

# **xDAP Family Safety Manual**

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*Safety Guidelines and Declaration of Conformity for the xDAP Family*

*Version 1.01*

**Microstar Laboratories, Inc.**

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Part Number xSFTY101

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# 1. Introduction

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This manual provides safety and maintenance information, applicable generally to data acquisition equipment, and applicable specifically to the Microstar Laboratories *xDAP* family of Data Acquisition Processor products. The *xDAP* family has been tested and found to be in conformance with international safety standards, and a declaration of conformity is included in this manual.

## Intended Application

The *xDAP* family of Data Acquisition Processor products is intended for capturing high-resolution measurements of signals of the kind produced by sensor or digital logic devices, converting these to a digitized form compatible with digital computer processing, and delivering these results through an external communication cable to other systems for recording, display, or other purposes.

Special restrictions on use of individual models are given in the hardware manual for each *xDAP* product.

*xDAP products are not intended for any application for which its performance is critical to human life and safety.* *xDAP* products cannot guarantee the availability necessary for critical applications such as direct control of nuclear reactors, and they do not provide electrical isolation suitable for general medical applications.

## Operating Instructions

Connect the *xDAP* equipment and power it up as described in the installation guide and the hardware manual for the specific *xDAP* product. Once started, the equipment is operated through software commands, sent from an application on the PC host to the equipment via the USB interface cable. The installation guide for *xDAP* USB equipment provides instructions on connectors and software setup. The installation guide is available on the *DAPtools* software CD (or the equivalent downloaded file system image) provided with each *xDAP* unit, or from the Microstar Laboratories Web site at <http://www.mstarlabs.com>.

## 2. Products Covered

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All xDAP products are variants of the xDAP008 or xDAP008i base product. These are chassis boxes containing variously-configured devices that constitute a complete xDAP product. The two base products are really the same thing except for physical dimensions. The size of the enclosure is indicated by an *i* suffix.

- The xDAP008 is packaged in a half-width rack size, compatible with 3U 42HP specifications.
- The xDAP008i is packaged in a full-width rack size, compatible with 3U 84HP specifications.

The *i* suffix is also carried forward to indicate the physical size of completely configured products. The products covered by this document include the following:

- xDAP7410, xDAP7410i
- xDAP7420, xDAP7420i
- xDAP7620, xDAP7620i

All of these products provide the following features:

- signal channel configurations
- signal conversion devices
- USB communications port
- processor and logic chip devices

The various products feature different configurations of the following features:

- embedded processor and chip set type
- digital logic devices
- numbers and arrangements of signal channels
- signal connectors

Study the hardware manual for specific information about hardware features available on each xDAP model.

## 3. Specifications

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### Technical specifications

Technical specifications are provided for each xDAP product. These are available on the DAPtools software CD (or the equivalent downloaded file system image) provided with each xDAP unit, or from the Microstar Laboratories Web site at <http://www.mstarlabs.com/>.

### Electrical Specifications

Electrical specifications are included within the technical specifications documents. Some general information related to safety is repeated in this manual for completeness. For full information about electrical specifications, refer to the technical specifications sheet.

The xDAP products are rated for operation at 100 to 120 VAC at up to 6A, or for operation at 220 to 240 VAC at up to 3A. No settings or configuration adjustments are necessary to select one of the two power source levels. The products are rated for operation on 50Hz or on 60Hz power systems.

### Physical specifications

Equipment conforms to the physical dimensions and mounting specifications defined in standard IEEE-1011.10 and compatible with IEC 60297 “19-inch rack” standards. Certain xDAP models are intended as a sub-rack assembly to be mounted in an industrial rack. These models will provide mounting flanges and mounting holes as defined by the standards. Other xDAP models are intended for desktop use only and do not have the flanges or mounting holes, but they may have carrying handles.

