SCADAPack 350E | 357E

Smart Remote Terminal Units

Specifications – General characteristics

Controller	
Processor	• 32-bit ARM7 microcontroller, 32 MHz clock, integrated watchdog timer. • Two microcontroller IO co-processors, 20 MHz clock
Memory	• 16 MB FLASH ROM, 4MB CMOS RAM, 4kB EEPROM • CMOS SRAM with lithium battery retains contents for 2 years with no power
Event Logging Capacity (events)	20,000 events
Database Capacity	Up to 1,000 points
Data Concentrator Capacity (points)	Up to 500 in DNP3
Data Concentrator Capacity (devices)	Up to 10 in DNP3 and up to 10 in Modbus or DF1
File System Typical Storage	Internal: 6MB

Communications	
Serial Port : COM1 Serial Port : COM2	• RS-485, 2-pole removable terminal block, 2-wire, half duplex, supports baud rates up to 115,200 bps • RS-232 port, 8-pin modular RJ45 jack, full or half duplex, or RS-485 port, 2-wire, half-duplex, supports baud rates up to 115,200 bps in RS-232 mode
Serial Port : COM3	RS-232 port, 8-pin modular RJ45 jack, full or half duplex with RTS/CTS control and operator interface power control, supports baud rates up to 115,200 bps
Embedded Wireless	The controller may embed an unlicensed radio module (different options in 900 Mhz or 2.4 Ghz) that uses one of the serial ports
Serial Protocols	DNP3 level 4 slave/master and peer-to-peer, IEC 60870-5-101 slave, Modbus slave/master, DF1 master
Ethernet port	8-pin modular RJ45 jack, 10/100 Mbps UTP (10/100Base-T), transformer-isolated
IP Protocol	• DNP3 level 4 in TCP Master/Slave, UDP Master/Slave and peer-to-peer, IEC 60870-5-104 Slave, Modbus/TCP Server, Modbus/ TCP Client, Modbus RTU in TCP Client • NTP Client/Server, Telnet Server, FTP Server, BOOTP Server
Master – Slave Capability	• Can simultaneously report to up to multiple independent active masters: 3 in DNP3, 2 in IEC 60870-5-101/-104, 5 in Modbus TCP and 3 in Modbus RTU, and connect to up to 100 remote devices in DNP3 peer-to-peer. • As a data concentrator it can manage up to 10 local or remote DNP3 slaves, and up to 10 local slaves communicating with Modbus RTU, Modbus TCP or DF1 serial.
USB Device	USB 2.0 compliant “B”-type receptacle, for local configuration

SCADAPack 350E | 357E

Smart Remote Terminal Units

Specifications – General characteristics

General	
Logic Control	IEC 61131-3 SCADAPack Workbench programming suite (LD, ST, FBD & SFC)
I/O Terminations	SCADAPack 350E: 6, 12-pole connector, 0.0810...3.31mm2 (28...12 AWG), solid or stranded SCADAPack 357E: 5, 6, 7, 9, 10, 12-pole connectors, 0.0810...3.31mm2 (28...12 AWG), solid or stranded
Dimensions	SCADAPack 350E: 211.8mm (8”34) wide, 140.4mm (5.53”) high, 46.5mm (1.83”) deep SCADAPack 357E: 211.8mm (8”34) wide, 181.0mm (7.13”) high, 66.0mm (2.60”) deep
Enclosure	Corrosion resistant zinc-plated steel with black enamel paint
Environment	• Conformally coated • -40°C (-40°F) to 70°C (158°F) operating, -40°C (-40°F) to 85°C (185°F) storage • 5% RH to 95% RH, non-condensing
Shock & Vibration	IEC 60068-2-27 (tested up to 15g), IEC 60068-2-6
Warranty	3 years on parts and labor

Power	
Rated Voltage	12...30 Vdc. Limit voltage: 11.5...32 Vdc; turn on voltage: 10...11.5 Vdc; turn off voltage: 9...10 Vdc
Maximum Power	12 W at 24 Vdc (internal 5 Vdc supply fully loaded and Vloop on and boosted, fully loaded)
Power Requirements	• SCADAPack 350E typical power consumption (at 20°C/ 68°F)

	Controller LEDs	Vloop fully loaded	12 Vdc	24 Vdc
Use case 1	OFF		1.6 W	1.5 W
Use case 2	OFF	ON	5.1 W	4.9 W
Use case 3	ON		5.2 W	5.0 W

• SCADAPack 357E typical power consumption: up to 8.9 W (with up to 7 analog input/output loops powered from Vloop supply)

Power outputs	Vloop • Maximum 140mA at 12 V (booster turned off) or 24 Vdc (booster turned on); can power up to 7 analog input/output loops

SCADAPack 350E | 357E

Smart Remote Terminal Units

Specifications – Digital and Analog Inputs/Outputs

Controller board

Analog Inputs	5, user-selectable 0...10V or 0...20mA plus over range 1, 0...32.7 Vdc (15-bit) for DC supply monitoring • Resolution: 15-bit ADC (15-bit over the measurement range in 10V, 14-bit in 20mA) • Accuracy: ±0.1% of full scale at 25°C (77°F), ±0.2% over temperature range • Input Resistance: 250 Ω or 20 kΩ in 20mA or 10V configurations (60 kΩ for 32.768V) • Normal rejection mode: 27 dB at 60 Hz • Sampling rate: 170 ms
Analog Outputs	2 (optional), 0...20 mA, 4...20 mA, voltage output may be accomplished with external precision resistor • Resolution: 12-bit over 0...20 mA range • Accuracy: ±0.15% at 25°C (77°F), ±0.35% of full scale over temperature range • Response Time: less than 10 µs for 10% to 90% signal change • Power Supply: 12…30 Vdc, external • Power (Current) Requirements: 10 mA plus up to 20 mA per output • Isolation: isolated from RTU logic and chassis • Load Range: 12 Vdc: 0…375Ω, 24 Vdc: 0…925Ω, • Logic End-Of- Scan to Signal Update Latency: typically 18... 27ms • Status & Reporting: output value • Controls: Direct Operate, Select Before Operate
Digital Inputs/Outputs	8, user-selectable as inputs or outputs (open drain) **As Digital Inputs** • Dry contact • Time stamping: 170ms **As Digital Outputs** • Sinking MOSFET output, rated 30V, 0.5A, ground return connected to Chassis Ground
Counter Inputs	• 1, 0...10Hz (dry contact) • 2, 0...10kHz (turbine or dry contact)
Internal Power monitor	Power input - analog input and low indication, onboard lithium battery - low indication
Internal Temperature Monitor	Controller temperature range -40°C…+75°C (-40°F...+167°F)

