

# Neuron

NFR2000

**Installation and service manual**

Edition A



**WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE**

**AVERTISSEMENT: POUR RÉDUIRE LE RISQUE D'INCENDIE OU D'ÉLECTROCUTION, N'EXPOSEZ PAS CET APPAREIL À LA PLUIE OU À L'HUMIDITÉ.**

- ALWAYS disconnect your entire system from the AC mains before cleaning any component. The product frame (NFR2000) must be terminated with three-conductor AC mains power cord that includes an earth ground connection. To prevent shock hazard, all three connections must always be used.
- TOUJOURS déconnecter tout votre système du secteur avant de nettoyer un composant. Le châssis du produit (NFR2000) doit être terminé par un cordon d'alimentation secteur à trois conducteurs comprenant une connexion à la terre. Pour éviter tout risque d'électrocution, les trois connexions doivent toujours être utilisées.
- NEVER use flammable or combustible chemicals for cleaning components.
- NE JAMAIS utiliser de produits chimiques inflammables ou combustibles pour nettoyer les composants.
- NEVER operate this product if any cover is removed.
- NE JAMAIS utiliser ce produit si le couvercle est retiré.
- NEVER wet the inside of this product with any liquid.
- Ne mouillez JAMAIS l'intérieur de ce produit avec un liquide.
- NEVER pour or spill liquids directly onto this unit.
- NE JAMAIS verser ou renverser de liquides directement sur cet appareil.
- NEVER block airflow through ventilation slots.
- Ne bloquez JAMAIS le flux d'air passant par les fentes de ventilation.
- NEVER bypass any fuse.
- NE JAMAIS court-circuiter/contourner un fusible.
- NEVER replace any fuse with a value or type other than those specified.
- NE JAMAIS remplacer un fusible par une valeur ou un type autre que ceux spécifiés.
- NEVER attempt to repair this product. If a problem occurs, contact your local Axon distributor.
- N'essayez JAMAIS de réparer ce produit. En cas de problème, contactez votre distributeur Axon local.

- NEVER expose this product to extremely high or low temperatures.  
● NE JAMAIS exposer ce produit à des températures extrêmement élevées ou basses.
- NEVER operate this product in an explosive atmosphere.  
● NE JAMAIS utiliser ce produit dans une atmosphère explosive.
- NEVER use this product in locations where children are likely to be present.  
● NE JAMAIS utiliser ce produit dans des endroits où des enfants peuvent être présents.
- ALWAYS install this product in locations marked as “restricted access area”.  
● TOUJOUR installer ce produit dans emplacements marqués “local à accès restreint”.

**Warranty:** Axon warrants their products according to the warranty policy as described in the general terms. That means that Axon Digital Design BV can only warrant the products as long as the serial numbers are not removed.

**Garantie:** Axon garantit ses produits conformément à la politique de garantie décrite dans les conditions générales. Cela signifie qu'Axon Digital Design BV ne garantit les produits que sous conditions que les numéros de série ne soient pas supprimés.

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This product complies with the requirements of the product family standards for audio, video, audio-visual entertainment lighting control apparatus for professional use as mentioned below.

Ce produit est conforme aux exigences des normes de la famille de produits pour les appareils de contrôle d'éclairage de divertissement audio, vidéo et audiovisuels à usage professionnel, comme indiqué ci-dessous.



IEC 62368 (pending)  
EN55032 (pending)  
EN55024 (pending)

