3.2 Series C I/O and C300 topology

Attention

Topology for the Series C I/O and C300 - 20mS CEE Controller is similar to the Series C I/O and C300 - 50ms Controller, with the exception that the C300 - 20mS CEE Controller does not support the PMI/Os.

Series C I/O is attached to an IOLINK that is being mastered by a C300 controller. It is important to note that:

- IOLINK - Serves as data repository for IOM function blocks in Control Builder to provide communications interface with Series C I/O.
- Series C I/O cannot reside on an IOLINK mastered by an IOLIM or xPM.

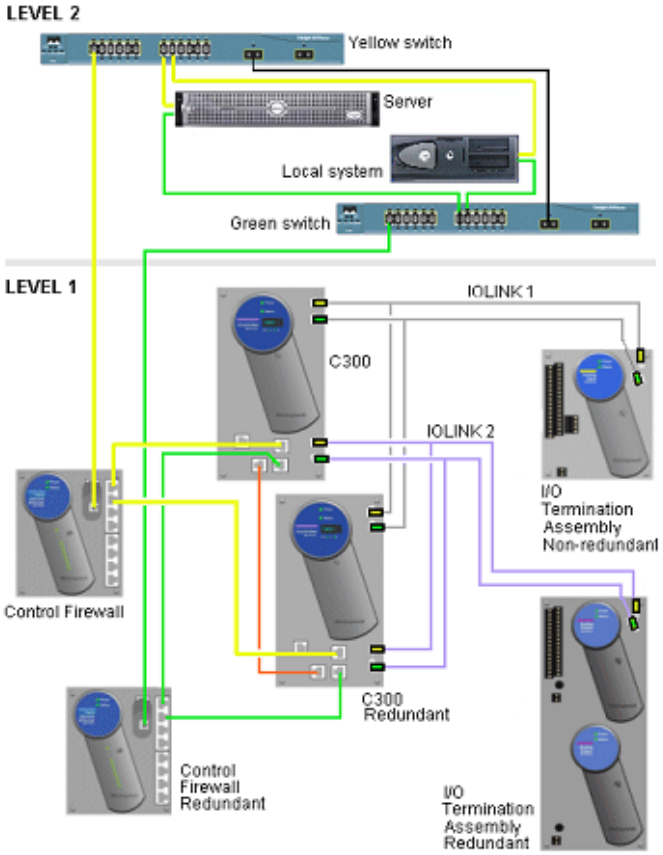


Figure 5: Series C I/O and C300 topology

3.2.1 Examining the topology rules

The following are the topology rules relating to the Series CI/O environment.

Refer to the following document for graphical representations of cabinet layouts depicting Series C, PMIO, FIM, and LLMUX hardware configurations. Control Hardware Planning Guide

Table 5: Topology rules

Item	Impact	Description
Redundancy	None	Redundancy capacity and performance is displayed while redundancy is present.

Item	Impact	Description
Switchover	Same as PM I/O	Series C I/O hardware and/or software can switchover, recover, and resume full view in a timeframe no greater than PM I/O.
Initialization	All Series C I/O per C300	Can be initialized in 60 seconds (+/- 25%) after cabinet-level loss power loss.
	1 I/O module	Can be initialized in 10 seconds (+/- 25%) after IOM level loss power loss.
Multiple I/O Links	2	Design allows the use of multiple Series C I/O Links in the same cabinet.
I/O Link performance	None	I/O Link networks perform at the current distance and IOP count specifications.
I/O Link capacity	40 max	Maximum of 40 redundant IOMs per link (for either Series C I/O or PM I/O).
IOMs / C300	64 max	Maximum of 64 redundant IOMs per C300 (for PM I/O).
	80 max	Maximum of 80 redundant IOMs per C300 (for Series C I/O).
Series C and PM I/O - combined	64	Design supports Series C and PM I/O FTAs in the same side of the cabinet. Current configuration prevents IOTA and FTAs in the same column.

3.3 Supported Series C I/O modules

The list of I/O modules below can be used on a Series C IOLINK. The IOLINK contains a function that enables programming and reprogramming the executable image (rather than substitution of a removable hardware component). The preferred method of delivery of the image is over the IOLINK.

Tip

Series C IOLINK cannot contain any PM I/O IOPs.

C300 IOLINK block parameter IOLINKTYPE is used to determine if the IOLINK supports either Series C I/O or PM I/O.

