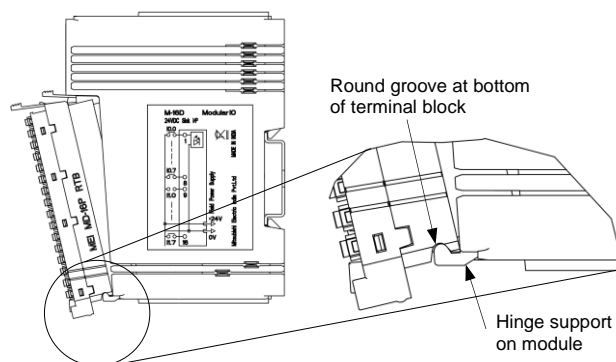
1. Terminal block is fixed on the front of the module in slanted position. Two types of terminal blocks are available for modular IO station i.e. 8 Point and 16 point.



Refer section [Dimension Details](#), [Nomenclature](#) and [Ordering Information](#), for more details of terminal block.

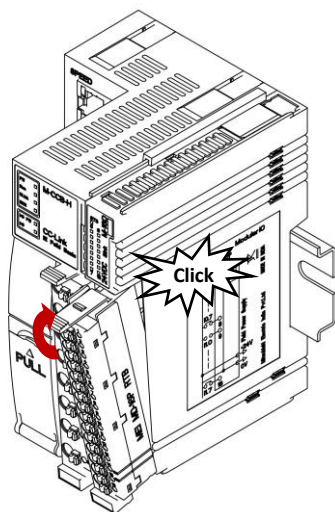
2. The figure below shows how to fix terminal block on IO module.

Hold terminal block latch part with finger and bottom part with thumb in slanted position. Terminal block bottom side should be towards IO module. Rest bottom part of terminal block on the hinge support of the module such that round groove of terminal block is aligned over the hinge support on module as shown.

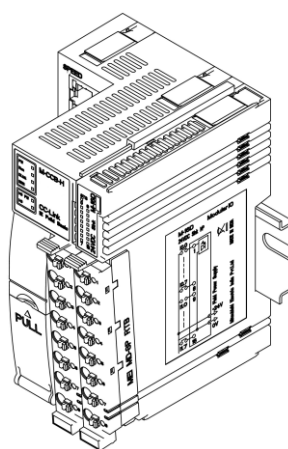


3. Once terminal block is rested on hinge support, push upper part of terminal block towards module in radial orientation till latch is clicked.

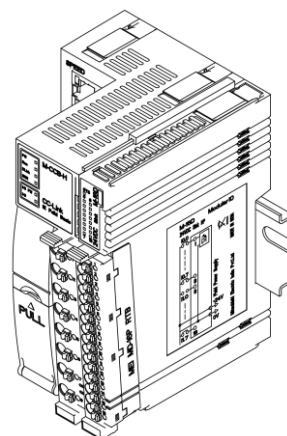
Push latch upward to ensure proper latching into the module.



4. The figure below shows Header module and IO module with terminal blocks.



IO module fixed with
8 point terminal block



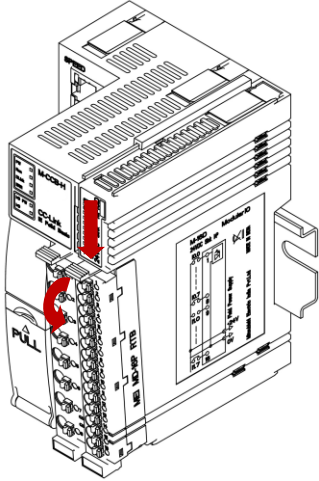
IO module fixed with
16 point terminal block

5. For Removal of terminal block,

Press latch of terminal block downward so it gets disengaged from the module.

Hold latch with finger with pressed down condition and bottom of terminal block with thumb.

Pull out upper part of terminal block in radial orientation away from the module and then take out bottom part of terminal block from hinge support.



NOTE

During transit or due to excessive and continuous vibrations or shocks, modular IO station may slide horizontally on DIN rail and may dislocate from its position. In such case, it is recommended to fix end clamps at the both sides of modular IO station.

- WAGO: 249-116/117
 - ELMEX: SCKU / SCUN
 - CONNECTWELL: CA702/ 802/ 202
-

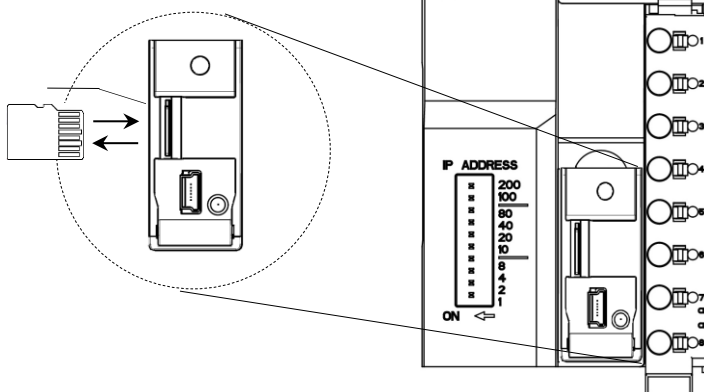
Insertion and removal of SDHC Card in Header card slot

Header module supports use of SDHC (Secure Digital Higher Capacity) memory card to store configuration backup.

For insertion, hold SD card with orientation as shown below and gently push inside the slot till it clicks.

For removal, gently press SD card placed in the slot. It gets released and comes out. Then take out SD card from slot.

Press push button for copy configuration from Header to SD memory card.



NOTE

For configuration copy between Header module and SD card, refer [5. Header Modules](#) → “[Configuration Transfer with SDHC Memory card](#)”,

For Read/ Write of configuration file, between “Modular IO Configurator” tool and SD card, refer section, [4. Modular IO Configurator](#).

[Back To Index Page](#)

3 Wiring

[Overview](#)

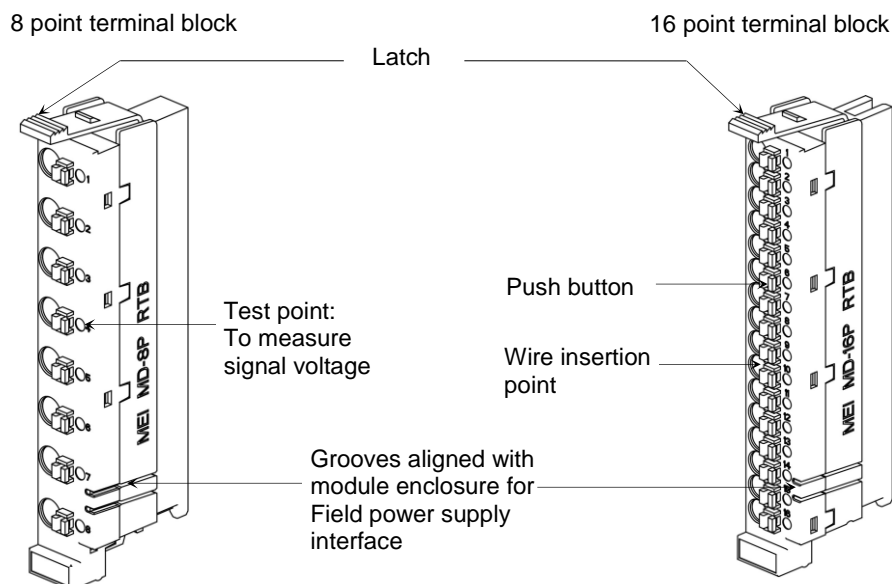
[Recommendations and Precautions](#)

[Wiring of Header Module and IO Module](#)

Overview

This section provides recommendations and precautions to be observed during wiring and method of wiring. Screw-less push type terminal block is fixed on the front of the module in slanted position. Refer section [Fixing and Removal of Terminal Block](#) for more details.

There are two types of terminal blocks as per module type as shown below. 8 point terminal block has pitch size of 9 mm whereas 16 point terminal block has pitch size of 4.5 mm.

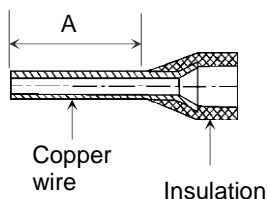


Refer sections [Dimension Details](#), [Nomenclature](#) and [Ordering Information](#) for more details of terminal block.

Recommendations and precautions

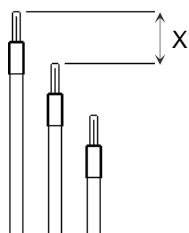
Recommendations:

1. It is recommended to use solid wire or stranded wire of 0.5 to 1.0 sq. mm (AWG 20 to 16) with 16 point terminal block and use 0.5 to 2.0 sq. mm (AWG 20 to 14) with 8 point terminal block.
2. Strip insulation of stranded wire and twist the strands to prevent it from spreading and crimp the lug with insulation.
3. Use lug with insulation. Recommended size of lug is as shown in the table below.



Terminal Block	Wire Size	Minimum Lug Length (A)
8-Point	0.5 mm ² to 2.0 mm ² (AWG 20 to 14)	8 mm
16-Point	0.5 mm ² to 1.0 mm ² (AWG 20 to 16)	8 mm

4. In order to maintain a similar length of all the wires connected to terminal block, it is recommended to keep difference in length in each subsequent wire, which is equal to the pitch of the terminal block.as shown below.



Terminal Block	Length of difference between two adjacent wires (X)
8-Pin	9 mm
16-Pin	4.5 mm

- While removing wire from terminal, use straight screw driver of smaller tip size (width 2.0 mm max., thickness of 0.4 mm max.) to press the push button.



Use of screw driver with bigger tip size may damage plastic wall above and below push button.

Precautions to be taken:

- Colour code is provided on LED label and at bottom side of terminal block. User should always ensure that colour code of LED label and terminal block is identical.
- Make sure to cut off all the phases of the power supply externally before attempting installation and wiring work. Failure to do so may cause electric shock or damage to the product.
- It is always recommended to route cables carrying low level signals e.g. analog I/O signals, serial communication signals, Ethernet communication cables and rack to rack expansion cables separately and away from cables carrying high voltage and large current signals.
- It is recommended to use twisted pair cables for carrying low level signals like analog signals, communication signals.
- Connect good quality EARTH, if not, it may cause noise or erroneous operations.

Wiring of Header Module and IO Module

The table below explains procedure for wiring Header module and IO module.

Wiring	Description
	<ol style="list-style-type: none"> Ensure that module is firmly mounted on DIN rail and terminal block is fitted on it with its latch clicked with the module enclosure. Ensure that latch is pushed upward to hold terminal block with module enclosure. For wire insertion, <ul style="list-style-type: none"> Insert wire crimped by lug with insulator through wire insertion point. Apply gentle push (upto 20N) till it clicks. Wire gets firmly hold by spring clamp inside. For removal of wire, <ul style="list-style-type: none"> Use screw driver of smaller tip size (width 2.0 mm max., thickness of 0.4 mm max.) Press push button using screw driver gently so that wire lug is released Pull out wire from terminal point and release the push button. <p>NOTE</p> <p>Push button pressing force should not exceed 50 N force. It may cause damage to push button or terminal block.</p>

NOTE

Terminal block complies for the Pull-out test according to IEC/EN 60947-7-1, IEC/EN 60998-2-2, IEC/EN 60999-1

Refer section [Nomenclature](#) for more details of terminal block and refer section [Wiring: Module Supply](#) for wiring details of Header module.

Refer wiring section explained in this manual for individual IO module.

After connecting all the wires, hold all the wires together and make a neat bunch of it. Wrap a cable tie bunch so that it is firmly held in position along with terminal block. This also relieves tension on part of wire and reduces chances of loose connections.

Recommendations for digital IO modules connections:

While selecting digital IO modules, user should be aware of connection type.

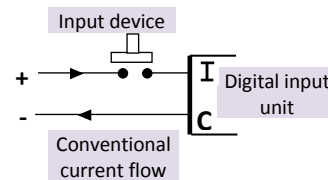
For digital inputs, term sourcing and sinking is referred to the manner in which input device is wired to input module.

Sink type (negative common) of input connection

For this type of input connection, the ground of 24 Vdc supply is connected to common point on unit (C0, C1).

When external input device is active (push button pressed in adjacent figure), +24 Vdc is available at input terminal on unit.

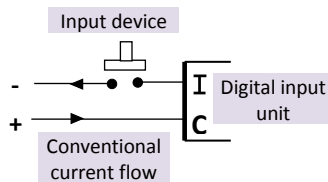
External input device in active state supplies current to input circuit of unit. As unit is receiving current in this case, it is sink type. Normally, PNP type of devices (e.g. proximity switches) are connected in this fashion.

**Source type (positive common) of input connection**

For this type of input connection, the +24 Vdc supply is connected to common point on unit (C0, C1).

When external input device is active (push button pressed in adjacent figure), current flows through input circuit of unit and passes through external input device to ground of 24 Vdc supply. As unit is supplying current in this case, it is source type.

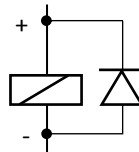
Normally, NPN type of devices (e.g. proximity switches) are connected in this fashion.



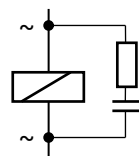
For digital or relay outputs, following precautions should be consider while connecting different types of loads.

Noise suppressor for DC devices

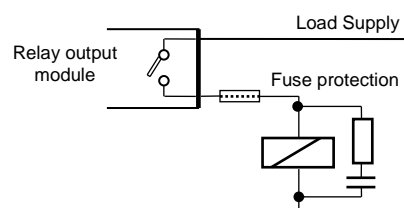
DC operated devices are protected by connecting diode.

**Noise suppressor for AC devices**

AC operated devices are protected by RC snubber.



External fuse links or fused terminals can be recommended for relay output to avoid any burnout of internal copper tracks due to excessive current flow due to external short circuit, overload or inductive surge.



[Back To Index Page](#)

4 Modular IO Configurator

[Overview: Modular IO Configurator](#)

[Steps to configure modular IO station](#)

[Steps to monitor IO data and diagnostics of a modular IO station in online mode](#)

[Special features of Modular IO Configurator](#)

Overview: Modular IO Configurator

Modular IO Configurator is a PC based software tool for configuration of modular IO station from Mitsubishi Electric India.

Tool provides a user-friendly GUI that allows addition, removal and configuration of Header modules and IO modules in an intuitive way. After configuration and parameterization, user can download configuration data to Header module via USB interface. Then tool can be used to monitor IO data and diagnostic data of modular IO station.

Highlighted features:

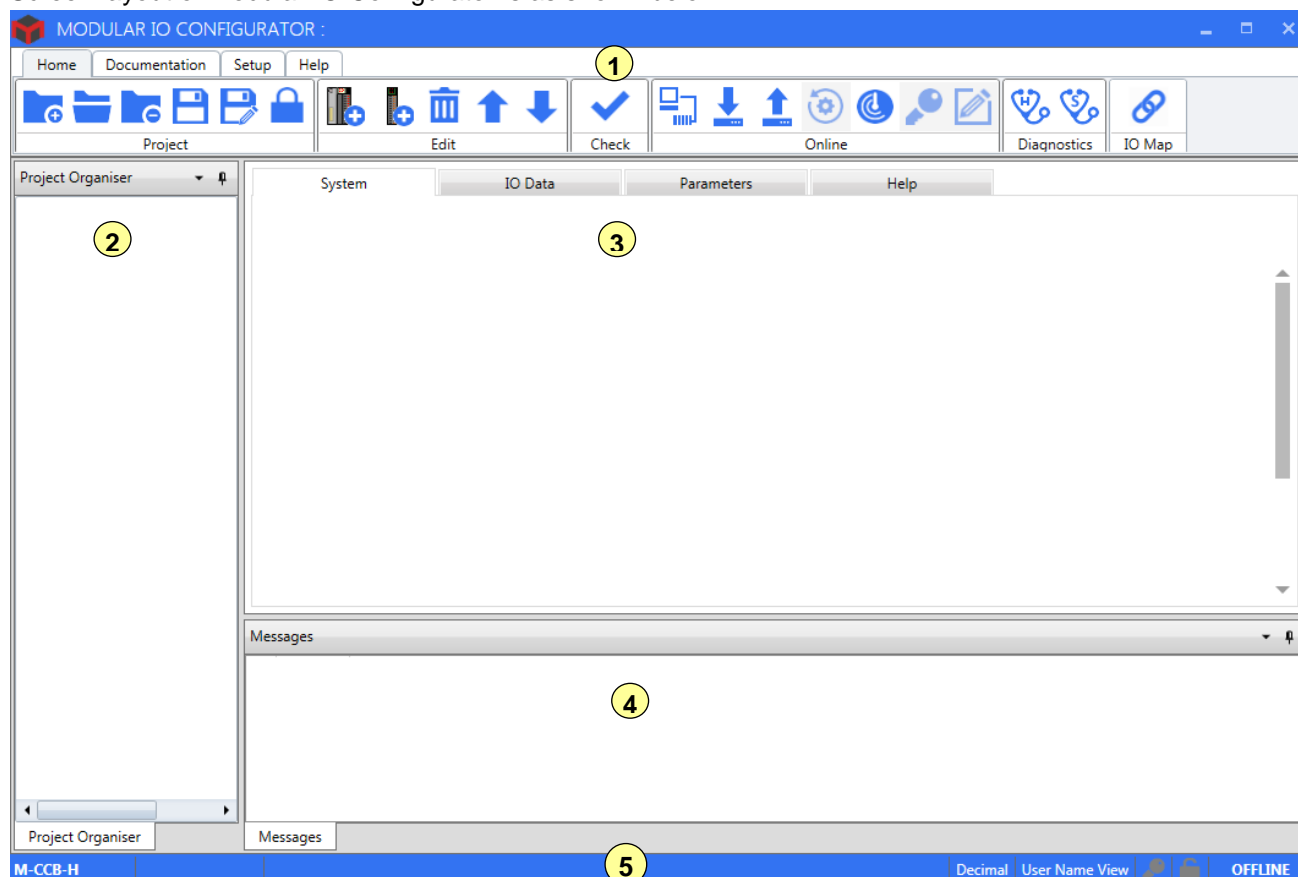
1. Easy configuration of multiple modular IO stations in a network in single project.
2. Keeps track of system power consumption, Field power supply isolation as well as maximum number of IO modules allowed and alerts user accordingly.
3. Allows monitoring of IO data and diagnostic data of individual module at channel level.
4. Provides entire system overview at a glance.
5. Facilitates testing of I/O modules without interfacing to the network.
6. Generates enquiry cum bill of material.
7. Allows configuration file transfer with SDHC memory card.

Software setup requirement:

Before installing the tool, ensure that the following system requirements are satisfied.

Processor	Intel core i3 or Higher version
Disk space	200 MB
RAM memory	2GB or Higher
Screen resolution	1280 x 768 or Higher
Platform	Windows 7 (64 bit/ 32 bit)/ Windows 8 (64 bit)/ Windows 8.1 (64 bit)/ Windows 10 (64 bit)
USB interface	USB 2.0

Screen layout of Modular IO Configurator is as shown below.



Sr. No.	Item	Description
1	Menu Bar	Consists of 4 menus as below <ul style="list-style-type: none"> - Home - Documentation - Setup - Help Each menu provides various functions. These functions are grouped in ribbon tabs.
2	Project Organiser	Shows the list of added Header modules in a project in a tree view and IO modules attached to individual Header module. User can add or remove Header module and IO module as per the project requirement
3	Working Area	This is an application window which includes following four tabs <ul style="list-style-type: none"> - System - IO Data - Parameters - Help
4	Message window	This window lists out various messages, which are generated by tool during operations like project creation, module deletion, project validation, online connection etc.
5	Status bar	Shows selected Header module, selected IO module, product view details and status of connection (offline or online), project (locked or unlocked), and output test (enable or disable).



















Subsequent sections provide information of various offline functions.

1. **Menu bar:** Provides three menus with various functions.

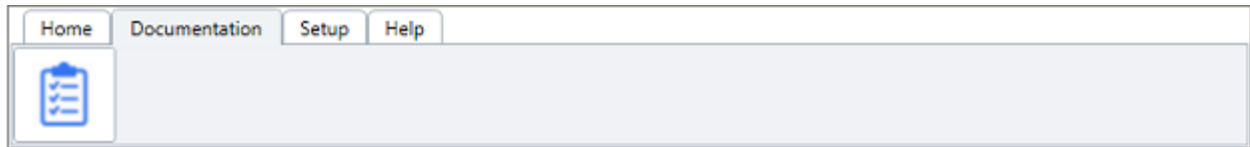
Home: Provides functions related to creation and editing of project, validation of project and online features.




Symbol	Function	Description
	New	Create new project (<Project Name>.mio file)
	Open	Open already created project file
	Save	Save the changes done in the project
	Save As	Save the project with different project name
	Close	Close the project
	Lock/ Unlock	<p>In Offline mode, if “Lock” is selected then It allows following project functions,</p> <ul style="list-style-type: none"> - Create new project - Open project - Save/ Save as project - Close the project <p>It disables following editing functions,</p> <ul style="list-style-type: none"> - Add Header - Add IO Module - Delete - Move Up/ Move Down - Station configuration checking etc. <p>In Online mode, if “Lock” is selected then It allows following online functions,</p> <ul style="list-style-type: none"> - Connection with Header - Downloading of configuration - IO data monitoring - Header and slot diagnostics monitoring - Project documentation <p>It disables following online functions,</p> <ul style="list-style-type: none"> - Uploading of configuration - Scanning of IO modules - Editing of dynamic parameters - Output test <p>Lock the project to disable editing of project to avoid accidental changes.</p>

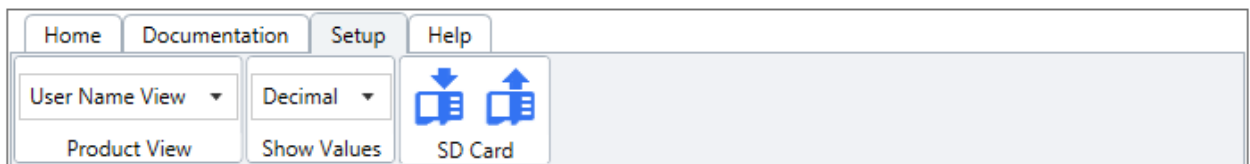
	Add Header	Add Header module to the project It opens dialog box to choose Header module grouped by bus type and change properties
	Add IO Module	Add IO module to selected Header module. It opens dialog box to choose IO module grouped by type and change properties. IO module types are as below. <ul style="list-style-type: none"> - Digital input - Digital output - Analog input - Analog output - System module
	Delete	Delete selected module from the project
	Move Up	Shift selected Header module (along with attached IO modules) to position of previous Header module or shift selected IO module to previous slot position, after confirming station checks.
	Move Down	Shift selected Header module (along with attached IO modules) to position of next Header module or shift selected IO module to next slot position, after confirming station configuration checks.
	Check Station Configuration	Validates configuration of Header module of modular IO station for, <ul style="list-style-type: none"> - Exceeding system power consumption. - Change in field power supply. - Exceeding maximum number of IO modules supported for selected Header module. - Presence of unknown module in a Station after scan In above cases, tool provides warning message to take corrective action.
	Connect/Disconnect	Connect or disconnect the communication with Header module  Click to connect to Header module  Click to disconnect with Header module
	Download	Download the configuration to the selected Header module
	Upload	Upload the configuration from the selected Header module
	Reset	Sends reset command to the Header module. On reception of reset command, Header module resets and starts IO module identification process in similar way to that of power on of the Header module.
	Scan	Scans the IO modules attached to selected Header module. Tool can read list of IO modules [other than system modules], physically connected to the Header module. User can further modify module parameters as required. It facilitates quick configuration of modular IO station.
	Enable/ Disable Output Test	User can force output value and write to output module if "Enable Output Test" is selected. This facilitates testing of output modules locally.
	Write Values	User can write forced values to output module if output test is enabled.
	Header Diagnostics	View diagnostic information of selected Header module
	Slot Diagnostics	View diagnostic information of all the slots.
	IO Map	Displays local address and fieldbus address of IO points in modular IO system.





Documentation: Provides function to generate enquiry as per enquiry scope selection i.e. either project wise or Modular IO station wise. It provides list of all the modules with ordering code, ordering description and quantity.



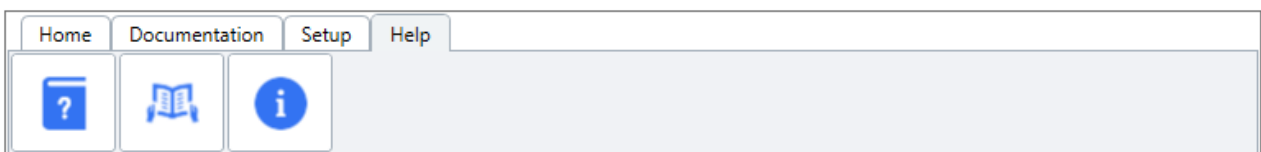
Symbol	Function	Description
	Enquiry	User can select scope of enquiry generation and then save enquiry as <Project Name>_Enquiry.csv file.




Setup: Provides functions for tool view and SD card support.



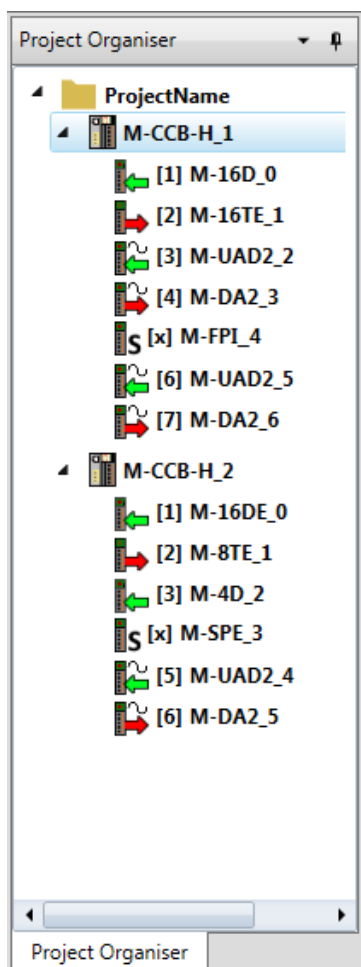
Symbol	Function	Description
--	Product View	User can view modules in tree view <ul style="list-style-type: none"> - By module ordering codes or - By user names (Default)
--	Show Values	User can monitor IO data in various number formats such as, <ul style="list-style-type: none"> - Decimal (Default) - Hex - Binary
 	SD Card	User can perform following SD card related functions. <div>  Write to SD card  Read from SD card </div>







Help: Provides tool help and version info of tool.



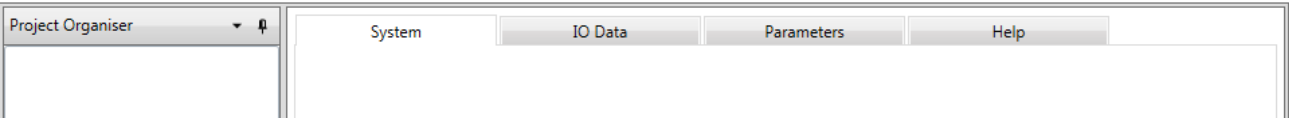
Symbol	Function	Description
	Help	Opens tool help for Modular IO Configurator
	Manuals	Opens user document i.e. Modular IO User Manual.pdf
	About	Displays tool version

2. **Project Organiser:** Shows list of added Header modules and IO modules in tree view.

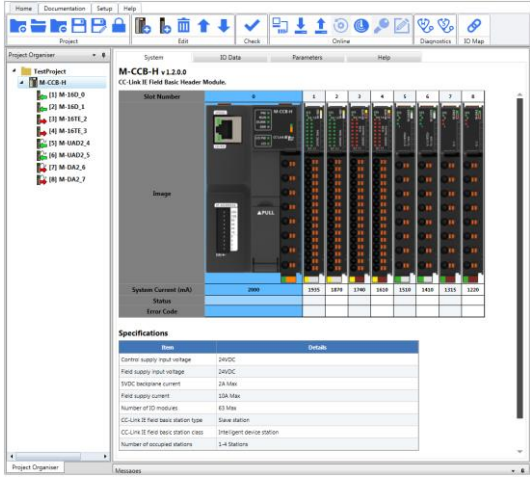
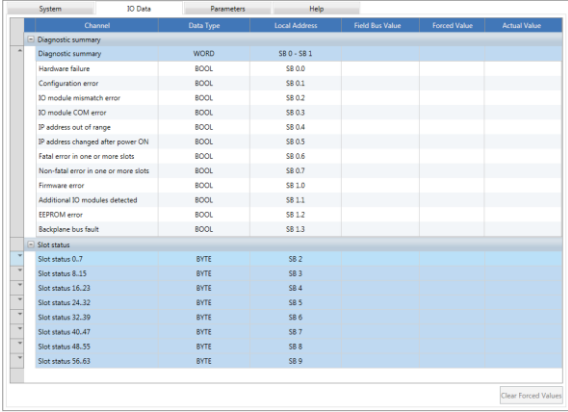
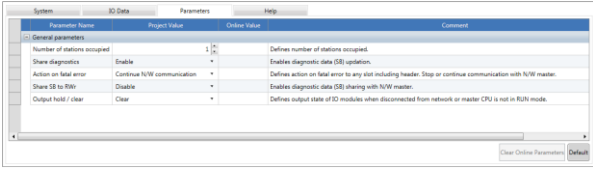



Item	Description
Project Name	This is user defined name of project
Header Module	Displays user defined name of Header module.  - Header module.
IO Module	Displays slot number and ordering code or user defined name of IO modules. For identification purpose, symbolic representation is provided for all types of IO modules as,  - Digital input  - Digital output  - Analog input  - Analog output  System module

3. **Working Area:** Provides four tabs as System, IO Data, Parameters and Help.

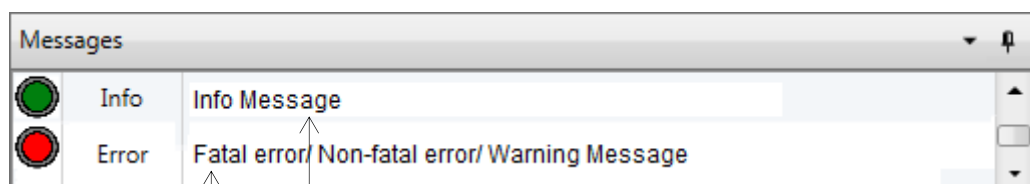


The table below provides details of each tab.

Tab	Description
<div><p>System</p></div>	<p>This tab shows modular IO station image built as per the configuration.</p> <p>Following information is shown</p> <ul style="list-style-type: none">– Slot number of module– Note: System modules are not intelligent modules and does not consume slot number. Hence, IO data and Diagnostics is not available.– Image of module– System current consumption of slot.– Status of module as healthy (with green color), fatal error (with red color) or non-fatal error (with yellow color).– Note: Status and Error code provides online status of Header module as well as IO modules connected in station.– Error code of module.– Refer section Troubleshooting --> List of Station Error Codes for more details.– Specifications of selected module in brief.
<div><p>IO Data</p></div>	<p>This tab shows summarized diagnostics and slot wise status (SB memory) of selected Header module.</p> <p>It shows IO memory (IX, QX, IW, and QW) and diagnostic (SB memory) of selected IO module.</p>
<div><p>Parameters</p></div>	<p>This tab provides list of user configurable parameters. Configuration parameters are grouped into two categories such as,</p> <ul style="list-style-type: none">– Module parameters: These are common user configurable parameters specific to a module– Channel parameters: These are user configurable parameters specific to a channel of a module
<div><p>Help</p></div>	<p>Shows help for selected module.</p>

4. **Message window:** List of various messages is displayed, which are generated by tool during offline operations like project creation, module deletion, project validation, etc. and online operations.

Refer section [List of Info and Error messages](#) for more details.



Description

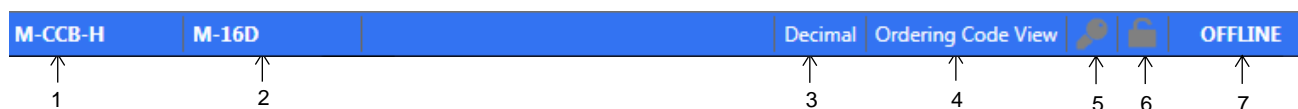
Info Message:

This includes list of messages which are generated during operations like project creation, module addition or deletion etc. This is generally useful information.

Fatal error/ Non-fatal error/ Warning:

This includes list of messages which are generated after project validation and list out most important issues that may or may not cause problems in project validation or compilation.

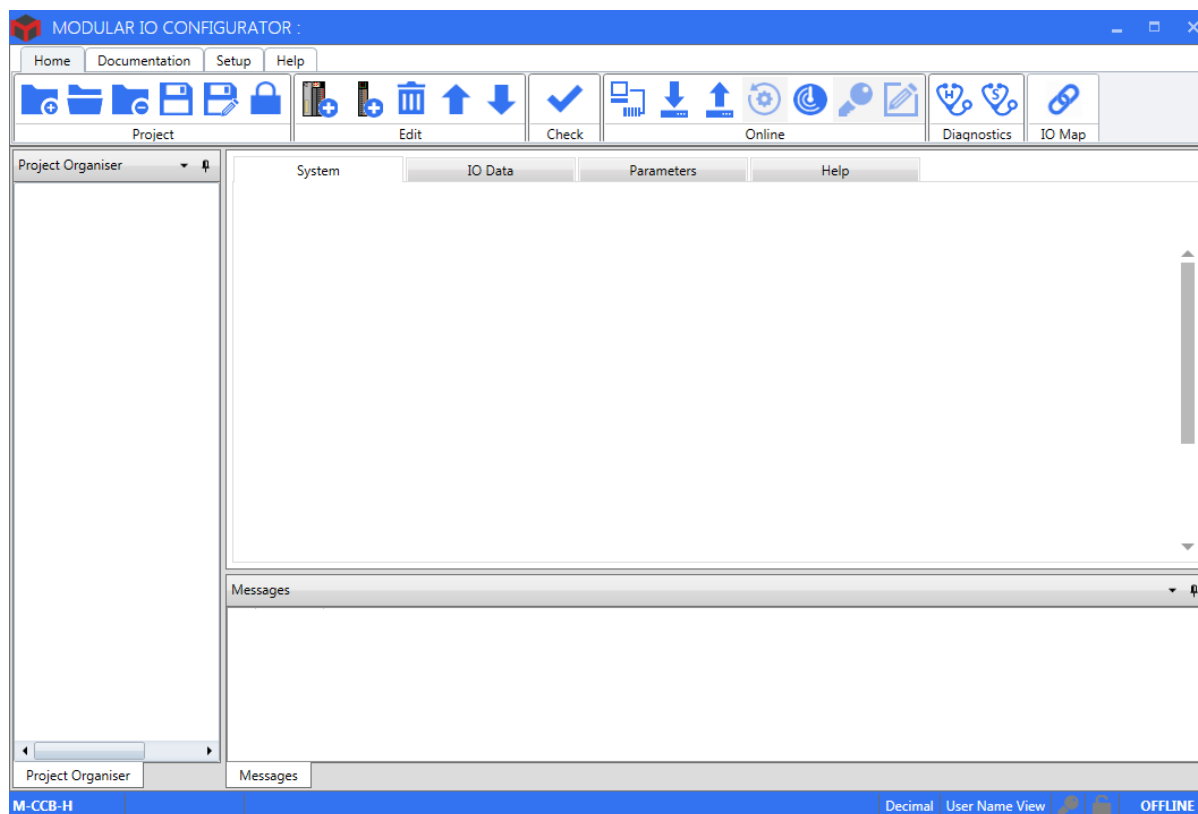
5. **Status bar:** Shows status tabs for selected Header module, selected IO module, connection (offline or online), project (locked or unlocked), product view etc.




No.	Description
1	User name of selected Header module
2	User name of selected IO module
3	Format view (Decimal/ Hex/ Binary) selected to show values of IO data
4	Product view selected as Module Ordering Code View or User Name View
5	Output test Enable/ Disable status.
6	Project state as locked or unlocked.
7	Project connection status as OFFLINE or ONLINE

4.1 Steps to configure Modular IO Station


1. Open Modular IO Configurator and view screen layout as below.



2. Click on  to create new project. This operation opens “Create Project” window.

Item	Description
Project Name	Enter project name of 32-character size maximum starting with alphabet Note: Special characters are not allowed.
Path	Select local drive path using “Browse” button to save the project file
Bus Type	Select required bus/ network type using drop-down, e.g., <i>CC Link IE Field Basic</i> , <i>Modbus TCP</i> , <i>Ethernet/IP™</i> .

3. Add and configure Header module.

Click on function , this opens *Add Header* dialogue box. Select Header module and click on *Add* button.

ADD HEADER

Headers

CC Link IE Field Basic

M-CCB-H

v1.2.0.0

v1.1.0.0

M-CCB-H v1.2.0.0

CC-Link IE Field Basic Header Module.

Control supply input voltage

24VDC

Field supply input voltage

24VDC

5VDC backplane current

2A Max

Field supply current

10A Max

Number of IO modules

63 Max

CC-Link IE field basic station type

Slave station

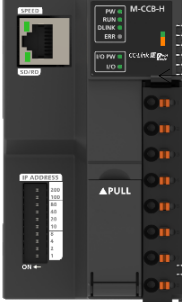
CC-Link IE field basic station class

Intelligent device station

Number of occupied stations

1-4 Stations

Header module image



Specifications of selected Header module

User Name

M-CCB-H

Station Number

Add

Cancel

List of Header modules with selected Bus type

Header module image

Specifications of selected Header module

User name of selected Header module

Item	Description
User Name	User defined name of 32-character size maximum starting with alphabet By default, module ordering code is the user name.

Added Header module is displayed in tree view as well as in System tab of working area as shown below.

Home Documentation Setup Help

Project

Edit

Check

Online

Diagnostics

IO Map

Project Organiser

TestProject

M-CCB-H

System

IO Data

Parameters

Help


M-CCB-H v1.2.0.0

CC-Link IE Field Basic Header Module.

Slot Number

0

Image



System Current (mA)

2000

Status

Error Code

Specifications

Item	Details
Control supply input voltage	24VDC
Field supply input voltage	24VDC
5VDC backplane current	2A Max
Field supply current	10A Max
Number of IO modules	63 Max
CC-Link IE field basic station type	Slave station
CC-Link IE field basic station class	Intelligent device station
Number of occupied stations	1-4 Stations

Project Organiser

Messages

4. Select Header module from Project Organiser window and click on “Parameters” tab to set Header configuration parameters. User can modify Project Values for individual parameter.

Parameter Name	Project Value	Online Value	Comment
General parameters			
Number of stations occupied	1		Defines number of stations occupied.
Share diagnostics	Enable		Enables diagnostic data (SB) updation.
Action on fatal error	Continue N/W communication		Defines action on fatal error to any slot including header. Stop or continue communication with N/W master.
Share SB to RWr	Disable		Enables diagnostic data (SB) sharing with N/W master.
Output hold / clear	Clear		Defines output state of IO modules when disconnected from network or master CPU is not in RUN mode.


Above parameters are specific to CC-Link IE Field Basic Header module (M-CCB-H) and shown for an example.

5. Click on tab “IO data” to view diagnostic (SB memory) of Header module.

Channel	Data Type	Local Address	Field Bus Value	Forced Value	Actual Value
Diagnostic summary					
Diagnostic summary	WORD	SB 0 - SB 1			
Slot status					
Slot status 0..7	BYTE	SB 2			
Slot status 8..15	BYTE	SB 3			
Slot status 16..23	BYTE	SB 4			
Slot status 24..32	BYTE	SB 5			
Slot status 32..39	BYTE	SB 6			
Slot status 40..47	BYTE	SB 7			
Slot status 48..55	BYTE	SB 8			
Slot status 56..63	BYTE	SB 9			

Item	Description
Diagnostic summary	Holds summarized Header diagnostics
Slot status 0..7	Holds slot wise status of IO module, configured in slot 0 to slot 7.
Slot status 8..15	Holds slot wise status of IO module, configured in slot 8 to slot 15.
Slot status 16..23	
Slot status 24..32	
Slot status 33..39	
Slot status 40..47	
Slot status 48..55	
Slot status 56..63	Holds slot wise status of IO module, configured in slot 56 to slot 63.

Refer section [M-CCB-H: IO Data](#) for more details.

6. Add and configure IO module to modular IO station, as below.
- Click on function  to open dialog box of “Add Module” which shows list of IO modules grouped as per IO module type.

ADD MODULE

IO Modules

▶ Analog input

▶ Analog output

▶ Digital input

▶ Digital output

▶ Special Module

▶ System module

M-AD4 v1.0.0.0

4 Ch. Analog Input Module

Number of input channels

4

Analog input type

0 to 10VDC, -10 to +10VDC, 0 to 20mA, 4 to 20mA

Resolution

15 bit + sign bit

Digital output data

Voltage: 0 to 10VDC = 0 to 32000, -10 to +10VDC = -32000 to 32000

Current: 0 to 20mA = 0 to 32000, 4 to 20mA = 0 to 32000

5VDC backplane current consumption

100mA

IO module image

Specifications of selected IO module

User Name

M-AD4_0

No. of Modules

1

Add

Cancel

List of supported IO modules

IO module image

Specifications of selected IO module

Add multiple number of modules of selected IO module at a time.

User name of selected IO module

Item	Description
User Name	User defined name of 32 characters size maximum starting with alphabet By default, module ordering code is the user name.

Added IO module is displayed in tree view as well as in System tab in working area as shown below.

Home

Documentation

Setup

Help

Project

Edit

Check

Online

Diagnostics

IO Map

Project Organiser

TestProject

M-CCB-H

M-AD4_0

System

IO Data

Parameters

Help

M-AD4_0 v1.0.0.0

4 Ch. Analog Input Module

Slot Number

0

Image

System Current (mA)

2000

Status

Error Code

Specifications

Item	Details
Number of input channels	4
Analog input type	0 to 10VDC, -10 to +10VDC, 0 to 20mA, 4 to 20mA
Resolution	15 bit + sign bit
Digital output data	Voltage: 0 to 10VDC = 0 to 32000, -10 to +10VDC = -32000 to 32000
Current: 0 to 20mA = 0 to 32000, 4 to 20mA = 0 to 32000	
5VDC backplane current consumption	100mA

Add number of IO modules as required to form a modular IO station as per the application requirement.

44

MODULAR IO STATION

Rev. No. V1.12

When system power consumption by IO modules exceeds capacity of Header module, tool prompts user to add System Power Extension module (M-SPE) and then add IO modules further.

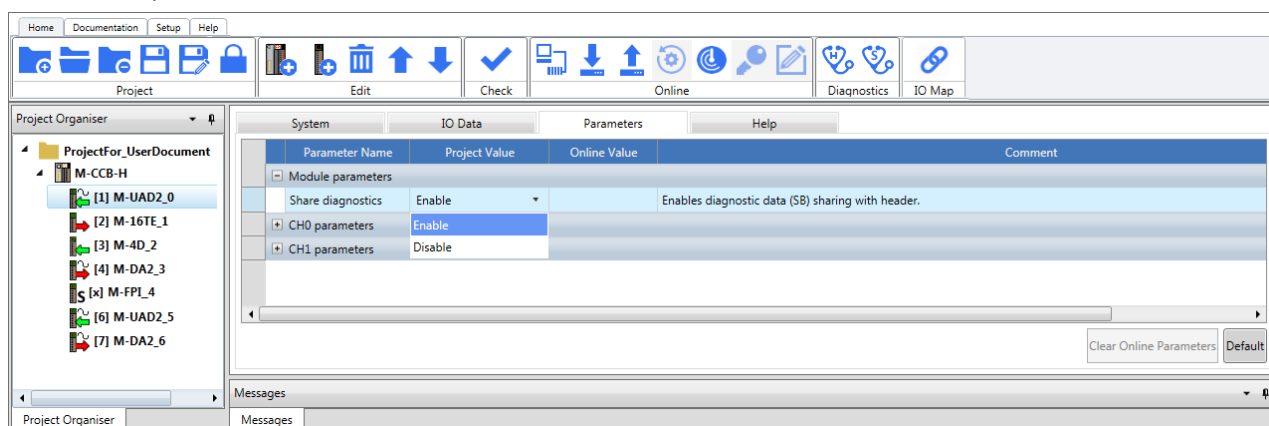
User should add other system modules as per the wiring and station requirements.

In a typical fieldbus system, there are number of modular IO stations connected. User can add number of Header modules and then attach IO modules to each Header module and save project as a single project.

NOTE

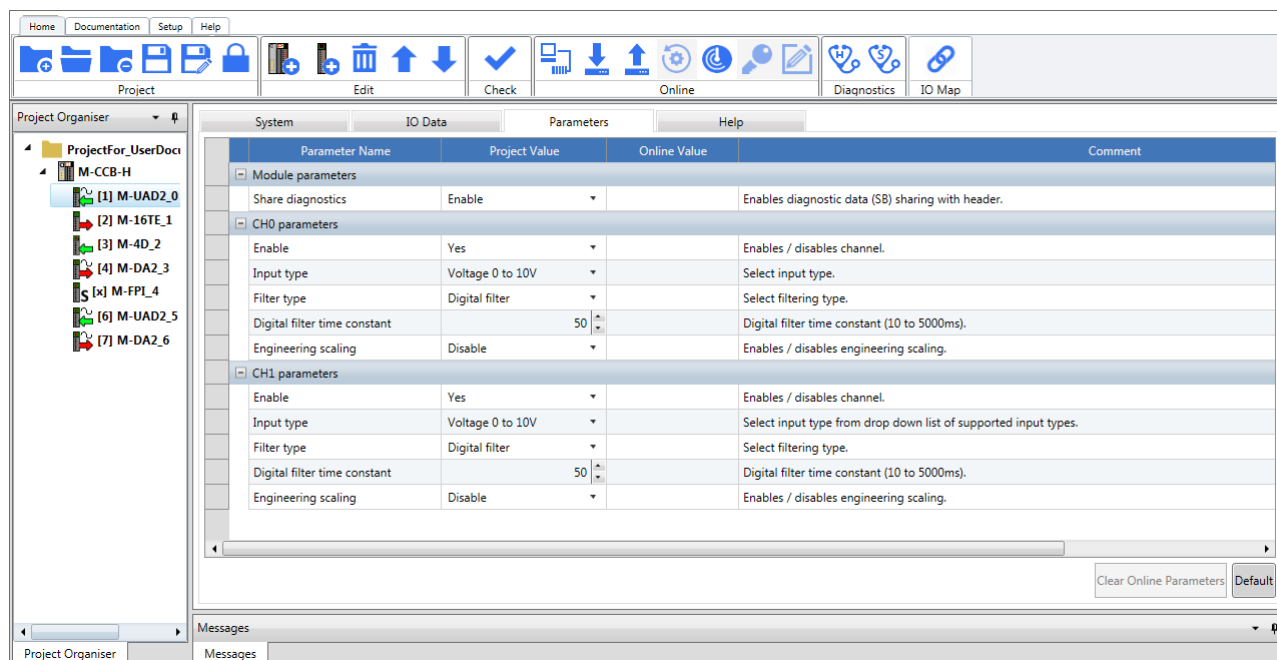
Digital and Analog IO modules are intelligent modules and provide IO data and diagnostics. System modules are passive modules and do not provide any IO data and diagnostics. Hence, Header module cannot detect presence of system modules and cannot assign slot position.

7. Select IO module from Project Organiser window and click on “Parameters” tab to set module as well as channel parameters.




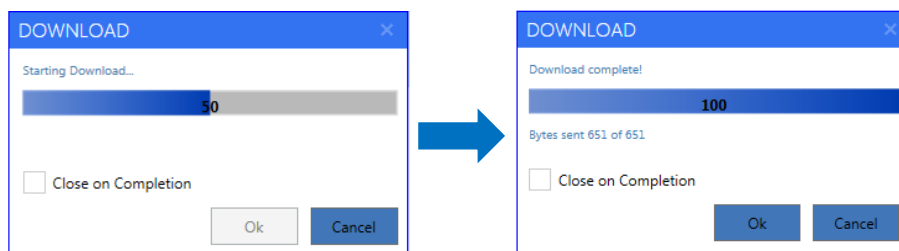
Parameters shown are specific to 2 Ch Universal Analog Input module (M-UAD2) and shown for an example.

Channel level parameters can be edited by expanding CH0 parameters and CH1 parameters.





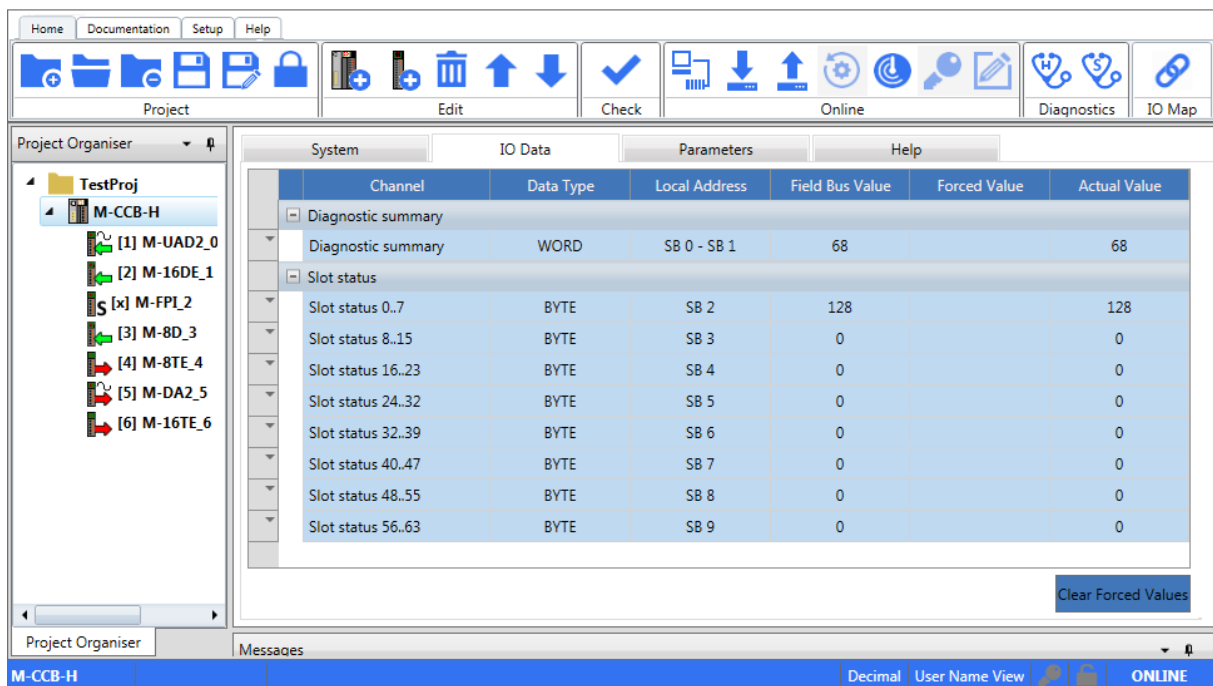
8. Similarly, configure parameters of all the modules by selecting individual module in tree view and respective parameters tab.
9. User should attach Bus End module (M-BE) at the last slot position if there are 16 or more IO modules.
10. Connect Header module to your PC via standard USB 2.0 cable.

11. Click on  to download the configuration to connected Header module. This pop ups progress window as shown below. After successful downloading, click Ok.



4.2 Steps to monitor IO Data and diagnostics

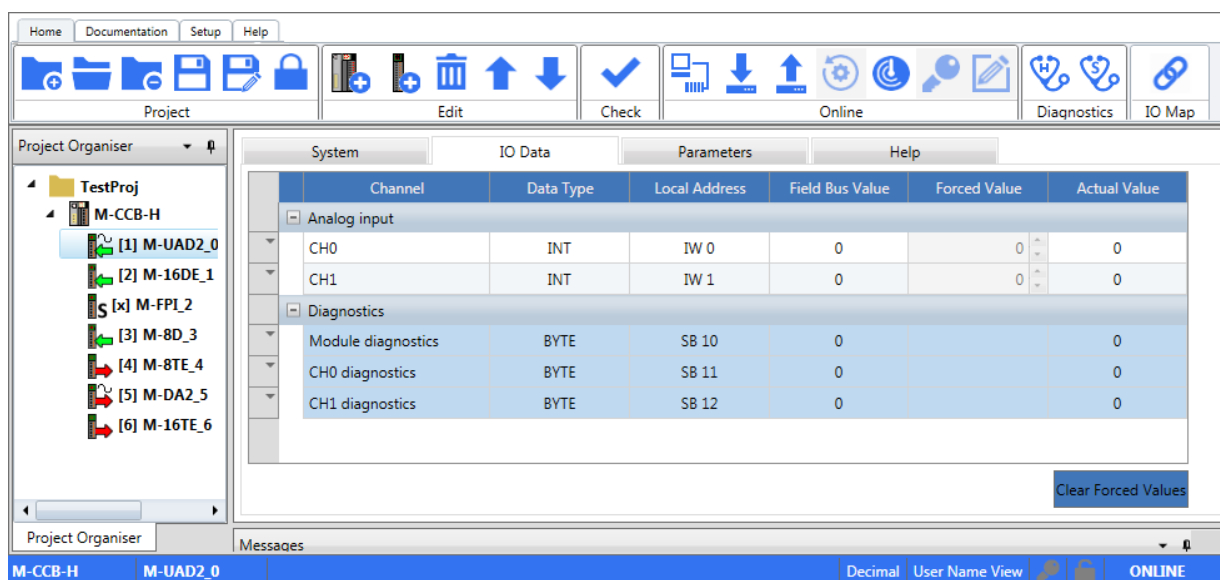
1. Click on function  to connect to Header module. Icon changes to  and Status bar is updated as ONLINE.
2. Select Header module in Project Organiser window and click on tab "IO data" to monitor diagnostics (SB memory) of Header module.



Channel	Data Type	Local Address	Field Bus Value	Forced Value	Actual Value
Diagnostic summary					
Diagnostic summary	WORD	SB 0 - SB 1	68		68
Slot status					
Slot status 0..7	BYTE	SB 2	128		128
Slot status 8..15	BYTE	SB 3	0		0
Slot status 16..23	BYTE	SB 4	0		0
Slot status 24..32	BYTE	SB 5	0		0
Slot status 32..39	BYTE	SB 6	0		0
Slot status 40..47	BYTE	SB 7	0		0
Slot status 48..55	BYTE	SB 8	0		0
Slot status 56..63	BYTE	SB 9	0		0

Field Bus Values can be monitored in Decimal/ Hex / Binary format by selection in menu Setup → Show Values.

3. Further, bit wise diagnostic summary and slot wise status can be monitored by expanding individual channel. Select IO module in Project Organiser window and click on tab "IO data" to monitor IX, QX, IW, QW and diagnostics (SB memory) of selected IO module.