Safety / Sécurité  
Emission / Emission  
Immunity / Immunité

**UL**



- Troubleshooting must be performed by a trained technician. Do not attempt to service this equipment unless you are qualified to do so.
- Le dépannage doit être effectué par un technicien qualifié. Ne tentez pas de réparer cet équipement à moins d’être qualifié pour le faire.
- This equipment has more than one power supply which are not hot swappable. To reduce the risk of electric shock, disconnect both power supply cords before servicing the apparatus.
- Cet équipement dispose de plusieurs sources d'alimentation qui ne sont pas remplaçables à chaud. Pour réduire les risques d'électrocution, débrancher les deux cordons d'alimentation avant tout entretien.
- This apparatus must be earthed. Use only certified power cables.
- Cet appareil doit être connecté à la terre. Utilisez uniquement des câbles d'alimentation certifiés.
- The power supplies and processing modules may only be removed by trained service personnel.
- Les blocs d'alimentation et les modules de traitement ne peuvent être retirés que par un personnel de maintenance qualifié.
- Installation and maintenance of the NFR2000 is considered service action.
- L'installation et la maintenance du NFR2000 sont considérées comme des actions de maintenance.
- The service area should be closed the proper way after service actions to guarantee safe operation. The service areas are marked with the label shown left.
- La zone de service doit être fermée correctement après les opérations de maintenance afin de garantir un fonctionnement sûr. Les zones de service sont marquées avec l'étiquette indiquée à gauche.
- No user serviceable parts are inside. Refer all service to qualified personnel.
- Aucune pièce de rechange utilisable par l'utilisateur ne se trouve à l'intérieur. Confiez tout le service à un personnel qualifié.
- Warning, hazardous moving parts inside power supplies. Keep fingers and other body parts away.
- Avertissement, pièces mobiles dangereuses à l'intérieur des blocs d'alimentation. Gardez les doigts et autres parties du corps éloignés.



- Chapters containing service actions are marked with an exclamation mark.
- Les chapitres contenant des actions de service sont marqués d'un point d'exclamation.



- This equipment is only for use at altitudes not more than 2000m above sea level or equivalent.
- Cet équipement ne doit être utilisé qu'à des altitudes inférieures à 2000m au-dessus du niveau de la mer ou à un niveau équivalent.



- This equipment is only for use in non-tropical conditions or equivalent.
- Cet équipement ne doit être utilisé que dans des conditions non tropicales ou équivalentes.



- Caution, electric shock hazard
- Attention, risque de choc électriques



- Disconnect all power plugs before servicing this product
- Débranchez toutes les prises électriques

Exposed portions of the power supply assembly are electrically “hot”. In order to reduce the risk of electrical shock, the power cord **must** be disconnected when the power supply assembly is removed. The ground terminal of the power plug is connected directly to the chassis of the unit. For continued protection against electric shock, a correctly wired and grounded (earthed) three-pin power outlet must be used. Do not use a ground-lifting adapter and never cut the ground pin on the three-prong plug.



Les parties exposées de l'alimentation sont électriquement «chaudes». Afin de réduire les risques d'électrocution, le cordon d'alimentation **doit** obligatoirement être débranché lorsque l'ensemble du bloc alimentation est retiré. La borne de terre de la fiche d'alimentation est connectée directement au châssis de l'unité. Pour assurer une protection continue contre les chocs électriques, vous devez utiliser une prise secteur à trois broches correctement câblée et mise à la terre. N'utilisez pas d'adaptateur de levage à la terre et ne coupez jamais la broche de terre de la fiche à trois broches.

# Table of Contents

<b>Preface</b>	<b>6</b>
Manual information	6
Purpose	6
Audience	6
Revision history	6
Writing styles	6
Unpacking and shipping	7
Unpacking	7
Shipping	7
<b>Chapter 1: Introduction</b>	<b>8</b>
Introduction to Neuron	8
An Introduction to Neuron	8
Remote Control Capabilities	8
Product Description	9
General description	9
Main features	9
Datacenter version	9
Broadcast version	9
LED indicators	10
LED positions	10
LED functions	10
<b>Chapter 2: Installation</b>	<b>11</b>
Unpacking	11
Preparing the product for installation	11
Unpacking	11
Processing module installation and replacement	12
General module layout	12
Inserting cards in an NFR2000 frame	12
Power supply installation and replacement	13
Installing or replacing a power supply in an NFR200	13
Replacing fans in an NFR2000	13
Installation in racks	14
Inserting into racks	14
<b>Chapter 3: Specifications</b>	<b>15</b>
Frames	15
Dimensions	15
Weight	15
Power	15
Cooling	15
Environmental conditions	15
Fan noise	15
Contacting Axon customer support	16




## Manual information

**Purpose** This manual details the features, installation, service, operation and specifications of the NFR2000 frames.

**Audience** This manual is written for the engineers, technicians, operators and other broadcasting employees that are responsible for the proper installation and/or operation of the NFR2000 frames.

