Trusted Fibre TX/RX Unit

Product Overview

The Trusted[®] Fibre Transmitter/Receiver (Tx/Rx) Unit T8314 is designed to extend the Trusted Expander Bus over distances of up to 10 km. This enables a Trusted Expander Chassis to be located remotely from the Trusted System.

Note: It is recommended that if a remote Expander Chassis is to be located more than 2 km from the Controller Chassis, the route of the cable is surveyed.

The Expander Bus is extended by means of a communications link using a single mode fibre optic cable. The Trusted Fibre TX/RX Unit converts the differential signals of the copper based Expander Bus to a fibre optic signal for transmission via the single mode cable. Three totally independent pairs of Trusted Fibre TX/RX Units provide a non-interfering 'Grey Channel' approach to safety.

Features:

- Dual 24 Vdc diode ORed power supply.
- Easy installation (Din rail mounting).
- Communications over a distance of 10 km.
- Independent units therefore easily maintained.
- Square Connector (SC) type connectors to two fibres (Tx and Rx).
- Low power consumption.



Trusted

PREFACE

In no event will Rockwell Automation be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment. The examples given in this manual are included solely for illustrative purposes. Because of the many variables and requirements related to any particular installation, Rockwell Automation does not assume responsibility or reliability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, with respect to use of information, circuits, equipment, or software described in this manual.

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DISCLAIMER

It is not intended that the information in this publication covers every possible detail about the construction, operation, or maintenance of a control system installation. You should also refer to your own local (or supplied) system safety manual, installation and operator/maintenance manuals.

REVISION AND UPDATING POLICY

This document is based on information available at the time of its publication. The document contents are subject to change from time to time. The latest versions of the manuals are available at the Rockwell Automation Literature Library under "Product Information" information "Critical Process Control & Safety Systems".

TRUSTED RELEASE

This technical manual applies to Trusted Release: 3.6.1.

LATEST PRODUCT INFORMATION

For the latest information about this product review the Product Notifications and Technical Notes issued by technical support. Product Notifications and product support are available at the Rockwell Automation Support Centre at

http://rockwellautomation.custhelp.com

At the Search Knowledgebase tab select the option "By Product" then scroll down and select the Trusted product.

Some of the Answer ID's in the Knowledge Base require a TechConnect Support Contract. For more information about TechConnect Support Contract Access Level and Features please click on the following link:

https://rockwellautomation.custhelp.com/app/answers/detail/a_id/50871

This will get you to the login page where you must enter your login details.

IMPORTANT A login is required to access the link. If you do not have an account then you can create one using the "Sign Up" link at the top right of the web page.

DOCUMENTATION FEEDBACK

Your comments help us to write better user documentation. If you discover an error, or have a suggestion on how to make this publication better, send your comment to our technical support group at http://rockwellautomation.custhelp.com

SCOPE

This manual specifies the maintenance requirements and describes the procedures to assist troubleshooting and maintenance of a Trusted system.

WHO SHOULD USE THIS MANUAL

This manual is for plant maintenance personnel who are experienced in the operation and maintenance of electronic equipment and are trained to work with safety systems.

SYMBOLS

In this manual we will use these notices to tell you about safety considerations.

| <u>A</u> | SHOCK HAZARD: Identifies an electrical shock hazard. If a warning label is fitted, it can be on or inside the equipment. |
|-----------|--|
| | WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which can cause injury or death, property damage or economic loss. |
| | ATTENTION: Identifies information about practices or circumstances that can cause injury or death. |
| | CAUTION: Identifies information about practices or circumstances that can cause property damage or economic loss. |
| | BURN HAZARD: Identifies where a surface can reach dangerous temperatures. If a warning label is fitted, it can be on or inside the equipment. |
| | This symbol identifies items which must be thought about and put in place when designing and assembling a Trusted controller for use in a Safety Instrumented Function (SIF). It appears extensively in the Trusted Safety Manual. |
| IMPORTANT | Identifies information that is critical for successful application and understanding of the product. |
| NOTE | Provides key information about the product or service. |
| TIP | Tips give helpful information about using or setting up the equipment. |

WARNINGS AND CAUTIONS



WARNING: EXPLOSION RISK

Do not connect or disconnect equipment while the circuit is live or unless the area is known to be free of ignitable concentrations or equivalent

AVERTISSEMENT - RISQUE D'EXPLOSION

Ne pas connecter ou déconnecter l'équipement alors qu'il est sous tension, sauf si l'environnement est exempt de concentrations inflammables ou équivalente



MAINTENANCE

Maintenance must be carried out only by qualified personnel. Failure to follow these instructions may result in personal injury.



CAUTION: RADIO FREQUENCY INTERFERENCE

Most electronic equipment is influenced by Radio Frequency Interference. Caution should be exercised with regard to the use of portable communications equipment around such equipment. Signs should be posted in the vicinity of the equipment cautioning against the use of portable communications equipment.



CAUTION:

The module PCBs contains static sensitive components. Static handling precautions must be observed. DO NOT touch exposed connector pins or attempt to dismantle a module.

ISSUE RECORD

| Issue | Date | Comments |
|-------|--------|---|
| 7 | Sep 05 | Format |
| 8 | Dec 06 | Corrections |
| 9 | Nov 07 | Optical Tx/Rx power specifications |
| 10 | Sep 08 | Max length difference |
| 11 | Oct 15 | Rebranded and reformatted with corrections to the Relative Humidity Range and Operating Temperature statements in the Specification section |
| 12 | Jun 16 | Updated to incorporate IEEE standards with correction of typographical errors. |

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1. Description



Figure 1 T8314 Photo

The Trusted Fibre TX/RX Unit T8314 is designed to be DIN rail mounted in the rear area of a cabinet/bay containing the Trusted Controller Chassis T8100. A block diagram of the Unit is shown in Figure 2 below:



Figure 2 Trusted Fibre TX/RX Unit Block Diagram

The Unit provides a communications connection interface between the Trusted Controller Chassis and a remote Expander Chassis.