I/O board (357E only)

Analog Inputs	8, software-configurable to 0...20, 4...20mA , 0...5 or 0...10V Same features as for the 5 analog inputs located on the controller board (see above) except isolation: • Isolation: 500 Vac from logic and chassis
Analog Outputs	2 (optional), 0...20/4...20mA, voltage output may be accomplished with external precision resistor Same features as for the analog outputs located on the controller board
Digital Inputs	32, 12…24 Vdc • Turn on voltage: 9 Vdc (minimum), Turn off voltage: 4 Vdc (maximum) • Over-voltage tolerance: 150% sustained over-voltage without foreseeable damage • DC input current: 0.67 mA at 24 Vdc • Time stamping : 170ms • Isolation : in group of 8, 1500 Vac from logic supply and chassis
Digital Outputs	16, relays (Form A) • 4 contacts share one common • Isolation : isolated in groups of 4. Isolated from RTU logic, RTU chassis and other groups to 1500 Vac • Maximum Switching Voltage: 30 Vdc or 250 Vac (resistive) • Maximum Switching Load: 150 W or 1250 VA (5 A) • Controls: Direct Operate, Select Before Operate, Trip/Close, Latch, Pulse

Additional I/O

I/O Expansion	Supported modules : • 5606, 5607, 5608 and 5610, and 5304, 5404, 5411, 5414, 5415, 5505 and 5506 Maximum number of modules per unit: • SCADAPack 350E: 8 (*) • SCADAPack 357E: 7 (*) (*): to reach this limit, additional power supply modules are required

SCADAPack 350E | 357E

Smart Remote Terminal Units

Model Code

	SCADAPack 350E/357E
Model	**Select : Controller**
TBUP350	SCADAPack350E, Controller 32 bits, 5 Analog Inputs, 8 Digital I/O, 3 High Speed Counter Inputs
TBUP357	SCADAPack357E, Controller 32 bits, comes with the above plus additional I/Os

Code	**Select : Platform**
E	SCADAPack E Firmware (Configuration Software included), executes two IEC 61131 kernels, Workbench required

Code	**Select: SCADA Security**
A	None
B	AGA-12 Encryption for DNP3 (Security Administrator application required)
C	DNP3 Secure Authentication SAv2 (Security Administrator application required)
D	DNP3 Secure Authentication with AGA-12 (Security Administrator application required)

Code	**Select: Protocol Option**
5	DNP3 Serial/IP mstr/slave/peer-to-peer, IEC 60870-5-101/104 Slave, Modbus RTU/TCP mstr/slave, TCP/IP, DF1 mstr

Code	**Select: License Option**
5	DNP3 Data Concentrator License (limit of 500 points from 10 IEDs), supports multiple DNP3 Masters (up to 3)
7	Adds WITS* protocol (available for SCADA Security Code C and Certification Code S only)

Code	**Select : Analog Inputs**
A	P350 : 5 selectable as 0...10V or 0...20mA *P357 : adds 8 selectable as 0...20mA, 4...20mA, 0...5V or 0...10V

Code	**Select: Digital Inputs/Outputs**
A	P350 only: 8 Digital I/O, individually selectable as digital input (Dry Contact) or digital output (Open Drain)
B	P357 only: adds 32 digital inputs (12-24V), 16 digital outputs (Dry Contact relay for Class I Div 2, Solid State relay for IECEx/ATEX)

* WITS protocol (Water Industry Telemetry Standard)

SCADAPack 350E | 357E

Smart Remote Terminal Units

Model Code

	SCADAPack 350E/357E
Code	**Select: Analog Outputs**
0	None
1	2 channel Analog Output, 0..20 mA, external DC supply
2	P357 only : 4 channel Analog Output, 0..20 mA, external DC supply

Code	**Select : Integrated Communications Interfaces**
0	None
	FreeWave™ & MDS™ Radios (requires one RS232 port)
1	900Mhz FreeWave Spread Spectrum Radio
A	900MHz MDS Spread Spectrum Radio
	Trio™ Radios – 900MHz (requires one RS232 port)
B	900MHz Trio Spread Spectrum Radio with encryption, 902-928MHz (FCC / IC)
C	900MHz Trio Spread Spectrum Radio with encryption, 915-928MHz (AUS)
D	900MHz Trio Spread Spectrum Radio, 915-928MHz (BRAZIL)
E	900MHz Trio Spread Spectrum Radio, 921-928MHz (NZ)
	Trio Radios – 2.4GHz (requires one RS232 port)
J	2.4GHz Trio Spread Spectrum Radio, ETSI/100mW, ATEX (EUROPE)
K	2.4GHz Trio Spread Spectrum Radio with Encryption, 500mW (CANADA, USA & AUSTRALIA)
L	2.4GHz Trio Spread Spectrum Radio, 500mW (OUTSIDE OF EUROPE, CANADA, USA & AUSTRALIA)

Code	**Selection: Certifications**
S	With FCC, UL508, CE marking and RCM
X	Adds IECEx/ATEX Class I, Zone 2
U	Adds cCSAus Nonincendive Electrical Equipment for use in Class I, Division 2, Groups A, B, C and D

Disclaimer: Not all product features are available in every mode of operation. Schneider Electric reserves the right to change product specifications. For more information visit www.schneider-electric.com.

