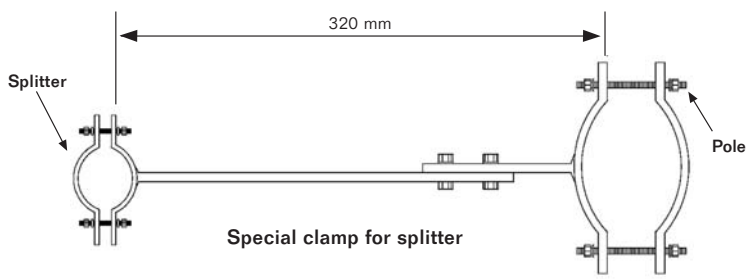
GENERAL CATALOG

Model GENERAL SPLITTER

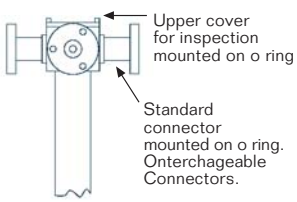
- **Splitter**
- **FM Band 87.5÷108 Mhz**
- **Special version with unequal power splitting**
- **Pressurizzable on request**

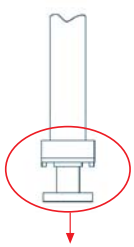
TYPICAL SPECIFICATIONS	
Impedance	50 Ohm
Frequency Range	87.5÷108 MHz
VSWR	1.05:1 Max
Insertion Loss	0.05 dB Max
Connectors	N-7/16"-7/8"-1+5/8"-3+1/8"-4+1/8" In according to the working power
Max Power Input	From 100 Watts to 40 KWatts In according to the model
Number of outputs	2-8 (In according to the model)
Length approx.	1600mm
Diameter external tube	From 40 to 120 mm In according to the working power
Mounting	With special pipe clamp
Working Temperature	-20°C ÷ +50°C
Colour	Enamel grai ral 7001
Materials	Aluminium, silver brass, copper, PTFE, stainless steel, silver plated (min 12µ thickness)

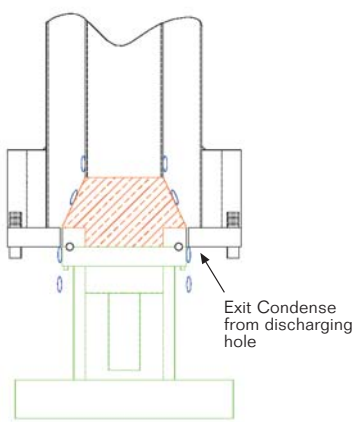
SPECIAL VERSIONS	
BAND	**LENGHT**
Band I 47-88 MHz	Aprox. 3000 mm
Band III 174-230 MHz	Aprox. 850 mm
UHF	Aprox. 500 mm



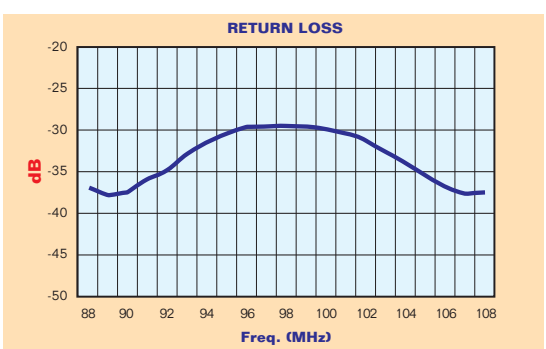
Special clamp for splitter







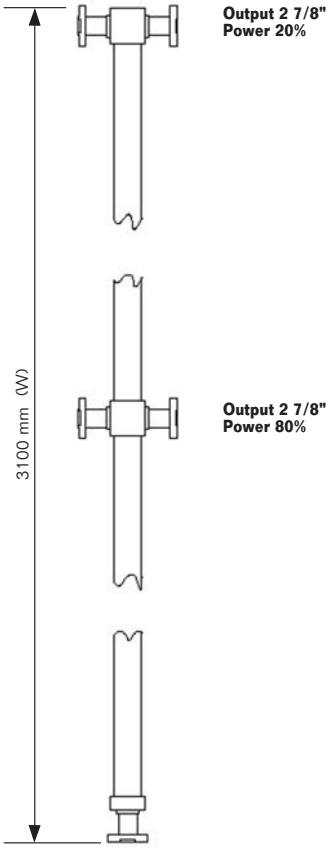
Typical return loss curve for splitter model DV/47/8-7/8



