



MITSUBISHI ELECTRIC Air-Conditioner Network system

MN CONVERTER

Installation Manual



CMS-MNG

1 | Safety precautions

- Before using the device, thoroughly read the following safety precautions.
- Symbol explanations are shown below.

⚠ WARNING	This symbol indicates that failure to follow the instructions exactly as stated poses the risk of serious injury or death.
⚠ CAUTION	This symbol indicates that failure to follow the instructions exactly as stated poses the risk of serious injury or damage to the unit.

- After reading this manual, give it to the user to retain for future reference. When the user changes, make sure that the new user receives this manual.

⚠ WARNING

Only use specified cables. Securely connect each cable so that the terminals do not carry the weight of the cable.
Improperly connected or fixed cables or short-circuited cables may produce heat and start a fire.

When malfunctions occurs, stop the device immediately.
Continuous use of the device after malfunction may result in electric shock or fire. If the device malfunctions (if burning smells), stop operation and disconnect the transmission line.

Only use the rated power supply.
Improper rated power supply may result in fire or malfunction.

Check the installation site and the connection status.
If the device is installed in an unstable place, where the unit may fall, in a place where the device may get wet, or in a place where the wiring may be easily disconnected, fire or electric shock may result.

Do not make any modifications or alternations to the device.
Improper modifications or alternations may result in electric shock or fire. Consult the dealer for alternations.

Do not dispose of the device by yourself.
To dispose of the device, consult your dealer.

⚠ CAUTION

Do not place the device in highly dusty, humid or damp locations.
Doing so may result in electric shock or fire.

Do not use in any place at a temperature of more than 40°C (104°F) or less than 0°C (32°F) or exposed to direct sunlight.
Doing so may cause deformation or malfunction.

Do not put dangerous goods around the device.
Do not install the device where there is a risk of leakage of flammable gas. If gas leaks and accumulates around the device, fire or burst may result.

Do not use the device in an unusual environment.
Do not install the device where a large amount of oil (including the machine oil), steam, or sulphide gas is present. Doing so may lead to a remarkable drop in performance, or malfunction.

Never supply AC power such as AC100V or AC200V and/or a voltage greater than DC 30V.
Doing so may result in breakdown, ignition or fire. Supplied voltage of this device is DC30V maximum.

Never pull or twist the transmission line.
Doing so may result in fire or malfunction.

If water, metal objects or extraneous matter enters the device, stop the operation and disconnect the transmission line.
Continuous use of the device may result in fire or electric shock.

Never wipe the device with benzene, thinner, chemical rags, etc.
Doing so may result in discoloration or malfunction. To remove heavy stains, soak a cloth in neutral detergent mixed with water, wring it out thoroughly, wipe the stains off, and wipe again with a dry cloth.

Do not use the device for special environment.
This device is exclusively for maintenance. Do not use it for any purpose other than maintenance. Doing so may cause malfunction.

Use standard wires with the proper current capacity.
Improper current capacity may result in electrical leakage or fire.

Always disconnect the transmission line by grasping the plug.
Pulling the cord may damage the transmission line, preventing normal measurement or causing equipment breakdown.

Do not splash water on the device or touch it with wet hands.
Doing so may result in electric shock or equipment breakdown.

Do not use the device if the cables or transmission line are damaged.
There is a risk of equipment breakdown, or measurement errors from a transmission line short circuit.

Do not place objects on top of the device.
There is a risk of malfunction or injury.

Do not spray any insecticide or flammable spray to the device.
Do not place such as the flammable spray around this device, or spray it directly to the device. Doing so may result in fire or burst.

Do not touch any PCB (Printed Circuit Board) with your hands or with tools. Do not allow dust to collect on the PCB.
Doing so may cause fire or an electric shock.

2 | Before Using the MN Converter

Check the box contains the following parts:

- (1) MN Converter (Including the M-NET transmission line with the Connection clips)
- (2) Installation manual (This manual)

3 | Functions

MN Converter has the following two functions.

