# Falcon x6-x7

New generation of AxelTech Audio Processors

The new generation of **AxelTech** audio processors continues in the tradition of quality, reliability and cost effectiveness, maintaining the name **Falcon:** renowned and valued in the broadcasting environment all around the world.

The new **Falcon** platform marks a clear break with the previous generation and offers cutting-edge technology that feats the ease of use, exceptional performances and unparalleled sound quality, allowing to generate a modern sound of the highest quality.
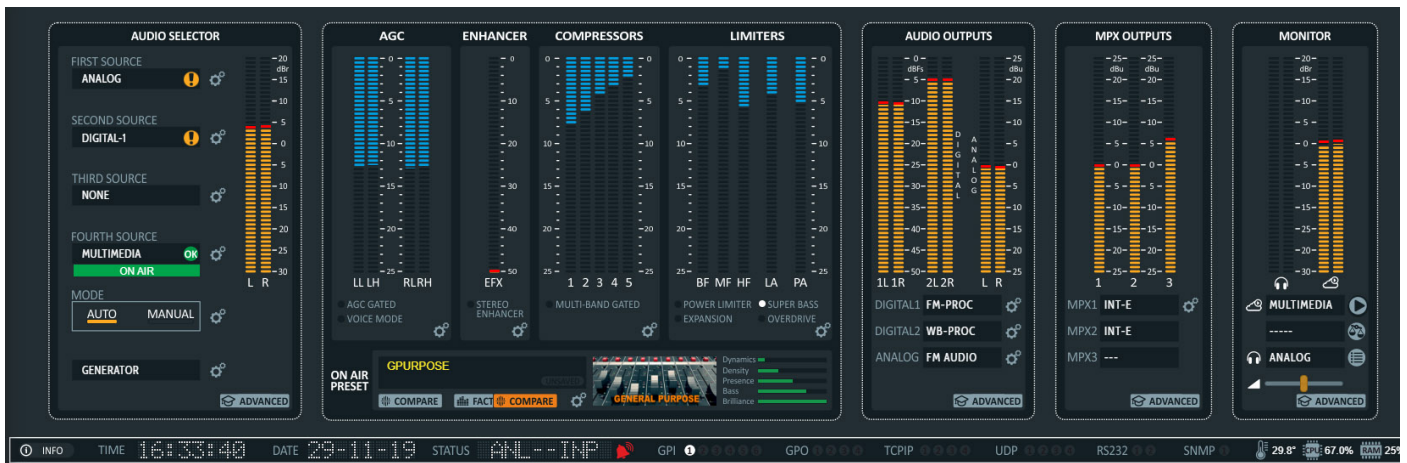
Product Overview

FALCON features full connectivity with analog and digital audio I/O (over XLR connectors), 2 independent MPX outputs, USB, GPI and serial ports. The hardware bypass circuit is included in order to guarantee audio presence and programs continuity.

FALCON series has built-in some extra special-features.
The LAN port and the built-in Web Server allow to control the processor and tune audio from anywhere. The built-in digital Stereo Generator ensures an extremely precise MPX Signal. Composite Clipper, part of the Stereo Generator circuit, grant the maximum modulation level, according with the technical rules around the world. This allows each radio station to build their unique sound shape.

The embedded RDS Encoder performs a full digital processing, in compliance with RDS 2.0 (UECP SPB490), and provides 2 Data Sets with a wide range of static services, including Radio Text. The logging of output signal is a native feature and give many information about

signals parameters. Stored information and time span can be customized and depend on the archiving size of the SD-Card or the USB flash drive.

Audio processing functions are all fully customizable: 5 bands compression control, adjustable drive and threshold, dual bands AGC, 3 bands equalization (Low, Mid and High frequency) and brightness control. The mono sounds phase control allows to give to the human voice a more natural and pleasant sound shape. The final limiter enhances the sound presence.

40 memories allow to recall factory pre-sets or save new one to be restored according to customer needs.

The **FALCON** processors are equipped with a universal 90-260 V AC power supply, working at 50 or 60 Hz, ready to be used in every country around the world. Due to the low power consumption (max 15 W) **FALCON** can be considered a "green" equipment.

The **FALCON** robust design finds substance from the extensive use of steel and aluminium. **FALCON** appliances are immune to strong electro-magnetic fields and are suitable to be installed in extreme environments.

