

UTIMSA RF



**BROADCAST CATALOGUE ED. 14
ANTENNA SYSTEMS, CHANNEL
COMBINERS & PASSIVE COMPONENTS**

BROADCAST ANTENNA SYSTEM SOLUTIONS



Since 1974, **RYMSA RF** has specialized in the implementation of complex broadcast radio and TV antenna systems providing turnkey services for customers on all five continents. Our expertise in this field has been strongly developed over the years leading us to today's market leadership position, with capabilities to manage each project from conceptual design to on-site installation and commissioning.

RYMSA RF has deployed broadcast antenna systems from the Equator to the Arctic Circle, providing reliable service in extreme environmental conditions such as high elevations, strong winds, heavy icing, intense solar radiation and high levels of humidity and salinity.

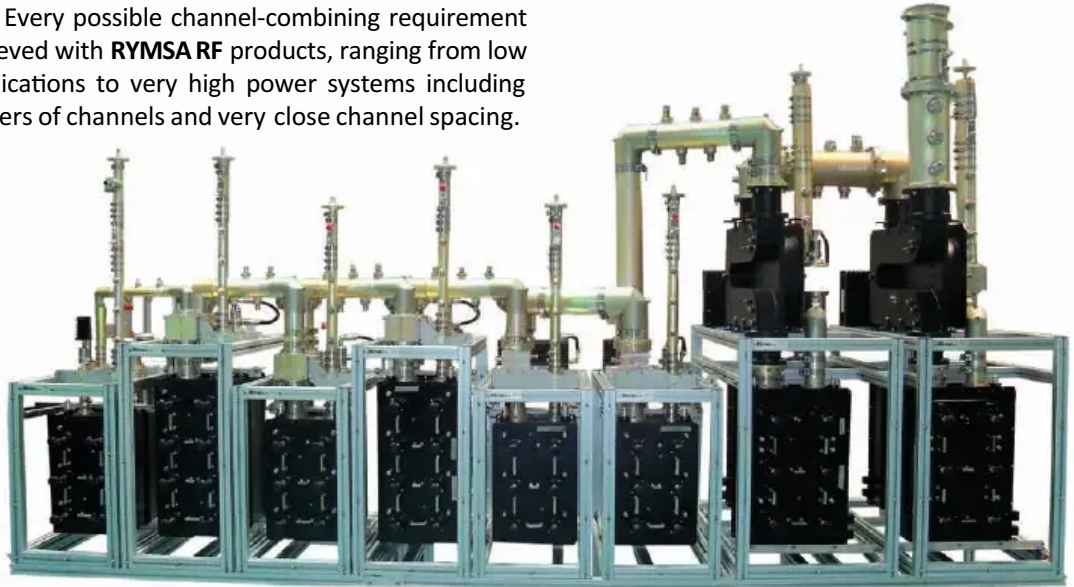
Customized radiating solutions of high complexity are one of our specialties. Multi-panel or skew panel arrays for large cross-section towers, embedded antenna systems and multi-pattern arrays have all been engineered by **RYMSA RF** to satisfy the most difficult antenna pattern requirements.

Multi-channel service and high-power capability are common requirements of today's modern broadcaster and **RYMSA RF** antenna systems have the strongest market reputation in terms of reliability when these needs arise.



FILTERS AND CHANNEL COMBINERS FOR RADIO AND TV

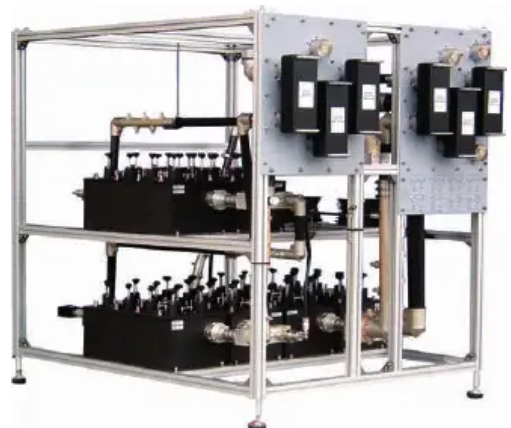
RYMSA RF has a successful history of supplying multi-channel combiners to radio and TV broadcasters worldwide. Every possible channel-combining requirement can be achieved with **RYMSA RF** products, ranging from low power applications to very high power systems including large numbers of channels and very close channel spacing.



Depending on the needs of each site, **RYMSA RF** can supply different types of combiners such as constant impedance, manifold, star-point or commutating line ("stretch-line"). As per customer request, patch panel systems can be integrated in our channel combiners.

Our expertise includes the ability to provide emissions mask filters for digital TV signals of any standard and any power level. We offer a complete line of re-tunable channel combiners and mask filters that can be tuned to any channel, even for adjacent channel conditions.

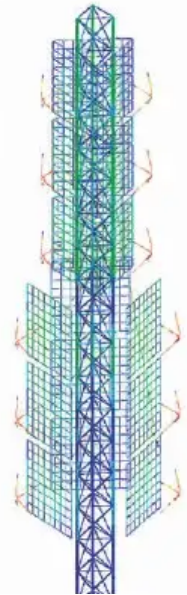
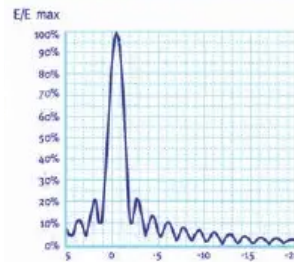
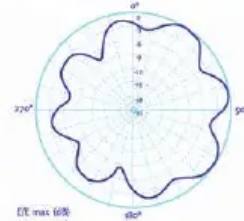
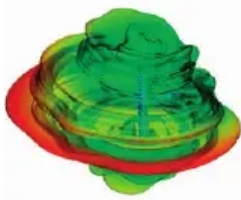
In addition to filters and combiners, we supply great stand-alone components including power combiners and dividers, hybrids, switches and directional couplers.



RF DESIGN & ENGINEERING

All key parameters of broadcast RF systems, such as radiation patterns, coverage calculations and RMS and peak power handling are matter of close scrutiny by **RYMSA RF** engineers. Cutting-edge computer-aided design tools enable us to provide optimum results for a wide variety of technical requirements.

In addition to our in-house proprietary software, we have the best commercial design tools available to guarantee the best performance, including SUPERNEC®, CST®, FEKO® and ICS Telecom®. These powerful tools, together with the experience and expertise necessary to use them accurately, guarantee the best possible performance of our products and the best value for the broadcaster.



TEST FACILITIES

RYMSA RF is continuously investing in the maintenance and upgrade of in-house test equipment at our manufacturing facilities located in Spain and USA in order to ensure a high level of accuracy in the verification of our designs. All RF components and assemblies designed by **RYMSA RF** are put through stringent electrical, mechanical and environmental testing in our state-of-the-art facilities that include:

- Several far-field antenna ranges and two indoor compact antenna ranges, working from 6 MHz to 40 GHz.
- Network analyzers with a full range of calibration kits for all relevant transmission lines types and sizes.
- RMS and peak power test sets.
- Vibration tables.
- Vacuum chambers.
- Salt spray corrosion chambers.
- Temperature chambers.

The use of these state-of-the-art facilities, in strict accordance with our quality management system endorsed by the DIN EN ISO 9001 Certification, guarantees the highest possible quality of all our products.

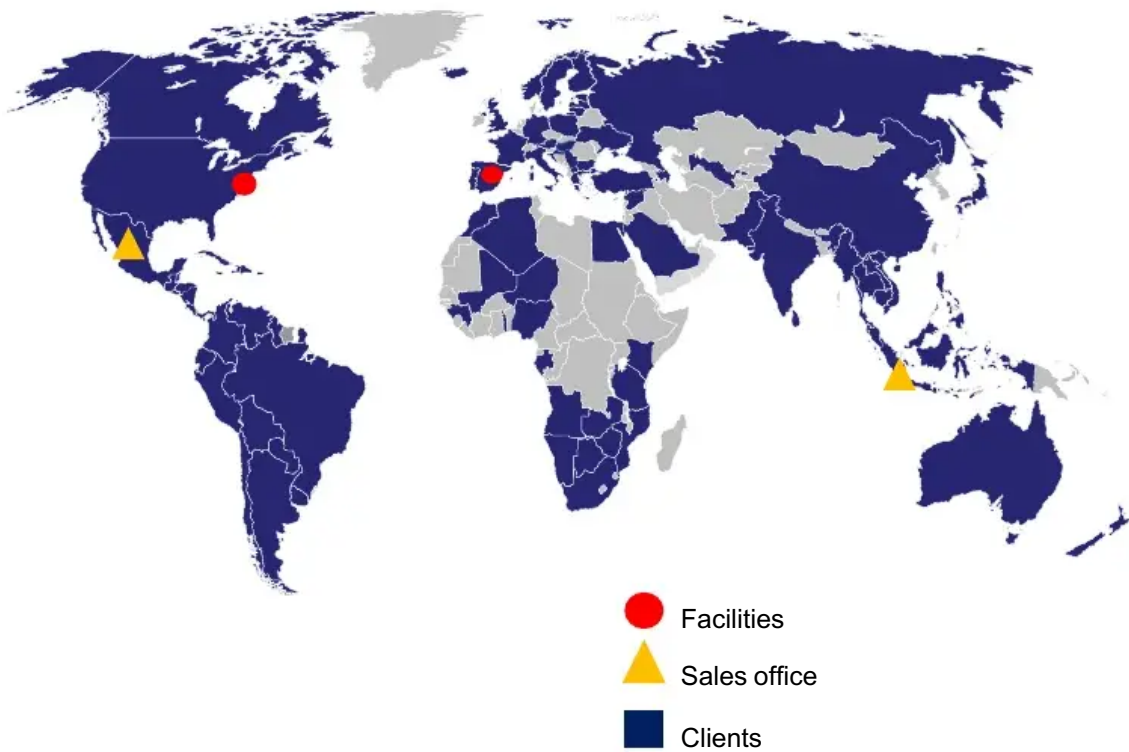




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RYMSA RF belongs to TRYO Technologies, a spanish technology group of consolidated companies focused on providing completed solutions to our clients in a wide range of the professional telecommunications and radio frequency applications for broadcast, space, critical communications, scientific and defence.



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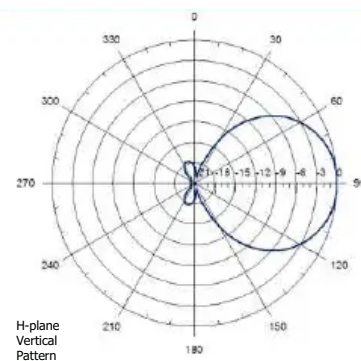
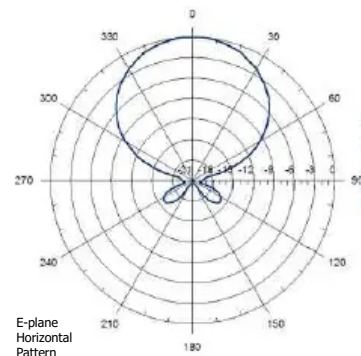
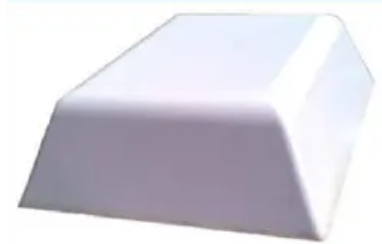
Band III 2 dipoles panel
Especially suitable for square masts
For extreme weather conditions (radome protected)
Model: AT13-222R

TV ANTENNA SYSTEMS

Electrical Specifications	
Frequency range	174-230 MHz
Peak gain	7.5 dB (ref. $\lambda/2$ dipole)
3 dB beam width	E-plane: 66° H-plane: 61°
Polarization	Horizontal
Impedance	50 Ohm
VSWR	$\leq 1.15:1$
Maximum power handling peak sync	2 kW
Maximum power handling RMS	1.4 kW
Connector type	DIN 7/16
Pressurization	Non pressurized

Mechanical & Environmental Specifications		
Materials	Radome Reflector & dipoles Isolators	Fiberglass Aluminium PTFE
Dimensions (W x D x H)	1210 x 520 x 1210 mm	
Maximum wind speed	200 Km/h	
Wind load (front)	1680 N (@160 km/h)	
Wind load (lateral)	860 N (@160 km/h)	
Weight	32 Kg	
Typical mounting	Square arrangement tower	
Clamp type	To \varnothing 80 – 115 mm pipe	
Vertical spacing	1600 mm	
Grounding	DC grounded	
Temperature range	-40°C to +80°C	
Humidity	100%	

Antenna System Characteristics					
Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (Kg)	Wind load (@160 Km/h)	System height (mm)
1	2	5.5	64	2.5 kN	1210
	3	3.7	96	3.4 kN	
	4	2.5	128	3.9 kN	
2	2	8.5	128	5.0 kN	2810
	3	6.7	192	6.8 kN	
	4	5.5	256	7.8 kN	
4	2	11.5	256	10.0 kN	6010
	3	9.7	384	13.6 kN	
	4	8.5	512	15.6 kN	
6	2	13.3	384	15.0 kN	9210
	3	11.5	576	20.4 kN	
	4	10.3	768	23.4 kN	
8	2	14.5	512	20.0 kN	12410
	3	12.7	768	27.2 kN	
	4	11.5	1024	31.2 kN	



NOTES:

- Table supplies data up to 8 bays only for simplification purposes; systems with more bays are available.
- Null fill, beam tilt, harness & feeder losses NOT INCLUDED.
- Wind load & weight figures without considering cables, splitters & hardware

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Band III 4 dipoles panel Especially suitable for square masts Model: AT13-240

Electrical Specifications

Frequency range	174-230 MHz		
Peak gain	10.5 dB (ref. $\lambda/2$ dipole)		
3 dB beam width	E-plane: 69°	H-plane: 25°	
Polarization	Horizontal		
Impedance	50 Ohm		
VSWR	$\leq 1.1:1$		
Maximum power handling peak sync	2 kW	3.5 kW	6 kW
Maximum power handling RMS	1.4 kW	2.5 kW	4.2 kW
Connector type	DIN 7/16	EIA 7/8"	DIN 13/30
Pressurization	Non pressurized	Gas barrier on input connector	

Mechanical & Environmental Specifications

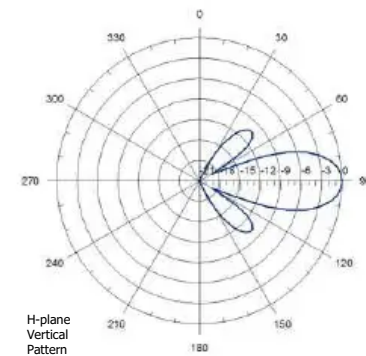
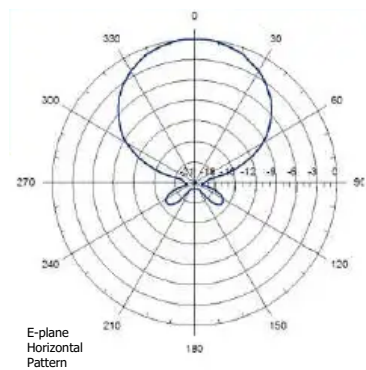
Materials	Reflector & dipoles Feed points radome	Hot dip galvanized steel Fiberglass
Dimensions (W x D x H)	1250 x 500 x 2900 mm	
Maximum wind speed	200 km/h	
Wind load (front)	1590 N (@160 km/h)	
Wind load (lateral)	950 N (@160 km/h)	
Weight	68 Kg	
Typical mounting	Square arrangement tower	
Clamp type	To \varnothing 80 – 115 mm pipe	
Vertical spacing	3200 mm	
Grounding	DC grounded	
Temperature range	-40°C to +80°C	
Humidity	100%	

Antenna System Characteristics

Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (Kg)	Wind load (@160 Km/h)	System height (mm)
1	2	8.5	136	2.5 kN	2900
	3	6.7	204	3.5 kN	
	4	5.5	272	4.3 kN	
2	2	11.5	272	5.1 kN	6100
	3	9.7	408	7.0 kN	
	4	8.5	544	8.5 kN	
4	2	14.5	544	10.1 kN	12500
	3	12.7	816	13.9 kN	
	4	11.5	1088	17.1 kN	
6	2	16.3	816	15.2 kN	18900
	3	14.5	1224	20.9 kN	
	4	13.3	1632	25.6 kN	
8	2	17.5	1088	20.2 kN	25300
	3	15.7	1632	27.8 kN	
	4	14.5	2176	34.2 kN	



TV ANTENNA SYSTEMS



NOTES:

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- Wind load & weight figures without considering cables, splitters & hardware.