- (1) M-NET/RS-232C(USB)Converter: In order to confirm the operation status of the air conditioner using MAINTENANCE TOOL, the signal from the M-NET transmission line is converted to the RS-232C (USB) signal.
- (2) Remote error notification: It connects to the public network through the modem. Error of the air-conditioner will be reported to the distant service center and etc.

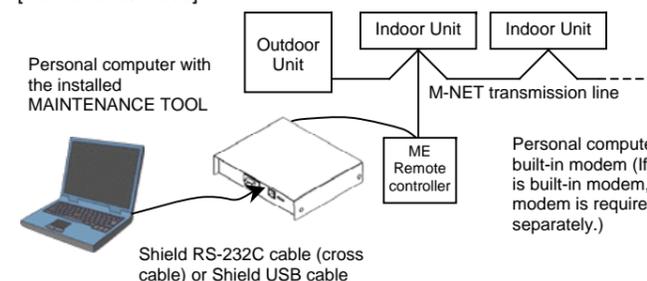
4 | Connections

The MN Converter has 2 operation modes. Connection methods differ with the each mode. Refer to the figure below for settings.

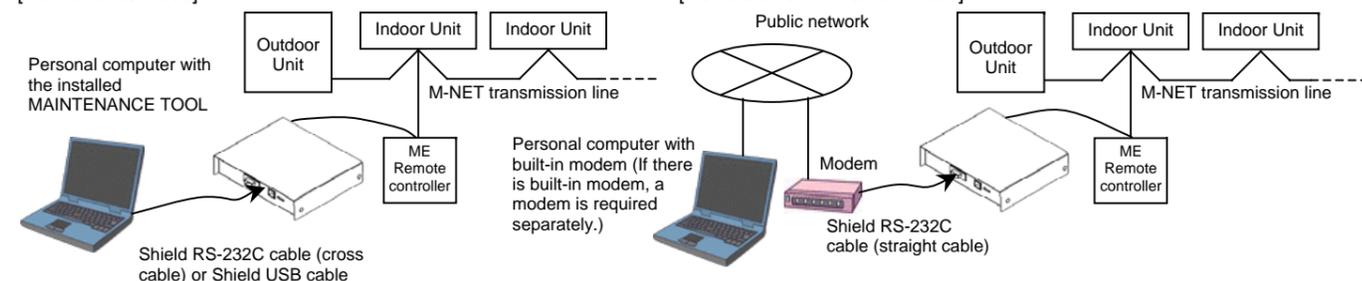
- (1) Maintenance mode (Use with a MAINTENANCE TOOL)
- (2) Remote error notification mode (Use as a remote error notification device)

The MAINTENANCE TOOL switches the operation mode. Please refer to the Operating manual of the MAINTENANCE TOOL.

[Maintenance mode]



[Remote error notification mode]



*M-NET address is set with the MAINTENANCE TOOL.

4.1 Connection to the personal computer

The MN Converter is equipped with the D-SUB 9Pin connector (male) and the USB connector (Type B).

4.1.1 RS-232C cable

Use a shielded RS-232C 9Pin- 9Pin **cross cable** (commercially available length: 1.5 m, 59 in, 4.9 ft max) to connect the MN Converter to the personal computer.

4.1.2 USB Cable

Use the shielded USB cable (commercially available length: 1.5 m, 59 in, 4.9 ft max) to connect to the personal computer. When the USB cable is used, installation of drivers is required. Refer to the Operating manual of the MAINTENANCE TOOL. These drivers are contained in the setup CD attached to the MAINTENANCE TOOL.

Notes

- The device can be connected to the personal computer using either the RS-232C cable or the USB cable. However, both cables cannot connect to the personal computer at once.
- When using the remote error notification mode, the device cannot connect to the personal computer with the RS-232C cable. Only USB cable can be used.
- Select the RS-232C cable depending on the serial interface of the personal computer to be used. If the form of the connector shape is special, consult a personal computer dealer.
- Select the USB cable depending on the USB interface of the personal computer to be used. The USB connector to be connected to the MN Converter is Type B.

