for a greener tomorrow

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 *

* coming soon

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 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 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.

■ 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 allows user for easy identification.

- **Module status identification**

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

  Thus overall features of quick installation and wiring without using any tool drastically reduces start up 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.

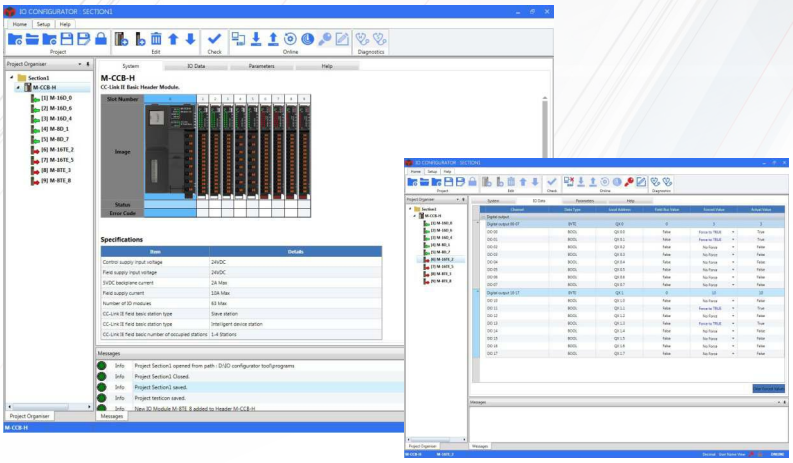
■ OPTIMISED DOWNTIME

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 start-up time.

■ EFFECTIVE ENGINEERING

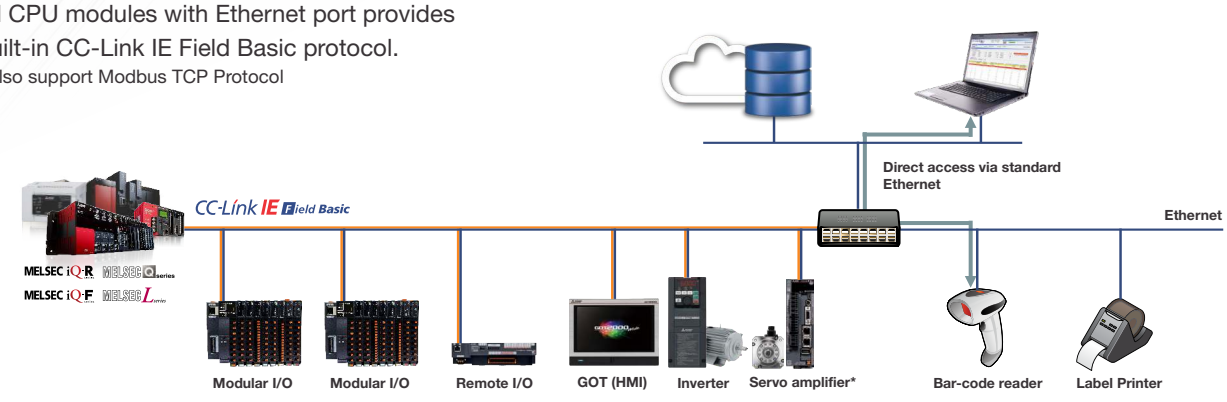
- **Graphic based configuration**
  Simply select Header module from the list and add required I/O modules to create station configuration easily. GUI provides graphical image of Modular I/O station as per configuration, healthiness of individual module, I/O data, user configurable parameters and detail 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



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 and Modbus TCP

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 24VDC	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
Communication protocol		UDP	TCP IP
Port numbers		No. 61450 (Cyclic data)	502
		No. 61451 (Node search and IP address set dedicated for CC-Link IE Field Network Basic)	
IP address		IPv4 range: 0.0.0.1 to 223.255.255.254 (Default 192.168.3.0)	IPv4 range: 0.0.0.1 to 223.255.255.254 (Default 192.168.3.100)
Subnet mask		Default: 255.255.255.0	
Physical layer		10/100 BASE-T	
Cable for fieldbus communication		Ethernet standard compliant products cable Cat5e or higher, shielded twisted pair cable	
Network topology		Star	
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 83	

■ 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					
Transition delay		10 msec (filter time)					
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)					
Module dimensions (H x W x D) in mm		105 x 13.2 x 83					

*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)		
Module dimensions (H x W x D) in mm		105 x 13.2 x 83		

*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

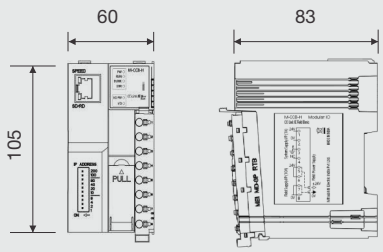
SPECIFICATION	DESCRIPTION				
Ordering code	M-UAD2				
Number of input channels	2 CH. universal, non-isolated, 16-bit resolution				
Input types (User configurable)	Voltage	0 to 10 VDC, ±10 VDC, ±100 mV			
	Current	0 to 20 mA, 4 to 20 mA			
	RTD	3 Wire PT100 (385): -50 to 250°C			
		3 Wire PT1000 (385): -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
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: < 140Ω , 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 to 5000 msec User can configure averaging or digital filter at a time				
Module updation time	**Module updation time** = channel 1 conversion time + channel 2 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 (ms)			
	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 to 850°C				
	PT100 -50 to 250°C	100			
	PT1000 -200 to 850°C				
	TC J Type -100 to 1200°C	200			
	TC K Type -100 to 1372°C				
	Module updation time varies as per filter type selection				
Sensor excitation current	0.5mA 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 supply to input channel	No isolation			
I/O memory consumption	Input words (IW)	2 words			
	Diagnostics (SB)	3 Bytes (2 bytes for 2 channels + 1 Byte for module diagnostic)			
System power supply consumption	100 mA				
Field power supply consumption	47 mA maximum				

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

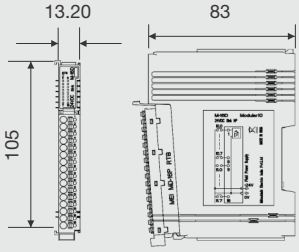
■ ANALOG OUTPUT MODULE

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
Load		> 5 KΩ		0 to 500Ω	
Module updation time		2 msec maximum for all channels			
Output settling time		2 msec			
I/O memory consumption		Output words (QW)		2 Words	
		Diagnostics (SB)		2 Bytes	
Isolation		Field 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 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			

■ EXTERNAL DIMENSION (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 24VDC	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

■ 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
Digital input	M-4D	4 Digital input, 24VDC, sink type module (Negative common)
	M-8D	8 Digital input, 24VDC, sink type module (Negative common)
	M-16D	16 Digital input, 24VDC, sink type module (Negative common)
	M-4DE	4 Digital input, 24VDC, source type module (Positive common)
	M-8DE	8 Digital input, 24VDC, source type module (Positive common)
	M-16DE	16 Digital input, 24VDC, source type module (Positive common)
Digital output	M-4TE	4 Digital output, 24VDC, source type module
	M-8TE	8 Digital output, 24VDC, source type module
	M-16TE	16 Digital output, 24VDC, source type module
Analog input	M-UAD2	2 Ch. universal analog input module
Analog output	M-DA2	2 Ch. analog output voltage/current 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

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