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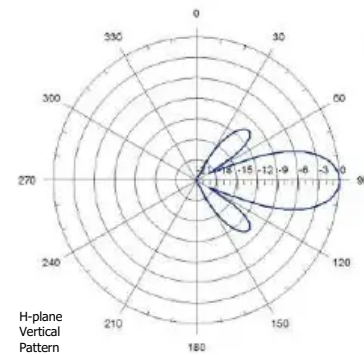
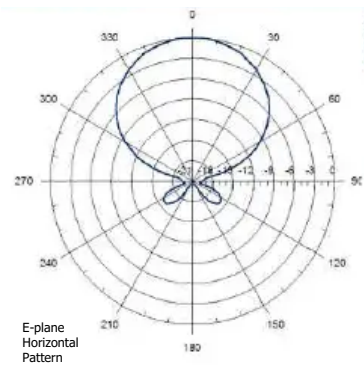
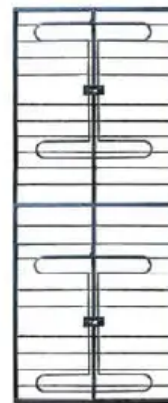
Band III 4 dipoles panel
Especially suitable for square masts
Light construction
Model: AT13-242

TV ANTENNA SYSTEMS

Electrical Specifications	
Frequency range	174-230 MHz
Peak gain	10.5 dB (ref. $\lambda/2$ dipole)
3 dB beam width	E-plane: 66° H-plane: 30°
Polarization	Horizontal
Impedance	50 Ohm
VSWR	$\leq 1.15:1$
Maximum power handling peak sync	2 kW
Maximum power handling RMS	1.4 kW
Connector type	DIN 7/16
Pressurization	Non pressurized

Mechanical & Environmental Specifications	
Materials	Reflector & dipoles: Hot dip galvanized steel (aluminium construction as option) Isolators: PTFE
Dimensions (W x D x H)	1200 x 440 x 2700 mm
Maximum wind speed	200 km/h
Wind load (front)	915 N (@160 km/h)
Wind load (lateral)	505 N (@160 km/h)
Weight	33 Kg
Typical mounting	Square arrangement tower
Clamp type	To \varnothing 50 – 70 mm pipe
Vertical spacing	3200 mm
Grounding	DC grounded
Temperature range	-40°C to +80°C
Humidity	100%

Antenna System Characteristics					
Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (kg)	Wind load (@160 Km/h)	System height (mm)
1	2	8.5	66	1.4 kN	2700
	3	6.7	99	1.9 kN	
	4	5.5	132	2.4 kN	
2	2	11.5	132	2.8 kN	5900
	3	9.7	198	3.9 kN	
	4	8.5	264	4.8 kN	
4	2	14.5	264	5.7 kN	12300
	3	12.7	396	7.7 kN	
	4	11.5	528	9.5 kN	
6	2	16.3	396	8.5 kN	18700
	3	14.5	594	11.6 kN	
	4	13.3	792	14.3 kN	
8	2	17.5	528	11.4 kN	25100
	3	15.7	792	15.4 kN	
	4	14.5	1056	19.1 kN	



NOTES:

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- Wind load & weight figures without considering cables, splitters & hardware.

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Band III 2 dipoles panel Especially suitable for triangular masts Model: AT13-223

TV ANTENNA SYSTEMS

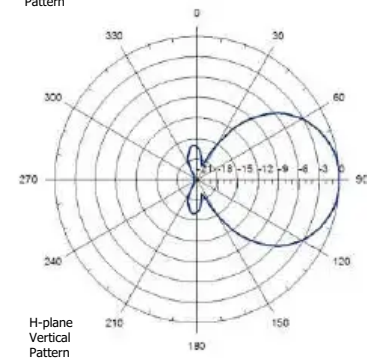
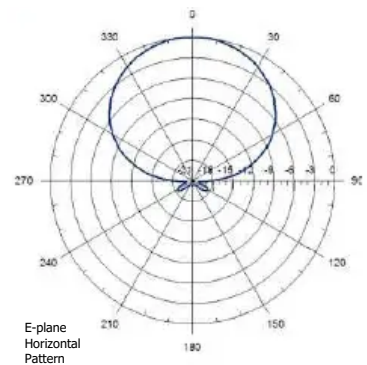
Electrical Specifications

Frequency range	174-230 MHz		
Peak gain	7 dB (ref. $\lambda/2$ dipole)		
3 dB beam width	E-plane: 78°	H-plane: 58°	
Polarization	Horizontal		
Impedance	50 Ohm		
VSWR	$\leq 1.15:1$		
Maximum power handling peak sync	2 kW	3.5 kW	6 kW
Maximum power handling RMS	1.4 kW	2.5 kW	4.2 kW
Connector type	DIN 7/16	EIA 7/8"	DIN 13/30
Pressurization	Non pressurized	Gas barrier on input connector	



Mechanical & Environmental Specifications

Materials	Reflector & dipoles Feed points radome	Hot dip galvanized steel Fiberglass
Dimensions (W x D x H)	1000 x 530 x 1300 mm	
Maximum wind speed	200 km/h	
Wind load (front)	664 N (@160 km/h)	
Wind load (lateral)	488 N (@160 km/h)	
Weight	36 kg	
Typical mounting	Triangular arrangement tower	
Clamp type	To \varnothing 80 – 115 mm pipe	
Vertical spacing	1600 mm	
Grounding	DC grounded	
Temperature range	-40°C to +80°C	
Humidity	100%	



Antenna System Characteristics

Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (kg)	Wind load (@160 Km/h)	System height (mm)
1	2	4.0	72	1.5 kN	1300
	3	2.2	108	2.2 kN	
2	2	7.0	144	3.0 kN	2900
	3	5.2	216	4.3 kN	
4	2	10.0	288	6.0 kN	6100
	3	8.3	432	8.7 kN	
6	2	11.8	432	9.1 kN	9300
	3	10.0	648	13.0 kN	
8	2	13.0	576	12.1 kN	12500
	3	11.3	864	17.4 kN	

NOTES:

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- Wind load & weight figures without considering cables, splitters & hardware.

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Band III 2 dipoles panel
Especially suitable for square masts
For extreme weather conditions (radome protected)
Model: AT13-227R

TV ANTENNA SYSTEMS

Electrical Specifications

Frequency range	174-230 MHz	
Peak gain	7.5 dB (ref. $\lambda/2$ dipole)	
3 dB beam width	E-plane: 66°	H-plane: 61°
Polarization	Vertical	
Impedance	50 Ohm	
VSWR	$\leq 1.15:1$	
Maximum power handling peak sync	2 kW	
Maximum power handling RMS	1.4 kW	
Connector type	DIN 7/16	
Pressurization	Non pressurized	

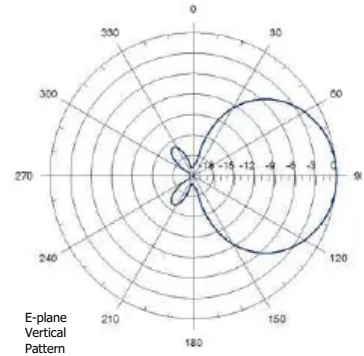
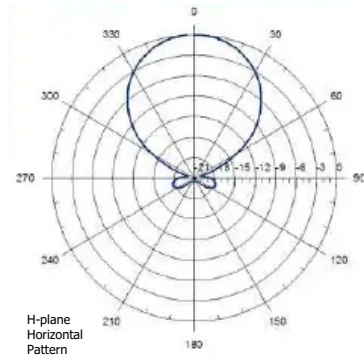


Mechanical & Environmental Specifications

Materials	Radome Reflector & dipoles Isolators	Fiberglass Aluminium PTFE
Dimensions (W x D x H)	1210 x 520 x 1210 mm	
Maximum wind speed	200 Km/h	
Wind load (front)	1680 N (@160 km/h)	
Wind load (lateral)	860 N (@160 km/h)	
Weight	32 Kg	
Typical mounting	Square arrangement tower	
Clamp type	To \varnothing 80 – 115 mm pipe	
Vertical spacing	1600 mm	
Grounding	DC grounded	
Temperature range	-40°C to +80°C	
Humidity	100%	

Antenna System Characteristics

Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (Kg)	Wind load (@160 Km/h)	System height (mm)
1	2	4.5	64	2.5 kN	1210
	3	2.7	96	3.4 kN	
	4	1.5	128	3.9 kN	
2	2	7.5	128	5.0 kN	2810
	3	5.7	192	6.8 kN	
	4	4.5	256	7.8 kN	
4	2	10.5	256	10.0 kN	6010
	3	8.7	384	13.6 kN	
	4	7.5	512	15.6 kN	
6	2	12.3	384	15.0 kN	9210
	3	10.5	576	20.4 kN	
	4	9.3	768	23.4 kN	
8	2	13.5	512	20.0 kN	12410
	3	11.7	768	27.2 kN	
	4	10.5	1024	31.2 kN	



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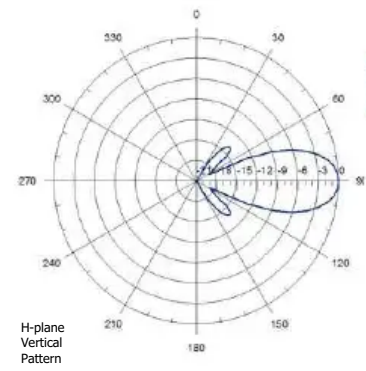
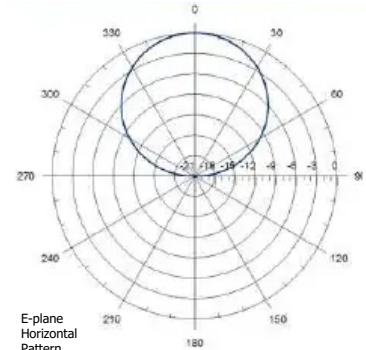
Band IV/V horizontal polarization panel Especially suitable for square masts Model: AT15-250

TV ANTENNA SYSTEMS

Electrical Specifications				
Frequency range	470-862 MHz			
Peak gain	11.35 dB (ref. $\lambda/2$ dipole)			
3 dB beam width	E-plane: 61°	H-plane: 26°		
Polarization	Horizontal			
Impedance	50 Ohm			
VSWR	$\leq 1.1:1$ typical ($\leq 1.13:1$ max)			
Maximum power handling peak sync	1.4 kW	3.5 kW	4.2 kW	6.5 kW
Maximum power handling RMS	1 kW	2.5 kW	3 kW	4.5 kW
Connector type	DIN 7/16	EIA 7/8"	DIN 13/30	EIA 1 5/8"
Pressurization	Non pressurized	Gas barrier on input connector		

Mechanical & Environmental Specifications	
Materials	Reflector & radiating elements Aluminium (Stainless steel available on request) Radome Fiberglass Radome colour Red or white on request
Dimensions (W x D x H)	483 x 264 x 983 mm
Maximum wind speed	220 km/h
Wind load (front)	743 N (@160 km/h)
Wind load (lateral)	258 N (@160 km/h)
Weight	10 Kg (model with DIN 7/16 connector)
Typical mounting	Several combinations depending on the radiation pattern required (square typical)
Vertical spacing	1000 mm
Grounding	DC grounded
Temperature range	-40°C to +80°C
Humidity	100%

Antenna System Characteristics					
Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (kg)	Wind load (@160 km/h)	System height (mm)
1	2	8.4	20	1.1 kN	1000
	3	6.6	30	1.6 kN	
	4	5.3	40	1.5 kN	
2	2	11.4	40	2.2 kN	2000
	3	9.6	60	3.2 kN	
	4	8.3	80	3.1 kN	
4	2	14.4	80	4.4 kN	4000
	3	12.6	120	6.4 kN	
	4	11.4	160	6.2 kN	
6	2	16.1	120	6.6 kN	6000
	3	14.4	180	9.6 kN	
	4	13.1	240	9.3 kN	
8	2	17.4	160	8.8 kN	8000
	3	15.6	240	12.8 kN	
	4	14.4	320	12.4 kN	


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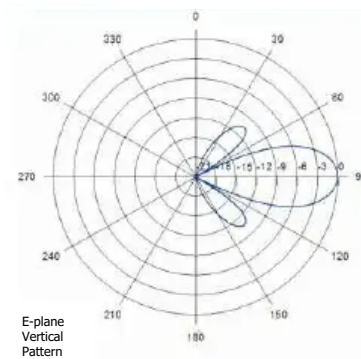
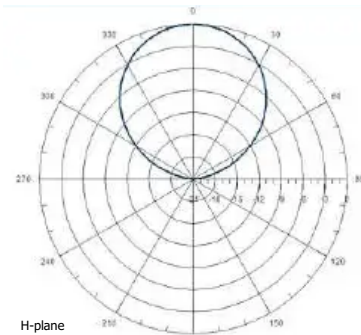
Band IV/V vertical polarization panel Especially suitable for square masts Model: AT15-251

TV ANTENNA SYSTEMS

Electrical Specifications				
Frequency range	470-862 MHz			
Peak gain	11.05 dB (ref. $\lambda/2$ dipole)			
3 dB beam width	E-plane: 27°		H-plane: 62°	
Polarization	Vertical			
Impedance	50 Ohm			
VSWR	≤ 1.15:1			
Maximum power handling peak sync	1.4 KW	3.5 KW	4.2 KW	6.5 KW
Maximum power handling RMS	1 KW	2.5 KW	3 KW	4.5 KW
Connector type	DIN 7/16	EIA 7/8"	DIN 13/30	EIA 1 5/8"
Pressurization	Non pressurized	Gas barrier on input connector		



Mechanical & Environmental Specifications		
Materials	Reflector & radiating elements	Aluminium
	Radome	Fiberglass
	Radome colour	Red or white on request
Dimensions (W x D x H)	483 x 264 x 983 mm	
Maximum wind speed	220 Km/h	
Wind load (front)	743 N (@160 Km/h)	
Wind load (lateral)	258 N (@160 Km/h)	
Weight	9 Kg (model with DIN 7/16 connector)	
Typical mounting	Several combinations depending on the radiation pattern required (square typical)	
Vertical spacing	1000 mm	
Grounding	DC grounded	
Temperature range	-40°C to +80°C	
Humidity	100%	



Antenna System Characteristics					
Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (Kg)	Wind load (@160 Km/h)	System height (mm)
1	2	8.1	18	1.1 kN	1000
	3	6.3	27	1.6 kN	
	4	5.0	36	1.5 kN	
2	2	11.1	36	2.2 kN	2000
	3	9.3	54	3.2 kN	
	4	8.0	72	3.1 kN	
4	2	14.1	96	4.4 kN	4000
	3	12.3	108	6.4 kN	
	4	11.1	144	6.2 kN	
6	2	15.8	108	6.6 kN	6000
	3	14.1	162	9.6 kN	
	4	12.8	216	9.3 kN	
8	2	17.1	144	8.8 kN	8000
	3	15.3	216	12.8 kN	
	4	14.1	288	12.4 kN	

NOTES:

- Table supplies data up to 8 bays only for simplification purposes; systems with more bays are available.
- Null fill, beam tilt, harness & feeder losses NOT INCLUDED.
- Wind load & weight figures without considering cables, splitters & hardware

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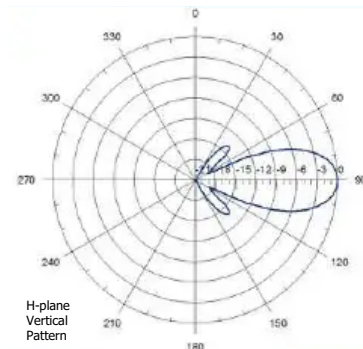
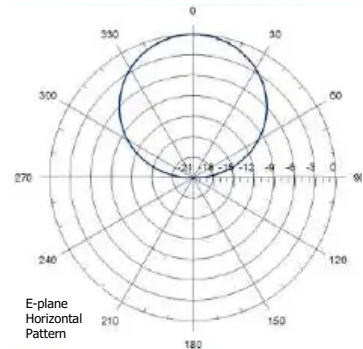
Band IV/V slant polarization panel Especially suitable for square masts Model: AT15-252