Channel	Data Type	Local Address	Field Bus Value	Forced Value	Actual Value
Analog input					
CH0	INT	IW 0	0	0	0
CH1	INT	IW 1	0	0	0
Diagnostics					
Module diagnostics	BYTE	SB 10	0		0
CH0 diagnostics	BYTE	SB 11	0		0
CH1 diagnostics	BYTE	SB 12	0		0

NOTE

Field Bus values shows the values available with network Master and normally, Field Bus values and Actual values are identical for input and output. User can force output values and write to actual output values when Output test is enabled. In such case, Forced Values and Actual Values become identical. For more details, refer section "Output test in online monitoring mode".

4.3 Special Features

[Modular IO Configurator]

Scan IO modules

Output test

Header diagnostics and slot diagnostics

Unknown module

Module versions

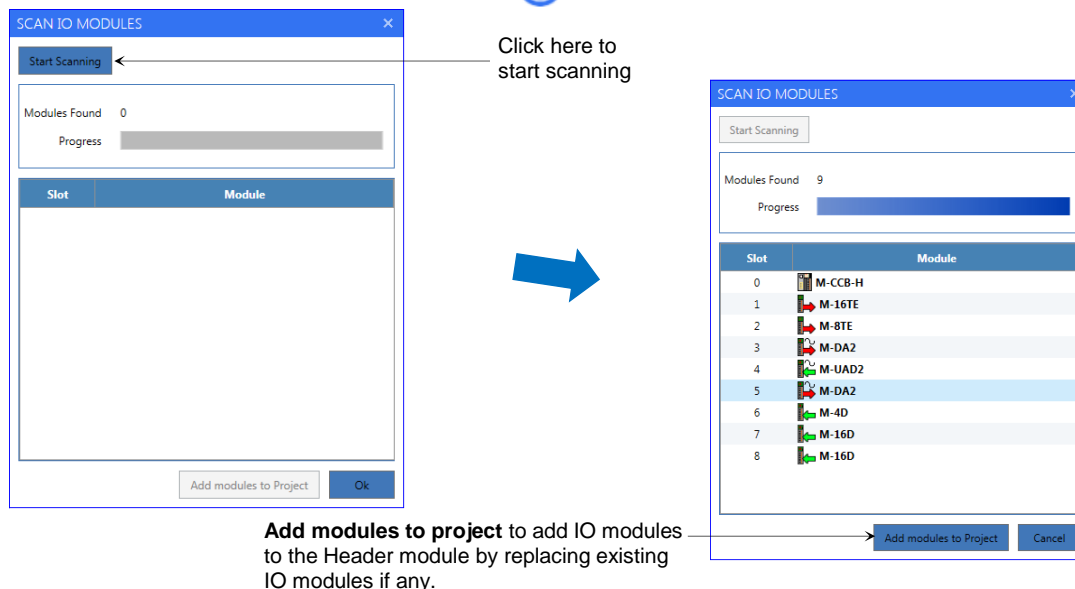
Configuration transfer with SDHC memory card

Enquiry generation

Scan IO modules:

Tool facilitates quick configuration of a modular IO station if setup is available with IO modules actually attached to the Header module. Using “Scan IO Module” function, tool can read the list of IO modules (other than system modules) physically attached to the Header module.

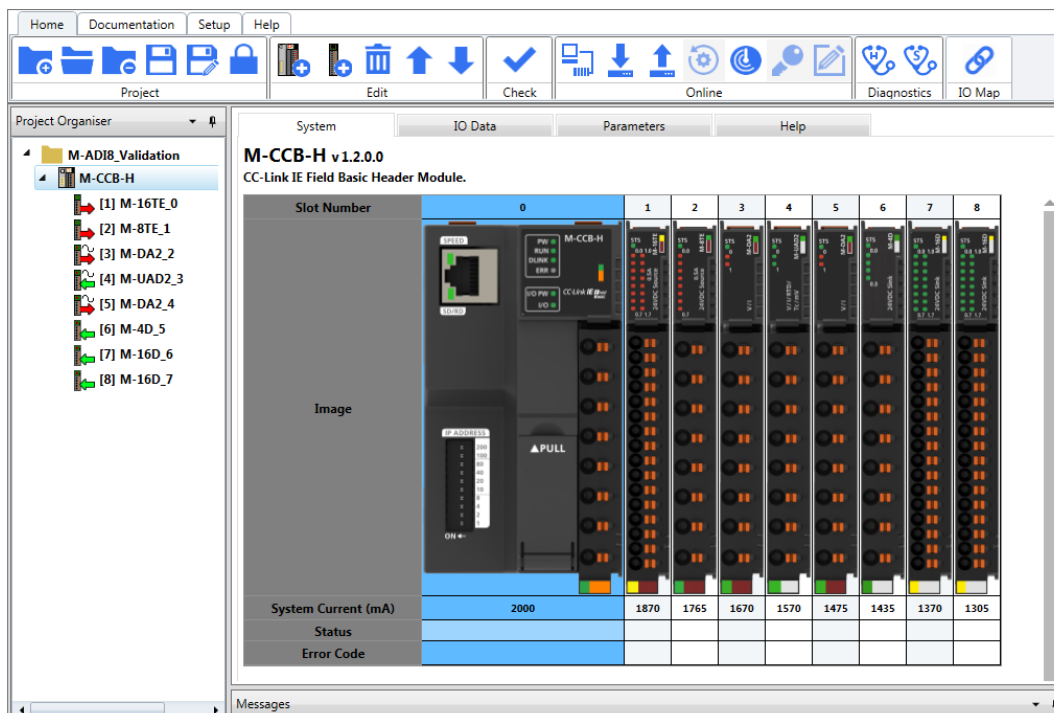
Select Header module and click on Online function  This opens following window of Scan IO Modules.



NOTE

System modules are passive modules. Hence, Header module cannot detect presence of System modules in a modular IO station. So System modules do not appear in the list after scan.

After scanning and adding modules successfully to project, system tab gets updated as shown below.



NOTE

After scanning IO modules, if mismatched module is detected then tool pops up error window which can guide user to perform further actions.






Output test:

This is online feature and useful to test output module locally even when Header module is not connected to the fieldbus/ network. User can write individual output (True/ False to digital output module and channel data to analog output module) and test individual output.

NOTE



Output test is possible only if modular IO station is healthy. Confirm status of modular IO station using LED indications on Header module. Refer section [LED Indications](#) for more details.

Follow the steps as below, to write outputs for test purpose.

1. Click on function  to connect to Header module. Icon changes to  and Status bar is updated as ONLINE.
2. Enable output test by clicking on function . Icon changes color to red  and updates status on status bar. This allows user to write force output values to actual output values.
3. When Output test is enabled, IO LED on Header module turns yellow.
4. Select output module to test output.
5. Select "IO Data" tab.
6. Select individual output DO nn (for Digital output) or CHn (for Analog output).
7. Select option as
 - Force to true/ Force to False/ No Force for Digital output and
 - Enter value between -32768 and 32767 for Analog output.
 Color of Forced values change to red.
8. Repeat step 7 for other output module as required.
9. Click on Online function  to write Forced values to Actual values. Forced value overwrites Field bus values. After writing output values to actual values, color of Forced values changes to blue.
10. Change in digital output is indicated by output LED indication on the digital output module. User can measure actual output signal to test digital output and analog output.

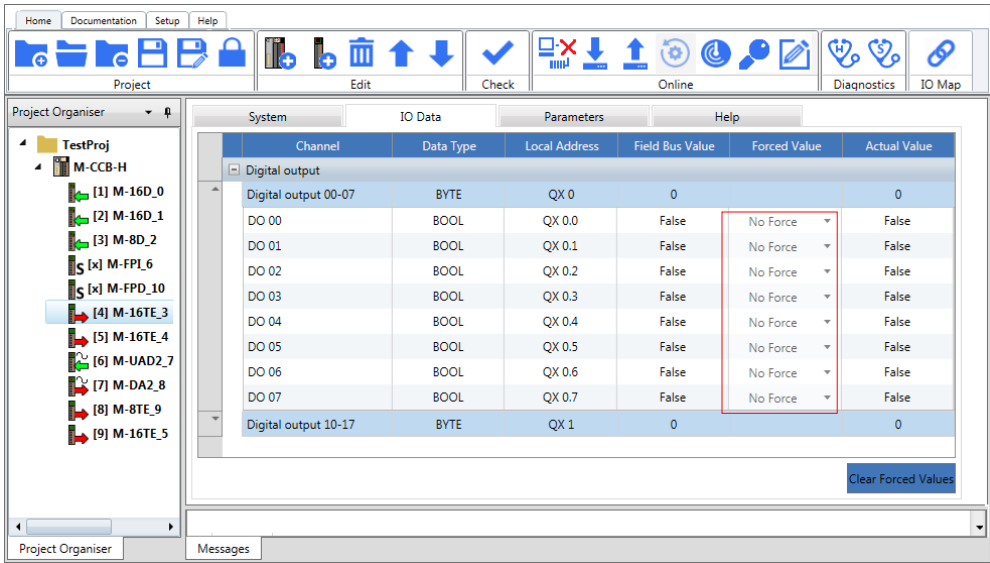
NOTE



Forcing of output continues as long as modular IO station is powered on and in ONLINE monitoring mode. When user tries to go OFFLINE, tool prompt user to clear forced values.

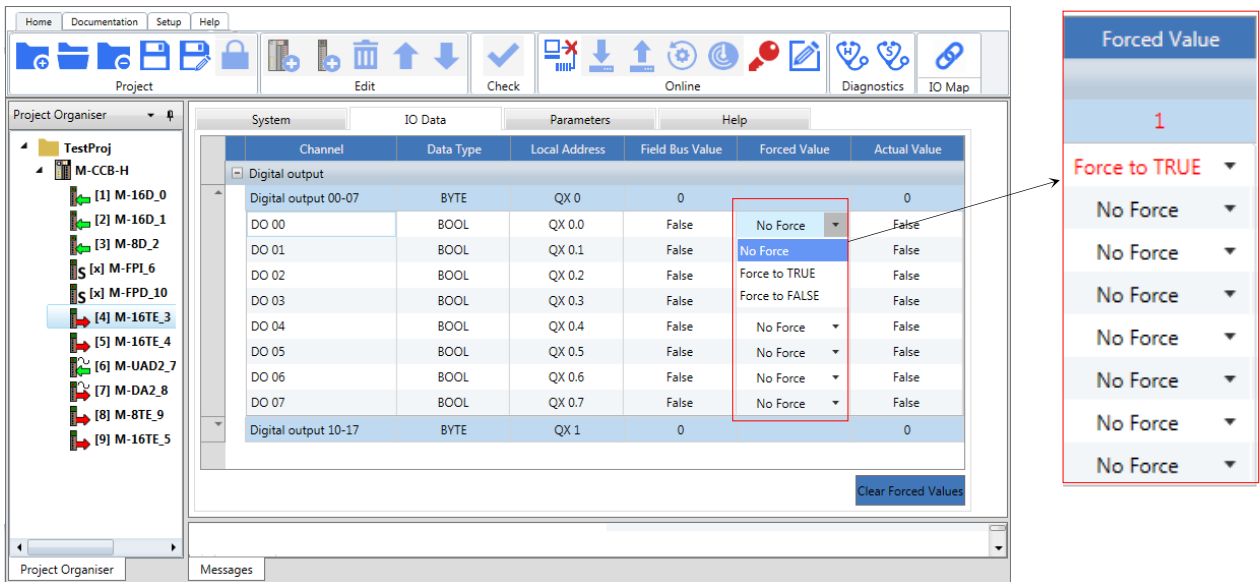
For digital output and analog output, functions “Enable/ Disable output test”  and “Write values”  are used as shown below.

For digital output:


In online monitoring mode, select digital output module, here M-16TE is selected as an example. By default, forcing of output is disable.

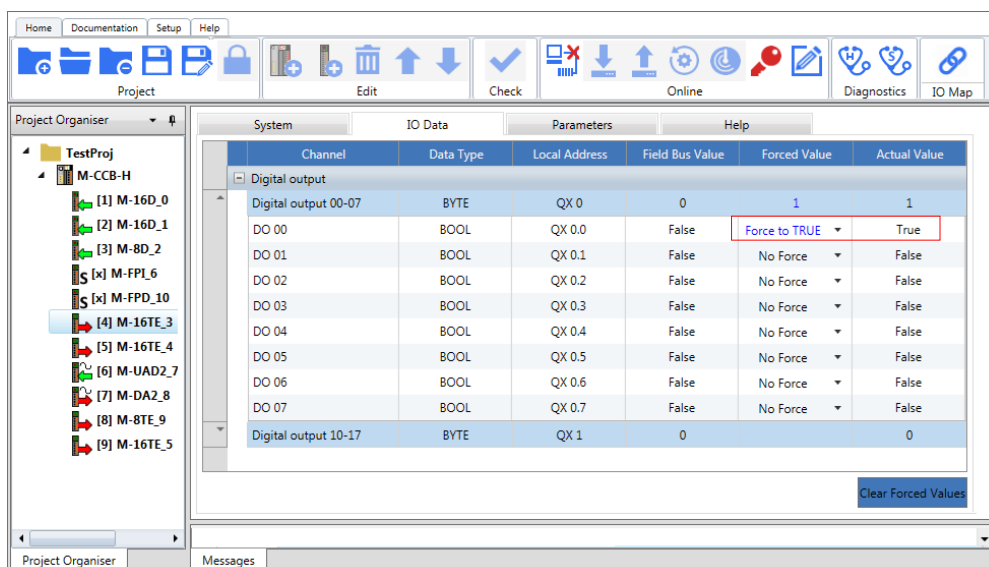


Click on function  Icon changes color to red . This enables output test feature and allows forcing of individual output as shown.



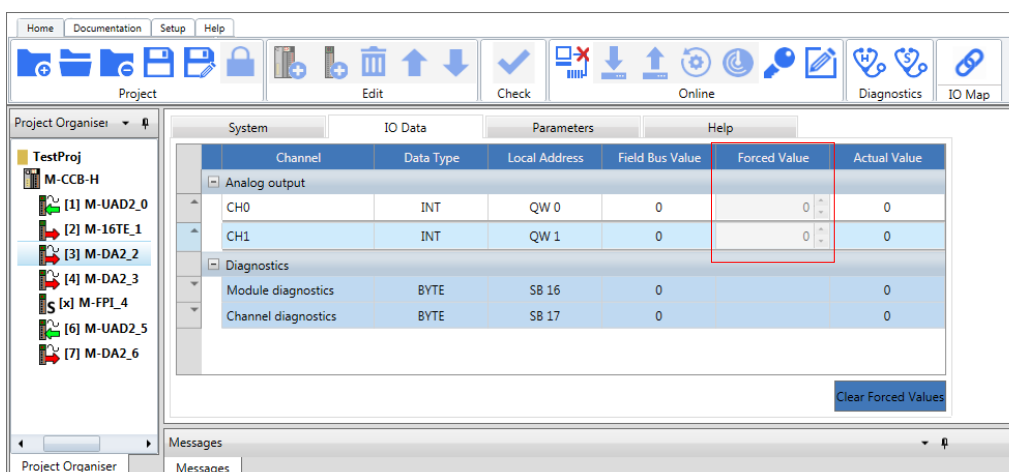
After selection of either Force to TRUE or Force to FALSE, online changed force value for output turns red as shown above.



Clicking on function  writes online changed force value to actual value and force value changes color as blue as below.

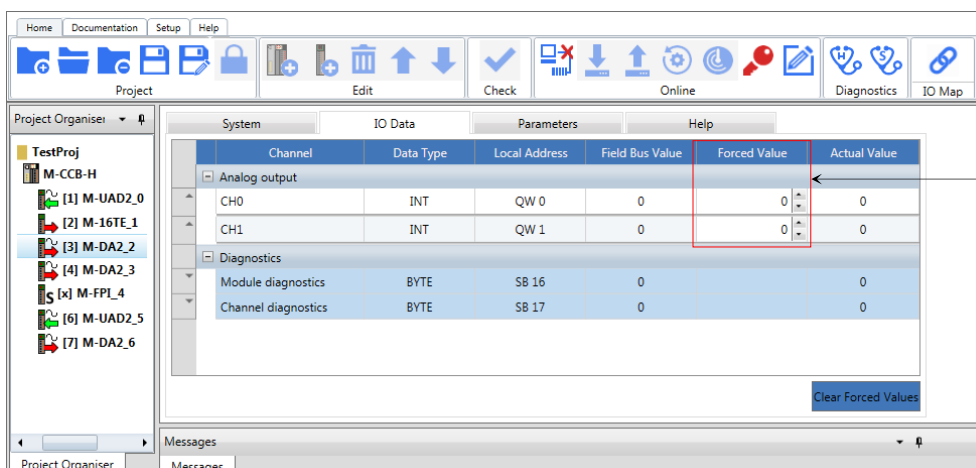


For analog output:

In online monitoring mode, select analog output module, here M-DA2 is selected as an example. By default, forcing of output is disable.

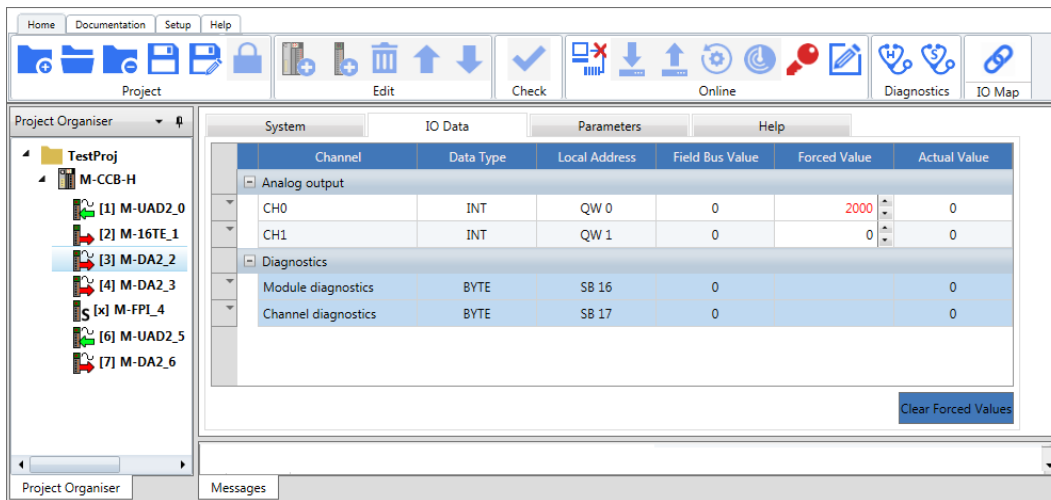



Click on function  It enables output test and function symbol becomes  It allows user to write count at individual output channel.

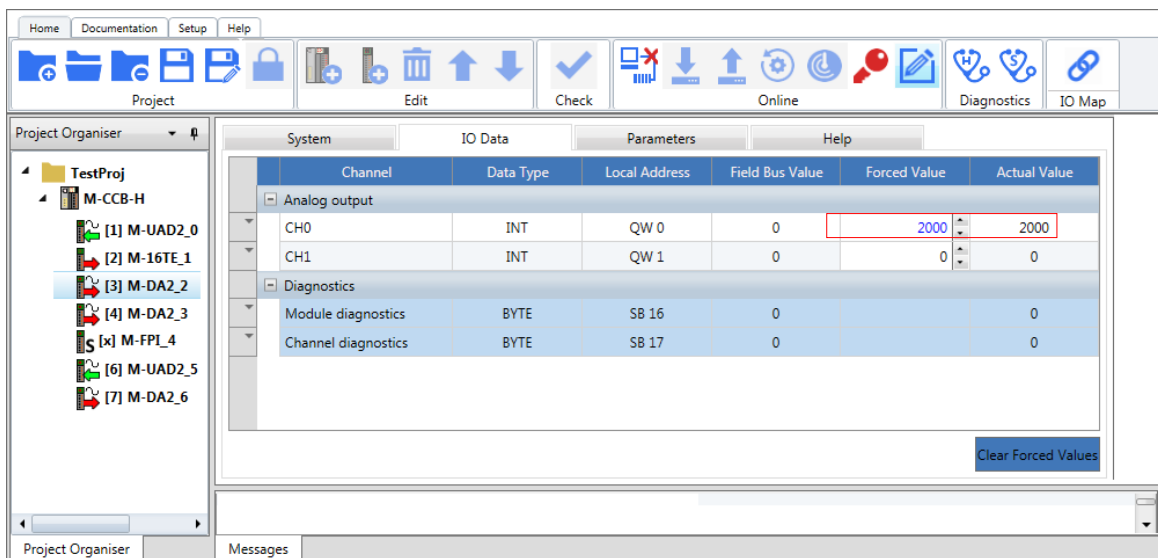


Click on combo button to change count at output CH0 and CH1 from "-32768 to 32767 or directly enter value

After changing count, online changed count turns red as shown



Click on function  to write online changed count to actual value and force value changes color as blue as below.



NOTE

If user tries to write invalid forced value, then it is not written successfully and remains in red color.

Header diagnostics and slot diagnostics:




This is online feature and useful to monitor details of Header diagnostics and slot diagnostics.

Header diagnostic information covers modular IO station specific as well as Header module specific diagnostic information.

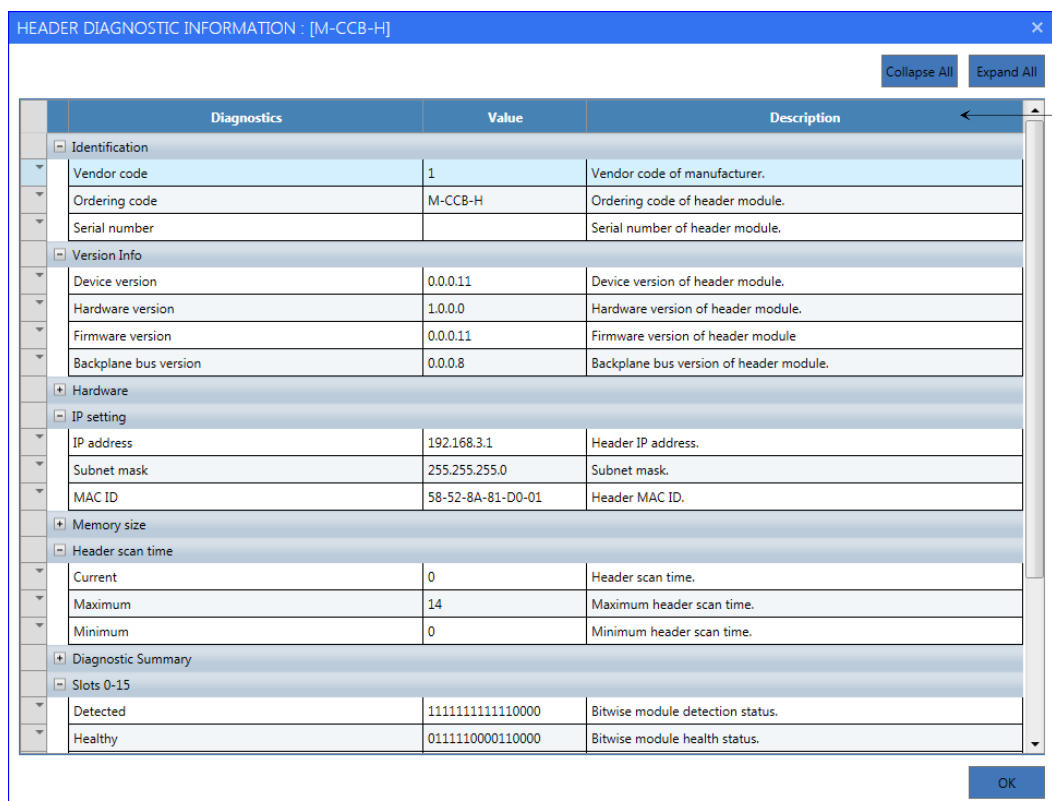
Slot diagnostic information provides configured modules and present modules, hardware versions and firmware versions of present modules, slot level error code, etc.

NOTE

Header diagnostics and slot diagnostics monitoring is possible only if modular IO station is healthy.

1. Click on function  to connect to Header module. Icon changes to  and Status bar is updated as ONLINE.
2. Click on diagnostic function “Header Diagnostics” , for monitoring diagnostic information of connected Header module.

This pops up following window of “HEADER DIAGNOSTIC INFORMATION”.




Diagnostics	Value	Description
Identification		
Vendor code	1	Vendor code of manufacturer.
Ordering code	M-CCB-H	Ordering code of header module.
Serial number		Serial number of header module.
Version Info		
Device version	0.0.0.11	Device version of header module.
Hardware version	1.0.0.0	Hardware version of header module.
Firmware version	0.0.0.11	Firmware version of header module.
Backplane bus version	0.0.0.8	Backplane bus version of header module.
Hardware		
IP setting		
IP address	192.168.3.1	Header IP address.
Subnet mask	255.255.255.0	Subnet mask.
MAC ID	58-52-8A-81-D0-01	Header MAC ID.
Memory size		
Header scan time		
Current	0	Header scan time.
Maximum	14	Maximum header scan time.
Minimum	0	Minimum header scan time.
Diagnostic Summary		
Slots 0-15		
Detected	1111111111110000	Bitwise module detection status.
Healthy	0111110000110000	Bitwise module health status.

Diagnostics
 Identification
 Version Info
 Hardware
 IP Setting
 Memory Size
 Header Scan Time
 Diagnostic Summary
 Slots 0-15
 Slots 16-31
 Slots 32-47
 Slots 48-63
 Fieldbus/network Diagnostics

Header diagnostics are categorized for easy monitoring. User can monitor individual parameter by expanding individual diagnostic as shown below.

Diagnostics	Value	Description
Identification		
Vendor code		Vendor code of manufacturer.
Ordering code		Ordering code of header module. M-CCB-H : For CC-Link IE Field Basic Header module M-MT-H: For Modbus TCP Header module
Version Info		
Device version		Device version of header module.
Hardware version		Hardware version of header module.
Firmware version		Firmware version of header module.
Backplane bus version		Backplane bus version of header module.
Hardware		
EEPROM checksum		EEPROM checksum.
Self-diagnostic test		Bitwise status of self-tests at start up.
ROM test		--
RAM test		--
Reserved		--
EEPROM test		--
MAC ID test		--
DIP switch setting		DIP switch setting to set IP address of Header module as slave station. For M-CCB-H, refer section M-CCB-H: Setting of station IP address , for more details.
Switch 1		--
Switch 2		--
...		...
Switch 10		--
IP setting		
IP address		Header IP address.
Subnet mask		Subnet mask.
MAC ID		Header MAC ID.
Memory size		
IX		Configured size of bit input image (IX) No. of bytes
IW		Configured size of word input image (IW).No. of bytes
QX		Configured size of bit output image (QX). No. of bytes
QW		Configured size of word output image (QW) No. of bytes
SB		Configured size of diagnostic (SB) image No. of bytes
Header scan time		
Current		Header scan time.
Maximum		Maximum header scan time.
Minimum		Minimum header scan time.

Diagnostics summary		
No. of configured slots		Number of configured slots.
No. of detected slots		Number of detected slots.
Status		Bitwise status of header module. For M-CCB-H, refer section M-CCB-H: IO Data for more details. For M-MT-H, refer section M-MT-H: IO Data for more details.
Slots 0-15		
Detected		Bitwise module detection status.
Healthy		Bitwise module health status.
IO error		Bitwise status of module mismatch or absent.
COM error		Bitwise status of COM error after power ON
Fatal error		Bitwise (slotwise) status of module fatal error.
Non-fatal error		Bitwise status of module non-fatal error
:	:	:
:	:	:
Slots 48-63		
Detected		Bitwise module detection status.
Healthy		Bitwise module health status.
IO error		Bitwise status of module mismatch or absent.
COM error		Bitwise status of COM error after power ON
Fatal error		Bitwise (slotwise) status of module fatal error.
Non-fatal error		Bitwise status of module non-fatal error
Fieldbus/Network diagnostics		
Refer sections M-CCB-H: IO Data , and M-MT-H: IO Data for more details of Header module specific diagnostics		

3. Similarly, click on function “Slot diagnostics”  to monitor slot diagnostics.

This pops up following window of “SLOT DIAGNOSTIC INFORMATION”.

SLOT DIAGNOSTIC INFORMATION : [M-CCB-H]

Slot	Vendor	Configured...	Present Module	Ver. Configured Module	Ver. Present Module	HW Ver.	FW Ver.	Backplane Ver.	Error	
0	1	M-CCB-H	M-CCB-H	0.0.0.4	0.0.0.11	1.0.0.0	0.0.0.11	0.0.0.8	0000	...
1	1	M-16D	M-16D	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
2	1	M-16D	M-16D	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
3	1	M-8D	M-8D	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
4	1	M-16TE	M-16TE	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
5	1	M-16TE	M-16TE	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
6	1	M-UAD2	M-UAD2	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
7	0	M-DA2	M-DA2	1.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0000	...
8	0	M-8TE	M-8TE	1.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0000	...
9	0	M-16TE	M-16TE	1.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0000	...

Ok

List of user names of Header module and IO modules configured

List of user names of connected Header module and IO modules physically attached to the Header.

Hardware versions of present modules.

Firmware version of present modules

Error code of individual module along with error description in tool tip

Slot diagnostic window gets updated in following cases as,

SLOT DIAGNOSTIC INFORMATION : [M-CCB-H]

Slot	Vendor	Configured...	Present Module	Ver. Configured Module	Ver. Present Module	HW Ver.	FW Ver.	Backplane Ver.	Error	
0	1	M-CCB-H	M-CCB-H	0.0.0.4	0.0.0.11	1.0.0.0	0.0.0.11	0.0.0.8	0000	...
1	1	M-16D	M-16D	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	← 1
2	1	M-16D	M-16D	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
3	1	M-8D	M-8D	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
4	1	M-16TE	M-16TE	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
5	1	M-16TE	M-UAD2	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	1003	← 2
6	1	M-16TE	M-16TE	1.0.0.0	1.0.0.0	1.0.0.0	1.0.0.0	0.0.0.2	0000	...
7	0	M-UAD2	M-UAD2	1.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	1003	← 3
8	0	M-DA2	M-16TE	1.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	1003	...
9	0	M-16DE		1.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	1003	...
x	x	x	x	x	x	x	x	x	x	...
10	0	M-DA2		1.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	0.0.0.0	1003	...

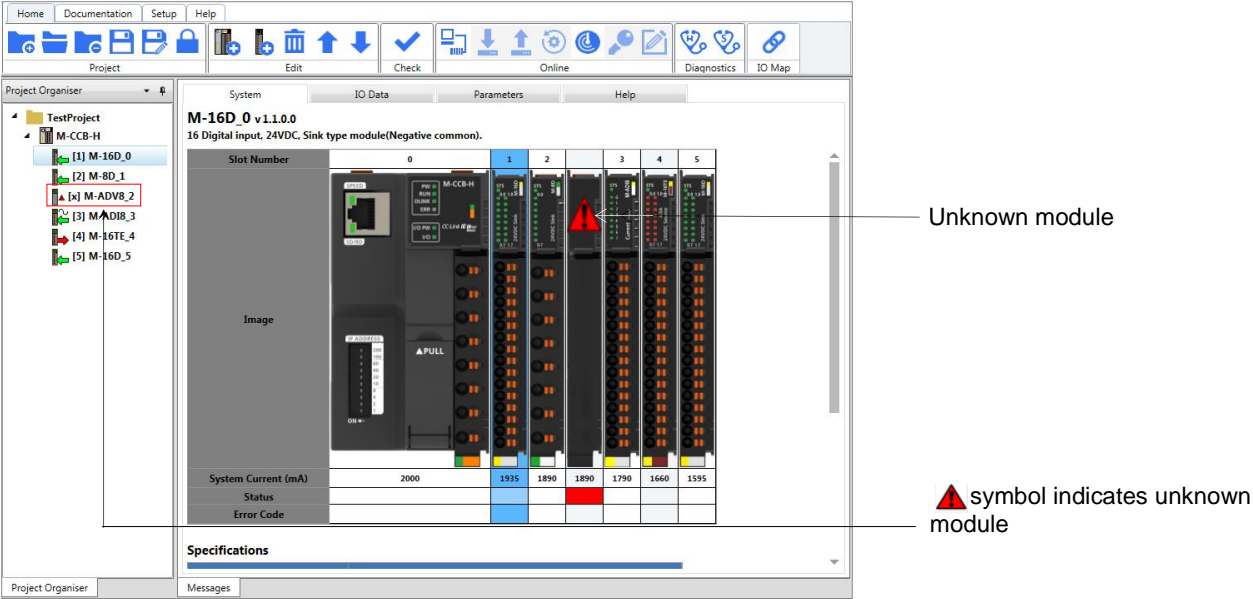
5 4

Ok

Sr. No.	Description
1	Module configured successfully and physically present in configured slot.
2	Module mismatch: Module configured in slot and module physically attached in slot is different.
3	Error is detected on module.
4	System module is attached in intermediate slot.
5	Module is configured but not physically present in slot.

Unknown module:

Tool declares 'Unknown module' error if module in project is not supported by tool. Unknown module is indicated as shown in below



In this case user must update 'Modular IO Configurator Tool' to latest version.

Module versions:

Multiple versions of modules are supported in configurator tool [V1.6.0.0] or later.

Refer file 'N16001AAMH02 Modular IO Version Information' for details of module versions of headers and IO modules in Modular IO system.

NOTE

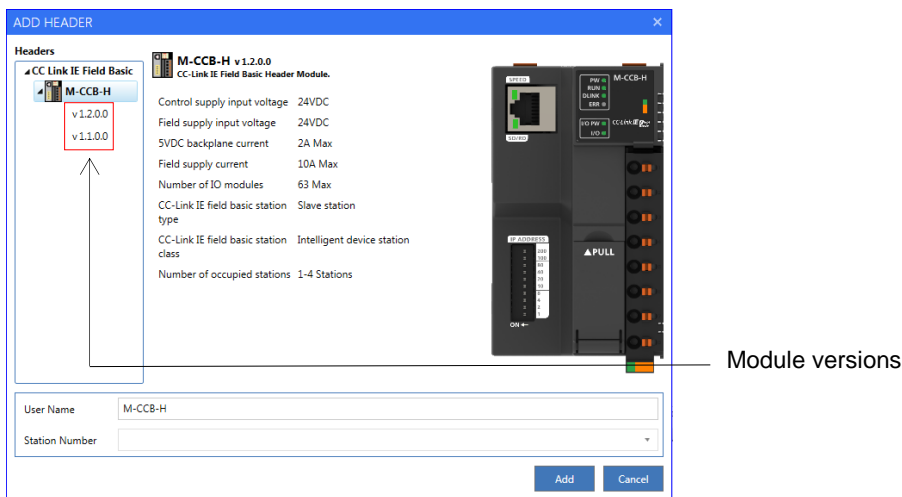
Project created using older configurator tool (V1.5.0.0 and lesser) are compatible with newer versions.

NOTE

Project created using configurator tool supporting multiple module versions (V1.6.0.0 or later) may open in older versions of tool but it will change module versions in project without any warning. Project data like configuration parameters etc. will get lost in such cases.

Add modules

While creating new project, user can choose modules from different available versions in configuration tool. While adding new header or module, tool shows available device versions of the module as shown below.



By default, latest version of module will get selected.

Select module version from the list and click Add button to add module of selected module version in project.

Version check while connecting to header

While communicating to target header (for scan, upload, download, connect etc.), configurator tool compares version of header added in project. If header version of target header is older than one configured in project then connection to header is aborted with message,

Configured header version '1.1.0.0' is incompatible with target header version '1.0.0.0'. Connection to header aborted

Where,

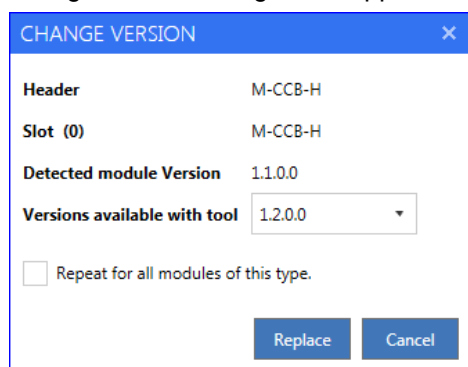
1.1.0.0: Version of header added in project.

1.0.0.0 : Version of target header

In this case user must change version of header module in project.

To change version of header, right click on header in Project Organiser and select option 'Change Version'.

Change version dialogue will appear as shown below.



Open existing project or uploaded project

While 'Opening project' or 'Uploading project' from header, tool compares version of modules in project with versions available with tool.

Following errors can be occur during device version comparison

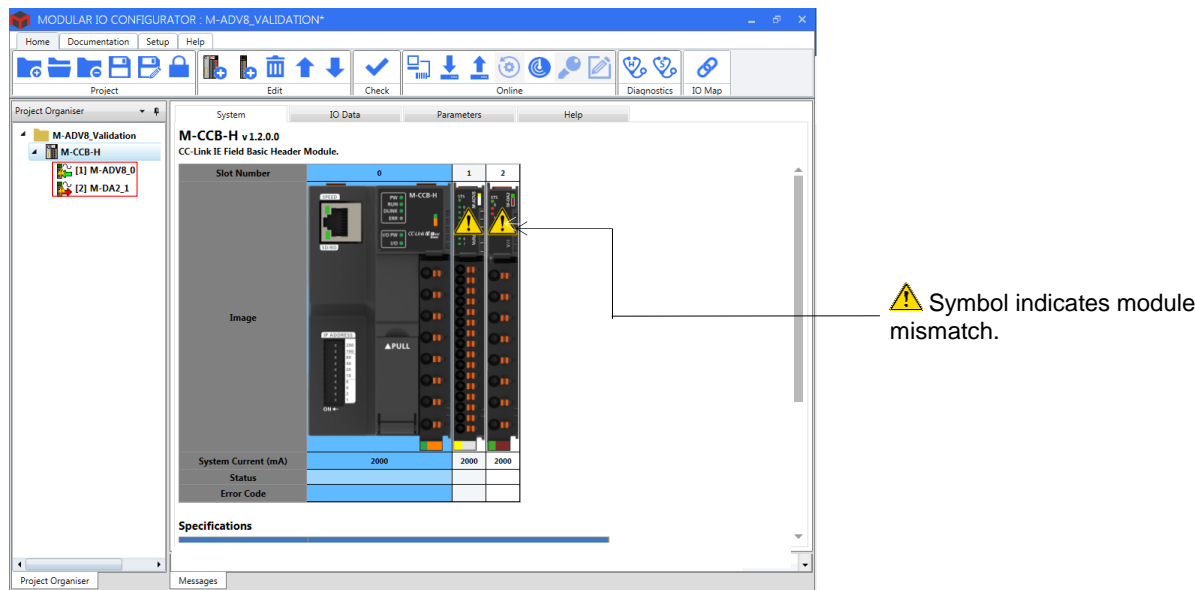
Unknown module detection :

Refer section "[Unknown module](#)" for more details.

Version mismatch detection :

Tool declares version mismatch, if module from project is supported by tool but module version in opened or uploaded project is not available with tool.

Version mismatch indicated as shown below.



This can happen because project being opened or uploaded is created with newer version of Configurator tool.

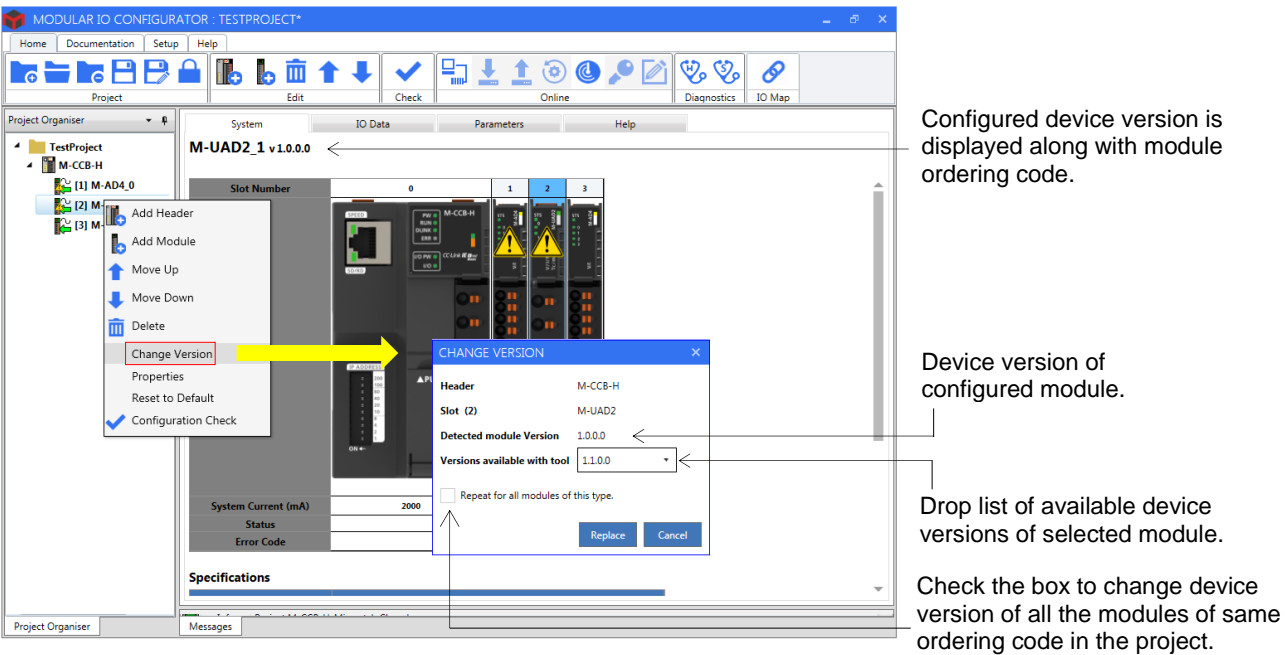
NOTE

Slot diagnostics shows version information of connected IO modules.

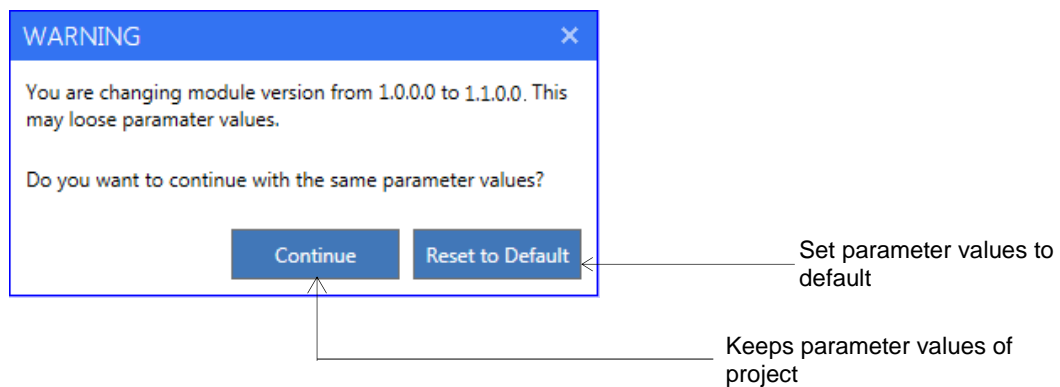
In this case, following actions can be performed,

- User can update 'Modular IO Configurator Tool' to latest version. Latest Configurator tool will support all versions of module.
- User can change module version in project to one which is available with tool.

To change module version, right click on module with version mismatch in "Project Organiser" window and select 'Change Version' as shown below.





Warning is displayed when click on "Replace" button.



Configuration transfer with SDHC memory card:

Tool supports configuration file transfer to/from SD card. This function is useful to store configuration file backup and transport configuration file to the End user.

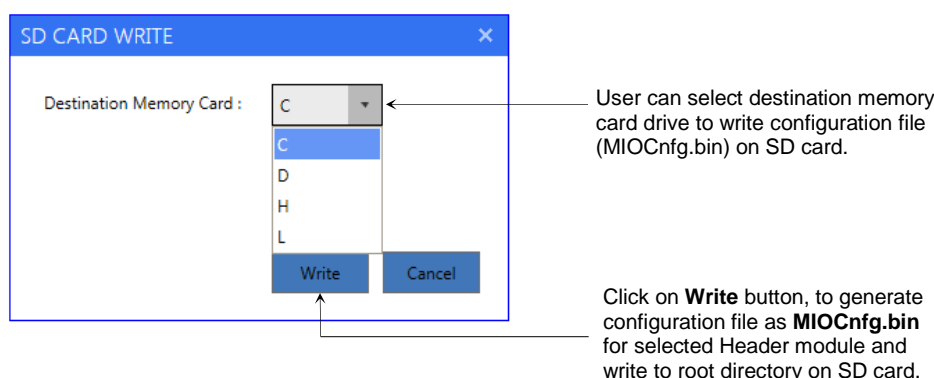
Setup menu provides SD card related functions.

- Write to SD Card 
- Read from SD Card 

NOTE

Insert SD card formatted with FAT32 file format in card reader for Read/ Write operation.

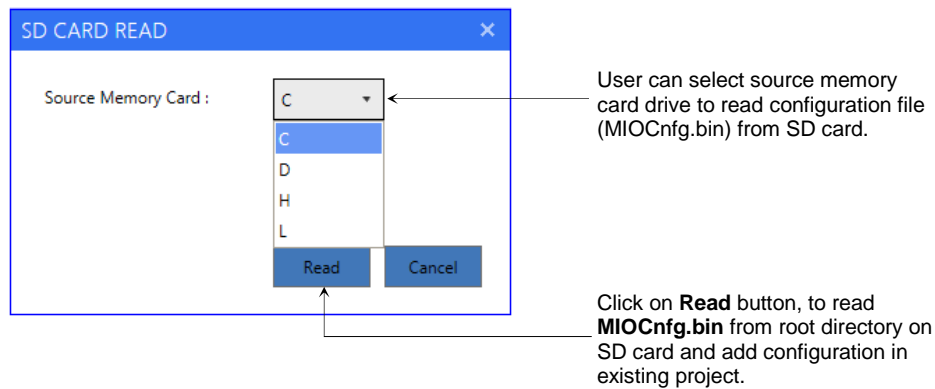
1. **Write to SD Card:** It opens “SD CARD WRITE” window.



Error and warning messages are popped up during “Write to SD card” operation as listed below.

Message Type	Display message	Occurrence
Error	Invalid configuration	If tries to write invalid configuration file
	Destination drive is not formatted with FAT32. Format drive and try again.	If selected removable destination drive is not formatted with FAT32 file format.
	Destination drive is not available	SD card is not inserted in reader device
	Destination drive is not removable	If selected “Destination memory card” is not removable.
	Insufficient memory available in selected drive	If space available on selected removable drive is less than 192 Kbytes.
Warning	Modular IO configuration file is already present at destination, do you want to replace?	If MIOcnfg.bin is already present on SD card.
In Message window of “Modular IO Configurator”		
Info	Start of SD card write	Configuration file transfer is initiated
	SD card write successful	After successful file transfer from tool to SD card
Error	Invalid SD card format	Tool checks file system of destination drive
	SD card write unsuccessful	Tool checks whether configuration file writing is successful or not.

2. **Read from SD Card:** It opens “SD CARD READ” window.




Error and warning messages are popped up during “Read from SD card” operation as listed below.

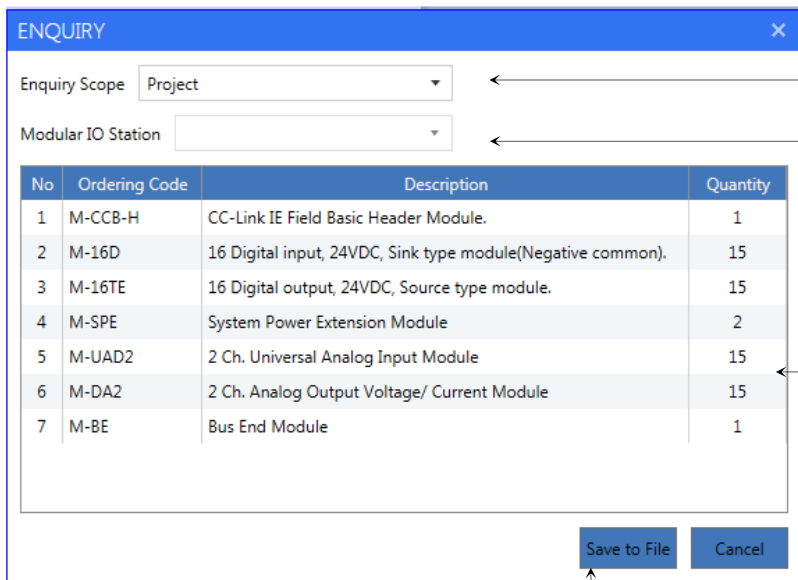
Message Type	Display message	Occurrence
Error	Source drive is not formatted with FAT32. Format drive and try again.	If selected source removable drive is not formatted with FAT32 file format.
	Configuration file is not available in source drive.	If configuration file is not present in source drive or configuration file name in source drive is other than “MIOcnfg.bin”
	Header ordering code in configuration file is not matched with selected header. Selected Header : [Ordering code] Configuration file : [Ordering code]	If Header types configured in tool (.mio project file) and defined in MIOcnfg.bin are different.
	Header username [username] in configuration file is already present in project. Cannot add configuration from SD card. Change header name and try again.	If header user names in MIOcnfg.bin on SD card and in project are identical
	Source drive is not available	SD card is not inserted in reader device
	The selected drive is not removable	If selected “Source memory card” is not removable
In Message window of “Modular IO Configurator”		
Info	Start of SD card read	Configuration file transfer is initiated
	SD card read successful	After successful file transfer from SD card to tool
Error	Invalid SD card format	Tool checks file system of destination drive
	SD card read unsuccessful	Tool checks whether configuration file writing is successful or not.

Enquiry generation (in .csv file format):

This is offline feature and useful to generate enquiry document for user in .csv file format.

Generated enquiry document covers list of ordering codes along with description and quantity of modules. Follow the steps below.

1. Click on function  on Documentation tab. This pops up ENQUIRY window as shown below.



ENQUIRY

Enquiry Scope: Project

Modular IO Station:

No	Ordering Code	Description	Quantity
1	M-CCB-H	CC-Link IE Field Basic Header Module.	1
2	M-16D	16 Digital input, 24VDC, Sink type module(Negative common).	15
3	M-16TE	16 Digital output, 24VDC, Source type module.	15
4	M-SPE	System Power Extension Module	2
5	M-UAD2	2 Ch. Universal Analog Input Module	15
6	M-DA2	2 Ch. Analog Output Voltage/ Current Module	15
7	M-BE	Bus End Module	1

Save to File Cancel

User can select enquiry scope as either **Project** or **Modular IO Station**.

This field is active when user chooses "Enquiry Scope" parameter is set as **Modular IO Station**.

User can select Modular IO station (Header module) from the list of configured stations.

Tool generates list of modules as per configuration.

User can save enquiry document on local drive in .csv format.

2. Select Enquiry scope as Project or Modular IO Station.
 - Enquiry of all the Modular IO stations is generated if option selected is Project.
 - Enquiry of selected single Modular IO Station is generated if option selected is Modular IO Station.
3. Click on "Save to file" button to save enquiry as **<Project Name>_Enquiry.csv** on local drive.

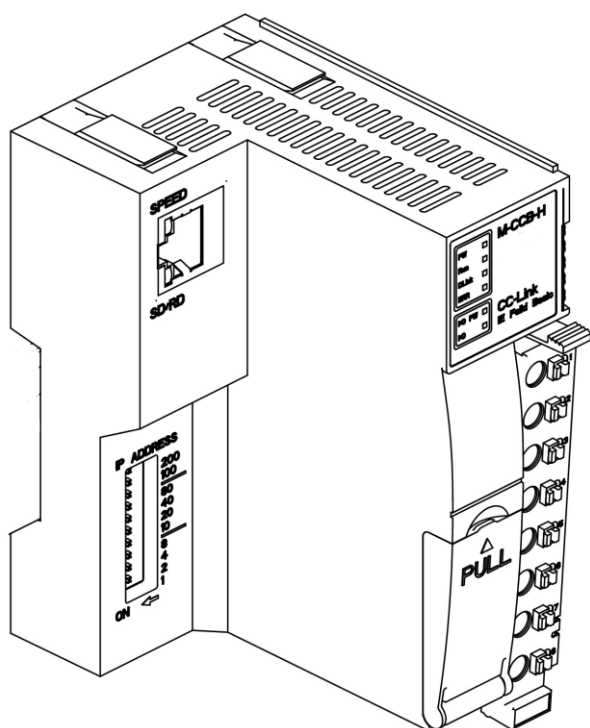
[Back To Index Page](#)

5 Header Modules

[M-CCB-H \[CC Link IE Field Basic Header Module\]](#)[M-MT-H \[Modbus TCP Header Module\]](#)[M-EIP-H \[Ethernet/ IP Header Module\]](#)[Configuration Transfer with SDHC Memory Card](#)

5.1 M-CCB-H

[CC Link IE Field Basic Header Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[Wiring: Module Supply](#)

[LED Indications](#)

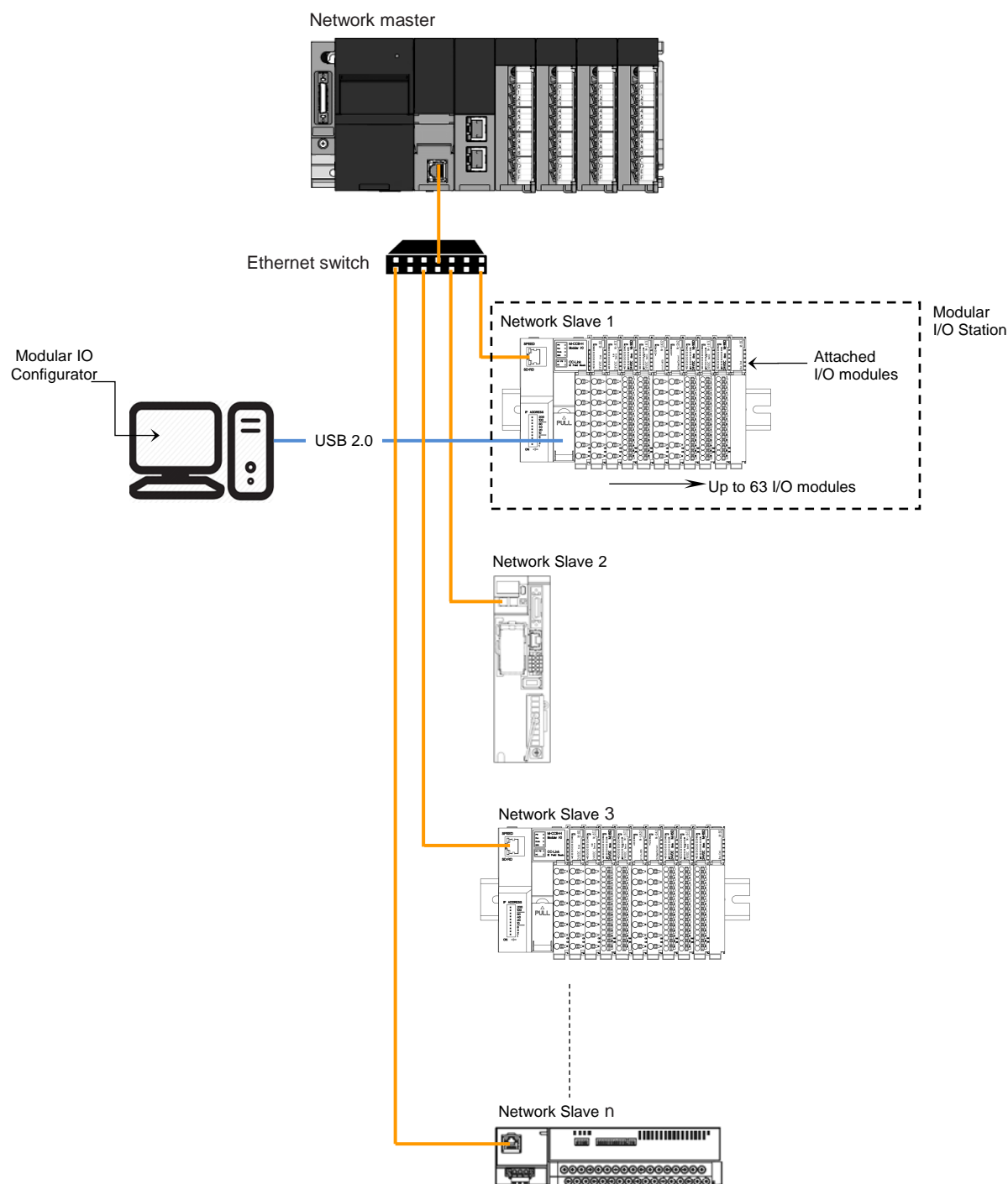
[Setting of Station IP Address](#)

[Memory Mapping](#)

[Parameters](#)

[IO Data](#)

The figure below provides overall system configuration.



