

# Trio Q

Licensed VHF | UHF  
Ethernet and Serial data radio

QP150 | QP450 – Hot Standby Simplex/Half Duplex



## Product at a glance

Trio™ Q Data Radios are advanced, high-speed licensed digital data radios, providing both Ethernet and serial communications for complex and demanding applications in Point-to-Point and Point-to-Multipoint (Multiple Address Radio) Telemetry and remote SCADA systems.

Features such as ChannelShare+™ and web-based user configuration, together with powerful remote diagnostics and Network Management, make Trio Q Data Radios the complete licensed radio solution that works with leading host systems and remote equipment.

Combining both Ethernet and serial connectivity, Trio Q Data Radios are suitable for use with the latest SCADA technology as well as providing a smooth transition from serial-based infrastructure to IP/Ethernet.

As a complement to the Trio QR half duplex remote radio, the Trio QP half duplex radio is ideal for deployment at base & repeater sites in systems using single frequency (simplex) operation. In high duty cycle applications, the Trio QP delivers maximum-rated transmitter power in ambient temperatures up to +70 °C (158 °F).

# Trio Q

## Licensed VHF | UHF Ethernet and Serial data radio

### Specifications – QP150 | QP450

<b>Radio</b>				
Frequency Range	<ul style="list-style-type: none"> <li>QP150: 135...175 MHz</li> <li>QP450: 400...450 MHz (L-Band) or 450...518 MHz (H-Band)</li> </ul>			
Frequency Splits	Various Tx/Rx frequency splits - configurable			
Channel Selection	<ul style="list-style-type: none"> <li>QP150: 3.125 kHz or 1.25 kHz channel steps</li> <li>QP450: 3.125 kHz channel steps</li> </ul>			
Channel Spacing	12.5 and 25 kHz (software selectable)			
Frequency Accuracy	±0.8 ppm, -40...70 °C (-40...158 °F) ambient			
Aging	≤ 1 ppm/year			
Radio Modes <sup>1</sup>	Simplex or Half Duplex			
<b>Transmitter</b>				
Tx Power <sup>1</sup>	<ul style="list-style-type: none"> <li>CPM: 0.05...10 W (+17...+40 dBm)</li> <li>QAM QPSK: 0.05...5 W (+17...+37 dBm)</li> <li>QAM 16-QAM: 0.05...3.2 W (+17...+35 dBm)</li> <li>QAM 64-QAM: 0.05...2.5 W (+17...+34 dBm)</li> <li>QAM 256-QAM: 0.05...2.2 W (+17...+33.5 dBm)</li> <li>0.1 dB resolution, user-configurable</li> </ul>			
Modulation <sup>1</sup>	Narrow band 2, 4, 8 and 16-level continuous phase modulation (CPM) QPSK, 16-QAM, 64-QAM and 256-QAM quadrature amplitude modulation (QAM)			
Emission Designator	Region	Channel Bandwidth	CPM	QAM
	ACMA/ETSI	12.5 kHz	11K2F1D	12K0D1D
		25 kHz	20K1F1D	23K6D1D
	FCC/ISED	12.5 kHz	11K2F1D	11K2D1D
25 kHz		N/A	16K0D1D	
Tx Keyup Time	<1 ms			
Timeout Timer	Configurable 0...255 seconds			
Tx Spurious	≤ -36 dBm			
PTT Control	Auto (Data)			
<b>Receiver<sup>1,3</sup></b>				
Topology	Hybrid single conversion / SDR			
Frequency Error Compensation	Digital receiver frequency tracking up to +/- 2000 Hz			
Maximum RF Level (Decoding)	-10 dBm			
Adjacent Channel Rejection Ratio (Selectivity)	<ul style="list-style-type: none"> <li>Compliant at all RF data rates: ETSI EN 300 113 V2.2.1 RED</li> <li>Compliant at all RF data rates: ETSI EN 302 561 V2.1.1 RED</li> </ul>			
Co-Channel Rejection Ratio	QPSK: -12 dB / 64-QAM: -23 dB			
Intermodulation Rejection	-33 dBm [62 dB]			
Spurious Response Rejection	-30 dBm [65 dB]			
Blocking or Desensitization	-5 dBm [90 dB]			

