

POWER-LINE CARRIER PRODUCTS



UPLC-II

The Second Generation of Universal Power-Line Carrier Narrowband Power-Line Carrier for Protective Relay Applications

Our UPLC-II is the most versatile power-line carrier available. It incorporates the latest technologies to assist you in application, installation and maintenance of your power-line carrier systems.

The UPLC-II is fully microprocessor controlled to provide automatic setting of the transmit output level and receiver sensitivity as well as monitoring of the AM channel and sequence of events recording. Programming is accomplished either via the front panel keypad, or with a personal computer and standard web browser.

Standard Features

- Programmable for either FSK or ON-OFF applications
- Fully frequency programmable from 30 to 535 kHz in 0.01 kHz increments
- Bandwidths and frequency shifts selectable
- FSK units settable for 2- or 3-frequency applications
- All software configurable items are set via standard web browser
- Integrated HMI with front keypad and 4x20 character display
- Front ports for PC interface: Ethernet RJ45 and RS-232
- Unit can be programmed to match any narrowband PLC at remote end, excluding voice or checkback function
- Measured transmit and receive level are displayed on front panel and web pages in dB units or W/V units
- Automatic receiver sensitivity settings
- Continuous transmit reflected power meter with frequency selectivity and settable alarm output
- Sequence of events, time-tagged with 1 ms accuracy for most events
- IRIG-B timing input (both modulated and unmodulated)
- Five programmable inputs: high threshold, current-limited and optically isolated design
- Ten programmable outputs: seven solid state and three contacts

Options

- 48/60 VDC or 110/250 VDC powered
- Trip duty contact outputs (4)
- Testing facilities-automatic checkback for ON-OFF and trip testing for FSK 2- or 3-frequency applications
- FSK 4-frequency logic (2 independent trips)
- Auxiliary power supply for driving 20/200 mA loads (older EM relays)
- Redundant power supply
- Redundant power amplifier
- Rear ethernet ports: Redundant 10/100 BaseT (RJ-45) or 100 BaseFX (ST connectors)
- Communication protocols: DNP3 or IEC61850

Compatibility

The UPLC-II may be used in any application in which our legacy TC-10B or TCF-10B were applied. Other compatible PLC equipment may be used at the opposite end of the line just as with the TC-10B/TCF-10B units.

The UPLC-II checkback is compatible with the UPLC/TC-10B checkback and the UCBS Standalone checkback system.



PROTOCOLS AVAILABLE

Allow remote communications and control of the UPLC-II through the use of either of two protocols. DNP3 is the workhorse of the RTU sector of the industry and allows binary and analog quantities to be remotely accessed. IEC61850 is the all inclusive protocol that allows high-speed interface over Ethernet-based local area networks for data transfer via a peer-to-peer communication network.