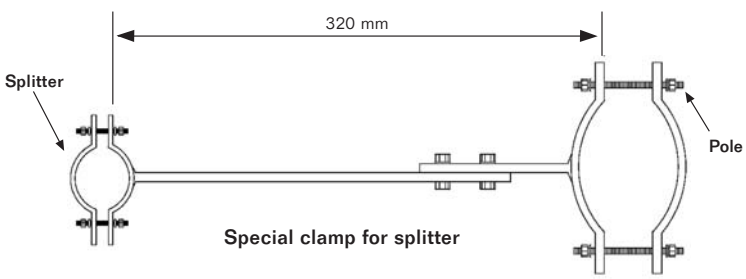
"These specifications are subject to change without notice"

Model UNBALACED SPLITTER

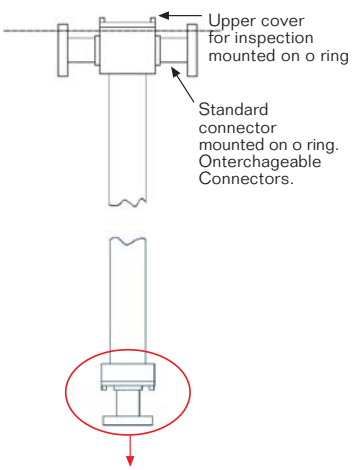
- **Unbalaced Splitter**
- **FM Band 87.5÷108 Mhz**
- **Pressurizzable on request**

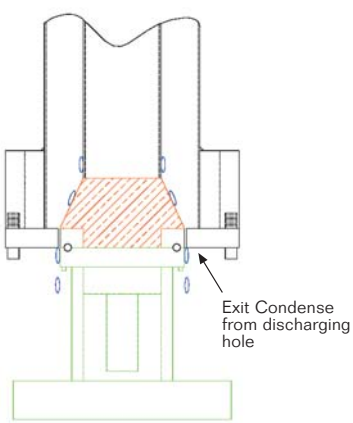


TYPICAL SPECIFICATIONS	
Model	UNBALACED SPLITTER
Impedance	50 Ohm
Frequency Range	2360÷2485 MHz
VSWR	1.05:1 Max
Insertion Loss	0.05 dB Max
Connectors	Input 7/8" - Output 2 7/8" (power 80%) 2 7/8" (power 20%)
Max Power Input	5 KWatts
Working Temperature	-20°C ÷ +50°C
Colour	Enamel gray ral 7001
Materials	Silver brass, copper, PTFE, stainless steel, silver plated (min 12µ thickness)

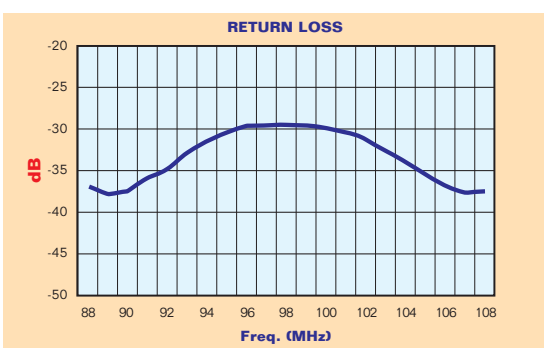


Special clamp for splitter





Typical return loss curve for splitter model DV/47/8-7/8

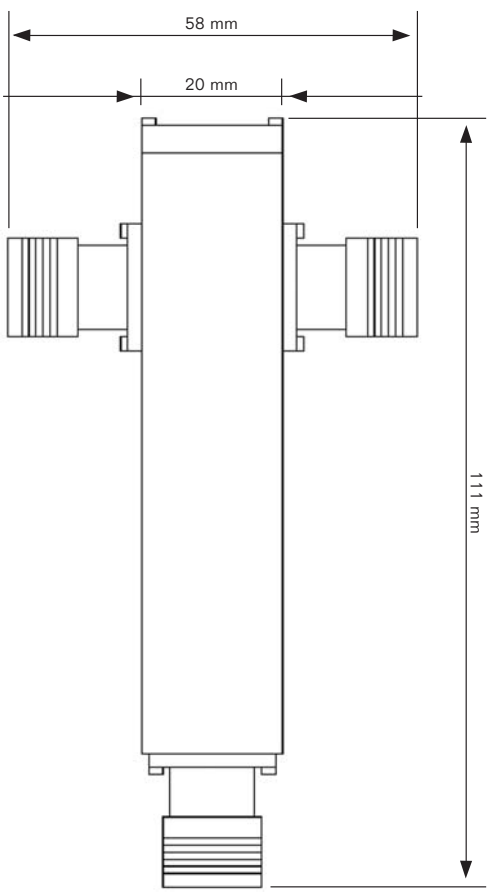


"These specifications are subject to change without notice"