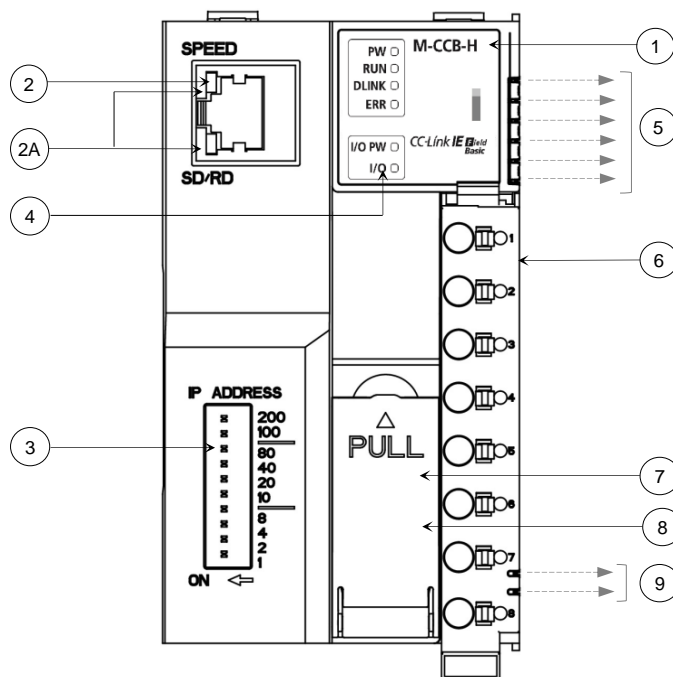
NOTE

- Refer CC-Link IE Field Network Basic [Manual Number: SH (NA)-081684ENG-D] and onwards for more information.
- Refer “Quick Start Guide Interfacing Modular IO Header M-CCB-H with Mitsubishi PLCs on CC-Link IE Field Basic Network.doc” to establish communication with Mitsubishi PLCs (iQ-R, iQ-F, Q and L series).

Module Overview

M-CCB-H Header module is a slave station in a CC-Link IE Field Basic network.

Part Names



No.	Name	Description
1	M-CCB-H	Module ordering code
2	Ethernet Port [RJ45]	CC-Link IE Field Basic communication port
2A	LED Indications on Ethernet port	SPEED: 1 Green LED for link status SD/RD: 1 Green LED for data transmission status
3	Settings for Station IP Address	Last octet of IP address is set by DIP switch
4	Module LED Indication	PW: 1 Green LED for power status of module. RUN: 1 Green LED for operation status of module. D LINK: 1 Green LED to display data link status of module. ERR: 1 Red LED to display error status of module. I/O PW: 1 Green LED for field power status. I/O: 1 Bi-colour LED for module status.
5	System Power Supply Interface	6 Outgoing pins for System power supply interface
6	Terminal Block	8-point removable push type
7	SD Card Interface	Micro SD (for configuration transfer)
8	USB Interface	USB 2.0
9	Field Power Supply Interface	2 Outgoing pins for Field power supply interface

Specifications

The table below provides technical specifications of **M-CCB-H**.

Specification		Description				
Module Ordering Code		M-CCB-H				
System Power Supply	Input voltage	24 VDC (11 to 28.8 VDC, ripple included), 22 Watt				
	Inrush current	20 A for 20 µsec duration				
	Protection	Reverse polarity protection				
	Output voltage	5 VDC				
	Output current for IO modules	2 A				
Field Power Supply	Voltage	24 VDC				
	Current	10 A				
External Connections	Network communication	RJ45 female				
	Input power supply (System power supply and Field power supply)	8 Point terminal block				
	Output System power supply	6-Pins				
	Output Field power supply	2-Pins				
	Configuration port	USB 2.0				
Fieldbus Support		CC-Link IE Field Basic				
Station Type		Slave station				
Number of Occupied Stations		1-4 stations (user configurable)				
Number of IO Modules		63 maximum (including system modules ^[*1])				
IO Data Size		Depends on number of stations occupied				
		No. of occupied stations	RX	RY	RWr	RWw
		1	64 bits	64 bits	32 word	32 word
		2	128 bits	128 bits	64 word	64 word
		3	192 bits	192 bits	96 word	96 word
		4	256 bits	256 bits	128 word	128 word
Communication Protocol		UDP				
Port Numbers		No. 61450 (Cyclic data)				
		No. 61451 (Node Search and IP Address Set dedicated for CC-Link IE Field Basic Network)				
IP Address		IPv4 range: 0.0.0.1 to 223.255.255.254 (Default 192.168.3.0)				
Subnet mask		Default: 255.255.255.0 Changes as per IP address class.				
Physical Layer		10/100BASE-T				
Cable for Fieldbus Communication		Ethernet standard compliant products cable Cat5e or higher, shielded twisted pair cable				
Maximum Cable Distance		100 meters				
Network Topology		Star				

Specification	Description
Terminal Block (Removable push type)	8 point
Recommended Wire Specifications	0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm	105 x 60 x 92

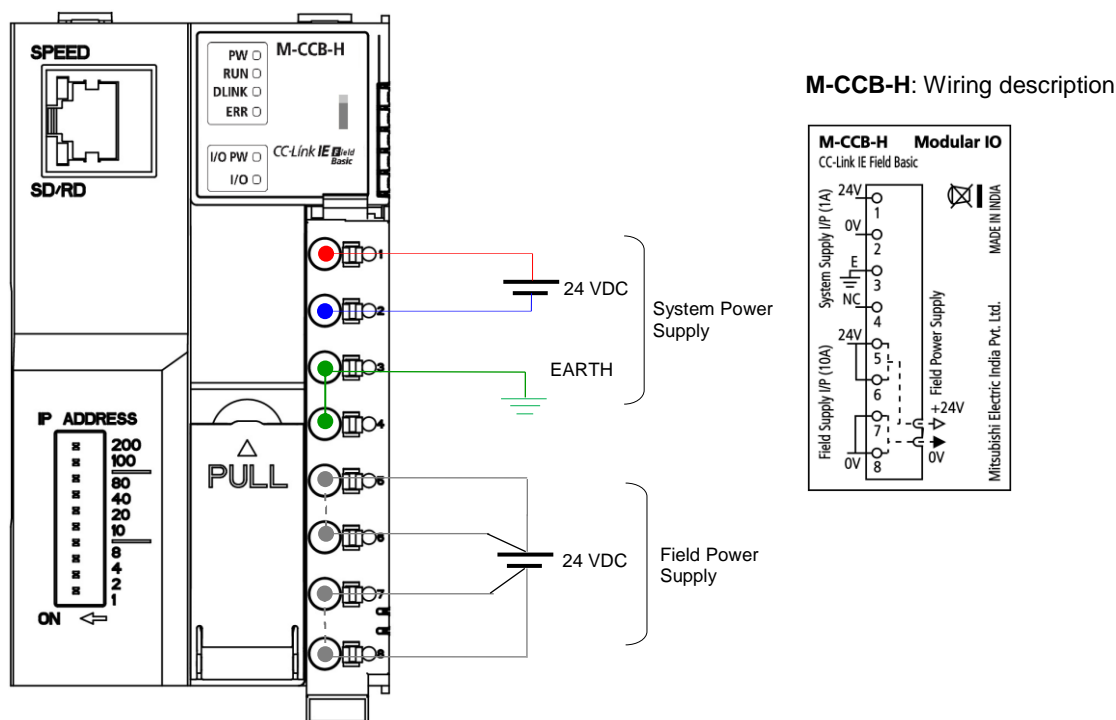
NOTE

*1 Digital and analog IO modules are intelligent modules and provide IO data and diagnostics to Header module. System modules are passive modules. So Header module does not provide any information about system modules. Header module cannot detect presence of System modules in a modular IO station. So System modules do not appear in the list after scan.

Wiring: Module Supply

The figure shows Header module front alongwith system power supply connections and field power supply connections. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



Connect +24 VDC system power supply between first two terminals (i.e. terminal 1 and 2).

Connect terminals 3/ 4 to clean EARTH directly.

Connect +24 VDC field power supply to terminal numbers 5 and 6.

Connect field power supply ground to terminal numbers 7 and 8.

NOTE

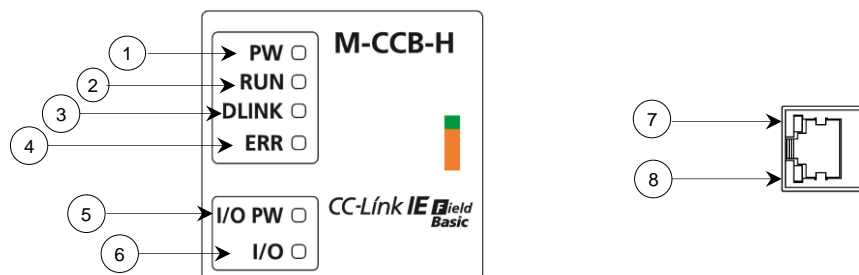
Current carrying capacity of each terminal of terminal block is 5 A max. Field power supply interface between modules has current carrying capacity of 10 A.

So it is necessary to connect 2 wires from source of field power supply to utilize maximum capacity of 10 A. Field power supply connected to terminal block is directly carried to field power supply pins for interfacing with IO modules.

Ensure that EARTH cable is thick and short as far as possible to provide low impedance path.

LED Indications

This section provides meaning of LED indications available on Header module.



No.	LED	Colour	Status	Description
1	PW	Green	ON	System power to Header module is ON
			OFF	System power to Header module is OFF
2	RUN	Green	ON	Header module functioning normal. No hardware error detected.
			OFF	Hardware error detected.
			Blinking	If SD card is detected in Header slot at power ON, <ul style="list-style-type: none"> Configuration download or upload to/from SD card is in progress.
3	D LINK	Green	ON	Cyclic transmission is ON.
			Blinking	Cyclic transmission stopped due one of the conditions occurred. <ul style="list-style-type: none"> Number of occupied station mismatch. Station not configured in network master. Another station with same IP address detected on network Header configuration download is in progress.
			OFF	Data link not established.
4	ERR	Red	ON	Fatal station error occurred*.
			Blinking	Non-fatal station error occurred*.
			OFF	No error
5	I/O PW	Green	ON	Field power to Header module is ON
			OFF	Field power to Header module is OFF

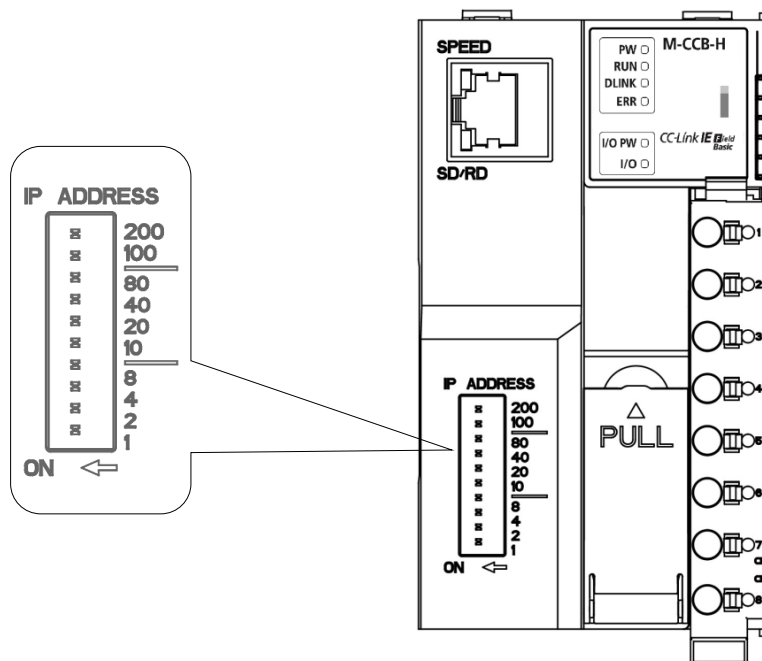
6	I/O	Bi-colour	None		Header module is powered OFF or Hardware failure error detected on header module.
			Blue Green	ON	Header module is powered ON and communicating with IO module and no error is present.
				Single Flash	Header module is powered ON and ready for communication with IO modules. No IO module detected.
			Red	ON	One of the following conditions occurred. <ul style="list-style-type: none"> Invalid configuration detected No communication due to backplane bus fault. Header configuration download (using either USB interface or SD card interface) is in progress
				Single Flash	IO module mismatch detected for one or more IO slots.
				Double Flash	Communication error observed for one or more IO modules.
				Triple Flash	Fatal error (Except IO Module mismatch or communication error) is observed for one or more IO modules, OR IO module related error is observed for one or more modules. [This includes sensor wire break, no 24V detected by IO module etc.]
			Yellow	ON	Output test mode is ON.
8	SPEED	Green	ON		Link up (100 Mbps)
			OFF		Link down or link up (10 Mbps)
7	SD/RD	Green	ON		Data transmission or reception is in progress on Ethernet port.
			OFF		No data transmission or reception.

*Refer section [Troubleshooting](#) for station error code list and error messages.

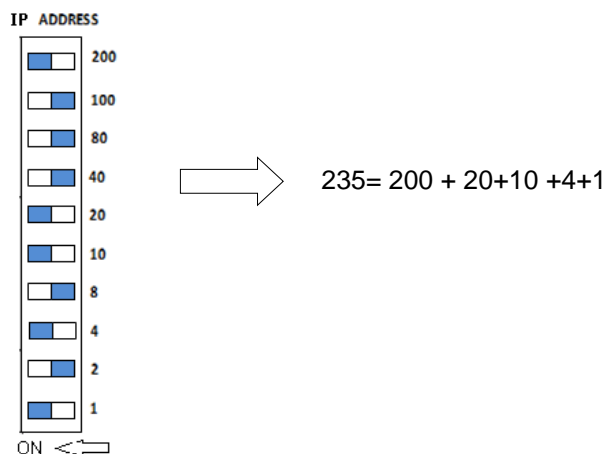
Setting of Station IP Address

This section provides information about setting of IP address on Header module.

First three octets of IP address are generated by network master station and the fourth octet is set using DIP switches as shown below.



Example below shows DIP switch setting for value of 235.



NOTE

If DIP switch setting is 0 (all switches set to OFF), then module switches to default IP address (192.168.3.100) and subnet mask (255.255.255.0).

Later on, user can modify default IP address and subnet mask using engineering software, after automatic detection of network devices.

Memory mapping

Local memory is mapped to CC-Link IE Field Basic remote IO and remote registers as shown below.

Memory Area	Local Address	Access	CC Link IE Field basic master
Input bit	IX	Read	RX
Input word	IW	Read	RWr
Output bit	QX	Write	RY
Output word	QW	Write	RWw
Status byte	SB	Read	RWr

NOTE

SB memory is shared with network master if “Share SB to RWr” parameter is set as Enable’.

IW memory is mapped to RWr memory and then SB memory is mapped to RWr memory consecutively.

Number of occupied stations configured decides size of memory to be shared with master during cyclic transmission. The table below shows size of link device memory consumed depending on number of occupied stations.

No. of occupied stations	RX	RY	RWr	RWw
1	64 bit	64 bit	32 word	32 word
2	128 bit	128 bit	64 word	64 word
3	192 bit	192 bit	96 word	96 word
4	256 bit	256 bit	128 word	128 word

NOTE

CC-Link IE Field Basic slave device consumes complete link device memory as per number of occupied stations irrespective of usage e.g. even though slave device is 16 Pt. digital input module, it consumes RX (64 bits), RY (64 bits), RWr (32 words) and RWw (32 words). Out of this memory, RX (16-bits) is useful and rest of the memory is consumed but unused.

Parameters

User can set the following parameters using Modular IO Configurator.

Parameter Name	Project Value	Comment
Number of stations occupied	1 [Default]	Defines number of stations occupied.
	2	
	3	
	4	
Share diagnostics	Enable [Default]	Enables diagnostic data (SB) updation.
	Disable	
Action on fatal error	Stop N/W Communication	Defines action on fatal error to any slot including header. Stop or continue communication with N/W master.
	Continue N/W Communication	
Share SB to RWr	Enable	Enables diagnostic data (SB) sharing with N/W master
	Disable [Default]	
Output hold/ clear	Hold	Defines output state of IO modules when disconnected from N/W or master CPU is not in RUN mode.
	Clear	

Header diagnostic data is available in Status Byte (SB) memory, if parameter “Share diagnostics” is set to **Enable**.

IO Data


User can monitor following Header diagnostics in SB memory.

Diagnostic summary	Data Type	Local Address*	Bit Status	Description
Hardware failure	BOOL	SB 0.0	TRUE	Becomes TRUE, if hardware error of Header module occurs.
			FALSE	
Configuration error	BOOL	SB 0.1	TRUE	Becomes TRUE, if invalid configuration data is downloaded in Header module.
			FALSE	
IO module mismatch error	BOOL	SB 0.2	TRUE	Becomes TRUE, if IO module configured in slot is different than the physically present IO module.
			FALSE	
IO module COM error	BOOL	SB 0.3	TRUE	Becomes TRUE, if data exchange between Header and one or more IO modules is stopped after successful data exchange.
			FALSE	
Reserved	BOOL	SB 0.4	--	--
Reserved	BOOL	SB 0.5	--	--
Fatal error in one or more slots	BOOL	SB 0.6	TRUE	Becomes TRUE, if fatal error occurs in one or more IO slots.
			FALSE	
Non-fatal error in one or more slots	BOOL	SB 0.7	TRUE	Becomes TRUE, if non-fatal error occurs in one or more IO slots.
			FALSE	
Reserved	BOOL	SB 1.0	--	--
Additional IO modules detected	BOOL	SB 1.1	TRUE	Becomes TRUE, if Header module detects additional IO modules (other than configured one) at modular IO station.
			FALSE	
Reserved	BOOL	SB 1.2	--	--

User can monitor slot status.

Slot status	Data Type	Local Address*	Bit Status	Description
Slot status 0..7				
Slot 0	BOOL	SB 2.0	TRUE	Module is configured in slot 0 and healthy.
			FALSE	Module in slot 0 has error or module is not configured in slot 0.
Slot 7	BOOL	SB 2.7	TRUE	Module is configured in slot 7 and healthy.
			FALSE	Module in slot 7 has error or module is not configured in slot 7.
Slot status 8..15				
Slot 8	BOOL	SB 3.0	TRUE	Module is configured in slot 8 and healthy.
			FALSE	Module in slot 8 has error or module is not configured in slot 8.
Slot 15	BOOL	SB 3.7	TRUE	Module is configured in slot 15 and healthy.
			FALSE	Module in slot 15 has error or module is not configured in slot 15.
Slot status 56..63				
Slot 56	BOOL	SB 9.0	TRUE	Module is configured in slot 56 and healthy.
			FALSE	Module in slot 56 has error or module is not configured in slot 56.
Slot 63	BOOL	SB 9.7	TRUE	Module is configured in slot 63 and healthy.
			FALSE	Module in slot 63 has error or module is not configured in slot 63.

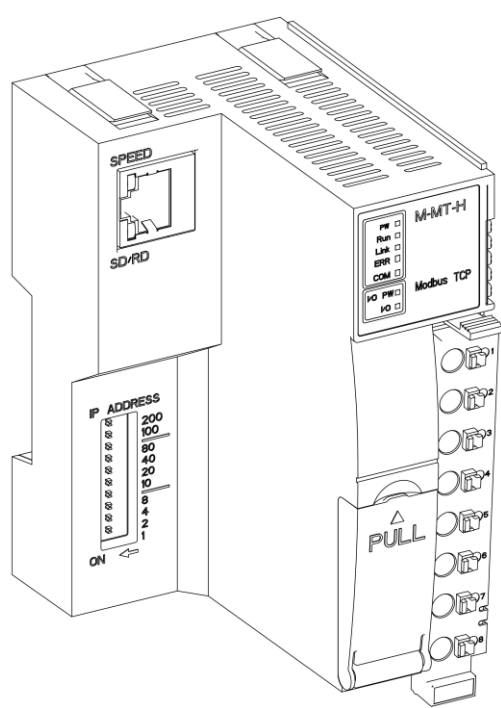
*For more details of module error, refer section “IO Data” of individual IO module in this manual.

In Modular IO Configurator, Header diagnostics  provides CC-Link IE Field Basic network specific diagnostics in as shown.

Diagnostics	Data type	Description
CC-Link IE Field Basic diagnostics	WORD	Bitwise CC-Link IE Field basic diagnostics
Cyclic data transmission ON	BOOL	--
Invalid station ID	BOOL	--
Duplicate station ID	BOOL	--
Slave disconnects due to time-out	BOOL	--
Slave station disconnection request issued	BOOL	--
Number of occupied station mismatch	BOOL	--
Control master detected	BOOL	--
IP address setting switch changed	BOOL	--
PHY link down	BOOL	--
Time between cyclic transmission requests (msec)	WORD	Time between last two transmission requests received from master (msec).
Maximum time between cyclic transmission requests (msec)	WORD	Maximum time between cyclic transmission requests (msec).
Minimum time between cyclic transmission requests (msec)	WORD	Minimum time between cyclic transmission requests (ms).
Time since last cyclic transmission requests (msec)	WORD	Time since last cyclic transmission request (msec).
No. of cyclic transmission requests received	WORD	Number of cyclic transmission requests received.
No. of cyclic transmission responses sent	WORD	Number of cyclic transmission responses sent.
No. of receive frame error	WORD	Number of receive frame errors.

5.2 M-MT-H

[Modbus TCP Header Module]



Module Overview

Part Names

Specifications

Wiring: Module Supply

LED Indications

Setting of Station IP Address

Memory Mapping

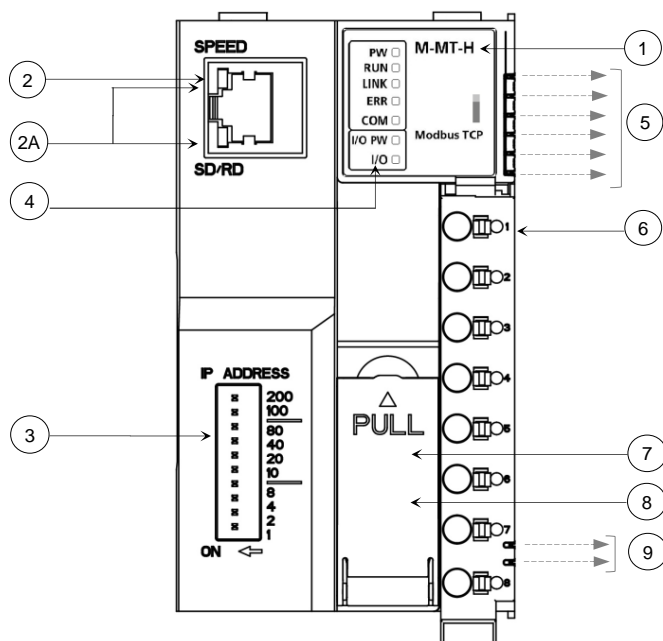
Parameters

IO Data

Module Overview

M-MT-H Header module is a Modbus TCP server in a Modbus TCP network. It allows connection of 1 Modbus TCP client at a time.

Part Names



No.	Name	Description
1	M-MT-H	Module ordering code
2	Ethernet Port [RJ45]	Field bus communication port
2A	LED Indications on Ethernet port	SD/ RD: 1 Green LED for data transmission status SPEED: 1 Green LED for link status
3	Settings for Station IP Address	Last octet of station IP address is set by DIP switch
4	Module LED Indication	PW: 1 Green LED for power status of module. RUN: 1 Green LED for operation status of module. D LINK: 1 Green LED to display data link status of module. ERR: 1 Red LED to display error status of module. I/O PW: 1 Green LED for field power status. I/O: 1 Bi-colour LED for module status.
5	System Power Supply Interface	6 Outgoing pins for System power supply interface
6	Terminal Block	16-point removable push type
7	SD Card Interface	Micro SD (for configuration transfer)
8	USB Interface	USB 2.0
9	Field Power Supply Interface	2 Outgoing pins for Field power supply interface

Specifications

The table below provides technical specifications of **M-MT-H**.

Specification		Description
Module Ordering Code		M-MT-H
System Power Supply	Input voltage	24 VDC (11 to 28.8 VDC, ripple included), 22 Watt
	Inrush current	20 A for 20 µsecs duration
	Output voltage	5 VDC
	Output current for IO modules	2 A
	Protection	Reverse polarity protection
Field Power Supply	Voltage	24 VDC (18 to 30 VDC, ripple included)
	Current	10 A
External Connections	Network communication	RJ45 female
	Input power supply (System power supply and Field power supply)	8 Point terminal block
	Output System power supply	6-Pins
	Output Field power supply	2-Pins
	Configuration port	USB 2.0
Fieldbus Support		Modbus TCP Server; 1 client connection
Baud Rate		10/100 Mbps
IO Data Size		1024 digital inputs 1024 digital output 256 analog inputs 256 analog outputs 512 bytes status memory
Communication Protocol		TCP
Port Number		502
IP Address		IPv4 range: 0.0.0.1 to 223.255.255.254 (Default 192.168.3.100)
Subnet mask		Default: 255.255.255.0
Cable for Fieldbus Communication		Ethernet standard compliant products cable Category 5 or higher (STP cable)
Maximum Cable Distance		100 meters
Network Topology		Star
Number of IO Modules		63 maximum (including system modules ^{*1})
Terminal Block (Removable push type)		8 Point
Recommended Wire Specifications		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm		105 x 60 x 92

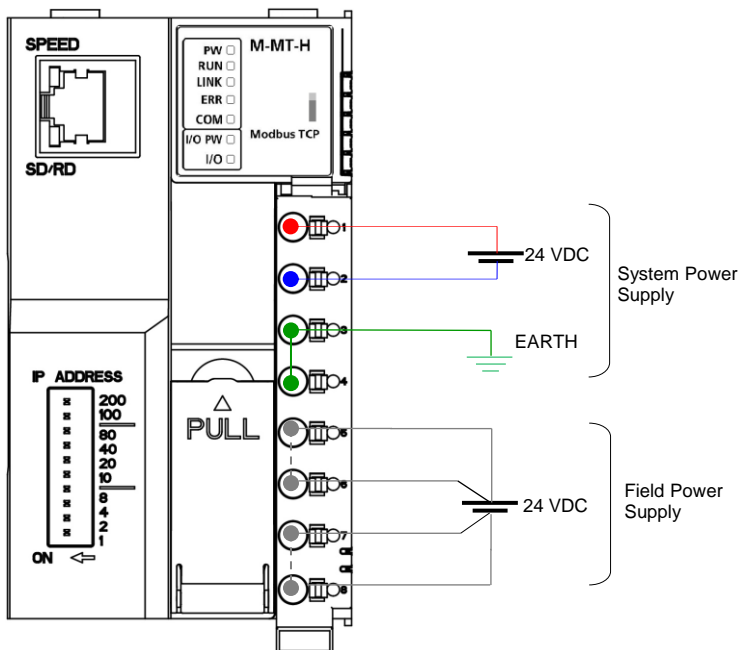
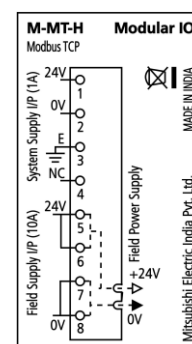
NOTE

*1 Digital and analog IO modules are intelligent modules and provide IO data and diagnostics to Header module. System modules are passive modules. So Header module does not provide any information about system modules. Header module cannot detect presence of System modules in a modular IO station. So System modules do not appear in the list after scan.

Wiring: Module Supply

The figure shows Header module front alongwith system power supply connections and field power supply connections. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).

**M-MT-H: Wiring description**

Connect +24 VDC system power supply between first two terminals (i.e. terminal 1 and 2).

Connect terminals 3/ 4 to clean EARTH directly.

Connect +24 VDC field power supply to terminal numbers 5 and 6.

Connect field power supply ground to terminal numbers 7 and 8.

NOTE

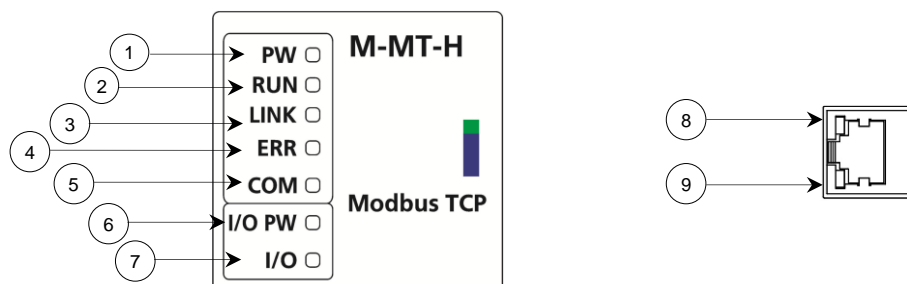
Current carrying capacity of each terminal is 5A max. So it is necessary to connect 2 wires from source of field power supply to utilize maximum capacity of 10 A of Field power supply interface between modules.

Field power supply connected to terminal block is directly carried to field power supply pins for interfacing with IO modules.

Ensure that EARTH cable is thick and short as far as possible to provide low impedance path.

LED Indications

This section provides meaning of LED indications available on Header module.



No.	LED	Colour	Status	Description	
1	PW	Green	ON	System power to Header module is ON	
			OFF	System power to Header module is OFF	
2	RUN	Green	ON	Header module functioning normal. No hardware error detected.	
			OFF	Hardware error detected	
			Blinking	If SD card is detected in Header slot at power ON, <ul style="list-style-type: none">Configuration download or upload to/from SD card is in progress.	
3	LINK	Green	ON	Modbus TCP port is open	
			OFF	Modbus TCP port is close	
4	ERR	Red	ON	Fatal station error occurred*.	
			Blinking	Non-fatal station error occurred*.	
			OFF	No error.	
5	COM	Green	ON	Valid Modbus query is received and response sent.	
6	I/O PW	Green	ON	Field power to Header module is ON	
			OFF	Field power to Header module is OFF	
7	I/O	Bi-colour	None		Header module is powered OFF or Hardware failure error detected on header module.
			Blue Green	ON	Header module is powered ON and communicating with IO module and no error is present.
				Single Flash	Header module is powered ON and ready for communication with IO modules. No IO module detected.
			Red	ON	One of the following conditions occurred. <ul style="list-style-type: none">Invalid configuration detected.No communication due to backplane bus fault.Header configuration download (using either USB interface or SD card interface) is in progress.
				Single Flash	IO module mismatch detected for one or more IO slots.
				Double Flash	Communication error observed for one or more IO modules.
				Triple Flash	Fatal error (Except IO Module mismatch or communication error) is observed for one or more IO modules, OR IO module related error is observed for one or more modules. [This includes sensor wire break, no 24V detected by IO module etc.]
			Yellow	ON	Output test mode is ON.

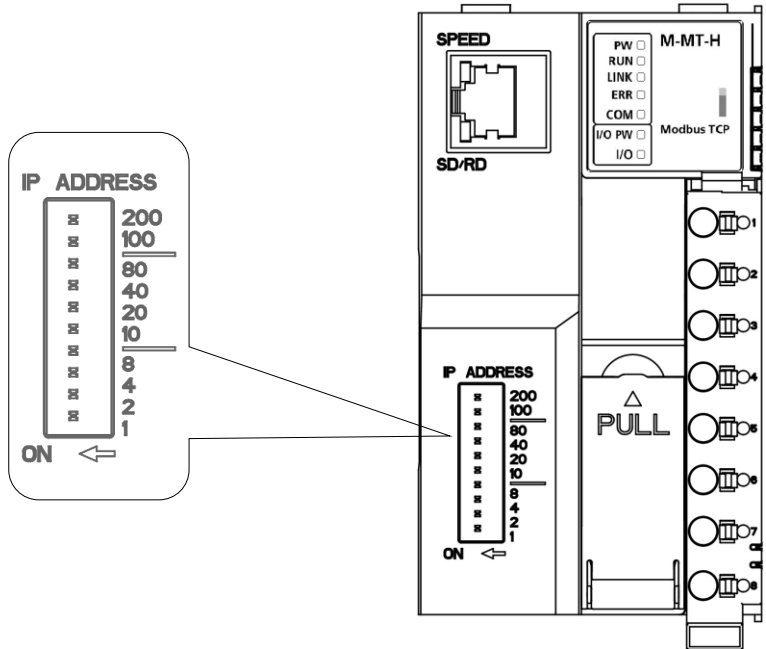
8	SPEED	Green	ON	Link up (100 Mbps)
			OFF	Link down or link up (10 Mbps)
9	SD/RD	Green	ON	Data transmission or reception is in progress on Ethernet port.
			OFF	No data transmission or reception.

*Refer section [Troubleshooting](#) for station error code list and error messages.

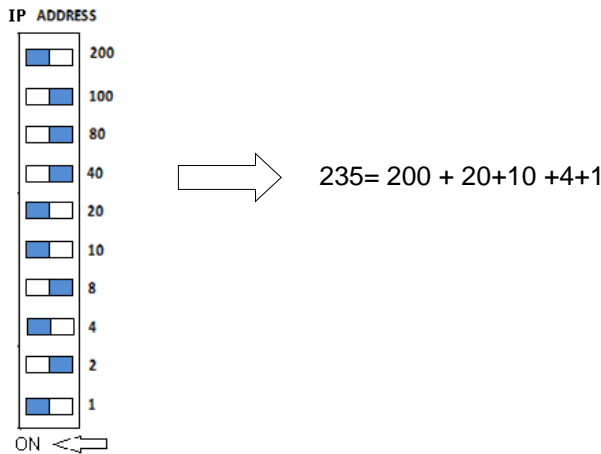
Setting of Station IP Address

This section provides information about setting of station IP address on Header module.

First three octets of IP address are configured using Modular IO Configuration Tool and the fourth octet is set using DIP switches as shown below.



Example below shows DIP switch setting for value of 235.



Memory Mapping

Local memory is mapped to Modbus memory as shown below.

Memory Area	Local address	Access	Addressing Method	Modbus Address	Function Code
Input Bit	IX0 to IX127	Read	WORD	0000 to 0063	FC03, FC04, FC23
			BIT	0000 to 1023	FC01, FC02
Input Word	IW0 to IW255	Read	WORD	1000 to 1255	FC03, FC04, FC23
Output Bit	QX0 to QX127	Read /Write	WORD	2000 to 2063	FC03, FC04, FC06, FC16, FC23
			BIT	2000 to 3023	FC01, FC02, FC05, FC15
Output word	QW0 to QW255	Read /Write	WORD	3000 to 3255	FC03, FC04, FC06, FC16, FC23
Status Memory	SB0 to SB511	Read	WORD	4000 to 4255	FC03, FC04, FC23
Illegal Address Ranges	Not applicable	NA	WORD	64 -999	All
	Not applicable	NA	WORD	1256 - 1999	
	Not applicable	NA	WORD	2064 - 2999	
	Not applicable	NA	WORD	3256 - 3999	
	Not applicable	NA	WORD	4256 - 65535	
	Not applicable	NA	BIT	1024 - 1999	
	Not applicable	NA	BIT	3024 - 65535	
	IX0 to IX127	Read	BIT	0000 to 1023	FC05, FC15
	IX0 to IX127	Read	WORD	0000 to 0063	FC06, FC16
	IW0 to IW255	Read	WORD	1000 to 1255	FC06, FC16
	SB0 to SB511	Read	WORD	4000 to 4255	FC06, FC16

Following Modbus function codes are supported:

Function name	Function code	Descriptions
Read coil status	1	Read output bit
Read input status	2	Read input bit
Read holding register	3	Read output word
Read input register	4	Read input word
Write/force single coil	5	Write single output bit
Write/Preset single register	6	Write single output register
Write/Force multiple coils	15	Write number of output bits
Preset multiple register	16	Write number of output registers
Read/ write registers	23	Read a number of output words /Write a number of output words

The table below provides list of Modbus exception codes supported.

Exception Name	Exception Code	Description
Illegal Function	1	Function code received in the query is not recognized or allowed by slave or invalid MBAP
Illegal Data Address	2	The data address received in the query is not an allowable address for the slave. More specifically, the combination of reference number and transfer length is invalid.
Illegal Data Value	3	Value is not accepted by slave <ul style="list-style-type: none"> - Invalid data length requested - Invalid output value, in case of FC05
Slave Device Failure	4	Fatal error occurred while the slave was attempting to perform the requested action. <ul style="list-style-type: none"> - IP address out of range - IO module error (depend on parameter setting "Action on fatal error")
Slave Device Busy	6	Slave is engaged in processing a long-duration command like configuration download, the request message processing cannot be executed

Parameters

User can set the following parameters using Modular IO Configurator.

Parameter Name	Project Value	Comment
IP Address	192.168.3.100 [Default]	Header IP address
Subnet mask	255.255.255.0	Subnet mask
Action on fatal error	Stop N/W Communication	Defines action on fatal error to any slot including header. Stop or continue communication with N/W master.
	Continue N/W Communication [Default]	
Modbus watchdog time (msec)	1000 [Default]	Communication watchdog time in msec
Output hold/ clear	Hold	Defines output state of IO modules when disconnected from network or master CPU is not in RUN mode.
	Clear [Default]	

Header diagnostic data is available in Status Byte (SB) memory, if parameter “Share diagnostics” is set to **Enable**.

IO Data

User can monitor following Header diagnostics in SB memory.

Diagnostic summary	Data Type	Local Address*	Bit Status	Description
Hardware failure	BOOL	SB 0.0	TRUE	Becomes TRUE, if hardware error on Header module occurs.
			FALSE	
Configuration error	BOOL	SB 0.1	TRUE	Becomes TRUE, if invalid configuration data is downloaded in Header module.
			FALSE	
IO module mismatch error	BOOL	SB 0.2	TRUE	Becomes TRUE, if IO module configured in slot is different than the physically present IO module.
			FALSE	
IO module COM error	BOOL	SB 0.3	TRUE	Becomes TRUE, if data exchange between Header and one or more IO modules is stopped after successful data exchange.
			FALSE	
Reserved	BOOL	SB 0.4	--	--
Reserved	BOOL	SB 0.5	--	--
Fatal error in one or more slots	BOOL	SB 0.6	TRUE	Becomes TRUE, if fatal error occurs in one or more IO slots.
			FALSE	
Non-fatal error in one or more slots	BOOL	SB 0.7	TRUE	Becomes TRUE, if non-fatal error occurs in one or more IO slots.
			FALSE	
Reserved	BOOL	SB 1.0	--	--
Additional IO modules detected	BOOL	SB 1.1	TRUE	Becomes TRUE, if Header module detects additional IO modules (other than configured one) at modular IO station.
			FALSE	
Reserved	BOOL	SB 1.2	--	--

User can monitor slot status.

Slot status	Data Type	Local Address*	Bit Status	Description
Slot status 0..7				
Slot 0	BOOL	SB 2.0	TRUE	Module is configured and working Ok in slot 0.
			FALSE	Module is either not configured in slot 0 or having error.
Slot 7	BOOL	SB 2.7	TRUE	Module is configured and working Ok in slot 7.
			FALSE	Module is either not configured in slot 7 or having error.
Slot status 8..15				
Slot 8	BOOL	SB 3.0	TRUE	Module is configured and working Ok in slot 8.
			FALSE	Module is either not configured in slot 8 or having error.
Slot 15	BOOL	SB 3.7	TRUE	Module is configured and working Ok in slot 15.
			FALSE	Module is either not configured in slot 15 or having error.
Slot status 56..63				
Slot 56	BOOL	SB 9.0	TRUE	Module is configured and working Ok in slot 56.
			FALSE	Module is either not configured in slot 56 or having error.
Slot 63	BOOL	SB 9.7	TRUE	Module is configured and working Ok in slot 63.
			FALSE	Module is either not configured in slot 63 or having error.

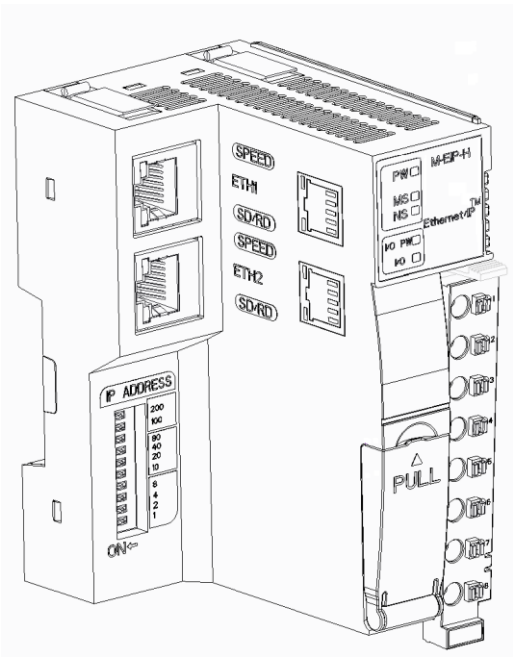
*For more details of error in slot, refer section “IO Data” covered for individual IO module in this manual.

In Modular IO Configurator, Header diagnostics  provides Modbus TCP network specific diagnostics in as shown.

Diagnostics	Data type	Description
Modbus TCP diagnostics	WORD	Bitwise Modbus TCP diagnostics.
Modbus TCP port open	BOOL	--
Invalid station ID	BOOL	--
Watchdog error status	BOOL	--
IP address setting switch changed	BOOL	--
Link status	BOOL	--
Modbus TCP/IP Active connection	WORD	Number of active connections.
Messages received from Master	WORD	No. of valid Modbus queries received from Master.
Responses sent to Master	WORD	No. of valid response sent to Master.
No. of invalid requests	WORD	No. of exception sent to Master.
No. of watchdog fault	WORD	No. of times watchdog fault occurred.
No. of disconnection requests	WORD	No. of disconnection requests received from Master
No. of broadcast messages	WORD	No. of broadcast messages received from Master
No. of message length errors	WORD	No. of message length error observed.
No. of invalid address errors	WORD	No. of invalid message addresses errors
No. of invalid protocol type errors	WORD	No. of times invalid protocol identifier received in Modbus query.
No. of invalid function code errors	WORD	No. of function code errors.
Time between two valid frames (msec)	WORD	Time between two valid frames (msec).
Maximum Time between two valid frames (msec)	WORD	Maximum Time between two valid frames (msec).
Minimum Time between two valid frames (msec)	WORD	Minimum Time between two valid frames (msec).
No. of receive frame errors	WORD	No. of receive frame errors.

5.3 M-EIP-H

[EtherNet/IP™ Header Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[Wiring: Module Supply](#)

[LED Indications](#)

[Setting of Station IP Address](#)

[Memory Mapping](#)

[Parameters](#)

[IO Data](#)

Module Overview

Ethernet/IP™ is the Industrial Ethernet standard of ODVA (Open DeviceNet Vendor Association).

Ethernet/IP™ is based on Ethernet TCP/IP and UDP/IP – IP stands for Industrial Protocol. Essentially, the CIP (Common Industrial Protocol) used in ControlNet and DeviceNet was ported to Ethernet TCP/IP and UDP/IP.

'M-EIP-H' Header module works as communication adapter on Ethernet/IP™ network. It communicates with IO modules connected to it and exchange their IO data on Ethernet/IP™ network.

'M-EIP-H' requires configuration using 'Modular IO Configurator' before connecting on Ethernet/IP™ network. Refer section 'Modular IO Configurator' for more details.

IP address of the device can be set using parameter setting in 'Modular IO Configurator' tool and DIP switch setting. Refer section 'Setting of IP Address' for more details.

Device contains 3-port switch with DLR support. Two ports operate on RJ45 connectors and can be used for connection on Ethernet/IP™ network. The I/O stations can thus be configured with ring topology and line topology, and the classic star topology. In many applications this significantly reduces the wiring effort and the cabling costs. The maximum distance between two couplers is 100 m.

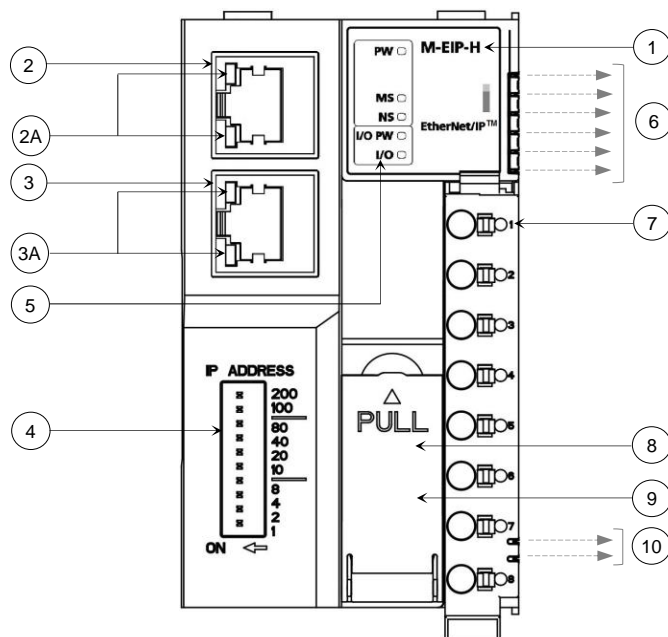
You can also refer following documentation for additional documentation

1. N18011AAMG02 Quick Start Guide Interfacing Modular IO Header M-EIP-H with Mitsubishi Scanner on EtherNet_IP
2. N18011AAMG01 Quick Start Guide Interfacing Modular IO Header M-EIP-H with Rockwell Communication Module on EtherNet_IP
3. N18011AAMG03 M-EIP-H - Ethernet/IP™ Object Classes, Messages and Services.

EDS file of 'M-EIP-H' module is necessary to configure module in Ethernet/IP™ network. Download EDS file from link.' <https://www.mitsubishielectric.in/fa/fa-modular-io.php>

Ethernet/IP™ is a trademark of ODVA, Inc.

Part Names



No.	Name	Description
1	M-EIP-H	Module ordering code
2	'ETH1' Ethernet Port [RJ45]	Field bus communication port
3	'ETH2' Ethernet Port [RJ45]	Field bus communication port
2A,3A	LED Indications on Ethernet ports	SD/ RD: 1 Green LED for link status SPEED: 1 LED for data transmission status
4	Settings for Station IP Address	Last octet of station IP address is set by DIP switch
5	Module LED Indication	PW: 1 Green LED for power status of module. MS: 1 Green LED for operation status of module. NS: 1 Green LED for Network status of module. I/O PW: 1 Green LED for field power status. I/O: 1 Bi-colour LED for I/O module status.
6	System Power Supply Interface	6 Outgoing pins for System power supply interface
7	Terminal Block	8-point removable push type
8	SD Card Interface	Micro SD (for configuration transfer)
9	USB Interface	USB 2.0
10	Field Power Supply Interface	2 Outgoing pins for Field power supply interface

Specifications

The table below provides technical specifications of **M-EIP-H**.

Specification		Description
Module Ordering Code		M-EIP-H
System Power Supply	Input voltage	24 VDC (11 to 28.8 VDC, ripple included), 22 Watt
	Inrush current	20 A for 20 µsecs duration
	Output voltage	5 VDC
	Output current for IO modules	2 A
	Protection	Reverse polarity protection
Field Power Supply	Voltage	24 VDC (18 to 30 VDC, ripple included)
	Current	10 A
External Connections	Network communication	RJ45 female- 2 nos. (Configured as embedded switch)
	Input power supply (System and Field power supply)	8 Point terminal block
	Output System power supply	6-Pins
	Output Field power supply	2-Pins
	Configuration port	USB 2.0
Fieldbus Support		Ethernet/IP™
Ethernet Interfaces		2 (Layer 2 switch with DLR support)
Station Type		Communication adapter
DLR Support		Yes
IO Data Size		128 bytes: IX memory for digital input. 512 bytes: IW memory for analog input. 128 bytes: QX memory for digital output. 512 bytes: QW memory for analog output. 512 bytes: SB memory for status info.
IP Address		IPv4 range: 0.0.0.1 to 223.255.255.254 (Default 192.168.3.100) First 3 octets set by using IO Configurator Tool. Last octet set by hardware switch.
Subnet mask		Default: 255.255.255.0
Gateway Address		Default... (No gateway)
Physical Layer		10/100BASE-T
Cable for Fieldbus Communication		Ethernet standard compliant products cable Cat5e or higher, shielded twisted pair cable
Maximum Cable Distance		100 meters
Network Topology		Line, Tree, Star, Ring
Number of IO Modules		63 maximum (including system modules *1)
Terminal Block (Removable push type)		8 Point
Recommended Wire Specifications		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm		105 x 60 x 92

NOTE

*1 Digital and analog IO modules are intelligent modules and provide IO data and diagnostics to Header module. System modules are passive modules. So, Header module does not provide any information about system modules. Header module cannot detect presence of System modules in a modular IO station. So, System modules do not appear in the list after scan.

Module M-EIP-H is supported in Modular IO Configurator Tool [V1.5.0.0] and onwards.

Ethernet/IP™ Communication Specifications

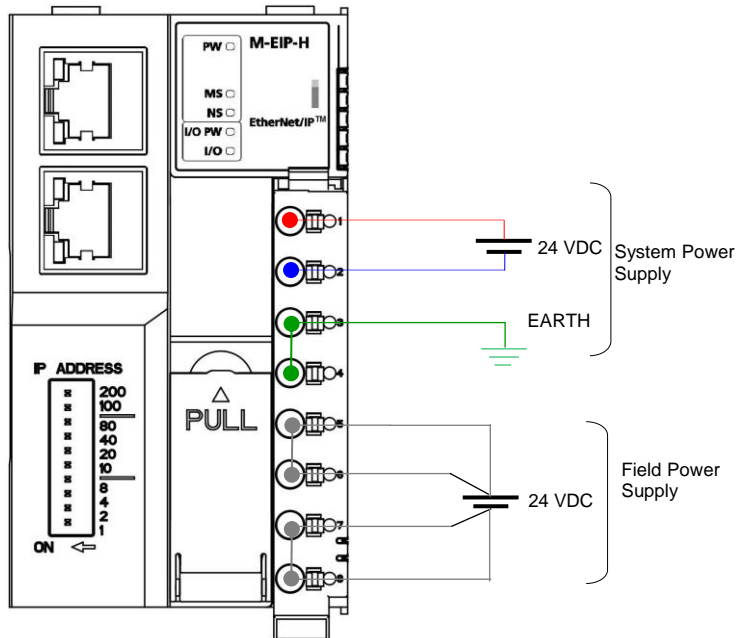
The table below provides Ethernet/IP™ communication specifications.

Specification			Description
Class 1 communications	Communication format		Instance communications
	Communication data size		Input data: 1152 bytes (Digital inputs, Analog inputs and Status data) Output data: 640 bytes (Digital outputs and Analog outputs)
	Transmission trigger		Cyclic, Change of State
	Connection Type		Point-to-point, multicast
	RPI (Communication cycle)	Max	2000 to 60,000,000µs (Default 5000 µs)
Class 3 communications	Communication format		Message communication
	Communication direction		Server: Available, Client: Not available
	Communication data size		1414 bytes
UCMM communications	Communication format		Message communication
	Communication direction		Server: Available, Client: Not available
	Communication data size		1414 bytes
Maximum number of CIP connections			8
PPS (Communication processing performance)			1200 PPS (at 500 bytes)
Certification			ODVA conformance tested to EtherNet/IP™ specifications

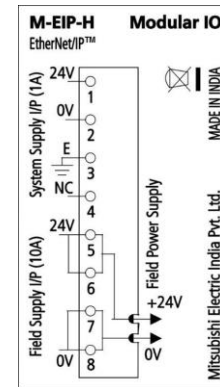
Wiring: Module Supply

The figure shows Header module front alongwith system power supply connections and field power supply connections. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-EIP-H: Wiring description



Connect +24 VDC system power supply between first two terminals (i.e. terminal 1 and 2).

Connect terminals 3/ 4 to clean EARTH directly.

Connect +24 VDC field power supply to terminal numbers 5 and 6.

Connect field power supply ground to terminal numbers 7 and 8.

NOTE

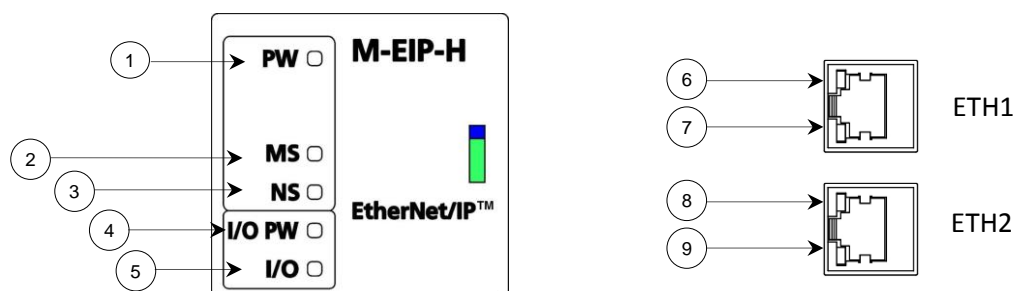
Current carrying capacity of each terminal is 5A max. So, it is necessary to connect 2 wires from source of field power supply to utilize maximum capacity of 10 A of Field power supply interface between modules.