TV ANTENNA SYSTEMS

Electrical Specifications				
Frequency range	470-862 MHz			
Peak gain	12.8 dB (ref. $\lambda/2$ dipole)			
3 dB beam width	E-plane: 61°	H-plane: 26°		
Polarization	Slant (typical 80%H / 20%V)			
Impedance	50 Ohm			
VSWR	$\leq 1.1:1$ typical ($\leq 1.13:1$ max)			
Maximum power handling peak sync	1.4 kW	3.5 kW	4.2 kW	6.5 kW
Maximum power handling RMS	1 kW	2.5 kW	3 kW	4.5 kW
Connector type	DIN 7/16	EIA 7/8"	DIN 13/30	EIA 1 5/8"
Pressurization	Non pressurized	Gas barrier on input connector		

Mechanical & Environmental Specifications		
Materials	Reflector & radiating elements Radome Radome colour	Aluminium (Stainless steel available on request) Fiberglass Red or white on request
Dimensions (W x D x H)	483 x 264 x 983 mm	
Maximum wind speed	220 km/h	
Wind load (front)	743 N (@160 km/h)	
Wind load (lateral)	215 N (@160 km/h)	
Weight	10 kg (model with DIN 7/16 connector)	
Typical mounting	Square arrangement tower	
Vertical spacing	1100 mm	
Grounding	DC grounded	
Temperature range	-40°C to +80°C	
Humidity	100%	

Antenna System Characteristics					
Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (kg)	Wind load (@160 km/h)	System height (mm)
1	2	9.8	20	1.0 kN	1094
	3	8.1	30	1.2 kN	
	4	6.8	40	1.4 kN	
2	2	12.8	40	1.9 kN	2194
	3	11.1	60	2.3 kN	
	4	9.8	80	2.8 kN	
4	2	15.8	80	3.8 kN	4394
	3	14.1	120	4.7 kN	
	4	12.8	160	5.7 kN	
6	2	17.6	120	5.8 kN	6594
	3	15.8	180	7.0 kN	
	4	14.6	240	8.5 kN	
8	2	18.9	160	7.7 kN	8794
	3	17.1	240	9.4 kN	
	4	15.8	320	11.4 kN	



NOTES:

- Table supplies data up to 8 bays only for simplification purposes; systems with more bays are available.
- Null fill, beam tilt, harness & feeder losses NOT INCLUDED.
- Wind load & weight figures without considering cables, splitters & hardware.

The above specifications correspond to the typical 80%H / 20%V polarization ratio

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Band IV/V low power superturnstile antennas Model: AT15-801 / 802

UHF Superturnstile Antennas for TV applications offer a broadband omnidirectional radiation pattern with excellent circularity, combined with a minimum wind load impact on the supporting mast.

These antenna systems are ideal for top-mounting, and they are supplied ready for installation, fully assembled and enclosed in a GRP cylinder.

TV ANTENNA SYSTEMS

Electrical Specifications		
	AT15-801	AT15-802
Frequency range	470-860 MHz	
VSWR	≤ 1.15:1	
Impedance	50 Ohm	
Polarization	Horizontal	
Peak gain (ref. λ/2 dipole)	1 Bay	2 Bays
	5 dBd	8 dBd
3 dB vertical beam width (mid-band)	25°	11°
Maximum power handling RMS	2 kW	4 kW
Connector type ⁽¹⁾	EIA 7/8" female	EIA 1 5/8" female
Pressurization	Not pressurized	

Mechanical & Environmental Specifications		
Materials	Batwings Connectors Isolators Radome	Aluminium Aluminium and brass PTFE Fiberglass
Radome dimensions (Ø X H)	318 x 1200 mm	318 x 2500 mm
Weight	26 Kg	46 Kg
Wind Load @ 160 Km/h	323 N	726 N
Maximum wind speed	220 km/h	
Grounding	DC grounded	
Temperature range	-40°C to +70°C	
Humidity	100%	

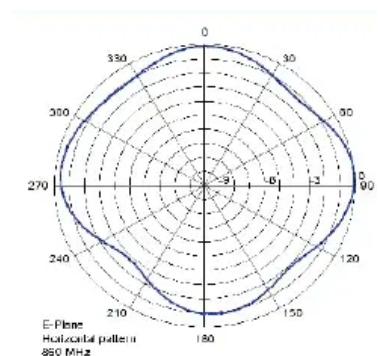
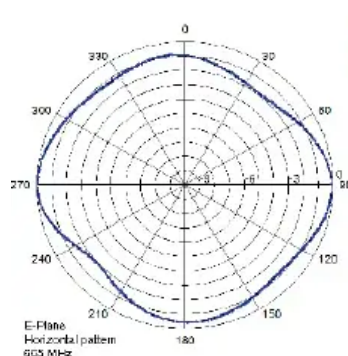
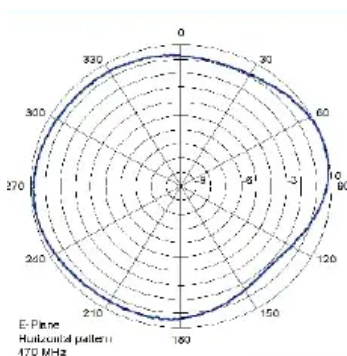


AT15-801 Superturnstile antenna.

NOTES:

(1) Other connector types under request.

Others gain values and power handling can be supplied. Please, ask RYMSA RF.



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Band IV/V slot antennas Suitable for top-mount or side-mount Series: AT15-9XX

TV ANTENNA SYSTEMS

Slot antennas for UHF TV applications are a neat way to provide broadcasting solutions minimizing the visual and mechanical impact over its supporting structure. These antennas are constructed fully enclosed in a cylindrical fiberglass radome, featuring very reduced weight and windload figures, while keeping optimum radioelectrical performances under most severe environmental conditions.

They are ready for installation in top-mount and side-mount configurations, offering a very wide scope of radiating characteristics depending on the polarization (horizontal, circular, elliptical), on the shape of the horizontal radiation pattern, and on the vertical aperture.

AT15-9XX series cover all the possible needs from low power/ low gain solutions up to 16 KW RMS and high gain.

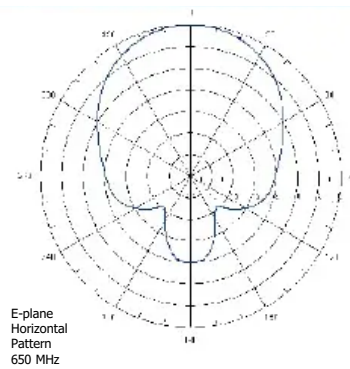
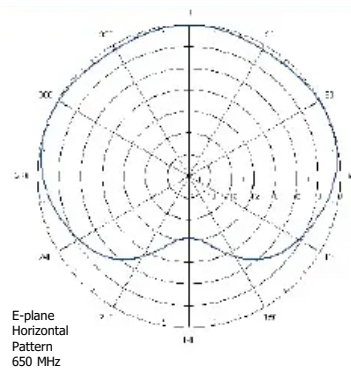
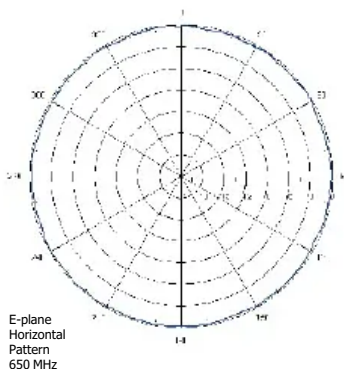
Electrical Specifications	
Frequency range	470-806 MHz
Multichannel versions available	Yes
VSWR	≤ 1.1:1 across a single channel
Polarization	Horizontal / Circular / Elliptical
Beam tilt & Null Fill	Customized under request
Impedance	50 Ohm
Number of bays	From 4 to 24 bays
Maximum power handling peak sync	From 500 W to 25 KW
Maximum power handling RMS	From 350 W to 16 KW
Connector type	EIA 1 5/8" or EIA 3 1/8"



Mechanical & Environmental Specifications	
Radome	Fiberglass (included)
Height (for 4 bays and 24 bays)	From 2400 mm to 13060 mm
Grounding	DC grounded
Temperature range	-40°C to +80°C
Humidity	100%

NOTES:

Note: Mechanical data supplied corresponds to channel 30 FCC. Ask RYMSA RF for others horizontal patterns



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Radio antenna systems

RYMSA RF manufactures a broad range of antennas for the transmission of radio signals in B-II (FM & IBOC) and B-III (DAB).

Antenna systems are currently formed by stacking single radiating elements properly disposed and fed with the adequate phase and amplitude. These unitary radiators can be either directional, as those based on panel or cavity solutions, or dipole-style providing omni or quasi-omnidirectional performances.

RYMSA RF designs the single antenna elements succeeding in the challenge of displaying the necessary ruggedness minimizing wind load and weight, and ready to remain weatherproof for a long life withstanding any sort of extreme climatic conditions. This versatility allows using them also individually for simple needs such as relay sites.

Power dividers and interconnecting lines (both flexible and rigid), are utilized to build the distribution network which transports the signals from the main transmission line up to each radiating element. The very assorted range of different models of these products manufactured by RYMSA RF ensures the capability of satisfying any possible request, from simple arrays to complex high power antenna systems.

RYMSA RF AT12 series offers an extensive range of radiating elements for applications in FM and IBOC radio. Digital radio needs in DAB B-III are covered by AT13 (included at TV Antenna Systems section of this catalog) and AT14 series.

Panel and Cavity Systems

These arrays are the most versatile solution to implement radiation patterns customized to any particular coverage requirement. Ideal for middle to big masts and multichannel operation, they also allow reaching the high power ratings frequently required in those situations. They can be classified as follows:

- **FM and IBOC:** horizontal, vertical and circular polarization panels are provided with several input connector sizes to reach any requested power handling. This assorted range is complemented by the back cavity model for circular polarization. Elliptical polarization is easily achievable as well. Linearly polarized unitary antennas have one input connector, whilst the circularly polarized ones display two and four connectors. Triangular, square and multi-panel arrays can be easily implemented with RYMSA RF AT12 series directional antennas.
- **DAB:** AT13 series panels, included in this catalog at the TV Antenna Systems section, are available for the transmission of digital radio in B-III. A special panel model, with reduced bandwidth just for the DAB range is also available.



FM circularly polarized antenna system built as an array of back-cavity unitary radiators



FM panel antenna for triangular mast assembled in-plant for factory tests

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Band II 2 crossed dipoles cavity Especially suitable for square masts Model: AT12-321

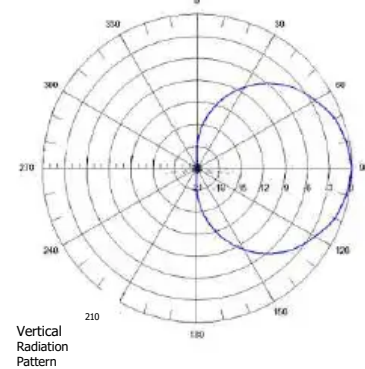
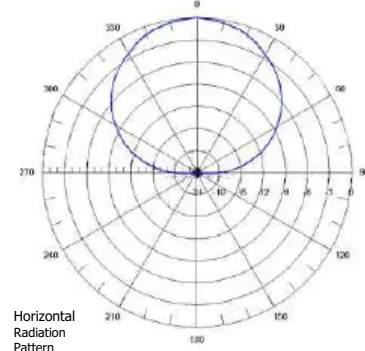
Electrical Specifications			
Frequency Range	87.5-108 MHz		
Peak gain	7.2 dB (ref. $\lambda/2$ dipole)		
3 dB beam width	Horizontal: 68°	Vertical: 68°	
Polarization	Circular / Elliptical		
Impedance	50 Ohm		
VSWR	≤ 1.1:1 (with circular polarization)		
Maximum power handling (per connector)	5 kW (2.5 kW)	10 kW (5 kW)	14 kW (7 kW)
Connector type (2 per antenna)	2 x DIN 7/16	2 x EIA 7/8"	2 x DIN 13/30
Pressurization	Non pressurized	Gas barrier on input connector	
	Fully pressurized as an option		

Mechanical & Environmental Specifications	
Materials	Hot dip galvanized steel
Dimensions (W x D x H)	2700 x 986 x 2700 mm
Maximum wind speed	200 km/h
Wind load (front)	2320 N (@160 km/h)
Wind load (lateral)	1273 N (@160 km/h)
Weight	101 Kg
Typical mounting	Square arrangement tower
Clamp type	To Ø 80 – 115 mm pipe
Vertical spacing	2800 mm
Grounding	DC grounded
Temperature range	-40°C to +80°C
Humidity	100%

Antenna System Characteristics					
Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (Kg)	Wind load (@160 Km/h)	System height (mm)
1	2	5.4	202	3.6 kN	2700
	3	3.7	303	4.9 kN	
	4	2.6	404	6.0 kN	
2	2	8.4	404	7.2 kN	5500
	3	6.7	606	9.7 kN	
	4	5.6	808	12.1 kN	
4	2	11.4	808	14.4 kN	11100
	3	9.7	1212	19.5 kN	
	4	8.6	1616	24.1 kN	
6	2	12.8	1212	21.6 kN	16700
	3	11.5	1818	29.2 kN	
	4	10.4	2424	36.2 kN	
8	2	14.4	1616	28.7 kN	22300
	3	12.7	2424	38.9 kN	
	4	11.6	3232	48.2 kN	



RADIO ANTENNA SYSTEMS



NOTES:

- Table supplies data up to 8 bays only for simplification purposes; systems with more bays are available.
- Null fill, beam tilt, harness & feeder losses NOT INCLUDED.
- Wind load & weight figures without considering cables, splitters & hardware.

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DAB Dipole Antenna Side-Mount Installation Model: AT14-512

Electrical Specifications

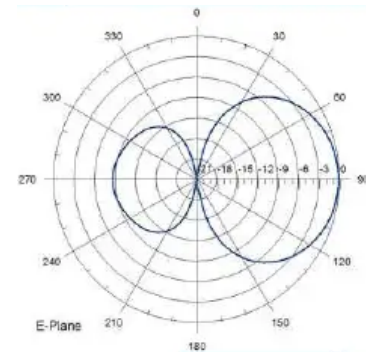
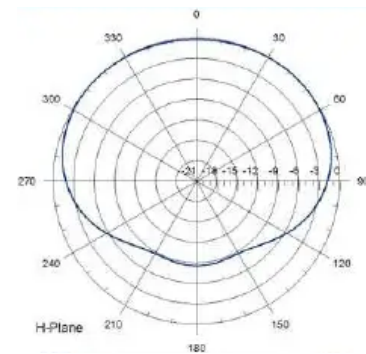
Frequency range	216-240 MHz
Peak gain	0 dB (ref. $\lambda/2$ dipole) 2.2 dB (ref. $\lambda/2$ dipole, with pole)
3 dB beam width	E-plane: 79° H-plane: 200°
Polarization	Vertical
Impedance	50 Ohm
VSWR	$\leq 1.15:1$
Maximum power handling RMS	1.5 kW
Connector type	DIN 7/16
Pressurization	Non pressurized



RADIO ANTENNA SYSTEMS

Mechanical & Environmental Specifications

Materials	Dipole Isolators	Hot dip galvanized steel PTFE
Dimensions (W x D x H)		50 x 690 x 650 mm
Maximum wind speed		200 Km/h
Wind load (front)		38 N (@160 km/h)
Wind load (lateral)		106 N (@160 km/h)
Weight		9 kg
Clamp type		To \varnothing 80 – 100 mm pipe
Vertical spacing		$0.8 \lambda - 0.9 \lambda$ typical
Grounding		DC grounded
Temperature range		-40°C to +80°C
Humidity		100%



Antenna System Characteristics

Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (kg)	Wind load (@160 km/h)	System height (mm)
1	1	2.2	9	0.11 kN	650
2	1	5.2	18	0.21 kN	1768
4	1	8.2	36	0.42 kN	4005
6	1	10.0	54	0.64 kN	6242
8	1	11.2	72	0.85 kN	8479
10	1	12.2	90	1.06 kN	10712
12	1	13.0	108	1.27 kN	12948

NOTES:

- Radiation patterns and gain values at the table are including the effect of supporting pole
- Null fill, beam tilt, harness & feeder losses NOT INCLUDED
- Wind load & weight figures without considering cables, splitters & hardware.

