

415U-2-C wireless I/O gateway

Condor series long-range high-speed industrial wireless I/O for reliable secure connectivity



Description

ELPRO's industrial wireless solutions has 30 years of expertise in solving critical industrial applications through our extensive knowledge in wireless I/O, modem and gateway applications. The 415U-2-C extends communications to sensors in local, remote, and difficult-to-reach locations.

Designed with the Condor series long-range, high data speed wireless transceiver and standards-based native Ethernet protocol over the air, gives 415U-2-C the power and flexibility to perform reliably in sprawling harsh industrial environments.

Secure. AES encryption, advanced IP filtering, multi-level 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 ELPRO 415U-2-C also provides Ethernet and serial gateway support for industrial protocols including Modbus TCP/RTU and DNP3 I/O.

Reliable. The Condor series 415U-2-C ProMesh™ 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.

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
- IO Plus Logic engine for controlling I/O points
- User configurable dashboard to display I/O and Diagnostics

- 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)
- 148-174 MHz, 340-520 MHz, 894-960MHz model options
- 10 mW to 10 W RF power configurable, license or license-free
- 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

Technical Data EL-415U-2-C

Effective September 2020

Specifications

Specification	Description																																			
Transmitter and receiver																																				
Frequency ^a	148 - 174MHz, 340 – 400 MHz, 400 – 480 MHz 470 - 520 MHz, 894 - 902 MHz, 928 - 960 MHz																																			
Transmit power—peak ^a	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, 25.0 kHz (software configurable)																																			
Data rate raw no compression ^b	<table border="1"> <thead> <tr> <th>Encoding</th> <th>Channel</th> <th>6.25 kHz</th> <th>12.5 kHz</th> <th>25.0 kHz</th> </tr> </thead> <tbody> <tr> <td>QPSK-FEC</td> <td>4 kbps</td> <td>8 kbps</td> <td>16 kbps</td> <td>16 kbps</td> </tr> <tr> <td>QPSK</td> <td>8 kbps</td> <td>16 kbps</td> <td>32 kbps</td> <td>32 kbps</td> </tr> <tr> <td>16-QAM</td> <td>16 kbps</td> <td>32 kbps</td> <td>64 kbps</td> <td>64 kbps</td> </tr> <tr> <td>64-QAM</td> <td>24 kbps</td> <td>48 kbps</td> <td>96 kbps</td> <td>96 kbps</td> </tr> <tr> <td>2-FSK</td> <td></td> <td>4.8 kbps</td> <td>9.6 kbps</td> <td>9.6 kbps</td> </tr> <tr> <td>4-FSK</td> <td></td> <td>9.6 kbps</td> <td>19.2 kbps</td> <td>19.2 kbps</td> </tr> </tbody> </table>	Encoding	Channel	6.25 kHz	12.5 kHz	25.0 kHz	QPSK-FEC	4 kbps	8 kbps	16 kbps	16 kbps	QPSK	8 kbps	16 kbps	32 kbps	32 kbps	16-QAM	16 kbps	32 kbps	64 kbps	64 kbps	64-QAM	24 kbps	48 kbps	96 kbps	96 kbps	2-FSK		4.8 kbps	9.6 kbps	9.6 kbps	4-FSK		9.6 kbps	19.2 kbps	19.2 kbps
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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 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, Dashboard, IO Plus logic 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 diagnostics																																				
LED indication	Power/OK, Radio TX/RX/Link, RS-232, RS-485, digital I/O, analog I/O status																																			
Reported diagnostics																																				
Network diagnostics	Diagnostic capture to Wireshark™ format file																																			
Radio diagnostics	Channel utilization, RSSI measurements (dBm), background noise, connectivity information/ statistics available Web/Modbus reg																																			

Specification	Description
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, 1200–230400 bps Serial over IP modem support
Operation	
Modes—topology	Point to multipoint Base, repeater, remote unit types ProMesh automatic path selection or fixed links Manual mode for advanced configuration
Input and output	
Discrete input ^c	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 ^c	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	115S series Modbus I/O modules
Compliance	
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
Hazardous area	Class I, Division 2 IEC EX Zone 2; ATEX Zone 2—pending
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	
Size (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
Mounting	DIN rail
Temperature rating	–40 to +158 °F (–40 to +70 °C)
Humidity rating	0–90% RH noncondensing
Weight	1.6 lb (0.7 kg)

