RADIO MODULES & SYSTEMS



SENECA

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RADIO MODULES AND SYSTEMS



SENECA **radio modules and systems** carry signals, ModBUS data and commands wirelessly, from a few metres up to 10 km. The range covers LoRa® 869 MHz, UHF 868 MHz and VHF 169 MHz technologies with transparent radio modems, gateways / repeaters and RTUs with integrated I/O, for point-to-point, point-to-multipoint, broadcasting and signal repeating links. The **R-GWR** system creates battery-powered LoRa sensor networks accessible via ModBUS RTU/TCP-IP. AES 128-bit encryption and compliance with the RED Directive 2014/53/EU.

Scan for more information

10 km coverage (directional antenna)

500 mW max output power

32 LoRa sensors per R-GWR

128 bit AES encryption

THE RANGE

Z-LINK2-LO

LoRa® 869 MHz gateway / repeater, RS232 + RS485, DIN rail



Z-AIR-1

UHF 868 MHz radio modem with integrated antenna, IP65 outdoor



RM169-1

VHF 169 MHz radio modem, RS232/RS485, 1 DI + 1 DO



RTURADIO-169

169 MHz radio RTU: 4 DI, 2 DO, 2 AI, 2 AO, counter, RS485



R-GWR

LoRa radio hub for 32 wireless sensors, ModBUS RTU / TCP-IP



HIGHLIGHTS

THREE OPERATING BANDS

VHF 169 MHz, UHF 868–870 MHz and LoRa® 869 MHz for every range and speed requirement.

LONG RANGE

Up to 10 km in open field with directional antenna and Class 1 receiver.

LoRa® TECHNOLOGY

CSS modulation with high noise immunity and sensitivity down to -146 dBm (R-GWR).

AES 128-BIT ENCRYPTION

Secure transmissions on all radio modems and R-GWR wireless sensors.

INTEGRATED I/O

Digital and analog inputs and outputs and counter built into the 169 MHz radio modems.

FLEXIBLE TOPOLOGIES

Point-to-point, point-to-multipoint, broadcasting, repeater and routing tables.

OUTDOOR VERSIONS

Z-AIR-1 in IP65 fiberglass; aluminium housings with -30.. +60 °C temperature range.

RED COMPLIANCE

Compliant with RED Directive 2014/53/EU, can be marketed throughout the European Union.

SELECTION TABLE – RADIO MODEMS

	Z-LINK2-LO	Z-AIR-1	RM169-1	RTURADIO-169
Description	LoRa® gateway / repeater	Simplex / half-duplex radio modem with integrated antenna	Radio modem with RS232 / RS485 interface	Radio modem with integrated I/O
RADIO				
Technology / band	LoRa®, 869.525 MHz (G3 band ERC 70-03)	UHF 868 – 870 MHz	VHF 169.400 – 169.475 MHz	
Channel spacing / channels	–	25 – 50 kHz; 1 @ 50 kHz, 3 @ 25 kHz	12.5 – 25 – 50 kHz; 1 @ 50 kHz, 3 @ 25 kHz, 6 @ 12.5 kHz	
Modulation	LoRa® CSS (Chirp Spread Spectrum)	9K00F1D / 18K0F1D	9K00F1D or 18K0F1D (NBFM / GFSK)	
Radio data rate	–	9.6 kbps @ 25 kHz; 19.2 kbps @ 50 kHz	4.8 kbps @ 12.5 kHz; 9.6 kbps @ 25 kHz; 19.2 kbps @ 50 kHz	
Output power	25 mW	25 / 150 / 500 mW (depending on sub-band)	50 – 150 – 500 mW	
Receiver	Class 2	Class 2, LBT and Agility	Class 2, LBT and Agility	Class 1, LBT and Agility
Sensitivity	–	< -105 dBm @ 50 kHz; < -107 dBm @ 25 kHz	< -105 dBm @ 50 kHz; < -107 dBm @ 25 kHz; < -110 dBm @ 12.5 kHz	
Coverage (open field)	Up to 1,000 m	Up to 7 km (antenna in dominant position)	Up to 10 km with directional antenna	
Encryption	AES 128 bit			
Antenna	Integrated λ/2, SMA connector	Integrated (omnidirectional)	λ/4, λ/2 or 3-element Yagi (BNC)	
COMMUNICATION AND FUNCTIONS				
Serial interfaces	1 x RS232 + 1 x RS485	RS485	RS232 / RS485	RS485
Protocol	ModBUS RTU (not compatible with Z-LINK1-LO)	Transparent (1,024-byte buffer)	Transparent (1,024-byte buffer)	ModBUS master / slave
Serial speed	Configurable	1.2 – 57.6 kbps	1.2 – 57.6 kbps	2.4 – 57.6 kbps
Integrated I/O	–	–	1 opto-isolated DI, 1 relay DO	4 DI, 1 counter 10 Hz, 2 relay DO, 2 AI and 2 AO 4–20 mA
Modes	Bridge, remote I/O, repeater	Point-to-point, multipoint, broadcasting, digipeater, routing		Point-to-point, multipoint, broadcasting, ModBUS, routing
Configuration	EASY SETUP, DIP switch	RADIO SETUP		
GENERAL DATA				
Power supply	10..40 Vdc; 19..28 Vac	9 – 32 Vdc	9 – 32 Vdc	9 – 32 Vdc; 3.3 – 4.8 Vdc battery
Consumption	Max 1 W	30 mA Rx / 200 mA Tx @ 12 Vdc		30 mA Rx / max 600 mA Tx
Isolation	1,500 Vac	–	–	–
Operating temperature	-20..+65 °C	-30..+60 °C		
Protection rating	IP20	IP65 (outdoor)	IP20	IP20
Dimensions / weight	17.5 x 100 x 112 mm · 110 g	Ø 40 x 320 mm · 750 g	90 x 100 x 40 mm · 210 g	140 x 110 x 50 mm · 330 g
Housing / mounting	PA6 · DIN rail, IDC10 bus	Fiberglass · stainless wall bracket	Aluminium · plate / wall	Aluminium · plate / wall