4.2 Connection to the air-conditioner

To connect the MN Converter and the air conditioner, use the M-NET transmission line crocodile clip to the M-NET terminal block of the outdoor unit or the remote controller. (No polarity.) To connect the MN Converter and the air conditioner (M-NET transmission line), strictly follow the instructions mentioned below.

⚠ Caution

- Check the voltage of M-NET transmission line so that it does not exceed DC 30V before connection.
- Do not touch M-NET transmission line and transmission terminal with hands.
- To extend the M-NET transmission line, if connecting the MN Converter and outdoor unit, be sure to use reinforced insulation transmission cable. Contact your dealer for further detail.
- Do not connect the M-NET transmission line to the power terminal block of the outdoor unit etc. Doing so may result in fire.
- If the MN Converter is consistently connected, use eyelet terminals instead of crocodile clips to connect the M-NET terminal block. Connection must be performed by authorized personnel.

4.3 Connection to the modem

Connect the modem (including GSM modem) to the MN Converter with the Shield RS-232C **straight cable** (commercially available length: 1.5 m, 59 in, 4.9 ft max). You cannot use USB cable.

To set "Remote error notification" function, various settings (e.g. reception settings) must be made on a personal computer (with the modem or built-in modem). Register the phone number and the building name to be contacted when an error occurs, and the error type to be notified. Refer to the Operating manual of the MAINTENANCE TOOL.

Notes

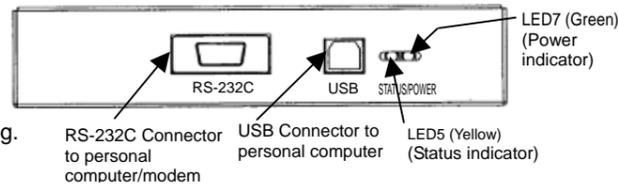
- When "Remote error notification" function is set, the receiving side personal computer must not turn off.
- When the MAINTENANCE TOOL is operated through the modem, "Remote error notification" function does not work.
- When "Remote error notification" function is set, MN Converter is counted as one of the System remote controller units that can be connected to the indoor unit. "Remote error notification" function cannot be used when more than five units are connected.

Attention

- When "Remote error notification" function is set, be sure to register the correct phone number to be contacted.

5 | Checking the Operation

After connecting the M-NET transmission line, look through the LED display hole on the casing side to check the LED7 light (Green: power) turns on. If the LED7 light (Green) is not turned on, no power is being supplied to the MN Converter. Check the connection of the transmission line and/or the wiring. (The power is supplied from the M-NET transmission line.)



6 | MN Converter Configuration and Self-Diagnose Function

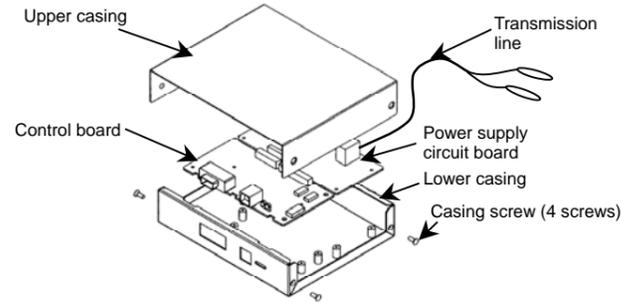
6.1 Configuration

The MN Connector consists of the upper casing, control board, power supply circuit board, the lower casing and the transmission line. For the maintenance and self-diagnose etc., remove the casing screws (4 screws) to remove the upper casing.

