Honeywell

Technical Information

Experion Series-C Mark II I/O Specification

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Revision History

Revision	Date	Description
0.1	January 2016	Preliminary version, contents subject to change
0.2	August 2016	Updated with additional IOM & IOTA from the latest release
1.0	April 2017	Additions to complete Mark II IOM & IOTA scope
1.1	November 2017	Updated the compatibilities of DC-TAID01/11 and DC-TAIX01/11 with CC-PAIH02
1.2	August 2018	Update minor parameters

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1. Product Introduction Summary

1.1. Overview

This document provides technical information to configure the Experion® Series C Mark II I/O and the C300 Controller, released with Experion R431.3.

1.2. Scope

The following Series C Mark II I/O items are included in this document:

- Digital Input 24 VDC
- Digital Input 110 / 220 VAC
- Digital Input Sequence of Events
- Pulse Input
- Digital Output - 24 VDC bussed
- Digital Output Relay
- High Level Analog Input with HART
- High Level Analog Input without HART
- Analog Output with HART
- Analog Output without HART
- Low Level Analog Input - RTD & TC
- Universal Input Output

1.3. 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.

2. Features

Series-C Mark II features 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 the 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 can be supplied through the IOTA, with no need for extra power supplies and the associated craft wired marshalling
- Redundancy is available directly on the IOTA without any external cabling or redundancy control devices, by simply adding a second IOM to an IOTA
- The innovative styling is one of its unique features. This styling includes features to facilitate the effective use of control hardware in a systems environment. These features include:
  - Vertical mounting for more effective wiring since most field wiring applications require entry from the top or bottom of the systems cabinet
  - An “information circle” for a quick visual cue to draw the Maintenance Technician’s eye to important status information

- "Tilted" design for effective heat management within the cabinet enclosure. Since Series C 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 C 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.

3. Series C Mark II I/O Sizing

In virtually all configurations, the C300 controller and Series C Mark II I/O provides useful, maintainable process equipment connections in a smaller footprint than existing competitors and Honeywell equivalent products. Installing Series C Mark II 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 is described in the Model Number Table.

3.1. 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. Two versions are available.
- **High Level Analog Input w/o HART (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. Two versions are available.
- **Analog Output w/o HART (16pt) –** The Analog Output Module supports standard 4-20mA DC outputs.
- **Digital Input 24 VDC (32pt) –** Digital input sensing for 24V signals. Two versions are availagle.
- **Digital Input High Voltage (32pt) –** Digital input sensing for 110 / 220 VAC
- **Digital Input Sequence of Events (32pt) -** Accepts 24VDC discrete signals as discrete inputs. The inputs can be time tagged to support 1ms resolution Sequence of Events.
- **Digital Output 24 VDC (32 pt) –** Current sourcing digital outputs. Outputs are electronically short-circuit protected. Two versions are available.
- **Relay Digital Output (32 pt) –** Digital output with NO or NC dry contacts. Can be used for low power or high power applications.
- **Low Level Analog Input – RTD & TC (16 pt) –** Provides thermocouple (TC) and resistance temperature device (RTD) inputs.
- **Universal Input Output (32 pt) –** Supports 32 channels of user configurable IO. Choices available – analog input, analog output, digital input, and digital output.

The field connectors accept up to 12 AWG / 2.5mm stranded wire.

4. I/O Module Sizes

IOTA Sizing is nominal (6in = 152mm, 9in =228mm, 12in =304mm, 15in = 381mm). I/O modules are associated with their respective IOTAs in the table below. An I/O Module is supported by one or more IOTAs.

I/O Module	IOTA	Description	Circuits	Size (in ")	Red.
CC-PAIH01		High-level AI HART	16		√
CC-PAIH02	DC-TAIX01	AI IOTA		6	
	DC-TAIX11	AI IOTA Red		12	√
CC-PAIH02		High-level AI HART – Differential	16		√
CC-PAIX02		High-level AI w/o HART - Differential	16		√
	DC-TAID01	AI IOTA – Differential		9	
	DC-TAID11	AI IOTA Red - Differential		12	√
CC-PAIH51		High-level AI HART Single-ended	16		√
CC-PAIN01		High-level AI w/o HART	16		√
	DC-TAIX51	AI IOTA		6	
	DC-TAIX61	AI IOTA Red		12	√
CC-PAIL51		Low-level AI – RTD & TC	16		
	DC-TAIL51	Low-level AI IOTA		9	
CC-PPIX01		Pulse Input w/ Fast Cut-off	8		√
	DC-TPIX11	PI IOTA Red		12	√
CC-PAOH01		Analog Output 16pt HART	16		√
	DC-TAOX01	AO IOTA		6	
	DC-TAOX11	AO IOTA Red.		12	√
CC-PAOH51		Analog Output 16pt HART	16		√
CC-PAON01		Analog Output 16pt w/o HART	16		√
	DC-TAOX51	AO IOTA		6	
	DC-TAOX61	AO IOTA Red.		12	√
CC-PDIL01		Digital Input 24 V			√
	DC-TDIL01	DI 24V IOTA	32	9	
	DC-TDIL11	DI 24V IOTA Red.		12	√
DC-PDIL51		Digital Input 24V	32		√
DC-PDIS51		Digital Input Sequence of Events	32		√
	DC-TDIL51	DI 24V IOTA		9	

