INSTRUCTION MANUAL

COMMUNICATION CONTROLLER
(Mitsubishi Control & Communication Link use)

MODEL **M2BC**

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1. GENERAL DESCRIPTION

The model M2BC is an I/O Terminal Block for Mitsubishi Communication & Control Link. Variety of input and output types can be mixed, selected from Mini-M series signal conditioners.

Model number and suffix codes are designated as follows:

M2BC–❑❑–❑

MODEL

CAPACITY

04: 4 positions
08: 8 positions
16: 16 positions

I/O TYPE

1 : Input
2 : Output

POWER INPUT

K : 85 – 132V AC
R : 24V DC

The Communication Controller Module of an Input Terminal Block converts analog inputs (0 – 100%) proportionally into 16-bit signed binary signals. The one for an Output Terminal Block converts 16-bit signed binary signals proportionally into analog outputs (0 – 100%).

This instruction manual explains hardware specifications, component identification, and wiring instructions, etc.

2. HARDWARE SPECIFICATIONS

2.1 M2BC-❑1 (suffix codes 04, 08, or 16 in ❑)

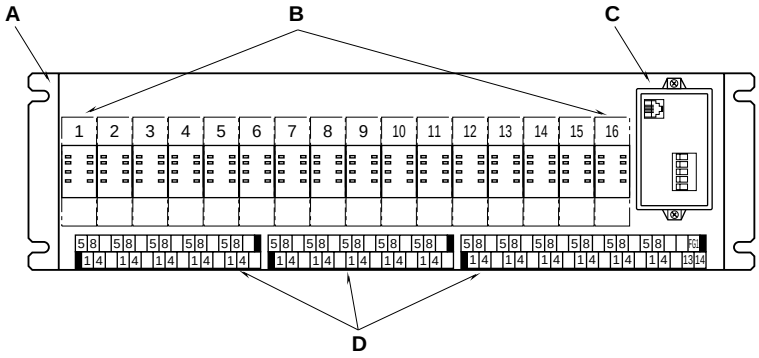
ITEM	SPECIFICATIONS	
Analog input	Refer to the data sheets for Mini-M series Signal Conditioners.	
Protocol	CC-Link V1.10	
Digital output	16-bit signed binary (14 bits for data)	
I/O characteristics	0 – 10000 (0 – 6000) proportional to analog input 0 – 100%	
Maximum resolution	1mV for 1 – 5V DC range	
Accuracy	≤±0.1% excluding the accuracy of I/O modules	
Maximum input voltage	Refer to the data sheets for Mini-M series Signal Conditioners.	
No. of analog input channels	M2BC-041	4
	M2BC-081	8
	M2BC-161	16
Isolation	Field input to communication section to power (isolated between channels)	
Required nodes	M2BC-041	1 (RX/RY 32 points each, RWr/RWw each 4 points)
	M2BC-081	2 (RX/RY 32 points each, RWr/RWw each 8 points)
	M2BC-161	4 (RX/RY 32 points each, RWr/RWw each 16 points)
Applicable wire size	0.75 – 2.0 mm^2	
Mounting screw for the base	M5 × 6 mm or larger	
Applicable solderless terminal	RAV 1.25-3, RAV2-2	
Noise immunity	500V p-p, 1μsec.	
Dielectric strength	1000V AC @ 1 minute (power to input module to communication section to FG1)	
Insulation resistance	≥100MΩ with 500V DC (power to input module to communication section to FG1)	
Weight	M2BC-041	approx. 1.2 kg (2.6 lbs)
	M2BC-081	approx. 1.5 kg (3.3 lbs)
	M2BC-161	approx. 2.0 kg (4.4 lbs)
Power input	M2BC-❑1-K	85 – 132V AC
	M2BC-❑1-R	24V DC ±10%
Power consumption	M2BC-❑1-K	approx. 6VA without I/O modules
	M2BC-041-K	approx. 30VA with all 4 modules
	M2BC-081-K	approx. 50VA with all 8 modules
	M2BC-161-K	approx. 90VA with all 16 modules
Current consumption	M2BC-❑1-R	approx. 0.25A without I/O modules
	M2BC-041-R	approx. 1.5A with all 4 modules
	M2BC-081-R	approx. 2.5A with all 8 modules
	M2BC-161-R	approx. 3.8A with all 16 modules