# Trio Q

## Licensed VHF | UHF Ethernet and Serial data radio

### Specifications – QP150 | QP450 – cont'd

#### Connections

Serial Interface 1/2	1 x DB9 socket connector providing 2 x RS-232 3-wire serial ports or 1 x RS-485 serial port (shared connector).
Serial Interface Data Rates	300...115,200 bps
Serial Interface Flow Control	Configurable hardware / 3-wire interface
Serial Interface DCD Control	Configurable DCD operation: activated on RF carrier or from user data output
Ethernet Port	3 x RJ45: 10/100 Mbps (auto-MDIX sensing) compliant with IEEE 802.3
USB Port	USB Type A Host supporting Zero-Touch Configuration
Antenna <sup>2</sup>	Refer to diagram at end of datasheet for detailed information <ul style="list-style-type: none"> <li>• 2 x N socket bulkhead (Refer to Option B)</li> <li>• 1 x N socket bulkhead (Refer to Option E)</li> </ul>
Power	10-pin locking, mating connector (11...30 Vdc)
Digital I/O	Optional 3 x digital inputs / 3 x digital outputs, which can be monitored or controlled by TVIEW+™ Diagnostics Software, EcoStruxure™ Geo SCADA Expert or SNMP
LED Display	Multimode Indicators for DC Power, Transmit, Receive, Synchronized Data, Serial Interface 1 & 2 Transmit & Receive Data, Ethernet 1 & 2 Transmit & Receive Data

#### Ethernet

Supported Protocols	Ethernet (including UDP, TCP, DHCP, ARP, ICMP, STP, IGMP, NTP & TFTP)
Ethernet Repeating	Automatic Peer-to-Peer repeating
Operating Modes	Layer-2 Ethernet Bridge mode / Layer-3 IP Router mode
Network Address Translation	Static NAT Port forwarding and 1:1 Destination NAT
VLAN	802.1Q VLAN
Quality of Service (QoS)	Eight priority lanes / Min-Max bandwidth / Flexible user-defined matches
Compression	Ethernet/IP/TCP/UDP/ESP Header (ROHC RFC-3095) and Advanced Payload Compression
Terminal Server	Legacy RS-232/RS-485 serial support via embedded terminal server (UDP/TCP)
Protocol Gateway	TCP <-> UDP and UDP <-> TCP Protocol Gateway with Unicast/Multicast Support
IP Configuration	Auto (DHCP) and Manual
SNMP	SNMP V1, V2c & V3, RFC 1213-compliant & radio diagnostics parameters (with notifications)
Modbus™ Gateway	Configurable Modbus/TCP-to-Modbus/RTU Gateway
Time Server	NTP Client / Server / Client-Server / Manual modes

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Specifications – QP150 | QP450 – cont'd

## Modem

RF Channel  
Data Rate <sup>1.5</sup>

Regulatory Region	Bandwidth (KHz)	Forward Error Correction (FEC)	Modulation	RF Data Rate (Kbps)	RF 1x10 <sup>-6</sup> BER Sensitivity (dBm)
ACMA/ETSI (QAM)	12.5	None	256-QAM	80.0	-92
			64-QAM	60.0	-100
			16-QAM	40.0	-107
			QPSK	20.0	-113
		Min FEC	256-QAM <sup>4</sup>	66.4 [76.0]	-98 [-92]
			64-QAM	49.8	-105
			16-QAM	33.2	-111
		Max FEC	256-QAM	57.6	-99
			64-QAM	43.2	-106
16-QAM	20.8		-112		
ACMA/ETSI (QAM)	25	None	256-QAM	160.0	-84
			64-QAM	120.0	-96
			16-QAM	80.0	-104
			QPSK	40.0	-112
		Min FEC	256-QAM <sup>4</sup>	132.8 [153.6]	-94 [-84]
			64-QAM	99.6	-101
			16-QAM	66.4	-108
		Max FEC	256-QAM	115.2	-95
			64-QAM	86.4	-102
16-QAM	41.6		-109		
FCC/ISED (QAM)	12.5	None	256-QAM	73.8	-92
			64-QAM	55.4	-100
			16-QAM	36.9	-107
			QPSK	18.5	-113
		Min FEC	256-QAM <sup>4</sup>	61.3 [70.8]	-98 [-92]
			64-QAM	46.0	-105
			16-QAM	30.6	-111
		Max FEC	256-QAM	53.1	-99
			64-QAM	39.9	-106
16-QAM	19.2		-112		
FCC/ISED (QAM)	25	None	256-QAM	120.0	-86
			64-QAM	90.0	-98
			16-QAM	60.0	-105
			QPSK	30.0	-110
		Min FEC	256-QAM <sup>4</sup>	99.6 [115.2]	-94 [-86]
			64-QAM	74.7	-102
			16-QAM	49.8	-108
		Max FEC	256-QAM	86.4	-95
			64-QAM	64.8	-103
16-QAM	31.2		-109		
ACMA/ETSI (CPM)	12.5	None	2-CPM	8.0	-113
			4-CPM	16.0	-110
			8-CPM	24.0	-107
			16-CPM	32.0	-100
ACMA/ETSI (CPM)	25	None	2-CPM	14.0	-111
			4-CPM	28.0	-109
			8-CPM	42.0	-106
			16-CPM	56.0	-99
FCC/ISED (CPM)	12.5	None	2-CPM	8.0	-113
			4-CPM	16.0	-110
			8-CPM	24.0	-107
			16-CPM	32.0	-100