DNP3

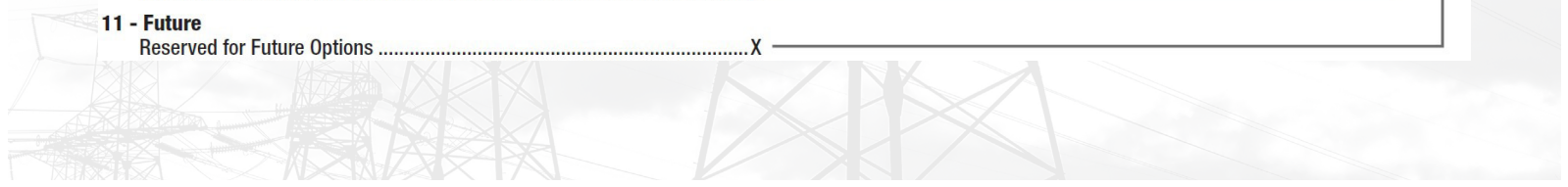
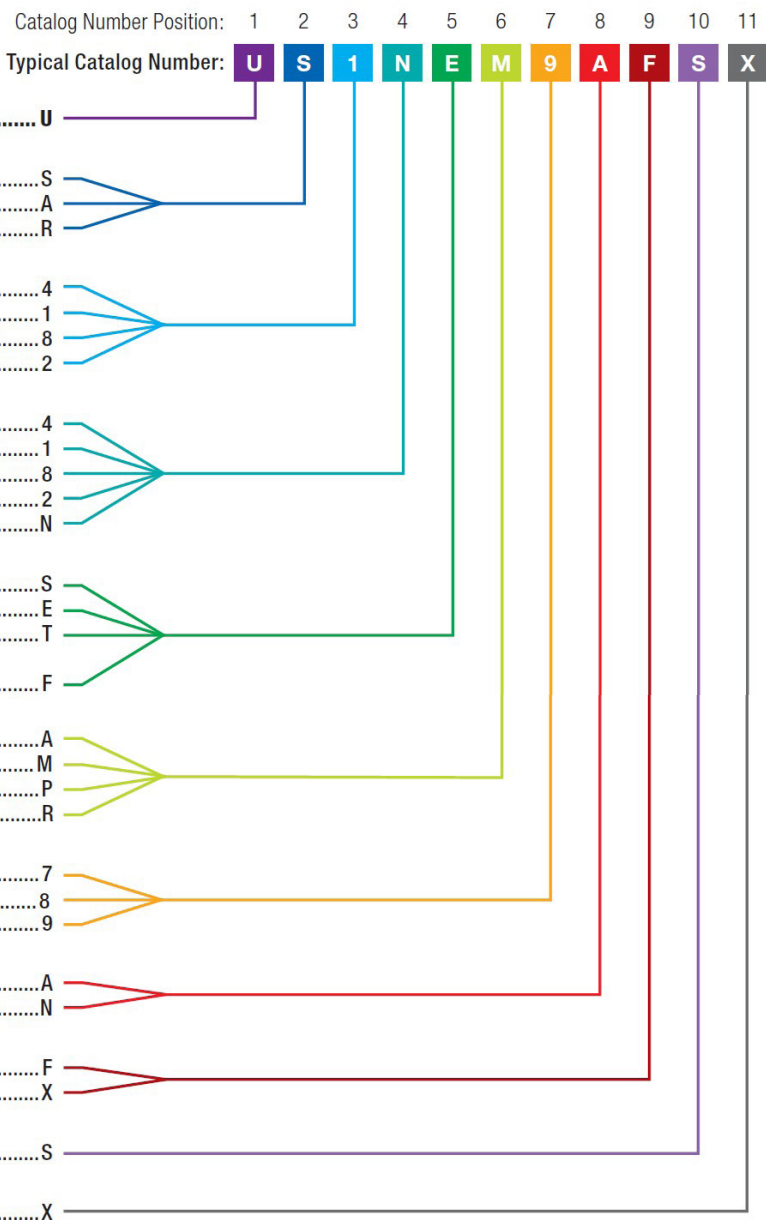
With the use of DNP3 the user can eliminate alarm wiring by utilizing the RS232, RS485 or Ethernet communications for data retrieval via SCADA. Data includes TX/RX levels, percent reflected power, RX margin and I/O status.

IEC61850

The user can eliminate almost all copper wiring with the use of IEC61850. All inputs and outputs can be implemented with the use of the Generic Object Oriented Substation Event messages (GOOSE). Digital and Analog events are available at speeds consistent with protection functions.

ORDERING

Ordering Notes:
 1. Dual Power Amps requires 2nd power supply
 2. Must also select an ethernet option



SPECIFICATIONS

Basic Transmit / Receive Specifications:	
Basic industry specification	Meets or exceeds requirements of IEEE C93.5, requirements for single function power-line carrier TX/RX equipment
Frequency range	30-535 kHz
TX/RX frequency resolution	10 Hz increments
Frequency stability	± 5 Hz
TX/RX connections	2-wire or 4-wire
TX RF output impedance	50 Ω, 75 Ω nominal unbalanced
TX RF output power	10 W max (20 W with optional redundant amp) 0.3 W min
TX RF harmonic & spurious output	55 dB below TX frequency at rated full power
TX output variation	±1 dB over temp/volt range
TX reflected power monitor accuracy	±10% of reading (with or without interference)
Modulation type	ON/OFF (Amplitude Modulation) or FSK (Frequency Shift Keyed), field programmable
FSK frequency shifts	Programmable ±100, ±250 or ±500 Hz
Minimum in-band SNR for good channel operation	13 dB for FSK, 20 dB for ON/OFF
4-wire receiver input impedance	>4 k Ω
RX signal level range (with 15 dB fade margin)	28 mV (min.) to 70.7 V (max.) or -18 dBm (min.) to +50 dBm (max.) across 50 Ω
Receiver sensitivity (absolute lowest level)	5 mV or -33 dBm across 50 Ω
Power supply & power amp boards only	Hot swappable

