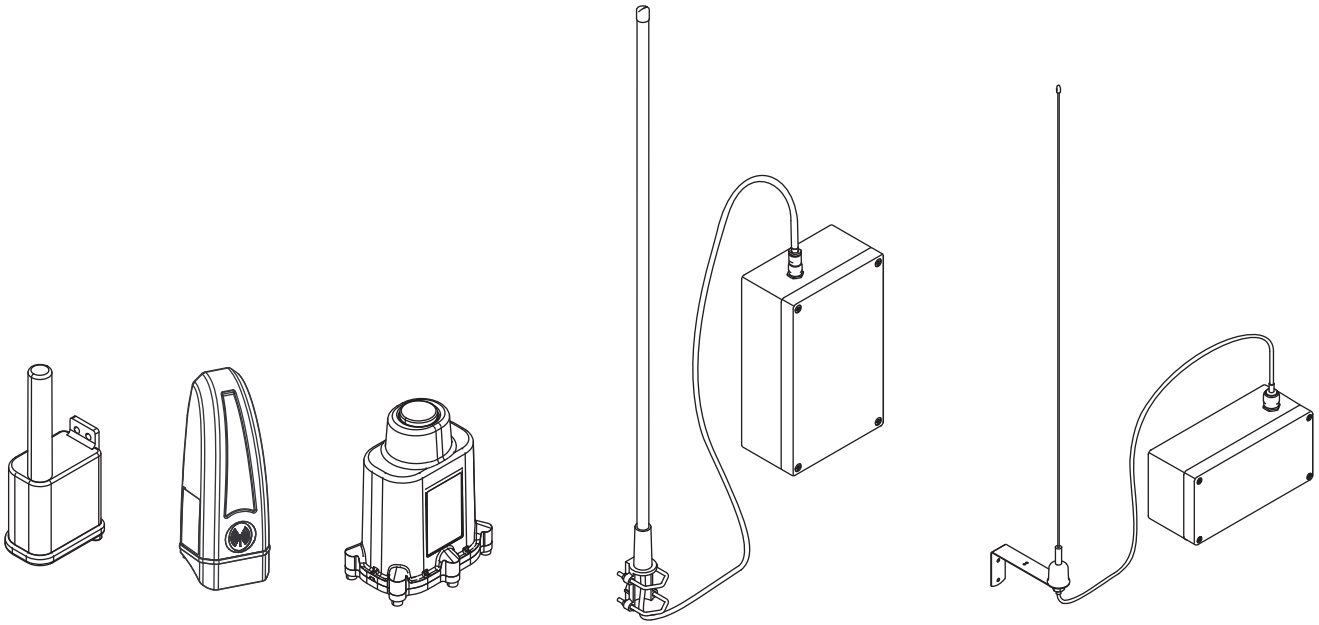
WT4100 series / WT4200 series
Long-range RF wireless devices

User manual

7EN02-0360-00
08/2015



Schneider Electric

Safety information

Important information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please note

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Notices

Legal information

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Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

FCC

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 the 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 user 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 to 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.

The user is cautioned that any changes or modifications not expressly approved by Schneider Electric could void the user's authority to operate the equipment.

This digital apparatus complies with CAN ICES-3 (B) /NMB-3(B).

This device complies with FCC radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada

This device complies with Industry Canada RF radiation exposure limits set forth for general population. This device must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

Le présent appareil est conforme aux niveaux limites d'exigences d'exposition RF aux personnes définies par Industrie Canada. L'appareil doit être installé afin d'offrir une distance de séparation d'au moins 20cm avec l'utilasateur, et ne doit pas être installé à proximité ou être utilisé en conjonction avec une autre antenne ou un autre émetteur.

R&TTE

This equipment is in accordance with the requirements of the R&TTE (Radio equipment and telecommunications terminal equipment) directive for the following authorized countries:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MT NL PL PT RO SE SI SK TR BA GE HR MD ME MK RS.

The R&TTE declaration of conformity is available at www.schneider-electric.com.

About this manual

This manual is intended for use by designers, system builders and maintenance technicians with an understanding of PLC, WAGES, electrical distribution systems, monitoring and control devices, and wireless technology.

This manual provides feature descriptions and configuration instructions for the PowerLogic™ WT4100 series / WT4200 series, WR4100 series / WR4200 series long-range RF wireless WAGES and energy monitoring devices and accessories.

Related documents

For more information on long-range RF wireless WAGES and energy monitoring components and technology, visit the product support download pages at www.schneider-electric.com and search or browse:

Title of document	Reference number
WT4100 series / WT4200 series installation sheet (wireless sensor/ transmitters)	NHA5134802
WR4100 series / WR4200 series installation sheet (wireless receiver and repeater)	NHA5135001
Com'X 200 series user guide	DOCA0036EN
Guidelines for Wireless Energy Metering Deployment in Buildings (white paper)	—

Contents

Chapter 1 Safety precautions

Installation, wiring, testing and service must be performed in accordance with all local and national electrical codes.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 or applicable local standards.
- Turn off all power supplying this device and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Do not exceed the device's ratings for maximum limits.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

INACCURATE DATA RESULTS

- Do not use data displayed in software as a substitute for proper workplace practices or equipment maintenance.
- Do not rely solely on data displayed in software to determine if this device is functioning correctly or complying with all applicable standards.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions could result in death or serious injury.

Chapter 2 Introduction

WAGES (Water, Air, Gas, Electricity, Steam) energy monitoring can be challenging, especially if the monitoring devices are installed in hazardous conditions or remote locations with rough or difficult-to-access terrain.

The WR4100 series / WR4200 series devices help provide an easy and reliable solution.

Long-range radio frequency wireless solution

The long-range radio frequency (RF) wireless solution consists of transmitters and a receiver. Typically, repeaters are also installed and located between the transmitter and receiver to boost the transmission signal when the line-of-sight distance between the transmitter and receiver is greater than the transmitter's range. Physical obstructions, such as buildings, reduce the effective transmission range of a transmitter, so repeaters are also installed in these situations.

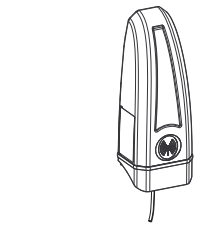
Transmission frequency

The wireless devices are grouped according to model numbers, and these identify a device's RF transmission frequency. It is common for countries to limit RF transmission to a specific radio frequency.

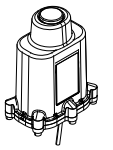
Wireless device model number	Frequency	Location
WT4200 series, WR4200 series, WA4200 series	169 MHz	Europe
WT4100 series, WR4100 series, WA4100 series	153 MHz	North America

NOTE: Before installing and operating the wireless devices, check the rules and restrictions on RF transmission for your country and make sure your devices' transmission frequency matches the radio frequency allowed for transmission in your country.

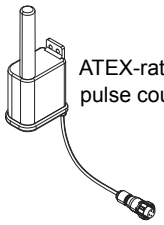
Transmitters



Pulse counter (1 or 2 channel)
Status monitor (2 channels)
Analog input sensor (2 channels)



Water pit
pulse counter



ATEX-rated
pulse counter

Temperature
sensor

Transmitter description	169 MHz model#	153 MHz model#
Pulse counter, 1 channel	WT4211	WT4111
Pulse counter, 2 channels[1]	WT4212	WT4112
Water pit pulse counter, 1 channel	WT4216	not available
ATEX-rated pulse counter, 1 channel	WT4214	not available
Status monitor, 2 channels	WT4232	WT4132
0 to 10 V analog input sensor, 2 channels	WT4222	WT4122
Temperature sensor	WT4241	WT4141

1. The dual channel pulse counter operates as two separate devices (two counters independent of each other), so the channels can be connected to two separate pulse sources (meters).

Pulse counters

A pulse counter transmitter detects and counts pulses from a meter's pulse output. The pulse counter transmitter supplies 5.0 V DC to the pulse output connection, and is intended for use only with a dry-contact or open-collector pulse output.

The pulse counter can count pulses with a 0.1 to 10 Hz pulse frequency. The total pulse count is the running total of all pulses counted since the transmitter was first activated. For data integrity reasons, you cannot reset the pulse count.

The value for total pulse count is transmitted once every 15 minutes.

Water pit pulse counter

The water pit pulse counter transmitter is designed to be used with a pulse output device such as a water flowmeter. The transmitter features a heavy-duty magnet at the top of device for easy mounting onto the underside of the water pit's ferromagnetic (cast iron) cover.

ATEX-rated pulse counter

The ATEX-rated pulse counter transmitter is designed to be used with a pulse output device such as a gas meter. The transmitter features ATEX II 3G and Ex ic IIA T3 compliant design for use in hazardous or explosive environments.

Status monitor

A status monitor transmitter detects the ON/OFF condition of a switch and is typically used to monitor and report alarm conditions. The status monitor transmitter supplies 5.0 V DC to the status output connection, and is intended for use only with a dry-contact switch or relay.

Information about the switch status (ON or OFF) and the total number of times the switch changed states is transmitted immediately after the switch status changes. If there is no change of state detected, the transmitter sends its information once every 15 minutes. Maximum response time for the status monitor transmitter is 3.0 seconds.

0 to 10 V analog input sensor

The analog input sensor transmitter detects the presence of a voltage signal between 0 to 10 V DC. It is typically used in air quality, oven heat, fluid level or pressure sensor applications.

