



Haliplex
Communication Systems

HPX-1600 USER GUIDE

Chapter 1-2: HPX-1600 Chassis and Operating Environment

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RECORD OF CHANGES

4.06	Addition	Section 1.1.1	“Note: This product contains ...the equipment.”
4.06	Addition	Section 1.1.4	“1.1.4 Rack Mount Preparation...making the connection.”
4.06	Addition	Section 1.3.3	Last bullet point: “For NEBS compliance...”
4.06	Addition	New Section 3	“Maintaining Electromagnetic Compatibility”
4.06	Addition	Section 6.1	“Warning: For NEBS compliance...”
4.06	Addition	Section 9	Bullet Point: “NEBS Level 1”
4.06	Addition	Section 9.1	Last bullet point: “GR-1089-CORE”
4.06	Changed	Section 1.2	Max Operating Temp from 50 to 45 d/c

1. INSTALLATION

1.1. SITE REQUIREMENTS

To ensure normal operation and avoid unnecessary maintenance, plan your site configuration and prepare your site before installation.

1.1.1. DC POWER

The DC-input power supply operates at -48 volts direct current (VDC) input voltage and supplies -48V DC power to the channel bank's internal components through the HPX-1600 midplane.



Note: Each Haliplex DC-input power supply uses a common 4 pole connector which has an electrical current rating of 10A. Although the HPX-1600 has a current draw of only 3A, use a minimum of 16 AWG (1.25mm²) wire for the input to each DC-input power supply. This allows use of a common DC power cable for all Haliplex DC powered products. The power input must be protected by a 3.15A (or greater) circuit breaker or fuse that is in compliance with your local electricity regulations.



Note: This product contains an Isolated DC return configuration (DC-I), in which the DC return terminals are not connected to the equipment frame or the grounding means of the equipment.

1.1.2. AC POWER

The HPX-1600 chassis can be optionally ordered with an external AC-input power supply. The external AC supply has an input rated at 100 to 240 VAC at 1.5A and 50 to 60Hz.

1.1.3. GROUND CONNECTOR

All HPX-1600s must be connected to an electrical ground. The equipment grounding should be in accordance with local and national electrical codes. Use a minimum of 16 AWG (1.25 mm²) wire for the ground connection.



All communications equipment should be connected to a common ground. This will result in improved data communications. Rack mounted systems may use the equipment rack as the ground path.

1.1.3.1. HPX-1600 GROUND CONNECTOR

The Haliplex HPX-1600 series must be connected to electrical ground using the ground stud on the face of the front panel. This is a safety feature.

1.1.4. RACK-MOUNT PREPARATION

For NEBS compliance, remove paint and any other non-conductive coatings on the surfaces between the mounting hardware and the rack framework. Clean all surfaces and apply anti-oxidant before joining. Coat all bare conductors with an appropriate anti-oxidant compound before crimp connections are made. Bring all connectors to a bright finish and coat with an anti-oxidant before making the connection.

1.2. SITE ENVIRONMENT

Table 1 lists the operating and non-operating environmental site requirements. The following ranges are those within which the Haliplex HPX-1600 series will continue to operate; however, a measurement that is approaching the minimum or maximum of a range indicates a potential problem. You can maintain normal operation by anticipating and correcting environmental anomalies before they approach a maximum operating range. The Haliplex HPX-1600 products are designed for highly reliable operation and are cooled by a fan mounted inside the case. The fan openings at the rear of the chassis should be maintained clear of obstruction to allow airflow. Optimal airflow to the fan can be maintained if blank panels are installed in all unused Interface Module (IM) slots.

	Min	Max
Temperature, ambient operating	0 degrees Celsius (32 degrees Fahrenheit)	45 degrees Celsius (113 degrees Fahrenheit)
Temperature, ambient non-operating and storage	-20 degrees Celsius (-4 degrees Fahrenheit)	65 degrees Celsius (149 degrees Fahrenheit)
Humidity, ambient (non-condensing) operating	10%	90%
Humidity, ambient (non-condensing) non-operating and storage	5%	95%
Altitude, operating and nonoperating	Sea level	10,000 feet (3,050 meters)
Vibration, operating	5 to 200 Hz 0.5 g (1 oct./min.)	-
Vibration, nonoperating	5 to 200 Hz, 1 g (1 oct./min.)	200 to 500 Hz 2 g (1oct./min.)
DC power (nominal 48 VDC)	40 volts DC	60 Volts DC

Table 1 – Environmental Site Requirements

1.3. PREVENTATIVE SITE CONFIGURATION: MAINTAINING NORMAL OPERATION

Planning a proper location for the Haliplex chassis and designing the layout of your equipment rack or wiring closet is essential for successful system operation. Equipment placed too close together or inadequately ventilated can cause system over-temperature conditions.

Following are precautions that can help avoid problems during installation and ongoing operation.

