



Pixel Processing Operating Juggler 2 Pixel Processor

User Guide



Operating Juggler 2 Pixel Processor : User Guide

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E: info@7thsense.one
W: 7thsense.one

7thSense Design Ltd
2 The Courtyard, Shoreham Road
Upper Beeding
Steyping
West Sussex
BN44 3TN
UK

T: +44 (0) 1903 812299

7thSense Design LLC
4207 Vineland Rd
Suite M1
Orlando, FL 32811
USA

T: +1 407 505 5200



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Introduction

Juggler® 2 is a highly configurable and powerful modular pixel processor, designed for and scalable up to the demands of very largest venues. Multiple Juggler 2 units can be bussed together via a high-speed box-to-box fibre-optic link to expand system requirements and with complete failover capability almost without limit. The configuration of a particular Juggler 2 unit will optimise use of the available bandwidth according to requirement.



Jugglers run the Compere® software to form integrated systems with Actor® media servers, Conjurer® generative content servers, with ST 2110 transport over IP supported throughout. It is the Compere software that creates integrated projects, manages all networking and external control.

For setting network connections, connecting and routing a fibre bus, and building project groups of multiple devices, see the Compere User Guides on the [7thSense user portal](#).

Summary features and capability of the Juggler 2 pixel processor

- Modular FPGA-based pixel processor.
- Configurability: multiple Juggler units can be daisy-chained via high-speed fibre-optic link, to add additional input and output capability.
- Video scaling, video matrixing and picture-in-picture capability, genlocking, framerate conversion.
- Failover redundant source management with 7thSense IntelligentSource™ (API available).
- Supports SMPTE ST 2110.
- 1G or 10G high speed Ethernet.
- Supports 12-bit 4:4:4 – internal processing at high precision.
- Colourspace mapping via 3D LUT.
- External control over IP.
- User interface: 7thSense Compere software.
- Warp, blend, and black level output support via MPCDI (2D MPCDI).
- NDI® 5.0 confidence monitoring.

Installation

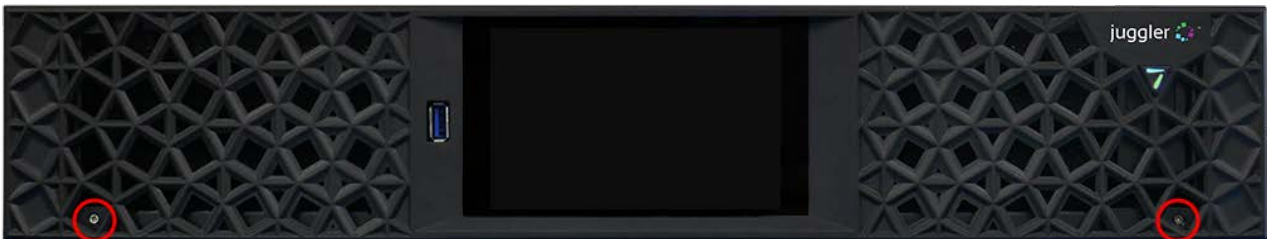
Lifting

The weight of the Juggler 2 unit is stated in the [Physical Specifications](#) ¹⁹ and on the product label. Observe your internal manual handling recommendations to avoid injury, especially when manoeuvring units into a rack at height.

Rack Mounting

The fascia panel must first be removed before mounting in a rack.

Note: Once mounted, sufficient finger access should be allowed in the rack sides to again remove the fascia for maintenance.



Remove the two small retaining screws bottom left and right, and then pull the fascia off its push-fit fasteners. Refit the fascia after mounting. Where side access is restricted for unranking, a 7thSense tool is available to insert into the grille. Take care not to damage the grille with other tools, or force when removing.



Juggler 2 is supplied with rack-mount slide rails and fixings. Installation instructions are included with the slide rails. Ensure that each unit is properly secured to the rack cabinet using M6 bolts.

