MITSUBISHI

Serial Communication Module for MODBUS

User's Manual (Hardware)

AJ71UC24-S2

Thank you for buying the Mitsubishi general-purpose programmable logic controller MELSEC-A Series

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.



MODEL	AJ71UC24-S2-U-E	
MODEL	13J803	
CODE	133803	
IB(NA)-66580-B(9912)MEE		

© 1995 MITSUBISHI ELECTRIC CORPORATION

SAFETY PRECAUTIONS •

(Always read before starting use)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the CPU module user's manual.

In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".



Note that the **CAUTION** level may lead to a serious consequence according to the circumstances.

Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[SYSTEM DESIGN PRECAUTIONS]

 When controlling a PLC by connecting a personal computer or other similar control device to a special function module for the purpose of changing the data, changing the program, or changing the operation status (status control), an interlock circuit must be configured in the sequence program so that the entire system will always operate safely.

If a remote PLC is controlled in the manner indicated above by an external device, the system may fail to respond immediately even when trouble occurs at the remote PLC due to data communication error.

In addition to configuring the interlock circuit in a sequence program, determine the response to be taken by the system at the occurrence of a data communication error as the processing between the external device and the PLC CPU.

[SYSTEM DESIGN PRECAUTIONS]

 Do not bundle control lines or communication wires together with main circuit or power lines, or lay them close to these lines.

As a guide, separate these lines by a distance of at least 100 mm, otherwise malfunctions may occur due to noise.

[CAUTIONS ON MOUNTING]

 Use the PLC in an environment that conforms to the general specifications in the manual.

Using the PLC in environments outside the ranges stated in the general specifications will cause electric shock, fire, malfunction, or damage to/deterioration of the product.

• Switch off all phases of the power supply outside the PLC before starting installing or wiring work.

If all phases are not switched off, there will be a danger of electric shock or damage to the product.

Make sure that the module fixing projection on the base of the module is
properly engaged in the module fixing hole in the base unit before mounting
the module.(AnS series modules must be screwed to the base unit with the
specified torque.)

Failure to mount the module properly will result in malfunction or failure, or in the module falling.

Tighten screws to the specified torque.

If a screw is not tightened to the specified torque, the module may fall out, or a short circuit or malfunction may occur.

If a screw is tightened excessively, exceeding the specified torque, the module may fall out, short circuit, or malfunction due to breakage of the screw or the module.

• Do not touch conductive parts or electronic components of the module with your bare hands.

This could cause malfunction or failure of the module.

 When connecting a wire to a connector, use the specified tool to connect it by crimping, pressure welding, or soldering correctly.

Plug the connector into the module securely.

[CAUTIONS ON WIRING]

(DANGER		
 Communication cables connected to a module must always be run in a duct or held securely using clamps. 		
 If a cable is not run in a duct or not held seourely using clamps, the cable will sag, move, or be pulled by mistake, which will cause damage to the module and the cable and also malfunctioning due to loose connection of the cable. Check the correct type of interface for the connection before connecting cables. Connecting a cable to the wrong interface or miswiring could cause failure of the module or external device. Do not connect an external device that requires power supply from the computer link module to the RS-422 interface of the computer link module. This could cause of the module or the specified torque. Tighten terminal screws to the specified torque. 		
fall out, short circuit, or malfunction. If a terminal screw is tightened excessively, exceeding the specified torque, the module may fall out, short circuit, or malfunction due to breakage of the screw or the module.		
 When removing the communication cable from a module, do not pull it out by the cable. 		
For a cable with a connector, hold the connector plugged into the module to disconnect the cable.		
For a cable without a connector, loosen the screws that hold the cable onto the module then remove the cable.		
If the cable is pulled while it is connected to the module, the module and/or the cable will be damaged and may malfunction due to loose connection of the cable.		
 Make sure that no foreign matter such as chips or wire offcuts gets inside the module. 		
It will cause fire, failure, or malfunction.		
CAUTIONS ON STARTUP AND MAINTENANCE		
DANGER		
Do net touch terminals while the power is ON		

- Do net touch terminals while the power is ON. This will cause malfunctions.
- Switch off all phases of the power supply outside the PLC before cleaning or re-tightening screws. If all phases are not switched off, the module may fail or malfunction.