A dedicated digital test signal generator can send to all the physical outputs (analogue, digital and MPX) signal sample with variable frequency and amplitude, that helps to calibrate the whole audio system.

The Falcon X Series

Different users have different needs. This is the reason why AxelTech feature a whole processors family with various models suitable for specific workflows. FALCON X7 is the full option version while FALCON X6 is the same model but without the controls on the front panel, suitable to be remotely installed anytime we need to manage remotely the appliance via WEB interface.

Highlights

The new FALCON audio processors integrate, as usual for AxelTech, many accessory features mandatory in the radio workflow - such as the RDS coding and Stereo Generation -
but also looking at the innovative technologies - such as DAB and audio over IP.

FALCON series equipment ensures top quality performances and exclusive audio. It features powerful DPSs, 5-bands architecture, dual bands AGCs, 3-bands equalizer, stereo enhancer, speech detector and 5 limiters. The comprehensive and accurate control of each audio parameter allows to shape perfectly the audio to broadcast unique and exceptional branded sound.

COMPLETE SET OF INPUTS
Extended Changeover/Silence Detector with configurable source priorities out of 11 sources:

1xAnalog, 2xAES/EBU, 2xIP, 2xMPX, 1xAES192, 1xDante (Optional), 1xMPX over Dante (Optional), 1xInternal Player

COMPLETE SET OF OUTPUTS

1xAnalog, 2xAES/EBU, 2xIP, 2xMPX, 1xAES192, 1xDante (Optional), 1xMPX over Dante (Optional)

BUILT-IN AUDIO PLAYER

Suitable like a backup source or for test purpose.

A Test Signal Generator is also available.

ADVANCED SNMP

(Simple Network Management Protocol)

Allows data interchange and simplified configuration of third-party appliances

connected in the same LAN using shared datasets MIB.

MPX CHANGEOVER

Manages the routing of MPX signals for Advertisement Area Splitting.

ADVANCED RDS

Dynamic RDS fully supported, UECP Input implemented, 8 Datasets available.

Suitable for network infrastructures.

UPGRADEABLE AND RELIABLE

Internal SD card whit OS for Disaster Recovery.

Easily Upgradable via WEB or Windows application.

BUILT-IN AUDIO ENCODER AND STREAMER

Can manage an audio stream like an input, can generate an output audio stream.

SAMPLING RATE FROM 32 kHz TO 192 kHz

WEB BASED CONTROL PANEL

The whole system can be managed through a WEB page generated by the internal web Server.

The main functions can be managed through the physical panel.

Advanced features

PROCESSING DELAY

A configurable delay (from 0 to 10") can be applied to the FM process in order to synch with those distribution channels having a significant latency like the DAB.

DUAL PROCESSING

15 KHz processing allows to use it as FM Audio Processor.

20 KHz processing for digital broadcasting, allows to use it as DAB Audio Processor, HD Radio Audio Processor, Sirius XM Audio Processor, Web Radio Audio Processor.

LOUDNESS PROCESSING

EBU R 128 and ITU-R BS.1770-4 Loudness Recommendations available for digital and analog radio processing chains compliant with every country loudness rules.

MPX LOUDNESS PROCESSING

ITU BS.412 MPX Power Loudness Recommendations available for MPX processing chains compliant with every country loudness rules.

DANTE AUDIO-OVER-IP CONNECTIVITY (Optional)

DanteTM option (compliant with AES67) provides an Ethernet connection for 1 Stereo Input and 1 Stereo Output, with independent and dedicated Level Control and Sample Rate Conversion.

MPX over AES 192 (AES3)

This is the standard for exchange the digital MPX+RDS signals between professional audio devices.
192 kHz standard is supported by several transmitter manufacturers.

RDS/RBDS ENCODER

The RDS encoder is compliant with the major international standards:
UECP EBU SPB490 v7.05 and Cenelec in Europe and NRSC in the United States.
The new "dynamic" features allow to manage many kinds of services:
PS, RT, RT+, PTY, PTYN. Connecting the Falcon with the radio automation software it can manage many
additional information such as song title, song artist, on-air program, speaker's name, etc. The native

interface with RSS feed format allows receiving directly news feeds and it is RDS 2.0 ready.