Revision history	<u>Edition</u>	<u>Date</u>	<u>Revision</u>
	A	July 2018	First draft version

**Writing styles** To make this document easier to understand, this manual contains the following text styles:

<u>Style</u>	<u>Description</u>
<b>Bold / Gras</b>	Chapter titles, paragraph titles, table headers. <i>Titres de chapitre, titres de paragraphe, en-têtes de tableau.</i>
<i>Italic / Italique</i>	Special words that need emphasis <i>Mots spéciaux qui doivent être soulignés</i>
CAPS / <i>Capitales</i>	Indicates a keystroke on the keyboard, such as ENTER, CTRL, SHIFT or ALT. <i>Indique une frappe sur le clavier, telle que ENTREE, CTRL, SHIFT ou ALT.</i>
>	Indicates the direction of navigation through a menu structure. <i>Indique le sens de la navigation dans une structure de menu.</i>
 <b>Note</b>	Indicates important information that helps to avoid problems. <i>Indique des informations importantes qui permettent d'éviter les problèmes.</i>
 <b>WARNING</b> ENERGY HAZARD SERVICE MAY ONLY BE PERFORMED BY TRAINED SERVICE PERSONNEL.	Indicates service areas which may only be performed by trained service personnel. <i>Indique les zones de service qui ne peuvent être effectuées que par du personnel de maintenance qualifié.</i>
 <b>AVERTISSEMENT</b> RISQUE DE CHOC ELECTRIQUE L'ENTRETIEN NE PEUT ETRE EFFECTUE QUE PAR DU PERSONNEL QUALIFIE	

## Unpacking and shipping

### Unpacking

Axon has carefully inspected this product before shipment to ensure years of trouble free service.

**ATTENTION**  
**Observer les précautions**  
**de manipulation**  
**Dispositifs sensibles à**  
**l'électricité statique**



Upon reception, please make sure you:

- 1- Check products for any visible damage that may have occurred during transit.
- 2- Confirm that you have received all products listed on the packing list.
- 3- Contact your Axon dealer if any product on the packing list is missing.
- 4- Contact the carrier if any item is damaged.
- 5- Remove all packing material from the products before you install them, in an *anti-static environment*.

### Shipping

Keep at least one set of original Axon packaging in case you need to return a product for servicing or replacement. If there is no original packaging available, please use your own packaging as long as it meets the following criteria:

- Withstand the weight of the product
- Holds the product rigid within the packaging
- Leaves at least 5 cm of space between the product and the container
- Protects the corners of the product
- Protects the connectors of the product



# **Chapter 1: Introduction**

## **Introduction to Neuron**

### **An Introduction to Neuron**

Neuron is a Network Attached Processor designed for the broadcast industry. Neuron is an extremely powerful and flexible platform designed with IT connectivity in mind. Unlike most available “hybrid” solutions, which are mainly just bolted-on Ethernet ports to a SDI centric processing unit, Neuron is a processing device with high speed Ethernet I/O (dual 100Gbps) and optional SDI I/O.

During its lifespan, Neuron will include processing capabilities that are predefined, like a multi channel Ethernet bridge, all the way to a virtual machine where the customer can drag-and-drop processing engines to his or her liking.

The main video (and embedded audio) processing unit is based on a massive FPGA with 9 times the horsepower of our most powerful Synapse card. This calculates to 6 times more horsepower per rack unit (RU) at a maximum of 50% of the electrical power usage of Synapse.

Please visit the Axon Digital Design Website at [www.axon.tv](http://www.axon.tv) to obtain the latest information on our new products and updates.

### **Remote Control Capabilities**

The remote control options and the method of connecting to a computer using Ethernet are explained in the Neuron control manual.



### **Note**

“Axon Cortex” software will increase system flexibility of one or more NFR2000 frames

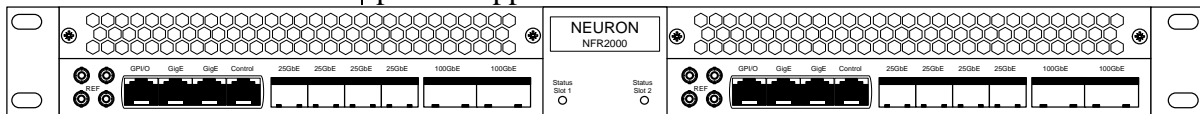
We strongly advised to use a remote personal computer or laptop PC with the Axon Cortex software installed as this increases the ease of use and understanding of Neuron. This program is downloadable on our website ([www.axon.tv](http://www.axon.tv)) free of charge.

