

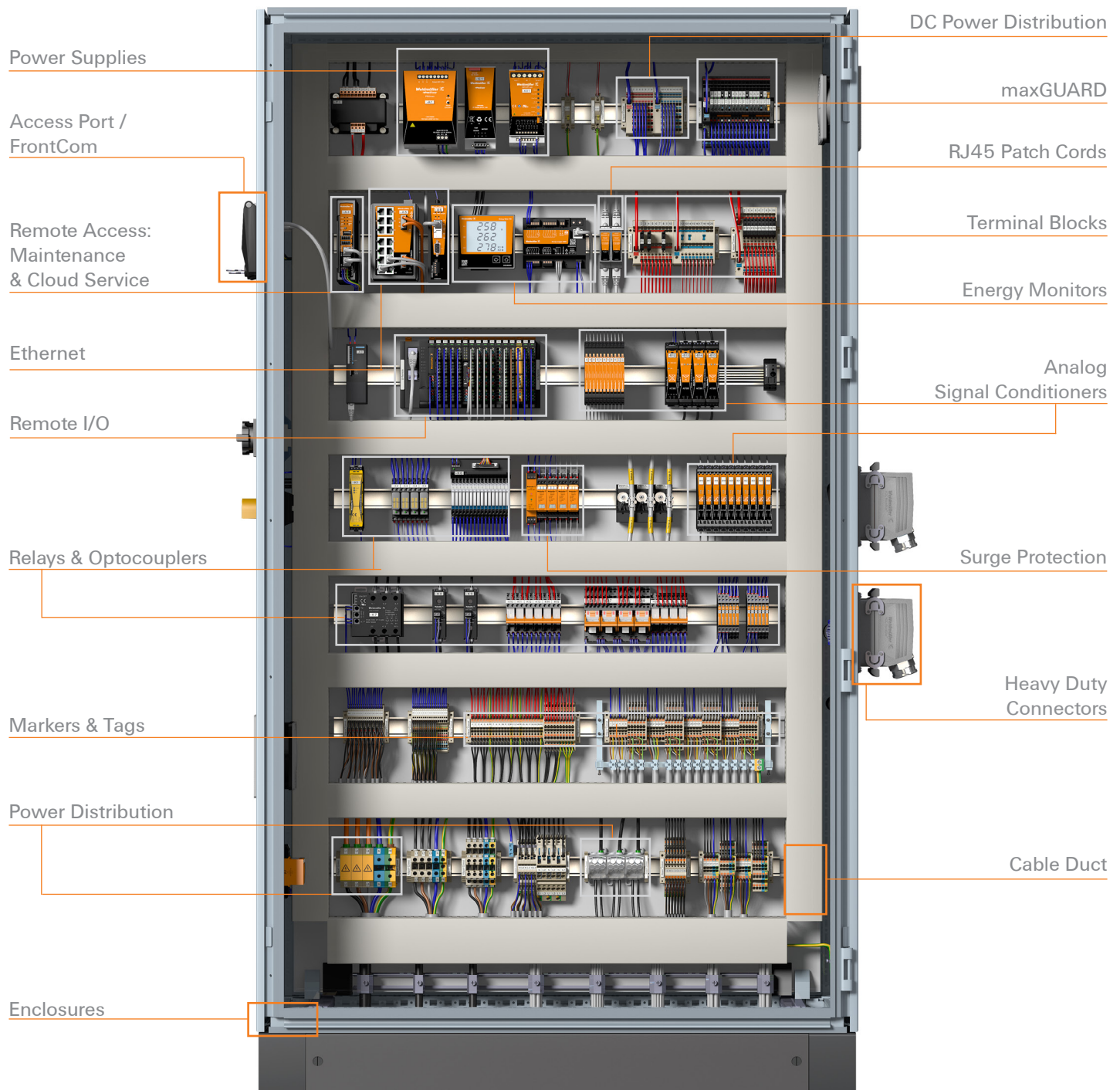
Automation & Software

Wireless Connectivity Solutions

Version 2026



Weidmuller – Your Partner in Smart Industrial Connectivity

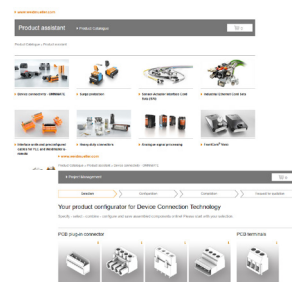


Configuration Software



Weidmuller Configurator

- Simplifies configuration and ordering for extra efficiency in panel planning, installation and operation
- Minimization of failures
- User-friendly
- Easy documentation



Product Configuration Selection Software

- Competitive cross-reference database
- Configure custom PCBs, rectangular connectors, Ethernet cabling and connectors, SAI cordsets and connectors

Wireless Connectivity

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Weidmüller

Who We Are

As knowledgeable experts, we support our customers and partners around the world with products, solutions and services in the industrial environment of power, signal and data.

Be it automobile manufacturing, electricity production or water management - hardly any of today's industries can do without electronics and electrical connectivity. In this internationalized, technologically changing world, the complexity of requirements is rapidly increasing due to the emergence of new markets. New, more varied challenges have to be overcome, and the solutions to them will not be found in high-tech products alone. Connectivity is the key, whether it involves power, signals and data, demands and solutions or theory and practice. Industrial Connectivity needs connections. And that's precisely what we stand for.

Together we set the standards in Smart Industrial Connectivity.

Let's connect.



Wireless Connectivity Solutions

Weidmüller industrial wireless products provide secure and reliable solutions for a wide range of industries and applications, as an alternative for signal and data wiring.

Product Overview

Weidmüller industrial wireless products provide secure and reliable solutions for a wide range of industries and applications, as an alternative for signal and data wiring. The Unlicensed & Licensed Frequency Hopping wireless transceiver supports over the-air Ethernet protocols which gives the radios and modems the power and flexibility to perform reliably in sprawling harsh industrial environments.

These products fall into three groups:

Wireless Meshing I/O & Gateways

Wireless I/O, combines multi I/O, automatic meshing and/or gateway functionality with the reliability of secure, scalable mesh for long distance communications. The IP-based addressing provides mesh/self-healing of network communications, multi-hop repeating and remote over the air re-configuration and diagnostics. The Meshing I/O units further complemented by its ease of commissioning and integration into existing plant infrastructure plus seamless interface with non-meshing systems. All the transceivers are configurable Modbus TCP gateways and modem (ethernet & serial) capabilities for secure and reliable connections.



Wireless Modems

Wireless Modems transmit serial or Ethernet data, providing a wireless extension of the data link. Example applications are PLC to PLC connections (point-to-point), connecting SCADA to a group of PLCs (point-to-multipoint), or forming a wireless PLC LAN (multidrop). Wireless modems transmit the data with minimal transformation.

Cellular Routers

Cellular routers, modems, IO make use of SIM based technology to remotely access hard to reach locations and for applications where point-to-point devices are not possible. Enabled for worldwide deployment these devices require no site surveys and, in most cases, have good coverage from local telecommunications carriers.



Wireless System Architecture

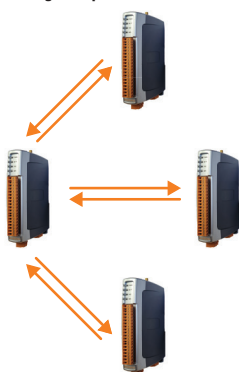
Weidmuller's solutions are a flexible native Ethernet support that provides solutions to connectivity challenges today and in the future. The transceiver units also provides Ethernet and serial gateway support for industrial protocols including Modbus TCP/RTU and DNP3 I/O, MQTT +Sparkplug B. These radios use the ProMesh™ system which operates reliably with the challenges of obstructed paths by using automatic path selection to allow the communications network to adapt to changes easily with redundancy. This is innovative ProMesh™ communications protocol specifically designed for highly reliable and secure operation on open license-free radio bands. Weidmuller wireless units form a network Wireless Information Backbone.

- **Exception-reporting transmissions for maximum wireless efficiency**

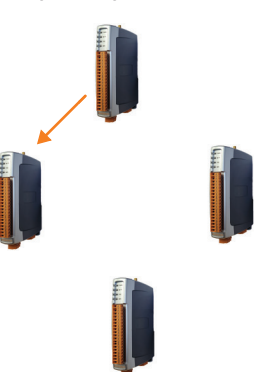
Wireless messages are only transmitted whenever a signal value changes, yielding effective real-time performance. Integrity check messages ensure reliable operation of the wireless network as well as signal link accuracy. Exception-reporting reduces signal traffic to messages of only real significance.

- **Error-checking with automatic re-transmission for high reliability operation**

Polling Example



Exception Example



Event-driven communication

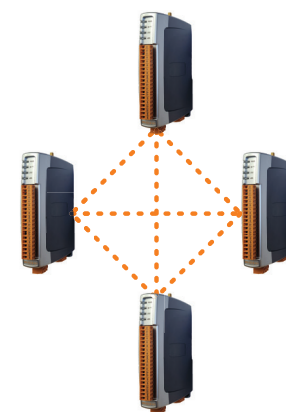
Every radio message has a probability of corruption, so automatic error detection, acknowledgement and re-transmission is critical to reliable operation.

WIB-net will send and then re-transmit up to five times. After the fifth attempt, a communication failure status is logged and an alarm set externally.

- **Listen-before transmit wireless operation to maximize the chance of successful message transmission**

- **Peer-to-peer networking for maximum network flexibility**

Each Weidmuller wireless gateway and transceiver unit can transmit/receive directly to/from any other wireless gateway and transceiver, and can transmit/receive to/from multiple wireless units.

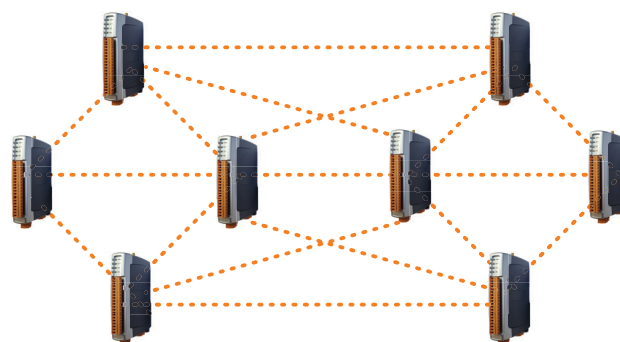


Peer-to-Peer Example

There are no master units and no slaves. Any module in a network can talk to any other. Input signals can be transmitted to multiple destinations.

- **Wireless mesh structure**

ProMesh enables every Weidmuller wireless gateway/transceiver to act as a repeater to optimize wireless message propagation. Messages can hop through multiple gateway/transceiver units to reach a destination. If these units have a reliable wireless link to at least one other gateway/transceiver, a wireless mesh forms to enable reliable links to the whole network.



Mesh Example

ProMesh is the best networking mode to use when it's not clear which sites will be repeaters. A ProMesh network consists of a Base and multiple Mesh Nodes. In a ProMesh network, any Mesh Node site can act as a repeater to provide a path for other stations to reach the Base. The ProMesh network automatically configures itself to a tree structure with the Base station at the root. When a Mesh Node cannot find a direct connection to the base, It chooses another Mesh Node to act as a repeater based on the best available path to the base.

- **High security encryption**

ProMesh uses a highly secure data encryption technique to protect against misuse of wireless data. Weidmuller wireless networks security matches or exceeds that of wired networks.

Input/Output Mapping

Process signals or sensors convey the value of an input value to a designated output channel:

- Source module address (1 – 127)
- Destination module address (1 – 127)
- Repeater addresses (up to 5 addresses)
- Output channel number
- I/O signal value (16-bit)
- CRC error-checking (16-bit)

All modules in the same system share a unique system address to avoid cross-talk between systems in the same radio environment. The configuration software automatically generates a random system address for each system.

Destination or repeater modules automatically acknowledge messages when received with a correct error-check value, except for messages from transmit-only units. If an acknowledgement is not received within 500 milliseconds, the message is re-transmitted. The message will be transmitted up to five times with random re-try times. After the fifth attempt, a “comms-fail” event will be set, which can be used to trigger an output alarm or register.

Block Messages

Block messages are similar to other transmissions. However, signal information is condensed into “blocks” and these blocks are sent at programmed intervals. Each block message contains up to 64 x 16-bits of values. Block messages are only transmitted or repeated by the wireless gateway product range.

Discrete/digital values can be packed [i.e. up to 1024 (64 x 16)] into a block message and unpacked at the destination gateway. Block messaging creates a more robust, reliable and efficient system by reducing the chance that messages will become corrupt and by minimizing radio frequency congestion.

Message Control

The ProMesh™ protocol is based on exception-reporting for optimum performance. Messages can be triggered by any of the following:

- Exception – change in input value compared to user-configurable “sensitivity” values
- Update time – user-configurable time period since the last message, individually configured for each I/O register
- Real time – block mappings only; messages transmitted on real time values
- On demand – block mappings only; poll command from another wireless unit or write command by a connected databus device

Before a message is transmitted, the radio channel is checked to ensure it is clear (listen-before-transmit). The message is preceded by a lead-in transmission; the length

depends on the radio model to allow all other units to lock onto the transmitted message.

Security Encryption

Security encryption of wireless messages is user-selectable. A 64-bit secure proprietary encryption algorithm is used. The 64-bit key is randomly generated by the configuration software and is never disclosed to the user or transmitted by radio. Configuration files are protected by password, up to 256 characters. The security level of the bridge communication link is configurable for 64-Bit WEP, 128-Bit WEP, TKIP and CCMP, and is completely independent of the client access level or any other communication link level.



CCMP (AES 128/256-bit) AES-CCMP (Advanced Encryption Standard-Counter Mode CBC-MAC Protocol) is the encryption algorithm used in the IEEE 802.11i and WPA-2 security protocols. This encryption standard uses either 256 or 128 bit-AES block cipher and CCMP technique to ensure the highest level of security and integrity available on a wireless network.

The wireless products have been designed with Cybersecurity as an important consideration. Several Cybersecurity features are available in the products. By implementing steps below will, help minimize the Cybersecurity risk for the wireless system:

- ◇ Asset identification and Inventory
- ◇ Restrict physical access
- ◇ Restrict logical access to equipment
- ◇ Conduct regular Cybersecurity risk analyses of the organization / system.
- ◇ Restrict network access
- ◇ Logging and event management
- ◇ Plan for business continuity/ cybersecurity disaster recovery)

Wi-Fi Protected Access 2 with Preshared Key (WPA2 PSK)

WPA2 PSK uses a common passphrase (preshared key) between the Access Point (AP) and the client to begin a secure communication session. This passphrase must be entered exactly the same in both the Access Point and the client. This passphrase is used to authenticate communication session between the AP and client to begin the secure wireless networking session.

Wi-Fi Protected Access 2 with Enterprise Server (WPA2 Enterprise)

Like WPA2 PSK, WPA2 Enterprise verifies the authenticity of the Access Point and client but uses an 802.1x backend authentication server handling the authentication decision. The most commonly type of authentication server is a RADIUS server. The Weidmuller devices can be configured to operate with an established RADIUS server on the network.

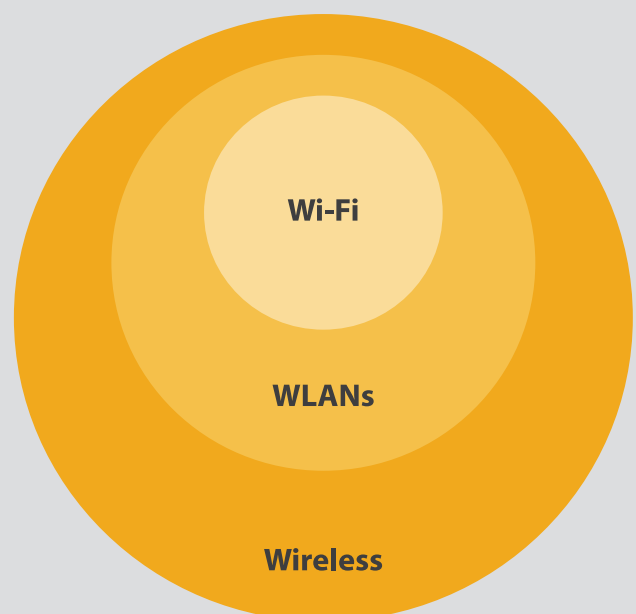
In a wireless network, WPA2 is server/client relationship between a device configured in a Client mode and configured in an Access Point mode (AP Bridge, AP Router or AP Masquerade). The scope of WPA2 Enterprise is limited in use to this mobile client configuration only. The security level on the Bridging layer is configured separately.

Nature of the Radio Path

The frequencies used by industrial wireless products are often referred to as “line-of-sight” frequencies, but this doesn’t necessarily mean a clear line of sight is required for reliable operation.

Wireless vs. WLAN vs. Wi-Fi

The key traits of a wireless LAN are local and wireless, which define the network's geographic borders and use of radio technology to connect networked nodes. Wi-Fi, on the other hand, is a certain type of WLAN that uses specifications in the 802.11 wireless protocol family.



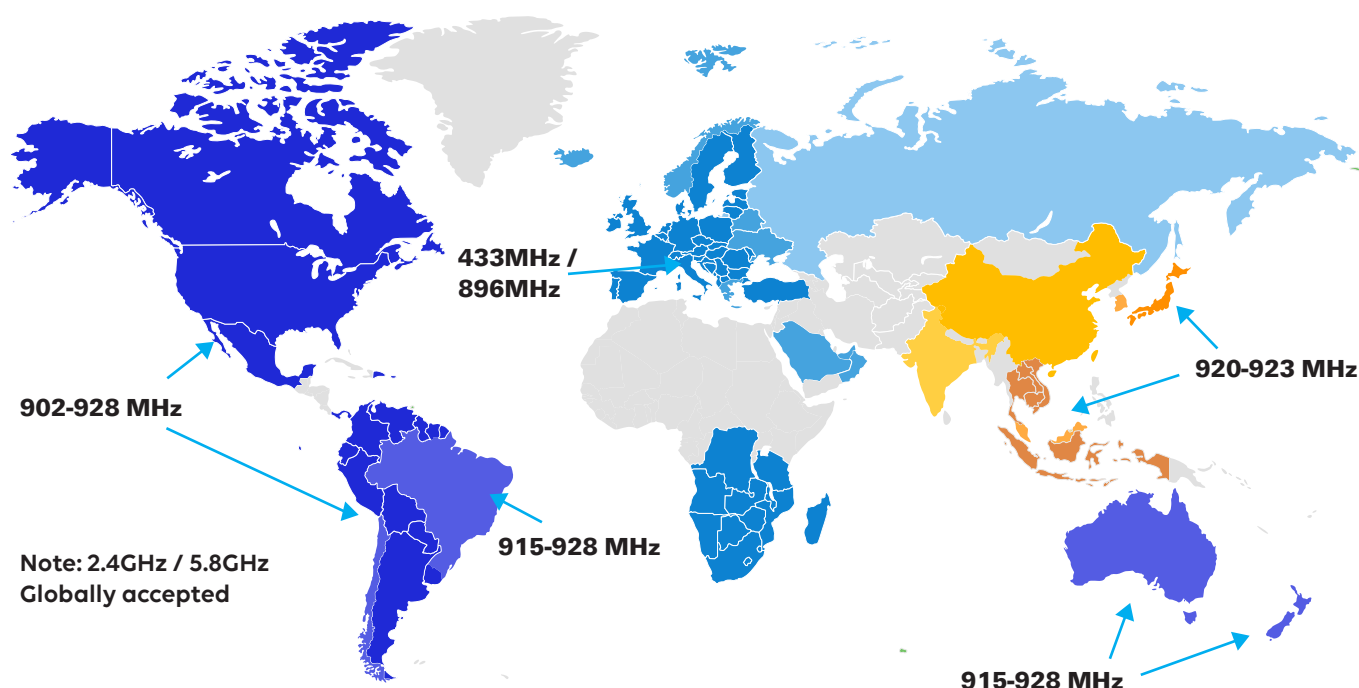
Most products that are specified with a line-of-sight distance is what can be expected to be achieved with no obstacles in the radio path. The curvature of the earth is an obstacle, so in most cases these distances can only be achieved by elevating the antennas above the ground level.

Typical line-of-sight distances	Km	Miles
2.4 GHz 36dBm /4W WiFi (Americas)	3 - 5	1.8 - 3
2.4 GHz 20dBm /100mW WiFi (Europe)	0.5 - 1	0.3 - 0.6
900 MHz 36dBm / 4W FHSS (Americas)	15 - 30	9.3 - 18.6
900 MHz 30dBm / 1W FHSS (Australia, Brazil)	8 - 15	4.9 - 9.3
869 MHz 27dBm / 500mW FF (Europe)	5 - 10	3.1 - 6.2
450 MHz 40dBm / 10W (Licensed Frequencies)	35 - 100	21.7 - 62.1
433 MHz 27dBm / 500mW FF (Europe)	5 - 15	3.1 - 9.3
433 MHz 10dBm / 10mW FF (Europe)	1 - 2	0.6 - 1.2
472 MHz 20dBm / 100mW FF (Australia)	5 - 10	3.1 - 6.2

Radio Bands and Government Regulation

The frequencies used of industrial wireless products is regulated throughout the world. Most countries (but not all) have allocated parts of the spectrum for licensed or license-free use: known as **Industrial, Scientific, and Medical (ISM) frequencies** and bands.

Band	Country or Region
220 MHz	China - licensed
433 MHz	Europe, parts of Asia, Middle East and Africa - license free
400 - 500 MHz	Parts of this band are available in most parts of the world - licensed
869 MHz	Europe, parts of Middle East and Africa - license free
900 MHz	North/South America, Australia and other countries including Japan - license free
2.4 GHz	Available in most parts of the world - license free
5.8 GHz	Available in most parts of the world - license free



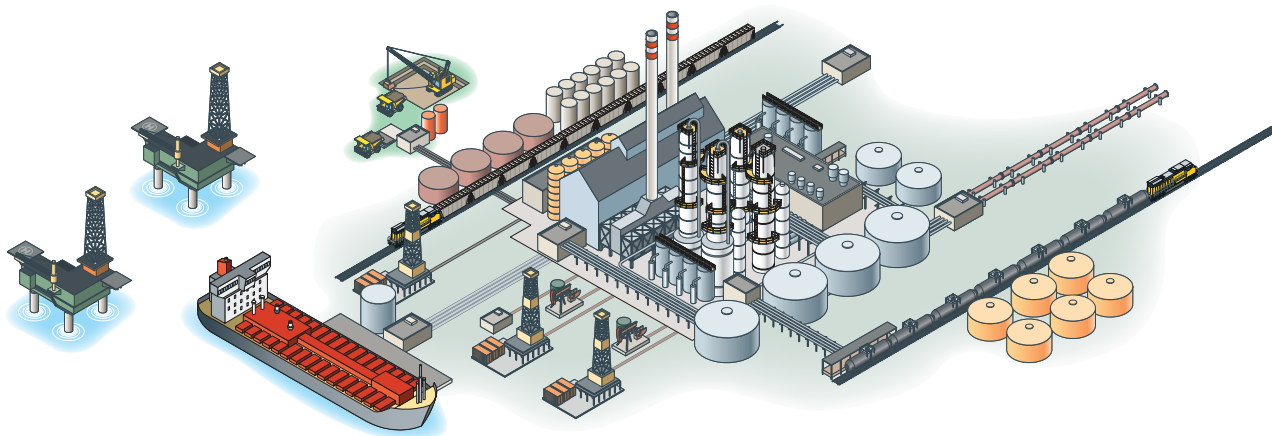
Industry Applications

Making Distances Disappear

Our complete line of wireless, Ethernet switching and network management products delivers an infrastructure for your critical assets that is flexible, productive, safe and easily managed.



Oil and Gas Applications



From the control room to the field, wireless solutions provide a wireless control infrastructure for productivity and safety gains in oil and gas applications.

Wireless benefits:

- **Long range:** Current frequencies allow for 20–50 km LoS between clients
- **High speed:** Up to 50 Mbps bandwidth
- **Secure:** Military-grade security encryption
- **Rugged:** Weatherproof casing
- **Reliable:** Advanced, self-healing meshing technology provides high availability
- **Easy deployment:** Deploys more easily and can be redeployed more quickly when compared to wired installation
- **Cost-effective:** Lower installation costs and longer, faster equipment uptime

More than Wireless



Production

Separation /
Refining

Storage

Distribution

Upgrading

	Production	Separation / Refining	Storage	Distribution	Upgrading
Circuit Protection	•			•	•
Industrial Ethernet				•	
Intrinsic Safety		•		•	
Junction Boxes			•		
Marshalling Solutions		•			
Mechanical and Solid State Relays		•			
Power Supplies and UPS		•			
Printing / Marking Systems	•				•
Signal Isolation and Conditioning		•	•		
Surge and Lightning Protection	•		•	•	•
Terminal Blocks	•		•		•
Wireless Communication	•	•	•		•
Wireless Monitoring			•		•
Wireless Technology				•	

Upstream Application

An operator of a long oil pipeline uses Weidmuller single I/O wireless transmitters to monitor the performance of its cathodic protection system. The cathodic protection actively suppresses pipeline corrosion by injecting electrical currents into the pipeline. Undetected failures of the protection system can lead to expensive corrosion and leaks. The Weidmuller wireless units monitor the injection current at the active injection sites, and also monitor pipeline voltage at points between injection sites.

These measurements are transmitted to a SCADA computer providing indication of system performance and early alarm of system failure. The Weidmuller units are powered from a small compact battery packs, powering down between measurements to extend battery life to 3+ years. Multiple wireless repeater units extend the wireless range to cover the complete length of the pipeline.

- Well-head and pump monitoring system
- Pipeline pressure, flow and valve monitoring
- Cathodic protection system monitoring
- Leak detection monitoring
- Underground gas storage monitoring
- Pump/compressor station control systems



Downstream Application

An oil refinery fitted Weidmuller wireless gateways to its tank radar level-gauges. Weidmuller was chosen because of the Gateways' ability to connect to a wide range of different level gauges, each using different field bus protocols.

The Weidmuller gateways also connected directly to the tanks independent high level point alarm. The wireless tank farm system formed part of a plant-wide wireless information system, utilizing Weidmuller's efficient peer-to-peer PROMESH wireless communications.

The system also formed part of the plant energy management system, and OBL alarm monitoring system.

- Oil and gas tank level gauging and monitoring
- Distribution pipeline pressure, flow and valve monitoring
- Plant IP camera and annunciator security management
- Production emissions monitoring and reporting
- Water and electrical utilities custody transfer verification and monitoring
- Electrical apparatus temperature profiling and monitoring
- Regulatory compliance reporting

Weidmuller Wireless Ethernet

Project: Mobile Monitoring

Overview

The company owns and/or operates over 11,300 miles of natural gas gathering pipelines and Liquefied Natural Gas (NGL) pipelines through the states of Texas and Louisiana. These pipelines cover a total area of over 14,400 square miles. The company also operates 22 natural gas processing plants, with a total of over 10,250 MMcf/d of gross processing capacity. In addition to these gathering systems and processing plants, the company manages an onshore plant facility that provides access to natural gas supplies in the Permian Basin, Fort Worth/Bend Arch Basin, South Louisiana Basin, deepwater and deep shelf Gulf of Mexico.

Problem

The company, a gas plant in Texas is a multi-function location that performs pumping, storage and processing for the natural gas industry. It covers several square miles, and includes a compressor station and multiple remote pumping stations located around the plant. Most of the pumping stations are very remote and have no access to the plant’s communication network. Some of the pumping stations have a satellite uplink that is only used for processing data, production logistics and safety information.

The company required a solution that could provide network access to their compressor station and numerous pumping station locations, and make a significant section of their gas plant a “hot spot” for broadband Ethernet access. The company’s field technicians would require access to this broadband network to conduct system monitoring, access data files and connect with other offices or company resources via the company’s Intranet network. The field technicians use laptop computers, therefore a 2.4GHz (WiFi) wireless frequency was necessary.

The company was having difficulty achieving reliable and stable connections due to the distance between the pumping stations, the compressor station, and the plant (over 3.5 miles in some cases) and the need to use the 2.4GHz (WiFi) spectrum for field technician access.

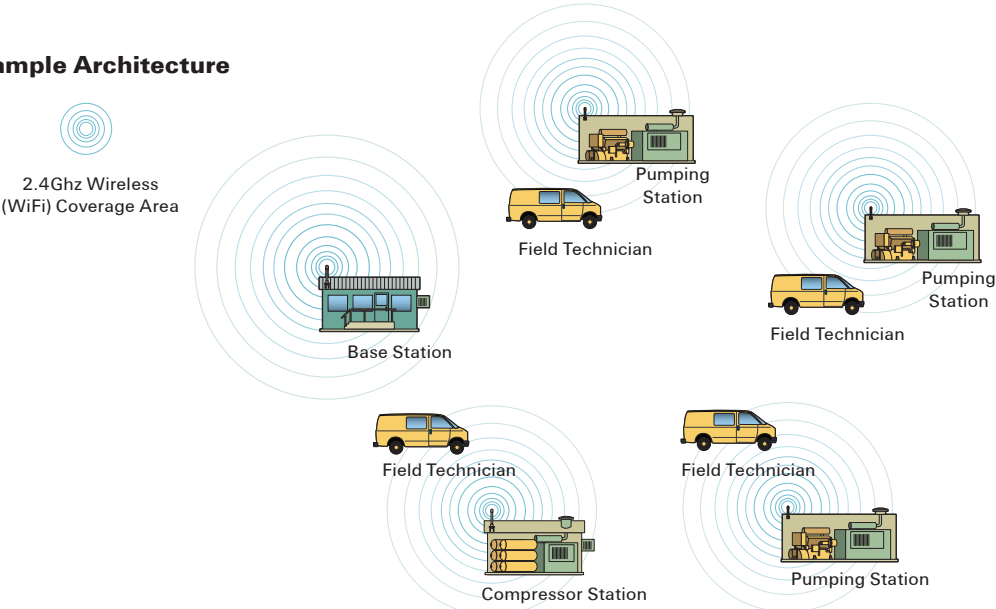
Solution



Weidmuller’s application engineer visited the plant location and performed a wireless Ethernet site survey. After the site survey was completed, a solution was proposed that included a combination of wireless Ethernet modems WI-MOD-E-G1 and dipole antennas with 3dbi of gain. The Ethernet modems provided the needed level of powerful signal transmission, and, combined with a sensitive high performance signal receiver, the company was able to receive the necessary signal strength and reliability required for their locations.

This wireless solution provides the required “Hot Spots” for service technicians to access the Intranet network with their laptops, as well as enabling connectivity between Targa’s base station locations and several remote pumping stations for an added level of communication and information exchange.

Example Architecture



Compressor Station

Process Industries

Weidmuller's Industrial Wireless products have superior penetrating performance in congested industrial environments. Steelwork, buildings, tanks, and vessels ... our products will still work reliably. Automation and control applications in all process industries are suitable for wireless connection.

- Chemical plants, Pulp & paper, Steel mills, Power stations,
- Glass manufacturing
- Custody transfer flow monitoring
- Tank level monitoring
- Temperature profiles
- Condition monitoring of equipment
- Utility plant alarms
- Effluent treatment plants
- Security and access-control
- Remote water pumps
- Rotating and moving machinery
- Monitoring of fire-fighting and safety systems
- Alert and Evacuation alarm systems
- Gas detection systems



Electricity Distribution

- Monitoring of power poles
- HV Feeder alarm fault monitoring
- Recloser remote control
- Temperature monitoring on transformers

A power authority fitted through-fault alarm sensors to HV overhead lines and required fast notification of alarms. The sensors were mounted on remote HV poles and were not easy to connect to the existing RTU network monitoring the network. The authority connected the sensors to Weidmuller wireless I/O units (a mix of cellular and UHF devices), which transmit immediately on alarm. The wireless units are battery powered as although HV power is available in abundance, LV power could only be obtained by installing transformers. Clusters of wireless units transmit to the closest RTU which feed the alarm information into the network SCADA system. Under normal non-alarm conditions, the wireless units transmit a daily "health" signal with battery supply voltage.

Gas Infrastructure

- Valve stations
- Pressure monitoring
- Flow metering systems



Utilities & Municipal

There are a number of applications where the Weidmuller's wireless communications devices are used.

- Water management
- Pump station control
- Tank monitoring, level, and security
- Valve and flowmeter stations
- Flow metering systems
- Irrigation monitoring and control.
- Water quality monitoring
- Dam gauging and gate control
- Large network SCADA systems
- Treatment plant monitoring
- Catchment rainfall monitoring
- Early flood-warning systems

A local authority wanted an on-line monitoring system for failure alarms on sewerage pump stations. The pump stations were fitted with local alarms, however if these were ignored, sewerage overflow resulted in environmental complaints. The authority used Weidmuller Industrial Wireless I/O units as a cost-effective solution. Pump run and fault status, and wet-well overflow status is transmitted back to a central computer. Because of the intelligent network functionality in the Wireless units, each pump station only must transmit as far as the nearest pump station, negating the need for expensive mast and antenna installations.

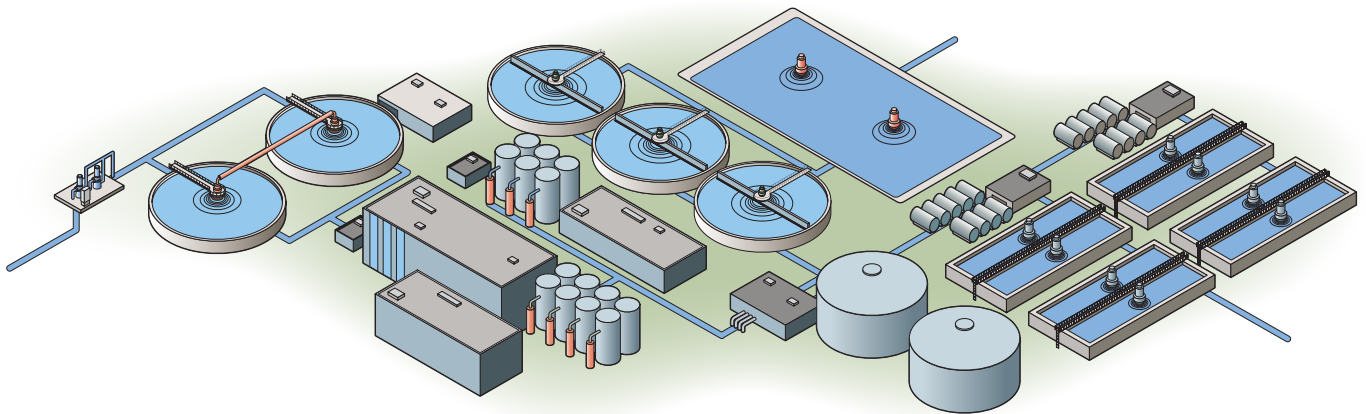
Cement Manufacturing Application

In cement manufacturing, the Weidmuller wireless units are used to monitor and control remote water supply pumps. The wireless units replaced an old underground cable which progressively failed over a 30-year period.

The wireless system connects the pump station PLC with the plant DCS via a wireless Ethernet link. The same wireless system is used to connect PLC's in other parts of the plant with the main DCS.

It was expanded to monitor tank and silos levels, run-offs and pull in remote sensors as the site expanded. The constant flow of trucks and cement dust did not effect the wireless connections and helped increase efficiencies.

Water and Waste Water Applications



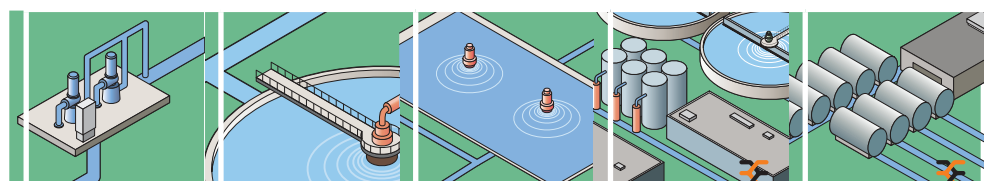
Wireless solutions reduce remote installation costs up to 70% and communicate reliable, secure EPA compliance data for system locations including:

- Head Works, Main Lift Stations, Remote Lift or Pumping Stations
- Storm Sewer Overflow, Sanitary Sewers and Collection Pits
- Effluent Discharge Points: River, Lake and Wetlands Re-use
- Transportation and Paved Runoff Areas
- Potable Water Storage and Processing
- Security and Surveillance

Wireless benefits:

- Optimizes response times and immediately indicates critical diagnostic information
- Improves monitoring and control of water flow over extended distances
- Improves operator safety and efficiency by eliminating travel time to remote site locations
- Reduces labor expenses and maximizes efficiency
- Simplifies installation and commissioning of network with reduced infrastructure required
- Provides enhanced reliability through a flexible network topology that can self-heal, while easing future expansion

More than Wireless



Head Works

Influent

Aeration

Treatment

Effluent

	Head Works	Influent	Aeration	Treatment	Effluent
Circuit and Surge Protection	•		•		
Distribution Blocks				•	
Engineered Systems				•	
Industrial Ethernet Networks		•			•
Interface Systems		•			
Intrinsic Safety	•		•	•	
Mechanical and Solid State Relays					•
Power Supplies and Battery Backup	•	•			•
Printing / Marking Systems / Ferrules			•		
Signal Conversion and Isolation			•	•	
Terminal Blocks		•			
Wireless Communication			•		•
Wireless Systems		•			
Wireless Technology	•			•	

Environmental Monitoring

Deployment of our modules in remote or sensitive environmental habitats is possible due to the high level of reliability, flexibility and range that can be attained as part of a network or 'mesh' installation. Once teamed with various sensors, Weidmuller's modules are able to offer data collection and transfer for crucial environmental sites.

These include:

- Weather Stations
- Rain Gauges
- Wind direction
- Wind speed
- Soil Monitoring
- Moisture Salinity
- Temperature
- Subsidence
- Water Quality
- Pollutant Detection
- Water treatment
- Water levels
- Regulate water supply.
- Flood warning detection



Application Examples

A large aquaculture producer used Weidmuller Wireless units to connect an extensive array of water quality analyzers and automatic dosing pumps. The system had a significant effect on quality improvement.

Another application is in producing hydroponic crops in greenhouses used Weidmuller Wireless units for environmental monitoring. Weidmuller units were also installed to control automatically navigated harvesting machines.

