

MAC

401 ; 201

REF. 4485 ; 4449

AV-COFDM standalone modulator



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General safety instructions

- Read all of this user manual carefully before plugging in the unit.
- Always have these instructions to hand during installation.
- Follow all of the instructions and safety notices regarding unit handling.

Types of notices

The meaning of the safety notices used in this manual are described below.



DANGER OF DEATH OR INJURY

This safety notice indicates a possible danger for the life and health of people. Not following these instructions may lead to serious consequences to health and may even cause fatal injuries.



RISK OF DAMAGE TO THE UNIT

This safety notice indicates a possible dangerous situation. Not following these instructions may lead to the unit being damaged.



NOTE

This type of notice is a note containing applicable advice and useful information for optimum use of the unit.



HANDLING THE INSIDE OF THE UNIT IS FORBIDDEN

This notice forbids any work that may affect the working order of the unit or its warranty.



DO NOT DISPOSE OF AS URBAN WASTE

This type of notice indicates that the unit must not be disposed of as unselected urban waste.

Basic safety instructions



DANGER OF DEATH OR INJURY

- Do not install the unit during an electrical storm. This could lead to electrostatic discharge from lightning.
- Do not open the unit. There is a risk of electrostatic discharge.

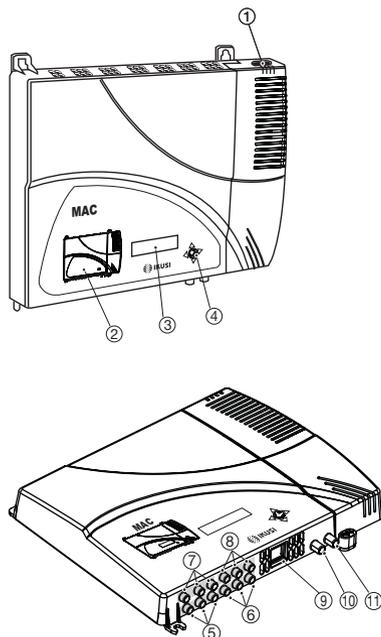


RISK OF DAMAGE TO THE UNIT

- The unit must be appropriately ventilated. Install the unit in a dust-free location. Do not place the unit in a location where the ventilation slots are covered or blocked. Install the unit in a location with at least 20 cm around it free of other objects.
- Do not expose the unit to rain or moisture. Install the equipment in a dry location with no infiltration or condensation of water. Should a liquid enter the unit, disconnect it immediately from the mains.
- Keep the unit away from flammable objects, candles and anything that may cause a fire.
- Connect the unit to an easily accessible power socket. In the event of an emergency, it will then be possible to quickly unplug the unit.
- Do not expose the unit to sources of heat (sun, heating, etc.).

Introduction

General description



KEY

- ① Mains connector
- ② Front panel with cluster map
- ③ Display (LCD)
- ④ Control button
- ⑤ AV input 1
- ⑥ AV input 2
- ⑦ AV input 3 *
- ⑧ AV input 4 *
- ⑨ Ethernet connector
- ⑩ TV Loophrough input
- ⑪ TV COFDM output

* Available only in MAC 401 model.

Main features

The MAC model is an AV analogue TV signal to COFDM digital TV signal standalone modulator unit. Suitable for individual residential installations, it is an ideal solution for the distribution of analogue video signals with COFDM digital TV modulation in a single standalone unit.

AV1 to AV4 are also serially digitalised, coded in MPEG2 and modulated in COFDM. The COFDM base band signal is modulated on an RF carrier that can be adjusted at the output to the VHF and UHF bands.

- Programming:
 - User interface with LCD display and control button for basic configuration.
 - User interface from web browser via Ethernet connection.
 - All settings are automatically memorised.
 - Reprogrammable as many times as required.
 - Firmware updated via Ethernet connection with web browser.

- Dimensions: 302 mm x 251 mm x 44 mm
- Weight: 1.5 kg

The main characteristics of the MAC model are described below.

EN

MAC 201 and MAC 401 models

Recommended for individual residential installations, consisting of two AV inputs and one RF VHF/UHF output that delivers an output level of >80 dB μ V.