Table 6: Available I/O modules

IOM model names	IOM block name	Description	# of chnls	Similar to PMIO type	IOP model names
CU-PAIH01 CC-PAIH01	AI-HART	High Level Analog Input with HART (supports differential inputs on only channel 13 through channel 16) Refer to Attention	16	HLAIHART	
CC-PAIH02	AI-HART	High Level Analog Input with HART ((supports differential inputs on all 16 channel)	16	HLAIHART	
CC-PAIX02	AI-HART	High Level Analog Input with Differential/Single-ended non-HART (supports differential inputs on all 16 channels)	16	HLAI	
CC-PAIX01	AI-HL	High Level Analog Input with Differential non-HART (supports differential inputs on only channel 13 through channel 16) Refer to Attention	16	HLAI	
CU-PAIN01 CC-PAIN01	AI-HL	High Level Analog Input with non-HART	16	HLAI	
CC-PAIH51	AI-HART	1 Modem, High Level Analog Input with HART	16	HLAIHART	
CU-PAON01 CC-PAON01	AO	Analog Output with non-HART	16	AO16	
CU-PAOX01 CC-PAOX01	AO	Analog Output with non-HART Refer to Attention	16	AO16	
CU-PAIM01 CC-PAIM01	AI-LLMUX[1]	Low Level Analog Input Mux	64	LLMUX	
CC-PAIM51	AI-LLAI	Low Level Analog Input Mux	16	LLAI	

IOM model names	IOM block name	Description	# of chnls	Similar to PMIO type	IOP model names
CU-PAOH01 CC-PAOH01	AO-HART	Analog Output with HART	16	AO16HART	
CC-PAOH51	AO-HART	1 Modem, Analog Output with HART	16	AO16HART	
CU-PDIH01 CC-PDIH01	DI-HV	High Voltage Digital Input (IOM supports both 120 and 240 volts AC)	32	DI	
CU-PDIL01 CC-PDIL01	DI-24	Low Voltage Digital Input (24 volts DC)	32	DI or DI24V	
CC-PDIL51	DI-24	Low Voltage, Digital Input (24 volts DC)	32	DI	
CU-PDIS01 CC-PDIS01	DI-SOE	Low Voltage Digital Input (24 volts DC)	32	DISOE	Mx-PDIS12
CU-PDOB01 CC-PDOB01	DO-24B[2]	Bussed Low Voltage Digital Output (24 volts DC)	32	DO_32	
CC-PDOD51	DO-24B	Bussed Low Voltage, Digital Output (24 volts DC)	32	DO32	
CU-PSOE01 CC-PSOE01	DI-SOE	Low Voltage Digital Input SOE (24 volts DC)	32	DISOE	
CC-PSP401	SP	Speed Protection	26		
CC-PSV201	SVP	Servo Valve Positioner	8		
CC-PPIX01	PIM	Pulse Input Module	8	PI IOP	
CC-PUIO01	UIO	Universal Input/Output Module	32		
CC-PUIO31	UIO	Universal Input/Output Module	32		
Series C Mark II IOM					
CC-PAIH01	AI-HART	High Level Analog Input with HART	16		
CC-PAOH01	AO-HART	Analog Output with HART	16		
DC-PDIL51	DI-24V	Digital Input (24 volt DC) without Open Wire Detection	32		
DC-PDIS51	DI-SOE	Low-Voltage Digital Input SOE-Low Resolution (24 volts DC) without Open Wire Detection	32		
DC-PDOD51	DO-24B	Bussed Low Voltage Digital Output (24 volts DC) without Open Wire Detection	32		
CC-PAIH51	AI-HART	1 Modem, High Level Analog Input with HART	16	HLAIHART	
CC-PAOH51	AO-HART	1 Modem, Analog Output with HART	16	AO16HART	
CC-PAIN01	AI-HL	High Level Analog Input with non-HART	16	HLAI	
CC-PAON01	AO	Analog Output with non-HART	16	AO16	

Following Series C IO modules introduced in Experion PKS R410.

HART Analog Input	CC -PAIH51
HART Analog Output	CC-PAOH51
Digital Input 24V DC	CC-PDIL51
Digital Output 24V DC	CC-PDOD51

These modules must be used only with Experion PKS R410 and later. These modules will not work as expected with earlier releases of Experion PKS. Using these with Experion releases prior to R410 by downgrading the firmware may render the module faulty and may not be possible to recover.

NOTES:

