# **RF MODEM**

## M110A

User's Manual



Ver 2.0

SEBINE Technology, Inc.

M110A\_20090926.hwp

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#### 1. Summary

#### 1.1 Product Introduction

M110A is a RF MODEM which uses ISM 433MHz frequency bandwidth. M110A has a function of RF transmission and reception and provides serial communication interface. When a user transmits data through a serial port by designated protocol, M110A transmits data by wireless communication. M110A allows users to set PC MODE, DEVICE MODE, and communication channels via environment setting. Usable frequency number, channel number, and serial number are printed in shipping products.



Figure 1. M110A

#### 1.1.1 Application examples

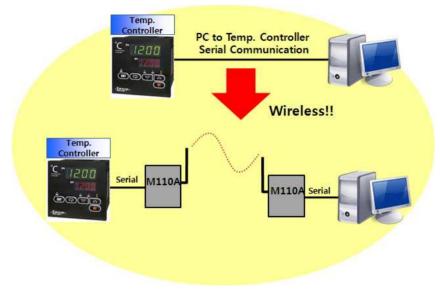


Figure 2. Wireless Serial Communication

#### 1.1.2 Product usage

- Cable system replacement : Maintenance difficulty with cables is solved
- Hard environment for cable installation : Environment that requires long and co mplicated cable installation is solved
- Uneasy area for data acquisition by cable : Outdoor tank monitoring system

#### 1.1.3 Product application area

- Pump, pipeline, liquid flow monitoring system
- Tank level, temperature monitoring system
- Poison gas detection and monitoring system
- Weather data (rainfall, wind direction, wind velocity, humidity, temperature) monitoring system

#### 1.1.4 Product parts

M110A main body, one  $\lambda/4$  dipole antenna, one power connector

#### 1.2 Specification

Item	Specification		
Name	M110A		
Dimension	$88.1$ mm(L) $\times 85$ mm(W) $\times 19.6$ mm(H) (w/o Antenna, Connector)		
Housing	Aluminum		
Weight	140g (w/o Antenna)		
Power Supply	+12Vdc $\pm$ 10%, Reverse Power/Overvoltage/Overcurrent Protection		
Current Consumption	Tx 94mA, Rx 88.5mA, WDT Reset 114mA (@12Vdc)		
Operating Temperature	-10℃ ~ +60℃		
RF Features	<ul> <li>Frequency : 433.050MHz ~ 434.790MHz</li> <li>Channel Spacing : 25KHz</li> <li>Transmitter Power : 10mW</li> <li>Receiver Sensitivity : -116 ~ -120dBm(-116dBm typ.)</li> <li>Modulation : FSK</li> <li>Bandwidth : &lt; 14KHz</li> </ul>		
<ul> <li>Performance</li> <li>Expected Line-Of-Sight Range : Up To 1.5km with λ/4 Dipole Antenna</li> <li>RF Data Rate : 4.8K Baud, 7.2K Baud</li> <li>RS232/RS485 Selectable</li> </ul>			
I/O Interface	<ul> <li>RS232/RS485 Selectable</li> <li>Serial Communication Basic Setting(User Selectable) : Data Bit 8bit, No Parity, 1 Stop Bit</li> <li>User Selectable Baud Using DIP Switch: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200</li> <li>9Pin D-SUB Female Connector</li> </ul>		
Antenna Interface	Antenna • SMA Connector		

Table 1. M110A Specification

#### 2. Operational mode

M110A allows PC MODE and DEVICE MODE for users' personal need. Function Code and its functionality is restricted based upon selected mode. Refer the Programmer guide for detailed protocol and Function Code.

#### 2.1 PC MODE

2.1.1 Definition of PC MODE

Data is transmitted when data is sent through serial port by selected protocol function.

