iVario Breakout & iXRS Pre-Stage Kit Generation 3 Manual

PN OE-565-BASE / OE-565-PRESTAGE

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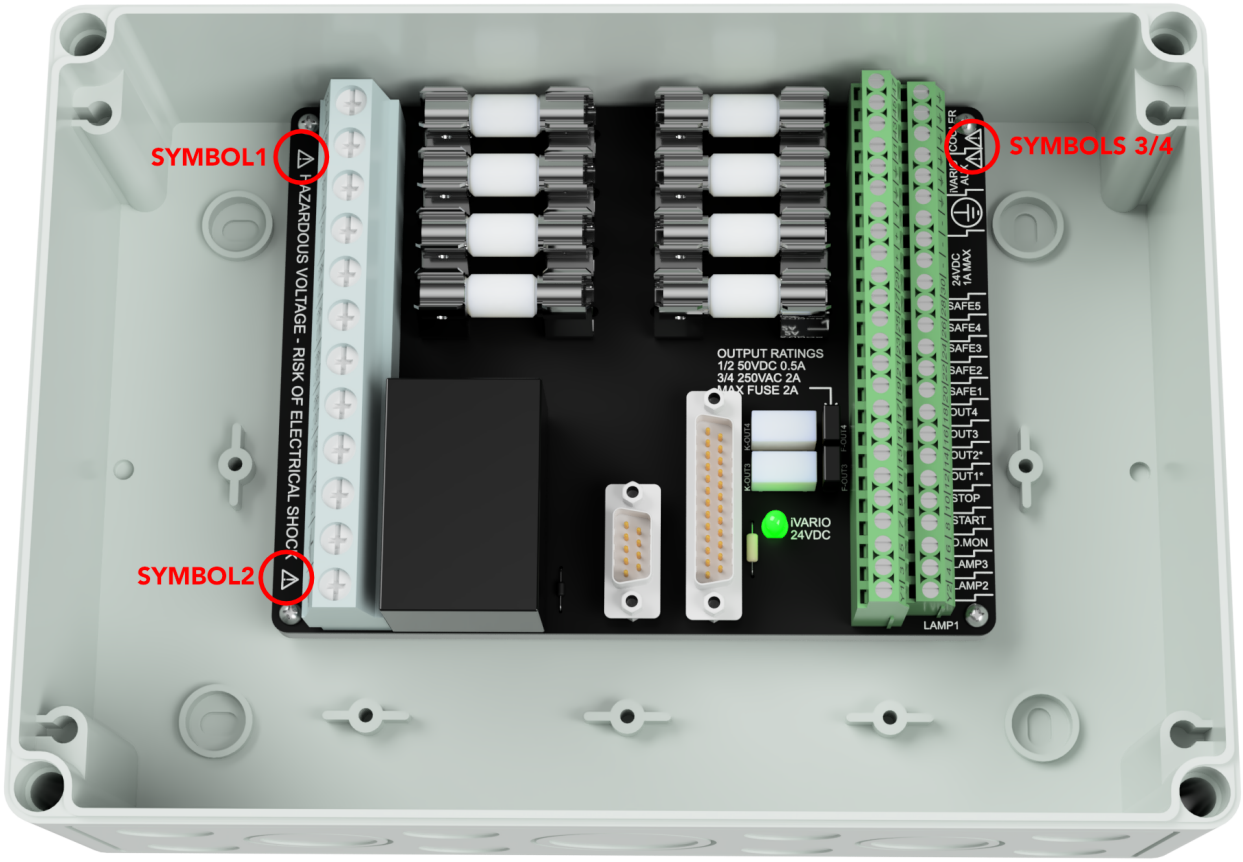
Warning Symbols



SYMBOL	DESCRIPTION
	Hazardous voltage warning symbol for the OE-565 circuit board. This symbol is located on the physical circuit board to warn of terminal blocks that contain hazardous live voltages (208VAC). The service person working on OE-565 should never remove the lid, install/uninstall any wires, install/uninstall any fuses, or tighten/loosen any terminal blocks with the board powered. Hazardous voltage warning symbol for the OE-565 manual. Risk of electrical shock.

There are four hazardous voltage warning symbols on the OE-565 circuit board. These symbols are for the following:

Symbol	Voltage	Terminal Blocks
SYMBOL 1/2	208VAC	L1, L2, L1 OUT, L2 OUT, L1 IN, L2 IN, PC1 L1, PC1 L2, PC2 L1, PC2 L2
SYMBOL 3/4	208VAC	Y41, Y43, Y45, Y47

Overview

The iVario Breakout [PN OE-565-BASE] is an electrical interface that significantly eases the setup of the iVario platform by providing a terminal block interface between the iVario high voltage generator and in-field x-ray cabinets/rooms, safety devices/interlocks, and manufacturing equipment. The iVario breakout is meant to be a quick and permanent solution to get x-ray systems using COMET Technologies iVario platform up and running in the field with minimal effort and resources.

Highlights

- Compatible with iVario 100kV, 160kV, 225kV, 320kV, 450kV, 600kV models
- Compatible with iVario 2250W and 4500W models
- Single 208VAC facility input power connection
- Power Outputs:
  - iVario Mains Power
  - iVario Auxiliary Power
  - Cooler/Chiller Power
- Fuses (13/32 x 1-1/2 in [10x38mm]):
  - iVario Mains Power 15A
  - iVario Auxiliary Power 3A
  - Cooler/Chiller 10A
- User Devices:
  - High Voltage Door Interlock (CDRH)
  - Five low voltage interlocks for use with emergency stops, low voltage door switch, MAINS key switch…
  - Enable Button
  - Stop Button
  - Three Current Monitored Warning Lamps (24VDC)
- iVario X8 Cable
  - Enable/Stop Buttons
  - Customer Safety Interlock
  - iVario Outputs 1-4
    - OUTPUT1/2 - 50VDC, 0.5A
    - OUTPUT3/4 - 250VAC, 2A
  - 24VDC Supply @ 1A
- iVario X10 Cable
  - All three 24VDC monitored warning lamps
  - Customer dynamic monitoring
- Electrical Enclosure
  - M20-M40 Knockouts (40 total)
  - Rated up to IP66
  - Wall, Panel or Standalone mountable
  - Can mount directly to iVario generator with available bracket
  - Dimensions: 10 x 7 x 3.5 inches
- PCB Mounting Options:
  - DIN Rail Mount
  - Panel/Wall Mount

IP Enclosure Details

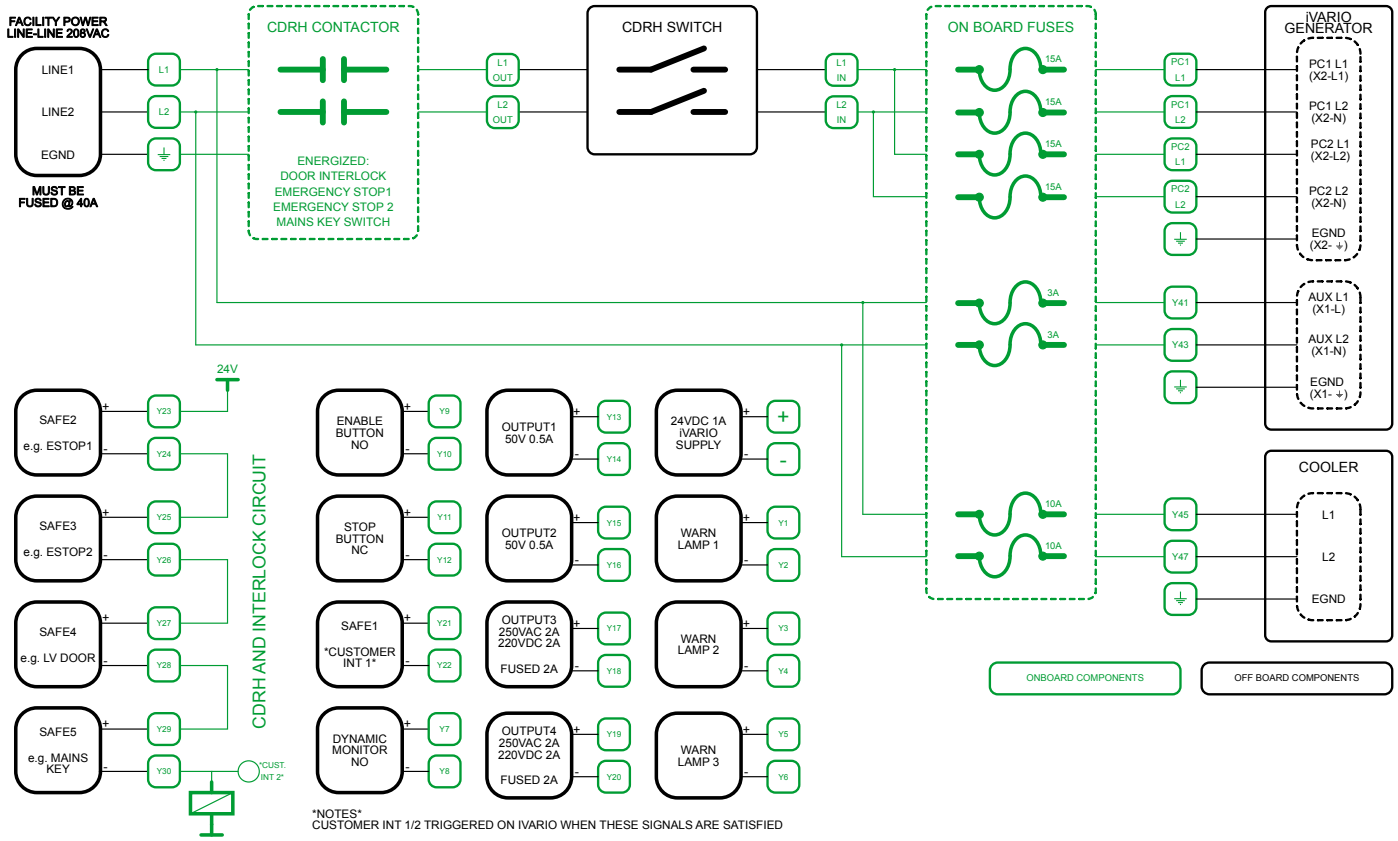
The iVario Breakout comes standard with an electrical enclosure [PN: OE-565-BOX] which has an IP rating up to IP66. By default, the DB9/DB25 connectors for iVario X8/X10 mounted on the cover of the electrical enclosure are not IP rated and therefore reduce the overall enclosure rating to IP60. In order to achieve a rating of IP66, Oenoke Engineering can supply panel mount DB9/DB25 connectors rated for IP66-IP67.