2.2 M2BC-❑2 (suffix codes 04, 08, or 16 in ❑)

ITEM	SPECIFICATIONS	
Analog output	Refer to the data sheets for Mini-M series Signal Conditioners.	
Protocol	CC-Link V1.10	
Digital input	16-bit signed binary (14 bits for data)	
I/O characteristics	0 – 10000 (0 – 6000) proportional to analog input 0 – 100%	
Maximum resolution	1mV for 1 – 5V DC range	
Accuracy	≤±0.1% excluding the accuracy of I/O modules	
Maximum output voltage	Refer to the data sheets for Mini-M series Signal Conditioners.	
No. of analog input channels	M2BC-042	4
	M2BC-082	8
	M2BC-162	16
Isolation	Field input to communication section to power (isolated between channels)	
Required nodes	M2BC-042	1 (RX/RY 32 points each, RWr/RWw each 4 points)
	M2BC-082	2 (RX/RY 32 points each, RWr/RWw each 8 points)
	M2BC-162	4 (RX/RY 32 points each, RWr/RWw each 16 points)
Applicable wire size	0.75 – 2.0 mm^2	
Mounting screw for the base	M5 × 6 mm or larger	
Applicable solderless terminal	RAV 1.25-3, RAV2-2	
Noise immunity	500V p-p, 1μsec.	
Dielectric strength	1000V AC @ 1 minute (power to input module to communication section to FG1)	
Insulation resistance	≥100MΩ with 500V DC (power to input module to communication section to FG1)	
Weight	M2BC-042	approx. 1.2 kg (2.6 lbs)
	M2BC-082	approx. 1.5 kg (3.3 lbs)
	M2BC-162	approx. 2.0 kg (4.4 lbs)
Power input	M2BC-❑2-K	85 – 132V AC
	M2BC-❑2-R	24V DC ±10%
Power consumption	M2BC-❑2-K	approx. 6VA without I/O modules
	M2BC-042-K	approx. 30VA with all 4 modules
	M2BC-082-K	approx. 50VA with all 8 modules
	M2BC-1621-K	approx. 90VA with all 16 modules
Current consumption	M2BC-❑2-R	approx. 0.25A without I/O modules
	M2BC-042-R	approx. 1.5A with all 4 modules
	M2BC-082-R	approx. 2.5A with all 8 modules
	M2BC-162-R	approx. 3.8A with all 16 modules

3. COMPONENT IDENTIFICATIONS & HARDWARE ADJUSTMENTS

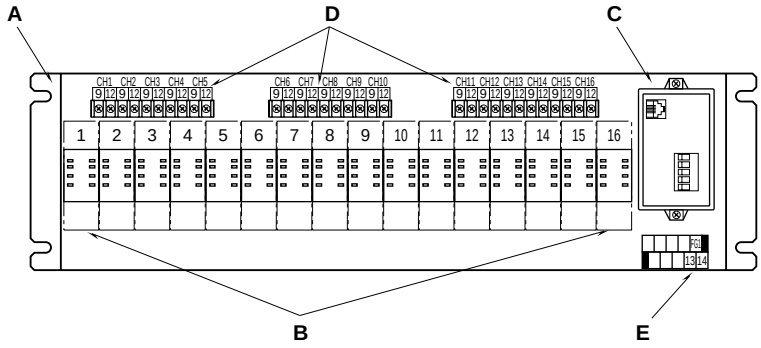
3.1 M2BC-❑1



REF.	NAME	FUNCTION
A	Base	Installation base
B	Base socket	Mounting Mini-M modules
C	Communication Controller Module	Interfacing field I/Os with DeviceNet
D	Terminal blocks	Connecting field inputs and power input

The above figure indicates model M2BC-161.

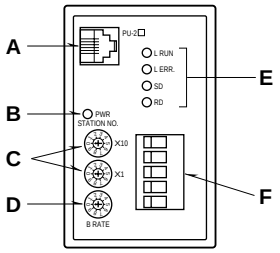
3.2 M2BC-❑2



REF.	NAME	FUNCTION
A	Base	Installation base
B	Base socket	Mounting Mini-M modules
C	Communication Controller Module	Interfacing field I/Os with DeviceNet
D	Output terminal blocks	Connecting field outputs
E	Power input terminal block	Connecting power input

The above figure indicates model M2BC-162.

3.3 COMMUNICATION CONTROLLER MODULE

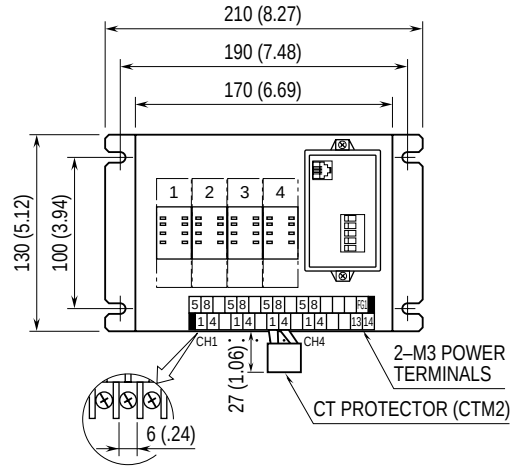


REF.	NAME	FUNCTIONS	
A	PU-2❑ modular jack	Connecting with the Programming Unit (model: PU-2❑)	
		MARKING (color)	FUNCTIONS
		PWR (green)	ON: Power is supplied.
			OFF: Power is not supplied.
C	Station No. Setting	Selectable within 1 – 64. (factory set to: 00)	
D	Baud rate Setting	SETTING	BAUD RATE
		0	156 kbps (factory default)
		1	625 kbps
		2	2.5 Mbps
		3	5 Mbps
		4	10 Mbps
		Other than 0 – 4	Not valid; L ERR. turns ON (Error status).
E	Status indicator LED	MARKING (color)	FUNCTIONS
		L RUN (red)	ON: normal
			OFF: no transmission (time-out error)
		L ERR. (red)	ON: transmission data error
			Flashing: transmission data error
			OFF: normal
		SD (red)	ON when transmitting
		RD (red)	ON when receiving
F	Terminal block	For wiring to CC-Link. Refer to Section 5. CONNECTING DATA LINK WIRES.	

