

TOASTER

16 sensors UDP / MIDI interface



La Kitchen hardware

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Presentation

The Toaster is a captation system dedicated to real time applications.

Every kind of analogic sensors can easily be connected to the kroonde. Most useful are flexion, pressure, light, acceleration, magnetic field, potentiometer, switch, etc...

The sensors are connected to the box through 6.35 stereo jack connectors.

The 1U Rack gets analogical information from sensors and transmits them to one computer or more with a high band (Ethernet (10MB/s), UDP network protocol), with a precision of **16 bits** by sensor.

The Toaster is also MIDI compatible.

Performances

UDP

The 16 sensors are updated in about 5 ms, with 16 bits precision. Only the first 14 bits are stable.

MIDI

MIDI speed depends on the number of variating sensors. The updating time varies between 3 and 12 ms. Precision is 14 bits on 2 MIDI Controls Change.

The Sensors

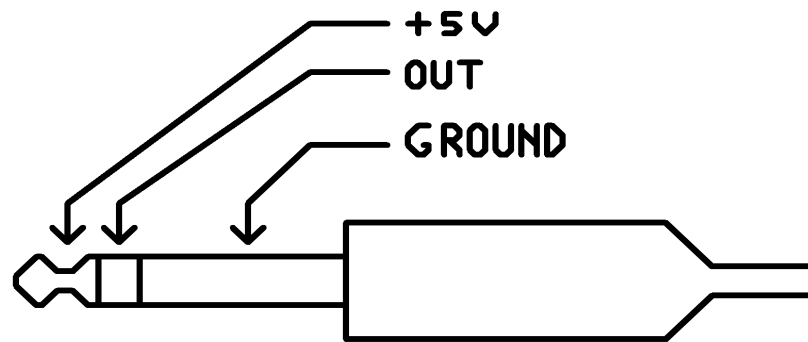
Sensor's plug are in the back of the rack

The sensors are powered in 0 / +5 V and transmit analog informations. The analog voltage (0/ +5 V) of the output sensor is converted into digital data (16 bits).

All sensors which transmit analogical power between 0 and 5 volts are compatible with the Toaster.

Interfacing

The connectors are organized as following:



Ground : the electric ground.

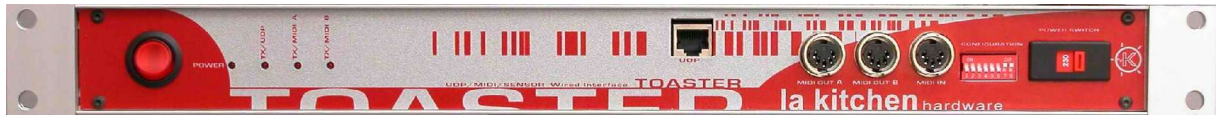
+5 V : sensor power.

Out : this wire corresponds to the output sensor, it's a high impedance montage entry. The voltage applied to this wire will be analysed, then transmitted to the computer.



The rack

Front



The Toaster is a 1U rack, with (from left to right)

- a general switch,
- 4 LEDs,
- a RJ45 connector for the Ethernet connection (10Mb/s)
- 3 MIDI connectors (2 OUT and 1 IN),
- some configuration micro-switches,
- one power switch.

The LEDs indicate (from left to right) :

Power : The module is switched on.

TX UDP: The module transmits information in UDP.

TX MIDI A : The module transmits information on the MIDI A plug.

TX MIDI B : The module transmits information on the MIDI B plug.

Configuration micro-switch allows to :

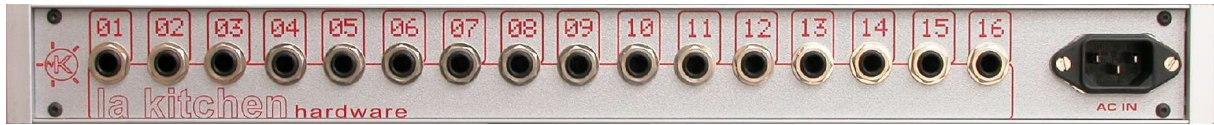
- 1 : Select or not OSC protocol (MAX compatible)
- 2 : Select or not binary protocol (Pure Data compatible)
- 3 : Select or not MIDI A protocol
- 4 : Select or not MIDI B protocol
- 5 : Select IP configuration mode
- 6 : select specific IP address for the Toaster
- 7 : idem
- 8 : select broadcast mode

The configuration micro switch will be describe later.

Caution! : power switch select between 110V and 220V power supply.

It should be in the correct way before plugging the Toaster in order to avoid electrical problem.

Rear



At the rear, there are a 110V or 220 V Schuko connector and 16 sensor's connectors.

Communication with the computer

The Toaster system allows communication through four different protocols.

All UDP communication transit via socket N° 1235 to socket N° 5679.

OSC :

Open Sound Control Protocol is compatible with MAX/MSP, Pure Data, AAASeed, SuperCollider etc.

A demonstration patch for MAX/MSP and Pure Data is available on this CD.