Field power supply connected to terminal block is directly carried to field power supply pins for interfacing with IO modules.

Ensure that EARTH cable is thick and short as far as possible to provide low impedance path.

LED Indications

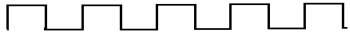



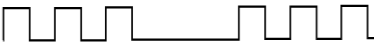
This section provides meaning of LED indications available on Header module.



No.	LED	Colour	Status	Description
1	PW	Green	ON	System power to Header module is ON
		--	OFF	System power to Header module is OFF
2	MS	--	OFF	System power to Header module is OFF
		Green	ON	Device operational
		Red	Blinking Slow	Major Recoverable Fault <ul style="list-style-type: none"> - Invalid configuration - IO module mismatch Minor recoverable fault <ul style="list-style-type: none"> - IP address changed after power ON.
		Red	ON	Major Unrecoverable Fault <ul style="list-style-type: none"> - Hardware fault
3	NS	--	OFF	Not powered
		Green	Blinking Slow	One of the following reasons, <ul style="list-style-type: none"> - No connections - Duplicate IP address - Invalid IP address.
			ON	Device on-line and has at least one CIP connection is established
		Red	Blinking Slow	One or more CIP connection timeout occurred.
4	I/O PW	Green	ON	Field power to Header module is ON
		--	OFF	Field power to Header module is OFF
		Green	Blinking Fast	Header module is in factory test mode

5	I/O	--	OFF	Header module is powered OFF OR Hardware failure error detected in header module
		Green	ON	Header module is powered ON and communicating with IO module and no error is present.
		Green	Single Flash	Module is powered ON and ready for communication with IO modules. No IO module is detected.
		Red	ON	Invalid configuration detected. During configuration download Backplane bus major error (bus off) detected. Backplane bus function not started.
		Red	Single Flash	Different module detected as compared with configuration in one or more slots.
		Red	Double Flash	Communication error observed with one or more IO modules.
		Red	Triple Flash	Fatal error (Except IO Module mismatch or communication error) is observed for one or more IO modules, OR IO module related error is observed for one or more modules. [This includes sensor wire break, no 24V detected by IO module etc.]
		Yellow	ON	Output test mode is ON.
6,8	SPEED	Green	ON	Link up 100Mbps
		--	OFF	Link down or Link up with 10Mbps
7,9	SD/RD	--	OFF	No link established
		Green	ON	Link established
			Blinking Fast	Transmit / receive activity is in progress.

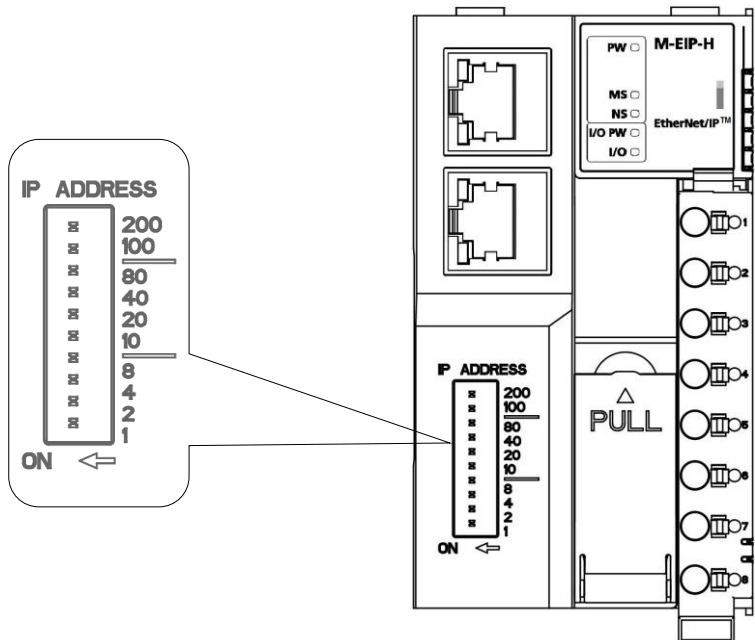
LED indication states and flashing rates

Indication State	Description
Blinking fast	Equal ON and OFF time. Approximately 250ms. 
Blinking slow	Equal ON and OFF time. Approximately 500ms. 
Single Flash	One short single flash followed by long OFF time Short ON Time = 250ms Long OFF Time :1000ms 
Double Flash	Two short flashes followed by long OFF time Short ON Time = Short OFF time = 250ms Long OFF Time :1000ms 
Triple Flash	Two short flashes followed by long OFF time Short ON Time = Short OFF time = 250ms Long OFF Time :1000ms 

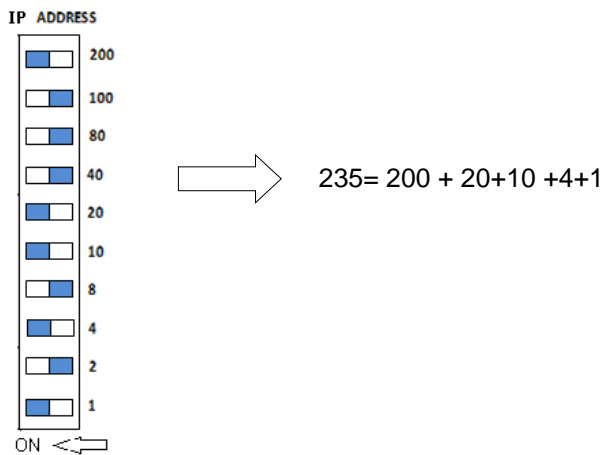
Setting of IP Address

This section provides information about setting of station IP address on Header module.

First three octets of IP address are configured using Modular IO Configuration Tool and the fourth octet is set using DIP switches as shown below.



Example below shows DIP switch setting for value of 235.



Meaning of DIP switch positions:

DIP Switch Setting	Descriptions
0 or ≥ 255	IP address (all the four octets) is set as per parameter setting 'IP address' of modular IO configurator.
1-254	4 th octet of IP address is set according to DIP switch

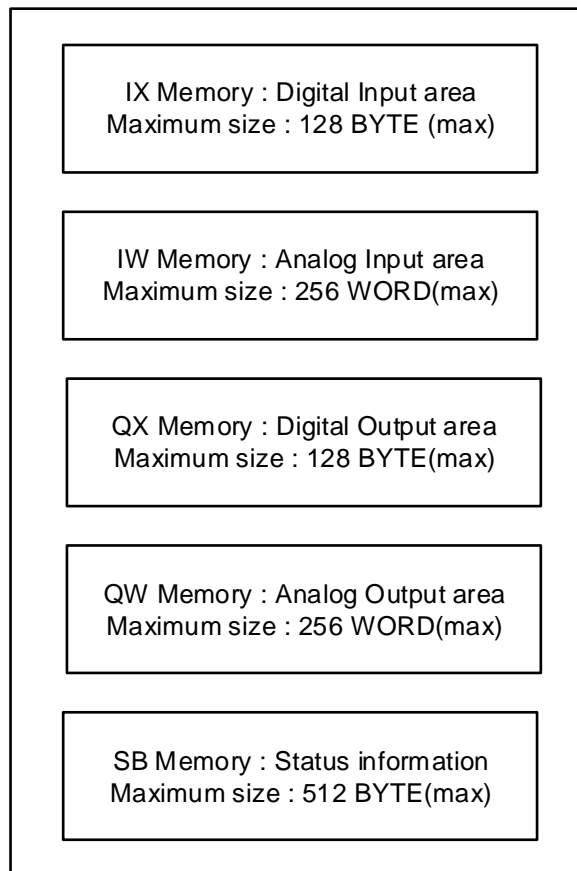
NOTE

Subnet mask and Gateway address are always received from parameter setting in IO Configurator Tool.

Memory Mapping

Process data of IO modules connected to the M-EIP-H is stored in 'Local IO data memory' of module.

Following figure shows local IO data memory M-EIP-H:



The 'Local IO data memory' of 'M-EIP-H' is mapped to 'Assembly objects'. Following instances of objects are implemented.

Instance (decimal)	size	Descriptions
100	Default: 128 bytes Max: 640 bytes	Digital output (QX) + Analog output (QW)
110	Default: 128 bytes Max: 1152 bytes	Digital input (IX) + Analog input (IW) + Status (SB) data

Following use cases shows example mapping of Local IO data memory to assembly objects

Example of 'Modular IO station

SLOT			0	1	2	3	4	5	6	7	8	9	10	Total Size
Module			M-EIP-H	M-16D	M-16D	M-16D	M-16TE	M-8TE	M-AD4	M-UAD2	M-8D	M-DA2	M-DA2	
Default IO data size in bytes	IX	Size	0	2	2	2	0	0	0	0	1	0	0	7
		Addr		IX0–IX1	IX2–IX3	IX4–IX5					IX6			
	IW	Size	0	0	0	0	0	0	8	4	0	0	0	12
		Addr							IW0–IW4	IW5–IW6				
	QX	Size	0	0	0	0	2	1	0	0	0	0	0	3
		Addr					QX0–QX1	QX2						
	QW	Size	0	0	0	0	0	0	0	0	0	4	4	8
		Addr										QW0–QW3	QW2–QW3	
	SB	Size	10	0	0	0	0	0	2	3	0	2	2	19
		Addr	SB0–SB9						SB10–SB11	SB12–SB14		SB15–SB16	SB17–SB18	

Mapping of assembly instances

Assembly Instance	Size
100	QX size + QW Size = 3 bytes + 8 bytes = Total 11 bytes
110	IX size + IW size + SB size = 7 bytes + 12 bytes + 19 bytes = Total 38 bytes

NOTE

Default size of input and output assembly instances is 128.

User can change assembly instance size while configuring connection with scanner.

Consider following cases where size of assembly instance configured while configuring connection in scanner does not match with actual IO data size of modular IO station.

Condition	Input Memory	Output memory
Size of IO data configured in connection more than actual IO data size of modular IO station. Example: Size of IO data in connection configuration 128 byte input and 128 byte output. Actual IO data at module IO station 30 bytes Input (IX+IW+SB) and 25 byte output (QX+QW)	Modular IO station will send additional input data as 0.	Additional output data received from scanner is ignored by modular IO station and will not be updated to any physical output.
Size of IO data configured in connection less than actual IO data size of modular IO station. Example: Size of IO data in connection configuration 20 byte input and 20 byte output. Actual IO data at module IO station 30 bytes Input (IX+IW+SB) and 25 byte output (QX+QW)	Modular IO station will send input data per connection configuration other input data will remain unmapped.	Modular IO station will update output data per connection configuration other outputs on modular IO station will remain unmapped and will be set to 0.

Input Mapping

Module		Input Assembly Instance (110)		
Slot	Module name			
1	M-16D	WORD 0	IX1	IX0
2	M-16D	WORD 1	IX3	IX2
3	M-16D	WORD 2	IX5	IX4
8	M-8D	WORD 3	Reserved	IX6
6	M-AD4	WORD 4	IW0	
		WORD 5	IW1	
		WORD 6	IW2	
		WORD 7	IW3	
7	M-UAD2	WORD 8	IW4	
		WORD 9	IW5	
0	M-EIP-H	WORD 10	SB1	SB0
		WORD 11	SB3	SB2
		WORD 12	SB5	SB4
		WORD 13	SB7	SB6
		WORD 14	SB9	SB8
6	M-AD4	WORD 15	SB11	SB10
7	M-UAD2	WORD 16	SB13	SB12
		WORD 17	SB15	SB14
8	M-DA2	WORD 18		SB16
9	M-DA2		SB17	
		WORD 19		SB18

Output mapping

Module		Output assembly instance (100)		
Slot	Module name			
4	M-16TE	WORD 0	QX1	QX0
5	M-8TE	WORD 1		QX2
9	M-DA2	WORD 2	QW0	
		WORD 3	QW1	
10	M-DA2	WORD 4	QW2	
		WORD 5	QW3	

Parameters

User can set the following parameters using Modular IO Configurator.

Parameter Name	Project Value	Comment
IP Address	192.168.3.100 (Default)	Header IP address Change to appropriate value as per network requirement.
Subnet mask	255.255.255.0 (Default)	Subnet mask Change to appropriate value as per network requirement.
Gateway Address	. . . (Default)	Gateway Address Change to appropriate value as per network requirement.
Action on fatal error	Stop N/W Communication	This parameter defines whether to continue or stop Ethernet/IP™ communication when FATAL error (IO module mismatch or communication error) is observed for one or more modules in the modular IO station.
	Continue N/W Communication [Default]	
Output hold/ clear	Hold	Defines output state of IO modules when disconnected from network or master CPU is not in RUN mode.
	Clear [Default]	

IO Data

User can monitor following Header diagnostics in SB memory.

Diagnostic summary	Data Type	Local Address*	Bit Status	Description
Hardware failure	BOOL	SB 0.0	TRUE	Becomes TRUE, if hardware error on Header module occurs.
			FALSE	
Configuration error	BOOL	SB 0.1	TRUE	Becomes TRUE, if invalid configuration data is downloaded in Header module.
			FALSE	
IO module mismatch error	BOOL	SB 0.2	TRUE	Becomes TRUE, if IO module configured in one or more slots is different than the physically present IO module.
			FALSE	
IO module COM error	BOOL	SB 0.3	TRUE	Becomes TRUE, if data exchange between Header and one or more IO modules is stopped after successful data exchange.
			FALSE	
Reserved	BOOL	SB 0.4	--	--
Reserved	BOOL	SB 0.5	--	--
Fatal error in one or more slots	BOOL	SB 0.6	TRUE	Becomes TRUE, if fatal error occurs in one or more IO slots.
			FALSE	
Non-fatal error in one or more slots	BOOL	SB 0.7	TRUE	Becomes TRUE, if non-fatal error occurs in one or more IO slots.
			FALSE	
Reserved	BOOL	SB 1.0	--	--
Additional IO modules detected	BOOL	SB 1.1	TRUE	Becomes TRUE, if Header module detects additional IO modules (other than configured one) at modular IO station.
			FALSE	
EEPROM error detected	BOOL	SB 1.2	TRUE	Becomes TRUE, if EEPROM error on Header module occurs.
			FALSE	

Backplane bus fault	BOOL	SB 1.3	TRUE	Becomes TRUE, if Backplane bus fault error on Header module occurs.
			FALSE	
Reserved	BOOL	SB 1.4	--	--
Reserved	BOOL	SB 1.5	--	--
Reserved	BOOL	SB 1.6	--	--
Reserved	BOOL	SB 1.7	--	--

User can monitor slot status.

Slot status	Data Type	Local Address*	Bit Status	Description
Slot status 0..7				
Slot 0	BOOL	SB 2.0	TRUE	Module is configured and working Ok in slot 0. (Slot 0 module is header)
			FALSE	Module is either not configured in slot 0 or having error. (Slot 0 module is header)
Slot 7	BOOL	SB 2.7	TRUE	Module is configured and working Ok in slot 7.
			FALSE	Module is either not configured in slot 7 or having error.
Slot status 8..15				
Slot 8	BOOL	SB 3.0	TRUE	Module is configured and working Ok in slot 8.
			FALSE	Module is either not configured in slot 8 or having error.
Slot 15	BOOL	SB 3.7	TRUE	Module is configured and working Ok in slot 15.
			FALSE	Module is either not configured in slot 15 or having error.
Slot status 56..63				
Slot 56	BOOL	SB 9.0	TRUE	Module is configured and working Ok in slot 56.
			FALSE	Module is either not configured in slot 56 or having error.
Slot 63	BOOL	SB 9.7	TRUE	Module is configured and working Ok in slot 63.
			FALSE	Module is either not configured in slot 63 or having error.

*For more details of error observed for module in particular slot, refer section "IO Data" for individual IO module in this manual.
Header diagnostic data is available in Status Byte (SB) memory.

Refer section '[List of Station Error Codes](#)' for details of Error codes displayed in IO configurator tool.

In Modular IO Configurator, Header diagnostics  provides Ethernet/IP™ network specific diagnostics as shown below.

Diagnostics	Data type	Description
Interface (ETH1)		
Interface status	Byte	Current interface status (0 : Link down, 1: Link up)
Interface speed	Byte	10 or 100
Interface (ETH2)		
Interface status	Byte	Current interface status (0 : Link down, 1: Link up)
Interface speed	Byte	10 or 100
Ethernet Link (ETH1)		
Received byte count	Integer(32)	Number of bytes received
Received unicast frames count	Integer(32)	Number of unicast frames received
Received non unicast frames count	Integer(32)	Number of non-unicast frames received
Sent byte count	Integer(32)	Number of bytes transmitted
Sent unicast frames count	Integer(32)	Number of unicast frames transmitted
Sent non unicast frames count	Integer(32)	Number of non-unicast frames transmitted
Large error count	Integer(32)	Number of frames received with large frame error
Align error count	Integer(32)	Number of frames received with alignment error
FCS error count	Integer(32)	Number of frames received with CRC/FCS error
Receive error count	Integer(32)	Number of frames with other receive errors
Single collision count	Integer(32)	Number of frames transmitted after single collision
Multi collision count	Integer(32)	Number of frames transmitted after multiple collisions
Drop count	Integer(32)	Number of frames dropped after excessive collisions
Sent error count	Integer(32)	Number of frames with other transmit errors
Ethernet Link (ETH2)		
Received byte count	Integer(32)	Number of bytes received
Received unicast frames count	Integer(32)	Number of unicast frames received
Received non unicast frames count	Integer(32)	Number of non-unicast frames received
Sent byte count	Integer(32)	Number of bytes transmitted
Sent unicast frames count	Integer(32)	Number of unicast frames transmitted
Sent non unicast frames count	Integer(32)	Number of non-unicast frames transmitted
Large error count	Integer(32)	Number of frames received with large frame error
Align error count	Integer(32)	Number of frames received with alignment error

FCS error count	Integer(32)	Number of frames received with CRC/FCS error
Receive error count	Integer(32)	Number of frames with other receive errors
Single collision count	Integer(32)	Number of frames transmitted after single collision
Multi collision count	Integer(32)	Number of frames transmitted after multiple collisions
Drop count	Integer(32)	Number of frames dropped after excessive collisions
Sent error count	Integer(32)	Frames with other transmit errors
CIP Diagnostics		
Open CIP connections count	Byte	Number of currently open CIP Connections
Open requests	Byte	Number of received Forward_Open services
Open format rejects	Byte	Number of Forward_Open services rejected due to format incompatibility
Open resource rejects	Byte	Number of Forward_Open services rejected due to insufficient resources
Open other rejects	Byte	Number of Forward_Open services rejected due to reasons other than format incompatibility and insufficient resources
Close requests	Byte	Number of received Forward_Close services
Close format requests	Byte	Number of Forward_Close services rejected due to format incompatibility
Close other requests	Byte	Number of Forward_Close services rejected due to reasons other than format incompatibility
Connection timeouts	Byte	Total number of connection timeouts that occurred in connections controlled by the Connection Manager
DLR		
DLR : Network topology	Byte	0: Line, 1: Ring
DLR : Network status	Byte	If network topology = Line Always 0 (Normal) If network topology = Ring 0: Normal, 1: Ring Faulted, 2:Unexpected loop detected, 3:partial network fault, 4: Rapid fault / Restore cycle
DLR : Supervisor MAC Address	Byte[6]	Supervisor MAC address

5.4 Special Features

[Configuration Transfer with SDHC Memory Card](#)

Configuration Transfer with SDHC Memory Card

Header supports configuration file transfer to/from SD card. This function is useful to store configuration file backup and copy to other Header modules. Configuration copy to/from SD card is possible at power ON only.

SD card specifications are as below.

Specification	Description
Type	Micro SD
SD Card Standard	SDHC
Speed Class Supported	Class 4 (4MB/S) , Class 10 (10MB/S)
Supported Memory Capacity	4GB to 32GB
File System	FAT32
SD card Dimensions	11 x 15 x 1.0 mm
Recommendations	Transcend, Scandisk, SAMSUNG

Table below explains conditions and actions performed during configuration copy.

Sr. No.	Condition		Visual Indication on Header module		Actions Performed
	File Copy from	Description	RUN LED	I/O LED	
1	SD Card to Header [Pushbutton on Header is not kept pressed at power ON]	SD card is formatted with FAT32 file format. Valid configuration file (MIOcnfg.bin) is stored at root directory on SD memory card.	Green : Blinking	Yellow : Blinking	Configuration file is copied
		SD card is formatted with FAT32 file format. Configuration file (MIOcnfg.bin) at root directory on SD memory card and configuration file in connected Header are identical .			Configuration file is not copied
		SD card is formatted with Non-FAT32 file format or formatting is invalid.		Red : Single flash	Header continues with normal execution after 15 secs duration.
		SD card is formatted with FAT32 file format. Configuration file (MIOcnfg.bin) is absent at root directory on SD memory card.		Red : Double flash	
		SD card is formatted with FAT32 file format. Invalid configuration file (MIOcnfg.bin) for file with size more than 192 Kbytes is stored at root directory on SD memory card.			
		Header types are mismatch. Header type in Configuration file (MIOcnfg.bin) is not matching with connected Header type.			
2	Header to SD Card [Pushbutton on Header is kept pressed at power ON]	SD card is formatted with Non-FAT32 file format or formatting is invalid..	Green : Blinking	Red : Single flash	
		SD card is formatted with FAT32 file format and configuration file MIOcnfg.bin is absent		Green : Continuous ON	MIOcnfg.bin is generated at root directory on SD memory card.
		SD card is formatted with FAT32 file format and configuration file MIOcnfg.bin is present at root directory		Green : Continuous ON	MIOcnfg.bin is overwritten at root directory on SD memory card.

NOTE

Only one configuration file i.e. "MIOcnfg.bin" can be stored in SD memory card at a time.

SD card functionality is supported for Modular IO Configurator Tool [V1.4.0.0] and Header (M-CCB-H and M-MT-H) firmware [V01.02.00.00], Header (M-EIP-H) firmware [V01.01.00.00] and onwards.

[Back To Index Page](#)

6 Digital IO Modules










Digital IO Modules: Overview	
24 VDC Digital Input Sink Type (Negative Common) Module	M-4D
	M-8D
	M-16D
24 VDC Digital Input Source Type (Positive Common) Module	M-4DE
	M-8DE
	M-16DE
24 VDC Transistor Output Source Type Module	M-4TE
	M-8TE
	M-16TE

Overview

Digital input module accepts 24 VDC inputs from various input devices like push buttons, limit switches and proximity switches. It can be used for sink or source type of interface.

Digital output module provides 24 VDC type of output through solid-state type of devices in order to switch on off various field elements like relays, contactors, lamps and solenoid valves, etc. Source type of digital output modules are available.

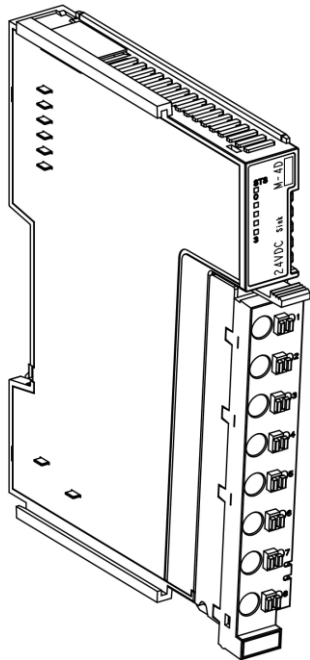
In modular IO station, different types of digital IO modules are available as below,

Ordering Information	Ordering Code	Colour Identification*
Digital Input		
4 Point 24 VDC Digital Input Sink Module	M-4D	
8 Point 24 VDC Digital Input Sink Module	M-8D	
16 Point 24 VDC Digital Input Sink Module	M-16D	
4 Point 24 VDC Digital Input Source Module	M-4DE	
8 Point 24 VDC Digital Input Source Module	M-8DE	
16 Point 24 VDC Digital Input Source Module	M-16DE	
Digital Output		
4 Point 24 VDC Digital Output Source Module	M-4TE	
8 Point 24 VDC Digital Output Source Module	M-8TE	
16 Point 24 VDC Digital Output Source Module	M-16TE	

*Color code is provided on LED label and at bottom side of terminal block. User should always ensure that color code of LED label and terminal block is identical.

6.1 M-4D

[4 Point 24 VDC Digital Input Sink Type (Negative Common) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

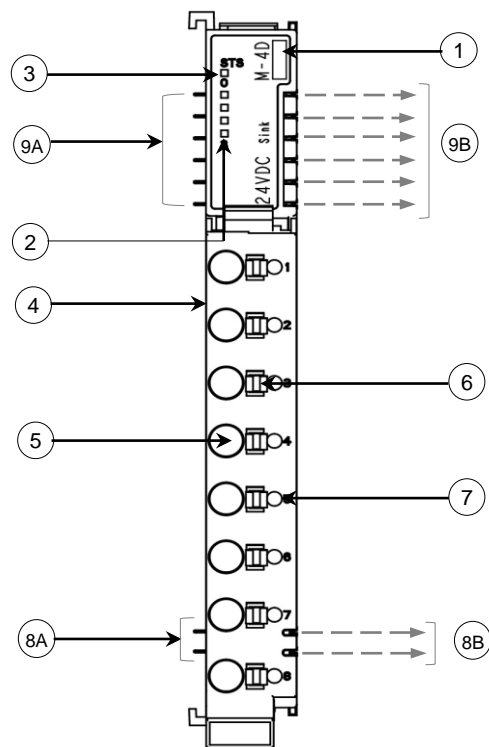
[IO Data](#)

Module Overview

M-4D is 4 point 24 VDC digital input module. It allows sink type (negative common) of connections for all the inputs. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-4D	Module ordering code
2	IO LED Indications	0 to 3: 4 Green colour LEDs for individual input status
3	Module LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

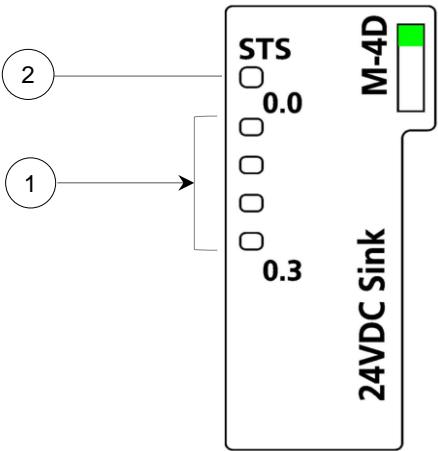
The table below provides technical specifications of **M-4D**.

Specification		Description	
Ordering Code		M-4D	
Number of Inputs		4	
Input Type		Sink type (Negative common)	
Voltage Rating		24 VDC (18 to 30 VDC including ripple)	
ON Voltage Level		18 VDC minimum	
OFF Voltage Level		5 VDC maximum	
Maximum Voltage		40 VDC	
ON State Current Per Point		6 mA typical at 24 VDC	
OFF State Current		3.8 mA at 24 VDC	
Transition Delay		3 ms to 70 ms [10 ms, Default]	
Input Impedance		5.2 K Ω	
Isolation		Between input and internal circuit	Optical 1.5 KV
		Between inputs	No isolation
IO Memory Consumption	Input Bits (IX)	4 points (1 byte)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		40 mA	
Field Power Supply Consumption		Number of inputs simultaneously ON X 6 mA	
Terminal Block (Removable push type)		8 point	
Recommended Wire Size*		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



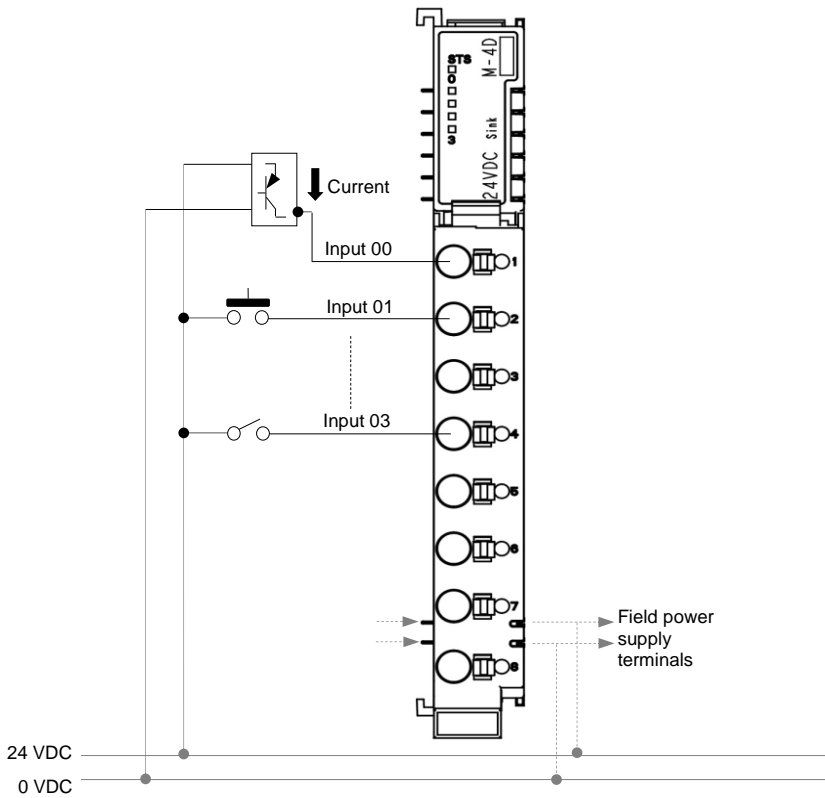
No.	LED	Colour	Status		Description
1	0.0 to 0.3	Green	ON		Input is ON
			OFF		Input is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow		24 VDC field power supply is not available

Connection Diagram

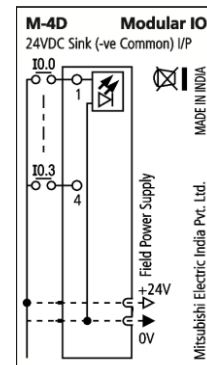
The figure shows module front with 8 point terminal block, alongwith interface of field input devices like push buttons, limit switches and proximity switches for sink operation i.e. with negative common.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-4D: Wiring description



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5, 6 and 7, 8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different,

Some of the input devices like proximity switches may malfunction due to inherent off state leakage current. Ensure that proper bleeder resistor is connected as a load considering maximum specified OFF state current of input module.

Parameters

Serial communication module can be configured in modular IO station using Modular IO Configurator. For addition and removal of module, refer section [Modular IO Configurator](#).

User can set the following module parameters

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header
	Disable [Default]	
Input Filter Time (ms)	10 (Default)	Defines input filter time in ms.

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

IO Data

The table below provides description of Input data for CH0 and CH1.

Channel	Data Type	Local Address*
Input Data CH0		
Digital Input 00-03	BYTE	IX n
DI 00	BOOL	IX n.0
...
DI 03	BOOL	IX n.3

*Local address n changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics.

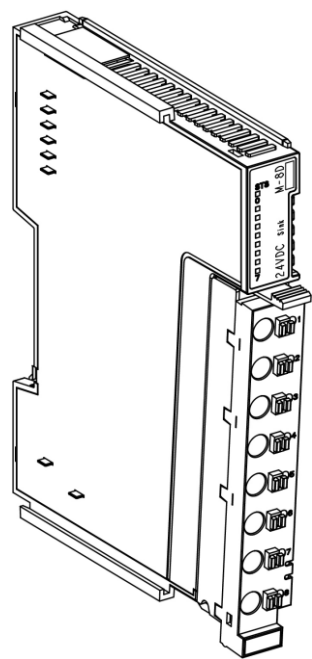
Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24VDC field power supply is not available
			FALSE	24VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

6.2 M-8D

[8 Point 24 VDC Digital Input Sink Type
(Negative Common) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

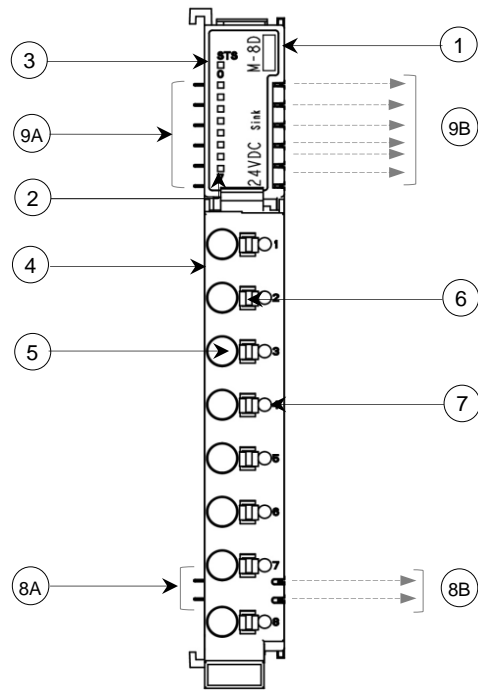
[IO Data](#)

Module Overview

M-8D is 8 point 24 VDC digital input module. It allows sink type (negative common) of connections for all the inputs. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-8D	Module ordering code
2	IO LED Indications	0 to 7: 8 Green colour LEDs for individual input status
3	Module LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

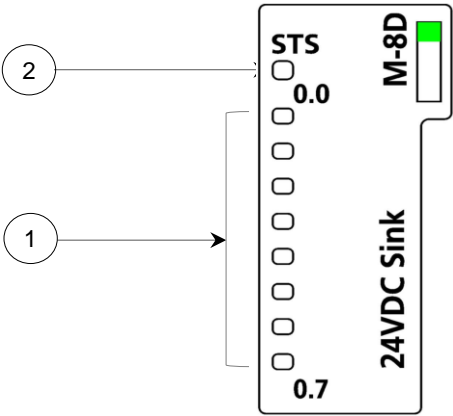
The table below provides technical specifications of **M-8D**.

Specification		Description	
Ordering Code		M-8D	
Number of Inputs		8	
Input Type		Sink type (Negative common)	
Voltage Rating		24 VDC (18 to 30 VDC including ripple)	
ON Voltage Level		18 VDC minimum	
OFF Voltage Level		5 VDC maximum	
Maximum Voltage		40 VDC	
ON State Current Per Point		6 mA typical at 24 VDC	
OFF State Current		3.8 mA at 24 VDC	
Transition Delay		3 ms to 70 ms [10 ms, Default]	
Input Impedance		5.2 K Ω	
Isolation		Between input and internal circuit	Optical 1.5 KV
		Between inputs	No isolation
IO Memory Consumption	Input Bits (IX)	8 points (1 byte)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		45 mA	
Field Power Supply Consumption		Number of inputs simultaneously ON X 6 mA	
Terminal Block (Removable push type)		8 point	
Recommended Wire Size*		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



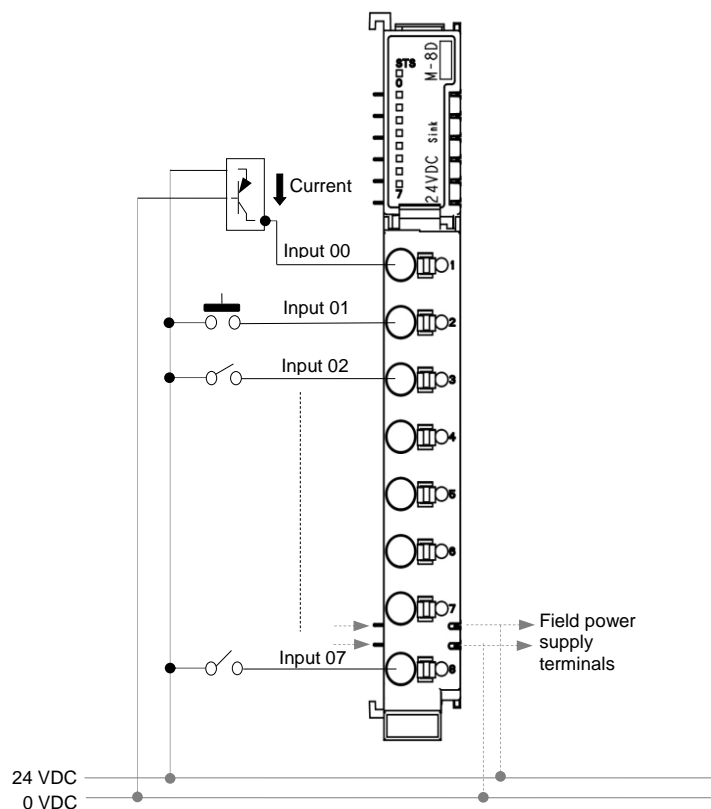
No.	LED	Colour	Status		Description
1	0.0 to 0.7	Green	ON		Input is ON
			OFF		Input is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. - No communication from Header - Backplane bus fault detected.
			Yellow	ON	24VDC field power supply is not available

Connection Diagram

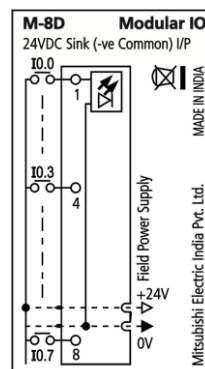
The figure shows module front with 8 point terminal block, alongwith interface of field input devices like push buttons, limit switches and proximity switches for sink operation i.e. with negative common.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-8D: Wiring description



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5, 6 and 7, 8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different,

Some of the input devices like proximity switches may malfunction due to inherent off state leakage current. Ensure that proper bleeder resistor is connected as a load considering maximum specified OFF state current of input module.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set the following module parameters

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header
	Disable [Default]	
Input Filter Time (ms)	10 (Default)	Defines input filter time in ms (Supported range : 3 to 70 msec).

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

IO Data

The table below provides description of Digital input.

Channel	Data Type	Local Address*
Digital Input		
Digital Input 00-07	BYTE	IX n
DI 00	BOOL	IX n.0
...
DI 07	BOOL	IX n.7

*Local address n changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics

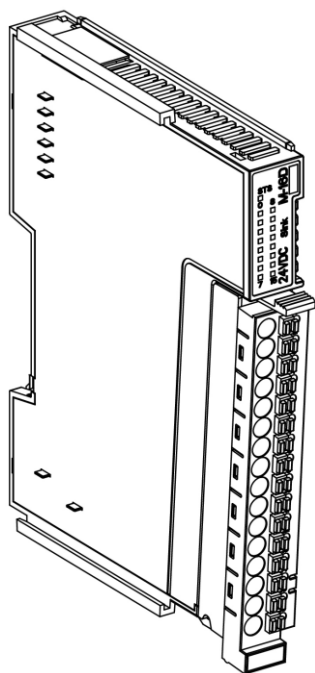
Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24VDC field power supply is not available
			FALSE	24VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

6.3 M-16D

[16 Point 24 VDC Digital Input Sink Type
(Negative Common) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

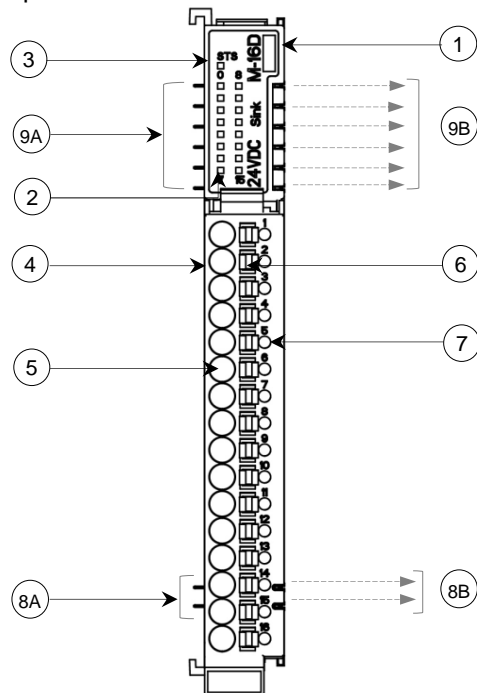
[IO Data](#)

Module Overview

M-16D is 16 point 24 VDC digital input module. It allows sink type (negative common) of connections for all the inputs. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-16D	Module ordering code
2	IO LED Indications	0 to 15: 16 Green colour LEDs for individual input status
3	Module LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	16-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

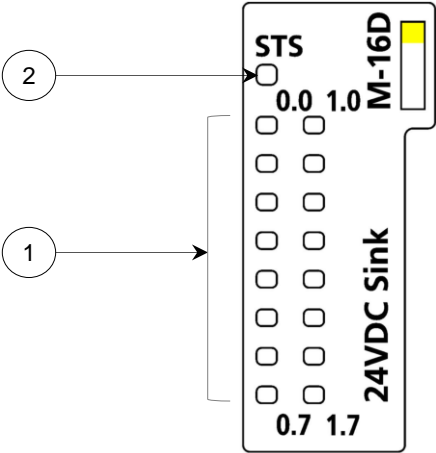
The table below provides technical specifications of **M-16D**.

Specification		Description	
Ordering Code		M-16D	
Number of Inputs		16	
Input Type		Sink type (Negative common)	
Voltage Rating		24 VDC (18 to 30 VDC including ripple)	
ON Voltage Level		18 VDC minimum	
OFF Voltage Level		5 VDC maximum	
Maximum Voltage		40 VDC	
ON State Current Per Point		6 mA typical at 24 VDC	
OFF State Current		3.8 mA at 24 VDC	
Transition Delay		3 ms to 70 ms [10 ms, Default]	
Input Impedance		5.2 K Ω	
Isolation		Between input and internal circuit	Optical 1.5 KV
		Between inputs	No isolation
IO Memory Consumption	Input Bits (IX)	16 points (2 bytes)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		65 mA	
Field Power Supply Consumption		Number of inputs simultaneously ON X 6 mA	
Terminal Block (Removable push type)		16 point	
Recommended Wire Size*		0.5 to 1.0 sq. mm (AWG 20 to 16)	
		Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



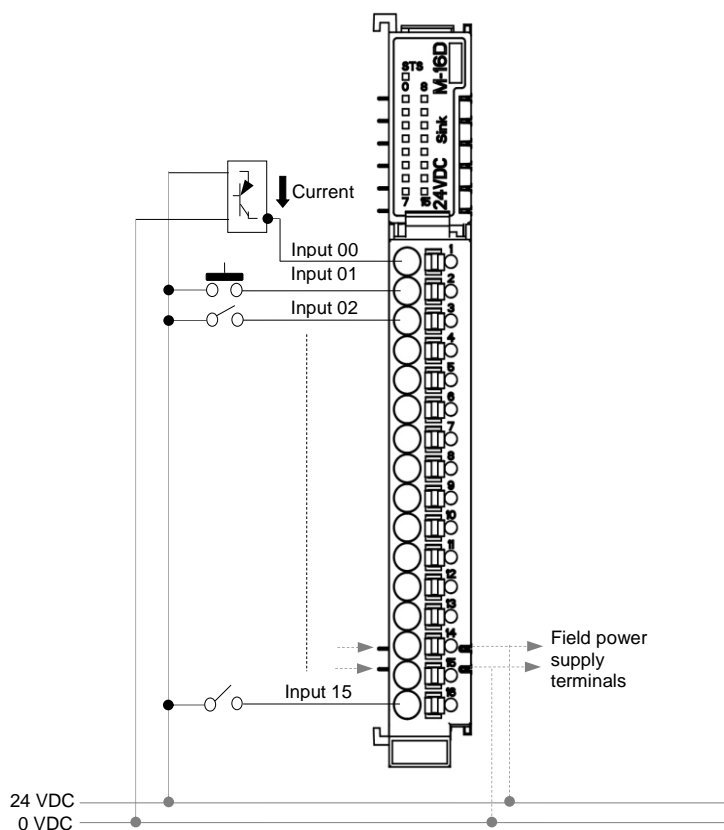
No.	LED	Colour	Status		Description
1	0.0 to 0.7, 1.0 to 1.7	Green	ON		Input is ON
			OFF		Input is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow	ON	24VDC field power supply is not available

Connection Diagram

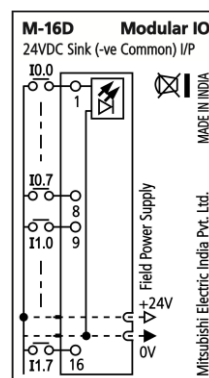
The figure shows module front with 16 point terminal block, alongwith interface of field input devices like push buttons, limit switches and proximity switches for sink operation i.e. with negative common.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-16D: Wiring description



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5, 6 and 7, 8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different,

Some of the input devices like proximity switches may malfunction due to inherent off state leakage current. Ensure that proper bleeder resistor is connected as a load considering maximum specified OFF state current of input module.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set the following module parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header.
	Disable [Default]	
Input Filter Time (ms)	10 (Default)	Defines input filter time in ms (Supported range : 3 to 70 msec).

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

IO Data

The table below provides description of Digital input.

Channel	Data Type	Local Address*
Digital Input		
Digital Input 00-07	BYTE	IX n
DI 00	BOOL	IX n.0
⋮	⋮	⋮
DI 07	BOOL	IX n.7
Digital Input 10-17	BYTE	IX n+1
DI 10	BOOL	IX n+1.0
⋮	⋮	⋮
DI 17	BOOL	IX n+1.7

*Local address n changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following module diagnostics.

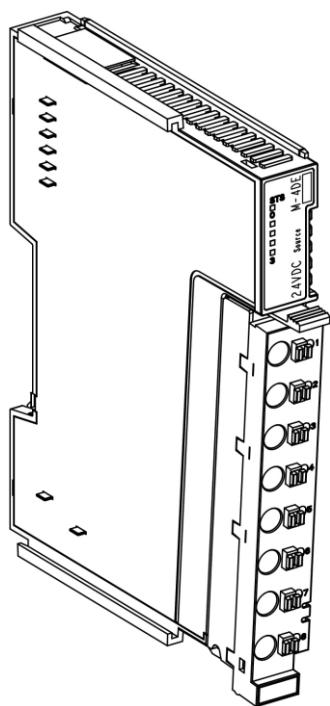
Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24VDC field power supply is not available
			FALSE	24VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

6.4 M-4DE

[4 Point 24 VDC Digital Input Source Type
(Positive Common) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

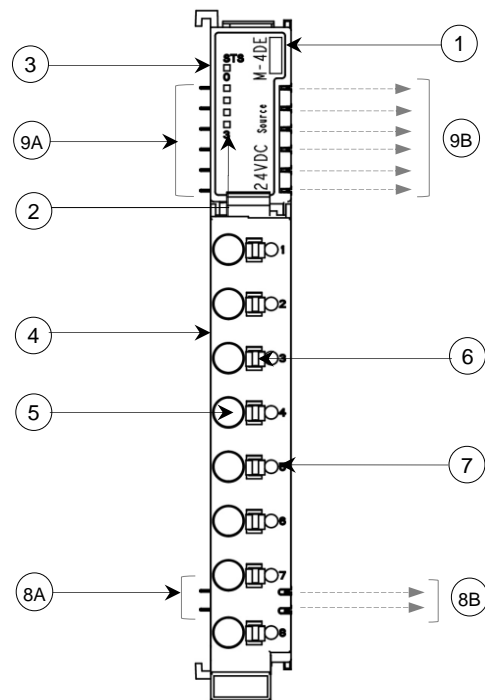
[IO Data](#)

Module Overview

M-4DE is 4 point 24 VDC digital input module. It allows source type (positive common) of connections for all the inputs. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-4DE	Module ordering code
2	IO LED Indications	0 to 3: 4 Green colour LEDs for individual input status
3	Module LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

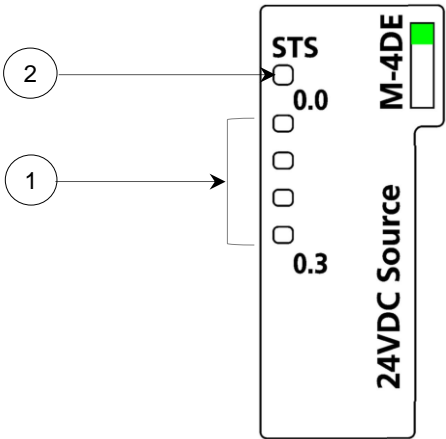
The table below provides technical specifications of **M-4DE**.

Specification		Description	
Ordering Code		M-4DE	
Number of Inputs		4	
Input Type		Source type (Positive common)	
Voltage Rating		24 VDC (18 to 30 VDC including ripple)	
ON Voltage Level		18 VDC minimum	
OFF Voltage Level		5 VDC maximum	
Maximum Voltage		40 VDC	
ON State Current Per Point		6 mA typical at 24 VDC	
OFF State Current		3.8 mA at 24 VDC	
Transition Delay		3 ms to 70 ms [10 ms, Default]	
Input Impedance		5.2 K Ω	
Isolation		Between input and internal circuit	Optical 1.5 KV
		Between inputs	No isolation
IO Memory Consumption	Input Bits (IX)	4 points (1 byte)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		40 mA	
Field Power Supply Consumption		Number of inputs simultaneously ON X 6 mA	
Terminal Block (Removable push type)		8 point	
Recommended Wire Size*		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



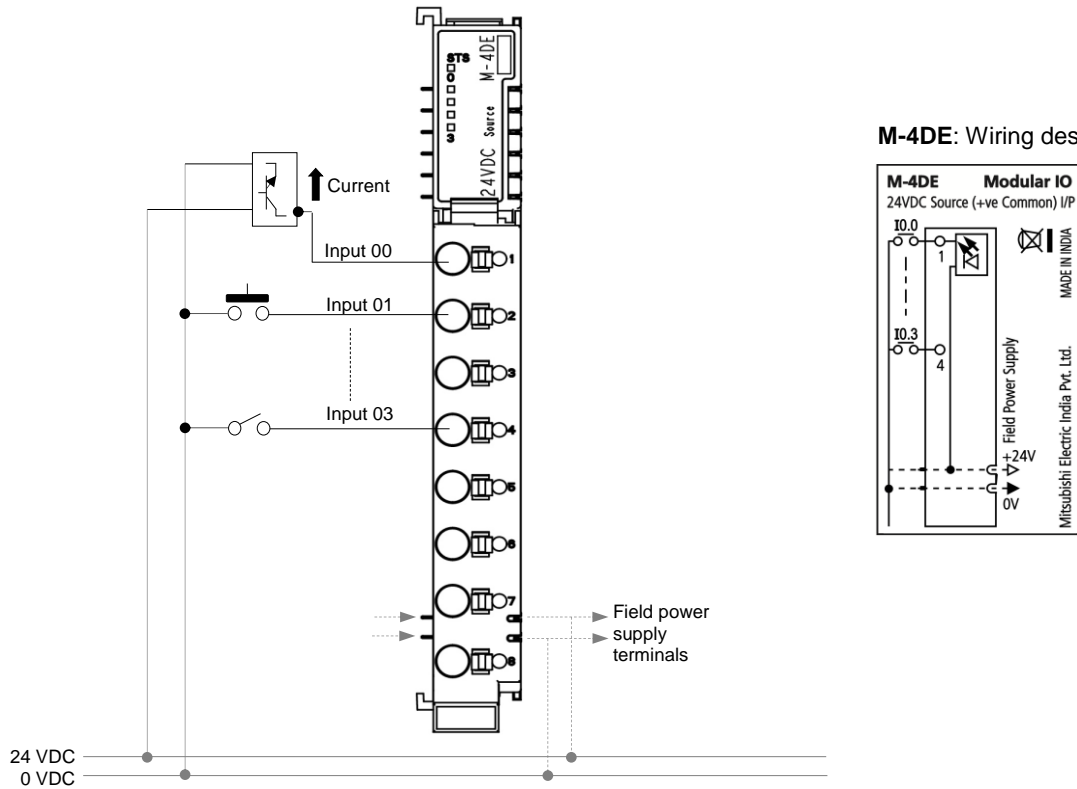
No.	LED	Colour	Status		Description
1	0.0 to 0.3	Green	ON		Input is ON
			OFF		Input is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow		24 VDC field power supply is not available

Connection Diagram

The figure shows module front with 8 point terminal block, alongwith interface of field input devices like push buttons, limit switches and proximity switches for source operation i.e. with positive common.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5, 6 and 7, 8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different,

Some of the input devices like proximity switches may malfunction due to inherent off state leakage current. Ensure that proper bleeder resistor is connected as a load considering maximum specified OFF state current of input module.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set the following module parameter.

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header
	Disable [Default]	
Input Filter Time (ms)	10 (Default)	Defines input filter time in ms (Supported range : 3 to 70 msec).

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

IO Data

The table below provides description of Digital input.

Channel	Data Type	Local Address*
Digital Input		
Digital Input 00-03	BYTE	IX n
DI 00	BOOL	IX n.0
...
DI 03	BOOL	IX n.3

*Local address n changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics.

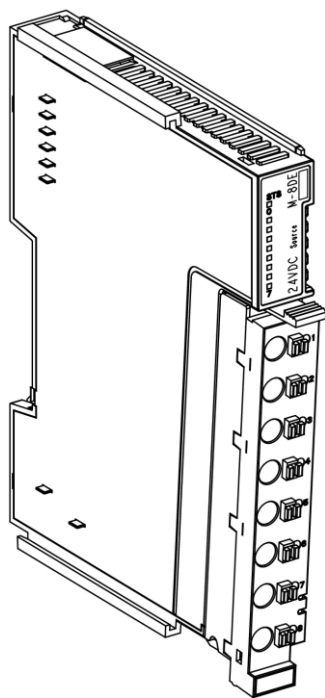
Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available
			FALSE	24 VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

6.5 M-8DE

[8 Point 24 VDC Digital Input Source Type
(Positive Common) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

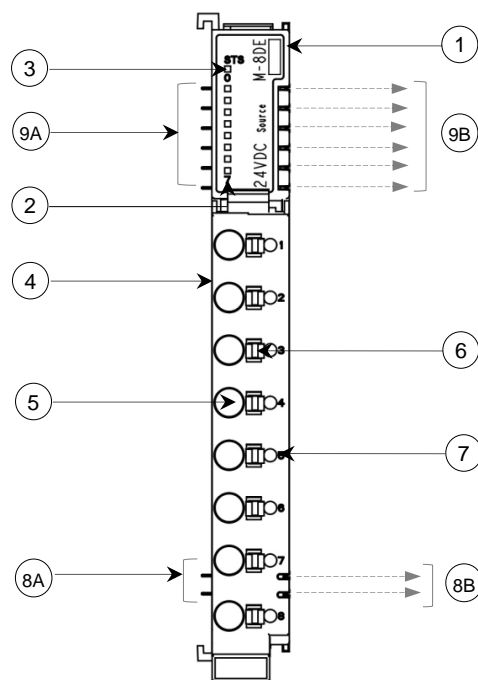
[IO Data](#)

Module Overview

M-8DE is 8 point 24 VDC digital input module. It allows source type (positive common) of connections for all the inputs. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-8DE	Module ordering code
2	IO LED Indications	0 to 7: 8 Green colour LEDs for individual input status
3	Module LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

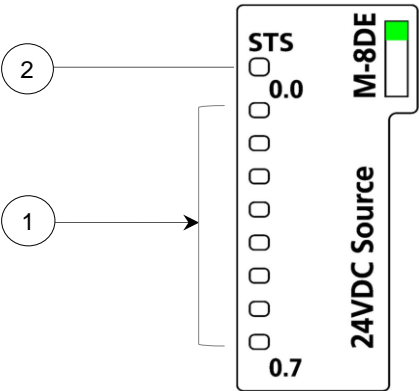
The table below provides technical specifications of **M-8DE**.