1. There are two models of High Level Analog Input such as, CU-PAIX01 and CU-PAIN01. The Module Hardware and the corresponding IOTAs are different and CU-PAIN01 is a new model. From the perspective of configuration and implementation, both High Level Analog Input models use the same IOM Block such as, AI-HL. It must be noted that the two models utilize the same configuration; online migration is not possible as mixed redundant pair is not possible. There are two models of Analog Output such as, CU-PAOX01 and CU-PAON01. Hence, similarly configuration, implementation, and interoperability constraints apply and CU-PAON01 is the new model.
2. Two new models of AI-HART (CC-PAIH02) and AI-HL (CC-PAIX02) modules are introduced to replace the older models of the AI-HART (CC-PAIH01) and AI-HL (CC-PAIX01) modules. The new models support both single-ended and differential inputs.
3. With R410, a new model of HART Analog Input CC-PAIH51 is introduced. The HART Analog Input CC-PAIH51 and Cx-PAIH01 use the same IOM block, that is, AI-HART. The configuration and implementation mentioned in note 1 applies to the HART Analog Input module.
4. With R410, a new model of HART Analog Output CC-PAOH51 is introduced. The HART Analog Output CC-PAOH51 and Cx-PAOH01 use the same IOM block, that is., AO-HART. The configuration and implementation mentioned in note 1 applies to the HART Analog Output module.
5. With R410, a new model of Digital Input 24V DC CC-PDIL51 is introduced. The Digital Input 24V DC CC-PDIL51 and Cx-PDIL01 use the same IOM block, that is, DI-24. The configuration and implementation mentioned in note 1 applies to the Digital Input 24V module.
6. With R410, a new model of Digital Output 24V DC CC-PDOD51 is introduced. The Digital Output 24V DC CC-PDOD51 and Cx-PDOB01 use the same IOM block, that is, DO-24B. . The configuration and implementation mentioned in note 1 applies to the Digital Output 24V module.
7. Starting with R430, a new model of Low Level Analog Input Mux CC-PAIM51 is introduced.
8. The UIO (CC-PUIO01) has 32 configurable input or output channels. Each channel can be configured as one of the following:
   - Analog Input (0-20mA or 4-20mA active)
   - Analog Output (4-20mA active)
   - Digital Input (with or without line monitoring)
   - Digital Output (with or without line monitoring)
9. The UIO (CC-PUIO31) module is introduced with R432 and has 32 configurable input or output channels that are identical to the UIO (CC-PUIO01) module.

3.3.1 Compatibility matrix between AI modules and differential AI modules

You can choose the AI modules based on your functionality requirements. The following table lists the functionalities and the respective AI modules.

If you want…	Then you must select…
AI HART/GIIS functionality	CC-PAIH02 module

If you want…	Then you must select…
Non-HART and Non-GIIS standard 2 wire transmitter (4-20mA input)	CC-PAIN01 module
Non-HART and Non-GIIS (1-5V input)	PAIX02 module

The following table lists the compatibility matrix between AI modules and differential AI modules for redundant and non-redundant configuration.

IOM	Redundant IOTA	Non-Redundant IOTA	AI			HART	No. of differential inputs
			4-20ma	1-5V	0-5V		
CC-PAIN01	CC-TAIN11	CC-TAIN01	X				None
CC-PAIH02	CC-TAIX11	CC-TAIX01	X	X	X	X	Channels 13 through 16
CC-PAIH02	CC-TAID11	CC-TAID01	X	X	X	X	Channels 1 through 16 (1)
CC-PAIX02	CC-TAIX11	CC-TAIX01	X	X	X		Channels 13 through 16
CC-PAIX02	CC-TAID11	CC-TAID01	X	X	X		Channels 1 through 16
CC-PAIH51	CC-TAIX61	CC-TAIX51		X			None

IOM	Redundant IOTA	Non-Redundant IOTA	IS	No. of differential inputs
CC-PAIH02	CC-GAIX11	CC-GAIX21	X	Not applicable
CC-PAIX02	CC-GAIX11	CC-GAIX21	X	Not applicable

Attention

The following module types are superseded by a new version of the module.

- CC-PAIH01 superseded by CC-PAIH02
- CC-PAIX01 superseded by CC-PAIX02
- CC-PAOX01 superseded by CC-PAON01

3.3.2 Compatibility matrix between AO modules and differential AO modules

The following table lists the compatibility matrix between AO modules and differential AO modules for redundant and non-redundant configuration.

IOM	Redundant IOTA	Non-Redundant IOTA	AO 4-20mA	HART	IS
CC-PAOH01	CC-TAOX11	CC-TAOX01	X	X	
CC-PAOH01	CC-GAOX11	CC-GAOX21	X	X	X
CC-PAOX01	CC-TAOX11	CC-TAOX01	X		
CC-PAOX01	CC-GAOX11	CC-GAOX21	X		X
CC-PAON01	CC-TAON11	CC-TAON01	X		

3.3.3 Difference between AI-HART modules Cx-PAIH01 and Cx-PAIH51

AI-HART module Cx-PAIH01	AI-HART module Cx-PAIH51
Supports Open Wire detection.	Does not support Open Wire detection.
Supports 64-HART Communication units.	Supports 16- HART Communication units.
Supports the following sensor types. • 1-5 V • 0-5V • 0.4-2V	Supports only 1-5 V sensor type.
Supports the following input types. • Voltage • Current (2-wire or self-powered transmitters)	Supports only current (2-wire or self-powered transmitters) input type.
Supports 16 input channels (single ended or differential).	Supports all single-ended input channels.
Supports the following input range. • 0 to 5V • 1 to 5V • 0.4 to 2V • 4-20 mA (through 250 Ω)	Supports only 4-20 mA (through 200 Ω) inputs.
Supports all HART scan rates.	Supports all HART scan rates except 1 Sec Dynamic, 1 Sec Device, 2 Sec Device and Dynamic.
Supports differential voltage inputs.	Does not support differential voltage inputs.
Supports field calibration	Field calibration is not required.