Model DV/2 LINK

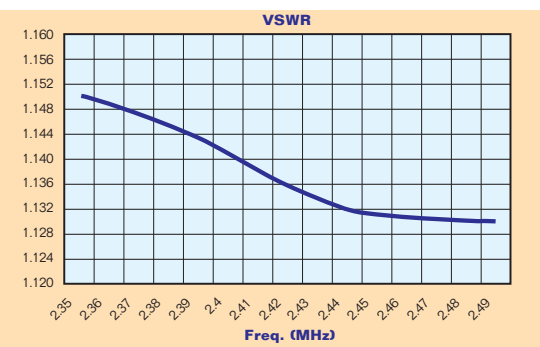
- **Splitter**
- **For to connect several antennas**
- **Band 2360÷2485 Mhz**

TYPICAL SPECIFICATIONS	
Model	DV/2 LINK
Impedance	50 Ohm
Frequency Range	2360÷2485 MHz
VSWR	1.15:1 Max
Insertion Loss	0.08 dB Max
Connectors	N Input-Output
Max Power	100 Watts
Working Temperature	-20°C ÷ +50°C
Colour	Enamel gray ral 7001
Materials	Aluminium, silver brass, copper, PTFE, stainless steel, silver plated (min 12µ thickness)



Dimensions	1300(Max size) x 650 x 450 mm (51.2(Max size) x 25.5 x 17.7 inch) (H x L x W)
Net Weight	≅ 0.15 Kg

Typical curve for VSWR



"These specifications are subject to change without notice"

Model HIJACKER5KW-HIJACKER30KW

- **RF Power HIJACKER**
- **FM Band 87.5÷108 Mhz**
- **Band II**

Presentation

RF Power Hijacker is a passive device that is inserted between a FM broadcast radio transmitter and its main antenna. Its main function is to shunt a part of the available power on to an auxiliary antenna.
RF Power Hijacker is designed for indoor placement, preferably in the transmitter's shelter.

Possible applications

- Diminution of the signal strength in a specific direction to reduce the interference against other broadcasters, or to avoid transmitting in other countries
- Signal enhancement in the direction where the preferred audience reside
- Adjustable horizontal radiation pattern rotation, to move the signal power to zones having variable population density
- Adjustment of the vertical radiation pattern, to modify the reached audience area
- RF power switching between two antennas without transmission interruption
- Removal of intermodulation for transmitters with near antennas
- Elimination with electrical uncoupling of interference for a receiving system.

In all the cases in that it is desirable to have signal power branching with adjustable power and phase.

TYPICAL SPECIFICATIONS		
Model	HIJACKER5KW	HIJACKER30KW
Frequency Range	87.5÷108 MHz	87.5÷108 MHz
VSWR	≤ 1.1:1 Max	≤ 1.1:1 Max
Return Loss	≤ -26 dB	≤ -26 dB
Connectors	Input - Output 7/8"	Input - Output 3+1/8"
Max Power	5 KW	30 KW

GENERAL SPECIFICATIONS	
Working Temperature	-20°C ÷ +50°C
Colour	Enamel gray ral 7001
Materials	Aluminium, silver brass, copper, PTFE, stainless steel, silver plated (min 12μ thickness)

Description

RF Power Hijacker features 4 connectors and 2 regulators. The connectors are used to join the device to
1. FM transmitter
2. Main antenna
3. Auxiliary antenna
4. Dummy load

The first regulator adjusts the power distribution among the antennas, while the second one regulates the phase shift between the output signals.
The role of the dummy load is to dissipate possible reflected power in the system, thus avoiding the transmitter being affected by it. The dummy load should not be needed for a well tuned and working system, but its presence guarantees better stability in the behaviour of the device.

Working principle

RF Power Hijacker consists of four functional parts:
1. Input signal splitter with fixed power ratio
2. A variable phase shifter
3. A signal combiner with fixed power ratio
4. A second variable phase shifter

The transmitted RF power is first divided by the power splitter. One of the outputs of the splitter is connected to one of the inputs of the combiner with a 50 Ohm transmission line. The other output is routed via the first phase shifter to the second input of the combiner. The last output of the input splitter is closed on a dummy load. The combiner has two output connectors: one is connected to the main antenna, while the other goes through the second phase adjuster to the auxiliary antenna. The phase shift between the signals at the combiner input determines the power ratio at the combiner output. The transmission line joining the splitter output with the combiner input determines the maximum range of the power ratio. The role of the dummy load is to dissipate possible reflected power in the system. The total loss of RF Power Hijacker is restricted to the insertion losses of the single components, as the total energy in the system is conserved and just divided in a determined way.