- Inputs:
 - 2 or 4 CVBS video inputs with stereo audio, as MAC 201 or MAC 401 model respectively.
 - Supported video standards: PAL/SECAM/NTSC
 - RF loopthrough input.
- Processing:
 - Video: MPEG2 and MPEG4 Layer II.
 - Audio: MPEG1 Layer II.
 - Quality: DVD full D1.
 - Generates the PSI tables: PAT, PMT, SDT, NIT, TDT and TOT.
 - LCN processing.
- Outputs:
 - DVB-T output according to ETSI EN 300 744.
 - Output MER > 38 dB (typical).
 - Band aliasing < -45 dB.
 - Output frequency bands: VHF + UHF.
 - Average output level 80 dB μ V.

General use of the unit

Below is described how to operate the unit using the control button and interpret the visual indications on the LCD display. The program comprises a main menu made up of sub-menus that can be selected to modify the basic operation settings of the unit.

Visual indications on the LCD display



This symbol visually indicates the possibility of moving vertically.

Vertical button movement



In the menus and submenus, move the button up or down to browse upwards and downwards position by position.

In the settings, move the button up or down to modify values position by position.



NOTE

Keep the button pressed up or down to browse or to modify values more quickly.

Horizontal button movement



In the menus, move the button to the left or the right to select and go back position by position.

In the settings, move the button to the left or the right to select and go back position by position.



NOTE

Keep the button pressed to the left or to the right to browse more quickly.

Press button



In the menus, this selects the submenu.

In the submenus, this selects the setting.

In the settings, this selects the parameter value.

Unit installation and configuration

The LCD display and the control button are sufficient for the basic settings of the unit. Follow the steps indicated below to install the unit and configure the various parameters accessible from the user interface on the LCD display.

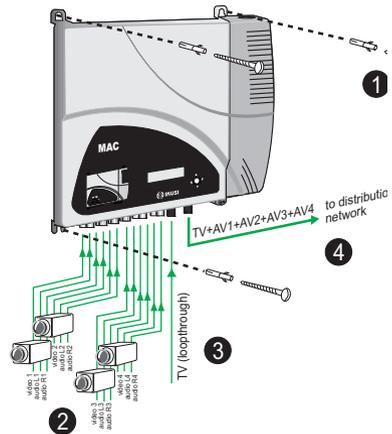
Installation



RISK OF DAMAGE TO THE UNIT

Mechanical handling of the unit while it is switched on may lead to it being damaged. Do not plug the unit into the mains before or during installation.

- 1) Fit and tighten the bolts and plugs securing the unit to the wall.
- 2) Connect AV inputs in the respective RCA connectors.
- 3) You can also connect the coaxial cable from the RF loopthrough input (connector F).
- 4) Connect the coaxial cable from the output to the unit (connector F).



NOTE

Illustration above only applies to the MAC 401 model.
For MAC 201 model only AV1 and AV2 inputs are available.

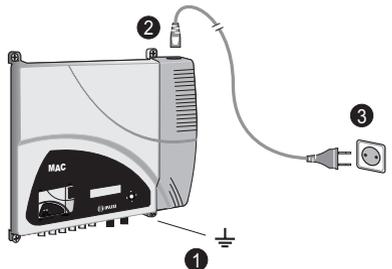
Power supply connection



DANGER OF DEATH OR INJURY

Incorrect unit power connection may cause an electric shock. Follow the steps below for the electrical installation of the unit.

- 1) Connect the earth cable.
- 2) Connect the power plug to the unit mains connector.
- 3) Connect the power plug to the mains socket.