3.3.4 Difference between AO-HART modules Cx-PAOH01 and Cx-PAOH51

AO-HART module Cx-PAOH01	AO-HART module Cx-PAOH51
Supports 64-HART Communication units.	Supports 16- HART Communication units.
Supports all HART scan rates.	Supports all HART scan rates except 1 Sec Dynamic, 1 Sec Device, 2 Sec Device and Dynamic.
Supports field calibration.	Field calibration is not required.
Supports OUTPUT READBACK.	Does not support OUTPUT READBACK.

3.3.5 Difference between bussed low voltage Digital Input modules Cx-PDIL01 and Cx-PDIL51

Digital Input module Cx-PDIL01	Digital Input module Cx-PDIL51
Supports Open Wire detection.	Does not support Open Wire detection.

3.3.6 Difference between low voltage Digital Output modules Cx-PDOB01 and Cx-PDOD51

Digital Output module Cx-PDOB01	Digital Output module Cx-PDOD51
Does not support Power fail diagnostics.	Supports Power fail diagnostics at module level to diagnose the output driver power failure (fuse/4 pin terminal block failure). When the failure is detected, OPFAIL soft fail is displayed on all the channels to take care of back initialization in upstream block. The following module level soft failure is displayed. 'Field Power Failure' Check the fuse or power supply status of the 4 pin terminal block when the error message is displayed.
Supports source output type.	Supports sink (open drain) output type.
Supports load current as 500mA.	Supports load current as 100mA.

3.3.7 Difference between AI-LLMUX and CC-PAIL51 modules Cx-PAIM01 and Cx-PAIM51

AI-LLMUX module Cx-PAIM01	AI-LLAI module Cx-PAIM51
Supports 64 input channels.	Supports 16 input channels.
Supports the following RTD types. • Pt: 100 ohm DIN 4376 • Pt: 100 ohm JIS C-1604 • Ni: 120 ohm ED #7 • Cu: 10 ohm SEER	Supports a new RTD type, CU50Rtd, in addition to the RTD types supported by the AI-LLMUX.
Supports field calibration	Field calibration is not required.
Supports remote cold junction capability.	Does not support remote cold junction.
Requires an external HPM FTA to connect the field inputs to IOTA.	Field inputs can be directly connected to the IOTA.
Supports cold junction compensation range, –20 to +60 degree Celsius.	Supports cold junction compensation range, –40 to +70 degree Celsius.
Supports the operating temperature between 0 to +60 degree Celsius.	Supports the operating temperature between –40 to +70 degree Celsius.

3.3.8 Identifying supported Series C I/O modules

The Series C I/O model designations follow a 'XX-YZZZNN' format.

Where:

- XX is CC or DC
- CC is for the Series C Product Line.

  The model number for every Series C product begins with a C designation for Series C.
- DC is for the Series C Mark II.
- Y is either C, E, F, G, H, K, M, P, PW, S or T
  - C = Control Processor
  - E = Enclosure
  - F = FTE
  - G = GI/IS Termination Assembly

  - H = Hazardous Interface
  - K = Cabling
  - M = Mechanical
  - P = I/O Module
  - PW = Power
  - S = Custom Interface
  - T = Termination Assembly
- ZZZ is a particular function or model.
- NN is a series of model and can be used as additional model information -

  NN +10 = Redundant complement to an IOTA.

Tip
Series C Mark II may not support all the above options.

3.3.9 Considerations for replacing or pairing Series C Analog I/O modules in a redundant configuration

In a redundant series C analog I/O module configuration, consider and complete the following before you replace or pair the modules.

Release	Hardware revisions of old modules	Hardware revisions of new modules	Considerations and actions for replacing or pairing modules
R301	• <=K for AI_HART and AI_HL • <=H for AO and AO_HART	• >=M for AI_HART and AI_HL • >=J for AO and AO_HART	You cannot pair an older hardware revision module with a latest hardware revision module. Replace your older module with a latest module.
R310 or later	• <=K for AI_HART and AI_HL • <=H for AO and AO_HART	• >=M for AI_HART and AI_HL • >=J for AO and AO_HART	You can pair an older hardware revision module with a latest hardware revision module. However, complete the following after you replace one of the older modules: 1. Migrate to the latest patch applicable for the release. 2. Migrate the applicable controllers 3. Update the firmware of the older hardware revision module. 4. Verify that the firmware versions of both the modules are indicated as “Green” in CTools.