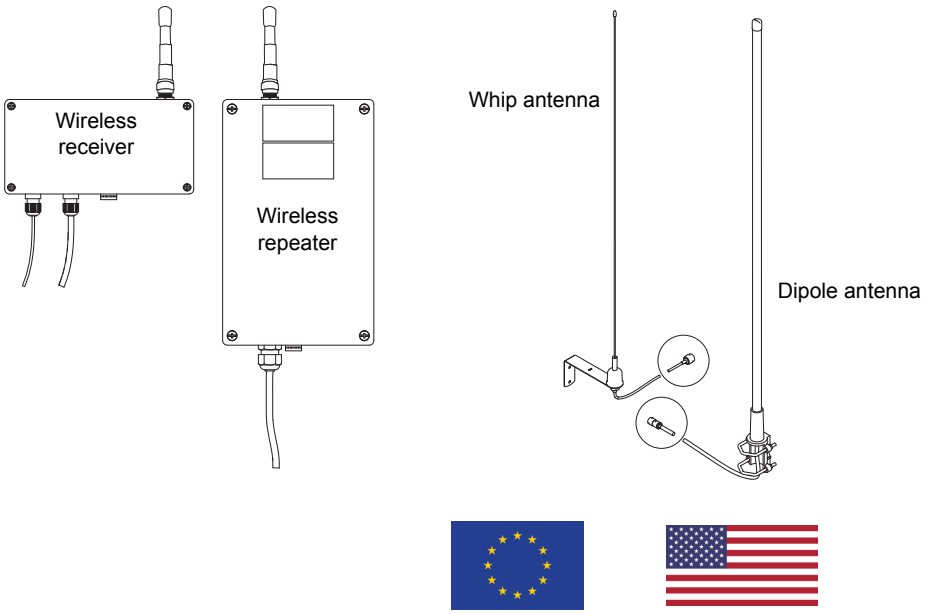
Analog input readings are transmitted once every 15 minutes.

Temperature sensor

The temperature sensor transmitter measures the ambient temperature where it is installed. The temperature readings can be used by an energy management system to normalize energy usage during different seasons in a year.

Temperature readings are transmitted once every 15 minutes.

Receiver, repeater and antenna options



Description	169 MHz model#	153 MHz model#
Wireless receiver	WR4200	WR4100
Wireless repeater	WR4290	WR4190
Dipole antenna with 5 m (16 ft) cable	WA4275	WA4175
Whip antenna with 5 m (16 ft) cable	WA4277	WA4177
5 m (16 ft) antenna extension cable	WA4X82	
10 (33 ft) antenna extension cable	WA4X84	

Wireless receiver

The wireless receiver is the data processing center of the long-range RF wireless system. It receives, stores and updates data coming from 1 to 255 wireless transmitters, then makes the data available through a Modbus RTU connection to the receiver's RS-485 port. The receiver is typically wired as a Modbus slave in an RS-485 network, where it handles all Modbus requests for transmitter data received.

A receiver stores data only from the transmitters you program into the receiver. Other receivers in different sites can also receive data from the same transmitter, if required.

Wireless repeater

The wireless repeater extends the range of the wireless transmitter. Depending on the receiver model and antenna used, the effective transmission range can extend up to 10 km (6.2 mi) unobstructed line-of-sight.

Optional antenna and accessories

The receiver and repeater ship with a small antenna. The dipole and whip antenna options significantly increase the wireless transmission range. Extension cables for the antenna are available, to allow mounting the antenna farther away from the receiver or repeater.

Chapter 3 Hardware reference

This section contains additional information about the long-range RF wireless devices.

Transmitters

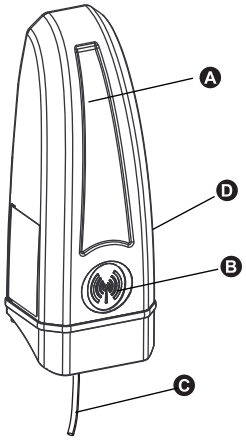
Related topics

- See WT4100 series / WT4200 series installation sheet, available for download at www.schneider-electric.com, for information related to transmitter installation.
- See “Transmitters” on page 45 for detailed device specifications for each type of transmitter.

Bracket mounted transmitters

These transmitters are shipped with a bracket for mounting the device on a flat surface. See “Bracket mounted transmitters” on page 27 for mounting instructions.

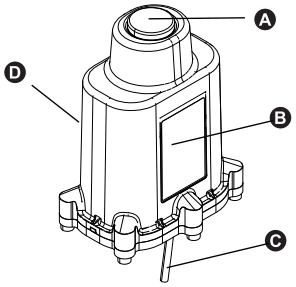
Description	169 MHz model#	153 MHz model#
Pulse counter, 1 channel	WT4211	WT4111
Pulse counter, 2 channels	WT4212	WT4112
Status monitor, 2 channels	WT4232	WT4132
0 to 10 V analog input sensor, 2 channels	WT4222	WT4122
Temperature sensor	WT4241	WT4141

Transmitter parts	Description	
	**A**	Antenna location
	B	Reed switch location
	C	Channel input wiring (N/A for WT4141 / WT4241 temperature sensor)
	D	Serial number label location (transmitter ID)

Water pit transmitter

See “Water pit transmitter” on page 28 for mounting instructions.

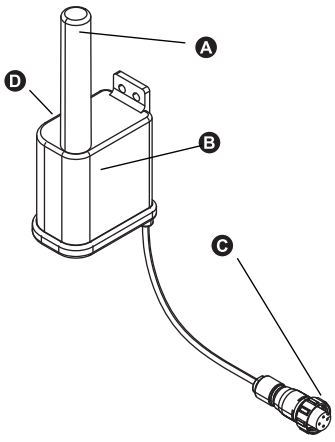
Description	169 MHz model#
Water pit pulse counter, 1 channel	WT4216

Transmitter parts	Description	
	**A**	Mounting magnet
	B	Reed switch location
	C	Channel input wiring
	D	Serial number label location (transmitter ID)

ATEX-rated transmitter

See “ATEX-rated transmitter” on page 28 for mounting instructions.

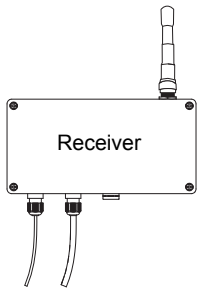
Description	169 MHz model#
ATEX-rated pulse counter, 1 channel	WT4214

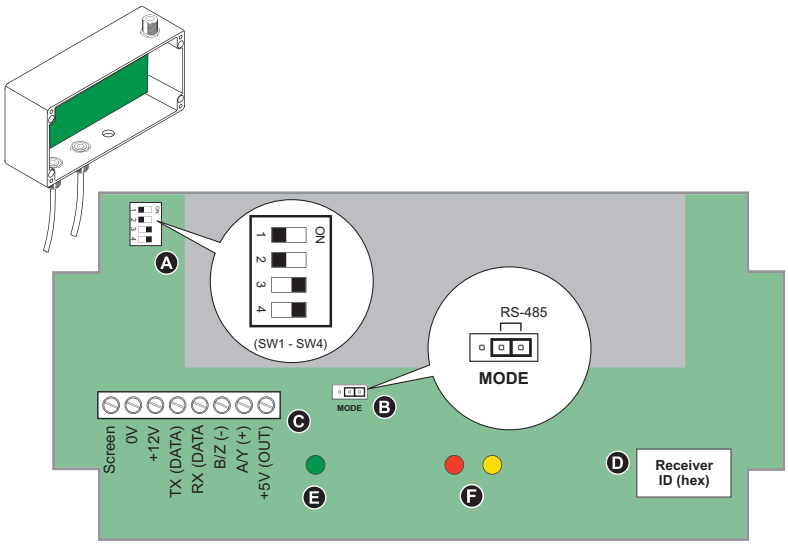
Transmitter parts	Description	
	**A**	Antenna
	B	Reed switch location
	C	Channel input wiring connector
	D	Serial number label location (transmitter ID)

Wireless receiver

The wireless receiver processes the data from the transmitters and sends the Modbus data to its RS-485 port. The wireless receiver is shipped from the factory preconfigured to use the **User Programmable Serial Protocol** settings (default Modbus RTU communication with serial port settings: 19200 baud, even parity and 1 stop bit).

Description	169 MHz model#	153 MHz model#
Wireless receiver	WR4200	WR4100



Receiver parts	Description	
	**A**	Serial communications setting (DIP switch)
	B	Serial communications mode (jumper pin)
	C	Serial communications wiring connector
	D	Wireless receiver ID (text field)
	E	Power on LED (Green)
	F	Communications LEDs – Red = Transmit (TXD) – Yellow = Receive (RXD

Serial communications DIP switch

Make sure the switches are in the proper position for user programmable mode:

SW1 OFF	Modbus RTU mode
SW2 OFF	
SW3 ON	User Programmable Serial Protocol mode
SW4 ON	

NOTE: See “Receiver jumper pin settings” on page 42 for troubleshooting information.

Serial communications terminal pins

Make sure the jumper is in the middle and right position (the two pins closest to the communications LED) for RS-485 communications.

NOTE: See “Receiver jumper pin settings” on page 42 if you need to connect the receiver via RS-232.

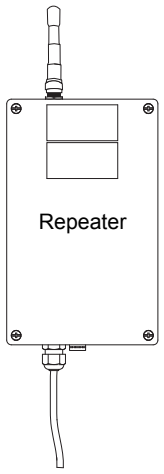
Related topics

- See WR4100 series / WR4200 series installation sheet, available for download at www.schneider-electric.com, for receiver installation details.
- See “Programming the wireless receiver” on page 26 for receiver setup details.

Wireless repeater

The wireless repeater extends the transmission range between the transmitters and the receiver.

