

digital keying modular
interface audio
converters analogue video

Power supplies for the Indigo frames

(Includes PSU-75i, PSU-150i, PSU-160i and PS-55i)

USER MANUAL



Contents

1	Introduction	2
2	Installation	4
	General Safety Summary	4
2.1	Crystal Vision PSU modules	5
	Mains Combiner	7
	Inserting and removing power supplies	9
	Power supply relay connections	11
3	Trouble shooting	12
	Reading LED status and active display messages	12
	Replacing the mains input fuses	13
	Replacing the PSU-150i-48V fuse	14
	Indigo 1-DP	15
3.1	Frequently asked questions	16
4	Specification	17

Revision 1 Indigo PSU-160i and dual PS-55i information added 28-02-07

1 Introduction

The Indigo range comprises of four frame types, 4U frames for up to 24 modules, 2U frames for up to 12 modules, 1U frames for up to 6 modules and a 1U Desktop Box for up to 2 modules. Each frame type has several front panel variants, being, either a passive front panel, an active panel with controls and a display or a Statesman-enabled version without controls or a display. Apart from the Indigo DT Desktop box, all the Indigo range of frames has plug-in PSU modules.

This manual is about the plug-in Indigo PSU modules fitted to 4U, 2U and 1U frames.

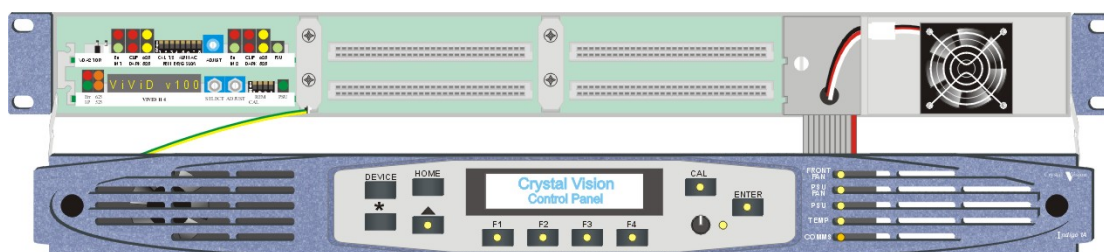
The Indigo range of plug-in PSU module are available in power outputs of, 75 watt (PSU-75i), 150 watt (PSU-150i), 160 watt (PSU-160i) and dual 55 watt for the Indigo 1-DP (PS-55i). The 150-watt PSU is also available with 48Vdc input, (PSU150i-48V).

All of the Indigo PSU's have a built-in processor, which communicates with the front panel display processor (referred to as a PIC) such information as power rail voltage levels (+5.75V and -6.0 V) and the PSU fan speed. The PSU also stores its own serial number in the non-volatile memory.

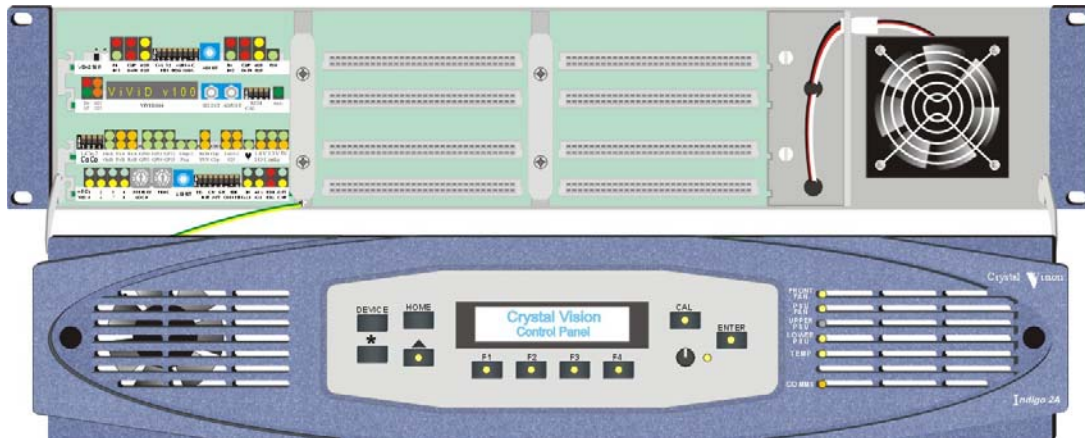
As the panel processor regularly receives status updates from the PSU processors about power rails and fan speed, the front panel is then able to update its status LEDs and control the alarm changeover relay according to the PSU condition. The relay contacts are available on the Remote sockets at the rear of the frame.