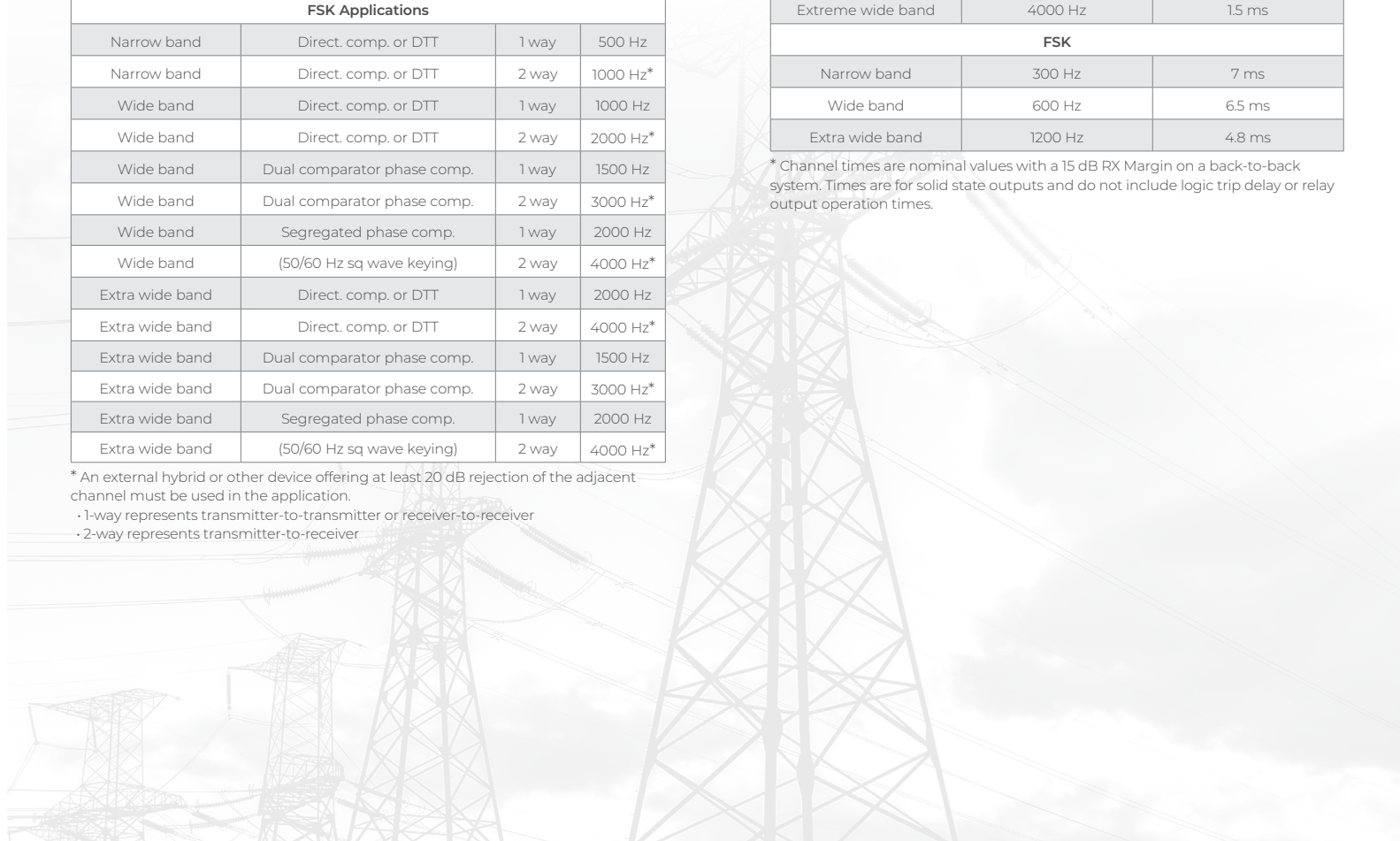
Minimum Frequency Spacing*			
ON/OFF Applications			
Wide band	Directional comparison relaying		4000 Hz
Narrow band	Directional comparison relaying		2000 Hz
Extreme wide band	Phase comparison relaying		4000 Hz
FSK Applications			
Narrow band	Direct. comp. or DTT	1 way	500 Hz
Narrow band	Direct. comp. or DTT	2 way	1000 Hz*
Wide band	Direct. comp. or DTT	1 way	1000 Hz
Wide band	Direct. comp. or DTT	2 way	2000 Hz*
Wide band	Dual comparator phase comp.	1 way	1500 Hz
Wide band	Dual comparator phase comp.	2 way	3000 Hz*
Wide band	Segregated phase comp.	1 way	2000 Hz
Wide band	(50/60 Hz sq wave keying)	2 way	4000 Hz*
Extra wide band	Direct. comp. or DTT	1 way	2000 Hz
Extra wide band	Direct. comp. or DTT	2 way	4000 Hz*
Extra wide band	Dual comparator phase comp.	1 way	1500 Hz
Extra wide band	Dual comparator phase comp.	2 way	3000 Hz*
Extra wide band	Segregated phase comp.	1 way	2000 Hz
Extra wide band	(50/60 Hz sq wave keying)	2 way	4000 Hz*

* An external hybrid or other device offering at least 20 dB rejection of the adjacent channel must be used in the application.