Coverage values depend on antenna, installation height and propagation conditions. All radio modems are CE marked and compliant with the RED Directive 2014/53/EU. Technical data are indicative and not binding.

RADIO MODULES AND SYSTEMS

TECHNOLOGY SELECTION GUIDE

LoRa® 869 MHz

Z-LINK2-LO · R-GWR

Range: up to 1 km (Z-LINK2)

Power: 25 mW

Strengths: high immunity, low consumption, DIN rail mounting with bus

Ideal for: extending ModBUS bus between panels, remote I/O, battery sensors

UHF 868 MHz

Z-AIR-1

Range: up to 7 km

Power: 25 / 150 / 500 mW

Strengths: integrated antenna, IP65 outdoor housing

Ideal for: transparent links between outdoor stations and multipoint networks

VHF 169 MHz

RM169-1 · RTURADIO-169

Range: up to 10 km

Power: 50 / 150 / 500 mW

Strengths: high penetration, integrated I/O, battery power

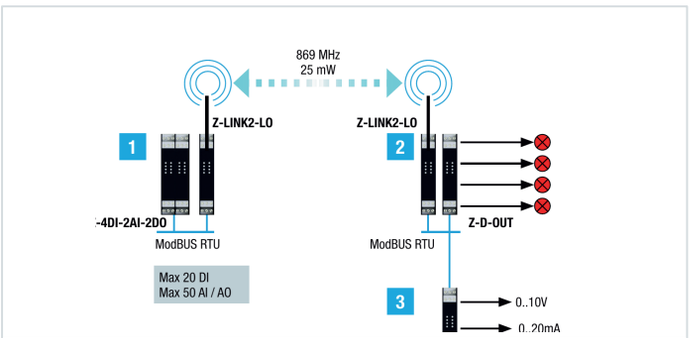
Ideal for: telemetry, meter reading, long-distance remote control

169 MHz ANTENNA SELECTION

Antenna	Type	Cable	RM169-1	RTURADIO-169
A-169DV12	Vertical λ/2 dipole, bracket	5 m	**1st choice · kit RM169-1-169DV12**	**1st choice · kit RTURADIO-169DV12**
A-169DV12-10	Vertical λ/2 dipole	10 m	Alternative · kit RM169-1-DV12-10	Alternative · kit RTURADIO-DV12-10
A-169DV14	Vertical λ/4 whip, L = 450 mm	–	Alternative · kit RM169-1-169DV14	Alternative · kit RTURADIO-169DV14
A-169DV16	¼ λ whip, L = 45 cm	–	Alternative	Alternative
A-169YAGI	3-element directional Yagi	10 m	Alternative (long links) · kit RM169-1-169YAGI	Alternative (long links) · kit RTURADIO-169YAGI

Z-LINK2-LO is supplied with a whip antenna; Z-AIR-1 has an integrated omnidirectional antenna (versions with 5 m or 10 m cable).