Specification		Description	
Ordering Code		M-8DE	
Number of Inputs		8	
Input Type		Source type (Positive common)	
Voltage Rating		24 VDC (18 to 30 VDC including ripple)	
ON Voltage Level		18 VDC minimum	
OFF Voltage Level		5 VDC maximum	
Maximum Voltage		40 VDC	
ON State Current Per Point		6 mA typical at 24 VDC	
OFF State Current		3.8 mA at 24 VDC	
Transition Delay		3 ms to 70 ms [10 ms, Default]	
Input Impedance		5.2 K Ω	
Isolation		Between input and internal circuit	Optical 1.5 KV
		Between inputs	No isolation
IO Memory Consumption	Input Bits (IX)	8 points (1 byte)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		45 mA	
Field Power Supply Consumption		Number of inputs simultaneously ON X 6 mA	
Terminal Block (Removable push type)		8 point	
Recommended Wire Size*		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



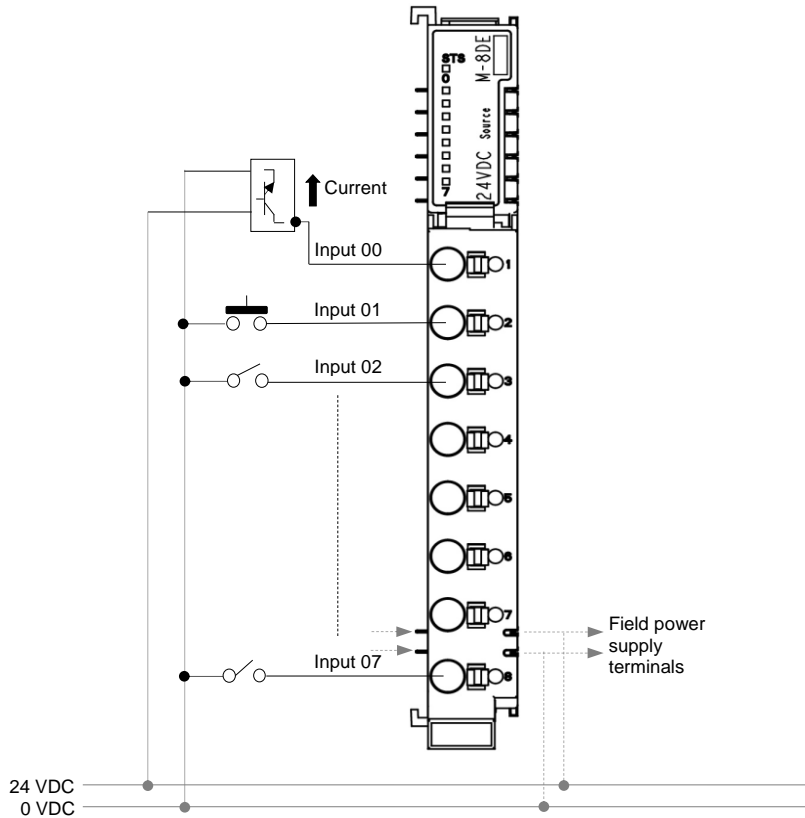
No.	LED	Colour	Status		Description
1	0.0 to 0.7	Green	ON		Input is ON
			OFF		Input is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow	ON	24VDC field power supply is not available

Connection Diagram

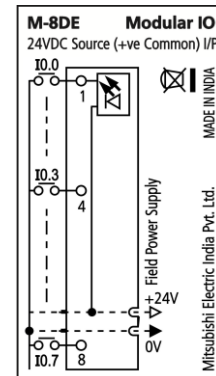
The figure shows module front with 8 point terminal block, alongwith interface of field input devices like push buttons, limit switches and proximity switches for source operation i.e. with positive common.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-8DE: Wiring description



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5, 6 and 7, 8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different, Some of the input devices like proximity switches may malfunction due to inherent off state leakage current. Ensure that proper bleeder resistor is connected as a load considering maximum specified OFF state current of input module.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set the following module parameters

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header
	Disable [Default]	
Input Filter Time (ms)	10 (Default)	Defines input filter time in ms (Supported range : 3 to 70 msec).

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

IO Data

The table below provides description of Digital input.

Channel	Data Type	Local Address*
Digital Input		
Digital Input 00-07	BYTE	IX n
DI 00	BOOL	IX n.0
...
DI 07	BOOL	IX n.7

*Local address n changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics

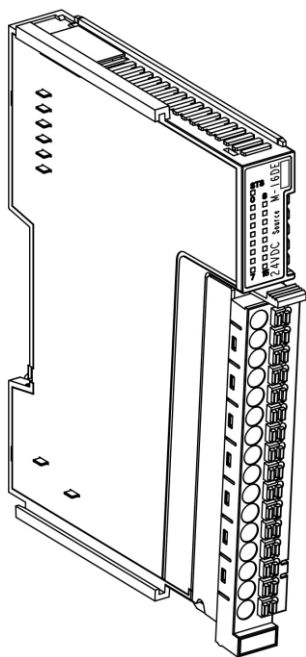
Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available
			FALSE	24 VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

6.6 M-16DE

[16 Point 24 VDC Digital Input Source
Type (Positive Common) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

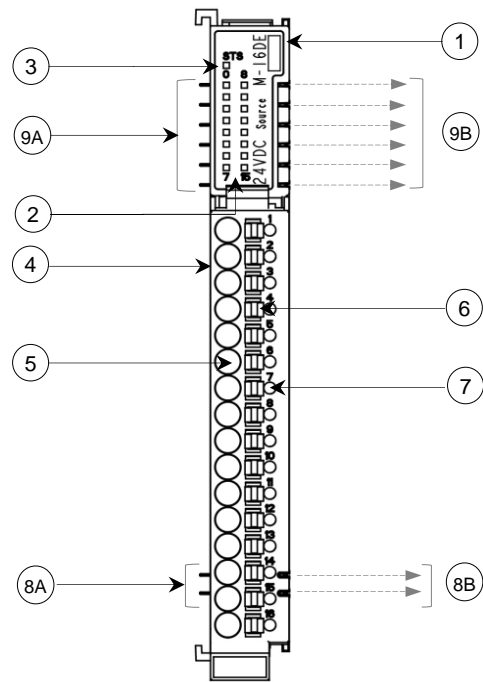
[IO Data](#)

Module Overview

M-16DE is 16 point 24 VDC digital input module. It allows source type (positive common) of connections for all the inputs. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-16DE	Module ordering code
2	IO LED Indications	0 to 15: 16 Green colour LEDs for individual input status
3	Module LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	16-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

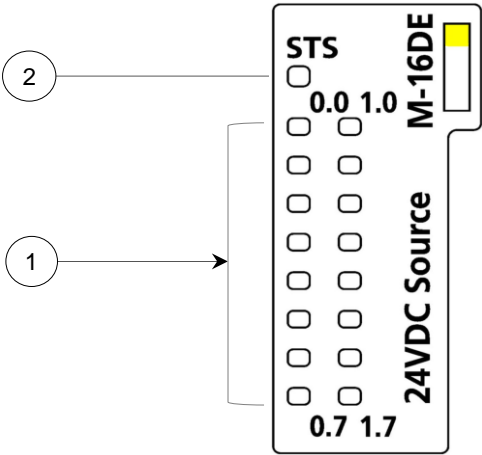
The table below provides technical specifications of **M-16DE**.

Specification		Description	
Ordering Code		M-16DE	
Number of Inputs		16	
Input Type		Source type (Positive common)	
Voltage Rating		24 VDC (18 to 30 VDC including ripple)	
ON Voltage Level		18 VDC minimum	
OFF Voltage Level		5 VDC maximum	
Maximum Voltage		40 VDC	
ON State Current Per Point		6 mA typical at 24 VDC	
OFF State Current		3.8 mA at 24 VDC	
Transition Delay		3 ms to 70 ms [10 ms, Default]	
Input Impedance		5.2 KΩ	
Isolation		Between input and internal circuit	Optical 1.5 KV
		Between inputs	No isolation
IO Memory Consumption	Input Bits (IX)	16 points (2 bytes)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		65 mA	
Field Power Supply Consumption		Number of inputs simultaneously ON X 6 mA	
Terminal Block (Removable push type)		16 point	
Recommended Wire Size*		0.5 to 1.0 sq. mm (AWG 20 to 16)	
		Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



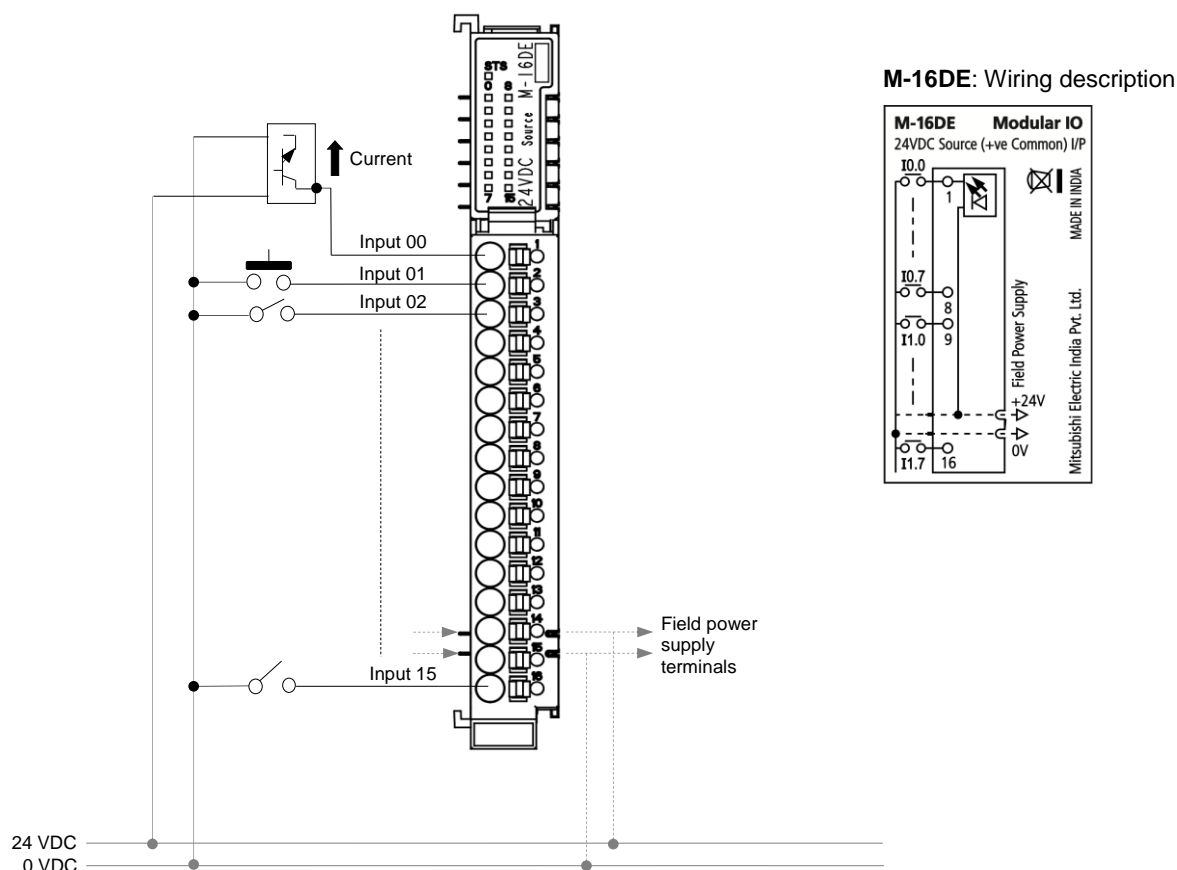
No.	LED	Colour	Status		Description
1	0.0 to 0.7, 1.0 to 1.7	Green	ON		Input is ON
			OFF		Input is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow		24VDC field power supply is not available

Connection Diagram

The figure shows module front with 16 point terminal block, alongwith interface of field input devices like push buttons, limit switches and proximity switches for source operation i.e. with positive common.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5,6 and 7,8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different,

Some of the input devices like proximity switches may malfunction due to inherent off state leakage current. Ensure that proper bleeder resistor is connected as a load considering maximum specified OFF state current of input module.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set the following module parameters

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header
	Disable [Default]	
Input Filter Time (ms)	10 (Default)	Defines input filter time in ms (Supported range : 3 to 70 msec).

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

IO Data

The table below provides description of Digital input.

Channel	Data Type	Local Address*
Digital Input		
Digital Input 00-07	BYTE	IX n
DI 00	BOOL	IX n.0
...
DI 07	BOOL	IX n.7
Digital Input 10-17	BYTE	IX n+1
DI 10	BOOL	IX n+1.0
...
DI 17	BOOL	IX n+1.7

*Local address n changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following module diagnostics.

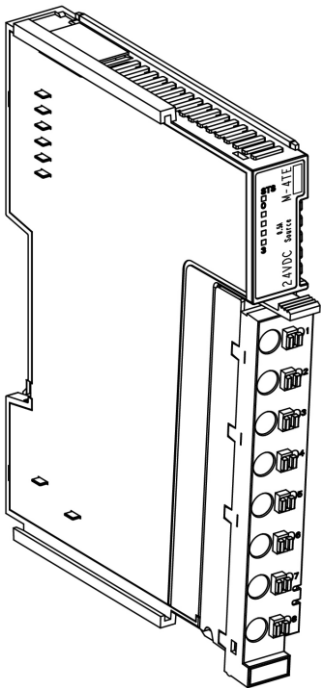
Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24VDC field power supply is not available
			FALSE	24VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

6.7 M-4TE

[4 Point 24 VDC Transistor Output (Source) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

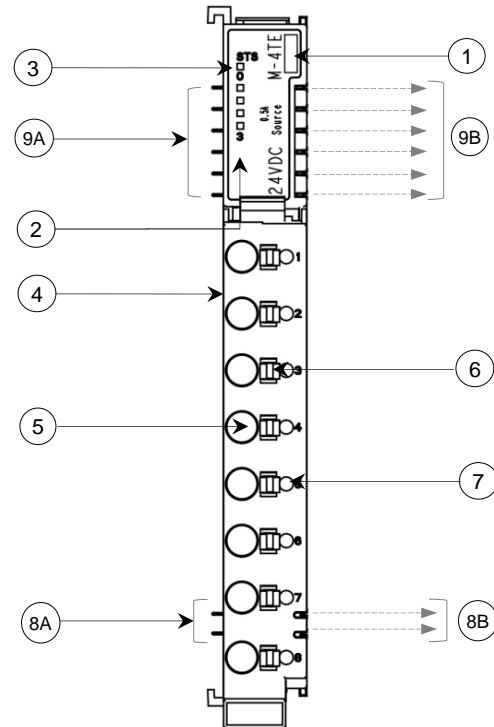
[IO Data](#)

Module Overview

M-4TE is 4 point transistor output (source) module. It allows source type of connections with field output devices. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-4TE	Module ordering code
2	IO LED Indication	0 to 3: 4, Red colour LEDs for individual output status
3	Module LED Indication	STS: 1, Bi-colour LED for module status
4	Terminal Block	16-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field power supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System power supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

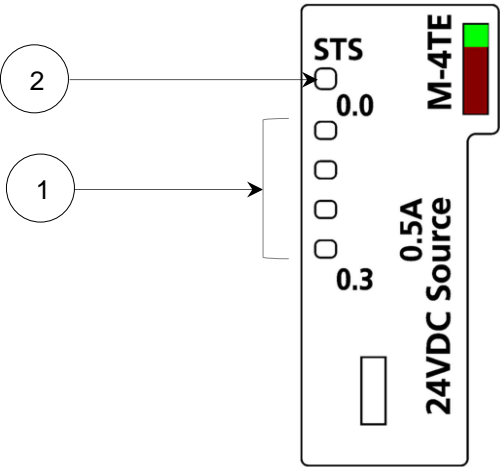
The table below provides technical specifications of **M-4TE**.

Specification		Description	
Ordering Code		M-4TE	
Number of Outputs		4	
Output Type		Source type	
Output Device		Transistor	
Voltage Rating		24 VDC (18 to 30 V including ripple)	
Current Rating		0.5 A per output	
ON Voltage Drop		0.6 VDC maximum	
ON State Resistance		200 mΩ	
OFF State Leakage Current		10 μA maximum	
Response Time		OFF to ON	250 μsecs
		ON to OFF	300 μsecs
Isolation		Between output and internal circuit	Optical 1.5 KV
Protection		Output short circuit protection Fast demagnetization for inductive loads	
IO Memory Consumption	Output Bits (QX)	4 points (1 byte)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		90 mA	
Field Power Supply Consumption		Sum of output loads simultaneously ON.	
Terminal Block (Removable push type)		8 point	
Recommended Wire Size*		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



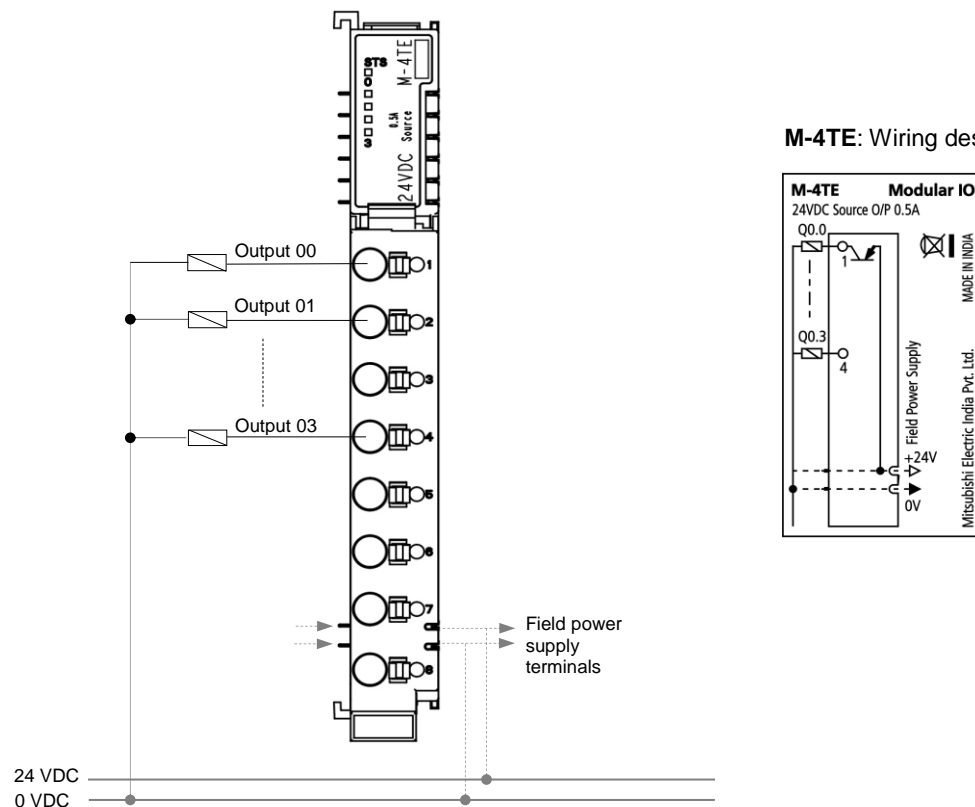
No.	LED	Colour	Status		Description
1	0.0 to 0.3	Red	ON		Output is ON
			OFF		Output is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow	ON	24 VDC field power supply is not available

Connection Diagram

The figure shows module front with 8 point terminal block, along with interface to field output devices like solenoid valves, for source operation.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5, 6 and 7, 8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different,

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set module parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header
	Disable [Default]	

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to Enable.

IO Data

The table below provides description of Digital output.

Channel	Data Type	Local Address*
Digital output		
Digital Output 00-03	BYTE	QX n
DO 00	BOOL	QX n.0
...
DO 03	BOOL	QX n.3

*Local address (n) value changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics.

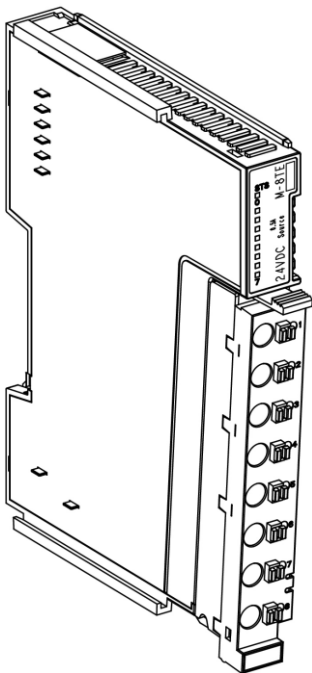
Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available
			FALSE	24 VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to Enable.

Refer section [Troubleshooting](#) for station error code list and error messages.

6.8 M-8TE

[8 Point 24 VDC Transistor Output (Source) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

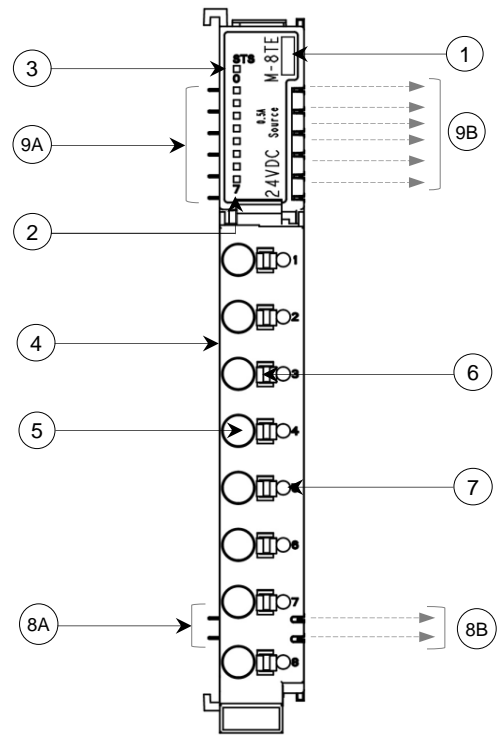
[IO Data](#)

Module Overview

M-8TE is 8 point transistor output (source) module. It allows source type of connections with field output devices. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-8TE	Module ordering code
2	IO LED Indication	0 to 7: 8, Red colour LEDs for individual output status
3	Module LED Indication	STS: 1, Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field power supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System power supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

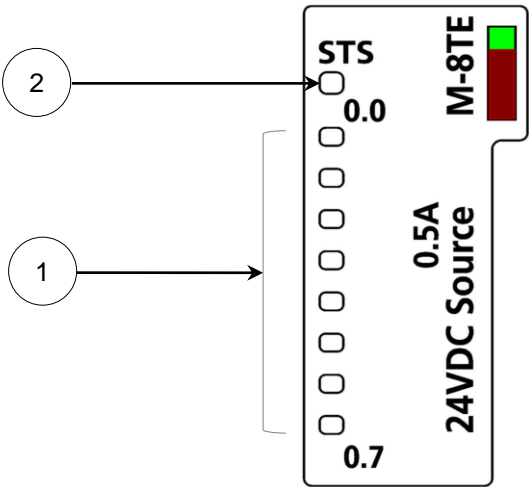
The table below provides technical specifications of **M-8TE**

Specification		Description	
Ordering Code		M-8TE	
Number of Outputs		8	
Output Type		Source type	
Output Device		Transistor	
Voltage Rating		24 VDC (18 to 30 V including ripple)	
Current Rating		0.5 A per output	
ON Voltage Drop		0.6 VDC maximum	
ON State Resistance		200 mΩ	
OFF State Leakage Current		10 μA maximum	
Response Time		OFF to ON	250 μsecs
		ON to OFF	300 μsecs
Isolation		Between output and internal circuit	Optical 1.5 KV
Protection		Output short circuit protection Fast demagnetization for inductive loads	
IO Memory Consumption	Output Bits (QX)	8 points (1 byte)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		105 mA	
Field Power Supply Consumption		Sum of output loads simultaneously ON.	
Terminal Block (Removable push type)		8 point	
Recommended Wire Size*		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



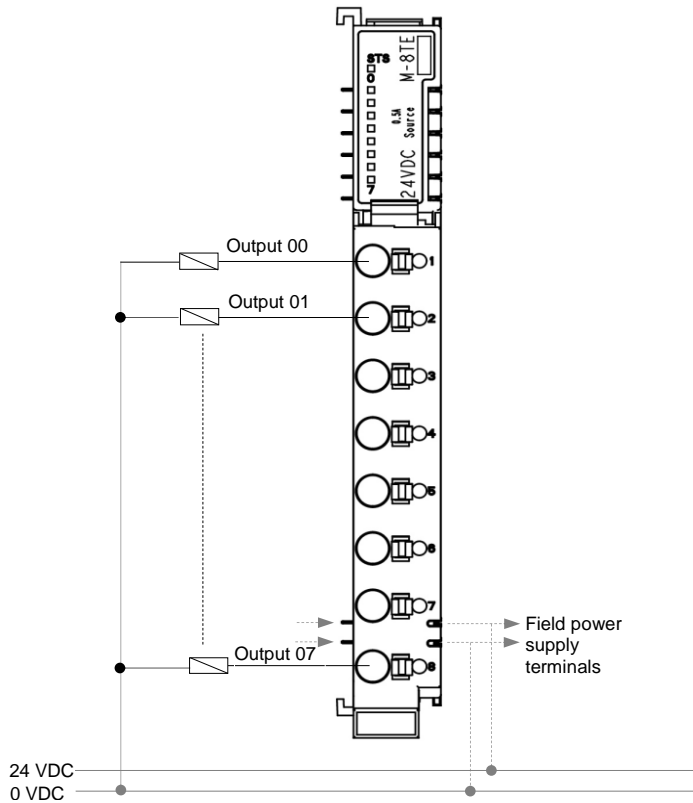
No.	LED	Colour	Status		Description
1	0.0 to 0.7	Red	ON		Output is ON
			OFF		Output is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow	ON	24 VDC field power supply is not available

Connection Diagram

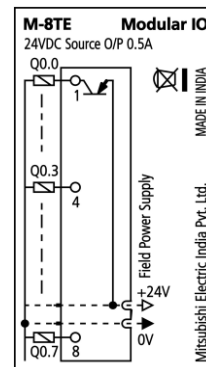
The figure shows module front with 8 point terminal block, along with interface to field output devices like solenoid valves for source operation.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-8TE: Wiring description



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5, 6 and 7, 8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different,

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set module parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header
	Disable [Default]	

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

IO Data

The table below provides description of Digital output.

Channel	Data Type	Local Address*
Digital output		
Digital Output 00-07	BYTE	QX (n)
DO 00	BOOL	QX (n).0
...
DO 07	BOOL	QX (n).7

*Local address (n) value changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics.

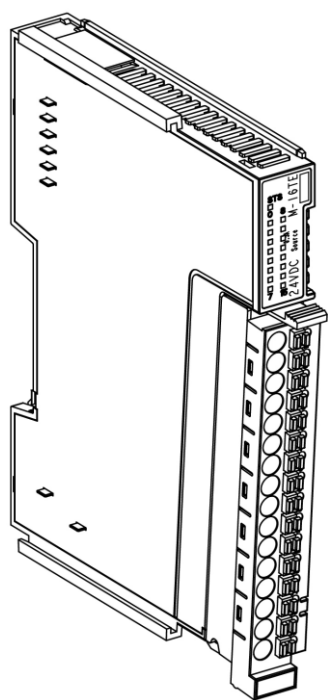
Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available
			FALSE	24 VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

6.9 M-16TE

[16 Point 24 VDC Transistor Output
(Source) Module]



Module Overview

Part Names

Specifications

LED Indications

Connection Diagram

Parameters

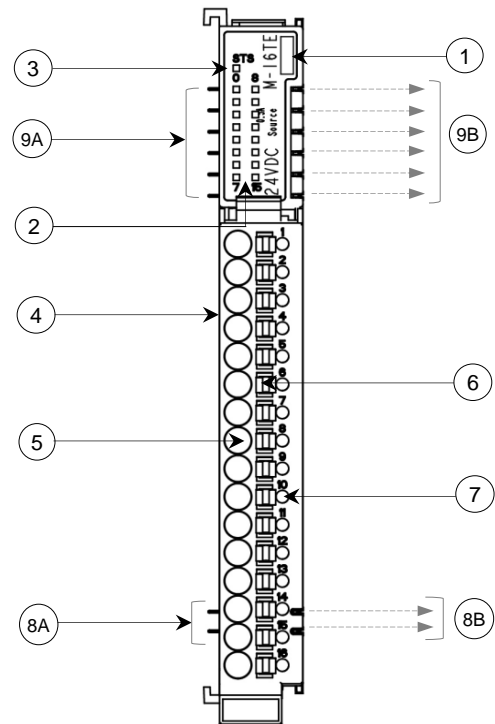
IO Data

Module Overview

M-16TE is 16 point transistor output (source) module. It allows source type of connections with field output devices. The module can be fixed in any IO slot of modular IO station.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-16TE	Module ordering code
2	IO LED Indication	0 to 15: 16, Red colour LEDs for individual output status
3	Module LED Indication	STS: 1, Bi-colour LED for module status
4	Terminal Block	16-point removable push type
5	IO Point	Wire insertion point for IO terminal
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

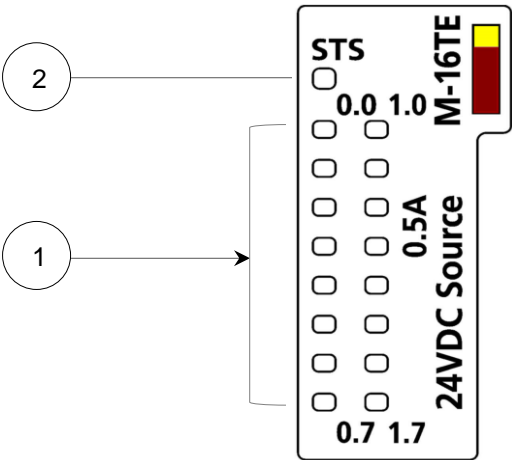
The table below provides technical specifications of **M-16TE**.

Specification		Description	
Ordering Code		M-16TE	
Number of Outputs		16	
Output Type		Source type	
Output Device		Transistor	
Voltage Rating		24 VDC (18 to 30 V including ripple)	
Current Rating		0.5 A per output, 6 A maximum per module	
ON Voltage Drop		0.6 VDC maximum	
ON State Resistance		200 mΩ	
OFF State Leakage Current		10 μA maximum	
Response Time		OFF to ON	250 μsecs
		ON to OFF	300 μsecs
Isolation		Between output and internal circuit	Optical 1.5 KV
Protection		Output short circuit protection Fast demagnetization for inductive loads	
IO Memory Consumption	Output Bits (QX)	16 points (2 bytes)	
	Diagnostics (SB) [User configurable]	1 byte	
System Power Supply Consumption		130 mA	
Field Power Supply Consumption		Sum of output loads simultaneously ON.	
Terminal Block (Removable push type)		16 point	
Recommended Wire Size*		0.5 to 1.0 sq. mm (AWG 20 to 16) Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Refer section [Wiring](#) for more details.

LED Indications

This section provides meaning of LED indications available on module.



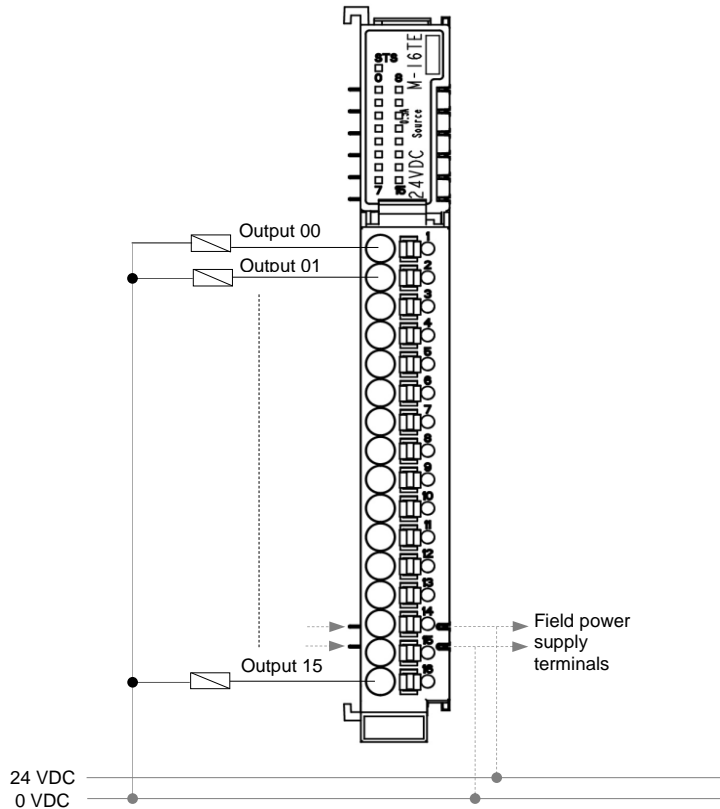
No.	LED	Colour	Status		Description
1	0.0 to 0.7 1.0 to 1.7	Red	ON		Output is ON
			OFF		Output is OFF
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow	ON	24 VDC field power supply is not available

Connection Diagram

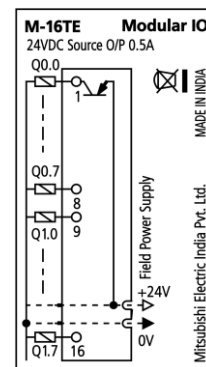
The figure shows module front with 16 point terminal block, along with interface to field output devices like solenoid valves for source operation.

Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [.Wiring.](#)



M-16TE: Wiring description



NOTE

24 VDC supply shown here and Field power supply connected to Header module (terminal numbers 5, 6 and 7, 8) should be same. Alternately, ensure that grounds (0V) are common if supply sources are different.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set module parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable	Enables diagnostic data (SB) sharing with header
	Disable [Default]	

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

IO Data

The table below provides description of Digital output.

Channel	Data Type	Local Address*
Digital output		
Digital Output 00-07	BYTE	QX (n)
DO 00	BOOL	QX (n).0
...
DO 07	BOOL	QX (n).7
Digital Output 10-17	BYTE	QX (n+1)
DO 10	BOOL	QX (n+1).0
...
DO 17	BOOL	QX (n+1).7

*Local address (n) value changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics.

Module Diagnostics	Data Type	Local Address*	Bit Status	Description
No field power Supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available
			FALSE	24 VDC field power supply is available
Reserved	BOOL	SB n.1 to SB n.7	Reserved	Reserved

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages

[Back To Index Page](#)

7 Analog IO Modules

Analog IO Modules: Overview






2 Channel Universal Analog Input Module	M-UAD2
4 Channel Analog V/I Input Module	M-AD4
8 Channel Analog Voltage Input Module	M-ADV8
8 Channel Analog Current Input Module	M-ADI8
2 Channel Analog Voltage/ Current Output Module	M-DA2

Overview

Analog input module converts input voltage, current, RTD and thermocouple readings into equivalent binary values.

Analog output module takes digital value data from processor and generates equivalent analog output voltage or current as per channel configuration.

In modular IO station, different types of analog IO modules are available as below,

Ordering Information	Ordering Code	Colour Identification*
Analog Input		
2 Channel Universal Analog Input Module	M-UAD2	
4 Channel V/ I Analog Input Module	M-AD4	
8 Channel Analog Voltage Input Module	M-ADV8	
8 Channel Analog Current Input Module	M-ADI8	
Analog Output		
2 Channel V/ I Analog Output Module	M-DA2	

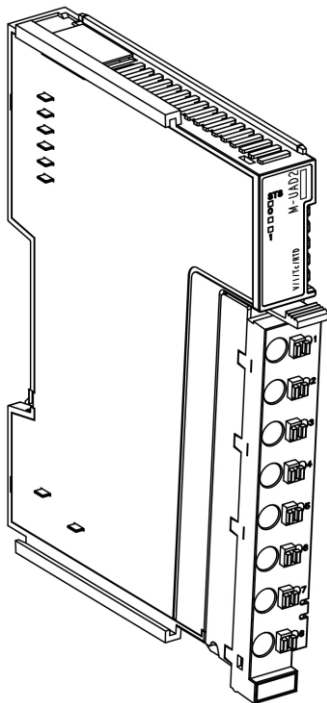
*Color code is provided on LED label and at bottom side of terminal block. User should always ensure that color code of LED label and terminal block is identical.

NOTE

For analog input and output modules, it is recommended to route IO cables carrying low level signals like analog signals, separately and away from cables carrying high voltage and high current.

7.1 M-UAD2

[2 CH. Universal Analog Input Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[User Configurable Features](#)

[Parameters](#)

[IO Data](#)

Module Overview

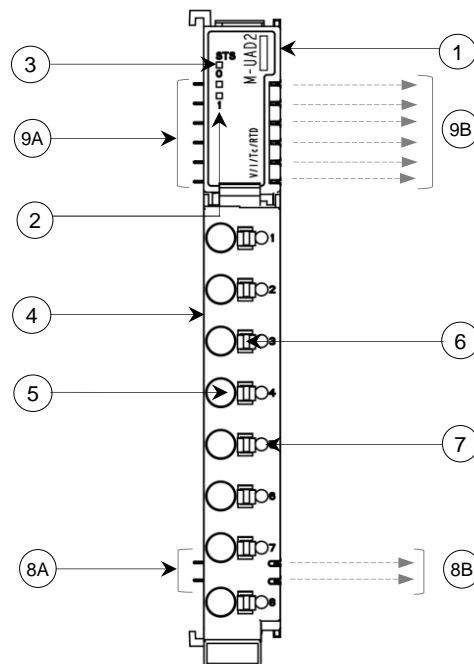
M-UAD2 is 2 channel universal analog input module. Highlighting features are as below

- Supports various types of inputs like voltage, current, mV, thermocouple and RTD.
- User configurable signal conditioning for stable analog measurement.
- User defined engineering scaling for voltage, mV and current type of inputs.
- Easy troubleshooting with module level as well as channel level diagnostics.

These are non-isolated type of input channels.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-UAD2	Module ordering code
2	IO LED Indication	0 and 1: 2, Green colour LEDs for individual input status
3	Module LED Indication	STS: 1, Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point for IO terminal.
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field power supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System power supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

The table below provides technical specifications of **M-UAD2**.

Specification	Description				
Ordering Code	M-UAD2				
Number of Input Channels	2 CH., universal, non-isolated, 16-bit resolution				
Input Types (user configurable)	Voltage	0 to 10 VDC, ±10 VDC, ±100 mV			
	Current	0 to 20 mA, 4 to 20 mA			
	RTD	3 Wire PT100 (385): -200°C to 850°C			
		3 Wire PT100 (385): -50°C to +250°C			
		3 Wire PT1000 (385): -50°C to +250°C			
	Thermocouple	J Type: -100°C to 1200°C			
		K Type: -100°C to 1372°C			
Resolution and Overall Accuracy*	16 bits				
	Input Type	Basic Resolution	Basic Digital Output (Integer format)	Overall accuracy in % of FSD	
				25°C	60°C
	0 to 10 VDC	0.15 mV	0 to 32000	±0.2	±0.3
	±10 VDC	0.3 mV	-32000 to 32000	±0.2	±0.3
	±100 mV	3 µV	-32000 to 32000	±0.1	±0.2
	0 to 20 mA	0.3 µA	0 to 32000	±0.2	±0.3
	4 to 20 mA	0.3 µA	0 to 32000	±0.2	±0.3
	PT100	0.1°C	-2000 to 8500	±0.3	±0.6
	PT100	0.01°C	-5000 to 25000	±0.5	±1
	PT1000	0.01°C	-5000 to 25000	±0.4	±0.6
	J Type TC	0.1 °C	-1000 to 12000	±1	±1.5
	K Type TC	0.1 °C	-1000 to 13720	±1	±1.5
ADC Conversion Type	Delta-sigma (ΔΣ)				
Scaling to Engineering units	Supported for voltage, mV and current input types				
Absolute Maximum Input	±30 VDC / ±30 mA				
Lead Wire Resistance Compensation	30Ω max. per wire (Applicable for 3-wire PT100, PT1000 input types)				
Input Impedance	Voltage input: 1 MΩ, Current input: 140 Ω, mV input: 100 KΩ				
Averaging	Number of averaging samples : 4, 8, 16 (Default), 32 User can configure averaging or digital filter at a time				
Digital Filter	1st order digital filter User configurable time constant: 10 msec to 5000 msec User can configure averaging or digital filter at a time				

*TC is the abbreviation of word Thermocouple.

M-UAD2 technical specifications are continued...

Specification		Description	
Module Updation Time		Module updation time = Channel 0 conversion time + Channel 1 conversion time*	
		The table below provides typical ADC conversion time for supported input types with Filter type setting as “No filter”.	
		Input Type	ADC Conversion time (msec)
		Voltage 0 to 10 V	50
		Voltage -10 to 10 V	
		Voltage -100 to 100 mV	
		Current 0 to 20 mA	
		Current 4 to 20 mA	
		PT100 -200°C to 850°C	
		PT100 -50°C to 250°C	100
		PT1000 -50°C to 250°C	
		TC J Type -100°C to 1200°C	200
TC K Type -100°C to 1372°C			
Sensor Excitation Current		0.5 mA for PT100 sensor input 0.125 mA for PT1000 sensor input	
Open Circuit Detection		For PT100 /PT1000, Thermocouple and 4 to 20 mA input types	
Channel Protection		PTC for over current protection of current input upto 70 mA	
Isolation	Input channel to internal circuit	1.5 KV, Optical	
	Input channel to input channel	No isolation	
	Field power supply to input channel	No isolation	
IO Memory Consumption	Input Words (IW)	2 Words	
	Diagnostics (SB) [User configurable]	3 Bytes	
System Power Supply Consumption		100 mA	
Field Power Supply Consumption		47 mA maximum at 24 VDC	
Terminal Block (Removable push type)		8-point	
Recommended Wire Size		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Channel conversion time (averaging): ADC conversion time X number of averaging samples.

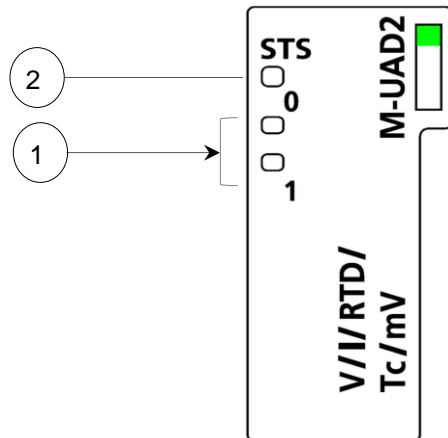
Channel conversion time (digital filter): ADC conversion time + (Time constant X 10).

NOTE

For PT100/ PT1000 input type, open circuit detection is supported for sensor connections. It is not supported for lead wire compensation input at terminal VIn-.

LED Indications

This section provides meaning of LED indications available on module.



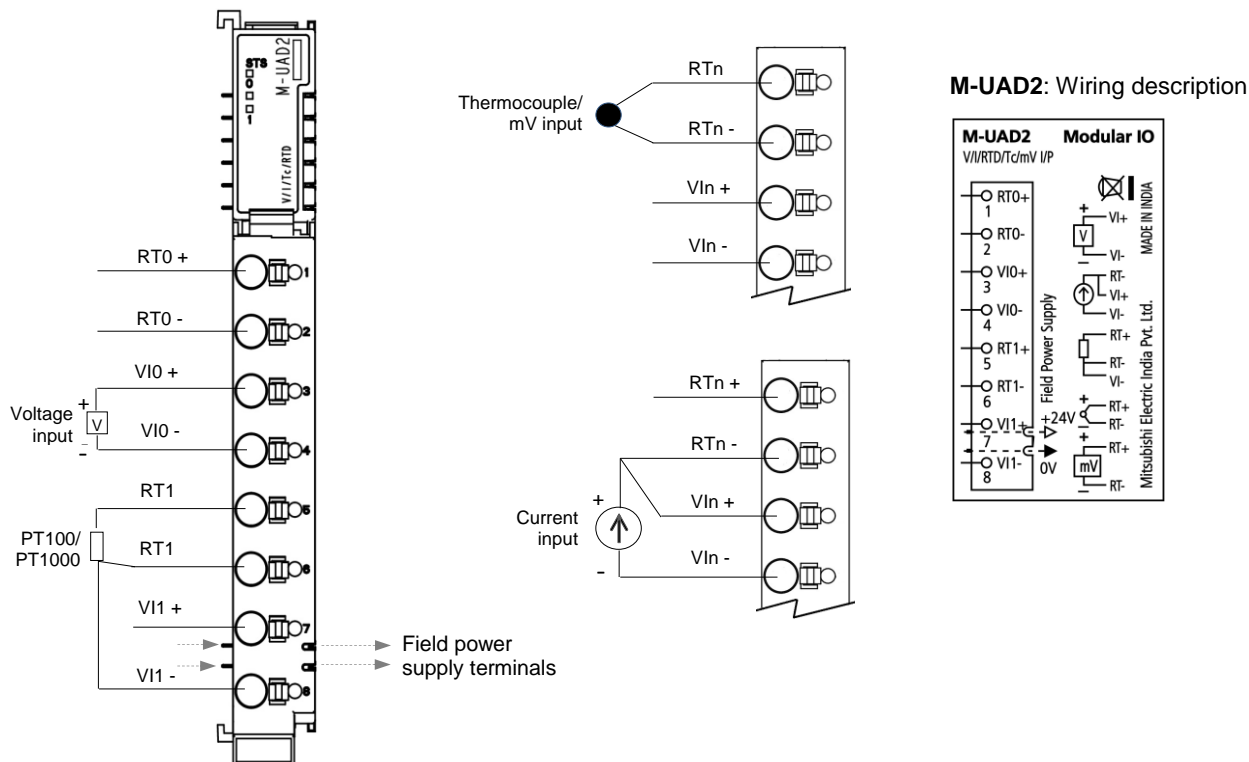
No.	LED	Colour	Status		Description
1	0, 1	Green	ON		Input channel is enabled.
			Single flash		Following errors may occur on individual input channel. <ul style="list-style-type: none"> - Open circuit [Applicable for 4 to 20 mA, thermocouple inputs and PT100/PT1000 inputs]
			Double flash		Invalid configuration and parameterization.
			OFF		Channel is disabled.
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module.
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch.
			Red	ON	One of the following condition occurred. <ul style="list-style-type: none"> - Factory calibration error - ADC error - Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected.
			Yellow	ON	24 VDC field power supply is not available.

Connection Diagram

This section provides wiring details for individual input channel. This module supports input types such as voltage, mV, current, RTD (PT100/ PT1000) and thermocouple. The figure below shows how to connect field sensors to module. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).

The figures below shows various sensors connected to the terminals of module for an example.



Following are the connection details for individual input type:

1. Voltage input is connected between **VIn+** and **VIn-**.
2. Current input is connected between **VIn-** and **RTn-**, along with short link between terminals **VIn+** and **RTn-**.
3. 3-wire PT100/ PT1000 sensor is connected between **RTn+** and **RTn-** along with lead compensation wire connected to **VIn-**.
4. Thermocouple/ mV input is connected between **RTn+** and **RTn-**.

Here, n is the input channel number 0 and 1.

NOTE

For M-UAD2, ambient temperature affects the overall accuracy of the module. So it is recommended to install analog input module away from modules dissipating heat e.g. M-DA2 as far as possible.

NOTE

For PT100/ PT1000 input type, open circuit detection is supported for sensor connections. It is not supported for lead wire compensation input at terminal VIn-.

For thermocouple and PT100/ PT1000 sensors, use cable provided or recommended by sensor manufacturer.

Connect cable shield directly to the good quality earth. It is recommended to keep cable shield at sensor end unconnected.

Use 2-core shielded twisted pair cable for carrying analog signal.

It is recommended to use thermocouple with isolated tip. Accuracy will be hampered if non isolated type of thermocouple element is used and if it gets connected to improper earth.

User Configurable Features

Module M-UAD2 provides user configurable features for all supported input types as shown below,

1. **Digital filter with user defined filter time constant settings.** [Range: 10 msec to 5000 msec].
 - It filters out spurious noise on analog input signal and ensures a stable analog count.
2. **Moving averaging with user definable number of samples.** [Number of samples : 4/ 8/ 16/ 32]
 - This feature is useful when an analog input signal is slowly varying or fluctuating.

User can either apply digital filter or moving average at a time.

3. **Engineering scaling units defined by minimum and maximum values.**

Module M-UAD2 provides user configurable engineering scaling in which channel data is scaled to engineering units defined by minimum and maximum values.

By default, Modular IO Configurator shows engineering scaling values as 0 and 100 for minimum and maximum value respectively.

For configuring user defined engineering scaling, set channel parameter Engineering scaling as **Enable**.

CH(n) Parameters*	Project Value	Comment
Engineering scaling	Enable	Enables / disables engineering scaling
	Disable [Default]	
Minimum Value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum Value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling

*Here, n is the channel number.

Programmer can define Minimum Value and Maximum Value in terms of engineering units like speed of meters per minute, temperature in °C, air pressure in bar, etc.

4. **Open circuit detection is provided.** This feature is applicable for 4 to 20 mA range, thermocouple input and PT100/ PT1000 inputs.

User can set open circuit value as,

- 7FFFH [Default]
- 0
- Maximum value of range
- Minimum value of range

Refer section [Modular IO Configurator](#) for more details.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set following parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable [Default]	Enables diagnostic data (SB) sharing with header
	Disable	

Module diagnostic data and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to Enable.

The table below provides a list of channel parameters that user can set for individual input channel.

Parameter Name	Project Value	Comment
Enable	Yes [Default] No	Enables/ Disables channel
Input Type	Voltage 0 to 10 V [Default] Voltage -10 to +10 V Voltage -100mV to 100 mV Current 0 to 20 mA Current 4 to 20 mA PT100: -200 to 850°C PT100: -50 to 250°C PT1000: -50 to 250°C TC J Type: -100 to 1200°C TC K Type: -100 to 1372°C	Select input type
Filter type	Digital Filter [Default] No Filter Averaging	Select filtering type
Digital filter time constant	50 [Default]	Digital filter time constant (10 to 5000 msec)
Number of averaging samples	4 8 16 [Default] 32	Number of samples for averaging
Engineering Scaling	Disable [Default] Enable	Enable/ Disables engineering scaling
Minimum value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling
Open circuit value	7FFFH [Default] 0 Maximum value of range Minimum value of range	Channel data in case of open circuit

IO Data

Following table provides description for Analog input channel data.

Channel	Data Type	Local Address*
CH0	INT	IW n
CH1	INT	IW n+1

*Local address (n) value changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics.

Channel	Data Type	Local Address*	Bit Status	Comment
Module Diagnostics	BYTE	SB n	--	--
No field power supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available.
			FALSE	24 VDC field power supply is available.
ADC fault	BOOL	SB n.1	TRUE	ADC is faulty.
			FALSE	ADC is healthy.
CJC error	BOOL	SB n.2	TRUE	CJC sensor onboard is faulty.
			FALSE	CJC sensor onboard is healthy.
Factory calibration error	BOOL	SB n.3	TRUE	Factory calibration data is invalid.
			FALSE	Factory calibration data is valid.
Reserved	BOOL	SB n.4	Reserved	
...
Reserved	BOOL	SB n.7	Reserved	
CH0 Diagnostics	BYTE	SB n+1	--	--
Channel enabled	BOOL	SB n+1.0	TRUE	If channel0 is enabled
			FALSE	If channel0 is disabled.
Channel open circuit	BOOL	SB n+1.1	TRUE	Sensor is disconnected when input type is current, thermocouple and RTD
			FALSE	Sensor is connected

Similarly, diagnostic data for CH1 is available in Status Byte (SB) memory at SB n+2.

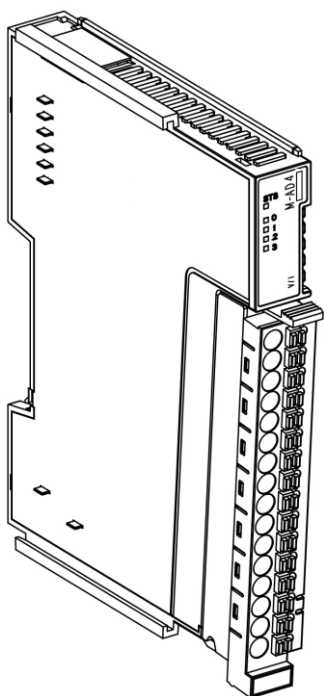
For PT100/ PT1000 input type, open circuit is not detected, in case if, lead compensation wire at terminal VIn- gets disconnected.

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

7.2 M-AD4

[4 CH. Analog Voltage/ Current Input Module]

[Module Overview](#)[Part Names](#)[Specifications](#)[LED Indications](#)[Connection Diagram](#)[User Configurable Features](#)[Parameters](#)[IO Data](#)

Module Overview

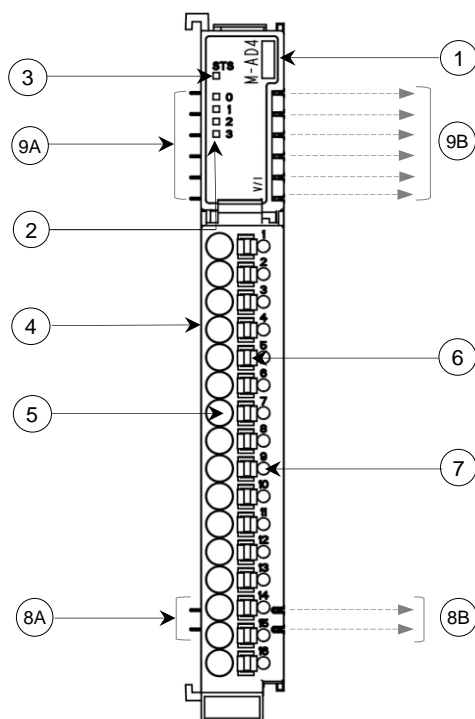
M-AD4 is 4 channel analog voltage/ current input module. Highlighting features are as below.

