Trio E-Series
Licensed Ethernet and Serial Hot Standby Radios
EH45e | EH450
Trio E-Series advanced digital data radios provide both Ethernet and serial communications for the most complex and demanding applications in Point-to-Point and Point-to-Multipoint (Multiple Address Radio) Telemetry and remote SCADA systems.

Base/Repeater stations are key elements in radio communication systems and are subject to high duty-cycle operational stresses. Trio EH45e, with Ethernet+serial interfaces, and EH450 with serial-only interfaces, are redundant 1+1 Hot Standby full duplex digital radio Base/Repeater stations with automatic changeover specially designed for installation at critical sites and to complement Trio ER45e and ER450 remote digital data radios by reliably delivering continuous duty operation at maximum rated output power in ambient temperatures up to +60°C (140°F).

A major feature of the EH45x and EH450 is their modular design comprising two identical EB45e or EB450 Base/Repeater station units linked to a central, monitoring and change-over Hot Standby Controller (HSC). Any of these units may be taken out for maintenance without the need for any system down time. Automatic change over is triggered by out-of-tolerance (alarm) conditions in either user data throughput or radio hardware operating parameters.

The EH450 may be user-configured for operation in either E-Series or M-Series modes.
## Trio EH45e

### Radio
- **Frequency Range:** 380-520MHz (various sub-frequency bands available)
- **Channel Selection:** Dual synthesizer, 6.25kHz channel step
- **Channel Spacing:** 12.5 or 25kHz
- **Frequency Accuracy:** ±1ppm, -30 to +60°C (-22 to 140°F) ambient
- **Aging:** < 1ppm/annum

### Transmitter
- **Tx Power:**
  - 5W Model: 1W to 5W (+30 to +37dBm) +/- 1dB configurable with over-temperature and high VSWR protection
  - 20W Model: 5W to 20W (+37 to +43dBm) +/- 1dB configurable with over-temperature and high VSWR protection
- **Modulation:** Configurable narrow band digitally filtered binary GMSK or 4 level FSK
- **Tx Keyup Time:** < 2mS
- **Timeout Timer:** Configurable 0 to 255 seconds
- **Tx Spurious:** <= -37dBm
- **PTT Control:** Auto (Data) / RTS line (Data Port) / System Port Override / Permanent Tx

### Receiver
- **Sensitivity:** -118dBm for 12dB SINAD
- **Selectivity:** Better than 60dB
- **Intermodulation:** Better than 70dB
- **Spurious Response:** Better than 70dB
- **AFC Tracking:** Digital receiver frequency tracking
- **Mute:** Programmable digital mute

### Connections (for each Base within the Hot Standby configuration)
- **Serial Data Port:** RS232 DB9 female DCE, 300-38,400bps asynchroneous
- **Serial Data Port Flow Control:** Configurable hardware / software / 3-wire interface
- **Serial Data Port DCD Control:** Configurable DCD operation : activated on RF carrier or from user data output
- **System Port:** 2 x RS232 RJ45 (Front & Rear): 19,200bps, for configuration and diagnostics
- **Ethernet Port:** 1 x RJ45: 10/100 Mbps (auto-MDIX sensing) compliant with IEEE 802.3
- **Digital I/O:** 2 Inputs monitored by TView+ Diagnostics Software, 2 outputs user-configurable by TView+ Diagnostics Software
- **Antenna:** 2 x N female bulkhead (separate Tx and Rx ports)
- **Power:** 2-pin locking, mating connector supplied
- **LED Display:** Multimode Indicators for Pwr, Tx, Rx, Sync, TxD and RxD data LEDs (for both Ethernet and Serial ports)
- **Bargraphs Indicators:** for Supply Volts, Tx Power, Drive Power, Receive Signal Strength and Frequency Error

