

# Vertiv™ PowerNexus



## Interface Connection Guidance Manual

### Introduction

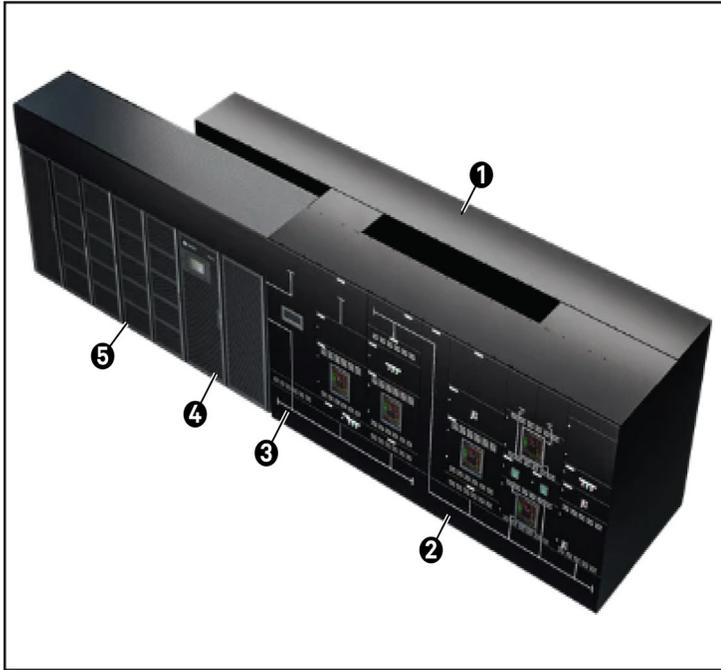
This interface connection guidance manual is designed to assist in the safe handling and installation of the Vertiv™ Switchgear input/output (I/O) box and Vertiv™ Liebert® Trinerger™ UPS system. These instructions are in addition to normal safe working practices as required by local health and safety regulations and statutory authority of the location of the installation. These instructions do not advocate a departure from these requirements.

**NOTE:** There will be 3-wire and 4-wire versions depending on where product is being deployed. Only 4-wire version is referred to in this document.

### Vertiv™ PowerNexus Layout

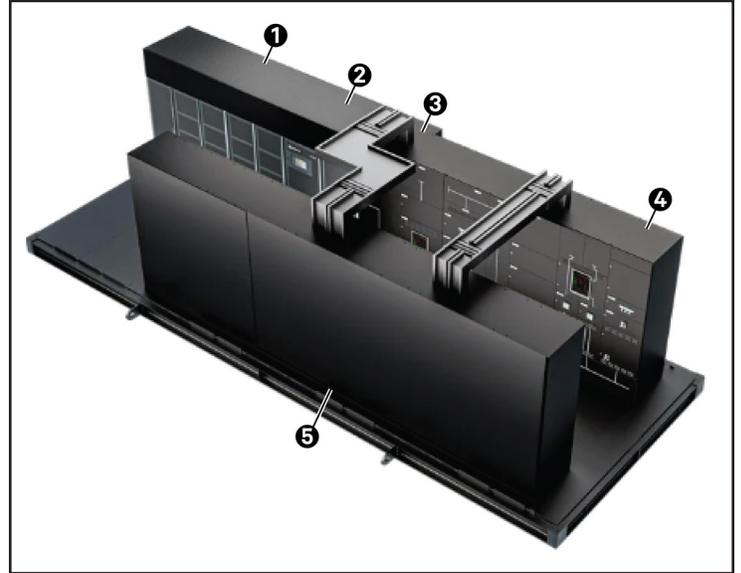
The design and the layout of the UPS system and associated panels and cabling should be examined closely to ensure that cable lengths and impedance are closely matched. The PowerNexus system combines the Switchgear I/O box and Liebert® Trinerger™ UPS.

Figure 1 Example of Back-to-Back Layout



Item	Description
1	Low voltage (LV) Switchgear
2	LV Switchgear including I/O box
3	I/O box
4	Static transfer switch (STS)
5	Liebert® Trinerger™ UPS including STS

Figure 2 Example of Front-to-Front Layout



Item	Description
1	Liebert® Trinerger™ UPS including STS
2	STS
3	I/O box
4	LV Switchgear including I/O box
5	LV Switchgear

Figure 3 Example of Front-to-Front Layout

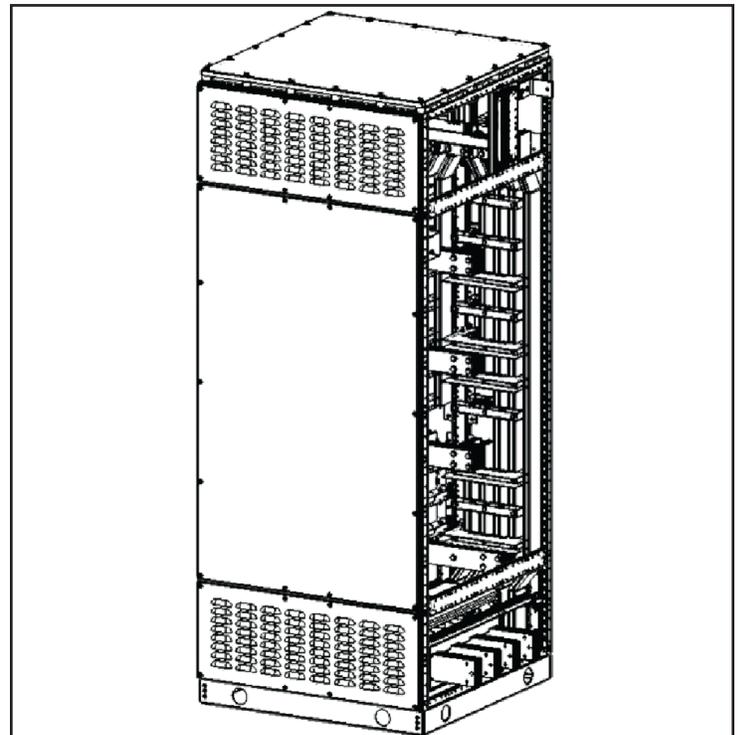


Figure 4 Example of Back-to-Back Layout

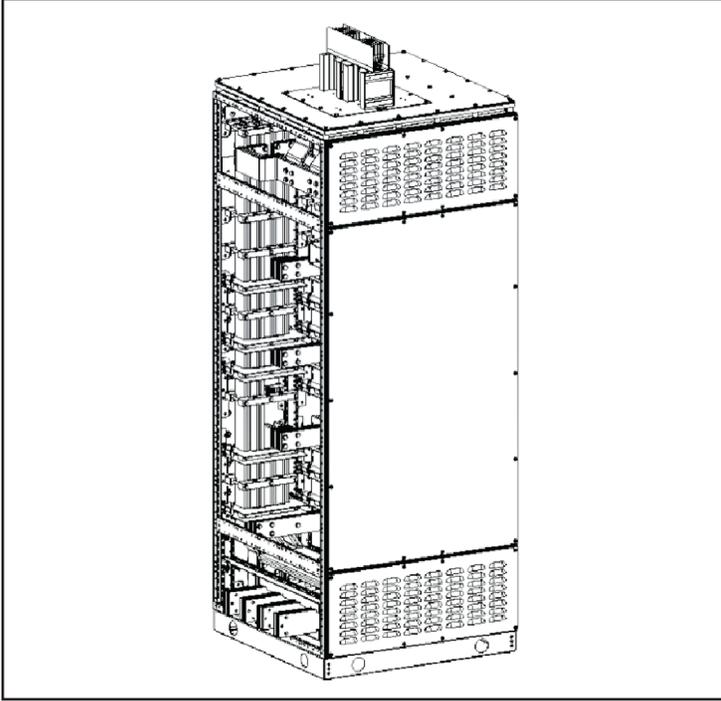
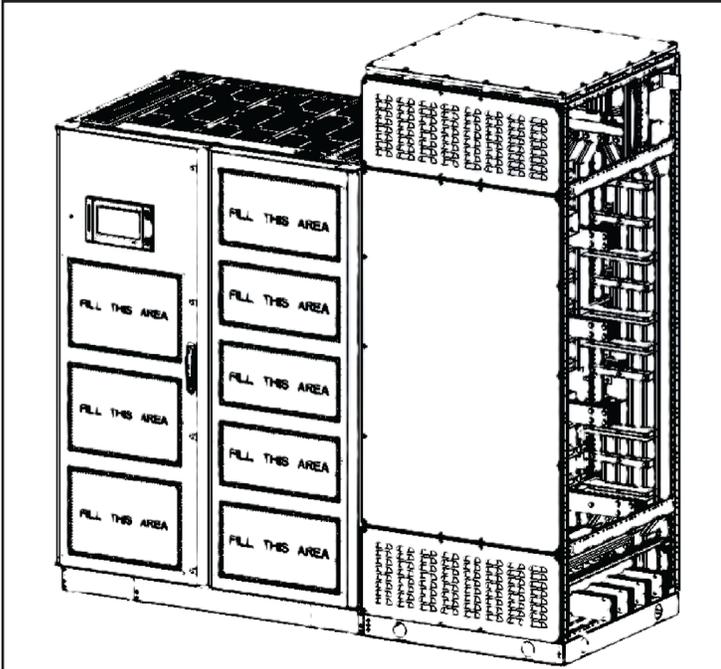


Figure 5 Coupling of I/O Box and UPS/STS



### Installation of Vertiv™ Switchgear I/O Box

Switchgear and UPS will be positioned by the integration team in line with the integrators project specific logistics plan.

Factors to be considered within the logistics plan of integrator:

- Ensure access to the rear sides of the UPS and Switchgear in line with their respective install manuals. Plan the installation sequence so that one equipment does not block the other equipment.

- Consider the size and weight of the equipment during installation. Set up the equipment such that it will be easy to adjust its position after installation. Switchgear sizes and weights will depend on the specific project.
- Additional installation space is required. For example, if busbar from one Switchgear section will ultimately extend into a neighboring Switchboard section, additional space is needed temporarily to allow one to pass the other before being joined. The minimum requirement space is 8 in. (200 mm).

Figure 6 Overlapping Copper. Gap required for installation



- As equipment is installed in order, use the Switchgear reconnection and test manual to guide competent technicians in reconnecting and testing the system.
  - Testing procedure with specific reference to the I/O box:
    - All other Switchgear is mechanically and electrically reconnected.

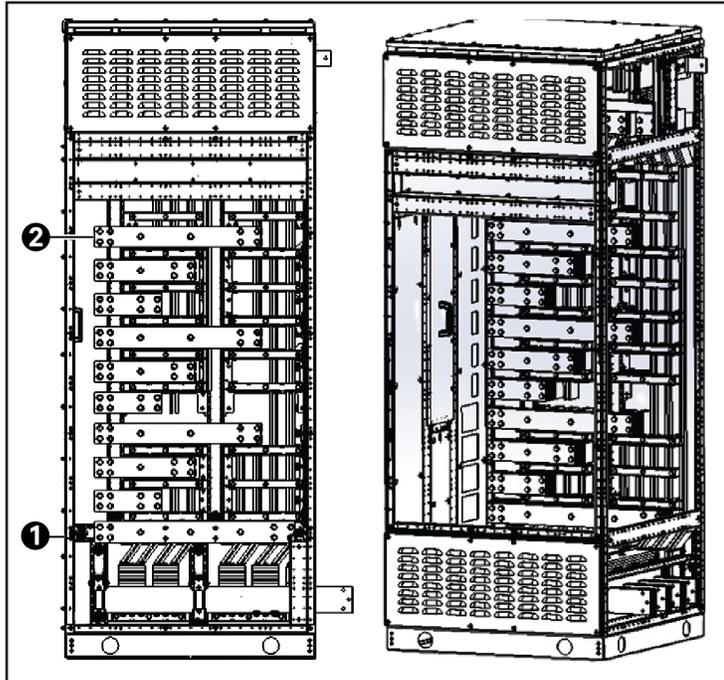
**NOTE:** The Switchgear I/O box busbar must not be connected to the Vertiv™ Liebert® Trinerity™ UPS/STS busbar.

