

Technical Information

PlantCruise by Experion Specification Series 8 I/O



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Honeywell

PlantCruise by Experion Series 8 I/O Specification, PC03-490-100

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Revision History

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1. Product Introduction

1.1. PlantCruise by Experion System

As a member of Honeywell's Experion family, PlantCruise by Experion is specifically designed to meet the customer needs in emerging markets, through integrating state-of-the-art technology from the award-winning Experion Process Knowledge System (PKS) with innovative design of Series 8 I/O modules and cabinets, validated wider range of COTS options, easier engineering and maintenance capabilities, and integrator-friendly programs and tools. PlantCruise is the perfect platform for process, asset and business management with small to medium complexity, and enables customers to increase their profitability and productivity and accessibility to local support without sacrificing quality and reliability in an increasingly competitive environment.

1.2. Architecture Overview

The PlantCruise platform comprises many different integrated hardware and software solutions depending upon the needs of the application. This pictured architecture is a representation of many of the possible nodes that can be used in the PlantCruise architecture. Note that the architecture is highly scalable and not all nodes are necessary or required.

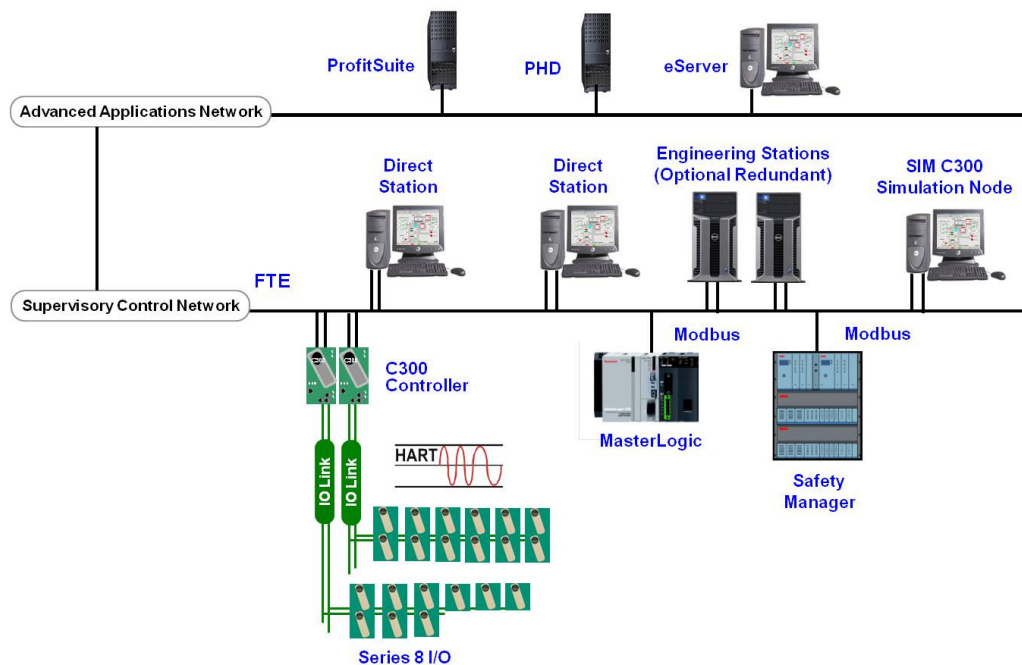


Figure 1. Sample PlantCruise Architecture

1.3. PlantCruise Series 8 I/O Overview

This document provides technical information to configure the PlantCruise Series 8 I/O and the C300 Controller, released with PlantCruise. The following Series 8 I/O items are included in this document.

- Digital Input Sequence of Events
- Digital Input

- Digital Output
- Analog Input with HART
- Analog Input
- Analog Output with HART
- Analog Output
- Low Level Multiplexer – RTD & TC



Definitions

- Input Output Termination Assembly (IOTA): An assembly that holds the IOM and the connections for field wiring,
- Input Output Module (IOM): A device that contains most of the electronics required to perform a specific I/O function. The IOM plugs onto the IOTA.

Features

All Series 8 components feature an innovative design that supports enhanced heat management. This unique look provides a significant reduction in overall size for the equivalent function.