4. EXTERNAL DIMENSIONS mm (inch)

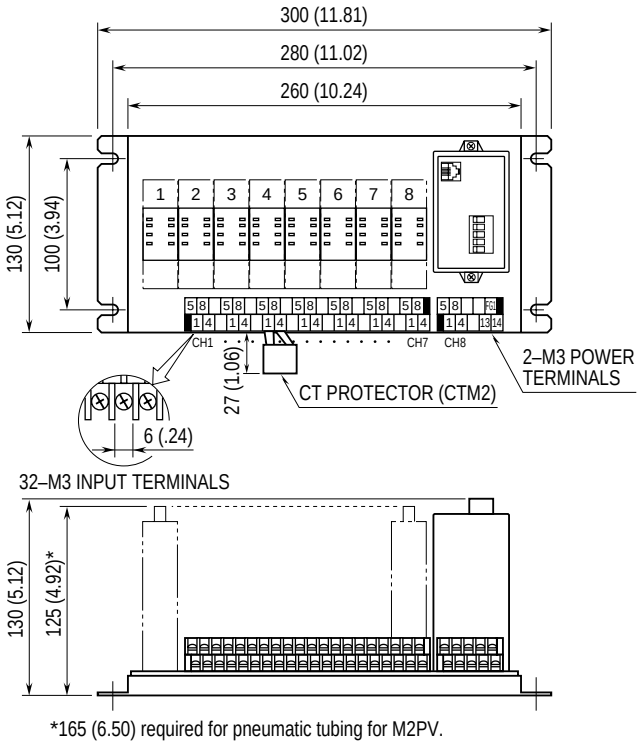
4.1 M2BC-❑1

4.1.1 M2BC-041



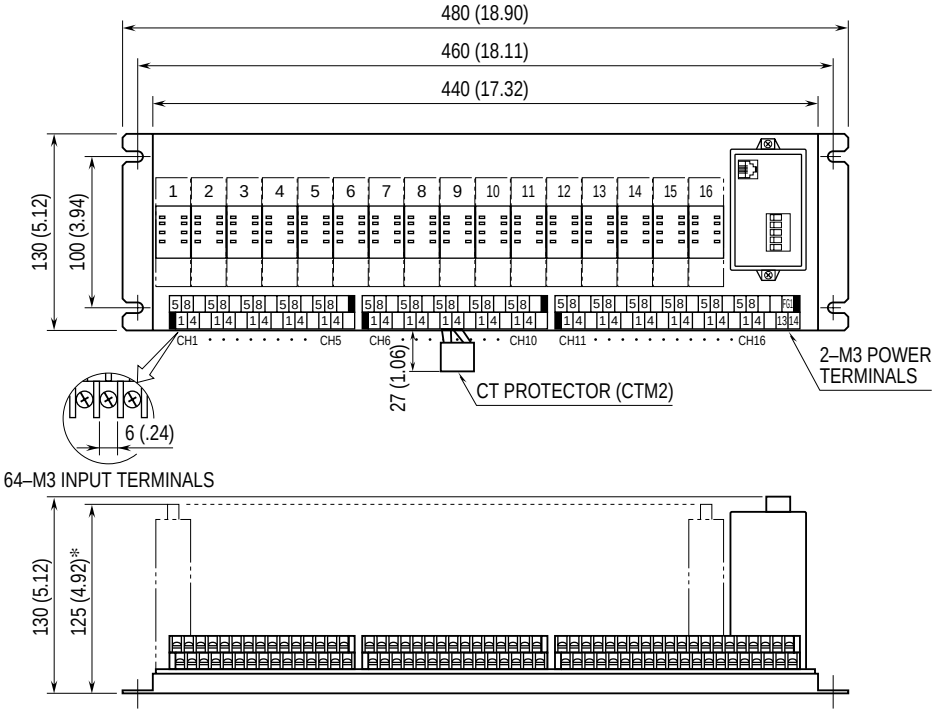
*165 (6.50) required for pneumatic tubing for M2PV.

4.1.2 M2BC-081



*165 (6.50) required for pneumatic tubing for M2PV.

