From 2 to **4 years**
Fracarro's warranty has been doubled

FRACARRO

SAF

MATV headend with **selective agile filters**

Selective **Agile** **Filters**

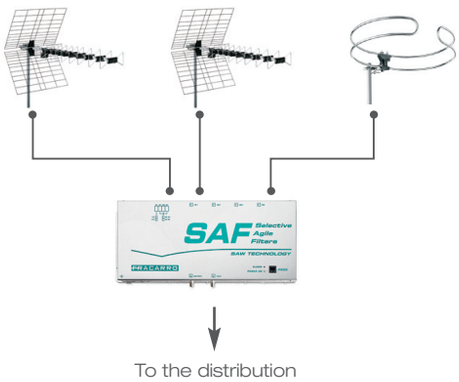
The **name** for **high performance** filters

Description

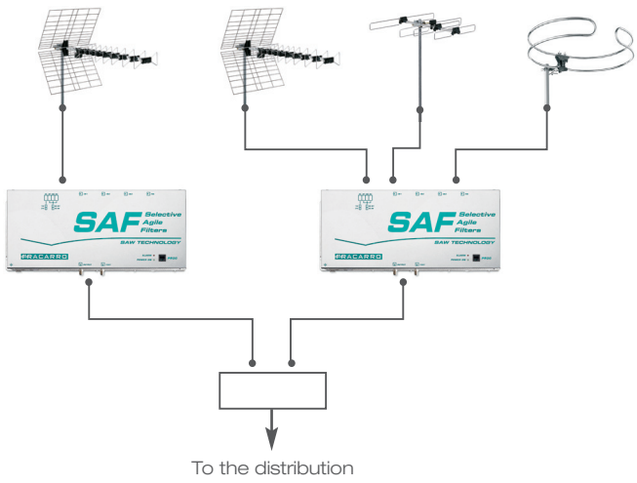
SAF is the new MATV headend with selective agile filters to distribute and filter analogue and digital TV signals.
Available in four versions with 7 or 12 filters, SAF can be used in any MATV installation where highly selective filtering is required and can also be used where conversion is needed.
The headend contains up to 12 filters and has 3 UHF or VHF inputs and 1 FM input.
Each UHF module has a SAW filter enabling them to be highly selective to reduce differences in levels between two adjacent channels, analogue or digital, producing the correct equalisation of the signal before distributing it across the network.

- Each UHF module has a SAW filter allowing them to be highly selective (adjacent channel rejection >45dB) with good channel flatness of <1dB and AGC to keep the output level stable. SAW filter technology is the best way to filter analogue or digital channels
- UHF agile filters enable the headend to be used in different installations and can be easily reprogrammed for frequency changes or if new transmitters are switched on
- The UHF modules can be used as filters or converters to solve frequency collision
- VHF filter based on tracking filter technology, to cut the unwanted carriers in band III
- Offset adjustment from +500 to -500KHz to change the filtering to greatly reduce either the upper or lower adjacent channel
- 3 antenna inputs can be used flexibly by all 12 modules due to a signal distributing matrix
- Compact housing - one unit contains a power supply, signal distributing matrix, 12 filters (SAF12U or SAF11U1V) or 7 filters (SAF7U or SAF6U1V) and final amplifier. Single filter modules are available individually packed, product SAF-U or SAF-V, and can be added to existing headends
- High gain of up to 50dB and high output level of 109dBµV for all analogue channels, 99dBµV for all digital multiplexes
- Remote power supply for mast amplifier available on any input, 12 or 24V, selected by means of a dip-switch
- Independent output level adjustment for each channel
- Heat dissipation by natural convection so no fans required
- Wall or 19" rack installation
- Programmable using a TPE programmer or PC with FHM (Fracarro Headend Management) programmable software

Installation examples



Up to 3 aerials can be connected to a SAF headend and it has an FM band input to enable the connection of a dedicated aerial. In this example the SAF headend is connected to 2 UHF aerials.



More than one SAF headend can be connected together. In this example 2 SAF headends are coupled using a 2 way splitter.