Protocol informations, objects for MAX/MSP and Pure Data are available on the following website : <http://cnmat.cnmat.berkeley.edu/OSC/>

Messages sent by the Toaster are a list of integer. They are as follows :

byte 1 to 8 : /toaster (in ASCII)

byte 9 to 11 : 0 (in binary)

(bytes from 1 to 11 are the OSC address pattern

byte 12 to 29 : ",iiiiiiiiiiiiiii" (in ASCII)

byte 30, 31 and 32 : 0 (in binary)

(bytes from 12 to 32 are the OSC type tag string)

byte 33 to 36 : number of 32 bits corresponding to the value of the first sensor. Only the 16 less significant bits have a different weight to zero.

byte 37 to 40 : idem, for the second sensor.

The other bytes are identical, grouped 4 by 4, for the other sensors.

binary :

Binary protocol is compatible with Pure Data object standard (netreceive).

Messages sent by the Toaster can be as follows:

Toaster 132 234 343; (in ASCII) followed by type 10 (carriage return), for example, in the case of transmission of three sensors with respective values 132 234 and 343.

MIDI A :

Control Change 0 and 1 are transmitted for the 1st sensor on MIDI channel 12.

Control Change 2 and 3 are transmitted for the 2nd sensor etc.

The first Control Change (CC0 for the first sensor) is the 7 MSB of the message.

The second Control Change (CC1 for the first sensor) is the 7 LSB of the message.

So Control Change 0 corresponds to the 7 bit value of the first sensor.

(CC0 << 7) + CC1 corresponds to the 14 bit value of the first sensor.

MIDI B :

It's the same protocol but the first 8 sensors are sent to the MIDI A plug and the other 8 sensors are sent to the MIDI B plug.

Configuration

The Toaster has 8 configuration's micro-switches.

Configuration of transmission's format

4 micro-switches are able to configure the transmission's format :

micro-switch 1 selects or inhibits OSC protocol (MAX/MSP).

micro-switch 2 selects or inhibits binary protocol (Pure Data).

micro-switch 3 selects or inhibits MIDI A transmission.

micro-switch 4 selects or inhibits MIDI B transmission.

Simultaneous selections of several protocols are possible excepted the MIDI A and MIDI B. The Toaster will transmit data according to the specified formats, but the latency time may be augmented.

Manual IP Addresses Configuration

Caution! : Current cut off during the IP address configuration of Toaster may result problems in internal memory. In order to prevent this problem, it's important to put switches 6, 7, and 8 in the OFF position before you turn ON and OFF the Toaster.

When micro-switch 5 is on ON, the Toaster is in IP address configuration mode.

In this mode, the Toaster awaits a MIDI configuration. The LEDs flash one after the other for underscore an atypical working mode.

8 MIDI Control Changes are useful to configure the Toaster IP address. Each message corresponds to 4 bits of IP address.

When 8 messages are correctly received, the Toaster refreshes the corresponding IP address, (transmission of a MIDI confirmation message), and returns to a waiting mode for further messages.

A rapid LED flash offers visual confirmation of the correct MIDI message reception.

Each message (Control Change) corresponds to 4 bits of IP address.

Message n° 50 : less significant 4 bits of the IP address of Toaster message receiver.

...

Message n° 57 : most significant 4 bits of the IP address of Toaster message receiver.

(idem for Toaster IP address)

Message n° 60 : less significant 4 bits of the Toaster's IP address.

Message n° 67 : most significant 4 bits of the Toaster's IP address.

The Toaster receives only messages sent on channel 12.

Once these IP addresses are configured, you have to return micro-switch 5 on OFF, then the Toaster will reboot normally, with the new IP address. These addresses are safe-guarded and will be used until replaced by a new configuration.

At the end of the initialisation sequence, the 3 LEDs will light up together. If not, it shows the Toaster is unable to connect into the network with the specified IP address. In this case, addresses should be changed.

Prior IP Address Configuration

Another faster way to configure Toaster IP addresses :

Micro-switches 6 to 8 enable standard configurations.

These configurations are only taken into account when the Toaster is started up.

When micro-switch 6 is on ON, the Toaster IP address is : "10.0.0.10" and the receiver's IP address for Toaster is: "10.0.0.20".

When micro-switch 7 is on ON, the Toaster IP address is : "192.168.254.95", and the receiver's IP address for the Toaster is: "192.168.254.93".

When micro-switch 8 is on ON, the receiver's IP address for Toaster became "255.255.255.255", witch enables transmission to all connected computers.

Warning, these micro-switches must be positioned on OFF to allow manual IP address configuration.

If the Toaster is connected to one computer, use a cross cable. In this case, these IP and remote IP addresses suit very well.

Installation :

There is nothing specific to do to install the Toaster on a computer.

The Toaster transmits information to a target identified by its IP address.

For an utilization with Pure Data, the Toaster is totally compatible with standard objects.

For an utilization with MAX, Open Sound Control (OSC) from CNMAT must be installed.

This is available through :

<http://cnmat.cmat.berkeley.edu/OSC/Max/#downloads>

The CD contains software which enables visualisation of the on-line information, in order to analyse the Toaster's sending. This software can be found in the "ethereal" dossier of this CD (for PC).

Examples can also be found for both Pure Data and Max.

Guarantee

The Toaster carries a one year manufacture guarantee.
Problem independent of a normal use of this product are not guaranteed.

In case of an electricity problem, the fuse must only be replaced by a 200 mA model.

Electric current must be only in 220 V or 110 V regarding to the voltage selector in front of the Toaster.

Contact

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