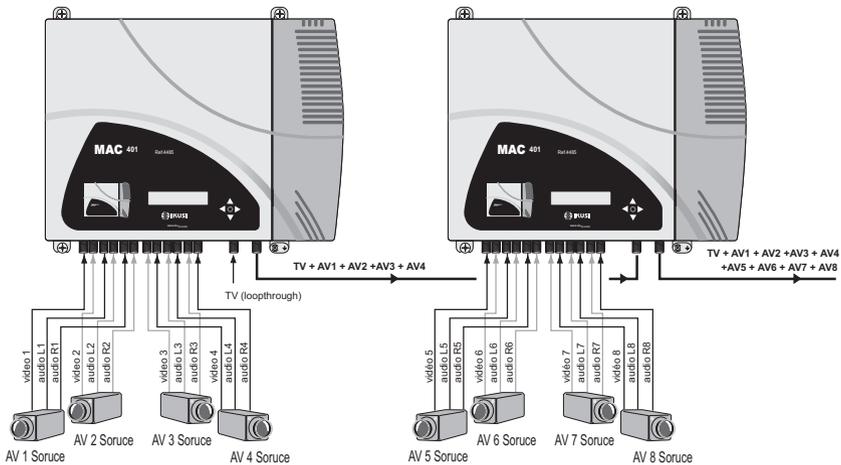


Cascade installation

The MAC unit has a maximum capacity to include 4 AV analogue TV signals at the RF VHF/ UHF output, coded as COFDM Digital TV signals.

To increase this capacity, several MAC units can be cascade connected. The maximum capacity of a group of N units is 2xN or 4xN TV signals included, as MAC 201 or MAC 401 model respectively.

To cascade connect 2 or more units, connect the RF output (4) of the previous unit to the TV input (loopthrough) (3) of the next unit (see [Installation](#) figure).



NOTE

Illustration above only applies to the MAC 401 model.
For MAC 201 model only AV1 and AV2 inputs are available.

For installations with 2 or more units, each one must be identified with a different TSID value and each service identified with a different SID value.

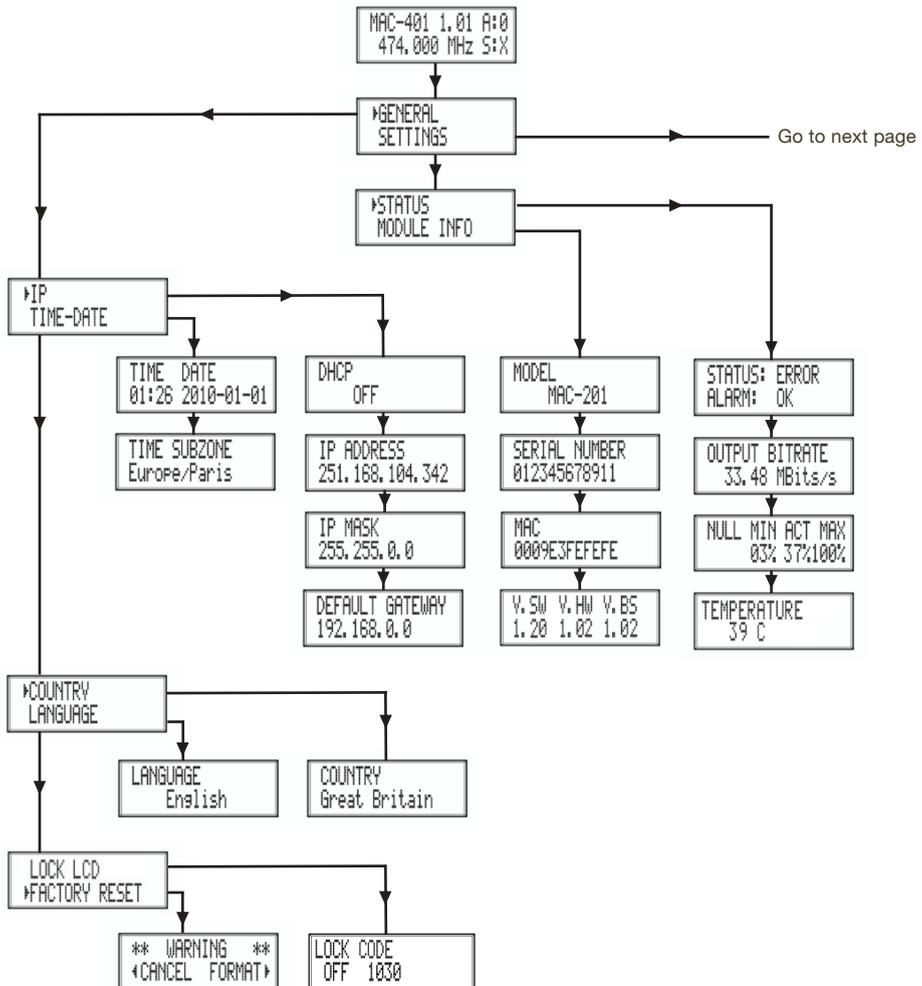
To configure TSID and SID values, perform advanced unit configuration (see [Advanced configuration of the unit section](#)).