A cool operating temperature is maintained by a de-mountable fan that is positioned in front of the PSU bay, drawing air through the slotting in the front panel.

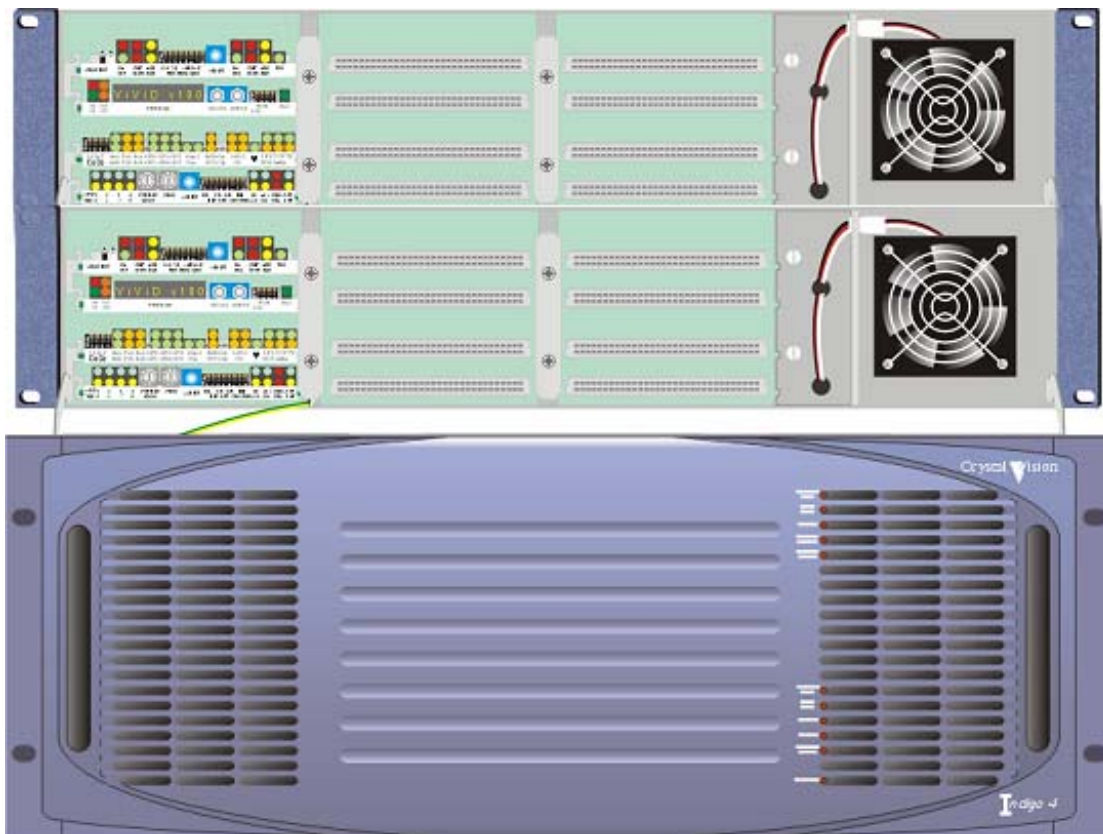
In general, the 75-watt PSU-75i was used in the 1U Indigo 1 frames and the 150-watt PSU-150i is used in both of the larger 2U and 4U frames. The recently introduced PSU-160i will in time supersede both the PSU-75i and PSU-150i. The dual PS-55i power supply modules can only be fitted into specially modified Indigo 1-DP frame.



The Indigo 1 Crystal Vision frame with front control panel open



The Indigo 2 Crystal Vision frame with front control panel open



The Indigo 4 Crystal Vision frame with front control panel open

2 Installation

These servicing instructions are for use by qualified personnel only. To reduce risk of electric shock, do not perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.

Refer also to the General Safety Summary below.