ADVANCED CHANGEOVER

The Advanced Audio Changeover/Silence Detector is able to switch between any available input source:
Analog, Digital, MPX, FM, IP, DanteTM, Internal Audio Player.

REAL TIME AUDIO MONITOR

Processing delay is quite non audible and depends on the processing complexity.

Audio Processing

Clarity of sound

FALCON processors high-quality hardware design and software algorithms produce a detailed, crystal clear sound on any speaker system, always preserving original audio signature.

Voice processor

A dedicated processing section boosts presence of voice delivering a soft, silky sounding effect. Vocals are always on top of the mix making lyrics comfortably audible. Each instrument and vocalist gains dominium of its own space.

Extreme density

FALCON processors deliver full impact sound at the highest volume density preserving original audio detail, identity and mood. The dedicated 'Bass Enhancer' stage delivers a strong and effective 'drum punch' for a deep musical emotion.

Here are the (processing) tools to make it sound as you like

Automatic Gain Control - AGC

- **Drive**

- **Attack**

- **Release**

- **Gate Threshold**

- **Idle Compression**

- **Work Zone Release**

- **Idle SpeedWork Zone Thresholdù**

- **L/R Linkae**

- **Band Copling**

Audio Processing Presets The right sound for your radio in a few clicks, with our factory presets
Falcon processors are factory populated with 60 presets belonging to 10 families, allowing sound engineer to rapidly find the desired sound.

Each preset family has 6 different flavors:

- **Standard**

- **EFX - Effect Extension**

- **Compressed**

- **Compressed EFX - Effect Extension**

- **Highly Compressed**

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- Phase Rotator

- HP Filter

Enhancer

Stereo Enhancer

- Mode, Band, Effect Limiter, Effect Drive, Effect Depth

Pre-Process Equalizer

- Low Band, Mid Band, High Band

Speech Detector

- Mode

- Action

Compressors Controls

- Threshold (for each of 5 bands)

- Drive (for each of 5 bands)

- Multiband Proc. Type

- Highly Compressed

EFX - Effect Extension

Presets families:

General Purpose
This is a preset able to offer the maximum to a radio with a schedule made of music, news and talk.
Moderate AGC response, Mid/High density and compression.

Ambient
The best preset for Ambient, Lounge, Chillout and Fusion music. Very slow AGC, warm & detailed sound and a low compression.

Rock
Base preset for Rock and Classic Rock music. Mid compression and fast AGC.

Hard Rock
Base preset for Hard Rock and Heavy Metal music. Low compression and fast AGC.

Country
Base preset for Country and Folk music. Low compression and fast AGC.

- **Multiband Coupling**

Limiters

- **Final Limiter Bass Drive**

- **Final Limiter Main Drive**

- **Main/Bass Mix Balance**

- **Limiters Look Ahead**

Detail

- **Super Bass**

- **Expander**

- **Process Brilliance**

- **Overdrive**

- **Wide Process Brilliance**

Attenuation

Disco
Let's dance, with this preset for Disco music. Low compression and fast AGC.

Oldies
Base preset for Oldies music, with Low compression and fast AGC.

Talk
Typical preset for Talk radio and Talk programs, with low compression and fast AGC.

Classic
A very gentle preset suitable for Classical music and Opera, with low compression and fast AGC.

70s-80s
Designed for thematic radios focused on 70s-80s Pop music with, low compression and fast AGC

And then you can extend these presets by adding new families and variants

Signal Routing and Changeover

**The new FALCON processor includes a technologically advanced Audio Changeover/Silence Detector able to switch between any available source: Analog, Digital, MPX, FM, IP, AoIP…**

In case of missing audio from any external sources, the processor can

play the playlist stored in the microSD or USB Flash drive.