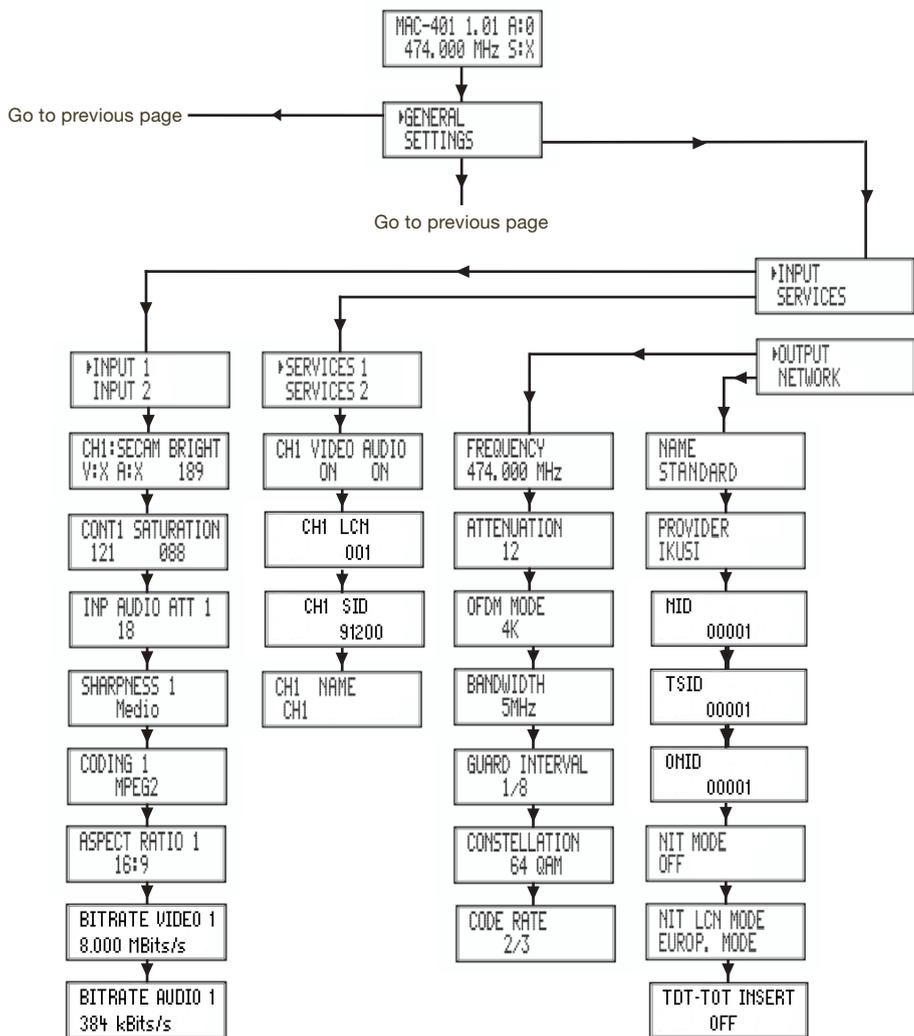


NOTE

The process of advanced configuration of the unit is explained in the “Web interface user manual” available at <http://www.ikusi.com>.

Fast menu guide





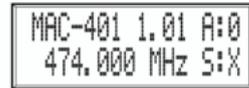
Main menu



NOTE

Over the following pages, the field locating and selection method is primarily indicated by the “vertical button movement” and “press button” icons. However, horizontal button movement can be used to locate and select fields, as indicated in the [General use of the unit](#).

- 1) After switching on the unit the initial display appears informing of the model, firmware version, output frequency and information on alarms and status:
 - Alarms:
 - △ A:0 = no alarms
 - △ A:X = alarms present
 - Status:
 - △ S:X = status correct
 - △ S:0 = status incorrect



- 2) Press the control button to access the main menu.



General Settings

- 1) In the main menu, locate and select GENERAL.