## Product Description

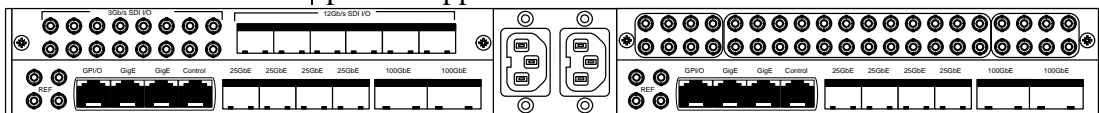
**General description** The NFR2000 is a frame which can contain 2 processing cards. It is 1RU high. Together with the power supplies the frame forms the base of the Neuron system.

- Main features** NFR2000 features include the following:
- 1 RU high
  - Redundant power supplies of 500W each (To reduce the risk of electric shock, disconnect both power supply cords before servicing).
  - Exchangeable processing modules from the back for broadcast versions and from the front for datacentre versions
  - Redundant power supplies from the front for broadcast versions and from the back for datacentre versions (To reduce the risk of electric shock, disconnect both power supply cords before servicing)
  - Front to back cooling
  - Fans inside the power supplies, also taking care of cooling the frame from front to back
  - Internal bus connecting the power supplies and the boards

**Datacenter version** In the Datacenter version, the I/O connectors are on the front and the power supplies on the back.



**Broadcast version** In the broadcast version, the I/O connectors are on the back and the power supplies on the front.



**LED positions**

**LED indicators**

The NFR2000 frame has 4 LEDs: 1 on each power supply and 2 on the front plate. In the image below, the PSU LEDs are indicated with red and the front LEDs with green.



**Note**

Displayed here is the broadcast version. With the datacentre version the PSU LEDs are on the *back* of the unit, while the front-plate LEDs remain on the front.

**LED functions**

These are the possible LED indicators:

PSU LED:

- Green solid** Power present, controlled, no errors
- Green blinking** Power present, not controlled, no errors
- Red solid** No power present or AC/DC converter defect, controlled / internal error (CAN comm error, I2C error, etc)
- Red blinking** No power present or AC/DC converter defect, not controlled / FAN error
- Orange** FAN override, controlled
- Orange blinking** FAN override, not controlled

Front plate LEDs:

- green solid** Application running
- green blinking** No application present, updating
- orange solid** Booting
- orange blinking** Warning, see menu for cause
- red blinking** Error, see menu for cause
- green fast blink** Where-am-I function, manually triggered in settings



## Chapter 2: Installation

### Unpacking

#### Preparing the product for installation

Before installing the frame, please do take the following step:

- Check the product for any visible damage that may have occurred during transit
- Confirm receipt of all products on the packing list.
- Retain the original packaging for possible re-use.

See “Unpacking and shipping” for more information about returning a product for servicing or replacement.



#### Note

Contact your Axon dealer if parts are missing or damaged or when products on the packing list are missing.