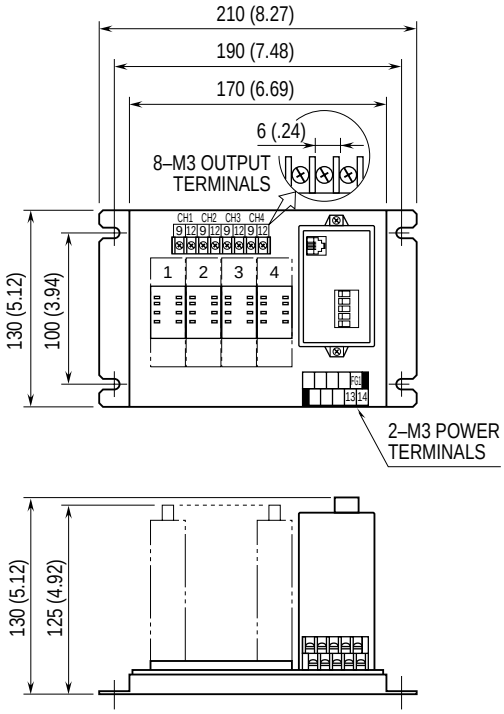
4.1.3 M2BC-161



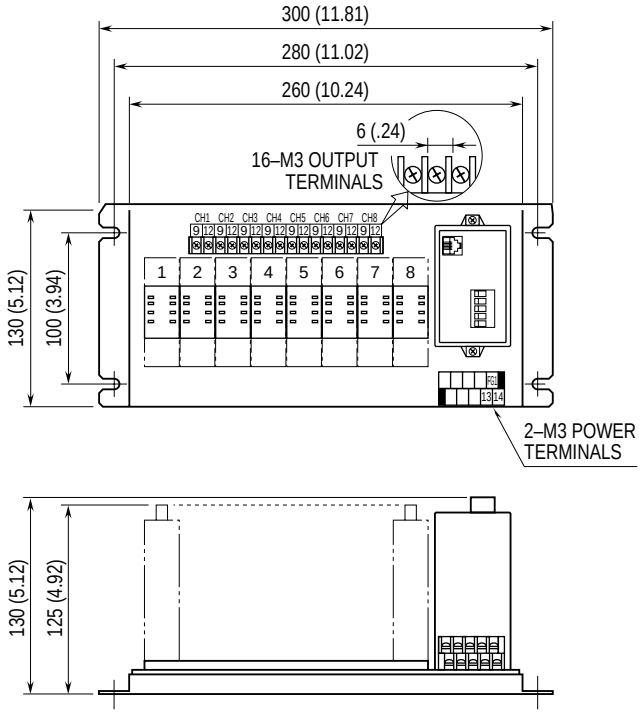
*165 (6.50) required for pneumatic tubing for M2PV.

4.2 M2BC-❑2

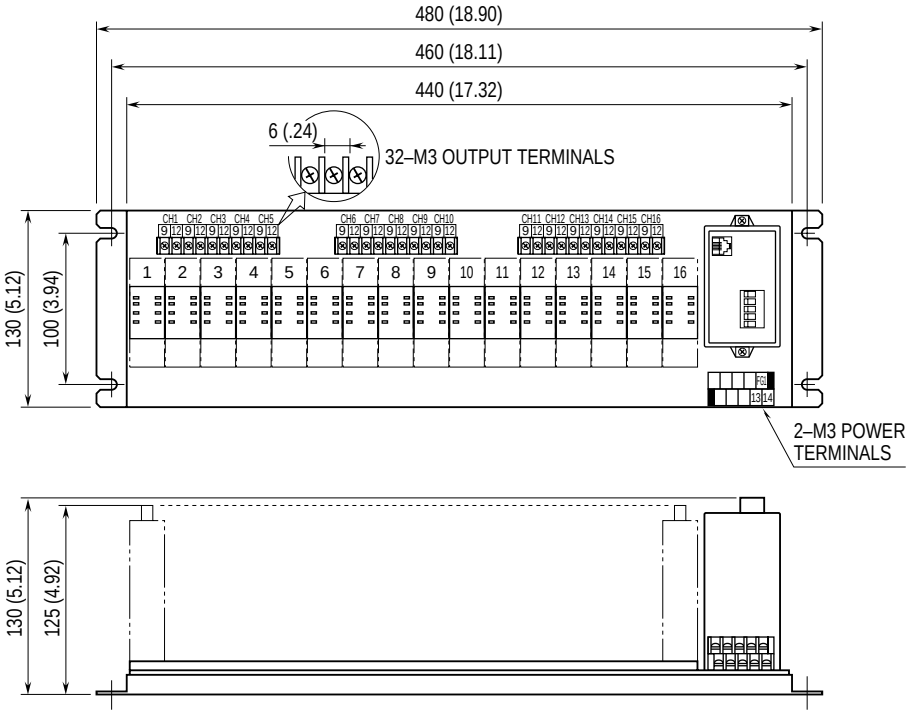
4.2.1 M2BC-042



4.2.2 M2BC-082

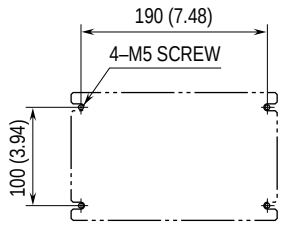


4.2.3 M2BC-162

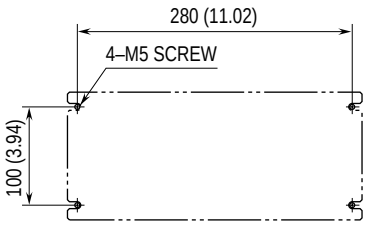


4.3 MOUNTING REQUIREMENTS mm (inch)

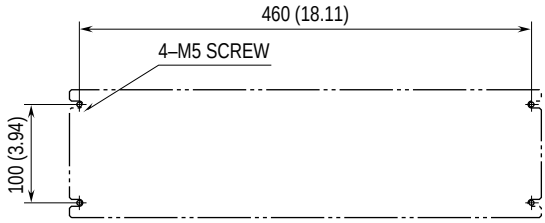
4.3.1 M2BC-04❑



4.3.2 M2BC-08❑



4.3.3 M2BC-16❑



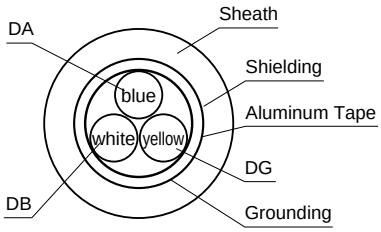
5. CONNECTING DATA LINK WIRES

The following explanations apply to the twisted-pair cables connecting the M2BC to the Master Unit.