Technical specifications

FRACARRO

Code	Item	Description
272001	SAF12U	MATV headend with 12 agile UHF filters
272003	SAF7U	MATV headend with 7 agile UHF filters, 5 free slots to add other filters
272002	SAF-U	UHF filter, packed individually, for installation in SAF headends
272004	SAF11U1V	MATV headend with 11 agile UHF filters and 1 VHF filter
272006	SAF6U1V	MATV headend with 6 agile UHF filters and 1 VHF filter
272005	SAF-V	VHF filter, packed individually, for installation in SAF headends

FREQUENCY	TV input	3 inputs for 3 different antennas
	FM input	1 input, 87-108MHz
	TV output	87-108MHz, 174-230MHz, 470-862MHz
CONNECTORS	Input	4 F connectors (IN1, IN2, IN3, FM)
	Output	2 F connectors (RF OUT/Test-30dB)
	Programming	1 RJ45 connector
INPUT SIGNAL	Impedance	75 Ohm
	Analogue channels - input level	63-83dBµV
	Digital channels - input level	53-73dBµV
	Max. input level for all inputs	92dBµV (over the whole band)
	FM band - input level	40-80dBµV
	Return Loss	10dB
UHF and VHF FILTER CHARACTERISTICS	Frequency	UHF: 470-862MHz, VHF: 174-230MHz
	Bandwidth	UHF: 8MHz, VHF: 15MHz
	Selectivity (referring to PAL B/G standard)	Audio carrier N/Video carrier UHF: N+1 45dB, VHF: N+2 ≥12dB
		Video carrier N/Audio carrier UHF: N-1 45dB, VHF: N-2 ≥12dB
	Level adjustment	UHF: 10dB (1dB steps), VHF: 20dB (2dB steps)
	Flatness	UHF: ±1dB
	AGC dynamic	UHF: 20dB
	Frequency programming steps	UHF: 250KHz
	Offset	UHF: ±250KHz, ±500KHz
	Output frequency accuracy	UHF: <20KHz (when filtering), <70KHz (when converting)
FM FILTER CHARACTERISTICS	Frequency	87-108MHz
	Level adjustment	20dB (1dB steps)
	Gain	20-40dB adj.
	Selectivity	≥50dB@174MHz
OUTPUT SIGNAL	Max output level (analogue channels)	109dBµV for each channel
	Max output level (digital channels)	99dBµV for each channel
	Max output level (FM band)	99dBµV
	Test output	-30dB
	Noise figure	10dB
	MER of DTT signal	≥25dB (with input MER ≥30dB)
	Spurious rejection	≥54dB
	Standard	PAL B/G, PAL I, SECAM L, PAL B/H
GENERAL	Mains	220-240V ~ 50-60Hz CLASS II
	Max. consumption	70W
	Remote power supply for mast amplifier	12/24V on each TV input, selectable by means of a dip-switch
	Max. remote power supply current	200mA@12V, 100mA@24V
	Operating temperature	-10 to +55°C
	Dimensions	439x196x105mm
	Compliant to	EN50083-2, EN60065

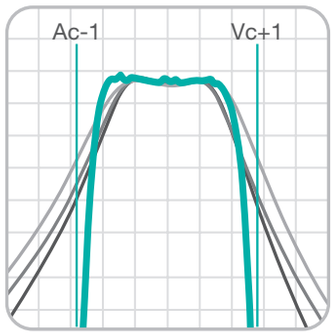
SAF filter advantages

The new SAF headends with selective agile filters have innovative characteristics, a result of the extensive Fracarro development project, making them reliable and technologically advanced. The heart of the headend is composed of SAF (Selective Agile Filter) units, that are characterised by their programmability and selectivity.

Advantages of the system include:
a) High selectivity
b) Offset conversion facility
c) Using the SAF as a converter
d) Expansion capability of the SAF7U or SAF6U1V headends
e) Flexibility

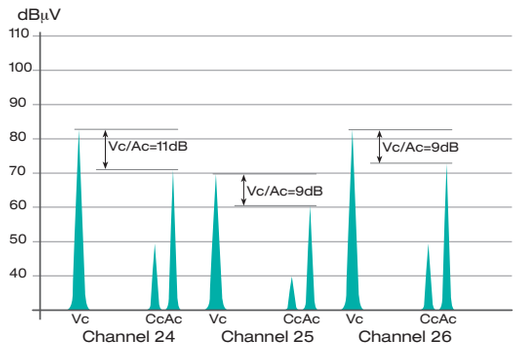
a) High selectivity

SAW (Surface Acoustic Wave) filters allow a high level of selectivity.
The graph to the right compares the performance of SAW filters with normal filters (resonant circuits). The green curve shows the SAF filter performance. SAF filter rejection of the audio carrier of channels N-1 (Ac -1) and video carrier of channel N+1 (Vc +1) is more than 40dB, typically 45dB.
Resonant circuit filters can only reach 15 to 18dB depending on how they are set up. Therefore SAF UHF filters provide better rejection of adjacent channels, a feature necessary for recovering high differences in levels between adjacent channels or when a channel needs to be removed from the distribution.