Z-LINK2-LO: REMOTE I/O MODE



In remote I/O mode, two Z-LINK2-LO units copy via radio the inputs of the Z-PC modules connected to the bus (e.g. Z-4DI-2AI-2DO) to the remote outputs (e.g. Z-D-OUT, Z-3AO), without a PLC: up to 20 digital inputs and 50 analog channels. **If the radio link is lost, the outputs can go to a configurable safe state.**

INSTALLATION AND COMPLIANCE

INSTALLATION TIPS

- Install the antenna in a high, dominant position, with a clear line of sight between stations
- Use directional Yagi antennas for longer links and omnidirectional antennas for multipoint networks
- Keep the antenna cable as short as possible and prefer low-loss cables
- Check the link using the status LEDs and the installation test function (Z-LINK2-LO)
- Overcome obstacles and distances with the repeater / digipeater function and routing tables

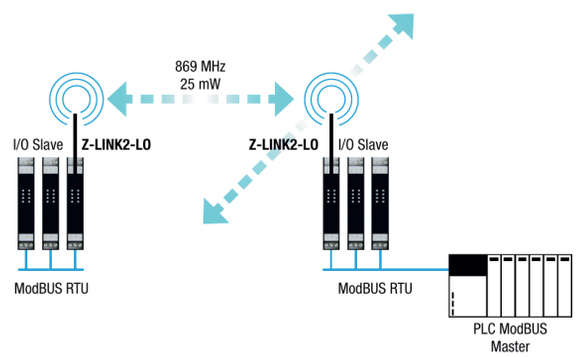
RED AND RED DA DIRECTIVE

All radio products comply with the essential requirements of the RED Directive 2014/53/EU and can be freely marketed in the European Union.

Delegated Regulation (EU) 2022/30 (cybersecurity): the applicability of the requirements of Art. 3(3)(d), (e) and (f) of the RED Directive is assessed for each product according to the intended connection modes. EU declarations of conformity are available on request.

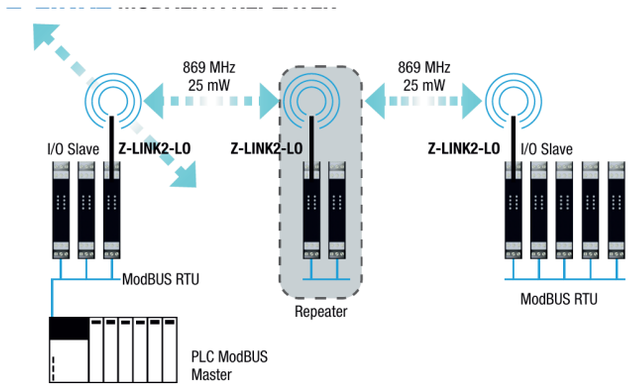
APPLICATION EXAMPLES

Z-LINK2-LO · BRIDGE MODE



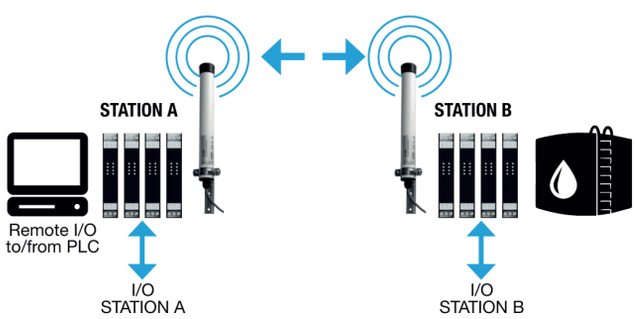
Transparent wireless link: the ModBUS master PLC communicates with remote slave I/O modules as if they were on the same RS485 bus.

Z-LINK2-LO · REPEATER MODE



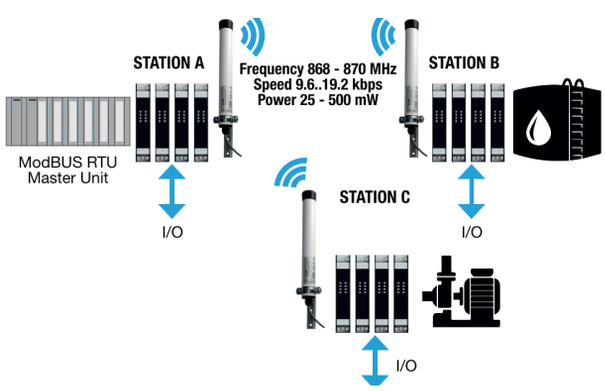
An intermediate module acting as a repeater retransmits packets, overcoming obstacles or distances beyond the range of a single link.

