

**Experion LS I/O Specifications and  
Technical Data**



**EP03-110-400**

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# 1. Introduction

## 1.1 I/O Families

Experion provides three I/O families that can be used in conjunction with the C200E/C200 control processor. The table below lists each family along with major characteristics.

Figure 1-1 Experion LS I/O Families

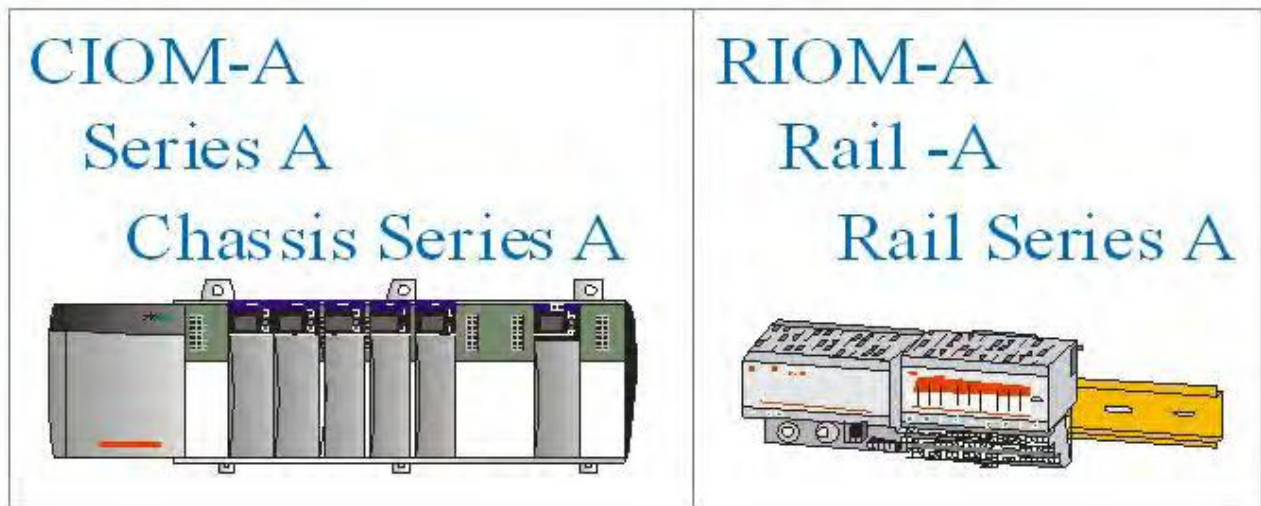


Table 1-1 I/O Family Summary and Description

I/O Family (Source)	Mounting Type/style	Major Features and Distinguishing Characteristics
CIOM-A	Chassis	Wide variety of I/O types and chassis sizes Good Backplane robustness (but non-redundant) Good quality I/O when redundancy is not required
RIOM-A	Din Rail	Inexpensive installation and wiring Flexible mounting configurations

## 2. Chassis I/O – Series A Specifications

### 2.1 Essential Concepts

#### Experion Chassis Series-A Modules and Platform

Chassis Input/Output Modules-Series A (CIOM-A) is a chassis based platform. Modules exist in a single-wide and double-wide form factor. Modules are inserted into chassis slot positions; single-wide occupy one slot position while double-wide modules occupy two slots. As a platform, the chassis is host to not only I/O modules, but modules that perform other functions.

Some examples include:

- C200E Control Processor
- Redundancy Module (RM)
- Battery Extension Module
- ControlNet Interface Module (CNI)
- Ethernet Module

The I/O modules are the focus of this document. Other module types are covered in separate Specification documents.