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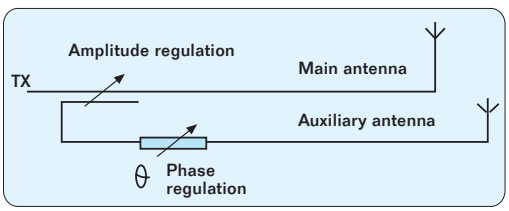
HIJACKER30KW

HIJACKER5KW

Scheme of principle



Model HIJACKER5KW-HIJACKER30KW

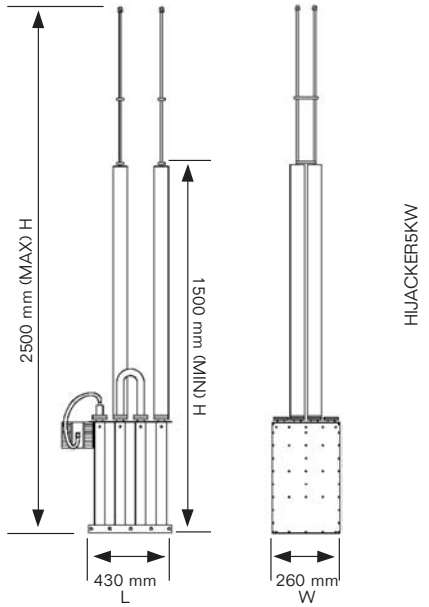
Installation

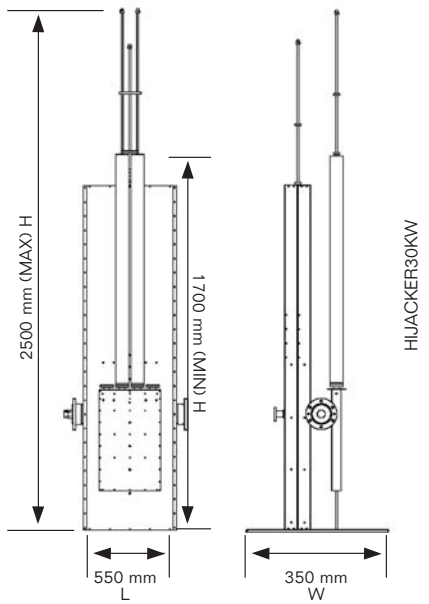
The setup of **RF Power Hijacker** requires appropriate study and design. The installation location shall permit the operator to comfortably perform the needed regulations: the preferred location is nearby the transmitter, even if there is no need to monitor its parameters during the setup of the system.
There is no requirement about the length of the cable connecting the transmitter with RF Power Hijacker. The initial setup is completed once the main and auxiliary antennas and the dummy load are connected.
The power that is dissipated by the dummy load is of little importance unless an antenna malfunction arises: it is up to the system engineer to evaluate the probability and type of the problems that could affect the antenna system, and to plan out the rating and positioning of the dummy load as a function of it.

Setup directions

The adjustment of **RF Power Hijacker** requires the collaboration of an operator that will manoeuvre the regulators of the device and of a second operator whose role is to monitor the effect in the field and to drive the operator on site towards the desired result. The operators will therefore be in radio or telephone contact.
Due to the very nature of the system, RF Power Hijacker cannot be factory-preset, and the best choice is just to request the device to be set with minimum power directed to the auxiliary antenna.
The typical regulation process consists of a succession of iterations until the desired result is obtained.
The first step of each iteration is to raise the amount of power directed to the auxiliary antenna: the operator in the field will notice the effect of this operation measuring the received field strength.
Than, the operator on site will vary the phase of the auxiliary signal along the whole range, while the operator in the filed monitors the corresponding variations in the received field. If the phase regulation doesn't give satisfactory results, the amount of power shunted to the auxiliary antenna is increased, beginning a new iteration.

Model	Dimension	Net Weight
HIJACKER5KW	1500(min)÷2500(max)x430x260 mm (59.1(min)÷98.4(max)x16.9x10.2 inch) (HxLxW)	≅ 25 Kg
HIJACKER30KW	1700(min)÷2500(max)x550x350 mm (66.9(min)÷98.4(max)x21.6x13.8 inch) (HxLxW)	≅ 30 Kg





Theoretical considerations

Using two antennas to irradiate the RF signal produced by a single transmitter, always results in mutual influence in the radiated fields. RF Power Hijacker is helpful to shape the resulting pattern in an useful way from the broadcaster's point of view.
At the receiver, the combination of the signal gives two different effects: the first and useful one is the enhancement or suppression of signal strength due the phase shift that is regulated by RF Power Hijacker. The second one, due to the relative delay of the received signals, is the so called multipath interference, resulting in distortion in the received signal and unwanted AM in the field. To reduce the multipath effect, it is important to avoid the use of filters affecting only one of the transmission paths, and to keep the length of the antenna feeders as similar as possible. It should be noted that the multipath effect could also be present in the direction of the notch of the overall radiation pattern: in this case, the resulting signal would be a suppressed-carrier AM, with lateral spectral lines carrying more energy, the bigger the delay and the deeper the modulation level of the FM signal is.
A final consideration about the antennas to be used in conjunction with the RF Power Hijacker: in most cases, the main antenna is already installed, while the auxiliary one has to be chosen in view of the desired result. Since the auxiliary antenna shall normally irradiate a small part of the total transmitted power, it can be of smaller size. It's also important to take into account the whole radiation pattern of the selected auxiliary antenna, and to study its effect on the global radiated field of the system, to avoid the risk of unwanted side-effects affecting the main audience area.