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DAB Dipole Antenna Side-Mount Installation For extreme weather conditions Model: AT14-522

Electrical Specifications

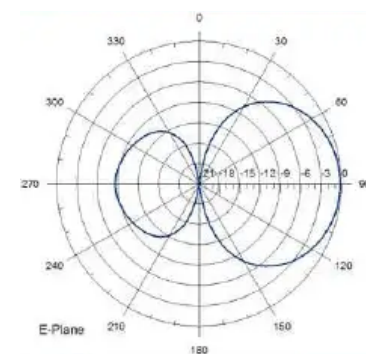
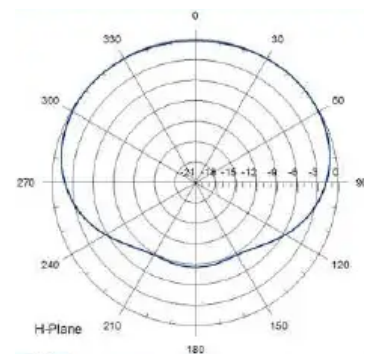
Frequency range	216-240 MHz	
Peak gain	0 dB (ref. $\lambda/2$ dipole) 2.2 dB (ref. $\lambda/2$ dipole, with pole)	
3 dB beam width	E-plane: 79°	H-plane: 200°
Polarization	Vertical	
Impedance	50 Ohm	
VSWR	$\leq 1.2:1$	
Maximum power handling RMS	1.5 kW	
Connector type	DIN 7/16	
Pressurization	Non pressurized	

Mechanical & Environmental Specifications

Materials	Dipole Feed points radome	Hot dip galvanized steel Fiberglass
Dimensions (W x D x H)	50 x 460 x 560 mm	
Maximum wind speed	200 Km/h	
Wind load (front)	38 N (@160 km/h)	
Wind load (lateral)	128 N (@160 km/h)	
Weight	12 Kg	
Clamp type	To \varnothing 80 – 100 mm pipe	
Vertical spacing	0.8 λ – 0.9 λ typical	
Grounding	DC grounded	
Temperature range	-40°C to +80°C	
Humidity	100%	

Antenna System Characteristics

Number of Bays	Number ant. per bay	Peak gain (dBd)	Weight (kg)	Wind load (@160 km/h)	System height (mm)
1	1	2.2	12	0.13 kN	560
2	1	5.2	24	0.26 kN	1678
4	1	8.2	48	0.51 kN	3915
6	1	10.0	73	0.77 kN	6152
8	1	11.2	96	1.02 kN	8389
10	1	12.2	120	1.27 kN	10622
12	1	13.0	144	1.53 kN	12858


 RADIO
ANTENNA
SYSTEMS


NOTES:

- Radiation patterns and gain values at the table are including the effect of supporting pole
- Null fill, beam tilt, harness & feeder losses NOT INCLUDED
- Wind load & weight figures without considering cables, splitters & hardware.

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UHF band IV-V DTV mask filter
Typical power: 150 W digital
Bandpass filter
Model: FLDV-016

Electrical Specifications

Filter type	Bandpass coaxial	
Order	6 poles with internal feedback	
Cavity size	55 mm	
Frequency range	470-862 MHz	
Mask type	Non critical	
Impedance	50 Ohm	
Channel bandwidth	6, 7, 8 MHz	
Maximum power handling ⁽¹⁾	150 W RMS	
Connectors	DIN 7/16 (F)	
VSWR	≤ 1.22:1	
Frequency response ⁽²⁾	474 MHz	858 MHz
f_0	≤ 1.0 dB	≤ 1.2 dB
$f_0 \pm 3.8$ MHz	≤ 1.9 dB	≤ 2.3 dB
$f_0 \pm 4.2$ MHz	> 4 dB	> 4 dB
$f_0 \pm 6$ MHz	> 20 dB	> 20 dB
$f_0 \pm 12$ MHz	> 40 dB	> 40 dB
Group delay variation	≤ 350 ns	
Thermal stability	≤ 2 kHz / °C	



FLDV-016 bandpass filter

DTV UHF MASK FILTERS &

Mechanical & Environmental Specifications

Dimensions (W x D x H)	121 x 290 x 200 mm	
Materials	Outer conductor	Copper
	Inner conductor	Silver plated brass
	Tuning elements	Silver plated brass
	Isolators	PTFE
	Finishing	Long lasting black paint
	Screws	Stainless steel
Temperature range	-10°C to +50°C	

NOTES:

(1): See section Environmental Conditions for an accurate application of power handling data.

(2): Other frequency responses can be supplied. Please, ask RYMSA RF.

The filter can be field returned to any channel within specified band

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UHF band IV-V DTV mask filter
Typical power: 150 W digital
Bandpass filter
Model: FLDV-018

Electrical Specifications

Filter type	Bandpass coaxial	
Order	8 poles with internal feedback	
Cavity size	55 mm	
Frequency range	470-862 MHz	
Mask type	Critical	
Impedance	50 Ohm	
Channel bandwidth	6, 7, 8 MHz	
Maximum power handling ⁽¹⁾	150 W RMS	
Connectors	DIN 7/16 (F)	
VSWR	≤ 1.22:1	
Frequency response ⁽²⁾	474 MHz	858 MHz
f_0	≤ 1.6 dB	≤ 1.9 dB
$f_0 \pm 3.8$ MHz	≤ 2.8 dB	≤ 4.0 dB
$f_0 \pm 4.2$ MHz	> 8 dB	> 8 dB
$f_0 \pm 6$ MHz	> 40 dB	> 40 dB
$f_0 \pm 12$ MHz	> 55 dB	> 50 dB
Group delay variation	≤ 400 ns	
Thermal stability	≤ 2 kHz / °C	



FLDV-018 bandpass filter

DTV UHF MASK FILTERS &

Mechanical & Environmental Specifications

Dimensions (W x D x H)	121 x 345 x 200 mm	
Materials	Outer conductor	Copper
	Inner conductor	Silver plated brass
	Tuning elements	Silver plated brass
	Isolators	PTFE
	Finishing	Long lasting black paint
	Screws	Stainless steel
Temperature range	-10°C to +50°C	

NOTES:

(1): See section Environmental Conditions for an accurate application of power handling data.

(2): Other frequency responses can be supplied. Please, ask RYMSA RF.

The filter can be field retuned to any channel within specified band

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UHF band IV-V DTV mask filter
Typical power: 1.9 kW digital
Bandpass filter
Model: FLDV-116

Electrical Specifications

Filter type	Bandpass coaxial
Order	6 poles with internal feedback
Cavity size	100 mm
Frequency range	470-862 MHz
Mask type	Non critical
Impedance	50 Ohm
Channel bandwidth	6, 7, 8 MHz
Maximum power handling ⁽¹⁾	1900 W RMS
Connectors	DIN 7/16 (F) or 1 5/8" unflanged
VSWR	≤ 1.15:1
Group delay variation	≤ 350 ns
Thermal stability	≤ 2 kHz / °C



FLDV-116 bandpass filter

DTV UHF MASK FILTERS &

Mechanical & Environmental Specifications

Dimensions (W x D x H)	214 x 355 x 401 mm	
Weight	15 kg	
Materials	Outer conductor	Copper
	Inner conductor	Silver plated aluminium and brass
	Tuning elements	Invar and silver plated aluminium and brass
	Isolators	PTFE
	Finishing	Long lasting black paint
	Screws	Stainless steel
Temperature range	-10°C to +50°C	

Frequency Responses ⁽²⁾

Channel bandwidth 8 MHz (typical DVB-T)

	474 MHz	858 MHz
f_0	≤ 0.45 dB	≤ 0.6 dB
$f_0 \pm 3.8$ MHz	≤ 1.0 dB	≤ 1.6 dB
$f_0 \pm 4.2$ MHz	> 4 dB	> 4 dB
$f_0 \pm 6$ MHz	> 20 dB	> 20 dB
$f_0 \pm 12$ MHz	> 40 dB	> 40 dB

Channel bandwidth 6 MHz (typical ATSC)

	473 MHz	803 MHz
f_0	≤ 0.5 dB	≤ 0.7 dB
$f_0 \pm 2.69$ MHz	≤ 0.55 dB	≤ 0.8 dB
$f_0 \pm 3$ MHz	≤ 0.6 dB	≤ 0.85 dB
$f_0 \pm 4$ MHz	> 5.5 dB	> 5.5 dB
$f_0 \pm 5$ MHz	> 18 dB	> 18 dB
$f_0 \pm 6$ MHz	> 30 dB	> 30 dB
$f_0 \pm 9$ MHz	> 64 dB	> 64 dB

NOTES:

(1): See section Environmental Conditions for an accurate application of power handling data.

(2): Other frequency responses can be supplied. Please, ask RYMSA RF.

Optional Accessories

Directional couplers at input and output

Rack mounted

The filter can be field retuned to any channel within specified band

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UHF band IV-V DTV mask filter
Typical power: 1.6 kW digital
Bandpass filter
Model: FLDV-118

Electrical Specifications

Filter type	Bandpass coaxial
Order	8 poles with internal feedback
Cavity size	100 mm
Frequency range	470-862 MHz
Mask type	Critical
Impedance	50 Ohm
Channel bandwidth	6, 7, 8 MHz
Maximum power handling ⁽¹⁾	1600 W RMS
Connectors	DIN 7/16 (F) or 1 5/8" unflanged
VSWR	≤ 1.15:1
Group delay variation	≤ 350 ns
Thermal stability	≤ 2 kHz / °C



FLDV-116 bandpass filter

Mechanical & Environmental Specifications

Dimensions (W x D x H)	214 x 455 x 401 mm	
Weight	21 kg	
Materials	Outer conductor	Copper
	Inner conductor	Silver plated aluminium and brass
	Tuning elements	Invar and silver plated aluminium and brass
	Isolators	PTFE
	Finishing	Long lasting black paint
Screws	Stainless steel	
Temperature range	-10°C to +50°C	

DTV UHF MASK FILTERS &

Frequency Responses ⁽²⁾

Channel bandwidth 8 MHz (typical DVB-T)

	474 MHz	858 MHz
f_0	≤ 0.55 dB	≤ 0.8 dB
$f_0 \pm 3.8$ MHz	≤ 2.10 dB	≤ 3.1 dB
$f_0 \pm 4.2$ MHz	> 15 dB	> 15 dB
$f_0 \pm 6$ MHz	> 40 dB	> 40 dB
$f_0 \pm 12$ MHz	> 60 dB	> 60 dB

Channel bandwidth 6 MHz (typical ISDB-T)

	473 MHz	803 MHz
f_0	≤ 0.65 dB	≤ 1.0 dB
$f_0 \pm 2.79$ MHz	≤ 2.10 dB	≤ 2.6 dB
$f_0 \pm 3.15$ MHz	> 15 dB	> 15 dB
$f_0 \pm 4.5$ MHz	> 35 dB	> 35 dB
$f_0 \pm 9$ MHz	> 60 dB	> 60 dB

NOTES:

(1): See section Environmental Conditions for an accurate application of power handling data.

(2): Other frequency responses can be supplied. Please, ask RYMSA RF.

Optional Accessories

Directional couplers at input and output
Rack mounted

The filter can be field returned to any channel within specified band

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UHF band IV-V DTV mask filter
Typical power: 3.5 - 6 kW digital
Bandpass filter
Model: FLDV-156

Electrical Specifications	
Filter type	Bandpass coaxial
Order	6 poles with internal feedback
Cavity size	150 mm
Frequency range	470-862 MHz
Mask type	Non critical
Impedance	50 Ohm
Channel bandwidth	6, 7, 8 MHz
Maximum power handling ⁽¹⁾	
Without liquid cooling	3500 W (8 MHz bandwidth) 3000 W (6 MHz bandwidth)
With optional liquid cooling	6000 W (8 MHz bandwidth) 4700 W (6 MHz bandwidth)
Connectors	Unflanged 1 5/8"
VSWR	≤ 1.15:1
Group delay variation	≤ 350 ns
Thermal stability	≤ 2 kHz / °C



FLDV-156 bandpass filter

Mechanical & Environmental Specifications		
Dimensions (W x D x H)	320 x 522 x 407 mm	
Weight	27 kg	
Materials	Outer conductor	Copper
	Inner conductor	Silver plated aluminium and brass
	Tuning elements	Invar and silver plated aluminium and brass
	Isolators	PTFE
	Finishing	Long lasting black paint
Screws	Stainless steel	
Temperature range	-10°C to +50°C	

Frequency Responses ⁽²⁾		
Channel bandwidth 8 MHz (typical DVB-T)		
	474 MHz	858 MHz
f_0	≤ 0.3 dB	≤ 0.35 dB
$f_0 \pm 3.8$ MHz	≤ 0.7 dB	≤ 0.9 dB
$f_0 \pm 4.2$ MHz	> 4 dB	> 4 dB
$f_0 \pm 6$ MHz	> 20 dB	> 20 dB
$f_0 \pm 12$ MHz	> 40 dB	> 40 dB
Channel bandwidth 6 MHz (typical ATSC)		
	473 MHz	803 MHz
f_0	≤ 0.35 dB	≤ 0.4 dB
$f_0 \pm 2.69$ MHz	≤ 0.50 dB	≤ 0.55 dB
$f_0 \pm 3$ MHz	≤ 0.55 dB	≤ 0.65 dB
$f_0 \pm 4$ MHz	> 5.5 dB	> 5.5 dB
$f_0 \pm 5$ MHz	> 20 dB	> 20 dB
$f_0 \pm 6$ MHz	> 35 dB	> 35 dB
$f_0 \pm 9$ MHz	> 64 dB	> 55 dB

Optional Accessories
Integrated stainless steel cold plate for liquid cooling
Directional couplers at inputs and output
Unflanged to flanged adapters at input and output
Rack mounted

The filter can be field returned to any channel within specified band

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NOTES:

(1): See section Environmental Conditions for an accurate application of power handling data.

(2): Other frequency responses can be supplied. Please, ask RYMSA RF.

DTV UHF MASK FILTERS &



UHF band IV-V DTV mask filter
Typical power: 2.5 - 4.7 kW digital
Bandpass filter
Model: FLDV-158

Electrical Specifications	
Filter type	Bandpass coaxial
Order	8 poles with internal feedback
Cavity size	150 mm
Frequency range	470-862 MHz
Mask type	Critical
Impedance	50 Ohm
Channel bandwidth	6, 7, 8 MHz
Maximum power handling ⁽¹⁾	
Without liquid cooling	2500 W (6 & 8 MHz bandwidth)
With optional liquid cooling	4700 W (8 MHz bandwidth) 3000 W (6 MHz bandwidth)
Connectors	Unflanged 1 5/8"
VSWR	≤ 1.15:1
Group delay variation	≤ 600 ns
Thermal stability	≤ 2 kHz / °C



FLDV-158 bandpass filter

DTV UHF MASK FILTERS &

Mechanical & Environmental Specifications		
Dimensions (W x D x H)	320 x 672 x 407 mm	
Weight	39 kg	
Materials	Outer conductor	Copper
	Inner conductor	Silver plated aluminium and brass
	Tuning elements	Invar and silver plated aluminium and brass
	Isolators	PTFE
	Finishing	Long lasting black paint
	Screws	Stainless steel
Temperature range	-10°C to +50°C	

Frequency Responses ⁽²⁾		
Channel bandwidth 8 MHz (typical DVB-T)		
	474 MHz	858 MHz
f_0	≤ 0.5 dB	≤ 0.6 dB
$f_0 \pm 3.8$ MHz	≤ 1.4 dB	≤ 1.8 dB
$f_0 \pm 4.2$ MHz	> 13 dB	> 14 dB
$f_0 \pm 6$ MHz	> 30 dB	> 30 dB
$f_0 \pm 12$ MHz	> 55 dB	> 55 dB
Channel bandwidth 6 MHz (typical ISDB-T)		
	473 MHz	803 MHz
f_0	≤ 0.55 dB	≤ 0.75 dB
$f_0 \pm 2.79$ MHz	≤ 1.6 dB	≤ 2.00 dB
$f_0 \pm 3.15$ MHz	> 15 dB	> 15 dB
$f_0 \pm 4.5$ MHz	> 30 dB	> 30 dB
$f_0 \pm 9$ MHz	> 55 dB	> 55 dB

Optional Accessories
Integrated stainless steel cold plate for liquid cooling
Directional couplers at input and output
Unflanged to flanged adapters at input and output
Rack mounted

NOTES:

(1): See section Environmental Conditions for an accurate application of power handling data.

