

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

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

Electronic Datasheet



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.

Secure.

256 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.

Ethernet native support provides solutions to connectivity challenges today and in the future. The Weidmüller WI-I/O-415-U2 Series also provides Ethernet and serial gateway support for industrial protocols including Modbus TCP/RTU and DNP3 I/O.

Reliable.

The series uses a new ProMesh system that operates reliably with the challenges of obstructed paths by using automatic path selection and frequency agility to allow the communications network to adapt to changes easily with redundancy.

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
- 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 - 174MHz, 340-480MHz Model Options
- 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 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

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Technical Data				
Transmitter/Receiver				
Frequency ¹	148-174 MHz			
	340-400 MHz			
	400-480 MHz			
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)		
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 rate 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
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 and 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 and 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 information/statistics available Web/Modbus reg			
Logging	Optional internal data logging for I/O and events.			
	Logging memory 1 MB			

Technical Data				
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 EX40 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 (7.20 x 1.38 x 6.20)			
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				
Freq. Band	Type	Part No.		
148-174 MHz	WHO-415-U2-C1	7940107949		
148-174 MHz (Hazloc Approved)	WHO-415-U2-C1-EX	7940107950		
340-400 MHz	WHO-415-U2-C3	7940107957		
400-480 MHz	WHO-415-U2-C4	7940107953		
400-480 MHz (Hazloc Approved)	WHO-415-U2-C4-EX	7940107954		

1 Available RF power and frequency may vary depending on country of application. Please confirm with local regulatory body.

2 Data compression will provide an improvement in over-the-air data throughput of up to 50%, depending on data content.

3 Discrete input and output function shared for total of 8 discrete inputs and outputs.

Weidmüller, Inc

821 Southlake Blvd.

Richmond, Virginia 23236

Telephone: (800) 849-9343

Website: www.weidmuller.com

Email: customerservice@weidmuller.com