### Ethernet
- **Protocols:** Ethernet/IP (including UDP, TCP, DHCP, ARP, ICMP, STP, IGMP, SNTP & TFPT)
- **Repeating:** Automatic and Self Learning Peer to Peer repeating
- **Shared IP Address:** The shared IP address can be used to access SNMP, eDiags and Terminal server functions within the “on-line” base
- **Traffic Filtering:** Configurable: No Filtering / Unicast Traffic & ARP Only / Unicast Traffic Only
- **Link Monitoring:** Monitor the Ethernet link between a base unit and up to two remote IP addresses
- **Compression:** Automatic Ethernet data compression
- **Terminal Server:** Legacy RS-232 serial support via embedded terminal server (UDP/TCP)
- **DHCP Modes:** Auto and Manual
- **SNMP:** SNMP V1/V2c, RFC1213-compliant and Trio Ethernet E-Series radio diagnostics parameters (including alarm generation via traps)
- **Modbus Gateway:** Configurable Modbus TCP/IP to Modbus Serial Gateway

Specifications continue on the next page
## Product Data Sheet Trio EH450 & EH45e

### Specifications

#### Modem

**RF Channel Data Rate**
- Radio Model F01: FCC (IC) 9600bps (12.5kHz) & 19200bps (12.5kHz) North America
- Radio Model F02: 19200bps (25kHz)
- Radio Model E01: ETSI 4800bps (12.5kHz) & 9600bps (12.5kHz) Europe
- Radio Model A01: ACMA 4800bps (12.5kHz) / 9600bps (12.5kHz) Australia
- Radio Model A02: ACMA 19200bps (25kHz) Australia

**Typical Bit Error Rate**
- < 1x10^-6 @ -111dBm (4800bps), < 1x10^-6 @ -110dBm (9600bps), < 1x10^-6 @ -106dBm (19,200bps)

**Operating Modes**
- Base, remote, repeater

**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

**Data Turnaround Time**
- <10mS

**Firmware**
- Local and over-the-air flash-based firmware upgradeable patches with support for broadcast updates

#### Security

**Encryption**
- 128-bit AES

**Password Protection**
- Password protected configuration sessions

#### Hot Standby Controller

**Change-over control**
- Manual (forced) / automatic / remote (software driven)

**Alarm Monitoring**
- Tx Power Failure / Receiver Failure / Received Signal Frequency Error / Data Corruption / DC Power Supply Fail

#### Diagnostics

**Diagnostics Overview**
- TView+ configuration, network management and diagnostic Windows GUI software
- Network-wide operation from any remote terminal
- Non-intrusive protocol – runs simultaneously with the application
- SNMP access to radio diagnostics
- Serial & Ethernet (eDiags) connectivity for diagnostics and configuration
- 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
  - VSWR

#### General

**Operating Temperature Range**
- -30°C to +60°C (-22°F to +140°F)

**Power Supply**
- 13.8Vdc nominal (11-16Vdc)

**Transmit Current**
- 5W Version: 2.0A nominal @ 1W, 3.2A nominal @ 5W
- 20W Version: 3.4A nominal @ 5W, 5.4A nominal @ 20W

**Receive Current**
- < 1A nominal @ 13.8Vdc

**Dimensions**
- Hot Standby is configured using 2 x EB45x (19” 2 RU each) plus 1 x Hot Standby Controller (19” 1 RU each) for a total of 19” 5RU’s
  - 5W: 19” 5 RU rack mount 485 x 225 x 420mm including heat-sink (19 x 8.9 x 16.5in.)
  - 20W: 19” 5 RU rack mount 485 x 225 x 446 mm including heat-sink (19 x 8.9 x 17.5in.)

**Weight**
- 12.7kg (28lbs) excluding optional duplexer

#### Approvals and Certifications

- **Europe (ETSI)**: ETSI EN300113, EN301489, EN60950
- **FCC**: FCC PART 15, PART 90
- **Industry Canada**: IC RS119, ICES-001
- **Australia**: ACMA AS4295-1995 (Data)

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*Export restrictions may apply. Contact your local representative for more details.*

# Local radio regulatory requirements may dictate the actual RF channel data rate and Bit Error Rates available. Contact your local representative for more details.