It's possible to add up to 10 seconds delay to MPX output to synchronize

DAB signal (connected to analogue or digital output) to FM signal

connected to MPX output. An embedded Test Signals Generator allows

to output an audio signal suitable for testing the equipment or the whole

audio system.
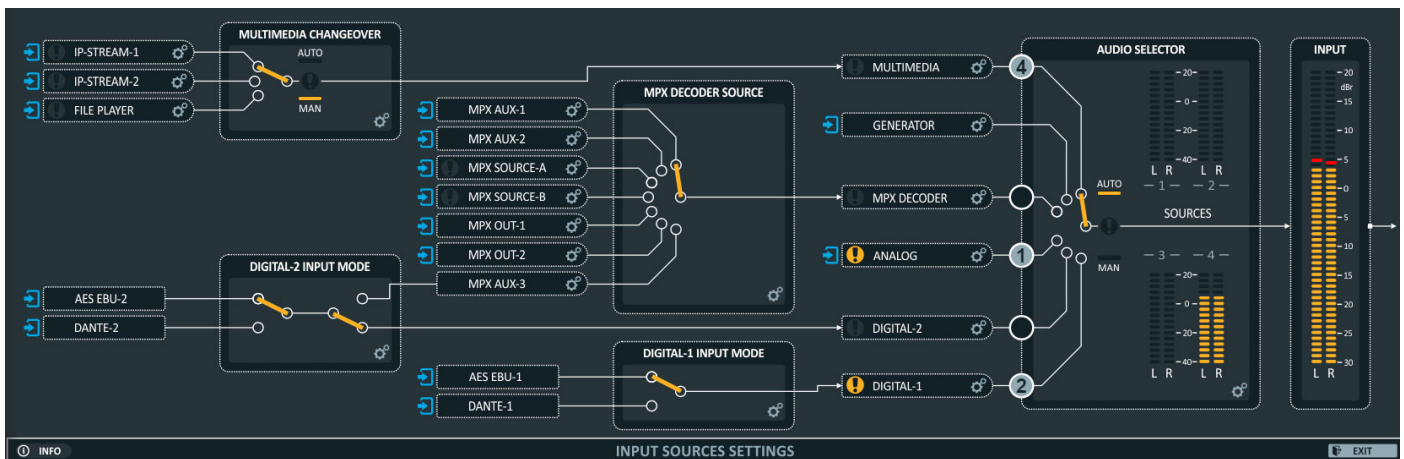
I/O Connections

FALCON Audio Processor new series features a complete set of input and

outputs connections. Analog and AES/EBU digital audio connections are

standard aside of two buffered and independent multiplexed output

(MPX+RDS) whit hardware bypass.

Analog Input > Analog Output | Digital1 Input > Digital1 Output | MPX1

Input > MPX1 Output | MPX2 Input > MPX2 Output

Three USB ports (one on the front, one on the rear panel and one

installed on the internal circuit board), allow to update the firmware,

record system logs and play audio tracks. microSD allows to clone the

whole setup from one Falcon to another one.

Two AUX inputs (SCA) allows to connect an external RDS encoder.

Another AUX input can receive the audio from another MPX processor

and switch with the internal generated MPX, allowing to build a small network managed from radio automation system. Dante connection, available as an option, allows to manage AoIP Dante or AE67 signals: 4 inputs and 4 outputs.

Front Panel

FALCON X7 features a wide LCD monitor, TFT Technology (480x128) that shows the input and output processing, including the corrections for each band featured from the compressor, the limiters and the multiband AGC. Obviously it shows also the input and output of all signal levels.

Moreover trough the display it's possible to check the system status: operating parameters, GPI/O port status and RDS parameters, including the station's ID.

A TRS (stereo Jack 6,3 mm) connector allows monitoring both original and processed signal, checking in the faster way the differences between the available pre-sets.


Communications & Alarms

FALCON audio processors can exchange information with other

equipment through some communication ports:

One LAN/WAN port, two RS-232 serial ports, two USB ports, one GPIO

port with optical coupler and relays.

Information will be sent (status, alarms) or received (commands).

A panel with 40 LEDs (the LCD panel in the bigger model) shows status

information.

Alarm messages can be sent via GPO, SNMP (Trap), http and email.
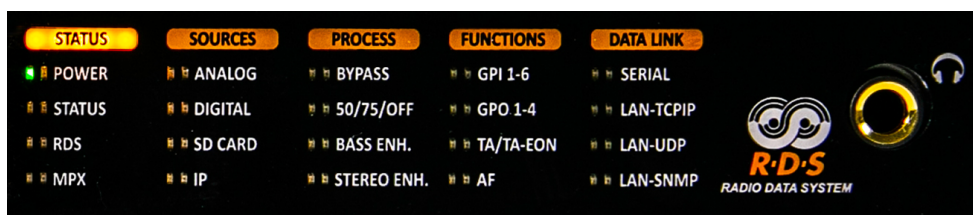
Web Server

Users can manage **FALCON** equipment via LAN, no need to install any

client software.

