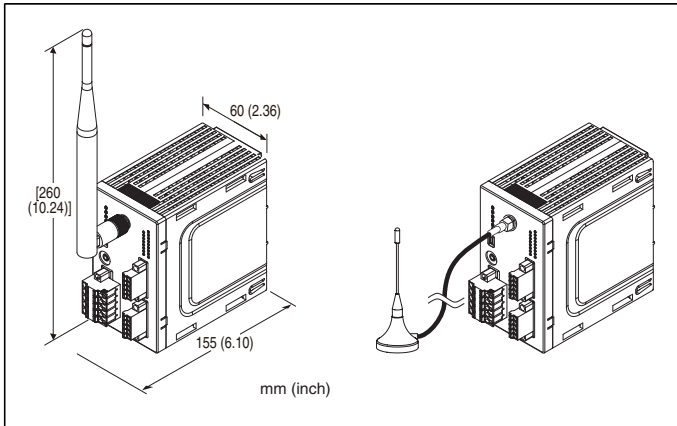


## Wireless I/O WL40F Series

### WIRELESS INPUT UNIT

Modbus-RTU Transparent 900MHz Band Wireless Device (Child Device), Built-in I/O, 2-wire Transmitter Inputs 2 points)



### MODEL: WL40W1F-DS2-R[1]

### ORDERING INFORMATION

- Code number: WL40W1F-DS2-R[1]  
Specify a code from below for [1].  
(e.g. WL40W1F-DS2-R/E/Q)
- Specify the specification for option code /Q  
(e.g. /C01)

### I/O TYPE

DS2: 2 2-wire transmitter inputs

### POWER INPUT

#### DC Power

R: 24 V DC

(Operational voltage range 24 V  $\pm$ 10 %, ripple 10 %p-p max.)

### [1] OPTIONS (multiple selections)

#### Antenna

/S: Sleeve antenna

/E: Rooftop antenna

#### Other Options

blank: none

/Q: Option other than the above (specify the specification)

### SPECIFICATIONS OF OPTION: Q

**COATING (For the detail, refer to M-System's web site.)**

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

### FUNCTIONS & FEATURES

This unit

- Operates as a 900MHz band wireless device.
- Incorporates the module compliant with FCC Part 15, and can be used only in the United States.
- Connects inputs by wireless communication using Modbus-RTU protocol.

### RELATED PRODUCTS

For related products of wireless device, refer to M-System's web site.

- PC configurator software (model: W920FCFG)

Downloadable at M-System's web site.

A dedicated cable is required to connect the unit to the PC. Please refer to the internet software download site or the users manual for the PC configurator software for applicable cable types.

#### Maintenance software

**Maintenance console:** MH920 Console International (model: MH920CI) (OKI)

(Maintenance software is downloadable at M-System's web site.)

#### Coaxial cable

- 7.5 m extension cable for rooftop antenna (model: CX-SAC0SAD0Q0750) (OKI)

Using 7.5 m coaxial cable for extension decreases transmission distance.

### GENERAL SPECIFICATIONS

#### Connection

**Wireless network:** SMA coaxial connector

**Power supply:** Tension clamp (Front Twinconnection)

**Applicable wire size:** 0.2 - 2.5 mm<sup>2</sup>, stripped length 10 mm

**Input:** Separable tension clamp terminal

**Applicable wire size:** 0.2 - 1.5 mm<sup>2</sup>, stripped length 10 mm

**Maintenance:** Mini USB type B female connector

**Isolation:** Power input to FE1 to Input 1 to Input 2 to antenna connector

**Indicator LED:** Power

### WIRELESS SPECIFICATIONS

**Communication Standard:** IEEE 802.15.4g

**Frequency:** 900MHz band (902 - 928 MHz)

**Max. Transmission power:** 20mW

**Bandwidth:** 400 kHz

**Modulation:** GFSK

**Baud rate:** Max. 100 kbps

**Channels:** 1 to 43ch

**Security:** 128bit AES

**Indicator LEDs:** 920Run, 920Link, 920ERR

**Protocol:** Modbus-RTU

**Communication module:** Coordinator module incorporated  
(Oki Electric Industry Co., Ltd. )

connector)