1.3.1. GENERAL PRECAUTIONS

Follow these general precautions when planning your equipment locations and connections:

- ❑ Haliplex recommends keeping equipment off the floor and out of any area that tends to collect dust, excessive condensation, or water.
- ❑ Follow ESD prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.
- ❑ Ensure that the IMs and any IM slot blank plates are in place and secure. The blank plates secure the electromagnetic protection of the HPX-1600 unit and optimise the cooling air flow.

1.3.2. POWER CONSIDERATIONS

When planning power connections to the Haliplex HPX-1600 products, check the power at your site before installation and periodically after installation to ensure that you are receiving clean power. Install a power conditioner if necessary.

1.3.3. INSTALLATION PRECAUTIONS

The following guidelines will help to ensure your safety and protect the equipment. This list does not cover all potentially hazardous situations, so be alert.

- ❑ The installation of your Haliplex products should be in compliance with national and local electrical codes.
- ❑ Always turn all power supplies OFF (0) and unplug all power cables before opening the chassis.
- ❑ Always unplug the power cable before installing or removing a chassis.
- ❑ Keep the chassis area clear and dust free during and after installation.
- ❑ Keep tools and chassis components away from walk areas.
- ❑ Do not wear loose clothing, jewellery (including rings and chains), or other items that could get caught in the chassis.
- ❑ For NEBS compliance, remove paint and any other non-conductive coatings on the surfaces between the mounting hardware and the rack framework. Clean all surfaces and apply anti-oxidant before joining. Coat all bare conductors with an appropriate anti-oxidant compound before crimp connections are made. Bring all connectors to a bright finish and coat with an anti-oxidant before making the connection.

2. SAFETY RECOMMENDATIONS

The following guidelines will help to ensure your safety and protect the equipment. This list does not cover all potentially hazardous situations, so be alert.

- ❑ The installation of your Haliplex HPX-1600 should be in compliance with national and local electrical codes.
- ❑ Always turn all power supplies OFF (0) and unplug all power cables before opening the chassis.
- ❑ Always unplug the power cable before installing or removing a chassis.
- ❑ Keep the chassis area clear and dust free during and after installation.
- ❑ Keep tools and chassis components away from walk areas.
- ❑ Do not wear loose clothing, jewellery (including rings and chains), or other items that could get caught in the chassis.
- ❑ The Haliplex HPX-1600 series ships with a 2-wire electrical plug, which will fit into the HPX-1600 DC power inlet. The other end of the supplied cable should be connected to a 48VDC supply. Use a minimum of 16 AWG (1.25 mm²) wire for the input to each DC-input power supply.
- ❑ The Haliplex HPX-1600 series operates safely when it is used in accordance with its marked electrical ratings and product usage instructions.



The Haliplex HPX-1600 series must be connected to an electrical ground using the ground connector on the face of the front panel on the HPX-1600 and the connection on the rear of the HPX-200. This is a safety feature. The equipment grounding should be in accordance with local and national electrical codes. Use a minimum of 16 AWG (1.25 mm²) wire for the ground connection.



Warning: Only trained and qualified personnel should be allowed to install or replace this equipment.



Note: For Australia and New Zealand, equipment is to be installed and maintained by service personnel only as defined by AS/NZS 60950-2000 clause 1.2.13.5 Service Personnel



Warning: Ultimate disposal of this product should be handled according to all national laws and regulations.



Warning: Dispose of used components that contain batteries according to the manufacturer's instructions.



Caution: You must power down the system before removing or replacing motherboard, power supply or midplane. Follow these basic guidelines when working with any electrical equipment:

2.1. SAFETY WITH ELECTRICITY

The Interface Modules are designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system.

- Before beginning any procedures requiring access to the chassis interior, locate the emergency power-off switch for the room in which you are working.
- Disconnect all power and external cables before installing or removing a chassis.
- Do not work alone if potentially hazardous conditions exist.
- Never assume that power has been disconnected from a circuit; always check.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.
- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards such as moist floors, ungrounded power extension cables, and missing safety grounds.



Warning: Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.

In addition, use the guidelines that follow when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or other network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.



Warning: Before opening the chassis, disconnect the telephone-network cables to avoid contact with telephone-network voltages.



Warning: The telecommunications lines must be disconnected 1) before unplugging the main power connector and/or 2) while the housing is open.



Warning: Do not work on the system or connect or disconnect cables during periods of lightning activity.

2.2. PREVENTING ELECTROSTATIC DISCHARGE DAMAGE

Electrostatic discharge (ESD) damage, which occurs when electronic cards or components are improperly handled, can result in complete or intermittent system failures. Each IM consists of a printed circuit board that is fixed in a metal carrier. Electromagnetic interference (EMI) shielding, connectors, and a handle are integral components of the carrier. Although the carrier helps protect the boards, use an antistatic strap whenever handling. Handle the IMs by the case only; never touch the boards or connector pins.