The internal Web Server can be managed with any browsers (Chrome,

Firefox, Explorer, Opera…). The GUI on the web page is clear, easy to use

and responsive, suitable to be managed from any device: Personal

Computers, tablets, smartphones.

SNMP (v 2.0) programming protocol allows to manage the whole

command set.

FALCON firmware implements also HTTP, FTP, SNMP, SMTP, UDP, TCP

and is PV4 – IPV6 addressing compliant. RDS services need a precise

synchronization: the system tries to connect to a primary NTP, backup

NTP and to an external GPS receiver (not supplied).

Moreover connecting an external GPS allows to geo-localize the **FALCON**.

The WEB server supplies a page with a map that shows the appliance

position.

Standard Ethernet interface can manage up to 4 independent TCP ports,

up to 4 separate UDP ports and 1 SNMP port. Obviously, it shows also

the input and output of all signal levels.
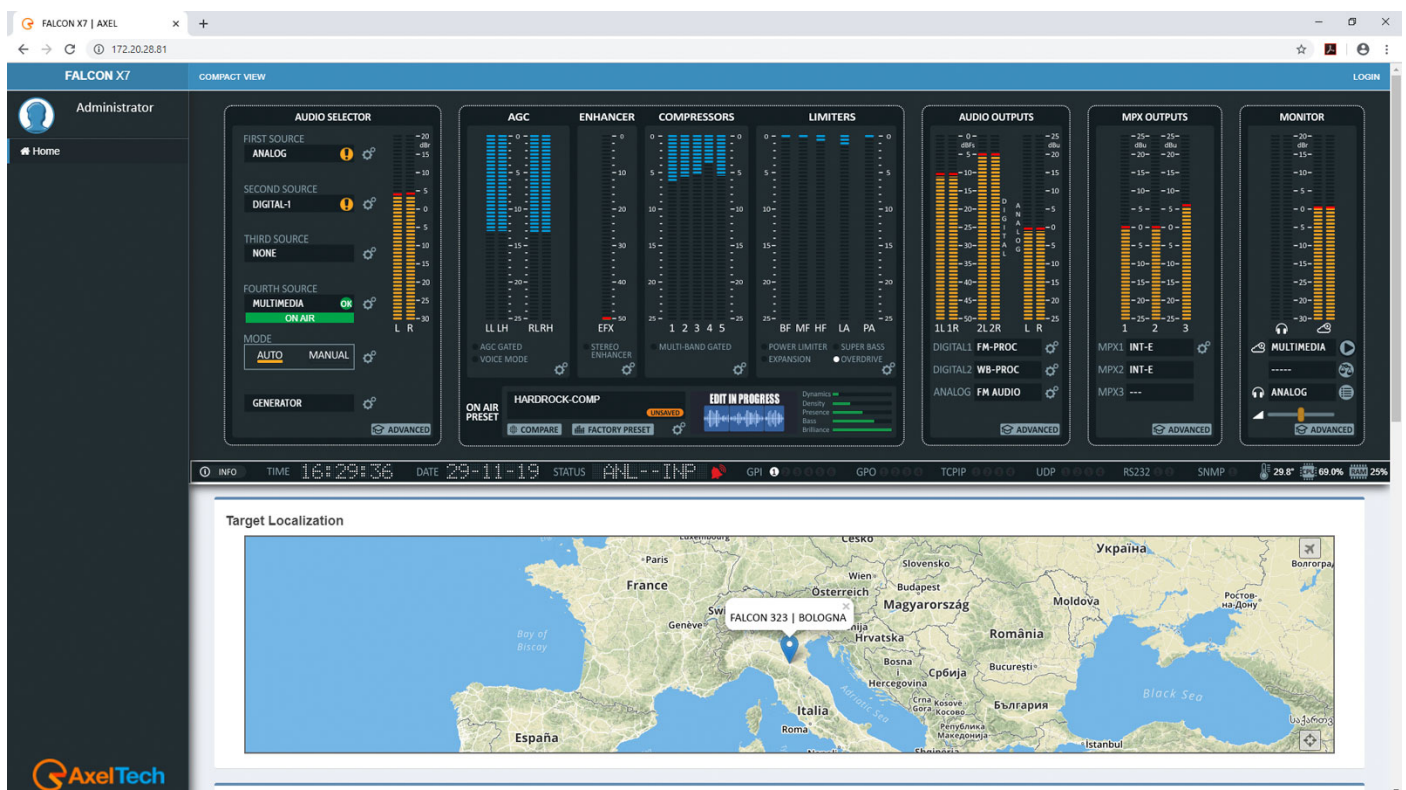
MPX Stereo Generator

The stereo generator integrated in the DSP structure, provides an almost

ideal MPX signal, optimizing the performances of the equipment to the

maximum.