I/O Module	IOTA	Description	Circuits	Size (in ")	Red.
	DC-TDIL61	DI 24V IOTA Red.		12	√
CC-PDIH01		Digital Input High Voltage	32		√
	DC-TDI110	DI 110VAC IOTA		12	
	DC-TDI220	DI 220VAC IOTA		12	
CC-PDOB01		DO – 24V Bussed Out	32		√
	DC-TDOB01	DO 24V Bussed IOTA		9	
	DC-TDOB11	DO 24V Bussed IOTA Red.		12	√
	DC-TDOR01	DO Relay IOTA		6	
	DC-TDOR11	DO Relay IOTA Red.		12	√
	CC-SDOR01	DO Relay Extension Board		12	
DC-PDOD51		DO - 24V Bussed Out	32		√
	DC-TDOD51	DO 24V Bussed Out IOTA		9	
	DC-TDOD61	DO 24V Bussed Out IOTA Red.		12	√
CC-PUIO31		Universal Input Output	32		√
	DC-TUIO31	Universal Input Output IOTA		9	
	DC-TUIO41	Universal Input Output IOTA Red.		12	√

5. Specifications

Specifications for Series-C Mark II I/O modules are shown below.

For information on environmental specifications, please refer to the Series-C Mark II Platform Specification and Technical data sheet EP03-525-xxx.

5.1. Analog Input with HART – CC-PAIH01

Function

The Analog Input Module accepts high level current or voltage inputs from transmitters and sensing devices.

Notable Features

- Extensive self diagnostics
- Optional redundancy
- Open Wire Detection
- Supplies non-incendive field power
- Non-incendive Power
- HART-capable, multivariable instruments and multiple modems for fast collection of control variables
- Fast loop scan
- PV protection through a open wire detection diagnostic
- Open-wire Bad PV Detection

Detail Specifications – Analog Input with HART

Parameter	Specification		
Input / Output Model	CC-PAIH01 - High-Level Analog Input with HART		
IOTA Models	DC-TAIX01	Non-Redundant	6”
	DC-TAIX11	Redundant	12”
Input Type	Voltage, current (2-wire or self-powered transmitters)		
Input Channels [1]	16 Channels (12 Single Ended / 4 Differential)		
Common Mode Rejection Ratio, dc to 60 Hz (500 Ω source imbalance)	70 dB		
Common Mode Voltage, dc to 60 Hz	-6 to +5 V peak		
A/D Converter Resolution	16 bits		
Input Range [1]	0 to 5 V, 1 to 5 V, 0.4 to 2 V, 4-20 mA (through 250 Ω)		
Normal Mode Rejection Ratio, at 60 Hz	19 dB		
Normal Mode Filter Response	Single-pole RC, -3 dB @ 6.5 Hz		
Maximum Normal Mode Input (differential inputs, no damage)	± 30 Volts		
Crosstalk, dc to 60 Hz (channel-to-channel)	-60 dB		
Input Impedance (voltage inputs)	> 10 M Ω powered		
Maximum Input Voltage (any input referenced to common, no damage)	± 30 Volts		

Parameter	Specification
Input Scan Rate	50 ms
Hardware Accuracy (@ CMV = 0 V)	± 0.075% of full-scale (23.5°± 2°C) ± 0.15% of full-scale (0 to 60°C)
Transmitter Field Power Conditioning	Individually Protected Current Limiting Circuits for Class 1, Div 2 non-incendive interfacing. No fusing required
Note 1: CC-PAIH01 supports voltage inputs for channels 13-16. Each channel's 250-Ohm load resistor is connected to the input terminal through a wire jumper on the IOTA. This jumper should be cut by the user on channels to be used with voltage transmitters. For channels 13-16 the low-side input connection is normally connected to system common by a wire jumper on the IOTA. This jumper may be cut by the user to enable differential operation subject to operate within the CMV specification.	

5.19. Universal Input Output – CC-PUIO31

Function

The Universal Input Output module accepts analog inputs, analog outputs, digital inputs, and digital outputs from field devices.