Factory Automation

Weidmuller Industrial Wireless products are extensively used in factory automation applications, from simple I/O connection to complex data-bus interconnection.

- Assembly plants, component manufacturers, pharmaceutical, food & beverage, packaging
- Detection of moving machinery
- Power network monitoring
- PLC interconnection
- Alarm monitoring of portable machinery
- Utility plant alarms
- Effluent treatment plants
- Security and access-control
- Rotating and moving machinery
- Alert and Evacuation alarm systems

Automotive Application

An automotive plant had an extensive Ethernet network throughout its site. Two buildings are separated from the rest of the site by a railway line, so ASDL telephone modems were used to connect the network. This link gave poor performance for real-time data acquisition. Weidmuller Industrial Wireless Ethernet units were used to replace the telephone links and gave much improved operating reliability.

Packaging Application

In a food packaging company wanted a wireless connection to a PLC on a rotary packer to transfer status and alarm data between the packer and rest of the factory PLC system. Unfortunately, the PLC on the rotary packer only had Profibus communications while the factory PLC system used EtherNet IP.

A Wireless Gateway with Profibus Master functionality was installed into the packer and an EtherNet IP Gateway connected to the PLC network. The wireless system was later enlarged to connect other peripheral PLC-controlled drives to the main PLC network.



Mining & Mineral Processing

Weidmuller's Industrial Wireless products are ideal for the rugged long-distance application of the mining industry.

- Surface extraction, Underground utility services, Ore treatment plants and Quarries
- Water supply control systems
- Ventilation fan monitoring
- Conveyor monitoring and interlocks.
- Security video monitoring
- Access-control systems
- Gas detection systems
- Fuel tank gauging
- Detection of moving machinery
- Power network monitoring
- PLC interconnection
- Alarm monitoring of portable machinery
- Remote control/alarm of emergency generators

A moving dragline excavator in a surface coal mine uses Weidmuller wireless units to transmit alarm status and operational data from the dragline boom to the operator's cabin, and also to the nearby maintenance depot. The wireless units replaced flexible cable connections which had poor reliability performance causing frequent machine outages.

In the same mine, the wireless Ethernet units are used to connect video cameras at ore dump points to monitors in the cabins of large ore-carriers. The wireless video connection allows the carrier drivers to monitor the area during the ore transfer process for potentially unsafe situations.



Transport Industries

Weidmuller's Industrial Wireless products are ideal for the rugged long-distance applications found in all transport sectors.

- Railways, Highways / motorways, Airports
- Wharves and docks, Shipping
- Traffic light warnings
- Environmental monitoring - road, rail, tunnel
- Rail signaling alarms.
- Monitoring of airport radar alarms
- Motorway text warning displays
- Security monitoring
- Lighting control
- Monitoring and control of ship loading
- Traffic density monitoring
- Seismic monitoring of impending rock-falls or bank slippage
- De-rail detection on ore trains
- Safety monitoring in parking stations

Wireless Mesh I/O and Gateways



Wireless I/O (radio telemetry) connects directly to sensor and control signals and transmits the signal values by radio.



Unidirectional Transmitter / Receiver Units



Wireless Input/Output (I/O)

Wireless I/O connects directly to analog, discrete and pulse transducer signals. The signals are transmitted by radio and either re-created as output signals, or output via serial link, or field-bus. Weidmuller Wireless I/O units have the ability to form sophisticated peer-to-peer networks, with event-reporting messaging to optimize wireless density. Weidmuller products are designed for high reliability operation on open license-free radio bands.

WI-I/O 9-L Unidirectional Transmitter/Receiver Units

The Unidirectional Wireless I/O range of products is suitable for connecting to a single sensor or group of sensors and provides an economical solution for remote monitoring systems. The Unidirectional 9-L products can also be used in more complex networks as signal transmitters or receivers.

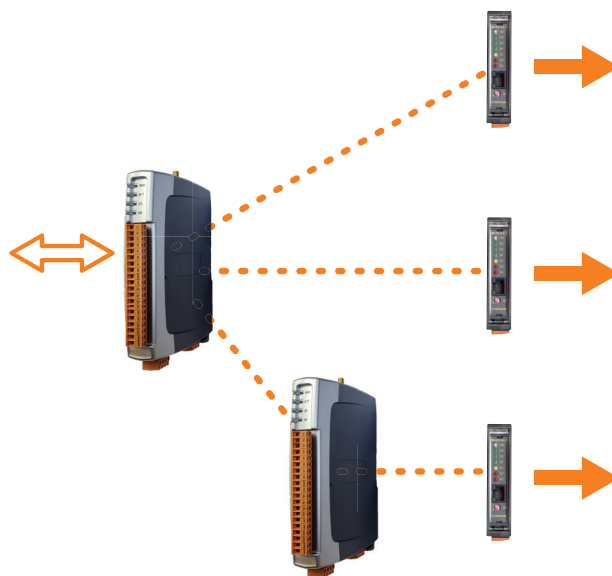
- Frequency hopping spread spectrum 902-928 MHz 1W license-free USA/Canada/Mexico
- Configurable sub-bands license-free South America, Australia/NZ, Asia, Europe

Features

- Matched transmitter/receiver pair of modules, or individual transmitter and receiver units
- Peer-to-peer communications
- Exception reporting
- Reliable self-checking messages
- Highly secure data encryption
- Multi-hop repeater functions - up to 5 intermediate units can be configured in any input-output link
- Factory configured: matched Transmitter / Receiver pair
- User-configurable: WI-Series Windows configuration program

Applications

- Wireless connection of flowmeters or energy meters
- Monitoring storage tanks
- Monitoring cathodic protection on pipelines
- Wireless alarms from power reticulation fault relays



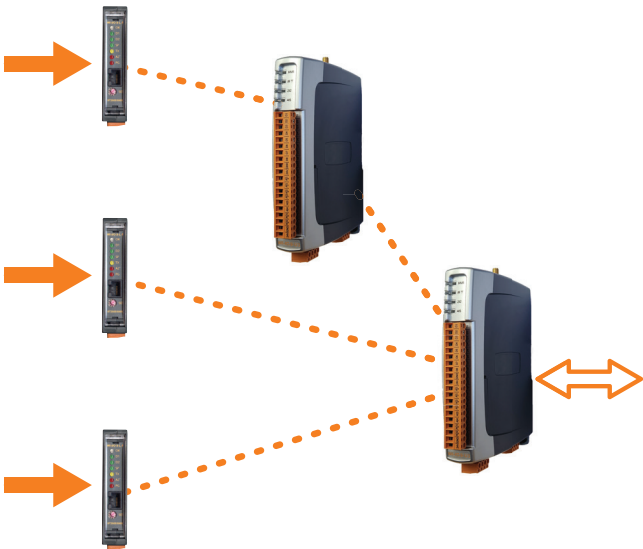
Transmitter unit

- Input-only transmitter unit - two digital/pulse inputs, one analog input and one thermocouple mV input
- Transmits to Receiver unit as a matched pair where the input signals are re-created as output signals, or can transmit to a Multi-I/O or Gateway unit
- Class 1 Div 2 hazardous areas approval
- Up to 3000 wireless units per network
- External inputs plus internally calculated values - analog setpoint status, pulse count, power supply voltage
- Thermocouple input -20 to +100mV with cold-junction compensation and linearization for J, K or T-type
- Setpoints status generated by comparing analog input to high and low setpoints
- Digital inputs can also be used as pulse count inputs
- Power supply 9 – 30VDC, measured and available as a transmitted variable
- 24VDC analog loop supply internally provided
- RS232 Configuration and diagnostics port



Receiver unit

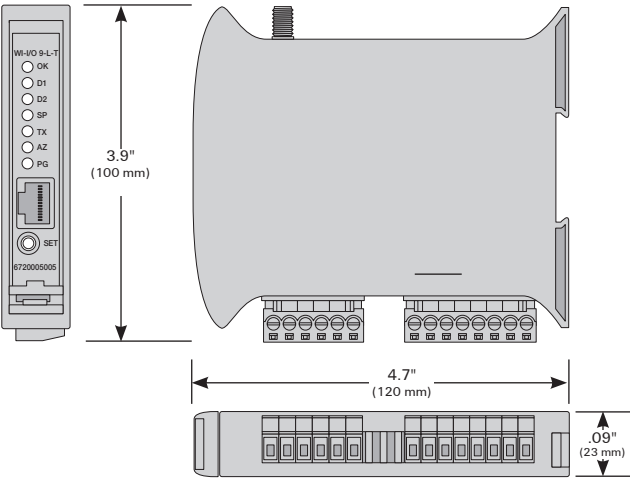
- Output-only receiver unit - three digital contact outputs and one analog output
- Receives radio commands from Transmitter unit as a matched pair where the input signals are re-created as output signals, or can receive commands from a Multi-I/O or Gateway unit
- Class 1 Div 2 hazardous areas approval
- Up to 3000 wireless units per network
- Power supply 9 – 30VDC; 24VDC analog loop supply internally provided
- Communications failure indication and configurable output
- Outputs can be configured as retained or reset (fail-safe) on communications failure
- LED indication of radio signal strength
- RS232 Configuration and diagnostics port



Transmitter/Receiver Unit Ordering Information

Unit	Description
WH-I/O 9-L-T	Wireless Transmitter (900 MHz)
WH-I/O 9-L-R	Wireless Receiver (900 MHz)

Dimensions



- **Transmitter Unit:** Power/OK, radio TX, DIN1, DIN2, analog set-point status
- **Receiver Unit:** Power/OK, radio RX, DO1, DO2, DO3, communications fail LEDs also used to provide radio signal strength indication

Input Type	Source	Function
Digital	external	status
Pulse Total	external	count
Analog	external	analog
Thermocouple	external	analog
Set Point	internal	status
Supply Voltage	internal	analog

WI-I/O 9-L-T Transmitter



WI-I/O 9-L-R Receiver



Technical Data

Transmitter Inputs		
Digital		two inputs, suitable for voltage free contacts / NPN, or voltage input 0-1 VDC on / >3 VDC off
Pulse		max rate 10 Hz, 50 msec on time. Pulse counted as 16 bit register.
Analog		0-20 mA (4-20mA)
"floating" differential input:		
resolution		16 bit
accuracy		< 0.1 %
Thermocouple		Millivolt (-20mV to +100mV), J, K or T type linearization with on-board cold-junction compensation
Accuracy		greater than 1°C
Receiver Outputs		
Digital		three relay contact outputs, 260V 1A
Analog		0-20mA
resolution		12 bit
accuracy		0.10%
Comms-Fail		Internal status based on configurable time-out value. Comms-fail status can be configured to a local output.
Fail-safe		On "comms-fail", outputs user-configurable as retained (last correct value) or reset (fail-safe)
Power Supply		
Power consumption @12VDC		9-30 VDC Receiver 100mA, Transmitter 40mA quiescent, during radio transmission (50 msec) 300mA
Analog loop supply internally generated		24VDC 30mA
Internal monitoring of supply low voltage status		may be transmitted as an "input" (Transmitter unit only)
Power consumption increases for pulse inputs > 10Hz.		
Serial Port		
		RS232 RJ45 female DCE, used for configuration and diagnostics
General Data		
Operating Temperature		-40 to 60°C (-40 to 140°F)
Humidity		0 - 99% RH
EMC Standards		FCC Part 15.247, RS210
Mounting		DIN-rail mounting
LED indication: Transmitter Unit		Power/OK, Radio TX, DIN1, DIN2, Analog Setpoint status
LED indication: Receiver Unit		
frequency hopping spread spectrum		902-928MHz, sub-bands available
Transmit power		1W
Maximum line of sight range		20 miles (4W ERP), 15km (1W ERP); 3000 ft / 1000 m in obstructed industrial environments. Radio distances can be increased by up to 5 intermediate repeater units. Each transmission may be configured to be sent 1 to 5 times.
		SMA female coaxial
		100 x 23 x 120 (3.9 x 0.9 x 4.7)
Antenna connector		
Dimensions mm (in)		
Configuration		
		User configuration via serial port. Unidirectional units can be configured to network with Multi-I/O and Gateway units.
Diagnostics		
		Features - read input values, write output values, radio signal strength, monitor communication messages.
Approvals		
		cULus C1D2
Ordering Data		
Type	Order Number	
WH-I/O 9-L-T-US	7940100233	
WI-CSER-RJ45	7940100266	
WI-I/O-9-LT-AUBR	7940033933	
WI-I/O-9-L-T-NZ	7940034332	
Type	Order Number	
WH-I/O 9-L-R-US	7940100234	
WI-CSER-RJ45	7940100266	
WH-I/O-9-L-R-AUBR	7940033936	
WI-I/O-9-L-R-NZ	7940034333	

Accessories: DB9 Female-RJ45 Serial configuration cable

Wireless Mesh Networking I/O and Gateway

Long-range, scalable, industrial multiple I/O node and gateway



Weidmuller's WI-I/O family combines multi I/O and/or gateway functionality with the reliability of secure, scalable mesh distance communication. The WI-I/O-9-U3 extends communications to sensors in local, remote, and difficult-to-reach locations. The WI-I/O-9-U3 IP-based addressing provides mesh/self-healing of network communications, multihop repeating and remote over the air configuration and diagnosis. Secure AES encryption, advanced IP filtering, multilevel authentication, user access and change event logging features provide the user with the tools to ensure the highest level of data integrity and protection against malicious attacks. Flexible native Ethernet support provides solutions to connectivity challenges of legacy devices and IIoT devices. WI-I/O-9-U3 provides Ethernet and serial gateway support for industrial protocols including Modbus TCP/IP, DNP3 I/O, HART, MQTT and Sparkplug B.

Compatibility with the legacy devices is available with a firmware downgrade.

Features At A Glance



Wireless UHF/VHF Radio
902 - 928MHz License Free
869 - 900MHz Bands for regional use 400MHz unlicensed or licensed 2.4GHz Wi-Fi



Inputs Pulse/Analog
8 Discrete on/off or pulsed
4x AI 4-20mA/0-5V
2x AO



MESH Ethernet & I/O
Modem + IO Radio functionality
FHSS 400/868/900MHz
Ethernet Modem/Router



Protocol Conversion
Convert Integrated I/O & Comm.
(Modbus RTU/TCP, DNP3, MQTT from simple Point to Point to Infrastructure networks)



Power IN
Pb, LiPo, LiFe, Li-P
Dual chemistry
Internal lithium
External lead acid



Logic Lite IO Plus
Logic engine uses a form of Statement List language as in PLCs.
Allows access to IO registers



HMI Lite Dashboard
Display device diagnostics / Engineering scaled units
Provide whole system views at Base Radio



Configure Diagnostic
Local Diagnostic access for I/O, Module and Network parameters
Config/Diagnostic



Charging DC IN Solar
External DC input 15-30Vdc
Solar charge up to 30W panel



Security
AES 128/256 encryption
2 level user access
Logging of user access



Certification Hazardous Area
IECEx, UL CSA, ATEX
Hazardous Area Certification

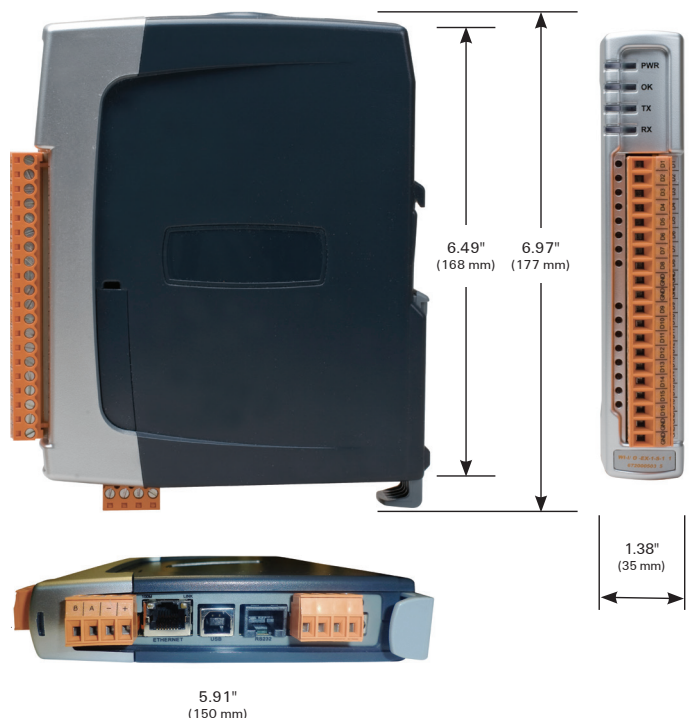
WI-I/O-9-U2 TC

The WI-I/O-9-U2 TC is a thermocouple adapter interface for the WI-I/O-9-U2 product. The WI-I/O-9-U2 TC provides greater accuracy by allowing calibration between the adapter, measurement devices and ambient temperatures. Temperature measurement accuracy depends on the measured temperature and ambient temperature. Errors are a result of both errors in cold junction temperature and thermocouple voltage measurement. The WI-I/O-9-U2 TC provides for greater accuracy by allowing calibration of the cold junction temperature offset value and thermocouple temperature (i.e. offset calibration).



- **Supported Thermocouple:** Type T
- **Measurement ranges:** -200 to +30°C and 0 to +390°C
- **Basic Accuracy (Un-calibrated):** +/- 3.5°C at -200 to +30°C +/- 2°C at 0 to +390°C
- **Calibrated Accuracy:** +/- 1°C over ambient temperature range +/- 0.5°C at calibration temperature
- **Security and Configuration**
Data encryption: 64bit; 128bit AES
Password: https accessibility
User Configuration: Web page; software configuration

Dimensions

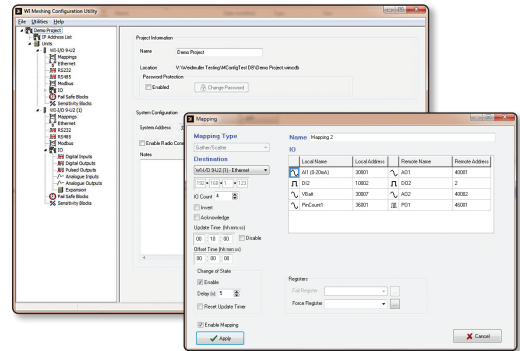


WI-I/O-9-U3

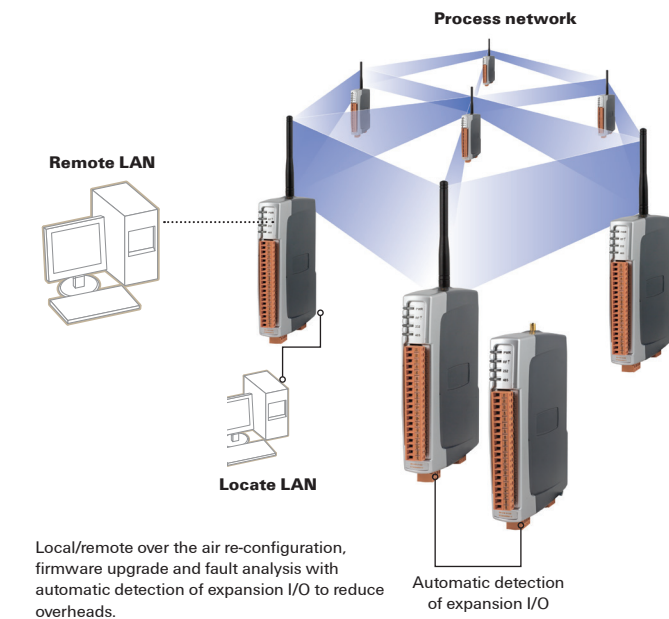
The 900MHz & 868MHz Unlicensed Frequency Hopping wireless transceiver supports over-the-air Ethernet protocols which gives the WI-I/O-9-U3 the power and flexibility to perform reliably in sprawling harsh industrial environments. Secure AES encryption, advanced IP filtering, multilevel authentication, user access and change event logging features provide the user with the tools to ensure the highest level of data integrity and protection against malicious attacks. Flexible native Ethernet support provides solutions to connectivity challenges today and in the future. The WI-I/O-9-U3 also provides Ethernet and serial gateway support for industrial protocols including Modbus TCP/RTU and DNP3 I/O, MQTT +Sparkplug B. ProMesh™ operates reliably with the challenges of obstructed paths by using automatic path selection to allow the communications network to adapt to changes easily with redundancy.

WI-I/O-9-U3 Meshed Multi I/O and Gateway

Configuring and commissioning time/effort on the WI-I/O-9-U3 has been designed for ease of customer use and cost savings during commissioning. The configuration utility allows for simple nomination of I/O points origin and destination with automatically detecting and routing the most efficient path to the destination node. This is complemented by periodic interrogation for optimal path verification, quick recovery of network communications and automatic detection of expansion I/O (Weidmuller's WI-I/O-EX). It also incorporates efficient 'change of state' radio communications and user configurable I/O or register periodic reporting of link status (i.e., update time). All combine to ensure the user is in charge of network communications.



Configuration is user friendly by nominating and labelling origin and destination points, and IP-based addressing finds the most efficient route.



Remote/Local Configuration, Upgrade & Analysis

Weidmuller's IP-based addressing further aids in cost reduction providing remote analysis and/or upgrade. A user may perform remote or local over the air re-configuration and interrogation of nodes for diagnostics and firmware upgrade. User nominated localized referencing of I/O and system wide network viewing aids in fault analysis and exporting/printing of node configuration is supported.

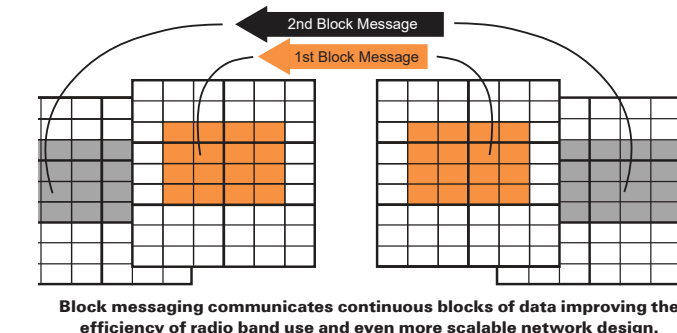
Quicker, More Cost Effective Commissioning

Radio network efficiency and commissioning of the WI-I/O-9-U3 into legacy process control/automation networks is aided with block mapping and block messaging technology. Block mapping technology allows end-users to gather related, non-contiguous data points/registers, into a single radio message structure and scatter these points at receiving devices for ease of integration (e.g. PLC logic, SCADA tags).

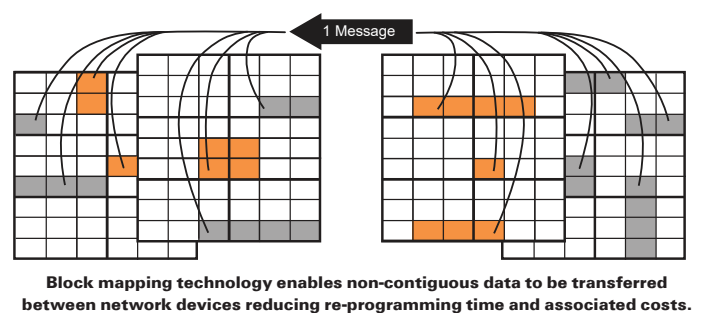
Block Mapping Technology

Block mapping technology is complemented by block messaging technology allowing end users to select continuous, related, I/O and registers for forwarding to receiving devices in a single message. Both block mapping and block messaging combine with highly efficient 'change of state', dense capacity radio messaging capabilities in providing scalable system design for ever growing application needs.

Block Messaging Technology



Block Mapping Technology



WI-I/O-9-U3



Technical Data

Transmitter/Receiver	
Frequency	902-928 MHz abd, 869.525 MHz c, 869.875 MHz c
Transmit Power	1 mW (+0 dBm) to 1W (+30 dBm) b d; 1 mW (+0 dBm) to 500 mW (+27 dBm) c
Radio Transceiver/Modulation	Frequency hopping spread spectrum (FHSS) b d, Single frequency c; Frequency shift keying (FSK)
Receiver Sensitivity	-109 dBm @ 19.2 kbps (3% FER) b d; -109 dBm @ 14.4 kbps (3% FER) c
Protocol	CSMA/CA with 32 bit CRC and auto-correction
Channel Spacing	50 x 250 kHz b d, single 250 kHz c
Data Rates	19.2-115.2 kbps b d, 14.4-76.8 kbps c
Typical Radio range (LoS)	20 miles (32 km) @ 4W EIRP b 9.3 miles (15 km) @ 1W EIRP d 6 miles (10 km) @ 500 mW EIRP c
Note: Range may be extended using repeater features	
Antenna connection	SMA female standard polarity
Protocols & Configuration	
System Address	ESSID; 1 to 31-character text string
Network Embedded Protocols	TCP/IP, UDP, ARP, DHCP, DNS, ICMP, HTTP, PPP, FTP, TFTP, TELNET, SNMP, VLAN 802.1Q, IPv6 pass through
Industrial Protocols	Gateway: Modbus RTU Master/Slave, Modbus-TCP Client/Server, DNP3 I/O, MQTT +SparkplugB; Pass-through: EtherNet/IP, Profinet, DNP3, IEC 61850, others
Configuration Parameters	Unit details, I/O mappings, I/O parameters, radio settings, Dashboard, IO Plus logic; DNP3 I/O and gateway (level 2+); Promesh™ - automatic selection of radio paths, traffic flow prioritization, Modbus TCP/RTU gateway; MQTT Client +SparkplugB; bandwidth utilization & efficiency features, redundancy, routing, bridging, VLAN Embedded Modbus master/slave- I/O transfer
User Configuration	Network access: USB or Ethernet; Remote access: over the air HTTPS with remote configuration via wireless link
Security	WPA2-PSK, AES 256 bit, multilevel password protected configuration; MAC Filtering; IP Filtering; ARP Filtering
IP Filtering	IP address, MAC address, ARP filtering whitelist/blacklist
LEDs & Diagnostics	
LED indication	Power/OK, Radio TX/RX/Link, Serial Activity RS-232, RS-485, Digital I/O, analog I/O status, LAN 10/100Mbit Link
Reported Diagnostics	RSSI measurements (dBm), BER connectivity information/statistics, system log file
Network Diagnostics	Diagnostic capture to Wireshark™ format file
Radio Diagnostics	Channel utilization, RSSI measurements (dBm), background noise, connectivity information/statistics available Web/Modbus reg
Logging	Optional internal data logging for I/O and events. Logging memory 1 MB
Connections	
LAN	x 10/100Base-T auto-MDIX RJ-45
Serial	1 x RS-232, 1 x RS-485 f, 1200-230400 bps, Serial over IP modem support
RS232 V.24 DCE	1.2 to 230.4 Kb/s
RS485	1.2 to 230.4 Kb/s; Serial server, PPP, Modbus to Modbus TCP conversion
Operation	
Modes – topology	Point to multipoint; Base, repeater, remote unit type; ProMesh automatic path selection or fixed links; Manual mode for advanced configuration
Ethernet	10/100 BaseT RJ45, IEEE 802.3 compliant. Bridge/router functions work with all Ethernet protocols
Networking	Configurable as Access Point or Client, Bridge or Router, Point-to-point, Point-to-multipoint, Repeater functionality
Discrete I/O	
Digital Inputs	8 digital I/O (1-4 configurable as PI or PO); On-state voltage: <2.1 Vdc; Wetting current: 5 mA; Max. I/P pulse rate-DI 1/2: 50 kHz, DI 3/4: 1 kHz; Max. I/P pulse width-DI 1/2: 10 µs, PI 3/4: 0.2 ms
Digital Outputs	8 digital I/O (1-4 configurable as PI or PO); Working voltage max.: 30 Vdc; Working current max.: 200 mA; Max. O/P pulse rate-PO max. rate: 1 kHz
Analog Inputs	4 AI (2 differential, 2 single ended); Current range: 0-24 mA; Voltage input range: AI 1/2: 0-25V, AI 3/4: 0-5V; Accuracy: 0.1%; Resolution: 14 bits
Analog Outputs	2 AO (sourcing); Current range: 0-24 mA; Current resolution: 13 bits; Accuracy (current): 0.1%
Analog loop power	+24 Vdc output provided to power loop devices; Max. current 100 mA—current limited
Thermocouple Input	Supported type Type J, K, and T. (optional Plug-in)
Expansion	Possible using -EX series Modbus I/O modules via Serial or Ethernet ports; Modbus TCP Remote I/O
Power Requirements	
Nominal supply	10.8-30 Vdc, undervoltage/overvoltage protection
Battery charger circuit	Lead-acid or gel cell backup, 500 mA charge
Average current draw	220 mA @ 12V (idle), 110 mA @ 24V (idle)
Transmit current draw	500 mA @ 12V (1W), 250 mA @ 24V (1W)
Compliance & Approvals	
EMC	FCC Part 15; EN 301 489; AS 3548
RF (radio)	FCC Part 15.247; EN 300 220; AS 4268.2; RFS29 NZ
Safety	IEC 60950 (RoHS compliant)
Hazardous Area	cULus Class I, Division 2; ATEX; IECEx Na IIC
General Data	
Dimensions in. (mm) (H x W x D)	5.91" x 7.09" x 1.38" (180 mm x 150 mm x 35 mm)
Housing	IP20 rated high-density thermoplastic
Terminal blocks	Removable, max. conductor 12 AWG 0.1 in2 (2.5 mm²)
Operating Temperature	-40 to 60°C (-40 to 140°F)
Humidity	0-90% RH non-condensing
Mounting	DIN rail mounting
Weight	1.1lb (0.5 kg)

Ordering Data

	Band	RF Power	Type	Order Number
	902 - 928MHz a	10mW - 1W	WI-I/O-9-U3-900	2914860000
	869.XXXMHz a	500mW/5mW a	WI-I/O-9-U3-869	2914850000
Notes:	a. Specific parameters set with Country/ Region selection in configuration b. 902-928 MHz FCC 15.247 band (USA) c. 869 MHz ISM band (Europe)		d. 915-928 MHz LIPD Class license (Australia) e. Typical maximum line-of-sight range (Check local conditions of use) f. Maximum distance 3937' (1200m)	

WI-I/O-2-E-N-GBL Wireless I/O and Gateway

802.11b/g/n scalable industrial wireless I/O radio for reliable and secure connectivity

The Weidmuller WI-I/O-2-E-N wireless networking I/O and gateway is a multiple I/O node that extends communications to sensors and actuators in local, remote, or difficult to reach locations. Designed with a standards based 802.11b/g/n wireless transceiver, the WI-I/O-2-E-N can provide IP-based networking across sprawling industrial environments typical of industrial applications and includes built-in I/O capability for digital and analog inputs and outputs.

The W-I/O-2-E-N provides robust/secure two-way wireless communications in extremely challenging indoor and outdoor industrial environments. The internal radio transceiver is designed to operate reliably with the challenges of obstructed paths, typical of remote monitoring and control applications. Supporting base, repeater, and remote functionality, the WI-I/O-2-E-N provides for reliable redundant networks in industrial applications. The WI-I/O-2-E-N can also provide Ethernet and serial gateway support for industrial protocols including Modbus® TCP/RTU and DNP3.

Features

- 2.412–2.472 GHz frequency (802.11b/g/n) 200mW RF power
- Transfer of I/O, Ethernet or RS232/485 serial data
- Multi-hop repeater and gateway functionality
- Gather-scatter and block mapping for I/O to I/O applications
- Modbus TCP and RTU I/O gateway and DNP3 Remote I/O
- Configurable digital, pulse, and analog I/O to 14-bit resolution
- Over-the-air network diagnostics and configuration
- Advanced security encryption provided with IEEE 802.11i (WPA2)
- Expandable digital I/O for local alarms and inputs/outputs
- Allows repeater to repeater communication for applications with challenging wireless conditions
- Provides reliability and flexibility within the network architecture with base, repeater and remote modes
- Reliable ProMesh is an intelligent meshing protocol designed for industrial environments provides stable and redundant connectivity.

Applications

- Water and Wastewater in-plant applications
- Oil & Gas remote sensor monitoring
- Discrete Factory automation
- Inventory management and warehousing

Note: Frequency range, number of channels, and/or RF power specification may vary depending on the country of application.

WI-I/O-2-E-N-GBL Wireless I/O and Gateway

802.11b/g/n scalable industrial wireless I/O radio for reliable and secure connectivity

General Data

Dimensions in. (mm) (H x W x D)	5.91" x 7.09" x 1.38" (180 mm x 150 mm x 35 mm)
Housing	IP20 rated high-density thermoplastic
Terminal blocks	Removable, max. conductor 12 AWG 0.1 in2 (2.5 mm2)
Operating Temperature	-40 to 70°C (-40 to 158°F)
Humidity	0–90% RH noncondensing
Mounting	DIN rail mounting
Weight	1.1lb (0.5 kg)

Ordering Data

Type	Band	RF Power	Order Number
WI-IO-2-E-N-GBL	2.401 – 2.483 GHz 802.11 b/g/n	10mW - 200mW	7940100251





Technical Data

Transmitter/Receiver	
Frequency	2.401–2.483 GHz; 802.11 b/g
Transmit Power	200 mW (+23 dBm)
Radio Transceiver/Modulation	Direct sequence spread spectrum (DSSS); Orthogonal frequency-division multiplexing (OFDM)
Receiver sensitivity	–94 dBm (11 Mbps) 802.11 b; –75 dBm (54 Mbps) 802.11 g
Protocol	802.11 b/g
Channel Spacing	13 channels, 20 MHz
Data rates	1–54 Mbps (selects fastest connection rate available)
Typical Radio range (LoS)	1300 ft (400 m) - Range may be extended using repeater features
Antenna connection	SMA female standard polarity
Protocols & Configuration	
System Address	ESSID: 1 to 31-character text string
Network Embedded Protocols	TCP/IP, UDP, ARP, DHCP, ICMP, HTTP, FTP, VLAN 802.1Q, Modbus RTU, Modbus TCP, DNP3, MQTT Client +SparkplugB
Industrial protocols	Gateway: Modbus RTU Master/Slave, Modbus-TCP Client/Server, DNP3 I/O, MQTT +Sparkplug; Pass through: EtherNet/IP, Profinet, DNP3, IEC 61850, and others
Configuration Parameters	Unit details, I/O mappings, I/O parameters, radio settings, Dashboard, IO Plus logic DNP3 I/O and gateway (level 2+); Modbus TCP/RTU gateway; MQTT Client +SparkplugB; Embedded Modbus master/slave for I/O transfer; Promesh™ for automatic selection of radio paths, prioritization of traffic flows, bandwidth efficiency features, bandwidth utilization, redundancy, routing, bridging, VLAN
User configuration	Network access: USB or Ethernet ; Remote access: over the air HTTPS with remote configuration via wireless link
Security	Data encryption, 802.11i w/ CCMP 128-bit AES; Support for 802.1x radius server; Secure HTTP protocol; Auto encryption key rotation
IP Filtering	MAC Filtering; IP Filtering; ARP Filtering ; Easy mode automatic filtering or advanced IP address, whitelist/blacklist MAC address, whitelist/blacklist ARP filtering, whitelist/blacklist
LEDs & Diagnostics	
LED indication	Power/OK, Radio TX/RX/Link, Serial Activity RS-232, RS-485, Digital I/O, analog I/O status, LAN 10/100Mbit Link
Reported Diagnostics	RSSI measurements (dBm), BER connectivity information/statistics, system log file
Network Diagnostics	Diagnostic capture to Wireshark™ format file
Radio Diagnostics	Channel utilization, RSSI measurements (dBm), background noise, connectivity information/statistics available Web/Modbus reg
Logging	Optional internal data logging for I/O and events. Logging memory 1 MB
Connections	
LAN	x 10/100Base-T auto-MDIX RJ-45
Serial	1 x RS-232, 1 x RS-485 f, 1200–230400 bps, Serial over IP modem support
RS232 V.24 DCE	1.2 to 230.4 Kb/s
RS485	1.2 to 230.4 Kb/s ; Serial server, PPP, Modbus to Modbus TCP conversion
Operation	
Modes — topology	Point to multipoint; Base, repeater, remote unit type; Manual mode for advanced configuration
Ethernet	10/100 BaseT RJ45, IEEE 802.3 compliant. Bridge/router functions work with all Ethernet protocols
Networking	Configurable as Access Point or Client, Bridge or Router; Point-to-point, Point-to-multipoint, Mesh node or fixed Maximum of 6 total remote/repeater/base/hot spot connections
Discrete I/O	
Digital Inputs	8 digital I/O (1–4 configurable as PI or PO); On-state voltage: <2.1 Vdc; Wetting current: 5 mA; Max. I/P pulse rate–DI 1/2: 50 kHz, DI 3/4: 1 kHz; Max. I/P pulse width–DI 1/2: 10 µs, PI 3/4: 0.2 ms
Digital Outputs	8 digital I/O (1–4 configurable as PI or PO); Working voltage maximum: 30 Vdc; Working current maximum: 200 mA; Max. O/P pulse rate–PO max. rate: 1 kHz
Analog Inputs	4 AI (2 differential, 2 single ended); Current range: 0–24 mA; Voltage input range: AI 1/2: 0–25 V, AI 3/4: 0–5 V; Accuracy: 0.1%; Resolution: 14 bits
Analog Outputs	2 AO (sourcing); Current range: 0–24 mA; Current resolution: 13 bits; Accuracy (current): 0.1%
Analog loop power	+24 Vdc output provided to power loop devices ; Max. current 100 mA—current limited
Thermocouple input	Supported type Type J, K, and T. (optional Plug-in)
Expansion	Possible using -EX series Modbus I/O modules via Serial or Ethernet ports; Modbus TCP Remote I/O
Power Requirements	
Nominal supply	10.8-30 Vdc, undervoltage/overvoltage protection
Battery charger circuit	Sealed lead acid backup battery can be charged by main power supply input, 500 mA charge
Average current draw	200 mA at 12 Vdc (idle), 100 mA at 24 Vdc (idle)
Transmit current draw	200 mA at 12 Vdc, 100 mA at 24 Vdc
Compliance & Approvals	
EMC	FCC Part 15; EN 301 489-17; AS/NZS CISPR22
RF (radio)	FCC Part 15.247; IC RSS 210; EN 300 328; AS/NZS4268
Safety	EN/IEC 60950 (RoHS compliant)
Hazardous Area	cULus Class I, Division 2; IEC EX Zone 2; ATEX Zone 2

WI-I/O-415-U2 Wireless I/O & Gateway

Long range scalable industrial wireless I/O radio for reliable and secure connectivity for 400MHz and 900MHz bands

Weidmüller's new WI-I/O-415-U2 IO and Gateway radios extends communications to sensors in local, remote, and difficult-to-reach locations. Designed in mind with the long-range, high data speed wireless transceiver and standards-based native Ethernet protocol over the air, gives WI-I/O-415-U2 Series the power and flexibility to perform reliably in sprawling harsh industrial environments.