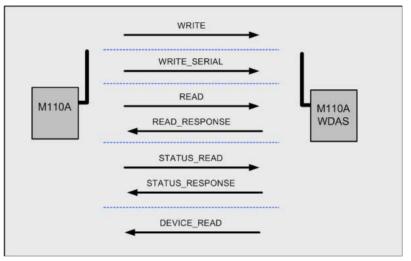


Figure 3. PC MODE of M110A

2.1.2 Function Code available at PC MODE

- WRITE : WDAS device output DO[Digital Output], AO[Analog Output]

- WRITE\_SERIAL : Transmit serial data to RF MODEM or W110A where serial port is available

- READ : WDAS device reads the status of DI[Digital Input], AI[Analog Input]

- READ\_RESPONSE : Function Code of READ\_RESPONSE is used when WDAS device receives READ Function Code and transmits current input status.

- STATUS\_READ : WDAS device reads the status of DO[Digital Output], AO[Analog Output]

- STATUS\_RESPONSE : Function Code of READ\_RESPONSE is used when WDAS device receives STATUS\_READ Function Code and transmits current output status.

- DEVICE\_READ : WDAS receives and output through Serial Port when DEVICE MODE available WDAS periodically transmits data of DI[Digital Input], AI[Analog Input]

2.1.3 Environment setting list before PC MODE use

- Select PC MODE at PC/DEVICE MODE Setting

#### 2.2 DEVICE MODE

2.2.1 Definition of DEVICE MODE

When the device that has usable PC MODE/DEVICE MODE as Serial Port is set as DESTINATION and data is input to Serial Port at once, data are transmitted automatically.

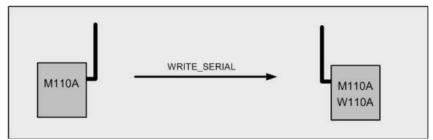


Figure 4. DEVICE MODE of M110A

 $2.2.2\ {\rm Function}\ {\rm Code}\ {\rm available}\ {\rm at}\ {\rm DEVICE}\ {\rm MODE}$ 

- WRITE\_SERIAL : When Data obtained through Serial Port are transmitted to established DESTINATION device, Function Code of WRITE\_SERIAL is used.

2.2.3 Environment setting list before DEVICE MODE use

- DEVICE MODE selection at PC/DEVICE MODE Setting
- DESTINATION ID set up at DESTINATION ID Setting

#### **3. Device Connection**

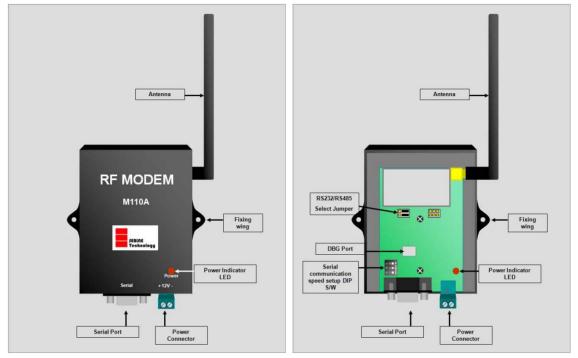


Figure 5. M110A Outer

Figure 6. M110A Inner

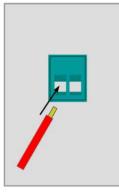
#### 3.1 Power Supply

M110A works at +12Vdc and equipped with Reverse Power / Overvoltage / Overcurrent Protection circuitry. Power is supplied by power connector provided at product purchase as shown in figure below. M110A has no external power switch and it becomes in working mode when the power is supplied. If normal power is supplied, power supply indicator LED is on.

 $\oplus$  As shown in Figure 7, remove the skin of wire about 7mm and put it into the terminal and tighten it by turning the left screw using screwdriver.

② As shown in Figure 8, connect it to power.

③ As shown in Figure 9, connect the terminal to power port of M110A, Make sure the direction is exact as shown in Figure 9.



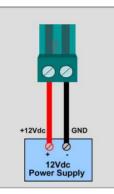




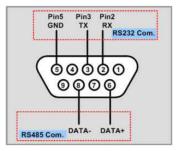
Figure 7. Power Supply-1 Figure 8. Power Supply-2 Figure 9. Power Supply-3

#### ≫ Notice

Readily accessible disconnect device shall be incorporated external to the equipment.