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### Specifications – QP150 | QP450 – cont'd

Dynamic Speed Selection	<ul style="list-style-type: none"> <li>User-configurable packet error rate / SNR / RSSI based algorithm for automatic data rate selection</li> <li>User-configurable minimum and maximum data rates, FEC and fixed data rate modes</li> </ul>		
Forward Error Correction	Modulation	Forward Error Correction (FEC) Level	FEC Sensitivity Gain (dB) with 10% Packet Error Rate due to Impulse Noise
	QPSK	Min FEC (0.83) Max FEC (0.52)	5 6
	16-QAM	Min FEC (0.83) Max FEC (0.52)	13 15
	64-QAM	Min FEC (0.83) Max FEC (0.72)	17 22
	256-QAM	Min FEC (0.83) Max FEC (0.72)	21 26
	Truncated interleaved BCH encoding with .52/0.72/0.83/0.96 <sup>3</sup> coding rates		
Operating Modes	Base, remote, repeater or store-and-forward		
Channelshare+	<ul style="list-style-type: none"> <li>Channelshare+ Advanced CSMA supervisory collision avoidance system (full-duplex)</li> <li>Channelshare+ Token Grant channel management system (half-duplex/simplex)</li> </ul>		
E/M-Series Compatibility <sup>6</sup>	Over-the-air compatibility with Trio E/M-Series radios		
Firmware	Local and over-the-air flash-based firmware – upgradable patches with support for broadcast updates		

### Security

Encryption <sup>7</sup>	256-bit AES / AES-GCM with automatic rotating keys as per NIST SP 800-38D
HTML Interface	Password-protected HTTP and HTTPS configuration and management interface
Certificate Management	Automatic managed signed certificates compatible with Microsoft® Certificate Authority™
Console Interface	Password-protected Telnet, SSHv2 and Serial console interface
Role Based Access Control	Multi-User password-protected access control [read only, read/write, read/write with security, unrestricted]
Managed Directory Services	Integrated with Active Directory™ using LDAP/LDAPS or RADIUS (RFC2865) with cached fallback
Authentication	Certificate-based radio authentication using DTLS and X509
Packet-Filtering Firewall	Advanced and basic mode packet-filtering firewall with user-configurable Layer 2 and Layer 3 rules for radio and Ethernet ports
Event Logging	Non-volatile time-stamped event log with support for integration into SYSLOG servers

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### Specifications – QP150 | QP450 – cont'd

#### Hot Standby

Change-over control	Manual (front panel switch) / automatic upon alarm / automatic upon timer / remote (software driven)
Alarm Monitoring	Transmitter / General Alarms / Power Supply

#### Diagnostics

Diagnostics	<ul style="list-style-type: none"> <li>Local (HTTP/HTTPS/Telnet/SSH/Console) or remote (Serial/TCP/UDP) access</li> <li>Command line interface</li> <li>Compatible with TVIEW+ and EcoStruxure Geo SCADA Expert</li> <li>Network-wide access</li> <li>Non-intrusive protocol – runs simultaneously with the application</li> <li>Embedded history of diagnostics parameters and data statistics</li> <li>Embedded network list of peer radios</li> <li>Embedded error rate testing capabilities</li> <li>Many diagnostics parameters available including Tx Power, RSSI, Supply Voltage, Temperature and VSWR</li> <li>Embedded Wireshark™ packet capture tool</li> </ul>
Logging	Embedded event and performance logs including time-stamped data statistics and channel occupancy
Configuration	<ul style="list-style-type: none"> <li>Manual Configuration via embedded HTTP, HTTPS web interface and/or Telnet/SSH/Serial console with optional TFTP/SCP</li> <li>Embedded configuration database with up to 100 different configurations</li> <li>Command line interface</li> <li>Automatic Zero-Touch configuration load via USB</li> <li>Automatic configuration save via TFTP/SCP server</li> <li>Time-based configuration change</li> </ul>
Ping Tester	Embedded ping test facility
Manufacturing	Embedded manufacturing test report (PDF)

