Technical Information

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.

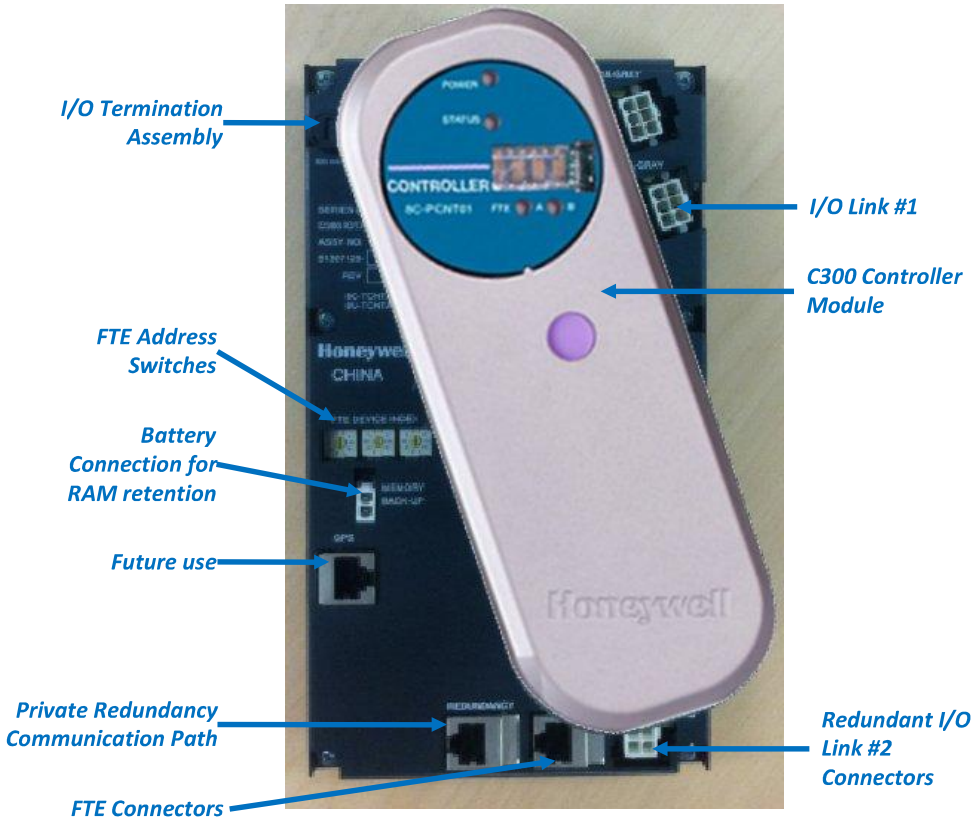


Figure 1 - C300 Controller

The Model Numbers of C300 controller are shown as below:

Model Number	Description
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.

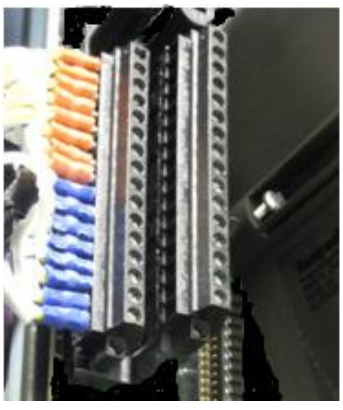
Series 8 I/O Sizing

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^2 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			√

2.2.10. 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 Module		8C-PDODA1 - Digital Output 24 VDC, Field Isolated, Bussed output, Coated		
		8U-PDODA1 - Digital Output 24 VDC, Field Isolated, Bussed output, Uncoated		
IOTA Module Numbers		8C-TDODA1	Non Redundant, Coated	9”
		8U-TDODA1	Non Redundant, Uncoated	9”
		8C-TDODB1	Redundant, Coated	12”
		8U-TDODB1	Redundant, Uncoated	12”
Output Channels		32		
Output Type		Source		
Voltage Rating		24 VDC		
Module current rating		105mA		
Temperature	Operating Temperature	0 to 60 ℃		
	Storage temperature	-40 to 85 ℃		
Load Voltage		30 VDC Maximum		
Module Removal and Insertion Under Power		Supported		

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	100mA per channel (Max)
Galvanic Isolation	1000 VAC RMS for System – to – Field isolation for user supplied field Power only No System- to-Field isolation for internal system power used for field sensing
On-State Voltage	24 VDC (typ) (load current @ 0.1A max)
Off-State Voltage	0v VDC
Off-State Leak Current	5 µA (max)
Turn-On/Turn-Off Time	10 ms (max)
Gap (0 current) of Output to Field on Switchover	None (0ms) (applies to Redundancy only)
Agency certifications	CE
	FM C US APPROVED Class I, Division 2, Group A, B, C, D; T4 Class I, Zone 2 AEx/ Ex nA II C T4
	CSA Class I, Division 2, Group A, B, C, D; T4 Class I, Zone 2, Ex nA II C T4

DI Function Matrix

IOM	NR IOTA	Red IOTA	Function		
			DI	SOE	PA
8C-PDILA1 8U-PDILA1	8C-TDILA1 8U-TDILA1	8C-TDILB1 8U-TDILB1	♦ ♦		
8C-PDISA1 8U-PDISA1	8C-TDILA1 8U-TDILA1	8C-TDILB1 8U-TDILB1		♦ ♦	
8C-PDIPA1 8U-PDIPA1	8C-TDILA1 8U-TDILA1	8C-TDILB1 8U-TDILB1			♦ ♦

DO Function Matrix

IOM	NR IOTA	Red IOTA	Relay Extension	Source
8C-PDODA1 8U-PDODA1	8C-TDODA1 8U-TDODA1	8C-TDODB1 8U-TDODB1	8C-SDOX01 8U-SDOX01	♦ ♦