5.1 TWISTED-PAIR CABLE

The following types of wire are recommended for connecting the M2BC to the Master Unit.

KURAMO ELECTRIC FANC-SB 0.5 mm^2 × 3 or equivalent



5.2 POINTS OF CAUTION IN HANDLING WIRES

DO NOT apply extraordinary forces to the wires as explained in the following:

(1) DO NOT SQUEEZE the wires with a sharp-edged tool.

(2) DO NOT TWIST the wires extraordinarily.

(3) DO NOT PULL the wires extraordinarily tight.

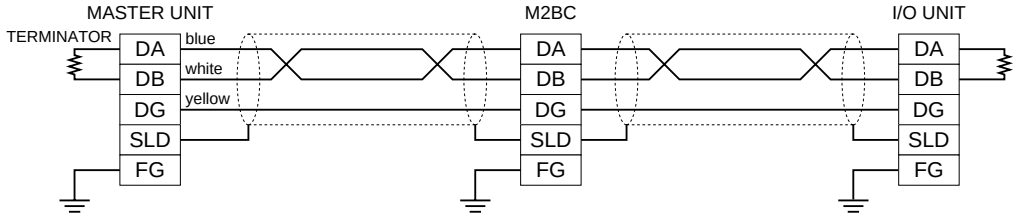
(4) DO NOT TRAMPLE on the wires.

(5) DO NOT PUT objects onto the wires.

(6) DO NOT DAMAGE the insulation tube of wires.

5.3 WIRING DIAGRAM

Connect the M2BC to the Master Unit as shown below.



6. CONNECTING WIRES

This section explains points of caution when wiring I/O modules and examples of wiring diagrams.

6.1 POINTS OF CAUTION

Appropriate precautions are required such as follows for protecting the system from external noise interference:

(1) Separate analog I/O and communication wires from others in order to prevent surge or induction noises.

(2) Separate power input wires (AC) from those for driving motors.

(3) Do not install these wires next to main supply circuits or high voltage cables.
Never bind them to these circuits.

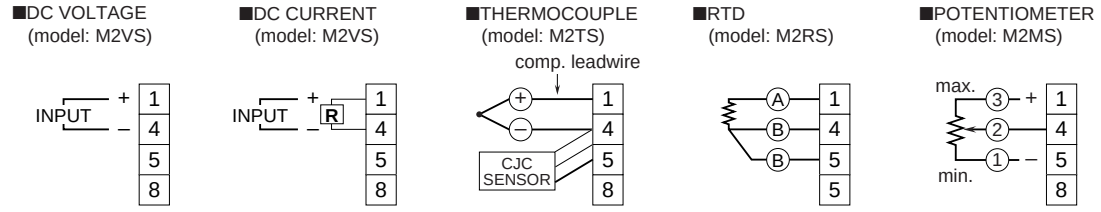
(4) Ground the shield of communication wires at one point.
Consideration about locations of the ground may be necessary according to external noise interference.

6.2 WIRING EXAMPLES OF M2BC-❑1

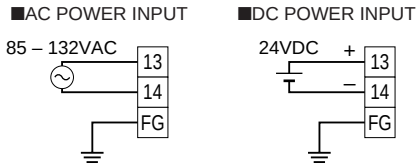
(1) Input Signal

The terminal No. marked on the Input Terminal Block are the same as those marked on individual Mini-M series I/O Signal Conditioners. Refer to data sheets for the I/O modules when wiring each module.

Typical wiring diagrams are shown in the following:



(2) Power Input

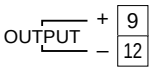


6.3 WIRING EXAMPLES OF M2BC-❑2

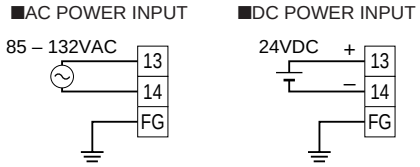
(1) Output Signal

The terminal No. marked on the Output Terminal Block are the same as those marked on individual Mini-M series I/O Signal Conditioners. Refer to data sheets for the I/O modules when wiring each module.

Output range may be different between modules even though all output signals are connected to the 9 (+) – 12 (–) terminals.



(2) Power Input



7. I/O SIGNALS

7.1 REMOTE I/O

The M2BC occupies from 1 up to 4 nodes according to the number of I/O channels. Regardless of the number of nodes, 32 bits are assigned to each of input and output for sending to/receiving from the Master Unit. One (1) bit among RXxB* is used as remote device (M2BC) READY signal, turned ON when the M2BC is in normal operation.