Following are guidelines for preventing ESD damage:

- ❑ Always use an ESD wrist strap or ankle strap and ensure that it makes good skin contact.
- ❑ When handling a removed IM or motherboard, make sure the equipment end of your ESD strap is attached to an unfinished chassis surface of the HPX-1600; do not touch the printed circuit board, and avoid contact between the printed circuit board and your clothing.
- ❑ Always place IM or motherboard component side up on an antistatic surface or in a static shielding bag. If you are returning the item to the factory, immediately place it in a static shielding bag.



Caution: For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 Megohm (Mohm).

2.3. SAFETY WITH LASER RADIATION

If a fibre optic IM is installed in the HPX-1600, users must take suitable precautions, to protect against damage to eyes from Class 1 laser radiation.

The fibre optic IMs transmit invisible laser radiation. When not in use or connected to fibre optic cables, the fibre optic IM connectors must have the dust caps fitted.



Warning: The fibre optic IM transmits invisible laser radiation.
Do not stare into beam or view directly with optical instruments.

This is a Class 1 laser product, operating at 1310nm or 1550nm, 0.5mW maximum.

3. MAINTAINING ELECTROMAGNETIC COMPATIBILITY

The following guidelines will help to ensure electromagnetic compatibility is maintained for the HPX-1600:

- ❑ All slots that are not filled with an Interface Module should have a blanking panel inserted.
- ❑ Use Haliplex approved cables
- ❑ For cabling of RJ45 IM connections, CAT5 STP cable should be used with a shielded RJ45 connector
- ❑ Equipment should be grounded in accordance with Section 1.1.3 of this chapter.

4. PACKAGING

The HPX-1600 has been shipped from our factory in carefully designed packing materials to ensure the HPX-1600 is delivered to you as a quality, functional product.

If the HPX-1600 is to be re-packed and shipped to other locations, please retain the original packaging for re-use.

The HPX-1600 product is shipped in a robust, fibre-board box that complies with Australian Standard ASTM 4169 D. The HPX-1600 chassis is first enclosed in a tough poly bag, which is then supported by shock absorbing foam end-caps. The complete assembly is then placed in the fibre-board box. Interface modules can be safely transported within the designated interface module slots.

Do Not:

- ❑ Place other objects in the air space that surrounds the HPX-1600 within the box.
- ❑ Omit the foam, shock absorbing supports.
- ❑ Pack more than one chassis in each box.

5. CHASSIS DIMENSIONS

5.1. HPX-1600 CHASSIS

The HPX-1600 chassis is designed to be rack mounted or free standing. Rack mounting ears are provided for installation in a standard 19-inch equipment rack. The HPX-1600 occupies only a single rack unit of vertical space (1 RU).



Figure 1 – HPX-1600 Dimensions

Width (not including mounting ears)	420mm
Height	44mm
Depth	300mm
Weight (base chassis)	2.7Kg
Weight (fully loaded with 16xIMs)	5.1Kg

Table 2 – HPX-1600 Chassis Specifications

6. MOUNTING

6.1. RACK MOUNT

The HPX-1600 chassis is designed to be rack mounted in a standard 19-inch equipment rack. The HPX-1600 occupies only a single rack unit of vertical space (1 RU). Rack mounting ears are included in the shipment.



Warning: For NEBS compliance, remove paint and any other non-conductive coatings on the surfaces between the mounting hardware and the rack framework. Clean all surfaces and apply anti-oxidant before joining. Coat all bare conductors with an appropriate anti-oxidant compound before crimp connections are made. Bring all connectors to a bright finish and coat with an anti-oxidant before making the connection.

As all connections and operational functions are accessed from the front of the unit, there is no requirement for service access to the rear of the HPX-1600 chassis.

Your Haliplex HPX-1600 is fully assembled at the factory; no assembly is required. However, you will need the following to install the chassis and the rack-mount kit:

- Phillips screwdriver

6.2. BENCHTOP

Both the HPX-100 and the HPX-1600 chassis can be located on a bench top. Bench top units should have the optional feet (included) attached.

7. INSTALLING INTERFACE MODULES (IM)

The Interface Module (IM) is plugged into the HPX-1600 midplane and provides the optical or electrical interface and connectors to other network devices. Each HPX-1600 chassis has slots for sixteen IMs. The IM slots are numbered from 01 to 16 starting from the left side of the system. IM slot 1 is furthest from the Front Panel. Each general use IM slot, of the HPX-1600-SS and HPX-1600-IA, has connection bandwidth capacity of up to 4Mbps, or 2 x E1, other data busses varies with chassis model type. Refer to Table 3 for IM slot maximum bandwidths. The HPX-1600-EV is a customized node and only accepts T1, Ethernet and DS3 IMs.