Rack stability warnings

- Ensure the rack is stable (e.g. bolted to the floor) before sliding out the Juggler unit.
- Do not place objects on equipment projecting from a rack (e.g. do not use as a shelf).
- Only slide out one piece of equipment from the rack at a time.

Airflow and cooling

Airflow intake is through the filtered vents in the front panel, and exhaust is out through the rear panel. These vents must all have a clearance of at least 50 mm.

Environment

- Juggler 2 is intended for use in a commercial (not domestic) environment and should be operated in a clean, dust free area (e.g. a server room).
- It is intended for operation in benign environments (not subject to corrosive or explosive atmospheres, moisture or flammable gases).
- Units are not protected against ingress of liquid (IPx0) or designed to be subject to excessive mechanical shock or vibration.



Only used at altitude not exceeding 2000 m



Only used in not-tropical climate regions

Thermal

Do not block any of the unit's air vents and ensure the ambient temperature around the Juggler 2 is compatible with the environmental characteristics stated in the [Physical Specifications](#)¹⁹.

Particularly when mounted in a rack cabinet with front or rear doors the ambient temperature around the unit may be higher than the ambient room temperature.

Electrical

Before connecting power to the unit, ensure the electricity supply is compatible with the electrical ratings shown in this document and on the unit's product label. The unit shall not be connected to an IT (unearthed neutral) power distribution system and the mains socket-outlet used shall connect to the building installation ground.

Juggler 2 is connected to and disconnected from the mains supply with the IEC 60320 power connector on the rear of the unit.

Care and Maintenance

Cleaning

External casing and the front panel should be carefully wiped with a soft cloth and antistatic solution.

Air filters

Juggler 2 units are supplied with spare filter pads. Others can be provided by your supplier. Juggler 2 should not be run without filters, since accumulations of dust inside the unit can affect performance.

Replacing filters

The front fascia is mounted on push-fit fasteners and secured by two small screws. Remove these screws before attempting to remove the fascia (see [Installation](#) ⁵):



The front fascia can then be pulled straight off. The right-side filter has a cutout for the power switch. Each filter pad is simply fitted under the respective rails.



Dual Redundant Power Supply Fuses

The Juggler 2 is protected by 2 × 5 A removable fuses mounted in the rear panel. If either malfunctions, both must only be replaced by a qualified person, using only T5A/250VAC 5 × 20 mm

ceramic cartridge fuses (Eaton-Bussmann series S505-5-R T speed). Disconnect the Juggler 2 from the mains supply before rotating the holders using a suitable tool and withdrawing the fuses. Fit new fuses, reinsert, and secure both before reconnecting.

Internal maintenance

There are no internal user-serviceable electrical parts.

I/O cards are not hot-swappable: power off the unit before removing or replacing.

Certain custom I/O cards may carry a user-replaceable coin cell battery. Switch the unit off before releasing the two panel mounting screws and withdraw the card. Replace the cell before reinserting and securing the card.

Electrostatic discharge (ESD)

When handling electronic assemblies, take precautions to avoid electrostatic discharge (ESD) causing damage. Precautions should include the wearing of an ESD protective wrist strap and using antistatic bags for electronic assemblies when not installed in any equipment.

Warning: Do not operate the Juggler with any covers removed as the air flow through the unit will be compromised and may lead to overheating. The lid of the Juggler forms an integral part of the cooling circuit. Operation of the unit with the lid removed can cause overheating.

Any alterations to the product's specification, e.g. additional/alternative components, may invalidate the warranty or impact the unit's performance. Additionally, such changes or modifications could cause equipment no longer to comply with the relevant EMC regulations, and void the user's authority to operate the equipment. If in doubt, please contact your supplier.

End of Service Life



Dispose of the equipment and any components in accordance with all local and national safety and environmental requirements.

Rear Panel Connections

The Juggler 2 rear panel reflects its highly configurable nature. It has 6 available slots for I/O cards, ranging from QSFP, SFP, to HDMI, DP or even custom cards.*

Slot 7 on the far left is always the System I/O module, and the power and communications panel lies to the right of slot 1.