Comparison of SAF and resonant circuit filter selectivity

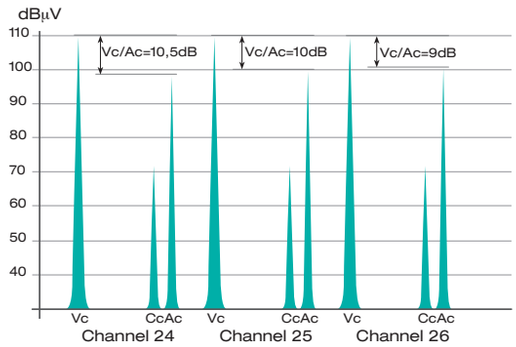
1) Filtering of an analogue channel (channel E25) with two adjacent analogue channels at a higher level



To recover the difference in level between channel 25 and the adjacent channels, the filter has to gain more on 25 than channels 24 and 26. To equalize the level of channels 24, 25 and 26 the channel 25 filter has to gain more than the others. By filtering using resonant circuit filters, channels 24 and 26 are affected by a distortion that causes a variation to the Vc/Ac ratio.

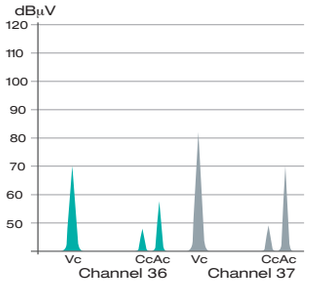
Signal coming from the antenna
(Vc= video carrier, Cc= colour carrier, Ac= audio carrier)

- Level of channel 24 = 83dBµV
- Level of channel 25 = 70 dBµV
- Level of channel 26 = 83 dBµV



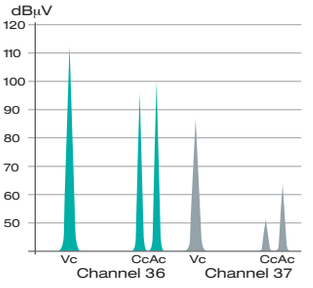
By filtering using the SAF the Vc/Ac ratio remains stable.
The SAF recovers the difference in the adjacent channel levels with low distortion of the Vc/Ac ratio (between 0.5 and 1dB).

2) Filtering channel E36 with an adjacent channel E37 at a high level



Signal from the antenna
- Level of channel 36 = 70 dBµV
- Level of channel 37 = 83 dBµV

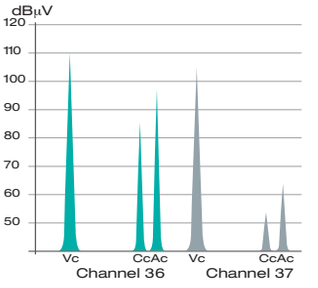
Difference ch36 - ch37 = -13dB



After SAF filtering of channel 36:
- output level of channel 36 = 112 dBµV
- output level of channel 37 = 86 dBµV

Difference between ch36 and ch37 = 26dB

Total difference 26 + 13 = 39dB

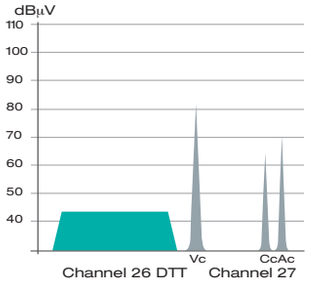


Filtering channel 36 with resonant circuit filters:
- output level of channel 36 = 110 dBµV
- output level of channel 37 = 105 dBµV

Difference between ch36 and ch37 = 5dB

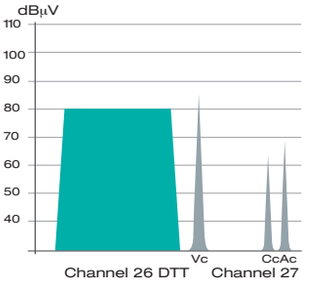
Total difference 5 + 13 = 18dB

3) Filtering of a digital multiplex (channel E26, level 58dBµV) with an analogue adjacent channel present (channel E27, level 83dBµV)



Signal coming from the antenna
- Level of channel 26 = 58dBµV (real digital power)
- Level of channel 27 = 83dBµV

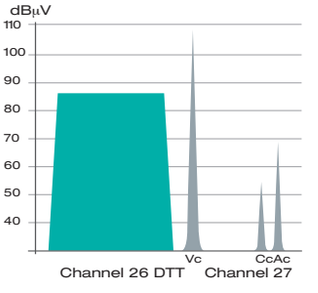
Difference between ch26 and ch27 = -25dB