  - Switchgear will be tested by trained/competent persons in line with normal Switchgear testing procedures as outlined by the project specific testing documentation.
- NOTE:** The Switchgear I/O busbar can only be connected to the UPS busbar after all electrical testing on both the UPS and Switchgear systems is complete.
- Connection of the I/O box to the UPS/STS (the interface):
    - Scope of supply (loose items)

Loose Items	
AC Power (UPS/STS)	Switchgear (I/O Box)
Frame fixing screws	Series of Packers: <ul style="list-style-type: none"> <li>Quantity-20 of 80x80 10 mm packers (quantity-18 for 3-wire)</li> <li>Quantity-20 of 80x80 6 mm packers (quantity-18 for 3-wire)</li> </ul>
L-shaped coppers complete with clench nut (these will be fitted to the UPS/STS prior to integration)	Bolts: Quantity-40 of M10 x 130 mm bolt and washers (quantity-36 for 3-wire) Drawing detail showing combination of Packers for each joint (refer to appended drawings) Busbar trunking flange (if it was removed for shipping) + fixings

- Prior to the I/O box and UPS/STS coming together, the gasket is fitted to the left side of the I/O box in line with the Switchgear reconnection and test manual.
- The equipment is aligned and leveled as necessary to ensure both sets of busbar can be connected without additional pressure being exerted on the joint. Frame fixing holes must be aligned.
- The UPS/STS copper will pass through slots in the side of the I/O box. Refer to install drawings. Maintain clearance between the copper parts and the slots.

Figure 7 I/O Box Interface Connections



Item	Description
1	Frame fixing points (refer to drawing)
2	Busbar interface connections (quantity-10)

- Join the frames using frame fixing screws.
- Fit the packers and bolts as shown in the Figure 9. Tighten the bolts to the correct level. Tighten the M10 bolts to a torque of 354 lb-in (40 Nm) ±20% torque. Follow AC power's recommendation for the clench nut already fitted to the L-copper. (For more information about Figure 3 through Figure 12 refer to the details drawing in the appendix.)

Figure 8 Side View of I/O Box

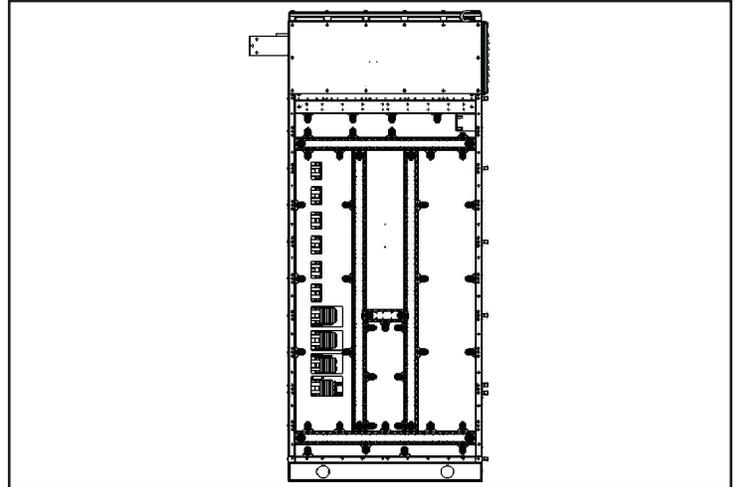
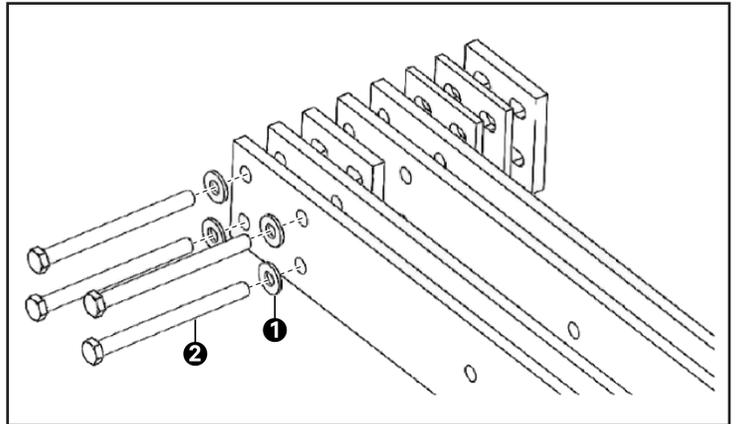


Figure 9 Exploded View of Busbar/Packer/Bolt Arrangement



Item	Description	Item	Description
1	Washer	2	Bolt

- Testing and documentation:
  - A contact resistance test (also known as a ductor test) will be carried out across the connected joints. Results will be recorded and added to the project test documentation.
  - Operative record of torque procedures having been followed (torque verification).
- Cable routing facility for Control and/or communication cables is included as part of the I/O box design. This is located at the top front, behind the cover. This will be utilized to route cables from UPS to some other part of the Vertiv™ Switchgear or vice versa.

Figure 10 Height of Connecting Busbar from Datum Points

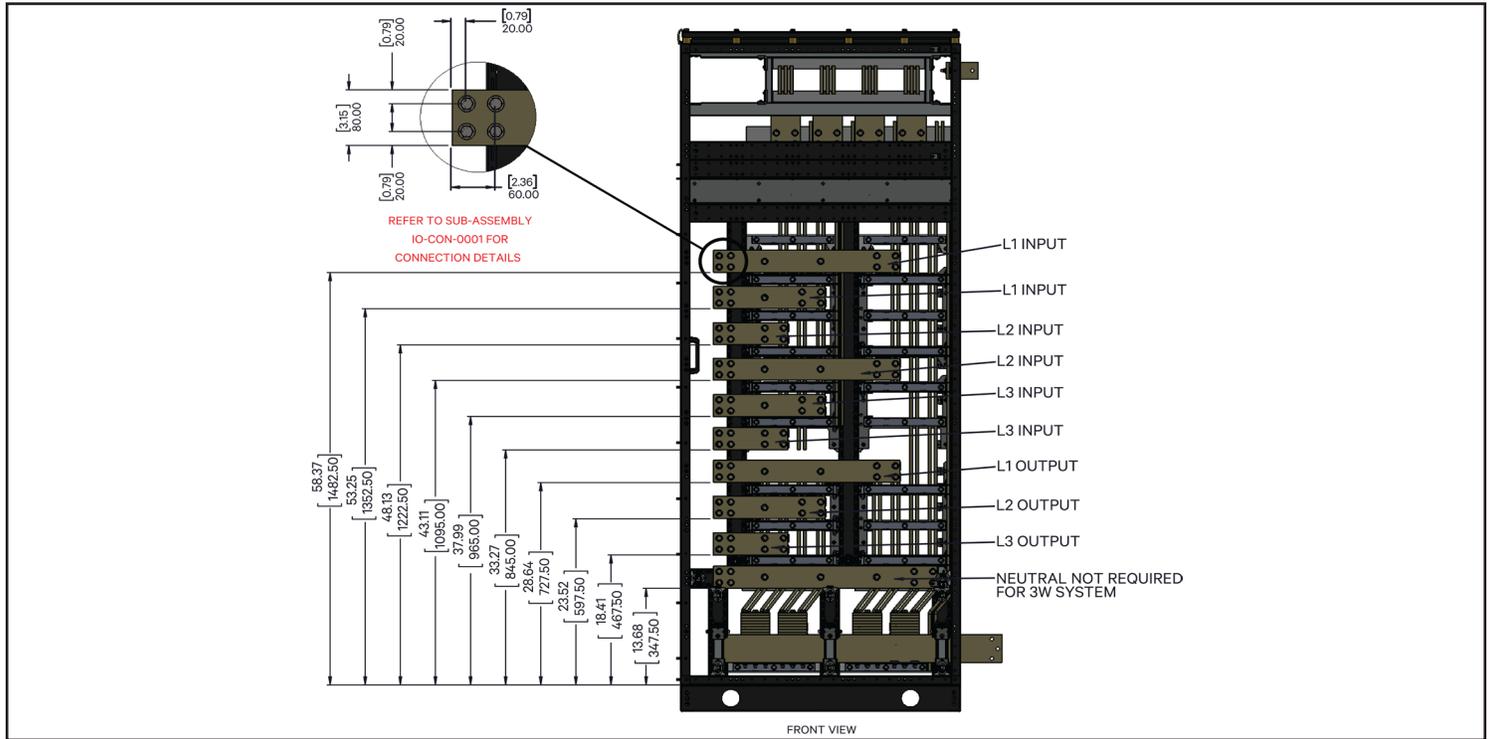


Figure 11 L-shaped Copper Busbar in Segregation Slots

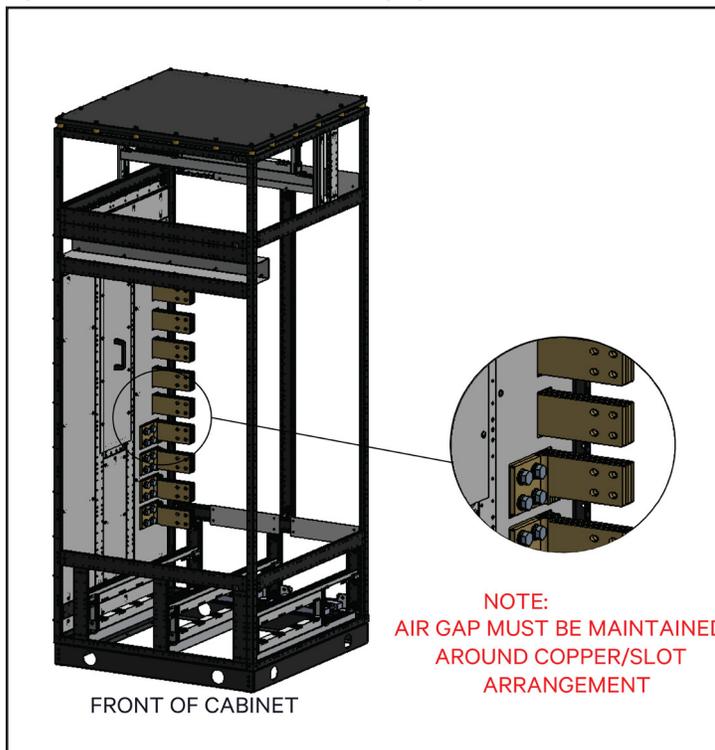
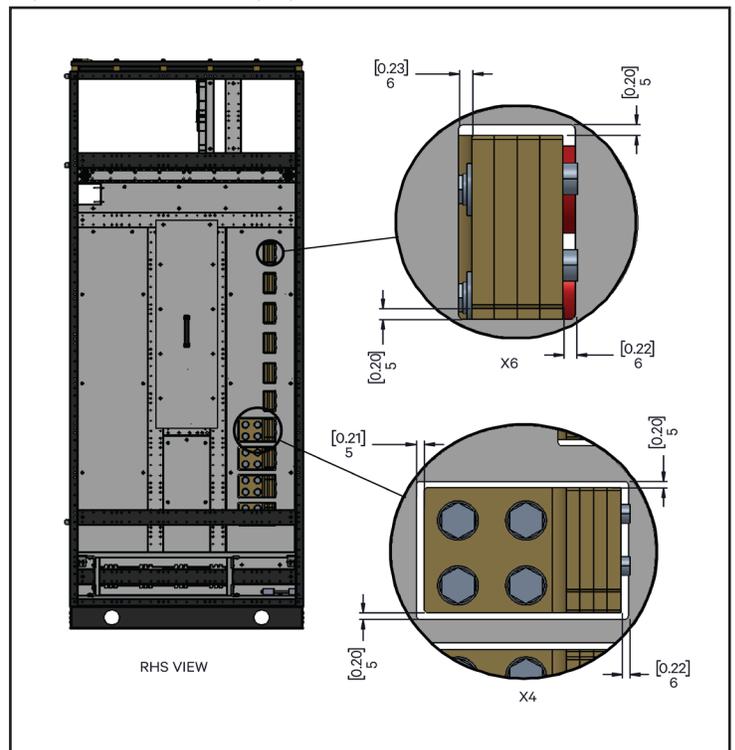