Model number references for the affected Series C Analog I/O modules

Module model number	Module type	Hardware revisions of old modules	Hardware revisions of new modules
CC- PAIH01/02	AI_HART	<=K	>=M
CC- PAIX01/02	AI_HL	<=K	>=M
CC- PAOH01	AO_HART	<=H	>=J
CC- PAOX01	AO	<=H	>=J

3.4 Supported Series C I/O options

The following Series C I/O options are supported:

- I/O redundancy
- Power supply redundancy
- HART communications
- Galvanically Isolated/Intrinsically Safe IOTAs
- Remote I/O (using Fiber Optic I/O Extender)
- Corrosion Protection
- Harsh environment

3.4.1 Inspecting the I/O library

Series C module function blocks and I/O channel blocks are housed in the Series C I/O library of Control Builder.

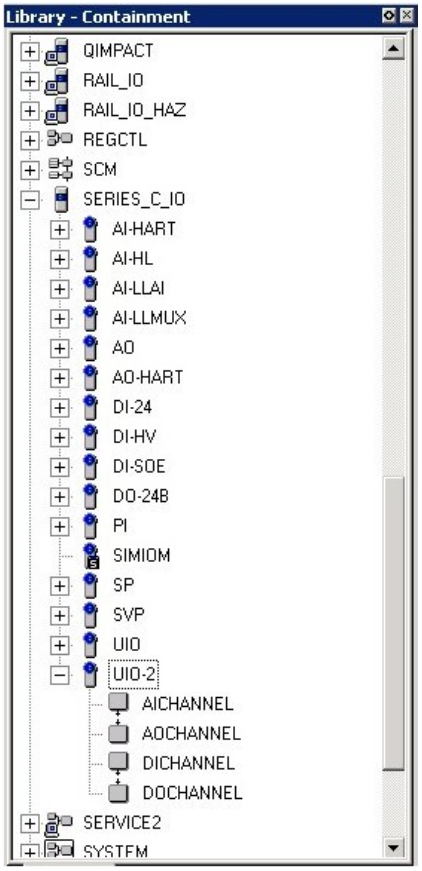


Figure 6: Series C I/O library

3.4.2 Inspecting IOM function blocks

All IOM function blocks are associated with (children of) an IOLINK function block.

The Series C I/O IOM function blocks are the following:

- AI-HART

- AI-HL
- AI-LLMUX
- AI-LLAI
- AO
- AO-HART
- DI-24
- DI-HV
- DISOE
- DO-24B
- SP
- SVP
- PI
- UIO
- UIO-2

3.4.3 Inspecting channel function blocks

The Series C I/O Channel function blocks are the following:

Table 7: Series C I/O channel function blocks

Channel block name	Associated with IOM blocks
AICHANNEL	• AI-HART • AI-HL • AI-LLMUX[1] • AI-LLAI • UIO • UIO-2
AOCHANNEL	• AO • AO-HART • UIO • UIO-2
DICHANNEL	• DI-HV • DI-24 • DI-SOE • UIO • UIO-2
DOCHANNEL	• DO-24B[2] • UIO • UIO-2
SP_AI SP_AO SP_DI SP_DO SP_SPDVOTE SP_SPEED	• SP

Channel block name	Associated with IOM blocks
SVP_AI SVP_AO SVP_REGCTL SVP_DI	• SVP
PICHANNEL	• PI

3.4.4 Defining module containment

An individual channel within a Series C I/O block is often abbreviated as an IOC block. While an IOC block must be 'contained in' a Control Module (CM) in Control Builder, the IOC block actually resides within the associated IOM device. This means you change the execution state (EXECSTATE) of a CM independent of the IOC's point execution state (PTEXECST).