**Radio parameters setting:** Configurator software

## Antenna

- Sleeve antenna (Model: MH920-ANT-F (S))  
Indoor use  
Non-waterproof  
Non-directional  
Gain: 3.0dBi max.
- Rooftop antenna (Model: MH920-ANT-F (R))  
Outdoor/indoor use  
Cable length: 2.5 m  
Waterproof performance: IPx6 (except connector)  
Non-directional  
Gain: 2.0dBi max.

## STANDARDS & APPROVALS

Module conforming to FCC Part 15 incorporated

## SUPPLY OUTPUT

(across the terminals 1 - 2)

**Output voltage:** 24 - 28 V DC with no load

19 V DC min. at 20 mA

**Current rating:**  $\leq 22$  mA DC

### •Shortcircuit Protection

**Current limited:** Approx. 30 mA

**Protected time duration:** No limit

## INPUT SPECIFICATIONS

**Input setting:** Configurator software

**No. of input channel:** 2

**Input resistance:** 250  $\Omega$  resistor incorporated

**DC Current:** 4 - 20 mA DC

**Conversion rate:** 40 msec.

## INSTALLATION

**Current consumption:**  $\leq 140$  mA

**Operating temperature:** -10 to +55°C (14 to 131°F)

**Storage temperature:** -10 to +55°C (14 to +131°F)

**Operating humidity:** 10 to 90 %RH (non-condensing)

**Atmosphere:** No corrosive gas or heavy dust

**Mounting:** DIN rail

### Weight

**Unit:** Approx. 270 g (0.60 lb)

**Sleeve antenna (standard):** 27 g (0.95 oz)

**Rooftop antenna:** 52 g (1.83 oz)

## PERFORMANCE

**Conversion accuracy:**  $\pm 0.05$  %

**Temp. coefficient:**  $\pm 0.015$  %/°C ( $\pm 0.008$  %/°F)

**Insulation resistance:**  $\geq 100$  M $\Omega$  with 500 V DC

**Dielectric strength:** 1500 V AC @ 1 minute

(power input to FE1 to input 1 to input 2 to antenna)

## CONFIGURATOR SOFTWARE SETTING

With configurator software, settings shown below are available.  
Refer to the users manual of W920FCFG for detailed operation.

### ■ WIRELESS SETTING

ITEM	SETTING RANGE	DEFAULT
Preferred PAN ID (group number)	0000 – FFFE (hexadecimal, 4 digits)	0000
Radio channel number	1 – 43 (selectable up to 10 channels)	None
Short address	0000 – FFFD (hexadecimal, 4 digits)	0000
Network name	English one-byte characters within 16 characters (one-byte space, “_”, “_”, “_”, “@” are usable.)	Blank
Encryption key	0000...0 – FFFF...F (hexadecimal, 32 digits)	0000...0
Transmitter power output	0.16mW / 1mW / 20mW	20mW
Low-speed moving mode	No / Yes	No
Device type in a network, Number of devices in a network	Child (fixed), 1 to 30 devices / Child (fixed), 31 to 60 devices / Child (fixed), 61 to 100 devices / Child (fixed) + child (moving)	Child (fixed), 1 to 30 devices
Set network quality	Standard (recommended) / Frequency of route switching and delay (higher) / Frequency of route switching and delay (highest)	Standard (recommended)
Network join mode	V3-compatible mode / Fast join mode	V3-compatible mode
Fixed route	No / Yes	No
Destination short address	0000 – FFFD (hexadecimal, 4 digits)	0000
Temporary detour	No / Yes	Yes
Packet filtering	None / Yes (polling type)	Yes (polling type)
Filter timeout on polling	1.0 – 60.0 (sec.)	1.0 (sec.)
920Run timeout	1.0 – 60.0 (sec.)	3.0 (sec.)
Modbus node address	1 – 247	1
Retry times before route switching	Once / Twice / Three times	Three times

