

Experion Series-C I/O Specification



EP03-490-520

Release 520

Dec 2021, Version 1.5

Revision History

Revision	Date	Description
1.0	March 2017	Original R500
1.1	July 2018	CC-PUIO01 and CC-PUIO31 update
1.2	Jan 2019	Section 4: IOM size update table
1.3	Jan 2019	Notes Update
1.4	Sep 2020	CC-PUIO31 Digital Output update
1.5	Dec 2021	CC-PUIO01 and CC-PUIO31 Electronic Short Circuit Protection update

Table of Contents

1. Product Introduction Summary	4
1.1. Overview	4
1.2. Scope.....	4
1.3. Definitions	4
2. Features.....	4
3. Series C I/O Sizing	5
3.1. I/O Module Functions	5
4. I/O Module Sizes	6
5. Specifications.....	8
5.1. Analog Input with HART – CC-PAIH01 / 02	8
5.2. Analog Input with HART – CC-PAIH51	10
5.3. Analog Input – CC-PAIX01 / 02	11
5.4. Analog Input – CC-PAIN01	13
5.5. Low Level Analog (Temperature) Input – LLMUX – CC-PAIM01	14
5.6. Low Level Analog (Temperature) Input – CC-PAIL51	17
5.7. Pulse Input – CC-PPIX01.....	19
5.8. Analog Output with HART – CC-PAOH01	21
5.9. Analog Output with HART – CC-PAOH51	23
5.10. Analog Output – CC-PAOX01.....	25
5.11. Analog Output – CC-PAON01.....	27
5.12. Digital Input 24VDC – CC-PDIL01	29
5.13. Digital Input 24VDC – CC-PDIL51	30
5.14. Digital Input Sequence of Events – CC-PDIS01	31
5.15. Digital Input High Voltage- CC-PDIH01.....	33
5.16. Digital Output - Bussed 24VDC – CC-PDOB01	34
5.17. Digital Output – Relay IOTA – Uses CC-PDOB01 IOM.....	36
5.18. Digital Output – SINKTYPE 24VDC – CC-PDOD51	38
5.19. Universal Input Output – CC-PUIO01	39
5.20. Universal Input Output – CC-PUIO31	44
6. Function Matrix	49

1. Product Introduction Summary

1.1. Overview

This document provides technical information to configure the Experion® Series C I/O and the C300 Controller, released starting with Experion R300.

1.2. Scope

The following Series C I/O items are included in this document.

- Digital Input 24 VDC
- Digital Input 110 VAC / 125VDC
- Digital Input 220 VAC
- Digital Output (24 VDC busse)
- 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 Multiplexer – RTD & TC
- Low Level Input – RTD & TC
- Pulse Input
- 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

All Series C 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 C 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 available directly on the IOTA without any external cabling or redundancy control devices, by simply adding a second IOM to an IOTA.
- The Series C 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.
- The IOTA receives its power from a 24 VDC bus that is part of the IOTA carrier – the IOTA is screwed into the bussed power.

3. Series C I/O Sizing

In virtually all configurations, the C300 controller and Series C I/O provides useful, maintainable process equipment connections in a smaller footprint than existing competitors and Honeywell equivalent products. Installing Series C 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 available.
- **Digital Input High Voltage (32pt)** – Digital input sensing for 110 VAC, 220 VAC, 125VDC.
- **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.
- **Temperature Multiplexer (64 pt)** – Provides thermocouple (TC) and resistance temperature device (RTD) inputs. The Multiplexer supports up to four, field proven PMIO FTAs.
- **Temperature Multiplexer (64 pt)** – Provides thermocouple (TC) and resistance temperature device (RTD) inputs. The Multiplexer supports up to four, field proven PMIO FTAs
- **Pulse Input (8pt)** – Provide linear counting, PV generation, and Quadrature Input for Custody Transfer
- **Universal Input Output (32 pt)** - Supports 32 channels of user configurable IO. Choices available – analog input, analog output, digital input, and digital output.

Series C field connectors accept up to 12ga AWG / 2.5mm stranded wire.