Detailed Specifications & Technical Data

ENGLISH MEASUREMENT VERSION

8723 Multi-Conductor - Shielded Twisted Pair Cable

For more Information
please call

1-800-Belden1

General Description:

22 AWG stranded (7x30) tinned copper conductors, polypropylene insulation, twisted pairs, individually Beldfoil® shielded (100% coverage), 24 AWG stranded tinned copper drain wire, PVC jacket.

Physical Characteristics (Overall)

Conductor

AWG:

# Pairs	AWG	Stranding	Conductor Material
2	22	7x30	TC - Tinned Copper

Total Number of Conductors:	4

Insulation

Insulation Material:

Insulation Material	Wall Thickness (in.)
PP - Polypropylene	0.009

Inner Shield

Inner Shield Material:

Inner Shield Trade Name	Type	Inner Shield Material	Coverage (%)	Description
Beldfoil® (Z-Fold®)	Tape	Aluminum Foil-Polyester Tape	100.000	foil side out

Inner Shield Drain Wire AWG:

AWG
24

Inner Shield Drain Wire Stranding:	7x32
Inner Shield Drain Wire Conductor Material:	TC - Tinned Copper

Outer Shield

Outer Shield Material:

Outer Shield Material
Unshielded

Outer Jacket

Outer Jacket Material:

Outer Jacket Material	Nom. Wall Thickness (in.)
PVC - Polyvinyl Chloride	0.020

Overall Cable

Overall Nominal Diameter:	0.160 in.

Pair

Pair Color Code Chart:

Number	Color
1	Red & Black
2	Green & White

Mechanical Characteristics (Overall)

Operating Temperature Range:	-20°C To +75°C
UL Temperature Rating:	60°C
Bulk Cable Weight:	17 lbs/1000 ft.
Max. Recommended Pulling Tension:	42 lbs.
Min. Bend Radius/Minor Axis:	1.750 in.

Applicable Specifications and Agency Compliance (Overall)

Applicable Standards & Environmental Programs

NEC/(UL) Specification:	CM
CEC/C(UL) Specification:	CM

EU Directive 2011/65/EU (ROHS II):	Yes
EU CE Mark:	Yes
EU Directive 2000/53/EC (ELV):	Yes
EU Directive 2002/95/EC (RoHS):	Yes
EU RoHS Compliance Date (mm/dd/yyyy):	01/01/2004
EU Directive 2002/96/EC (WEEE):	Yes
EU Directive 2003/11/EC (BFR):	Yes
CA Prop 65 (CJ for Wire & Cable):	Yes
MII Order #39 (China RoHS):	Yes

Flame Test

UL Flame Test:	UL1685 UL Loading

Plenum/Non-Plenum

Plenum (Y/N):	No
Plenum Number:	82723, 87723, 88723

Electrical Characteristics (Overall)

Nom. Characteristic Impedance:

Impedance (Ohm)
52.000

Nom. Inductance:

Inductance (µH/ft)
0.17

Nom. Capacitance Conductor to Conductor:

Capacitance (pF/ft)
33.000

Nom. Capacitance Cond. to Other Conductor & Shield:

Capacitance (pF/ft)
62

Nominal Velocity of Propagation:

VP (%)
66

Nom. Conductor DC Resistance:

DCR @ 20°C (Ohm/1000 ft)
14.7

Ind. Pair Nominal Shield DC Resistance @ 20 Deg. C:	15 Ohm/1000 ft

Max. Operating Voltage - UL:

Voltage
300 V RMS

Max. Recommended Current:

Current
2.3 Amps per conductor @ 25°C

Put Ups and Colors:

Item #	Putup	Ship Weight	Color	Notes	Item Desc
8723 060U1000	1,000 FT	19.000 LB	CHROME		2 SH PR #22 PP PVC
8723 060U2000	2,000 FT	36.000 LB	CHROME		2 SH PR #22 PP PVC
8723 060U500	500 FT	10.000 LB	CHROME		2 SH PR #22 PP PVC
8723 060100	100 FT	3.200 LB	CHROME		2 SH PR #22 PP PVC
8723 0601000	1,000 FT	19.000 LB	CHROME	C	2 SH PR #22 PP PVC
8723 06010000	10,000 FT	190.000 LB	CHROME	C Y	2 SH PR #22 PP PVC
8723 06010001	10,000 FT	190.000 LB	CHROME	C	2 SH PR #22 PP PVC
8723 06015000	15,000 FT	285.000 LB	CHROME		2 SH PR #22 PP PVC
8723 0601640	1,640 FT	31.160 LB	CHROME		2 SH PR #22 PP PVC
8723 0602000	2,000 FT	38.000 LB	CHROME	C	2 SH PR #22 PP PVC
8723 0603280	3,280 FT	62.320 LB	CHROME	C	2 SH PR #22 PP PVC
8723 060500	500 FT	9.500 LB	CHROME		2 SH PR #22 PP PVC
8723 0605000	5,000 FT	90.000 LB	CHROME	C	2 SH PR #22 PP PVC
8723 0609999	10,000 FT	190.000 LB	CHROME	C Y	2 SH PR #22 PP PVC

Notes:

C = CRATE REEL PUT-UP.
Y = FINAL PUT-UP LENGTH MAY VARY -10% TO +20% FROM LENGTH SHOWN.MAY CONTAIN 2 PIECES. MINIMUM LENGTH OF ANY ONE PIECE IS 1500'.