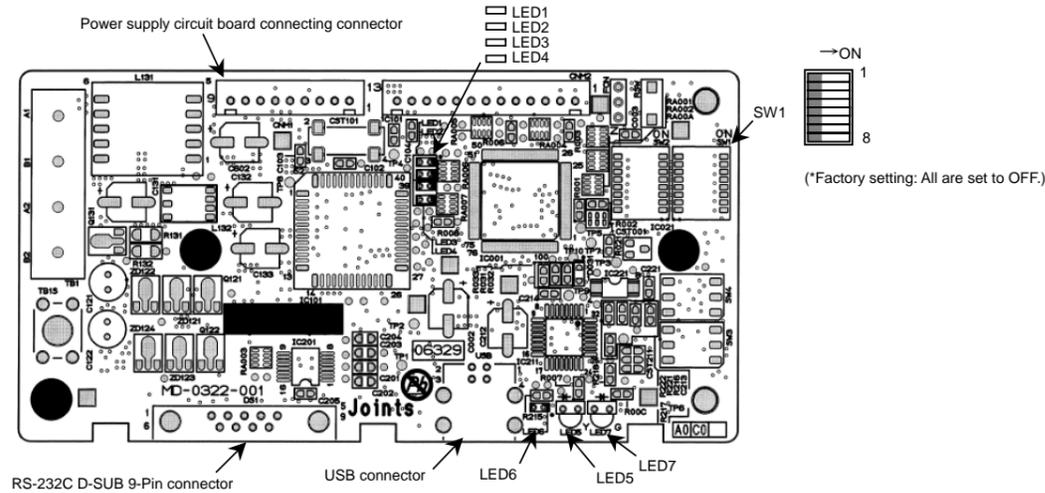


Caution

To avoid the risk of electric shock or damage to the board, never disassemble the MN Converter with the transmission line connected. Be certain to disconnect the transmission line before starting the operation.



6.2 Names and functions of parts (control board)



(*Factory setting: All are set to OFF.)

SW1	Function name	Function details	Remarks
1 to 5	Not used	Set all switches to OFF.	-
6 to 8	For maintenance	Change the settings to check the status. Settings to be made are shown below.	Factory setting: All are set to OFF.

