

Trusted Expander Chassis

Product Overview

The Trusted® Expander Chassis can be either swing frame or fixed frame mounted and houses the Trusted Expander Processors and Trusted Input/Output (I/O) Modules.

The Chassis may be panel (rear) mounted by the addition of Panel Mounting Kit T8380 which comprises a pair of brackets with rear facing ears.

The Inter-Module Bus backplane is part of the Trusted Expander Chassis and provides electrical interconnection and other services for the modules.

Features:

- 2 x 30 mm (1.2 in) Trusted Expander Processor Slots.
- 12 x 30 mm (1.2 in) single width Trusted I/O Module Slots.
- No user-serviceable parts inside.
- Fast assembly.
- Minimum tooling/parts.
- 32, 48, 64 and 96-way DIN 41612 I/O port connector capability.
- Cable entry options.
- Convection cooling of modules through the Chassis.

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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.



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
9	Sep 05	Format
10	Aug 06	TC-006 connection
11	Dec 06	Cable distance
12	Jan 07	Earthing
13	Jul 12	Correction
14	Sep 15	Rebranded and reformatted
15	Apr 16	Standardisation of Relative Humidity Range and Operating Temperature statements in the Specification Section

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1. Description

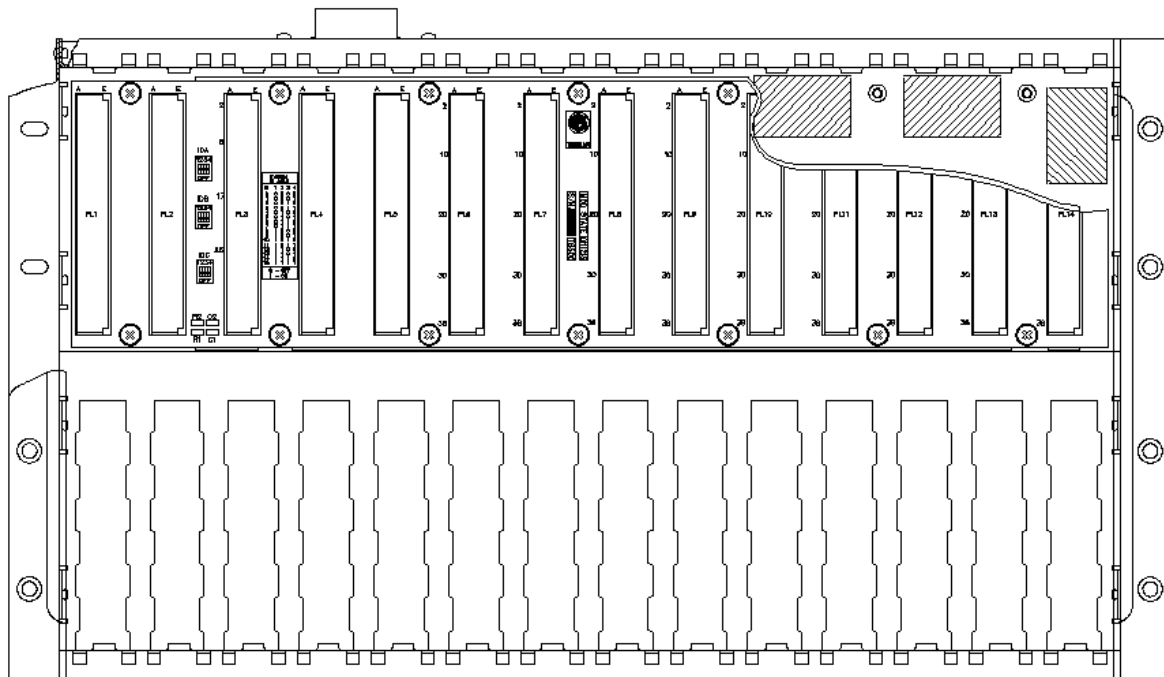


Figure 1 Trusted Expander Chassis and Backplane

The Chassis may be populated in different ways depending on the requirements of the specific System, to accommodate a maximum of 12 single-width (30 mm) Trusted I/O Modules and up to two single-width Trusted Expander Processors. The Chassis Assembly has eight screw positions, four on each flange, that are used to enable secure attachment to the side brackets on the Frame.