#### 3.2 RS232 Communication Connection

3.2.1 PC Communication



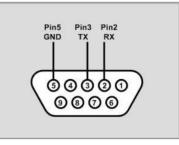


Figure 10. M110A Connector : DB-9 Female

Figure 11. PC Connector

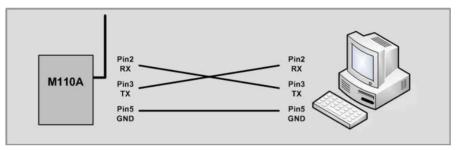


Figure 12. Connection of M110A and PC

#### 3.2.2 DEVICE Connection

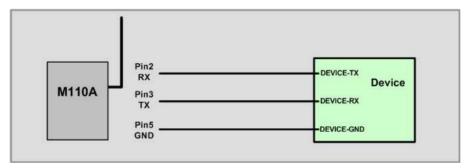


Figure 13. Connection of M110A and DEVICE  $% \left( {{{\rm{A}}} \right)$ 

#### 3.3 RS485 Communication Connection

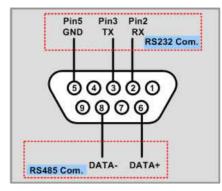


Figure 14. M110A Connector : DB-9 Female



Figure 15. Connection of M110A and RS485 Communication

#### 3.4 Serial communication speed setup

M110A is able to adjust serial communication speed with DIP switch as shown in Figure 16. Serial communication adjustment must be set before power is supplied. During the operation, if the communication speed is to be reset, DIP switch is set and then power should be OFF/ON afterward.

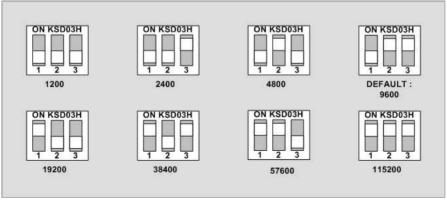


Figure 16. Communication speed adjustment with DIP switch

#### 3.5 RS232/RS485 communication setup

M110A is able to set the serial communication method by RS232/RS485 jumper shown in Figure 6. If serial communication method is selected, appropriate pin of serial port must be used corresponding to communication method.



Figure 17. RS232/RS485 communication method setup by RS232/RS485 jumper

#### 3.6 Antenna connection

Connect the SMA-P(male) connector antenna to SMA-J(Female) connector of M110A. At purchase,  $\lambda/4$  dipole antenna is provided.



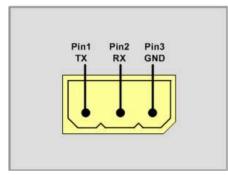
Figure 18. SMA-J Antenna connector

#### 4. Environment setup

Environment setup can be made through SetModemEnv.exe program. For details, consult the corresponding manual.

#### 4.1 Hardware connection

Use DBG port for PC connection shown in Figure 6.



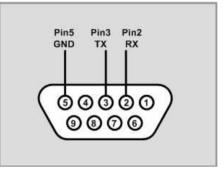


Figure 19. Hardware connection-1(M110A)

Figure 20. Hardware connection-2(PC)

For communication frequency adjustment, port and PC must be connected via serial communication program as shown in Figure 19.

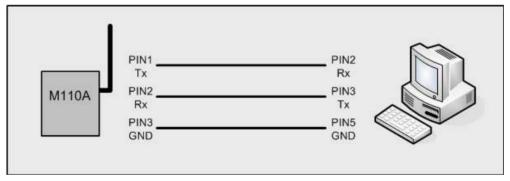


Figure 21. Hardware connection-3

The hardware connection between M110A and PC can be done as shown in Figure 21.

