

## Series 8 Controller and I/O Specification



**S803-150-110**

**Release 110**

**December 2015, Version 1.2**

## 1. Product Introduction

### 1.1. C300 Controller Overview

Honeywell’s C300 Controller provides powerful and robust control for the distributed control system (DCS). The C300 is a node in operating Honeywell’s field-proven deterministic Control Execution Environment (CEE) core software. The CEE software provides a superior control execution and scheduling environment. Control strategies for each controller node are configured and loaded through a common Control Builder, an easy and intuitive engineering tool.

In addition to a standard and robust library of pre-built function blocks and algorithms, the C300 Controller also supports Custom Algorithm Blocks (CABs). Custom Algorithm Blocks are similar in purpose and structure to the standard function blocks that are distributed with Control Builder. However, CABs have user-defined algorithms and data structures, allowing custom tailored strategies to be developed to specific requirements.

The C300 controller shares its hardware design with the Series 8 I/O, offering an innovative design that reduces footprint and installation and maintenance costs. The C300 controller module is mounted on the C300 Input Output Termination Assembly (IOTA). The C300 IOTA contains only passive devices such as FTE address switches. [Figure 1](#) below depicts the IOTA components.

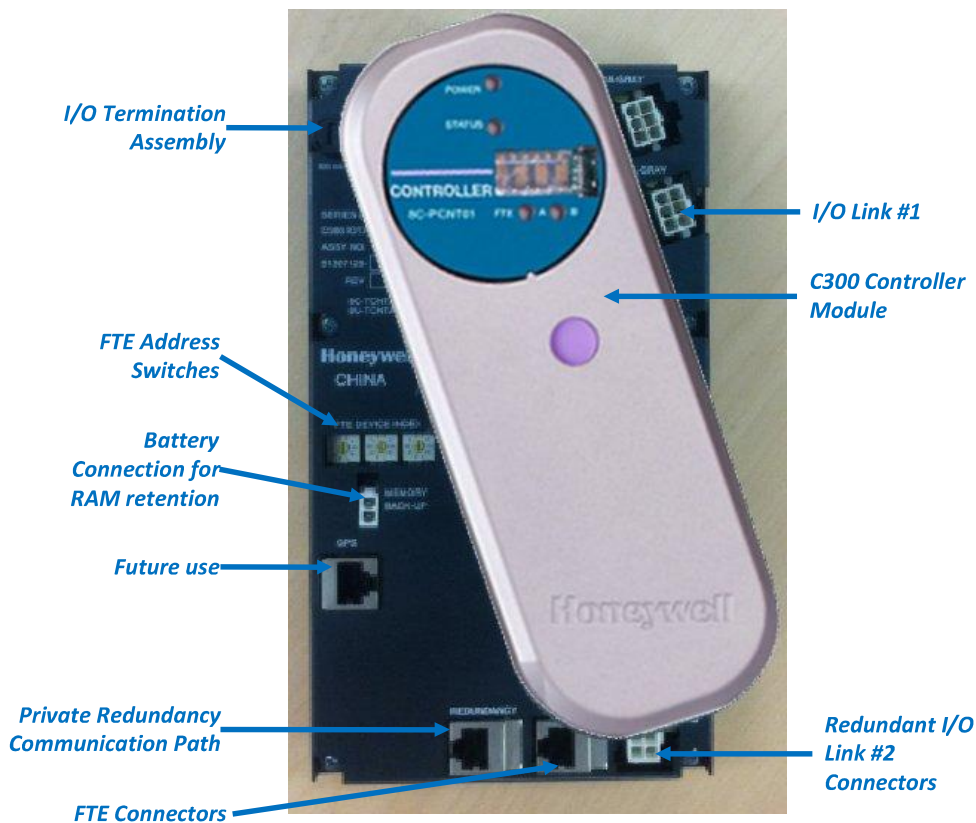


Figure 1 - C300 Controller

The Model Numbers of C300 controller are shown as below:

<b>Model Number</b>	<b>Description</b>
8C-PCNT02	Series 8 C300 Controller, coated
8U-PCNT02	Series 8 C300 Controller, uncoated
8C-TCNTA1	Series 8 C300 Controller I/O Termination Assembly(IOTA),coated
8U-TCNTA1	Series 8 C300 Controller I/O Termination Assembly(IOTA),uncoated
51305980-836	Cable, Redundant C300 Controller
51454475-100	Series 8 RAM Charger Module (C300 Memory Backup)
51202330-300	Cable, Battery RAM Charger, 30 in
51202330-200	Cable, Battery RAM Charger, 84 in
Redundancy is implemented with two modules/IOTAs and a redundancy cable (51305980-836). C300 Memory Backup is optional.	