If a screw is not tightened securely, the module may fall out, short circuit, or malfunction.

If a screw is tightened excessively, the module may fall out, short circuit, or malfunction due to breakage of the screw or the module.

[CAUTIONS ON STARTUP AND MAINTENANCE]

- Do not disassemble or modify any module. This will cause failure, malfunction, injuries, or fire.
- Switch off all phases of the power supply outside the PLC before mounting or removing the module.

If all phases are not switched off, the module may fail or malfunction.

[CAUTIONS ON OPERATION]

 Do not write data in the "system area" in the buffer memory of a special function module.

Among the signals output from the PLC CPU to a special function module, do not output the "usage prohibited" signals.

Writing data in the "system area" or outputting the "usage prohibited" signals will cause malfunctions of the PLC system.

 When controlling a PLC by connecting a personal computer or other similar control device to a special function module for the purpose of changing the data, changing a program, or changing the operation status (status control), read this manual carefully and start the intended control only after ensuring that it can be performed safely.

Errors in changing the data, changing the program, or controlling the status will cause system malfunction, and machine damage or accidents.

[CAUTIONS ON DISPOSAL]

Dispose of this product as industrial waste.

Revisions

*The manual number is given on the bottom left of the back cover.

Print Date	*Manual Number	Revision		
July, 1999 Dec., 1999	IB-(NA)-66580-A	First edition		
Dec., 1999	IB-(NA)-66580-B	Correction		
		Section 2.1, 5.2		
	1			
·				

This manual confers no industrial property rights or any rights of any other kind, nor does it confer any patent licenses. Mitsubishi Electric Corporation cannot be held responsible for any problems involving industrial property rights which may occur as a result of using the contents noted in this manual.

© 1999 MITSUBISHI ELECTRIC CORPORATION

CONTENTS CONTENTS CONTENTS CONTENTS

1. General Description	
1.1 Related Manual ·····	
2. System Configurations ·····	2
2.1 Applicable Systems ·····	2
3. Specifications	3
3.1 RS-232C Interface ·····	3
3.1.1 RS-232C interface specifications ·····	ŝ
3.1.2 RS-232C cable	3
3.2 RS-422/485 Interface	4
3.2.1 RS-422/485 interface specifications	4
3.2.2 RS-422/485 cable specifications ·····	4
3.2.3 Connecting terminal resistances	5
3.2.4 How to mount and detach the RS-422/485 interface terminal block · · ·	6
3.3 Handling Instructions · · · · · · · · · · · · · · · · · · ·	6
3.4 Self Loopback Test · · · · · · · · · · · · · · · · · · ·	7
4. External Wiring	8
4.1 How to Connect an RS-232C Line ·····	8
4.2 How to Connect an RS-422 Line ·····	9
5. Transmission Specifications/Nomenclature and Setting	ō
5.1 Transmission Specifications · · · · · · · · · · · · · · · · · · ·	õ
5.2 Nomenclature and Setting	1
6. Outside Dimensions	

1. General Description

This manual describes specifications and names of parts of AJ71UC24-S2 serial communication module for MODBUS *1 for use with MELSEC-A Series compact building block type PLC CPU.

Upon unpacking the AJ71UC24-S2, make sure that the items shown below are contained.

Name of Item	Quantity
AJ71UC24-S2 serial communication module for MODBUS	1
Terminal resistance 330 Ω 1/4W (orange orange brown []])	2
Terminal resistance 110Ω 1/2W (brown brown brown []])	2

*1:MODBUS is a registered trade mark of MODICON INC.