*x = (Station No. × 2 – 1) H

[example] Station No. = 9
9 × 2 – 1 = 17H
READY signal is input at RX17B.

7.2 ASSIGNING REMOTE REGISTERS

(1) M2BC-❑1

The M2BC-❑1 does not use the remote registers for the direction from the Master to Remote (WRwn to RWwn+15).

The table below shows the data assignment of those for the direction from the Remote to Master.

DIRECTION	ADDRESS	CONTENTS	M2BC-041	M2BC-081	M2BC-161	DEFAULT
	RWrn + 0	Ch. 1 digital output	X	X	X	0
	RWrn + 1	Ch. 2 digital output	X	X	X	0
M2BC	RWrn + 2	Ch. 3 digital output	X	X	X	0
	RWrn + 3	Ch. 4 digital output	X	X	X	0
↕	RWrn + 4	Ch. 5 digital output		X	X	0
	RWrn + 5	Ch. 6 digital output		X	X	0
Master	RWrn + 6	Ch. 7 digital output		X	X	0
	RWrn + 7	Ch. 8 digital output		X	X	0
	RWrn + 8	Ch. 9 digital output			X	0
	RWrn + 9	Ch. 10 digital output			X	0
	RWrn + 10	Ch. 11 digital output			X	0
	RWrn + 11	Ch. 12 digital output			X	0
	RWrn + 12	Ch. 13 digital output			X	0
	RWrn + 13	Ch. 14 digital output			X	0
	RWrn + 14	Ch. 15 digital output			X	0
	RWrn + 15	Ch. 16 digital output			X	0

(2) M2BC-❑2

The M2BC-❑2 does not use the remote registers for the direction from the Remote to Master (WRrn to RWrn+15).

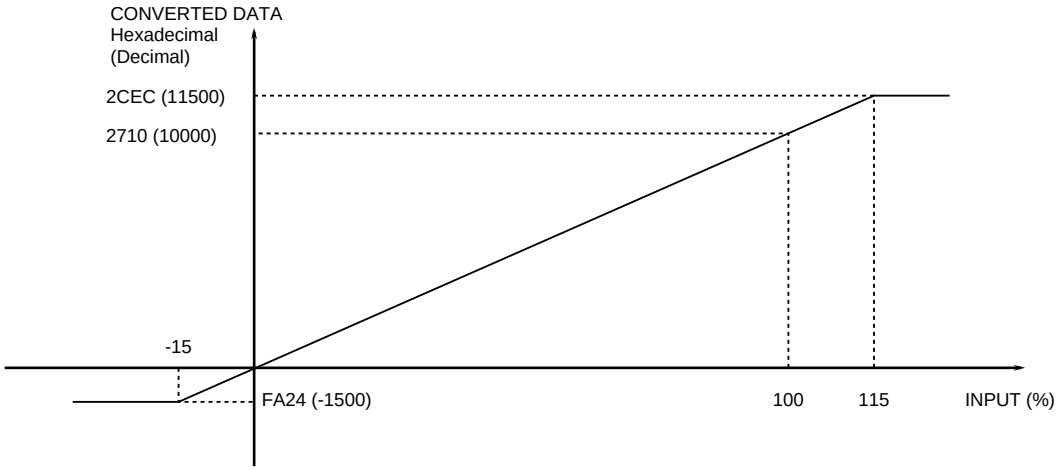
The table below shows the data assignment of those for the direction from the Master to Remote.

DIRECTION	ADDRESS	CONTENTS	M2BC-042	M2BC-082	M2BC-162	DEFAULT
	RWrn + 0	Ch. 1 digital input	X	X	X	0
	RWrn + 1	Ch. 2 digital input	X	X	X	0
Master	RWrn + 2	Ch. 3 digital input	X	X	X	0
	RWrn + 3	Ch. 4 digital input	X	X	X	0
↕	RWrn + 4	Ch. 5 digital input		X	X	0
	RWrn + 5	Ch. 6 digital input		X	X	0
M2BC	RWrn + 6	Ch. 7 digital input		X	X	0
	RWrn + 7	Ch. 8 digital input		X	X	0
	RWrn + 8	Ch. 9 digital input			X	0
	RWrn + 9	Ch. 10 digital input			X	0
	RWrn + 10	Ch. 11 digital input			X	0
	RWrn + 11	Ch. 12 digital input			X	0
	RWrn + 12	Ch. 13 digital input			X	0
	RWrn + 13	Ch. 14 digital input			X	0
	RWrn + 14	Ch. 15 digital input			X	0
	RWrn + 15	Ch. 16 digital input			X	0