### Electrical connector specifications

The power connector is an IEC 60320 type C14 receptacle. The provided power cable is intended for use withing the USA, where it is typical of appliances such as computer equipment at up to 120 V and 15Amp, AC. This connector is safe to use with European voltages up to 240 V, but *it is the user's responsibility to provide a safe and appropriate power cable that has the IEC 60320 mating connector on one end, and the appropriate connector or converter on the other end*, for compatibility with electrical equipment used by the local power distribution system.

## 4. Mounting and Environment

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There are typically no thermal hazards when desktop equipment is used as intended and with reasonable care on the desktop.

Rack mounted systems will need to provide clearance sufficient for the power cord connector, so that there is no danger of crimping and damaging the power conductors to create a risk of short circuits and fire.

If there is an external enclosure into which an xDAP unit is mounted, there must be sufficient separation between the enclosure door and xDAP front panel to avoid damaging front panel cables and connectors. Some separation might be needed between the enclosure's door and cables to avoid coupling of electrical ground noise into sensitive signal paths.

The processor chip inside of the xDAP unit will generate a significant amount of heat. The maximum safe ambient temperature is given in the technical specifications, but will typically be around 50 degrees Centigrade. In general, temperatures that are safe for humans are also safe for operating the xDAP units, but sustained operation at relatively high ambient temperatures could accelerate degradation of materials in electronic components, thus impairing the product lifetime.

For equipment mounted in an enclosure, there must be adequate air flow to carry away generated heat and avoid an excessive temperature rise inside of the enclosure. The air intake is through the bottom plate. The primary fan for drawing air and processor heat out of the unit is on the back of the xDAP unit. It is particularly important that these air flow paths are not obstructed.

If it is necessary to unmount the unit, the recommended sequence of actions is:

1. stop software processing first if you can
2. turn off the front panel illuminated switch
3. turn off the back panel power supply switch
4. disconnect the power cable

The unit is not isolated from environmental hazards. Take appropriate precautions to prevent liquids and other contaminants from getting into the equipment and causing harm to sensitive electronic components.

## 5. Electrical Grounding

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The principal point of connection to the main grounding means for an xDAP is through the ground connection on the power receptacle, which uses IEC 60320 type C14 connectors. xDAP products follow the accepted practices for grounding computing equipment such as PCs. The case is solidly connected to the receptacle earth ground. There is a low impedance connection between the case and the DC power supply ground. There is a similar connection, with much lesser current capability, between xDAP low-power signal converter electronics and the same common ground. Generally, this grounding strategy will provide a high degree of grounding safety for desktop units, but for industrial equipment in a rack, beware that it can introduce unanticipated electrical ground connections between equipment through the case and rack. This can be beneficial, but it could also allow stray ground current to use the rack as a bypass path or ground coupling link. There is usually no danger from this, but there could be implications for how the affected equipment operates, and for conformance with EMC directives.

There can be exposure to damage from connecting xDAP systems to signal sources that are referenced to a “floating ground.” The analog inputs on xDAP products cope well with small shifts in common mode voltage levels, since the signal inputs are differential and high impedance, but the inputs can be damaged if either input voltage exceeds the maximum voltage range limits relative to the xDAP ground, even for a short time.

There are ground-reference pins on analog connectors, intended for equalizing small voltage differences that might exist between sensors and signal inputs. There are also ground-return pins on digital input and output connectors. If any of these are incorrectly connected to power current source, it is possible that too much current will attempt to flow back to the power supply ground through the delicate ground reference connections of the signal pins. This more or less guarantees damage to the xDAP unit.

Be particularly careful when wiring signals. It is best to have all systems turned off and unplugged from power sources when wiring. It is easy to accidentally short-circuit signal lines to incorrect pins or to the strongly grounded case, damaging the signal inputs, the sensors, or both. Signals lines that you think are not powered could pack a damaging level of static charge, so anti-static precautions are strongly advised.