Modules are inserted by sliding them carefully into their slot position, ensuring that the 'U'-channels of the Module top and bottom casings engage the raised guides of the upper and lower Chassis Plates. Ejector levers on the Modules secure the handle-less Modules within the Chassis.

A 90 mm space must be provided between Chassis on a frame to assist the cooling process.

1.1. Inter-Module Bus Backplane

The Chassis houses the Inter-Module Bus (IMB) Backplane which is a single, printed circuit board assembly. The Inter-Module Bus Backplane provides the electrical interconnections between Modules in a Trusted Expander Chassis. These interconnections are part of the physical layer communications between Modules.

Figure 2 shows a simplified top level block diagram of the Inter-Module Bus Backplane.

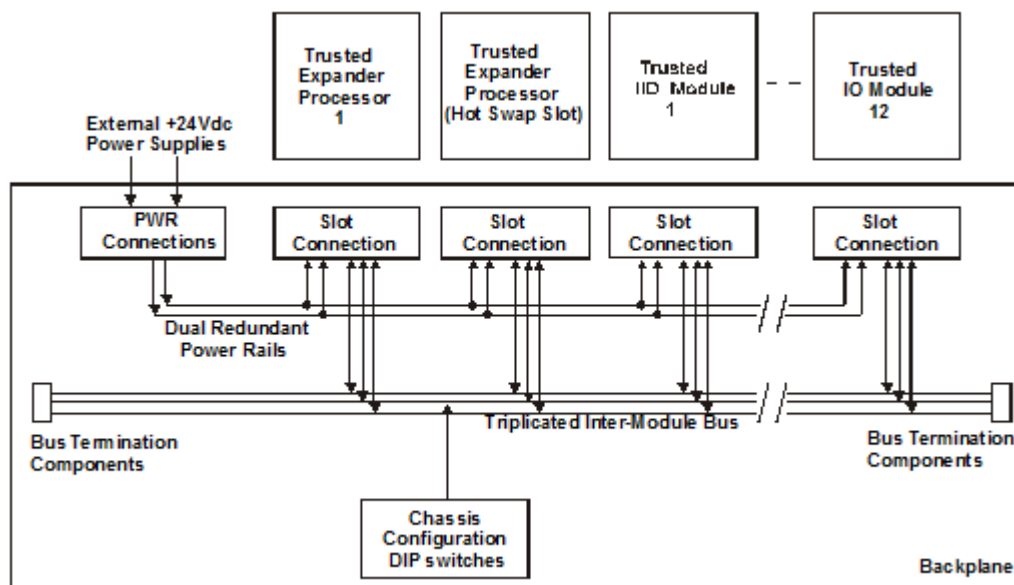


Figure 2 Inter-Module Bus Backplane

1.2. System Configuration

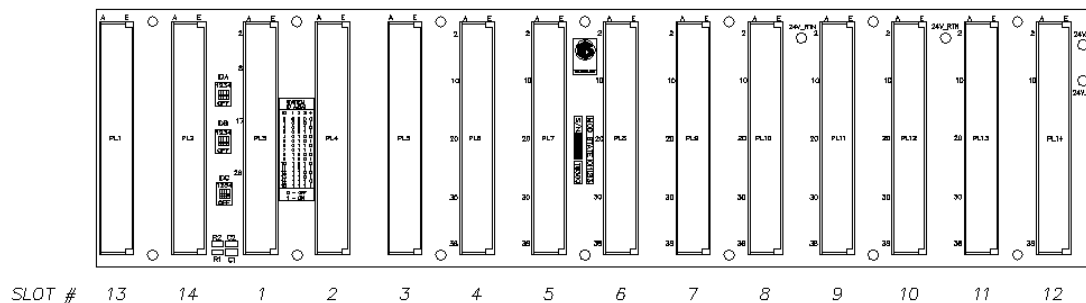


Figure 3 Backplane Front View

The Backplane contains a user-configurable setting for system identification. In the Trusted Expander Chassis, this setting represents the system number 0 to 15. The setting is implemented via three 4-position DIP switches (IDA, IDB and IDC) and is provided to the Trusted Triple Modular Redundant (TMR) Processor connector. Adjacent to the three DIP switches is a table which shows the required settings for each System. See Table 1 below.

Note: On some early models of Trusted Expander Chassis, the designation of the 'Off' and 'On' switches detailed in the table on the Backplane was reversed.

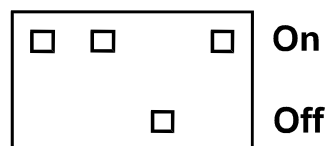