Figure 12 Clearance of Segregation Slots

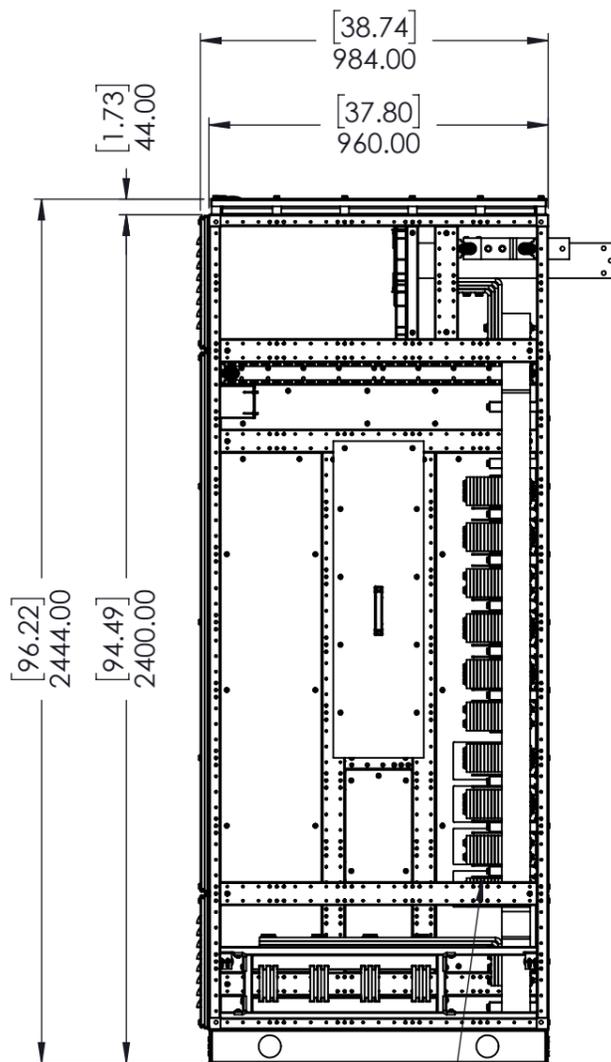


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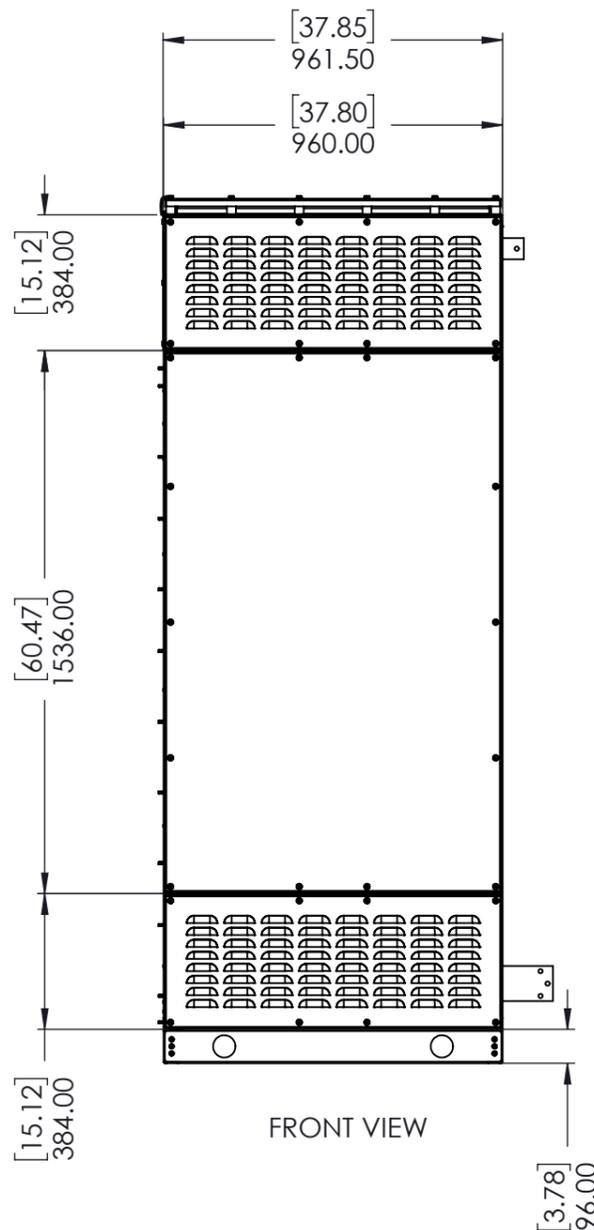


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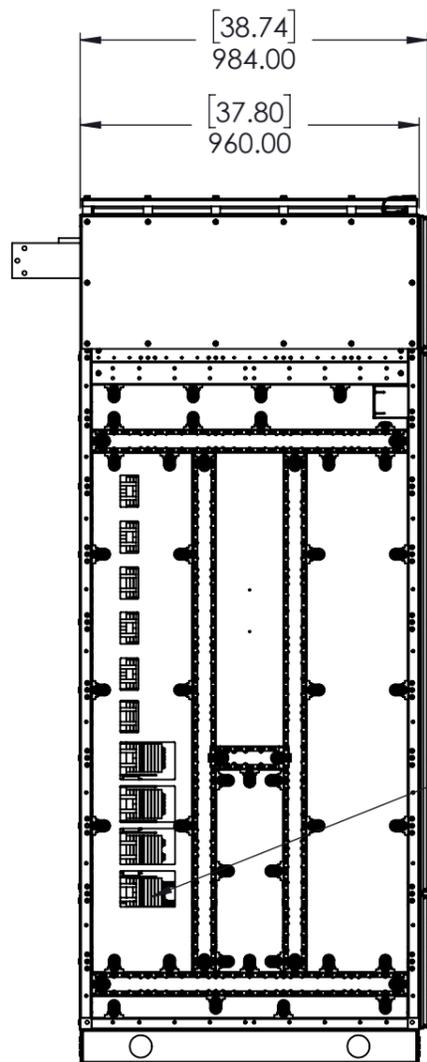
RHS VIEW

NEUTRAL NOT REQUIRED FOR 3W SYSTEM



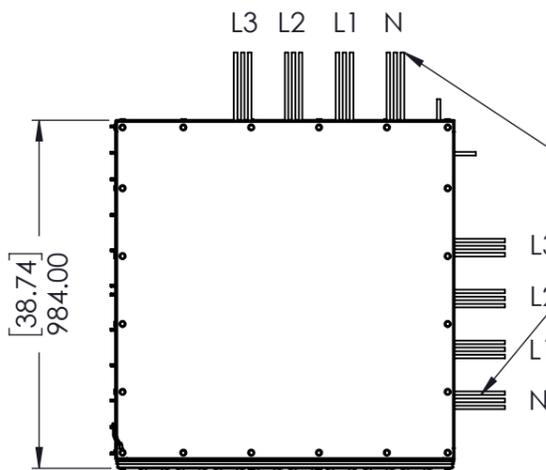
FRONT VIEW

NEUTRAL NOT REQUIRED FOR 3W SYSTEM



LHS VIEW

NEUTRAL NOT REQUIRED FOR 3W SYSTEM



PLAN VIEW

NOTES:

- CONSTRUCTION MATERIAL: 2MM THICK POWDER COATED MILD STEEL
- ALL DIMENSIONS IN MILLIMETERS/INCHES
- PROTECTION IEC: IP31  
UL: TYPE 1
- ACCESS: FRONT
- BUSBARS ARE DESIGNED FOR A SHORT-CIRCUIT WITHSTAND STRENGTH IEC: 100% (100kA/1SEC)  
UL: 3c cycles @ 100kA
- COPPER COULD BE BARE OR TINNED

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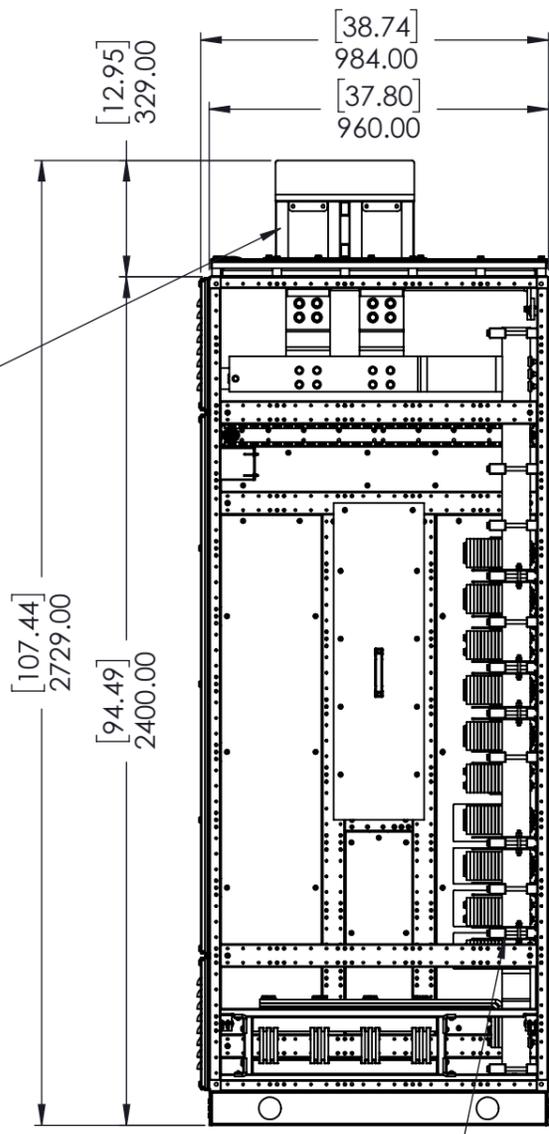