## 6. Access and Maintenance

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The only access to the inside of an xDAP unit is through removable front connector panels. Sometimes these panels are solely for purposes of physically mounting signal connectors, but sometimes a mounted circuit board behind the panel will fit into board guides, and physically and electrically connect deep inside the unit. The only reason for opening these panels is for purposes of mounting or maintaining connectors or connector/circuit board modules. Make sure that the unit is turned off and power switched off before uncovering any panels. Disconnect the power and signal cables before inserting or removing boards. Slots should not be left uncovered. Do not allow chemical, liquid, or foreign object to get into the unit while slots are uncovered. Use electrostatic charge precautions when handling boards, which may carry delicate static-sensitive components. Make sure that modules are correctly seated and the panels tightly reattached before operating the equipment again.

Except for the modules that fit the covered slots, and the external cables and connectors that attached to external connectors, the system has no user-repairable parts. In the event that the high-speed fuses act and possibly limit accidental electrical overload damage, these too are mounted on internal circuit boards and are not user-replaceable. The unit must be shipped back to the factory for repair. Contact Microstar Laboratories at the address listed in the front of this manual.

Over long periods of time, it is possible that the xDAP unit will start to exhibit small offset and gain errors in its measurement results. Follow your organization's policies and use good technical judgment about how often to check the calibration of your equipment. Calibration adjustments do not require access to the interior of the unit. Calibration of an xDAP requires some very sophisticated equipment and is not "field adjustable." Contact Microstar Laboratories, or have your qualified calibration laboratory do this, for assistance.

## A. Appendix: Declaration of Conformity

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The xDAP products are intended to be used in an industrial or controlled laboratory environment. They are not intended to be used in residential or commercial environments.

Installations must provide 3-wire AC power with an earth ground common to the host computer system and the xDAP units, as discussed in Chapter 5 of this document, in order to meet the IEC61326 EMC requirements as set forth in the applicable EMC directives.

*NOTE:* xDAP products are used in combination with separate equipment provided by the system user or system integrator. It is the responsibility of the system user or system integrator to ensure that any system using an xDAP product is compliant to all relevant standards.

*NOTE:* This equipment was found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules (USA), and to ICES-003 (Canada). Cet appareil numérique de la classe A est conforme à la norme NMB-003 (du Canada). The class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his or her own expense.

*NOTE:* The RoHS directive (*Restrictions on Hazardous Substances*) from the European Union applies to products categorized in the WEEE directive (*Waste from Electrical and Electronic Equipment*), which was intended to guide further standards for recycling used electronic equipment. WEEE defines 10 product categories in its Annex 1A. The RoHS directive is not mandatory for products in category 9, *Monitoring and control instruments*, which is the category covering xDAP products. While this means that the xDAP products are suitable for use within the European Union, policies of individual organizations, or constraints on systems where Microstar products could be used, might demand full conformance to the RoHS directive. Microstar Laboratories is committed to providing products that conform to RoHS requirements, and xDAP products that fully conform will be indicated clearly.



## DECLARATION OF CONFORMITY

(According to ISO/IEC GUIDE 22 and EN 45014)

Manufacturer: Microstar Laboratories, Inc.  
2265 116<sup>th</sup> Avenue N.E.  
Bellevue WA 98004 USA

### ***DECLARES THAT THE PRODUCTS***

Product Name: **xDAP Data Acquisition Processors**

Model Numbers: Base Chassis: xDAP008 and xDAP008i  
Products: (base system configured with option cards)  
xDAP7410, xDAP7410i  
xDAP7420, xDAP7420i  
xDAP7620, xDAP7620i

### ***CONFORM TO THE FOLLOWING EUROPEAN DIRECTIVES***

Low Voltage Directive: 2006 / 95 / EC  
EMC Directive: 2004 / 108 / EC

Test Protocols: Safety: **EN 61010-1:2001**  
EMC: **EN 61326-1:2013**

Year Mark First Applied: **2011**

Signatory: Ian Lewis, President  
Microstar Laboratories, Inc.

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