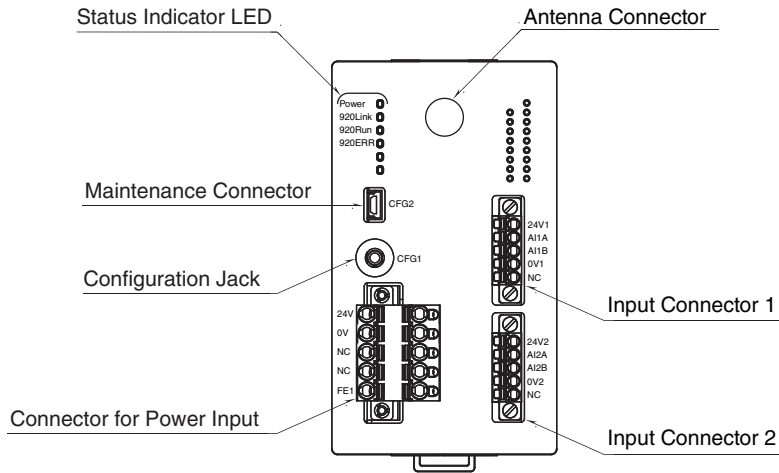
\* For version confirmation of communication module, refer to the users manual of W920FCFG.

### ■ INPUT SETTING

CHANNEL	ITEM	SETTING RANGE	DEFAULT
Analog input 1	Input enabled / disabled	Enabled / Disabled	Enabled
	Zero input value	4.000 – 20.000	4.000 (mA)
	Full input value	4.000 – 20.000 (full input value > zero input value)	20.000 (mA)
	Fine zero adjustment	-5.00 – +5.00 (%)	0.00 (%)
	Fine gain adjustment	0.9500 – 1.0500	1.0000
	Zero scaling value	-32000 – +32000	0
	Full scaling value	-32000 – +32000	10000
	First-order filter time constant	0.0 – 60.0 (sec.)	0.0 (sec.)
Analog input 2	Input enabled / disabled	Enabled / Disabled	Enabled
	Zero input value	4.000 – 20.000	4.000 (mA)
	Full input value	4.000 – 20.000 (full input value > zero input value)	20.000 (mA)
	Fine zero adjustment	-5.00 – +5.00 (%)	0.00 (%)
	Fine gain adjustment	0.9500 – 1.0500	1.0000
	Zero scaling value	-32000 – +32000	0
	Full scaling value	-32000 – +32000	10000
	First-order filter time constant	0.0 – 60.0 (sec.)	0.0 (sec.)

## EXTERNAL VIEW

### FRONT VIEW

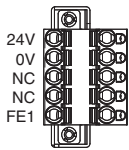


## TERMINAL ASSIGNMENTS

### CONNECTOR FOR POWER INPUT

Unit side connector: MSTBV2,5/5-GF-5,08AU (Phoenix Contact)

Cable side connector: TFKC2,5/5-STF-5,08AU (Phoenix Contact)



ID	FUNCTION
24 V	Power input 24 V
0 V	Power input 0 V
NC	Not used
NC	Not used
FE1	Power input earth

### INPUT CONNECTOR 1

Unit side connect: MC1,5/5-GF-3,5 (Phoenix Contact)

Cable side connector: FMC1,5/5-STF-3,5 (Phoenix Contact)



ID	FUNCTION
24V1	2-wire transmitter 1 +
AI1A	2-wire transmitter 1 -
AI1B	Current input 1 +
0V1	Current input 1 -
NC	Not used

### INPUT CONNECTOR 2

Unit side connect: MC1,5/5-GF-3,5 (Phoenix Contact)

Cable side connector: FMC1,5/5-STF-3,5 (Phoenix Contact)



ID	FUNCTION
24V2	2-wire transmitter 2 +
AI2A	2-wire transmitter 2 -
AI2B	Current input 2 +
0V2	Current input 2 -
NC	Not used

## MODBUS FUNCTION CODES & SUPPORTED CODES

Modbus function codes are shown below.