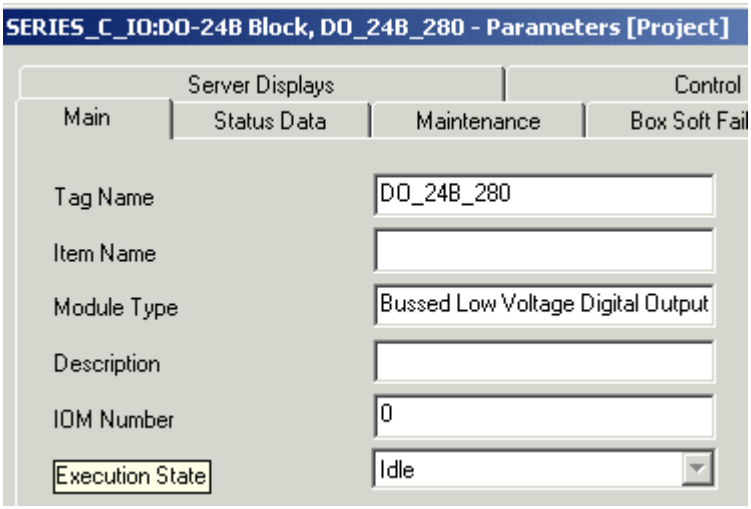


Figure 7: Execution State

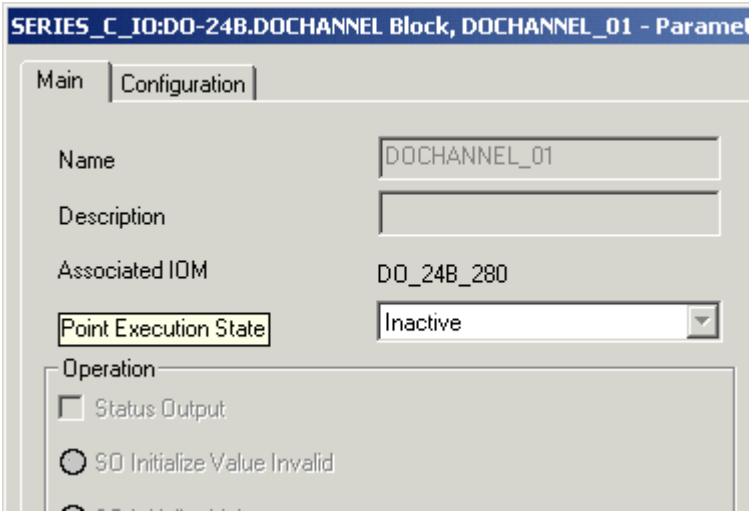


Figure 8: Point Execution State

3.4.5 Temperature Derating for UIO

The maximum outside module temperature must be limited depending on the internal dissipation.

Attention

- Airflow through the module is assumed to be natural convection.
- Ensure that the UIO modules are installed in the correct position. A UIO module must be mounted in the upright position.

To determine the maximum acceptable outside module temperature for a typical configuration, perform the following steps.

1. Perform the **Internal Dissipation Calculation for UIO**.
   a. Determine and record the actual configuration data.
   b. Calculate the totals per dissipation contributor.
   c. Add the totals of the previous step to determine the internal dissipation.
2. Using the **Temperature Derating Curves for UIO**, determine the maximum acceptable outside module temperature.

3.4.6 Internal dissipation calculation for UIO

To calculate the maximum outside module temperature, you require the IO configuration. The maximum dissipation caused by the kernel logic of the UIO module is a fixed value. The other dissipation contributions depend on the channel configuration.

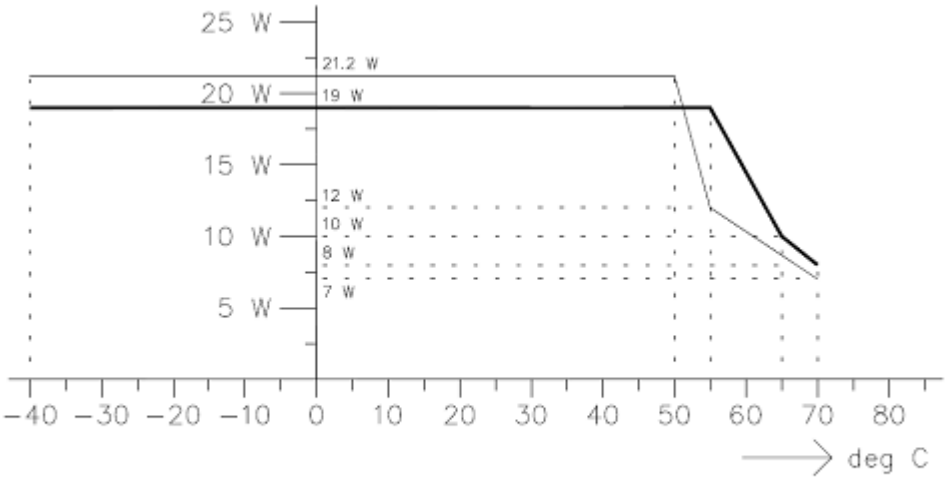
Table 8: Dissipation Calculation

Dissipation contributor	Max. dissipation per channel (W)	Number of configured channels	Dissipation (W)
Kernel logic			5.5
DI w/ OWD; field impedance ≥ 5 kΩ	0.01		
DI; closed contact; 3.5mA	0.085		
AI; I < 24mA; Current limited by field	0.05		
AI; I > 24mA; Current limited by UIO *	0.49		
DO; I < 0.3A	0.115		
DO; I < 0.5A	0.305		
AO; 500 Ω field impedance; I < 23mA	0.225		
AO; 250 Ω field impedance; I < 23 mA	0.335		
AO; field impedance < 250 Ω; I < 23 mA	0.47		
AO; field impedance < 250 Ω; I < 20 mA	0.42		
Total Power Dissipation (W)			
Max. outside module temperature °C			

* Analog input current above 24mA must be avoided. Field devices for the analog input must be configured to drive current below 24mA. For example, 3.5mA, for sensor fault conditions to minimize the UIO internal power dissipation. The thin-line derating curve needs to be taken when you are using current above 24mA.