1.1 Related Manual

For details on the specifications, functions, and handling of the AJ71UC24-S2, refer to the following manuals.

User's Manual for ĂJ71UC24-S2, A1SJ71UC24-R2-S2, and A1SJ71UC24-R4-S2 serial communication modules for MODBUS. (IB-66583)

2. System Configurations

2.1 Applicable Systems

1) Applicable PLC CPU modules and the number of AJ71UC24-S2 modules to be connected

The table below shows the applicable PLC CPU modules for which the AJ71UC24-S2 will be used, and the number of AJ71UC24-S2 modules to be connected to the modules.

Applicable	Number of	
1 1 1	Connectable	Notes
Modules	AJ71UC24s	noies
A0J2H	7107 10 02 43	If the A1S series special function modules and/or
A1, A1N		the A series special function modules are connected
A1SJ(S3)		to a PLC CPU, the total number of these special
A1SJH		function modules is regarded as the maximum
A1S(S1)		number of modules connectable to the PLC CPU.
AISH		A1SJ71C24-R2 Computer link module
A2S(S1)	2	AISJ71C24-PRF Computer link module
A2SH	2	module
A2(S1),		A1SJ71C24-R4 Computer link/multidrop link
A2N(S1)		module
A3, A3N		AD51(S3)/AD51H(S3) Intelligent Communication
A3H, A3M		Module
A73		AD51FD(S3) External Failure Diagnosis Module
A2A(S1)		AD57G(S3) Graphic Controller Module
A2U(S1)		AJ71C21(S1) Terminal Interface Module
A2AS(S1)		(Only in BASIC Program Mode)
A2USH-S1		AJ71C22(S1) Multidrop Link System Module
A3A		AJ71C23 Higher Controller High Speed Link
AGU	6	Module
A4U		AJ71C24(S3/S6/S8) Computer Link Module
Q2AS(S1)		AJ71UC24 Computer Link/Multidrop Link Module
Q2ASH(S1)		AJ71P41 SUMINET Interface Module
Q3A		AJ71E71 Ethernet Interface Module
Q4A		A0J2C214-S1 Computer Link/Multidrop Link
A52G	1	Module

3. Specifications

3.1 RS-232C Interface

3.1.1 RS-232C interface specifications

1 • 014 2 • 015	Pin Number	Name	Signal Abbreviation	Signal Direction AJ71UC24-S2 ↔ Master Station
3 • 016	1	Frame ground	FG	← →
5 017 5 018	2	Send data	SD(TXD)	
6● 019 7● 019	3	Receive data	RD(RXD)	
8 • 020 021	4	Request to send	RS(RTS)	>
9 0 022 100 023	5	Clear to send	CS(CTS)	
110 023 120 024	6	Data set ready	DSR(DR)	
120 025	7	Signal ground	SG	← →
	8	Receive carrier detecation	CD	←
0	20	Data terminal ready	DTR(ER)	

The following type of RS-232C connector is used. Use a matching connector. 25-pin D-sub(female) screw-fixing type

3.1.2 RS-232C cable

Use a cable that conforms to RS-232C standards and is no longer than 15 m for RS-232C communications.

3.2 RS-422/485 Interface

3.2.1 RS-422/485 interface specifications

 The specifications of the RS-422/485 interface for connection to a master station or for connection to another AJ71UC24-S2 are shown below.

Signal Abbreviation	Signal Direction AJ71UC24-S2 ↔ Master Station	Description
SDA		Send data
SDB		Send data
RDA		Receive data
RDB		Receive data
SG	← →	Signal ground
FG	→	Frame ground

 The following function block diagram shows the RS-422/485 inter face function block diagram.



3.2.2 RS-422/485 cable specifications

Use a cable that conforms to RS422/485 standards and is no longer than 500 m for RS-422/485 communications.

Use a cable that conforms to the specifications listed in the following table.