#### General

Operating Temperature Range	-40...+70 °C (-40...+58 °F) ambient
Altitude	0...3000 m (0...9843 ft.) above mean sea level
Barometric Pressure	75...106 kPa (0.75...1.06 Bar)
Cooling	Built-in temperature controlled fan
Input Voltage	11...30 Vdc
Input Power (Tx typical)	<ul style="list-style-type: none"> <li>QP150: 26 W @ 30 dBm, 38 W @ 37 dBm, 46 W @ 40 dBm</li> <li>QP450: 34 W @ 30 dBm, 46 W @ 37 dBm, 59 W @ 40 dBm</li> </ul>
Input Power (Rx typical)	14 W
Housing & Dimensions	483 mm (19 in.) 1 RU rack mount (Brackets adjustable for front, center or proud mount). Without mounting brackets: 424 mm x 44.45 mm x 436.5 mm (16.7 in. x 1.75 in. x 17.18 in.)
Weight	5 kg (11 lbs.)

#### Compliance<sup>1,5</sup>

Europe (ETSI)	ETSI EN 300 113 V2.2.1 RED, ETSI EN 302 561, EN 301 489, EN 62638-1, EN 50385, EN 50383 and EN 300 019-2-3
United States (FCC)	47CFR PART 2, PART 15 A & B, PART 90, IEC 60950-14
Canada (ISED)	RSS-Gen, RSS-102, RSS-119, IEC 60950-14
Australia (ACMA)	AS/NZS 4295-2004, AS/NZS 60950.1
Substation	Communications ports substation hardened to IEC-61850-3

# Trio Q

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Model Code QP150 | QP450

TBURQP4HN-E00E1L0B represents a typical part number

Model	Trio Radio QP150   QP450
TBURQ	Q Data Radios
Code	Select: Unit Type
P	Half Duplex Hot Standby Radio - 19" 1 RU
Code	Select: Frequency Band & Sub Band
1M	VHF Mid Band: 135...175 MHz
4L	UHF Low Band: 400...450 MHz
4H	UHF High Band: 450...518 MHz
Code	Select: Reserved for future use
N	Reserved for future use
Code	Select: Regulatory Region <sup>1, 5</sup>
E00	ETSI/ACMA Region
F00	FCC Region
Code	Select: Encryption <sup>7</sup>
E	256-bit AES encryption (standard)
N	No encryption
Code	Select: Reserved for future use
1	Reserved for future use
Code	Select: Software Licensed Features
L	Ethernet & Serial (three Ethernet & two Serial Ports)

# Trio Q

## Licensed VHF | UHF Ethernet and Serial data radio

### Model Code QP150 | QP450 – cont'd

TBURQP4HN-E00E1L0B represents a typical part number

Code	Select: Power Supply
0	10...30 Vdc

Code	Select: Hot Standby Controller Options
B	Duplicated Tx/Rx Ports
D	Separate Switched Tx & Rx Ports
E	Common switched Tx/Rx Port

Example: TBURQP4LN-E00E1L0B specifies: Trio QP450 Hot Standby half duplex radio, 400 to 450 MHz, ETSI/ACMA Regulatory Region, 256 bit Encryption enabled, three Ethernet & two Serial Ports, 11...30 Vdc power supply, Duplicated Tx/Rx Ports.

Radio Regulatory Standards:

FCC – Federal Communications Commission

ISED – Innovation, Science and Economic Development Canada

ETSI – European Telecommunication Standards Institute

ACMA – Australian Communications and Media Authority

#### Footnotes

1: Availability of radio models is dependent on country of deployment. Local and regulatory conditions may determine the performance and suitability of the radio in different countries. It is the responsibility of the buyer to ensure the radio model meets the regulatory conditions required. Some parameters depend on model type and/or mode of operation. Contact your local Schneider Electric sales office for more details.