#### 4.2 Setup list of each mode

4.2.1 PC MODE

- PC/DEVICE MODE Setting : PC MODE Setting

- Channel Setting : Communication Frequency Setting

- Tx Power Level Setting : Communication RF Power Level Setting

- UART Configuration : Select RS232/RS485, Data Bit, Parity Bit, Stop Bit Setting

#### 4.2.2 DEVICE MODE

- PC/DEVICE MODE Setting : DEVICE MODE Setting

- Channel Setting : Communication Frequency Setting
- Tx Power Level Setting : Communication RF Power Level Setting
- DESTINATION ID Setting : DESTINATION ID Setting

- UART Configuration : Select RS232/RS485, Data Bit, Parity Bit, Stop Bit Setting

4.2.3 Environment Setting Program

1) PC/DEVICE MODE Setting(MODE Setting)

9 M110A			X
COM PORT 2	Open Close	SebineTech SetModem	Env Ver 1.0 <b>비술 (주)</b>
Information	All Setting		
Channel Setting	10 HEX(1~45)	M110A Information	
Tx Power Level Setting	0A HEX(1~FF)	1. Device ID : M002 2. Destination ID : M200	
PC/Device Mode Setting	PC     Device	3. Channel Number : 10 4. Power : 0A	
Destination ID Setting	M200 ex) M200	5. Mode : Device Mode 6. FW Update Date : 2009.08.1	.4
Period Setting	🖸 HOUR 🔘 MIN 🔍 SEC	7. FW Version : Ver2.3	
		UART Information Reading	
UART_Information	UART All Setting	Data Bit : 5 Bit Stop Bit : 1 Bit	
UART Mode Setting	• RS232 • RS485	Parity Bit : Non Bit	
Bit Setting	• 5 • 6 • 7 • 8	Data Bit OK	
	● 1         ● 1.5         ● 2           ● Even ● Odd ● Space         ● Mark ● Non	Stop Bit PC/Device Mode Setting Parity Bit Input 1 or 2 : 1 Please Rebooting!!	

Figure 22. Environment Setting Program-MODE Setting

Information Channel Setting Tx Power Level Setting PC/Device Mode Setting Destination ID Setting	10 0A • PC	HEX(1~45) HEX(1~FF)	M11	w.sebinetech.com LOA Information ID : M002
Tx Power Level Setting PC/Device Mode Setting	0A • PC	HEX(1~FF)	M11 ********	LOA Information ID : M002
PC/Device Mode Setting	• PC		1. Device	ID: M002
		C Device	2 Dectina	
Destination ID Setting	10	and these	3. Channe	ition ID : M000 el Number : 10
	M200	ex) M200	4. Power : 5. Mode :	PC Mode
Period Setting	e Hour C	MIN Ó SEC		date Date:2009.08.14 sion:Ver2.3
	• RS232	Il Setting C RS485 C 7 C 8	UART	1 Bit
		1.5 C 2 Odd C Space	Stop Bit Chann	hel Setting hannel HEX(0x01~0x45) 10

2) Channel Setting(Communication Frequency Setting)

Figure 23. Environment Setting Program-Channel Setting

- M110A SebineTech SetModemEnv Ver 1.0 Close COM PORT 2 semine 세빈기술(주) 2. Destination ID : M000 3. Channel Number : 10 4. Power : 0A 5. Mode : PC Mode 6. FW Update Date : 2009.08.14 7. FW Version : Ver2.3 Information All Setting ^ 10 HEX(1~45) Channel Setting Tx Power Level Setting 8 HEX(1~FF) PC/Device Mode Setting · PC C Device OK Destination ID Setting M200 ex) M200 -- UART Information Reading --UART Mode : RS232 Communication Data Bit : 5 Bit Stop Bit : 1 Bit Parity Bit : Non Bit 🖲 HOUR C MIN O SHC Period Setting OK UART\_Information UART All Setting -- Channel Setting --• RS232 C RS485 UART Mode Setting Input Channel HEX(0x01~0x45) 10 Bit Setting • 5 • 6 • 7 • 8 Data Bit C 1.5 C 2 Stop Bit • 1 -- Tx Power Level Setting --Input HEX(01~FF): 8 C Even C Odd C Space Parity Bit C Mark 🖲 Non OK
- 3) Tx Power Level Setting(Communication RF Power Level Setting)