### ■ DATA AND CONTROL FUNCTION

CODE	NAME	
01	Read Coil Status	Digital output from the slave (read / write)
02	Read Input Status	Status of digital inputs to the slave (read only)
03	Read Holding Registers	General purpose register within the slave (read / write)
04	Read Input Registers	Collected data from the field by the slave (read only)
05	Force Single Coil	Digital output from the slave (read / write)
06	Preset Single Registers	General purpose register within the slave (read / write)
15	Force Multiple Coils	Digital output from the slave (read / write)
16	Preset Multiple Registers	General purpose register within the slave (read / write)

### ■ EXCEPTION CODE

CODE	NAME	
01	Illegal Function	Function code is not allowable for the slave
02	Illegal Data Address	Address is not available within the slave
03	Illegal Data Value	Data is not valid for the function
04	Slave Device Failure	
05	Acknowledge	
06	Slave Device Busy	
07	Negative Acknowledge	

## MODBUS I/O ASSIGNMENT

	ADDRESS	DATA TYPE	DATA
Coil (0X)	1 – 16		Reserved (unused)
Input (1X)	1 – 8		Reserved (unused)
	9		Analog input error (input range error of analog input 1)
	10		Analog input error (input range error of analog input 2)
	11 – 16		Reserved (unused)
Input Register (3X)	1	I	Analog Input (analog input 1)
	2	I	Analog Input (analog input 2)
	3 – 16	–	Reserved (unused)
Holding Register (4X)	1 – 16	–	Reserved (unused)

Note: DO NOT access addresses other than mentioned above. Such access may cause problems such as inadequate operation.

### ■ DATA TYPE

I: Integer -32768 – +32767

### ■ STATUS

1 bit: indicates input status.

Input range error (Input range is out of the range -5 to +105% for scaling setting, or out of the range -32768 to +32767.)

0: Normal

1: Error

## INPUT DATA DESCRIPTIONS

### ■ ANALOG DATA (16 BITS)



When the scaling setting is initial value, the data is 0 to 10000 for input 0 to 100% setting.

If the input range is -5 to +105% (-500 to +10500) and that is out of range, the data is fixed to -500 or 10500.

Minus value is converted into negative values, represented in 2's complements.