## 1.2. Series 8 I/O Overview

This document provides technical information to configure the Series 8 I/O. The following Series 8 I/O items are included in this document.

- TC/RTD
- Analog Input – Single Ended
- Analog Input with HART – Single Ended
- Analog Input with HART – Differential
- Analog Output
- Analog Output with HART
- Digital Input Sequence of Events (SOE)
- Digital Input, 24 VDC
- Digital Input Pulse Accumulation
- Digital Output, 24 VDC
- DO Relay Extension Board

### 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 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 to power the field devices 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 eyes 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 system 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 through cables from header board.

### 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 traditional rack based 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

- **TC/RTD (16pt)** – Provides thermocouple (TC) and resistance temperature device (RTD) inputs.
- **Analog Input – Single Ended (16pt)** - The Analog Input Module supports analog inputs which are typically 4-20mA DC inputs for traditional devices, such as transmitters.
- **Analog Input with HART – Single Ended (16pt)** – The Analog Input Module supports both 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.
- **Analog Input with HART – Differential (16pt)** – The Analog Input Module supports Single Ended or Differential analog inputs, and HART inputs.
- **Analog Output (16pt)** – The Analog Output Module supports standard 4-20mA DC outputs.
- **Analog Output with HART (16pt)** – The Analog Output Module supports both standard 4-20mA DC outputs and HART outputs.



- **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 Input 24 VDC (32pt)** – Digital input sensing for 24V signals
- **Digital Input Pulse Accumulation (32pt)** – Accepts 24VDC discrete signals as discrete inputs. The first 16 channels can be configured as Pulse accumulation to support Pulse Accumulation and frequency measurement on per channel basis. Channels 17 – 32 can be configured as DI.
- **Digital Output 24 VDC (32 pt)** – Current sinking digital outputs. Outputs are electronically short-circuited protected.
- **DO Relay Extension Board (32 pt)** – Digital output with NO or NC dry contacts. It can be used for low power or high power applications.

### 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 12 AWG / 2.5 mm<sup>2</sup> stranded wire.

### IOTA 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.

Model Number	Description	Channels	Size	Red.
TC/RTD				
8C-TAIMA1	TC/RTD IOTA, Coated	16	9"	
8U-TAIMA1	TC/RTD IOTA, Uncoated			
Analog Input				
8C-TAIXA1	ANALOG INPUT IOTA Single Ended, Coated	16	6"	
8U-TAIXA1	ANALOG INPUT IOTA Single Ended, Uncoated			
8C-TAIDA1	ANALOG INPUT IOTA Differential, Coated		9"	
8U-TAIDA1	ANALOG INPUT IOTA Differential, Uncoated			
8C-TAIXB1	ANALOG INPUT IOTA Single Ended, Red, Coated		12"	✓
8U-TAIXB1	ANALOG INPUT IOTA Single Ended, Red, Uncoated			✓
8C-TAIDB1	ANALOG INPUT IOTA Differential, Red, Coated			✓
8U-TAIDB1	ANALOG INPUT IOTA Differential, Red, Uncoated			✓
Analog Output				
8C-TAOXA1	ANALOG OUTPUT IOTA, Coated	16	6"	
8U-TAOXA1	ANALOG OUTPUT IOTA, Uncoated			
8C-TAOXB1	ANALOG OUTPUT IOTA Red, Coated		12"	✓
8U-TAOXB1	ANALOG OUTPUT IOTA Red, Uncoated			✓

Digital Input				
8C-TDILA1	DIGITAL INPUT 24V IOTA, Coated	32	9"	
8U-TDILA1	DIGITAL INPUT 24V IOTA, Uncoated			
8C-TDILB1	DIGITAL INPUT 24V IOTA Red. Coated		12"	✓
8C-TDILB1	DIGITAL INPUT 24V IOTA Red. Uncoated			✓
Digital Output				
8C-TDODA1	DIGITAL OUTPUT IOTA, Coated	32	9"	
8U-TDODA1	DIGITAL OUTPUT IOTA, Uncoated			
8C-TDODB1	DIGITAL OUTPUT IOTA Red, Coated		12"	✓
8U-TDODB1	DIGITAL OUTPUT IOTA Red, Uncoated			✓

## 2.2.2. Analog Input – Single Ended




### Function

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

### Notable Features

- Extensive self diagnostics
- Optional redundancy
- Fast loop scan
- Internal or external field power selection
- On board excitation power (no need for marshalling power)
- Galvanic Isolation