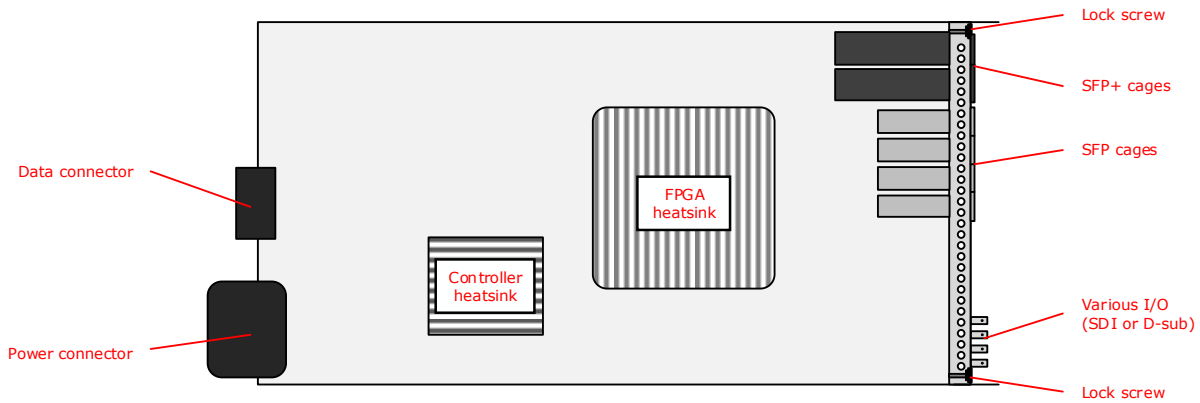
#### Unpacking

The Axon Neuron frame must be unpacked and installed in an *anti-static environment*. Make sure all package material on the outside **and** the inside of the frames are removed before putting it into operation.

## Processing module installation and replacement

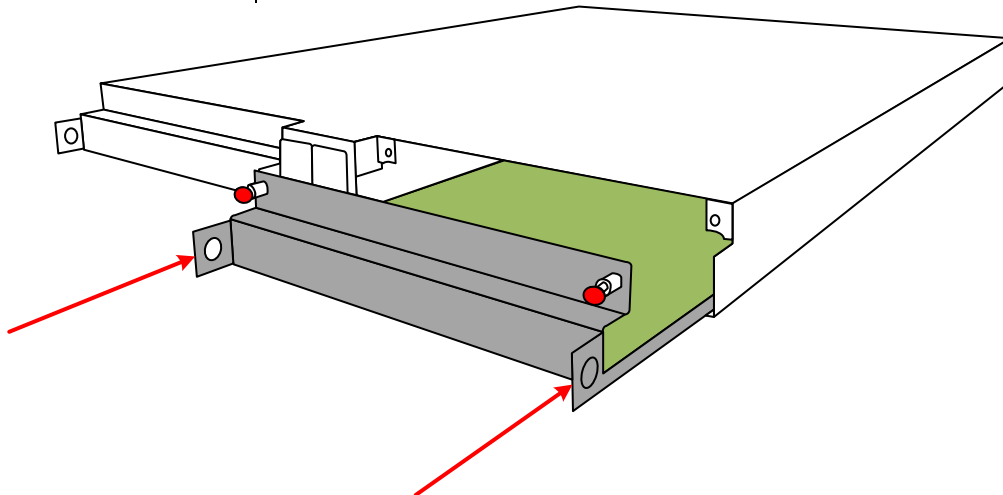
### General module layout

In general, a Neuron processing module layout looks like as shown in the picture below. Indicated in the picture are the most important parts of a Neuron processing module. The module consists out of a metal bottom plate and I/O backplate and a PCB with connectors.



### Inserting cards in an NFR2000 frame

To insert the processing module into an NFR2000 frame you first determine whether the frame is built as a datacenter version (connections on the front) or a broadcast version (connections on the back). Once this is determined, slide in the processing module from the connector side until it cannot be pressed any further. Make sure both sides of the card are following the glides so the card is guided exactly into the frame's internal bus connector. Push the card firmly into the internal bus. Then screw the two lock screws, indicated in the picture below in red, steadfast into the frame.



### Note

In case one module slot remains empty, the empty slot has to be fit with a blind panel.

## Power supply installation and replacement

### Installing or replacing a power supply in an NFR2000



The NFR2000 has redundant power supplies. Servicing one of the power supplies requires disconnecting the corresponding power supply cord. **To reduce the risk of electric shock, disconnect both power supply cords before servicing! This will cause the Neuron frame to shut down.**

Le châssis NFR2000 est équipé d'alimentations redondées. Remplacer l'une des alimentations nécessite de déconnecter le cordon d'alimentation correspondant. **Pour réduire les risques d'électrocution, débrancher les deux cordons d'alimentation avant tout entretien ! Cela permettra au châssis Neuron de s'éteindre complètement.**



### Note

When one PSU is removed, the cooling for that slot will also stop, causing risk of overheating the processing module behind that slot. Please make sure that the time between taking out a PSU and replacing it with a new one is as short as possible.

To reduce the risk of electric shock, disconnect both power supply cords before servicing. There are 2 screws (Torx 10) per PSU which you have to undo (marked with red dots in the picture below). The power supply is now unlocked. Simply pull out the power supply using your index fingers hooked behind the front bezel where the screws are positioned. Put back in the new power supply and push it firmly into the power connector inside the frame. Screw the lock 2 screws steadfast into the frame. After reconnecting the power cord(s), the corresponding slot status LED should light up and the fans of the new PSU should start spinning.