Applications

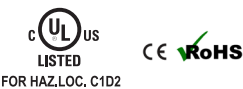
- Water and wastewater: flows, levels, pumps
- Renewables: solar farms, wind turbines, hydro
- Irrigation: slew gate controls, levels
- Oil and gas networks: gas well production, lift pump
- Environmental: storm warning, smoke stacks, filters
- Mining infrastructure: conveyor, re-claimer, pumps

Features

- Exceeding 140 kbps data throughput
- Secure data protection with WPA and AES256 encryption
- ProMesh automatic path selection and network formation
- Internal Web dashboard for immediate view of local I/O
- 148 - 174MHz, 340-480MHz, 928-960MHz model options
- Redundancy modes for base, repeater, and remote
- Wireless point-to-point or multipoint I/O and gateway functionality
- Modbus TCP and RTU I/O gateway
- Integrated digital, pulse, and analog I/O
- DNP3 I/O gateway, including internal status registers
- Over-the-air network diagnostics and configuration
- Expandable I/O for local alarms and inputs/outputs
- Full Ethernet protocol over the air provides a standards-based flexibility to support future and legacy devices
- Supports multiple data rates simultaneously for high performance over short & long communication links
- Frequency agility roaming provides reliability and flexibility within the network architecture
- Over-the-air context-based data compression and forward error correction provides max reliability and transmission efficiency
- Standard Ethernet bridge default to allow modem function for external Ethernet host devices (full L2/L3 network support)
- 10 mW to 10 W RF power configurable, license or license-free depending on location
- Software configurable wireless channel bandwidth supporting 6.25, 12.5, 25.0 kHz
- Gather-scatter/block mapping and integrity checking transmissions for efficient event triggered peer-to-peer I/O



WI-IO-415-U2
Wireless Mesh Networking I/O and Gateway



Technical Data

Transmitter/Receiver				
Frequency ¹	148-174 MHz / 340-400 MHz / 400-480 MHz / 928-960MHz			
Transmit Power	10 mW–10 W (+40 dBm) configurable	QPSK 4 W (+36 dBm)	16-QAM, 64 QAM 2.5 W (+34 dBm)	2-FSK, 4-FSK 10 W (+40 dBm)
Radio Transceiver/Modulation	QPSK, 16-QAM, 64-QAM; 2-FSK or 4-FSK (compatibility mode)			
Receiver Sensitivity	QPSK-FEC -116 dBm			
6.25/12.5/25 kHz	QPSK	-113 dBm		
	16-QAM	-104 dBm		
	64-QAM	-97dBm		
	2-FSK	-110 dBm		
	4-FSK	-102 dBm		
Protocol	CSMA/CA with 32 bit CRC and auto-correction			
Channel Spacing	6.25, 12.5, 25.0 kHz (software configurable)			
Data Rates (raw, no compression ²)		6.25 kHz	12.5 kHz	25.0 kHz
	QPSK-FEC	4 kbps	8 kbps	16 kbps
	QPSK	8 kbps	16 kbps	32 kbps
	16-QAM	16 kbps	32 kbps	64 kbps
	64-QAM	24 kbps	48 kbps	96 kbps
	2-FSK	4.8 kbps	9.6 kbps	-
	4-FSK	9.6 kbps	19.2 kbps	-
Typical Data Throughput	64-QAM	45 kbps	80 kbps	140 kbps
Typical Range (LoS QPSK-FEC)	62 miles (100 km) at 4 W; 10 miles (16 km) at 0.5 W			
Antenna connector	SMA female			

Protocols & Configuration	
System address ESSID	1 to 31- character text string
Networking protocols	TCP/IP, UDP, ARP, DHCP, DNS, ICMP, HTTP, VLAN 802.1Q, IPv6 pass through
Industrial Protocols Gateway	Modbus RTU, Modbus TCP, DNP3 I/O; Pass through: EtherNet/IP, Profinet, DNP, IEC 61850, and others
Configurable parameters	Unit details, I/O mappings, I/O parameters, radio settings; DNP3 I/O and gateway (level 2+); Modbus TCP/RTU gateway; Embedded Modbus master/slave for I/O transfer; Frequency agility parameters for automatic selection of radio paths, prioritization of traffic flows, bandwidth efficiency features, bandwidth utilization, redundancy, routing, bridging, VLAN
User Configuration	Network access: USB or Ethernet; Remote access: over the air
Security	WPA2-PSK, AES 256 bit, multilevel password protected configuration
IP Filtering	IP address, MAC address, ARP filtering whitelist/blacklist

LED Indications & Reported Diagnostics	
LED Indication	Power/OK, Radio TX/RX/Link, RS-232, RS-485, digital I/O, analog I/O status
Network Diagnostics	Diagnostic capture to Wireshark format file
Radio Diagnostics	Channel utilization, RSSI measurements (dBm), background noise, connectivity info. /statistics available Web/Modbus reg
Logging	Optional internal data logging for I/O and events. Logging memory 1 MB

Connections	
LAN	1 x 10/100Base-T auto-MDIX RJ-45
Serial	1 x RS-232, 1 x RS-485, 110–230400 bps Serial over IP modem support

Operation	
Modes – Topology	Point to multipoint; ProMesh automatic path selection or fixed links; Base, repeater, remote unit types; Manual mode for advanced configuration

Input & Output	
Discrete Input ³	8 digital I/O (1–4 configurable as PI or PO); On-state voltage: <2.1 Vdc; Wetting current: 5 mA; Max. I/P pulse rate–DI 1/2: 50 kHz, DI 3/4: 1 kHz; Max. I/P pulse width–DI 1/2: 10 µs, PI 3/4: 0.2 ms
Discrete output ³	8 digital I/O (1-4 configurable as PI or PO); Working voltage max.: 30 VDC; Working current maximum: 200 mA; Max. O/P pulse rate–PO max. rate: 1kHz
Analog Inputs	4 AI (2 differential, 2 single ended) Current range: 0–24 mA; Voltage input range: AI 1/2: 0–25 V, AI 3/4: 0–5 V; Accuracy: 0.1% ; Resolution: 14 bits
Analog Output	2 AO (sourcing); Current range: 0–24 mA; Current resolution: 13 bits; Accuracy (current): 0.1%
Analog Loop Power	+24 Vdc output provided to power loop devices; Max. current 100 mA—current limited
Expansion	use EX-IO series Modbus I/O modules (RTU / TCP)

Approvals	
EMC	FCC CFR47 Part 15; EN 301 489-3; EN 301 489-5
RF (radio)	FCC CFR47 Part 90; IC RSS 119; EN 300 113; EN 300 220; AS/NZS4295; AS/NZS4268
Safety	EN/IEC 62368; cULus, CE, RoHS
Hazardous area	cULus Class I, Division 2; IEC EX Zone 2; ATEX Zone 2

Power Supply	
Nominal supply	10.8-30 Vdc, undervoltage/overvoltage protection
Battery charger	Lead-acid or gel cell backup, 500 mA charge
Average current draw	220 mA at 13.8 V (idle), 130 mA at 24 V (idle)
Transmit current draw	2.5 A at 13.8 V (10 W RF), 1.5 A at 24 V (10 W RF); 0.9 A at 13.8 V (500 mW RF), 0.5 A at 24 V (500 mW RF)

General Data	
Dimensions mm (in) (H x W x D)	183 x 35 x 156 mm (7.20 x 1.38 x 6.20 in)
Housing	Powder-coated aluminum and high-density thermoplastic, IP20 rated
Terminal blocks	Removable, max. conductor 12 AWG
Operating Temperature	-40 to 60°C (-40 to 140°F)
Humidity	0-99% RH noncondensing
Mounting	DIN rail mounting
Weight	0.7 kg / 1.6 lb

Ordering Data			
Note	Type	Frequency Band	Order Number
¹ Available RF power and frequency may vary depending on country of application. Please confirm with local regulatory body.	WH-IO-415-U2-C1	148-174 MHz	7940107949
² Data compression will provide an improvement in over-the-air data throughput of up to 50%, depending on data content.	WH-IO-415-U2-C1-EX	148-174 MHz (Hazloc Approved)	7940107950
³ Discrete input and output function shared for total of eight (8) discrete inputs and outputs.	WH-IO-415-U2-C3	340-400 MHz	7940107957
	WH-IO-415-U2-C3-EX	340-400 MHz (Hazloc Approved)	7940107958
	WH-IO-415-U2-C4	400-480 MHz	7940107953
	WH-IO-415-U2-C4-EX	400-480 MHz (Hazloc Approved)	7940107954
	WH-IO-415-U2-C9	928-960MHz	7940107961

WI-I/O-EX

Expansion I/O Units

The WI-I/O-EX is a wired device capable of interfacing with other Weidmuller wireless radios to increase the number of signals radios can monitor/control. They can also be used as a slave to any Modbus control system.



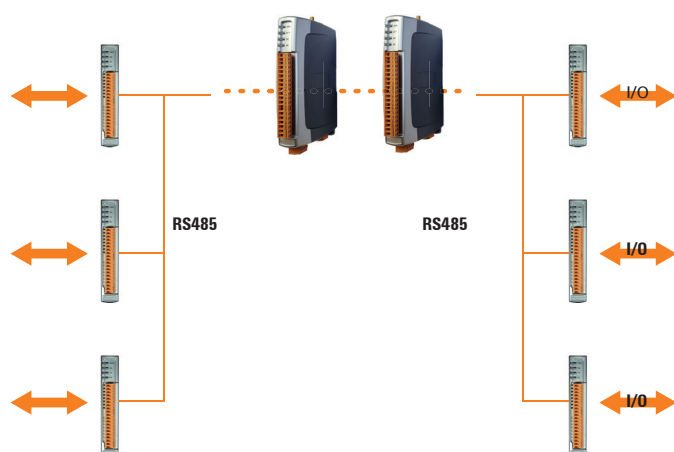
Typical Applications

Expansion I/O for WI-I/O 9 wireless units and WI-MOD units

- up to 31 x WI-I/O-EX units can be connected to each wireless unit via RS485 (up to 2 km long). Serial I/O multiplexer
- transfer I/O via RS485— up to 32 units per multi-drop link.

Expansion I/O for Modbus devices

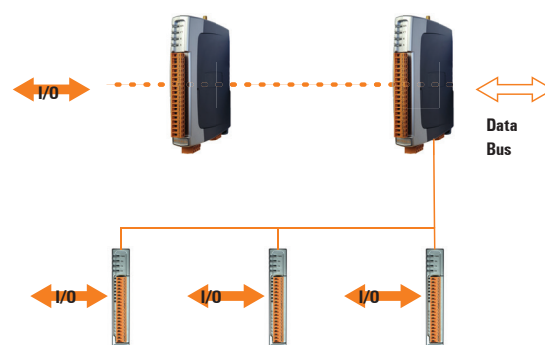
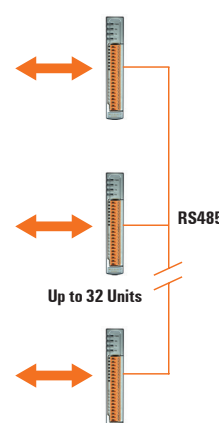
- up to 31 x WI-I/O-EX units can be connected to each Modbus master via RS485 (up to 2 km long).



Features

- Multi I/O channels— monitoring and control functions
- Connected via RS485 multi-drop
- Selectable communications via WIB-net or Modbus protocol (both RTU and ASCII formats)
- Sensor signals connected at one module (input signals) are transmitted to another module where the signals are re-created as output signals, or passed via serial to a host device such as a PLC or SCADA system
- Connect to WI-I/O 9 wireless I/O units for up to 31 serial addresses per wireless unit
- Connect WI-I/O-EX units together to form a serial multi-drop I/O system - up to 32 serial addresses per multi-drop link— no Master device is required to control communications

- Connect up to 99 x WI-I/O-EX units as multi-drop Modbus I/O (RS485 extenders/isolators required for more than 31 units per single multi-drop length)
- RS485 multi-drop up to 2 km (1 mile) depending on installation environment
- Three I/O versions available
- Peer-to-peer communications; Exception reporting; Reliable self-checking messages; Any input on any unit can be linked to any output on any unit. Inputs can be linked to multiple outputs; Serial communications 9.6Kb/s
- Alternate Modbus RTU or Modbus ASCII slave protocol, serial communications configurable up to 115.2Kb/s, 7 or 8 data bit format
- External I/O plus internally calculated values - analog setpoint status, pulse rate and pulse total, power



supply voltage, power supply alarm

- Setpoint status generated by comparing analog inputs to high and low setpoints
- Analog inputs selectable as “floating” dual-terminal inputs or commoned single-terminal inputs; Configurable current (0-10/0-20/4-20mA) or voltage (0-5/0-10/1-5V).
- Analog outputs selectable as single-terminal source or sink outputs. Configurable current (0-10/0-20/4-20mA) or voltage (0-5/0-10/1-5V). Configurable scaling, zero and span parameters.
- Pulse inputs generate separate pulse count value and a pulse rate value. Pulse rates are treated as internal analog registers with a configurable maximum value.
- Multiple communication-failure diagnostics with output status. Fail-to-transmit alarm and fail-to-receive alarm status.
- Class 1 Div 2 hazardous areas approval
- Input measurement display and output “forcing” diagnostics.
- Communication logging diagnostics.



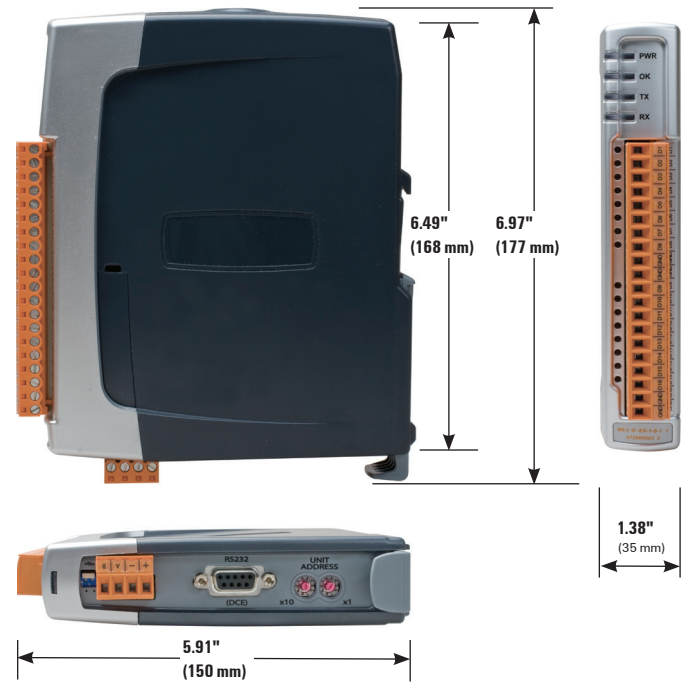


Expansion Unit Ordering Information

WI-I/O-EX	S-11	S-12	S-13	E-1
Connection Interface	RS232/485	RS232/485	RS232/485	RJ45 10/100, RS232/485
Digital inputs	Up to 16	up to 8 Voltage-free contacts	up to 8 Voltage-free contacts	up to 8 Voltage-free contacts
Digital outputs	Up to 16	up to 8 Voltage-free contacts	up to 8 Voltage-free contacts	up to 8 Voltage-free contacts
Analog inputs	0	4 "floating" / 8 commoned 0-20mA / 0-10V	0	4 AI (2 differential, 2 single ended)
Analog outputs	0	0	8 sink / source 0-20mA / 0-10V	2 AO (sourcing)
Pulse inputs	4 (1KHz)	0	0	Up to 4
Pulse outputs	8 (100Hz)	8 (100Hz)	8 (100Hz)	Up to 4

Note: Digital inputs and outputs are combined channels. When a channel is used as an output, it is not available as an input. Pulse and digital I/O are same connection.

Dimensions



General Specifications

- **Temperature:** -40 to 60°C / -40 to 140°F
- **Humidity:** 0-99% RH
- **Regulatory Approvals:** EMC FCC Part 15, AS3548, 89/336/EEC
- **Certifications:** CSA Class I, Division 2 hazardous areas (USA/Canada)
- **Housing:** high density thermo-plastic, 5.91" x 6.97" x 1.38" (150 X 177 x 35mm) with DIN-rail mounting
- **Removable terminals** up to 12 gauge (2.5 mm²) wires
- **LED indication** for power supply, processor OK, serial TX and RX, digital I/O



WI-I/O-EX-1-S-11



WI-I/O-EX-1-S-12



Technical Data

Inputs		
Digital: suitable for voltage free contacts or NPN transistor, contact wetting current 5mA, inputs are surge protected	up to 16 selectable I/O	up to 8 selectable I/O
Analog: "floating" differential inputs, common mode voltage 27V, 24VDC for powering external loops provided, 0-20mA/0-10V resolution 12 bit, accuracy 0.1%		8 input channels, selectable as 4 dual-terminal floating inputs or 8 single-terminal commoned inputs.
Pulse: specifications as per digital inputs Max pulse rate 1kHz, pulse width min 0.5ms	4 inputs (DIO1-4)	
Outputs		
Digital: FET outputs, 30VDC 200mA	up to 16 selectable I/O	up to 8 selectable I/O
Pulse: specifications as per digital outputs Max pulse rate 100Hz, pulse width min 5ms	8 outputs (DIO1-8)	8 outputs (DIO 1-8)
Power Supply	10.8 - 30VDC, over-voltage and reverse power protected Internal monitoring of supply voltage. These values may be transmitted to remote modules for monitoring. An internal DC/DC converter provides 24VDC 250mA for analog loop supply.	10.8 - 30VDC, over-voltage and reverse power protected Internal monitoring of supply voltage. These values may be transmitted to remote modules for monitoring. An internal DC/DC converter provides 24VDC 250mA for analog loop supply.
Serial Port		
RS485	serial port configurable up to 115.2Kb/s, 7/8 data bits, n/e/o parity, 1 / 2 stop bits	serial port configurable up to 115.2Kb/s, 7/8 data bits, n/e/o parity, 1 / 2 stop bits
RS232 connector	configuration port 9pin DB9 female connector, 9.6Kb/s, 8/n/1	configuration port 9pin DB9 female connector, 9.6Kb/s, 8/n/1
RS485 connector	max cable distance 2000 m terminal connections	max cable distance 2000 m terminal connections
General Data		
Operating Temperature	-40 to 60°C (-40 to 140°F)	-40 to 60°C (-40 to 140°F)
Humidity	0-99% RH	0-99% RH
EMC Standards	FCC Part 15, AS3548, 89/336/EEC	FCC Part 15, AS3548, 89/336/EEC
Approvals	Class 1 Div 2 hazardous areas	Class 1 Div 2 hazardous areas
Mounting	DIN-rail mounting	DIN-rail mounting
LED indication	power supply, processor OK, serial TX and RX, digital I/O	power supply, processor OK, serial TX and RX, digital I/O
Dimensions mm (in)	150 x 177 x 35 (5.91 x 6.97 x 1.38)	150 x 177 x 35 (5.91 x 6.97 x 1.38)

Ordering Data

Type	Order Number	Type	Order Number
WI-I/O-EX-1-S-11	7940100248	WI-I/O-EX-1-S-12	7940100249

WI-I/O-EX-1-S-13



Technical Data

Inputs:	
Digital: suitable for voltage free contacts or NPN transistor, contact wetting current 5mA, inputs are surge protected	up to 8 selectable I/O
Outputs	
Digital: FET outputs, 30VDC 200mA	up to 8 selectable I/O
Analog: selectable as current/voltage source or current sink to common, max loop voltage 27V, max loop resistance 1000 ohms, 0 – 20mA/0 – 10V, 12 bit, accuracy 0.1%	8 channels
Pulse: specifications as per digital outputs Max pulse rate 100Hz, pulse width min 5ms	8 outputs (DIO 1-8)
Power Supply	10.8 - 30VDC, over-voltage and reverse power protected. Internal monitoring of supply voltage. These values may be transmitted to remote modules for monitoring. An internal DC/DC converter provides 20VDC 250mA for analog loop supply.
Serial Port	
RS485	serial port configurable up to 115.2Kb/s, 7/8 data bits, n/e/o parity, 1 / 2 stop bits
RS232 connector	configuration port 9pin DB9 female connector, 9.6Kb/s, 8/n/1
RS485 connector	max cable distance 2000 m terminal connections
General Data	
Operating Temperature	-40 to 60°C (-40 to 140°F)
Humidity	0-99% RH
EMC Standards	FCC Part 15, AS3548, 89/336/EEC
Approvals	Class 1 Div 2 hazardous areas
Mounting	DIN-rail mounting
LED indication	power supply, processor OK, serial TX and RX, digital I/O
Dimensions mm (in)	150 x 177 x 35 (5.91 x 6.97 x 1.38)

Ordering Data

Type	Order Number
WI-I/O-EX-1-S-13	7940100250



Technical Data

Protocols & Configuration				
System Address	ESSID; 1 to 31-character text string			
Network Embedded Protocols	TCP/IP, UDP, ARP, DHCP, ICMP, HTTP, FTP, VLAN 802.1Q, Modbus RTU, Modbus TCP, DNP3, MQTT Client +SparkplugB, HART			
Industrial protocols	Gateway: Modbus RTU Master/Slave, Modbus-TCP Client/Server, DNP3 I/O, MQTT +Sparkplug; Pass through: EtherNet/IP, Profinet, DNP3, IEC 61850, and others			
Configuration Parameters	Unit details, I/O mappings, I/O parameters, radio settings, Dashboard, IO Plus logic Modbus TCP/RTU gateway; MQTT Client +SparkplugB		DNP3 I/O and gateway (level 2+), HART gateway Embedded Modbus master/slave for I/O transfer	
User configuration	Network access: USB or Ethernet	Remote access: over HTTPS with remote configuration		
Security	Secure HTTP protocol	MAC Filtering; IP Filtering; ARP Filtering		
IP Filtering	Easy mode automatic filtering or advanced IP address, whitelist/blacklist MAC address, whitelist/blacklist ARP filtering, whitelist/blacklist			
LEDs & Diagnostics				
LED indication	Power/OK, Serial Activity RS-232, RS-485, Digital I/O, analog I/O status, LAN 10/100Mbit Link			
Reported Diagnostics	Connectivity information/statistics, system log file			
Network Diagnostics	Diagnostic capture to Wireshark™ format file			
Logging	Optional internal data logging for I/O and events. Logging memory 1 MB			
Connections				
LAN	10/100BaseT, RJ-45 connector, IEEE 802.3			
Serial	1 x RS-232, 1 x RS-485 f, 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 76800, 115200, 230400 bps, Serial over IP modem support			
RS232 V.24 DCE	EIA-562 (RJ-45 connector); 7/8 data bits, stop/start/parity (configurable)			
RS485	2-pin terminal block, non-isolated; 1.2 to 230.4 Kb/s		Serial server, PPP, Modbus to Modbus TCP conversion	
Operation				
Modes—topology	End node or network gateway and is scalable to thousands of nodes. Gather-scatter and block mapping technology			
Ethernet	10/100 BaseT RJ45, IEEE 802.3 compliant.			
Discrete I/O				
Digital Inputs	8 digital I/O (1–4 configurable as PI or PO) Wetting current: 5 mA	Max. I/P pulse rate–DI 1/2: 50 kHz, DI 3/4: 1 kHz Max. I/P pulse width–DI 1/2: 10 μs, PI 3/4: 0.2 ms		
Digital Outputs	8 digital I/O (1–4 configurable as PI or PO)	Working voltage max. : 30 Vdc	Working current max. : 200 mA	Max. O/P pulse rate–PO max. rate: 1 kHz
Analog Inputs	4 AI (2 differential, 2 single ended) Resolution: 14 bits	Current range: 0–24 mA Accuracy: 0.1%	Voltage input range: AI 1/2: 0–25 V, AI 3/4: 0–5 V	
Analog Outputs	2 AO (sourcing)	Current range: 0–24 mA	Current resolution: 13 bits	Accuracy (current): 0.1%
Analog loop power	+24 Vdc output provided to power loop devices		Max. current 100 mA—current limited	
Thermocouple Input	Supported type Type J, K, and T. (optional Plug-in)			
Expansion	Possible using -EX series Modbus I/O modules via Serial or Ethernet ports; Modbus TCP Remote I/O			
Power Requirements				
Nominal supply	10.8-30 Vdc, undervoltage/overvoltage protection			
Battery charger circuit	Sealed lead acid backup battery can be charged by main power supply input, 500 mA charge			
Average current draw	200 mA at 12 Vdc (idle), 100 mA at 24 Vdc (idle)			
Compliance & Approvals				
EMC	FCC Part 15; EN 301 489-17; AS/NZS CISPR22			
RF (radio)	FCC Part 15.247; IC RSS 210; EN 300 328; AS/NZS4268			
Safety	EN/IEC 60950 (RoHS compliant)			
Hazardous Area	cULus Class I, Division 2; IEC EX Zone 2; ATEX Zone 2			
General Data				
Dimensions in. (mm) (HxWxD)	5.91" x 7.09" x 1.38" (180 mm x 150 mm x 35 mm)			
Housing	IP20 rated high-density thermoplastic			
Terminal blocks	Removable, max. conductor 12 AWG 0.1 in2 (2.5 mm2)			
Operating Temperature	-40 to 70°C (-40 to 158°F)			
Humidity	0–90% RH noncondensing			
Mounting	DIN rail mounting			
Weight	1.1lb (0.5 kg)			

Ordering Data

Description	Type	Order Number
Ethernet I/O I/O 8 DI/O, 4AI, 2AO, 1-4 PI/O Modbus TCP/RTU Gateway	WI-I/O-EX-2-E-1	7940113340
TCP Adaptor (Type T Thermocouple Add-on)	WI-I/O 9-U2 TC	7940115319

Wireless Ethernet & Cellular Modems



Wireless Ethernet & Cellular Modems

Wireless Modems transmit serial or Ethernet data, providing a wireless extension of the data link.



Wireless Data Modems

Wireless data modems connect to serial or Ethernet links and transmit the data wirelessly. The modem controls the wireless messages and data ports to provide a “transparent” data transfer.

Wireless Ethernet Data Modems

The Weidmüller Wireless Ethernet Modems are a robust, license-free wireless 802.11 standards compliant transceiver capable of high bandwidth communications. They are optimized for throughputs of up to 108Mbps which provides robust and secure two-way wireless communications in challenging indoor and outdoor environments typical of industrial monitoring and control applications.

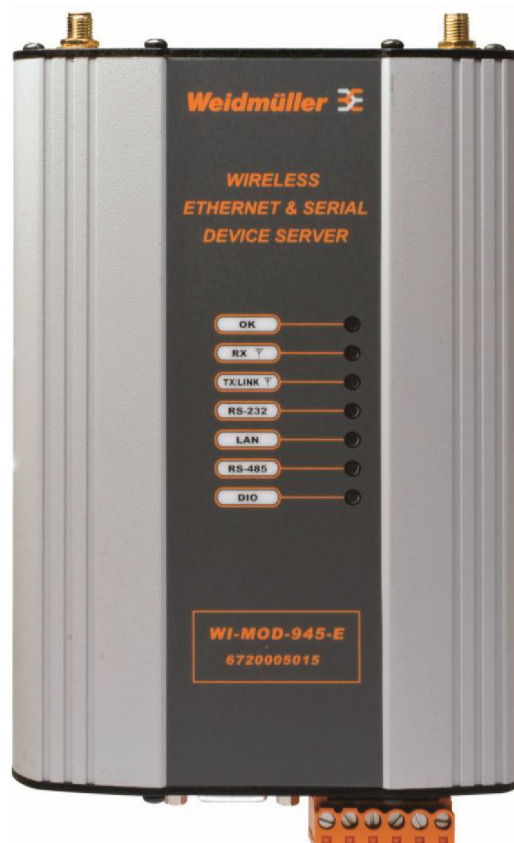
The Weidmüller modems offer node to node deterministic mesh network repeatability for further range and multiple channel spacing options to increase network scalability. Integrated Modbus server capability allows seamless I/O expansion through the use of WI-I/O-EX-1-S Expansion units.

Applications

- IP Cameras
- Roaming Vehicles
- PLC Communications
- Data Logger Communications
- Serial and Ethernet Communications
- Agriculture Sprayer Control
- Water/ Waste Water Systems
- SCADA Networks

Features

- 802.11b/g and 802.11a Standard Compliant Options
902 – 928MHz; 2.412 – 2.472GHz (802.11b/g);
5.18 – 5.825GHz Frequency (802.11a)
- Up to 108Mbps Data Throughput
- Transmit and Receive Antenna Diversity
- Access Point/Client and Bridge/Router Configuration
- Serial Client/Server/Multicast Modbus TCP to RTU Gateway
- Spanning Tree (Self Healing) Support
- Deterministic AP to AP Mesh Network Repeatability
- Fast Roaming for AP to AP Handover
- IEEE 802.11i Secure 128-bit AES Encryption (WPA2)
- MAC and IP Address Filtering
- Digital I/O Channel Transfer
- Configurable Settings for High Noise Environments
- Over-The-Air Network Diagnostics and Configuration
- VLAN Tagging Supported for Bridging and Routing Modes



Wireless Data Modems—Introduction

	WI-MOD-E-G1	IE-WL-BL-AP-CL	IE-WL-VL-AP-BR-CL	WI-I/O-2-E-N-GBL	WI-I/O-9-U3	WI-MOD-945-E	WI-MOD-415-E-Cx
Frequency	2.4GHz	2.4GHz / 5.8GHz	2.4GHz / 5.8GHz	2.4GHz	868 / 900MHz	900MHz	148-960MHz
Modulation	802.11b/g + OFDM	802.11 a/b/g/n + OFDM	802.11 a/b/g/n + OFDM	802.11b/g + OFDM	Frequency shift keying (FSK) FHSS	Based on 802.11g + OFDM	QPSK, 16-QAM, 64-QAM 2-FSK or 4-FSK
TX Power	630mW	400mW	400mW	200mW	630mW	630mW	10mW – 10W
Typical Range	5Km*	Up to 2Km*	Up to 2Km*	500m – 1km*	10km / 32km (LOS 20km)*	10km - 15km*	40+km (LOS 20km)*
Data Rate	108Mbps	IEEE 802.11b – 11Mbps IEEE 802.11a/g – 54Mbps IEEE 802.11n – 300Mbps	IEEE 802.11b – 11Mbps IEEE 802.11a/g – 54Mbps IEEE 802.11n – 300Mbps	54Mbps	76kbps / 115kbps	54Mbps	Up to 140kbps
MESH Capable	Yes	Yes	Yes	Yes - PROMESH	Yes - PROMESH	Yes	Yes - PROMESH
Industrial Protocols	TCP/IP, UDP, ARP, SNMP, RADIUS/802.1x, DHCP, DNS, PPP, ICMP, HTTP, FTP, TFTP, TELNET, Modbus and Modbus-TCP	Proxy ARP, DNS, HTTP, HTTPS, IP, ICMP, SNTP, TCP, UDP, Radius, SNMP, DHCP, LLDP	Proxy ARP, DNS, HTTP, HTTPS, IP, ICMP, SNTP, TCP, UDP, Radius, SNMP, DHCP, LLDP	TCP/IP, UDP, ARP, DHCP, ICMP, HTTP, FTP, VLAN 802.1Q, Modbus RTU, Modbus TCP, DNP3, MQTT Client +SparkplugB	Modbus RTU, Modbus TCP, DNP3 I/O, MQTT Client +SparkplugB Pass through: EtherNet/IP, Profinet, DNP3*, IEC 61850, and others	TCP/IP, UDP, ARP, SNMP, RADIUS/802.1x, DHCP, DNS, PPP, ICMP, HTTP, FTP, TFTP, TELNET, Modbus and Modbus-TCP	Modbus RTU, Modbus TCP, DNP3 I/O, MQTT Client +SparkplugB Pass through: EtherNet/IP, Profinet, DNP3*, IEC 61850, and others
Wireless Security	Data encryption, 802.11i with CCMP 128-bit AES Support for 802.1x Radius server Secure HTTP protocol	SSID broadcast enable/disable, Firewall for MAC/IP/ protocol/port-based filtering, 64-bit and 128-bit WEP encryption, WPA/ WPA2 Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP and AES). Disable Telnet / Browser Access	SSID broadcast enable/disable, Firewall for MAC/IP/ protocol/port-based filtering, 64-bit and 128-bit WEP encryption, WPA/ WPA2 Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP and AES). Disable Telnet / Browser Access	Data encryption, 802.11i with CCMP 128-bit AES Support for 802.1x radius server Secure HTTP protocol Auto encryption key rotation	WPA2-PSK, AES 256 bit, multilevel password protected configuration Auto Encryption Key Rotation	Data encryption, 802.11i with CCMP 128-bit AES	WPA2-PSK, AES 256 bit, multilevel password protected configuration Auto Encryption Key Rotation
Online Diagnostics & Configuration	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Operation Modes	AP /Client / Bridge / Router	AP / Client	AP / Client / Bridge	AP / Client / Bridge / Router	AP / Client / Bridge / Router	AP /Client / Bridge / Router	AP / Client / Bridge / Router
Hybrid I/O + Ethernet + Serial	Ethernet + Serial	Ethernet	Ethernet	Ethernet + Serial	Ethernet + Serial	Ethernet + Serial	Ethernet + Serial
Certifications	cULus, Hazardous Zone 2, CE	cULus, CE	cULus, Hazardous Zone 2, CE	cULus, Hazardous Zone 2, CE	cULus, Hazardous Zone 2	cULus, Hazardous Zone 2	cULus, Hazardous Zone 2, CE

*Range is dependent on environmental conditions and local limitations on ERP and Tx power.