Notable Features

- Each channel user configurable as:
  - Analog Input
  - Analog Output
  - Digital Input
  - Digital Output
  - Pulse Input (any four channels)
- Open Wire Detection
- Electronic Short Circuit Protestation
- Fast Scan (Priority I/O Module Scan)
- Safe-state (FAILOPT) behaviors configurable on a per channel basis for Digital / Analog Output
- HART 7 support (Analog IO)
- HART Modem per channel for Fast Performance
- Extended Temperature Range -40 to +70°C module ambient

Detail Specifications – Model Specifications

Parameter	Specification		
Universal Process IO Module	CC-PUIO31		
IOTA Model Numbers	DC-TUIO31	Non Redundant	9”
	DC-TUIO41	Redundant	12”

Detail Specifications – Analog Input with HART

Parameter	Specification
Input type	Current (2, 3, or 4 wire devices)
Input Channels	32 Maximum per module (with or without open wire detect)
A/D Converter Resolution	16 bit
Input Range	0-20 mA or 4-20 mA
Normal Mode Rejection Ratio	18 dB at 50 Hz, 20 dB at 60 Hz
Normal Mode Filter Response	Single pole, -3 dB @ 6 Hz
Crosstalk, dc to 60 Hz (channel-to-channel)	60 dB
Input Impedance	250 Ω nominal
Maximum Input Voltage (any input referenced to common, no damage)	+33 VDC to -1 VDC
Input Scan Rate	10 ms

6. Function Matrix

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

AI Function Matrix

Series-C Mark II IO			Function						
IOM	NR IOTA	Red IOTA	AI 4-20ma	HART Conf / Status	HART on CTL	HART Fast Ctrl	AI 0-5V 1-5V	NR IOTA Size	Differential Inputs
CC-PAIH01 CC-PAIH02	DC-TAIX01	DC-TAIX11	♦	♦	♦	♦	♦	6"	13 - 16
CC-PAIH02	DC-TAID01	DC-TAID11	♦	♦	♦	♦	♦	9”	1 - 16
CC-PAIX02	DC-TAID01	DC-TAID11	♦			♦	♦	6”	1 - 16
CC-PAIH51	DC-TAIX51	DC-TAIX61	♦	♦				6"	None
CC-PAIN01	DC-TAIX51	DC-TAIX61	♦					6"	None
CC-PUIO31	DC-TUIO31	DC-TUIO41	♦	♦	♦			9”	None

AO Function Matrix

Series-C Mark II IO			Function						
IOM	NR IOTA	Red IOTA	AO 4-20ma	HART Conf / Status	HART on CTL	HART Fast CTL	Output Valida-tion	Open Wire Det.	NR IOTA Size
CC-PAOH01	DC-TAOX01	DC-TAOX11	♦	♦	♦		♦	♦	6"
CC-PAOH51	DC-TAOX51	DC-TAOX61	♦	♦				♦	6"
CC-PAON01	DC-TAOX51	DC-TAOX61	♦				♦	♦	6"
CC-PUIO31	DC-TUIO31	DC-TUIO41	♦	♦	♦	♦	♦	♦	9”

DI Function Matrix

Series-C Mark II IO			Function					
IOM	NR IOTA	Red IOTA	24V	HV	SOE	Fast Scan	Open Wire	Isolation
CC-PDIL01	DC-TDIL01	DC-TDIL11	♦			♦	♦	1500V
DC-PDIL51	DC-TDIL51	DC-TDIL61	♦			♦		1000V
DC-PDIS51	DC-TDIL51	DC-TDIL61	♦		♦	♦		1000V

Series-C Mark II IO			Function					
IOM	NR IOTA	Red IOTA	24V	HV	SOE	Fast Scan	Open Wire	Isolation
CC-PDIH01	DC-TDI110			110V			♦	1500V
CC-PDIH01	DC-TDI220			220V			♦	1500V
CC-PUIO31	DC-TUIO31	DC-TUIO41	♦			♦	♦	None

DO Function Matrix

Series-C Mark II IO				Function				
IOM	NR IOTA	Red IOTA	Support IOTA	Open Wire Det	Short Prot.	Output Type	Out. I	Isolation
CC-PDOB01	DC-TDOB01	DC-TDOB11		♦	♦	Source	0.5A	1500V
CC-PDOB01	DC-TDOR01	DC-TDOR11	CC-SDOR01	♦	♦	Dry Contact	3A	
DC-PDOD51	DC-TDOD51	DC-TDOD61			♦	Source	0.1A	1000V
CC-PUIO31	DC-TUIO31	DC-TUIO41		♦	♦	Source	0.5A	None