The Positive Emitter Coupled Logic (PECL) signal from the Trusted Expander Interface Module in the Controller Chassis is connected to the Unit by a Trusted Expander Cable TC-302. The signal is fed through an isolator, then filtered and terminated before being connected to the PECL input of the Fibre-optic Transceiver. The fibre-optic signal is transmitted to a similar Unit at the remote end via a Single Mode Fibre-Optic Cable. The Fibre-optic Transceiver at the remote end of the link converts the signal back to a PECL signal before transmitting it to the Trusted Expander Processor Module via a filter/termination circuit, isolator and ' π ' filter. Signals originating from the Trusted Expander Processor Module in the remote Expander Chassis are processed in the same manner.

Figure 3 below shows the configuration of the Unit within a Trusted System using a remote Expander Chassis.



Figure 3 Trusted Fibre TX/RX Unit Configuration

Six Units and six fibres are required for each remote link with three located at each end. A dual 24 Vdc power philosophy is employed allowing the user to supply each Unit with dual power feeds.

Individual Units require no configuration prior to installation within a remote communications link. Each Unit operates in a stand-alone mode allowing replacement without interrupting the operation of the Trusted System.

There are no diagnostics available, but the quality of communications may be checked by using the Expander Interface and Processor diagnostics via the application program.

Note: Data is transmitted along the fibre-optic link at a rate of 250 Mb/s. Signal skew will take place but it must not exceed 80 ns, which equates to a cable length difference of 15 metres. For distances greater than 2 km, cable routes must be surveyed to ensure that the propagation time difference between the shortest and longest distance of the three links is less than 80 ns and that the round trip delay does not exceed the Inter-Module Bus (IMB) Timeout time.

2. Installation

The Trusted Fibre TX/RX Unit T8314 may be mounted on either of the TS32 or TS35 DIN rails in the horizontal or vertical position as required.

Note: Allow a minimum of 200 mm on either side of the Unit to allow for the fibre cable bend radius. This bend radius may vary depending upon the type of cable chosen by the user.

3. Associated Trusted Cable Selection

| Cable Type | Description |
|------------|--|
| TC-302-01 | 250 Mbits/s Remote Expander Outgoing Cable from T8312 to T8314 |
| TC-303-01 | 250 Mbits/s Remote Expander Incoming Cable from T8314 to T8310 |

Table 1 Associated Trusted Cable Selection

Note: ICS Triplex recommends that BICC Brand-Rex Helios Optical Single Mode Fibre Cable be used to inter-connect the Trusted Fibre TX/RX Units. The cable must be configured using 'SC' type connectors.

4. Cable Specification

The specification of cables used to inter-connect Trusted Fibre TX/RX Units is detailed below.

| Parameter | Value | Min | Max | Unit |
|---|--|------|------|-------|
| Cable Type | Single Mode 1300 | | | nm |
| Attenuation @ 1300 nm | | | 0.38 | dB/km |
| Cut-off Wavelength | | 1270 | 1360 | nm |
| Dispersion @ 1300 nm | | | 3.5 | nm |
| Bandwidth | | 600 | | MHz |
| Spectral Width | | | 2.5 | nm |
| Variation in Refractive Index | | | 0.5 | % |
| Transmitter power (into the fibre cable) | | -15 | | dBm |
| Receive Sensitivity (minimum power budget for optical link) | | | -28 | dBm |
| Laser Output Optical Eye Opening | Compliant With TR-NWT-000253 and ITU-T Recommendations G.957 | | | |
| Connector Type | SC | | | |
| Cores | 6 | | | |

Table 2 Cable Specification

5. Pin Connections

5.1. Power Connection Details

| Pin | Service |
|-----|-----------|
| 1 | +24 Vdc 1 |
| 2 | 0V1 |
| 3 | 0V2 |
| 4 | +24 Vdc 2 |

Table 3 Power Connection Details

Note: The 24 Vdc supplies are diode ORed to allow the Unit to be powered from a dual or single source as required.

5.2. Expander Bus Connection Details

| Pin | Service |
|-----|---------|
| 1 | TX+ |
| 2 | TX- |
| 3 | RX- |
| 4 | RX+ |

Table 4 Expander Bus Connection Details

6. Specifications

| Voltage Range | 18 Vdc to 32 Vdc |
|---|--------------------------------------|
| Power Consumption (Max) | 1.7 W |
| Transmitter power | -15 dBm minimum |
| Receiver sensitivity | -28 dBm |
| Maximum propagation time difference | 80 ns |
| Maximum fibre length difference | 15 m |
| Operating Temperature | 0 °C to +60 °C (+32 °F to +140 °F) |
| Non-operating Temperature | -25 °C to +70 °C (-13 °F to +158 °F) |
| Relative Humidity range (operating, storage & transport) | 10 % - 95 %, non-condensing |
| Environmental Specifications | Refer to Document 552517 |
| Dimensions | |
| Height | 84 mm (3.3 in) |
| Width | 110 mm (4.3 in) |
| Depth | 40 mm (1.6 in) |
| Weight | 320 g (0.7 lb) |