3.4.7 Temperature Derating curves for UIO

The following graph displays the maximum outside module temperature versus the internal power dissipation.



Thick line: applicable for most applications having AO<=20mA and AI<=24mA

Thin line: applicable if one or more channels have AO>20mA or AI>24mA

3.4.8 Maximum Temperature Alarm for UIO-2

The alarm threshold safe operating temperature is determined based on the I/O channel configuration of the module and the anticipated module inlet air temperature.

Attention

- Airflow through the module is assumed to be natural convection.
- Ensure that the UIO modules are installed in the correct position. A UIO module must be mounted in the upright position.

To determine the maximum acceptable outside module temperature for a typical configuration, perform the following steps:

1. Perform the **High Temperature Limit Calculation for UIO-2**.
   a. Determine and record the actual configuration data and the **Estimated Ambient** inlet air temperature.
   b. Calculate the totals per dissipation contributor. For each channel type, multiply the total number of configured channels by the corresponding **Maximum Temperature Rise per channel** value.
   c. Add the totals of the previous step to the **Estimated Ambient** temperature to determine the **High Temperature Limit Setting**. This limit value should not exceed 120 °C.
2. Enter the limit value into UIO-2 module configuration screen in Experion Control Builder.

3.4.9 High Temperature Limit Calculation for UIO-2

Table 9: Dissipation Calculation

Estimated Ambient [°C]		**50**		
Dissipation Contributor		**Temperature Rise per channel [°C]**	**Number of channels (Total not to exceed 32)**	**Channel Contribution to Temperature Rise [°C]**
DI	Closed contact	0.91	0	0.00
DO	<500 mA	1.06	0	0.00
AI	<20 mA	1.42	0	0.00
AO	<22 mA, 220 ohms	1.56	0	0.00
Total Number of Configured Channels			0	
High Temperature Limit Setting [°C]				50

3.5 I/O Link performance specifications

The concept of a Link Unit (LU) was introduced with PM I/O where a LU was defined as being roughly equivalent to one parameter read (or write) per second.

With the introduction of Series C I/O, the transmission rate of data on an IOLINK configured with Series C I/O is now double that of PM I/O.

Attention
The Specification and Technical information is subject to change without notice and is superseded by information in applicable Experion product Specification and Technical data documents. Hence, for each Experion release, you are recommended to refer the applicable Specification and Technical data documents.

Table 10: Transmission rate of data on an I/O Link

I/O type	Link rate per second	Link Units per second
PM I/O	1 parameter read or write	1000
Series C I/O	1 parameter read or write	2000

Note: Refer to *Turbine Control User's Guide* for I/O link performance specification of the SPM and SVPM.

3.5.1 Reviewing Link Unit utilization

The Link Unit utilization cycle rate varies depending on the type of block being used. The following table defines the specifications for the various blocks.

Table 11: Link Unit utilization rates

Block names	Data processing	Link Units per cycle time	Cycle time
Every primary IOM	Event Collection	1	500 ms
Every secondary IOM	Event Collection	1	500 ms
DI-xxx IOM blocks	PV Scanning	1.75	IOM block's SCANRATE
DO-xxx IOM blocks	BACKCALC Scanning	1.25	IOM block's SCANRATE
AI-xxx IOM blocks	PV Scanning	5	IOM block's SCANRATE
AO-xxx IOM blocks	BACKCALC Scanning	5	IOM block's SCANRATE
AOCHANNEL	OP Store	1	OP connector's CM Execution Rate
status output for DOCHANNEL	SO Store	1	SO connector's CM Execution Rate
Pulse width modulation for DOCHANNEL	BACKCALC Scanning	1	IOM block's SCANRATE
Pulse width modulation for DOCHANNEL	OP Store	1	OP connector's CM Execution Rate

3.5.2 Reducing I/O Link traffic

If I/O Link overruns persist, you reduce the I/O Link traffic by:

- Increasing the value of the IOM's Scanning Rate parameter [SCANRATE]
  (i.e. increasing the time interval between IOM scans)

- Increase the Execution Period of Control Modules containing Output Channel blocks
- Reducing the number of IOMs configured
- Split the IOMs across multiple IOLINKS
- Check for presence of an address 'Chattering ' alarm events

Tip
Link IDs are only detected on their corresponding modules.