2: The version of QHxxx that is a full duplex needs to be deployed with suitable isolation between transmitter and receiver. Isolation may be achieved by the use of band pass duplexer, external filters or suitably spaced separate antennas. Internal duplexers and filters are not available.

Suitable duplexers include TBUMDUPLXBPXXXCOA. For information regarding duplexers, contact your local sales office or refer to the Wireless Accessories data sheet.

3: Typical figures shown based on QPSK modulation in 12.5 kHz ETSI channel without Forward Error Correction unless otherwise specified.

4: 256-QAM full data rate (without FEC) may not be obtainable under all hardware operating conditions. For this reason, dynamic speed selection may select 256 QAM with [FEC 0.96] providing close to full data rate with minimal overhead in conjunction with FEC 0.83 to achieve improved sensitivity.

5: Other country and radio regulatory regional approvals are available upon request. Contact your local Schneider Electric sales office for more details.

6: Backward-compatibility is not available for all types & models of Trio E radio. Not all features are available when operating in backward-compatible mode. The following modulations are supported in E/M compatibility mode (as of Firmware Version 1.3.6.3674):

E-Series	M-Series
9600 12.5 kHz ACA 4 Level	9600 25.0 kHz ACA M-Series
19200 25.0 kHz ACA 4 Level	4800 12.5 kHz ACA M-Series
9600 12.5 kHz FCC 4 Level	4800 25.0 kHz ACA M-Series
19200 12.5 kHz FCC 4 Level	2400 12.5 kHz ACA M-Series
19200 25.0 kHz FCC 2 Level	9600 12.5 kHz FCC M-Series
9600 12.5 kHz ETSI 4 Level	4800 12.5 kHz ETSI M-Series

For BER specifications and/or sensitivities, refer to the corresponding E or M Series datasheet.

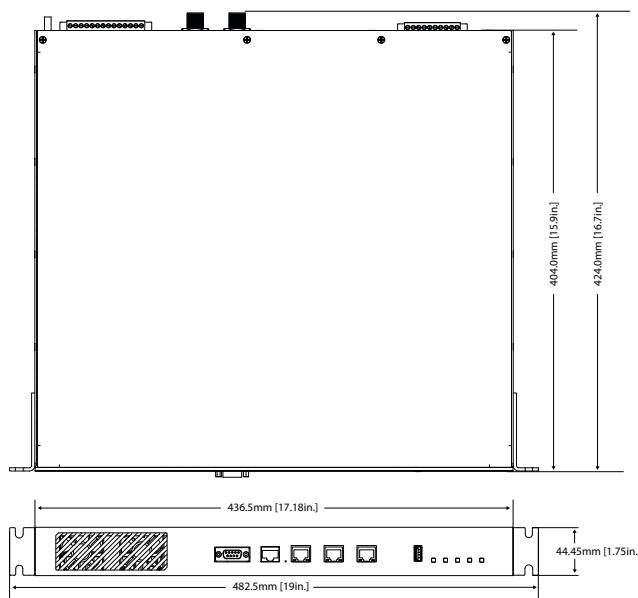
7: Export and import restrictions may apply.



# Trio Q

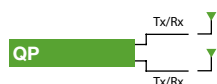
Licensed VHF | UHF Ethernet and Serial data radio

Dimensions –  
QP450 – Hot Standby Half  
Duplex Radio

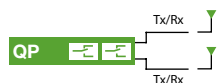


## QP150 | QP450 - Hot Standby Half Duplex Options

### Hot Standby Options



**B**



**D**



**E**

### QP Hot Standby Option Descriptions

	Description	Antenna Type
B	Duplicated Tx/Rx Ports	Duplicated Tx/Rx Antennas
D	Separate Switched Tx & Rx Ports	Separate Tx & Rx Antennas
E	Common Switched Tx/Rx Port	Common Tx/Rx Antenna



RELAY (Coaxial Transmitter Switch)

**Note:** Accessories sold separately.

### Disclaimer:

The information provided in this document contains general descriptions and/or technical characteristics of the performance of the described products or services. For detailed specification, performance and instruction of use, refer to corresponding Catalogs and user guides if available.

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#### Improved sales through... Differentiation

Green Premium delivers strong value propositions through third-party labels and services. By collaborating with third-party organizations we can support our customers in meeting their sustainability goals such as green building certifications.

\*PEP: Product Environmental Profile (i.e. Environmental Product Declaration)