Accessories

Description	Product code
Antennas	
400 MHz dipole antenna, N-type female, 2 dBi gain	UDP400-C
400 MHz collinear antenna, N-type female, 5 dBi gain	BU3-400
400 MHz collinear antenna, N-type female, 8 dBi gain	BU6-400
400 MHz Yagi antenna, N-type female, 6 dBi gain, includes bracket	YU3-400
400 MHz Yagi antenna, N-type female, 9 dBi gain, includes bracket	YU6-400
400 MHz Yagi antenna, N-type female, 12 dBi gain, includes bracket	YU9-400
Cables	
Coaxial cable kit, 9.8 ft (3 m)/32 ft (10 m)/65 ft (20 m), N-type to SMA	CC3/10/20-SMA
Coaxial cable tail, 24 in (600 mm), SMA to N-type female or male	CCTAIL-SMA-F/M
Ethernet cable, 6 ft (1.8 m), straight through, RJ-45 to RJ-45	ETH-C5A
USB 2.0 configuration cable—Type A to Type B, 1 m long, included with 215U-2/415U-x-C units	CBLUSB-ATOB
Surge diverters	
Coaxial surge diverter, bulkhead N-type female to N-type female	CSD-N-6000
Power supply surge diverter, 110 Vac/15 A	MA15/D/1/SI
Power supply surge diverter, 240 Vac/10 A	MA15/D/2/SI
I/O interface	
215/915/415U series single channel thermocouple adaptor, type j, k, t, cold junction comp	915U-TCADP
Mounting brackets	
415U series flat wall mounting kit	BR-415-PLATE
Mounting bracket kit for collinear antenna UDP, BU3, BU6	BR-COL-KIT
Mounting bracket kit for Yagi antennas, YU3, YU6, YU9	BR-YAG-KIT
Power supplies	
DIN rail power supply, 85–264 Vac, 24 Vdc/2.5 A	PS-DINAC-24DC-OK

Ordering

Description	Band	RF power	Product code
Wireless IO/gateway	148 - 174 MHz	10 mW - 5 W	415U-2-C1
Base/repeater/remote, 96 kbps	214 - 240 MHz	10 mW–10 W	415U-2-C2
	340 - 400 MHz	10 mW–10 W	415U-2-C3
QAM, 10.4–30 Vdc, 10 W, 6.25/12.5/25 kHz	400 - 480 MHz	10 mW–10 W	415U-2-C4
	470 - 520 MHz	10 mW–10 W	415U-2-C5
	894 - 902 MHz	10 mW–5 W	415U-2-C91
	928 - 960 MHz	10 mW–5 W	415U-2-C92
415U-2 wireless I/O modem/gateway including Class 1 Div 2 for hazardous area use	214 - 240 MHz	10 mW–10 W	415U-2-C2-EX
	340–400 MHz	10 mW–10 W	415U-2-C3-EX
	400 - 480 MHz	10 mW–10 W	415U-2-C4-EX
	894 - 902 MHz	10 mW–5 W	415U-2-C91-EX
	928 - 960 MHz	10 mW–5 W	415U-2-C92-EX

Related products

Description	Band	RF power	Product code
Wireless Ethernet	148 - 174 MHz	10 mW - 5 W	415U-E-C1
	214 - 240 MHz	10 mW–10 W	415U-E-C2
Modem/gateway	340 - 400 MHz	10 mW–10 W	415U-E-C3
	400 - 480 MHz	10 mW–10 W	415U-E-C4
Base/repeater/remote, 96 kbps	470 - 520 MHz	10 mW–10 W	415U-E-C5
	894 - 902 MHz	10 mW–5 W	415U-E-C91
QAM, 10.4–30 Vdc, 10 W, 6.25/12.5/25 kHz	928 - 960 MHz	10 mW–5 W	415U-E-C92
	Redundant base station/repeater	148 - 174 MHz	10 mW - 5 W
214 - 240 MHz		10 mW–10 W	415U-BSR-C2
QAM, 10.4–30 Vdc, 10 W, 6.25/12.5/25 kHz	340 - 400 MHz	10 mW–10 W	415U-BSR-C3
	400 - 480 MHz	10 mW–10 W	415U-BSR-C4
	470 - 520 MHz	10 mW–10 W	415U-BSR-C5
	894 - 902 MHz	10 mW–5 W	415U-BSR-C91
	928 - 960 MHz	10 mW–5 W	415U-BSR-C92

- Available RF power and frequency may vary depending on country and model selected. Please confirm with local regulatory body.
- Data compression will provide an improvement in over-the-air data throughput of up to 50%, depending on data content..
- Discrete input and output function shared for total of 8 discrete inputs and outputs.

Specifications subject to change.



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