Z-AIR-1 · POINT-TO-POINT



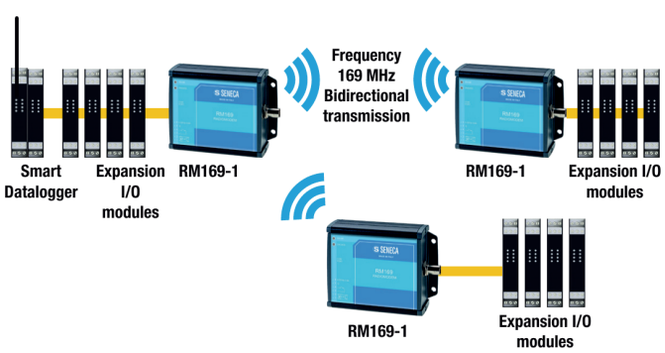
Data transmission between two outdoor stations, for example to repeat remote I/O to and from a PLC.

Z-AIR-1 · POINT-TO-MULTIPOINT



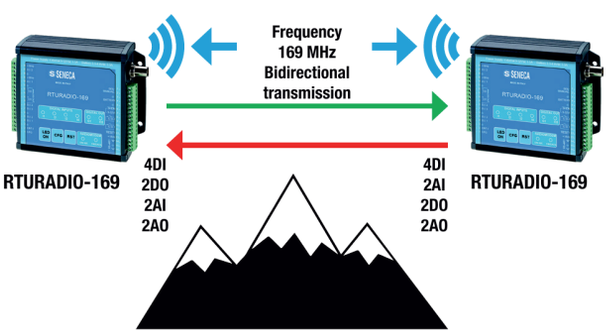
A ModBUS RTU master unit polls several remote stations (wells, tanks, pumps) on the same radio network.

RM169-1 · MODBUS I/O EXPANSION



Dataloggers or controllers extend their I/O expansion modules via 169 MHz radio, point-to-point or multipoint.

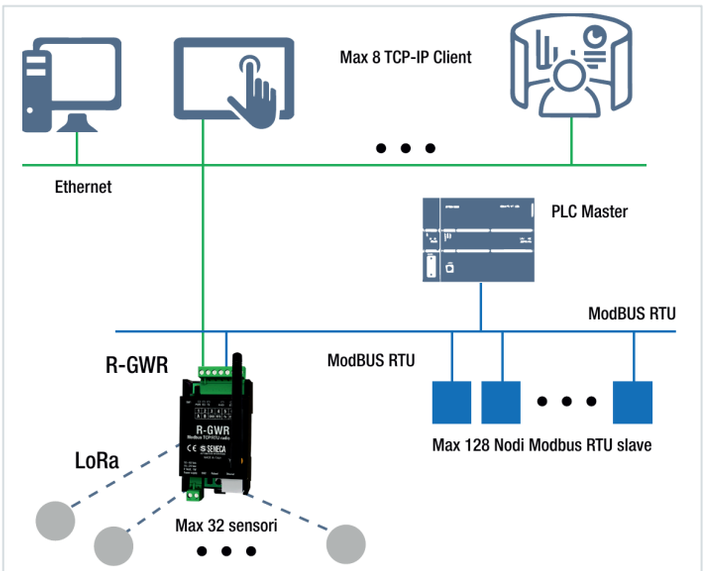
RTURADIO-169 · I/O MIRRORING



Remote bidirectional replication of digital and analog inputs and outputs between two RTUs, without a PLC.

LoRa® RADIO MEASUREMENT SYSTEM – R-GWR

R-GWR is a radio hub that creates a network of LoRa wireless sensors (863–865 MHz) for measuring industrial, building and environmental parameters, accessible from PLCs and remote management systems via ModBUS RTU or ModBUS TCP-IP. It manages up to 32 sensors, each with integrated temperature / humidity and a 0–30 V analog, digital or 16-bit counter input. The sensors are powered by lithium batteries and transmit periodically, on event or via push button; configuration is done via web server.