General Safety Summary

The following warnings are intended for user guidance and safety.

Ground This product must be grounded through the grounding conductor of the power cord.

Power cable Use only power cords that meet the required specification for this product.

Fuses To avoid fire hazard use only fuses of the type and rating specified.

Service These servicing instructions are for use by qualified personnel only. To reduce risk of electric shock, do not perform any servicing other than that contained in this manual unless you are qualified to do so. Refer all servicing to qualified service personnel.

Apart from procedures described in this manual there are no user serviceable parts within the frame. If the frame requires any other servicing it should be returned to the manufacturer or dealer.

On no account should the unit be powered whilst any covers are removed.

Ventilation The unit must have adequate ventilation. Installation should be in standard 19" racks with cool air circulation available at the front. The left and right ventilation grilles must not be obstructed.

EMC To comply with EMC regulations the following guide lines should be observed:

Do not operate this unit for extended periods with the front panel open.

Do not use the frame unless all the rear connector positions are filled, either with Crystal Vision Rear Modules, or with Crystal Vision blanking plates.

Do not operate the equipment with covers or panels removed.

General To avoid electric shock do not operate this product in wet or damp conditions.

To avoid injury or fire hazard do not operate this product in an explosive atmosphere.

Only use this rack in conjunction with Crystal Vision modules designed for that purpose.

2.1 Crystal Vision PSU modules

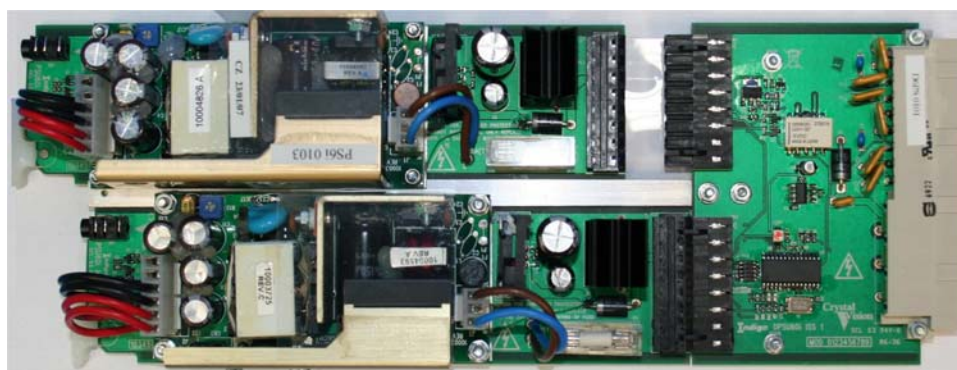
The Indigo range of plug-in PSU modules are available in power outputs of, 75 watt (PSU-75i), 150 watt (PSU-150i), 160 watt (PSU-160i) and dual 55 watt for the Indigo 1-DP (PS-55i). The 150-watt PSU is also available with 48Vdc input, (PSU150i-48V).



PSU-75i/150i/150i-48V – top view



PSU-160i



Dual PS-55i

Note: If two supplies are fitted they should both be the same version. i.e. 2 x PSU-75i, 2 x PSU-150i/160i The PSU-75i, PSU-150i and PSU-160i are **not** compatible with similar PSUs used on FR2AV and FR1AV Frames.

Indigo 1-DP power supply module

The Indigo 1-DP is fitted with a pair of removable slim-line 55-watt power modules. These modules fit side by side in the place of the single PSU module in an adapted Indigo 1 frame.

Note: The maximum power is limited to 55 Watts. Ensure this maximum is not exceeded by the inappropriate selection of cards fitted into the frame.

Left/Right conversion

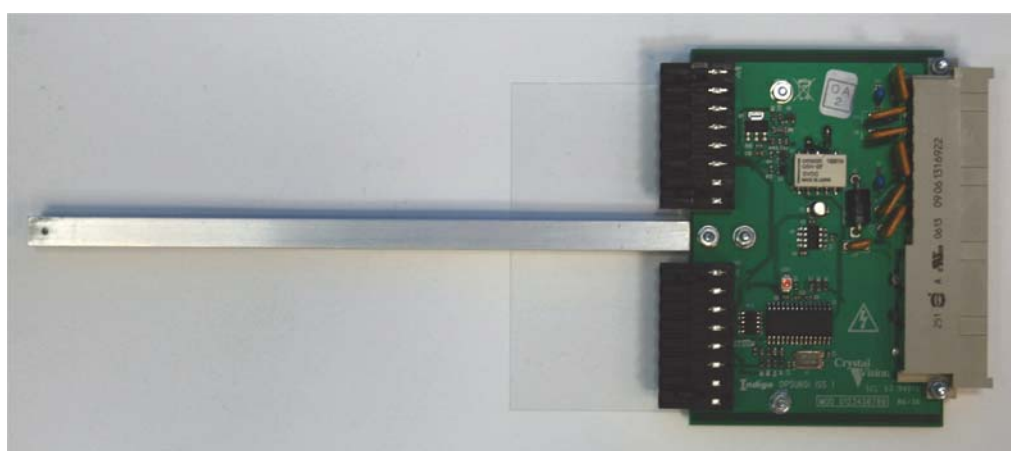
For a pair of PS-55i power supply modules to fit side-by-side in the 1U power supply bay it is necessary for them to be handed i.e. a power supply module set for the right hand position will not fit into the left-hand and visa versa. Reconfiguring a PS-55i to its opposite handing requires the power supply module to be repositioned on its carrier-board. The removal of two fixing screws will allow this repositioning of the module.



Underside of PS-55i showing alternate fixing positions

Dual power supplies mother-board.

The PS-55i power supply modules are mounted into the Indigo 1-DP frame by way of a retained mother-board. This mother-board which remains in situ contains the CPU, alarm relay and low voltage fusing for the frame bays. It is also the purpose of the mother board to connect the two PS-55i power supplies to the frame and supply the mains input connection. There are no user adjustments on this board so removal should not normally be necessary.



Dual PSU mother-board assembly

The dual power supply mother-board is retained by a pin at the front end of the central runner. This pin is press fitted into a hole in the chassis. To remove the mother-board lift the front of the runner to disengage the pin and pull forward to unplug and remove.

Refit in reverse ensuring that the pin is fully located into the chassis hole.

Mains Combiner

In situations where power redundancy is required in the Indigo 4 a third PSU module is added. For this third PSU to function in the event of one of the two mains inputs failing, the PSU-CMB or PSU-CMB2 mains combiner is fitted to the vacant slot in the upper PSU bay. The mains combiner has been designed to be narrower than a PSU module so preventing either the mains combiner or PSU module from being inter-changed. The mains combiner has a pair of alarm relay contacts which will close on the loss of a mains supply or internal fault. These contacts are available from the Remote connectors on the rear of the frame. See power supply relay connections for details.



Note: The PSU-CMB is used with the Indigo 4 frame when fitted with a PSU-150i third supply. The PSU-CMB2 is used with a PSU-160i third supply. PSU-CMB and PSU-CMB2 are not interchangeable.

Configuring Indigo 2 PSUs

The 2U Indigo 2 frame will take either one or two PSU modules. If one PSU module is fitted, either the upper or lower slot in the PSU bay may be used. If one or two power supply modules are fitted the frame must be configured accordingly. The position of the two-position slide switch on the top right of the front panel PCB must be set to one or two.



Indigo 2/2A/2S front panel hardware settings – PSU configuration

If both power supplies are fitted the slide switch is set to position two. If the switch is set to one and there are two power supplies fitted, the LOWER PSU LED will flash from GREEN to OFF every 2-3 seconds to warn that the switch is set to one instead of two.

Warning: These servicing instructions are for use by qualified personnel only. To reduce risk of electric shock, do not perform any servicing other than that contained in the Operating Instructions unless you are qualified to do so. Refer all servicing to qualified service personnel.
Refer also to the General Safety Summary in the Installation chapter.

Configuring Indigo 4 PSUs

The 4U Indigo 4 frame will take either two or three PSU modules. The PSU modules are to be fitted in both the lower and the uppermost slot positions. The two vacant slot positions are for the Mains Combiner module upper and third PSU module lower.

Note: The third PSU module relies on the presence of the Main Combiner module for its operation. If two or three PSU modules are fitted again the frame must be configured accordingly. The position of the two-position slide switch on the top right of the lower front panel PCB must be set to one for two PSUs or two for three PSUs and Mains combiner.

If the PSU configuration switch is set incorrectly the lower front panel PSU status LED will flash as a warning.

Inserting and removing power supplies

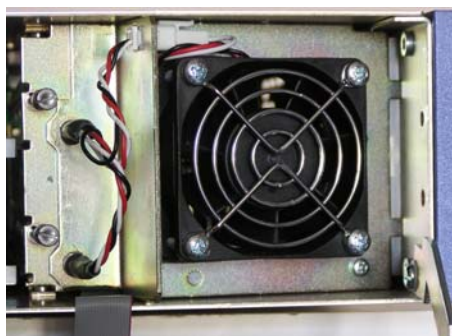
In multi-supply frames one of the power supplies at a time can be inserted and removed while the system is powered without damage. However, this must be done quickly as there will be no forced convection air, as the PSU fan assembly has to be removed.

To gain access to the Indigo PSUs proceed as follows:

- If possible, power down the frame
- Pull down the front panel using the black knobs or handles at either side of the panel
- Release the two captive screws to the left of the PSU fan
- Remove the fan assembly by applying sideways pressure on the fan assembly outwards and towards the right hand frame side

Note: Take care not to damage the panel ribbon cable when removing the fan assembly.

Once the fan assembly has been pulled backwards to free the fan connector plugs, the PSU fan will stop and the front panel PSU FAN LED will change from green to red.



Removing the PSU fan assembly



Lower PSU-75i – front view

In addition to the PSU and fan LEDs on the front control panel, there is also a red error LED on the PSU. This LED will flash slowly if there is no fan speed signal present on the fan connector SK1 when the PSU fan assembly is removed or if the PSU fan stops.

The error LED will light up continuously if power rail levels are outside operational limits. When the fan speed signal is present and power rails are normal the error LED is unlit.

Removing a PSU

To remove a PSU proceed as follows:

- Apply sideways pressure on the PSU handle towards the right and remove the PSU by pulling it forward
- Take care when removing the lower PSU not to damage the panel ribbon cable

Caution: There are no user serviceable parts inside the power supply module covers. The safety covers should not be removed even when the module is disconnected.

Note: Check that the two/one switch behind the control panel is set correctly for the number of PSUs installed to prevent redundant PSU warnings.

Inserting a PSU

To insert a PSU proceed as follows:

- Check that any second power supply is the same type as already fitted
- Offer up the PSU to the frame guide rails – it may help to turn the PSU extractor handle fully outwards to clear the panel hinge
- Carefully push the PSU all the way into its socket

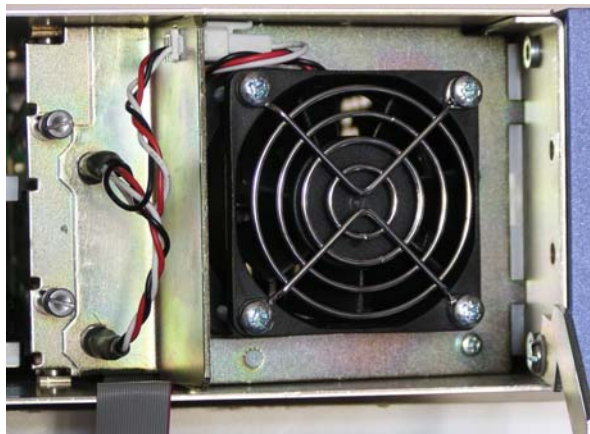
Note: PSU modules should only fit into the PSU slots behind the PSU fan assembly. Do not attempt to fit a PSU into a video or audio module slot. Check that the two/one switch behind the control panel is set correctly for the number of PSUs installed to prevent redundant PSU warnings.

Refitting the fan assembly

To replace the PSU fan assembly proceed as follows:

- Offer up the fan assembly ensuring that the two lugs fit into two slots in the right hand side of the frame just in front of a plastic stop
- Carefully move the fan assembly into position ensuring that the PSU fan jacks fit into the PSU jack sockets (SK 1)
- Take care not to damage the panel ribbon cable
- Tighten the two captive screws to the left of the PSU fan ensuring that they are not too tight to be undone without a screwdriver.
- If the unit was unpowered it may now be powered and tested

If the frame is powered, the PSU fan should now be operating and the PSU FAN LED should be green.



PSU fan showing 3-pin connector and finger guard

Power supply relay connections

The power supply module has a changeover relay to indicate if the frame is in an alarm state caused by a power supply problem, a fan stopping or an overheating frame.

Pinout is as follows:

Indigo 2, Indigo 4 Upper Power Supply and Indigo 1 Relay Connections

Description	Pin number
relay common	Remote 2 pin 14
open on fault	Remote 2 pin 23
close on fault	Remote 2 pin 5

Indigo 2 Lower Power Supply Relay Connections

Description	Pin number
relay common	Remote 4 pin 14
open on fault	Remote 4 pin 23
close on fault	Remote 4 pin 5

Indigo 4 Lower Power Supply Relay Connections

Description	pin number
relay common	Remote 8 pin 14
open on fault	Remote 8 pin 23
close on fault	Remote 8 pin 5

Indigo 4 3rd Power Supply Relay Connections

Description	pin number
relay common	Remote 6 pin 14
open on fault	Remote 6 pin 23
close on fault	Remote 6 pin 5

Indigo 4 Mains Combiner Relay Connections

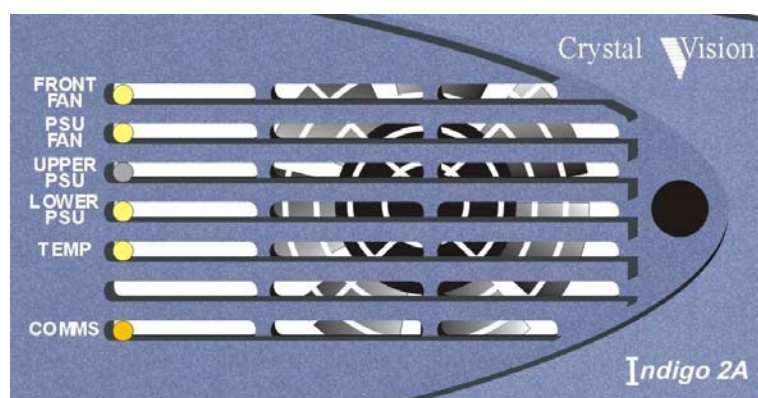
Description	pin number
relay common	Remote 4 pin 14
open on loss of Upper mains inlet or CMB failure	Remote 4 pin 23
open on loss of Lower mains inlet or CMB failure	Remote 4 pin 5

Note: The current through the relay contacts should be limited to a maximum of 200mA.

3 Trouble shooting

Reading LED status and active display messages

There are a number of two-colour LEDs on an active or passive front panel, with yellow/green indicating a normal condition and red an abnormal condition.



Example-The Indigo 2/2A/2S LEDs

The following LED status indications and/or Indigo display messages may be seen:

LED	Colour	Indigo display message	Notes
Front Fan	Unlit	None	Quiet mode/Door open
	Yell/Grn	None	Normal operation
	Red	Front fan speed low	Change the panel fan Indigo 4, maybe upper or lower fan
PSU Fan	Yell/Grn	None	Normal operation
	Red	Psu fan speed low	Change PSU fan Indigo 4, maybe upper or lower fan
PSU (Indigo 1)	Yell/Grn	None	Normal operation
	Red	PSU fault	Change PSU
Upper PSU (Indigo 2)	Unlit	None	No upper PSU detected
	Yell/Grn	None	Normal operation
	Red	Upper PSU fault	Change upper PSU, check supply, change upper inlet fuse.
Lower PSU (Indigo 2)	Unlit	None	No lower PSU detected
	Yell/Grn	None	Normal operation
	Red	Lower PSU fault,	Change lower PSU, check supply, change lower inlet fuse.
PSU 1	Unlit	None	No PSU 1 detected
	Yell/Grn	None	Normal operation
	Red	lower PSU fault	Change PSU 1, check supply, change lower inlet fuse.
PSU 2	Unlit	None	No PSU 2 detected

PSU 3	Yell/Grn	None	Normal operation
	Red	Upper PSU fault	Change PSU 2, check supply, change upper inlet fuse.
	Unlit	None	No PSU 3 detected
Mains Input	Yell/Grn	None	Normal operation
	Red	Upper PSU fault	Change PSU 3,
	Unlit	None	Mains Combiner not fitted
Temp	Yell/Grn	None	Normal operation
	Red	Upper or Lower PSU fault	Supply fault, either PSU 1 or PSU 2 will also show a fault
	Flash amber	None	Press Device in Statesman mode for comms status

If a PSU is not fitted, the corresponding LED will not illuminate. If the front panel is open, the Front Fan LED will also be unlit.

Power supply related faults operate a relay the contacts of which are brought out to the Remote connectors. These contacts can be used to operate external indicators as desired.

Please refer to the power supply pinout section for more details.

The PSU-150i-48V line fuse is located internally to the PSU module. Replacing this fuse will involve dismantling the module. See replacing PSU-150i-48V fuse

Note: The red LED built into the front of the vertical PCB on the LHS of the PSU will flash repeatedly (on for one second and off for one second) if there is no speed fan signal present on the connector SK1(the front LHS of the PSU). This will occur when the PSU Fan assembly is removed or if the PSU fan stops. When the fan speed signal is present the LED is unlit. The same red led will light up continuously if levels of the power rails (+5.75V or -6.0V) are outside operational limits. Refer to Section 2.6 for further details.

Replacing the mains input fuses

The mains input fuses are fitted inside the IEC 320 connectors at the rear of the frame. A spare fuse is also stored inside the connector. The fuse can only be accessed when the power cord is disconnected.

The sequence is as follows: -

- Disconnect ALL the power cords (one or two depending on configuration) from the rear of the frame.
- Using a flat bladed screwdriver or similar tool gently lever out the fuse drawer from the relevant IEC connector using the tab visible at the bottom of the connector depression
- Remove the defective fuse and replace with either the spare fuse or with a 5A, 250V time delay fuse
- Replace the fuse drawer and reconnect the power cords



Rear connectors showing IEC mains inputs and fuse tray with main and spare fuses

If a fuse blows repeatedly this indicates a fault either in the associated power supply module or elsewhere. Return the frame and/or power supply to the manufacturer or dealer for repair.

Note: Replace the fuse only with one of the same type and rating (5A, 250V time delay).

Replacing the PSU-150i-48V fuse

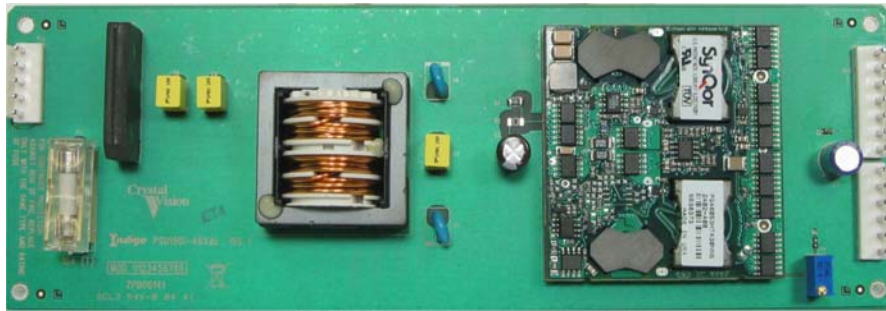
The supply input fuse is fitted inside the PSU150I-48Vdc module. The fuse can only be accessed once the PSU module has been removed from the frame.

The sequence for replacing the fuse is as follows: -

- Remove the un-powered PSU module from the frame.
- Using a pozi headed cross-bladed screwdriver remove the six screws securing the transparent insulation cover from the under side of the PSU.
- Remove the four further screws one from each corner of the dc-dc module and prise its rear edge from the carrier board. The DC-DC module will then swing out still attached by its input wiring loom. This loom maybe disconnected to allow the complete removal of the module or it is possible to replace the fuse whilst still attached.

Note: As a precaution the screw retaining the CPU module may be removed to prevent excessive strain being put on it.

- Remove the defective fuse and replace with either the spare fuse or with a 10A, 250V time delay fuse.
- A spare fuse is stored in a clip which is attached to the PSU module and can be accessed once the module is removed.
- Reassemble in reverse order.