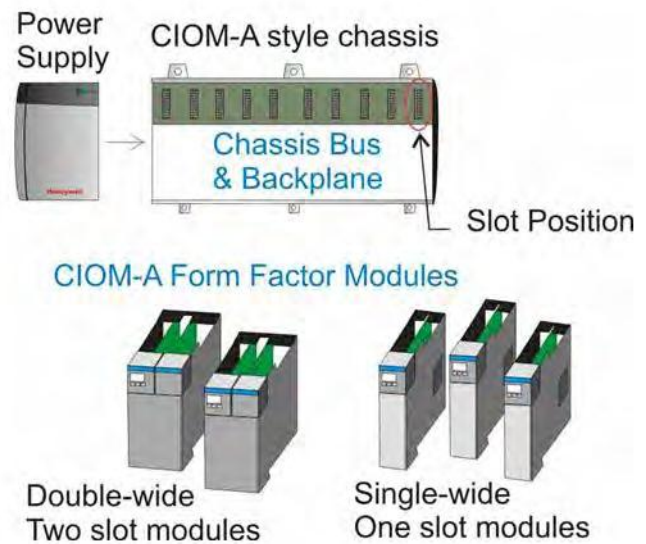


Figure 2-1 Experion Chassis Series

#### Power

Module power is supplied by a Series-A specific power supply. Power supplies are available in a redundant and non-redundant configuration. The power module plugs to the left side of each chassis and does not consume a chassis slot position. The power supply provides DC power for the modules inserted into the chassis. Field power is provided by separate (external) power supplies.

#### Series-A Chassis Types

Chassis differ by the number of module positions or slots that the given chassis can accommodate. Chassis come in five versions (4, 7, 10, 13, and 17 slot). Some modules are double-wide and will use two chassis positions.

#### Model Number Conventions (TC and TK)

All model numbers are preceded by a **TC-** or a **TK-**. The TC designator indicates that the module is not conformal coated while the TK designator indicates that the module has conformal coating applied. Aside from this the modules are identical.

#### Supported Control Processors

All CIOM-A I/O modules are usable with the C200E control processor.

**C200E and the I/O ControlNet**

Figure 3-1 shows how CIOM-A modules interface to the C200E control processor over the I/O Control Network. ControlNet is an open communication protocol developed by Rockwell and is based on RG-6 coax at 5 mega bit transmission speed. Coax segments can be extended using repeaters and fiber optic modules. Although the media can be redundant, the interface modules have a single set of electronics for both A and B cables.

**The C200E or Downlink Chassis:** This is the chassis that has the C200E inserted. It is also referred to as the “Downlink” chassis because it has the CNI (ControlNet Interface) modules that connect the C200E to the various remote I/O modules. The user can insert up to four total “Downlink” CNIs to create four separate I/O network routings. This provides the flexibility to create from one to four different I/O network branches.

**Redundant C200E:** When the C200E is implemented in a redundant configuration there are two chassis with an identical set of modules installed in the same physical positions.

**Mixed I/O Families:** As the figure, shows, CIOM-A I/O modules can be implemented on the same I/O Control Network as the RIOM-A module type. RIOM-A module are interfaced to the I/O CNet through ControlNet Gateway modules and the CIOM-A modules are interfaced through the CNI module.

**Downlink and Uplink CNIs:** There are only two versions of the CNI (single media and dual media). The terms uplink and downlink are assigned based on the CNI location in the topology.

**I/O ControlNet Limits:**

Item	Limit	See
Maximum number of CNI modules/Downlink chassis	4	
Maximum number of uplink CNI's (I/O chassis) and Gateways per downlink CNI	8	
Maximum number of I/O units per downlink CNI	24	Note-1
Maximum I/O units per C200E	64	Note-1 & 2
Note-1: In most cases an I/O unit is one I/O module. Some module types (like the SI and Profibus module) will consume more than one I/O unit. Note-2: PMIO (connected through the IOLIM) will also consume this resource.		

### 3. Planning and Platform Details

#### 3.1 Implementation Rules and Limits

**Redundant C200E Configurations:** When the C200E is implemented in a redundant configuration no I/O modules can be inserted into the C200 chassis.

**Non-Redundant C200E Configurations:** When the C200E is non-redundant, I/O modules can be inserted into the C200 chassis.

**Remote I/O Chassis:** The “Remote I/O” chassis is located remote to the C200E chassis and on one of four possible I/O ControlNet branches. The remote I/O chassis has one CNI (single or dual media) to provide the interface to the CNet and is populated with the desired mix of I/O modules up to the maximum available slot positions.

**I/O Module/Channel Identification:** The I/O modules are identified by the assigned CNI MAC (network) address number and the physical position of the I/O module in the chassis (0 to the maximum number of slots). Each input and output is then referenced by its unique channel number (0 to the maximum number of channels).