All of the parameters for pilot level, phase and levels are adjustable via

the web page.

Stereo Generator circuit can switch the source between the internal MPX

and an external signal. Switch can be managed locally or with a

command sent by an external radio automation software via Ethernet or

GPI.

RDS Radio
Data System Encoder

FALCON RDS **embedded circuit is compliant with the latest standards:**

UECP EBU SPB490 v7.05, Cenelec (Europe) and NRSC (USA).

The new "dynamic" feature allows to manage many kinds of services:

PS, RT, RT+, PTY, PTYN.

Connecting the RDS with the radio automation software it can show

many kinds of information: song title, song artist, on-air program,

speaker's name, etc.

The native interface with RSS feed format (RSS 2.0) allows receiving

directly news feed

The internal RDS embedding give more advantages:

> Allows to remove a separate appliance from the transmission chain

> Concentrate the control of all the broadcasting parameters just in one

equipment

> Raise the output signal signal/noise ratio and stability

> Remove all the locking problems between the pilot phase and the RDS
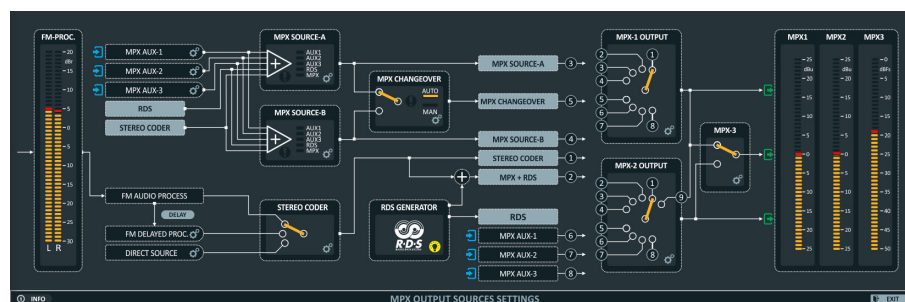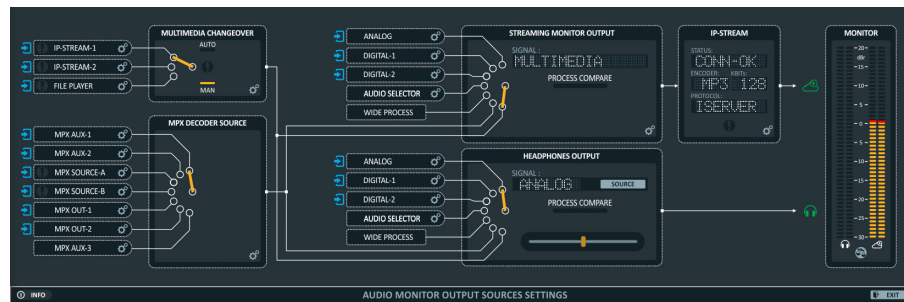
carrier phase

Signal Routing GUI
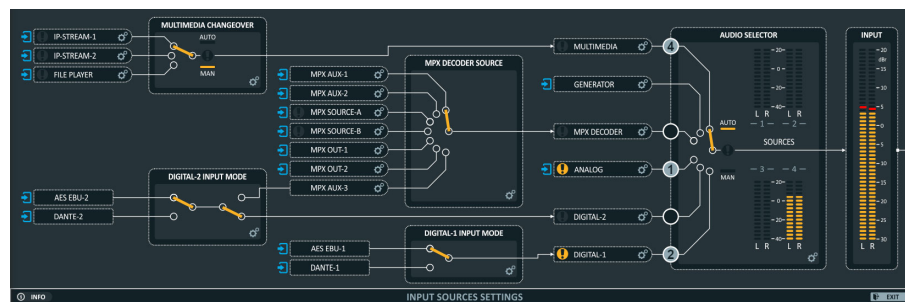
Inputs Sources Settings