Application examples

Received interference suppression in a radio link

In some cases a radio link can suffer from interference induced by a signal arriving from a direction different from the one of the desired signal. If the normal anti-reflecting receiving system or reduced sidelobes antennas are not sufficient to bring the interference below the needed level, the RF Power Hijacker can be helpful as a sidelobe canceller.
In this configuration, an auxiliary directive antenna is installed with its main lobe pointed towards the interfering source. The received signal is then routed through the phase shifting channel of the RF Power Hijacker. Adjusting the provided regulators in a proper way, it is possible to render the contributions in the channels due to the interfering signal as having the same amplitude and opposite phase, thus obtaining suppression levels often well below 40 dB, compared to 20-25 dB permitted by traditional systems.
The system has a remarkable bandwidth, thanks to the maximum efficiency design of the circuit. The auxiliary antenna can be constituted by one or more elements in different configurations, to obtain the most suitable receiving pattern for the specific application.

Attenuation of the power transmitted in a certain direction

In this case, the desired effect is to reduce the interference caused by a transmitter in an area that is not intended to be served by it. The auxiliary antenna is pointed in the direction of the area to be protected, and fed with the signal shunted by the RF Power Hijacker. The regulations of the RF Power Hijacker will be adjusted so that the resulting radiation pattern will have a minimum in this direction, thanks to the main and auxiliary signals having opposite phase in the desired direction.

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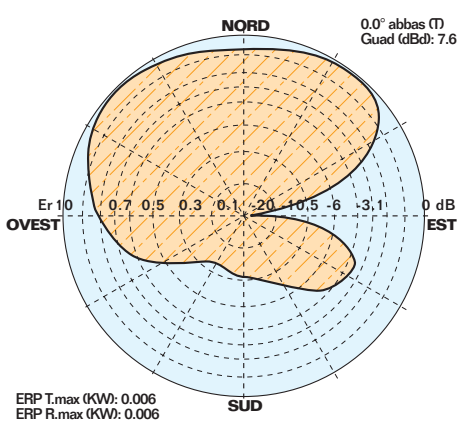
Example of antenna system comprising a main section of four collinear broadband fm dipoles pointed at 0°, and an auxiliary 5 elements yagi auxiliary antenna pointed at 90°, creating a null in the corresponding direction



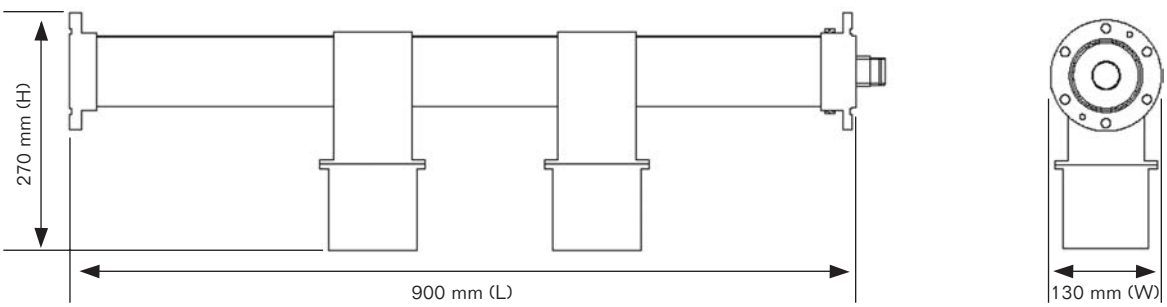
Model FMT30K

- **Fine Matcher**
- **FM Band 87.5÷108 Mhz**
- **Band II**
- **Fine Tuned Antenna for minimun VSWR**

Although the TELECOMUNICAZIONI FERRARA antennas are tuned at the factory to provide a low standing wave ratio for the operating channel, when an antenna is mounted on a conductive metal object such as a tower or a pole its VSWR naturally increases. The fine matcher provides the user a quick and easy way to optimize the antenna for the absolute minimum VSWR and releted signal degradation. With this device, tuning can be accomplished in a fraction of the time that it take to tune competitive antennas without having to disassemble the feedline. Tunning can even be accomplished without loss of system pessure.