**Supervisory Control Network:** Depending on the network type used this interface module could be a CNI or Ethernet or module.

**RIUP:** Modules can be removed and inserted under power (user must also comply with all zone/location certifications and safety requirements).

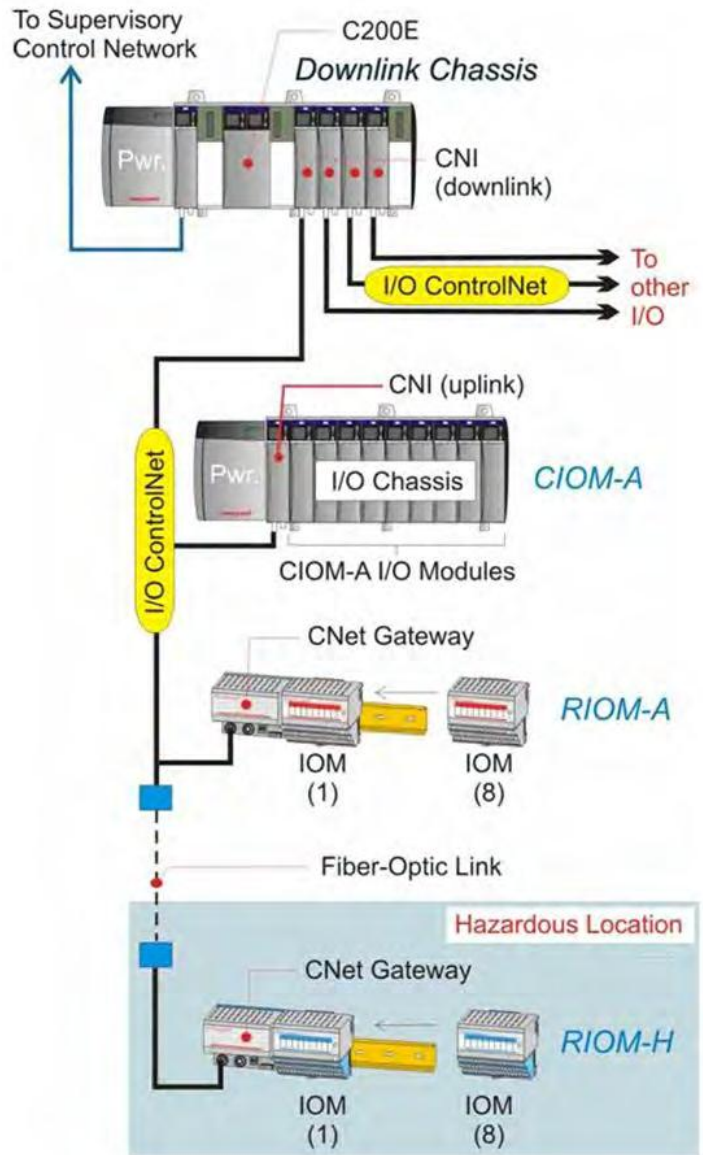
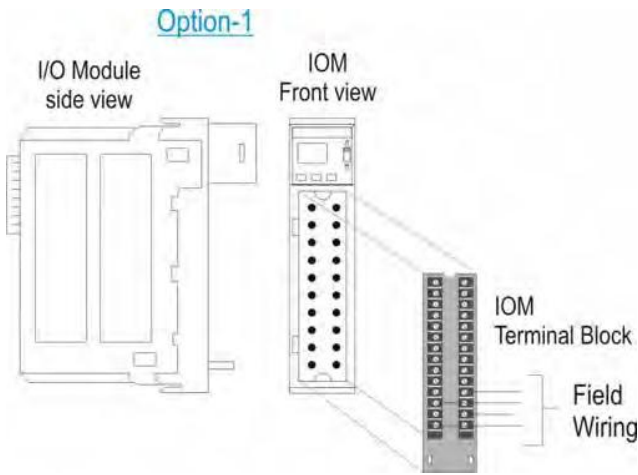


Figure 3-1 I/O Control Network Overview

## 4. Wiring Options

There are two methods available to connect field wiring to a Series-A IOM (I/O module).