Description	169 MHz model#	153 MHz model#
RF wireless repeater	WR4290	WR4190



Related topics

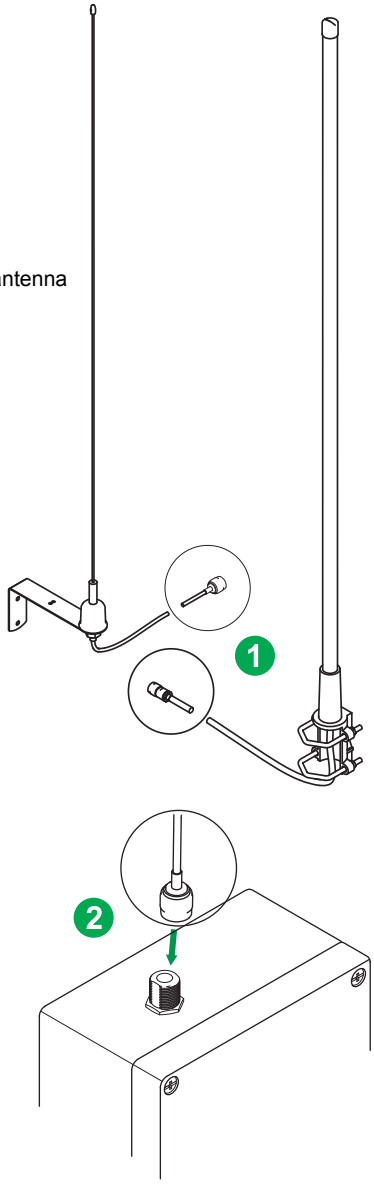
- See WR4100 series / WR4200 series installation sheet, available for download at www.schneider-electric.com, for information related to repeater installation.
- See “Repeater mounting location” on page 30 for guidance on determining the repeater’s location.
- See “Repeater” on page 48 for detailed device specifications for the repeater.

Antenna options

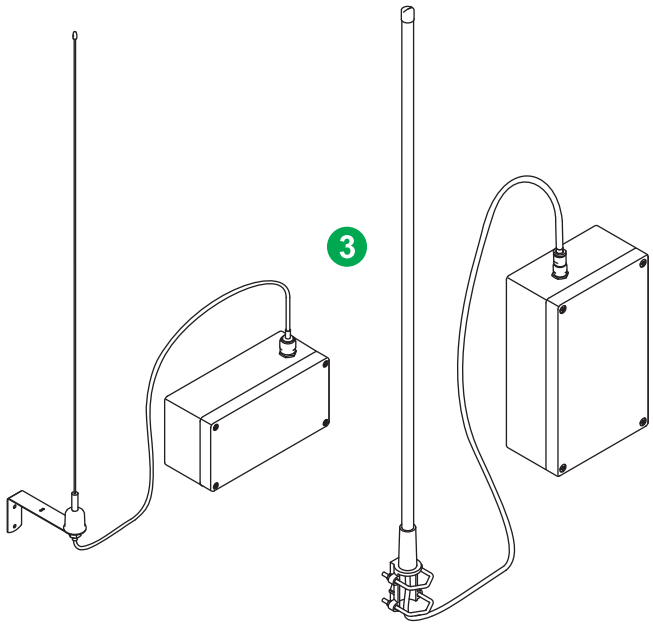
The receiver and repeater ship with a small antenna. You can increase the transmission range by using a whip or dipole antenna instead. Both options are available from www.schneider-electric.com. Optional extension antenna cables are also available.

Description	169 MHz model#	153 MHz model#
Dipole antenna with 5 m (16 ft) cable	WA4275	WA4175
Whip antenna with 5 m (16 ft) cable	WA4277	WA4177
5 m (16 ft) antenna extension cable	WA4X82	
10 (33 ft) antenna extension cable	WA4X84	

Whip antenna



Dipole antenna



Related topics

For antenna options and accessories specifications, see:

- “Whip antenna” on page 49
- “Dipole antenna” on page 49
- “Extension cables” on page 49

Chapter 4 Wireless system commissioning

This section provides guidance for planning, installing and commissioning a long-range RF wireless energy monitoring system.

Related topics

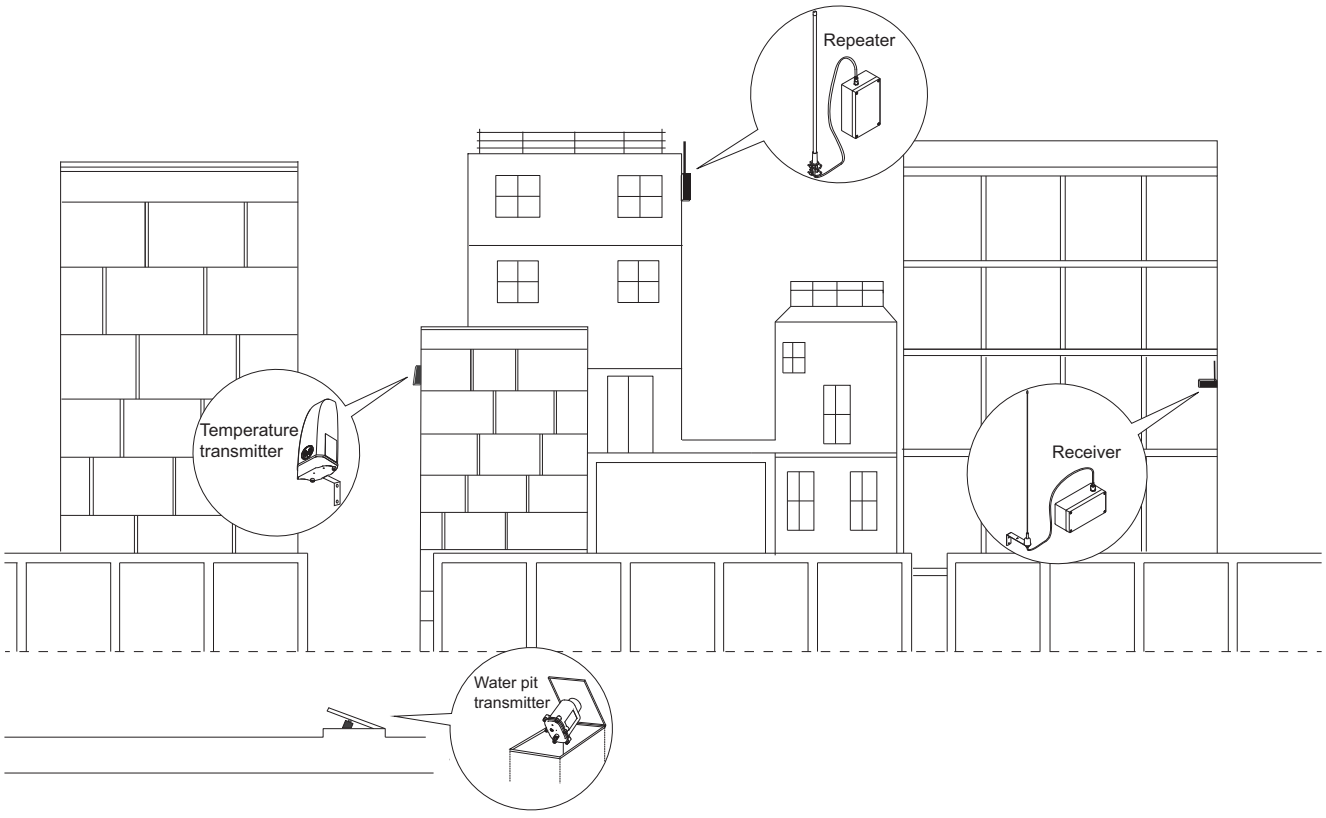
You can download updated documentation from www.schneider-electric.com:

- See the white paper "Guidelines for Wireless Energy Metering Deployment in Buildings" for information on wireless system planning, design and implementation.
- See the WT4100 series / WT4200 series and WR4100 series / WR4200 series installation sheets for information related to wireless device installation.
- See the catalog pages for information about wireless products, options and accessories.

Before you begin

Plan and schedule the work involved before you start the wireless system installation and commissioning. Carefully read and follow all safety precautions before working with the devices. Before proceeding, you should:

- Understand how RF wireless communications work.
- Understand the capabilities and limitations of RF wireless devices.
- Understand the country rules and regulations on RF wireless transmission.
- Obtain or create a map of the installation site, and indicate where you plan to install the RF transmitters and receiver.
- Identify physical obstructions that could adversely affect the signal transmission from the transmitters to the receiver, and plan to install repeaters as required.



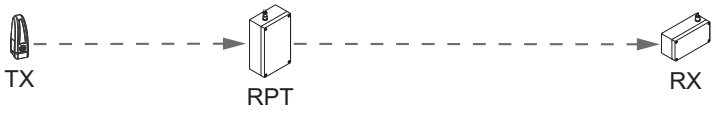
RF wireless communications topologies

The WT4100 series / WT4200 series and WR4100 series / WR4200 series devices support various wireless communications topologies to satisfy your system and application requirements.

Basic wireless system

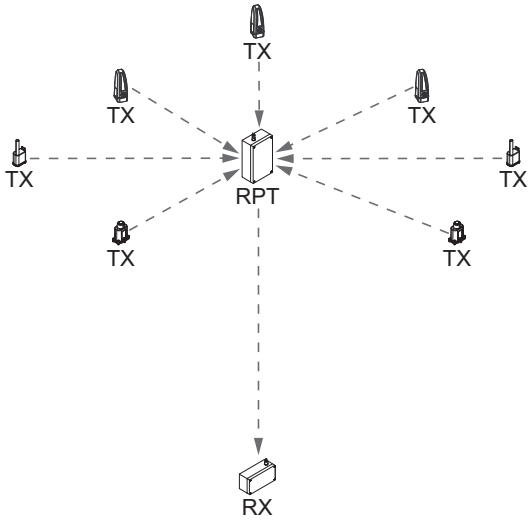
A simple RF wireless system consists of a transmitter (TX) and a receiver (RX).

A repeater (RPT) is used for longer transmission distances. The repeater receives the transmitter signal, amplifies it, then retransmits the boosted signal. Typically the repeater is installed closer to the transmitter than the receiver in the same RF wireless path.