In all cases, '1' = Off and '0' = On and 'down' means logic 1.

All three address settings must be the same, otherwise an error condition will be reported.

The first Expander Chassis should be set to IDA=2, IDB=2 and IDC=2, the second Expander Chassis should be set to IDA=3, IDB=3 and IDC=3. The last Expander Chassis should be set to IDA=8, IDB=8 and IDC=8.

System ID A.B.C				
ID	1	2	3	4
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1
10	1	0	1	0
11	1	0	1	1
12	1	1	0	0
13	1	1	0	1
14	1	1	1	0
15	1	1	1	1
1 - OFF 0 - ON				

Table 1 System ID Settings



Switch set for ID = 2

1.3. Bus Terminations

The backplane contains termination circuits for certain bus signals. The terminators are used to reduce signal reflections on critical signals and also to provide default logic levels for open or tri-stated signals. Termination circuits are located at the end slot positions, 12 and 13.

1.4. Bus Connections

All bus connections are triplicated except for the +24 Vdc external power supply, which is dual redundant.

1.5. Slot Positions

The module positions for the Trusted Expander Processors are pre-configured and may only be installed in the slot positions 13 and 14. The left-hand slot in the chassis is slot 13.

All connections between the Module and the Backplane are via a single, self-aligning high-density connector. The male connector is on the Backplane.

1.6. External Power

The Backplane has two terminal blocks, one for each of the redundant external +24 Vdc power supplies, which are connected to the input power connectors. Redundant power is supplied to all Modules in the Chassis.