After SAF filtering of channel 26:
- output level of channel 26 = 95dBµV (real digital power)
- output level of channel 27 = 86dBµV

Difference between ch26 and ch27 = 9dB

Total difference 9 + 25 = 34dB

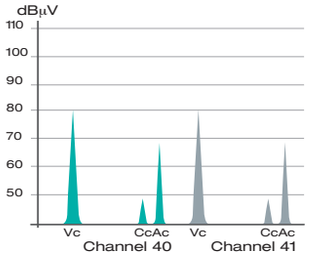


Filtering channel 26 with resonant circuit filters:
- output level of channel 26 = 101dBµV (real digital power)
- output level of channel 27 = 109dBµV

Difference between ch26 and ch27 = -8dB

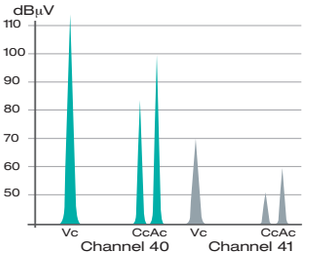
Total difference -8 + 25 = 17dB

4) Filtering of an analogue channel (channel E40, level 81dBµV) with an adjacent analogue channel at the same level



Signal coming from the antenna
- Level of channel 40 = 81dBµV
- Level of channel 41 = 81dBµV

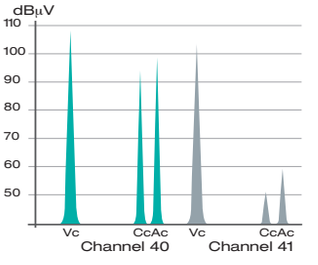
Difference ch40 - ch41 = 0dB



After SAF filtering of channel 40:
- output level of channel 40 = 114dBµV
- output level of channel 41 = 71dBµV

Difference ch40 and ch41 = 43dB

Total difference 43 - 0 = 43dB



Filtering of channel 40 with resonant circuit filters:
- output level of channel 40 = 109dBµV
- output level of channels 41 =104dBµV

Difference ch40 - ch41 = 5dB

Total difference 5 - 0 = 5dB

Comparison of adjacent channel rejection between SAF UHF filters and resonant circuit filters:

	SAF	Resonant circuit filter
Case 2: Two analogue channels with high level differences	39dB	18dB
Case 3: One digital multiplex and one adjacent analogue channel with high level differences	34dB	17dB
Case 4: Two analogue channels at the same level	43dB	5dB

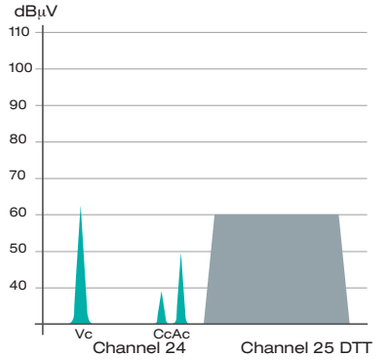
SAF filter advantages

b) Offset conversion facility

SAF UHF filters allow a conversion offset to be defined. The offset can be used to slightly adjust the curve of the SAW filter up or down in order to attenuate mainly the upper or lower adjacent channels or to maximize the attenuation of distortions coming from close channels.

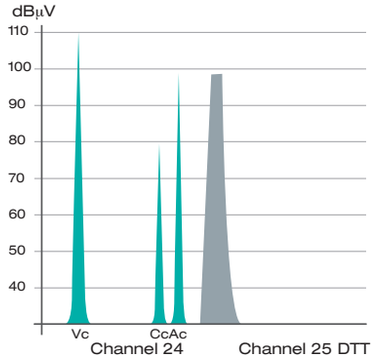
Example of using the offset

Filtering of an analogue channel (channel E24, level 63dBµV) with an adjacent digital multiplex at a high level.

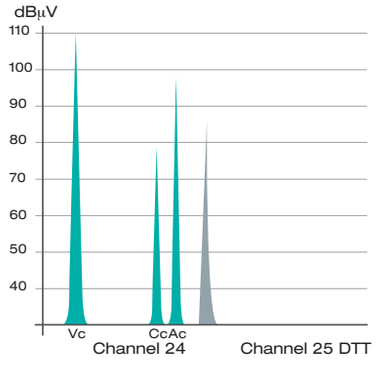


Signal coming from the antenna
(Vc = video carrier, Cc = colour carrier,
Ac = audio carrier)

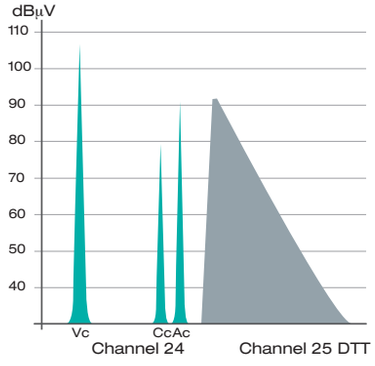
- Level of channel 24 = 63dBµV
- Level of channel 25 DTT = 75dBµV
(real digital power)



After SAF filtering of channel 24,
with OFFSET = 0, part of channel 25
is still present.