The unique features of Series 8 I/O include:

- I/O Module and field terminations are combined in the same area. The I/O Module is plugged into the IOTA to eliminate the need for a separate chassis to hold the electronics assemblies
- Two level “detachable” terminals for landing the field wiring in the enclosure, providing easier plant installation and maintenance.
- Field power is supplied through the IOTA, with no need for extra power supplies and the associated craft wired marshalling.
- Redundancy is accomplished directly on the IOTA without any external cabling or redundancy control devices, by simply adding a second IOM to an IOTA
- For both IOM and IOTA, coated (module numbers starting with 8C) and uncoated (module numbers starting with 8U) options are provided. Conformal coating material is applied to electronic circuitry to act as protection against moisture, dust, chemicals, and temperature extremes. Coated IOM and IOTA are recommended when electronics must withstand harsh environments and added protection is necessary.

The Series 8 inherits the innovative styling of Series C. This styling includes features to facilitate the effective use of control hardware in a systems environment. These features include:

- Vertical mounting allows for more effective wiring since most field wiring applications require entry from the top or bottom of the systems cabinet.
- An “information circle” allows for a quick visual cue to draw the Maintenance Technician’s eye to important status information.

- “Tilted” design allows for effective heat management within the cabinet enclosure. Since Series 8 allows for a significant increase in cabinet density, an effective heat management system is critical for high systems availability.
- Input and output circuits are protected from shorts to alleviate the need for in- line fusing, reducing installation and maintenance costs

Series 8 IOTAs combine multiple functions into a single piece of equipment:

- Single and redundant configurations
- On-board termination of process signals
- On-board signal conditioning
- On-board connection to appropriate networks (FTE, I/O LINK)
- Field power distribution without external marshalling
- IOM plugs into the IOTA and receives power from the IOTA
- The IOTA receives its power from a 24 VDC bus that is part of the IOTA carrier – the IOTA is simply screwed into the bussed power.

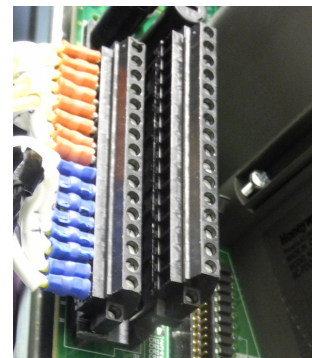
Series 8 I/O Sizing

In virtually all configurations, the C300 controller and Series 8 I/O provides useful, maintainable process equipment connections in a smaller footprint than competitor systems. Installing Series 8 I/O modules contributes to overall total installed cost savings.

IOTA sizes vary based on the application. In general, an analog module has 16 points and resides on a 6-inch (152mm) IOTA for non-redundant applications and a 12-inch (304mm) IOTA for redundant applications. A discrete module has 32 points and resides on a 9-inch (228mm) IOTA for non-redundant applications and a 12-inch (304mm) IOTA for redundant applications. Specific information on the size of a particular module can be found in the Model Number Table.

I/O Module Functions

- **High Level Analog Input /HART Input Module (16pt)** – The High Level Analog Input Module supports both high level analog and HART inputs. Analog inputs are typically 4-20mA DC for both traditional and HART devices. HART data can be used for status and configuration. HART data, such as the secondary and tertiary variables, can also be used as process control variables.
- **High Level Analog Input (16pt)** - The High Level Analog Input Module supports high level analog inputs Analog inputs are typically 4-20mA DC for traditional devices.
- **Analog Output/HART Output Module (16pt)** – The Analog Output Module supports both standard 4-20mA DC outputs and HART transmitter outputs.
- **Analog Output (16pt)** – The Analog Output Module supports standard 4-20mA DC outputs.
- **Digital Input 24 VDC (32pt)** – Digital input sensing for 24V signals



- **Digital Output 24 VDC (32 pt)** – Current sinking digital outputs. Outputs are electronically short-circuit protected.
- **Temperature Multiplexer (64pt)**. – Provides thermocouple (TC) and resistance temperature device (RTD) inputs. The Multiplexer supports up to four, field proven termination assemblies FTAs.
- **Digital Input Sequence of Events** - Accepts 24VDC discrete signals as discrete inputs. The inputs can be time tagged to support 1ms resolution Sequence of Events

Series 8 Field Connections

Series 8 Field connections use a standard modular connector. The connector modularity allows for removal and insertion of the field wiring. This significantly reduces installation and maintenance procedures and can assist in field check out. Series 8 field connectors accept up to 12ga AWG / 2.5mm stranded wire.