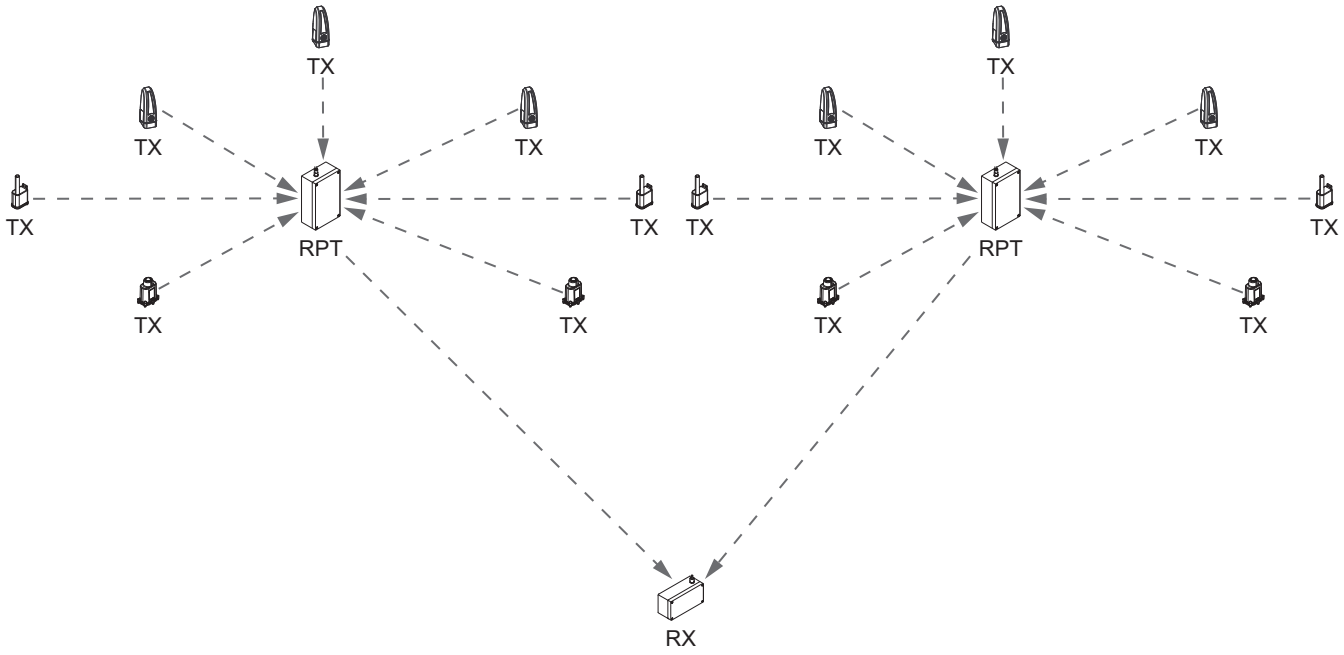
Multiple transmitters to one receiver

In this configuration, a single receiver collects and records data from multiple sensor/transmitters. This is commonly used in applications where many sources of different WAGES data in a building or site are recorded and analyzed.



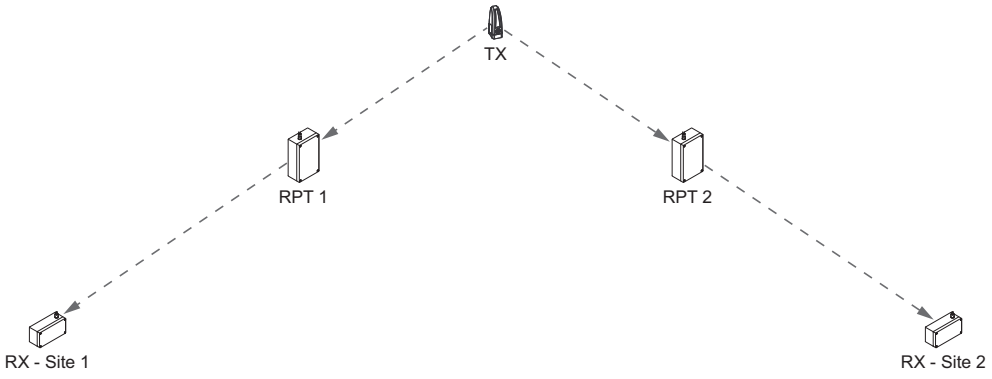
Multiple transmitters and repeaters to one receiver

This expanded version of the multiple transmitters to one receiver topology is typically used by an energy management system to monitor WAGES information coming from multiple buildings or sites. In this configuration, a repeater installed in a building or site takes the sensor/transmitter data received at that location and retransmits the data to the receiver. Another repeater installed in a different building or site takes the transmitter data for that other location and retransmits the data to the same receiver.



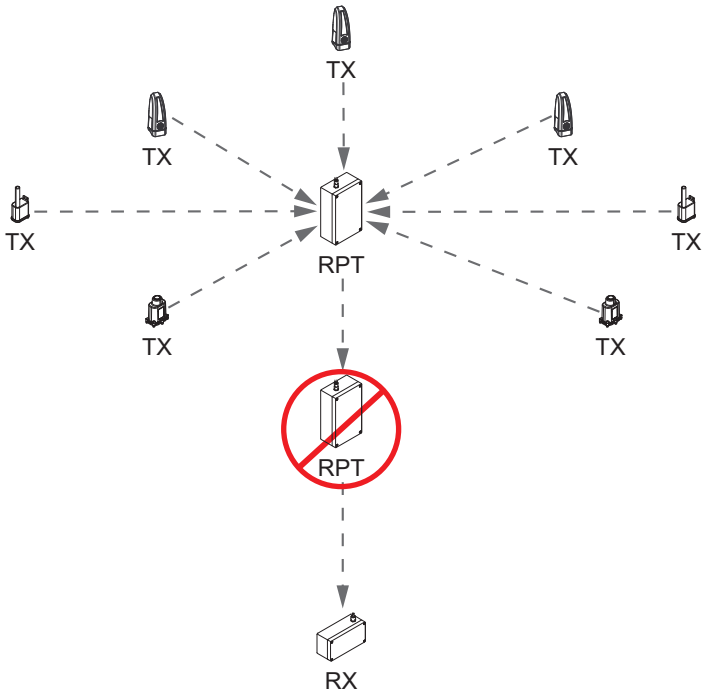
One transmitter to multiple receivers

Data from one sensor/transmitter can be used by two or more receivers. This configuration allows multiple sites (e.g., building energy management systems) to collect information from the same source.



Repeater limitations

The WR4190 / WR4290 repeater can only amplify signals coming directly from transmitters. The repeater will reject amplified signals coming from other repeaters. You cannot have two repeaters located in the same RF path towards the receiver.



Site survey

Physical and topographic maps are normally used to create an initial plan of where the wireless devices will be installed. A site survey fine-tunes and determines the exact locations for the wireless devices. Unanticipated barriers that could adversely affect the RF wireless signals are usually discovered during the site survey. Make sure the barriers you encounter during your site survey are identified and clearly marked in the maps.

Wireless device inventory

For easier tracking and troubleshooting purposes, create an inventory of all the wireless devices to be installed in your system.

NOTE: Use only supplied accessories or parts recommended by Schneider Electric.

Keep the record of all your wireless devices up-to-date. For each device, make sure you include information such as:

- Model number and serial number of the wireless device
- Installation location details such as building, floor, room number

Mapping the wireless device locations

1. Study the available maps for the site — construction map, aerial/satellite map, etc., and identify where the meters (water, gas, etc.) are located.
2. Determine the mounting locations for all the transmitters (usually they are physically near the actual meter).
3. Determine the best location for the repeater (usually a central location or highest point on the map). Use the procedure “Determining the optimal location for the receiver” on page 29 to confirm all transmitter signals are being seen at this location.
4. Determine the receiver location. Typically this is in the electrical or server room where there is easy access to communications.
5. Go to the site and confirm the planned locations for the transmitters. Make sure they are accessible and nothing is blocking them.

   NOTE: Position the antenna away from nearby metal housings or roofs, as they can block the wireless signals.

Programming the wireless receiver

Programming the transmitters into the wireless receiver is typically performed before you install the transmitters at their final locations.

For the next sections, make sure that you have completed the power supply and the USB-to-RS485 adapter cable wiring. Refer to the WR4100 series / WR4200 series installation sheet for details.

1. Use the CD that shipped with the wireless receiver to install the following on your computer:
   – USB-to-RS485 driver
   – Wireless receiver setup software
2. Apply control power to the receiver.
3. Plug the USB connector to the computer.

   The red and green LEDs on the USB connector flash once.

   NOTE: If the LEDs do not flash, power down the receiver and check that the RS-485 wire ends are terminated correctly.
4. Run the wireless receiver setup program.
5. Wait for the **Channel Registers** table to appear; this indicates that the receiver is communicating. If the table does not appear, click the **Read** button.

   The register values update and the **Channel Registers** table becomes editable to indicate proper communications.

   NOTE: If the register values or **Channel Registers** table do not behave as described, ensure the **PC Serial Port Settings** are configured correctly.
6. Add all the transmitter IDs in the **Channel Registers** table. Click **Write Channels** to save your changes.
7. If required, edit the **Modbus Address** field to change the slave Modbus address for the receiver.
8. Before you exit the window, make sure the **User Programmable Serial Protocol** parameters match the RS-485 communications settings of the gateway device you are connecting the receiver to (for example, 19200 Baud Rate, Even Parity, and 1 Stop Bit).
9. Click **Program** to save your changes.

NOTE: If you need to re-establish communications with the computer, modify the **PC Serial Port Settings** to match the new settings you just programmed.

Related topics

- See “Receiver” on page 48 for detailed device specifications.
- Visit www.ftdichip.com if you need to download the latest version of the USB-to-RS485 driver.
- Visit www.schneider-electric.com if you need to download the latest versions of the wireless receiver setup software.

Transmitter installation and wiring

Install the transmitters after they have been programmed into the wireless receiver. Refer to the WT4200 series / WT4100 series installation sheet for mounting and wiring instructions.

NOTE: The transmitters are powered by lithium cell batteries and are already functional when shipped from the factory.

⚠ WARNING

FIRE OR EXPLOSION

- Do not short-circuit, recharge or force discharge the battery.
- Do not puncture, incinerate, crush, immerse, expose to direct sunlight or temperatures above the operating temperature range of the product.