### Wiring Option-1 (Standard Terminal Blocks)

This option involves plugging in the standard removable terminal block (TB) into the front of the I/O Module. Depending on the IOM selected, these blocks come with (20) or (36) terminal connectors. Field wiring is then terminated directly on the TB.

As the block is removable, wiring can be done ahead of time and before the IOM is delivered on site. TBs are available separately.

### 4.1 Terminal Blocks

Table 4-1 - Terminal Blocks, Cables and Connector Sizes

Description	Model Number	Wire Size Range
<i>I/O Module Terminal Blocks</i>		
I/O Module Field Wiring Conn., 20 pin	TC-TBNH	1 wire @ 14-22 AWG (0.64-1.63 mm) or 2 wires @ 16-22 AWG (0.64-1.30 mm)
I/O Module Field Wiring Conn., 36 pin	TC-TBCH	1 wire @ 16-22 AWG (0.64-1.30 mm)

Note: See **Table 6-2: Standard/Traditional I/O Modules & Model Numbers** for a listing of modules and required TB types.

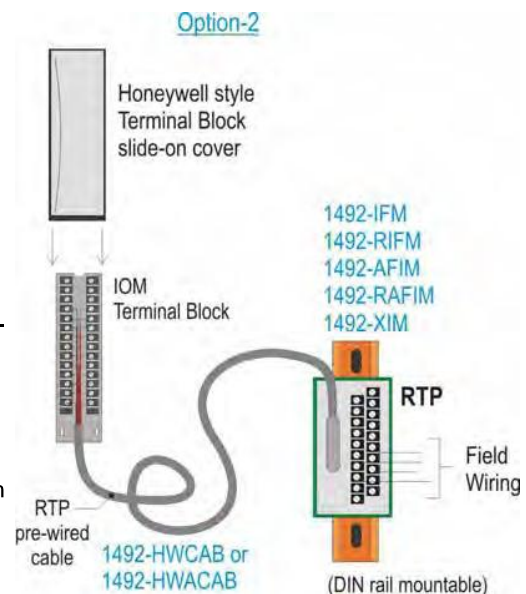
### 4.2 Wiring Option-2 (RTPs)

This option involves connecting a pre-wired terminal block (same as the 20/36 pin blocks used for Opt-1 above) to a multi-conductor cable assembly. The TB and pre-wired cable connects the IOM to a remote termination panel (RTP). Field wiring is then terminated on the RTP terminal blocks.

This solution is purchased as two separate components:

- The **Cable Assembly** (includes the IOM TB, TB cover, and pre-wired cable assembly).
- The Din mountable **RTP**.

There is a comprehensive selection of different RTPs and cable assemblies based on the IOM type and required input or output wiring. In many cases, there are more than one cable and RTP that can be used with a given IOM. The user specifies the cable length as part of the catalog number.



**Sourcing:** RTPs and pre-wired cable assemblies are purchased directly from Rockwell Automation (Allen-Bradley).

All components are part of the A-B 1492 I/O wiring system and all catalog numbers begin with 1492 followed by alpha-numeric characters that indicate desired features and options.

#### **4.2.1 Terminology and Ordering Information**

**Cables:** Except for the style of "Slide-on Cover" supplied the pre-wired cable assembly used for A-B I/O modules and Honeywell I/O modules are identical. All Honeywell cables must have the HW designator in the catalog number.

Basic pre-wired Cable Assembly catalog numbers:

- 1492-CABLE-Cable Assembly for Digital (discrete) IOM's (A-B Slide-on Cover supplied)
- 1492-ACABLE-Cable Assembly for Analog IOM's (A-B Slide-on Cover supplied)
- 1492-HWCAB-Cable Assembly for Digital (discrete) IOM's (Honeywell style Slide-on Cover)
- 1492-HWACAB-Cable Assembly for Analog IOM's (Honeywell style Slide-on Cover)

Example catalog number:-1492-HWACAB ### UB

1492-HWACAB Indicates an analog IOM cable supplied with a Honeywell style cover.