(2): Other frequency responses can be supplied. Please, ask RYMSA RF.

The filter can be field returned to any channel within specified band

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UHF band IV-V DTV mask channel combiner
Typical power: 300 W digital NB input
Constant impedance diplexer
Model: DPDV-018

Electrical Specifications

Filter type	FLDV-018 (55 mm)	
Order of the bandpass filter	8 poles with internal feedback	
Frequency range	470-862 MHz	
Type	Constant impedance	
Impedance	50 Ohm	
Minimum channel spacing	≥ 0	
Max. power handling (NB/WB/Output) ⁽¹⁾	0.3 / 1.1 / 1.1 kW RMS	
Connectors (NB/WB/Output)	DIN 7/16 (F)	
Channel bandwidth	6, 7, 8 MHz	
VSWR	≤ 1.15:1	
Frequency response (1)	474 MHz	858 MHz
f_0	≤ 1.7 dB	≤ 2.0 dB
$f_0 \pm 3.8$ MHz	≤ 2.9 dB	≤ 4.1 dB
$f_0 \pm 4.2$ MHz	> 8 dB	> 8 dB
$f_0 \pm 6$ MHz	> 40 dB	> 30 dB
$f_0 \pm 12$ MHz	>55 dB	> 50 dB
Isolation	≥ 30 dB	
Group delay variation	≤ 400 ns	
Thermal stability	≤ 2 kHz / °C	

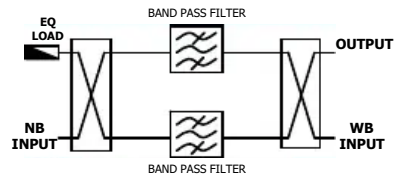


DPDV-018 constant impedance 8 poles channel combiner

DTV UHF MASK FILTERS &

Mechanical & Environmental Specifications

Dimensions (W x D x H)	483 x 460 x 130 mm	
Materials	Outer conductor	Copper and brass
	Inner conductor	Silver plated brass
	Tuning elements	Silver plated brass
	Isolators	PTFE
	Finishing	Chromatized plating & long lasting black paint
	Screws	Stainless steel
Temperature range	-10°C to +50°C	



CONSTANT IMPEDANCE CONFIGURATION

NOTES:

- (1): See section Environmental Conditions for an accurate application of power handling data.
- (2): Typical specifications for adjacent channel. Ask RYMSA RF for other cases.

Optional Accessories

Directional couplers and/or fine matchers at inputs and output

The combiner can be field retuned to any frequency within specified band

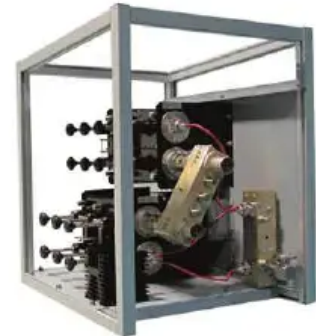
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UHF band IV-V DTV mask channel combiner
Typical power: 1.2 kW, 2 kW digital NB input
Constant impedance diplexer
Models: DPDV-116, DPDV-146, DPDV-146HP, DPDV-1462EHP

Electrical Specifications	
Filter type	FLDV-116 (100 mm)
Order of the bandpass filter	6 poles with internal feedback
Frequency range	470-862 MHz
Type	Constant impedance
Impedance	50 Ohm
Minimum channel spacing	≥ 0
Max. power handling (NB/WB/Output) ⁽¹⁾	
DPDV-116	1.2/1.2/1.2 kW RMS
DPDV-146	1.2/2.3/3.5 kW RMS
DPDV-146HP	1.2/5/5 kW RMS
DPDV-1462EHP	2/5/5 kW RMS
Connectors (NB/WB/Output)	
DPDV-116	DIN 7/16(F) / DIN 7/16(F) / DIN 7/16(F)
DPDV-146, DPDV-146HP	DIN 7/16(F) / 1 5/8"unflanged / 1 5/8"unflanged
DPDV-1462EHP	EIA 7/8"(M) / 1 5/8"unflanged / 1 5/8"unflanged
Channel bandwidth	6, 7, 8 MHz
VSWR	≤ 1.10:1
Isolation	≥ 35 dB
Group delay variation	≤ 350 ns
Thermal stability	≤ 2 kHz / °C

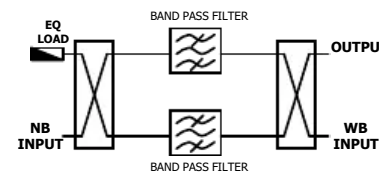


DPDV-1462EHP constant impedance 6 poles channel combiner

DTV UHF MASK FILTERS &

Mechanical & Environmental Specifications		
Dimensions (W x D x H)	483 x 423 x 448 mm	
Materials	Outer conductor	Copper (filters), Aluminium (rest)
	Inner conductor	Silver plated aluminium and brass
	Tuning elements	Invar, silver plated aluminium and brass
	Isolators	PTFE
	Finishing	Chromatized plating & long lasting paint
	Screws	Stainless steel
Temperature range	-10°C to +50°C	

Frequency Responses		
Channel bandwidth 8 MHz (typical DVB-T) ⁽²⁾		
	474 MHz	858 MHz
f ₀	≤ 0.5 dB	≤ 0.65 dB
f ₀ ± 3.8 MHz	≤ 1.1 dB	≤ 1.6 dB
f ₀ ± 4.2 MHz	> 4 dB	> 4 dB
f ₀ ± 6 MHz	> 20 dB	> 20 dB
f ₀ ± 12 MHz	> 40 dB	> 40 dB
Channel bandwidth 6 MHz (typical ATSC) ⁽²⁾		
	473 MHz	803 MHz
f ₀	≤ 0.55 dB	≤ 0.75 dB
f ₀ ± 2.69 MHz	≤ 0.6 dB	≤ 0.85 dB
f ₀ ± 3 MHz	≤ 0.65 dB	≤ 0.9 dB
f ₀ ± 4 MHz	> 5.5 dB	> 5.5 dB
f ₀ ± 5 MHz	> 18 dB	> 18 dB
f ₀ ± 6 MHz	> 30 dB	> 30 dB
f ₀ ± 9 MHz	> 64 dB	> 64 dB



CONSTANT IMPEDANCE CONFIGURATION

Optional Accessories	
Directional couplers and/or fine matcher at inputs and output	
Unflanged to flanged adapters at output	

The combiner can be field returned to any frequency within specified band

NOTES:

(1): See section Environmental Conditions for an accurate application of power handling data. Other narrowband input power handlings with the same filter type can be used. Please, ask RYMSA RF.

(2): Typical specifications for non adjacent channel. Ask RYMSA RF for other cases.

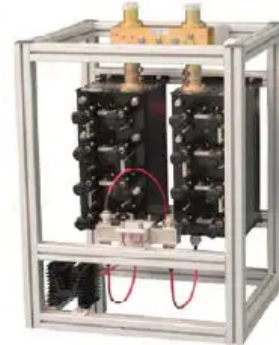
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UHF band IV-V DTV mask channel combiner
Typical power: 1.2 kW, 2kW digital NB input
Constant impedance diplexer
Models: DPDV-118, DPDV-148, DPDV-148HP, DPDV-1482EHP

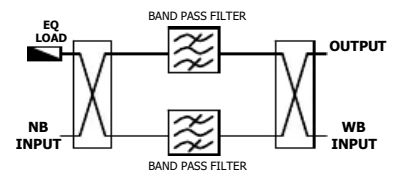
Electrical Specifications	
Filter type	FLDV-118 (100 mm)
Order of the bandpass filter	8 poles with internal feedback
Frequency range	470-862 MHz
Type	Constant impedance
Impedance	50 Ohm
Minimum channel spacing	≥ 0
Max. power handling (NB/WB/Output) ⁽¹⁾	
DPDV-118	1.2/1.2/1.2 kW RMS
DPDV-148	1.2/2.3/3.5 kW RMS
DPDV-148HP	1.2/5/5 kW RMS
DPDV-1482EHP	2/5/5 kW RMS
Connectors (NB/WB/Output)	
DPDV-118	DIN 7/16(F) / DIN 7/16(F) / DIN 7/16(F)
DPDV-148, DPDV-148HP	DIN 7/16(F) / 1 5/8"unflanged / 1 5/8"unflanged
DPDV-1482EHP	EIA 7/8"(M) / 1 5/8"unflanged / 1 5/8"unflanged
Channel bandwidth	6, 7, 8 MHz
VSWR	≤ 1.10:1
Isolation	≥ 35 dB
Group delay variation	≤ 450 ns
Thermal stability	≤ 2 kHz / °C



DPDV-148 Constant impedance 8 poles channel combiner

DTV UHF MASK FILTERS &

Mechanical & Environmental Specifications		
Dimensions (W x D x H)	610 x 575 x 900 mm	
Materials	Outer conductor	Copper (filters), Aluminium (rest)
	Inner conductor	Silver plated aluminium and brass
	Tuning elements	Invar, silver plated aluminium and brass
	Isolators	PTFE
	Finishing	Chromatized plating & long lasting paint
Screws	Stainless steel	
Temperature range	-10°C to +50°C	



CONSTANT IMPEDANCE CONFIGURATION

Frequency Responses		
Channel bandwidth 8 MHz (typical DVB-T) ⁽²⁾		
	474 MHz	858 MHz
f ₀	≤ 0.60 dB	≤ 0.85 dB
f ₀ ± 3.8 MHz	≤ 2.15 dB	≤ 3.15 dB
f ₀ ± 4.2 MHz	> 15 dB	> 15 dB
f ₀ ± 6 MHz	> 40 dB	> 40 dB
f ₀ ± 12 MHz	> 55 dB	> 55 dB
Channel bandwidth 6 MHz (typical ISDB-T) ⁽²⁾		
	473 MHz	803 MHz
f ₀	≤ 0.70 dB	≤ 1.05 dB
f ₀ ± 2.79 MHz	≤ 2.15 dB	≤ 2.65 dB
f ₀ ± 3.15 MHz	> 15 dB	> 15 dB
f ₀ ± 4.5 MHz	> 35 dB	> 35 dB
f ₀ ± 9 MHz	> 60 dB	> 60 dB

NOTES:

(1): See section Environmental Conditions for an accurate application of power handling data. Other narrowband input power handlings with the same filter type can be used. Please, ask RYMSA RF.

(2): Typical specifications for non adjacent channel. Ask RYMSA RF for other cases.

Optional Accessories
Directional couplers and/or fine matcher at inputs and output
Unflanged to flanged adapters at output

The combiner can be field retuned to any frequency within specified band

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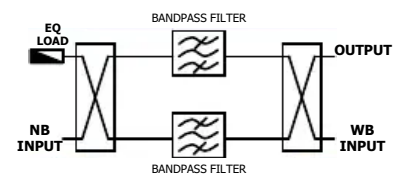
VHF band I non mask channel combiner
Typical power : 5 + 10 kW, 20 + 20 kW
Constant impedance diplexer
Models: DP11-230, DP11-240

Electrical Specifications		
Order of the bandpass filters	4	5
Frequency range	54-88 MHz	
Type	Constant impedance	
Impedance	50 Ohm	
Minimum frequency spacing	1 channel guard	Channel 4-5
Max. power handling (NB/WB/Output)		
DP11-230	10/10/15 kW peak sync	
DP11-240	20/20/40 kW peak sync	
Input connectors (NB/WB)		
DP11-230	Unflanged 1 5/8"	
DP11-240	Unflanged 3 1/8"	
Output connector		
DP11-230	Unflanged 1 5/8"	
DP11-240	Unflanged 3 1/8"	
Channel bandwidth	6 MHz	
VSWR	Narrowband input	≤ 1.08:1
	Wideband input	≤ 1.10:1
Insertion loss	Narrowband input	≤ 0.2 dB
	Wideband input	≤ 0.1 dB
Isolation	NB input to WB input	≥ 35 dB
	WB input to NB input	≥ 40 dB
Thermoswitch at EQ load	Yes	

DP11-230 4th order channel combiner

TV NON MASK COMBINERS

Mechanical & Environmental Specifications		
Order of the bandpass filters	4	5
Dimensions (W x D x H)		
DP11-230	1350x1490x1300mm	1350x1690x1300mm
DP11-240	1350x1690x1300mm	1350x1890x1300mm
Materials	Outer conductor	Aluminium
	Inner conductor	Aluminium
	Tuning elements	Aluminium
	Isolators	PTFE
	Finishing	Chromatized plating & long lasting black paint
Screws	Stainless steel	
Temperature range	-10°C to +50°C	



CONSTANT IMPEDANCE CONFIGURATION

Optional Accessories	
Unflanged to flanged adapter at inputs and output	
Directional couplers at inputs and output ^o	

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VHF band I non mask channel combiner
Typical power: 20 + 40 kW, 40 + 80 kW
Constant impedance diplexer
Models: DP11-440, DP11-470

Electrical Specifications

Order of the bandpass filters	3	4
Frequency range	54-88 MHz	
Type	Constant impedance	
Impedance	50 Ohm	
Minimum frequency spacing	1 channel	Channel 4-5
Max. power handling (NB/WB/Output)	40/60/60 kW peak sync 40/120/120 kW peak sync	
Input connectors (NB/WB)	Unflanged 3 1/8"	
Output connector	Unflanged 6 1/8"	
Channel bandwidth	6 MHz	
VSWR	Narrowband input	≤ 1.08:1
	Wideband input	≤ 1.10:1
Insertion loss	Narrowband input	≤ 0.2 dB
	Wideband input	≤ 0.1 dB
Isolation	NB input to WB input	≥ 35 dB
	WB input to NB input	≥ 40 dB
Thermoswitch at EQ load	Yes	



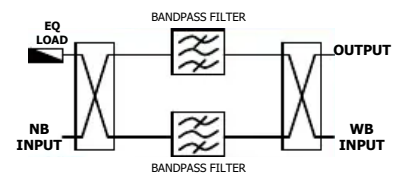
DP11-440 3rd order channel combiner

Mechanical & Environmental Specifications

Order of the bandpass filters	3	4
Dimensions (W x D x H)	3150x1420x1900mm	3800x1420x1900mm
Materials	Outer conductor	Aluminium
	Inner conductor	Silver plated aluminium
	Tuning elements	Aluminium
	Isolators	PTFE
	Finishing	Chromatized plating & long lasting black paint
	Screws	Stainless steel
Temperature Range	-10°C to +50°C	

Optional Accessories

- Unflanged to flanged adapter at inputs and output
- Directional couplers at inputs and output



CONSTANT IMPEDANCE CONFIGURATION

TV NON MASK COMBINERS

VHF band III non mask channel combiner
Typical power: 500 + 500 W
Constant impedance diplexer
Model: DP13-930

Electrical Specifications

Order of the bandpass filters	5	
Frequency range	174 - 230 MHz	
Type	Constant impedance	
Impedance	50 Ohm	
Recommended minimum freq. spacing	1 guard channel	
Max. power handling (NB/WB/Output)	500/500/1000 W peak sync 350/350/700 W RMS	
Input connectors (NB/WB)	EIA 7/8"	
Output connector	EIA 7/8"	
Channel bandwidth	7 MHz	
VSWR	Narrowband input	≤ 1.08:1
	Wideband input	≤ 1.15:1
Insertion loss	Narrowband input	≤ 0.7 dB
	Wideband input	≤ 0.2 dB
Isolation	NB input to WB input	≥ 35 dB
	WB input to NB input	≥ 40 dB

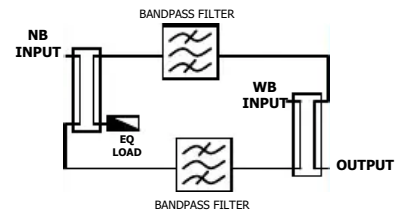


Mechanical & Environmental Specifications

Dimensions (W x D x H)	470 x 641 x 448 mm	
Materials	Outer conductor	Aluminium
	Inner conductor	Silver plated aluminium and brass
	Tuning elements	Aluminium
	Isolators	PTFE
	Finishing	Chromatized plating
	Screws	Stainless steel
Temperature range	-10°C to +50°C	