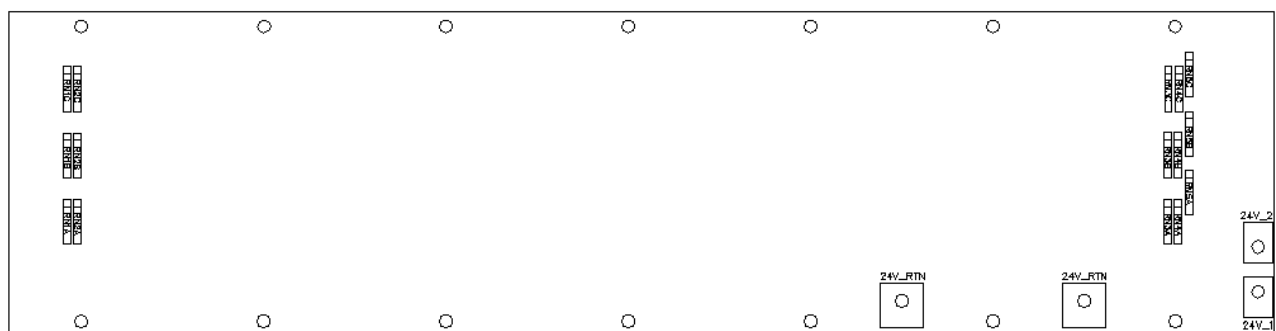


Figure 4 Backplane Back View

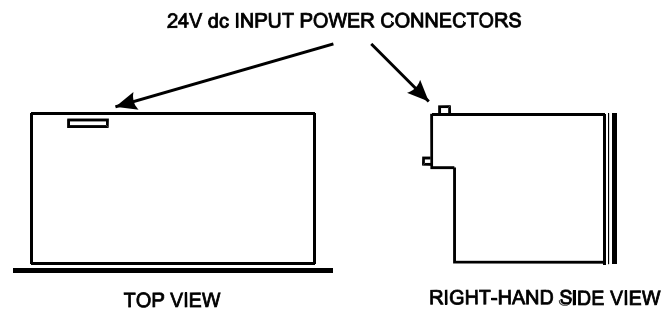


Figure 5 Chassis 24 Vdc Input Power Connectors

1.7. Smart Slot Referencing

For a Smart Slot configuration, the secondary slot is not required to be unique to each primary slot. Instead, a single secondary slot can be shared among many primary slots. This technique provides the highest density of Modules to be fitted in a given physical space. Smart Slot between Chassis can be performed if the Chassis are version 2 (or higher) as these have the connector fitted to enable connection of a TC-006 that ensures the IMB 0 V of each Chassis is at the same potential.

1.7.1. Location of Smart Slots

Design considerations should be given to the location of Smart Slots within the System. One option is to allocate a spare slot on each Chassis or per Module type. Another option is to allocate one Smart Slot per system panel; if this option is selected then the IMB 0 V of each Chassis needs connecting together using a TC-006 cable. Each Chassis (Processor and Expander) requires a TC-006 to connect to the Molex socket on the back of each Chassis. The crimps on the other end are taken to terminals that are commoned together. This ensures that each isolated IMB 0 V is at the same potential. Refer to PD-TC000 for further information on TC-006.



Figure 6 Molex Sockets on the Rear of each Processor and Expander Chassis

1.8. I/O Connectors

Up to 14 DIN 41612 port connectors, slotted into the Chassis Backplate, can be provided for connecting the Trusted Expander Processors to the Controller and Trusted I/O to the field termination area. Double and single connector options are available.

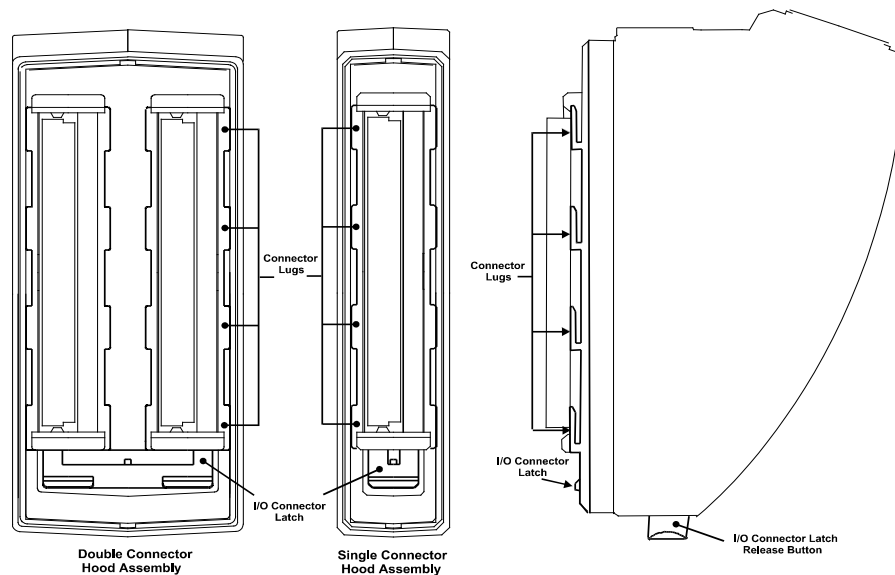


Figure 7 Connector to Chassis Attachment Features

Each I/O connector has an earth tail which should be fixed to the cable saddle bracket across the rear of the Chassis using M5 x 10 Pan Head Taptite screws. The strap holes must be tapped in fitting the Taptite screws to ensure a good earth bond.