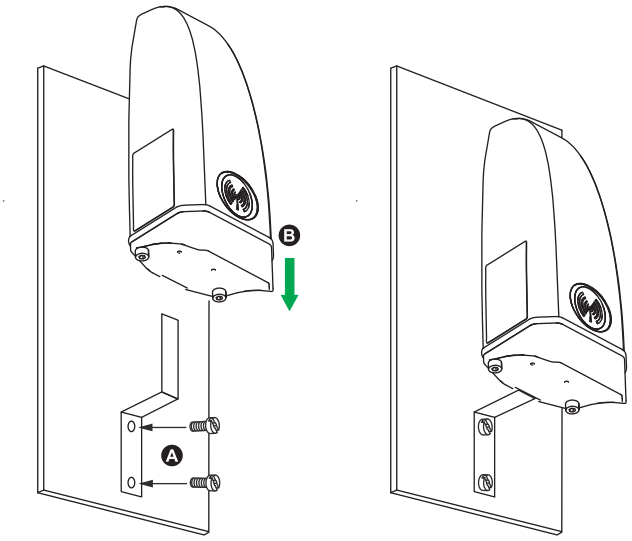
Failure to follow these instructions can result in death or serious injury.

Related topics

- See “Transmitters” on page 45 for detailed device specifications.

Bracket mounted transmitters

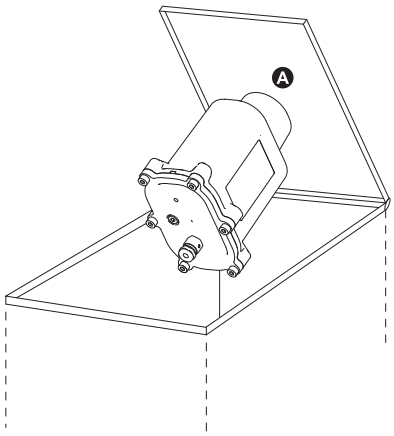
1. Fasten the mounting bracket (A) in a vertical position onto a flat surface.
2. Line up the transmitter’s mounting slot to the mounting bracket, then slide the transmitter down onto the bracket (B).



3. Refer to the installation sheet for wiring details.

Water pit transmitter

1. Fasten the transmitter by positioning the magnet on top of the transmitter onto the underside of the water pit cover (A).



2. Refer to the installation sheet for wiring details. Make sure individual wire connections are enclosed in a waterproof housing to protect the wire ends from water, rust and corrosion.

ATEX-rated transmitter

The ATEX-rated transmission must be installed in a location and environment that is compatible with the following device specifications:

- ATEX environment: Ex II 3G
- ATEX protection: Ex ic IIA T3
- Ta = -20 to 65 °C (-4 to 149 °F)

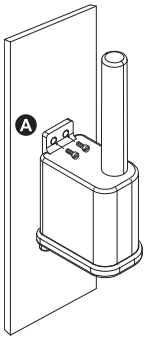
⚠ WARNING

FIRE OR EXPLOSION

Do not modify the existing connector on the product.

Failure to follow these instructions can result in death or serious injury.

1. Fasten the transmitter (A) in a vertical position onto a flat surface.



2. Refer to the installation sheet for details on the transmitter's wire connector. Terminate the pulse output wires using only the supplied matching connector hardware.

Receiver mounting location

The receiver should be located where the radio signals from the transmitters are strongest and at a fairly equal level relative to each other. Use the received signal strength indicator (RSSI) scale to determine the optimal location for the receiver. A value of 10 means it is receiving the strongest RF signal, while a value of zero (0) means no signal is received. The recommended RSSI level is 6 or greater.

RSSI scale

RSSI information for each transmitter is listed in “Data register types” on page 38.

Finding the optimal location for the receiver is a task best performed by two persons: one is responsible for reading the RSSI value from the receiver, while the other goes to each transmitter and uses a mobile phone or radio to communicate instructions with the person monitoring the receiver.

Determining the optimal location for the receiver

A magnet is shipped with each receiver. This magnet is used for activating the reed switch on the transmitter.

1. Hold the magnet to the transmitter’s reed switch location to force the transmitter to transmit data every 2 seconds.
2. Use the receiver to read the RSSI value from the transmitter.
3. If the RSSI level is low, move the receiver untl the RSSI level is between 6 and 10.
4. Go to the next transmitter and repeat the procedure.
5. After the last transmitter has been read, go back to the first transmitter and make sure the RSSI level is still between 6 and 10.

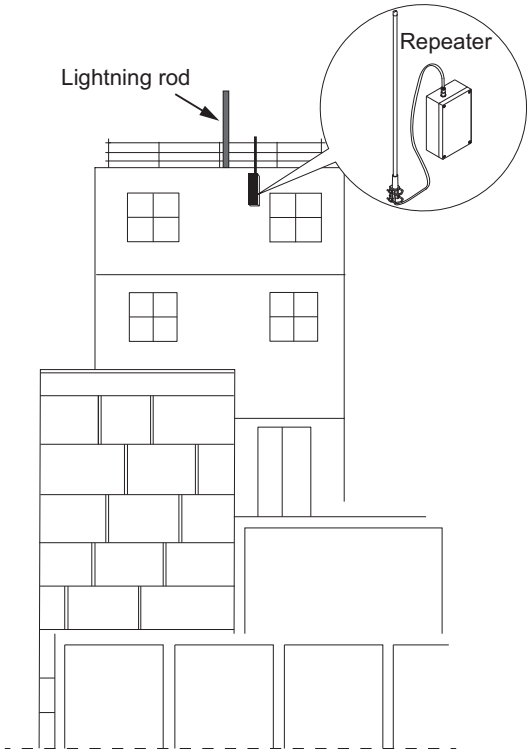
Repeater mounting location

A repeater amplifies the signal from a transmitter, then retransmits the amplified signal. Only one hop is allowed in the transmission path; the repeater only acknowledges signals coming directly from the transmitters and ignores amplified signals coming from other repeaters.

NOTICE
EQUIPMENT DAMAGE • Install the device where the antenna location is protected by a lightning rod. • Connect the antenna to the repeater before applying power to it. **Failure to follow these instructions can result in equipment damage.**

The repeater's mounting location should be the highest point along the wireless transmission path between the transmitters and the receiver.

An antenna must be attached to the repeater before powering it up.



Use the receiver to determine the optimal location for the repeater. Follow the same procedure in "Determining the optimal location for the receiver" on page 29, then use that optimal location as the repeater's mounting location.

NOTE: If a repeater is used between the transmitters and the receiver, the RSSI level shown by the receiver is the signal strength coming from the repeater only.

Modbus gateway/data collectors

The wireless receiver receives, stores and updates the transmitted data, then makes it available to the receiver's RS-485 port. You can connect the RS-485 port to a Modbus master and configure it to collect the data from the transmitters, for use in an energy management system.

You can use any Modbus-compatible gateway device to collect and process the data from the wireless receiver. The gateway device should support Modbus RTU communications and have a defined structure for capturing and reporting the transmitted data (including system metadata such as signal strength, battery level and other diagnostics information).

Modbus gateway considerations

The Com'X series gateway devices offer native support for the WT4200 series / WT4100 series transmitters. This means the gateway can automatically recognize the wireless device type and its associated register map, simplifying the data collection and processing tasks. The gateway provides a web interface to configure the devices and view the transmitted data.

Related topics

- See the Com'X series product pages on www.schneider-electric.com for additional information about the gateway/data collector devices and the energy management software systems they support.

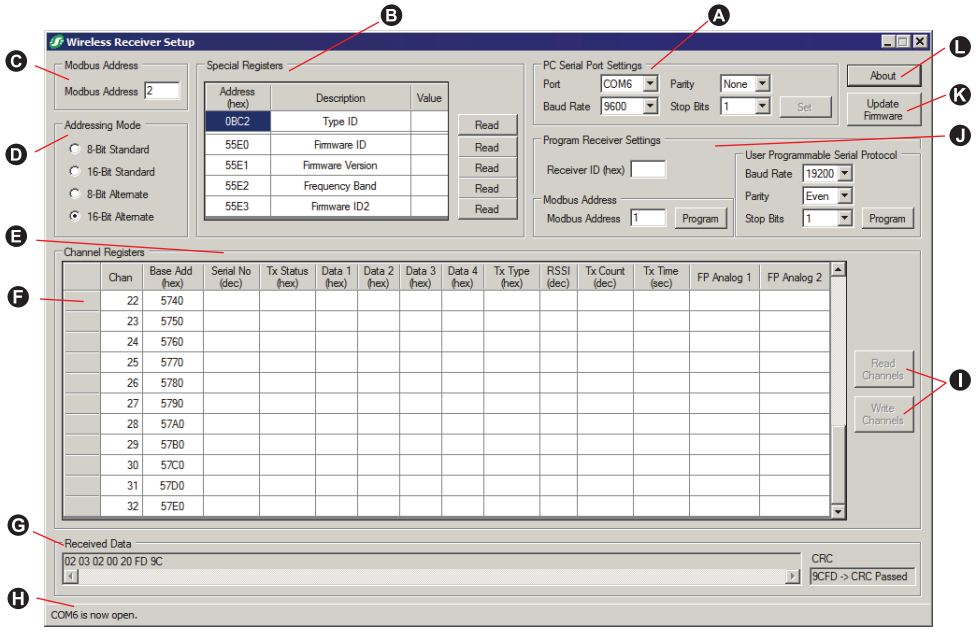
Chapter 5 Wireless receiver programming

This section explains the wireless receiver setup software interface and details the wireless receiver's implementation of the Modbus protocol and the Modbus register mapping for the supported transmitters.

