MITSUBISHI ELECTRIC
Changes for the Better

Modular I/Os

Flexible and compact distributed I/Os

Supports various field bus

CC-Link IE Field Basic | Modbus TCP | EtherNet/IP

MODULAR I/O
Flexible, Compact and Cost-effective Distributed I/O

Modular I/O series is ideal for application requiring flexible and cost-effective remote I/Os. Modular I/O station can be formed by using required Header module, I/O modules and System modules required for it. With different field bus Header modules and flexible I/Os, increases its adaptability in different network architecture greatly.

COMPATIBILITY AND FLEXIBILITY

■ COMPATIBILITY

The compatibility of different Header modules makes it simple in adopting network and configuring system as per the need of the application.

- **Modular architecture**

  Modular I/O station comprises of one Header and up to 63 I/O modules.

- **Network connectivity**

  Modular I/O station can be connected to various open networks and field bus like CC Link IE Field Basic, Modbus TCP and EtherNet/IP using respective Header module.

■ FLEXIBILITY

The flexibility of I/O modules makes it simple in configuring system as per required I/Os.

- **Wide range of I/O modules**

  Multiple variants with 2, 4, 8, 16 I/O points are available. Meet the need of the application with required digital and analog I/O modules, serial modules as well as system modules.

- **Gain more flexibility with integrated structure**

  The backplane connections and field supply connections are automatically formed to reduce the installation and wiring efforts of each I/O modules.

- **USB communication as standard**

  USB interface on each Header module helps to configure and monitor diagnostics locally at Modular I/O station without interfacing to the network.

- **Configuration using SD memory card**

  Header supports configuration file transfer to / from SD memory card.

■ EASE OF INSTALLATION

DIN rail mounted header and slide-in required I/O modules gives effortless mounting, eliminates base unit and saves overall system cost.

- **Quick, easy and accurate wiring**

  With removable 8/16-Pin Terminal Block and push type connection helps quick and easy wiring, reduces system commissioning time by 60%.

- **Compact design**

  Compact hardware design of Header and I/O modules saves overall system space.

- **Module identification**

  White and Red colours are used to differentiate inputs and outputs which allow a user for easy identification.

- **Module status identification**

  Bi-colour status LED display the current status of module which helps a user to identify module status.

  Thus overall features of quick installation and wiring without using any tool drastically reduces startup time.

MODULAR I/O CONFIGURATION TOOL

Modular I/O Configuration Tool is software developed for configuring modular I/O system, monitoring I/O status and diagnostics. The easy-to-use software helps to speed up commissioning.

■ OPTIMISED DOWNTIME

Software extends benefits beyond system configuration and provides additional functionality as below to reduce maintenance cost and optimise downtime.

● **System monitor and diagnostics**

Monitor operation status between Master station and Modular I/O station resulting in quickly identifying network errors.

Header diagnostic provides overall detail diagnostic of connected I/O station, Slot diagnostic provides diagnostic of selected I/O module at slot level as well as individual channel-level which enable faster troubleshooting.

● **Effective output test**

The software also facilitates output test function to test outputs without interfacing to the network. Thus helps in simplifying troubleshooting, optimise downtime as well as startup time.

● **IO Map**

This feature displays local address and field bus adress of IO point in Modular I/O system.

■ EFFECTIVE ENGINEERING

● **Graphic based configuration**

Simply select Header module from the list and add required I/O modules to create station configuration easily. GUI provides graphical image of Modular I/O station as per configuration, healthiness of individual module, I/O data, user configurable parameters and detailed information for selected module as a help.

Single configuration project for multiple Modular I/O stations enables easy handling of project file.

● **Auto configuration**

Online-Scan feature provides auto configuration of Modular I/O station by just selecting Header module and scanning the I/O modules attached to it; thus, helps in reducing overall configuration time.

● **System validation**

Prevents invalid configuration to download, keep track of power supply consumption, field supply isolation as well as maximum number of I/O modules allowed and provide alerts accordingly.

● **Global realization by language support***

Supports multi-language features for software menus.
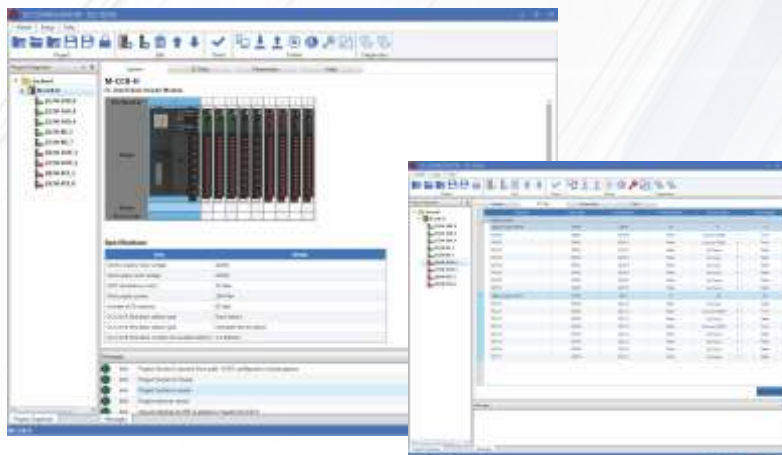
*Will be available soon