### Detail Specifications – Analog Input

Parameter		Specification	
Input / Output Module		8C-PAINA1 - Analog Input – Single Ended, Coated	
		8U-PAINA1 - Analog Input – Single Ended, Uncoated	
IOTA Modules		8C-TAIXA1	Non Redundant, Coated 6"
		8U-TAIXA1	Non Redundant, Uncoated 6"
		8C-TAIXB1	Redundant, Coated 12"
		8U-TAIXB1	Redundant, Uncoated 12"
Input Type		current (2-wire or self-powered transmitters)	
Input Channels		16 Channels (All 16 Single Ended)	
Voltage Rating		24 VDC	
Module current rating		105m A	
Temperature	Operating Temperature	0 to 60 °C	
	Storage temperature	-40 to 85 °C	
A/D Converter Resolution		16 bits	
Module Removal and Insertion Under Power		Supported	
Input Range		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	
Crosstalk, dc to 60 Hz (channel-to-channel)		-60 dB	
Maximum Input Voltage (any input referenced to common, no damage)		± 30 Volts	
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)	
Galvanic Isolation (any input terminal voltage referenced to common)		1000 VAC RMS or ±1000 VDC	
Isolation Technique		Icoupler (in IOM)	
Agency certifications			
		 Class I, Division 2, Group A, B, C, D; T4 Class I, Zone 2 AEx/ Ex nA II C T4	
		 Class I, Division 2, Group A, B, C, D; T4 Class I, Zone 2, Ex nA II C T4	

## 2.2.3. Analog Input with HART – Single Ended




### Function

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

### Notable Features

- Extensive self diagnostics
- Optional redundancy
- HART-capable
- Fast loop scan
- Internal or external field power selection
- On board excitation power (no need for marshalling power)
- Galvanic Isolation

### Detail Specifications – Analog Input with HART – Single Ended

Parameter		Specification	
Input / Output Module		8C-PAIHA1 - Analog Input with HART, Coated	
		8U-PAIHA1 - Analog Input with HART, Uncoated	
IOTA Modules		8C-TAIXA1	Non Redundant, Coated 6"
		8U-TAIXA1	Non Redundant, Uncoated 6"
		8C-TAIXB1	Redundant, Coated 12"
		8U-TAIXB1	Redundant, Uncoated 12"
Input Type		current (2-wire or self-powered transmitters)	
Input Channels		16 Channels (All 16 Single Ended)	
A/D Converter Resolution		16 bits	
Voltage Rating		24 VDC	
Module current rating		110 mA	
Temperature	Operating Temperature	0 to 60 °C	
	Storage temperature	-40 to 85 °C	
Input Range		4-20 mA (through 250 Ω)	
Module Removal and Insertion Under Power		Supported	
Normal Mode Rejection Ratio, at 60 Hz		19 dB	
Normal Mode Filter Response		Single-pole RC, -3 dB @ 6.5 Hz	
Crosstalk, dc to 60 Hz (channel-to-channel)		-60 dB	
Maximum Input Voltage (any input referenced to common, no damage)		± 30 Volts	
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)	
Galvanic Isolation (any input terminal voltage referenced to common)		1000VAC RMS or ±1000 VDC	
Isolation Technique		Icoupler (in IOM)	
Agency certifications			
		 Class I, Division 2, Group A, B, C, D; T4 Class I, Zone 2 AEx/ Ex nA II C T4	
		 Class I, Division 2, Group A, B, C, D; T4 Class I, Zone 2, Ex nA II C T4	

## 2.2.12. Series 8 IO 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-PAIHA1 8U-PAIHA1	8C-TAIXA1 8U-TAIXA1	8C-TAIXB1 8U-TAIXB1	◆ ◆	◆ ◆
8C-PAINA1 8U-PAINA1	8C-TAIXA1 8U-TAIXA1	8C-TAIXB1 8U-TAIXB1	◆ ◆	
8C-PAIH54 8U-PAIH54	8C-TAIDA1 8U-TAIDA1	8C-TAIDB1 8U-TAIDB1	◆ ◆	◆ ◆

### TC/RTD Function Matrix

IOM	NR IOTA	Red IOTA	Function	
			TC	RTD
8C-PAIMA1 8U-PAIMA1	8C-TAIMA1 8U-TAIMA1	NA NA	◆ ◆	◆ ◆

### AO Function Matrix

IOM	NR IOTA	Red IOTA	Function	
			AIO 4-20 mA	HART
8C-PAOHA1 8U-PAOHA1	8C-TAOXA1 8U-TAOXA1	8C-TAOXB1 8U-TAOXB1	◆ ◆	◆ ◆
8C-PAONA1 8U-PAONA1	8C-TAOXA1 8U-TAOXA1	8C-TAOXB1 8U-TAOXB1	◆ ◆	