- Supports voltage and current input types.
- User configurable signal conditioning for stable analog measurement.
- User defined engineering scaling.
- Easy troubleshooting with module level as well as channel level diagnostics.

These are non-isolated type of input channels.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-AD4	Module ordering code
2	IO LED Indication	0 to 3: 4, Green colour LEDs for individual input status
3	Module LED Indication	STS: 1, Bi-colour LED for module status
4	Terminal Block	16-point removable push type
5	IO Point	Wire insertion point for IO terminal.
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field power supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System power supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

The table below provides technical specifications of **M-AD4**.

Specification	Description				
Ordering Code	M-AD4				
Number of Input Channels	4 CH., Voltage or current, non-isolated				
Input Types (user configurable)	Voltage	0 to 10V, -10 to 10V			
	Current	0 to 20mA, 4 to 20mA			
Resolution and Overall Accuracy	16 bits				
	Input Type	Resolution	Digital Output (Integer format)	Overall accuracy in % of FSD	
				25°C	60°C
	0 to 10V	0.3 mV	0 to 32000	±0.2	±0.3
	-10 to 10V	0.3 mV	-32000 to 32000	±0.2	±0.3
	0 to 20mA	0.6 µA	0 to 32000	±0.2	±0.3
	4 to 20mA	0.6 µA	0 to 32000	±0.2	±0.3
ADC Conversion Type	Delta-sigma (ΔΣ)				
Scaling to Engineering units	Supported				
Absolute Maximum Input	±30 VDC / ±30 mA				
Input Impedance	Voltage input: 800 KΩ, Current input: 140 Ω,				
Averaging	Number of averaging samples : 4, 8, 16 (Default), 32 User can configure averaging or digital filter at a time				
Digital Filter	1st order digital filter User configurable time constant: 5 msec (Default) to 5000 msec User can configure averaging or digital filter at a time				

NOTE

Module M-AD4 is supported in Modular IO Configurator Tool [V1.4.0.0] and Header firmware [V01.02.00.00] and onwards.

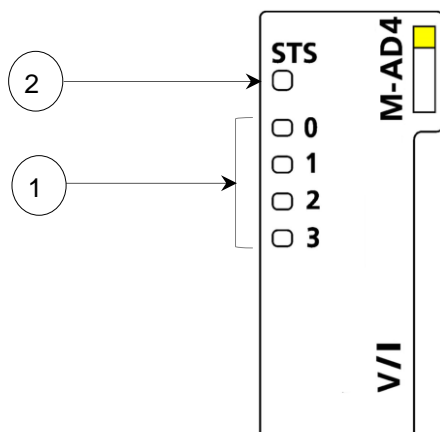
M-AD4 technical specifications are continued...

Specification		Description	
Module Updation Time		*Module updation time [for Averaging]= Hardware Filter Time + [(ADC Conversion time X No. Of channels enabelled) X Number Of Samples].	
		*Module updation time [for Digital Filter]= Hardware Filter Time + [(ADC Conversion time X No. Of channels enabelled) + (Time Constant X 10)]	
		The table below provides typical ADC conversion time.	
		Input Type	ADC Conversion time (msec)
		Voltage 0 to 10V	2.1
		Voltage -10 to 10V	
		Current 0 to 20mA	4.2
		Current 4 to 20mA	
Open Circuit Detection		For 4 to 20mA input types	
Channel Protection		PTC for over current protection of current input upto 70 mA	
Isolation	Input channel to internal circuit	1.5 KV, Optical	
	Input channel to input channel	No isolation	
	Field power supply to input channel	No isolation	
IO Memory Consumption	Input Words (IW)	4 Words	
	Diagnostics (SB) [User configurable]	2 Bytes	
System Power Supply Consumption		100 mA	
Field Power Supply Consumption		30 mA maximum at 24 VDC	
Terminal Block (Removable push type)		16-point	
Recommended Wire Size		0.5 to 1.0 sq. mm (AWG 20 to 16) Solid wire or Stranded (flexible) wire with lugs	
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83	

*Hardware filter time is 20 msec.

LED Indications

This section provides meaning of LED indications available on module.



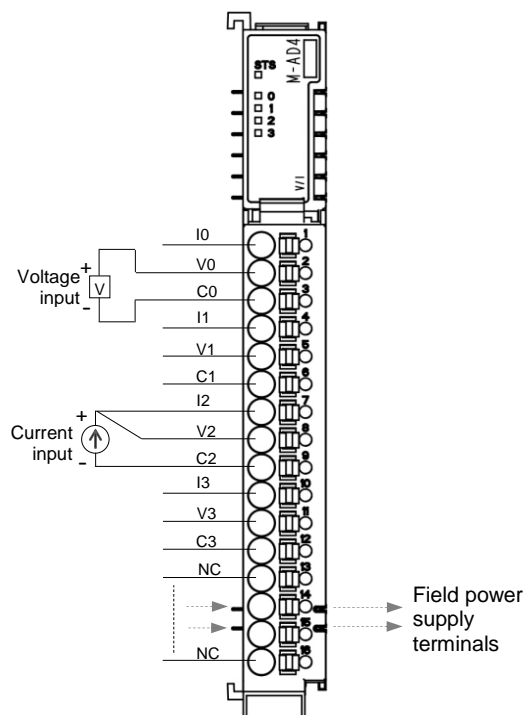
No.	LED	Colour	Status		Description
1	0 to 3	Green	ON		Input channel is enabled.
			Single flash		Following errors may occur on individual input channel. <ul style="list-style-type: none"> - Open circuit [Applicable for 4 to 20 mA type input]
			Double flash		Invalid configuration and parameterization.
			OFF		Channel is disabled.
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module.
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch.
			Red	ON	One of the following condition occurred. <ul style="list-style-type: none"> - Factory calibration error - ADC error - Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected
			Yellow	ON	24 VDC field power supply is not available.

Connection Diagram

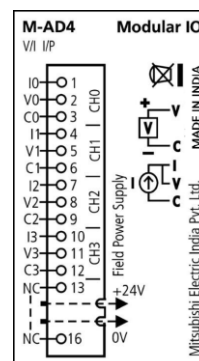
This section provides wiring details for individual input channel. This module supports voltage and current input types. The figure below shows how to connect field sensors to module. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).

Example of voltage input for channel 0 and current input for channel 2.



M-AD4: Wiring description



Following are the connection details for individual input type:

1. Voltage input is connected between **V_n** and **C_n**.
2. Current input is connected between **I_n** and **C_n**, along with short link between terminals **V_n** and **I_n**.

Here, n is the input channel number 0 to 3.

NOTE

For M-AD4, ambient temperature affects the overall accuracy of the module. So it is recommended to install analog input module away from modules dissipating heat e.g. M-DA2 as far as possible.

NOTE

Connect cable shield directly to the good quality earth. It is recommended to keep cable shield at sensor end unconnected.

Use 2-core shielded twisted pair cable for carrying analog signal.

User Configurable Features

Module M-AD4 provides user configurable features for all supported input types as shown below,

1. **Digital filter with user defined filter time constant settings.** [Range: 5 msec to 5000 msec].
 - It filters out spurious noise on analog input signal and ensures a stable analog count.
2. **Moving averaging with user definable number of samples.** [Number of samples : 4/ 8/ 16/ 32]
 - This feature is useful when an analog input signal is slowly varying or fluctuating.

User can either apply digital filter or moving average at a time.

3. **Engineering scaling units defined by minimum and maximum values.**

Module M-AD4 provides user configurable engineering scaling in which channel data is scaled to engineering units defined by minimum and maximum values.

By default, Modular IO Configurator shows engineering scaling values as 0 and 100 for minimum and maximum value respectively.

For configuring user defined engineering scaling, set channel parameter Engineering scaling as **Enable**.

CH(n) Parameters*	Project Value	Comment
Engineering scaling	Enable	Enables / disables engineering scaling
	Disable [Default]	
Minimum Value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum Value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling

*Here, n is the channel number.

Programmer can define Minimum Value and Maximum Value in terms of engineering units like speed of meters per minute, air pressure in bar, etc

4. **Open circuit detection is provided.** This feature is applicable only for 4 to 20 mA range.

User can set open circuit value as,

- 7FFFH [Default]
- 0
- Maximum value of range
- Minimum value of range

Refer section [Modular IO Configurator](#) for more details.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set following parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable [Default]	Enables diagnostic data (SB) sharing with header
	Disable	
Update time IW (msec)	10	Defines time interval of input data exchange (3 to 500 msec)

Module diagnostic data and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

The table below provides a list of channel parameters that user can set for individual input channel.

Parameter Name	Project Value	Comment
Enable	Yes [Default] No	Enables/ disables channel
Input Type	Voltage 0 to 10V [Default] Voltage -10 to +10V Current 0 to 20mA Current 4 to 20mA	Select input type
Filter type	No Filter Averaging Digital Filter [Default]	Select filtering type
Digital filter time constant	5 [Default]	Digital filter time constant (5 to 5000msec)
Number of averaging samples	4 8 16 [Default] 32	Number of samples for averaging
Engineering Scaling	Disable [Default] Enable	Enable/ disables engineering scaling
Minimum value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling
Open circuit value	7FFFH [Default] 0 Maximum value of range Minimum value of range	Channel data in case of open circuit

IO Data

Following table provides description for Analog input channel data.

Channel	Data Type	Local Address*
CH0	INT	IW n
CH1	INT	IW n+1
CH2	INT	IW n+2
CH3	INT	IW n+3

*Local address (n) value changes as per the slot position of IO module and configuration of modular IO station.

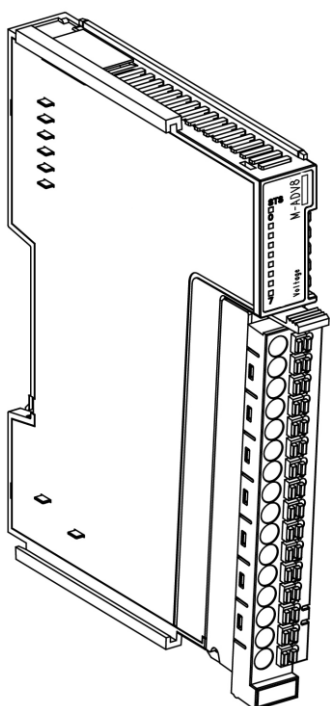
User can monitor the following diagnostics.

Channel	Data Type	Local Address*	Bit Status	Comment
Module Diagnostics	BYTE	SB n	--	--
No field power supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available.
			FALSE	24 VDC field power supply is available.
ADC fault	BOOL	SB n.1	TRUE	ADC section is faulty.
			FALSE	ADC section is healthy.
Factory calibration error	BOOL	SB n.2	TRUE	Factory calibration data is invalid.
			FALSE	Factory calibration data is valid.
Reserved	BOOL	SB n.3	Reserved	
...
Reserved	BOOL	SB n.7	Reserved	
Channel Diagnostics	BYTE	SB n+1	--	--
Channel 0 enabled	BOOL	SB n+1.0	TRUE	If channel 0 is enabled
			FALSE	If channel 0 is disabled.
Channel 0 open circuit	BOOL	SB n+1.1	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 1 enabled	BOOL	SB n+1.2	TRUE	If channel 1 is enabled
			FALSE	If channel 1 is disabled.
Channel 1 open circuit	BOOL	SB n+1.3	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 2 enabled	BOOL	SB n+1.4	TRUE	If channel 2 is enabled
			FALSE	If channel 2 is disabled.
Channel 2 open circuit	BOOL	SB n+1.5	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 3 enabled	BOOL	SB n+1.6	TRUE	If channel 3 is enabled
			FALSE	If channel 3 is disabled.
Channel 3 open circuit	BOOL	SB n+1.7	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected

Module diagnostic and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**. Refer section [Troubleshooting](#) for station error code list and error messages.

7.3 M-ADV8

[8 CH. Analog Voltage Input Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[User Configurable Features](#)

[Parameters](#)

[IO Data](#)

Module Overview

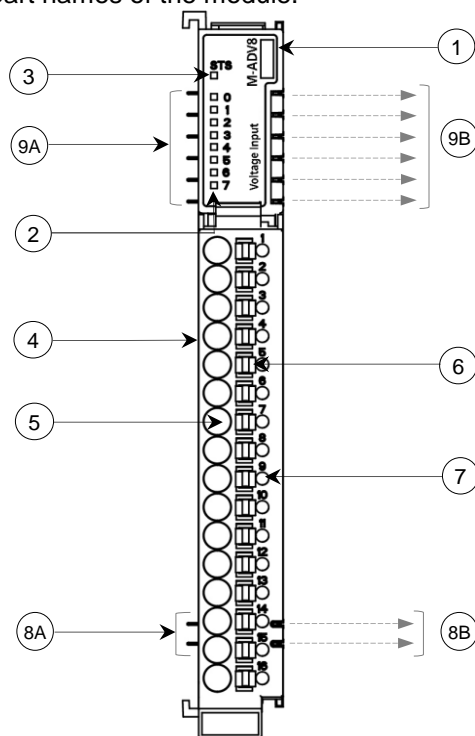
M-ADV8 is 8 channel analog voltage input module. Highlighting features are as below.

- Individual channel supports voltage input types 0 to 10V and -10 to 10V.
- User configurable signal conditioning for stable analog measurement.
- User configurable functions such as engineering scaling, reduces PLC application development.
- LED indications for module as well as channel status.

These are non-isolated type of input channels.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-ADV8	Module ordering code
2	IO LED Indication	0 to 7: 8, Green colour LEDs for individual input status
3	Module LED Indication	STS: 1, Bi-colour LED for module status
4	Terminal Block	16-point removable push type
5	IO Point	Wire insertion point for IO terminal.
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field power supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System power supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

The table below provides technical specifications of **M-ADV8**.

Specification		Description				
Ordering Code		M-ADV8				
Number of Input Channels		8 CH., Voltage, non-isolated				
Input Types (user configurable)		Voltage	0 to 10V [Default], -10 to 10V			
Resolution and Overall Accuracy		16 bits				
		Input Type	Resolution	Digital Output (Integer format)	Overall accuracy in % of FSD	
					25°C	60°C
					0 to 10V	0.3 mV
-10 to 10V	0.3 mV	-32000 to 32000	±0.2	±0.3		
ADC Conversion Type		Delta-sigma (ΔΣ)				
Scaling to Engineering units		Supported				
Absolute Maximum Input		±30 VDC				
Input Impedance		Voltage input: 500 KΩ				
Averaging		Number of averaging samples: 4, 8, 16 (Default), 32 User can configure averaging or digital filter at a time				
Digital Filter		1st order digital filter User configurable time constant: 5 msec (Default) to 5000 msec User can configure averaging or digital filter at a time				
Module Updation Time		*Module updation time [for Averaging]= Hardware Filter Time + [(ADC Conversion time X No. Of channels enabled) X Number Of Samples]. *Module updation time [for Digital Filter]= Hardware Filter Time + [(ADC Conversion time X No. Of channels enabled) + (Time Constant X 5)] The table below provides typical ADC conversion time.				
		Input Type		ADC Conversion time (msec)		
		Voltage 0 to 10V		1.2		
		Voltage -10 to 10V				
Isolation	Input channel to internal circuit	1.5 KV, Optical				
	Input channel to input channel	No isolation				
	Field power supply to input channel	No isolation				
IO Memory Consumption	Input Words (IW)	8 Words				
	Diagnostics (SB) [User configurable]	3 Bytes				

M-ADV8 technical specifications are continued...

Specification	Description
System Power Supply Consumption	100 mA
Field Power Supply Consumption	30 mA maximum at 24 VDC
5VDC Backplane Current Consumption	135 mA
Terminal Block (Removable push type)	16-point
Recommended Wire Size	0.5 to 1.0 sq. mm (AWG 20 to 16) Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm	105 x 13.2 x 83

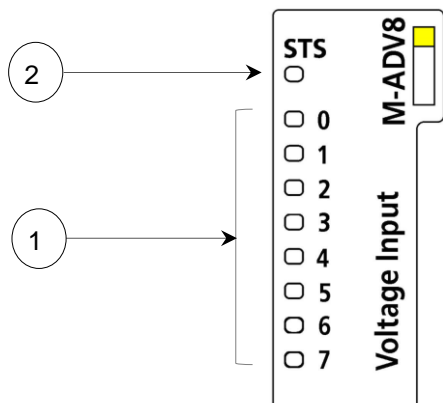
*Hardware filter time is 25 msec.

NOTE

Module M-ADV8 is supported in Modular IO Configurator Tool [V1.6.0.0] and Header firmware [V01.02.00.00] and onwards.

LED Indications

This section provides meaning of LED indications available on module.



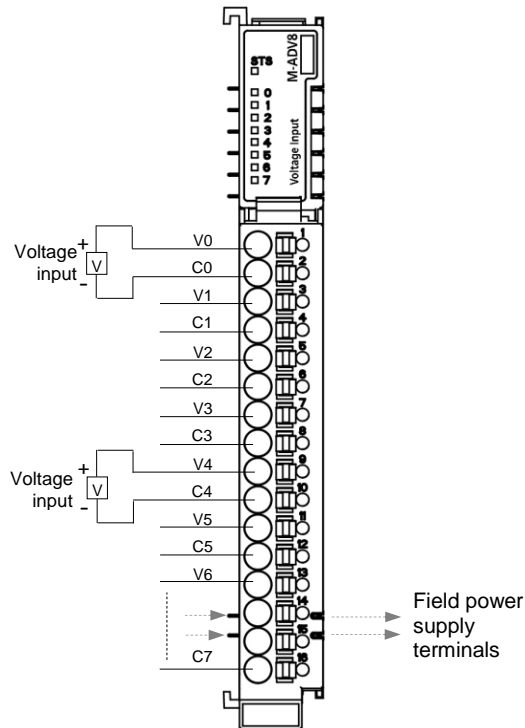
No.	LED	Colour	Status		Description
1	0 to 7	Green	ON		Input channel is enabled.
			Double flash		Invalid configuration and parameterization.
			OFF		Input channel is disabled.
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module.
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none"> - Module is powered ON and waiting for communication from Header. - Module mismatch.
			Red	ON	One of the following conditions occurred. <ul style="list-style-type: none"> - Factory calibration error - ADC error - Hardware failure is detected on module.
				Single flash	One of the following conditions occurred. <ul style="list-style-type: none"> - No communication from Header - Backplane bus fault detected
			Yellow	ON	24 VDC field power supply is not available.

Connection Diagram

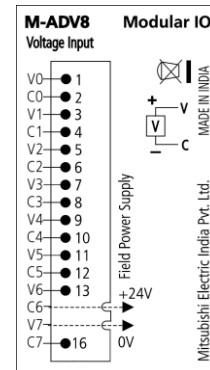
This section provides wiring details for individual input channel. This module supports voltage input types. The figure below shows how to connect field sensors to module. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).

Example of voltage input for channel 0 and channel 4.



M-ADV8: Wiring description



Following are the connection details for individual input type:

1. Voltage input is connected between **V_n** and **C_n**.

Here, n is the input channel number 0 to 7.

NOTE

For M-ADV8, ambient temperature affects the overall accuracy of the module. So, it is recommended to install analog input module away from modules dissipating heat e.g. M-DA2 as far as possible.

NOTE

Connect cable shield directly to the good quality earth. It is recommended to keep cable shield at sensor end unconnected.

Use 2-core shielded twisted pair cable for carrying analog signal.

User Configurable Features

Module M-ADV8 provides user configurable features for voltage input types as shown below,

1. **Digital filter with user defined filter time constant settings.** [Range: 5 msec to 5000 msec].
 - It filters out spurious noise on analog input signal and ensures a stable analog count.
2. **Moving averaging with user definable number of samples.** [Number of samples: 4/ 8/ 16/ 32]
 - This feature is useful when an analog input signal is slowly varying or fluctuating.

User can either apply digital filter or moving average at a time.

3. **Engineering scaling units defined by minimum and maximum values.**

Module M-ADV8 provides user configurable engineering scaling in which channel data is scaled to engineering units defined by minimum and maximum values.

By default, Modular IO Configurator shows engineering scaling values as 0 and 100 for minimum and maximum value respectively.

For configuring user defined engineering scaling, set channel parameter Engineering scaling as **Enable**.

CH(n) Parameters*	Project Value	Comment
Engineering scaling	Enable	Enables / disables engineering scaling
	Disable [Default]	
Minimum Value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum Value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling

*Here, n is the channel number.

Programmer can define Minimum Value and Maximum Value in terms of engineering units like speed of meters per minute, air pressure in bar, etc.

Refer section [Modular IO Configurator](#) for more details.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set following parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable [Default]	Enables diagnostic data (SB) sharing with header
	Disable	
Update time IW (msec)	10	Defines time interval of input data exchange (3 to 500 msec)

Module diagnostic data and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

The table below provides a list of channel parameters that user can set for individual input channel.

Parameter Name	Project Value	Comment
Enable	Yes [Default] No	Enables/ disables channel
Input Type	Voltage 0 to 10V [Default] Voltage -10 to +10V	Select input type
Filter type	No Filter Averaging Digital Filter [Default]	Select filtering type
Digital filter time constant	10 [Default]	Digital filter time constant (5 to 5000 msec)
Number of averaging samples	4 8 16 [Default] 32	Number of samples for averaging
Engineering Scaling	Disable [Default] Enable	Enable/ disables engineering scaling
Minimum value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling

IO Data

Following table provides description for Analog input channel data.

Channel	Data Type	Local Address*
CH0	INT	IW n
CH1	INT	IW n+1
CH2	INT	IW n+2
CH3	INT	IW n+3
CH4	INT	IW n+4
CH5	INT	IW n+5
CH6	INT	IW n+6
CH7	INT	IW n+7

*Local address (n) value changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics.

Channel	Data Type	Local Address*	Bit Status	Comment
Module Diagnostics	BYTE	SB n	--	--
No field power supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available.
			FALSE	24 VDC field power supply is available.
ADC fault	BOOL	SB n.1	TRUE	ADC section is faulty.
			FALSE	ADC section is healthy.
Factory calibration error	BOOL	SB n.2	TRUE	Factory calibration data is invalid.
			FALSE	Factory calibration data is valid.
Reserved	BOOL	SB n.3	Reserved	
...	
Reserved	BOOL	SB n.7	Reserved	
Channel Diagnostics	WORD	SB n+1 – SB n+2	--	--
Channel 0 enabled	BOOL	SB n+1.0	TRUE	If channel 0 is enabled
			FALSE	If channel 0 is disabled.
Reserved	BOOL	SB n+1.1	Reserved	
Channel 1 enabled	BOOL	SB n+1.2	TRUE	If channel 1 is enabled
			FALSE	If channel 1 is disabled.
Reserved	BOOL	SB n+1.3	Reserved	
Channel 2 enabled	BOOL	SB n+1.4	TRUE	If channel 2 is enabled
			FALSE	If channel 2 is disabled.
Reserved	BOOL	SB n+1.5	Reserved	
Channel 3 enabled	BOOL	SB n+1.6	TRUE	If channel 3 is enabled
			FALSE	If channel 3 is disabled.
Reserved	BOOL	SB n+1.7	Reserved	

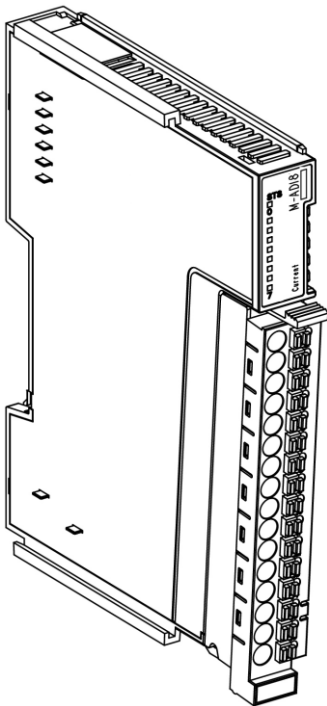
Channel 4 enabled	BOOL	SB n+2.0	TRUE	If channel 4 is enabled
			FALSE	If channel 4 is disabled.
Reserved	BOOL	SB n+2.1	Reserved	
Channel 5 enabled	BOOL	SB n+2.2	TRUE	If channel 5 is enabled
			FALSE	If channel 5 is disabled.
Reserved	BOOL	SB n+2.3	Reserved	
Channel 6 enabled	BOOL	SB n+2.4	TRUE	If channel 6 is enabled
			FALSE	If channel 6 is disabled.
Reserved	BOOL	SB n+2.5	Reserved	
Channel 7 enabled	BOOL	SB n+2.6	TRUE	If channel 7 is enabled
			FALSE	If channel 7 is disabled.
Reserved	BOOL	SB n+2.7	Reserved	

Module diagnostic and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

7.4 M-ADI8

[8 CH. Analog Current Input Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[User Configurable Features](#)

[Parameters](#)

[IO Data](#)

Module Overview

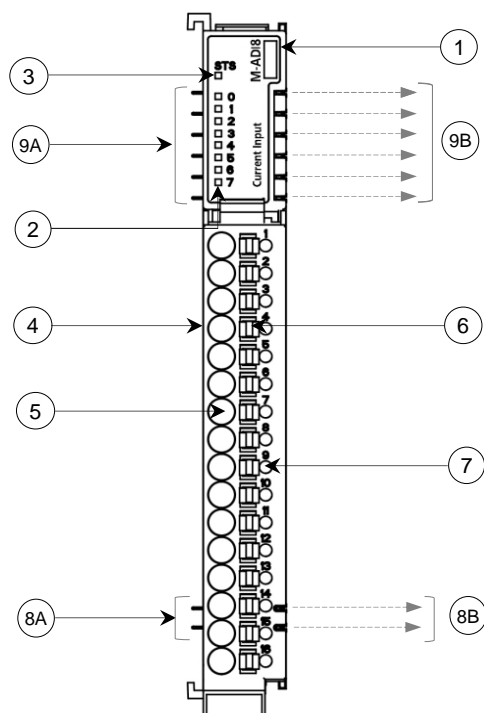
M-ADI8 is 8 channel analog current input module. Highlighting features are as below.

- Individual channel supports current input types 0 to 20mA and 4 to 20mA.
- User configurable signal conditioning for stable analog measurement.
- User configurable functions such as engineering scaling, reduces PLC application development.
- Easy troubleshooting with module level as well as channel level diagnostics.
- LED indications for module as well as channel status.

These are non-isolated type of input channels.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-ADI8	Module ordering code
2	IO LED Indication	0 to 3: 4, Green colour LEDs for individual input status
3	Module LED Indication	STS: 1, Bi-colour LED for module status
4	Terminal Block	16-point removable push type
5	IO Point	Wire insertion point for IO terminal.
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field power supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System power supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

The table below provides technical specifications of **M-ADI8**.

Specification		Description				
Ordering Code		M-ADI8				
Number of Input Channels		8CH., Current, non-isolated				
Input Types (user configurable)		Current	0 to 20mA [Default], 4 to 20mA			
Resolution and Overall Accuracy		16 bits				
		Input Type	Resolution	Digital Output (Integer format)	Overall accuracy in % of FSD	
					25°C	60°C
					0 to 20mA	0.6 µA
		4 to 20mA	0.6 µA	0 to 32000	±0.25	±0.4
ADC Conversion Type		Delta-sigma (ΔΣ)				
Scaling to Engineering units		Supported				
Absolute Maximum Input		±30 mA				
Input Impedance		Current input: 135 Ω				
Averaging		Number of averaging samples: 4, 8, 16 (Default), 32 User can configure averaging or digital filter at a time				
Digital Filter		1st order digital filter User configurable time constant: 5 msec (Default) to 5000 msec User can configure averaging or digital filter at a time				
Module Updation Time		*Module updation time [for Averaging]= Hardware Filter Time + [(ADC Conversion time X No. Of channels enabled) X Number Of Samples]. *Module updation time [for Digital Filter]= Hardware Filter Time + [(ADC Conversion time X No. Of channels enabled) + (Time Constant X 5)] The table below provides typical ADC conversion time.				
		Input Type			ADC Conversion time (msec)	
		Current 0 to 20mA			12.5	
		Current 4 to 20mA				
Open Circuit Detection		For 4 to 20mA input types				
Channel Protection		PTC for over current protection of current input up to 70 mA				
Isolation	Input channel to internal circuit	1.5 KV, Optical				
	Input channel to input channel	No isolation				
	Field power supply to input channel	No isolation				
IO Memory Consumption	Input Words (IW)	8 Words				
	Diagnostics (SB) [User configurable]	3 Bytes				

M-ADI8 technical specifications are continued...

Specification	Description
System Power Supply Consumption	100 mA
Field Power Supply Consumption	30 mA maximum at 24 VDC
5VDC Backplane Current Consumption	135 mA
Terminal Block (Removable push type)	16-point
Recommended Wire Size	0.5 to 1.0 sq. mm (AWG 20 to 16) Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm	105 x 13.2 x 83

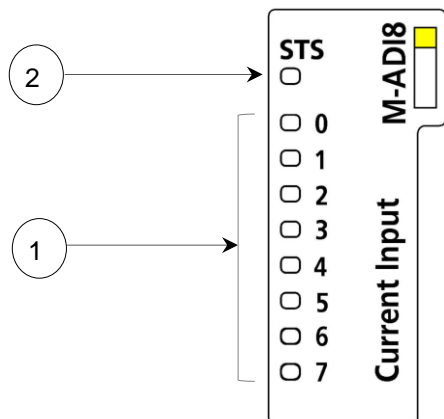
*Hardware filter time is 5 msec.

NOTE

Module M-ADI8 is supported in Modular IO Configurator Tool [V1.6.0.0] and Header firmware [V01.02.00.00] and onwards.

LED Indications

This section provides meaning of LED indications available on module.



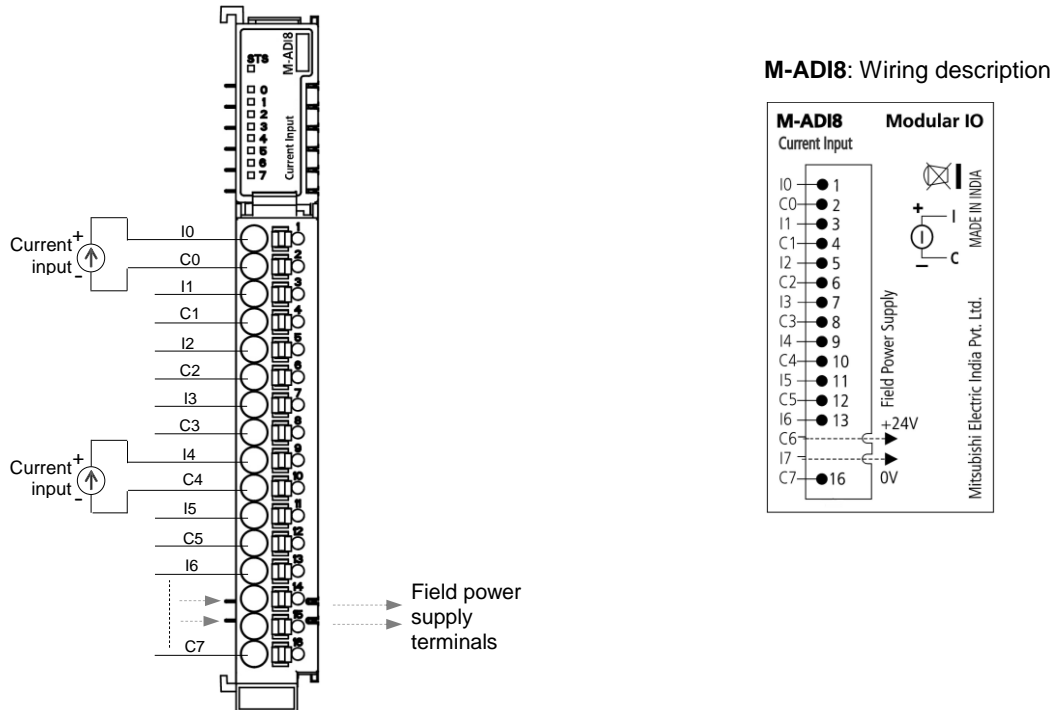
No.	LED	Colour	Status		Description
1	0 to 7	Green	ON		Input channel is enabled.
			Single flash		Following errors may occur on individual input channel. - Open circuit [Applicable for 4 to 20 mA type input]
			Double flash		Invalid configuration and parameterization.
			OFF		Channel is disabled.
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module.
				Single flash	Communication with Header is not established due to, - Module is powered ON and waiting for communication from Header. - Module mismatch.
			Red	ON	One of the following conditions occurred. - Factory calibration error - ADC error - Hardware failure is detected on module.
				Single flash	One of the following conditions occurred. - No communication from Header - Backplane bus fault detected
			Yellow	ON	24 VDC field power supply is not available.

Connection Diagram

This section provides wiring details for individual input channel. This module supports current input types. The figure below shows how to connect field sensors to module. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).

Example of current input for channel 0 and channel 4.



Following are the connection details for individual input type:

1. Current input is connected between **In** and **Cn**.

Here, n is the input channel number 0 to 7.

NOTE

For M-ADI8, ambient temperature affects the overall accuracy of the module. So, it is recommended to install analog input module away from modules dissipating heat e.g. M-DA2 as far as possible.

NOTE

Connect cable shield directly to the good quality earth. It is recommended to keep cable shield at sensor end unconnected.

Use 2-core shielded twisted pair cable for carrying analog signal.

User Configurable Features

Module M-ADI8 provides user configurable features for all supported input types as shown below,

1. **Digital filter with user defined filter time constant settings.** [Range: 5 msec to 5000 msec].
 - It filters out spurious noise on analog input signal and ensures a stable analog count.
2. **Moving averaging with user definable number of samples.** [Number of samples: 4/ 8/ 16/ 32]
 - This feature is useful when an analog input signal is slowly varying or fluctuating.

User can either apply digital filter or moving average at a time.

3. **Engineering scaling units defined by minimum and maximum values.**

Module M-ADI8 provides user configurable engineering scaling in which channel data is scaled to engineering units defined by minimum and maximum values.

By default, Modular IO Configurator shows engineering scaling values as 0 and 100 for minimum and maximum value respectively.

For configuring user defined engineering scaling, set channel parameter Engineering scaling as **Enable**.

CH(n) Parameters*	Project Value	Comment
Engineering scaling	Enable	Enables / disables engineering scaling
	Disable [Default]	
Minimum Value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum Value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling

*Here, n is the channel number.

Programmer can define Minimum Value and Maximum Value in terms of engineering units like speed of meters per minute, air pressure in bar, etc.

4. **Open circuit detection is provided.** This feature is applicable only for 4 to 20 mA range.

User can set open circuit value as,

- 7FFFH [Default]
- 0
- Maximum value of range
- Minimum value of range

Refer section [Modular IO Configurator](#) for more details.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set following parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable [Default]	Enables diagnostic data (SB) sharing with header
	Disable	
Update time IW (msec)	10	Defines time interval of input data exchange (3 to 500 msec)

Module diagnostic data and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

The table below provides a list of channel parameters that user can set for individual input channel.

Parameter Name	Project Value	Comment
Enable	Yes [Default] No	Enables/ disables channel
Input Type	Current 0 to 20mA [Default] Current 4 to 20mA	Select input type
Filter type	No Filter Averaging Digital Filter [Default]	Select filtering type
Digital filter time constant	10 [Default]	Digital filter time constant (5 to 5000msec)
Number of averaging samples	4 8 16 [Default] 32	Number of samples for averaging
Engineering Scaling	Disable [Default] Enable	Enable/ disables engineering scaling
Minimum value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling
Open circuit value	7FFFH [Default] 0 Maximum value of range Minimum value of range	Channel data in case of open circuit

IO Data

Following table provides description for Analog input channel data.

Channel	Data Type	Local Address*
CH0	INT	IW n
CH1	INT	IW n+1
CH2	INT	IW n+2
CH3	INT	IW n+3
CH4	INT	IW n+4
CH5	INT	IW n+5
CH6	INT	IW n+6
CH7	INT	IW n+7

*Local address (n) value changes as per the slot position of IO module and configuration of modular IO station.

User can monitor the following diagnostics.

Channel	Data Type	Local Address*	Bit Status	Comment
Module Diagnostics	BYTE	SB n	--	--
No field power supply	BOOL	SB n.0	TRUE	24 VDC field power supply is not available.
			FALSE	24 VDC field power supply is available.
ADC fault	BOOL	SB n.1	TRUE	ADC section is faulty.
			FALSE	ADC section is healthy.
Factory calibration error	BOOL	SB n.2	TRUE	Factory calibration data is invalid.
			FALSE	Factory calibration data is valid.
Reserved	BOOL	SB n.3	Reserved	
...
Reserved	BOOL	SB n.7	Reserved	
Channel Diagnostics	BYTE	SB n+1 – SB n+2	--	--
Channel 0 enabled	BOOL	SB n+1.0	TRUE	If channel 0 is enabled
			FALSE	If channel 0 is disabled.
Channel 0 open circuit	BOOL	SB n+1.1	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 1 enabled	BOOL	SB n+1.2	TRUE	If channel 1 is enabled
			FALSE	If channel 1 is disabled.
Channel 1 open circuit	BOOL	SB n+1.3	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 2 enabled	BOOL	SB n+1.4	TRUE	If channel 2 is enabled
			FALSE	If channel 2 is disabled.
Channel 2 open circuit	BOOL	SB n+1.5	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected

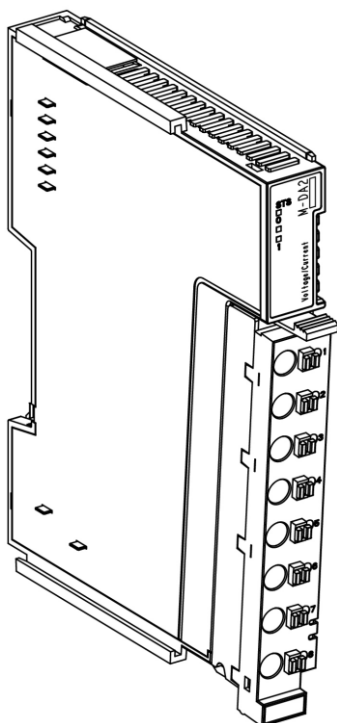
Channel 3 enabled	BOOL	SB n+1.6	TRUE	If channel 3 is enabled
			FALSE	If channel 3 is disabled.
Channel 3 open circuit	BOOL	SB n+1.7	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 4 enabled	BOOL	SB n+2.0	TRUE	If channel 4 is enabled
			FALSE	If channel 4 is disabled.
Channel 4 open circuit	BOOL	SB n+2.1	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 5 enabled	BOOL	SB n+2.2	TRUE	If channel 5 is enabled
			FALSE	If channel 5 is disabled.
Channel 5 open circuit	BOOL	SB n+2.3	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 6 enabled	BOOL	SB n+2.4	TRUE	If channel 6 is enabled
			FALSE	If channel 6 is disabled.
Channel 6 open circuit	BOOL	SB n+2.5	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected
Channel 7 enabled	BOOL	SB n+2.6	TRUE	If channel 7 is enabled
			FALSE	If channel 7 is disabled.
Channel 7 open circuit	BOOL	SB n+2.7	TRUE	Sensor is disconnected when input type is current
			FALSE	Sensor is connected

Module diagnostic and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

7.5 M-DA2

[2 CH. Analog Voltage/ Current Output]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[User Configurable Features](#)

[Parameters](#)

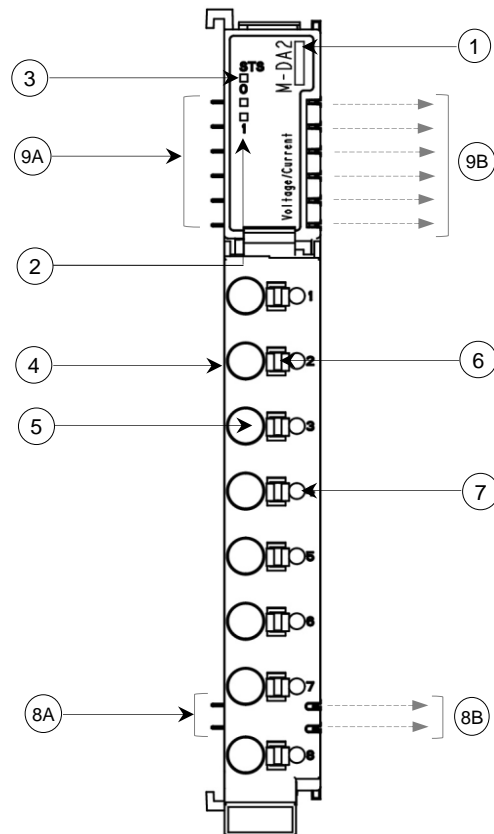
[IO Data](#)

Module Overview

M-DA2 is 2 channel analog voltage/ current output module. These output channels are of non-isolated type.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-DA2	Module ordering code
2	IO LED Indication	0 and 1: 2 Red colour LEDs for individual output status
3	Module LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point for IO terminal.
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field power supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System power supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

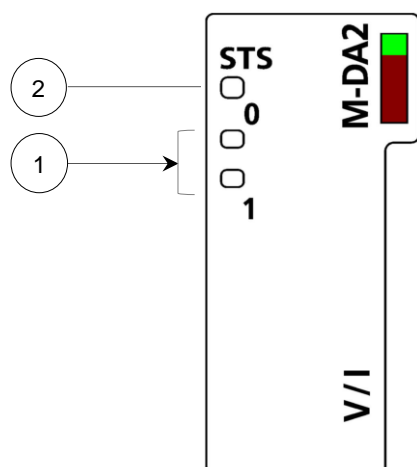
Specifications

The table below provides technical specifications of **M-DA2**.

Specification		Description			
Ordering Code		M-DA2			
Number of Outputs		2 CH., voltage/current, non-isolated, 12-bit resolution			
Output Types		Voltage		Current	
		0 to 10V	-10 to 10V	0 to 20mA	4 to 20mA
Input Data		0 to 4000	-2000 to 2000	0 to 4000	0 to 4000
Resolution		2.5 mV	2.5 mV	5 μA	5 μA
Overall Accuracy (% of FSD)	At 25°C	±0.1	±0.1	±0.2	±0.2
	At 55°C	±0.2	±0.2	±0.3	±0.3
Load		> 5 KΩ		0 to 500 Ω	
Module Updation Time		2 msec maximum onboard for all channels			
Output Settling Time		2 msec			
IO Memory Consumption	Output Words (QW)	2 Words			
	Diagnostics (SB) [User configurable]	2 Bytes			
Isolation	Field power supply to output channel	1.5 KV, Optical			
	Output channel to output channel	No isolation			
	Output channel to internal circuit	No isolation			
Protections		Short circuit protection for voltage output			
Open Circuit Detection		For current output			
System Power Supply Consumption		95 mA			
Field Power Supply Consumption		132 mA maximum			
Terminal Block (Removable push type)		8-point			
Recommended Wire Size		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs			
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83			

LED Indications

This section provides meaning of LED indications available on module.



No.	LED	Colour	Status	Description	
1	0, 1	Red	ON	Channel is enabled.	
			Single flash	Following error may occur for individual output channel. - Open circuit is detected for 0/4 to 20 mA output*	
			Double flash	Invalid configuration and parameterization.	
			OFF	Channel is disabled.	
2	STS	Bi-colour LED	None	Module is powered OFF.	
			Blue Green	ON	Module is powered ON and communicating with Header module.
				Single flash	Communication with Header is not established due to, - Module is powered ON and waiting for communication from Header. - Module mismatch.
			Red	ON	One of the following condition occurred. - DAC error - Hardware failure is detected on module.
				Single flash	One of the following condition occurred. - No communication from Header - Backplane bus fault detected.
			Yellow	ON	24 VDC field power supply is not available.

*In case of 0 to 20 mA output, open circuit is detected when non-zero channel data is written

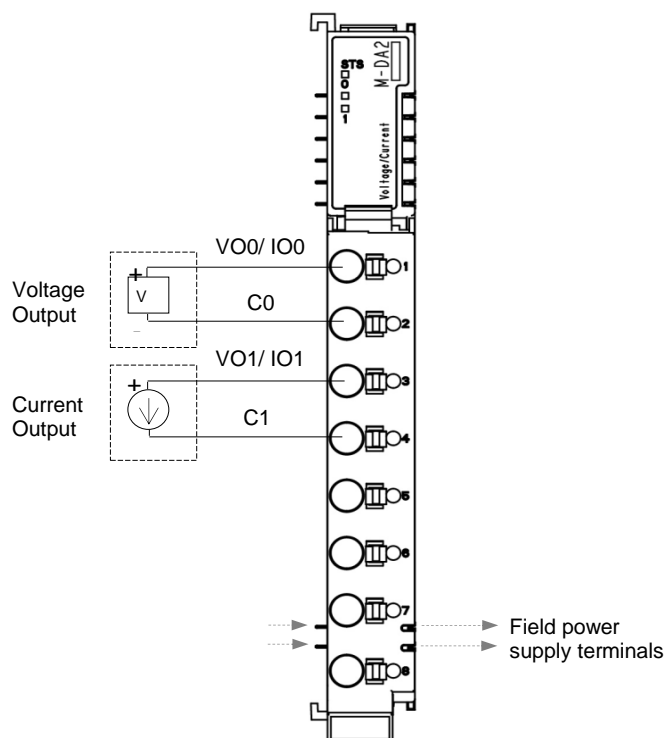
Connection Diagram

This section provides wiring details for individual output point connected for voltage and current output.

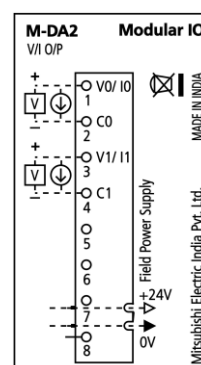
Wiring description is provided on right side wall of the module.

The figure shows module front with 8 point terminal block. Here, Channel0 is connected for voltage output and Channel1 is connected for current output, as an example.

For common wiring recommendations, refer section [Wiring](#).



M-DA2: Wiring description



NOTE

It is recommended to use 2-core shielded twisted pair cable for carrying analog signal.

Connect cable shield at module end directly to a good quality earth in panel. It is recommended to keep cable shield at sensor end unconnected.

The Earthing resistance should be 100Ω or less.

NOTE

M-DA2 module has on-board power supply circuit. It dissipates 2.2 W power which causes increase in temperature of the module above 60°C depending upon ambient temperature inside control panel. It is recommended to install M-DA2 module/s in the last slots of a modular IO station.

For modules like analog input module, ambient temperature affects the overall accuracy of the module. So it is recommended to install analog input module away from M-DA2 modules as far as possible.

User Configurable Features

Module M-DA2 provides user configurable Engineering scaling in which channel data is scaled to engineering units defined by minimum and maximum values.

For configuring, user defined engineering scaling, set channel parameter Engineering scaling as **Enable**.

CH(n) Parameters*	Project Value	Comment
Engineering scaling	Enable [Default]	Enables / disables engineering scaling
	Disable	
Minimum Value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum Value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling

*Here, n is the channel number.

Parameters

IO module can be configured in modular IO station using Modular IO Configurator. For addition and removal of IO module, refer section [Modular IO Configurator](#).

User can set following parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable [Default]	Enables diagnostic data (SB) sharing with header.
	Disable	

Module diagnostic data and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

The table below provides a list of channel parameters that user can set for individual output channel.

Parameter Name	Project Value	Comment
CH0 Parameters		
Enable	Yes [Default] No	Enables / disables channel
Output type	Voltage 0 to 10 V [Default] Voltage -10 to 10 V Current 0 to 20 mA Current 4 to 20 mA	Select output type.
Engineering scaling	Disable [Disable] Enable	Enables / disables engineering scaling
Minimum value	0 [Default] [Supported range: -32768 to 32767]	Minimum value for engineering scaling
Maximum value	100 [Default] [Supported range: -32768 to 32767]	Maximum value for engineering scaling

IO Data

Following table provides description of Analog output data.

Channel	Data Type	Local Address*
CH0	INT	QW n
CH1	INT	QW n+1

*Local address (n) value changes as per the slot position of IO module and configuration of modular IO station.

NOTE

Output channel generates zero output, in case, if channel data is out of range.

Bitwise significance of diagnostic data of module as well as output channel level, is as below.

Channel	Data Type	Local Address*	Bit Status	Description
Module Diagnostics	BYTE	SB (n)		
No field power Supply	BOOL	SB n.0	TRUE	No 24 VDC Field power supply present on module
			FALSE	24 VDC Field power supply is available on module
DAC Fault	BOOL	SB n.1	TRUE	DAC fault
			FALSE	DAC is working Ok
Reserved	BOOL	SB n.2	Reserved	
Reserved	BOOL	SB n.7	Reserved	
Channel Diagnostics	BYTE	SB n+1		
Channel 0 enabled	BOOL	SB n+1.0	TRUE	CH0 is enabled
			FALSE	CH0 is disabled
Channel 0 open circuit	BOOL	SB n+1.1	TRUE	Open circuit is detected on CH0*
			FALSE	CH0 is working Ok
Channel 1 enabled	BOOL	SB n+1.2	TRUE	CH1 is enabled
			FALSE	CH1 is disabled
Channel 1 open circuit	BOOL	SB n+1.3	TRUE	Open circuit is detected on CH1*
			FALSE	CH1 is working Ok

*Open circuit detection is applicable for current output types. In case of 0 to 20 mA output, open circuit is detected when channel data is other than 0.

Module diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages.

[Back To Index Page](#)

8 System Modules

System Modules: Overview	
System Power Extension Module	M-SPE
Field Power Distribution Module	M-FPD
Field Power Isolator Module	M-FPI
Shield Termination Module	M-ST
Bus End Module	M-BE





Overview

System modules are auxiliary modules in modular IO station, which are added to fulfil specific purpose like providing additional system power source and providing terminals to connect sensors and actuators, etc.

NOTE

System modules are passive modules and not intelligent modules like IO modules. These modules do not consume any IO slot and IO points. So Header module does not provide any information about system modules.

Following types of system modules are available.

Ordering Information	Ordering Code	Colour Identification*
System Power Extension Module	M-SPE	
Field Power Isolator Module	M-FPI	
Shield Termination Module	M-ST	
Field Power Distribution Module	M-FPD	
Bus End Module	M-BE	--

*Color code is provided on LED label and at bottom side of terminal block. User should always ensure that color code of LED label and terminal block is identical.

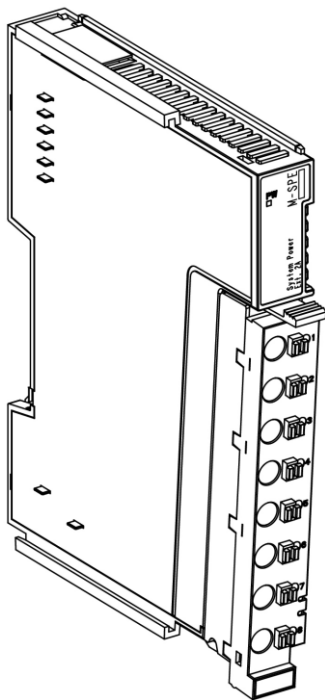
NOTE

IO modules with 24 VDC Field power supply only are available as on May 2018.

Subsequent sections explain purpose of individual system module in modular IO station.

8.1 M-SPE

[System Power Extension Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

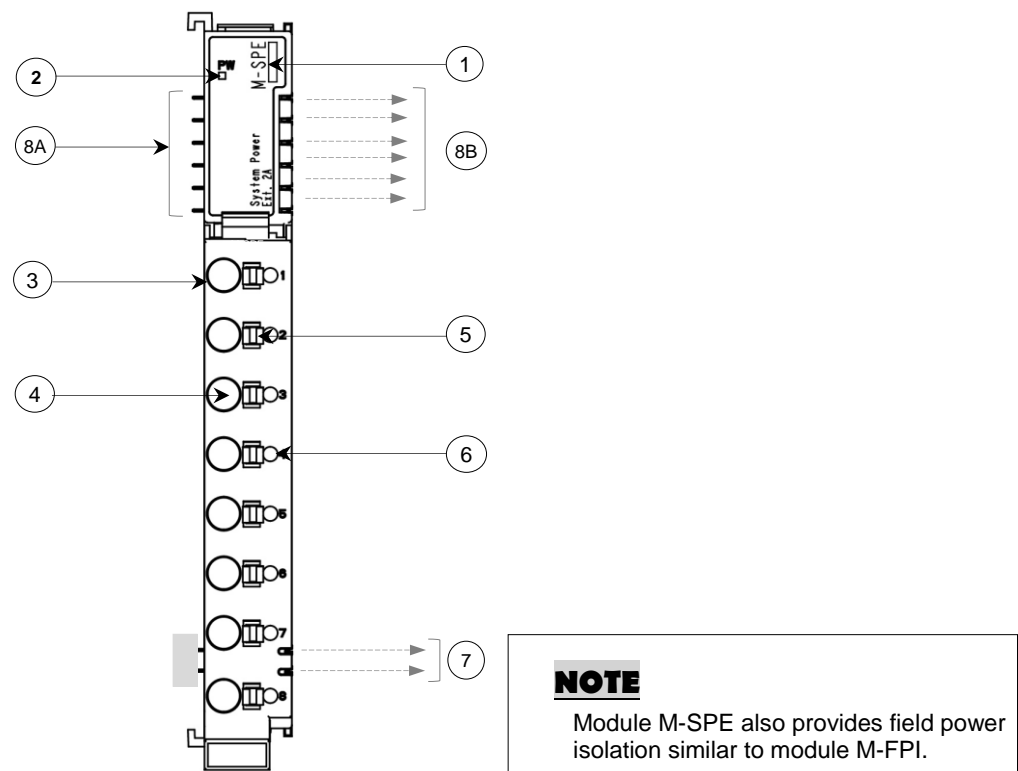
Module Overview

In a modular IO station, Header module provides system power supply for IO modules. This supply is connected to IO modules through pins and receptacles interface of each module. If number of IO modules attached to Header module increases, system power consumption increases and then the system power supply provided by Header module will not be sufficient. In such case, user needs to add system power supply extension module in the station.

NOTE
Modular IO Configurator keeps track of system power consumption and warns user to add system power extension module M-SPE whenever required.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-SPE	Module ordering code
2	Module LED Indication	PW: 1, Green LED for module power status
3	Terminal Block	8-point removable push type
4	IO Point	Wire insertion point for IO terminals
5	Push Button	Press to release wire
6	Test Point	To measure signal voltage
7	Field Power Supply Interface	2, Outgoing pins for field power supply interface
8A	System Power Supply Interface	6, Incoming pins for system power supply interface
8B		6, Outgoing pins for system power supply interface

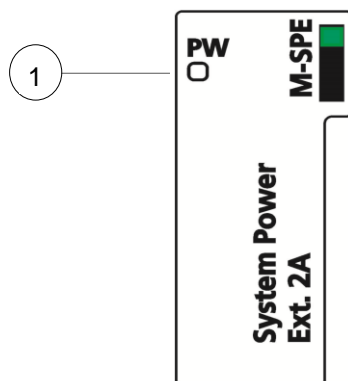
Specifications

The table below provides technical specifications of **M-SPE**.