Related topics

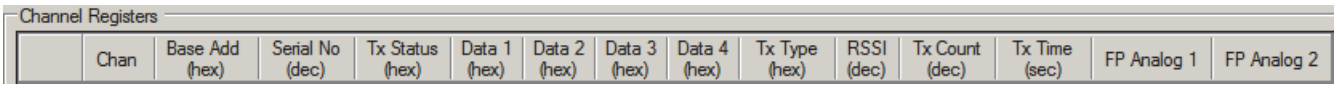
- See "Programming the wireless receiver" on page 26 for initial setup instructions for the wireless receiver.

Wireless receiver setup software interface



A	**PC Serial Port Settings** control the serial port communications link between the wireless receiver and the computer.
B	**Special Registers** contain the wireless receiver device information. You can use the **Read** buttons to view each register's contents.
C	Use **Modbus Address** field to enter the wireless receiver's Modbus ID. Factory setting is 1.
D	**Addressing Mode** controls what registers are displayed under Channel Registers and should be set to **16-Bit Alternate**.
E	**Channel Registers** display the contents of the registers for each channel. See "Channel register addresses" on page 35.
F	Click the row header to select the channel. You can multi-select rows by holding down CTRL or SHIFT while clicking.
G	**Received Data** displays the hexadecimal data of the last received message, as well as CRC pass or fail information for the received data.
H	The status bar shows the current status of the communications port.
I	**Read Channels** displays the register contents for the selected channels. **Write Channels** is used to program the transmitter's serial number to a particular channel.
J	After all transmitters have been programmed, **Program Receiver Settings** is used to configure the wireless receiver's Modbus slave RS-485 settings to match the gateway communications settings.
K	**Update firmware** starts the firmware upgrade process. See "Firmware upgrade" on page 44.
L	**About** displays information about the software interface.

Wireless receiver channel register descriptions



Column title	Description
Chan	Receiver channel number (1 to 255)
Base Add (hex)	The starting (base) address for the receiver channel number (in hexadeximal format)
Serial No (dec)	32-bit register for reading/writing the transmitter's serial number (in decimal format)
Tx Status (hex)	Status information for the transmitter. See "Data register types" on page 38.
Data 1 - 3 (hex)	24-bit register counter for pulse transmitters. See "Data register types" on page 38.
Data 4 (hex)	Contains encoded RSSI and Tx Count data. Use RSSI and TX Count columns instead to avoid decoding.
RSSI (dec)	Radio signal strength indicator (0 to 10)
Tx Count (dec)	Incremental counter for number of transmissions received (1 to 15, restarts after 15)
Tx Time (sec)[1]	The number of elapsed seconds since the last frame was received.
FP Analog 1	32-bit floating-point value (decimal format). See "Data register types" on page 38.
FP Analog 2	32-bit floating-point value (decimal format). See "Data register types" on page 38.

1. Tx Time can be used to diagnose wireless transmission problems since WT4100 series and WT4200 series devices transmit data at least once every 15 minutes (900 seconds).

The columns in the **Channel Registers** table are arranged to correspond to ascending 16-bit register addresses for the particular channel. For a channel base address represented by "@" in the table below, the next column corresponds to the base address incremented by 1, i.e., @ + 1, @ + 2, etc.

Serial No		Tx Status	Data 1	Data 2 - Data 3	Data 4	Tx Type	RSSI	Tx Count	Tx Time	FP Analog 1		FP Analog 2	
@	@ + 1	@ + 2	@ + 3	@ + 4	@ + 5	@ + 6	@ + 7	@ + 8	@ + 9	@ + 10	@ + 11	@ + 12	@ + 13

For example, the base address for Channel 1 is 22000 decimal (55F0 hexadecimal) so the register address map for that channel looks like this:

Serial No[1]		Tx Status	Data 1	Data 2 - Data 3	Data 4	Tx Type	RSSI	Tx Count	Tx Time	FP Analog 1		FP Analog 2	
55F0	55F1	55F2	55F3	55F4	55F5	55F6	55F7	55F8	55F9	55FA	55FB	55FC	55FD

1. The transmitter's serial number occupies two 16-bit registers, with high order (HO) register contents in base address 55F0 (@) and low order (LO) register contents in base address 55F1 (@ + 1).

Related topics

- See "Channel register addresses" on page 35 for instructions on how to calculate the register address for any channel.

Modbus data map

The wireless receiver supports Modbus RTU slave mode. Data received from the WT4200 series / WT4100 series transmitters are stored in the wireless receiver's memory.

A Modbus master uses the wireless receiver's device memory map to read the stored transmitter data.

Function codes

The wireless receiver supports the following function codes:

Function code		Function
Hexadecimal	Decimal	
0x03	03	Read holding registers
0x10	16	Write multiple registers
0x42	66	Special function - program unit ID
0x44	68	Special function - set serial protocol

Wireless receiver register settings

The following table lists the factory settings for the wireless receiver's device registers (**Special Registers** in the wireless receiver setup interface):

Dec	Hex	High byte	Low byte	Register value (dec)[1]
3010	0BC2	0	Type ID	17140
21984	55E0	Firmware ID		546
21985	55E1	Firmware Version		13
21986	55E2	Frequency Band		0 (for 153 MHz) or 1 (for 169 MHz)
21987	55E3	0	Firmware ID2	2 (or 1 for older hardware)

1. Factory settings such as firmware ID and version are subject to change without notice.

Channel register addresses

WT4100 series / WT4200 series and WR4100 series / WR4200 series devices support the Modbus 16-bit alternate data format.

The base address of a given channel can be calculated using the formula:

Channel base address = 22000 + [(Channel - 1) x 16]

For example, Channel 32 = 22000 + [(32 - 1) x 16] = 22496 (dec) or 57E0 (hex).

The memory map below defines the device registers that the wireless receiver can read. The map defines the register containing the transmitter IDs as well as the data associated with the transmitter.

The wireless receiver supports up to 255 transmitters, shown under the channel number (Chan) column in the following table:

Chan	Modbus register address		Description	
	Dec	Hex	High byte	Low byte
1	22000	55F0	Serial No (transmitter address HO 16 bits)	
	22001	55F1	Serial No (transmitter address LO 16 bits)	
	22002	55F2	0	Tx Status
	22003	55F3	0	Data 1
	22004	55F4	Data 2	Data 3
	22005	55F5	0	Data 4
	22006	55F6	0	Tx Type
	22007	55F7	0	RSSI
	22008	55F8	0	Tx Count
	22009	55F9	Tx Time	
	22010	55FA	FP Analog 1, bytes 1 & 2	
	22011	55FB	FP Analog 1, bytes 3 & 4	
	22012	55FC	FP Analog 2, bytes 1 & 2	
	22013	55FD	FP Analog 2, bytes 3 & 4	
2	22016	5600	Serial No (transmitter address HO 16 bits)	
	22017	5601	Serial No (transmitter address LO 16 bits)	
	22018	5602	0	Tx Status
	22019	5603	0	Data 1
	22020	5604	Data 2	Data 3
	22021	5605	0	Data 4
	22022	5606	0	Tx Type
	22023	5607	0	RSSI
	22024	5608	0	Tx Count
	22025	5609	Tx Time	
	22026	560A	FP Analog 1, bytes 1 & 2	
	22027	560B	FP Analog 1, bytes 3 & 4	
	22028	560C	FP Analog 2, bytes 1 & 2	
	22029	560D	FP Analog 2, bytes 3 & 4	
…	…	…	…	

NOTE: All the above registers are sent as 16-bit data with the high byte sent first, e.g., for a pulse count of 8702 (Hex), the data is sent as 0x87 & 0x02.

Chan	Modbus register address		Description	
	Dec	Hex	High byte	Low byte
32	22496	57E0	Serial No (transmitter address HO 16 bits)	
	22497	57E1	Serial No (transmitter address LO 16 bits)	
	22498	57E2	0	Tx Status
	22499	57E3	0	Data 1
	22500	57E4	Data 2	Data 3
	22501	57E5	0	Data 4
	22502	57E6	0	Tx Type
	22503	57E7	0	RSSI
	22504	57E8	0	Tx Count
	22505	57E9	Tx Time	
	22506	57EA	FP Analog 1, bytes 1 & 2	
	22507	57EB	FP Analog 1, bytes 3 & 4	
	22508	57EC	FP Analog 2, bytes 1 & 2	
	22509	57ED	FP Analog 2, bytes 3 & 4	
…	…	…	…	
255	26064	65D0	Serial No (transmitter address HO 16 bits)	
	26065	65D1	Serial No (transmitter address LO 16 bits)	
	26066	65D2	0	Tx Status
	26067	65D3	0	Data 1
	26068	65D4	Data 2	Data 3
	26069	65D5	0	Data 4
	26070	65D6	0	Tx Type
	26071	65D7	0	RSSI
	26072	65D8	0	Tx Count
	26073	65D9	Tx Time	
	26074	65DA	FP Analog 1, bytes 1 & 2	
	26075	65DB	FP Analog 1, bytes 3 & 4	
	26076	65DC	FP Analog 2, bytes 1 & 2	
	26077	65DD	FP Analog 2, bytes 3 & 4	

NOTE: All the above registers are sent as 16-bit data with the high byte sent first, e.g., for a pulse count of 8702 (Hex), the data is sent as 0x87 & 0x02.

Channel default register values

The following table lists the default register values for an unprogrammed receiver channel (Channel 1 is shown in the example below):

Modbus register address		Description		Default register value
Dec	Hex	High byte	Low byte	
22000	55F0	Serial No (transmitter address HO 16 bits)		0x0000
22001	55F1	Serial No (transmitter address LO 16 bits)		0x0000
22002	55F2	0	Tx Status	0x0000
22003	55F3	0	Data 1	0x00FF
22004	55F4	Data 2	Data 3	0xFFFF

Modbus register address		Description		Default register value
Dec	Hex	High byte	Low byte	
22005	55F5	0	Data 4	0x00FF
22006	55F6	0	Tx Type	0x0000
22007	55F7	0	RSSI	0x0000
22008	55F8	0	Tx Count	0x0000
22009	55F9	Tx Time		0x0000
22010	55FA	FP Analog 1, bytes 1 & 2		NaN[1]
22011	55FB	FP Analog 1, bytes 3 & 4		NaN
22012	55FC	FP Analog 2, bytes 1 & 2		NaN
22013	55FD	FP Analog 2, bytes 3 & 4		NaN

1. Floating point registers contain the value FFC00000 (hexadecimal) to represent Not-a-Number, until data is received.

NOTE: After the wireless receiver is power-cycled, all channel registers (except previously programmed transmitter ID registers) revert to the above default values. Register updates resume when new messages from the transmitters are received.