Item	Description
Cable type	Shielded cable
Number of pairs	3 pairs
Conductor resistance (20°C)	88.0 Ω/km or less
Insulation resistance	10,000 MΩ km or more
Dielectric strength	500 VDC, 1 minute
Electrostatic capacity (1 kHz)	60 nF/km or less on average
Characteristic impedance (100 kHz)	110 ± Ω 10

(km = 0.621 mile)

3.2.3 Connecting terminal resistances

If the AJ71UC24-S2 is either the first or the last station, be sure to connect terminal resistances as shown below.

Failure to do so may cause faulty data transmission.

Select a suitable terminal resistance according to the transmission specifications adopted.

• When using the RS-422, select 330 Ω terminal resistances.

• When using the RS-485, select 110 Ω terminal resistances.

1) Method for connecting a 4-wire type terminal register



Install a terminal resistance both between SDA and SDB and between RDA and RDB.

2) Method for connecting a 2-wire type terminal register



Install a terminal resistance between RDA and RDB.

3.2.4 How to mount and detach the RS-422/485 interface terminal block

The RS-422/485 interface of the AJ71UC24-S2 is provided with a two piece terminal block. This feature allows the module to be replaced without removing the signal wires connected with the terminal block.

The following illustration shows how to mount and detach the interface terminal block.



3.3 Handling Instructions

Tighten the module mounting and terminal screws as specified below.

Screw			Tightening Torque (N•cm)		
Module mounting screws (M4)			78 to 117		
RS-422/485 terminal block mounting screw (M3.5)			58 to 88		
RS-422/485 (M3.5)	terminal	block	terminal	screw	58 to 88

3.4 Self Loopback Test

The function of this test is to check if the AJ71UC24-S2 operates normally without connecting the AJ71UC24-S2 to an external device.

Cable connection

AJ71U0	Cable	
Name of	Pin	Caple
Signal	Number	Connection
FG	1	
SD	2	
RD	3	•
RS	4	
CS	5	••
DSR	6	4
SG	7	
CD	8	•
DTR	20	

٠	Connection	of RS-422/485 interface	

AJ71UC24-S2	Cable
Name of Signal	Connection
SDA	
SDB	
RDA	₄
RDB	▲
SG	
FG	

Setting of Mode Setting Switch

Set the switch to "F".

Executing a self loopback test

• Testing startus upon turning on the power of the PLC CPU or resetting the PLC CPU.

Checking LED status

Check Item	LED Status v	vhen Normal	LED Srarus when Abnormal (When an error is detected.)		
Checking CPU	2-C/N	OFF	2-C/N		
transmission	CPU R/W	Flash	2-C/N	ON	
Checking	2-SIO	OFF			
RS-232C	2-SD	Elech	2-SIO	ON	
transmission	2-RD	Flash			
Checking	4-SIO	OFF			
RS-422/485	4-SD	Fleek	4-SIO	ON	
transmission	4-RD	Flash			

End

Testing ends when the power supply is shut off.

4. External Wiring

4.1 How to Connect an RS-232C Line

The diagram below shows a standard method of connecting an RS-232C line to the AJ71UC24-S2.

1) Connection example: connection to an external device capable of switching the CD signal (pin No.8) ON and OFF.

AJ71UC	24-S2	Cable Connections and	Master Station
Signal Names	Pin Numbers	Signal Directions	Signal Names
FG	1	¢	FG
SD(TXD)	2		SD(TXD)
RD(RXD)	3	+	RD(RXD)
RS	4		RS
CS(CTS)	5		CS(CTS)
DSR(DR)	6		DSR(DR)
SG	7	\leftarrow	SG
CD	8		CD
DTR(ER)	20		DTR(ER)

2) Connection example: connection to an external device that is not capable of switching the CD signal (pin No.8) ON and OFF.