IP configuration



NOTE

The IP configuration affects the Ethernet interface.



NOTE

To introduce a sequence of digits in the display move the control button vertically to change the value of the current digit and horizontally to move between digits.

- 1) Locate and select the option IP.



- a) Locate and select the option DHCP to activate (ON) or deactivate (OFF) dynamic IP assigning. If this is deactivated, a static IP must be configured.



- b) Locate and select the option IP ADDRESS. Enter the 12-digit sequence corresponding to the static IP address of the unit.
- c) Locate and select the option IP MASK. Enter the 12-digit sequence corresponding to the IP mask of the unit.
- d) Locate and select the option DEFAULT GATEWAY. Enter the 12-digit sequence corresponding to the IP direction of the LAN gateway.



IP ADDRESS
251.168.104.342



IP MASK
255.255.0.0



DEFAULT GATEWAY
192.168.0.0

Setting the time

- 2) Locate and select the option TIME-DATE.



▶IP
TIME-DATE

- a) Locate and select TIME-DATE to configure the time and date of the unit in the format HH:MM YYYY-MM-DD.



TIME DATE
01:26 2010-01-01

- b) Locate and select the option TIME SUBZONE to configure the reference time zone.



TIME SUBZONE
Europe/Paris

Selecting the country

- 3) Locate and select the option COUNTRY to select the reference country.



COUNTRY
Great Britain

Setting the language

- 4) Locate and select the option LANGUAGE to establish the language of the menus on the display: ESPAÑOL, ENGLISH, FRANÇAIS.



LANGUAGE
English

Blocking the LCD and joystick

- 5) Locate and select the option BLOCK LCD to block access to the configuration from the LCD display and using the control button.



LOCK LCD
▶FACTORY RESET

- a) Activate (ON) or deactivate (OFF) the blocking option.
- b) Establish a code to unlock the unit if this option has been activated.



LOCK CODE
OFF 1030

Restoring factory settings

- 6) Locate and select the option **FACTORY SETTINGS** to restore the factory settings of the unit.



Select the option **DELETE** to delete all the modifications entered in the configuration by the installer or operator of the unit.



Setting the signals



NOTE

The unit can switch the input signals; alter their brightness, contrast and saturation conditions; and adjust the output carrier in RF.

- 1) Locate and select the option **SETTINGS**.

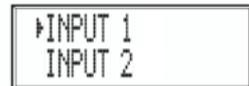


Configuring the input signals

- 1) Locate and select the option **INPUT**.



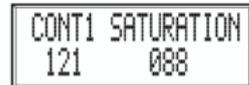
- 2) Locate and select the option **INPUT** and the number corresponding to the input you want to configure: 1 to 2 for MAC 201 and 1 to 4 for MAC 401.



- a) Locate and select the option **CH1:***** BRIGHT** to check the type of input signal, the video and audio detection, and configure the brightness of the video signal (1 to 255).



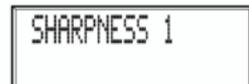
- b) Locate and select the option **CONT1 SATURATION** to configure the contrast and saturation of video signal 1 (1 to 255).



- c) Locate and select the option **INP AUDIO ATT 1** to configure the attenuation of audio signal 1 in dB (1 to 40)



- d) Locate and select the option **SHARPNESS 1** to configure the sharpness of video signal 1 (**HIGH**, **MEDIUM**, **SOFT** or **NONE**).



- e) Locate and select the option CODING 1. This configures the coding parameters: MPEG2 or MPEG4 LAYER2.



CODING 1
MPEG2

- f) Locate and select the option ASPECT RATIO. The possible aspect ratio values are 1:1, 4:3 and 16:9.



ASPECT RATIO 1
16:9

- g) Locate and select the option VIDEO BI-TRATE. The unit can be configured for a data coding speed at input of 3 to 8 Mbits/s.



VIDEO BITRATE 1
8.000 Mbits/s

- h) Locate and select the option AUDIO BITRATE. The unit can be configured for a data coding speed at input of 96; 128; 160; 192; 224; 256; 320 and 384 Kbits/s.



AUDIO BITRATE 1
384 kBits/s



NOTE

If you keep pressing the control button down you will access the information and configuration of the following input signals.