TV NON MASK COMBINERS

The combiner can be field retuned to any channel within specified band



CONSTANT IMPEDANCE CONFIGURATION

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VHF band III non mask channel combiner
Typical power: 5 + 5 kW, 10 + 30 kW
Constant impedance diplexer
Model: DP13-230, DP13-240

Electrical Specifications

Order of the bandpass filters	4	
Frequency range	174 - 230 MHz	
Type	Constant impedance	
Impedance	50 Ohm	
Recommended minimum freq. spacing	1 guard channel	
Max. power handling (NB/WB/Output)		
DP13-230	10/10/10 kW peak sync, 7/7/7 RMS	
DP13-240	10/30/40 kW peak sync, 7/21/28 RMS	
Input connectors (NB/WB)		
DP13-230	Unflanged 1 5/8" / Unflanged 1 5/8"	
DP13-240	Unflanged 1 5/8" / Unflanged 3 1/8"	
Output connector		
DP13-230	Unflanged 1 5/8"	
DP13-240	Unflanged 3 1/8"	
Channel bandwidth	6 MHz / 7 MHz / 8 MHz	
VSWR	Narrowband input	≤ 1.08:1
	Wideband input	≤ 1.10:1
Insertion loss	Narrowband input	≤ 0.25 dB
	Wideband input	≤ 0.2 dB
Isolation	NB input to WB input	≥ 35 dB
	WB input to NB input	≥ 40 dB
Thermoswitch at EQ load	Yes	



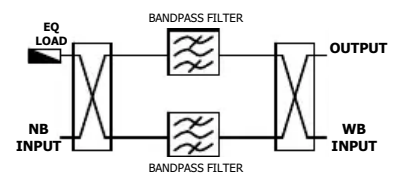
DP13-230 channel combiner

Mechanical & Environmental Specifications

Dimensions (W x D x H)	DP13-230	430 x 665 x 1570 mm
	DP13-240	430 x 665 x 1730 mm
Materials	Outer conductor	Aluminium
	Inner conductor	Silver plated aluminium
	Tuning elements	Aluminium
	Isolators	PTFE
	Finishing	Chromatized plating & long lasting black paint
Screws	Stainless steel	
Temperature range	-10°C to +50°C	

Optional Accessories

- Directional couplers at inputs and output
- Unflanged to flanged adapters at inputs and output



CONSTANT IMPEDANCE CONFIGURATION

The combiner can be field returned to any channel within specified band

TV NON MASK COMBINERS

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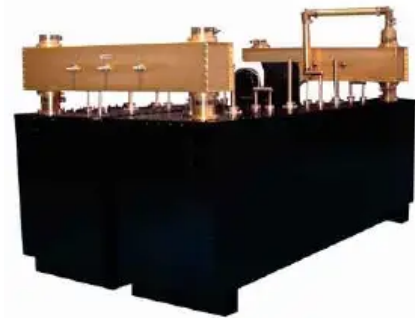
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VHF band III non mask channel combiner
Typical power: 20 + 20 kW, 40 + 80 kW
Constant impedance diplexer
Model: DP13-440, DP13-470

Electrical Specifications

Order of the bandpass filters	4	
Frequency range	174 - 230 MHz	
Type	Constant impedance	
Impedance	50 Ohm	
Recommended minimum freq. spacing	1 guard channel	
Max. power handling (NB/WB/Output)		
DP13-440	20/40/40 kW peak sync, 14/28/28 RMS	
DP13-470	40/80/120 kW peak sync, 28/56/84 RMS	
Input connectors (NB/WB)		
DP13-440	Unflanged 3 1/8" / Unflanged 3 1/8"	
DP13-470	Unflanged 3 1/8" / Flanged 6 1/8"	
Output connector		
DP13-440	Unflanged 3 1/8"	
DP13-470	Flanged 6 1/8"	
Channel bandwidth	6 MHz / 7 MHz / 8 MHz	
VSWR	Narrowband input	≤ 1.08:1
	Wideband input	≤ 1.10:1
Insertion loss	Narrowband input	≤ 0.2 dB
	Wideband input	≤ 0.1 dB
Isolation	NB input to WB input	≥ 35 dB
	WB input to NB input	≥ 40 dB
Thermoswitch at EQ load	Yes	



DP13-440 channel combiner

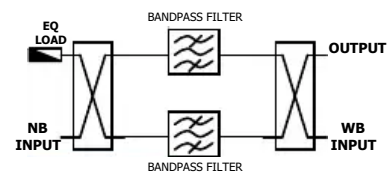
Mechanical & Environmental Specifications

Dimensions (W x D x H)	DP13-440	955 x 1620 x 1110 mm
	DP13-470	955 x 1620 x 1350 mm
Materials	Outer conductor	Aluminium
	Inner conductor	Silver plated aluminium
	Tuning elements	Aluminium
	Isolators	PTFE
	Finishing	Chromatized plating & long lasting black paint
	Screws	Stainless steel
Temperature range	-10°C to +50°C	

TV NON MASK COMBINERS

Optional Accessories

- Directional couplers at inputs and output
- Unflanged to flanged adapters at inputs and output



CONSTANT IMPEDANCE CONFIGURATION

The combiner can be field retuned to any channel within specified band

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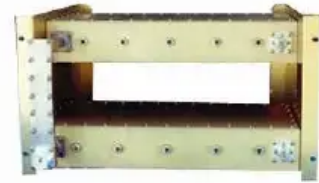
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VHF band III non mask channel combiner
Typical power: 2 x 250 W
Star-point diplexer
Model: DP13-911, DP13-931

Electrical Specifications

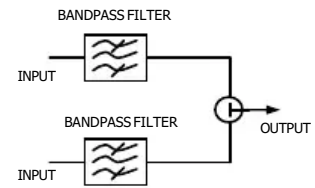
Order of the bandpass filters	5
Frequency range	174 - 230 MHz
Type	Star-point
Impedance	50 Ohm
Recommended minimum freq. spacing	2 guard channels
Maximum power handling	2 x 250 W peak sync, 2 x 175 W RMS
Input connectors (NB/WB)	
DP13-911	N (F)
DP13-931	Flanged 7/8"
Output connector	
DP13-911	DIN 7/16 (F)
DP13-931	Flanged 7/8"
Channel bandwidth	7 MHz
VSWR	≤ 1.08:1
Insertion loss	≤ 0.7 dB
Isolation between inputs	≥ 35 dB



DP13-911 channel combiner

Mechanical & Environmental Specifications

Dimensions (W x D x H)	266 x 360 x 482 mm	
Materials	Outer conductor	Aluminium
	Inner conductor	Silver plated aluminium and brass
	Tuning elements	Silver plated brass
	Isolators	PTFE
	Finishing	Chromatized plating
	Screws	Stainless steel
Temperature range	-10°C to +50°C	



STAR POINT CONFIGURATION

TV NON MASK COMBINERS

The combiner can be field returned to any channel within specified band

UHF band IV-V non mask channel combiner
Typical power: 50 + 300 W
Constant impedance diplexer
Model: DP15-02A

Electrical Specifications		
Order of the band-pass filter	4	
Frequency range	470-862 MHz	
Type	Constant impedance	
Impedance	50 Ohm	
Recommended min. frequency spacing	1 guard channel	
Max. power handling (NB/WB/Output)	70/300/300 W peak sync 50/200/200 W RMS	
Input connectors	N (F)	
Output connector	N (F)	
Channel bandwidth	6, 7, 8 MHz	
VSWR	Narrowband input	≤ 1.06
	Wideband input	≤ 1.10:1
Insertion loss	Narrowband input (1)	≤ 0.9 dB
	Wideband input	≤ 0.05 dB
Isolation	Narrowband input	≥ 30 dB
	Wideband input	≥ 30 dB

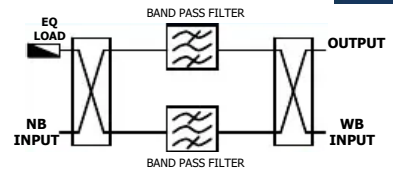


Constant Impedance 4 poles filter tetraplexer (including structure to install in a 19" rack and measurement coupler at the output)

Mechanical & Environmental Specifications		
Dimensions (W x D x H)	252 x 43 x 152 mm	
Materials	Outer conductor	Aluminium
	Inner conductor	Silver plated aluminium
	Tuning elements	Silver plated aluminium
	Isolators	PTFE
	Finishing	Long lasting black paint
Screws	Stainless steel	
Temperature range	-10°C to +50°C	

Optional Accessories
Directional couplers and/or fine matcher at inputs and output
Structure to install in a 19" rack

TV NON MASK COMBINERS



CONSTANT IMPEDANCE CONFIGURATION

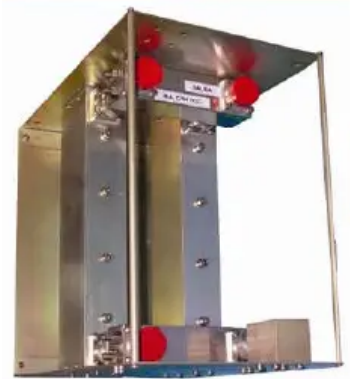
NOTES:

(1): Typical specifications for 8 MHz channels. Ask RYMSA RF for other cases.

UHF band IV-V non mask channel combiner
Typical power: 200 + 800 W
Constant impedance diplexer
Model: DP15-12A

Electrical Specifications

Order of the bandpass filter	4	
Frequency range	470-862 MHz	
Type	Constant impedance	
Impedance	50 Ohm	
Minimum frequency spacing (1)	2 guard channels	
Max. power handling (NB/WB/Output)	400/800/1200 W peak sync 280/560/840 W RMS	
Input connectors (2)	DIN 7/16 (F)	
Output connector (2)	DIN 7/16 (F)	
Channel bandwidth	6, 7, 8 MHz	
VSWR	Narrowband input	≤ 1.07:1
	Wideband input	≤ 1.20:1 (typical ≤ 1.1:1)
Insertion loss	Narrowband input (3)	≤ 1.2 dB (typical ≤ 0.7 dB)
	Wideband input	≤ 0.2 dB
Isolation	Narrowband input	≥ 26 dB
	Wideband input	≥ 35 dB

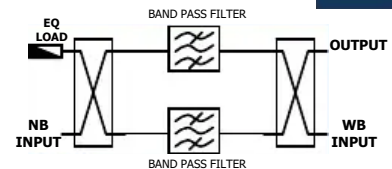


DP15-12A 4th order Channel Combiner

Mechanical & Environmental Specifications

Dimensions (W x D x H)	220 x 352 x 315 mm	
Materials	Outer conductor	Aluminium and brass
	Inner conductor	Silver plated brass
	Tuning elements	Silver plated brass
	Isolators	PTFE
	Finishing	Chromatized plating
	Screws	Stainless steel
Temperature range	-10°C to +50°C	

The combiner can be field returned to any channel within specified band



CONSTANT IMPEDANCE CONFIGURATION

NOTES:

- (1): Less than two channels frequency spacing can be achieved by sacrificing the transmission response figures.
- (2): N (F) connector available.
- (3): Typical specifications for 8 MHz channels. Ask RYMSA RF for other cases.

TV NON MASK COMBINERS

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FM band II channel combiner
Typical power: 10 + 30 kW, 10 + 60 kW
Constant impedance diplexer
Model: DP12-430, DP12-460

Electrical Specifications

Order of the bandpass filters	2	3	4
Frequency range	87.5-108 MHz		
Type	Constant impedance		
Impedance	50 Ohm		
Recommended minimum freq. spacing (1)	1.2 MHz	0.9 MHz	0.7 MHz
Max. power handling (NB/WB/Output)			
DP12-430	12/40/40 kW		
DP12-460	12/70/70 kW		
Input connectors (NB/WB)			
DP12-430	Unflanged 1 5/8" / Unflanged 3 1/8"		
DP12-460	Unflanged 1 5/8" / Unflanged 4 1/2"		
Output connector			
DP12-430	Unflanged 3 1/8"		
DP12-460	Unflanged 4 1/2"		
VSWR	≤ 1.05:1 at carrier fc		
Narrowband input	≤ 1.10:1		
Wideband input			
Insertion loss	≤ 0.20dB (fc) ≤ 0.26dB (fc) ≤ 0.32dB (fc)		
Narrowband input	≤ 0.1 dB		
Wideband input	≥ 40 dB		
NB input to WB input	≥ 50 dB		
Isolation	≥ 50 dB		
WB input to NB input			
Group delay at fc ± 150 kHz	≤ 50 ns	≤ 80 ns	≤ 100 ns
Thermoswitch at EQ load	Yes		

DP12-430 3rd order channel combiner



Mechanical & Environmental Specifications

Order of the bandpass filters	2	3	4
Dimensions DP12-430 (W x D x H)	1052 x 985 x 1520 mm	1052 x 1445 x 1520 mm	1052 x 1905 x 1520 mm
Dimensions DP12-460 (W x D x H)	1052 x 985 x 1520 mm	1052 x 1445 x 1520 mm	1052 x 1905 x 1520 mm
Materials	Aluminium		
Outer conductor	Aluminium		
Inner conductor	Silver plated aluminium		
Tuning elements	Invar and silver plated aluminium		
Isolators	PTFE		
Finishing	Chromatized plating & long lasting black paint		
Screws	Stainless steel		
Temperature range	-10°C to +50°C		

CONSTANT IMPEDANCE CONFIGURATION

RADIO COMBINERS

NOTES:

- (1): Each model can achieve a narrower channel spacing than the one specified, by sacrificing the transmission response figures. 0.5 MHz spacing available with 4th order and inter-cavity feedback.
- (2): The use of an extra filter connected to the wideband input enhances the isolation between inputs, thus reducing the possible generation of inter-mod products.

Optional Accessories

- Directional couplers at inputs and output
- Unflanged to flanged adapters at inputs and output
- Bandpass filter on wideband input (2)

The combiner can be field retuned to any frequency within specified band

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FM band II channel combiner
Typical power: 20 + 20 kW, 20 + 50 kW
Constant impedance diplexer
Model: DP12-440, DP12-450

Electrical Specifications

Order of the bandpass filters	2	3	4
Frequency range	87.5-108 MHz		
Type	Constant impedance		
Impedance	50 Ohm		
Recommended minimum freq. spacing (1)	1.2 MHz	0.9 MHz	0.7 MHz
Max. power handling (NB/WB/Output)			
DP12-440	25/40/40 kW		
DP12-450	25/70/70 kW		
Input connectors (NB/WB)			
DP12-440	Unflanged 3 1/8" / Unflanged 3 1/8"		
DP12-450	Unflanged 3 1/8" / Unflanged 4 1/2"		
Output connector			
DP12-440	Unflanged 3 1/8"		
DP12-450	Unflanged 4 1/2"		
VSWR	Narrowband input	≤ 1.05:1 at carrier fc	
	Wideband input	≤ 1.10:1	
Insertion loss	Narrowband input	≤ 0.20dB(fc)	≤ 0.26dB(fc)
	Wideband input	≤ 0.1 dB	
Isolation	NB input to WB input	≥ 40 dB	
	WB input to NB input	≥ 50 dB	
Group delay at fc ± 150 kHz	≤ 50 ns	≤ 80 ns	≤ 100 ns
Thermoswitch at EQ load	Yes		

DP12-440 4th order channel combiner

Mechanical & Environmental Specifications

Order of the bandpass filters	2	3	4
Dimensions DP12-440 (W x D x H)	1055 x 980 x 1653 mm	1055 x 1440 x 1653 mm	1055 x 1900 x 1653 mm
Dimensions DP12-450 (W x D x H)	1055 x 990 x 1698 mm	1055 x 1450 x 1698 mm	1055 x 1910 x 1698 mm
Materials	Outer conductor	Aluminium	
	Inner conductor	Silver plated aluminium	
	Tuning elements	INVAR and silver plated aluminium	
	Isolators	PTFE	
	Finishing	Chromatized plating & long lasting black paint	
	Screws	Stainless steel	
Temperature range	-10°C to +50°C		

RADIO COMBINERS

Optional Accessories

Directional couplers at inputs and output
Unflanged to flanged adapters at inputs and output
Bandpass filter on wideband input (2)

NOTES:

(1): Each model can achieve a narrower channel spacing than the one specified, by sacrificing the transmission response figures. 0.5 MHz spacing available with 4th order and inter-cavity feedback.