- UL 508, type 4X & 12K specifications
- Up to IP66 rating, default IP60
- IK08 impact rating
- Knockouts
  - 24 x M20
  - 4 x M25/32
  - 4 x M32/40

Ordering & Part Numbers

Part Number	Description
OE-565-BASE	iVario Breakout, standard package, includes: OE-565-PCB, OE-565-BOX, OE-565-DB9, OE-565-DB25
OE-565-PCB	iVario Breakout circuit board. Use for field replacements or when no electrical enclosure is necessary
OE-565-BOX	Electrical enclosure for circuit board. Can be wall mounted, panel mounted or used standalone on table/equipment
OE-565-DB9	Standard DB9 extension cable from circuit board to electrical enclosure
OE-565-DB25	Standard DB25 extension cable from circuit board to electrical enclosure
OE-565-DB9IP	DB9 extension cable from circuit board to lid of electrical enclosure. For use when an IP rating of IP66 is required
OE-565-DB25IP	DB25 extension cable from circuit board to lid of electrical enclosure. For use when an IP rating of IP66 is required
Replacement Fuses	Replace MAINS with UL248-4 Class CC, 600VAC, 200,000A interrupting rating. Fuses are 4x 15A, 2x 10A, and 2x 3A. Replace OUTPUT3/4 fuses with TE5 (8.5x4x8mm) board mount fuses - 250VAC, 2A MAX

High Level Schematic



Warning - the *CDRH and Interlock Circuit* is designed for protection of the CDRH switch and to monitor interlocks. For information on safety, please see section *Safety Considerations.*

Installation Guide

Intended Use of iVario Breakout

The iVario Breakout is intended for easing the permanent installation and setup of the COMET iVario generator platform at a customers site. iVario Breakout is only approved for installations on COMET iVario generators rated for ≤4500W operation. Generator operation over 4500W is not approved and can lead to damage to the product and connected components including the iVario.

Manufacturer Information

iVario Breakout (OE-565-BASE) and iXRS Pre-Stage Kit (OE-565-PRESTAGE) are manufactured by:
Oenoke Engineering, LLC
P.O. Box 2213
Shelton, CT 06484

Environmental Ratings

Parameter	Max Rating
Ambient Air Temperature	-20 - 45°C
Relative Humidity	90% non-condensing
Altitude	2000m

Mounting

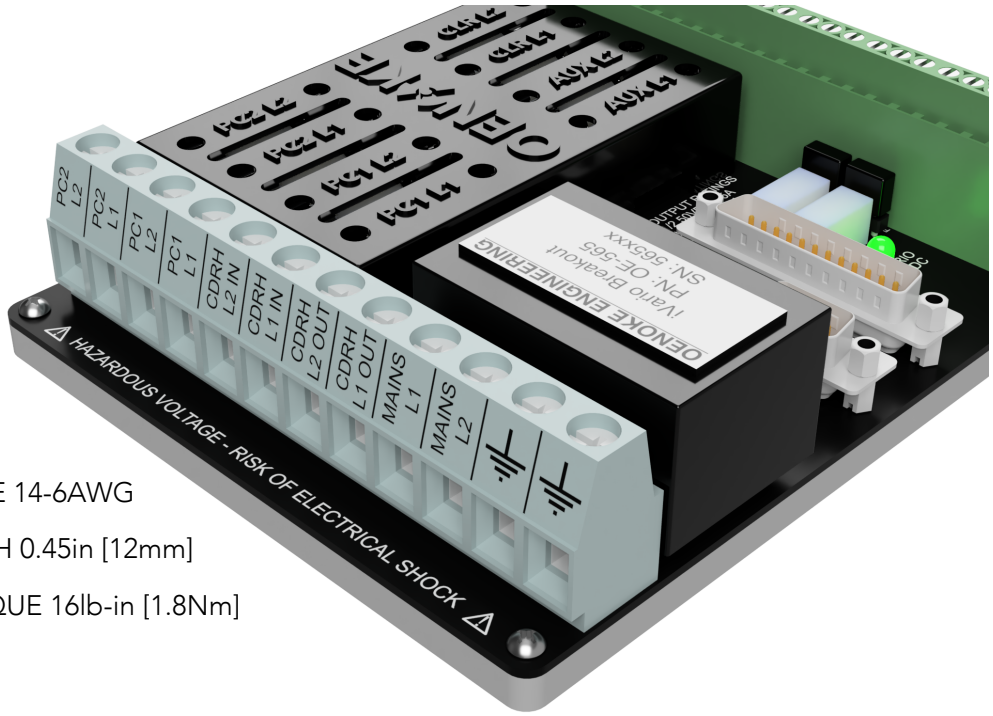
The iVario Breakout can be mounted in one of many ways including:

- Simply placed on top of iVario generator, table, or other equipment with no fastening
- Fastening to a wall or table via the four mounting holes located on the bottom of enclosure
- Fastening to an electrical panel, including inside an electrical enclosure, via the four mounting holes located on the bottom of the OE-565-BOX
- The PCB itself can be mounted onto 35mm DIN rail or panel/wall
- For mounting dimensions and details please see *Dimensions* section

Other Considerations

- An external switch or circuit breaker or disconnect box, providing power to the iVario Breakout must be located in an easily reached location. The switch/breaker/disconnect must be marked as a disconnect for the iVario Breakout
- All electrical installations are to be performed in accordance with local codes (ANSI/NFPA 70, National Electrical Code (NEC)); designed to b installed in accordance with the Canadian Electrical Code (CEC), Part 1, CSA C22.1, and CSA C22.2 No.0; or designed to comply with both the NEC and CEC
- For overcorrect devices outside of the iVario Breakout:
    - Multiple-pole circuit breakers interrupts all neutral and ungrounded connectors of the mains supply simultaneously
    - Single fuse is connected in the ungrounded supply conductor
    - Fuseholders for fuses used in both conductors mounted adjacent to each other are fuses of the same ratings and characteristics
    - The screw shell of a plug fuse holder and the ACCESSIBLE contact of an extractor fuse holder connected to the ungrounded supply conductor is connected towards the load. The ACCESSIBLE contact or screw shell of fuse holders connected in the neutral (grounded) conductor is located towards the grounded supply line.

Terminal Block Specifications

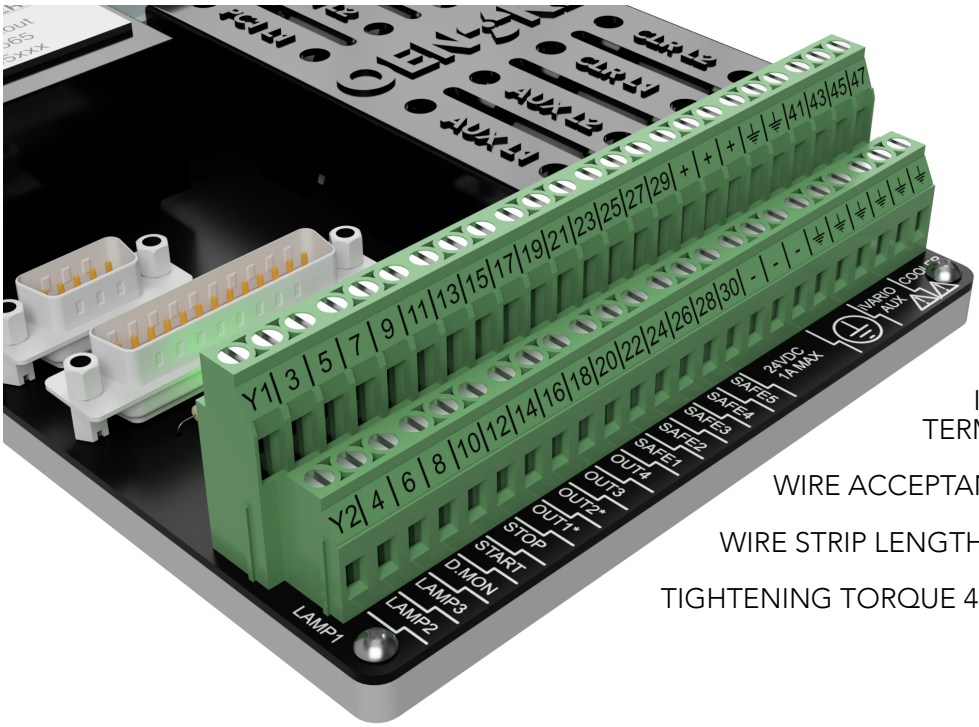


POWER
TERMINAL BLOCKS

WIRE ACCEPTANCE 14-6AWG

WIRE STRIP LENGTH 0.45in [12mm]

TIGHTENING TORQUE 16lb-in [1.8Nm]



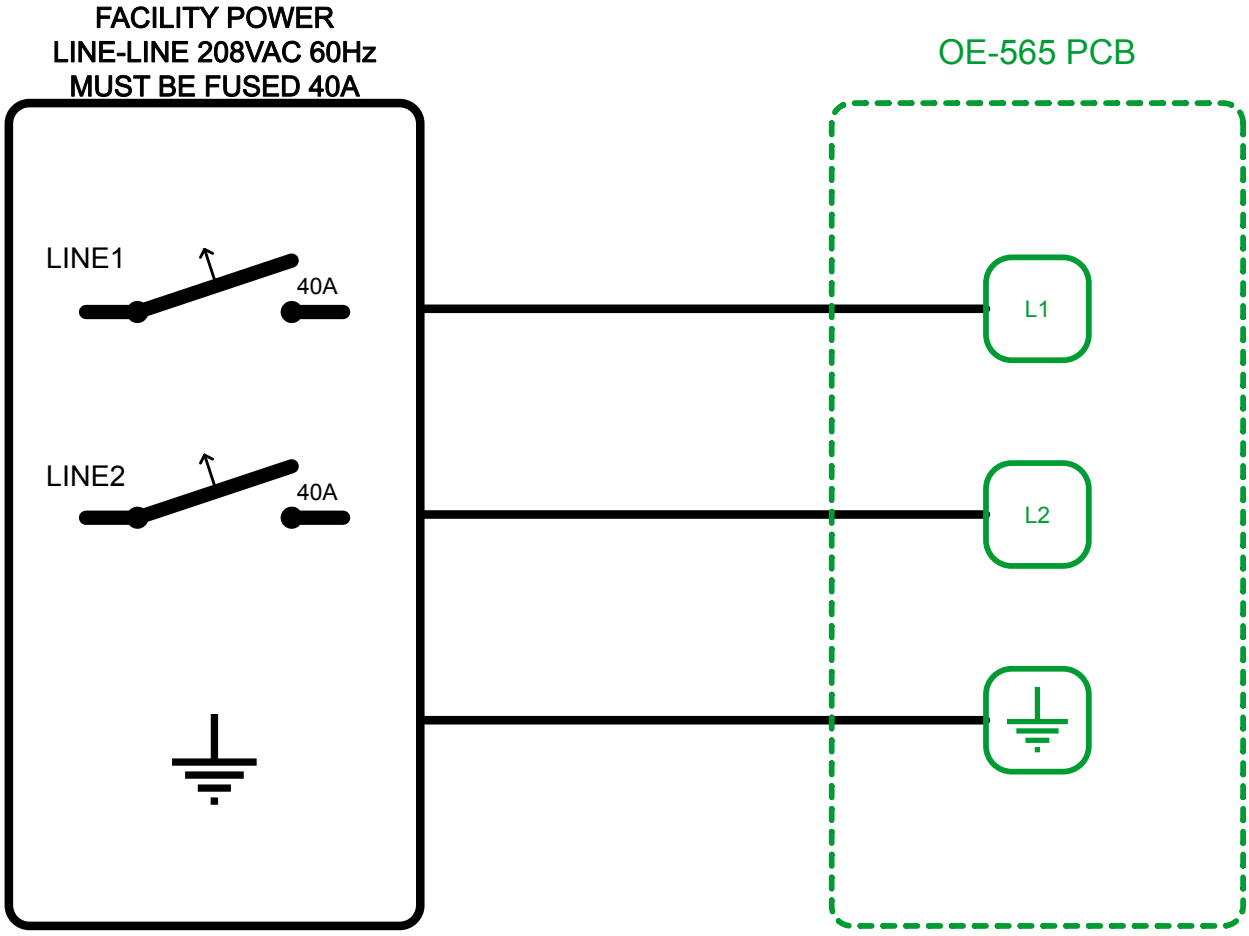
INPUT/OUTPUT
TERMINAL BLOCKS

WIRE ACCEPTANCE 24-14AWG

WIRE STRIP LENGTH 0.25in [6-7mm]

TIGHTENING TORQUE 4.3lb-in [0.49Nm]

Facility Input Power

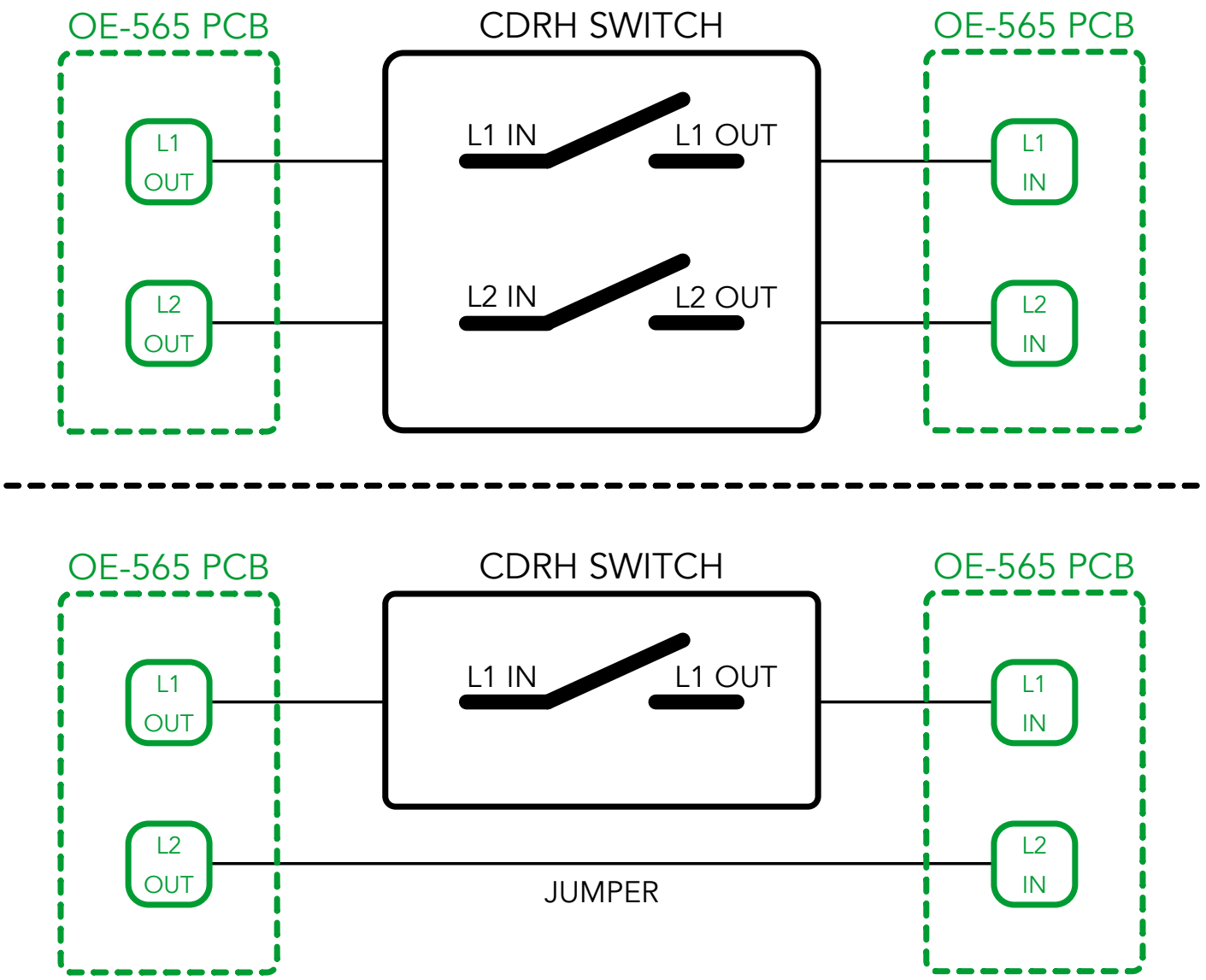


Connect the MAINS power cable to iVario Breakout Board as shown above. **NOTE - Each Line must be fused at 40A by the customer. Failure to provide 40A fuses may result in damage to the iVario Breakout and connected hardware!** Cables/wires should be rated for ambient temperatures 60°C and above.

Refer to *Terminal Block Specifications* section, *POWER TERMINAL BLOCKS* subsection for proper wire insertion specifications

⚠	**HAZARDOUS VOLTAGE - RISK OF ELECTRICAL SHOCK - DISCONNECT INPUT POWER BEFORE INSTALLING CABLING**

CDRH Switch

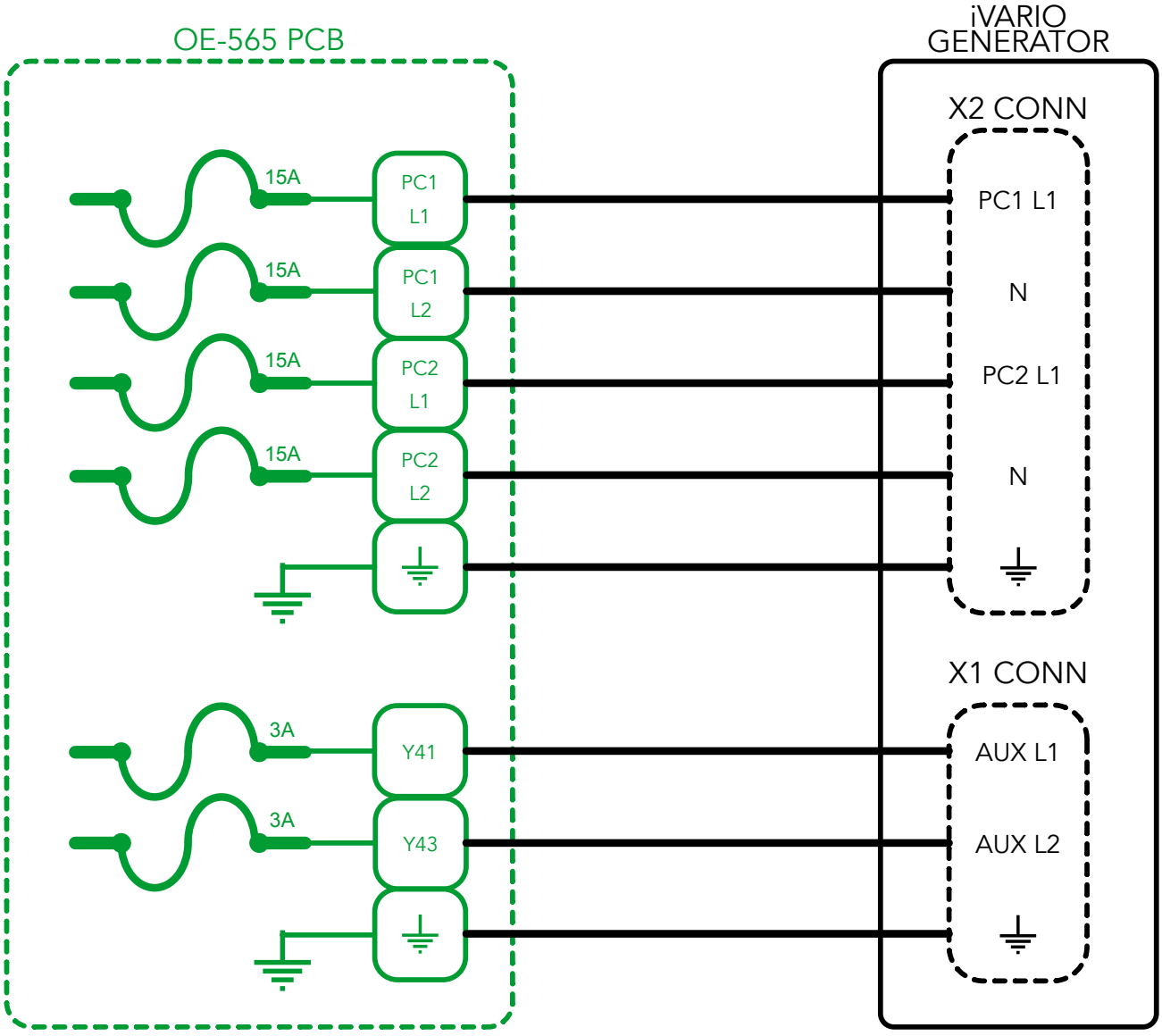


Connect CDRH switch to the iVario Breakout Board as shown above. It is recommended both *L1* and *L2* be broken through the switch. If only *L1* is broken, *L2* must be shorted/jumped as shown in the lower diagram.

Refer to *Terminal Block Specifications* section, *POWER TERMINAL BLOCKS* subsection for proper wire insertion specifications

	**HAZARDOUS VOLTAGE - RISK OF ELECTRICAL SHOCK - DISCONNECT INPUT POWER BEFORE INSTALLING CABLING**

Generator Power (X1/X2)

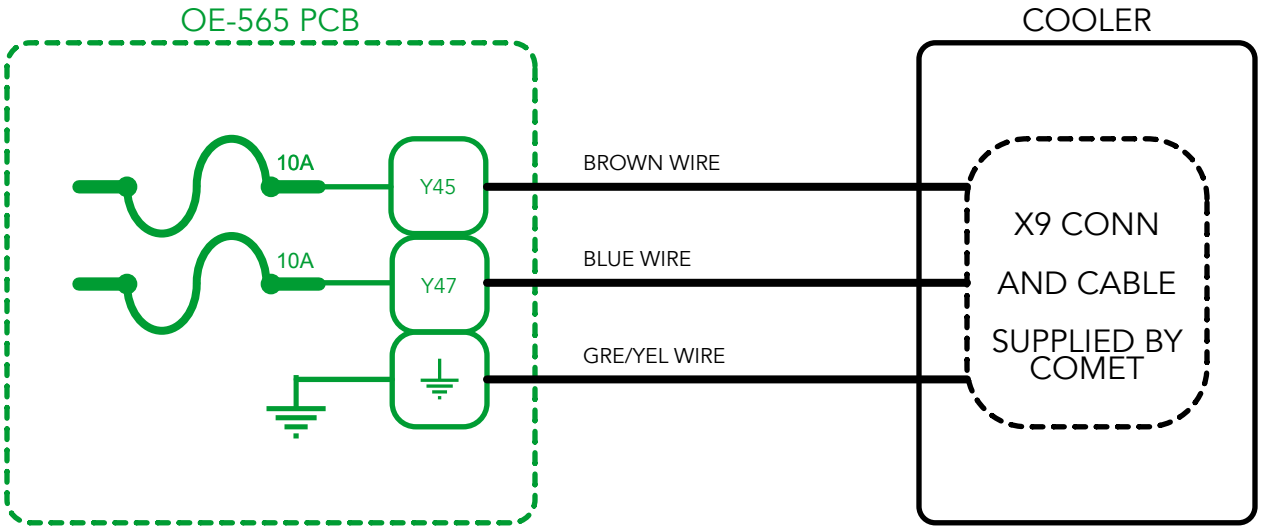


Wire the iVario *X2* MAINS power connector and *X1* AUXILIARY power connector to iVario Breakout Board as shown above. Replacement fuses are to be UL248-4 Class CC, 600VAC, 200,000A interrupting rating.

Refer to *Terminal Block Specifications* section, *POWER TERMINAL BLOCKS* and *INPUT/OUTPUT TERMINAL BLOCKS* subsection for proper wire insertion specifications

⚠	**HAZARDOUS VOLTAGE - RISK OF ELECTRICAL SHOCK - DISCONNECT INPUT POWER BEFORE INSTALLING CABLING**

Cooler Power Cable (X9)

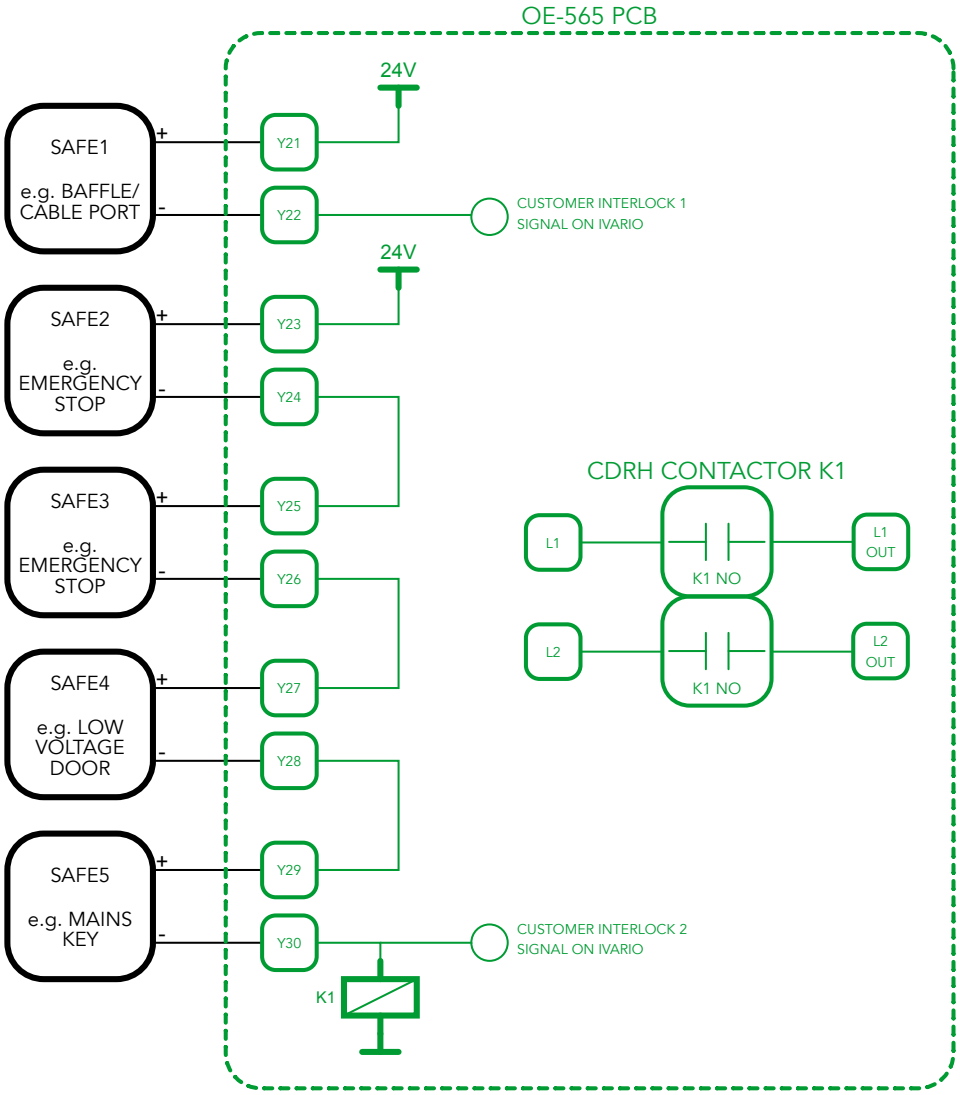


Connect Cooler Power Cable *X9* to the iVario Breakout Board as shown above with the COMET supplied cooler power cable. Replacement fuses are to be UL248-4 Class CC, 600VAC, 200,000A interrupting rating.

Refer to *Terminal Block Specifications* section, INPUT/OUTPUT *TERMINAL BLOCKS* subsection for proper wire insertion specifications

	**HAZARDOUS VOLTAGE - RISK OF ELECTRICAL SHOCK - DISCONNECT INPUT POWER BEFORE INSTALLING CABLING**

CDRH and Interlock Monitoring Circuit



This circuit provides an interface for the CDRH switch, required by FDA CFR1020.40, in a manner that protects the switch from electrical damage during normal operation. The low voltage interlock must "make" after the high voltage contacts when the door is closing, and it must "break" before the high voltage contacts when the door is opening. It is the responsibility of the integrator to ensure this procedure is followed.

The interlocks connected to this circuit are monitored by the iVario generator *Customer Interlock 2* and will trigger an interlock fault, along with turning the cooler off after a specified amount of time (see iVario manual for details).

Warning - this circuit is designed for protection of the CDRH switch and to monitor interlocks. For information on safety, please see section *Safety Considerations.*

Safety Considerations

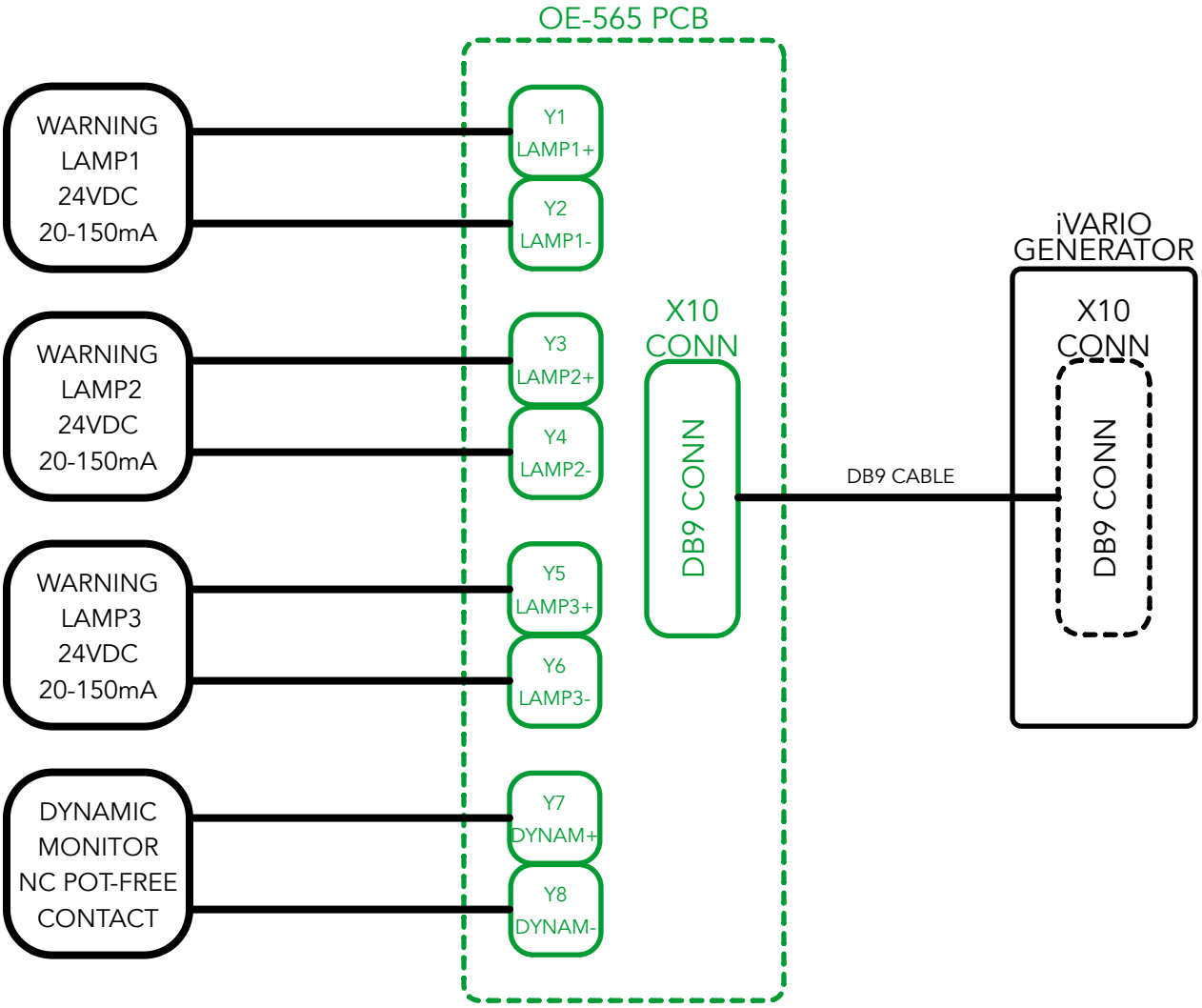
The CDRH switch, along with the opening of a cabinet or vault door, will always terminate the generation of x-rays regardless of a component failure within the iVario Breakout. However, an internal component failure can result in loss of functionality of a connected emergency stop or other connected safety devices, thus a non-failsafe scenario.

To make the iVario Breakout failsafe, external components must be installed. It is the responsibility of the integrator to define applicable safety standards, including FDA CFR1020.40, and implement external components to meet said requirements.

Oenoke Engineering offers a field-installable *Safety Kit* for the iVario Breakout or iXRS Pre-Stage Kit to meet minimum requirements of ISO 13849-1 PLd and FDA CFR1020.40. This kit can be installed on existing and new installations.

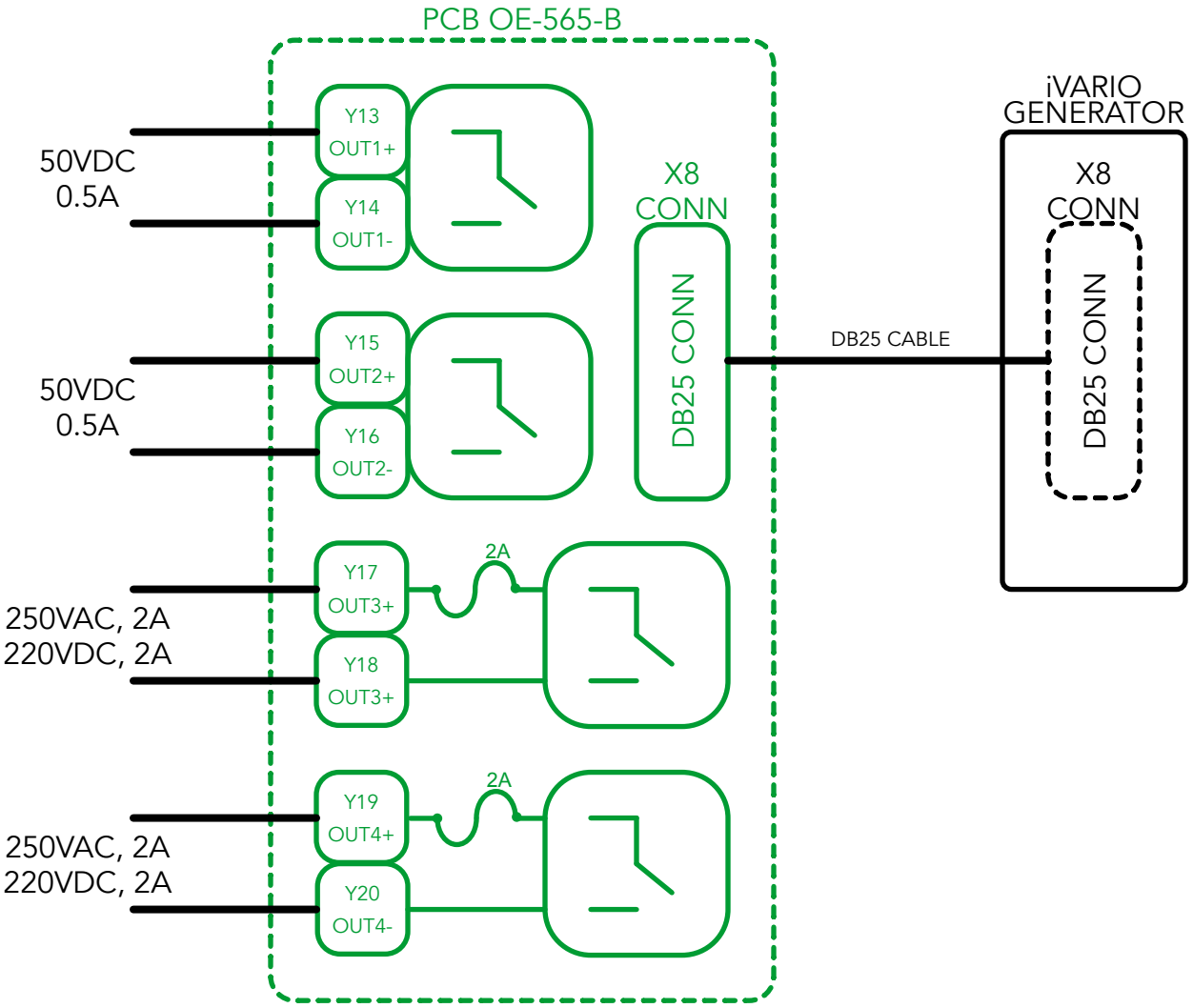
For more details on safety considerations or our offered safety kit, please contact Oenoke Engineering.

Warning Lamps (X10)



Connect a DB9 cable from iVario generator connector *X10* to iVario Breakout connector *X10*. Wire in needed warning lamps as shown above. Each warning lamp is monitored by the iVario generator and can be programmed for different operation via the iVario Web UI.

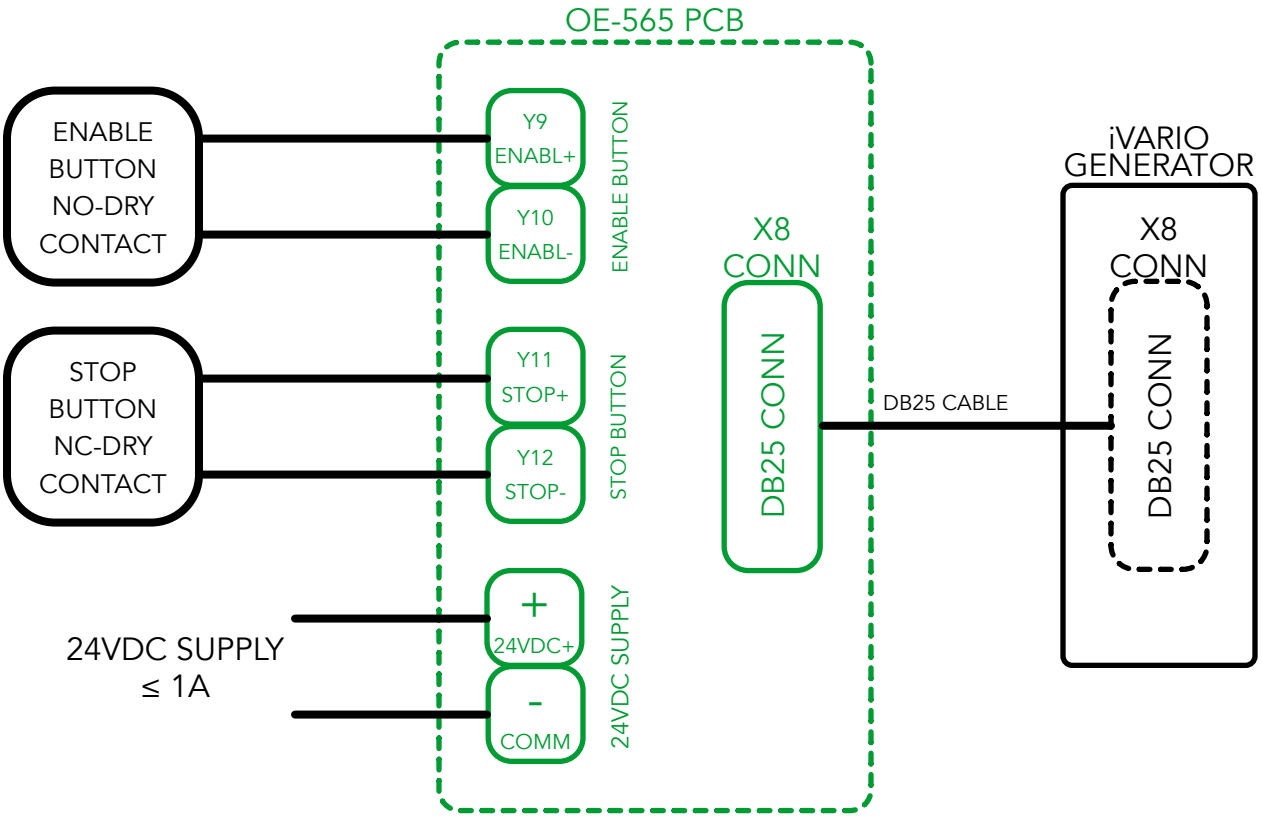
iVario Outputs (X8)



Connect a DB25 cable from iVario generator connector *X8* to iVario Breakout connector *X8*. Wire in needed outputs as shown above. Each output can be programmed for different operation via the iVario Web UI.

Replacement fuses are Littlefuse Inc. [PN 39212000000] or similar. Fuses can be purchased from Digi-Key [PN F5502CT-ND] or similar distributors.

Other Inputs (X8)



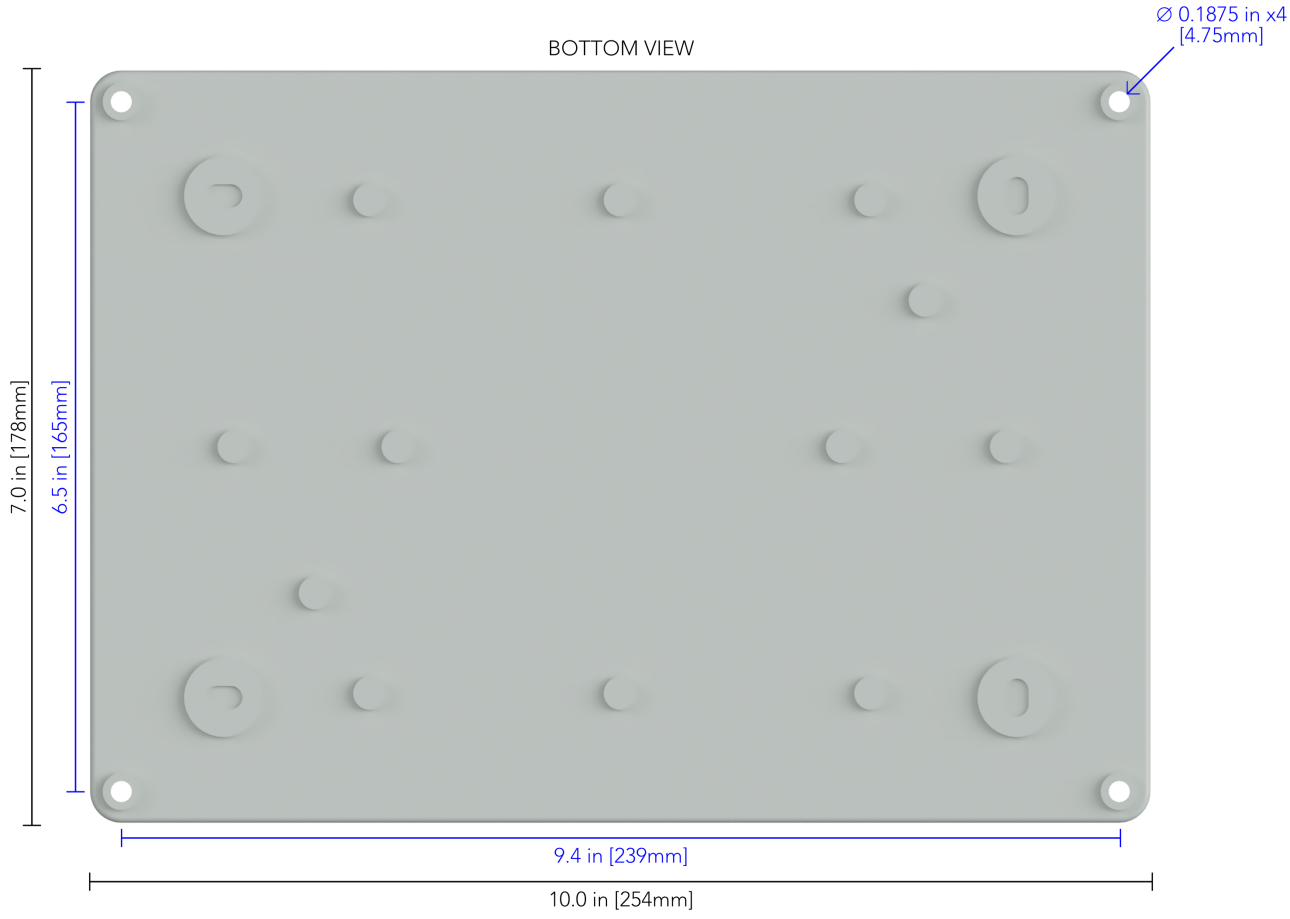
Wire in an ENABLE BUTTON (if needed) as shown above. Wire in a STOP BUTTON as shown above. If no STOP BUTTON is used, it must be shorted/jumped in order to make x-rays.

A 24VDC power supply is available for customer use, as shown above, with a current output limit of 1A. This supply is sourced from the iVario generator.

Dimensions

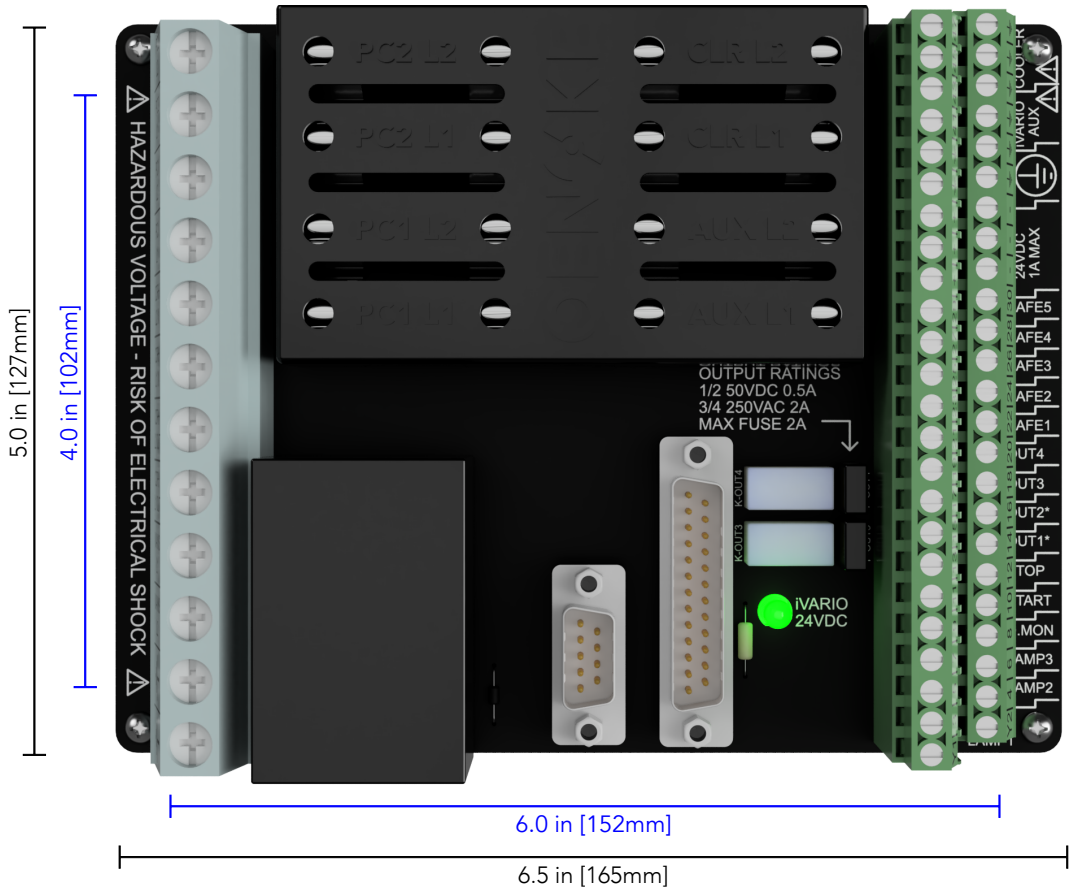
Enclosure Dimensions and Mounting

Mounting dimensions shown in BLUE



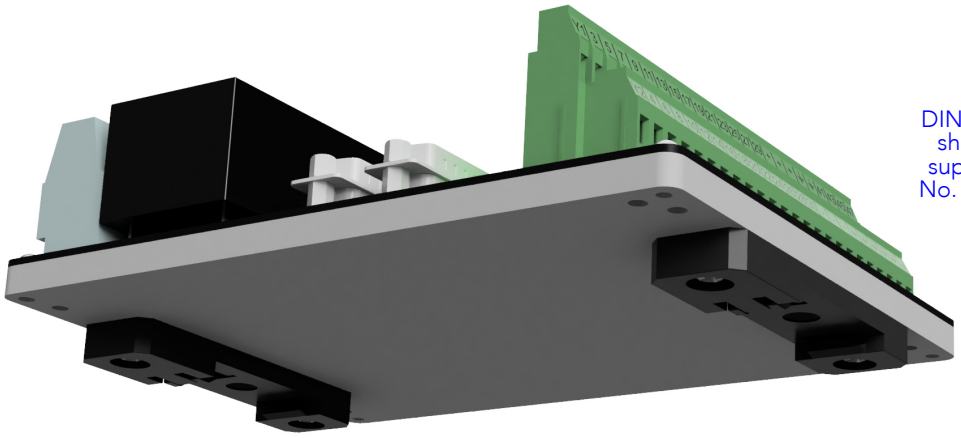
PCB Dimensions and Panel/DIN Mounting

Mounting dimensions shown in BLUE



Panel/wall mounting holes located under PCB on mounting plate

Use No. 6 pan head cap screws x4



DIN Mounting brackets shown installed. Use supplied brackets and No. 6 tapping screws x4