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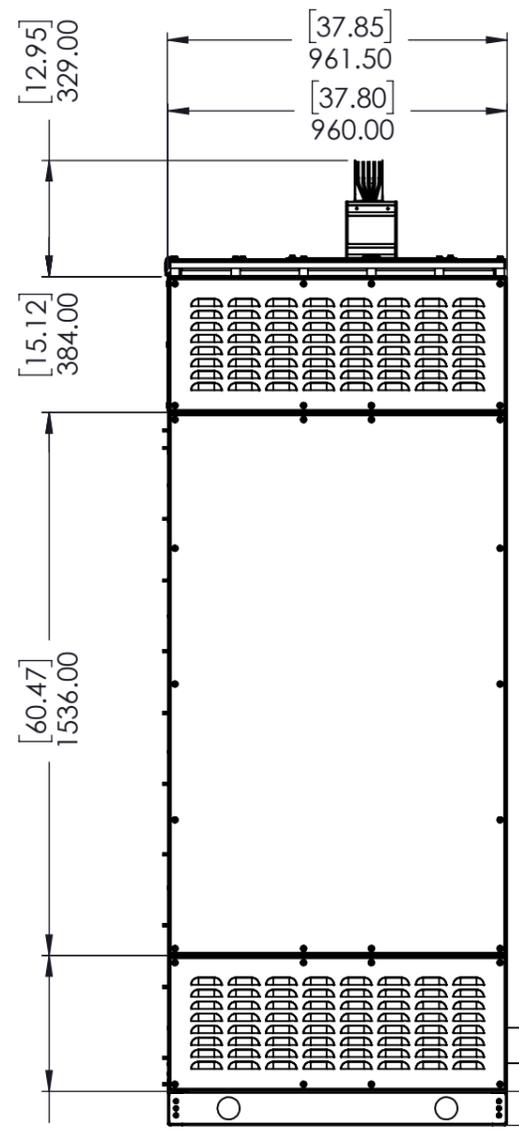
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BUSBAR FLANGE DETAIL  
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SPECIFIC AND MAY  
DIFFER IN HEIGHT

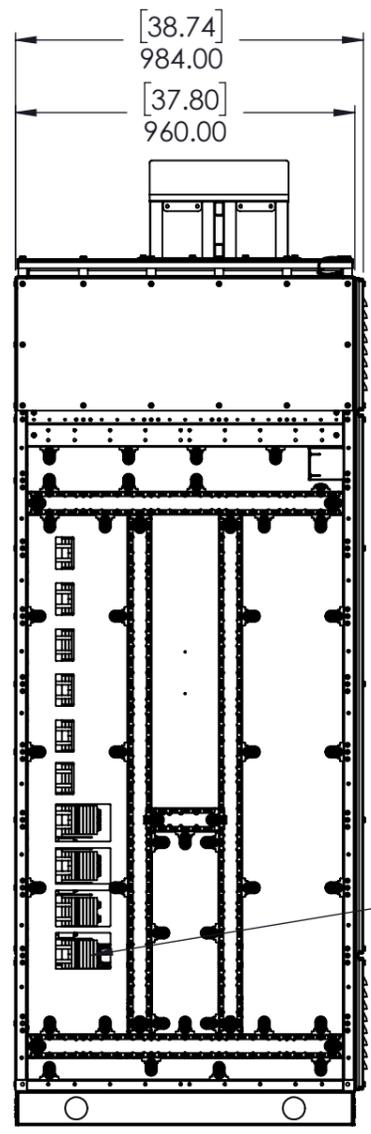


RHS VIEW

NEUTRAL NOT REQUIRED  
FOR 3W SYSTEM



FRONT VIEW



LHS VIEW

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FOR 3W SYSTEM

NEUTRAL NOT REQUIRED  
FOR 3W SYSTEM

B

C

D

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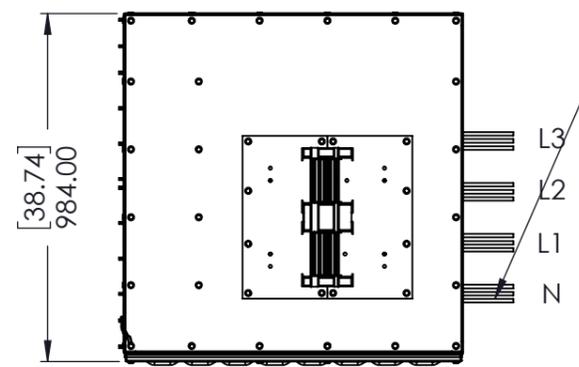
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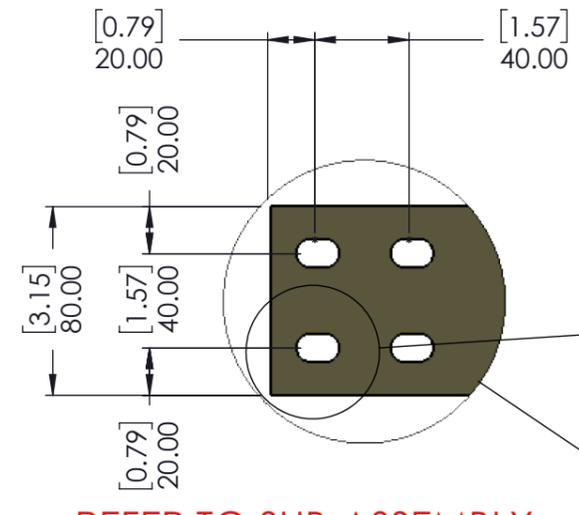


PLAN VIEW

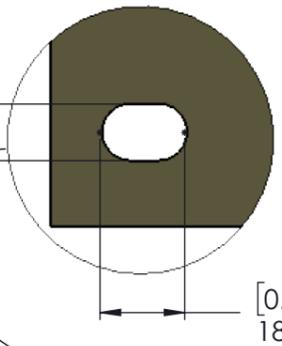
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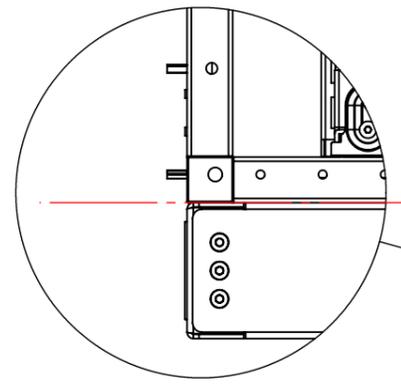
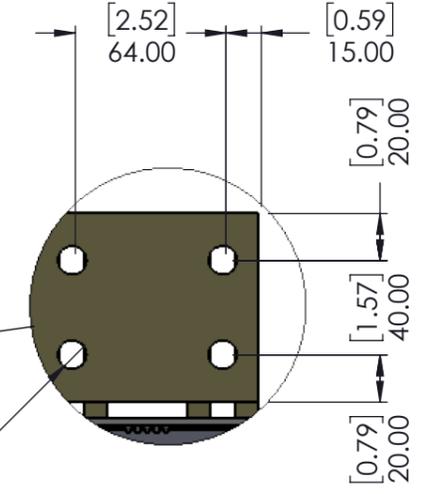
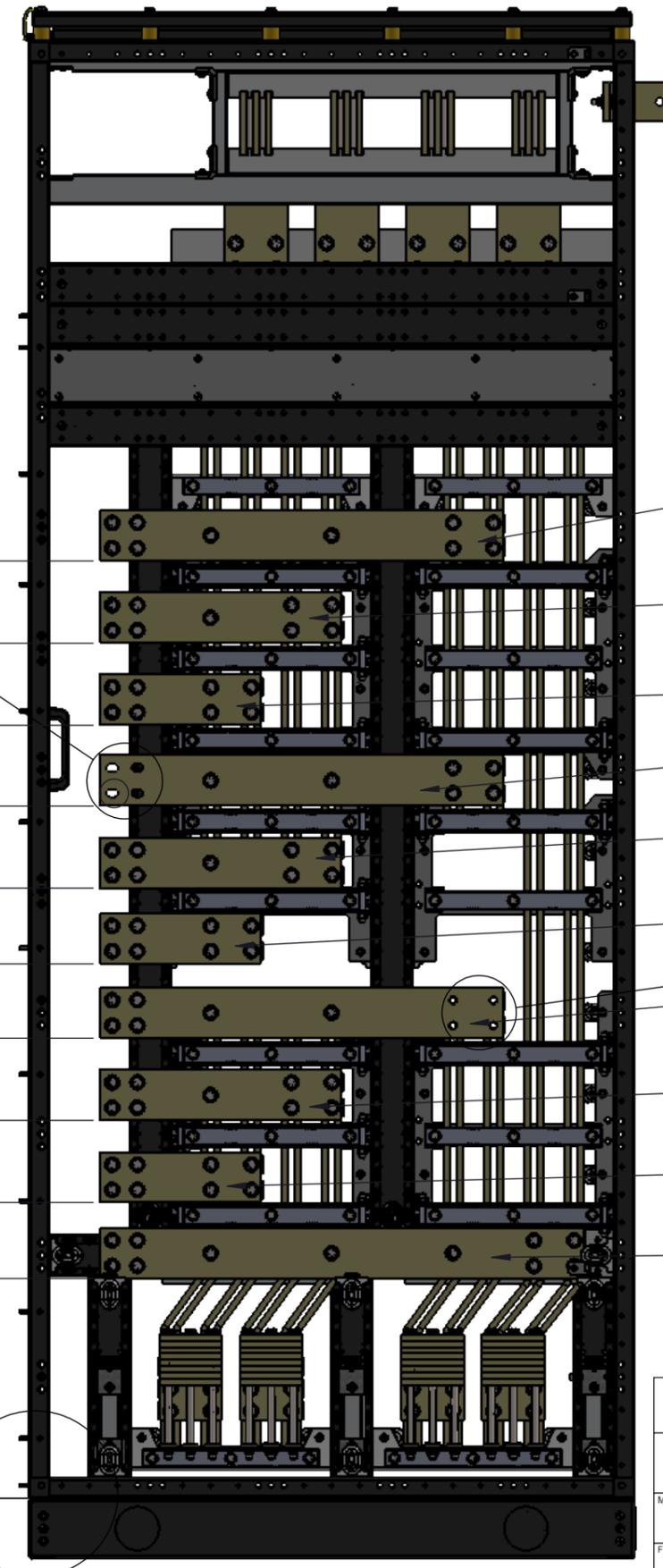
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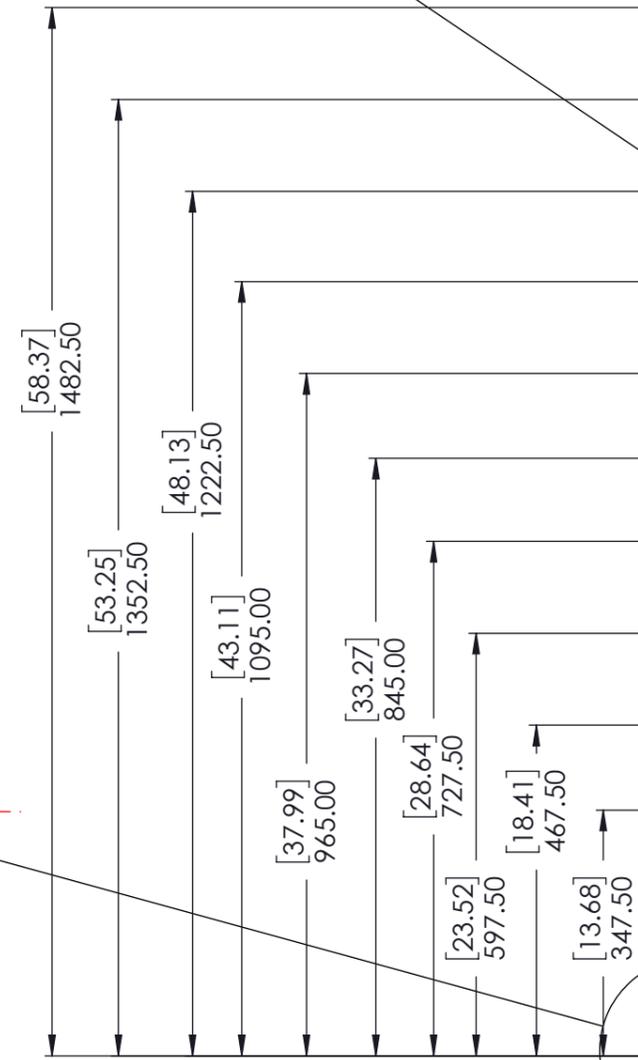
SLOT DETAILS