A 171110	24 62	Cable Connections and	
AJ71UC24-S2			Master Station
Signal Names	Pin Numbers	Signal Directions	Signal Names
FG	1	۰	FG
SD(TXD)	2		SD(TXD)
RD(RXD)	3	+	RD(RXD)
RS	4		RS
CS(CTS)	5	ℯ _ └≽	CS(CTS)
DSR(DR)	6		DSR(DR)
SG	7	\leftarrow	SG
CD	8		CD
DTR(ER)	20		DTR(ER)

4.2 How to Connect an RS-422 Line

The diagram below shows a standard method of connecting an RS-422 line to the AJ71UC24-S2.

AJ71UC24-S2	Cable Connections and	Master Station	Description
Signal Names	Signal Directions	Signal Names	Description
SDA	→	RDA	Receive data
SDB		RDB	Receive data
RDA	•	SDA	Send data
RDB	•	SDB	Send data
		RSA	Request to send
		RSB	Request to send
	L	CSA	Clear to send
	L.	CSB	Clear to send
NC			
SG	«	SG	Signal ground
FG	t	FG	Frame ground

1) Method for connecting a 4-wire type terminal resistor

2) Method for connecting a 4-wire type terminal resistor

AJ71UC24-S2		Master Station	Description
Signal Names	Signal Directions	Signal Names	Becomption
SDA		RDA	Send data
SDB		RDB	Send data
RDA	• f • t	SDA	Receive data
RDB	¥	SDB	Receive data
		RSA	Request to send
		RSB	Request to send
		CSA	Clear to send
	L.	CSB	Clear to send
NC			
SG	<	SG	Signal ground
FG	<	FG	Frame ground

5. Transmission Specifications/Nomenclature And Setting

	em		Specifications		
		DT	Specifications		
Transmission I		RTU mode	ASCII mode		
Data format	Start bit	1	1		
	Data bit	8	7		
	Parity bit	1 or none		Switch	
	Stop bit	2 or 1		Selected	
Error detection	1	CRC	LRC		
		Parity check pr	esent (odd/even)/absent	
Interface		Conform to RS	-232C.		
		Conform to RS	-422/485.		
Transmission r	nethod	Half-duplex cor	nmunications sy	stem	
Synchronous s	system	Asynchronous system			
Transmission a	system	300, 600, 1200, 2400, 4800, 9600, 19200 BPS			
		(switch selected)			
Access cycle		Each request is processed in the END			
		processing or	f the sequer	nce program.	
		Therefore, acce	ess cycle is 1 sca	an time	
DTR/DSR (ER	/DR) control	Absent			
DC1/DC3, DC2	2/DC4 control	Absent			
System config	uration (Master	1:1, 1:n		n: max 32	
station: A1SJ7	1UC24-S2)				
Transmission of	distance	Up to 15 m (49.2 ft) for RS-232C			
		Up to 500 m (1640.5 ft) for RS-422/485			
Current consur	nption	5 VDC, 1.4 A			
Number of I/O	points occupied	32 points *1			
Weight		630g			

5.1 Transmission Specifications

*1: Set "special function module, 32 points" (F32 points) as the I/O allocation in the parameters.

For general specifications, refer to the User's Manual for the PLC CPU you are using.