### 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](http://www.schneider-electric.com).
**Trio EH450 Radio**

**Frequency Range**
380-520MHz (various sub-frequency bands available)

**Frequency Splits**
Various Tx/Rx frequency splits - configurable

**Channel Selection**
Dual synthesizer, 6.25kHz channel step

**Channel Spacing**
12.5 or 25kHz

**Frequency Accuracy**
±1ppm, -30 to +60°C (-22 to 140°F) ambient

**Aging**
<= 1ppm/annum

**Radio Modes**
Full Duplex

**Duplexer**
Optional external duplexer available for single antenna operation

**Configuration**
All configuration via Windows based software

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**Transmitter**

**Tx Power**
- 5W Model: 1W to 5W (+30 to +37dBm) +/- 1dB configurable with over-temperature and high VSWR protection
- 20W Model: 5W to 20W (+37 to +43dBm) +/- 1dB configurable with over-temperature and high VSWR protection

**Modulation**
Configurable narrow band digitally filtered binary GMSK or 4 level FSK

**Tx Keyup Time**
< 2mS

**Timeout Timer**
Configurable 0 to 255 seconds

**Tx Spurious**
<= -37dBm

**PTT Control**
Auto (Data) / RTS line (Data Port) / System Port Override / Permanent Tx

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**Receiver**

**Sensitivity**
-118dBm for 12dB SINAD

**Selectivity**
Better than 60dB

**Intermodulation**
Better than 70dB

**Spurious Response**
Better than 70dB

**AFC Tracking**
Digital receiver frequency tracking

**Mute**
Programmable digital mute

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**Connections**
(for each Base within the Hot Standby configuration)

**Serial Data Port A**
RS232 DB9 female DCE. 300-57,600bps asynchronous

**Serial Data Port B**
RS232 DB9 female DCE. 300-38,400bps asynchronous

**Serial Data Port Flow Control**
Configurable hardware / software / 3-wire interface

**Serial Data Port DCD Control**
Configurable DCD operation: activated on RF carrier or from user data output

**System Port**
2 x RS232 RJ45 (Front & Rear): 19,200bps, for configuration and diagnostics

**Digital I/O**
2 Inputs monitored by TView+ Diagnostics Software, 2 outputs user-configurable by TView+ Diagnostics Software

**Antenna**
2 x N female bulkhead (separate Tx and Rx ports)

**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)

**Bargraphs**
Indicators for Supply Volts, Tx Power, Drive Power, Receive Signal Strength and Frequency Error

Specifications continue on the next page
## Trio EH450

### Modem

<table>
<thead>
<tr>
<th>RF Channel Data Rate</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radio Model F01</td>
<td>FCC (IC) 9600bps (12.5kHz) &amp; 19200bps (12.5kHz) North America</td>
</tr>
<tr>
<td>Radio Model F02</td>
<td>19200bps (25kHz)</td>
</tr>
<tr>
<td>Radio Model E01</td>
<td>ETSI 4800bps (12.5kHz) &amp; 9600bps (12.5kHz) Europe</td>
</tr>
<tr>
<td>Radio Model A01</td>
<td>ACMA 4800bps (12.5kHz) &amp; 9600bps (12.5kHz) Australia</td>
</tr>
<tr>
<td>Radio Model A02</td>
<td>ACMA 19200bps (25kHz) Australia</td>
</tr>
</tbody>
</table>

### Typical Bit Error Rate

- $< 1 \times 10^{-6} \text{ @ } -111 \text{dBm (4800bps)}$, $< 1 \times 10^{-6} \text{ @ } -110 \text{dBm (9600bps)}$, $< 1 \times 10^{-6} \text{ @ } -106 \text{dBm (19,200bps)}$

### Operating Modes

- Base, remote, repeater

### Data Buffer

16kbyte of on-board RAM

### 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

### Data Turnaround Time

$< 10 \text{mS}$

### Security

- Encryption*: 128-bit AES
- Password Protection: Password protected configuration sessions

### Hot Standby Controller

- Change-over control: Manual (forced) / automatic / remote (software driven)
- Alarm Monitoring: Tx Power Failure / Receiver Failure / Received Signal Frequency Error / Data Corruption / DC Power Supply Fail

### Diagnostics

#### Diagnostics Overview

- TView+ configuration, network management and diagnostic Windows GUI software
- 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
- Transmit Power
- Received Signal Strength
- DC Supply Voltage
- Received Frequency Error
- Radio Temperature
- VSWR