■ SYSTEM ARCHITECTURE

The System Architecture illustrates Modular I/O system on CC-Link IE Field Basic Network.
All CPU modules with Ethernet port provides built-in CC-Link IE Field Basic protocol.
* Also support Modbus TCP Protocol

Direct access via standard Ethernet

Ethernet

CC-Link IE Field Basic

MELSEC iQ-R   MELSEC Q series
MELSEC iQ-F   MELSEC L series

Modular I/O   Modular I/O   Remote I/O   GOT (HMI)   Inverter   Servo amplifier*   Bar-code reader   Label Printer
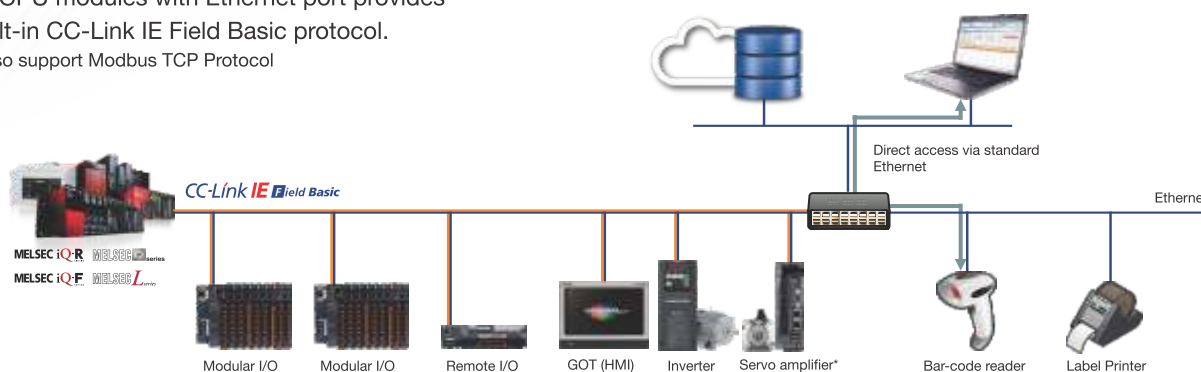
PRODUCT SPECIFICATIONS

Modular I/O system provides various header modules, I/O modules, system modules

■ HEADER MODULES

Modular I/O system supports CC-Link IE Field Basic,
Modbus TCP and EtherNet/IP

ITEM		SPECIFICATION	
Module name		CC-Link IE Field Basic	Modbus TCP
Module ordering code		M-CCB-H	M-MT-H
System power supply	Input voltage	24 VDC (11 to 28.8 VDC, Ripple included), 22 Watts	
	Inrush current	20 A for 20 µsec duration	
	Protection	Reverse polarity protection	
	Output voltage	5 VDC	
	Output current for I/O modules	2 A	
Field power supply	Input voltage	24 VDC (18 to 30 VDC, ripple included)	
	Maximum input current at 24 VDC	10 A	
External connections	Network communication	RJ45 female	
	Input power supply (System power supply and field power supply)	8 Point terminal block	
	Configuration port	USB 2.0	
Fieldbus support		CC-Link IE Field Basic	Modbus TCP server; 1 client connection
Station type		Slave station	Slave station
Number of occupied stations		1-4 Stations (user configurable)	Not applicable
Number of I/O modules		Maximum 63	

I/O Data size	Depends on number of stations occupied					Not applicable
	No. of occupied stations	RX	RY	RWr	RWw	1024 Digital inputs
	1	64 Bit	64 Bit	32 Word	32 Word	1024 Digital output
	2	128 Bit	128 Bit	64 Word	64 Word	256 Analog inputs
	3	192 Bit	192 Bit	96 Word	96 Word	256 Analog outputs
	4	256 Bit	256 Bit	128 Word	128 Word	512 Bytes status memory

ITEM		SPECIFICATION
Module ordering code		M-EIP-H
System power supply	Input voltage	24 VDC (11 to 28.8 VDC, Ripple included), 22 Watts
	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 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		EtherNet/IP
Ethernet Interface		2 (Layer 2 switch with DLR support)
Station Type		Communication adapter
DLR Support		Yes