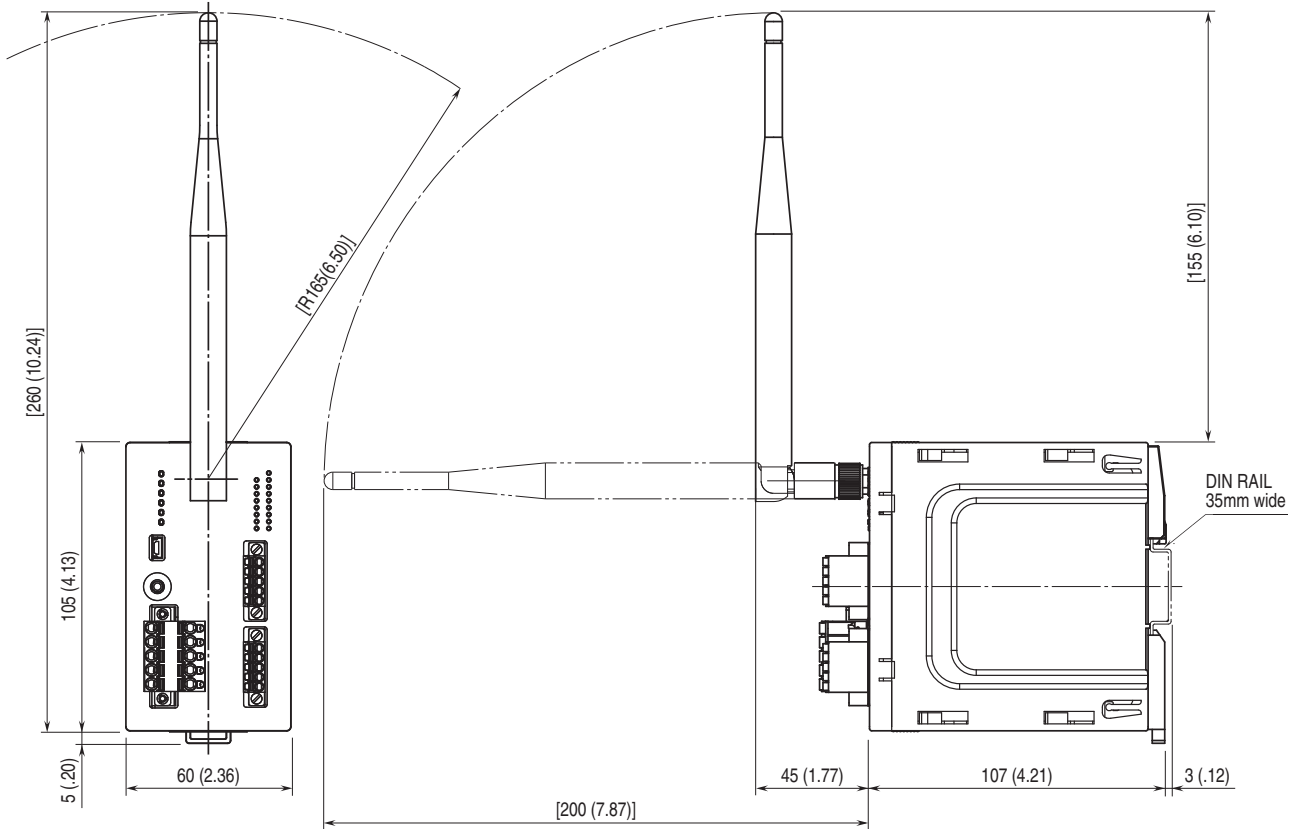
## ■ DATA ERROR STATUS (1 BIT)

Data error status is indicated by 1 bit.