6.3 Self-Diagnose function

LED number	Functions	Function details																																																																															
LED1 to 4 (Green)	LED for maintenance Displayed contents are changed according to SW1-6 to 8 settings.																																																																																
		<table border="1"> <thead> <tr> <th colspan="3">SW1</th> <th rowspan="2">Functions</th> <th colspan="4">Meaning</th> </tr> <tr> <th>-6</th> <th>-7</th> <th>-8</th> <th>LED1</th> <th>LED2</th> <th>LED3</th> <th>LED4</th> </tr> </thead> <tbody> <tr> <td>OFF</td> <td>OFF</td> <td>OFF</td> <td>Operation status display</td> <td>Maintenance mode</td> <td>Remote error notification mode</td> <td>Constant monitor status</td> <td>Remote error notification status</td> </tr> <tr> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>Communication status display</td> <td>M-NET transmission</td> <td>M-NET reception</td> <td>RS-232C transmission</td> <td>RS-232C reception</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>OFF</td> <td>Error status display</td> <td>Air-conditioner malfunction</td> <td>Preliminary error</td> <td>Communication error</td> <td>Remote error notification error</td> </tr> <tr> <td>OFF</td> <td>ON</td> <td>ON</td> <td>Communication error detail 1</td> <td>Duplicated address error</td> <td>Bus busy error</td> <td>H/W error</td> <td></td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>OFF</td> <td>Communication error detail 2</td> <td>No polar settings error</td> <td>Transmitted data error</td> <td>No ACK error</td> <td>No response error</td> </tr> <tr> <td>ON</td> <td>OFF</td> <td>ON</td> <td>Remote error notification error detail 1</td> <td>Unregistered phone number to be connected.</td> <td>No connection information</td> <td>No response from the modem</td> <td>Call timeout</td> </tr> <tr> <td>ON</td> <td>ON</td> <td>OFF</td> <td>Remote error notification error detail 2</td> <td>Call redialing</td> <td></td> <td></td> <td></td> </tr> <tr> <td>ON</td> <td>ON</td> <td>ON</td> <td>Not used</td> <td colspan="4">* Do not set the functions.</td> </tr> </tbody> </table>	SW1			Functions	Meaning				-6	-7	-8	LED1	LED2	LED3	LED4	OFF	OFF	OFF	Operation status display	Maintenance mode	Remote error notification mode	Constant monitor status	Remote error notification status	OFF	OFF	ON	Communication status display	M-NET transmission	M-NET reception	RS-232C transmission	RS-232C reception	OFF	ON	OFF	Error status display	Air-conditioner malfunction	Preliminary error	Communication error	Remote error notification error	OFF	ON	ON	Communication error detail 1	Duplicated address error	Bus busy error	H/W error		ON	OFF	OFF	Communication error detail 2	No polar settings error	Transmitted data error	No ACK error	No response error	ON	OFF	ON	Remote error notification error detail 1	Unregistered phone number to be connected.	No connection information	No response from the modem	Call timeout	ON	ON	OFF	Remote error notification error detail 2	Call redialing				ON	ON	ON	Not used	* Do not set the functions.			
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LED number	Functions	Function details																									
LED5 (Yellow)	Operation status LED	<p>[For the both maintenance mode and the remote error notification mode] Lit: Ready for operation. (normal) Unlit: Not ready for operation. (error)</p> <p>[For the remote error notification only.] Blink: When the remote error notification activates, the LED light blinks according to the following blink patterns: ■ ...Lit (Unit: second)</p> <table border="1"> <thead> <tr> <th>Pattern</th> <th>Explanation</th> <th>Priority*</th> <th>Blinking pattern</th> <th>Operation status</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Slow blink</td> <td>High</td> <td>0.5 2.0 0.5</td> <td>Modem error</td> </tr> <tr> <td>2</td> <td>Long blink</td> <td>↑</td> <td>2.0 0.5 2.0</td> <td>Remote error notification failed</td> </tr> <tr> <td>3</td> <td>Double blink</td> <td>↑</td> <td>0.2-0.1-0.2-0.5</td> <td>Redialing</td> </tr> <tr> <td>4</td> <td>Blinking</td> <td>Low</td> <td>0.5 0.5</td> <td>Air-conditioner error</td> </tr> </tbody> </table> <p>(*When all of the operation statuses occur at a time, the status with the highest priority is displayed.)</p> <p>Refer to the Operating Manual of the MAINTENANCE TOOL for more information.</p>	Pattern	Explanation	Priority*	Blinking pattern	Operation status	1	Slow blink	High	0.5 2.0 0.5	Modem error	2	Long blink	↑	2.0 0.5 2.0	Remote error notification failed	3	Double blink	↑	0.2-0.1-0.2-0.5	Redialing	4	Blinking	Low	0.5 0.5	Air-conditioner error
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4	Blinking	Low	0.5 0.5	Air-conditioner error																							
LED6 (Green)	USB transmission/reception status LED	LED6 blinks on transmitting and receiving data through USB communication.																									
LED7 (Green)	Power LED	LED7 lights when the MN Converter power turns on.																									

7 | Troubleshooting

Check the operation according to the following contents.

Phenomenon	Check items	Remedy
MN Converter does not run	Check whether the power LED (LED7) is lit.	When the power LED (LED7) is not lighting, no power is being supplied. Check the wiring. Check whether the voltage of the M-NET transmission contact is between DC17-30V.
	Check whether the operation status LED (LED5) is lit.	When the operation state LED (LED5) does not light, this device does not work properly. Check whether SW1-1 to 5 are turned OFF.
RS-232C Communication error	Check whether the cable is firmly connected.	Connect the cable firmly.
	Check the COM Port number of the cable connected to the personal computer.	Change the COM port number to be used on the MAINTENANCE TOOL screen.
	Check the cable type.	When RS-232C is connected to the personal computer, use the cross cable. When it is connected to the modem, use the straight cable.
USB Communication error	Check whether the cable is firmly connected.	Firmly connect the cable.
	The drivers are not installed.	Install the drivers. (The drivers are contained in the setup CD attached to the MAINTENANCE TOOL Ver.4.20 or later.)
Operation status LED (LED5: yellow) is blinking with pattern 1(Slow blink).	Communication failure with the modem that is connected to the MN Converter.	Check that the power of the modem is turned on and that the communication cable of the modem is correctly connected.
Operation status LED (LED5: yellow) is blinking with pattern 2(Long blink).	Remote error notification failed.	Check the "Report log display" screen of the MAINTENANCE TOOL. Then check the modem that is connected to the MN Converter, phone line, and the remote error notification status. (Refer to the Operating Manual of the MAINTENANCE TOOL for more information.)