Figure 24. Environment Setting Program-Tx Power Level Setting

4) DESTINATION ID Setting (DESTINATION ID Sett
--

9 M110A		
	Open Close	SebineTech SetModemEnv Ver 1.0
Information	All Setting	토ERINE         예빈기술(주)           ************************************
		M110A Information
Channel Setting		1. Device ID : M002 2. Destination ID : M200
Tx Power Level Setting	08 HEX(1~FF)	3. Channel Number : 10
PC/Device Mode Setting	C PC	4. Power : 08 5. Mode : Device Mode
Destination ID Setting	M001 ex) M200	6. FW Update Date : 2009.08.14 7. FW Version : Ver2.3
Period Setting	🕙 HOUR 🌑 MON 🔘 SEG	OK
		UART Information Reading
		UART Mode : RS232 Communication
UART_Information	UART All Setting	Data Bit : 5 Bit Stop Bit : 1 Bit Parity Bit : Non Bit
UART Mode Setting	💽 RS232 🛛 💭 RS485	OK
Bit Setting	• 5 • 6 • 7 • 8 I	Data Bit Destination ID Setting
	● 1 ● 1.5 ● 2 5	Stop Bit Input Destination ID(4byte): M001
	C Even C Odd C Space	Parity Bit M001
	C Mark 🖲 Non	OK
	<	

Figure 25. Environment Setting Program-DESTINATION ID Setting

5) U	JART	MODE	Setting(UART	MODE	Setting)	
------	------	------	--------------	------	----------	--

6 M110A		
	Open Close	SebineTech SetModemEnv Ver 1.0
Information Channel Setting Tx Power Level Setting PC/Device Mode Setting Destination ID Setting Period Setting	All Setting           10         HEX(1~45)           08         HEX(1~FF)           C         PC         C           M001         ex) M200           C         HCAUC         HEX.	5. Mode : Device Mode 6. FW Update Date : 2009.08.14 7. FW Version : Ver2.3 OK 
UART_Information UART Mode Setting Bit Setting	UART All Setting RS232 RS485 S 6 7 8 Data Bit 1 1.5 2 Stop Bit Even Odd Space Parity Bit Mark Non	OK Destination ID Setting Input Destination ID(4byte) : M001 M001 OK RS232/RS485 Setting ***********************************

Figure 26. Environment Setting Program-UART MODE Setting

6) UART Bit Setting(UART Bit Setting)

© M110A				
	Open C	lose	SebineTech SetModemEnv Ver 1.0	
Information	All Setting		Step 2. Stop Bit	^
Channel Setting	10 HEX	(1~45)	1. 1 Stop Bit 2. 1.5 Stop Bit	
Tx Power Level Setting	08 HEX	(1~FF)	3. 2 Stop Bit	
PC/Device Mode Setting	C PC C D	evice	Input Stop Bit (1 ~ 3): 1	
Destination ID Setting	M001 ex) M	1200	step3. Parity Bit	
Period Setting	CHARCENE (	7 5HG	1. Even Parity 2. Odd Parity 3. Space Parity 4. Mark Parity 5. Non Parity	
UART_Information	UART All Settin		Input Parity Bit ( 1 ~ 5 ) : 5	
UART Mode Setting	RS232     S 6 7     1 1 1.5     Even C Odd C     Mark © Non	RS485 C 8 Data Bit C 2 Stop Bit Space Parity Bit	< MENU UART CONFIGURATION Meru > 1. RS232/RS485 Setting 2. UART Setting 3. UART Information Reading Please Rebooting!!	