TYPICAL SPECIFICATIONS	
Model	FMT30K
Impedance	50 ohm
Frequency Range	87.5-108 MHz
Insertion Loss	0.05 dB Max
Connectors	3+1/8" Input-Output (Opt. 4+1/8")
Max Power	30 KW
Working Temperature	-20°C ÷ +50°C
Colour	Enamel gray ral 7001
Materials	Aluminum, silver brass, copper, PTFE, stainless steel, silver plated (min 12µ thickness)

Dimensions	270 x 900 x 130 mm (10.6 x 35.5 x 5.1 inch) (H x L x W)
Net Weight	≅ 15 Kg



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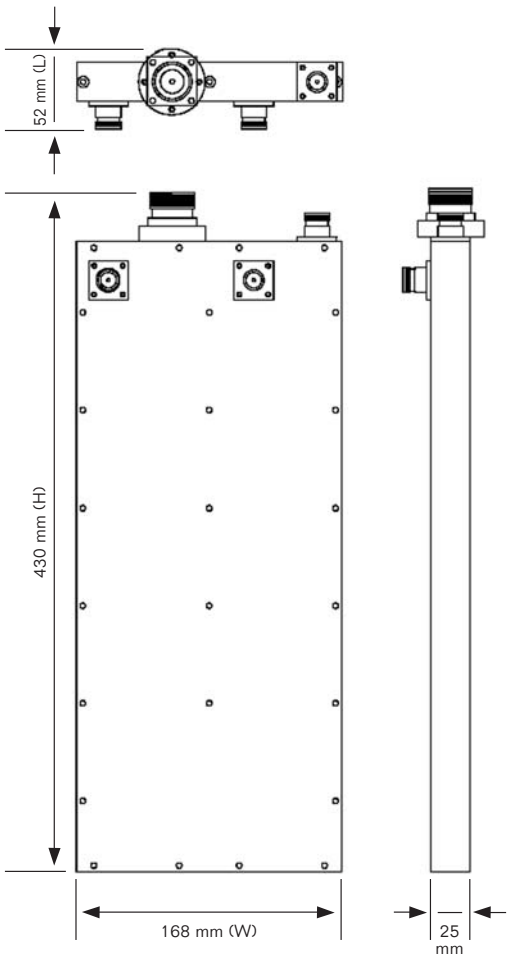
Model COUP3DB2KW

- **-3 dB Couplers**
- **FM Band 87.5÷108 Mhz**
- **Band II**

- Special version on request
- Possibility of interchange between the mouths

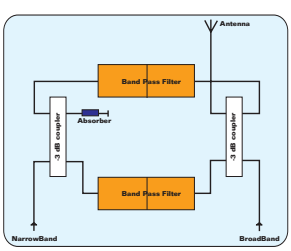


TYPICAL SPECIFICATIONS	
Frequency Range	87.5÷108 MHz
Directivity	≥ 32 dB
Impedance	50 Ohm
VSWR ±150 KHz	1.1:1 Max
Return Loss ±150 KHz	≤ -26 dB
Coupling	-3 dB ± 0.25 dB
Connectors	Input N– Output 7/16"
Max Power	2 KW

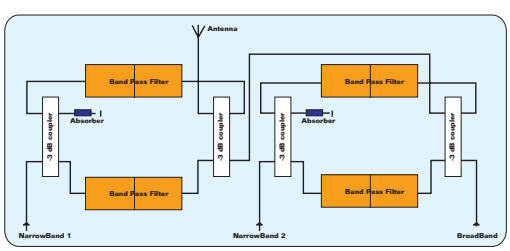
GENERAL SPECIFICATIONS	
Working Temperature	-20°C ÷ +50°C
Colour	Enamel gray ral 7001
Materials	Aluminium, silver brass, copper, PTFE, stainless steel, silver plated (min 12μ thickness)