8 | Specification

Item	Specification
Dimensions	160 (W) × 37 (H) × 137 (D) mm / 6 1/4 (W) × 1 1/2 (H) × 5 3/8 (D) in
Weight	0.65 kg / 1 1/2 lb
Power Supply (*1)	30 VDC / 24 VDC (M-NET)
Rated Power Consumption	2 W
Environment Conditions	Temperature
	Humidity
Interface	Operating temperature range
	Storage temperature range
	RS-232C (D-SUB 9Pin: male connector) USB connector (Type B)

*1: Supply electric power from a power supply unit for the transmission line or an outdoor unit.

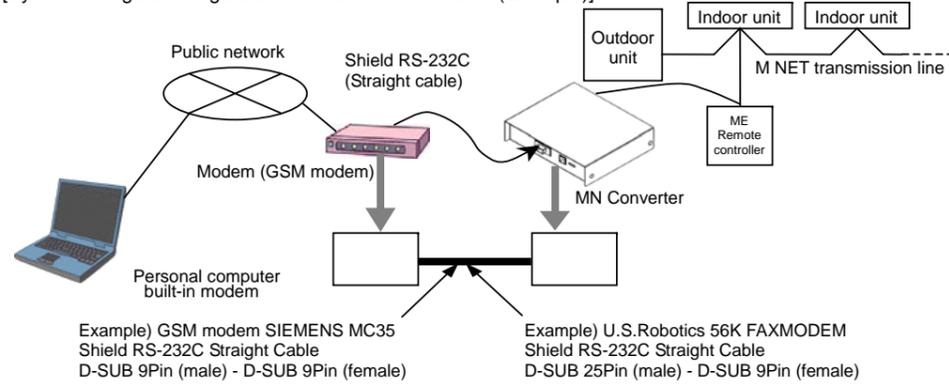
Appendix | How to connect to the modem

This section describes how to connect the MN Converter to the modem and use it through the public line.

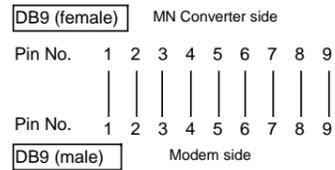
1. Basic configuration

Recommended modem: Analog - U.S.Robotics 56K FAXMODEM
GSM - SIEMENS MC35

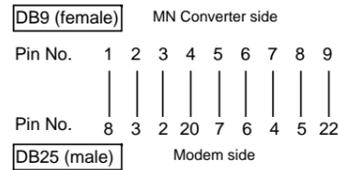
[System configuration figure connected with the modem (Example)]



[Connection diagram of the connection cable]



[Connection diagram of the connection cable]



2. Modem initialization

The modem of MN Converter side is required to be initialized. Modem setting procedures by the MAINTENANCE TOOL are shown below.

Procedure (1) Connect the personal computer with installed MAINTENANCE TOOL and the modem which is on the MN Converter side using the Shield RS-232C cable (straight cable(*1)) as shown below.

*1: Refer to the previous chapter for the details of the cable connection.

[Connection to the modem at Initialization]



Procedure (2) After finishing the cable connection, activate the MAINTENANCE TOOL and jump to the modem setting screen. Set 3 items shown below. Refer to the [Setting procedures] on page 6. As the AT commands are used for settings, also refer to the manual of the modem.

- Set the modem to ignore the Data Terminal Ready (DTR) by AT command.
- Set the modem to ignore the Required Transmission Service (RTS) by AT command.
(In case of the modem with no RTS settings, set the modem to deactivate the H/W flow control by AT command.)
- Set the modem not to volatilize the memory of step (a) and (b) by AT command.

[Setting Procedures]

- After connecting the MAINTENANCE TOOL that is already installed on the personal computer and the modem, start the MAINTENANCE TOOL.
- On the Select Monitor mode screen, choose MN CONVERTER, Remote Connection, CMS-MNG-E, and the COM port that are being connected and then choose **Select**.
- Jump to the Connection setting screen. Choose **MODEM initial setting**.
- Jump to the Connection modem initial setting screen. Choose **New settings**.
- Jump to the AT Command transmit screen.