Ethernet and Serial Data



Technical Data

Radio Transceiver	
Transmission	
Frequency - USA/Canada	
Transmit Power	
Modulation	
Receiver Sensitivity	
Channel Spacing	
RF Data Transmission Rate	
Expected line-of-sight range, depending on local conditions	
Range may be extended by:	
Ethernet/Serial Port	
Ethernet	
Embedded Protocols:	
Serial	
RS232 V.24 DCE	
RS485	
Serial Settings	
Data Rate (Bps)	
Protocols/Configuration	
System Address	
Protocols supported	
Network/Configurable Parameters	
User Configuration	
Security	
Bandwidth Protection	
General Data	
Antenna connection	
Operating Temperature	
Humidity	
Power Supply	
Current consumption	Idle:
Transmit:	
EMC	
RF (Radio)	
Approvals	
Mounting	
Dimensions (LxWxH) mm	
Weight	
Housing	
Mounting	
Terminal Blocks	
LED indication	
Reported Diagnostics	
Input/Output Configurable DI/DO/AI	
Ordering Data	

WI-MOD-945-E

Serial and Ethernet 900MHz (DSSS)



Direct Sequence Spread Spectrum (DSSS)			
902 – 928MHz			
250mW (+24dBm) to 1W (+30dBm)			
802.11g Orthogonal Frequency Data Modulation (OFDM)			
-95dBm @ 0.25Mbps - 71dBm @ 54Mbps (8% FER)			
9 x 1.25MHz; 9 x 2.5MHz; 4 x 5MHz; 4 x 10MHz; 2 x 20MHz			
1 – 54Mbps			
"Auto Mode" Selects Fastest Rate Possible Relative to RSSI			
6+ miles @ 630mW/30Km (18 mi.) @ 1W (*up to 4W ERP permitted in USA/Canada)			
Range may be extended using repeater features			
Ability to construct complex networks using multiple repeaters and roaming features			
10/100 BaseT RJ45, IEEE 802.3 compliant. Bridge/router functions work with all Ethernet protocols			
TCP/IP, UDP ARP, PPP, ICMP, HTTP, FTP, TFTP, TELNET, SNMP, RADIUS/802.1X, DHCP, OFDM			
DB9 Female DCE; RTS/CTS/DTR/DCD			
2-Pin Terminal Block – Non-Isolated			
Serial server, PPP, Modbus to Modbus TCP conversion			
7/8 Data Bits; Stop/Start/Parity (Configurable)			
1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 76800, 115200, 230400			
ESSID: 1 – 31 Character Text String			
TCP/IP, UDP, ARP, Radius/802.1x, DHCP, DNS, PPP, ICMP, HTTP, FTP, TFTP, TELNET, MODBUS-RTU and MODBUS-TCP			
Access Point/Client/Bridge/Router/VLAN			
Point-to-Point, Point-to-Multi-point			
Wireless Distribution System (AP - AP Repeater)			
Modbus TCP/RTU Gateway			
Serial Client/Server/Multicast			
Simultaneous RS232/485 Connection			
Embedded Modbus Master/Slave for I/O Transfer			
User Configurable Parameters via HTTPS Embedded Web Server			
Network Access - Ethernet			
Data Encryption – 802.11i with CCMP 128-bit AES			
Support for 802.1x Radius Server			
Secure HTTP Protocol			
MAC Address – Whitelist/Blacklist			
IP Filtering – Whitelist/Blacklist			
ARP/GARP Filtering – Whitelist/Blacklist			
1 x Female SMA for the antenna connection. Supports signal diversity or high-gain antenna			
-40 to +60°C; -40 to +140°F			
0 – 99% RH Non-condensing			
9 to 30 VDC; Under/Over Voltage Protection			
270mA @ 12 VDC; 140mA @ 24 VDC			
500mA @ 12V (+30dBm), 250mA @ 24V (+30dBm)			
FCC Part 15; EN 301 489 – 17; AS/NZS CISPR22			
EN 300 328; FCC Part 15; RSS 210			
CSA Class I, Division 2; ATEX; IECEx NA IIC; IEC 60950 (RoHS Compliant); cULus Listed (pending on 1W)			
DIN-rail mounting			
114 x 168 x 30mm (4.5" x 6.7" x 1.2")			
0.5kg (1.1lb).			
Powder-Coated Aluminium			
DIN-Rail			
Removable; Max Conductor 12 AWG (2.5 mm ²)			
Power/OK; RX; TX/Link; RS232; LAN; RS485; Digital I/O			
Serial Activity, Digital I/O, LAN 10/100Mbit Link			
RSSI Measurements (dBm) Connectivity Information/Statistics System Log File			
Input Voltage-Free Contact Output FET 30 VDC 500mA			
Type	Frequency	RF Power	Order Number
WI-MOD-945-E-US	902-928MHz	630mW	7940100239
WI-MOD-945-E-AUBR	915-928MHz	630mW	2873580000

Ethernet and Serial Data


WI-MOD-E-G1
Serial and Ethernet 2.4GHz

Technical Data

Radio Transceiver	
Transmission	Direct Sequence Spread Spectrum (DSSS)
Frequency - USA/Canada	2.412–2.472 GHz
Transmit Power	15–400 mW (data rate and country-specific)
Modulation	Orthogonal frequency data modulation (OFDM)
Receiver Sensitivity	–100 dBm @ 250 kbps, 74 dBm @ 108 Mbps (8% FER)
Channel Spacing	5-MHz spacing (13 channels, 2.412–2.472 GHz)
RF Data Transmission Rate	1–108 Mbps
Expected line-of-sight range, depending on local conditions	"Auto Mode" selects fastest rate possible relative to RSSI
Range may be extended by:	6 miles (10 km) @ 400 mW Range may be extended using repeater features Ability to construct complex networks using multiple repeaters and roaming features
Ethernet/Serial Port	
Ethernet	10/100 BaseT RJ45, IEEE 802.3 compliant. Bridge/router functions work with all Ethernet protocols TCP/IP, UDP ARP, PPP, ICMP, HTTP, FTP, TFTP, TELNET, SNMP, RADIUS/802.1X, DHCP, OFDM
Embedded Protocols:	
Serial	
RS232 V.24 DCE	DB9 Female DCE; RTS/CTS/DTR/DCD
RS485	2-Pin Terminal Block – Non-Isolated Serial server, PPP, Modbus to Modbus TCP conversion
Serial Settings	
Data Rate (Bps)	7/8 Data Bits; Stop/Start/Parity (Configurable) 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 76800, 115200, 230400
Protocols/Configuration	
System Address	ESSID; 1 – 31 Character Text String
Protocols supported	TCP/IP, UDP, ARP, Radius/802.1x, DHCP, DNS, PPP, ICMP, HTTP, FTP, TFTP, TELNET, MODBUS-RTU and MODBUS-TCP
Network/Configurable Parameters	Access Point/Client/Bridge/Router/VLAN Point-to-Point, Point-to-Multi-point Wireless Distribution System (AP - AP Repeater) Modbus TCP/RTU Gateway Serial Client/Server/Multicast Simultaneous RS232/485 Connection Embedded Modbus Master/Slave for I/O Transfer User Configurable Parameters via HTTPS Embedded Web Server Network Access - Ethernet
User Configuration	Data Encryption – 802.11i with CCMP 128-bit AES Support for 802.1x Radius Server Secure HTTP Protocol
Security	MAC Address – Whitelist/Blacklist IP Filtering – Whitelist/Blacklist ARP/GARP Filtering – Whitelist/Blacklist
Bandwidth Protection	
General Data	
Antenna connection	2 x Female SMA Standard Polarity 50Ω Supports signal diversity or high-gain antenna
Operating Temperature	–40 to 60°C (–40 to 140°F)
Humidity	0 - 99% RH non-condensing
Power Supply	9 to 30 VDC; Under/Over Voltage Protection
Current consumption Idle:	270 mA @ 12V (idle); 140 mA @ 24V (idle)
Transmit:	470 mA @ 12V (400 mW), 250 mA @ 24V (400 mW)
EMC	FCC CFR47 Part 15; EN 301 489-3; EN 301 489-5
RF (Radio)	FCC 15.247, RS210
Approvals	CSA Class I, Division 2; ATEX; IECEx NA IIC; IEC 60950 (RoHS Compliant); cULus Listed
Mounting	DIN-rail mounting
Dimensions (LxWxH) mm	4.5" x 5.5" x 1.2" (114 x 140 x 30 mm)
Weight	1.0 lb (0.45 kg)
Housing	Powder-Coated Aluminium
Mounting	DIN-Rail
Terminal Blocks	Removable; Max conductor 12 AWG (2.5mm ²)
LED indication	Power/OK; RX; TX/Link; RS232; LAN; RS485; Digital I/O
Reported Diagnostics	Serial Activity, Digital I/O, LAN 10/100Mbit Link Diagnostics available through web pages
Input/Output Configurable DI/DO/AI	Input Voltage-Free Contact Output FET 30 VDC 500mA

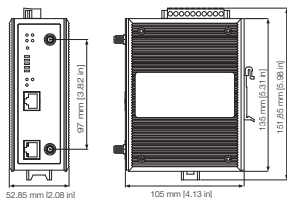
Ordering Data

Type	Part No.
WI-MOD-E-G1-US	2876610000

Ethernet Only Data

Industrial Wireless - Access point/bridge/client

- IEEE 802.11a/b/g compatible single radio module (2.4 GHz or 5 GHz band)
- Power input by redundant 24 V DC power inputs or Power-over-Ethernet
- Multi-SSID and VLAN support
- Turbo Roaming for seamless wireless connections
- Integrated DI/DO for on-site monitoring and warning
- QoS (WMM) support



Technical Data

WLAN Interface	
Standards	IEEE 802.11a/b/g/h for Wireless LAN IEEE 802.11i for Wireless Security IEEE 802.3u for 10/100BaseT(X) IEEE 802.3af for Power-over-Ethernet IEEE 802.1D for Spanning Tree Protocol IEEE 802.1w for Rapid STP IEEE 802.1Q VLAN
Spread Spectrum and Modulation (typical)	• DSSS with DBPSK, DQPSK, CCK • OFDM with BPSK, QPSK, 16QAM, 64QAM • 802.11b: CCK @ 11/5.5 Mbps, DQPSK @ 2 Mbps, DBPSK @ 11 Mbps • 802.11a/g: 64QAM @ 54/48 Mbps, 16QAM @ 36/24 Mbps, QPSK @ 18/12 Mbps, BPSK @ 9/6 Mbps
Operating Channels (central frequency)	US: 2.412 to 2.462 GHz (11 channels) 5.18 to 5.24 GHz (4 channels) EU: 2.412 to 2.472 GHz (13 channels) 5.18 to 5.24 GHz (4 channels)
Security	• SSID broadcast enable/disable • Firewall for MAC/IP/Protocol/Port-based filtering • 64-bit and 128-bit WEP encryption, WPA /WPA2-Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP and AES)
Transmission Rates	802.11b: 1, 2, 5.5, 11 Mbps 802.11a/g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps
TX Transmit Power	802.11b: Typ. 23±1.5 dBm @ 1 to 11 Mbps 802.11g: Typ. 20±1.5 dBm @ 6 to 24 Mbps, Typ. 19±1.5 dBm @ 36 Mbps, Typ. 18±1.5 dBm @ 48 Mbps, Typ. 17±1.5 dBm @ 54 Mbps 802.11a: Typ. 18±1.5 dBm @ 6 to 24 Mbps, Typ. 16±1.5 dBm @ 36 to 48 Mbps, Typ. 15±1.5 dBm @ 54 Mbps
RX Sensitivity	802.11b: -97 dBm @ 1 Mbps, -94 dBm @ 2 Mbps, -92 dBm @ 5.5 Mbps, -90 dBm @ 11 Mbps 802.11g: -93 dBm @ 6 Mbps, -91 dBm @ 9 Mbps, -90 dBm @ 12 Mbps, -88 dBm @ 18 Mbps, -84 dBm @ 24 Mbps, -80 dBm @ 36 Mbps, -76 dBm @ 48 Mbps, -74 dBm @ 54 Mbps 802.11a: -90 dBm @ 6 Mbps, -89 dBm @ 9 Mbps, -89 dBm @ 12 Mbps, -85 dBm @ 18 Mbps, -83 dBm @ 24 Mbps, -79 dBm @ 36 Mbps, -75 dBm @ 48 Mbps, -74 dBm @ 54 Mbps
Protocol Support	
General Protocols:	Proxy ARP, DNS, HTTP, HTTPS, IP, ICMP, SNMP, TCP, UDP, RADIUS, SNMP, PPPoE, DHCP
AP-only Protocols:	ARP, BOOTP, DHCP, dynamic VLAN-Tags for 802.1X-Clients, STP/RSTP (IEEE 802.1D/w)
Interface	
Default Antenna	2 dBi dual-band omni-directional antenna, RP-SMA (male)
Connector for External Antennas	RP-SMA (female)
LAN Port	10/100BaseT(X), auto negotiation speed (RJ45-type)
Console Port	RS-232 (RJ45-type)
LED Indicators	PWR1, PWR2, PoE, FAULT, STATE, signal strength, CLIENT MODE, BRIDGE MODE, WLAN, 10M, 100M

Wireless Data Modems—WLAN



Interface (continued)	
Alarm Contact	1 relay output with current carrying capacity of 1 A @ 24 VDC
Digital Inputs	2 electrically isolated inputs • +13 to +30 V for state "1" • +3 to -30 V for state "0" • Max. input current: 8 mA
Physical Characteristics	
Housing	Metal, IP30 protection
Weight	850 g
Dimensions	53.6 x 135 x 105 mm (2.11 x 5.31 x 4.13 in)
Installation	DIN-Rail mounting
Environmental Limits	
Operating Temperature	0 to 60° C (32 to 140° F)
Storage Temperature	-40 to 85° C (-40 to 185° F)
Ambient Relative Humidity	5% to 95% (non-condensing)
Power Requirements	
Input Voltage	12 to 48 V DC, redundant dual DC power inputs or 48 V DC Power-over-Ethernet (IEEE 802.3af compliant)
Connector	10-pin Pluggable Terminal (0.2–1.5mm ²) 28–14 AWG
Power Consumption	• 0.121 to 0.494 A @ 12 to 48 VDC • 0.3 A @ 24 VDC
Reverse Polarity Protection	Present
Regulatory Approvals	
Safety	EN60950-1, UL60950-1
Radio	EN300 328, EN301 893,
EMC	EN301 489-1/-17, FCC Part 15 Subpart B Class B, EN55022/55024
Hazardous Location	UL/cUL Class I, Div. 2; ATEX Class I, Zone 2
MTBF	392.209 hrs
Warranty	
Warranty Period	5 years

Ordering Data

Models	Model Type	Operating Temperature	Order Number
Wireless Access Point/Client, IEEE 802.11 a/b/g/n, EU-Model, IP30	IE-WL-BL-AP-CL-EU IE-WLT-BL-AP-CL-EU	0 °C...60 °C -40 °C...75 °C	2536600000 2536650000
Wireless Access Point/Client, IEEE 802.11 a/b/g/n, US-Model, IP30	IE-WL-BL-AP-CL-US IE-WLT-BL-AP-CL-US	0 °C...60 °C -40 °C...75 °C	2536660000 2536670000
Wireless Access Point/Bridge/Client, IEEE 802.11 a/b/g/n, EU-Model, IP30	IE-WL-VL-AP-BR-CL-EU IE-WLT-VL-AP-BR-CL-EU	-25 °C...60 °C -40 °C...75 °C	2536680000 2536690000
Wireless Access Point/Bridge/Client, IEEE 802.11 a/b/g/n, US-Model, IP30	IE-WL-VL-AP-BR-CL-US IE-WLT-VL-AP-BR-CL-US	-25 °C...60 °C -40 °C...75 °C	2536700000 2536710000
Accessories	Model Type	Order Number	
External Backup and Restore Module	EBR-Module RS232	1241430000	
19" Rack Mounting Kit	RM-KIT	1241440000	

Wireless Data Modems - Licensed Frequencies

Licensed frequencies have many advantages and are ideal for industrial applications. The Weidmuller product offers powerful long-range communications to extend Ethernet networks in difficult-to-reach locations. Flexible options available support 360 to 512MHz (MHz) as well as 928 to 960MHz (60MHz) configurations, providing users with an integrated and complete industrial Ethernet infrastructure solution.

The FCC (United States) and Industry Canada (Canada) has information to help you through the licensing process. You can find the basic information you need to begin the process. If you are engaged in Public Safety Radio Activities, you can go directly to:

FCC: <http://wireless.fcc.gov/publicsafety>

Industry Canada:

<http://www.ic.gc.ca/eic/site/sd-sd.nsf/eng/home>

In Australia/NZ, 148 to 174 MHz and 400MHz bands are used.

In Europe and parts of Asia, 433MHz band is free under 500mW (country specific).



Movable Machinery



Process Control



Aging Infrastructure

Licensees in the Industrial/Business Radio Pool are issued to radio users to support business operations. Their communications systems are used for support of day-to-day business activities, such as dispatching, AVL and diverting personnel or work vehicles, coordinating the activities of workers and machines on location, or remotely monitoring and controlling equipment with data radio modems.

The Weidmuller Wireless Ethernet Modem is a robust, licensed and license-free wireless transceiver capable of ultra-long range communications. With models operating at 360 to 512MHz and 928 to 960MHz up to 5.0W, the modems are optimized for throughputs of up to 19.2kbps. This provides robust and secure two-way wireless communications in extremely challenging outdoor environments; over obstructed paths typical of remote monitoring and control applications.

Capable of operating in Access Point/Client configuration, functioning as a network Bridge/Router, or serving as a Serial Server (RS232/485), the devices use over-the-air data compression to ensure maximum throughput. Integrated Modbus server capability allows seamless integration with smart sensors, RTU's or I/O expansion through the use of WH/O-EX Expansion modules.

Features

- 10mW – 5W RF Power
- Access Point/Client and Bridge/Router Configuration
- Spanning Tree (Self Healing) Support
- Designed for Industrial, High Noise Environments
- Over-The-Air Network Diagnostics and Configuration
- VLAN Tagging Supported for Bridging and Routing Modes
- Network Management Capabilities
- Frequencies Configured via Built-In Webserver

Applications

- Remote Well Head Monitoring
- Pipeline Leak Detection
- PLC Networks
- Environmental Monitoring
- Water Treatment Facilities
- Mining Operations Infrastructure
- Tank Farm Monitoring

WI-MOD-415-E Ethernet Modem & Gateway

Long range scalable industrial wireless Ethernet modem and I/O radio for reliable and secure connectivity for 400MHz and 900MHz bands

The WI-MOD-415-E Ethernet modem and gateway extends communications to sensors in local, remote, and difficult-to-reach locations. Designed in mind with the long-range, high data speed wireless transceiver and standards-based native Ethernet protocol over the air, gives WI-MOD-415-E Series the power and flexibility to perform reliably in sprawling harsh industrial environments.



Features

- Exceeding 140 kbps data throughput
- Secure data protection with WPA and AES256 encryption
- Full Ethernet protocol over the air provides a standards-based flexibility to support future and legacy devices
- ProMesh automatic path selection and network formation
- Internal Web dashboard for immediate view of local I/O
- 148-174 MHz / 340-400 MHz / 400-480 MHz / 928-960MHz model options
- Supports multiple data rates simultaneously for high performance over short and long communication links
- Frequency agility roaming provides reliability and flexibility within the network architecture
- Over-the-air context-based data compression and forward error correction provides maximum reliability and transmission efficiency
- Redundancy modes for base, repeater, and remote
- Wireless point-to-point or multipoint I/O and gateway functionality
- Modbus TCP and RTU I/O gateway
- DNP3 I/O gateway, including internal status registers
- Standard Ethernet bridge default to allow modem function for external Ethernet host devices (full L2/L3 network support)
- 10 mW to 10 W RF power configurable, license or license-free depending on location
- Software configurable wireless channel bandwidth supporting 6.25, 12.5, 25.0 kHz
- Integrated digital, pulse, and analog I/O
- Gather-scatter/block mapping and integrity checking transmissions for efficient event triggered peer-to-peer I/O
- Over-the-air network diagnostics and configuration
- Expandable I/O for local alarms and inputs/outputs

Applications

- Water and wastewater: flows, levels, pumps
- Renewables: solar farms, wind turbines, hydro
- Irrigation: slew gate controls, levels
- Oil and gas networks: gas well production, lift pump
- Environmental: storm warning, smoke stacks, filters
- Mining infrastructure: conveyor, re-claimer, pumps





WI-MOD-415-E Ethernet Modem & Gateway



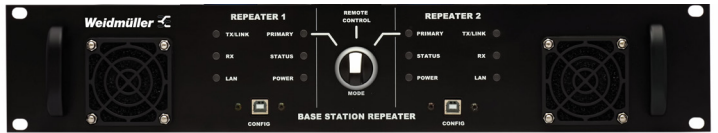
Technical Data

Transmitter/Receiver				
Frequency ¹	148-174 MHz; 340-400 MHz; 400-480 MHz, 928-960MHz			
Transmit Power - peak	10 mW – 10 W (+40 dBm) configurable			
Transmit Power	QPSK 4 W (+36 dBm); 16-QAM, 64 QAM 2.5 W (+34 dBm); 2-FSK, 4-FSK 10 W (+40 dBm) 10 W (+ 40 dBm)			
Modulation	QPSK, 16-QAM, 64-QAM; 2-FSK or 4-FSK (compatibility mode)			
Receiver Sensitivity 6.25/12.5/25 kHz	QPSK-FEC – 116 dBm; QPSK -113 dBm; 16-QAM -104 dBm; 64-QAM -97 dBm; 2-FSK -110 dBm; 4-FSK -102 dBm			
Channel Spacing	6.25, 12.5, 25.0kHz (software configurable)			
Data Rates (raw, no compression ²)		6.25 kHz	12.5 kHz	25.0 kHz
	QPSK-FEC	4 kbps	8 kbps	16 kbps
	QPSK	8 kbps	16 kbps	32 kbps
	16-QAM	16 kbps	32 kbps	64 kbps
	64-QAM	24 kbps	48 kbps	96 kbps
	2-FSK	4.8 kbps	9.6 kbps	-
	4-FSK	9.6 kbps	19.2 kbps	-
	64-QAM	45 kbps	80 kbps	140 kbps
Typical Data Throughput	64-QAM			
Typical Range (LoS QPSK-FEC)	62 miles (100 km) at 4 W; 10 miles (16 km) at 0.5 W			
Antenna connector	SMA female			
Protocols & Configuration				
System address ESSID	1 to 31- character text string			
Networking protocols	TCP/IP, UDP, ARP, DHCP, DNS, ICMP, HTTP, VLAN 802.1Q, IPv6 pass through			
Industrial Protocols Gateway	Modbus RTU, Modbus TCP, DNP3 I/O; Pass through: EtherNet/IP, Profinet, DNP, IEC 61850, and others			
Configurable parameters	Unit details, I/O mappings, I/O parameters, radio settings; DNP3 I/O and gateway (level 2+); Modbus TCP/RTU gateway; Embedded Modbus master/slave for I/O transfer; Frequency agility parameters for automatic selection of radio paths, prioritization of traffic flows, bandwidth efficiency features, bandwidth utilization, redundancy, routing, bridging, VLAN			
User Configuration	Network access: USB or Ethernet; Remote access: over the air			
Security	WPA2-PSK, AES 256 bit, multilevel password protected configuration			
IP Filtering	IP address, MAC address, ARP filtering whitelist/blacklist			
LED Indications & Reported Diagnostics				
LED Indication	Power/OK, Radio TX/RX/Link, RS-232, RS-485, digital I/O, analog I/O status			
Network Diagnostics	Diagnostic capture to Wireshark format file			
Radio Diagnostics	Channel utilization, RSSI measurements (dBm), background noise, connectivity info./statistics available Web/Modbus reg			
Logging	Optional internal data logging for I/O and events. Logging memory 1 MB			
Connections				
LAN	1 x 10/100Base-T auto-MDIX RJ-45			
Serial	1 x RS-232, 1 x RS-485, 110–230400 bps Serial over IP modem support			
Operation				
Modes — Topology	Point to multipoint; ProMesh automatic path selection or fixed links; Base, repeater, remote unit types; Manual mode for advanced configuration			
Input & Output				
Discrete Input ³	8 digital I/O (1–4 configurable as PI or PO); On-state voltage: <2.1 Vdc; Wetting current: 5 mA; Max. I/P pulse rate–DI 1/2: 50 kHz, DI 3/4: 1 kHz; Max. I/P pulse width–DI 1/2: 10 µs, PI 3/4: 0.2 ms			
Discrete output ³	8 digital I/O (1–4 configurable as PI or PO); Working voltage maximum: 30 VDC; Working current maximum: 200 mA; Max. O/P pulse rate–PO max. rate: 1 kHz			
Analog Inputs	4 AI (2 differential, 2 single ended) Current range: 0–24 mA; Voltage input range: AI 1/2: 0–25 V, AI 3/4: 0–5 V; Accuracy: 0.1% ; Resolution: 14 bits			
Analog Output	2 AO (sourcing); Current range: 0–24 mA; Current resolution: 13 bits; Accuracy (current): 0.1%			
Analog Loop Power	+24 Vdc output provided to power loop devices; Max. current 100 mA—current limited			
Expansion	use EX-IO series Modbus I/O modules (RTU/TCP)			
Approvals				
EMC	FCC CFR47 Part 15; EN 301 489-3; EN 301 489-5			
RF (radio)	FCC CFR47 Part 90; IC RSS 119; EN 300 113; EN 300 220; AS/NZS4295; AS/NZS4268			
Safety	EN/IEC 62368; cULus, CE, RoHS			
Hazardous area	cULus Class I, Division 2; IEC EX Zone 2; ATEX Zone 2			
Power Supply				
Nominal supply	10.8-30 VDC, undervoltage / overvoltage protection			
Battery charger	Lead-acid or gel cell backup, 500 mA charge			
Average current draw	220 mA at 13.8 V (idle), 130 mA at 24 V (idle)			
Transmit current draw	2.5 A at 13.8 V (10 W RF), 1.5 A at 24 V (10 W RF); 0.9 A at 13.8 V (500 mW RF), 0.5 A at 24 V (500 mW RF)			
General Data				
Dimensions mm (in) H x W x D	183 x 35 x 156 mm (7.20 x 1.38 x 6.20 in)			
Housing	Powder-coated aluminum and high-density thermoplastic, IP20 rated			
Terminal blocks	Removable, max. conductor 12 AWG			
Operating Temperature	-40 to 60°C (-40 to 140°F)			
Humidity	0-99% RH noncondensing			
Mounting	DIN rail mounting			
Weight	0.7 kg / 1.6 lb			
Ordering Data				
Note	Type	Frequency Band	Order Number	
¹ Available RF power and frequency may vary depending on country of application. Please confirm with local regulatory body.	WI-MOD-415-E-C1	148-174 MHz	7940107951	
	WI-MOD-415-E-C1-EX	148-174 MHz (Hazloc Approved)	7940107952	
² Data compression will provide an improvement in over-the-air data throughput of up to 50%, depending on data content.	WI-MOD-415-E-C3	340-400 MHz	7940107959	
	WI-MOD-415-E-C3-EX	340-400 MHz (Hazloc Approved)	7940107960	
³ Discrete input and output function shared for total of eight (8) discrete inputs and outputs.	WI-MOD-415-E-C4	400-480 MHz	7940107955	
	WI-MOD-415-E-C4-EX	400-480 MHz (Hazloc Approved)	7940107956	
	WI-MOD-415-C9	928-960MHz	7940107963	
	WI-MOD-415-C9-EX	928-960MHz (Hazloc Approved)	3104830000	

WI-BSR-415-xx Series

Base Station Repeater for 19" Rack mounting

- Redundant Base Station, Repeater or Remote functionality
- Remote monitored Primary and Secondary redundant radios with automatic selection control
- Frequency agility roaming, provides reliability and flexibility within the network architecture
- Full duplex link capability option for maximum data capacity - Internal duplexer
- 340-520 MHz, 894-960MHz frequency licensed bands
- 0.01 to 10W RF power



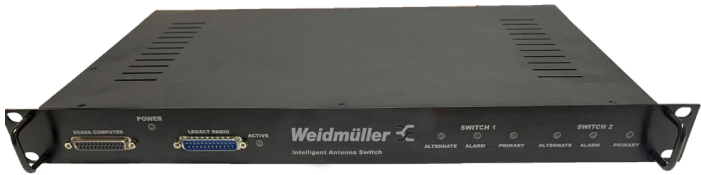
Technical Data

Transmitter/Receiver				
Transmitter and receiver frequency	340 - 520MHz 894 - 960 MHz			
Transmit Power	10 mW- 10 W (+40 dBm) configurable QPSK 4 W (+36 dBm) 16-QAM, 64 QAM 2.5 W (+34 dBm) 2-FSK, 4-FSK 10 W (+40 dBm)			
Radio Transceiver/Modulation	2QPSK, 16-QAM, 64-QAM; 2-FSK or 4-FSK (compatibility mode)			
Receiver sensitivity	QPSK-FEC -116 dBm QPSK -113 dBm 16-QAM -104 dBm 64-QAM -97dBm 2-FSK -110 dBm 2-FSK -110 dBm			
6.25/12.5/25 kHz				
Protocol	CSMA/CA with 32 bit CRC and auto-correction			
Channel Spacing	6.25, 12.5, 25.0 kHz (software configurable)			
Data rate raw no compression		6.25kHz	12.5kHz	25.0kHz
	QPSK-FEC	4kbps	8kbps	16kbps
	QPSK	8kbps	16kbps	32kbps
	16-QAM	16kbps	32kbps	64kbps
	64-QAM	24kbps	48kbps	96kbps
	2-FSK		4.8kbps	9.6kbps
	4-FSK		9.6kbps	19.2kbps
Typical data Throughput with compression	64-QAM - 6.25 kHz @ 45 kbps; 12.5 kHz @ 80 kbps; 25 kHz @ 140 kbps			
Typical Radio range (LoS QPSK-FEC)	62 miles (100 km) at 4 W; 10 miles (16 km) at 0.5 W Range may be extended using repeater features			
Antenna connection	Half Duplex - 2 x N-Type Female			
Protocols & Configuration				
System Address	ESSID; 1 to 31-character text string			
Network Embedded Protocols:	TCP/IP, UDP, ARP, DHCP, DNS, ICMP, HTTP, PPP, FTP, TFTP, TELNET, SNMP, VLAN 802.1Q, IPv6 pass through			
Industrial protocols	Gateway: Modbus RTU Master/Slave, Modbus-TCP Client/Server, DNP3 I/O, MQTT +SparkplugB; Pass through: EtherNet/IP, Profinet, DNP3, IEC 61850, and others			
Configuration Parameters	Unit details, I/O mappings, I/O parameters, radio settings, Dahsboard, IO Plus logic DNP3 I/O and gateway (level 2+) Modbus TCP/RTU gateway MQTT Client +SparkplugB Embedded Modbus master/slave for I/O transfer Promesh for automatic selection of radio paths, prioritization of traffic flows, bandwidth efficiency features, bandwidth utilization, redundancy, routing, bridging, VLAN Frequency agility parameters for automatic selection of radio paths, prioritization of traffic flows, bandwidth efficiency features, bandwidth utilization, redundancy, routing, bridging, VLAN			
User configuration	Network access: USB or Ethernet Remote access: over the air HTTPS with remote configuration via wireless link Base station, Repeater, Remote for large fixed and roaming station networks, redundant radio paths, automatic selection of radio paths, prioritization of traffic flows, bandwidth efficiency features, bandwidth utilization, routing, bridging, VLAN			
Security	WPA2-PSK, AES 256 bit, multilevel password protected configuration MAC Filtering; IP Filtering; ARP Filtering			
IP Filtering	IP address, whitelist/blacklist MAC address, whitelist/blacklist ARP filtering, whitelist/blacklist			
LEDs & Diagnostics				
LED indication	Radio 1 - Power/OK, RX, TX/Link, Status, LAN Radio 2 - Power/OK, RX, TX/Link, Status, LAN			
Reported Diagnostics	RSSI measurements (dBm), BER connectivity information/statistics, system log file			
Network Diagnostics	Diagnostic capture to Wireshark™ format file, Modbus TCP Status registers access to full diagnostic data			
Radio Diagnostics	Channel utilization, RSSI measurements (dBm), background noise, connectivity information/statistics available Web/ Modbus reg			
Logging	Optional internal data logging for I/O and events. Logging memory 1 MB			
I/O & Alarms	Alarms accessible via Modbus registers Additional IO expansion available as option			
Connections				
LAN	x 10/100Base-T auto-MDIX RJ-45			
Serial	1 x RS-232, 1 x RS-485 f, 1200-230400 bps, Serial over IP modem support			
RS232 V.24 DCE	1.2 to 230.4 Kb/s			
RS485	1.2 to 230.4 Kb/s Serial server, PPP, Modbus to Modbus TCP conversion			
USB	2 x USB-B RNDIS Maintenance port 2 x USB-A for Firmware update			
Operation				
Modes—topology	Point to multipoint; Base, repeater, remote unit type; ProMesh automatic path selection or fixed links; Manual mode for advanced configuration			
Ethernet	10/100 BaseT RJ45, IEEE 802.3 compliant. Bridge/router functions work with all Ethernet protocols			
Networking	Redundant Base station, Repeater or Remote Selectable AUTO/Primary/Secondary Point-to-point, Point-to-multipoint, Repeater functionality			

Power Requirements			
Nominal supply	10.8-30 Vdc, undervoltage/overvoltage protection		
Battery charger circuit	Lead-acid or gel cell backup, 500 mA charge		
Average current draw	880 mA at 13.8 V (idle), 550 mA at 24 V (idle)		
Transmit current draw	2.5 A at 13.8 V (10 W RF), 1.7 A at 24 V (10 W RF) 1.1 A at 13.8 V (500 mW RF), 0.8 A at 24 V (500 mW RF)		
Optional	Redundant AC supplies		
Compliance & Approvals			
EMC	FCC CFR47 Part 15; EN 301 489-3; EN 301 489-5		
RF (radio)	FCC CFR47 Part 90; IC RSS 119; EN 300 113; EN 300 220; AS/NZS4295; AS/NZS4268		
Safety	EN/IEC 62368 (RoHS compliant)		
General Data			
Dimensions mm (in) (H x W x D)	7.20 x 1.38 x 6.20 inches (183 x 35 x 156 mm)		
Housing	Powder-coated aluminum and high-density thermoplastic, IP20 rated		
Terminal blocks	Removable, max. conductor 12 AWG 0.1 in2 (2.5 mm2)		
Operating Temperature	-30°C to +60°C (-22 to 140°F)		
Elevation	500m BSL to 2000m ASL		
Humidity	0–90% RH noncondensing		
Mounting	19" Rack mountable		
Enclosure size			
Half Duplex	19" 2U enclosure 90x490x300 (HxWxD mm) 19" 4U enclosure 180x490x300 (HxWxD mm)		
Weight	12 lb (5.4 kg)		
Ordering Data			
Note	Type/Description	Band	Order Number
¹ Available RF power and frequency may vary depending on country of application. Please confirm with local regulatory body.	WI-BSR-415-C4	400-480 MHz (0.01-10W)	3093530000
² Data compression will provide an improvement in over-the-air data throughput of up to 50%, depending on data content.	WI-BSR-415-C9	928-960MHz (0.01-10W)	3104840000

WI-IAS-415-xx Series
Intelligent Antenna Switch

- Redundant Base Station, Repeater or Remote functionality
- Remote monitored Primary and Secondary redundant radios with automatic selection control
- Frequency agility roaming, provides reliability and flexibility within the network architecture
- Full duplex link capability option for maximum data capacity - Internal duplexer
- 340-520 MHz, 894-960MHz frequency licensed bands
- 0.01 to 10W RF power



Technical Data

Transmitter/Receiver	
Transmitter and receiver frequency	148-174Mhz, 400-480MHz, 896-960MHz
Transmit Power	10 mW- 10 W (+40 dBm) Max 10W input with internal protection
RF Insertion Loss	Less than 1dB
VSWR	ax 1.3:1 (Return loss -18dB)
Switch Isolation	30 dB
Interfaces	
Antenna Switch	Two RF switches supporting redundant antenna systems. Primary: Weidmuller base or repeater Alternate: Legacy base or repeater ANT: Antenna System
Network Embedded Protocols:	
Serial Data	Legacy Radio: D25 RS-232 SCADA Computer: D25 RS-232 Rear DTE: D9 RS-232
Industrial protocols	Modbus RTU Master/Slave
User configuration	Network access: Serial or Ethernet Remote access: over the air HTTPS with remote configuration via wireless link Base station, Repeater, Remote for large fixed and roaming station networks, redundant radio paths, automatic selection of radio paths, prioritization of traffic flows, bandwidth efficiency features, bandwidth utilization
Terminals Supply/RS485	Supply Input +/- RS-485 Base/Repeater Control
Earth Lug	M6 lug for system protective earth connectio
RF Ports	2 Absorptive SPDT Switches
Primary, Alternate	50 Ω Connection to radio 10W maximum power 50Ω termination when disconnected from ANT Power detection and Protection from Switching while carrying power Internal Surge protection provides additional protection for surges coming from the Antenna port.
ANT	50Ω connection to Antenna. Internal Surge protection. Additional Protection recommended when connected to exposed antenna.
LEDs & Diagnostics	
LED indication	Channel utilization, RSSI measurements (dBm), background noise, connectivity information/statistics available Web/Modbus reg
Reported Diagnostics	RSSI measurements (dBm), BER connectivity information/statistics, system log file
Network Diagnostics	Diagnostic capture to Wireshark™ format file, Modbus TCP Status registers access to full diagnostic data
Radio Diagnostics	Channel utilization, RSSI measurements (dBm), background noise, connectivity information/statistics available Web/Modbus reg
Connections	
Internal Surge protection provides additional protection for surges coming from the Antenna port. "	
LAN	1 x WAN, 1 x LAN or 2 x LAN, Auto 10/100Mbps
Serial Connections	4 Serial Connections
RS232 V.24 DTE	1.2 to 230.4 Kb/s; DB9 DTE to WI-BSR-415-Cx
Legacy Radio	DB-25 DTE to Legacy Base Radio
RS485	2 wire data interface Terminal block, 1.2 to 230.4 Kb/s; RS-485 to WI-BSR-415-Cx
SCADA Computer	DB-25 DCE to SCADA computer
Power	4 way screw terminal, pluggable
Operation	
Ethernet	10/100 BaseT RJ45, IEEE 802.3 compliant. Bridge/router functions work with all Ethernet protocols
Networking	Redundant Base station, Repeater or Remote Selectable AUTO/Primary/Secondary Point-to-point, Point-to-multipoint, Repeater functionality
Power Requirements	
Nominal supply	10.8-30 Vdc, undervoltage/overvoltage protection
Battery charger circuit	Lead-acid or gel cell backup, 500 mA charge
Average current draw	880 mA at 13.8 V (idle), 550 mA at 24 V (idle)
Transmit current draw	2.5 A at 13.8 V (10 W RF), 1.7 A at 24 V (10 W RF) 1.1 A at 13.8 V (500 mW RF), 0.8 A at 24 V (500 mW RF)
Optional	Redundant AC supplies
Compliance & Approvals	
EMC	FCC CFR47 Part 15; EN 301 489-3; EN 301 489-5
RF (radio)	FCC CFR47 Part 90; IC RSS 119; EN 300 113; EN 300 220; AS/NZS4295; AS/NZS4268
Safety	EN/IEC 62368 (RoHS compliant)
Regulatory	Australia: RCM, Europe: CE, USA: FCC, Canada: IC

Wireless Data Modems – Wireless I/O & Gateway

General Data			
Dimensions mm (in) (H x W x D)	429(W) x 226(D) x 40(H) (19.9" x 8.9" x 1.6") Front panel 482(W) x 44(H) (19" x 1.7")		
Housing	Powder-coated aluminum and high-density thermoplastic, IP20 rated		
Terminal blocks	Removable, max. conductor 12 AWG 0.1 in2 (2.5 mm2)		
Operating Temperature	-40 to +75°C (-40 to +158°F)		
Pollution Degree	4		
Elevation	0-3000m (0-10000ft)		
Humidity	0-99% RH noncondensing		
Mounting	19" Rack mountable		
Enclosure size	19" 1U enclosure		
Weight	7 lb (3.1 kg)		
Ordering Data			
Note	Type/Description	Band	Order Number
¹ Available RF power and frequency may vary depending on country of application. Please confirm with local regulatory body.	WHAS-415-C4	400-540MHz (0.01-10W)	3093540000
	WHAS-415-C9	890-960MHz(0.01-10W)	3104850000
	WHAS-415-C1	148-170MHz (0.01 - 10 W)	On request
² Data compression will provide an improvement in over-the-air data throughput of up to 50%, depending on data content.			

Migration Plan Overview

Easy, 4-step migration plan for a simplified transition

- 1. Site survey & compatibility assessment:**
Identify infrastructure compatibility and develop a migration roadmap
- 2. Hardware & software setup:**
Pre-configured radios for plug-and-play integration
- 3. Migration & integration support:**
Technical support during and post-migration
- 4. Training & ongoing support:**
Hands-on training and continuous support



Advanced Security

Mitigate cybersecurity risks and potential losses from network breaches



Future-Proof Investment

Scalable architecture for growth and adapting to future requirements



Reduced Downtime

Pre-configured systems and streamlined migration process

3 main components to build a state-of-the-art wireless system



Ethernet Modem

or



I/O Radio

+



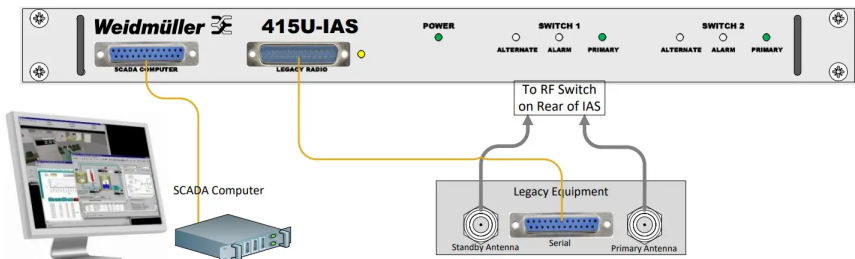
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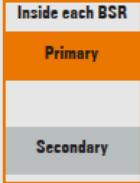
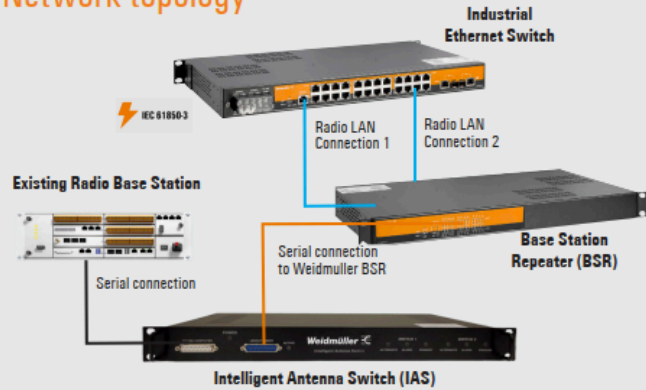
The Intelligent Antenna Switch (IAS), a fully redundant RF antenna switch, is paired with the BSR to deliver a robust and reliable, redundant hot standby solution for base or repeater sites.