7.3 A/D CONVERSION

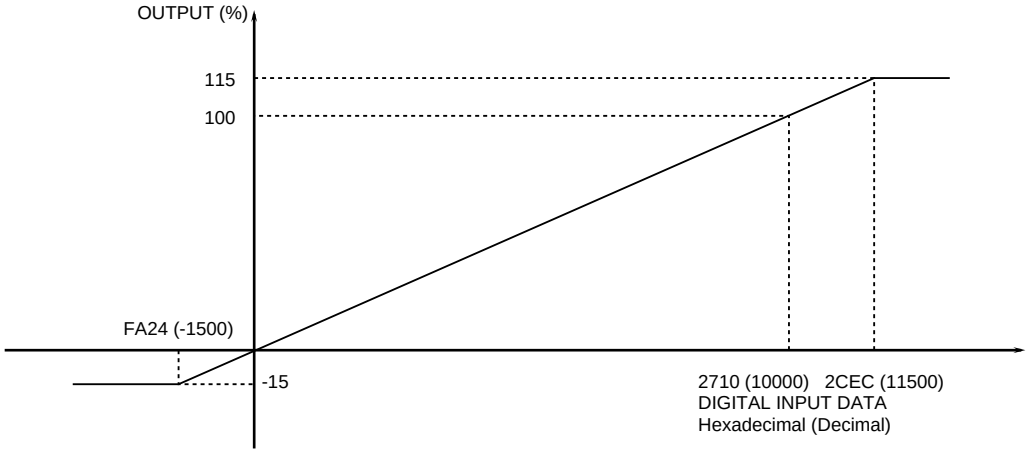
(1) M2BC-❑1

Analog input signal (0 – 100%) from Mini-M Signal Conditioners is converted proportionally into digital data, provided to the Master Unit.



(2) M2BC-❑2

Digital input signal from the Master Unit is converted proportionally into analog output signal (0 – 100%).



(3) OUTPUT IN AN ABNORMALITY

When an abnormality such like CPU error, STOP, time-out occurs at the PLC, the output signal of the M2BC is maintained as HOLD (no clearing output signal, keeping the value just before the abnormality).

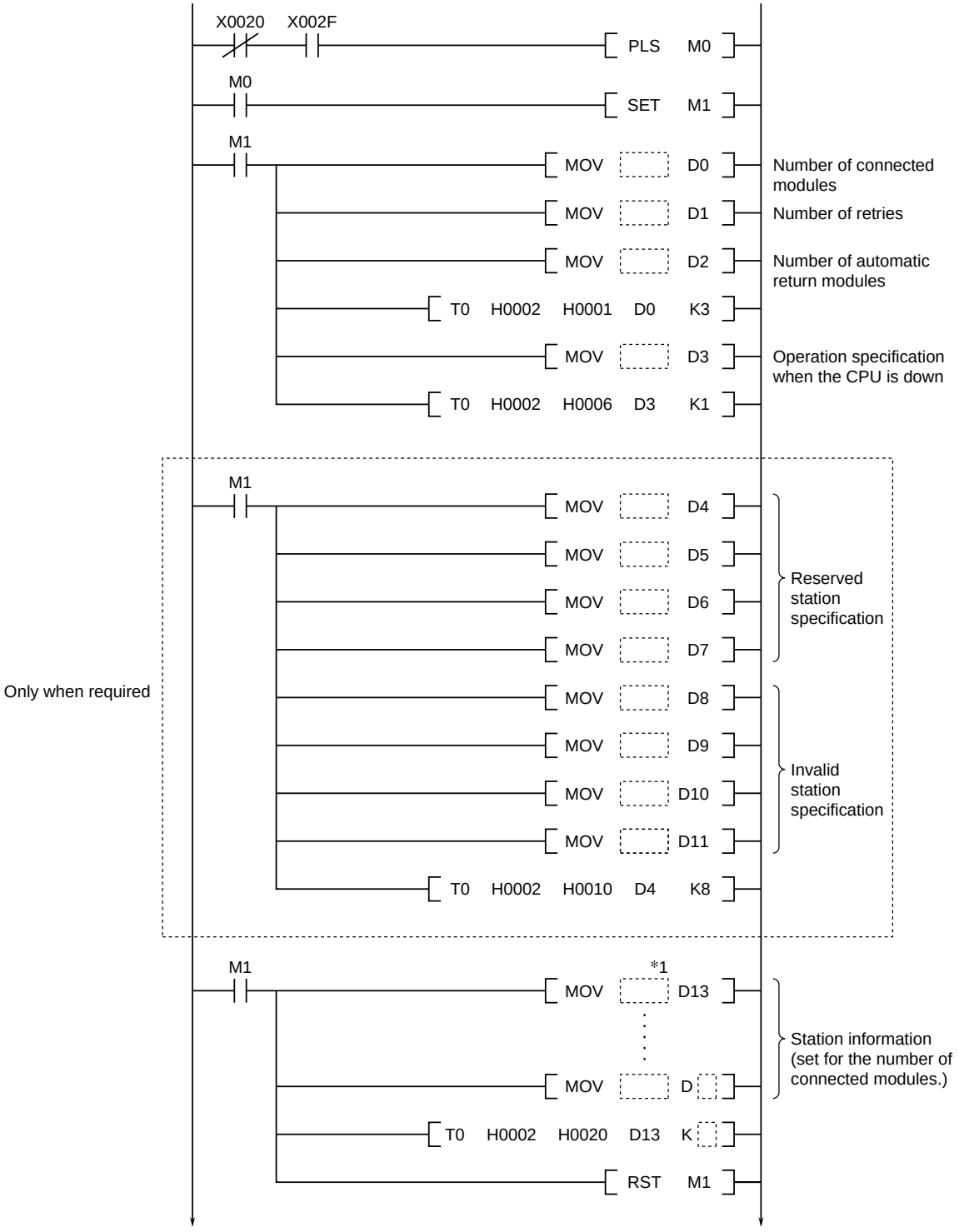
When the PLC recovers to normal operation and the M2BC receives new data, the output restarts changing.