Enter the AT command corresponding to the procedure (2) (a), (b), (c) in the space under **AT COMMAND**. Then choose **Transmission** beside the entry space.

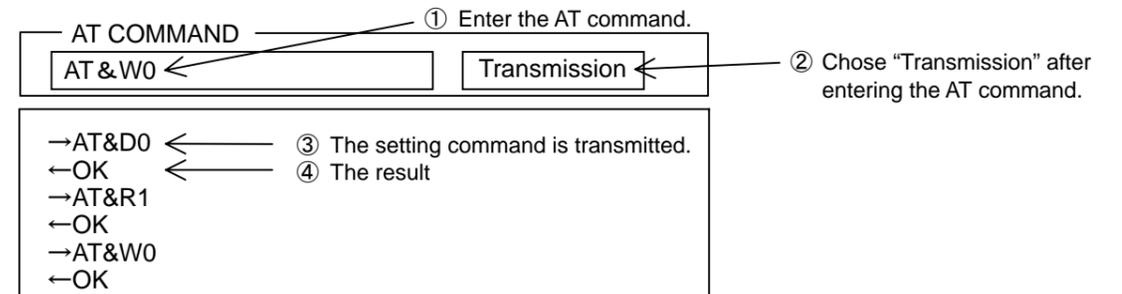
*Refer to the manual of the modem and enter the proper AT command.

In case of U.S. robotics 56K FAXMODEM, see below for the proper AT command.

- AT&D0
- AT&R1
- AT&W0

Notes ● AT command may differ depending on the modem type. Check the proper AT command referring to the manual of the modem.

Example: AT command transmit screen



- When "Transmission" is chosen, AT command is sent to the modem. When the setting is completed, the modem sends back OK command. This is the end of the modem setting by AT command.
- Close the MAINTENANCE TOOL.

After initializing the modem, connect each unit as shown in the System configuration figure connected with the modem (Example) on page 5.

3. Communication error with the modem

When the MN Converter cannot communicate with the modem properly, disable data compression function and set the baud rate to 9600bps. For settings, refer to chapter 2. Modem initialization.

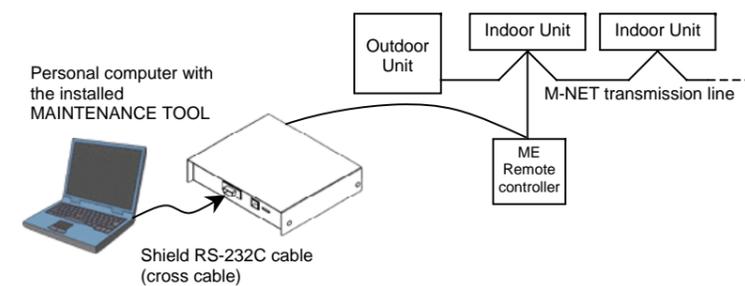
- Data compression function: Disabled
- Baud rate setting: 9600bps

Send the AT command corresponded to the contents (1) and (2) to the modem, and make the settings. Refer to the manual of the modem and set.

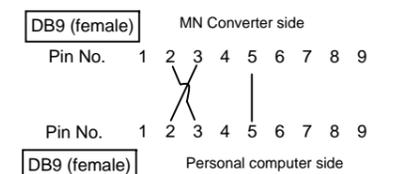
Appendix | How to connect RS-232C to a Personal Computer

This section describes how to connect the MN Converter through RS-232C to the Personal Computer.

[System configuration figure connected with the Personal computer (Example)]



[Connection diagram of the connection cable]
Shield RS-232C cross cable
D-SUB 9Pin (female) - D-SUB 9Pin (female)



This product is designed and intended for use in the residential, commercial and light -industrial environment.

This product at hand is based on the following EU regulations:

- Low Voltage Directive 73/23/EEC
- Electromagnetic Compatibility Directive 2004/108/EC

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the use is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

 **MITSUBISHI ELECTRIC CORPORATION**

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN