Technical Information

Honeywell

# Experion Series C I/O Specification

## EP03-490-300, Version 1.3

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## Product Introduction Summary

### Overview

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

### 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
- Analog Output with HART
- Low Level Multiplexer – RTD & TC

### 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.
- IOTA Carrier: The assembly that allows mounting of the IOTA.
- IOTA Support: Supports mounting the carrier to the cabinet.

## 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 accomplished 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 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 eye to important status information.
- “Tilted” design allows 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 simply screwed into the bussed power.

**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.
- **Analog Output/HART Output Module (16pt**) – The Analog Output Module supports both standard 4-20mA DC outputs and HART transmitter outputs.
- **Digital Input 24 VDC (32pt)** – Digital input sensing for 24V signals
- **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.
- **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 (64pt).** – Provides thermocouple (TC) and resistance temperature device (RTD) inputs. The Multiplexer supports up to four, field proven PMIO FTAs.

## 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 IOTA for redundant applications. Specific information on the size of a particular module can be found in the Model Number Table.

## Approval Bodies

### Factory Mutual

Division 2 Approvals

Most models are approved as non-incendive for use in Class I, Division 2, Group A, B, C, D hazardous (classified) locations.

Selected low voltage AO, AI and DI models will also have additional approval as having non-incendive field wiring for connection to Class I, Division, 2, Group A, B, C and D hazardous (classified) locations.

Zone 2 Approvals

Most models are approved as normally non-sparking apparatus for use in Class I, Zone 2, AEx nA IIC hazardous (classified) locations.Selected low voltage AO, AI and DI models will also have additional approval as having non-incendive field wiring connections to Class I, Zone 2, Group IIC hazardous (classified) locations.

Temperature rating of all individual models as well cabinet configurations is not to exceed T4.

### Canadian Standards Association

Division 2 Certifications

All models are certified as suitable for use in Class I, Division 2, Group A, B, C, D hazardous locations.

Zone 2 Certifications

All models are certified as normally non-sparking apparatus, Ex nA IIC, for use in Zone 2 hazardous locations.Selected low voltage AO, AI and DI models will also have additional certification as having energy limited circuits, Ex nA [L] IIC, for field wiring connections within Class I, Zone 2, Group IIC hazardous (classified) locations.

Temperature rating of all individual models as well cabinet configurations is not to exceed T4.

### ATEX Certification

Zone 2 Certifications

All models are certified as normally non-sparking apparatus, II 3 G EEx nA IIC, for use in Zone 2 hazardous locations.

Selected low voltage AO, AI and DI models will also have additional certification as having energy limited circuits, II 3 G EEx nA [L] IIC, for field wiring connections within Zone 2, Group IIC hazardous locations.

Temperature rating of all individual models as well cabinet configurations is not to exceed T4.

### CE

EN 61326:1998 Electrical equipment for measurement, control and laboratory use - EMC requirements

EN 50082-2:1995 Electromagnetic Compatibility - Generic Immunity Standard, Part 2: Industrial Environment

EN 55011:1991 Limits and Methods of Measurement of Radio Disturbance Characteristics of Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment

EN 61010-1:1993 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use

Part 1: General Requirements

### C-Tick

Australian Radio communications Act of 1997, Section 182

## Model Numbers

The table below illustrates the various I/O modules and their associated IOTAs.

- Size column – The size table entry denotes the relative (not exact) size of the IOTA in inches. No size is shown for the IOMs since they reside on the IOTA.
- "Red." column – Denotes if the IOM can be made redundant.
- Model Prefix column – The "CC" designation represents the corrosion protected model. When applicable, only the corrosion protected device is offered. This provides a more robust function which allows for enhanced peace of mind. Corrosion protected devices support the ANSI/ISA-S71.04-1985 corrosion standard at the harsh environment or G3 level.

| WX-YZZZNM | Series C Model Numbering Key |
|---|---|
| | W = Series C Product Line - C |
| | X - U = Standard Assembly (G1) - C = Corrosion Protected Assembly (G3), x = Either |
| | Y – P = IOProcessor, T = Termination Assembly, |
| | G = GI/IS Termination Assembly, H = Hazardous Interface, |
| | S = Custom Interface, |
| | PW=Power, K=Cabling, E=Enclosure, M=Mechanical |
| | ZZZ - Particular function or model |
| | N = Series of Model - Also can be used as additional model information |
| | - +1 = Redundant complement to an IOTA |
| | M = Series or Release number of Model - Also can be used as additional model information |

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.

| I/O Module | IOTA | Description | Circuits | Size | Red. |
|---|---|---|---|---|---|
| CC-PAIH01 | | High-level AI HART | 16 | | √ |
| | CC-TAIX01 | AI IOTA | | 6 | |
| | CC-TAIX11 | AI IOTA Red | | 12 | √ |
| CC-PAOH01 | | AO 16pt HART | 16 | | √ |
| | CC-TAOX01 | AO IOTA | | 6 | |
| | CC-TAOX11 | AO IOTA Red. | | 12 | √ |
| CC-PDIL01 | | DI 24V | 32 | | √ |
| | CC-TDIL01 | DI 24V IOTA | | 9 | |
| | CC-TDIL11 | 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 | |

| I/O Module | IOTA | Description | Circuits | Size | Red. |
|---|---|---|---|---|---|
| | 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-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 | |

## Specifications

Specifications for the various 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 EP03-520-300.

## Analog Input with HART

### Function

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

### Notable Features

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

### Non-Incendive Power

Non-incendive power is provided with no external marshalling to support the 4-20mA loop and still provide for channel power protection. This protection supports the Division 2 hazardous protection non-incendive power rating.

### Broken-wire Bad PV Detection

Each channel is able to detect and annunciate a broken field wire. In addition, a seemingly-valid PV from a channel diagnosed as having a broken-wire will be marked as invalid thus preventing incorrect control action. A soft failure is generated to alert the maintenance staff for corrective action. This function is channel configurable.

### Detail Specifications – Analog Input with HART

| Parameter | Specification | | |
|---|---|---|---|
| Input / Output Model | CC-PAIH01 - High-Level Analog Input with HART | | |
| IOTA Models | CC-TAIX01 | Non Redundant | 6” |
| | CC-TAIX11 | Redundant | 12” |
| Input Type | Voltage, current (2-wire or self-powered transmitters) | | |
| Input Channels | 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 [1] | -6 to +5 V peak | | |
| A/D Converter Resolution | 16 bits | | |
| Input Range | 0 to 5 V, 1 to 5 V, 0.4 to 2 V, 4-20 mA (through 250 Ω)[2] | | |
| 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 | | |
| 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 | | |
| 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.<br>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. | | | |

## Analog Output w/ HART

### Function

The Analog Output (AO) Module delivers high-level constant-current to actuators and recording/indicating devices.

### Notable Features

- Extensive self diagnostics
- Optional redundancy
- HART-capable, multivariable instruments
  - Multiple modems for Fast collection of control variables
- Safe-state (FAILOPT) behaviors configurable on a per channel basis
- Output read-back and alarm on discrepancy
- Non-incendive output

### FAILOPT

Series C AO module supports the FAILOPT parameter on a per channel basis. The user can configure each channel to either HOLD LAST VALUE, or SHED to a SAFE VALUE. The Output will always go to zero, the safe state, if the IOM device electronics fails.

### Broken-wire Detection

This Series C IO function will be able to detect and annunciate broken field wire with a Channel Soft Failure indication.

### Detail Specifications – Analog Output with HART

| Parameter | Specification | | |
|---|---|---|---|
| Input / Output Model | CC-PAOH01 - High-Level Analog Output with HART | | |
| IOTA Models | CC-TAOX01 | Non-Redundant | 6” |
| | CC-TAOX11 | Redundant | 12” |
| Output Type | 4-20 mA | | |
| Output Channels | 16 | | |
| Output Ripple | < 100 mV peak-to-peak at power line frequency, across 250 Ω load | | |
| Output Temperature Drift | 0.005% of Full Scale/°C | | |
| Output Readback Accuracy | ±4% of Full Scale | | |
| Output Current Linearity | ± 0.05% of Full Scale nominal | | |
| Resolution | ± 0.05% of Full Scale | | |
| Calibrated Accuracy | ± 0.35% of Full Scale (25°C) including linearity | | |
| Directly Settable Output Current Range | 0 mA, 2.9 mA to 21.1 mA | | |
| Maximum Resistive Load<br>(24 V supply = 22 VDC through 28 VDC) | 800 ohms | | |
| Maximum Output Compliant Voltage<br>(24 V supply = 22 VDC through 28 VDC) | 16 V | | |
| Maximum Open Circuit Voltage | 22 V | | |
| Response Time<br>(DAC input code to output) | settles to within 1% of final value within 80 ms | | |
| Gap (0 mA) of Output to Field on Switchover | 10 ms maximum (applies to Redundancy only) | | |

## Digital Input 24VDC

### Function

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

### Notable Features

- Extensive internal diagnostics for data integrity
- Broken 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

### Broken-wire Bad PV Detection

This Series C IO function will be able to detect and annunciate broken field wire. In addition, a seemingly-valid PV from a channel diagnosed as having a broken-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 | 6” |
| | CC-TDIL11 | Redundant | 12” |
| Input Channels | 32 | | |
| Galvanic Isolation (any input terminal voltage referenced to common) | 30 VAC, ±42.4 VDC (max) | | |
| Isolation Technique | Optical (in IOM) | | |
| DI Power Voltage Range | 18 to 30 VDC | | |
| Input Signal Direction | Source | | |
| 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 Ωmax @ 15 VDC | | |
| Field Resistance for Guaranteed OFF Condition | 30 KΩmin @ 30 VDC | | |

## Digital Input High Voltage

### Function

The Digital Input High Voltage accepts 120VAC / 125VDC or 250VAC signals as discrete inputs. The same IOM but different IOTA is used for both the 120VAC / 125VDC and 250VAC models. This reduces the number of spares required to support Series C system maintenance.

### Notable Features

- Extensive internal diagnostics to ensure data integrity
- Optional redundancy
- Input direct/reverse
- Galvanic isolation

### High Voltage

Require high voltage inputs 90–264 VAC and 125 VDC. Inputs can travel over 500ft without triggering a false positive.

**Detail Specifications – Digital Input High Voltage**

| Parameter | Specification | | | | | |
|---|---|---|---|---|---|---|
| Input / Output Model | CC-PDIH01 – Digital Input High Voltage | | | | | |
| | 120 VAC IOTA | | | 240 VAC IOTA | | |
| IOTA Models | CC-TDI110 | Non Redundant | 9" | CC-TDI210 | Non Redundant | 9" |
| | CC-TDI120 | Redundant | 12" | CC-TDI220 | Redundant | 12" |
| Input Channels | 32 | | | 32 | | |
| Galvanic Isolation (field to logic common) | 1500 VAC RMS or ±1500 VDC | | | 1500 VAC RMS or ±1500 VDC | | |
| Isolation Technique | Optical | | | Optical | | |
| | 120 VAC | 125 VDC | | 240VAC | | |
| Digital Input Pwr. Range | 90-132 VAC RMS | 100-138 VDC | | 180-264 VAC RMS | | |
| Sense Current (ON condition) | 1.0 mA minimum | 1.2 mA minimum | | 1.11 mA minimum | | |
| Sense Current (OFF condition) | 0.32 mA maximum | 0.32 mA maximum | | 0.32 mA maximum | | |
| Pick Up Voltage (ON condition) | 90 VAC RMS minimum | 100 VDC minimum | | 180 VAC RMS minimum | | |
| Drop Out Voltage (OFF condition) | 25 VAC RMS maximum | 25 VDC minimum | | 50 VAC RMS maximum | | |
| Absolute Delay Across Input Filter and Isolation (Bounceless Input to logic level change) | 25 ms maximum | 25 ms maximum | | 25 ms maximum | | |
| Frequency Range | 47-63 Hz | NA | | 47-63 Hz | | |

## Digital Output - Bussed 24VDC

### Function

The Digital Output bussed 24VDC (DO24V) module provides reliable 24V digital output signals to control other process equipment as well as solenoid valves and interposing relays. The DO24V can support high energy outputs to reduce the number of external components in the output loop.

### Notable Features

- Extensive internal diagnostics to ensure data integrity
- Optional redundancy
- Direct/Reverse output support
- Safe-state (FAILOPT) behaviors
- “Fuse-less” short circuit protection
- Latched, pulsed* or pulse-width* modulated output (per channel)
- Galvanic isolation
- Output readback check

### 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 C power system. A wiring option on the IOTA determines if outputs are referenced to the Series C system power or an external field power source.

### Fuse-less Short Circuit Protection

This unique feature allows a short circuit to exist without blowing any fuses. When a particular channel is shorted, internal circuits detect this and remove power to the field connection. The channel remains de-energized until the short circuit is repaired.

### FAILOPT

Series C 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 - Bussed 24VDC DO

| Parameter | Specification | | |
|---|---|---|---|
| Input / Output Model | CC-PDOB01 - 24Volt Digital Output , Field Isolated, Bussed output | | |
| IOTA Model Numbers | CC-TDOB01 | Non Redundant | 6” |
| | CC-TDOB11 | Redundant | 12” |
| Output Channels | 32 | | |
| Output Type | Source | | |
| Load Voltage Range | 30 VDC | | |
| Load Current | 0.5 A (max) per point<br>1.0 A (max) per 2 points<br>5 A (max) per 32 points | | |
| Isolation | Galvanic Isolation (photo coupler)<br>120 VAC, ±42.4 VDC max. (see trace tag below)<br>(Any output voltage referenced to common) | | |
| On-State Voltage | 24 V (typ), load current @ 0.5A(3) | | |
| Off-State Voltage | 0v VDC (max) (3.3VDC (max) indicated under no-load condition) | | |
| Off-State Leak Current | 0.5 µA (max) | | |
| Turn-On/Turn-Off Time | 10 ms (max) | | |
| Gap (0 current) of Output to Field on Switchover | 150 µs maximum (applies to Redundancy only) | | |
| Output voltage will be the Source Voltage – 150mV maximum. | | | |

## Digital Output – Relay IOTA

### Function

The Digital Output Relay provides a dry contact for isolated low voltage / low current or high voltage / high current discrete output applications. Each relay supports a Form-A or Form-B output based on jumper configuration.

The Relay IOTA uses the Digital Output 24V (DO24V) IOM with a special IOTA to support the Relay IOTA. All characteristics of the DO24V IUOM are incorporated here.

### Notable Features

- Galvanic isolation
- Optional redundancy
- Isolated Dry Contact
- Counter EMF Snubbing Circuit
- All relays on one 12” IOTA
- Socketed relays
- Jumper selection between NO and NC contacts
- Cover for electrical shock and vibration protection.
- LED indication for each channel ON condition

**Detail Specifications - Relay DO IOTA**

| Parameter | Specification | | |
|---|---|---|---|
| Input / Output Model | CC-PDOB01 - 24Volt Field Isolated, Bussed output | | |
| IOTA Model Numbers | CC-TDOR01 | Non Redundant | 6" |
| | CC-TDOR11 | Redundant | 12" |
| | CC-SDOR01 | Relay Extension | 12" |
| Output Channels | 32 isolated Form A (SPST/NO) or Form B (SPST/NC) contacts (jumper selectable per output) | | |
| Contact Type | Gold-clad silver nickel | | |
| Maximum Load Voltage | 250 VAC (RMS)/125 VDC | | |
| Maximum Steady State Load Current per Output | Current →Voltage<br>3 A → 250 VAC (resistive)<br>3 A → 125 VAC (resistive)<br>3 A → 30 VDC (resistive)<br>1 A → 48 VDC (resistive)<br>0.2 A → 125 VDC (resistive)<br>2 A → 250 VAC (inductive = 0.4 power factor)<br>2 A → 125 VAC (inductive = 0.4 power factor)<br>1 A → 30 VAC (inductive L/R = 100 ms)<br>0.3 A → 48 VAC (inductive L/R = 100 ms)<br>0.1 A → 125 VAC (inductive L/R = 100 ms) | | |
| Minimum Load Voltage | 5 VDC (4) | | |
| Minimum Load Current | 10 mA (4) | | |
| Isolation | 1500 VAC RMS or ±1500 VDC<br>Channel-to-channel, and channel-to-logic common | | |
| Turn On Time | 20 ms maximum | | |
| Turn Off Time | 20 ms maximum | | |
| Contact Life | Operations → % of Max Load<br>10,000,0000 → (Mechanical Life)<br>200,000 @ 3 A (100%) | | |
| Surge Absorber for Coil | 120Ω + 0.03°F for each channel | | |
| The minimum 10 mA load current and 5 VDC load voltage specified are only valid if the contact has not been previously used in high current / high voltage applications. | | | |

## Low Level Analog (Temperature) Input - LLMUX

**Function**

This module supports up to 64 channels of temperature inputs. Low level inputs use the Honeywell PMIO LLMUX FTA. Each FTA supports 16 channels. An FTA can provide either TC or RTD inputs.

**Notable Features**

- TC and RTD operation
- Remote cold junction capability
- 1 Second PV scanning with OTD protection
- Configurable OTD protection (See below)
- Temperature points can be added in 16 point increments

**Temperature Support**

The Temperature Input LLMUX supports the existing solid state PMIO LLMUX FTA. The PMIO LLMUX FTA supports RTD and Thermocouple (TC) inputs. The Temperature variable is collected from all points at a 1 second rate. The 1 second update includes a configurable check for Open Thermocouple Detection (OTD) (see below) before propagation of the temperature variable. All TC inputs are compensated using a Cold Junction Compensation (CJT) device.

**Sampling and Open Sensor Detect**

The Temperature multiplexer supports RTD and Thermocouples with Open Sensor Detect before PV delivered if so configured. With the OTD configuration active, the PV is sampled and held while an OTD cycle is performed within the same measurement window. If the OTD is negative, the PV is propagated up through the system. If the OTD is positive, the PV is set to NAN and the input channel soft failure is set. In this way, no inappropriate control action occurs for PV values that are invalid due to an open thermocouple. PV sampling/reporting incurs no added delays from OTD processing.

**Detailed Specs – Low Level Input Multiplexer**

| Parameter | | Specification |
|---|---|---|
| Input / Output Model | | CC PAIM01 |
| PMIO FTA Models (5) | | MU-TAMR04, TAMT04, TAMT14 |
| Input Type | | Thermocouple and / or RTD |
| Input channels | | 64 fully-isolated channel-to-channel, channel-to-PM, and channel-to-power supply common in 16 channel increments. |
| Input scan rate | | 1 Second fixed by IOM (up to 64 channels/sec max.) |
| Channel bandwidth | | 0 to 4.7 Hz (-3 dB) |
| Nominal input range (TC only) | | -20 to +100 millivolts |
| Maximum normal mode continuous input non-damaging (any thermocouple type configured) | | -10 to +10 volts (TC)<br>-1 to +2 Volts @ 100 milliamps (RTD) |
| Gain error (-20 to +100 millivolt range) | | 0.050% full scale max |
| Temperature stability | | |
| | TC, Millivolt inputs | +/-20 ppm per deg C max |
| | RTD inputs | +/-20 ppm per deg C max |
| Long term drift | | 500 ppm |
| Input impedance | | 1 megohm at dc (TC only) |
| CMV with respect to Power System common, dc to 60 Hz | | +/-250 VDC or VAC RMS |
| CMRR, 50 or 60 Hz (with 1000 ohms source impedance max.) | | 120 dB min |

| Parameter | | | Specification |
|---|---|---|---|
| Voltage, channel-to-channel, dc to 60 Hz | | | +/-250 VDC or VAC RMS |
| Crosstalk, dc to 60 Hz | | | 80 dB (120 dB at 50 and 60 Hz) |
| NMRR at 50/ 60 Hz | | | 60 dB min |
| Line frequency integration | | | Fixed selection of 50 Hz or 60 Hz |
| RTD sensor excitation current | | | 1 milliamp |
| Cold junction compensation range | | | -20 to +60 deg C (+/-0.5 deg C typical) |
| TC Linearization Accuracy (6) | | | □0.05□C |
| Open Thermocouple Detection | | | Each conversion qualified, ≤ 1000□ = guaranteed no-trip<br>≥ 1500□ guaranteed trip. |
| RTD Max Lead Resistance | | | 15□ |
| Surge protection (sensor terminals) | | | EN 61000-4-5 (for Industrial locations, 1kV line to line, 2kV line to gnd.) |
| Surge protection (power/serial link with cable adapter option) | | | EN 61000-4-5 (for Industrial locations, 1kV line to line, 2kV line to gnd.) |
| Maximum cable distance IOTA to FTA using cable adapter | | | 1000 feet 16 gauge wire, two twisted pair per FTA |
| Supported types (RTD) | | | |
| | Pt: 100 ohm DIN 4376 | | -180 to +800 deg C |
| | Pt: 100 ohm JIS C-1604 | | -180 to +650 deg C |
| | Ni: 120 ohm ED #7 | | -45 to +315 deg C |
| | Cu: 10 ohm SEER | | -20 to +250 deg C |
| Supported thermocouple types | | | |
| | | ANSI specification J | -200 to +1200 deg C |
| | | ANSI specification K | -100 to +1370 deg C |
| | | ANSI specification E | -200 to +1000 deg C |
| | | ANSI specification T | -230 to +400 deg C |
| | | ANSI specification B | +100 to +1820 deg C |
| | | ANSI specification S | 0 to +1700 deg C |
| | | ANSI specification R | 0 to +1700 deg C |
| | | JAPAN TYPE R’ | 0 to +1770 deg C |
| Supported millivolt types | | | 20 to +100 millivolts |
| FTA dimensions (5) | | | 2.5 D x 4.9 W x 12.1 L (inches)<br>63.5 D x 124.46 W x 307.34 L (millimeters) |

Note : FTAs are PMIO FTAs. These must be installed in FTA channels. These are similar to but not identical to Series C channels. The TPC will support this configuration.

Note: Linearization polynomials are 4th order and based on NIST Monograph 175, ITS90 and JIS C-1602-1995.

**For More Information**

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EP03-490-300
July 2006