■ DIGITAL INPUT MODULES

ITEM		SPECIFICATIONS					
Ordering code		M-4D	M-8D	M-16D	M-4DE	M-8DE	M-16DE
Input type		Sink (Negative common)			Source (Positive common)		
No. of input points		4	8	16	4	8	16
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					
Filter time		3ms to 70 ms software (selectable), 10 msec (default)					
Input impedance		5.2 KΩ					
Isolation	Between input and internal circuit	Optical 1.5 kV					
	Between inputs	No isolation					
I/O memory consumption	Input bits (IX)	4 Points (1 Byte)	8 Points (1 Byte)	16 Points (2 Bytes)	4 Points (1 Byte)	8 Points (1 Byte)	16 Points (2 Bytes)
	Diagnostics (SB) [User configurable]	1 byte					
System power supply consumption		40 mA	45 mA	65 mA	40 mA	45 mA	65 mA
Field power supply consumption		Number of inputs simultaneously ON X 6 mA					
Terminal block (Removable push type)		8-point	16-point		8-point		16-point
Recommended wire specifications*		0.5 to 2 sq. mm (AWG 20 to 14) solid wire or stranded (flexible) wire with lugs (except 16-point)					

*For 16 Point : 0.5 to 1.00 sq. mm (AWG 20 to 16)

■ DIGITAL OUTPUT MODULES

ITEM		SPECIFICATIONS		
Ordering code		M-4TE	M-8TE	M-16TE
Output type (device)		Source type (Transistor)		
No. of output points		4	8	16
Voltage rating		24 VDC (18 to 30 V including ripple)		
Current rating[1]		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)	8 Points (1 Byte)	16 Points (2 Bytes)
	Diagnostics (SB)	1 Byte		
System power supply consumption		90 mA	105 mA	130 mA
Field power supply consumption		Sum of output loads simultaneously ON		
Terminal block (Removable push type)		8-point		16-point
Recommended wire specifications*		0.5 to 2 sq. mm (AWG 20 to 14) solid wire or stranded (flexible) wire with lugs (except 16-point)		

*For 16 Point : 0.5 to 1.00 sq. mm (AWG 20 to 16)
[1] for more details refer user manual

UNIVERSAL ANALOG INPUT MODULE

SPECIFICATION		DESCRIPTION			
Ordering code		M-UAD2			
Number of input channels		2 CH. universal, non-isolated			
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): -50 to 250°C			
		3 Wire PT1000 (385): -50 to 250°C			
		3 Wire PT100 (385): -200 to 850°C			
	Thermocouple	J Type: -100 to 1200°C			
		K Type: -100 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

4 CH ANALOG INPUT MODULE (VOLTAGE/CURRENT)

SPECIFICATION		DESCRIPTION			
Ordering code		M-AD4			
Number of input channels		4 CH, Voltage / 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 µV	0 to 32000	±0.2	±0.3
	4 to 20mA	0.6 µV	0 to 32000	±0.2	±0.3

8 CH ANALOG INPUT VOLTAGE MODULE

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	0 to 32000	±0.2	±0.3
	-10 to 10V	0.3 mV	-32000 to 32000	±0.2	±0.3

8 CH ANALOG INPUT CURRENT MODULE

SPECIFICATION		DESCRIPTION			
Ordering code		M-ADI8			
Number of input channels		8 CH, 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 µV	0 to 32000	±0.2	±0.3
	4 to 20mA	0.6 µV	0 to 32000	±0.2	±0.3

ANALOG OUTPUT MODULE

SPECIFICATION		DESCRIPTION			
Ordering code		M-DA2			
Number of outputs		2 CH. Voltage/Current, non-isolated, 12-bit resolution			
Output types		Voltage		Current	
		0 to 10 VDC	-10 to +10 VDC	0 to 20 mA	4 to 20 mA
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	At 25°C	±0.1	±0.1	±0.2	±0.2
(% of FSD)	At 60°C	±0.2	±0.2	±0.3	±0.3

SERIAL COMMUNICATION MODULE

SPECIFICATION	DESCRIPTION	
Ordering Code	M-1R2	M-2R2
Hardware Interface	RS232 with RTS CTC flow control	RS232
Communication Type	Full duplex	Full duplex
Number of channels	1	2
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	16 bytes (8 bytes per channel)
Output Image Size	8 bytes	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, TX, RX : Transmit/Receive signal lines RTS, CTS* : Flow control signal lines	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

EXTERNAL DIMENSIONS (All dimensions are in mm)