Audio Output

Product Technical Specifications
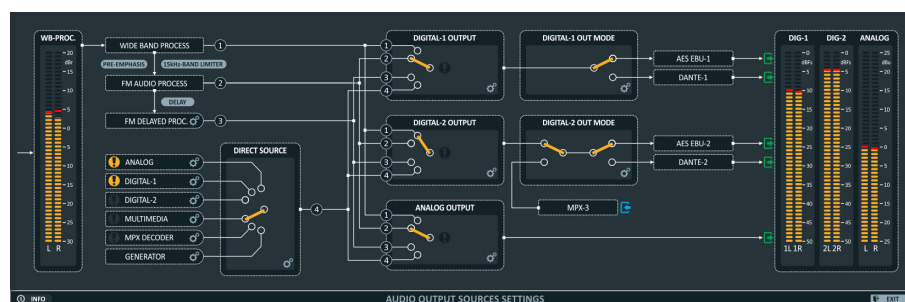
Mpx Output

Monitor Out

Technical Specifications

Analog Input - AUDIO

Connectors:	Balanced on 2 XLR – EMI Suppression
Nominal Input Level (sensitivity):	Adjustable via software: -12dBu : +13dBu
Level range:	–21,0 dBu ÷ + 24,0 dBu
Input level max.:	+24,0 dBu
A/D Conversion:	CS4272 DAC 24bit 192KHz
CMRR input:	>60 dB (20 Hz ÷ 20 kHz)

Digital Input – AUDIO

Inputs Number:	2
Connectors	Balanced on 1 XLR – EMI Suppression
Input impedance:	110 Ω
Format:	AES3/EBU & SPDIF
Sample rate:	32/44.1/48/64/88.2/96/192 KHz
Nominal input level (sensitivity):	From -0,1 dBFs to –25dBFs (0,1dB step)
Level range:	0,0 dBFs ÷ -36dBFs
Conversion dynamic range:	124 dB (32 KHz) | 126 dB (44,1 kHz) | 126 dB (48 kHz) 122 dB (96 kHz)
Conversion resolution:	24 bits

DIGITAL INPUT - MPX

Connectors:	Balanced on 1 XLR – EMI Suppression
Input impedance:	110 Ω
Format:	AES3/EBU & SPDIF
Sample rate:	192 KHz
Nominal input level (sensitivity):	From -0,1 dBFs to –25dBFs (0,1dB step)

DIGITAL INPUT - MPX

Level range:	0,0 dBFs ÷ -36dBFs
Conversion dynamic range:	124 dB (32 KHz) | 126 dB (44,1 kHz) | 126 dB (48 kHz) 122 dB (96 kHz)
Conversion resolution:	24 bits

MPX INPUT

Connectors:	Unbalanced on 2 BNC – EMI Suppression
Input impedance:	50 KΩ
Nominal input level (sensitivity):	Adjustable from -6,0 dBFs to +13,0 dBFs
Conversion dynamic range:	PCM4220 24bit 216KHz
Level range:	-21,0 dBu ÷ +24 dBu

Analog Output - AUDIO

Connectors:	Balanced on 2 XLR – EMI Suppression
Output impedance:	47 Ω
Output Level:	Adjustable software from -6dBu a +18 ,0 dBu
Level Range:	–20,0dBu ÷ + 24,0dBu
Output Level Max.:	+ 24,0dBu
CMRR Output:	>60dB (20Hz-20kHz)
D/A Conversion	CS4272 DAC 24bit 192KHz

Digital Output - AUDIO

Outputs Number	2
Connectors:	Balanced on 1 XLR – EMI Suppression
Input impedance:	110Ω
Format:	AES3/EBU
Sample rate:	32/44.1/48/64/88.2/96/192 KHz
Output level adjustment:	Da 0,0dBFs a –dBFs (passo 0,1dB)
Level range:	0,0 dBFs ÷ -36dBFs

MPX OUTPUT

Connectors:	Unbalanced on 2 BNC – EMI Suppression
Output impedance:	10 Ω
Load impedance:	600 Ω o higher
A/D conversion:	Texas PCM1796
Nominal input level (sensitivity):	From -9,0 dBFs to +15,0 dBFs