5.2 Nomenclature and setting





No	. N	lame			Description	
1)	LED (Co	ontinu	ued)	4-RD	RS-422/485 receiving display	
ľ			,		During data receiving: Flash	
	RUN		2-C/N	2-C/N	Result of RS-232C and PLC	CPU
I .	2-SD		2-P/S		communications display	
	2-RD (Unused)		2-PRO 2-SIO		Abnormal	: ON
	2-NEÚ	100	4-C/N		Normal	OFF
	2-ACK 2-NAK		4-P/N 4-PRO	2-P/S	RS-232C parity,CRC/LRC error display	
	2-NAK 2-NEU		4-PRO 4-SIO		Parity.CRC/LRC error	: ON
	4-ACK		(Unused)	-	Normal	OFF
	4-NAK 4-SD		CPUR/W	2-PRO	RS-232C protocol error display	
	4-RD	00	M.D.M		Communications protocol error	: ON
		88	M.D.L BO		Normal	: OFF
	(Unused) <	ŏŏ	81	2-SIO	RS-232C SIO error display	
		00	B2		Overrun, framing error	: ON
1						OFF
				4-C/N	Result of RS-422/485 and PLC CPU	
					communications display	
						: ON
	1				Normal	OFF
				4-P/S	RS-422/485 parity, CRC/LRC error disp	olav
	1.00					: ÓN
			1.1		Normal	: OFF
				4-PRO	RS-422/485 protocol error display	
					Communications protocol error	: ON
			· .		Normal	: OFF
				4-SIO	RS-422/485 SIO error display	
			i			ON
						: ÓFF
				CRUR	Communications with PLC CPU display	
				/W	During communications with PLC	
						lash
					When not communicating	
					with the PLC CPU:O	N
				СОМ	Unused(always OFF)	
				M.D.M		
				M.L.M		
				B0	Baud rate status Refer to *1	
	.			B1		
				B2		

*1: Baud rate status

Baud Rate (BPS)	300	600	1200	2400	4800	9600	19200
B0	OFF	ON	OFF	ON	OFF	ON	OFF
B1	OFF	OFF	ON	ON	OFF	OFF	ON
B2	OFF	OFF	OFF	OFF	ON	ON	ON

No.	Name		Description				
2)	Transmission	Setting	Setting of Transmission Specifications				
	Specification Setting Switches	sw	Setting Items	Sw	of Setting itch		
	ON			ON	OFF		
		11	Main channel settings *2	-	Fix		
	SW/12	12	Transmission mode	RTU	ASCII		
	SW13			(8 bits)	(7 bits)		
	SW14	13	Tansmission speed	Refer to *	3		
	SW15	14	setting	5			
	SW16 SW17 SW17	15					
	SW18	16	Parity bit setting	Set	Not set		
		17	Even/odd parity setting	Even	Odd		
	→ ON	18	Stop bit settng	2 bits	1 bit		
	SW21	21	Unusable	-	-		
	SW22	22	Write during RUN	Enabled	Disabled		
	SW23	23	Unusable	Fix	-		
	SW24	24	Unusable	-	-		

*2: Effective when the main channel is RS-232C and the mode setting switch is set to "2"

*3: Transmission speed setting

Baud Rate (BPS)	300	600	1200	2400	4800	9600	19200
SW13	OFF	ON	OFF	ON	OFF	ON	OFF
SW14	OFF	OFF	ON	ON	OFF	OFF	ON
SW15	OFF	OFF	OF	OFF	ON	ON	ON

No.	Name	Description			
3)	Mode Setting Switch	Used to set the mode. (Factory setting: 0)			
		Mode	Mode Settings		
	BCOS	wode	RS-232C	RS-422/485	
	0,7 7 1	0 *4	MODBUS Protocol	Unusable	
		1 *5	Unusable	MODBUS Protocol	
	0,770	2 *6	MODBUS Protocol	MODBUS Protocol	
		3 to E	Unusable		
	MODE	F	For module test		

*4: Used when connecting to the master station with RS-232C.

*5: Used when connecting to the master station with RS-422/485.

*6: Used when using the RS-232C and RS-422/485 interface in conjunction.

POINT

When the mode setting switch is set to "2", if there is an interface not used to connect a peripheral device, noise will enter from that interface and make normal operation impossible. To prevent this, set the mode setting switch to "0" or "1".