The ### indicates the desired cable length in meters. Two standard lengths are provided (use 010 for one meter or 3.28 feet) and (025 for 2.5 meters or 8.2 feet). Custom cable lengths up to 99 meters (374.72 feet) can be specified.

UB indicates the wiring layout (In this case a cable pre-wired for module TC-IAH161 and single ended current inputs). Different letter designators are used with other IOM's.

**RTPs:** Honeywell always refers to the Din rail mountable terminal assembly as an **RTP** (Remote Terminal Panel). Rockwell uses the acronyms IFM, RIFM, AFIM, RAIFM, or XIM.

The Rockwell catalog numbers begin with 1492- followed by alpha-numeric characters that indicate desired features, options, and associated IOM.

When ordering RTPs, the following RTP catalog numbers are used:

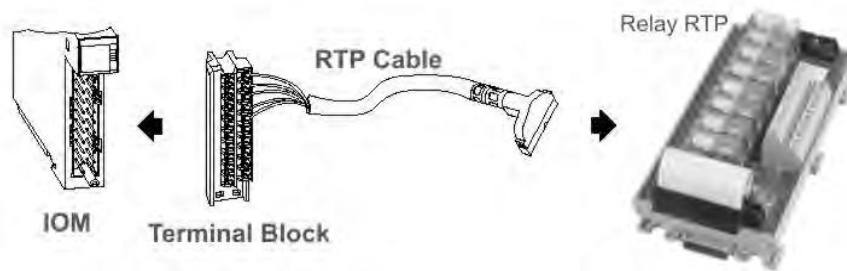
- 1492-IFM - Identifies an RTP for use with Digital (discrete) I/O
- 1492-RIFM - Same as IFM with removable terminal blocks
- 1492-AIFM - Identifies an RTP for use with Analog I/O
- 1492-RAIFM - Same as AIFM with removable terminal blocks
- 1492-XIM -Identifies a "Relay Expander Module" that provide relays on the RTP for use with Digital Output IOM's

Example catalog number: - 1492-AIFM6TC-3

This RTP is use with the 6 channel TC-IXL062 T/C input module.

**Relay and Expandable Interface Modules (XIM)** provide additional flexibility for discrete output type IOM's (TC/TK-ODD321 and TC/TK-ODA161). They were developed to maximize the effectiveness of user applications that require output contact ratings greater than 2 A. Driving large loads up to 10 A for applications such as motor starters is now possible using these relay type RTPs.

In addition, the relay modules provide a means to isolate output points. The relay and expandable product line consists of a relay master module and expander module(s) with expander cable. The relay master modules provide the connection for the 20- or 40-pin cable connectors for the pre-wired cable. There are three types of expander XIMs: eight-channel relay, eight-channel fused, and eight-channel feed-through. Expander module capabilities are offered in eight-channel increments. After using 8 or 16 channels of I/O for relays (master relay module), design engineers can use expander modules for the other I/O point needs. The flexibility means that they work with relays, fuses, and feed-through modules. In addition, the expander modules can be added when system expansion is required.