- 1-way represents transmitter-to-transmitter or receiver-to-receiver
- 2-way represents transmitter-to-receiver

Nominal Receiver Bandwidths & Corresponding Channel Delay*		
Mode	Receiver Bandwidth	Channel Delay
ON/OFF		
Narrow band	600 Hz	2.8 ms
Wide band	1200 Hz	2.1 ms
Extreme wide band	4000 Hz	1.5 ms
FSK		
Narrow band	300 Hz	7 ms
Wide band	600 Hz	6.5 ms
Extra wide band	1200 Hz	4.8 ms

* Channel times are nominal values with a 15 dB RX Margin on a back-to-back system. Times are for solid state outputs and do not include logic trip delay or relay output operation times.



SPECIFICATIONS CONT.

Output Ratings (All Outputs Non-Wetted & Non-Polarity Sensitive)								
Output (Terminal Block)	Max Current @ 250 VDC			N.O. / N.C. Selectable	Nominal Voltage Drop	Voltage Range	Max Operate Time	Max Dropout Time
	Make & Carry Continuous	Make & Carry Short Term	Interrupt					
Power supply (TB1 or 2 - 5 & 6)	2 A	N/A	0.25 A	Hardware jumper (PS)	0 V	15-250 VDC	15 ms	10 ms
7 low level solid state (TB4 & 5)	0,1/1.0 A hardware selectable	6 A/15 ms for 1 A setting	0,1/1.0 A hardware selectable	Software setting	2.5 V	15-250 VDC	0.5 ms	0.5 ms
3 low level EM contacts (TB5)	2 A	N/A	0.25 A	Hardware jumper (I/O)	0 V	15-250 VDC	15 ms	10 ms
4 trip duty EM contacts (TB6)	14 A	30 A/200 ms w/ duty cycle per IEEE C37.90	0.25 A	Hardware jumper (I/O)	0.2 V @ <1 A 7 V @ 30 A	15-250 VDC	N.O. contact closing = 3 ms N.C. contact opening = 2 ms	N.O. contact opening = 5 ms N.C. contact closing = 4 ms

Keying Input Ratings (Non-Polarity Sensitive)		
Nominal Input Voltage	Min Keying Voltage	Max Current Draw
15 VDC	12 VDC	5 mA
48/60 VDC	38 VDC	5 mA
110/125 VDC	70 VDC	5 mA
220/250 VDC	150 VDC	5 mA

IRIG-B Specifications	
Modulated IRIG-B input impedance	2.5 K ohm min (3.5 K ohm typical)
TTL IRIG-B input current draw	3.8 mA typical at 5 VDC

Environmental / Surge / Interference Specifications	
Ambient temperature, range of air	-30°C to +70°C (IEEE C37.90)
Relative humidity	Up to 95% (non-condensing at 40°C for 96 hrs cumulative) (IEEE C93.5)
Altitude	Up to 1500 m (without de-rating), 6000 m with de-rating
Surge withstanding capability	Per IEEE C37.90.1
1 minute withstand	IEC 255-5 and IEEE C37.90 (500 VDC class)
Coax, center conductor to ground	3000 V impulse level, 1.2 x 50 µs impulse, per IEEE C93.5
Dielectric	Per IEEE C37.90, 500 VDC Class, (3000 VDC dielectric withstand), IEC60255-5
Electrostatic discharge (ESD)	Per IEEE C37.90.3, IEC61000-4-2
Radiated electromagnetic interference from transceivers	Per IEEE C37.90.2
Carrier frequency on DC input leads when transmitting 1 W	20 mV (max)

Power Requirements (With Single Power Supply)				
Nominal Battery Voltage	Permissible Voltage Range	Standby	1 Watt Transmit	10 Watt Transmit
48/60 VDC	38 to 76 VDC	25 W	35 W	60 W
110/125/250 VDC	88 to 300 VDC	20 W	30 W	66 W

Weight & Dimension Specifications (Without Redundant Modules - Add 1 lb for Each Redundant Module)									
Equipment	Net Weight		Height		Width		Depth		Rack
	lbs	kg	in	mm	in	mm	in	mm	
Single unit	21	9.53	5.218	132.54	17.437	442.90	13.26	336.75	3 RU

WORLD HEADQUARTERS
 255 North Union Street
 Rochester, NY 14605
 Toll Free: +1.800.950.6686
 Tel: +585.263.7700
 Fax: +585.454.7805

EUROPEAN HEADQUARTERS
 UK
 +44.770.280.9377
 power.sales@ametek.com

ASIA PACIFIC HEADQUARTERS
 Singapore
 +65.6484.2388
 sales@ametekasia.com

AMETEK INSTRUMENTS INDIA PVT. LTD.
 Bengaluru
 +91.80.6782.3252
 power.sales@ametek.com

WEBSITE
www.ametekpower.com
EMAIL
pi.marketing@ametek.com



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