Dimensions	430 x 52 x 168 mm (16.9 x 2 x 6.6 inch) (H x L x W)
Net Weight	≅ 3 Kg

TYPICAL APPLICATIONS

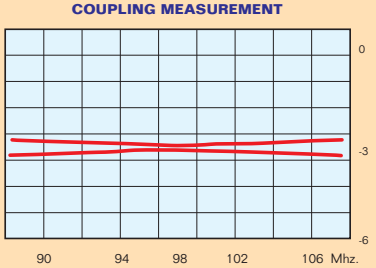


DIPLEXER

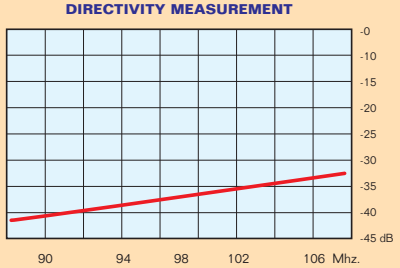


TRIPLEXER

COUPLING MEASUREMENT



DIRECTIVITY MEASUREMENT



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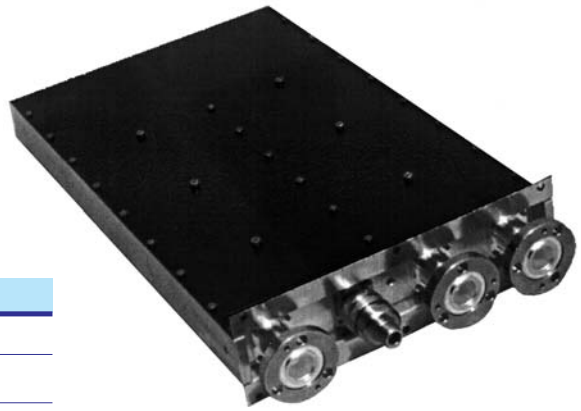
Model COUP3DB5KW-COUP3DB10KW COUP3DB45KW-COUP3DB80KW

- **-3 dB Couplers**
- **FM Band 87.5÷108 Mhz**
- **Band II**

- Special version on request
- Possibility of interchange between the mouths



COUP3DB5KW

TYPICAL SPECIFICATIONS

Model	COUP3DB5KW	COUP3DB10KW	COUP3DB45KW	COUP3D80KW
Frequency Range	87.5-108 MHz	87.5-108 MHz	87.5-108 MHz	87.5-108 MHz
Directivity	≥ 32dB	≥ 35dB	≥ 35dB	≥ 35dB
Impedance	50 ohm	50 ohm	50 ohm	50 ohm
VSWR ± 150 KHz	1.1:1 max	1.1:1 max	1.1:1 max	1.1:1 max
Return Loss ± 150 KHz	≤ -26 dB	≤ -26 dB	≤ -26 dB	≤ -26 dB
Coupling	-3 dB ± 0.25 dB	-3 dB ± 0.25 dB	-3 dB ± 0.25 dB	-3 dB ± 0.25 dB
Connectors	Input – Output 7/8"	Input - Output 1+5/8"	Input - Output 3+1/8"	Input 3+1/8-Output 6+1/8"
Max Power	5 KW	10 KW (Opt. 15KW*)	45 KW	80 KW

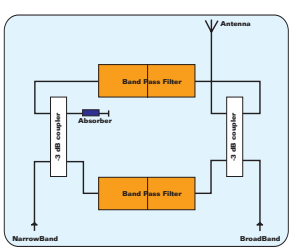
*Input 1+5/8" – Output 3+1/8"

GENERAL SPECIFICATIONS

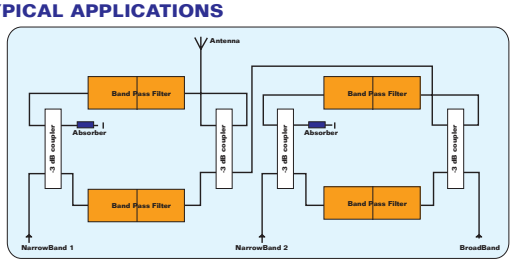
Working Temperature	-20°C ÷ +50°C
Colour	Enamel gray ral 7001
Materials	Aluminium, silver brass, copper, PTFE, stainless steel, silver plated (min 12μ thickness)

Model	Dimension	Net Weight
COUP3DB5KW	460x260x40 mm (18.1x10.2x1.6 inch) (HxLxW)	≅ 4 Kg
COUP3DB10KW	490x450x80 mm (19.3x17.7x3.2 inch) (HxLxW)	≅ 8 Kg
COUP3DB45KW	870x410x150 mm (34.3x16.1x5.9 inch) (HxLxW)	≅ 15 Kg
COUP3DB80KW	870x450x150 mm (34.3x17.7x5.9 inch) (HxLxW)	≅ 25 Kg