32	sensors per hub	**30 s**	minimum interval
-146	dBm sensitivity	**36**	months max battery

RADIO HUB R-GWR

Power supply	10..40 Vdc; 19..28 Vac · max 1 W
Ports	1 Ethernet 100 Base-TX · 1 RS232/RS485
Protocols	ModBUS TCP-IP (8 client), ModBUS RTU
Radio	LoRa 863–865 MHz, +14 dBm, AES 128 bit
Managed sensors	Max 32 · minimum interval 30 s
Temperature	-20..+70 °C · IP20
Dimensions / weight	53.3 x 90 x 32 mm · 80 g
Mounting	DIN rail IEC EN 60715 or wall
Configuration	Web server, DIP switch, SDD

COMPATIBLE WIRELESS SENSORS



	R-GWR-IP-1 / IP-2	R-GWR-S-1
Type	Industrial	Home automation, flood detection
Battery	Lithium 1,650 mAh, ~2 years (IP-2: double)	Lithium 900 mAh, ~1 year
Measurements	Temperature -25..+70 °C (±0.5 °C), humidity 0..100% (±3%)	
IN0 input	Analog 0–30 V, digital or 16-bit counter, 1 Hz	
Additional inputs	–	Reed (IN1), water probe, tamper (IN2)
Protection	IP40	IP20
Dimensions / weight	80 x 60 x 45 mm · 150 g	65 x 45 x 30 mm · 45 g

TYPICAL APPLICATIONS

- Production site monitoring
- Commercial and residential buildings
- Ambient temperature and humidity
- Flood detection
- Door and access opening

ORDER CODES

Code	Description
LoRa® 869 MHz	
Z-LINK2-LO	Wireless LoRa gateway / repeater, RS232 + RS485
UHF 868 MHz	
Z-AIR-1	868 MHz radio modem with omnidirectional antenna, RED, 5 m cable
Z-AIR-1-10M	868 MHz radio modem with omnidirectional antenna, RED, 10 m cable
VHF 169 MHz – RADIOMODEM RM169-1	
RM169-1	169 MHz radio modem, 1 DI, 1 DO, RS485, BNC F connector, RED
RM169-1-169DV12	RM169-1 + λ/2 dipole antenna, 5 m cable
RM169-1-DV12-10	RM169-1 + λ/2 dipole antenna, 10 m cable
RM169-1-169DV14	RM169-1 + λ/4 whip antenna
RM169-1-169YAGI	RM169-1 + 3-element directional Yagi antenna
VHF 169 MHz – RTU RADIO	
RTURADIO-169	169 MHz radio RTU, 4 DI, 2 DO, 1 counter, 2 AI, 2 AO, RS485
RTURADIO-169DV12	RTURADIO-169 + λ/2 dipole antenna, 5 m cable
RTURADIO-DV12-10	RTURADIO-169 + λ/2 dipole antenna, 10 m cable
RTURADIO-169DV14	RTURADIO-169 + λ/4 whip antenna
RTURADIO-169YAGI	RTURADIO-169 + 3-element Yagi antenna

Code	Description
R-GWR RADIO MEASUREMENT SYSTEM	
R-GWR	ModBUS gateway for LoRa wireless sensors
R-GWR-IP-1	Industrial LoRa sensor with analog / digital input
R-GWR-IP-2	Industrial LoRa sensor with A/D input, double battery
R-GWR-S-1	Home automation LoRa sensor with A/D input and flood detection
R-GWR-AF	Flood sensor cable
R-BT1	Single battery pack
R-BT2	Double battery pack 3.6 V
169 MHz ANTENNAS	
A-169DV12	Vertical λ/2 dipole, BNC M, 5 m cable
A-169DV12-5	Vertical λ/2 dipole, BNC M, 5 m cable and bracket
A-169DV12-10	Vertical λ/2 dipole, BNC M, 10 m cable
A-169DV14	Vertical λ/4 whip, BNC M, L = 450 mm
A-169DV16	¼ λ whip, BNC M, L = 45 cm
A-169YAGI	3-element Yagi, BNC M, 10 m cable
SOFTWARE	
RADIO SETUP	Configuration software for Z-AIR-1, RM169-1, RTURADIO-169

HOW TO READ 169 MHz KIT CODES

-169DV12

λ/2 dipole antenna with 5 m cable (1st choice)

-DV12-10

λ/2 dipole antenna with 10 m cable

-169DV14

λ/4 whip antenna, direct mounting

-169YAGI

Directional Yagi antenna, 10 m cable

Example: RM169-1-169DV12 = RM169-1 radio modem supplied with A-169DV12 antenna. Z-LINK2-LO is configured with EASY SETUP or DIP switches; Z-AIR-1, RM169-1 and RTURADIO-169 with the RADIO SETUP software.

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