- Modules with Link ID 1 cannot detect Link ID 2.
- Modules with Link ID 2 cannot detect Link ID 1.

3.5.3 Event collection

Under normal conditions, every IOM configured on the I/O Link, whether primary or secondary, uses Link Units for event collection. This activity is periodic and can be accounted for, however; conditions in which numerous events and alarms are generated are unpredictable and may cause transient I/O Link overruns and delays in display updates. These transient overruns clear once the rush of events and alarms are collected.

3.5.4 PV and Back calculation scanning

The following I/O parameters are automatically scanned by the C300 as soon as the IOM block is loaded.

Table 12: I/O parameters scanned when the IOM is loaded

IOM block	Scanned parameters
AI-xxx	PV, PVSTS
AO-xxx	OP, INITREQ
DI-xxx	PVFL, BADPVFL
DO-xxx	SO, INITREQ, OP

The number of AI and DI channel blocks contained within CMs or SCMs:

- does not increase LU consumption.

The DO channel blocks contained in CMs and SCMs:

- does also not increase LU consumption for Back Calculation scanning, but LU consumption increases for each OP or SO store.

3.6 Universal Input/Output Module-2 (UIO-2)

Beginning with R432, a new Series C Universal Input/Output (UIO) module, the UIO-2, has been introduced. The UIO-2 not only supports all features and benefits offered by UIO, it also provides a few enhancements over the UIO. There are a few differences compared to the UIO too.

The UIO-2, driven by hardware miniaturization has resulted in a new design with reduced overall IOM and IOTA dimensions. Available in both redundant and non-redundant versions, the UIO-2 has a reduced footprint in the cabinet and increased density of IO point count per cabinet.

As the physical dimensions of the IOM and its IOTA are entirely different from the existing UIO, the UIO-2 is not a replacement for the UIO. The following sections provide a list of features of the UIO-2 and a list of significant differences between UIO-2 and UIO.

3.6.1 New and enhanced features of UIO-2

The UIO-2, in addition to providing all features provided by UIO, provides the following enhanced features beginning with R432:

- Is a single board module with physical dimension: 8.5 mm x 14.5 mm x 16 mm (5.5 mm dia) [4 x 4.5 dia x 14 width x 17 height]
- Dimensions of the redundant and non-redundant IOTAs are 12” and 9”, respectively
- Provides one HART modem per I/O channel
- Supports pulse counting on up to four of any of the 32 channels that are configured as DI
- Supports DO ganging within the following eight channel number groups: 1 - 4, 5 - 8, 9 - 12, 13 - 16, 17 - 20, 21 - 24, 25 - 28, and 29 – 32. However, ganging across these groups is NOT possible.

Beginning with Experion R500.1, the following additional enhancements have been provided :

- Supports Sequence Of Events (SOE) functionality for digital input signals on all 32 channels
- Supports 24 V NAMUR type input signals with current (Amps) levels in accordance with IEC 60947-5-6:1999 specifications.

3.6.2 UIO-2 and UIO-1 compared

The following table describes the differences between UIO-2 and UIO-1.

Table 13: UIO-2 and UIO-1 comparison

Feature	UIO-2	UIO-1
Board	Single board module	Three board module
IOTA dimensions	Redundant – 12” Non-redundant – 9”	Redundant – 18” Non-redundant – 12”
HART modem count	One HART modem per channel	Only two HART modems: one modem dedicated to channels 1-16 and a second modem dedicated to channels 17-32.
Pulse counting	Supported on a maximum of 4 channels where each channel can be any of the 32 channels configured as DI. Input pulse frequency less than or equal to 15 KHz is supported.	Up to 4 channels, within channels 15 to 18 only, are supported for pulse counting. Input pulse frequency of 10 KHz is supported.

Feature	UIO-2	UIO-1
DO ganging	Supported for 2, 3, or 4 channels within the following eight channel number groups: 1 - 4, 5 - 8, 9 - 12, 13 - 16, 17 - 20, 21 - 24, 25 - 28, and 29 – 32. However, ganging across these groups is NOT possible.	Supported for 2, 3,or 4 channels within any 4 channels. However, channels 32 and 1 cannot be ganged.
SOE	Supported on all 32 DI channels	Not supported.
NAMUR input signals	Supported on all DI channels receiving 24 V NAMUR type input signals with current (Amps) levels in accordance with IEC 60947-5-6:1999 specifications. The DI channel can be configured to detect and report Open Wire and Short Circuit conditions. The following states are supported: • Open Wire • ON • OFF • Short Circuit **Note** DI channels enabled for SOE cannot be configured to support NAMUR signal inputs.	Not supported.