TYPICAL APPLICATIONS

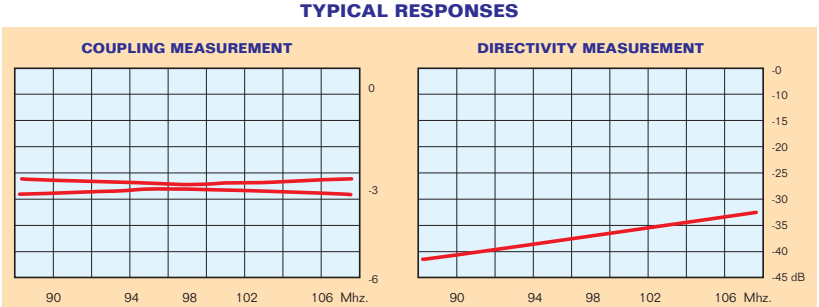


DIPLEXER



TRIPLEXER

TYPICAL RESPONSES



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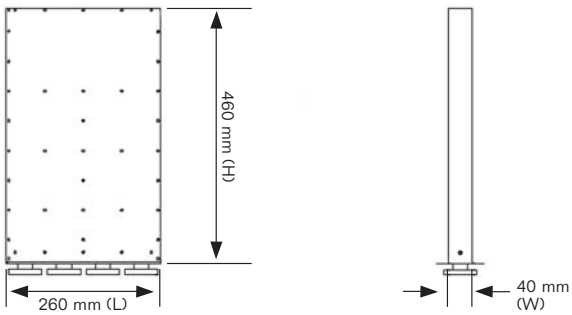
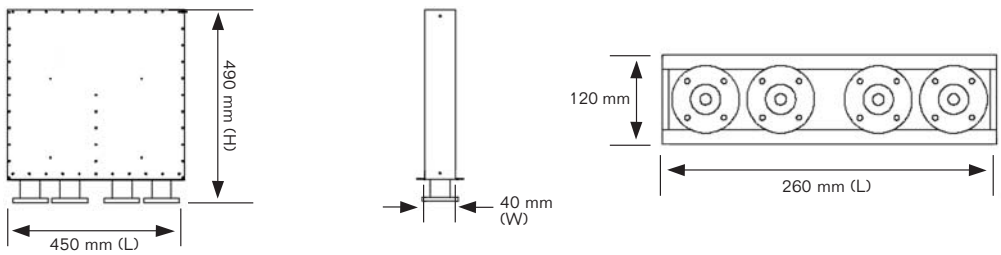
Model COUP3DB5KW-COUP3DB10KW COUP3DB45KW-COUP3DB80KW

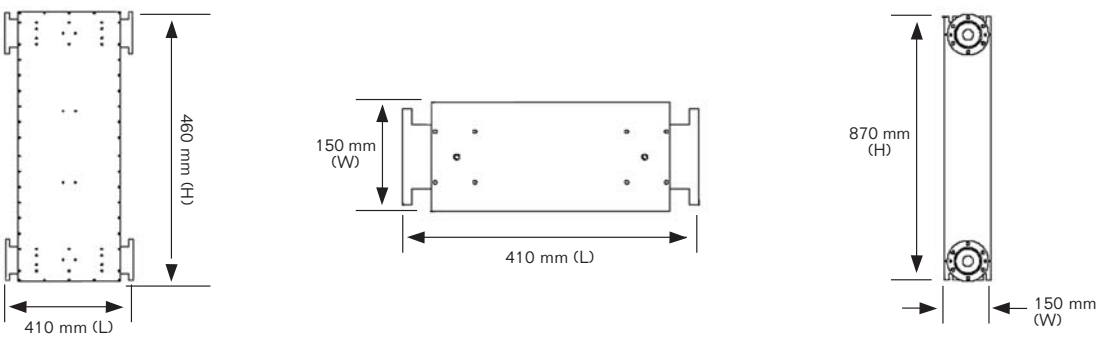
Mechanical specifications for COUP3DB5KW



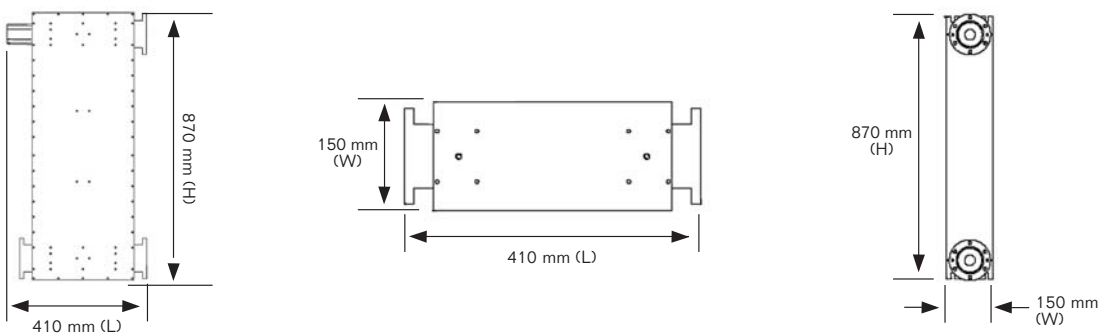
Mechanical specifications for COUP3DB10KW



Mechanical specifications for COUP3DB45KW



Mechanical specifications for COUP3DB80KW



"These specifications are subject to change without notice"