The Base Station Repeater (BSR) (operating as both the master station and the migration switch) offers smart redundancy by utilizing adaptive switching schemes on Weidmüller’s reliable Ethernet modems and I/O radios.

The Intelligent Switch can be paired with the Weidmüller BSR (base station repeater) which provides a robust and reliable redundant hot standby base or repeater site.

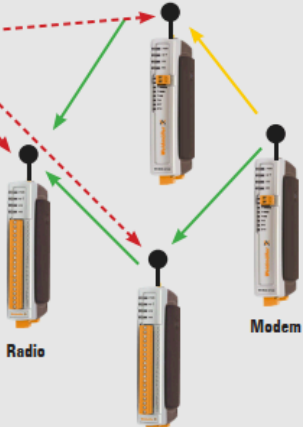


Network topology



Features

- Can replicate existing clusters of 120 radios to each BSR
- ProMesh networking to simplify deployment
- Weidmüller radios can combine networks for I/O and Ethernet/Serial communications



Seamlessly upgrade legacy radio networks with our wireless system to reduce risk and downtime during the migration process.

Secure data communication with integrated VPN technology

Industrial security routers – versatile, reliable and flexible

As data and information networking continues to increase, Ethernet communication seeing more and more use in industrial automation technology. This is a trend that has not only changed the individual requirements of many customers, but has also had an impact on the devices used. These must now support a flexible system structure, allow networking with each other and, in addition to the targeted integration of all relevant network participants, also guarantee maximum data security

In order to provide optimal support for meeting the many different requirements, we offer different versions of industrial security routers. These routers enable secure, reliable and location-independent communication between machines and systems, as well as reliable user authentication to protect the network.

Our routers with integrated VPN technology are ideally suited for secure remote access to components and systems in remote networks. They are available with either wired or mobile Internet connectivity and support the u-link Remote Access Service. This allows remote access systems to be set up quickly and easily, with no special IT knowledge required.

Your special advantage:

- Easy integration of subnets with identical IP address ranges through 1:1 NAT
- Secure and easy remote maintenance via Weidmüller u-link Remote Access Service
- Future-proof network connection with static and dynamic routing
- Increased network security thanks to stateful inspection firewall, IP/port forwarding and network segmentation
- Full flexibility thanks to Fast Ethernet and Gigabit Ethernet interfaces with up to 4 separate subnets and ports

Compatible
with u-link
Remote Access
Service



Reliable Internet connection

Reliable Internet connection thanks to integrated 4G/LTE mobile modem

WLAN interface

Also for use as a service access point

Remote Access Service

Secure remote access with VPN

Configuration

Extensive configuration options for IP address mapping

Internet communication

Secure Internet communication thanks to IPsec and OpenVPN

2-Port Fast Ethernet Industrial Security Router

- Firewall for secure protection of machinery and equipment
- Extensive IP address management for the integration of series machines
- WLAN interface – also for use as a service access point



Technical data

Management features	
Device configuration	Webbrowser (HTTP/HTTPS), SNMP v2c, Command Line Interface (Telnet/SSH), Upload of a configuration file via web-interface
Monitoring function	SNMP v2c, Syslog, Event based warning via E-Mail, Event based warning via relay, Event based warning via SNMP trap
IP-address management	Static, DHCP-Client, DHCP-Server (pool-based), DHCP-Relay, DNS-Relay
Security functions	Access Control List (MAC-based) for WLAN Access Point mode
Time synchronization management	NTP server, NTP client
Operating modes	WLAN Access Point, WLAN Client, Virtual COM mode, TCP Server mode, TCP Client mode, UDP Server/Client mode
Routing functionality	
Firewall functions	Stateful Packet Inspection Firewall (Layer-3)
NAT functions	Source / Destination NAT (Port / Host / Network)
Routing functions	IPv4 routing, Static and dynamic IP Routing
VPN functions	u-link client, OpenVPN (Server or Client), IPSec (Initiator or Responder)
Interfaces	
Number of ports	2x RJ45 10/100BASE-T(X), 1x DB9 male for RS-232/422/485
Digital outputs	1x, with a current capacity of 0.2 A at 30 V DC
Digital inputs	1x, 5 to 30 V for logic "1", 0 to 2 V for logic "0"
Function reset button	<5 sec: System reboot and set LAN IP to factory Default, >5 sec: Factory default
Connector for external antennas	1x RP-SMA female
Serial communication parameters	
Baud rate	110 bit/s to 460800 bit/s
Data bits	7, 8
Parity	none, odd, even, Mark, Space
Stop bits	1, 2
WLAN interface	
Data security	64-bit and 128-bit WEP encryption, WPA/WPA2 Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP and AES)
Transmission rate WLAN	IEEE 802.11b: 1...11Mbps IEEE 802.11g: 6...54Mbps IEEE 802.11n: 6.5...150Mbps

Note

Power supply	
Connection type	1 removable 4-pin terminal block
Voltage supply range	10.8...52.8VDC
Voltage supply	12/24/48 V DC, 2 redundant inputs, or 48 V DC Power-over-Ethernet (IEEE 802.3af)
Current consumption	0.22A @ 12V DC; 0.11A @ 24V DC; 0.07A @ 48V DC
Reverse polarity protection	Yes
Overload current protection	Yes
Physical characteristics	
Housing main material	Metal
Protection degree	IP30
Type of mounting	DIN rail, Wall mounting
Dimensions H x W x D	95 / 45 / 81 mm (3.7402 / 1.7717 / 3.189 inch)
Net weight	411 GRM
Environmental conditions	
Operating temperature	-25 °C...70 °C
Humidity	5 to 95 % (non-condensing)
Operating altitude	2000m in acc. with UL
EMC conformity and approvals	
EMC standards	EN 55032, EN 55024, FCC Part 15 Subpart B Class A, IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV, IEC 61000-4-3 RS: 80 MHz bis 1 GHz: 3 V/m, IEC 61000-4-4 EFT: Power: 0.5 kV; Signal: 0.5 kV, IEC 61000-4-5 Surge: Power: 0.5 kV; Signal: 1 kV, IEC 61000-4-6 CS: 3 Vrms
Safety standard	SELV according to EN 62368-1, UL 61010-1, UL 61010-2-201
Shock	according to IEC 60068-2-27
Vibration	according to IEC 60068-2-6
Free fall	According to IEC 60068-2-31
MTBF	
Operating time (hours), min.	381084 hrs
According to Standard	Telcordia SR-332
Approvals	
Approvals	CE; CULUS; EAC

Ordering data

Type	Qty.	Order No.
IE-SR-2TX-WL	1	2682590000

2-Port Fast Ethernet Industrial Security Router

- Firewall for secure protection of machinery and equipment
- Extensive IP address management for the integration of series machines
- Integrated 4G/LTE modem with dual SIM option
- WLAN interface – also for use as a service access point

Technical data

Management features	
Device configuration	Webbrowser (HTTP/HTTPS), SNMP v2c, Command Line Interface (Telnet/SSH), Upload of a configuration file via web-interface, SMS control commands
Monitoring function	SNMP v2c, Syslog, Event based warning via E-Mail, Event based warning via relay, Event based warning via SNMP trap, Event based warning via SMS, Device information and mobile radio status via SMS request
IP-address management	Static, DHCP-Client, DHCP-Server (pool-based), DHCP-Relay, DNS-Relay
Security functions	Access Control List (MAC-based) for WLAN Access Point mode
Time synchronization management	NTP server, NTP client
Operating modes	WLAN Access Point, WLAN Client, Virtual COM mode, TCP Server mode, TCP Client mode, UDP Server/Client mode
Routing functionality	
Firewall functions	Stateful Packet Inspection Firewall (Layer-3)
NAT functions	Source / Destination NAT (Port / Host / Network)
Routing functions	IPv4 routing, Static and dynamic IP Routing
VPN functions	u-link client, OpenVPN (Server or Client), IPSec (Initiator or Responder)
Interfaces	
Number of ports	2x RJ45 10/100BASE-T(X), 1x DB9 male for RS-232/422/485
Digital outputs	1x, with a current capacity of 0.2 A at 30 V DC
Digital inputs	1x, 5 to 30 V for logic "1", 0 to 2 V for logic "0"
Function reset button	<5 sec: System reboot and set LAN IP to factory Default, >5 sec: Factory default
Number of SIM-Card slots	2
SIM-Card slot type	Mini-SIM (ID-000 format)
Connector for external antennas	2x SMA female, 1x RP-SMA female
Serial communication parameters	
Baud rate	110 bit/s to 460800 bit/s
Data bits	7, 8
Parity	none, odd, even, Mark, Space
Stop bits	1, 2
WLAN interface	
Data security	64-bit and 128-bit WEP encryption, WPA/WPA2 Personal and Enterprise (IEEE 802.1X/RADIUS, TKIP and AES)
Transmission rate WLAN	IEEE 802.11b: 1...11Mbps IEEE 802.11g: 6...54Mbps IEEE 802.11n: 6.5...150Mbps

Note



Mobile radio interface	
Wireless module	multi-band modem (4G/3G), Region: North America
Transmission rate mobile radio	LTE category: CAT 4 Download rate, max.: 150Mbps Upload rate, max.: 50Mbps
*FirstNET available on request.	LTE-FDD: B2, B4, B5, B12, B13, B14, B66, B71, WCDMA: B2, B4, B5
Power supply	
Connection type	1 removable 4-pin terminal block
Voltage supply range	10.8...52.8VDC
Voltage supply	12/24/48 V DC, 2 redundant inputs, or 48 V DC Power-over-Ethernet (IEEE 802.3af)
Current consumption	0.46A @ 12V DC; 0.22A @ 24V DC; 0.11A @ 48V DC
Reverse polarity protection	Yes
Overload current protection	Yes
Physical characteristics	
Housing main material	Metal
Protection degree	IP30
Type of mounting	DIN rail, Wall mounting
Dimensions H x W x D	95 / 45 / 81 mm (3.7402 / 1.7717 / 3.189 inch)
Net weight	437 GRM
Environmental conditions	
Operating temperature	-25 °C...70 °C
Humidity	5 to 95 % (non-condensing)
Operating altitude	2000m in acc. with UL
EMC conformity and approvals	
EMC standards	EN 55032, EN 55024, FCC Part 15 Subpart B Class A, IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV, IEC 61000-4-3 RS: 80 MHz bis 1 GHz: 3 V/m, IEC 61000-4-4 EFT: Power: 0.5 kV; Signal: 0.5 kV, IEC 61000-4-5 Surge: Power: 0.5 kV; Signal: 1 kV, IEC 61000-4-6 CS: 3 Vrms
Safety standard	SELV according to EN 62368-1, UL 61010-1, UL 61010-2-201
Shock	according to IEC 60068-2-27
Vibration	according to IEC 60068-2-6
Free fall	According to IEC 60068-2-31
MTBF	
Operating time (hours), min.	353679 hrs
According to Standard	Telcordia SR-332
Approvals	
Approvals	CE; CULUS; EAC

Ordering data

Type	Qty.	Order No.
IE-SR-2TX-WL-4G-EU	1	2682560000
IE-SR-2TX-WL-4G-US-V	1	2682580000

FirstNet approved version available on request

4-Port Fast Ethernet Industrial Security Router

- Easy integration of subnets with identical IP address ranges through 1:1 NAT
- Secure and easy remote maintenance with Weidmüller u-link remote access service
- Future-proof network connection with static and dynamic routing
- Increased network security through stateful inspection firewall, IP/Port- forwarding and network segmentation
- Reliable internet connection, even without on-site internet access, thanks to integrated 4G/LTE cellular modem



Technical data

Management features	
Device configuration	Webbrowser (HTTP/HTTPS), SNMP v1/v2c/v3, Windows tool
Monitoring function	SNMP v1/v2c/v3, Syslog, Event based warning via E-Mail
IP-address management	Static, DHCP-Client, DHCP-Server (pool-based)
Security functions	IPv4 Stateful Packet Inspection Firewall (incoming/outgoing), NAT masquerading, 1:1 NAT, IP forwarding, Port forwarding
Time synchronization management	NTP client
Industrial protocol support	Modbus/TCP slave
Modes of operation	
IP router	IP routing (IPv4, Layer-3) with SPI firewall (Stateful Packet Inspection), Static or dynamic routing, Supports RIPv2 / OSPF
Transparent bridge	4-port switch with additional Layer-2 filter
VPN functionality	
u-link	OpenVPN-based remote access service via the Weidmüller u-link cloud
OpenVPN	Configurable as OpenVPN server or client (Layer 2 and Layer 3), Authentication via X.509 certificate, Tunnel support via HTTP proxy, Maximum 10 different client or server configurations
IPsec	Configurable as IPsec server or client
Interfaces	
RJ45 ports	10/100BaseT(X), auto negotiation, Full/half-duplex mode, Auto MDI/MDI-X port
Number of ports	4x RJ45 10/100BaseT(X)
Number of SCM-Card slots	1
Number of SIM-Card slots	1
Digital inputs	1x, galvanically isolated, VPN-initiate: establishes a pre-configured VPN connection (24 V in), Cut: physically disconnects (Link Down) the WAN port (24 V in), Trigger pre-configured packet filter rules (24 V in)
Serial port	1x RS-485, 2-wire, galvanically isolated, 1 removable 3-pole terminal block
Function reset button	Restoration of factory settings
SCM-Card slot type	Smart Card (ID-000 format), Save and restore the configuration using smart card (memory chip)
SIM-Card slot type	Mini-SIM (ID-000 format)
LED indicator	Power: indicates power supply status, boot-up process, firmware update process, Status: indicates system status, VPN: indicates VPN tunnel status, LTE/4G: indicates mobile radio connection status, Port LED: Link/ACT, Speed (RJ45 port)
Connector for external antennas	1x SMA female
Mobile radio interface	
Mode of operation	Permanent connection, Manual connection control via web interface
Wireless module	multi-band modem (4G/3G)
Transmission rate mobile radio	LTE category: CAT 6 Download rate, max.: 300Mbps Upload rate, max.: 50Mbps
Frequency band	EMEA / Americas, LTE: B1 (2100), B2 (1900), B3 (1800), B4 (AWS), B5 (850), B7 (2600), B12 (700ac), B13 (700c), B20 (800DD), B25 (1900), B26 (US 850 Ext), B29 (US 700de Lower), B30 (2300 WCS), B41 (TDD 2500), UMTS: B1 (2100), B2 (1900), B3 (1800), B4 (AWS), B5 (850), B8 (900)
Note	

Power supply	
Connection type	1 removable 4-pin terminal block
Voltage supply range	19.2...28.8VDC
Voltage supply	24 V DC, 1 single input
Current consumption	0.8A @ 24V
Reverse polarity protection	Yes
Physical characteristics	
Housing main material	Plastic
Protection degree	IP30
Type of mounting	DIN rail
Dimensions H x W x D	134.5 / 29.9 / 94.8 mm (5.2953 / 1.1772 / 3.7323 inch)
Net weight	213 GRM
Environmental conditions	
Operating temperature	-30 °C...70 °C
Humidity	5 - 90 %, no condensation
Operating altitude	2000m in acc. with UL
EMC conformity and approvals	
EMC standards	EN 55032, EN 55024, EN 61000-6-2, EN 61000-6-4
Safety standard	EN 62368-1, EN 62311
Shock	according to IEC 60068-2-27
Vibration	according to IEC 60068-2-6
Approvals	
Approvals	CE; CULUS; EAC

Ordering data

Type	Qty.	Order No.
IE-SR4TX-LTE/4G-USEMEA	1	2739630000
IE-SR4TX-LTE/4G-EU	1	2751280000
IE-SR4TX (LAN Only)	1	2751270000

4-Port Gigabit Ethernet Industrial Security Router

- Highly functional router and firewall
- Integrated u-link remote access service
- Up to 4 independent and individually secured networks
- Reliable internet connection thanks to integrated 4G/LTE mobile modem



Technical data

Technology	
Standard	IEEE 802.3 for 10BASE-T, IEEE 802.3u for 100BASE-TX, IEEE 802.3ab for 1000BASE-T
Management features	
Device configuration	Webbrowser (HTTP/HTTPS), SNMP v1/v2c/v3, Windows tool
Monitoring function	SNMP v1/v2c/v3, Syslog
IP-address management	Static, DHCP-Client, DHCP-Server (pool-based)
Security functions	IPv4 Stateful Packet Inspection Firewall (incoming/outgoing), NAT masquerading, 1:1 NAT, IP forwarding, Port forwarding
Time synchronization management	NTP server, NTP client
Modes of operation	
Extended IP router	Each interface (LAN, WAN, optional 4G/LTE) can be configured as separate IP network
IP router	IP routing (IPv4, Layer-3) with SPI firewall (Stateful Packet Inspection), Static or dynamic routing, Supports RIPv2 / OSPF
Transparent bridge	4-port switch with additional Layer-2 filter
VPN functionality	
u-link	OpenVPN-based remote access service via the Weidmüller u-link cloud
OpenVPN	Configurable as OpenVPN server or client (Layer 2 and Layer 3)
IPsec	Configurable as IPsec server or client
Interfaces	
Connector for external antennas	2x SMA female
Number of ports	4x RJ45 10/100/1000BaseT(X)
Number of SCM-Card slots	1
Number of SIM-Card slots	1
Function reset button	Restoration of factory settings
SCM-Card slot type	Smart Card (ID-000 format), Save and restore the configuration using smart card (memory chip)
SIM-Card slot type	Mini-SIM (ID-000 format)
USB port	USB 2.0 interface for firmware update or restoration of the device configuration via USB flash drive
Mobile radio interface	
Wireless module	multi-band modem (4G/3G)
Transmission rate mobile radio	LTE category: CAT 6 Download rate, max.: 300Mbps Upload rate, max.: 50Mbps
Frequency band	EMEA / Americas, LTE: B1 (2100), B2 (1900), B3 (1800), B4 (AWS), B5 (850), B7 (2600), B12 (700ac), B13 (700c), B20 (800DD), B25 (1900), B26 (US 850 Ext), B29 (US 700de Lower), B30 (2300 WCS), B41 (TDD 2500), UMTS: B1 (2100), B2 (1900), B3 (1800), B4 (AWS), B5 (850), B8 (900)
Note	

Power supply	
Connection type	1 removable 4-pin terminal block
Voltage supply range	19.2...28.8VDC
Voltage supply	24 V DC, 1 single input
Current consumption	1.5A @ 24V
Reverse polarity protection	Yes
Physical characteristics	
Housing main material	Aluminium
Speed	Gigabit Ethernet
Protection degree	IP20
Type of mounting	DIN rail
Dimensions H x W x D	150 / 35 / 115 mm (5.9055 / 1.378 / 4.5276 inch)
Net weight	632 GRM
Environmental conditions	
Operating temperature	-25 °C...70 °C
Humidity	5 - 90 %, no condensation
Operating altitude	2000m in acc. with UL
EMC conformity and approvals	
EMC standards	EN 61000-6-4, EN 61000-6-2
Safety standard	EN 62368-1, EN 62311
Shock	according to IEC 60068-2-27
Vibration	according to IEC 60068-2-6
Approvals	
Approvals	CE, cULus

Ordering data

Type	Qty.	Order No.
IE-SR-4GT-LTE/4G-USEMEA	1	2873930000
IE-SR-4GT-LTE/4G-EU	1	2873920000
IE-SR-4GT (LAN Only)	1	2873910000

DNV approved for use in a maritime environment also available

WI-MOD-641-4-IOT

Industrial 4G-LTE Industrial IOT Connectivity

- Worldwide LTE, UMTS/HSPA+ and GSM/GPRS/EDGE coverage
- IEEE 802.11b/g/n, Access Point (AP), Client, 2*2 MIMO 300Mbps
- RS232/RS485 Serial, 2 digital Inputs and 2 digital outputs
- Dual SIM card support
- NMEA 0183 GPS Reporting
- Modbus RTU, TCP, MQTT and SparkplugB support
- Internal serial server
- SMS to read or control inputs/outputs, router status/alarm/state
- Eliminate dead zones with Starlink Direct to Cell



Technical Data

Transmitter/Receiver	
Frequency	4G LTE Global
LTE-FDD	B1/B2/B3/B4/B5/B7/B8/B12/B13/B18/ B19/B20/B25/B26/B28 STARLINK direct-to-cell compatible
LTE-TDD	B38/B39/B40/B41
WCDMA	B1/B2/B4/B5/B6/B8/B19
GSM/EDGE	B2/B3/B5/B8
WiFi	2.412 - 2.484 GHz (2.4GHz ISM Band) 802.11b/g/n: 2*2 MIMO
Transmit Power	Wi-Fi: 10 mW~100 mW (+20 dBm) configurable GSM850: Class 4 (33 dBm ±2 dB) EGSM900: Class 4 (33 dBm ±2 dB) DCS1800: Class 1 (30 dBm ±2 dB) PCS1900: Class 1 (30 dBm ±2 dB) GSM850 8-PSK: Class E2 (27 dBm ±3 dB) EGSM900 8-PSK: Class E2 (27 dBm ±3 dB) DCS1800 8-PSK: Class E2 (26 dBm ±3 dB) PCS1900 8-PSK: Class E2 (26 dBm ±3 dB) WCDMA: Class 3 (24 dBm +1/-3 dB) LTE-FDD: Class 3 (23 dBm ±2 dB) LTE-TDD: Class 3 (23 dBm ±2 dB)
GNSS (Global Navigation Satellite System)	NMEA-0183 GPS NMEA-0183 / GLONASS / BDS / Galileo
SMS	SMS Configuration, SMS Gateway, SMS Notification on input/outputs or events
Cellular Data rates (UL - Up Link; DL - Down Link)	LTE Cat4: Max 150Mbps DL/50Mbps UL Channels Bandwidth: 1.4/ 3/ 5/ 10/ 15/ 20 MHz LTE-FDD: Max. 150 Mbps (DL)/Max. 50 Mbps (UL) LTE-TDD: Max. 130 Mbps (DL)/Max. 30 Mbps (UL) UMTS: DC-HSDPA: Max. 42 Mbps (DL) HSUPA: Max. 5.76 Mbps (UL) WCDMA: Max. 384 kbps (DL)/Max. 384 kbps (UL) GSM-EDGE: Max. 296 kbps (DL)/Max. 236.8 kbps (UL) GPRS: Max. 107 kbps (DL)/Max. 85.6 kbps (UL)
Wi-Fi Data Rates	802.11b/g/n: 2*2 MIMO, 300Mbps
Antenna connections	3x SMA female standard polarity + 2x SMA Male standard polarity
SIM	2x SIM slots
SIM Failover	Auto-switch cases: data limited, no network, network denied, data connection fail
Protocols & Configuration	
Network Embedded Protocols:	TCP, UDP, IPv4, ICMP, NTP, DNS, HTTP, HTTPS, ARP, PPP, PPPoE, DHCP, IP Passthrough, VRRP
Industrial protocols	Gateway: Modbus RTU Master/Slave, Modbus-TCP Client/Server, DNP3 I/O, MQTT +SparkplugB; Pass through: EtherNet/IP, Profinet, DNP3, IEC 61850, and others
Configuration Parameters	Network connection, tunnelling protocol, security, gateway protocols, LAN configuration Dynamic Routing (RIPv1/v2, OSPF, BGP), VRRP, Qos, Email Notification, Enforce Modem PPP, NAT Loopback, Loopback, Roaming policy, VPN ICMP detection, GRE VPN Redundancy
Wi-Fi Protocol	802.11 b/g/n Access Point / Client / WDS
User configuration	Web Page Remote access: over the air HTTPS with remote configuration via wireless link Command Line Interface: SSHv2 and TELNET
Security	Data encryption, 802.11i with CCMP 256-bit AES Support for 802.1x radius server Secure HTTP protocol Auto encryption key rotation MAC Filtering; IP Filtering
Wireless Security	WPA, WPA2, WEP, CCMP, TKIP
IP Filtering	Easy mode automatic filtering or advanced IP address, whitelist/blacklist MAC address, whitelist/blacklist ARP filtering, whitelist/blacklist
Firewall	Flexible access control of TCP, UDP, ICMP packets, MAC address filter
VPN	OpenVPN: client/server up to 5 connections GRE: Layer2/3, up to 5 GRE tunnels IPsec: IKEv1, IKEv2, up to 5 IPsec tunnels
Remote Management	HTTP/HTTPS, Firmware Upgrade, SSHv2 and TELNET Central Management Platform
Application	Additional applications available (max of 5): DNP3, Email notification, AT command, IEC101/104, dynamic routing and many more Modbus Master, Modbus Slave, Modbus ID Mapping, Modbus Gateway IEC101-104, Modbus to DNP3, DNP3 to IEC104, Modbus to SparkplugB, Modbus to LwM2M, M Modbus to IEC104, DLMS Master, DLMS to IEC104, FTP Transfer

Wireless Data Modems – Wireless I/O & Gateway

Interfaces & I/O		RS-485 Base/Repeater Control
Ethernet		1 x WAN, 3 x LAN or 4 x LAN, Auto 10/100Mbps
Network Embedded Protocols:		
Cellular Antenna		2 x SMA Female Diversity switched Main / AUX
GPS Antenna		1x SMA Female
Wi-Fi Antenna		2 x SMA male
Discrete input/ Outputs		Input 2 digital inputs, 2 digital outputs Max voltage 36Vdc, Max current 100mA Isolation 3kVdc or 2kVrms
Terminals IO/RS232/ RS485		Pluggable, push connect terminals Up to 1.5 mm ² (28 - 16 AWG) 300V / 8A
Terminals Supply		Pluggable, push connect terminals Up to 1.5 mm ² (28 - 16 AWG) 300V / 8A
RS-232		2 wire interface (Tx and Rx) Terminal block
RS-485		2 wire data interface (A and B) Terminal block
LEDs		SYS, NET, USR and RSSI
LEDs & Diagnostics		
LED indication		Power/OK, Radio TX/RX/Link, Serial Activity RS-232, RS-485, Digital I/O, analog I/O status, LAN 10/100Mbit Link
Reported Diagnostics		RSSI measurements (dBm), BER connectivity information/statistics, system log file
Network Diagnostics		Diagnostic capture to Wireshark™ format file
Radio Diagnostics		Channel utilization, RSSI measurements (dBm), background noise, connectivity information/statistics available Web/Modbus reg
Connections		
LAN		4x 10/100Base-T auto-MDIX RJ-45
Serial		1 x RS-232, 1 x RS-485 f, 1200–921600 bps, Serial over IP modem support
RS232 V.24 DCE		1.2 to 921.6 Kb/s
RS485		1.2 to 921.6 Kb/s Serial server, PPP, Modbus to Modbus TCP conversion
Power Requirements		
Nominal supply		9-48 Vdc, under/over voltage protection
Battery charger circuit		Sealed lead acid backup battery can be charged by main power supply input, 500 mA charge
Average current draw		100 mA at 12Vdc
Transmit current draw		400 mA at 12 Vdc, 200 mA at 24 Vdc
Connector		3-pin 3.5mm female socket with locking screws
Compliance & Approvals		
EMC		FCC Part 15; EN 301 489-17; AS/NZS CISPR22
RF (radio)		FCC Part 15; EN 301 489-17; AS/NZS CISPR23
Safety		EN/IEC 62368 (RoHS compliant)
Regulatory		Australia: RCM, Europe: CE, USA: FCC, Canada: IC
General Data		
Dimensions mm (in) (H x W x D)		106 x 106 x 40 mm (4.2" x 4.2" x 1.6")
Housing		Sheetmetal powder-coated, IP30
Terminal blocks		Removable, max. conductor 12 AWG 0.1 in2 (2.5 mm2)
Operating Temperature		-40 to +75°C (-40 to +158°F)
Humidity		0–90% RH noncondensing
Mounting		DIN rail mounting
Weight		370g (0.8lb)
Altitude		0-3000m (0-10000ft)
Polution Degree		4
Ordering Data		
Type/Description	Order Number	
WI-MOD-641-4-IOT	2994150000	

u-link Remote Access Service – A tool for all purposes

Advanced features for convenient remote access management

The remote maintenance of machines and systems is often a complex and time-consuming task. On top of that is the demand for a targeted and secure functional connection to the associated IT systems. For many users, these two challenges constitute a major obstacle to the global connection of systems.

u-link guarantees a quick and secure access to machines and plants and, at the same time, allows the efficient management of production plants, user clients, access rights and firmware versions. The intuitive u-link web portal are quick and easy to configure without expert knowledge and can be adapted to specific processes. Secure servers in Europe provide an online platform that ensures conformity between different IT systems when carrying out remote maintenance.



Individual system management

u-link can manage users and groups as well as their access rights according to individual specifications. This includes group assignments and access rights to production systems.



Little configuration effort

Thanks to the intuitive user interface, the devices and clients can be connected easily and without detailed IT knowledge. Thus u-link allows you to quickly network multiple systems.



Secure remote access and remote diagnostics

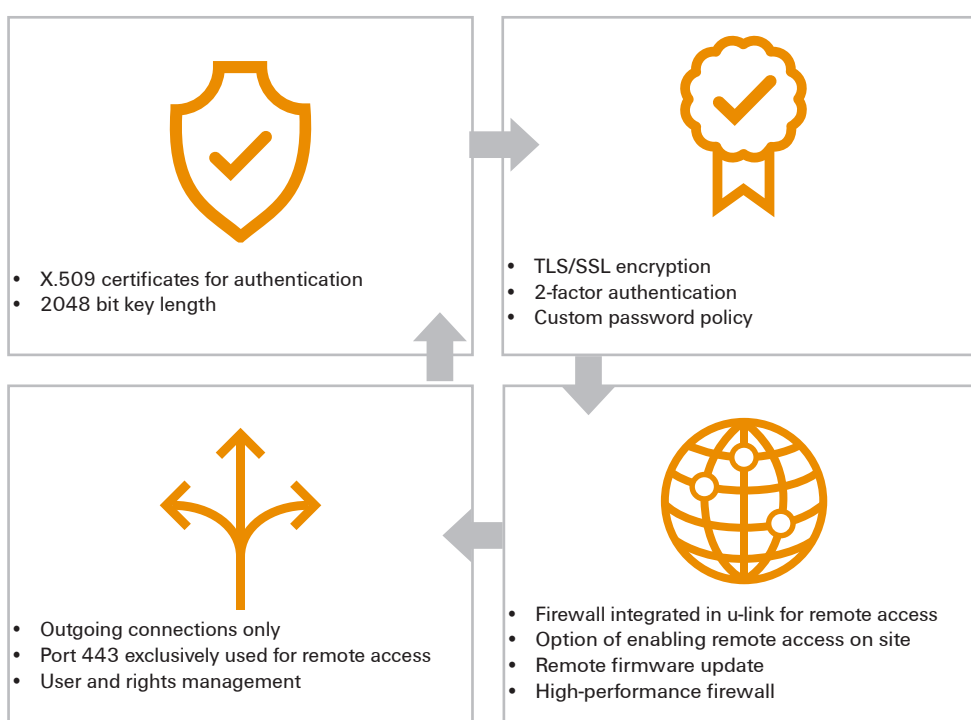
Remote access to machines and systems takes place via a secure VPN connection – worldwide and regardless of location. You have secure access to your systems at all times via the highly available servers.



Condition monitoring and status reporting

Weidmuller Heartbeat can be used to report the availability of a router to u-link. This makes condition monitoring easier and enables status messages of the installed router.

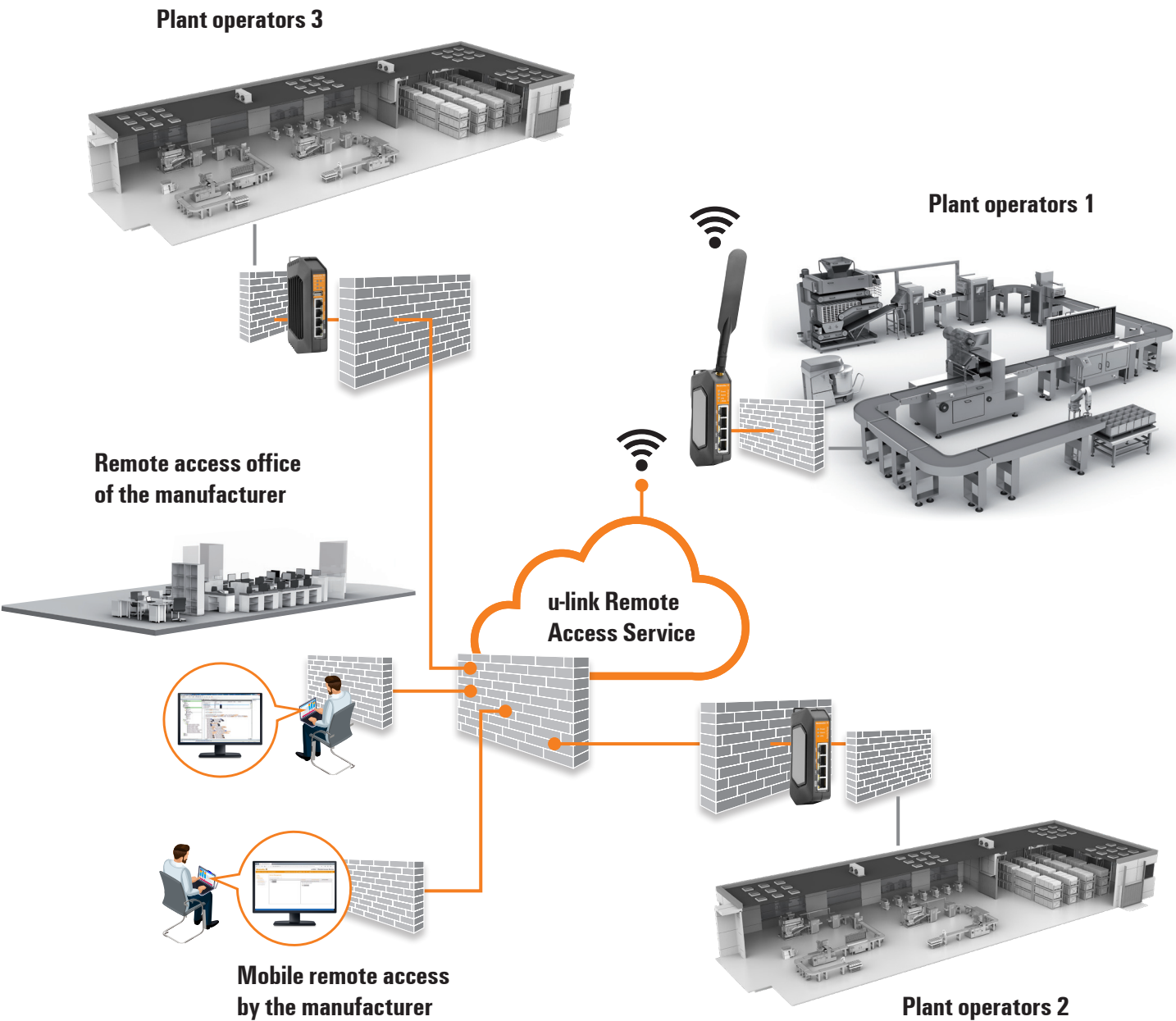
Your security features:



Simple – secure – u-link

The integrated security concept for your networks

The growing number of network-capable devices together with the increasing networking of manufacturing through the Internet provides ample opportunities for cyber attacks. To protect your systems, u-link offers state-of-the-art functions without increasing complexity.



u-link device licenses

- 1-click VPN remote access for service PC's
- easyAccess: web, rdp or vnc connections to remote hosts fully browser based for use with tablet or smartphone
- Organization and Group Management
- Topologies including 3rd party end-devices
- Firmware management: Display of firmware status of all routers and the option of a time-controlled, automated firmware update
- Individual access rights: granular configuration of access rights to devices in the target network
- Extensive event log: Presentation of all activities in the u-link portal with extensive filter and export functions
- Password policy: Increased security through configurable specification of minimum requirements for password quality and validity period



Technical data

Version	
Version	License code for u-link Remote Access Service., Adds additional configurable u-link clients on Weidmuller hardware to the basic license and extends the period of the basic license accordingly.
Function and performance features	
Number of configurable user objects (service PC)	Unrestricted
Number of configurable u-link clients on Weidmuller hardware (access points remote network)	U-LINK-50-DEVICES-1Y: 50 U-LINK-100-DEVICES-1Y: 100 U-LINK-250-DEVICES-1Y: 250 U-LINK-500-DEVICES-1Y: 500 U-LINK-1000-DEVICES-1Y: 1000
Type of 2-factor authentication	E-mail, Google-Authenticator APP, Microsoft Authenticator APP
Type of web-based access (easyAccess)	Local web-server, RDP, VNC server
VPN channel bandwidth	100 Mbit/s
User organisation	Organisation of service users in groups, assignment of selective access rights to device topology, group-dependent assignment of rights re. device configuration and user administration, Self-management of organizations within the framework of organizational rights
Firmware management	Display of the firmware version of all u-link clients and optional, time-controlled, automatic firmware updates (for selected device classes)
Functionality of integrated cloud firewall	Group-based rules for accessing remote networks based on IP, port and protocol
Device management	Illustration of the device infrastructure (remote access objects) in a clearly defined tree structure via location, group and device objects
Simultaneously usable pass-through VPN connections	1 (expandable by booking further pass-through VPN connections)
Period	1 year from activation of the license key or expiry of the existing license. The individual license term is visible during activation.
Monthly data volume and bandwidth	Unlimited (subject to normal market usage)
Usage information	Extended reporting and statistical information (connection reports, usage duration, data volume)
Password guideline	Increased security through configurable specification of minimum requirements for the password quality and validity period
System availability	≥ 99.6%
Note	

System requirements	
Hardware (service PC)	PC with operating system Windows 7, 8 or 10
Hardware, remote target network	Weidmuller hardware with u-link VPN client
Portal administration (user/device configuration)	via Webbrowser (HTTPS), login via username and password
VPN software (service PC)	u-link VPN-client (installation on PC)
Miscellaneous	
Activation	Client account administrator enters the licence key in the u-link portal (functions immediately available)
Included in delivery	Email with license key

Ordering data

Type	Qty.	Order No.
U-LINK-50-DEVICES-1Y		2870090000
U-LINK-100-DEVICES-1Y		2870100000
U-LINK-250-DEVICES-1Y		2870110000
U-LINK-500-DEVICES-1Y		2870120000
U-LINK-1000-DEVICES-1Y		2924220000
U-LINK-1-CONNECTION-1Y		2870130000
U-LINK-1-CONNECTION-1Y		2870130000
U-LINK-CNSERVER-1Y (China)		2870140000

Wireless Accessories



Antennas & Accessories

Wireless Accessories including antennas, jumper cables, hardware, and adapters.