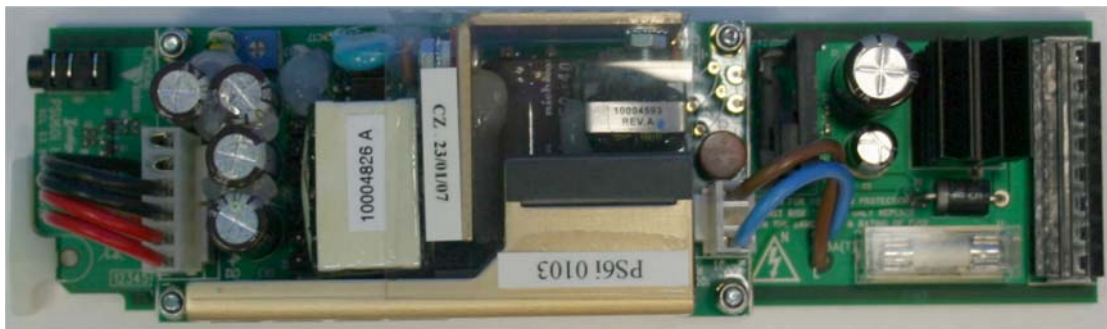
DC-DC converter module showing fuse carrier on the left side

If a fuse blows repeatedly this indicates a fault either in the associated power supply module or elsewhere. Return the frame and/or power supply to the manufacturer or dealer for repair.

Note: Replace the fuse only with one of the same type and rating (10A, 250V time delay).

Indigo 1-DP

The Indigo 1-DP does not have externally accessible mains fuses. They are situated on the Power supply modules. To service these fuses it is necessary to remove the power supply module from the frame.



PS-55i showing mains fuse.

To replace the mains fuse first remove the protective cover. The fuse may then be prized from its carrier with the aid of an instrument such as a flat bladed screwdriver. Take care not to damage any surrounding components or wiring. Once the replacement fuse has been inserted ensure the safety cover is replaced before refitting the module.

Note: Replace the fuse only with one of the same type and rating (5A, 250V time delay).

3.1 Frequently asked questions

Why is the display black and/or no LEDs illuminated?

- Check that at least one frame PSU is functioning
- Check that the frame is powered and that the fuse is intact
- Check that the panel is cabled correctly

What should I do if the TEMP LED is red and/or the FRAME TOO HOT message is displayed?

- Check that cool air is able to circulate through the front panel grilles and out of the ventilation holes at each side of the frame
- Check that the panel and PSU fans are operational and that the FRONT FAN and PSU FAN LEDs are not red

What should I do if the PSU FAN LED is red?

- Check that the PSU fan is plugged in correctly
- Try replacing the fan

What should I do if the FRONT FAN LED is red?

- Check that the front control panel fan is plugged in correctly
- Try replacing the fan

What should I do if the UPPER or LOWER PSU LED is red?

- Try replacing the appropriate PSU

Why do I keep getting a warning message about a power supply problem?

- If PSU warning persist even when no PSU fault is suspected, check that the Two/One PSU switch at the rear of the front panel is set correctly for the number of power supplies installed

Why does the LOWER PSU LED flash from green to off?

- This will occur if two PSUs are fitted when the Two/One PSU switch at the rear of the front panel is set for only one PSU. Move the switch into the Two position.

How do I check PSU status?

- Check front panel LED conditions. From the active Front panel, if fitted. Press the Device key and rotate the shaft to interrogate the PSU status.

4 Specification

Indigo PSU

General

Dimensions: 268mm x 105mm x 38mm.

Power requirements: 85 to 264 volts, 47 to 400Hz

Operating conditions: 0 to 40 degrees C non-condensing
Ventilation front to sides, without air filters

Weight	PSU-75i.	610g	610g
	PSU-150i	730g	730g
	PSU-150i-48Vdc	610g	610g
	PSU-160i		480g
	PS-55i (2 required)		240g

Mains Combiners

PSU-CMB Indigo 4 mains combiner for use with PSU-150i 340g

PSU-CMB2 Indigo 4 mains combiner for use with PSU-160i 280g