By setting the OFFSET at -2 the residual part
of the digital multiplex 25 is very small.

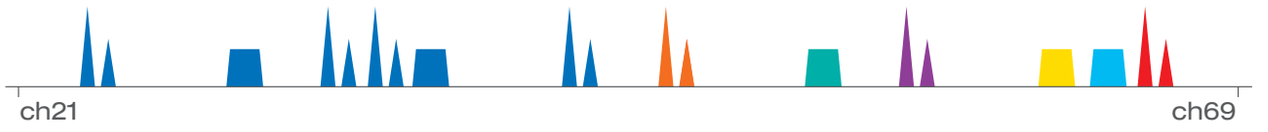


In the graph above the result after filtering
channel 24 with a resonant circuit filter shows
the digital multiplex is still received.

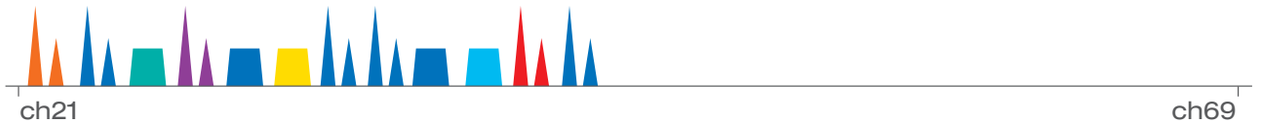
c) Using the SAF as a converter

SAF UHF filters can be used as a filter as well as a converter, to move channels from one frequency to another. Conversion is useful to distribute channels at lower frequencies in order to introduce lower attenuation due to coaxial cable losses. It can also be used to solve conflicts between channels with the same frequency coming from different antennas.

Below is an example of the reception of UHF channels with conversion at lower frequencies:



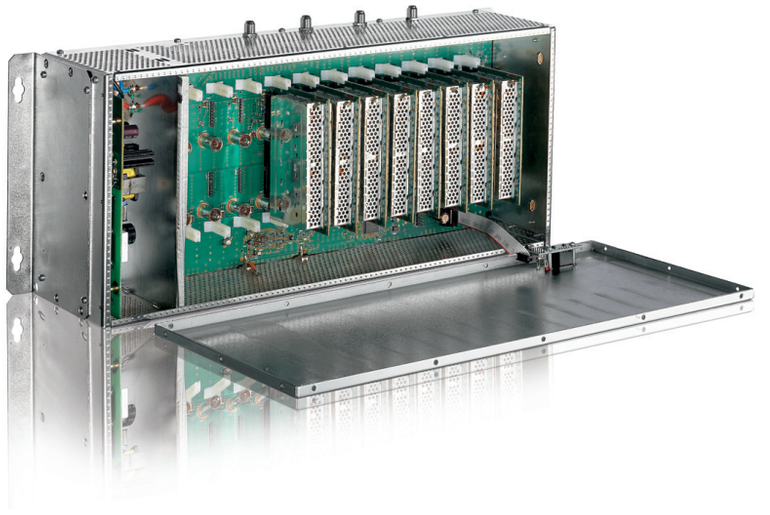
Some channels are converted to group all the signals in the lower part of UHF band. All the channels are distributed easily using the coaxial cable network.



Signal attenuation is lower so the channels can be distributed over larger number of sockets or longer distances.

d) Expansion capability of the SAF7U or SAF6U1V headends

It is extremely easy to add modules in the SAF7U or SAF6U1V, to increase the number of distributed channels. Just open the cover and add the single modules (item SAF-U or SAF-V) into the free slots.
The operation is quick and easy and can be done by the installer at the installation site.



e) Flexibility

Each filter can be programmed for any channel and the headend can be used in different installation sites being adjusted easily to the signal being received. 3 antenna inputs are processed through a matrix in order to distribute the signal to the 12 modules in **many different variations**.
The 19 possible configurations are already preset.

Also for SAF headends, Fracarro has extended its warranty to 4 years. Valid only in the EU. For further information visit our website: www.fracarro.com

FRACARRO

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