Antennas & Accessories

Antenna Gains

The units dBi and dBd are used to express antenna gains.

dBi (decibel relative to isotropic) The gain of an antenna can be measured relative to an isotropic antenna and is expressed in dBi. An isotropic antenna is a hypothetical antenna that radiates power uniformly in all directions. The gain of an isotropic antenna is 0 dB which means it has no gain or loss.

dBd (decibel relative to dipole) The gain of an antenna can be measured relative to a reference dipole antenna and is expressed in dBd. A reference dipole antenna offers a fixed 2.15 dB of gain over an isotropic antenna.

The following equation represents the relationship between dBi and dBd: $dBi = dBd + 2.15 \text{ dB}$

Types of Antennas

Omni

An omnidirectional antenna sends a signal out equally in all directions around it. Using omnidirectional antennas has the benefit of creating connections in any direction.

Not as much planning to connect with multiple neighbors or buildings. If there is enough signal between nodes, they should connect. The all-direction strength of these antennas comes with the drawback of transmitting a weaker signal. Since the signal is going in all directions, it spreads out and gets weaker with distance very fast. If nodes or clients are far away, they may not connect well.

Cable Considerations

The type of cable selected depends mostly on the length of that cable required and associated cost. Generally, the longer the cable run, the better the cable must be in terms of attenuation but the greater the costs.

Attenuation in this case refers to the degradation of the signal as it travels through the cable. This is usually stated as a loss in dB per 100 feet.

Yagi / Directional

Yagi antennas also known as directional – it sends out a signal in a more focused way.

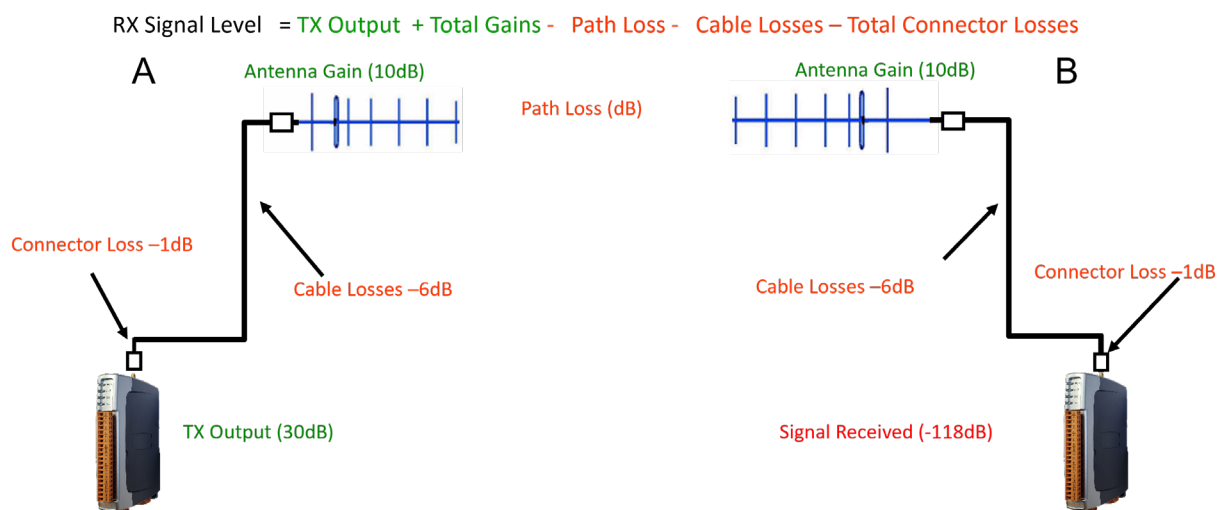
Using directional antennas has the benefit of increasing the distance a signal will travel in one direction, while reducing it in all other directions. Since the signal is all going one way, the power that would be sent out in all directions with omnidirectional nodes is now focused, increasing the power in that direction.

It can also decrease the interference received at the node. There are fewer signals coming into the antenna, since the node is only listening to signals from the direction it is pointing.

However, directional antennas also have the drawback of requiring more planning to create links in your neighborhood. Since you are defining and limiting the areas where wireless signals go, you need to think about how those signals cover your neighborhood.

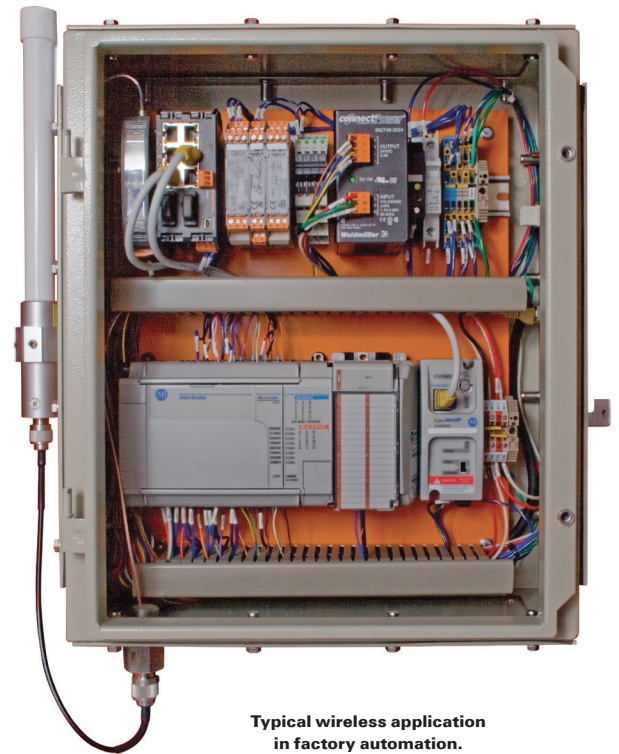
Gains / Losses in a system

The radio and antenna are usually the only two points of gain in an installation. All the connections in-between are a potential loss. Rule of thumb is always to have a NET GAIN while keeping the ERP at each location below the country specific regulatory requirements.

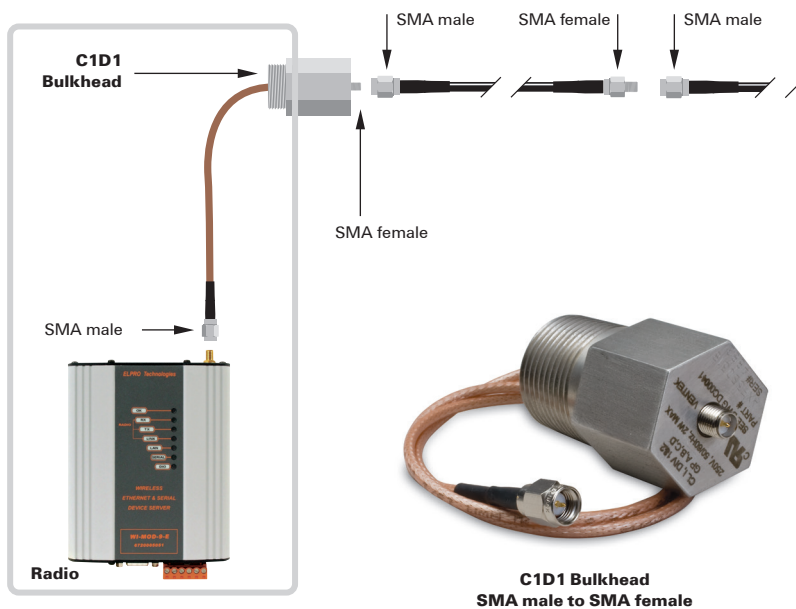


Connection Diagrams

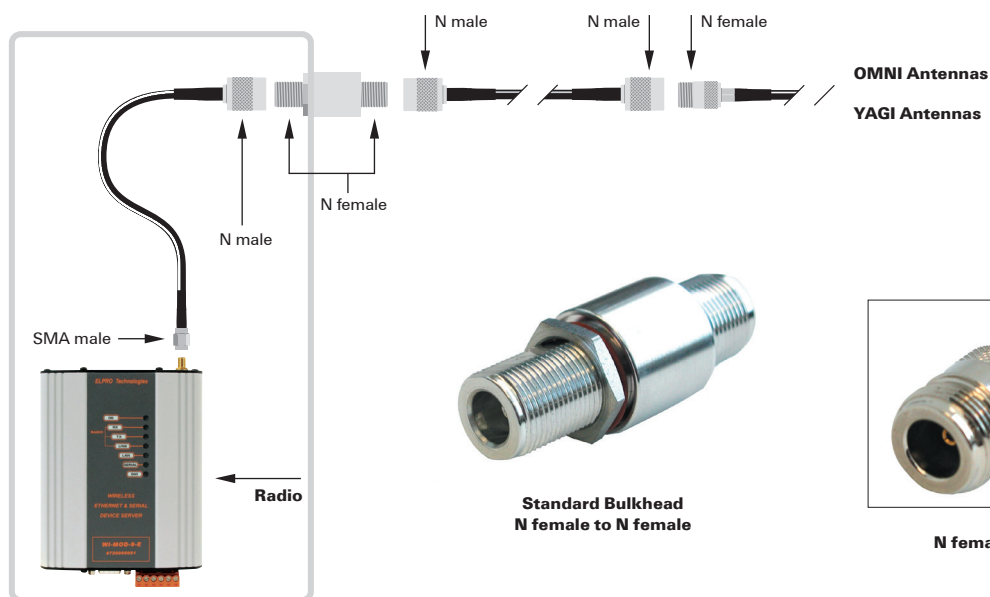
Direct Connect



Enclosure with C1D1 Bulkhead



Enclosure with Standard Bulkhead & Surge Arrestor

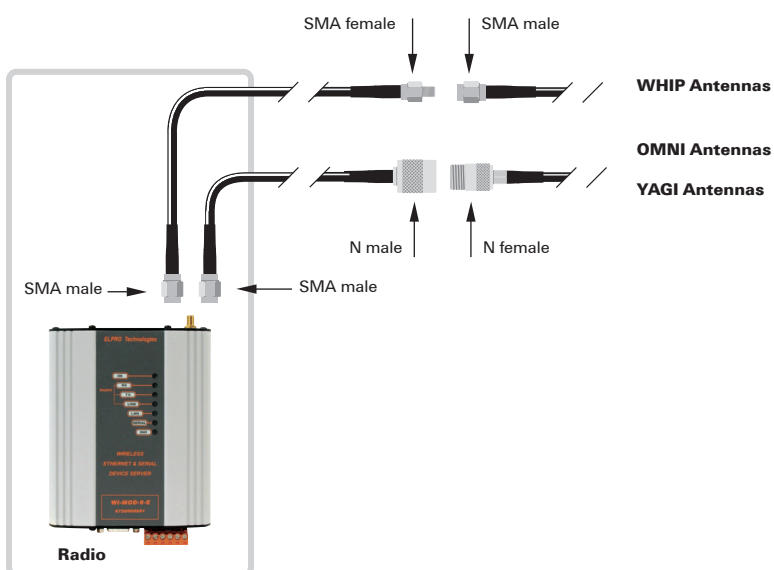


N female



N male

Enclosure without Bulkhead (non-direct)



SMA male



SMA female



N female



N male

Selection Guide

Antennas



Representative Photo



Representative Photo



Representative Photo

100-520 MHz

Gain	Frequency Range	Description	Connector End	Mounting Style	Type	Order Number
-2dBi	400-490	Omni-directional Whip	SMA male	Direct attach	WI-ANT-DEMO-450MHz	3100400000
5dBd	430-470MHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-440MHZ-5DB OMNI NF	8000088443
3dBd	450-460MHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-450MHZ-3DB OMNI NF	8000088444
5dBd	450-460MHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-450MHZ-5DB OMNI NF	8000088445
9dBd	406-440MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-420MHZ-9DBD YAGI NF	8000088439
10dBd	450-470MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-450MHZ-10DBD YAGI NF	8000088440
9dBd	440-490MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-490MHZ-9DBD YAGI NF	8000088446
9dBd	470-512MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-490MHZ-9DBD YAGI NF	8000088441

800-960 MHz

Gain	Frequency Range	Description	Connector End	Mounting Style	Type	Order Number
-2dBi	890-960MHz	Omni-directional Whip	SMA male	Direct attach	WI-ANT-DEMO-900MHz -2dBi SMA	7940100262
2dBi	690-950 MHz, 1.7-3.8 GHz	Omni-directional wideband	SMA male	Direct attach	IE-ANT-CELL-SISO-EO-SMAM	2788130000
0dBi	853-929 MHz	Omni w/molded cable & SMA Conn & Mnt	SMA male with 16.4' (5m) of RG-58 coaxial cable	Mast / pole	WI-ANT-DPL-O-16	7940100258
0dBd	900-930MHz	Omni w/molded cable & SMA Conn & Mnt	SMA male with 3.2' (1m) coaxial cable	Mast / pole	WI-ANT-DPL-DG900-1	7940100261
3dBi	600-950 MHz, 1.7-3.8 GHz	Omni-directional wideband	N-Type Female	Panel Mount	IE-ANT-CELL-SISO-LO-NF	2788150000
3dBi	806-2500MHz	Omni-directional wideband	N-Type Female	Panel Mount	WI-ANT-0.9/2.4GHZ-3/4DBI MOBILE	8000088447
3dBd	902-925MHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-900MHZ-3DB OMNI NF	8000088448
5dBd	902-925MHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-900MHZ-5DB OMNI NF	8000088450
7dBd	902-925MHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-900MHZ-7DB OMNI NF	8000088449
6.5dBd	890-960MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-900MHZ-6.5DB-2"YAGI NF	8000088451
10dBd	890-960MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-900MHZ-10DB-2"YAGI NF	8000088452
12dBd	890-960MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-900MHZ-12DBD-2ft YAGI NF	8000088453
14dBd	890-960MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-890-960 MHZ-14 DBD YAGI NF	8000088454

2.4 GHz Antennas



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1-5.8 GHz

Gain	Frequency Range	Description	Connector End	Mounting Style	Type	Order Number
2dBi	690-950 MHz, 1.7-3.8 GHz	Omni-directional wideband	SMA male	Direct attach	IE-ANT-CELL-SISO-EO-SMAM	2788130000
3dBi	806-2500MHz	Omni w/N-F Conn & Mnt	N-Type Female	Panel Mount	WI-ANT-0.9/2.4GHZ-3/4DBI MOBILE	8000088447
3 dBi, 4 dBi	2.4-2.5 GHz, 4.9-6.425 GHz	Wi-Fi Omni w/N-F Conn & Mnt, Up to Wi-Fi 6 & 6E	N-Type Female	Panel Mount	IE-ANT-WL-DB-SISO-LO-NF	2788110000
3dBi	600-950 MHz, 1.7-3.8 GHz	Omni-directional wideband	N-Type Female	Panel Mount	IE-ANT-CELL-SISO-LO-NF	2788150000
6dBi	2.4-2.5GHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-24GHZ-6DBI OMNI NF	8000088455
8 dBi	2.4-2.5GHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-24GHZ-8DBI OMNI	8000088456
9 dBi	2400 - 2500 MHz, 5150 - 5875 MHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Wall Mount	IE-ANT-P-ABG-75-9-NF	1367140000
10 dBi	2.4-2.5GHz	Omni w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-24GHZ-10DBI OMNI NF	8000088457
12 dBi	2.4-2.5GHz	Directional Yagi w/N-F Conn & Mnt	N-Type Female	Mast / pole	WI-ANT-24GHZ-12DBI YAGI NF	8000132856
1.5 dBi, 0.5 dBi	2.3-2.8 GHz, 4.9-7.125 GHz	Omni MIMO Up to Wi-Fi 6 & 6E w/1m cable attached	2x RP-SMA male	Panel Mount	IE-ANT-WL-DB-MIMO-DO-RPSMAM	2788070000
6 dBi, 5 dBi	2.3-2.8 GHz, 4.9-7.125 GHz	Semi-directional MIMO, Wi-Fi, Wi-Fi 6 & 6E w/ 0.78 m cable attached	4x RP-SMA male	Wall Mount. Needs IE-ANT-MOUNT-PANEL	IE-ANT-WL-DB-MIMO-PD-RPSMAM	2788080000
2.5 dBi, 3-4 dBi	690-950 MHz, 1.7-3.8 GHz, 2.4-2.5 GHz, 4.9-7.125 GHz	Omni MIMO, Cellular, Wi-Fi antenna w/1m cable attached	2x SMA male, 2x RP-SMA male	Panel Mount	IE-ANT-CELL/WL-MB-MIMO-DO	2788090000
2.5 dBi	690-950 MHz, 1.7-3.8 GHz	Omni MIMO, Cellular, Wi-Fi antenna w/1m cable attached	2x SMA male	Panel Mount	IE-ANT-CELL-MIMO-DO-SMAM	2788120000

Antenna Cables



SMA male



SMA male

SMA-Male to SMA-Male

Cable Length (ft)	Cable Length (m)	Connector Type	Cable Type	Product Type	Order Number
1	0.3	SMA Male - SMA Male	Type 195	WI-ACC-TYP195-1FT SMA M-SMA M	8000107662
2	0.6	SMA Male - SMA Male	Type 195	WI-ACC-TYP195-2FT SMA M-SMA M	8000107663
3	0.9	SMA Male - SMA Male	Type 195	WI-ACC-TYP195-3FT SMA M-SMA M	8000107664



SMA male



SMA female

SMA-Male to SMA-Female

Cable Length (ft)	Cable Length (m)	Connector Type	Cable Type	Product Type	Order Number
3.3	1	SMA Male - SMA Female	Type 195	IE-CC-SMAM-SMAF-1M	2787920000
9.8	3	SMA Male - SMA Female	Type 195	IE-CC-SMAM-SMAF-3M	2787930000
16.4	5	SMA Male - SMA Female	Type 195	IE-CC-SMAM-SMAF-5M	2787940000



SMA male



N male



SMA-Male to N-Male

Cable Length (ft)	Cable Length (m)	Connector Type	Cable Type	Product Type	Order Number
1	0.3	SMA Male - N Male	Type 195	WI-ACC-TYP195-1FT SMA M-NM	8000118128
2	0.6	SMA Male - N Male	Type 195	WI-ACC-TYP195-2FT SMA M-NM	8000118129
3	0.9	SMA Male - N Male	Type 195	WI-ACC-TYP195-3FT SMA M-NM	8000118130
3.3	1	SMA Male - N Male	Type 195	IE-CC-NM-SMAM-1M	2788010000
9.8	3	SMA Male - N Male	Type 195	IE-CC-NM-SMAM-3M	2788020000
16.4	5	SMA Male - N Male	Type 195	IE-CC-NM-SMAM-5M	2788030000
6.6	2	SMA Male - N Male	PFP 400	IE-CC-NM-SMAM-2M	1491180000
10	3	SMA Male - N Male	PFP 400	WI-ACC-TYP400-10FT SMA M-NM	8000118131
13.1	4	SMA Male - N Male	PFP 400	IE-CC-NM-SMAM-4M	1491190000
19.7	6	SMA Male - N Male	PFP 400	IE-CC-NM-SMAM-6M	1491210000
25	7.6	SMA Male - N Male	PFP 400	WI-ACC-TYP400-25FT SMA M-NM	8000118132
40	12	SMA Male - N Male	PFP 400	WI-ACC-TYP400-40FT SMA M-NM	8000118133

N-Male to N-Male

Cable Length (ft)	Cable Length (m)	Connector Type	Cable Type	Product Type	Order Number
1	0.3	N-Male to N-Male	Type 195	WI-ACC-TYP195-1FT NM-NM	8000118134
2	0.6	N-Male to N-Male	Type 195	WI-ACC-TYP195-2FT NM-NM	8000118135
3	0.9	N-Male to N-Male	Type 195	WI-ACC-TYP195-3FT NM-NM	8000118136
10	3	N-Male to N-Male	PFP 400	WI-ACC-TYP400-10FT NM-NM	8000118137
25	7.6	N-Male to N-Male	PFP 400	WI-ACC-TYP400-25FT NM-NM	8000118138
40	12	N-Male to N-Male	PFP 400	WI-ACC-TYP400-40FT NM-NM	8000118139
55	16.7	N-Male to N-Male	PFP 400	WI-ACC-TYP400-55FT NM-NM	8000118140
75	22.8	N-Male to N-Male	PFP 400	WI-ACC-TYP400-75FT NM-NM	8000118141
100	30.5	N-Male to N-Male	PFP 400	WI-ACC-TYP400-100FT NM-NM	8000118142
200	60.9	N-Male to N-Male	PFP 400	WI-ACC-TYP600-200FT NM-NM	8000118143

Reverse Polarity SMA Male to Reverse Polarity SMA Female

Cable Length (ft)	Cable Length (m)	Connector Type	Cable Type	Product Type	Order Number
3.3	1	RPSMA-Male to RPSMA-Female	Type 195	IE-CC-RPSMAM-RPSMAF-1M	2787950000
9.8	3	RPSMA-Male to RPSMA-Female	Type 195	IE-CC-RPSMAM-RPSMAF-3M	2787960000
16.4	5	RPSMA-Male to RPSMA-Female	Type 195	E-CC-RPSMAM-RPSMAF-5M	2787970000

N-Type Male to Reverse Polarity SMA Male

Cable Length (ft)	Cable Length (m)	Connector Type	Cable Type	Product Type	Order Number
3.3	1	N-Type Male to RPSMA-Male	PFP 400	IE-CC-NM-RPSMAM-1M	2788040000
6.6	2	N-Type Male to RPSMA-Male	PFP 400	IE-CC-NM-RPSMAM-2M	1367110000
9.8	3	N-Type Male to RPSMA-Male	PFP 400	IE-CC-NM-RPSMAM-3M	2788050000
13.1	4	N-Type Male to RPSMA-Male	PFP 400	IE-CC-NM-RPSMAM-4M	1367100000
16.4	5	N-Type Male to RPSMA-Male	PFP 400	IE-CC-NM-RPSMAM-5M	2788060000

Antennas

**WI-ANT-0.9/2.4GHZ-3/4DB
MOBILE**

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**WI-ANT-24GHZ-6DB
OMNI NF**

Representative Photo

**WI-ANT-24GHZ-8DB
OMNI NF**

Representative Photo

Technical Data

Maximum Power	100 watts	25 watts	25 watts
Polarization	Vertical	Vertical	Vertical
Nominal Impedance	50 ohms	50 ohms	50 ohms
VSWR across the band	< 2.0:1	< 1.5:1	< 1.5:1
Radome Material	PVC	UV resistant pultruded fiberglass	UV resistant pultruded fiberglass
Termination	Determined by Thru-panel base	N female	N female
Mounting Base Diameter	Compatible with most 1-1/8" - 18 thread mounts, including 3/4" hole mounts	1.25"	1.25"
Electrical Specifications			
Frequency Range	902-928 MHz / 2400-2500 MHz	2.4 - 2.48 GHz	2.4 - 2.48 GHz
Gain	4 dBi	6 dBi	8 dBi
Half Power Vertical Beamwidth		20°	13°
Mechanical Specifications			
Antenna Type	Low Profile Whipless	Omni	Omni
Connector Type	N Female	N female	N female
Antenna Height	2.4" (60.9 mm)	11.6" (294.6 mm)	20.2" 513.1 mm)
Bending Moment at Rated Wind		1.4 ft-lbs	4.4 ft-lbs
Max wind load @ rated velocity		3.0 lbs	5.2 lbs
Equivalent Flat Plate Area	1.5" OD	.04 ft ²	.06 ft ²
Rated Wind		125 mph	125 mph
Weight lbs (kg)	0.29 (0.13)	0.38 (0.172)	0.50 (0.226)
Temperature Range	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C

Ordering Data

Type	Order Number	Type	Order Number	Type	Order Number
WI-ANT-0.9/ 2.4GHZ-3/4DB MOBILE	8000088447	WI-ANT-24GHZ-6DB OMNI NF	8000088455	WI-ANT-24GHZ-8DB OMNI NF	8000088456

Antennas

WI-ANT-24GHZ-10DB
OMNI NF



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WI-ANT-24GHZ-10DBI
OMNI NF



Representative Photo

Technical Data

Maximum Power	25 watts	5 watts 50 watts
Polarization	Vertical	Horizontal or vertical
Nominal Impedance	50 ohms	50 ohms
VSWR across the band	< 1.5:1	<2.0:1 avg.
Radome Material	UV resistant pultruded fiberglass	UV-inhibited Polymer (UL94HB)
Cable Length and type		12" coax cable
Termination	N female	N female
Mounting Base Diameter	1.25"	
Mounting Method		Heavy duty outdoor adjustable
Electrical Specifications		
Frequency Range	2.4 - 2.48 GHz	2.4 - 2.485 GHz
Gain	10 dBi	12 dBi
Half Power Horizontal Beamwidth		30°
Half Power Vertical Beamwidth	9°	30°
Front to Back Ratio		>30 dB
Mechanical Specifications		
Antenna Type	Omni	Directional Yagi
Connector Type	N female	N female
Dimensions		11.2" x 3.0" diameter
Antenna Height	36.0" (914.4 mm)	
Bending Moment at Rated Wind	14.7 ft-lbs	
Max Wind Load @ Rated Velocity	10.1 lbs	11lbf @ 125 mph
Equivalent Flat Plate Area	.11 ft2	0.20 ft2
Rated Wind	125 mph	125 mph
Weight lbs (kg)	0.65 (0.295)	1.3 (0.59)
Temperature Range	-40°C to +70°C	20°C to +60°C

Ordering Data

Type	Order Number	Type	Order Number
WI-ANT-24GHZ-10DB OMNI NF	8000088457	WI-ANT-2.4GHZ-12DBI YAGI NF	8000132856

Antennas

IE-ANT-WL-DB-MIMO-DO-RPSMAM



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WI-ANT-GSM-STUB-2DB LP



Representative Photo

IE-ANT-CELL/WL-MB-MIMO-DO



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Technical Data

Maximum Power	25 Watts	8 Watts	50 Watts
Polarization	Vertical	+/- 45° linear	Vertical Linear
Nominal Impedence	50 Ω	50 Ω	50 Ω
VSWR across the band	< 2.0 typical, 2.5 max.	< 2.5:1	< 2.0 typical, 3.5 max
Radome Material	UV- stable rugged thermoplastics (IP67)	UV- stable rugged thermoplastics (IP67)	UV- stable rugged thermoplastics (IP67)
Termination	1 m cable 2x RP-SMA male	0.78m cable 4x RP-SMA male	1 m cable 2x SMA + 2x RP-SMA male
Mounting Base Diameter	134x67x24mm (25.4 mm hole diameter)	173.7mm x 173.7mm (Ø5 x 35 mm) or pole mount with 2789830000 IE-ANT-MOUNT-PANEL	134x90x24mm (25.4 mm hole diameter)
Electrical Specifications			
Frequency Range	2.3-2.8 GHz, 4.9-7.125 GHz	2.3-2.8 GHz, 4.9-7.125 GHz	690-950 MHz, 1.7-3.8 GHz, 2.4-2.5 GHz, 4.9-7.125 GHz
Gain	1.5 dBi, 0.5 dBi	6 dBi, 5 dBi	2.5 dBi, 3-4 dBi
Version	MIMO 2 antenna elements	MIMO 4x4	MIMO
Mechanical Specifications			
Antenna Type (Radiation)	Omni-directional antenna, Wi-Fi antenna, Up to Wi-Fi 6 & 6E	Semi-directional antenna, Wi-Fi antenna, Up to Wi-Fi 6 & 6E (IEEE802.11ax)	Omni-directional antenna, Cellular antenna, Wi-Fi antenna, Up to 5G (NR), Up to Wi-Fi 6 & 6E
Connector Type	2x RP-SMA male	4x RG-316 RP-SMA male	Pro-Flex™ Plus 195 2x Male SMA + 2x RP-SMA male
Antenna Dimensions	134 x 67 x 24 mm	1.339 x 73795 x 7.795" (34 x 198 x 198mm)	90 x 132 mm (3.543" H)
Equivalent Flat Plate Area	1.5" OD	No Ground Plane Required	No Ground Plane Required
Weight lbs (kg)	0.29 (0.13)	1.0 (0.45)	1.4 (0.627)
Temperature Range	-40 °C...80 °C	-40 to +70°C	-40 °C...85 °C
Ratd Wind		125 mph	

Ordering Data

Type	Order Number	Type	Order Number	Type	Order Number
IE-ANT-WL-DB-MIMO-DO-RPSMAM	2788070000	IE-ANT-WL-DB-MIMO-PD-RPSMAM	2788080000	IE-ANT-CELL/WL-MB-MIMO-DO	2788090000

Antennas

IE-ANT-CELL-MIMO-DO-SMAM



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IE-ANT-P-ABG-75-9-NF



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IE-ANT-CELL-SISO-LO-NF



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Technical Data

Maximum Power	50 W		150 Watts
Polarization	Vertical, Linear	Vertical, Linear	Vertical Linear
Nominal Impedence	50 Ω	50 Ω	50 Ω
VSWR across the band	< 2.0 typical, 3.0 max.	< 2.0:1	< 2.0:1 (40 MHz)
Radome Material	PVC IP67	PVC (IP67)	PVC IP67
Termination	1m 2x SMA male	1x N-type female, bottom	N Female
Mounting Base Diameter	100x119x24mm (25.4 mm hole diameter)	2x $\varnothing$ 6mm holes with supplied bracket	'Compatible with most 1-1/8" - 18 thread mounts, including 3/4" hole mounts
Electrical Specifications			
Frequency Range	690-950 MHz, 1.7-3.8 GHz	Band 1: 2400 - 2500 (MHz), Band 2: 5150 - 5875 (MHz)	690-950 MHz, 1.7-3.8 GHz
Gain	2.5 dBi	9dBi	3 dBi
Version	MIMO 2x2		
Half Power Vertical Beamwidth			75o
Mechanical Specifications			
Antenna Type (Radiation)	Omni-directional antenna, Cellular antenna, Up to 5G (NR)	Directional antenna, Dual Band (2.4 GHz / 5 GHz)	Omni
Connector Type	Pro-Flex™ Plus 195 2x Male SMA	1x N-type female, bottom	N Female
Antenna Dimensions	119 x 100 x 88 mm (3.937" H)	3.15 x 3.976 x 1.378mm (80 x 101 x 35")	
Equivalent Flat Plate Area	No Ground Plane Required	1.5" (36 mm)	0.44ft ²
Weight lbs (kg)	1.54 (0.700)	0.3 (0.135)	
Temperature Range	-40 °C...85 °C	-40 °C...80 °C	-40 to +75 deg C
Rated Wind		160 Km/h	99 mph
Antenna Height			35.8 x 89 mm
Bending Moment at Rated Wind			62.5 ft-lbs
Max Wind Load @ Rated Velocity			15.8 lbs

Ordering Data

Type	Order Number	Type	Order Number	Type	Order Number
IE-ANT-CELL-MIMO-DO-SMAM	2788120000	IE-ANT-P-ABG-75-9-NF	1367140000	IE-ANT-CELL-SISO-LO-NF	2788150000

Antennas

WI-ANT-DPL-0-16

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WI-ANT-0.9/2.4GHZ-3/4DB MOBILE

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WI-ANT-DEMO-900MHZ-2dBi SMA

Representative Photo

Technical Data

Maximum Power	10 watts	100 watts	10 Watts
Polarization	Vertical	Vertical	Vertical
Nominal Impedance	50 ohms	50 ohms	50 Ω
VSWR across the band	<1.5: 1	< 2.0:1	< 1.5:1
Radome Material	Fiberglass	PVC	PVC (IP66)
Termination	SMA male	Determined by thru-panel base	SMA male 1m (3.2') cable
Mounting Base Diameter		Compatible with most 1-1/8" - 18 thread mounts, including 3/4" hole mounts	

Electrical Specifications

Frequency Range	853-930 MHz	902-928 MHz / 2400-2500 MHz	900-930MHz
Gain	0 dBi	3 dBi	-2dBi
Half Power Vertical Beamwidth			

Mechanical Specifications

Antenna Type	Half wave dipole	Low Profile Whipless	Omni directional
Connector Type	SMA male	N Female	SMA male
Antenna Height	16" (40 cm)	2.4"	150mm (6")
Bending Moment at Rated Wind			
Max Wind Load @ Rated Velocity			
Equivalent Flat Plate Area		1.5" OD	
Rated Wind			
Weight lbs (kg)	0.5 (0.2)	0.29 (0.13)	0.22 lbs (0.1kg)
Temperature Range		-40°C to +70°C	-40 to +70°C

Ordering Data

Type	Order Number	Type	Order Number	Type	Order Number
WI-ANT-DPL-0-16	7940100258	WI-ANT-900MHZ-3DB STUB MAG	8000088447	WI-ANT-DEMO-900MHZ-2dBi SMA	7940100262

Antennas

WI-ANT-900MHZ-3DBD
OMNI NF



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WI-ANT-900MHZ-5DBD
OMNI NF



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WI-ANT-900MHZ-7DBD
OMNI NF



Representative Photo

Technical Data

Maximum Power	150 watts	150 watts	150 watts
Polarization	Vertical	Vertical	Vertical
Nominal Impedance	50 ohms	50 ohms	50 ohms
VSWR across the band			
Radome Material	Fiberglass	Fiberglass	Fiberglass
Termination	N female	N female	N female
Mounting Base Diameter	1-5/16"	1-5/16"	1-5/16"
Electrical Specifications			
Frequency Range	902-928 MHz	902-928 MHz	902-928 MHz
Gain	3 dB	5 dB	7 dB
Half Power Vertical Beamwidth	40°	22°	17°
Mechanical Specifications			
Antenna Type	Omni	Omni	Omni
Connector Type	N female	N female	N female
Antenna Height	23.25" (59.1 cm)	48" (121.9 cm)	96" (243.8 cm)
Bending Moment at Rated Wind	4.7 ft-lbs	14.2 ft-lbs	62.5 ft-lbs
Max Wind Load @ Rated Velocity	4.3 lbs	8.0 lbs	15.8 lbs
Equivalent Flat Plate Area	0.12 ft²	0.22 ft²	0.44 ft²
Rated Wind	100 mph	100 mph	100 mph
Weight lbs (kg)	1.25 (0.57)	1.75 (0.79)	4 (1.81)
Temperature Range	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C

Ordering Data

Type	Order Number	Type	Order Number	Type	Order Number
WI-ANT-900MHZ-3DBD OMNI NF	8000088448	WI-ANT-900MHZ-5DBD OMNI NF	8000088450	WI-ANT-900MHZ-7DBD OMNI NF	8000088449

Antennas

WI-ANT-900MHZ-6.5DB-2' YAGI NF



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WI-ANT-900MHZ-10DB-2' YAGI NF



Representative Photo

Technical Data

Maximum Power	200 watts	200 watts
Polarization	Linear	Linear
Nominal Impedance	50 ohms	50 ohms
VSWR Across the band	<1.5:1	<1.5:1
Radome Material	Aluminum 6061-T6	Aluminum 6061-T6
Termination	N female	N female
Mounting Method	Includes mounting hardware	Includes mounting hardware
Electrical Specifications		
Frequency Range	890-960 MHz	890-960 MHz
Gain	6.5 dBd	10 dBd
Half Power Horizontal Beamwidth	100°	56°
Half Power Vertical Beamwidth	62°	62°
Front to Back Ratio	>15 dB	>20 dB
Mechanical Specifications		
Antenna Type	Directional Yagi	Directional Yagi
Antenna Dimensions (L x W)	13" x 6.8"	24" x 6.8"
Weight lbs (kg)	2 (0.9)	6.8 (3.08)
Cross Sectional Area	0.12 ft ²	0.24 ft ²
Max Wind Load @ Rated Velocity	3 lbf	6 lbf
Rated Wind	125 mph	125 mph
Elements	3	7
Cable Type	RG213	RG213
Cable Length	2 ft.	2 ft.
Connector Type	N female	N female
Temperature Range	-40°C to +70°C	-40°C to +70°C

Ordering Data

Type	Order Number	Type	Order Number
WI-ANT-900MHZ-6.5DB-2' YAGI NF	8000088451	WI-ANT-900MHZ-10DB-2' YAGI NF	8000088452