Configuration of the carrier services

- 1) Locate and select the option SERVICES.



▶INPUT
SERVICES

- 2) Locate and select the option SERVICES and the number corresponding to the input you want to configure: 1 to 2 for MAC 201 and 1 to 4 for MAC 401.



▶SERVICES 1
SERVICES 2

- a) Locate and select the option CH1 VIDEO AUDIO. Activate (ON) or deactivate (OFF) the video and audio signals of the first input.



CH1 VIDEO AUDIO
OFF OFF

- b) Locate and select CH1 LCN. Configure the LCN value of the signal.



CH1 LCN
001

- c) Locate and select CH1 SID. Configure the SID value of the signal.



CH1 SID
91200

- d) Locate and select CH1 NAME. Assign a name to the signal in CH1.



CH1 NAME
CH1

**NOTE**

If you keep pressing the control button down you will access the information and configuration of the following input signals.

Configuration of the output signal**NOTE**

To introduce a sequence of digits in the display move the control button vertically to change the value of the current digit and horizontally to move between digits.

**NOTE**

Position the cursor to the right of the current value and move the control button vertically to increase or decrease the current value. Hold the control button up or down to increase or decrease the current value more quickly.

3) Locate and select the option OUTPUT.

OUTPUT
NETWORK

- a) Locate and select the option FREQUENCY. Configure the output frequency value between 45 MHz and 865 MHz.



FREQUENCY
474.000 MHz

- b) Locate and select the option ATTENUATION. Select the output attenuation between 0 and 47 dB.



ATTENUATION
12

- c) Locate and select the option OFDM MODE. Select the OFDM mode between 2K and 8K subcarriers.



OFDM MODE
4K

- d) Locate and select the option BANDWIDTH. Select the bandwidth between 6, 7 and 8 MHz.



BANDWIDTH
5MHz

- e) Locate and select the option GUARD INTERVAL. Select the guard interval between 1/32, 1/16, 1/8 and 1/4 of symbol.



GUARD INTERVAL
1/8

- f) Locate and select the option CONSTELLATION. Select the modulation constellation between 16QAM and 64QAM.



CONSTELLATION
64 QAM

- g) Locate and select the option CODE RATE.
Select the code rate between 1/2, 2/3, 3/4, 5/6 and 7/8.



Network configuration



NOTE

To introduce a sequence of digits in the display move the control button vertically to change the value of the current digit and horizontally to move between digits.



NOTE

Position the cursor to the right of the current value and move the control button vertically to increase or decrease the current value. Hold the control button up or down to increase or decrease the current value more quickly.

- 4) Locate and select the option NETWORK.



- a) Locate and select the option NAME. Configure the name of the network.



- b) Locate and select the option PROVIDER. Configure the name of the network service provider.



- c) Locate and select the option NID. Configure the value of the network identifier.



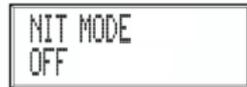
- d) Locate and select the option TSID. Configure the value of the transport stream identifier.



- e) Locate and select the option ONID. Select the guard interval between 1/32, 1/16, 1/8 and 1/4 of symbol.



- f) Locate and select the option NIT MODE. Configure the NIT mode:



- △ OFF: NIT is not inserted (the LCN values are ignored).

- △ WITHOUT MODEL: the NIT generated by the unit is inserted.
 - △ INTEGRATION WITH MODEL NIT: the information generated by the unit is integrated in a selected model NIT. If the TSID coincides, it replaces the information in the model NIT with that of the unit.
- g) Locate and select the option NIT LCN MODE. Allows you to select the mode of the NIT LCNs:
- △ OFF: the LCN descriptor is not inserted in the NIT
 - △ EUROPE MODE: the descriptor for Europe is inserted.
 - △ INDEPENDENT TELEVISION COMMISSION: the descriptor for the UK is inserted.
 - △ NORDIG MODE V1: the descriptor according to the Nordig V1 specification is inserted.
 - △ NORDIG MODE V2: the descriptor according to the Nordig V2 specification is inserted.
 - △ GENERIC MODE: generic LCN descriptor.
- h) Locate and select the option TDT-TOT MODE.. Allows deactivating date and hour insertion in the receptor.