I/O Module Sizes

IOTA Sizing is nominal (6in = 152mm, 9in =228mm, 12in =304mm). I/O modules are associated with their respective IOTAs in the table below. The I/O Module is supported by one or more IOTAs.

I/O Module	IOTA	Description	Circuits	Size	Red.
8C-PAIH51 8U-PAIH51 8C-PAIN01 8U-PAIN01		High-level AI HART High-level AI w/o HART	16		√
	8C-TAIX51	AI IOTA, Coated		6	
	8U-TAIX51	AI IOTA, Uncoated		6	
	8C-TAIX61	AI IOTA, Red, Coated		12	√
	8U-TAIX61	AI IOTA, Red, Uncoated		12	√
8C-PAIM01 8U-PAIM01		PMIO LL Mux	64		
	8C-TAIM01	PMIO LL Mux IOTA, Coated		6	
	8U-TAIM01	PMIO LL Mux IOTA, Uncoated		6	
	FTA				
	MC-TAMT04	LL Mux TC FTA	16	12	
	MC-TAMR04	LL Mux RTD FTA	16	12	
8C-PAOH51 8U-PAOH51 8C-PAON01 8U-PAON01		Analog Output 16pt HART Analog Output 16pt w/o HART	16		√
	8C-TAOX51	AO IOTA, Coated		6	
	8U-TAOX51	AO IOTA, Uncoated		6	
	8C-TAOX61	AO IOTA Red., Coated		12	√
	8U-TAOX61	AO IOTA Red., Uncoated		12	√
8C-PDIL51 8U-PDIL51		Digital Input 24V	32		√
	8C-TDIL51	DI 24V IOTA, Coated		9	
	8U-TDIL51	DI 24V IOTA, Uncoated		9	
	8C-TDIL61	DI 24V IOTA Red. Coated		12	√
	8C-TDIL61	DI 24V IOTA Red. Uncoated		12	√

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I/O Module	IOTA	Description	Circuits	Size	Red.
8C-PDOD51 8U-PDOD51		Digital Output	32		√
	8C-TDOD51	DO IOTA, Coated		9	
	8U-TDOD51	DO IOTA, Uncoated		9	
	8C-TDOD61	DO IOTA Red, Coated		12	√
	8U-TDOD61	DO IOTA Red, Uncoated		12	√
8C-PDIS01 8U-PDIS01		Digital Input Sequence of Events	32		√
	8C-TDIL01	DI SOE IOTA, Coated		9	
	8U-TDIL01	DI SOE IOTA, Uncoated		9	
	8C-TDIL11	DI SOE IOTA Red, Coated		12	√
	8C-TDIL11	DI SOE IOTA Red, Uncoated		12	√

2.8. Digital Output 24VDC

Function

The Digital Output bussed 24VDC (DO24V) module can switch reliable 24V digital output signals to control other process equipment as well as solenoid valves and interposing relays.

Notable Features

- Extensive internal diagnostics to ensure data integrity
- Optional redundancy
- Safe-state (FAILOPT) behaviors
- Latched, pulsed or pulse-width modulated output (per channel)
- Galvanic Isolation (System to Field only with external user supplied power)

Bussed 24VDC DO

The Digital Output Bussed 24VDC has provisions for both internal and external field power excitation. As a bussed output device, all of the outputs share a common return (ground). All outputs get their power from the same source, which can be either the system power supply or an externally connected 24V power supply. When selection is from an external source, outputs can be galvanically isolated from the Series 8 power system. A wiring option on the IOTA determines if outputs are referenced to the Series 8 system power or an external field power source.

Safe-state Behavior (FAILOPT)

Series 8 DO module will support FAILOPT parameter on a per channel basis. The output can be directed by configuration to either HOLD THE LAST VALUE, or SHED to a SAFE VALUE. The safe value can be configured by the user.

Detail Specifications – Digital Output 24VDC

Parameter	Specification		
Input / Output Model	8C-PDOD51 - 24Volt Digital Output , Field Isolated, Bussed output, Coated		
	8U-PDOD51 - 24Volt Digital Output , Field Isolated, Bussed output, Uncoated		
IOTA Model Numbers	8C-TDOD51	Non Redundant, Coated	9"
	8U-TDOD51	Non Redundant, Uncoated	9"
	8C-TDOD61	Redundant, Coated	12"
	8U-TDOD61	Redundant, Uncoated	12"
Output Channels	32		