Antennas

WI-ANT-900MHZ-12DB-2' YAGI NF

WI-ANT-900MHZ-14DB-2' YAGI NF



Representative Photo



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Technical Data

Maximum Power	200 watts	200 watts
Polarization	Linear	Linear
Nominal Impedance	50 ohms	50 ohms
VSWR Across the band	<1.5:1	<1.5:1
Radome Material	Aluminum 6061-T6	Aluminum 6061-T6
Termination	N female	N female
Mounting Method	Includes mounting hardware	Includes mounting hardware
Electrical Specifications		
Frequency Range	890-960 MHz	890-960 MHz
Gain	12 dBd	14 dBd
Half Power Horizontal Beamwidth	40°	32°
Half Power Vertical Beamwidth	34°	26°
Front to Back Ratio	>20 dB	>25 dB
Mechanical Specifications		
Antenna Type	Directional Yagi	Directional Yagi
Antenna Dimensions (L x W)	37" x 6.6"	63" x 6.6"
Weight lbs (kg)	2.5 (1.3)	3.5 (1.58)
Cross Sectional Area	0.35 ft ²	0.67 ft ²
Max wind load @ rated velocity	8.75 lbf	16.75 lbf
Rated Wind	125 mph	125 mph
Elements	11	18
Cable Type	RG213	RG213
Cable Length	2 ft.	2 ft.
Connector Type	N female	N female
Temperature Range	-40°C to +70°C	-40°C to +70°C

Ordering Data

Type	Order Number	Type	Order Number
WI-ANT-900MHZ-12DB-2' YAGI NF	8000088453	WI-ANT-900MHZ-14DB-2' YAGI NF	8000088454

Antennas–
300-500 MHz

WI-ANT-440MHZ-5DB
OMNI NF



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WI-ANT-450MHZ-3DB
OMNI NF



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WI-ANT-450MHZ-5DB
OMNI NF



Representative Photo

Technical Data

Maximum Power	250 Watts	250 Watts	250 Watts
Polarization	Vertical Linear	Vertical Linear	Vertical Linear
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR across the band	<1.5:1 (70 MHz)	<1.5:1 (10 MHz)	<1.5:1 (10 MHz)
Radome Material	2.0" OD pultruded white fiberglass	Pultruded white fiberglass	Pultruded white fiberglass
Termination	N Female	N Female	N Female
Mounting Base Diameter	1-5/16"	1-5/16"	1-5/16"
Electrical Specifications			
Frequency Range	430-470 MHz	450-460 MHz	450-460 MHz
Gain	5 dBd (7 dBi)	3 dBd	5 dBd
Half Power Vertical Beamwidth	18°	38°	27°
Mechanical Specifications			
Antenna Type	Omni	Omni	Omni
Connector Type	N Female	N Female	N Female
Antenna Height	83"	71"	77"
Bending Moment at Rated Wind	250 ft-lbs	29.0 ft-lbs	40.4 ft-lbs
Max Wind Load @ Rated Velocity	45 lbs	10.8 lbs	12.6 lbs
Equivalent Flat Plate Area	1.125 ft ²	0.30 ft ²	0.35 ft ²
Rated Wind	125 mph	100 mph	100 mph
Weight lbs (kg)	7.0 lbs	4.0 lbs	4.50 lbs
Temperature Range	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C

Ordering Data

Type	Order Number	Type	Order Number	Type	Order Number
WI-ANT-440MHZ-5DB OMNI NF	8000088443	WI-ANT-450MHZ-3DB OMNI NF	8000088444	WI-ANT-450MHZ-5DB OMNI NF	8000088445

Antennas–
300-500 MHzWI-ANT-420Mhz-
9DBD YAGI NF

Representative Photo

WI-ANT-DEMO-
450MHz

Representative Photo

Technical Data

Maximum Power	150 Watts	250 Watts
Polarization	Linear	Vertical Linear
Nominal Impedance	50 Ohms	50 Ω
VSWR across the band	<1.5:1 (34 MHz)	< 1.5:1 (70 MHz)
Radome Material	3/8" solid 6061-T6 aluminum	PC+PBT
Termination	N Female	SMA(M)
Mounting Pipe Diameter	1.9" OD	Direct Attach
Electrical Specifications		
Frequency Range	406-440 MHz	440-510MHz
Gain	9 dBd	Unity
Half Power Vertical Beamwidth	45°	70°
Half Power Horizontal Beamwidth	52°	
Front to Back Ratio	> 15 dB	
Mechanical Specifications		
Antenna Type	Directional Yagi	Omni
Connector Type	N Female	SMA(M)
Antenna Length (Boom OD)	34" (.75")	13 x 198mm
Number of Elements	5	
Bending Moment at Rated Wind	32.4 ft-lbs	90°
Max wind load @ rated velocity	24.2 lbs	
Equivalent Flat Plate Area	0.31 ft²	
Rated Wind	125 mph	
Weight lbs (kg)	2 lbs	0.05 lbs (0.23)
Temperature Range	-40°C to +70°C	-40°C - +85°C

Ordering Data

	Type	Order Number	Type	Order Number
	WI-ANT-420Mhz-9DBD YAGI NF	8000088439	WI-ANT-DEMO-450MHz	3100400000

Antennas– 300-500 MHz

WI-ANT-470MHz-9DBD YAGI NF



Representative Photo

WI-ANT-450MHZ- 10DB YAGI



Representative Photo

WI-ANT-470MHz-9DBD YAGI NF



Representative Photo

Technical Data

Maximum Power	150 Watts	250 Watts	150 Watts
Polarization	Linear	Linear	Linear
Nominal Impedance	50 Ohms	50 Ohms	50 Ohms
VSWR across the band	<1.5:1 (40 MHz)	<1.5:1 (70 MHz)	<1.5:1 (40 MHz)
Radome Material	3/8" solid 6061-T6 aluminum	3/8" solid 6061-T6 aluminum	3/8" solid 6061-T6 aluminum
Termination	N Female	N Female	N Female
Mounting Pipe Diameter	1.9" OD	1.9" OD	1.9" OD
Electrical Specifications			
Frequency Range	440-480 MHz	450-470 MHz	470-512 MHz
Gain	9 dBd	10 dBd	9 dBd
Half Power Vertical Beamwidth	45°	45°	45°
Half Power Horizontal Beamwidth	52°	0°	52°
Front to Back Ratio	> 15 dB	> 20 dB	> 15 dB
Mechanical Specifications			
Antenna Type	Directional Yagi	Directional Yagi	Directional Yagi
Connector Type	N Female	N Female	N Female
Antenna Length (Boom OD)	34" (.75")	42" x 11.8"	34" (.75")
Number of Elements	5	7	5
Bending Moment at Rated Wind	32.4 ft-lbs	250 ft-lbs	32.4 ft-lbs
Max wind load @ rated velocity	24.2 lbs	11.5 lbs	24.2 lbs
Equivalent Flat Plate Area	0.31 ft ²	0.46 ft ²	0.31 ft ²
Rated Wind	125 mph	150 mph	125 mph
Weight lbs (kg)	2 lbs	3 lbs (1.36kg)	2 lbs
Temperature Range	-40°C to +70°C	-40°C to +70°C	-40°C to +70°C

Ordering Data

Type	Order Number	Type	Order Number	Type	Order Number
WI-ANT-470MHz-9DBD YAGI NF	8000088440	WI-ANT-490MHz-9DBD YAGI NF	8000088446	WI-ANT-490MHz-9DBD YAGI NF	8000088441

Cables

- Impedance:
50 ohms
- Foamed
Polyethylene
- 100% Bonded
Aluminum Foil
- Tinned Copper
Braid - CuSn
- Flame-retardant
PVC
- Polyethylene Jacket

PFP195



PFP400



PFP600



Technical Data

Electrical Specifications			
Cutoff Frequency	41 GHz	16.2 GHz	10.3 GHz
Velocity of Propagation	80%	85%	87%
Dielectric Constant	1.56	1.38	1.32
Time Delay nS/ft (nS/m)	1.27 (4.17)	1.20 (3.92)	1.17 (3.83)
Impedance	50 ohms	50 ohms	50 Ohms
Capacitance (pF/m)	79.7	78.4	76.8
Inductance uH/ft (uH/m)	0.064 (0.21)	0.060 (0.20)	0.058 (0.19)
Shielding Effectiveness	>90 dB	>90 dB	>90 dB
DC Resistance:			
Inner Conductor ohms/ 1000ft (/km)	7.6 (24.9)	1.39 (4.6)	0.53 (1.7)
Outer Conductor ohms/ 1000ft (/km)	4.9 (16.1)	1.65 (5.4)	1.2 (3.9)
Voltage Withstand	1000 VDC	2500 VDC	4000 VDC
Jacket Spark	3000 Vrms	8000 Vrms	8000 Vrms
Peak Power	2.5 kW	16 kW	40 kW
Mechanical Specifications			
Bend Radius: installation in. (mm)	0.5 (12.7)	1.00 (25.4)	1.50 (38.1)
Bend Radius: repeated in. (mm)	2.0 (50.8)	4.0 (101.6)	6.0 (152.4)
Bending Moment ft-lb (N-m)	0.2 (0.27)	0.5 (0.68)	2.75 (3.73)
Weight lb/ft (kg/m)	0.021 (0.03)	0.068 (0.10)	0.131 (0.20)
Tensile Strength lb (kg)	40 (18.2)	160 (72.6)	350 (158.9)
Flat Plate Crush lb/in. (kg/mm)	15 (0.27)	40 (0.71)	60 (1.07)
Center Conductor (mm)	0.94 Solid BC	2.74 Solid CCA	4.47 Solid CCA
Insulation (mm)	2.8	7.24	11.56
Binder	Bonded Aluminum Foil	Bonded Aluminum Foil	Bonded Aluminum Foil
Shield (mm)	0.11 x 112 CuSn	0.15 x 192 CuSn	0.18 x 240 CuSn
Insulation Jacket (mm)	4.95	10.29	14.99
Environmental Specifications			
Installation Temperature Range	-40° to +185° F / -40° to +85° C	-40° to +185° F / -40° to +85° C	-40° to +185° F / -40° to +85° C
Storage Temperature Range	-94° to +185° F / -70° to +85° C	-94° to +185° F / -70° to +85° C	-94° to +185° F / -70° to +85° C
Operating Temperature Range	-40° to +185° F / -40° to +85° C	-40° to +185° F / -40° to +85° C	-40° to +185° F / -40° to +85° C

Cable lengths and part numbers on page 78.

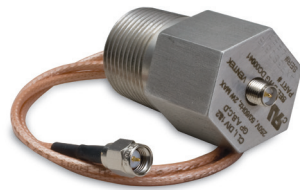
Cable Length (ft)	Cable Length (m)	Cable Type	Product Type	Order Number	Calculated Assembly Insertion Loss dB			
					400MHz	800/90MHz	2.4GHz	5.8GHz
1	0.3	Type 195	WI-ACC-TYP195-1FT SMA M-SMA M	8000107662	0.1	0.1	0.2	0.34
2	0.6	Type 195	WI-ACC-TYP195-2FT SMA M-SMA M	8000107663	0.2	0.2	0.4	0.68
3	0.9	Type 195	WI-ACC-TYP195-3FT SMA M-SMA M	8000107664	0.3	0.3	0.6	1.02
3.3	1	Type 195	IE-CC-SMAM-SMAF-1M	2787920000	0.3	0.5	0.8	1.2
9.8	3	Type 195	IE-CC-SMAM-SMAF-3M	2787930000	0.8	1.3	2.1	3.4
16.4	5	Type 195	IE-CC-SMAM-SMAF-5M	2787940000	1.4	2.1	3.5	5.6
1	0.3	Type 195	WI-ACC-TYP195-1FT SMA M-NM	8000118128	0.1	0.1	0.2	0.34
2	0.6	Type 195	WI-ACC-TYP195-2FT SMA M-NM	8000118129	0.2	0.2	0.4	0.68
3	0.9	Type 195	WI-ACC-TYP195-3FT SMA M-NM	8000118130	0.3	0.4	0.6	1.1
3.3	1	Type 195	IE-CC-NM-SMAM-1M	2788010000	0.3	0.5	0.8	1.2
9.8	3	Type 195	IE-CC-NM-SMAM-3M	2788020000	0.8	1.3	2.1	3.4
16.4	5	Type 195	IE-CC-NM-SMAM-5M	2788030000	1.4	2.1	3.5	5.6
6.6	2	PFP 400	IE-CC-NM-SMAM-2M	1491180000	0.2	0.3	0.6	1.1
10	3	PFP 400	WI-ACC-TYP400-10FT SMA M-NM	8000118131	0.3	0.5	1	3.4
13.1	4	PFP 400	IE-CC-NM-SMAM-4M	1491190000	0.4	0.6	1.1	1.8
19.7	6	PFP 400	IE-CC-NM-SMAM-6M	1491210000	0.6	0.9	1.5	2.5
25	7.6	PFP 400	WI-ACC-TYP400-25FT SMA M-NM	8000118132	0.7	2.8	1.9	8.16
40	12	PFP 400	WI-ACC-TYP400-40FT SMA M-NM	8000118133	1.2	4.5	3	6
1	0.3	Type 195	WI-ACC-TYP195-1FT NM-NM	8000118134	0.1	0.1	0.2	0.2
2	0.6	Type 195	WI-ACC-TYP195-2FT NM-NM	8000118135	0.2	0.2	0.4	0.4
3	0.9	Type 195	WI-ACC-TYP195-3FT NM-NM	8000118136	0.3	0.3	0.6	0.6
10	3	PFP 400	WI-ACC-TYP400-10FT NM-NM	8000118137	0.3	0.4	0.7	1.5
25	7.6	PFP 400	WI-ACC-TYP400-25FT NM-NM	8000118138	0.7	1	1.7	3.2
40	12	PFP 400	WI-ACC-TYP400-40FT NM-NM	8000118139	1.2	1.6	2.7	5
55	16.7	PFP 400	WI-ACC-TYP400-55FT NM-NM	8000118140	1.6	2.1	3.7	6.8
75	22.8	PFP 400	WI-ACC-TYP400-75FT NM-NM	8000118141	2.2	3	5.2	9.2
100	30.5	PFP 400	WI-ACC-TYP400-100FT NM-NM	8000118142	2.9	3.8	6.7	12.2
200	60.9	PFP 600	WI-ACC-TYP600-200FT NM-NM	8000118143	3.6	5.6	10	N/A
3.3	1	Type 195	IE-CC-RPSMAM-RPSMAF-1M	2787950000	0.3	0.5	0.8	1.2
9.8	3	Type 195	IE-CC-RPSMAM-RPSMAF-3M	2787960000	0.8	1.3	2.1	3.4
16.4	5	Type 195	IE-CC-RPSMAM-RPSMAF-5M	2787970000	1.4	2.1	3.5	5.6
3.3	1	PFP 400	IE-CC-NM-RPSMAM-1M	2788040000	0.1	0.2	0.3	0.6
6.6	2	PFP 400	IE-CC-NM-RPSMAM-2M	1367110000	0.2	0.3	0.6	0.9
9.8	3	PFP 400	IE-CC-NM-RPSMAM-3M	2788050000	0.3	0.5	0.8	1.5
13.1	4	PFP 400	IE-CC-NM-RPSMAM-4M	1367100000	0.4	0.6	1.1	1.8
16.4	5	PFP 400	IE-CC-NM-RPSMAM-5M	2788060000	0.5	0.8	1.3	2.3

Surge Suppressor**WI-ACC-125-1000MHZ
SURGE NF-NF****WI-ACC-2-6GHZ SURGE
NF-NF****WI-DIV-CCMA
SMA M – SMA F****Technical Data**

Connector	N female to N female	N female to N female	SMA Male to SMA Female
Frequency Range	125 - 1000 MHz	2.0 - 6.0 GHz	<1200 MHz
VSWR	<1.1 over frequency range	1.3: 1	
Insertion Loss	<0.1 dB over frequency range	0.1 dB	<0.2dB over range
Turn-on	600fb VDC +/- 20%		

Ordering Data

Type	Order Number	Type	Order Number	Type	Order Number
WI-ACC-125-1000MHZ SURGE NF-NF	7940100313	WI-ACC-2-6GHZ SURGE NF-NF	7940100314	WI-DIV-CCMA SMA M-SMAF	7940100269

Antenna Coupler**WI-ACC-BULK-C1D1
SMA M - SMA F****WI-ACC-BULK-C1D1
SMA M - NF****Technical Data**

Maximum Fault Voltage	250 VDC, 250 VAC 50-60 Hz	250 VDC, 250 VAC 50-60 Hz
Maximum Antenna Power Output	2 watts or 33 dB	2 watts or 33 dB
Maximum Capacitance	5.64 nF	5.64 nF
Frequency Range	260 to 2483 MHz	260 to 2483 MHz
Impedance	50 Ohms	50 Ohms
Approximate Signal Attenuation (1):		
@ 425 MHz	0.6 dB	3.2 dB
@ 915 MHz	2.2 dB	2.4 dB
@ 2.4 GHz	2.6 dB	4.1 dB
Approximate Weight	0.5 lb (0.23 kg)	0.5 lb (0.23 kg)
Housing Material	300 Series Stainless Steel	300 Series Stainless Steel
Ambient Temperature Range	-40°/+85° C	-40°/+85° C
Connector	SMA male to SMA female	SMA male to N female
Approvals		
	Class 1 Div 1, group A, B, C, D	Class 1 Div 1, group A, B, C, D

Ordering Data

Type	Order Number	Type	Order Number
WI-ACC-BULK-C1D1 SMA M - SMA F	7940119935	WI-ACC-BULK-C1D1 SMA M - NF	7940100337

Pre-configured Wireless Enclosures

Weidmuller is pleased to offer pre-configured and assembled Wireless Enclosure Solutions. These wireless enclosures feature plastic or metal enclosures with either Wireless Ethernet Modems or Radio Frequency (RF) Transmitters/Receivers. Just connect power and your signals and you are wireless!

Example 900MHz Ethernet enclosure

Features:

- NEMA4X Stainless Steel Enclosure
- 900MHz Wireless Ethernet modem
- Operate as a Client/Bridge/AccessPoint/Router with a 630mW transmit power
- Built in Security/Encryption including AES and WEP with thru-panel surge protection ready for any antenna or cable
- Assembled, wired and tested!
- Dimensions mm/in (h x w x d) 458 x 382 x 205 / 18.03 x 15.04 x 8.07



The I/O version are comprised of two pre-assembled plastic enclosures. Each enclosure contains a power supply, circuit protection, surge protection, antenna, antenna connection cables and terminal blocks for the uni-directional 9-L Series IO Radios.

Meshing radio versions can also be configured.

Specialty Enclosures

At Weidmuller, we have the resources and capabilities to design and build both industrial and ATEX certified enclosures. We handle every aspect of the process:

- Initial design specifications
- Assembly and installation of box elements
- Design and specification of DIN-rail modules
- Terminal wiring
- Specifying, ordering and integrating third-party products
- Application of special coatings
- Providing full ATEX certification and documentation

Universal Industrial Gateway Communications Device

Solutions for interference-free data transmission over long distances



A single solution for connecting multiple devices, across multiple protocols. In systems where the installed base includes Industrial Ethernet and/or Serial protocols, establishing communication across devices is critical. The Universal Industrial Gateway is the most cost-effective way to move data between multiple PLCs and slave (server) devices (each with a different protocol).

Features

- Multiple protocols, multiple communication ports, one box
- Transfer data to and from any port, in any combination
- Multiple serial ports; maximum device connectivity
- The functionality of multiple gateways for the price of one
- Consistent configuration for any protocol conversions
- Fully searchable with instructions only one click away
- No software to install; browser-based configuration
- Transfer data without editing PLC code
- Ability to add protocols (via firmware upgrade)

Technical data

Ethernet Interface	
Protocols (Master only):	EtherNet/IP, EtherNet/IP-PCCC, ModbusTCP, S7comm
Number of Ports:	1, 2-port device in development
Speed:	10/100 Mbps full-duplex
Connector:	8-pin RJ45
Serial Interface	
Protocols (Master only):	Modbus RTU, Modbus ASCII, DF1-CIP, DF1-PCCC, PPI, DirectNET, CCM, HostLink
Number of Ports:	2-port or 4-port option
Serial Standards:	RS-232/485
Connectors	8-pin RJ45
Compatible controllers	
Controllers:	Rockwell Automation ControlLogix, CompactLogix, MicroLogix, Micro800, SLC 500, PLC-5 Schneider M340 & Quantum 140 Siemens S7-200/300/1200/1500, SIMATIC TI305 & TI405 Automation Direct DL05, DL06, DL205, DL305, DL405 GE Series Five & Series Six

Features/Configurable Parameters	
Tag Pairs:	100 tag pairs/map (max)
Tag Maps:	50 (Max)
Data Types: (Protocol dependent)	SINT, INT, REAL, BOOL, STRING, SHORT (SIGNED 16 BIT), USHORT (UNSIGNED 16 BIT), DINT (SIGNED 32 BIT), UDINT (UNSIGNED 32 BIT), ARRAY
Formatting:	Byte-Swap, Word-swap, Straight copy
Electrical/Environmental	
Input/Voltage:	12-24 VDC
Max Baud Rate:	115.2 kbps
Operating Temp:	0° to 55° C (32°F to 130°F)
Certifications:	RoHS-compliant, UL, cUL, CE; Class I, Div 2
Enclosure	
Dimensions:	5.40" x 1.88" x 3.88"
Weight:	12.80 oz.
Mounting:	DIN Rail mounting with latch

Ordering data

Type	Serial Ports	Ethernet Ports	Order No.	Protocols
IE-UGW-1TX-2RS232/485	2	1	7940124930	EtherNet/IP, EtherNet/IP-PCCC, Modbus TCP, Modbus RTU, Modbus ASCII, DF1-PCCC, DF1-CIP, PPI, S7comm, DirectNET, CCM, HostLink
IE-UGW-1TX-4RS232/485	4	1	7940124931	
IE-UGW-2TX-2RS232/485	2	2	7940124932	EtherNet/IP, EtherNet/IP-PCCC, Modbus TCP, Modbus RTU, Modbus ASCII, DF1-PCCC, DF1-CIP, PPI, S7comm, DirectNET, CCM, HostLink, MAC address per EtherNetport.
IE-UGW-2TX-4RS232/485	4	2	7940124933	

Unmanaged Switches: EcoLine Series B

Space-saving and cost-efficient unmanaged switches with PROFINET Class A conformity

Weidmuller Industrial Ethernet switches are ideal for data communication between Ethernet-capable devices. As a full-range supplier for industrial network devices, we offer a wide range of products for the communication infrastructure.

Unleash efficiency with EcoLine Series B unmanaged switches. Tailored for fieldbus networks, they marry quality of service and broadcast storm protection. Small, tough, and eco-friendly, powered by adaptable AC/DC sources.

Your benefits:

- Increased network reliability with Quality of Service and Broadcast Storm Protection
- Space-saving installation
- Applicable in building automation applications thanks to AC voltage input



Ordering data

Type	Number of ports	RJ45 ports speed	Order. No.
IE-SW-ELB-05-5TX	5x RJ45	10/100BaseT(X)	2828540000
IE-SW-ELB-08-8TX	8x RJ45	10/100BaseT(X)	2828550000
IE-SW-ELB-05-5GT	5x RJ45	10/100/1000BaseT(X)	2828560000
IE-SW-ELB-08-8GT	8x RJ45	10/100/1000BaseT(X)	2828570000
IE-SW-ELB-16-16TX	16x RJ45	10/100BaseT(X)	2828580000
IE-SW-ELB-05-4TX-1FESFP	4x RJ45, 1x 100BaseSFP slot	10/100BaseT(X)	2828590000
IE-SW-ELB-08-6TX-2FESFP	6x RJ45, 2x 100BaseSFP slot	10/100BaseT(X)	2828600000

See Industrial Ethernet catalogue for more options

Increased productivity through uninterrupted operation

Managed switches – for optimal control and effective redundancy

In order to coordinate the different requirements of communication participants within an industrial network, managed switches feature extensive control mechanisms for data distribution and bandwidth management. Different configuration options are supported, e.g. web-based configuration, SNMP, Telnet console, command-line interface (CLI) and serial console connection.

In the industrial Ethernet infrastructures of today, system availability must be ensured through network redundancy. This prevents machine downtimes and production losses due to connection errors in the highly integrated systems. Weidmuller managed switches feature high-performance redundancy mechanisms in order to increase the availability of managed Ethernet networks.

In order to satisfy all the requirements of industrial networks, our managed switches are available in four different lines: ValueLine, AdvancedLine, PremiumLine and SubstationLine. This selection ensures the availability of the right product regardless of application-specific and industrial requirements. The lines offer both DIN rail and 19" rack models, Fast, Gigabit and up to 10 Gigabit interfaces, a broad selection of port numbers and types, Power over Ethernet variants, support for the most important industrial automation protocols and the necessary approvals for use in such demanding sectors as the process industry, transmission and distribution, and shipbuilding.

Your special advantage:

- Wide variety of ports in terms of number and features to meet individual requirements
- Models available with Fast Ethernet, Gigabit and up to 10 Gigabit interfaces
- Lite- to full-managed models, including Power over Ethernet variants
- Support of industrial protocols for optimal integration into the most common automation networks



5-Port lite Managed Fast Ethernet Switch

- Extensive set of management features enable the set-up of various redundancy, monitoring, traffic filter and security functions
- Suitable for use in harsh industrial environment thanks to rugged design and wide operating temperature range of -40 °C up to 75 °C



Technical data

Technology	
Standard	IEEE 802.3 for 10BaseT, IEEE 802.3u for 100BaseT(X), IEEE 802.3x for flow control, IEEE 802.1D for the Spanning Tree protocol, IEEE 802.1w for Rapid STP, IEEE 802.1AB for Link Layer Discovery protocol (LLDP)
Data switching	Store and Forward
Flow control	IEEE 802.3x flow control
Switch characteristics	
MAC table size	2 K
Packet buffer size	1 Mbit
Management features	
Device configuration	Webbrowser (HTTP/HTTPS), SNMP v1/v2c/v3, Telnet console, Command Line Interface (CLI), Upload of a configuration file via web-interface or TFTP-Server
Monitoring function	SNMP v1/v2c/v3, Link Layer Discovery Protocol (LLDP), Syslog, Event based warning via E-Mail, Event based warning via relay, Event based warning via SNMP trap
Network redundancy	Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), O-Ring (recovery time <10 ms), O-Chain (recovery time <10 ms), Fast recovery
Network traffic filter	Port based VLAN
IP-address management	Static, DHCP-Client, DHCP-Server (port based, pool-based), DHCP Option 82, DHCP-Relay
Security functions	VLAN segmentation, Enable/disable ports, Loop protection, TACACS+ Authentication, Management access security via secure IP-list and configuration of allowed access methods (web-interface, telnet, SSH)
Time synchronization management	NTP server, SNTP client
Industrial protocol support	Modbus/TCP slave
Interfaces	
RJ45 ports	10/100BaseT(X), auto negotiation, Full/half-duplex mode, Auto MDI/MDI-X port
Number of ports	5x RJ45
Alarm contact	1 relay output with a current capacity of 1 A at 24 V DC
Function DIP switch	1x for enabling/disabling power fault alarm via relay, 3x for ring redundancy settings
Function reset button	<5 sec: System reboot, >5 sec: Factory default
Power supply	
Connection type	1 removable 6-pin terminal block
Voltage supply range	10.8...52.8VDC
Voltage supply	12/24/48 V DC, 2 redundant inputs
Current consumption	0.5A @ 12V DC; 0.25A @ 24V DC; 0.12A @ 48V DC
Overload current protection	Yes
Reverse polarity protection	Yes
Note	



Physical characteristics	
Housing main material	Metal
Protection degree	IP30
Type of mounting	DIN rail
Dimensions H x W x D	144.3 / 26.1 / 95 mm (5.6811 / 1.0276 / 3.7402 inch)
Net weight	396 GRM
Environmental conditions	
Operating temperature	-40 °C...75 °C
Humidity	5 to 95 % (non-condensing)
Operating altitude	2000m in acc. with UL
EMC conformity and approvals	
EMC standards	EN 55032, EN 55024, FCC Part 15 Subpart B Class A, IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV, IEC 61000-4-3 RS: 80 MHz bis 1 GHz: 3 V/m, IEC 61000-4-4 EFT: Power: 0.5 kV; Signal: 0.5 kV, IEC 61000-4-5 Surge: Power: 0.5 kV; Signal: 1 kV, IEC 61000-4-6 CS: 3 Vrms
Safety standard	UL 61010-1, UL 61010-2-201
Shock	according to IEC 60068-2-27
Vibration	according to IEC 60068-2-6
Free fall	According to IEC 60068-2-31
MTBF	
Operating time (hours), min.	1796601 hrs
According to Standard	Telcordia SR-332
Approvals	
Approvals	CE; CULUS; EAC; KOREANCERT

Ordering data

Type	Qty.	Order No.
IE-SW-AL05LM-5TX	1	2682250000

See Industrial Ethernet catalogue for more options

8-Port managed Fast Ethernet Switch

- Extensive set of management features enable the set-up of various redundancy, monitoring, traffic filter and security functions
- Suitable for use in harsh industrial environment thanks to rugged design and wide operating temperature range of -40 °C up to 75 °C



Technical data

Technology	
Standard	IEEE 802.3 for 10BaseT, IEEE 802.3u for 100BaseT(X), IEEE 802.3x for flow control, IEEE 802.3ad for port trunk with LACP, IEEE 802.1D for the Spanning Tree protocol, IEEE 802.1w for Rapid STP, IEEE 802.1s for the Multiple Spanning Tree Protocol (MSTP), IEEE 802.1p for Class of Service, IEEE 802.1Q for VLAN tagging, IEEE 802.1X for authentication, IEEE 802.1AB for Link Layer Discovery protocol (LLDP)
Data switching	Store and Forward
Flow control	IEEE 802.3x flow control
Switch characteristics	
MAC table size	8 K
Packet buffer size	1 Mbit
Priority queues	4
Max. number of available VLANs	4095
IGMP-Groups	1024
Management features	
Device configuration	Webbrowser (HTTP/HTTPS), SNMP v1/v2c/v3, Telnet console, Command Line Interface (CLI), Local serial console port (RS-232 via RJ-45 port), Upload of a configuration file via web-interface or TFTP-Server
Monitoring function	SNMP v1/v2c/v3, Link Layer Discovery Protocol (LLDP), Port mirroring, Port statistics, Port monitoring, Syslog, RMON (Remote monitoring), Event based warning via E-Mail, Event based warning via relay, Event based warning via SNMP trap
Network redundancy	Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), Multiple Spanning Tree Protocol (MSTP), R-Ring (recovery time <10 ms), R-Chain (recovery time <10 ms), Link Aggregation Control Protocol (LACP), Fast recovery
Network traffic filter	Quality of Service (QoS), Class of Service (CoS), Type of Service (ToS), Differentiated Services Code Point (DSCP), Port based VLAN, Tag based VLAN, IGMP v2/v3, Multicast VLAN Registration (MVR), Traffic Rate Limiting
IP-address management	Static, DHCP-Client, DHCP-Server (port based, pool-based), DHCP Option 82, DHCP-Relay
Security functions	VLAN segmentation, Enable/disable ports, TACACS+ and IEEE 802.1X User Authentication, Access control (port based via IEEE 802.1X), Access control list (IP-based), Access control list (MAC-based), Management access security via secure IP-list and configuration of allowed access methods (web-interface, telnet, SSH), Loop protection
Time synchronization management	NTP server, SNTP client
Industrial protocol support	Modbus/TCP slave, PROFINET device acc. to conformance class A
Interfaces	
RJ45 ports	10/100BaseT(X), auto negotiation, Full-/half-duplex mode, Auto MDI/MDI-X port
Number of ports	8x RJ45
Console port interface	RS-232 (RJ45 connector)
Alarm contact	1 relay output with a current capacity of 1 A at 24 V DC
Function reset button	<5 sec: System reboot, >5 sec: Factory default
Note	

Power supply	
Connection type	1 removable 7-pin terminal block
Voltage supply range	10.8...52.8VDC
Voltage supply	12/24/48 V DC, 2 redundant inputs
Current consumption	0.47A @ 12V DC; 24A @ 24V DC; 0.12A @ 48V DC
Overload current protection	Yes
Reverse polarity protection	Yes
Physical characteristics	
Housing main material	Metal
Protection degree	IP30
Type of mounting	DIN rail
Dimensions H x W x D	144.3 / 52 / 107.1 mm (5.6811 / 2.0472 / 4.2165 inch)
Net weight	812 GRM
Environmental conditions	
Operating temperature	-40 °C...75 °C
Humidity	5 to 95 % (non-condensing)
Operating altitude	2000m in acc. with UL
EMC conformity and approvals	
EMC standards	EN 55032, EN 55024, FCC Part 15 Subpart B Class A, IEC 61000-4-2 ESD: Contact: 4 kV; Air: 8 kV, IEC 61000-4-3 RS: 80 MHz bis 1 GHz: 3 V/m, IEC 61000-4-4 EFT: Power: 0.5 kV; Signal: 0.5 kV, IEC 61000-4-5 Surge: Power: 0.5 kV; Signal: 1 kV, IEC 61000-4-6 CS: 3 Vrms
Safety standard	SELV according to EN 62368-1, UL 61010-1, UL 61010-2-201
Shock	according to IEC 60068-2-27
Vibration	according to IEC 60068-2-6
Free fall	According to IEC 60068-2-31
MTBF	
Operating time (hours), min.	841599 hrs
According to Standard	Telcordia SR-332
Approvals	
Approvals	CE; CUWS; EAC; KOREANCERT

Ordering data

Type	Qty.	Order No.
IE-SW-AL08M-8TX	1	2682280000
IE-SW-AL16M-16TX	1	2682310000
IE-SW-AL24M-24TX	1	2682320000

See Industrial Ethernet catalogue for more options

Ethernet Switches: SubstationLine

Highest robustness combined with extreme flexibility to meet all requirements



Weidmüller’s SubstationLine product family is specifically designed to meet the most demanding requirements for Ethernet Switches in Protection & Control systems or in any other application related with the Power Grid. SubstationLine includes compact DIN-rail models as well as 19” rack devices.

All products have a redundant power supply to ensure reliability in critical environments. The product family ranges from Fast Ethernet switches to 10GB products with sophisticated features such as time synchronization according to PTPv2, PRP/ HSR RedBox function to build networks with zero recovery time, or Layer 3 capabilities.

All these features combined with the available port combinations, including copper and optical fibre ports, allow users to find the most suitable product for any specific requirement.

Your benefits:

- IEC 61850-3 / IEEE 1613 compliance to ensure operation in Substations
- Redundant power-supply and extended temperature range
- Meet latest requirements to operate according to IEC 61850 Ed.2 (PRP/HSR RedBox, PTPv2, MMS server, etc.)