8. PARAMETERS SETTING BY PLC PROGRAM

8.1 GENERAL DESCRIPTION

The ladder diagram below shows a program example assuming that the master station's first I/O number is X/Y20 to 3F.

For detailed information, refer to users manuals for the PLC CPU and the Master Unit.



*1. [Example] 11xx for model M2BC-04
12xx for model M2BC-08
14xx for model M2BC-16

xx = M2BC Station No.

9. TROUBLESHOOTING

Basic troubleshooting methods are explained in this section.

For problems concerning the PLC CPU and Master Unit, consult users manuals for these units.

9.1 L ERR. INDICATOR FLASHING

CHECK	TROUBLESHOOTING
Have you changed the station No. and/or baud rate settings during normal operation?	Return these settings to the state when the unit operated normally.

9.2 L ERR. INDICATOR ON

CHECK	TROUBLESHOOTING
Are the station No. and/or baud rate settings correct?	Set them correctly.

9.3 L RUN INDICATOR OFF

Consult the users manual for the Master Unit.

9.4 UNABLE TO READ/WRITE DIGITAL VALUES?

CHECK	TROUBLESHOOTING
Is the L RUN indicator OFF?	Refer to Section 8.3.
Is the L ERR. indicator flashing or OFF?	Consult the users manual for the Master Unit.
Is the RUN indicator on the PLC CPU flashing or OFF?	Consult the users manual for the CPU.
Is the RUN indicator on the Master Unit OFF?	Consult the users manual for the Master Unit.
Are the RD/SD indicators on the Master Unit ON?	Consult the users manual for the Master Unit.
Are the wires for analog I/O properly connected to respective terminals? No wire breakdown?	Check these wires visually or check conductivity for each pair of wires.
[M2BC-❑1] Remove analog input wires and apply test voltage to the terminals (e.g. Use a dry cell). Try to read out digital value.	If the digital value is read out normally, there are possibilities of noise interference via external wires. Check wiring and grounding.
[M2BC-❑1] Remove analog output wires and connect a tester to the terminals. Try to read out digital value.	If the digital value is read out normally, there are possibilities of noise interference via external wires. Check wiring and grounding.

9.5 I/O ZERO & SPAN NEED ADJUSTMENTS?

I/O types and ranges can be field-selectable for certain types of Mini-M series I/O Signal Conditioners, and zero and span adjustments are available for most types. Refer to data sheets for the I/O modules for detailed information.

M-SYSTEM WARRANTY

1. What is covered.

M-System Co., Ltd. ("M-System") warrants, only to the original purchaser of new M-System products purchased directly from M-System, or from M-System's authorized distributors or resellers, for its own use not for resale, that the M-System products shall be free from defects in materials and workmanship and shall conform to the specifications set forth in the product catalogue applicable to the M-System products for the Warranty Period (see Paragraph 5 below for the Warranty Period of each product).

THE ABOVE WARRANTY IS THE ONLY WARRANTY APPLICABLE TO THE M-SYSTEM PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

2. What is not covered.

This warranty does not cover any M-System product which has been: (1) modified, altered or subjected to abuse, misuse, negligence or accident; (2) improperly installed or installed in conjunction with any equipment for which it was not designed; or (3) damaged or destroyed by disasters such as fire, flood, lightning or earthquake.

In no event shall M-System be liable for any special, incidental, consequential or other damages, costs or expenses (including, but not limited to, loss of time, loss of profits, inconvenience or loss of use of any equipment).

3. Remedies.

If a defective product is returned to M-System in accordance with the procedures described below, M-System will, at its sole option and expense, either: (1) repair the defective product; (2) replace the defective product; or (3) refund the purchase price for the defective product paid by the purchaser. Except as otherwise provided by applicable state law, these remedies constitute the purchaser's **sole and exclusive** remedies and M-System's sole and exclusive obligation under this warranty.

4. Warranty Procedure.

If the purchaser discovers a failure of the M-System products to conform to the terms of this warranty within the Warranty Period, the purchaser must promptly (and, in any event not more than 30 days after the discovery of such failure) notify the relevant party as described below either by telephone or in writing at the below address to obtain an Authorized Return (AR) number and return the defective product to the relevant party. The designated AR number should be marked on the outside of the return package and on all correspondence related to the defective product. The purchaser shall return, at purchaser's expense, defective products only upon receiving an AR number. In order to avoid processing delays, the purchaser must include: copies of the original purchase order and sales invoice; the purchaser's name, address and phone number; the model and serial numbers of the returned product; and a detailed description of the alleged defect.

5. Warranty Period.

Signal Conditioner:	36 months from the date of purchase.
M-Rester:	12 months from the date of purchase.
Valve Actuator:	18 months from the date of shipment from M-System or 12 months from the date of its installation, whichever comes first.
Other Products:	36 months from the date of purchase.

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