Specification		Description
Module Ordering Code		M-SPE
System Power Supply	Input voltage	24 VDC (11 to 28.8 VDC, ripple included), 12 Watt
	Inrush current	20 A for 20 µsec duration
	Output voltage	5 VDC
	Output current for IO modules	2 A
	Protection	Reverse polarity protection
Field Power Supply	Voltage	24 VDC (18 to 30 VDC, ripple included)
	Maximum input current at 24 VDC	5 A per input terminal
	Current	10 A
Terminal block (Removable push type)		8-point
Recommended Wire Size		0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm		105 x 13.2 x 83

LED Indications

This section provides meanings of LED indications available on module.

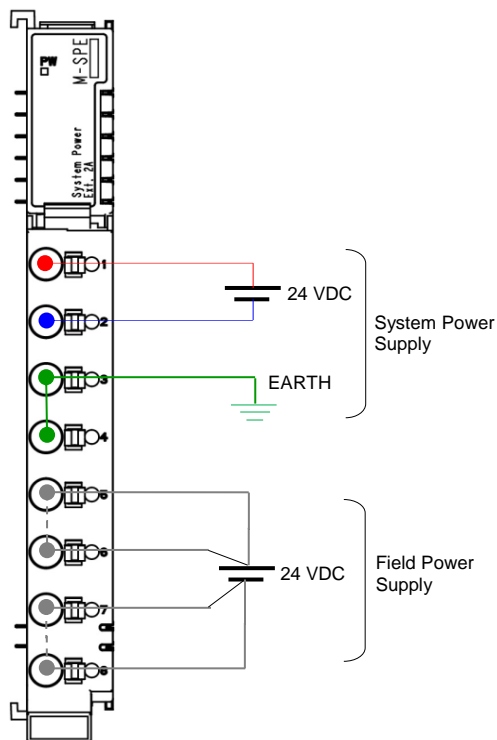


No.	LED	Colour	Status	Description
1	PW	Green	OFF	Module is powered OFF.
			ON	Module is powered ON.

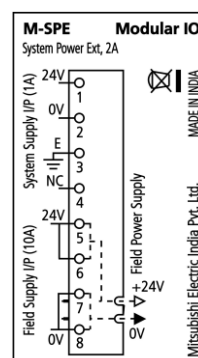
Connection Diagram

The figure shows module M-SPE front with 8 point terminal block. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-SPE: Wiring description



Connect system power supply between first two terminals (i.e. terminal 1 and 2).

Connect terminals 3/ 4 to clean EARTH directly.

Connect +24 VDC field power supply to terminal numbers 5 and 6.

Connect field power supply ground to terminal numbers 7 and 8.

NOTE

Current carrying capacity of each terminal of terminal block is 5 A max. Field power supply interface between modules has current carrying capacity of 10 A.

So it is necessary to connect 2 wires from source of field power supply to utilize maximum capacity of 10 A.

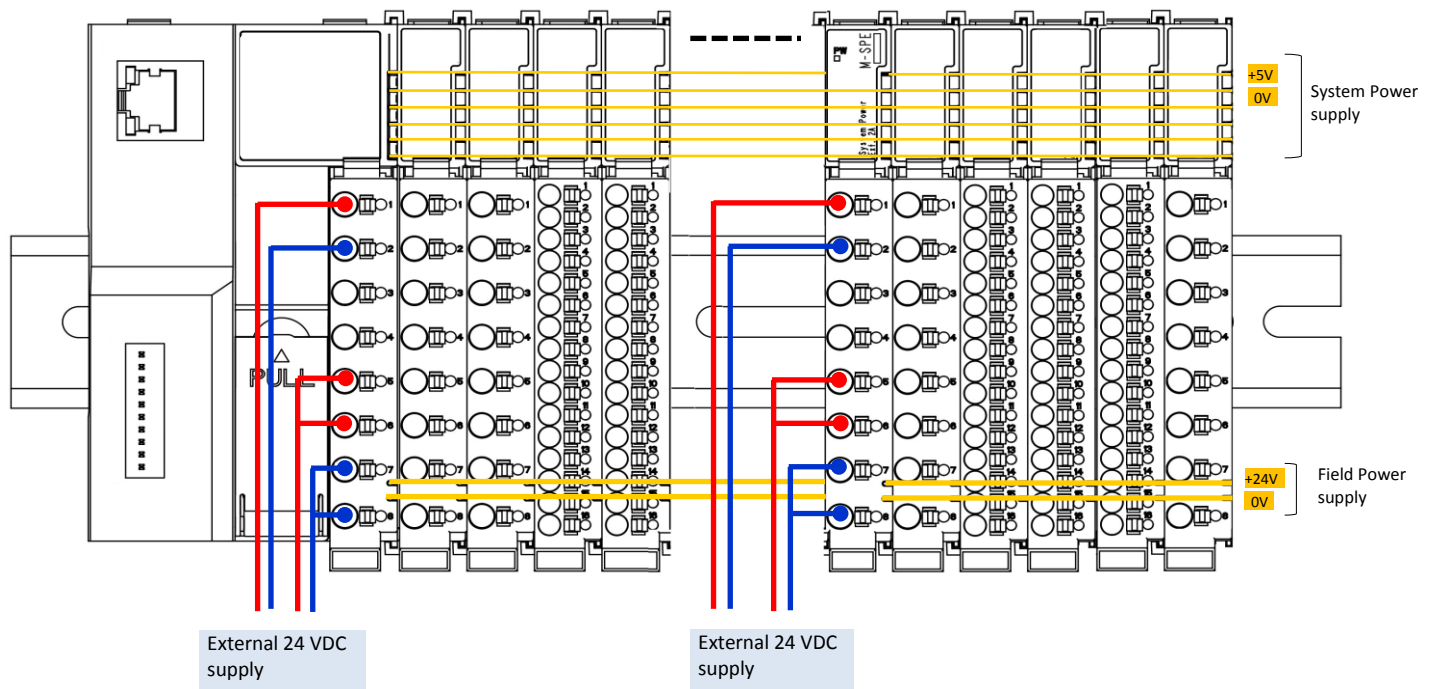
Field power supply connected to terminal block is directly carried to field power supply pins for interfacing with IO modules.

Ensure that EARTH cable is thick and short as far as possible to provide low impedance path.

NOTE

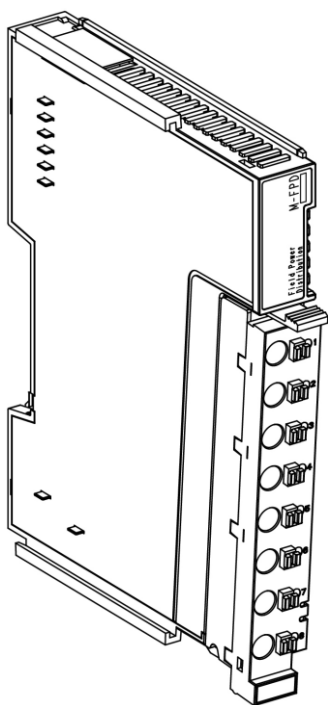
Module M-SPE also acts as field power supply isolation similar to module M-FPI. So it is necessary to connect field power supply to the module.

The figure below shows system power supply connections and field power supply connections in a modular IO station when M-SPE is used.



8.2 M-FPD

[Field Power Distribution Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[Connection Diagram](#)

Module Overview

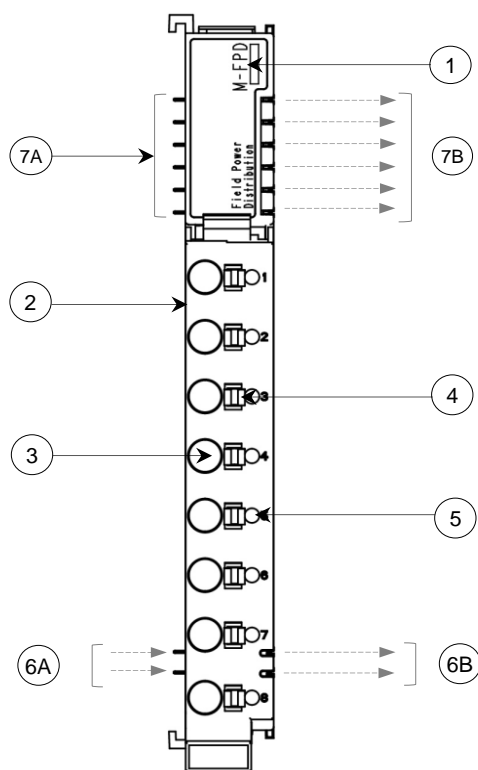
In a modular IO station, field power distribution module M-FPD provides additional terminals for the field power supply. Module M-FPD provides 8 terminals out of which 4 terminals provide 24 VDC and 4 terminals provide 0 VDC connections. It avoids use of extra terminals in the control panel and facilitates ease of sensor and actuator connections.

Module M-FPD can be attached in following cases

- Case 1:** User can connect field power supply from module M-FPD to a sensor and connect sensor output to analog input module like M-UAD2.
- Case 2:** User can connect actuators between terminal of output module e.g. M-4DE and 0 VDC terminals of M-FPD.

Part Names

Below figure describes part names of the module.



No.	Name	Description
1	M-FPD	Module ordering code
2	Terminal Block	8-point removable push type
3	IO Point	Wire insertion point for IO terminals
4	Push Button	Press to release wire
5	Test Point	To measure signal voltage
6A	Field Power Supply Interface	2, Incoming pins for field power supply interface
6B		2, Outgoing pins for field power supply interface
7A	System Power Supply Interface	6, Incoming pins for system power supply interface
7B		6, Outgoing pins for system power supply interface

Specifications

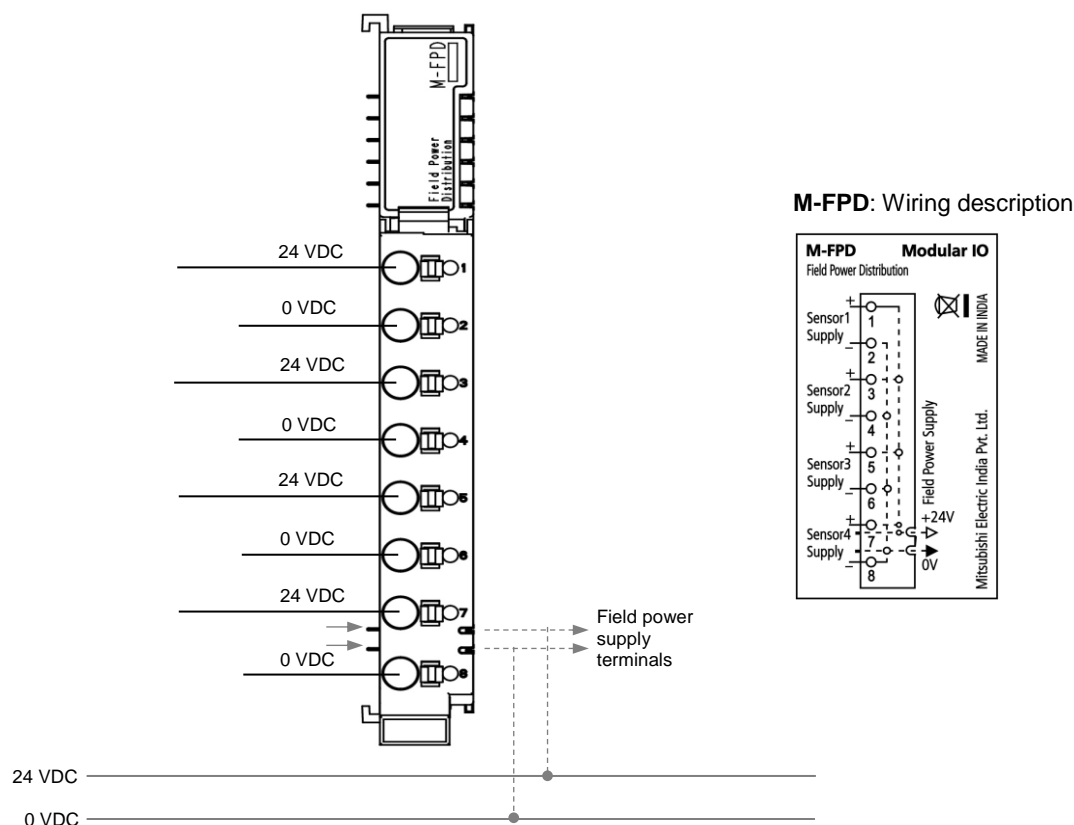
The table below provides technical specifications of **M-FPD**.

Specification	Description
Module Ordering Code	M-FPD
Field Voltage	24 VDC, 0 VDC
Field power contact Current	Max. 10 Amps.
Terminal block (Removable push type)	8-point
Recommended Wire Size	0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm	105 x 13.2 x 83

Connection Diagram

The figure shows module (M-FPD) front with 8 point terminal block. Wiring description is provided on right side wall of the module.

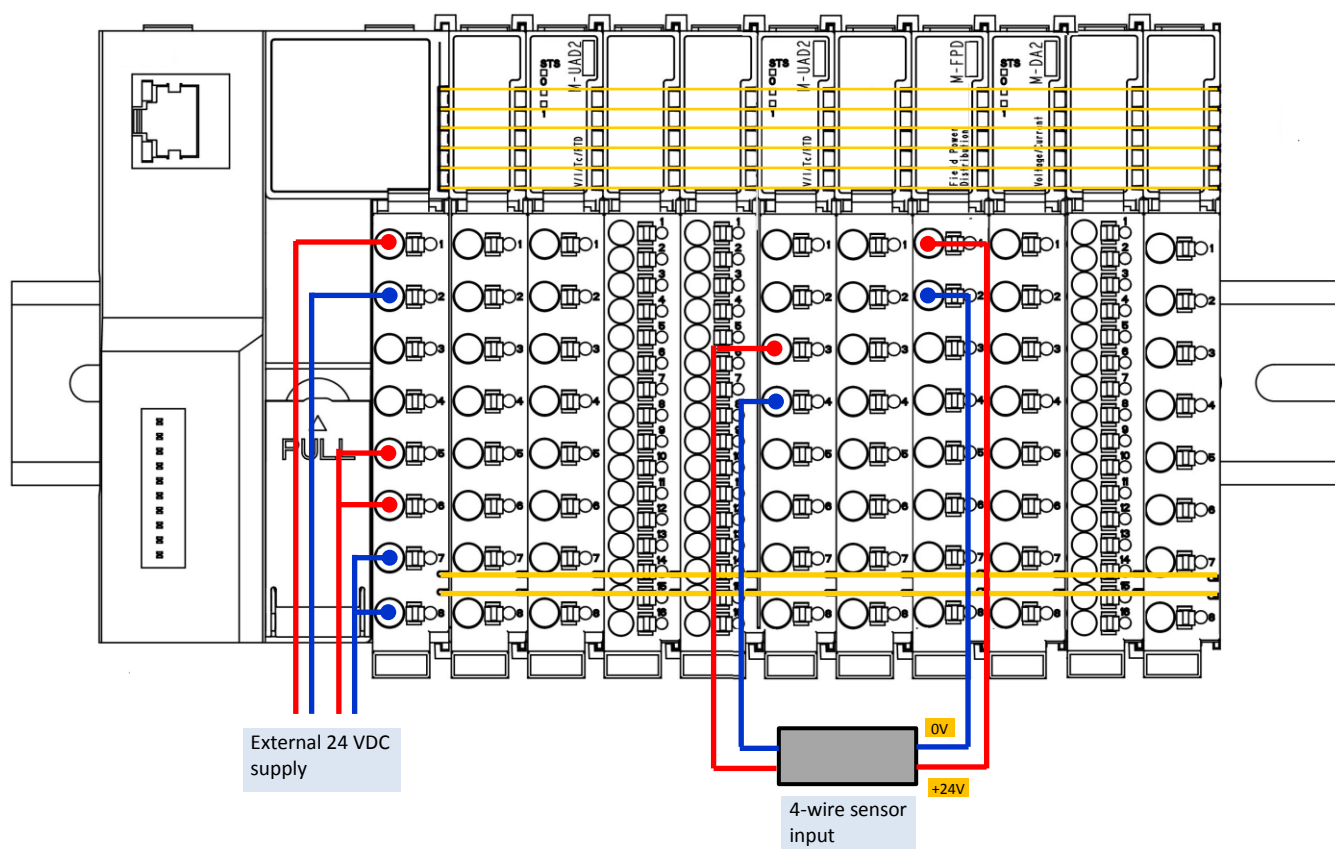
For common wiring recommendations, refer section [Wiring](#).



NOTE

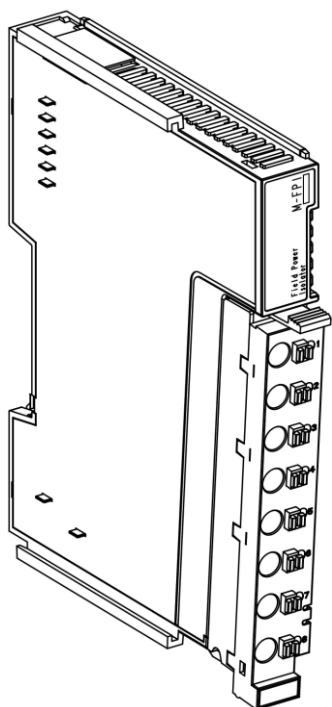
User should note that field power supply received at 2 incoming pins is connected to the terminals of module M-FPD internally and the capacity of pins and receptacles interface of modules is 10 A maximum. So user should consider field power supply consumption while using module M-FPD. When field power supply consumption of IO modules exceeds 10 A, use module M-FPI as explained in section [8.3 M-FPI](#).

User can connect field power supply from module M-FPD to a sensor and connect sensor output to analog input and output modules like M-UAD2, M-DA2.



8.3 M-FPI

[Field Power Isolator Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[Connection Diagram](#)

Module Overview

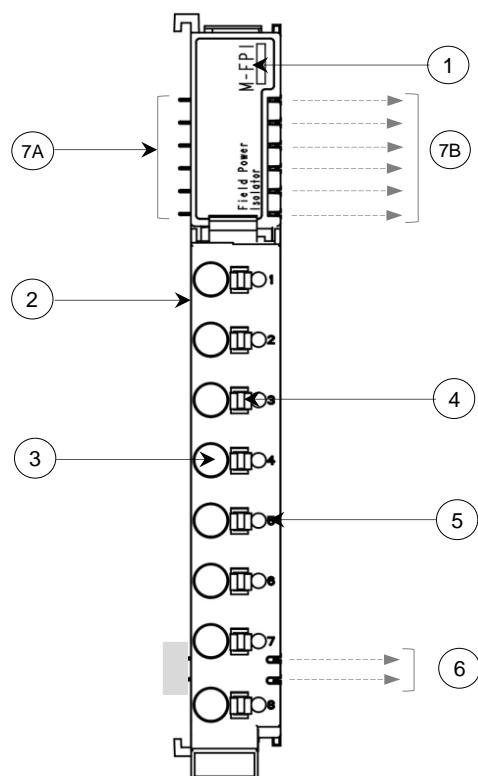
In a modular IO station, field power supply is connected to a Header module. This supply is connected to IO modules through pins and receptacles interface of each module. Capacity of pins and receptacles interface of modules is 10A maximum.

It is necessary to add M-FPI module in a station in following conditions.

- Case 1:** Each module consumes field power supply depending upon number of inputs, outputs turned ON at a time. For field power supply consumption, refer specification section of individual module when total field power supply consumption by number of IO modules attached exceeds 10 A, user should add M-FPI module.
- Case 2:** In some applications, there is need to use different power supply sources for inputs and outputs. In such case, user should attach input modules starting from slot 1 and utilize field power supply connected to a Header module. Then user should add M-FPI module with field power supply from different source and attach output modules afterwards.
- Case 3:** If a station is attached with IO modules operating with different field voltage levels such as 24 VDC, 12 VDC, 48 VDC, etc. User should attach M-FPI module with different field power supply connection and then attach IO module with different field voltage level.

Part Names

Below figure describes part names of the module.



No.	Name	Description
1	M-FPI	Module ordering code
2	Terminal Block	8-point removable push type
3	IO Point	Wire insertion point for terminals
4	Push Button	Press to release wire
5	Test Point	To measure signal voltage
6	Field Power Supply Interface	2, Outgoing pins for field power supply interface
7A	System Power Supply Interface	6, Incoming pins for system power supply interface
7B		6, Outgoing pins for system power supply interface

Specifications

The table below provides technical specifications of **M-FPI**.

Specification	Description
Module ordering code	M-FPI
Field voltage	5 VDC/ 12 VDC/ 24 VDC/ 48 VDC/ 110 VAC/ 220 VAC
Field power contact current	5 A per input terminal
Terminal block (Removable push type)	8-point
Recommended Wire Size	0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm	105 x 13.2 x 83

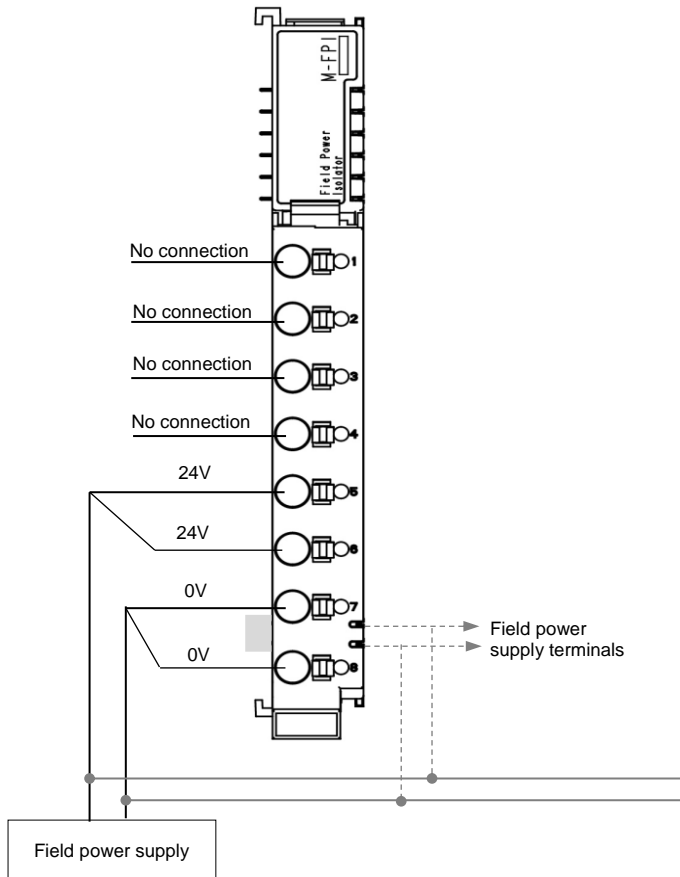
NOTE

IO modules with 24 VDC Field power supply only are available as on May 2018.

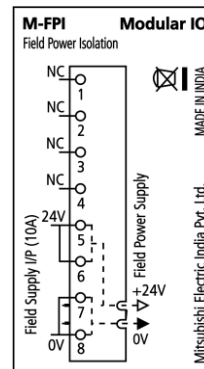
Connection Diagram

The figure shows module M-FPI front with 8 point terminal block. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-FPI: Wiring description



NOTE

Current carrying capacity of each terminal of terminal block is 5 A max. Field power supply interface between modules has current carrying capacity of 10 A.

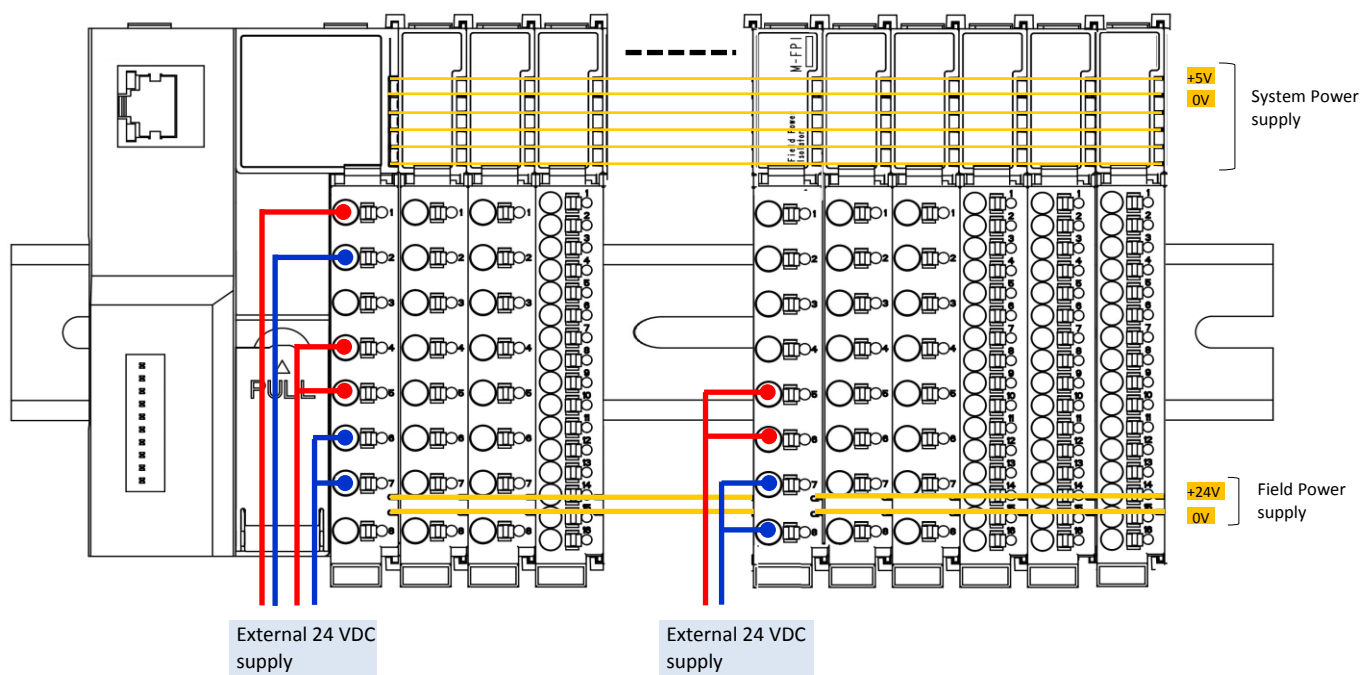
So it is necessary to connect 2 wires from source of field power supply to utilize maximum capacity of 10 A.

Field power supply connected to terminal block is directly carried to field power supply pins for interfacing with IO modules.

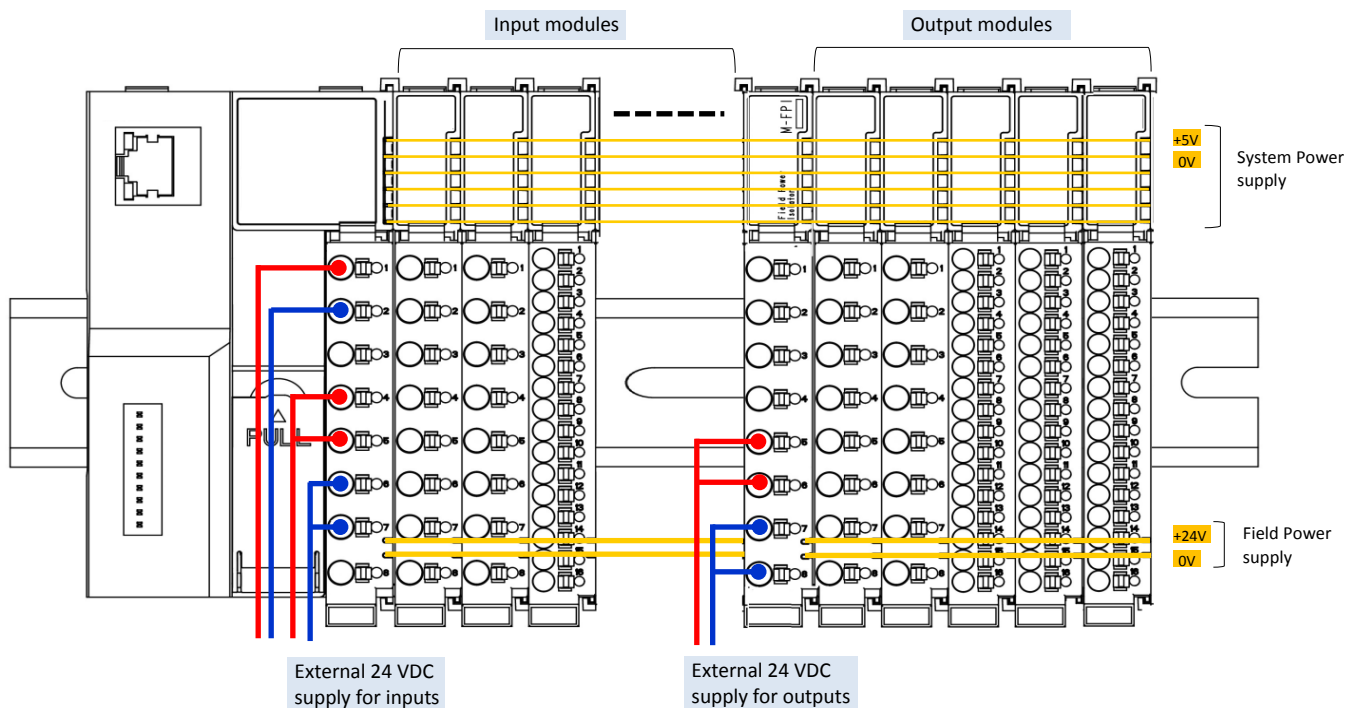
NOTE

IO modules attached on the right side of module M-FPI, utilize field power supply connected to module M-FPI.

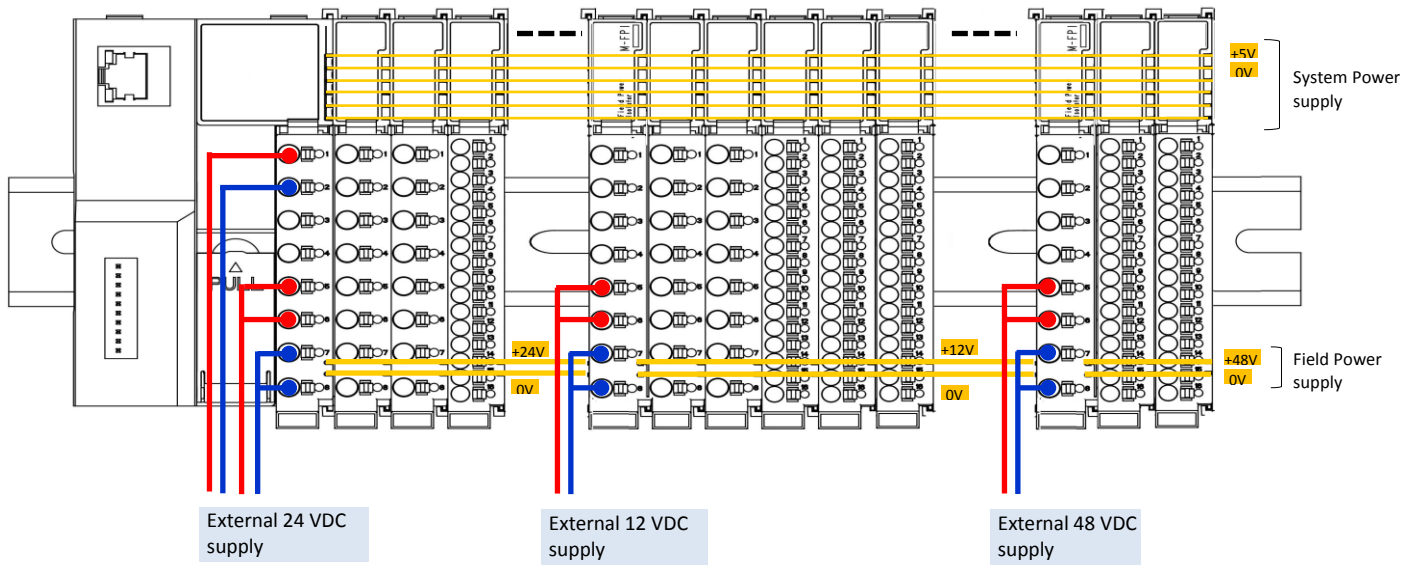
Case 1: Each module consumes field power supply depending upon number of inputs, outputs turned ON at a time. When total field power supply consumption by number of IO modules attached exceeds 10 A, user should add M-FPI module.



Case 2: In some applications, there is need to use different power supply sources for inputs and outputs. In such case, user should attach input modules starting from slot 1 and utilize field power supply connected to a Header module. Then user should add M-FPI module with field power supply from different source and attach output modules afterwards.



Case 3: If a station is attached with IO modules operating with different field voltage levels such as 24 VDC, 12 VDC, 48 VDC, etc. User should attach M-FPI module with different field power supply connection and then attach IO module with different field voltage level.

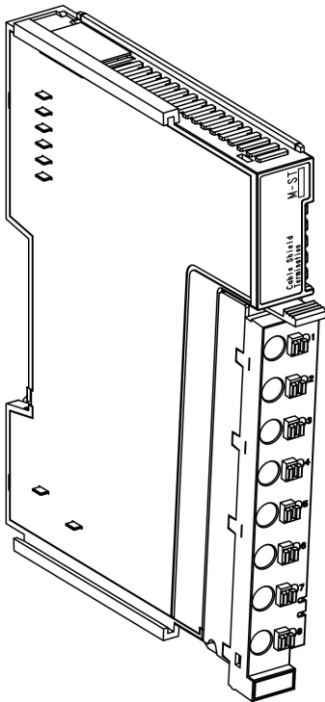


NOTE

IO modules with 24 VDC Field power supply only are available as on May 2018.

8.4 M-ST

[Shield Termination Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

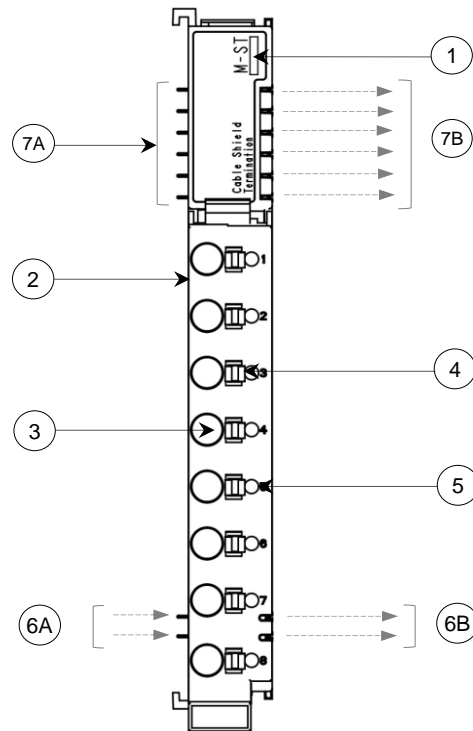
[Connection Diagram](#)

Module Overview

In a modular IO station, shield termination module M-ST provides terminals to connect shield of cables carrying low level signals like analog, communication, etc. So, it is recommended to attach module M-ST after IO module which provides such interfaces e.g. M-UAD2, M-DA2 where analog IOs are connected.

Part Names

Below figure describes part names of the module.



No.	Name	Description
1	M-ST	Module ordering code
2	Terminal Block	8-point removable push type
3	IO Point	Wire insertion point for IO terminals
4	Push Button	Press to release wire
5	Test Point	To measure signal voltage
6A	Field Power Supply Interface	2, Incoming pins for field power supply interface
6B		2, Outgoing pins for field power supply interface
7A	System Power Supply Interface	6, Incoming pins for system power supply interface
7B		6, Outgoing pins for system power supply interface

Specifications

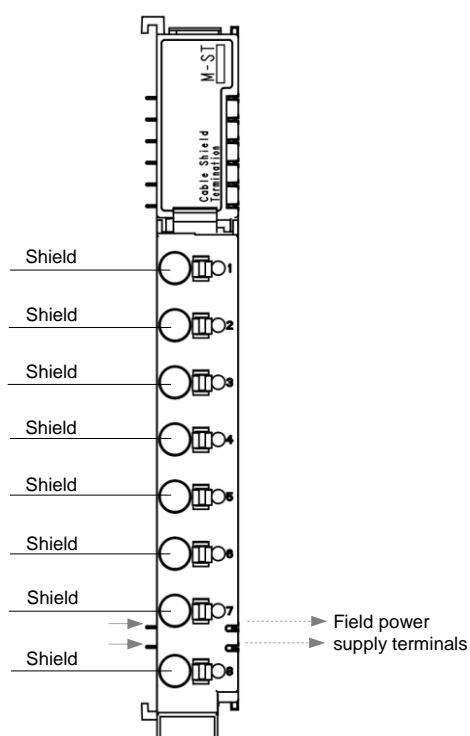
The table below provides technical specifications of **M-ST**.

Specification	Description
Module ordering code	M-ST
Number of shield terminals	8
Contact current at terminal	5 A per input terminal
Terminal block (Removable push type)	8-point
Recommended Wire Size	0.5 sq. mm to 2.0 sq. mm (AWG 20 to 14), Solid wire or Stranded (flexible) wire with lugs
Module Dimensions (H x W x D) in mm	105 x 13.2 x 83

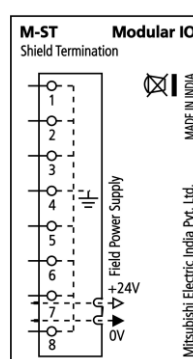
Connection Diagram

The figure shows module M-ST front with 8 point terminal block. Wiring description is provided on right side wall of the module.

For common wiring recommendations, refer section [Wiring](#).



M-ST: Wiring description

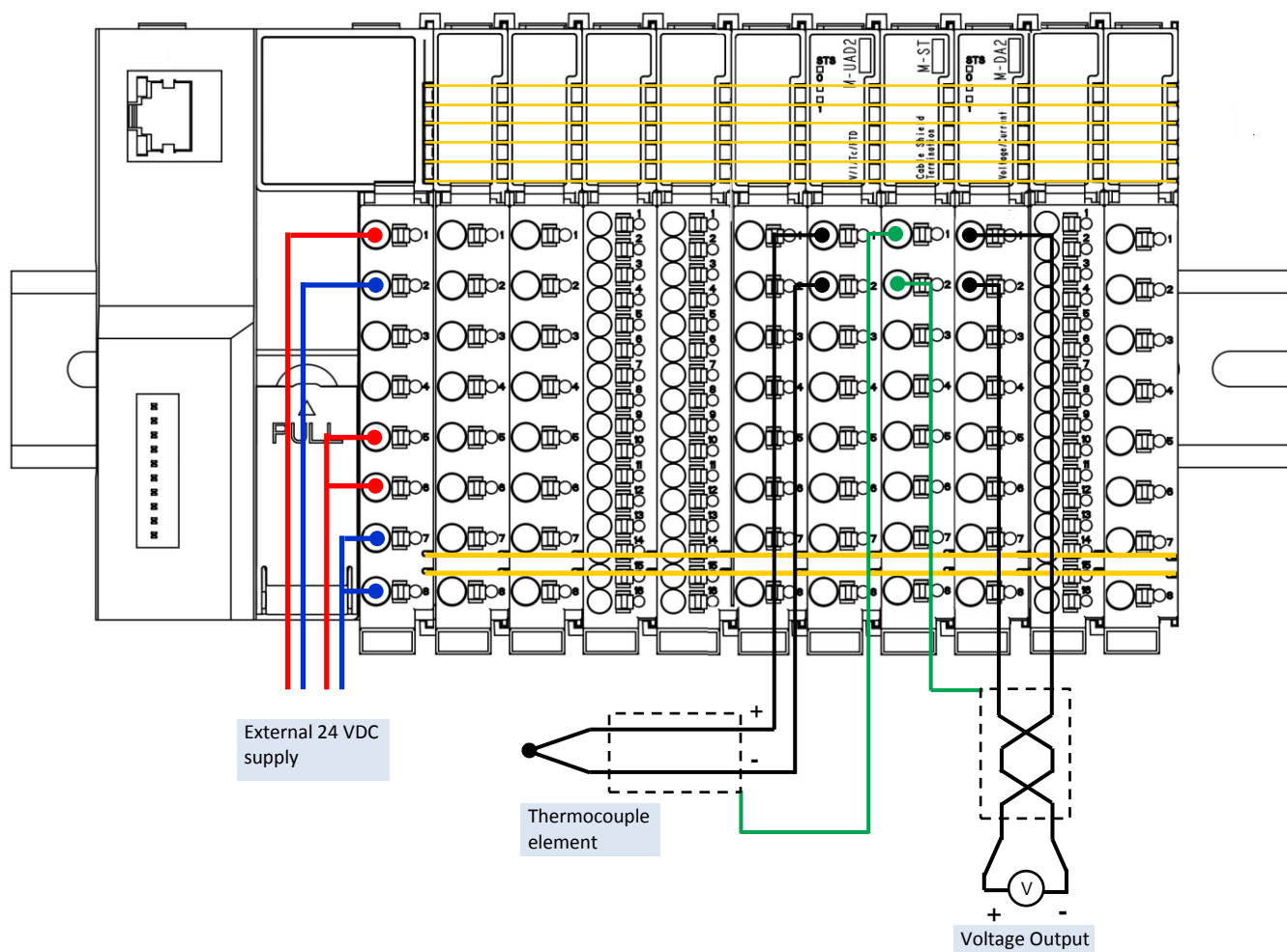


NOTE

All the 8 terminal of module M-ST are connected internally to DIN rail on which module IO station is mounted. It is necessary to ensure that DIN rail and control panel is connected to a proper Earth.

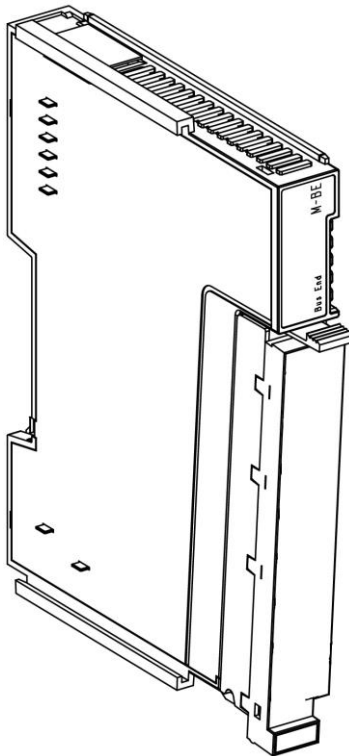
The figure below shows shield termination connections in a modular IO station when M-ST is used.

Shield termination module provides earth connection on the terminal block. User can connect cable shield of analog IO signals to this module.



8.5 M-BE

[Bus End Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

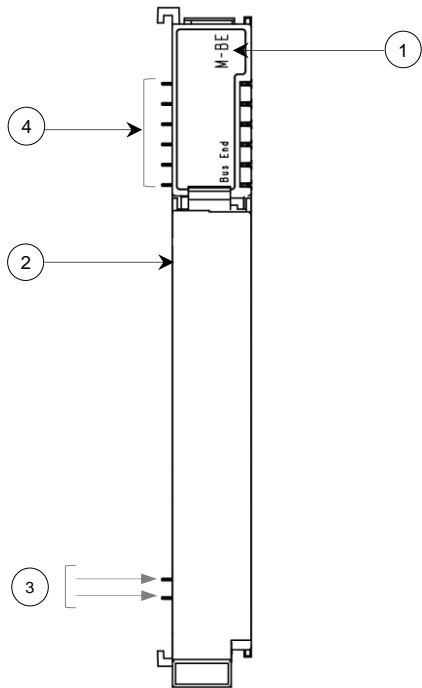
[Connection Diagram](#)

Module Overview

In a modular IO station, bus end module M-BE provides termination to backplane bus. User should attach bus end module M-BE at the last slot position if there are 16 or more IO modules.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-BE	Module ordering code
2	Front Label	Fixed in place of terminal block
3	Field Power Supply Interface	2, Incoming pins for field power supply interface
4	System Power Supply Interface	6, Incoming pins for system power supply interface

NOTE
Bus End module M-BE does not provide outgoing pins for field power supply and system power supply.

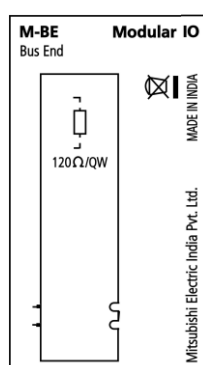
Specifications

The table below provides technical specifications of **M-BE**.

Specification	Description
Module Ordering Code	M-BE
Terminating Resistor	120 Ω / QW
Power Dissipation	Nil
Module Dimensions (H x W x D) in mm	105 x 13.2 x 83

Connection Diagram

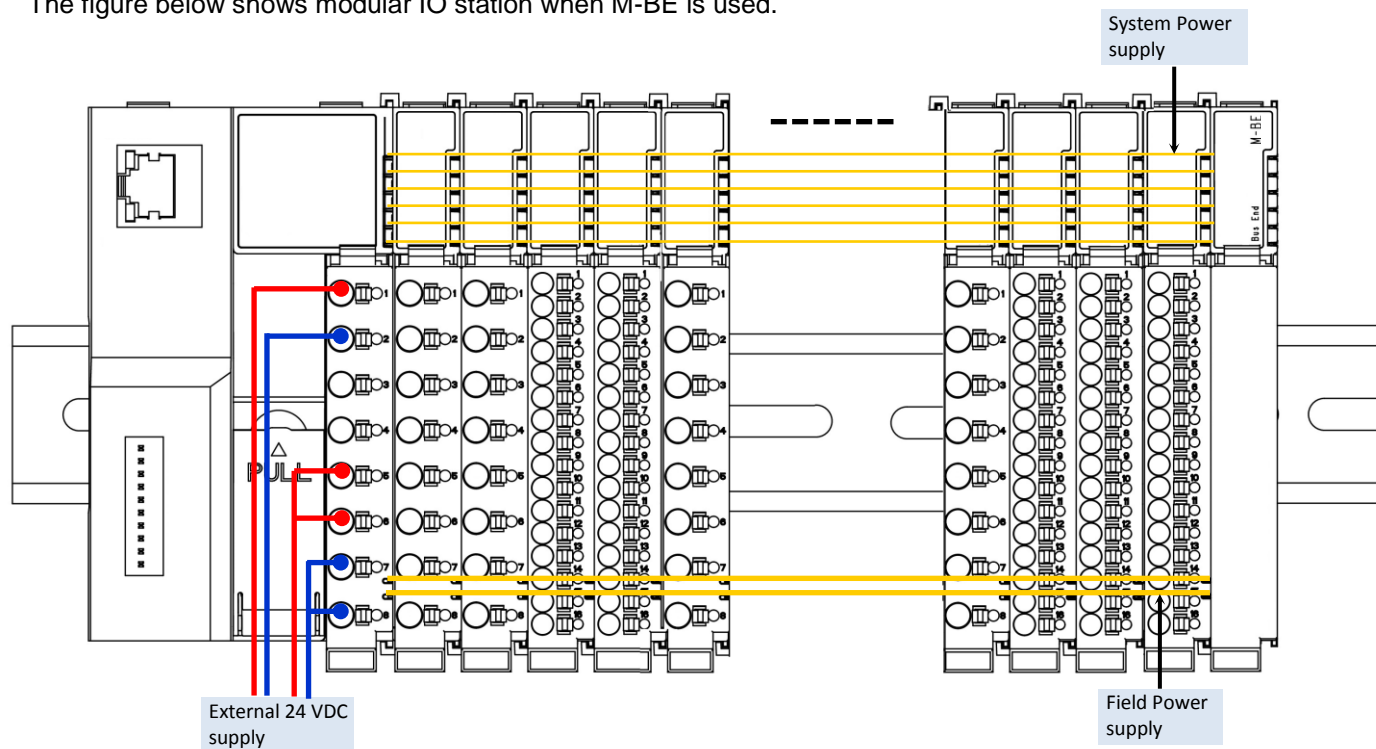
The figure shows module M-BE with front label fixed on it. Wiring description is provided on right side wall of the module.



NOTE

M-BE does not require external connections.

The figure below shows modular IO station when M-BE is used.



NOTE

User should attach Bus End module M-BE at the last slot position if there are 16 or more IO modules.

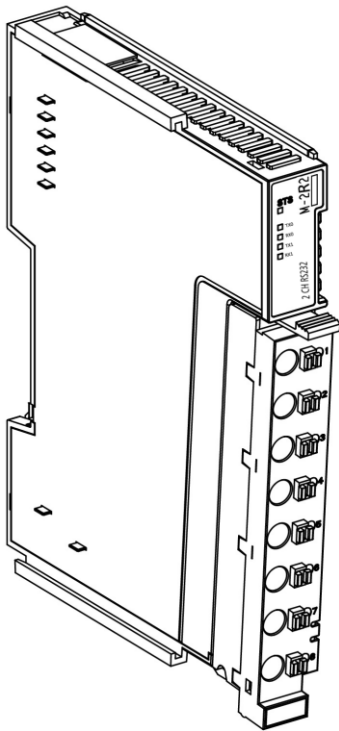
[Back To Index Page](#)

9 Special Function Modules

2 Channel Serial COM [RS 232] Module	M-2R2
1 Channel Serial COM [RS 232] Module	M-1R2

9.1 M-2R2

[2 Ch. Serial COM (RS232) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

[IO Data](#)

[Example: Transmit and Receive](#)

Module Overview

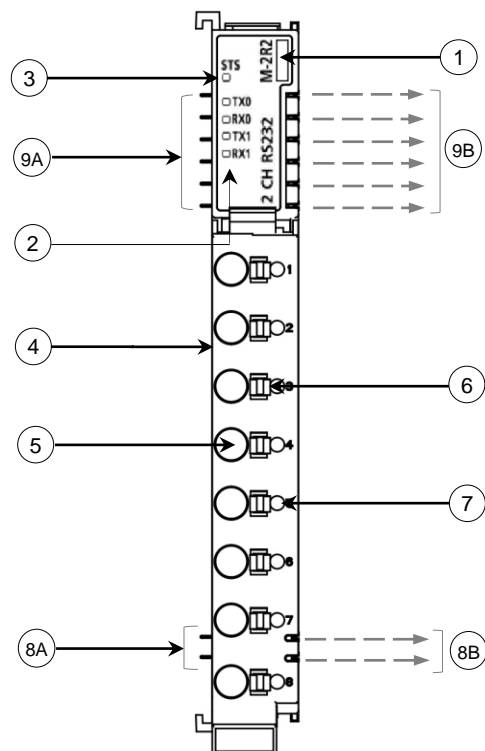
M-2R2 is 2 channel serial communication module. It provides RS232 full duplex serial communication channels. The module can be fixed in any IO slot of modular IO station.

Considering methodology of serial communication over fieldbus network, handling simple protocols like ASCII protocol will be easier from application program perspective. It is recommended to interface serial devices like bar code scanner, RFIDs, printers, etc. Refer section [Transmit and receive example](#) which provides more information of IO data with example.

Fieldbus network cycle time is a major factor to decide effective throughput of module. Typically, 100 bytes can be transmitted / received at an interval of 600 msec at baud rate of 9600 bps and network cycle time of 10 msec.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-2R2	Module ordering code
2	Channel LED Indications	TX0, TX1: Transmit signal lines RX0, RX1: Receive signal lines
3	Module Status LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

The table below provides technical specifications of **M-2R2**.

Specification		Description
Ordering Code		M-2R2
Hardware Interface		RS232
Communication Type		Full duplex
Number of channels		2
Supported baud rate (in bps)		2400,4800,9600 [Default],19200,38400, 57600,115200
Receive Buffer size		512 bytes per channel
Transmit Buffer Size		256 bytes per channel
Input Image Size		16 bytes (8 bytes per channel)
Output Image Size		16 bytes (8 bytes per channel)
Length of Cable		15 meters maximum
LED Indications		1 bicolor LED (red + green) for, module status Indication. 4 LEDs (green) for channel indication, TX0, RX0 : For channel 0 TX1, RX1 : For channel 1
High Signal Voltage		+18 VDC to +3 VDC
Low Signal Voltage		-18 VDC to -3 VDC
Maximum Signal Voltage		±40 VDC
Backplane Current Consumption		50 mA
Field Power Supply Consumption		40 mA
Terminal Block (Removable push type)		8 point
Isolation		Between communication port and internal circuit Optical 2.5 KV RMS
IO memory consumption	Input Bytes (IW)	16 bytes
	Output Bytes (QW)	16 bytes
	Diagnostic (SB) [User configurable]	1 byte
I/O terminals		TX, RX, GND, SHLD (for each channel)

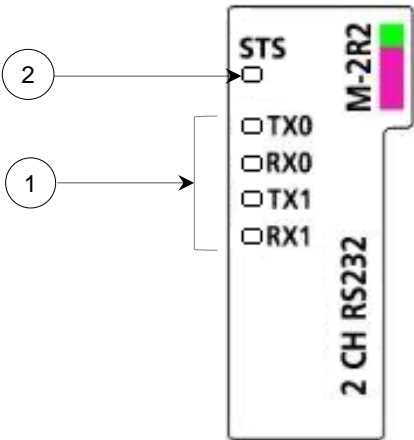
Refer section [Wiring](#) for more details.

NOTE

Module M-2R2 is supported in Modular IO Configurator Tool [V1.4.0.0] and Header (M-CCB-H and M-MT-H) firmware [V01.02.00.00], Header (M-EIP-H) firmware [V01.01.00.00] and onwards.

LED Indications

This section provides meaning of LED indications available on module.



No.	LED	Colour	Status		Description
1	TX0	Green	ON		TX0 Signal is high
			OFF		TX0 Signal is low
	RX0		ON		RX0 Signal is high
			OFF		RX0 Signal is low
	TX1		ON		TX1 Signal is high
			OFF		TX1 Signal is low
	RX1		ON		RX1 Signal is high
			OFF		RX1 Signal is low
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, - Module is powered ON and waiting for communication from Header. - Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following conditions occurred. - No communication from Header - Backplane bus fault detected.
				Double flash	- Parity Error occurred at CH0 or CH1. - Framing Error occurred at CH0 or CH1. - Overrun Error occurred at CH0 or CH1
			Yellow	ON	24 VDC field power supply is not available.