Advanced features for critical communication networks

- Flexibility – Find the right product (DIN-rail or 19” rack) with the required number of ports (copper/optical) for any requirement
- Robustness – Thanks to compliance of IEC 61850-3 and IEEE 1613 standards
- Redundancy – RSTP/ MSTP/ MRP/ PRP&HSR RedBox/ ORing
- Management – Web/ CLI/ SNMP/ MMS/ ModbusTCP/ Alarm Relay
- Time synchronization – SNTP/ PTPv2
- Security – MAC&IP blocking/ RADIUS & TACACS+ authentication/ HTTPS/ SSH/ SNMPv3/ SYSLOG/Access Control Lists
- Traffic Control – VLANs/ Prioritization GOOSE & Sampled Values/ Multicast filtering/ Rate limit control/ Broadcast protection

SubstationLine managed switches

Ordering data

Type	Description	Order No.
IE-SW-SL10M-7TX-3GC-HV	DIN-rail, Fast/Gigabit, 10 ports (7+3), HV supply	2778950000
IE-SW-SL10M-7TX-3GC-LV	DIN-rail, Fast/Gigabit, 10 ports (7+3), LV supply	2778960000
IE-SW-SL20M-8GT-12GESFP-HV	DIN-rail, Full Gigabit, 20 ports (8+12), HV supply	2778970000
IE-SW-SL20M-8GT-12GESFP-LV	DIN-rail, Full Gigabit, 20 ports (8+12), LV supply	2778980000
IE-SW-SL26M-24TX-2GC-HV	19” rack, Fast/Gigabit, 26 ports(24+2), HV supply	2778990000
IE-SW-SL26M-24TX-2GC-LV	19” rack, Fast/Gigabit, 26 ports(24+2), LV supply	2779000000
IE-SW-SL28M-HV	19” rack, Modular, up 28 ports, HV supply	2779010000
IE-SW-SL28M-LV	19” rack, Modular, up 28 ports, LV supply	2779020000
IE-SW-L3-SL28M-HV	19” rack,Layer3, Modular, up 28 ports, HV supply	2875580000
IE-SW-L3-SL28M-LV	19” rack,Layer3, Modular, up 28 ports, LV supply	2875590000

SubstationLine media interface modules (modular 19” rack)

Ordering data

Type	Description	Order. No.
IE-SWM-SL08-8GT	8x10/100/1000Base-T(X)ports	2779140000
IE-SWM-SL08-8GESFP	8x100/1000Base SFP ports	2779150000
IE-SWM-SL04-4SCS	4x 100Base-FX (Singlemode fibre optic, SC connector)	2779160000
IE-SWM-SL04-4SC	4x 100Base-FX (Multimode fibre optic, SC connector)	2779170000
IE-SWM-SL04-4STS	4x 100Base-FX (Singlemode fibre optic, ST connector)	2779180000
IE-SWM-SL04-4ST	4x 100Base-FX (Multimode fibre optic, ST connector)	2779190000
IE-SWM-SL04-4GESFP	4x 1000Base SFP	2779200000
IE-SWM-SL02-2GESFP+	2x 10 GBase SFP	2779210000
IE-SWM-SL04-4GESFP+	4x 10 GBase SFP	2779220000
IE-SWM-SL02-2GC-PRP/HSR	2x combo-ports (10/100/1000 Base-T(x) or 100/1000Base SFP), PRP/HSR RedBox	2985050000

Power Supplies

Electronics



Power supplies from Weidmüller have long since proved their worth in supplying electrical modules. They can therefore be used safely in harsh industrial environments, in small businesses and in living areas, and have been granted international approvals. Weidmüller provides power supplies and additional components for industrial applications:

- Switched-mode power supply units
- DC/DC converters
- UPS control modules
- Electronic fuses

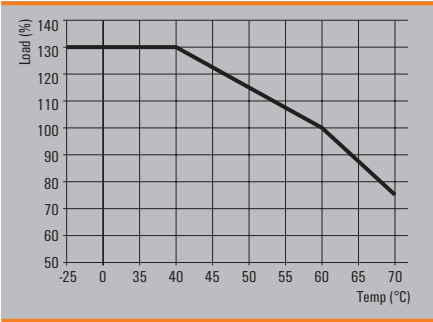
connectPower PROtop

connectPower PROtop

- DCL technology for an excellent dynamic range
- High energy efficiency (up to 95.4 % efficiency)
- Mode of operation: single or parallel operation and adjustable short-circuit response (continuous current or switch-off)
- Useful life of up to 10 years, MTBF > 1 000 000 h.
- Extremely slim design
- Time-saving PUSH IN connection technology



Derating curve



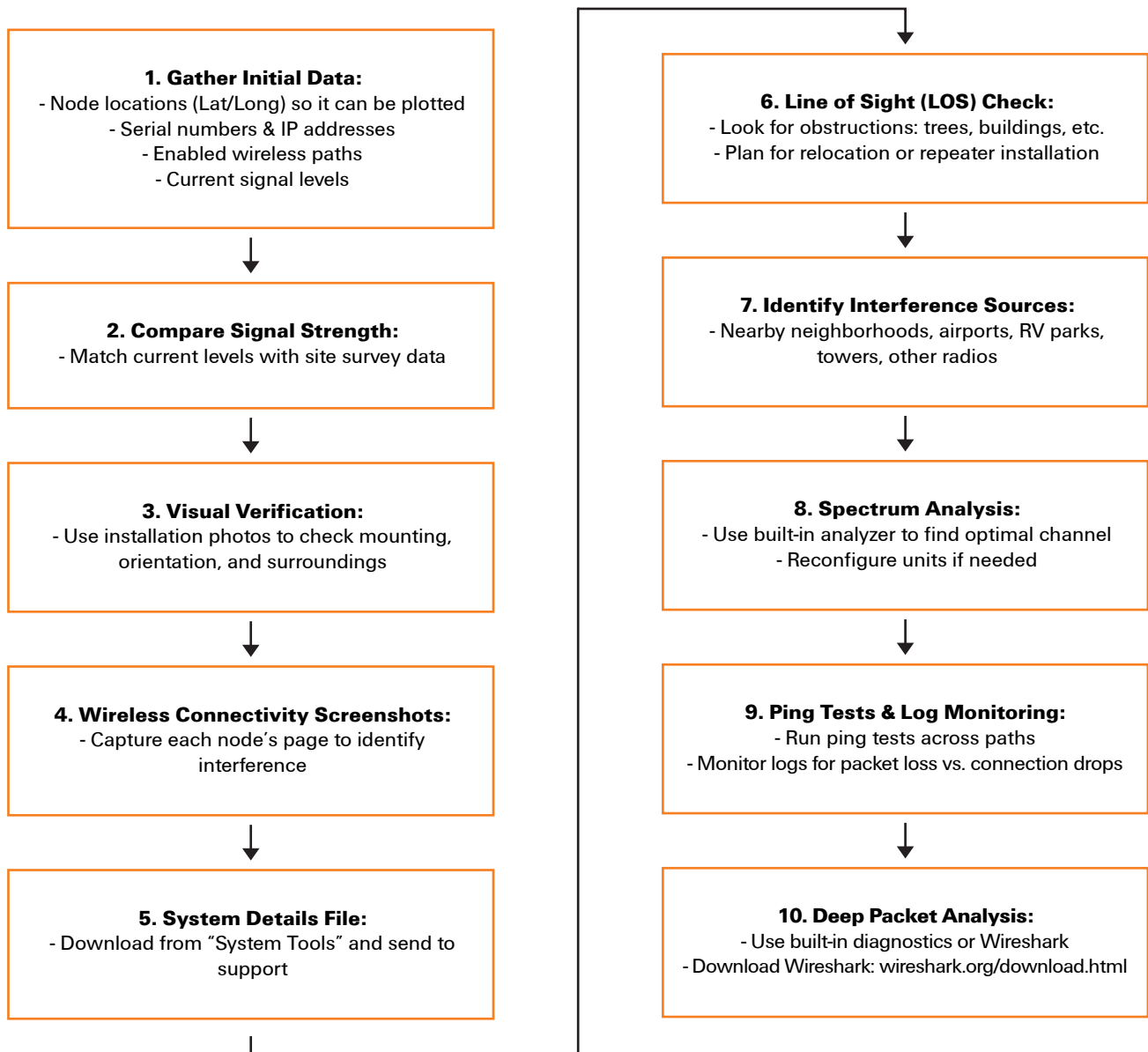
Technical data

General data	
Insulation voltage input / earth	3.2 kV
Insulation voltage output / earth	0.5 kV
Insulation voltage, input/output	3.5 kV
Earth leakage current, max.	3.5 mA
Series switching capability	Yes
Ambient temperature (operational) / Storage temperature	-40 °C...70 °C / -40 °C...85 °C
Humidity at operating temperature	5...100 % no condensation
Protection class / Pollution degree	I, with PE connection / 2
Housing version	Metal, corrosion resistant
Mounting position, installation notice	Horizontal on DIN rail TS 35, top and bottom 50 mm clearance for free air flow, 10 mm clearance to neighbouring active subassemblies with full load, 5 mm with passive neighbouring subassemblies, direct row mounting with 90% rated load
Conformal coating	Yes
EMC / shock / vibration	
Interference immunity test acc. to	EN 55032:2015, EN 55024:2010/A1:2015, EN 55035:2017, EN 61000-3-2:2014, EN 61000-6-1:2007, EN 61000-6-2:2005, EN 61000-6-3:2007/A1:2011, EN 61000-6-4:2007/A1:2011
Shock	30 g in all directions
Resistance to vibration	2.3 g (on DIN rail), 4 g (with direct mounting)
Electrical safety (applied standards)	
Electrical machine equipment	Acc. to EN60204
Safety transformers for switch-mode power supplies	According to EN 61558-2-16
For use with electronic equipment	Acc. to EN50178 / VDE0160
Safety extra-low voltage	SELV acc. to IEC 60950-1, PELV according to EN 60204-1
Protective separation / protection against electrical shock	VDE0100-410 / acc. to DIN57100-410
Protection against dangerous shock currents	Acc. to VDE0106-101

Type	Qty.	Order. No.
PRO TOP1 72W 24V 3A CO	1	2466970000
PRO TOP1 120W 24V 5A EX	1	2466980000
PRO TOP1 240W 24V 10A EX	1	2466990000
PRO TOP1 480W 24V 20A EX	1	2467000000

Wireless Ethernet Site Troubleshooting

The first step in troubleshooting any wireless network is to separate and test the wireless network apart from the communications network. Once the wireless "backbone" has been verified, only then can your communications network be accurately tested and analyzed.



Once the wireless Backbone network has been tested and all appropriate changes have been made, the specific communication protocols and programs can be tested for use.

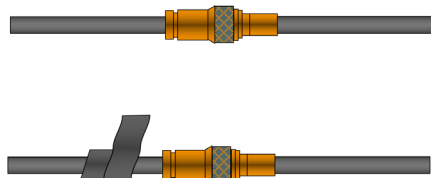
Organizing an RF Project

Site Surveys can provide answers to some commonly asked questions and link them together for an overall RF plan:

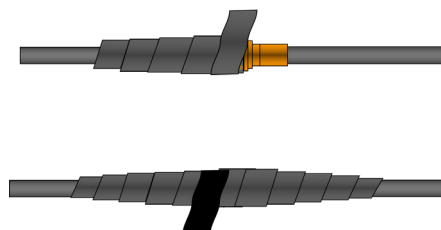
1. WHO will be completing various actions to provide the permanent RF installation?
2. WHAT RF equipment and mounting hardware are needed for the project.
3. WHERE to install the RF equipment.
4. WHEN are the licensing, equipment ordering, installation and site commissioning tasks needing to be conducted for the final project.
5. HOW the RF equipment or mounting hardware is to be installed.

Antenna Installation Tips

Connections between the antenna and the coaxial cable should be carefully taped to prevent ingress of moisture. Moisture ingress in the coaxial cable is a common cause for problems with radio systems because it greatly increases the radio losses. We recommend that the connection be taped—first with a layer of PVC tape, next with vulcanizing tape (such as 3M™ 23 tape), and finally with another layer of PVC UV-stabilized insulating tape. The first layer of tape allows the joint to be easily inspected when troubleshooting because the vulcanizing seal can be easily removed (see Figure).



Stretch to elongate sealant tape while wrapping over the connection



For proper UV protection Electrical Tape should then be wrapped over the Vulcanising Tape

Where antennas are mounted on elevated masts, the masts should be effectively grounded to avoid lightning surges. For high lightning risk areas, surge suppression devices should be fitted between the module and the antenna. The devices must have a “turn on” voltage of less than 90 V. If the antenna is not already shielded from lightning strike by an adjacent grounded structure, a lightning rod may be installed above the antenna to provide shielding.

Wireless Network Security

Effective wireless security is crucial for protecting sensitive information and maintaining network integrity. Below are key strategies to fortify your wireless network:

1. Implement WPA2/WPA3 Encryption

WPA3 is the latest and strongest encryption standard, providing enhanced security for both personal and enterprise networks. Its 192-bit security suite offers protection against brute-force attacks, and it prevents key reinstallation attacks. Where not available use WPA2 protection.

2. Configure a Secure SSID

Use a unique SSID (Service Set Identifier) that does not reveal the network’s purpose or location. Avoid using default names and site names since attackers can easily target these. Additionally, disable SSID broadcast to keep your network less visible to potential attackers.

3. Enable MAC Address Filtering

Use MAC address filtering to control which devices can connect to the network. Although this is not foolproof (as MAC addresses can be spoofed), it adds an additional layer of access control by blocking devices that do not match the allowed list.

4. Create a Separate Guest Network

Isolate guest users by setting up a separate SSID for guest devices. Apply strict bandwidth and access limitations, and prevent guests from accessing the internal network. This approach safeguards core systems even if the guest network is compromised.

5. Disable WPS (Wi-Fi Protected Setup)

WPS simplifies device configuration, but it is inherently insecure due to its reliance on an 8-digit PIN that can be cracked in hours. Disable WPS to eliminate this vulnerability, and opt for manual configuration of new devices.

6. Use a Secure Management Interface

Manage your WLAN using HTTPS, SNMPv3, or secure SSH instead of Telnet or HTTP, which transmit credentials in plaintext. Additionally, change the default management passwords and regularly update them to prevent unauthorized access.

7. Limit Signal Range and Coverage

Adjust the power output of access points to limit signal spillage outside your intended coverage area. Use directional antennas or physical barriers to contain the Wi-Fi signal, reducing the risk of interception by nearby attackers.

8. Deploy Network Access Control (NAC)

Implement NAC solutions to enforce security policies, authenticate devices, and monitor activity on the WLAN. NAC can automatically quarantine non-compliant devices, ensuring only trusted systems can access sensitive resources.

9. Regularly Update Firmware

Access points, routers, and controllers should be kept up to date with the latest security patches. Outdated firmware can expose the network to known vulnerabilities, making it an easy target for attackers.

Wireless Network Capacity Planning and Requirements

Wireless capacity planning optimizes network performance for present and future requirements. It's crucial for supporting mission-critical applications and accommodating varying device types.

- 1. Requirements Analysis:** Identify the types and number of devices, applications used, and their bandwidth needs. Consider both the peak and average usage to avoid congestion.
- 2. Capacity vs. Coverage:** Balance high-density user support and consistent coverage. Design for adequate signal strength and capacity in high-traffic areas.
- 3. Site Surveys and Optimization:** Conduct site surveys to understand environmental factors like interference and physical obstructions. Adjust access point placements to minimize dead zones and ensure seamless connectivity.

Key Considerations:

- Scalability: Plan for growth by selecting hardware and software solutions that can be expanded as demand increases.
- Network Security: Include robust security measures, especially for critical infrastructure environments, to prevent unauthorized access and protect sensitive data.
- Roaming and Latency: Ensure that devices can roam seamlessly between APs without latency spikes, which is critical in industrial settings where machine control or safety is involved.

Implementing a structured capacity plan ensures scalable, high-performance wireless networks capable of supporting modern IoT, industrial automation, and critical business functions.

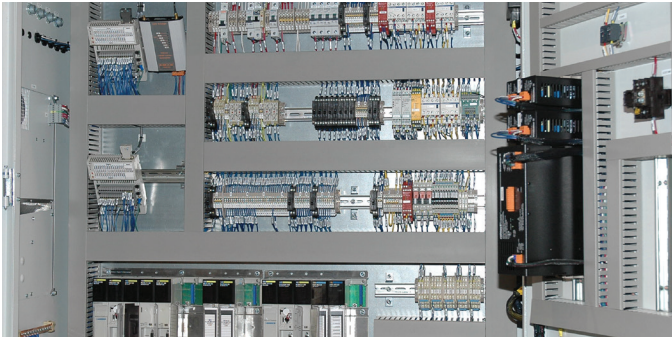
Application Notes

Factors Affecting Distance & E.R.P

- Frequency (as frequency increases, distance decreases proportionally)
- Receiver sensitivity, antenna gain, cable loss
- Noise / interference (the noisier the environment the more careful you have to be with antenna placement)
- Transmitter power, antenna gain, cable loss
- Attenuation of radio signal
- Heights of antennas, Obstructions in radio path
- Other factors Atmospheric, Ground Mineralization

In most applications it is desirable to have an overall dB gain as opposed to a loss to ensure good communication between radios.

Gain Sources	
Radios	1 W radio = 30dB Gain
	300mW radio = 24dB Gain
	100mW radio = 20dB Gain
Antennas	(see antenna selection chart for Antenna dB Gains)
Points of Loss	
Connection points	~0.1dB loss per connection
Jumper cables	see cable selection section (p. 64)
Surge Protection	see surge protection section (p. 65)
Bulkhead adapters	see Bulkhead Adapter section (p. 65)



*Sample assembly showing radios, power supply, surge arrestor (bottom of cabinet), terminals & relays.

Our expertise for your requirements

Service connects – worldwide



Automation technology functions are becoming more complex in a globally-oriented world facing ambitious targets in terms of energy efficiency and smart production. We are your equal partners for the best connections in Industrial Connectivity.

Our personal support answers all questions reliably and expertly. During planning, installation or operation our service and support offer is your best companion.

In short: Weidmüller's global service combines our expertise with your requirements.



Your way to our service
www.weidmueller.com/service

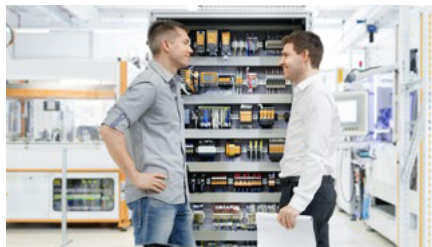
Engineering services and customised products

Automation engineering and connectivity consulting belongs to our services as well as assembly of engineered products. We also support the process from the idea to the product with our Weidmüller Configurator and the Configure-to-Order process.



Consulting and engineering

The challenge for you is reducing costs and increasing efficiency. This requires intelligent, individual solutions. Whether it is modified products, prefitted mounting rails or complete small cabinets – our application centres provide a highly qualified custom-made engineering and production service.



Connectivity Consulting

Increase your competitiveness - supported by our experts. Our drive is to optimise your competitiveness. That's why our team of experts supports you in significantly increasing your efficiency in electrical machine design and control cabinet construction. With proven products and services from the Weidmüller portfolio – and with the experience gained from over 300 projects worldwide.



Assembled terminal rails - Flexibly

Your processes in panel building have to be fast, flexible and productive. This is the only way you can cut your costs and increase efficiency. Depending on the application in question, you will have different requirements with respect to the engineering service, delivery speed and flexibility to be provided.



Modified and assembled enclosures - Competitive advantages included

To compete internationally, your plants need to satisfy high standards of safety, quality and performance. The smart combination of consultation, application expertise and industry know-how is our key to finding a custom-fit solution for your application. Reduce costs and increase efficiency.



Fast Delivery Service - Your ideas deserve a quick realisation

Obtain offers 24/7 and within minutes, including directly orderable article numbers with our Fast Delivery Service. The Weidmüller Configurator (WMC) for planning and configuration is key for consistent processes. Dispatch your orders in 5 days. Assemble individual terminal strips and enclosures from batch size 1!

Your ticket to the world of digital service

easyConnect – Your Industrial Service Platform



Our cloud-based platform is your ticket to the world of digital services from Weidmüller, and the intuitive and future-proof tool for your way to the Industrial IoT. Realise your use cases easily, consistently and without any relevant prior knowledge, thanks to the perfect interaction of platform, devices and diverse software services.

As an open, modular and perfectly integrable system, the platform is your enabler for a wide range of use cases. Increase your efficiency and unleash your full innovation potential with easyConnect.



Interested in using easyConnect?

Learn how to get started with easyConnect step-by-step.

www.weidmueller.com/easyconnect

Why should you use easyConnect?

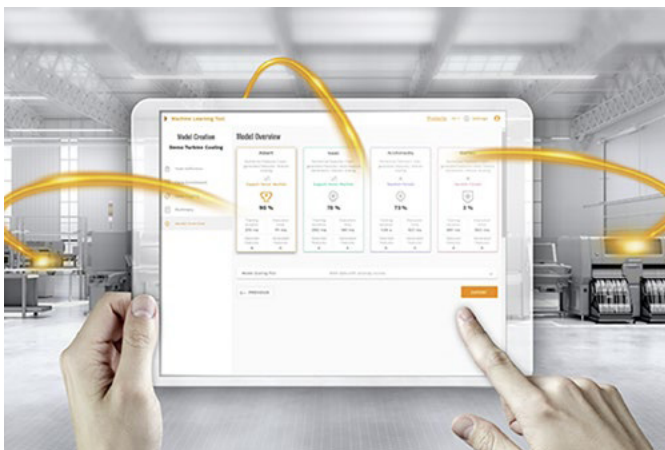
- You want to enter your digital transformation step-by-step?
- You want to make the step into Industrial IOT, but have no or little IT expertise?
- You want to use your digital data for smart & scalable services?
- You want to offer digital services (such as customised dashboard) to your customers?
- You want to improve your service offering and efficiency, e.g. through remote access?
- You feel Weidmüller's digital services are interesting, but you have „your cloud“ already?



Weidmüller comes up with the solution: easyConnect, the new digitalisation platform. It bundles Weidmüller's digital services at one place in the cloud and connects them with various Weidmüller devices.

With easyConnect you start digitalising your application step-by-step without ballast in a secure way.

The following services are initially available on easyConnect:



Device management

Adding and managing cloud-connected devices is typically the first step in any Industrial IoT use case.

Asset management

The asset management service is a modelling tool that allows users to model their assets and processes and link them to relevant time series data.

Remote access (u-link)

u-link guarantees a quick and secure access to machines and plants while also allowing for efficient management.

Data visualisation

easyConnect data visualisation services enable users to view, monitor and display live and historical data.

AutoML

With Weidmüller Industrial AutoML, you can optimize operations, increase product quality and develop new business models by benefiting from advanced analytics.

Expand the possibilities of our products

Our Support Center provides you with comprehensive, clear and personal assistance



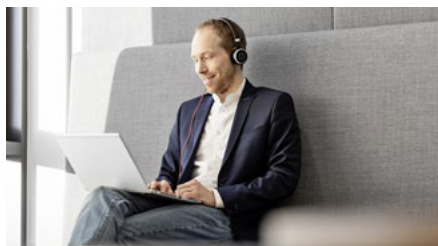
Receive fast and intuitive support to get the most out of our products in your application. In our new Support Center you can search or navigate to the many application notes, product information, video tutorials or software downloads of our products.

- **Everything at a glance** – One central support hub, where all relevant information is available
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Additional support services



Training and Webinars

Stay tuned in a world that is accelerating. In our entertaining interactive webinars, we offer you the opportunity to learn about new products and technology topics and to interact with our experts.



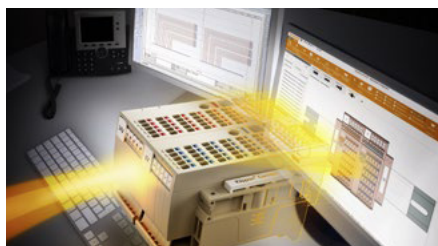
Repairs and replacement parts

We offer repair and components for our Workplace Solutions as well as assistance for other Weidmüller products. Find out how our experts can help you with your repair request.



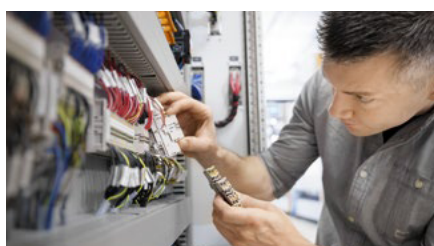
Security advisory board

Our Product Security Incident Response Team (PSIRT) continuously informs you about possible security-related vulnerabilities of our products.



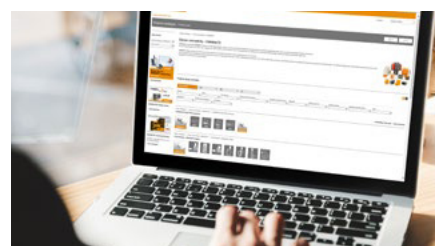
Engineering data

For the quick integration of our products into your design, there are a lot of digital product data for engineering systems like EPLAN, Zuken E3.series, WSCAD and many others available for download.



Product change notifications

Technical modifications of our products always available online.



Technical product catalogues

Technical data for our entire program in Industrial Connectivity for download in PDF-format.

From the idea to the finished solution

Weidmüller Configurator: intuitive, uncomplicated & fast digital engineering

Digital engineering can be so easy – with the Weidmüller Configurator!

It's a **free to use** software application to easily configure industrial solutions. It features more than **12,000 articles** from multiple product families including rail-mounted components, industrial and excertified enclosures, Heavy Duty Connectors, remote I/O-systems and PCB connectors.

Unleash the full power of digital engineering:

Our application wizards help you choose the right articles.

Place, mark or modify them to your needs and get your solution **visualized in 3D** – what you see is what you get!

Our promise: Speed up your solution planning process by up to 70%!

Your benefits:

- **Proven configuration designs in real 3D:** The plausibility and collision check with the complete digital documentation ensures that you can rely 100% on your configuration.
 - **Seamless E-CAD Roundtrip:** Interfaces enable the simple exchange of product data between the WMC and all common engineering tools, such as Zuken E3 or EPLAN Electric P8.
 - **Sample Service & Fast Delivery Service:** to support your design-in process, we offer a **3-day sample service** for many products. Inquire them directly online – for free!
- You want your solution right away? Our **Fast Delivery Service** guarantees delivery of individually assembled terminal strips or enclosures within a few days.

Get started online now!

The Weidmüller Configurator makes solution planning easy. Visit our website for more information, tutorials and download it for free:



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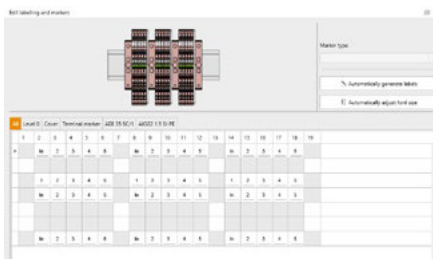


or register on easyconnect.weidmueller.com and use it online.



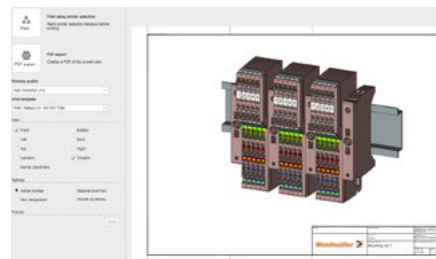
Wizards:

Design complete applications within few clicks – even without detailed product knowledge – for signal wiring, load monitoring, instrument transformers, enclosures, remote I/O-systems and many more.



Assistants:

Finalize your solutions with supporting assistants to add cross-connectors, markers or colors and verify the faultlessness. Automatic modes save valuable time!



1-click documentation:

Get assembly drawings for production – only 1 click. Bill of material – only 1 click. The complete solution documentation including all component data sheets – you're right, only 1 click!

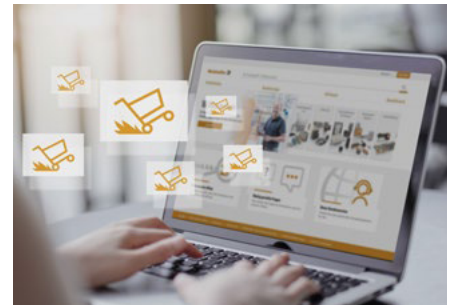
Digital ordering options

Your digital ordering options at Weidmüller

Find and easily select the products you need, with convenient ordering: as your Partner in Industrial Connectivity, we know what counts in purchasing. That is why we offer you a variety of options for ordering products from us and optimising your purchasing processes to meet your individual requirements and your workflow. The choice is yours.

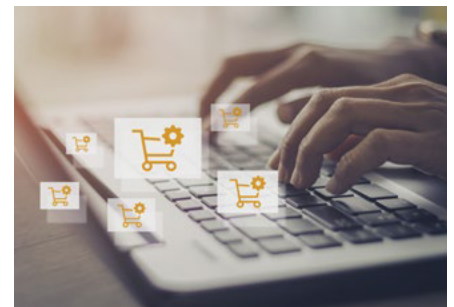
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Glossary

ACK	Acknowledgment.
Access point	An access point is the connection that ties wireless communication devices into a network. Also known as a base station, the access point is usually connected to a wired network.
Antenna Gain	Antennae don't increase the transmission power, but focus the signal more. So instead of transmitting in every direction (including the sky and ground) antenna focus the signal usually either more horizontally or in one particular direction. This gain is measured in decibels.
Bandwidth	The amount of "transportation" space an Internet user has at any given time.
Bridge	A hardware component used to connect two or more network segments which are physically and logically separated.
Collision avoidance	A network node characteristic for proactively detecting that it can transmit a signal without risking a collision.
Crossover cable	A special cable used for networking two computers without the use of a hub. Crossover cables may also be required for connecting a cable or DSL modem to a wireless gateway or access point. Instead of the signals transferring in parallel paths from one set of plugs to another, the signals "crossover." If an eight-wire cable was being used, for instance, the signal would start on pin one at one end of the cable and end up on pin eight at the other end. They "cross-over" from one side to the other.
CSMA/CA	CSMA/CA is a "listen before talk" method of minimizing (but not eliminating) collisions caused by simultaneous transmission by multiple radios. IEEE 802.11 states collision avoidance method rather than collision detection must be used, because the standard employs half duplex radios—radios capable of transmission or reception—but not both simultaneously. Unlike conventional wired Ethernet nodes, a WLAN station cannot detect a collision while transmitting. If a collision occurs, the transmitting station will not receive an ACKnowledge packet from the intended receive station. For this reason, ACK packets have a higher priority than all other network traffic. After completion of a data transmission, the receive station will begin transmission of the ACK packet before any other node can begin transmitting a new data packet. All other stations must wait a longer pseudo randomized period of time before transmitting. If an ACK packet is not received, the transmitting station will wait for a subsequent opportunity to retry transmission.
CSMA/CD	A method of managing traffic and reducing noise on an Ethernet network. A network device transmits data after detecting that a channel is available. However, if two devices transmit data simultaneously, the sending devices detect a collision and retransmit after a random time delay.
DHCP	A utility that enables a server to dynamically assign IP addresses from a predefined list and limit their time of use so that they can be reassigned. Without DHCP, an IT Manager would have to manually enter in all the IP addresses of all the computers on the network. When DHCP is used, whenever a computer logs onto the network, it automatically gets an IP address assigned to it.
Dial-up	A communication connection via the standard telephone network, or Plain Old Telephone Service (POTS).
DNS	A program that translates URLs to IP addresses by accessing a database maintained on a collection of Internet servers. The program works behind the scenes to facilitate surfing the Web with alpha versus numeric addresses. A DNS server converts a name like mywebsite.com to a series of numbers like 107.22.55.26. Every website has its own specific IP address on the Internet.
DSL	Various technology protocols for high-speed data, voice and video transmission over ordinary twisted-pair copper POTS (Plain Old Telephone Service) telephone wires.
Encryption key	An alphanumeric (letters and/or numbers) series that enables data to be encrypted and then decrypted so it can be safely shared among members of a network. WEP uses an encryption key that automatically encrypts outgoing wireless data. On the receiving side, the same encryption key enables the computer to automatically decrypt the information so it can be read.
Firewall	Keeps unauthorized users out of a private network. Everything entering or leaving a system's internal network passes through the firewall and must meet the system's security standards in order to be transmitted. Often used to keep unauthorized people from using systems connected to the Internet.

Hub	A multiport device used to connect PCs to a network via Ethernet cabling or via WiFi. Wired hubs can have numerous ports and can transmit data at speeds ranging from 10 Mbps to multigigabyte speeds per second. A hub transmits packets it receives to all the connected ports. A small wired hub may only connect 4 computers; a large hub can connect 48 or more.
HZ	The international unit for measuring frequency, equivalent to the older unit of cycles per second. One megahertz (MHz) is one million hertz. One gigahertz (GHz) is one billion hertz. The standard US electrical power frequency is 60 Hz, the AM broadcast radio frequency band is 535–1605 kHz, the FM broadcast radio frequency band is 88–108 MHz and wireless 802.11b LANs operate at 2.4 GHz.
IEEE	Institute of Electrical and Electronics Engineers, New York, www.ieee.org . A membership organization that includes engineers, scientists and students in electronics and allied fields. It has more than 300,000 members and is involved with setting standards for computers and communications.
Infrastructure mode	A client setting providing connectivity to an AP. As compared to Ad-Hoc mode, whereby PCs communicate directly with each other, clients set in Infrastructure Mode all pass data through a central AP. The AP not only mediates wireless network traffic in the immediate neighborhood, but also provides communication with the wired network. See Ad-Hoc and AP.
I/O	The term used to describe any operation, program or device that transfers data to or from a computer.
Internet appliance	A computer that is intended primarily for Internet access is simple to set up and usually does not support installation of third-party software. These computers generally offer customized web browsing, touch-screen navigation, e-mail services, entertainment and personal information management applications.
IP	A set of rules used to send and receive messages at the Internet address level.
IP (Internet Protocol) telephony	Technology that supports voice, data and video transmission via IP-based LANs, WANs and the Internet. This includes VoIP (Voice over IP).
IP address	A 32-bit number that identifies each sender or receiver of information that is sent across the Internet. An IP address has two parts: an identifier of a particular network on the Internet and an identifier of the particular device (which can be a server or a workstation) within that network.
IPX-SPX	IPX, short for Internetwork Packet Exchange, a networking protocol used by the Novell NetWare operating systems. Like UDP/IP, IPX is a datagram protocol used for connectionless communications. Higher-level protocols, such as SPX and NCP, are used for additional error recovery services. Sequenced Packet Exchange, SPX, a transport layer protocol (layer 4 of the OSI Model) used in Novell Netware networks. The SPX layer sits on top of the IPX layer (layer 3) and provides connection-oriented services between two nodes on the network. SPX is used primarily by client/server applications.
ISA	A type of internal computer bus that allows the addition of card-based components like modems and network adapters. ISA has been replaced by PCI and is not very common anymore.
ISDN	A type of broadband Internet connection that provides digital service from the customer's premises to the dial-up telephone network. ISDN uses standard POTS copper wiring to deliver voice, data or video.
ISO Network Model	A network model developed by the International Standards Organization (ISO) that consists of seven different levels, or layers. By standardizing these layers and the interfaces in between, different portions of a given protocol can be modified or changed as technologies advance or systems requirements are altered. The seven layers are: Physical, Data Link, Network, Transport, Session, Presentation and Application.
LAN	A system of connecting PCs and other devices within the same physical proximity for sharing resources such as an Internet connection, printers, files and drives.
MAC Address	A MAC address, short for Media Access Control address, is a unique code assigned to most forms of networking hardware. The address is permanently assigned to the hardware, so limiting a wireless network's access to hardware – such as wireless cards – is a security feature employed by closed wireless networks. But an experienced hacker – armed with the proper tools – can still figure out an authorized MAC address, masquerade as a legitimate address and access a closed network. Every wireless 802.11 device has its own specific MAC address hard-coded into it. This unique identifier can be used to provide security for wireless networks. When a network uses a MAC table, only the 802.11 radios that have had their MAC addresses added to that network's MAC table would be able to get onto the network.

Modbus	Modbus is a serial communications protocol for use with its programmable logic controllers (PLCs). Simple and robust, it has since become a de facto standard communication protocol, and it is now amongst the most commonly available means of connecting industrial electronic devices.
Modbus RTU	This is used in serial communication & makes use of a compact, binary representation of the data for protocol communication. The RTU format follows the commands/data with a cyclic redundancy check checksum as an error check mechanism to ensure the reliability of data. Modbus RTU is the most common implementation available for Modbus. A Modbus RTU message must be transmitted continuously without inter-character hesitations. Modbus messages are framed (separated) by idle (silent) periods.
Modbus TCP	Also called Modbus TCP/IP. This is a Modbus variant used for communications over TCP/IP networks, connecting over port 502. It does not require a checksum calculation as lower layers already provide checksum protection.
NAT	Network Address Translation: A network capability that enables a houseful of computers to dynamically share a single incoming IP address from a dial-up, cable or xDSL connection. NAT takes the single incoming IP address and creates new IP address for each client computer on the network.
NIC	A type of PC adapter card that either works without wires (Wi-Fi) or attaches to a network cable to provide two-way communication between the computer and network devices such as a hub or switch. Most office wired NICs operate at 10 Mbps (Ethernet), 100 Mbps (Fast Ethernet) or 10/100 Mbps dual speed. High-speed Gigabit and 10 Gigabit NIC cards are also available. See PC Card.
OFDM	Orthogonal frequency-division multiplexing (OFDM) is a method of encoding digital data on multiple carrier frequencies. OFDM has many advantages over DSSS (more bandwidth over less spectrum, better multi-path immunity, better Doppler shift immunity and greater resilience to interference.) The radios use DSSS when downgraded to data rates of: 1, 2, 5.5 and 11Mbps. OFDM is used when the radio is transmitting at data rates of 6, 9, 12, 18, 24, 36, 48 and 54Mbps. The data rate depends on the RSSI.
Proxy server	Used in larger companies and organizations to improve network operations and security, a proxy server is able to prevent direct communication between two or more networks. The proxy server forwards allowable data requests to remote servers and/or responds to data requests directly from stored remote server data.
RJ-45	Standard connectors used in Ethernet networks. Even though they look very similar to standard RJ-11 telephone connectors, RJ-45 connectors can have up to eight wires, whereas telephone connectors have only four.
Receive Sensitivity	The minimum signal strength required to pick up a signal. Higher bandwidth connections have less receive sensitivity than lower bandwidth connections.
Router	A device that forwards data from one WLAN or wired local area network to another.
Server	A computer that provides its resources to other computers and devices on a network. These include print servers, Internet servers and data servers. A server can also be combined with a hub or router.
Site survey	The process whereby a wireless network installer inspects a location prior to putting in a wireless network. Site surveys are used to identify the radio- and client-use properties of a facility so that access points can be optimally placed.
SSL	Commonly used encryption scheme used by many online retail and banking sites to protect the financial integrity of transactions. When an SSL session begins, the server sends its public key to the browser. The browser then sends a randomly generated secret key back to the server in order to have a secret key exchange for that session.
SNR	Signal to Noise Ratio. The number of decibels difference between the signal strength and background noise.

Subnetwork or Subnet	Found in larger networks, these smaller networks are used to simplify addressing between numerous computers. Subnets connect to the central network through a router, hub or gateway. Each individual wireless LAN will probably use the same subnet for all the local computers it talks to.
Switch	A type of hub that efficiently controls the way multiple devices use the same network so that each can operate at optimal performance. A switch acts as a networks traffic cop: rather than transmitting all the packets it receives to all ports as a hub does, a switch transmits packets to only the receiving port.
TCP	A protocol used along with the Internet Protocol (IP) to send data in the form of individual units (called packets) between computers over the Internet. While IP takes care of handling the actual delivery of the data, TCP takes care of keeping track of the packets that a message is divided into for efficient routing through the Internet. For example, when a web page is downloaded from a web server, the TCP program layer in that server divides the file into packets, numbers the packets and then forwards them individually to the IP program layer. Although each packet has the same destination IP address, it may get routed differently through the network. At the other end, TCP reassembles the individual packets and waits until they have all arrived to forward them as a single file.
TCP/IP	The underlying technology behind the Internet and communications between computers in a network. The first part, TCP, is the transport part, which matches the size of the messages on either end and guarantees that the correct message has been received. The IP part is the user's computer address on a network. Every computer in a TCP/IP network has its own IP address that is either dynamically assigned at startup or permanently assigned. All TCP/IP messages contain the address of the destination network as well as the address of the destination station. This enables TCP/IP messages to be transmitted to multiple networks (subnets) within an organization or worldwide.
Transmit Power	The power usually expressed in mW or db that the wireless device transmits at.
VoIP	Voice transmission using Internet Protocol to create digital packets distributed over the Internet. VoIP can be less expensive than voice transmission using standard analog packets over POTS (Plain Old Telephone Service).
VPN	A type of technology designed to increase the security of information transferred over the Internet. VPN can work with either wired or wireless networks, as well as with dial-up connections over POTS. VPN creates a private encrypted tunnel from the end user's computer, through the local wireless network, through the Internet, all the way to the corporate servers and database.
WAN	A communication system of connecting PCs and other computing devices across a large local, regional, national or international geographic area Also used to distinguish between phone-based data networks and Wi-Fi. Phone networks are considered WANs and Wi-Fi networks are considered Wireless Local Area Networks (WLANs).
WEP	Basic wireless security provided by Wi-Fi. In some instances, WEP may be all a home or small-business user needs to protect wireless data. WEP is available in 40-bit (also called 64-bit), or in 108-bit (also called 128-bit) encryption modes. As 108-bit encryption provides a longer algorithm that takes longer to decode, it can provide better security than basic 40-bit (64-bit) encryption.
Wi-Fi	Wireless Fidelity: An interoperability certification for wireless local area network (LAN) products based on the Institute of Electrical and Electronics Engineers (IEEE) 802.11 standard.

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As experienced experts we support our customers and partners around the world with products, solutions and services in the industrial environment of power, signal and data. We are at home in their industries and markets and know the technological challenges of tomorrow. We are therefore continuously developing innovative, sustainable and useful solutions for their individual needs. Together we set standards in Smart Industrial Connectivity.

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