Parameter	Specification
Output Type	SINK
Load Voltage	30 VDC Maximum
Load Current Short circuit protection for DO channel would be using series FUSEs in the output channel. One FUSE per Eight channels. Total FOUR (4) fuses for 32 channels on DO IOTA	0.1 A per channel (Max)
Galvanic Isolation	1000 VAC RMS for System – to – Field isolation for user supplied field Power only
On-State Voltage	Max 1 VDC (load current @ 0.1A max)
Off-State Voltage	24 V (typ),
Off-State Leak Current	100 μ A (max)
Turn-On/Turn-Off Time	10 ms (max)
Gap (0 current) of Output to Field on Switchover	None (0ms) (applies to Redundancy only)

Function Matrix

The following tables assist in selecting I/O Modules and IOTAs with similar functional characteristics

AI Function Matrix

IOM	NR IOTA	Red IOTA	Function	
			AI 4-20 mA	HART
8C-PAIH51 8U-PAIH51	8C-TAIX51 8U-TAIX51	8C-TAIX61 8U-TAIX61	◆ ◆	◆ ◆
8C-PAIN01 8U-PAIN01	8C-TAIX51 8U-TAIX51	8C-TAIX61 8U-TAIX61	◆ ◆	

AO Function Matrix

IOM	NR IOTA	Red IOTA	Function	
			AIO 4-20 mA	HART
8C-PAOH51 8U-PAOH51	8C-TAOX51 8U-TAOX51	8C-TAOX61 8U-TAOX61	◆ ◆	◆ ◆
8C-PAON01 8U-PAON01	8C-TAOX51 8U-TAOX51	8C-TAOX61 8U-TAOX61	◆ ◆	

Chapter 3 - Series C I/O Planning and Design

Input CC-PAIH51 and Cx-PAIH01 use the same IOM block, that is, AI-HART. The configuration and implementation mentioned in note 1 applies to the HART Analog Input module.

4. With R410, a new model of HART Analog Output CC-PAOH51 is introduced. The HART Analog Output CC-PAOH51 and Cx-PAOH01 use the same IOM block, that is, AO-HART. The configuration and implementation mentioned in note 1 applies to the HART Analog Output module.
5. With R410, a new model of Digital Input 24V DC CC-PDIL51 is introduced. The Digital Input 24V DC CC-PDIL51 and Cx-PDIL01 use the same IOM block, that is, DI-24. The configuration and implementation mentioned in note 1 applies to the Digital Input 24V module.
6. With R410, a new model of Digital Output 24V DC CC-PDOD51 is introduced. The Digital Output 24V DC CC-PDOD51 and Cx-PDOB01 use the same IOM block, that is, DO-24B. . The configuration and implementation mentioned in note 1 applies to the Digital Output 24V module.
7. Starting with R430, a new model of Low Level Analog Input Mux CC-PAIM51 is introduced.
8. The UIO (CC-PUIO01) has 32 configurable input or output channels. Each channel can be configured as one of the following:
 - Analog Input (0-20mA or 4-20mA active)
 - Analog Output (4-20mA active)
 - Digital Input (with or without line monitoring)
 - Digital Output (with or without line monitoring)
9. The UIO (CC-PUIO31) module is introduced with R432 and has 32 configurable input or output channels that are identical to the UIO (CC-PUIO01) module.

ATTENTION

Series C IO modules introduced in ExperionPKS R410.x release should not be used with its prior ExperionPKS releases R400.x. Do not try to downgrade the firmware of Series C IO Modules introduced in ExperionPKS R410.x release, as IOM will not work and it is difficult to recover as well.

- [Compatibility matrix between AI modules and differential AI modules](#)
- [Compatibility matrix between AO modules and differential AO modules](#)
- [Difference between AI-HART modules Cx-PAIH01 and Cx-PAIH51](#)
- [Difference between AO-HART modules Cx-PAOH01 and Cx-PAOH51](#)
- [Difference between bussed low voltage Digital Input modules Cx-PDIL01 and Cx-PDIL51](#)
- [Difference between low voltage Digital Output modules Cx-PDOB01 and Cx-PDOD51](#)
- [Difference between AI-LLMUX and CC-PAIM51 modules Cx-PAIM01 and Cx-PAIM51](#)
- [Identifying supported Series C I/O modules](#)
- [Considerations for replacing or pairing Series C Analog I/O modules in a redundant configuration](#)

3.3.1 Compatibility matrix between AI modules and differential AI modules

You can choose the AI modules based on your functionality requirements. The following table lists the functionalities and the respective AI modules.