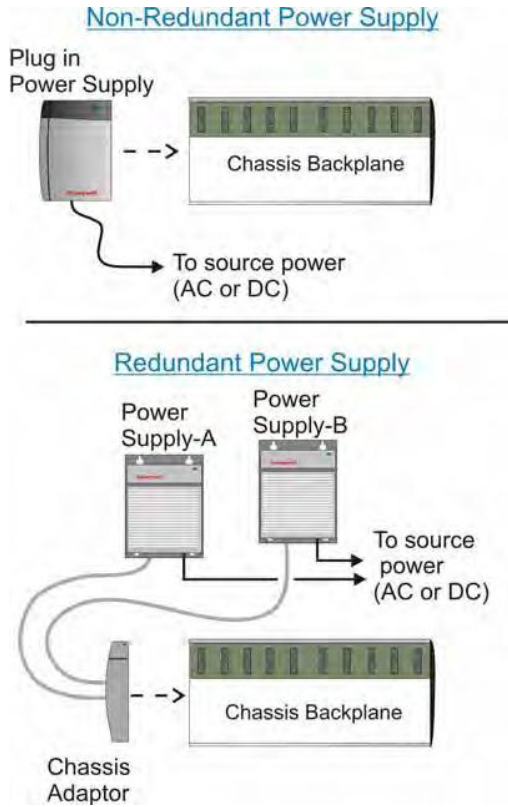


**Important Notes and Guidelines:**

1. RTPs and cables are manufactured by and are ordered directly from Allen-Bradley (A-B). Always refer to the A-B web site for the most up-to-date RTP/Cable information.
2. Detailed information (specifications, certifications, warnings, and wiring diagrams) can be accessed from the Allen-Bradley Web site. Reference the Bulletin 1492 wiring systems. Please refer to Allen-Bradley Bulletin 1492 PLC/SLC Wiring System Product Line for digital RTPs/cables and Bulletin 1492-AIFM for Analog RTP and cable specifications and size details.
3. When using RTPs with an IOM, it is not necessary to order a separate TC-TBNH or TC-TBCH terminal block. This component comes with the RTP Cable assembly.
4. All RTPs are mountable on standard DIN #3 rail mounting for quick installation.
5. Always use the **HW** designator in catalog numbers for cables that will be used with Honeywell I/O Modules. This ensures that the Honeywell style slide-on cover will be supplied.

## 5. Chassis Series-A Power System

There is a non-redundant and redundant version of the power supply system.



**Non-Redundant Power:** With this implementation a Chassis Series-A power supply module slides onto the left side of the chassis. This connects the DC output voltage to the chassis backplane and powers all modules that are inserted into one of the chassis slot positions. There is a version that accepts AC source power and a version that accepts DC source power.

**Redundant Power:** With this implementation two panel mounted Chassis Series-A power supplies are connected to the chassis through a chassis adaptor module that connects to the left side of the chassis. If one power supply fails, the other will carry the load. There is a version that accepts AC source power and a version that accepts DC source power.

**PMIO Power System Redundancy:** The PMIO platform provides a fully redundant and robust power supply assembly. This supply generates 24 Vdc and can be used to as the source power for a DC type Chassis-A power supply.

Redundant Power System Versions: There are two versions of the redundant power system. They differ by the cables and chassis adaptor (power supplies are the same). Older versions may exist in the field, but they are no longer available for sale. The table below shows the old and new versions and associated model numbers.

Model No.		Description	No. req.	Notes
TC or TK-	RPDXX1	24 Vdc Power Supply	2	Usable with both versions.
TC or TK-	RPCXX1	120 Vac Power Supply	2	Usable with both versions.
TC-	PRSC03	Power Cable (female connector both ends)	2	Old version- not available.
TC or TK-	RPSCA1	Chassis Adaptor (male connector)	1	Old version- not available.
TC-	PRSC04	Power Cable (female connector for power supply male connector for adaptor)	2	New version – active.
TC or TK-	RPSCA2	Chassis Adaptor (female connector)	1	New version – active.

Note: all power cables are 1 meter long.

## 5.1 Power Calculations

The Chassis Series-A power supply provides 24 Vdc, 5 Vdc, 3.3 Vdc, and 1.2 Vdc. Each module that is inserted into the chassis will consume a portion of the available power. The user must ensure that the planned configuration and mix of modules does not exceed the capability of the power supply. See power consumption section “Module Power Consumption Data”.