Revision Number: 3 Revision Date: 11-20-2015

Aprisa XE

POINT-TO-POINT DIGITAL MICROWAVE LINKS

2.0 GHz licensed band

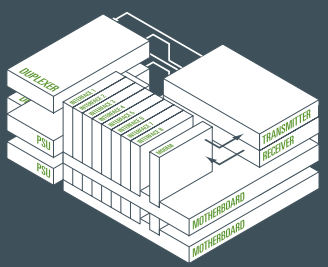
Aprisa XE: maximizing spectrum use and making challenging long distance links possible

- **Efficient future-proof single-box architecture**: the Aprisa XE's built-in multiplexer and cross-connect eliminate external equipment and minimize the over-the-air requirements, with customer-configurable interface slots integrating all IP, voice and data traffic. Configuration, performance monitoring and diagnostics are easy with the 4RF embedded web-based element management system, SuperVisor.
- **High capacity**: class-leading spectral efficiency and up to 64 QAM modulation make the maximum use of the available spectrum, with industry leading capacity of up to 65.4 Mbit/s in a 14.0 MHz channel.
- **Long range**: a single 2.0 GHz Aprisa XE can link distances in excess of 80 miles, overcoming the problems of water, environmental conditions and topographical obstacles.
- **Carrier-class performance**: Aprisa XE links are engineered to achieve 'five 9s' availability, benefiting from state of the art forward error correction and inherent low latencies, for unrivaled quality of service.
- **Cost effective**: the Aprisa XE has a low total cost of ownership, providing a rapid return on investment by minimizing both capital and operational expenditure.
- **Redundancy options**: Monitored Hot Standby and Hitless Space Diversity are available for protection in mission-critical applications.
- **Reliable**: the Aprisa XE has an actual MTBF of 95.72 years. It can be relied upon to perform in the harshest and most remote environments.

The Aprisa XE in brief

- Licensed 2.0 GHz frequency band
- Built-in cross-connect and multiplexer
- Up to 65.4 Mbit/s capacity
- 500 kHz, 1.0 MHz, 1.75 MHz, 3.5 MHz, 7.0 MHz and 14.0 MHz channel sizes
- QPSK to 64 QAM modulation
- Range of 80+ miles
- Industry-leading reliability
- Web server and SNMP management
- All voice, data and IP applications
- MHSB and HSD protection options

Future-proof single-box architecture



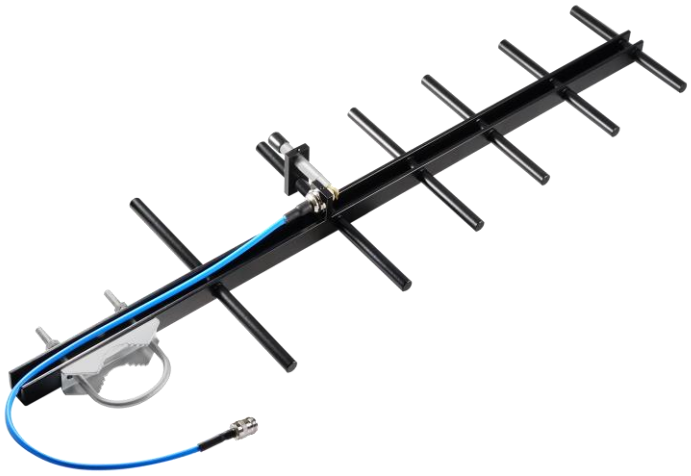
4RF

SYSTEM SPECIFICATION

RF	BAND	TUNING RANGE	SYNTHESIZER STEP SIZE
FREQUENCIES	2000 MHz	1900 – 2300 MHz	62.5 kHz
MODULATION TYPES	Software configurable: QPSK / 16 / 32 / 64 QAM		
FREQUENCY STABILITY	Short term ± 1 ppm (environmental effects and power supply variations) Long term ± 2 ppm (aging of crystal oscillators ≈ over 5 years)		
ANTENNA CONNECTION	N-type female 50 ohm		
TRANSMITTER OUTPUT POWER			
QPSK	+20 dBm to +34 dBm		
16 QAM	+17 dBm to +31 dBm		
32 QAM	+16 dBm to +30 dBm		
64 QAM	+15 dBm to +29 dBm		
RECEIVER			
MAXIMUM INPUT LEVEL	–20 dBm		
DYNAMIC RANGE	58 to 87 dB at 10^{-6} BER		
C/I RATIO	Co-channel	QPSK	better than 16 dB
		16 QAM	better than 20 dB
		32 QAM	better than 23 dB
		64 QAM	better than 27 dB
	First adjacent channel		better than –5 dB
	Second adjacent channel		better than –30 dB
DUPLEXER (bandpass)	**PASSBAND**	**TX / RX SPLIT**	**TUNING RANGE**
	14 MHz	≥ 91 MHz	1900 – 2300 MHz
POWER SUPPLY			
INPUT RANGE	115 / 230 VAC, 50 / 60 Hz		
	±24 VDC (20.5 – 30 VDC), ±48 VDC (40 – 60 VDC)		
POWER CONSUMPTION	53 – 180 W input power (dependent on interface cards fitted and transmitter output power level)		

INTERFACES	
ETHERNET	Integrated 4-port 10 / 100Base-T switch with port-based rate limiting, VLAN tagging and QoS Support
E1 / T1	Quad 120 ohm G.703 / 4
DATA	Quad V.24 asynchronous, synchronous and over sampling mode Single synchronous X.21 / V.35 / RS-449 / RS-530
ANALOG	Dual 2-wire FXS / FXO (POTS); Quad 4-wire E&M
AUXILIARY INTERFACES	
ALARMS	4 external alarm outputs, 2 external alarm inputs
CONFIGURATION	Embedded web server with SNMP
MANAGEMENT	Ethernet interface for SuperVisor and SNMP; V.24 setup port
RSSI	Front panel test point
ENVIRONMENTAL	
OPERATING	+14° F to +122° F (–10° C to +50° C)
STORAGE	–4° F to +158° F (–20° C to +70° C)
HUMIDITY	Maximum 95 % non-condensing
MECHANICAL	
RACK MOUNT	19" 2U high (internal duplexer)
WEIGHT	23 lbs (10 kg) typical
PROTECTED OPTIONS	
MHSB	≤ 4 dB splitter / cable loss, ≤1 dB TX relay / cable loss (system gain reduced by a maximum of 5 dB)
HSD	≤ 1 dB TX relay / cable loss, < 25 ms TX switching / hitless RX switching
COMPLIANCE	
RADIO	RSS-GEN, RSS-119, SRSP-302.0
EMI / EMC	ICES-003
SAFETY	EN 60950 CSA 253147 applicable for AC, 48 VDC and 24 VDC product variants
ENVIRONMENTAL	ETS 300 019 Class 3.2, WEEE