(2): The use of an extra filter connected to the wideband input enhances the isolation between inputs, thus reducing the possible generation of inter-mod products.

The combiner can be field returned to any frequency within specified band

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FM band II channel combiner
Typical power: 30 + 110 kW
Constant impedance diplexer
Model: DP12-470

Electrical Specifications

Order of the bandpass filters	2	3	4
Frequency range	87.5-108 MHz		
Type	Constant impedance		
Impedance	50 Ohm		
Recommended minimum freq. spacing (1)	1.2 MHz	0.9 MHz	0.7 MHz
Max. power handling (NB/WB/Output)	30/140/140 kW		
Input connectors (NB/WB)	Unflanged 3 1/8" / Flanged 6 1/8"		
Output connector	Flanged 6 1/8"		
VSWR	Narrowband input	≤ 1.05:1 at carrier fc	
	Wideband input	≤ 1.10:1	
Insertion loss	Narrowband input	≤0.20dB(fc)	≤0.26dB(fc) ≤0.32dB(fc)
	Wideband input	≤ 0.1 dB	
Isolation	NB input to WB input	≥ 40 dB	
	WB input to NB input	≥ 50 dB	
Group delay at fc ± 150 kHz	≤ 50 ns	≤ 80 ns	≤ 100 ns
Thermoswitch at EQ load	Yes		

Mechanical & Environmental Specifications

Order of the bandpass filters	2	3	4
Dimensions (W x D x H)	1070 x 1085 x 1890 mm	1070 x 1545 x 1890 mm	1070 x 2005 x 1890 mm
Materials	Outer conductor	Aluminium	
	Inner conductor	Silver plated aluminium	
	Tuning elements	Invar and silver plated aluminium	
	Isolators	PTFE	
	Finishing	Chromatized plating & long lasting black paint	
	Screws	Stainless steel	
Temperature range	-10°C to +50°C		

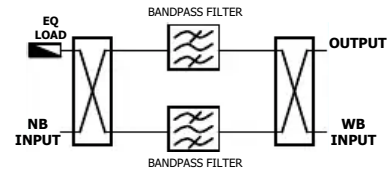
Optional Accessories

Directional couplers at inputs and output
Unflanged to flanged adapters at inputs and output
Bandpass filter on wideband input (2)

The combiner can be field returned to any frequency within specified band



DP12-470 2nd order channel combiner



CONSTANT IMPEDANCE CONFIGURATION

NOTES:

- (1): Each model can achieve a narrower channel spacing than the one specified, by sacrificing the transmission response figures. 0.5 MHz spacing available with 4th order and inter-cavity feedback.
- (2): The use of an extra filter connected to the wideband input enhances the isolation between inputs, thus reducing the possible generation of inter-mod products.

RADIO COMBINERS

FM band II channel combiner
Typical Power: 30 + 270 kW
Constant impedance diplexer
Model: DP12-680

Electrical Specifications

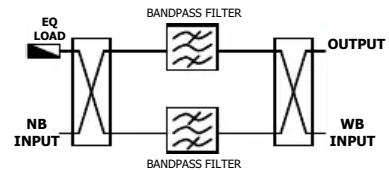
Order of the bandpass filters	2	3	4
Frequency range	87.5-108 MHz		
Type	Constant impedance		
Impedance	50 Ohm		
Recommended minimum freq. spacing (1)	1.2 MHz	0.9 MHz	0.7 MHz
Max. power handling (NB/WB/Output)	30/300/300 kW		
Input connectors (NB/WB)	Unflanged 3 1/8" / Flanged 9 3/16"		
Output connector	Flanged 9 3/16"		
VSWR	Narrowband input	≤ 1.05:1 at carrier fc	
	Wideband input	≤ 1.10:1	
Insertion loss	Narrowband input	≤ 0.18dB(fc)	≤ 0.25dB(fc) ≤ 0.34dB(fc)
	Wideband input	≤ 0.1 dB	
Isolation	NB input to WB input	≥ 40 dB	
	WB input to NB input	≥ 50 dB	
Group delay at fc ± 150 kHz	≤ 50 ns	≤ 80 ns	≤ 100 ns
Thermoswitch at EQ load	Yes		



DP12-680 4th order channel combiner, with inter-cavity feedback to increase selectivity

Mechanical & Environmental Specifications

Order of the bandpass filters	2	3	4
Dimensions (W x D x H)	1430 x 1525 x 2150 mm	1430 x 2050 x 2150 mm	1430 x 2640 x 2150 mm
Materials	Outer conductor	Aluminium	
	Inner conductor	Silver plated aluminium	
	Tuning elements	Invar and silver plated aluminium	
	Isolators	PTFE	
	Finishing	Chromatized plating & long lasting black paint	
	Screws	Stainless steel	
Temperature range	-10°C to +50°C		



CONSTANT IMPEDANCE CONFIGURATION

Optional Accessories

Directional couplers at inputs and output
Unflanged to flanged adapters at inputs and output
Bandpass filter on wideband input (2)

The combiner can be field returned to any frequency within specified band

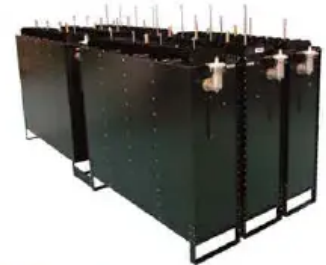
NOTES:

- (1): Each model can achieve a narrower channel spacing than the one specified, by sacrificing the transmission response figures. 0.5 MHz spacing available with 4th order and inter-cavity feedback.
- (2): The use of an extra filter connected to the wideband input enhances the isolation between inputs, thus reducing the possible generation of inter-mod products.

RADIO COMBINERS

FM band II channel combiner Typical power: 2, 5, 10 kW per input Star-point combiner

Technical Specifications	
Order of the bandpass filters	2, 3 and 4
Frequency range	87.5-108 MHz
Type	Star-point
Impedance	50 Ohm
VSWR	≤ 1.10:1 at carrier fc
Insertion loss	See table below
Isolation between inputs	≥ 32 dB
Connectors	Unflanged except on DIN 7/16 (see table below)
Temperature range	-10°C to +50°C



HS12-A40-40 Star-point 4 poles channel combiner

Models										
Max. power per input ⁽¹⁾	Input connectors	Output connector	No. of inputs	Model	Filter order	Freq. spacing ⁽²⁾	Insertion loss at fc	Dimensions Width x Depth x Height		
2 kW	DIN 7/16 F or EIA 7/8"	Unflanged 1 5/8"	2	DS12-203-20	2	≥ 2.6 MHz	≤0.35 dB	495 x 460 x 1250 mm		
				DS12-203-30	3	≥ 1.5 MHz	≤0.55 dB	495 x 660 x 1250 mm		
				DS12-203-40	4	≥ 1.2 MHz	≤0.75 dB	495 x 860 x 1250 mm		
			3	TS12-204-20	2	≥ 2.6 MHz	≤0.35 dB	726 x 460 x 1250 mm		
				TS12-204-30	3	≥ 1.5 MHz	≤0.55 dB	726 x 660 x 1250 mm		
				TS12-204-40	4	≥ 1.2 MHz	≤0.75 dB	726 x 860 x 1250 mm		
				4	XS12-204-20	2	≥ 2.6 MHz	≤0.35 dB	1090 x 495 x 1250 mm	
					XS12-204-30	3	≥ 1.5 MHz	≤0.55 dB	1490 x 495 x 1250 mm	
					XS12-204-40	4	≥ 1.2 MHz	≤0.75 dB	1890 x 495 x 1250 mm	
5 kW	Unflanged 1 5/8"	Unflanged 1 5/8"	2	DS12-A30-20	2	≥ 2.2 MHz	≤0.30 dB	815 x 700 x 1400 mm		
				DS12-A30-30	3	≥ 1.4 MHz	≤0.45 dB	815 x 1050 x 1400 mm		
				DS12-A30-40	4	≥ 1.0 MHz	≤0.60 dB	780 x 1650 x 1400 mm		
		3	TS12-A40-20	2	≥ 2.2 MHz	≤0.30 dB	1170 x 700 x 1400 mm			
			TS12-A40-30	3	≥ 1.4 MHz	≤0.45 dB	1170 x 1050 x 1400 mm			
			TS12-A40-40	4	≥ 1.0 MHz	≤0.60 dB	1150 x 1650 x 1400 mm			
		4	XS12-A40-20	2	≥ 2.2 MHz	≤0.30 dB	815 x 1400 x 1400 mm			
			XS12-A40-30	3	≥ 1.4 MHz	≤0.45 dB	815 x 2100 x 1400 mm			
			XS12-A40-40	4	≥ 1.0 MHz	≤0.60 dB	730 x 3300 x 1400 mm			
		6	Unflanged 3 1/8"	HS12-A40-20	2	≥ 2.2 MHz	≤0.30 dB	815 x 2120 x 1400 mm		
				HS12-A40-30	3	≥ 1.4 MHz	≤0.45 dB	815 x 3160 x 1400 mm		
				HS12-A40-40	4	≥ 1.0 MHz	≤0.60 dB	1090 x 3300 x 1400 mm		
10 kW	Unflanged 1 5/8"	Unflanged 3 1/8"	2	DS12-430-20	2	≥ 2.0 MHz	≤0.20 dB	970 x 985 x 1350 mm		
				DS12-430-30	3	≥ 1.2 MHz	≤0.30 dB	970 x 1450 x 1350 mm		
				DS12-430-40	4	≥ 0.9 MHz	≤0.40 dB	970 x 1910 x 1350 mm		
			3	TS12-430-20	2	≥ 2.0 MHz	≤0.20 dB	1490 x 985 x 1350 mm		
				TS12-430-30	3	≥ 1.2 MHz	≤0.30 dB	1490 x 1450 x 1350 mm		
				TS12-430-40	4	≥ 0.9 MHz	≤0.40 dB	1490 x 1910 x 1350 mm		
			4	XS12-430-20	2	≥ 2.0 MHz	≤0.20 dB	970 x 1975 x 1350 mm		
				XS12-430-30	3	≥ 1.2 MHz	≤0.30 dB	970 x 2895 x 1350 mm		
				XS12-430-40	4	≥ 0.9 MHz	≤0.40 dB	970 x 3820 x 1350 mm		



XS12-204 using a mixed configuration of 2nd and 3rd order filters

RADIO COMBINERS

Optional Accessories	
Directional couplers at inputs and output	
Unflanged to flanged adapters at inputs and outputs	

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RF passive components and accessories

RYMSA RF manufactures an assorted range of 50 ohm passive components and accessories which complement the wide range of solutions for radio and TV antenna systems, filters and channel combiners, enabling the supply of complete turnkey RF systems including any possible element existing beyond the transmitter outputs at the broadcast transmission facilities.

RYMSA RF passive components and accessories can be classified in the following categories:

- Rigid transmission line of several sizes for the interconnection of RF systems, including the inner and outer conductor tubes and the basic associated accessories:
 - Unflanged elbows
 - Inner and outer coupling elements
 - Typical adapters
- Accessories and components for antenna systems:
 - Connectors for coaxial cables
 - Gas Barriers
 - Outdoor fine matchers
 - Outdoor flanged elbows
- Accessories for indoor equipments:
 - Indoor fine matchers
 - Measurement couplers
 - 3 dB hybrids
- Switch devices:
 - Manual patch panels
 - Motorized coaxial switches
 - Patch panel / dividers
 - Coaxial switch / dividers

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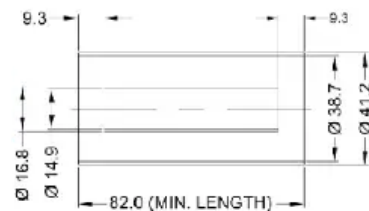
1 5/8" Transmission line

RYMSA RF supplies 50 Ohm unflanged 1 5/8" rigid line sections for indoor applications. The inner conductor is made in copper, and the outer conductor can be supplied either made in aluminium or in copper. Crossed isolators made of two PTFE rods are available to achieve the alignment between the two conductors, ensuring minimum VSWR contribution to the line performance by applying the relative spacing directions supplied below.

RYMSA RF also manufactures the related rigid coaxial accessories such as rigid line coupling elements, devoted to enable the connection between sections of unflanged rigid line, PTFE crossed isolators, coupling elements, unflanged elbows, inner connectors and unflanged to flanged adapters.

Both the rigid line and the corresponding accessories are manufactured optimizing the VSWR and insertion loss values.

Rigid line conductors											
Frequency range	DC-3260 MHz										
Impedance	50 Ohm										
Maximum power handling ⁽¹⁾	<table border="1"> <tr> <td>70 MHz</td> <td>100 MHz</td> <td>200 MHz</td> <td>500 MHz</td> <td>800 MHz</td> </tr> <tr> <td>19.0 KW</td> <td>16.0 KW</td> <td>11.3 KW</td> <td>7.2 KW</td> <td>5.7 KW</td> </tr> </table>	70 MHz	100 MHz	200 MHz	500 MHz	800 MHz	19.0 KW	16.0 KW	11.3 KW	7.2 KW	5.7 KW
70 MHz	100 MHz	200 MHz	500 MHz	800 MHz							
19.0 KW	16.0 KW	11.3 KW	7.2 KW	5.7 KW							
RF Peak Voltage at sea level	5.2 KV										
Insertion loss (dB/100m) ⁽²⁾	<table border="1"> <tr> <td>70 MHz</td> <td>100 MHz</td> <td>200 MHz</td> <td>500 MHz</td> <td>800 MHz</td> </tr> <tr> <td>0.51</td> <td>0.61</td> <td>0.90</td> <td>1.37</td> <td>1.74</td> </tr> </table>	70 MHz	100 MHz	200 MHz	500 MHz	800 MHz	0.51	0.61	0.90	1.37	1.74
70 MHz	100 MHz	200 MHz	500 MHz	800 MHz							
0.51	0.61	0.90	1.37	1.74							
Maximum Length section	5 m										
Materials	<table border="1"> <tr> <td>Outer conductor</td> <td>Aluminium or copper</td> </tr> <tr> <td>Inner conductor</td> <td>Copper</td> </tr> </table>	Outer conductor	Aluminium or copper	Inner conductor	Copper						
Outer conductor	Aluminium or copper										
Inner conductor	Copper										
Temperature range	-10°C to +50°C										



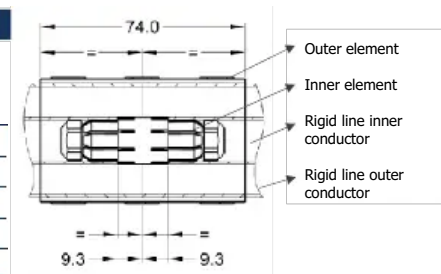
Line Size	Conductor	Material	Reference
1 5/8"	Inner	Copper	1123105800
1 5/8"	Outer	Copper	1123114100
1 5/8"	Outer	Aluminium	1253105800

⁽¹⁾ This value is referred to ambient temperature of +40°C and VSWR 1.0
⁽²⁾ This value is referred to ambient temperature of +20°C

Unflanged coupling elements

These elements enable the connection between two unflanged rigid line sections

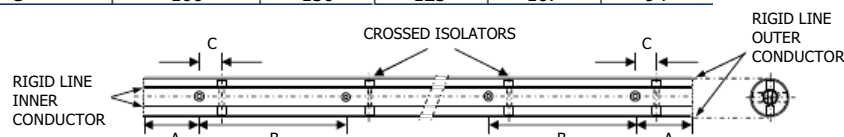
Model	Description
LR22-570 / 5013	1 5/8" unflanged inner coupling element
LR22-473 / 5019	1 5/8" unflanged outer coupling element for Al line
LR22-473 / 5074	1 5/8" unflanged outer coupling element for Cu line



Crossed isolators

These elements enable the alignment between the two conductors ensuring minimum VSWR

Model LR22-090	VHF (BI/II/III)	500 MHz	600 MHz	700 MHz	800 MHz
A	350	350	350	350	350
B	1200	1200	1200	1200	1200
C	100	150	125	107	94



NOTE: INNER CONDUCTOR HAS TO BE DRILLED WITH THE TOOL COMPOSED BY THE PIECES CQ 3036 003 0 AND CQ 3036 004 0

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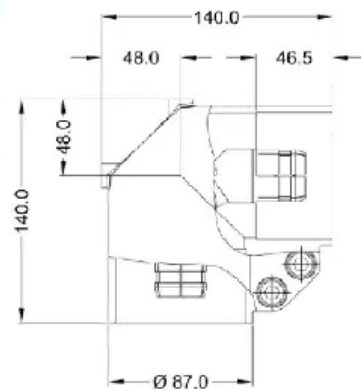
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Unflanged elbow

This element enables a direct connection to the rigid line conductor without using additional coupling elements

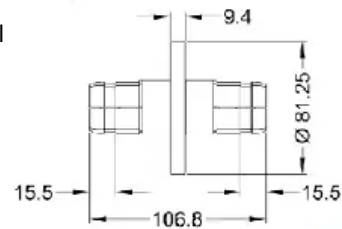
Model	CD24-010	
Frequency range	DC-862 MHz	
Impedance	50 Ohm	
VSWR	<1.03:1	
Insertion loss	Negligible	
Max. Power and voltage	According to line size	
Materials	Outer conductor	Aluminium
	Inner conductor	Brass
	Isolator	PTFE
	Finishing	Chromatized plating
Temperature range	-10°C to +50°C	



Inner connector

This element enables the connection between two standard EIA flanged coaxial transmission line terminations.