REFER TO SUB-ASSEMBLY IO-CON-0001 FOR CONNECTION DETAILS



DIMENSIONS ARE TAKEN FROM THE BOTTOM OF THE FRAME BAR

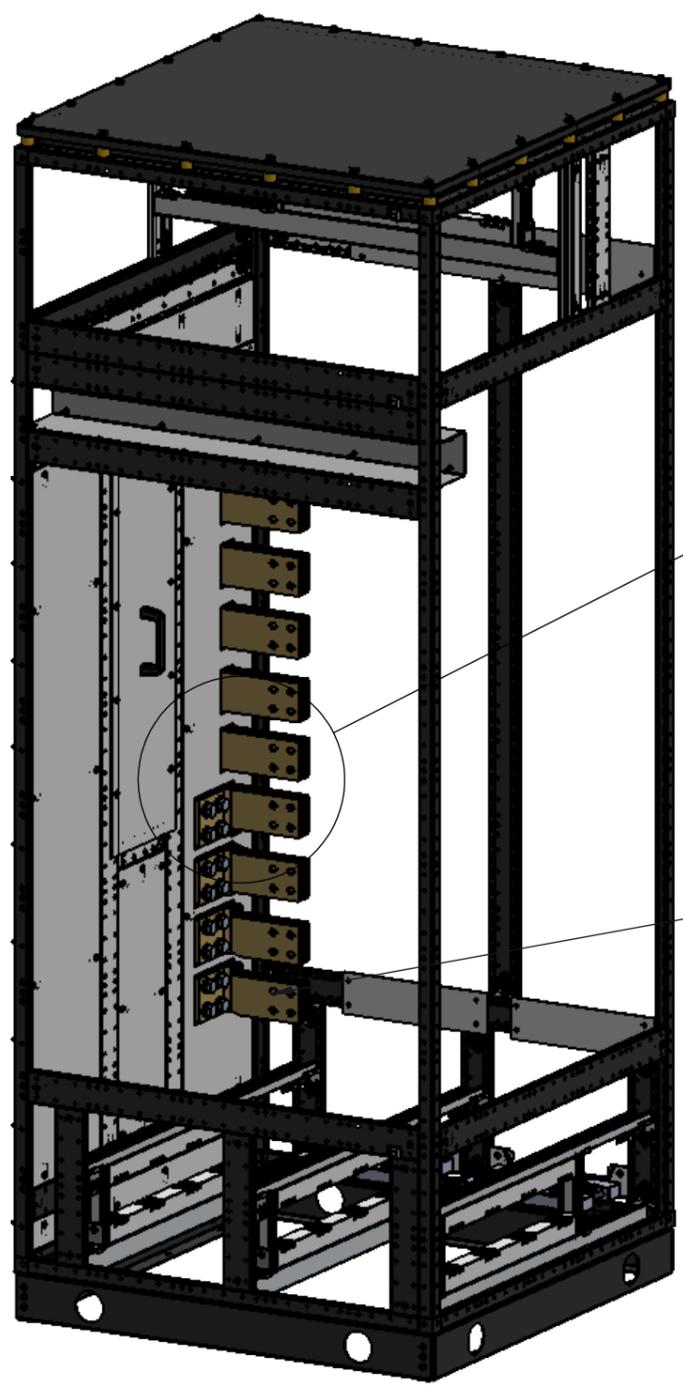


FRONT VIEW

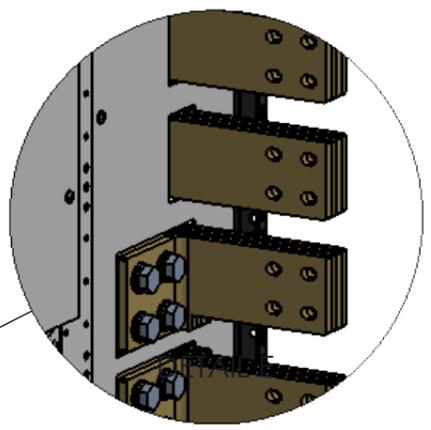
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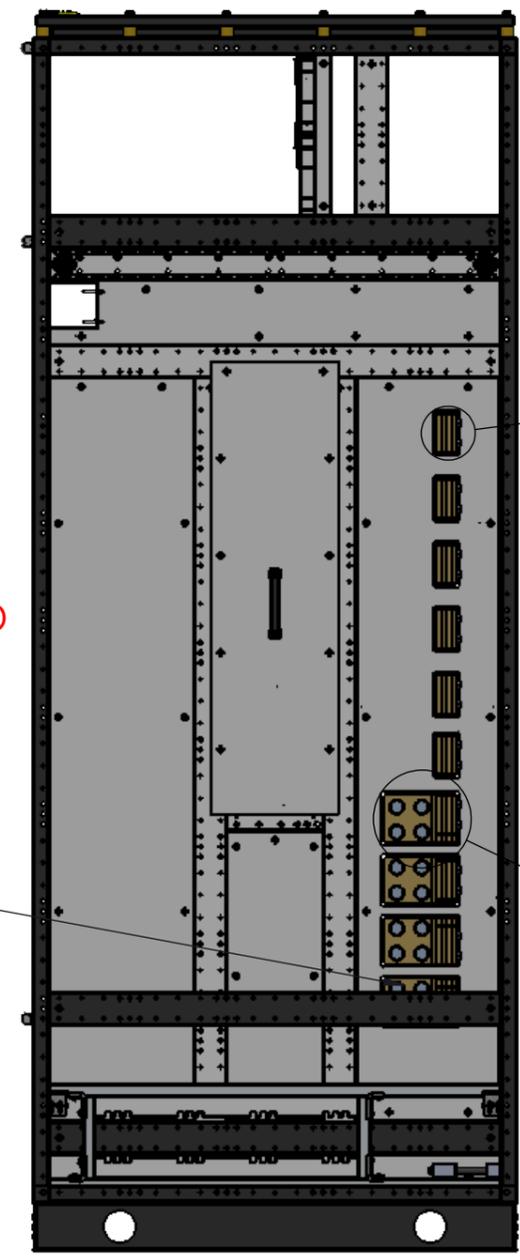


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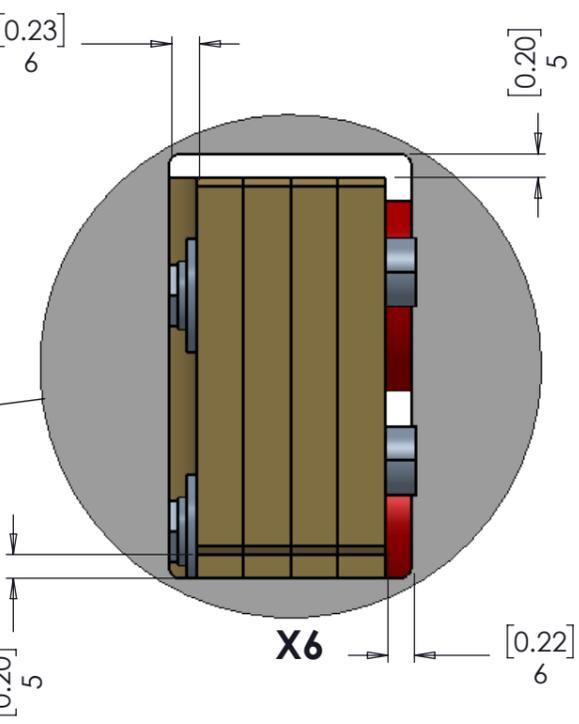


**NOTE:**  
AIR GAP MUST BE MAINTAINED  
AROUND COPPER/SLOT  
ARRANGEMENT

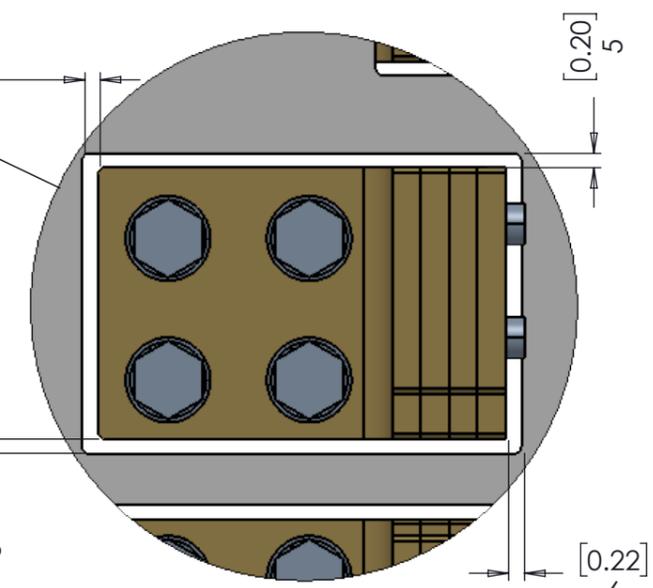
NEUTRAL NOT REQUIRED  
FOR 3W SYSTEM



RHS VIEW



X6



X4

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HOLE DIA ±0.13	HOLE DIA ±0.005															
ANGULAR	±1.5*															
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1 No. STAINLESS STEEL FRAME BAR  
 MIN 3No. FIXING POINTS REQUIRED  
 NO EXCEPTIONS IN THE CASE OF THIS BAR ONLY.  
 (THIS BAR FORMS THE EARTH CONNECTION  
 BETWEEN IO & STS FRAMES)

THIS DRAWING INDICATES ALL  
 AVAILABLE FRAME FIXING POINTS,  
 FRONT, BACK, TOP & BOTTOM.

