



Trusted TMR System

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Table 3-1 - Central Modules

Functions/Module	IEC 61508 Certified Configuration	Conditions
Peer to Peer Software board definitions dxpai16, dxpao16, dxpdi128, dxpdo128, dxpai128 & dxpao128	Certified for use over single or multiple communication networks	Certified as safety-related and can be used for safety critical communications up to SIL 3 applications provided two separate Dxpai16 & Dxpao16, Dxpdil28 & Dxpdo128, or Dxpai128 & Dxpao128 software board definition pairs are defined and used for safety values. The safety values from the duplicate software board definitions must be compared, with equivalency verified, within the receiving application.
Trusted TMR Interface 8160	Non-interfering	Certified as non-interfering to the Trusted controller but retains DIN19250/AK5 certification of the original Regent and Regent+Plus I/O system (refer to Appendix A) when used to migrate applications to the Trusted Controller in accordance with this manual, publication ICSTT-RM255 (PD-T8160), and taking account of guidance in NAMUR 126.
SC300E Bridge Module 8161	Non-interfering	Certified to SIL 3 IEC 61508 Ed 1 of the original SC300E system (refer to Appendix B) when used to migrate applications to the Trusted Controller in accordance with this manual and publication ICSTT-RM403 (PD-8161) and taking into account of guidance in NAMUR 126.
CS300 Bridge Module 8162	Non-interfering	Certified as non-interfering to the Trusted controller but retains DIN19250/AK6 certification of the original CS300 system (refer to Appendix C on page 99) when used to migrate applications to the Trusted Controller in accordance with this manual and publication ICSTT-RM404 (PD-8162), and taking account of guidance in NAMUR 126.
Trusted Communication Interface T8150 / T8151 / T8151B / T8151C	Not safety-related but interference free	Certified as non-interfering safety-related and can be used for safety-critical communication up to SIL 3 as part of the black channel in single or dual module configurations.
Trusted Expander Modules (XIM / XPM) T8310 / T8310C / T8311 / T8311C	Not safety-related but interference free 2003	Certified as non-interfering safety-related and can be used for safety-critical communication up to SIL 3 as part of the gray channel in single module or active/standby configurations.
Trusted Fiber TX/RX Unit T8314 / T8314C	Not safety-related but interference free 2003	Certified as non-interfering safety-related and can be used for safety-critical communication up to SIL 3.



Note: Module numbers ending in "C" are conformal coated versions. Conformal coated printed circuit boards in these modules are coated during manufacture. The coating meets defense and aerospace requirements and is approved to US MIL Specification MIL-1-46058C, which meets the requirement for IPC-CC-830. The coating is also UL-recognized.

Table 3-2 - Input Modules High Density I/O

Functions/Module	IEC 61508 Certified Configuration	Conditions
Trusted Digital Inputs T8403, Triplicated, 24V DC T8423, Triplicated, 120V DC T8425, Triplicated, 120V DC	Internal 2003 (2003 implemented in a single module)	De-energize to trip: certified up to SIL 3. Energize to trip: certified only for applications that fulfill the requirements under Energize to trip configurations on page 42.

Table C-1 List of CS300 Modules Suitable for Safety-Related Applications

Item	Description	Part No. / Revision	Remarks
	... cooling fan unit	031-1001-01	
4	PI-110/C PI-M cooling module	001-1010-02	
5	PM108 D/C power supply digital termination (24V DC)	001-1039-00	
	... chassis	031-1005-02	
	... power supply module	031-1004-01	
6	TM118-TWD triplicated watchdog timer	001-1032-00	
7	PI-716 digital input board	099-1045	AK6 certified 320 and 321
8	PI-726 digital output board	099-1078	
9	PI-727 digital output board	099-1043	AK6 certified 321
10	PI-732 analog input board (5V unipolar)	099-1042	
11	PI-616 digital input board	099-1124	AK6 certified 320 and 321
12	PI-626 digital output board	099-0084	
13	PI-627 digital output board	099-0074	AK6 certified 321
14	PI-632 analog input board (5V unipolar)	099-1105	
15	TM-117-RME termination panel digital output monitor (24V DC)	099-1094-00	Only use in dual tested configurations
16	TM-118-D digital termination panel (24V DC)	099-1003	Only use in dual tested configurations
17	TM117-SME digital output testing	099-1097/8/9	
18	TM117-DC digital input	099-1000	
19	TM118-DH digital input	099-1157	
20	TM119-DH digital input	099-1152	



Note: The PI-641 and PI-741 analog output modules and their associated termination panels are also supported by the migration, but for only non-safety applications. Therefore, there is no function blocks associated with these modules.