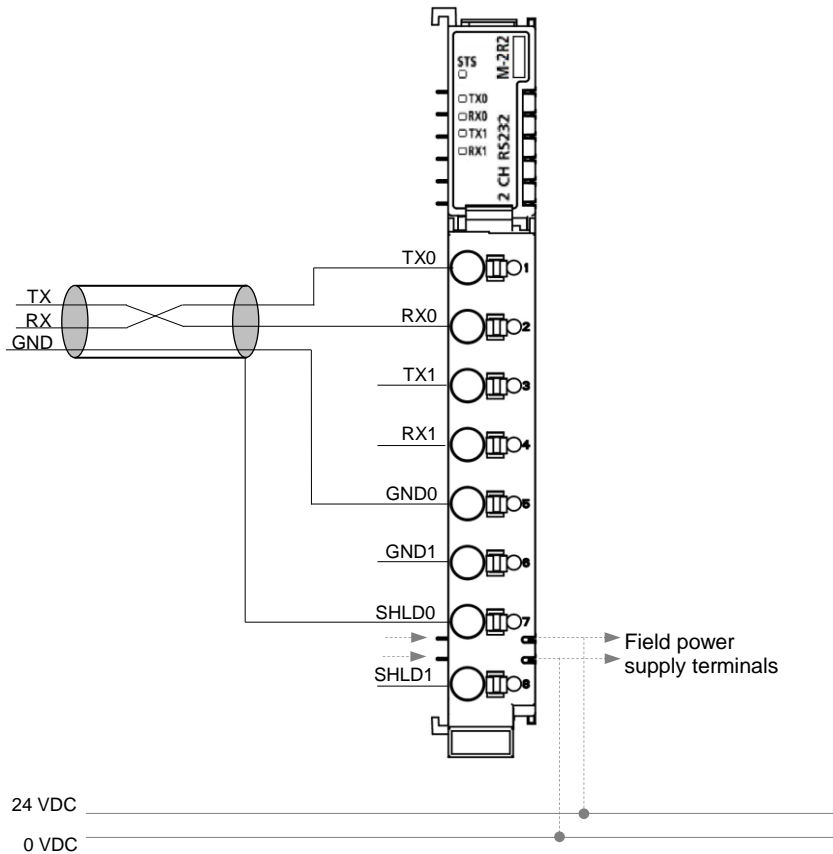
Connection Diagram

The figure shows module front with 8 point terminal block, to interface serial communication module and external devices, to establish communication.

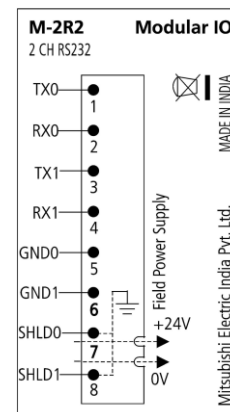
Wiring description is provided on right side wall of the module.

The figures below shows connections for channel 0, for an example.

For common wiring recommendations, refer section [Wiring](#).



M-2R2: Wiring description



NOTE

Recommended length of RS232 serial communication cable is maximum up to 15 meters.

Parameters

Module can be configured using Modular IO Configurator.

For addition and removal of module in configuration tool, refer section [Modular IO Configurator](#).

User can set following parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable [Default]	Enables diagnostic data (SB) sharing with header
	Disable	

Module diagnostic data and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

The table below provides a list of channel parameters that user can set for individual channel.

Parameter Name	Project Value	Comment
Enable	Yes [Default] No	Enable/ disable channel
Baud rate	2400 4800 9600 [Default] 19200 38400 57600 115200	Communication baud rate
Parity	None Odd [Default] Even	Parity selection
No. of data bits	7 bits 8 bits [Default] 9 bits	Number of data bits
No. of stop bits	1 bit [Default] 2 bits	Number of stop bits

For more functional details, refer [Transmit and Receive Example](#) provided in this manual.

IO Data

Following table provides description for input data and output data.

Channel	Data Type	Local Address*
CH0	BYTE	IW n (BYTE 0)
	BYTE	QW m (BYTE 0)
CH1	BYTE	IW n+4 (BYTE 0)
	BYTE	QW m+4 (BYTE 0)

*Local address (n) and (m) values changes as per the slot position of IO module and configuration of modular IO station.

For serial communication module,

IW memory holds status information and received data as shown below.

	IWn.7	IWn.6	IWn.5	IWn.4	IWn.3	IWn.2	IWn.1	IWn.0
IWn Byte 0	TXA	RL2	RL1	RL0	TBO	RRBA	WTBA	INITA
IWn Byte 1	Read byte 1							
IWn+1 Byte 0	Read byte 2							
IWn+1 Byte 1	Read byte 3							
IWn+2 Byte 0	Read byte 4							
IWn+2 Byte 1	Read byte 5							
IWn+3 Byte 0	Read byte 6							
IWn+3 Byte 1	Read byte 7							

Channel	Data Type	Local Address*	Status	Comment
Input Data CH0*				
INITA (Init Ack)	BOOL	IWn (BYTE 0).0	TRUE	Initialisation Acknowledge. Module sends acknowledgement of INIT command received from fieldbus master using this bit.
			FALSE	Channel is ready for serial communication.
WTBA (Write TX Buffer Ack)	BOOL	IWn (BYTE 0).1	Change of state [0 → 1 or 1 → 0]	Write Transmit Buffer Acknowledge. Module sends acknowledgement of WTB command received from fieldbus master using this bit. Status of WTB is copied to WTBA, after successful writing to transmit buffer of module.
RRBA (Read RX Buffer Ack)	BOOL	IWn (BYTE 0).2		Read Receive Buffer Acknowledge. Module sends acknowledgement of RRB command received from fieldbus master using this bit. Status of RRB is copied to RRBA after successful reading from receive buffer of module.
TBO (TX Buffer Overflow)	BOOL	IWn (BYTE 0).3		Transmit Buffer Overflow. Transmit buffer of module is full. After transmit buffer overflow, additional bytes received on serial communication are lost. Transmit buffer size is 256 bytes per channel.

RL0.....RL2 (Receive Length bit 0 to Receive Length bit 2)	BOOL	IWn (BYTE 0).4 to IWn (BYTE 0).6	--	Read Length for Read Receive Buffer command Number of bytes read from receive buffer of module. Maximum length is 7 bytes.			
				RL2	RL1	RL0	Read Length (in Bytes)
				0	0	0	0
				0	0	1	1
				0	1	0	2
				0	1	1	3
				1	0	0	4
				1	0	1	5
				1	1	0	6
				1	1	1	7
TXA (Transmit Ack)	BOO L	IWn (BYTE 0).7	Change of state [0 → 1 or 1 → 0]	Transmit Acknowledge. Module sends acknowledgement of TX command received from fieldbus master using this bit. Once data transmission is complete, status of TX is copied to TXA.			
RD Byte 1	BYTE	IWn (BYTE 1)	--	Read Data byte 1.			
RD Byte 2	BYTE	IWn+1 (BYTE 0)	--	Read Data byte 2.			
RD Byte 3	BYTE	IWn+1 (BYTE 1)	--	Read Data byte 3.			
RD Byte 4	BYTE	IWn+2 (BYTE 0)	--	Read Data byte 4.			
RD Byte 5	BYTE	IWn+2 (BYTE 1)	--	Read Data byte 5			
RD Byte 6	BYTE	IWn+3 (BYTE 0)	--	Read Data byte 6.			
RD Byte 7	BYTE	IWn+3 (BYTE 1)	--	Read Data byte 7.			

*Similarly, input data for CH1 is mapped from **IWn+4** to **IWn+7**.

QW memory holds control information and transmit data as shown below.

	QWm.7	QWm.6	QWm.5	QWm.4	QWm.3	QWm.2	QWm.1	QWm.0
QWm Byte 0	TX	WL2	WL1	WL0	RES	RRB	WTB	INIT
QWm Byte 1	Write byte 1							
QWm+1 Byte 0	Write byte 2							
QWm+1 Byte 1	Write byte 3							
QWm+2 Byte 0	Write byte 4							
QWm+2 Byte 1	Write byte 5							
QWm+3 Byte 0	Write byte 6							
QWm+3 Byte 1	Write byte 7							

Channel	Data Type	Local Address*	Status	Comment
Output Data CH0*				
INIT (Init)	BOOL	QWm (BYTE 0).0	TRUE	Initialisation command. Fieldbus master can generate request to reset channel using this bit. When this bit is ON, channel is initialised. When initialised, module takes following actions, 1. FIFO pointers of TX buffer and RX buffer are initialised 2. Channel port is initialised with communication parameters set. 3. Errors are cleared. (Overrun, parity, framing) 4. Acknowledge status bits in input image are cleared. (WTBA, RRBA) 5. Status of INITA in input image is turned ON indicating successful initialisation.
			FALSE	No initialisation request is issued. Channel is ready for serial communication.
WTB (Write TX Buffer)	BOOL	QWm (BYTE 0).1	Change of state [0 → 1 or 1 → 0]	Write Transmit Buffer command. Fieldbus master can generate command to write data to transmit buffer of module using this bit. When module receives change of state of this bit, module does following actions, 1. Check size of data to write to transmit buffer in 'WL0 to WL2' 2. Write data received in 'WR Byte 1' to WR Byte 7' to transmit buffer of module as per write length. If write length is 0, then no data is written to transmit buffer. Maximum 7 bytes data can be written with single command. 3. Status of WTBA in input image is updated indicating successful write operation. Status of WTB is copied to WTBA.

RRB (Receive RX Buffer)	BOOL	QWm (BYTE 0).2		<p>Read Receive Buffer command.</p> <p>Fieldbus master can generate command to read data from receive buffer of module using this bit.</p> <p>When module receives state change on this bit, module does following actions,</p> <p>1. Checks if any data is present in its RX buffer.</p> <p>2. If data is present in receive buffer, copy data from RX buffer to input image ' RD Byte 1' to 'RD Byte 7'. Data is copied on FIFO basis.</p> <p>Maximum 7 bytes data can be read with single command.</p> <p>If no data present in receive buffer no data is copied.</p> <p>3. Update size of bytes read in input image bits 'RL0 to RL2' In case of no data present in RX buffer, size is updated as 0.</p> <p>4. Status of RRBA in input image is updated indicating successful read operation. Status of RRB is copied to RRBA.</p>																																				
RES (Reserved)	BOOL	QWm (BYTE 0).3	--	Reserved.																																				
WL0....WL2 (Write Length bit 0 to Write Length bit 2)	BOOL	QWm (BYTE 0).4 to QWm (BYTE 0).6	--	<p>Write Length for Write Transmit Buffer command.</p> <p>Number of bytes to write to transmit buffer of module.</p> <table><tr><th>WL2</th><th>WL1</th><th>WL0</th><th>Write Length (in Bytes)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>2</td></tr><tr><td>0</td><td>1</td><td>1</td><td>3</td></tr><tr><td>1</td><td>0</td><td>0</td><td>4</td></tr><tr><td>1</td><td>0</td><td>1</td><td>5</td></tr><tr><td>1</td><td>1</td><td>0</td><td>6</td></tr><tr><td>1</td><td>1</td><td>1</td><td>7</td></tr></table> <p>Maximum length is 7 bytes .</p>	WL2	WL1	WL0	Write Length (in Bytes)	0	0	0	0	0	0	1	1	0	1	0	2	0	1	1	3	1	0	0	4	1	0	1	5	1	1	0	6	1	1	1	7
WL2	WL1	WL0	Write Length (in Bytes)																																					
0	0	0	0																																					
0	0	1	1																																					
0	1	0	2																																					
0	1	1	3																																					
1	0	0	4																																					
1	0	1	5																																					
1	1	0	6																																					
1	1	1	7																																					
TX (Transmit Data from Buffer)	BOOL	QWm (BYTE 0).7	Change of state [0 → 1 or 1 → 0]	<p>Transmit command.</p> <p>Fieldbus master can generate command to transmit data from transmit buffer of module using this bit.</p> <p>When module receives change of state of this bit, module does following</p> <p>1. Transmit all data available in transmit buffer over serial communication.</p> <p>2.Once data transmission is complete, status of TXA in input image is updated indicating successful trasmission. Status of TX is copied to TXA.</p>																																				
WR Byte 1	BYTE	QWm (BYTE 1)	--	Write Data byte 1.																																				
WR Byte 2	BYTE	QWm+1 (BYTE 0)	--	Write Data byte 2.																																				
WR Byte 3	BYTE	QWm+1 (BYTE 1)	--	Write Data byte 3.																																				
WR Byte 4	BYTE	QWm+2 (BYTE 0)	--	Write Data byte 4																																				
WR Byte 5	BYTE	QWm+2 (BYTE 1)	--	Write Data byte 5.																																				
WR Byte 6	BYTE	QWm+3 (BYTE 0)	--	Write Data byte 6.																																				
WR Byte 7	BYTE	QWm+3 (BYTE 1)	--	Write Data byte 7.																																				

*Similarly, output data for CH1 is mapped from **QWm+4** to **QWm+7**.

NOTE

When fieldbus master is in STOP mode then,

- Module goes in initialization mode.

When fieldbus master gets disconnected from network then,

- It is recommended to initialize channels using INIT command.

User can monitor the following diagnostics.

Channel	Data Type	Local Address	Bit Status	Comment
Module Diagnostics	BYTE	SB (n+10)	--	--
No field power supply	BOOL	SB (n+10).0	TRUE	24 VDC field power supply is not available.
			FALSE	24 VDC field power supply is available.
RBO0 (RX Buffer Overflow CH0)	BOOL	SB (n+10).1	TRUE	Receive buffer of CH0 is full. After CH0 receive buffer overflow, additional bytes received from external device are not acknowledged by module. Receive buffer size is 512 bytes per channel.
			FALSE	No transmit buffer overflow error.
PE0 (Parity Error CH0)	BOOL	SB (n+10).2	TRUE	Parity error occur during data reception on CH0. In case of parity error, received byte is not copied to receive buffer of module. Once set, parity error is reset after channel initialisation. (When initialisation command INIT is generated from fieldbus master or power cycle)
			FALSE	No Parity error
FE0 (Framing Error CH0)	BOOL	SB (n+10).3	TRUE	Framing error occur during data reception on CH0. In case of framing error, received byte is not copied to receive buffer of module. Once set, framing error is reset after channel initialisation. (When initialisation command INIT is generated from fieldbus master or power cycle)
			FALSE	No Framing error

RBO1 (RX Buffer Overflow CH1)	BOOL	SB (n+10).4	TRUE	Receive buffer of CH1 is full. After CH1 receive buffer overflow, additional bytes received from external device are not acknowledged by module. Receive buffer size is 512 bytes per channel.
			FALSE	No transmit buffer overflow error.
PE1 (Parity Error CH1)	BOOL	SB (n+10).5	TRUE	Parity error occur during data reception on CH1. In case of parity error, received byte is not copied to receive buffer of module. Once set, parity error is reset after channel initialisation. (When initialisation command INIT is generated from fieldbus master or power cycle)
			FALSE	No Parity error
FE1 (Framing Error CH1)	BOOL	SB (n+10).6	TRUE	Framing error occur during data reception on CH1. In case of framing error, received byte is not copied to receive buffer of module. Once set, framing error is reset after channel initialisation. (When initialisation command INIT is generated from fieldbus master or power cycle)
			FALSE	No Framing error

Module diagnostic data is available in Status Byte (SB) memory, if module parameter "Share diagnostics" is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages

Transmit and Receive Example

Module provides buffer of 512 bytes for receive and 256 bytes for transmit.

Network master/controller can write to transmit buffer and read from receive buffer of module using IO data of 8 bytes. 1 byte IO data is for handshaking and 7 bytes of IO data for serial communication. So maximum 7 bytes of data can be exchanged with module in one iteration.

User should develop suitable logic using handshaking information in network master/ controller to write transmit frame to transmit buffer in chunk of 7 bytes and then transmit over serial communication. E.g. to write 32 bytes, it will take 5 iterations.

Similarly, user should develop suitable logic in network master controller to read from receive buffer in chunks of 7 bytes and combine these bytes together in sequence to form receive frame. Then, it can be processed as per protocol.

Refer following formula to determine typical time taken to transmit/ receive IO data.

$$\left[\left(\text{Roundup} (\text{No. Of Bytes} / 7) + 1 \right) \times 2 \times \text{Network cycle time} \right] + \text{Serial communication time}$$

Prerequisites:

Modular IO station is communicating with fieldbus master and IO data communication established.

External device is connected to M-1R2 device over serial communication.

Channel is initialised using INIT command from fieldbus master and channel is ready for serial communication.

Note:

To avoid malfunctioning of communication between M-1R2 module with external device take care in master application program to initialise communication channels in following cases

- Recovery after disconnection of modular IO station over fieldbus.
- Any kind of error in reception like parity error, frame error, receive buffer overflow
- Reconnection of fieldbus
- Reconnection of field power supply.

Transmit example: Consider an example where ASCII string 'MITSUBISHI' of 10 characters is transmitted to external device connected to M-2R2 module.

Step	Step Details	Output from Fieldbus Master	Input from Modular IO station (M-2R2)	M-2R2 TX buffer memory
1	Generate 'write transmit buffer' command from fieldbus master to write first 7 bytes to transmit buffer of M-2R2	Control Byte INIT =0, WTB =1, RRB =0, WL2 =1, WL1 =1, WL0 =1, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48	Status Byte INTA =0, WTBA =0, RRBA =0, RBO =0, RL2 =0, RL1=0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	null
2	M-2R2 module acknowledges WTB command from master	Control Byte INIT =0, WTB =1, RRB =0, WL2 =1, WL1 =1, WL0 =1, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48	Status Byte INTA =0, WTBA =1, RRBA =0, RBO =0, RL2 =0, RL1=0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48
3	Generate 'write transmit buffer' command from fieldbus master to write remaining 3 bytes to transmit buffer of M-2R2	Control Byte INIT =0, WTB =0, RRB =0, WL2 =0, WL1 =1, WL0 =1, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x53, 0x48, 0x49, 0x 00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =1, RRBA =0, RBO =0, RL2 =0, RL1=0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48
4	M-2R2 module acknowledges WTB command from master	Control Byte INIT =0, WTB =0, RRB =0, WL2 =0, WL1 =1, WL0 =1, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x53, 0x48, 0x49, 0x 00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =0, RBO =0, RL2 =0, RL1=0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48, 0x53, 0x48, 0x49
5	Generate 'Transmit (TX)' command from fieldbus master	Control Byte INIT =0, WTB =0, RRB =0, WL2 =0, WL1 =1, WL0 =1, Res =0, TX =1 WR Byte 0 ... WR Byte7 = 0x53, 0x48, 0x49, 0x 00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =0, RBO =0, RL2 =0, RL1=0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48, 0x53, 0x48, 0x49
6	M-2R2 module transmit data over serial communication and acknowledges successful transmission.	Control Byte INIT =0, WTB =0, RRB =0, WL2 =0, WL1 =1, WL0 =1, Res =0, TX =1 WR Byte 0 ... WR Byte7 = 0x53, 0x48, 0x49, 0x 00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =1, RBO =0, RL2 =0, RL1=0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	null

Receive Example: Consider an example where ASCII string 'MITSUBISHI' of 10 characters is transmitted by external device to M-2R2 module and receive buffer data is read by fieldbus master.

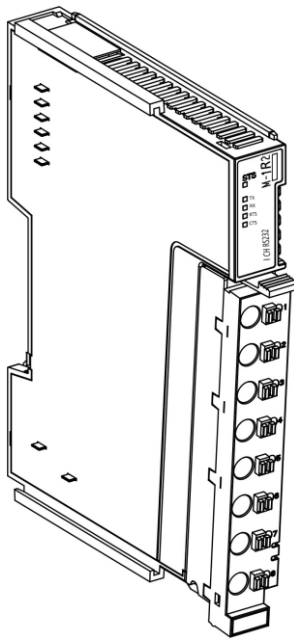
Step	Step Details	Output from Fieldbus Master	Input from Modular IO station (M-2R2)	M-2R2 RX buffer memory
1	Fieldbus master generates 'Read Receive Buffer' command to read data from RX buffer.	Control Byte INIT =0, WTB =0, RRB =1, WL2 =0, WL1 =0, WL0 =0, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =0, RBO =0, RL2 =0, RL1 =0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	null
2	Since no data is available in RX buffer module acknowledges RRB command by RRBA and read length =0 bytes.	Control Byte INIT =0, WTB =0, RRB =1, WL2 =0, WL1 =0, WL0 =0, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =1, RBO =0, RL2 =0, RL1 =0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	null
3	M-2R2 module receives 10 bytes data over serial communication	--	--	0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48, 0x53, 0x48, 0x49
4	Fieldbus master generates 'Read Receive Buffer' command to read data from RX buffer.	Control Byte INIT =0, WTB =0, RRB =0, WL2 =0, WL1 =0, WL0 =0, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =1, RBO =0, RL2 =0, RL1 =0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48, 0x53, 0x48, 0x49

5	M-2R2 module acknowledges WTB command from master and copies 7 bytes from RX buffer data to input image. Receive length is 7 bytes.	Control Byte INIT =0, WTB =0, RRB =0, WL2 =0, WL1 =0, WL0 =0, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =0, RBO =0, RL2 =1, RL1=1, RL0 =1, TXA=0 RD Byte 0 ... RD Byte7 = 0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48	0x53, 0x48, 0x49
6	Fieldbus master generates 'Read Receive Buffer' command to read data from RX buffer.	Control Byte INIT =0, WTB =0, RRB =1, WL2 =0, WL1 =0, WL0 =0, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =0, RBO =0, RL2 =1, RL1=1, RL0 =1, TXA=0 RD Byte 0 ... RD Byte7 = 0x4D, 0x49, 0x54, 0x 53, 0x55, 0x42, 0x48	0x53, 0x48, 0x49
7	M-2R2 module acknowledges WTB command from master and copies remaining 3 bytes from RX buffer data to input image. Receive length is 3 bytes.	Control Byte INIT =0, WTB =0, RRB =1, WL2 =0, WL1 =0, WL0 =0, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =1, RBO =0, RL2 =0, RL1=1, RL0 =1, TXA=0 RD Byte 0 ... RD Byte7 = 0x53, 0x48, 0x49, 0x00, 0x00, 0x00, 0x00	null
8	Fieldbus master generates 'Read Receive Buffer' command to read data from RX buffer.	Control Byte INIT =0, WTB =0, RRB =0, WL2 =0, WL1 =0, WL0 =0, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =1, RBO =0, RL2 =0, RL1=1, RL0 =1, TXA=0 RD Byte 0 ... RD Byte7 = 0x53, 0x48, 0x49, 0x00, 0x00, 0x00, 0x00	null
9	Since no data is available in RX buffer module acknowledges RRB command by RRBA and read length =0 bytes.	Control Byte INIT =0, WTB =0, RRB =0, WL2 =0, WL1 =0, WL0 =0, Res =0, TX =0 WR Byte 0 ... WR Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	Status Byte INTA =0, WTBA =0, RRBA =0, RBO =0, RL2 =0, RL1=0, RL0 =0, TXA=0 RD Byte 0 ... RD Byte7 = 0x00, 0x00, 0x00, 0x00, 0x00, 0x00, 0x00	null

ASCII Codes M=0x4D, I = 0x49, T =0x54, S=0x 53, U=0x 55, B=0x42, S=0x 53, H=0x48, I=0x49.

9.2 M-1R2

[1 Ch. Serial COM (RS232) Module]



[Module Overview](#)

[Part Names](#)

[Specifications](#)

[LED Indications](#)

[Connection Diagram](#)

[Parameters](#)

[IO Data](#)

Module Overview

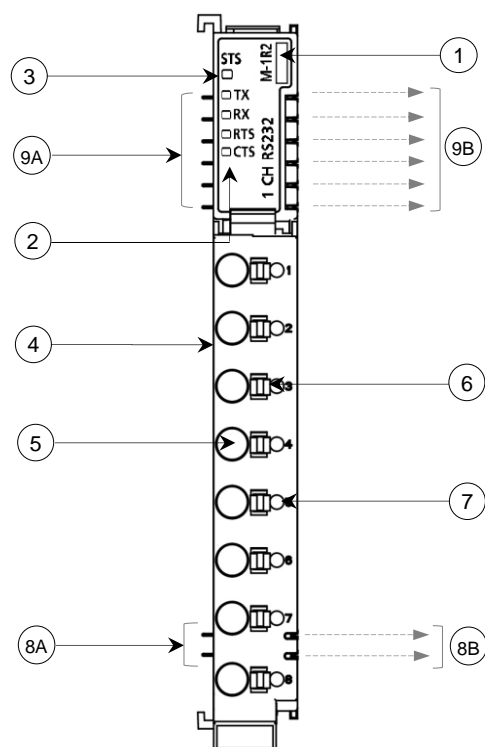
M-1R2 is 1 channel serial communication module. It provides RS232 full duplex serial communication channel with RTS/CTS flow control. The module can be fixed in any IO slot of modular IO station.

Considering methodology of serial communication over fieldbus network, handling simple protocols like ASCII protocol will be easier from application program perspective. It is recommended to interface serial devices like bar code scanner, RFIDs, printers, etc. Refer section [Transmit and receive example](#) which provides more information of IO data with example.

Fieldbus network cycle time is a major factor to decide effective throughput of module. Typically, 100 bytes can be transmitted / received at an interval of 600 msec at baud rate of 9600bps and network cycle time of 10 msec.

Part Names

The figure below describes part names of the module.



No.	Name	Description
1	M-1R2	Module ordering code
2	Channel LED Indications	TX, RX: Transmit/ Receive signal lines RTS, CTS: Flow control signal lines
3	Module Status LED Indication	STS: 1 Bi-colour LED for module status
4	Terminal Block	8-point removable push type
5	IO Point	Wire insertion point
6	Push Button	Press to release wire
7	Test Point	To measure signal voltage
8A	Field Power Supply Interface	2 Incoming pins for field power supply interface
8B		2 Outgoing pins for field power supply interface
9A	System Power Supply Interface	6 Incoming pins for system power supply interface
9B		6 Outgoing pins for system power supply interface

Specifications

The table below provides technical specifications of **M-1R2**.

Specification		Description
Ordering Code		M-1R2
Hardware Interface		RS232 with RTS CTS flow control
Communication Type		Full duplex
Number of channels		1
Supported baud rate (in bps)		2400,4800,9600 [Default],19200,38400, 57600,115200
Receive Buffer size		512 bytes
Transmit Buffer Size		256 bytes
Input Image Size		8 bytes
Output Image Size		8 bytes
Length of Cable		15 meters maximum
LED Indications		1 bicolor LED (red + green) for, module status Indication. 4 LEDs (green) for channel indication, TX, RX : Transmit/ Receive signal lines RTS, CTS* : Flow control signal lines
High Signal Voltage		+18 VDC to +3 VDC
Low Signal Voltage		-18 VDC to -3 VDC
Maximum Signal Voltage		±40 VDC
Backplane Current Consumption		50 mA
Field Power Supply Consumption		40 mA
Terminal Block (Removable push type)		8 point
Isolation		Between communication port and internal circuit Optical 2.5 KV RMS
IO memory consumption	Input Bytes (IW)	8 bytes
	Output Bytes (QW)	8 bytes
	Diagnostic (SB) [User configurable]	1 byte
I/O terminals		TX, RX, RTS, CTS, GND, SHLD

*RTS is abbreviation of "Request To Send" and CTS is abbreviation of "Clear To Send".

NOTE

RTS signal (when hardware flow control is enabled) becomes low, when size of data in receive buffer is more than 80% (409 bytes) of receive buffer size (512 bytes).

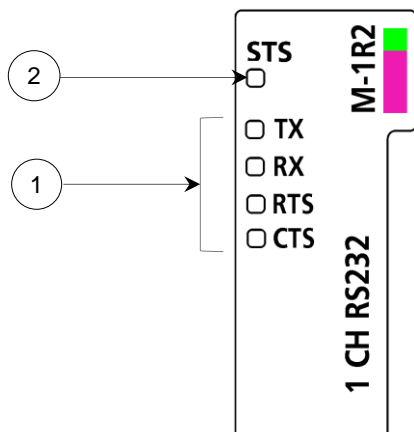
It becomes high again, when size of data in receive buffer is less than 30% (153 bytes) of receive buffer size.

With RTS signal as low, module continues to receive data till receive buffer is full.

Module M-1R2 is supported in Modular IO Configurator Tool [V1.5.0.0] and Header (M-CCB-H and M-MT-H) firmware [V01.02.00.00], Header (M-EIP-H) firmware [V01.01.00.00] and onwards.

LED Indications

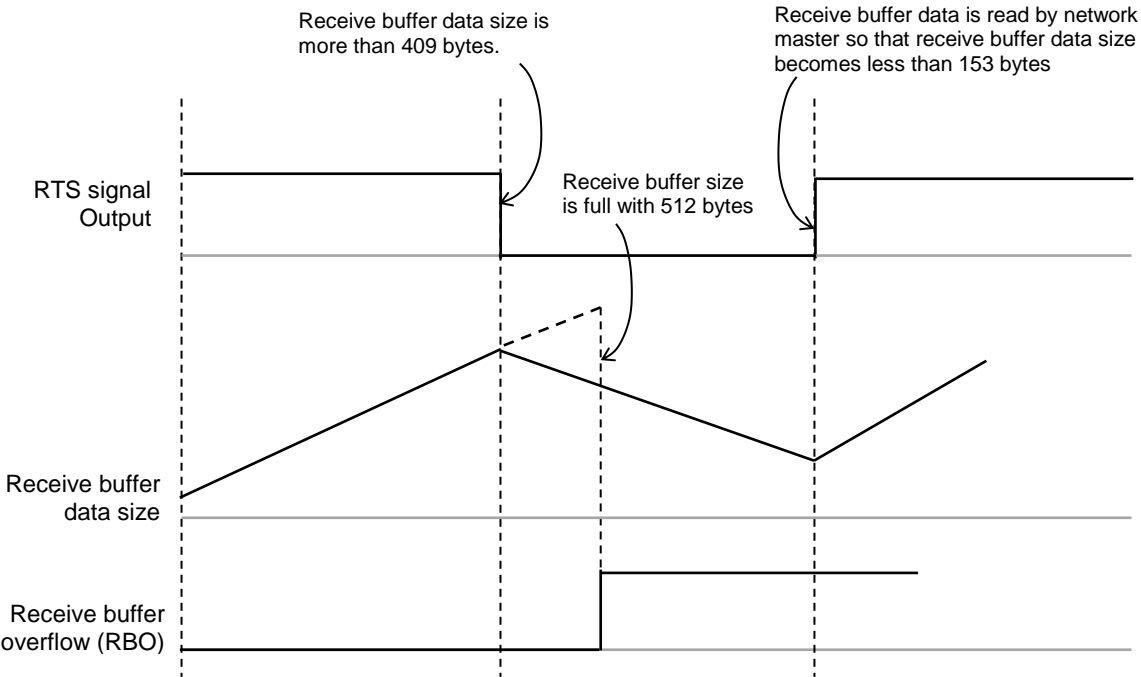
This section provides meaning of LED indications available on module.



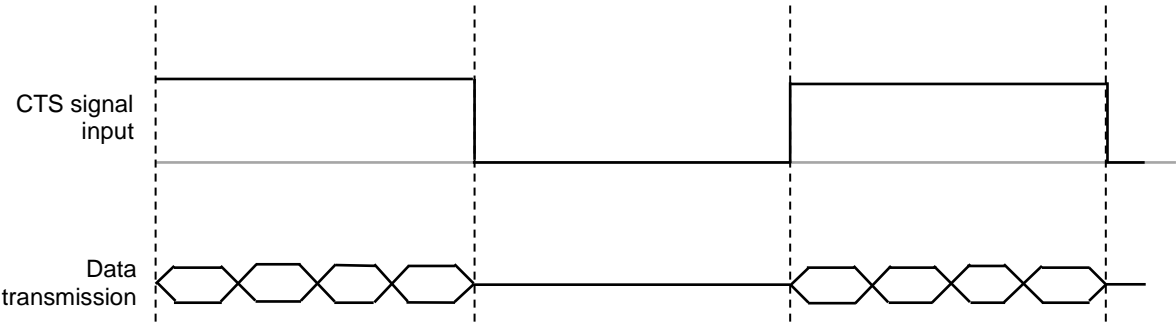
No.	LED	Colour	Status		Description
1	TX	Green	ON		TX Signal is high.
			OFF		TX Signal is low.
	RX		ON		RX Signal is high.
			OFF		RX Signal is low.
	RTS		ON		RTS Signal is high, <ul style="list-style-type: none">- Until size of data in receive buffer less than 80% (409 bytes) of receive buffer size (512 bytes).- When size of data in receive buffer becomes less than 30% (153 bytes) of its receive buffer size.- There is no parity error or framing error occurred during data reception.
			OFF		RTS Signal is low, <ul style="list-style-type: none">- When size of received data is greater than 80% (409 bytes) of receive buffer size and remains low, till size of received data is greater than 30% (153 bytes).- Either parity error or framing error occurred during data reception.
	CTS		ON		If CTS Signal is high, module can transmit data.
			OFF		If CTS Signal is low, module stops transmitting data.
2	STS	Bi-colour LED	None		Module is powered OFF.
			Blue Green	ON	Module is powered ON and communicating with Header module
				Single flash	Communication with Header is not established due to, <ul style="list-style-type: none">- Module is powered ON and waiting for communication from Header.- Module mismatch
			Red	ON	Hardware failure is detected on module.
				Single flash	One of the following condition occurred. <ul style="list-style-type: none">- No communication from Header- Backplane bus fault detected.
				Double flash	<ul style="list-style-type: none">- Parity Error occurred at reception.- Framing Error occurred at reception.- Overrun Error occurred at reception.
			Yellow	ON	24 VDC field power supply is not available

Waveforms: Flow control signals

This section explains behavior of RTS signal.



The figure below explains behaviour of CTS signal.



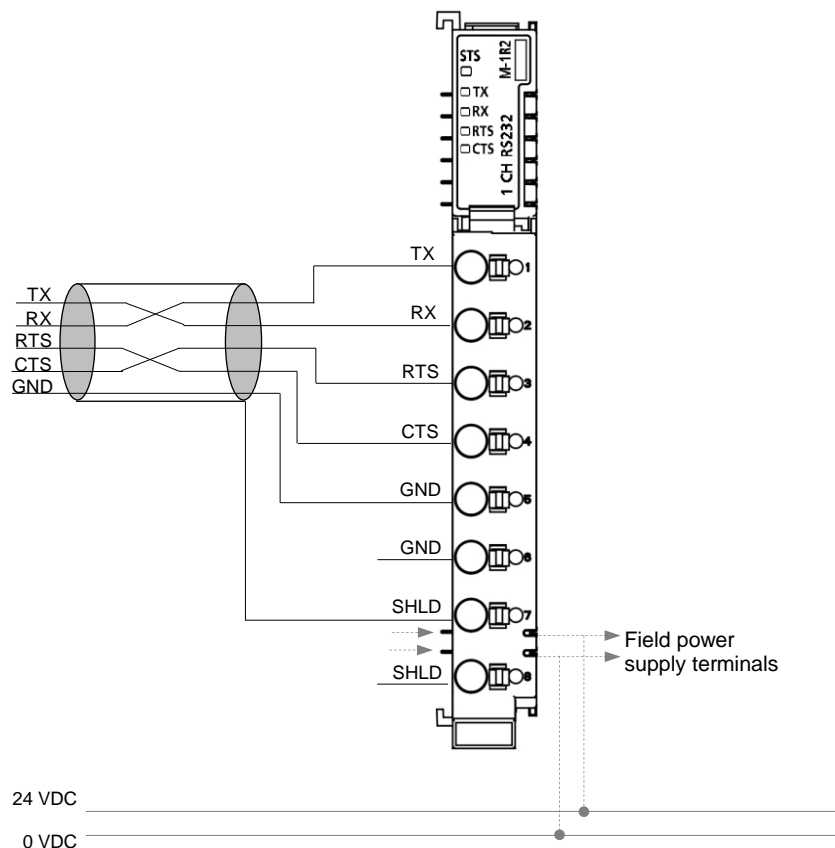
Connection Diagram

The figure shows module front with 8 point terminal block, to interface serial communication module and external devices, to establish communication.

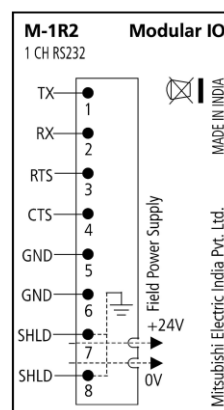
Wiring description is provided on right side wall of the module.

The figures below shows connections for channel 0, for an example.

For common wiring recommendations, refer section [Wiring](#).



M-1R2: Wiring description



NOTE

Recommended length of RS232 serial communication cable is maximum up to 15 meters.

Parameters

Module can be configured using Modular IO Configurator.

For addition and removal of module in configuration tool, refer section [Modular IO Configurator](#).

User can set following parameters.

Parameter Name	Project Value	Comment
Share diagnostics	Enable [Default]	Enables diagnostic data (SB) sharing with header
	Disable	

Module diagnostic data and channel diagnostic data is available in Status Byte (SB) memory, if module parameter “Share diagnostics” is set to **Enable**.

The table below provides a list of channel parameters that user can set as per application requirement.

Parameter Name	Project Value	Comment
Enable	Yes [Default] No	Enable/ disable channel
Baudrate	2400 4800 9600 [Default] 19200 38400 57600 115200	Communication baud rate
Parity	None Odd [Default] Even	Parity selection
No. of data bits	7 bits 8 bits [Default] 9 bits	Number of data bits
No. of stop bits	1 bit [Default] 2 bits	Number of stop bits
Flow control	No flow control [Default] Hardware flow control	Hardware flow control or No flow control

For more functional details, refer [Transmit and Receive Example](#) provided in this manual.

IO Data

Following table provides description for input data and output data.

Channel	Data Type	Local Address*
CH0	BYTE	IW n (BYTE 0)
	BYTE	QW m (BYTE 0)

*Local address (n) and (m) values changes as per the slot position of IO module and configuration of modular IO station.

For serial communication module,

IW memory holds status information and received data as shown below.

	IWn.7	IWn.6	IWn.5	IWn.4	IWn.3	IWn.2	IWn.1	IWn.0
IWn Byte 0	TXA	RL2	RL1	RL0	TBO	RRBA	WTBA	INITA
IWn Byte 1	Read byte 1							
IWn+1 Byte 0	Read byte 2							
IWn+1 Byte 1	Read byte 3							
IWn+2 Byte 0	Read byte 4							
IWn+2 Byte 1	Read byte 5							
IWn+3 Byte 0	Read byte 6							
IWn+3 Byte 1	Read byte 7							

Channel	Data Type	Local Address	Status	Comment
Input Data CH0*				
INITA (Init Ack)	BOOL	IWn (BYTE 0).0	TRUE	Initialisation Acknowledge. Module sends acknowledgement of INIT command received from fieldbus master using this bit.
			FALSE	Channel is ready for serial communication.
WTBA (Write TX Buffer Ack)	BOOL	IWn (BYTE 0).1	Change of state [0 → 1 or 1 → 0]	Write Transmit Buffer Acknowledge. Module sends acknowledgement of WTB command received from fieldbus master using this bit. Status of WTB is copied to WTBA, after successful writing to transmit buffer of module.
RRBA (Read RX Buffer Ack)	BOOL	IWn (BYTE 0).2		Read Receive Buffer Acknowledge. Module sends acknowledgement of RRB command received from fieldbus master using this bit. Status of RRB is copied to RRBA after successful reading from receive buffer of module.
TBO (TX Buffer Overflow)	BOOL	IWn (BYTE 0).3		Transmit Buffer Overflow. Transmit buffer of module is full. After transmit buffer overflow, additional bytes received on serial communication are lost. Transmit buffer size is 256 bytes per channel.

RL0.....RL2 (Receive Length bit 0 to Receive Length bit 2)	BOOL	IWn (BYTE 0).4 to IWn (BYTE 0).6	--	<div>Read Length for Read Receive Buffer command Number of bytes read from receive buffer of module.</div> <table><tr><th>RL2</th><th>RL1</th><th>RL0</th><th>Read Length (in Bytes)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>2</td></tr><tr><td>0</td><td>1</td><td>1</td><td>3</td></tr><tr><td>1</td><td>0</td><td>0</td><td>4</td></tr><tr><td>1</td><td>0</td><td>1</td><td>5</td></tr><tr><td>1</td><td>1</td><td>0</td><td>6</td></tr><tr><td>1</td><td>1</td><td>1</td><td>7</td></tr></table> <div>Maximum length is 7 bytes.</div>	RL2	RL1	RL0	Read Length (in Bytes)	0	0	0	0	0	0	1	1	0	1	0	2	0	1	1	3	1	0	0	4	1	0	1	5	1	1	0	6	1	1	1	7
RL2	RL1	RL0	Read Length (in Bytes)																																					
0	0	0	0																																					
0	0	1	1																																					
0	1	0	2																																					
0	1	1	3																																					
1	0	0	4																																					
1	0	1	5																																					
1	1	0	6																																					
1	1	1	7																																					
TXA (Transmit Ack)	BOOL	IWn (BYTE 0).7	Change of state [0 → 1 or 1 → 0]	<div>Transmit Acknowledge. Module sends acknowledgement of TX command received from fieldbus master using this bit. Once data transmission is complete, status of TX is copied to TXA.</div>																																				
RD Byte 1	BYTE	IWn (BYTE 1)	--	Read Data byte 1.																																				
RD Byte 2	BYTE	IWn+1 (BYTE 0)	--	Read Data byte 2.																																				
RD Byte 3	BYTE	IWn+1 (BYTE 1)	--	Read Data byte 3.																																				
RD Byte 4	BYTE	IWn+2 (BYTE 0)	--	Read Data byte 4.																																				
RD Byte 5	BYTE	IWn+2 (BYTE 1)	--	Read Data byte 5.																																				
RD Byte 6	BYTE	IWn+3 (BYTE 0)	--	Read Data byte 6.																																				
RD Byte 7	BYTE	IWn+3 (BYTE 1)	--	Read Data byte 7.																																				

QW memory holds control information and transmit data as shown below.

	QWm.7	QWm.6	QWm.5	QWm.4	QWm.3	QWm.2	QWm.1	QWm.0
QWm Byte 0	TX	WL2	WL1	WL0	RES	RRB	WTB	INIT
QWm Byte 1	Write byte 1							
QWm+1 Byte 0	Write byte 2							
QWm+1 Byte 1	Write byte 3							
QWm+2 Byte 0	Write byte 4							
QWm+2 Byte 1	Write byte 5							
QWm+3 Byte 0	Write byte 6							
QWm+3 Byte 1	Write byte 7							

Channel	Data Type	Local Address	Status	Comment
Output Data CH0*				
INIT (Init)	BOOL	QWm (BYTE 0).0	TRUE	Initialisation command. Fieldbus master can generate request to reset channel using this bit. When this bit is ON, channel is initialised. When initialised, module takes following actions, 1. FIFO pointers of TX buffer and RX buffer are initialised 2. Channel port is initialised with communication parameters set. 3. Errors are cleared. (Overrun, parity, framing) 4. Acknowledge status bits in input image are cleared.(WTBA, RRBA) 5. Status of INITA in input image is turned ON indicating successful initialisation.
			FALSE	No initialisation request is issued. Channel is ready for serial communication.
WTB (Write TX Buffer)	BOOL	QWm (BYTE 0).1	Change of state [0 → 1 or 1 → 0]	Write Transmit Buffer command. Fieldbus master can generate command to write data to transmit buffer of module using this bit. When module receives change of state of this bit, module does following actions, 1. Check size of data to write to transmit buffer in 'WL0 to WL2' 2. Write data received in 'WR Byte 1'to WR Byte 7' to transmit buffer of module as per write length. If write length is 0, then no data is written to transmit buffer. Maximum 7 bytes data can be written with single command. 3. Status of WTBA in input image is updated indicating successful write operation. Status of WTB is copied to WTBA.

RRB (Receive RX Buffer)	BOOL	QWm (BYTE 0).2		<p>Read Receive Buffer command.</p> <p>Fieldbus master can generate command to read data from receive buffer of module using this bit.</p> <p>When module receives state change on this bit, module does following actions,</p> <p>1. Checks if any data is present in its RX buffer.</p> <p>2. If data is present in receive buffer, copy data from RX buffer to input image ' RD Byte 1' to 'RD Byte 7'. Data is copied on FIFO basis.</p> <p>Maximum 7 bytes data can be read with single command.</p> <p>If no data present in receive buffer no data is copied.</p> <p>3. Update size of bytes read in input image bits 'RL0 to RL2' In case of no data present in RX buffer, size is updated as 0.</p> <p>4. Status of RRBA in input image is updated indicating successful read operation. Status of RRB is copied to RRBA.</p>																																				
RES	BOOL	QWm (BYTE 0).3	--	Reserved.																																				
WL0....WL2 (Write Length bit 0 to Write Length bit 2)	BOOL	QWm (BYTE 0).4 to QWm (BYTE 0).6	--	<p>Write Length for Write Transmit Buffer command.</p> <p>Number of bytes to write to transmit buffer of module.</p> <p>Maximum length is 7 bytes.</p> <table><tr><th>WL2</th><th>WL1</th><th>WL0</th><th>Write Length (in Bytes)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td>2</td></tr><tr><td>0</td><td>1</td><td>1</td><td>3</td></tr><tr><td>1</td><td>0</td><td>0</td><td>4</td></tr><tr><td>1</td><td>0</td><td>1</td><td>5</td></tr><tr><td>1</td><td>1</td><td>0</td><td>6</td></tr><tr><td>1</td><td>1</td><td>1</td><td>7</td></tr></table>	WL2	WL1	WL0	Write Length (in Bytes)	0	0	0	0	0	0	1	1	0	1	0	2	0	1	1	3	1	0	0	4	1	0	1	5	1	1	0	6	1	1	1	7
WL2	WL1	WL0	Write Length (in Bytes)																																					
0	0	0	0																																					
0	0	1	1																																					
0	1	0	2																																					
0	1	1	3																																					
1	0	0	4																																					
1	0	1	5																																					
1	1	0	6																																					
1	1	1	7																																					
TX (Transmit Data from Buffer)	BOOL	QWm (BYTE 0).7	Change of state [0 → 1 or 1 → 0]	<p>Transmit command.</p> <p>Fieldbus master can generate command to transmit data from transmit buffer of module using this bit.</p> <p>When module receives change of state of this bit, module does following</p> <p>1. Transmit all data available in transmit buffer over serial communication.</p> <p>2.Once data transmission is complete, status of TXA in input image is updated indicating successful trasmission. Status of TX is copied to TXA.</p>																																				
WR Byte 1	BYTE	QWm (BYTE 1)	--	Write Data byte 1.																																				
WR Byte 2	BYTE	QWm+1 (BYTE 0)	--	Write Data byte 2.																																				
WR Byte 3	BYTE	QWm+1 (BYTE 1)	--	Write Data byte 3.																																				
WR Byte 4	BYTE	QWm+2 (BYTE 0)	--	Write Data byte 4																																				
WR Byte 5	BYTE	QWm+2 (BYTE 1)	--	Write Data byte 5.																																				
WR Byte 6	BYTE	QWm+3 (BYTE 0)	--	Write Data byte 6.																																				

WR Byte 7	BYTE	QWm+3 (BYTE 1)	--	Write Data byte 7.
-----------	------	----------------	----	--------------------

NOTE

When fieldbus master is in STOP mode then,

- Module goes in initialization mode.

When fieldbus master gets connected again after disconnection from network then,

- It is recommended to initialize channels using INIT command.

User can monitor the following diagnostics.

Channel	Data Type	* Local Address	Bit Status	Comment
Module Diagnostics	BYTE	SB (n+10)	--	--
No field power supply	BOOL	SB (n+10).0	TRUE	24 VDC field power supply is not available.
			FALSE	24 VDC field power supply is available.
RBO0 (RX Buffer Overflow CH0)	BOOL	SB (n+10).1	TRUE	Receive buffer of CH0 is full. If RTS CTS flow control is Enable and after CH0 receive buffer overflow, additional bytes received from external device are not acknowledged by module. Receive buffer size is 512 bytes per channel.
			FALSE	No transmit buffer overflow error.
PE0 (Parity Error CH0)	BOOL	SB (n+10).2	TRUE	Parity error occur during data reception on CH0. In case of parity error, received byte is not copied to receive buffer of module. Once set, parity error is reset after channel initialisation. (When initialisation command INIT is generated from fieldbus master or power cycle)
			FALSE	No Parity error
FE0 (Framing Error CH0)	BOOL	SB (n+10).3	TRUE	Framing error occur during data reception on CH0. In case of framing error, received byte is not copied to receive buffer of module. Once set, framing error is reset after channel initialisation. (When initialisation command INIT is generated from fieldbus master or power cycle)
			FALSE	No Framing error

*Local address (n) changes as per the slot position of IO module and configuration of modular IO station.

Module diagnostic data is available in Status Byte (SB) memory, if module parameter "Share diagnostics" is set to **Enable**.

Refer section [Troubleshooting](#) for station error code list and error messages

For more functional details, refer [Transmit and Receive Example](#) provided in this manual..

[Back To Index Page](#)

10 Troubleshooting

[List of station Error Codes](#)

[List of info and error messages](#)

List of Station Error Codes

The table below provides list of error codes.

Error Code	Classification	Error Name	Applicable Module	Description
1000H	Fatal	Hardware failure	All	Module hardware error
1001H	Fatal	Firmware watchdog error	All	Firmware watchdog error detected on the module
1002H	Fatal	Configuration error	All	Configuration data invalid.
1003H	Fatal	Module absent or mismatch error	IO module	Either module configured in slot is different than the module actually present or Module is absent
1004H	Fatal	IO module COM error	IO module	If data exchange between Header and one or more IO modules is stopped after successful data exchange.
1005H	Reserved			
1006H	Reserved			
1007H	Fatal	Factory calibration error	M-UAD2, M-AD4, M-ADV8 and M-ADI8	Invalid factory calibration data detected.
1008H	Fatal	CJC error	M-UAD2	CJC error detected
1009H	Fatal	Invalid parameter	All	Parameter read / write request received for unknown parameter
1FFFH	Fatal	Fatal fieldbus error	M-CCB-H	Fatal fieldbus error detected. Severe or moderate station error detected at CC-Link IE Field basis network.. Further diagnosis related to fieldbus can be monitored in header diagnostic area.
2000H	Non-Fatal	Field power absent	All	Field power absent at header module
2001H	Non-Fatal	IP address setting switch is changed	Header module	IP address setting switch has been changed while keeping the module power on.
2003H	Non-Fatal	Additional IO modules detected	Header module	All configured IO modules are present. Additional IO module detected by Header.
2FFFH	Non-Fatal	Non-fatal fieldbus error	M-CCB-H	Non-fatal fieldbus error detected. Mild station error detected at CC-Link IE Field basis network. Further diagnosis related to fieldbus can be monitored in header diagnostic area.
230XH	Non-Fatal	Wire break /Sensor fault	IO module	Sensor wire break detected at IO module. Here X is channel number
231XH	Non-Fatal	Wire break /Actuator fault	IO module	Actuator/ output device open circuit/ short circuit detected. Here X is channel number
360XH	Non-Fatal	Parity Error	M-2R2 and M-1R2	Parity error occur during reception
361XH	Non-Fatal	Framing Error		Framing error occur during reception
362XH	Non-Fatal	Overrun Error		Overrun error occur during data reception

List of Info and Error messages

The table below provides list of info and error messages generated by [Modular IO Configurator](#) during operations like project creation, module deletion, project validation etc.

No	Message	Type of message	Validation stage
1	Start of header configuration check for : [Header No][Header name]	Info	Start Header configuration check
2	Starting 'Number of IO modules' check	Info	Number of IO modules check
3	Total number of IO modules in configuration : XX	Info	
4	Number of IO modules exceeds maximum limit of NN modules Where NN is maximum number of modules allowed in header configuration. Device description file of selected header mentions about maximum number of modules allowed to connect to header.	Error	
5	End of 'Number of IO modules' check	Info	
6	Starting 'Unknown module' check	Info	Unknown module check
7	Unknown modules detected in slot n1, n2, n3, n4.....	Error	
8	Unknown modules are not detected	Info	
9	End of 'Unknown module' check	Info	
10	Starting 'Field power distribution' check	Info	Field power distribution check
11	Field power distribution error detected at slot 'n'. Where 'n' is slot number where field power distribution error is detected.	Error	
12	No field power distribution error detected.	Info	
13	End of field power distribution check	Info	
14	Starting 'System power consumption' check	Info	System power consumption check
15	System power consumption error detected at slot 'n'. Where 'n' is slot number where system power distribution error is detected.	Error	
16	No system power consumption error detected	Info	
17	End of system power consumption check	Info	
18	Starting 'Bus end module' check	Info	Bus termination module check
19	No bus end module detected	Error	
20	Bus end module detected	Info	
21	End of bus end module check	Info	
22	Starting 'Parameter' check	Info	Parameter check
23	Checking parameters of [Slot No][Module Name]	Info	
24	Parameter value error at [Slot No][Module Name] : invalid value for parameter [Parameter name]	Error	
25	Parameter check complete for [Slot No][Module Name]	Info	
26	End of parameter check	Info	

27	Configuration data size exceeds maximum limit. Max size : [Size] bytes	Error	Configuration data size check
28	Size of configuration data : [Size] bytes	Info	
29	End of header configuration check for : [Header name]	Info	End Header configuration check
30	Errors :[Number of errors], Warnings : [Number of warnings]	Info	
31	Invalid configuration	Error	SD memory card
32	Invalid file format. Destination drive should be FAT32	Error	
33	Configuration file of selected header is already present, do you want to replace?	Warning	
34	Configuration file is not available in source drive.	Error	
35	Header ordering code[Ordering code] in configuration file is not matched with selected header	Error	
36	Header username [username] in configuration file is already present in project.	Error	
37	Configuration exceeded maximum limit.	Error	
38	Insufficient memory available in Destination drive.	Error	
39	Destination drive is not removable.	Error	
40	SD Card is not available.	Error	
41	Destination drive is not available.	Error	
42	Source drive is not removable.	Error	
43	Source drive is not available.	Error	
44	Start of SD Card Write	Info	
45	SD Card Write Successful	Info	
46	Start of SD Card Read	Info	
47	SD Card Read Successful	Info	

Copyright © Mitsubishi Electric India Pvt. Ltd. 2012. All rights reserved.

The reproduction or transmission of this document or its contents in full or part is not permitted without express written authority. Offenders will be liable for damages. All rights, including rights created by patent grant or registration of a utility model or design, trademark is reserved.

Specifications subject to change without notice.

MITSUBISHI ELECTRIC INDIA PRIVATE LIMITED

Factory Automation and Industrial Division (FAID)

FAID Head Office: EMERALD House, EL-3, J Block, M.I.D.C. Bhosari, Pune - 411 026,
Maharashtra, INDIA.

Tel.: +91-20-2710 2000 | **Fax:** +91-20-2710 2100

Learn more at <http://in.mitsubishielectric.com>