### General

- Operating Temperature Range: $-30^\circ \text{C} \text{ to } +60^\circ \text{C} \text{ (-22}^\circ \text{F to +140}^\circ \text{F)}$
- Power Supply: 13.8Vdc nominal (11-16Vdc)
- Transmit Current:
  - 5W Version: 2.0A nominal @ 1W, 3.2A nominal @ 5W
  - 20W Version: 3.4A nominal @ 5W, 5.4A nominal @ 20W
- Receive Current: $< 1 \text{A nominal @ 13.8Vdc}$
- Dimensions: Hot Standby is configured using 2 x EB45x (19” 2 RU each) + 1 x Hot Standby Controller (19” 1 RU each) for a total of 19” 5RU’s
  - 5W: 19” 5 RU rack mount 485 x 225 x 420mm including heat-sink (19 x 8.9 x 16.5in.)
  - 20W: 19” 5 RU rack mount 485 x 225 x 446 mm including heat-sink (19 x 8.9 x 17.5in.)
- Weight: 12.7kg (28lbs) excluding optional duplexer

### Approvals and Certifications

- Europe (ETSI): ETSI EN300113, EN301489, EN60950
- FCC: FCC PART 15, PART 90
- Industry Canada: IC RS119, ICES-001
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# Local radio regulatory requirements may dictate the actual RF channel data rate and Bit Error Rates available. Contact your local representative for more details

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## Model Code

<table>
<thead>
<tr>
<th>Model</th>
<th>Trio Radio ER450 &amp; ER45e</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBURE</td>
<td>E-Series</td>
</tr>
</tbody>
</table>

### Code: Select: Unit Type
- **H**: Hot Standby Base / Repeater

### Code: Select: Generic Frequency Band
- 45: 370 to 518 MHz

### Code: Select: Data Ports
- 0: Two serial ports
- E: One Ethernet & one serial port

### Code: Frequency (400MHz bands) – Frequencies to be specified at time of order

<table>
<thead>
<tr>
<th>Code</th>
<th>Frequency (400MHz bands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>47</td>
<td>380 to 396 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>48</td>
<td>395 to 406 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>50</td>
<td>403 to 417 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>63</td>
<td>406 to 421 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>64</td>
<td>415 to 430 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>56</td>
<td>418 to 435 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>57</td>
<td>428 to 444 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>55</td>
<td>436 to 450 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>51</td>
<td>450 to 465 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>65</td>
<td>455 to 470 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>52</td>
<td>465 to 480 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>53</td>
<td>480 to 494 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>60</td>
<td>490 to 500 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>54</td>
<td>505 to 518 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>A6</td>
<td>370 to 400 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>B3</td>
<td>395 to 426 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>B4</td>
<td>413 to 447 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>B5</td>
<td>433 to 450 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>C1</td>
<td>436 to 467 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>C2</td>
<td>450 to 487 MHz (Tx &amp; Rx)</td>
</tr>
<tr>
<td>C3</td>
<td>473 to 518 MHz (Tx &amp; Rx)</td>
</tr>
</tbody>
</table>

### Code: Select: RF Channel Data Rate & Bandwidth (Internal Modem)

<table>
<thead>
<tr>
<th>Code</th>
<th>Data Rate &amp; Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>F01</td>
<td>FCC (IC) 9600 / 19k2bps, 12.5kHz – provides M-Series compatability</td>
</tr>
<tr>
<td>F02</td>
<td>FCC (IC) 19k2bps, 25kHz – Not for sale in North America</td>
</tr>
<tr>
<td>E01</td>
<td>ETSI 9600bps, 12.5kHz</td>
</tr>
<tr>
<td>A01</td>
<td>ACMA 4800 / 9600bps, 12.5kHz - provides M-Series compatability</td>
</tr>
<tr>
<td>A02</td>
<td>ACMA 9600 / 19k2bps, 25kHz</td>
</tr>
</tbody>
</table>

### Code: Select: Diagnostics & Encryption
- D: Diagnostics Only (No Encryption)
- E: Diagnostics & Encryption

### Code: Select: Options
- 0: Separate Tx & Rx Antenna Ports
- 1: Internal base station band reject duplexers. No RF switching via Hot Standby Controller. Ref to Hot Standby configuration diagram. #
- A: 20W RF Power Output**
Product Data Sheet Trio EH450 & EH45e