The I/O cards in slots 6-1 are push-fit but are not hot-swappable. The firmware of each Juggler 2 unit is custom to the physical arrangement of the unit. The example above shows two QSFP 28 optical bus cards, one HDMI 2.0 card and one DisplayPort 1.4.

* DisplayPort, HDMI and SDI options available soon

Power and Communications Panel

Power is supplied to the dual redundant power supply units in the Juggler via a standard IEC connector. This can be retained using the mounted sprung clip:

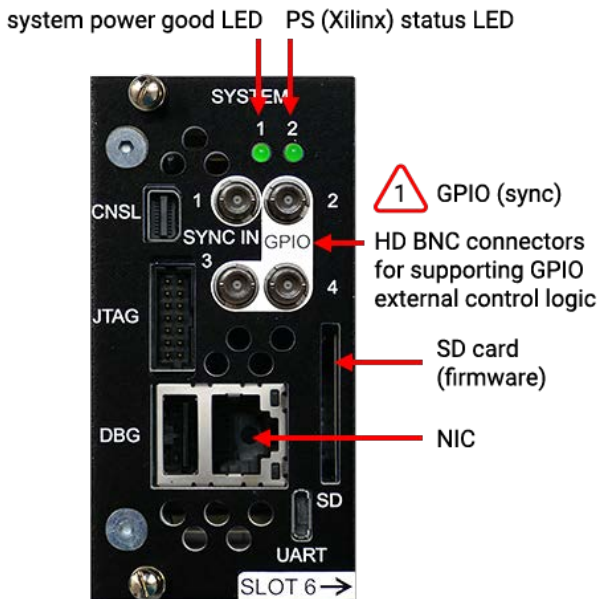


To the left of this are the two fuses for each internal power supply. (For replacement, see [Care and Maintenance](#) ⁽⁸⁾.)

Juggler 2 is capable of hosting a 10G NIC. Where this is not included, there will be a blanking plate in this location.

Debug features are for systems support only.

System I/O Module



This panel contains the unit's RJ45 network connection, four GPIO connectors, and the firmware SD card. GPIO 1 is used for receiving tri-level sync signals. All other ports are configuration and debug purposes only.

Note that Compere software and Juggler-specific firmware can be updated via the Compere UI. The SD card will never normally be required to be accessed.

Connecting External Equipment

To ensure best performance from the Juggler 2 and compliance with relevant EMC regulations, this equipment should only be used with high-quality shielded data and signal cables.

Only equipment and accessories approved to IEC 60950-1 and SELV circuits may be connected to the unit. All equipment and accessories shall comply to the relevant standard for the port or ports to which it is connected.

Front Panel



The Juggler 2 front panel has a touch-screen display, the 7-symbol power button (recessed into the fascia, top right) and a single USB 3 connector to the internal processor that runs Compere and the front panel display. The USB connector is for keyboard access to the internal processor (single board computer running Linux).

Switching on

Juggler 2 must first be connected to an appropriate power source using the supplied IEC power cord. The front panel power button will show a dimly illuminated '7' indicating this connection. Press and release the power button to start the unit. The power button will show bright and the display panel will go through a start-up cycle before settling to the landing page shown above.

Reset

Should you need to reset the internal FPGA board only, the power button can be pressed and held for 3 seconds then released when the '7' light dims. The button will flash for 2 seconds before returning to normal status.

Front Panel Controls and Display

The front panel display is a touch-screen controller for the Juggler. It is used for configuration, monitoring and play control. Touch and swipe navigation provides selection menus, and NDI media display in user-selectable layouts. The panel can itself be tested and calibrated.