Data register types

This section describes the data packets for the different transmitter types.

Pulse transmitters (WT4211 / WT4111, WT4212 / WT4112, WT4216, WT4214)

Modbus register address	Byte description	Byte details
Channel base address + 2	Tx Status (transmitter status byte)	Bit 7 – Set for low battery
		Bit 6 – Not used
		Bit 5 – Not used
		Bit 4 – Not used
		Bits 0 to 3 – Firmware revision
Channel base address + 3	Data 1 – Data 3	24-bit pulse count value[1]
Channel base address + 6	Tx Type (transmitter type)	Set to 0x81 for pulse transmitter
Channel base address + 7	RSSI	Signal strength (0 to 10)
Channel base address + 8	Tx Count (transmit counter)	Incremental counter (0 to 15, increments by one for each transmission, restarts after 15)

1. One complete pulse is counted after an OFF-to-ON transition.

Temperature transmitter (WT4241 / WT4141)

Modbus register address	Byte description	Byte details
Channel base address + 2	Tx Status (transmitter status byte)	Bit 7 – Set for low battery
		Bit 6 – Not used
		Bit 5 – Not used
		Bit 4 – Not used
		Bits 0 to 3 – Firmware revision
Channel base address + 6	Tx Type (transmitter type)	Set to 0x82 for temperature transmitter
Channel base address + 7	RSSI	Signal strength (0 to 10)
Channel base address + 8	Tx Count (transmit counter)	Incremental counter (0 to 15, increments by one for each transmission, restarts after 15)
Channel base address + 10	FP Analog 1 (4-byte floating point registers)	FP Analog 1 contains the temperature in degrees Celsius

Alarm/status transmitter (WT4232 / WT4132)

Modbus register address	Byte description	Byte details
Channel base address + 2	Tx Status (transmitter status byte)	Bit 7 - Set for low battery
		Bit 6 - Not used
		Bit 5 - Alarm/status Ch 2 (0 = OFF, 1 = ON)
		Bit 4 - Alarm/status Ch 1 (0 = OFF, 1 = ON)
		Bits 0 to 3 - Firmware revision
Channel base address + 3	Data 1 – Data 3	24-bit pulse count value[1]
Channel base address + 6	Tx Type (transmitter type)	Set to 0x88 for alarm/status transmitter
Channel base address + 7	RSSI	Signal strength (0 to 10)
Channel base address + 8	Tx Count (transmit counter)	Incremental counter (0 to 15, increments by one for each transmission, restarts after 15)

1. Pulse count is typically not used for alarm/status transmitter applications. One complete pulse is counted after an ON-to-OFF transition.

0 – 10V analog transmitter (WT4222 / WT4122)

Modbus register address	Byte description	Byte details
Channel base address + 2	Tx Status (transmitter status byte)	Bit 7 - Set for low battery
		Bit 6 - ADC type bit = 1
		Bit 5 - Not used
		Bit 4 - Not used
		Bits 0 to 3 - Firmware revision
Channel base address + 6	Tx Type (transmitter type)	Set to 0xF1 for analog transmitter
Channel base address + 10	FP Analog 1 (4-byte floating point registers)	FP Analog 1 contains analog input #1 value in volts
Channel base address + 12	FP Analog 2 (4-byte floating point registers)	FP Analog 2 contains analog input #2 value in volts
NOTE: The RSSI and Transmit counter registers are not available for the dual analog transmitter (RSSI and Tx Count values are always zero).		

Chapter 6 Maintenance

During the commissioning process or after your long-range RF wireless system is operational, events can occur that require attention.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 or applicable local standards.
- Turn off all power supplying this device and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Do not exceed the device's ratings for maximum limits.

Failure to follow these instructions will result in death or serious injury.

The WR4100 series / WR4200 series and WT4100 series / WT4200 series RF wireless devices do not contain any user-serviceable parts. If the wireless device requires service, contact your local Schneider Electric representative.

Do not open the WT4100 series / WT4200 series transmitters. Opening the transmitter voids the warranty.

NOTICE

DAMAGE TO THE WIRELESS DEVICE

- Do not open the wireless device.
- Do not attempt to repair any components of the wireless device.

Failure to follow these instructions can result in equipment damage.

Related topics

- See "Specifications" on page 45 for detailed wireless device characteristics, limits and operating conditions.

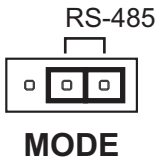
Transmitter battery

The internal battery powers the transmitter's memory to retain all the stored data.

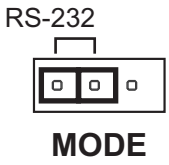
The battery is non-replaceable. The life expectancy of the internal battery is estimated to be 10 years at 25°C under typical operating conditions.

Receiver jumper pin settings

The serial communications mode must be set to RS-485 when connecting the receiver to an RS-485 serial communications bus or when using the USB-to-RS485 adapter cable:

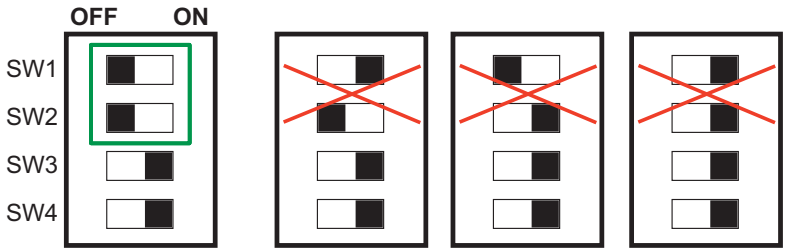


If you need to connect the receiver directly to a computer as a single Modbus device using RS-232, move the jumper to the RS-232 position on the MODE jumper block:



Receiver DIP switch settings

SW1 and SW2 must always be in the OFF position for proper Modbus RTU communications. SW3 and SW4 control the serial communication port settings. The recommended setting is **User Programmable Serial Protocol** mode.



Related topics

- See “Programming the wireless receiver” on page 26 for detailed setup instructions for the wireless receiver.

User programmable serial protocol mode

The **User Programmable Serial Protocol** mode setting allows you to use the Wireless Receiver Setup software to program the **Serial Port Baud** setting (2400, 4800, 9600 or 19200 baud), the **Parity** setting (None, Even, Odd) and the **Stop Bits** setting (1 or 2).

The factory default Modbus RTU serial communications port settings are: 19200 baud, even parity and 1 stop bit.

Fixed serial protocol mode

The fixed serial protocol mode uses the DIP switches to physically set the receiver's baud rate to 2400, 4800 or 9600 baud. In this mode, the serial port is set to 8N1 (8 data bits, no parity and 1 stop bit). Fixed serial protocol mode can be used to troubleshoot a receiver that has stopped communicating. In this situation, the computer's settings (**PC Serial Port Settings**) are set to match the receiver DIP switch settings.

NOTE: After making changes to the DIP switch settings, you must power-cycle the receiver in order for the changes to take effect.

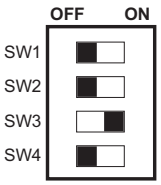
Setting the receiver to fixed serial protocol mode

1. Turn off all power supplying this device and the equipment in which it is installed before working on it.
2. Always use a properly rated voltage sensing device to confirm that all power is off.
3. Unscrew the cover screws on the receiver and remove the cover.
4. Set the DIP switches to one of the following modes:

2400 baud setting

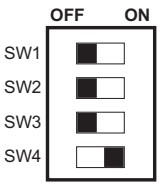
SW1 OFF	Modbus RTU mode
SW2 OFF	
SW3 OFF	2400 baud, no parity, 1 stop bit
SW4 OFF	

4800 baud setting



SW1 OFF	Modbus RTU mode
SW2 OFF	
SW3 ON	4800 baud, no parity, 1 stop bit
SW4 OFF	

9600 baud setting



SW1 OFF	Modbus RTU mode
SW2 OFF	
SW3 OFF	9600 baud, no parity, 1 stop bit
SW4 ON	

5. Replace the cover on the receiver.
6. Apply control power to the receiver.
7. Connect the USB-to-RS485 adapter to the computer's USB port.
8. Start the Wireless Receiver Setup program.
9. Change the **PC Serial Port Settings** (**Port**, **Baud Rate**, **Parity**, **Stop Bits**) to match the fixed serial protocol mode you set on the receiver.

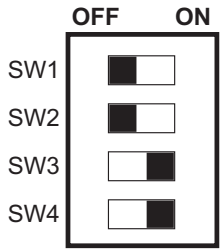
10. Click **Set**.

    The Channel Registers table appears to indicate the receiver is communicating with the computer.

Changing serial protocol mode from fixed to user programmable

If your gateway's serial communications port settings do not match any of the fixed serial protocol modes (for example, if your gateway's serial protocol setting is 19200 baud, even parity and 1 stop bit), you must set the receiver to **User Programmable Serial Protocol** mode.

1. While the receiver is communicating with the computer and the USB-to-RS485 adapter is still connected, set the **Receiver ID (hex)** and **Modbus Address**, then click **Program**.
2. Under **User Programmable Serial Protocol**, change **Baud Rate**, **Parity** and **Stop Bits** to match your gateway's serial port settings, then click **Program**.
3. Unplug or turn off the receiver's control power.
4. Use a properly rated voltage sensing device to confirm that all power is off.
5. Unscrew the cover screws on the receiver and remove the cover.
6. Set the DIP switches to **User Programmable Serial Protocol** mode:



7. Replace the cover on the receiver.
8. Apply control power to the receiver.
9. Change the **PC Serial Port Settings** to match the new **Baud Rate**, **Parity**, **Stop Bits** settings, then click **Set**.