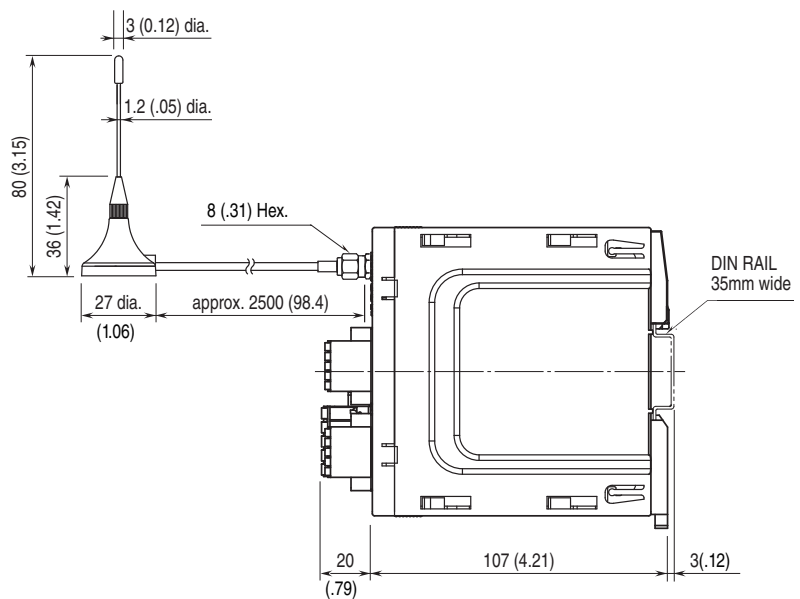
- 0: OFF
- 1: ON

## EXTERNAL DIMENSIONS & TERMINAL ASSIGNMENTS unit: mm (inch)

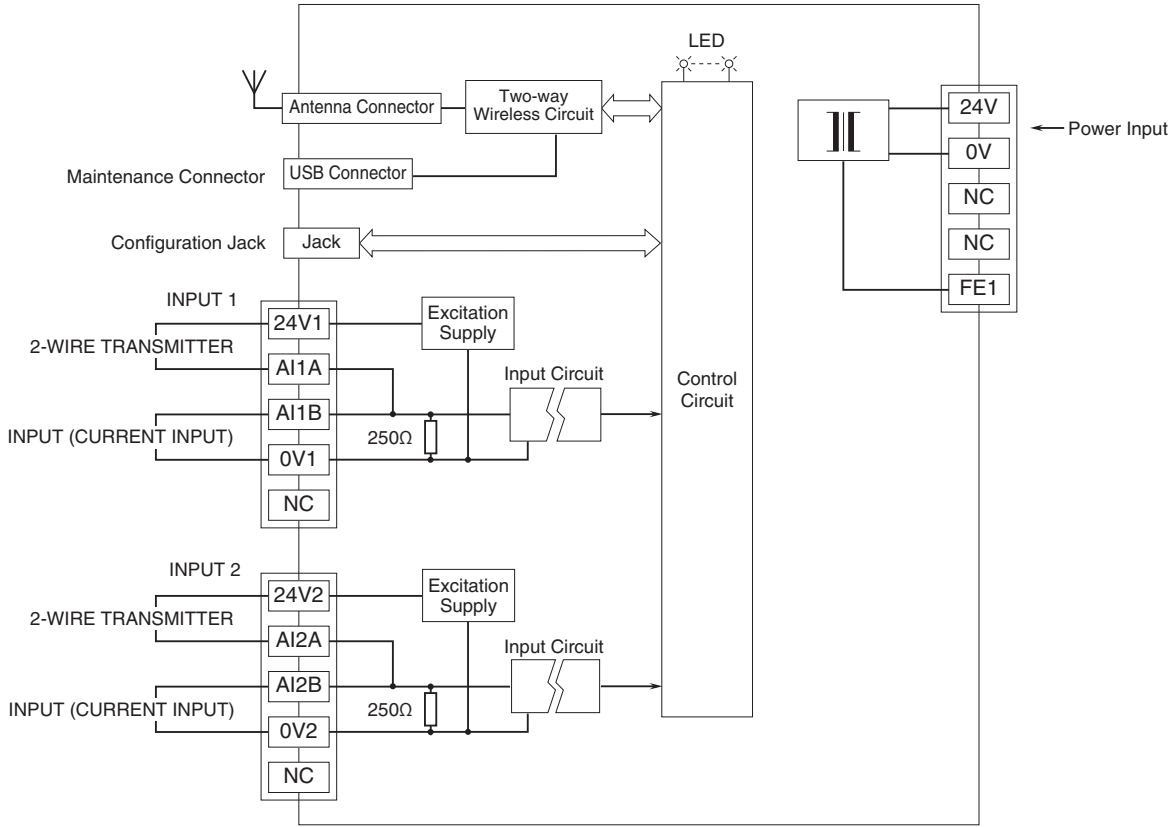
### ● WITH SLEEVE ANTENNA



### ● WITH ROOFTOP ANTENNA

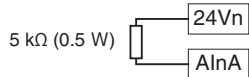


**SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM**




**■ HANDLING OF THE UNUSED INPUT**

Connect 5 kΩ (0.5 W) terminating resistor to the input terminal which is not used, as shown below.



If the above step is not performed, input becomes -5% or less, and PLC and such show data error. However, using PC configuration software (model: W920FCFG) enables the setting of the unused input without the above step.

 Specifications are subject to change without notice.