Dimensions

<table>
<thead>
<tr>
<th>Code</th>
<th>Hot Standby Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Separate Tx &amp; Rx Antenna ports with RF switching via Hot Standby Controller</td>
</tr>
<tr>
<td>B</td>
<td>Dual Redundant External Duplexers (not included) with no RF switching via Hot Standby Controller</td>
</tr>
<tr>
<td>C</td>
<td>Internal hot standby controller band reject duplexers. No RF switching via Hot Standby Controller. Ref to Hot Standby configuration diagram.</td>
</tr>
</tbody>
</table>

Example: TBUREH450-C2F01E0A specifies:
Trio EH450 hot standby base / repeater, two serial ports, frequencies to be specified at time of order, FCC (IC) 9600/19k2bps, 12.5kHz, Diagnostics & Encryption, separate Tx & Rx Ports

Contact your local sales office for accessories

* Export restrictions may apply. Contact factory for details.

** Local regulatory conditions may prevent the use of 20W in some countries

#Note – Suitable duplexer reference number is TBURDUPLXBR450COD. The supply of duplexers is not included in the reference number or in the price for any reference number – the reference number only indicates that equipment is configured for a particular duplexer arrangement. If TBURDUPLXBR450COD duplexer is required to be factory fitted then this must be clearly specified at time of order. Contact local sales office for further details.

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![Diagram of Trio EH450 & EH45e](image)

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**EH45x Hot Standby Controller Configurations**

<table>
<thead>
<tr>
<th>External Duplexer</th>
<th>EB45x</th>
<th>EHHSC Hot Standby Controller Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBUREH45x-xxxxxxA</td>
<td>EB45x</td>
<td>A</td>
</tr>
<tr>
<td>• 2 x TBUREB45-xxxxxxx0</td>
<td>EB45x</td>
<td></td>
</tr>
<tr>
<td>• 1 x TBUREHHSC-00A</td>
<td>EB45x</td>
<td></td>
</tr>
<tr>
<td>TBUREH45x-xxxxxxB</td>
<td>EB45x</td>
<td>B</td>
</tr>
<tr>
<td>• 2 x TBUREB45x-xxxxxxx0</td>
<td>EB45x</td>
<td></td>
</tr>
<tr>
<td>• 1 x TBUREHHSC-00B</td>
<td>EB45x</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internal Duplexer (Band Reject only)</th>
<th>EB45x</th>
<th>EHHSC Hot Standby Controller Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBUREH45x-xxxxxx0C</td>
<td>EB45x</td>
<td>C</td>
</tr>
<tr>
<td>• 2 x TBUREB45x-xxxxxxx00</td>
<td>EB45x</td>
<td></td>
</tr>
<tr>
<td>• 1 x TBUREHHSC-00C</td>
<td>EB45x</td>
<td></td>
</tr>
<tr>
<td>TBUREH45x-xxxxxx1B</td>
<td>EB45x</td>
<td>B</td>
</tr>
<tr>
<td>• 2 x TBUREB45x-xxxxxxx10</td>
<td>EB45x</td>
<td></td>
</tr>
<tr>
<td>• 1 x TBUREHHSC-00B</td>
<td>EB45x</td>
<td></td>
</tr>
</tbody>
</table>

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**Hot Standby Controller options**

<table>
<thead>
<tr>
<th>Description</th>
<th>Duplexer</th>
<th>Antenna Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A LNA &amp; RF Relay Fitted</td>
<td>Not Fitted</td>
<td>Separate Tx &amp; Rx Ant</td>
</tr>
<tr>
<td>B No RF connections</td>
<td>Not Fitted</td>
<td>No Antenna Connection</td>
</tr>
<tr>
<td>C LNA &amp; RF Relay Fitted</td>
<td>Band Reject</td>
<td>Single Antenna (Tx/Rx)</td>
</tr>
</tbody>
</table>

#Note – Suitable duplexer reference number is TBURDUPLXBR450COD. The supply of duplexers is not included in the reference number or in the price for any reference number – the reference number only indicates that equipment is configured for a particular duplexer arrangement. If TBURDUPLXBR450COD duplexer is required to be factory fitted then this must be clearly specified at time of order. Contact local sales office for further details.