REFER TO NEXT DRAWING FOR DETAILS

MINIMUM No. OF FIXING POINTS

Location	Qty	Min No.
Front	10	4
Back	10	3-4
Top	10	3 (NO EXCEPTIONS)
Bottom	10	2-3

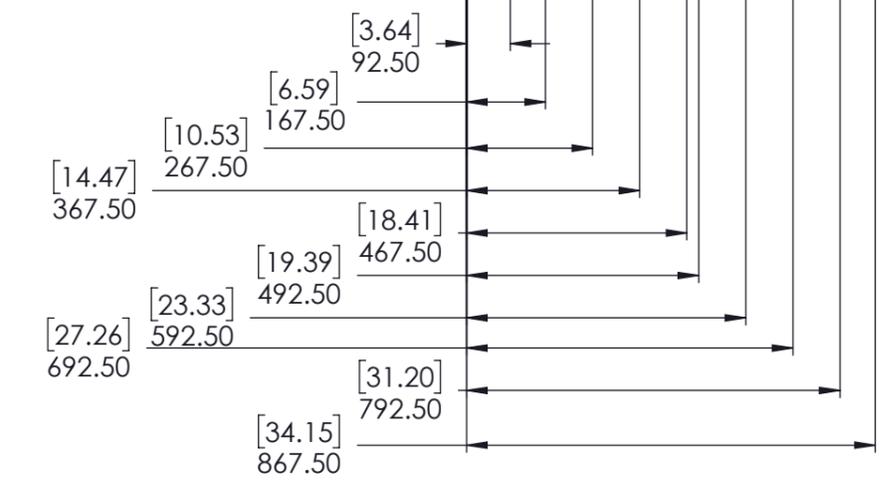
N.B  
 IDEALLY 1 FIXING NEAR TO THE CORNERS AND THE  
 REST SPREAD INBETWEEN THESE.  
 FOR EXAMPLE, SEE CIRCLED POSITIONS.

DEPENDING ON REAR ACCESS, OTHER COMBINATIONS  
 OF SCREW POSITIONS AND QUANTITIES CAN BE DEEMED  
 ACCEPTABLE AT TIME OF INSTALL.

NEUTRAL NOT  
 REQUIRED  
 FOR 3W SYSTEM

REAR OF PANEL

FRONT OF PANEL



LHS VIEW

I	CORPORATE CAGE CODE	505 N. CLEVELAND AVE WESTERVILLE, OHIO 43082	FRAME CONNECTION DETAILS	FRAME TO FRAME CONNECTION DIENSIONS
	1EDC2		PART NUMBER	DESCRIPTION
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			X ±2	X ±.1
			X ±.8	XX ±.03
			XX ±.38	XXX ±.015
			HOLE DIA ±0.13	HOLE DIA ±0.005
			ANGULAR	±1.5*
DESIGNED BY:	DATE:	WEIGHT	PART DESCRIPTION	
Bryan.Harkin	29/01/2025	1186225.89	FRAME TO FRAME CONNECTION DIENSIONS	
DRAWN BY:	DATE:	SHEET:	CONTROL CHARACTERISTICS	SCALE
Bryan.Harkin	29/08/2025	1 / 2	FIRST ANGLE PROJECTION	A3 1:50
			DOCUMENT NUMBER	REV
			FRAME CONNECTION DETAILS	01



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CO NO	REV	DESCRIPTION	DRAWN BY: APPROVED BY:	DATE DATE

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A

B

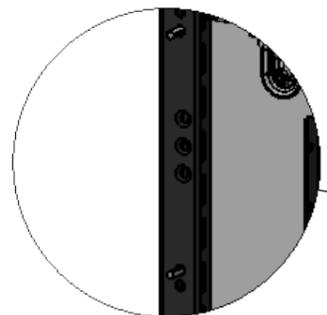
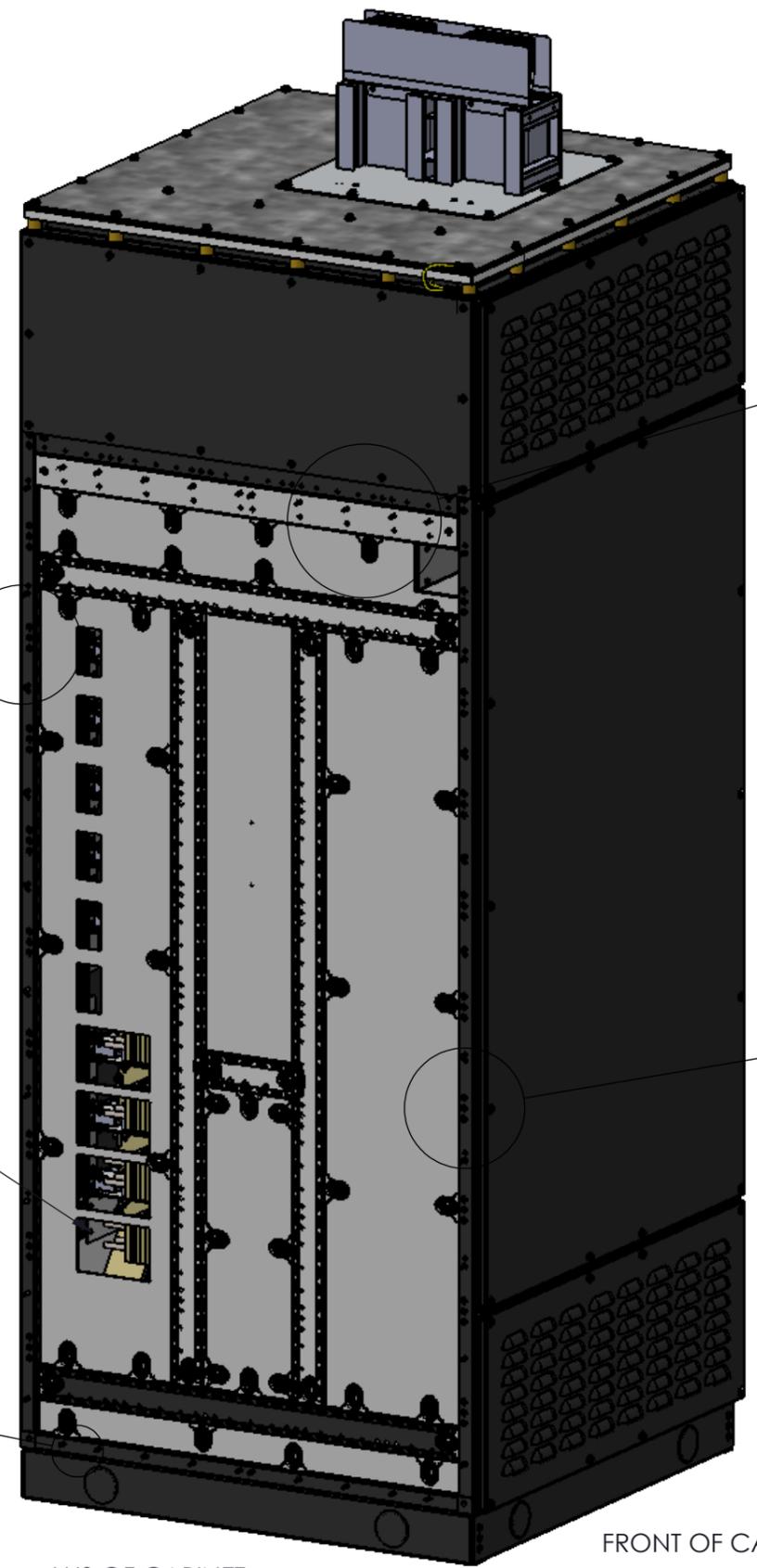
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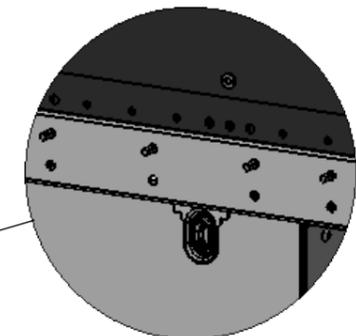
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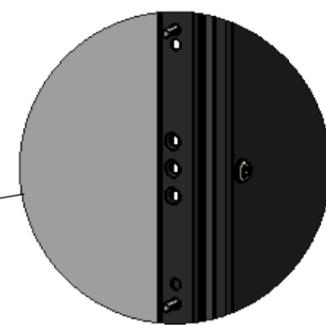
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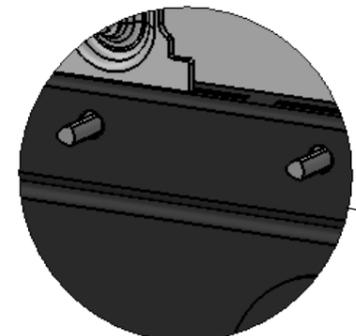
10 No. VERTICAL CONNECTIONS DIRECT TO STS FRAME FIXING HOLES



10 No. HORIZONTAL CONNECTIONS DIRECT TO STS FRAME FIXING HOLES



10 No. VERTICAL CONNECTIONS DIRECT TO STS FRAME FIXING HOLES



10 No. HORIZONTAL CONNECTIONS DIRECT TO STS FRAME FIXING HOLES

NEUTRAL NOT REQUIRED FOR 3W SYSTEM

LHS OF CABINET

FRONT OF CABINET

I	CORPORATE CAGE CODE	505 N. CLEVELAND AVE WESTERVILLE, OHIO 43082	FRAME CONNECTION DETAILS	FRAME TO FRAME CONNECTION DETAILS
	1EDC2		PART NUMBER	DESCRIPTION
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MATERIAL:		THICKNESS(mm)	UNLESS OTHERWISE SPECIFIED TOLERANCE	
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			X ±.8	XX ±.03
			XX ±.38	XXX ±.015
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			ANGULAR	±1.5*
DESIGNED BY:	DATE:	WEIGHT:	CONTROL CHARACTERISTICS	
Bryan.Harkin	29/01/2025	1186225.89		
DRAWN BY:	DATE:	SHEET:	FIRST ANGLE PROJECTION	SIZE SCALE
Bryan.Harkin	29/08/2025	2 / 2		A3 1:50
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			DOCUMENT NUMBER	REV
			FRAME CONNECTION DETAILS	00