NIT LCN MODE
EUROP. MODE



INSEr TDT-TOT
OFF

Status of the unit



NOTE

The unit lets you see its status in detail and the existence of active alarms in the module.

- 1) Locate and indicate STATUS.
- a) Locate and indicate STATUS: **. The unit displays its status and alarms: OK / ERROR.
- b) Locate and indicate OUTPUT BITRATE. The unit displays the output data speed in MBITS/S.
- c) Locate and indicate MIN ACT MAX NULL. The unit displays the volume of null data packets in the output (minimum, actual and maximum) as a percentage of the total.
- d) Locate and indicate TEMPERATURE. The unit displays its temperature.



STATUS
MODULE INFO



STATUS: ERROR
ALARM: OK



OUTPUT BITRATE
33.48 MBits/s



NULL MIN ACT MAX
03% 37%100%



TEMPERATURE
39 C

Unit information

- 1) Locate and indicate the option MODULE INFO.

- a) Locate and indicate the option MODEL. The unit displays its model and version.

- b) Locate and indicate the option SERIAL NUMBER. The unit displays its serial number.

- c) Locate and indicate the option MAC. The unit displays its MAC address.

- d) Locate and indicate the option VERSION. The unit displays its software version.



▶STATUS
MODULE INFO



MODEL
MAC-201



SERIAL NUMBER
012345678911



MAC
0009E3FEFEFE



VERSION
1.01

Unblocking the unit

The unit can be blocked from the web interface preventing the user operating the display and the control button to modify the configuration.

To unblock the unit:

- 1) Locate and select BLOCKING CODE.

- 2) Enter the unblocking code assigned by the unit operator through the web interface.

- 3) The unit displays the validity of the code.



▶LOCK CODE
INFORMATION



LOCK CODE
1030



LOCK CODE
CODE OK



NOTE

The unit will remain unblocked until it is restarted or the operator deactivates the block from the web interface.

To unblock the unit without the blocking code:

- 1) Locate and select INFORMATION.



▶LOCK CODE
INFORMATION

- 2) Contact the supplier of the unit and provide the serial number. The supplier of the unit will provide an unblocking code for the serial number indicated.



Advanced configuration of the unit

User interface via web browser

The web interface allows you to fully configure the MAC unit through an Ethernet connection and a web browser.



NOTE

To display the graphics provided in the unit configuration program correctly, we recommend installing the web browser Mozilla Firefox 1.5 or higher (www.mozilla.com) in the control PC.



NOTE

Cookies and Javascript must be enabled.



NOTE

Use a PC with an Ethernet network card and an Ethernet CAT-5E crossover cable.

- 1) Access the TCP/IP PROPERTIES of the PC and configure the following parameters:
 - IP ADDRESS OF THE PC: 192.168.1.1
 - SUBNET MASK: 255.255.255.0
- 2) Connect the PC to the LAN (RJ-45) port of the MAC unit (see number ① on the diagram in the section [General description](#)).



NOTE

The initial process must be made in local mode, although later you will be able to access the unit from any PC in the LAN.



NOTE

The Ethernet connector of the MAC has two indicator lights:

- The link is correct when the link LED (to the left of the Ethernet connector) is lit.
- There is activity in the link when the activity LED (to the right of the Ethernet connector) is flashing.

- 3) Launch the web browser and enter the MAC unit's IP address:
 - INITIAL IP ADDRESS: 192.168.1.6



NOTE

This initial IP address may be modified by the user.

**NOTE**

The unit also has the IP address 10.254.254.254 assigned by default.
This IP address may not be modified by the user.

EN

- 4) Press ENTER to access to the welcome screen.
- 5) Enter the user name “Admin” and the password “admin”.

**NOTE**

The process of configuration and setting via Ethernet connection is explained in the “Web interface user manual” available at <http://www.ikusi.com>.



Maintenance

Unit care



HANDLING THE INSIDE OF THE UNIT IS FORBIDDEN

Do not dismantle or try to repair the unit, its accessories or its components. This will render the warranty null and void.