## 5.2 Series-A Power Supply Specifications

**Table 5-1 – Standard (non-redundant) Power Supply Modules**

Model	Uncoated:	TC-FPCXX2	TC-FPDXX2
	Coated:	TK-FPCXX2	TK-FPDXX2
Input Voltage Range		85-132 VAC or 170-265 VAC (selectable)	19.2-32 VDC <sup>1</sup>
Input Power <sup>2</sup>		150 VA, 92 W	100 W
Maximum Inrush Current		15 A	30 A
Frequency Range		47-63 Hz	DC
Total power output maximum, watts		70 W @ 60 °C	70 W @ 60 °C
Backplane Output Current, Maximum <sup>3</sup>		1.5 A @ 1.2 V 4 A @ 3.3 V 10 A @ 5.1 V 2.8 A @ 24.0 V	
Fuse Protection <sup>4</sup>		non-replaceable fuse is soldered in place	
Wiring		#14 AWG (1.4 mm)	
Dimensions (L x D x H)		11.2 x 14.5 x 14.0 cm (4.41 x 5.71 x 5.51 in)	
Weight – Approximate		1.1 kg (2.5 lb.)	
Location		Left side of chassis (does not consume a slot)	
<ol style="list-style-type: none"> <li>1. Input may drop to 16 V for a maximum of 2 minutes each hour for motor starting.</li> <li>2. Note earlier models were rated as follows: TC-FPCXX1 -- 55 W @ 60°C; 70 W @ 45°C and TC-FPDXX1 -- 50 W @ 60°C; 70 W @ 40°C.</li> <li>3. The combination of all output power (5 V backplane, 24 V backplane, 3.3 V backplane and 1.2 V backplane) cannot exceed 70 W.</li> <li>4. This fuse is intended to guard against fire hazard due to short circuit conditions and may not protect the power supply from damage under overload conditions.</li> </ol>			

**Table 5-2 Redundant Power Supply Modules**

Model	Uncoated:	TC- RPCXX1	TC- RPDXX1
	Coated:	TK- RPCXX1	TK- RPDXX1
Input Voltage Range		85 – 265 VAC	16 – 32 VDC
Input Power		110VA, 110 W (estimated)	110 W (estimated)
Maximum Inrush Current		20 A	30 A @ 19 – 32 VDC
Frequency Range		47 – 63 Hz	DC
Total power output maximum, watts		75 W @ 60 C	75 W @ 60 C
Backplane Output Current, Maximum <sup>1</sup>		1.5 A @ 1.2 V 4 A @ 3.3 V 13 A @ 5.1 V 2.8 A @ 24.0 V	
Input Power Wiring		#14 AWG (1.4 mm)	
Annunciation User Connection <sup>2</sup>		Solid state relay rated for 120 VAC/DC at 100ma maximum	
Dimensions (L x D x H)		14.4 x 13.7 x 17.5 cm (5.67 x 5.39 x 6.89 in)	
Weight – Approximate		1.1 kg (2.5 lb.)	
Redundant Power Supply Cable Model (3ft)		TC-RPSC03 (one required per power supply)	
Power Supply Cable Weight – Approximate		0.57 kg (1.25 lb.)	
Location <sup>3</sup>		Upright mounting, typically above/below chassis to be powered.	
<ol style="list-style-type: none"> <li>1. The combination of all output power (5 V backplane, 24 V backplane, 3.3 V backplane and 1.2 V backplane) cannot exceed 75 W.</li> <li>2. In order to pass certain input power surge testing for CE certification, the length of the wiring from this relay must be limited to ten (10) meters.</li> <li>3. It is not recommended to mount the power supply above/below its partner power supply as this could create ambient temperatures that are greater than 60 C within 1.0 inch of the bottom of the power supply.</li> </ol>			

**Table 5-3 Redundant Power System Chassis Adaptor**

Model	Uncoated:	TC-RPSCA2
	Coated:	TK-RPSCA2
Dimensions (L x D x H)		3.4 x 14.4 x 15.0 cm (1.34 x 5.67 x 5.91 in.)
Weight – Approximate		0.228 kg (0.50 lb.)
Location		Left side of chassis (does not consume a slot)
Environmental Conditions		See Table 3.
Chassis compatibility <sup>1</sup>		TC-FXX042, TC-FXX072, TC-FXX102, TK-FXX102, TC-FXX132, TK-TXX132, TC-FXX172
<ol style="list-style-type: none"> <li>1. The Chassis Adapter Module will only mount to Chassis model numbers identified above due to a physical interlock. These chassis models are rated for the 13 A supplied by the redundant power supplies. Earlier versions of the chassis were only rated for 10 A.</li> </ol>		

The Redundant Power Supply System is designed with the following features:

- Current Sharing Control between each supply – for maximum power supply life
- Error Detection – for maximum security
- Error Annunciation – for immediate notification
- LED Indication – indicating redundant, non-redundant, and failure conditions