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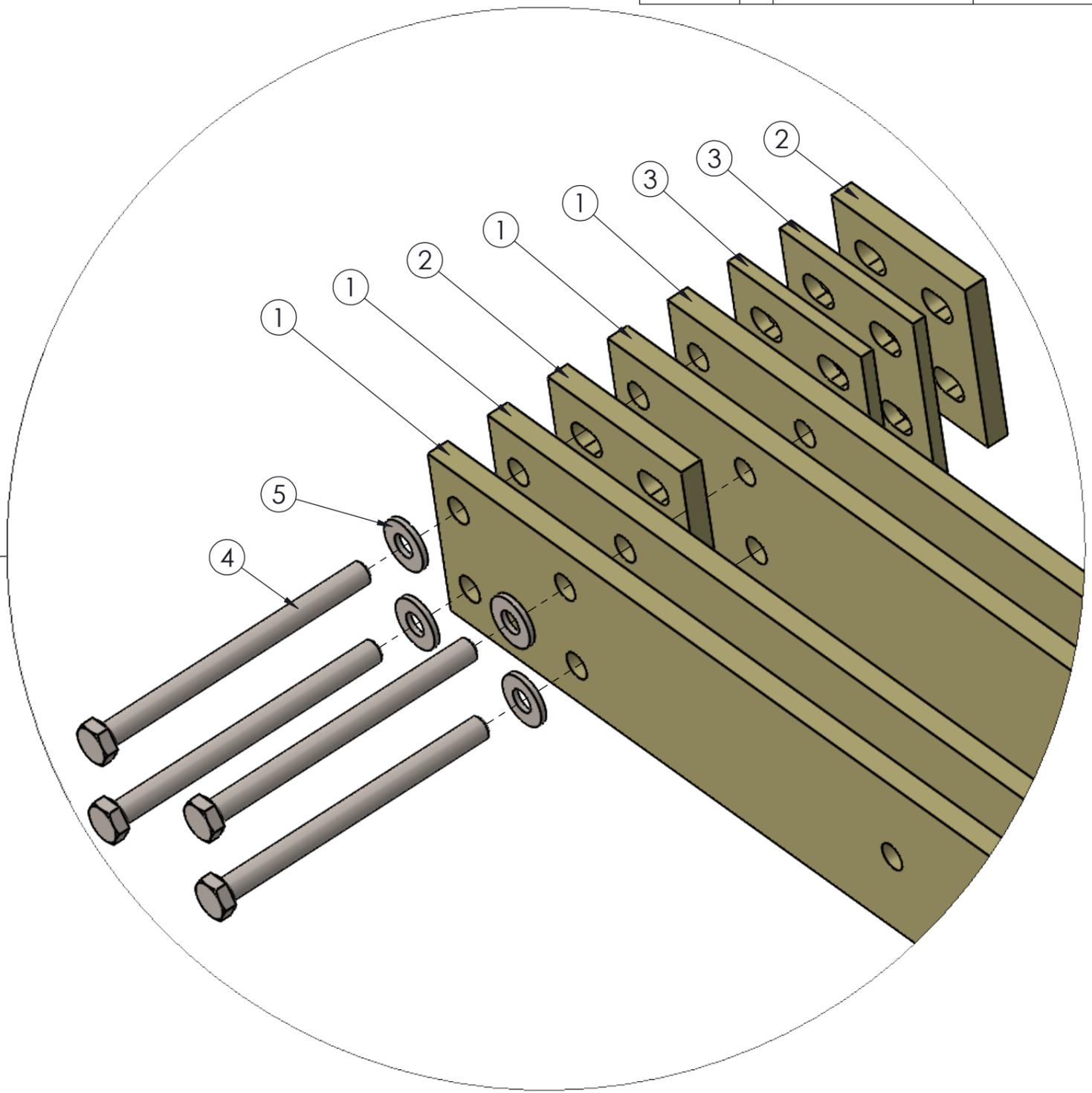
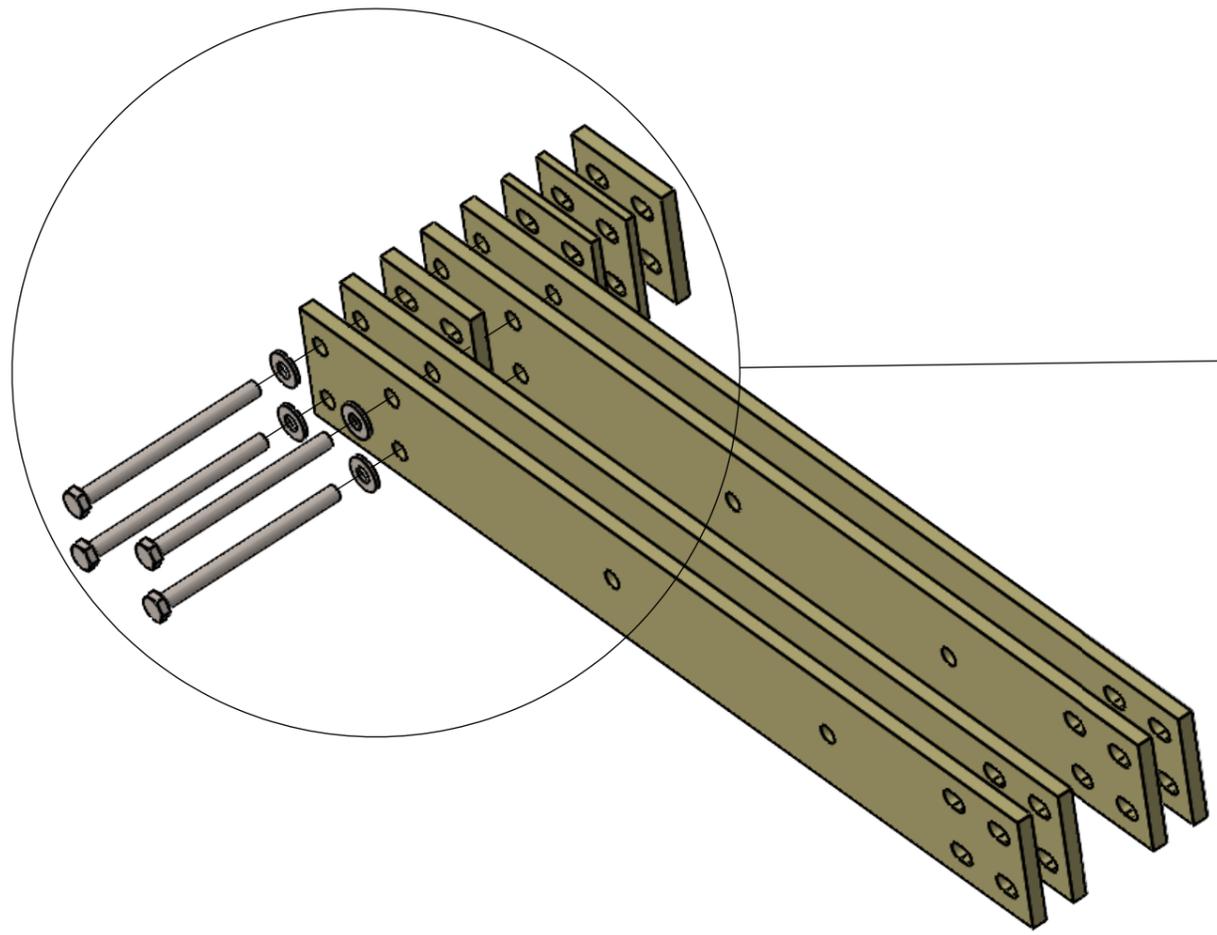
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CO NO	REV	DESCRIPTION	DRAWN BY: APPROVED BY:	DATE DATE



REDUCED QUANTITIES FOR 3W SYSTEM ( 1 LESS CONNECTION THAN 4W)

ITEM NO.	PART NUMBER	DESCRIPTION	4W TOTAL QTY.	3W TOTAL QTY
2	IOC-PK-80X80X10	IOC-PK-80X80X10	20	18
3	IOC-PK-80X80X6	IOC-PK-80X80X6	20	18
4	M10X130	M10X130	40	36
5	CU-2018-1000	10mm Conical Washers 5x23x2.5	40	36

**N.B REFER TO INSTALLATION MANUAL FOR TORQUE LEVELS**

I	CORPORATE CAGE CODE	505 N. CLEVELAND AVE WESTERVILLE, OHIO 43082	IO-CON-0001	INTERFACE CONNECTION DETAILS
	1EDC2		PART NUMBER	DESCRIPTION
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MATERIAL:		THICKNESS(mm)	UNLESS OTHERWISE SPECIFIED TOLERANCE	
SEE DETAILS			MM (PRIMARY)	INCHES (SECONDARY)
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			.X ±.8	.XX ±.03
			.XX ±.38	.XXX ±.015
FINISH:			HOLE DIA ±0.13	HOLE DIA ±0.005
xxx			ANGULAR	±1.5°
DESIGNED BY:	DATE:	WEIGHT	CONTROL CHARACTERISTICS	
Bryan.Harkin	30/01/2025	19369.36		
DRAWN BY:	DATE:	SHEET:	FIRST ANGLE PROJECTION	SIZE
Bryan.Harkin	10/02/2025	1 / 1		A3
			SCALE	DOCUMENT NUMBER
			1:5	IO-CON-0001
			REV	

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CO NO	REV	DESCRIPTION	DRAWN BY: APPROVED BY:	DATE DATE

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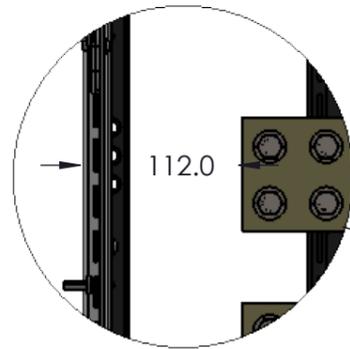
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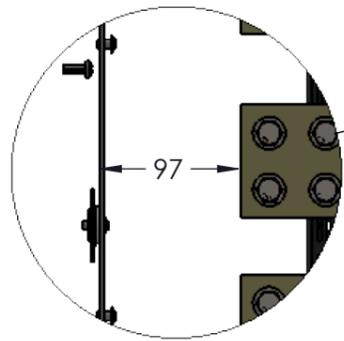
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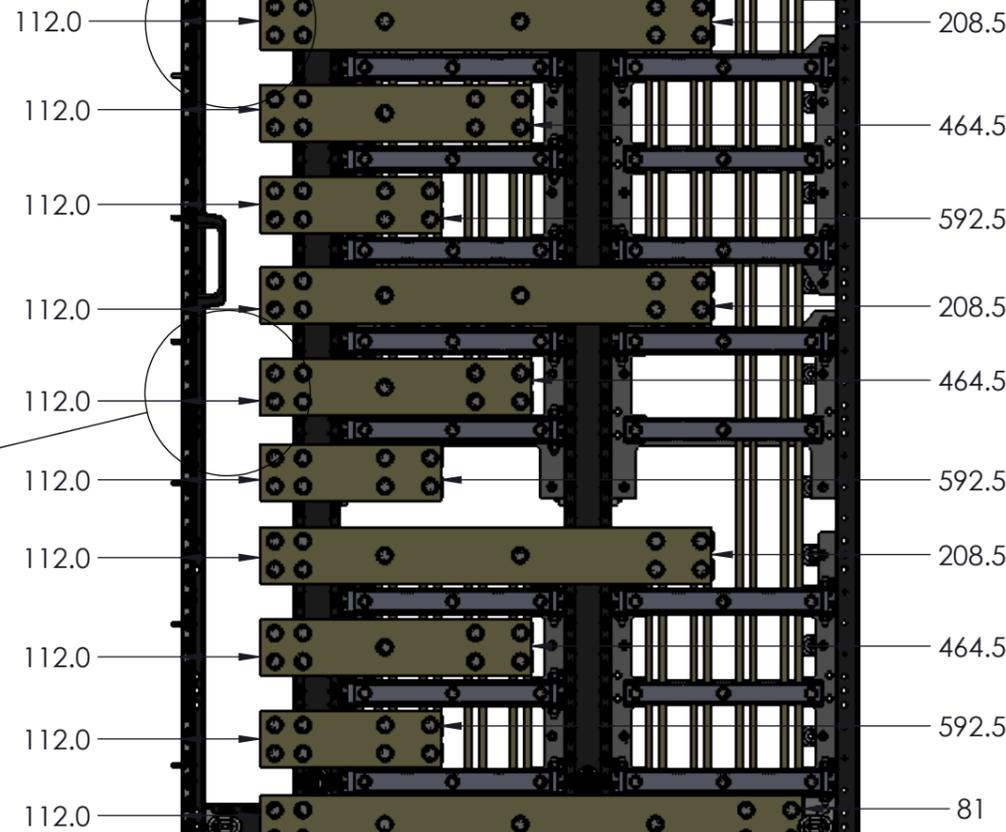
D