Requirements for the Trusted TMR system

The Trusted TMR System requires at least a controller assembly and a power system, and possibly an expander system as well. The controller assembly has a T8100 Trusted Controller Chassis to house the essential modules:

- One T8111 or T8110 Trusted TMR Processor.
- One T8311 Trusted Expander Interface modules to provide the interface between the controller chassis and the CS300 chassis.
- One T8151B Trusted Communication Interface for the Ethernet interface to the engineering workstation and, if present, other Trusted systems or third-party equipment. (A T8151C conformal coated version can also be used).
- One T8153 Trusted Communications Interface Adapter, to allow the physical connections to the T8151B Trusted Communication Interface.

The T8100 Trusted Controller Chassis must be installed in a rack with doors and side panels, and the doors must be kept closed during usual operation. This lets the 8162 Bridge Module achieve compliance with its EMC specifications with no degradation in performance. The front door can have a window so that the LEDs are visible. The CS300 equipment must be inside the cabinet and earthed correctly (see [Physical Installation Design](#) on [page 75](#)). A

complete list of all Trusted items needed for the migration is given in Table C-2.

Table C-2 Trusted Items Needed for the Migration

Item	Description	Remarks
1	T8100 Trusted Controller Chassis	
2	T8111 or T8110B Trusted TMR Processor	
3	8162 CS300 Bridge Module (qty. 3)	
4	TC 324-02 CS300 interface cable connector card	
5	TC 322-02 CS300/SC300E interface cable assembly	
6	T8311 Trusted Expander Interface Module	
7	T8312 Trusted Expander Interface Adaptor	
8	T8151B Trusted Communication Interface or T8151C Trusted Communications Interface (Conformal coated module)	

System architecture features

The three 8162 CS300 Bridge Modules enable the connection between the Trusted TMR System and the legacy CS300 I/O, as shown in this figure:

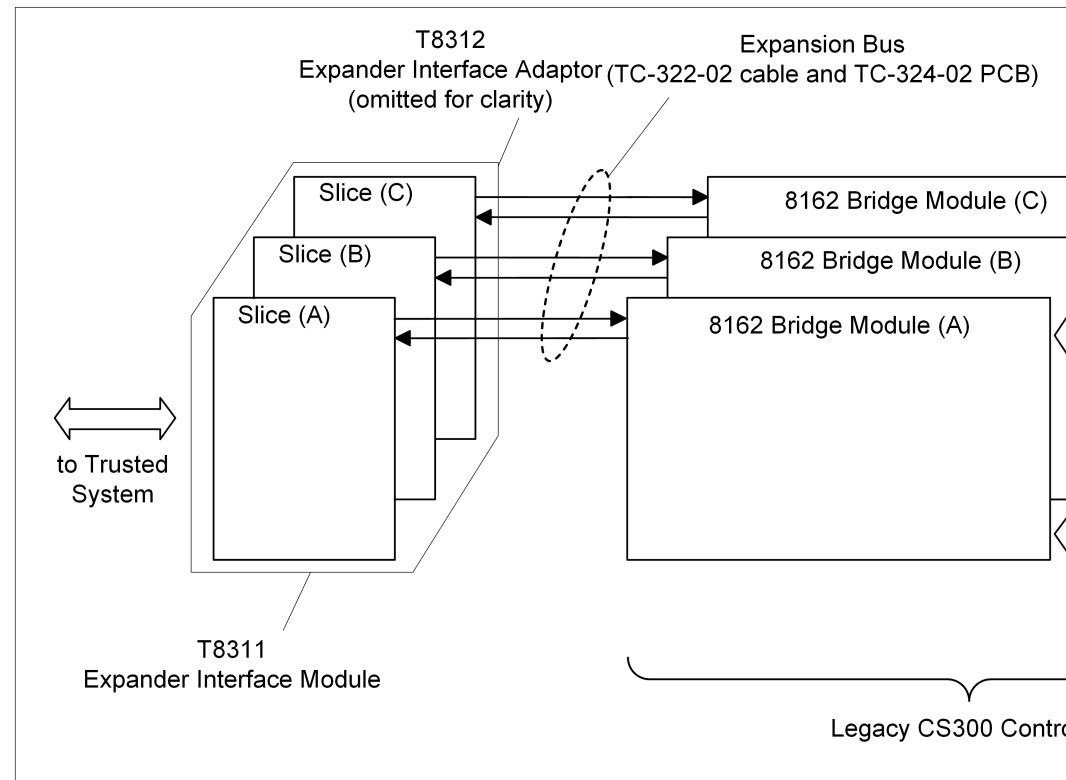


Figure 9: System Architecture features using 8162 Bridge Modules

The system communications must use approved cabling and accessories. In particular:

- The Trusted TMR System carries a T8312 Expander Interface Adaptor and the CS300 rack carries a TC-324-02 PCB.