# 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 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 Multiplexer – RTD & TC
- Low Level Input – RTD & TC
- Pulse Input
- Universal Input Output

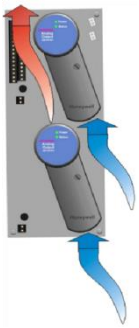
## 1.3. Definitions

- **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 Quaduature 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<br>CC-PAIX01 / 02 | | High-level AI HART<br>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<br>CC-PAOX01 | | Analog Output 16pt HART<br>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<br>CC-PDIS01 | | Digital Input 24V<br>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 | | √ |

| | | | | | |
|---|---|---|---|---|---|
| | CC-TUIO31 | Universal Input Output IOTA | | 9 | |
| | CC-TUIO41 | Universal Input Output IOTA Red. | | 12 | √ |

# 5. Specifications

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

For information on environmental specifications, please refer to the Series-C Platform Specification and Technical data sheet EP03-520-xxx.

## 5.1. Analog Input with HART – CC-PAIH01 / 02

### 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 an open wire detection diagnostic
- Open-wire Bad PV Detection

### Detail Specifications – Analog Input with HART

| Parameter | Specification | |
|---|---|---|
| Input / Output Model | CC-PAIH02 - High-Level Analog Input with HART | |
| IOTA Models | Non-Redundant | Redundant |
| | CC-TAIX01 | CC-TAIX11 |
| | CC-GAIX21 | CC-GAIX11 |
| | CC-TAID01 | CC-TAID11 |
| 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 | |

| Parameter | Specification |
|---|---|
| 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 |
| Input Scan Rate | 50 ms |
| Hardware Accuracy (@ CMV = 0 V) | ± 0.075% of full-scale (23.5°± 2°C)<br>± 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 CC-PAIH02 supports voltage inputs for channels 1-16 when used with CC-TAIDx1 IOTA. 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 operating within the CMV specification. | |

## 5.2. Analog Input with HART – CC-PAIH51

### Function

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

### Notable Features

- Extensive self-diagnostics
- Optional redundancy
- Supplies non-incendive field power (No external user supplied power)
- Suitable for Configure / Status for HART devices
- HART-capable, multivariable instruments for fast collection of control variables
- Fast loop scan
- Non-Incendive Power

### Detail Specifications – Analog Input with HART

| Parameter | Specification | | |
|---|---|---|---|
| Input / Output Model | CC-PAIH51 - High-Level Analog Input with HART | | |
| IOTA Models | CC-TAIX51 | Non Redundant | 6” |
| | CC-TAIX61 | Redundant | 12” |
| Input Type | Current (2-wire or self-powered transmitters) | | |
| Input Channels [1] | 16 Channels (ALL Single Ended). | | |
| 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] | 4-20 mA only (through 200 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 | ± 30 Volts | | |
| Crosstalk, dc to 60 Hz (channel-to-channel) | -60 dB | | |
| Input Scan Rate | 50 ms | | |
| Hardware Accuracy (@ CMV = 0 V) | ± 0.075% of full-scale (23.5°± 2°C)<br>± 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: No differential / voltage inputs are supported. | | | |