Product Data Sheet



EM-B11909
900 MHz
6 Element Yagi Antenna
890-960 MHz

- » Rugged Aluminum Construction
- » UV and Environmentally Resistant Black Powder Coat Finish
- » Boom: 3/4” 6063 Aluminum
- » Radiators: 3/8” 6061 Aluminum, Solid Rod
- » V or H Polarization Mountable
- » Mounting Hardware Included
- » Integrated Feed Cable, RG-141 Plenum Type

Electrical Specifications

Frequency Band	890-960 MHz
VSWR	<1.5:1, typical, 2:1 max
Impedance	50Ω
Gain	9.5 dBi / 7.4 dBd
E-Plane HPBW	55º, typical
H-Plane HPBW	65º, typical
F/B	≥10 dB
Power Handling	125 W

Mechanical Specifications

Color / Finish	Black / Powder Coat
Dimensions	24 x 6.85 x 1.65 in. (610 x 174 x 42mm)
Mounting Diameter, Pipe	1.75 in. dia. (44.5mm), max (1-1/4 in. pipe)
Weight	1.25 lb. (.57 kg)
Mounting Application / Type	Pole/Mast Mount
Cable / Connector Type	RG-141 Plenum Type / N Type, Jack
Mounting Material / Finish	Steel / Dacron Finish
Wind Velocity, Rated	125 mph (201 km/h)
Operating Temperature Range	-40° to 85° C
Corrosion	Salt Fog
Humidity	95%

Specifications subject to change without notification.

ELECTRO-MAGWAVE, INC.
6111 Carey Drive, Unit #1, Valley View, Ohio 44125 t 216-453-1160 f 216-447-8828 www.emwaveinc.com

Trio K-Series

License-free serial data radio

KR900 | KR240 | KP900 | KP240 | KB900 | KB240

Schneider Electric

Trio K-Series frequency-hopping, spread-spectrum data radios set the standard for reliable and secure serial data communication in the license-free 900MHz and 2.4GHz ISM bands. With unique features like LinkXtend™ for single radio store-and-forward, and ChannelShare™ collision-avoidance for support of spontaneous SCADA messages, K-Series radios provide the flexibility to allow implementation of even the most complex wireless solutions with virtually unlimited expansion capability.

The industrial strength K-Series is ideally suited for the most demanding Point-to-Multipoint, Point-to-Point, and SmartPath™ mesh-like wireless Telemetry and remote SCADA applications, and is available in a fully enclosed housing (KR) as well as small-format DIN rail-mountable (KP), board-only (KB), and OEM module (OM) variants.

Product Data Sheet Trio KR900 | KR240
Specifications

>	Trio KR900 | KR240
Radio	
Frequency Range	902-928MHz or 2.4-2.48335GHz, (region-specific versions available)
Frequency Accuracy	±2.5ppm (900MHz) ±3.0ppm (2.4GHz)
Radio Modes	Half Duplex, Pseudo Full Duplex
Configuration	All configuration via Windows based software
Selectivity	Better than 50dB
Spurious Response	Better than 70dB
Tx Power	• 900MHz : 0.01 - 1W (+30dBm) 0.5dB steps configurable with over-temperature and high VSWR protection • 2.4GHz : 0.01 - 500mW (+27dBm) 0.5dB steps configurable with over-temperature protection.
Modulation	2 Level GFSK
Connections	
Serial Data Port A	1 x RS232/RS485 RJ-45. 600-230,000bps asynchronous
Serial Data Port B	1 x RS232 DB9 female DCE. 300-38,400bps asynchronous
Serial Data Port Flow Control	Configurable hardware / 3-wire interface
Serial Data Port DCD Control	Configurable DCD operation : activated on Master synchronisation or from user data output.
System Port	1 x RS232 RJ45: 19,200bps, for configuration and diagnostics
Antenna	2 x TNC female bulkhead connectors for LinkXtend or separate TX/RX antennas
Power	2-pin locking, mating connector supplied
LED Display	Multimode Indicators for Pwr, Tx, Rx, Sync, TxD and RxD data LEDs (for both port A and B)
Modem	
RF Channel Data Rate	32,000/64,000/128,000 or 256,000bps
Bit Error Rate	Max sensitivity < $1x10^{-6}$ @ -108dBm
Operating Modes	Master, remote, repeater or network-bridge
Network Types	Point-to-Point, Point-to-Multipoint, Point-to-Multipoint with Repeaters / Store n' Forward, Mesh
Channelshare™	Trio's unique supervisory collision avoidance system
MultiStream™	Simultaneous data stream delivery allows for multiple vendor devices/protocols to be transported on the one radio network
SmartPath™	Technology for enhanced redundancy in network configuration (Mesh)
Firmware	Local and over-the-air flash-based firmware
Security	
Encryption*	256-bit AES
Password Protection	Password protected configuration sessions
Trusted Unit	Optional Trusted Access point-Trusted Remote operation

* Export restrictions may apply. Contact factory for details.

Specifications continue on the next page.

Product Data Sheet Trio KR900 | KR240
Specifications

>	Trio KR900 | KR240
Diagnostics	

Diagnostics Overview	• TView+ configuration, network management and diagnostic Windows GUI software
	• Spectrum Analyser and Channel Lockout facilities
	• Network-wide operation from any remote terminal
	• Non intrusive protocol – runs simultaneously with the application
	• Over-the-air re-configuration of user parameters.
	• Storage of data error and channel occupancy statistics
	• In-built Error Rate testing capabilities
	• Diagnostics parameters available
	  • Transmitter Power
	  • Received Signal Strength
	  • DC Supply Voltage
	  • Received Frequency Error
	  • Radio Temperature

General	
Operating Temperature Range	-40 to + 70ºC (-40 to +158ºF)
Power Supply	10-30Vdc (13.8Vdc nominal)
Transmit Current	• 900MHz : 500mA nominal @ 1W • 2.4GHz : 800mA nominal @ 0.5W
Receive Current	• 900MHz: <120mA nominal @ 13.8Vdc • 2.4GHz: <100mA nominal @ 13.8Vdc
Sleep Mode	Software Controlled
Housing & Dimensions	Rugged die-cast, 100 x 34 x 165mm (4.0 x 1.4 x 6.5in.)
Mounting	Integrated Mounting Holes or DIN Rail mounting (optional)
Weight	0.5kg (1.1lbs.)
Warranty	3 years on parts and labor
Approvals and Certifications	
Europe (ETSI)	ETSI EN60950, EN50392 EN300328 EN301489 (2.4GHz only)
FCC	FCC PART 15
Industry Canada	IC RSS210
Australia	ACMA AS/NZS 4268
Hazardous Locations	• 900MHz : CSA Class I, Division II, Groups (A,B,C,D) for Hazardous Locations ANSI/UL equivalent) • 2.4GHz : ATEX II 3G Ex nA IIC T4

Note: Not all product features are available in every mode of operation.