- Do not use the power cable if it is damaged.
- To disconnect the power cable, pull carefully on the plug and not the cable.
- To clean the panel and unit connections:
 - Unplug the unit.
 - Clean with a slightly damp, soft cloth.
 - Allow to dry completely before use.
- Do not spill liquid onto the unit.
- Keep ventilation slots free of dust and any foreign bodies.

Troubleshooting

The most frequent problems arising during unit installation are indicated below. If you encounter any other type of problem, please contact the unit sales team.

Problem	Possible cause	What to do
Forgotten unlock code.	-	Contact your supplier.
Nothing appears on LCD display.	The power cable is not connected properly.	Check the power cable.

Technical specifications

MAC models

Inputs		AV1 / AV2 / AV3 * / AV4 *
Format		CVBS
Input level (video)	Vpp	0,7 - 1,4
Input impedance	Ω	75
Video standards		PAL/SECAM/NTSC
Analogue / digital audio		Yes / No
Input level (audio)	Vpp	0,5 - 4,0

* Available only in MAC 401 model.

Output		COFDM digital TV
COFDM standard		DVB-T according to ETSI EN 300 744
Bandwidths	MHz	6 / 7 / 8
Number of carriers		2K / 8K
MER	dB	38 (typical)
Central frequency	MHz	51 - 858
Level	dB μ V	80
Output pitch attenuation	dB	1
Impedance	Ω	75
Frequency pitch	kHz	1
Level adjustment	dB	-15
Frequency stability	ppm	$\leq \pm 30$
Band aliasing	dB	≤ -50
Noise level ($\Delta B = 8$ MHz)	dBc	≤ -70

Web user interface

Electric standard	Ethernet 10BaseT 10/100 Mbps
LAN connector	RJ-45
Protocols	HTTP / UDP

Operations

Mains voltage	230 - 240 V~
Consumption	0.45 A / 30 W
Operating temperature	0 to 45 °C
Mains connector	IEC C8

Warranty

Notwithstanding any complaints made to the direct vendor of the product, IKUSI offers unit users a two-year warranty as of the invoice date, which shall become valid on presenting the receipt of purchase.

During the warranty period, IKUSI is responsible for any faults arising due to material or manufacturing defects and shall repair the receiver or replace it for another corresponding to the state of technology at that time. The warranty does not cover any faults or defects due to misuse or non-fulfilment of the information given in this installation manual.

All complaints other than those indicated are not included in the warranty. More specifically, the warranty does not cover services provided by the authorised vendor (e.g. installation, configuration or programme updates) or the repair of any damages or injuries caused to the client or others as a result of the installation or of receiver operations.

Unit recycling



RECYCLING OF ELECTRICAL AND ELECTRONIC EQUIPMENT

(Applicable in the European Union and in European countries with selective waste collection systems.)

This symbol on your unit or its packaging indicates that this product cannot be treated as general domestic waste and must be handed in at the corresponding point of collection for electric and electronic equipment. By ensuring this product is disposed of correctly you will help prevent negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. Recycling of materials helps preserve natural resources. For more detailed information on the recycling of this product, please contact your local council, your nearest collection point or the distributor from whom you purchased the product.



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EC-Declaration of Conformity



We, Manufacturer

Ikusi Electrónica S.L.
Paseo Miramón, 170
20014 San Sebastián, Spain

declare that the product

**Stand-alone modulator
MAC-HD (4493)**

are in conformity with

Council Directive 2014/30/EU
Standards to which conformity is declared :

are in conformity with

Council Directive 2014/35/EU
Standards to which conformity is declared :

are in conformity with

RoHS 3. Directive 2015/863/EU
Standards to which conformity is declared :

EN 50083-2:2012+A1:2015

Cable networks for television signals, sound signals and interactive services. Part 2: Electromagnetic compatibility for equipment.

EN 61000-3-2:2014

Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current up to and including 16 A per phase).

EN 61000-3-3:2013

Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current up to 16 A per phase and not subject to conditional connection.

EN 62368-1:2014

Audio/video, information and communication technology equipment - Part 1: Safety requirements (LVD) (Endorsed by AENOR in September of 2014).

UNE-EN 50581:2012

Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances (RoHS) (Endorsed by AENOR in November of 2012)



San Sebastián, October 2019

Jesús Gómez Río

— R&D Director —