Header module
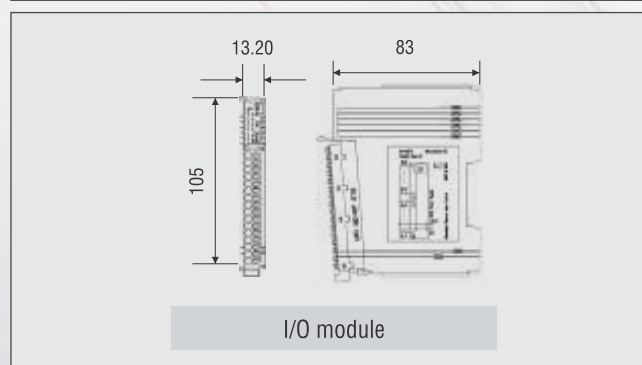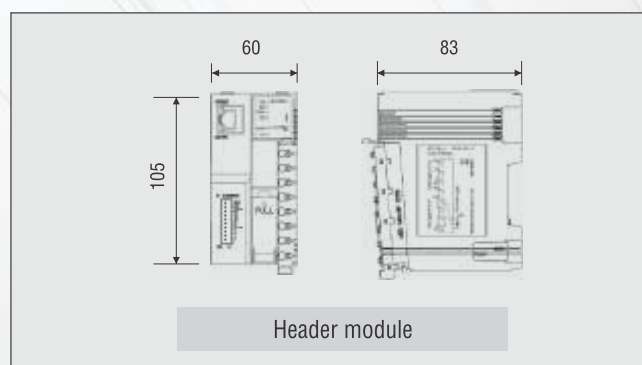
I/O module

■ SYSTEM MODULES

ITEM		SPECIFICATION
Module name		System power extension
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 I/O modules	2 A
	Protections	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 specifications		0.5 to 2 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

ITEM	SPECIFICATION		
Module name	Field power distribution	Field power isolator	Shield termination
Module ordering code	M-FPD	M-FPI	M-ST
Field voltage/s	24 VDC, 0 VDC	5 VDC/ 12 VDC/ 24 VDC/ 48 VDC/ 110 VAC/ 220 VAC	–
Field power contact current	Max. 10 Amps.	5 A per input terminal	5 A per input terminal
Terminal block (Removable push type)	8 - point		
Recommended wire specifications	0.5 to 2 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		

ITEM	SPECIFICATION
Module name	Bus end
Module ordering code	M-BE
Terminating resistor	120/QW
Power description	Nil
Module dimension (H x W x D) in mm	105 x 13.2 x 83

■ SD Memory Card

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 10 x 1.0 mm
Recommendation	Transcend, Scandisk, SAMSUNG

■ ENVIRONMENTAL SPECIFICATIONS

SPECIFICATION	DESCRIPTION	
Operating temperature	Operating: 0 to 55 °C	Storage: -20 to 75 °C
Humidity	Operating: 10 to 90 % RH, no condensation	Storage: 10 to 90 % 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 I/O: ±1 kV, analog and communication I/O: ±1 kV	
	Surge (IEC 61000-4-5): power line: ±0.5 kV, digital I/O : ±1 kV, analog and communication I/O: ±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)	

■ PRODUCT LIST

TYPE	MODULE	DESCRIPTION
Header	M-CCB-H	CC-Link IE Field Basic header module
	M-MT-H	Modbus TCP header module
	M-EIP-H	EtherNet/IP header module
Digital input	M-4D	4 Digital input, 24 VDC, sink type module (Negative common)
	M-8D	8 Digital input, 24 VDC, sink type module (Negative common)
	M-16D	16 Digital input, 24 VDC, sink type module (Negative common)
	M-4DE	4 Digital input, 24 VDC, source type module (Positive common)
	M-8DE	8 Digital input, 24 VDC, source type module (Positive common)
	M-16DE	16 Digital input, 24 VDC, source type module (Positive common)
Digital output	M-4TE	4 Digital output, 24 VDC, source type module
	M-8TE	8 Digital output, 24 VDC, source type module
	M-16TE	16 Digital output, 24 VDC, source type module
Analog input	M-UAD2	2 Ch. universal analog input module
	M-AD4	4 Ch. Analog input, Voltage/Current module
	M-ADV8	8 Ch. Analog input Voltage module
	M-ADI8	18 Ch. Analog input Current module
Analog output	M-DA2	2 Ch. analog output voltage/current module
Serial COM Module	M-2R2	2 Ch. RS-232 Serial COM module
	M-1R2	1 Ch. RS-232 Serial COM module
System	M-SPE	System power extension module
	M-FPD	Field power distribution module
	M-FPI	Field power isolator module
	M-ST	Shield termination module
	M-BE	Bus end module

Notes

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Modular I/O configuration tool and user manual is available on website

New publication effective from August 2018. Specifications are subject to change without prior notice.

Compatible with international standard,
Modular I/O series conforms to CE making (Europe)
and therefore can be used for overseas facilities.

CE

Mitsubishi Electric India Pvt. Ltd.
Factory Automation and Industrial Division

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Learn More at **www.MitsubishiElectric.in/Fa/Fa-modular-io.php**