Disclaimer: Schneider Electric reserves the right to change product specifications. For more information visit www.schneider-electric.com.

LC-R127R2P

For main and standby power supplies.
Expected trickle life: 3-5 years at 25°C, Approx. 5 years at 20°C.

Photo/Label for reference only.

Specifications

Nominal Voltage		12V
Rated Capacity (20 hour rate)		7.2Ah
Dimensions	Length	5.945 inches (151.0 mm)
	Width	2.539 inches (64.5 mm)
	Height	3.702 inches (94.0 mm)
	Total Height*	3.937 inches (100.0 mm)
Approx. mass		5.45 lbs. (2.47 kg)
Standard Terminals and Resin	UL94HB Faston 187	LC-R127R2P
	UL94HB Faston 250	LC-R127R2P1

* The total height with #250 terminal is 101.5mm.

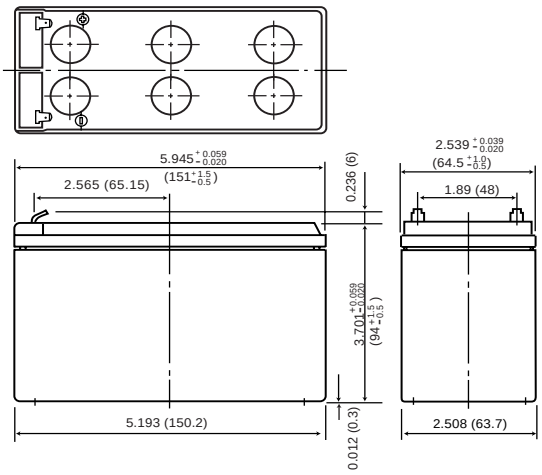
Characteristics

Capacity (note) 77˚F (25˚C)	20 hour rate (360mA) 10 hour rate (680mA) 5 hour rate (1260mA) 1 hour rate (4900mA)	7.2Ah 6.8Ah 6.3Ah 4.9Ah
	1.5 hour rate discharge Cut-off voltage 10.5 V	3.5A
Internal Resistance	Fully charged battery 77˚F (25˚C)	Approx. 40mΩ
Temperature dependency of capacity (20 hour rate)	104˚F (40˚C) 77˚F (25˚C) 32˚F (0˚C) 5˚F (-15˚C)	102% 100% 85% 65%
Self discharge 77˚F (25˚C)	Residual capacity after standing 3 months Residual capacity after standing 6 months Residual capacity after standing 12 months	91% 82% 64%
Charge Method (Constant Voltage) — Cycle use (Repeating use)	Initial current	2.88 A or smaller
	Control voltage	14.5V to 14.9V (per 12V cell 25˚C)
Charge Method (Constant Voltage) — Trickle use	Initial current	1.08 A or smaller
	Control voltage	13.6V to 13.8V (per 12V cell 25˚C)

(Note) The above characteristics data are average values obtained within three charge/discharge. Cycles not the minimum values.

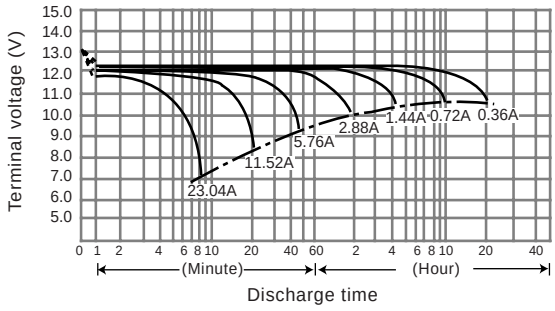
Dimensions (mm)

Terminal type: Faston 187 or Faston 250

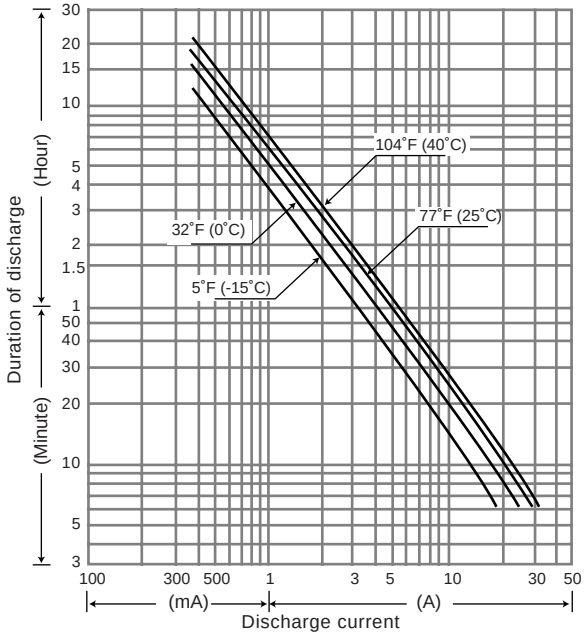


Battery case resin: Standard (UL94HB) Color is black.