3.3.5 Difference between bussed low voltage Digital Input modules Cx-PDIL01 and Cx-PDIL51

Digital Input module Cx-PDIL01	Digital Input module Cx-PDIL51
Supports Open Wire detection.	Does not support Open Wire detection.

3.3.6 Difference between low voltage Digital Output modules Cx-PDOB01 and Cx-PDOD51

Digital Output module Cx-PDOB01	Digital Output module Cx-PDOD51
Does not support Power fail diagnostics.	Supports Power fail diagnostics at module level to diagnose the output driver power failure (fuse/4 pin terminal block failure). When the failure is detected, OPFAIL soft fail is displayed on all the channels to take care of back initialization in upstream block. The following module level soft failure is displayed. 'Field Power Failure' Check the fuse or power supply status of the 4 pin terminal block when the error message is displayed.
Supports source output type.	Supports sink (open drain) output type.
Supports load current as 500mA.	Supports load current as 100mA.

3.3.7 Difference between AI-LLMUX and CC-PAIL51 modules Cx-PAIM01 and Cx-PAIM51

AI-LLMUX module Cx-PAIM01	AI-LLAI module Cx-PAIM51
Supports 64 input channels.	Supports 16 input channels.
Supports the following RTD types. - Pt: 100 ohm DIN 4376 - Pt: 100 ohm JIS C-1604 - Ni: 120 ohm ED #7 - Cu: 10 ohm SEER	Supports a new RTD type, CU50Rtd, in addition to the RTD types supported by the AI-LLMUX.
Supports field calibration	Field calibration is not required.
Supports remote cold junction capability.	Does not support remote cold junction.
Requires an external HPM FTA to connect the field inputs to IOTA.	Field inputs can be directly connected to the IOTA.
Supports cold junction compensation	Supports cold junction compensation range, -40 to

Chapter 4 - Series C I/O Installation and Upgrades

IOM block type	IOM model number	IOTA model number	IOTA description ⁷	IOTA supported FTAs or ancillary cards
DI-24	Cx-PDIL01	Cx-TDIL01	DI-24V, non-redundant	None
		Cx-TDIL11	DI-24V, redundant	None
		Cx-GDIL11	DI-24VDC, GI-IS, redundant	MTL4516 MTL4517
		Cx-GDIL21	DI-24VDC, GI-IS, non-redundant	MTL4510
		Cx-GDIL01	DI-24VDC, GI-IS, redundant (for expander)	MTL4511
		Cx-SDXX01	GI-IS expander	MTL4511
	Cx-PDIL51	Cx-TDIL51	DI-24V, non-redundant	None
		Cx-TDIL61	DI-24V, redundant	None
DI_SOE	Cx-PSOE01 (note 4)	Cx-TDIL01	DI-24V, non-redundant	None
DO-24B	Cx-PDOB01	Cx-TDOB01	DO-24V, bussed, non-redundant	None
		Cx-TDOB11	DO-24V, bussed, redundant	None
		Cx-TDOR01	DO- High Voltage Relay, non-redundant	Cx-SDOR01 ² (note 2)
		Cx-TDOR11	DO- High Voltage Relay, redundant	Cx-SDOR01 ² (note 2)
		Cx-GDOL01	DO-24VDC, GI-IS, redundant (for expander)	MTL4521
		Cx-SDXX01	GI-IS expander	MTL4521
	Cx-PDOD51	Cx-TDOD51	DO-24V, bussed, non-redundant	None
		Cx-TDOD61	DO-24V, bussed, redundant	None
SVPM	CC-PSV201	CC-TSV211	Servo Valve Positioner IOTA, Redundant, Coated	None
SPM	CC-PSP401	CC-TSP411	Speed Protection IOTA, Redundant, Coated	None
PI	CC-PPIX01	CC-TPIX11	Pulse Input w/ Fast Cutout, Redundant	None
UIO	CC-PUI001	CC-TUI001	UIO, Non-Redundant	None
		CC-TUI011	UIO, Redundant	
UIO-2	CC-PUI031	CC-TUI031	Universal IO-2, non-redundant, coated	None
		CC-TUI041	Universal IO-2, redundant, coated	
DI-24	DC-PDIL51	DC-TDIL01	DI 24V IOTA (Non-Redundant)	None
		DC-	DI 24V IOTA (Redundant)	



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