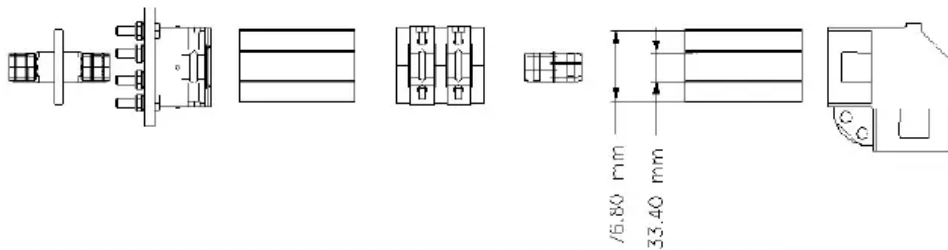
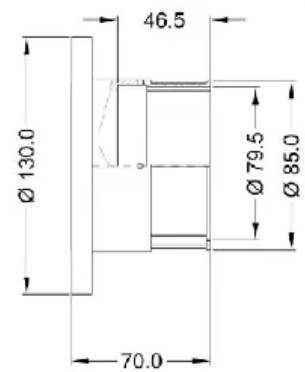
Model	LR24-600	
Max. Power and voltage	According to line size	
Materials	Conductor	Brass
	Isolator	PTFE
	Finishing	White brass
Temperature range	-10°C to +50°C	



Unflanged to flange adaptor

This element enables a standard flanged EIA termination to an unflanged rigid line section

Model	TR24-125	
Frequency range	DC-862 MHz	
Impedance	50 Ohm	
VSWR	<1.03:1	
Insertion loss	Negligible	
Max. Power and voltage	According to line size	
Materials	Outer Conductor	Aluminium
	Finishing	Chromatized plating
Temperature range	-10°C to +50°C	



Assembling diagram for 3 1/8" elements

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4 1/2" Transmission line

RYMSA RF supplies 50 Ohm unflanged 4 1/2" rigid line sections for indoor applications. The inner conductor is made in copper, and the outer conductor is made in aluminium. Crossed isolators made of two PTFE rods are available to achieve the alignment between the two conductors, ensuring minimum VSWR contribution to the line performance by applying the relative spacing directions supplied below.

RYMSA RF also manufactures the related rigid coaxial accessories such as rigid line coupling elements, devoted to enable the connection between sections of unflanged rigid line, PTFE cross isolators, coupling elements, unflanged elbows, inner and adapters.

Both the rigid line and the corresponding accessories are manufactured optimizing the VSWR and insertion loss values.

Rigid line conductors

Frequency range	DC-1226 MHz				
Impedance	50 Ohm				
Maximum power handling ⁽¹⁾	70 MHz	100 MHz	200 MHz	500 MHz	800 MHz
	105 KW	87.8 KW	62.1 KW	39.3 KW	31.0 KW
RF Peak Voltage at sea level	12.5 KV				
Insertion loss (dB/100m) ⁽²⁾	70 MHz	100 MHz	200 MHz	500 MHz	800 MHz
	0.19	0.23	0.33	0.52	0.65
Maximum Length section	5 m				
Materials	Outer conductor		Aluminium		
	Inner conductor		Copper		
Temperature range	-10°C to +50°C				

Line Size	Conductor	Material	Reference
4 1/2"	Inner	Copper	1123114120
4 1/2"	Outer	Aluminium	1253111300

⁽¹⁾ This value is referred to ambient temperature of +40°C and VSWR 1.0
⁽²⁾ This value is referred to ambient temperature of +20°C

⁽³⁾Unflanged Coupling Elements

These elements enable the connection between two unflanged rigid line sections

Model	Description	
LR30-570 / 5157	4 1/2" unflanged inner coupling element	Outer element
LR30-473 / 5151	4 1/2" unflanged outer coupling element	Inner element
		Rigid line inner conductor
		Rigid line outer conductor

Crossed Isolators

These elements enable the alignment between the two conductors ensuring minimum VSWR

Model LR30-090	VHF (BI/II/III)	500 MHz	600 MHz	700 MHz	800 MHz
A	500	500	500	500	500
B	2000	2000	2000	2000	2000
C	100	150	125	107	94

NOTE: INNER CONDUCTOR HAS TO BE DRILLED WITH THE TOOL COMPOSED BY THE PIECES CQ 3036 003 0 AND CQ 3036 004 0

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Unflanged elbow

This element enables a direct connection to the rigid line conductor without using additional coupling elements

Model	CD30-010
Frequency range	DC-862 MHz
Impedance	50 Ohm
VSWR	<1.03:1
Insertion loss	Negligible
Max. Power and voltage	According to line size
Materials	
Outer conductor	Aluminium
Inner conductor	Brass
Isolator	PTFE
Finishing	Chromatized aluminium
Temperature range	-10°C to +50°C

Inner connector

This element enables the connection between two standard EIA flanged coaxial transmission line terminations

Model	LR30-600
Max. Power and voltage	According to line size
Materials	
Conductor	Brass
Isolator	PTFE
Finishing	White brass
Temperature range	-10°C to +50°C

Unflanged to flange adaptor

This element provides a standard flanged EIA termination to an unflanged rigid line section

Model	TR30-131
Frequency range	DC-862 MHz
Impedance	50 Ohm
VSWR	<1.03:1
Insertion loss	Negligible
Max. Power and voltage	According to line size
Materials	
Outer Conductor	Aluminium
Finishing	Chromatized plating
Temperature range	-10°C to +50°C

Assembling diagram for 4 1/2" elements

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6 1/8" Transmission line

RYMSA RF supplies 50 Ohm unflanged 6 1/8" rigid line sections for indoor applications. The inner conductor is made in copper, and the outer conductor is made in aluminium. Crossed isolators made of two PTFE rods are available to achieve the alignment between the two conductors, ensuring minimum VSWR contribution to the line performance by applying the relative spacing directions supplied below. The outer conductor can be supplied either as such or with a standard EIA flanged factory welded.

RYMSA RF also manufactures the related rigid coaxial accessories such as rigid line coupling elements, devoted to enable the connection between sections of unflanged rigid line, PTFE cross isolators, coupling elements, unflanged elbows, inner and adapters.

Both the rigid line and the corresponding accessories are manufactured optimizing the VSWR and insertion loss values.

Rigid line conductors

Frequency range	DC-830 MHz				
Impedance	50 Ohm				
Maximum power handling ⁽¹⁾	70 MHz 211 KW	100 MHz 176 KW	200 MHz 125 KW	500 MHz 79 KW	800 MHz 62 KW
RF Peak Voltage at sea level	17.9 KV				
Insertion loss (dB/100m) ⁽²⁾	70 MHz 0.13	100 MHz 0.16	200 MHz 0.22	500 MHz 0.35	800 MHz 0.44
Maximum Length section	5 m				
Materials	Outer conductor	Aluminium or copper			
	Inner conductor	Copper			
Temperature range	-10°C to +50°C				

Line Size	Conductor	Material	Reference
6 1/8"	Inner	Copper	1123119450
6 1/8"	Outer	Aluminium	1253112100
6 1/8"	Outer with one welded flanged	Aluminium	LR26-313

⁽¹⁾ This value is referred to ambient temperature of +40°C and VSWR 1.0
⁽²⁾ This value is referred to ambient temperature of +20°C

Flanged Elbow

This element enables a direct connection to a rigid line standard Flanged EIA termination

Model	CD26-200	
Frequency range	DC-830 MHz	
Impedance	50 Ohm	
VSWR	<1.03:1	
Insertion loss	Negligible	
Max. Power and voltage	According to line size	
Materials	Outer conductor	Aluminium
	Inner conductor	Silver plated brass
	Isolator	PTFE
	Finishing	Chromatized plating
Temperature range	-10°C to +50°C	

RF PASSIVE COMPONENTS & ACCESSORIES

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Coaxial switch / divider For dual feed line antenna systems

These devices basically consist of two motorized coaxial switches and one divider, and they are widely utilized on antenna systems fed by two feeder lines.

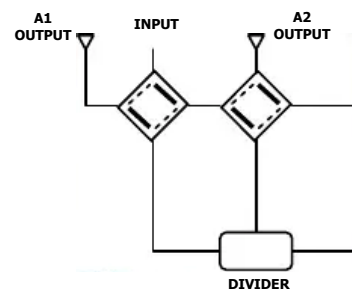
The mentioned elements are presented in a unitised frame, interconnected in a way that enables the three operative configurations of the antenna system by means of the proper selection of the coaxial switch positions: either the total system working or each of the two half sections separately.

A control unit is included to govern the states of the switches and to supply the necessary interlock service.

The control and supervision of the coaxial switch / divider is done by means of a front panel with buttons and LED displays showing the current antenna configuration, and it also can be done by use of the remote interface.



Electrical Specifications	
Impedance	50 Ohm
Frequency range and bandwidth	See models table
VSWR	TV VHF & FM: < 1.05:1
	TV UHF: < 1.10:1 (A1+A2) < 1.07:1 (A1, A2)
Insertion loss	< 0.1 dB
Amplitude split	TV VHF & FM: - 3 +/- 0.2 dB TV UHF: -3 +/- 0.25 dB
Phase split	0° +/- 2° (TV VHF & FM) 0° +/- 3° (TV UHF)
Input/output connectors	EIA 1 5/8" & 3 1/8": Unf. female EIA 6 1/8": Flanged female
Maximum power handling	According to line size
Motor voltage	220 VAC



COAXIAL SWITCH / DIVIDER CONFIGURATION

Mechanical & Environmental Specifications		
Materials	Outer conductor	Aluminium and brass
	Inner conductor	Silver plated aluminium and copper
	Isolators	PTFE
	Finishing	Chromatized plating and long lasting paint
	Screws	Stainless steel
Temperature range		-10°C to + 50°C

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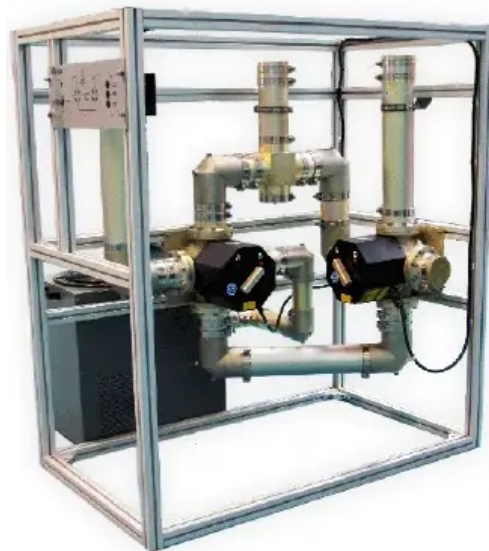
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Coaxial switch / divider For dual feed line antenna systems

Models				
Frequency Range	Coaxial size EIA 1 5/8"	Coaxial size EIA 3 1/8"	Coaxial size EIA 4 1/2"	Coaxial size EIA 6 1/8"
FM BII	CC12-231	CC12-261	CC12-241	CC12-281
TV VHF BIII	CC13-231	CC13-261	CC13-241	CC13-281
DAB VHF BIII	CC14-231	CC14-261	CC14-241	CC14-281
TV UHF BIV-V	CC15-231	CC15-261	CC15-241	-----
470-750 MHz	-----	-----		CC15-281

Optional Accessories
Directional couplers at inputs and output
Adapters at inputs and output



B IV-V 4 1/2" Coaxial Switch /Divider special configuration

RF PASSIVE COMPONENTS & ACCESSORIES

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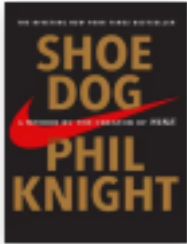


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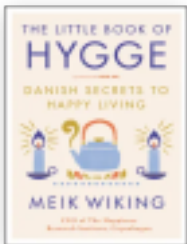
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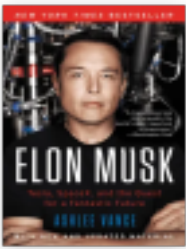
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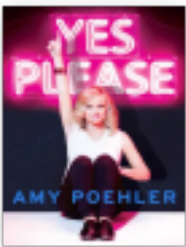
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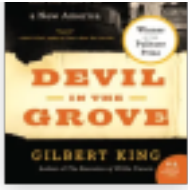
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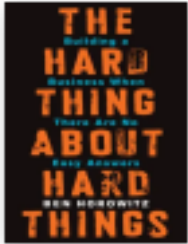


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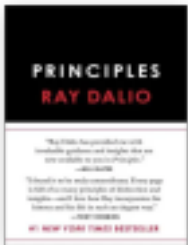
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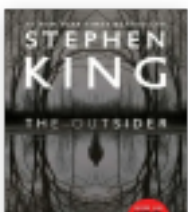
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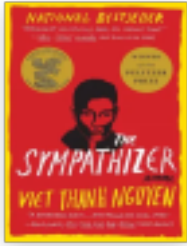
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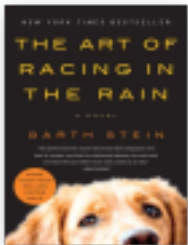
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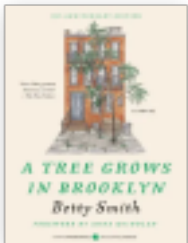
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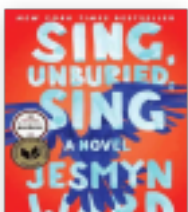
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TIÊU CHUẨN THIẾT KẾ-All-in-Electrical-Design

Anh Nho



Ece-V-microwaves and Radar Notes

Rethumon Rethu



bt1.0

Synthesis movie clip or all video or



Ewdes Hernandez



Harmony XB5_XB5AS9442.pdf

imsayaa



Wang 2016

Arjun



Tutorial 2.pdf

Yong Yee



Minor Project-Silicon Nanowire Solar Cell

Aparajita Mallick Sarkar



USB-FBLMCB User's Manual

Zeljko Krivokuca



Lg e1942s Chassis Lm12a

malord958



How residential energy storage could help support the power grid - McKinsey - March 2019.pdf

Sergey Varnavskiy



Cable - Awg & Mm

marolopsitohang



Matlab Simulation

Donatus Ogalue



GID 208 ME GAF DS 50322 Raw Water Motor Datasheet R2 Cat 2

Santoshkumar Gupta



WIEN'S BRIDGE OSCILLATOR USING OP-AMP

gcn575



WPS ISO 15609 Template

Satish Keskar



Science-Grade-8.-ACTIVITIES-in-Science-BNHS

Kenneth Cruz



copeland-cr42k6-pfv- recip-compressor-technical specifications

carlosmochima



AC Saveris Wireless Probes Datasheet

esterbuttercup



Abstract

Shairaj Shaha



Keron Trotz



DRM163.pdf

Andres Baena Zuluaga



EC 1 notes.pdf

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