Model Type	IM slot maximum bandwidth	
-IA	4 Mbps or 2xE1	
-SS	16 Mbps or 8xE1	(1xDS3 or 100BaseT some slots)

Table 3 – IM slot maximum bandwidth

An IM may be inserted or removed while power is on to the HPX-1600, called a "hot" insert. Naturally any communication using the IM will be disrupted when the IM is removed. Extreme care should be exercised to reduce the risk of interruption to services by correctly identifying the IM to be removed.

When the IM is inserted "hot" into a running system, the IM insert status and type, is automatically identified by HPXView. The IM firmware that matches the IM type is automatically loaded, followed by the stored configuration files or, if undefined, the factory defaults. The IM LEDs will indicate the operational status of the IM. See Section 2 – Interface Modules for details.

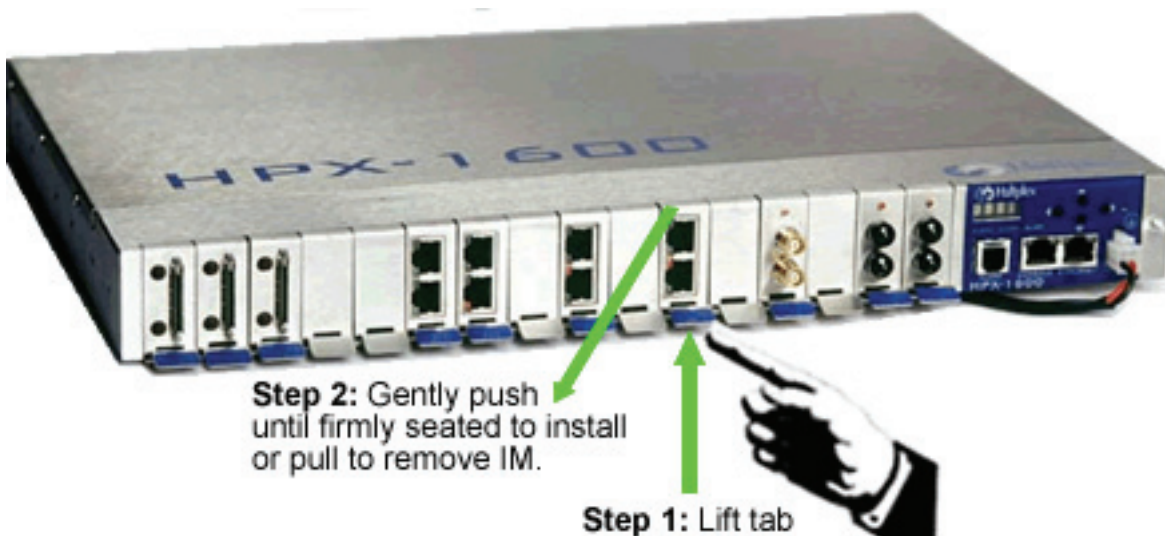


Figure 2 - Installing an IM

Follow safety precautions and use ESD procedures when removing or handling IMs or other printed circuit boards.

8. PRODUCT LABELLING

Every HPX-1600 chassis has a label affixed to the base of the unit. The label contains the following information:

- Model number
- Serial number
- Input power requirements
- Safety and Regulatory Standards Compliance

Each IM is identified by a function descriptive label on the handle, which is visible while the IM is inserted in the chassis and in operation.

A detailed label is fixed to the metal case of the IM. This label is visible only with the IM removed from the chassis. The label contains the following information:

- Model number
- Hardware revision number
- Serial number

9. INTERNATIONAL COMPLIANCES

All HPX-1600 products have achieved the following international compliances;

- CE
- A Tick
- C Tick
- FCC part 15 class B
- NEBS Level 1
- UL



FCC COMPLIANCE STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures

- *Reorient or relocate the receiving antenna*
- *Increase the separation between the equipment and the receiver*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected*
- *Consult the dealer or an experienced radio/TV technician for help*

Warning: *Any changes or modifications not expressly approved by Haliplex Pty Ltd could void the user's authority to operate this equipment.*

9.1. ELECTROMAGNETIC COMPATIBILITY (EMC)

- CISPR 22 class B
- EN55022
- FCC part 15 class B
- AS3548
- EW61000-3-2
- EW61000-3-3
- ETS300386-1
- GR-1089-CORE

9.2. SAFETY

- IEC60950, UL60950, and AS-NZ60950:2000 for General safety
- IEC60825-1 & -2 for Laser Safety

9.3. IMMUNITY

- IEC1000-4-2 and IEC801-2 for electrostatic discharge
- IEC1000-4-3 and IEC801-3 for EMC immunity
- IEC1000-4-4 and IEC801-4 for Electrical transients
- IEC1000-4-5 and IEC801-5 for Mains Surge
- IEC1000-4-11