BACKUP PLAYER

Physical support:	USB Flash Drive, microSD CARD (max 64GB)

BACKUP PLAYER

Audio file format: MP3, WAV

Sample Rate: 32 | 44.1 | 48 | 64| 96 KHz

PHYSICAL

Power supply:	90-260 V AC / 47-63 Hz
Power consumption:	15 W
Operating temperature:	0°C ÷ 50°C
Falcon X5/X6/X7 - Dimensions WxHxD:	485 x 44 x 240 mm (1 rack unit 19")
Falcon X5/X6/X7 - Weight:	< 3Kg

MPX & RDS SIGNAL

Pilot frequency:	19 KHz +/- 1Hz
Pilot injection	−25,0 dB ÷ 15,5 dB (step 0,1)	6-18% total deviation
Pilot stability:	±10 ppm (-10 ÷ +55 °C)
Pilot distortion	0,05 % (typical)
Distortion + Pilot noise:	0,068% (on the 100Khz band)
External composite THD:	0,005 % (typical on the whole band)
Stereo separation:	>70 dB (typical on the whole band)
Linear crosstalk:	≤ −80 dB (for a 100% modulation)
main>sub and sub>main crosstalk:	> 65 dB (at least)
Filtering / digital band	30 Hz ÷ 15 kHz (-0,1 dB), 17 kHz (-70 dB), 19 kHz (-100 dB)
Protect. 57 kHz subcarrier (RDS/RBDS):	Better than 51 dB
Pre-emphasis:	Off, 50µS, 75µS (+-0,1dB)
Frequency response:	±0,3 dB (30 Hz ÷ 15 kHz)
Operating mode:	Mono /Stereo
MPX/RDS Output:	Adjustable from −10,0 dB to 15,0 dB (step 0,1 dB)
Signal/Noise Ratio:	> 90 dB (on the 100 kHz band)
Carrier Suppression	>85 dB

RDS FEATURES (Optional)

Supported Group:	All
Group Sequence:	Configurable
PS:	8 DSN x 10 PSN
PI:	8 DSN x 10 PSN
PTY:	RDS/RBDS
AF Method A:	25
AF Method B:	up to 1024 (64 lists)
RT:	Yes, 32 messages

RDS FEATURES (Optional)

RT rate adjustment:	Group Sequence
RT+ for songs and content tagging:	Yes
TP:	Yes
TA Control:	Command, Soft, GPI
PTYN:	Yes
EON:	10 PSN
CT:	Yes
TMC, EWS, IH, TDC:	Yes
Free Format Groups (FFG):	Yes
Open Data Application (ODA):	Yes
PS Scrolling:	Yes
Auto "parses" long messages for: best text display:	No
Scrolling by characters:	From 1 up to 8
Scrolling by word, Auto centering: Truncate long words	Yes

COMMUNICATION

Connection with radio automation: Software:	Yes
Network connectivity:	4 TCP ports / 4 UDP / 1 SNMP
Configuration software:	Web Server, FTP
Password protection:	Yes
ASCII Protocol:	Configuration messages
UDP, TCP, HTTP, SNTP:	Yes
Alert notifications on user-defined: events via SNMP traps or E-mails:	Yes
Embedded SNMP agent permitting: active management tasks	Yes
Supported Network Protocols:	HTTP, SNTP, UDP, TCP, NTP,FTP
UECP Protocol:	EBU SPB490 Ver.7.05

GENERAL

GPIO Inputs/Outputs:	6 GPI, 4 GPO
Communication Port:	2xRS232, 3xUSB, 1xLAN
Synchronization:	Ext (Pilot MPX)/ Int/Auto
Synchronization monitoring:	Yes
RDS Level adjustment:	Digitally controlled
Phase adjustment:	0 ÷ 359.9°
Separate out RDS+MPX / RDS only:	Yes

GENERAL

Command to activate the RDS SCA: Yes

Operating modes: Side chain, Loop through, Bypass

RDS Subcarrier.   100% digitally generated shape

CENELEC - EN50067 compliant: Yes

Clock time (CT):   Accurate clock time sync with Internet connection

Remote TA traffic announcements: Yes

Automatic RTC synchronization: Autosync with optional USB external GPS receiver