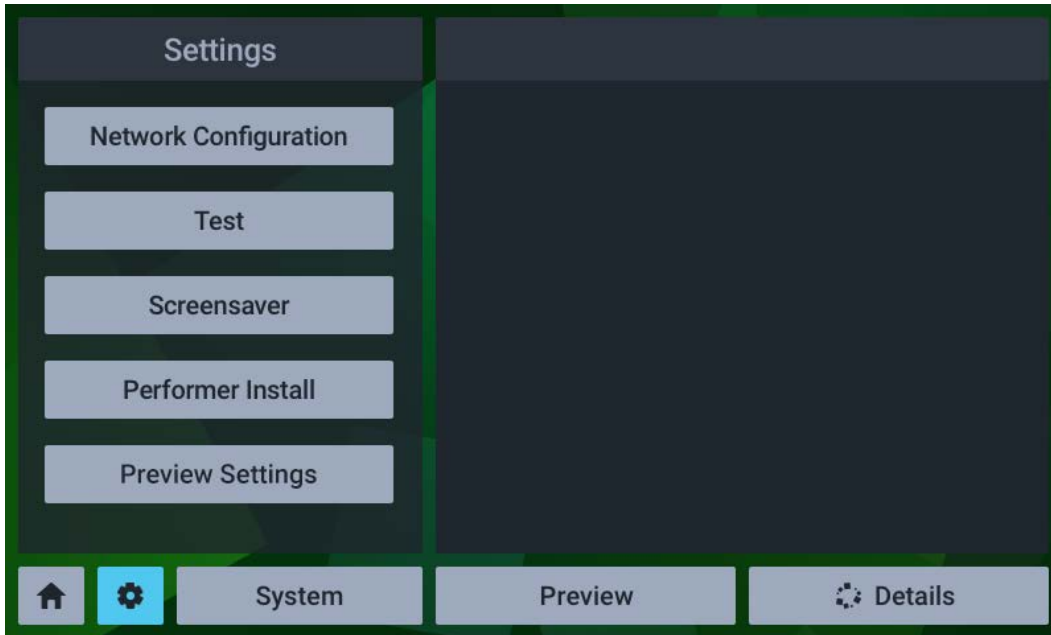
Landing Page

When powered up, the home/landing page on the touch-screen display identifies the Juggler unit, its name, role, Project Group, and IP address.



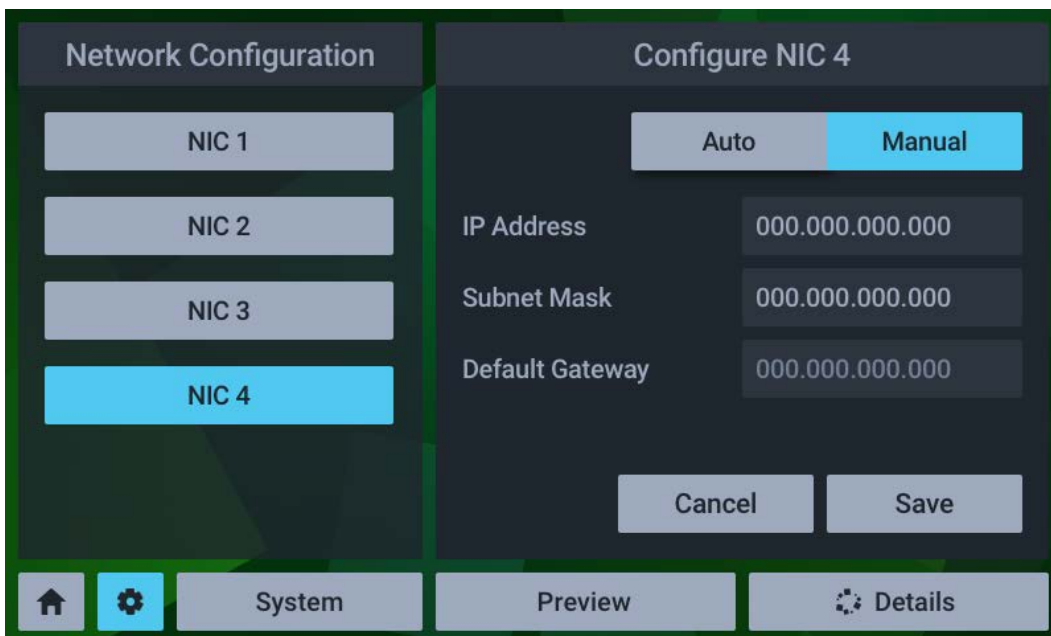
Touch-the display menu to access NIC settings, system information and timeline controls, details, and preview settings.