   The Channel Registers table appears to indicate the receiver is communicating with the computer.

Firmware upgrade

You can upgrade your wireless receiver's firmware if a new version becomes available.

1. Download the new firmware (with a .upd extension) from www.schneider-electric.com.
2. Connect the receiver to the computer using the USB-to-RS485 adapter cable.
3. Start the **Wireless Receiver Setup** software.
4. Click **Upgrade Firmware**.
5. Click ..., then browse to where you saved the firmware upgrade file.
6. Click **Update Firmware**.

   The **Update complete** dialog displays after the firmware upgrade is finished.
7. Read the **Firmware Version** special register to verify the new firmware version.

Chapter 7 Specifications

This section provides additional specifications for your device. For mechanical dimensions, installation and wiring information, refer to the device installation sheet.

Transmitters

All transmitters

Control power	Battery	2 x 3.6V 8500mAh lithium cell
	Battery life	Up to 10 years, under normal conditions
Environment	Operating temperature	-10 to 40 °C (14 to 104 °F)
	IP rating	IP68
Standards	Radio (R&TTE Directive)	EN300-220
	CE (LVD)	EN60950
Radiated and conducted emissions		FCC CFR47 Part 90 IC RSS-119

WT4211 / WT4111 pulse counter

Operating frequency	WT4211	169 MHz
	WT4111	153 MHz
Number of input channels		1
Wireless	Output power, WT4211	250 mW max
	Output power, WT4111	120 mW max
	Transmission range	Up to 2 km (1.24 mi.) line-of-sight
	Transmission interval	15 min
Sensor input	Wetting voltage	5.0 V DC ±10%
	Pulse width	> 1 ms
	Pulse frequency	0.1 Hz to 10 Hz
Weight		approx. 380 g (0.84 lb)
Mounting method		Vertical, using supplied mounting bracket

WT4212 / WT4112 pulse counter

Operating frequency	WT4212	169 MHz
	WT4112	153 MHz
Number of input channels[1]		2
Wireless	Output power, WT4212	250 mW max
	Output power, WT4112	120 mW max
	Transmission range	Up to 2 km (1.24 mi.) line-of-sight
	Transmission interval	15 min
Sensor input	Wetting voltage	5.0 V DC ±10%
	Pulse width	> 1 ms
	Pulse frequency	0.1 Hz to 10 Hz
Weight		approx. 380 g (0.84 lb)
Mounting method		Vertical, using supplied mounting bracket

1. The dual channel pulse counter operates as two separate devices (two counters independent of each other), so the channels can be connected to two separate pulse sources (meters).

WT4232 / WT4132 status monitor

Operating frequency	WT4232	169 MHz
	WT4132	153 MHz
Number of input channels		2
Wireless	Output power, WT4232	250 mW max
	Output power, WT4132	120 mW max
	Transmission range	Up to 2 km (1.24 mi.) line-of-sight
	Transmission interval	Immediately, upon change of state
Sensor input	Wetting voltage	5.0 V DC ±10%
	Pulse width	> 1 ms
	Pulse frequency	0.1 Hz to 10 Hz
Control power	Battery	2 x 3.6V 8500mAh lithium cell
	Battery life	Up to 10 years, under normal conditions
Weight		approx. 380 g (0.84 lb)
Mounting method		Vertical, using supplied mounting bracket

WT4222 / WT4122 0 to 10 V analog input sensor

Operating frequency	WT4222	169 MHz
	WT4122	153 MHz
Number of input channels		2
Wireless	Output power, WT4222	250 mW max
	Output power, WT4122	120 mW max
	Transmission range	Up to 2 km (1.24 mi.) line-of-sight
	Transmission interval	15 min
	Transmitted data format	Floating point number
	Data accuracy	± 3%
Sensor input	Input signal	0 to 10 V DC
Weight		approx. 380 g (0.84 lb)
Mounting method		Vertical, using supplied mounting bracket

WT4241 / WT4141 temperature sensor

Operating frequency	WT4241	169 MHz
	WT4141	153 MHz
Number of input channels		1
Wireless	Output power, WT4241	250 mW max
	Output power, WT4141	120 mW max
	Transmission range	Up to 2 km (1.24 mi.) line-of-sight
	Transmission interval	15 min
Sensor measurement	Range	-20 to 65 °C (-4 to 149 °F)
	Accuracy	±0.5 °C
Weight		approx. 380 g (0.84 lb)
Mounting method		Vertical, using supplied mounting bracket

WT4216 water pit pulse counter

Operating frequency		169 MHz
Number of input channels		1
Wireless	Output power	125 mW typical, 500 mW max
	Transmission range	Up to 2 km (1.24 mi.) line-of-sight
	Transmission interval	15 min
Sensor input	Wetting voltage	5.0 V DC ±10%
	Pulse width	> 1 ms
	Pulse frequency	0.1 Hz to 10 Hz
Control power	Battery	2 x 3.6V 8500mAh lithium cell
	Battery life	Up to 10 years, under normal conditions
Standards	Radio (R&TTE Directive)	EN300-220
	CE (LVD)	EN60950
Weight		approx. 485 g (1.1 lb)
Mounting method		Use built-in magnet on top of device

WT4214 ATEX-rated pulse counter

Operating frequency		169 MHz
Number of input channels		1
Wireless	Output power	250 mW typical, 500 mW max
	Transmission range	Up to 2 km (1.24 mi.) line-of-sight
	Transmission interval	15 min
Sensor input	Wetting voltage	5.0 V DC ±10%
	Pulse width	> 1 ms
	Pulse frequency	0.1 Hz to 10 Hz
	Logic ’0’ (closed)	0 to 0.5 V DC
	Logic ’1’ (open)	+3.3 to 5.0 V DC
Control power	Battery	2 x 3.6V 8500mAh lithium cell
	Battery life	Up to 10 years, under normal conditions
ATEX markings	ATEX environment	Ex II 3G [Ta = -20 to 65 °C (-4 to 149 °F)]
	ATEX protection	Ex ic IIA T3 [Ta = -20 to 65 °C (-4 to 149 °F)]
Weight		approx. 380 g (0.84 lb)
Mounting method		Vertical, flush on a flat surface

Receiver

Devices supported		Up to 255 transmitters
Operating frequency	WR4200	169 MHz
	WR4100	153 MHz
Antenna impedance		50 Ω
Wireless range (with dipole antenna)		Up to 2 km / 1.2 mi. line-of-sight
Communications	Modbus mode	Modbus slave RTU
	Slave address	Configurable (1 to 255)
	Protocol	RS-485 (default) or RS-232
	Baud rate	19200 (programmable), 9600, 4800 or 2400
	Parity	Even, odd or none
	Stop bits	1 or 2
Control power		12 - 24 V DC (use a SELV or PELV power supply)
Environment	Operating temperature	-10 to 40 °C (14 to 104 °F)
	Mounting location	Protected from direct sunlight
	Protection degree	IP65
	Pollution degree	2
	Altitude	< 2000 m (6562 ft) above sea level
Standards	Safety	EN60950-1
	Radio (R&TTE Directive)	EN300-220
	CE (LVD)	EN60950
Receiver cover screw torque		2.5 N·m (22 in·lb)
Weight		1.2 kg (2.6 lb)

Repeater

Operating frequency	WR4290	169 MHz
	WR4190	153 MHz
Antenna impedance		50 Ω
Wireless range (with dipole antenna)	WR4290	Up to 4 km / 2.5 mi. line-of-sight
	WR4190	Up to 10 km / 6.2 mi. line-of-sight
Wireless output power	WR4290	0.5 W max
	WR4190	5.0 W max
Transmit interval		Open channel
Cable length		Up to 15 m (49 ft)
Control power		100-240 VAC, 50/60 Hz, universal plug
Environment	Operating temperature	-10 to 40 °C (14 to 104 °F)
	Mounting location	Protected from direct sunlight
	IP rating	IP65
	Pollution degree	2
	Altitude	< 2000 m (6562 ft) above sea level
Standards	Safety	EN60950-1
	Radio (R&TTE Directive)	EN300-220
	CE (LVD)	EN60950
Repeater cover screw torque		2.5 N·m (22 in·lb)
Weight		4.0 kg (8.8 lb)

Whip antenna

Ordering information	METSEWA4277	For 169 MHz devices
	METSEWA4177	For 153 MHz devices
Impedance		50 Ω
Gain		Unity
Bandwidth		15 MHz at 1.5:1 VSWR
Polarization		Vertical
Power handling		25 W
Materials		Stainless steel whip, plated brass fittings, molded base
Cable		RG58, 5 m (16 ft)
Connector		N-type male to BNC
Overall length		0.9 m (3.0 ft)
Weight		250 g (0.6 lb)
Mounting		M 12 x 25 stud or L bracket

Dipole antenna

Ordering information	METSEWA4275	For 169 MHz devices
	METSEWA4175	For 153 MHz devices
Impedance		50 Ω
Gain		Unity
E plane bandwidth		80°
VSWR		< 2:1
Power handling		75 W
Materials		White parallel glass fiber tube, 26 mm (1 in)
Cable		RG213, 5 m (16 ft)
Connector		N-plug
Overall length		1.6 m (5.2 ft)
Weight		1.0 kg (2.2 lb)
Mounting		Integral diecast aluminum
Fasteners		M8 V bolts, stainless steel

Extension cables

Ordering information	METSEWA4X82	5 m (16 ft) length
	METSEWA4X84	10 m (33 ft) length
Impedance		50 Ω
Dielectric withstand voltage		1500 Veff
Insulation resistance		5000 MΩ
Operating temperature		-55 to 155 °C (-67 to 311 °F)
IP rating (mated)		IP67

Schneider Electric

35 Rue Joseph Monier
92500 Rueil Malmaison – France

www.schneider-electric.com

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