Service Manual

⚠	**HAZARDOUS VOLTAGE - RISK OF ELECTRICAL SHOCK - DISCONNECT INPUT POWER BEFORE SERVICING**

Any service performed on the iVario Breakout should be done so with the input power disconnected. There are no serviceable parts that need maintaining while the input power is connected. Input power should always be disconnected before the lid is removed as there is an electrical shock hazard from the exposed fuses.

The iVario Breakout requires only one type of service: replacing blown fuses. There are no other services of any kind required other than replacing blown fuses. In the event that a fuse blows the following steps in the proceeding section must be followed for replacement:

Fuse Replacement

1. DISCONNECT INPUT POWER TO iVario Breakout. Power must be off when the lid is removed!
2. Remove the lid by using a large slotted (flathead) screwdriver to loosen each screw in the four corners of the enclosures lid. The screws will back out to a certain point and then remained captured - the screws do not need to be completely removed.
3. While holding the circuit board down against the enclosure, remove the desired fuse using specialty fuse remover or pliers
    3.1. Oenoke Engineering recommends using a specialty fuse remover for 13/32" diameter fuses such as PN HCTR8 from AutomationDirect.com [see side image for reference]

4. Install the new fuse with specialty fuse remover or pliers
5. Reinstall the lid and tighten the four screws using a large slotted (flathead) screwdriver

iXRS Pre-Stage Kit

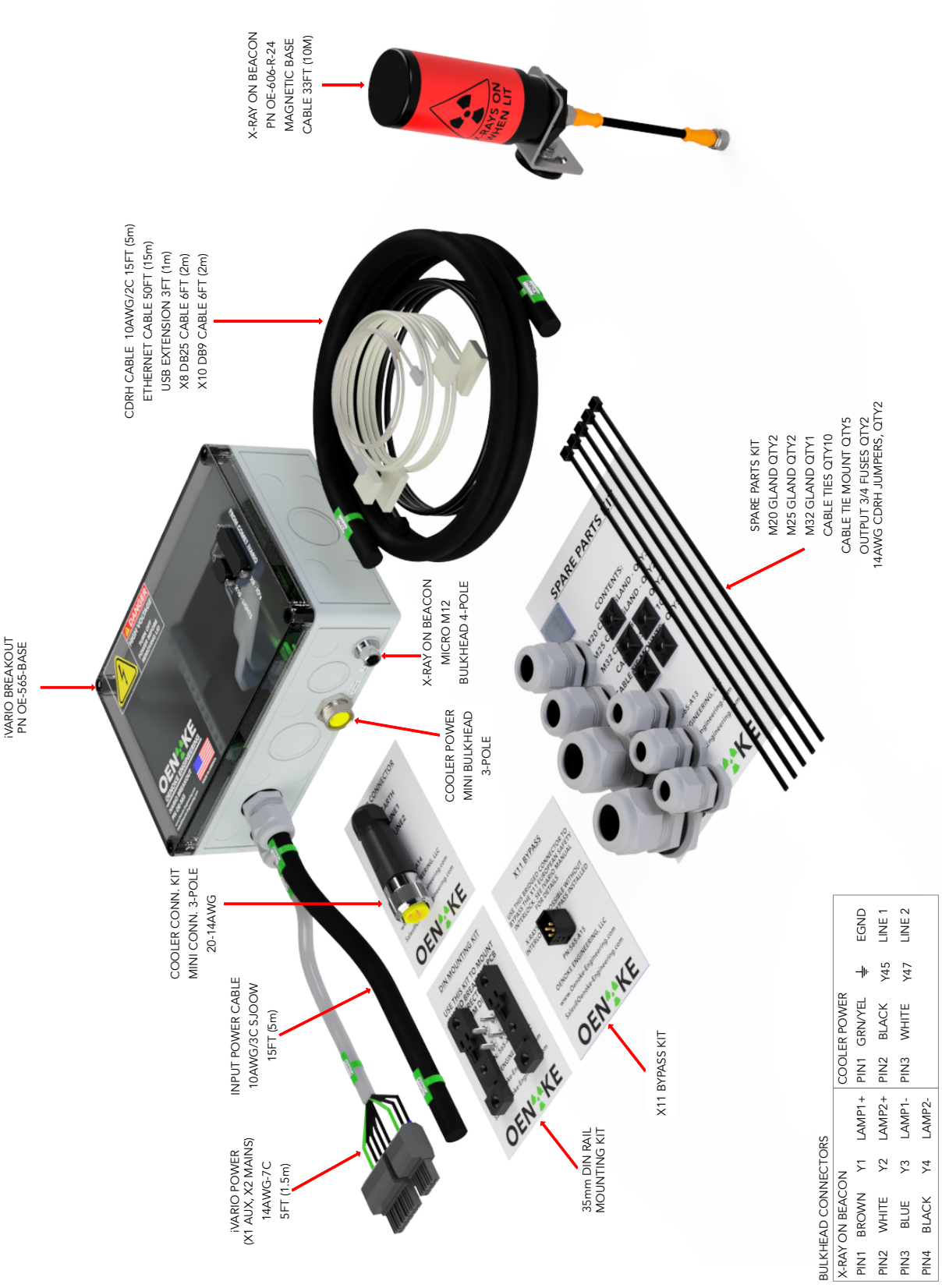
Overview

The iXRS Pre-Stage Kit is an add-on to the iVario Breakout (PN OE-565-BASE) which makes installation of the iXRS platform even easier due to the significant amount of pre-wiring and supplied accessories that come standard in this kit. This kit contains everything needed to get a basic installation of the iXRS platform completed with minimal effort.

Highlights

- Includes all highlights and features of the iVario Breakout
- Pre-wired facility input power cable
  - 15ft, 10AWG, 3 conductor, SOOW
- Pre-wired iVario X1/X2 mains and auxiliary power cable with generator power connectors
- Pre-wired Cooler power bulkhead
- Cooler power connector, field wireable
- Pre-wired X-Ray Beacon bulkhead
- LED X-Ray Beacon
  - Magnetic Base
  - ISO W003 Radiation Symbol Label
  - “X-RAYS ON WHEN LIT” label
  - Custom labels available
  - 30ft power cable, M12 4-pole
- X11 European safety interlock bypass kit
- CDRH cable
  - 15ft, 10AWG, 2 conductor, SOOW
  - unterminated, needs installation
- X8 IO cable - DB9, 6ft
- X10 Warning lights cable - DB25, 6ft
- X4 Ethernet cable - 50ft
- X6 USB extension cable - 3ft
  - For use with COMET IP Cover
- Spare Parts Kit
  - M20 cable gland, QTY3
  - M25 cable gland, QTY2
  - M32 cable gland, QTY2
  - Cable ties, QTY10, 11in
  - Cable tie adhesive mounts, QTY5
  - Snap-together fastening pads with adhesive backing for mounting iVario Breakout onto generator or panel

iXRS Pre-Stage Specifications



BULKHEAD CONNECTORS

X-RAY ON BEACON			
PIN1	BROWN	Y1	LAMP1+
PIN2	WHITE	Y2	LAMP2+
PIN3	BLUE	Y3	LAMP1-
PIN4	BLACK	Y4	LAMP2-

COOLER POWER			
PIN1	GRN/YEL	⏚	EGND
PIN2	BLACK	Y45	LINE 1
PIN3	WHITE	Y47	LINE 2

Revision History

Revision	Description
A	Original Release
B	Added *Safety Considerations* section. Updated *High Level Schematic* section.