 **Settings**



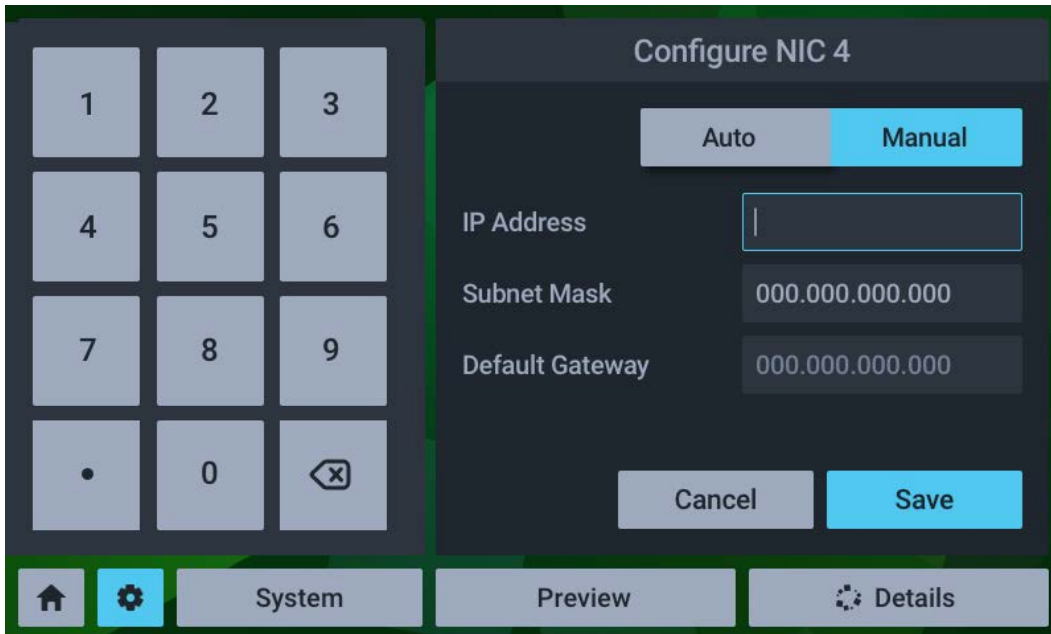
Settings > Network configuration

This shows all IP addresses and allows Auto (DHCP) and manual NIC configuration:



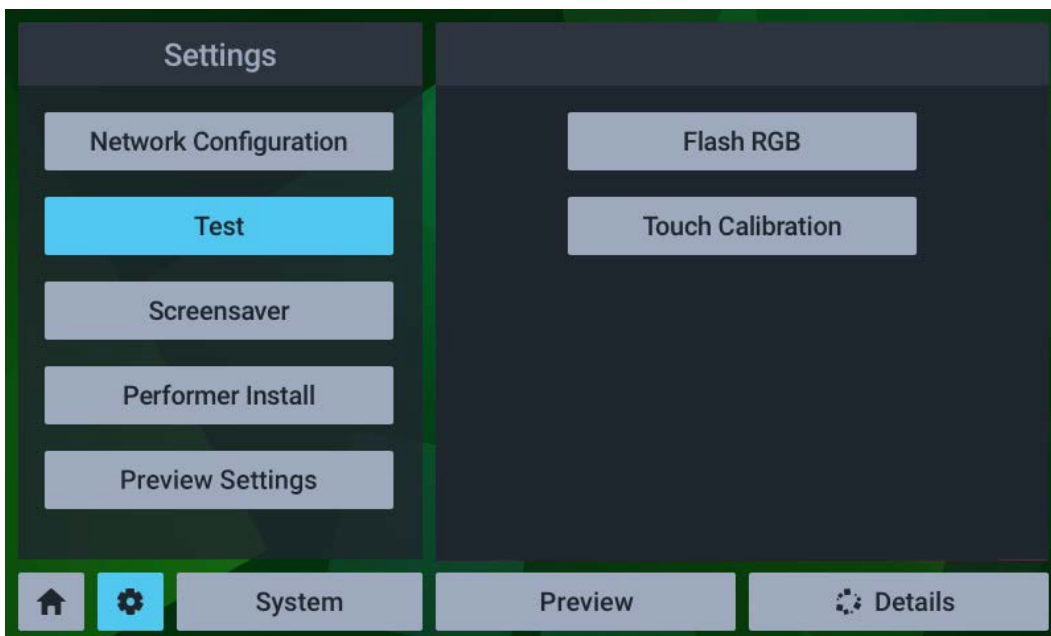
The NIC naming follows the 'friendly names' given in the software.