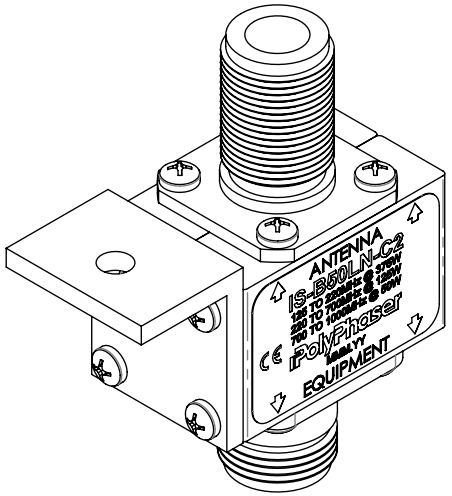
Discharge characteristics 77°F (25°C) (Note)



Duration of discharge vs. Discharge current (Note)

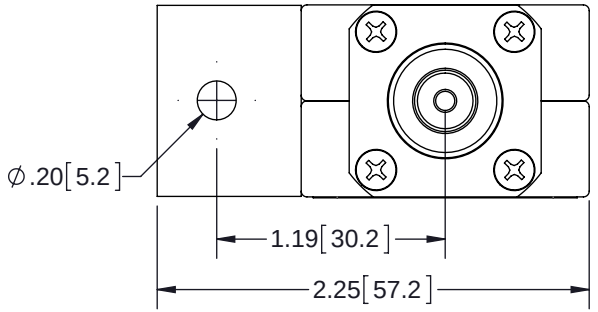


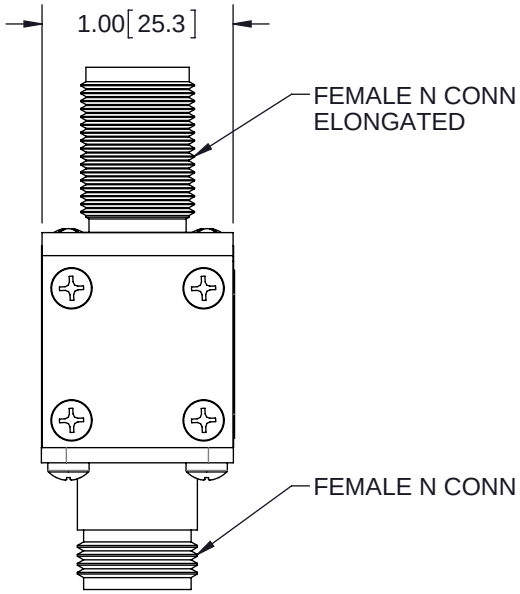
REVISIONS				
REV.	DESCRIPTION	ECN	DATE	APPROVED
J	REFER TO ECN	13175	4/22/15	EJD

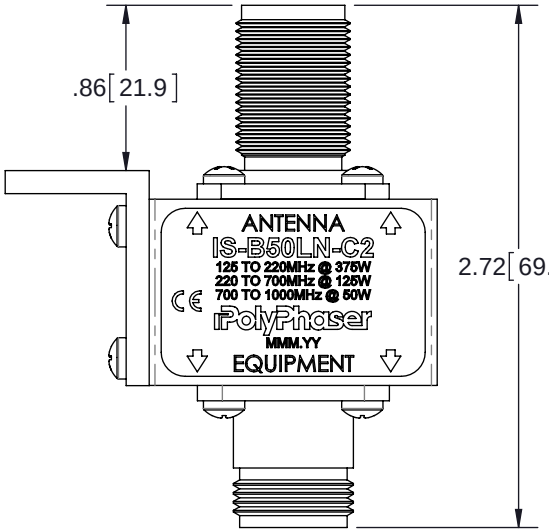


HARDWARE KIT INCLUDES:

QTY	DESCRIPTION
1	SCREW 10-32x.75 HEX MS 18-8 SS
1	NUT 10-32 HEX 18-8 SS
2	WASHER 10 INT 4-10 SS
1	NUT 5/8-24 303 HEX SS
1	WASHER 5/8 410 SS
1	O-RING 114 EPDM







MAXIMUM CHARACTERISTICS

APPLICATION:
FOR TWO WAY RADIO AND SCADA APPLICATIONS
NON-WEATHERIZED, BULKHEAD MOUNT
SURGE:
20kA IEC 61000-4-5 8/20Õs WAVEFORM MULTIPLE
TURN-ON:
600Vdc Ñ20%
TURN-ON TIME:
2.5ns for 2kV/ns
FREQUENCY RANGE:
10MHz to 1GHz
VSWR:
Ò1.1 to 1 OVER FREQUENCY RANGE
INSERTION LOSS:
Ò0.1dB OVER FREQUENCY RANGE
MAX POWER:
1.5kW @ 10 to 50MHz
375W @ 50 to 220MHz
125W @ 220 to 700MHz
50W @ 700 to 1000MHz
THROUGHTPUT ENERGY:
Ò8.5mJ @ 3kA 8/20Õs WAVEFORM
TEMPERATURE:
STORAGE: -55ÁC to +85ÁC
OPERATING: -50ÁC to +50ÁC
VIBRATION:
1G up to 100Hz
CE COMPLIANT
RoHS COMPLIANT

CUSTOMER APPROVAL: _____ DATE: _____

ALL DIMENSIONS SHOWN ARE FOR REFERENCE ONLY.

UNLESS OTHERWISE SPECIFIED
LEADING DIMENSIONS ARE INCHES
DIMENSIONS IN [ ] ARE MILLIMETERS

TOLERANCES:
FRACTIONS=Ñ1/32 .XX=Ñ .03
ANGLES=Ñ 1Á .XXX=Ñ .010

THIRD-ANGLE PROJECTION

DRAWN	M. JOHNSON	7/11/94
ENG APPD	K. BARTEL	5/1/95
PRODUCT MGR	R. MATHEUS	5/1/95
MARKETING APPD		
PROJECT NO.		
DOCUMENT NAME	IS-B50LN-C2-C	

PolyPhaser

SHEET 1 OF 1
SCALE 1:1

TITLE
BROADBAND 10MHz TO 1GHz
N FEM BLKH
CUSTOMER SPECIFICATION

SIZE	CAGE	PROD CAT	PART NUMBER	REV
A	30992	RFP	IS-B50LN-C2	J

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PT2000C & PT5000C PSU/Charger