4. I/O Module Sizes

IOTA Sizing is nominal (6in = 152mm, 9in = 228mm, 12in = 304mm, 18in = 457mm) 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-TAIX01	AI IOTA		6	
	CC-TAIX11	AI IOTA Red		12	√
CC-PAIH02 CC-PAIX01 / 02		High-level AI HART High-level AI w/o HART	16		√
	CC-TAIX01	AI IOTA		6	
	CC-TAIX11	AI IOTA Red		12	√
	CC-TAID01	AI IOTA – 16 Channel Differential		9	
	CC-TAID11	AI IOTA Red – 16 Channel Differential		12	√
CC-PAIH51		High-level AI HART	16		√
	CC-TAIX51	AI IOTA		6	
	CC-TAIX61	AI IOTA Red		12	√
CC-PAIN01		High-level AI w/o HART	16		√
	CC-TAIN01	AI IOTA		6	
	CC-TAIN11	AI IOTA Red		12	√
CC-PPIX01		Pulse Input w/ Fast Cut-off	8		√
	CC-TPIX11	PI IOTA Red		12	√
CC-PAIM01		PMIO LL Mux	64		
	CC-TAIM01	PMIO LL Mux IOTA		6	
		FTA			
	Mx-TAMT04	LL Mux TC FTA	16	12	
	Mx-TAMT14	LL Mux TC FTA w/Remote CJR	16	12	
	Mx-TAMR04	LL Mux RTD FTA	16	12	
CC-PAIL51	CC-TAIL51	Low-level AI	16	9	
CC-PPIX01	CC-TPIX01	Pulse Input	8	12	√

CC-PAOH01 CC-PAOX01		Analog Output 16pt HART Analog Output 16pt w/o HART	16		√
	CC-TAOX01	AO IOTA		6	
	CC-TAOX11	AO IOTA Red.		12	√
CC-PAOH51		Analog Output 16pt HART	16		√
	CC-TAOX51	AO IOTA		6	
	CC-TAOX61	AO IOTA Red		12	√
CC-PAON01		Analog Output 16pt w/o HART	16		√
	CC-TAON01	AO IOTA		6	
	CC-TAON11	AO IOTA Red		12	√
CC-PDIL01 CC-PDIS01		Digital Input 24V Digital Input Sequence of Events	32		√
	CC-TDIL01	DI 24V IOTA		9	
	CC-TDIL11	DI 24V IOTA Red.		12	√
CC-PDIL51		Digital Input 24V	32		√
	CC-TDIL51	DI 24V IOTA		9	
	CC-TDIL61	DI 24V IOTA Red.		12	√
CC-PDIH01		Digital Input High Voltage	32		√
	CC-TDI110	DI 110V IOTA		9	
	CC-TDI120	DI 110V IOTA Red.		12	√
	CC-TDI220	DI 220VAC IOTA		9	
	CC-TDI230	DI 220VAC IOTA Red.		12	√
CC-PDOB01		DO - 24V Bussed Out	32		√
	CC-TDOB01	DO 24V Buss IOTA		9	
	CC-TDOB11	DO 24V Buss IOTA Red.		12	√
	CC-TDOR01	DO Relay IOTA		6	
	CC-TDOR11	DO Relay IOTA Red.		12	√
	CC-SDOR01	DO Relay Extension Board		12	
CC-PUIO01		Universal Input Output	32		√
	CC-TUIO01	Universal Input Output IOTA		12	
	CC-TUIO11	Universal Input Output IOTA Red.		18	√
CC-PUIO31		Universal Input Output	32		√

5.12. Digital Input 24VDC – CC-PDIL01

Function

The Digital Input 24VDC accepts 24VDC signals as discrete inputs.

Notable Features

- Extensive internal diagnostics for data integrity
- Open wire detection
- Optional redundancy
- Internal or external field power selection
- On board excitation power (no need for marshalling power)
- Supplies Non-incendive field power
- Direct / Reverse Input Indication
- Galvanic isolation

Open-wire Bad PV Detection

This Series C IO function will be able to detect and annunciate Open field wire. In addition, a seemingly-valid PV from a channel diagnosed as having a Open-wire will provide a status of “invalid” (thus preventing incorrect control action).