For manual edit of a selected NIC, select manual and click on the required field:



Edit the required octet(s) and save.

Settings > Test



The **Test** button has two functions, to cycle all outputs once through solid red, blue, green, and to calibrate the touch function.

The touch calibration simply requires a touch to be traced across the range of the display panel:



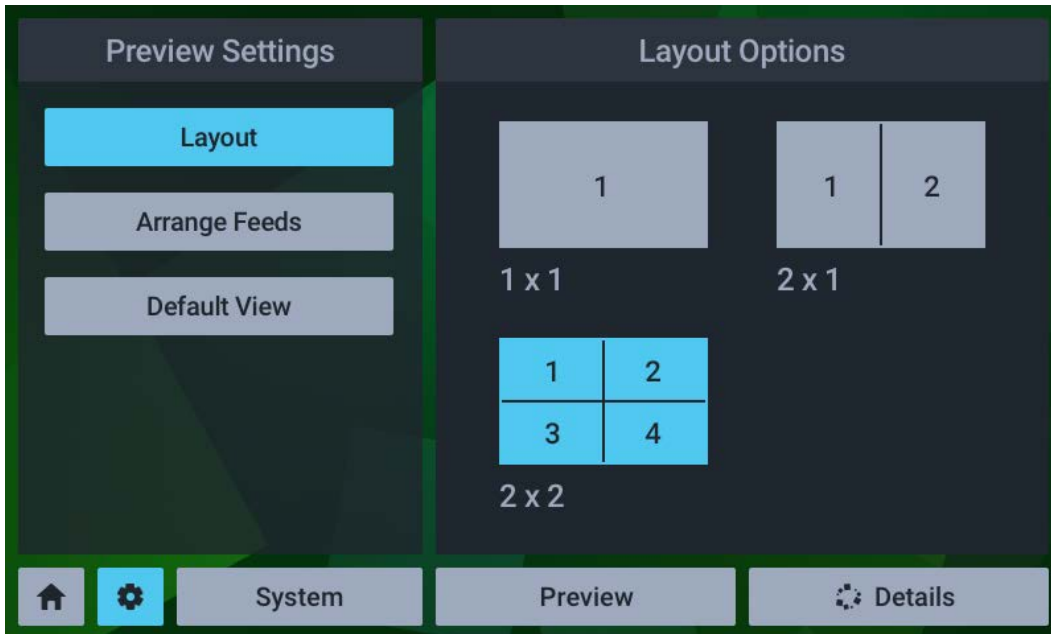
If insufficient data is collected you will be prompted to try again, otherwise a success message will briefly be displayed.

Settings > Performer Install

This is a service function for the configuration of the Compere software.