DIMENSION TO  
OUTSIDE OF  
FRAME BAR



DIMENSION TO  
INSIDE FACE  
OF SEGREGATION



FRONT VIEW

I	CORPORATE CAGE CODE	505 N. CLEVELAND AVE WESTERVILLE, OHIO 43082	IO INTERFACE CONNECTIONS	IO CABINET INTERFACE CONNECTION DETAILS
	1EDC2		PART NUMBER	DESCRIPTION
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			MM (PRIMARY)	INCHES (SECONDARY)
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			ANGULAR	±1.5*
DESIGNED BY: Bryan.Harkin		DATE: 12/12/2024	WEIGHT: 894375.01	
DRAWN BY: Bryan.Harkin		DATE: 13/05/2025	SHEET: 1 / 1	
			FIRST ANGLE PROJECTION	SIZE A3
			SCALE 1:10	PART DESCRIPTION IO CABINET INTERFACE CONNECTION DETAILS
			DOCUMENT NUMBER IO INTERFACE CONNECTIONS	REV 01

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CO NO	REV	DESCRIPTION	DRAWN BY: APPROVED BY:	DATE DATE

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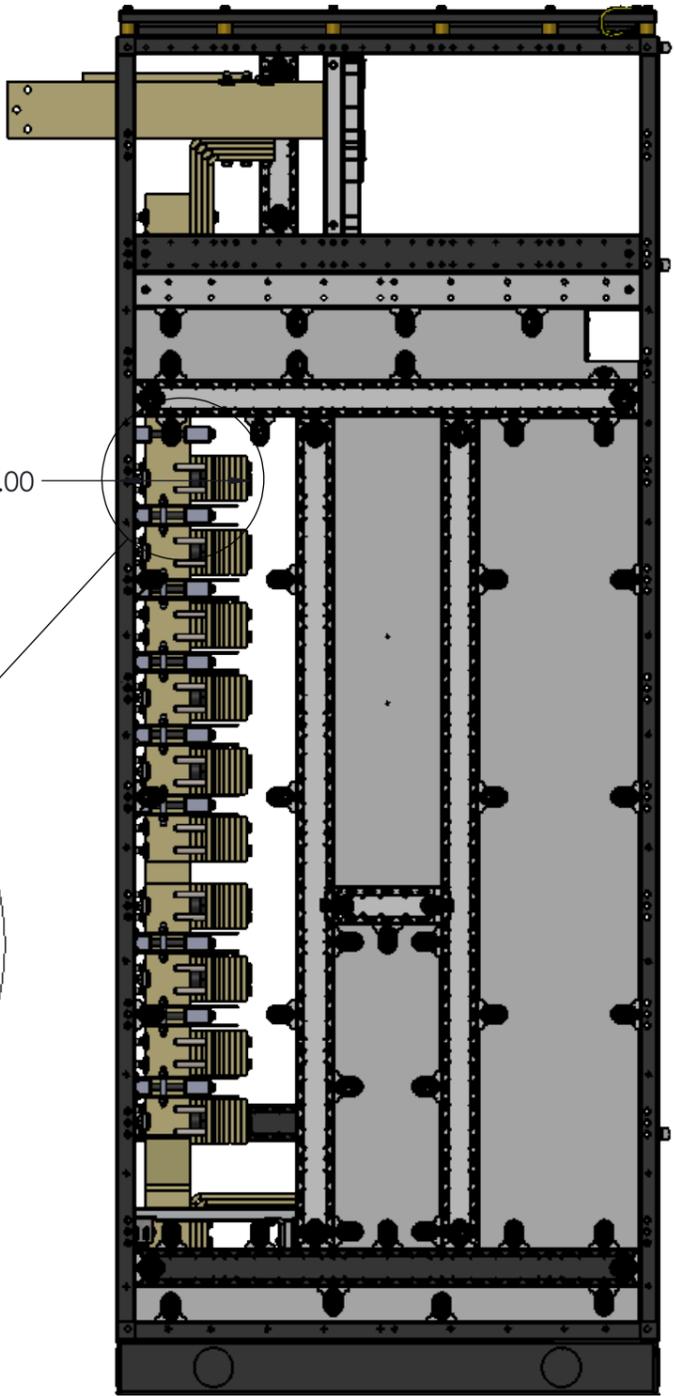
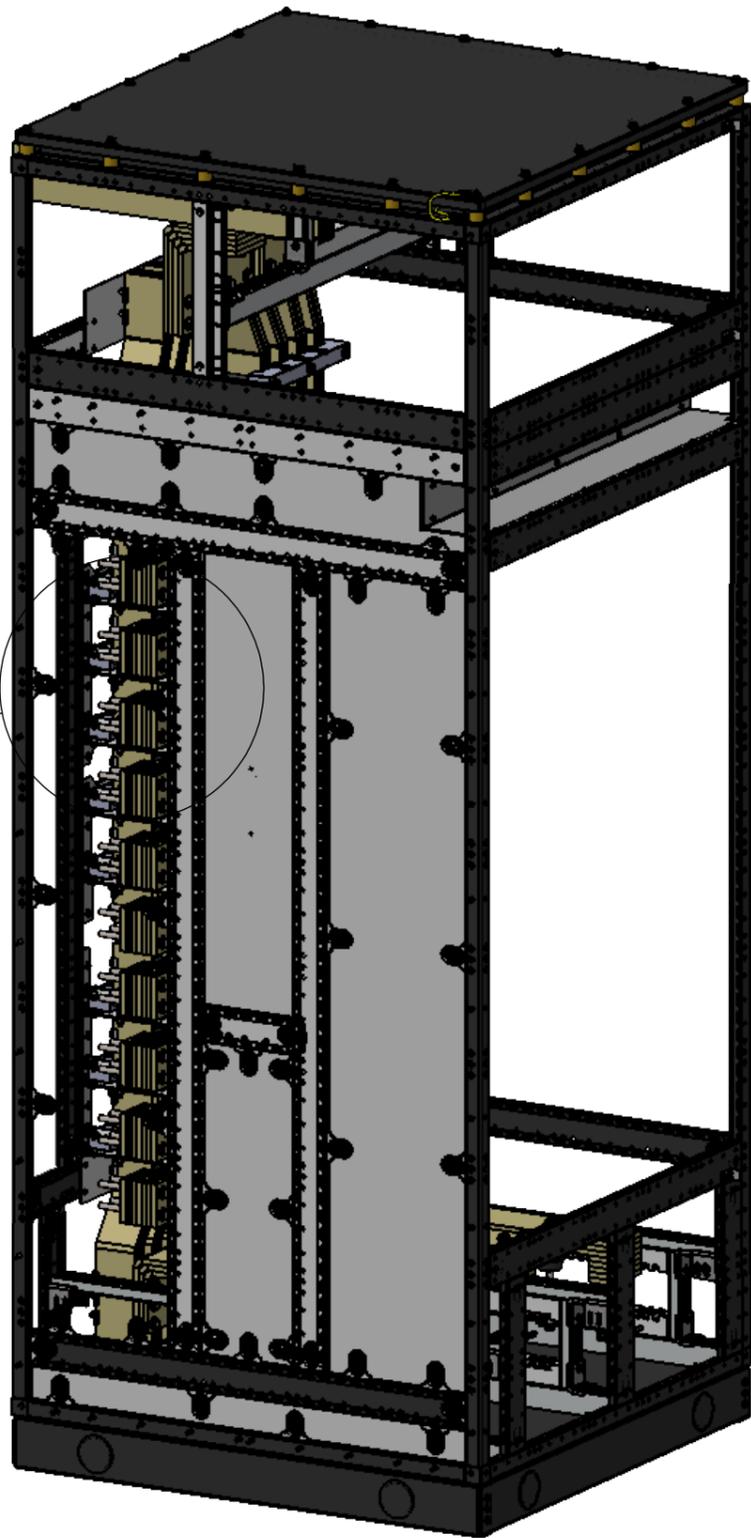
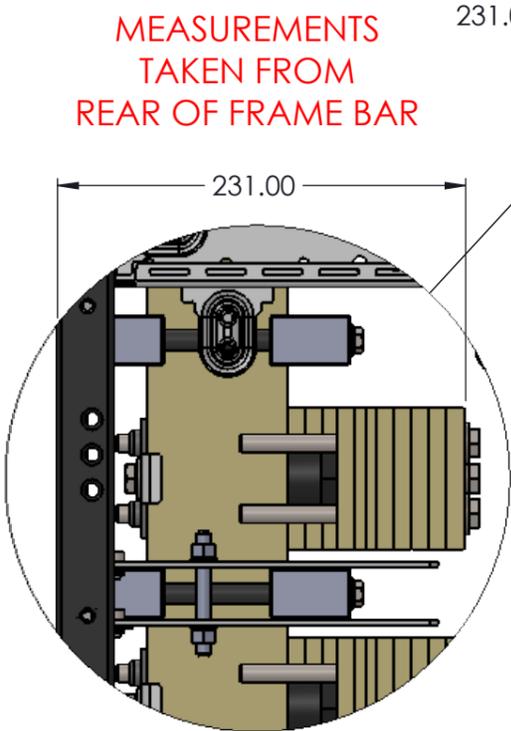
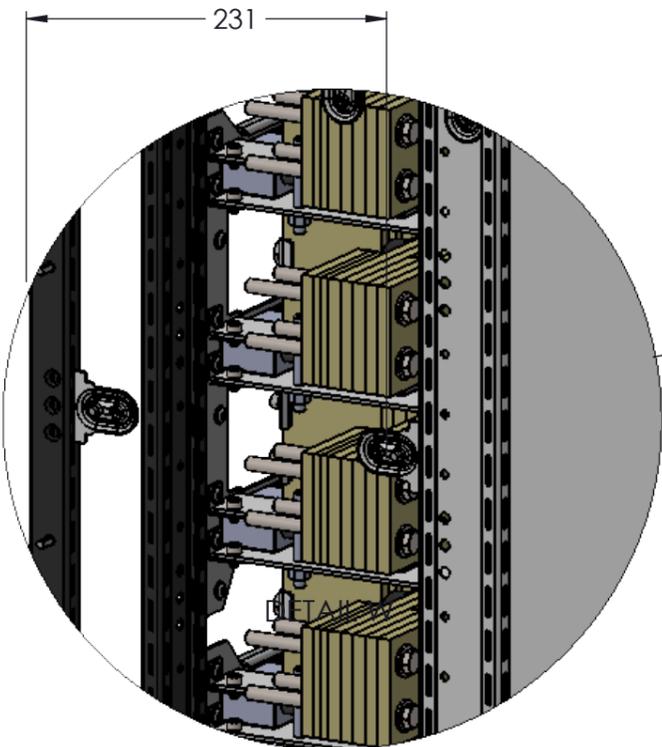
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C



LHS VIEW

LHS VIEW

D

D

I	CORPORATE CAGE CODE	505 N. CLEVELAND AVE WESTERVILLE, OHIO 43082	IO INTERFACE CONNECTIONS	IO CABINET INTERFACE CONNECTION DETAILS
	1EDC2		PART NUMBER	DESCRIPTION
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			XX ±.38	XXX ±.015
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			ANGULAR	±1.5*
DESIGNED BY:	DATE:	WEIGHT:	PART DESCRIPTION	
Bryan.Harkin	12/12/2024	894375.01	IO CABINET INTERFACE CONNECTION DETAILS	
DRAWN BY:	DATE:	SHEET:	CONTROL CHARACTERISTICS	SCALE
Bryan.Harkin	13/05/2025	1 / 1	FIRST ANGLE PROJECTION	A3 1:12.5
			DOCUMENT NUMBER	REV
			IO INTERFACE CONNECTIONS	01



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