Model C2176 (1.5 Amp load) & C2177 (4 Amp load) Power Supply/ Battery Charger

SPECIFICATIONS

AC Input

Model:	PT2000C	PT5000C
AC input voltage range	85-264Vac	85-132Vac on 115Vac input. 170-264Vac on 230Vac input.
AC input frequency	47-63 Hz	
Input current at full load	<1.5A rms at 115Vac <0.7A rms at 230Vac	<3A rms at 115Vac <1.5A rms at 230Vac
Switch-on inrush current	11A for <10ms (80A for < 1ms)	22A for <10ms (160A for < 1ms)
Surge withstand	2.5kA 8/20microsecond pulse 40 joules max.	
Fast Transients	2 kV	

Load Ouput

Model:	PT2000C		PT5000C	
Voltage	**12V**	**24V**	**12V**	**24V**
Output Voltage	13.0V - 14.0V	26.0V – 28.0V	13.0V - 14.0V	26.0V – 28.0V
Max continuous rated load	2.5A	1.5A	4A	4A
Max Full Load Operating Ambient Temperature	60°C	50°C	60°C	50°C
Temperature derating up to 65°C maximum	derate 4%/°C	derate 3%/°C	derate 3%/°C	derate 3%/°C
Overload protection	≅ 3A	≅ 2A	≅6A	≅6A
AC line regulation	0.5% max over 85-132Vac/170-264Vac			
Load Regulation	2% max over 10-100%			
Temperature Regulation (excl. effect of external temperature sensor)	<0.05%/°C			

Battery Charger

Model:	PT2000C	PT5000C
Charging method	Constant voltage/Constant Current	
Float Voltage (at 20°C)	13.5V – 13.8V on 12V versions 27.0V-27.6V on 24V versions	
Max. Charging Current	0.5 Amp	1 Amp

Under-voltage cutout

Option	12V versions	24V versions
Cut out Voltage	11 +- 0.5 Volt	22 +-0.8 Volt
Restore Voltage	9.5 +- 0.5 Volt	19 +-1.0 Volt
Battery drain when cut out	300uA max	300uA max

Shutdown Input

Type	Switch to 0 Volts
Max. open circuit voltage	30V dc
Max. closed circuit current	20mA

AC Detect Output

Type	Normally open contact – closed when AC power is healthy.
Max. operating voltage	30V dc
Max. closed circuit current	20mA

Optional Temperature Sensor Input

Option	12V versions	24V versions
Sensor Type	Thermistor	
Accuracy	+-2°C	
Float voltage change from 20°C	-20mV/°C	-40mV/°C

Environment & Safety

Operating Temperature	See Load Output Section for details
Storage Temperature	-10°C – 70 °C (+14°F – 158°F)
Insulation Resistance (100% tested)	100Mohm at 500Vdc input to outputs to ground.
Insulation Breakdown (100% tested)	1500Vac input to earth for 1s 1000Vac output to earth for 1s
Safety Conformance	Conforms to IEC950; EN60950
Electromagnetic Interference	Conforms to EN55011; EN50082-2
Design Life at 50°C full load	50 000hours

Mechanical

Model:	PT2000C	PT5000C
Width	100mm	150mm
Height	120mm	
Depth	70mm	

Weight

Model:	PT2000C	PT5000C
Unpacked	450gm approx.	850gm approx.
Packed	550gm approx.	950gm approx.

Compliance to Standards

Safety	EN 60950:1995
Emissions	EN 55011 and EN50081-2:1994 Group I, Class A
Immunity – ESD	IEC 61000-4-2:1995, level 3
Immunity – RF Fields	IEC 61000-4-3:1995, level 3
Immunity – Fast Transients	IEC 61000-4-4:1995 2 kV – DC power port 1 kV – input/output lines
Supply Variations	IEC 61000-4-7:1991, 24 V dc +15% -10%

Ordering Information

ORDER CODE	DESCRIPTION
C2176-1	PT2000C with 12Volt output (2.5A load max; 0.5A Charging max)
C2176	PT2000C with 24Volt output (1.5A load max; 0.5A Charging max)
C2177-1	PT5000C with 12Volt output (4A load max; 1A Charging max)
C2177	PT5000C with 24Volt output (4A load max; 1A Charging max)
C0003	External Temperature Probe

Solutions by Design
http://www.omniflex.com

BELDEN
SENDING ALL THE RIGHT SIGNALS

Technical
Data Sheet
02/02/2015
Rev. 2

I. DESCRIPTION:

RG-213/U TYPE COAX

II. ELECTRICAL CHARACTERISTICS:

NOM. IMPEDANCE:	50 OHMS
NOM. INDUCTANCE:	.077 MICRO-H/FT
NOM. CAPACITANCE CONDUCTOR TO SHIELD:	30.8 PF/FT
NOM. VELOCITY OF PROPAGATION:	66%
NOM. DELAY:	1.54 NS/FT

ATTENUATION:

MHZ	NOMINAL DB/100 FT.
1	.27
10	.55
50	1.3
100	1.9
200	2.7
400	4.1
700	6.5
900	7.6
1000	8.0
4000	21.5

NOM. SHIELD DC RESISTANCE @ 20 DEG C:	1.2 OHMS/1000 FT.
NOM. CONDUCTOR DC RESISTANCE @ 20 DEG. C:	1.7 OHMS/1000 FT.
MAX. OPERATING VOLTAGE:	3700 V RMS

III. PHYSICAL CHARACTERISTICS:

NOM. WEIGHT/1000 FT.:	100 LBS.
MIN. BENDING RADIUS:	5.0"
TEMPERATURE RATING:	-30 TO +80 DEG C
MAX. PULLING TENSION:	184 LBS.
CONDUCTOR MATERIAL & DIA.:	13 AWG (7 X .0296") STRANDED BARE COPPER, .089" NOM.
DIELECTRIC MATERIAL & DIA.:	SOLID POLYETHYLENE, .285" NOM.
SHIELD TYPE AND % COVERAGE:	BARE COPPER BRAID; 96%
JACKET MATERIAL AND DIA.:	PVC (BLACK), .405" NOM.