**Table 6-3: Chassis - Series A Network and Specialty I/O Module Model Numbers**

Description	Chassis Slots Used	Model Number
Specialty Modules		
PI (High Speed Pulse Input). 8-high speed counter inputs & 2- On/Off outputs. This module uses a 36 pin Terminal Block (TC-TBCH). Corresponding A-B model number is 1756-IJ4.	1	TK-MDP081
SI (Serial Interface) module. Provides 2-Serial Channels to communicate with smart devices.	2	TC or TK-MUX021
C200 Control Processor For complete information, consult the C200 Specification document.	2	TK-PRS021
RM (Redundancy Module) to support C200 redundancy	2	TK-PRR021
Communication/ Network/ Gateway Modules		
PBIM (PROFIBUS DP Interface Module) <i>Order directly from SST</i> For complete information, consult the PBIM Specification document.	1	SST-PFBCLX
DeviceNet Bridge Module. <i>Order directly from Allen-Bradley</i> For complete information, consult the DeviceNet Specification document.	1	1756-DNB
IOLIM (I/O Link Module), Interface for PMIO. For complete information, consult the PMIO Specification document.	2	TK-IOLI01
CNI (Single media Type)	1	TC-CCN014
CNI (Dual Media Type)	1	TC OR TK-CCR014
Ethernet Module	1	TK-FTEB01

## 6.2 Series-A Chassis Summary

**Table 6-4 – Series-A Chassis Types & Specifications**

Table 7. TC-FXX041, TC-FXX071, TC-FXX102, TC-FXX132, TC-FXX171, TK-FXX101, TK-FXX131			
Model	Module slots	Dimensions (with mounting tabs & power supplies) W x H x D	Approx. weight (without modules)
TC-FXX042	4	26.3 x 16.9 x 14.5 cm (10.3 x 6.7 x 5.8 in)	0.75 kg (1.6 lbs)
TC-FXX072	7	36.8 x 16.9 x 14.5 cm (14.5 x 6.7 x 5.8 in)	1.1 kg (2.4 lbs)
TC-, TK-FXX102	10	48.3 x 16.9 x 14.5 cm (19.0 x 6.7 x 5.8 in)	1.45 kg (3.2 lbs)
TC-, TK-FXX132	13	58.8 x 16.9 x 14.5 cm (23.1 x 6.7 x 5.8 in)	1.9 kg (4.2 lbs)
TC-FXX172	17	73.8 x 16.9 x 14.5 cm (29.1 x 6.7 x 5.8 in)	2.2 kg (4.8 lbs)
Minimum Chassis-to-Cabinet Vertical Distance		15.2 cm (6.0 in)	
Minimum Chassis-to-Cabinet Horizontal Distance		10.2 cm (4.0 in)	
Minimum Chassis-to-Chassis Vertical Distance		20.3 cm (8.0 in)	
Minimum Chassis-to-Chassis Horizontal Distance		10.2 cm (4.0 in)	
Type of mount		Panel mount	
Environmental Conditions Agency Certification		Same as Power Supply Specifications	
Minimum Enclosure Depth		20.3 cm (8.0 in)	

### 6.3 Hardware Mounting Options

Note that in order to comply with applicable regulations and codes, the controller and I/O racks may have to be located in a room, vault, or enclosure that is accessible only to qualified persons. Please refer to NEC 110-17, part 1 (1996 National Electrical Code, Copyright 1995 NFPA) or to the appropriate local or national electrical standards for more information.

**Table 6-5 Chassis Dimensions**

Chassis Type (No. of Slots)	Dimensions (HxWxD), Approx. (Note-1)
4	137 x 263 x 145 mm (5.4 x 10.4 x 5.8 in.)
7	137 x 368 x 145 mm (5.4 x 14.5 x 5.8 in.)
10	137 x 483 x 145 mm (5.4 x 19.0 x 5.8 in.)
13	137 x 588 x 145 mm (5.4 x 23.2 x 5.8 in.)
17	137 x 738 x 145 mm (5.4 x 29.1 x 5.8 in.)
Note-1: All dimensions include the chassis and power supply assembly.	

### 6.4 Miscellaneous Components

The following blank cover module is used to cover an empty slot in the chassis.

Model Number	Description
TC-XXXXX2	Blank Cover Modules (Qty 1). These are covers that clip into used chassis slot positions.