1.9. Chassis Dimensions

The dimensions of the Trusted Expander Chassis are shown in Figure 8

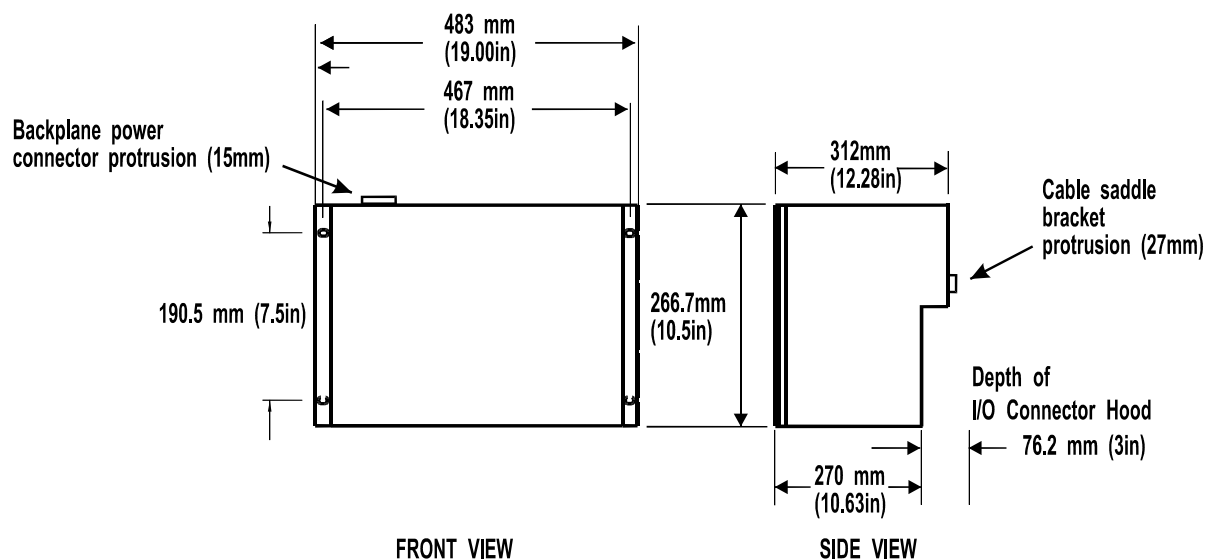


Figure 8 Chassis Dimensions

2. Installation

The Trusted Expander Chassis is installed into a swingframe-mount, or fixed frame as shown in Figure 9 using M5 x 12 Pan Head Taptite screws.



Figure 9 Installation of Chassis

Note that only the inner pair of holes in the mounting ears are used at this stage to secure the Chassis in the frame. The outer holes are used to fit the plastic fascia ears once all Chassis and fan trays are fitted and alignment is correct

Alternatively, the Chassis may be mounted on a panel, or equipment sheet using Panel Mounting Kit T8380 which comprises a pair of brackets with rear facing ears.

The brackets are first located and fitted using M5 fixings in four positions per bracket. The Chassis is then fitted to the front ears of the brackets using M5 x 12 Pan Head Taptite screws.

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3. Specifications

Voltage Range	20 Vdc to 32 Vdc
Fusing	External, 20 A
Connectors	14 x DIN 41642, male
Expander Comms Max Distance Using TC-301 copper cable Using fibre converters	 30 m 10 km
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 Width Depth	 268 mm (10.5 in) 483 mm (19 in) 312 mm (12.3 in)
Weight	5 kg (11 lb)