Figure 27. Environment Setting Program-UART Bit Setting

#### 5. Example

(EX. 1) M110A(PC MODE/DEVICE MODE) to M110A(PC MODE/DEVICE MODE) Communication

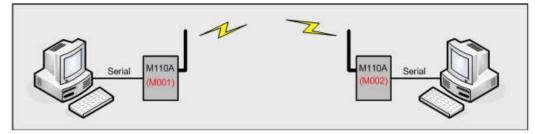


Figure 28. M110A to M110A Communication Example

(EX. 2) M110A(PC MODE) to W110A(PC MODE) Communication

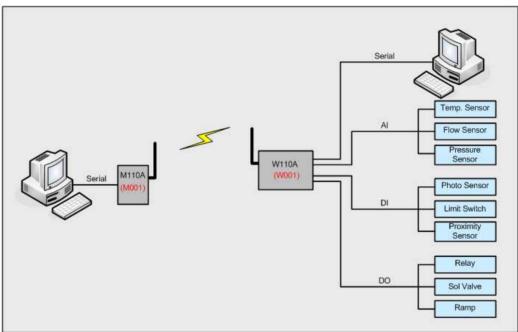


Figure 29. M110A to W110A Communication Example

(EX. 3) W210A(PC MODE/DEVICE MODE) to M110A(PC MODE) Communication

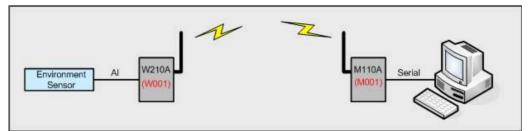


Figure 30. W210A to M110A Communication Example

(EX. 4) W310A(PC MODE/DEVICE MODE) to M110A(PC MODE) Communication

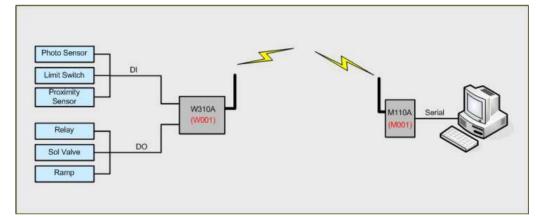


Figure 31. W310A to M110A Communication Example

(EX. 5) W410A(PC MODE/DEVICE MODE) to M110A(PC MODE) Communication

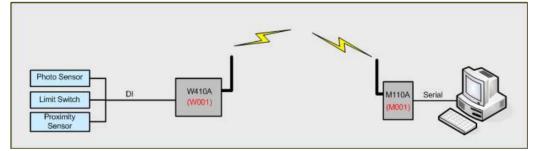


Figure 32. W410A to M110A Communication Example

(EX. 7) M110A(PC MODE) to W510A(PC MODE) Communication

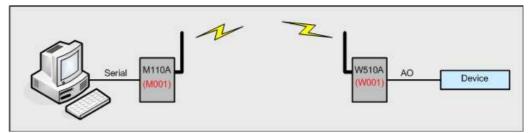
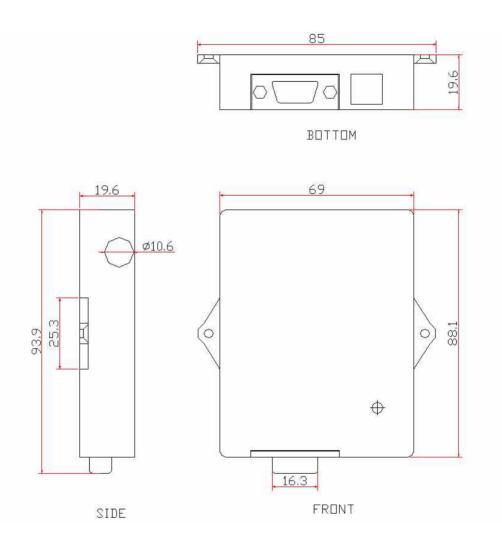


Figure 33. M110A to W510A Communication Example

### Appendix 1. Dimension



#### Appendix 2. R&TTE

Hereby, SEBINE Technology, Inc. declares that this device(M/N: M110A) is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

### Appendix 3. Document Information

Revision	H/W Version	Description
1.0	RF1-AE-RS Ver 1.1	03/30/2009 - Initial Release Version
2.0	RF1-AE-RS Ver 1.1	09/14/2009 - Modified

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