No.	Name	Description
4)	Station Number Setting Switches e z x = z	Used to set the station number. (Factory setting : 1, station No.0 must not be used) The station number is set to enable specification of the AJ71UC24-S2 to be accessed by the MODBUS master station. When setting a station number, make sure it is not duplicated in the system. < <setting range="">> 1 to 99 (however the maximum number of AJ71UC24-S2 slave station is 32. X10 Sets the tens digit X1 Sets the units digit.</setting>
5)	RS-232C interface	RS-232C interface for connection to an external device
6)	RS-422/485 interface	RS-422/485 interface for connection to an external device

6. Outside Dimensions



Unit:mm(inch)

IMPORTANT

- Design the configuration of a system to provide an external protective or safety interlocking circuit for the PL7Cs.
- (2) The components on the printed circuit boards will be damaged by static electricity, so avoid handling them directly. If it is necessary to handle them take the following precautions.
 - (a) Ground human body and work bench.
 - (b) Do not touch the conductive areas of the printed circuit board and its electrical parts with and non-grounded tools etc.

Under no circumstances will Mitsubishi Electric be liable or responsible for any consequential damage that may arise as a result of the installation or use of this equipment

All examples and diagrams shown in this manual are intended only as an aid to understanding the text, not to guarantee operation.

Mitsubishi Electric will accept no responsibility for actual use of the product based on these illustrative examples.

Owing to the very great variety in possible applications of this equipment, you must satisfy yourself as to its suitability for your specific application.

Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties. \hat{M} For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

	n Sales office/Tel	Country/Region	Sales office/Tel
U.S.A	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061 Tel: 1.847-478-2100	Indonesia	P.T. Autoteknindo SUMBER MAKMUR Kompleks Agung Sedayu Propertindo (Harco Mangga Dua) Blok H No.4 JI Mangga Dua Raya
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda.		Jakarta Pusat 10730-Indonesia. Tel : 62-21-336292
	Av. Rio Branco, 123-15 ,and S/1507, Rio de Janeiro, RJ CEP 20040-005, Brazil Tel : 55-21-221-8343	Thailand	F. A. Tech Co.,Ltd. 1138/33-34 Rama 3 Road, Yannawa, Bangkok 10120, Thailand Tel : 66-2-295-2861
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Herts., AL10 8XB.UK	Hong Kong	Ryoden International Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, HongKong Tel: 852-2887-8870
Germany	Tel : 44-1707-276100 Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY	China	Ryoden International Shanghai Ltd. 3F Block5 Building Automation Instrumentation Plaza 103 Cao Bao Rd. Shanghai 200233 China Tel : 86-21-6475-3228
South Africa	Tel: 49-2102-486-0 MSA Manufacturing (Pty) Ltd. P O Box 39733 Bramley 201 8 Johannesburg, South Africa	Taiwan	Setsuyo Enterprise Co., Ltd. 6F., No.105 Wu-Kung 3rd.RD, Wu-Ku Hsiang, Taipei Hsine, Taiwan R.O.C. Tel : 886-2-2299-2499
India	Tel : 27-11-444-8080 Messung Systems Put,Ltd. Electronic Sadan NO:111 Unit No15, M.I.D.C BHOSARI,PUNE-411026	Australia	Mitsubishi Electric Australia Pty. Ltd. 348 Victoria Road, PostalBag, No 2, Rydalmere, N.S.W 2116, Australia Tel : 61-2-9684-7777
Singapore	Tel: 91-212-793130 Mitsubishi Electric Asia Pte, Ltd. 307 ALEXANDRA ROAD #05-01/02, MITSUBISHI ELECTRIC BUILDING SINGAPORE 159943 Tel: 65-470-2480		

MITSUBISHI ELECTRIC CORPORATION

EAD OFFICE:MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100-8310 TELEX: 24532 CABLE MELCO TOKYO NAGOYA WORKS:1-14, YADA-MINAMI 5, HIGASHI-KJ, NAGOYA, JAPAN

When exported from Japan, this manual does not require application to the Ministry of International Trade and Industry for service transaction permission.

> Specifications subject to change without notice. Printed in Japan on recycled paper.