Settings > Preview Settings

Layout: The display can show up to four available NDI feeds. Choose between 1, 2 and 4 feeds, laid out as shown:



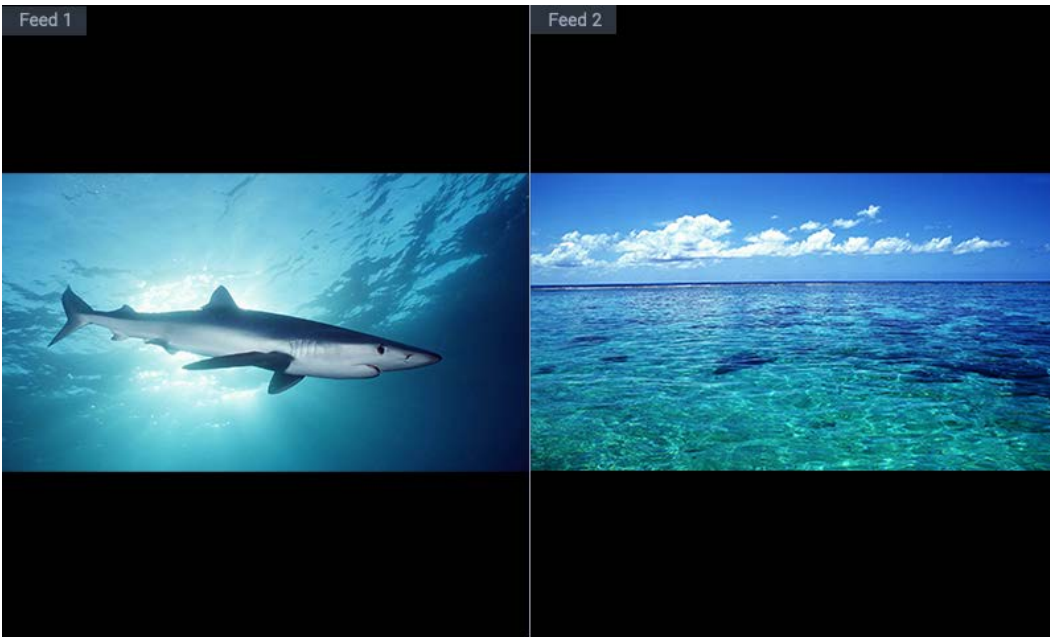
Arrange Feeds: Allocate which feeds to assign to each part of the display.



Naming follows that given in the Compere project.

Preview

Select the Preview button to see NDI feeds available in the Juggler arranged as in Settings > Preview Settings.



Details

Here you access server information, version and licence details.



Juggler 2 Physical Specifications

Environmental Characteristics	Operating	Non-operating
Temperature	+15 to +30 °C	-10 to +50 °C
Humidity (non-condensing)	10 to 90%	5 to 95%
Altitude	≤ 2000 m	≤ 10000 m

Specification	Rating/Description	Notes
Rackmount Dimensions (H × W × D)	(2U) 88 × 429 × 491.5 mm (3.5 × 16.9 × 19.4 in)	Width including mounting ears: 483 mm (19 in)
Rackmount weight (approx.)	9 kg (approx)	
Power Supply	100-240 V, 3 A, 50-60 Hz	Autoranging, IEC 60320 inlet
Power	300 W	
Cooling	Forced air	Inlets at front, exhaust at rear

Warranty, Support and Service

Standard warranty is 24 months, return-to-distributor. Please contact 7thSense Design if you require an extended warranty.

Please ask for instructions and request authorisation before returning a Juggler unit to your distributor.

➤ Visit our Support Portal for [support and service](#)

Regulatory Compliance

FCC

Juggler 2 Pixel Processor 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: The equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These 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 this user guide, 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 their own expense.

UK and European Union

Juggler 2 Pixel Processor is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Document Information

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June 2023	1	New release	Andie Davidson

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E: info@7thsense.one
W: 7thsense.one

7thSense Design Ltd
2 The Courtyard, Shoreham Road
Upper Beeding
Steyning
West Sussex
BN44 3TN
UK

T: +44 (0) 1903 812299

7thSense LLC
4207 Vineland Rd
Suite M1
Orlando, FL 32811
USA

T: +1 407 505 5200