### Replacing fans in an NFR2000

The fans of an NFR2000 are part of the power supplies. When fans are reported as defect by Cortex or Cerebrum, the PSU will have to be replaced.



### Note



If service has to be performed to the frame assure the power supplies should be switched off by disconnecting the power cable to the frame. In case of redundant power supplies always be assured both power cables are disconnected.

Si une maintenance doit être effectuée sur l'équipement, assurez-vous que les alimentations électriques soient bien coupées en débranchant les cordons d'alimentation du châssis. En cas d'alimentations redondées, toujours s'assurer que les deux cordons d'alimentation soient bien débranchés.

## Inserting into racks

# Installation in racks

NFR2000 frames fit in standard 19” racks. Air-cooled racks are preferred. The frame’s own cooling design works with air outlets to the back and the sides of the frame for the broadcast version. Airflow is reversed in the datacentre version (going from back to front). *Installation of the equipment in a rack should be in such a way that the amount of air flow required for safe operation of the equipment is not compromised.* Please make sure there is sufficient space and airflow on the front, sides and back of the frames. When stacking frames, please do not block the air vents on the top of the frame to prevent the unit from overheating. We strongly recommend leaving 1 RU space between frames.

*If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the specified maximum ambient temperature.*



NFR2000 frames should be mounted firmly in 19”racks by using valid mounting material at the front. Using L-profiles is mandatory. The holes on the back side are intended for switching between datacentre and broadcast versions and not for rear suspension kits. **Do not mount the frame upside down. The top lid contains the power spec label and should always face upwards.**

**Ne montez pas le châssis à l'envers. Le couvercle supérieur contient l'étiquette de puissance et doit toujours être orienté vers le haut.**

*Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.*

*Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on over current protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.*

*A reliable earth connection of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).*

Installing the NFR2000 frame is a service action and may only be performed by trained service personnel.

## Chapter 3: Specifications

### Frames

<b>Dimensions</b>	Height	44 mm (1.73") (1RU)
	Width	483 mm (19")
	Depth (including power supply, excluding processing module)	605 mm (23.82")
	Depth (including power supply and processing module)	615 mm (24.21")

<b>Weight</b>	Weight (without modules, incl. 2 PSU and 1 blind panel)	9.5kg (34 lbs), approximately
	Processing modules (depending on setup)	< 2.5kg (5.5 lbs)

<b>Power</b>	NPU0500 (specification @ 25°C)	<p>Input: Wide input range: 100-240VAC at 48-62Hz Inrush current: 25A (115VAC) 45A (230VAC)</p> <p>Output: Max. output power: 500W 115-240Vac Linear derating 425-500W 100-115Vac Output voltage: +12V (SELV) Tolerance: +/- 1% (120mV) Ripple/Noise: 2% (20MHz) Load Range: 0 .. 500W Fuse: 250V / 8 A fast – 2x (not serviceable) Max. power per slot: 200W Power factor @ full load &gt;0.95</p>
	Each PSU is additionally fused internal (not customer serviceable).	

<b>Cooling</b>	Fans	4 fans in each PSU
	Required air volume for maximum cooling capacity	290 M <sup>3</sup> /h

<b>Environmental conditions</b>	Operating temperature	0° to 30° C environmental temperature (32° to 86° F)
	Storage temperature	-20° to 70 ° environmental temperature (-4° to 158° F)
	Humidity	Up to 95% relative humidity, non-condensing

**Fan noise** All SPL measurements are performed at a weighted measurement up to 55 dB with filter “A”. Distance to DUT is 1 meter. Frames are placed one meter from the ground in a 19” rack of 47 RU. All unused space is closed with blind panels.

NFR2000, broadcast version, fully loaded	80 dB(A) (preliminary)
NFR2000, Datacenter version, fully loaded	73 dB(A) (preliminary)



## Contacting Axon customer support

Our customer support is committed to solve every problem you might have all around the world. You can contact our customer support here:

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Hercules 28  
5126 RK Gilze  
The Netherlands

Phone: +31 161 850 450  
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