Detail Specifications - DI 24VDC

Parameter	Specification		
Input / Output Model	CC-PDIL01 - 24Volt Digital Input		
IOTA Models	CC-TDIL01	Non Redundant	9"
	CC-TDIL11	Redundant	12"
	CC-GDIL11	Redundant	12"
	CC-GDIL21	Non Redundant	6"
	CC-GDIL01	Redundant for exp.	12"
	CC-SDXX01	GHS I/O Expander	12"
Input Channels	32		
Galvanic Isolation (any input terminal voltage referenced to common)	1500 VAC RMS or ±1500 VDC		
Isolation Technique	Optical (in IOM)		
DI Power Voltage Range	18 to 30 VDC		
ON Sense Voltage/Current	13 VDC (min) or 3 mA (min)		
OFF Sense Voltage/Current	5 VDC (max) or 1.2 mA (max)		
Input Impedance	4.2 KΩ		
Absolute Delay Across Input Filter and Isolation	5 ms ± 20%		
Field Resistance for Guaranteed ON Condition	300 Ω _{max} @ 15 VDC		
Field Resistance for Guaranteed OFF Condition	30 KΩ _{min} @ 30 VDC		

5.13. Digital Input 24VDC – CC-PDIL51

Function

The Digital Input 24VDC accepts 24VDC signals as discrete inputs.

Notable Features

- Extensive internal diagnostics for data integrity
- NO Open wire detection
- Optional redundancy
- Internal or external field power selection
- On board excitation power (no need for marshalling power)
- Supplies Non-incendive field power
- Direct / Reverse Input Indication
- Galvanic isolation

Detail Specifications - DI 24VDC

Parameter	Specification		
Input / Output Model	CC-PDIL51 - 24Volt Digital Input		
IOTA Models	CC-TDIL51	Non Redundant	9"
	CC-TDIL61	Redundant	12"
Input Channels	32		
Galvanic Isolation (any input terminal voltage referenced to common)	1000 VAC RMS		
Isolation Technique	Optical (in IOM)		
DI Power Voltage Range	18 to 30 VDC		
ON Sense Voltage/Current	13 VDC (min) or 3 mA (min)		
OFF Sense Voltage/Current	5 VDC (max) or 1.2 mA (max)		
Input Impedance	4.2 K Ω		
Absolute Delay Across Input Filter and Isolation	5 ms \pm 20%		
Field Resistance for Guaranteed ON Condition	300 Ω max @ 15 VDC		
Field Resistance for Guaranteed OFF Condition	30 K Ω min @ 30 VDC		

5.14. Digital Input Sequence of Events – CC-PDIS01

Function

The Digital Input Sequence of Events (DISOE) accepts 24VDC discrete signals as discrete inputs. The inputs can be time tagged to support 1ms resolution Sequence of Events.

Notable Features

- Three modes of operation:
 - Normal (20ms PV scan)
 - Sequence of Events (1ms resolution SOE, 20ms PV scan)
 - Low Latency (5ms PV scan)
 - Extensive internal diagnostics for data integrity
 - Open Wire Detection (in Normal mode only)
- Optional redundancy
- Internal or external field power selection
- On board excitation power (no need for marshalling power)
- Supplies Non-incendive field power
- Direct / Reverse Input Indication
- Galvanic Isolation

Open-Wire Bad PV Detection

This Series C IO function will be able to detect and annunciate an open field wire. In addition, a seemingly valid PV from a channel diagnosed as having an open wire will provide a status of “invalid” (thus preventing incorrect control action).

Detail Specifications - DISOE

Parameter	Specification		
Input / Output Model	CC-PDIS01 - Digital Input Sequence of Events		
IOTA Models	CC-TDIL01	Non Redundant	9"
	CC-TDIL11	Redundant	12"
	CC-GDIL11	Redundant	12"
	CC-GDIL21	Non Redundant	6"
	CC-GDIL01	Redundant for exp.	12"
	CC-SDXX01	GHS I/O Expander	12"
Input Channels	32		
Input Channel Scanning (PV)	Normal = 20ms ; Fast = 5ms		
Digital Input Resolution for Sequence of Events (SOE)	1ms		
Galvanic Isolation (any input terminal voltage referenced to common)	1500 VAC RMS or ±1500 VDC		
Isolation Technique	Optical (in IOM)		
DI Power Voltage Range	18 to 30 VDC		
ON Sense Voltage/Current	13 VDC (min) or 3 mA (min)		
OFF Sense Voltage/Current	5 VDC (max) or 1.2 mA (max)		
Input Impedance	4.2 KΩ		
Absolute Delay Across Input Filter and Isolation	5 ms ± 20%		